EIP-2000
EtherNet/IP I/O Module User`s Manual

Warranty

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

Warning

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1. Introduction

The EIP-2000 is an Industrial EtherNet/IP Remote I/O module series. It is equipped with the EtherNet/IP protocol, and allows daisy chain connections, making it possible to transfer data much faster during process control and other industrial automation applications. Daisy chain connectivity provides a more scalable system with fewer wires to help avoid interference common in factory settings. Otherwise, ICPDAS also provides Utility, It allows user to configure and test the ENIP module through Ethernet. The words **"EIP-2000"** and **"EIP-2000 module"** are stand for all kinds of EIP-2000 series modules, while the word "EIP-2***" represents the specific module such as "EIP-2055".

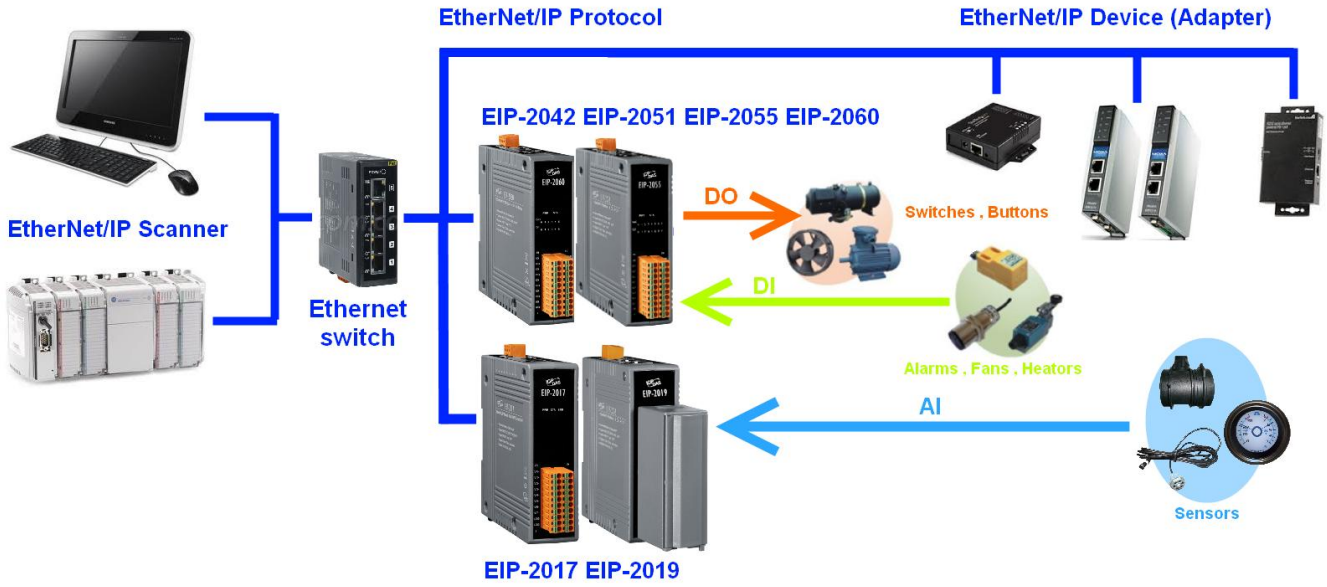


Figure1-1. EIP-2000 applications

1.1 Product Information

1.1.1 Features

General Features:

- Powerful 32-bit MCU handles efficient network traffic
- 10/100 Base-TX Ethernet, RJ-45 x 2
- (Auto-negotiating, auto MDI/MDIX, LED Indicators)
- Support ARP,TCP, UDP, ICMP, DHCP, BOOTP and TFTP protocols
- Support Daisy Chain connection
- Easy firmware update via Ethernet

- Removable terminal block connector
- RoHS compliant with Halogen-free
- LED display to indicate the I/O status
- Fire retardant materials (UL94-V0 Level)

Built-in Multi-function I/O:

- All Digital Output modules provide additional functions which can be configured by EIP-2000 Utility:
  - **Power-On-Value. (EIP-2055、EIP-2060、EIP-2042)**

    On boot up, DO status is set to the Power-On-Value for few seconds.
  - **Safe-Value and Safe-Delay. (EIP-2055、EIP-2060、EIP-2042)**

    If the EtherNet/IP connection disconnected, the DO status with remain the last status for certain seconds which is set by Safe Delay then set to Safe-Value.
  - **All-in-one Module. (EIP-2055、EIP-2060)**

    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.
- All Digital Input modules provide additional functions:
  - **DI counters. (EIP-2055、EIP-2060、EIP-2051)**

    Every DI channels can be used as DI status and 32-bit low speed (5kHz) counters. The counts can be transferred or set zero by EtherNet/IP.
- All Analog Input modules provide additional functions which can be configured by EIP-2000 Utility:
  - **Type Code. (EIP-2017、EIP-2019)**

    Analog Input should be limited by different Type Code. Users can select Type Code for the channel which users receive analog status.
  - **Differential / Single-Ended. (EIP-2017)**

    Differential inputs provide a more stable reading when EMI or RFI is present. Single-ended inputs are lower in cost, and provide twice the number of inputs for the same size wiring connector.

1.1.2 EIP-2000 Series Release Module

EIP-2000 series will provide a variety of digital and analog modules in the future. The module list is shown below.

Model	Description
EIP-2055	Isolated 8-channel Sink Type Open Collector Output and 8-channel DI EtherNet/IP Module
EIP-2060	Isolated 6-ch DI and 6-ch Relay Output EtherNet/IP module
EIP-2042	Isolated 16-channel Sink Type Open Collector Output EtherNet/IP module
EIP-2051	Isolated 16-channel DI EtherNet/IP Module

EIP-2017	Isolated 8-ch DIFF / 16-ch SE AI EtherNet/IP Module
EIP-2019	Isolated 8-ch Thermocouple AI EtherNet/IP Module

2. Hardware Information

2.1 System Specifications

2.1.1 EIP-2055

Digital Input		
Channels		8
Input Type		Dry Contact: Source, Wet Contact: Sink / Source
Dry Contact Level		Off Voltage Level: Open On Voltage Level: Close to GND
Wet Contact Level		Off Voltage Level: +4V max. On Voltage Level: +10 V ~ +50 V
Counters	Channels	8
	Max. Counts	32-bit (4294967295)
	Max. Input Frequency	5KHz
Photo-Isolation		3750 VDC
Digital Output		
Channels		8
Isolation Voltage		3750 VDC
Type		Open Collector
Sink/Source(NPN/PNP)		Sink
Load Voltage		+3.5 ~ +50 V
Max. Load Current		700mA per channel
Communication Interface		
Connector		10/100 Base-TX, 8-pin RJ-45 x 2 Support daisy chain connection.
Standard Supported		IEEE 802.3 Ethernet/IP
Power		
Input Voltage Range		10V ~ 30V
Power Consumption		1.6W
Mechanism		
Installation		DIN-Rail
Dimensions		110mm x 90mm x 33mm (H x W x D)
Environment		
Operating Temperature		-25℃ ~ +75℃
Storage Temperature		-30℃ ~ +80℃

2.1.2 EIP-2060

Digital Input			
Channels		6	
Input Type		Dry Contact: Source, Wet Contact: Sink / Source	
Dry Contact Level		Off Voltage Level: Open On Voltage Level: Close to GND	
Wet Contact Level		Off Voltage Level: +4V max. On Voltage Level: +10 V ~ +50 V	
Counters	Channels	6	
	Max. Counts	32-bit (4294967295)	
	Max. Input Frequency	5KHz	
Photo-Isolation		3750 VDC	
Digital Output			
Channels		6	
Output Type		Form A(SPST-NO)	
Contact Rating(Resistive Load)		5A 250VAC (47~63Hz)	
		5A 30 VDC	
Operate Time		10ms max.	
Release Time		5ms max.	
Insulation Resistance		1,000MΩs at 500 VDC	
Dielectric Strength		Between Open Contact	1000VAC (1 min.)
		Between Coil and Contacts	3000VAC (1 min.)
Endurance		Mechanical	20,000,000 times min.
		Electrical	100,000 times min.
Communication Interface			
Connector		10/100 Base-TX, 8-pin RJ-45 x 2 Support daisy chain connection.	
Standard Supported		IEEE 802.3 Ethernet/IP	
Power			
Input Voltage Range		10V ~ 30V	
Power Consumption		1.6W	
Mechanism			
Installation		DIN-Rail	
Dimensions		110mm x 90mm x 33mm (H x W x D)	
Environment			
Operating Temperature		-25℃ ~ +75℃	
Storage Temperature		-30℃ ~ +80℃	

2.1.3 EIP-2042

Digital Output	
Channels	16
Isolation Voltage	3750 VDC
Type	Open Collector
Sink/Source(NPN/PNP)	Sink
Load Voltage	+3.5 ~ +50 V
Max. Load Current	700mA per channel
Communication Interface	
Connector	10/100 Base-TX, 8-pin RJ-45 x 2 Support daisy chain connection.
Standard Supported	IEEE 802.3 Ethernet/IP
Power	
Input Voltage Range	10V ~ 30V
Power Consumption	1.6W
Mechanism	
Installation	DIN-Rail
Dimensions	110mm x 90mm x 33mm (H x W x D)
Environment	
Operating Temperature	-25℃ ~ +75℃
Storage Temperature	-30℃ ~ +80℃

2.1.4 EIP-2051

Digital Input		
Channels		16
Input Type		Dry Contact: Source, Wet Contact: Sink / Source
Dry Contact Level		Off Voltage Level: Open On Voltage Level: Close to GND
Wet Contact Level		Off Voltage Level: +4V max. On Voltage Level: +10 V ~ +50 V
Counters	Channels	16
	Max. Counts	32-bit (4294967295)
	Max. Input Freq.	5KHz
Photo-Isolation		3750 VDC
Communication Interface		
Connector		10/100 Base-TX, 8-pin RJ-45 x 2 Support daisy chain connection.
Standard Supported		IEEE 802.3 Ethernet/IP

Power	
Input Voltage Range	10V ~ 30V
Power Consumption	1.6W
Mechanism	
Installation	DIN-Rail
Dimensions	110mm x 90mm x 33mm (H x W x D)
Environment	
Operating Temperature	-25℃ ~ +75℃
Storage Temperature	-30℃ ~ +80℃

2.1.5 EIP-2017

Analog Input	
Channels	8-ch differential or 16-ch single-ended (Jump selecctable)
Input Type	**Voltage :** ±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V
	Current : 0 ~ +20 mA, +4 ~ +20 mA, ±20 mA **(Jumper Selectable in DIFF mode. An external resistor is required in SE mode)**
Resolution	24bits
Sampling Rate	10 samples/ second
Accuracy	+/-0.1%
Zero Drift	+/-20uV/℃
Span Drift	+/-25ppm/℃
Input Impedance	Voltage Input: >400 kΩ, Current Input: 125 Ω
Intra-Module Isolation, Field-to-Logic	3000 VDC
Overvoltage protection	240 Vrms
Individual Channel Configuration	Yes
Communication Interface	
Connector	10/100 Base-TX, 8-pin RJ-45 x 2 Support daisy chain connection.
Standard Supported	IEEE 802.3 Ethernet/IP
Power	
Input Voltage Range	10V ~ 30V
Power Consumption	3.8W
Mechanism	
Installation	DIN-Rail
Dimensions	110mm x 90mm x 33mm (H x W x D)
Environment	
Storage Temperature	-30℃ ~ +80℃

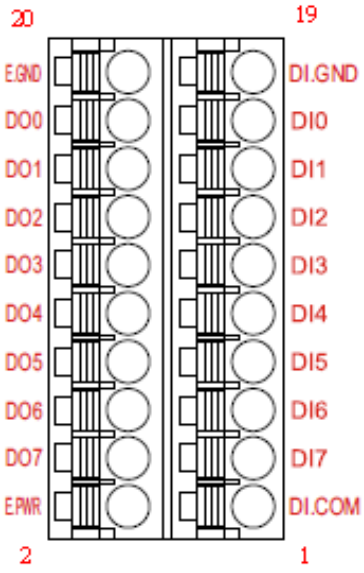
2.1.6 EIP-2019

Analog Input	
Channels	**8-ch Thermocouple Analog Input**
Input Type	**Voltage:**±15 mV, ±50 mV, ±100 mV, ±150 mV, ± 500 mV, ±1 V, ±2.5 V, ±5 V, ±10 V
	Thermocouple :B,C,E,J,K,N,R,S,T
	Current : ±20 mA (Jumper Selectable**)**
Resolution	24 bits
Sampling Rate	10 samples/ second
Accuracy	+/-0.1%
Zero Drift	+/-20uV/℃
Span Drift	+/-25ppm/℃
Input Impedance	Voltage Input: >400 kΩ, Current Input: 125 Ω
Intra-Module Isolation, Field-to-Logic	3000 VDC
Overvoltage protection	240 Vrms
Individual Channel Configuration	Yes
Open Wire Detection	Yes
Communication Interface	
Connector	10/100 Base-TX, 8-pin RJ-45 x 2 Support daisy chain connection.
Standard Supported	IEEE 802.3 Ethernet/IP
Power	
Input Voltage Range	10V ~ 30V
Power Consumption	3.8W
Mechanism	
Installation	DIN-Rail
Dimensions	110mm x 90mm x 33mm (H x W x D)
Environment	
Operating Temperature	-25℃ ~ +75℃
Storage Temperature	-30℃ ~ +80℃

2.2 I/O Specification

2.2.1 EIP-2055

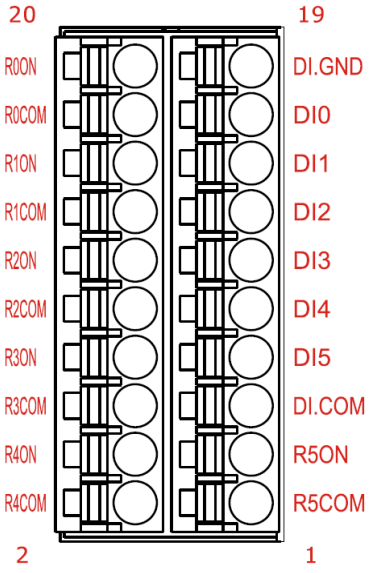
20-pin Spring-type terminal connecter			
Pin	Description	Pin	Description
1	DI.COM	2	EXT.PWR
3	DI7	4	DO7
5	DI6	6	DO6
7	DI5	8	DO5
9	DI4	10	DO4
11	DI3	12	DO3
13	DI2	14	DO2
15	DI1	16	DO1
17	DI0	18	DO0
19	DI.GND	20	EXT.GND



Spring-type terminal connecter

2.2.2 EIP-2060

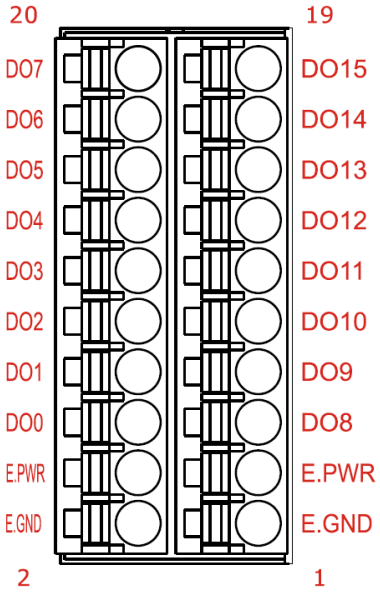
20-pin Spring-type terminal connecter			
Pin	Description	Pin	Description
1	R5_COM	2	R4_COM
3	R5_ON	4	R4_ON
5	DI.COM	6	R3_COM
7	DI5	8	R3_ON
9	DI4	10	R2_COM
11	DI3	12	R2_ON
13	DI2	14	R1_COM
15	DI1	16	R1_ON
17	DI0	18	R0_COM
19	DI.GND	20	R0_ON



