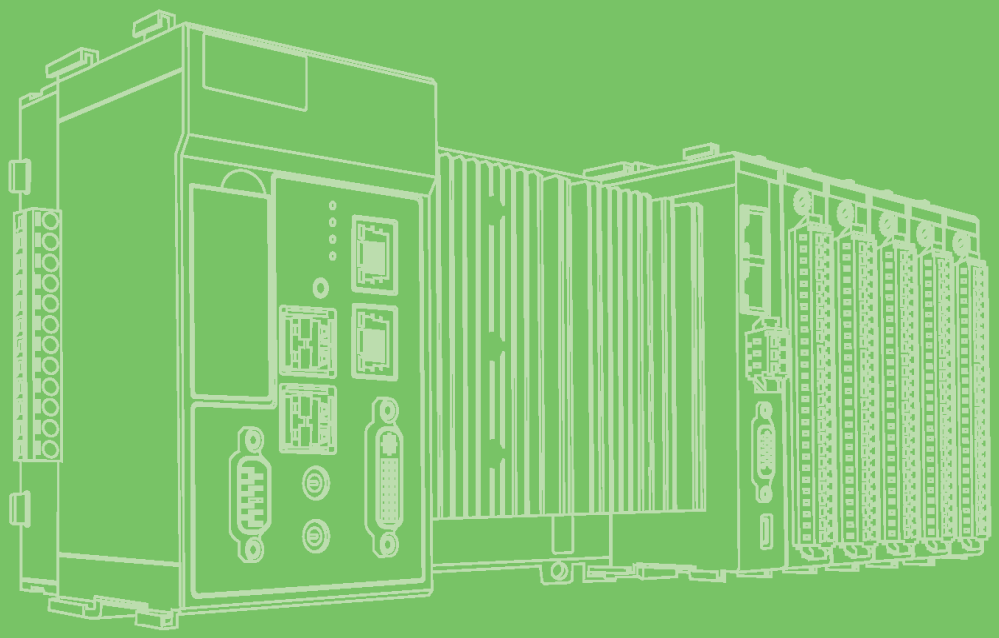
User Manual



APAX-5070

Software Manual

ADVANTECH
eAutomation

Copyright

Acknowledgements

Intel and Pentium are trademarks of Intel Corporation.

Microsoft Windows and MS-DOS are registered trademarks of Microsoft Corp.

All other product names or trademarks are properties of their respective owners.

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

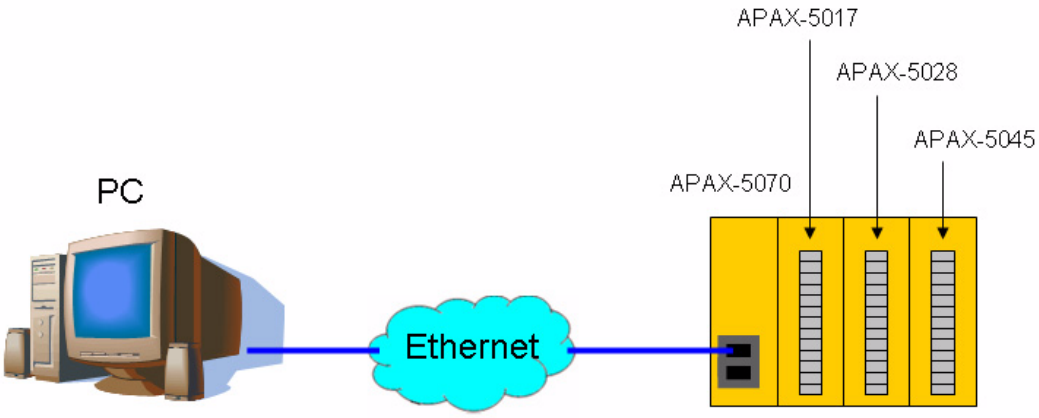
Contents

Chapter 1

Quick Start

1.1 Hardware System Diagram

For the example demonstration showing how to use APAX-5070, the system hardware architecture can be shown as figure. One computer with LAN port is used to connect to the APAX-5070 and APAX-5000 I/O modules.



1.2 Installing the ADAM/APAX .NET utility

Advantech provides the ADAM/APAX .NET utility which allows developers and end users to see APAX-5070 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).

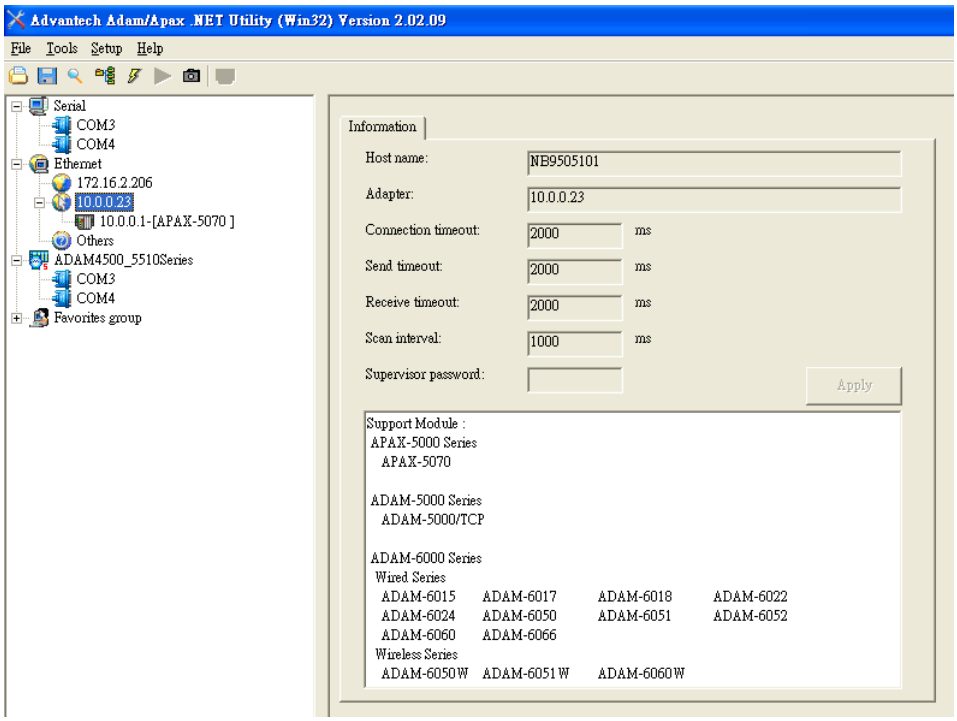
Therefore, you need to install ADAM/APAX .NET utility first to configure APAX-5070 and related APAX-5000 I/O modules. After that, you can use other software package which supports Modbus/TCP client (like Modscan or HMI/SCADA software) to perform write or read action to APAX-5070.

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.

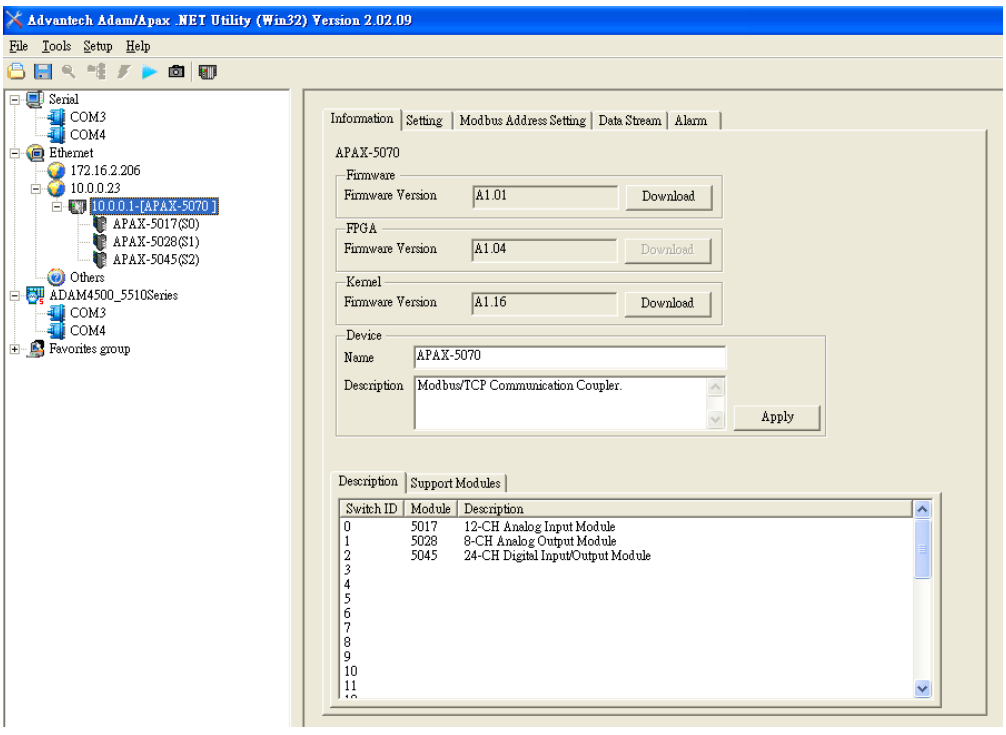
1.3 Configuring APAX-5070 with ADAM/APAX .NET

Launch ADAM/APAX .NET utility by selecting **Start >> All Programs >> Advantech Automation >> AdamADAM/APAX .NET Utility >> AdamADAM/APAX .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-5070 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-5070 item showing under the IP address item, as shown below.

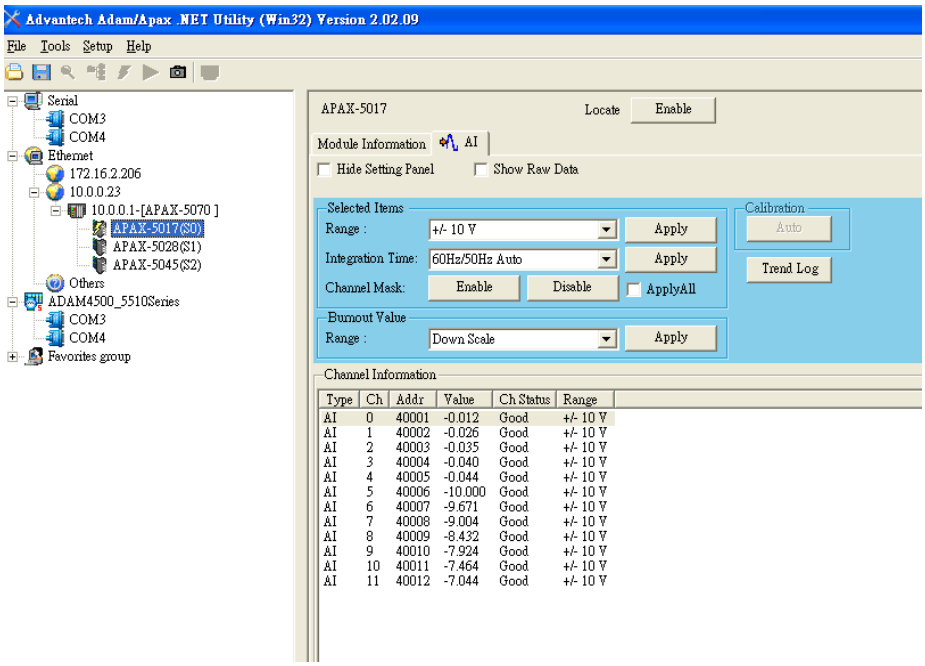


Click the item showing the APAX-5070 (with APAX-5070 IP address). Type the correct password on the pop-up window. All the connected APAX-5000 I/O modules will show under the APAX-5070 item. (In this example, they are APAX-5017, APAX-5028 and APAX-5045)

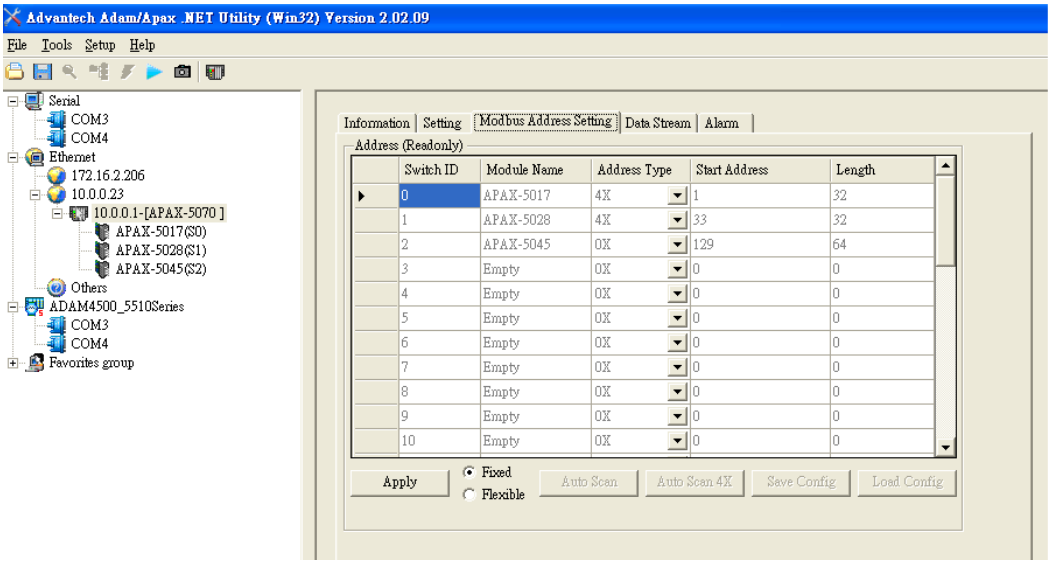
Note! *The default password of APAX-5070 is 00000000.*



On the right window, you can perform all related configurations toward APAX-5070 through the five tabs: **Information**, **Setting**, **Modbus address setting**, **Data Stream and Alarm**. Click the I/O modules items under the APAX-5070 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 B for more detail for these configurations.

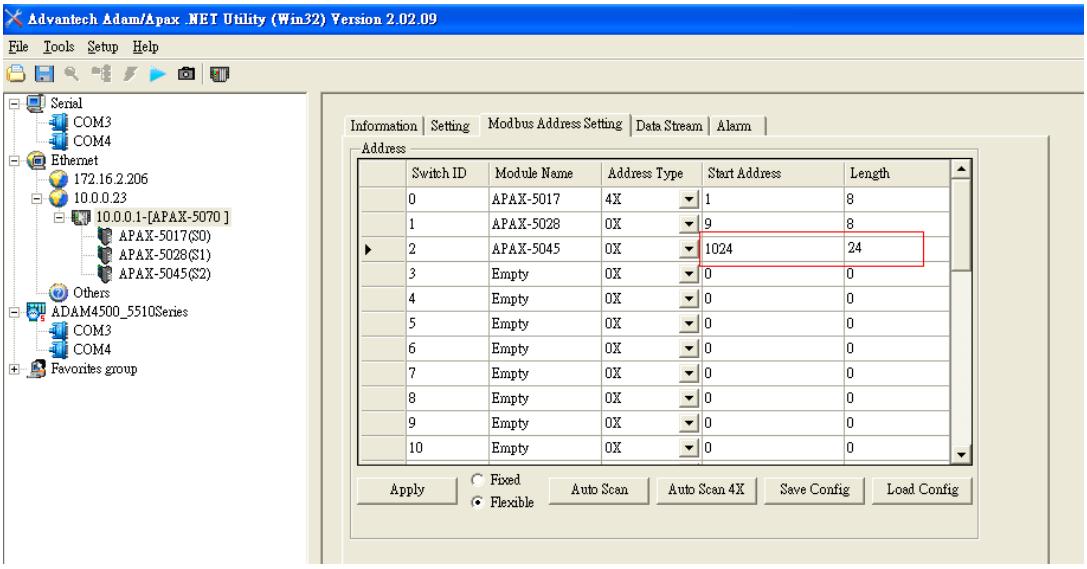


The most important configuration for APAX-5070 is to define the Modbus address mapping. After you have completed the address mapping, you can simply get data from or write data to APAX-5070 through the defined address. APAX-5070 offer two selections to assign the address: Fixed mapping mode and Flexible mapping mode (by clicking the **Fixed** and **Flexible** radio button and then clicking the **Apply** button)



When you choose Fixed mapping mode, all APAX-5000 I/O modules' Modbus address will be assigned by system, as the figure shown above. Refer to Appendix C for how the system will allocate the Modbus address of your APAX-5000 I/O modules.

When you choose Flexible mapping mode, it means you can allocate all Modbus address manually. Simply click the **Start Address** and **Length** text box and enter the desired number to define related Modbus address for a specific module. Refer to figure below, user is configuring the start address as 1024 and length as 64 for APAX-5045 module. The pencil icon shown on the left side of the raw "APAX-5045" means this module's Modbus address is editing.



Note! *All Modbus address you can allocate must lie between 00001 ~ 09999 (0x or 4x)*

Modbus address 0x can only be used for APAX DI/O modules

Modbus address 4x can be used for APAX DI/O, AI/O and counter modules

Modbus address of a module with less ID number MUST NOT exceed Modbus address of a module with larger ID number

(Example: Modbus address of the module with ID number 5 should be less than Modbus address of a module with ID number 6)

Length of Modbus address 0x MUST be multiples of 8

Except for manually assigned all Modbus address by yourself, you also can click the **Auto Scan** or **Auto Scan (4X)** buttons to let APAX-5070 automatically find the optimized Modbus address allocation, according to module's channel number and type. The difference between these two options from the Fixed mapping mode lies in the address allocation way. Refer to table below.

Fixed Mapping Mode

Module ID	Module Name	Address Type	Start Address	Length	Modbus Address
0	APAX-5017	4x	1	32	40001 ~ 40032
1	APAX-5028	4x	33	32	40033 ~ 40064
2	APAX-5045	0x	129	64	00129 ~ 00192

Flexbile Mapping Mode (Auto Scan)

Module ID	Module Name	Address Type	Start Address	Length	Modbus Address
0	APAX-5017	4x	1	12	40001 ~ 40012
1	APAX-5028	4x	13	8	40013 ~ 40020
2	APAX-5045	0x	1	24	00001 ~ 00024

Flexbile Mapping Mode (Auto Scan 4X)

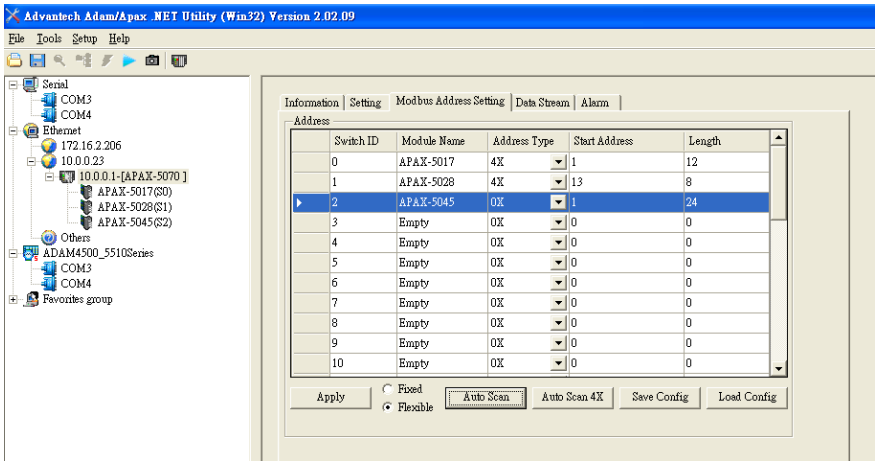
Module ID	Module Name	Address Type	Start Address	Length	Modbus Address
0	APAX-5017	4x	1	12	40001 ~ 40012
1	APAX-5028	4x	13	8	40013 ~ 40020
2	APAX-5045	4x	21	2	40021 ~ 40022

For each APAX-5000 I/O module, it will be expected to occupy 64 addresses for all channels' data if the Modbus address type is 0x (32 registers will be occupied if the Modbus address type is 4x.) for Fixed mapping mode. However, usually it doesn't need so many addresses because the channel number is less. Taking APAX-5017 module as example, 32 Modbus registers will be expected to be used for Fixed mapping mode. But APAX-5017 module only has 16 channels, and each channel only needs one 4x register.

