

User Manual



APAX-5072

Software Manual

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Notes on the Manual

This is the Software Manual for the Advantech APAX-5570 product. This manual will help guide the end user through implementation and use of the software portion of this product.

What is covered in this manual:

This manual will give a general overview of the Windows XP Embedded operating system, most of the applications that are included with Windows XP Embedded as well as the applications added and/or created by Advantech Corporation in the Windows XP Embedded image. This manual will also cover installation and use of development and utility software that is needed. It will also reference optional software that can be used by the end user with the Windows XP Embedded Operating system.

What is not covered in this manual:

This manual will reference the hardware but does not contain hardware setup information, wiring information, electrical specifications or any detailed hardware information. Please refer to the hardware manual for this information.

Edition 1
June 2010

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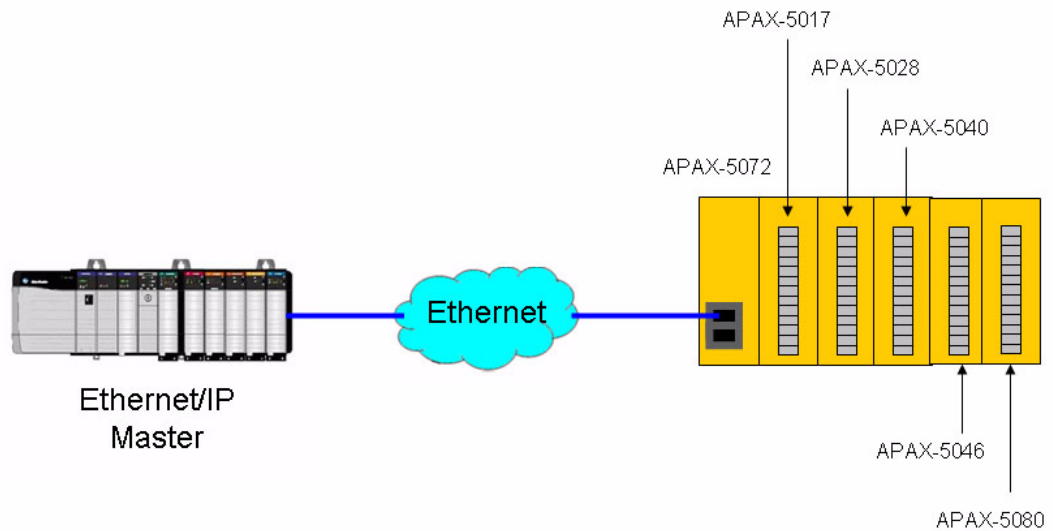
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Chapter 1

Quick Start

1.1 Hardware System Diagram

APAX-5072 coupler with APAX-5000 I/O modules will be controlled by a Ethernet/IP master. Here, we use Allen-Bradley CompactLogix PLC as example. The complete system includes APAX series, CompactLogix PLC and a PC used to configure the setting of CompactLogix PLC. The system hardware architecture can be shown as figure below.



- Note!**
1. Do not use hub between the Ethernet/IP master and APAX-5072. Only Ethernet switch is acceptable.
 2. The quality of the network will influence the Ethernet/IP communication performance, so make the network as simple as possible.

1.2 Installing the ADAM/APAX .NET utility

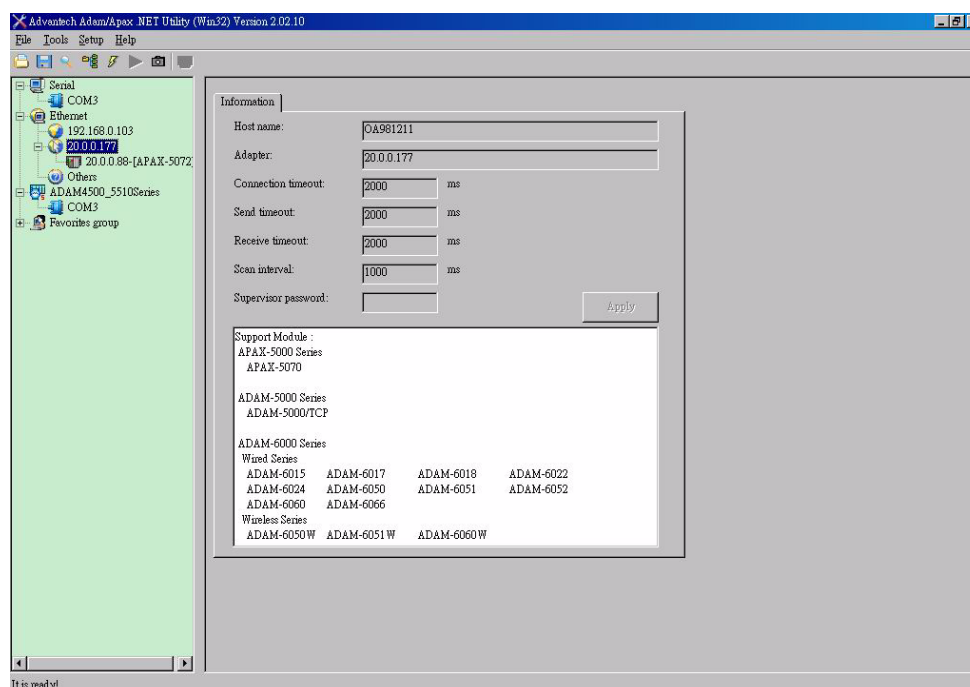
Advantech provides the ADAM/APAX .NET utility which allows developers and end users to see APAX-5072 and connected I/O modules, perform configurations, and simple testing of the I/O. This software can be helpful when checking wiring inputs prior to installing the runtime project. It is also able to detect and test other Advantech supported hardware for this product such as Ethernet or Serial I/O. (ADAM-4000, ADAM-5000 and ADAM-6000 series). Therefore, you need to install ADAM/APAX .NET utility first to configure APAX-5072 and related APAX-5000 I/O modules. After that, you can use other software package which supports Ethernet/IP protocol (such as Allen-Bradley RSLogix) to perform write or read action to APAX-5072.

The installation file is contained in the CD. When you launch the CD, select the APAX Software button and click the ADAM/APAX .NET Utility button to find the installation file. Besides, you always can link to the web site <http://www.advantech.com> and click into the Download area under the Support site to get the latest version of the ADAM/APAX .NET utility.

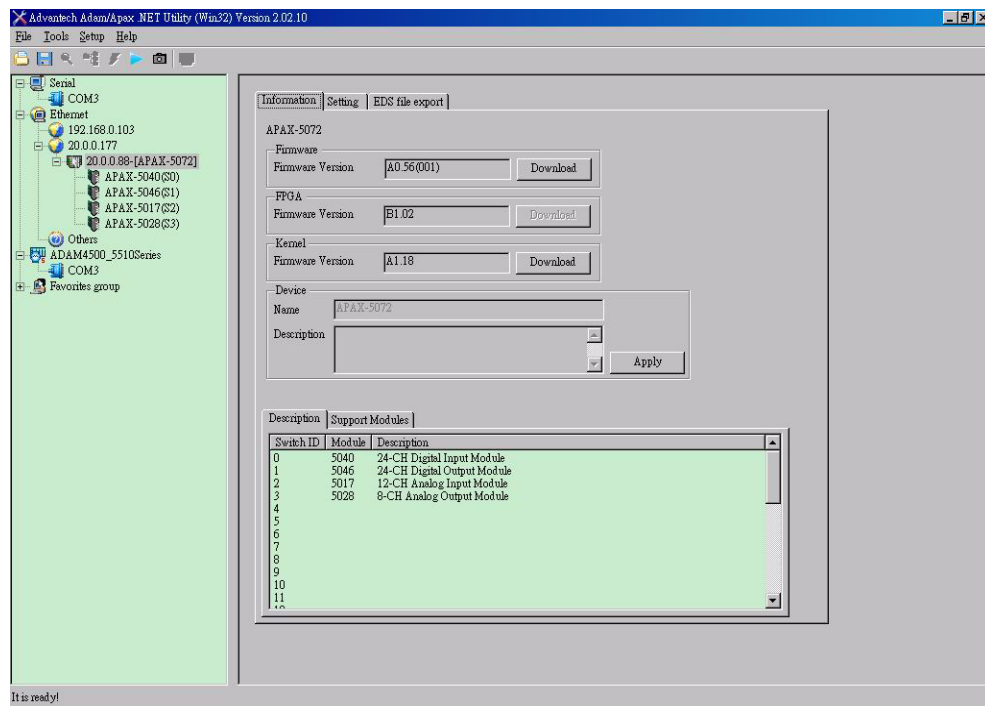
1.3 Configuring APAX-5072 with ADAM/APAX .NET

Launch ADAM/APAX .NET utility by selecting **Start >> All Programs >> Advantech Automation >> AdamApax .NET Utility >> AdamApax .NET Utility**. On the left side of the utility window, you can see several items showing IP address under the **Ethernet** item. (These items represent the Ethernet port on your computer). Click on the item showing the IP address which stands for the specific port used to connect with APAX-5072 module, and then click the icon **Search Modules** on the toolbar. (Or you can right click the item and select **Search** option.) Then you should be able to see APAX-5072 item showing under the IP address item, as shown below.

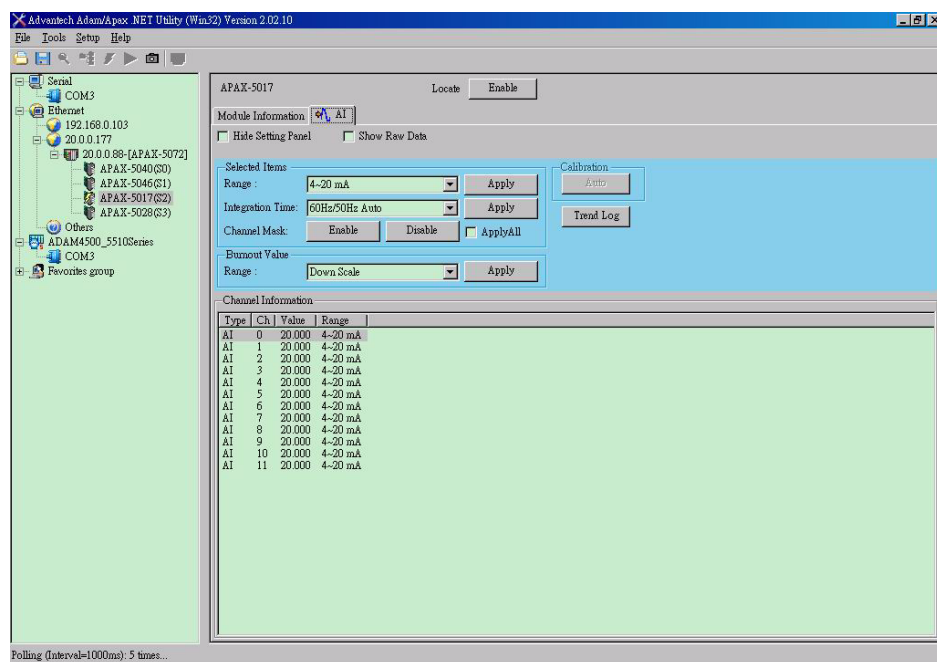
Note! Before you start search the APAX-5072 module in utility, remember to change that APAX-5072 module's mode to Utility mode. Refer to APAX-5072 Hardware Manual for how to configure APAX-5072 mode.



Click the item showing the APAX-5072 (with APAX-5072 IP address). Type the correct password on the pop-up window. All the connected APAX-5000 I/O modules will show under the APAX-5072 item. (In this example, they are APAX-5017, APAX-5028 and APAX-5040 and APAX-5046)

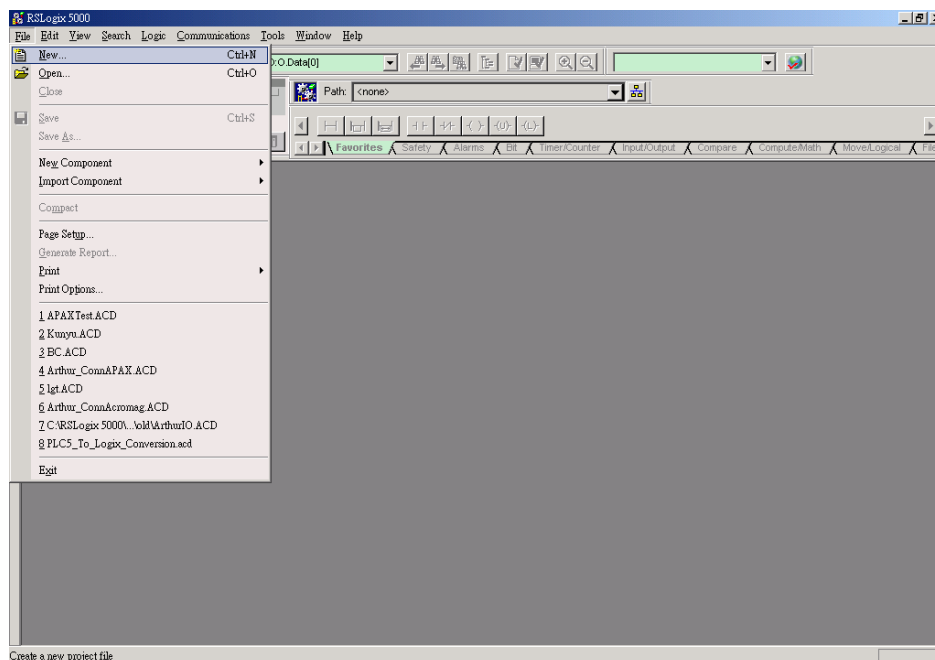


On the right window, you can perform all related configurations toward APAX-5072 through the three tabs: **Information**, **Setting** and **EDS file export**. Refer to the figure below. You can upgrade related firmware to selected APAX-5072 coupler on the **Information** tab. Click the I/O modules items under the APAX-5072 item, then you can configure or read/write specific I/O modules. Take the figure below as example, you can read the AI channel value or perform related setting after you click the APAX-5017 item. Refer to Appendix A for more detail for these configurations.