Spring-type terminal connecter

2.2.3 EIP-2042

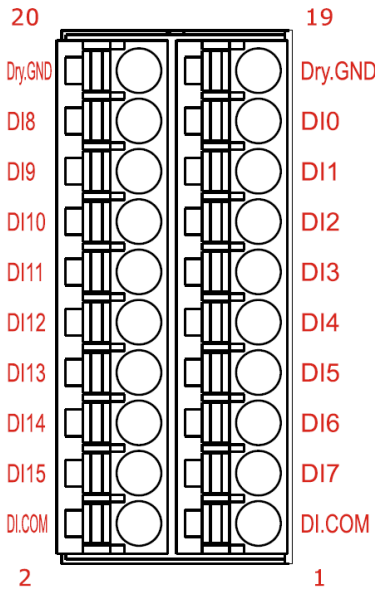
20-pin Spring-type terminal connecter			
Pin	Description	Pin	Description
1	EXT.GND	2	EXT.GND
3	EXT.PWR	4	EXT.PWR
5	DO8	6	DO0
7	DO9	8	DO1
9	DO10	10	DO2
11	DO11	12	DO3
13	DO12	14	DO4
15	DO13	16	DO5
17	DO14	18	DO6
19	DO15	20	DO7



Spring-type terminal connecter

2.2.4 EIP-2051

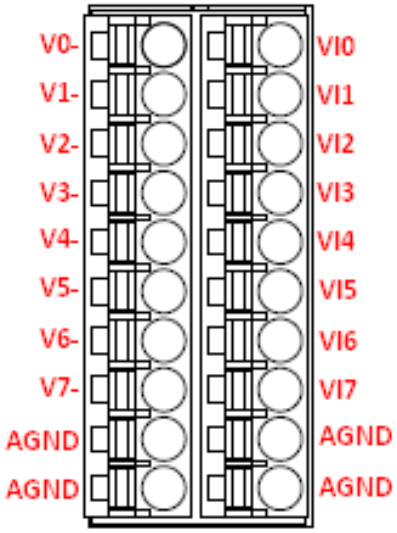
20-pin Spring-type terminal connecter			
Pin	Description	Pin	Description
1	DI.COM	2	DI.COM
3	DI7	4	DI15
5	DI6	6	DI14
7	DI5	8	DI13
9	DI4	10	DI12
11	DI3	12	DI11
13	DI2	14	DI10
15	DI1	16	DI9
17	DI0	18	DI8
19	Dry.GND	20	Dry.GND



Spring-type terminal connecter

2.2.5 EIP-2017

20-pin Spring-type terminal connecter			
Pin	Description	Pin	Description
1	V0-	2	VI0
3	V1-	4	VI1
5	V2-	6	VI2
7	V3-	8	VI3
9	V4-	10	VI4
11	V5-	12	VI5
13	V6-	14	VI6
15	V7-	16	VI7
17	AGND	18	AGND
19	AGND	20	AGND

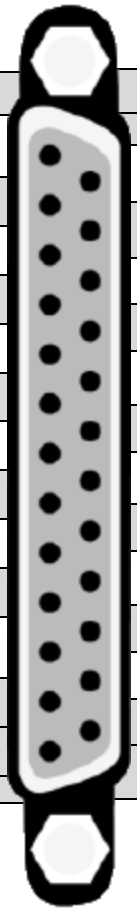


Spring-type terminal connecter

2.2.6 EIP-2019

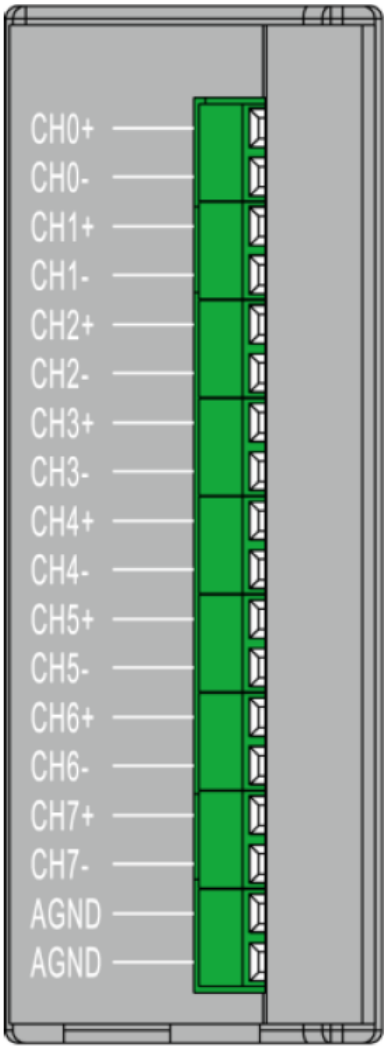
(1). D-Sub

Pin	Terminal	No.	Pin
+5V	01		
CJC	02	14	AGND
CH 0-	03	15	CH 0+
CH 1-	04	16	CH 1+
CH 2-	05	17	CH 2+
CH 3-	06	18	CH 3+
CH 4-	07	19	CH 4+
CH 5-	08	20	CH 5+
CH6-	09	21	CH 6+
CH7-	10	22	CH 7+
N.C.	11	23	N.C.
N.C.	12	24	N.C.
N.C.	13	25	N.C.
		SHIELD	F.G.

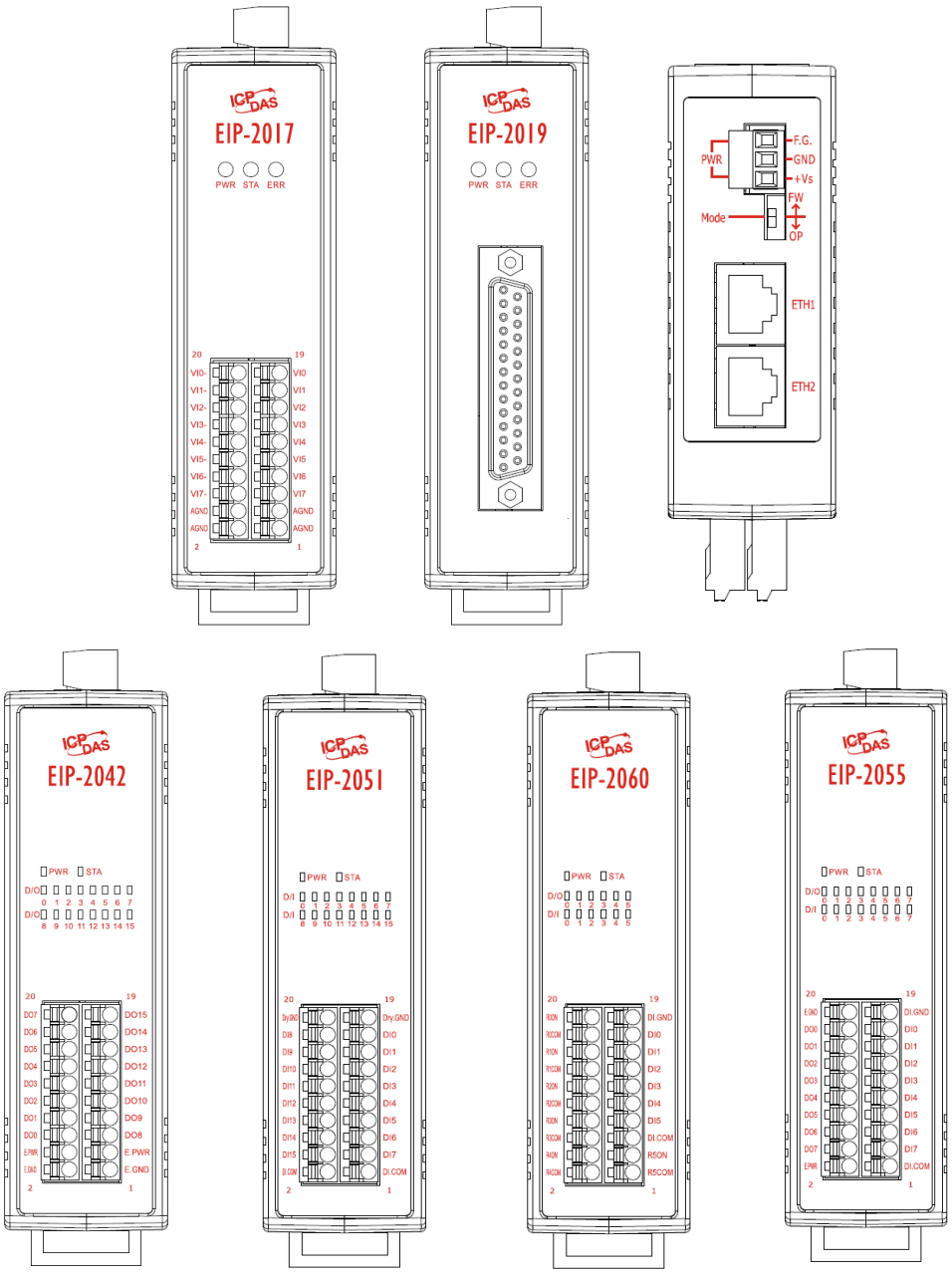


(2). CN-1824

Pin	Description
01	CH0+
02	CH0-
03	CH1+
04	CH1-
05	CH2+
06	CH2-
07	CH3+
08	CH3-
09	CH4+
10	CH4-
11	CH5+
12	CH5-
13	CH6+
14	CH6-
15	CH7+
16	CH7-
17	AGND
18	AGND



Front View



Dual Ethernet RJ-45 Jack:

The EIP-2000 is equipped with two RJ-45 jacks for the 10/100 Base-TX Ethernet port and features networking capability. Two RJ-45 jacks of EIP-2000 have same functionality and designed to support “Daisy chain connection”. When the Ethernet link is detected and Ethernet packet is received, the Link/Act LED (Orange) indicator will be turned on.

LED indicators:

There are three kinds of LED indicators on the EIP-2000. The behavior of LED indicators are shown below.

Table2-1. LED indicator for EIP-2000 DIO module

LED Indicator			
Module	**LED**	**LED Status**	**Description**
EIP-2042 **EIP-2051** **EIP-2055** **EIP-2060**	**Power LED**	Always On	Module is in Run mode.
		Flashing	Module is in Init mode.
	Status LED	Always On	EtherNet/IP connection is failed.
		Blink per second	EtherNet/IP connection is successful.
		Blink per 300 ms	EtherNet/IP disconnected during communication but still in Safe-Delay time.
		Blink per 100 ms	Module is about to reboot.
	I/O status LED	On	The DI/DO is activated.
		Off	The DI/DO is inactivated.
For configuration of the **Power On Value**, **Safe Value**, **Safe Delay** for the EIP-2000. Please refer to section "**4.2.2 Digital Settings**"			

Table2-2. LED indicator for EIP-2000 AI module

LED Indicator			
Module	**LED**	**LED Status**	**Description**
EIP-2017 **EIP-2019**	**Power LED**	Always On	Module is in Run mode.
		Flashing	Module is in Init mode.
	Status LED	Always On	EtherNet/IP connection is failed.
		Blink per second	EtherNet/IP connection is successful.
		Blink per 300 ms	EtherNet/IP disconnected during communication but still in Safe-Delay time.
		Blink per 100 ms	Module is about to reboot.
	Error LED	On/Flashing	AI status is close to full or out of range.
		Off	AI status is within the range of input type.

Operating Mode Selector:

FW Mode: Firmware update mode

OP Mode: Firmware running mode

Generally, the switch is always in the OP position while the EIP-2000 works. Only when updating the EIP-2000, the switch needs to be set to the FW position. Move the switch to the OP position and then re-

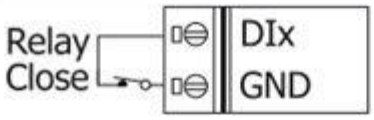
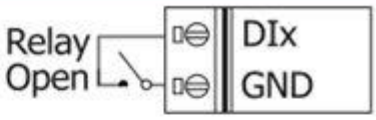
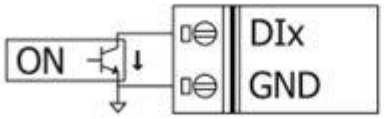
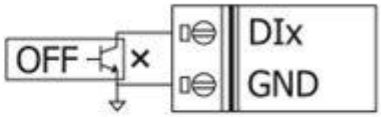
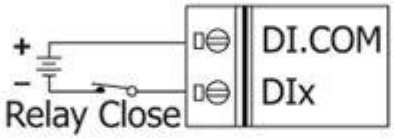
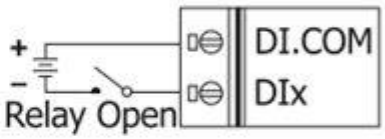
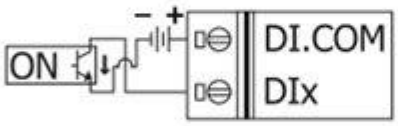
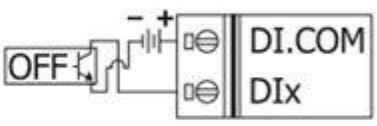
power on the EIP-2000 after the update is completed.

