



Ω OMEGA® User's Guide

**Shop online at
omega.com®**

***e-mail: info@omega.com
For latest product manuals:
omegamanual.info***

ISO 9001
CERTIFIED
CORPORATE QUALITY

STAMFORD, CT

ISO 9001
CERTIFIED
CORPORATE QUALITY

MANCHESTER, UK

OME-ET-7000 AND OME-PET-7000 SERIES Ethernet I/O Modules



OMEGAnet® Online Service
omega.com

Internet e-mail
info@omega.com

Servicing North America:

U.S.A.:
ISO 9001 Certified

Omega Engineering, Inc., One Omega Drive, P.O. Box 4047
Stamford, CT 06907-0047 USA
Toll Free: 1-800-826-6342
FAX: (203) 359-7700
TEL: (203) 359-1660
e-mail: info@omega.com

Canada:

976 Bergar
Laval (Quebec), H7L 5A1 Canada
Toll-Free: 1-800-826-6342
FAX: (514) 856-6886
TEL: (514) 856-6928
e-mail: info@omega.ca

For immediate technical or application assistance:

U.S.A. and Canada: Sales Service: 1-800-826-6342 / 1-800-TC-OMEGA®
Customer Service: 1-800-622-2378 / 1-800-622-BEST®
Engineering Service: 1-800-872-9436 / 1-800-USA-WHEN®

**Mexico/
Latin America**

TEL: 001 (203) 359-1660
FAX: 001 (203) 359-7700
e-mail: espanol@omega.com

Servicing Asia:

China:

1698 Ti Shan Road, Unit 102,
Min Hang District, Shanghai, China 201103 P.R.C.
Hotline: 800 819 059 / 400 619 0559 e-mail: info@cn.omegacom

Servicing Europe:

Benelux:

Toll-Free: 0800 099 3344
FAX: +31 20 643 46 43
TEL: +31 20 347 21 21
e-mail: sales@omegaeng.nl

Czech Republic:

Frystatska 184
733 01 Karviná, Czech Republic
Toll-Free: 0800-1-66342
FAX: +420-59-6311114
TEL: +420-59-6311899
e-mail: info@omegashop.cz

France:

Toll-Free: 0850 541038
FAX: 01 57 32 48 18
TEL: 01 57 32 48 17
e-mail: esales@omega.fr

Germany/ Austria:

Daimlerstrasse 26
D-75392 Deckenpfronn, Germany
Toll-Free: 0800 8266342
FAX: +49 (0) 7056 9398-29
TEL: +49 (0) 7056 9398-0
e-mail: info@omega.de

United Kingdom:
ISO 9001 Certified

OMEGA Engineering Ltd.
One Omega Drive, River Bend Technology Centre, Northbank
Irlam, Manchester M44 5BD United Kingdom
Toll-Free: 0800-488-488
FAX: +44 (0) 161 777-6622
TEL: +44 (0) 161 777-6611
e-mail: sales@omega.co.uk

It is the policy of OMEGA Engineering, Inc. to comply with all worldwide safety and EMC/EMI regulations that apply. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE mark to every appropriate device upon certification.

The information contained in this document is believed to be correct, but OMEGA accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, human applications.

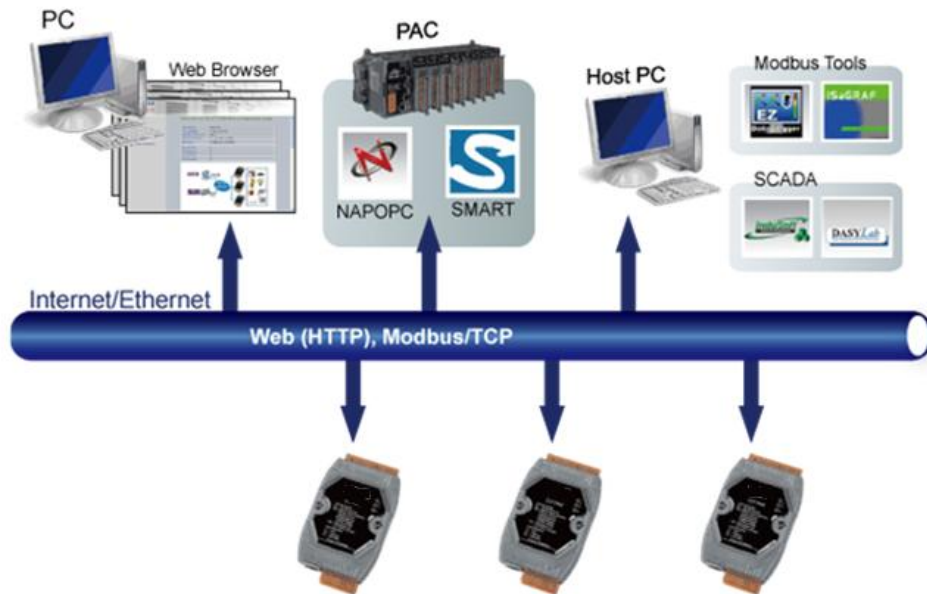
Table of Contents

1. Introduction	1
1.1. Features	4
1.2. Hardware Overview	7
1.2.1. Front Panel	7
1.2.2. Back Panel	8
1.3. Dimensions	10
1.4. Companion CD	12
2. Getting Started	13
2.1. Mounting the OME-ET-7000/OME-PET-7000	14
2.2. Configuring the Boot Mode	16
2.3. OME-ET-7000/OME-PET-7000 Hardware Connections	17
2.4. Installing the MiniOS7 Utility	19
2.5. Using the MiniOS7 Utility to Assign an IP Address	20
2.6. Enabling the Adobe Flash Player in Your Browser	24
2.7. Configuring the I/O Functions	25
3. Web Applications	28
3.1. Overview	31
3.2. Configuration	33
3.2.1. Network Settings	34
3.2.2. Basic Settings	37
3.2.3. Module I/O Settings	48
3.3. Authentication	57
3.3.1. Account Management	58
3.3.2. Accessible IP Settings	61
3.4. Web HMI	65
3.4.1. Web HMI	66
3.4.2. Web Edit	67

3.5.	I/O Pair Connection	76
3.5.1.	Example 1: Pair Connection - AO to AI.....	78
3.5.2.	Example 2: Pair Connection - DO to DI	83
3.6.	More Information	86
4.	Modbus and Modbus TCP	88
4.1.	Modbus TCP/IP Interface.....	89
4.2.	Protocol Description	90
4.3.	Data Encoding.....	93
4.3.1.	Binary	93
4.3.2.	16-bits Word.....	93
4.4.	Data Model	94
4.5.	Modbus Functions and Registers	95
4.5.1.	01 (0x01) Read Coils.....	95
4.5.2.	02 (0x02) Read Discrete Inputs	96
4.5.3.	03 (0x03) Read Holding Registers	97
4.5.4.	04 (0x04) Read Inputs Registers.....	98
4.5.5.	05 (0x05) Write Single Coil.....	99
4.5.6.	06 (0x06) Write Single Register.....	100
4.5.7.	15 (0x0F) Write Multiple Coils	101
4.5.8.	16 (0x10) Write Multiple Registers	102
4.6.	Modbus Master Simulators	103
4.6.1.	Modbus/TCP Client	103
4.6.2.	Modbus Master Tool	105
4.7.	Modbus Demo Programs.....	108
5.	Calibration	109
5.1.	Voltage and Current Calibration	109
5.2.	Thermocouple Calibration.....	114
5.3.	RTD Calibration	115
5.4.	Recover Calibration to Factory Setting	117

6. MiniOS7 Utility.....	118
6.1. Establishing a Connection.....	118
6.2. Exchanging the Protocol (TCP/IP to UDP)	121
6.3. Updating the OME-ET-7000/OME-PET-7000 OS.....	123
6.4. Updating the OME-ET-7000/OME-PET-7000 Firmware.....	126
Appendix A. Node Information Area.....	126
Appendix B. Thermocouple	132
Appendix C. Application Notes	133
C.1. Dual Watchdog	133
C.2. Power-on Value	134
C.3. Safe Value	136
C.4. AI High/Low Alarm	138
C.5. AI High/Low Latch	143
Appendix D. Analog Input Type and Data Format Table	144
Appendix E. Analog Output Type and Data Format Table	149
Appendix F. Network Address Translation.....	150
Appendix G. Troubleshooting	152

1. Introduction



The OME-ET-7000/OME-PET-7000 is a web-enabled Ethernet I/O module featuring a built-in web server that allows remote configuration, I/O monitoring and I/O control simply by using a standard browser. Remote control is as easy as surfing the Internet. In addition, the web HMI function means that programming or HTML skills are no longer required, so creating dynamic and attractive web pages for I/O monitoring and I/O control purposes will be more enjoyable for engineers in the future. The OME-ET-7000/OME-PET-7000 offers easy and safe access for users at any time and from anywhere, and also supports the Modbus/TCP protocol that ensures perfect integration with SCADA software. Furthermore, the OME-PET-7000 features “PoE” technology, meaning that not only is data transmitted through the Ethernet cable, but also power, making installation of the OME-PET-7000 extremely easy. Imagine no more unnecessary wires, with only an Ethernet cable being required to take care of everything in the field.

This series of analog modules is specifically designed to interface with analog current and voltage input signals, and all analog input channels can be individually configured for different kinds of analog input. Thanks to its intuitive design, measurement of either current or voltage input signal is easy and can be selected via a jumper. Thus an external resistor is no longer needed.

The "OME-ET-7018Z/OME-PET-7018Z/OME-ET-7019Z/OME-PET-7019Z" is a thermocouple module that is specifically designed for extremely accurate thermocouple measurement. The "Z" features automatic cold-junction compensation for each channel to ensure temperature output consistency and stable temperature output in the field. Open thermocouple detection and ESD/EFT/Surge protection mechanisms are also included.

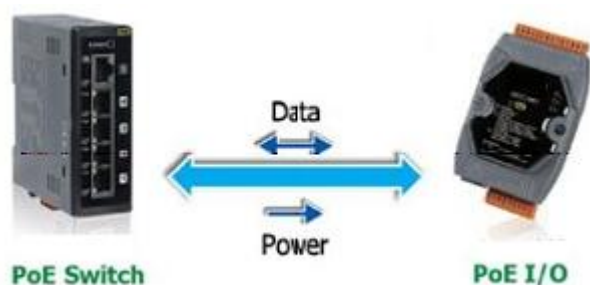
Comparison between OME-ET-7000 and OME-PET-7000

The OME-PET-7000 has some unique features that different from the OME-ET-7000

➤ OME-PET-7000 = Power over Ethernet + OME-ET-7000

The OME-PET-7000 includes integrated Power over Ethernet (PoE) technology that allows both power and data to be carried over a single Ethernet cable, meaning that a device can operate solely from the power it receives through the data cable. This innovation allows greater flexibility in office design, higher efficiency in systems design, and faster turnaround time in installation and implementation. The OME-PET-7000 features true IEEE 802.3af-compliant (classification, Class 1) PoE using both Ethernet pairs (Category 5 Ethernet cable). The OME-PET-7000 can also receive power from auxiliary power sources such as DC adapters and external battery packs, in addition to the PoE-enabled network. This is a desirable feature when the total system power requirements exceed the PoE's load capacity. Furthermore, with the benefit of the auxiliary power option, the OME-PET-7000 can be easily integrated into a standard Ethernet (non-PoE) system.

➤ Industrial PoE Solution



The PoE switch is the ideal power source when using the OME-PET-7000 module. The NS-205PSE automatically detects whether the connected devices are PoE-enabled or not, which ensures that the PoE switch will function in conjunction with both PoE and non-PoE devices simultaneously.

➤ **More information about the OME-PET-7000 series**

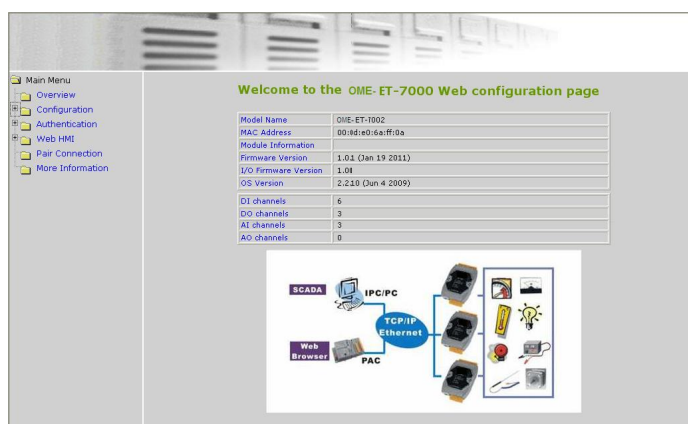
There are two ways for OME-PET-7000 series devices to obtain power. The first is through the Ethernet via a PoE switch; the second one is the usual method through wiring from an external power source. External power source should range from +12 V_{DC} to 48 V_{DC}. The reason that the second method has been retained is because it might still prove useful for different applications in a variety of scenarios. The OME-PET-7000 is also equipped with an LED to indicate whether or not the power is being supplied via a PoE Switch.

1.1. Features

The OME-ET-7000/OME-PET-7000 module offers the most comprehensive configuration focused on meeting specific application requirements. The following details the features designed to simplify installation, configuration and application.

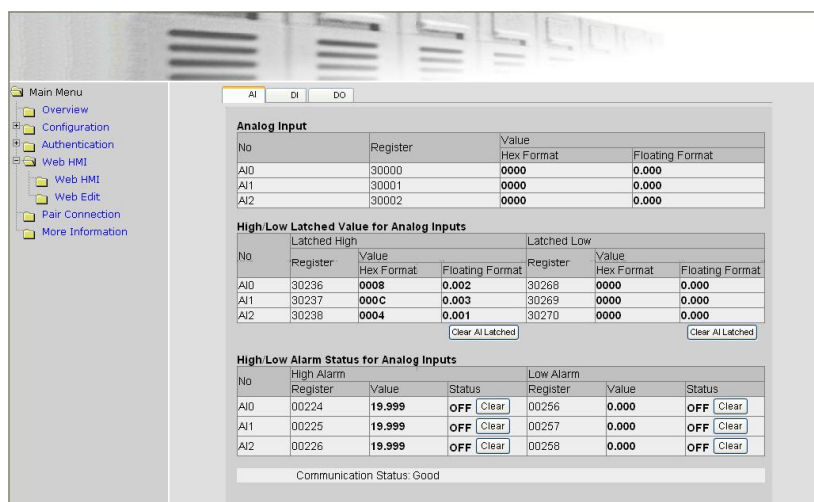
Built-in Web Server

Each OME-ET-7000/OME-PET-7000 module has a built-in web server that allows users to easily configure, monitor and control the module from a remote location using a standard web browser.



Web HMI

The Web HMI function enables users to create dynamic and attractive web pages that can be used to monitor and control the I/O points. Users can upload specific I/O layout diagrams in either bmp, jpg, or gif format, and define a description for each I/O point. No HTML or Java skills are in order to create the web pages.



Communication Security

An account and password are required when logging into the OME-ET-7000/OME-PET-7000 web server. An IP Address filter is also included, which can be used to either allow or deny connections from specific IP addresses.

Modbus/TCP, Modbus/UDP Protocol

The Modbus/TCP, and Modbus/UDP slave functions on the Ethernet Port can be used to provide data to remote HMI/SCADA software based on the Modbus/TCP driver.

Built-in Multi-function I/O

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

Automatic MDI/MDI-X Crossover for Plug-and-Play

The RJ-45 Port supports automatic MDI/MDI-x, meaning that it can automatically detect the type of connection to the Ethernet device without requiring dedicated straight or crossover cables.

Built-in Dual Watchdog

The Dual Watchdog consists of a Module Watchdog and a Host Watchdog. The activities of the outputs are also associated with the Dual Watchdog.

The Module Watchdog is a built-in hardware circuit that monitors the operating status of the module and will reset the module if a failure occurs in either the hardware or the software.

The Host Watchdog is a software function that monitors the operating status of the host, and is used to prevent network communication problems or host failures. When a host watchdog timeout occurs, the module will reset all outputs to a safe state in order to prevent any erroneous operations of the controlled target.

Highly Reliable Under Harsh Environments

The OME-ET-7000/OME-PET-7000 is housed in a plastic-based case with a vertical style ventilator that helps to cool the working environment inside the case.

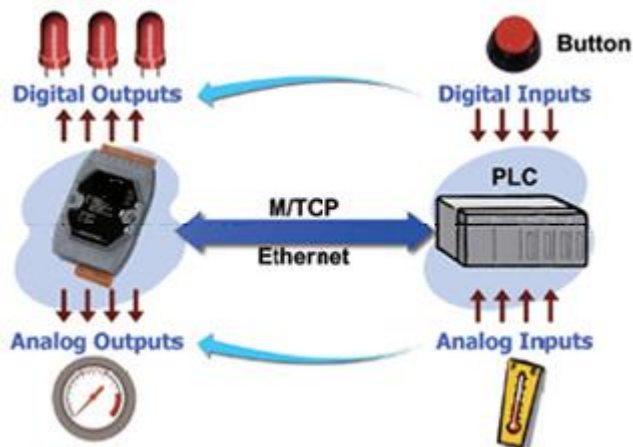
Operating Temperature: -25 ~ +75 °C

Storage Temperature: -30 ~ +80 °C

Humidity: 10 ~ 90% RH (non-condensing)

I/O Pair Connection

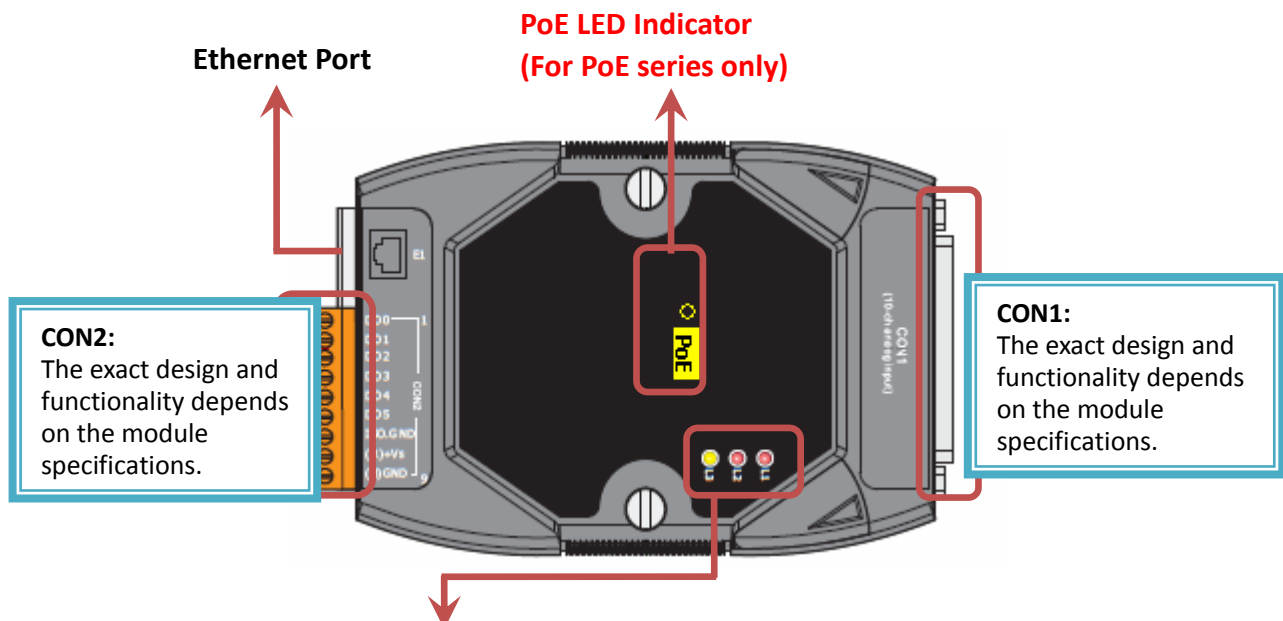
The I/O Pair Connection function is used to create a DI to DO (AI to AO) pair via the Ethernet. Once the configuration is complete, the OME-ET-7000/OME-PET-7000 module can poll the status of the remote input devices using the Modbus TCP protocol, and then continuously write to the local outputs in the background.



1.2. Hardware Overview

1.2.1. Front Panel

The front panel of the OME-ET-7000/OME-PET-7000 module contains the Ethernet Port, connectors and LEDs.



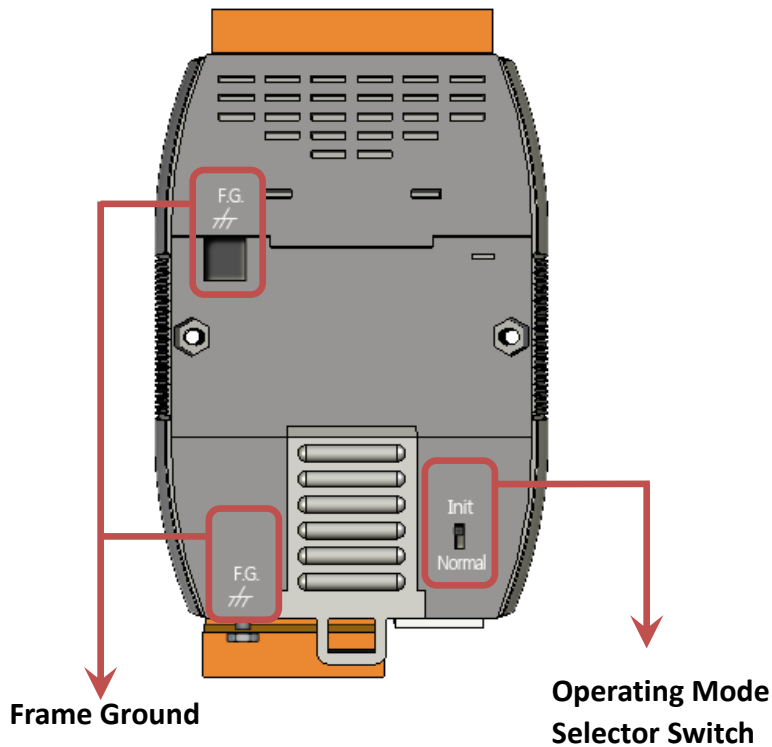
L3 LED Indicator	
LED Status	Function
On	Speed = 100 Mbps
Off	Speed = 10 Mbps

L2 LED Indicator	
LED Status	Function
On	Ethernet link detected
Off	No Ethernet link detected
Flashing	Ethernet packet received

L1 LED Indicator	
LED Status	Function
Flashing	The OME-ET-7000/OME-PET-7000 is turned on and is ready for use

1.2.2. Back Panel

The back panel of the OME-ET-7000/OME-PET-7000 module contains the frame ground and the operating mode selector switch.



Operating Mode Selector Switch

Init Mode:

This mode is used for MiniOS7 configuration.

Normal Mode:

This mode is used to execute and run firmware.

On the OME-ET-7000/OME-PET-7000 module, the operating mode selector switch should usually be in the Normal position. The switch should only be moved from the Normal position to the Init position when updating the OME-ET-7000/OME-PET-7000 firmware or the OS. Once the update has been completed, ensure that the switch is returned to the Normal position.

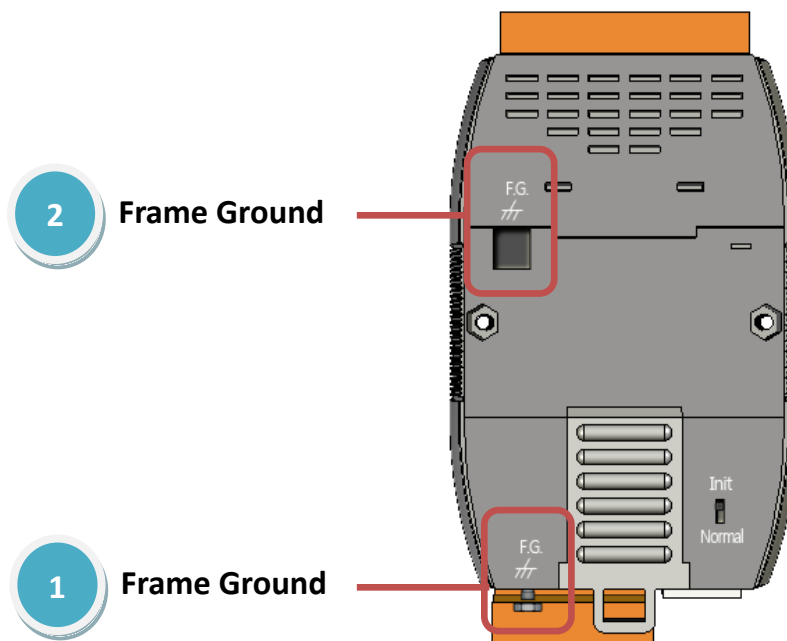
Frame Ground

Electronic circuits are constantly vulnerable to Electrostatic Discharge (ESD), which becomes worse in a continental climate area. The OME-ET-7000/OME-PET-7000 series features a new design for the frame ground that provides a path for bypassing ESD, allowing enhanced static (ESD) protection capabilities and ensuring that the module is more reliable.

Choosing either of the following options will provide a better level of protection for the module:

The OME-ET-7000/OME-PET-7000 has a metallic board attached to the back of the plastic case, shown as “1” in the figure below.

When mounted to a DIN-Rail, connect the DIN-Rail to the earth ground because the DIN-Rail is in contact with the upper frame ground, as shown as “2” in the figure below.

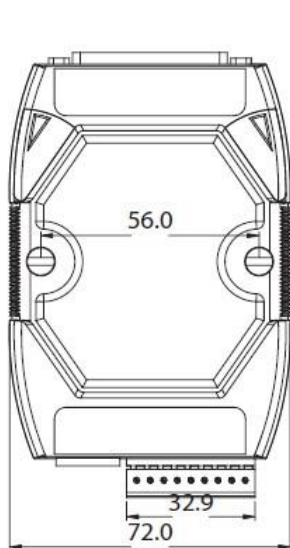


1.3. Dimensions

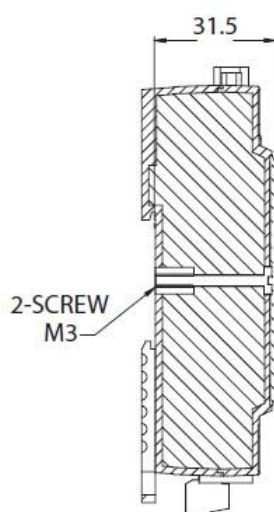
The following diagrams provide the dimensions of the OME-ET-7000/OME-PET-7000 module and can be used as a reference when defining the specifications for any custom enclosures. All dimensions are in millimeters.

For the OME-ET-7000Z, OME-PET-7000Z: 72 x 116 x 35

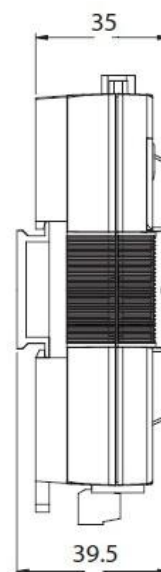
Note that the dimensions of the “Z” version are different from the other models.



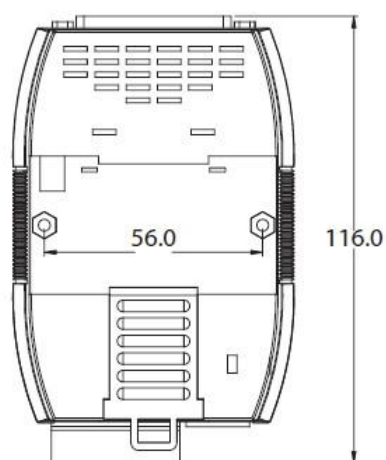
Front View



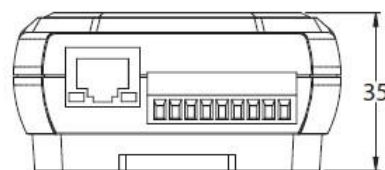
Right Side View



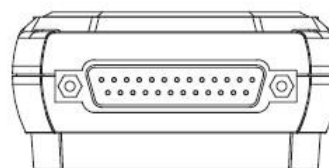
DIN-Rail Mounting Bracket



Rear View

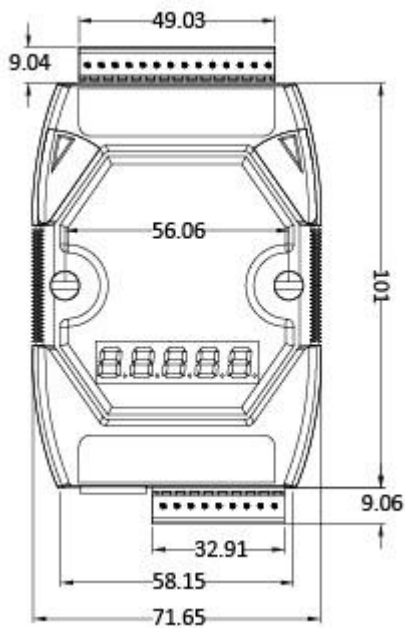


Bottom View

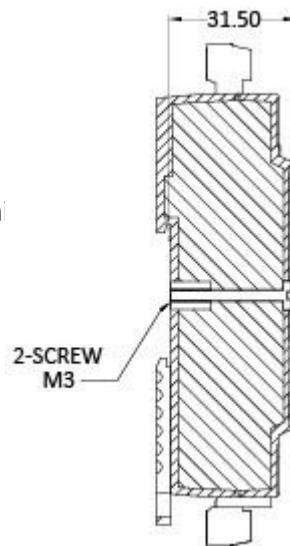


Top View

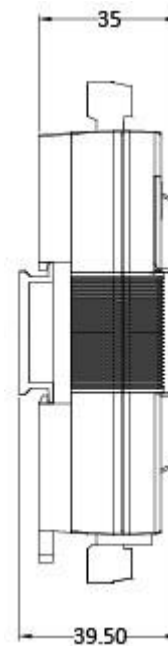
For the OME-ET-7000, OME-PET-7000: 72 x 123 x 35



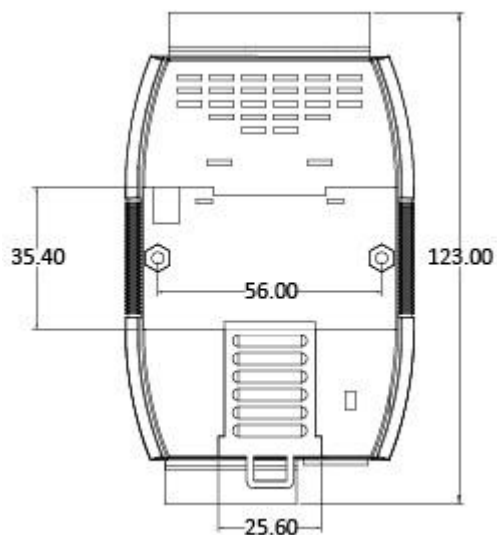
Front View



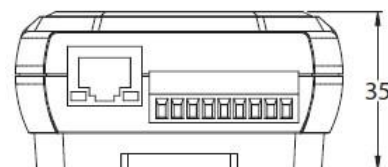
Right Side View



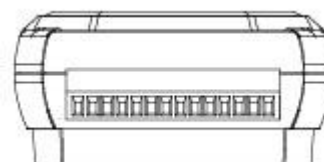
DIN-Rail Mounting Bracket



Rear View



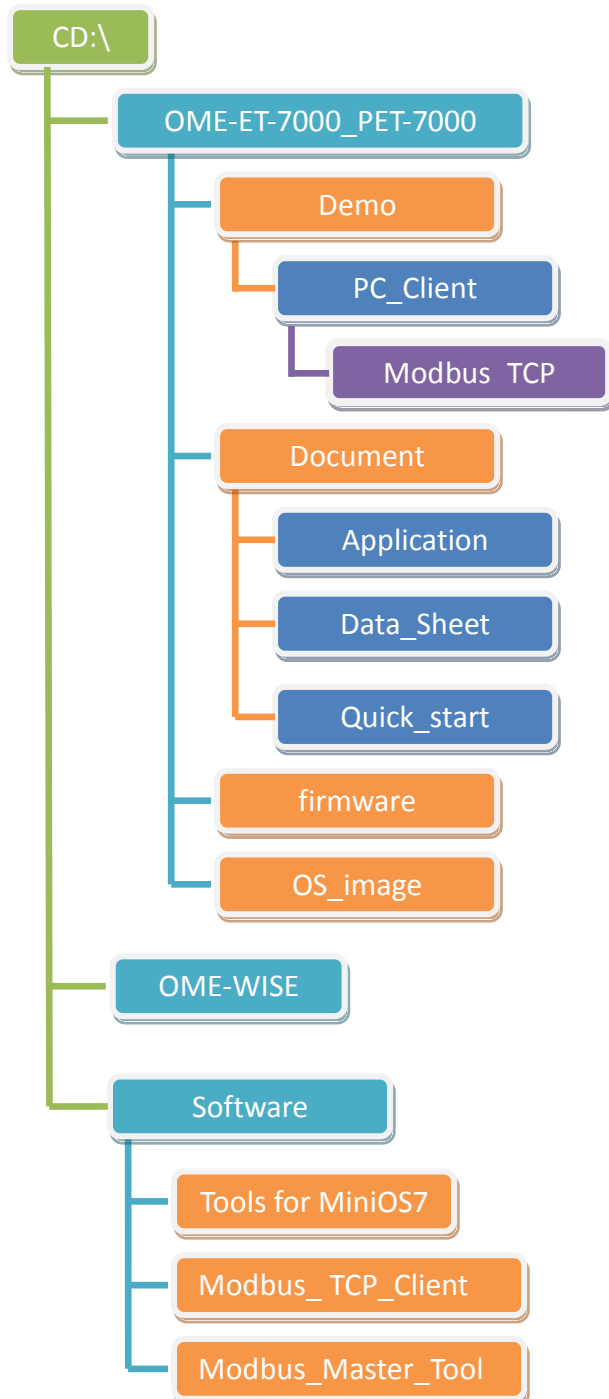
Bottom View



Top View

1.4. Companion CD

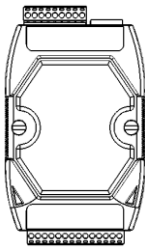
This package includes a companion CD that provides the drivers, a software utility, and all of the required documentation, etc. An outline of the directory structure for the files contained on the CD is shown below.



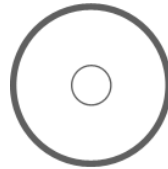
2. Getting Started

If you are a new user, begin with this chapter as it includes a guided tour that provides a basic overview of how to install, configure and use the OME-ET-7000/OME-PET-7000 module.

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



OME-ET-7000/OME-PET-7000



Software Utility CD



Quick Start Guide

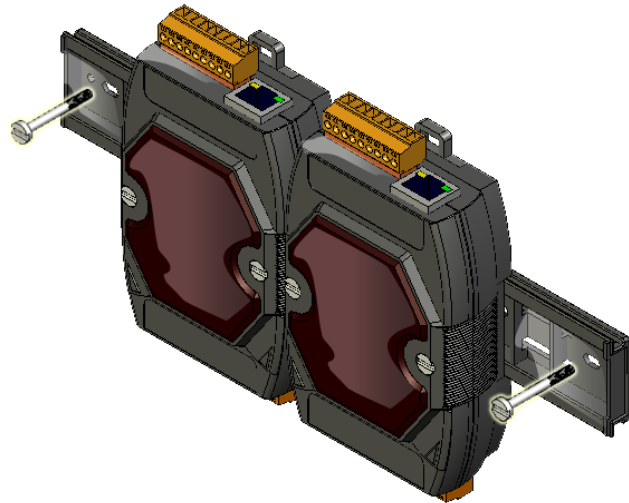
Before operating the OME-ET-7000/OME-PET-7000 module, a basic understanding of the hardware specifications is required, such as the dimensions of the module, the usable input voltage range of the power supply, and the type of communication interfaces.

2.1. Mounting the OME-ET-7000/OME-PET-7000

The OME-ET-7000/OME-PET-7000 module can be mounted by attaching the bottom of the chassis to a DIN-Rail, to the wall, or by piggybacking it to another module.