So if you choose Auto Scan mode, only 16 Modbus registers will be used for APAX-5017. This mechanism can help to ignore unused address in the Modbus data package transferred from APAX-5070 to remote target (PC in this example), making the data transferring more efficient (decrease the times to transfer Modbus data).

When you choose Auto Scan (4X) mode, all module's data will be assigned to Modbus 4x registers sequentially. It makes the data transferring performance even better.

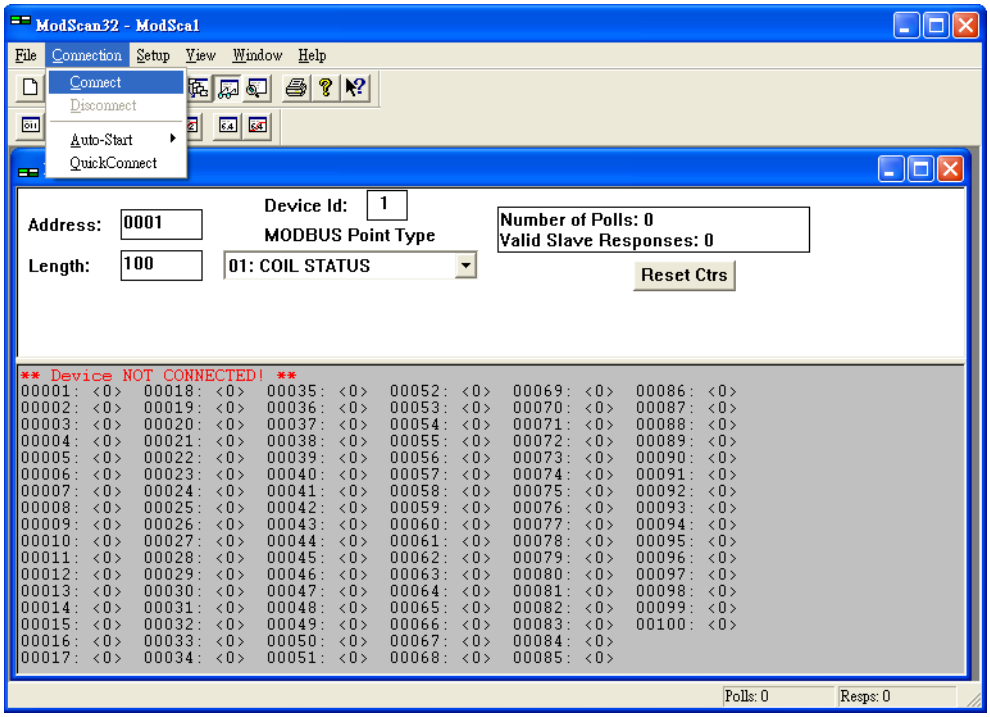
Here, we choose to use Auto Scan mode. After clicking the **Auto Scan** button, the Modbus address mapping will be assigned, shown by figure below.



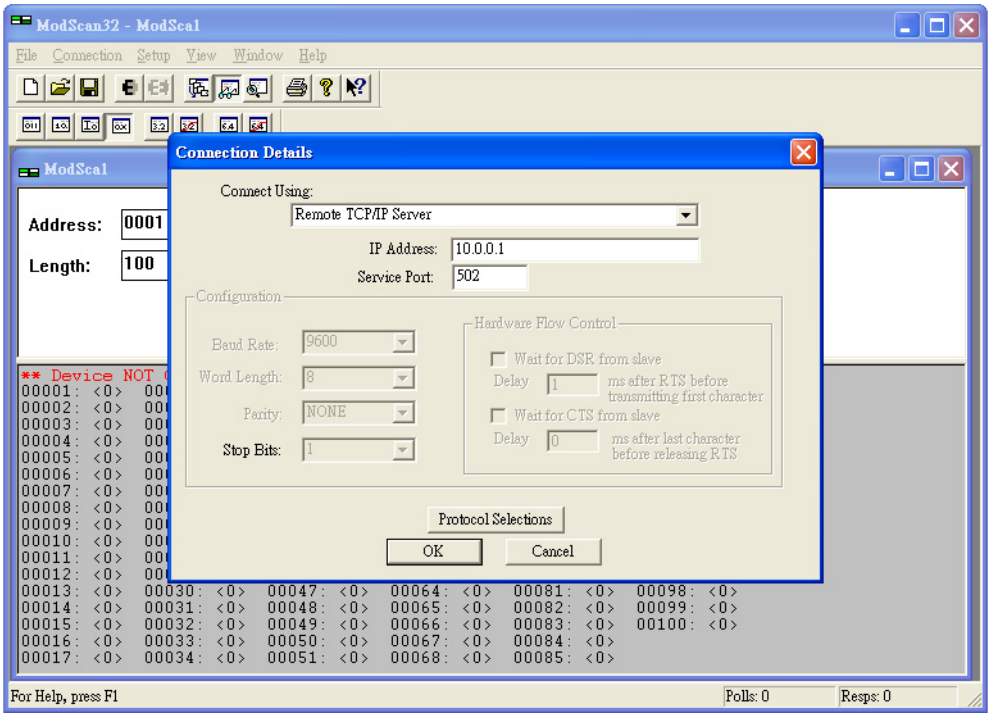
1.4 Read/Write Data Using Modscan

After the Modbus address mapping is done, you can start to use APAX-5070 in your application. Here, we use the Modscan software performing data access to the three APAX-5000 I/O modules.

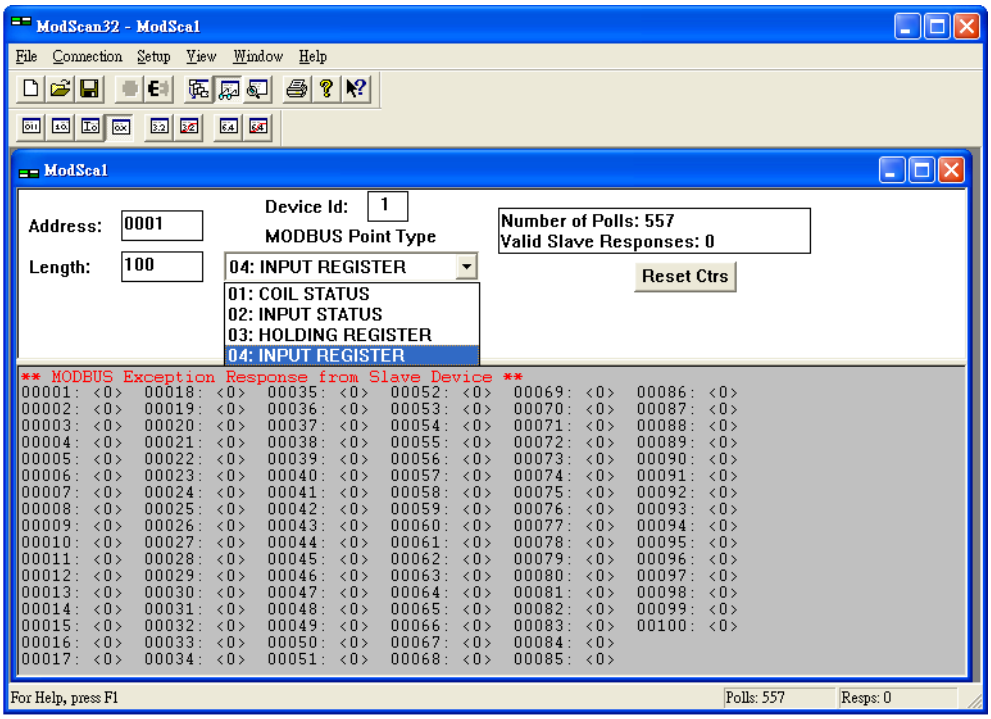
Launch the Modscan application program on your computer. Select **Connect** under **Connection** menu selection to establish a connection to the APAX-5070.



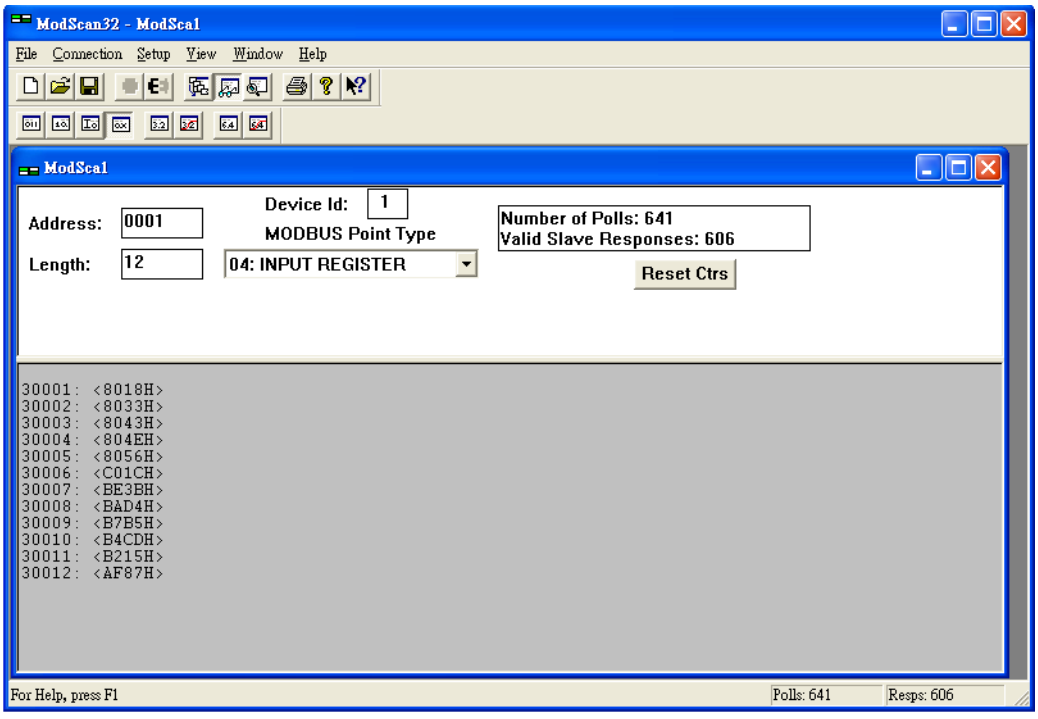
On the **Connection Details** pop-up window, enter the correct IP address of the APAX-5070 you want to connect on the IP Address text box. (Here it is 10.0.0.1.) Then click the **OK** button to apply the configuration.



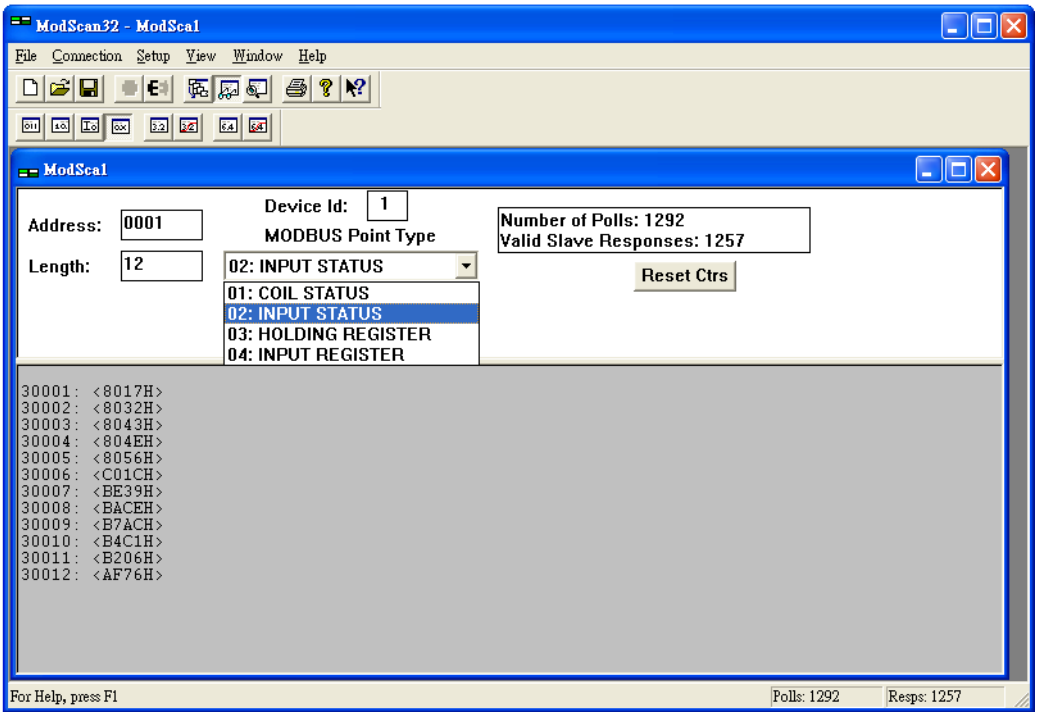
Now, we want to read the channels' data from APAX-5017 module with ID number 0. From previous section, we know the Modbus address of APAX-5017 is located between 1 ~ 12 after you configure it using the Auto Scan mode. Select **03: HOLDING REGISTER** or **04: INPUT REGISTER** in the **MODBUS Point Type** combo box because the Modbus data type is 4x.



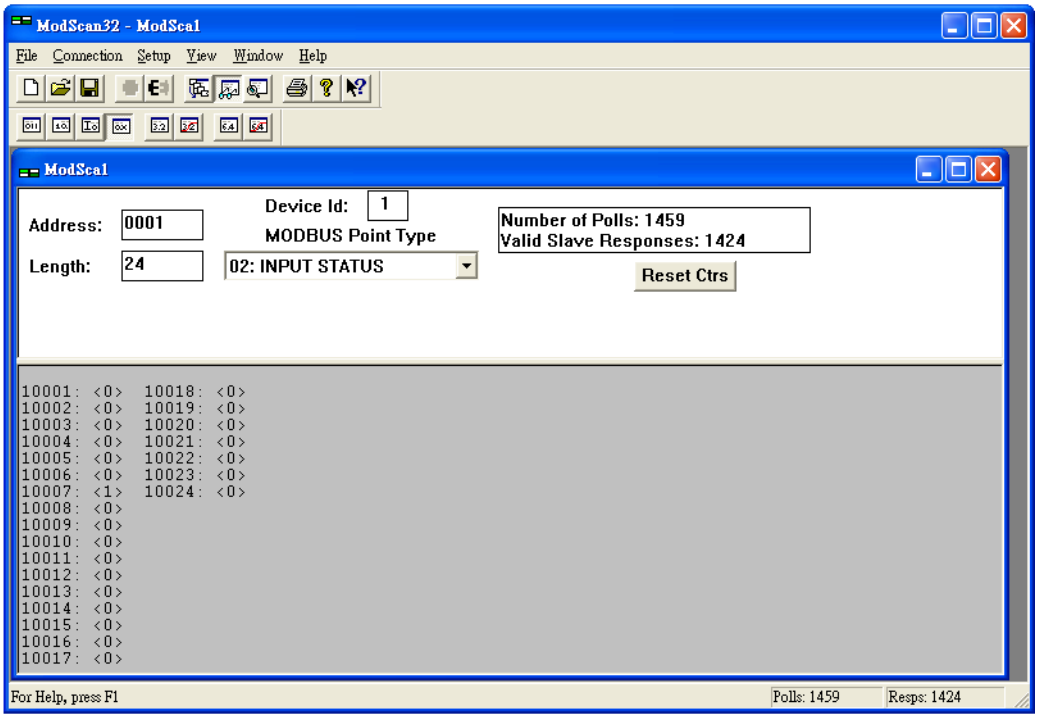
Enter 0001 in the **Address** text box for the Modbus start address, and then enter 12 in the **Length** text box to define the Modbus address length. Then you can see the 12 AI channels' value from APAX-5017 on Modscan now, as shown by figure below.



The procedure to perform read or write action on APAX-5045 module is similar. From previous section, we know the Modbus address of APAX-5045 is located between 1 ~ 24. Select **01: COIL STATUS** or **02: INPUT STATUS** in the **MODBUS Point Type** combo box because the Modbus data type is 0x.



Enter 0001 in the **Address** text box for the Modbus start address, and then enter 24 in the **Length** text box to define the Modbus address length. Then you can see the 24 DI/O channels' value from APAX-5045 on Modscan now, as shown by figure below.



Chapter 2

API Programming

2.1 VC++ API

Advantech provides a VC++ API for C/C++ development environment to control APAX-5000 I/O modules. You can install the VC++ API by the CD offered by APAX-5070. The installation file is contained in the CD. When you launch the CD, select the **APAX Software** button and click the **I/O Drivers** button to find the installation file.

In order to save your development time, Advantech provides several examples that you can use it as reference to build your own C or C++ application program. These examples can be found in the CD offered by APAX-5070, or from the Advantech web-site at *http://www.advantech.com* in the download area under Support page. When you launch the CD, select the **APAX Software** button and click the **VC++ Example** button to find these examples.

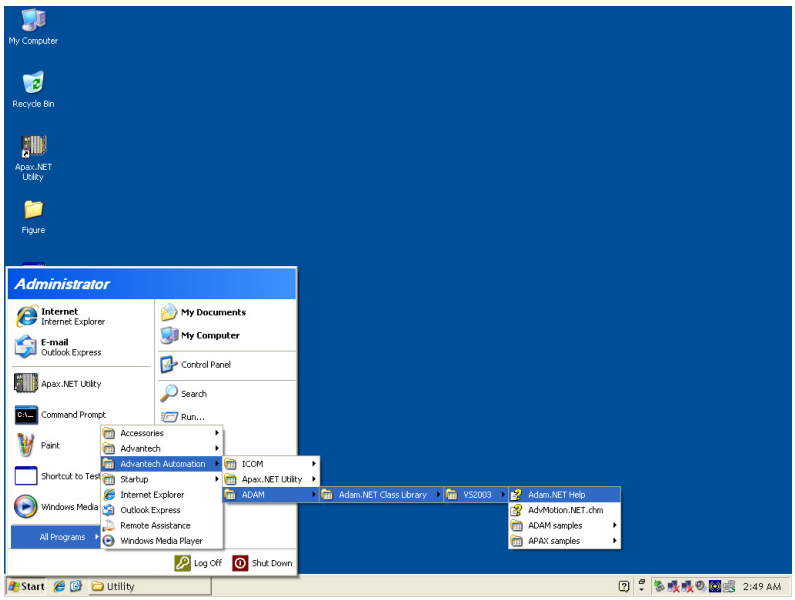
The Modbus functions' reference manual is located on the CD that comes with the APAX-5070. When you launch the CD, click the **Browser Manual** button and the you can see the document **APAX Modbus Library Manual.pdf** there.

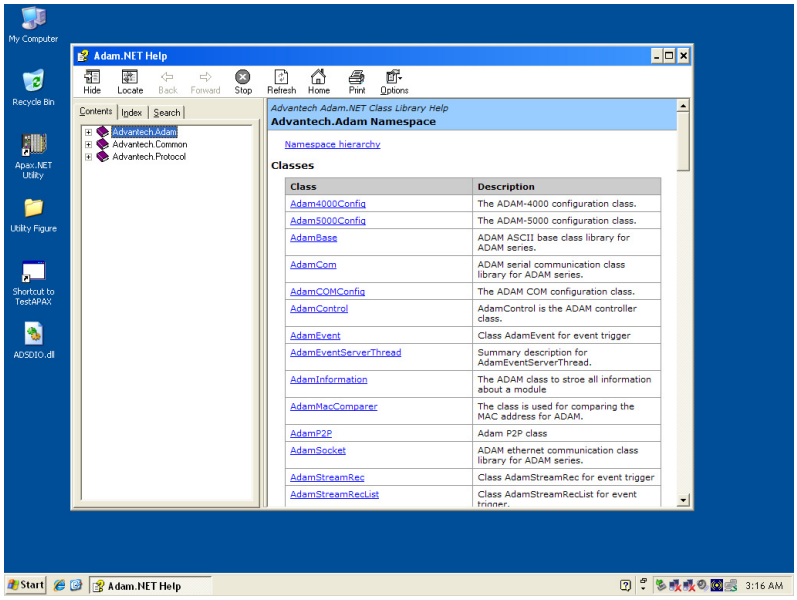
2.2 .NET API (Adam .NET Class Library)

Advantech provides a .NET API for developing .NET applications for many Advantech products. This API interface is called Adam .NET Class library. All the functions described in Section 3.1 are supported by Adam .NET class library. You can leverage Advantech Adam .NET class library to develop application controlling APAX-5000 I/O modules under Microsoft Visual Studio .NET environment such as VB .NET or C#.

