

Industrial Computer Products

Data Acquisition Systems

# ET-7x00/PET-7x00 Series

# <complex-block>

ET-7000/ET-7200 Series (Ethernet I/O)



**User Manual** 

PET-7000/PET-7200 Series (PoE I/O)

> Author: Liam Lin Editor: Janice Hong

### Warranty

All products manufactured by ICP DAS are under warranty regarding defective materials for one year, beginning from the date of delivery to the original purchaser.

### Warning

ICP DAS assumes no liability for any damage resulting from 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 any infringements of patents or other rights of third parties resulting from its use.

### Copyright

Copyright © 2014 by ICP DAS CO., LTD. All rights are reserved.

### Trademarks

The names are used for identification purposes only and may be registered trademarks of their respective companies.

### **Contact Us**

If you have any problems, please feel free to contact us. You can count on us for a quick response.

Email: <a href="mailto:service@icpdas.com">service@icpdas.com</a>

# **Revision History**

The table below shows the revision history.

Revision	Date	Description
1.1.5	Apr. 2025	<ul> <li>Add Section 3.2.3 (H) Low-Pass Filter</li> </ul>
1.1.4	May. 2024	<ul> <li>Since FW3.11 (or later), the factory defaults for ID or password are not supported. Users need to create them during their initial login. Refer to <u>Section 3.3</u> for the updated information on Authentication.</li> <li>Since FW3.11 (or later), a maintenance feature has been added that enables users to export/import configurations, making bulk module configuration easier. Refer to <u>Section 3.6</u> for an explanation of Maintenance.</li> </ul>
1.1.3	Jun. 2023	<ul> <li>Add Section 3.2.3-(F) NTC Thermistor Temperature Settings - User Defined Type</li> </ul>
	Oct. 2022	<ul> <li>Add chapters         <ol> <li>Add pictures for AO, DI, DO</li> <li>Companion the provided the formation the formation Value</li> </ol> </li> <li>Remove chapters         <ol> <li>Companion CD</li> <li>Enabling the Adobe Flash Player in Your Browser</li> <li>Data Encoding</li> <li>Data Model</li> <li>Appendix A. Node Information Area</li> <li>Appendix B. Thermocouple</li> </ol> </li> <li>Change the Title         <ol> <li>Modbus TCP/IP Message Format</li> <li>Function Code</li> </ol> </li> </ul>
1.1.2	Feb. 2014	<ul> <li>Added product information for the ET-7200/PET-7200 in each section of the manual.</li> </ul>
1.1.1	Apr. 2013	<ul> <li>Added the tip about selecting the input/output range of each analog input/output channel in section 3.2.3. (D) Analog Output Settings and 3.2.3. (E) Analog Input Settings.</li> </ul>
1.1.0	Feb. 2013	<ul> <li>Added the I/O configuration instructions in section 2.7. Configuring the I/O Functions.</li> </ul>
1.0.1	Dec. 2011	Initial issue

# **Table of Contents**

Chapter 1.	Introduction	7
1.1. Feat	tures	9
1.2. Ove	rview1	2
1.3. Dim	ensions1	5
Chapter 2.	Getting Started1	7
2.1. Mou	unting the ET-7x00/PET-7x001	8
2.2. Con	figuring the Boot Mode1	9
2.3. ET-7	x00/PET-7x00 Hardware Connections2	0
2.4. Insta	alling the MiniOS7 Utility2	2
2.5. Usin	ng the MiniOS7 Utility to Assign an IP Address2	3
2.6. Con	figuring the I/O Functions2	6
Chapter 3.	Web Applications3	0
3.1. Ove	rview3	2
3.2. Con	figuration3	3
3.2.1.	Network Settings3	4
3.2.2.	Basic Settings3	5
3.2.3.	Module I/O Settings4	4
3.3. Autl	hentication5	9
3.3.1.	Account Management6	0
3.3.2.	Accessible IP Settings6	3
3.4. Web	o HMI6	4
3.4.1.	Web HMI6	5
3.4.2.	Web Edit6	7
3.5. I/O	Pair Connection7	6
3.5.1.	Example 1: Pair Connection - AI to AO7	9

3.5.2	Example 2: Pair Connection - DI to DO84
3.6. M	aintenance
3.7. M	ore Information92
Chapter 4	l. Modbus TCP/IP
4.1. M	odbus TCP/IP Message Format93
4.2. Fu	inction Code96
4.2.1	01 (0x01) Read Coils96
4.2.2	02 (0x02) Read Discrete Inputs97
4.2.3	03 (0x03) Read Holding Registers98
4.2.4	04 (0x04) Read Inputs Registers99
4.2.5	05 (0x05) Write Single Coil 100
4.2.6	06 (0x06) Write Single Register 101
4.2.7	15 (0x0F) Write Multiple Coils102
4.2.8	16 (0x10) Write Multiple Registers 103
4.3. M	odbus Master Simulators 104
4.3.1	Modbus/TCP Client 104
4.3.2	Modbus Master Tool107
4.4. M	odbus Demo Programs 110
Chapter !	5. Calibration 111
5.1. Vo	oltage and Current Calibration111
5.2. Tł	nermocouple Calibration116
5.3. R <sup>-</sup>	D Calibration117
5.4. Re	ecover Calibration to the Factory Setting119
Chapter (	5. MiniOS7 Utility Tools 120
6.1. Es	tablishing a Connection120
6.2. E>	changing the Protocol (TCP/IP to UDP)123
6.3. U	odating the ET-7x00/PET-7x00 OS124

6.3.1. Using the MiniOS7 Utility 124
6.3.2. Using the 7188EU.exe and Command Line128
6.4. Updating the ET-7x00/PET-7x00 Firmware130
Chapter 7. SCADA and System Integration Tools
7.1. LabVIEW
7.2. OPC Server
7.3. SCADA
7.3.1. InduSoft
7.3.2. Citect
7.3.3. iFix
Appendix A Description of I/O Functions
A.1. Dual Watchdog139
A.2. Power-on Value
A.3. Safe Value142
A.4. Al High/Low Alarm 144
A.5. Al High/Low Latch 149
Appendix B Analog Input Type and Data Format Table
Appendix C Analog Output Type and Data Format Table
Appendix D Convert Modbus Data to the Actual Value
Appendix E Network Address Translation 159
Appendix F Troubleshooting 161

# **Chapter 1. Introduction**

The ET-7200/PET-7200 series is a kind of Ethernet I/O module, including Analog Input/Output, Digital Input/Output, Power Relay, Thermocouple, and RTD modules. The ET-7200/PET-7200 series provides full networking capabilities, and a variety of I/O functions, together with web-based Ethernet I/O monitoring and control modules, meaning that the modules can be remotely controlled using the Modbus TCP/UDP protocol via a 10/100 M Ethernet network.

Modbus has become the de facto standard protocol for industrial communication and is now the most commonly available means of connecting industrial electronic devices. This ensures that the ET-7200/PET-7200 series provides perfect integration with HMI, SCADA, PLC, and other industrial control software systems.



Visit the ET-7000/ET-7200 selection guide page to choose the desired modules.

### Analog I/O Modules:

https://www.icpdas.com/en/product/guide+Remote\_I\_O\_Module\_and\_Unit+Ethernet I O Modules+ET-7000#650

### Digital I/O Modules:

https://www.icpdas.com/en/product/guide+Remote\_\_I\_O\_\_Module\_\_and\_\_Unit+Ethernet \_\_I\_O\_\_Modules+ET-7000#652

### Encoder/Frequency/Counter:

https://www.icpdas.com/en/product/guide+Remote\_\_I\_O\_\_Module\_\_and\_\_Unit+Ethernet\_\_I\_ O Modules+ET-7000#654

## Comparison between (P)ET-7000 and (P)ET-7200 Series

### The PET-7x00 has some unique features that are different from the ET-7x00

Model	ET-7000	<b>PET-7000</b>	ET-7200	<b>PET-7200</b>			
Software							
Embedded Web Server	Yes						
Web HMI	Yes						
I/O Pair Connection		Yes					
CPU Module							
Dual Watchdog	Module, Communication (Programmable)						
Ethernet							
Ports	1 x RJ-45, 10/2	LOOM Base-TX	2 x RJ-45, 2 Swit	LO/100 Base-TX, tch Ports			
Security		ID, Password, a	nd IP Filter				
Protocol		Modbus TCP and	Modbus UDP				
LED Indicators							
System Operation		Yes					
Ethernet Link/Activity		Yes					
I/O Status	-	-		Yes			
Power							
Reverse Polarity Protection		Yes					
Powered from PoE	-	Yes	-	Yes			
Powered from Terminal Block	+10 ~ +30 VDC	+12 ~ +48 VDC	+12 ^	~ +48 VDC			
Power Inputs	One	pair	Two pairs				
Mechanical							
Dimensions (mm)	72 x 123 x 35 (W x L x H) 76 x 120 x 38 (W x L x H)						
Other							
Reset Button	-	-		Yes			

# 1.1. Features

### **Power over Ethernet (PoE)**

The **PET**-7x00 series module features true IEEE802.3af-compliant (classification, Class 1) PoE technology that allows both power and data to be carried over a single Ethernet cable, meaning that a device can operate solely from the power it receives through the data cable. This also eliminates the need for additional wiring and power supply.



### **Daisy-Chain Ethernet Cabling**

The **ET-7200/PET-7200** series 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.



**LAN Bypass** 



The **ET-7200/PET-7200** series modules provide a LAN bypass feature that guarantees Ethernet communication. It will automatically activate to continue the network traffic when the module loses its power.

### **Communication Security**

To change the settings or monitor the status of I/O, the account and password are needed when logging into the web server. An IP address filter is also included, which can be used to allow or deny connections with specific IP addresses.

### Support for both Modbus TCP and Modbus UDP Protocols

The Modbus TCP/UDP slave function Ethernet port can be used to provide data to remote SCADA software.

### Built-in I/O

Various I/O components are mixed with multiple channels in a single I/O module, which provides the most cost-effective I/O usage and enhances the performance of I/O operations.

### **Dual Watchdog**

The Dual Watchdog consists of a Module Watchdog and a Communication Watchdog. The action of AO and DO is also associated with the Dual Watchdog.

<u>Module Watchdog</u> is a built-in hardware circuit to monitor the operation of the module and will reset the CPU if a failure occurs in the hardware or the software. Then the Power-on Value of AO and DO will be loaded.

<u>Communication Watchdog</u> is a software function to monitor the communication between the host and the I/O module. The timeout of the communication Watchdog is programmable, when the I/O doesn't receive commands from the host for a while, the watchdog forces the AO and DO to pre-programmed the Safe Value to prevent unpredictable damage to the connected devices.

### **Highly Reliable Under Harsh Environment**

Wide Operating Temperature Range: -25 ~ +75°C Storage Temperature: -30 ~ +80°C Humidity 10 ~ 90% RH (Non-condensing)



### I/O Pair Connection

This function is used to create an AI/DI to AO/DO pair through the Ethernet. Once the configuration is completed, the I/O module can poll the status of remote AI/DI devices and then use the Modbus TCP protocol to continuously write to local AO/DO channels in the background.



### Power-on Value and Safe Value

Besides setting by the set AO and DO commands, the AO and DO can be set under two other conditions.

**<u>Power-on Value</u>**: The Power-on Value will be loaded to the AO or DO on three conditions: Power-on, reset by Module Watchdog and reset by reset command.

<u>Safe Value</u>: When the Communication Watchdog is enabled and a Communication Watchdog timeout occurs, the "safe value" is loaded into the AO, DO.

### **LED indicators for DIO status**

The LED indicators for DIO status are for the ET-7200/PET-7200 series.

### **Reset button**

The reset button is for the ET-7200/PET-7200 series. It is used to clear all data and restore all settings to factory default values. It is very useful especially when you forget the ID, password to log into the web server, or IP address to access the Ethernet I/O module.



### Two pairs of power input pins

For (P)ET-7000 series, there are only two pins for power input. To ease the wiring, the pins are increased to four pins as two pairs for (P)ET-7200 series.

# 1.2. Overview

The front panel of the ET-7x00/PET-7x00 series module contains the Ethernet Port, connectors, and LEDs. Refer to data sheets for specific ET-7x00/PET-7x00 models for details of pin assignments, which can be found at:

https://www.icpdas.com/en/product/guide+Remote\_\_I\_O\_\_Module\_\_and\_\_Unit+Ethernet\_\_I\_ O\_\_Modules+ET-7000



Model	Label	Status	Description
	L1	Flashing	The unit is turned on and is ready for use.
		On	A link has been established on the E1 port.
ET-7000/	L2	Off	No link is established on the E1 port.
PET-7000		Flashing	Data transmission or receiving activity is occurring on the E1 port.
	10	On	The E1 port is operating at 100 Mb/s.
	L3	Off	The E1 port is operating at 10 Mb/s.
	RUN	Flashing	The unit is turned on and is ready for use.
		On	A link has been established on the E1 port.
FT 7200/	E1	Off	No link is established on the E1 port.
E1-72007		Flashing	Data transmission or receiving activity is occurring on the E1 port.
PE1-7200		On	A link has been established on the E2 port.
	E2	Off	No link is established on the E2 port.
		Flashing	Data transmission or receiving activity is occurring on the E2 port.

The bottom panel of the ET-7x00/PET-7x00 module contains the Ethernet port and the reset button. Note that the PoE function is only for PET-7000 and PET-7200.



### Reset button (for ET-7200/PET-7200 series modules only)

The reset button is used to restore the following settings to their factory defaults by pressing and holding the reset button for 5 seconds.

- Network Settings
- Authentication
- Web HMI
- Pair Connection

For more information about these settings, refer to section 3.2.2. "Basic Settings - (C)".

The back panel of the ET-7x00/PET-7x00 series module contains the frame ground and the operating mode selector switch.





### **Operating Mode Selector Switch**

### Init Mode:

This mode is used for MiniOS7 configuration.

### Normal Mode:

This mode is used to execute and run firmware.

On the ET-7x00/PET-7x00 series module, the operating mode selector switch should usually be in the Normal position. The switch should only be moved from the **Normal** position to the **Init** position when updating the ET-7x00/PET-7x00 firmware or the OS. Once the update has been completed, ensure that the switch is returned to the Normal position.

### **Frame Ground**

Electronic circuits are constantly vulnerable to Electrostatic Discharge (ESD), which becomes worse in a continental climate area. The ET-7x00/PET-7x00 series features a new design for the frame ground that provides a path for bypassing ESD, allowing enhanced static (ESD) protection capabilities and ensuring that the module is more reliable.

As the figure below, the user can choose one of the frame grounds to provide a better level of protection for the module. These two frame grounds are conductive inside the module. When a DIN-Rail is mounted, it will in contact with the metallic board of the upper F.G., so a ground wire can be connected to either the lower F.G. or to the DIN-Rail.







ET-7200

# 1.3. Dimensions

The following diagrams provide the dimensions of the ET-7x00/PET-7x00 module and can be used as a reference when defining the specifications for any custom enclosures. All dimensions are in millimeters.

### For the ET-7000, PET-7000: 72 x 123 x 35



### For the ET-7200, PET-7200: 76 x 120 x 42











# **Chapter 2. Getting Started**

If you are a new user, begin with this chapter as it includes a guided tour that provides a basic overview of how to install, configure and use the ET-7x00/PET-7x00 module.

https://www.icpdas.com/en/download/show.php?num=2218

Before starting any task, please check the package contents. If any of the following items are either missing or damaged, contact your dealer or distributor.







Quick Start Guide

Before operating the ET-7x00/PET-7x00 module, a basic understanding of the hardware specifications is required, such as the dimensions of the module, the usable input voltage range of the power supply, and the type of communication interfaces.

# 2.1. Mounting the ET-7x00/PET-7x00

The ET-7x00/PET-7x00 module can be mounted by attaching the bottom of the chassis to a DIN-Rail, to the wall, or by piggybacking it to another module.

### **DIN-Rail Mounting**

The ET-7x00/PET-7x00 module includes simple rail clips that can be used to reliably mount it on a standard 35 mm DIN-Rail.

### Mounting the Chassis on a DIN-Rail

1. Hook the upper tab over the upper flange of the DIN-Rail.





2. Tilt the module toward the DIN-Rail until it snaps securely to the rail.

### **Piggyback Mounting**

The ET-7x00/PET-7x00 module has a hole on either side of the casing that can be used for piggyback mounting.



# 2.2. Configuring the Boot Mode

The ET-7x00/PET-7x00 module has two operating modes, which can be determined by the switch mechanism on the chassis.

### Init Mode



Init mode is a way to use MiniOS7 configuration mode.

Tips & Warnings



Init mode is a method to use MiniOS7 configuration mode and update the software. After the update is completed, set the switch to the Normal position.



### Normal Mode



Normal mode is the default mode of operation and the one you will use most of the time. Use this mode for more tasks and configurations. Programs also are executed in this mode.

# 2.3. ET-7x00/PET-7x00 Hardware Connections

ET-7x00/PET-7x00 series modules provide a variety of communication interfaces to suit a range of applications. Below is a description of the configuration for simple applications using the ET-7x00/PET-7x00 when implementing both Non-PoE and PoE solutions.

### Non-PoE

- 1. Connect the PC to the Ethernet Port via the Hub or Switch.
- 2. Connect the positive of the power supply to the terminal marked "(R)+Vs" on the ET-7x00.
- 3. Connect the negative of the power supply to the terminal marked "(B)GND" on the ET-7x00.



### ΡοΕ

- 1. Connect the PC to the Ethernet Port via the PoE Switch.
- 2. Connect the power supply to the PoE Switch, which in turn supplies power to the PET-7x00.



PET-7X00

# 2.4. Installing the MiniOS7 Utility

The MiniOS7 Utility is a useful tool that provides a quick and easy way to update the OS image or the firmware, configure the Ethernet settings, and upload files to the ET-7x00/PET-7x00 from a PC.

### Step 1: Install the MiniOS7 Utility tool



The latest version of the MiniOS7 Utility can be obtained from the ICP DAS website: https://www.icpdas.com/en/product/guide+Software+Development\_\_Tools+MiniOS7

### Step 2: Follow the instructions in the Setup Wizard to complete the installation

After the installation has been completed, a new short cut for the MiniOS7 Utility will be displayed on your desktop.



# 2.5. Using the MiniOS7 Utility to Assign an IP Address

The ET-7x00/PET-7x00 is a web-based device and is configured using a default IP address, meaning that you must first assign a new IP address to the ET-7x00/PET-7x00 before operation.

The factory default IP settings are as follows:

Item	Default
IP Address	192.168.255.1
Subnet Mask	255.255.0.0
Gateway	192.168.0.1

### Step 1: Run the MiniOS7 Utility



🏙 MiniOS7 Utility	Version 3.2.7										×
🔯 File 🌔 Conne	ection 👻 🚸 Command [	Configuration	📑 Tools 🥥	Help	•						
Look in: 📘 MiniOS	67_Utility	💽 🔇 🎓 🖻			Lock in: Disk	٢A	~	]			
Name	Size	Туре	Modified	No	Name			Size			Modified
📙 bin		File Folder	2022/1/:								
FIRMWARE		File Folder	2022/1/:								
🔄 OS_IMAGE		File Folder	2022/17:								
💽 icpdas	1KB	URL File	2022/17:								
🛯 🔄 load232.dll	88KB	DLL File	2007/1/:								
🙀 MiniOS7_Utility.chn	m 1,015KB	CHM File	2009/10								
MiniOS7_Utility.exe	e 2,544KB	EXE File	2015/7/								
MiniOS7_Utility.ini	1KB	INI File	2015/7/								
🔄 uart.dll	56KB	DLL File	2006/12								
unins000.dat	18KB	DAT File	2022/1/:								
🔂 unins000.exe	1,166KB	EXE File	2022/1/:								
<			>								
Connection(F2)	🗐 Upload(F5) 📓 DiskT	ool(F6) 📑 Info(F7)	🗵 Delete(F	8)	🚽 Refresh(F9)	E Conso	ole(F10)	🔤 DOS(F11	)	🖄 Searc	:h(F12)

ook jn: <u>N</u> er Las	w connectio t Connectio	n F n Alt+F	2 2 🔽 🔾 🔊	<b>19</b>			
ame <u>D</u> ise	connect	Ctrl+F	2 J Type				
bin Sea	rch	F1	2 File Folder File Folder				
MiniOS7 Sci	an		/ 🖓 丢		-		×
MiniOS7 Sco <u>Search</u> Type	an <u>C</u> onnect	Dear IP s	etting <u>H</u> elp Exit	Alias	 Mask	Gateway	×
MiniOS7 Sca Search Options Type TCP BroadCast	Econnect	Clear IP s	etting Help Exit	Alias Etherl0		Gateway 192.168.1.1	×
MiniOS7 Sco Search Options Type TCP BroadCast TCP BroadCast	an <u>C</u> onnect IP/Port 192.16 192.16	Clear IP s 8.85.103 8.255.1	etting Help Exit Name DL-302 ET-7255/PET-7255	Alias EtherID	Mask 255.255.0.0 255.255.0.0	Gateway 192.168.1.1 192.168.0.1	× 
MiniOS7 Sci Search Options Type TCP BroadCast TCP BroadCast TCP BroadCast	an <u>Connect</u> IP/Port 192.16 192.16 192.16	Clear IP s 8.85.103 8.255.1 8.79.26	Image: Name         Image: Name           DL-302         E1-7255/PET-7255           E1-7026/PET-7026	Alias EtherlO TEST	Mask 255.255.0.0 255.255.0.0 255.255.0.0	Gateway 192.168.1.1 192.168.0.1 192.168.0.1	× 
MiniOS7 Sci Search Options Type TCP BroadCast TCP BroadCast TCP BroadCast TCP BroadCast TCP BroadCast	an <u>Connect</u> IP/Port 192.16 192.16 192.16 192.16 192.16	Clear IP s 8.85.103 8.255.1 8.79.26 8.12.100	Image: Ward of the second se	Alias EtherIO TEST LED	Mask 255.255.0.0 255.255.0.0 255.255.0.0 255.255.0.0	Gateway 192.168.1.1 192.168.0.1 192.168.0.1 192.168.0.1	×
MiniOS7 Sca Search Options Type TCP BroadCast TCP BroadCast TCP BroadCast TCP BroadCast TCP BroadCast TCP BroadCast	an <u>Connect</u> IP/Port 192.16 192.16 192.16 192.16 192.16 192.16	Clear IP s 8.85.103 8.255.1 8.79.26 8.12.100 8.11.16	Etting     Help     Exit      Name      DL-302      ET-7255/PET-7255      ET-7026/PET-7026      iKAN-124      WP5◊◊◊◊	Alias EtherIO TEST LED PMC-5151	Mask 255.255.0.0 255.255.0.0 255.255.0.0 255.255.0.0 255.255.0.0 255.255.0.0	Gateway 192.168.1.1 192.168.0.1 192.168.0.1 192.168.0.1 192.168.0.1	×

Step 2: Click "Connection > Search" on the menu bar (or press "F12") to search modules

### Step 3: Click the "192.168.255.1" item in the IP/Port field and click the "IP Settings" button

Click the item you want to configure (the default IP= "**192.168.255.1**") and click the "**IP Settings**" button to display the IP Settings dialog box.

🏙 MiniO	S7 Scan			$\frown$					_		×
<u>S</u> earch	)ptions	<b>E</b> onnect	Dea <u>r</u>	Kan IP setting	Pelp	E <u>x</u> it					
Туре		IP/Po	ort	Nar	me		Alias	Mask		Gateway	^
TCP Broad	dCast	192.1	68.85.103	DL·	-302		EtherIO	255.255.0.0		192.168.1	.1
TCP Broad	dCast	192.1	68.255.1	ET·	-7255/PET	-7255		255.255.0.0		192.168.0	.1
TCP Broad	dCast	192.1	68.79.26	ET	-7026/PET	-7026	TEST	255.255.0.0		192.168.1	.1
TCP Broad	dCast	192.1	68.12.100	iKA	N-124		LED	255.255.0.0		192.168.0	.1
TCP Broad	dCast	192.1	68.11.16	WF	°5XXX		PMC-5151	255.255.0.0		192.168.1	.1 🗸
<								•			>
Search don	e.										

