PETL-7000 DIO Series User Manual

Version 1.1, December 2010

Service and usage information for

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Warranty

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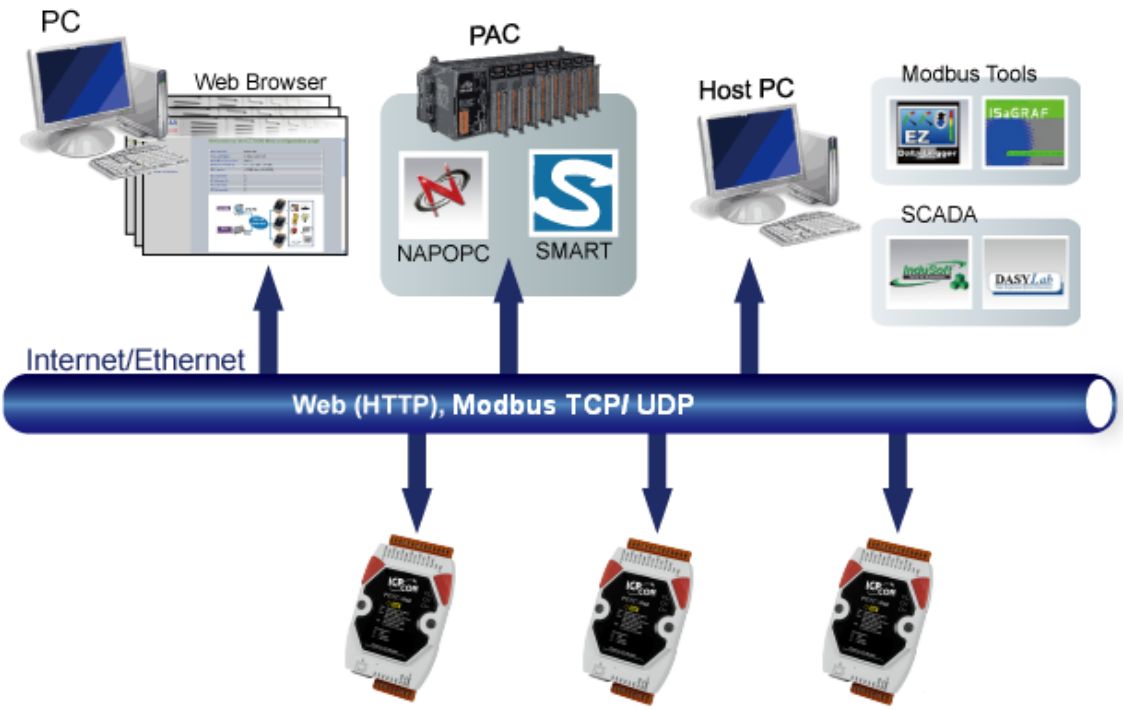
1. Introduction



Providing networking ability and various digital I/O functions, the PETL-7000 series are IP-based Ethernet I/O monitoring and control modules. The module can be remotely controlled through a 10/100 M Ethernet network by using Modbus TCP/UDP protocol. Modbus has become a de facto standard communications protocol in industry, and is now the most commonly available means of connecting industrial electronic devices. This makes the PETL-7000 series perfect integration with the HMI, SCADA, PLC and other software systems.

1.1. Product Information

1.1.1. PETL-7000 DIO Series Module

Type	Model	Description
DC Digital Output (Open Collector)	PETL-7042	16-channel Sink Type Open Collector Isolated DO Module
DC Digital Input	PETL-7051	16-channel Isolated DI Module with 32-bit Counters
	PETL-7053	16-channel Isolated DI Module with 32-bit Counters
DC Digital Input and Output	PETL-7044	8-channel Isolated Sink Type Open Collector Output 8-channel Isolated DI Module with 32-bit Counters
	PETL-7050	6-channel Isolated Sink Type Open Collector Output 12-channel Isolated DI Module with 32-bit Counters
	PETL-7052	8-channel Isolated Source Type Open Collector Output 8-channel Isolated DI Module with 32-bit Counters
Power Relay Output	PETL-7060	6-channel Power Relay Output 6-channel Isolation DI module
	PETL-7067	8-channel Power Relay Output
PhotoMOS Relay Output	PETL-7065	6-channel PhotoMOS Relay Output Module 6-channel Isolated DI Module with 32-bit Counters
	PETL-7066	8-channel PhotoMOS Relay Output Module

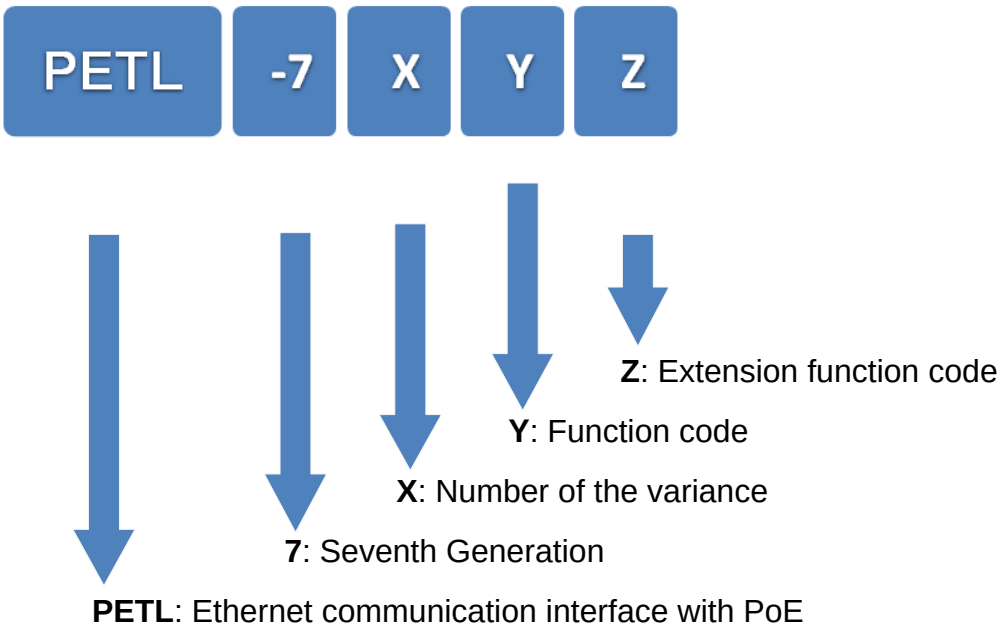
PETL-7000 Series Selection Guide:

Digital I/O						
Model	DI			DO		
	Channel	Type	Sink/Source	Channel	Type	Sink/Source
PETL-7042	-	-	-	16	Open Collector	Sink
PETL-7044	8	Wet	Sink, Source	8	Open Collector	Sink
PETL-7050	12	Wet	Sink, Source	6	Open Collector	Sink
PETL-7051	16	Wet	Sink, Source	-	-	-
PETL-7052	8	Wet	Sink, Source	8	Open Collector	Source
PETL-7053	16	Dry	Source	-	-	-

Relay Output/Digital Input							
Model	Relay Output				DI		
	Channel	Relay	Type	Max. Load Current	Channel	Type	Sink/Source
PETL-7060	6	Power Relay	Form A (SPST N.O.)	5.0 A/ channel	6	Wet	Sink, Source
PETL-7065	6	PhotoMOS Relay	Form A (SPST N.O.)	1.0 A/ channel	6	Wet	Sink, Source
PETL-7066	8	PhotoMOS Relay	Form A (SPST N.O.)	1.0 A/ channel	-	-	-
PETL-7067	8	Power Relay	Form A (SPST N.O.)	5.0 A/ channel	-	-	-

1.1.2. PETL-7000 Module Naming Convention

There are many different products available, and sometimes it is difficult to remember the specifications for any given product. However, if you take a few minutes to understand the module naming conventions, it may save your time and prevent confusion. The figure below shows how the module naming conventions work for each PETL-7000 product.



X	Y	Z
Number of variance	4. DIO module	Number of variance
	5. DIO module	Number of variance
	6. DIO module with relay	Number of variance
	7. Multi-function	1. General purpose
	8. Counter/Frequency	Number of variance

1.1.3. PETL-7000 Comparison

PETL-7000 features true IEEE 802.3af-compliant (classification, Class 1) Power over Ethernet (PoE). Now, not only data but power is carried through an Ethernet cable. This feature makes installation of PETL-7000 a piece of cake. Imagine that no more unnecessary wires, only an Ethernet cable takes care of everything in the field.

PETL-7000 features a built-in web server that allows basic configuration, I/O monitoring and I/O control by simply using a web browser. Remote control is as easy as you surf the internet. PETL-7000 also supports Modbus TCP/ UDP protocols that make perfect integration to SCADA software.

Industrial PoE Solution

When using PoE devices like PETL-7000, you can choose ICP DAS “PoE” switch —”NS-205PSE” as the power source, NS-205PSE automatically detects the connected devices whether they are PoE devices or not. This mechanism ensures NS-205PSE to work with both PoE and non-PoE devices coordinately at the same time.

Being as a power source for PoE devices, NS-205PSE requires its power input ranging from +46 to +55V_{DC}.

More information about PETL-7000

There are two ways for PETL-7000 getting the power. One is through Ethernet by a PoE switch; the other is through removable terminal block by an external power. External power should range from +12 to 48 V_{DC}. The reason we keep the second way is to provide redundant power input feature.

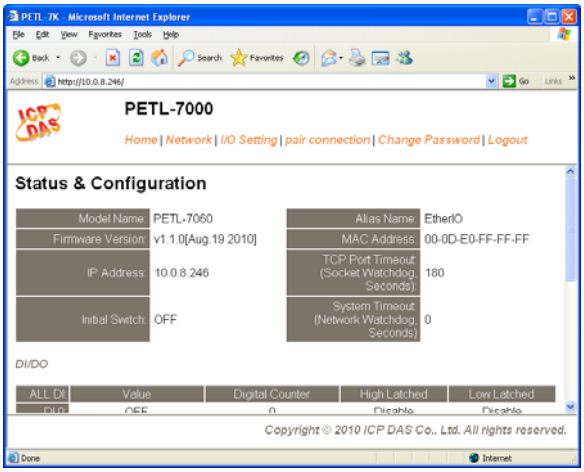
There is a LED on PETL-7000. The LED indicates whether the power comes from the PoE switch or not.

	PET-7000	PETL-7000
CPU	16-bit 80186	32-bit ARM
PoE	○	○
Modbus TCP	○	○
Modbus UDP	✕	○
Multi-client	○	✕
Web configuration	○	○
Web HMI	○	✕
Dual-Watchdog	○	○
Power-on & Safe Value	○	○
DI latch	○	○
DI as counter	○	○
I/O pair-connection	○	○

1.2. Features

➢ Built in Web Server

Each PETL-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 web browser.



➢ Modbus Protocol

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

➢ Built-in Multi-function I/O

All Digital Output modules provide:

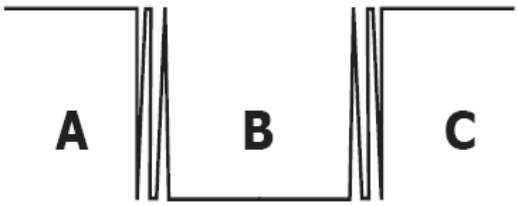
Power-on value (On boot up, the DO status is set to the Power-on value)

Safe value (If Modbus TCP communication is lost for a certain period, the DO status will be set to the user defined safe value)

All Digital Input modules provide:

DI channels can also be used as 32-bit high speed (500 Hz) counters.

High/Low latched status: The modules provide commands to read the latched high digital input and latched low digital input status. Following is an example to show the usefulness of the latched digital input. When we want to read the key stroke of a key switch connected to the digital input channel of a module, the input signal of the key stroke is a pulse signal as shown in the following figure.



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

➢ All-in-one Module

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

➢ Automatic MDI / MDI-X Crossover for Plug-and-play

RJ-45 port supports automatic MDI/MDI-x that can automatically detect the type of connection to the Ethernet device without requiring special straight or crossover cables.

➢ Built-in Dual Watchdog

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

CPU Watchdog automatically resets it-self when the built-in firmware runs abnormally.

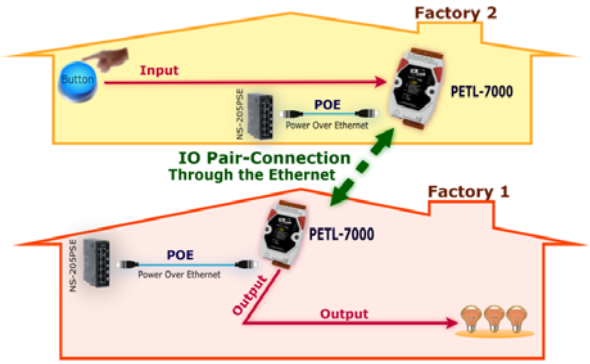
Host Watchdog set the digital output with predefined safe-value when there is no communication between the module and host (PC or PLC) over a period of time (Watchdog timeout).

➢ Ventilated Housing Designed to Operate Between -25 °C to +75 °C

PETL-7000 is housed in a fire retardant plastic (UL94-V0 Level) shell/case with a column-like ventilator that helps to cool the working environment inside the shell/case and allows PETL-7000 to operate at temperatures ranging from -25 °C to +75 °C.

➢ I/O Pair Connection

This function is used to create a DI to DO pair through the Ethernet. Once the configuration is completed, PETL-7000 module can continuously poll the status of remote DI device using the Modbus TCP protocol and then write to local DO channels in the background.



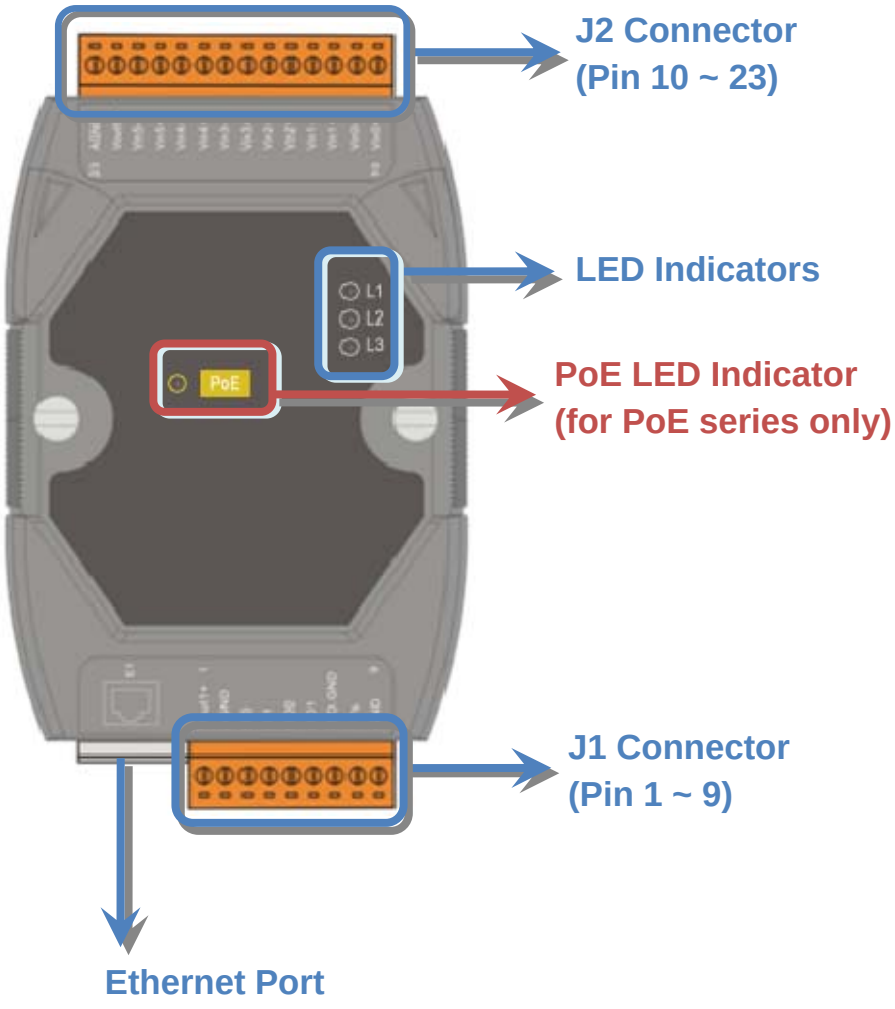
2. Hardware Information

2.1. Overview

Here is a brief overview of the components and its descriptions for module status.

2.1.1. Front Panel

The PETL-7000 front panel contains the Ethernet port, connectors and LEDs.



➢ J1 Connector

Depending on the types of the PETL-7000 modules.

For more detailed information regarding the pin assignments of the J1 Connector, please refer to "4.3. Modbus Register Map & Pin Assignments"

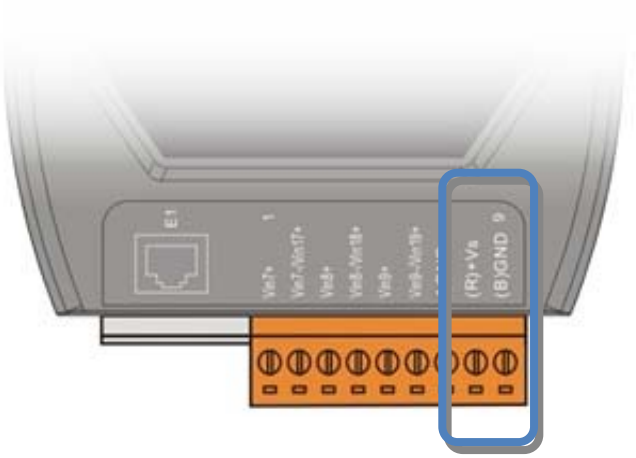
➢ J2 Connector

Depending on the types of the PETL-7000 modules.

For more detailed information regarding the pin assignments of the J2 Connector, please refer to "4.3. Modbus Register Map & Pin Assignments"

Tips & Warnings

The definition of pin 8 and pin 9 applies to all types of the PETL-7000 modules. The definition of the other pins is depending on the particular PETL-7000 modules.



Pin number	Name	Function
8	+Vs	+12 ~ 48 V_{DC} power input
9	GND	Ground connection

LED Indicators

Name	LED Action	Function
Run	Flashing	Firmware is running
Link/ACT	ON	Ethernet link detected
	OFF	No Ethernet link detected
	Flashing	Ethernet packet received
10/100M	OFF	Speed 10 Mbps
	ON	Speed 100 Mbps

Tips & Warnings

If the Run LED is not flashing, the following steps should be taken:

Step 1: Switch the power off

Step 2: Check that the Init/Normal switch is in the Normal position (Refer to "2.1.2. Back Panel")

Step 3: Switch the power on and double-check the LED indicators

PoE LED Indicator

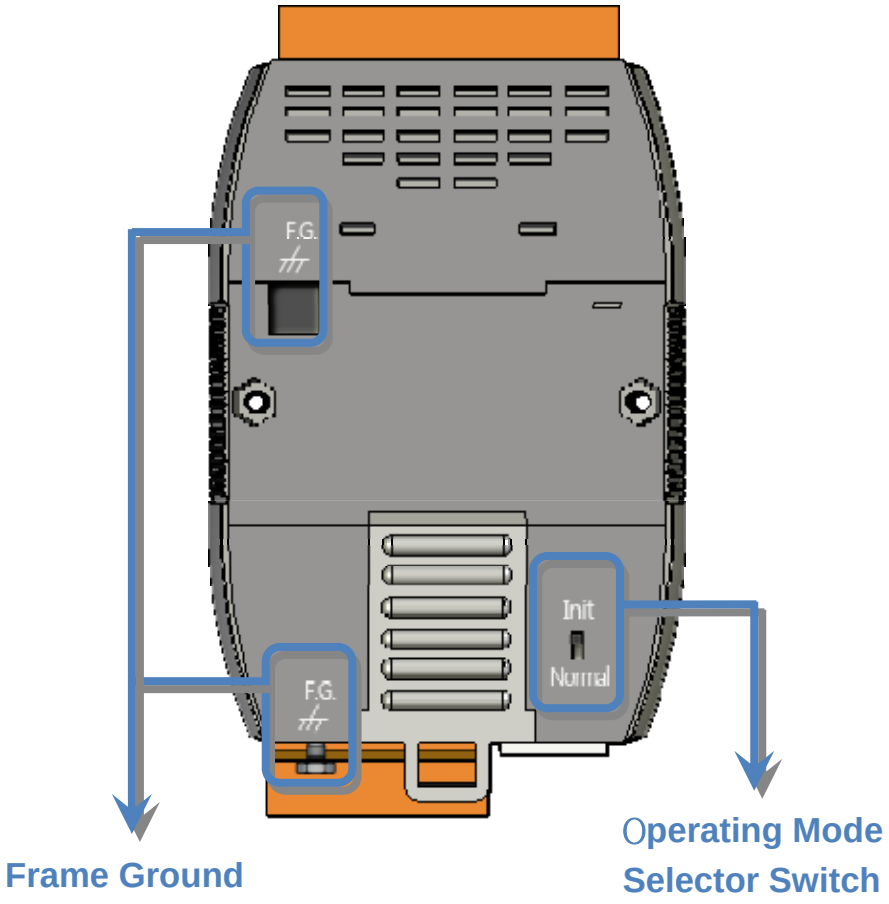
When power is supplied via PoE (Power-over-Ethernet), the PoE indicator will be on.

