8410/8810
Serial I/O Unit
User's Manual

Version 1.1, June 2005

I-8410

I-8810

ICP DAS, Co., LTD www.icpdas.com

8410/8810

Warranty

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All information about this manual is for items as the table below.

I-8410	4-slots Serial I/O unit
I-8410-G	4-slots Serial I/O unit (Gray color)
I-8810	8-slots Serial I/O unit
I-8810-G	8-slots Serial I/O unit (Gray color)

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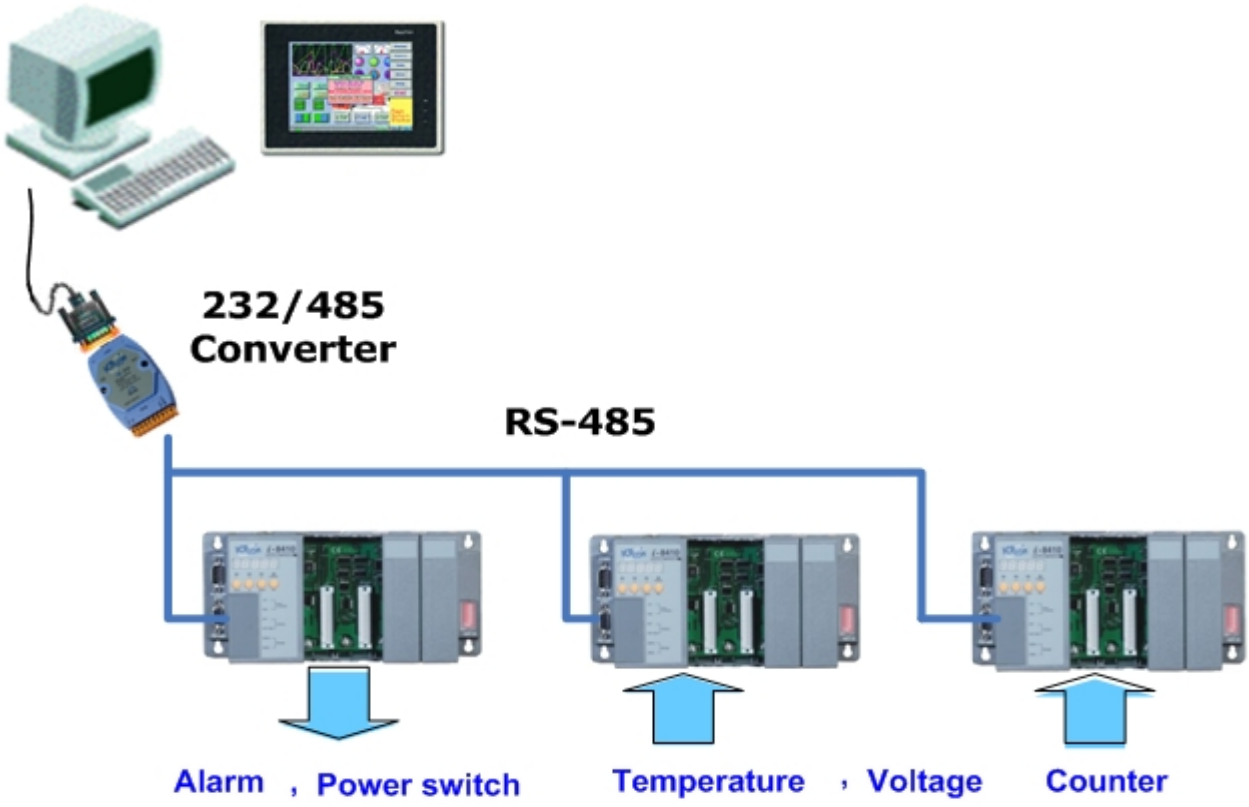
Chapter 1. Introduction

The i-8410 and i-8810 are Serial I/O units using DCON Protocol Firmware DCON_nnn.exe (*1). ICPDAS provides various I/O modules (*2), using such as analog input/output and digital input/output and counter modules which can be used in remote data acquisition and control application for environment monitoring, power management, factory automation, etc. via Serial communication.

Configuration 1

Configuration 2



For RS-485 network wiring and configuration please refer to Appendix C.

(*1): For detail of DCON_nnn.exe, please refer to
CD:\Napdos\DCON\8410_8810\Firmware\Version_Annn.txt
ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/dcon/8410_8810/firmware/
(*2): For detail of I/O modules which can be used with 8410/8810,
please refer to CD:\Napdos\DCON\IO_Module\
ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/dcon/io_module/

1.1 Features

Serial –based Data Acquisition I/O unit

The i-8410 and i-8810 are Serial I/O units. This feature allows COM Port applications to access and control the remote I/O in industrial RS-485 network. And DCON_nnn.exe, 8K232.exe or 8K485.exe is the DCON firmware for the i-8410 and i-8810. Using this firmware, applications can be easily and directly developed using a COM Port program.

ASCII-based protocol (DCON Protocol)

The i-8410 and i-8810 are Serial I/O units use the DCON protocol, which is a request/reply communication protocol used with I-7000/8000/87K series I/O modules. And is used to access the data from the module using a simple ASCII format. For example, sending the command “$01M” will query the controller name. The responding module will reply with a message similar to “!018410(cr)” or “!018810(cr)”

For more details regarding the DCON Protocol,
please refer to Appendix B: DCON protocol.

For DCON Protocol about 8000 MCU and 8000 series I/O modules. Please refer to :
CD:\Napdos\DCON\IO_Module\hw_dcon_on_8KUnit
ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/dcon/io_module/hw_dcon_on_8kunit/

Various SDK provided (free)

In order to access the I/O modules those are connected to 8410/8810.
Various SDKs are provided, such as: (see Note1, Note2)

- DLL driver
- ActiveX component
- LabVIEW bundled driver
- Indusoft bundled driver
- Linux driver
- OPC server

Note1: All these SDKs include the DCON Command and can be easily and quickly integrated into the user's system. Please refer to Chapter 3 for more detail information.

