# tET/tPET I/O Series User Manual

Ethernet I/O Modules Ver.2.4, Dec. 2024

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

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### **SUPPORT**

This manual relates to the following modules: tET-AD2, tPET-AD2 tET-DA2, tPET- DA2 tET-P6, tPET-P6 tET-P06, tPET-P06 tET-C4, tPET-C4 tET-A4, tPET-A4 tET-P2C2, tPET-P2C2 tET-P2A2, tPET-P2A2 tET-P2POR2, tPET-P2POR2, tET-PD2POR2, tPET-PD2POR2 tET-P2R2, tPET-P2R2 tET-PD2R1, tPET-PD2R1

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# **Revision History**

This chapter provides revision history information to this document.

The table below shows the revision history.

Revision	Date	Description				
	Dec. 2024	1. Add Ch6.5 Modbus Register Table (AO)				
2.4	Jan. 2024	<ol> <li>Add information about tET/tPET-DA2. Related chapters:</li> <li>1.1, 1.2, 2.2.3, 4.2.2</li> <li>4.4.3 Analog Output Configuration, 4.4.4 AO - Calibration</li> <li>4.7.4 Analog Output, 4.9.2 SNMP Specific Trap,</li> </ol>				
2.4		4.9.3 Restore Factory Defaults				
	Sep. 2023	<ol> <li>Remove information about PETL-7060 (Phased out)</li> <li>Add information about tET/tPET-AD2</li> <li>Add Section 4.4.2 Calibration (for AI modules)</li> <li>Add Sections 4.7 MQTT, 4.8 MQTT- Realization, 4.9 SNMP</li> <li>Add Section 5.5 Shared Memory</li> </ol>				
2.3	Jun. 2020	Updated the related links of official website.				
2.2.1	Mar. 2018	Remove the package CD				
2.2	Aug. 2017	<ol> <li>Update the information about the Firmware Version v1.4.6 [Jun.16, 2017] in Chapter 4 Web Configuration.</li> <li>Add Appendix A: Troubleshooting.</li> <li>Add Appendix B: Revision History.</li> </ol>				
1.6	Jul. 2013	<ol> <li>Add the software and hardware information about the tET/tPET-PD6.</li> <li>Add the software and hardware information about the tET/tPET-PD2POR2.</li> <li>Add the software and hardware information about the tET/tPET-PD2R1.</li> </ol>				
1.0	Mar. 2011	Initial issue				

# **Packing List**

The shipping package includes the following items:





Quick Start x 1

### 🔔 Note

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

# **More Information**

### Documentation

https://www.icpdas.com/en/downloaDIndex.php?nation=US&kind1=&model=&kw=tPET

### Firmware

https://www.icpdas.com/en/download/show.php?num=2632

### Software https://www.icpdas.com/en/downloaDIndex.php?nation=US&kind1=&model=&kw=eSearch

# **1** Introduction

The tET/tPET series of devices are Ethernet I/O monitoring and control modules that provide the networking ability and a variety of I/O functions. The modules can be remotely controlled through a 10/100M Ethernet network using the Modbus TCP/UDP protocol. Modbus has become a de facto standard communication, and is now the most commonly available means of connecting industrial electronic devices. This makes the tET/tPET series perfect for integration with HMI, SCADA, PLC and other software systems.



### **1.1** Product Information

### 1.1.1 Ethernet IO Module Series

The tET/tPET series of Ethernet I/O modules support a range of I/O formats, such as photo-isolated digital input, relay contact, PhotoMOS relay, and open-collector output, etc.

The table below provides a description of each model.

DC Analog Input				
tET-AD2	Tiny Ethernet module with Isolated 2-ch AI			
tPET-AD2	Tiny PoE Ethernet module with Isolated 2-ch AI			

DC Analog Input				
tET-DA2	Tiny Ethernet module with Isolated 2-ch AO			
tPET-DA2	Tiny PoE Ethernet module with Isolated 2-ch AO			

DC Digital Input			
tET-P6	Tiny Ethernet Module with 6-ch DI (Wet Contact)		
tET-PD6	Tiny Ethernet Module with 6-ch DI (Dry Contact)		
tPET-P6	Tiny PoE Ethernet Module with 6-ch DI (Wet Contact)		
tPET-PD6	Tiny PoE Ethernet Module with 6-ch DI (Dry Contact)		

DC Digital Output				
tET-C4	Tiny Ethernet Module with 4-ch DO (Sink, NPN)			
tET-A4	Tiny Ethernet Module with 4-ch DO (Source, PNP)			
tPET-C4	Tiny PoE Ethernet Module with 4-ch DO (Sink, NPN)			
tPET-A4	Tiny PoE Ethernet Module with 4-ch DO (Source, PNP)			

DC Digital Input and Output			
tET-P2C2	Tiny Ethernet Module with 2-ch DI and 2-ch DO (Sink, NPN)		
tET-P2A2	Tiny Ethernet Module with 2-ch DI and 2-ch DO (Source, PNP)		
tPET-P2C2	Tiny PoE Ethernet Module with 2-ch DI and 2-ch DO (Sink, NPN)		
tPET-P2A2	Tiny PoE Ethernet Module with 2-ch DI and 2-ch DO (Source, PNP)		

Power Relay Output				
tET-P2R2	Tiny Ethernet Module with 2-ch DI (Wet Contact), 2-ch Power Relay			
tET-PD2R1	Tiny Ethernet Module with 2-ch DI (Dry Contact), 1-ch Power Relay			
tPET-P2R2	Tiny PoE Ethernet Module with 2-ch DI (Wet Contact), 2-ch Power Relay			
tPET-PD2R1	Tiny PoE Ethernet Module with 2-ch DI (Dry Contact), 1-ch Power Relay			

PhotoMOS Relay Output				
tET-P2POR2 Tiny Ethernet Module with 2-ch DI (Wet Contact), 2-ch PhotoMOS Re				
tET-PD2POR2	Tiny Ethernet Module with 2-ch DI (Wet Contact), 2-ch PhotoMOS Relay			
tPET-P2POR2	Tiny PoE Ethernet Module with 2-ch DI (Wet Contact), and 2-ch PhotoMOS Relay			
tPET-PD2POR2	Tiny PoE Ethernet Module with 2-ch DI (Wet Contact), and 2-ch PhotoMOS Relay			

### 1.1.2 Selection Guide

Мо	del	I/O Specifications			Modbu		SNMP
Ethernet	ΡοΕ	AI	AO	Isolation	s TCP	MQTI	V2c
tET-AD2	tPET- AD2	2 (Single-end)	-	Yes	Yes	Yes	Yes
tET-DA2	tPET-DA2	-	2	Yes	Yes	Yes	Yes

M	odel	I/O	Modbus	NAOTT		
Ethernet	РоЕ	DI DO Is		Isolation	ТСР	IVIQTI
tET-P6	tPET-P6	6-ch (Wet Contact)	-			
tET-PD6	tPET-PD6	6-ch (Dry Contact)	-			
tET-C4	tPET-C4	-	4-ch (Sink)			
tET-A4	tPET-A4	-	4-ch (Source)		Yes	
tET-P2C2	tPET-P2C2	2-ch (Wet Contact)	2-ch (Sink)	Yes		
tET-P2A2	tPET-P2A2	2-ch (Wet Contact)	2-ch (Source)			Yes
tET-P2POR2	tPET-P2POR2	2-ch (Wet Contact)	2-ch Form A PhotoMos Relay			
tET-PD2POR2	D2POR2 tPET-PD2POR2 2-ch Pr (Dry Contact) 2-cc Pr		2-ch Form A PhotoMos Relay			
tET-P2R2	tPET-P2R2	2-ch (Wet Contact)	2-ch Form A Relay			
tET-PD2R1	tPET-PD2R1	2-ch (Dry Contact)	1-ch Form A Relay			

### 1.1.3 Comparison of tET/tPET Module

The tPET series features true IEEE 802.3af-compliant (classification, Class 1) Power over Ethernet (PoE) functions. Now, not only can data be carried through an Ethernet cable, but power can also be provided. This feature makes installation of tPET series modules a straightforward task. Imagine no more unnecessary wires with only an Ethernet cable required in order to take care of everything in the field.

The tET/tPET series also features a built-in web server that allows basic configuration, I/O monitoring and I/O control to be performed by simply using a web browser, meaning that remote control of your modules is as easy as surfing the Internet. In addition, tET/tPET series modules support the Modbus TCP/UDP, MQTT, or SNMP protocols, ensuring perfect integration with HMI, SCADA, PLC, or other software.

### **Industrial PoE Solutions**

When using PoE devices such as the tPET series, you can incorporate the ICP DAS **"PoE"** switch, the **"NS-205PSE"**, as the power source. The NS-205PSE automatically detects any connected devices, whether they are PoE devices or not. This mechanism ensures that the NS-205PSE will function simultaneously with both PoE and non-PoE devices.

Note that when acting as a power source for a PoE device, the NS-205PSE requires a power input ranging from +46  $V_{DC}$  to +55  $V_{DC}$ .



### More Information for tET/tPET Series Modules

All tET series modules can only be powered using a +12  $V_{DC}$  to +48  $V_{DC}$  power supply connected through a removable terminal block.

In contrast, tPET series modules offer two methods of supplying power. The first is through the Ethernet via a PoE switch; the second is through a removable terminal block via an external power source. The external power supply should be in the range of +12  $V_{DC}$  to 48  $V_{DC}$ . The reason for including the second method is to provide a redundant power input feature. tPET series modules also include an LED indicator that indicates whether the power is being supplied by the PoE switch or not.

Series	tPET	PET-7000					
CPU	32-bit ARM	80186					
Ethernet	10/100 M, PoE						
Modbus TCP/UDP	Yes						
Web Configuration	Yes						
Web HMI	Simplified	Yes					
Multi-client	Yes (Max. Connections: 5)	Yes (Max. Connections: 12)					
IP Filter	Yes (white list)						
Latched DI	Yes						
DI as Counter	32-bit, 3.5 kHz	32-bit, 500 Hz					
Frequency Measurement	Yes (3.5 kHz Max.)	-					
I/O Pair-connection	Yes (Pull/Push Mode)	Yes (Pull Mode)					
PWM	Yes (100 Hz Max.)	-					
Dual-Watchdog	Yes (CPU, Host)	Yes (Module, Host)					
ESD Protection	+/- 4 kV						
Surge Protection	-	+/- 0.5 kV					
Form Factor	Tiny Size	Palm Size					
Remarks	Cost-effective	-					
Note: The tET series and tPET series are similar, but only the tPET series has PoE functionality.							

### 1.2 Features

### Built-in Web Server

The tET/tPET series module can receive/send network packets efficiently by using a 32-bit MCU. Web Server is also built in to provide an intuitive web management interface that allows users to easily configure, monitor and control the module from a remote location using a web browser.



### Modbus TCP/UDP, MQTT, or SNMP Protocol

The Modbus TCP/UDP slave function on the Ethernet port can be used to provide data to remote SCADA software. All tET/tPET series modules support the MQTT protocol. So far, only the tPET-AD2 and tPET-DA2 support the SNMP V2c protocol.

### All-in-one Module

A variety of I/O components are available on multiple channels in a single module, which provides the most cost effective I/O usage and enhances the performance of I/O operations.

### Automatic MDI/MDI-X Detection for Plug-and-Play



The RJ-45 port supports the Auto-MDI/MDI-x feature to detect the type of the connected Ethernet device and then automatically choose the MDI or MDIX configuration. Thus, the user can use straight-through or crossover cables.

### Built-in Multi-Function I/O

The **DO** modules support these functions:

- **Power-on Value:** On boot up, the DO value will be set to the Power-on value.
- Safe Value:

If Modbus TCP communication is lost for a specific period, the DO value will be set to the user-defined safe value.

• A PWM (Pulse-Width Modulation) Function:

Each of DO channel can be set to a different frequency (50 or 100 Hz Max.) and duty cycle, also work either independently or simultaneously. The term "High Duty Cycle" describes the duration of 'ON' time in proportion to the regular interval or 'period' of time. Similarly, the term "Low Duty Cycle" corresponds to the duration of the 'OFF' time. Consequently, it is not necessary to keep switching from ON to OFF from remote a controller. In this way, the module reduces the complexity required for the control system and enhances timing accuracy.

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

#### The **DI** modules support these functions:

- Can be Used as a 32-bit High Speed Counter
- High/Low Latched Status Commands:

The modules provide commands to read the status of any digital input channels that are latched high or latched low. The following is an example that shows the usefulness of the latched digital input. If we wish to read a key stroke from a key switch connected to the digital input channel of a module,



the input signal of the key stroke is a pulse signal as shown in the figure.

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

#### • Frequency Measurement:

This function can be used to retrieve the digital input counter value at specific times and calculates the frequency (Hz, Max. 3.5 kHz). Rather than polling via a remote host, the module can determine the frequency directly, reducing the communication delay caused by two ends and also improves the accuracy of the frequency measurement. In order to applying for more applications, this module provides 3 scan modes and 4 moving average methods for user to select the best way in their applications.

### Built-in Dual Watchdog

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

#### **CPU Watchdog:**

The CPU Watchdog will automatically reset it-self if the built-in firmware encounters an abnormal situation.

### Host Watchdog

If there is no communication between the module and the host (PC or PLC) for a specified period of time (i.e., the Watchdog timeout), the Host Watchdog will set the digital output based on a predefined safe-value.

### > I/O Pair-Connection

The I/O Pair-connection function is used to create a digital input to digital output pair through the Ethernet. Once the configuration is complete, the modules can continuously poll the status of a remote digital input device using the Modbus TCP protocol, and then write to the local digital output channels in the background.





# 2 Hardware Information

### 2.1 Appearance

The components of the tET/tPET module include LED indicators, pluggable terminal blocks for power input or I/O, an operating mode switch, and an Ethernet port.





1	System LED Indicator	4	Operating Mode Switch
2	Power Input Connector	5	Ethernet Port (PoE)
3	I/O Connector		

### System LED Indicator

Once power is supplied to the tET/tPET series module, the LED indicator will be illuminated as follows:

Function	S1
System running	Red light (flashing once every 3 seconds)
Firmware update in progress (0 ~ 100%)	Red light (ON)

#### Power Input Connector

The power input connector on the tET/tPET series module differs in pin assignments (4-pin or 2-pin) base on the model. For more information about pin assignments, refer to Section 2.2 "Specification and Wiring".

### **DC Power Input:**

All tET/tPET series modules include "(R)+Vs" and "(B)GND" pins and are powered by a DC power supply.

Name	Function				
(R)+Vs	+12 to +48 V <sub>DC</sub> Power Input				
(B)GND	Ground Connection				



#### Frame Ground (F.G.):

Electronic circuits are constantly vulnerable to Electrostatic Discharge (ESD), which becomes worse in a continental climate area. The tET/tPET series modules feature a new design for the frame ground, which provides a path that bypasses ESD to prevent direct impact on hardware from ESD and environmental interference, resulting in enhanced ESD protection capability and ensuring that the module is more reliable.

### > I/O Connector

The pin assignments for the I/O connector on the tET/tPET series module differ based on the model. For more information about pin assignments, refer to Section 2.2 "Specification and Wiring".

#### Operating Mode Switch

The operating mode switch on the tET/tPET series module is set to the **Run** position by default. When updating the firmware, you will need to switch to Init mode. Once the update is completed, you should switch back to Run mode.



#### Init mode:

For firmware update or troubleshooting. The factory presets will be loaded.

### <u>Run mode</u>:

For normal operation. The user-defined configuration will be loaded



After modifying the operating mode, it is necessary to reboot the tET/tPET series modules.

#### Ethernet Port

The tET/tPET series module includes an RJ-45 socket that serves as a 10/100 Base-TX Ethernet standard port. When a network connection is established and network packets are received, both the Link/Act LED and the 10/100 M LED on the RJ-45 socket will light up.



#### PoE (Power-over-Ethernet) functionality is only available for the tPET series modules



### 2.2 Specification and Wiring

### 2.2.1 Product Page

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



### 2.2.2 tET/tPET Selection Guide

https://www.icpdas.com/en/product/guide+Remote\_I\_O\_Module\_and\_Unit+Ethernet\_I\_O\_ \_Modules+tET\_tPET\_\_Series#1110

HOME > PRODUCTS > Remote I/O Module and Unit > Ethernet I/O Modules > tET/tPET Series									
Introduction Selection Guide Ethernet I/O Comparison Table									
► Available soon ► Will be phased out ► Phased out									
tET/tPET Analog I/O Modules									
Mc	odel	A				AO			
PoE	Non-PoE	Channels	Fast Sampling Rate	Resolution	Voltage & Current Input	Channels	Resolution	Voltage & Current Output	
<u>tPET-AD2</u> ►	tet-AD2	2	200 Hz	16-bit	0 ~ 500 mV, 0 ~ 1 V, 0 ~ 2.5 V, 0 ~ 5 V, 0 ~ 10 V, 0 ~ 20 mA, 4 ~ 20 mA	-	-	-	
							· · · ·		

### 2.2.3 Data Sheet

Users can also click the "Data Sheet" icon on the product webpage to view the pin assignments and wire connections.



The table listed the web link of the data sheet for tET/tPET series modules.

www.icpdas.com/web/product/download/io\_and\_unit/ethernet/tet\_tpet/document/data\_sheet/ XXX.pdf

Model	Name
Analog Input Modules	
t(P)ET-AD2	tET-AD2_tPET-AD2_en.pdf
Analog Output Modules	
t(P)ET-DA2	tET DA2_tPET-DA2_en.pdf
Digital I/O Modules	
t(P)ET-P6, t(P)ET-PD6	tET-P6_tET-PD6_en.pdf
t(P)ET-A4, t(P)ET-C4	tET-A4_tET-C4_en.pdf
t(P)ET-P2A2, t(P)ET-P2C2	tET-P2A2_tET-P2C2_en.pdf
Digital Input Modules/Relay Output	
t(P)ET-P2POR2, t(P)ET-PD2POR2	tET-P2POR2_tET-PD2POR2_en.pdf
t(P)ET-P2R2, t(P)ET-PD2R1	tET-P2R2_tET-PD2R1_en.pdf

### 2.3 Dimensions





# **3** Getting Started

This chapter provides a basic overview of how to install, configure and operate your tET/tPET series module.

### 3.1 Mounting the Module

The tET/tPET series module can be mounted by attaching the back of the chassis to a standard 35 mm DIN-Rail.

### **DIN-Rail Mounting**

The tET/tPET series modules include simple rail clips on the back of the chassis that allow them to be reliably mounted on a DIN-Rail.



### Mounting on a DIN-Rail



**Dismounting from a DIN-Rail** 



### Mountable DIN-Rail Models

Din-Rail mounts are available in three sizes, and enable a variety of ICP DAS devices to be mounted. Each is made of stainless steel and has a ground wire attached at one end.



Part Number	Maximum Number of Modules	Dimensions			
DRS-125	2	125 mm x 35 mm			
DRS-240	3	240 mm x 35 mm			
DRS-360	5	360 mm x 35 mm			

### 3.2 Configuring the Operating Mode

All tET/tPET series modules feature two operating modes, which can be selected by adjusting the switch on the module. **Note that it is necessary to reboot the module after modifying the operating mode.** 



### Init Mode

The Init Mode should be chosen when updating the firmware or conducting troubleshooting. In this mode, the configurations of the module will be forced to the default factory settings.

### **Run Mode**

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



- 1. After updating the firmware, be sure to set the switch back to the "Run" position and reboot the module.
- 2. If the user cannot log in to the module's web server or forget the password, please refer to Appendix A to restore the factory default settings.

### 3.3 Connecting to the Network and the PC

All tET/tPET series module are equipped with an RJ-45 Ethernet port to allow connecting to an Ethernet switch/hub or a PC.

### Uses Non-PoE Switch



### Uses PoE Switch (for tPET only)



### 3.4 Configuring the Network Settings

The **eSearch Utility** is a useful tool that provides a quick and easy method of configuring the Ethernet settings for the module from a PC.

Step1. Download and install the eSearch Utility, and then open the eSearch Utility eSearch Utility can be obtained from the ICP DAS web site at: https://www.icpdas.com/en/download/show.php?num=1327



# Step2. Click the "Search Server" button to search for your module double-click the module name to start network settings

The factory settings of the module are as follows:

IP Address 192.168.255.1 Subnet Mask 255.255.0.0 Gateway 192.168.0.1

	🦪 eSearch Utility	ı [ v1.3.0, J	lul.25, 2022 ]				×
	File Server Tools	6					
	Name 2	Alias	IP Address	Sub-net Mask	Gateway	MAC Address	~
	DL 302	EtherIO	192.168.101.15	255.255.0.0	192.168.1.1	00:0D:E0:92:00:A1	
Ĺ	t(P)ET-AD2	EtherIO	192.168.255.1	255.255.0.0	192.168.0.1	00:0d:e0:ff:ff:ff	
-	ET-7233/PET-725	NA	10.0.255.10	255.255.0.0	10.0.0.254	00:0d:e0:66:72:5a	
	WP5231	WP5231	192.168.73.51	255.255.0.0	192.168.1.1	00:0D:E0:3E:67:88	
	ACS-11-MF	ACS-1	192.168.1.242	255.255.0.0	192.168.1.1	00:0d:e0:c0:04:f7	
	ACS-11-MF	ACS-1	192.168.1.241	255.255.0.0	192.168.1.1	00:0d:e0:c0:04:fd	
	RPAC-2658M	RPAC	192.168.83.51	255.255.0.0	192.168.1.1	00:0d:e0:c0:00:28	$\sim$
	<	(1.)				>	Þ
	Search Serve	Cor	nfiguration (UDP)		Web	Exit	

#### Step3. Configure the network settings and click the "OK" button

Contact your Network Administrator to obtain the correct network configuration information. Modify the network settings and click the "**OK**" button to save the changes.

**Note:** Make sure that the IP addresses of the PC and the module are on the same sub-network.

Configure Serve	r (UDP)						X
Server Name :	t(P)ET-AD2		IPv6 Address	fc00:0:0:0:0:0:0:1	3.		
DHCP:	0: OFF	•	Sub-net Mask :	255.255.0.0	Alias:	EtherIO	
IP Address :	192.168.15.7		Gateway :	192.168.1.1	MAC:	00:0d:e0:ff:ff:ff	
Warning!! Contact your Network Administrator to get correct configuration before any changing! OK Cancel							

### Step4. Search the module again and check the settings

Click the "Search Server" button to search the module again and check the settings are correct.