Ethernet Port

PETL-7000 is equipped with a RJ-45 jack for the Ethernet port and features networking capability. The Ethernet port can be connected with a cable with 8-pin RJ-45 connector. Notes: The function of the Ethernet LED on RJ-45 is reserved (Function: N/A).

2.1.2. Back Panel

The PETL-7000 back panel contains the frame ground, Init Switch and DIN-Rail mounting.



➢ Operating Mode Selector Switch

Init mode: Configuration mode
Normal mode: Firmware running mode

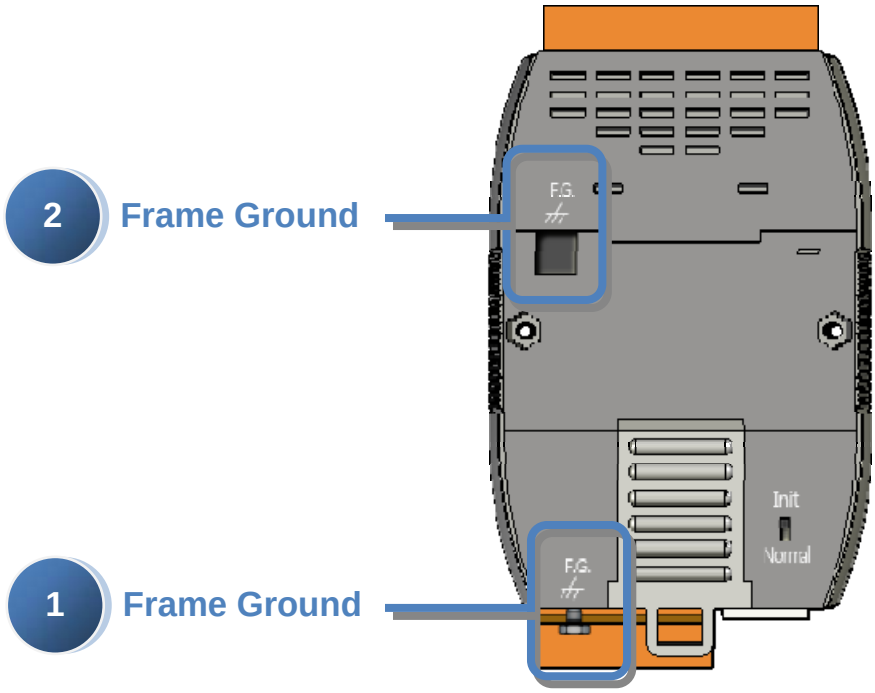
In the PETL-7000 series, the Switch is always in the Normal position. Only when updating the PETL-7000 firmware, the switch can be moved from the Normal position to the Init position.

Move the Switch to the Normal position after the update is complete.

➢ Frame Ground

Electronic circuits are constantly vulnerable to Electro-Static Discharge (ESD), which become worse in a continental climate area. PETL-7000 series modules feature a new design for the frame ground, which provides a path for bypassing ESD, resulting enhanced ESD protection capability and ensures that the module is more reliable.

The following options will provide a better protection for the module:
The PETL-7000 controller has a metallic board attached to the back of the plastic basket as shown in the figure below, point 1.
When mounted to the DIN-Rail, connect the DIN-Rail to the earth ground because the DIN-Rail is in contact with the upper frame ground as shown in the figure below, point 2.



2.2. Specification

2.2.1. System Specification

System	
CPU	32-bit MCU
Dual Watchdog	Yes
Communication	
Ethernet Port	10/100 Base-TX (With Link, Activity LED Indicator) Automatic MDI/MDI-X 8-Pin RJ-45 x1
LED Display	
PoE	PoE On
L1	Run indicator
L2	Link/Act indicator
L3	10/100 M indicator
Mechanical	
Dimensions (W x H x D)	123 mm x 72 mm x 35 mm
Installation	DIN-Rail or Wall mounting
Environment	
Operating Temperature	-25 ˚C ~ +75 ˚C
Storage Temperature	-30 ˚C ~ +80 ˚C
Humidity	10 ~ 90 % RH, non-condensing
Power Requirements	
IEEE 802.3af	Class 1
Required Supply Voltage	Powered by Power-Over-Ethernet (PoE) or external +12~ 48 V_{DC} (non-regulated)
LED Indicator	Yes
Power consumption	0.04 A @ 48 V_{DC} Max. for PETL-7060

2.2.2. I/O Specification

2.2.2.1. PETL-7042/7044/7050

Digital Input			
Models	**PETL-7042**	**PETL-7050**	**PETL-7044**
Input Channels	-	12	8
Input Type (Device)	-	Wet Contact (Sink, Source)	
On Voltage Level	-	+10 V_{DC} ~ +50 V_{DC}	
Off Voltage Level	-	+4 V_{DC} max.	
Input Impedance	-	10 k Ohm	
Counters	-	Max. Count: 4,294,967,285 (32 bits)	
	-	Max. Input Frequency: 3.5 kHz (without filter)	
	-	Min. Pulse Width: 0.15 ms	
Overvoltage Protection	-	+70 V_{DC}	
Intra-module Isolation	-	3750 Vrms	

Digital Output			
Models	**PETL-7042**	**PETL-7050**	**PETL-7044**
Output Channels	16	6	8
Output Type (Module)	Sink, Open Collector		
Output Voltage	+5 V_{DC} ~ +30 V_{DC}		+10 V_{DC} ~ +40 V_{DC}
Max. Load Current	100 mA/channel at 25 °C		300 mA/channel at 25 °C
Short Circuit Protection	Yes		
Output Isolation	3750 Vrms		

2.2.2.2. PETL-7051/7052/7053

Digital Input			
Models	**PETL-7052**	**PETL-7051**	**PETL-7053**
Input Channels	8	16	16
Input Type (Device)	Wet Contact (Sink, Source)		Dry Contact
On Voltage Level	+10 V_{DC} ~ +50 V_{DC}		Open
Off Voltage Level	+4 V_{DC} max.		Close to GND
Input Impedance	10 k Ohm		
Counters	Max. Count: 4,294,967,285 (32 bits)		
	Max. Input Frequency: 3.5 kHz (without filter)		
	Min. Pulse Width: 0.15 ms		
Overvoltage Protection	+70 V_{DC}		-
Effective Distance	-		500 m max.
Intra-module Isolation	3750 Vrms		

Digital Output			
Models	**PETL-7052**	**PETL-7051**	**PETL-7053**
Output Channels	8	-	
Output Type(Module)	Source, Open Collector	-	
Output Voltage	+10 V_{DC} ~ +40 V_{DC}	-	
Max. Load Current	650 mA/channel at 25 °C	-	
Overvoltage Protection	+48 V_{DC}	-	
Output Isolation	3750 Vrms	-	

2.2.2.3. PETL-7060/7067

Digital Input		
Models	**PETL-7060**	**PETL-7067**
Input Channels	6	-
Input Type (Device)	Wet Contact (Sink, Source)	-
On Voltage Level	+10 V_{DC} ~ +50 V_{DC}	-
Off Voltage Level	+4 V_{DC} max.	-
Input Impedance	10 k Ohm	-
Counters	Max. Count: 4,294,967,285 (32 bits)	-
	Max. Input Frequency: 3.5 kHz (without filter)	-
	Min. Pulse Width: 0.15 ms	-
Overvoltage Protection	+70 V_{DC}	-
Isolation	3750 Vrms	-

Relay Output			
Models		**PETL-7060**	**PETL-7067**
Output Channels		6	8
Output Type (Module)		Power Relay, Form A (SPST N.O.)	
Output Voltage Range		250 V_{AC}/30 V_{DC}	
Max. Load Current		5.0 A/channel at 25 °C	
Operating Time		6 ms	
Release Time		3 ms	
Electrical Life (Resistive load)	VED	5 A 250 V_{AC} 30,000 ops (10 ops/minute) at 75 °C	
		5 A 30 V_{DC} 70,000 ops (10 ops/minute) at 75 °C	
	UL	5 A 250 V_{AC}/30 V_{DC} 6,000 ops	
		3 A 250 V_{AC}/30 V_{DC} 100,000 ops	
Mechanical Life		20,000,000 ops. At no load (300 ops./ minute)	
Relay Output Isolation		3000 Vrms	

2.2.2.4. PETL-7065/7066

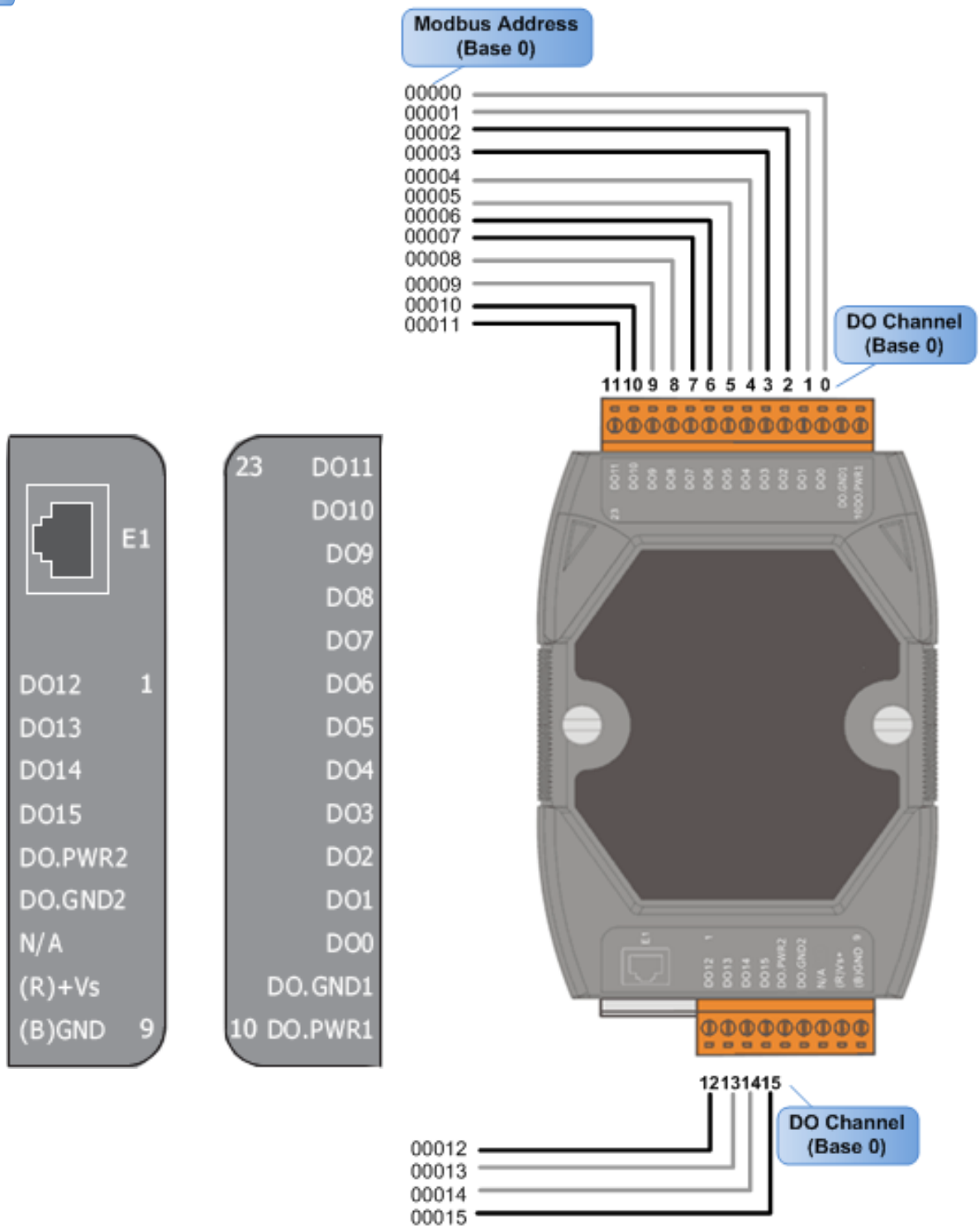
Digital Input		
Models	**PETL-7065**	**PETL-7066**
Input Channels	6	-
Input Type (Device)	Wet Contact (Sink, Source)	-
On Voltage Level	+10 V_{DC} ~ +50 V_{DC}	-
Off Voltage Level	+4 V_{DC} max.	-
Input Impedance	10 k Ohm	-
Counters	Max. Count: 4,294,967,285 (32 bits)	-
	Max. Input Frequency: 3.5 kHz (without filter)	-
	Min. Pulse Width: 0.15 ms	-
Overvoltage Protection	+70 V_{DC}	-
Isolation	3750 Vrms	-

Relay Output		
Models	**PETL-7065**	**PETL-7066**
Output Channels	6	8
Output Type (Module)	PhotoMOS Relay, Form A	
Load Voltage	60 V_{DC}/ V_{AC}	
Load Current	60 V/1.0 A (Operating Temperature -25°C ~ -40°C)	
	60 V/0.8 A (Operating Temperature +40°C ~ +60°C)	
	60 V/0.7 A (Operating Temperature +60°C ~ +75°C)	
Turn ON Time	1.3 ms (Typical)	
Turn Off Time	0.1 ms (Typical)	
Relay Output Isolation	3000 Vrms	