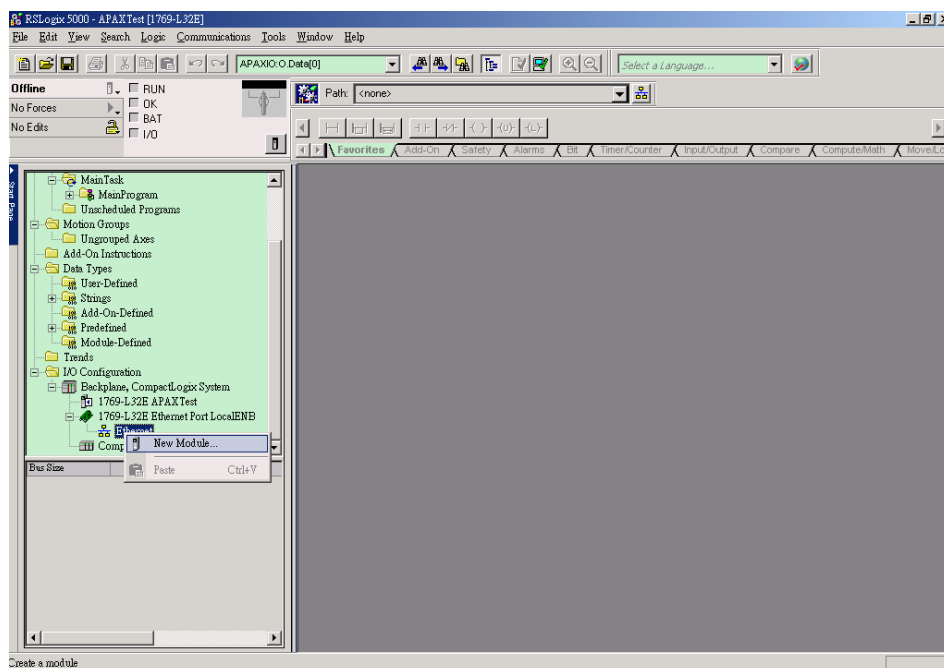


1.4 Configure & Access Data in EtherNet/IP Master

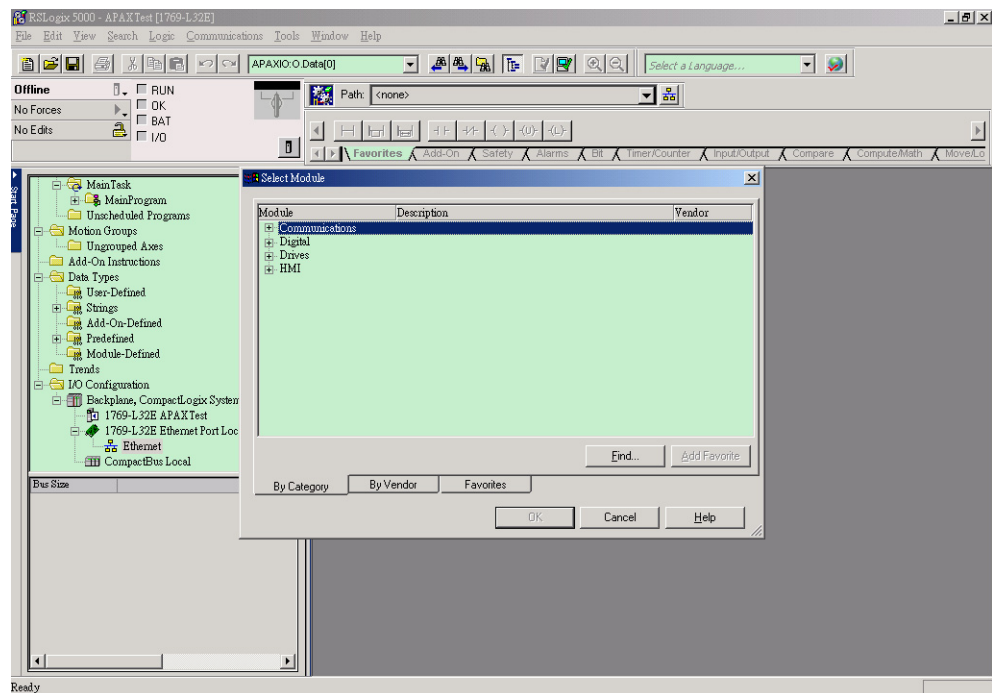
Here, we use an Allen-Bradley CompactLogix 1769-L32E PLC to connect with APAX-5072 and related APAX-5000 I/O modules. So we need to use Allen-Bradley RxLogix software to configure the connection between CompactLogix PLC and APAX-5072. First, Select the **New** item on the **File** menu to create a new RxLogix project after you launch the RxLogix software, as shown by figure below.



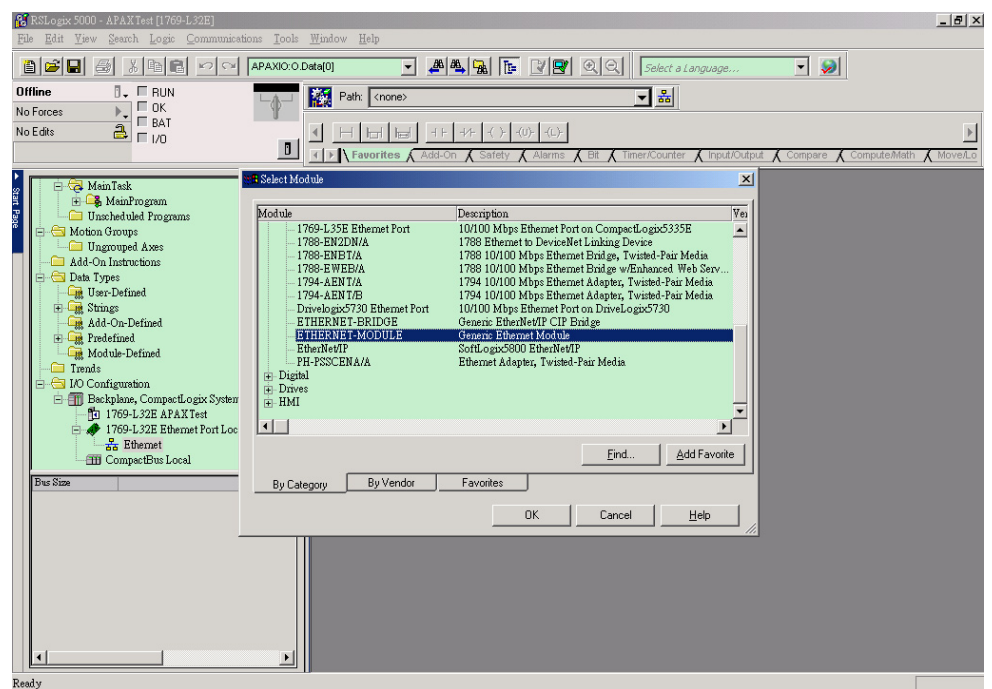
We want to add APAX-5072 connection into this new RxLogix project. So, right click the **Ethernet** item on the left tree window under **I/O configuration>>1769-L32E EthernetPortLocalENB** and select **New Module** to create a new connection. (The path may be changed depending on the AB PLC you used)



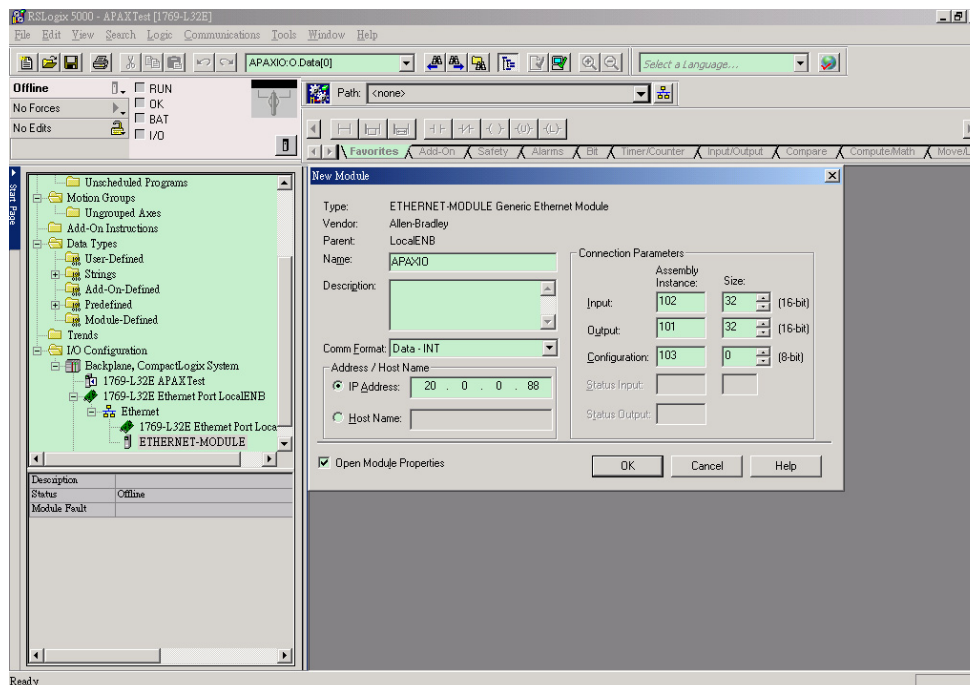
Then a pop-up window appears. Click the **Communication** check box on the **by Category** tab.



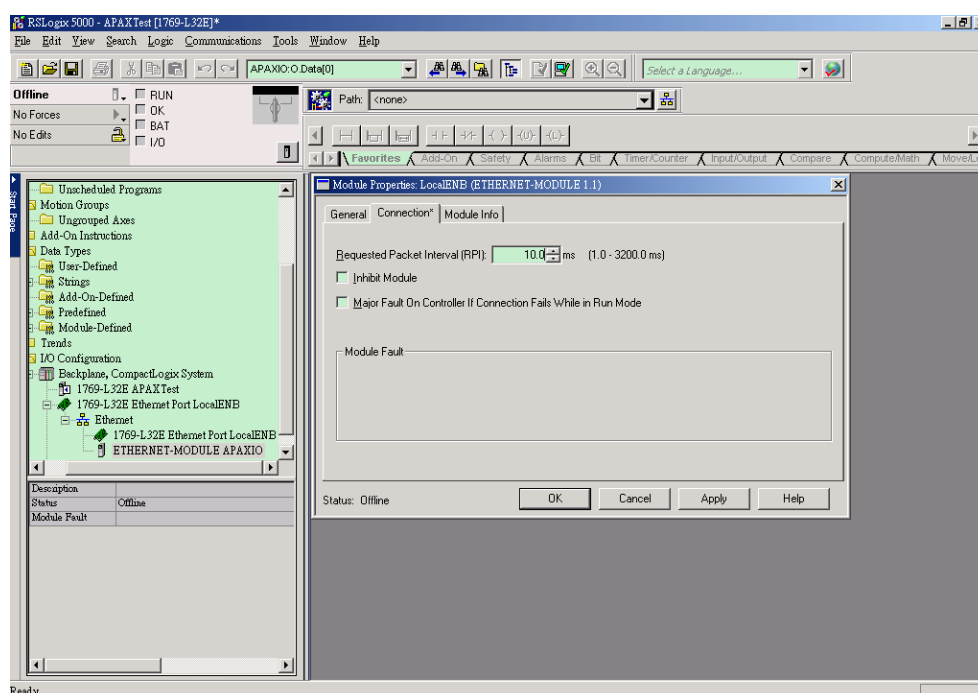
Select the **ETHERNET-MODULE** item and click the **OK** button.



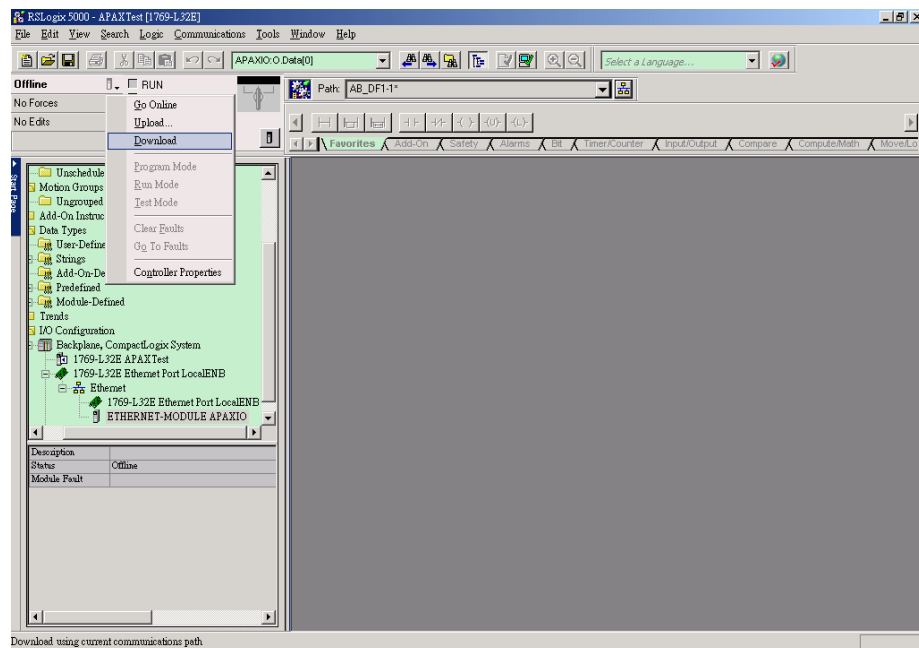
Then you can configure the connection name by type into the **Name** text box. And configure IP address of APAX-5072 by the **IP Address**. Then type the correct Connection parameters including **Input Assembly Interface**, **Input Size**, **Output Assembly Interface**, **Output Size**, **Configuration Assembly Interface**, and **Configuration Size**. Refer to Appendix B for how to configure it. Click **OK** button when you have done the configuration.



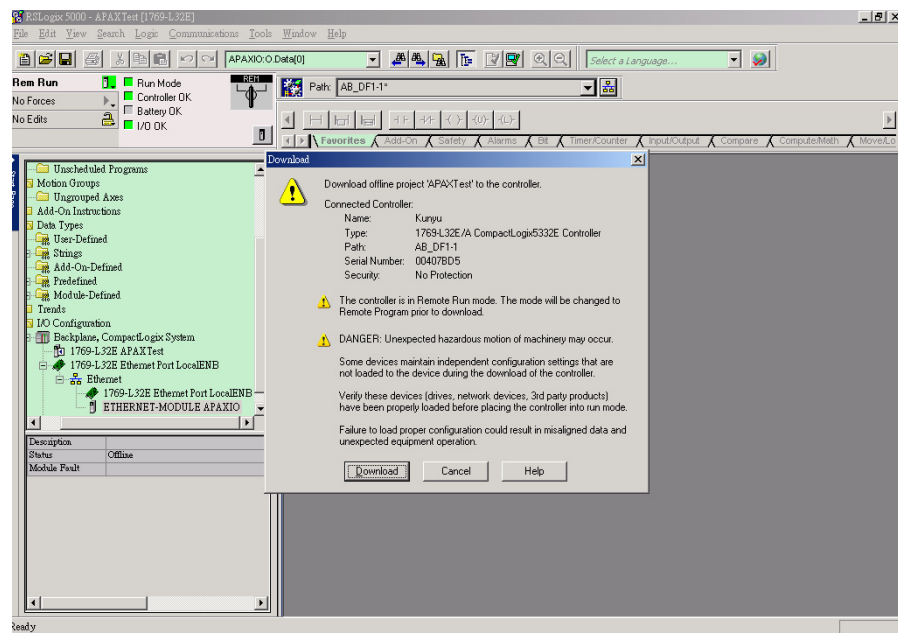
Enter the desired polling time between AB PLC with APAX-5072 module in the **Request Packet Interval (RPI)** combo box as shown by figure below. Click the **OK** button when you have done the configuration.