🥩 eSearch Utility	- 🗆	$\times$				
File Server Tools	5					
Name	Alias	IP Address	Sub-net Mask	Gateway	MAC Address	~
DL 302	EthorIO	192.168.101.15	255,255,0.0	192.168.1.1	00:0D:E0:92:00:A1	
t(P)ET-AD2	EtherIO	192.168.15.7	255.255.0.0	192.168.1.1	00:0d:e0:ff:ff:ff	
E1-7255/PE1-7255	N/A	10.0.255.10	255.255.0.0	10.0.0.254	00:0d:e0:66:72:5a	
WP8000	WP8000	192.168.83.10	255.255.0.0	192.168.1.1	00:0D:E0:3E:66:11	
WP5231	WP5231	192.168.73.51	255.255.0.0	192.168.1.1	00:0D:E0:3E:67:88	
ACS-11-MF	ACS-1	192.168.1.241	255.255.0.0	192.168.1.1	00:0d:e0:c0:04:fd	
RPAC-2658M		192.168.83.51	255.255.0.0	192.168.1.1	00:0d:e0:c0:00:25	$\sim$
<	(4.)				2	>
Search Serve	er Co	nfiguration (UDP)	) We	eb	Exit	
Status (")						11

# 4 Web Configuration

The Ethernet I/O module has a built-in Web Server to provide an intuitive web management interface, allowing users to modify the module's settings by using a web browser.

### 4.1 Logging in to the Web Server

After completing the network settings, users can access the module's built-in web server from any computer that's connected to the same network. Follow these steps:

### Step 1: Open a web browser

Open a standard web browser. For example, Mozilla Firefox, Google Chrome, Internet Explorer, and so on.



Internet Explorer

### Step 2: Enter the IP address of the module into the address bar

Ensure that you have correctly configured the network settings for the I/O module, or refer to Section 3.4 "Using the eSearch Utility to Assign a New IP".



- **Note1:** The function tab will be different depending on the I/O type of the module.
- **Note2:** The "Sync" and "PWM" functions are only suitable for the DIO module.
- **<u>Note3</u>**: The "SNMP" function is available for the tPET-AD2 and the tPET-DA2 module.

#### Step 3: Enter the password

For the first time to log into the web interface, the default password must be changed. Enter the factory preset password "**Admin**" and give a new password. Then, click the "**Submit**" button.



Enter the new password in the "**Login password**" field and click the "**Submit**" button to log into the web server. Also, refer the Section 4.10 "Change Password" to change the password.



#### Step 4: Login to the web server

After logging into the module's web server, the **Home** page will be displayed. The function tabs will be different depending on the I/O type of the module. Refer to the screenshoots below.

### For example,

### Analog Input

G 🕼 Ethe	ernet I/O Module	× +							$\sim$	-		×
$\leftrightarrow \rightarrow G$	▲ 不安全   ht	ttp://192.168.15.100				(		☆ (	3 🚯	* 🗆	۲	÷
ICP	Etherne Home   Net	et I/O Module	MQTT   SNMP	Pair   Filter	Monitor   Pas	sword   Logo	ut					
	Mode	l Name t(P)ET-AD2				Alias Name	EtherIO	)				Î
	Firmware	Version v00.6.0 [202	30629]			MAC Address	6 00-0d-e	0-ff-ff	-ff			
	IP /	Address 192.168.15.1	100			Initial Switch	OFF					
(Socket	Watchdog, Sec	c's)TCP Timeout		(Net	work Watchdog	, Sec's)System Timeou	1 t					
	Modbus	Format Hexadecima	I			Sampling Rate	Normal					. 1
Analog Inp	ut (Modbus	Address: Al=3000	00 ~)									
Al Channel	Value (30000~)	Туре (40427~)	4mA WireBreak (30380~)	Channel Enable (00595~)	Hi Alarm Status/Clear (10224~)	Low Alarm Status/Clear (10256~)	Max Late (30236~	ch M ~) (3	in Latch 80268~)	Clea (0076	r Latch 4/796 <sup>-</sup>	1 ~)
AIO:	0.000	0x08:0 ~ +10V	-	Enabled	Disable	Disable	0.000		0.000	Clea	r Latch	
AI1:	0.000	0x08:0 ~ +10V	-	Enabled	Disable	Disable	0.000		0.000	Clea	r Latch	
Current port set	ttings:											
Pair	-Connection S	Settings			Port 1							
Server Mode				Server					. 1			
Remote Server IP					Disable	iu id						
					Disable							
Note: Above I	Modbus addres	ses are all in base 0.										-
						Copyrig	ht © 2022 IC	CP DAS	S Co., Ltd	. All righ	nts rese	rved.

### Digital Input & Output

🙀 Ethernet I/O Module 🛛 🗙	+		v –		
← → C ▲ 不安全   192.1	68.15.101		臣 ☆ 🕈		
Ethernet I/O Module Home   Network   I/O Settings   Sync   PWM   Pair   Filter   Monitor   Password   Logout MQTT (Topics: DO   DI )					
Model Name	tPET-P2R2_RevB	Alias Name	EtherIO		
Firmware Version	B2.3.2 [Dec.16 2021]	MAC Address	00-0d-e0-65-fa-7f		
IP Address	192.168.15.101	Initial Switch	ON		
TCP Timeout (Socket Watchdog, Seconds)	180	System Timeout (Network Watchdog, Seconds)	0		

### 4.2 Home

The **Home** page provides users with information about the I/O module, as detailed below.



### 4.2.1 Module Information

**Note:** After updating the firmware, the user can check the version number on this page.

Model Name t(P)ET-AD2	Alias Name EtherIO
Firmware Version v00.6.0 [20230629]	MAC Address 00-0d-e0-ff-ff-ff
IP Address 192.168.15.100	Initial Switch OFF
(Socket Watchdog, Sec's)TCP Timeout	(Network Watchdog, Sec's)System Timeout
Modbus Format Hexadecimal	Sampling Rate Normal

The following information that can be different according to the type of I/O module.

Items	AIO	DIO	DIO Items		AO	DIO
Model Name			Alias Name			
Firmware Version	0		MAC Address	0		
IP Address			Initial Switch			
TCP Timeout (Seconds.)			System Timeout (Seconds)			
Modbus Format	0 X		Sampling Rate	0	Х	
			Host Timeout (Safe value, Seconds)	х	0	Х

### 4.2.2 I/O Information

The following information allows users to view the status of I/O and Pair-Connection. All items will be different according to the type of I/O module.

### Analog Input

Used to display AI information such as the value, type, wiring, channel, also clear the alarm or latch.

Analog Ir	Analog Input (Modbus Address: Al=30000 ~)								
Al Channel	Value (30000~)	Туре (40427~)	4mA WireBreak (30380~)	Channel Enable (00595~)	Hi Alarm Status/Clear (10224~)	Low Alarm Status/Clear (10256~)	Max Latch (30236~)	Min Latch (30268~)	Clear Latch (00764/796~)
AIO:	0.000	0x08:0 ~ +10V	-	Enabled	Disable	Disable	0.000	0.000	Clear Latch
Al1:	0.000	0x08:0 ~ +10V	-	Enabled	Disable	Disable	0.000	0.000	Clear Latch

#### **Digital Input & Digital Output**

Used to display the status of the DI, or control the DO status.

Digital I/O	Digital I/O (Modbus Address: DO=00000 to 00015, DI=10000 to 10015)								
DO7	DO6	DO5	DO4	DO3	DO2	DO1		DO0	٢
DI Channel	Value (10	0000)	Counter (300 (30	16) / Frequency 0064)	High Latched	(10032)	Low Lat	ched (1	0064)
DI0:		)		-	-			-	
DI1:				-	-			-	

#### Analog Output

Used to display the type, read value, power-on value, safe value, slew rate, and the status of the wiring, or set the AO value.

Analog Output (Modbus Address: AO=40000 to 40007.)						
AO Channel	Type (40459~466)	AO Read (40000~007)	AO Write (40000~007)	Submit Value	Wire Break (10290)	
AO0:	0x32:0 ~ +10V	4.000	0.000	Set Value	-	
AO1:	0x32:0 ~ +10V	4.000	0.000	Set Value	-	
AO Channel	Power On Value (40360~367)	Safe Value (40392~399)	Slew Rate (40523~530)			
AO0:	4.000	4.000	0x00:Immediate			
AO1:	4.000	4.000	0x00:Immediate			

#### **Pair-Connection**

Used to display the module is in Server/Client mode or the IP address and the TCP port of the remote devide.

Current port settings:	
Pair-Connection Settings	Port 1
Server Mode	Server
Remote Server IP	Disabled
Remote TCP Port	Disabled

### 4.3 Network



The **Network** page offers three sections, which will be described in the following chapters:

1. IP Address:

Used to configure the network IP, Gateway, and MAC addresses for the module.

2. General Settings:

Used to configure network settings such as the Ethernet speed, system timeout, TCP timeout, etc.

3. Other Operations:

Used to restore all module settings to the factory presets, reboot the module, or update the firmware remotely.

### 4.3.1 IP Address

#### **IP Address**

IPv4 Address					
Address Type	Static IP 🗸				
Static IPv4 Address	192 . 168 . 15 . 101				
Subnet Mask	255 . 255 . 0 . 0				
Default Gateway	192 . 168 . 1 . 1				
MAC Address	00-0d-e0-65-fa-7f (Format: FF-FF-FF-FF-FF)				
IPv6 Address					
Link Local Address	fe80:0:0:0:20d:e0ff:fe65:fa7f				
SLAAC Address	):0:0:0:0:0:0				
SLAAC Timeout (SLAAC Watchdog)	0 (30 ~ 65000 seconds, 0 = Default Disabled)				
User-defined Address	fc00:0:0:0:0:0:1				
DNS Settings	Client Mode Only				
Auto DNS Configuration	Enable 🗸 (Auto DNS Server Configuration by IPv4 DHCP. Default = Enable)				
Preferred DNS Server IP	208.67.222.222 IPv4 example: 208.67.222.222, IPv6 example: 2620:119:35::35				
Alternate DNS Server IP	208.67.220.220 IPv4 example: 208.67.220.220, IPv6 example: 2620:119:53::53				
Modbus TCP Slave					
Local Modbus TCP port	502 (Default= 502)				
Local Modbus NetID	1 (Default= 1)				
Check Modbus NetID	Enable  (Process messages with correct NetID only. Default = Enable)				
	Update Settings				

The following table provides parameter notes for the **IP Address** section:

Item	Description
IPv4 Address	
	<b>Static IP:</b> If there is no DHCP server, you can manually assign a static IP address to the module. See "Manual Configuration" section for details.
Address Type	<b>DHCP:</b> The IP address can be automatically assigned through a DHCP server. When the module restarts, the IP address may be changed. See "Dynamic Configuration" section for details.
Static IPv4 Address	Used to set the IP address. Each module connected to the network must have a unique IP address.
Subnet Mask	Used to set the subnet mask address. The subnet mask indicates which part of the IP address is designated as the local network or subnet.
Default Gateway	Used to set the gateway address. A Gateway (or router) is a device that is used to connect an individual network to one or more additional networks.
MAC Address	Used to set the User-defined MAC address, which must be in the format FF-FF-FF-FF-FF-FF.
IPv6 Address	
Link Local Address	Each IPv6 device connected to the network must have a link-local address. The address is auto-configured by the module and is always effective in the same link layer.
SLAAC Address	The module supports Stateless Address Auto-configuration (SLAAC), which is automatically configured by a router. The default is the router's link-local address.
SLAAC Timeout (SLAAC Watchdog)	Used to set the timeout value of SLAAC. If SLAAC address is not configured within the specified time, the system will reboot and attempt to configure SLAAC address again.
User-defined Address	Used to set the module's IP address. Each module connected to the network must have a unique IP address.
DNS Settings	
Auto DNS Configuration	Enable: The DNS server's IP address can be automatically set through IPv4 DHCP. Disable: Automatically set to the preferred IP address of the DNS server.
Preferred DNS Server IP	Used to set the preferred IP address of the DNS Server.
Alternate DNS Server IP	Used to set the alternate IP address of the DNS Server.
Modbus TCP Slave	
Local Modbus TCP port	Used to set the local port of the Modbus Slave device. The default value is 502.
Local Modbus NetID	Used to set the Network ID of the Modbus slave device. The default value is 1.
Update Settings	Click this button to save the changes.

### **Dynamic Configuration**

If a DHCP server is present on your network, you can dynamically configure a network address using the following procedure:

- **Step 1**: Select **"DHCP"** from the **Address Type** drop-down menu.
- **Step 2:** Click the **"Update Settings"** button to complete the configuration.

		$\frown$		
IPv4 Address		1.		
Address Type	ОНСР 🗸			
Static IPv4 Address	192 .	168	. 15	. 101
Subnet Mask	255 .	255	. 0	. 0
Default Gateway	192 .	168	. 1	. 1
MAC Address	00-0d-e0-6	5-fa-7f		(Format: FF-FF-FF-FF-FF)

### **Manual Configuration**

When using manual configuration, the network settings should be assigned in the following manner:

- **Step 1**: Select **"Static IP"** from the **Address Type** drop-down menu and Enter the relevant details in the respective **network settings** fields.
- **Step 2**: Click the **"Update Settings"** button to complete the configuration.

IPv4 Address	1.	
Address Type	Static IP V	
Static IPv4 Address	192 . 168 . 15 . 101	
Subnet Mask	255 . 255 . 0 . 0	
Default Gateway	192 . 168 . 1 . 1	
MAC Address	00-0d-e0-65-fa-7f (Format: FF-	-FF-FF-FF-FF)

Modbus TCP Slave	
Local Modbus TCP port	502 (Default= 502)
Local Modbus NetID	1 (Default= 1)
Check Modbus NetID	Enable  (Process messages 2.) rrect NetID only. Default = Enable)
	Update Settings

### 4.3.2 General Settings

### **General Settings**

Ethernet Speed	Auto <ul> <li>(Auto=10/100 Mbps Auto-negotiation)</li> </ul>
System Timeout (Network Watchdog)	0 (30 ~ 65000 s, 0 = Default Disabled) Action:Reboot
TCP Timeout	180 (5 ~ 65000 s, Default = 180, Disable = 0) Action:Cut-off connection
UDP Heartbeat	0 (20 ~ 300 seconds, 0 = Default Disabled)
UDP Configuration	Enable  (Enable/Disable the UDP Configuration, Default = Enable)
Web Auto-logout	10 (1 ~ 65000 minutes, Default = 10, Disable = 0)
HTTP port	80 (Default = 80)
Alias Name	EtherIO (Max. 18 chars)
Update Settings	

### The following table provides parameter notes for the **General Settings** section:

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

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

#### Restore all options to their factory default states

To restore all parameters of the module to their factory presets, follow the steps:

- **Step 1**: Click the **"Restore Defaults"** button to reset the configuration.
- **Step 2:** Click the **"OK"** button in the message dialog box.
- Step 3: Check whether the module has been reset to factory presets by using eSearch Utility. Refer to Section 3.4 "Using the eSearch Utility to assign a new IP".

Restore all op	tions to	their factory default states	]
	192	02.168.15.101 says	
	Are	e you sure you want to restore the settings?	
🥩 eSearch Utility File Server Tools	/ [ v1.3.0,	Factory presets 3.	×
Name	Alias	IP Address Sub-net Mask Gateway MAC Address	^
tPET-P2R2_RevB	EtherIO	192.168.255.1 255.255.0.0 192.168.0.1 00:0d:e0:65:fa:7f	
DL-302	EtherIO	192.168.101.15 255.255.0.0 192.168.1.1 00:0D:E0:92:00:A1	$\sim$
<			>
Search Serve	r Co	onfiguration (UDP) Web Exit	
Status			//

#### **Reboot the module**

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

(	Other Operations
	Restore all options to their factory default states
	Reboot the module
ICP	Ethernet I/O Module Home   Network   I/O Settings   Sync   PWM   Pair   Filter   Monitor   Password   Logout MQTT (Topics: DO   DI )
The system is To enter the w	logged out. veb configuration, please type password in the following field.
Login passwo	ord: •••• Submit
Google Chrome:	Menu / Settings / Show advanced settings / Privacy / Content settings / Javascript / Allow all sites to run JavaScript (recommended).
Microsoft IE: Firefox:	Menu / Tools / Internet Options / Security / Internet / Custom level / Scripting / Enable. about:config / I'll be careful, I promise! / Preference Name / javascript.enabled / True.
When using IE Menu items: T	E, please disable its cache as follows. ools / Internet Options / General / Temporary Internet Files / Settings / Every visit to the page

#### Firmware Update via Ethernet

When updating the firmware, the module requires initialization on the LAN. In the case of earlier firmware updates, users had to manually set the operating switch to "Init" and reboot the module to complete the initialization. However, with the new firmware update, users can now initiate the initialization process by clicking the "**Update**" button on the module's web interface.



1. Visit the website to download the latest firmware of the tET/tPET module. Also, refer to the "tET/tPET Firmware Update Manual" for instructions.

https://www.icpdas.com/en/download/show.php?num=2632

2. Run eSearch Utility to search the module and execute "Firmware Update" to start the process.

🥩 eSearch Utility	[ v1.3.0, Jul.25, 202	C:\WINDOWS\syst	em32\cmd.exe		_		]
File Server Tools						^	
Name	Alias IP Addre	Waiting request 1	from MAC 00-0d-e0-ff-ft	f-ff (IP:	192.168	8.255.1)	
tPET-P2R2_RevB         DL-302       PI         ACS-11       2.         t(P)ET-A       Image: Comparison of the second	EtherIO 192.168.2 ing Server configure Server ( irmware Update ocate copy to Clipboard	Starting BOOTP/TH 2 Complete: 0% 5.0.0 55.0.0 55.0.0	After completing the it will start updating.	initializa	tion,	]	-
Search Server	r Configuratio	n (UDP)	Web 3.	Exit			

- 3. On the module's web interface, click the "**Update**" button to reboot the module and then start updating. Note that if the operation is unsuccessful due to the "Web Auto-logout" being enabled, simply log into the web server again.
- 4. After that, adjust the module's operating switch to the "**Run**" position and reboot the module.
- 5. Logging into the module's web server to verify the firmware version.

When the module is installed remotely, you can also use remote control software (such as TeamViewer) to connect to the remote PC. This allows you to initialize the module and complete the firmware update through the web interface.

Note: If the remote firmware update fails, the module might not function correctly. In such cases, please attempt the "Firmware Update" process again and manually initiate the initialization. This should restore the module to its normal state.



# 4.4 I/O Settings



The I/O Settings page offers sections such as Analog Input Configuration, Calibration, DI/DO Configuration, DO Control, and more, based on the I/O type. These sections enable users to configure I/O or calibration parameters. Each of these features is described as follows.

### 4.4.1 Analog Input Configuration

Analog Inpu	ıt Configuratioı	า						
Al Channel	Type (40427~434)	Channel Enable (00595~602)	Hi Alarm Enable (00636~643)	Hi Alarm Mode (00700~707)	Hi Alarm Value (40296~303)	Low Alarm Enable (00668~675)	Low Alarm Mode (00732~739)	Low Alarm Value (40328~335)
Al0:	0x08:0~+10V 🗸	Enabled 🗸	Disabled 🗸	Momentary ~	0.000	Disabled ~	Momentary ~	0.000
Al1:	0x08:0~+10V 🗸	Enabled 🗸	Disabled 🗸	Momentary ~	0.000	Disabled 🗸	Momentary ~	0.000
Modbus Format	Hexadecimal  Action: Modbus Read/Write Format Hexadecimal or Engineering							
Sampling Rate	Normal 🗸	Normal  Action: AI Sampling Rate setting						
Update Settings								

The following table provides parameter notes for the **Analog Input Configuration** section:

Item	Description	
Analog Input Channel		
	Set the data type for each channel and whether to enable or disable it.	
AI0 ~ AI1	If the alarm function is enabled and an alarm event happens. The <b>Momentary</b> mode implies that the alarm status will automatically be cleared when the AI value returns to normal. However, the <b>Latch</b> mode implies that the alarm status can only be reset by executing the Clear command.	
Analog Input		
Data Format	Set the data format, e.g., Hex or Engineering.	
Sampling Rates	Set the sampling rate, e.g., 20 Hz or 200 Hz.	
Update Settings	Click this button to save the changes.	

### 4.4.2 AI - Calibration

Calibration			
Now Mode	Change Mode		
Run	Calibration Mode		
Channel	Item	Set Calibration	
0 🗸	Zero 🗸	Calibration Apply	
Warning: Incorrect manual calibration will cause your device's input imprecise.			

1.Use "Calibration Mode" button to enter Calibration mode.

2.Select which Channel & Type going to manual calibration, then press "Update Settings" on top.

3.Apply the full scale source to the channel's Type(0x08,0x09,0x05,0x0A,0x0B,0x1A).

4.DMM(Digit Multimeter) is needed to measure the input as close as the full scale value.

5. Press "Calibration Apply" will calculate & store the value.

Note: Use "Restore Defaults" on Network page, can recover your calibration value from factory default.

#### The following table provides parameter notes for the **Calibration** section:

ltem	Description		
Calibration			
Now Mode	Used to display the current mode		
Change Mode	Click the Calibration Mode (or Run Mode) button to change the mode		
Channel	Choose the AI channel for calibration		
Item	Choose to use either zero calibration or span calibration		
Set Calibration	Click the Calibration Apply button to perform calibration		

**Step1**: In the **Analog Input Configuration** section of the **I/O Settings** page, enable the AI channel and select the type and Modbus format, then click the **Update Settings** button to save the changes.

Analog Input (	Configuration				
Al Channel	Type (40427~434)	Channel Enable (00595~602)	Hi Alarm Enable (00636~643)	Hi Alarm Mode (00700~707)	Hi Alarm Value (40296~303)
AI0:	0x08:0~+10V V	Enabled V	Disabled ~	Momentary ~	0.000
AI1:	0x08:0~+10V V	Enabled V	Disabled V	Momentary 🗸	0.000
Modbus Format	Engineering 🗸	Action: Modbus	ead/Write Forma	it Hexadecimal or	Engineering
Sampling Rate	Normal 🗸	Action: AI Sample	ing Rate setting		
				Update S	Settings

**Step2:** In the **Calibration** section of the **I/O Settings** page, click the **Calibration Mode** button to get into the calibration mode.



**Step3:** Choose a channel for calibration and link the module to a voltage source (or current source) and a multimeter. Digital Multimeter





**Step4:** Choose the **Zero** calibration, input voltage (or current) via a digital multimeter, and check the input value using a multimeter. Click the **Calibration Apply** button to perform the calibration.

Note: The input voltage (or current) must be as close as the min/max value. For example,

Туре	08: 0 to +10V	1A: 0 to +20mA
Zero Input Value	0V	0mA
Span Input Value	10V	20mA

Step5: Follow the same way to perform Span calibration.