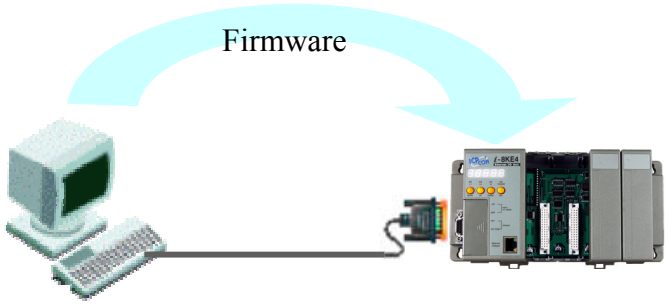
Note2: DLL, ActiveX, LabVIEW, IndoSoft, OPC server only support the windows platform. (Windows 98, Windows NT, Windows 2000, Windows XP)

I/O configurable via the RS-232 or RS-485

The DCON Utility is used to configure I-7000, I-8000 and I-87K series I/O modules. It originally communicated with the I/O modules via the COM port. For I/O modules on the

i-8410 and i-8810, using the COM port can let DCON Utility access the I/O modules via the RS-232 or RS-485 interface. For more details, please refer to Chapter 3.

Updateable firmware (via the RS-232 port)



Note: the 8410/8810's COM1 port can be used to download firmware, update the MiniOS image file.

When should the firmware be updated?
➔ Firmware should be updated when ICPDAS announces

- Support for new I/O modules
- The addition of new functions
- Bug fixes and revision

There is a document (Revision.txt) that records the update information as follows:

```
/************************************************/
/*  Reversion information for I-8000 firmware  */
/*   8K232.exe, 8K485.exe, 8KE10.exe           */
/*                                              */
/************************************************/
================================================
  A1.95 [Oct,14,2003] by Kevin
        Support:
           1. 8037 (command sets are same as 8057)

        Note:
           1. DCON Utility must update to ver. 4.2.7
              to support 8037.
```

For more details, please refer to Appendix E: Updating the firmware and MiniOS7 image.

Dual Bus design to supports i-8K and i-87K series I/O modules

The 8410/8810 has two types of bus on its back plane. The first is a serial bus (RS-485 interface) for 87K I/O modules and the second is a parallel bus for 8K I/O modules. The DCON firmware can support both 8K and 87K series I/O modules. These two series I/O

modules can both be connected into the same I-8000 MCU, and can use the same DCON command when they are both attached to I-8000 MCU. The modules for DI, DO, DIO, AI, AO and Counter/Frequency purpose are supported. Other modules, such as multi-serial port (8112, 8144, 8142, 8144), MMC (8073), motion (8090, 8091), are not supported. For more details, please refer to Appendix D: i-8K and i-87K series I/O modules.

For more about I/O module's information, please refer to
CD:\ Napdos\DCON\IO_Module\hw_dcon_on_8KUnit
ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/dcon/io_module/hw_dcon_on_8kunit/

More flexible I/O combination and Compact、fasten、quick to install

The 8410/8810 Serial I/O units contain either a 4-slot or 8-slot bus to allow various i/o modules to be connected, removing the need for complex wiring between i/o modules. Furthermore, various I/O modules can be inserted into the slots at the same time, such as digital input/output, analog input/output and counter modules, and each I/O module allows various numbers of channels. For example, with i-8040 or i-8041, the 8810 provides max 256 digital input or digital output channels. The module can simply be plugged into the slot and secured to the plastic base using a pair of locking buttons. The assembly can then be mounted on the control box using DIN rail clips.

Built-in Watchdog

The built-in watchdog circuit will reset the CPU module if a failure occurs in either the hardware or software. If the application program does not refresh the watchdog timer within 0.8 sec, the watchdog circuit will initiate a reset of the CPU.

Input Protection circuitry

The protection circuitry on both the network and power supply protects the system from external signals such as main spikes and ambient electrical noise. In addition, the central processing module is isolated from external signals in three ways. This is achieved through I/O isolation of 3KV, power isolation to 3KV and network isolation to 2KV

High performance integrated power supply

The built-in isolated 20W power supply is rated to perform linearly up to full loading.

Ventilated housing design to work between -25 ~+75℃

The 8410/8810 is housed in a plastic base box with a column-like ventilator that can help to cool the work environment inside the box and allow the 8410/8810 to operator between -25℃ and +75℃.

1.2 i-8410/i-8810 Hardware Specifications

- **CPU**:
  80188 or compatible
  16-bits
  40MHz
- **SRAM:**
  256KBytes
- **Flash ROM:**
  256KBytes
  4 sectors, each sector has 64KBytes
  100,000 erase/write cycles
- **Built-in Watchdog Timer**
  0.8 seconds
- **COM0 (RS-232)**:
  TXD, RXD, GND, internal serial bus.
  Fixed communication speed at 115200 bps.
  Used to communicate with 87K modules connected to the slots.
- **COM1 (RS-232)**:
  TXD, RXD, GND
  Communication speed: programmable, 115200 bps max.
  Used to download firmware, update the MiniOS image file and to configure the IP information
- **COM2 (RS-485)**:

  RS-485 (DATA+, DATA-)

  Communication speed: programmable, 115200 bps max.

- **COM3 (RS-232/485)**:

  RS-232 (TXD, RXD, GND, CTS, RTS) or

  RS-485 (DATA+, DATA-)

  Communication speed: programmable, 115200 bps max.