### Step 4: Assign a new IP address and then click the "Set" button

In the IP Settings dialog box, you can manually assign an IP Address, Mask Address, Gateway, and Alias, or you can enable the DHCP function to dynamically assign IP addresses. Once the appropriate values have been entered, click the "**Set**" button to save the settings.

	🏙 IP Setting 🛛 🗆 🗙
	Recommend Settings
IP setting	IP: 192.168.255.1
	Mask: 255.255.0.0
	Gateway: 192.168.0.1
	Alias:
	DHCP
	Set Cancel

# Step 5: After rebooting, click the "Connection > Search" (F12) from the menu bar to check the IP settings

After completing the settings, reboot the module and search it by using MiniOS7 Utility to make sure that the IP settings are correct.

🔯 File	Connectio	n 두 🚸 Command	Configuration				
Look jn:	<u>N</u> ew conn <u>L</u> ast Conne	ection F2 ection Alt+F2	💽 🕝 🤌 📂	c .			
Name bin FIRMW	Disconnec Search	t Ctrl+F2	Type File Folder File Folder				
100 🖄	MiniOS7 Scan				—		<
<b>S</b> ea	arch Options	📡 놀 👔 Connect Clea <u>r</u> IP	setting Help E	<b>x</b> it			
T	уре	IP/Port	Name	Alias	Mask	Gateway	^
T	CP BroadCast	192.168.84.62	DL-302	EtherI0	255.255.0.0	192.168.0.1	
T	CP BroadCast	192.168.101.15	DL-302	EtherI0	255.255.0.0	192.168.1.1	
► T	CP BroadCast	192.168.79.55	ET-7255/PET-7255		255.255.0.0	192.168.1.1	
T	CP BroadCast	192.168.12.100	iKAN-124	LED	255.255.0.0	192.168.0.1	$\mathbf{v}$
<						>	
Sear	rch done.						

# 2.6. Configuring the I/O Functions

The ET-7x00/PET-7x00 series provide a web-based configuration interface that allows users to perform module settings and monitor and control the I/O status by using a web browser to log on to the built-in web page. Users do not need to install any utility.



Step 1: Be sure that the switch is set to the "Normal" position and then reboot the module

### Step 2: Open a browser

Use a standard internet browser to view the ET-7x00/PET-7x00 web pages, such as Google Chrome, Mozilla Firefox or Internet Explorer, etc.

### Step 3: Enter the URL address for the ET-7x00/PET-7x00

If you haven't changed the default IP address of the ET-7x00/PET-7x00 module, please refer to section 2.5. "Using the MiniOS7 Utility to Assign an IP Address" to configure it.



### Step 4: Enter your User name and Password

After entering the IP address, the login dialog box will appear, prompting you to enter your user name and password.

				Windows 安全性 X
ltem		Default		iexplore.exe
User name		Admin		伺服器 192.168.79.55 正要求您提供使用者名稱與密碼。
Password		Admin		該伺服器也回報: "ET-7255/PET-7255"。
		<u> </u>		警告:將在不安全的連線上使用基本驗證來傳送您的使用者名稱與 密碼 •
Since firmwar the default us	e vers ernan	ion V3.11 (or lat ne and password	er),	Admin
create them f	or the	ir initial login.		□ 記住我的認證
				確定取消

The factory default user name and password are as follows:

### Step 5: Welcome to the ET-7x00/PET-7x00 web interface

After logging into the ET-7x00/PET-7x00 web interface, the Overview page will be displayed.

CP DAS tp://www.icpdas.com	
Overview	
Configuration +	ET-7255/PET-7255
Authentication +	As Ethernat module that is assumed with 9 divital estants 8 divital
Web HMI +	An Einemet module that is equipped with a digital outputs, a digital inputs and 8 counters.
Pair Connection	Module Information: TEST
More Information	MAC Address: 00:0D:E0:65:ED:D1
	Firmware Version: 3.0.3 (Oct. 29, 2019)
	I/O Version: 1.01
	Ethernet Version: 1.28 (May. 20, 2015)
	Web Server Version: 2.1.1 (Feb. 26, 2016)
	OS Version: 2.3.4 (Nov. 24, 2016)

### **Step 6:** Configure and browse the I/O functions

Expand the "Web HMI" menu and click the "Web HMI" item to set and browse the I/O functions.

Overview		THIS CON	IPUTER		ET-7200	
Configuration +	MAIN			1		
Authentication +		It indic	cates the	e network	connectio	n between
Web HMI	Digital In	your P	C and th	ne module	e is working	g fine.
Web HMI						
Web Edit	Channel No.	Modbus Register	Status	Counter	High Latched	Low Latched
Pair Connection	D10	10000	OFF	-	-	-
More Information	DI1	10001	OFF	-	-	-
	DI2	10002	OFF	-	-	-
	DI3	10003	OFF	-	-	-
	D14	10004	OFF		-	-
	DI5	10005	OFF	-	-	-
	D16	10006	OFF	-	-	-
	DI7	10007	OFF	-	-	-
	Digital O	utputs				
	Channel No.	Modbus Regis	ter S	Status	Action	
	DO0	00000	C	N	OFF	ON
	DO1	00001	C	)FF	OFF	ON
	DO2	00002	C	DFF	OFF	ON
	DO3	00003	c	)FF	OFF	ON
	DO4	00004	C	OFF	OFF	ON
	DO5	00005	c	OFF	OFF	ON
	D06	00006	c	OFF	OFF	ON
	D07	00007	C	OFF	OFF	ON

For more information about the I/O specification, pin assignment, I/O functions, etc. for each ET-7x00/PET-7x00, please refer to "ET7000\_ET7200 Register Table", which can be obtained from: https://www.icpdas.com/en/download/show.php?num=2217

CP DAS Ethernet I/O Modules				ICP DAS Ethernet I/O Modules				
ET-7005/PET	-7005		M	lodbu	s Regis	ter Ta	ble	
			Co	oils (Ox	xxx)			
I/O Specifications		Pin Assignments		Regis DEC	iter HEX	Points	Description	
Thermistor Input Channels	8 (Differential)			00000	0000	4	DO value	
Sensor Type	Precon ST-A3, Fenwell U, YSI L100, YSI L300, YSI L1000, YSI B2252, YSI B3000, YSI B5000, YSI B6000, YSI B10000, YSI H10000, YSI H30000, Llser,defined			00003	0003 00A2 :	8	Clear 1-ch historical Al max. value	
Individual Channel Configuration Resolution	Yes 16-bit	6		00169	00A9	8	Clear 1-ch historical Al min, value	
Sampling Rate Accuracy Zero Drift	10 Samples/Second (Total) +/-0.1% or better +/-20 µV/°C			00201	00C9	1	Reset the I/O settings to the factory default state	
Span Drift Over voltage Protection	*/-25 ppm/°C 110 V <sub>DC</sub> /V <sub>AC</sub>			00233	00E2	1	Reboot module	
Common Mode Rejection Normal Mode Rejection	86 dB 100 dB	83 7 1 1 1 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		00431	01AF	1	Save the DO power-on value to the EEPROM Save the DO safe value to the EEPROM	
Open Wire Detection Digital Output Channels	Yes			00435	0183 :	4	Enable/Disable the DO power-on value function	
Type Sink/Source (NPN/PNP) Max. Load Current	Isolated Open Collector Sink 700 mA/Channel			00438	01B6 0203 :	4	Enable/Disable the DO safe value function	
Overvoltage Protection Overload Protection Short-circuit Protection	60 V <sub>DC</sub> 1.4 A Yes			00595	0253	8	Enable/Disable the Al function	
Power-on Value Safe Value	Yes, Programmable Yes, Programmable			00627	0273	1	Set the temperature scale	
Wire Connections				00631	0277	1	Set the Al data format	
	Therm	istor Input		00632	0278	1	Reset the AI calibration to the factory settings	
	Bx			00634	027A	1	Clear all historical AI max. values	
	Ax			00635	027B 027C	1	Clear all historical AI min. values	
	ON State	ON State		: 00643	: 0283	8	Enable/Disable the AI high alarm function	
Digital Output	Readback as 1	Readback as 0		00668 : 00675	029C : 02A3	8	Enable/Disable the AI low alarm function	
Open Collector (Sink)				00700 : 00707	02BC : 02C3	8	Set the AI high alarm mode	

# Chapter 3. Web Applications

The ET-7x00/PET-7x00 contains an advanced web configuration system that provides users with access to ET-7x00/PET-7x00 applications through a standard web browser.

### Logging into the ET-7x00/PET-7x00 web pages

You can log into the ET-7x00/PET-7x00 web pages from any computer that has Internet access.

### Step 1: Open a browser

Use a standard internet browser to view the ET-7x00/PET-7x00 web pages, such as Mozilla Firefox or Internet Explorer, etc.

### Step 2: Enter the URL address for the ET-7x00/PET-7x00

If you haven't changed the default IP address of the ET-7x00/PET-7x00 module, please refer to section 2.5. "Using the MiniOS7 Utility to Assign an IP Address" to configure it.

### Step 3: Enter your User name and Password

After entering the IP address, the login dialog box will appear, prompting you to enter your user name and password.

The factory default user name and password are as follows:

			Windows 安全性		$\times$
			iexplore.exe		
Item	Default		伺服器 192.168.79.55 正要求您提	供使用者名稱與密碼。	
User name	Admin		該伺服器也回報: "ET-7255/PET-7	255" •	
Password	Admin		警告: 將在不安全的連線上使用基 密碼。	本驗證來傳送您的使用者名稱與	Į
Since firmware vers the default usernan are not supported. create them for the	ion V3.11 (or atone and password Users need to Ir initial login.	er), J	Admin		
			確定	取消	

### Step 4: Welcome to the ET-7x00/PET-7x00 web interface

After logging into the ET-7x00/PET-7x00 web interface, the "Overview" page will be displayed.



# 3.1. Overview

Overview		The "Overview" pa	ge provides a brief introd	uction and	
Configuration	-	explanation of the	module.		
Network Settings					
Basic Settings		The page provides	some basic information	about both	
Module I/O Setting	s	the ET-7x00/PET-7x00 hardware and software.			
Authentication					
Account Managem	ET-	-7005 /	<b>PET-70</b>	)05	
Accessible IP Setti	An Ethorn	ot modulo that is a	auippod with 4 digits		
Web HMI	All Etherno	and 8 and	alog inputs.		
Web HMI		Madala la faces d'acco			
WED THVI		Module Information:			
Web Edit		MAC Address:	00:0D:E0:66:84:2A		
Deia Generation		Firmware Version:	3.1.1 (Sep. 27, 2023)		
Pair Connection		I/O Version:	4.05		
Maintenance		Ethernet Version:	1.29 (Feb. 25, 2019)		
Import / Export Co		Web Server Version:	2.10.4 (Jul. 18, 2023)		
Import/ Export Co		OS Version:	2.4.0 (Nov. 24, 2016)		
More Information					
Logout					

# 3.2. Configuration

The "Configuration" menu includes the following settings:

Overview	
Configuration	_
Network Settings	
Basic Settings	
Module I/O Settings	
Authentication	_
Account Management	
Accessible IP Settings	
Web HMI	_
Web HMI	
Web Edit	
Pair Connection	
Maintenance	_
Import / Export Configuration	
More Information	
Logout	

### **Network Settings:**

Provides access to the **Ethernet Configuration** section which allows you to access the IP settings and check the software version.

### **Basic Settings:**

Provides access to the **Basic Settings** section which allows you to configure the basic information for the web interface. Also, the **Restore All Default Settings** section allows you to reset the module to factory settings.

### Module I/O Settings:

Provides access to **Common Functions, Modbus Definition,** and I/O-related sections, which allows you to configure the I/O settings of the module.

### 3.2.1. Network Settings

The **Network Settings** page provides the **Ethernet Configuration** section that allows you to perform the following functions:

Ethernet Configuration			
Configure: Manually	2		
IP address	Subnet mask	Gateway	
192.168.79.55	255.255.0.0	192.168.1.1	
	SUBMIT		

### ♦ Manual Configuration (Manually):

The user can enter the IP, Mask, and Gateway addresses for the module and then click the **SUBMIT** button to finish the setting.

### IP address:

Each ET-7x00/PET-7x00 on the network must have a unique IP address.

### Subnet mask:

The subnet mask splits the IP address into the host and network addresses, thereby defining which part of the IP address belongs to the device and which part belongs to the network.

### Gateway:

A gateway (or router) can be used to connect local devices to other networks.

### ♦ Dynamic Configuration (Using DHCP):

The Dynamic Host Configuration Protocol (DHCP) is a network application protocol that automatically assigns an IP address to a device. The user can choose **Using DHCP** in the **Configure** drop-down menu and click the **SUBMIT** button to finish the setting.

### 3.2.2. Basic Settings

The **Basic Settings** page provides **Basic Settings** and **Restore All Default Setting** sections that allow you to perform the following functions.

### (A) Basic Settings

Basic Settings	(A.)
Module Name	ET-7255/PET-7255
Module Information	TEST Maximum of 16 characters (The content cannot include ' or " characters)
Page Header Information (First line)	ICP DAS     Maximum of 20 characters       Color     Blue       Font size     7
Page Header Information (Second line)	http://www.icpdas.com     Maximum of 50 characters       Color     Red     ✓       Font size     4
More Information URL	http://www.icpdas.com Maximum of 100 characters
Web Server Port	80
Modbus TCP Port	502
Modbus TCP Port (WAN)	502 This setting can be ignored if ET-7200/PET-7200 is not behind a router
	SUBMIT

### ♦ Configure the module information

### Module Name:

The initial value for this field will depend on the model of the module and cannot be modified.

### Module Information:

The module information field indicates the name of the alias that is used to identify the module.

### ♦ Configure the web interface information

### Page Header Information (First line) and Page Header Information (Second line):

The title of the website is displayed in the top left-hand corner of the interface, for example, the company name and web address as per the example below.

Overview	Page Header	ICP DAS	Maximum of 20 characters
Configuration _	(First line)	Color Blue V Font size 7 V	
Network Settings	Page Header	http://www.icpdas.com	Maximum of 50 characters
Basic Settings	Information (Second line)	Color Red V Font size 4 V	
Module I/O Settings	More	http://www.icpdas.com	
Authentication +	Information URL	Maximum of 100 characters	
Web HMI +	Web Server Port	80	
Pair Connection More Information	Modbus TCP Port	502	
	Modbus TCP	502	

### More Information URL:

This item allows you to specify the URL that will be displayed when the "**More Information**" option is clicked to provide additional support for the ET-7x00/PET-7x00.

After completing the settings and refreshing the web page (F5), click the "More Information" option to check that the link to the web site is correct as the figure below.


#### Web Server Port:

This option specifies which port is to be used for the web server. By default, the HTTP port is 80.

#### Modbus TCP Port:

This option specifies which port is to be used for communication on the Modbus TCP. By default, the Modbus protocol uses port 502.

#### Modbus TCP Port (WAN):

This option specifies which port is to be used for Modbus communication between the remote host and local EX-7x00/PET-7x00. This setting can be ignored if ET-7x00/PET-7x00 is not located behind a router.

To configure the web interface information, follow the procedure below:

#### Step 1: Enter the desired information into the respective fields.

#### Step 2: Click the "Submit" button to finish configuring the module information.

rview	Basic Setting	js
nfiguration etwork Settings	Module Name	et-7255/Pet-7255 <b>1.</b>
Basic Settings	Module Information	8 DI, 8 DO Maximum of 16 characters (The content cannot include ' or " characters)
uthentication +	Page Header Information (First line)	ICP DAS Maximum of 20 characters
Neb HMI +		
Pair Connection	Page Header Information	http://www.icpdas.com Maximum of 50 characters
Nore Information	(Second line)	Color Green V Font size 3 V
	More Information URL	https://www.icpdas.com/en/download/index.php Maximum of 100 characters
	Web Server Port	80
	Modbus TCP Port	502
	Modbus TCP Port (WAN)	502 This setting can be ignored if ET-7200/PET-7200 is not behind a router

#### (B) Restore All Default Settings

The reset function is divided into categories based on the menu options for the web interface and can be used to restore the individual settings to their factory default state.

To reset the settings to their factory default, follow the procedure below:

#### Step 1: Check the relevant check boxes for the items you wish to reset.

#### Step 2: Click the "Submit" button to reset the settings to their factory default state.

Overview		Restore All Default Settings
Configuration	_	
Network Settings		
Basic Settings		Authentication
Module I/O Settings	3	Web HMI
Authentication	+	Pair Connection
Web HMI	+	
Pair Connection		
More Information	1	



For ET-7200/PET-7200 modules, in addition to using the reset function in the web-based **Basic Settings** page, you can also press and hold the reset button for five seconds to restore the ET-7200/PET-7200 to factory defaults.



#### (B.1) Factory Default Settings for the "Configuration" Menu Options

The tables below outline the factory default settings for the items listed in the "**Configuration**" menu.

#### **Network Settings**

#### **Ethernet Configuration**

Item	Factory Default Settings
IP Address	192.168.255.1
Subnet Mask	255.255.0.0
Gateway	192.168.0.1

#### **Basic Settings**

#### **Basic Settings**

Item	Factory Default Settings
Module Name	Depends on the name of the module
Module Information	Empty
Page Header Information (First line)	ICP DAS
Page Header Information (Second line)	https://www.icpdas.com
More Information URL	https://www.icpdas.com
Web Server Port	80
Modbus TCP Port	502
Modbus TCP Port (WAN)	502

#### Module I/O Settings

#### Note that all settings displayed on this page vary depending on the model number.

#### **Common Functions**

Item	Factory Default Settings
Host Watchdog Timeout	0 (0: Disabled, 1 ~ 65535: Enabled) (units: 0.1 seconds)

#### Modbus Definition

ltem	Factory Default Settings
Modbus Unit ID	1

#### **Digital Output Settings**

Item	Factory Default Settings
Power-on Value	OFF
Safe Value	OFF

#### **Digital Input Settings**

Item	Factory Default Settings
DI Latched Status	Disabled
Digital Input Counter	Disabled
Counter Value Inverse	Disabled
Low-Pass Filter	100 Hz. The Min. width is 5 ms

#### Analog Output Settings

Item	Factory Default Settings
Panga	This value varies depending on the model of
Kange	the module
Slew Rate	00, Immediate
Power-on Value	0.0
Safe Value	0.0

#### Analog Input Settings

Item		Factory Default Settings
Channel		Enable
Range		This value varies depending on the model of the module
Sampling Rate	Normal mode (10 Hz)	Normal mode
	Fast mode (50 Hz)	
Filter Setting	60 Hz Rejection	60 Hz Rejection
	50 Hz Rejection	
Data Format	HEX 2's complement	HEX 2's complement
	Engineering	

**Note**: The analog input and the analog output share the same data format settings.

#### <u>Alarm Settings</u>

Item		Factory Default Settings
High Alarm	Channel	Disable
	High Limit Value	This value varies depending on the model of
		the module
	Mode	Momentary
Low Alarm	Channel	Disable
	Low Limit Value	This value varies depending on the model of
		the module
	Mode	Momentary

#### (B.2) Factory Default Settings for the "Authentication" Menu Options

The tables below outline the factory default settings for the items listed in the "Authentication" menu.

#### Account Management

#### Privilege Management

Item	Factory Default Settings	
Authority	Administrator	
Admin	Admin	
Password	Admin	
Note: Since firmware version V3.11 (or later), the default username and password are not		
supported. Users need to create them for their initial login.		

#### **Accessible IP Settings**

#### IP Filter Settings

Item	Factory Default Settings
Enable the IP filter table	
Activate	Empty, there is no limit to allowing any
From (IP Address)	outgoing access.
To (IP Address)	

#### (B.3) Factory Default Settings for "Web HMI" Menu Option

The tables below outline the factory default settings for the items listed in the "Web HMI" menu.

#### Web HMI

#### Factory Default Settings

Depends on the Modbus setting function of the ET-7x00/PET-7x00.

#### Web Edit

Factory Default Settings

Main Page

#### (B.4) Factory Default Settings for the "Pair Connection" Menu Option

The table below outlines the factory default settings for the "Pair Connection" option.

#### **Pair Connection**

#### **Configuration of Communication**

Item	Factory Default Settings
Connection Timeout (ms)	2000
Reconnect Interval (ms)	3000

#### **Remote DI to Local DO**

Item	Factory Default Settings
Communication Timeout (ms)	1000
Scan Time (ms)	1000
Local DO Base Address	0
I/O Count	0
IP Address of the Remote Device	192.168.255.200
Modbus TCP Port	502
Modbus ID	1
Remote DI Base Address	0

#### Local DI to Remote DO

Item	Factory Default Settings
Communication Timeout (ms)	1000
Scan Time (ms)	1000
Local DI Base Address	0
I/O Count	0
IP Address of the Remote Device	192.168.255.200
Modbus TCP Port	502
Modbus ID	1
Remote DO Base Address	0

## 3.2.3. Module I/O Settings

After completing the general configuration of the ET-7x00/PET-7x00 module described in the previous section, the settings for the input and output channels need to be configured, such as the channel range and the alarm, etc.

	Overview	Common Fu	nctions	
	Network Settings	Madhua Address	Function	
	Network Settings	Modbus Address	Function	
	Basic Settings	00226	Reset to Factory Default Settings	
	Module I/O Settings	00233	Reboot ET-7000/PET-7000	
	Authentication +	40555	Reset Status	1 1:Power-on, 2:Module Watchdog, 3:Reset command
	Web HMI +	40556	Reset Event Counter	21
	Pair Connection			
	More Information	40557	Host Watchdog Timeout	0:Disabled, 1~65535:Enabled (units:0.1 seconds)
		40558	WDT Event Counter	0
				SUBMIT
		Modbus Defi	inition	
		Modbus Address	Function	
		40271	Modbus Unit ID	1 0~255 (default:1)
				SUBMIT
_				

#### **Tips & Warnings**



The contents displayed on this page will be depending on the Modbus functions applicable to the specific ET-7x00/PET-7x00 module. Please refer to the user manual for each module for details on how to configure the relevant I/O settings.

In this example, ET-7026/PET-7026 will be used to explain the I/O settings. (The ET-7026/ PET-7026 is a multi-function module that has 6 AI channels, 2 AO channels, 2 DI channels and 2 DO channels.)

#### (A) Common Functions

The **Common Functions** area provides options that allow the settings for the Modbus functions to be configured.

Common Fu	nctions	
Modbus Address	Function	
00226	Reset to Factory Default Settings	
00233	Reboot ET-7000/PET-7000	
40555	Reset Status	1 1:Power-on, 2:Module Watchdog, 3:Reset command
40556	Reset Event Counter	21
40557	Host Watchdog Timeout	0 0:Disabled, 1~65535:Enabled (units:0.1 seconds)
40558	WDT Event Counter	0
		SUBMIT

Modbus Definition			
Modbus Address	Function		
40271	Modbus Unit ID	1	0~255 (default:1)
		SUBMIT	

#### (B) Digital Output Settings

The **Digital Output settings** area provides details of the configuration settings for all digital output channels.

Digital (	Output Settings		
Channel	Power-on Value	Safe Value	
Ch0	○ On  ● Off	○ On	Disabled - Maintain the current status 🗸
Ch1	○ On <sup>®</sup> Off	O On  Off	Disabled - Maintain the current status  Disabled - Maintain the current status Enabled - Host Watchdog Enabled - Pair-Connection UBMI

#### Power-on value:

Used to preset the power-on value of the DO.