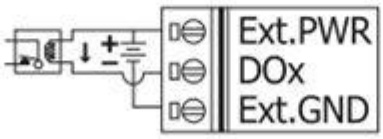
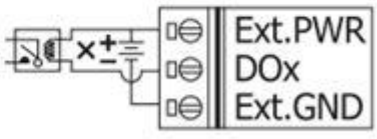
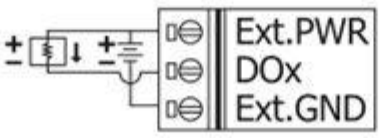
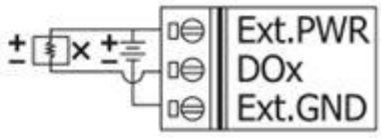
Table2-3. EIP-2000 module switch position

Mode	Firmware Running	Flash Protection	Firmware Update	Configuration
FW	No	No	Yes	Not allowed
OP	Yse	Yes	No	Allowed

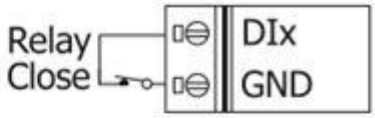
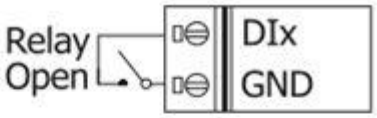
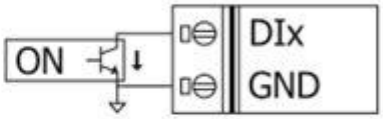
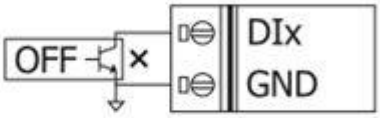
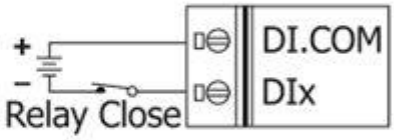
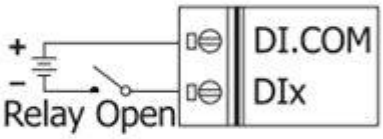
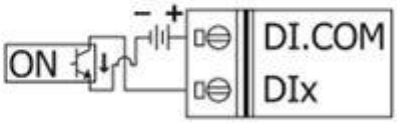
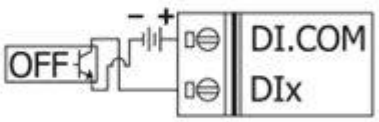
2.3 Wiring Connection

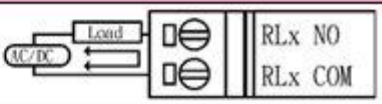
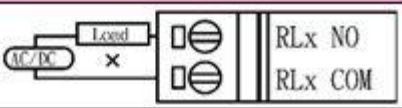
2.4.1 EIP-2055

Input	ON	OFF
Relay Contact (Dry)		
Open Collector (Dry)		
Relay Contact (Wet)		
NPN Output (Wet)		

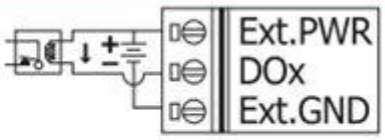
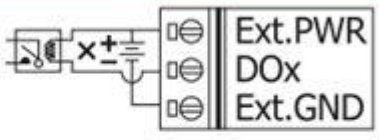
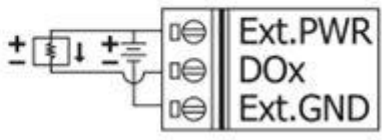
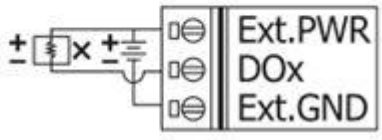
Output	ON	OFF
Drive Relay		
Resistance Load		

2.4.2 EIP-2060

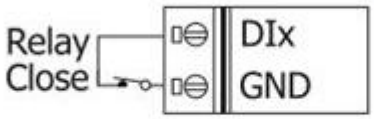
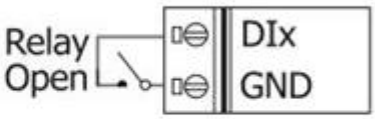
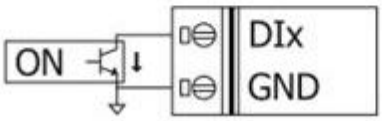
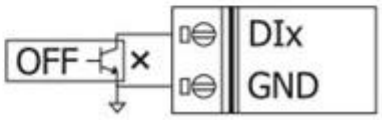
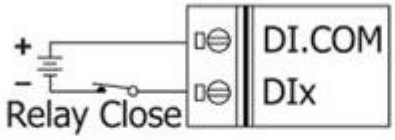
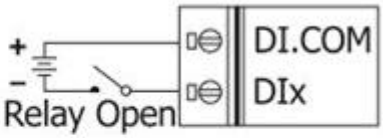
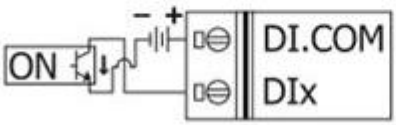
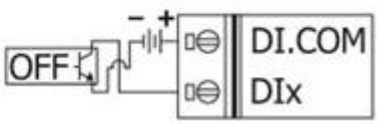
Input	ON	OFF
Relay Contact (Dry)		
Open Collector (Dry)		
Relay Contact (Wet)		
NPN Output (Wet)		

Output	ON	OFF
Relay		

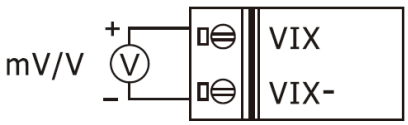
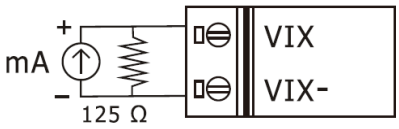
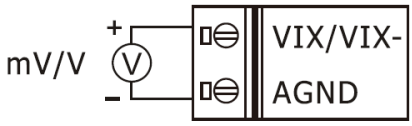
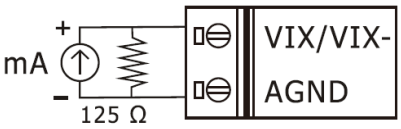
2.4.3 EIP-2042

Output	ON	OFF
Drive Relay		
Resistance Load		

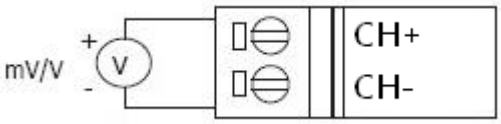
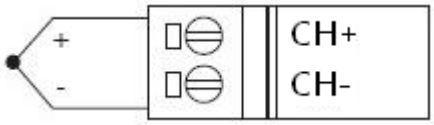
2.4.4 EIP-2051

Input	ON	OFF
Relay Contact (Dry)		
Open Collector (Dry)		
Relay Contact (Wet)		
NPN Output (Wet)		

2.4.5 EIP-2017

AI	Voltage Input Wiring	Current Input Wiring
DIFF.		
S.E.		

2.4.6 EIP-2019

Voltage Input	Thermocouple Input
	

2.4.7 Ethernet Connections

EIP-2000 can not only be directly connected to PC or EtherNet/IP scanner by Ethernet, but also be connected by daisy chain with other EIP-2000.

3. Setup and Test the EIP-2000 module

This chapter helps user to setup and test the EIP-2000 modules by EIP-2000 Utility, which is a supporting software used to configure and diagnose the EIP-2000 series modules.

3.1 Install the EIP-2000 Utility

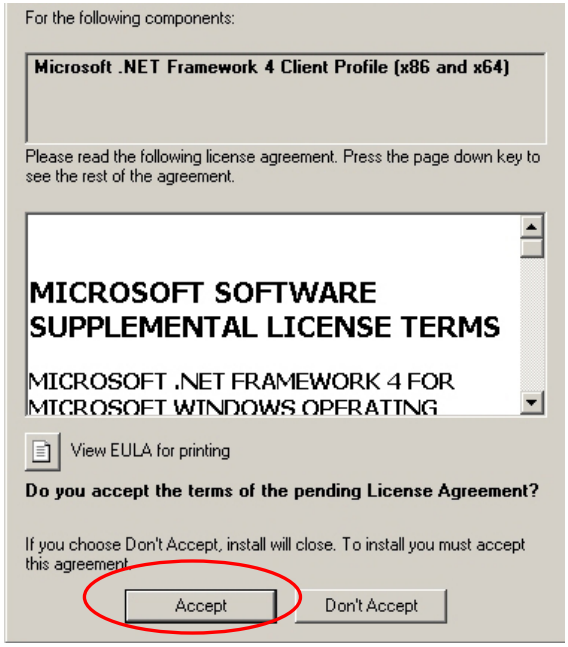
The EIP-2000 Utility is supporting software designed for EIP-2000 Series. It can not only update or configure the EIP-2000 series modules, but also communicate with module by EtherNet/IP.

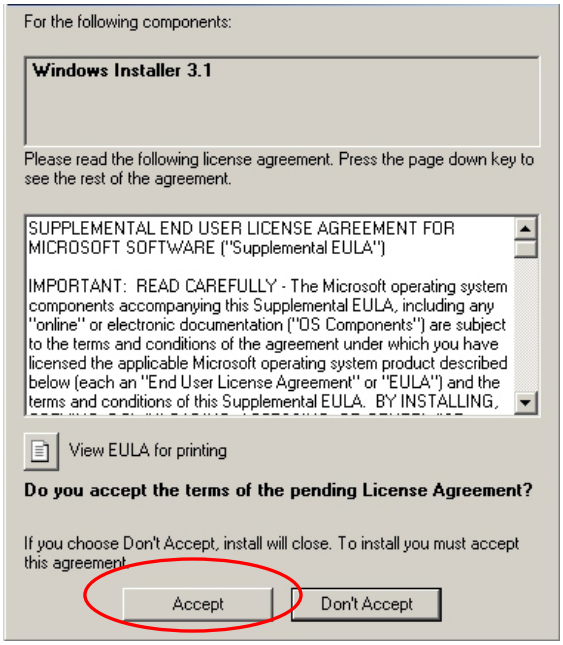
Step 1: Get the EIP-2000 Utility

The software is located at:
Fieldbus_CD:\EtherNetIP\remote-io\EIP-2000\Utility

Step 2: Install .NET Framework 4 component

The EIP-2000 Utility tool requires the Windows Installer 3.1 and the .NET Framework 4 components. These components can be obtained from the web site.





Step 3: Install Utility tool

After installing the ".Net Framework" components, please run the EIP-2000 Utility setup file.

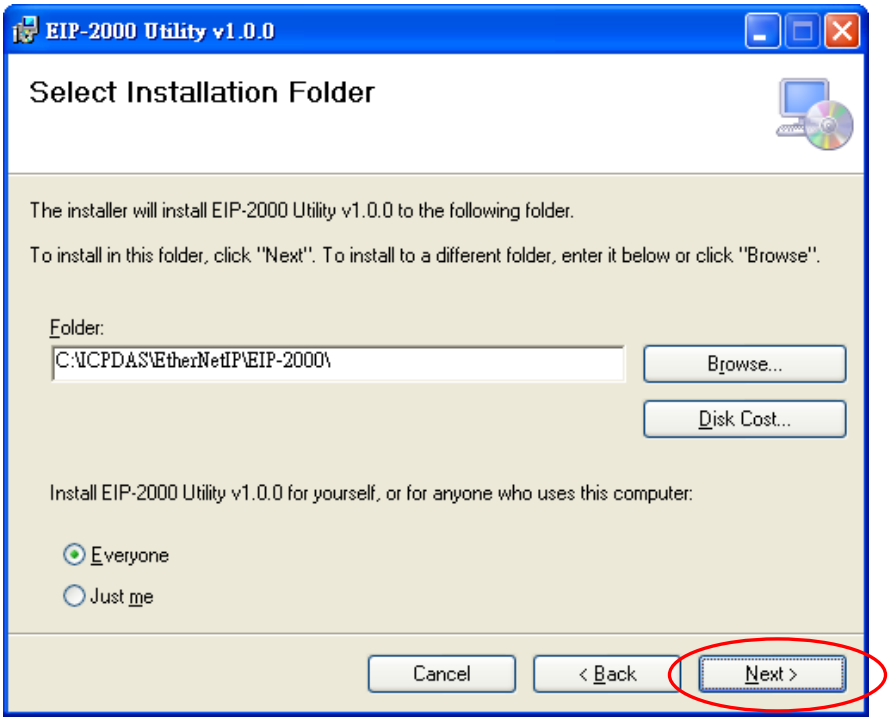


Figure3-1. To Select the installation path of the EIP-2000 Utility and click the "Next" button.

3.2 Setup the EIP-2000 module

Step 1: Connect the power and host PC

(1) Make sure your PC is under the workable network configuration and environment.

(2) First, disable or correctly configure the firewall of the Windows system and any anti-virus software. Or, some function of the EIP-2000 Utility may not work. (Contact your system administrator for more details about how to do this.)

(3) Check **FW/OP switch** is on **OP position**. The **OP Mode** of EIP-2000 series modules support all of the functions except firmware update. Make sure the **Power LED** is always on.

Step 2: Search and configure the EIP-2000 modules

(1) Double click the EIP-2000 Utility shortcut on the desktop.

(2) Click the "**Network Scan**" button to search your EIP-2000.

(3) Select the item of the EIP-2000 and open the **Configuration Dialog** of the selected module.
EX: Click on the **EIP-2055** on the list can open the Configuration Dialog of **EIP-2055**.
If the module connects with PC properly, the EIP-2000 Utility will build the connection with the module through EtherNet/IP when opening the **Configuration Dialog**.In configuration dialog, user can modify the Network Setting and Digital output setting in this dialog.

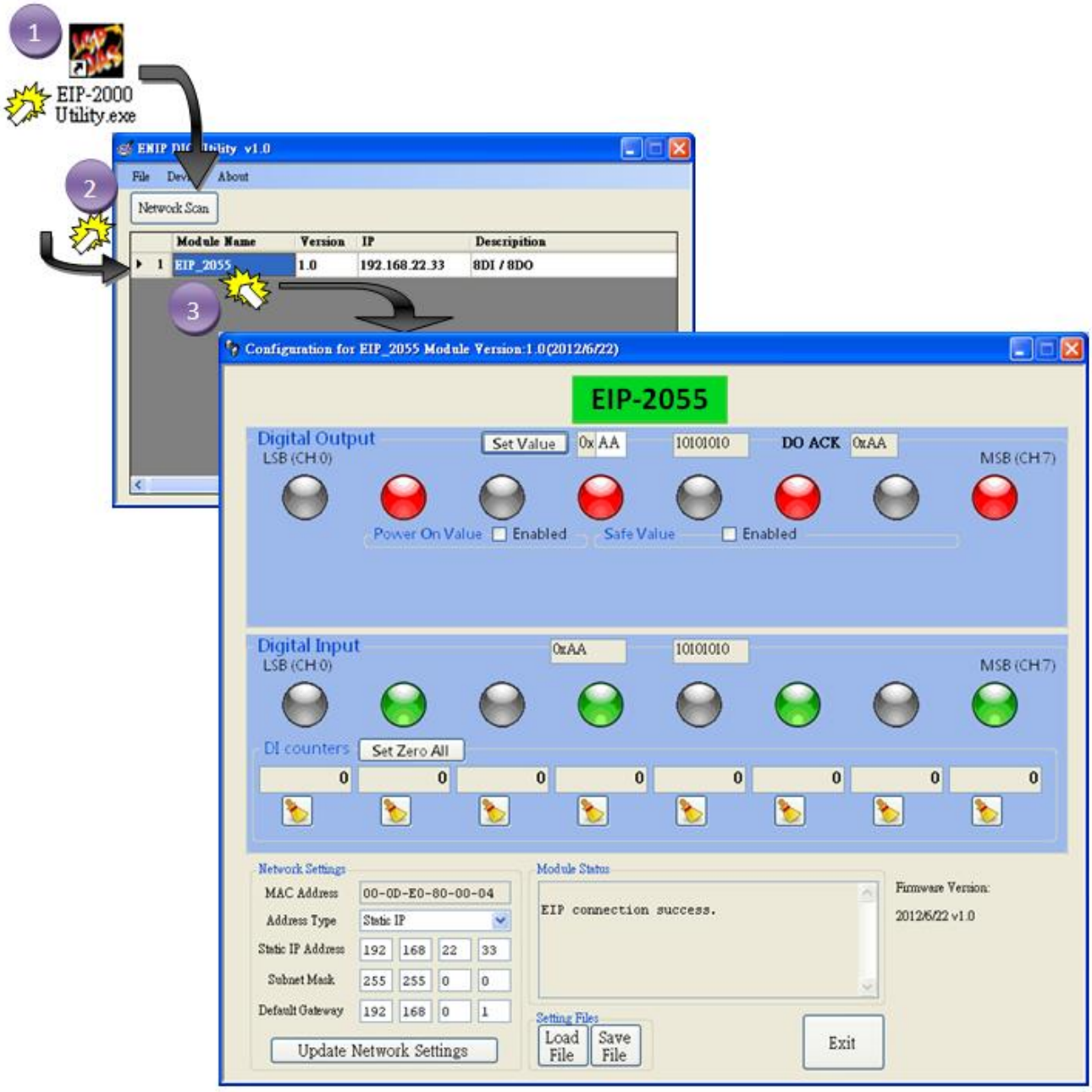


Figure3-2. the steps to configure EIP-2000 Utility

If the “Network Scan” cannot find the EIP-2000 module, switch the **FW/OP switch** to **FW position** and reboot the module.
In FW mode, the EIP-2000 is forced to the network configuration as following table. Connect the EIP-2000 with your computer at the same sub network or by using the same Ethernet switch. Afterwards, you can use the command “ping 192.168.255.1” in the Command Prompt window to test if the connection between the EIP-2000 and your computer is OK.