- **SMMI (Small Man Machine Interface)**
  5-digit LED display
  4 LED indicators
  4 push buttons

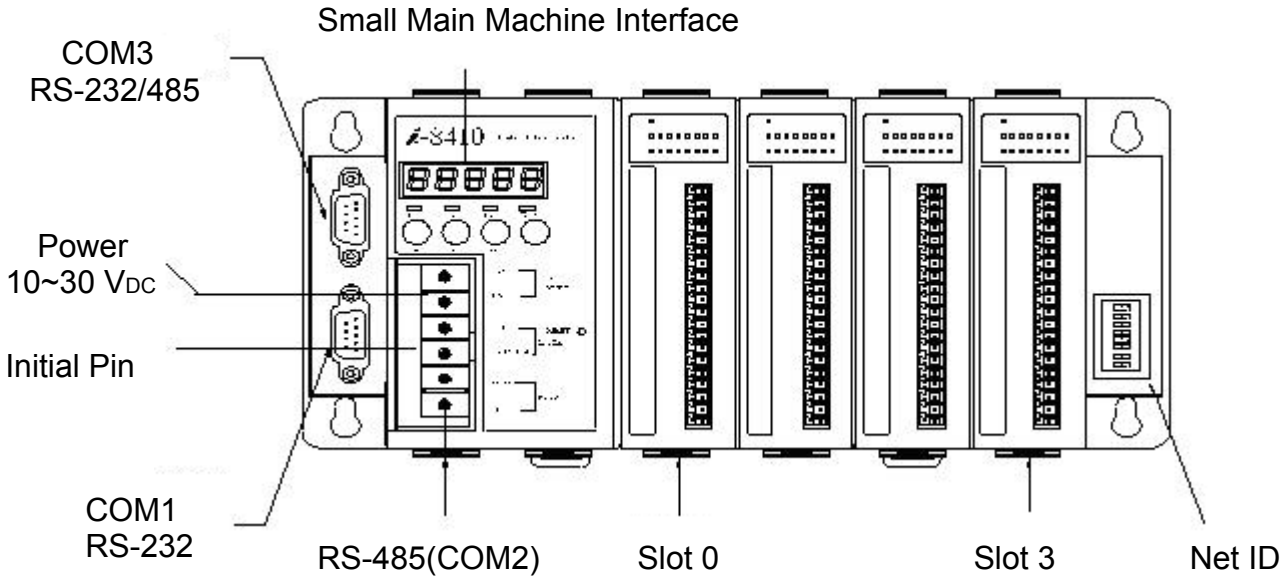
- **I/O expansion slots:**
  4 slots for 8410
  8 slots for 8810
- **Mounting mechanism**
  pannel mounting and din-rail mounting

- **Power supply:**
  20W
- **Power requirement:**
  10 ~ 30 V_{DC}
- **Power consumption:**
  3.9 W (for 8410)
  5.1 W (for 8810)
- **Operating Environment**:
  Operating Temp.: –25°C to +75°C.
  Storage Temp.: –30°C to +85°C
  Humidity: 5 ~ 95%,non-condensing
- **Dimension**:
  230 x 110 x 75.5 mm (for 8410)
  354 x 110 x 75.5 mm (for 8810)

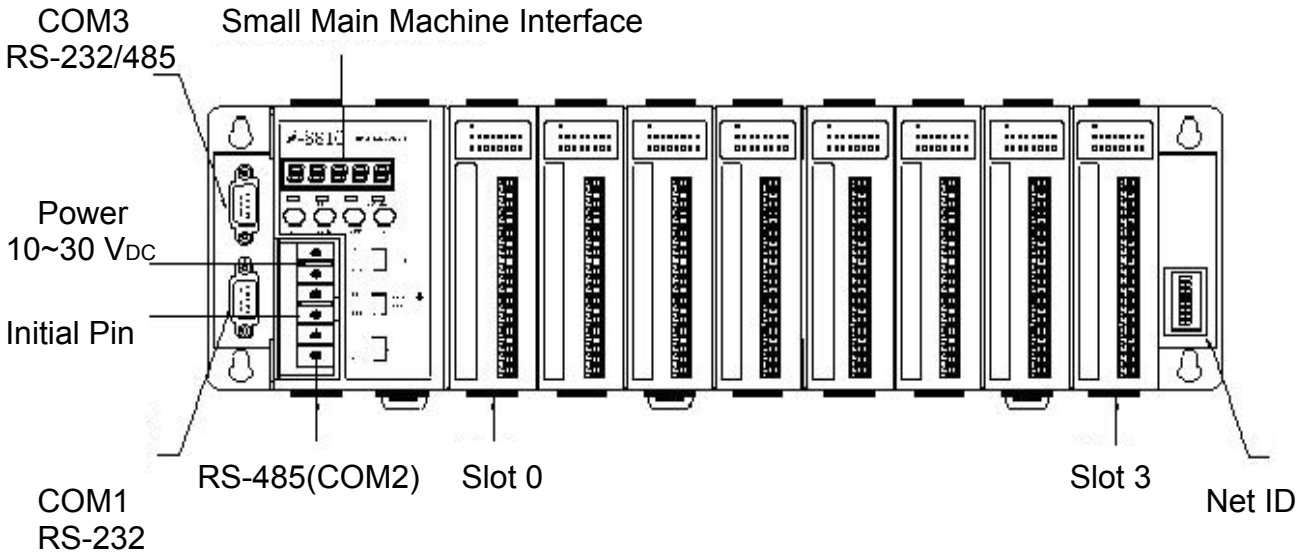
  For more detailed dimensions, please refer to “Appendix A:Dimensions”.