- **Step6:** After completing the Zero and Span calibration, click the "**Run Mode**" button to back to the Run mode.
- <u>Note:</u> The user can click the **Restore Defaults** button on the **Network** page to restore the settings to the factory defaults.

# 4.4.3 Analog Output Configuration

Analog Output Configu	uration				
AO Channel	Type (40459~466)	Power On Value (40360~367)	Safe Value (40392~399)	Slew Rate (40523~530)	
AO0:	0x32: 0 ~ +10V ∨	4.000	4.000	0x00:Immediate	~
AO1:	0x32: 0 ~ +10V ∨	4.000	4.000	0x00:Immediate	~
Modbus Format	Hexadecimal ~	Action: Modbus Read/Writ	te Format Hexadecimal	or Engineering	
Host Timeout (Safe Value/Enable, Seconds)	0	(10 ~ 65000 s, 0 = Default	t Disabled) Action:AO Ou	utput Safe Value	
		Update	Settings		

The following table provides parameter notes for the Analog Output Configuration section:

ltem	Description		
AO Channel			
AO0 ~ AO1	Set the data type, power-on value, safe value, and slew rate for each channel.		
Modbus Format	Set the data format, e.g., Hex or Engineering.		
Host Timeout	Set the host timeout. If there is no response within the specified time, the AO value will be set to the safe value. (0: Disabled)		
Update Settings	Click this button to save the changes.		

### 4.4.4 AO - Calibration

Calibration		
Now Mode	Change Mod	e
Run	Calibration Mod	de
Channel	Set Output	Set Calibration
0 🗸	0 Set	Calibration Apply

Warning: Incorrect manual calibration will cause your device's output imprecise.

1.Use "Calibration Mode" button to enter Calibration mode.

2.Select Channel & Type(0x30,0x31,0x32) for manual calibration, then press "Update Settings" on top.

3.Calibration Type 0x30(20mA) before Type 0x31(4mA).

4.Try the Engineering value(18800~18900[20mA], 6900~7100[4mA], 9900~9990[10V]), to get the full scale value.

5.Press "Set" to make the output change.

6.DMM(Digit Multimeter) is needed to measure the output as close as the full scale value.

7.Press "Calibration Apply" will calculate & store the value.

Note: Use "Restore Defaults" on Network page, can recover your calibration value from factory default.

#### The following table provides parameter notes for the **Calibration** section:

Item	Description
Calibration	
Now Mode	Used to display the current mode
Change Mode	Click the Calibration Mode (or Run Mode) button to change the mode
Channel	Choose the AO channel for calibration
Set Output	Enter output value for the voltage/current type
Set Calibration	Click the Calibration Apply button to perform calibration

**Step1**: In the **Analog Output Configuration** section of the **I/O Settings** page, choose the data type and Modbus format for the selected AO channel, then click the **Update Settings** button to apply the changes.

Analog Output Config	juration				
AO Chai	nnel (4045	ype I 59~466)	Power On Value (40360~367)	Safe Value (40392~399)	Slew Rate (40523~530)
A	O0: 0x32: 0	~ +10V 🗸	1.000	4.000	0x00:Immediate ~
A	01: 0x32: 0	~ +10V 🗸	1.000	4.000	0x00:Immediate ~
Modbus For	mat Engine	eering	Modbus Read/Write For	mat Hexadecimal or En	gineering
Host Time (Safe Value/Enable, Secor	out nds)	(10 ~ 6	(10 ~ 65000 s, 0 = Default Disabled) Action:AO Output Safe Value		
			Update Se	ettings	

**Step2:** In the **Calibration** section of the **I/O Settings** page, click the **Calibration Mode** button to get into the calibration mode.



**Step3:** Choose a channel for calibration and link the module to the digital multimeter.







**Step4:** In the **Set Output** field, enter a maximum voltage (or current) value in Engineering format and click the **Set** button. Also, check the output value using a digital multimeter. Click the **Calibration Apply** button to perform the calibration.



Note: The output voltage (or current) must be very close to the full-scale value.

Туре	+10V	+5V	4mA	20mA
Full-scale Range	9900 ~ 9990	4900 ~ 4990	6900 ~ 7100	18800 ~ 18900

For example, calibrating a 10 V output within the range of 9900 to **9990**. If the output value is set to **9990**, the voltmeter displays 10.0315V. The user can further adjust the output value (9960) to the nearest value close to 10 V, and click the **Calibration Apply** button.

**Step5:** After completing the calibration, click the "**Calibration (Run) Mode**" button to back to the Run mode.

#### Note:

If necessary, the user can click the **Restore Defaults** button on the **Network** page to restore all settings to the factory defaults.

ICP	Ethernet I/O Module Home   Network   I/O Settings   MQTT   SNMP   Pair   Fil	ter   Monitor   Password   Logout
0	other Operations	
R	Restore all options to their factory default states	Restore Defaults
R	Reboot the module	Reboot

# 4.4.5 DI/DO Configuration

#### DI/DO Configuration:

Digital Output	Modbus Address	Setting	
Host/Slave Watchdog Timeout	40257	0 (10 ~ 65535 Seconds, Default= 0, Disable= 0)	
Enable Safe Value (Enable Watchdog)	00339 - 00332	0x0         Ch 7~4(         Ch 3~0(         )	
Safe Value	00274 - 00267	Ch 7~4( Ch 7~4( Ch 7~4( Ch Ch 7~0( Ch 7~0( Ch Ch 7~4)	
Power-On Value	00242 - 00235	0x0 Ch 7~4( 0 0 0) Ch 3~0( 0 0 0)	
Digital Input	Modbus Address	Setting	
Enable Latched DI	00150	0 (Disable All= 0, Enable All= 1)	
Clear Latched Status (High)	00032	0 (No Operation= 0, Clear All= 1)	
Clear Latched Status (Low)	00033	0 (No Operation= 0, Clear All= 1)	
DI Filter Level	-	0 (1 ~ 6500 ms, Default= 0, Disable= 0)	
Digital Counter	Modbus Address	Setting	
Enable Digital Counter	00158 - 00151	Dx0 Ch 7~4( Ch 7~4( Ch Ch 3~0( Ch 3~0( Ch	
Clear Digital Counter	00041 - 00034	0x0 Ch 7~4( Ch 7~4( Ch 7~4( Ch 7~4) Ch 7~0( Ch 7~4) Ch 7~4( Ch 7~4) Ch 7~0( Ch	
Preset Counter Value	40065 - 40050	Ch 07:         D         Ch 06:         D         Ch 05:         D         Ch 04:         D           Ch 03:         D         Ch 02:         D         Ch 01:         D         Ch 00:         D	
Frequency Measurement (DI)	Modbus Address	Setting	
Enable Frequency Measurement	00197 - 00190	Dx0 Ch 7~4( Ch 7~4( Ch 7~0( Ch 7~0( Ch 7~0( Ch 7~4( Ch 7~4( Ch 7~0( Ch 7~0))))))))))))))))))))))))))))))))))))	
Scan Mode	40150	Single pulse ▼ 1000 ms: 1 Hz ~ 3 kHz (+/- 1 Hz error). 100 ms: 100 Hz to 3 kHz (+/- 10 Hz error). Single-pulse: 0.01 Hz ~ 1 Hz (+/- 0.01 Hz error), for stable signal only. Note: ET-2254P supports counter/frequency up-to 2.5 kHz.	
Moving Average	40200	1 •	
Universal DIO	Modbus Address	Setting	
Force DI/DO Mode	00299 00307 - 00300	Dynamic ▼ Static: By configuration. Dynamic: Depends on DO requests.         0xff00 Ch 7~4(         0 Ch 3~0(         0=DO, 1=DI; for ET-2254 Only)	
		Update Settings	

#### The following table provides parameter notes for the **DI/DO Configuration** section:

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

Safe Value	Used to define the DO safe value for the module. If the Host Watchdog alarm is activated, the DO will be set to the user-defined safe value.
Power-On Value	Used to define the DO Power-on value. On boot up, the DO is set to the
Digital Input	user-defined Power-on value.
Enable Latched DI	This parameter is used to enable the latch function on all DI channels. The status of the DI will be recorded if it has been flagged as either high or low. 0 = Disable All; 1 = Enable All
Clear Latched Status (High)	Used to clear the status of all high latched DI. 0 = No Operation; 1 = Clear All
Clear Latched Status	Used to clear the status of all low latched DL
(Low)	0 = No Operation; 1= Clear All
DI Filter Level	The DI filter eliminates high-frequency noise from the input and can be adjusted in a range of 1 to 6500 (ms). 0 = Disable (Default). Refer to "FAQ: What is Digital-Input Filter (DI Filter)" for more information.
Digital Counter	
Enable Digital Counter	Used to enable the digital counter on each DI channels.
Clear Digital Counter	Used to clear the values of each DI counters.
Preset Counter Value	Used to set the default value for each DI counters.
Frequency Measurement	by DI
Enable Frequency Measurement	Used to enable the frequency measurement function on each DI channels.
	Used to define the scan mode for the frequency measurement. <b>1000 ms:</b> It features standard update speed and standard accuracy. The acceptable frequency range for the input signal is 1 Hz to 3.5 kHz (± 1 Hz error). This mode can be used when the pulse width (signal source) contains small errors, since the measurement is based on the pulse count.
Scan Mode	<b>100 ms:</b> It features fast update speed and low accuracy. The acceptable frequency range for the input signal is 100 Hz to 3.5 kHz (± 10 Hz error). This mode can be used when the pulse width (signal source) contains small errors, since the measurement is based on the pulse count.
	<b>Single-pulse:</b> It is only used for stable signals and features high accuracy. The data update rate depends on the signal frequency and the acceptable signal frequency range for the input signal is 0.01 Hz to 3.5 kHz (± 0.01 Hz error). This mode can only be used when the pulse width (signal source) is stable, since the measurement is based on the width of a single pulse.

Moving Average	<ul> <li>1 ==&gt; No Average is used</li> <li>2 ==&gt;Uses the average of 2 continuous sample values</li> <li>4 ==&gt;Uses the average of 4 continuous sample values</li> <li>8 ==&gt;Uses the average of 8 continuous sample values</li> </ul>
Universal DIO	
Force DI/DO Mode	Dynamic: Dynamic I/O types based on DO request.         Static: Static I/O type by configuration (web or Modbus).         Dxff00       Ch 7~4(         Ch 7~4(       Ch 3~0(         Used to set the Universal DIO channels to DI or DO Port.         1 ==> DI; 0 ==> DO
Update Settings	Click this button to save the changes.

### 4.4.6 DO Control

#### **DO Control**

Digital Output	Modbus Address	Setting
Value	00007 - 00000	0x0 Ch 7~4( Ch
Update Settings		

The following table provides parameter notes for the **DO Control** section:

Item	Description
Set DO value	Used to manually assign a specific a value for the DO.
Update Settings	Click this button to save the changes.

# 4.5 Sync

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

On the **Sync** page, the **DIO Synchronization** section enables users to synchronize DI/DO signals, set the minimum DO switching time, and specify the DO auto-off time on the module. Each of these features will be described in more detail below.

### 4.5.1 DIO Synchronization

#### DIO Synchronization

Synchronous DIO (Local Mirror)	Modbus Address			Setting	
Level Sync (DO=DI)	00403 - 00396	0x0 Set the DO st	CH7-CH4:  CH7-CH	CH3-CH0: CH3	
Rising Active (DO=ON)	00419 - 00412	DxD     CH7-CH4:     CH3-CH0:     CH3-CH0:       Turn ON DO when DI is changed from OFF to ON.			
Falling Active (DO=ON)	00435 - 00428	Dx0     CH7-CH4:     CH3-CH0:     CH3-CH0:       Turn ON DO when DI is changed from ON to OFF.			
Additional Controls	Modbus Address			Setting	
Min-Switching Time of DO (0 to 65535 Seconds)	40283 - 40268	DO 15:0 DO 11:0 DO 07:0 DO 03:0	DO 14:0 DO 10:0 DO 06:0 DO 02:0	DO 13:0 DO 09:0 DO 05:0 DO 01:0	DO 12:0 DO 08:0 DO 04:0 DO 00:0
Auto-off Time of DO (0 to 65535 Seconds)	40299 - 40284	DO 15:0 DO 11:0 DO 07:0 DO 03:0	DO 14:0 DO 10:0 DO 06:0 DO 02:0	DO 13:0 DO 09:0 DO 05:0 DO 01:0	DO 12:0 DO 08:0 DO 04:0 DO 00:0
Update Settings					

The following table provides parameter notes for the **DIO Synchronization** section:

Item	Description		
Synchronous DIO (Local Mirr	or)		
Level Sync (DO = DI)	Used to enable DIO synchronization function (DO and DI synchronization).		
Rising Active (DO = ON)	Used to enable rising active in Digital Input function. When the specified DI state changed from OFF to ON, the corresponding DO will be set to ON.		
Falling Active (DO = ON)	Used to enable falling active in Digital Input function. When the specified DI state changed from ON to OFF, the corresponding DO will be set to ON.		
Additional Controls			
Min-Switch Time of DO (0 to 65535 Seconds)	Used to set the minimum switching time between the ON and OFF state of the Digital Output. This protects some machines from being damaged by too many ON/OFF switches in a short time.		
Auto-off Time of DO (0 to 65535 Seconds)	Used to set the auto-off time of the Digital Output. If the Digital Output is ON, the Digital Output will be auto-off based on the configured time value.		
Update Settings	Click this button to save the changes.		

### 4.6 PWM



On the **PWM** page, the **PWM Configuration** section allows users to enable and configure the PWM parameters for the DO module. The details are as follows.

<u>Note</u>: The module with Relay functionality (see Product Information) is not suitable for prolonged use of PWM (Pulse Width Modulation) due to its inherent characteristics

### 4.6.1 **PWM Configuration**

#### PWM Configuration:

<b>PWM Functions</b>	Modbus Address	Setting	
Enable PWM	00107 - 00100	0x0 Ch 7~4( Ch	
Enable PWM Alarm	00371 - 00364	0x0       Ch 7~4(       Ch 3~0(       )         (Activates the PWM outputs when Host/Slave Watchdog Timeout)	
Duty Cycle	40115 - 40100	DO 07: ( 0 , 0 ) DO 06: ( 0 , 0 ) DO 05: ( 0 , 0 ) DO 04: ( 0 , 0 ) DO 03: ( 0 , 0 ) DO 04: ( 0 , 0 ) DO 01: ( 1000 , 1000 ) DO 00: ( 1000 , 0 ) (High, Low: 10 ~ 65535 ms, 0= Disable)	
Update Settings			

The following table provides parameter notes for the **PWM Configuration** section:

Item	Description		
Enable PWM	Used to enable the PWM output function.		
Enable PWM Alarm	Used to enable the PWM output alarm function.		
Duty Cycle	Two values are required for each DO channel. The first value is the high pulse width, while the second is the low pulse width. The duty cycle is in 1 ms units, and the resolution is approximately 5 ms. (5 to 65535 ms). A value of 0 will disable the duty cycle functions for that channel. Refer to "FAQ: Can tET/tPET Modules achieve a PWM Output Accuracy of less than 1 ms" for more information.	1000 (ms)	
Update Settings	Click this button to save the changes.		

# 4.7 MQTT



**The MQTT** architecture mainly consists of a server (Broker) and clients (Clients). Each MQTT Client requires a unique identifier, and the MQTT Broker identifies users based on these identifiers and records their status, such as subscribed topics and communication quality. Clicking on the **MQTT** tab opens the MQTT settings page.



**MQTT** is a protocol consisting of a Publish/Subscribe mechanism where the Client only needs to know the IP address of the Broker. The Publisher is responsible for sending topic messages, while the Subscriber is responsible for receiving new messages from the Broker. The Broker then acts as a central location to handle the sending and receiving of all messages between a Publisher and a Subscriber.

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

# 4.7.1 Connectivity Settings

#### **Connectivity Settings**

MQTT	Disable ~		
Broker	IPv4 / Host Name (Max. 127 chars)		
Broker Port	1883	(Default= 1883)	
Client Identifier	t(P)ET-AD2_FFFFFF		
User Name	(Max. 63 chars)		
Password			(Max. 63 chars)
Reconnection Interval	10	] (5 ∼ 65000 s, Default= 10)	
Keep Alive Interval	20	] (5 ∼ 65000 s, Default= 20)	
Main Topic Name	N/A		
	(Max. 126 chars)		
	U	pdate Settings	

#### The following table provides parameter notes for the **Connectivity Settings** section:

ltem	Description	
MQTT	Enables or Disables the MQTT connection function.	Disabled
Broker	The IP address or the Hostname for the MQTT broker.	N/A
Broker Port	The port number for the MQTT broker.	1883
Client Identifier	The client identifier uniquely identifies the MQTT client to the MQTT broker, and consists of the "module name"+ "_" (underscore character) + "the last 6 digits of the MAC address" and cannot be changed.	-
User Name	This parameter is used when the MQTT broker requires authentication. The length should be no more than 63 characters.	
Password	This parameter is used when the MQTT broker requires authentication. The length should be no more than 63 characters.	
Reconnection Interval	The time interval between attempts by the module to connect to the broker if a connection failure occurs. The valid range is 5 to 65000 seconds	10(s)

Item	Description	Defaults
Keep Alive Interval	The keep-alive mechanism is provided to ensure that both the client and the broker are alive and the connection is still open. If a Client doesn't send any messages during the Keep Alive period, it must send a PINGREQ packet to the broker to confirm its availability. The broker must reply with a PINGRESP packet to also indicate its availability. The broker will disconnect a client, which doesn't send a PINGREQ packet or any other message within one and a half times of the Keep Alive Interval. The valid range is 5 to 65000 seconds.	20(s)
Main Topic Name	The Topic Name is a combination of the Main Topic Name and the Sub Topic Name. The Main Topic Name can be empty. The same part of the Topic Names can be entered in the Main Topic Name field to improve the processing efficiency of all Topic Names. A shorter Topic Name also improves processing efficiency.	N/A
Update Setting	Click this button to save the changes.	

# 4.7.2 Publication Settings

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

The following table provides parameter notes for the **Publication Settings** section:

ltem	Description Defaults				
Publication					
Retain	Check this option to ensure that the message is retained Disabled				
Cycle	The time interval that the module periodically publishes data. The valid range is 100 to 2147483000 milliseconds in intervals of 10 milliseconds.	9000(ms)			
All Information					
Enable	This option is used to enable or disable the All Information function. All Information adopts Periodic Publish, which includes the Module Name, the MAC address, AI values. The publishing period depends on the Cycle setting.	Disabled			
Sub Topic Name	The Topic Name is a combination of the Main Topic Name and the Sub Topic Name. A shorter Topic Name improves processing efficiency.	info			
Last Will and Testa	ament				
Enable	Check this option to enable the Last Will and Testament function.	Disabled			
Retain	Check this option to ensure that the Last Will and Testament Disable Disable				
QoS	The QoS for the Last Will and Testament message.				
Торіс	The Topic Name for the last will and Testament message. The length should be no more than 63 characters				
Message	The Last Will and Testament message.N/AThe length should be no more than 63 characters.N/A				
Update Setting	Click this button to save the changes.				

# 4.7.3 Analog Inputs

Analog Inputs				
Analog Input	Periodic Publish	Sub Topic Name (Max. 63 chars)		
AIO		A100		
Al1	AI1 AI01			
Update				

The following table provides parameter notes for the **Analog Inputs** section:

Item	Description	Defaults
Analog Input		
Periodic Publish	To enable or disable the Periodic Publish function. The publishing period depends on the Cycle settings. Choose the check-box to enable the function on AI channels.	Disabled
Sub Topic Name	The Topic Name is a combination of the Main Topic Name and the Sub Topic Name. A shorter Topic Name improves processing efficiency.	Corresponding Al
Update	Click this button to save the changes.	

# 4.7.4 Analog Outputs

Analog Outputs					
Readback	Periodic Publish	Publish On Change	Sub Topic Name (Max. 63 chars)		
AO0			rbAO0		
AO1			rbAO1		
	Update				
		)r			
Ou	Output 🗌 Subscribe Sub Topic Name (Max. 63 chars)				
	AO0	AO0			
	AO1	AO1			
Update					

The following table provides parameter notes for the **Analog Outputs** section:

ltem	Description	Defaults
Readback		
Periodic Publish	The AO value will be regularly published according to the Cycle setting. Choose the check-box to enable the function on AO channels.	Disabled

Publish On Change	AO values will be published upon a change in the value. Choose the check-box to enable the function on AO channels.	Disabled
Output		
Subscribe	To subscribe to AO topics. The user can modify the AO value by sending an MQTT message. Choose the check-box to enable the function on AO channels.	Disabled
Sub Topic Name	The Topic Name is a combination of the Main Topic Name and the Sub Topic Name. A shorter Topic Name improves processing efficiency.	Corresponding AO
Update	Click the "Update" button to save the changes.	

# 4.7.5 Restore Factory Defaults

#### **Restore Factory Defaults**

Restore MQTT factory settings	Restore Defaults
Restart MQTT service	Restart Service

The following table provides parameter notes for the **Restore Factory Defaults** section:

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

# 4.8 MQTT- Realization

This section described how to use the open-source software Mosquitto and MQTTX to demonstrate the usage of MQTT protocol in conjunction with the tET/tPET series module.

### 4.8.1 Set up Mosquitto

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

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

	😚 Eclipse Mosquitto Setup		- 0	×
	Choose Components Choose which features of Eclipse Mo	squitto you want to install.	(	
	Check the components you want to i install. Click Next to continue.	nstall and uncheck the com	ponents you don't want to	
	Select components to install:	Files Service	Description Position your mouse over a component to see its description,	
	Space required: 4.7 MB			
😽 Eclipse Mosquitto Setup		- 🗆 🗙 –		
Choose Install Location Choose the folder in which to insta	l Edipse Mosquitto.		Next > Cance	2
Setup will install Edipse Mosquitto i Browse and select another folder.	n the following folder. To install in a differ Click Install to start the installation.	ent folder, dick		
Destination Folder		Browse		
Space required: 4.7 MB Space available: 164.7 GB				
Nullsoft Install System v3.03 ———	< Back Install	Cancel		
		_		

**<u>Step 2</u>** Locate the "**mosquitto.exe**" file in the default installation path and double-click it to enable the Mosquitto server.



#### Why can't I open "mosquitto.exe" or why does it crash?

Once Mosquitto installation is done, the Broker server is automatically activated upon computer boot-up. Thus, if you try to click on the 'mosquitto.exe' file again, it's akin to attempting to enable an already active broker server, which would result in the action being prevented.

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

Open the **Services** application by searching for "Services" in Windows.