Table3-1. EIP-2000 module default Ethernet settings

Item	Settings
IP	192.168.255.1
Gateway	192.168.0.1
Mask	255.255.0.0

Step 3: Test the EIP-2000

DIO Module

Click on the dark LED( ) or red led( ) icons inside the Digital Output panel to switch on/off the Digital Outputs of module.The dark green or light green icons inside the Digital Input panel indicate the status of the Digital inputs of the module. Make sure the System LED indicator is flashing.

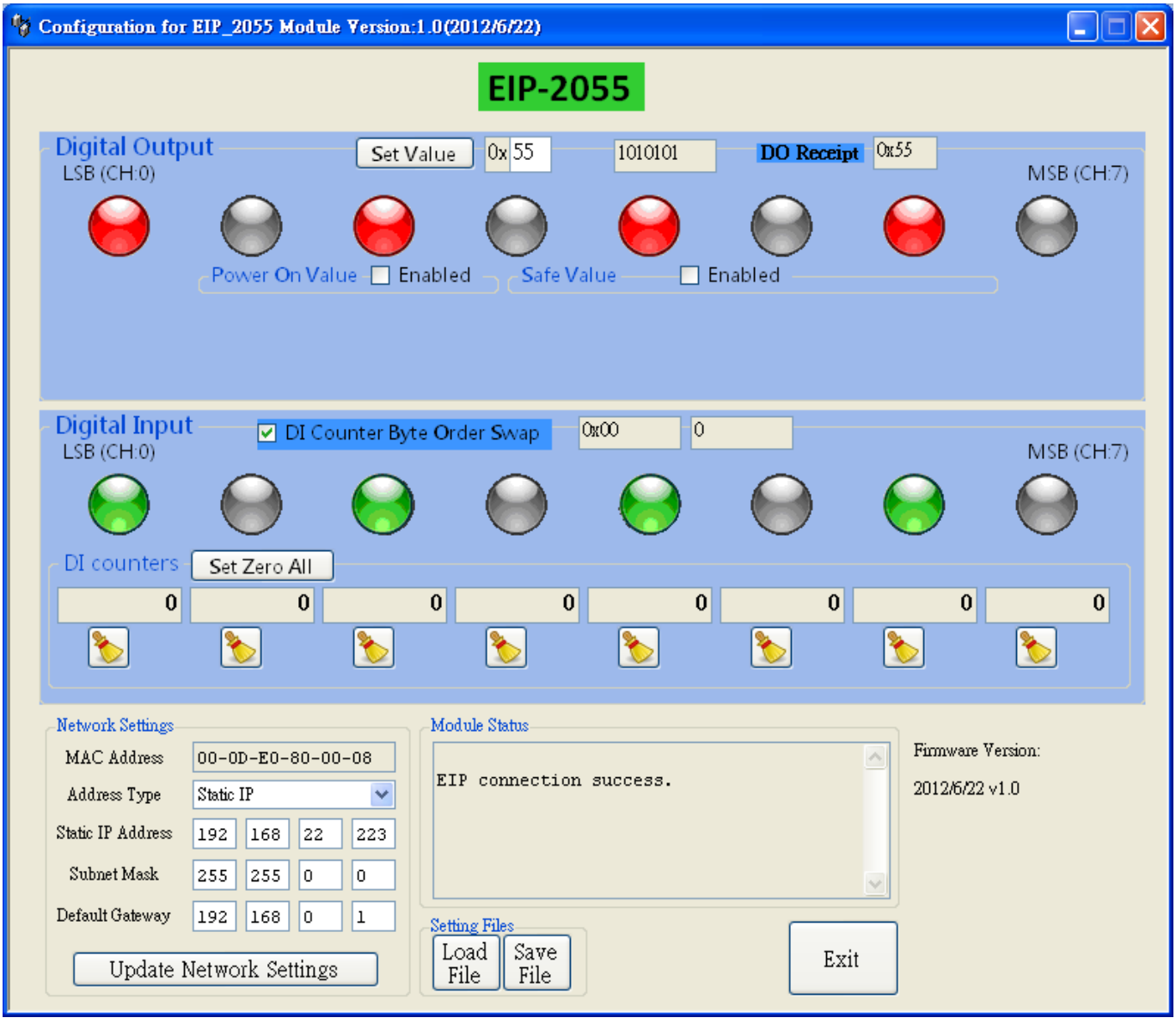


Figure3-3. the steps to test EIP-2000 Utility of DIO module

AI Module

To Select the Analog Input type (+/-15mV) and observe the AI status. If the AI status is close to maximum or minimum limit, the textbox shows red/blue. The Module Status message will log the event of AI status. Users can also select the AI filter (50Hz) and AI representation (Engineer).

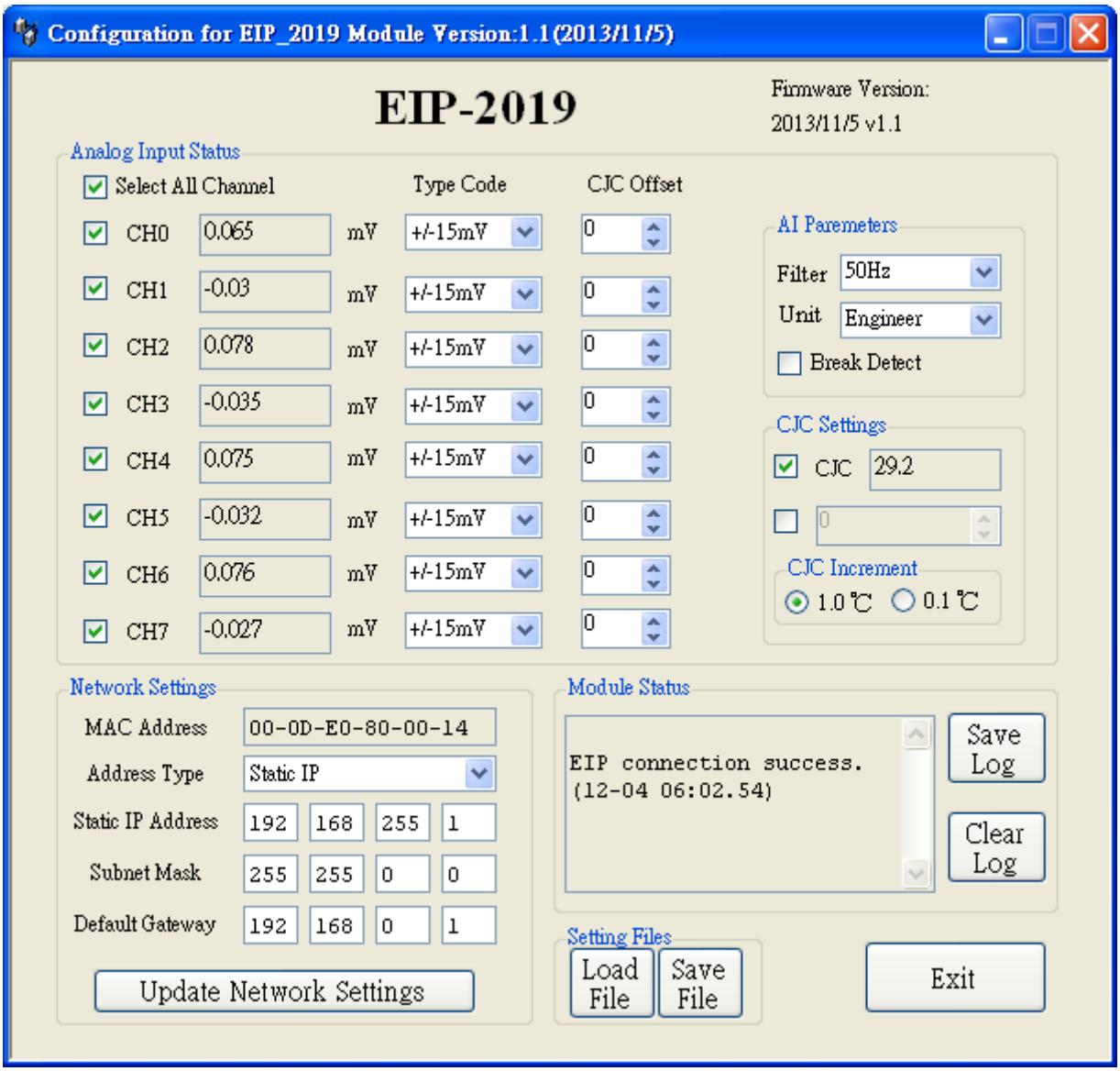


Figure3-4. the steps to test EIP-2000 Utility of AI module

4. EIP-2000 Utility Functionalities

4.1 Network Scan

(1) Double click the EIP-2000 Utility shortcut on the desktop.

(2) Click the "**Network Scan**" button to search your EIP-2000. Afterwards, you can see all of the EIP-2000 on the same network of your PC.

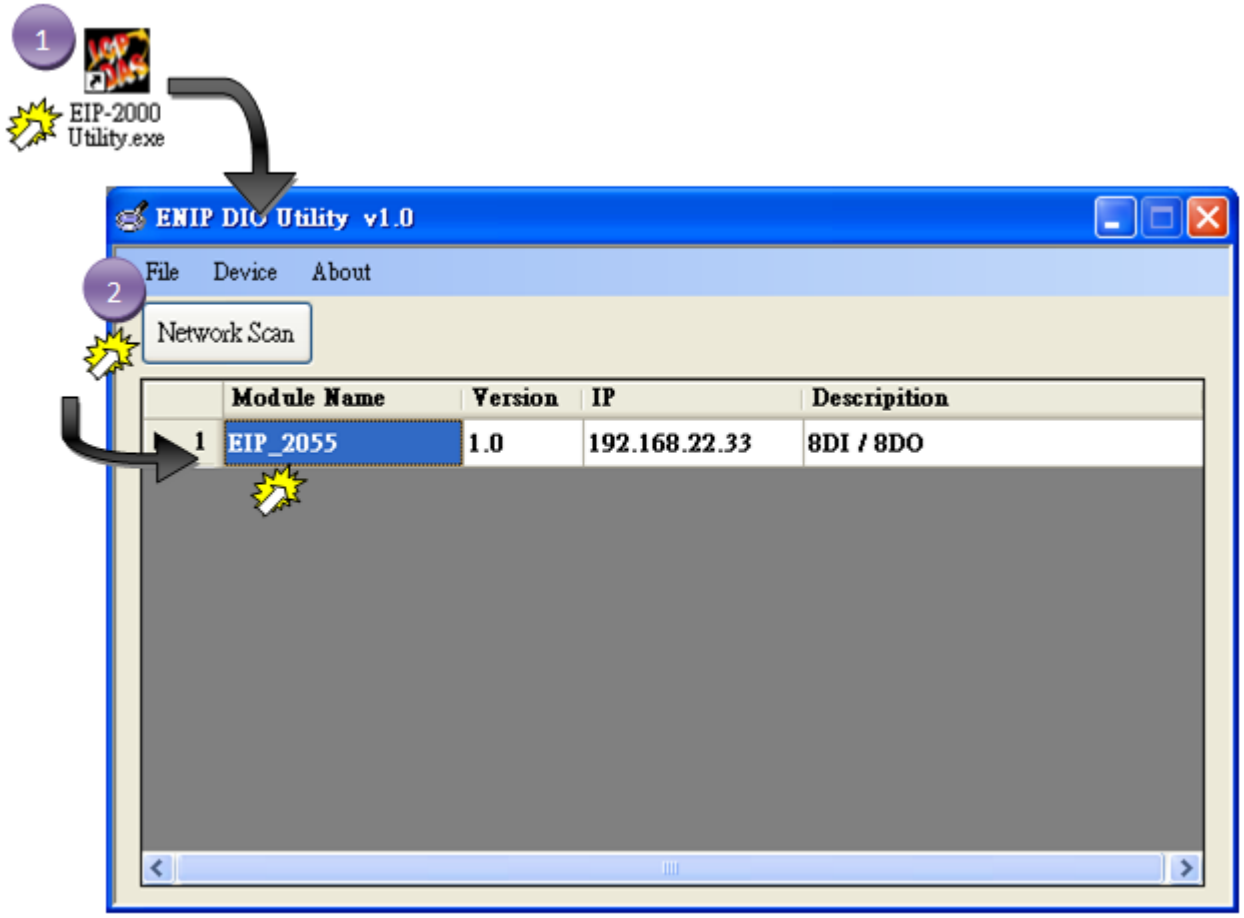


Figure4-1. the steps to scan EIP-2000 Utility

4.2 Module Configuration and Control

(1) Double click the EIP-2000 Utility shortcut on the desktop.

(2) Click the "**Network Scan**" button to search your EIP-2000.

(3) Click the list item of the EIP-2000 to open the Configuration dialog.