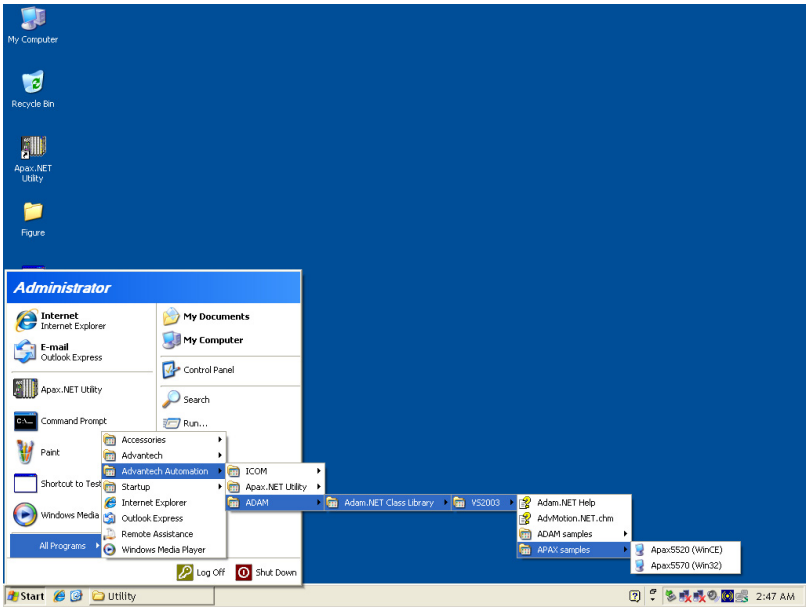
The installation file is contained in the CD. When you launch the CD, select the APAX Software button and click the .NET Class Library button to find the installation file. Besides, you also can link to the website: http://www.advantech.com and click into the Download Area under the Support site to get the latest version of the Adam.NET class library.

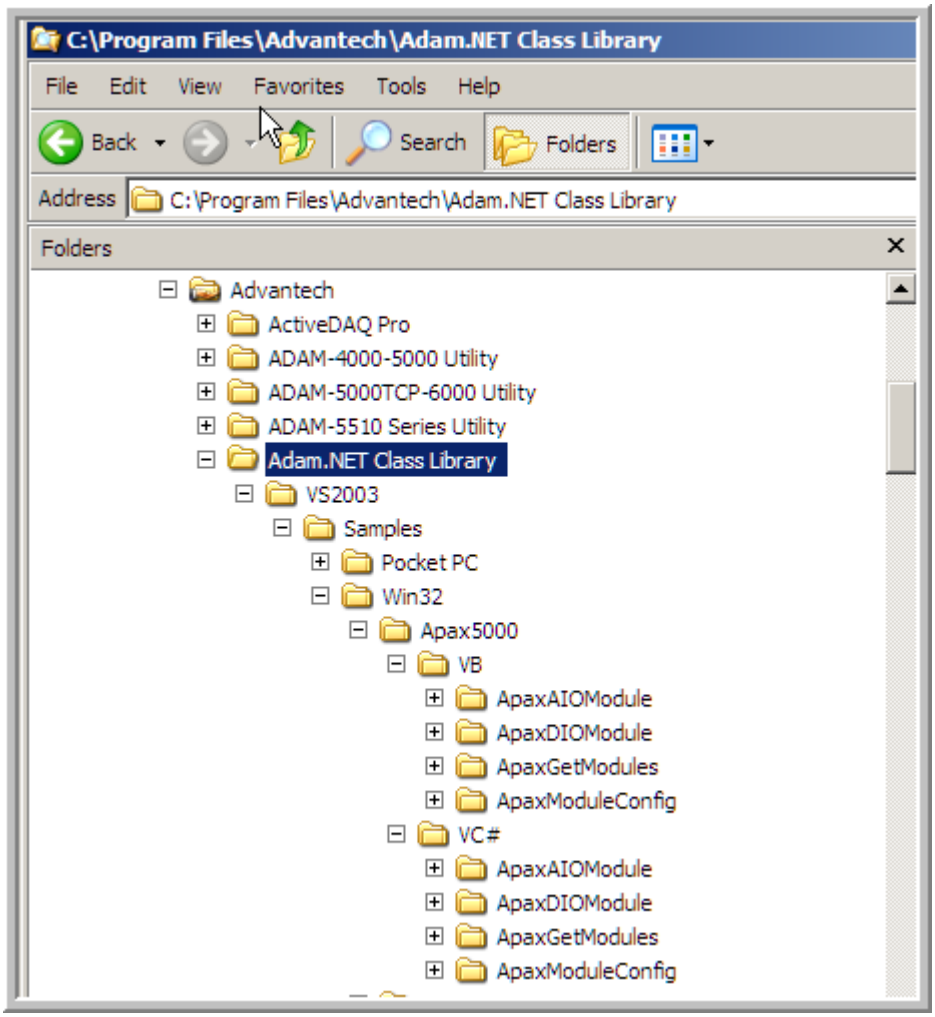
After you complete the installation, you can find Adam .NET class library help document by selecting Start >> All Programs >> Advantech Automation >> ADAM >> Adam.NET Class Library >> VS2003 >> Adam.NET Help.





Besides, there are many examples offered that you can use it as reference to build your own application program. These examples can also be found by selecting Start >> All Programs >> Advantech Automation >> ADAM >> Adam.NET Class Library >> VS2003 >> APAX samples >> Apax5570 (Win32) after you have installed Adam.NET Class library. Or you can find these examples by C:\Program Files\Advantech\Adam.NET Class Library\.




C:\Program Files\Advantech\Adam.NET Class Library
File Edit View Favorites Tools Help
Back Search Folders
Address C:\Program Files\Advantech\Adam.NET Class Library
Folders
Advantech
ActiveDAQ Pro
ADAM-4000-5000 Utility
ADAM-5000TCP-6000 Utility
ADAM-5510 Series Utility
Adam.NET Class Library
VS2003
Samples
Pocket PC
Win32
Apax5000
VB
ApaxAIOModule
ApaxDIOModule
ApaxGetModules
ApaxModuleConfig
VC#
ApaxAIOModule
ApaxDIOModule
ApaxGetModules
ApaxModuleConfig

Appendix A

Analog I/O Board Settings

A.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

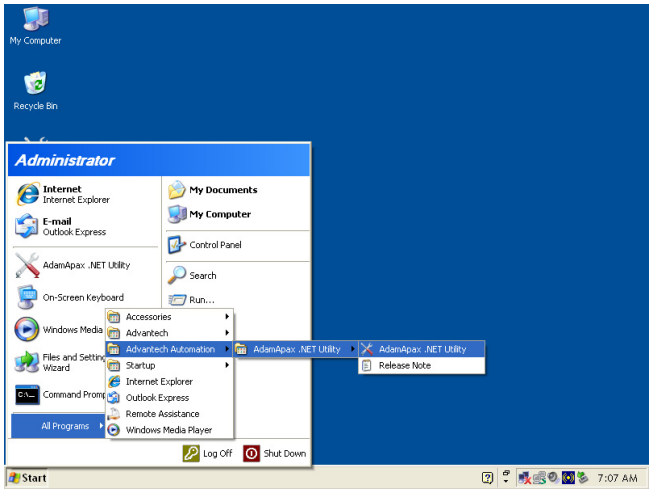
Pt-1000 (3851)	Pt-1000 (3851) -200~850 'C	0x0260
	Pt-1000 (3851) -120~130 'C	0x0261
	Pt-1000 (3851) -40~160 'C	0x0262
Pt-100 (3916)	Pt-100 (3916) -200~850 'C	0x0280
	Pt-100 (3916) -120~130 'C	0x0281
	Pt-100 (3916) -200~200 'C	0x0282
	Pt-100 (3916) -100~100 'C	0x0283
	Pt-100 (3916) -50~150 'C	0x0284
	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 B

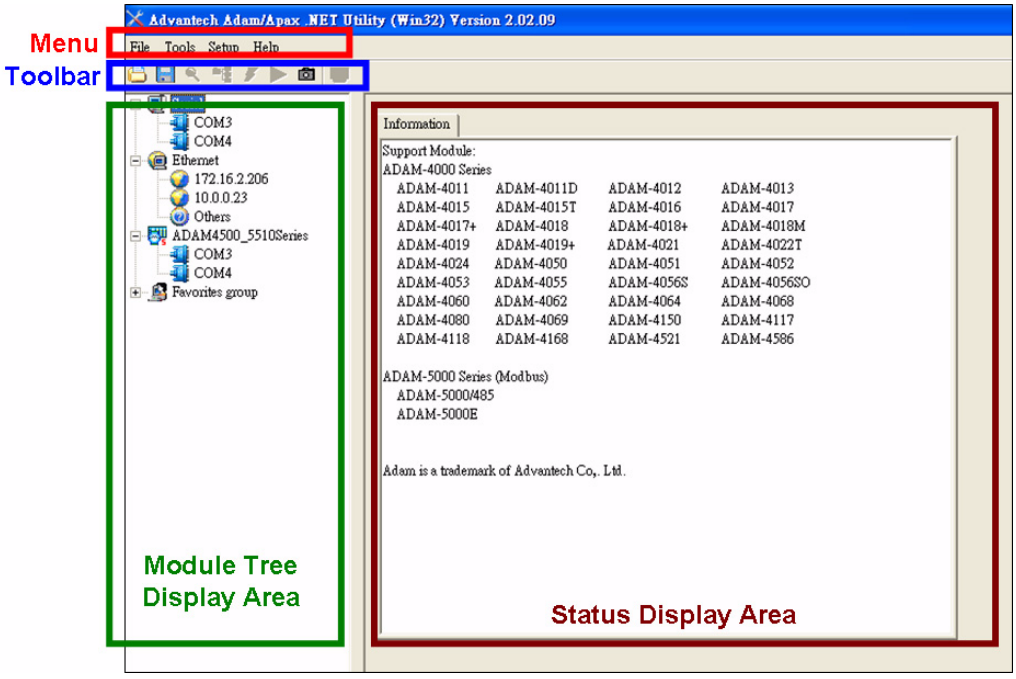
ADAM/APAX .NET Utility Operation

B.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 >> ADAM/APAX .NET Utility >> ADAM/APAX .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.

B.1.1 Menu

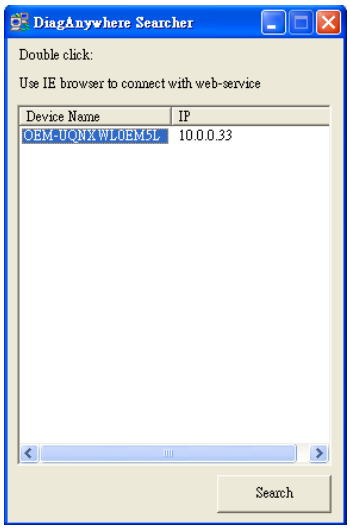
The menu at the top of the operation window contains:

- The **File** menu

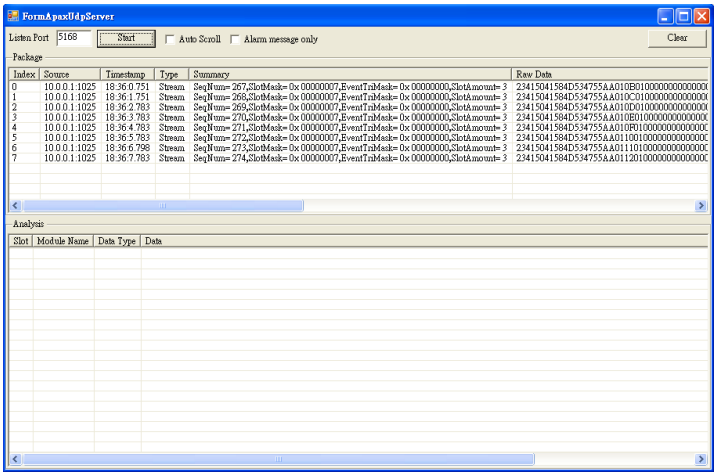
1. **Open Favorite Group** - You can configure your favorite group and save the configuration into one file. Using this option, you can load your configuration file for favorite group.
2. **Save Favorite Group** - You can configure your favorite group and save the configuration into one file. Using this 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

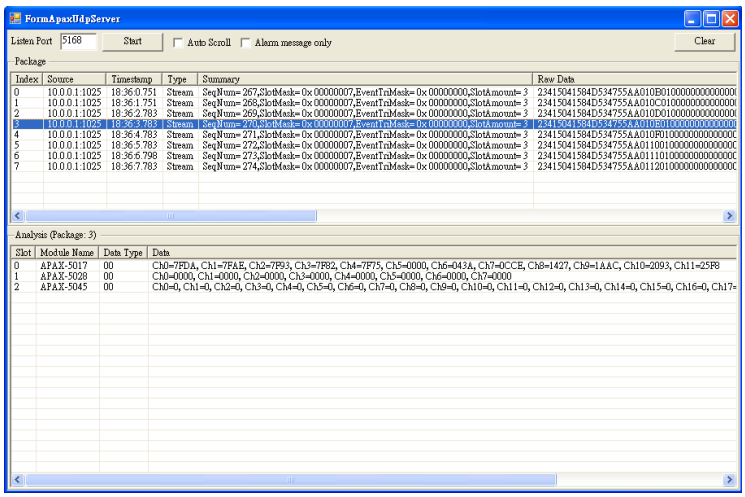
1. **Search** - Search if there are any remote I/O modules connected. For I/O modules communicated by serial (such as ADAM-4000 modules), click the **COM1** item (COM 2 is an internal COM port) under **Serial** item in the **Module Tree Display Area** first before you click this button. For I/O modules communicated by Ethernet (such as APAX-5070 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.



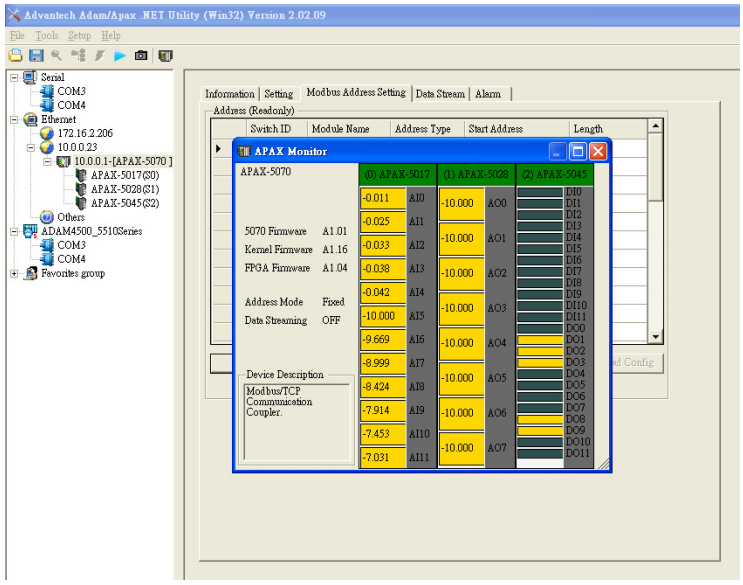
5. **Print Screen** - You can acquire current utility window image and save it as an image file (*.bmp).
6. **Monitor Stream/Adam5000 Event Data** - APAX-5070 supports Data Stream function. If you enable APAX-5070 Data Stream functions and configure this computer (where the utility is installed) as the host to receive data, then you can use this option to receive and view the data transferred from APAX-5070. Refer to figure below.



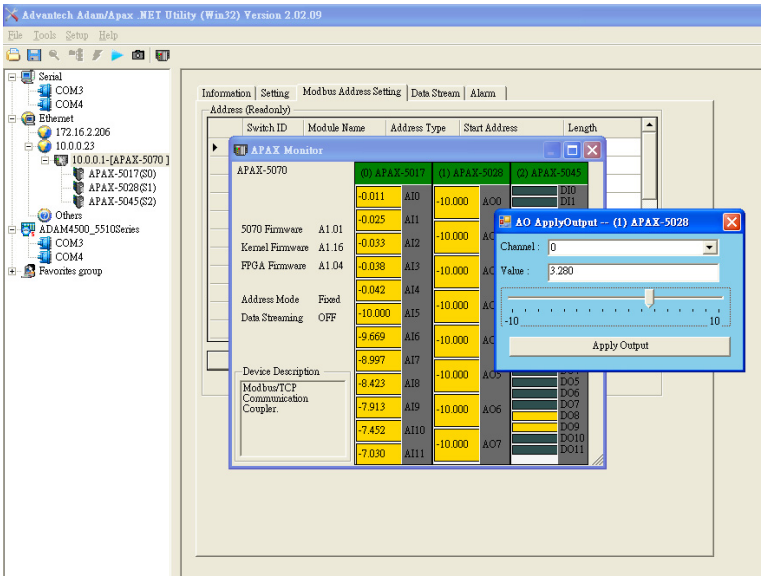
- Click the **Start/Stop** button to start or stop the data collection. After you click the **Start** button, every time the host receive a pack of data, a new line represented the latest data from APAX-5070 will be added in the **Package** window. When the package number (the raw number in the **Package** window) is more than 11, there will be one scroll bar automatically appearing at the right side of the **Package** window. You can drag the scroll bar up and down to see all historical data. Click the **Auto Scroll** check box, then the latest data will always appear in the **Package** window.
- For Data Stream, there are two types of package transferred: Data message and Alarm message. Data message includes all module's channel value. Alarm message will be transferred only when alarm happens. Refer to Section B.2.5 for more detail about Alarm function. Alarm message will be shown with red text in the **Package** window. You also can click the **Alarm message only** check box, then only the alarm message will be displayed on this window. Click specific raw in the **Package** window, you can see the analyzed data within a specific package in the **Analysis** window. Refer to figure below. The third package is analyzed and displayed.



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.
9. **APAX Monitor** - When you select this option, there will be one pop-up window showing status of all APAX-5000 I/O modules connected with APAX-5070, including ID number and channel value. Refer to the figure below.



10. DI and AI channel values are displayed on the window. Click the DO channels to change its value. Clicking the AO channels, another pop-up window will let you configure the output value. Click the **Apply** button after you adjust the output value. (Refer to figure below)



- The **Setup** menu

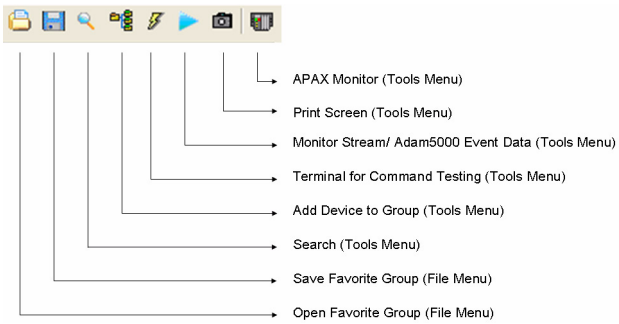
1. **Favorite Group** - You can configure your favorite group including add one new device (only for remote device), modify or delete one current device, sort current devices and diagnose connection to one device.
2. **Refresh COM and LAN node** - ADAM/APAX .NET utility will refresh the serial and LAN network connection situation.
3. **Add COM Port Tree Nodes** - This option is used to add serial COM ports in APAX.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.

B.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:



B.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-5070 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.