1.3 Front view of 8410/8810

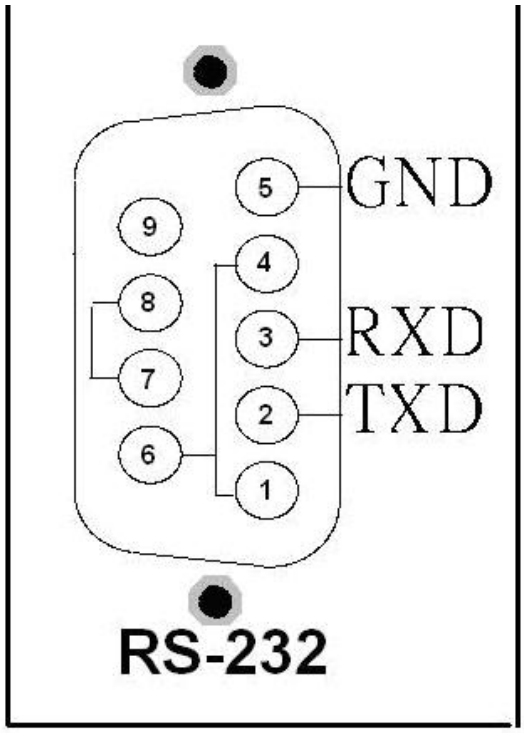
i-8410:



i-8810:

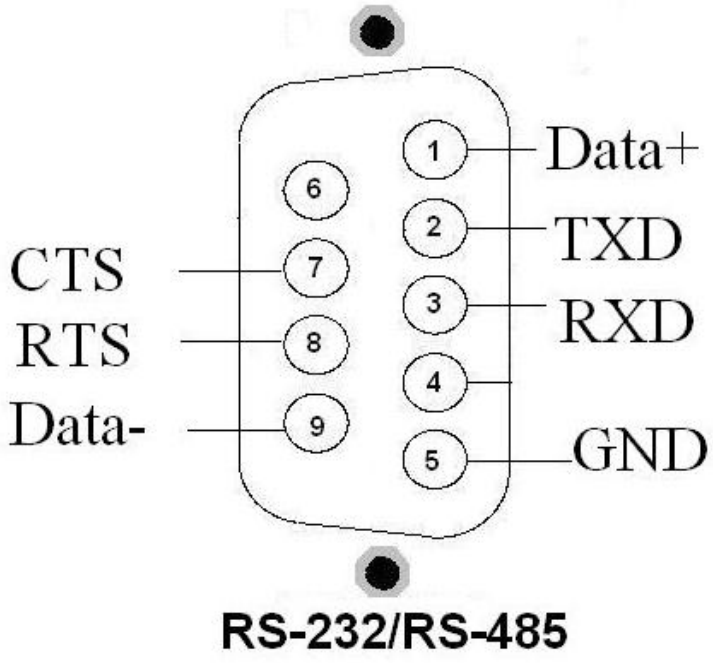


Pin assignment of COM1 Port



The COM1 Pin assignment

Pin assignment of COM3 Port

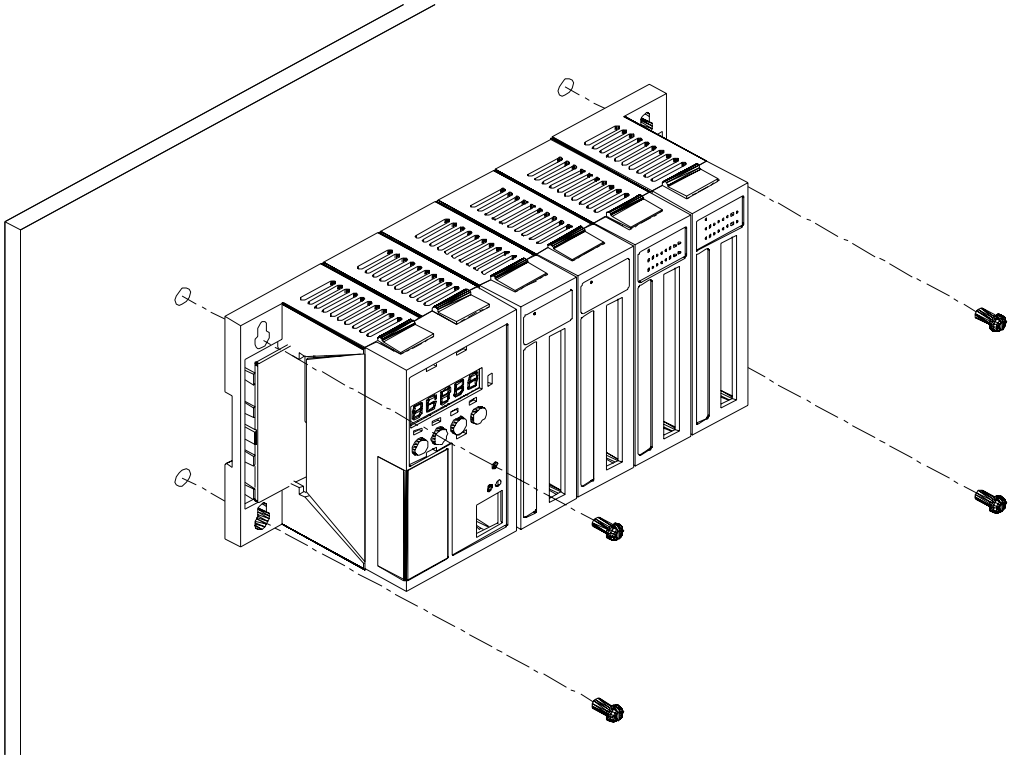


The COM3 Pin assignment

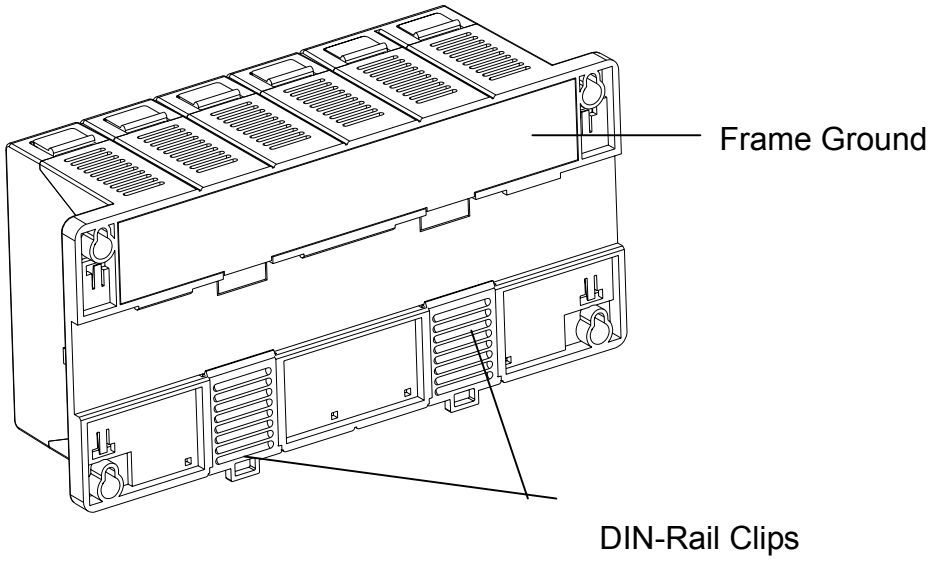
1.4 8410/8810 installation

Step1: Mount the I/O unit

Method (a): using screw panel mounting



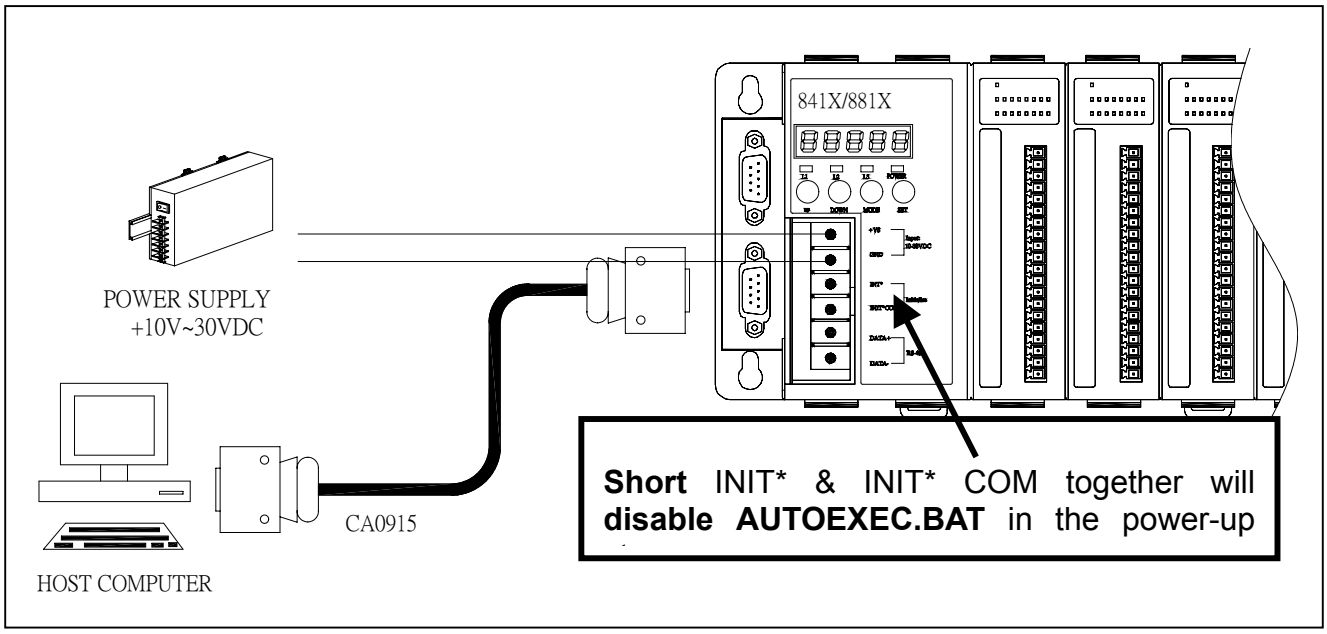
Method (b): DIN-Rail mounting



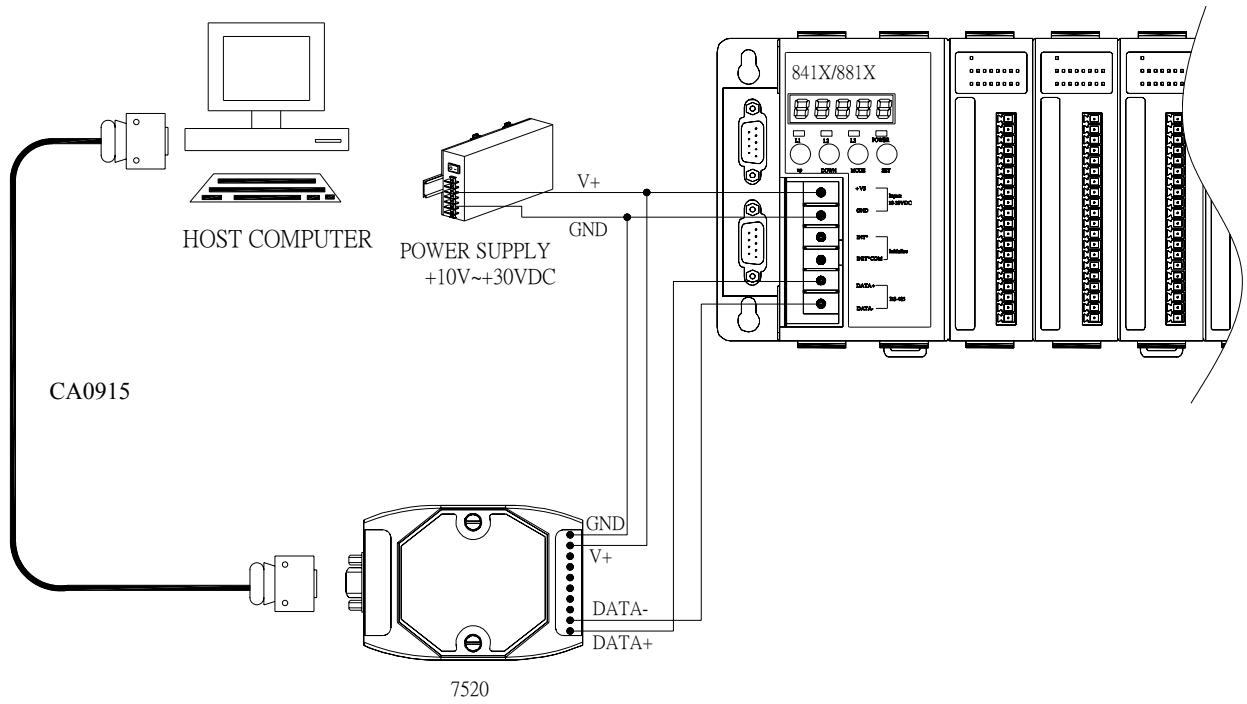
The explanation of Frame Ground, please refer to Appendix B.