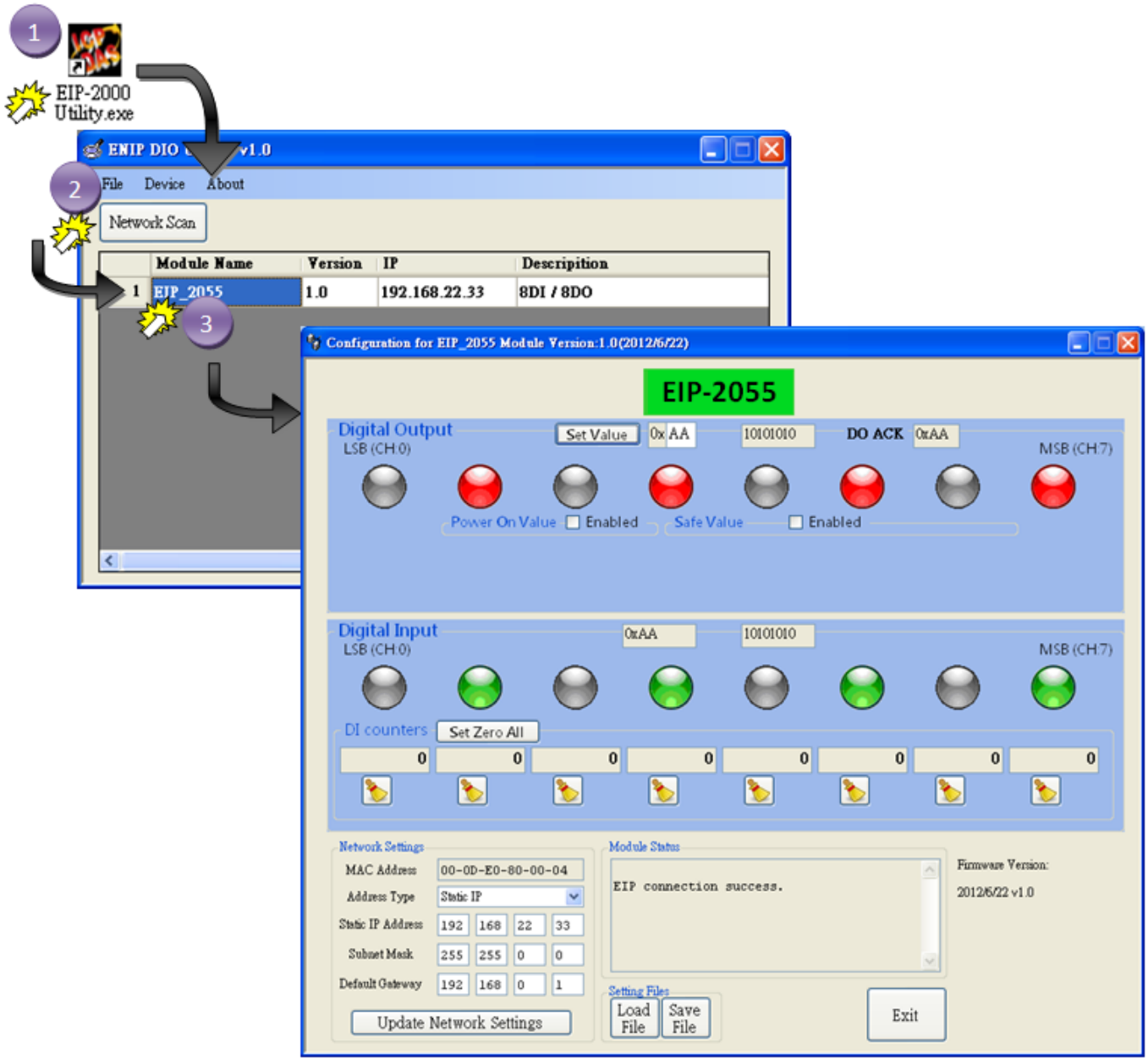


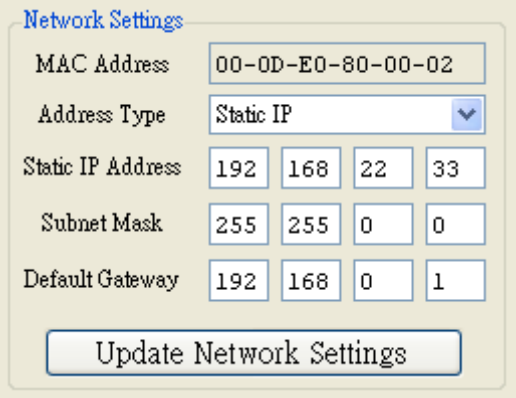
Figure4-2. the steps to open EIP-2000 Utility

Table4-1. EIP-2000 Utility item descriptions

Item	Description
Network Settings	For configuration of the Address Type, Static IP Address, Subnet Mask and Default Gateway of the EIP-2000 Please refer to section "**4.2.1 Network Settings**"
Digital Output Settings	For configuration of the **Power On Value**, **Safe Value**, and **Safe Delay**, of the EIP-2000. Please refer to section "**4.2.2 Digital Output Settings**"
Digital Input Counters	To calculate the DI status.
Setting File Management	For the setting files management of EIP-2000. Please refer to section "**4.2.3 Setting File Management**"
AI Type Settings	To select the AI types. Different AI types have their own limitations. Please refer to section "**4.2.6 AI Type Settings**"
AI Parameters	To configure the AI parameters for all AI channels. Please refer to sectoin "**4.2.7 AI Parameters**"
CJC Settings	To set the CJC configurations. Please refer to section "**4.2.8 CJC Settings**"

Note!!
Network Setting will take effected after rebooting the system of the EIP-2000 module.

4.2.1 Network Settings



The **Address Type**, **Static IP Address**, **Subnet Mask** and **Default Gateway** items are the most important network configuration and should always match the LAN definition of your PC. Or, the connection between the EIP-2000 and your PC may have problem. Contact your network administrator to obtain a proper network configuration for the EIP-2000.

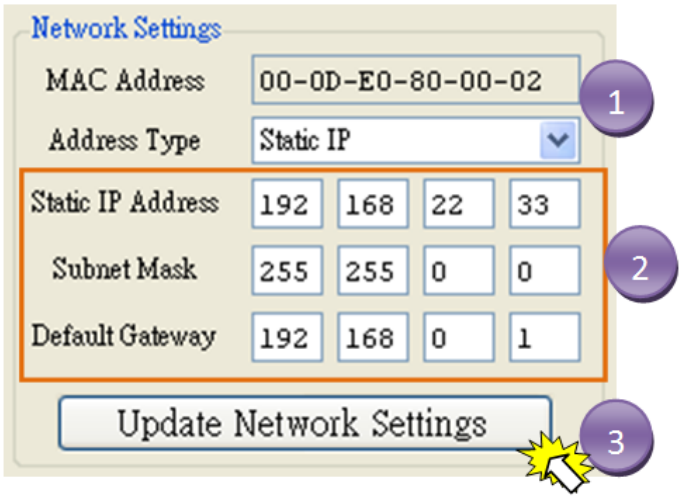
Table4-2." Network Settings" item descriptions

Item	Description
Address Type	**Static IP:** If you don't have a DHCP server in your network, configure the network settings manually. Please refer to the section "**4.2.1.1 Manually Configuration**"
	DHCP: Dynamic Host Configuration Protocol (DHCP) is a network application protocol that automatically assigns IP address to devices by the DHCP server. If there is no DHCP server in the network, the static IP must be used. Please refer to the section "**4.2.1.2 Dynamic Configuration**"
Static IP Address	Each EIP-2000 on the network must have a unique IP address. This field is used to assign an IP address for the EIP-2000.
Subnet Mask	The subnet mask defines which IP addresses of the network device are in the same sub-network.
Default Gateway	A gateway (or router) is a device that is used to build a connection between two sub-networks.
MAC Address	The MAC address of the EIP-2000.
Update Settings	Click this button to save the new settings to the EIP-2000.

Manually Configuration

In manually configuration, you have to assign all the network settings by yourself. The steps are shown below:

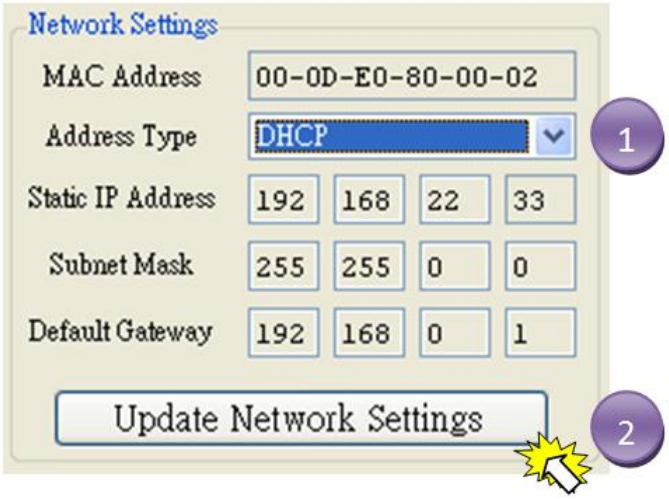
Step1: Select the "**Static IP**".
Step2: Enter the **network settings**.
Step3: Click the "**Update Settings**" button to finish the configuration.



Dynamic Configuration

The procedure of the dynamic configuration is very easy. If you have a DHCP server, network address can be configured dynamically by the following steps:

Step1: Select the "**DHCP**".
Step2: Click the "**Update Settings**" button to finish the configuration.



4.2.2 Digital Output Settings

There are three parameters in the Digital Output Settings dialog.

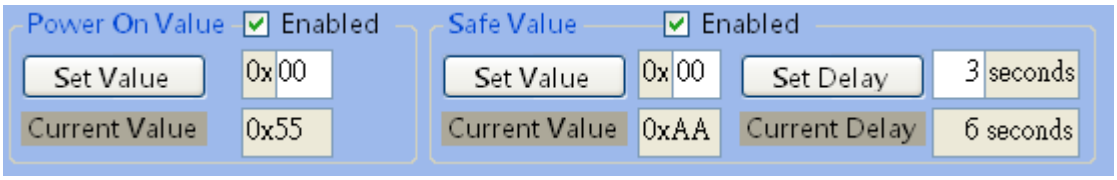


Table4-3. DIO settings item descriptions

Item	Description	Default
Power On Value	Set the Power On Value of EIP-2000.	0x00
Safe Value	Set the Safe Value of EIP-2000.	0x00
Safe Delay	Set the Safe Delay of EIP-2000.	3 second

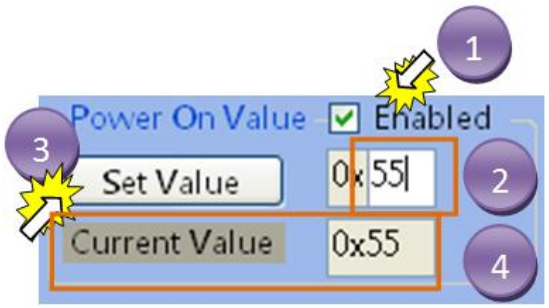
Power On Value

Step1: Click the **Power On Value checkbox** to enable the Power On Value setting panel.

Step2: Enter the "Power On Value" in the textbox. (0x00~0xFF)

Step3: Click **"Set Value"** button to modify the "Power On Value" of the EIP-2000.

Step4: Check if the **"Current Value"** shown below is correct.



Note!!

If user clicks the checkbox to disable the Power On Value panel, the Power On Value will be set to 0x00.

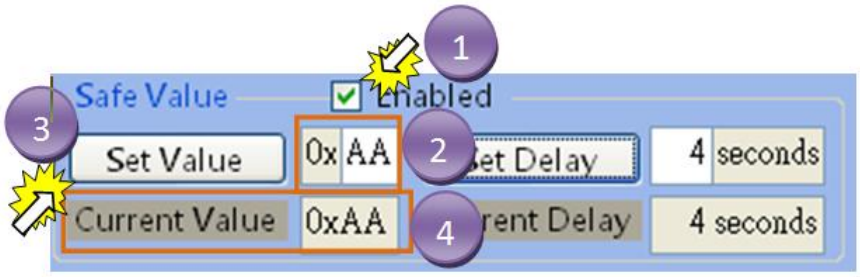
Safe Value

Step1: Click the **Safe Value checkbox** to enable the Safe Value setting panel.

Step2: Enter the "Safe Value" in the textbox. (0x00~0xFF)

Step3: Click **"Set Value"** button to modify the "Safe Value" of the EIP-2000.

Step4: Check if the **"Current Value"** shown below is correct.



Note!!

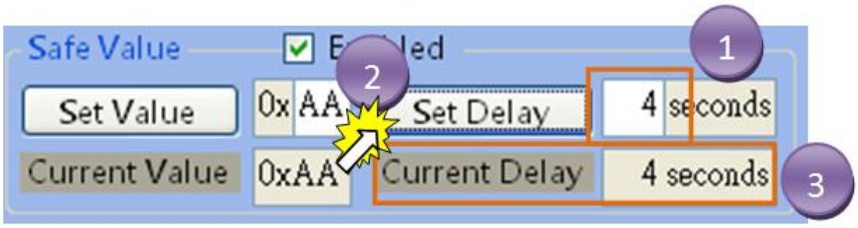
If user clicks the checkbox to disable the Power On Value panel, the Safe Value will be set to 0x00.

Safe Delay

Step1: Enter the "Safe Delay" in the textbox. (3~255 second)

Step2: Click **"Set Value"** button to modify the "Safe Delay" of the EIP-2000.

Step3: Check if the **"Current Delay"** shown below is correct.



Setting File Management

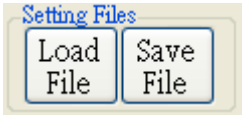


Table4-4. "Setting Files" item descriptions

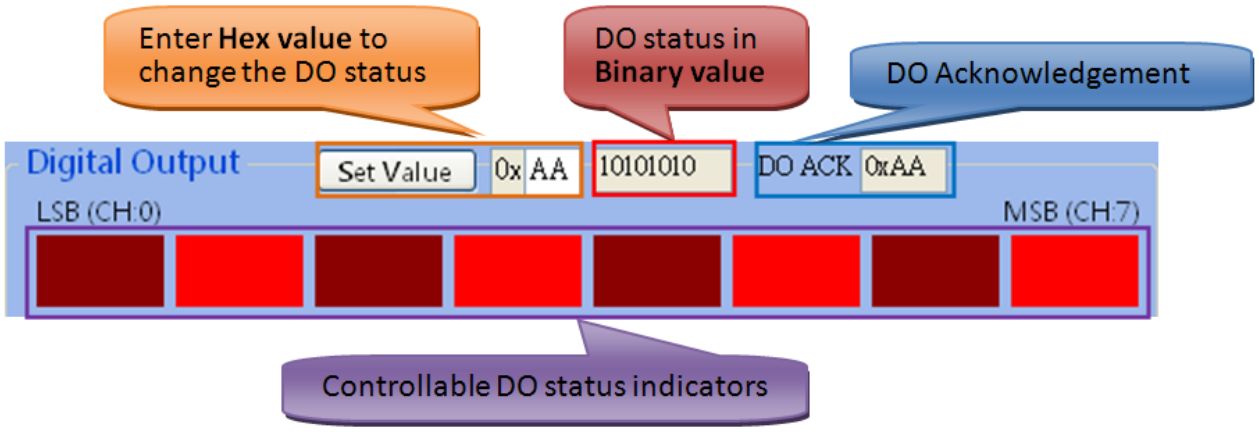
Item	Description
Load File	Load the setting file to configure the parameters of EIP-2000.
Save File	Save the setting file of the current configuration of EIP-2000.

Note!!

Only setting files output from EIP-2000 Utility and matching dialog of the specific module can be loaded to configure the specific module.
Ex: The EIP-2055 can only configured by the setting files produced by EIP-2055 configuration dialog.

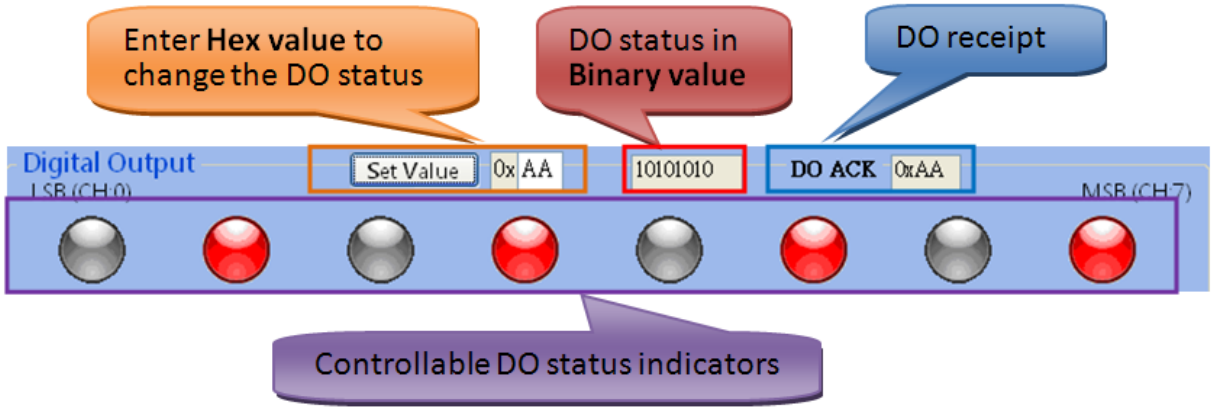
4.2.3 Digital Output

User can observe and control the DO status on the Digital Output Panel. Click on the green icons to change the status of the DO. The icon indicates this digital output is at **low status**. Otherwise the icons indicates the **high status** of digital output.User can also enter the total value of 8 DOs to control all the Dos at one time.