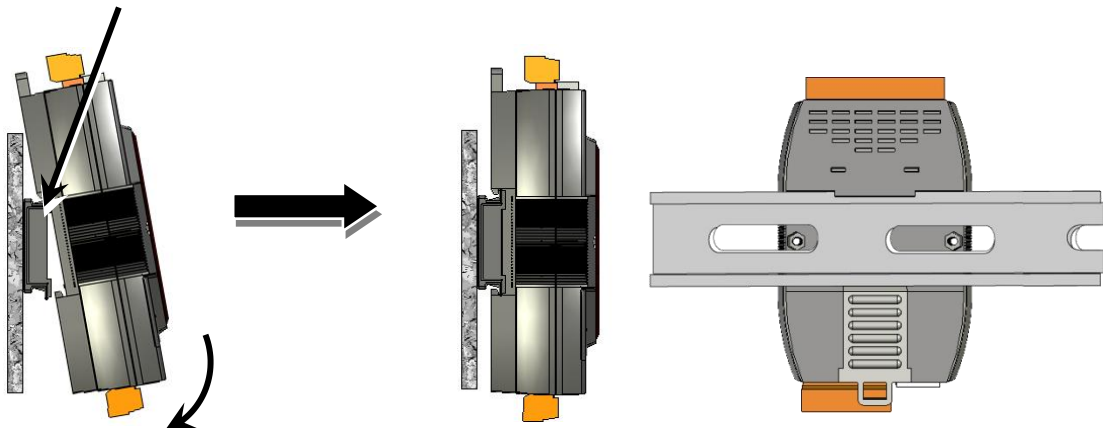
DIN-Rail Mounting

The OME-ET-7000/OME-PET-7000 module includes simple rail clips that can be used to reliably mount it on a standard 35 mm DIN-Rail.



Mounting the Chassis on a DIN-Rail

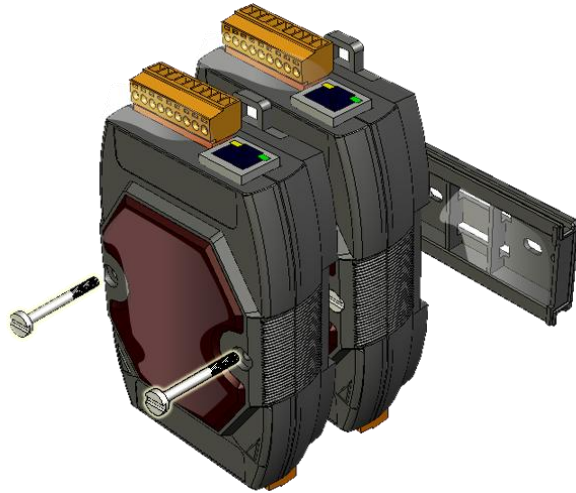
1. Hook the upper tab over the upper flange of the DIN-Rail.



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

Piggyback Mounting

The OME-ET-7000/OME-PET-7000 module has a hole on either side of the casing that can be used for piggyback mounting.

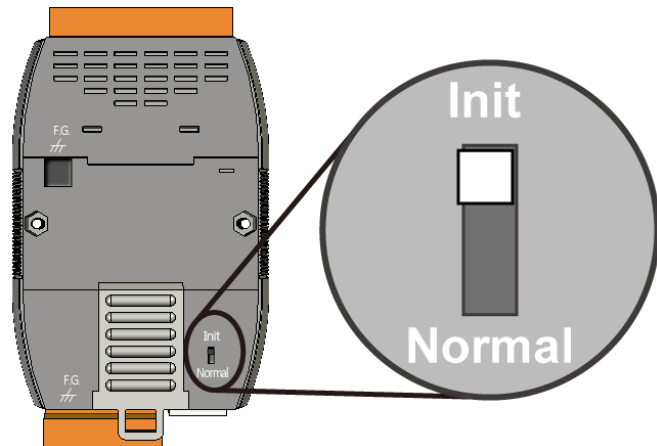


2.2. Configuring the Boot Mode

The OME-ET-7000/OME-PET-7000 module has two operating modes, which can be determined by the switch mechanism on the chassis.

Init Mode

Init mode is a way to use MiniOS7 configuration mode.



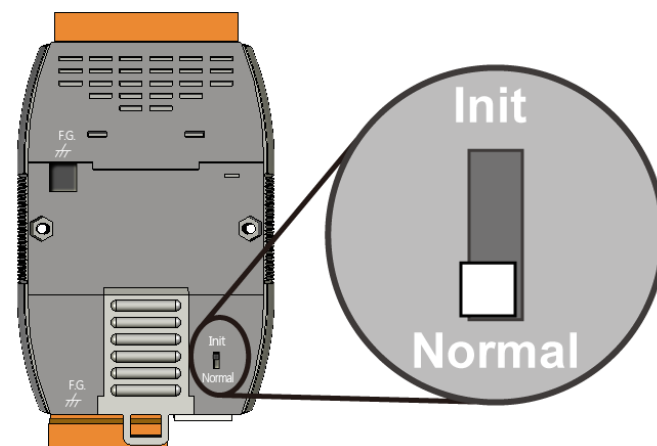
Tips & Warnings



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

Normal Mode

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



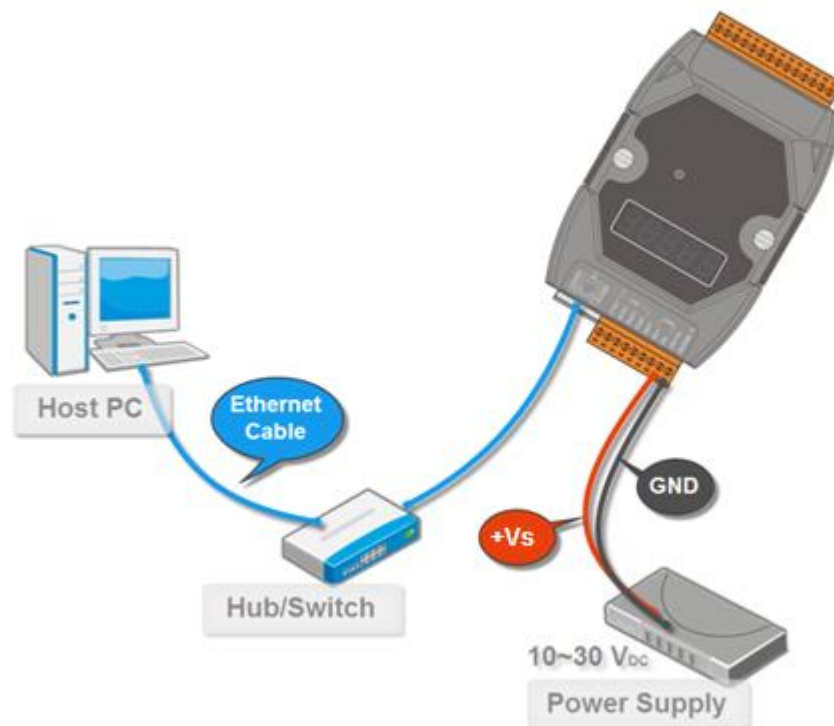
2.3. OME-ET-7000/OME-PET-7000 Hardware Connections

OME-ET-7000/OME-PET-7000 series modules provide a variety of communication interfaces to suit a range of applications. Below is a description of the configuration for simple applications using the OME-ET-7000/OME-PET-7000 when implementing both PoE and Non-PoE solutions.

Non-PoE

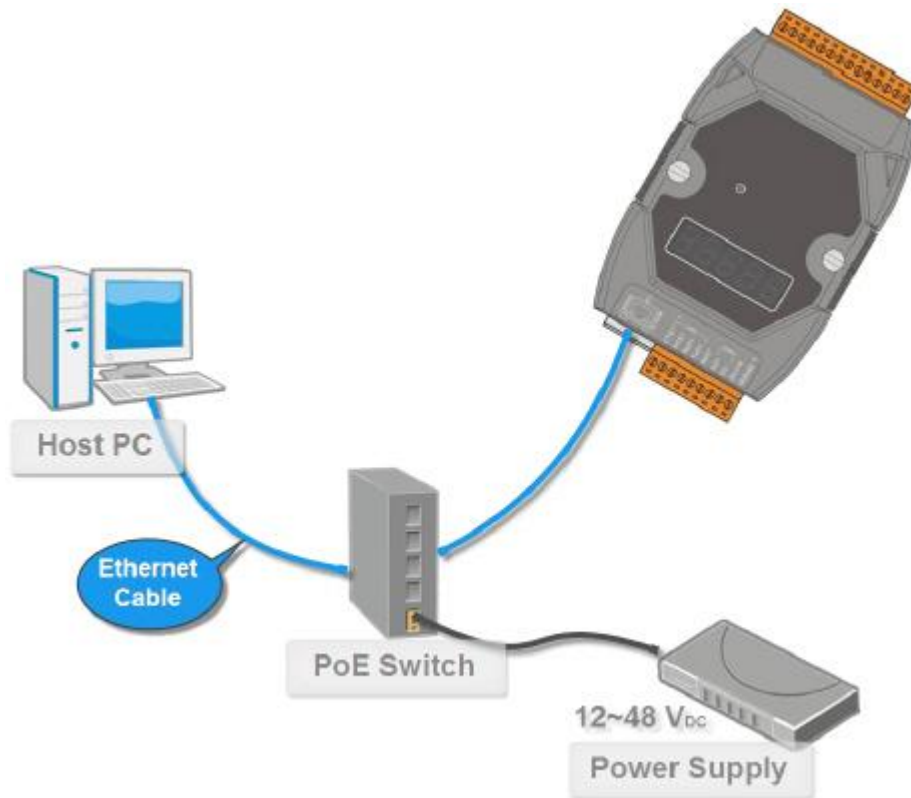
- i. Connect the PC to the Ethernet Port via the Hub or Switch.
- ii. Connect the positive of the power supply to the terminal marked (+Vs) on the OME-ET-7000.

Connect the negative of the power supply to the terminal marked (GND) on the OME-ET-7000.



PoE

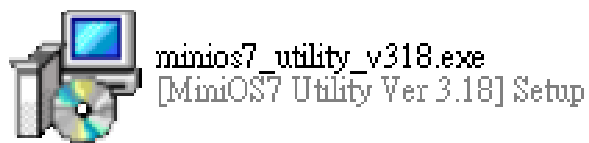
- i. Connect the PC to the Ethernet Port via the PoE Switch.
- ii. Connect the power supply to the PoE Switch, which in turn supplies power to the OME-PET-7000.



2.4. Installing the MiniOS7 Utility

The MiniOS7 Utility is a useful tool that provides a quick and easy way to update the OS image or the firmware, configure the Ethernet settings, and upload files to the OME-ET-7000/OME-PET-7000 from a PC.

Step 1 : Install the MiniOS7 Utility tool



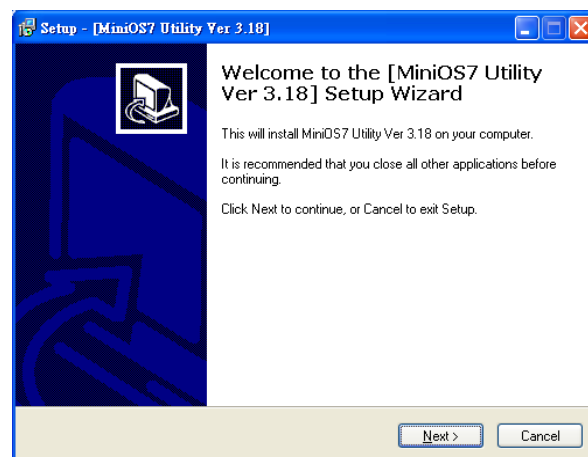
The latest version of the MiniOS7 Utility can be obtained from the companion CD:

CD:\Software\Tools for MiniOS7\

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



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



2.5. Using the MiniOS7 Utility to Assign an IP Address

The OME-ET-7000/OME-PET-7000 is web-based device, and is configured using a default IP address, meaning that you must first assign a new IP address to the OME-ET-7000/OME-PET-7000 before operation.

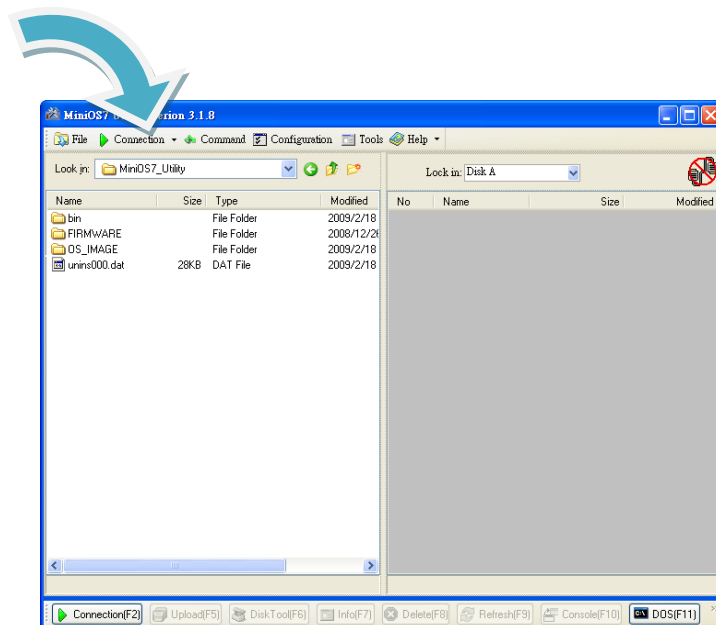
The factory default IP settings are as follows:

Item	Default
IP Address	192.168.255.1
Subnet Mask	255.255.0.0
Gateway	192.168.0.1

Step 1 : Run the MiniOS7 Utility

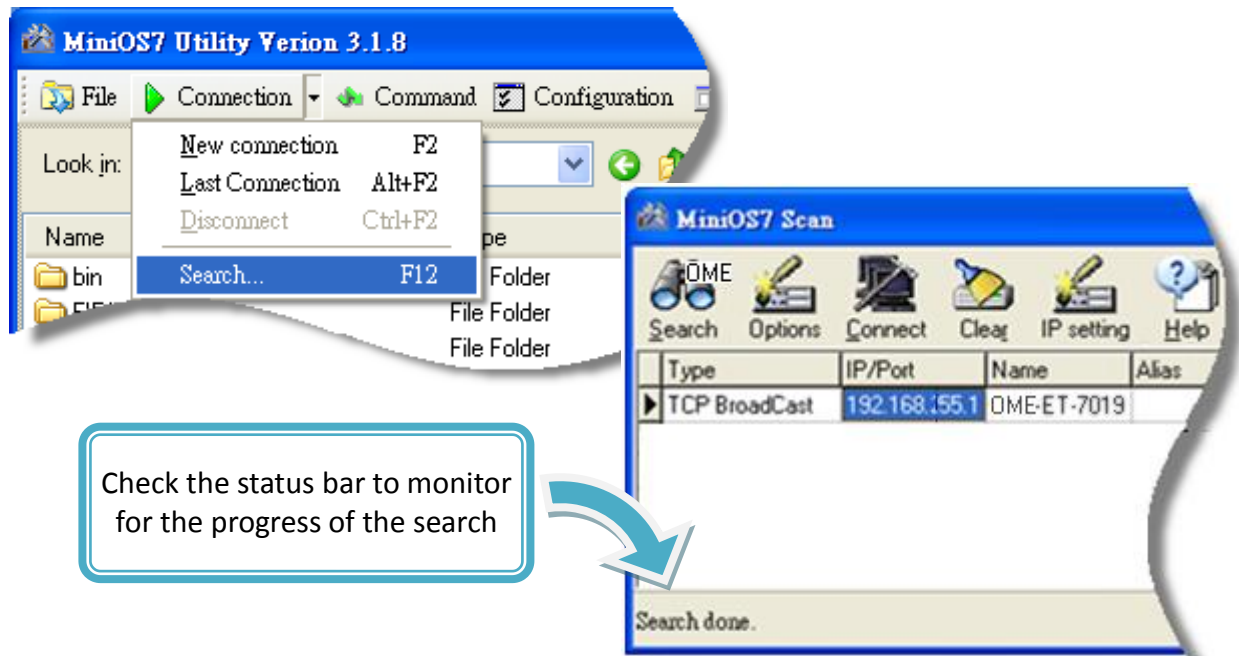


Double-click the “MiniOS7 Utility” shortcut on your desktop.



Step 2 : Press the “F12” key or choose the “Search” option from the “Connection” menu

After pressing the “F12” key or choosing the “Search” option from “Connection” menu, the utility will perform a search of all MiniOS7 modules on your network.



Step 3 : Click the “192.168.255.1” item in the IP/Port field list and then click the “IP Settings” icon in the toolbar

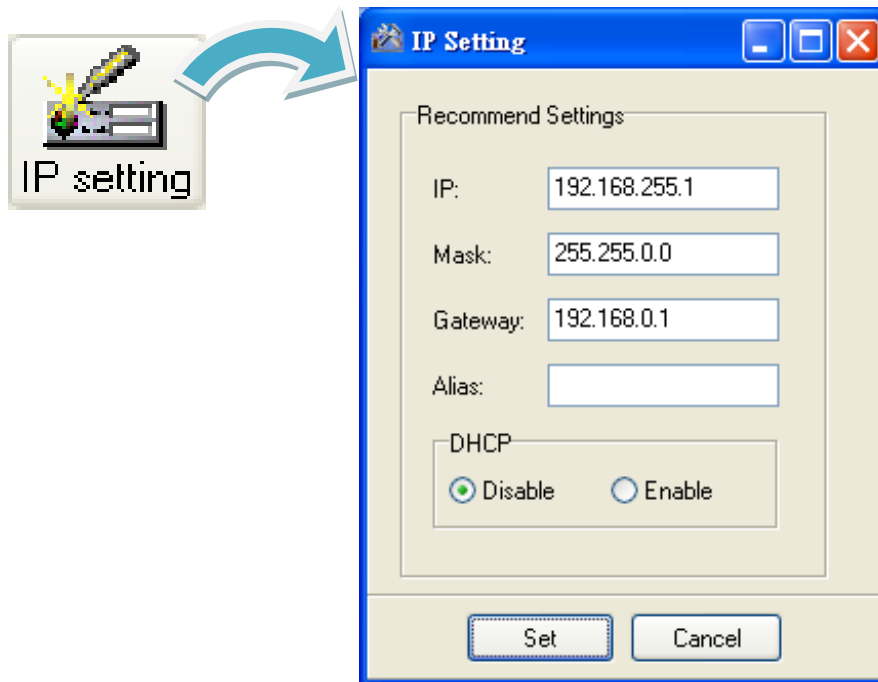
After the search has been completed, click the default value “192.168.255.1” in the IP/Port field list, and then click the “IP Settings” icon in the toolbar to display the IP Settings dialog box.



Step 4 : Assign a new IP address and then click the “Set” button

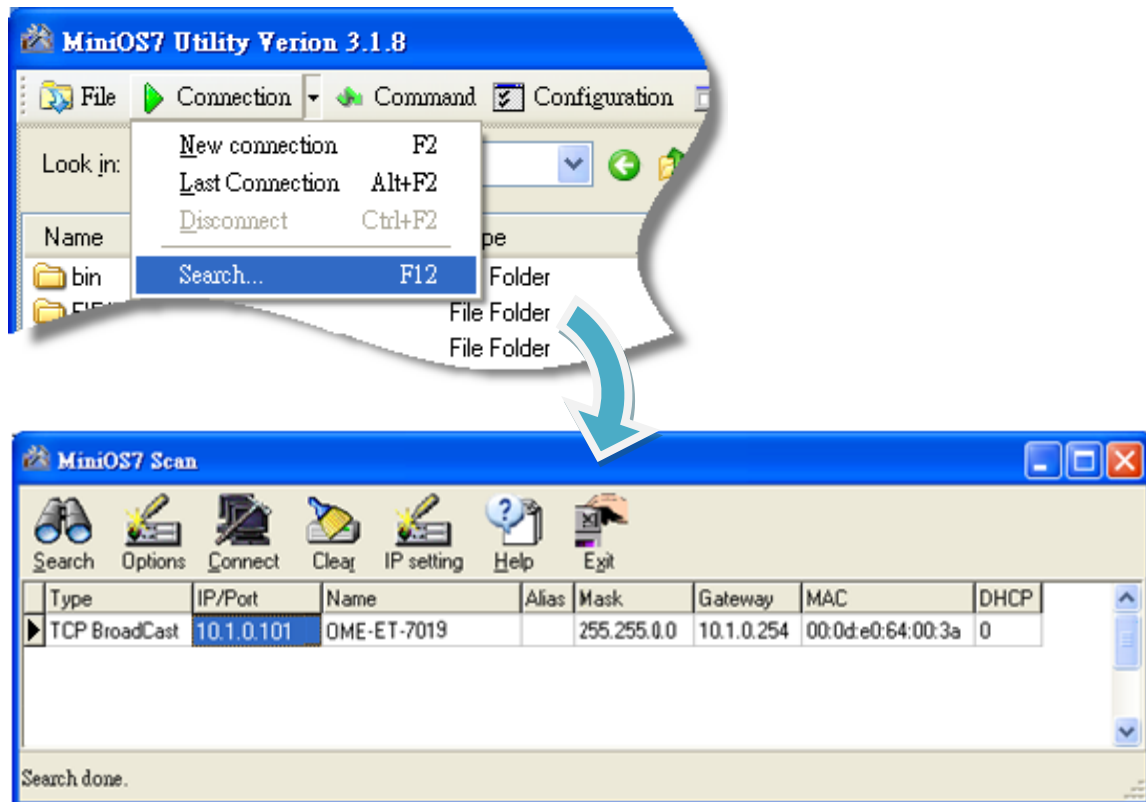
In the IP Settings dialog box, you can manually assign an IP Address, Mask Address, Gateway and Alias, or you can use the DHCP function to dynamically assign IP addresses.

Once the appropriate values have been entered, click the “Set” button to save the settings.



Step 5 : Reboot the module and then press the “F12” key or click the “Search” option from the “Connection” menu to check the IP settings

After completing and saving the settings, you should reboot the module and then use the MiniOS7 Utility to perform another search for the module to make sure that the IP settings are correct. See Step 2 for details.



2.6. Enabling the Adobe Flash Player in Your Browser

The Web HMI page requires the Adobe Flash Player to be installed. The latest version of the Adobe Flash Player can be downloaded by accessing the Adobe Systems Incorporated website. The following instructions will help you to install the Adobe Flash Player in your web browser.

Step 1 : Go to the Adobe Flash Player Download Center




The Adobe Flash Player Download Center:

<http://get.adobe.com/flashplayer/>

The Adobe Flash Player is subject to change without notice; refer to <http://www.adobe.com/support/flashplayer/downloads.html> for the latest version of this software.

Step 2 : Follow the instructions to download the installation file

Click the “Agree and install now” button and follow the instructions to download the installation file. Note that unless you uncheck the option, the Google Toolbar will be included in the installation by default, so if you do not require this feature, be sure to uncheck this option.



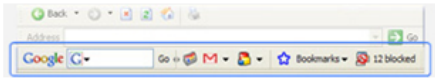
Install Adobe Flash Player

Adobe Flash Player version 10.0.32.18 1.87 MB
Windows, Internet Explorer
[Different operating system or browser?](#)

[Learn more](#) | [System requirements](#) | [Distribute Flash Player](#) | [Installation instructions](#)

Also install:


☒ Free Google Toolbar (optional) 1.8 MB



Search Google from any web page, block pop-ups

[Learn more](#) | [Privacy policy](#) | [License](#)

You must close all other browser windows before installing.
Download time estimate: 2 minutes @ 56K modem



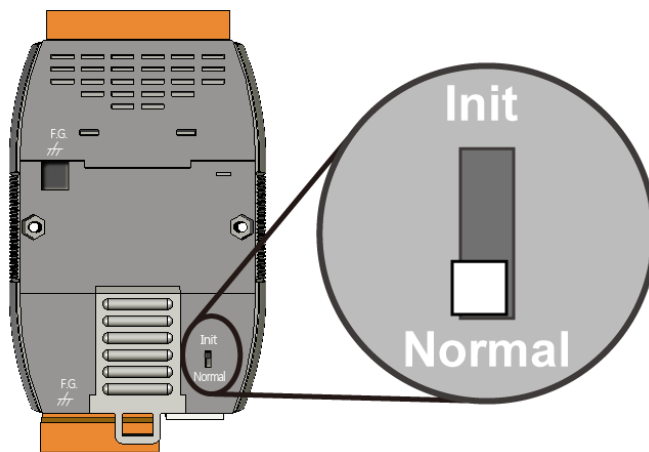
Total:
3.67MB

By clicking the “Agree and install now” button, you agree to the [Software License Agreement](#) and the [Google Toolbar Terms of Service](#). Adobe may use the Adobe Download Manager to seamlessly install your software.

2.7. Configuring the I/O Functions

The OME-ET-7000/OME-PET-7000 series contains an advanced web configuration system that provides users with access to OME-ET-7000/OME-PET-7000 series applications through a standard web browser.

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



Step 2 : Open a browser

Use a standard internet browser to view the OME-ET-7000/OME-PET-7000 web pages, such as Mozilla Firefox or Internet Explorer, etc.

Step 3 : Enter the URL address for the OME-ET-7000/OME-PET-7000

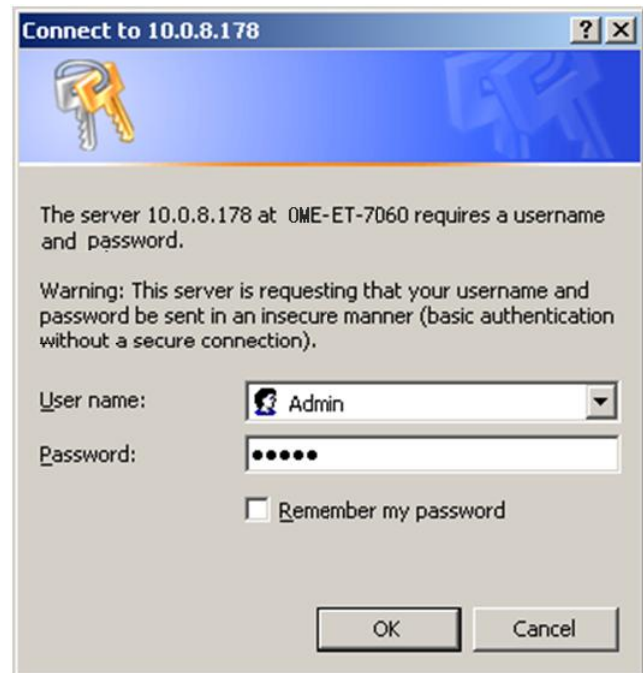
If you haven't changed the default IP address of the OME-ET-7000/OME-PET-7000 module, please refer to section 2.5. "Using the MiniOS7 Utility to Assign an IP Address" to configure it.

Step 4 : Enter your User name and Password

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

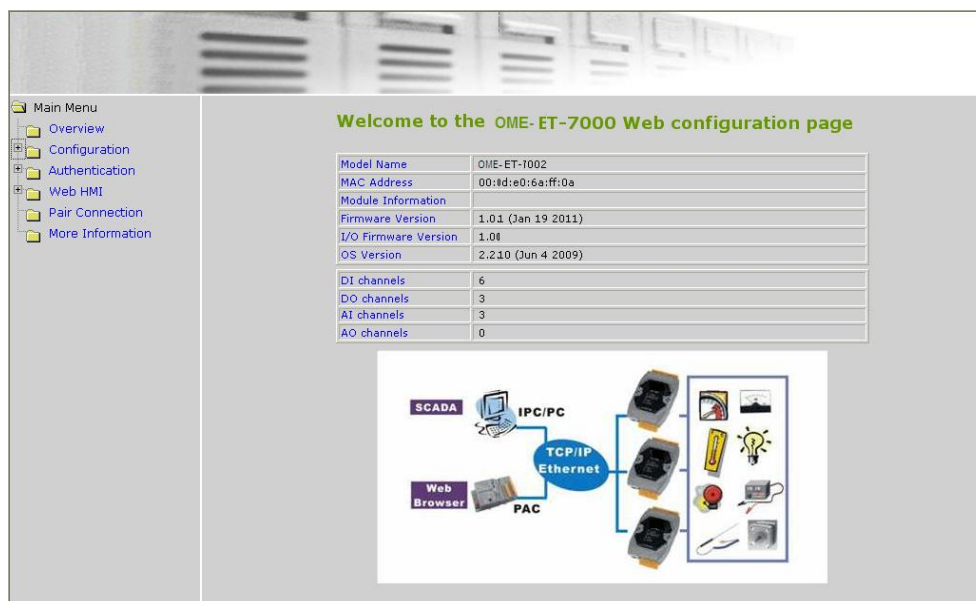
The factory default user name and password are as follows:

Item	Default
User name	Admin
Password	Admin

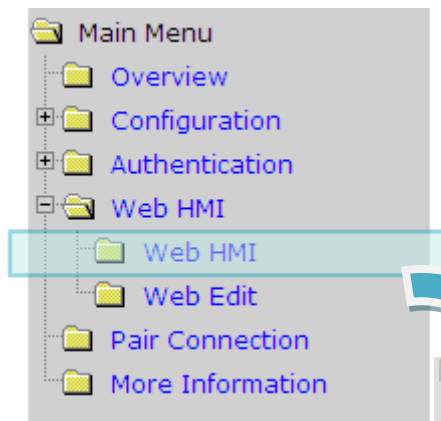


Step 5 : Welcome to the OME-ET-7000/OME-PET-7000 web interface

After logging into the OME-ET-7000/OME-PET-7000 web interface, the welcome page will be displayed.



Step 6 : Configure and browse the I/O functions



Click the “Web HMI” option in the “Web HMI” section of the Main Menu for the OME-ET-7000/OME-PET-7000, and then click the I/O function tabs to configure and browse the I/O functions.

Analog Input				
No	Register	Value		
		Hex Format	Floating Format	
AI0	30000	0000	0.000	
AI1	30001	0000	0.000	
AI2	30002	0000	0.000	
AI3	30003	0000	0.000	
AI4	30004	0000	0.000	
AI5	30005	0000	0.000	

High/Low Latched Value for Analog Inputs						
No	Register	Latched High Value		Register	Latched Low Value	
		Hex Format	Floating Format		Hex Format	Floating Format
AI0	30236	0001	0.000	30268	FFFF	-0.000
AI1	30237	0000	0.000	30269	FFFF	-0.000
AI2	30238	0002	0.000	30270	FFFF	-0.000
AI3	30239	0000	0.000	30271	FFFF	-0.000
AI4	30240	0002	0.000	30272	FFFF	-0.000
AI5	30241	0000	0.000	30273	FFFF	-0.000

Clear AI Latched Clear AI Latched

For more detailed information related to the I/O specification, pin assignment, and I/O functions, etc. for each OME-ET-7000/OME-PET-7000 module, please refer to “OME-ET-7000/OME-PET-7000 Register Table”, which can be obtained from:

CD:\OME-ET-7000_PET-7000\Document\

OME-ET-7000/OME-PET-7000 Series

OME-ET-7002/OME-PET-7002

I/O Specifications

Analog Input	
Input Channels	3 (Differential)
Input Type	±150 mV, ±500 mV, ±1 V, ±15 V, ±10 V, 0-20 mA, ±10 mA, 4-20 mA (Bumper selectable)
Individual Channel Configuration	Yes
Resolution	Normal Mode: 15-bit Fast Mode: 12-bit
Sampling Rate	Normal Mode: 10 Samples/Sec. (Total) Fast Mode: 80 Samples/Sec. (Total)
Accuracy	Normal Mode: ±0.1% Fast Mode: ±0.3% or better
Zero Drift	±0.25 µV/°C
Span Drift	±0.25 ppm/°C
Overvoltage Protection	240 Vrms
Overcurrent Protection	50 mA max. at 110 V _{DD} /V _{CC} max.
Input Impedance	Voltage: 2 MΩ Current: 124 Ω
Common Mode Rejection	80 dB Min.
Normal Mode Rejection	100 dB
Digital Input/Counter	
Input Channels	5
Type	9M Contact (Sink or Source)
On Voltage Level	+10 V _{DD} ~ +50 V _{DD}
Off Voltage Level	+4V V _{CC} max.
Input Impedance	10 KΩ, 0.5W
Counter	Channels: 5 Max. Count: 4,294,967,295 (32-bit) Type: Max. Input Frequency: 100 Hz Min. Pulse Width: 5 µs