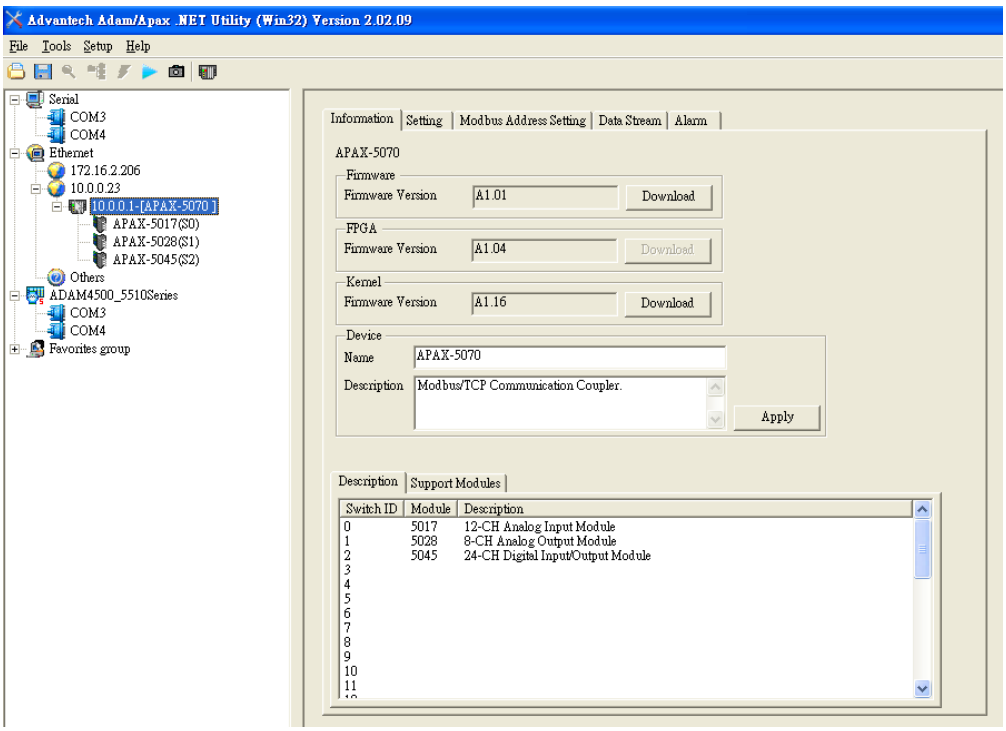
B.1.4 Status Display Area

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.

B.2 General Configuration

If you click the **APAX-5070** item in the **Module Tree Display Area**, the **Status Display Area** should looks as figure below. There will be five configuration tabs shown on the Status Display Area: Information, Setting, Module Address Setting, Data Stream, Alarm.

B.2.1 Information

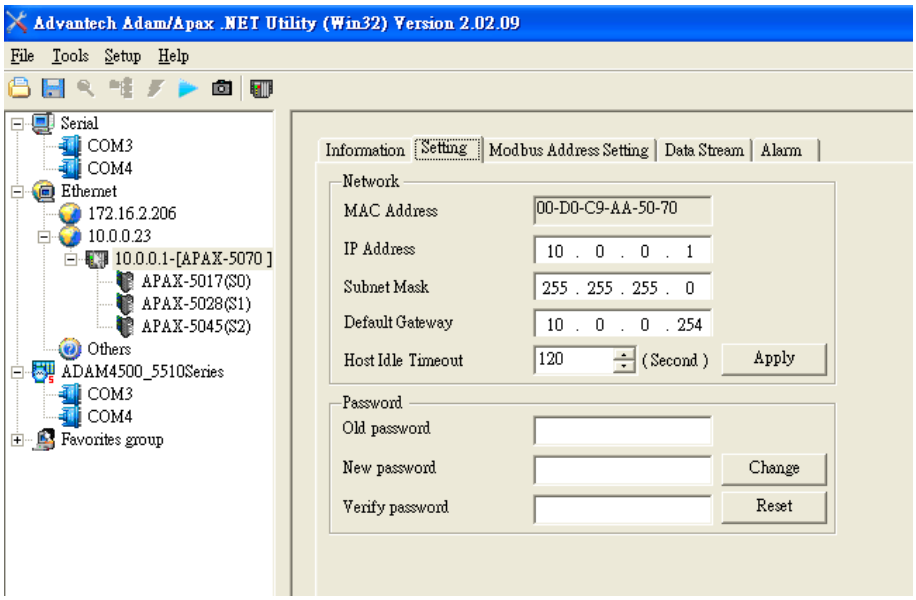


Refer to figure above. You can download related firmware to selected APAX-5070 by clicking the **Download** button in the **Firmware** and **Kernel** area. You also can name the selected APAX-5070 module by the **Name** and **Description** text box in the Device area. All I/O modules connected with APAX-5070 module with its ID number are listed in the **Description** tab in the **Module Tree Display** Area (the left tab) and **Description** tab on **Status Display** Area. You can see all I/O modules supported by APAX-5070 by the **Support Modules** tab.

B.2.2 Setting

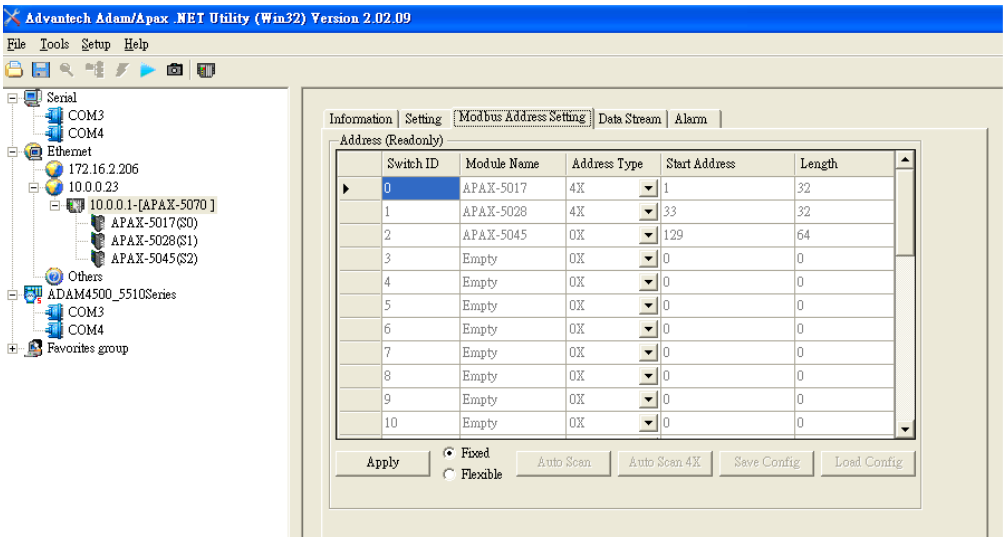
Here, you can change related networking setting, including IP address, Subnet Mask, Default Gateway, and Host Idle Timeout. After you have complete the setting, click the **Apply** button to apply the setting. Besides, you also can change the password setting. Enter current password in the **Old password** text box, and enter the new password you want to use in the **New password** and **Verify password** text boxes. Then Click the **Change** button to apply the new password.

The maximum connection between host device and one single APAX-5070 is 16. In other words, there could be maximum 16 host devices connecting to one APAX-5070 at the same time. In order to ensure a new connection can be established, there will be host idel timeout. When the timeout reaches, the connection between specific host device and APAX-5070 will be disconnected, letting a new host device able to connect to that APAX-5070. The **Host Idle Timeout** combo box defines how long the connection between host and APAX-5070 will be disconnected if there is no package transferred from that host to APAX-5070.



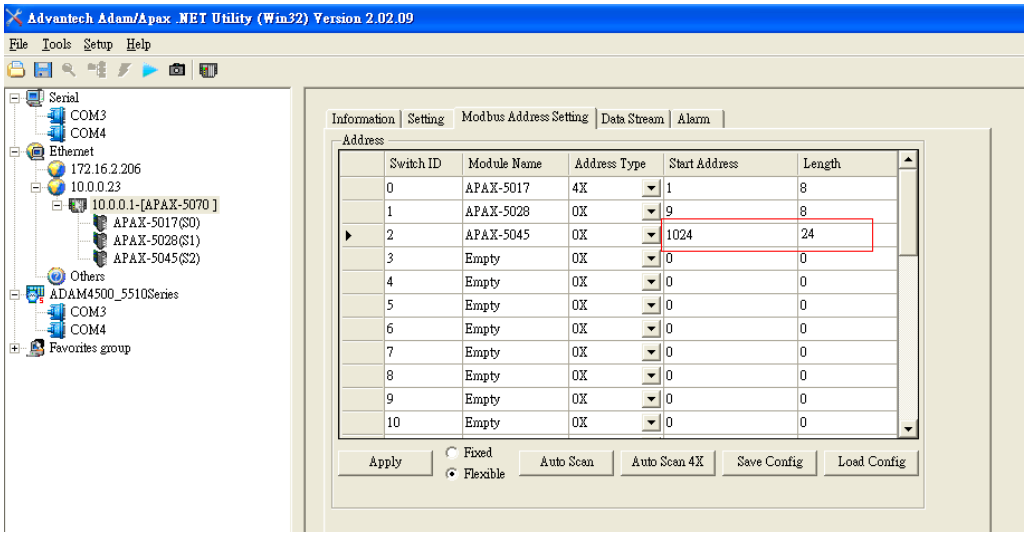
B.2.3 Modbus Address Setting

The most important configuration for APAX-5070 is to define the Modbus address mapping. After you have completed the address mapping, you can simply get data from or write data to APAX-5070 through the defined address. APAX-5070 offer two selections to assign the address: Fixed mapping mode and Flexible mapping mode (by clicking the **Fixed** and **Flexible** radio button and then clicking the **Apply** button)



When you choose Fixed mapping mode, all APAX-5000 I/O modules' Modbus address will be assigned by system, as the figure shown above. Refer to Appendix C for how the system will allocate the Modbus address of your APAX-5000 I/O modules.

When you choose Flexible mapping mode, it means you can allocate all Modbus address manually. Simply click the **Start Address** and **Length** text box and enter the desired number to define related Modbus address for a specific module. Refer to figure below, user is configuring the start address as 1024 and length as 64 for APAX-5045 module. The pencil icon shown on the left side of the raw "APAX-5045" means this module's Modbus address is editing.



Note! *1.All Modbus address you can allocate must lie between 00001 ~ 09999 (0x or 4x)*

2.Modbus address 0x can only be used for APAX DI/O modules

3.Modbus address 4x can be used for APAX DI/O, AI/O and counter modules

4.Modbus address of a module with less ID number MUST NOT exceed Modbus address of a module with larger ID number

(Example: Modbus address of the module with ID number 5 should be less than Modbus address of a module with ID number 6)

5.Length of Modbus address 0x MUST be multiples of 8

Except for manually assigned all Modbus address by yourself, you also can click the **Auto Scan** or **Auto Scan (4X)** buttons to let APAX-5070 automatically find the optimized Modbus address allocation, according to module's channel number and type. The difference between these two options from the Fixed mapping mode lies in the address allocation way. Refer to table below.

Fixed Mapping Mode

Module ID	Module Name	Address Type	Start Address	Length	Modbus Address
0	APAX-5017	4x	1	32	40001 ~ 40032
1	APAX-5028	4x	33	32	40033 ~ 40064
2	APAX-5045	0x	129	64	00129 ~ 00192

Flexbile Mapping Mode (Auto Scan)

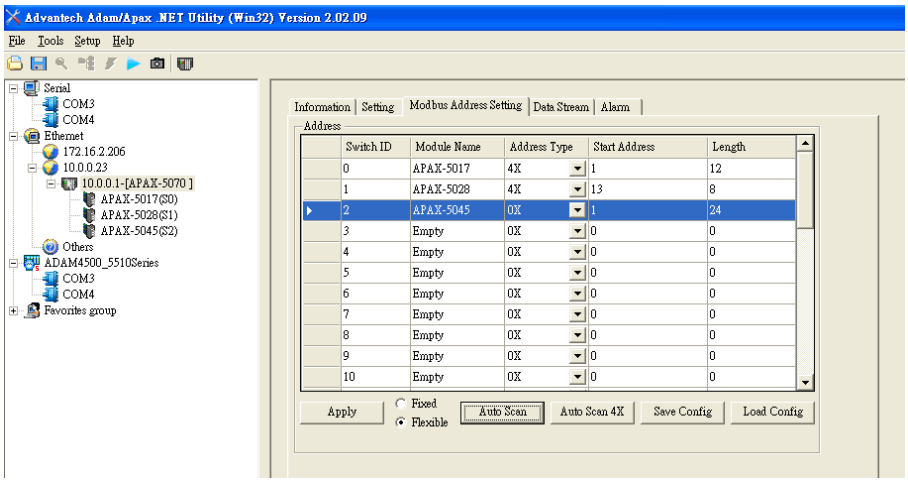
Module ID	Module Name	Address Type	Start Address	Length	Modbus Address
0	APAX-5017	4x	1	12	40001 ~ 40012
1	APAX-5028	4x	13	8	40013 ~ 40020
2	APAX-5045	0x	1	24	00001 ~ 00024

Flexbile Mapping Mode (Auto Scan 4X)

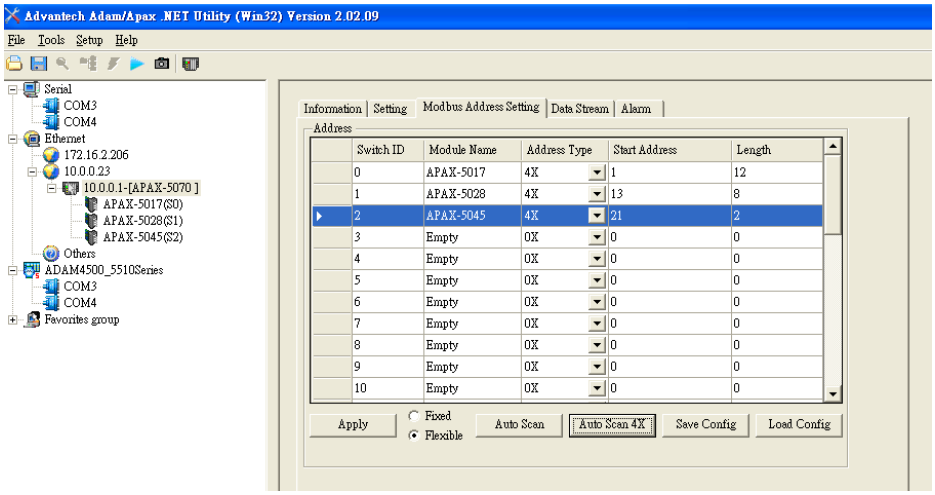
Module ID	Module Name	Address Type	Start Address	Length	Modbus Address
0	APAX-5017	4x	1	12	40001 ~ 40012
1	APAX-5028	4x	13	8	40013 ~ 40020
2	APAX-5045	4x	21	2	40021 ~ 40022

For each APAX-5000 I/O module, it will be expected to occupy 64 addresses for all channels' data if the Modbus address type is 0x (32 registers will be occupied if the Modbus address type is 4x.) for Fixed mapping mode. However, usually it doesn't need so many addresses because the channel number is less. Taking APAX-5017 module as example, 32 Modbus registers will be expected to be used for Fixed mapping mode. But APAX-5017 module only has 16 channels, and each channel only needs one 4x register.

So if you choose Auto Scan mode, only 16 Modbus registers will be used for APAX-5017. This mechanism can help to ignore unused address in the Modbus data package transferred from APAX-5070 to remote target (PC in this example), making the data transferring more efficient (decrease the times to transfer Modbus data).



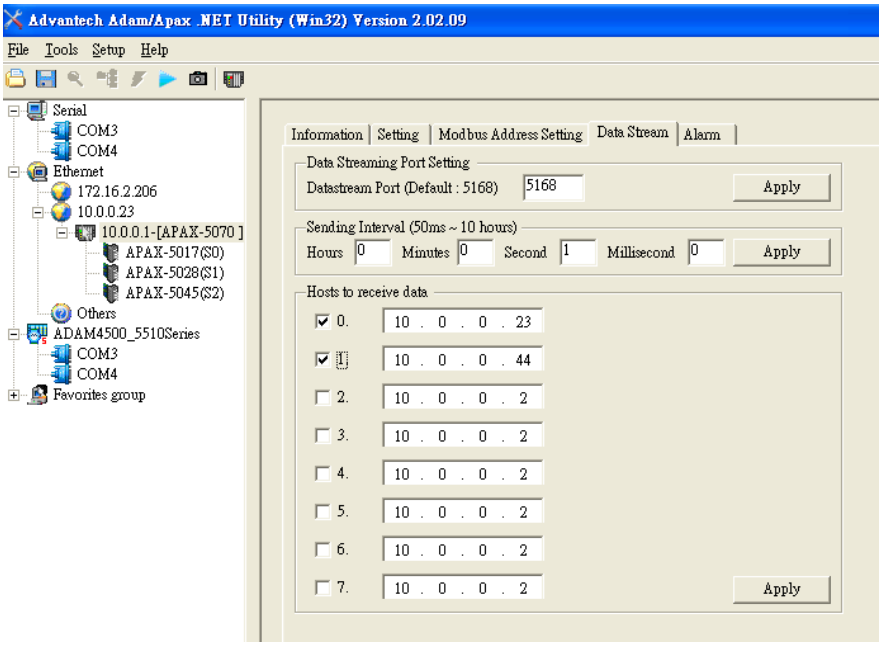
When you choose Auto Scan (4X) mode, all module's data will be assigned to Modbus 4x registers sequentially. It makes the data transferring performance even better.



Click the **Save Config** button to save current Modbus address mapping setting into a specific file. Next tme, you can click the **Load Config** button to load previous address mapping setting.

B.2.4 Data Stream

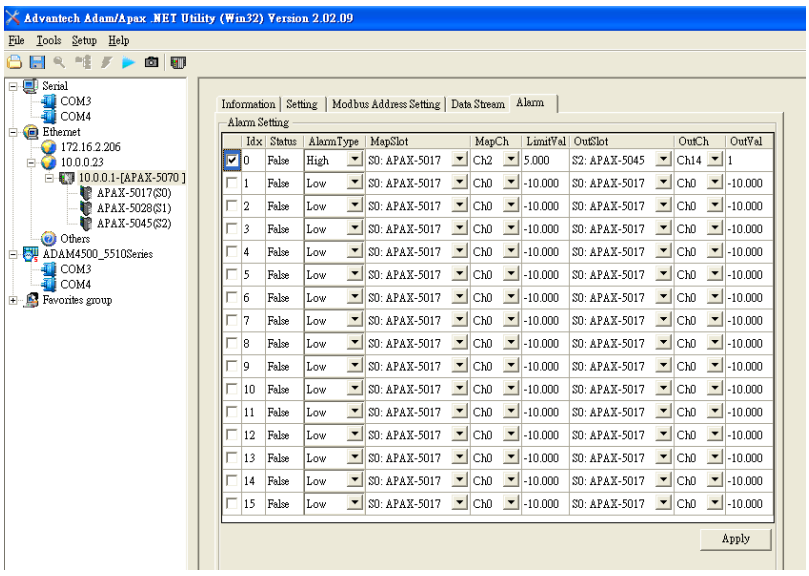
APAX-5070 supports Data Stream function. When you enable this function, APAX-5070 will automatically and periodically send its Modbus data to remote host. Define the period by the **Hours**, **Minutes**, **Second** and **Millisecond** text box in the **Sending Interval (50ms ~ 10 hours)** Area. Refer to figure below. The period in this example is 1 second. Then, type the IP address of the hosts, which you want to use to receive the data transferred from APAX-5070 module, and click related check box in the **Hosts to receive data** Area. The host in this example is equipped with IP address 10.0.0.23 and 10.0.0.44. You also can change the port number used for Data Stream by the **Datastream Port (Default: 5168)** text box in the **Data Stream Port Setting** Area. For each configuration, remember to click **Apply** button to apply your configuration.