All	Apps	Documents	Settings	Web	More 🔻	Feedback	
Best n	natch						
0	Services App				Q.		
Setting	gs Onfigure	proxy <b>ser</b> ver		>	Services App		

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

	🔕 Services									-		×
	File Action View	Help										
		1 🗟 🛛		▶								
(	🔍 Services (Local)	O Serv	rices (Local)									
		Mosquitte	o Broker		Name	^	Description	Status	Startup Type		Log On As	s ^
		Chandrakhana			Mosquitto Br	roker	MQTT v3.1.1 broker		Automatic		Local Syst	em
		<u>Start</u> the s	ervice		wanimic serv	ice c in	Nahimic service	Running	Automatic		Local Syst	em
		Descriptio	n:		Natural Auth	entica	Signal aggregator	Kunning	Manual (Trigger S Automatic	tart)	Local Syst	em vice
		MQTT v3.	1.1 broker		Net.Tcp Port	Sharing Service	Provides ability to		Manual		Local Serv	ice
					Netlogon		Maintains a secur		Manual		Local Syst	em
					Network Con	nected Devices Auto-Setup	Network Connect	Duration	Manual (Trigger S	tart)	Local Serv	ice
					Network Con	nection broker	Manages objects i	Running	Manual (Irigger 5	tart)	Local Syst	em em
					Network Con	nectivity Assistant	Provides DirectAc		Manual (Trigger S	tart)	Local Syst	em 🗸
					<							>
		Extended	d (Standard /									
			Mosquitt	o Broker	Properties (	(Local Computer)			$\times$			
			_									
			General	Log On	Recovery	Dependencies						
			Service	name:	mosquitto							
			Display	name:	Mosquitto	Broker						
			Diopidy		ino oquitto 1	2. orter						
			Descript	tion:	MQTT v3.1	1.1 broker		~				
								$\sim$				
			Path to	executabl	le:							
			C:\Prog	ram Files	vnosquitto vn	osquitto.exe run		2	. )			
			Startup	type:	Manual			~				
				71					J			
			Service	status:	Stopped	1.						
			S	itart	Stop	Pause	e Res	ume				
			Valuation			5.2	an usu start the					
			from her	e.	ne start para	means that apply wr	ien you start the	service				
			Start pa	rameters:					1			
						(3.)						
						ОК	Cancel	Apply				
						C)						

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



3.1 Open the Advanced Settings section of the Windows Firewall.

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

P Windows Defender Firewall	with Advanced Security			- 🗆 X
File Action View Help				
🗢 🔿 🖄 📰 🗟 🛛				$\frown$
Aundows Defense function     Mondows Defense function     Connection Security Rbm     Monitoring	<ol> <li>nd Rules</li> <li>eflash         <ul> <li>eflash</li> <li>eflash</li> <li>eflash</li> <li>eflash</li> </ul> </li> <li>New Inbound Rule Wizard         <ul> <li>Rule Type</li> <li>Stept:</li> <li>Rule Type</li> <li>Protocol and Ports</li> <li>Action</li> <li>Profile</li> <li>Name</li> </ul> </li> </ol>	Group	Profile Private Private Private Private Private Private Private O create? or a program. or a TCP or UDP port.	
			< Back Next >	encel
<	> <		>	

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

🔗 New Inbound Rule Wizard		×
Protocol and Ports		
Specify the protocols and ports to	which this rule applies.	
Steps:		
a Rule Type	Does this rule apply to TCP or UDP?	
Protocol and Ports	О ТСР СР	
<ul> <li>Action</li> </ul>	OUDP	
Profile		
<ul> <li>Name</li> </ul>	Does this rule apply to all local ports or specific local ports?	
	○ All local ports	
	Specific local ports:	
	Example: 80, 443, 5000-5010	
	< Back Next > 3. Incel	

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



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

Prew Inbound Rule Wizard		×
Profile		
Specify the profiles for which this	rule applies.	
Steps:		
a Rule Type	When does this rule apply?	
Protocol and Ports		
Action	<b>Domain</b>	
Profile	⊡ ⊠ Private	
Name	Applies when a computer is connected to a private network location, such as a home or work place.	
	✓ Public	
	Applies when a computer is connected to a public network location.	
	< Back Next > Cancel	

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

🔗 New Inbound Rule Wizard		×
Name		
Specify the name and description of	of this rule.	
Steps:	The News field is sustantized	
a Rule Type	The Name field is customized.	
Protocol and Ports	It's for the user to easily identify.	
Action	News	
Profile	MQTT Broker	
Name	Description (optional):	
	Essimption (optional).	
	< Back	

### 4.8.2 MQTTX Instructions

MQTTX is an open source, cross-platform MQTT 5.0 desktop client originally developed by EMQ, which can run on macOS, Linux and Windows.

#### Step1 Install MQTTX

Download and execute the installation file (V1.9.4) from the MQTTX website (https://mqttx.app/).

#### Step2 Open MQTTX

After the installation is complete, MQTTX will be automatically opened, and the user can also double-click the shortcut on the desktop to open the software.





#### Step3 Establish a connection

- 1. Click "+" and then click **New Connection** to establish a connection.
- 2. Enter the Broker name and IP address , and then click the **Connect** button.

(Refer to the Connectivity Settings)

MQTTX	/iew Window Help			– 🗆 X
	Connections	< Back	New	4. Connect
	New Connection	reneral	2.	
	New Group	* Name Broker	Enter a name for easy	identification 0
ዊ		* Client ID mqttx_3	353545a <b>3.</b>	0 0
1		* Host mqtt://	✓ 10.0.8.51 Enter t	he Broker's IP address
		* Port 1883	or host	name
		Username		
5	No Data	Password		
		SSL/ILS		
ŝ		Advanced 🔺		
27		MQTT Version	5.0	~
m		Connect Timeout	10	∧ (s)
()		Keep Alive	60	∧ (s)
		Auto Reconnect		

#### Step4 If the connection is available, the green light will be displayed.

S MQTTX					- 🗆 X
File Edit \	View Window Help				
	Connections	+	Broker 📎 🕕		(b) 🖉 …
<b>1</b>	ever@10.0.8.51:1883		+ New Subscription	Plaintext ∨	All Received Published

<u>Note:</u> If the connection is unavailable, check to see if the version of the Mosquitto Broker is **1.6.4** (see C:\Program Files\mosquitto\ChangeLog.txt), and refer to "Set up Mosquitto".

### 4.8.3 MQTT - DO Example

The topic name of MQTT is composed of Main Topic Name (e.g., ICPDAS/, refer to Connectivity Settings) and Sub Topic Name (e.g., do\_all), which can be set on the **MQTT - DO** page.



#### The MQTT – DO page provides the following functions:

Function	Description
Subscribe	Used to subscribe to the topic. The DO statuses can be changed through MQTT messages
Power-on Publish	The DO statuses will be published upon module power-up
State-Change Publish The DO statuses will be published whenever it changes.	
Periodic Publish	The DO statuses will be published periodically, based on the Cycle settings.

#### <u>MQTT DO – Subscribe</u>

Users can choose to enable/disable single-channel (DO0, DO1, etc.) or multi-channel (ALL) for topics operations. It is recommended to use multi-channel operations to reduce network traffic and to disable unused topics to reduce unnecessary processing and improve operational efficiency.

<u>Step1</u> Log in to the module's Web Server, and click the Subscribe option for the "do\_all" on the MQTT - "DO" page to enable the function. After that, click Update to save the changes.

MQTT - Digital Outputs Show	Hide		
Digital Output	Power-on Publish	L. Subscribe	Sub Topic Name (Max. 63 chars)
ALL			do_all
Digital Output	Publish	Subscribe	Sub Topic Name (Max. 63 chars)
DO0			do00
DO1			do01
DO2			do02
DO3			do03
DO4			do04
DO5			do05
DO6			do06 <b>2.</b>
DO7			do07
			Update

**<u>Step2</u>** Make sure that the **MQTT** function has been enabled on the **MQTT** page, and the Broker's IP address and the Main Topic Name have been set (refer to Connectivity Settings).

#### Connectivity Settings

MQTT	Enable 🗸		
Broker	IPv4 / Host Name (Max. 127 chars) 10.0.8.51		
Broker Port	[1883] (Defa	ault= 1883)	
Client Identifier	tPET-P2R2_RevB_65FA7F		
User Name		(Max. 63 cl	hars)
Password		(Max. 63 cl	hars)
Reconnection Interval	10 (5 ~ )	65000 s, Default= 10)	
Keep Alive Interval	20 (5 ~	65000 s, Default= 20)	
Main Topic Name	ICPDAS/ (Max. 126 chars)		
	Updat	e Settings	

**Step3** Enter the message (e.g., 0xF) to be published for the "**ICPDAS/do\_all**" topic, and click the button on the right corner to send the message.

Broker 📎 1		Ů ⊉ …
+ New Subscription	Plaintext ∨	All Received Published
	3.	Topic: ICPDAS/do_all QoS: 0 0xF
		2023–07–25 16:29:38:513
1.	Payload: Plaintext V	QoS: 0 V O Retain Meta
$\sim$	ICPDAS/do_all Enter	the Topic name: ICPDAS/do_all
[	ØxF Enter	the text to be published: 0xF
		2.

**<u>Step 4</u>** The user can check whether the DO status is correct on the **Home** page.



The message "0Xf" indicates DO 0-3 = ON, DO 4-7 = OFF

#### MQTT DO – Power on Publish

**Step1** Make sure that the Mosquitto Broker is enabled, and the MQTTX is connected. In this example, the topic is "ICPDAS/do\_all".

S MQTTX File Edit Vie	ew Window Help		-	_ X
	Connections + E	Broker 🛛 🚺 1.	Ċ	) <u>a</u>
<b>&gt;</b>	• Broker@10.0.8.51:1883	+ New Subscription Plainte	All Received	Published
ዋ	Add a subscrip	tion CPDAS/do.all Enter	the topic name: ICPDAS,	(do_all
+		* QoS	Color	
		0 At most	once V #C1DE03	C
6		Alias		٥
ø		Subscription Identifier		
2		No Local flag	🔿 true 💽 false	
(i)		Retain as Published flag	🔿 true 💿 false	
		Retain Handling	0	3.
			Can	ncel Confirm

Step2 Log in to the module's Web Server, and click the Power-on Publish option for the "do\_all" on the MQTT - "DO" page to enable the function. After that, click Update to save the changes.



MQTT - Digital Outputs Show	Hide		
Digital Output	Power-on 1. Publish	Subscribe	Sub Topic Name (Max. 63 chars)
ALL			do_all
Digital Output	Power-on Publish	Subscribe	Sub Topic Name (Max. 63 chars)
DO0			do00
DO1			do01
DO2			do02
DO3			do03
DO4			do04
DO5			do05
DO6			do06 <b>2.</b>
DO7			do07
			Update

**Step3** On the **I/O Settings** page, set the DO power-on value, and then click **Update Setting** to update the settings.



#### DI/DO Configuration:

Digital Output	Modbus Address	
Host/Slave Watchdog Timeout	40257	0 (10 ~ 65000 Seconds, Default= 0, Disable= 0) Outputs DO with safe-value or <i>PWM</i> when host/slave timeout.
Enable Safe Value (Enable Watchdog)	00339 - 00332	0x0 ( CH 7 - 0:
Safe Value	00274 - 00267	0x0 (CH7-0: 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Power-On Value	00242 - 00235	0x3 (CH7-0:

The DO0, DO1 will be set to ON when the module starts.

**<u>Step4</u>** After the module boots, the DO value will be set to the predefined power-on value.



Digital I/O (Modbus Addr	ress: DO=00000 to 00015, DI=10000 to 10015.	.)						
D07	D06 🕐 D05	٢	DO4 🕐 DO	٢	D02	DO1	000 D00	٢
DI Channel	Value (10000)		Counter (30016) / Frequency (30064)	( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( ) ( )	High Latched (10032		Low Latched (10064)	
DIO	•		-		-			
DI1	•		-		-		-	
			The DOO, DO	1 will	be set to ON a	after reb	ooting the	

In addition, users can check the received DO values in MQTTX.

+ New Subscription	Plaintext ∨	All Received Published
ICPDAS/do_all QoS 0	Topic: ICPDAS/do_all QoS: 0 0x3 2023-07-26 09:14:20:468	

"0x3" indicates DO0 to DO1 are "ON" and the others are "OFF"

#### MQTT DO – State Change Publish

**Step1** Make sure that the Mosquitto Broker is enabled, and the MQTTX is connected. In this example, the topic is "ICPDAS/rb\_all".

S MQTTX File Edit Vi	iew Window Help					-	
	Connections	÷	Broker 📎 🕕	1.		(	b 🖉 …
8	• Broker@10.0.8.51:1883		+ New Subscripti	Plaintext ~		All Received	Published
ዋ	ļ	Add a s	ubscription	ICPDAS/rb_all	he topic	name: ICP	DAS/rb_all
+				* QoS		Color	
				0 At most	once 🗸	#D99DF9	C
ß				Alias			٥
ø				Subscription Identifier			
2				No Local flag	⊖ true	• false	
0				Retain as Published flag	O true	• false	
				Retain Handling	0		3. Cancel Confirm

Step2 Log in to the module's Web Server, and click the State-Change Publish option for the "rb\_all" on the MQTT - "DO" page to enable the function. After that, click Update to save the changes.

eadbacks of the Dig Readback	ital Outputs Show Hide State-Change Publish	Sub Topic Name (Max. 63 chars)						
ALL			[rb_all					
Readback	State-Change Publish	Periodic Publish	Sub Topic Name (Max. 63 chars)					
DO0			00dr					
DO1			[rb01					
DO2			rb02					
DO3			rb03					
DO4			rb04					
DO5			rb05					
DO6			[rb06					
DO7			rb07					
	Update							
**<u>Step3</u>** On the **Home** page, set the DO0 to DO2 to "ON" in sequence.



**<u>Step4</u>** The user can verify the received messages within the MQTTX window.

		– – X
Broker 🧇 🚯		· <u>/</u> ···
+ New Subscription	Plaintext ~	All Received Published
ICPDAS/rb_all QoS 0	Topic: ICPDAS/rb_all QoS: 0 0x1 2023 07 13 09.47.52.906 Topic: ICPDAS/rb_all QoS: 0 0x3 2023 07 13 09.47.53.409 Topic: ICPDAS/rb_all QoS: 0 0x7 2023 07 13 09.47.54.188	It will receive messages with all DO statuses whenever it changes. 0x1: 0000 0001 (DO0 = ON) 0x3: 0000 0011 (DO0, DO1 = ON) 0x7: 0000 0111 (DO0, DO1, DO2 = ON)
	Payload: Plaintext V QoS: 0 V Topic	C Retain Meta
		$\epsilon = \mathfrak{S}$

## <u>MQTT DO – Periodic Publish</u>

**Step1** Make sure that the Mosquitto Broker is enabled, and the MQTTX is connected. In this example, the topic is "ICPDAS/rb\_all ".

🗴 MQTTX File Edit Vi	iew Window Help					-	
	Connections	+	Broker   0	1.			" ∠ …
	• Broker@10.0.8.51:1883		+ New Subscripti	on Plaintext ~		All Receive	d Published
	ſ	Add a	subscription	* Topic 2.			0
Ф	ļ			ICPDAS/rb_allEnter t	he topi	c name: ICI	PDAS/rb_all
+				* QoS		Color	
				0 At most	once 🗸	#D99DF9	C
ß				Alias			0
							1
				Subscription Identifier			
2				No Local flag	⊖ true	• false	
0				Retain as Published flag	O true	• false	
				Retain Handling	0		3.
							Cancel Confirm

**Step2** Log in to the module's Web Server, and click the **Periodic Publish** option for the "**rb\_all**" on the **MQTT** - "**DO**" page to enable the function. After that, click **Update** to save the changes.

teadbacks of the Digital Outputs Show Hide				
Readback	State-Change Publish	Periodic Publish	Sub Topic Name (Max. 63 chars)	
ALL			[rb_all	
Readback	State-Change Publish	Periodic Publish	Sub Topic Name (Max. 63 chars)	
DO0			00dr	
DO1			rb01	
DO2			rb02	
DO3			rb03	
DO4			rb04	
DO5			rb05	
DO6			rb06	
DO7			rb07	
Update				

**<u>Step3</u>** Go to the **MQTT** page, set the message publishing cycle (Cycle), and click "**Update Setting**" to save the changes.



### Publication Settings

Publication		
Retair		
Cycle	9000 (100 ~ 2147483000 ms, in 10 ms step, Default= 9000)	
All Information		
Enable	Disable 🗸	
Sub Topic Name	info (N	1ax. 63 chars)
Last Will and Testamen		
Enable		
Retair		
QoS	0 - At most once 🗸	
Торіс	N/A	1ax. 63 chars)
Message	N/A	1ax. 63 chars)
	Update Settings	

**<u>Step4</u>** The user can verify the received messages within the MQTTX window.

Broker 📎 <b>3</b>		ڻ ٺ	<u>0</u>
+ New Subscription	Plaintext ~	All Received	Published
ICPDAS/rb_all QoS 0	Topic: ICPDAS/rb_all         QoS: 0           0x0         2023-07-13 15:23:42:755           Topic: ICPDAS/rb_all         QoS: 0           0x1         2023-07-13 15:23:51:762           Topic: ICPDAS/rb_all         QoS: 0           0x0         2023-07-13 15:23:51:762           Topic: ICPDAS/rb_all         QoS: 0           0x0         2023-07-13 15:24:00:759	Receiving DO statuses periodically. In this case, Cycle = 9 seconds	

## 4.8.4 MQTT - DI Example

The topic name of MQTT is composed of Main Topic Name (e.g., ICPDAS/, refer to Connectivity Settings) and Sub Topic Name (e.g., di\_all), which can be set on the **MQTT** - **DI** page.



### The MQTT – DI page provides the following functions:

Function	Description	
State-Change Publish	The message will be published when the DI state changes.	
Periodic Publish	The DI status is published periodically, and the release cycle is determined by the Cycle setting.	

### <u>MQTT DI – State Change Publish</u>

Users can choose to enable/disable single-channel (DIO, DI1, etc.) or multi-channel (ALL) for topics operations. It is recommended to use multi-channel operations to reduce network traffic and to disable unused topics to reduce unnecessary processing and improve operational efficiency.

**Step1** On the **MQTT - DI** page, click the **State-Change Publish** for the "**di\_all**" to enable this function. After that, click **Update** to save the changes.

AQTT - Digital Inputs					
Digital Input	State-Change Pu <u>bli</u> sh 1.	Periodic Publish	Sub Topic Name (Max. 63 chars)		
ALL			di_all		
Digital Input	State-Change Publish	Periodic Publish	Sub Topic Name (Max. 63 chars)		
DI0			di00		
DI1			di01		
DI2			di02		
DI3			di03		
DI4			di04		
DI5			di05		
DI6			di06 <b>2</b> .		
DI7			di07		
	Update				

<u>Step2</u> Make sure that the **Mosquitto Broker** is enabled, and the **MQTTX** is connected. In this example, the topic is "**ICPDAS/di\_all**".

S MQTTX File Edit View Windo	w Help				- 🗆 X
Conne	ections 🕂 Broke	r 🛛 🛈	1.		<u>(')</u>
• Bro	ker@10.0.8.51:1883	⊢ New Subscription	on Plaintext	All	Received Published
			Add a s	ubscription	
æ	New Subscription			×	
+	$\frown$				
	* Topic <b>2.</b>			0	
	ICPDAS/di_all Enter th	e topic na	ime: ICPDAS/di_	all	
ø	* QoS		Color	×	
2	0 At most o	once 🗸	#91D937	0	Retain Meta
	Alias			0	×
	-			//	
	Subscription Identifier				
	No Local flag	◯ true	• false		
	Retain as Published flag	🔿 true	• false		
	Datain Handlin -	0			
	Retain Handling	U		3.	
				Cancel Confirm	

**Step3** Changing the external signal causes the DI status to change, and the MQTT message will be sent from the module.

The user ca refer to t(P)ET series Quick Start to wire the I/O for testing purposes. https://www.icpdas.com/en/download/show.php?num=2635



**Step5.** <u>Step 4</u> The user can verify the received messages within the MQTTX window.



## **MQTT DI – Periodic Publish**

**Step 1** Make sure that the Mosquitto Broker is enabled, and the MQTTX is connected. In this example, the topic is "**ICPDAS/di\_all**".

		– _ X
File Edit View W	/indow Help	
Cor	nnections 🕂 Broker 🛛 💿 🕻 1.	() <u>/</u> …
<b>S</b>	Broker@10.0.8.511883	
	+ New Subscription	All Received Published
	Add a subscr	iption
ዋ		
	New Subscription	×
+		
	* Topic <b>2.</b>	0
>		
	Enter the topic name: ICPDAS/di_a	"
.m.	* QoS Color	
£03	0 At most once y #91D937	D
20		Retain Meta
		~ ·
0	Allas	
_		
	Subscription Identifier	
	Subscription identifier	
	No Local flag O true O false	
	Retain as Published flag O true <b>o</b> false	
	Betain Handling	
	Hotan Handing 0	3.
	Conor	al Confirm
	Cance	

Step7. <u>Step2</u> Log in to the module's Web Server, and click the Periodic Publish option for the "di\_all" on the MQTT - "DI" page to enable the function. After that, click Update to save the changes.

Ethernet I/O Module Home   Network   Contings   Sync   PWM   Pair   Filter   Monitor   Password   Logout MQTT (Topics: Do DI ) SNMP			
MQTT - Digital Inputs			
Digital Input	State-Change Publish	Periodic Publish	Sub Topic Name (Max. 63 chars)
ALL			di_all
Digital Input	□ State-Change Publish	Periodic Publish	Sub Topic Name (Max. 63 chars)
DIO			di00
DI1			di01
DI2			di02
DI3			di03
DI4			di04
DI5			di05
DI6			di06
DI7			di07
Update			

**<u>Step3</u>** Go to the **MQTT** page, set the message publishing cycle (Cycle), and click "**Update Setting**" to save the changes.



### Ethernet I/O Module

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

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

**Step8.** <u>Step 4</u> The user can verify the received messages within the MQTTX window.



# 4.9 **SNMP**



The "SNMP" page provides the function for the module to send module information and I/O information to the SNMP Network Management Software or device to help administrators to monitor the status of the module in real time. If the Trap function is enabled, the module can actively send messages to the SNMP manager to keep track of data when the I/O status of the module changes or restarts. <u>Note:</u> The supported MIB-II management items are sysContact, sysLocation, sysDescr, and sysName.