Pin Assignments

Pin 1: DI0+, Pin 2: DI0-, Pin 3: DI1+, Pin 4: DI1-, Pin 5: DI2+, Pin 6: DI2-, Pin 7: DI3+, Pin 8: DI3-, Pin 9: DI4+, Pin 10: DI4-, Pin 11: DI5+, Pin 12: DI5-, Pin 13: AI0+, Pin 14: AI0-, Pin 15: AI1+, Pin 16: AI1-, Pin 17: AI2+, Pin 18: AI2-, Pin 19: AI3+, Pin 20: AI3-, Pin 21: AI4+, Pin 22: AI4-, Pin 23: AI5+, Pin 24: AI5-, Pin 25: GND, Pin 26: VDD, Pin 27: VCC, Pin 28: GND, Pin 29: VDD, Pin 30: VCC, Pin 31: GND, Pin 32: VDD, Pin 33: VCC, Pin 34: GND, Pin 35: VDD, Pin 36: VCC, Pin 37: GND, Pin 38: VDD, Pin 39: VCC, Pin 40: GND, Pin 41: VDD, Pin 42: VCC, Pin 43: GND, Pin 44: VDD, Pin 45: VCC, Pin 46: GND, Pin 47: VDD, Pin 48: VCC, Pin 49: GND, Pin 50: VDD, Pin 51: VCC, Pin 52: GND, Pin 53: VDD, Pin 54: VCC, Pin 55: GND, Pin 56: VDD, Pin 57: VCC, Pin 58: GND, Pin 59: VDD, Pin 60: VCC, Pin 61: GND, Pin 62: VDD, Pin 63: VCC, Pin 64: GND, Pin 65: VDD, Pin 66: VCC, Pin 67: GND, Pin 68: VDD, Pin 69: VCC, Pin 70: GND, Pin 71: VDD, Pin 72: VCC, Pin 73: GND, Pin 74: VDD, Pin 75: VCC, Pin 76: GND, Pin 77: VDD, Pin 78: VCC, Pin 79: GND, Pin 80: VDD, Pin 81: VCC, Pin 82: GND, Pin 83: VDD, Pin 84: VCC, Pin 85: GND, Pin 86: VDD, Pin 87: VCC, Pin 88: GND, Pin 89: VDD, Pin 90: VCC, Pin 91: GND, Pin 92: VDD, Pin 93: VCC, Pin 94: GND, Pin 95: VDD, Pin 96: VCC, Pin 97: GND, Pin 98: VDD, Pin 99: VCC, Pin 100: GND, Pin 101: VDD, Pin 102: VCC, Pin 103: GND, Pin 104: VDD, Pin 105: VCC, Pin 106: GND, Pin 107: VDD, Pin 108: VCC, Pin 109: GND, Pin 110: VDD, Pin 111: VCC, Pin 112: GND, Pin 113: VDD, Pin 114: VCC, Pin 115: GND, Pin 116: VDD, Pin 117: VCC, Pin 118: GND, Pin 119: VDD, Pin 120: VCC, Pin 121: GND, Pin 122: VDD, Pin 123: VCC, Pin 124: GND, Pin 125: VDD, Pin 126: VCC, Pin 127: GND, Pin 128: VDD, Pin 129: VCC, Pin 130: GND, Pin 131: VDD, Pin 132: VCC, Pin 133: GND, Pin 134: VDD, Pin 135: VCC, Pin 136: GND, Pin 137: VDD, Pin 138: VCC, Pin 139: GND, Pin 140: VDD, Pin 141: VCC, Pin 142: GND, Pin 143: VDD, Pin 144: VCC, Pin 145: GND, Pin 146: VDD, Pin 147: VCC, Pin 148: GND, Pin 149: VDD, Pin 150: VCC, Pin 151: GND, Pin 152: VDD, Pin 153: VCC, Pin 154: GND, Pin 155: VDD, Pin 156: VCC, Pin 157: GND, Pin 158: VDD, Pin 159: VCC, Pin 160: GND, Pin 161: VDD, Pin 162: VCC, Pin 163: GND, Pin 164: VDD, Pin 165: VCC, Pin 166: GND, Pin 167: VDD, Pin 168: VCC, Pin 169: GND, Pin 170: VDD, Pin 171: VCC, Pin 172: GND, Pin 173: VDD, Pin 174: VCC, Pin 175: GND, Pin 176: VDD, Pin 177: VCC, Pin 178: GND, Pin 179: VDD, Pin 180: VCC, Pin 181: GND, Pin 182: VDD, Pin 183: VCC, Pin 184: GND, Pin 185: VDD, Pin 186: VCC, Pin 187: GND, Pin 188: VDD, Pin 189: VCC, Pin 190: GND, Pin 191: VDD, Pin 192: VCC, Pin 193: GND, Pin 194: VDD, Pin 195: VCC, Pin 196: GND, Pin 197: VDD, Pin 198: VCC, Pin 199: GND, Pin 200: VDD, Pin 201: VCC, Pin 202: GND, Pin 203: VDD, Pin 204: VCC, Pin 205: GND, Pin 206: VDD, Pin 207: VCC, Pin 208: GND, Pin 209: VDD, Pin 210: VCC, Pin 211: GND, Pin 212: VDD, Pin 213: VCC, Pin 214: GND, Pin 215: VDD, Pin 216: VCC, Pin 217: GND, Pin 218: VDD, Pin 219: VCC, Pin 220: GND, Pin 221: VDD, Pin 222: VCC, Pin 223: GND, Pin 224: VDD, Pin 225: VCC, Pin 226: GND, Pin 227: VDD, Pin 228: VCC, Pin 229: GND, Pin 230: VDD, Pin 231: VCC, Pin 232: GND, Pin 233: VDD, Pin 234: VCC, Pin 235: GND, Pin 236: VDD, Pin 237: VCC, Pin 238: GND, Pin 239: VDD, Pin 240: VCC, Pin 241: GND, Pin 242: VDD, Pin 243: VCC, Pin 244: GND, Pin 245: VDD, Pin 246: VCC, Pin 247: GND, Pin 248: VDD, Pin 249: VCC, Pin 250: GND, Pin 251: VDD, Pin 252: VCC, Pin 253: GND, Pin 254: VDD, Pin 255: VCC, Pin 256: GND, Pin 257: VDD, Pin 258: VCC, Pin 259: GND, Pin 260: VDD, Pin 261: VCC, Pin 262: GND, Pin 263: VDD, Pin 264: VCC, Pin 265: GND, Pin 266: VDD, Pin 267: VCC, Pin 268: GND, Pin 269: VDD, Pin 270: VCC, Pin 271: GND, Pin 272: VDD, Pin 273: VCC, Pin 274: GND, Pin 275: VDD, Pin 276: VCC, Pin 277: GND, Pin 278: VDD, Pin 279: VCC, Pin 280: GND, Pin 281: VDD, Pin 282: VCC, Pin 283: GND, Pin 284: VDD, Pin 285: VCC, Pin 286: GND, Pin 287: VDD, Pin 288: VCC, Pin 289: GND, Pin 290: VDD, Pin 291: VCC, Pin 292: GND, Pin 293: VDD, Pin 294: VCC, Pin 295: GND, Pin 296: VDD, Pin 297: VCC, Pin 298: GND, Pin 299: VDD, Pin 300: VCC, Pin 301: GND, Pin 302: VDD, Pin 303: VCC, Pin 304: GND, Pin 305: VDD, Pin 306: VCC, Pin 307: GND, Pin 308: VDD, Pin 309: VCC, Pin 310: GND, Pin 311: VDD, Pin 312: VCC, Pin 313: GND, Pin 314: VDD, Pin 315: VCC, Pin 316: GND, Pin 317: VDD, Pin 318: VCC, Pin 319: GND, Pin 320: VDD, Pin 321: VCC, Pin 322: GND, Pin 323: VDD, Pin 324: VCC, Pin 325: GND, Pin 326: VDD, Pin 327: VCC, Pin 328: GND, Pin 329: VDD, Pin 330: VCC, Pin 331: GND, Pin 332: VDD, Pin 333: VCC, Pin 334: GND, Pin 335: VDD, Pin 336: VCC, Pin 337: GND, Pin 338: VDD, Pin 339: VCC, Pin 340: GND, Pin 341: VDD, Pin 342: VCC, Pin 343: GND, Pin 344: VDD, Pin 345: VCC, Pin 346: GND, Pin 347: VDD, Pin 348: VCC, Pin 349: GND, Pin 350: VDD, Pin 351: VCC, Pin 352: GND, Pin 353: VDD, Pin 354: VCC, Pin 355: GND, Pin 356: VDD, Pin 357: VCC, Pin 358: GND, Pin 359: VDD, Pin 360: VCC, Pin 361: GND, Pin 362: VDD, Pin 363: VCC, Pin 364: GND, Pin 365: VDD, Pin 366: VCC, Pin 367: GND, Pin 368: VDD, Pin 369: VCC, Pin 369: GND, Pin 370: VDD, Pin 371: VCC, Pin 371: GND, Pin 372: VDD, Pin 373: VCC, Pin 373: GND, Pin 374: VDD, Pin 375: VCC, Pin 375: GND, Pin 376: VDD, Pin 377: VCC, Pin 377: GND, Pin 378: VDD, Pin 379: VCC, Pin 379: GND, Pin 380: VDD, Pin 381: VCC, Pin 381: GND, Pin 382: VDD, Pin 383: VCC, Pin 383: GND, Pin 384: VDD, Pin 385: VCC, Pin 385: GND, Pin 386: VDD, Pin 387: VCC, Pin 387: GND, Pin 388: VDD, Pin 389: VCC, Pin 389: GND, Pin 390: VDD, Pin 391: VCC, Pin 391: GND, Pin 392: VDD, Pin 393: VCC, Pin 393: GND, Pin 394: VDD, Pin 395: VCC, Pin 395: GND, Pin 396: VDD, Pin 397: VCC, Pin 397: GND, Pin 398: VDD, Pin 399: VCC, Pin 399: GND, Pin 400: VDD, Pin 401: VCC, Pin 401: GND, Pin 402: VDD, Pin 403: VCC, Pin 403: GND, Pin 404: VDD, Pin 405: VCC, Pin 405: GND, Pin 406: VDD, Pin 407: VCC, Pin 407: GND, Pin 408: VDD, Pin 409: VCC, Pin 409: GND, Pin 410: VDD, Pin 411: VCC, Pin 411: GND, Pin 412: VDD, Pin 413: VCC, Pin 413: GND, Pin 414: VDD, Pin 415: VCC, Pin 415: GND, Pin 416: VDD, Pin 417: VCC, Pin 417: GND, Pin 418: VDD, Pin 419: VCC, Pin 419: GND, Pin 420: VDD, Pin 421: VCC, Pin 421: GND, Pin 422: VDD, Pin 423: VCC, Pin 423: GND, Pin 424: VDD, Pin 425: VCC, Pin 425: GND, Pin 426: VDD, Pin 427: VCC, Pin 427: GND, Pin 428: VDD, Pin 429: VCC, Pin 429: GND, Pin 430: VDD, Pin 431: VCC, Pin 431: GND, Pin 432: VDD, Pin 433: VCC, Pin 433: GND, Pin 434: VDD, Pin 435: VCC, Pin 435: GND, Pin 436: VDD, Pin 437: VCC, Pin 437: GND, Pin 438: VDD, Pin 439: VCC, Pin 439: GND, Pin 440: VDD, Pin 441: VCC, Pin 441: GND, Pin 442: VDD, Pin 443: VCC, Pin 443: GND, Pin 444: VDD, Pin 445: VCC, Pin 445: GND, Pin 446: VDD, Pin 447: VCC, Pin 447: GND, Pin 448: VDD, Pin 449: VCC, Pin 449: GND, Pin 450: VDD, Pin 451: VCC, Pin 451: GND, Pin 452: VDD, Pin 453: VCC, Pin 453: GND, Pin 454: VDD, Pin 455: VCC, Pin 455: GND, Pin 456: VDD, Pin 457: VCC, Pin 457: GND, Pin 458: VDD, Pin 459: VCC, Pin 459: GND, Pin 460: VDD, Pin 461: VCC, Pin 461: GND, Pin 462: VDD, Pin 463: VCC, Pin 463: GND, Pin 464: VDD, Pin 465: VCC, Pin 465: GND, Pin 466: VDD, Pin 467: VCC, Pin 467: GND, Pin 468: VDD, Pin 469: VCC, Pin 469: GND, Pin 470: VDD, Pin 471: VCC, Pin 471: GND, Pin 472: VDD, Pin 473: VCC, Pin 473: GND, Pin 474: VDD, Pin 475: VCC, Pin 475: GND, Pin 476: VDD, Pin 477: VCC, Pin 477: GND, Pin 478: VDD, Pin 479: VCC, Pin 479: GND, Pin 480: VDD, Pin 481: VCC, Pin 481: GND, Pin 482: VDD, Pin 483: VCC, Pin 483: GND, Pin 484: VDD, Pin 485: VCC, Pin 485: GND, Pin 486: VDD, Pin 487: VCC, Pin 487: GND, Pin 488: VDD, Pin 489: VCC, Pin 489: GND, Pin 490: VDD, Pin 491: VCC, Pin 491: GND, Pin 492: VDD, Pin 493: VCC, Pin 493: GND, Pin 494: VDD, Pin 495: VCC, Pin 495: GND, Pin 496: VDD, Pin 497: VCC, Pin 497: GND, Pin 498: VDD, Pin 499: VCC, Pin 499: GND, Pin 500: VDD, Pin 501: VCC, Pin 501: GND, Pin 502: VDD, Pin 503: VCC, Pin 503: GND, Pin 504: VDD, Pin 505: VCC, Pin 505: GND, Pin 506: VDD, Pin 507: VCC, Pin 507: GND, Pin 508: VDD, Pin 509: VCC, Pin 509: GND, Pin 510: VDD, Pin 511: VCC, Pin 511: GND, Pin 512: VDD, Pin 513: VCC, Pin 513: GND, Pin 514: VDD, Pin 515: VCC, Pin 515: GND, Pin 516: VDD, Pin 517: VCC, Pin 517: GND, Pin 518: VDD, Pin 519: VCC, Pin 519: GND, Pin 520: VDD, Pin 521: VCC, Pin 521: GND, Pin 522: VDD, Pin 523: VCC, Pin 523: GND, Pin 524: VDD, Pin 525: VCC, Pin 525: GND, Pin 526: VDD, Pin 527: VCC, Pin 527: GND, Pin 528: VDD, Pin 529: VCC, Pin 529: GND, Pin 530: VDD, Pin 531: VCC, Pin 531: GND, Pin 532: VDD, Pin 533: VCC, Pin 533: GND, Pin 534: VDD, Pin 535: VCC, Pin 535: GND, Pin 536: VDD, Pin 537: VCC, Pin 537: GND, Pin 538: VDD, Pin 539: VCC, Pin 539: GND, Pin 540: VDD, Pin 541: VCC, Pin 541: GND, Pin 542: VDD, Pin 543: VCC, Pin 543: GND, Pin 544: VDD, Pin 545: VCC, Pin 545: GND, Pin 546: VDD, Pin 547: VCC, Pin 547: GND, Pin 548: VDD, Pin 549: VCC, Pin 549: GND, Pin 550: VDD, Pin 551: VCC, Pin 551: GND, Pin 552: VDD, Pin 553: VCC, Pin 553: GND, Pin 554: VDD, Pin 555: VCC, Pin 555: GND, Pin 556: VDD, Pin 557: VCC, Pin 557: GND, Pin 558: VDD, Pin 559: VCC, Pin 559: GND, Pin 560: VDD, Pin 561: VCC, Pin 561: GND, Pin 562: VDD, Pin 563: VCC, Pin 563: GND, Pin 564: VDD, Pin 565: VCC, Pin 565: GND, Pin 566: VDD, Pin 567: VCC, Pin 567: GND, Pin 568: VDD, Pin 569: VCC, Pin 569: GND, Pin 570: VDD, Pin 571: VCC, Pin 571: GND, Pin 572: VDD, Pin 573: VCC, Pin 573: GND, Pin 574: VDD, Pin 575: VCC, Pin 575: GND, Pin 576: VDD, Pin 577: VCC, Pin 577: GND, Pin 578: VDD, Pin 579: VCC, Pin 579: GND, Pin 580: VDD, Pin 581: VCC, Pin 581: GND, Pin 582: VDD, Pin 583: VCC, Pin 583: GND, Pin 584: VDD, Pin 585: VCC, Pin 585: GND, Pin 586: VDD, Pin 587: VCC, Pin 587: GND, Pin 588: VDD, Pin 589: VCC, Pin 589: GND, Pin 590: VDD, Pin 591: VCC, Pin 591: GND, Pin 592: VDD, Pin 593: VCC, Pin 593: GND, Pin 594: VDD, Pin 595: VCC, Pin 595: GND, Pin 596: VDD, Pin 597: VCC, Pin 597: GND, Pin 598: VDD, Pin 599: VCC, Pin 599: GND, Pin 600: VDD, Pin 601: VCC, Pin 601: GND, Pin 602: VDD, Pin 603: VCC, Pin 603: GND, Pin 604: VDD, Pin 605: VCC, Pin 605: GND, Pin 606: VDD, Pin 607: VCC, Pin 607: GND, Pin 608: VDD, Pin 609: VCC, Pin 609: GND, Pin 610: VDD, Pin 611: VCC, Pin 611: GND, Pin 612: VDD, Pin 613: VCC, Pin 613: GND, Pin 614: VDD, Pin 615: VCC, Pin 615: GND, Pin 616: VDD, Pin 617: VCC, Pin 617: GND, Pin 618: VDD, Pin 619: VCC, Pin 619: GND, Pin 620: VDD, Pin 621: VCC, Pin 621: GND, Pin 622: VDD, Pin 623: VCC, Pin 623: GND, Pin 624: VDD, Pin 625: VCC, Pin 625: GND, Pin 626: VDD, Pin 627: VCC, Pin 627: GND, Pin 628: VDD, Pin 629: VCC, Pin 629: GND, Pin 630: VDD, Pin 631: VCC, Pin 631: GND, Pin 632: VDD, Pin 633: VCC, Pin 633: GND, Pin 634: VDD, Pin 635: VCC, Pin 635: GND, Pin 636: VDD, Pin 637: VCC, Pin 637: GND, Pin 638: VDD, Pin 639: VCC, Pin 639: GND, Pin 640: VDD, Pin 641: VCC, Pin 641: GND, Pin 642: VDD, Pin 643: VCC, Pin 643: GND, Pin 644: VDD, Pin 645: VCC, Pin 645: GND, Pin 646: VDD, Pin 647: VCC, Pin 647: GND, Pin 648: VDD, Pin 649: VCC, Pin 649: GND, Pin 650: VDD, Pin 651: VCC, Pin 651: GND, Pin 652: VDD, Pin 653: VCC, Pin 653: GND, Pin 654: VDD, Pin 655: VCC, Pin 655: GND, Pin 656: VDD, Pin 657: VCC, Pin 657: GND, Pin 658: VDD, Pin 659: VCC, Pin 659: GND, Pin 660: VDD, Pin 661: VCC, Pin 661: GND, Pin 662: VDD, Pin 663: VCC, Pin 663: GND, Pin 664: VDD, Pin 665: VCC, Pin 665: GND, Pin 666: VDD, Pin 667: VCC, Pin 667: GND, Pin 668: VDD, Pin 669: VCC, Pin 669: GND, Pin 670: VDD, Pin 671: VCC, Pin 671: GND, Pin 672: VDD, Pin 673: VCC, Pin 673: GND, Pin 674: VDD, Pin 675: VCC, Pin 675: GND, Pin 676: VDD, Pin 677: VCC, Pin 677: GND, Pin 678: VDD, Pin 679: VCC, Pin 679: GND, Pin 680: VDD, Pin 681: VCC, Pin 681: GND, Pin 682: VDD, Pin 683: VCC, Pin 683: GND, Pin 684: VDD, Pin 685: VCC, Pin 685: GND, Pin 686: VDD, Pin 687: VCC, Pin 687: GND, Pin 688: VDD, Pin 689: VCC, Pin 689: GND, Pin 690: VDD, Pin 691: VCC, Pin 691: GND, Pin 692: VDD, Pin 693: VCC, Pin 693: GND, Pin 694: VDD, Pin 695: VCC, Pin 695: GND, Pin 696: VDD, Pin 697: VCC, Pin 697: GND, Pin 698: VDD, Pin 699: VCC, Pin 699: GND, Pin 700: VDD, Pin 701: VCC, Pin 701: GND, Pin 702: VDD, Pin 703: VCC, Pin 703: GND, Pin 704: VDD, Pin 705: VCC, Pin 705: GND, Pin 706: VDD, Pin 707: VCC, Pin 707: GND, Pin 708: VDD, Pin 709: VCC, Pin 709: GND, Pin 710: VDD, Pin 711: VCC, Pin 711: GND, Pin 712: VDD, Pin 713: VCC, Pin 713: GND, Pin 714: VDD, Pin 715: VCC, Pin 715: GND, Pin 716: VDD, Pin 717: VCC, Pin 717: GND, Pin 718: VDD, Pin 719: VCC, Pin 719: GND, Pin 720: VDD, Pin 721: VCC, Pin 721: GND, Pin 722: VDD, Pin 723: VCC, Pin 723: GND, Pin 724: VDD, Pin 725: VCC, Pin 725: GND, Pin 726: VDD, Pin 727: VCC, Pin 727: GND, Pin 728: VDD, Pin 729: VCC, Pin 729: GND, Pin 730: VDD, Pin 731: VCC, Pin 731: GND, Pin 732: VDD, Pin 733: VCC, Pin 733: GND, Pin 734: VDD, Pin 735: VCC, Pin 735: GND, Pin 736: VDD, Pin 737: VCC, Pin 737: GND, Pin 738: VDD, Pin 739: VCC, Pin 739: GND, Pin 740: VDD, Pin 741: VCC, Pin 741: GND, Pin 742: VDD, Pin 743: VCC, Pin 743: GND, Pin 744: VDD, Pin 745: VCC, Pin 745: GND, Pin 746: VDD, Pin 747: VCC, Pin 747: GND, Pin 748: VDD, Pin 749: VCC, Pin 749: GND, Pin 750: VDD, Pin 751: VCC, Pin 751: GND, Pin 752: VDD, Pin 753: VCC, Pin 753: GND, Pin 754: VDD, Pin 755: VCC, Pin 755: GND, Pin 756: VDD, Pin 757: VCC, Pin 757: GND, Pin 758: VDD, Pin 759: VCC, Pin 759: GND, Pin 760: VDD, Pin 761: VCC, Pin 761: GND, Pin 762: VDD, Pin 763: VCC, Pin 763: GND, Pin 764: VDD, Pin 765: VCC, Pin 765: GND, Pin 766: VDD, Pin 767: VCC, Pin 767: GND, Pin 768: VDD, Pin 769: VCC, Pin 769: GND, Pin 770: VDD, Pin 771: VCC, Pin 771: GND, Pin 772: VDD, Pin 773: VCC, Pin 773: GND, Pin 774: VDD, Pin 775: VCC, Pin 775: GND, Pin 776: VDD, Pin 777: VCC, Pin 777: GND, Pin 778: VDD, Pin 779: VCC, Pin 779: GND, Pin 780: VDD, Pin 781: VCC, Pin 781: GND, Pin 782: VDD, Pin 783: VCC, Pin 783: GND, Pin 784: VDD, Pin 785: VCC, Pin 785: GND, Pin 786: VDD, Pin 787: VCC, Pin 787: GND, Pin 788: VDD, Pin 789: VCC, Pin 789: GND, Pin 790: VDD, Pin 791: VCC, Pin 791: GND, Pin 792: VDD, Pin 793: VCC, Pin 793: GND, Pin 794: VDD, Pin 795: VCC, Pin 795: GND, Pin 796: VDD, Pin 797: VCC, Pin 797: GND, Pin 798: VDD, Pin 799: VCC, Pin 799: GND, Pin 800: VDD, Pin 801: VCC, Pin 801: GND, Pin 802: VDD, Pin 803: VCC, Pin 803: GND, Pin 804: VDD, Pin 805: VCC, Pin 805: GND, Pin 806: VDD, Pin 807: VCC, Pin 807: GND, Pin 808: VDD, Pin 809: VCC, Pin 809: GND, Pin 810: VDD, Pin 811: VCC, Pin 811: GND, Pin 812: VDD, Pin 813: VCC, Pin 813: GND, Pin 814: VDD, Pin 815: VCC, Pin 815: GND, Pin 816: VDD, Pin 817: VCC, Pin 817: GND, Pin 818: VDD, Pin 819: VCC, Pin 819: GND, Pin 820: VDD, Pin 821: VCC, Pin 821: GND, Pin 822: VDD, Pin 823: VCC, Pin 823: GND, Pin 824: VDD, Pin 825: VCC, Pin 825: GND, Pin 826: VDD, Pin 827: VCC, Pin 827: GND, Pin 828: VDD, Pin 829: VCC, Pin 829: GND, Pin 830: VDD, Pin 831: VCC, Pin 831: GND, Pin 832: VDD, Pin 833: VCC, Pin 833: GND, Pin 834: VDD, Pin 835: VCC, Pin 835: GND, Pin 836: VDD, Pin 837: VCC, Pin 837: GND, Pin 838: VDD, Pin 839: VCC, Pin 839: GND, Pin 840: VDD, Pin 841: VCC, Pin 841: GND, Pin 842: VDD, Pin 843: VCC, Pin 843: GND, Pin 844: VDD, Pin 845: VCC, Pin 845: GND, Pin 846: VDD, Pin 847: VCC, Pin 847: GND, Pin 848: VDD, Pin 849: VCC, Pin 849: GND, Pin 850: VDD, Pin 851: VCC, Pin 851: GND, Pin 852: VDD, Pin 853: VCC, Pin 853: GND, Pin 854: VDD, Pin 855: VCC, Pin 855: GND, Pin 856: VDD, Pin 857: VCC, Pin 857: GND, Pin 858: VDD, Pin 859: VCC, Pin 859: GND, Pin 860: VDD, Pin 861: VCC, Pin 861: GND, Pin 862: VDD, Pin 863: VCC, Pin 863: GND, Pin 864: VDD, Pin 865: VCC, Pin 865: GND, Pin 866: VDD, Pin 867: VCC, Pin 867: GND, Pin 868: VDD, Pin 869: VCC, Pin 8

3. Web Applications

The OME-ET-7000/OME-PET-7000 contains an advanced web configuration system that provides users with access to OME-ET-7000/OME-PET-7000 applications through a standard web browser.

Logging into the OME-ET-7000/OME-PET-7000 web pages

You can log into the OME-ET-7000/OME-PET-7000 web pages from any computer that has Internet access.

Step 1 : Open a browser

Use a standard internet browser to view the OME-ET-7000/OME-PET-7000 web pages, such as Mozilla Firefox or Internet Explorer, etc.

Step 2 : Enter the URL address for the OME-ET-7000/OME-PET-7000

If you haven't changed the default IP address of the OME-ET-7000/OME-PET-7000 module, please refer to section 2.5. " Using the MiniOS7 Utility to Assign an IP Address" to configure it.

Step 3 : Enter your User name and Password

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

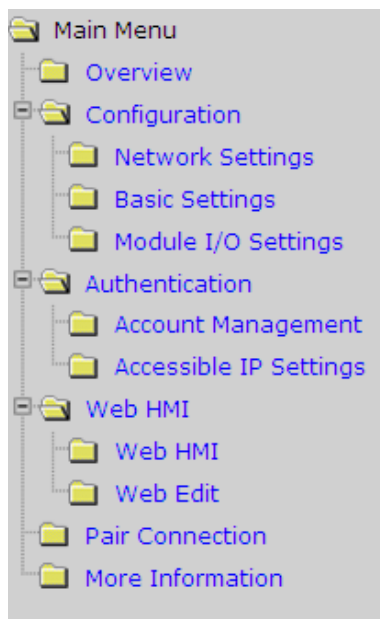
The factory default user name and password are as follows:

Item	Default
User name	Admin
Password	Admin



Step 4 : Welcome to the OME-ET-7000/OME-PET-7000 web interface

After logging into the OME-ET-7000/OME-PET-7000 web interface, the welcome page will be displayed.



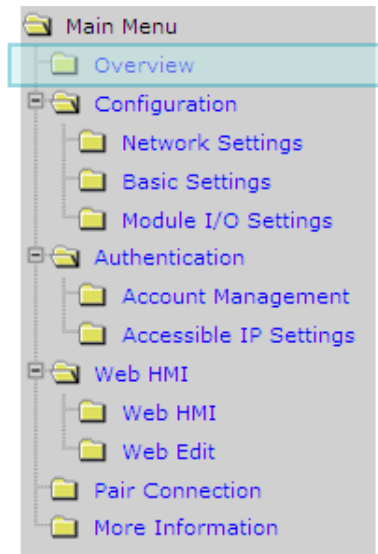
This web interface provides a number of functions, which can be easily accessed via the menu on the left hand side of the page.

3.1. Overview

The “**Overview**” option in the Main menu provides a brief introduction to and explanation of the web interface.

The “**Overview**” option links to the welcome page and contains two main parts.

The top section of the page provides some basic information about both the OME-ET-7000/OME-PET-7000 hardware and software.



Welcome to the OME-ET-7000 Web configuration page

Model Name	OME-ET-7026
MAC Address	00:0d:e0:64:00:3d
Module Information	
Firmware Version	1.1.4 (Dec. 21, 2012)
IO Version	1.07
OS Version	2.2.10 (Jun. 4, 2009)
DI channels	2
DO channels	2
AI channels	6
AO channels	2

The lower section of the page provides a brief introduction to the web interface.

General Description

The OME-ET-7000 series is a selection of cost effective, high performance 10/100 Mbps I/O modules designed for remote data collection and remote Ethernet application control. Each OME-ET-7000 module includes its own internal Ethernet configuration, Modbus TCP/IP port and web port, with a built-in simple HMI that makes configuration and access easy, together with an I/O LED display to indicate the current transmission status.

The OME-ET-7000 supports Modbus/TCP without the need for any additional programming. It can be easily connected to most SCADA software, iFix and Labview. The OME-ET-7000 also supports web server access allowing the user to monitor and access the remote I/O from a web browser. We also provide a JavaScript page for OME-ET-7000 as a reference guide allowing user to design custom web interfaces.

Configuration

- [Network Settings](#)

IP address, Net mask, default gateway, DHCP, Static or Dynamic IP, Firmware and OS version information...

- [Basic Settings](#)

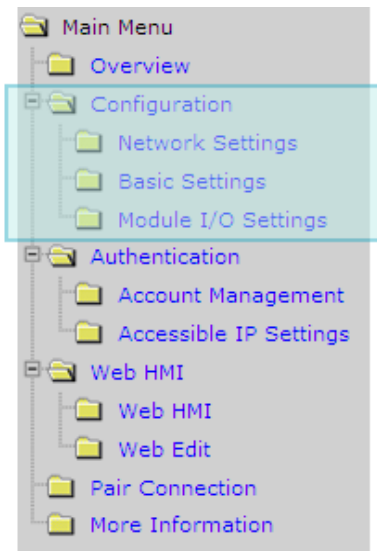
Module name, Module information, Real Time Clock, Time Server IP address, Web HMI and Telnet console Enable, Disable functions. Load the factory default settings

- [Module I/O Settings](#)

Module I/O configuration including DI latch, Digital Counter Enabled/Disabled functions
Settings for Watchdog Timer, DO Power-On value and Safe values, AI High/Low alarm...

3.2. Configuration

The “**Configuration**” section of the Main menu contains the following options:



Network Settings:

Provides access to the Ethernet Settings page which allows you to access the IP settings and check the software version.

Basic Settings:

Provides access to the Basic Settings page which allows you to configure the basic information for the web interface.

Module I/O Settings:

Provides access to the Common Functions page which allows you to configure the settings for the module I/O.

3.2.1. Network Settings

The “**Network Settings**” page allows you to perform the following functions:

- (A) Configure the network settings
- (B) Check the software information

Items	Current Value	New Value
IP Address	10.1.112.17	<input type="text" value="10.1.112.17"/>
Gateway	10.1.0.254	<input type="text" value="10.1.0.254"/>
Subnet Mask	255.255.0.0	<input type="text" value="255.255.0.0"/>
DHCP	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled	
Web Server Lib. Version	Version 127 (Dec. 24, 2012)	
MiniOS7 Version	Version 2.02.10	

[Modify Settings](#)

Please access the new IP Address after modifying the configuration

(A) Configuring the Network Settings

In general, network settings include the following parameters:

- **An IP address**: Each OME-ET-7000/OME-PET-7000 on the network must have a unique IP address.
- **A default gateway**: A gateway (or router) is a system that is used to connect a network with one or more other networks.
- **A subnet mask**: The subnet mask indicates which portion of the IP address that is used to identify the local network or subnet.

There are two methods of configuring the network settings:

- **Dynamic configuration**: The Dynamic Host Configuration Protocol (DHCP) is a network application protocol that automatically assigns an IP address to a device.
- **Manual configuration**: In the absence of DHCP, OME-ET-7000/OME-PET-7000 modules can be manually configured with an IP address, mask, and a gateway.

Dynamic Configuration

If a DHCP server is present on the network, the OME-ET-7000/OME-PET-7000 will automatically obtain the network settings from the DHCP server when the DHCP function is enabled.

Step 1 : Enable the DHCP by checking the “**Enabled**” radio button.

Step 2 : Click the “**Modify Settings**” button to finish configuring the network settings.

Items	Current Value	New Value
IP Address	10.1.112.17	<input type="text" value="10.1.112.17"/>
Gateway	10	<input type="text" value="10.1.0.254"/>
Subnet Mask	255	<input type="text" value="255.255.0.0"/>
DHCP	<input checked="" type="radio"/> Enabled <input type="radio"/> Disabled	
Web Server Lib. Version	Version 127 (Dec. 24, 2012)	
MiniOS7 Version	Version 2.02.10	

Please access the new IP Address after modifying the configuration

Manual Configuration

When using manual configuration, all network settings need to be assigned manually. Each OME-ET-7000/OME-PET-7000 module should have a unique IP address assigned to the interface in order to identify itself on the network.

Step 1 : Disable the DHCP by checking the “**Disabled**” radio button.

Step 2 : Enter the relevant network settings information into the respective fields .

Step 3 : Click the “**Modify Settings**” button to finish configuring the network settings.

Items	Current Value	New Value
IP Address	10.1.112.17	<input type="text" value="10.1.112.17"/>
Gateway	10.1.0.254	<input type="text" value="10.1.0.254"/>
Subnet Mask	255.255.0.0	<input type="text" value="255.255.0.0"/>
DHCP	<input type="radio"/> Enabled <input checked="" type="radio"/> Disabled	
Web Server Lib. Version	Version 127 (Dec. 24, 2012)	
MiniOS7 Version	Version 2.02.10	

Please access the new IP Address after modifying the configuration

(B) Checking the Software Information

The software information section includes the following items:

- **Web Server Lib. Version**: This item provides details of the version number for the web server library, which is a collection of web development solutions that are providing by OMEGA for use with custom applications.
- **MiniOS7 Version**: This item provides defaults of the version number for the MiniOS7 OS image, which is an embedded operating system specifically designed for use with OMEGA controllers.

The screenshot shows the 'Ethernet Settings' page. It contains a table with three columns: 'Items', 'Current Value', and 'New Value'. The rows are: IP Address (10.1.112.17), Gateway (10.1.0.254), Subnet Mask (255.255.0.0), DHCP (Enabled/Disabled), Web Server Lib. Version (Version 127 (Dec. 24, 2012)), and MiniOS7 Version (Version 2.02.10). A blue box highlights the 'Web Server Lib. Version' and 'MiniOS7 Version' rows. Below the table is a 'Modify Settings' button. At the bottom, a blue text message reads: 'Please access the new IP Address after modifying the configuration'.

Items	Current Value	New Value
IP Address	10.1.112.17	10.1.112.17
Gateway	10.1.0.254	10.1.0.254
Subnet Mask	255.255.0.0	255.255.0.0
DHCP	Enabled Disabled	
Web Server Lib. Version	Version 127 (Dec. 24, 2012)	
MiniOS7 Version	Version 2.02.10	

Modify Settings

Please access the new IP Address after modifying the configuration

This page can be used to check the version information for the OME-ET-7000/OME-PET-7000 software after updating the OME-ET-7000/OME-PET-7000 firmware (see section 6.4 . “Uploading the OME-ET-7000/OME-PET-7000 firmware” for more details).

3.2.2. Basic Settings

The “**Basic Settings**” page allows you to perform the following functions:

- (A) Configure the module information
- (B) Configure the web interface information
- (C) Reset all parameters to the default settings

The screenshot shows the 'Basic Settings' page. Callout A points to the 'Module Name' field (OME-ET-7026) and the 'Module Information' field (DIO, AIO). Callout B points to the 'Page Header Information (First line)' and 'Page Header Information (Second line)' fields. Callout C points to the 'Restore All Default Settings' section.

Basic Settings	
Module Name	OME-ET-7026
Module Information	DIO, AIO <small>(Maximum of 16 characters) (The content cannot include ' or " character)</small>
Page Header Information (First line)	OMEGA <small>(Maximum of 20 characters)</small> Color: Red Font Size: 6
Page Header Information (Second line)	http://www.omega.com <small>(Maximum of 50 characters)</small> Color: Red Font Size: 3
More Information URL	http://www.omega.com/das/pdf/OME-ET-7000_OME-PET-70 <small>(Maximum of 100 characters)</small>
Web Server TCP Port	80
Modbus Server Port	502
<input type="button" value="Submit"/>	
Restore All Default Settings	
<input type="checkbox"/> Configuration	
<input type="checkbox"/> Authentication	
<input type="checkbox"/> Web HMI	
<input type="checkbox"/> Pair Connection	
<input type="checkbox"/> All	
<input type="button" value="Submit"/>	

(A) Configuring the Module Information

The “**Module Information**” section includes the following items:

- **Module Name**: The initial value for this field will depend on the model of the module and can not be modified.
- **Module Information**: The module information field indicates the name of the alias that is used to identify the module.

To configure the module information, follow the procedure below:

Step 1 : Enter the Module information in the relevant field.

Step 2 : Click the “**Submit**” button to finish configuring the module information.

The screenshot shows a 'Basic Settings' form with the following fields and annotations:

- Module Name**: Contains 'OME-ET-7026'. A blue circle with the number '1' points to this field.
- Module Information**: Contains 'DIO, AIO'. A blue rectangle highlights this field, with a blue circle containing '1' pointing to it. Below the field is the text: *(Maximum of 16 characters) (The content cannot include ' or " character)*.
- Page Header Information (First line)**: Contains 'OMEGA'. A blue rectangle highlights this field, with a blue circle containing '1' pointing to it. Below the field is the text: *(Maximum of 20 characters)*.
- Page Header Information (Second line)**: Contains 'http://www.omega.com'. A blue rectangle highlights this field, with a blue circle containing '1' pointing to it. Below the field is the text: *(Maximum of 50 characters)*.
- More Information URL**: Contains 'http://www.omega.com/das/pdf/OME-ET-7000_OME-PET-70'. A blue rectangle highlights this field, with a blue circle containing '1' pointing to it. Below the field is the text: *(Maximum of 100 characters)*.
- Web Server TCP Port**: Contains '80'.
- Modbus Server Port**: Contains '502'.
- Submit**: A button at the bottom right, highlighted by a blue rectangle. A blue circle with the number '2' points to this button.

(B) Configuring the Web Interface Information

The “**Module Information**” section includes the following items:

- **Page Header Information (First line)** and **Page Header Information (Second line)**: The title of the website that is displayed the top left-hand corner of the interface, for example the company name and web address as per the example below.

Basic Settings	
Module Name	OME-ET-7026
Module Information	DIO, AIO <small>(Maximum of 16 characters) (The content cannot include ' or " character)</small>
Page Header Information (First line)	OMEGA <small>(Maximum of 20 characters)</small>
Color	Red
Font Size	6
Page Header Information (Second line)	http://www.omega.com <small>(Maximum of 50 characters)</small>
Color	Red
Font Size	3
More Information URL	http://www.omega.com/das/pdf/OME-ET-7000_OME-PET-70 <small>(Maximum of 100 characters)</small>
Web Server TCP Port	80
Modbus Server Port	502
<input type="button" value="Submit"/>	

- **More Information URL**: This item allows you to specify the URL that will be displayed when the “**More information**” option in the Main Menu is clicked in order to provide additional support for the OME-ET-7000/OME-PET-7000. After completing the settings, click the “**More Information**” option to check that the link to the web site is correct (As per the figure below).



- **Web Server TCP Port:** By default, TCP/IP uses Port 80.
- **Modbus Server TCP Port:** By default, TCP/IP uses Port 502.