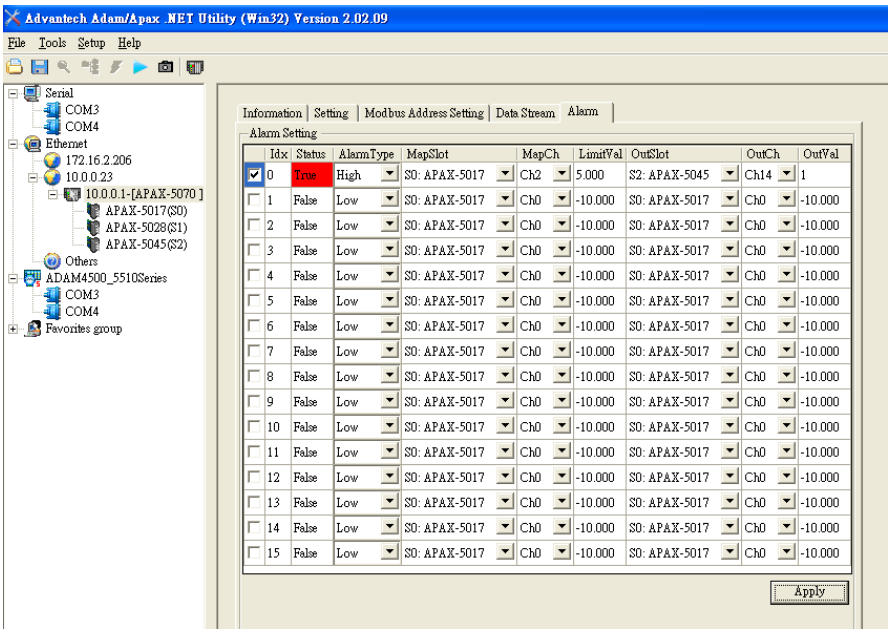
B.2.5 Alarm

APAX-5070 supports Alarm function. You can use specific input channel value from a selected APAX-5000 module (connected with APAX-5070 module) as parameter. And if that channel value is higher or lower than a pre-defined reference value, then an alarm will be activated. An output channel value of a selected output module will change according to your define.

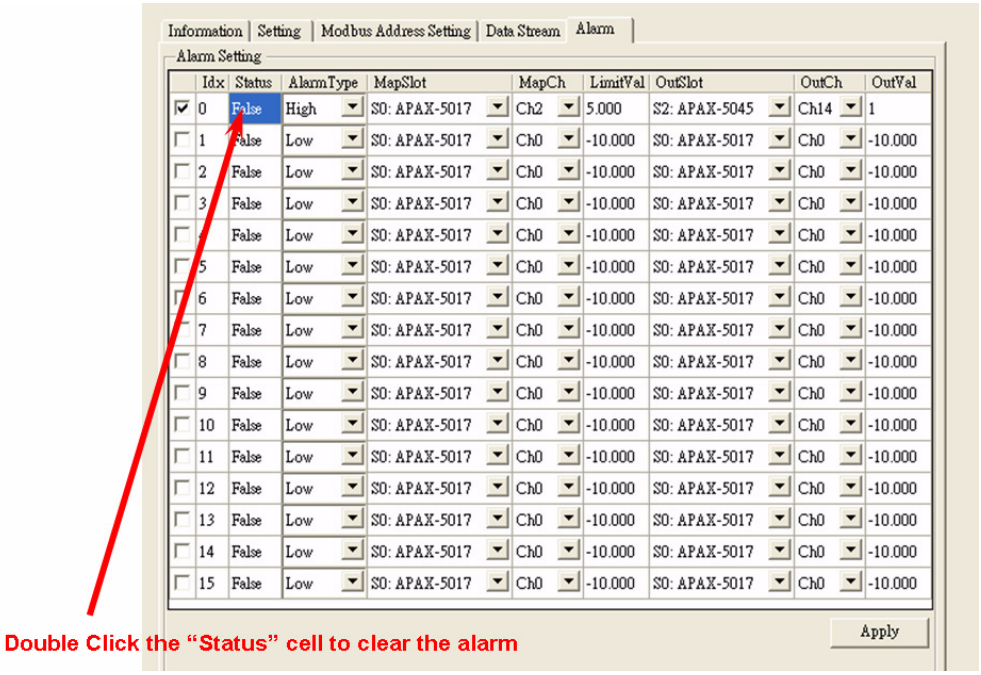
There are maximum 16 alarms you can use for one APAX-5070 module. Refer to figure below. In this example, alarm 0 will be activated when channel 2 value of APAX-5017 module (ID number 0) is higher than 5. And APAX-5045 module's (ID number 2) 14th channel value (APAX-5045 has 12 DI channels and 12 DO channels, so it is DO channel 2) will become logic high (integer value "1") at this moment.



You can simply click the cells of the **LimitVal** column and enter the reference value. (In this example, it is 5.) And you can click the cells of the **OutVal** column and enter the desired output value. (In this example, it is 1.) Remember to click the check box to enable the specific alarms. After the alarm setting is done, click the **Apply** button to apply the configuration. At this moment, you can see the alarm value shown in the cells of the **Status** column. (In this example, it is "True", meaning the alarm is happening)

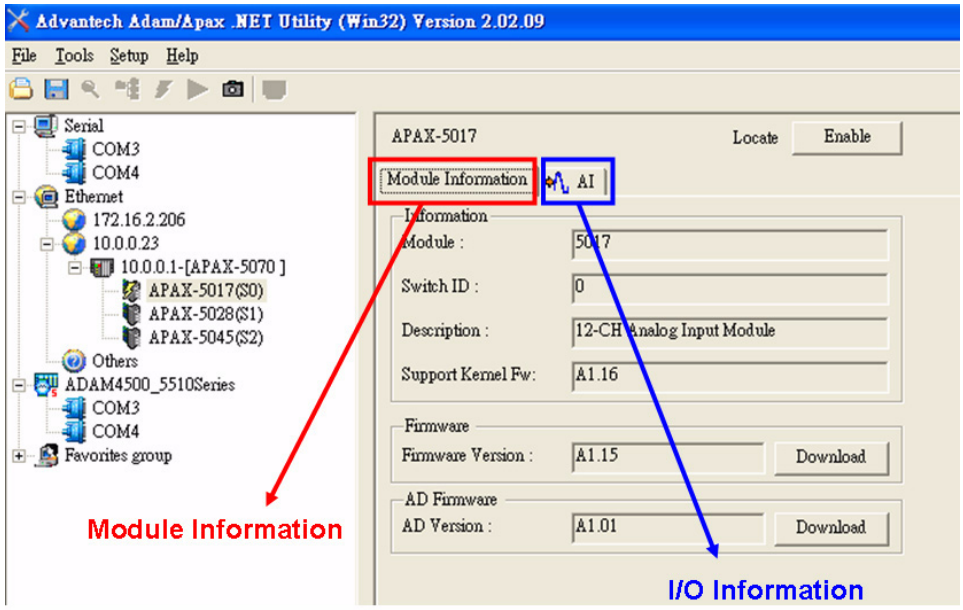


Note! *Once the alarm condition has occurred, even if the condition disappears, the alarm status will remain "True". You need to manually clear the alarm to make its status back to "False". Double click related cells of the **Status** column will clear the alarm.*



B.3 I/O Module Configuration

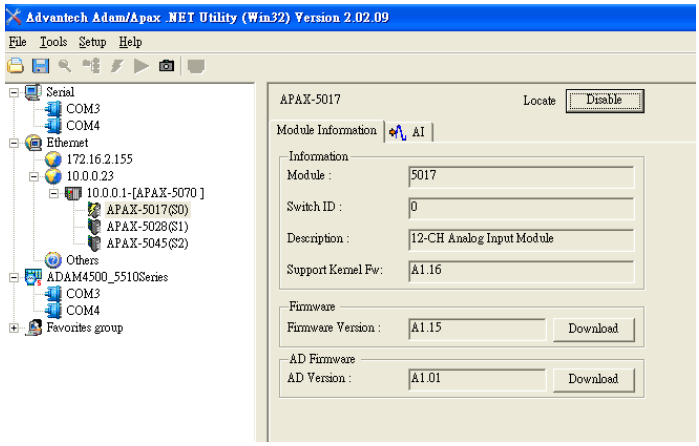
When you click any I/O module in the **Module Tree Display** Area, the **Status Display** Area at the right side will automatically change to show the module's information. There will be two tabs displayed: **Module Information** and **I/O Information**. (Refer to the figure below)



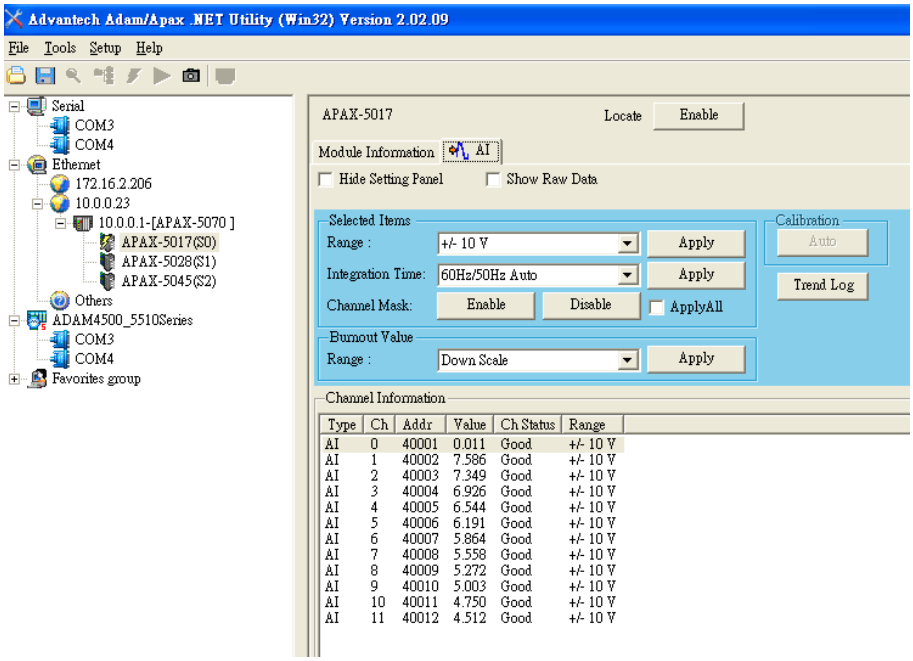
On the **Module Information** tab, module information (such as module name, switch ID, module description, and firmware version) is displayed. You also can update related firmware to the specific module by the **Download** button.

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.



B.3.1 Analog Input Modules

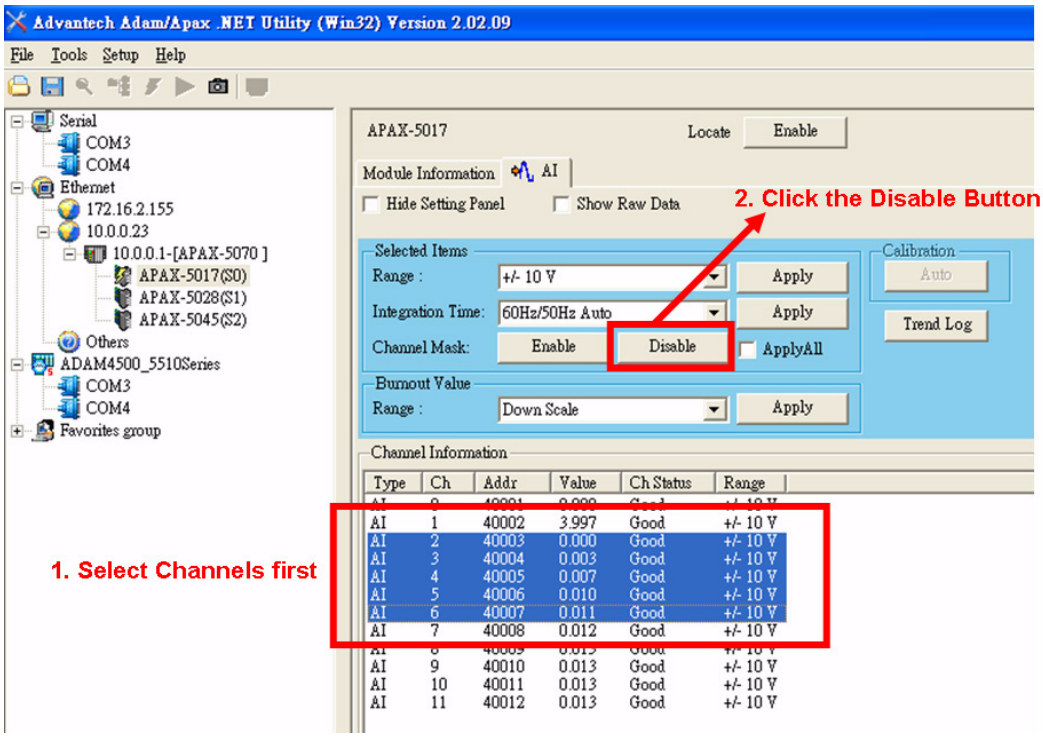


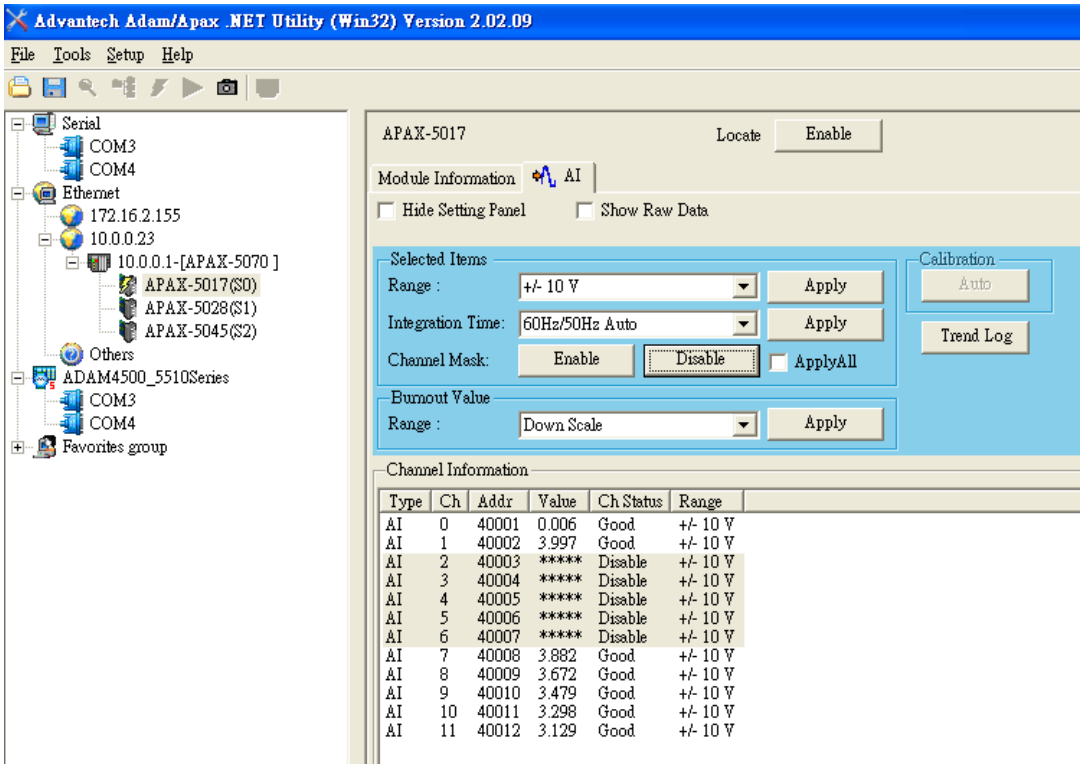
There are two parts for the **I/O Informaion** tab of APAX-5000 AI module. At the bottom is the **Channel Information** Area. You can see all channels' type, Modbus address, value, channel status (burnout or not), and range. Above the **Channel Information** Area is the **Setting Panel** Area. If you 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.*

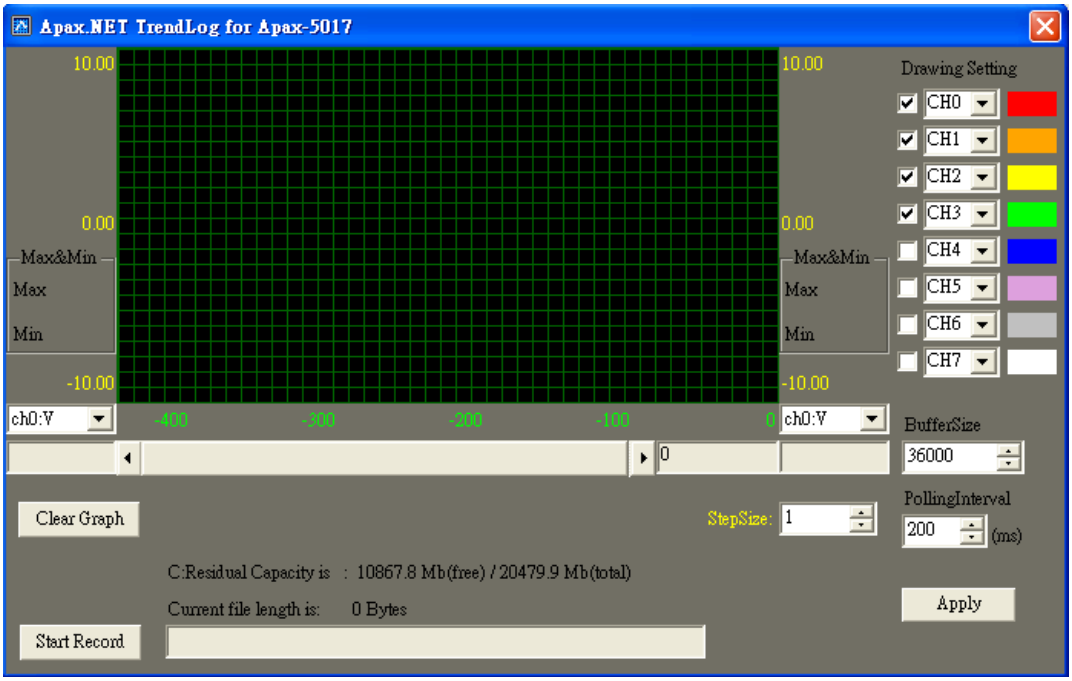
You can define specific channels reading or not by the **Enable** and **Disable** buttons. Refer to figure below, channel 2 ~ 6 are disabled that no data will be read.



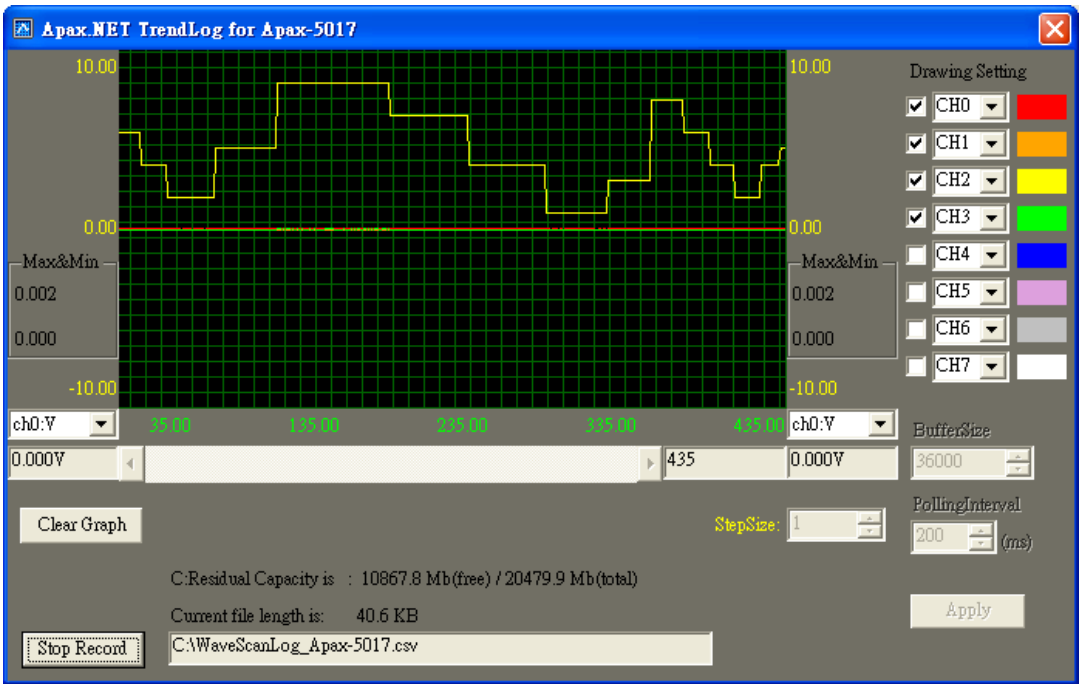


Most APAX-5000 analog module supports auto calibration. To perform calibration, you need to enable calibration function by **Setup** menu (**Setup>>Enable Calibration Function**). After that, you can perform auto calibration to the AI modules by clicking the **Auto** button in the **Calibration** Area. 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.