## 4.9.1 SNMP Agent Configuration

SNMP v2c Agent Configuration				
System Info	Setting			
Contact	User	(Max. 47 chars)		
Location	Site	(Max. 47 chars)		
Description	EtherIO	(Max. 47 chars)		
Name	Device	(Max. 47 chars)		
Function	Setting			
Read-Only Community	public	(Max. 47 chars, example: public)		
Read-Write Community	private	] (Max. 47 chars, example: private)		
Trap Community	public	(Max. 47 chars, example: public)		
Manager / Trap IP #1	0.0.0.0	] (IPv4/v6 Address, example: 10.0.8.123, fe80:0:0:0:a8ee:dc07:1cda:5678)		
Manager / Trap IP #2	0.0.0.0	]		
Generic Trap	Cold Start, Warm Start			
Enable SNMP	Check to enable. (Default disabled)			
	Update Settings			

### The following table provides parameter notes for the **SNMP v2c Agent Configuration** section:

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

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

# 4.9.2 SNMP Specific Trap

NMP Specific Trap								
Analog Output	State-Change	Specific ID (1-255)						
AO0		1						
AO1		1						
	Update	Settings						

## The following table provides parameter notes for the **SNMP Specific Trap – AO** section:

ltem	Description					
Analog Output						
AO0 ~ AO1	Each DI channel has a specific Trap. Check the box to enable the Trap function for that DI channel. "Specific ID" is the ID number set for individual channel					
Update Settings	After clicking the "Update Settings" button to save the changes, also <b>reboot</b> <b>the module for the changes to take effect.</b>					

# 4.9.3 Restore Factory Defaults

Restore Factory Defaults	
Restore SNMP factory settings	Restore Defaults
Reboot is required after SNMP configuration	Reboot

The following table provides parameter notes for the **Restore Factory Defaults** section:

Item	Description
Restore SNMP factory settings	Click the ""Restore Defaults" button to reset all SNMP settings to the default factory settings.
Reboot is required after SNMP configuration	After completing the SNMP settings, not only click the <b>Update</b> <b>Settings</b> button to save them, but also click the <b>Reboot</b> button to reboot the module.

## 4.9.4 SNMP I/O Example

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

Step 1 Start the iReasoning MIB Browser. Click the File > Load MIBs on the menu bar and click the MIB file of the module (e.g. ICPDAS-ET2200-MIB\_20220705.mib), then click the Open button to open it.



**<u>Step 2</u>** Enter the IP address of the module in the **Address** field.

	🚳 iReasoning MIB Browser		
	File Edit Operations Tools Bookmarks Help		
l	Address: 10.0.8.169 V Advanced   OID: .1.3		
	SNMP MIBs	Result Table	
	nib Tree		Name/OID
	iso.org.dod.internet		

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



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

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

Function	Setting						
Read-Only Community	public (Max. 47 chars, example: public)						
Read-Write Community	ate (Max. 47 chars, example: private)						
Trap Community	lic Normally the PC's IP. (Max. 47 chars, example: public)						
Manager / Trap IP #1	0.8.17 (IPv4/v6 Address, example: 10.0.8.123, fe80:0:0:0:a8ee:dc07:1c	da:5678)					
Manager / Trap IP #2	0.0						
Generic Trap	Cold Start, 🗆 Warm Start						
Enable SNMP	Check to enable. (Default disabled)						
	Update Settings						
Reboot is requi	after SNMP configuration.						
<b>\</b>							

## Read the information of the tET/tPET – the Walk command

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

🕤 iRe	asoning MIB Br Operations Tools	owser Bookma	rks Help			_		)	×
Address:	10.0.8.169	- Adva	nced   OID: .1.3.6.1	~	Operations:	Get Next	×.	<b>r )</b> G	0
SNMP MI	Bs	(	Result Table						
🐢 MIB Tr	ee		Name/OID	Value		Type 🖂	ID: Port	_	
iso	ora dod internet		firmware\/ereion 0			tetString	10.0.9.169	-	•
	Find in subtree		modelName 0	+(D)ET AD2	0	ctetString	10.0.8.169		8
	Export to CSV		ifDescr 1	en	0	ctetString	10.0.8.169	·	
	Export to XMI		svsContact 0	User	0	ctetString	10.0.8.169	•	$\mathbf{P}$
			syst ocation 0	Site	0	ctetString	10.0.8.169	·	
	Expand subtree	9	aliasName 0	EtherlO	0	ctetString	10.0.8.169		
	Graph View	Ctrl+R	svsDescr 0	EtheriO -	· .				<b>~</b>
			sysName 0	Device The	informa	ition or	i analog		
	Get Next	Ctrl+N	aiName 2	All	nput of t	the mo	dule.		
	Get Bulk	Ctrl+B	aiName 1	AIO	0	ctetStrina	10 0 8 169	-	
	Get Subtree	Ctrl+E	atPhysAddress.1.10.0.8.17	54-B2-03-85-D7-70	0	ctetStrina	10.0.8.169		
	Walk	Ctrl+W	ipNetToMediaPhysAddress.1.10.0.8.17	54-B2-03-85-D7-70	0	ctetString	10.0.8.169		
	Table View	CtrluT	ifPhysAddress.1	00-0D-E0-FF-FF-FF	0	ctetString	10.0.8.169		
	Table View	Cui+i	aiHexValue.1	+0.000V	0	ctetString	10.0.8.169		
			aiHex∨alue.2	+0.000V	0	ctetString	10.0.8.169		
			sysObjectID.0	icpdas	0	ID	10.0.8.169		
			ifSpecific.1	.0.0	0	ID	10.0.8.169		
			ipRouteInfo.0.0.0.0	.0.0	0	ID	10.0.8.169		
			ipRouteInfo.10.0.0.0	.0.0	0	ID	10.0.8.169		
			aiHexValue.2		N	III	10.0.8.169		
Namo	internet		ipAdEntNetMask.10.0.8.169	255.255.0.0	lp.	Address	10.0.8.169		
	1261	^	ipRouteMask.10.0.0.0	255.255.0.0	Ip.	Address	10.0.8.169		
	.1.3.0.1	_	atNetAddress.1.10.0.8.17	10.0.8.17	lp.	Address	10.0.8.169		
Suntay		_	ipNetToMediaNetAddress.1.10.0.8.17	10.0.8.17	Ip.	Address	10.0.8.169		
Access			ipRouteNextHop.10.0.0.0	10.0.8.169	lp.	Address	10.0.8.169		
Status			ipAdEntAddr.10.0.8.169	10.0.8.169	Ip.	Address	10.0.8.169		
		~	ipRouteNextHop.0.0.0.0	10.0.0.254	lp.	Address	10.0.8.169	. 🗸	
.iso.org.d	od.internet								

## 4.9.5 SNMP Trap Example

<u>Step 1</u>	Click Tools $\rightarrow$ Trap Receiver on the menu bar to display the window for receiving the Trap
	messages.

🚳 iReasoning MIB Browser							-		$\times$
File Edit Operations To	ools Borkmarks Help	_							
Address: 10.0.8.169	Trap Receiver Ctrl+I		~	~	Operations	Get Next	~	ø	Go
SNMP MIBs	Trap Sender Ping	Result Table Trap	Receiver ×						
MIB Tree	Trace Route	perations Tools							
iso.org.dod.inter	Network Discovery	> 🔇 🐮 🏹 🤞							
	Manage SNMPv3 USM Users	Description		Source	Time		Se	verity	
	Compare Devices	pecific: 10; icpdas		10.0.8.169	.8.169 2022-11-11 15:50:42				
	Port View	pecific: 11; icpdas 10.0.8.169			2022-11-11 15:50:42				
	Switch Port Mapper	Result Table	t Table Trap Receiver ×						
	Cisco Device Snapshot	Operations Tools							
	Log Window	🜔 🥸 🔠 🏹 🤞							
	Options	Description	Source	Time		Severity			
		coldStart	10.0.8.169	2023-07-21 1	5:12:22				
		warmStart	10.0.8.169	2023-07-21 1	5:03:54				
		coldStart	10.0.8.169	2023-07-21 14	4:23:12				

**<u>Step 2</u>** The types of traps received from the module for alarms are as follows:

### 1. Cold Start Trap:

After the module's power is completely shut down and then restarted, it will send a Trap message indicating a "Cold Start".

#### 2. Warm Start Trap:

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

<u>Note</u>: The Cold Start or Warm Start Trap function can be enabled on the <u>SNMP</u> page. Then, reboot the module if any changed.



## 3. Specific Trap (I/O State-Change):

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

## Click the Trap message to view the details

Result Table Trap Receiver ×									
Operations Tools									
🔘 🔇 🎦 🏹	1								
Description	Description Source Time Severity								
coldStart		10.0.8.1	69	2023-07-21 1	5:12:22				
warmStart		10.0.8.1	69	2023-07-21 1	5:03:54				
coldStart		10.0.8.1	69	2023-07-21 1	4:23:12				
Source:	10.0.8.	169	Timestamp:	2 seconds	SNMP Ve	rsion:	1		
Enterprise:	snmp				Communi	ty:	public		
Specific:	0		Generic:	coldStart					
Description:	coldSta	rt							

項目	說明
Source	The IP address of the device that sending the SNMP trap.
Timestamp	How much time has passed after the module starts
SNMP Version	The version of SNMP
Enterprise	The name of the enterprise
Community	SNMP community name according to the Trap Community setting
Specific	Specific ID
Generic	Generic ID
Name	The generic name for the Trap
Value	The I/O channel and status value of the module
value	(e.g., 0 = OFF, 1 = ON, or an AI value)

## 4.9.6 SNMP Problem Solving

## Unable to receive the Trap message from the device

- 1. Check the setting of the Windows firewall or the Anti-virus software. These functions can be disabled during the testing.
- Check the setting of the Trap port. Using iReasoning MIB Browser as an example, click the Trap Receiver Settings button on the Trap Receiver page to open the window. Then, confirm the Trap Port, Bind IP, and Transport settings. The module uses the default Trap port 162 according to the SNMP specification.

SNMP MIBs		Result Table	10.0.8.169 - doTable	Trap Receiver ×			
🕈 MIB Tree		Operations Too	Is				
iso.org.dod.internet		🖸 🙆 🖄 🚺	18				
Trap Receiver Settings			Trap	Receiver Settings			×
General							
Tran Port:	162	Bind IP <sup>.</sup> All			Both	×	ר
The Profile					2001		J

**3.** Disable Windows SNMP Trap Service.

### Note:

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

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



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

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

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

🔍 Services							_		×
File Action View	Help								
	à 🗟   🛛 📷   🕨 🔲 II ID								
🧟 Services (Local)	Services (Local)	_							
	SNMP Trap	Name		Descript	tion	Status	Startup Type	Log On As	^
	<u>Start</u> the service Description:	Sensor Service Server Service KMSELDI Shared PC Accour		A servic Support	e fo is fil	Running Running	Manual (Trig Automatic (T Automatic	Local Syste Local Syste Local Syste	1 1 1
	Receives trap messages generated by local or remote Simple Network	Shell Hardware De	General	Log On	Recover	y Depend	encies		^
	agents and forwards the messages to SNMP management programs running on this computer. If this service is stopped, SNMP-based programs on this computer will not receive SNMP trap messages. If this service is disabled, any services that explicitly depend on it will fail to start.	Smart Card Device Smart Card Remo Software Protection Software Protection Spatial Data Service Spot Verifier SQL Server (ICPDA SQL Server Agent SQL Server Browse SQL Server CEIP se	Service Display Descrip Path to C:\WIN Startup	vice name: SNMPTRAP play name: SNMP Trap scription: Receives trap messages generated by local o remote Simple Network Management Protoco (SNMP) agente and forwards the messages to h to executable: WINDOWS\System32\snmptrap.exe rtup type: Disabled			ocal or rotocol	< >	
	Extended Standard /	SSDP Discovery     SSDP Discovery     State Repository S     State Repository S     Still Image Acquis     Storage Service     Storage Tiers Man	Service Service You can from he Start pa	status: <u>i</u> tart n specify the re. ra <u>m</u> eters:	Stopped Si e start pa	Lop arameters that	Pause at apply when you s	<u>R</u> esume start the service	e
						OK	Cancel	Арр	ly

# 4.10 Pair Connection



On the **Pair** page, within the **Pair Connection Settings** section, users can enable and configure the pair-connection function of the I/O module using Modbus TCP. This allows for the establishment of logic connections between Local and remote I/O, as explained below.

## 4.10.1 Pair-Connection Settings

Note: The configuration iteams varies based on the I/O type.

					Pair-Connection Settings:								
Submit 1-2					_								
# Enable Remote IPv4 / IPv6 / Host Name (Max. 127 chars)	Remote	e Port I	Net ID	Scan Ti (ms)	me A	I Address	AO Address	Network Protocol					
01 DUSH V 0.0.0	502		1	1000	0		0	TCPv4 🗸					
02 PUSH V 0.0.0	502		1	1000	0		0	TCPv4 🗸					
Note: Only Support TCP PUSH Mode = Local AI to Remote AO. Data	Format m	iust be	Enginee	ering									
Pair-Connection Settings:   Submit 1-8   9-16													
# Enable Mode Remote IPv4 / IPv6 / Host Name (Max. 127 chars) : Po	rt	Net ID	Scan (ms)	Time IO	Count	Local IO Addres	Remote s IO Address	Vetwork Protocol					
01 PULL V	: 502	1	1000	1		0x:Coil C 🗸	0x:Coil C ✓ 0	TCPv4 🗸					
	: 502	1	1000	1		0x:Coil C ✔ 0	0x:Coil C ✔ 0	TCPv4 🗸					
	: 502	1	1000	1		0x:Coil C ✔ 0	0x:Coil C ✓ 0	TCPv4 🗸					
04 PULL V	: 502	1	1000	1		0x:Coil C 🗸	0x:Coil C 🗸	TCPv4 🗸					
	: 502	1	1000	1		0x:Coil C 🗸	0x:Coil C ✔ 0	TCPv4 🗸					
	: 502	1	1000	1		0x:Coil C 🗸 0	0x:Coil C ✔ 0	TCPv4 🗸					
07 PULL V	: 502	1	1000	1		0x:Coil C 🗸 0	0x:Coil C ✓ 0	TCPv4 🗸					
	: 502	1	1000	1		0x:Coil C 🗸	0x:Coil C 🗸	TCPv4 🗸					
Note: PULL Mode = Remote to Local PUSH Mode = Local to Remote Pair-connection is disabled if the IO Count is 0 (no data) IO Address (base 0): 0 - 65535 no leading 0x/1x/3x/4x	V8     PULL     Image: Solution of the solu												

The following table provides parameter notes for the **Pair-Connection Settings** section:

	ltem	Description	Defaults	
Enable Mode		Used to enable or disable the Client (Master) function and select either <b>PULL</b> or <b>PUSH</b> mode. <b>PULL Mode</b> : To read the remote AI (or DI) and write to the local AO (or DO). <b>PUSH Mode</b> : To read the local AI (or DI) and write to the remote AO (or DO).		
Remote IP		Used to set the IP address or the hostname of the remote module. Before entering the Host Name, ensure that the correct DNS has been set on the Network page.	0	
Remote Port		Used to set the TCP port number of the remote device. The valid range is 0 - 65535.	502	
Net ID		Used to set the Modbus Net ID of the remote device. The valid range is 1 - 247.	1	
Scan Time		<ul> <li>In "PULL" mode, the module will update its I/O data based on the specified scan time.</li> <li>In "PUSH" mode, If the local DI/AI changes, the module will immediately update the remote DO/AO. Furthermore, even if the local DI/AI remains unchanged throughout the scan time, the module will still update the remote DO/AO.</li> <li>The valid range is 1000 to 42949672965 (ms)</li> </ul>	1000 ms	
	AI Address	Used to specify the starting address of the analog input.	0	
AIO	AO Address	Used to specify the starting address of the analog output.	0	
	DI Count	Used to specify how many DI/DO channels are mapped.	0	
DIO	Local IO Address	Used to select the DI or DO type for the Local site and to enter the starting address. <u>Shared memory is only available for DIO series modules</u> : The DIO (Bit) addresses range from 3000 to 7094 The AIO (Register) addresses range from 3000 to 3254 DI, DO, AI, and AO data all share a common memory block. If various types of I/O data are written to the same address, they will overwrite one another. To learn more, refer to Section 5.5 Shared Memory.	0	
	Remote IO Address	Used to select the DI or DO type for the Remote site and to enter the starting address.	0	
Netwo (TCP/	ork Protocol UDP)	Used to set the type of Modbus protocol to be used and can be <b>TCPv4/TCPv6</b> or <b>UDPv4/ UDPv6</b>	TCPv4	
Subm	it	Click this button to save the changes.		

# 4.11 Filter

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

On the **Filter** page, the **Filter Settings** section allows users to enable and configure the IP filter list for the module, as explained below.

## 4.11.1 Filter Settings

This function can be used to query or edit the IP filter list for the module. Only Clients whose IP address is specified in the list will be able to access the module.

Filter Setting:	
Accessible IP	Pv4/v6 Address (example: 10.0.8.123, fe80:0:0:0:a8ee:dc07:1cda:5678)
IP1	
IP2	
IP3	
IP4	
IP5	
Enable IP Filter	□Check to enable. (Default disabled)
Update Setting	
Note: Remember to	include the IP address of your configuration computer.

### The following table provides parameter notes for the Filter Settings section:

Item	Description
IP1 ~ IP5	Enter the accessible IP address (IPv4 or IPv6). Note that remember to enter the IP address of the PC used to configure the module.
Enable IP Filter	Check the item to enable the function (Defaults: Disabled).
Update Settings	Click this button to save the changes.

# 4.12 Monitor



On the **Monitor** page, the **Current Connection Status** section enables users to observe the real-time status of the network connection for the module

Current Connection Status:							
Sei	rver Mode	Connected IP	Server Mode	Connected IP			
	IP1	-	IP2	-			
	IP3	-	IP4	-			
	IP5	-	IP6	-			
	IP7	-	IP8	-			
	IP9	-	IP10	-			
	IP11	-	IP12	-			
Available Co	nnections	32					
Client Mode	Remote IF	Connection S	State Query St	ate Last Query	Time Host Name		
IP1	-	-	-	-	-		
IP2	-	-	-	-	-		
IP3	-	-	-	-	-		
IP4	-	-	-	-	-		
IP5	-	-	-	-	-		
IP6	-	-	-	-	-		
Client Mode	Remote IF	Connection S	State Query St	ate Last Query	Time Host Name		
IP7	-	-	-	-	-		
IP8	-	-	-	-	-		
IP9	-	-	-	-	-		
IP10	-	-	-	-	-		
IP11	-	-	-	-	-		
IP12	-	-	-	-	-		

# 4.13 Change Password



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

On the **Password** page, the **Change Password** section enables users to modify the login password for the module's web server. The steps are outlined below.

- **Step1**: Enter your old password in the the **Current password** field. When initially logging into the web server, the user is required to change the factory default password (Admin).
- **Step2**: Enter the new password in the **New password** field. Please use 1 to 12 digits or English characters.
- Step3: Re-enter the new password in the Confirm new password field to confirm.
- Step4: Click the Submit button to update the password.

Change Password The length of the password is 12 characters maximum	1.
Current password:	
New password:	
Confirm new password:	Submit

# 4.14 Logout

Click on the **Logout** tab to sign out from the module's web server and return to the login page.



# 5 I/O Pair Connection Applications

The tET/tPET series modules can establish remote logical I/O connections via Ethernet. After configuring the settings, it becomes possible to continuously read the DI status of the local (or remote) module and then write it to the DO of the remote (or local) module. This function is useful when connecting DI/DO modules that have no Ethernet functionality.

To configure the Pair-Connection function, please consult the following chapters.

# 5.1 Set a Single Module to Pull/Push Mode (DI/DO)

### Step 1: Connect the Module to the Network, PC, and Power Supply

Confirm that the tET/tPET series modules are functioning correctly. Refer to Chapter 3. "Getting Started" for more details. Here is the schematic diagram for this example, utilizing the tPET-P2R2 module.



### Step 2: Configure the Ethernet Settings

Contact your network administrator to get the correct network configuration information (e.g., IP/Mask/Gateway) needed to set up I/O modules. For more instructions, refer to Section 3.4 "Using the eSearch Utility to assign a new IP".

🥩 eSearch Utility [ v1.3.0, May.05, 2023 ] — 🗆 🗙								
File Server Tools								
Name	Alias	IP Address	Sub-net M	Gateway	MAC Address	~		
tPET-P2R2_RevB tPET-P2R2_RevB	t(P)ET #1 t(P)ET #2	192.168.15.1 192.168.15.2	255.255.0.0 255.255.0.0	192.168.1.1 192.168.1.1	00:0d:e0:65:fa:7f 00:0d:e0:65:fa:80			
WP5231 ACS-11-MF	WP5231 ACS-11	192.168.73.11 192.168.1.242	255.255.0.0 255.255.0.0	192.168.1.1 192.168.1.1	00:0D:E0:3E:67:88 00:0d:e0:c0:04:f7	~		
<					>			
Search Server Configuration (UDP) Web Exit								
Status						//		

### Step 3: Log into the tET/tPET Web Server

- Choose the t(P)ET module within the eSearch Utility and then click the "Web" button to open the login webpage.
- Enter the password in the Login password field (Defaults: "Admin") and click the "Submit" button to log into the Web Server.

ø eSearch Ut	ility [ v1.3.0, M	ay.05, 2023 ]			- 🗆 >	<
File Ser	ols					
Name 1.	Alias	IP Address	Sub-net M	Gateway	MAC Address	~
tPET-P2R2_Rev	3 t(P)ET #1	192.168.15.1	255.255.0.0	192.168.1.1	00:0d:e0:65:fa:7f	
tPET-P2R2_Revi	P)ET #2	192.168.15.2	255.255.0.0	192.168.1.1	00:0d:e0:65:fa:80	
WP5231	₩P5231	192.168.73.11	255.255.0.0	192.168.1.1	00:0D:E0:3E:67:88	
ACS-11-MF	ACS-11	192.168.1.242	255,255.0.0	192.168.1.1	00:0d:e0:c0:04:f7	$\checkmark$
<			2.		>	
Search Se	rver Config	guration (UDP)	Wet	· Ռո	Exit	
Status						



3. Click the **"Pair**" tab to display the configuration page.

ICP	Etherne Home   Ne MQTT (Top	et I/O Module twork   I/O Settings   Sync   PV ics: DO   DI )	VM Pair jilter   Monitor   Pas	sword   Logout
	Model Name	tPET-P2R2_RevB	Alias Name	#1
Firn	nware Versior	B2.3.2 [Dec.16 2021]	MAC Address	00-0d-e0-65-fa-7f
	IP Address	192.168.15.1	Initial Switch	OFF
(Socket Watcho	TCP Timeout dog, Seconds)	180	System Timeout (Network Watchdog, Seconds)	0

## 5.1.1 Pull Mode

- 1. In the **Pair-Connection Setting** section, choose **PULL** and check the box in the **Enable Mode** field to enable this mode.
- In the Remote IP...: Port fields, enter the IP address and TCP Port of the remote t(P)ET #2 module.
- 3. In the **IO Count** field, enter the mapped quantity for DI and DO.