Basic Settings	
Module Name	OME-ET-7026
Module Information	DIO, AIO <small>(Maximum of 16 characters) (The content cannot include ' or " character)</small>
Page Header Information (First line)	OMEGA <small>(Maximum of 20 characters)</small> Color: Red Font Size: 6
Page Header Information (Second line)	http://www.omega.com <small>(Maximum of 50 characters)</small> Color: Red Font Size: 3
More Information URL	http://www.omega.com/das/pdf/OME-ET-7000_OME-PET-70 <small>(Maximum of 100 characters)</small>
Web Server TCP Port	80
Modbus Server Port	502
Submit	

To configure the web interface information, follow procedure below:

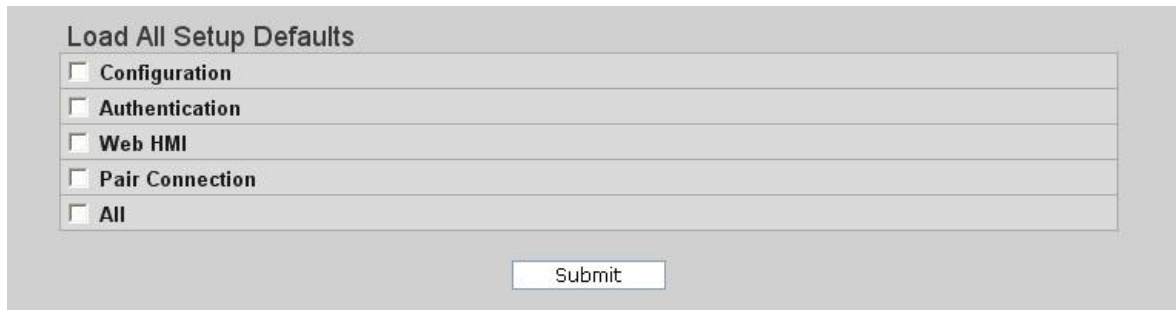
Step 1 : Enter the desired information into the respective fields.

Step 2 : Click the “**Submit**” button to finish configuring the module information.

The screenshot shows the 'Basic Settings' configuration page. On the left is a 'Main Menu' sidebar with options: Overview, Configuration (expanded), Network Settings, Basic Settings, Module I/O Settings, Authentication, Web HMI, Pair Connection, and More Information. The 'Basic Settings' form contains the same fields as the previous image. A blue callout box with the number '1' points to the 'Page Header Information (First line)', 'Page Header Information (Second line)', and 'More Information URL' fields. Another blue callout box with the number '2' points to the 'Submit' button at the bottom right of the form.

(C) Resetting All Settings to Default

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

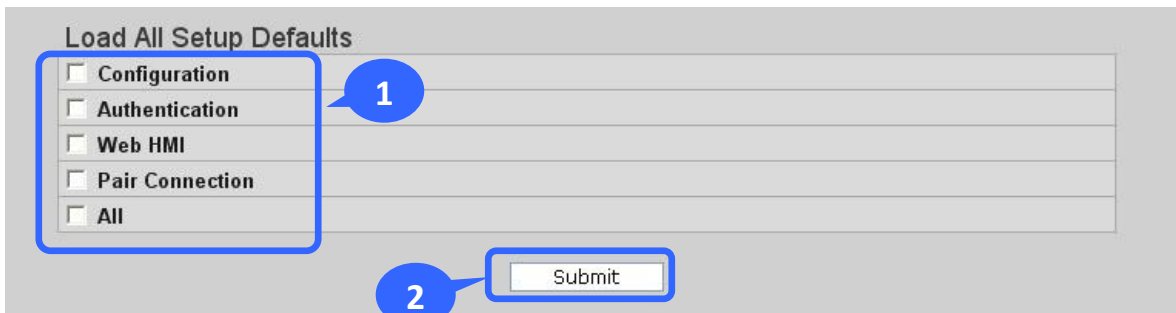


The screenshot shows a web interface titled "Load All Setup Defaults". It contains a list of five items, each with an unchecked checkbox: "Configuration", "Authentication", "Web HMI", "Pair Connection", and "All". Below this list is a "Submit" button.

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

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

Step 2 : Click the “**Submit**” button to reset the settings to their factory default state.



This screenshot is an annotated version of the previous one. A blue rectangular box labeled "1" encloses the list of checkboxes. A blue circular callout with the number "1" points to the "Authentication" checkbox. Another blue rectangular box labeled "2" encloses the "Submit" button, with a blue circular callout containing the number "2" pointing to it.

(a) Factory Default Settings for the “Configuration” Menu Options

The tables below outline the factory default settings for the items listed in the “Configuration” menu.

Network Settings

Ethernet Settings

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

Basic Settings

Basic Settings

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

Module I/O Settings

The information displayed on the settings page varies depending on the model number.

Common Functions

Item	Factory Default Settings
Host WDT Timeout	0 (Disabled)
WDT Event Counter	0
Modbus NetID	1

Digital Output

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

Digital Input

Item	Factory Default Settings
DI Latch Status	Disabled
DI Counter	Disabled

Analog Output

Item		Factory Default Settings
Output Range		This value varies depending on the model of the module
Output Slew Rate		0 (Immediate)
Power-on Value		0
Safe Value		0
Data Format	2's Comp Hexadecimal	2's Comp Hexadecimal
	Engineering Unit	

Analog Input

Item		Factory Default Setting
Input Range		This value varies depending on the model of the module
Enable		ON
High Alarm	Alarm Limit Value	This value varies depending on the model of the module
	Enable	OFF
	Alarm Mode	Momentary
Low Alarm	Alarm Limit Value	This value varies depending on the model of the module
	Enable	OFF
	Alarm Mode	Momentary
Sampling Rate	Normal mode (16 bits & 10 Hz)	Normal mode
	Fast mode (12 bits & 60 Hz)	
Filter Setting	60 Hz Rejection	60 Hz Rejection
	50 Hz Rejection	
Data Format	2's Comp Hexadecimal	2's Comp Hexadecimal
	Engineering Unit	

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

(b) Factory Default Settings for the “Authentication” Menu Options

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

Account Management

Factory Default Settings
A default user account consists of an account name, “Admin”, and a password, “Admin”.

Accessible IP Settings

Factory Default Settings
Empty, there is no limit allowing any outgoing access.

(c) Factory Default Settings for “Web HMI” Menu Option

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

Web HMI

Factory Default Settings
Depends on the Modbus setting function of the OME-ET-7000/OME-PET-7000.

Web Edit

Factory Default Settings
0 Pages

(d) Factory Default Settings for the “I/O Pair Connection” Menu Option

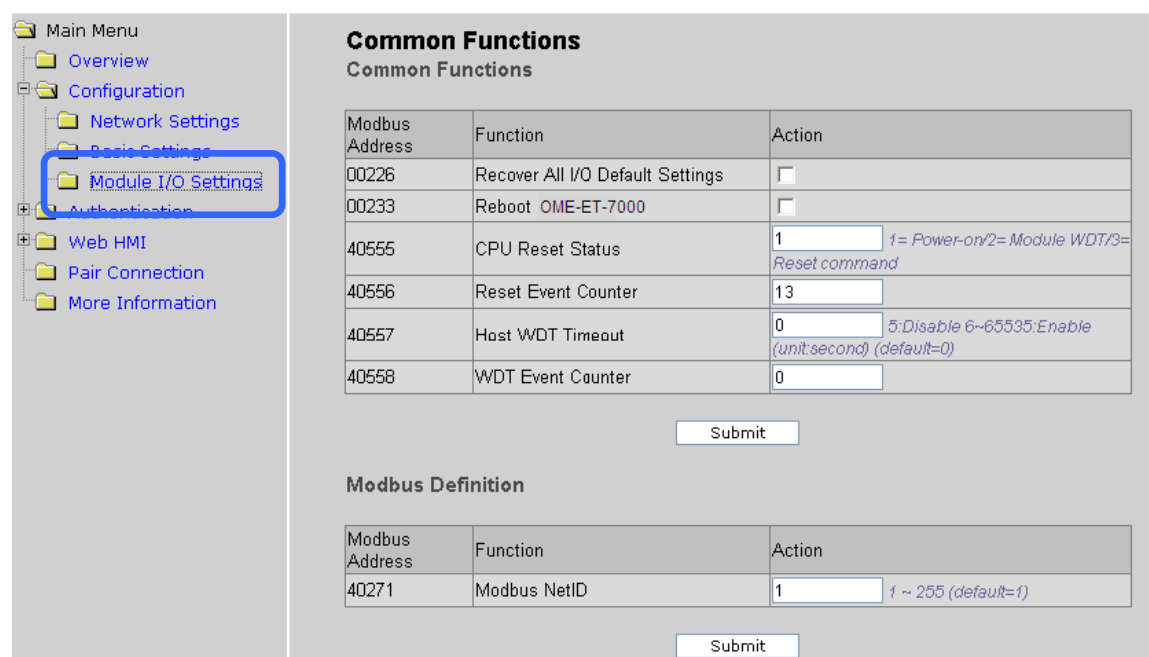
The table below outlines the factory default settings for the “Pair Connection” option.

Pair Connection

Factory Default Settings
Empty

3.2.3. Module I/O Settings

After completing the general configuration of the OME-ET-7000/OME-PET-7000 module described in the previous section, the settings for the input and output channels need to be configured, such as the channel range and the alarm, etc.



Common Functions
Common Functions

Modbus Address	Function	Action
00226	Recover All I/O Default Settings	<input type="checkbox"/>
00233	Reboot OME-ET-7000	<input type="checkbox"/>
40555	CPU Reset Status	<input type="text" value="1"/> 1= Power-on/2= Module WDT/3= Reset command
40556	Reset Event Counter	<input type="text" value="13"/>
40557	Host WDT Timeout	<input type="text" value="0"/> 5:Disable 6~65535:Enable (unit:second) (default=0)
40558	WDT Event Counter	<input type="text" value="0"/>

Modbus Definition

Modbus Address	Function	Action
40271	Modbus NetID	<input type="text" value="1"/> 1 ~ 255 (default=1)

Tips & Warnings



The contents displayed on this page will be depending on the Modbus functions applicable to the specific the OME-ET-7000/OME-PET-7000 module. Please refer to the user manual for each module for details of how to configure the relevant I/O settings.

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

(A) Common Functions

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

Common Functions
Common Functions

Modbus Address	Function	Action
00226	Reset to Factory Default Settings	<input type="checkbox"/>
00233	Reboot ET-7000	<input type="checkbox"/>
40555	CPU Reset Status	2 <input type="text"/> <small>1=Power-on, 2=Module WDT, 3=Reset command</small>
40556	Reset Event Counter	2 <input type="text"/>
40557	Host WDT Timeout	0 <input type="text"/> <small>0=Disabled, 6~65535=Enabled (units:seconds) (default=0)</small>
40558	WDT Event Counter	0 <input type="text"/>

Submit

Modbus Definition

Modbus Address	Function	Action
40271	Modbus NetID	1 <input type="text"/> <small>1 ~ 255 (default=1)</small>

Submit

(B) Digital Output Settings

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

Digital Output Settings
Power-on/Safe Values

Channel	Power-on Value (00435)	Safe Value (00515)
Ch0	OFF <input checked="" type="radio"/> ON <input type="radio"/>	OFF <input checked="" type="radio"/> ON <input type="radio"/>
Ch1	OFF <input checked="" type="radio"/> ON <input type="radio"/>	OFF <input checked="" type="radio"/> ON <input type="radio"/>

Note: The default value for all parameters is OFF.

Submit

- **Power-on Value**: This section is used to set the power-on value for a specific digital output channel. The digital output channel will then generate the start-up value output.
- **Safe Value**: When communication between the Host PC and the OME-ET-7000/OME-PET-7000 module interrupted is broken, the digital output channels can generate a predefined safe value. This function can be enabled by configuring the Host WDT Timeout setting.

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

(C) Digital Input Settings

All digital input channels in OME-ET-7000/OME-PET-7000 modules can be used as 32-bit counters and each counter consists of two address values, the Low word and the High word. Specific individual DI channels can be counters via the Digital Input settings web page.

Digital Input Settings
DI Latch

Modbus Address	Function	Action
00350	Enable DI Latched Status	OFF <input checked="" type="radio"/> ON <input type="radio"/> 0=Disabled, 1=Enabled (default=0)

Submit

DI Counter

Channel	Enabled (00351)	Preset Value for DI Counter (40200)
Ch0	OFF <input checked="" type="radio"/> ON <input type="radio"/>	0 <input type="text"/> 0~4294967294 (default=0)
Ch1	OFF <input checked="" type="radio"/> ON <input type="radio"/>	0 <input type="text"/> 0~4294967294 (default=0)

Submit

- **DI Latched**: When DI Latch function is enabled, once the digital input channel detects any change in input status, the input status will be latched and will remain in this condition the latch is manually.
- **DI Counter**: When Counter mode is selected, one counter will record the number of pulses from the digital signal for the selected channel, and will then record the count value in the register.
- **Preset Value**: This option allows the default values for the counters to be set.

(D) Analog Output Settings

The Analog Output settings area contains two parts, the Basic Settings section and the Power-on/Safe Values section, which will be described in detail below.

Analog Output Settings
Basic Settings

Channel	Range (40459)	Slew Rate (40523)
Ch0	32, 0 V ~ 10 V	0 (Immediate)
Ch1	32, 0 V ~ 10 V	0 (Immediate)

Submit

Power-on/Safe Values

Channel	Power-on Value (40360)	Safe Value (40392)
Ch0	0.000 0 V ~ 10 V	0.000 0 V ~ 10 V
Ch1	0.000 0 V ~ 10 V	0.000 0 V ~ 10 V

Submit

Tips & Warnings



Before selecting the output range for each analog output channel, make sure that the jumpers are set properly.

OME-ET-7000/OME-PET-7000 Series
Voltage/Current Input/Output Selection Jumper Settings

Remove the top case of the module.

The selection jumpers are next to the connector. Refer to the table below to set the input type.

Channel	Vout0 & AGND	Vin5 ±	Vin4 ±	Vin3 ±	Vin2 ±	Vin1 ±	Vin0 ±
Jumper	JP5	J6	J5	J4	J3	J2	JP1

Channel	Vout1+ & AGND
Jumper	JP6

OME-ET-7000/OME-PET-7000 Series
Modbus Register Table

Coils (0xxxx)

Register	HEX	Points	
00000	0000	2	DO value
00001	0001		
00034	0022	2	Clear the DI counter
00035	0023		
00130	0082	2	Clear the DI latched
00131	0083		
00162	00A2	6	Clear 1-ch hist
00167	00A7		
00194	00C2	6	Clear 1-ch
00199	00C7		
00226			

For more detailed technical specifications related to the jumper settings for each OME-ET-7000/OME-PET-7000 module, please refer to “OME-ET-7000/OME-PET-7000 Register Table”, which can be obtained from: CD:\OME-ET-7000_PET-7000\Document\

- **Range**: In a manner, a different range can be set for each individual analog output channel. Select the required voltage/current range from the respective drop-down menus. For more detailed technical specifications related to the output range for each analog output channel, please refer to: "Appendix E. Analog Output Type and Data Format Table".
- **Slew Rate**: This is the programmable output slew rate for the analog output channels, i.e., the rate of change in the analog output voltage/current as it changes from one output voltage/current to another. Select the most appropriate value from the respective drop-down menus.
- **Power-on Value**: A power-on value can be set for a specific analog output channel, and the analog output channel will then generate the start-up value output.
- **Safe Value**: When communication between the Host PC and the OME-ET-7000/OME-PET-7000 module is interrupted, the analog output channels can generate a predefined safe value. This function can be enabled or disabled by configuring the Host WDT Timeout setting.

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

(E) Analog Input Settings

Analog Input Settings area contains two parts, the Basic Settings section and the Alarm Settings section, which will be described in detail below.

Analog Input Settings
Basic Settings

Channel	Range (40427)	Enabled (00595)
Ch0	08, -10 V ~ 10 V	OFF <input type="radio"/> ON <input checked="" type="radio"/>
Ch1	08, -10 V ~ 10 V	OFF <input type="radio"/> ON <input checked="" type="radio"/>
Ch2	08, -10 V ~ 10 V	OFF <input type="radio"/> ON <input checked="" type="radio"/>
Ch3	08, -10 V ~ 10 V	OFF <input type="radio"/> ON <input checked="" type="radio"/>
Ch4	08, -10 V ~ 10 V	OFF <input type="radio"/> ON <input checked="" type="radio"/>
Ch5	08, -10 V ~ 10 V	OFF <input type="radio"/> ON <input checked="" type="radio"/>

Modbus Address	Function	Action
00628	Normal mode (16 bits and 10 Hz), Fast mode (12 bits and 60 Hz) for AI	OFF <input type="radio"/> ON <input checked="" type="radio"/> 0=Normal, 1=Fast (default=0)
00629	60/50 Hz Rejection	OFF <input type="radio"/> ON <input checked="" type="radio"/> 0=60 Hz, 1=50 Hz (default=0)
00631	Data Format	OFF <input type="radio"/> ON <input checked="" type="radio"/> 0=Hex, 1=Engineering (default=0)
00632	Restore Analog Calibration to Factory Settings	<input type="checkbox"/>

Submit

Tips & Warnings



Before selecting the input range for each analog input channel, make sure that the jumpers are set properly.

OME-ET-7000/OME-PET-7000 Series
Voltage/Current Input/Output Selection Jumper Settings

Remove the top case of the module.

The selection jumpers are next to the connector. Refer to the table below to set the input type.

Channel	Vout+ & AGND	Vin5 ±	Vin4 ±	Vin3 ±	Vin2 ±	Vin1 ±	Vin0 ±
Jumper	JPE	J5	J6	J4	J3	J2	JP1

Voltage Input

Current Input

Voltage Output

Current Output

OME-ET-7000/OME-PET-7000 Series
Modbus Register Table

Coils (0xxxx)

Register	Points	
DEC	HEX	
00000	0000	DO value
00001	0001	
00084	0022	Clear the DI counter
00085	0023	
00190	0082	Clear the DI latched
00191	0083	
00162	00A2	Clear 1-ch hist
00167	00A7	
00194	00C2	Clear 1-
00199	00C7	
00226		

For more detailed technical specifications related to the jumper settings for each OME-ET-7000/OME-PET-7000 module, please refer to “OME-ET-7000/OME-PET-7000 Register Table”, which can be obtained from: CD:\OME-ET-7000_PET-7000\Document\

- **Range:** OME-ET-7000/OME-PET-7000 modules provide a programmable input voltage/current range on all analog inputs channels, where a different range can be set for each individual analog input channel. Select the required voltage/current from the respective drop-down menus. For more detailed technical specifications related to the input range for each analog input channel, please refer to: “Appendix D. Analog Input Type and Data Format Table”.
- **Enable:** This section allows each analog input channel to be switched ON or OFF.
- **Normal/Fast Mode:** OME-ET-7000/OME-PET-7000 modules support sample rates in either “Normal” or “Fast” mode. Fast mode uses 60 Hz with a 12-bit resolution, while Normal mode uses 10 Hz with a 16-bit resolution.
- **50/60Hz Rejection for AI:** In order to remove the noise from the power supply, OME-ET-7000/OME-PET-7000 analog input modules feature two built-in rejection filters, that operate at different frequencies, 50 or 60 Hz, that are designed to remove noise generated by different power supplies.
- **AI Data Format:** OME-ET-7000/OME-PET-7000 modules allow data to be displayed in either hexadecimal or engineering unit format. For more detailed technical specifications related to the data format for each analog input channel, please refer to: “Appendix D. Analog Input Type and Data Format Table”.

(F) Analog Input Alarm Settings

The OME-ET-7000/OME-PET-7000 modules feature a built-in alarm function. The alarm includes two parts, the high alarm and the low alarm and each need to be configured for a specific channel.

Alarm Settings

Channel	High Alarm			Low Alarm		
	Value (40296)	Enabled (00636)	Type (00700)	Value (40328)	Enabled (00668)	Type (00732)
Ch0	10.000 +/-10 V	OFF <input checked="" type="radio"/> ON <input type="radio"/>	0 - Momentar ▼	-10.000 +/-10 V	OFF <input checked="" type="radio"/> ON <input type="radio"/>	0 - Momentar ▼
Ch1	10.000 +/-10 V	OFF <input checked="" type="radio"/> ON <input type="radio"/>	0 - Momentar ▼	-10.000 +/-10 V	OFF <input checked="" type="radio"/> ON <input type="radio"/>	0 - Momentar ▼
Ch2	10.000 +/-10 V	OFF <input checked="" type="radio"/> ON <input type="radio"/>	0 - Momentar ▼	-10.000 +/-10 V	OFF <input checked="" type="radio"/> ON <input type="radio"/>	0 - Momentar ▼
Ch3	10.000 +/-10 V	OFF <input checked="" type="radio"/> ON <input type="radio"/>	0 - Momentar ▼	-10.000 +/-10 V	OFF <input checked="" type="radio"/> ON <input type="radio"/>	0 - Momentar ▼
Ch4	10.000 +/-10 V	OFF <input checked="" type="radio"/> ON <input type="radio"/>	0 - Momentar ▼	-10.000 +/-10 V	OFF <input checked="" type="radio"/> ON <input type="radio"/>	0 - Momentar ▼
Ch5	10.000 +/-10 V	OFF <input checked="" type="radio"/> ON <input type="radio"/>	0 - Momentar ▼	-10.000 +/-10 V	OFF <input checked="" type="radio"/> ON <input type="radio"/>	0 - Momentar ▼

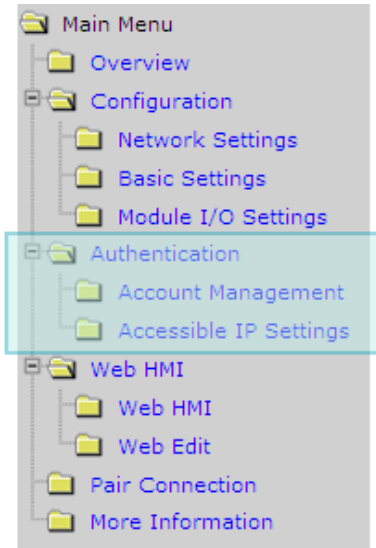
Note: By default, the Alarm function is disabled and the Alarm Type is set to momentary.

Submit

- **Value:** You can define both the high alarm value and the low alarm value using the Alarm Value text box. When the analog input value is higher than the high alarm value, or lower than the low alarm value, an alarm occurs. The alarm status will then be activated and switched to on.
- **Enable:** Each analog input alarm can be switched to on or off by clicking the appropriate radio button.
- **Mode:** The OME-ET-7000/OME-PET-7000 allows the alarm to be selected as either Momentary or Latch mode, which can be set using the Mode combo box for both the low alarm and the high alarm.
 - **Latch Mode:** Once an alarm occurs, the alarm status will be activated and set to the logic high level. This value will remain until the alarm is cleared manually.
 - **Momentary Mode:** In this mode, the alarm status will dynamically change depending on whether or not an alarm has occurred. If an alarm occurs, the alarm status will be set to on. If the alarm is deactivated, the alarm status will be set to off.

3.3. Authentication

The “**Authentication**” section of the Main Menu contains the following options:



Account Management:

Provides access to the privilege management page, which allows you to manage user accounts and their associated privileges.

Accessible IP Settings:

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

3.3.1. Account Management

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

- (A) Configuration of user accounts
- (B) Restoration of the factory default user account

Account Management

No.	Account	Password	Verify Password	Authority	Enabled
1	Admin	Admin	On
2				Admin	<input type="checkbox"/>
3				Admin	<input type="checkbox"/>
4				Admin	<input type="checkbox"/>
5				Admin	<input type="checkbox"/>

Submit

Account: (Maximum of 8 characters)
Password: (Maximum of 8 characters)

☐ Load Setup Default

Submit

(A) Configuring the User Accounts

The OME-ET-7000/OME-PET-7000 interface supports a maximum of five user accounts, including:

- A Built-in Administrator Account

The built-in Administrator account is basically a setup and disaster recovery account that can be deleted. You can, however, change the password for the administrator account.

- Four User-defined Accounts

Each user account consists of an account name, a password and an authority level.

The authority level includes the following roles, which determine the type of operations the user is allowed to perform.

- **Admin:** This level enables access to all OME-ET-7000/OME-PET-7000 web site features, functions, and commands.
- **User:** This level enables limited access to the OME-ET-7000/OME-PET-7000 web site features, functions, and commands. In general, operators at this level cannot change configuration settings.

Once a user account has been created, it can be either enabled or disabled.

Account Management

No.	Account	Password	Verify Password	Authority	Enabled
1	Admin	****	****	Admin	<input type="checkbox"/>
2	USER1	****	****	User	<input checked="" type="checkbox"/>
3				Admin	<input type="checkbox"/>
4				Admin	<input type="checkbox"/>
5				Admin	<input type="checkbox"/>

Submit

Account: (Maximum of 8 characters)
Password: (Maximum of 8 characters)

To add a new user account, perform the followings:

Step 1 : Enter the user account information into the relevant text fields, and then select the “**Enable**” checkbox.

Step 2 : Click the “**Submit**” button to complete the user account configuration and save the details.

(B) Restoring the Factory Default User Accounts

The OME-ET-7000/OME-PET-7000 has a built-in administrator account named **Admin** that is created by default. The default account cannot be deleted.



To restore the factory default user accounts, perform the followings:

Step 1 : Select the “**Load Setup Default**” checkbox.

Step 2 : Click the “**Submit**” button to restore the factory default user accounts.

3.3.2. Accessible IP Settings

The IP Filter Settings page provides functions that allow the following tasks to be performed:

- Configuration of the connection filtering

IP Filter Settings

☐ Enable the IP filter table. (Note: By leaving this unchecked, the filter table will be "Disabled", which will allow connection requests from all IPs.)

IP address for the browser PC is: 10.1.0.25

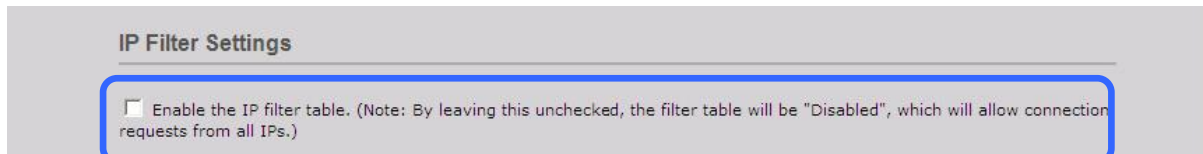
No.	Activate	From (IP Address)	To (IP Address)
1	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
2	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
3	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
4	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
5	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
6	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>

Submit

(A) Configuring IP Filter

The OME-ET-7000/OME-PET-7000 includes an IP filter that enables you to restrict or grant user access based on a custom IP filter list that you create.

The filter can be enabled by selecting the **“Enable the IP filter table”** checkbox. After this option is selected, only requests from the IP addresses included in the list will be allowed access to the module.



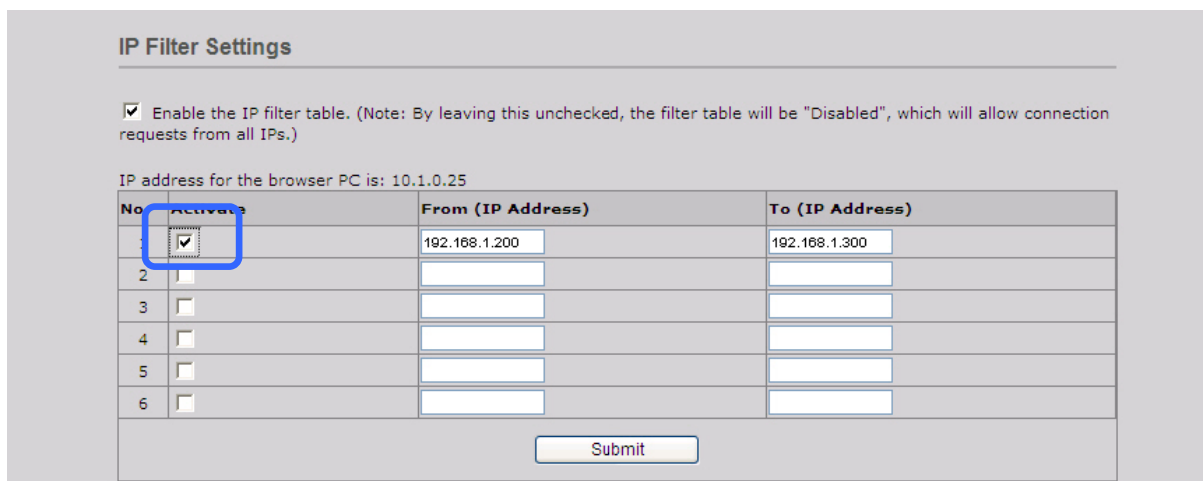
The screenshot shows the 'IP Filter Settings' section. A blue box highlights the checkbox labeled 'Enable the IP filter table. (Note: By leaving this unchecked, the filter table will be "Disabled", which will allow connection requests from all IPs.)'.

Tips & Warnings



By default, there is no restriction on outgoing access.

Each filter list entry can be either activated or deactivated by selecting the respective **“Activate the Rule”** checkbox.



The screenshot shows the 'IP Filter Settings' section with the 'Enable the IP filter table' checkbox checked. Below the checkbox, it says 'IP address for the browser PC is: 10.1.0.25'. A table with 3 columns is shown: 'No.', 'Activate', and 'From (IP Address)' to 'To (IP Address)'. The first row is highlighted with a blue box around the 'Activate' checkbox, which is checked. The 'From' and 'To' IP addresses are 192.168.1.200 and 192.168.1.300 respectively. There are 6 rows in total. A 'Submit' button is at the bottom.

No.	Activate	From (IP Address)	To (IP Address)
1	<input checked="" type="checkbox"/>	192.168.1.200	192.168.1.300
2	<input type="checkbox"/>		
3	<input type="checkbox"/>		
4	<input type="checkbox"/>		
5	<input type="checkbox"/>		
6	<input type="checkbox"/>		

(B) Configuring the IP Filters

Two methods are provided for configuring the IP filter, allowing filtering for either individual IP addresses, or across a range (group) of IP addresses.

Method 1: Allow access from a single IP address

The screenshot shows the 'IP Filter Settings' interface. It includes a checkbox to 'Enable the IP filter table', a text field for the browser PC IP address, a table with columns for rule number, activation, and IP range, and a 'Submit' button. Numbered callouts indicate the following steps:

- 1**: Points to the 'IP Filter Settings' title.
- 2**: Points to the 'From (IP Address)' and 'To (IP Address)' text boxes in the first row of the table.
- 3**: Points to the 'Activate' checkbox in the first row of the table.
- 4**: Points to the 'Submit' button.

No.	Activate	From (IP Address)	To (IP Address)
1	<input checked="" type="checkbox"/>	10.1.0.25	10.1.0.25
2	<input type="checkbox"/>		
3	<input type="checkbox"/>		
4	<input type="checkbox"/>		
5	<input type="checkbox"/>		
6	<input type="checkbox"/>		

Step 1 : Select the “Enable the IP filter table” checkbox.

Step 2 : Enter the same IP address in both the “From (IP Address)” and the “To (IP Address)” text boxes. (The IP address may be the address of the PC currently being used or others)

Step 3 : Select the “Activate the Rule” checkbox.

Step 4 : Click the “Submit” button to complete the configuration of the IP filter list and save the settings.

Method 2: Allow access from a group of IP addresses

The screenshot shows the 'IP Filter Settings' page. At the top, there is a checkbox labeled 'Enable the IP filter table. (Note: By leaving this unchecked, the filter table will be "Disabled", which will allow connection requests from all IPs.)' with a blue circle '1' pointing to it. Below this, a text label says 'IP address for the browser PC is: 10.1.0.25'. A table with 3 columns ('No.', 'Activate', 'From (IP Address)', 'To (IP Address)') and 6 rows is shown. The first row has '1' in the 'No.' column, a checked checkbox in the 'Activate' column (pointed to by blue circle '3'), '10.1.0.20' in the 'From (IP Address)' column (pointed to by blue circle '2'), and '10.1.0.30' in the 'To (IP Address)' column (also pointed to by blue circle '2'). The other rows have empty checkboxes and text boxes. At the bottom right, there is a 'Submit' button (pointed to by blue circle '4').

No.	Activate	From (IP Address)	To (IP Address)
1	<input checked="" type="checkbox"/>	10.1.0.20	10.1.0.30
2	<input type="checkbox"/>		
3	<input type="checkbox"/>		
4	<input type="checkbox"/>		
5	<input type="checkbox"/>		
6	<input type="checkbox"/>		

Submit

Step 1 : Select the “Enable the IP filter table” checkbox

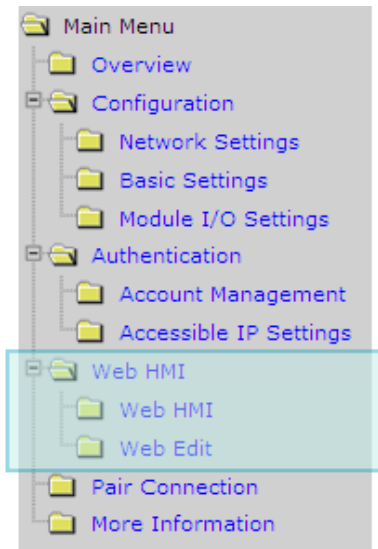
Step 2 : Enter the first IP address in the range in the “From (IP Address)” and enter the final IP address in the range in the “To (IP Address)” text boxes.

Step 3 : Select the “Activate the Rule” checkbox.

Step 4 : Click the “Submit” button to complete the configuration of the IP filter list and save the settings.

3.4. Web HMI

The “**Web HMI**” section of the Main Menu contains the following options:



Web HMI:

Provides access to the I/O monitor page, which allows you to remotely monitor and control the I/O status of the OME-ET-7000/OME-PET-7000 module.

Web Edit:

Provides access to the Web interface Configuration page, which allows you to create dynamic web HMI pages.

3.4.1. Web HMI

The OME-ET-7000/OME-PET-7000 module features a Web HMI web interface that can be used to display real-time I/O data values and alarms via the LAN or the Internet. Real-time I/O data values and alarms can be monitored at either the local or remote site using any web browser. Then, the Web HMI is completed immediately without requiring any programming skills.

The screenshot displays the Web HMI web interface. On the left is a navigation menu with the following items: Main Menu, Overview, Configuration (Network Settings, Basic Settings, Module I/O Settings), Authentication (Account Management, Accessible IP Settings), Web HMI (highlighted with a blue box), Web Edit, Pair Connection, and More Information. The main content area has tabs for AI, AO, DI, and DO, with 'AI' selected. It contains three sections:

Analog Input

No	Register	Value	
		Hex Format	Floating Format
AI0	30000	FFFF	-0.000
AI1	30001	FFFF	-0.000
AI2	30002	0000	0.000
AI3	30003	0000	0.000
AI4	30004	FFFF	-0.000
AI5	30005	FFFF	-0.000

High/Low Latched Value for Analog Inputs

No	Latched High				Latched Low		
	Register	Value Hex Format	Floating Format	Register	Value Hex Format	Floating Format	
AI0	30236	0005	0.001	30268	FFFB	-0.001	
AI1	30237	0003	0.000	30269	FFFA	-0.001	
AI2	30238	0006	0.001	30270	FFFA	-0.001	
AI3	30239	0006	0.001	30271	FFFB	-0.001	
AI4	30240	0004	0.001	30272	FFFA	-0.001	
AI5	30241	0004	0.001	30273	FFFC	-0.001	

Below the table are two buttons: "Clear AI Latched" (appearing twice).

High/Low Alarm Status for Analog Inputs

No	High Alarm				Low Alarm			
	Register	Value	Status		Register	Value	Status	
AI0	10224	10.000	OFF	Clear	10256	-10.000	OFF	Clear

3.4.2. Web Edit

The OME-ET-7000/OME-PET-7000 module provides functions that enable users to create customized web pages. Users can upload specific I/O layout diagrams in either bmp, jpg, or gif format and can define a description for each I/O point. No HTML or Java skills are required in order to create the web pages.