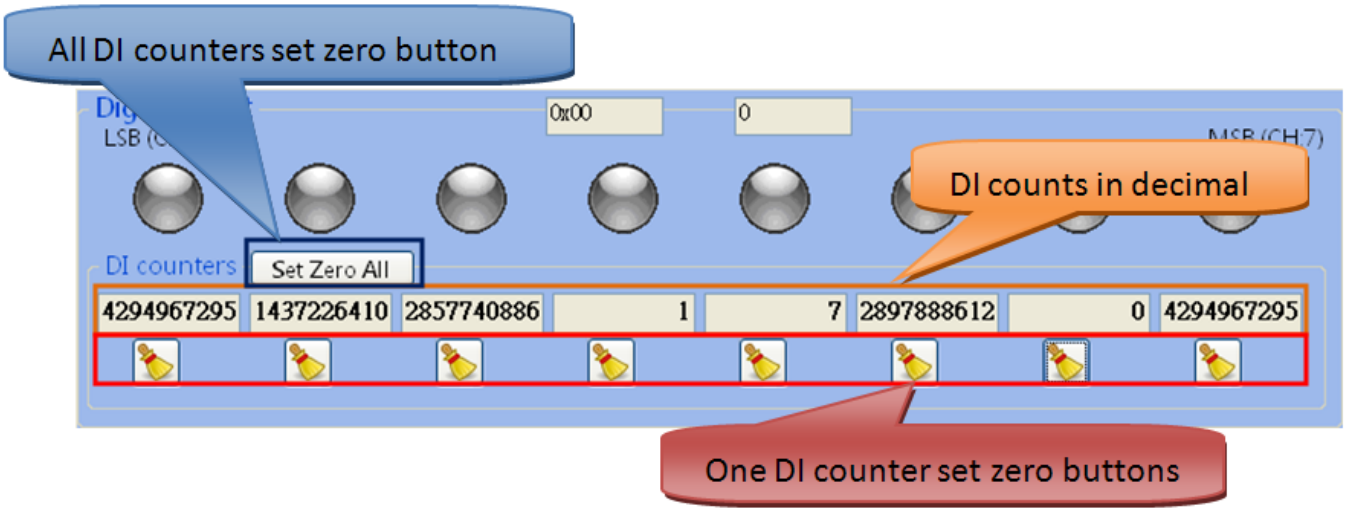
4.2.4 Digital Input

User can observe the DI status on the Digital Input Panel. The icon indicates this digital input is at **low status**. Otherwise the icons indicates the **high status**.



4.2.5 Digital Input Counters (If module support DI counter)

The labels under each DI led icons are their counters which indicate the count of the DI counters. The "Set Zero All" button can reset all of the DI counters at the same time, while the button under each DI counter can reset just one DI counter.



4.2.6 AI type settings (for AI module)

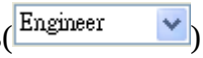
Users can select different AI types to observe the AI status. Different AI types have their own limitations. Please refer to the table 4-5, EIP-2017 and EIP-2019 support voltage and current type. Only EIP-2019 supports thermocouple type.

Table4-5. AI type code of EIP-2017 and EIP-2019

Module	AI Type
EIP-2017	**Voltage :** ±150 mV, ±500 mV, ±1 V, ±5 V, ±10 V
	Current : 0 ~ +20 mA, +4 ~ +20 mA, ±20 mA (Jumper Selectable)
EIP-2019	**Voltage:**±15 mV, ±50 mV, ±100 mV, ±150 mV, ±500 mV, ±1 V, ± 2.5 V, ±5 V, ±10 V
	Thermocouple :B,C,E,J,K,N,R,S,T
	Current : ±20 mA (Jumper Selectable**)**

4.2.7 AI paraters (for AI module)

Users can select the AI filters(

) and AI representations(

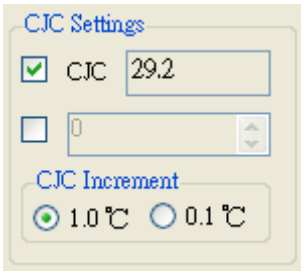
) here. There are two different AI filters 50Hz and 60Hz. The selection of filters must correspond with the frequency of AI sensors. Users have to check what is the requirment of AI sensors. We provide two AI representations engineer and hex unit. If users change the AI representations, all AI status will become to it.

4.2.8 CJC settings (for AI module)

In a measurement system, simply connecting a thermocouple to a data acquisition board or breakout box will add more dissimilar metal junctions, called cold junctions, to your circuit that may skew your measurement. Cold Junction Compensation (CJC) removes the effect of the voltages generated by these cold junctions for a more accurate temperature measurement. Some data acquisition boards and signal conditioning units have a built-in CJC terminal, which is a temperature reference on the board used to calculate and remove the unwanted voltages.

(1) CJC Switch: Users can set the CJC enable or not by the CJC Switch. If this selection is enable, users can observe the CJC temperature on the textbox.

(2) CJC Offset: Users can set the CJC Offset by this switch. The rage of the increment is -127~+127, and the order of the CJC Offset can be 1.0℃ or 0.1℃.

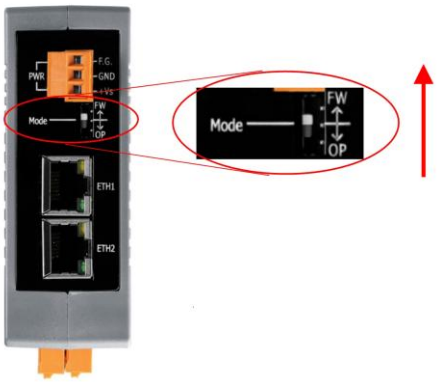


4.3 Firmware Update

The EIP-2000 module supports firmware update through the Ethernet network with the BOOTP/TFTP protocol. Generally, the firmware is not necessary to update when it works well. If there are some bugs in the firmware of your EIP-2000 module or you need new released functions which did not support by your EIP-2000, the firmware update is necessary. If the firmware update procedure is broken unfortunately, please try it again.

Before updating the firmware, you have to set the **"FWSwitch"** to **"FW"** position and then re-power on

the EIP-2000 module. Since the flash becomes writable, we can update the firmware through the Ethernet network.



Mode	Firmware Running	Flash Protection	Firmware Update	Configuration
FW	No	No	Yes	Factory
OP	Yes	Yes	No	User-Defined

Note!!

1. Well configure the network settings of your PC. Or the update procedures through the Ethernet network may not work correctly.

2. The program (TFTP server) may not run correctly if there is another TFTP server running on the same PC.

3. The BOOTP and TFTP protocols use the Ethernet UDP port 67, 68 and 69. Please confirm that the firewall of the Windows system or anti-virus software can pass these UDP ports.

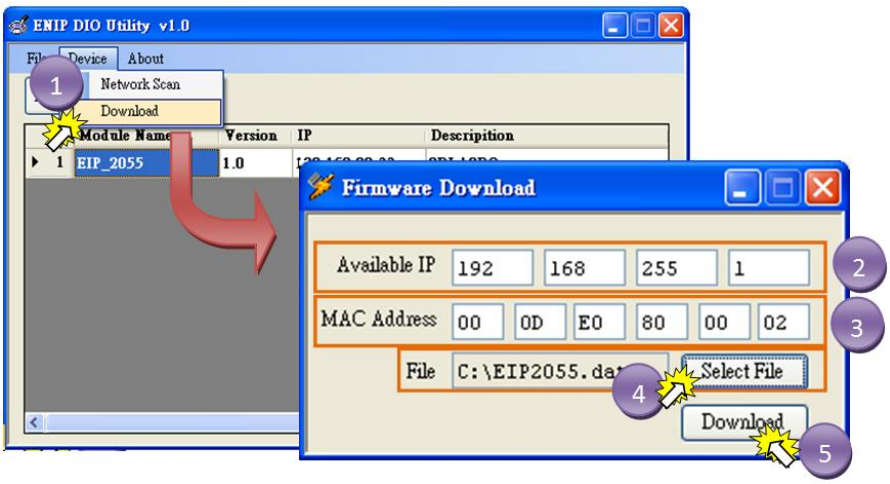
Step1: Click the "**Download**" item to open the "Firmware Download" dialog.

Step2: Enter an available IP address which will be temporally assigned to the EIP-2000 module via the BOOTP protocol. After finishing the firmware update, this IP address is useless.

Step3: The MAC address of the EIP-2000 module shall be filled in itself.

Step4: Select the firmware which will be updated.

Step5: Click the "**Download**" button to start the update procedure.



Available IP:

This parameter is an available IP address on the Ethernet network. During the update procedure, the EIP-2000 will use this IP address. You can also assign the IP address which is used in the OP mode of the EIP-2000. Contact your network administrator for more information about an available IP address.

MAC Address:

This parameter is the MAC address of the EIP-2000. You can get it from the Utility tool or use “ARP” after “ping” the module. The MAC Address shall be filled in itself when opening the “Firmware Download” dialog.

Please refer to section “**4.2.1 Network Settings**”

Select File:

The folder path of the new firmware can’t include the character “ “(the space character). Or the update procedure may be broken.

Note!!

The folder path should not include Chinese or other unrecognizable characters. And we suggest user to use short folder path to make the update procedure working properly.

5. R/W I/O data from EtherNet/IP

Since the EIP-2000 provides the functions of an EtherNet/IP adapter with digital I/O data information, there are some mechanisms for data-exchanging between EtherNet/IP objects and the digital I/O data registers. This section describes some parameters for users to setup their EtherNet/IP scanners to connect with EIP-2000 via EtherNet/IP.

5.1 Communication

We suggest users using Implicit Message communicate with EIP-2000. Implicit Messages are applied only for accessing the Input Instance 65_{hex} (101) and Output Instance 66_{hex} (102) of the Assembly Object in the object model. Before using Implicit Messages, you must use the Forward Open service with correct "Instance ID" and "Data length" settings of the Connection Manager Object to build a connection between the EtherNet/IP scanner and the EIP-2000. Afterwards, the Implicit Message can be used.
The "Instance ID" of EIP-2000 modules are shown below, but the "Data length" is different from modules.

Table 5-1. Instance ID table of EIP-2000

Implicit Message Information of EIP-2000		
Instance	**Instance ID**	**Data length**
Input(T->O)	65_{hex} (101)	Depends on modules.
Out(O->T)	66_{hex} (102)	Depends on modules.
Configuration	64_{hex} (100)	

5.2 Data Assembly

If the connection built successfully, the EtherNet/IP scanner will communicate the I/O data with the EIP-2000 continuously. The input data get from the EIP-2000 are the digital input received by the EIP-2000, and the output data send to the EIP-2000 can control the digital output of the EIP-2000. Each module of the EIP-2000 has some difference of the data assembly.

5.2.1 EIP-2055

Table 5-2. Data Assembly of EIP-2055

Data Assembly	Byte count	Description
Input Assembly	34	1st Byte: DI status
		2nd Byte: DO status read back
		3rd~34th Byte: DI counters
Output Assembly	2	1st Byte: DO status
		2nd Byte: to set DI counters zero

Input Assembly

Input data is the data collected from the EIP-2055.

a. The 1st byte of input data indicates the status of DI0~DI7. For example, the value 0x11 means DI0 and DI4 are activated while the others are not.

b. The 2nd byte of input data is the **Receipt** of the DO. The **DO Receipt** indicates the DO status set by EtherNet/IP scanner. User can confirm if their control is success. Note that it cannot be regarded as the DO status actually output by the EIP-2055 if there is some unexpected problem of hardware.

c. The 3rd ~ 34th bytes indicate the counters of 8 DIs. Each DI counter have 4 bytes to transmit the count. That means the maximun number the count is 4,294,967,295. The byte order of the counters are low to high in default.

d. User can can the byte order in the EIP-2000 Utility.

For example:

Byte No.	**2**	**3**	**4**	**5**
Data	0x30	0x40	0x50	0x60
Represent				
DI0 counter = 60504030_{hex} =1615872048_{dec}				

Byte No.	**14**	**15**	**16**	**17**
Data	0x01	0x02	0x00	0x00
Represent				
DI3 counter = 201_{hex} = 513_{dec}				

The relationship between byte number and the DI counters are shown below:

DI Counter	Byte Number
0	5,4,3,2
1	9,8,7,6
2	13,12,11,10
3	17,16,15,14
4	21,20,19,18
5	25,24,23,22
6	29,28,27,26
7	33,32,31,30

Output Assembly

Output data is the data sent to the EIP-2055.

a. The 1st byte of output data is DO status. DO status indicates the status of DO0~DO7. For example, the value 0x11 means DO0 and DO4 are activated while the others are not.

b. The 2nd byte of output data is DI counter zero controler. User can zero the specific DI counter by enable the relative bit.

For example:

DI counter data	Description
0xff=11111111$_{bin}$	All DI counter set zero.
0x55=1010101$_{bin}$	DI0, DI2,DI4,DI6 counters set zero.
0xAA=10101010$_{bin}$	DI1, DI3,DI5,DI7 counters set zero.

5.2.2 EIP-2060

Table 5-3. Data Assembly of EIP-2060

Data Assembly	Byte count	Description
Input Assembly	26	1st Byte: DI status
		2nd Byte: DO status read back
		3rd~26th Byte: DI counters
Output Assembly	2	1st Byte: DO status
		2nd Byte: to set DI counters zero

Input Assembly

Input data is the data collected from the EIP-2060.

a. The 1st byte of input data indicates the status of DI0~DI5. For example, the value 0x11 means DI0 and DI4 are activated while the others are not.

b. The 2nd byte of input data is the **Receipt** of the DO. The **DO Receipt** indicates the DO status set by EtherNet/IP scanner. User can confirm if their control is success. Note that it cannot be regarded as the DO status actually output by the EIP-2055 if there is some unexpected problem of hardware.

c. The 3rd ~ 26th bytes indicate the counters of 6 DIs. Each DI counter have 4 bytes to transmit the count. That means the maximun number the count is 4,294,967,295. The byte order of the counter is low to high.

d. User can can the byte order in the EIP-2000 Utility.

For example: If the Byte order is low to high.

Byte No.	**2**	**3**	**4**	**5**
Data	0x30	0x40	0x50	0x60
Represent				
DI0 counter = 60504030_{hex} =1615872048_{dec}				

Byte No.	**14**	**15**	**16**	**17**
Data	0x01	0x02	0x00	0x00
Represent				
DI3 counter = 201_{hex} = 513_{dec}				

The relationship between byte number and the DI counters are shown below:

DI Counter	Byte Number
0	5,4,3,2
1	9,8,7,6
2	13,12,11,10
3	17,16,15,14
4	21,20,19,18
5	25,24,23,22

Output Assembly

Output data is the data sent to the EIP-2060.

a. The 1st byte of output data is DO status. DO status indicates the status of DO0~DO5. For example, the value 0x11 means DO0 and DO4 are activated while the others are not.

b. The 2nd byte of output data is DI counter zero controler. User can zero the specific DI counter by enable the relative bit.