For example, the <u>PULL Mode (Remote DI to Local DO)</u> configuration: Enter "2" in the "IO Count" field and "0" in both the Local/Remote IO Address fields. This means DIO and DI1 of t(P)ET #2 module correspond to DOO and DO1 of t(P)ET #1 module.

- In the Local IO Address field, select "0x: Coil Output..." and enter the starting DO address.
   In the Remote IO Address field, select "1x: Discrete Input.." and enter the starting DI address.
- 5. Choose the Modbus protocol (e.g., **TCPv4**) from the **Network Protocol** drop-down menu.
- 6. Click the "**Submit...**" button to complete the configuration.

Pa	Pair-Connection Settingst   Submit 1-8 9-16									
#	Enable Mode	Remote IPv4 / IPv6 / Host Name (Max. 127 chars) : Port	Net ID	Scan Time (ms)	IO Count	Local IO Address	Remote IO Address	Network Protocol		
01	PULL V	192.168.15.2 502	1	1000	2	0x:Coil ( ✔ 0	1x:Discr ✔ 0	TCPv4 🗸		
02	PULL V	502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸		
03	PULL V	502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸		
04	PULL V	502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸		
05	PULL V	502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸		

## 5.1.2 Push Mode

- 1. In the **Pair-Connection Setting** section, choose **PUSH** and check the box in the **Enable Mode** field to enable this mode.
- In the Remote IP...: Port fields, enter the IP address and the TCP Port of the remote t(P)ET #2 module
- 3. In the **IO Count** field, enter the mapped quantity for DI and DO.

For example, the <u>PUSH Mode (Local DI to Remote DO)</u> configuration: Enter "2" in the IO Count field and "0" in both the Local/Remote IO Address fields. This means DIO and DI1 of t(P)ET #1 module correspond to DOO and DO1 of t(P)ET #2 module.

- In the Local IO Address field, select "1x: Discrete Input.." and enter the starting DI address.
   In the Remote IO Address field, select "0x: Coil Output..." and enter the starting DO address.
- 5. Choose the Modbus protocol (e.g., **TCPv4**) from the **Network Protocol** drop-down menu.
- 6. Click the **"Submit...**" button to complete the configuration.

Pair-Connection Settings Submit 1-8 9-16									
#	Enable Mode	Remote IPv4 / IPv6 / Host Name (Max. 127 chars) : Port		Net ID	Scan Time (ms)	IO Count	Local IO Address	Remote IO Address	Network Protocol
01	PULL 🗸	192.168.15.2	502	1	1000	2	0x:Coil ( 🗸 0	1x:Discr ✔ 0	TCPv4 🗸
02	PUSH 🗸	192.168.15.2	: 502	1	1000	2	1x:Discr ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸
03	PULL 🗸		502	1	1000	1	0x:Coil ( V 0	0x:Coil ( V 0	TCPv4 🗸

The user can test this function on the **Home** page. Also, refer to specific tPET Quick Start for the I/O wiring.



# 5.2 Set Two Modules to Push Mode (Local DI to Remote DO)

### Step 1: Connect the Module to the Network, PC, and Power Supply

Confirm that the tET/tPET series modules are functioning correctly. Refer to Chapter 3. "Getting Started" for more details. Here is the schematic diagram for this example, utilizing the tPET-P2R2 module.



### Step 2: Configure the Ethernet Settings

Contact your network administrator to get the correct network configuration information (e.g., IP/Mask/Gateway) needed to set up I/O modules. For more instructions, refer to Section 3.4 "Using the eSearch Utility to assign a new IP".

	🥏 eSearch Utilit	y [ v1.3.0, M	ay.05, 2023 ]			- 🗆 X	<
$\bigcap$	File Server Tool	s					
2.	Name	Alias	IP Address	Sub-net M	Gateway	MAC Address	~
$\sim$	tPET-P2R2_RevB	t(P)ET #1	192.168.15.1	255.255.0.0	192.168.1.1	00:0d:e0:65:fa:7f	
	tPET-P2R2_RevB	t(P)ET #2	192.168.15.2	255.255.0.0	192.168.1.1	00:0d:e0:65:fa:80	
_	WP5231	WP5231	192.168.73.11	255.255.0.0	192.168.1.1	00:0D:E0:3E:67:88	_
$\frown$	ACS-11-MF	ACS-11	192.168.1.242	255.0.0	192.168.1.1	00:0d:e0:c0:04:f7	$\sim$
1.	<			3.		>	
7	Search Serve	er Config	juration (UDP)	Wet		Exit	

### Step 3: Log into the tET/tPET Web Server

- Choose the t(P)ET #1 or t(P)ET #2 module within the eSearch Utility and then click the "Web" button to open the login webpage.
- Enter the password in the Login password field (Defaults: "Admin") and click the "Submit" button to log into the Web Server. (See Section 5.1 – Step3)

### Step 4-1: Configure the Pair-Connection for the tET/tPET #1 (Push Mode)

- 1. Click the **Pair** tab to display the configuration page.
- 2. In the **Pair-Connection Setting** section, choose **PUSH** and check the box in the **Enable Mode** field to enable this mode.
- In the Remote IP...: Port fields, enter the IP address and the TCP Port of the remote t(P)ET #2 module
- 4. In the **IO Count** field, enter the mapped quantity for DI and DO.

For example, the <u>PUSH Mode (Local DI to Remote DO)</u> configuration: Enter "1" in the **IO Count** field and "0" in both the Local/Remote **IO Address** fields. This means **DIO** of **t(P)ET #1** module correspond to **DOO** of **t(P)ET #2** module.

- In the Local IO Address field, select "1x: Discrete Input.." and enter the starting DI address.
   In the Remote IO Address field, select "0x: Coil Output..." and enter the starting DO address.
- 6. Choose the Modbus protocol (e.g., **TCPv4**) from the **Network Protocol** drop-down menu.
- 7. Click the **"Submit...**" button to complete the configuration.

Model NametPET-P2R2_RevBFirmware VersionB2.4.2 [May.05 2023]IP Address192.168.15.1TCP Timeout (Socket Watchdog, Seconds)180	Alias Name t(P)ET #1 MAC Address 00-0d-e0-65-fa-7f Initial Switch OFF System Timeout (Network Watchdog, Seconds)							
Pair-Connection Settings: Submit 1-8								
# Enable Remote IPv4 / IPv6 / Host Name (Max. 127 chars) : Port		Net ID	Scan Time (ms)	IO Count	Local IO Address	Remote IO Address	Network Protocol	
01 PUSH V 192.168.15.2	: 502	1	1000	1	1x:Discr ∨ 0	0x:Coil ( 🗸 0	TCPv4 🗸	
02 PULL V	: 502	1	1000	1	0x:Coil ( 🗸 0	1x:Discr ∨ 0	TCPv4 🗸	
	: 502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸	
	502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( 🗸 0	TCPv4 🗸	
	: 502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸	
	: 502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸	
07 PULL V	: 502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸	
	: 502	1	1000	1	0x:Coil(✔ 0	0x:Coil ( 🗸 0	TCPv4 🗸	
Note: PULL Mode = Remote to Local PUSH Mode = Local to Remote Pair-connection is disabled if the IO Count is 0 (no data) IO Address (base 0): 0 - 65535, no leading 0x/1x/3x/4x.								

- Step 4-2: Configure the Pair-Connection for the tET/tPET #2 (Push Mode)
- 1. Click the **Pair** tab to display the configuration page.
- In the Pair-Connection Setting section, choose PUSH and check the box in the Enable Mode field to enable this mode.
- In the Remote IP...: Port fields, enter the IP address and the TCP Port of the remote t(P)ET #1 module.
- 4. In the **IO Count** field, enter the mapped quantity for DI and DO.

For example, the <u>PUSH Mode (Local DI to Remote DO)</u> configuration: Enter "**1**" in the **IO Count** field and "**0**" in both the Local/Remote IO Address fields. This means **DIO** of **t(P)ET #2** module correspond to **DOO** of **t(P)ET #1** module.

- In the Local IO Address field, select "1x: Discrete Input.." and enter the starting DI address.
   In the Remote IO Address field, select "0x: Coil Output..." and enter the starting DO address.
- 6. Choose the Modbus protocol (e.g., **TCPv4**) from the **Network Protocol** drop-down menu.
- 7. Click the **"Submit...**" button to complete the configuration.

				(10)5	<b>T</b> 110				
Model Name TPE I-P2R2_RevB									
Firmware Version B2.4.2 [May.05 2023]	MAC Address 00-0d-e0-65-fa-80								
IP Address 192.168.15.2			Initial Swi	tch OFF					
TCP Timeout (Socket Watchdog, Seconds) 180	System Timeout (Network Watchdog, Seconds)								
Pair-Connection Settings									
# Enable Mode Remote IPv4 / IPv6 / Host Name (Max. 127 chars) : Port		Net ID	Scan Time (ms)	IO Count	Local IO Address	Remote IO Address	Network Protocol		
01 PUSH V 192.168.15.1	: 502	1	1000	1	1x:Discr ✔ 0	0x:Coil ( 🗸 0	TCPv4 🗸		
02 PULL V	: 502	1	1000	1	0x:Coil ( 🗸 0	0x:Coil ( 🗸 0	TCPv4 🗸		
	: 502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸		
	: 502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸		
	: 502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸		
06 PULL V	: <mark>502</mark>	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸		
07 PULL V	: <mark>502</mark>	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( 🗸 0	TCPv4 🗸		
08 PULL V	: <mark>502</mark>	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸		
Note: PULL Mode = Remote to Local PUSH Mode = Local to Remote Pair-connection is disabled if the IO Count is 0 (no data) IO Address (base 0): 0 - 65535, no leading 0x/1x/3x/4x									

# 5.3 Set Two Modules to PULL Mode (Remote DI to 2-Local DO)

### Step 1: Connect the Module to the Network, PC, and Power Supply

Confirm that the tET/tPET series modules are functioning correctly. Refer to Chapter 3. "Getting Started" for more details. Here is the schematic diagram for this example, utilizing the tPET-P2R2 and ET-2260 modules.



### Step 2: Configure the Ethernet Settings

Contact your network administrator to get the correct network configuration information (e.g., IP/Mask/Gateway) needed to set up I/O modules. For more instructions, refer to Section 3.4 "Using the eSearch Utility to assign a new IP".



### Step 3: Log into the Module's Web Server

- Choose the t(P)ET #1/#2 or ET-2260 module within the eSearch Utility and then click the "Web" button to open the login webpage.
- Enter the password in the Login password field (Defaults: "Admin") and click the "Submit" button to log into the Web Server. (See Section 5.1 – Step3)

### Step 4-1: Configure the Pair-Connection for the tET/tPET #1 (Pull Mode)

- 1. Click the **Pair** tab to display the configuration page.
- 2. In the **Pair-Connection Setting** section, choose **PULL** and check the box in the **Enable Mode** field to enable this mode.
- 3. In the **Remote IP... : Port** fields, enter the IP address and the TCP Port of the remote **ET-2260** module
- 4. In the **IO Count** field, enter the mapped quantity for DI and DO.

For example, the <u>PULL Mode (Remote DI to Local DO)</u> configuration: Enter "2" in the "IO Count" field and "0" in both the Local/Remote IO Address fields. This means DIO and DI1 of ET-2260 module correspond to DOO and DO1 of t(P)ET #1 module.

- In the Local IO Address field, select "0x: Coil Output..." and enter the starting DO address.
   In the Remote IO Address field, select "1x: Discrete Input.." and enter the starting DI address.
- 6. Choose the Modbus protocol (e.g., **TCPv4**) from the **Network Protocol** drop-down menu.
- 7. Click the **"Submit...**" button to complete the configuration.

Model Name tPET-P2R2_RevB Alias Name t(P)ET #1									
Firmware Version B2.4.2 [May.05 2023]	MAC Address 00-0d-e0-65-fa-7f								
IP Address 192.168.15.1			Initial Sw	itch OFF					
TCP Timeout (Socket Watchdog, Seconds) 180	(Netw	ج ork Watcl	System Time ndog, Secon	out 0 ids)					
Pair-Connection Settings: Submit 1-8   -16									
# Enable Remote IPv4 / IPv6 / Host Name (Max. 127 chars) : Port		Net ID	Scan Time (ms)	IO Count	Local IO Address	Remote IO Address	Network Protocol		
01 PULL V 192.168.15.60	502	1	1000	2	0x:Coil ( ✔ 0	1x:Discr ✔ 0	TCPv4 🗸		
02 PULL V	: 502	1	1000	1	0x:Coil ( 🗸 0	1x:Discr 🗸 0	TCPv4 🗸		
	: 502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸		
04 PULL V	: 502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸		
05 PULL V	: 502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸		
	: 502	1	1000	1	0x:Coil(✔ 0	0x:Coil ( ✓ 0	TCPv4 🗸		
07 PULL V	: 502	1	1000	1	0x:Coil(✔ 0	0x:Coil ( ✓ 0	TCPv4 🗸		
	: 502	1	1000	1	0x:Coil(✔ 0	0x:Coil ( ✓ 0	TCPv4 🗸		
Note: PULL Mode = Remote to Local PUSH Mode = Local to Remote Pair-connection is disabled if the IO Count is 0 (no data) IO Address (base 0): 0 - 65535, no leading 0x/1x/3x/4x.									

### Step 4-2: Configure the Pair-Connection for the tET/tPET #2 (Pull Mode)

- 1. Click the **Pair** tab to display the configuration page.
- 2. In the **Pair-Connection Setting** section, choose **PULL** and check the box in the **Enable Mode** field to enable this mode.
- 3. In the **Remote IP... : Port** fields, enter the IP address and the TCP Port of the remote **ET-2260** module
- 4. In the **IO Count** field, enter the mapped quantity for DI and DO.

For example, the <u>PULL Mode (Remote DI to Local DO)</u> configuration: Enter "2" in the "IO Count" field and "0 / 2" in the Local/Remote IO Address fields. This means DI2 and DI3 of ET-2260 module correspond to DO0 and DO1 of t(P)ET #2 module.

- In the Local IO Address field, select "0x: Coil Output..." and enter the starting DO address.
   In the Remote IO Address field, select "1x: Discrete Input.." and enter the starting DI address.
- 6. Choose the Modbus protocol (e.g., TCPv4) from the Network Protocol drop-down menu.
- 7. Click the **"Submit...**" button to complete the configuration.

Model Name tPET-P2R2_RevB Alias Name t(P)ET #2										
Firmware Version B2.4.2 [May.05 2023]	MAC Address 00-0d-e0-65-fa-80									
IP Address 192.168.15.2			Initial Swi	tch OFF						
TCP Timeout (Socket Watchdog, Seconds) 180	(Netwo	ع ork Watcl	System Time hdog, Secon	out 0 ds)						
Pair-Connection Settings: Submit 1-8   9-16										
# Enable Remote IPv4 / IPv6 / Host Name (Max. 127 chars) : Port		Net ID	Scan Time (ms)	IO Count	Local IO Address	Remote IO Address	Network Protocol			
01 PULL V 192.168.15.60	: 502	1	1000	2	0x:Coil ( ✔ 0	1x:Discr ✔ 2	TCPv4 🗸			
02 PULL V	: 502	1	1000	1	0x:Coil ( 🗸 0	0x:Coll ( 🗸 0	TCPv4 🗸			
	: 502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸			
04 PULL V	: 502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸			
05 PULL V	: 502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸			
06 PULL V	: 502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸			
07 PULL V	: 502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸			
08 PULL V	502	1	1000	1	0x:Coil ( ✓ 0	0x:Coil ( 🗸 0	TCPv4 🗸			
Note: PULL Mode = Remote to Local PUSH Mode = Local to Remote Pair-connection is disabled if the IO Count is 0 (no data) IO Address (base 0): 0 - 65535, no leading 0x/1x/3x/4x.										

# 5.4 Set Two Modules to Push Mode (2-Local DI to Remote DO)

### Step 1: Connect the Module to the Network, PC, and Power Supply

Confirm that the tET/tPET series modules are functioning correctly. Refer to Chapter 3. "Getting Started" for more details. Here is the schematic diagram for this example, utilizing the tPET-P2R2 and ET-2260 modules.



### Step 2: Configure the Ethernet Settings

Contact your network administrator to get the correct network configuration information (e.g., IP/Mask/Gateway) needed to set up I/O modules. For more instructions, refer to Section 3.4 "Using the eSearch Utility to assign a new IP".



### Step 3: Log into the Module's Web Server

- Choose the t(P)ET #1/#2 or ET-2260 module within the eSearch Utility and then click the "Web" button to open the login webpage.
- Enter the password in the Login password field (Defaults: "Admin") and click the "Submit" button to log into the Web Server. (See Section 5.1 – Step3)
- Step 4-1: Configure the Pair-Connection for the tET/tPET #1 (Push Mode)
- 1. Click the **Pair** tab to display the configuration page.
- 2. In the **Pair-Connection Setting** section, choose **PUSH** and check the box in the **Enable Mode** field to enable this mode.
- 3. In the **Remote IP...** : **Port** fields, enter the IP address and the TCP Port of the remote **ET-2260** module
- 4. In the **IO Count** field, enter the mapped quantity for DI and DO.

For example, the <u>PUSH Mode (Local DI to Remote DO)</u> configuration: Enter "2" in the "IO Count" field and "0" in both the Local/Remote IO Address fields. This means DIO and DI1 of t(P)ET #1 module correspond to DOO and DO1 of ET-2260 module.

- In the Local IO Address field, select "1x: Discrete Input.." and enter the starting DI address.
   In the Remote IO Address field, select "0x: Coil Output..." and enter the starting DO address.
- 6. Choose the Modbus protocol (e.g., **TCPv4**) from the **Network Protocol** drop-down menu.
- 7. Click the **"Submit...**" button to complete the configuration.

	Model Name tPET-P2R2_RevB			Alias Na	me t(P)E	T #1		
	Firmware Version B2.4.2 [May.05 2023]	MAC Address 00-0d-e0-65-fa-7f						
	IP Address 192.168.15.1			Initial Swi	tch OFF			
(S	TCP Timeout ocket Watchdog, Seconds)	(Netwo	s ork Watch	System Time ndog, Secon	out ds)			
Pair-Connect	ion Settings:   Submit 1-8   9-16							
# Enable Mode	Remote IPv4 / IPv6 / Host Name (Max. 127 chars) : Port		Net ID	Scan Time (ms)	IO Count	Local IO Address	Remote IO Address	Network Protocol
01 PUSH 🗸	192.168.15.60	: 502	1	1000	2	1x:Discr ✔ 0	0x:Coil(✔ 0	TCPv4 🗸
02 PULL V		: 502	1	1000	1	0x:Coil ( ✓ 0	1x:Discr ✓ 0	TCPv4 🗸
03 PULL V		: <mark>502</mark>	1	1000	1	0x:Coil ( ✓ 0	0x:Coil(✔ 0	TCPv4 🗸
04 PULL 🗸		: <mark>502</mark>	1	1000	1	0x:Coil ( ✔ 0	0x:Coil(✔ 0	TCPv4 🗸
05 PULL 🗸		: <mark>502</mark>	1	1000	1	0x:Coil ( ✔ 0	0x:Coil(✔ 0	TCPv4 🗸
06 PULL 🗸		: <mark>502</mark>	1	1000	1	0x:Coil ( ✓ 0	0x:Coil(✔ 0	TCPv4 🗸
07 PULL V		: <mark>502</mark>	1	1000	1	0x:Coil ( ✓ 0	0x:Coil(✔ 0	TCPv4 🗸
08 PULL V		: <mark>502</mark>	1	1000	1	0x:Coil ( ✓ 0	0x:Coil(✔ 0	TCPv4 🗸
Note: PULL Mode = PUSH Mode = Pair-connectio	Note: PULL Mode = Remote to Local PUSH Mode = Local to Remote Pair-connection is disabled if the IO Count is 0 (no data)							
O Address (base 0): 0 - 65535, no leading 0x/1x/3x/4x.								

#### Step 4-2: Configure the Pair-Connection for the tET/tPET #2 (Push Mode)

- 1. Click the **Pair** tab to display the configuration page.
- 2. In the **Pair-Connection Setting** section, choose **PUSH** and check the box in the **Enable Mode** field to enable this mode.
- 3. In the **Remote IP... : Port** fields, enter the IP address and the TCP Port of the remote **ET-2260** module
- 4. In the **IO Count** field, enter the mapped quantity for DI and DO.

For example, the <u>PUSH Mode (Local DI to Remote DO)</u> configuration: Enter "2" in the "IO Count" field and "0 / 2" in the Local/Remote IO Address fields. This means DIO and DI1 of t(P)ET #1 module correspond to DO2 and DO3 of ET-2260 module.

- In the Local IO Address field, select "1x: Discrete Input.." and enter the starting DI address.
   In the Remote IO Address field, select "0x: Coil Output..." and enter the starting DO address.
- 6. Choose the Modbus protocol (e.g., **TCPv4**) from the **Network Protocol** drop-down menu.
- 7. Click the **"Submit...**" button to complete the configuration.

Model Name tPET-P2R2_RevB			Alias Nar	ne t(P)E	T #2	n	
IP Address 192 168 15 2							
		\$	System Timer				
(Socket Watchdog, Seconds) 180	(Netw	ork Watch	ndog, Second	ds) 0			
Pair-Connection Settings							
Enable Mode         Remote IPv4 / IPv6 / Host Name (Max. 127 chars) : Port		Net ID	Scan Time (ms)	O Count	Local IO Address	Remote IO Address	Network Protocol
01 PUSH V 192.168.15.60	502	1	1000	2	1x:Discr 🗸 0	0x:Coil ( 🗸 2	TCPv4 🗸
02 PULL V	502	1	1000	1	0x:Coil ( 🗸 0	0x:Coil ( 🗸 0	TCPv4 🗸
03 PULL V	: 502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸
04 PULL V	: 502	1	1000	1	0x:Coil ( 🗸 0	0x:Coil ( ✔ 0	TCPv4 🗸
05 PULL V	: 502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( 🗸 0	TCPv4 🗸
06 PULL V	: 502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸
07 PULL V	: 502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( ✔ 0	TCPv4 🗸
08 PULL V	502	1	1000	1	0x:Coil ( ✔ 0	0x:Coil ( 🗸	TCPv4 🗸
Note: PULL Mode = Remote to Local PUSH Mode = Local to Remote Pair-connection is disabled if the IO Count is 0 (no data) IO Address (base 0): 0 - 65535, no leading 0x/1x/3x/4x.							