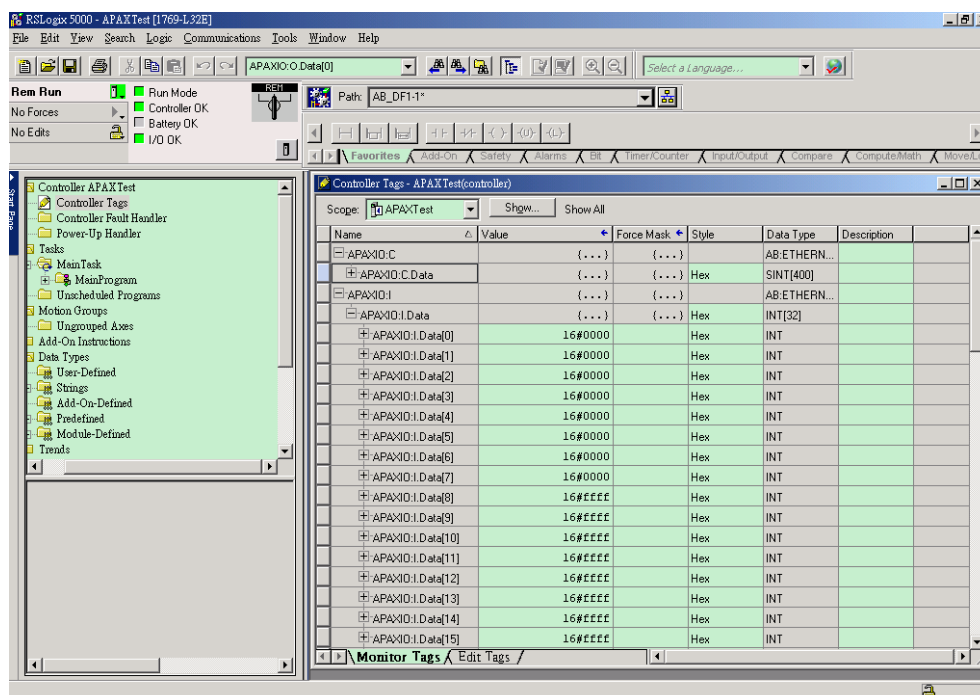
After you have completed these settings, select the **Download** item to download these setting to the connected Allen-Bradley CompactLogix 1769-L32E PLC.



Click the **Download** button.



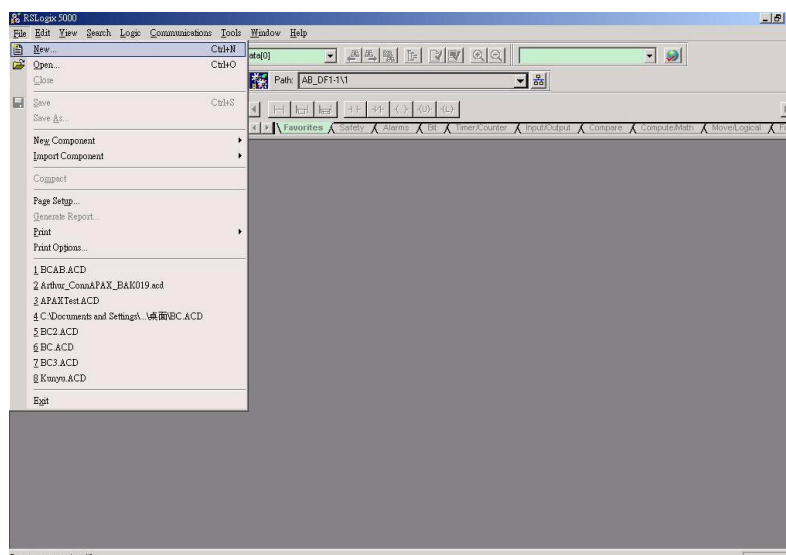
Click the **Yes** button when a pop-up window shows "Done downloading. Change controller mode back to Remote Run?" Then you should be able to see APAX-5000 input modules' data and perform write action to APAX-5000 output modules. Refer to Appendix B for APAX-5000 I/O modules' data mapping.



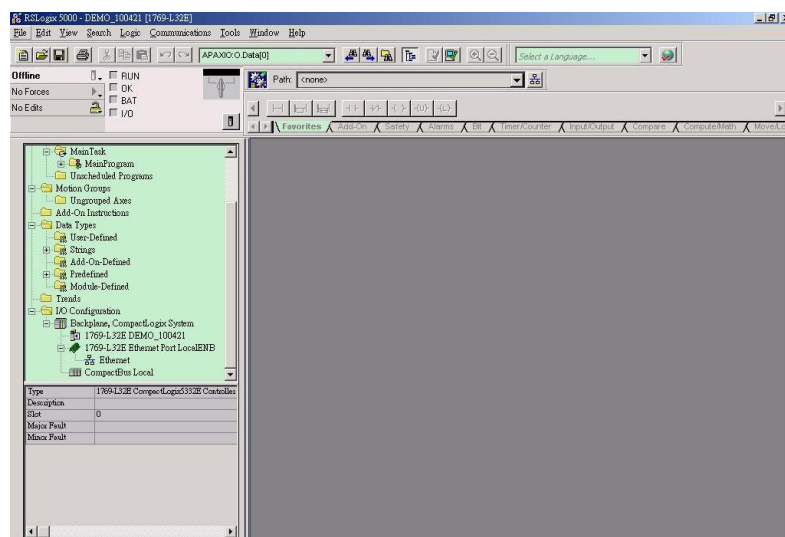
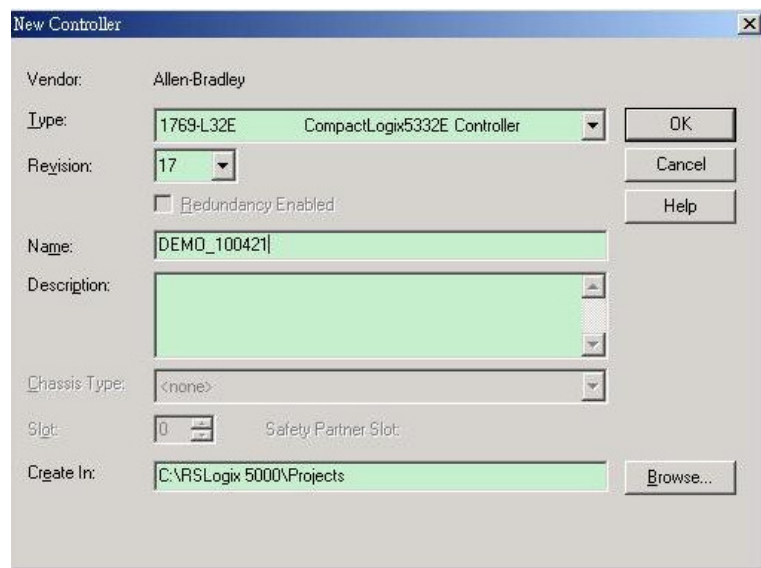
1.5 Using L5K File to Access APAX I/O

In previous section, you have learned how to manually define the Ethernet/IP address in Allen-Bradley RxLogix software, and then you can access APAX-5000 I/O modules' data. Actually, there is an easier way to do the address mapping configuration. Advantech offered APAX/ADAM utility can export current APAX-5000 I/O modules configuration as L5K file that Allen-Bradley RxLogix software can import it. So you don't need to do the address mapping by yourself. Below is the procedure.

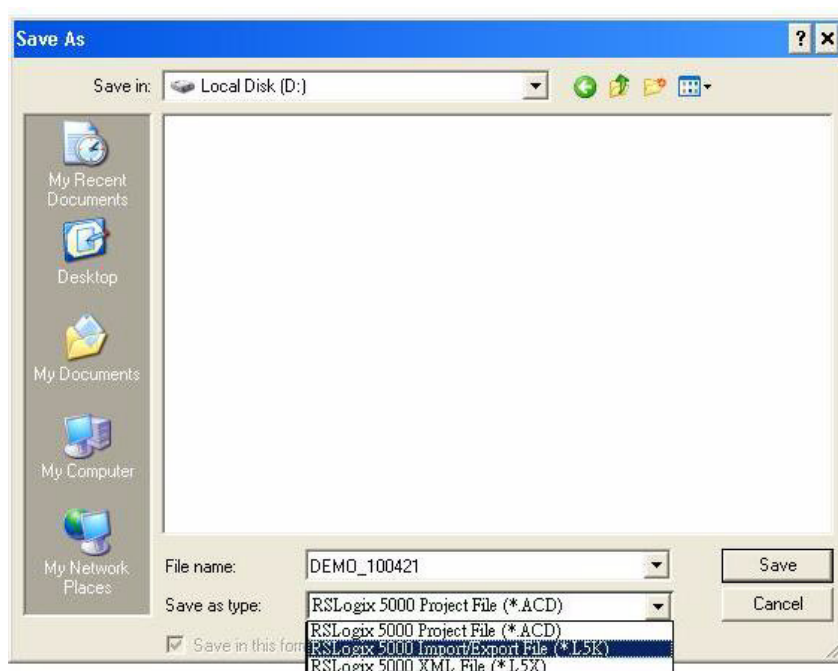
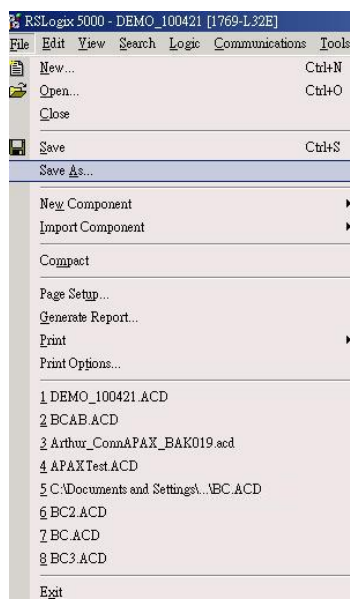
First, Select the **New** item on the **File** menu to create a new RxLogix project after you launch the RxLogix software, as shown by figure below.



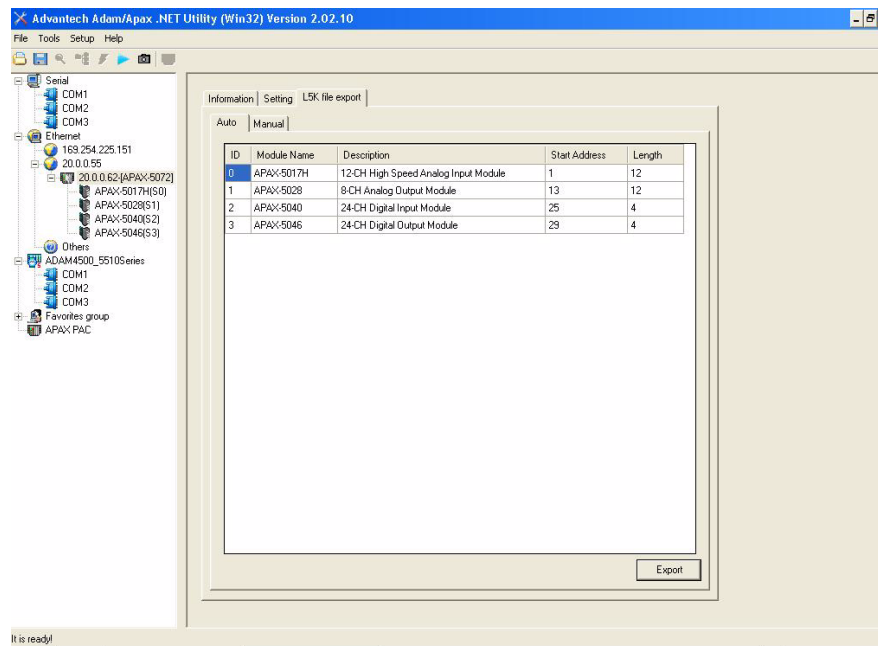
Select the suitable Allen-Bradley controller (In this example, it is 1769-L32E) in the Type combo box. Name the controller by typing into the **Name** text box (In this example, it is DEMO_100421) and click the **OK** button.



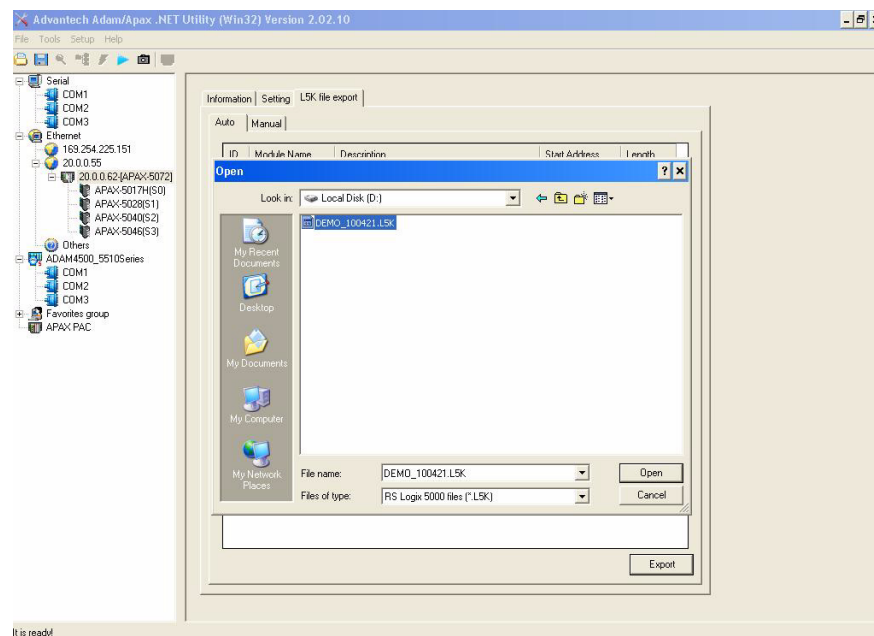
Now, we want to save current project into one .L5K format file. Select the **Save as** item on the **File** menu as figure below, and save the L5K in specific location in your computer. (In this example, the file is saved as "DEMO_100421.L5K" file.) Remember to choose RSLogix 5000 Import/Export File (*.L5K) in the **Save as type** combo box.



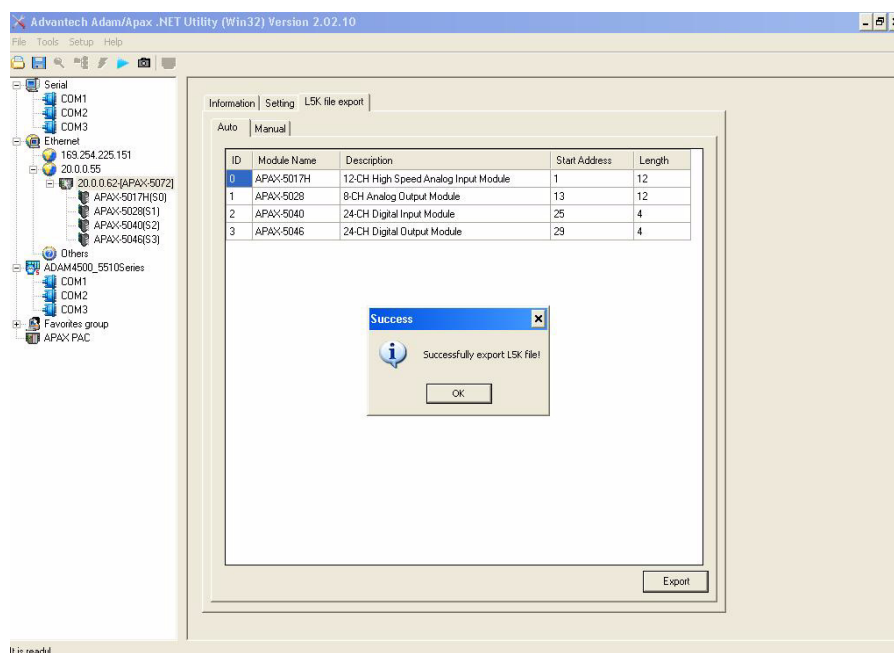
Launch ADAM/APAX .NET utility by selecting **Start >> All Programs >> Advantech Automation >> AdamApax .NET Utility >> AdamApax .NET Utility**. On the left side of the utility window, you can see several items showing IP address under the Ethernet item. (These items represent the Ethernet port on your computer). Click on the item showing the IP address which stands for the specific port used to connect with APAX-5072 module, and then click the icon **Search Modules** on the toolbar. (Or you can right click the item and select **Search** option.) Then you should be able to see APAX-5072 item and connected APAX-5000 I/o modules showing under the IP address item, and select the **L5K tab** on the right side of the utility window as shown below.