The screenshot displays the 'Web Page Configuration' interface. At the top, there is a dropdown menu set to 'MainPage' and a 'Go' button. Below this is a table listing the configured pages:

No.	Page Description	Function
*	Main Page	
1	Carriage	Edit Delete
2	Reservoir	Edit Delete
3	Oilcan	Edit Delete

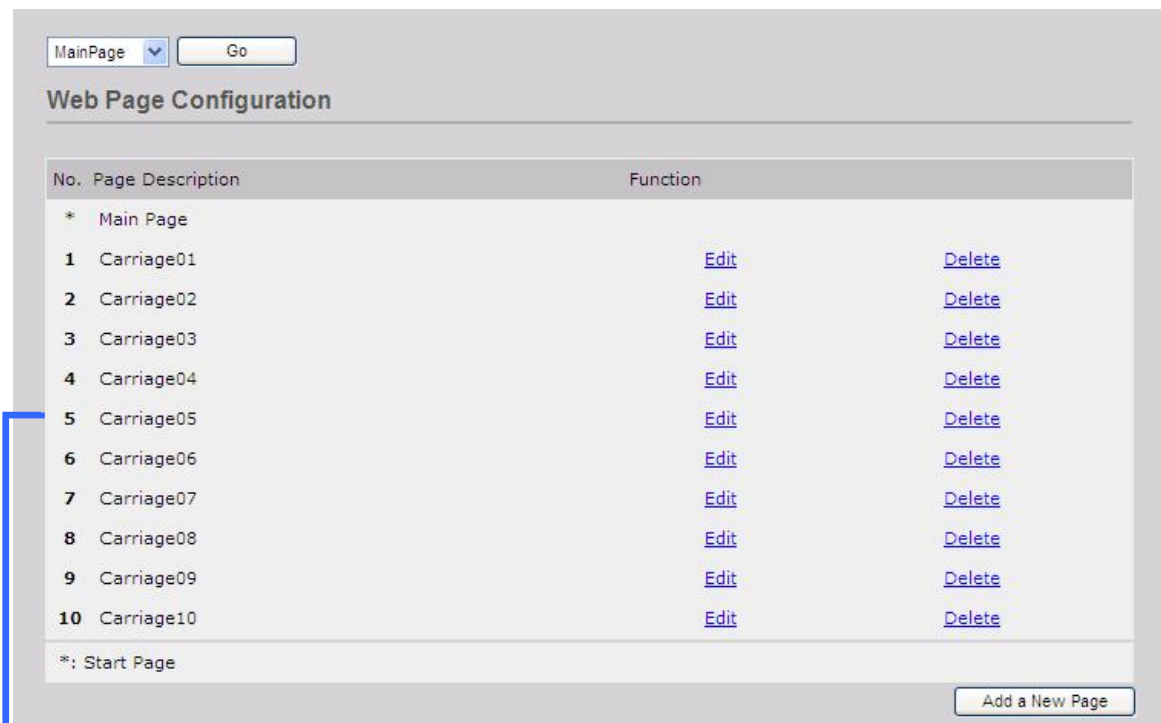
A blue circle highlights the 'Main Page' and the first three pages in the table. An arrow points from this circle to the 'Page0-Carriage' tab in the second screenshot. The second screenshot shows the 'Page0-Carriage' page selected, displaying an I/O layout diagram of a carriage system with three stations (Station 1, Station 2, Station 3) and three motors (Motor1, Motor2, Motor3). Below the diagram is a table with the following data:

Point No.	Alias	Status	Action
0	Motor1	OFF	<input type="button" value="On"/> <input type="button" value="Off"/>
1	PHS1	-0.000	

At the bottom of the interface, a status bar indicates 'Communication Status: Good'.

By default, no pages are listed on the initial “**Web Page Configuration**” page.

The OME-ET-7000/OME-PET-7000 Web Edit function allows the creation of up to 10 user-defined web pages.



The screenshot shows the 'Web Page Configuration' interface. At the top, there is a dropdown menu set to 'MainPage' and a 'Go' button. Below the title, there is a table with the following structure:

No.	Page Description	Function
*	Main Page	
1	Carriage01	Edit Delete
2	Carriage02	Edit Delete
3	Carriage03	Edit Delete
4	Carriage04	Edit Delete
5	Carriage05	Edit Delete
6	Carriage06	Edit Delete
7	Carriage07	Edit Delete
8	Carriage08	Edit Delete
9	Carriage09	Edit Delete
10	Carriage10	Edit Delete

Below the table, there is a note: '*: Start Page'. At the bottom right, there is a button labeled 'Add a New Page'.

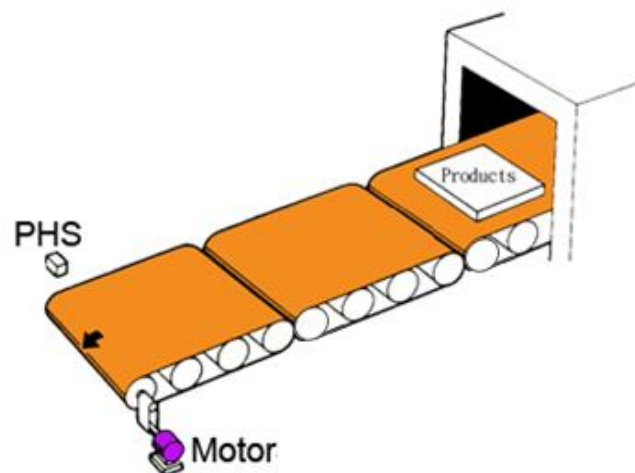
A maximum of 10 pages can be created

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

Example

Objective:

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



Step 1 : Add a New Page

Click the “**Add a new Page**” button to begin creating a new page.

MainPage

Go

Web Page Configuration

No.	Page Description	Function
*	Main Page	

*: Start Page

Add a New Page

Step 2 : Upload an Image

Click the “**Browse...**” button to select an image, and then click the “**Upload**” button to upload the image to the OME-ET-7000/OME-PET-7000 module, as shown in the figure below.

The screenshot shows the 'Web Page Configuration' window. At the top, there's a 'MainPage' dropdown and a 'Go' button. Below this, a callout box says '1. Click the “Browse...” button to select an image'. The main area has a large empty box on the left for the image preview. To its right, the 'Image:' field shows 'C:\conveyor.jpg'. Next to it are 'Browse...', 'Upload', and 'Del All' buttons. A warning message states: 'The total space available for storing images is only 64Kb, so the file size for the image must be less then 64Kb.' Below this, another callout box says '2. Click the “Upload” button to upload the image'. At the bottom, the 'Page Name:' field is '0', the 'Image:' dropdown shows 'b/conveyor.gif', and there are 'Save' and 'Set as Start Page' checkboxes. The 'Free space' is noted as 65504 bytes.

Tips & Warnings



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

After the upload is completed, the image information will be displayed and the image will be added to the “Image” dropdown list box, as shown below.

This screenshot shows the 'Web Page Configuration' window after a successful upload. A callout box labeled 'Image information' points to a list of files: 'ET7K.jpg: 03/12/2009 9:35:25, size=' and 'conveyor.jpg: 165/165/2097 165:165'. Another callout box labeled 'File name added to the Image dropdown list box' points to the 'Image:' dropdown menu, which now lists 'None', 'ET7K.jpg', and 'conveyor.jpg'. The 'Page Name:' field is still '0', and the 'Image:' field now shows 'b/conveyor.gif'. The 'Free space' is now 52361 bytes.

Step 3 : Set the Page Name and Select the Image

Enter a name for the page in the “Page Name” field and then select an image from the “Image” dropdown list box. After selecting the image, it will be displayed in the preview window.

Step 4 : Add the Register Item(s) that are to be used to read the selected sensor input

Click the “Edit” button from the first row in the Group table, and the “Edit Group Register” window will be displayed.

The screenshot shows the 'Web Page Configuration' window. At the top, there is a 'MainPage' dropdown and a 'Go' button. Below this is a preview window showing a conveyor belt diagram with labels 'PHS', 'Products', and 'Motor'. To the right of the preview is an 'Image:' field with 'Browse...', 'Upload', and 'Del All' buttons. A blue callout box points to the 'Image:' field with the text: 'Enter a name for the page and select an image'. Below the preview, there is a list of images: 'ET7K.jpg: 03/12/2009 9:35:25, size=6866 bytes' and 'conveyor.jpg: 165/165/2097 165:165:85, size=13111 bytes'. Below this list is a 'Page Name:' field containing 'Carriage', an 'Image:' dropdown showing 'b/conveyor.gif' and 'conveyor.jpg', a 'Save' button, and a 'Set as Start Page' button. A blue oval highlights the 'Page Name' field, the 'Image' dropdown, and the 'Save' button. Below this is a 'Group' table with columns: Register, Alias, Scaling, Type, Data type, and buttons 'Edit' and 'Clear'. The table has three rows. The first row's 'Edit' button is circled in blue, with a blue arrow pointing to it from a blue callout box at the bottom that says: 'Click the “Edit” button to enter or modify the details of the register item(s)'.

Web Page Configuration

Image:

Browse... Upload Del All

Enter a name for the page and select an image

ET7K.jpg: 03/12/2009 9:35:25, size=6866 bytes

conveyor.jpg: 165/165/2097 165:165:85, size=13111 bytes

Free space=62361 bytes

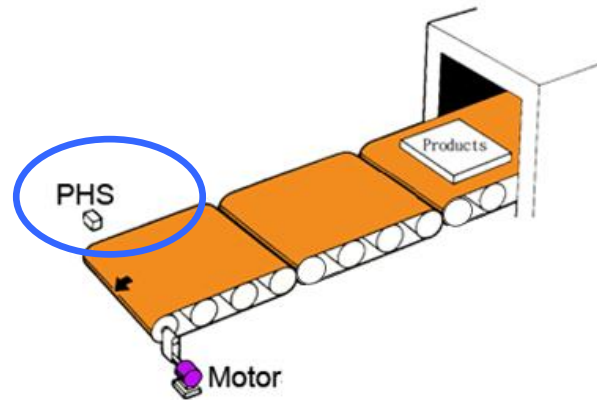
Page Name: Carriage Image: b/conveyor.gif conveyor.jpg Save Set as Start Page

	Register	Alias	Scaling	Type	Data type		
1						Edit	Clear
2						Edit	Clear
3						Edit	Clear

Click the “Edit” button to enter or modify the details of the register item(s)

Step 5 : Add a DI value that is to be used to read “PHS” input

Set the PHS as an input (use the **Modbus Register 0 (DIO)**), and then select **Discrete Input** as the **Register Type** and enter the name **PHS1** as the **Alias**, as per the figure shown below.



MainPage Go

Edit Group Register

Modbus Register	DIO	Protocol Address (Base 0)	0
Alias		PHS1	The maximum length for the alias is 8 characters
Scaling		Disabled	0
Register Type		Discrete Input	Read

Scaled value = (A/D value) * Gain
Gain ranges from 0.01 to 655.35

Discrete Input Coil Discrete Input Input Holding Save

Step 6 : Save the selected sensor settings

Click the **“Save”** button to complete the setup and save the register settings.

MainPage Go

Edit Group Register

Modbus Register		Protocol Address (Base 0)	0
Alias		PHS1	The maximum length for the alias is 8 characters
Scaling		Disabled	0
Register Type		Discrete Input	Read

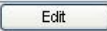
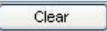

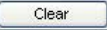
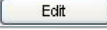

Scaled value = (A/D value) * Gain
Gain ranges from 0.01 to 655.35

Discrete Input Coil Discrete Input Input Holding Save

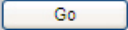
Step 7 : Add the register item(s) that is to be used to write the selected motor output

After saving the register settings, the new register item will be displayed in the Group table.

If you wish to edit the details for an item, click the “Edit” button to access the Edit Group Register page.


Group							
	Register	Alias	Scaling	Type	Data type		
1	0	PHS1	0	Discrete Input	Boolean		
2							
3							

Click the “Edit” button to enter or modify the details of the register item(s)

MainPage 

Edit Group Register

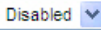
Modbus Register

Protocol Address (Base 0) 

Alias

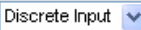
The maximum length for the alias is 8 characters


Scaling

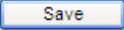
Disabled 

Scaled value = (A/D value) * Gain
Gain ranges from 0.01 to 655.35

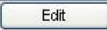
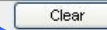
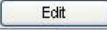
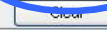
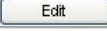
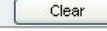
Register Type

Discrete Input 

Read 

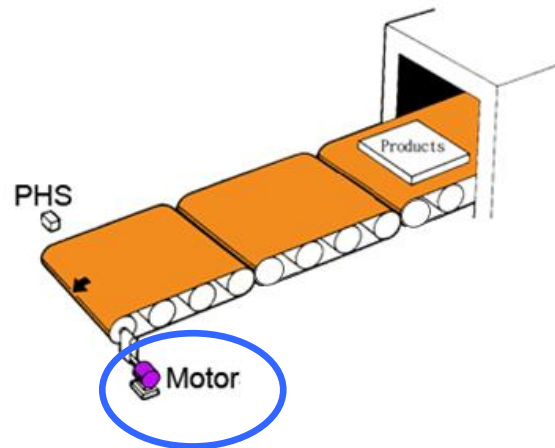


If you wish to delete a register item, click the “Clear” button.

Group							
	Register	Alias	Scaling	Type	Data type		
1	0	PHS1	0	Discrete Input	Boolean		
2							
3							

Step 8 : Add a DO that is to be used to write the “Motor” out put to turn the conveyor motor on and off

Set the Motor as an output (use the **Modbus Register 0 (DO0)**), and then select **Coil** and **Write** as the **Register Type** and enter **Motor** as the **Alias**, as shown in the figure below.



MainPage Go

Edit Group Register

Modbus Register	DO0	Protocol Address (Base 0)	0
Alias	Motor <small>The maximum length for the alias is 8 characters</small>		
Scaling	Disabled 0 <small>Scaled value = (A/D value) * Gain Gain ranges from 0.01 to 655.35</small>		
Register Type	Coil	Write	Save

By selecting “write” as the Register type, control button will be shown on the web page. (Refer to Step 10)

Step 9 : Save the selected sensor settings

Click the “**Save**” button to complete setup and save the register settings.

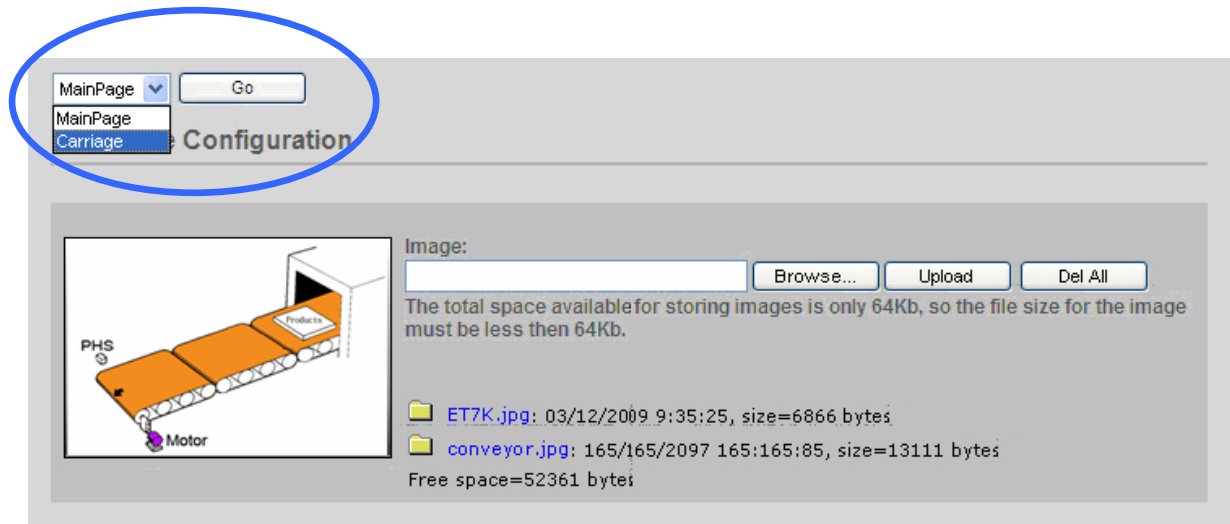
MainPage Go

Edit Group Register

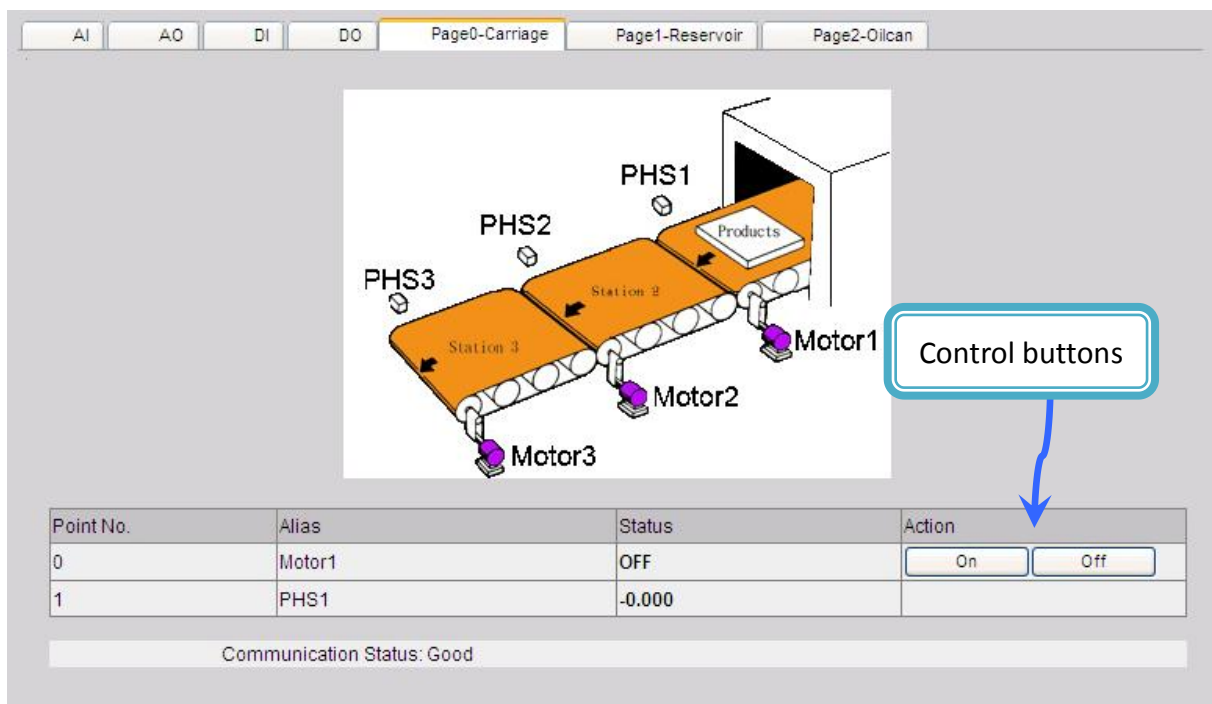
Modbus Register		Protocol Address (Base 0)	0
Alias	Motor <small>The maximum length for the alias is 8 characters</small>		
Scaling	Disabled 0 <small>Scaled value = (A/D value) * Gain Gain ranges from 0.01 to 655.35</small>		
Register Type	Coil	Write	Save

Step 10 : Browse the “Carriage” web page

After saving the editing page, a page named **Carriage** has been added to the list box on the top left-hand side of the **Web Page Configuration** window. Select the **Carriage** item and click the “Go” button to display to the **Carriage** web page.

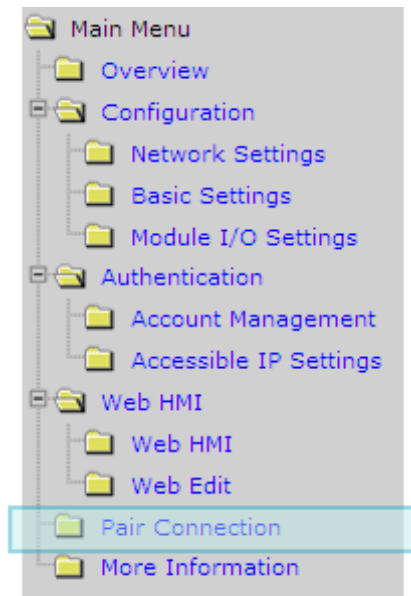


The conveyor image file and the newly created register items will be displayed on the **Carriage** web page, including control buttons that can be used to switch the motor for the conveyor on or off.



3.5. I/O Pair Connection

The “**Pair Connection**” option in the Main Menu provides access to the configuration page for the pair connection function.



The pair connection function is a particular feature of the OME-ET-7000/OME-PET-7000 module that can be used to enable a pair of DI-to-DO (AI-to-AO) via Modbus/TCP. With the pair connection function enabled, the OME-ET-7000/OME-PET-7000 module can poll the status of remote input devices using the Modbus/TCP protocol and then continuously write to its output channels in the background.

The Pair Connection function consists of the following parameters:

The image shows a 'Modbus Settings' configuration window. At the top, 'Modbus Port' is set to 502. Below this is a section for 'I/O Pair Connection' which is currently disabled (checkbox is unchecked). This section contains two identical blocks for 'DO' and 'AO' access types. Each block includes fields for 'Remote IP Address', 'Remote TCP Port' (set to 0), 'Connection Timeout' (0 ms), 'Reconnect Interval' (0 ms), 'Remote NetID' (0), 'Scan Time' (0 ms), 'Local Base Address' (0), 'Remote Base Address' (0), 'I/O Count' (0), and 'Communication Timeout' (0 ms). A 'Submit' button is located at the bottom right of the settings area.

I/O Pair Connection: This item is used to enable/disable the I/O pair connection.

Remote IP Address: The IP address of the remote input device.

Remote TCP Port: The Modbus/TCP Port of the remote input device.

Connection Timeout: The length of time that the OME-ET-7000/OME-PET-7000 module should wait for a connection to the remote input device.

Reconnect Interval: The reconnect interval is the amount of time between attempts by the OME-ET-7000/OME-PET-7000 module to reconnect with the remote input device.

Remote Net ID: The Modbus Net ID of the remote device.

Scan Time: The frequency that the remote input device will be polled.

Access Type: Enable/Disable the DI-to-DO (AI-to-AO) pair connection.

Local DO Base Address: The DO base address of the local DO register that will be mapped to the remote DI device.

Remote DI Base Address: The DI base address of the Remote DI device that will be mapped to the local DO register.

I/O Count: The I/O count mapped from the base address.

Communication Timeout: The period of time that the OME-ET-7000/OME-PET-7000 module will wait for a response from the remote DI device.

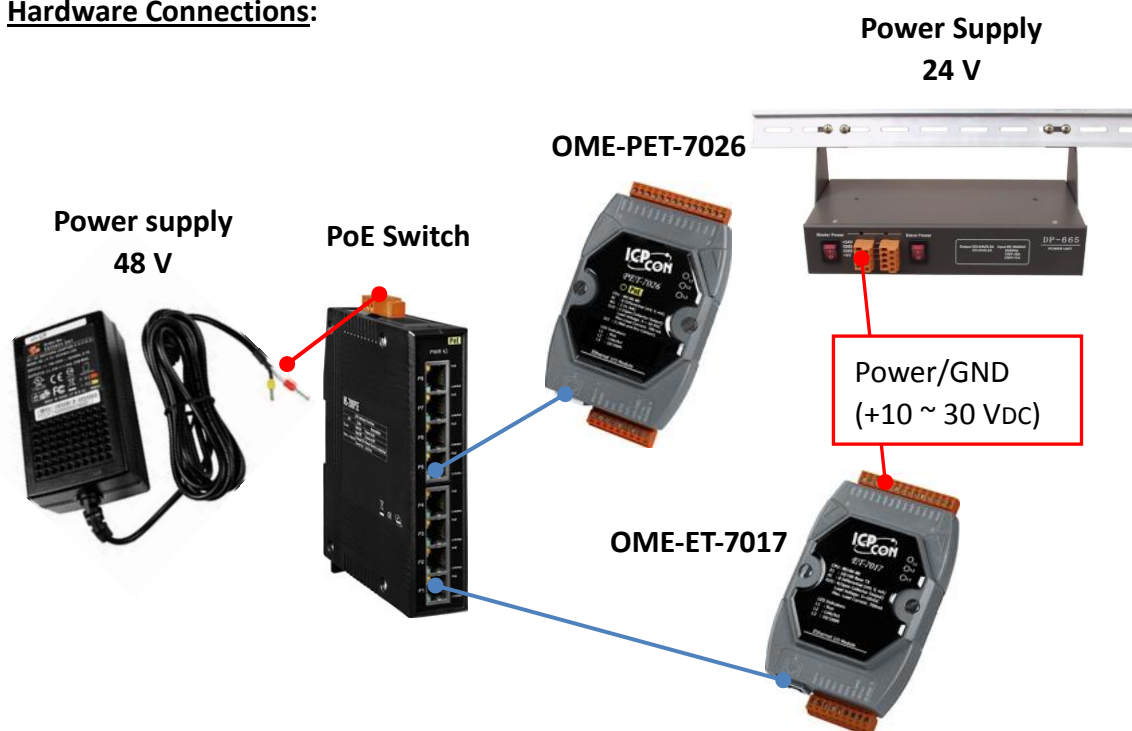
3.5.1. Example 1: Pair Connection - AO to AI

In this example, we will show how to use this feature to achieve AI/AO mapping on two remote I/O devices.

Hardware devices:

OME-PET-7026 (AIO/DIO module), OME-ET-7017 (AI/DO module), PoE Switch, Power Supply (24 V), Power Supply (48 V).

Hardware Connections:



Software Configuration:

The following provides step-by-step instructions for how to configure the OME-ET-7000/OME-PET-7000 via the built-in web interface.

In this example, the AO0/AO1 of the OME-PET-7026 must be mapped to the AI0/AI1 of the OME-ET-7017. Later, when the AI0/AI1 of the OME-ET-7017 receives the 5 V, the AO0/AO1 of the OME-PET-7026 will automatically output 5 V.

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

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

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

Click the “**Module I/O Settings**” option in the configuration section of the Main Menu to open the “**analog Output Settings**” page and set the voltage/current range to “**-5 V - 5V**”, and then click the “**Submit**” button. (Follow the same procedure to set the AI range for the OME-ET-7017)

Channel	Range (40459)	Slow Rate (40523)
Ch0	35, -5 V ~ 5 V	0 (Immediate)
Ch1	35, -5 V ~ 5 V	0 (Immediate)

Submit

Tips & Warnings



The settings for both the AO type for the OME-PET-7026 and the AI type for the OME-ET-7017 must be the same. In this example, they are both “**-5 V ~ 5 V**”.

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

Click the “**Pair Connection**” option in the “**Configuration**” section of the Main Menu and enter the details noted in the table below into the respective fields.

Field	Settings						
I/O Pair Connection	Select this option to enable the I/O pair connection functions.						
Remote IP Address	This is the IP address of the OME-ET-7017 (e.g. 192.168.1.204)						
Remote TCP Port	502						
Connection Timeout	3000 ms						
Reconnect Interval	5000 ms						
Remote Net ID	1 (Default = 1, the Net ID for the OME-ET-7017)						
<p>To determine the Net ID, check the “Modbus Definition” section on the “Common Function” page, which can be found by clicking the “Module I/O Settings” option in the “Configuration” section of the Main Menu.</p>							
<div><div>Modbus Definition</div><table><tr><th>Modbus Address</th><th>Function</th><th>Action</th></tr><tr><td>40271</td><td>Modbus Net ID</td><td><input type="text" value="1"/> 1 ~ 255 (default=1)</td></tr></table><div>Submit</div></div>		Modbus Address	Function	Action	40271	Modbus Net ID	<input type="text" value="1"/> 1 ~ 255 (default=1)
Modbus Address	Function	Action					
40271	Modbus Net ID	<input type="text" value="1"/> 1 ~ 255 (default=1)					
Scan Time	300 ms						
Access Type	Select AO						
Local AO Base Address	0, (Starting from AO0 on the OME-PET-7026)						
Remote AI Base Address:	0, (Starting from AI0 on the OME-ET-7017)						
I/O Count	2, (Using AO0, AO1 and AI0, AI1)						
Communication Timeout	400 ms						

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

The image shows a 'Modbus Settings' configuration form. A blue callout bubble with the number '1' points to the 'Modbus Port' field, which contains the value '502'. Another blue callout bubble with the number '2' points to the 'Submit' button at the bottom of the form. The form is divided into two main sections: 'I/O Pair Connection' (checked) and 'I/O Count' (unchecked). The 'I/O Pair Connection' section includes fields for Remote IP Address (192.168.1.204), Remote TCP Port (502), Connection Timeout (3000 ms), Reconnect Interval (5000 ms), Remote NetID (1), Scan Time (300 ms), Access Type (DO), Local DO Base Address (0), Remote DI Base Address (0), I/O Count (0), Communication Timeout (0 ms), Access Type (AO), Local AO Base Address (0), Remote AI Base Address (0), I/O Count (2), and Communication Timeout (400 ms). The 'I/O Count' section is currently unchecked.

Modbus Settings			
Modbus Port	502		
✓ I/O Pair Connection			
Remote IP Address	192.168.1.204	Remote TCP Port	502
Connection Timeout	3000 ms	Reconnect Interval	5000 ms
Remote NetID	1	Scan Time	300 ms
Access Type	DO <input type="checkbox"/>		
Local DO Base Address	0	Remote DI Base Address	0
I/O Count	0	Communication Timeout	0 ms
Access Type	AO <input checked="" type="checkbox"/>		
Local AO Base Address	0	Remote AI Base Address	0
I/O Count	2	Communication Timeout	400 ms
<div>Submit</div>			

Testing:

Before beginning testing, check that the Data Format settings are the same for both the OME-PET-7026 and the OME-ET-7017. To do this, click the “**Module I/O Settings**” option in the “**Configuration**” section of the main menu, and check the “**Basic Settings**” section on the “**Analog Input**” page.

Analog Input Settings
Basic Settings

Channel	Range (40427)	Enabled (00595)
Ch0	08, -10 V ~ 10 V	OFF <input type="radio"/> ON <input checked="" type="radio"/>
Ch1	08, -10 V ~ 10 V	OFF <input type="radio"/> ON <input checked="" type="radio"/>
Ch2	08, -10 V ~ 10 V	OFF <input type="radio"/> ON <input checked="" type="radio"/>
Ch3	08, -10 V ~ 10 V	OFF <input type="radio"/> ON <input checked="" type="radio"/>
Ch4	08, -10 V ~ 10 V	OFF <input type="radio"/> ON <input checked="" type="radio"/>
Ch5	08, -10 V ~ 10 V	OFF <input type="radio"/> ON <input checked="" type="radio"/>

Modbus Address	Function	Action
00628	Normal mode (16 bits and 10 Hz), Fast mode (12 bits and 60 Hz) for AI	OFF <input checked="" type="radio"/> ON <input type="radio"/> 0=Normal, 1=Fast (default=0)
00629	60/50 Hz Rejection	OFF <input checked="" type="radio"/> ON <input type="radio"/> 0=60 Hz, 1=50 Hz (default=0)
00631	Data Format	OFF <input checked="" type="radio"/> ON <input type="radio"/> 0=Hex, 1=Engineering (default=0)
00632	Restore Analog Calibration to Factory Settings	<input type="checkbox"/>

Submit

Supply +5 V to AI0 on the OME-ET-7017, and then click the “**Web HMI**” option in the “**Web HMI**” section of the Main Menu for the OME-PET-7026, and then click the “**AO**” tab, where you will be able to check the AO0 value for the OME-PET-7026.

AI AO DI DO Pair Page0-Carriage

Analog Output

No	Register	Hex Format	Floating Format	Value
AO0	40000	7FFF	5.000	<input type="text"/> -5V~5V <input type="button" value="Enter"/>
AO1	40001	0000	0.000	<input type="text"/> -5V~5V <input type="button" value="Enter"/>

Communication Status: Good

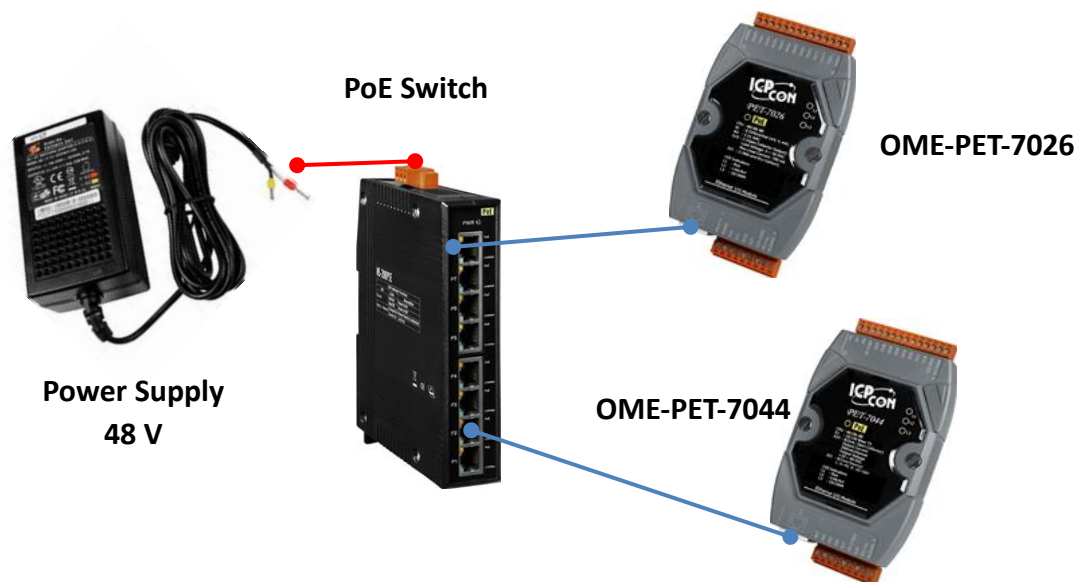
3.5.2. Example 2: Pair Connection - DO to DI

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

Hardware devices:

OME-PET-7026 (AIO/DIO module), OME-PET-7044 (DIO module), PoE Switch, and Power Supply (48 V).

Hardware Connections:



Software Configuration:

The following provides step-by-step instructions for how to configure the OME-ET-7000/OME-PET-7000 via the built-in web interface.

In this example, the DO0/DO1 of the OME-PET-7026 must be mapped to the DI0/DI1 of the OME-PET-7044. Later, when the status of the DI0/DI1 is switched to ON, the status of the DO0/DO1 will be switched to logic high automatically.

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

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

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

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

Field	Settings
I/O Pair Connection	Select this option to enable the I/O pair connection functions.
Remote IP Address	This is the IP address of the OME-PET-7044 (e.g. 192.168.1.99)
Remote TCP Port	502
Connection Timeout	3000 ms
Reconnect Interval	5000 ms
Remote Net ID	1 (Default = 1, the Net ID for the OME-PET-7044)

To determine the Net ID, check the “**Modbus Definition**” section on the “**Common Function**” page, which can be found by clicking the “**Module I/O Settings**” option in the “**Configuration**” section of the Main Menu.

Modbus Definition

Modbus Address	Function	Action
40271	Modbus Net ID	<input type="text" value="1"/> 1 ~ 255 (default=1)

Submit

Scan Time	300 ms
Access Type	Select DO
Local DO Base Address	0, (Starting from DO0 on the OME-PET-7026)
Remote DI Base Address:	0, (Starting from DI0 on the OME-PET-7044)
I/O Count	2, (Using DO0, DO1 and DI0, DI1)
Communication Timeout	400 ms

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

The image shows the 'Modbus Settings' configuration window. A blue circle with the number '1' points to the 'Modbus Port' field, which contains the value '502'. A blue rectangle with a blue border encloses the 'I/O Pair Connection' section. A blue circle with the number '2' points to the 'Submit' button at the bottom of the form.

Modbus Settings

Modbus Port: 502

☒ **I/O Pair Connection**

Remote IP Address	192.168.1.204	Remote TCP Port	502
Connection Timeout	3000 ms	Reconnect Interval	5000 ms
Remote NetID	1	Scan Time	300 ms
Access Type	DO <input checked="" type="checkbox"/>		
Local DO Base Address	0	Remote DI Base Address	0
I/O Count	2	Communication Timeout	0 ms
Access Type	AO <input type="checkbox"/>		
Local AO Base Address	0	Remote AI Base Address	0
I/O Count	0	Communication Timeout	400 ms

Submit

Testing:

First, set the DI0 status on the OME-PET-7044 to ON, and then click the “**Web HMI**” option in the “**Web HMI**” section of the Main Menu for the OME-PET-7026, and click the “**DO**” tab, you will notice the status of the DO0 has changed to “**ON**”.

The image shows the 'Digital Output' status screen. A blue rectangle highlights the 'DO' tab in the top navigation bar. A blue rectangle highlights the row for 'DO0' in the table, which shows its status as 'ON'. The 'on' button in the 'Action' column for 'DO0' is also highlighted.