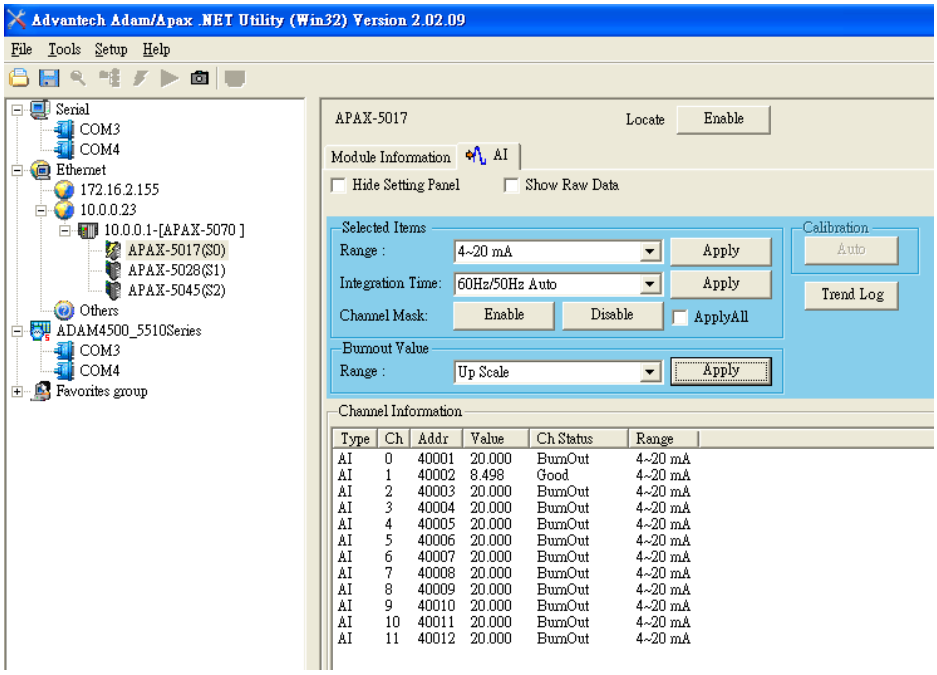
Click the **Start Record** to start data logging. At first, a pop-up window will appear to let you configure where you want to save the log file. Then, the data logging will start and the data will be displayed on the plot.



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:

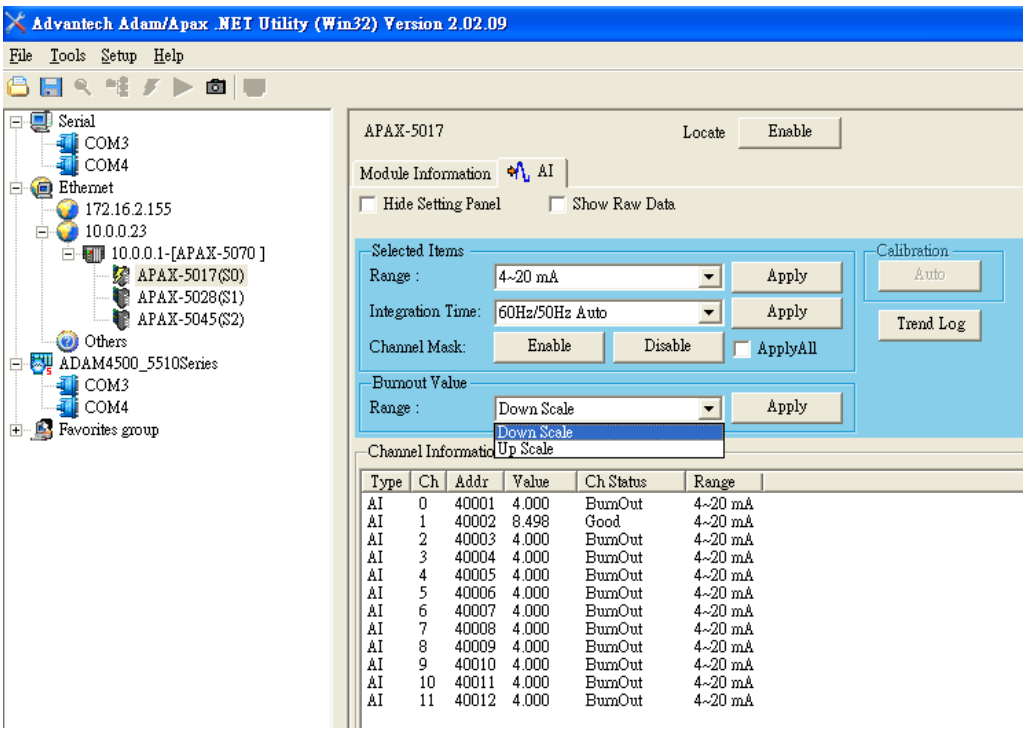
1. APAX-5013: Burnout function available for RTD input (all type)
2. APAX-5017: Burnout function only available for current input (only 4 ~ 20 mA)
3. APAX-5017H: Burnout function only available for current input (only 4 ~ 20 mA)
4. APAX-5018: Burnout function available for thermocouple input (all type)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

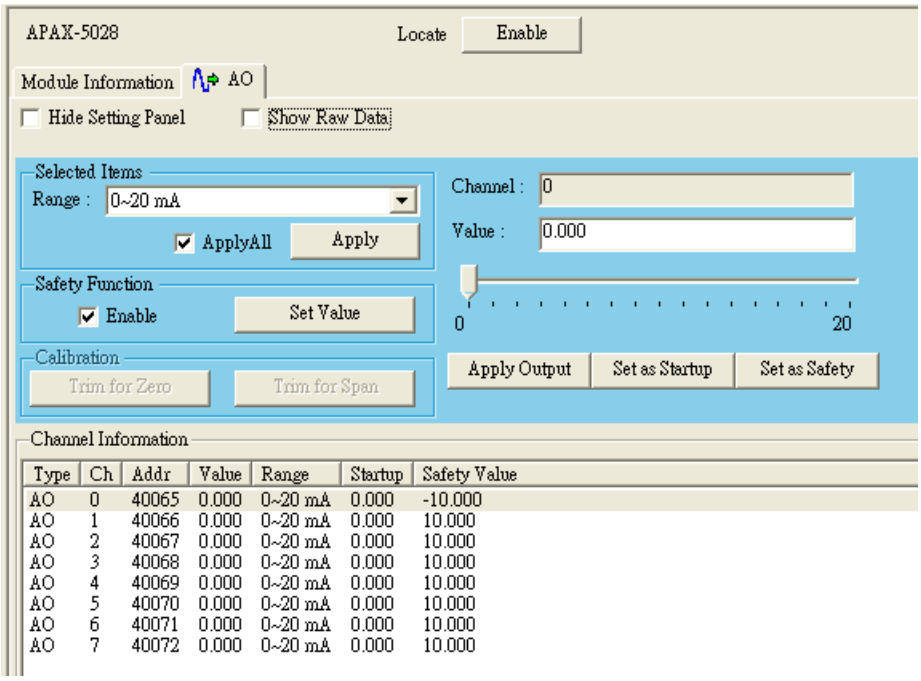


You can choose to show the maximum value or minimum value of the input range as the read value when burnout condition happens (no wire input signal). It is configured by the **Range** combo box in the **Burnout Value** Area. Refer to figure above. The setting is "Up scale", meaning the maximum value 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)



B.3.2 Analog Output Module



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.

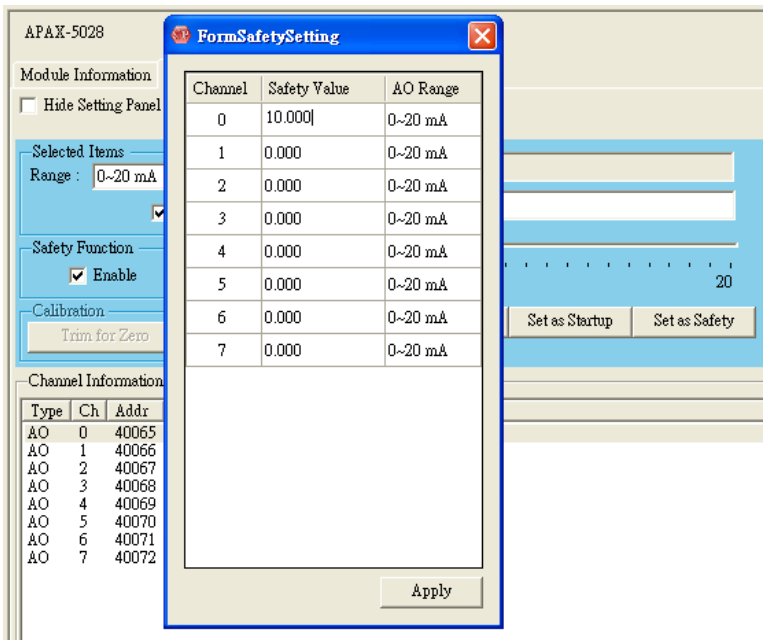
If you want to configure specific output channels' range, select the channels in the **Channel Information** Area. Choose appropriate range by the **Range** combo box in the **Setting Panel** Area and then click the **Apply** button to save the configuration. If you want to save the same range setting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

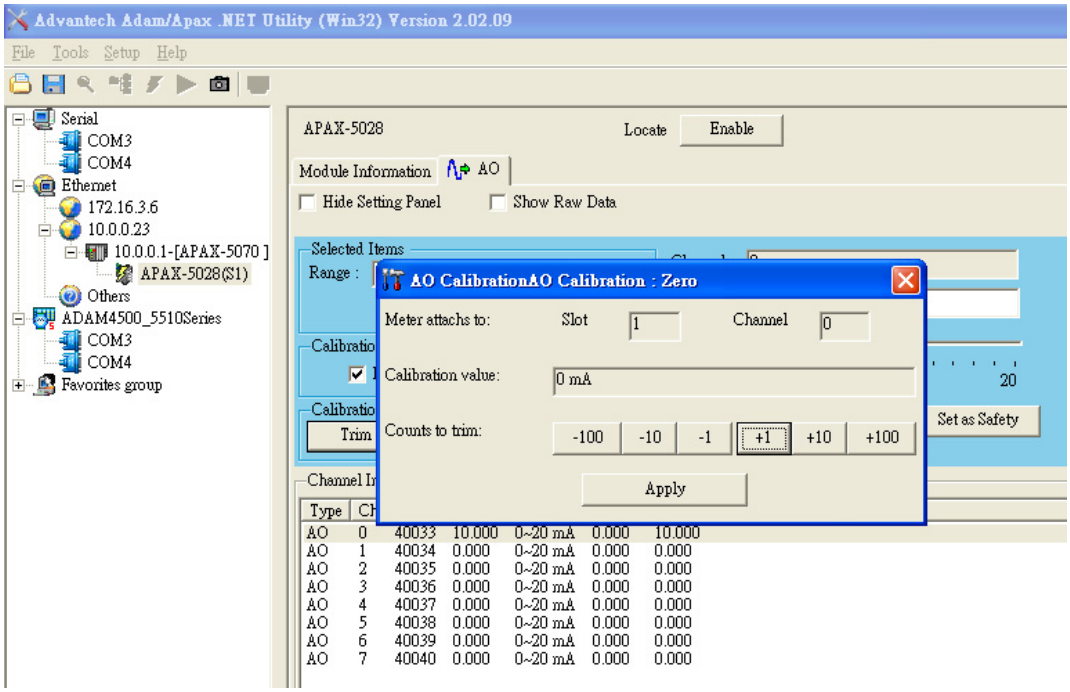
Then, click the **Set Value** button to configure the safety value. A pop-up window will appear, like the figure below. You can simply type the desired safety value for each channel. In this example, safety value of channel 0 is configured as 10 mA, while other channels' are 0 mA. Click the **Apply** 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.



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.

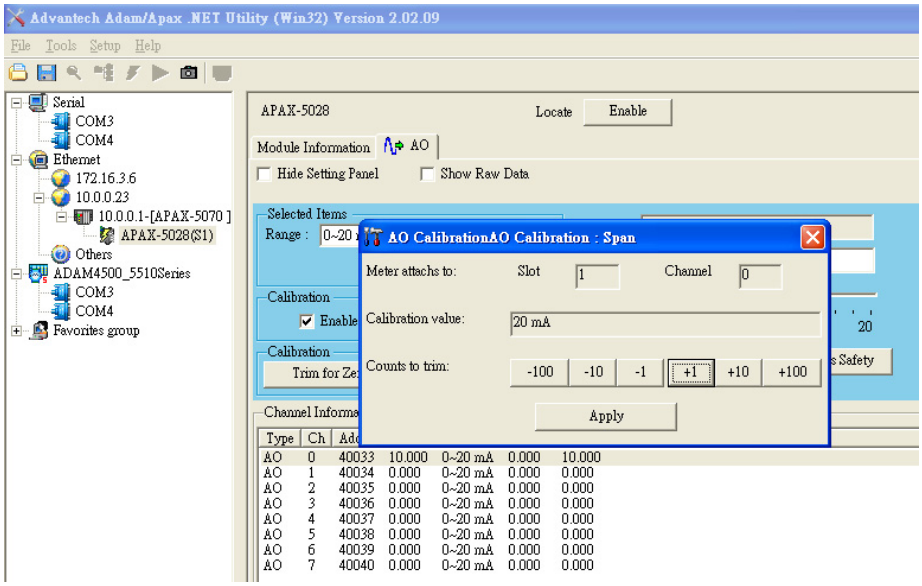
Note! *The zero calibration can only be implemented when the AO range is ±10V, ±5V or 0 ~ 20 mA*



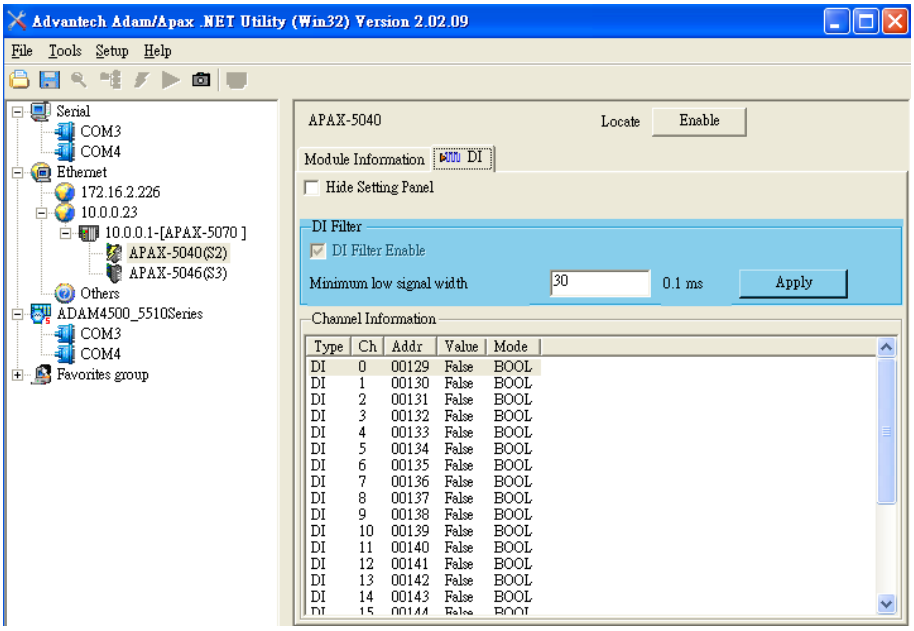
When you click the **Trim to Span** button, you will see a dialog popping-up as figure below. The specific channel will generate output signal using the maximum value within range which is shown in the **Calibration Value** text box. Connect that channel to an external accurate instrument and measure 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! *Note: The S\span calibration can only be implemented when the AO range is ±10V, ±5V or 0 ~ 20 mA*



B.3.3 Digital Input Module



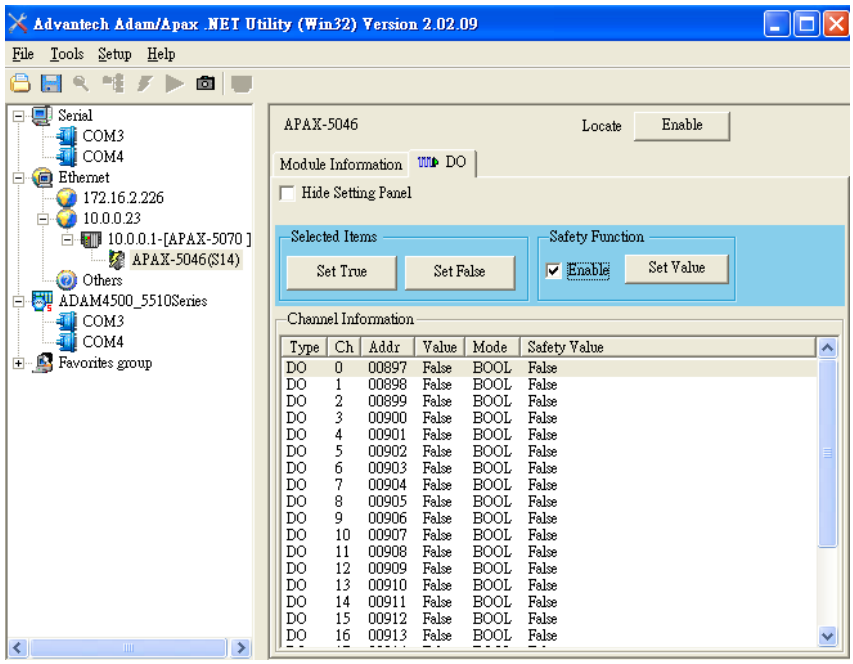
There are two parts for the **I/O Information** tab of APAX-5000 DI module. At the bottom is the **Channel Information** Area. You can see all channels' type, Modbus addres, value, and mode. Above the **Channel Information** Area is the **Setting Panel**

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.*

B.3.4 Digital Output Module

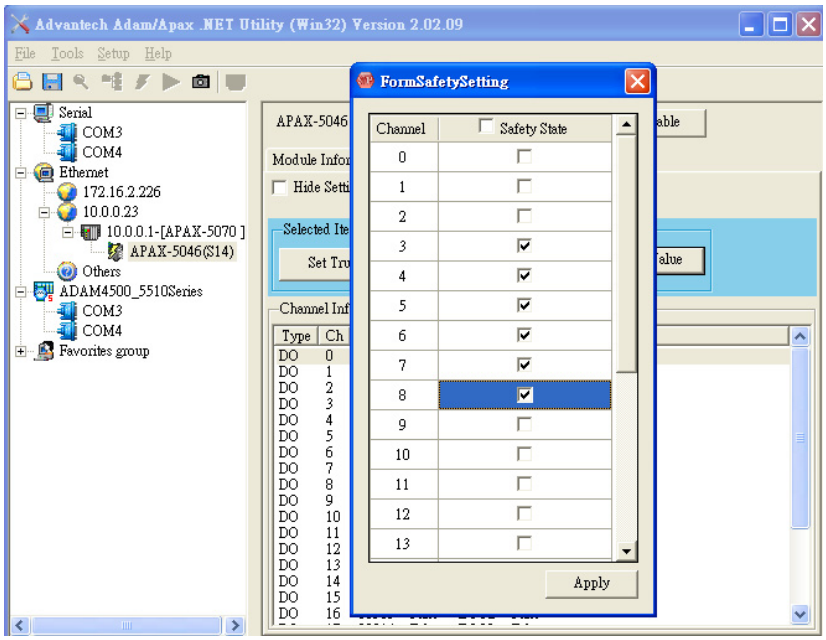


There are two parts for the **I/O Information** tab of APAX-5000 DO module. At the bottom is the **Channel Information** Area. You can see all channels' type, Modbus address, value, mode and safety value (the default value when the communication is broken). Above the **Channel Information** Area is the **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 have complete your setting. (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.