5.2.5 EIP-2042

Table 5-4. Data Assembly of EIP-2042

Data Assembly	Byte count	Description
Input Assembly	2	1st Byte: DO status read back (DO0~DO7).
		2nd Byte: DO status read back (DO8~DO15).
Output Assembly	2	1st Byte: DO status(DO0~DO7).
		2nd Byte:DO status(DO8~DO15).

Input Assembly

Input data is the data collected from the EIP-2042.

a. The 1st ~2nd byte of input data is the **Receipt** of the DO. The **DO Receipt** indicates the DO status set by EtherNet/IP scanner. User can confirm if their control is success. Note that it cannot be regarded as the DO status actually output by the EIP-2042 if there is some unexpected problem of hardware.

Output Assembly

Output data is the data sent to the EIP-2042.

a. The 1st byte of output data is DO status. DO status indicates the status of DO0~DO7. For example, the value 0x11 means DO0 and DO4 are activated while the others are not.

b. The 2nd byte of output data is DO status. DO status indicates the status of DO8~DO15.

5.2.6 EIP-2051

Table 5-5. Data Assembly of EIP-2051

Data Assembly	Byte count	Description
Input Assembly	66	1st Byte: DI status(DI0~DI7).
		2nd Byte: DI status(DI8~DI15).
		3rd~65th Byte: DI counters.
Output Assembly	2	1st Byte: to set DI counters zero (DI0~DI7).
		2nd Byte: to set DI counters zero (DI8~DI15).

Input Assembly

Input data is the data collected from the EIP-2051.

a. The 1st byte of input data indicates the status of DI0~DI7. For example, the value 0x11 means DI0 and DI4 are activated while the others are not.

b. The 2nd byte of input data indicates the status of DI8~DI15.

c. The 3rd ~ 65th bytes indicate the counters of 16 DIs. Each DI counter have 4 bytes to transmit the count. That means the maximun number the count is 4,294,967,295. The byte order of the counters are low to high in default.

d. User can can the byte order in the EIP-2000 Utility.

For example:

Byte No.	**2**	**3**	**4**	**5**
Data	0x30	0x40	0x50	0x60
Represent				
DI0 counter = 60504030_{hex} =1615872048_{dec}				

Byte No.	14	15	16	17
Data	0x01	0x02	0x00	0x00
Represent				
DI3 counter = 201_{hex} = 513_{dec}				

The relationship between byte number and the DI counters are shown below:

DI Counter	Byte Number
0	5,4,3,2
1	9,8,7,6
2	13,12,11,10
3	17,16,15,14
4	21,20,19,18
5	25,24,23,22
6	29,28,27,26
7	33,32,31,30

Output Assembly

Output data is the data sent to the EIP-2051.

a. The 1st byte of output data is DI counter zero controler(DI8~DI15). User can zero the specific DI counter by enable the relative bit.

b. The 2nd byte of output data is DI counter zero controler(DI0~DI7). User can zero the specific DI counter by enable the relative bit.

For example:

DI counter data	Description
0xff=11111111_{bin}	All DI counter set zero.
0x55=1010101_{bin}	DI0, DI2,DI4,DI6 counters set zero.
0xAA=10101010_{bin}	DI1, DI3,DI5,DI7 counters set zero.

Note!!

If the DI counter zero control stay 1, the DI counter is always 0. So user has to set zero the DI counter zero control after zero the DI counters.

5.2.7 EIP-2017

Table 5-6. Data Assembly of EIP-2017

Data Assembly	Byte count	Description
Input Assembly	53	1st ~ 16th Byte: AI status(AI0~AI7) for DIFF. or S.E. mode.
		17th ~ 32nd Byte: AI status(AI8~AI15) for S.E. mode only.
		33rd~40th Byte:AI Type Code(AI0~AI7) for DIFF. or S.E. mode.
		41st~48th Byte: AI Type Code(AI0~AI7) for S.E. mode only.
		49th Byte: AI filters status.
		50th Byte:Channel mode status.
		51st Byte:AI representation.
		52nd Byte: Channel selection(AI0~AI7).
		53rd Byte: Channel selection (AI8~AI15).
Output Assembly	22	1st Byte: Set value to the module.
		2nd ~ 17th Byte: Set type code to AI0~AI15.
		18th Byte: Filter selections of AI
		19th Byte: Channel mode selection DIFF. or S.E.
		20th Byte: AI representations
		21st Byte: AI channel selection (AI0 ~ AI7)
		22nd Byte: AI channel selection (AI8 ~ AI15)

Input Assembly

Input data is the data collected from the EIP-2017.

a. The 1st ~ 16th bytes of input data indicate the status of AI0~AI7. An AI status combine two input bytes. For example, the AI0 status is the combination of the 1st and the 2nd bytes.
b. The 17th ~ 32nd bytes of input data indicate the status of AI8~AI15. An AI status combine two input bytes. For example, the AI8 status is the combination of the 17st and the 18nd bytes.
c. The 33rd ~ 40th bytes of input data indicate the type code status of AI0 ~ AI7 (DIFF. or S.E. mode).
d. The 41st ~ 48th bytes of input data indicate the type code status of AI8~ AI15(S.E. mode).
e. The 49th byte of input data indicates the filter status of AI. If the byte shows “0”, It means that the AI filter is 50Hz. If the byte shows “1”, the AI filter is 60Hz.

f. The 50th byte of input data indicates the channel mode status of AI. If the byte shows “0”, It means that the channel mode is Differential mode. If the byte shows “1”, the channel mode is Single-Ended mode.

g. The 51st byte of input data indicates the AI representations of AI. If the byte shows “0”, It means that the representation is “Engineer”. If the byte shows “1”, the representation is “Hex”.

h. The 52nd byte of input data indicates the channel selection of AI0~AI7. For example, if the byte shows “0x03” (Binary: 0000 0011), it means that the AI0 and AI1 do not be selected.

i. The 53rd byte of input data indicates the channel selection of AI8~AI15. For example, if the byte shows “0x03” (Binary: 0000 0011), it means that the AI8 and AI9 do not be selected.

Output Assembly

Output data is the data sent to the EIP-2017.

a. The 1st byte of output data will let the configurations set in the EIP-2017 module. If the 1st byte change into 1, the 2nd ~ 22th byte will set in EIP-2017 module. Please refer to **Table 5-7**.

b. The 2nd ~ 17th bytes of output data are the type codes of AI0~AI15. For example, the 2nd byte is set into 0x05 and the type code of AI0 will be 0x05.

c. The 18th byte of output data is the selections of AI filters 50Hz and 60Hz. Please refer to **Table 5-7**.

d. The 19th byte of output data is the switch of channel mode Differential or Single-Ended. Please refer to **Table 5-7**.

e. The 20th byte of output data is the switch of AI representation hex and engineer. Please refer to **Table 5-7**.

f. The 21st byte of output data is the selection of AI channels (AI0 ~ AI7). For example, if users do not want to select AI0 and AI1. The value of 21st byte should be fill out “0x03” (Binary: 0000 0011). It supports for Differential and Single-Ended mode.

g. The 22nd byte of output data is the selection of AI channels (AI8 ~ AI15). For example, if users do not want to select AI8 and AI9. The value of 21th byte should be fill out “0x03” (Binary: 0000 0011). It just supports for Single-Ended mode.

Table 5-7. Output data configurations of EIP-2017

Byte	Description	Set Value	
		0	1
1st Byte	Set the configuration to the module	Off	On
18th Byte	AI filters	50Hz	60Hz
19th Byte	Channel Mode	DIFF.	S.E.
20th Byte	AI representation	Engineer	Hex

Note!!

If you want to keep the configurations after reboot the module. You must to click "Set Value" on the EIP-2000 Utility or let the 1st byte change into 1.

5.2.8 EIP-2019

Table 5-8. Data Assembly of EIP-2019

Data Assembly	Byte count	Description
Input Assembly	41	1st ~ 16th Byte: AI status(AI0~AI7).
		17th ~ 18th Byte: The broken wire status.
		19th ~ 20th Byte: CJC status.
		21st ~ 28th Byte: AI type code(AI0~AI7).
		29th Byte: AI filter status.
		30th Byte: AI representation.
		31st Byte: Wire break detector.
		32nd Byte: CJC switch.
		33rd Byte: CJC increment.
		34th ~ 41st Byte: CJC offset(AI0~AI7).
Output Assembly	23	1st Byte: Set value to the module.
		2nd ~ 9th Byte: Set type code to Ch0~Ch7.
		10th Byte: Filter selection of AI
		11st Byte: Wire break detector
		12nd Byte: AI representation
		13rd Byte: Select AI channel to be short
		14th Byte: CJC switch
		15th Byte: CJC increment
		16th ~ 23rd Byte:CJC Offset

Input Assembly

Input data is the data collected from the EIP-2019.

a. The 1st ~ 16th bytes of input data indicates the status of AI0~AI7. An AI status combine two input bytes. For example, the AI0 status is the combination of the 1st and the 2nd bytes.

b. The 17th ~18th bytes of input data indicates the break status of AI0~AI7. For example, if the AI0 and AI1 are broken and the brocken wire status will be shown 0x03 in hex(Binary:0000 0011).
c. The 19th ~ 20th bytes indicate the CJC temperature. The CJC status is shown by the combination of 19th and 20th bytes. For example, the combination is 0x121 (Decimal: 289). The 289 means 28.9 ℃.
d. The 21st ~ 28th bytes of input data indicate the type code status of AI0~ AI7.
e. The 29th byte of input data indicates the filter status of AI. If the byte shows "0", It means that the AI filter is 50Hz. If the byte shows "1", the AI filter is 60Hz.
f. The 30th byte of input data indicates the AI representations of AI. If the byte shows "0", It means that the representation is "Engineer". If the byte shows "1", the representation is "Hex".
g. The 31st byte of input data indicates the wire break detector. If the byte shows "0", It means that the wire break detector is "OFF". If the byte shows "1", the wire break detector is "ON".
h. The 32nd byte of input data indicates the CJC switch. If the byte shows "0", It means that the CJC switch is "OFF". If the byte shows "1", the CJC switch is "ON".
i. The 33rd byte of input data indicates the CJC increment. If the byte shows "0", It means that the CJC increment is "1℃". If the byte shows "1", the CJC increment is "0.1℃".
j. The 34th ~ 41st bytes of input data indicate the CJC offset of AI0~ AI7.

Output Assembly

Output data is the data sent to the EIP-2019.

a. The 1st byte of output data will let the configurations set in the EIP-2019 module. If the 1st byte change into 1, the 2nd ~ 21st byte will set in EIP-2019 module. Please refer to **Table 5-9**.
b. The 2nd ~ 9th bytes of output data are the type codes of AI0~AI7. For example, the 2nd byte is set into 0x05 and the type code of AI0 will be 0x05.
c. The 10th byte of output data is the selections of AI filters 50Hz and 60Hz. Please refer to **Table 5-9**.
d. The 11st byte of output data is the switch of wire break detector. Please refer to **Table 5-9**.
e. The 12nd byte of output data is the switch of AI representation 2's complement and Engineer. Please refer to **Table 5-9**.
f. The 13rd byte of output data is the selection of AI channels. The selection will let the AI channels be short. For example, If we set the 11th byte into 0x03(Binary:0000 0011), the AI0 and AI1 will be short. And the AI status of AI0 and AI1 will be 0.
g. The 14th byte of output data is the switch of CJC. Please refer to **Table 5-9**.
h. The 15th byte of output data is the switch of CJC increment 1℃ and 0.1℃. Please refer to **Table 5-9**.
i. The 16th ~ 23rd bytes of output data are the status of CJC offset. The rage of the increment is -127~+127 (1 byte)

Table 5-9. Output data configurations of EIP-2019

Byte	Description	Set Value	
		0	1
1st Byte	Set the configuration to the module	Off	On
10th Byte	AI filters	50Hz	60Hz
11st Byte	Wire Break detector	Off	On
12nd Byte	AI representation	Engineer	Hex
14th Byte	CJC switch	Off	On
15th Byte	CJC increment	1℃	0.1℃

6. Appendix A: Glossary

ARP (Address Resolution Protocol)

Consider two machines A and B that share a physical network. Each has an assigned IP address IP_A and IP_B, and a MAC address the MAC_A and MAC_B. The goal is to devise low-level software that hides MAC addresses and allows higher-level programs to work only with the IP addresses. Ultimately, however, communication must be carried out by the physical networks using whatever MAC address scheme the hardware supplies.

Suppose machine A wants to send a packet to machine B across a physical network to which they are both attached, but A only has the Internet address for B, IP_B. The question arises: how does A map that address to the MAC address for B, MAC_B?

ARP provides a method of dynamically mapping 32-bit IP address to the corresponding 48-bit MAC address. The term dynamic is used since it happens automatically and is normally not a concern for either the application user or the system administrator.

Clients and Servers

The client-server paradigm uses the direction of initiation to categorize whether a program is a client or server. In general, an application program that initiates peer to peer communication is called a client. End users usually invoke client programs when they use network services.

Most client programs consist of conventional application program develop tools. Each time a client program is executed; it contacts a server, sends a request and waits for a response. When the response arrives, the client program continues processing. Client programs are often easier to develop than servers, and usually require no special system privileges to operate.

By comparison, a server is any program that waits for incoming requests from a client program. The server receives a request from a client, performs the necessary computation and returns the result to the client.

Ethernet

The term Ethernet generally refers to a standard published in 1982 by Digital Equipment Corp., Intel Corp. and Xerox Corp. Ethernet is the most popular physical layer local area network (LAN) technology today. Ethernet is a best-effort delivery system that uses CSMA/CD technology. It recognizes hosts using 48-bit MAC address.

Firmware

Firmware is an alterable program located or stored in the semi-permanent storage area, e.g., ROM, EEPROM, or Flash memory.

ICMP (Internet Control Messages Protocol)

No system works correctly all the time. ICMP provides a method of communicating between the Internet Protocol software on one machine and the Internet Protocol software on another. It allows gateways to send error or control messages to other gateways or allows a host to know what is wrong with the network communication.

Internet

Physically, the Internet is a collection of packet switching networks interconnected by gateways along with TCP/IP protocol that allows them to perform logically as a single, large and virtual network. The Internet recognizes hosts using 32-bit IP address.

IP (Internet Protocol) address

Every interface on an Internet must have a unique IP address (also called an Internet address). These addresses are 32-bit numbers. They are normally written as four decimal numbers, one for each byte of the address such as "192.168.41.1". This is called dotted-decimal notation.

MAC (Media Access Control) address

To allow a computer to determine which packets are meant for it, each computer attached to an Ethernet is assigned a 48-bit integer known as its MAC address (also called an Ethernet address, hardware address or physical address). They are normally written as eight hexadecimal numbers such as "**00:71:88:af:12:3e:0f:01**". Ethernet hardware manufacturers purchase blocks of MAC addresses and assign them in sequence as they manufacture the Ethernet interface hardware. Thus, no two hardware interfaces have the same MAC address.

Packet

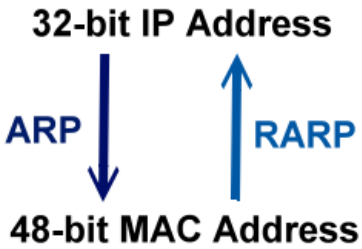
A packet is the unit of data sent across a physical network. It consists of a series of bits containing data and control information, including the source and the destination node (host) address, and is formatted for transmission from one node to another.