AI AO DI DO Pair Page0-Carriage

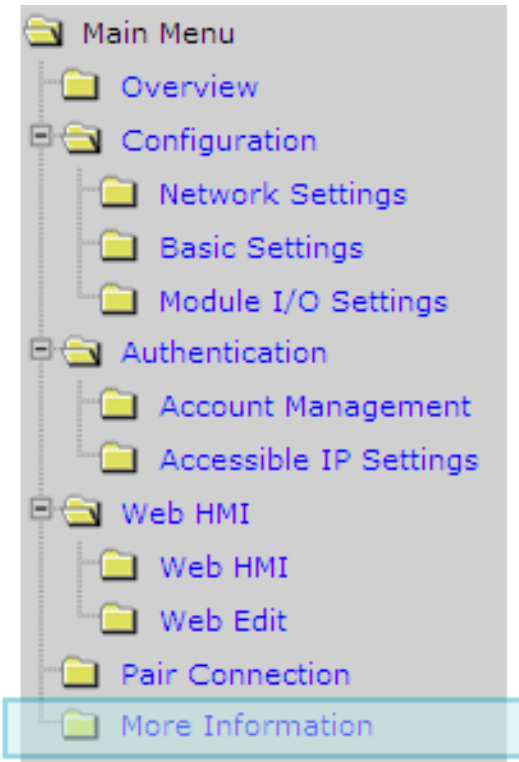
Digital Output

No	Register	Status	Action
DO0	00000	ON	on off
DO1	00001	OFF	on off

Communication Status: Good

3.6. More Information

The “**More Information**” option in the main menu will open the OMEGA site in your browser and display the main introduction page for the OME-ET-7000/OME-PET-7000 series of modules, which provides more detailed information related to the modules.



The URL for this link can be changed by simply editing the URL. For more details, refer to section 3.2.2 “Configure the web interface information”.

The default URL that the More Information item will link to:

<http://www.omega.com>



4. Modbus and Modbus TCP

Modbus is a serial communication protocol that allows a wide variety of instruments to be connected to a common data collection network.

Modbus/TCP is a variant of the Modbus communication protocol that allows devices to communicate over a TCP/IP.

With the support of the Modbus TCP protocol, the OME-ET-7000/OME-PET-7000 series module can communicate with PC-based applications, such as SCADA (Supervisor Control And Data Acquisition) and HMI programs. The Modbus/TCP information is only available via an Ethernet interface.

The Modbus/TCP messaging service provides a Client/Server communication between devices connected on a TCP/IP network. The OME-ET-7000/OME-PET-7000 module is a Modbus Server, meaning that it is only capable of responding to requests from the Modbus client device. Note that the Modbus/RTU protocol requires a serial interface, not Ethernet, and is therefore not directly compatible with the OME-ET-7000/OME-PET-7000 module.

The Modbus protocol, as well as the TCP extension, is well documented in the specifications, which are available at <http://www.modbus.org>, a website established by the Modbus Organization to provide support and organization for the Modbus protocol. Only the use of the protocol is documented here.

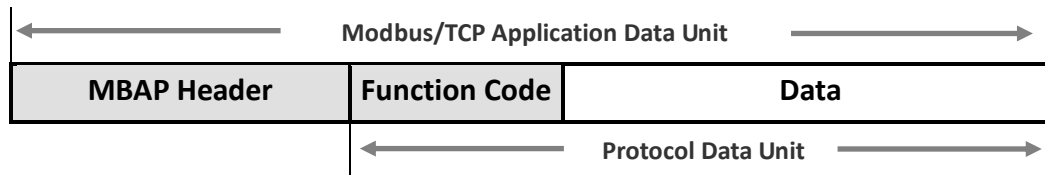
4.1. Modbus TCP/IP Interface

The Modbus/TCP interface is attached to the TCP/IP stack that is implemented within the OME-ET-7000/OME-PET-7000 module, and will listen to all communications that come in on Modbus/TCP registered Port 502.

The Modbus/TCP client uses the standard TCP method for communicating with the OME-ET-7000/OME-PET-7000 module. UP to 12 connections are possible at one time. If there are 12 active connections, any attempt at any more connections is ignored.

4.2. Protocol Description

The Modbus protocol defines a simple protocol data unit independent of the underlying communication layers. The mapping of Modbus protocol on network can introduce some additional fields on the application data unit.



MBAP

The Modbus/TCP extension includes 7 additional bytes to the original Modbus protocol, which allows for transport over the TCP/IP layers.

A dedicated header is used on TCP/IP to identify the Modbus Application Data Unit. It is called the MBAP Header (MODBUS Application Protocol Header). The MBAP Header consists of 7 bytes of information:

Field	Length	Description
Transaction Identifier	2 bytes	Identification of Request/Response transaction – Copied from request to response
Protocol Identifier	2 bytes	0 = Modbus protocol
Length	2 bytes	Number of following bytes - Includes the Unit Identifier
Unit Identifier	1 byte	Identification of remote slave

Function Code

The function code field of a Modbus data unit is coded in one byte. Valid codes are in the range of 1 ... 255 decimal (the range 128 - 255 is reserved and used for exception responses). When a Modbus request is sent from a Modbus Client to a Server device the function code field tells the Server what kind of action to perform.

The Modbus/TCP feature of OME-ET-7000/OME-PET-7000 series module supports 8 function codes, which allows the reading and writing of data contents of registers.

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

Any other function code request will be returned with an error response indicating the function code is not supported, as well as a request for too much data or data at a register address that not present.

Data

The data field of Modbus request sent from a client to server devices contains additional information that the server uses to take the action defined by the function code. This can include items like discrete and register addresses, the quantity of items to be handled, and the count of actual data bytes in the field.

The data field may be nonexistent (of zero length) in certain kinds of requests; in this case the server does not require any additional information. The function code alone specifies the action.

Response

If no error occurs related to the Modbus function requested in a properly received Modbus PDU (Protocol Data Unit) the data field of a Modbus response from a server to a client contains the data requested. If an error related to the Modbus function requested occurs, the field contains an exception code that the server application can use to determine the next action to be taken.

For example a client can read the ON/OFF states of a group of digital input or output or it can read/write the data contents of a group of registers.

When the server responds to the client, it uses the function code field to indicate either a normal response or that some kind of error occurred (called an exception response). For a normal response, the server simply echoes to the request the original function code.

For an exception response, the server returns a code that is equivalent to the original function code from the request PDU with its most significant bit set to logic 1.

4.3. Data Encoding

Modbus uses a “big-endian” representation for address and data items. This means that when a numerical quantity larger than single byte is transmitted, the most significant byte (MSB, also called the high-order byte) is send first. The following sub-topics describe the different byte of encoding and show how the data is encoded as it is within the Modbus/TCP packet.

4.3.1. Binary

A binary item is represented as a single bit within a data word. All binary is packed into 16-bits data words, which are accessed using function code 01 and 02. Therefore, a single register contains 16 bits of binary data, each having a specific meaning.

Value	1st	2nd
0xAA55 (1010101001010101)	0xAA (10101010)	0x55 (01010101)

4.3.2. 16-bits Word

A 16-bits word item is transmitted with the most significant byte first. Function code 03 and 04 read 16-bits items at a time; therefore, each of these data items will fit within one register that is read.

Value	1st	2nd
0x1234	0x12	0x34

4.4. Data Model

Modbus bases its data model on a series of tables that have individual characteristics. The four primary tables are:

Primary table	Data type	Type of access
Discrete Input	Single bit	Read-Only
Coils	Single bit	Read-Write
Input Registers	16-bits word	Read-Only
Holding Registers	16-bits word	Read-Write

To access each entry in to the four primary tables, a starting address (0 indicates the first entry in the table) is required as well as the number of registers that are requested.

For each of the primary tables, the protocol allows individual selection of 65535 data items, and the operations of read or write of those items are designed to span multiple consecutive data items up to a data size limit which is dependent on the transaction function code.

Once the data is stored within the local tables, the driver does not differentiate what is stored in them. The Modbus/TCP client needs to know what data is stored in which register locations to be able to retrieve it, process it, and/or display it.

4.5. Modbus Functions and Registers

4.5.1. 01 (0x01) Read Coils

This function code is used to read the status of coils in an OME-ET-7000/OME-PET-7000 module. The Request PDU specifies the starting address, i.e. the address of the first coil specified, and the number of coils. In the PDU Coils are addressed starting at zero.

The coils in the response message are packed as one coil per bit of the data field. Status is indicated as 1=ON and 0=OFF. The LSB of the first data byte contains the output addressed in the query. The other coils follow toward the high order end of this byte, and from low order to high order in subsequent bytes.

If the returned output quantity is not a multiple of eight, the remaining bits in the final data byte will be padded with zeros (toward the high order end of the byte). The Byte Count field specifies the quantity of complete bytes of data.

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

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
MBAP Header	01	MBAP Header	01
	02		02
	00		00
	00		00
	00		00
	06		04
Unit Identifier	01	Unit Identifier	01
Function Code	01	Function Code	01
Starting Address Hi	00	Byte Count	01
Starting Address Lo	00	Outputs status 0-1	02
Quantity of Outputs Hi	00		
Quantity of Outputs Lo	02		

The status of outputs 0-1 is shown as the byte value 02 hex, or binary 0000 00**10**. DO1 is in the seventh bit position from the left, and DO0 is the LSB of this byte. The six remaining high order bits are zero filled.

4.5.2. 02 (0x02) Read Discrete Inputs

This function code is used to read status of discrete inputs in an OME-ET-7000/OME-PET-7000 module. The Request PDU specifies the starting address, i.e. the address of the first input specified, and the number of inputs. In the PDU Discrete inputs are addressed starting at zero.

The discrete inputs in the response message are packed as one input per bit of the data field. Status is indicated as 1=ON and 0=OFF. The LSB of the first data byte contains the input addressed in the query. The other inputs follow toward the high order end of this byte, and from low order to high order in subsequent bytes.

If the returned input quantity is not a multiple of eight, the remaining bits in the final data byte will be padded with zeros (toward the high order end of the byte). The Byte Count field specifies the quantity of complete bytes of data.

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

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
MBAP Header	01	MBAP Header	01
	02		02
	00		00
	00		00
	00		00
	06		04
Unit Identifier	01	Unit Identifier	01
Function Code	02	Function Code	02
Starting Address Hi	00	Byte Count	01
Starting Address Lo	00	Digital Inputs status 0-1	03
Quantity of Inputs Hi	00		
Quantity of Inputs Lo	02		

The status of Inputs 0-1 is shown as the byte value 03 hex, or binary 0000 0011. DI1 is in the seventh bit position from the left, and DI0 is the LSB of this byte. The six remaining high order bits are zero filled.

4.5.3. 03 (0x03) Read Holding Registers

This function code is used to read the contents of a contiguous block of holding registers in an OME-ET-7000/OME-PET-7000 module. The Request PDU specifies the starting register address and the number of registers. In the PDU Registers are addressed starting at zero.

The register data in the response message are packed as two bytes per register, with the binary contents right justified within each byte. For each register, the first byte contains the high order bits and the second contains the low order bits.

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

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
MBAP Header	01	MBAP Header	01
	02		02
	00		00
	00		00
	00		00
	06		07
Unit Identifier	01	Unit Identifier	01
Function Code	03	Function Code	03
Starting Address Hi	00	Byte Count	04
Starting Address Lo	00	Register value Hi (AO0)	02
Quantity of Outputs Hi	00	Register value Lo (AO0)	2B
Quantity of Outputs Lo	02	Register value Hi (AO1)	00
		Register value Lo (AO1)	64

The contents of AO0 are shown as the two byte values of 02 2B hex, or 555 decimal. The content of AO1 are 00 64, or 100 decimal.

4.5.4. 04 (0x04) Read Inputs Registers

This function code is used to read input registers in an OME-ET-7000/OME-PET-7000 module. The Request PDU specifies the starting register address and the number of registers. In the PDU Registers are addressed starting at zero.

The register data in the response message are packed as two bytes per register, with the binary contents right justified within each byte. For each register, the first byte contains the high order bits and the second contains the low order bits.

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

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
MBAP Header	01	MBAP Header	01
	02		02
	00		00
	00		00
	00		00
	06		07
Unit Identifier	01	Unit Identifier	01
Function Code	04	Function Code	04
Starting Address Hi	00	Byte Count	04
Starting Address Lo	00	Register value Hi (AI0)	00
Quantity of Inputs Hi	00	Register value Lo (AI0)	0A
Quantity of Inputs Lo	02	Register value Hi (AI1)	00
		Register value Lo (AI1)	64

The contents of AI0 are shown as the two byte values of 00 0A hex, or 10 decimal. The content of AI1 are 00 64, or 100 decimal.

4.5.5. 05 (0x05) Write Single Coil

This function code is used to write a single digital output to either ON or OFF in an OME-ET-7000/OME-PET-7000 module. The requested ON/OFF state is specified by a constant in the request data field. A value of FF 00 hex requests the output to be ON. A value of 00 00 requests it to be OFF. All other values are illegal and will not affect the output.

The normal response is an echo of the request, returned after the coil state has been written.

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

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
MBAP Header	01	MBAP Header	01
	02		02
	00		00
	00		00
	00		00
	06		06
Unit Identifier	01	Unit Identifier	01
Function Code	05	Function Code	05
Output Address Hi	00	Output Address Hi	00
Output Address Lo	01	Output Address Lo	01
Output Value Hi	FF	Output Value Hi	FF
Output Value Lo	00	Output Value Lo	00

4.5.6. 06 (0x06) Write Single Register

This function code is used to write a single analog output in an OME-ET-7000/OME-PET-7000 module. The Request PDU specifies the address of the register to be written. Registers are addressed starting at zero.

The normal response is an echo of the request, returned after register contents have been written.

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

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
MBAP Header	01	MBAP Header	01
	02		02
	00		00
	00		00
	00		00
	06		06
Unit Identifier	01	Unit Identifier	01
Function Code	06	Function Code	06
Register Address Hi	00	Register Address Hi	00
Register Address Lo	01	Register Address Lo	01
Register Value Hi	55	Register Value Hi	55
Register Value Lo	FF	Register Value Lo	FF

4.5.7. 15 (0x0F) Write Multiple Coils

This function code is used to force each coil in a sequence of coils to either ON or OFF in an OME-ET-7000/OME-PET-7000 module. The Request PDU specifies the coil references to be forced. Coils are addressed starting at zero.

The requested ON/OFF states are specified by contents of the request data field. A logical '1' in a bit position of the field requests the corresponding output to be ON. A logical '0' requests it to be OFF.

The normal response returns the function code, starting address, and quantity of coils forced.

Here is an example of a request to write a series of 2 digital outputs starting at DO0:

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

Bit	0	0	0	0	0	0	1	0
Output	-	-	-	-	-	-	DO1	DO0

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
MBAP Header	01	MBAP Header	01
	02		02
	00		00
	00		00
	00		00
	06		06
Unit Identifier	01	Unit Identifier	01
Function Code	0F	Function Code	0F
Starting Address Hi	00	Starting Address Hi	00
Starting Address Lo	00	Starting Address Lo	00
Quantity of Outputs Hi	00	Quantity Value Hi	00
Quantity of Outputs Lo	02	Quantity Value Lo	02
Byte Count	01		
Outputs Value Lo	02		

4.5.8. 16 (0x10) Write Multiple Registers

This function code is used to write a block of contiguous registers in an OME-ET-7000/OME-PET-7000 module. The requested written values are specified in the request data field. Data is packed as two bytes per register.

The normal response returns the function code, starting address, and quantity of registers written.

Here is an example of a request to write two AO registers starting at AO0:

Request		Response	
Field Name	(Hex)	Field Name	(Hex)
MBAP Header	01	MBAP Header	01
	02		02
	00		00
	00		00
	00		00
	06		06
Unit Identifier	01	Unit Identifier	01
Function Code	10	Function Code	10
Starting Address Hi	00	Starting Address Hi	00
Starting Address Lo	00	Starting Address Lo	00
Quantity of Registers Hi	00	Quantity Value Hi	00
Quantity of Registers Lo	02	Quantity Value Lo	02
Byte Count	04		
Registers Value Hi	00		
Registers Value Lo	0A		
Registers Value Hi	01		
Registers Value Lo	02		

4.6. Modbus Master Simulators

In the previous section, we introduced the Modbus communication protocol. Now, we will describe how to achieve the Modbus/TCP communication between the OME-ET-7000/OME-PET-7000 module and PC-connection.

4.6.1. Modbus/TCP Client

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

For each individual Modbus request you specify the slave ID, function code, starting address and quantity. You can refer to the previous section for more detailed information about Modbus communication protocol.

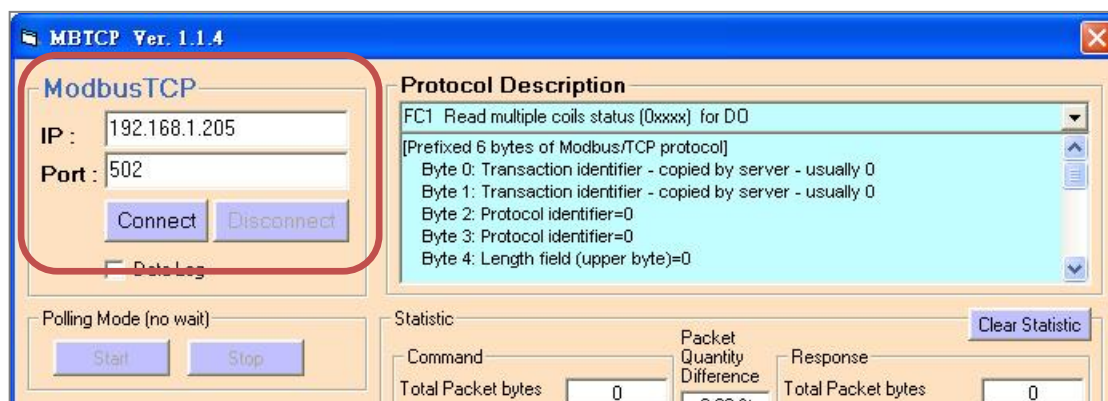
The complete version of the Modbus/TCP Client can be obtained from the companion CD:
CD:\Software\Modbus_TCP_Client\

The following instructions will help you to read the status of digital inputs in an OME-ET-7026 by using the Modbus/TCP Client application.

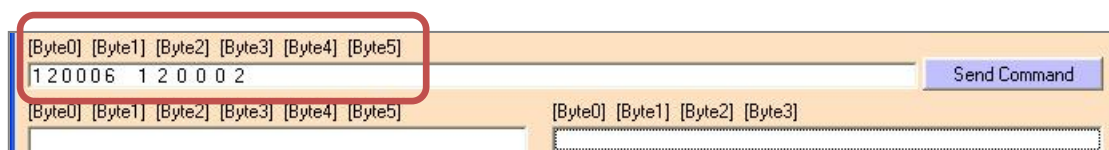
Step 1: Double-click the “MBTCP.exe” to open it.



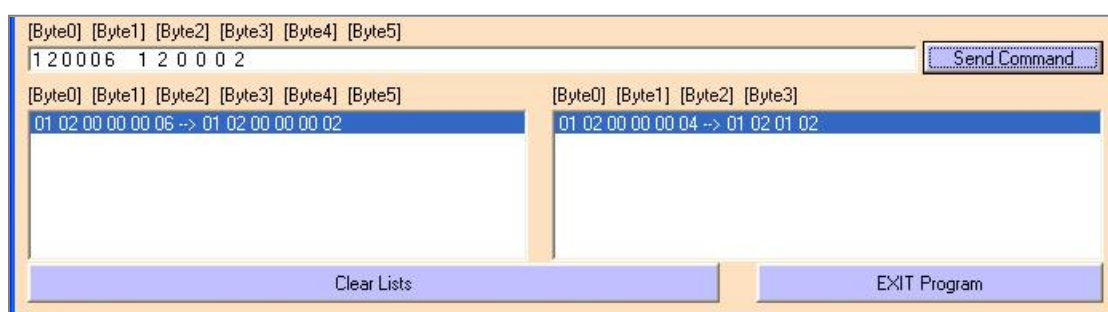
Step 2: Type in the IP address of OME-ET-7026 that you wish to communication with in the Modbus TCP block shown below. Then click the “Connect” button to connect the module.



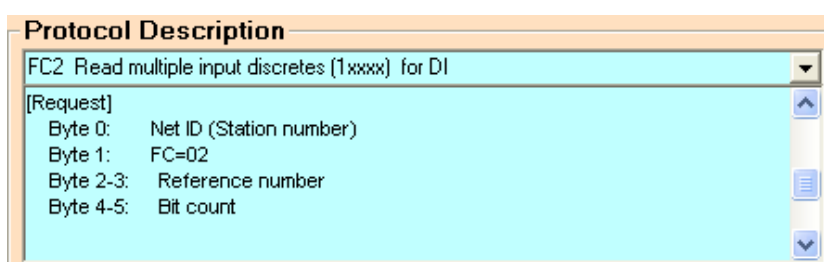
Step 3: Send a Modbus query to the OME-ET-7026 by clicking the “Send” button. An example of a query to read digital inputs 0 to 1 from the OME-ET-7026 at Modbus ID 1 is given below.



Step 4: If no error occurs, a data field of a response from the OME-ET-7026 to the Modbus/TCP Client contains the status of digital inputs of OME-ET-7026.



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



4.6.2. Modbus Master Tool

Modbus Master Tool is a Modbus master simulator designed by OMEGA. It used to help developers of Modbus slave devices or others that want to test the Modbus connection.

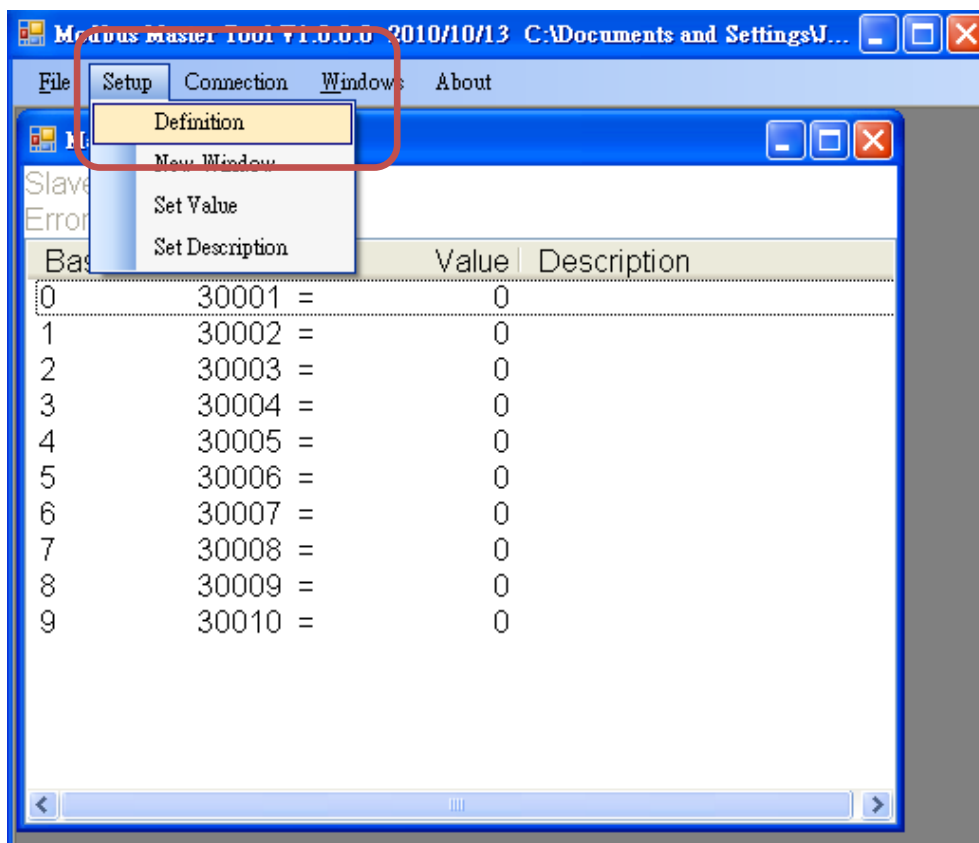
The complete version of the Modbus Master Tool can be obtained from the companion CD:
CD:\Software\Modbus_Master_Tool\

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

Step 1: Double-click the “ModbusMasterToolPC.exe” to open it.



Step 2: Click the “Setup > Definition” in menu bar to setup the parameters.



We use the same example in the [section 4.5.1](#); you can see the parameters in the table.

Request		
	Field Name	(Hex)
1	Unit Identifier	01
2	Function Code	01
3	Starting Address Hi	00
	Starting Address Lo	00
4	Quantity of Outputs Hi	00
	Quantity of Outputs Lo	02

You can go to “Modules I/O Settings” (section 3.2.3) to check/set the ID.

01 (0x01) Read Coils

Starting from D00

Read two channels

Definition
✕

1.

2.

3.

Slave ID:

Function:

01 Read Coils Status ▾

Address:

Length:

Format:

Singed Int16 ▾

OK

Cancel

Tips & Warnings



Please select “Hex” options in the “Format” drop-up menu when you read/write the AO/AI.

Step 3: Click the “Connection > Connect” to set TCP Connection.

File
Setup
Connection
Windows
About

Master0
⏏
⏏
✕

Slave ID =

1

Error = 0

0

Base 0	Base 1	Value	Description
0	00001 =	0	
1	00002 =	0	

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

frmConnect

Interface: TCP/IP

Remote Server IP: 192.168.1.205

Modbus TCP Port: 502

Scan Interval(ms): 1000

Timeout(ms): 200

Delay between poll(ms): 20

Cancel OK

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

Modbus Master Tool V1.0.0.0 2010/10/13 C:\Documents and Settings\J...

File Setup Connection Windows About

Master0

Slave ID = 1, FC = 1

Error = 0

Base 0	Base 1	Value	Description
0	00001 =	1	
1	00002 =	0	

4.7. Modbus Demo Programs

nModbus is a C# 3.0 implementation of the Modbus protocol. It is developed and maintained on a voluntary basis and provided free of charge.

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

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

ftp://ftp.omega.com/public/DASgroup/products/OME-ET-7000_OME-PET-7000/

5. Calibration

Tips & Warnings



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

5.1. Voltage and Current Calibration

Analog Input Calibration Requirement for OME-ET-7000/OME-PET-7000

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

Type Code

The following table shows all of the type code for use in voltage and current, you can use it upon the model number of OME-ET-7000/OME-PET-7000 (e.g. OME-ET-7017 can use type 07 ~ 1A).

Type Code	00	01	02	03	04	05	06	07
Zero Input	0 mV	0 mV	0 mV	0 mV	0 V	0 V	0 mA	0mA
Span Input	+15 mV	+50 mV	+100 mV	+500 mV	+1 V	+2.5 V	+20 mA	+20 mA

Type Code	08	09	0A	0B	0C	0D	1A
Zero Input	0 V	0 V	0 V	0 mV	0 mV	0 mA	0 mA
Span Input	+10V	+5 V	+1 V	+500 mV	+150 mV	+20 mA	+20 mA

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

Step 1 : Warm up the module for 30 minutes.

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

Please go to the configuration page of Modules I/O Settings (refer to Section 3.2.3), set AI0 as ON and the others as OFF. (As figure below)

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

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

Analog Input
Basic Setting

	Range (40427)	Enable (00595)
Ch0	09, -5V~5V	OFF <input type="radio"/> ON <input checked="" type="radio"/>
Ch1	08, -10V~10V	OFF <input checked="" type="radio"/> ON <input type="radio"/>
Ch2	08, -10V~10V	OFF <input checked="" type="radio"/> ON <input type="radio"/>
Ch3	08, -10V~10V	OFF <input checked="" type="radio"/> ON <input type="radio"/>
Ch4	08, -10V~10V	OFF <input checked="" type="radio"/> ON <input type="radio"/>
Ch5	08, -10V~10V	OFF <input checked="" type="radio"/> ON <input type="radio"/>
Ch6	08, -10V~10V	OFF <input checked="" type="radio"/> ON <input type="radio"/>
Ch7	08, -10V~10V	OFF <input checked="" type="radio"/> ON <input type="radio"/>


Step 4 : Enable calibration.

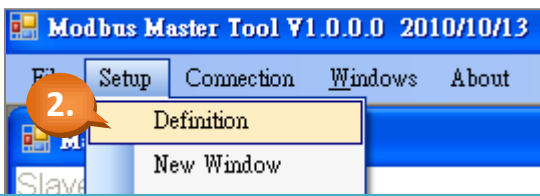
We will use the software – Modbus Master Tool - to complete the step 4 ~ 8.

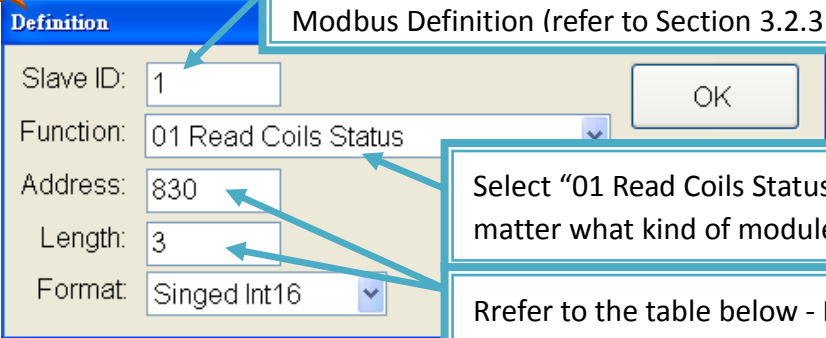
The complete version of the Modbus Master Tool can be obtained from the companion CD:

CD:\Software\Modbus_Master_Tool\

4.1 Please double-click the “ModbusMasterToolPC.exe” to open it and click the “Setup > Definition” in menu bar to setup the parameters.

1.  ModbusMasterToolPC.exe
Modbus Master Tool (PC)
CP DAS

2.  Setup Connection Windows About
Definition
New Window

3. 
Definition
Slave ID: 1
Function: 01 Read Coils Status
Address: 830
Length: 3
Format: Signed Int16
OK

It depends on the settings in Modules I/O Settings - Modbus Definition (refer to Section 3.2.3)

Select “01 Read Coils Status” (no matter what kind of module you use).

Refer to the table below - Modbus Address for Calibration. (830 ~ 832)

Modbus Address for Calibration

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

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

Refer to the link for details.

[ftp://ftp.omega.com/public/DASgroup/products/OME-ET-7000 OME-PET-7000/](ftp://ftp.omega.com/public/DASgroup/products/OME-ET-7000%20OME-PET-7000/)

4.2 Clicking the “Connection > Connect” in menu bar and fill out the OME-ET-7017’s IP address to set TCP Connection.

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

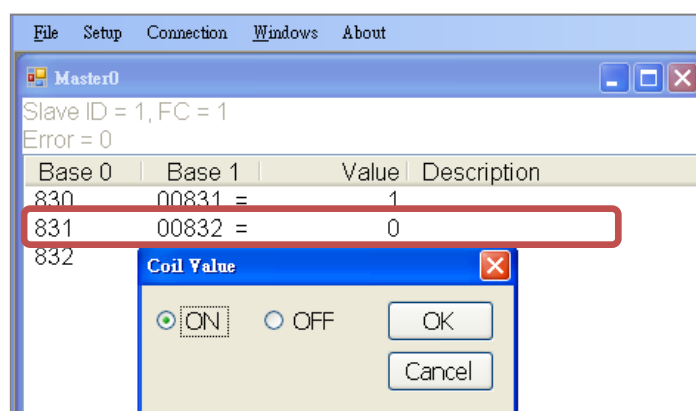
Step 5 : Apply the zero calibration voltage/current to channel 0.

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

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

Step 6 : Send the zero calibration command.

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

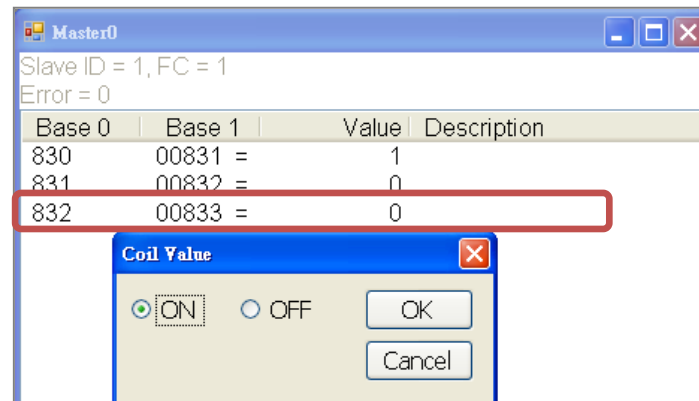
**Step 7 : Apply the span calibration voltage/current to channel 0.**

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

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

Step 8 : Send the span calibration command.

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



Step 9 : Disable calibration.

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

5.2. Thermocouple Calibration

Type Code

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

Type Code	14	18	0E	10	12	13	15	16	19	0F	11	17
Thermocouple Calibration Range	00		01							02		
Zero Input	0 mV		0 mV							0 mV		
Span Input	+15 mV		+50 mV							+100 mV		

The calibration procedure is similar to the section 5.1. But, the difference between them is that the OME-ET-7000/OME-PET-7000 doesn't directly support type code - 0E ~ 19 for AI calibration, so you need to change the channel 0 as range - 00 ~ 02 to complete the work (refer to section 5.1 step 3).

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

For example

If you want to calibrate type 0E, you need to set the channel 0 as range - 01.

Modbus Settings (AI Basic Setting)

	Range (40427)	Enable (00595)
Ch0	[01] +/-50mV	OFF <input type="radio"/> ON <input checked="" type="radio"/>
Ch1	[05] +/-2.5V	OFF <input checked="" type="radio"/> ON <input type="radio"/>
Ch2	[05] +/-2.5V	OFF <input checked="" type="radio"/> ON <input type="radio"/>

5.3.RTD Calibration

Type Code

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

Type Code	20 ~ 29	2E	2F	80	81	83	2B	2C	82	2A	2D
Zero Calibration Resistor	0 Ω						0 Ω			0 Ω	
Span Calibration Resistor	375 Ω						200 Ω			3200 Ω	

Modbus Address for Calibration

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

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

The calibration procedure is as follows:

- Step 1 Warm up the module for latest 30 minutes.**
- Step 2 Set the type code to the type you wish to calibrate.**
- Step 3 Enable calibration.**
- Step 4 Connect the zero calibration resistor.**
(Refer to the table – Type Code)
- Step 5 Send the zero calibration command.**
(Refer to the table - Modbus Address for Calibration)
- Step 6 Connect the span calibration resistor.**
(Refer to the table – Type Code)
- Step 7 Send the span calibration command.**
(Refer to the table - Modbus Address for Calibration)
- Step 8 Disable calibration.**

5.4.Recover Calibration to Factory Setting

Please go to the configuration page of Modules I/O Settings – Analog Input (refer to Section 3.2.3). After you selecting the "Recover AI Calibration to Factory Setting", it will auto complete the function.