#### Safe Value

#### When choosing the "Disabled – Maintain the current status" option

Whether the Host Watchdog or Pair-Connection feature is enabled, the Safe Value will not take effect (the DO remains in its original state).

#### When choosing the "Enabled – Host Watchdog" option

Remember to set a Host Watchdog timeout in the "Common Functions" section. Notice that the Host Watchdog will be enabled by entering a non-zero value.



If the Host Watchdog is enabled, the digital outputs will be set to the safe value when the communication between a Host PC and the ET-7x00/ PET-7x00 module is interrupted. In this case, the timeout is set to 10 seconds.

#### When choosing the "Enabled – Pair-Connection" option

Make sure that the Pair Connection function has been configured, refer to Section 3.5. If the communication between the module and the remote module is failed, the digital outputs will be set to the safe value.

Refer to "Appendix A. Description of I/O Functions" for more information.

#### (C) Digital Input Settings

All digital input channels in ET-7x00/PET-7x00 modules can be used as 32-bit counters and each counter consists of two address values, the Low word, and the High word. Specific individual DI channels can be counted via the Digital Input settings web page.

Digital In	put Settings			
Modbus Addr	ess	Function		
00350		Enable DI Latched S	Status	○ Enable
Channel	Digital Input Co	unter	SUBMIT Preset Value for Digita	l Input Counter
Ch0	○ Enable <sup>●</sup> D	isable	0	0~4294967294
Ch1	○ Enable <sup>●</sup> D	isable	0	0~4294967294
			SUBMIT	

#### • Enable DI Latched Status:

When the DI Latch function is enabled, once the digital input channel detects any change in input status, the input status will be latched until it is cleared by using the clear command manually.

#### • Digital Input Counter:

When the Counter mode is selected, one counter will record the number of pulses from the digital signal for the selected channel, and will then record the count value in the register.

#### Preset Value for Digital Input Counter:

This option allows the default values for the counters to be set.



When the signal occurs for a short time, the Host (Modbus TCP master) may not be in a hurry to read the changed state of DI, and will mistakenly think that DI has not changed all the time.



#### (D) Analog Output Settings

The **Analog Output settings** section contains the Range, Slew Rate, Power-on Value, and Safe Values Settings that will be described in detail below.

Channel	Range	Slew Rate		
Ch0	32, 0 ~ 10 V 🗸 🗸	00, Immediate	~	Apply the current settings to all channels
Ch1	32, 0 ~ 10 V 🗸 🗸	00, Immediate	~	
		5	SUBMIT	
Channel	Power-on Value	Safe Value	SUBMIT	
C <b>hannel</b> Ch0	Power-on Value	Safe Value	SUBMIT 0 ~ 10 V	Disabled - Maintain the current status 🗸
C <b>hannel</b> Ch0 Ch1	Power-on Value           0.0         0           0.0         0	Safe Value - 10 V 0.0 - 10 V 0.0	SUBMIT 0 ~ 10 V 0 ~ 10 V	Disabled - Maintain the current status ↓ Disabled - Maintain the current status ↓

#### • <u>Range</u>:

In a manner, a different range can be set for individual analog output channels. Select the required voltage/current range from the respective drop-down menus. For more detailed technical specifications related to the output range for each analog output channel, please refer to: "Appendix C. Analog Output Type and Data Format Table".

#### Tips & Warnings

igs 🔨

For modules that support the Voltage/Current type (e.g., <u>ET-7017</u>) or the Voltage/Current/ Thermocouple type (e.g., <u>ET-7018Z/S</u>), the jumper is at the [Voltage/Thermocouple] position by default. To use the Current signal, you need to adjust the jumper(s).

Before selecting the range for each AIO channel, make sure that jumpers are set properly. For more detailed related to the jumper settings for each ET-7x00/PET-7x00 module, please refer to "ET7000 ET7200 Register Table".



#### • Slew Rate:

This is the programmable output slew rate for the analog output channels, i.e., the rate of change in the analog output voltage/current as it changes from one output voltage/current to another. Select the most appropriate value from the respective drop-down menus.

#### • Power-on Value:

A power-on value can be set for a specific analog output channel. After rebooting the module, the analog output value will be set to the power-on value.

#### Safe Value:

The Host Watchdog can be enabled or disabled by configuring the Host Watchdog Timeout setting in the (A) "Common Functions" section. When communication between the Host PC and the ET-7x00/PET-7x00 module is interrupted, the analog output value will be set to a predefined safe value.

For a more detailed description of these Modbus functions, please refer to "Appendix C. Modbus Application Notes".

#### (E) Analog Input Settings

**The Analog Input Settings** area contains two parts, the Range settings, and Modbus function Settings, which will be described in detail below.

Analog	Input Settings		
Channel		Range	
Ch0	$ullet$ Enable $\bigcirc$ Disable	08, -10 ~ 10 V 🗸 🗸	Apply the current settings to all channels
Ch1	$ullet$ Enable $\bigcirc$ Disable	08, -10 ~ 10 V 🛛 🗸	
Ch2	$ullet$ Enable $\bigcirc$ Disable	08, -10 ~ 10 V 🔹 🗸	
Ch3	$ullet$ Enable $\bigcirc$ Disable	08, -10 ~ 10 V 🔹 🗸	
Ch4	$ullet$ Enable $\bigcirc$ Disable	08, -10 ~ 10 V 🔹 🗸	
Ch5	$ullet$ Enable $\bigcirc$ Disable	08, -10 ~ 10 V 🗸	
Modbus Addr	ress Function	SUBMI	T
00628	Normal Mode (1	0 Hz)/Fast Mode (50 Hz)	Normal mode      Fast mode
00629	60/50 Hz Rejec	lion	● 60 Hz ○ 50 Hz
00631	Data Format	Outline to Factory Outlines	HEX 2's complement      Engineering
00632	Restore Analog	Calibration to Factory Settings	U
		SUBMI	Т
Modbus Addr	ress Function		
		If the measured value is below 4	mA, it defaults to a value of -32768 🗸
40654	Open Wire Detection	This feature is available onlinput mode and the data for	y when the module is operating in the 4~20 mA current mat is in engineering units.
		SUBMI	Τ

#### • Enable/Disable:

This section allows the user to enable or disable each analog input channel. For the ET-7000/ ET-7200 series module, all analog input channels share a single A/D Chip so the user can

disable unused channels to improve the sampling rate for each channel. For example, the sampling rate for a total of eight AI channels of an ET-7017 is 10 Hz. If all channels are enabled, the sampling rate for each channel is 1.25 Hz. If three channels are disabled, the sampling rate for the enabled five channels is 2 Hz.

#### • <u>Range</u>:

ET-7x00/PET-7x00 modules provide a programmable input voltage/current range on all analog input channels, where a different range can be set for each analog input channel. Select the required voltage/current range from the respective drop-down menus. For more detailed technical specifications related to the input range for each analog input channel, please refer to: "Appendix B. Analog Input Type and Data Format Table".

# Tips & Warnings

For modules that support the Voltage/Current type (e.g., <u>ET-7017</u>) or the Voltage/Current/ Thermocouple type (e.g., <u>ET-7018Z/S</u>), the jumper is at the [Voltage/Thermocouple] position by default. To use the Current signal, you need to adjust the jumper(s).

Before selecting the range for each AIO channel, make sure that jumpers are set properly. For more detailed related to the jumper settings for each ET-7x00/PET-7x00 module, please refer to "ET7000 ET7200 Register Table".

ET-7019Z/PET-7019Z/ET-7219Z/PET-7219Z



#### • Normal Mode/Fast Mode:

ET-7x00/PET-7x00 modules support sample rates in either "Normal" or "Fast" mode. The fast mode uses 60 Hz with a 16-bit resolution, while the Normal mode uses 10 Hz with a 16-bit resolution.

#### • <u>60/50 Hz Rejection</u>:

To remove the noise from the power supply, ET-7x00/PET-7x00 analog input modules feature two built-in rejection filters, that operate at different frequencies, 50 or 60 Hz, that are designed to remove noise generated by different power supplies.

#### • Data Format:

The analog value can be displayed in either hexadecimal or engineering.

#### Hexadecimal format:

All ranges of the Modbus 16-bit Register can be applied, where no resolution loss for the A/D or D/A value.

#### Engineering format:

Converting values is simple in this way, but there is some resolution loss when using the entire range of the Modbus 16-bit Register to express the value.

For example,

The input range of the ET-7017 is set to +/-10V,

00		Engineering Unit	+10000	-10000
00	$-10 \sim +10 V$	2's comp HEX	7FFF	8000

If the real value is +6 V, the Modbus date will be:

<u>Value in Hexadecimal:</u> 6/10 \* 0x7FFF = 0.6 \* 32767 = 19660 (or 0x4CCC) Each scale is 10 V / 32767 = 0.305 mV

<u>Value in Engineering:</u> 6/10 \* 10000 = 6000 (or 0x1770) Each scale is 10 V / 32767 = 1 mV



Engineering Unit



#### (F) NTC Thermistor Temperature Settings (for ET-7005) – User Defined Type

(P)ET-7005 supports NTC Thermistors, and the resistance/temperature characteristics of each manufacturer's Thermistor may vary. Although the (P)ET-7005 already supports several well-known brand of thermistors, it provides users with the function to create their own conversion formulas to match other thermistor.

The equipment listed below is used in this example.

#### 1. ET-7005 \* 1:

#### https://www.icpdas.com/en/product/ET-7005

The ET-7005 is a Ethernet I/O module with 8-ch Thermistor input and 4-ch DO. With a maximum resistance measurement of 200K ohms, the ET-7005 is capable of supporting temperatures as low as -40°C.

2. CA-TM-P100-L050 \*1:

https://www.icpdas.com/en/product/ET-7005#Accessories NTC Thermistor, Epoxy Resin Cable, 5M (-40 °C to +80 °C)



Step1: In the Analog Input Settings section, enable the channel you want to use (e.g., Ch0), set the Range to "71, User- Defined, -50 ~ 150°C", and click the SUBMIT button.

Overview	Analog Input Settings	•	
Configuration _			
Network Settings	Channel	Range	
Basic Settings	Ch0   Enable  Disable	71, User-defined, -50 ~ 150 °C 🗸	Apply the current settings to all channels
Module I/O Settings	Ch1      Enable      Disable	60, PreCon Type III 10K@25°C, -30 ~ 240 °F 61, Fenwell Type U 2K@25°C, -50 ~ 150 °C 62 Fenwell Type U 2K@25°C, 0 ~ 150 °C	
Authentication +	Ch2   Enable  Disable	63, YSI L Mix 100@25°C, -80 ~ 100 °C 64, YSI L Mix 300@25°C, -80 ~ 100 °C	
Web HMI + Pair Connection	Ch3	65, YSI L Mix 1000@25°C, -70 ~ 100 °C 66, YSI B Mix 2252@25°C, -50 ~ 150 °C 67, YSI B Mix 3000@25°C, -40 ~ 150 °C	
More Information	Ch4    Enable   Disable	68, YSI B Mix 5000@25°C, -40 ~ 150 °C 69, YSI B Mix 6000@25°C, -30 ~ 150 °C	
	Ch5	6A, YSI B Mix 10000@25°C, -30 ~ 150 °C 6B, YSI H Mix 10000@25°C, -30 ~ 150 °C 6C, YSI H Mix 30000@25°C, -10 ~ 200 °C	
	Ch6   Enable  Disable	70, User-defined, -50 ~ 150 °C 71, User-defined, -50 ~ 150 °C	
	Ch7	72, User-defined, -50 ~ 150 °C 73, User-defined, -50 ~ 150 °C 74, User-defined, -50 ~ 150 °C	
		75, User-defined, -50 ~ 150 °C 76, User-defined, -50 ~ 150 °C	

Step2: Users can refer to the thermistor's resistance-temperature table and enter three resistance values and their corresponding temperatures into the User-Defined
 Type-71 item. It is recommended to follow the rules for optimal accuracy.

(1) -40°C <= T1, T2, T3 <= 150°C (2) |T2 - T1| <= 50°C (3) |T3 - T2| <= 50°C

Resistance (ohm)	Temperature (°C)
67770	-20
12090	20
3020	60

#### 5.1 Tabella valori temperatura resistenza sensore NTC 10K@25°C ß 3435

Temp.	Valore di Resistenza		Temp.	Temp. Valore di Resistenza			Temp.	Valore di Resistenza			
	Max.	Tipico	Min.		Max.	Tipico	Min.	-	Max.	Tipico	Min.
C	ΚΩ	ΚΩ	ΚΩ	°C	ΚΩ	ΚΩ	KΩ	°C	ΚΩ	ΚΩ	ΚΩ
50	344,60	329,50	314,90	1	26,65	26,13	25,62	56	3,50	3,43	3,35
49	325,00	310,90	297,30	2	25,52	25,03	24,55	57	3,39	3,32	3,25
48	306,60	293,50	280,90	3	24,44	23,99	23,54	58	3,28	3,22	3,15
47	289,40	277,20	265,40	4	23,42	23,00	22,57	59	3,18	3.12	3,05
-46	273.40	262.00	251,00	5	22,45	22.05	21,66	60	8.09	3.02	2.95
45	258.30	247.70	237.40	6	21.53	21.15	20.78	61	2.99	2.93	2.86
-44	244.20	234.30	224,70	7	20.64	20.30	19.95	62	2.90	2.84	2.77
43	231.00	221.70	212.80	8	19.81	19.48	19.15	63	2.82	2.75	2.69
42	218.60	209.90	201.60	9	19.01	18,70	18.39	64	2.73	2.67	2.61
41	207.00	198.90	191.00	10	18.25	17.96	17,67	65	2.65	2.59	2.53
40	196.00	188.50	181.10	11	17.51	17.24	16.97	66	2,57	2.51	2,55
30	185 50	178.50	171.60	12	16.81	1656	1630	67	2.50	2.44	2,15
-38	175.60	169.00	162.60	13	1614	15.90	15.67	68	2,00	236	2,30
37	166.30	160.20	154.20	14	15.50	15,28	15,05	69	2.35	2,30	2,51
-36	157.60	151.90	146 30	15	14.89	14.69	14.48	70	2,55	2,30	217
-35	149.40	144.10	138.80	16	14.31	14.12	13.92	70	2,20	2,25	2,17
34	141.70	136.70	131.80	17	13.75	13.58	13,32	72	2.15	2,10	2,05
33	134.50	120.80	125.20	18	13.22	13.06	12,89	72	2,09	2,10	1 00
37	127.70	123,00	11900	19	12.72	12.56	12,05	7.0	2.03	1.98	1.99
31	121.20	117.10	113.10		2.24	12.00	11.04	75	1.09	1,00	1,95
30	115.20	111.30	107.50		11.77	12,02	11.50	75	1.02	1,92	1,07
20	109.40	105.70	107,30		11.32	11.20	11,07	77	1,72	1,07	1,02
22	103,40	100,70	07.20	12	10.00	10.70	10.66	70	1,07	1,02	1,77
20	09.69	05.52	97,20	25	10,90	10,70	10,00	70	1,01	1,77	1,72
26	90,00	95,52	92,45	24	10,49	10,00	10,27		1,70	1,72	1,07
20	95,60	90,04	07,97	25	0.72	0.62	9,90	00	1,72	1,07	1,02
-20	09,20	00,43	20.74	20	9,75	9,05	9,55		1,07	1,02	1,50
-24	09,80	82,20	79,74	2/	9,38	9,28	9,16	. 82	1,02	1,53	1,53
22	26.00	74,61	73,90	20	9,04	0,94	0,0**		1,50	1.40	1,49
-22	70,89	74,01	/2,39	29	0,/2	8,02	8,52	04	1,54	1,49	1,45
-21	13,23	67.77	09,01	30	8,41	8,31	8,21	85	1,49	1,45	1,41
20	9,77	07,77	63.74	31	0,11	7.72	7,92	00	1,45	1,41	1,37
19	63,30	61.54	02,74	32	7,83	7,73	7,03		1,42	1,37	1,33
12	60.30	01,54	59,83	33	7,35	7,45	7,30	88	1,38	1,34	1,30
16	60,52	56,68	57,07	39	7,29	7,19	7,10		1,59	1,30	1,20
10	54.95	53,97	54,40	30	6.70	6,70	C 6,0	90	1,31	1,27	1,23
-12	24,85	53,41	21,99	30	0,/9	6,70	0,01	- 91	1,27	1,23	1,19
12	52,55	40.60	49,05	3/	6,30	6.75	6.15	92	1,29	1,20	1,10
13	49,95	46,08	47,43	38	6,34	6.02	6,15	93	1,21	1,17	1,13
12	47,09	40,50	45,52	39	0,12	6,03	5,94	94	1.17	1,14	1,10
10	45,55	44,43	43,33	40	5,92	5,83	5,74	95	1,14	1,11	1,07
-10	45,52	42,47	41,45	41	5,72	5,05	5,54	96	1,12	1,08	1,04
.9	41,55	40,57	39,00	42	5,55	5,44	5,35	9/	1,09	1,05	1,02
0 7	39,09	38,77	37,80	43	5,34	5,20	5,17	98	1,06	1,02	0,99
1	37,92	37,05	30,21	44	5,17	5,08	4,99	99	1,03	1,00	0,97
0	36,25	35,44	34,64	45	5,00	4,91	4,83	100	1,01	0,97	0,94
2	34,66	33,90	33,15	46	4,83	4,/5	4,67	101	0,98	0,95	0,92
4	33,15	32,44	31,73	47	4,68	4,59	4,51	102	0,96	0,92	0,89
3	31,72	31,05	30,39	48	4,52	4,44	4,36	103	0,93	0,90	0,87
2	30,36	29,73	29,11	49	4,38	4,30	4,22	104	0,91	0,88	0,85
1	29,06	28,48	27,89	50	4,24	4,16	4,018	105	0,89	0,86	0,83
)	27,83	27,28	26,74	51	4,10	4,03	3,95	106	0,87	0,84	0,81
				52	3,97	3,90	3,82	107	0,84	0,82	0,79
				53	3,85	3,77	3,70	108	0,82	0,80	0,77
				54	3,73	3,65	3,58	109	0,80	0,78	0,75
				55	3,61	3.54	3,46	110	0,79	0,76	0,73

# **Step3:** Once the **Calculate** button is clicked, the Steinhart coefficient will be computed. Then, click the **Save** button to save the settings and finalize the configuration.

Thermistor Steinhart-Hart Coefficients									
Step 1: Input temperatures and resistance for basis of calculating A, B and C. Step 2: Click the Calculate button to calculate coefficients.									
Step 3: Click the Save button to save the coefficients.									
User-defined Type	Low Tempo Parameters	erature s	Mid Temp Parameter	erature rs	High Temp Parameter	erature s	Coefficients		
							Α		
70		ohms		ohms		ohms	3CB34A92	CALCULATE	
70		°C		°C		°C	BB58DE17	SAVE	
							C		
							375C405F		
(							A 0.0008931457241	l'	
71	67770	ohms	12090	ohms	3020	ohms	B 0.0002505307333		
11	-20	°C	20	°C	60	°C	398359AA	SAVE	
							C 1.9630498418100		
							34320727		
							A		
72		ohms		ohms		ohms	B	CALCULATE	
12		°C		°C		°C	0000000	SAVE	
							C		
							0000000		

71	ohms °C	ohms °C	ohms °C	A 3A6A21FF B 398359AA C 3452C7E7	CALCULATE SAVE
72	ohms °C	ohms °C	ohms °C	A 00000000 B 00000000 C 00000000	CALCULATE

**Step4:** The user can view the current temperature of the Al0 on the **Web HMI** page.

Overview	THIS COMPUTER - 奋 - ET-7000								
Configuration -									
Network Settings		AI DO							
Basic Settings									
Module I/O Settings	Analog inputs								
Authentication +	Channel No.	Actual Value	Historical Max/Min Value		High/Low Alarm				
Web LIMI	A10	-9.33 °C	Max: -9.07 °C	Min: -9.33 °C	High Alarm: OFF	Low Alarm: OFF			
	Alu	Modbus 30000: FC5B	Modbus 30236: FC75	Modbus 30268: FC5B	Modbus 10224:0	Modbus 10256:0			
Web HMI		<b>0.0</b> °C	Max: 0.0 °C	Min: 0.0 °C	High Alarm: OFF	Low Alarm: OFF			
Web Edit	Al1	Modbus 30001:0000	Modbus 30237:0000	Modbus 30269:0000	Modbus 10225:0	Modbus 10257:0			
Pair Connection	412	0.0 °C	Max: 0.0 °C	Min: 0.0 °C	High Alarm: OFF	Low Alarm: OFF			
More Information	AIZ	Modbus 30002:0000	Modbus 30238:0000	Modbus 30270:0000	Modbus 10226:0	Modbus 10258:0			
	AI3	0.0 °C	Max: 0.0 °C	Min: 0.0 °C	High Alarm: OFF	Low Alarm: OFF			
		Modbus 30003:0000	Modbus 30239:0000	Modbus 30271:0000	Modbus 10227:0	Modbus 10259:0			
		0.0 °C	Max: 0.0 °C	Min: 0.0 °C	High Alarm: OFF	Low Alarm: OFF			
	AI4	Modbus 30004:0000	Modbus 30240:0000	Modbus 30272:0000	Modbus 10228:0	Modbus 10260:0			
AI1 to AI7 are	415	0.0 °C	Max: 0.0 °C	Min: 0.0 °C	High Alarm: OFF	Low Alarm: OFF			
set to "Disable"	AI5	Modbus 30005:0000	Modbus 30241:0000	Modbus 30273:0000	Modbus 10229:0	Modbus 10261:0			
	410	0.0 °C	Max: 0.0 °C	Min: 0.0 °C	High Alarm: OFF	Low Alarm: OFF			
	Alb	Modbus 30006:0000	Modbus 30242:0000	Modbus 30274:0000	Modbus 10230:0	Modbus 10262:0			
	417	0.0 °C	Max: 0.0 °C	Min: 0.0 °C	High Alarm: OFF	Low Alarm: OFF			
	All	Modbus 30007:0000	Modbus 30243:0000	Modbus 30275:0000	Modbus 10231:0	Modbus 10263:0			
			RESET ALL MAX. VALUES	RESET ALL MIN. VALUES					

AI DO				
Analog Inputs				
Channel No. Actual Value	Historical Max/Min Value		High/Low Alarm	
-9.33 °C	Max: -9.07 °C	Min: -9.33 °C	High Alarm: OFF	Low Alarm: OFF
Nadhus 39000: FC5B	Modbus 30236: FC75	Modbus 30268: FC5B	Modbus 10224:0	Modbus 10256:0

#### (G) Alarm Settings

The ET-7x00/PET-7x00 modules feature a built-in alarm function. The alarm settings include two parts, the high limit value, and the low limit value, and each need to be configured for a specific channel.

Alar	m Settings				
Channel	· (	High Limit Value		Mode	
Ch0	🔿 Enable 🖲 Disable	10.0 -	-10 ~ 10 V	Monemtary 🗸	Apply the current settings to all channels
Ch1	🔿 Enable 🖲 Disable	10.0 -	-10 ~ 10 V	Monemtary 🗸	
Ch2	🔿 Enable 🖲 Disable	10.0 -	-10 ~ 10 V	Monemtary 🗸	
Ch3	🔿 Enable 🖲 Disable	10.0 -	-10 ~ 10 V	Monemtary 🗸	
Ch4	🔿 Enable 🖲 Disable	10.0 -	-10 ~ 10 V	Monemtary 🗸	
Ch5	🔿 Enable 🖲 Disable	10.0 -	-10 ~ 10 V	Monemtary 🗸	
			SUBMI	T	

#### • Enable/Disable:

This section allows each analog input alarm to be set to enable or disabled.