Ping

Ping sends an ICMP echo request message to a host, expecting an ICMP echo reply to be returned. Normally, if a host cannot be pinged, you won't be able to use Telnet or FTP to connect to the host. Conversely, if Telnet or FTP cannot be used to connect to a host, Ping is often the starting point to determine what the problem is.

RARP (Reverse Address Resolution Protocol)

RARP provides a method of dynamically mapping 48-bit MAC address to the corresponding 32-bit IP address.



Socket

Each TCP segment contains the source and destination port number that can be used to identify the sending and receiving application. These two values, along with the source and destination IP address in the IP header, uniquely identify each connection.
The combination of an IP address and a port number is called a socket.

Subnet Mask

Subnet mask is often simply called the mask. Given its own IP address and its subnet mask, a host can determine if a TCP/IP packet is destined for a host that is (1) on its own subnet, or (2) on a different network. If (1), the packet will be delivered directly; otherwise if, will be delivered via gateways or routers.

TCP (Transmission Control Protocol)

TCP provides a reliable flow of data between two hosts. It is associated with tasks such as dividing the data passed to it from applications into appropriately sized chunks for the network layer below, acknowledging received packets, setting timeouts to make certain that the other end acknowledges packets that are sent, and so on.

TCP/IP

The transmission Control Protocol (TCP) and the Internet Protocol (IP) are the standard network protocols. They are almost always implemented and used together and called TCP/IP. TCP/IP can be used to communicate across any set of interconnected networks.

UDP (User Datagram Protocol)

UDP provides a much simpler service to the application layer. It just sends packets of data from one host to the other. But there is no guarantee that the packets will reach the destination host.

7. Appendix B: FAQ

How to connect with Allen-Bradley PLC?

1. Open RSLogix 5000 and create a new project.

Figure7-1. Create a new project.

2. Select the PLC type and give the project a name.

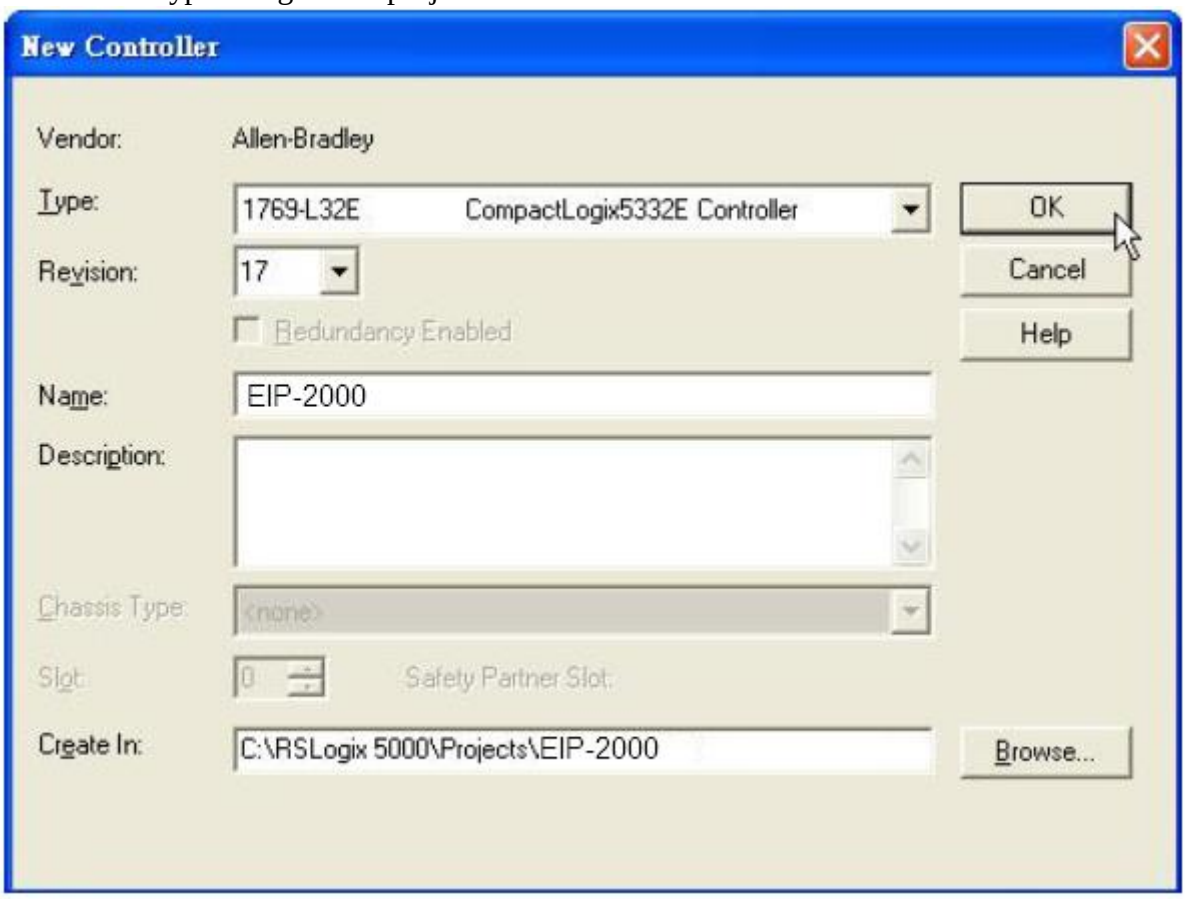


Figure7-2. Set the PLC type and project name.

3. Create a new module in the “Ethernet” item.

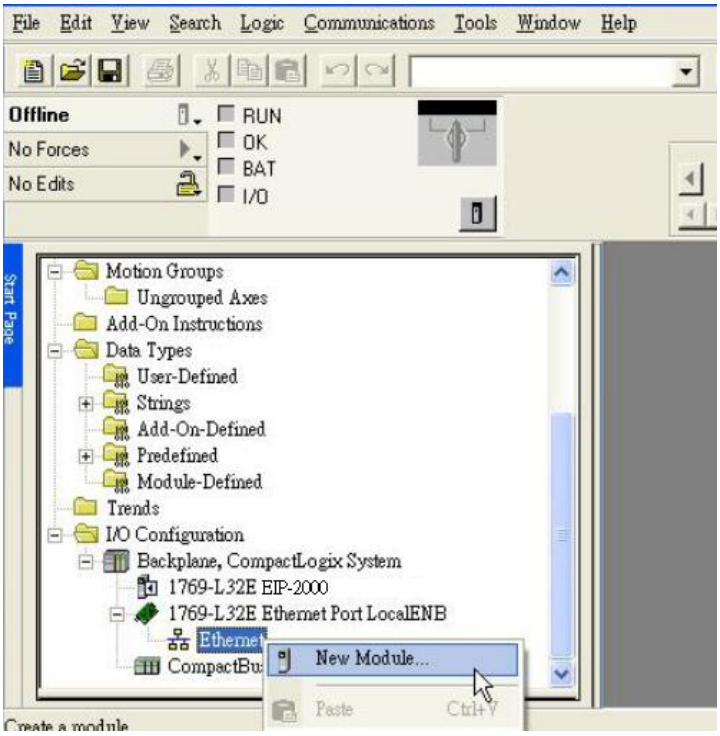


Figure 7-3. Create a new module.

4. Select the “ETHERNET-MODULE” below “Communications” in the Select Module window.

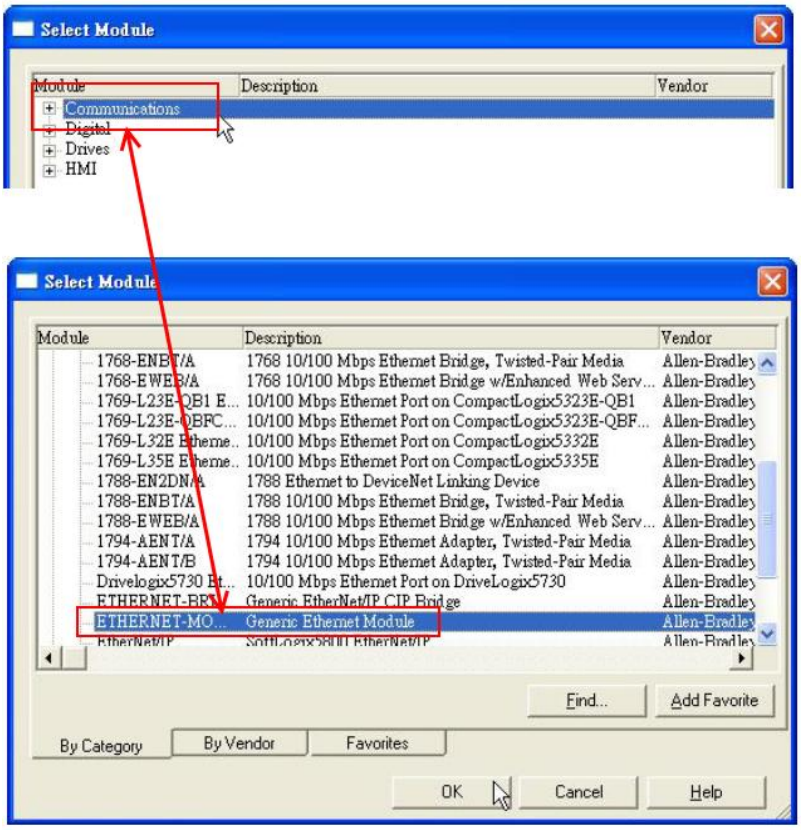


Figure7-4. Select “ETHERNET-MODULE”.

5. Configure the new module parameters. The I/O length of new module must be the same with the length of EIP-2000 I/O data. The data assembly please refer to Table 7-1 and the instance ID please refer to Table 7-2.

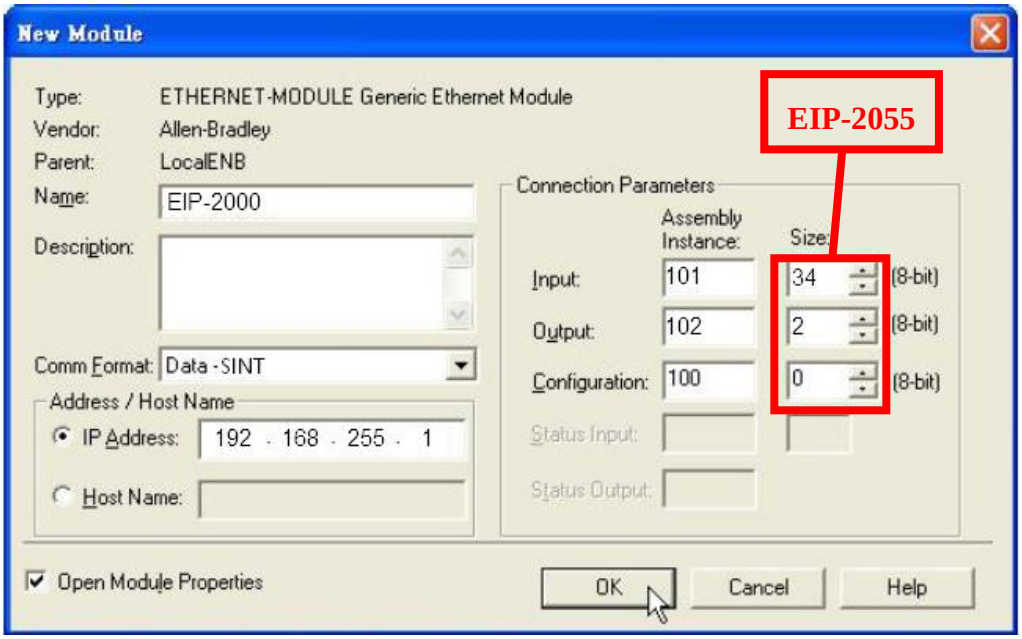


Figure7-5. The settings of EIP-2055

Table 7-1. Data Assembly of EIP-2000

Module	Data Assembly	Byte count	Description
EIP-2055	**Input Assembly**	34	1st Byte: DI status
			2nd Byte: DO status read back
			3rd~34th Byte: DI counters
	Output Assembly	2	1st Byte: DO status
			2nd Byte: to set DI counters zero
EIP-2060	**Input Assembly**	26	1st Byte: DI status
			2nd Byte: DO status read back
			3rd~26th Byte: DI counters
	Output Assembly	2	1st Byte: DO status
			2nd Byte: to set DI counters zero
EIP-2042	**Input Assembly**	2	1st Byte: DO status read back (DO0~DO7).
			2nd Byte: DO status read back (DO8~DO15).
	Output Assembly	2	1st Byte: DO status (DO0~DO7).
			2nd Byte: DO status (DO8~DO15).
EIP-2051	**Input Assembly**	66	1st Byte: DI status(DI0~DI7).
			2nd Byte: DI status(DI8~DI15).

			3rd~65th Byte: DI counters.
	Output Assembly	2	1st Byte: to set DI counters zero (DI0~DI7).
			2nd Byte: to set DI counters zero (DI8~DI15).
EIP-2017	**Input Assembly**	53	1st ~ 16th Byte: AI status(AI0~AI7) for DIFF. or S.E. mode.
			17th ~ 32nd Byte: AI status(AI8~AI15) for S.E. mode only.
			33rd~40th Byte:AI Type Code(AI0~AI7) for DIFF. or S.E. mode.
			41st~48th Byte: AI Type Code(AI0~AI7) for S.E. mode only.
			49th Byte: AI filters status.
			50th Byte:Channel mode status.
			51st Byte:AI representation.
			52nd Byte: Channel selection(AI0~AI7).
			53rd Byte: Channel selection (AI8~AI15).
	Output Assembly	22	1st Byte: Set value to the module.
			2nd ~ 17th Byte: Set type code to AI0~AI15.
			18th Byte: Filter selection of AI
			19th Byte: Channel mode selection DIFF. or S.E.
			20th Byte: AI representation
			21st Byte: AI channel selection (AI0 ~ AI7)
			22nd Byte: AI channel selection (AI8 ~ AI15)
EIP-2019	**Input Assembly**	41	1st ~ 16th Byte: AI status(AI0~AI7).
			17th ~ 18th Byte: The broken wire status.
			19th ~ 20th Byte: CJC status.
			21st ~ 28th Byte: AI type code(AI0~AI7).
			29th Byte: AI filter status.
			30th Byte: AI representation.
			31st Byte: Wire break detector.
			32nd Byte: CJC switch.
			33rd Byte: CJC increment.
			34th ~ 41st Byte: CJC offset(AI0~AI7).
	Output Assembly	23	1st Byte: Set value to the module.
			2nd ~ 7th Byte: Set type code to Ch0~Ch7.
			8th Byte: Filter selection of AI
			9th Byte: Wire break detector

			10th Byte: AI representation
			11st Byte: Select AI channel to be short
			12nd Byte: CJC switch
			13rd Byte: CJC increment
			14th ~ 21st Byte:CJC Offset

Table 7-2. Instance ID table of EIP-2000

Implicit Message Information of EIP-2000		
Instance	**Instance ID**	**Data length**
Input(T->O)	65_{hex}(101)	Depends on modules. e.g.34(EIP-2055)
Out(O->T)	66_{hex}(102)	Depends on modules. e.g.2(EIP-2055)
Configuration	64_{hex}(100)	

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