Step2: Attach power supply (10 ~ 30 V_{DC})

Communicate with RS-232 interface



Communicate with RS-485 interface



1.5 I/O module installation

Step1: Read the document at the following location

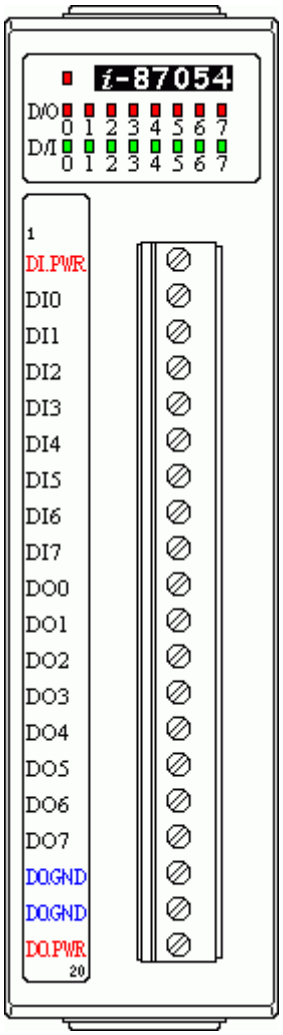
For I-8000 series modules the files are located at:

CD:\ Napdos\DCON\IO_Module\hw_dcon_on_8KUnit\8k
ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/dcon/io_module/hw_dcon_on_8kunit/8k/

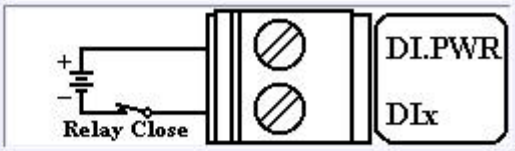
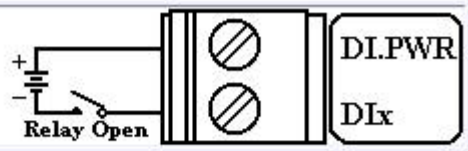
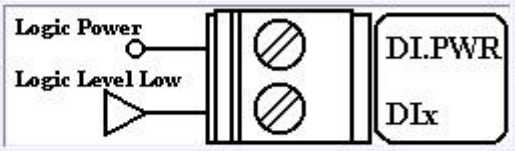
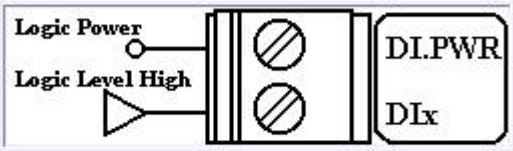
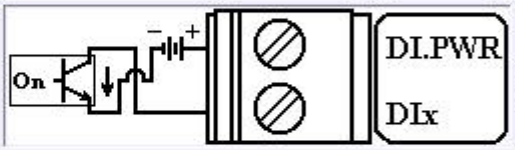
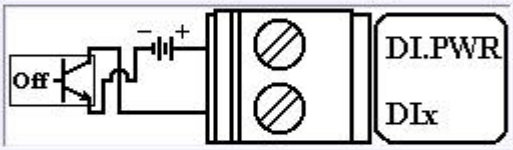
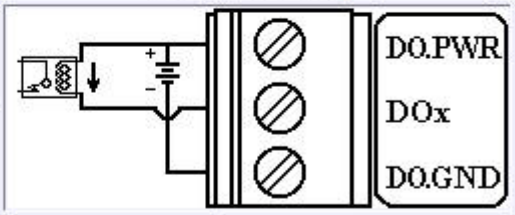
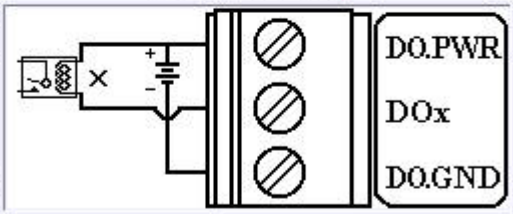
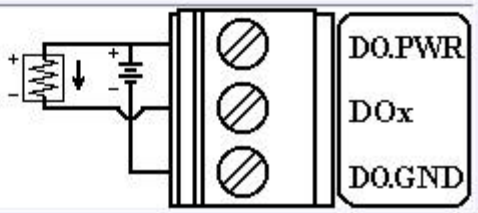
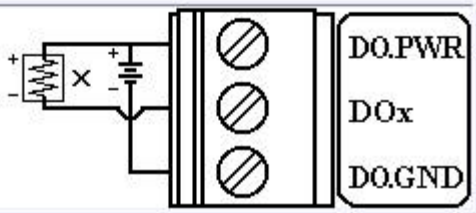
For I-87K series modules the files are located at:

CD:\ Napdos\DCON\IO_Module\hw_dcon_on_8KUnit\87k
ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/dcon/io_module/hw_dcon_on_8kunit/87k/

These *.chm files include the I/O module specifications, pin assignments, wire connections. For example, the pin assignments and wire connections are as follows.