2.3. Pin Assignments

2.3.1 PETL-7042

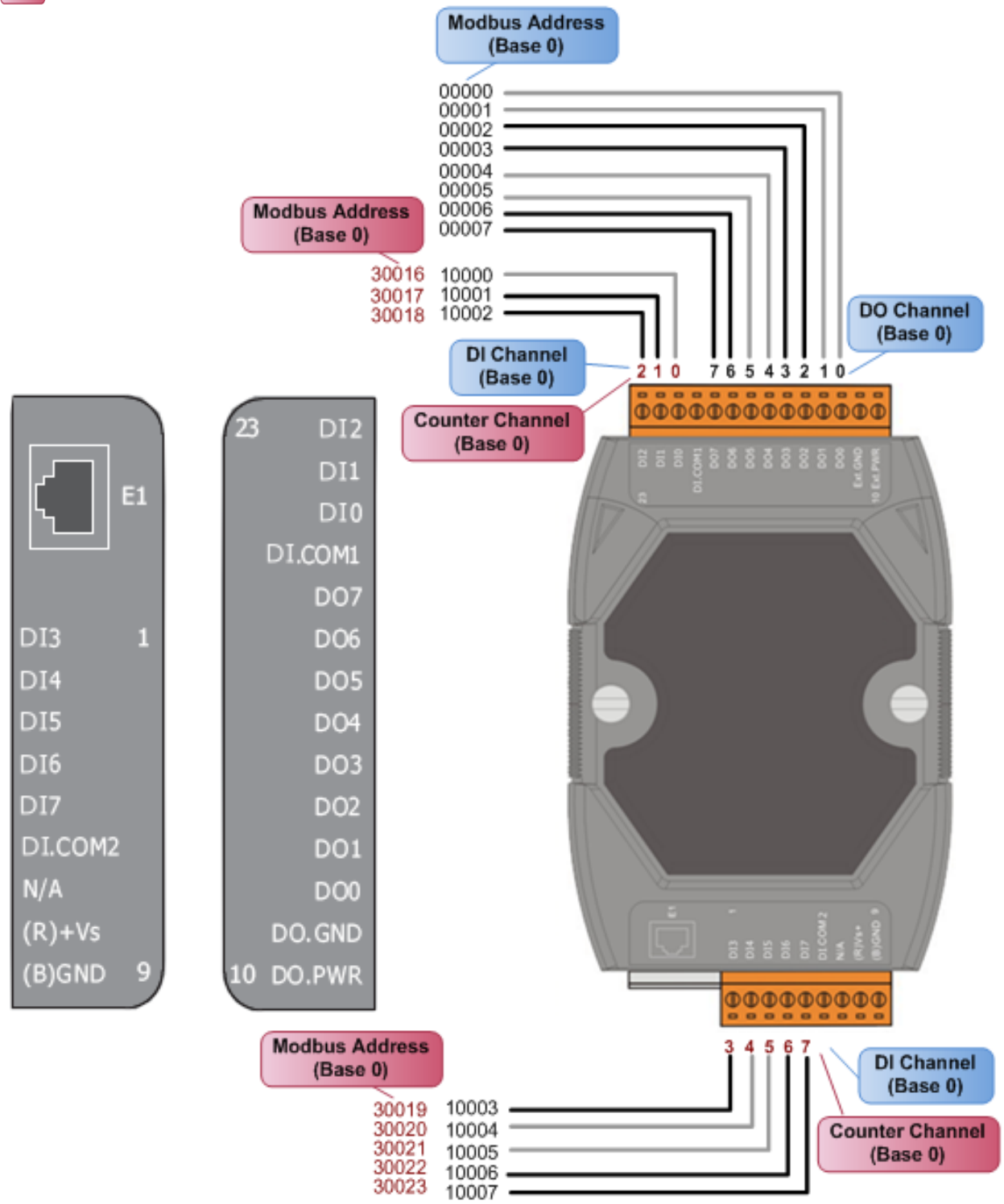
: I/O Address Mapping



2.3.2 PETL-7044

: I/O Address Mapping

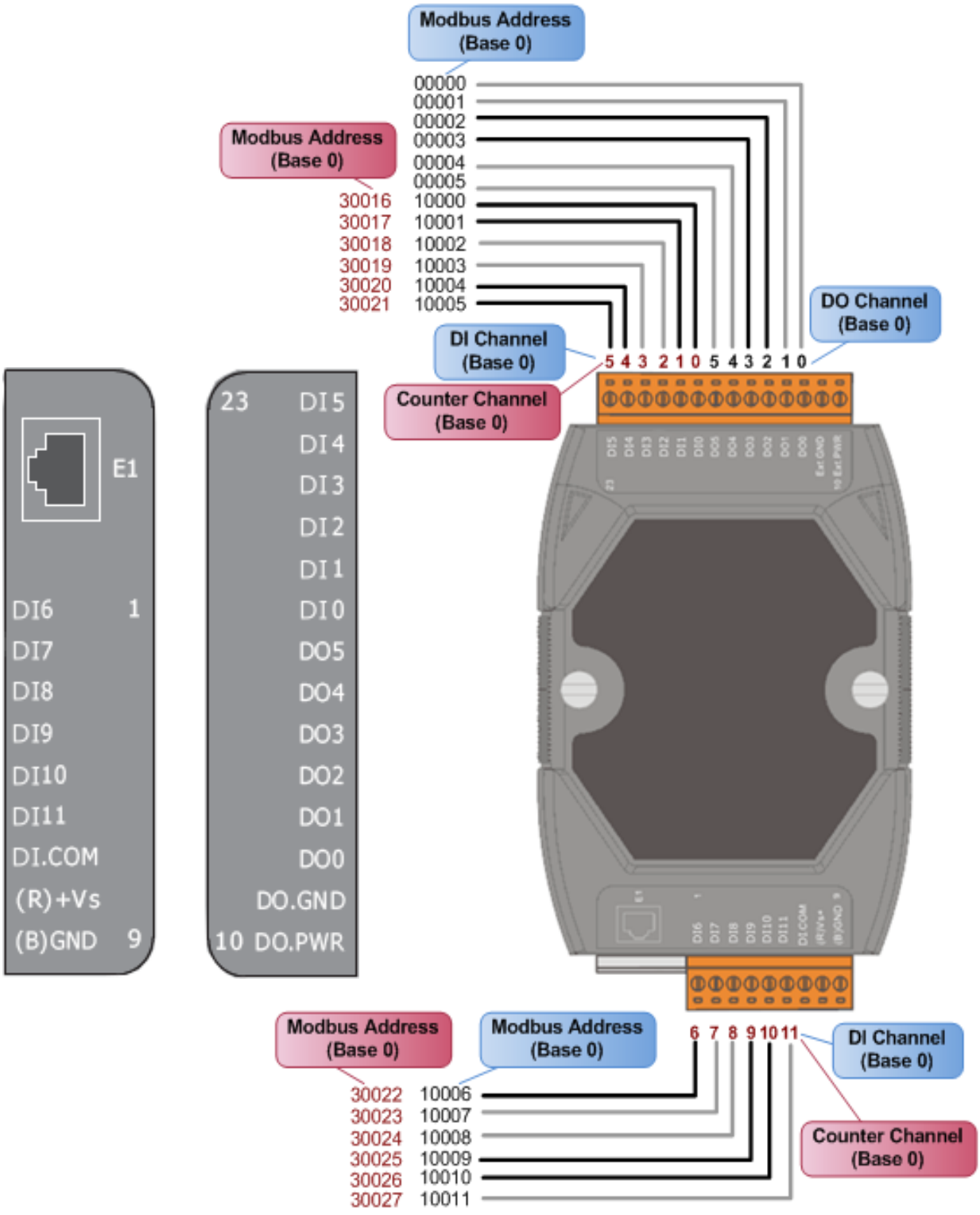
: Counter Address Mapping



2.3.3 PETL-7050

: I/O Address Mapping

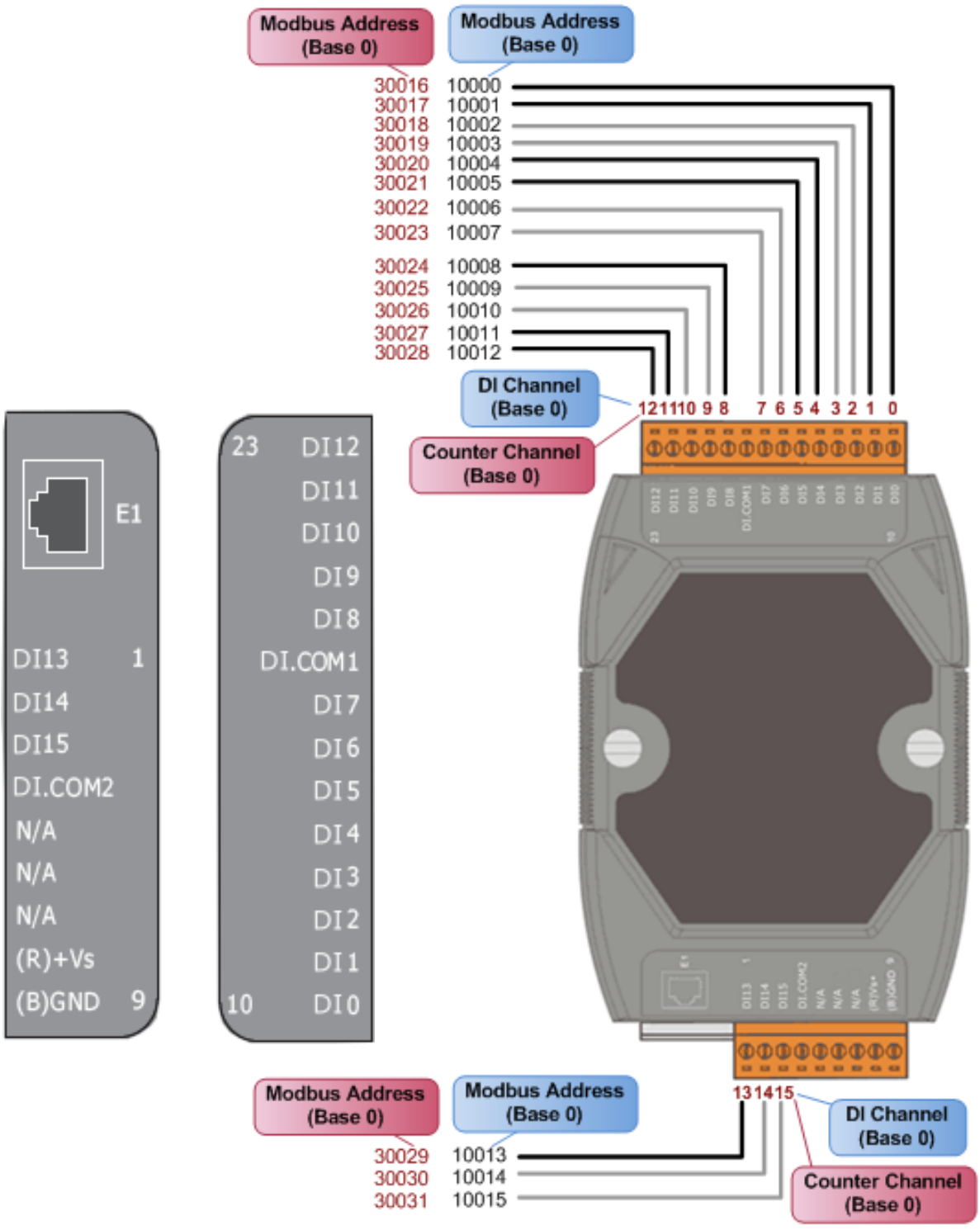
: Counter Address Mapping



2.3.4 PETL-7051

: I/O Address Mapping

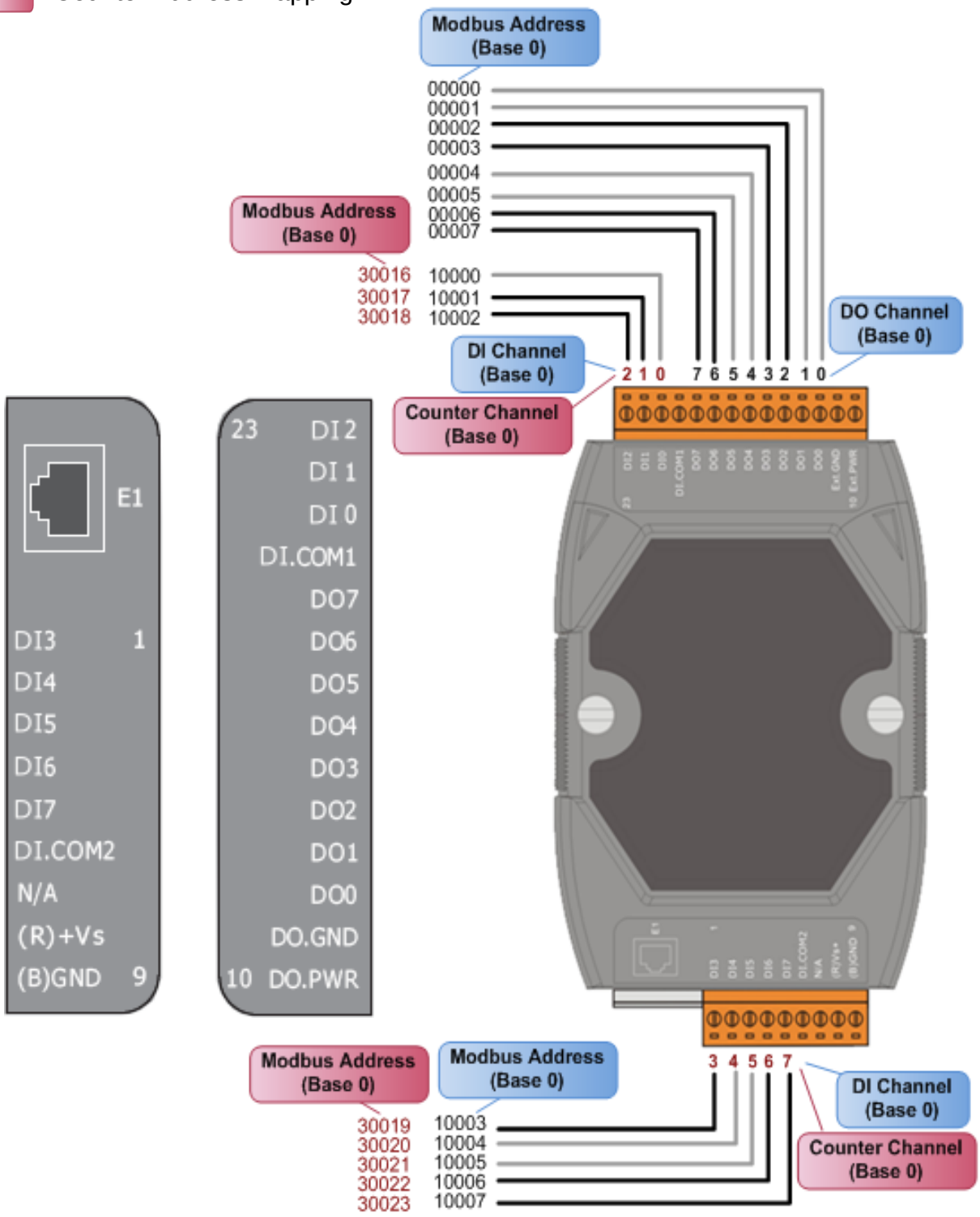
: Counter Address Mapping



2.3.5 PETL-7052

: I/O Address Mapping

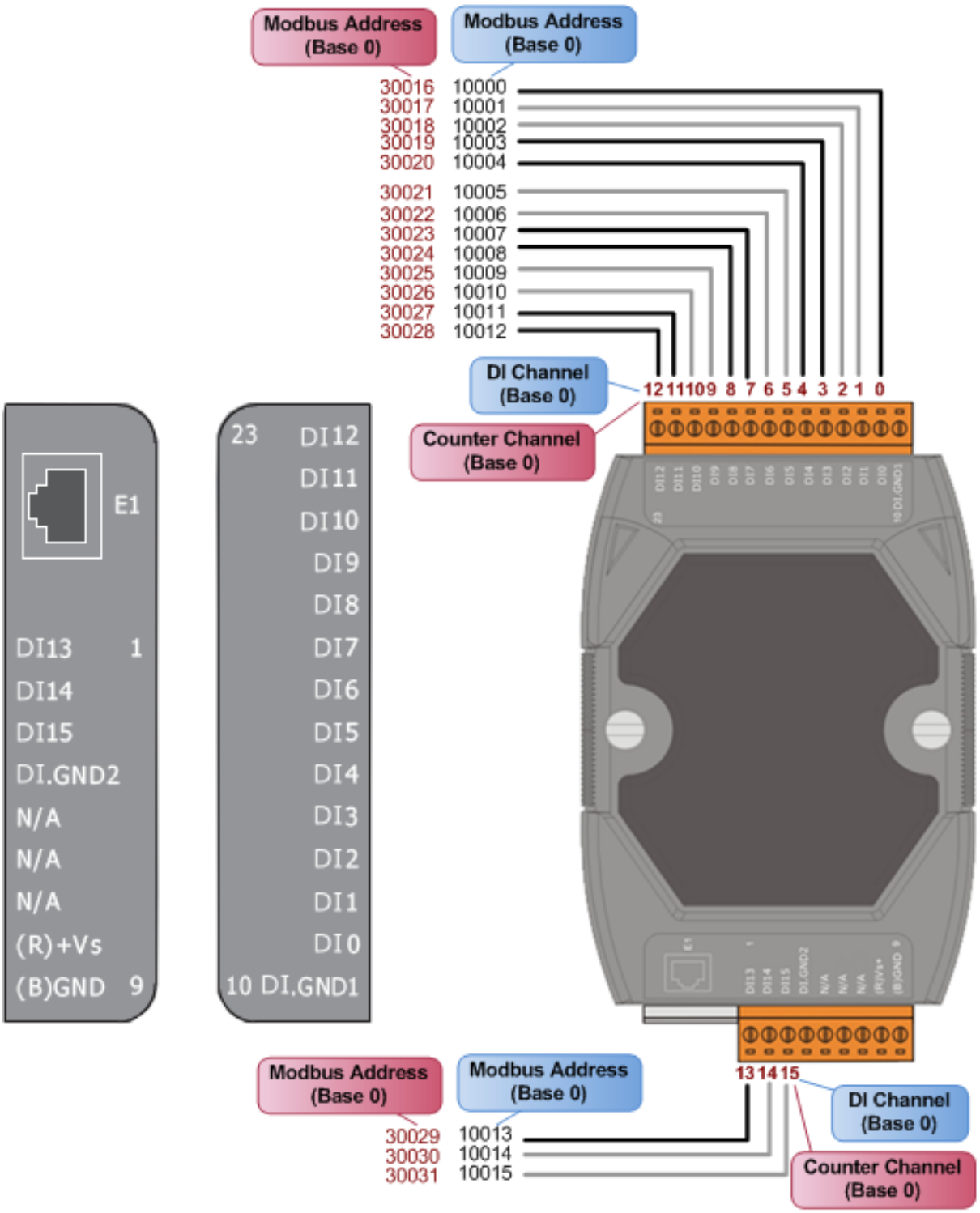
: Counter Address Mapping



2.3.6 PETL-7053

: I/O Address Mapping

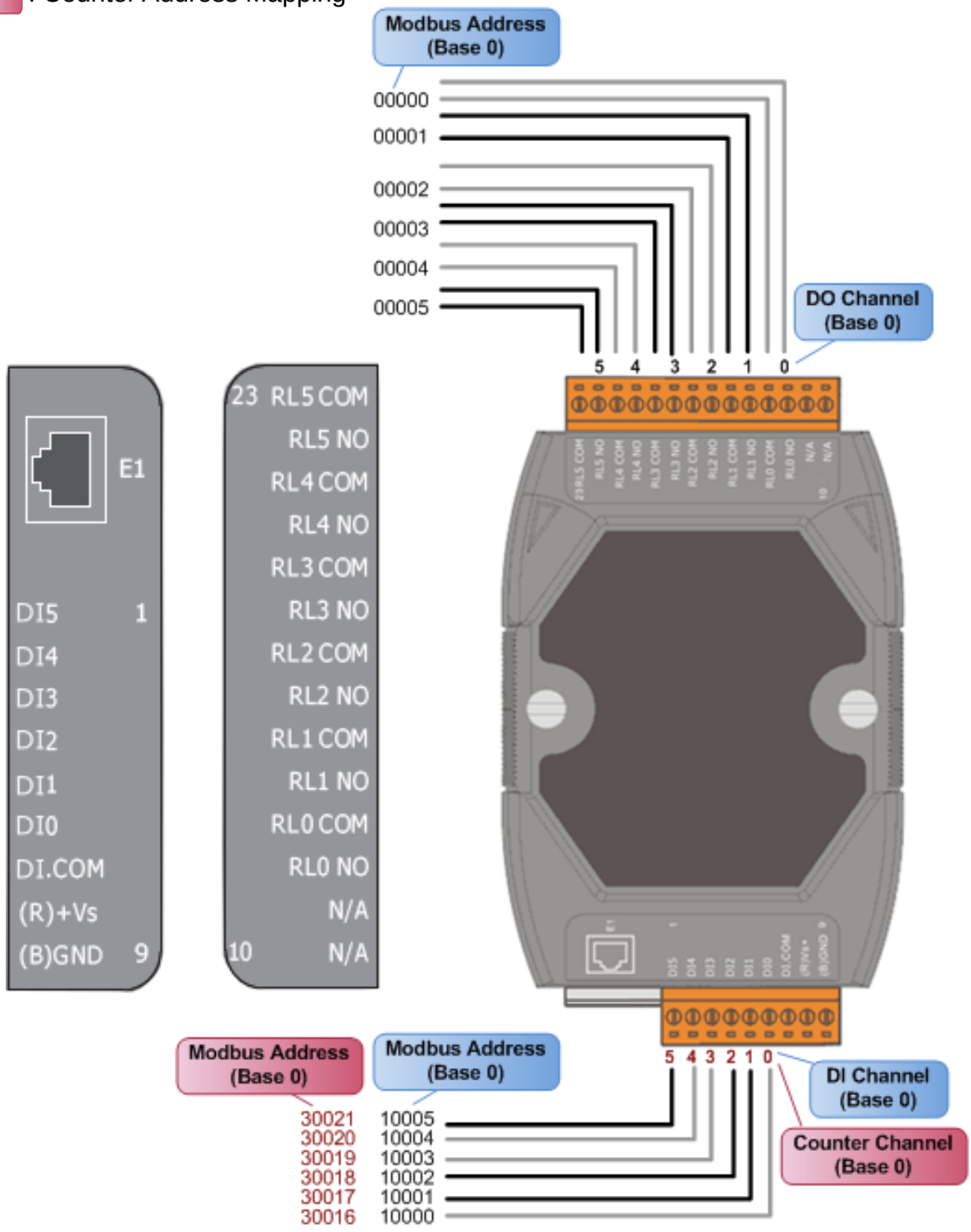
: Counter Address Mapping



2.3.7 PETL-7060/7065

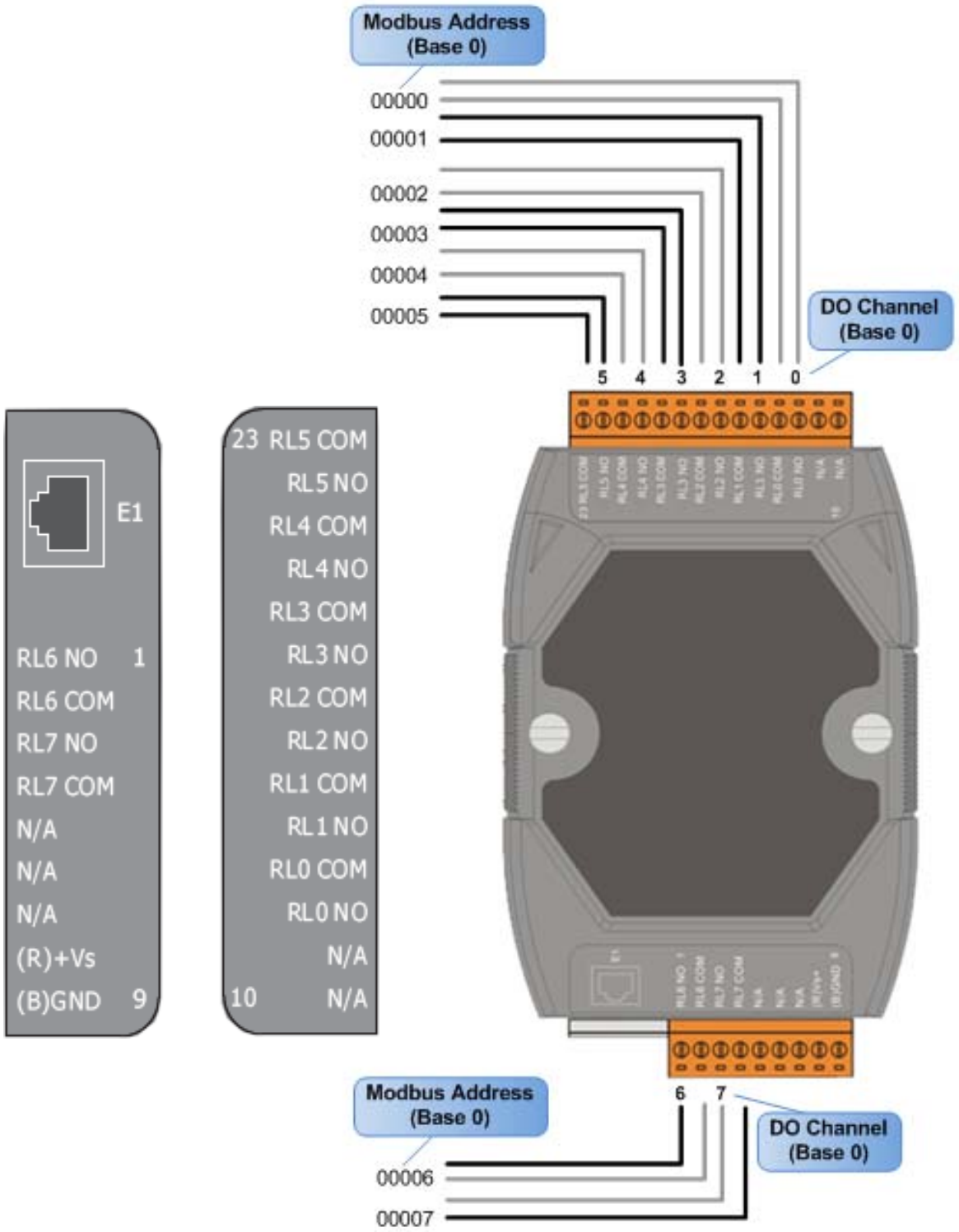
: I/O Address Mapping

: Counter Address Mapping



2.3.8 PETL-7066/7067

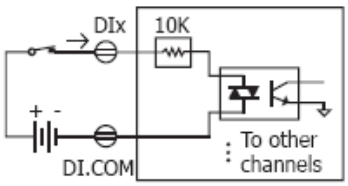
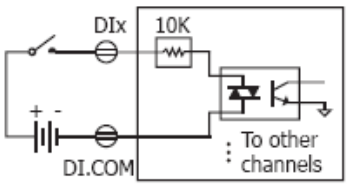
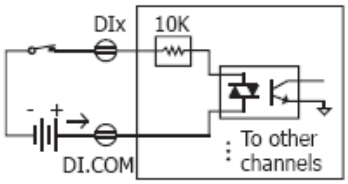
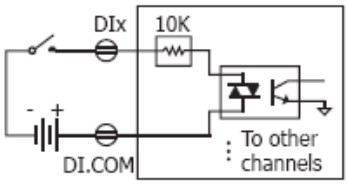
: I/O Address Mapping