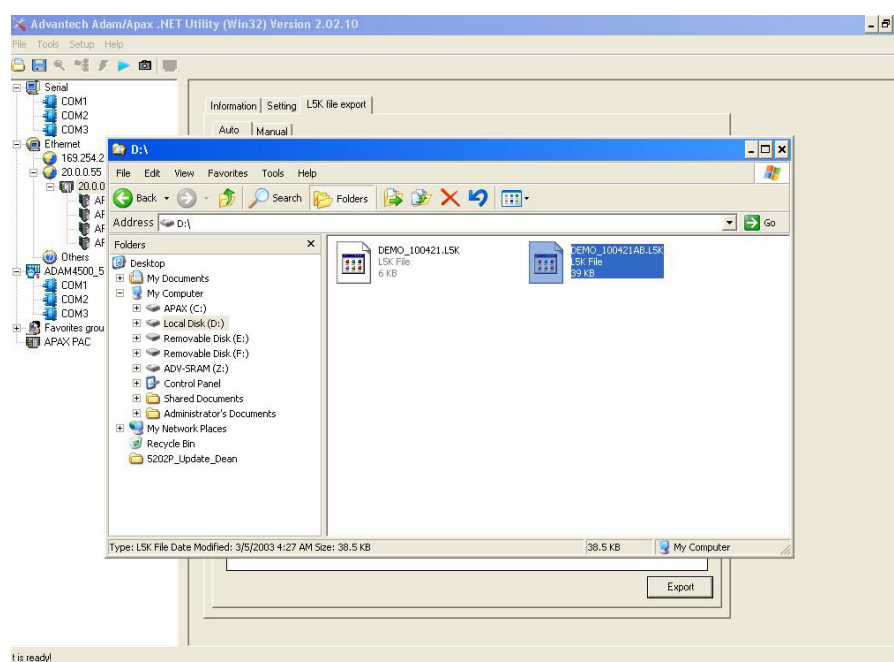
Click the **Export** button at the right-down corner to generate a new L5K file which can represent current APAX-5000 I/O configurations. A pop-up window as figure below will appear. Open the previous L5K file (In this example, it's DEMO_100421.L5K) you have generated from RxLogix software file and APAX/ADAM Utility will generate a new L5K file based on it within the APAX-5000 I/O modules' configuration. Select the previous generated file (In this example, it's DEMO_100421.L5K) in the dialog and click the **Open** button.



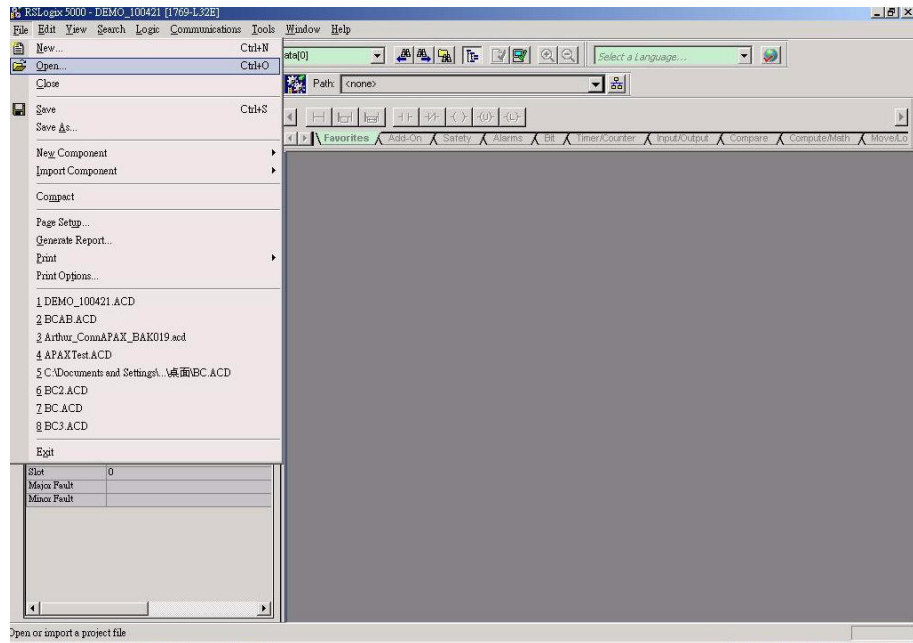
A pop-up message will appear showing the new L5K file export has been done successfully. Click the **Ok** button to finish it.



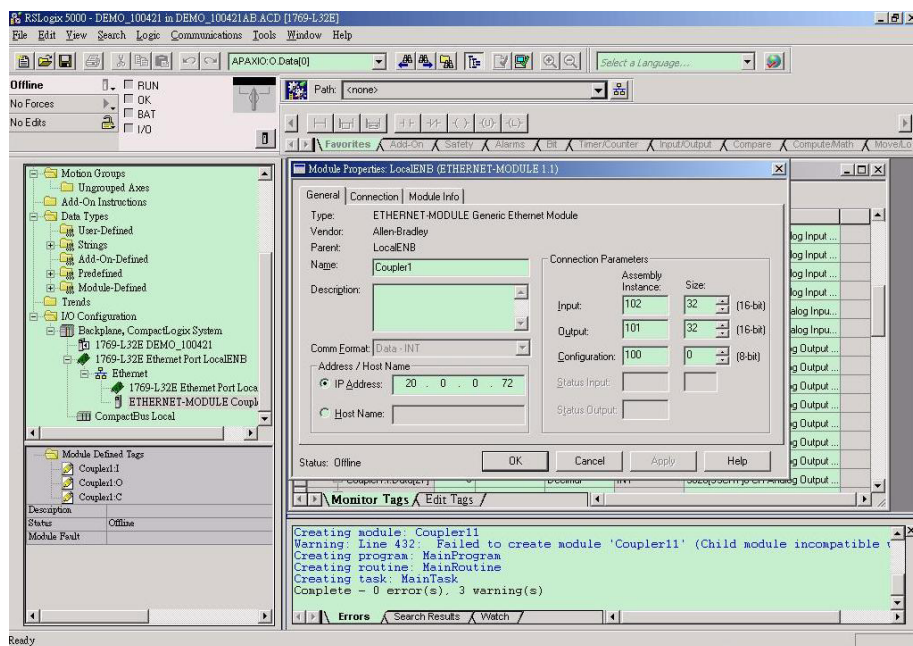
You can browse the new generated L5K file. In this example, it is DEMO_100421AB.L5K.

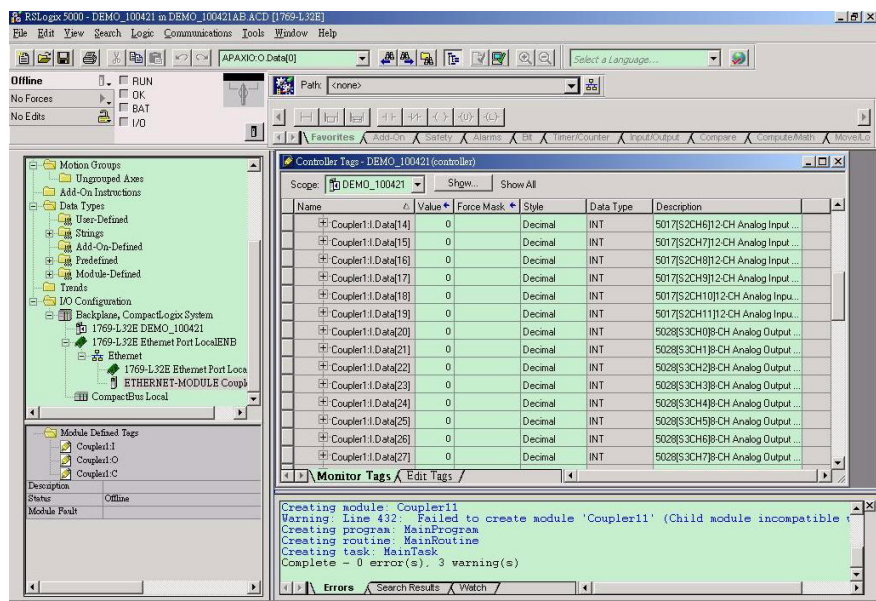


Since the new L5K file is available, launch Allen-Bradley RxLogix software again. Select the **Open** item on the **File** menu.



Select the new generated L5K file (In this example, it's DEMO_100421AB.L5K), and click **Open** button. Another pop-up window will appear. Save a new .ACD file by typing your desired file name and click the Import button. Then all related configurations have been done. You can see it by the **Module Properties** and **Controller tag** window as shown by figures below:





Chapter 2

Analog I/O Board Settings

2.1 Analog I/O Board Settings

Range Settings for Analog I/O Boards. These ranges are provided for reference. Not all boards support all ranges. Please see hardware manual for valid ranges for a particular board.

	Setting Type	Value (Hex)
Millivolts DC (mV)	+/- 15mV	0x0100
	+/- 50mV	0x0101
	+/- 100mV	0x0102
	+/- 150mV	0x0103
	+/- 500mV	0x0104
	0~150mV	0x0105
	0~500mV	0x0106
Volts DC (V)	+/- 1V	0x0140
	+/- 2.5V	0x0141
	+/- 5V	0x0142
	+/- 10V	0x0143
	+/- 15V	0x0144
	0~1V	0x0145
	0~2.5V	0x0146
	0~5V	0x0147
	0~10V	0x0148
	0~15V	0x0149
Milliamps (mA)	4~20mA	0x0180
	+/-20mA	0x0181
	0~20mA	0x0182
Counter settings	Pulse/DIR	0x01C0
	Up/Down	0x01C1
	Up	0x01C2
	Frequency	0x01C3
	AB 1X	0x01C4
	AB 2X	0x01C5
	AB 4X	0x01C6
Pt-100 (3851)	Pt-100 (3851) -200~850 'C	0x0200
	Pt-100 (3851) -120~130 'C	0x0201
	Pt-100 (3851) -200~200 'C	0x0202
	Pt-100 (3851) -100~100 'C	0x0203
	Pt-100 (3851) -50~150 'C	0x0204
	Pt-100 (3851) 0~100 'C	0x0205
	Pt-100 (3851) 0~200 'C	0x0206
	Pt-100 (3851) 0~400 'C	0x0207
	Pt-100 (3851) 0~600 'C	0x0208
Pt-200 (3851)	Pt-200 (3851) -200~850 'C	0x0220
	Pt-200 (3851) -120~130 'C	0x0221
Pt-500 (3851)	Pt-500 (3851) -200~850 'C	0x0240
	Pt-500 (3851) -120~130 'C	0x0241

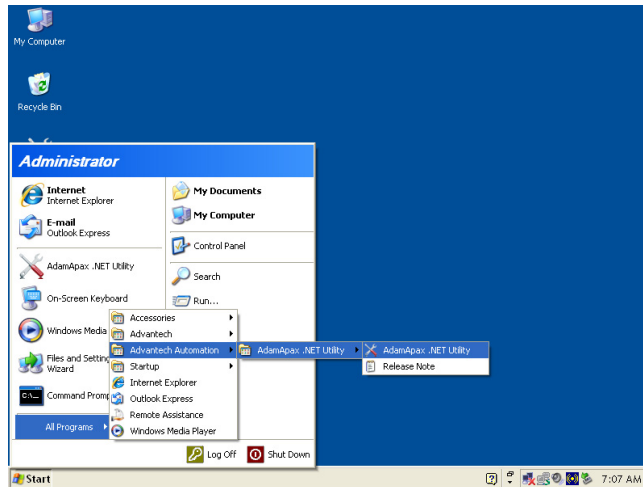
Pt-1000 (3851)	Pt-1000 (3851) -200~850 'C	0x0260
	Pt-1000 (3851) -120~130 'C	0x0261
	Pt-1000 (3851) -40~160 'C	0x0262
Pt-100 (3916)	Pt-100 (3916) -200~850 'C	0x0280
	Pt-100 (3916) -120~130 'C	0x0281
	Pt-100 (3916) -200~200 'C	0x0282
	Pt-100 (3916) -100~100 'C	0x0283
	Pt-100 (3916) -50~150 'C	0x0284
	Pt-100 (3916) 0~100 'C	0x0285
	Pt-100 (3916) 0~200 'C	0x0286
	Pt-100 (3916) 0~400 'C	0x0287
	Pt-100 (3916) 0~600 'C	0x0288
Pt-200 (3916)	Pt-200 (3916) -200~850 'C	0x02A0
	Pt-200 (3916) -120~130 'C	0x02A1
Pt-500 (3916)	Pt-500 (3916) -200~850 'C	0x02C0
	Pt-500 (3916) -120~130 'C	0x02C1
Pt-1000 (3916)	Pt-1000 (3916) -200~850 'C	0x02E0
	Pt-1000 (3916) -120~130 'C	0x02E1
	Pt-1000 (3916) -40~160 'C	0x02E2
Balco 500	Balcon(500) -30~120	0x0300
Ni 518	Ni(518) -80~100 'C	0x0320
	Ni(518) 0~100 'C	0x0321
Ni 508	Ni(508) 0~100 'C	0x0340
	Ni(508) -50~200 'C	0x0341
Thermistor 3K	Thermistor 3K 0~100 'C	0x0360
Thermistor 10K	Thermistor 10K 0~100 'C	0x0380
	Thermistor 10K -50~100 'C	0x0381
T/C TypeJ	T/C TypeJ 0~760 'C	0x0400
	T/C TypeJ -200~1200 'C	0x0401
T/C TypeK	T/C TypeK 0~1370 'C	0x0420
	T/C TypeK -270~1372 'C	0x0421
T/C TypeT	T/C TypeT -100~400 'C	0x0440
	T/C TypeT -270~400 'C	0x0441
T/C TypeE	T/C TypeE 0~1000 'C	0x0460
	T/C TypeE -270~1000 'C	0x0461
T/C TypeR	T/C TypeR 500~1750 'C	0x0480
	T/C TypeR 0~1768	0x0481
T/C TypeS	T/C TypeS 500~1750 'C	0x04A0
	T/C TypeS 0~1768 'C	0x04A1
T/C TypeB	T/C TypeB 500~1800 'C	0x04C0
	T/C TypeB 300~1820 'C	0x04C1

Appendix **A**

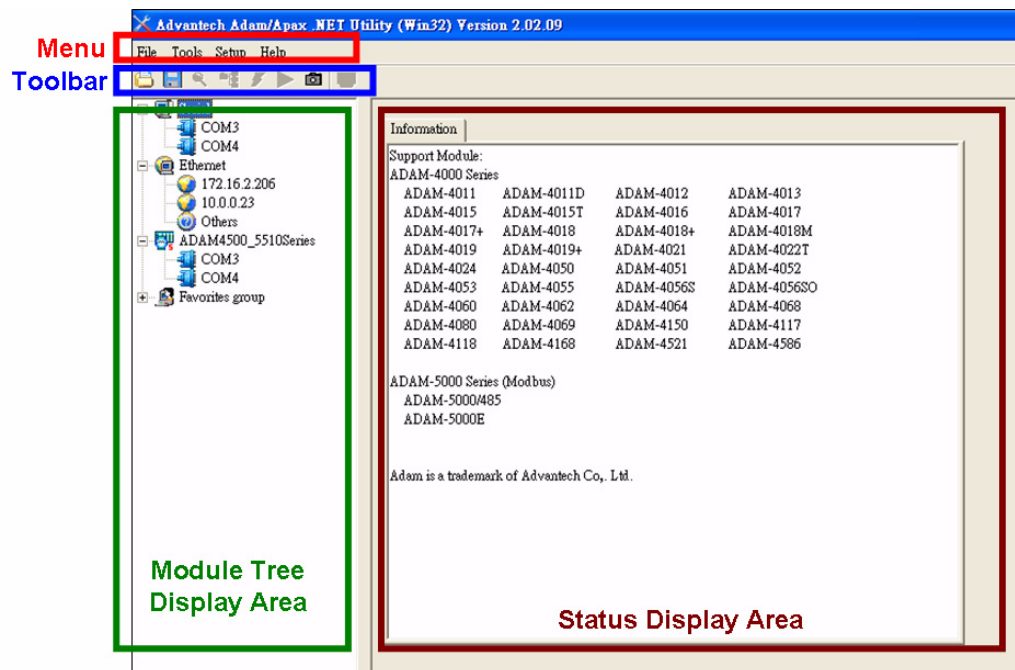
ADAM/APAX .NET
Utility Operation

A.1 ADAM/APAX .NET Utility General Window

After you install the ADAM/APAX .NET utility, you can launch it by selecting **Start >> All Programs >> Advantech Automation >> AdamApax .NET Utility >> AdamApax .NET Utility**. Refer to Section 1.2 for installation information.