Analog Input
Basic Setting

	Range (40427)	Enable (00595)
Ch0	08, -10V~10V	OFF <input type="radio"/> ON <input checked="" type="radio"/>
Ch1	08, -10V~10V	OFF <input type="radio"/> ON <input checked="" type="radio"/>
Ch2	08, -10V~10V	OFF <input type="radio"/> ON <input checked="" type="radio"/>
Ch3	08, -10V~10V	OFF <input type="radio"/> ON <input checked="" type="radio"/>
Ch4	08, -10V~10V	OFF <input type="radio"/> ON <input checked="" type="radio"/>
Ch5	08, -10V~10V	OFF <input type="radio"/> ON <input checked="" type="radio"/>
Ch6	08, -10V~10V	OFF <input type="radio"/> ON <input checked="" type="radio"/>
Ch7	08, -10V~10V	OFF <input type="radio"/> ON <input checked="" type="radio"/>

Modbus Address	Function	Action
00628	Normal(16 bits & 10Hz)/Fast mode(12 bits & 60Hz) for AI	OFF <input checked="" type="radio"/> ON <input type="radio"/> 0=Normal/1=Fast (default=0)
00629	60/50Hz rejection for AI	OFF <input checked="" type="radio"/> ON <input type="radio"/> 0=60Hz/1=50Hz (default=0)
00631	AI Data Format	OFF <input checked="" type="radio"/> ON <input type="radio"/> 0=Hex/1=Engineering (default=0)
00632	Recover AI Calibration Values to Factory Setting	<input type="checkbox"/>

Submit

6. MiniOS7 Utility

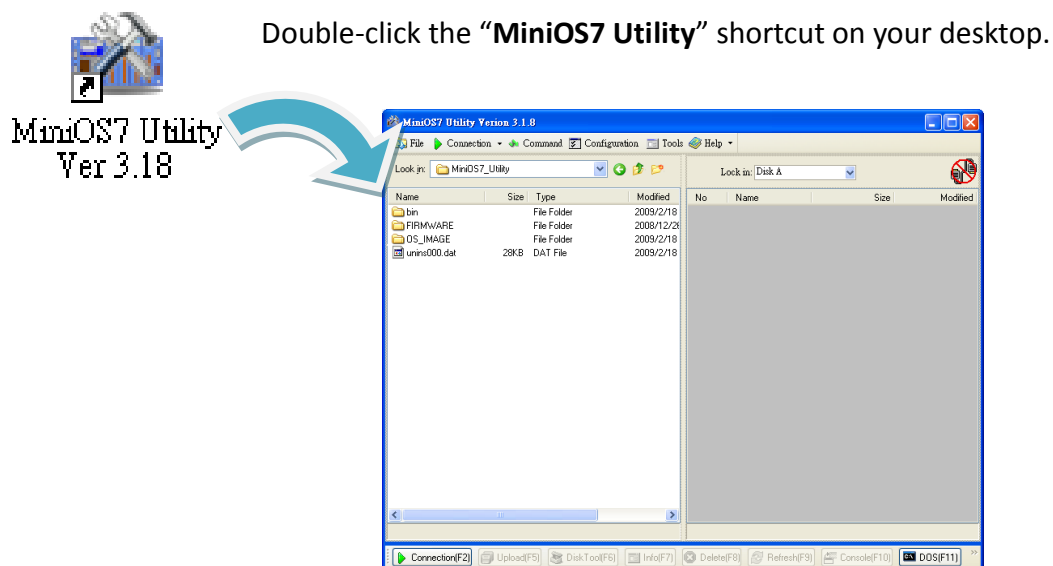
MiniOS7 Utility is a tool for uploading firmware to flash memory and updating the OS to OME-ET-7000/OME-PET-7000 module embedded with MiniOS7 with easiness and quickness.

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

6.1. Establishing a Connection

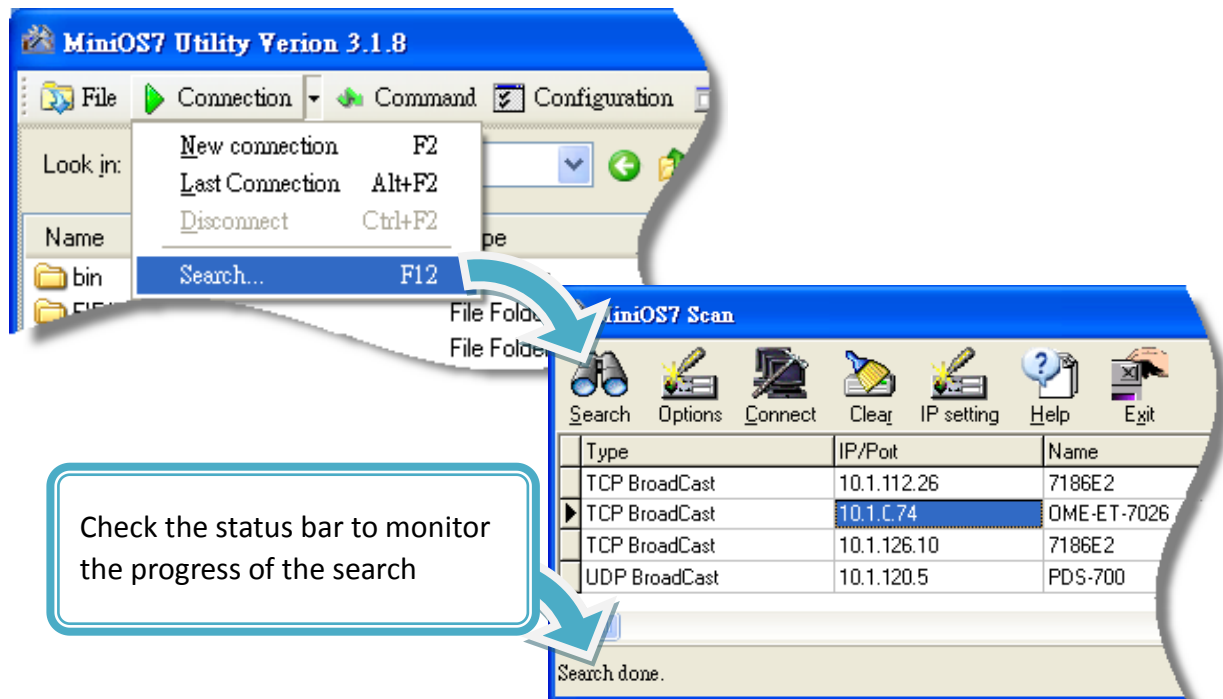
To upload firmware or update the OS to OME-ET-7000/OME-PET-7000 module, you must first establish a connection between PC and the OME-ET-7000/OME-PET-7000 module.

Step 1 : Run the MiniOS7 Utility



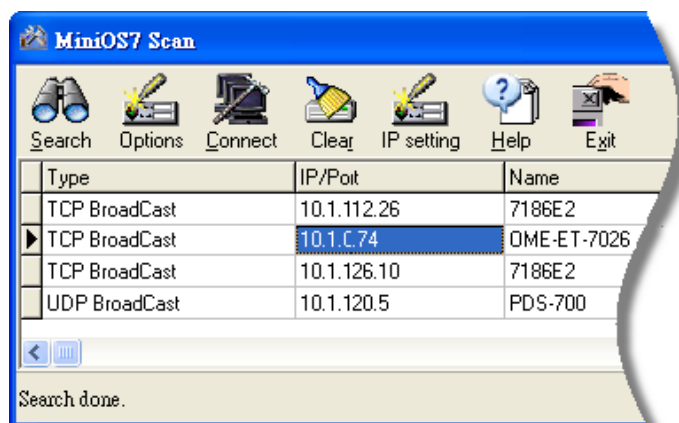
Step 2 : Press the “F12” key or choose the “Search” option from the “Connection” menu

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



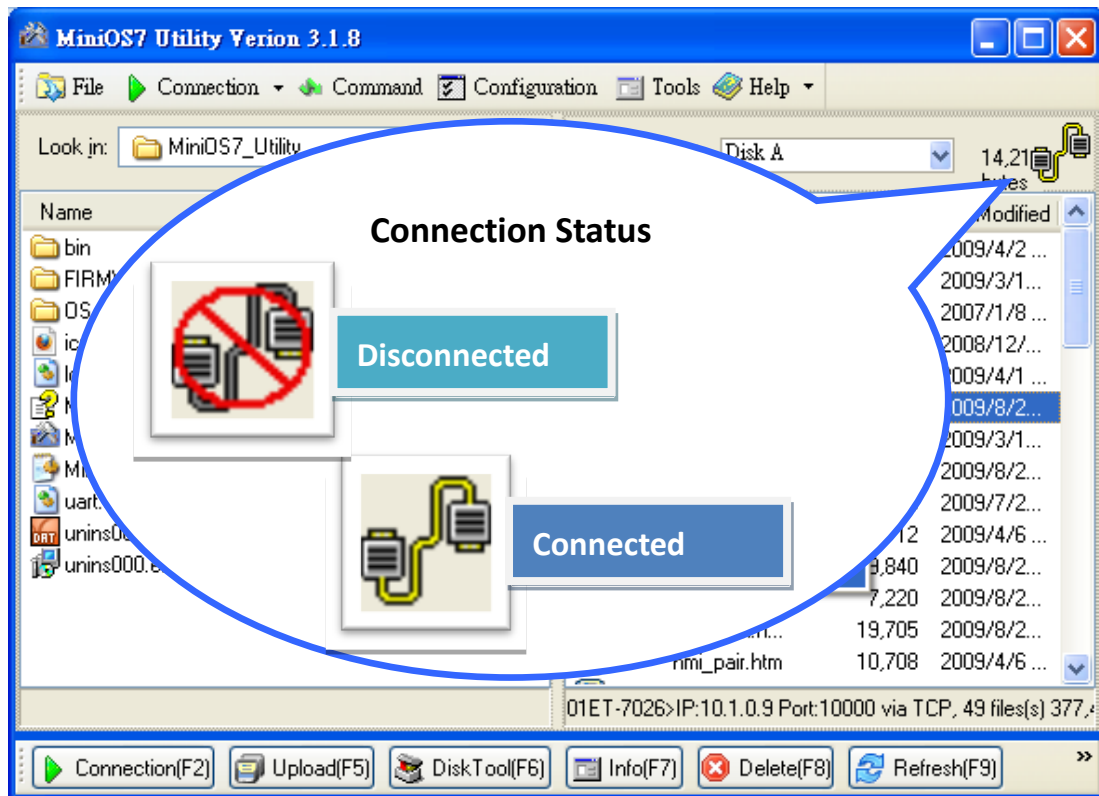
Step 3 : Click the IP address in the IP/Port field list and then click the “Connect” icon in the toolbar

After the search has been completed, click the IP address for the OME-ET-7000/OME-PET-7000 module in the IP/Port field list and then click the “Connect” icon in the toolbar to connect to the OME-ET-7000/OME-PET-7000.



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

A connection symbol Check the connection symbol status in the top right side to make sure the connection has been established



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

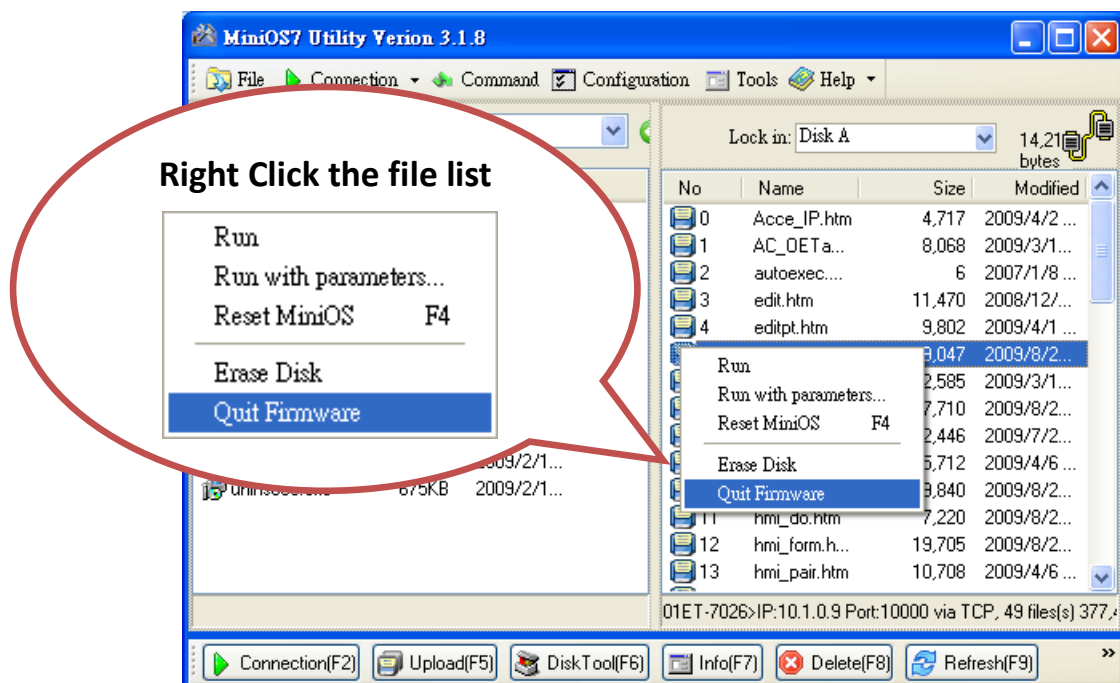
MiniOS7 Utility supports both UDP and TCP protocols. For MiniOS7 Utility, the TCP/IP is the default protocol for communicating with OME-ET-7000/OME-PET-7000, and the UDP is used to update the OS. Therefore, if you want to update the OS, you might need to change protocols to support them.

Step 1 : Establish a connection to the OME-ET-7000/OME-PET-7000

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

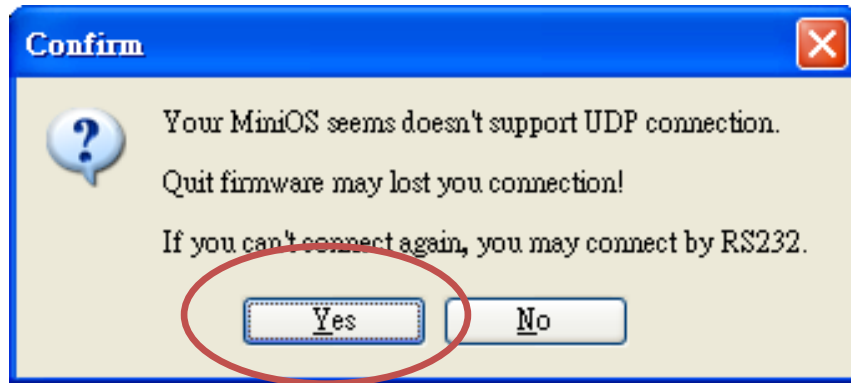
Step 2 : Right Click the file list of the right side window, and then choose “Quit Firmware” to stop the firmware running

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



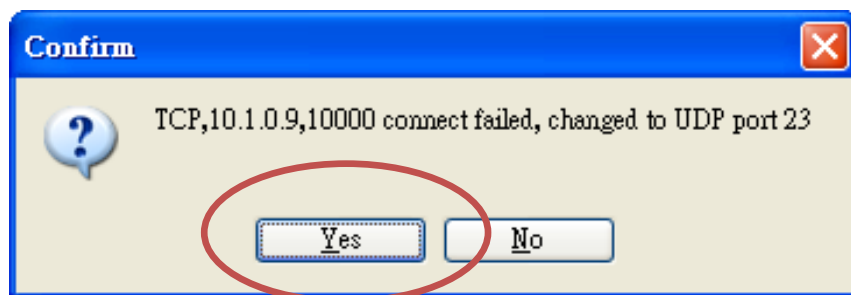
Step 3 : Click the “Yes” button to continue

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



Step 4 : Click “Yes” to continue

After confirming the command, the “Confirm” dialog will appear, and then click “Yes” button to exchange UDP protocol for TCP protocol.

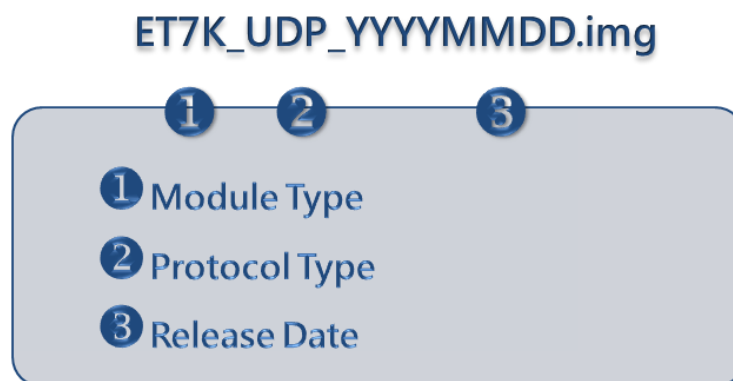


Step 5 : The changes have been affected.

6.3. Updating the OME-ET-7000/OME-PET-7000 OS

Additional features to OME-ET-7000/OME-PET-7000 OS will continue to be added in the future, so we advise you to periodically check with OMEGA web site for the latest updates.

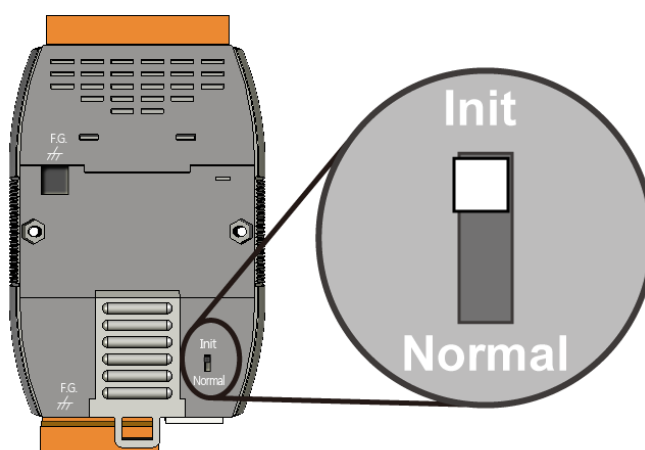
Step 1 : Download the latest version of the MiniOS7 OS image.



The latest version of the MiniOS7 OS image can be obtained from the companion CD:

CD:\OME-ET-7000_PET-7000\OS_image\

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

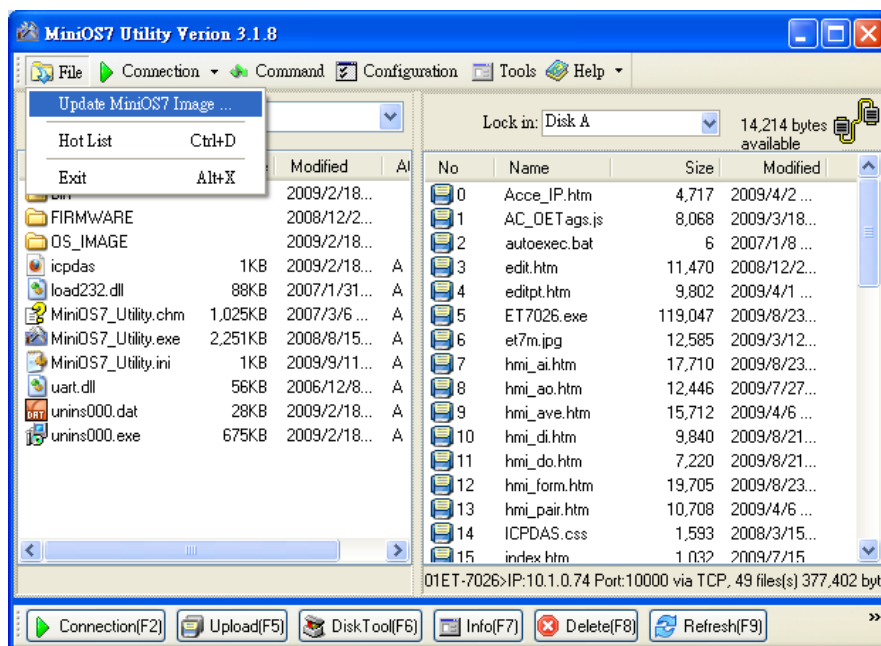


Step 3 : Establish a connection to OME-ET-7000/OME-PET-7000.

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

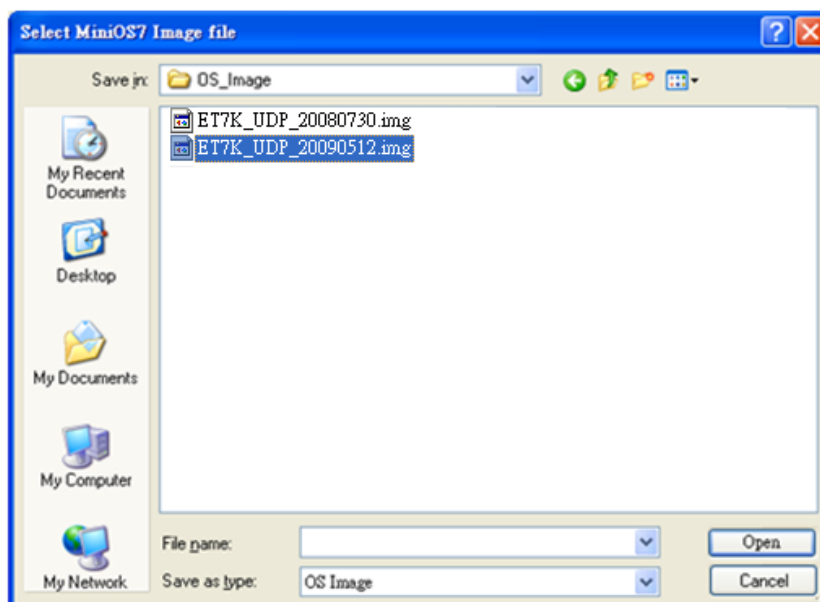
Step 4 : Choose “Update MiniOS7 Image” from the “File” menu.

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



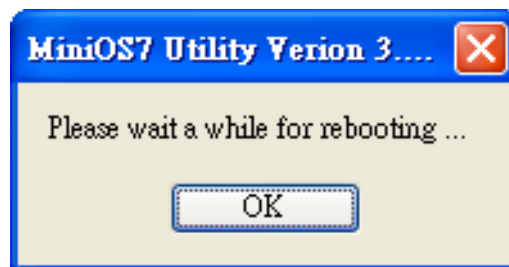
Step 5 : Select the latest version of the MiniOS7 OS image.

After choosing the update MiniOS7 Image command, the “Select MiniOS7 Image file” dialog will appear, and then select the latest version of the MiniOS7 OS image.



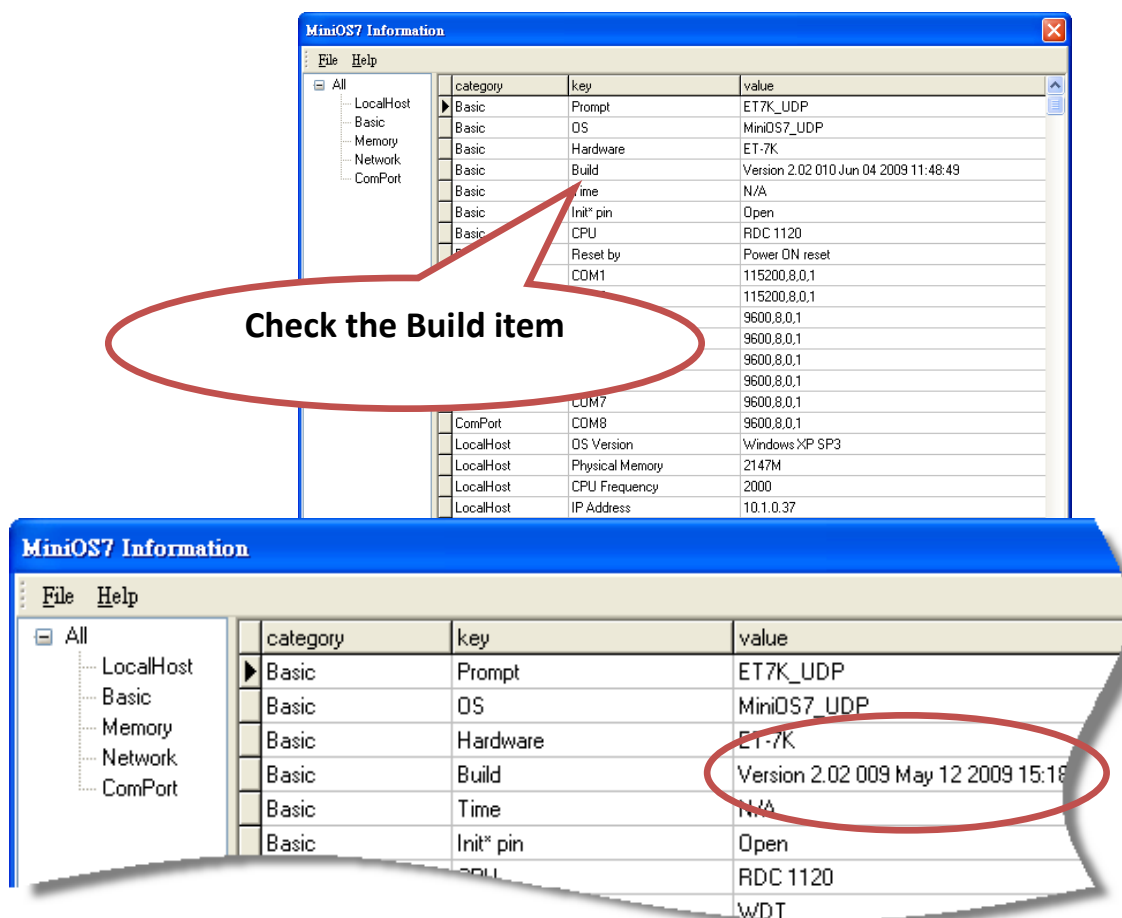
Step 6 : Click “OK” to finish the procedure.

After confirming the command, you just need to wait awhile until the following dialog appear, and then click “OK” button to finish the procedure.



Step 7 : Press “F7” or choose “Info” from the “Command” menu to check the OS version.

After pressing “F7” or choosing info from “Command” menu to check the OS version.



6.4. Updating the OME-ET-7000/OME-PET-7000 Firmware

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

Step 1 : Download the latest version of the firmware

ET-7000

OME-ET7000_VXXX.HEX



The latest version of the MiniOS7 OS image can be obtained from the companion CD:

CD:\OME-ET-7000_PET-7000\Firmware\

PET-7000

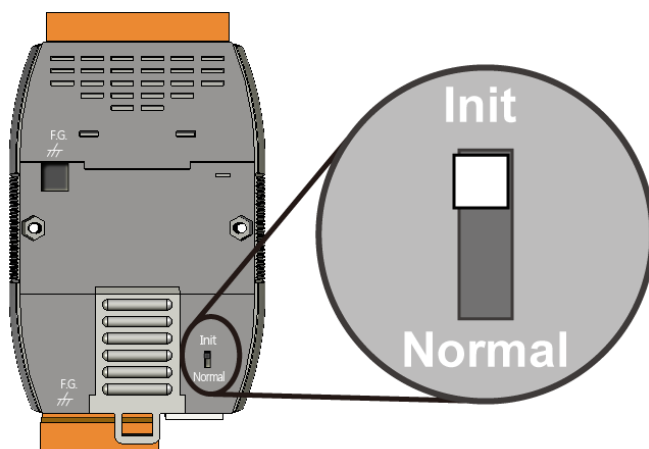
OME-PET7000_VXXX.HEX



The latest version of the MiniOS7 OS image can be obtained from the companion CD:

CD:\OME-ET-7000_PET-7000Napdos\Firmware\

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

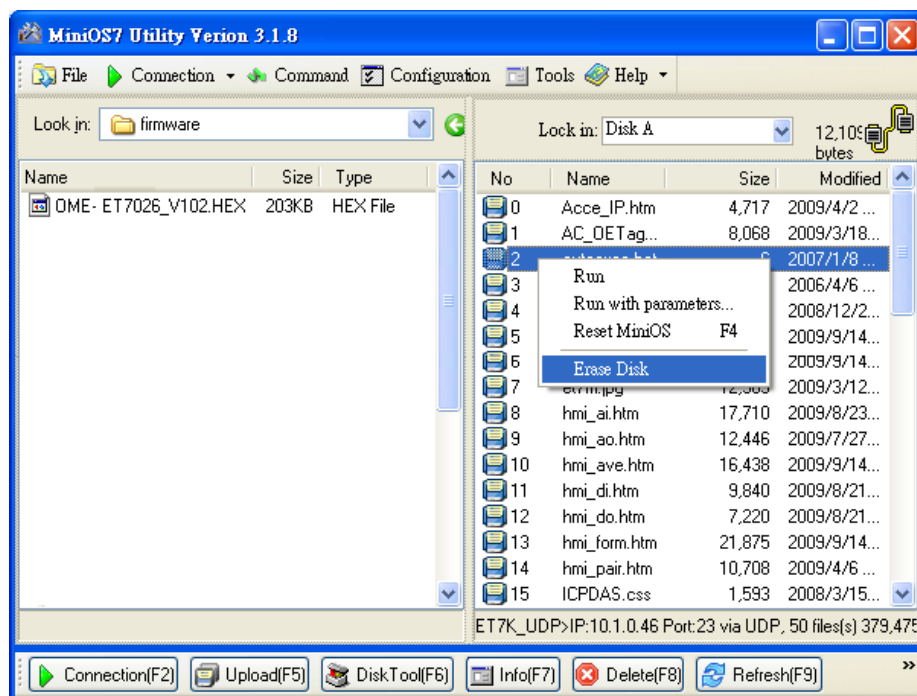


Step 3 : Establish a connection to connection to the OME-ET-7000/OME-PET-7000

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

Step 4 : Choose “Erase Disk” from the “Command” menu.

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



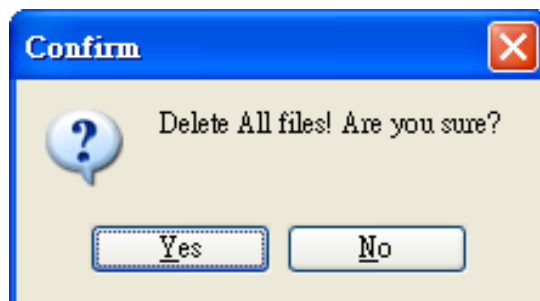
Tips & Warnings



You have to delete all files existed on the OME-ET-7000/OME-PET-7000 before uploading the firmware.

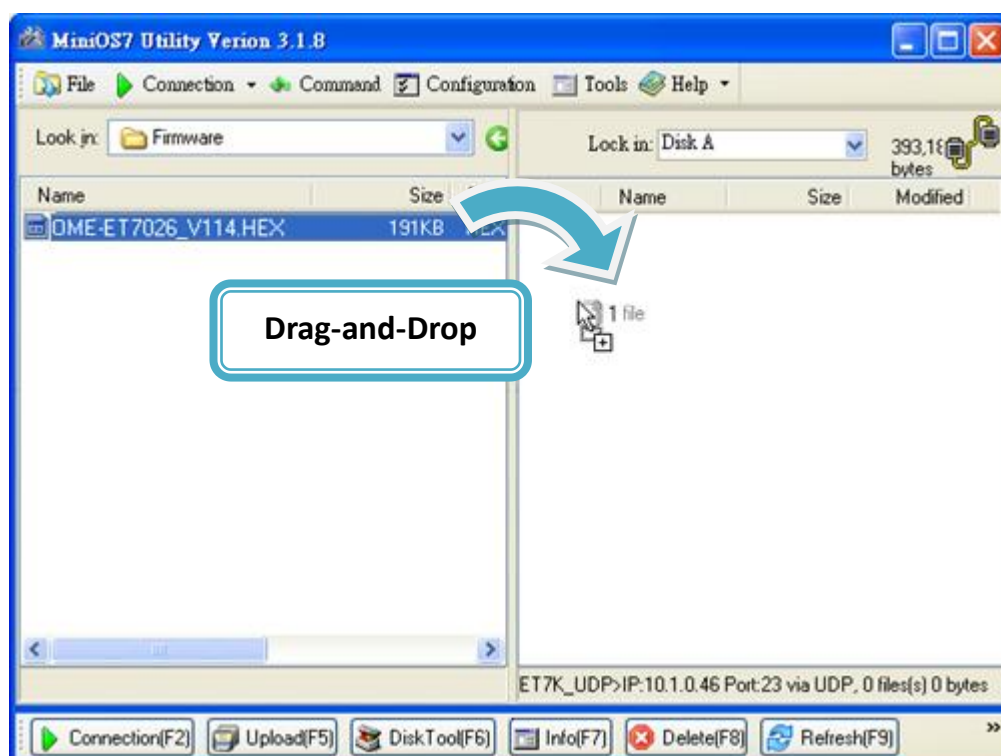
Step 5 : In the Confirm dialog box, click the “Yes” button to continue.

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



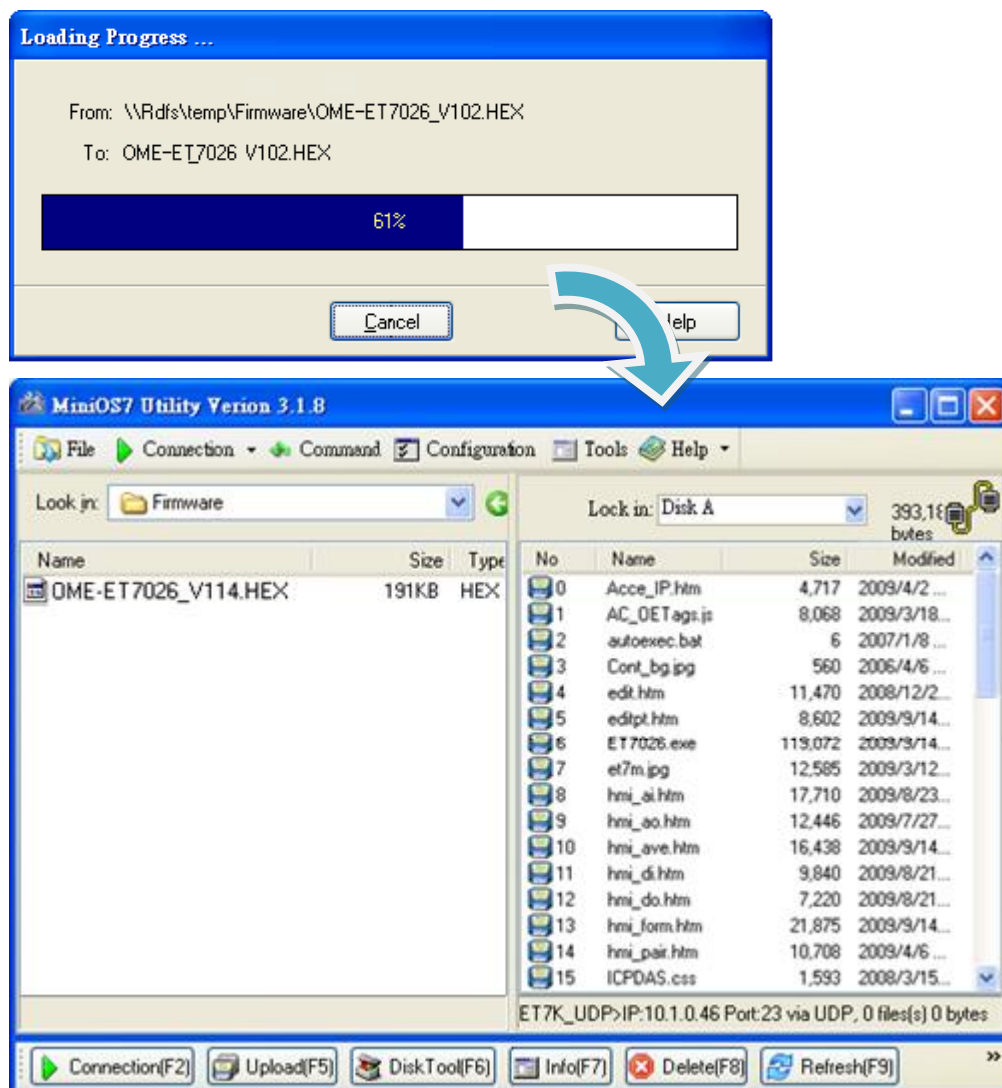
Step 6 : Select the latest version of the firmware.

Upload the last version of the firmware to the OME-ET-7000/OME-PET-7000 using drag-and-drop operation.



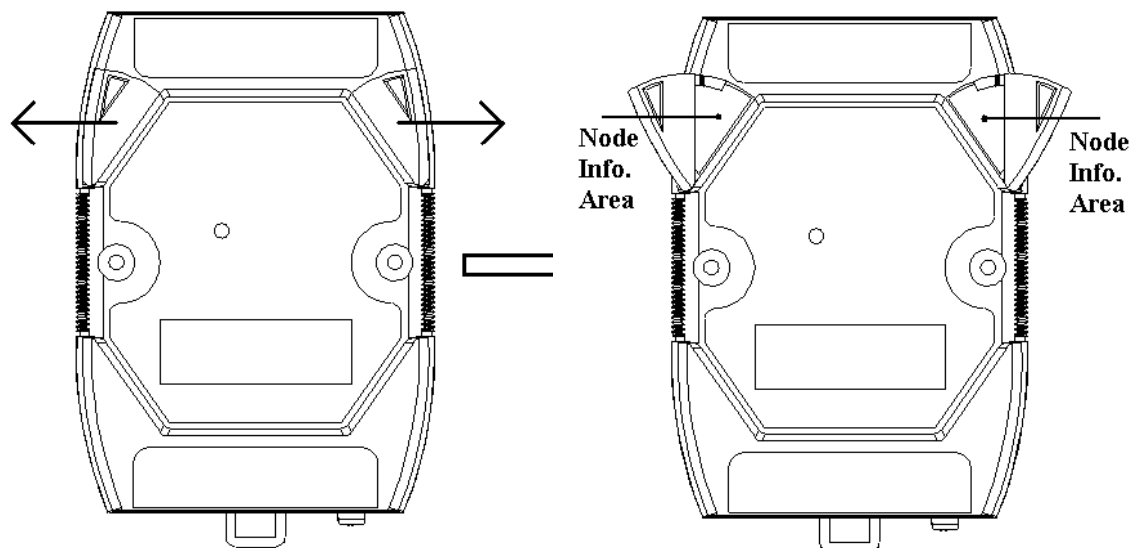
Step 7 : Click “OK” to finish and reboot the module.