#### • <u>High/Low Limit Value:</u>

Both the high alarm value and the low alarm value can be defined in the High (or Low) Limit Value text box. When the analog input value is higher than the high alarm value, or lower than the low alarm value, an alarm occurs. The alarm status will then be activated and switched to on.

Channel	I	Low Limit Value	Mode	
Ch0	🔿 Enable 🖲 Disable	-10.0 -10 ~ 10 V	Monemtary 🗸	Apply the current settings to all channel
Ch1	🔿 Enable 🖲 Disable	-10.0 -10 ~ 10 V	Monemtary 🗸	
Ch2	🔿 Enable 🖲 Disable	-10.0 -10 ~ 10 V	Monemtary 🗸	
Ch3	🔿 Enable 🔍 Disable	-10.0 -10 ~ 10 V	Monemtary 🗸	
Ch4	🔿 Enable 🔍 Disable	-10.0 -10 ~ 10 V	Monemtary 🗸	
Ch5	🔿 Enable 🖲 Disable	-10.0 -10 ~ 10 V	Monemtary 🗸	
		SU	IBMIT	

#### • Mode:

The ET-7x00/PET-7x00 allows the alarm to be selected as either Momentary or Latch mode, which can be set using the Mode combo box for both the low alarm and the high alarm.

#### > Latch Mode:

An alarm will be triggered when the analog input value exceeds alarm limits. When the AI value is back to normal, the alarm status will keep until the clear command is sent to the specific address.

#### > Momentary Mode:

An alarm will be triggered when the analog input value exceeds alarm limits. When the AI value is back to normal, the alarm status will automatically be cleared.

#### (H) Low-Pass Filter

ICP DAS http://www.icpdas.com			
Overview	Madhua Addraaa	Function	
Configuration —	Moubus Address	Function	
Network Settings	40100	Low-Pass Filter Disabled	
Basic Settings		2 Hz, Min. Pu	lse Width is 250 ms
Module I/O Settings		U HZ, Min. P	ulse Width is 50 ms k
Authentication +			
Web HMI +			
Pair Connection			
More Information	Modbus Address	Function	
	00349	Counter Value Inverse	O Enabled 💿 Disabled

#### • Low-Pass Filter

#### **Preventing Signal Bounce**

When mechanical switches or sensors change state, they can sometimes create "bouncy" signals, which means the signal quickly turns on and off many times. The low-pass filter cleans up these bouncy signals, making the DI input stable and preventing mistakes

## 3.3. Authentication

The "Authentication" menu contains the following options:

Overview	
Configuration	_
Network Settings	
Basic Settings	
Module I/O Settings	
Authentication	_
Account Management	
Accessible IP Settings	
Web HMI	_
Web HMI	
Web Edit	
Web Edit Pair Connection	
Web Edit Pair Connection Maintenance	_
Web Edit Pair Connection Maintenance Import / Export Configuration	
Web Edit Pair Connection Maintenance Import / Export Configuration More Information	-

#### Privilege Management:

Provides access to the Privilege Management and Reset Settings sections. The user can manage user accounts and their associated privileges and also reset the settings.

#### Accessible IP Settings:

Provides access to the IP Filter Settings page, which allows you to control access to the web page.

## 3.3.1. Account Management

The **Privilege Management** page provides functions that allow the following tasks to be performed:

Priv	vilege Managem	FW V3	FW V30x		
No.	Account	Password	Confirm Password	Authority	Enabled
1	Admin			Admin 🗸	
2	user01			User 🗸	
3	admin01			Admin 🗸	
4				Admin 🗸	
5				Admin 🗸	
		SUBMI	T		
Res	et Settings				
Restor	e settings to the defaults	After clicking this but removed and restore	ton, all accounts will the default account.	be	

Privi	lege Mana	FW V311		
Active	Role	Username	Password	
	administrator	Admin	1111	SAVE
	user 🗸	user01	abc@001	SAVE
	administrator 🗸	admin01	admin01	SAVE
	user 🗸			SAVE
	user 🗸			SAVE

#### (A) Configuring the User Accounts

The ET-7x00/PET-7x00 interface supports a maximum of five user accounts, including:

#### • An Administrator Account

FW V3.0x (or older) provides a default administrator account (Admin). Sine FW v3.11 (or later), the user needs to create an administrator account upon login, which must be at least 4 characters long. This account cannot be deleted, but administrators can change the username/password.

#### • Four User-defined Accounts

Each account consists of an username, a password, and an authority level. There are two types of authority levels: Administrator and User.

#### > <u>Admin</u>:

With the highest authority, the administrator has full access to all functions on the ET-7x00/ PET-7x00 web page, including modifying or reviewing all settings.

#### > <u>User</u>:

This level only allows the user to view some of the module settings. The user cannot modify any settings through the ET-7x00/PET-7x00 web page.

#### (B) Restoring the Factory Default User Accounts

The ET-7x00/PET-7x00 has a built-in administrator account (**Admin**) that can be modified but cannot be deleted. The firmware version 30x allows the user to restore the default settings (password: Admin) by clicking the "**Reset Settings**" button.

#### Note:

Firmware v3.11 (or later) does not include a default administrator account for security reasons. Also, there is no "**Reset Settings**" button on this page.

However, users can remove all usernames/passwords on the "**Basic Settings**" page and then create a new one the next time they log in. Alternatively, the ET-72xx/PET-72xx series have a physical **Reset** button that can be pressed and held for 5 seconds to restore the factory settings.

Overview		Restore All Default Settings				
Configuration	-		-			
Network Settings		Configuration				
Basic Settings Module I/O Settings		Authentication				
Authentication	_	Web HMI				
Account Management		Pair Connection				
Accessible IP Settings		All	The setting will take effect			
Web HMI	+		after the module is rebooted.			
Pair Connection			SUBMIT			

Press and hold the **Reset** button on the ET-7200/PET-7200 for 5 seconds to restore the factory settings.



## 3.3.2. Accessible IP Settings

The **IP Filter Settings** page allows the user to whitelist a range of IP addresses. Only those in the list will have access to this module. <u>Note:</u> By default, there is no restriction on outgoing access.

IP Fil	IP Filter Settings						
This feat to acces	This feature allows you to whitelist a range of IP addresses. Only IP addresses in this list will be able to access this module.						
IP addre	ss of the local computer is 192.	168.79.33					
Active	Start IP Address	End IP Address (Optional)	3.				
1.	192.168.79.201		SAVE				
	192.168.79.20	192.168.79.50	SAVE				
	192.168.79.10		SAVE				
			SAVE				
			SAVE				
			SAVE				
✓ Ne	✓ New settings are properly configured.						

Follow the steps to configure the accesible IP addresses:

- **Step 1:** Check the "Active" checkbox and input the Start and End IP addresses. Alternatively, users can only enter the Start IP address if you are not using continuous IP addresses.
- **Step 2:** After making changes, click each "**SAVE**" button to save the settings.
- **Step 1:** Reboot the module to apply the settings.

## 3.4. Web HMI

The "Web HMI" menu contains the following options:



#### Web HMI:

Provides access to the I/O monitor page, which allows you to remotely monitor and control the I/O status of the ET-7x00/PET-7x00 module.

#### Web Edit:

Provides access to the "Web Page Configuration" page, which allows you to create up to ten dynamic web HMI pages and set one of them as the start page so that it will be displayed when logging in to an ET-7000/ET-7200.

#### 3.4.1. Web HMI

The ET-7x00/PET-7x00 module features a Web HMI web interface that can be used to display real-time I/O data values and alarms via the LAN or the Internet. Real-time I/O data values and alarms can be monitored at either the local or remote site using any web browser. Also, the Web HMI is completed immediately without requiring any programming skills (HTML or Java).

First, you can see the default I/O monitoring page (Main Page), which displays the supported I/O tabs for the module.

	THIS COMPUTER - 👉 - ET-7000							
Amelogila								
Analog Ir	iputs							
Channel No.	Actual Value	Historical Max/Min Value		High/Low Alarm				
410	<b>0.0</b> V	Max: 0.0 V	Min: -0.0 V	High Alarm: OFF	Low Alarm: OFF			
AIU	Modbus 30000:0000	Modbus 30236:0001	Modbus 30268: FFFF	Modbus 10224:0	Modbus 10256:0			
A14	<b>0.0</b> V	Max: 0.0 V	Min: -0.0 V	High Alarm: OFF	Low Alarm: OFF			
ALI	Modbus 30001:0000	Modbus 30237:0001	Modbus 30269: FFFF	Modbus 10225:0	Modbus 10257:0			
412	<b>0.0</b> V	Max: -10.0 V	Min: 10.0 V	High Alarm: OFF	Low Alarm: OFF			
AIZ	Modbus 30002:0000	Modbus 30238:D8F0	Modbus 30270:2710	Modbus 10226:0	Modbus 10258:0			
412	<b>0.0</b> V	Max: -10.0 V	Min: 10.0 V	High Alarm: OFF	Low Alarm: OFF			
AI3	Modbus 30003:0000	Modbus 30239:D8F0	Modbus 30271:2710	Modbus 10227:0	Modbus 10259:0			
414	<b>0.0</b> V	Max: -10.0 V	Min: 10.0 V	High Alarm: OFF	Low Alarm: OFF			
AI4	Modbus 30004:0000	Modbus 30240:D8F0	Modbus 30272:2710	Modbus 10228:0	Modbus 10260:0			
415	<b>0.0</b> V	Max: -10.0 V	Min: 10.0 V	High Alarm: OFF	Low Alarm: OFF			
AIS	Modbus 30005:0000	Modbus 30241:D8F0	Modbus 30273:2710	Modbus 10229:0	Modbus 10261:0			
		RESET ALL MAX. VALUES	RESET ALL MIN. VALUES					

#### <u>Al page</u>

#### <u>AO page</u>

THIS COMPUTER - 谷 - ET-7000						
AI AQ DI DO						
Analog Outp	outs					
Channel No.	Actual Value	Output Value	Action			
A00	<b>0.0</b> V Modbus 40232:0000	-10 ~ 10 V Modbus 40000:0000	APPLY			
A01	<b>0.0</b> V Modbus 40233:0000	-10 ~ 10 V Modbus 40001:0000	APPLY			

#### <u>DI page</u>

	THIS		🐴 - ET-7	7000	
AI AO DI DO Digital Inputs					
Channel No.	Modbus Register	Status	Counter	High Latched	Low Latched
DI0	10000	OFF	-	-	-
DI1	10001	OFF		-	-

#### DO page

	THIS COMPUTER	R - 谷 - ET-7000			
AI AO DI DO					
Digital Outputs					
Channel No.	Modbus Register	Status	Action		
DO0	00000	OFF	OFF ON		
DO1	00001	OFF	OFF ON		

## 3.4.2. Web Edit

The ET-7x00/PET-7x00 module provides functions that enable users to create customized web pages. Users can upload specific I/O layout diagrams in either **.bmp**, **.jpg**, or **.gif** format and can define a description for each page.

By default, there is only a Main page, you can click the **"Add a new page"** button to add a page. Up to 10 user-defined web pages can be created.



**<u>Note</u>**: An asterisk indicates that the page is the start page.

Next, you can also set the new page (e.g., Carriage) as a start page so that it will be displayed when logging in to an ET-7000/ET-7200. Click **"Yes"** under the **"Set as the Start Page**" section and click the **"SUBMIT**" button.

Web Page Co	onfiguration	
Page Name	Image	Set as the Start Page
carriage	none 🗸	Yes O No
	SUBMIT	

Click the "Web HMI" item to see the start pages (e.g., Carriage).



Below is an example of how to create a customized web page.

#### Example

#### Objective:

Create a Web page to monitor the I/O status of a conveyor system, as shown below. The I/O system contains a sensor that is used to detect the products and a switch that is used to turn the conveyor motor on and off.



#### Step 1: Add a New Page

Click the "Add a new Page" button to begin creating a new page.

Web Page Configuration				
Page No.	Description			
*	MAIN PAGE			
		ADD A NEW PAGE		

#### Step 2: Upload an Image

Click the "**Choose File**" button to select an image, and then click the "**UPLOAD**" button to upload the image to the ET-7x00/PET-7x00 module, as shown in the figure below.

Web Page Configuration						
Page Name 0	Image none V SUBMIT	Set as the Start Page Yes No				
no image	DELETE ALL IMAGES	L L L L L L L L L L L L L L L L L L L				

#### **Tips & Warnings**



The image can be in either .jpg, .gif, or .bmp format with a maximum file size of 64 KB. The recommended resolution for the image to be displayed on the editing Web page is 340 \* 250 pixels.

After the upload is completed, you can see the image. Also, the file name will be added to the "Image" dropdown list box. (See the step3)



#### Step 3: Set the Page Name and Select the Image

Enter a name for the page in the "**Page Name**" field and then select an image from the "**Image**" dropdown list box. After selecting the image, it will be displayed in the preview window. Then, click the "**SUBMIT**" button.



#### Step 4: Add a Modbus Register Item to be used to read the selected sensor input

On the **Carriage** page, click the **"Edit"** button in the first row to display the **"Edit Group Register"** page.





ET-7X00/PET-7X00 User Manual P71

Now, a new Register item will be displayed in the list. To edit the item, click the "EDIT" button to access the Edit Group Register page, or to remove the item, click the "REMOVE" button.

PHS	Motor		DELETE ALL IMAGES		DELETE ALL IMAGES       Choose         DELETE ALL IMAGES       UPLOAD         The total space available for store images is only 64Kb, so the files the image must be less than 64Kb	
	Modbus Register	Alias	Scaling	Туре	Data type	
1	00000	PHS1	0	Coil	Boolean	EDIT REMOVE

#### Step 6: Add a Modbus Register Item to be used to write the selected motor output

Click the "Edit" button in the second row of the list, and the "Edit Group Register" page will be displayed.

	Modbus Register	Alias	Scaling	Туре	Data type	
1	10000	PHS1	0	Discrete Input	Boolean	EDIT REMOVE
2						EDIT
3						EDIT REMOVE

# Step 7: Add a DO that is to be used to write the "Motor" output to turn the conveyor motor on and off

Set the Motor as a DO tag (use the Modbus Register "0", i.e., DO0). Set the Register Type to "Coil" and "Write" and enter " Motor" in the Alias field. Then, click the SUBMIT button to save the settings.
Edit Group Register Register Type 2.	Alias 3.
Modbus Register 0 Modbus Address (Base 0)	The maximum length for the alias is 8 characters Scaling Disabled
	Scaled value = (A/D value) * Gain. Gain ranges from 0.01 to 655.35
SUE	3MIT 4.

#### Step 8: Add an AI that is to be used to read the speed of the conveyor (In this case, 0-2.5 m/s)

Set the Speed as an AI tag (use the **Modbus Register "0"**, i.e., AI**0**).

(See the figure on the next page)

Set the Register Type to "Input" (Read).
 Enter "Speed" in the Alias field.
 Set the Scaling as "Enabled" and enter the Gain value as "0.25" (i.e., 2.5/10 = 0.25).

In this example, the **Range** of AIO is set to "-10 ~ 10V" and the **Data Format** is set to "Engineering". For more information about the setting, refer to Section 3.2.3 – (E) Analog Input Settings (P49).



4. Click the **SUBMIT** button to save the settings.

Edit Group Register	
Register Type	Alias
Input V Read V	Speed
Modbus Register	The maximum length for the alias is 8 characters
0 🗸	Scaling
Modbus Address (Base 0)	Enabled V 0.25
	Scaled value = (A/D value) * Gain. Gain ranges from 0.01 to $655.35$
SUBI	

#### Step 9: Browse the "Carriage" web page

After clicking the Web HMI item, you can click on the **Carriage** tab to see the added page.

Overview		Motor			TE ALL IMAGES	The tot	tal space availa	ble for storing
Configuration +						the ima	age must be les	so then 64K bytes.
Authentication +								
Web HMI	$\bigcap$	Modbus Register	Alias	Scaling	Туре	Data type		
Web HMI Web Edit	1	10000	PHS1	0	Discrete Input	Boolean	EDIT	REMOVE
Pair Connection	2	00000	Motor	0	Coil	Boolean	EDIT	REMOVE
More Information	3	30000	Speed	0.25	Input	Signed 16	EDIT	REMOVE



On the **Carriage** page, you can click the control button of the motor to set it as ON. For testing, when the AI value is "5", the value will be converted to a conveyor speed of  $5 \times 0.25 = 1.25$  (m/s)



# 3.5. I/O Pair Connection

The "**Pair Connection**" feature enables configuring connections between remote and local I/O, facilitating the remote transmission of input data to output channels.



The **pair connection** function is a particular feature of the ET-7x00/PET-7x00 module that can be used to enable a pair of DI-to-DO (or AI-to-AO) via Modbus TCP.

With the pair connection function enabled, the ET-7x00/ PET-7x00 module can poll the status of remote input devices using the Modbus/TCP protocol and then continuously write to its output channels in the background. The **Pair Connection** function consists of the following parameters:

**<u>Connection Timeout</u>**: The (P)ET-7x00 module wait for a connection to the remote module for a specified period of time.

**<u>Reconnect Interval</u>**: The (P)ET-7x00 module attempt to reconnect to the remote module at specified intervals.

Remote DI to Local DO	
Disable	
Communication Timeout (ms)	IP Address of the Remote Device
1000	192.168.255.200
Scan Time (ms)	Modbus TCP Port
1000	502
Local DO Base Address	Modbus ID
0	1
I/O Count	Remote DI Base Address
8	0

#### Communication Timeout (ms):

The (P)ET-7x00 module wait for a response from the remote module for a specified period of time.

#### IP Address of the Remote Device:

The IP address of the remote module.

#### Scan Time (ms):

The polling frequency of the remote module.

#### Modbus TCP Port:

The Modbus TCP Port of the remote module.

#### Local DO Base Address:

The start number of the local DO channel, used for mapping to the remote DI channel.

#### Modbus ID:

The Modbus Net ID of the remote module.

#### I/O Count:

The count of mapped I/O channels starting from the initial channel number.

#### Remote DI Base Address:

The start number of the remote DI channel, used for mapping to the local DO channel.

Remote AI to Local AO	
	ID Address of the Domeste Device
	192 168 255 200
1000	132.100.233.200
Scan Time (ms)	Modbus TCP Port
1000	502
Local AO Base Address	Modbus ID
0	1
I/O Count 8	Remote Al Base Address 0
	SUBMIT

Except for these two items, all descriptions are the same as noted before.

#### Local AO Base Address:

The start number of the local AO channel, used for mapping to the remote AI channel.

#### Remote AI Base Address:

The start number of the remote AI channel, used for mapping to the local AO channel.

## 3.5.1. Example 1: Pair Connection - AI to AO

This example will describe how to use this feature to achieve remote AI/AO mapping between two I/O modules.

#### Hardware Devices:

- 1. PET-7026 (with AI, AO, DI, and DO)
- 2. ET-7017 (with AI and DO)
- 3. PoE Ethernet Switch
- 4. Power Supply (24 V)
- 5. Power Supply (48 V)



#### **Software Configuration:**

The following provides step-by-step instructions for how to configure the ET-7x00/PET-7x00 via the built-in web interface.

In this example, we will configure the PET-7026's settings page to map its AO to the ET-7017's AI. Then, when the ET-7017's AI receives 7.5V, the PET-7026's AO will automatically output 7.5V.

#### Step 1: Log in to the PET-7026 web interface

Enter the IP address of the PET-7026 in the browser, and then enter your user name and password to log in to the PET-7026 web interface. Refer to chapter 3, "**Web Applications**", for more details.

	<b>6</b> 19	2.168.15	.26	× +		
$\leftarrow$	$\rightarrow$	С	ŵ	() 192.168.15.26	]	
					Sign in to Authorizatio Your connec Username Password	access this site on required by http://192.168.15.26 ttion to this site is not secure Admin  Sign in Cancel

#### Step 2: Configure the AO type for the PET-7026

Click the "Module I/O Settings" option in the Configuration menu and set the voltage (or current) range to "-10 ~ 10V" in the "Analog Output Settings" section. Then, click the "Submit" button. Follow the same procedure to set the AI range for the ET-7017.

Overview	Analog Output Settings	
Configuration – Network Settings	Channel Range <b>2.</b> Slew Rate	
Basic Settings 1.	Ch0 33, -10 ~ 10 V 🗸 00, Immediate	✓ Apply the
Module I/O Settings	Ch1 33, -10 ~ 10 V 💙 00, Immediate	~
Authentication +		
Web HMI +	SUBMIT	

#### **Tips & Warnings**



The settings for both the AO type for the PET-7026 and the AI type for the ET-7017 must be the same. In this example, they are both "-10 ~ 10V".

#### Step 3: Configure the Modbus Settings for the PET-7026

Click the "**Pair Connection**" option in the main menu and enter the details noted in the table below info the respective fields.

Field			Settings			
	Configuration of	Commu	unication			
	Connection Timeout (ms)		Reconnect Interval (ms)			
	3000		5000			
-						
Connec	tion Timeout		3000 ms			
Reconn	ect Interval		5000 ms			
Remo	te AI to Local AO					
Click th	e toggle button to enable t	the I/O pai	ir connection functions. (See the next page)			
Commu	inication Timeout (1000 to	0 12000)	2000 ms			
Scan Ti	me (1000 to 30000)		2000 ms			
Local A	O Base Address		0 (Starting from AO0 on the PET-7026)			
I/O Count			2 (Using AO0, AO1 and AI0, AI1)			
IP Address of the Remote Device			The IP address of the ET-7017 module. (e.g. 192.168.15.17)			
Modbu	s TCP Port		502			
Modbu	s ID		1 (Default = 1, the Net ID for the ET-7017)			
To dete clicking	ermine the Net ID, check the <b>"Module I/O Settings</b>	the <b>"Mo</b> " option ir	dbus Definition" section which can be found by a the "Configuration" menu.			
Ove	rview	Modbus	Definition			
Con	figuration – work Settings	Modbus Addre	ress Function			
Bas	ic Settings	40271	Modbus Unit ID 1 0~255 (default:1)			
Mod	dule I/O Settings		SUBMIT			
Remote	e Al Base Address:		0 (Starting from AIO on the ET-7017)			

After completing the configuration, click the "Submit" button to save the settings.

Remote AI to Local AO	
Enable	
Communication Timeout (ms)	IP Address of the Remote Device
2000	192.168.15.17
Scan Time (ms)	Modbus TCP Port
2000	502
Local AO Base Address	Modbus ID
0	1
I/O Count	Remote AI Base Address
2	0
SI	JBWIT
	$\mathbf{i}$

#### Testing:

Before starting the test, confirm that the data format of ET-7017 is the same as that of PET-7026. To do this, click the "**Module I/O Settings**" option in the "**Configuration**" menu and check the "**Range**" setting in the "Analog Input Settings" section.

Overview	Analo	Analog Input Settings				
Network Settings	Channel		Range			
Basic Settings	Ch0	ullet Enable $igodow$ Disable	08, -10 ~ 10 V	~	Apply the current	
Module I/O Settings	Ch1	$lacel{eq:expectation}$ Enable $\bigcirc$ Disable	08, -10 ~ 10 V	•		
Authentication +	Ch2	🔿 Enable 🖲 Disable	08, -10 ~ 10 V	~		

To supply +7.5V to Al0 and +5.5V to Al1 on the ET-7017 and click the "**Web HMI**" item in the "**Web HMI**" menu.

The wiring for ET-7017 in this example:

ET-7017		External Power	ET-7017		<b>External Power</b>
Vin0+	$\rightarrow$	+Vs (7.5V)	Vin1+	$\rightarrow$	+Vs (5.5V)
Vin0-	$\rightarrow$	GND	Vin1-	$\rightarrow$	GND



Click the "**AI**" tab on the **Web HMI** page of the ET-7017. As shown in the figure below, Al0 received about 7.5V. Al1 received about 5.5V.