After you launch the utility, you should see the operation window as figure below. Except APAX-5000 I/O modules, other devices such as ADAM-4000, ADAM-5000 and ADAM-6000 modules can also be searched and configured in this utility.



The operation window consists of four areas --- the **Menu**, the **Toolbar**, the **Module Tree Display Area** and the **Status Display Area**.

A.1.1 Menu

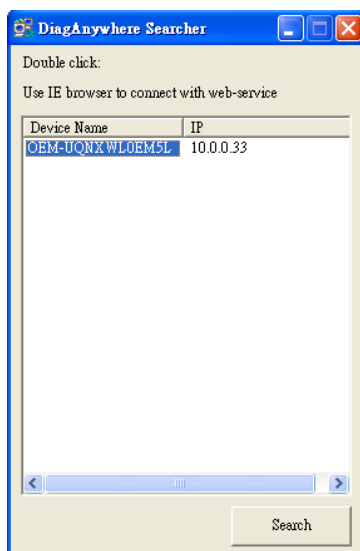
The menu at the top of the operation window contains:

■ The **File** menu

1. **Open Favorite Group** - You can configure your favorite group and save the configuration into one file. Using this option, you can load your configuration file for favorite group.
2. **Save Favorite Group** - You can configure your favorite group and save the configuration into one file. Using this option, you can save your favorite group into one configuration file.
3. **Auto-Initial Group** - If you want to have the same favorite group configuration when you exit ADAM/APAX .NET utility and launch it again, you need to check this option.
4. **Exit** - Exit ADAM/APAX .NET Utility.

■ The **Tools** menu

1. **Search** - Search if there are any remote I/O modules connected. For I/O modules communicated by serial (such as ADAM-4000 modules), click the **COM1** item (COM 2 is an internal COM port) under **Serial** item in the **Module Tree Display Area** first before you click this button. For I/O modules communicated by Ethernet (such as APAX-5072 with APAX-5000 I/O modules, ADAM-6000 modules), click the **Ethernet** item in the **Module Tree Display Area** first before you click this button.
2. **Add Devices to Group** - You can add any I/O modules to your favorite group by this option. You need to select the device you want to add in the **Module Tree Display Area** (it will be described below) first, and then select this option to add.
3. **Terminal for Command Testing** - ADAM modules support ASCII commands and Modbus as communication protocol. You can launch the terminal to communicate with remote module by these two kinds of protocols directly. Refer to ADAM-4000, ADAM-5000 and ADAM-6000 manual for ASCII and Modbus command.
4. **DiagAnywhere Searcher** - "DiagAnywhere" tool, an abbreviation of "Diagnostic Anywhere", is a networking solution for remotely monitoring and controlling other Windows based devices. It is very similar to a remote desktop application with some additional features. This option will show all devices with DiagAnywhere server in the same network. Click the **Search** button to start the search. The device with DiagAnywhere server will be listed, as shown by figure below.



5. **Print Screen** - You can acquire current utility window image and save it as an image file (*.bmp).
6. **Monitor Stream/Adam5000 Event Data** - This functionality is for ADAM/APAX module which supports Data Stream/Event function. If you enable Data Stream functions and configure this computer (where the utility is installed) as the host to receive data, then you can use this option to receive and view the data.
7. **Monitor Peer-to-Peer (Event Trigger)** - ADAM-6000 modules support Peer-to-Peer function. You can use this option to see data transferred from connected ADAM-6000 module which is enabled Peer-to-Peer function. Refer to ADAM-6000 manual for more detail.
8. **Monitor GCL IO Data Message** - ADAM-6000 modules support GCL function. You can use this option to see data transferred from connected ADAM-6000 module which is enabled GCL function. Refer to ADAM-6000 manual for more detail.

■ The **Setup** menu

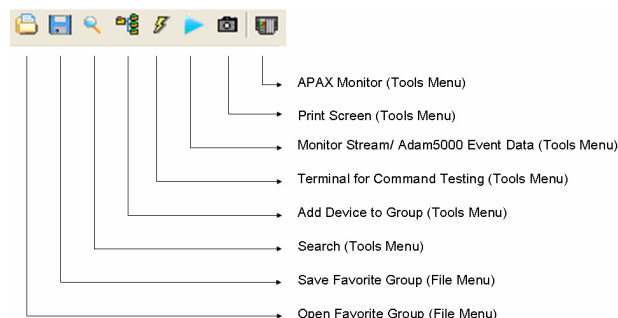
1. **Favorite Group** - You can configure your favorite group including add one new device (only for remote device), modify or delete one current device, sort current devices and diagnose connection to one device.
2. **Refresh COM and LAN node** - ADAM/APAX .NET utility will refresh the serial and LAN network connection situation.
3. **Add COM Port Tree Nodes** - This option is used to add serial COM ports in APAX/ADAM.NET Utility.
4. **ShowTreeView** - Check this option to display the **Module Tree Display** Area.
5. **Enable Calibration Function** - Check this option to let APAX-5000 analog module able to perform calibration procedure.

■ The **Help** menu

1. **Check Up-to-Date on the Web** - Choose this option, it will automatically connect to Advantech download website. You can download the latest utility there.
2. **About ADAM/APAX .NET Utility** - Choose this option, you can see version of ADAM/APAX .NET Utility installed on your computer.

A.1.2 Toolbar

The eight buttons on toolbar represent the eight common used items from the **Menu**. Refer to figure below for the definition of each button:



A.1.3 Module Tree Display Area

ADAM/APAX .NET Utility is one complete software tool that all APAX and ADAM I/O module can be configure and operated in this utility. The **Module Tree Display** Area is on the left part of the utility operation window. There are four categories in the **Module Tree Display** Area:

■ Serial

All serial remote I/O Modules connected to the host computer will be listed in this category. You also can configure COM port parameter (such as baud rate, parity, stop bit) here.

■ Ethernet

All Ethernet remote I/O modules (including APAX-5072 modules) connected to the host computer will be listed in this category.

■ ADAM-4500/5510 Series

All ADAM-4500 and ADAM-5000 controllers connected to the host computer through serial interface in the same system, such as ADAM-5510 or ADAM-4501, will be listed in this category. Simply click this item all related modules will be displayed automatically.

■ Favorite Group

You can define which devices listed in **Serial** or **Ethernet** categories above into your personal favorite group. This will make you easier to find your interested modules. Click on the **ADAM device** item under **Favorite group** item, and select **Favorite >> New** in Setup menu to create a new group. After you create your own group, click on your group and select **Favorite >> New** in **Setup** menu to add any remote devices into your group. You can also select **Diagnose connection** to check the communication.

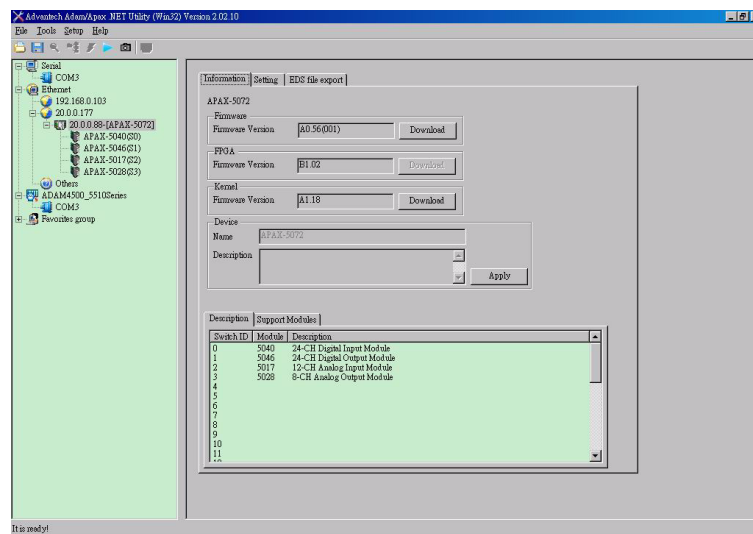
A.1.4 Status Display Area

Status Display Area, on the right part of utility operation window, is the main screen for operation. When you select different items in **Modules Tree Display** Area, **Status Display** Area will change dependently. You can do all configurations and tests on this area.

A.2 General Configuration

If you click the **APAX-5072** item in the **Module Tree Display Area**, the **Status Display Area** should look as figure below. There will be three configuration tabs shown on the Status Display Area: **Information**, **Setting**, and **EDS file export**.

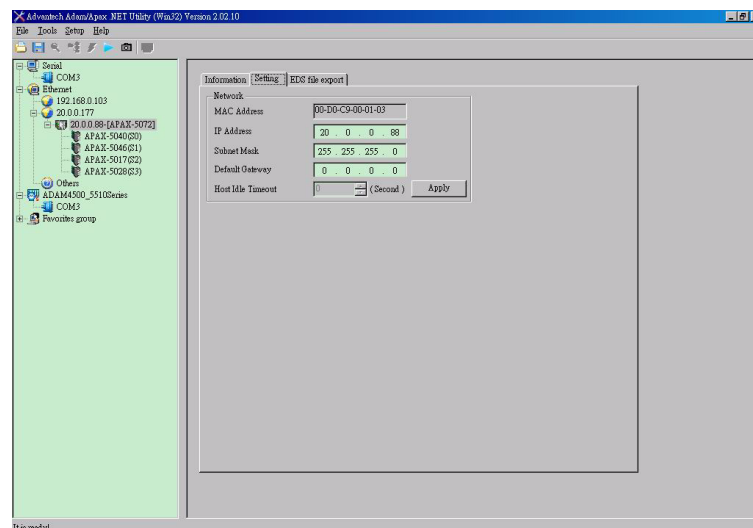
A.2.1 Information



Refer to figure above. You can download related firmware to selected APAX-5072 by clicking the **Download** button in the **Firmware** and **Kernel** area. You also can name the selected APAX-5072 module by the Name and Description text box in the Device area. All I/O modules connected with APAX-5072 module with its ID number are listed in the **Description** tab (the left tab). You can see all I/O modules supported by APAX-5072 by the **Support Modules** tab.

A.2.2 Setting

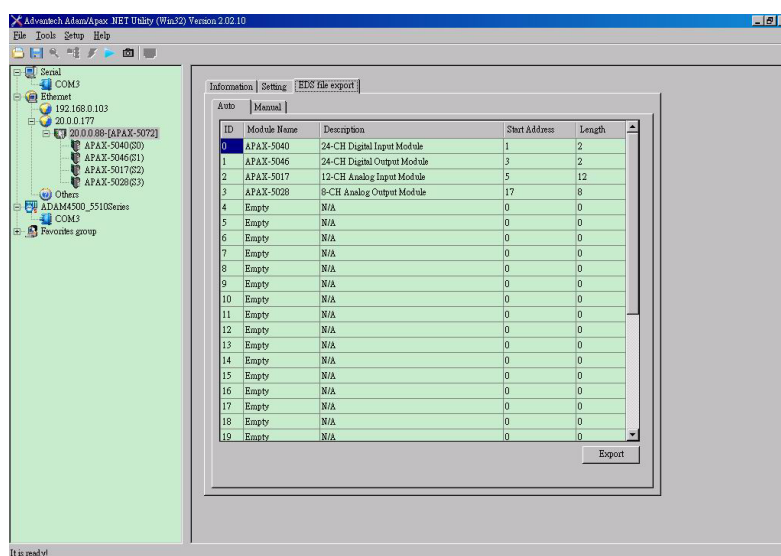
Here, you can change related networking setting, including IP address, Subnet Mask, Default Gateway, and Host Idle Timeout. After you have complete the setting, click the **Apply** button to apply the setting. Remember these parameters will be used when you configure the network setting on the Ethernet/IP master such as RxLogix used to configure Allen-Bradley CompactLogix PLC.



A.2.3 EDS File Export

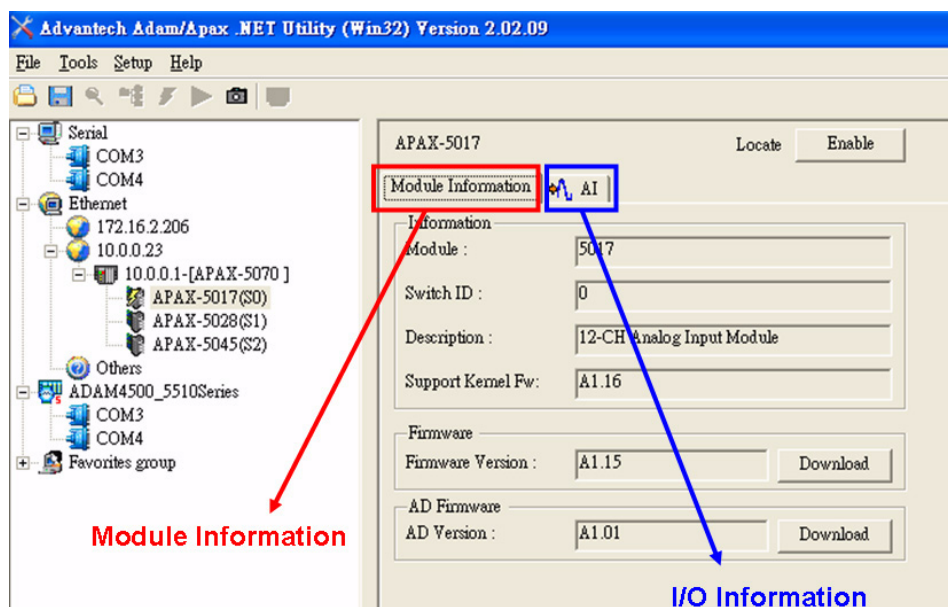
EDS file is used to save Ethernet/IP I/O modules' information, and you can leverage it for the data access. You can generate the EDS file on the **EDS file export** tab, by clicking the **Export** button to generate a L5K file based on current APAX-5000 I/O

configuration. Refer to figure below. Then you can import that EDS file in the Ethernet/IP master software (such as Allen-Bradley RxLogix).