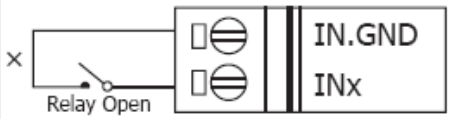
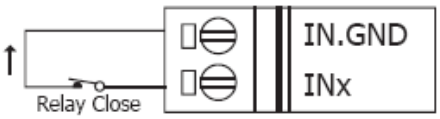
2.4. Wiring Connection

2.4.1. Input Wiring

➢ **PETL-7044/7050/7051/7052/7060/7065:**

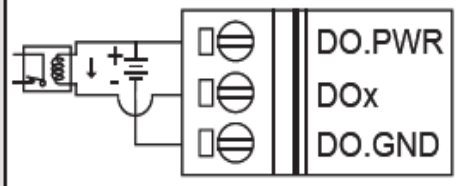
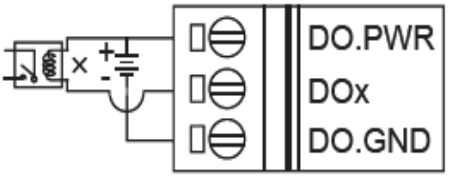
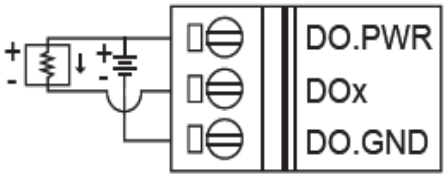
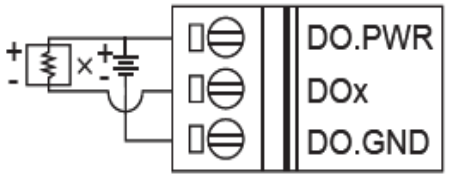
Digital Input	Readback as 1	Readback as 0
Sink	+10 ~ +50 VDC	OPEN or <4 VDC
		
Source	+10 ~ +50 VDC	OPEN or <4 VDC
		

➢ **PETL-7053:**

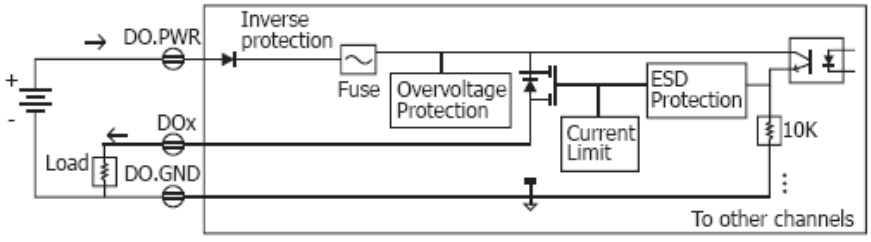
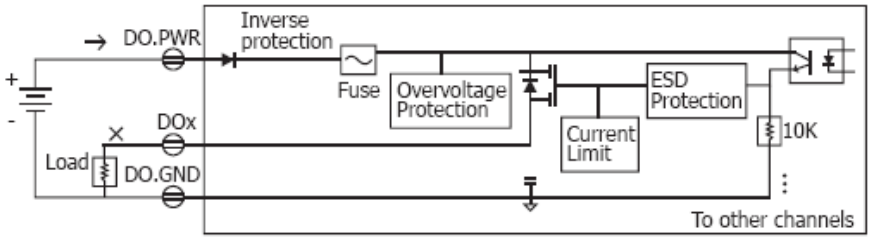
Input Type	Readback as 1	Readback as 0
Dry Contact	Relay Off	Relay On
		

2.4.2. Output Wiring

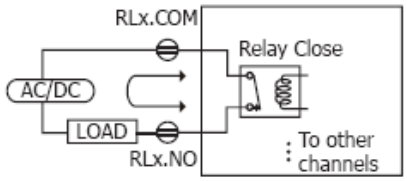
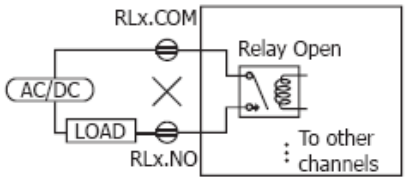
➢ **PETL-7042/7044/7050:**

Output Type	Readback as 1	Readback as 0
Drive Relay	Relay ON	Relay Off
		
Resistance Load		
		

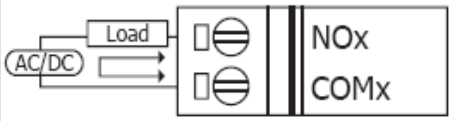
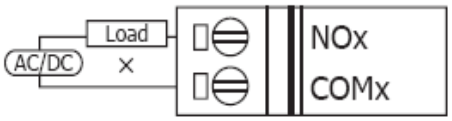
➢ **PETL-7052:**

Digital Output	
ON State Readback as 1	
OFF State Readback as 0	

➢ **PETL-7060/7067:**

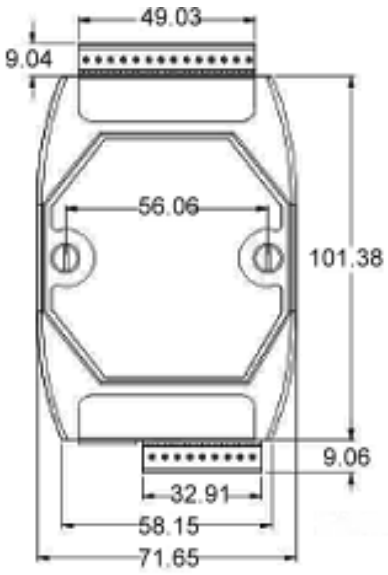
Digital Output	Readback as 1	Readback as 0
Relay Output	Relay On	Relay Off
		

➢ **PETL-7065/7066:**

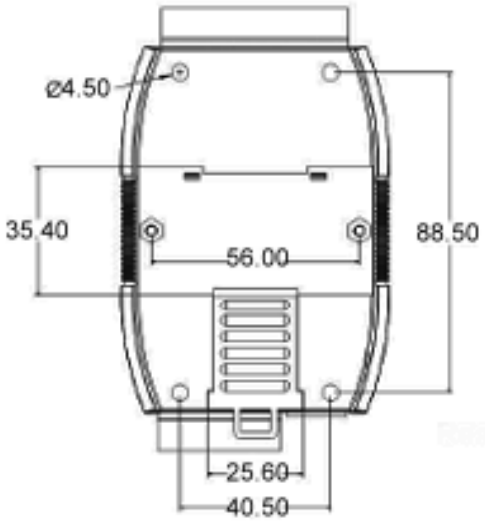
Output Type	Readback as 1	Readback as 0
From A Relay Contact	Relay On	Relay Off
		

2.5. Dimensions

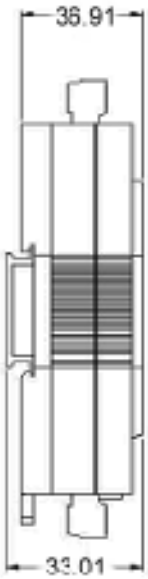
All dimensions are in millimeters.



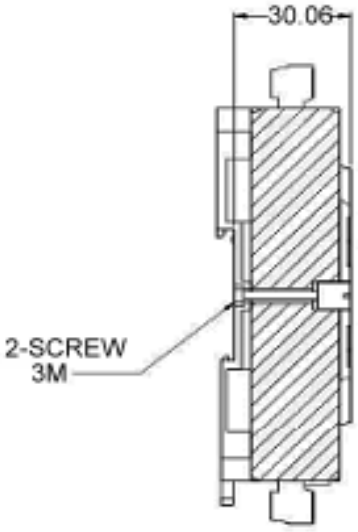
Front View



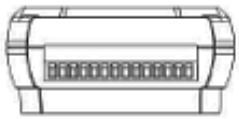
Rear View



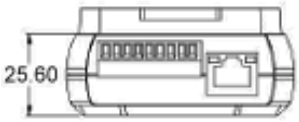
Din-Rail Mounting bracket



Side View



Top View



Bottom View

3. Getting Started

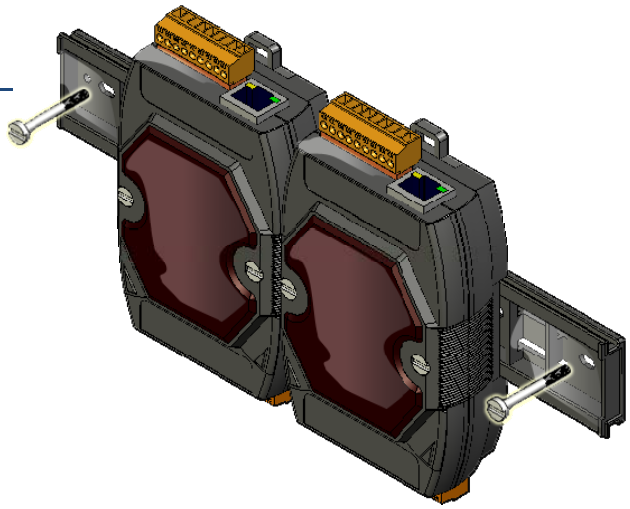
This chapter provides a basic overview of installing, configuring and using the PETL-7000.

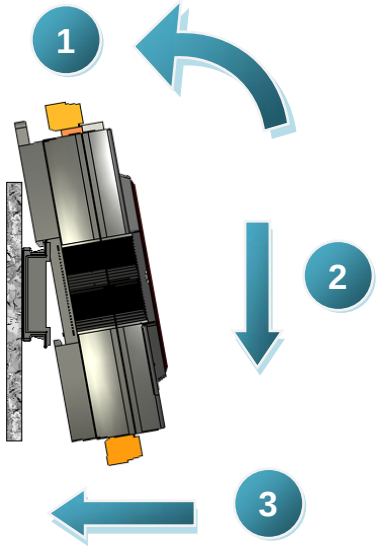
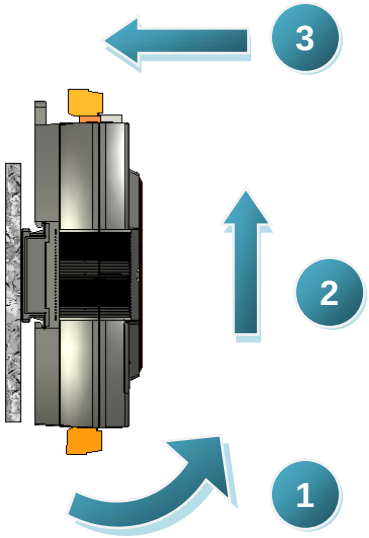
3.1. Mounting the Hardware

The PETL-7000 can be mounted with the bottom of the chassis on the DIN-Rail, the wall or piggyback.

➢ DIN-Rail mounting

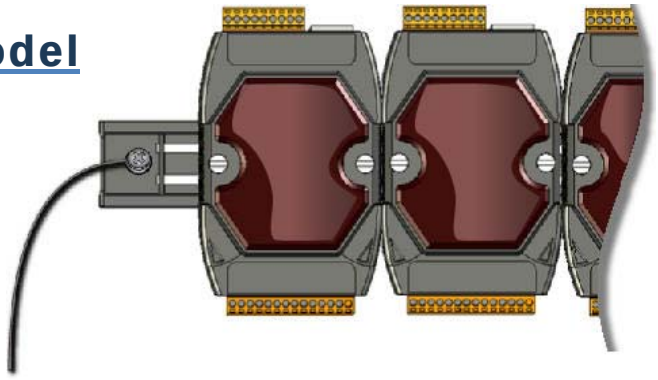
The PETL-7000 has simple rail clips for mounting reliably on a standard 35 mm DIN rail.



Mounting on DIN-Rail	Un-mounting from DIN-Rail
	

Din-Rail Mountable Model

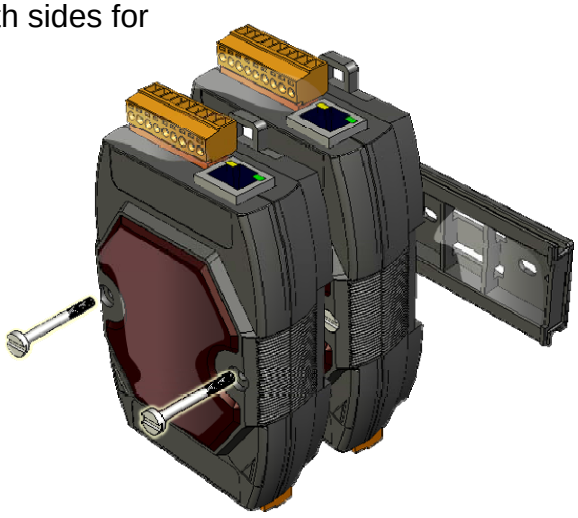
Three Din-Rail mountable models are available to mount a variety for ICP DAS devices. Each is made of stainless steel and has a ground wire at the end.



Part number	Maximum number of modules	Dimensions
DRS-125	2	125 mm x 35 mm
DRS-240	3	240 mm x 35 mm
DRS-360	5	360 mm x 35 mm

➢ Piggyback Mounting

The PETL-7000 has two holes on both sides for piggyback mounting



3.2. Configuring the Boot Mode

The PETL-7000 has two operating modes that can be determined by the switch mechanism on the chassis.

➢ Init Mode

Init mode is used for firmware update or troubleshooting..

Init

Normal

➢ Normal Mode

Normal mode is the default mode of operation and the one you will use most of the time.

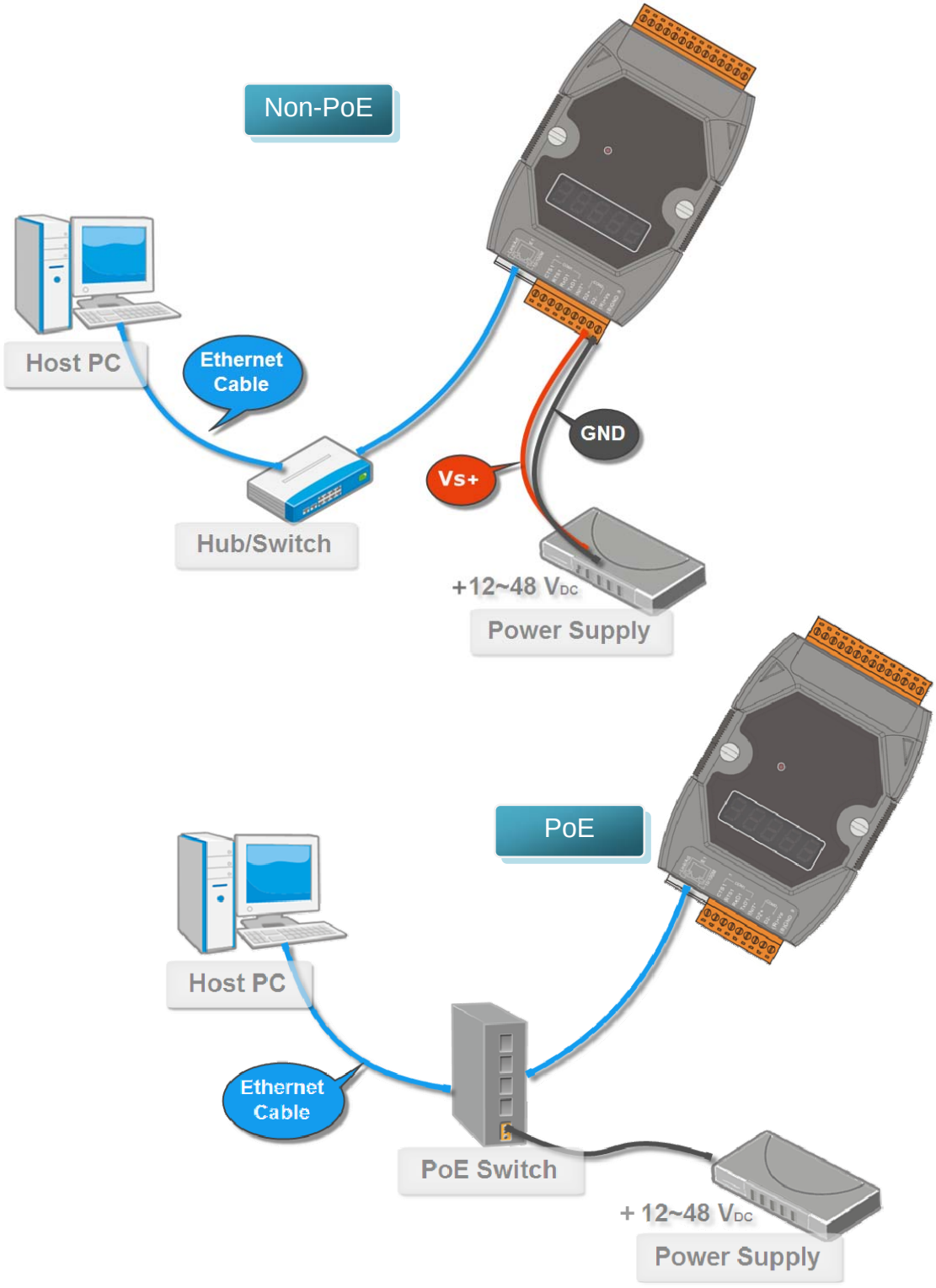
Init

Normal

Move the switch to the Normal position after the update is complete

3.3. Connecting to Network, PC and Power

The PETL-7000 is equipped with an RJ-45 Ethernet port for connection to an Ethernet hub/switch and PC



3.4. Using eSearch Utility to assign a new IP

The eSearch Utility is a useful tool that provides a quick and easy way to configure Ethernet settings of the PETL-7000 from PC.