ET-7017 THIS COMPUTER - (2) - ET-7000								
Channel	No. Actual Value	Historical Max/Min Value		High/Low Alarm				
(	<b>7.494</b> v	Max: 7.494 V	Min: -0.022 V	High Alarm: OFF	Low Alarm: OFF			
AIU	Modbus 30000: 1D46	Modbus 30236: 1D46	Modbus 30268: FFEA	Modbus 10224: 0	Modbus 10256: 0			
	5.494 v	Max: 5.499 V	Min: 0.0 V	High Alarm: OFF	Low Alarm: OFF			
AIT	Modbus 30001: 1576	Modbus 30237: 157B	Modbus 30269:0000	Modbus 10225: 0	Modbus 10257: 0			
410	<b>0.0</b> v	Max: -10.0 V	Min: 10.0 V	High Alarm: OFF	Low Alarm: OFF			
AI2	Modbus 30002: 0000	Modbus 30238: D8F0	Modbus 30270: 2710	Modbus 10226: 0	Modbus 10258: 0			

Next, click the "**AO**" tab on the **Web HMI** page of the ET-7026 and you can see that AO0 outputs about 7.5 V and AO1 outputs about 5.5V. automatically.

ET-	<sup>7026</sup> TH	IS COMPUTER - 🐴 - ET-7000				
AI AO DI DO CARRIAGE PAIR CONNECTION						
Analog Outputs						
Channel No.	Actual Value	Output Value	Action			
Channel No. AO0	Actual Value 7.496 v Modbus 40232: 1D48	Output Value -10 ~ 10 V Modbus 40000: 0000	Action			

### 3.5.2. Example 2: Pair Connection - DI to DO

In this example, we will show how to use this feature to achieve remote DI/DO mapping between two I/O modules.

#### Hardware devices:

- 1. PET-7026 (with AI, AO, DI, and DO)
- 2. PET-7044 (with DI and DO)
- 3. PoE Switch
- 4. Power Supply (48 V).



#### **Software Configuration:**

The following provides step-by-step instructions for how to configure the ET-7x00/PET-7x00 via the built-in web interface.

In this example, we will configure the settings page of PET-7026 to map its DO to the DI of PET-7044. Then, when the DI status of PET-7044 changes to ON, the DO of PET-7026 will automatically be set to ON.

#### Step 1: Log in to the PET-7026 web interface

Enter the IP address of the PET-7026 in the browser, and then enter your user name and password to log in to the PET-7026 web interface. Refer to chapter 3, "**Web Applications**", for more details.

	<b>6</b> 19	92.168.15	.26	× +		
$\leftarrow$	$\rightarrow$	С	ŵ	() 192.168.15.26	]	
					Sign in to Authorizatio Your connec Username Password	access this site on required by http://192.168.15.26 ttion to this site is not secure Admin  Sign in Cancel

#### Step 2: Configure the Modbus Settings for the PET-7026

Click the **"Pair Connection"** option in the Main Menu, and enter the details listed in the table below into the respective fields.

Field		Settings		
	Configuration of Comm	unication		
	Connection Timeout (ms)	Reconnect Interval (ms)		
	3000	5000		
Connec	tion Timeout	3000 ms		
Reconn	ect Interval	5000 ms		
Remo	te DI to Local DO			
Click th	e toggle button to enable the I/O pa	ir connection functions.		
Commu	inication Timeout (1000 to 12000)	1000 ms		
Scan Time (1000 to 30000)		1000 ms		
Local DO Base Address		0, starting from DO0 on the PET-7026		
I/O Cou	nt	2, using DO0, DO1, and DI0, DI1		

IP Address of the Remote Devi	ce	The IP address of the PET-7044 module. (e.g. 192.168.15. 44)
Modbus TCP Port		502
Modbus ID		1 (Default = 1, the Net ID for the PET-7044)
To determine the Net ID, ch clicking the <b>"Module I/O Setti</b>	eck the " <b>M</b> e ngs" option i	odbus Definition" section which can be found by in the "Configuration" menu.
Overview Configuration –	Modbus Add	s Definition
Network Settings Basic Settings	40271	Modbus Unit ID 1 0~255 (default:1)
Authentication _		SUBMIT

After completing the configuration, click the "**Submit**" button to save the settings.

Remote DI to Local DO	
Enable	
Communication Timeout (ms)	IP Address of the Remote Device
1000	192.168.15.44
Scan Time (ms)	Modbus TCP Port
1000	502
Local DO Base Address	Modbus ID
0	1
$\frown$	
1/O Count	Remote DI Base Address
2	0
SUBMIT	

#### For Testing the function:

The user can view the Wire Connection in the data sheet on <u>the product page</u>. In this example, the wiring of the PET-7044 is shown below.

DO.PWR DOx

DO.GND

PET	-7044	1	External Power		
INO	$\rightarrow$	DO0			0-
IN1	$\rightarrow$	DO1		IN.COMx	
IN.COM	$\rightarrow$	DO.PWR		INX	
		DO.PWR $\rightarrow$	Vs (24V, 10 – 50V)		An
		DO.GND $\rightarrow$	GND		

On the **Web HMI** page of the PET-7044. Depending on the wiring above, if DO1 is set to ON, DI1 will become ON.

Overview		Digital Inp	uts				
Configuration	+	Channel No.	Modbus Register	Status	Counter	High Latched	Low Latched
Authentication	+	DI0	10000	OFF		-	-
Web HMI	_ _	DI1	10001	ON	2.	-	-
Web Edit		DI2	10002	OFF	-	-	-
		Digital Out	puts				
		Channel No.	Modbus Regist	er	Status	Action	
		DO0	00000		OFF	1. OFF	ON
		D01	00001		ON	OFF	ON
							$\overline{\mathbf{V}}$

On the "Web HMI - DO" page of PET-7026, the status of DO1 becomes ON automatically.

Overview		THIS COMPU	ter - 🐴 -	ET-7000		
Configuration +			ONNECTION			
Authentication +			onneerion			
Web HMI _	Digital Outputs					
Web HMI	~			• #		
Web Edit	Channel No.	Modbus Register	Status	Action		
	DO0	00000	OFF	OFF ON		
	DO1	00001	ON	OFF ON		

# 3.6. Maintenance

The function is supported sine the firmware version 3.11.

#### Import / Export Configuration:

Used to import or export the configuration file of the I/O module.



The "Maintenance" menu as below:



The "**Import / Export Configuration**" page allows users to import or export the configuration file of the module.

Import / Export Configuration							
Version 1.0, initially released in version 3.1.	.1 of firmware.						
<ol> <li>Select Source</li> <li>CHOOSE FILE</li> <li>Select Configuration Items</li> <li>IMPORT CANCEL</li> </ol>	add comments to the configuration file						

#### **Export the Configuration**

After completing the module settings, the user can add some notes in the text box and then click the "**Export**" button to export the configuration file. The file will be saved in your default download location.

(File name: module name\_cfg\_v1.bin)



http://192.168.79.1	☆ O D	$(\overline{\mathbf{T}})$
A Annual Long	Recent download history	$\otimes$
as com	et7005_cfg_v1.bin         P           2,222 B • 13 minutes ago         P	Ø
Import / Export Configuration	ET7005_V311.HEX 186 KB • 3 hours ago	

#### **Import the Configuration**



**Step 2:** Choose the file (.bin) to be imported, and then click the "**Open**" button.

🚱 Open			×
$\leftarrow \rightarrow$ $\checkmark$ $\uparrow$ $\frown$ w Desktop $\Rightarrow$ IO_File	√ Ū	Search IO_File	م
Organize 🔻 New folder			
et7005_cfg_ v1.bin			
File name: et7005_cfg_v1.bin	~	所有檔案 (*.*)	~
		Open	Cancel

Import / Export Configuration								
Version 1.0, initially released in version 3.1.1 of firmware.								
Select Source	add comments to the configuration file							
et7005_cfg_v1.bin 2024/4/11 下午	6							
12:01:15								
(P)ET-7005-2024-04-11	EXPORT							
Select Configuration Items								
Entire Configuration (includes all configuration below)								
Network Settings								
Basic Settings								
Module I/O Settings								
Account Management / User Accounts								
Accessible IP Settings	t, all options are checked,							
Web HMI and the A	ccessible IP Settings							
Pair Connection cannot be	e overwritten.							
3 IMPORT CANCEL								

Users can uncheck unwanted items or select only the "Entire Configuration" option, which includes all default checked options.



**Step 3:** Click the "**Import**" button, and the prompt message will appear based on the module settings. Users can review the imported configuration values again.

Ø	Select Configuration Items
	Entire Configuration (includes all configuration below)
	Network Settings
	Basic Settings
	Module I/O Settings
	Account Management / User Accounts
	× Accessible IP Settings
	Web HMI
	Pair Connection
	Import
	6 of 6 items were successfully imported.
1	Make sure to remember these new settings.
×	This module has an IP address of 192.168.79.1.
	<ul> <li>Ine built-in web server uses TCP port 80 for HTTP communication.</li> <li>Log in to the web server with the username 'Admin' and password '1111'</li> </ul>
	- Log in to the web server with the userhame Admin and password 1111.

# 3.7. More Information

The "More Information" option in the main menu can be used to open the ICP DAS site in your browser. The default URL is <u>http://www.icpdas.com</u>.



Also, refer to Section 3.2.2 Basic Settings to modify the URL if it is necessary.

verview	Basic Setting	s
onfiguration _		
Network Settings	Module Name	ET-7255/PET-7255
Basic Settings	Module	8 DI, 8 DO Maximum of 16 characters (The content cannot include ' or " characters)
Module I/O Settings	Information	
uthentication +	Page Header	ICP DAS Maximum of 20 characters
Ap HMI +	(First line)	Color Red V Font size 7 V
air Connection	Page Header	http://www.icndas.com Maximum.of.50 characters
	Information (Second line)	Color Green V Font size 3 V
ore Information	(,	
	More	https://www.icpdas.com/en/download/index.php
	Information URL	Maximum of 100 characters
	Web Server Port	80
	Port	502
	Modbus TCP	502 This setting can be ignored if ET-7200/PET-7200 is not behind a router

# Chapter 4. Modbus TCP/IP

With the support of the Modbus TCP protocol, the (P)ET-7000/(P)ET-7200 series module can send Modbus data via Ethernet for remote I/O monitoring applications. Modbus TCP is an Ethernet communication based on the Master/Slave (or Client/Server) architecture. The Master sends a query or control command, and the Slave executes the Master's request according to the function code in the command and then responds with a message to the Master.

The Modbus TCP Client connects to the (P)ET-7x00 with standard TCP/IP communication. Up to 12, Modbus TCP connections are available at one time for a (P)ET-7x00. Visit the website <a href="http://www.modbus.org">http://www.modbus.org</a> for more information about the Modbus protocol.

## 4.1. Modbus TCP/IP Message Format

Modbus TCP ADU consists of the Modbus Application Protocol (MBAP) Header and the Modbus PDU. When sending a Modbus message, the MBAP header is used for identifying the Modbus TCP package.

Modbus TCP Application Data Unit (ADU)						
MBAP Header	Data					
	Protoc	col Data Unit (PDU)				

#### **MBAP Header**

Field	Length	Description
Transaction Identifier	2 bytes	Specified by Modbus TCP Master (Client)
Protocol Identifier	2 bytes	0 = Modbus protocol
Length Field	2 bytes	Number of following bytes (Counting from the <b>Unit Identifier</b> to the last data of PDU)
Unit Identifier	1 byte	Identification of the remote Slave device

#### **Function Code**

Modbus TCP supports several function codes, and the Slave device can perform actions according to function codes. The Modbus/TCP feature of the ET-7x00/PET-7x00 series module supports eight function codes, which allows read/write data from/to the register.

Function Code	Function
01 (0x01)	Read Coil Status
02 (0x02)	Read Input Status
03 (0x03)	Read Holding Registers
04 (0x04)	Read Input Registers
05 (0x05)	Force Single Coil
06 (0x06)	Preset Single Register
15 (0x0F)	Force Multiple Coils
16 (0x10)	Preset Multiple Registers

Any function codes that are not supported by ET-7000/ET-7200 will be replied to with an exception code to inform the Client to do appropriate actions

#### Data

The data field is used to specify the register's address of the Slave device to be accessed. In addition, the data field needs to contain the necessary information according to the function code, such as the number of registers to be accessed.

#### Response

When the Master sends a request to the Slave device, the following conditions may occur.

- 1. If the Slave receives the request and no communication error occurs, it will make a normal response.
- 2. If the Slave does not receive a request due to a communication error or if the unit ID in the request does not match, it will not respond.
- 3. If the Slave receives a request but the function code is not supported or the specified register address is incorrect, it will respond with an exception code to notify the Master for appropriate processing.



# 4.2. Function Code

## 4.2.1. 01 (0x01) Read Coils

This function code is used to read the status of digital outputs.

Here is an example of a request to read two digital outputs of the ET-7026/PET-7026 module:

Request		Response		
Field Name		(Hex)	Field Name	(Hex)
		01		01
		02		02
MPAD Hondor		00	MPAD Hoodor	00
MBAP Header		00	MBAP Header	00
		00		00
		06		04
Unit ID		01	Unit ID	01
Function Code		01	Function Code	01
Hi		00	Byte Count	01
Starting Address	Lo	00	Outputs Status (0-1)	02
Channel	Hi	00		
Channels	Lo	02		

The status of outputs in the Modbus response is expressed in hexadecimal 02, also binary 0000 0010. The LSB (Least Significant Bit) indicates the status of DO0 (0=OFF) and the bit1 indicates the status of DO1 (1=ON).

## 4.2.2. 02 (0x02) Read Discrete Inputs

This function code is used to read the status of digital inputs.

Here is an example of a request to read two digital inputs of the ET-7026/PET-7026 module:

Request			Response		
Field Name		(Hex)	Field Name	(Hex)	
		01		01	
		02		02	
MPAD Hondor		00	MPAD Header	00	
MBAP Header		00	MBAP Header	00	
		00		00	
				04	
Unit ID		01	Unit ID	01	
Function Code		02	Function Code	02	
Hi		00	Byte Count	01	
Starting Address	Lo	00	Digital Inputs Status (0-1)	03	
	Hi	00			
Quantity of Inputs	Lo	02			

The status of inputs in the Modbus response is expressed in hexadecimal 03, also binary 0000 0011. The LSB (Least Significant Bit) indicates the status of DI0 (0=OFF) and the bit1 indicates the status of DI1 (1=ON).

## 4.2.3. 03 (0x03) Read Holding Registers

This function code is used to read the value of analog outputs.

Request			Response		
Field Name		(Hex)	Field Name		(Hex)
		01			01
		02			02
MDAD Lloador		00			00
MBAP Header		00	WBAP Header		00
		00			00
					07
Unit ID		01	Unit ID		01
Function Code		03	Function Code		03
Chanting Address	Hi	00	Byte Count		04
Starting Address	Lo	00	Pagister Value (AQQ)	Hi	02
	Hi	00	Register value (AOO)	Lo	2B
Quantity of Outputs	Lo	02		Hi	00
			Register value (AUI)	Lo	64

Here is an example of a request to read two analog outputs of the ET-7026/PET-7026 module:

The AO value is made up of 1 word (2 bytes). The AOO value in the Modbus response is expressed in hexadecimal 022B, i.e., decimal 555. The AO1 value is expressed in hexadecimal 0064, i.e., decimal 100.

## 4.2.4. 04 (0x04) Read Inputs Registers

This function code is used to read the value of analog inputs.

Request			Response		
Field Name		(Hex)	Field Name		(Hex)
		01			01
		02			02
MPAD Hoodor		00			00
MBAP Header		00	MBAP Header		00
		00			00
		06			07
Unit ID		01	Unit ID		01
Function Code		04	Function Code		04
Starting Address	Hi	00	Byte Count		04
Starting Address	Lo	00	Pagistor Value (AIO)	Hi	00
Quantity of Inputs Lo		00	Register Value (Alu)	Lo	0A
		02		Hi	00
			Register value (ALL)	Lo	64

Here is an example of a request to read two analog inputs of the ET-7026/PET-7026 module:

The AI value is made up of 1 word (2 bytes). The AIO value in the Modbus response is expressed in hexadecimal 000A, i.e., decimal 10. The AI1 value is expressed in hexadecimal 0064, i.e., decimal 100.

## 4.2.5. 05 (0x05) Write Single Coil

This function code is used to write a single DO to either ON or OFF.

Request			Response		
Field Name		(Hex)	Field Name		(Hex)
		01			01
		02			
MPAD Hondor		00			00
MBAP Header		00	MBAP Header		00
		00			00
		06		06	
Unit ID		01	Unit ID		01
Function Code		05	Function Code		05
Output Address	Hi	00		Hi	00
Lc		01	Output Address	Lo	01
Hi Hi		FF	Output Value	Hi	FF
Output value	Lo	00	Output Value	Lo	00

Here is an example of a request to write DO1 of ET-7026/PET-7026 ON:

In the Modbus request, the output value is FF00 in Hex which means to output ON; the output value is 0000 in Hex which means to output OFF. The normal response is an echo of the request, returned after the DO status has been written.

## 4.2.6. 06 (0x06) Write Single Register

This function code is used to write a single AO value. The normal response is an echo of the request, returned after the value has been written.

Here is an example of a request to write AO1 of ET-7026/PET-7026 to 55 FF (hex):

Request			Response		
Field Name		(Hex)	Field Name		(Hex)
		01			01
		02			02
MPAD Hondor		00	MPAD Hondor		00
MBAP Header		00	MBAP Header		00
		00			00
		06		06	
Unit ID		01	Unit ID		01
Function Code		06	Function Code		06
Degister Address	Hi	00		Hi	00
Lo		01	Register Address	Lo	01
Hi		55	Destates Males	Hi	55
Register value	Lo	FF	Register Value	Lo	FF

## 4.2.7. 15 (0x0F) Write Multiple Coils

This function code is used to write several DO to either ON or OFF.

The requested ON/OFF states are specified by the contents of the request data field. A logical '1' in a bit position of the field requests the corresponding output to be ON. A logical '0' requests it to be OFF. The normal response returns the function code, starting address, and several digital outputs to be written.

Here is an example of a request to write a series of 2 digital outputs starting at DOO:

The request data content is one byte: **02** hex (0000 0010 binary). The binary bits correspond to the outputs in the following way:

Bit (0-7)	0	0	0	0	0	0	1	0
Output	_	-	_	-	_	-	DO1	DO <b>0</b>

Reque	st		Response			
Field Name		(Hex)	Field Name		(Hex)	
		01			01	
		02			02	
MDAD Lloader		00	MDAD		00	
MBAP Header		00	MBAP Header		00	
		00				
		08			06	
Unit ID		01	Unit ID	01		
Function Code		OF	Function Code		OF	
Starting Address	Hi	00	Starting Address	Hi	00	
Starting Address	Lo	00	Starting Address	Lo	00	
Quantity of Outputs Lo		00	Quantity Value Hi Lo		00	
		02			02	
Byte Count		01				
Outputs Value Lo		02				

## 4.2.8. 16 (0x10) Write Multiple Registers

This function code is used to write several AO values. The normal response returns the function code, starting address, and the number of analog outputs to be written.

Reque	st		Response			
Field Name		(Hex)	Field Name		(Hex)	
		01			01	
		02			02	
MPAD Hoodor		00			00	
WIDAP Reduel		00	WIDAP REduct		00	
		00			00	
		OB		06		
Unit ID		01	Unit ID		01	
Function Code		10	Function Code		10	
Starting Address	Hi	00	Starting Address	Hi	00	
Starting Address	Lo	00	Starting Address	Lo	00	
Quantity of Degisters	Hi	00	Quantity Value	Hi	00	
Quantity of Registers	Lo	02	Quantity value	Lo	02	
Byte Count		04				
Hi		00				
Degisters Value	Lo	0A				
Registers value	Hi	01				
	Lo	02				

Here is an example of a request to write two AO values starting at AOO:

The AO value is made up of 1 word (2 bytes). In the Modbus request, the AO0 value to be written is 000A in hexadecimal and the AO1 value to be written is 0064 in hexadecimal.

## 4.3. Modbus Master Simulators

In the previous section, we introduced the Modbus communication protocol. Now, we will describe how to achieve the Modbus/TCP communication between the ET-7x00/PET-7x00 module and PC-connection.

## 4.3.1. Modbus/TCP Client

**Modbus Utility** is a Modbus master simulator and test utility designed primarily to help users who want to test and simulate the Modbus protocol. Using the Modbus/TCP Client application, you can compose and send individual Modbus requests to a Modbus slave, and it can also continually poll (send read and write requests to) the slave. Subsequently, you can re-run the sequence of commands.

For each Modbus request, you specify the slave ID, function code, starting address, and quantity. You can refer to the previous section for more detailed information about the Modbus communication protocol. The software can be obtained from the website at:

www.icpdas.com/en/product/guide+Software+Development\_\_Tools+Modbus\_\_Tool#676 or www.icpdas.com/en/download/show.php?num=1028

The following instructions will help you to read the status of digital inputs in an ET-7026 by using the **Modbus Utility**.

**Step 1:** Right-click the **Modbus Utility** and select the **Run as administrator** option. Next, click the Modbus/TCP button for the ET-7000 module.



🚟 Modbus Utility Ver 1.8.5 2021/06/30 Window Client Tools Settings Help File Modbus/TCP Client al Modbus/RTU Client ale Sav Load Help Exit Trenc UDP Search Counter/Freq Settings I-10ET-Update Firmware

Step 2: Select the Modbus/TCP Client item from the Client Tools menu.

**Step 3:** Enter the IP address of ET-7026 in the **Modbus TCP** section and click the "**Connect**" button to connect the module.

	S, MBTO	CP Ver. 1.1.5		$\times$
(	Mod	ousTCP	Protocol Description	
l	ID	192.168.15.26	FC1 Read multiple coils status (0xxxx) for D0	-
	Port	502	[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	î
		Connect Disconnect	Byte 2: Protocol identifier=0 Byte 3: Protocol identifier=0 Byte 4: Field Length (upper byte)=0	¥

**Step 4:** In this case, the request is to read the status of DIO and DI1 on ET-7026 and its Modbus ID is "**1**". Click the "**Send Command**" button to send the Modbus request to ET-7026.

Ę	, MBTO	CP Ver. 1.1.5		×				
	Mod	busTCP	6	Protocol Description				
	IP	192.168.15.26		FC2 Read multiple input discretes (1xxxx) for DI				
	 Port	502		[Prefixed 6 bytes for Modbus/TCP protocol] Byte 0: Transaction identifier - copied by server - usually 0				
		Connect Disconnect		Byte 1: Transaction identifier - copied by server - usually 0 Byte 2: Protocol identifier=0 Byte 3: Protocol identifier=0				
		Data Log		Byte 4: Field Length (upper byte)=0 FC2: Read multiple DI				
	- Polling f	Mode (No Waiting)	[	Difference     Clear Statistic       Commands     Difference       Total Packet Size (Bytes)     0       0000 %     Dasket Quantity				
	– Timer M	lode (Fixed Period)						
	Interv	al 100 ms Set		Polling or Timer Mode (Date/Time)         Polling Mode Timing (ms)           Start Time         Max         0				
	Header ID=1, Function Code=2, Starting Address=00, Quantity of Inputs=02							
C	[Byte0] [Byte1] [Byte2] [Byte3] [Byte4] [Byte5] 1 2 0 0 0 6 1 2 0 0 0 2 Send Command							

Λ

**Step 5:** If no error occurs, a data field of a response from the ET-7026 to the Modbus TCP Client contains the status of digital inputs of ET-7026.