A.3 I/O Module Configuration

When you click any I/O module in the **Module Tree Display Area**, the **Status Display Area** at the right side will automatically change to show the module's information. There will be two tabs displayed: **Module Information** and **I/O Information**. (Refer to the figure below)



On the **Module Information** tab, module information (such as module name, switch ID, module description, and firmware version) is displayed. You also can update related firmware to the specific module by the **Download** button.

On the **I/O Information** tab, you can write or read all channels' status and perform related configuration and calibration. Refer to sections below for more detail.

All APAX-5000 I/O modules support Locate function. Using this function, you can easily identify specific APAX modules through utility. Click the **Locate** button in the upper right corner of the **Status Display Area**, and the text on the button will become "Disable". Refer to figure below. It means you have enabled Locate function, and the power LED of that selected module will continuously flashing, letting you easily to identify. Click the **Locate** button again to disable the Locate function (the text on the button will become "Enable"), and that module's LED will stop flashing.

A.3.1 Analog Input Modules

APAX-5017 Locate **Enable**

Module Information **AI**

☐ Hide Setting Panel ☐ Show Raw Data

Selected Items

Range : **+/- 10 V** **Apply**

Integration Time: **60Hz/50Hz Auto** **Apply**

Channel Mask: **Enable** **Disable** ☐ **ApplyAll**

Burnout Value

Range : **Down Scale** **Apply**

Calibration

Auto

Trend Log

Channel Information

Type	Ch	Addr	Value	Ch Status	Range
AI	0	40001	0.011	Good	+/- 10 V
AI	1	40002	7.586	Good	+/- 10 V
AI	2	40003	7.349	Good	+/- 10 V
AI	3	40004	6.926	Good	+/- 10 V
AI	4	40005	6.544	Good	+/- 10 V
AI	5	40006	6.191	Good	+/- 10 V
AI	6	40007	5.864	Good	+/- 10 V
AI	7	40008	5.558	Good	+/- 10 V
AI	8	40009	5.272	Good	+/- 10 V
AI	9	40010	5.003	Good	+/- 10 V
AI	10	40011	4.750	Good	+/- 10 V
AI	11	40012	4.512	Good	+/- 10 V

There are two parts for the **I/O Information** tab of APAX-5000 AI module. At the bottom is the **Channel Information** Area. You can see all channels' type, Modbus address, value, channel status (burnout or not), and range. Above the **Channel Information** Area is the **Setting Panel** Area. If you don't want see the **Setting Panel** Area, you can click the **Hide Setting Panel** check box to hide the **Setting Panel** Area. If you want to see the raw data (presented in Hexadecimal format) from the input channels, click the **Show Raw Data** check box.

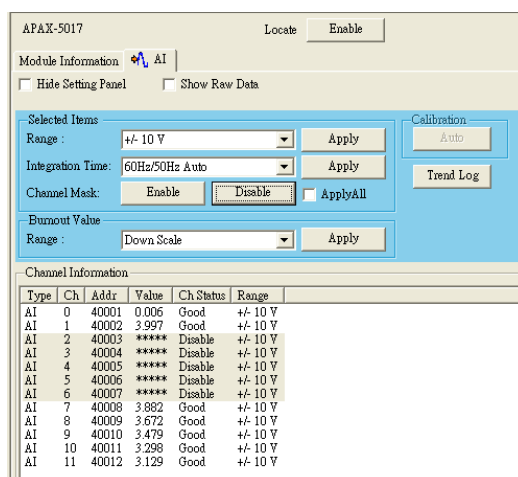
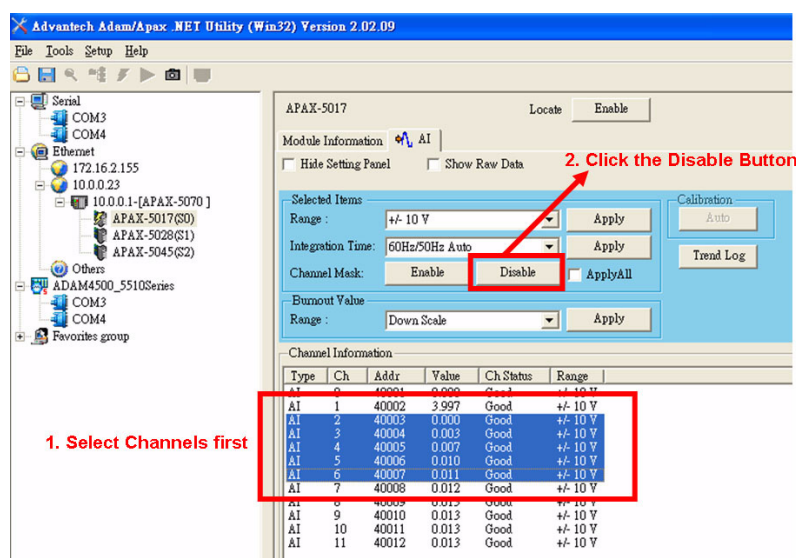
If you want to configure specific input channels' range or integration time, select the channels in the **Channel Information** Area (use the "Shift" or "Ctrl" key on keyboard to select multiple channels at the same time). Choose appropriate range and integration time for the selected channels by the **Range** and **Integration Time** combo boxes in the **Setting Panel** Area and then click the **Apply** button to save the configuration. If you want to save the same range setting for all channels, click the **ApplyAll** check box before you click the **Apply** button.

Note!



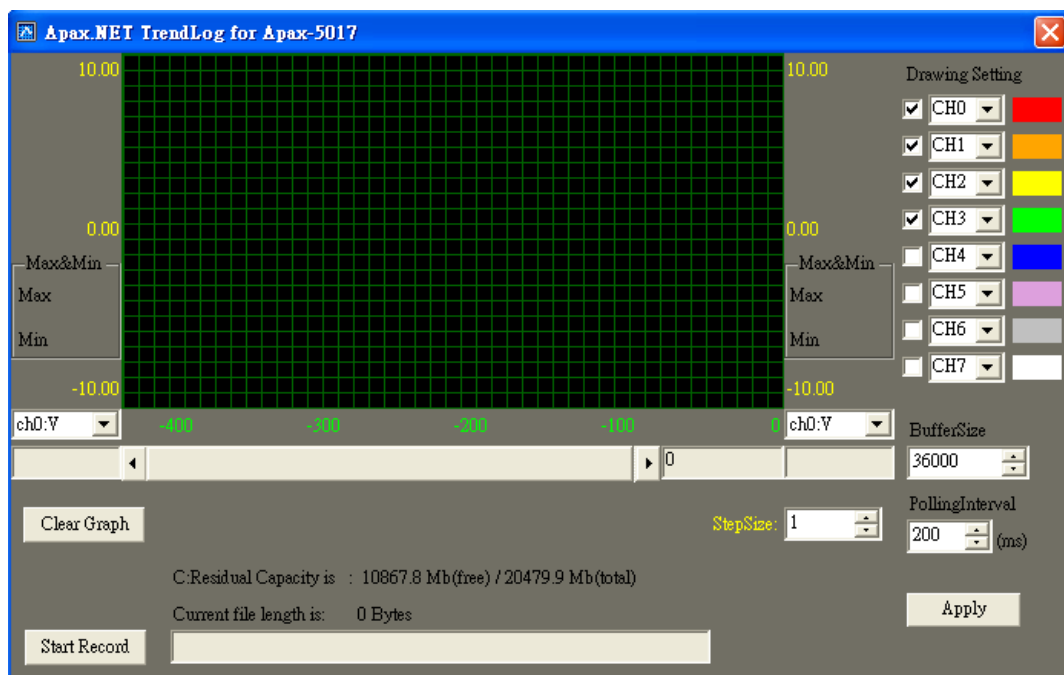
In order to remove the noise from the power supply, APAX AI modules feature built-in filter. Filters are used to remove noise generated from environment. The integration time is used to configure the filter frequency.

You can define specific channels reading or not by the **Enable** and **Disable** buttons. Refer to figure below, channel 2 ~ 6 are disabled that no data will be read.

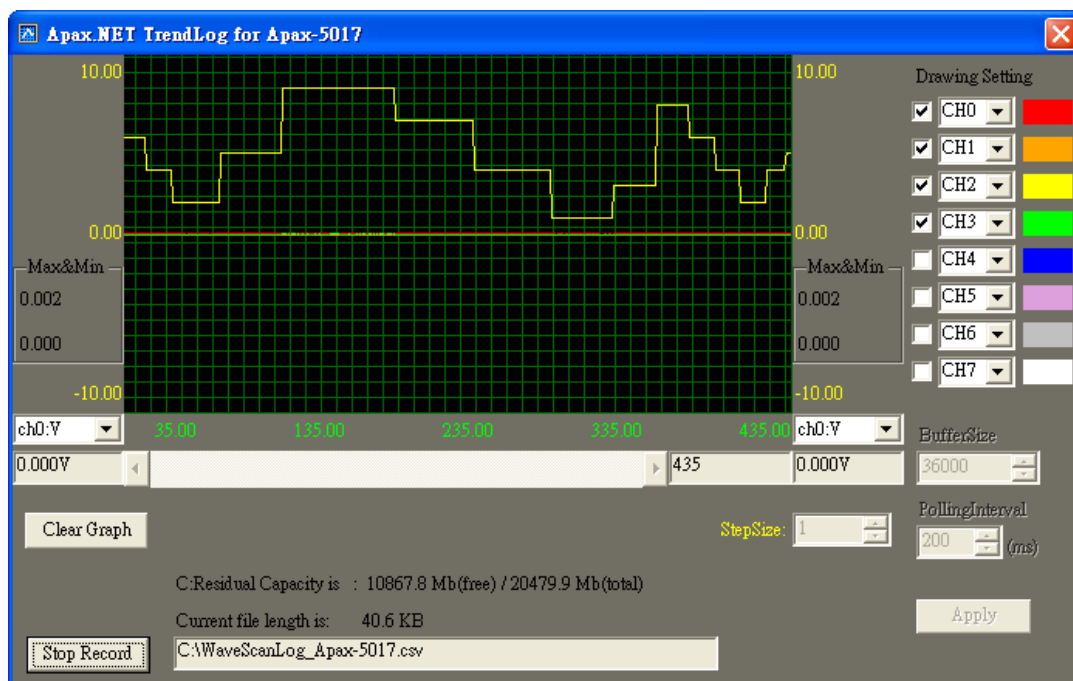


Most APAX-5000 analog module supports auto calibration. To perform calibration, you need to enable calibration function by **Setup** menu (**Setup>>Enable Calibration Function**). After that, you can perform auto calibration to the AI modules by clicking the **Auto** button in the **Calibration** Area. The module will automatically calibrate itself. You don't need to connect any external devices or instruments.

APAX-5000 AI modules offer data logging functionality. Click the **Trend Log** button to launch Trend Log window. Here, you can configure which channels you want to log by the check box representing specific channels in the **Draw Setting** Area. Click the color box beside the channel index to configure the color of the trend line on the plot. You can set the data log period (how often APAX-5000 modules record its channel value) by the **PollingInterval** combo box. Refer to figure below. Here, only channel 0 ~ channel 4 value are logged, and the data log period is 200 milliseconds.



Click the **Start Record** to start data logging. At first, a pop-up window will appear to let you configure where you want to save the log file. Then, the data logging will start and the data will be displayed on the plot.



APAX-5000 AI modules support Burnout function. It means when there is no signal wiring, the input channel will detect it. Below are the modules which supports Burnout function:

1. APAX-5013: Burnout function available for RTD input (all type)
2. APAX-5017: Burnout function only available for current input (only 4 ~ 20 mA)
3. APAX-5017H: Burnout function available only for current input (only 4 ~ 20 mA)
4. APAX-5018: Burnout function available for thermocouple input (all type) and current input (only 4 ~ 20 mA)

Refer to figure below. Now we configure all input channels' range as 4 ~ 20 mA for APAX-5017 module. Only channel 1 has real current signal input, so you can see other channels' status showing "Burnout". (Only channel 1 status shows "Good", means there is signal input.)

APAX-5017

Module Information: AI

Selected Items:

- Range: 4-20 mA
- Integration Time: 60Hz/50Hz Auto
- Channel Mask: Enable, Disable, Apply All
- Burnout Value Range: Up Scale

Channel Information:

Type	Ch	Addr	Value	Ch Status	Range
AI	0	40001	20.000	BurnOut	4-20 mA
AI	1	40002	8.498	Good	4-20 mA
AI	2	40003	20.000	BurnOut	4-20 mA
AI	3	40004	20.000	BurnOut	4-20 mA
AI	4	40005	20.000	BurnOut	4-20 mA
AI	5	40006	20.000	BurnOut	4-20 mA
AI	6	40007	20.000	BurnOut	4-20 mA
AI	7	40008	20.000	BurnOut	4-20 mA
AI	8	40009	20.000	BurnOut	4-20 mA
AI	9	40010	20.000	BurnOut	4-20 mA
AI	10	40011	20.000	BurnOut	4-20 mA
AI	11	40012	20.000	BurnOut	4-20 mA

You can choose to show the maximum value or minimum value of the input range as the read value when burnout condition happens (no wire input signal). It is configured by the **Range** combo box in the **Burnout Value** Area. Refer to figure above. The setting is "Up scale", meaning the maximum value of the input range will be shown when burnout condition happens. So you can see all other channels' values (except channel 1) are 20. (meaning 20 mA, the maximum value of the input range)

Now, if we select "Down scale" for the **Range** combo box in the **Burnout Value** Area, it means the minimum value of the input range will be shown when burnout condition happens. Refer to figure below. You can see all other channels' values (except channel 1) are 4. (meaning 4 mA, the minimum value of the input range)

APAX-5017

Module Information: AI

Selected Items:

- Range: 4-20 mA
- Integration Time: 60Hz/50Hz Auto
- Channel Mask: Enable, Disable, Apply All
- Burnout Value Range: Down Scale

Channel Information:

Type	Ch	Addr	Value	Ch Status	Range
AI	0	40001	4.000	BurnOut	4-20 mA
AI	1	40002	8.498	Good	4-20 mA
AI	2	40003	4.000	BurnOut	4-20 mA
AI	3	40004	4.000	BurnOut	4-20 mA
AI	4	40005	4.000	BurnOut	4-20 mA
AI	5	40006	4.000	BurnOut	4-20 mA
AI	6	40007	4.000	BurnOut	4-20 mA
AI	7	40008	4.000	BurnOut	4-20 mA
AI	8	40009	4.000	BurnOut	4-20 mA
AI	9	40010	4.000	BurnOut	4-20 mA
AI	10	40011	4.000	BurnOut	4-20 mA
AI	11	40012	4.000	BurnOut	4-20 mA

A.3.2 Analog Output Module

Type	Ch	Addr	Value	Range	Startup	Safety Value
AO	0	40065	0.000	0~20 mA	0.000	-10.000
AO	1	40066	0.000	0~20 mA	0.000	10.000
AO	2	40067	0.000	0~20 mA	0.000	10.000
AO	3	40068	0.000	0~20 mA	0.000	10.000
AO	4	40069	0.000	0~20 mA	0.000	10.000
AO	5	40070	0.000	0~20 mA	0.000	10.000
AO	6	40071	0.000	0~20 mA	0.000	10.000
AO	7	40072	0.000	0~20 mA	0.000	10.000

There are two parts for the **I/O Information** tab of APAX-5000 AO module. At the bottom is the **Channel Information** Area. You can see all channels' type, Modbus address, value, range, startup value (the initial value when the AO module is power-on) and safety value (the default value when the communication is broken). Above the **Channel Information** Area is the **Setting Panel** Area. If you don't want see the **Setting Panel** Area, you can click the **Hide Setting Panel** check box to hide the **Setting Panel** Area. If you want to see the raw data (presented in Hexadecimal format) from the output channels, click the **Show Raw Data** check box.