## 5.5 Shared Memory

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

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

#### Note:

Shared memory is only available for the firmware v2.4.2 and later. The older version is not supported.



Shared Memory Register Name	3x, 4x (AIO) Register Address	Mapping ( = )	Shared Memory Bit Name	0x, 1x (DIO) Bit Address
Register 0	3000	←→	Bit 0 Bit 15	3000 3015
Register 1	3001	(÷ →	Bit 16 Bit 31	3016 3031
Register 2	3002	<b>←</b> →	Bit 32 Bit 47	3032 3047
Register 3	3003	÷۲	Bit 48 Bit 63	3048 3063
Register 4	3004	÷۲	Bit 64 Bit 79	3064 3079
Register 5	3005	÷۲	Bit 80 Bit 95	3080 3095
Register 6	3006	÷۲	Bit 96 Bit 111	3096 3111
Register 7	3007	÷۲	Bit 112 Bit 127	3112 3127
Register 8	3008	÷۲	Bit 128 Bit 143	3128 3143
Register 9	3009	<b>←→</b>	Bit 144 Bit 159	3144 3159
Register 10	3010	÷۲	Bit 160 Bit 175	3160 3175

## 5.5.1 Address Mapping for Shared Memory

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

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

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

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

### AIO\_Address = (DIO\_Address - 3000) / 16 + 3000

## 5.5.2 Application of Spreading the Load



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

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

llest		Remote IP	IO Address
HOSL	ter/tPer + Concentrator iP	(Slave #1-8 )	(Shared Memory)
		10.0.8. <mark>10</mark>	<b>3000</b> 3015
	10.0.8.200	10.0.8. <mark>11</mark>	<b>3016</b> 3031
50 40 30 (2) Downlight		10.0.8. <mark>12</mark>	<b>3032</b> 3047
20. T Piconscent 10. Sensition		10.0.8. <mark>13</mark>	<b>3048</b> 3063
-10. -20. -30.		10.0.8. <mark>14</mark>	<b>3064</b> 3079
26c //*		10.0.8. <mark>15</mark>	<b>3080</b> 3095
		10.0.8. <mark>16</mark>	<b>3096</b> 3111
		10.0.8. <mark>17</mark>	<b>3112</b> 3127

#### Refer to Chapter 5 - I/O Pair Connection Application for detailed configuration

- Click Enable Mode and choose the PULL mode (Remote DI to Local DO) to enable this function (#01 ~ #08).
- In the Remote IP...: Port field, enter the IP address and TCP port (502) of remote modules (Slave #1-8). In the IO Count field, enter the number of mapped DI (e.g., 16). In the Local IO Address field, select "0x: Coil Output..." and enter the starting address of the shared memory.

In the **Remote IO Address** field, select "1x: Discrete Input..." and enter the starting **DI** address.

3. In Shared Memory, the host computer has the option to use either Bit or Register addresses to poll tET/tPET, and both approaches can read the same data. Accessing a Register is equivalent to accessing 16 bits.

# En Mo	able ode	Remote IPv4 / IPv6 / Host Name (Max. 127 chars) : Port			Scan Time (ms)	IO Count	Local IO Address	Remote IO Address	Network Protocol
01 <mark> </mark>	JLL 🗸	10.0.8.10	502	1	1000	16	0x:Coil O ✔ 3000	1x:Discre 0	TCPv4 🗸
02 <mark>-</mark>	JLL 🗸	10.0.8.11	502	1	1000	16	0x:Coil O ✔ 3016	1x:Discre ➤ 0	TCPv4 🗸
03 <mark>-</mark>	JLL 🗸	10.0.8.12	502	1	1000	16	0x:Coil 0 ✔ 3032	1x:Discre ➤ 0	TCPv4 🗸
04 <mark> </mark>	JLL 🗸	10.0.8.13	502	1	1000	16	0x:Coil O ✔ 3048	1x:Discre ➤ 0	TCPv4 🗸
05 <mark>-</mark>	JLL 🗸	10.0.8.14	502	1	1000	16	0x:Coil O ✔ 3064	1x:Discre ➤ 0	TCPv4 🗸
06 <mark>-</mark>	JLL 🗸	10.0.8.15	502	1	1000	16	0x:Coil O ✔ 3080	1x:Discre ➤ 0	TCPv4 🗸
07 <mark>-</mark>	JLL 🗸	10.0.8.16	502	1	1000	16	0x:Coil 0 ✔ 3096	1x:Discre ❤ 0	TCPv4 🗸
08 <mark>-</mark>	JLL 🗸	10.0.8.17	502	1	1000	16	0x:Coil 0 🗸 3112	1x:Discre ❤ 0	TCPv4 🗸
Note: PULL Mode = Remote to Local PUSH Mode = Local to Remote Pair-connection is disabled if the IO Count is 0 (no data)									

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



## 5.5.3 Master/Slave/MTCP/MUDP Data Exchange

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

### 5.5.4 Bits / Registers Data Exchange



< Master#2 diagram >

Generally, the device cannot exchange the Bit and Register data directly, but this can achieve by using the shared memory of tET/tPET as a concentrator.

As the diagram above, the Modbus Master#1 writes data **255 (0X00FF)** to the shared memory with a Register address **3000**. The Modbus Master#2 reads data from the shared memory with Bit addresses 3015 to 3000 and gets the result **0000 0000 1111 1111**.

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

# 6 Modbus Information

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

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



## 6.1 What is Modbus TCP/IP?

Modbus is a communication protocol that was developed by Modicon Inc. in 1979, and was originally designed for use with Modicon controllers. Detailed information regarding the Modbus protocol can be found at: http://www.modbus.org.

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

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

## 6.2 Modbus Message Structure

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

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

#### The Modbus/TCP Message Structure

Compared to Modbus RTU, the message structure of Modbus TCP includes an additional 6 bytes, as follows.

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

#### > The Leading 6 bytes of a Modbus/TCP Protocol Query

Byte 00	Byte 01	Byte 02	Byte 03	Byte 04	Byte 05
Transactior	n identifier	Protocol ic	dentifier	Length Field (upper byte )	Length Field (lower byte)

- 1) Transaction identifier = Assigned by the Modbus/TCP Master (Client)
- 2) **Protocol identifier** = 0
- 3) Length field (upper byte) = 0 (since all messages are smaller than 256)
- 4) Length field (lower byte) = The number of following RTU data bytes

#### **RTU Data Structure**

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

- 1) **Net ID** specifies the address of the receiver (Modbus/TCP slave).
- 2) Function Code specifies the message type.
- 3) Data Field is the data block.

#### 1) Net ID (Station Number)

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

#### 2) Function Code

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

Code	Function	Reference (Address)
01 (0x01)	Read the Status of the Coils (Readback DOs)	Охххх
02 (0x02)	Read the Status of the Input(Reads DIs)	1xxxx
03 (0x03)	Read the Holding Registers (Readback AOs)	4xxxx
04 (0x04)	Read the Input Registers (Reads AIs)	Зхххх
05 (0x05)	Force a Single Coil (Writes DO)	Охххх
06 (0x06)	Preset a Single Register (Writes AO)	4xxxx
15 (0x0F)	Force Multiple Coils (Writes DOs)	Охххх
16 (0x10)	Preset Multiple Registers (Writes AOs)	4xxxx

#### 3) Data Field

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

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

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

## 🚺 <u>Note:</u>

For more details on Address Mapping, refer to the "Modbus Register Table".

## 6.2.1 01(0x01) Read the Status of the Coils (Readback DOs)

This function code is used to read either the current status of the coils or the current digital output readback value from the tET/tPET module.

### [Request]

Byte	Description	Size	Value
00	Net ID	1	1 to 247
01	Function Code	1	0x01
02.02	Starting DO Address	2	Refer to the Modbus Address Table.
02-03			Byte 02 = high byte ; Byte 03 = low byte
04-05	Points (Channels)	2	Byte 04 = high byte ; Byte 05 = low byte

#### \* Size: Byte

#### [Response]

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

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

## Example: Function 01 (0x01), Readback DOs

## Reads the digital output value

Command	[Leading 6 bytes]	[Request]
command.	01 02 00 00 00 06	01 01 00 00 00 02
Posponso:	[Leading 6 bytes]	[Response]
Response.	01 02 00 00 00 04	01 01 01 03

	[Leading 6 bytes]	
	Byte 00-03	01 02 00 00 (Message number)
Command:	Byte 04-05	00 06 (Number of bytes used for the request)
	[Request]	
	Byte 00	01 (Net ID)
	Byte 01	01 (Function Code)
	Byte 02-03	00 00 (Starting DO Address)
	Byte 04-05	00 02 (Channels)

	[Leading 6 bytes]	
	Byte 00-03	01 02 00 00 (Message Number)
Response:	Byte 04-05	00 04 (Number of bytes used for the response)
	[Response]	
	Byte 00	01 (Net ID)
Byte 01		01 (Function Code)
	Byte 02	01 (Byte Count of data)
	Byte 03	03 (Value for DO1 to DO0)

# 6.2.2 02(0x02) Read the Status of the Input (Read DIs)

This function code is used to read the current digital input value.

#### [Request]

Byte	Description	Size	Value
00	Net ID	1	1 to 247
01	Function Code	1	0x02
02-03	Starting DI Address	2	Refer to the Modbus Address Table.
			Byte 02 = high byte ; Byte 03 = low byte
04-05	Number of Points (Channels)	2	Byte 04 = high byte ; Byte 05 = low byte

\* Size: Byte

#### [Response]

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

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

## Example: Function 02 (0x02), Read DIs

## Reads the digital input value

Command:	[Leading 6 bytes]	[Request]
communu.	01 02 00 00 00 06	01 02 00 00 00 02
Response <sup>.</sup>	[Leading 6 bytes]	[Response]
Response.	01 02 00 00 00 04	01 02 01 03

	[Leading 6 bytes]			
	Byte 00-03	01 02 00 00 (Message number)		
Command:	Byte 04-05 d:	00 06 (Number of bytes used for the request)		
	[Request]			
	Byte 00	01 (Net ID)		
	Byte 01	02 (Function Code)		
	Bytes 02-03	00 00 (Starting DI Address)		
	Bytes 04-05	00 02 (Number of Points)		

	[Leading 6 bytes]	
	Byte 00-03	01 02 00 00 (Message Number)
Response:	Byte 04-05	00 04 (Number of bytes used for the response)
	[Response]	
	Byte 00	01 (Net ID)
	Byte 01	02 (Function Code)
	Byte 02	01 (Byte Count of data)
	Byte 03	03 (Value for DI1 to DI0)

## 6.2.3 03(0x03) Read the Holding Registers (Readback AOs)

This function code is used to readback either the current values in the holding registers or the analog output value from the tET/tPET module. These registers are also used to store the preset values for the digital counter, the host watchdog timer, the module name and the TCP timeout, etc.

#### [Request]

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

\* Size: Byte

#### [Response]

Byte	Description	Size	Value
00	Net ID	1	1 to 247
01	Function Code	1	0x03
02	Byte Count	1	Byte Count of data
02		T	(n=Points x 2 Bytes)
03	Data	n	n= 2;
			Byte 03 = high byte; Byte 04 = low byte
			n= m;
			Byte m+1 = high byte
			Byte m+2 = low byte

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

## Example: Function 03 (0x03), Read AOs

Reads the name of the module for the tPET-P2A2.

Command	[Leading 6 bytes]	[Request]
Command.	<u>01 02 00 00 00 06</u>	01 03 01 03 00 02
Deserves	[Leading 6 bytes]	[Response]
Response:	01 02 00 00 00 07	01 03 0450 32 41 32

	[Leading 6 bytes]	
	Byte 00-03	01 02 00 00 (Message number)
Command:	nd: Byte 04-05	00 06 (Number of bytes used for the request)
	[Request]	
	Byte 00	01 (Net ID)
	Byte 01	03 (Function Code)
	Byte 02-03	01 03 (Starting AO Address)
	Byte 04-05	00 02 (Channels)

	[Leading 6 bytes]	
	Byte 00-03	01 02 00 00 (Message Number)
Response:	Byte 04-05	00 07 (Number of bytes used for the response)
	[Response]	
	Byte 00	01 (Net ID)
	Byte 01	03 (Function Code)
	Byte 02	04 (Byte Count of data)
		50 32
	Byte 03-04	(The low word for the module name: The ASCII code
		"0x50, 0x32" represents the characters "P" and "2")
		41 32
	Byte 05-06	(The high word for the module name: The ASCII code
		"0x41, 0x32" represents the characters "A" and "2")

# 6.2.4 04(0x04) Read the Input Registers (Read Als)

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

#### [Request]

Byte	Description	Size	Value
00	Net ID	1	1 to 247
01	Function Code	1	0x04
02-03	Starting AI Address	2	Refer to the Modbus Address Table.
			Byte 02 = high byte ; Byte 03 = low byte
04-05	Number of 16-bit Registers	2	Word Count
	(Channels)	2	Byte 04 = high byte ; Byte 05 = low byte

#### \* Size: Byte

#### [Response]

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

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

## Example: Function 04 (0x04), Read Als

### Reads the number of the DI channels on the tPET-P2A2.

Command	[Leading 6 bytes]	[Request]
command.	<u>01 02 00 00 00 06</u>	01 04 00 64 00 01
Posponso:	[Leading 6 bytes]	[Response]
Response.	<u>01 02 00 00 00 05</u>	01 04 02 00 02

	[Leading 6 bytes]	
	Byte 00-03	01 02 00 00 (Message number)
Command:	Byte 04-05	00 06 (Number of bytes used for the request)
	[Request]	
	Byte 00	01 (Net ID)
	Byte 01	04 (Function Code)
	Byte 02-03	00 64 (Starting Al Address)
	Byte 04-05	00 01 (Number of 16-bit Registers)

	[Leading 6 bytes]	
	Byte 00-03	01 02 00 00 (Message Number)
Response:	Byte 04-05	00 05 (Number of bytes used for the response)
	[Response]	
	Byte 00	01 (Net ID)
	Byte 01	04 (Function Code)
	Byte 02	02 (Byte Count of data)
	Byte 03-04	00 02 (Number of DI Channels on the tPET-P2A2)

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

This function code is used to set the status of a single coil or a single digital output value for the tET/tPET module.

### [Request]

Byte	Description	Size	Value
00	Net ID	1	1 to 247
01	Function Code	1	0x05
02-03	DO Address	2	Refer to the Modbus Address Table.
		Z	Byte 02 = high byte ; Byte 03 = low byte
04-05	Output Value	2	0xFF 00: sets the output to ON.
			0x00 00: sets the output to OFF.
			All other values are invalid and will not
			affect the coil.
			Byte 04 = high byte ; Byte 05 = low byte

#### \* Size: Byte

#### [Response]

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

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

## Example: Function 05 (0x05), Write DO

### Sets Channel DO1 to ON.

Command	[Leading 6 bytes]	[Request]
Command.	<u>01 02 00 00 00 06</u>	01 05 00 01 FF 00
Posponso	[Leading 6 bytes]	[Response]
Response.	01 02 00 00 00 06	<u>01 05 00 01 FF 00</u>

	[Leading 6 bytes]	
	Byte 00-03	01 02 00 00 (Message number)
Command:	Byte 04-05	00 06 (Number of bytes used for the request)
	[Request]	
	Byte 00	01 (Net ID)
	Byte 01	05 (Function Code)
	Byte 02-03	00 00 (DO Address)
	Byte 04-05	FF 00 (Sets the output to ON)

	[Leading 6 bytes]	
	Byte 00-03	01 02 00 00 (Message Number)
Response:	Byte 04-05	00 06 (Number of bytes used for the response)
	[Response]	
	Byte 00	01 (Net ID)
	Byte 01	05 (Function Code)
	Bytes 02-03	00 01 (DO Address)
	Bytes 04-05	FF 00 (The DO has been set to ON)

# 6.2.6 06(0x06) Preset a Single Register (Write AO)

This function code is used to set a specific holding register to store the configuration values for the tET/tPET module.

### [Request]

Byte	Description	Size	Value
00	Net ID	1	1 to 247
01	Function Code	1	0x06
02-03	AO Address	2	Refer to the Modbus Address Table.
			Byte 02 = high byte ; Byte 03 = low byte
04-05	Register Value	2	Byte 04 = high byte ; Byte 05 = low byte

#### \* Size: Byte

### [Response]

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

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

## Example: Function 06 (0x06), Write AO

Sets the system timeout to 60 seconds.

Command	[Leading 6 bytes]	[Request]
command.	<u>01 02 00 00 00 06</u>	<u>01 06 01 08 00 3C</u>
Posponso:	[Leading 6 bytes]	[Response]
Response.	<u>01 02 00 00 00 06</u>	<u>01 06 01 08 00 3C</u>

	[Leading 6 bytes]	
	Byte 00-03	01 02 00 00 (Message number)
Command:	Byte 04-05	00 06 (Number of bytes used for the request)
	[Request]	
	Byte 00	01 (Net ID)
	Byte 01	06 (Function Code)
	Byte 02-03	01 08 (AO Address)
	Byte 04-05	00 3C (Sets the system timeout to 60 seconds)

	[Leading 6 bytes]	
	Byte 00-03	01 02 00 00 (Message Number)
Response:	Byte 04-05	00 06 (Number of bytes used for the response)
	[Response]	
	Byte 00	01 (Net ID)
	Byte 01	06 (Function Code)
	Bytes 02-03	01 08 (AO Address)
	Bytes 04-05	00 3C
		(The system timeout has been set to 60 seconds)

# 6.2.7 15(0x0F) Force Multiple Coils (Write DOs)

This function code is used to set multiple coils status or write multiple digital output values for the tET/tPET module.

#### [Request] (\* Size: Byte)

Byte	Description	Size	Value
00	Net ID	1	1 to 247
01	Function Code	1	0x0F
02.02	Starting DO Addross	2	Refer to the Modbus Address Table.
02-05	Starting DO Address	Z	Byte 02 = high byte ; Byte 03 = low byte
04-05	Number of Output	2	$P_{\rm v}$ to $0.4 - high by to \cdot P_{\rm v} to 0.5 - how by to$
	Channels (Points)		Byte 04 = high byte; Byte 05 = low byte
06	Byte count	1	n = (Points +7)/8
	Output Value	n	One bit corresponds to a single channel.
			(1: ON ; 0: OFF)
07			n= 1; Byte 07 = data bit 7 to 0
			n= 2; Byte 08 = data bit 15 to 8
			n= m; Byte m+6 = data bit (8m-1) to 8(m-1)

### [Response]

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

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

## Example: Function 15 (0x0F), Write Dos

Sets the safe value (DO0 – DO1).

Command	[Leading 6 bytes]	[Request]
command.	01 02 00 00 00 08	<u>01 0F 01 0B 00 02 01 03</u>
Posponso:	[Leading 6 bytes]	[Response]
Response.	<u>01 02 00 00 00 06</u>	<u>01 OF 01 OB 00 02</u>

	[Leading 6 bytes]	
	Byte 00-03	01 02 00 00 (Message number)
Command:	Byte 04-05	00 08 (Number of bytes used for the request)
	[Request]	
	Byte 00	01 (Net ID)
	Byte 01	0F (Function Code)
	Bytes 02-03	01 0B (Starting DO Address)
	Bytes 04-05	00 02 (Number of Output Channels)
	Byte 06	01 (Byte Count)
	Byte 07	03 (Output Value)

	[Leading 6 bytes]					
	Byte 00-03	01 02 00 00 (Message Number)				
Response:	Byte 04-05	00 04 (Number of bytes used for the response)				
	[Response]					
Byte 00		01 (Net ID)				
	Byte 01	0F (Function Code)				
	Bytes 02-03	01 0B (Starting DO Address)				
	Bytes 04-05	00 02 (Number of Input Channels)				

# 6.2.8 16(0x10) Preset Multiple Registers (Write AOs)

This function code is used to set multiple holding registers that are used to store the configuration values for the tET/tPET module.

#### [Request] (\* Size: Byte)

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

### [Response]

Byte	Description	Size	Value
00	Net ID	1	1 to 247
01	Function Code	1	0x05
02.02	Starting AO Addross	2	The value is the same as Bytes 02-03 of the
02-05	Starting AO Address	2	Request
04.05	Number of 16-bit Registers	2	The value is the same as Bytes 04-05 of the
04-05	(Channels)	2	Request

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

## Example: Function 16 (0x10), Write AOs

Sets the Preset value for the digital counter.

Command	[Leading 6 bytes]	[Request]		
command.	01 02 00 00 00 08	<u>01 10 00 32 00 01 02 03 E8 00 00</u>		
	[Leading 6 bytes]	[Response]		
Response:	01 02 00 00 00 06	01 10 00 32 00 01		

	[Leading 6 bytes]	
	Byte 00-03	01 02 00 00 (Message number)
Command:	Byte 04-05	00 0B (Number of bytes used for the request)
	[Request]	
	Byte 00	01 (Net ID)
	Byte 01	10 (Function Code)
	Bytes 02-03	00 32 (Starting AO Address)
	Bytes 04-05	00 01 (Number of 16-bit Registers)
	Byte 06	02 (Byte Count)
	Bytes 07-10	03 E8 00 00 (Preset Value for the digital counter)

	[Leading 6 bytes]	
	Byte 00-03	01 02 00 00 (Message Number)
Response:	Byte 04-05	00 06 (Number of bytes used for the response)
	[Response]	
	Byte 00	01 (Net ID)
	Byte 01	10 (Function Code)
	Bytes 02-03	00 32 (Starting AO address)
	Bytes 04-05	00 01 (Word Count)

# 6.3 Modbus Register Table (For DI/DO Module)

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

### 6.3.1 Common Functions

Starting Address	Points	Description	Bits per Point	Range	Access Type
127	1	Postoros all default web settings	1	1 – Doctoro	W
(0x7F)	L L	Restores all default web settings	T	I = Restore	(Pulse)
128	1	Default ID Sattings	1	1 – Doctoro	W
(0x80)	L L	Default ID Settings	<u></u>	I – Restore	(Pulse)
133	1	Debeets the tFT (tDFT medule	1	1 - Doboot	W
(0x85)	L	Reboots the terriper module	L	I = Rebool	(Pulse)
Remarks	" <b>W</b> ":	Write			

### > 0xxxx: DO Address (Base 0)

#### 3xxxx: AI address (Base 0)

Starting Address	Points	Description	Bits per Point	Range	Access Type
151 (0x97)	1	Firmware Version	16	"123" stands for "v1.2.3"	R
158 (0x9E)	1	Modbus Communication Status	16	0 = No Error 1 = Timeout	R
160 (0xA0)	1	Pair-Connection Status	16	0 = Normal 1 = Timeout 2 = Disconnected	R
Remarks	" <b>R</b> " : R	lead			

## 4xxxx: AO Address (Base 0)

Starting Address	Points	Description	Bits per Point	Range	Access Type	
				1 = Reset at Power-on		
255	1	CPU Reset	16	2 = Reset by the WDT	R/W	
(0xFF)	_	Status		3 =		
				Reset using the reset command		
				< 5: Disabled		
				5 to 65535: Enabled		
				(Units: seconds; Defaults: 0)		
257		Sets the Host		If the tET/tPET module loses		
257 (0v101)	1	Watchdog	16	communication with the host PC	R/W/F	
(0101)		Timer (WDT)		for more than the period defined		
				in the WDT settings, the DO		
				channels will revert to their safe		
				values and the Host WDT Events		
				Counter will be increased by one.		
258		Host WDT		Denotes how many Host WDT		
(0x102)	1	Events	16	Events have occurred since the	R/W	
(0/102)				last CPU reset		
259 (0x103)	1	Module Name	16	Module Name	R	
202		Coto the TCD		< 5: Disabled		
263	1	Sets the TCP	16	5 to 65535: Enabled	R/W/F	
(0x107)		Timeout value		(Units: seconds; Defaults: 0)		
264		Sats the System		< 30: Disabled		
20 <del>4</del> (0v108)	1	Timeout Value	16	<b>30 to 65535:</b> Enabled	R/W/F	
(0/100)				(Units: seconds; Defaults: 0)		
	" <b>R</b> " : F	Read;				
Remarks	"W":	Write;				
	<b>"F"</b> : Setting is recorded in flash as default.					
	* Warning: Frequent writing to the Flash can cause it to become corrupt.					