After confirming the command, you just need to wait awhile until the following dialog appear, and then click “OK” button to finish the procedure. After the update is completed, set the switch (on the back of the module) to the "Normal" position.



Appendix A. Node Information Area

Each OME-ET-7000/OME-PET-7000 module has a built-in EEPROM to store configuration information such as IP address, type code, etc. One minor drawback is that there are no visual indications of the configuration of the module. New OME-ET-7000/OME-PET-7000 modules include node information areas that are protected by a cover, as shown below, and can be used to make a written record of the node information, such as IP address, etc. To access the node information areas, first slide the covers outward, as shown in the figure below.



Appendix B. Thermocouple

When two wires composed of dissimilar homogeneous metals are joined at one end, a thermoelectric electromotive force (emf) appears that depends only on the metals and the junction temperature. This is called the Seebeck effect. A pair of different metals with a fixed junction at one end constitutes a thermocouple. For small changes in temperature, the emf is linearly proportional to the temperature. This implies that the temperature reading can be obtained by measuring the emf.

We cannot measure the emf, V_1 , directly because when a voltmeter is connected to the thermocouple, another emf, V_2 , is created at the (cold) junction of the thermocouple and the voltmeter. The cold junction compensation method is used to resolve the problem. Using another sensor, e.g. a thermistor, to measure the cold junction temperature, T_2 , we can calculate the emf, V_2 , which corresponds to T_2 . The thermocouple emf, V_1 , can be obtained by adding V_2 to that measured by the voltmeter and then the temperature.

Appendix C. Modbus Application Notes

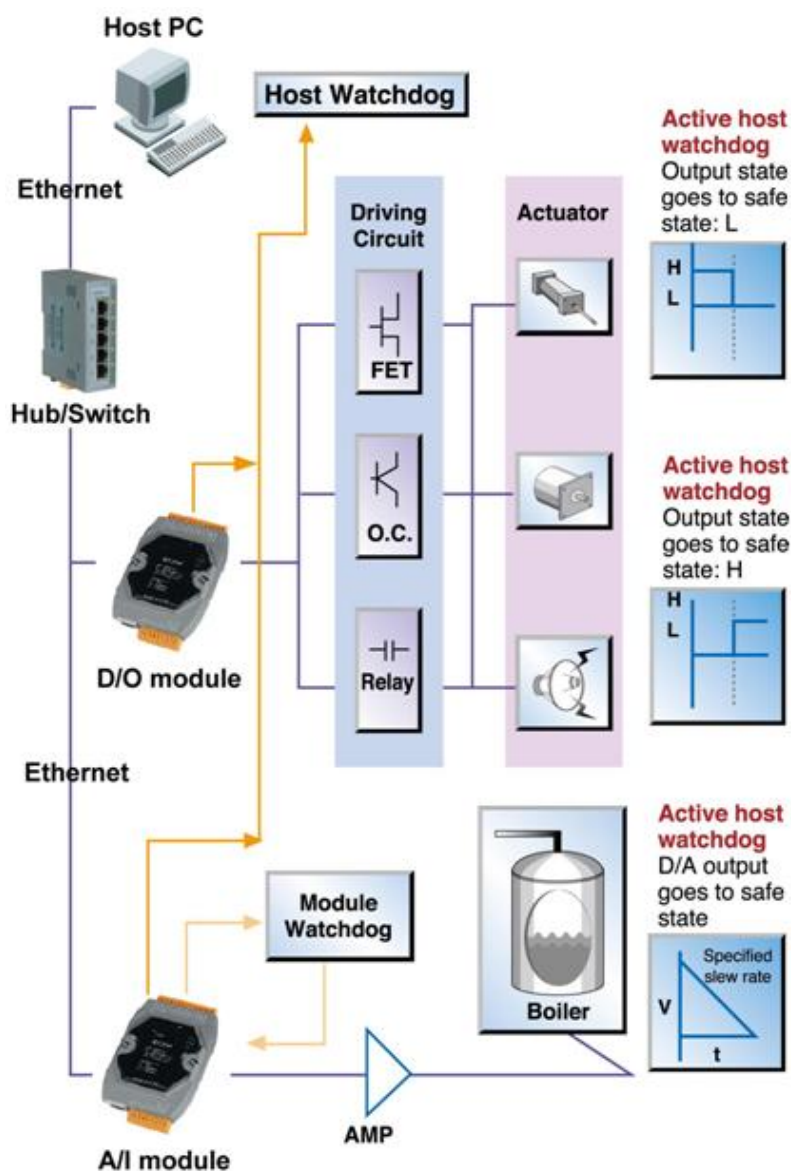
C.1. Dual Watchdog

The Dual Watchdog consists of Module Watchdog and Host Watchdog.

1. **The Module Watchdog** is a built-in hardware circuit that will reset the CPU module if a failure occurs in either the hardware or the software. If the application does not refresh the watchdog timer within 0.8 seconds, the watchdog circuit will initiate a reset of the CPU.

2. **The Host Watchdog** is a software function that can be used to monitor the operating status of the host. Its purpose is to prevent network communication problems or a host failure. If the Watchdog timeout interval expires, the module will return all outputs to a predefined Safe value (Refer to the Safe Value application note), which can prevent the controlled target from unexpected situation.

AO address 40557 of the



OME-ET-7000/OME-PET-7000 Modbus register is the address of the Host Watchdog timer, and will be stored in EEPROM. The WDT function will be disabled if the value is set to less than 5 seconds.

C.2. Power-on Value

Many industrial applications require a "safe" start-up condition to prevent accidents at critical points in the process. Each OME-ET-7000/OME-PET-7000 contains an initial power-on value which is used to configure the analog/digital outputs on power up. In other words, power-on value can be considered as a start-up value. The power-on value is loaded into the output modules under 3 conditions: power on, reset by Module Watchdog, reset by the reset command.

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

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

The screenshot shows the web interface for configuring the OME-ET-7000/OME-PET-7000. The left sidebar contains the 'Main Menu' with options like 'Overview', 'Configuration', 'Network Settings', 'Basic Settings', 'Module I/O Settings' (highlighted with a blue box and callout 1), 'Authentication', 'Web HMI', 'Pair Connection', and 'More Information'. The main content area is titled 'Digital Output Settings' and 'Power-on/Safe Values'. It contains a table with columns 'Channel', 'Power-on Value (00435)', and 'Safe Value (00515)'. The table has two rows: 'Ch0' and 'Ch1'. For 'Ch0', the 'Power-on Value' is set to 'ON' (radio button selected) and the 'Safe Value' is set to 'OFF'. For 'Ch1', the 'Power-on Value' is set to 'OFF' and the 'Safe Value' is set to 'ON'. A 'Submit' button is located below the table. Callout 2 points to the 'ON' radio button for 'Ch0', and callout 3 points to the 'Submit' button. Below the table, there is a section for 'Digital Input Settings' with a 'DI Latch' table. The 'DI Latch' table has columns 'Modbus Address', 'Function', and 'Action'. It contains one row with 'Modbus Address' 00350, 'Function' 'Enable DI Latched Status', and 'Action' 'OFF' (radio button selected). A 'Submit' button is also present at the bottom of this section.

Channel	Power-on Value (00435)	Safe Value (00515)
Ch0	OFF <input checked="" type="radio"/> ON <input type="radio"/>	OFF <input checked="" type="radio"/> ON <input type="radio"/>
Ch1	OFF <input type="radio"/> ON <input checked="" type="radio"/>	OFF <input checked="" type="radio"/> ON <input type="radio"/>

Submit

Modbus Address	Function	Action
00350	Enable DI Latched Status	OFF <input checked="" type="radio"/> ON <input type="radio"/> 0=Disabled, 1=Enabled (default=0)

Submit

Step 1 : Log into the OME-ET-7000/OME-PET-7000 web page, and then click the “**Module I/O Settings**” option in the “**Configuration**” section of the Main Menu

Step 2 : Enable the Power-on Value by checking the “**ON**” radio button

Step 3 : Click the “**Submit**” button to complete the configuration of the power-on Value

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

The screenshot shows the 'Module I/O Settings' page. The left sidebar contains a tree view with 'Main Menu' expanded, showing 'Overview', 'Configuration', 'Network Settings', 'Basic Settings', 'Module I/O Settings' (highlighted with a blue box and labeled '1'), 'Authentication', 'Web HMI', 'Pair Connection', and 'More Information'. The main content area is titled 'Analog Output Settings' and contains two sections. The 'Basic Settings' section has a table with columns 'Channel', 'Range (40459)', and 'Slew Rate (40523)'. The 'Power-on/Safe Values' section has a table with columns 'Channel', 'Power-on Value (40350)', and 'Safe Value (40392)'. The 'Power-on Value' text boxes for Ch0 and Ch1 are highlighted with a blue box and labeled with a '2'. The 'Submit' button at the bottom of the 'Power-on/Safe Values' section is highlighted with a blue box and labeled with a '3'.

Channel	Range (40459)	Slew Rate (40523)
Ch0	32.0 V ~ 10 V	0 (Immediate)
Ch1	32.0 V ~ 10 V	0 (Immediate)

Submit

Channel	Power-on Value (40350)	Safe Value (40392)
Ch0	0.000 0 V ~ 10 V	0.000 0 V ~ 10 V
Ch1	0.000 0 V ~ 10 V	0.000 0 V ~ 10 V

Submit

Step 1 : Log into the OME-ET-7000/OME-PET-7000 web page, and then click the “**Module I/O Settings**” option in the “**Configuration**” section of the Main Menu

Step 2 : Set the Power-on Value in the “**Power-on Value**” text box

Step 3 : Click the “**Submit**” button to complete the configuration of the Power-on Value and save the settings to the EEPROM

C.3. Safe Value

When the Host Watchdog is enabled and the communication between host PC and OME-ET-7000/OME-PET-7000 modules is broken, the analog/digital output channels can generate a predefined value to prevent unpredictable damage of the connected devices. By default, this feature is disabled. User can enable this feature by configuring the Host WDT Timeout.

Setting the Safe Value for a Specific Digital Output Channel

Digital Output Settings
Power-on/Safe Values

Channel	Power-on Value (00435)	Safe Value (00515)
Ch0	OFF <input checked="" type="radio"/> ON <input type="radio"/>	OFF <input checked="" type="radio"/> ON <input type="radio"/>
Ch1	OFF <input checked="" type="radio"/> ON <input type="radio"/>	OFF <input checked="" type="radio"/> ON <input type="radio"/>

Note: The default value for all parameters is 0.

Digital Input Settings
DI Latch

Modbus Address	Function	Action
00350	Enable DI Latched Status	OFF <input checked="" type="radio"/> ON <input type="radio"/> 0=Disabled, 1=Enabled (default=0)

Step 1 : Log into the OME-ET-7000/OME-PET-7000 web page, and then click the “**Module I/O Settings**” option in the “**Configuration**” section of the Main Menu

Step 2 : Enable the Safe Value by checking the “**ON**” radio button

Step 3 : Click the “**Submit**” button to complete the configuration of the power-on Value

Setting the Safe Value for a Specific Analog Output Channel

Analog Output Settings
Basic Settings

Channel	Range (40459)	Slew Rate (40523)
Ch0	32.0 V ~ 10 V	0 (Immediate)
Ch1	32.0 V ~ 10 V	0 (Immediate)

Submit

Power-on/Safe Values

Channel	Power-on Value (40360)	Safe Value (40392)
Ch0	0.000 0 V ~ 10 V	0.000 0 V ~ 10 V
Ch1	0.000 0 V ~ 10 V	0.000 0 V ~ 10 V

Submit

Step 1 : Log into the OME-ET-7000/OME-PET-7000 web page, and then click the “**Module I/O Settings**” option in the “**Configuration**” section of the Main Menu

Step 2 : Set the Safe Value in the “**Safe Value**” text box

Step 3 : Click the “**Submit**” button to complete the configuration of the Safe Value and save the settings to the EEPROM

C.4. AI High/Low Alarm

OME-ET-7000/OME-PET-7000 module equip with the High/Low Alarm function. When the alarm function is enabled, the specific registers are the alarm indicator. The alarm function is to compare the analog input value with given high alarm value and low alarm value.

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

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

AI High/Low Alarm Switch Table

Channel Number	AI High Alarm		AI Low Alarm	
	Register	Description	Register	Description
AI0	00636	0: Disable/1: Enable	00668	0: Disable/1: Enable
AI1	00637	0: Disable/1: Enable	00669	0: Disable/1: Enable
AI2	00638	0: Disable/1: Enable	00670	0: Disable/1: Enable
AI3	00639	0: Disable/1: Enable	00671	0: Disable/1: Enable
AI4	00640	0: Disable/1: Enable	00672	0: Disable/1: Enable
AI5	00641	0: Disable/1: Enable	00673	0: Disable/1: Enable
AI6	00642	0: Disable/1: Enable	00674	0: Disable/1: Enable
AI7	00643	0: Disable/1: Enable	00675	0: Disable/1: Enable
AI8	00644	0: Disable/1: Enable	00676	0: Disable/1: Enable
AI9	00645	0: Disable/1: Enable	00677	0: Disable/1: Enable

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

AI High/Low Alarm Value Table

Channel Number	High Alarm Value of AI		Low Alarm Value of AI	
	Register	Description	Register	Description
AI0	40296	-32768 ~ 32767	40328	-32768 ~ 32767
AI1	40297	-32768 ~ 32767	40329	-32768 ~ 32767
AI2	40298	-32768 ~ 32767	40330	-32768 ~ 32767
AI4	40300	-32768 ~ 32767	40332	-32768 ~ 32767
AI5	40301	-32768 ~ 32767	40333	-32768 ~ 32767
AI6	40302	-32768 ~ 32767	40334	-32768 ~ 32767
AI7	40303	-32768 ~ 32767	40335	-32768 ~ 32767
AI8	40304	-32768 ~ 32767	40336	-32768 ~ 32767
AI9	40305	-32768 ~ 32767	40337	-32768 ~ 32767

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

AI High/Low Type Value Table

Channel Number	AI High Alarm Type		AI Low Alarm Type	
	Register	Description	Register	Description
AI0	00700	0: Momentary Mode 1: Latch Mode	00732	0: Momentary Mode 1: Latch Mode
AI1	00701	0: Momentary Mode 1: Latch Mode	00733	0: Momentary Mode 1: Latch Mode
AI2	00702	0: Momentary Mode 1: Latch Mode	00734	0: Momentary Mode 1: Latch Mode
AI3	00703	0: Momentary 1: Latched	00735	0: Momentary 1: Latched
AI4	00704	0: Momentary 1: Latched	00736	0: Momentary 1: Latched
AI5	00705	0: Momentary 1: Latched	00737	0: Momentary 1: Latched
AI6	00706	0: Momentary 1: Latched	00738	0: Momentary 1: Latched
AI7	00707	0: Momentary 1: Latched	00739	0: Momentary 1: Latched
AI8	00708	0: Momentary 1: Latched	00740	0: Momentary 1: Latched
AI9	00709	0: Momentary 1: Latched	00741	0: Momentary 1: Latched

The following are the descriptions for two alarm types.

Momentary Alarm

The alarm status is cleared while the analog input is not exceeding the alarm value.

For example:

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

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

The address 10224 to 10255 is the high alarm indicator. If a high alarm occurred, the value of register is 1. In normal condition, it will be 0. The address 10256 to 10287 is the low alarm indicator. If a low alarm occurred, the value of register is 1. In normal condition, it will be 0.

Latch Alarm

When the Latch Alarm mode is enabled, the register stays latched until the specified registers are cleared.

For example:

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

The address 10224 to 10255 is the high alarm indicator. In normal condition, the value of register is 0. If a High alarm occurred, the value of register stays 1 until the address 00764 to 00795 is cleared. The address 10256 to 10287 is the low alarm indicator. In normal condition, the value of register is 0. If a low alarm occurred, the value of register stays 1 until the address 00796 to 00827 is cleared.

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

Modbus Address	Function	Action
00628	Normal mode (16 bits and 10 Hz), Fast mode (12 bits and 60 Hz) for AI	OFF <input type="radio"/> ON <input type="radio"/> 0=Normal, 1=Fast (default=0)
00629	50/50 Hz Rejection	OFF <input type="radio"/> ON <input type="radio"/> 0=60 Hz, 1=50 Hz (default=0)
00629	Data Format	OFF <input type="radio"/> ON <input type="radio"/> 0=Hex, 1=Engineering (default=0)
00622	Restore Analog Calibration to Factory Settings	<input type="checkbox"/>

Submit

Alarm Settings

Channel	High Alarm			Low Alarm		
	Value (40296)	Enabled (00636)	Type (00700)	Value (40328)	Enabled (00668)	Type (00732)
Ch0	10.000 ± 10 V	OFF <input type="radio"/> ON <input type="radio"/>	0 - Momentar	-10.000 ± 10 V	OFF <input type="radio"/> ON <input type="radio"/>	0 - Momentar
Ch1	10.000 ± 10 V	OFF <input type="radio"/> ON <input type="radio"/>	0 - Momentar	-10.000 ± 10 V	OFF <input type="radio"/> ON <input type="radio"/>	0 - Momentar
Ch2	10.000 ± 10 V	OFF <input type="radio"/> ON <input type="radio"/>	0 - Momentar	-10.000 ± 10 V	OFF <input type="radio"/> ON <input type="radio"/>	0 - Momentar
Ch3	10.000 ± 10 V	OFF <input type="radio"/> ON <input type="radio"/>	0 - Momentar	-10.000 ± 10 V	OFF <input type="radio"/> ON <input type="radio"/>	0 - Momentar
Ch4	10.000 ± 10 V	OFF <input type="radio"/> ON <input type="radio"/>	0 - Momentar	-10.000 ± 10 V	OFF <input type="radio"/> ON <input type="radio"/>	0 - Momentar
Ch5	10.000 ± 10 V	OFF <input type="radio"/> ON <input type="radio"/>	0 - Momentar	-10.000 ± 10 V	OFF <input type="radio"/> ON <input type="radio"/>	0 - Momentar

Note: By default, the Alarm function is disabled and the Alarm Type is set to momentar

Submit

Step 1 : Log into the OME-ET-7000/OME-PET-7000 web page, and then click the “**Module I/O Settings**” option in the “**Configuration**” section of the Main Menu

Step 2 : Set the High Alarm and Low Alarm information in the relevant field

Step 3 : Click the “**Submit**” button to complete the configuration of the High Alarm and the Low Alarm

C.5. AI High/Low Latch

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

Monitoring the Alarm Status for a Specific Analog Input Channel

The screenshot displays the web interface of the OME-ET-7000/OME-PET-7000. On the left, the 'Main Menu' is visible, with 'Web HMI' highlighted under the 'Web HMI' section. A blue circle with the number '1' points to this menu item. The main content area shows the 'AI' tab selected. It contains three tables: 'Analog Input', 'High/Low Latched Value for Analog Inputs', and 'High/Low Alarm Status for Analog Inputs'. The 'High/Low Latched Value for Analog Inputs' table is highlighted with a blue box and a blue circle with the number '2' pointing to it. This table shows the latched high and low values for analog inputs AI0 through AI5, including their registers, hex format, and floating format values. Below this table are two 'Clear AI Latched' buttons.

No	Register	Value	Hex Format	Floating Format
AI0	30000		FFFF	-0.000
AI1	30001		FFFF	-0.000
AI2	30002		0000	0.000
AI3	30003		0000	0.000
AI4	30004		FFFF	-0.000
AI5	30005		FFFF	-0.000

No	Latched High				Latched Low			
	Register	Value	Hex Format	Floating Format	Register	Value	Hex Format	Floating Format
AI0	30236	0005	0.001		30268	FFFB	-0.001	
AI1	30237	0003	0.000		30269	FFFA	-0.001	
AI2	30238	0006	0.001		30270	FFFA	-0.001	
AI3	30239	0006	0.001		30271	FFFB	-0.001	
AI4	30240	0004	0.001		30272	FFFA	-0.001	
AI5	30241	0004	0.001		30273	FFFC	-0.001	

No	High Alarm				Low Alarm			
	Register	Value	Status		Register	Value	Status	

Step 1 : Log into the OME-ET-7000/OME-PET-7000 web page, and then click the “Web HMI” option in the “Web HMI” section of the Main Menu

Step 2 : Monitor the alarm status by viewing the “High/Low Latched Value for Analog Inputs” group table

Appendix D. Analog Input Type and Data Format Table

Type Code	Input Range	Data Format	+F.S	-F.S
00	-15 ~ +15 mA	Engineering Unit	+15000	-15000
		2's comp HEX	7FFF	8000
01	-50 ~ +50 mA	Engineering Unit	+5000	-5000
		2's comp HEX	7FFF	8000
02	-100 ~ +100 mV	Engineering Unit	+10000	-10000
		2's comp HEX	7FFF	8000
03	-500 ~ +500 mV	Engineering Unit	+5000	-5000
		2's comp HEX	7FFF	8000
04	-1 ~ +1 V	Engineering Unit	+10000	-10000
		2's comp HEX	7FFF	8000
05	-2.5 ~ +2.5 V	Engineering Unit	+25000	-25000
		2's comp HEX	7FFF	8000
06	-20 ~ +20 mA	Engineering Unit	+20000	-20000
		2's comp HEX	7FFF	8000
07	+4 ~ +20 mA	Engineering Unit	+20000	+4000
		2's comp HEX	FFFF	0000
08	-10 ~ +10 V	Engineering Unit	+10000	-10000
		2's comp HEX	7FFF	8000
09	-5 ~ +5 V	Engineering Unit	+5000	-5000
		2's comp HEX	7FFF	8000

Type Code	Input Range	Data Format	+F.S	-F.S
0A	-1 ~ +1 V	Engineering Unit	+10000	-10000
		2's comp HEX	7FFF	8000
0B	-500 ~ +500 mV	Engineering Unit	+5000	-5000
		2's comp HEX	7FFF	8000
0C	-150 ~ +150 mV	Engineering Unit	+15000	-15000
		2's comp HEX	7FFF	8000
0D	-20 ~ +20 mA	Engineering Unit	+20000	-20000
		2's comp HEX	7FFF	8000
1A	0 ~ +20 mA	Engineering Unit	+20000	0
		2's comp HEX	FFFF	0000
0E	Type J Thermocouple -210 ~ 760°C	Engineering Unit	+7600	-2100
		2's comp HEX	7FFF	DCA2
0F	Type K Thermocouple -270 ~ 1372°C	Engineering Unit	+13720	-2700
		2's comp HEX	7FFF	E6D0
10	Type T Thermocouple -270 ~ 400°C	Engineering Unit	+4000	-2700
		2's comp HEX	7FFF	A99A
11	Type E Thermocouple -270 ~ 1000°C	Engineering Unit	10000	-2700
		2's comp HEX	7FFF	DD71
12	Type R Thermocouple 0 ~ 1768°C	Engineering Unit	+17680	0
		2's comp HEX	7FFF	0000
13	Type S Thermocouple 0 ~ 1768°C	Engineering Unit	+17680	0
		2's comp HEX	7FFF	0000

Type Code	Input Range	Data Format	+F.S	-F.S
14	Type B Thermocouple 0 ~ 1820°C	Engineering Unit	+18200	0
		2's comp HEX	7FFF	0000
15	Type N Thermocouple -270 ~ 1300°C	Engineering Unit	+13000	-2700
		2's comp HEX	7FFF	E56B
16	Type C Thermocouple 0 ~ 2320°C	Engineering Unit	+23200	0
		2's comp HEX	7FFF	0000
17	Type L Thermocouple -200 ~ 800°C	Engineering Unit	+8000	-2000
		2's comp HEX	7FFF	E000
18	Type M Thermocouple -200 ~ 100°C	Engineering Unit	+10000	-20000
		2's comp HEX	4000	8000
19	Type L DIN43710 Thermocouple -200 ~ 900°C	Engineering Unit	9000	-2000
		2's comp HEX	FFFF	E38E
20	Platinum 100 $\alpha=0.00385$ -100 ~ 100°C	Engineering Unit	+10000	-10000
		2's comp HEX	7FFF	8000
21	Platinum 100 $\alpha=0.00385$ 0 ~ 100°C	Engineering Unit	+10000	0
		2's comp HEX	7FFF	0000
22	Platinum 100 $\alpha=0.00385$ 0 ~ 200°C	Engineering Unit	+20000	0
		2's comp HEX	7FFF	0000
23	Platinum 100 $\alpha=0.00385$ 0 ~ 600°C	Engineering Unit	+6000	0
		2's comp HEX	7FFF	0000

Type Code	Input Range	Data Format	+F.S	-F.S
24	Platinum 100 $\alpha=0.003916$ -100 ~ 100°C	Engineering Unit	+10000	-10000
		2's comp HEX	7FFF	8000
25	Platinum 100 $\alpha=0.003916$ 0 ~ 100°C	Engineering Unit	+10000	0
		2's comp HEX	7FFF	0000
26	Platinum 100 $\alpha=0.003916$ 0 ~ 200°C	Engineering Unit	+20000	0
		2's comp HEX	7FFF	0000
27	Platinum 100 $\alpha=0.003916$ 0 ~ 600°C	Engineering Unit	+6000	0
		2's comp HEX	7FFF	0000
28	Nickel 120 -80 ~ 100°C	Engineering Unit	+10000	-8000
		2's comp HEX	7FFF	999A
29	Nickel 120 0 ~ 100°C	Engineering Unit	+10000	0
		2's comp HEX	7FFF	0000
2A	Platinum 1000 $\alpha=0.00385$ -200 ~ 600°C	Engineering Unit	+6000	-2000
		2's comp HEX	7FFF	D556
2B	Cu 100 $\alpha=0.00421$ -20 ~ 150°C	Engineering Unit	+15000	-2000
		2's comp HEX	7FFF	EEEE
2C	Cu 100 $\alpha=0.00427$ 0 ~ 200°C	Engineering Unit	+20000	0
		2's comp HEX	7FFF	0000
2D	Cu 1000 $\alpha=0.00421$ -20 ~ 150°C	Engineering Unit	+15000	-2000
		2's comp HEX	7FFF	EEEE

Type Code	Input Range	Data Format	+F.S	-F.S
2E	Platinum 1000 $\alpha=0.00385$ -200 ~ 200°C	Engineering Unit	+20000	-20000
		2's comp HEX	7FFF	8000
2F	Platinum 1000 $\alpha=0.003916$ -200 ~ 200°C	Engineering Unit	+20000	-20000
		2's comp HEX	7FFF	8000
80	Platinum 100 $\alpha=0.00385$ -200 ~ 600°C	Engineering Unit	+6000	-2000
		2's comp HEX	7FFF	D556
81	Platinum 100 $\alpha=0.003916$ -200 ~ 600°C	Engineering Unit	+6000	-2000
		2's comp HEX	7FFF	D556
82	Cu 50 -50 ~ 150°C	Engineering Unit	+15000	-5000
		2's comp HEX	7FFF	D556
83	Nickel 100 -60 ~ 180°C	Engineering Unit	+18000	-6000
		2's comp HEX	7FFF	D556

Appendix E. Analog Output Type and Data Format Table

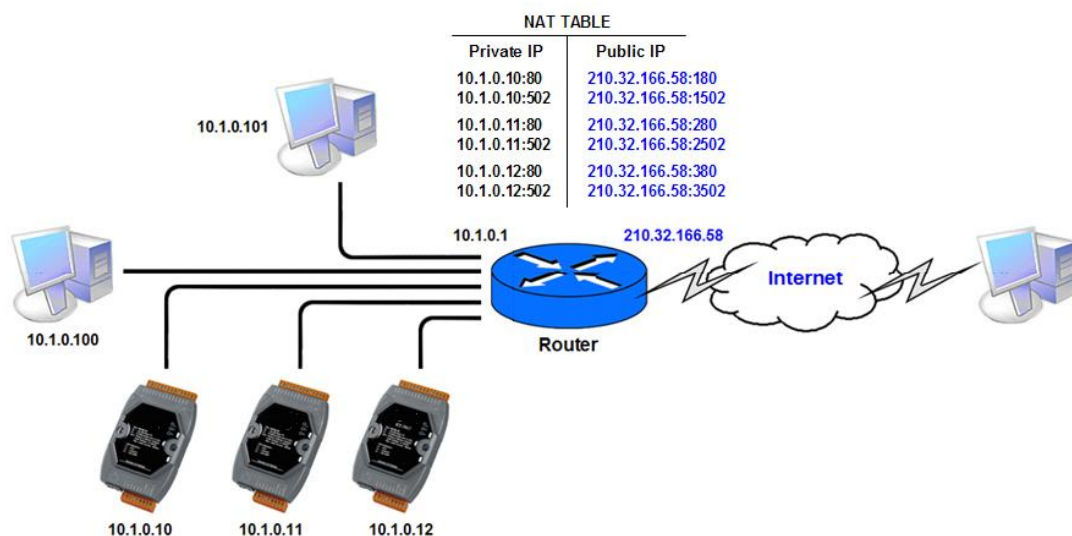
Type Code	Input Range	Data Format	+F.S	-F.S
30	0 ~ +20 mV	Engineering Unit	+20000	0
		2's comp HEX	FFFF	0000
31	4 ~ +20 mV	Engineering Unit	+20000	4000
		2's comp HEX	FFFF	0000
32	0 ~ +10 V	Engineering Unit	+10000	0
		2's comp HEX	7FFF	0000
33	-10 ~ +10 V	Engineering Unit	+10000	-10000
		2's comp HEX	7FFF	8000
34	0 ~ +5 V	Engineering Unit	+5000	0
		2's comp HEX	7FFF	0000
35	-5 ~ +5 V	Engineering Unit	+5000	-5000
		2's comp HEX	7FFF	8000

Appendix F. Network Address Translation

For a computer to communicate with OME-ET-7000/OME-PET-7000 modules on the Internet, OME-ET-7000/OME-PET-7000 modules must have a public IP address. Basically, it works like your street address - as a way to find out exactly where you are and deliver information to you.

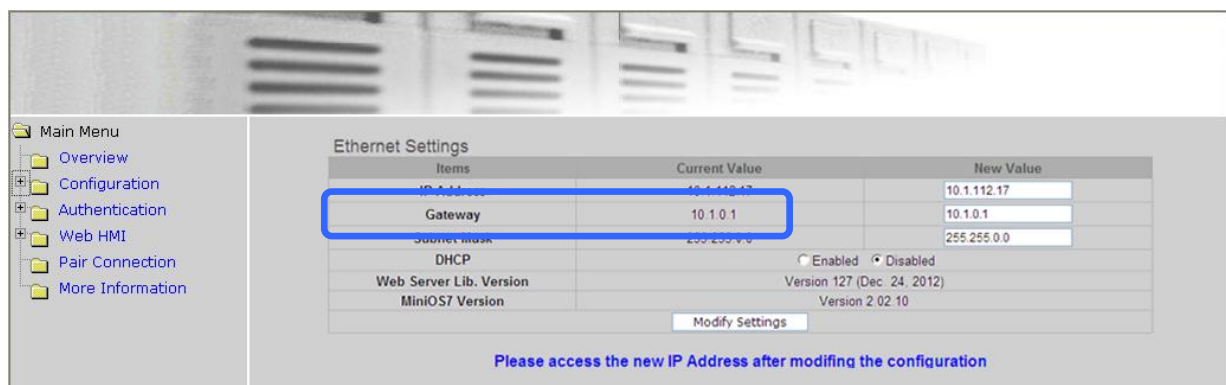
Network Address Translation (NAT) allows a single device, such as a router, to act as an agent between the Internet (or "public network") and a local (or "private") network. This means that only a single, unique IP address is required to represent an entire group of computers.

A type of NAT in which a private IP address is mapped to a public IP address, where the public address is always the same IP address (i.e., it has a static address). This allows an internal host, such as an OME-ET-7000/OME-PET-7000 module, to have an unregistered (private) IP address and still be reachable over the Internet.



Step 1 : Configure the Ethernet settings of OME-ET-7000/OME-PET-7000 module.

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



Step 2 : Connect to the web server of OME-ET-7000/OME-PET-7000 module with the public IP address on the Internet

For accessing the web page, the access URL will need to include the port number as shown below: <http://210.32.166.58:180>



Appendix G. Troubleshooting

A number of common problems are easy to diagnose and fix if you know the cause.

Symptom/Problem	Possible cause	Solution
The Run LED doesn't light	Internal power has failed	Return the module for repair.
The Run LED indicator is ON (light), but not flashing.	The module has possibly crashed.	Reboot the module
Cannot communicate via the Ethernet port, but the OME-ET-7000/OME-PET-7000 is still operating.	The IP/Mask/Gateway address isn't within the IP address range of the LAN.	Change the IP/Mask/Gateway address to match the LAN, or ask the MIS administrator for assistance.
	The IP address has restricted by the IP filter settings	Check the IP filter setting using the Web configuration.
	There are more than 30 TCP/IP connections.	Reboot the module.
Able to explore the web page through Port 80 using a web browser, but the Web HMI and Modbus/TCP program cannot access the module through Port 502.	Port 502 has been restricted by the firewall.	Consult your MIS administrator for assistance.
The Web HMI and Modbus/TCP program can access the module through Port 502, but Web browser cannot explore the web page through Port 80 using a web browser.	The Port 502 has restricted by the firewall.	Consult your MIS administrator for assistance.
	The Web Configuration function has been disabled. (Shown on the Basic Settings page)	Enable the Web Configuration function using either the SMMI or the console.
	The Web server TCP Port has been changed from Port 80 (Shown on the Basic Settings page)	Change the TCP Port to 80 or reconnect the OME-ET-7000/OME-PET-7000 using the specific TCP Port.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

RETURN REQUESTS/INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

OMEGA is a registered trademark of OMEGA ENGINEERING, INC.

© Copyright 2012 OMEGA ENGINEERING, INC. All rights reserved. This document may not be copied, photocopied, reproduced, translated, or reduced to any electronic medium or machine-readable form, in whole or in part, without the prior written consent of OMEGA ENGINEERING, INC.

Where Do I Find Everything I Need for Process Measurement and Control? **OMEGA...Of Course!** *Shop online at omega.com*

TEMPERATURE

- ☑ Thermocouple, RTD & Thermistor Probes, Connectors, Panels & Assemblies
- ☑ Wire: Thermocouple, RTD & Thermistor
- ☑ Calibrators & Ice Point References
- ☑ Recorders, Controllers & Process Monitors
- ☑ Infrared Pyrometers

PRESSURE, STRAIN AND FORCE

- ☑ Transducers & Strain Gauges
- ☑ Load Cells & Pressure Gauges
- ☑ Displacement Transducers
- ☑ Instrumentation & Accessories

FLOW/LEVEL

- ☑ Rotameters, Gas Mass Flowmeters & Flow Computers
- ☑ Air Velocity Indicators
- ☑ Turbine/Paddlewheel Systems
- ☑ Totalizers & Batch Controllers

pH/CONDUCTIVITY

- ☑ pH Electrodes, Testers & Accessories
- ☑ Benchtop/Laboratory Meters
- ☑ Controllers, Calibrators, Simulators & Pumps
- ☑ Industrial pH & Conductivity Equipment

DATA ACQUISITION

- ☑ Data Acquisition & Engineering Software
- ☑ Communications-Based Acquisition Systems
- ☑ Plug-in Cards for Apple, IBM & Compatibles
- ☑ Data Logging Systems
- ☑ Recorders, Printers & Plotters

HEATERS

- ☑ Heating Cable
- ☑ Cartridge & Strip Heaters
- ☑ Immersion & Band Heaters
- ☑ Flexible Heaters
- ☑ Laboratory Heaters

ENVIRONMENTAL MONITORING AND CONTROL

- ☑ Metering & Control Instrumentation
- ☑ Refractometers
- ☑ Pumps & Tubing
- ☑ Air, Soil & Water Monitors
- ☑ Industrial Water & Wastewater Treatment
- ☑ pH, Conductivity & Dissolved Oxygen Instruments