MBTCP Ver. 1.1.5	×
ModbusTCP IP 192.168.15.26 Port 502 Connect Disconnect Data Log	Protocol Description         FC2 Read multiple input discretes (1xxxx) for DI         [Response]         Byte 0:       Net ID (Station number)         Byte 1:       FC=02         Byte 2:       Byte count of response (B=(bit count + 7)/8)         Byte 3-(B+2): Bit values (least significant is first coil!)
Folling Mode (No Waiting)       Start     Stop       Timer Mode (Fixed Period)       Interval     100       Start     Stop	Statistic       Clear Statistic         Commands       Difference in Packet       Responses         Total Packet Size (Bytes)       12       0.00 %         Packet Quantity Sent       1       0         Polling or Timer Mode (Date/Time)       Polling Mode Timing (ms)         Start Time       Start Time         Stop Time       Stop Time
[Byte0] [Byte1] [Byte2] [Byte3] [Byte4] [By 1 2 0 0 0 6 1 2 0 0 0 2 [Byte0] [Byte1] [Byte2] [Byte3] [Byte4] [By 01 02 00 00 00 06> 01 02 00 00 00 02	te5] [Byte0] [Byte1] [Byte2] [Byte3] 01 02 00 00 00 04 0 01 02 01 00 ID=01, Function Code=02, Byte Count=01, DI0 and DI1=OFF
Clear	Lists EXIT Program

For a more detailed description of this function code, see the "**Protocol Description**" group box.

### 4.3.2. Modbus Master Tool

Modbus Master Tool is a Modbus master simulator designed by ICP DAS. It is used to help developers of Modbus slave devices or others that want to test the Modbus connection. The software can be obtained from the website at:

www.icpdas.com/en/product/guide+Software+Development\_\_Tools+Modbus\_\_Tool#674

The following are step-by-step instructions on how to read the DO status of PET-7026.

#### Step 1: Double-click the "ModbusMasterToolPC.exe" to open it.



#### Step 2: Click the "Setup > Definition" in the menu bar to setup the parameters.

🔝 Modbu	s Master Tool V1.1.5.0	2021/06/0	4D:\ModbusMaste	erToolPC\Configurati	_	×
File Set	up Connection Wi	indow A	bout			
M N	Definition	J				
Slave	New Window					
Error	Set Value					
AI (1	Set Description	Value	Description			
0 (0x0)		0				
1 (0x1)		0				
2 (0x2)		0				
3 (0x3)		0				
4 (0x4)		0				
5 (0X5)		0				
7(0x7)		0				
8 (0x8)		0				
9 (0x9)		0				
		Ŭ				
					-	
						.::

We use the same example in <u>section 4.5.1</u>; you can see the parameters in the table.

Step	Request			You can go to "Madulas 1/0 Sattings"			
	Data Field	(Hex)		(section 3.2.3) to check/set the ID.			
1	Unit Identifier	01					
2	Function Code	01		01 (0x01) Read Coils			
2	Starting Address Hi	00					
3	Starting Address Lo	00		Starting from DO0			
4	Quantity of Outputs Hi	00					
4	Quantity of Outputs Lo	02		Read two channels			



#### Tips & Warnings



When reading or writing the AO or AI channel, select the "Hex" options in the "Format" drop-up menu.
#### Step 3: Click the "Connection > Connect" to set TCP Connection.

File	Setup	Connection	Window	Ab	bout	
Martin		Conne	ct			
Slave ID = 1,						
DO	DO (0x) Base 0 Va			ie I	Description	
0 (0	x0)			0		
1 (0	x1)					

- 1. Select "TCP/IP" in the "Interface" field.
- 2. Fill out the PET-7026's IP address in the "Remote Server IP".
- 3. You can keep the settings of other fields or change them then click OK.

👿 Connect	1.			×
Interface:	TCP/IP	~	Scan Interval(ms):	220
Remote Server IP:	192.168.79.2	2.	Timeout(ms):	200
Modbus TCP Port:	502		Delay Between Poll(ms):	20
				3.
			Cancel	ОК

Now, the DO status of PET-7026 will show on the screen. (1: ON; 0: OFF)

M M	odbus Ma	aster Tool V1.1	1.5.0 2021/06	5/04D:\	uninst	all_tool\M.	—		×
File	Setup	Connection	Window	Abou	ıt				
Slav	Master0 Slave ID = 1, FC = 1 Error = 0								
DC	DO (0x) Base 0 Value Description								
0 (	0 (0x0) 1								
1 ((	Dx1)			0					
Connec	Connection is established. IP= 192.168.79.2								

## 4.4. Modbus Demo Programs

nModbus is a C# 3.0 implementation of the Modbus protocol. It is developed and maintained voluntarily and provided free of change.

The DLL based on the official releases from <u>http://nmodbus.googlecode.com</u> was verified and improved. Programmers can use the DLL released to develop a Modbus application for regular Windows-based PCs.

The relevant Modbus demo and SDK can be obtained from the following ICP DAS website.

• Documents, DLL, and Demo:

https://www.icpdas.com/en/download/index.php?root=&model=&kw=nModbus

## **Chapter 5.** Calibration

#### **Tips & Warnings**



It is not recommended that calibration be performed until the process is fully understood.

### 5.1. Voltage and Current Calibration

#### Analog Input Calibration Requirement for ET-7x00/PET-7x00

Connect the calibration voltage/current source to channel 0 and only channel 0 should be enabled during calibration.

#### **Type Code**

The following table shows all of the type codes for use in voltage and current, you can use it upon the model number of ET-7x00/PET-7x00 (e.g. ET-7017 can use type 07  $\sim$  1A).

Type Code	00	01	02	03	04
Zero Input	0 mV	0 mV	0 mV	0 mV	0 V
Span Input	n Input +15 mV +		+100 mV	+500 mV	+1 V

Type Code	05	06	07	08	09
Zero Input	0 V	0 mA	0mA	0 V	0 V
Span Input	pan Input +2.5 V		+20 mA	+10V	+5 V

Type Code	0A	ОВ	0C	0D	1A
Zero Input	0 V	0 mV	0 mV	0 mA	0 mA
Span Input +1 V		+500 mV	+150 mV	+20 mA	+20 mA

The following steps will show you how to calibrate the ET-7017 (8 AI, 4 DO):

#### Step 1: Warm up the module for 30 minutes.

#### Step 2: Enable channel 0 to calibrate and disable other channels.

Go to the configuration page of Modules I/O Settings, and set AIO as ON and the others as OFF.

#### Step 3: Set the type code to the type you want to calibrate.

Select the AI range (e.g. 09, -5V ~ 5V) then click the "Submit" button.

Overview		Analo	g Input	Settings		
Configuration	-	Channel	1.		Range	3.
Network Settings		Ch0	Enable	O Disable	095 ~ 5 V	<ul> <li>Apply the current settings to all channels</li> </ul>
Basic Settings						
Module I/O Settings		Ch1	O Enable	Disable	08, -10 ~ 10 V	<b>~</b>
Authentication	+	Ch2	O Enable	Disable	08, -10 ~ 10 V	~
Web HMI	+	Ch3	O Enable	Disable	08, -10 ~ 10 V	•
Pair Connection		Ch4	O Enable	Disable	08, -10 ~ 10 V	~
More Information		Ch5	O Enable	Disable	08, -10 ~ 10 V	•
		Ch6	O Enable	Disable	08, -10 ~ 10 V	~
	(	Ch7	O Enable	Disable	08, -10 ~ 10 V	~
				2.	SUBMIT	

#### Step 4: Enable calibration.

We will complete steps 4 to 8 by using Modbus Master Tool.

Modbus Master Tool can be obtained from the ICP DAS FTP site at:

https://www.icpdas.com/en/product/guide+Software+Development\_\_Tools+Modbus\_\_Tool#674

4.1 Double-click the "ModbusMasterToolPC.exe" to open it and click the "Setup > Definition" in the menu bar to setup the parameters.



#### **Modbus Address for Calibration**

	Register	Points	Description	Access Type
			Enable/Disable Calibration	
	00830	1	0=Disabled	R/W
			1=Enabled	
	00831	1	Zero calibration command of ch0 (1 = run)	W (Pulse)
	00832	1	Span calibration command of ch0 (1 = run)	W (Pulse)

# <u>Note:</u> When calibrating the current type (i.e. type 06, 07, and 1A), the jumper of the corresponding channel should be short.

Refer to the **ET-7x00 and PET-7x00 Register Table** for details. https://www.icpdas.com/en/download/show.php?num=2217 4.2 Click the "**Connection > Connect**" in the menu bar and enter ET-7017's IP address to establish a TCP Connection.

	File	Setup	Connection	n Window	About		
Connect	M Slav	Master0 /e ID = 1;	Conne Discor	nnect			×
Interfac	e:	TCP/IP	~	Sca	n Interval(r	ns):	220
Remote Server	IP:	192.168.1	.5.17		Timeout(r	ns):	200
Modbus TCP Po	rt: [	502		Delay Bet	ween Poll(r	ns):	20
					Cancel		ок 🛌

4.3 Double-click on address 830 to set it as "**ON**". (Enable Calibration)

File	Setup	Connectio	n Window	About			
M N	aster0	FC = 1					×
Error	= 0	FC = 1					
DO	(0x) Ba	se 0	Valu	e Des	cription		
830	(0x33E	E)		1			
831	(0x33F	)		0			
832	(0x340	) 🔤	Coil Value			$\times$	
			ON O	OFF	OK Cance		

#### Step 5: Apply the zero calibration voltage/current to channel 0.

In this example, we use type code - 09 and its "Zero Input" is 0 V.

Type Code	09
Input Range	-5V ~ +5 V

#### Step 6: Send the zero calibration command.

Double-click on address 831 to set it as ON. If the calibration is successful, the value will return 0.



#### Step 7: Apply the span calibration voltage/current to channel 0.

In this example, we use type code - 09 and its "Span Input" is +5 V.

Type Code	09
Input Range	-5V ~ +5 V

#### Step 8: Send the span calibration command.

Double-click on address 832 to set it as ON. If the calibration is successful, the value will return 0.



#### Step 9: Disable calibration.

As figure above, double-click on address 830 to set it as "OFF".

## 5.2. Thermocouple Calibration

### **Type Code**

The following table shows all of the type codes for use in the thermocouple.

Type Code	14	18	OE 10 12 13 15 16 19						OF	11	17	
Thermocouple Calibration Range	0	0		01						02		
Zero Input	0 r	nV		0 mV						0 mV		
Span Input	+15	mV		+50 mV						+100 mV		

The calibration procedure is similar to section 5.1. But, the difference between them is that the ET-7x00/PET-7x00 doesn't directly support type code - **0E** ~ **19** for AI calibration, so you need to change the channel 0 as a range - **00** ~ **02** to complete the work, refer to section 5.1 step 3.

- Step 1 Warm up the module for the latest 30 minutes.
- Step 2 Set the type code to the type you wish to calibrate.
- Step 3 Enable calibration.
- Step 4 Apply the zero calibration voltage to channel 0.
- Step 5 Send the zero calibration command.
- Step 6 Apply the span calibration voltage to channel 0.
- **Step 7** Send the span calibration command.
- Step 8 Disable calibration.

#### For example

If you want to calibrate **type 0E**, you need to set the Range of channel 0 to **[01] ±50 mV**.

Modbus Settings (Al Basic Setting)						
	Range (40427)	Enable (00595)				
Ch0	[01] +/-50mV	OFF ON 📀				
Ch1	[05] +/-2.5V	OFF ON O				
Ch2	[05] +/-2.5V	OFF ON O				

## 5.3. RTD Calibration

### **Type Code**

The following table shows all of the type codes for use in RTD calibration.

Type Code	20 ~ 29	<b>2</b> E	2F	80	81	83	2B	2C	82	2A	2D	
Zero Calibration Resistor		0 Ω							0 Ω			
Span Calibration Resistor			375 Ω	2				200 Ω	2	320	0Ω	

#### **Modbus Address for Calibration**

Register	Points	Description	Access Type
		Enable/Disable Calibration	
00830	1	0=Disabled	R/W
		1=Enabled	
00831	1	Zero calibration command of ch0 (1=run)	W (Pulse)
00832	1	Span calibration command of ch0 (1=run)	W (Pulse)
00833	1	Zero calibration command of ch1 (1=run)	W (Pulse)
00834	1	Span calibration command of ch1 (1=run)	W (Pulse)
00835	1	Zero calibration command of ch2 (1=run)	W (Pulse)
00836	1	Span calibration command of ch2 (1=run)	W (Pulse)
00837	1	Zero calibration command of ch3 (1=run)	W (Pulse)
00838	1	Span calibration command of ch3 (1=run)	W (Pulse)
00839	1	Zero calibration command of ch4 (1=run)	W (Pulse)
00840	1	Span calibration command of ch4 (1=run)	W (Pulse)
00841	1	Zero calibration command of ch5 (1=run)	W (Pulse)
00842	1	Span calibration command of ch5 (1=run)	W (Pulse)

The calibration procedure is similar to section 5.1. However, the RTD calibration required an external resistor and must be calibrated for each channel rather than just the ch0 we mentioned before.

The calibration procedure is as follows:

- Step 1 Warm up the module for the latest 30 minutes.
- Step 2 Set the type code to the type you wish to calibrate.

Step 3 Enable calibration.

- Step 4 Connect the zero calibration resistor. (Refer to the table – Type Code)
- Step 5 Send the zero calibration command. (Refer to the table - Modbus Address for Calibration)
- Step 6 Connect the span calibration resistor. (Refer to the table – Type Code)
- Step 7Send the span calibration command.(Refer to the table Modbus Address for Calibration)
- Step 8 Disable calibration.

## 5.4. Recover Calibration to the Factory Setting

In the Modules I/O Settings – Analog Input Settings configuration page, click the "Restore Analog Calibration to Factory Settings" item and click the Submit button to complete the function.

Overview	Analog Inpu	ut Settings		
Configuration _	Channel		Range	
Network Settings	Ch0 🖲 Ena	able $^{\bigcirc}$ Disable	09, -5 ~ 5 V 🗸	Apply the current settings to all channels
Module I/O Settings	Ch1 O Ena	able 🖲 Disable	08, -10 ~ 10 V 🛛 🗸	
Authentication +	Ch2 O Ena	able 🖲 Disable	08, -10 ~ 10 V 🖍	
Web HMI +	Ch3 O Ena	able 🖲 Disable	08, -10 ~ 10 V 🗸	
Pair Connection	Ch4 O Ena	able 🖲 Disable	08, -10 ~ 10 V 🗸	
More Information	Ch5 O Ena	able 🖲 Disable	08, -10 ~ 10 V 🗸 🗸	
	Ch6 O Ena	able 🖲 Disable	08, -10 ~ 10 V 🛛 🗸	
	Ch7 O Ena	able 🖲 Disable	08, -10 ~ 10 V 🛛 🗸	
	Modbus Address	Function	SUBMIT	
	00628	Normal Mode (1	10 Hz)/Fast Mode (50 Hz)	Normal mode O Fast mode
	00629	60/50 Hz Reject	tion	● 60 Hz ○ 50 Hz
	00631	Data Format		IEX 2's complement $\bigcirc$ Engineering
	00632	Restore Analog	Calibration to Factory Settings	
			SUBMIT	

## Chapter 6. MiniOS7 Utility Tools

MiniOS7 Utility is a tool for uploading firmware to flash memory and updating the OS to ET-7x00/PET-7x00 module embedded with MiniOS7 with easiness and quickness.

If you haven't the MiniOS7 Utility installed on your system, installation of the MiniOS7 Utility should be the first step. Please refer to section "2.4 Installing MiniOS7 Utility" to install it.

### 6.1. Establishing a Connection

To upload firmware or update the OS to ET-7x00/PET-7x00 module, you must first establish a connection between the PC and the ET-7x00/PET-7x00 module.

#### Step 1: Run the MiniOS7 Utility



🚵 MiniOS7 Utility Version 3.2	.7							_		×
🔯 File ႃ Connection 👻 🚸	Command [	Configuration	📑 Tools 🍕	👂 Help	•					
Look jn: MiniOS7_Utility		💽 🔇 🌶 📂			Lock in: Disk	A	~			働
Name	Size	Туре	Modified	No	Name		Size		h	1odified
📙 bin		File Folder	2022/17:							
FIRMWARE		File Folder	2022/17:							
OS_IMAGE		File Folder	2022/17:							
💽 icpdas	1KB	URL File	2022/17:							
🛯 🚳 load232.dll	88KB	DLL File	2007/17:							
👔 MiniOS7_Utility.chm	1,015KB	CHM File	2009/10							
MiniOS7_Utility.exe	2,544KB	EXE File	2015/7/							
🛓 MiniOS7_Utility.ini	1KB	INI File	2015/7/							
📓 uart.dll	56KB	DLL File	2006/12							
unins000.dat	18KB	DAT File	2022/17:							
🔂 unins000.exe	1,166KB	EXE File	2022/17:							
<			>							
Connection(F2)	5) 💽 DiskT	ool(F6) 💼 Info(F7)	🗴 Delete(	(F8)	Refresh(F9)	🚰 Console(F10)	🖭 DOS(F11	)	Search	n(F12)

#### Step 2: Press the "F12" key or choose the "Search" option from the "Connection" menu

After pressing the **"F12**" key or choosing the **"Search**" option from the **"Connection**" menu, the MiniOS7 utility performs a search of all modules on your network.

🔯 File	Connection	🗸 🗄 Command	d 😨 Configuratio	on			
Look <u>i</u> n:	<u>New connec</u> Last Connec	tion F2 tion Alt+F2	🖸 🗿 😰 🖻	9.			
Name	<u>D</u> isconnect	Ctrl+F2	. Туре				
bin FIRMV	Search	F12	File Folder File Folder				
OS_IN	🏙 MiniOS7 Scan						×
	Search Options	Connect Clear	Kan IP setting Help	E <u>x</u> it			
	Туре	IP/Port	Name	Alias	Mask	Gateway	^
	TCP BroadCast	192.168.101.15	DL-302	EtherIO	255.255.0.0	192.168.1.1	
	TCP BroadCast	192.168.79.3	P/ET-2228	EtherIO	255.255.0.0	192.168.1.1	
	TCP BroadCast	192.168.15.17	ET-7017/PET-7017		255.255.0.0	192.168.1.1	
	TCP BroadCast	192.168.16.35	PET-7026		255.255.0.0	192.168.1.1	~
	<					>	
	Search done.	Check the sta	tus bar to mon	itor the pro	gress of the sear	ch.	//

# Step 3: Click the IP address in the IP/Port field list and then click the "Connect" icon in the toolbar

After the search has been completed, click the IP address for the ET-7x00/PET-7x00 module in the IP/Port field list and then click the "**Connect**" icon in the toolbar to connect to the ET-7x00/PET-7x00.

🏙 MiniOS7 Scan	2.					×
			Enite			
Jeaich Options	IP/Port	e e	Alias	Mask	Gateway	~
TCP BroadCast	192.168.101.15	<b>1.</b> <sub>b2</sub>	EtherIO	255.255.0.0	192.168.1.1	
TCP BroadCast	192.168.79.3	ET-2228	EtherIO	255.255.0.0	192.168.1.1	
TCP BroadCast	192.168.15.17	ET-7017/PET-7017		255.255.0.0	192.168.1.1	
TCP BroadCast	192.168.16.35	PET-7026		255.255.0.0	192.168.1.1	~
<		1			>	
Search done.						//

#### Step 4: Check the connection symbol to make sure that the connection is established

A connection symbol is displayed on the top right side of the screen to make sure the connection has been established.

📸 MiniOS7 Utility Version 3.2.7					—		×
🔯 File 🌔 Connection 👻 🚸 Co	ommand 🛐 Coi	nfiguration	📑 Tools 🥔 Help	• <del>•</del>			
Look in: MiniOS7_Utility	•	3 🤌 📂	Lock in:	Disk A	~	94,027 bytes	ef)
Name bin FIRMWARE OS_IMAGE icpdas load232.dll MiniOS7_Utility.chm		Cor : Connect	nnection Sta	tus : Disconr	nected	Modifi 7/2/24 8/5/23 7/2/17 8/11/14 8/8/9 4/12/29	ed ^
MiniUS /_Utility.exe MiniOS 7_Utility.ini uart.dll unins000.dat	2,544K6 EAL F 1KB INI File 56KB DLL F 18KB DAT F 1,166KB EXE F	e 2022 ile 2006 ile 2022 ile 2022 >	20 passwo 21 reboot l 22 reload l 23 setting. 24 skeleto 10ET-7017/PET-70	nt.ntm rd.htm htm htm h.css 117>IP:192.168	4,201 7,460 352 302 8,965 11,452 .15.17 Poi	2018/7/11 2018/7/11 2018/4/20 2017/2/16 2018/8/14 2014/12/29 t:10000 via	   v TCP, 27
Connection(F2) 🗊 Upload(F5)	🥞 DiskTool(F6)	📑 Info(F7)	😢 Delete(F8) 🔮	🖥 Refresh(F9)	📇 Cor	nsole(F10)	»

## 6.2. Exchanging the Protocol (TCP/IP to UDP)

MiniOS7 Utility supports both UDP and TCP protocols. For MiniOS7 Utility, the TCP/IP is the default protocol for communicating with ET-7x00/PET-7x00, and the UDP is used to update the OS. Changing the protocol to UDP if you want to update the OS.

#### Step 1: Establish a connection to the ET-7x00/PET-7x00

For more information, refer to section "6.1. Establishing a Connection".

#### Step 2: Stop running the firmware

Right-click the file list of the right side windows, and then choose "Quit Firmware" to stop the firmware running and exchange TCP/IP protocol to UDP protocol.

📸 MiniOS7 Utility Versi 1.						—		×
🔯 File 🕨 Connection 🗸	Command [	🗲 Configu	iration	🔄 Tools	🥔 Help 🔻			
Look in: MiniOS7_Utility		- 3 🕯	) <b>()</b>		Lock in: Disk A	~	94,027 bytes	ŧ
Name	Size	Туре	Mod	No	Name	Size	Mod	fied 🔺
🔄 bin		File Folder	2022	<u>                                     </u>	manu lates	2 102	-2017/2/24	ł
FIRMWARE		File Folder File Folder	2022 2022		Right-click the	file list	18/5/23 17/2/17	3 7
	1KB	URL File	2022	16	modset.htm	17,207	2018/11/1	4
🗟 load232.dll	88KB	DLL File	2007	17	Dur		2018/8/9	
💕 MiniOS7_Utility.chm	1,015KB	CHM File	2009	18	- Kun		2014/12/2	29
MiniOS7_Utility.exe	2,544KB	EXE File	2015	9 19	Run with paran	neters	2018/7/11	
🔄 MiniOS7_Utility.ini	1KB	INI File	2022	1 20	Reset MiniOS	F4	2 V/11	
📓 uart.dll	56KB	DLL File	2006	1 21	Frase Disk		Z. A/20	)
unins000.dat	18KB	DAT File	2022	22	Ouit Eirmware		:017/2/16	S
👘 unins000.exe	1,166KB	EXE File	2022	23 📔	Quit Himware		2018/8/14	ł
<			>	24	skeleton.css	11,452	2014/12/2	29 🗸
-				10ET-70	17/PET-7017>IP:192.1	68.15.17 Po	rt:10000 via	TCP, 27
Connection(F2)	-5) 🧕 DiskT	ool(F6) 📑	Info(F7)	😢 Dela	ete(F8) 🛃 Refresh(F9	9) 🚝 Co	nsole(F10)	»

#### Step 3: Click the "Yes" button to continue and the settings will take effect

After executing the Quick Firmware command, the "Confirm" dialog will appear, and then click the "Yes" button to continue and stop the firmware running.



## 6.3. Updating the ET-7x00/PET-7x00 OS

Additional features to ET-7x00/PET-7x00 OS will continue to be added in the future, so we advise you to periodically check with the ICP DAS website for the latest updates.