# 6.3.2 Specific Functions

The table below lists the nDI and nDO parameters used in the Modbus address table, representing the number of channels for each tPET series module.

Mode	el Name	(nDO)	(nDI)	
Non-PoE	ΡοΕ	Number of DO Channels	Number of DI Channels	
tET-P6	tPET-P6	0	6	
tET-PD6	tPET-PD6	0	Ø	
tET-C4	tPET-C4	4	0	
tET-A4	tPET-A4	4		
tET-P2C2	tPET-P2C2			
tET-P2A2	tPET-P2A2			
tET-P2POR2	tPET-P2POR2	2	2	
tET-PD2POR2	tPET-PD2POR2			
tET-P2R2	tPET-P2R2			
tET-PD2R1	tPET-PD2R1	1	2	

### > 0xxxx: DO address (Base 0)

Starting Address	Points	Description	Bits per Point	Range	Access Type
0 (0x00)	1 to nDO	Digital Output Channels	1	0 = Off 1 = On	R/W
32 (0x20)	1	Clears the status of all high latched DI Channels	1	1 = Clear	W
33 (0x21)	1	Clears the status of all low latched DI Channels	1	1 = Clear	W
34 (0x22)	1 to nDI	Clears the high speed digital counter for all DI Channels	1	1 = Clear	W
60 (0x3C)	1	Saves specific data to Flash (The access type for some registers is labeled with an " <b>E</b> ")	1	0 = Off 1 = On	W
100 (0x64)	1 to nDO	Enables the PWM for all DO Channels	1	0 = Off 1 = On (Default= 0)	R/W

Starting Address	Points	Description	Bits per Point	Range	Access Type	
150 (0x96)	1	Enables the high and low latches for all DI Channels	1	0 = Disable 1 = Enable (Default= 0)	R/W/F	
151 (0x97)	1 to nDI	Enables the high speed digital counter for all DI Channels	1	0 = Disable 1 = Enable (Default= 0)	R/W/F	
190 (0xBE)	1 to nDI	Enables frequency measurement for all DI Channels	1	0 = Disable 1 = Enable (Default= 0)	R/W/F	
235 (0xEB)	1 to nDO	Sets the Power-on value for all DO Channels	1	0 = Off 1 = On (Default= 0)	R/W/F	
267 (0x10B)	1 to 1DO	Sets the Safe value for all DO Channels	1	0 = Off 1 = On (Default= 0)	R/W/F	
Remarks	<ul> <li>"R" : Read</li> <li>"W" : Write</li> <li>"F" : Settings are recorded in flash by default</li> <li>"E" : After writing DO[60] register, the data will be stored in flash.</li> <li>* Warning: Frequency writing to the Flash can cause it to become corrupt.</li> </ul>					

## **A**Note

Because of the inherent traits of relays, modules equipped with relay functions are not well-suited for prolonged utilization of PWM functions.

## > 1xxxx: DI address (Base 0)

Starting Address	Points	Description	Bits per Point	Range	Access Type
0 (0x00)	1 to nDI	The status of all Digital Input Channels	1	0 = Off 1 = On	R
32 (0x20)	1 to nDI	The status of all high latched DI Channels	1	0 = None 1 = Latched	R
64 (0x40)	1 to nDI	The status of all low latched DI Channels	1	0 = None 1 = Latched	R
Remarks	" <b>R</b> ":Rea	d			

## 3xxxx: AI Address (Base 0)

Starting Address	Points	Description	Bits per Point	Value	Access Type		
16 (0x10)	1 to nDI	The Digital Counter Value	32	0 to 4294967296	R		
64 (0x40)	1 to nDI	The frequency Value * 1,000. (Note: The Client must first divide the value by 1,000.)	32	0 to 4294967296	R		
Note: The "DI value and offset of 2	Note: The "DI Counter (0x10)" and "DI Frequency (0x40)" that the records data as 32-bit value and is transmitted as two 16-bit registers. Consequently, the register address has an offset of 2, i.e., the address of the second channel will be at starting-address +2, and so on.						
Exam	<b>ple:</b> Reads	the 6DI Counter on the tPET-P6.					
	[Le	ading 6 bytes] [Request]					
Comr	mand: 01	02 00 00 00 06 01 04 00 <mark>10</mark>	00 <u>0C</u>				
		Starting Address	6 cha	nnels * 2 registers = 1	2		
The user can refer to "FAQ: How do I read DI Counter for the tET/tPET Series Modules correctly" for more detailed information.							
100 (0x64)	1	Number of DI Channels	16	nDI	R		
110 (0x6E)	1	Number of DO Channels	16	nDO	R		
121 (0x79)	1	Number of high-speed counters	16	nDI	R		
Remarks	emarks "R" : Read						

## 4xxxx: AO Address (Base 0)

Starting Address	Points	Description	Bits per Point	Range	Access Type		
50 (0x32)	1 to nDI	The preset value for the high speed digital counter	32	0 to 4294967296	R/W/E		
Note: "Preset DI Counter Value (0x32)" that the records data as 32-bit value and is transmitted							
of the sec	ond chann	el will be at starting-address +2, ar	nd so on.	onset of 2, i.e., the a	duress		
Exam	ple: Reads נו	the preset value of 6DI Counter on	the tPET-F	P6.			
Comr	nand: 01	02 00 00 00 06 01 04 00 <u>32</u> 00	0 <u>oc</u> ↓				
		Starting Address	6 chann	el * 2 register = 12			
The user correctly"	The user can refer to "FAQ: How do I read DI Counter for the tET/tPET Series Modules correctly" for more detailed information.						
100 (0x64)	1 to nDO	The duty cycle for the DO PWM. The first word (16-bit register) is the high pulse width, while the second word is the low pulse width. The units rein ms, and the resolution is about 10 ms.	32	0 to 65535; 0 to 65535;	R/W/E		
150 (0x64)	1 to nDO	The Scan mode for the DI frequency measurement. Refer to Section "DI/DO Configuration" for more details.	16	1000 = 1000ms 100 = 100ms 2000 = Single pulse	R/W/F		

Starting Address	Points	Description	Bits per Point	Range	Access Type	
200 (0x64)	1 to nDO	The moving average of the DI frequency measurement.	16	1= No average 2= Average 2 values 4= Average 4 values 8= Average 8 values	R/W/F	
268 (0x10C)	1 to nDO	The Min-Switching Time for all DO Channels	16	1 to 65535 second	R/W/F	
284 (0x11C)	1 to nDO	The Auto-off Time for all DO Channels	16	1 to 65535 second	R/W/F	
Remarks	"R" : Read "W" : Write "F" : Settings are recorded in flash by default "E" : After writing the DO[60] register, the data will be stored in flash. * Warning: Frequent writing to the Flash can cause it to become corrupt.					
# 6.4 Modbus Register Table (For AI Module)

Coils (0xxxx)

Register		Deinte	Description	Cottingo	Attributo	Factory
DEC	HEX	Points	Description	Sectings	Attribute	Value
00162 : 00163	00A2 : 00A3	2	Clear 1-ch historical AI max. value	1: Clear	W	-
00194 : 00195	00C2 : 00C3	2	Clear 1-ch historical AI min. value	1: Clear	W	-
00226	00E2	1	Reset the IO settings to the factory default state	1: Reset	W	-
00233	00E9	1	Reboot the module	1: Reboot	W	-
00595 : 00596	0253 : 0254	2	Enable/Disable the AI function	0: Disable 1: Enable	R/W/E	1
00628	0274	1	Set the AI sampling rate	0: Normal mode (20 Hz) 1: Fast mode (200 Hz)	R/W/E	0
00631	0277	1	Set the AI data format	0: Hexadecimal format 1: Engineering unit	R/W/E	0
00632	0278	1	Reset the AI calibration to the factory settings	1: Reset	W	-
00634	027A	1	Clear all historical AI max. values	1: Clear	W	-
00635	027B	1	Clear all historical AI min. values	1: Clear	W	-
00636 : 00637	027C : 027D	2	Enable/Disable the AI high alarm function	0: Disable 1: Enable	R/W/E	0
00668 : 00669	029C : 029D	2	Enable/Disable the AI low alarm function	0: Disable 1: Enable	R/W/E	0
00700 : 00701	02BC : 02BD	2	Set the AI high alarm mode	0: Momentary mode 1: Latching mode	R/W/E	0
00732 : 00733	02DC : 02DD	2	Set the AI low alarm mode	0: Momentary mode 1: Latching mode	R/W/E	0
00764 : 00765	02FC : 2FD	2	Clear the AI high alarm status	1: Clear	W	-
00796 : 00797	031C : 31D	2	Clear the AI low alarm status	1: Clear	W	-
00830	033E	1	Enable/Disable the AI calibration	0: Disable 1: Enable	R/W	-

Register		Dointo	Description	Sottings	Attributo	Factory	
DEC	HEX	Points	Description	Settings	Allfibule	Value	
00831	033F	1	Zero calibration for the channel 0	1: Set	W	-	
00832	0340	1	Span/Gain calibration for the channel 0 ~ 7	1: Set	W	-	

### Discrete Inputs (1xxxx)

Register		Dointe	Description	Sottings	Attributo
DEC	HEX	Points	Description	Settings	Allibule
10224: 10225	00E0: 00E1	2	Read AI high alarm status. When the AI value is higher than the high alarm value, the status becomes 1.	0: Normal 1: Alarmed	R
10256: 10257	0100: 0101	2	Read AI low alarm status. When the AI value is lower than the low alarm value, the status becomes 1.	0: Normal 1: Alarmed	R

### Input Register (3xxxx)

Register		Dointe	No.	Description	Sottings	Attributo		
DEC	HEX	POINTS	Point	Description	Settings	Allibule		
30000:	0000:	2	1	Al value	-32768 to 32767	R		
30001	0001	-	-		(0x0000 to 0xFFFF)	i v		
30236:	00EC:	2	1	Al historical max value	-32768 to 32767	D		
30237	00ED	2	L.	Al filstofical filax. Value	(0x0000 to 0xFFFF)	n		
30268:	010C:	2	2 1	Al historical min value	-32768 to 32767	D		
30269	010D	2	Т	Al historical min. value	(0x0000 to 0xFFFF)			
30320	0140	1	1	Number of the AI channel	2	R		
20251	0155	1	1	1	1	Firmware version	0x123 means version	P
30331	0131	-	1		1.2.3	N		
20260	0169	1	1	Communication state of the	0: Normal	D		
30360 0168		1	L	pair-connection	<0: Failed	n		
30380:	017C:	2	1	Open wire detection	0: Normal	р		
30381	017D	2	T	(For 4 ~ 20 mA only)	1: Wire break	К		

## Holding Register (4xxxx)

Register		Deinte	No.	Description	Data Format	<b>A + + + :  </b> + - + - =	Factory
DEC	HEX	Points	Per Point	Description	Data Format	Attribute	Value
40271	010F	1	1	Set the module identification (Modbus NetID)	0 to 255	R/W/E	1
40296: 40297	0128: 0129	2	1	Set the AI high alarm value	-32768 to 32767 (0x0000 to 0xFFFF)	R/W/E	32767 (0x7FFF)
40328: 40329	0148: 0149	2	1	Set the AI low alarm value	-32768 to 32767 (0x0000 to 0xFFFF)	R/W/E	-32768 (0x8000)
40427: 40428	01AB: 01AC	2	1	Set the AI range	0x05: 0 ~ 2.5 V 0x07: 4 ~ 20 mA 0x08: 0 ~ 10 V 0x09: 0 ~ 5 V 0x0A: 0 ~ 1 V 0x0B: 0 ~ 500 mV 0x1A: 0 ~ 20 mA	R/W/E	0x08
40555	022B	1	1	Read the module reset status	1: Power-on 2: Module Watchdog 3: Software Reset Command	R	-
40556	022C	1	1	Read the boot count of the module. The value resets to 0 when the user performs a factory reset.	1 to 32767	R	-
40559	022F	1	1	Read the module name	0x5002	R	-

# 6.5 Modbus Register Table (For AO Module)

### Discrete Inputs (1xxxx)

Register		Doints	Description	Data Format	Attribut
DEC	HEX	POINTS	Description	Data Format	е
10290:	0122:	2	Dood Current mode wine breek status	0: Normal	D
10291	0123	Z	Read Current mode wire break status.	1:Wire Break	К

#### Input Register (3xxxx)

Register		Pointe	No. Per	Description	Data Earmat	Attributo															
DEC	HEX	Points	Point	Description	Data Format	Attribute															
30330	014A	1	1	Number of the AO channel	2	R															
30351 015F		1	1	1	1	1	1	1	1	1	1	1	Firmwara varsion	0x123 means	D						
			T		version 1.2.3	n															
		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1		Communication state of the	0: Normal	D
30300	0108	T		pair-connection	<0: Failed	ĸ															

#### Holding Register (4xxxx)

Regi	ster	Dointo	No. Per	Description	Data Format	Attributo	Factory
DEC	HEX	POINTS	Point	Description		Allindule	Value
40000:	0000:	n	1	AO value			
40001	0001	Z	L L	-32768 to 32767 (0x0000 to 0xF	FFF)		-
40271	0105	1	1	Set the module identification (N	1odbus NetID)	D/\\/E	1
40271	0101	1	-	0 to 255			Ţ
40360:	0168:	2	1	Set the power-on value for the AO channel			0
40361	0169	Z	L	-32768 to 32767 (0x0000 to 0xF	K/VV/E	U	
40392:	0188:	2	1	Set the safe value for the AO cha	annel		0
40393	0189	2	L	-32768 to 32767 (0x0000 to 0xF	R/W/E	0	
				Set the AO range			
				0x30: 0~20 mA			
10150.	01 CD.			0x31: 4~20 mA			
40459.		2	1	0x32: 0~10 V		R/W/E	0x32
40400	UICC			0x33: +/-10 V			
				0x34: 0~5 V			
				0x35: +/-5 V			

Regi	ister		No.				Factory							
DEC	НЕХ	Points	Per	Description	Data Format	Attribute	Value							
DLC			Point				value							
					Set the AO slew rate rang	e								
						0x00: Immediate								
									0x01: 0.0625 V/sec or 0.1	25 mA/sec				
				0x02: 0.125 V/sec or 0.25	mA/sec									
				0x03: 0.25 V/sec or 0.5 m	A/sec									
				0x04: 0.5 V/sec or 1.0 mA	/sec									
				0x05: 1.0 V/sec or 2.0 mA	/sec									
40523:	020B:	2	1	0x06: 2.0 V/sec or 4.0 mA	/sec	R/W/F	0x00							
40524	020C	-	-	0x07: 4.0 V/sec or 8.0 mA	/sec	,, _	UNUU							
				0x08: 8.0 V/sec or 16 mA	/sec									
				0x09: 16 V/ser or 32 mA/	sec									
						0x10: 32 V/sec or 64 mA/	sec							
								0x11: 64 V/sec or 128 mA/sec						
												0x12: 128 V/sec or 256 m	A/sec	
				0x13: 256 V/sec or 512 m	A/sec									
				0x14: 512 V/sec or 1024 r	mA/sec									
		3 1		Read the module reset stat	us									
10555	022B		1	1	1	1	1	1	1	1	1: Power-on		R	_
40555	0220									T	1	2: Module Watchdog	n	-
				3: Software Reset Commar	d									
										Read the boot count of the	module The factory			
10556	0220	1	1	default value is 0 when the	settings are set to the	R	_							
40550	0220	1	-	factory default values.		K	-							
				1 to 32767										
				Set the Host WDT timeout	(unit: second)									
40557	022D	1	1	0: Disable the Host WDT		R/W/E	0							
				6 to 65535: Enable the Hos	t WDT									
				Read the WDT event count	. The initial value is 0									
10550	0225	1	1	when the module is reset,	and is increased when	D								
40558	UZZE	T	T	the WDT even happens.		ĸ	-							
				0 to 32767										
10550	0225	1	1	Read the module name		D								
40559	UZZF	L L	L	0x5042		К	-							

# 7 Related Tools

## 7.1 LabVIEW

LabVIEW is a system-design platform and development environment and is ideal for acquiring, analyzing, and presenting data. LabVIEW provides a graphical development environment that allows you to drag and drop pre-built objects to quickly create data acquisition, instrumentation and control systems, thereby boosting productivity and reducing development time. LabVIEW makes it possible to quickly create user interfaces that enable interactive control of software systems then



specify the functionality of your system, by simply assembling a block diagram, which is a natural design notation for scientists and engineers.

A document that describes how to link LabVIEW to a tET/tPET device using the Modbus protocol can be found at:

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

## 7.2 OPC Server

OPC (OLE for Process Control) was the first standard resulting from the collaboration of a number of 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.

A wide range of different mechanisms are 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 also be able to access the device via the OPC interface.

# 7.3 SCADA

SCADA stands for Supervisor Control and Data Acquisition and is a PC-based production automation and control system.

SCADA is widely used in many fields, including power generation, water systems, the oil industry, the chemical, and the automobile industry. Different fields require different functions, but they all have the same common requirements:

- ✓ Graphical interface
- ✓ Process mimicking
- ✓ Real-time and historical trend data
- ✓ Alarm systems
- ✓ Data acquisition and recording
- ✓ Data analysis
- ✓ Report generation

#### Accessing the tET/tPET Series Module

SCADA software is able to access tET/tPET series devices using the Modbus communication protocol without the need for other software drivers.

#### **Popular SCADA Software**

Some of the more popular SCADA software includes **Citect, ICONICS, iFIX, InduSoft, Intouch, Entivity Studio, Entivity Live, Entivity VLC, Trace Mode, Wizcon, and Wonderware**, etc.

In the following sections, three popular brands of SCADA software are introduced, together with detailed instructions of how to use them to communicate with tET/tPET series modules using the Modbus TCP protocol.

#### InduSoft

InduSoft Web Studio is a powerful, integrated collection of automation tools that includes all the building blocks needed to develop modern Human Machine Interfaces (HMI), Supervisory Control and Data Acquisition (SCADA) systems, and embedded instrumentation and control applications. InduSoft Web Studio's application runs in native Windows NT, 2000, XP, CE and CE .NET environments and conforms to industry standards such as Microsoft .NET, OPC, DDE, ODBC, XML, and ActiveX.



The related information about InduSoft is located at: http://www.icpdas.com/en/product/guide+Software+InduSoft+InduSoft

#### > 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 the rapid development and deployment of solutions for applications of any size.

The document describing how to link Citect to the tET/tPET module using the Modbus protocol is located on:

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

# **Appendix A: Troubleshooting**

## A: How can I Factory Reset the Module (Password: Admin)?

If the module encounters an anomaly and you cannot access the module's web server for configuration, or if you have forgotten the login password, you can perform a factory reset of the module. Please note that after completing the following steps, all of your customized settings will be erased

#### Step 1

Adjust the Init/Run switch to the "Init" mode and reboot the module to load factory settings, including the default web password.



#### Step 2

Execute the eSearch Utility to verify that the module has been reset to the factory settings. For example, the default IP address is "192.168.255.1". And then, modify the network settings (e.g., the IP, Mask, and Gateway addresses) and click the **"OK"** button.

	🎻 eSearch Utility [ v1.3.0, May.05, 2023 ] 🧼 — 🗆 🗙											
	File Server Tools											
	Name	Alias	IP Address	Sub-net M	Gateway	MAC Address						
	DL-302	EtherIO	192.168.101.1	5 255.255.0.0	192.168.1.1	00:0D:E0:92:00:A1						
2.	DL-302	EtherIO	192.168.123.20	0 255.255.0.0	192.168.1.1	00:0D:E0:92:00:7E						
	PFT-P2R2_RevB	Ether10	192 168 15 15	255 255 0.0	192.168.1.1	00:0d:e0:65:fa:7f						
Ľ		Etherio	192.168.255.1	255.255.0.0	192.168.0.1	υυ:υα:eυ:π:π:π						
	ACS-TI-MF	ACS-1	192.168.1.241	255.255.0.0	192.168.1.1	00:0d:e0:c0:04:fd						
	ACS-TI-MF	ACS-1	192.168.1.242	255.255.0.0	192.168.1.1	00:0d:e0:c0:04:T7						
1.	<					2	>					
$\frown$	Search Serve	r Confi	guration (UDP)	Web		Exit						
I	Status						11.					
Configu	re Server (UDP)	3										
Server	Name : t(P)ET-AD2		Pv6 Address	fc00:0:0:0:0:0:0:1								
DHCP:	0: OFF	<b>•</b>	Sub-net Mask : 🛛	255.255.0.0	Alias:	EtherIO						
IP Addr	ress : 192.168.15.20		Gateway :	192.168.1.1	MAC:	00:0d:e0:ff:ff:ff						
Warnin Contac	g!! t your Network Administ	trator to get o	correct configurat	ion before any char	nging!	OK Can	cel					



### Step 3

Adjust the Init/Run switch back to the **"Run"** mode and reboot the module.

#### Step 4

Log in to the tET/tPET web server. Enter the factory password "Admin" and specify the new password, and then click the **Submit** button to save the settings.