Step 1: Get the eSearch Utility tool

The eSearch Utility can be obtained from companion CD or our FTP site:

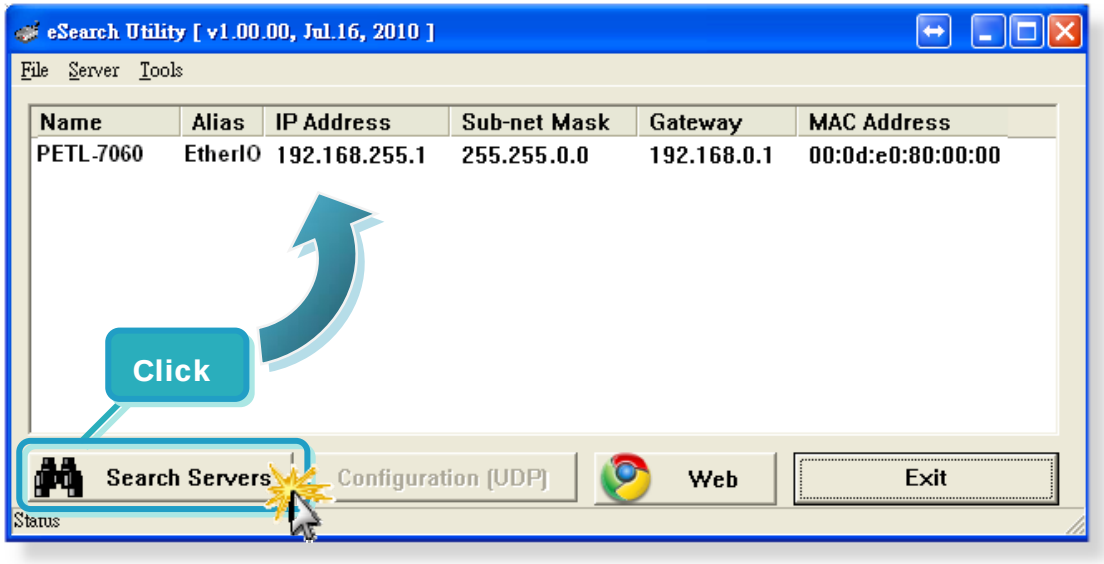
CD:\Napdos\Software\eSearch\

ftp://ftp.icpdas.com/pub/cd/6000cd/napdos/software/eSearch/

Step 2: Run the eSearch Utility

Double-click the eSearch Utility.

Step 3: Click “Search Servers” to search your PETL-7000

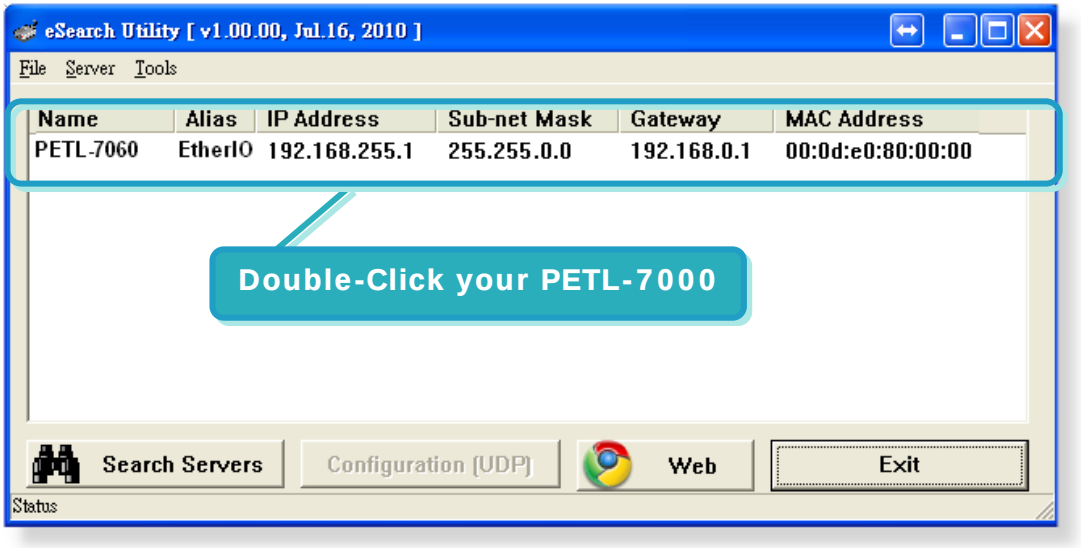


Step 4: Double-Click your PETL-7060 to configure the settings.

The PETL-7000 series are IP-based devices that may not suitable for your network with a default IP address. Therefore, you must first assign a new IP address to the PETL-7000 depending on your network.

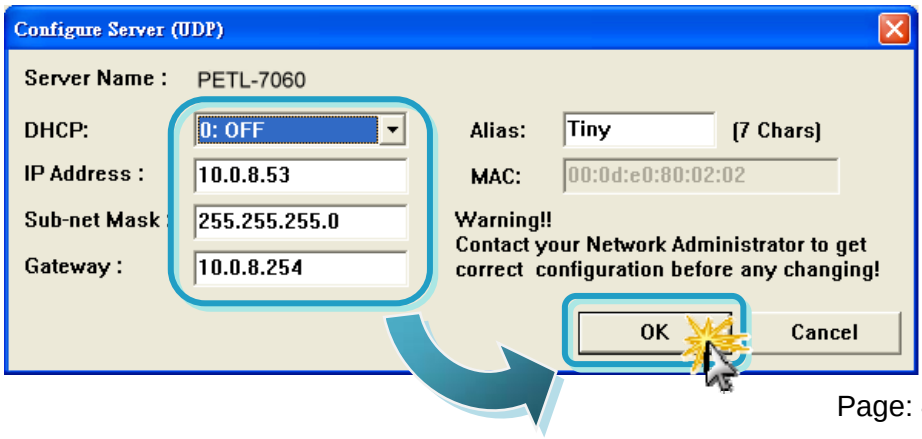
The factory default IP settings are as follows:

Item	Default
IP Address	192.168.255.1
Subnet Mask	255.255.0.0
Gateway	192.168.0.1



Step 5: Assign a new IP address and then choose “OK” button

Contact your Network Administrator to get correct network configuration. Modify the network settings and then click “**OK**”. The PETL-7060 will use the new settings immediately.



4. Web Configuration

The PETL-7000 contains an advanced web configuration system that provides I/O accessibility of the PETL-7000 through a web browser.

Logging in to the PETL-7000 Web Server

You can login to the PETL-7000 web server from any computer that has Internet access capability.

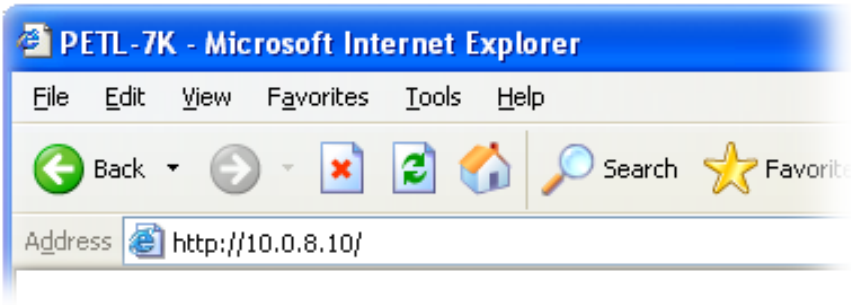
Step 1: Open a browser

For example, Mozilla Firefox, Google Chrome and Internet Explorer are reliable and popular internet browsers that can be used to configure the PETL-7000 modules.

If using IE, please disable its cache to avoid browser accessing error. The detail settings steps refer to “Appendix: A”.

Step 2: Type the URL address of the PETL-7000

Make sure you have well configured the network settings of the PETL-7000, or please refer to the section 3.4 Using eSearch Utility to Assign a New IP.

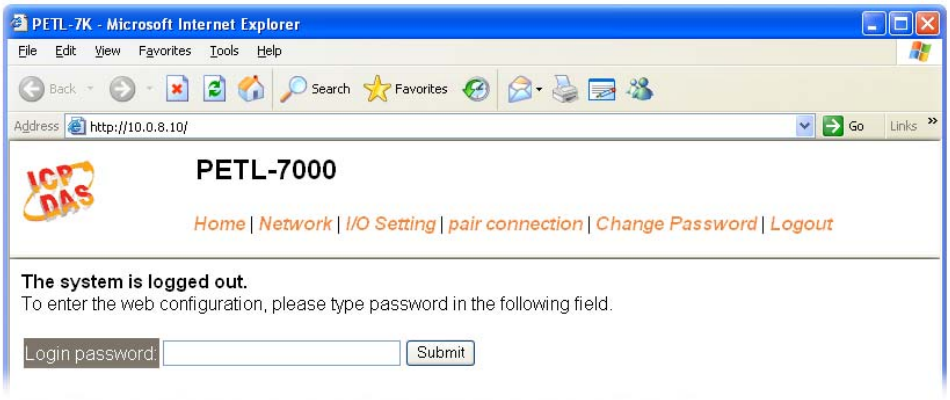


Step 3: Fill out the Password

After entering the IP address, the login dialog page will prompt you to enter password.

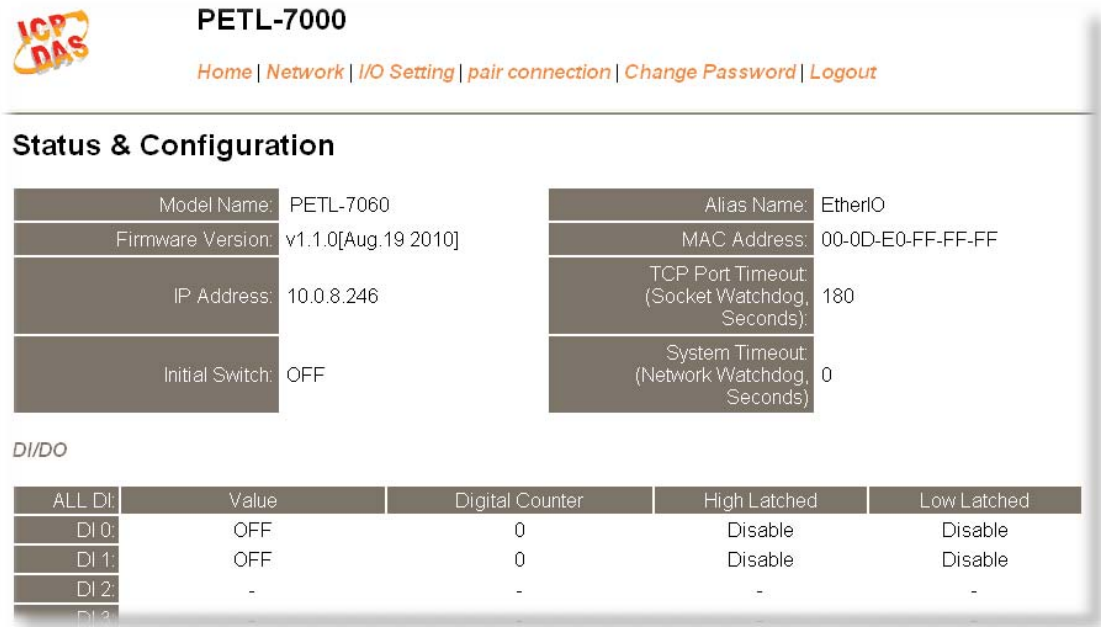
The factory default password is as follows:

Item	Default
Login password	**Admin**



Step 4: Login to PETL-7000 web server

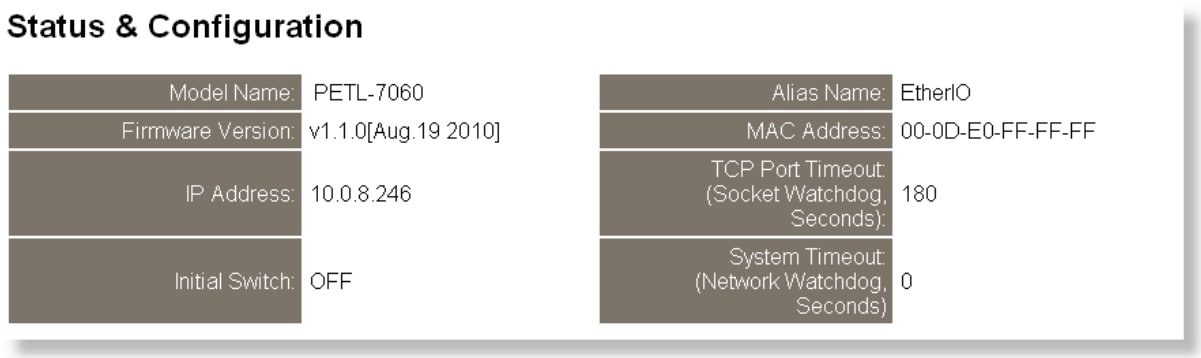
After logging into the PETL-7000 web server, the main page will appear.



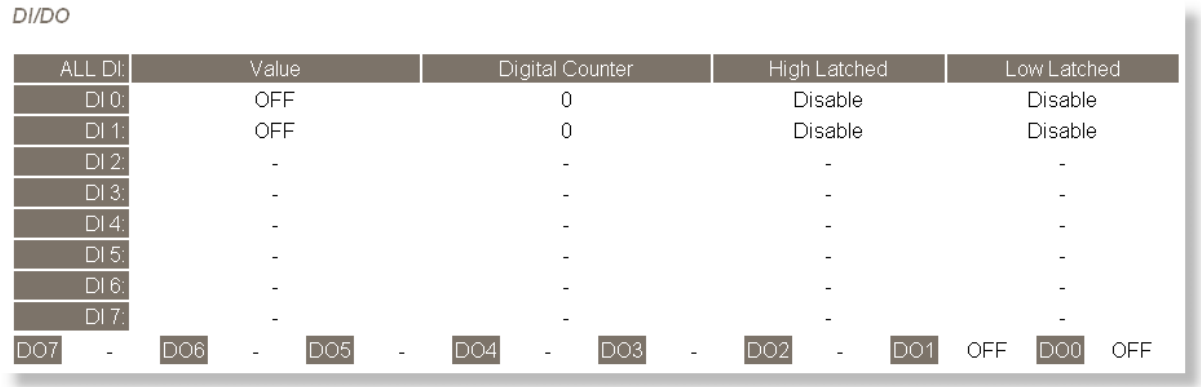
4.1. Home page

The Home links to the main page that determines three message body parts.

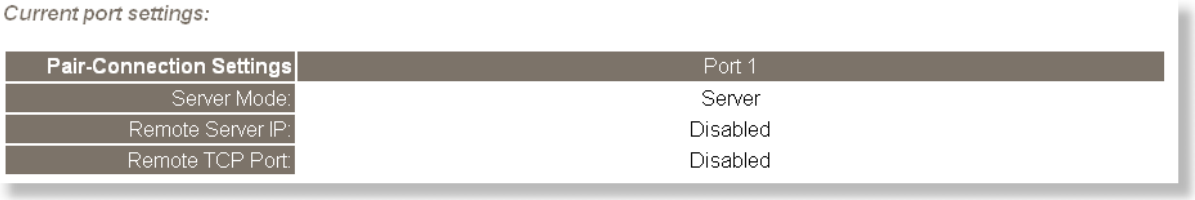
The first part of this page provides basic information about the PETL-7000 hardware and software.



The second part of this page provides information about the status of I/O.



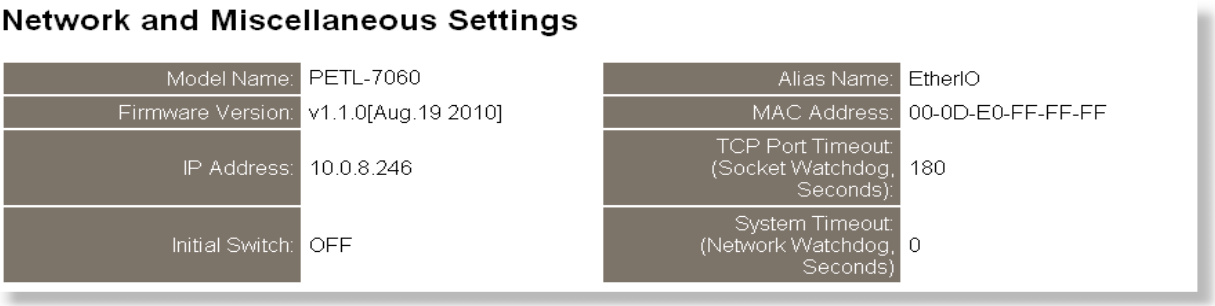
The Third part of this page provides status of I/O pair connection.



4.2. Network Setting

4.2.1. Network and Miscellaneous Settings

Check the Model name and the software information

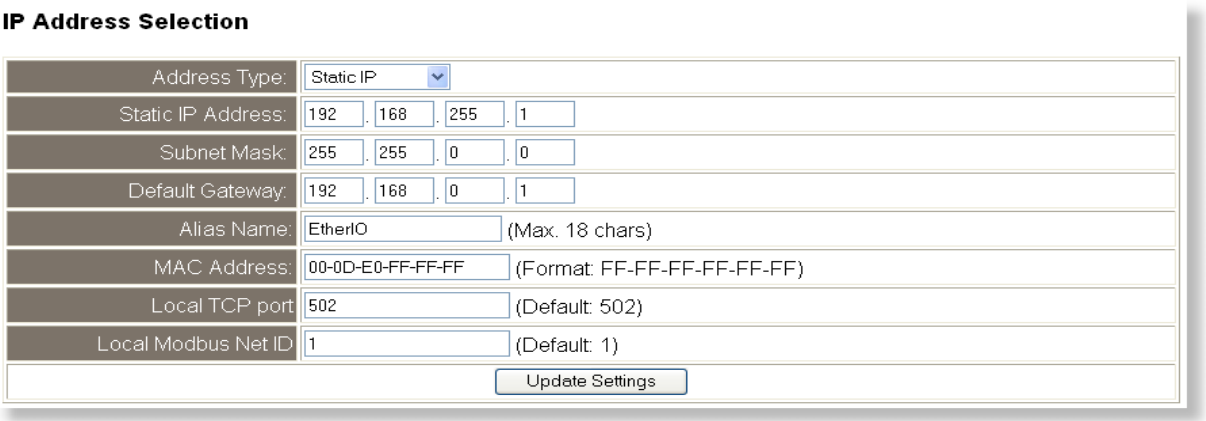


The software information includes the following data items:

- **Firmware Version**: Model Name, IP Address, Initial Switch, MAC Address, TCP Port Timeout, System Timeout.

After updating the PETL-7000 firmware, you can check the version of the PETL-7000 software information.

4.2.2. IP Address Selection



■ Item Descriptions:

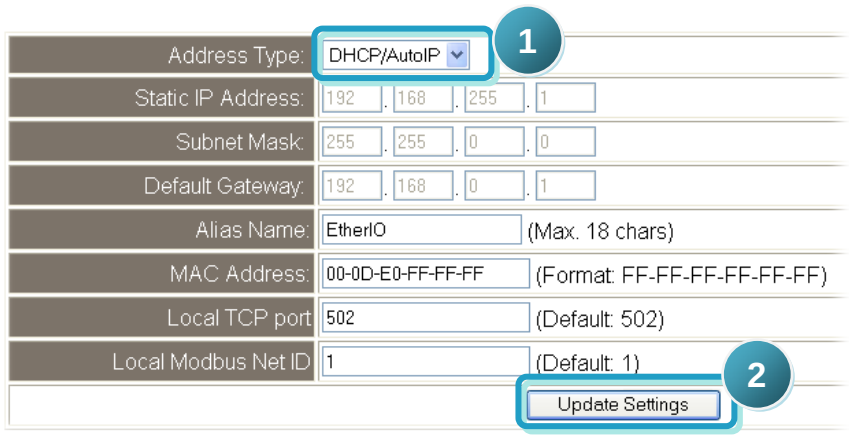
Item	Description
Address Type	**Static IP:** If you don't have a DHCP server in your network, you can configure network settings manually. Please refer to the section "4.2.2.2 Manually Configuration"
	DHCP/AutoIP: Dynamic Host Configuration Protocol (DHCP) is a network application protocol that automatically assigns IP address to devices. Please refer to the section "4.2.2.1 Dynamic Configuration"
Static IP Address	Each PETL-7000 on the network must have a unique IP address. It is used to assign an IP address.
Subnet Mask	The subnet mask indicates which portion of the IP address that is used to identify the local network or subnet.
Default Gateway	A gateway (or router) is a system that is used to connect a network with one or more other networks.
Alias Name	Each PETL-7000 can have an Alias name on the network.
MAC Address	User-defined MAC address.
Local TCP port	Default is 502
Local Modbus Net ID	Default is 1
Update Settings	Click this button to save the new settings to the PETL-7000.