### 6.3.1. Using the MiniOS7 Utility

Step 1: Download the latest version of the MiniOS7 OS image



#### For ET-7000/PET-7000 series module:

The latest version of the MiniOS7 OS image can be obtained from the ICP DAS website at:

https://www.icpdas.com/en/download/show.php?num=2235

#### For ET-7200/PET-7200 series module:

The latest version of the MiniOS7 OS image can be obtained from the ICP DAS website at:

https://www.icpdas.com/en/download/show.php?num=2236

#### Step 2: Be sure that the switch is set to the "Init" position and then reboot the module



#### Step 3: Establish a connection to ET-7x00/PET-7x00

Refer to section "6.1. Establishing a Connection & 6.2 Exchange the protocol". Waiting for a while to search available **UDP** devices.

🚵 MiniOS7 Scan — 🛛	🏙 IP Setting 🛛 🗆 🗙
A 🖌 📄 🏊 🏑 🖓 🏊	Recommend Settings
Search Options Connect Clear IP setting Help Exit	IP: 192.168.15.17
Type IP/Port Name	Mask: ×
UDP BroadLast 192.168.1.242	Gateway: *
UDP BroadCast 192.168.1.241	Alias: ×
Couble-click the UDP module	
Search done.	
	Set Cancel
Tips & Warnings	

If the connection fails, it is recommended to click the "**Options**" from the "**Configuration**" menu to change the "**Response Timeout**" setting (e.g., 1200 ms).

📸 MiniO	9S7 Utility Version 3.2.7
🔯 File	🕨 Connection 👻 🚸 Command 🛐 Configuration 📑 Tools 🥔 Help 👻
Look in:	MiniOS7_Utility Options
p	🚵 Options 🛛 🚽 🗆 🗙
	System TCP/UDP Search
	<ul> <li>Save last directory</li> <li>Open last connection</li> <li>Compress EXE files before upload</li> </ul>
	Connection
	Delay Between Polls 200 ms
	Response Timeout 1200 ms
	Refresh Retry 5 times
	Display Filter Filtered (*.exe; *.txt; *.img; *.bin)
	<u>D</u> K <u>Cancel</u> <u>H</u> elp

#### Step 4: Choose "Update MiniOS7 Image" from the "File" menu

Choose "Update MiniOS7 Image" from the File menu to start the update procedure.

MiniOS7 Utility Version 3.2.7						—		×
🔯 File 🕨 Connection 👻 🚸 Co	ommand	🜮 Configu	ration	📑 Tools	s 🥔 Help 🔻			
Update MiniOS7 Image		- 3 💋	F 📂		Lock in: Disk A	~		, fe
Hot List Ctrl+D				· · ·	Lock III. Biology		<b>.</b>	<u> </u>
	Size	Туре	Moc	No	Name	Size	Modified	비스
Exit Alt+X		File Folder	202	0	7188eu.ini	30	2019/1/24	
FIRMWARE	_	File Folder	202	1	acce_ip.htm	5,807	2018/7/11	
OS_IMAGE		File Folder	202	2	autoexec.bat	6	2018/3/5	
💽 icpdas	1KB	URL File	202	<b>A</b> 3	comm_api.js	6,799	2019/1/23	
💿 load232.dll	88KB	DLL File	200	<b>4</b>	conn.png	2,381	2016/7/5	
😰 MiniOS7_Utility.chm	1,015KB	CHM File	200	<b>5</b>	custom.css	2,468	2018/3/22	
MiniOS7_Utility.exe	2,544KB	EXE File	201	6	edit.htm	11,943	2018/8/1	
🔄 MiniOS7_Utility.ini	1KB	INI File	202	7	editpt.htm	8,392	2018/11/13	
🔊 uart.dll	56KB	DLL File	200	<b>A</b> 8	et7017.exe	127,613	2019/1/24	
unins000.dat	18KB	DAT File	202	9	index.htm	561	2018/3/5	
🐻 unins000.exe	1,166KB	EXE File	202	<b>i</b> 10	io.js	5,687	2018/5/2	
<			>	11	javahmi.htm	23,887	2018/9/25	~
Connection(F2)	🥞 DiskT	ool(F6) 📑	Info(F7)	🙁 Dek	ete(F8) 👩 Refre	esh(F9) / 🚝 Co	nsole(F10)	»

#### Step 5: Select the latest version of the MiniOS7 OS image

After choosing the update MiniOS7 Image command, the "**Select MiniOS7 Image file**" dialog will appear, and then select the latest version of the MiniOS7 OS image. Note that DO NOT update the same version as the current one.

🏙 Select MiniO	S7 Image file					×
Look in:	OS_Image			•	+ 🗈 💣	
Quick access Desktop Libraries This PC	ET7K_UDP_2	0161124.img				
	File name: Files of type:	ET7K_UDP_2 OS Image	20161124.img		•	Open Cancel

#### **Step 6: Click "OK" to finish the procedure**

After confirming the command, you just need to wait a while until the following dialog appears, and then click the "**OK**" button to finish the procedure.



#### Step 7: To check the OS version

After pressing **"F7**" or choosing **"info**" from the **"Command**" menu, check the OS version of the **"Build**" entry.

	🏙 MiniOS7 Utility Versi	ion 3.2.7	
	踠 File 🌓 Connecti	on 🝷 🚸 Command	😰 Configuration 📑 Tools
	Look in: 📙 MiniOS7_	Upload Utility DiskTool	F5 F6 3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
	Name	Refresh	F9 le Mo
	hin	Info	F7 Eolder 20
	FIRMWARE	OS Type	Folder 201
		20	
MiniOS7 Informa	tion		×
File Help			
E- All	category ke	90	value
LocalHost	▶ Basic Pr	ompt	ET7K UDP
Basic	Basic 0	6	MiniOS7 UDP
- Memory	Basic H	ardware	FT-7K
- Network	Basic Bu	uild	Version 2.04 000 Nov 24 2016 11:17:39
ComPort	Basic Ti	me	N/A
	Basic In	it* pin	
	Basic Cf	<sup>2U</sup> Version 2.0.	4 000 Nov 24 2016 11:17:39
	Basic R(	eset by	+ 000 1107 24 2010 11:11:00
	ComPort CO	ОМ1	115200,8,0,1
	ComPort CO	JM2	115200,8,0,1
	ComPort CO	ОМЗ	9600,8,0,1
	ComPort CO	DM4	9600,8,0,1
	ComPort CO	DM5	9600,8,0,1
	ComPort CO	DM6	9600,8,0,1
	ComPort CO	DM7	9600,8,0,1
	ComPort CO	3M8	9600,8,0,1
	LocalHost 03	5 Version	
	LocalHost Ph	nysical Memory	17080M
	LocalHost CF	PU Frequency	3000
	LocalHost IP	Address	192.168.79.200
	LocalHost Co	omPort	COM1
	<		>
		[ <u>C</u> lose ]	

### 6.3.2. Using the 7188EU.exe and Command Line

Note: If you cannot update OS successfully, use the method of the command line instead.

#### Step 1: Be sure that the switch is set to the "Init" position and then reboot the module

It is necessary to update the MinisOS7 image under the INIT mode, adjust the switch to INIT on the back of the module, and reboot.

Step 2: Run the MiniOS7 Utility and the file folder of the MinisOS7 image.

MiniOS7 Utility Version 3.2.	7			_	
🔯 File 🕨 Connection 🔹 🚸	Command 🗾 Configuration	🛅 Tool	s 🥔 Help 🔻		
Look in: ET-7000	<b>3</b> 🕫 🖻		Lock in: Disk A	~	0
Name	Size Type	No	Name	Size	Modified
CT7K_UDP_20080730	64KB IMG File				
GET7K_UDP_20090512	64KB IMG File				
GET7K_UDP_20090604	64KB IMG File				
ET7K_UDP_20161124	64KB IMG File				
<	>				
Connection(F2)	5) 📓 DiskTool(F6) 📑 Info(F7)	🗴 De	lete(F8) 🛃 Refresh	(F9) 🖆 Console(F10)	>>

#### Step 3: Connect to the module by using UDP

Click **Tools > 7188EU** on the menu bar and enter "/s: IP address of the module /p:23" in the "Parameters" dialog.

Description of parameters: /s:192.168.255.1 → IP address of the module /p:23 → UDP Port 23 (fixed)

🔯 File 🌔 Connect	ion 👻 🚸 Command 🛐 (	Configuration	🛅 Tools 🎻 Help 🔻			
Look in: ET-7000	_	A 🛧 🖂	7188XW			
	Look in:					
Name	Size Typ	e	7188E			
<pre> ET7K_UDP_200807: </pre>	30 64KB IM0	à File	Send232			
GET7K_UDP. 7188EU	J Parameters	$\times$	SendTCP			
ET7K_UDP			VxComm Utility			
Param	eters:					
/s:19	2.168.15.17 /p:23		Console F10			
	OK Cancel					

#### Step 4: Upload the MiniOS7 image

Press Enter to see "ET7K\_UDP>" in the window and input the **upload** command, then press Enter. Also, press **ALT + E** and enter the full name of the image file (e.g., ET7K\_UDP\_20161124.img)



#### Step 5: Update the OS image file to a Flash

Enter the **bios1** command to update the image to the flash. It spends 15 seconds for updating and does not perform power off or reboot.



#### Step 6: Confirm the version of the MiniOS7 by using the "ver" command



## 6.4. Updating the ET-7x00/PET-7x00 Firmware

The firmware is stored in flash memory and can be updated to fix functionality issues or add additional features, so we advise you to periodically check the ICP DAS website for the latest updates.

#### Step 1: Download the latest version of the firmware

#### ET-7x00, PET-7x00

The latest version of the ET-7000/PET-7000 firmware can be obtained from:

https://www.icpdas.com/en/download/show.php?num=3790

#### ET-7200, PET-7200

The latest version of the ET-7200/PET-7200 firmware can be obtained from: V1: https://www.icpdas.com/en/download/show.php?num=3785 V2: https://www.icpdas.com/en/download/show.php?num=2233

Step 2: Be sure that the switch is set to the "Init" position and then reboot the module



#### Step 3: Establish a connection to connect to the ET-7x00/PET-7x00

For a more detailed description of this instruction, refer to section "6.1. Establishing a Connection".



If the connection fails, it is recommended to click the "**Options**" from the "**Configuration**" menu to change the "**Response Timeout**" setting (e.g., 1200 ms).

You have to delete all files that existed on the ET-7x00/PET-7x00 before uploading the firmware.

#### Step 4: Choose "Erase Disk" from the "Command" menu

After establishing a connection, then choose **"Erase Disk**" from the **"Command**" menu (or right-click on the right of the window) to erase the contents of the flash memory.



#### Step 5: In the Confirm dialog box, click the "Yes" button to continue.

After executing the Erase Disk command, the **Confirm** dialog will appear, and then click the "**Yes**" button to continue erasing the memory contents.



#### Step 6: Select the latest version of the firmware.

Select the new version of the firmware and click the **Upload(F5)** button to upload the file to ET-7x00/PET-7x00.

🏙 MiniOS7 Utility Version 3.2.7				—		×
🔯 File 🌔 Connection 👻 🚸 Command 🖉	Configuration 🗖	🛛 Tools 🥔 Help	o <del>▼</del>			
Look in Firmware	可 📀 🔊	Lock in	: Disk A	94,016 availat	) bytes ble	ŧ
Name <b>1.</b> Size	Туре	No Nam	ie 📃	Size	Modified	<u>^</u>
ET7017_V300.HEX 157KB	HEX File	188	Beulini	41	\$/21	
	Loading Progress		o in lates	E 907	3.	
N N						
	From: D:\Firmw	are\ET7017_V300	HEX			
	T-: 577017	V200 HEV				
	10. 217017_	V300.HEX				
			50%			
			30%			
						~
( 2. )		C	<u>C</u> ancel	Ŀ	<u>t</u> elp	4 bytes
Connection(F2) 🗊 Upload(F5) 📚 DiskTo	ool(F6) 📑 Info(F7)	😢 Delete(F8)	😂 Refresh(F9)	🚝 Console(F10	))	»

**Step 7:** After the update is complete, set the switch on the back of the module to the **"Normal"** position and reboot.



# Chapter 7. SCADA and System Integration Tools

ET-7x00/PET-7x00 supports several external tools to aid in developing your applications

## 7.1. LabVIEW

	Analog Out & Analog Data Acquisition Demo Program	
	dwBaudRata 19600 10 10 10 10 10 10 10 10 10 10 10 10 1	
w7008	\$2 \$4 \$7012 \$0 \$100 \$0 \$0	
w7000d]	22 minute 25 minute 27021 mil 20055 mil 21100 mil 200minute 200minute 1	
[7000]		
00 7.5- 5.0-		
0.0-		
-5.0-		

LabVIEW is the best way to acquire, analyze, and present data. LabVIEW delivers a graphical development environment that can be used to quickly build data acquisition, instrumentation, and control systems, boosting productivity and saving development time. With LabVIEW, it is possible to quickly create user interfaces that enable interactive control of software systems. To specify your system functionality, simply assemble a block diagram – a natural design notation for scientists and engineers.

The document containing the detailed instructions for linking to the ET-7x00/PET-7x00 using the Modbus protocol is located at

https://www.icpdas.com/en/download/show.php?num=1029

## 7.2. OPC Server

OPC (OLE for Process Control) is the first standard resulting from the collaboration of several leading worldwide automation suppliers working in cooperation with Microsoft. Originally based on Microsoft's OLE COM (Component Object Model) and DCOM (Distributed Component Object Model) technologies, the specification defines a standard set of objects, interfaces, and methods for use in process control and manufacturing automation applications to facilitate interoperability.

There are many different mechanisms provided by various vendors that allow access to a variety of devices via specific applications. However, if an OPC Server is provided for the device, other applications will be able to access the OPC Server via the OPC interface.

## 7.3. SCADA

SCADA stands for Supervisor Control and Data Acquisition. It is a production automation and control system based on PCs.

SCADA is wildly used in many fields e.g. power generation, water systems, the oil industry, chemistry, and the automobile industry. Different fields require different functions, but they all have common features:

- Graphic interface
- Process mimicking
- Real-time and historic trend data
- Alarm system
- Data acquisition and recording
- Data analysis
- Report generator

#### Accessing the ET-7x00/PET-7x00 module

SCADA software can access ET-7x00/PET-7x00 devices using Modbus communication protocols and can communicate without the need for other software drivers.

#### Famous SCADA software

Citect, ICONICS, iFIX, InduSoft, Intouch, Entivity Studio, Entivity Live, Entivity VLC, Trace Mode, Wizcon, Wonderware, etc.

In the following sections, 3 popular brands of SCADA software are introduced together with detailed instructions on how to use them to communicate with ET-7x00/PET-7x00 module using the Modbus/TCP protocol.

### 7.3.1. InduSoft



**InduSoft Web Studio** is a comprehensive platform that includes all the tools you'll need to make SCADA and HMI applications that have real power behind them. The development environment allows you to develop once and deploy anywhere.

InduSoft Web Studio supports all Windows runtime platforms (including 32 and 64-bit), ranging from Windows Embedded Compact, Windows Embedded Standard, Windows 8.1/10, and Windows Server Editions (Server 2012/2016/2019), along with built-in support for local or remote (web) based visualization.

Build powerful graphical displays and take advantage of the 250+ available communication drivers for all major PLC products. InduSoft Web Studio includes OPC UA and OPC Classic (HDA and DA), trends, alarms, reports, recipes, and built-in SQL database support as standard features.

The document containing detailed instructions for linking to the ET-7x00/PET-7x00 module using the Modbus protocol is located on https://www.icpdas.com/en/faq/index.php?kind=133

### 7.3.2. Citect



Citect SCADA is a fully integrated Human Machine Interface (HMI) / SCADA solution that enables users to increase return on assets by delivering a highly scalable, reliable control and monitoring system. Easy-to-use configuration tools and powerful features enable rapid development and deployment of solutions for any size application.

The document containing detailed instructions for linking to the ET-7x00/PET-7x00 module using the Modbus protocol is located on https://www.icpdas.com/en/faq/index.php?kind=133

https://www.icpdas.com/en/product/guide+Software+Development\_\_Tools+Modbus\_\_Tool#1150

### 7.3.3. iFix



The document containing detailed instructions for linking to the ET-7x00/PET-7x00 module using the Modbus protocol is located on https://www.icpdas.com/en/faq/index.php?kind=133

https://www.icpdas.com/en/product/guide+Software+Development\_\_Tools+Modbus\_\_Tool#1150

## **Appendix A Description of I/O Functions**

### A.1. Dual Watchdog

The Dual Watchdog consists of Module Watchdog and Host Watchdog.

- 1. **The Module Watchdog** is a built-in hardware circuit that will reset the CPU module if a failure occurs in either the hardware or the software. If the application does not refresh the watchdog timer within 0.8 seconds, the watchdog circuit will initiate a reset of the CPU.
- 2. The Host Watchdog is a software function that can be used to monitor the operating status of the host. Its purpose is to prevent network communication problems or host failure. If the Watchdog timeout interval expires, the module will return all outputs to a predefined Safe value (Refer to the Safe Value application note), which can prevent the controlled target from an unexpected situation.



### A.2. Power-on Value

Many industrial applications require a "**safe**" start-up condition to prevent accidents at critical points in the process. Each ET-7x00/PET-7x00 contains an initial power-on value which is used to configure the analog/digital outputs on power up. In other words, the power-on value can be considered a start-up value. The power-on value is loaded into the output modules under 3 conditions: power on, reset by Module Watchdog, and reset by the reset command.

Users can set the power-on value of the specific analog/digital output channel and the power-on value is stored in EEPROM.

Overview	Digital	Output Setting	IS	
Configuration _ Network Settings	Channel	Power-on Value	2. Value	
Basic Settings <b>1.</b>	Ch0	◉ On ◯ Off	O On  Off	Disabled - Maintain the current status 🗸
Module I/O Settings Authentication +	Ch1	○ On	○ On	Disabled - Maintain the current status Enabled - Host Watchdog Enabled - Pair-Connection
Web HMI +	Ch2	◯ On  ● Off	◯ On ◉ Off	Disabled - Maintain the current status 🗸
	Ch7	○ On	○ On	Disabled - Maintain the current status v
			SUBMIT	

#### Setting the Power-on Value for a Specific Digital Output Channel

- **Step 1:** Log into the ET-7x00/PET-7x00 web page, and then click the "**Module I/O Settings**" option in the "**Configuration**" section of the Main Menu.
- **Step 2:** Enable the Power-on Value by checking the "**ON**" radio button.
- **Step 3:** Click the **"Submit**" button to complete the configuration of the power-on Value.

#### Setting the Power-on Value for a Specific Analog Output Channel

Overview	Analog Output Sett	ings
Configuration _	Channel Range	Slew Rate
Network Settings	Ch0 35, -5 ~ 5 V 🗸	00, Immediate   Apply the current
Basic Settings 1. Module I/O Settings	Ch1 35, -5 ~ 5 V 🗸	00, Immediate
Authentication +		SUBMIT
Web HMI +	$\int$	
Pair Connection	Channel Power-on Value	Safe Value
More Information		
	Ch0 0.0 -5 ~ 5 V	-5 ∼ 5 V Disabled - Maintain the current status ✓
	Ch1 0.0 -5 ~ 5 V	0.0 Disabled - Maintain the current status ▼
		3. SUBMIT

- **Step 1:** Log into the ET-7x00/PET-7x00 web page, and then click the **"Module I/O Settings"** option in the **"Configuration**" section of the Main Menu.
- **Step 2:** Set the Power-on Value in the "**Power-on Value**" text box.
- **Step 3:** Click the "**Submit**" button to complete the configuration of the Power-on Value and save the settings to the EEPROM.

### A.3. Safe Value

When the Host Watchdog is enabled and the communication between the host PC and ET-7x00/PET-7x00 modules is broken, the analog/digital output channels can generate a predefined value to prevent unpredictable damage to the connected devices. By default, this feature is disabled. Users can enable this feature by configuring the Host WDT Timeout.

#### Setting the Safe Value for a Specific Digital Output Channel



- **Step 1:** Log into the ET-7x00/PET-7x00 web page, and then click the "**Module I/O Settings**" option in the "**Configuration**" section of the Main Menu.
- **Step 2:** Enable the Safe Value by checking the "**ON**" radio button.
- **Step 3:** Click the "**Submit**" button to complete the configuration of the Safe Value.

#### Setting the Safe Value for a Specific Analog Output Channel



- **Step 1:** Log into the ET-7x00/PET-7x00 web page, and then click the "**Module I/O Settings**" option in the "**Configuration**" section of the Main Menu.
- Step 2: Set the Safe Value in the "Safe Value" text box.
- **Step 3:** Click the "**Submit**" button to complete the configuration of the Safe Value and save the settings to the EEPROM.

### A.4. AI High/Low Alarm

ET-7x00/PET-7x00 module equipped with the High/Low Alarm function. When the alarm function is activated, the value of the specified registers is 1. The status of the alarm is the result of comparing the analog input value with a given high alarm value or a low alarm value.

Address 00636 to 00667 can be used to enable/disable the AI High Alarm function. Address 00668 to 00699 can be used to enable/disable the AI Low Alarm function.

Channel	Channel Al High Alarm			AI Low Alarm
Number	Register	Description	Register	Description
AIO	00636	0: Disable/1: Enable	00668	0: Disable/1: Enable
AI1	00637	0: Disable/1: Enable	00669	0: Disable/1: Enable
AI2	00638	0: Disable/1: Enable	00670	0: Disable/1: Enable
AI3	00639	0: Disable/1: Enable	00671	0: Disable/1: Enable
AI4	00640	0: Disable/1: Enable	00672	0: Disable/1: Enable
AI5	00641	0: Disable/1: Enable	00673	0: Disable/1: Enable
AI6	00642	0: Disable/1: Enable	00674	0: Disable/1: Enable
AI7	00643	0: Disable/1: Enable	00675	0: Disable/1: Enable
AI8	00644	0: Disable/1: Enable	00676	0: Disable/1: Enable
AI9	00645	0: Disable/1: Enable	00677	0: Disable/1: Enable

#### AI High/Low Alarm Switch Table
Address 40296 to 40327 records the High Alarm value. Address 40328 to 40359 record the Low Alarm value. By default, the High Alarm value is +32767 (0x7FFF) and the low alarm value is -32768 (0xFFFF).

Channel	High Alarm Value of Al		Low Alarm Value of Al		
Number	Register	Description	Register	Description	
AIO	40296	-32768 ~ 32767	40328	-32768 ~ 32767	
AI1	40297	-32768 ~ 32767	40329	-32768 ~ 32767	
AI2	40298	-32768 ~ 32767	40330	-32768 ~ 32767	
AI4	40300	-32768 ~ 32767	40332	-32768 ~ 32767	
AI5	40301	-32768 ~ 32767	40333	-32768 ~ 32767	
AI6	40302	-32768 ~ 32767	40334	-32768 ~ 32767	
AI7	40303	-32768 ~ 32767	40335	-32768 ~ 32767	
AI8	40304	-32768 ~ 32767	40336	-32768 ~ 32767	
A19	40305	-32768 ~ 32767	40337	-32768 ~ 32767	

### AI High/Low Alarm Value Table

The analog input High/Low Alarm contains two alarm types, Momentary Alarm and Latch Alarm. Address 00700 of the Modbus register can be used to set the High Alarm type of channel 0 and the total number of channels depends on the type of module. Address 00732 of the Modbus register can be used to set the Low Alarm type of channel 0.