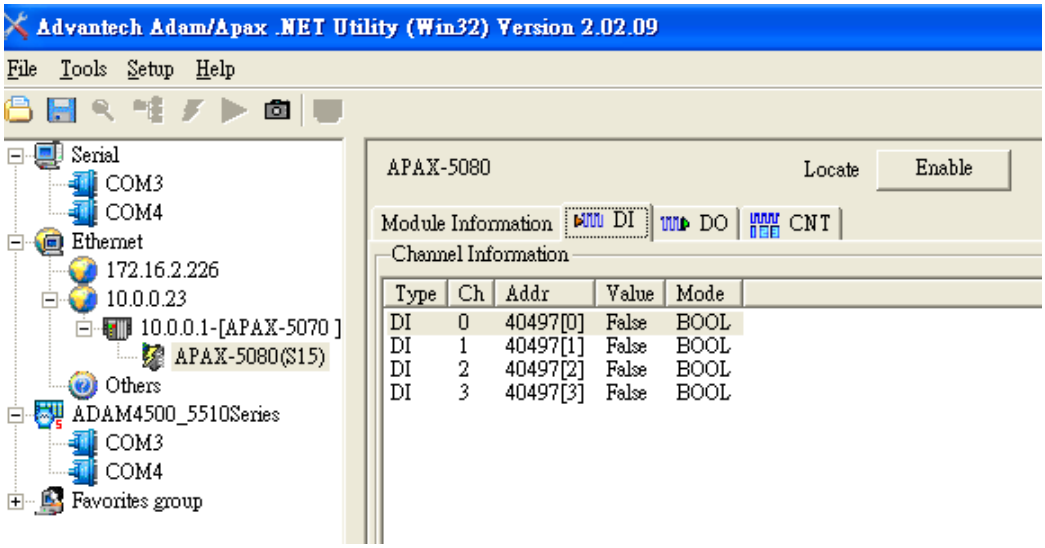
B.3.5 Counter Module

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

(A) DI tab for digital input channels

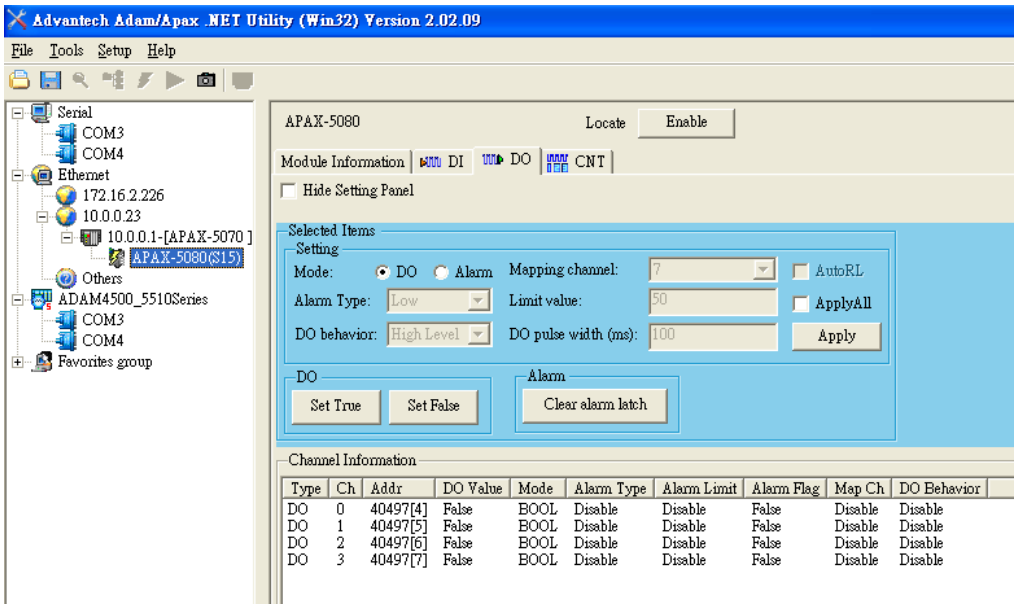
Refer to figure below. It is similar to standard DI module's **I/O Information** tab (Refer to Section B.3.3). At the bottom is the **Channel Information** Area. You can see all channels' type, Modbus address, value, and mode.

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.*



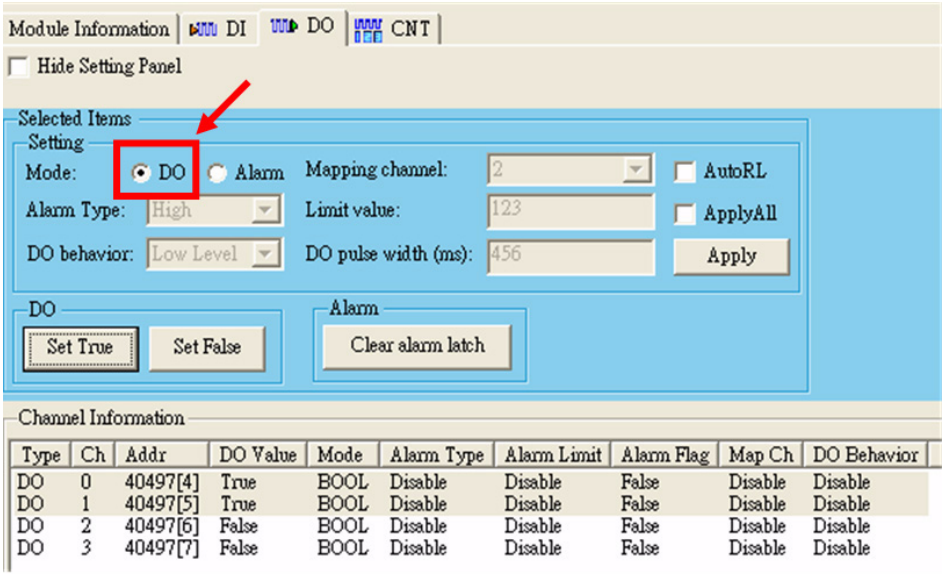
(B) DO tab for digital output channels

The DO tab for counter module looks very similar to the DO module's **I/O Information** tab (Refer to Section B.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.



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.

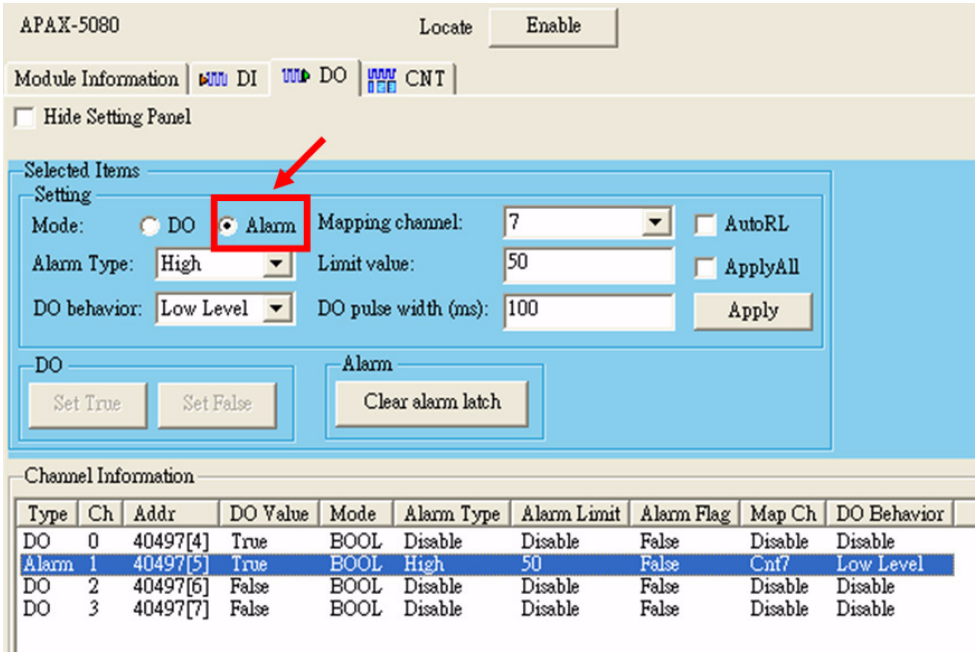


When you select Alarm mode for specific channels, those channels' value will be changed automatically based on the mapping counter input channel's value. In other words, the DO channel becomes alarm channel for specific counter channel. Below are some related parameters you need to set for alarm:

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.

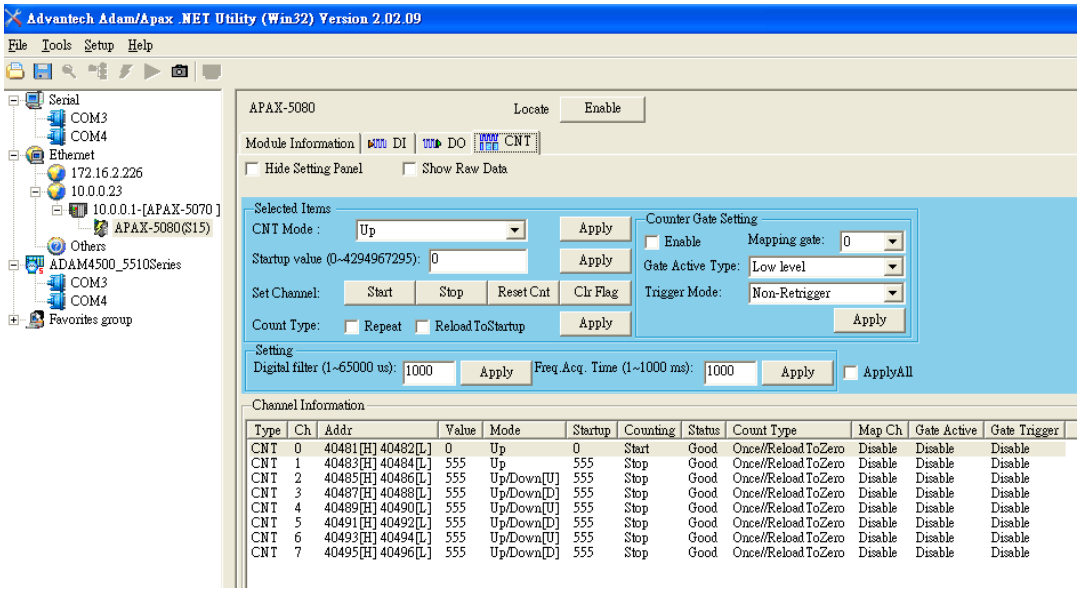
Refer to figure below. DO channel 1 is configured as alarm channel for counter input channel 7 (defined by the **Mapping channel** combo box). So as long as the counted value of the counter input channel 7 is greater (defined by the **Alarm Type** combo box) than 50 (defined by the **Limit value** combo 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).



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.



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 A**pplyAll** 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.

Appendix C

Modbus/TCP Address Mapping Table

C.1 Modbus/TCP Fixed Mode Address Mapping Table (0x)

Start Address	Length	Address (0x)	Description	Attribute
1	64	00001 ~ 00064	DI/O channels' value (module with ID # 0)	Read/Write
65	64	00065 ~ 00128	DI/O channels' value (module with ID # 1)	Read/Write
129	64	00129 ~ 00192	DI/O channels' value (module with ID # 2)	Read/Write
193	64	00193 ~ 00256	DI/O channels' value (module with ID # 3)	Read/Write
257	64	00257 ~ 00320	DI/O channels' value (module with ID # 4)	Read/Write
321	64	00321 ~ 00384	DI/O channels' value (module with ID # 5)	Read/Write
385	64	00385 ~ 00448	DI/O channels' value (module with ID # 6)	Read/Write
449	64	00449 ~ 00512	DI/O channels' value (module with ID # 7)	Read/Write
513	64	00513 ~ 00576	DI/O channels' value (module with ID # 8)	Read/Write
577	64	00577 ~ 00640	DI/O channels' value (module with ID # 9)	Read/Write
641	64	00641 ~ 00704	DI/O channels' value (module with ID # 10)	Read/Write
705	64	00705 ~ 00768	DI/O channels' value (module with ID # 11)	Read/Write
769	64	00769 ~ 00832	DI/O channels' value (module with ID # 12)	Read/Write
833	64	00833 ~ 00896	DI/O channels' value (module with ID # 13)	Read/Write
897	64	00897 ~ 00960	DI/O channels' value (module with ID # 14)	Read/Write
961	64	00961 ~ 01024	DI/O channels' value (module with ID # 15)	Read/Write
1025	64	01025 ~ 01088	DI/O channels' value (module with ID # 16)	Read/Write
1089	64	01089 ~ 01152	DI/O channels' value (module with ID # 17)	Read/Write
1153	64	01153 ~ 01216	DI/O channels' value (module with ID # 18)	Read/Write
1217	64	01217 ~ 01280	DI/O channels' value (module with ID # 19)	Read/Write
1281	64	01281 ~ 01344	DI/O channels' value (module with ID # 20)	Read/Write
1345	64	01345 ~ 01408	DI/O channels' value (module with ID # 21)	Read/Write
1409	64	01409 ~ 01472	DI/O channels' value (module with ID # 22)	Read/Write
1473	64	01473 ~ 01536	DI/O channels' value (module with ID # 23)	Read/Write
1537	64	01537 ~ 01600	DI/O channels' value (module with ID # 24)	Read/Write
1601	64	01601 ~ 01664	DI/O channels' value (module with ID # 25)	Read/Write
1665	64	01665 ~ 01728	DI/O channels' value (module with ID # 26)	Read/Write
1729	64	01729 ~ 01792	DI/O channels' value (module with ID # 27)	Read/Write
1793	64	01793 ~ 01856	DI/O channels' value (module with ID # 28)	Read/Write
1857	64	01857 ~ 01920	DI/O channels' value (module with ID # 29)	Read/Write
1921	64	01921 ~ 01984	DI/O channels' value (module with ID # 30)	Read/Write
1985	64	01985 ~ 02048	DI/O channels' value (module with ID # 31)	Read/Write

Example 1: Read channel 2 value from APAX-5040 DI module with ID number 2

ID number 2 means the Modbus address is between **00129 ~ 00192**

For DI/O module, each channel occupy one 0x address (1-bit)

Therefore, You can read channel 2 value from Modbus address **00131**

Example 2: Write *"True"* value to channel 5 of APAX-5046 DO module with ID number 7

ID number 7 means the Modbus address is between **00449 ~ 00512**

For DI/O module, each channel occupy 1 0x address (1-bit)

Therefore, You can write *"True"* value to Modbus address **00453** for channel 5

C.2 Modbus/TCP Fixed Mode Address Mapping Table (4x)

Start Address	Length	Address (4x)	Description	Attribute
1	32	00001 ~ 00032	AI/O, counter channels' value (module with ID # 0)	Read/Write
33	32	00033 ~ 00064	AI/O, counter channels' value (module with ID # 1)	Read/Write
65	32	00065 ~ 00096	AI/O, counter channels' value (module with ID # 2)	Read/Write
97	32	00097 ~ 00128	AI/O, counter channels' value (module with ID # 3)	Read/Write
129	32	00129 ~ 00160	AI/O, counter channels' value (module with ID # 4)	Read/Write
161	32	00161 ~ 00192	AI/O, counter channels' value (module with ID # 5)	Read/Write
193	32	00193 ~ 00224	AI/O, counter channels' value (module with ID # 6)	Read/Write
225	32	00225 ~ 00256	AI/O, counter channels' value (module with ID # 7)	Read/Write
257	32	00257 ~ 00288	AI/O, counter channels' value (module with ID # 8)	Read/Write
289	32	00289 ~ 00320	AI/O, counter channels' value (module with ID # 9)	Read/Write
321	32	00321 ~ 00352	AI/O, counter channels' value (module with ID # 10)	Read/Write
353	32	00353 ~ 00384	AI/O, counter channels' value (module with ID # 11)	Read/Write
385	32	00385 ~ 00416	AI/O, counter channels' value (module with ID # 12)	Read/Write
417	32	00417 ~ 00448	AI/O, counter channels' value (module with ID # 13)	Read/Write
449	32	00449 ~ 00480	AI/O, counter channels' value (module with ID # 14)	Read/Write
481	32	00481 ~ 00512	AI/O, counter channels' value (module with ID # 15)	Read/Write
513	32	00513 ~ 00544	AI/O, counter channels' value (module with ID # 16)	Read/Write
545	32	00545 ~ 00576	AI/O, counter channels' value (module with ID # 17)	Read/Write
577	32	00577 ~ 00608	AI/O, counter channels' value (module with ID # 18)	Read/Write
609	32	00609 ~ 00600	AI/O, counter channels' value (module with ID # 19)	Read/Write
641	32	00641 ~ 00672	AI/O, counter channels' value (module with ID # 20)	Read/Write
673	32	00673 ~ 00704	AI/O, counter channels' value (module with ID # 21)	Read/Write
705	32	00705 ~ 00736	AI/O, counter channels' value (module with ID # 22)	Read/Write
737	32	00737 ~ 00768	AI/O, counter channels' value (module with ID # 23)	Read/Write
769	32	00769 ~ 00800	AI/O, counter channels' value (module with ID # 24)	Read/Write
801	32	00801 ~ 00832	AI/O, counter channels' value (module with ID # 25)	Read/Write
833	32	00833 ~ 00864	AI/O, counter channels' value (module with ID # 26)	Read/Write
865	32	00865 ~ 00896	AI/O, counter channels' value (module with ID # 27)	Read/Write
897	32	00897 ~ 00928	AI/O, counter channels' value (module with ID # 28)	Read/Write
929	32	00929 ~ 00960	AI/O, counter channels' value (module with ID # 29)	Read/Write
961	32	00961 ~ 00992	AI/O, counter channels' value (module with ID # 30)	Read/Write
993	32	00993 ~ 01024	AI/O, counter channels' value (module with ID # 31)	Read/Write

Example 1: Read channel 4 value from APAX-5017 **AI** module with ID number 2

ID number 2 means the Modbus address (fixed mode) is between **65 ~ 96**

For AI/O channel, each channel occupy one 4x address (2 byte)

Therefore, You can read AI channel 4 value from Modbus address **69**

Example 2: Write analog value to channel 7 on APAX-5028 **AO** module with ID number 15

ID number 15 means the Modbus address (fixed mode) is between **481 ~ 512**

For AI/O channel, each channel occupy one 4x address (2 byte)

Therefore, You can write value to AO channel 4 value by Modbus address **488**

Example 3: Read channel 2 value from APAX-5080 **Counter** module with ID number 9

ID number 9 means the Modbus address (fixed mode) is between **289 ~ 320**

For counter channel, each channel occupy two 4x address (4 byte)