4.2.2.1. Dynamic Configuration

Dynamic configuration is very easy to configure. If you have a DHCP server, network address can be configured dynamically by following steps:

Step 1: Select the **DHCP/ AutoIP**

Step 2: Click **Update Settings** to finish configuration



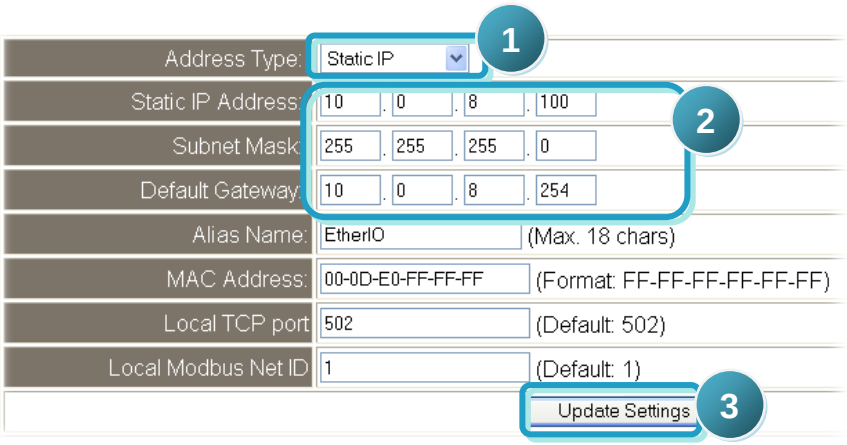
4.2.2.2. Manually Configuration

In manual configuration, you have to assign all the network settings as the following steps:

Step 1: Select the **Static IP**

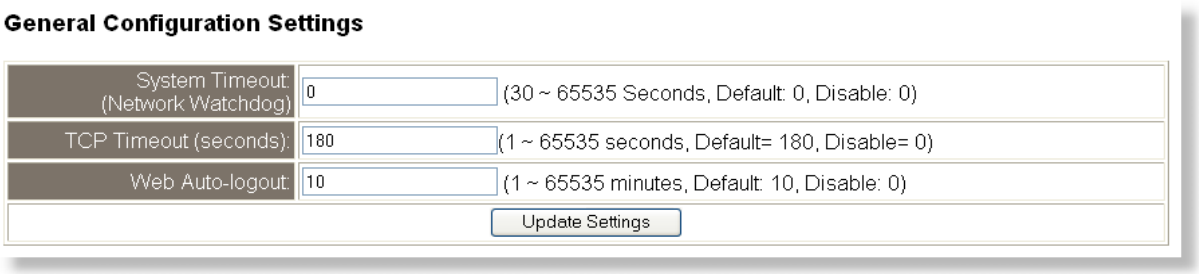
Step 2: Enter the **network settings**

Step 3: Click **Update Setting** to finish configuration



4.2.3. General Configuration Settings

The General Configuration Settings provides the following functions:



■ Item Descriptions:

Item	Description
System Timeout (Network Watchdog)	If there is no network communication action for a certain period, the system will be rebooted.
TCP Timeout (Seconds)	If Modbus TCP communication is lost for a certain period, the system will cut off the connection.
Web Auto-logout	If there is no action for a certain period in the web server, user account will be logout.
Update Settings	Click this button to save the new settings to the PETL-7000.

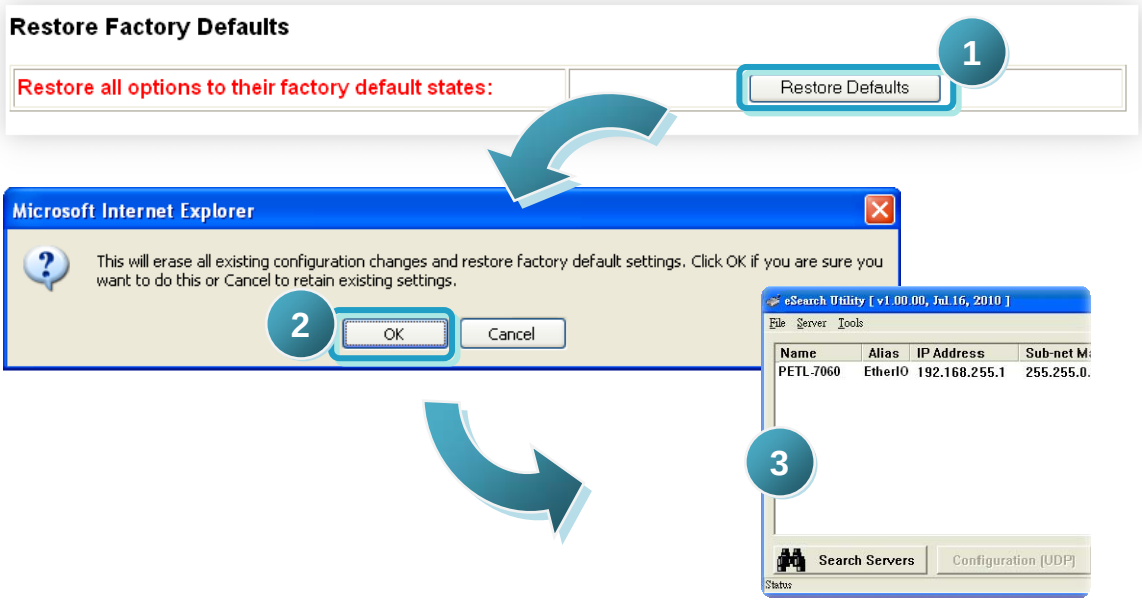
4.2.4. Reset Factory Default

To reset the settings to their factory default, follow these steps:

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

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

Step 3: Use eSearch Utility to check PETL-7000 whether backs to factory settings. Refer to the section "3.4 Using eSearch Utility to assign a new IP".

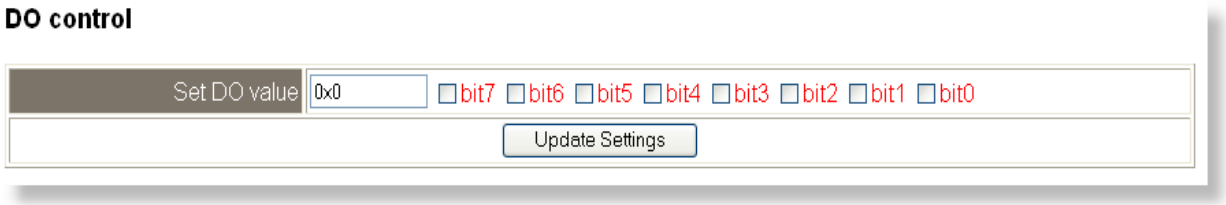


■ The table below lists the factory default settings:

Data Item	Factory Default Settings
Network Settings	
IP	192.168.255.1
Gateway	192.168.0.1
Mask	255.255.0.0
DHCP	Disable
Basic Settings	
Module Name	Depending on the module name
Alias Name	EtherIO

4.3. I/O Setting

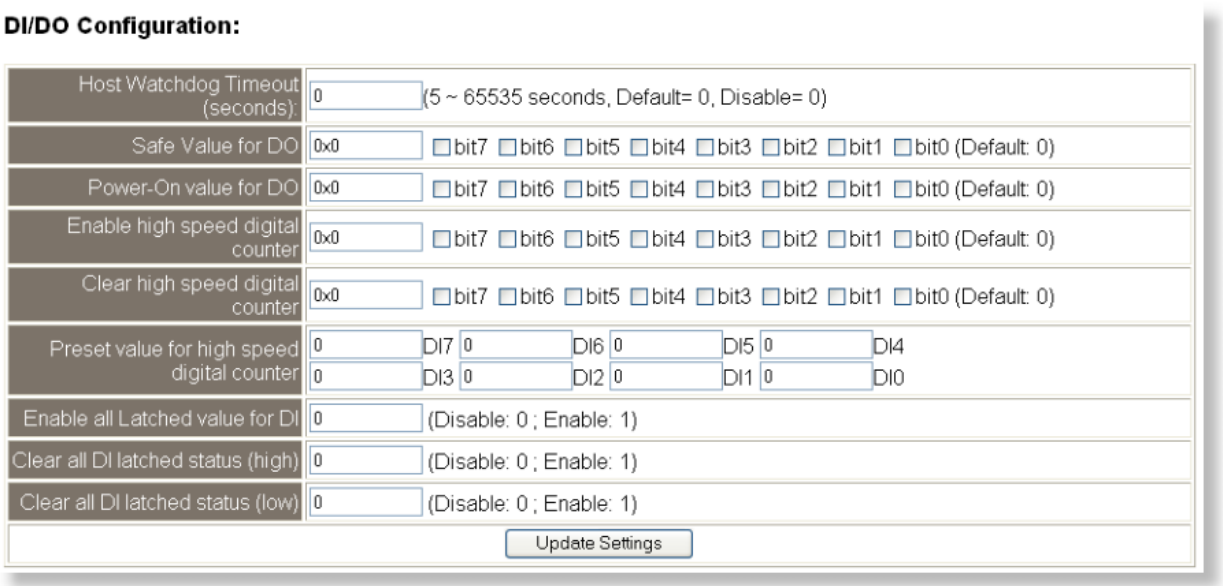
4.3.1. DO Control



■ Item Descriptions:

Item	Description
Set DO value	User can set certain value to DO manually
Update Settings	Click this button to save the new settings to the PETL-7000.

4.3.2. DI/DO configuration



■ Item Descriptions:

Item	Description
Host Watchdog Timeout (Seconds)	If Modbus TCP communication is lost for a certain period, the safe value will be set.
Safe Value for DO	If Modbus TCP communication is lost for a certain period, the DO status will be set to the user defined safe value.
Power-On value for DO	On boot up, the DO status is set to the Power-on value
Enable high speed digital counter	Make the counters are enabled.
Clear high speed digital counter	Clear all values in all counters.
Preset value for high speed digital counter	Setting the default values for the counters.
Enable all latched value for DI	Make latched status are enabled.
Clear all DI latched status (high)	Clear high latched status in all counters.
Clear all DI latched status (low)	Clear low latched status in all counters.
Update Settings	Click this button to save the new settings to the PETL-7000.

4.4. I/O Pair Connection

4.4.1. Settings

This I/O pair connection function is a particular feature of PETL-7000 that can enable a pair of DI-to-DO via Modbus TCP (Ethernet).

Settings:

I/O Pair-Connection Settings	Current	Updated
Pair Mode:	Disabled	Disable
Remote Server IP:	Disabled	10 . 1 . 120 . 53
Remote TCP Port:	Disabled	502 (Default: 502)
Connection Timeout:	5000	5000 (Default: 5000 ms)
Reconnect Interval:	10000	10000 (Default: 10000 ms)
Remote Net ID:	1	1 (Default: 1)
Scan Time:	1000	1000 (Default: 1000 ms)
Remote DI to Local DO	Current	Updated
Local DO Address:	0	0 (Default: 0)
Remote DI Address:	0	0 (Default: 0)
Remote DI Count:	6	6
Local DI to Remote DO	Current	Updated
Local DI Address:	0	0 (Default: 0)
Remote DO Address:	0	0 (Default: 0)
Local DI Count:	0	0

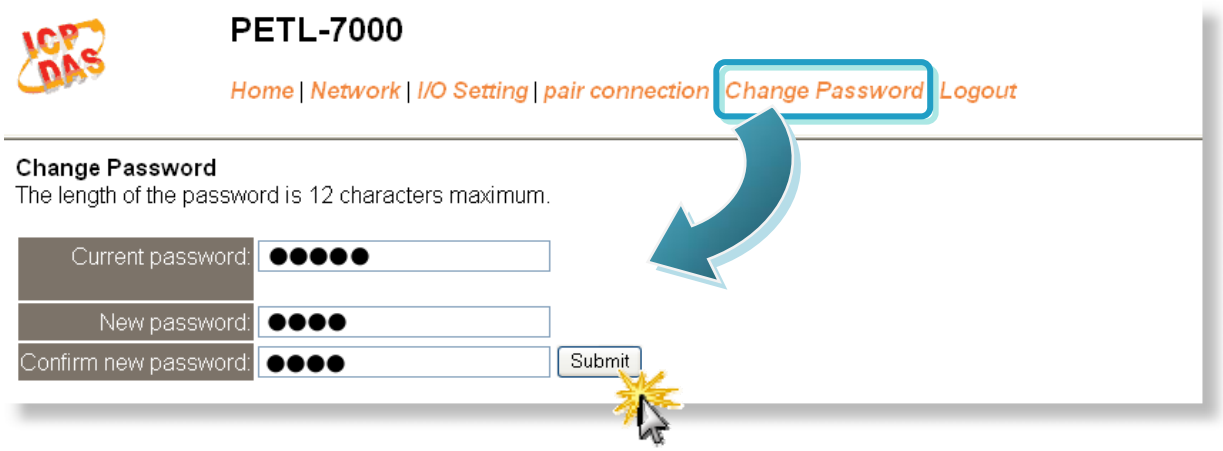
Submit

■ Item Descriptions:

Item	Description	Default
Pair Mode	Enable/Disable I/O pair connection	Disable
	Range: -	
Remote Server IP	IP address of remote device	0
	Range:-	
Remote TCP Port	port number of remote device	502
	Range: 0~65535	
Connection Timeout	Timeout to build a connection.	5000
	Range: 1000~42949672965 ms	
Remote Net ID	Modbus Net ID of remote device	1
	Range: 1~247	
Scan Time	Time period to establish the communication	1000
	Range: 1000~42949672965 ms	
Local DO Address	DO base address of local DO register will be mapped to remote DI device.	0
	Range: Depend on the PETL-7000	
Remote DI Address	DI base address of Remote DI device that will be mapped to local DO register	0
	Range: Depend on remote device	
Remote DI count	I/O count mapped from the base address	1
	Range: 1~255	
Local DI Address	DI base address of local DI register will be mapped to remote DO device.	0
	Range: Depend on the PETL-7000	
Remote DO Address	DO base address of Remote DO device that will be mapped to local DI register	0
	Range: Depend on remote device	
Local DI count	I/O count mapped from the base address	0
	Range: 1~255	

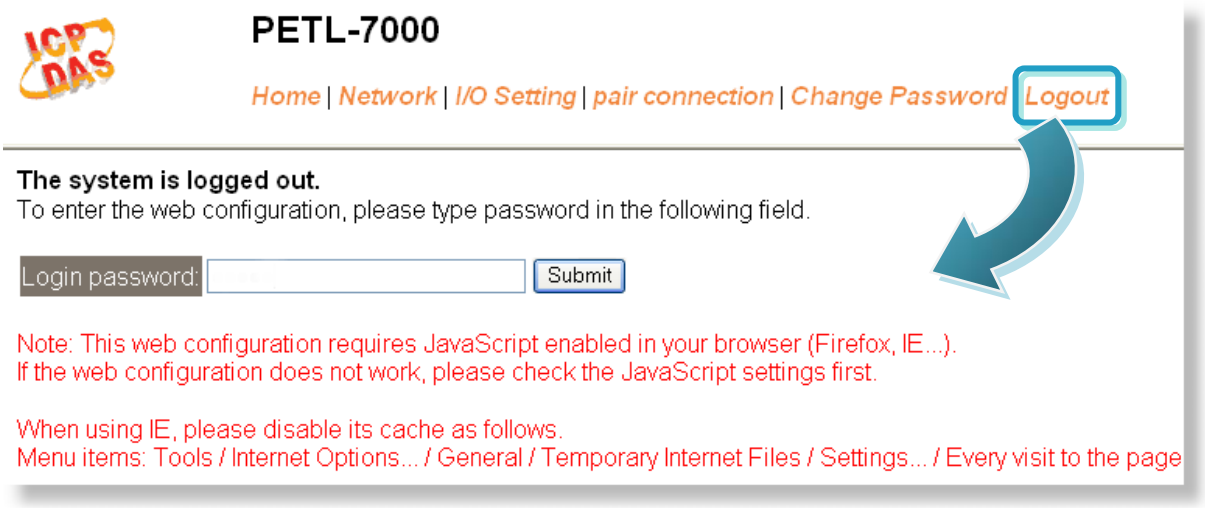
4.5 Change Password

Enter the old password (default is **Admin**) in “Current password” field and than type new password in “New password” field and “Confirm new password” field, afterward click the “**Submit**” button to update your password.



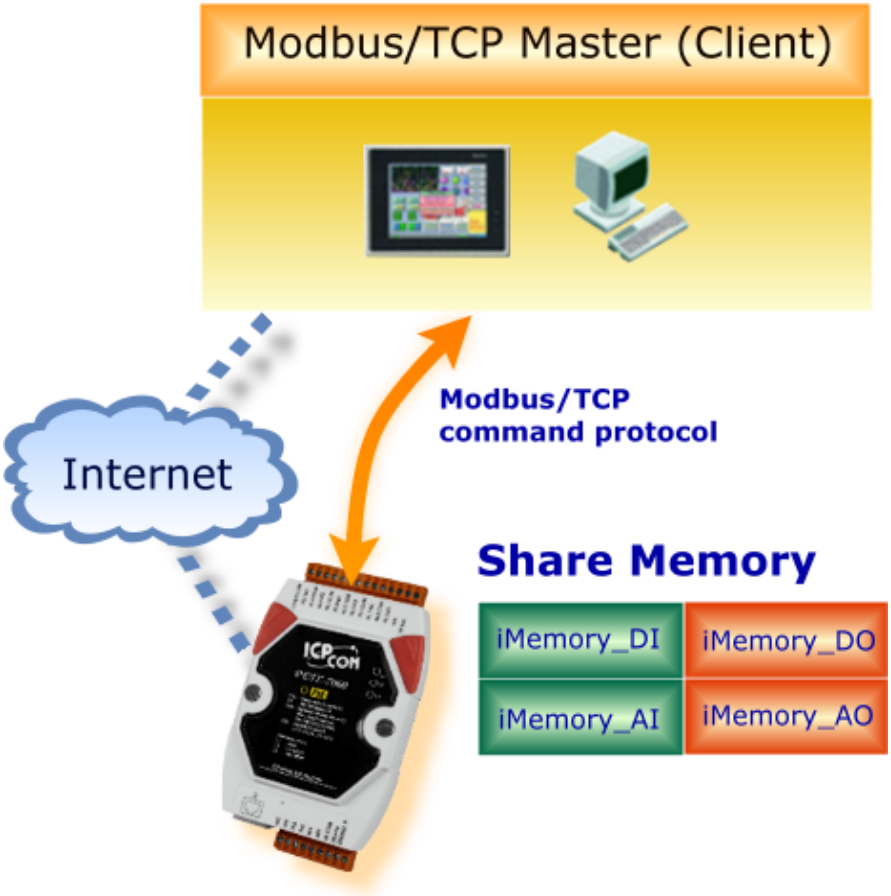
4.6 Logout

Click the **“Logout”** tag to logout the system and return to the login page.



5. Modbus Information

The PETL-7000 series is an IP-based Modbus I/O device that allows you to remote control DI/DO terminals via Ethernet. It uses a master-slave communication technique that only one device (the master) can initiate the transactions (called queries), while other devices (slaves) respond the requested data to the master, or take the action requested in the query.



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

5.1. What is Modbus TCP/IP?

Modbus is a communication protocol developed by Modicon in 1979. You can also visit http://www.modbus.org to find more valuable information.

Different versions of Modbus used today include Modbus RTU (based on serial communication like RS485 and RS232), Modbus ASCII and Modbus TCP, which is the Modbus RTU protocol embedded into TCP packets.