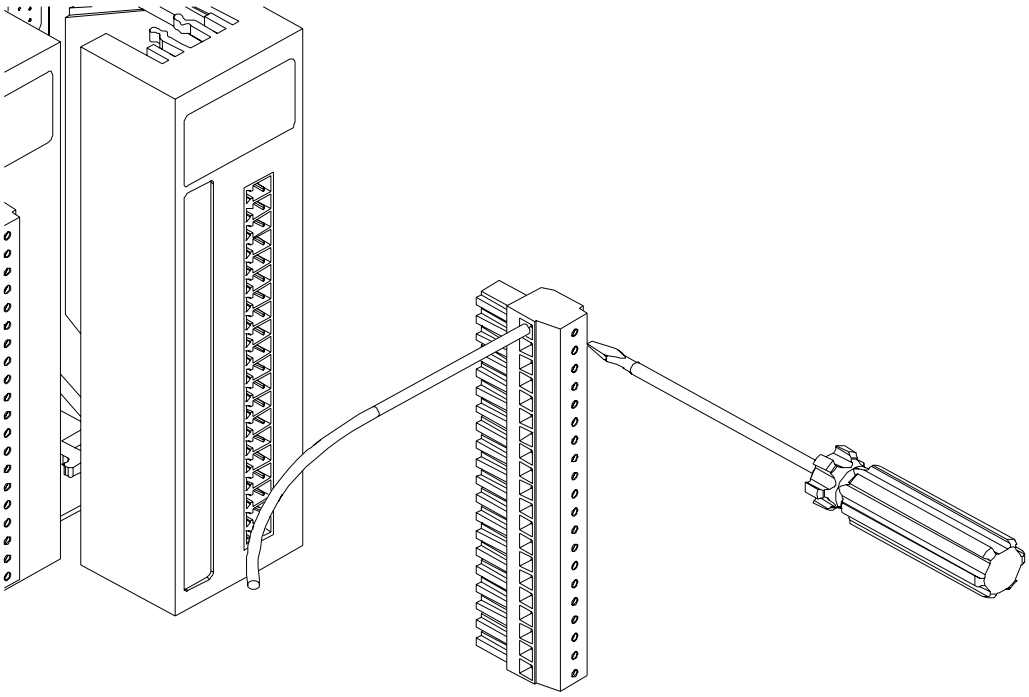


Pin assignment

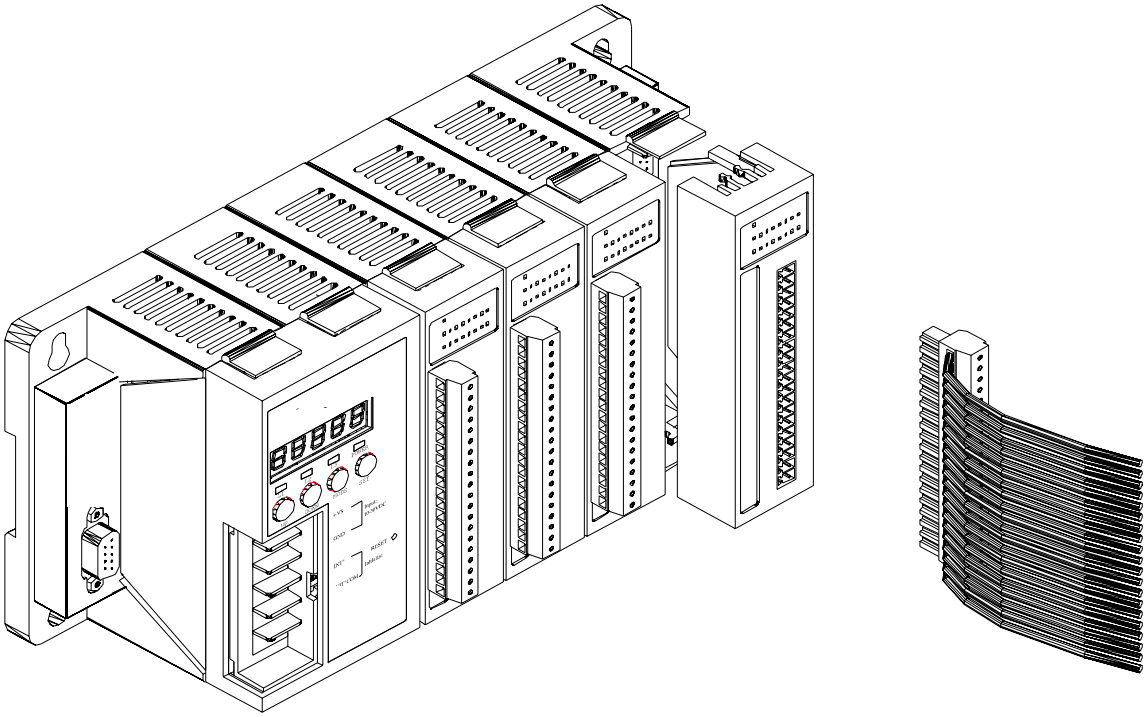
Input Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0
Relay Contact		
TTL/CMOS Logic		
Open Collector		
Output Type	ON State LED ON Readback as 1	OFF State LED OFF Readback as 0
Drive Relay		
Resistance Load		

Wire Connection

Step2: Connect the wire



Step3: Insert the I/O module into the 8410/8810



Chapter 2. Configure the 8410/8810 and I/O modules

Before using the 8410/8810 and any I/O modules connected to it, the following settings must be configured:

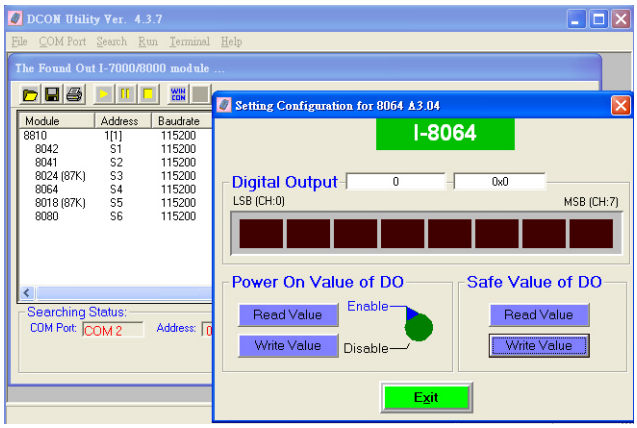
- **Networking settings**: Module Address of 8410/8810
- **Power on value** of AO, DO modules
- **Safe value** of AO, DO modules
- **Input range** of AI modules
- **Noise filter** of AI modules
- **Check sum** of all communication protocol

The DCON utility can be used to configure other settings.