If you want to configure specific output channels' range, select the channels in the **Channel Information** Area. Choose appropriate range by the **Range** combo box in the **Setting Panel** Area and then click the **Apply** button to save the configuration. If you want to save the same range setting for all channels, click the **ApplyAll** check box before you click the **Apply** button.

If you want to change specific output channel' output value, select that channel by clicking the channel in the **Channel Information** Area or choosing it from **Channel** combo box in the **Setting Panel** Area. Then define the output value by the **Value** text box or the horizontal slide below in the **Setting Panel** Area. Then, click the **Apply Output** button to save the configuration. You can see the channel output value changed in the **Channel Information** Area. Similarly, you can save the value in the **Value** text box to become the startup value by the **Set as Startup** button. And you also can see the startup value changed in the **Channel Information** Area.

Note! Startup value means the default value when the module boots.



APAX-5000 output module like AO or DO module supports Fail Safety Value (FSV) function. When the output module lose its ability to communicate with controller or coupler, all output channels will become the pre-defined value (the safety value). You can enable the FSV function by clicking the **Enable** check box in the **Safety Function** area.

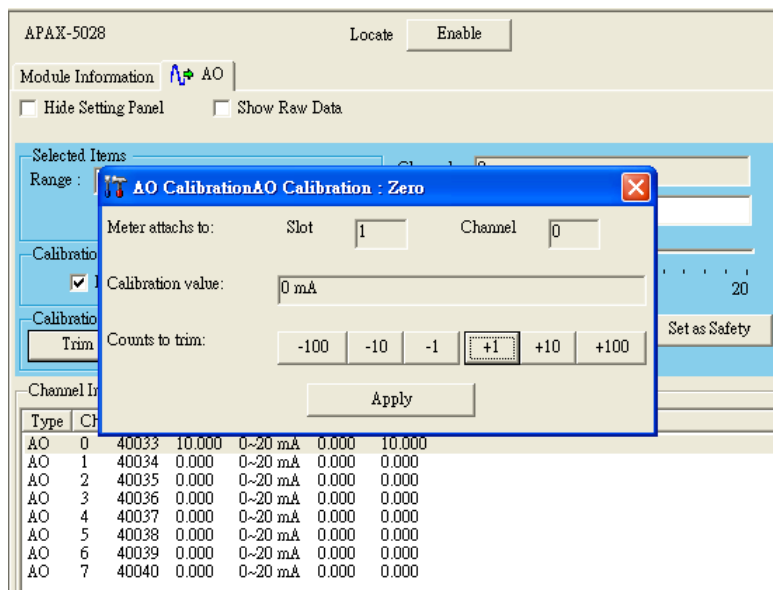
Then, click the **Set Value** button to configure the safety value. A pop-up window will appear, like the figure below. You can simply type the desired safety value for each channel. In this example, safety value of channel 0 is configured as 10 mA, while other channels' are 0 mA. Click the **Apply** button after you have complete your setting. You can see the modified safety value showing by the **Safety Value** column in the **Channel Information** Area.

Channel	Safety Value	AO Range
0	10.000	0~20 mA
1	0.000	0~20 mA
2	0.000	0~20 mA
3	0.000	0~20 mA
4	0.000	0~20 mA
5	0.000	0~20 mA
6	0.000	0~20 mA
7	0.000	0~20 mA

Note! You also can set the safety value by entering the value to the **Value** text box or drawing the horizontal slide below in the **Setting Panel** Area. Then click the **Set as Safety** button to apply that value as safety value.

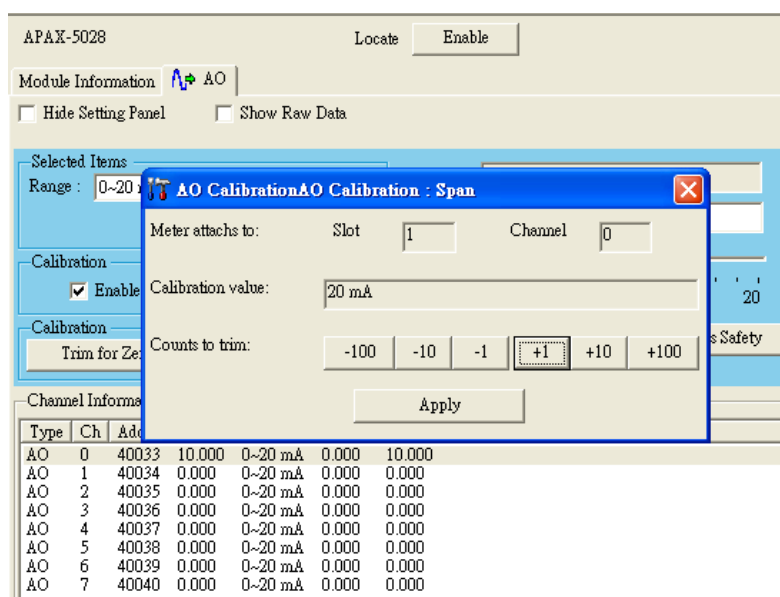
APAX AO module like APAX-5028 offer manual calibration functionality. To perform calibration, you need to enable calibration function first by Setup menu (**Setup>>Enable Calibration Function**). After the calibration functionality is enabled, you can click the **Trim to Span** button and **Trim to Zero** button, and then you can perform span calibration and zero calibration, separately. When you click the **Trim to Zero** button, you will see a dialog popping-up as figure below. The specific channel will generate output signal using the minimum value within range which is shown in the **Calibration Value** text box. Connect that channel to an external accurate instrument and measure the output signal. Using the **Counts to trim** buttons to adjust until the output value real matches the value in the **Calibration Value** text box. Then click the **Apply** button to save the calibration configuration.

Note! The zero calibration can only be implemented when the AO range is $\pm 10V$, $\pm 5V$ or $0 \sim 20 \text{ mA}$



When you click the **Trim to Span** button, you will see a dialog popping-up as figure below. The specific channel will generate output signal using the maximum value within range which is shown in the **Calibration Value** text box. Connect that channel to an external accurate instrument and measure the output signal. Using the **Counts to trim** buttons to adjust until the output value real matches the value in the **Calibration Value** text box. Then click the **Apply** button to save the calibration configuration.

Note! The *S\span* calibration can only be implemented when the AO range is $\pm 10V$, $\pm 5V$ or $0 \sim 20 \text{ mA}$



A.3.3 Digital Input Module

APAX-5040 Locate Enable

Module Information **DI**

☐ Hide Setting Panel

DI Filter

☒ DI Filter Enable

Minimum low signal width 30 0.1 ms Apply

Channel Information

Type	Ch	Addr	Value	Mode
DI	0	00129	False	BOOL
DI	1	00130	False	BOOL
DI	2	00131	False	BOOL
DI	3	00132	False	BOOL
DI	4	00133	False	BOOL
DI	5	00134	False	BOOL
DI	6	00135	False	BOOL
DI	7	00136	False	BOOL
DI	8	00137	False	BOOL
DI	9	00138	False	BOOL
DI	10	00139	False	BOOL
DI	11	00140	False	BOOL
DI	12	00141	False	BOOL
DI	13	00142	False	BOOL
DI	14	00143	False	BOOL
DI	15	00144	False	BOOL

There are two parts for the **I/O Information** tab of APAX-5000 DI module. At the bottom is the **Channel Information** Area. You can see all channels' type, Modbus address, value, and mode. Above the **Channel Information** Area is the **Setting Panel** Area. If you don't want see the **Setting Panel** Area, you can click the **Hide Setting Panel** check box to hide the **Setting Panel** Area.

APAX DI module supports digital filter functionality. Signals with period less the filter width will be filtered (regarding as high frequency noise). You can configure the filter width (acceptable pulse width). Select the channels you want to configure in the Channel Information Area (use the "Shift" or "Ctrl" key on keyboard to select multiple channels at the same time). Type the appropriate value (unit: 0.1 ms) into the **Minimum low signal width** text box to configure acceptable minimum pulse width in the **Setting Panel** Area. After you complete the configuration, click the **Apply** button to save the configuration.

Note! *APAX-5040 is equipped with a filter which minimum period is 3 ms. Therefore, the minimum value for the **Minimum low signal width** text box is 30.*



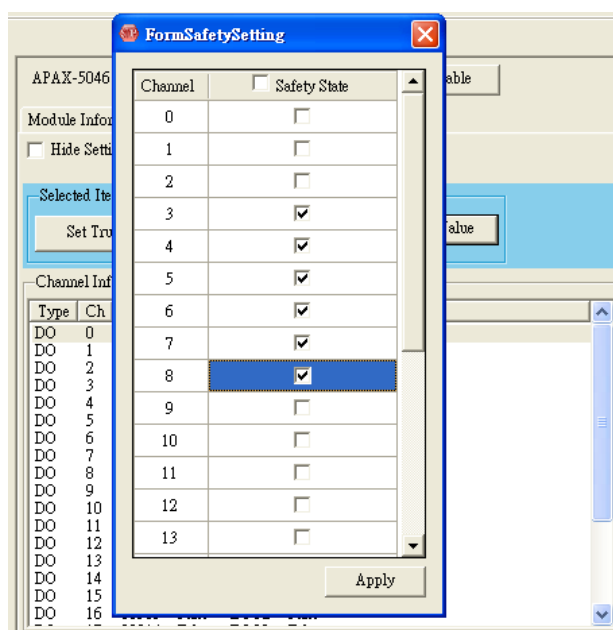
A.3.4 Digital Output Module

There are two parts for the **I/O Information** tab of APAX-5000 DO module. At the bottom is the **Channel Information** Area. You can see all channels' type, Modbus address, value, mode and safety value (the default value when the communication is broken). Above the **Channel Information** Area is the **Setting Panel** Area. If you don't want see the **Setting Panel** Area, you can click the **Hide Setting Panel** check box to hide the **Setting Panel** Area.

If you want to change specific output channels' output value, select those channels by clicking the channel in the **Channel Information** Area (use the "Shift" or "Ctrl" key on keyboard to select multiple channels at the same time). Then define the output value by the **Set True** button or **Set False** button in the **Setting Panel** Area. Then, click the **Apply** button to save the configuration. You can see the channel output value changed in the **Channel Information** Area.

APAX-5000 output module like AO or DO module supports Fail Safety Value (FSV) function. When the output module lose its ability to communicate with controller or coupler, all output channels will become the pre-defined value (the safety value). You can enable the FSV function by clicking the **Enable** check box in the **Safety Function** Area.

Then, click the **Set Value** button to configure the safety value. A pop-up window will appear, like the figure below. You can simply type the desired safety value for each channel. In this example, safety value of channel 3 to 8 are "True", while other channels' safety value are "False". Click the **Apply** button after you complete your settings. (You can set all channels' safety value together by clicking the check box inside the Safety State cell.) You can see the modified safety value showing by the **Safety Value** column in the **Channel Information** Area.



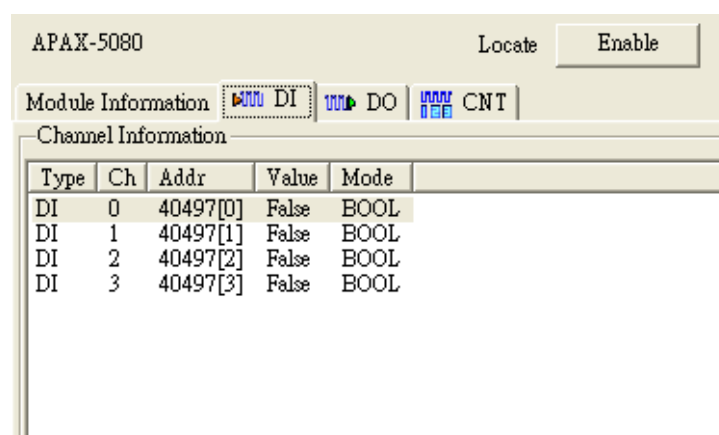
A.3.5 Counter Module

Usually, except counter input channels, there are also digital input and digital output channels for counter module like APAX-5080. So there will be three I/O Information tabs (DI, DO and CNT)

(A) DI tab for digital input channels

Refer to figure below. It is similar to standard DI module's **I/O Information** tab (Refer to Section A.3.3). At the bottom is the **Channel Information** Area. You can see all channels' type, Modbus address, value, and mode.

Note! For APAX-5080, there is no digital filter for digital input channels. So you can not configure the minimum accept signal width like DI module.



(B) DO tab for digital output channels

The DO tab for counter module looks very similar to the DO module's I/O Information tab (Refer to Section A.3.4). At the bottom is the **Channel Information** Area. You can see all channels' type, Modbus address, value, and alarm situation. Above the Channel Information Area is the **Setting Panel** Area. If you don't want see the **Setting Panel** Area, you can click the **Hide Setting Panel** check box to hide the **Setting Panel** area.

Type	Ch	Addr	DO Value	Mode	Alarm Type	Alarm Limit	Alarm Flag	Map Ch	DO Behavior
DO	0	40497[4]	False	BOOL	Disable	Disable	False	Disable	Disable
DO	1	40497[5]	False	BOOL	Disable	Disable	False	Disable	Disable
DO	2	40497[6]	False	BOOL	Disable	Disable	False	Disable	Disable
DO	3	40497[7]	False	BOOL	Disable	Disable	False	Disable	Disable

You can configure each DO channel as simple digital output channel (it can be controlled manually) or an alarm channel (channel status will depend on value from a specific counter channel) on the **Setting Panel** Area. Select the channels you want to configure in the **Channel Information** Area (use the "Shift" or "Ctrl" key on keyboard to select multiple channels at the same time). You can set these channels' mode by clicking **DO** or **Alarm** radio button. Then click **Apply** button to save the configuration. If you want to save the same mode setting for all channels, click the **ApplyAll** check box before you click the **Apply** button.

When you select DO mode for specific channels, you can manually control these channels' value. Refer to figure below. Select the channels you want to control the output value in the **Channel Information** Area (use the "Shift" or "Ctrl" key on keyboard to select multiple channels at the same time). Then define the output value by the **Set True** button or **Set False** button at the lower left of the **Setting Panel** Area.

Type	Ch	Addr	DO Value	Mode	Alarm Type	Alarm Limit	Alarm Flag	Map Ch	DO Behavior
DO	0	40497[4]	True	BOOL	Disable	Disable	False	Disable	Disable
DO	1	40497[5]	True	BOOL	Disable	Disable	False	Disable	Disable
DO	2	40497[6]	False	BOOL	Disable	Disable	False	Disable	Disable
DO	3	40497[7]	False	BOOL	Disable	Disable	False	Disable	Disable

When you select Alarm mode for specific channels, those channels' value will be changed automatically based on the mapping counter input channel's value. In other words, the DO channel becomes alarm channel for specific counter channel. Below are some related parameters you need to set for alarm:

1. **Mapping Channel** combo box: It defines which counter channel's value is used for this alarm channel (DO channel).
2. **Limit value** text box: The reference value to decide when an alarm happens. When the specific channel counter value is higher or lower than this limit value (depends on the Alarm Type combo box), alarm will be activated.
3. **Alarm Type** combo box:
 "High": When the counter value is higher than the reference limit value (defined by the Limit value text box), the alarm will be activated.
 "Low": When the counter value is lower than the reference limit value (defined by the Limit value text box), the alarm will be activated.
4. **DO behavior** combo box: What action that DO channel will perform when alarm is activated.
 "High Level": DO channel will become logic high level when alarm happens.
 "Low Level": DO channel will become logic low level when alarm happens.
 "High Pulse": A high pulse will be generated when alarm happens.
 "Low Pulse": A low pulse will be generated when alarm happens.
5. **DO pulse width (ms)** text box: When you select "High Pulse" or "Low Pulse" for DO behavior, this parameter define the generated pulse width. (Unit: ms)

After you have complete the setting, click the **Apply** button to save the configuration. If you want to save the same mode setting for all channels, click the **ApplyAll** check box before you click the **Apply** button.