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

5.2. Modbus Message Structure

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

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

Modbus/TCP Message Structure

Byte 00~05	Byte 06~11
6-byte header	**RTU Data**

Leading 6 bytes of Modbus/TCP protocol:

Byte 00	Byte 01	Byte 02	Byte 03	Byte 04	Byte 05
Transaction identifier		Protocol identifier		Length field (upper byte)	Length field (lower byte)

Transaction identifier - copied by server - usually 0

Protocol identifier = 0

Length field (upper byte) = 0 (since all messages are smaller than 256)

Length field (lower byte) = Number of following RTU data bytes

RTU Data Structure

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

Net ID specifies the address of the receiver.

Function Code specifies the message type.

Data Field is the data block.

■ Net ID (Station Number)

The first byte in the message structure of Modbus is the receiver's address. The valid addresses are in the range of 0 to 247. Addresses 0 is used for broadcast, while addresses 1 to 247 are given to individual Modbus devices.

■ Function Code

The second byte in the frame structure is the function code. The function code describes what the slave is required to do. Valid function codes are between 1 and 255. The slave uses the same function code as the request to answer it. Only when error occurs in the system, the highest bit of the function code will be made '1'. Hence the master will know if the message has been transmitted correctly or not.

Code	Function	Reference (Address)
01 (0x01)	Read Coils (Output) Status	0xxxx
02 (0x02)	Read Input Status	1xxxx
03 (0x03)	Read Holding Registers	4xxxx
04 (0x04)	Read Input Registers	3xxxx
05 (0x05)	Force Single Coil (Output)	0xxxx
06 (0x06)	Preset Single Register	4xxxx
15 (0x0F)	Force Multiple Coils (Outputs)	0xxxx
16 (0x10)	Preset multiple Registers	4xxxx

5.2.1. 01 (0x01) Read Coils (Output) Status

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

[Request]

Byte	Description	Size	Value
00	Net ID (Station number)	1 Byte	1~247
01	Function code	1 Byte	0x01
02-03	Starting channel number or address mapping	2 Bytes	Refer to Modbus Address Table for PETL-7000 series. "5.3.2 Particular Function" Byte 02 = high byte Byte 03 = low byte
04-05	Number of points	2 Bytes	Byte 04 = high byte Byte 05 = low byte

[Response]

Byte	Description	Size	Value
00	Net ID (Station number)	1 Byte	1-247
01	Function code	1 Byte	0x01
02	Byte Count	1 Byte	Byte count of response (n = (Points+7)/8)
03	Data	n Byte	n= 1; Byte 03 = data bit 7~0 n= 2; Byte 04 = data bit 15~8 ..... n= m; Byte m+2 = data bit (8m-1)~ 8(m-1)

[Error Response]

Byte	Description	Size	Value
00	Net ID (Station number)	1 Byte	1-247
01	Function code	1 Byte	0x81
02	Exception code	1 Byte	Refer to Modbus standard for more details

For example: function 01 (0x01)

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

	[Leading 6 bytes]	[Response]
Response:	01 02 00 00 00 04	01 01 01 1F

Reads digital output value

Descriptions as follows:

Command:

[Leading 6 bytes]
Byte 00-03: 01 02 00 00 (Message number)
Byte 04-05: 00 06 (Number of Request bytes)

[Request]
Byte 00 : 01 (Net ID)
Byte 01 : 01 (Function Code)
Byte 02-03: 00 00 (starting channel number)
Byte 04-05: 00 05 (Number of output channels)

Response:

[Leading 6 bytes]
Byte 00-03: 01 02 00 00 (Message number)
Byte 04-05: 00 04 (Number of Response bytes)

[Response]
Byte 00: 01 (Net ID)
Byte 01: 01 (Function Code)
Byte 02: 01 (Byte count of response)
Byte 03: 1F (DO4~DO0 Value)

5.2.2. 02 (0x02) Read Input Status

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

[Request]

Byte	Description	Size	Value
00	Net ID (Station number)	1 Byte	1-247
01	Function code	1 Byte	0x02
02-03	Starting channel number or address mapping	2 Bytes	Refer to Modbus Address Table for PETL-7000 series. "5.3.2 Particular Function" Byte 02 = high byte Byte 03 = low byte
04-05	Number of points	2 Bytes	Byte 04 = high byte Byte 05 = low byte

[Response]

Byte	Description	Size	Value
00	Net ID (Station number)	1 Byte	1-247
01	Function code	1 Byte	0x02
02	Byte Count	1 Byte	Byte count of response (n =(Points+7)/8)
03	Data	n Byte	n= 1; Byte 03 = data bit 7~0 n= 2; Byte 04 = data bit 15~8 ..... n= m; Byte m+2 = data bit (8m-1)~ 8(m-1)

[Error Response]

Byte	Description		Value
00	Net ID (Station number)	1 Byte	1-247
01	Function code	1 Byte	0x82
02	Exception code	1 Byte	Refer to Modbus standard for more details

For example: function 02 (0x02)

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

	[Leading 6 bytes]	[Response]
Response:	01 02 00 00 00 04	01 02 01 0F

Reads digital input value

Descriptions as follows:

Command:

[Leading 6 bytes]

Byte 00-03: 01 02 00 00 (Message number)

Byte 04-05: 00 06 (Number of Request bytes)

[Request]

Byte 00 : 01 (Net ID)

Byte 01 : 02 (Function Code)

Byte 02-03: 00 00 (starting channel number)

Byte 04-05: 00 04 (Number of input channels)

Response:

[Leading 6 bytes]

Byte 00-03: 01 02 00 00 (Message number)

Byte 04-05: 00 04 (Number of Response bytes)

[Response]

Byte 00: 01 (Net ID)

Byte 01: 02 (Function Code)

Byte 02: 01 (Byte count of response)

Byte 03: 0F (DI3~DI0 Value)

5.2.3. 05 (0x05) Force Single Coil (Output)

This function code is used to write the digital output value.

[Request]

Byte	Description	Size	Value
00	Net ID (Station number)	1 Byte	1-247
01	Function code	1 Byte	0x05
02-03	Output channel number	2 Bytes	Refer to Modbus Address Table for PETL-7000 series. "5.3.2 Particular Function"
04-05	Output value	2 Bytes	0xFF 00 set the output to ON. 0x00 00 set the output to OFF. All other values are illegal and will not affect the coil. Byte 04 = high byte Byte 05 = low byte

[Response]

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

[Error Response]

Byte	Description	Size	Value
00	Net ID (Station number)	1 Byte	1-247
01	Function code	1 Byte	0x85
02	Exception code	1 Byte	Refer to Modbus standard for more details

For example: function 05 (0x05)

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

Sets the DO2 to ON

Descriptions as follows:

Command:

[Leading 6 bytes]
Byte 00-03: 01 02 00 00 (Message number)
Byte 04-05: 00 06 (Number of Request bytes)

[Request]
Byte 00 : 01 (Net ID)
Byte 01 : 05 (Function Code)
Byte 02-03: 00 02 (Starting channel number)
Byte 04-05: FF 00 (Set the output to ON)

Response:

[Leading 6 bytes]
Byte 00-03: 01 02 00 00 (Message number)
Byte 04-05: 00 06 (Number of Response bytes)

[Response]
Byte 00 : 01 (Net ID)
Byte 01 : 05 (Function Code)
Byte 02-03: 00 02 (Starting channel number)
Byte 04-05: FF 00 (Set the output to ON)

5.2.4. 15 (0x0F) Force Multiple Coils (Outputs)

This function code is used to write the digital output value.

[Request]

Byte	Description	Size	Value
00	Net ID (Station number)	1 Byte	1-247
01	Function code	1 Byte	0x0F
02-03	Starting channel number	2 Bytes	Refer to Modbus Address Table for PETL-7000 series. "5.3.2 Particular Function" Byte 02 = high byte Byte 03 = low byte
04-05	Number of output channels (Points)	2 Bytes	Byte 04 = high byte Byte 05 = low byte
06	Byte count	1 Byte	n = (Points +7)/8
07	Output value	n Byte	A bit corresponds to a channel. Value 1 for a bit denotes the channel is ON, while the value 0 is OFF. n= 1; Byte 07 = data bit 7 ~ 0 n= 2; Byte 08 = data bit 15 ~ 8 ..... n= m; Byte m+6 = data bit (8m-1)~ 8(m-1)

[Response]

Byte	Description	Size	Value
00	Net ID (Station number)	1 Byte	1-247
01	Function code	1 Byte	0x0F
02-03	Starting channel number	2 Bytes	The value is the same as Byte 02-03 of the Request
04-05	Number of output channels (Points)	2 Bytes	The value is the same as Byte 04-05 of the Request

[Error Response]

Byte	Description	Size	Value
00	Net ID (Station number)	1 Byte	1-247
01	Function code	1 Byte	0x8F
02	Exception code	1 Byte	Refer to Modbus standard for more details

Notes:

The other function code and detail Modbus protocol information, please refer to http://ftp.icpdas.com/pub/cd/8000cd/napdos/7000/manual/modbusdio.pdf

For example: function 15 (0x0F)

	[Leading 6 bytes]	[Request]
Command:	01 02 00 00 00 08	01 0F 01 0B 00 03 01 07
	[Leading 6 bytes]	**[Response]**
Response:	01 02 00 00 00 06	01 0F 01 0B 00 03

Sets Safe value (DO0-DO2)

Descriptions as follows:

Command:

[Leading 6 bytes]
Byte 00-03: 01 02 00 00 (Message number)
Byte 04-05: 00 08 (Number of Request bytes)

[Request]
Byte 00 : 01 (Net ID)
Byte 01 : 0F (Function Code)
Byte 02-03: 01 0B (Starting channel number)
Byte 04-05: 00 03 (Number of output channels)
Byte 06 : 01 (Byte count)
Byte 07 : 07 (Output value)

Response:

[Leading 6 bytes]
Byte 00-03: 01 02 00 00 (Message number)
Byte 04-05: 00 06 (Number of Response bytes)

[Response]
Byte 00 : 01 (Net ID)
Byte 01 : 0F (Function Code)
Byte 02-03: 01 0B (Starting channel number)
Byte 04-05: 00 03 (Number of input channels)

■ Data Field

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

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

For more detail of Address Mapping (Reference number), please refer to 5.3 Modbus Register Map.

5.3. Modbus Register Map

5.3.1. Common Function

- **(0xxxx) DO address**

Begin address	Points	Description	Bits per Point	Range	Access Type
127 (0x7F)	1	Recover all web default settings	1	1=recover	W (Pulse)
128 (0x80)	1	ID default settings	1	1=recover	W (Pulse)
133 (0x85)	1	Reboot PETL-7000	1	1=reboot	W (Pulse)
Remarks	"**W**" : Write				

- **(3xxxx) AI address**

Begin address	Points	Description	Bits per Point	Range	Access Type
151 (0x97)	1	Firmware version	16	123 means version=1.2.3	R
158 (0x9E)	1	Modbus communication status	16	0= No Error 1= Timeout	R
160 (0xA0)	1	Pair Connection	16	0=Normal 1=Timeout 2=Disconnected	R
Remarks	"**R**": Read				

- **(4xxxx) AO address**

Begin address	Points	Description	Bits per Point	Range	Access Type
255 (0xFF)	1	CPU reset status	16	1= by Power-on 2= by WDT 3= by Reset command	R/W
257 (0x101)	1	Set host watch dog timer	16	<5: Disabled 5~65535: Enabled (unit: second) (Default=0) When PETL-7000 loses communication with PC more than the WDT setting, DO go to their safe values and host WDT events plus 1 count.	R/W/F
258 (0x102)	1	Host WDT events	16	How many host WDT events has happened after CPU reset?	R/W
259 (0x103)	1	Module name	16	Module name	R
263 (0x107)	1	Set TCP timeout	16	<5: Disabled 5~65535: Enabled (unit: second) (default=0)	R/W/F
264 (0x108)	1	Set System timeout	16	<30: Disabled 30~65535: Enabled (unit: second) (default=0)	R/W/F
Remarks	"**R**": Read ; " **W**": Write ; "**F**": Setting is recorded in flash as default.				

5.3.2. Particular Function

The nDI and nDO parameters of each model used in the following Modbus address tables are shown as follows:

Model name	Number of DO channels **(nDO)**	Number of DI channels **(nDI)**
PETL-7042	16	0
PETL-7044	8	8
PETL-7050	6	12
PETL-7051	0	16
PETL-7052	8	8
PETL-7053	0	16
PETL-7060	6	6
PETL-7065	6	6
PETL-7066	8	0
PETL-7067	8	0

- **(0xxxx) DO address**

Begin address	Points	Description	Bits per Point	Range	Access Type
0 (0x00)	1~nDO	Digital Output	1	0=Off 1=On	R/W
32 (0x20)	1	Clear all DI latched status (high)	1	1=Clear	W
33 (0x21)	1	Clear all DI latched status (low)	1	1=Clear	W
34 (0x22)	1	Clear high speed digital counter	1	1=Clear	W
150 (0x96)	1	Enable all DI latched status (high/low)	1	0=Disable 1=Enable (Default=0)	R/W/F
151 (0x97)	1~nDI	Enable high speed digital counter	1	0=Disable 1=Enable (Default=0)	R/W/F
235 (0xEB)	1~nDO	Power-on value for DO	1	0=Off 1=On (Default=0)	R/W/F
267 (0x10B)	1~nDO	Safe value for DO	1	0=Off 1=On (Default=0)	R/W/F
Remarks	"**R**": Read ; " **W**": Write ; "**F**": Setting is recorded in flash as default.				

- **(1xxxx) DI address**

Begin address	Points	Description	Bits per Point	Range	Access Type
0 (0x00)	1~nDI	Digital Input	1	0=Off 1=On	R
32 (0x20)	1~nDI	Digital latched status (high)	1	0=no 1=latched	R
64 (0x40)	1~nDI	Digital latched status (low)	1	0=no 1=latched	R
Remarks	"**R**": Read				

- **(3xxxx) AI address**

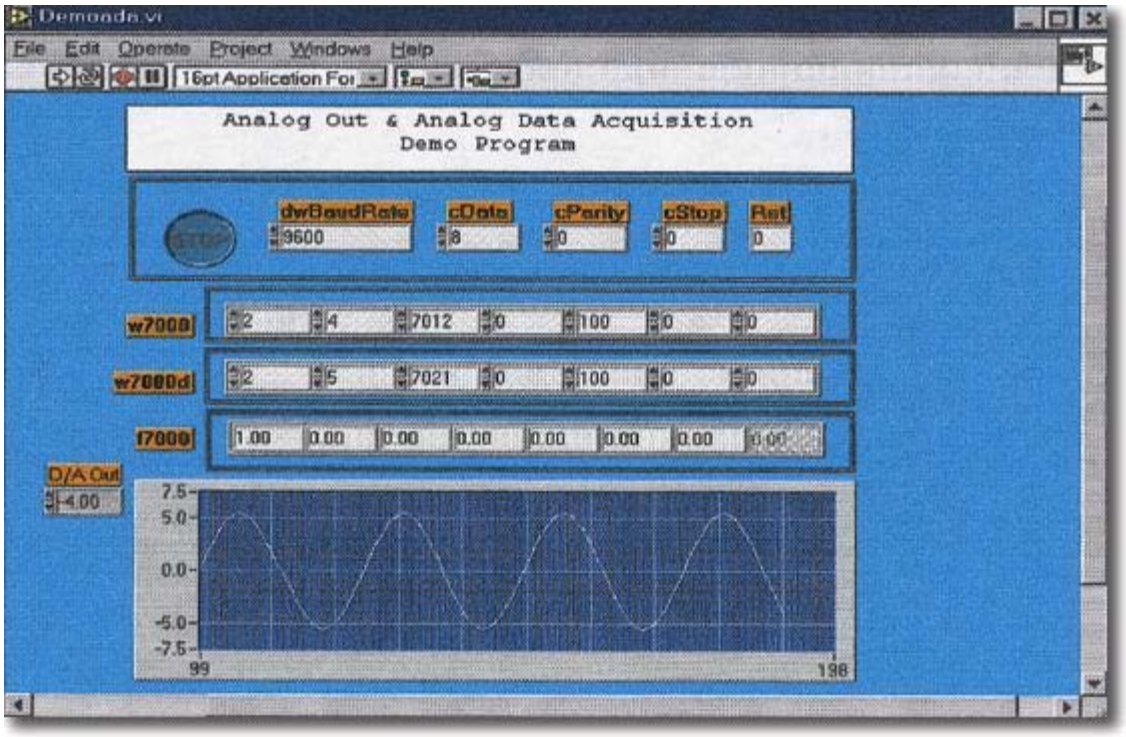
Begin address	Points	Description	Bits per Point	**Value**	Access Type
16 (0x10)	1~nDI	High speed digital counter	32	0~4294967296	R
100 (0x64)	1	Number of DI channels	16	nDI	R
110 (0x6E)	1	Number of DO channels	16	nDO	R
121 (0x79)	1	Number of high-speed counters	16	nDI	R
Remarks	"**R**": Read				

- **(4xxxx) AO address**

Begin address	Points	Description	Bits per Point	Range	Access Type
50 (0x32)	1~nDI	Preset value for high speed digital counter	32	0~4294967296	R/W/F
Remarks	"**R**": Read ; " **W**": Write ; "**F**": Setting is recorded in flash as default.				

6. Related Tools

6.1. LabVIEW



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

The document for linking LabVIEW to the PETL-7000 using the Modbus protocol is located

CD:\NAPDOS\PET7000_ET7000\Document\Application\LabVIEW\
ftp://ftp.icpdas.com/pub/cd/6000cd/napdos/pet7000_et7000/document/application/labview/

6.2. OPC Server

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

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

6.3. SCADA

SCADA stands for Supervisor Control and Data Acquisition. It is a production automation and control system based on PCs
SCADA is wildly used in many fields e.g. power generation, water systems, the oil industry, chemistry, the automobile industry. Different fields require different functions, but they all have the common features:

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

➢ Accessing PETL-7000 module

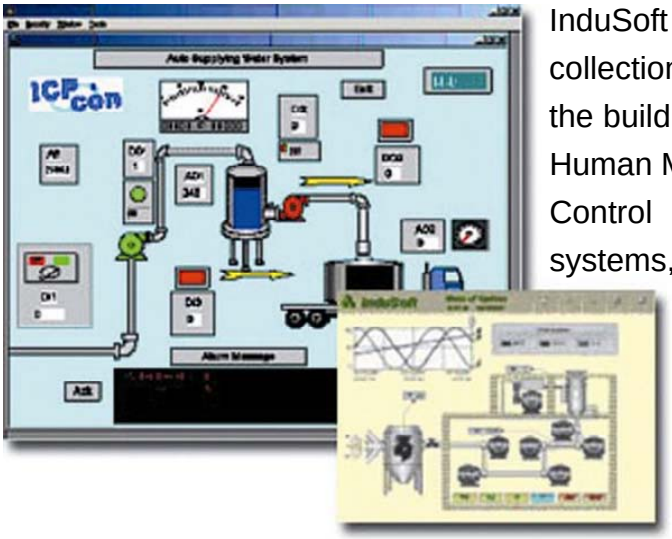
SCADA software is able to access PETL-7000 devices using Modbus communication protocol without the need for other software drivers.

➢ Famous SCADA software

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

In the following sections, 3 popular brands of SCADA software are introduced together with the detailed instructions in how to use them to communicate with PETL-7000 series module using the Modbus TCP protocol.