Therefore, You can read channel 2 value from Modbus address **293** and **294**

Start Address	Length	Address (4x)	Description	Attribute
10001	32	10001 ~ 10032	Channels' status (module with ID # 0)	Read
10033	32	10033 ~ 10064	Channels' status (module with ID # 1)	Read
10065	32	10065 ~ 10096	Channels' status (module with ID # 2)	Read
10097	32	10097 ~ 10128	Channels' status (module with ID # 3)	Read
10129	32	10129 ~ 10160	Channels' status (module with ID # 4)	Read
10161	32	10161 ~ 10192	Channels' status (module with ID # 5)	Read
10193	32	10193 ~ 10224	Channels' status (module with ID # 6)	Read
10225	32	10225 ~ 10256	Channels' status (module with ID # 7)	Read
10257	32	10257 ~ 10288	Channels' status (module with ID # 8)	Read
10289	32	10289 ~ 10320	Channels' status (module with ID # 9)	Read
10321	32	10321 ~ 10352	Channels' status (module with ID # 10)	Read
10353	32	10353 ~ 10384	Channels' status (module with ID # 11)	Read
10385	32	10385 ~ 10416	Channels' status (module with ID # 12)	Read
10417	32	10417 ~ 10448	Channels' status (module with ID # 13)	Read
10449	32	10449 ~ 10480	Channels' status (module with ID # 14)	Read
10481	32	10481 ~ 10512	Channels' status (module with ID # 15)	Read
10513	32	10513 ~ 10544	Channels' status (module with ID # 16)	Read
10545	32	10545 ~ 10576	Channels' status (module with ID # 17)	Read
10577	32	10577 ~ 10608	Channels' status (module with ID # 18)	Read
10609	32	10609 ~ 10640	Channels' status (module with ID # 19)	Read
10641	32	10641 ~ 10672	Channels' status (module with ID # 20)	Read
10673	32	10673 ~ 10704	Channels' status (module with ID # 21)	Read
10705	32	10705 ~ 10736	Channels' status (module with ID # 22)	Read
10737	32	10737 ~ 10768	Channels' status (module with ID # 23)	Read
10769	32	10769 ~ 10800	Channels' status (module with ID # 24)	Read
10801	32	10801 ~ 10832	Channels' status (module with ID # 25)	Read
10833	32	10833 ~ 10864	Channels' status (module with ID # 26)	Read
10865	32	10865 ~ 10896	Channels' status (module with ID # 27)	Read
10897	32	10897 ~ 10928	Channels' status (module with ID # 28)	Read
10929	32	10929 ~ 10960	Channels' status (module with ID # 29)	Read
10961	32	10961 ~ 10992	Channels' status (module with ID # 30)	Read
10993	32	10993 ~ 11024	Channels' status (module with ID # 31)	Read

Example: Read channel 2 status from APAX-5045 **DI/O** module with ID number 5

ID number 5 means the Modbus address (fixed mode) is between **10161 ~ 10192**

Each channel 's status occupy one 4x address (4 byte)

Therefore, You can read channel 2 status from Modbus address **10163**

Start Address	Length	Address (4x)	Description	Attribute
20001	2	20001 ~ 20002	Which ID # are used in this APAX-5070 system	Read

Example: Read Modbus address **20001** and **20002**

Response 000D (Hex) means there are 3 modules with ID number 0, 1 and 2 in the system

Start Address	Length	Address (4x)	Description	Attribute
20005	1	20005	Alarm status on APAX-5070 module	Read
20006	1	20006	Clear APAX-5070 module alarm status	Write

Start Address	Length	Address (4x)	Description	Attribute
20101	2	20101 ~ 20102	Channels' Enable Mask status (module with ID # 0)	Read/Write
20103	2	20103 ~ 20104	Channels' Enable Mask status (module with ID # 1)	Read/Write
20105	2	20105 ~ 20106	Channels' Enable Mask status (module with ID # 2)	Read/Write
20107	2	20107 ~ 20108	Channels' Enable Mask status (module with ID # 3)	Read/Write
20109	2	20109 ~ 20110	Channels' Enable Mask status (module with ID # 4)	Read/Write
20111	2	20111 ~ 20112	Channels' Enable Mask status (module with ID # 5)	Read/Write
20113	2	20113 ~ 20114	Channels' Enable Mask status (module with ID # 6)	Read/Write
20115	2	20115 ~ 20116	Channels' Enable Mask status (module with ID # 7)	Read/Write
20117	2	20117 ~ 20118	Channels' Enable Mask status (module with ID # 8)	Read/Write
20119	2	20119 ~ 20120	Channels' Enable Mask status (module with ID # 9)	Read/Write
20121	2	20121 ~ 20122	Channels' Enable Mask status (module with ID # 10)	Read/Write
20123	2	20123 ~ 20124	Channels' Enable Mask status (module with ID # 11)	Read/Write
20125	2	20125 ~ 20126	Channels' Enable Mask status (module with ID # 12)	Read/Write
20127	2	20127 ~ 20128	Channels' Enable Mask status (module with ID # 13)	Read/Write
20129	2	20129 ~ 20130	Channels' Enable Mask status (module with ID # 14)	Read/Write
20131	2	20131 ~ 20132	Channels' Enable Mask status (module with ID # 15)	Read/Write
20133	2	20133 ~ 20134	Channels' Enable Mask status (module with ID # 16)	Read/Write
20135	2	20135 ~ 20136	Channels' Enable Mask status (module with ID # 17)	Read/Write
20137	2	20137 ~ 20138	Channels' Enable Mask status (module with ID # 18)	Read/Write
20139	2	20139 ~ 20140	Channels' Enable Mask status (module with ID # 19)	Read/Write
20141	2	20141 ~ 20142	Channels' Enable Mask status (module with ID # 20)	Read/Write
20143	2	20143 ~ 20144	Channels' Enable Mask status (module with ID # 21)	Read/Write
20145	2	20145 ~ 20146	Channels' Enable Mask status (module with ID # 22)	Read/Write
20147	2	20147 ~ 20148	Channels' Enable Mask status (module with ID # 23)	Read/Write
20149	2	20149 ~ 20150	Channels' Enable Mask status (module with ID # 24)	Read/Write
20151	2	20151 ~ 20152	Channels' Enable Mask status (module with ID # 25)	Read/Write
20153	2	20153 ~ 20154	Channels' Enable Mask status (module with ID # 26)	Read/Write
20155	2	20155 ~ 20156	Channels' Enable Mask status (module with ID # 27)	Read/Write
20157	2	20157 ~ 20158	Channels' Enable Mask status (module with ID # 28)	Read/Write
20159	2	20159 ~ 20160	Channels' Enable Mask status (module with ID # 29)	Read/Write
20161	2	20161 ~ 20162	Channels' Enable Mask status (module with ID # 30)	Read/Write
20163	2	20163 ~ 20164	Channels' Enable Mask status (module with ID # 31)	Read/Write

Note: For AI module, enabling channel mask status means enabling that channel (able to read)
For Counter module, enabling/disabling channel mask status means start/stop counter counting action

Start Address	Length	Address (4x)	Description	Attribute
20201	2	20201 ~ 20202	Clear channels' overflow or underflow status (module with ID # 0)	Write
20203	2	20203 ~ 20204	Clear channels' overflow or underflow status (module with ID # 1)	Write
20205	2	20205 ~ 20206	Clear channels' overflow or underflow status (module with ID # 2)	Write
20207	2	20207 ~ 20208	Clear channels' overflow or underflow status (module with ID # 3)	Write
20209	2	20209 ~ 20210	Clear channels' overflow or underflow status (module with ID # 4)	Write
20211	2	20211 ~ 20212	Clear channels' overflow or underflow status (module with ID # 5)	Write
20213	2	20213 ~ 20214	Clear channels' overflow or underflow status (module with ID # 6)	Write
20215	2	20215 ~ 20216	Clear channels' overflow or underflow status (module with ID # 7)	Write
20217	2	20217 ~ 20218	Clear channels' overflow or underflow status (module with ID # 8)	Write
20219	2	20219 ~ 20220	Clear channels' overflow or underflow status (module with ID # 9)	Write
20221	2	20221 ~ 20222	Clear channels' overflow or underflow status (module with ID # 10)	Write
20223	2	20223 ~ 20224	Clear channels' overflow or underflow status (module with ID # 11)	Write
20225	2	20225 ~ 20226	Clear channels' overflow or underflow status (module with ID # 12)	Write
20227	2	20227 ~ 20228	Clear channels' overflow or underflow status (module with ID # 13)	Write
20229	2	20229 ~ 20230	Clear channels' overflow or underflow status (module with ID # 14)	Write
20231	2	20231 ~ 20232	Clear channels' overflow or underflow status (module with ID # 15)	Write
20233	2	20233 ~ 20234	Clear channels' overflow or underflow status (module with ID # 16)	Write
20235	2	20235 ~ 20236	Clear channels' overflow or underflow status (module with ID # 17)	Write
20237	2	20237 ~ 20238	Clear channels' overflow or underflow status (module with ID # 18)	Write
20239	2	20239 ~ 20240	Clear channels' overflow or underflow status (module with ID # 19)	Write
20241	2	20241 ~ 20242	Clear channels' overflow or underflow status (module with ID # 20)	Write
20243	2	20243 ~ 20244	Clear channels' overflow or underflow status (module with ID # 21)	Write
20245	2	20245 ~ 20246	Clear channels' overflow or underflow status (module with ID # 22)	Write
20247	2	20247 ~ 20248	Clear channels' overflow or underflow status (module with ID # 23)	Write
20249	2	20249 ~ 20250	Clear channels' overflow or underflow status (module with ID # 24)	Write

20251	2	20251 ~ 20252	Clear channels' overflow or underflow status (module with ID # 25)	Write
20253	2	20253 ~ 20254	Clear channels' overflow or underflow status (module with ID # 26)	Write
20255	2	20255 ~ 20256	Clear channels' overflow or underflow status (module with ID # 27)	Write
20257	2	20257 ~ 20258	Clear channels' overflow or underflow status (module with ID # 28)	Write
20259	2	20259 ~ 20260	Clear channels' overflow or underflow status (module with ID # 29)	Write
20261	2	20261 ~ 20262	Clear channels' overflow or underflow status (module with ID # 30)	Write
20263	2	20263 ~ 20264	Clear channels' overflow or underflow status (module with ID # 31)	Write

Start Address	Length	Address (4x)	Description	Attribute
20301	2	20301 ~ 20302	Counter channels' alarm status (module with ID # 0)	Read
20303	2	20303 ~ 20304	Counter channels' alarm status (module with ID # 1)	Read
20305	2	20305 ~ 20306	Counter channels' alarm status (module with ID # 2)	Read
20307	2	20307 ~ 20308	Counter channels' alarm status (module with ID # 3)	Read
20309	2	20309 ~ 20310	Counter channels' alarm status (module with ID # 4)	Read
20311	2	20311 ~ 20312	Counter channels' alarm status (module with ID # 5)	Read
20313	2	20313 ~ 20314	Counter channels' alarm status (module with ID # 6)	Read
20315	2	20315 ~ 20316	Counter channels' alarm status (module with ID # 7)	Read
20317	2	20317 ~ 20318	Counter channels' alarm status (module with ID # 8)	Read
20319	2	20319 ~ 20320	Counter channels' alarm status (module with ID # 9)	Read
20321	2	20321 ~ 20322	Counter channels' alarm status (module with ID # 10)	Read
20323	2	20323 ~ 20324	Counter channels' alarm status (module with ID # 11)	Read
20325	2	20325 ~ 20326	Counter channels' alarm status (module with ID # 12)	Read
20327	2	20327 ~ 20328	Counter channels' alarm status (module with ID # 13)	Read
20329	2	20329 ~ 20330	Counter channels' alarm status (module with ID # 14)	Read
20331	2	20331 ~ 20332	Counter channels' alarm status (module with ID # 15)	Read
20333	2	20333 ~ 20334	Counter channels' alarm status (module with ID # 16)	Read
20335	2	20335 ~ 20336	Counter channels' alarm status (module with ID # 17)	Read
20337	2	20337 ~ 20338	Counter channels' alarm status (module with ID # 18)	Read
20339	2	20339 ~ 20340	Counter channels' alarm status (module with ID # 19)	Read
20341	2	20341 ~ 20342	Counter channels' alarm status (module with ID # 20)	Read
20343	2	20343 ~ 20344	Counter channels' alarm status (module with ID # 21)	Read
20345	2	20345 ~ 20346	Counter channels' alarm status (module with ID # 22)	Read
20347	2	20347 ~ 20348	Counter channels' alarm status (module with ID # 23)	Read
20349	2	20349 ~ 20350	Counter channels' alarm status (module with ID # 24)	Read
20351	2	20351 ~ 20352	Counter channels' alarm status (module with ID # 25)	Read
20353	2	20353 ~ 20354	Counter channels' alarm status (module with ID # 26)	Read
20355	2	20355 ~ 20356	Counter channels' alarm status (module with ID # 27)	Read
20357	2	20357 ~ 20358	Counter channels' alarm status (module with ID # 28)	Read
20359	2	20359 ~ 20360	Counter channels' alarm status (module with ID # 29)	Read
20361	2	20361 ~ 20362	Counter channels' alarm status (module with ID # 30)	Read
20363	2	20363 ~ 20364	Counter channels' alarm status (module with ID # 31)	Read

Start Address	Length	Address (4x)	Description	Attribute
20401	2	20401 ~ 20402	Reset counter channels' value (module with ID # 0)	Write
20403	2	20403 ~ 20404	Reset counter channels' value (module with ID # 1)	Write
20405	2	20405 ~ 20406	Reset counter channels' value (module with ID # 2)	Write
20407	2	20407 ~ 20408	Reset counter channels' value (module with ID # 3)	Write
20409	2	20409 ~ 20410	Reset counter channels' value (module with ID # 4)	Write
20411	2	20411 ~ 20412	Reset counter channels' value (module with ID # 5)	Write
20413	2	20413 ~ 20414	Reset counter channels' value (module with ID # 6)	Write
20415	2	20415 ~ 20416	Reset counter channels' value (module with ID # 7)	Write
20417	2	20417 ~ 20418	Reset counter channels' value (module with ID # 8)	Write
20419	2	20419 ~ 20420	Reset counter channels' value (module with ID # 9)	Write
20421	2	20421 ~ 20422	Reset counter channels' value (module with ID # 10)	Write
20423	2	20423 ~ 20424	Reset counter channels' value (module with ID # 11)	Write
20425	2	20425 ~ 20426	Reset counter channels' value (module with ID # 12)	Write
20427	2	20427 ~ 20428	Reset counter channels' value (module with ID # 13)	Write
20429	2	20429 ~ 20430	Reset counter channels' value (module with ID # 14)	Write
20431	2	20431 ~ 20432	Reset counter channels' value (module with ID # 15)	Write
20433	2	20433 ~ 20434	Reset counter channels' value (module with ID # 16)	Write
20435	2	20435 ~ 20436	Reset counter channels' value (module with ID # 17)	Write
20437	2	20437 ~ 20438	Reset counter channels' value (module with ID # 18)	Write
20439	2	20439 ~ 20440	Reset counter channels' value (module with ID # 19)	Write
20441	2	20441 ~ 20442	Reset counter channels' value (module with ID # 20)	Write
20443	2	20443 ~ 20444	Reset counter channels' value (module with ID # 21)	Write
20445	2	20445 ~ 20446	Reset counter channels' value (module with ID # 22)	Write
20447	2	20447 ~ 20448	Reset counter channels' value (module with ID # 23)	Write
20449	2	20449 ~ 20450	Reset counter channels' value (module with ID # 24)	Write
20451	2	20451 ~ 20452	Reset counter channels' value (module with ID # 25)	Write
20453	2	20453 ~ 20454	Reset counter channels' value (module with ID # 26)	Write
20455	2	20455 ~ 20456	Reset counter channels' value (module with ID # 27)	Write
20457	2	20457 ~ 20458	Reset counter channels' value (module with ID # 28)	Write
20459	2	20459 ~ 20460	Reset counter channels' value (module with ID # 29)	Write
20461	2	20461 ~ 20462	Reset counter channels' value (module with ID # 30)	Write
20463	2	20463 ~ 20464	Reset counter channels' value (module with ID # 31)	Write

Start Address	Length	Address (4x)	Description	Attribute
20501	2	20501 ~ 20502	Clear counter channels' alarm status (module with ID # 0)	Write
20503	2	20503 ~ 20504	Clear counter channels' alarm status (module with ID # 1)	Write
20505	2	20505 ~ 20506	Clear counter channels' alarm status (module with ID # 2)	Write
20507	2	20507 ~ 20508	Clear counter channels' alarm status (module with ID # 3)	Write
20509	2	20509 ~ 20510	Clear counter channels' alarm status (module with ID # 4)	Write
20511	2	20511 ~ 20512	Clear counter channels' alarm status (module with ID # 5)	Write

20513	2	20513 ~ 20514	Clear counter channels' alarm status (module with ID # 6)	Write
20515	2	20515 ~ 20516	Clear counter channels' alarm status (module with ID # 7)	Write
20517	2	20517 ~ 20518	Clear counter channels' alarm status (module with ID # 8)	Write
20519	2	20519 ~ 20520	Clear counter channels' alarm status (module with ID # 9)	Write
20521	2	20521 ~ 20522	Clear counter channels' alarm status (module with ID # 10)	Write
20523	2	20523 ~ 20524	Clear counter channels' alarm status (module with ID # 11)	Write
20525	2	20525 ~ 20526	Clear counter channels' alarm status (module with ID # 12)	Write
20527	2	20527 ~ 20528	Clear counter channels' alarm status (module with ID # 13)	Write
20529	2	20529 ~ 20530	Clear counter channels' alarm status (module with ID # 14)	Write
20531	2	20531 ~ 20532	Clear counter channels' alarm status (module with ID # 15)	Write
20533	2	20533 ~ 20534	Clear counter channels' alarm status (module with ID # 16)	Write
20535	2	20535 ~ 20536	Clear counter channels' alarm status (module with ID # 17)	Write
20537	2	20537 ~ 20538	Clear counter channels' alarm status (module with ID # 18)	Write
20539	2	20539 ~ 20540	Clear counter channels' alarm status (module with ID # 19)	Write
20541	2	20541 ~ 20542	Clear counter channels' alarm status (module with ID # 20)	Write
20543	2	20543 ~ 20544	Clear counter channels' alarm status (module with ID # 21)	Write
20545	2	20545 ~ 20546	Clear counter channels' alarm status (module with ID # 22)	Write
20547	2	20547 ~ 20548	Clear counter channels' alarm status (module with ID # 23)	Write
20549	2	20549 ~ 20550	Clear counter channels' alarm status (module with ID # 24)	Write
20551	2	20551 ~ 20552	Clear counter channels' alarm status (module with ID # 25)	Write
20553	2	20553 ~ 20554	Clear counter channels' alarm status (module with ID # 26)	Write
20555	2	20555 ~ 20556	Clear counter channels' alarm status (module with ID # 27)	Write
20557	2	20557 ~ 20558	Clear counter channels' alarm status (module with ID # 28)	Write
20559	2	20559 ~ 20560	Clear counter channels' alarm status (module with ID # 29)	Write
20561	2	20561 ~ 20562	Clear counter channels' alarm status (module with ID # 30)	Write
20563	2	20563 ~ 20564	Clear counter channels' alarm status (module with ID # 31)	Write

Appendix D

APAX-5000 I/O Module Channel Status

D.1 APAX-5000 I/O Module Channel Status

Channel Status Bit Representation Table						
Bit order	DIO	AO	Counter	AI (Voltage, Current)	AI (RTD)	AI (Thermocouple)
0	Channel Bad	Channel Bad	Channel Bad	Channel Bad	Channel Bad	Channel Bad
1			Overflow	Over Current	Over Current	Over Current
2			Underflow	Under Current	Under Current	Under Current
3				Burnout	Burnout	Burnout
4				OpenLoop	AI (RTD)	OpenLoop
5				Not Ready	Not Ready	Not Ready
6				Short	Short	Short
7						Channel Temperautre Sensor Error (5018)
8						Channel Temperautre Sensor Error (5018)
9				Zero Span Calibration Error (5013)	Zero Span Calibration Error (5013)	
10				Factory Calibration Error (5013)	Factory Calibration Error (5013)	
11						CJC Initial Error (5018)
12						
13						
14						
15						

ADVANTECH

eAutomation

www.advantech.com

Please verify specifications before quoting. This guide is intended for reference purposes only.