Refer to figure below. DO channel 1 is configured as alarm channel for counter input channel 7 (defined by the **Mapping channel** combo box). So as long as the counted value of the counter input channel 7 is greater (defined by the **Alarm Type** combo box) than 50 (defined by the **Limit value** combo box), then the alarm is activated, and the value of DO channel 1 will become logic low level (defined by the **DO behavior** combo box).

APAX-5080 Locate Enable

Module Information DI DO CNT

☐ Hide Setting Panel

Selected Items

Setting

Mode: ☐ DO ☒ Alarm Mapping channel: 7 ☐ AutoRL

Alarm Type: High Limit value: 50 ☐ ApplyAll

DO behavior: Low Level DO pulse width (ms): 100 Apply

DO Alarm

Set True Set False Clear alarm latch

Channel Information

Type	Ch	Addr	DO Value	Mode	Alarm Type	Alarm Limit	Alarm Flag	Map Ch	DO Behavior
DO	0	40497[4]	True	BOOL	Disable	Disable	False	Disable	Disable
Alarm	1	40497[5]	True	BOOL	High	50	False	Cnt7	Low Level
DO	2	40497[6]	False	BOOL	Disable	Disable	False	Disable	Disable
DO	3	40497[7]	False	BOOL	Disable	Disable	False	Disable	Disable

Once alarm is activated, the alarm status will be latched. It won't change its value to previous status even when alarm condition is gone. You need to manually clear the alarm to make it back to the normal status, by click the **Clear alarm latch** button in the **Alarm Area** on the **Setting Panel Area**.

(C) CNT tab for counter input channels

At the bottom is the **Channel Information** Area. You can see all channels' type, Modbus address, value, mode, startup value, counter status, and counter gate setting situation. Above the **Channel Information** Area is the **Setting Panel Area**. If you don't want see the **Setting Panel Area**, you can click the **Hide Setting Panel** check box to hide the **Setting Panel Area**. If you want to see the raw data (presented in Hexadecimal format) from the input channels, click the **Show Raw Data** check box.

Type	Ch	Addr	Value	Mode	Startup	Counting	Status	Count Type	Map Ch	Gate Active	Gate Trigger
CNT	0	40481[H] 40482[L]	0	Up	0	Start	Good	Once/Reload ToZero	Disable	Disable	Disable
CNT	1	40483[H] 40484[L]	555	Up	555	Stop	Good	Once/Reload ToZero	Disable	Disable	Disable
CNT	2	40485[H] 40486[L]	555	Up/Down[U]	555	Stop	Good	Once/Reload ToZero	Disable	Disable	Disable
CNT	3	40487[H] 40488[L]	555	Up/Down[D]	555	Stop	Good	Once/Reload ToZero	Disable	Disable	Disable
CNT	4	40489[H] 40490[L]	555	Up/Down[U]	555	Stop	Good	Once/Reload ToZero	Disable	Disable	Disable
CNT	5	40491[H] 40492[L]	555	Up/Down[D]	555	Stop	Good	Once/Reload ToZero	Disable	Disable	Disable
CNT	6	40493[H] 40494[L]	555	Up/Down[U]	555	Stop	Good	Once/Reload ToZero	Disable	Disable	Disable
CNT	7	40495[H] 40496[L]	555	Up/Down[D]	555	Stop	Good	Once/Reload ToZero	Disable	Disable	Disable

APAX-5080 supports several operating mode (Bi-direction, Up, Up/Down, Frequency, and A/B phase). Select the channels you want to control the output value in the **Channel Information** Area (use the "Shift" or "Ctrl" key on keyboard to select multiple channels at the same time). Then you can configure the selected counter input channels' mode by the **CNT Mode** combo box. You also can define the initial value when module is power-on, by entering the value you want to the **Startup** value (0~4294967295) text box. Click the **Apply** button when you complete the counter mode or startup value setting. If you want to save the setting for all channels, click the **ApplyAll** check box before you click the **Apply** button.

Note! Refer to APAX-5000 I/O Manual to see definition of different counter modes.



Click the **Start** button in the **Set channels** Area to start counting action for the selected counter input channel. Click the **Stop** button in the **Set channels** Area to stop the counting action for the selected counter input channel. You can reset the selected counter input channel by clicking the **Reset Cnt** button in the **Set channels** Area. Counter value will become the startup value (defined by the Startup value (0~4294967295) text box) if you click the **ReloadToStartup** check box. Otherwise, the counter value should back to zero after you click the **Reset Cnt** button.

When you click the **Repeat** check box in the **Count Type** Area, it means when the counter value reaches the maximum or minimum acceptable counting value, it will restart to count (starting from 0 or the startup value, depending on the **ReloadToStartup** check box.) Otherwise, the counter value won't change its value after reaching the maximum or minimum acceptable counting value. Click the **Apply** button when you complete the repeating and reload to startup setting. If you want to save the setting for all channels, click the **ApplyAll** check box before you click the **Apply** button.

APAX counter module supports counter gate function. It means the counter action (counting or not) will be performed depending on signal value from specific digital input channel. Related configuration is done by the parameter in the **Counter Gate Setting** Area. Select the channels you want to configure in the **Channel Information** Area (use the "Shift" or "Ctrl" key on keyboard to select multiple channels at the same time). Then configure the parameters listed below for the counter gate function:

1. **Enable** check box: Enable or disable the counter gate function.
2. **Mapping gate** combo box: It defines which DI channel's is used (as the gate channel) for this counter channel.
3. **Gate Active Type** combo box: What condition when the DI channel's status match will let the counter channel perform the counting action.
 "Low level": The specific counter channel will perform counting action only when the gate channel (specific DI channel) value is logic low.
 "Falling edge": The specific counter channel will perform counting action only when a falling edge (the DI channel changes from logic high to logic low) is detected.
 "High level": The specific counter channel will perform counting action only when the gate channel (specific DI channel) value is logic high.
 "Rising edge": The specific counter channel will perform counting action only when a rising edge (the DI channel changes from logic low to logic high) is detected.
4. **Trigger Mode** combo box: It defines if the gate can repeatedly trigger the counter channel performing counting action. Refer to figure below.

Appendix **B**

Ethernet/IP Address Mapping Table

B.1 EtherNet/IP Address Mapping Table (0x)

Type: ETHERNET-MODULE Generic Ethernet Module

Common Format: INT

Assembly Instance:

- Input: 102
Size = 12 x [APAX-5000 analog I/O module number] + 4 x [APAX-5000 digital I/O module number] + 26 x [APAX-5000 counter module number]
- Output: 101
Size = 12 x [APAX-5000 analog I/O module number] + 4 x [APAX-5000 digital I/O module number] + 26 x [APAX-5000 counter module number]
- Configuration: 103
Size = 0

New Module

Type: ETHERNET-MODULE Generic Ethernet Module
Vendor: Allen-Bradley
Parent: LocalENB
Name: APAXIO
Description:
Comm Format: Data - INT
Address / Host Name
☒ IP Address: 20 . 0 . 0 . 88
☐ Host Name:
Connection Parameters
Input: 102 (Size: 32 (16-bit))
Output: 101 (Size: 32 (16-bit))
Configuration: 103 (Size: 0 (8-bit))
Status Input:
Status Output:
☒ Open Module Properties
OK Cancel Help

Mapping Rule

Offset	Input	Output
0 ~ x ₁	Data from APAX module with ID 0	Data from APAX module with ID 0
x ₁ ~ x ₂	Data from APAX module with ID 1	Data from APAX module with ID 1
x ₂ ~ x ₃	Data from APAX module with ID 2	Data from APAX module with ID 2
x ₄ ~ x ₅	Data from APAX module with ID 3	Data from APAX module with ID 3
...	...	...
x ₃₁ ~ x ₃₂	Data from APAX module with ID 32	Data from APAX module with ID 32

Warning! The ID number for all APAX modules should be sequentially and start from 0, or the data will not be read.



Analog Input and Analog Output Modules

Each APAX analog module will use 24 BYTE (12 WORD, or 12 INT) address for its data. Each analog channel will occupy one WORD address.

Data	Input	Output	Description
Word 0	DeviceName:I.data[0]	DeviceName:O.data[0]	Analog Channel 0 Value
Word 1	DeviceName:I.data[1]	DeviceName:O.data[1]	Analog Channel 1 Value
Word 2	DeviceName:I.data[2]	DeviceName:O.data[2]	Analog Channel 2 Value
Word 3	DeviceName:I.data[3]	DeviceName:O.data[3]	Analog Channel 3 Value
...	...	...	...
Word 11	DeviceName:I.data[11]	DeviceName:O.data[11]	Analog Channel 11 Value

Digital Input and Digital Output Modules

Each APAX digital module will use 8 BYTE (4 WORD, or 4 INT) address for its data. Each WORD address will contain 16 digital channel data.

Data	Input	Output	Description
Word 0	DeviceName:I.data[0]	DeviceName:O.data[0]	Digital Channel 0 ~ 15 Value
Word 1	DeviceName:I.data[1]	DeviceName:O.data[1]	Digital Channel 16 ~ 31 Value
Word 2	DeviceName:I.data[2]	DeviceName:O.data[2]	Digital Channel 32 ~ 47 Value
Word 3	DeviceName:I.data[3]	DeviceName:O.data[3]	Digital Channel 48 ~ 63 Value

Counter Module

Each APAX counter module will use 52 BYTE (26 WORD, or 26 INT) address for its data. The first 4 WORD address will reserved for digital input and digital output channels. Then 16 WORD address will be used for counter channels' value. The rest address will be left for other counter setting, such as counter mask, reset, overflow and underflow, etc.

Data	Input	Output	Description
Word 0	DeviceName:I.data[0]	DeviceName:O.data[0]	Digital Channel 0 ~ 15 Value
Word 1	DeviceName:I.data[1]	DeviceName:O.data[1]	Digital Channel 16 ~ 31 Value
Word 2	DeviceName:I.data[2]	DeviceName:O.data[2]	Digital Channel 32 ~ 47 Value
Word 3	DeviceName:I.data[3]	DeviceName:O.data[3]	Digital Channel 48 ~ 63 Value
Word 4	DeviceName:I.data[4]	DeviceName:O.data[4]	Counter Channel 0 Value (High)
Word 5	DeviceName:I.data[5]	DeviceName:O.data[5]	Counter Channel 0 Value (Low)
Word 6	DeviceName:I.data[6]	DeviceName:O.data[6]	Counter Channel 1 Value (High)
Word 7	DeviceName:I.data[7]	DeviceName:O.data[7]	Counter Channel 1 Value (Low)
...	...	...	...
Word 18	DeviceName:I.data[18]	DeviceName:O.data[18]	Counter Channel 8 Value (High)
Word 19	DeviceName:I.data[19]	DeviceName:O.data[19]	Counter Channel 8 Value (Low)
Word 20	DeviceName:I.data[20]	DeviceName:O.data[20]	Start/Stop Flag for 8 Counter Channel
Word 21	DeviceName:I.data[21]	DeviceName:O.data[21]	Reset Flag for 8 Counter Channel Value
Word 22	DeviceName:I.data[22]	DeviceName:O.data[22]	Overflow/Underflow Flag Status for 8 Counter Channel
Word 23	DeviceName:I.data[23]	DeviceName:O.data[23]	Clear Overflow/Underflow Flag for 8 Counter Channel
Word 24	DeviceName:I.data[24]	DeviceName:O.data[24]	Alarm Status on the Counter Module
Word 25	DeviceName:I.data[25]	DeviceName:O.data[25]	Clear Alarm on the Counter Module

Note!  You need to change the flag value from low to high and then set it back to low to perform resetting counter channel value function. It is the same to perform clearing counter channels' overflow/underflow status and to clear counter module's alarm status.

Example: We have four APAX-5000 modules connected with APAX-5072: APAX-5017 (AI), APAX-5028 (AO), APAX-5040 (DI) and APAX-5046 (DO). So the Assembly Interface will be listed as below:

- Input: 102 Size: $12 \times 2 + 4 \times 2 = 32$
- Output: 101 Size: $12 \times 2 + 4 \times 2 = 32$
- Configuration: 103 Size: 0

If the ID switch on the four APAX modules are set as:

APAX-5017 ID = 2

APAX-5028 ID = 1

APAX-5040 ID = 0

APAX-5046 ID = 3

Note!  As we mentioned before, the ID of all APAX modules should be sequential and start with 0. So if we change the APAX-5040 ID to 5, then all APAX I/O module data cannot be read back to the Ethernet/IP master.

Data	Input	Output	Description
Word 0	DeviceName:I.data[0]	DeviceName:O.data[0]	APAX-5040 channel 0 ~ 15
Word 1	DeviceName:I.data[1]	DeviceName:O.data[1]	APAX-5040 channel 16 ~ 31
Word 2	DeviceName:I.data[2]	DeviceName:O.data[2]	APAX-5040 channel 32 ~ 47
Word 3	DeviceName:I.data[3]	DeviceName:O.data[3]	APAX-5040 channel 48 ~ 63
Word 4	DeviceName:I.data[4]	DeviceName:O.data[4]	APAX-5028 channel 0 value
Word 5	DeviceName:I.data[5]	DeviceName:O.data[5]	APAX-5028 channel 1 value
Word 6	DeviceName:I.data[6]	DeviceName:O.data[6]	APAX-5028 channel 2 value
...	...	...	...
Word 14	DeviceName:I.data[14]	DeviceName:O.data[14]	APAX-5028 channel 10 value
Word 15	DeviceName:I.data[15]	DeviceName:O.data[15]	APAX-5028 channel 11 value
Word 16	DeviceName:I.data[16]	DeviceName:O.data[16]	APAX-5017 channel 0 value
Word 17	DeviceName:I.data[17]	DeviceName:O.data[17]	APAX-5017 channel 1 value
Word 18	DeviceName:I.data[18]	DeviceName:O.data[18]	APAX-5017 channel 2 value
...	...	...	...
Word 26	DeviceName:I.data[26]	DeviceName:O.data[26]	APAX-5017 channel 10 value
Word 27	DeviceName:I.data[27]	DeviceName:O.data[27]	APAX-5017 channel 11 value
Word 28	DeviceName:I.data[28]	DeviceName:O.data[28]	APAX-5046 channel 0 ~ 15
Word 29	DeviceName:I.data[29]	DeviceName:O.data[29]	APAX-5046 channel 16 ~ 31
Word 30	DeviceName:I.data[30]	DeviceName:O.data[30]	APAX-5046 channel 32 ~ 47
Word 31	DeviceName:I.data[31]	DeviceName:O.data[31]	APAX-5046 channel 48 ~ 63

Note!  APAX-5040 only has 24 channels (channel 0 to channel 23). So although the Ethernet/IP package will carry 64 channels' data, address for channel 24 to channel 63 won't be used (It would be empty). It is similar for the APAX-5046.

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