6.3.1. InduSoft

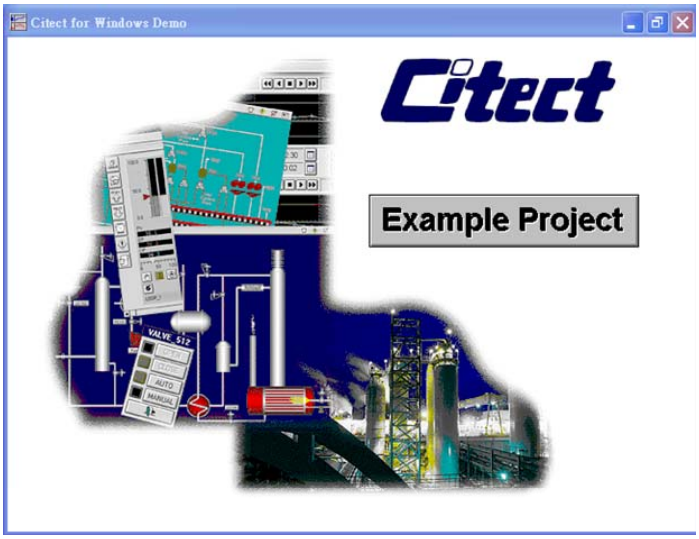


InduSoft Web Studio is a powerful, integrated collection of automation tools that includes all the building blocks needed to develop modern Human Machine Interfaces (HMI), Supervisory Control and Data Acquisition (SCADA) systems, and embedded instrumentation and control applications. InduSoft Web Studio's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

The document for linking InduSoft to the PETL-7000 module using the Modbus protocol is located on

CD:\NAPDOS\PET7000_ET7000\Document\Application\InduSoft\
ftp://ftp.icpdas.com/pub/cd/6000cd/napdos/pet7000_et7000/document/application/indusoft/

6.3.2. Citect



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

The document for linking Citect to the PETL-7000 module using the Modbus protocol is located on

CD:\NAPDOS\PET7000\Document\Application\Citect\
ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/petl-7000/document/application/citect/

6.3.3. iFix

The document for linking iFix to the PETL-7000 module using the Modbus protocol is located on

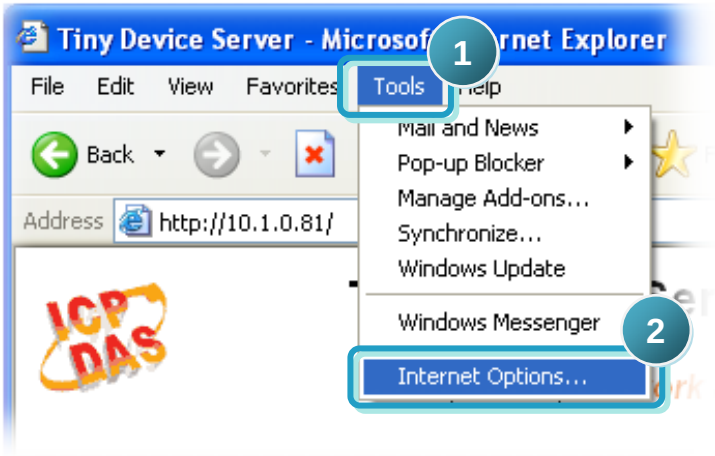
CD:\NAPDOS\PET7000_ET7000\Document\Application\iFix\
ftp://ftp.icpdas.com/pub/cd/6000cd/napdos/pet7000_et7000/document/application/ifix/

Appendix

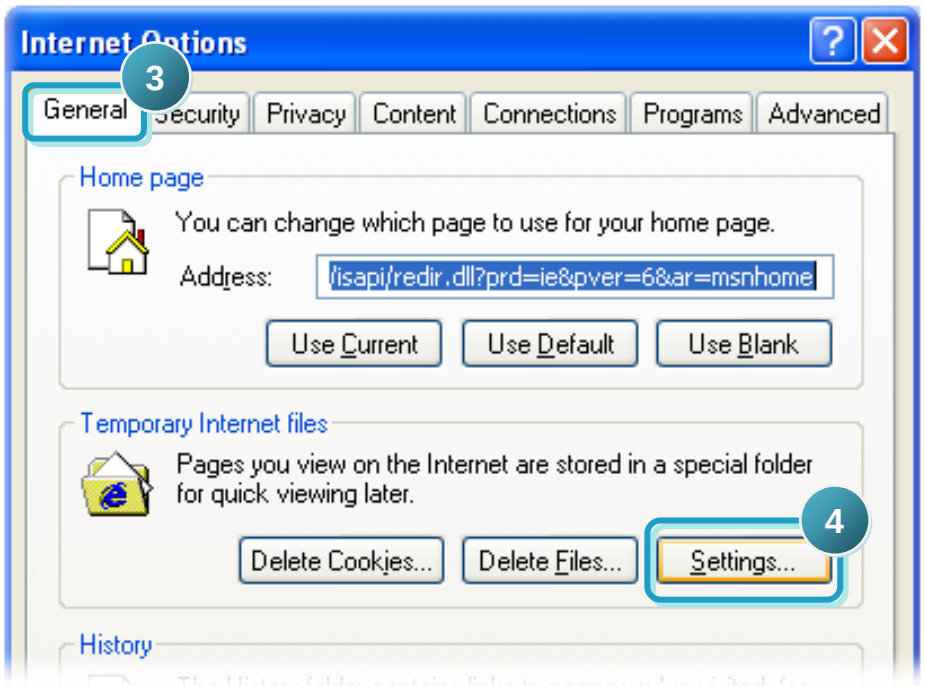
A. How to avoid browser accessing error to cause blank page when using IE?

Please disable IE cache as follows steps:

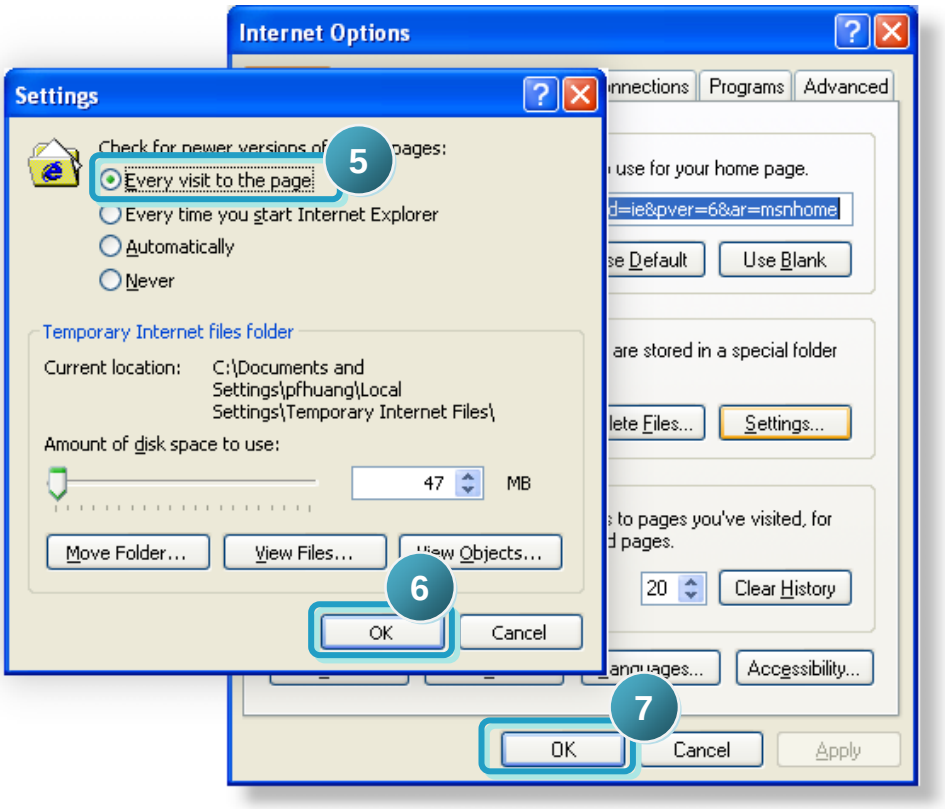
Step 1: Click **"Tools"** >> "**Internet Options...**" in the menu items.



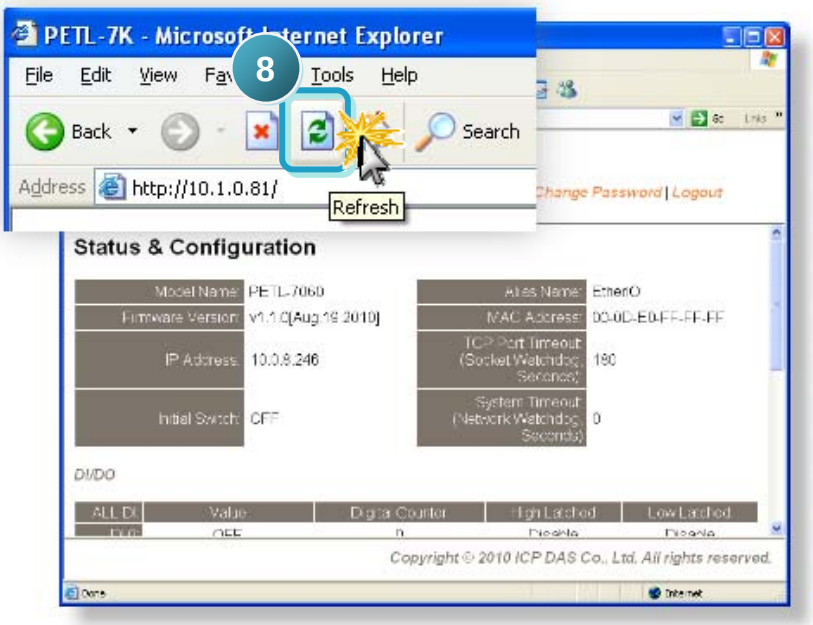
Step 2: Click the "**General**" tab and then click the "**Settings...**" button in Temporary Internet files frame.



Step 3: Click the "**Every visit to the page**" and then click the "**OK**" button in Settings box and Internet Options box.



Step 4: Click the "**Refresh**" button to refresh the PETL-7000 web server or re-open IE.



B. Firmware Update through Ethernet

Introduction

The PETL-7000 supports firmware update through the Ethernet network via BOOTP/TFTP protocol. The PETL-7000 (network client) uses BOOTP protocol to obtain an IP address from the eflash.exe utility program (configuration server), and then uses TFTP protocol to transfer the firmware image from the eflash.exe (server) to the PETL-7000 (client).

The code (in the boot loader) used to update the firmware image is not part of the firmware it-self. Thus, users can update the firmware even the built-in one is broken or does not exist. If the firmware update fails, we just need to rerun the update procedures again.

The PETL-7000has a built-in feature of flash protection that prohibits modification to the firmware in the flash. Before update the firmware, we have to set "**Init Switch**" in "**Init**" state and then power-on reset the PETL-7000 to disable the flash protection. Since the flash becomes writable, we can update the firmware through the Ethernet network remotely.

Mode	Flash Protection	**Firmware Update**	Configuration
Initial	No	**Yes**	Factory
Run	**Yes**	No	User-Defined

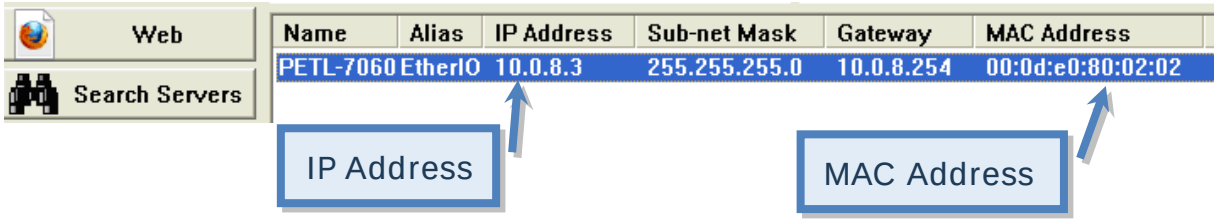
Notes:

1. Well configure the network settings of your computer or the update procedures through the Ethernet network may not work correctly.
2. The eflash.exe program may not start correctly if there is another TFTP server running on the same computer.
3. RFC-951 defines BOOTP (Bootstrap Protocol, uses UDP port 67 and 68).
4. RFC-1350 defines TFTP (Trivial File Transfer Protocol, uses UDP port 69).

Firmware Update through the Ethernet

1. Connect the PETL-7000 to the same HUB or same sub-network as your PC. Do not connect it to a router or Internet that may cause the update failure.

2. Run the eSearch Utility to search PETL-7000 and see its IP and MAC address.



If the above IP address does not work correctly (for example, it does response to the ping command), please contact with your network administrator to get a valid IP address for the PETL-7000.

3. Create an "**update.bat**" file in the firmware folder (for example, C:\PETL7K). Enter the following command strings of eflash.exe in the file.

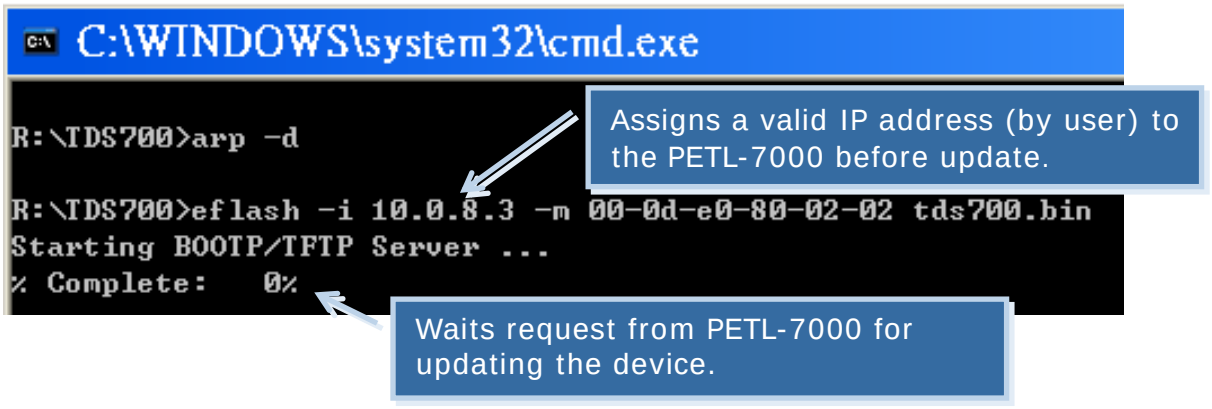
```
eflash –i [IP address] –m [MAC address] [Firmware Name]
pause
```

The **"pause"** command keeps the DOS box in open state, and you can then check the result and press **"Enter"** to close it later.

For example, we (user) assign the 10.0.8.3 IP address to the PETL-7000 that has a MAC address 00.0d.e0:80:02:02. The IP address assigned to the PETL-7000 can be the same as DHCP assigned (since it works), or can be another valid IP address that is in the same sub-network and does not conflict with other devices.

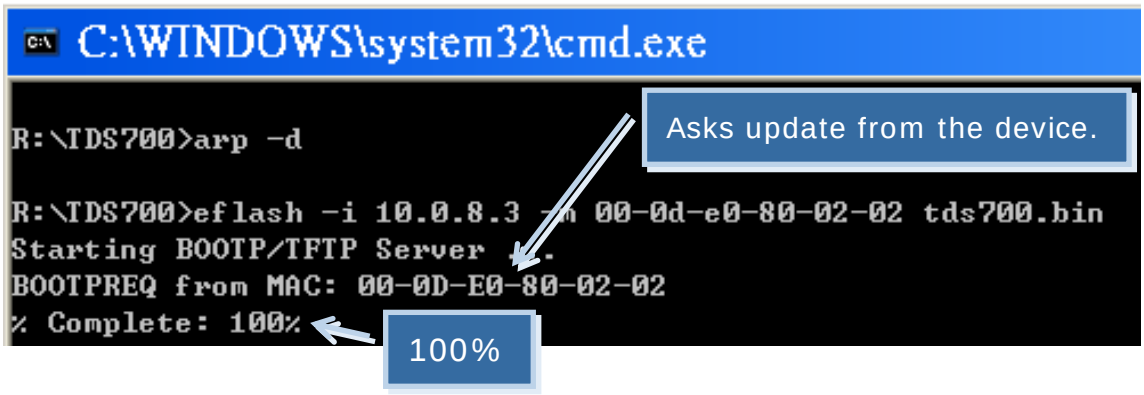
```
eflash -i 10.0.8.3 -m 00-0d-e0-80-02-02 ETL7K.dat
pause
```


4. Double-click the **update.bat** file (you just create above) on Windows 2000/XP/2003 system to start waiting update for the PETL-7000.



5. Set the "**Init Switch**" of the PETL-7000 in "**Init**" state.

6. Reboot the PETL-7000 in initial mode by power cycling to request the update.



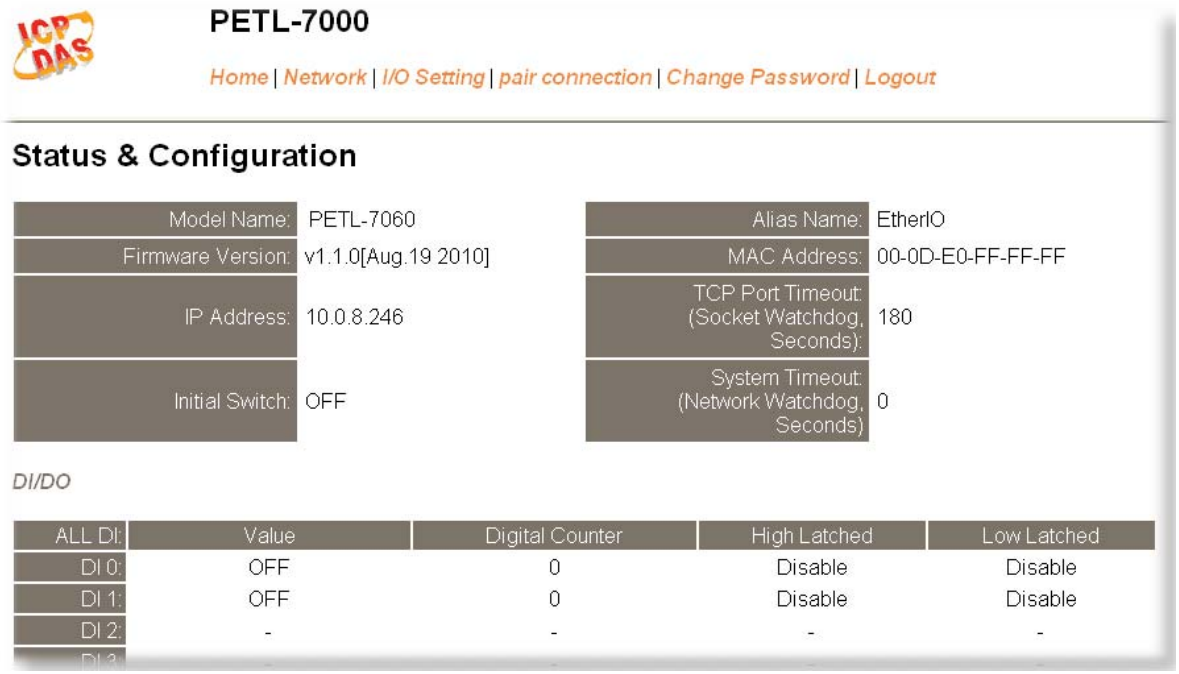
7. Set the "**Init Switch**" in "**Run**" state after the update is finished as shown "**100%**".

8. Reboot the PETL-7000 module for running in normal mode.

9. Run the eSearch Utility to search the PETL-7000 again to see if it is working now.

If any problem causes the firmware does not work (for example, the module cannot be found by search, or the system LED is always off), please download a new firmware image from our web and then update it again.

10. Login (default password is **"Admin"**) to the web configuration of the PETL-7000 to check the firmware version/date.



PETL-7000

Home | Network | I/O Setting | pair connection | Change Password | Logout

Status & Configuration

Model Name:	PETL-7060	Alias Name:	EtherIO
Firmware Version:	v1.1.0[Aug.19 2010]	MAC Address:	00-0D-E0-FF-FF-FF
IP Address:	10.0.8.246	TCP Port Timeout: (Socket Watchdog, Seconds):	180
Initial Switch:	OFF	System Timeout: (Network Watchdog, Seconds)	0

DI/DO

ALL DI:	Value	Digital Counter	High Latched	Low Latched
DI 0:	OFF	0	Disable	Disable
DI 1:	OFF	0	Disable	Disable
DI 2:	-	-	-	-