Channel	Al High Alarm Type		AI Low Alarm Type		
Number	Register	Description	Register	Description	
A10	00700	0: Momentary Mode	00722	0: Momentary Mode	
AIU	00700	1: Latch Mode	00752	1: Latch Mode	
A11	00701	0: Momentary Mode	00722	0: Momentary Mode	
	00701	1: Latch Mode	00755	1: Latch Mode	
A12	00702	0: Momentary Mode	00734	0: Momentary Mode	
	00702	1: Latch Mode	00734	1: Latch Mode	
A12 00702		0: Momentary	00725	0: Momentary	
	00703	1: Latched	00735	1: Latched	
	00704	0: Momentary	00736	0: Momentary	
	00704	1: Latched	00730	1: Latched	
A15	00705	0: Momentary	00737	0: Momentary	
	00705	1: Latched	00737	1: Latched	
416	00706	0: Momentary	00738	0: Momentary	
	00700	1: Latched	00738	1: Latched	
Δ17	00707	0: Momentary	00739	0: Momentary	
	00707	1: Latched	00735	1: Latched	
A18	00708	0: Momentary	00740	0: Momentary	
	1: Latched		00740	1: Latched	
ΔΙΟ	00700	0: Momentary	00741	0: Momentary	
	00709	1: Latched	00741	1: Latched	

### AI High/Low Type Value Table

The following are the descriptions for two alarm types.

### **Momentary Alarm**

An alarm will be triggered when the analog input value exceeds alarm limits. When the AI value is back to normal, the alarm status will automatically be cleared.

#### For example:

If analog input value of channel 0 (Address: 30000) > High Alarm value (Address: 40296), the address 10224 is 1, else it is 0.

If the analog input Value of channel 0 (30000) < Low Alarm value (40328), the address 10256 is 1, else it is 0.

The address 10224 to 10255 is used to read the status of the high alarm. If a high alarm occurred, the Register value is 1. Under normal conditions, the value is 0. The address 10256 to 10287 is used to read the status of the low alarm. If a low alarm occurred, the Register value is 1. Under normal conditions, the value is 0.

### Latch Alarm

An alarm will be triggered when the analog input value exceeds alarm limits. When the AI value is back to normal, the alarm status will keep until the clear command is sent to the specific address.

#### For example:

If the analog input value of channel 0 (30000) > High Alarm value (40296), the address 10224 is 1. If the analog input value of channel 0 (30000) < Low Alarm value (40328), the address 10256 is 1.

The address 10224 to 10255 is used to read the status of the high alarm. In normal conditions, the value of the register is 0. If a High alarm occurred, the Register value stays 1 until the status of the address(es) 00764 to 00795 is cleared. The address 10256 to 10287 is used to read the status of the Low alarm. In normal conditions, the value of the register is 0. If a low alarm occurred, the value of the register stays 1 until the status of the address(es) 00796 to 00827 is cleared.

### Setting the High Alarm and Low Alarm for a Specific Analog Input Channel



- **Step 1:** Log into the ET-7x00/PET-7x00 web page, and then click the "**Module I/O Settings**" option in the "**Configuration**" section of the Main Menu.
- **Step 2:** Set the High Alarm and Low Alarm information in the relevant field.
- **Step 3:** Click the **"Submit**" button to complete the configuration of the High Alarm and the Low Alarm.

Channel		Low Limit Value		Mode 2.
Ch0	Enable $\bigcirc$ Disable	-10.0	-10 ~ 10 V	Monemtary 🗸
Ch1	Enable O Disable	-10.0	-10 ~ 10 V	Latch 🗸
Ch2	○ Enable	-10.0	-10 ~ 10 V	Monemtary 🗸
Ch3	○ Enable	-10.0	-10 ~ 10 V	Monemtary 🗸
Ch4	🔿 Enable 🖲 Disable	-10.0	-10 ~ 10 V	Monemtary 🗸
Ch5	🔿 Enable 🖲 Disable	-10.0	-10 ~ 10 V	Monemtary 🗸
				3.
			SUB	

### A.5. Al High/Low Latch

The address 30236 to 30267 records the maximum value of analog inputs and stays the value until another maximum input enters. The address 30268 to 30299 records the minimum value of analog inputs and stays the value until another minimum input enters.

### Monitoring the Alarm Status for a Specific Analog Input Channel

Overview	THIS COMPUTER - 奋 - ET-7000					
Configuration _	AL AO DI DO PAIR CONNECTION					
Network Settings						
Basic Settings	Analog	Innute				$\bigcirc$
Module I/O Settings	Analog	mputs				<u> </u>
Authentication + 1.	Channel No	. Actual Value	Historical Max/Min Value		High/Low Alarm	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~
Web HMI _	AI0	<b>0.0</b> v	Max: 0.0 V	Min: -0.0 V	High Alarm: OFF	Low Alarm: ON
Web HMI	Al1	0.0 v	Max: 0.0 V	Min: 0.0 V	High Alarm: OFF	Low Alarm: ON
Web Edit	AI2	<b>0.0</b> v	Max: 0.0 V	Min: 0.0 V	High Alarm: OFF	Low Alarm: OFF
Pair Connection	AI3	<b>0.0</b> v	Max: 0.0 V	Min: -0.0 V	High Alarm: OFF	Low Alarm: OFF
More Information	AI4	<b>0.0</b> v	Max: 0.0 V	Min: -0.0 V	High Alarm: OFF	Low Alarm: OFF
	AI5	<b>0.0</b> V	Max: 0.0 V	Min: -0.0 V	High Alarm: OFF	Low Alarm: OFF
			RESET ALL MAX. VALUES	RESET ALL MIN. VALUES		

Click the "Web HMI" item from the "Web HMI" menu.

- **Step 1:** Log into the ET-7x00/PET-7x00 web page, and then click the "**Module I/O Settings**" option in the "**Configuration**" section of the Main Menu.
- **Step 2:** Monitor the alarm status by viewing the "**Analog Inputs**" group table.

# Appendix B Analog Input Type and Data Format Table

Type Code	Input Range	Data Format	+F.S	-F.S
		Engineering Unit	+15000	-15000
00	-15 ~ +15 mA	2's comp HEX	7FFF	8000
01	F0	Engineering Unit	+5000	-5000
01	-50 ~ +50 IIIA	2's comp HEX	7FFF	8000
02	$-100 \sim \pm 100 \text{ mV}$	Engineering Unit	+10000	-10000
02	-100 /0 +100 111	2's comp HEX	7FFF	8000
02	$500 \approx \pm 500 \text{ m}$	Engineering Unit	+5000	-5000
03	-300 ~ +300 mV	2's comp HEX	7FFF	8000
04	-1 ~ +1 V	Engineering Unit	+10000	-10000
04	-1 ~ +1 V	2's comp HEX	7FFF	8000
05	-2.5 ~ +2.5 V	Engineering Unit	+25000	-25000
05		2's comp HEX	7FFF	8000
06	20 a. +20 mA	Engineering Unit	+20000	-20000
00	-20 ~ +20 IIIA	2's comp HEX	7FFF	8000
07	+4 at +20 mA	Engineering Unit	+20000	+4000
07	±4 ~ ±20 mA	2's comp HEX	FFFF	0000
08	-10 $\sim$ +10 V	Engineering Unit	+10000	-10000
08		2's comp HEX	7FFF	8000
00	-5 ~ +5 \/	Engineering Unit	+5000	-5000
03		2's comp HEX	7FFF	8000
0.0	-1 ~ +1 V	Engineering Unit	+10000	-10000
	-1	2's comp HEX	7FFF	8000
OR	$500 \approx \pm 500 \text{ m}$	Engineering Unit	+5000	-5000
08	-500 1000 mV	2's comp HEX	7FFF	8000
00	$-150 \sim \pm 150 \mathrm{mV}$	Engineering Unit	+15000	-15000
	100 × 100 III	2's comp HEX	7FFF	8000
00	-20 ~ +20 mA	Engineering Unit	+20000	-20000
0D	-20 ~ +20 mA	2's comp HEX	7FFF	8000

Type Code	Input Range	Data Format	+F.S	-F.S
1.0	0 120 m 1	Engineering Unit	+20000	0
A	0 ~ +20 MA	2's comp HEX	FFFF	0000
05	Type J Thermocouple	Engineering Unit	+7600	-2100
UE	-210 ~ 760°C	2's comp HEX	7FFF	DCA2
05	Type K Thermocouple	Engineering Unit	+13720	-2700
UF	-270 ~ 1372°C	2's comp HEX	7FFF	E6D0
10	Type T Thermocouple	Engineering Unit	+4000	-2700
10	-270 ~ 400°C	2's comp HEX	7FFF	A99A
11	Type E Thermocouple	Engineering Unit	10000	-2700
11	-270 ~ 1000°C	2's comp HEX	7FFF	DD71
10	Type R Thermocouple	Engineering Unit	+17680	0
12	0 ~ 1768°C	2's comp HEX	7FFF	0000
12	Type S Thermocouple 0 ~ 1768°C	Engineering Unit	+17680	0
13		2's comp HEX	7FFF	0000
1.4	Type B Thermocouple	Engineering Unit	+18200	0
14	0 ~ 1820°C	2's comp HEX	7FFF	0000
15	Type N Thermocouple	Engineering Unit	+13000	-2700
15	-270 ~ 1300°C	2's comp HEX	7FFF	E56B
16	Type C Thermocouple	Engineering Unit	+23200	0
10	0 ~ 2320°C	2's comp HEX	7FFF	0000
17	Type L Thermocouple	Engineering Unit	+8000	-2000
17	-200 ~ 800°C	2's comp HEX	7FFF	E000
10	Type M Thermocouple	Engineering Unit	+10000	-20000
10	-200 ~ 100°C	2's comp HEX	4000	8000
10	Type L DIN43710	Engineering Unit	9000	-2000
19	Thermocouple -200 $\sim$ 900°C	2's comp HEX	FFFF	E38E
20	Platinum 100 α=0.00385	Engineering Unit	+10000	-10000
20	-100 ~ 100°C	2's comp HEX	7FFF	8000
21	Platinum 100 α=0.00385	Engineering Unit	+10000	0
21	0 ~ 100°C	2's comp HEX	7FFF	0000

Type Code	Input Range	Data Format	+F.S	-F.S
22	Platinum 100 α=0.00385	Engineering Unit	+20000	0
22	0 ~ 200°C	2's comp HEX	7FFF	0000
22	Platinum 100 α=0.00385	Engineering Unit	+6000	0
23	0 ~ 600°C	2's comp HEX	7FFF	0000
24	Platinum 100 α=0.003916 -100 ~ 100°C	Engineering Unit	+10000	-10000
24		2's comp HEX	7FFF	8000
25	Platinum 100 α=0.003916	Engineering Unit	+10000	0
25	0~100°C	2's comp HEX	7FFF	0000
26	Platinum 100 α=0.003916	Engineering Unit	+20000	0
20	0 ~ 200°C	2's comp HEX	7FFF	0000
27	Platinum 100 α=0.003916	Engineering Unit	+6000	0
27	0 ~ 600°C	2's comp HEX	7FFF	0000
20	Nickel 120	Engineering Unit	+10000	-8000
20	-80 ~ 100°C	2's comp HEX	7FFF	999A
20	Nickel 120	Engineering Unit	+10000	0
29	0 ~ 100°C	2's comp HEX	7FFF	0000
2 ^	Platinum 1000 α=0.00385 -200 ~ 600°C	Engineering Unit	+6000	-2000
ZA		2's comp HEX	7FFF	D556
סר	Cu 100 α=0.00421	Engineering Unit	+15000	-2000
ZD	-20 ~ 150°C	2's comp HEX	7FFF	EEEF
20	Cu 100 α=0.00427	Engineering Unit	+20000	0
20	0 ~ 200°C	2's comp HEX	7FFF	0000
חנ	Cu 1000 α=0.00421	Engineering Unit	+15000	-2000
20	-20 ~ 150°C	2's comp HEX	7FFF	EEEF
2F	Platinum 1000 α=0.00385	Engineering Unit	+20000	-20000
2L	-200 ~ 200°C	2's comp HEX	7FFF	8000
2E	Platinum 1000 α=0.003916	Engineering Unit	+20000	-20000
21	-200 ~ 200°C	2's comp HEX	7FFF	8000
60	PreCon Type III 10K@25°C,	Engineering Unit	+24000	-3000
00	-30°F ~ 240°F	2's comp HEX	7FFF	F000
61	Fenwell Type U 2K@25°C,	Engineering Unit	+15000	-5000
61	-50°C ~ 150°C	2's comp HEX	7FFF	D556

Type Code	Input Range	Data Format	+F.S	-F.S
62	Fenwell Type U 2K@25°C,	Engineering Unit	+15000	0
02	0°C ~ 150°C	2's comp HEX	7FFF	0000
63	YSI L Mix 100@25°C,	Engineering Unit	10000	-8000
63	-80°C ~ 100°C	2's comp HEX	7FFF	999A
C A	YSI L Mix 300@25°C, -80°C ~ 100°C	Engineering Unit	+10000	-8000
64		2's comp HEX	7FFF	999A
6F	YSI L Mix 1000@25°C,	Engineering Unit	+10000	-7000
65	-70°C ~ 100°C	2's comp HEX	7FFF	A667
66	YSI B Mix 2252@25°C,	Engineering Unit	+15000	-5000
00	-50°C ~ 150°C	2's comp HEX	7FFF	D556
67	YSI B Mix 3000@25°C,	Engineering Unit	+15000	-4000
67	-40°C ~ 150°C	2's comp HEX	7FFF	DDDE
69	YSI B Mix 5000@25°C,	Engineering Unit	+15000	-4000
00	-40°C ~ 150°C	2's comp HEX	7FFF	DDDE
60	YSI B Mix 6000@25°C,	Engineering Unit	+15000	-3000
09	-30°C ~ 150°C	2's comp HEX	7FFF	E667
64	YSI B Mix 10000@25°C,	Engineering Unit	+15000	-3000
бA	-30°C ~ 150°C	2's comp HEX	7FFF	E667
6P	YSI H Mix 10000@25°C,	Engineering Unit	+15000	-3000
08	-30°C ~ 150°C	2's comp HEX	7FFF	E667
60	YSI H Mix 30000@25°C, -10°C ~ 200°C	Engineering Unit	+20000	-1000
00		2's comp HEX	7FFF	F99A
70	User-defined,	Engineering Unit	+15000	-5000
70	-50°C ~ 150°C	2's comp HEX	7FFF	D556
71	User-defined,	Engineering Unit	+15000	-5000
/1	-50°C ~ 150°C	2's comp HEX	7FFF	D556
72	User-defined,	Engineering Unit	+15000	-5000
72	-50°C ~ 150°C	2's comp HEX	7FFF	D556
72	User-defined,	Engineering Unit	+15000	-5000
/3	-50°C ~ 150°C	2's comp HEX	7FFF	D556
7/	User-defined,	Engineering Unit	+15000	-5000
74	-50°C ~ 150°C	2's comp HEX	7FFF	D556

Type Code	Input Range	Data Format	+F.S	-F.S
75	User-defined,	Engineering Unit	+15000	-5000
75	-50°C ~ 150°C	2's comp HEX	7FFF	D556
76	User-defined,	Engineering Unit	+15000	-5000
70	-50°C ~ 150°C	2's comp HEX	7FFF	D556
77	User-defined,	Engineering Unit	+15000	-5000
-50°C	-50°C ~ 150°C	2's comp HEX	7FFF	D556
80	Platinum 100 α=0.00385	Engineering Unit	+6000	-2000
80	-200 ~ 600°C	2's comp HEX	7FFF	D556
01	Platinum 100 α=0.003916	Engineering Unit	+6000	-2000
01	-200 ~ 600°C	2's comp HEX	7FFF	D556
00	Cu 50	Engineering Unit	+15000	-5000
02	-50 ~ 150°C	2's comp HEX	7FFF	D556
02	Nickel 100	Engineering Unit	+18000	-6000
65	-60 ~ 180°C	2's comp HEX	7FFF	D556

# Appendix C Analog Output Type and Data Format Table

Type Code	Output Range	Data Format	+F.S	-F.S
20		Engineering Unit	+20000	0
30	0~+20 MA	2's comp HEX	FFFF	0000
21	4 + 20 m A	Engineering Unit	+20000	4000
51	4 ~ +20 MA	2's comp HEX	FFFF	0000
	0 ~ +10 V	Engineering Unit	+10000	0
52		2's comp HEX	7FFF	0000
22	-10 $\sim$ +10 V	Engineering Unit	+10000	-10000
55		2's comp HEX	7FFF	8000
24	0 ~ +5 V	Engineering Unit	+5000	0
34		2's comp HEX	7FFF	0000
25	E IE V	Engineering Unit	+5000	-5000
55	-5 ~ +5 V	2's comp HEX	7FFF	8000

# Appendix D Convert Modbus Data to the Actual Value

This chapter describes how to convert Modbus raw data read by ET-7000 into actual voltage, current, or temperature values.

On the Module I/O Settings page, check the Range and Data Format settings in the Analog Input Setting section.

ICP DAS	=	Range	CENT
Overview	.com	08, -10 ~ 10 V 💙	2
Configuration –	Analog Inpu	t Setti 08, -10 ~ 10 V	
Basic Settings	Channel Ch0	⊙ <sub>Ena</sub> 08, -10 ~ 10 V	Range 08, -10 ~ 10 V
Authentication +	Ch1		08, -10 ~ 10 V 💌
Web HMI + Pair Connection	Ch2 Ch3	Enable O Disable     Enable O Disable	08, -10 ~ 10 V ~
More Information	Ch4	Sopwit	
	Modbus Address	Function	
	00628	Normal Mode (10 Hz)/Fast Mode (50 Hz)	● Normal mode ○ Fast mode
	00629	60/50 Hz Rejection	
	00631	Data Format	● HEX 2's complement ○ Engineering
	00632	Restore Analog Calibration to Factory Settings	
00631	Data Format	⊙ F	IEX 2's complement O Engineering

#### The following example shows how to convert the Modbus data to a **voltage** value.

Type Code	Input Range	Data Format	Min.	Max.
00	10 10 . /	Engineering	-10000	+10000
08	-10 ~ +10 V	2's Complement	8000	7FFF



The user can get the input voltage with the following formula.

For example, if the **Modbus Raw Data** read by the module is **0x200E**, the **Actual Value** of the input voltage is 2.5 (V).





The following example shows how to convert the Modbus data to a **current** value.

Type Code	Input Range	Data Format	Min.	Max.
07	4 ~ 20 m A	Engineering	4000	20000
07	4 20 MA	2's Complement	0x0000	OxFFFF

For example, if the **Modbus Raw Data** read by the module is **0x7FFF**, the **Actual Value** of the input current is 12.0 (mA).



Channel No.	Actual Value	Historical Max/Min Value		High/Low Alarm	
	12.0 mA	Max: 12.0 mA	Min: 4.0 mA	High Alarm: OFF	Low Alarm: OFF
A10	Modbus 30000:7FFF	Modbus 30236:8002	Modbus 30268:0000	Modbus 10224:0	Modbus 10256:0
	4.0 mA	Max <b>4.0</b> mA	Min: 4.0 mA	High Alarm: OFF	Low Alarm: OFF
Al1	Modbus 30001:0000	Modbus 30237:0000	Modbus 30269:0000	Modbus 10225:0	Modbus 10257:0

The following example shows how to convert the Modbus data to a **temperature** value.

Type Code	Input Range	Data Format	Min.	Max.
05	<b>Туре К</b> Thermocouple	Engineering	-2700	13720
UF	-270 ~ 1372°C	2's Complement	0xE6D0	0x7FFF

The user can get the input temperature with the following formula.

Actual value	_	Max. value of input range
Modbus Raw Data (decimal)	=	Max. raw data value (decimal)

For example, if the **Modbus Raw Data** read by the module is **0x00EE**, the **Actual Value** of the input current is 23.8 (°C).

 Actual value	_	1372	<u> </u>	Actual value = 23.8 (°C)	
238 (00EE in hexadecimal)	-	13720	L/		

### **Appendix E** Network Address Translation

For a computer to communicate with ET-7x00/PET-7x00 modules on the Internet, ET-7x00/ PET-7x00 modules must have a public IP address. It works like your street address - as a way to find out exactly where you are and deliver information to you.

Network Address Translation (NAT) allows a single device, such as a router, to act as an agent between the Internet (or "**public network**") and a local (or "**private**") network. This means that only a single, unique IP address is required to represent an entire group of computers.

A type of NAT in which a private IP address is mapped to a public IP address, where the public address is always the same IP address (i.e., it has a static address). This allows an internal host, such as an ET-7x00/PET-7x00 module, to have an unregistered (private) IP address and still be reachable over the Internet.



### Step 1: Configure the Ethernet settings of the ET-7x00/PET-7x00 module.

The Gateway must be set to the IP address of the router (i.e., 10.1.0.1)

Network Settings   Basic Settings   Module I/O Settings   Authentication     Configure:   Manually     IP address   Subnet mask   255.255.0.0     IO.1.0.11     SUBMIT	Overview	Ethernet Con	figuration	
Basic Settings     IP address     Subnet mask     Gateway       Module I/O Settings     10.1.0.11     255.255.0.0     10.1.0.1       Authentication     +     SUBMIT	Network Settings	Configure: Manua	ally 🗸	
Module I/O Settings         10.1.0.11         255.255.0.0         10.1.0.1           Authentication         +         SUBMIT         SUBMIT	Basic Settings	IP address	Subnet mask	Gateway
Authentication + SUBMIT	Module I/O Settings	10.1.0.11	255.255.0.0	10.1.0.1
	Authentication +		SUBMIT	

## Step 2: Connect to the Web Server of the ET-7x00/PET-7x00 module with the public IP address on the Internet.

To access the web page, the port number must be included in the access URL as shown below: http://210.32.166.58:180

← C ŵ	•	210.32.166.58:180				£≣	Ē	ē	
ICP DAS	das.c	om	-	1		L	][		
Overview						70	~~		
Configuration	+		EI-702	26 / 1	PEI-I	$\left( 0\right) $	26		
Authentication	+	An Eth	nernet module that is	equipped wi	th 2 digital out	puts, 2	digital	input	s,
Web HMI	+		2 analog	outputs and	l 6 analog input	ts.			
Pair Connection			Module	Information:					
More Information			M	AC Address:	00:0D:E0:65:D7:9	0			
			Firmw	are Version:	3.0.1 (Apr. 13, 202	21)			
				I/O Version:	1.08				
			Ether	net Version:	1.29 (Feb. 25, 201	9)			
			Web Ser	ver Version:	2.1.01 (Feb. 26, 2	016)			
				OS Version:	2.4.0 (Nov. 24, 20	16)			

### **Appendix F** Troubleshooting

Several common problems are easy to diagnose and fix if you know the cause.

Symptom/Problem				
Possible cause	Solution			
• The Run LED doesn't light				
Internal power has failed	Return the module for repair.			

The Run LED indicator is ON (light), but not flashing.				
The module has possibly crashed.	Reboot the module			

<ul> <li>Cannot communicate via the Ethernet port, but the ET-7x00/PET-7x00 is still operating.</li> </ul>			
The IP/Mask/Gateway address isn't within the IP address range of the LAN.	Change the IP/Mask/Gateway address to match the LAN, or ask the MIS administrator for assistance.		
The IP address has restricted by the IP filter settings	Check the IP filter settings using the Web configuration.		
There are more than 30 TCP/IP connections.	Reboot the module.		

## • Able to explore the web page through Port 80 using a web browser, but the Web HMI and Modbus/TCP program cannot access the module through Port 502.

Port 502 has been restricted by the firewall.	Consult your MIS administrator for assistance.
---	--

## • The Web HMI and Modbus/TCP program can access the module through Port 502, but the Web browser cannot explore the web page through Port 80 using a web browser.

Port 80 has been restricted by the firewall.	Consult your MIS administrator for assistance.
The Web server TCP Port has been changed from Port 80, refer to the <u>Basic Settings</u> page.	Change the TCP Port to 80 or reconnect the ET-7x00/PET-7x00 using the specific TCP Port.