2.1 Configure I/O modules

The DCON Utility is used to configure I-7000, I-8000 and I-87K series I/O modules and communicates with I/O modules via the COM port.

For I/O modules on the 8410/8810:



DCON Utility

Main functions

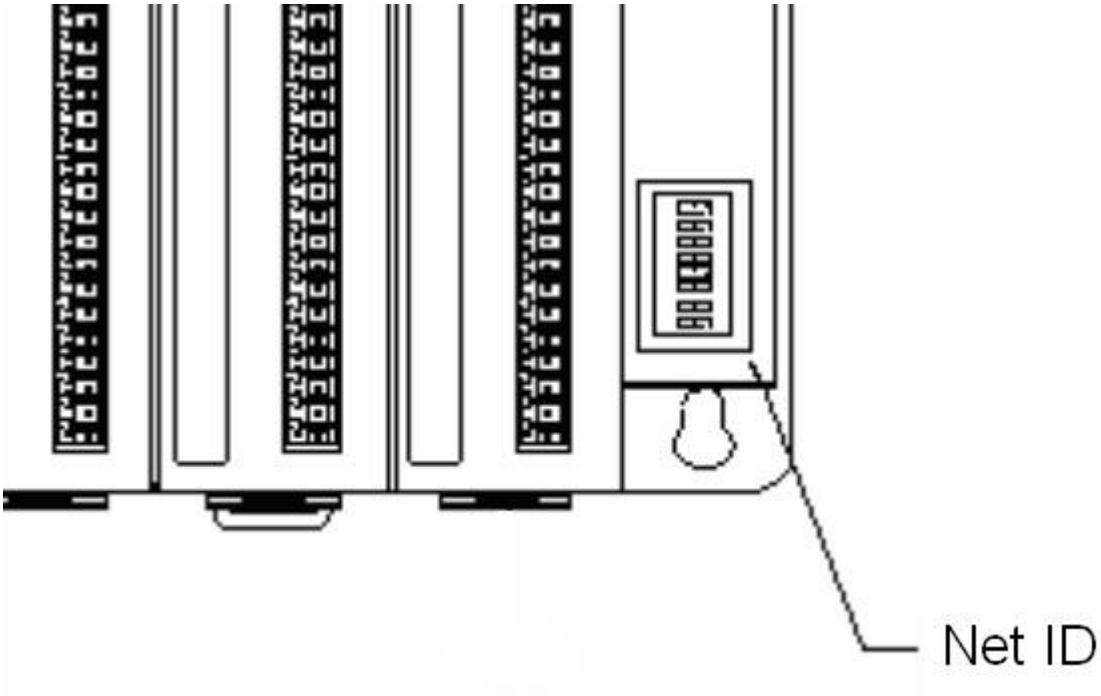
Configuring modules
- Baudrate
- Address
- Check sum
- Power on value
- Safe value …etc.
- Testing I/O actions

Modules supported:
i-7000/i-8000/i-87K series (with DCON protocol)

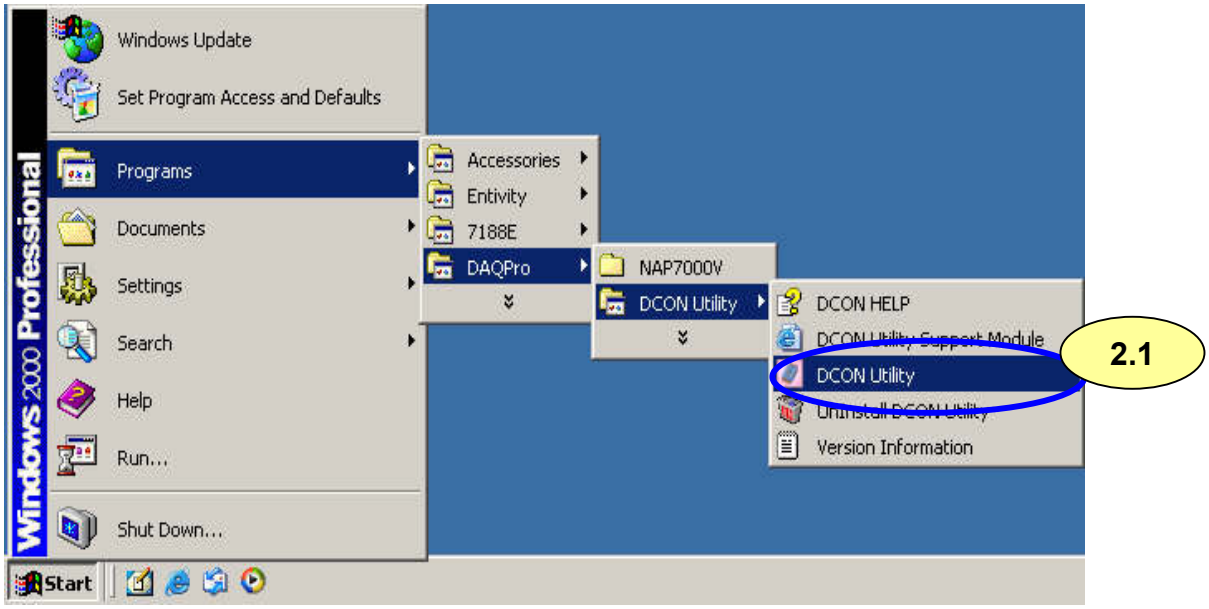
OS supported:
Windows 98/NT/2000/XP

File location:
CD:\Napdos\Driver\DCON_Utility

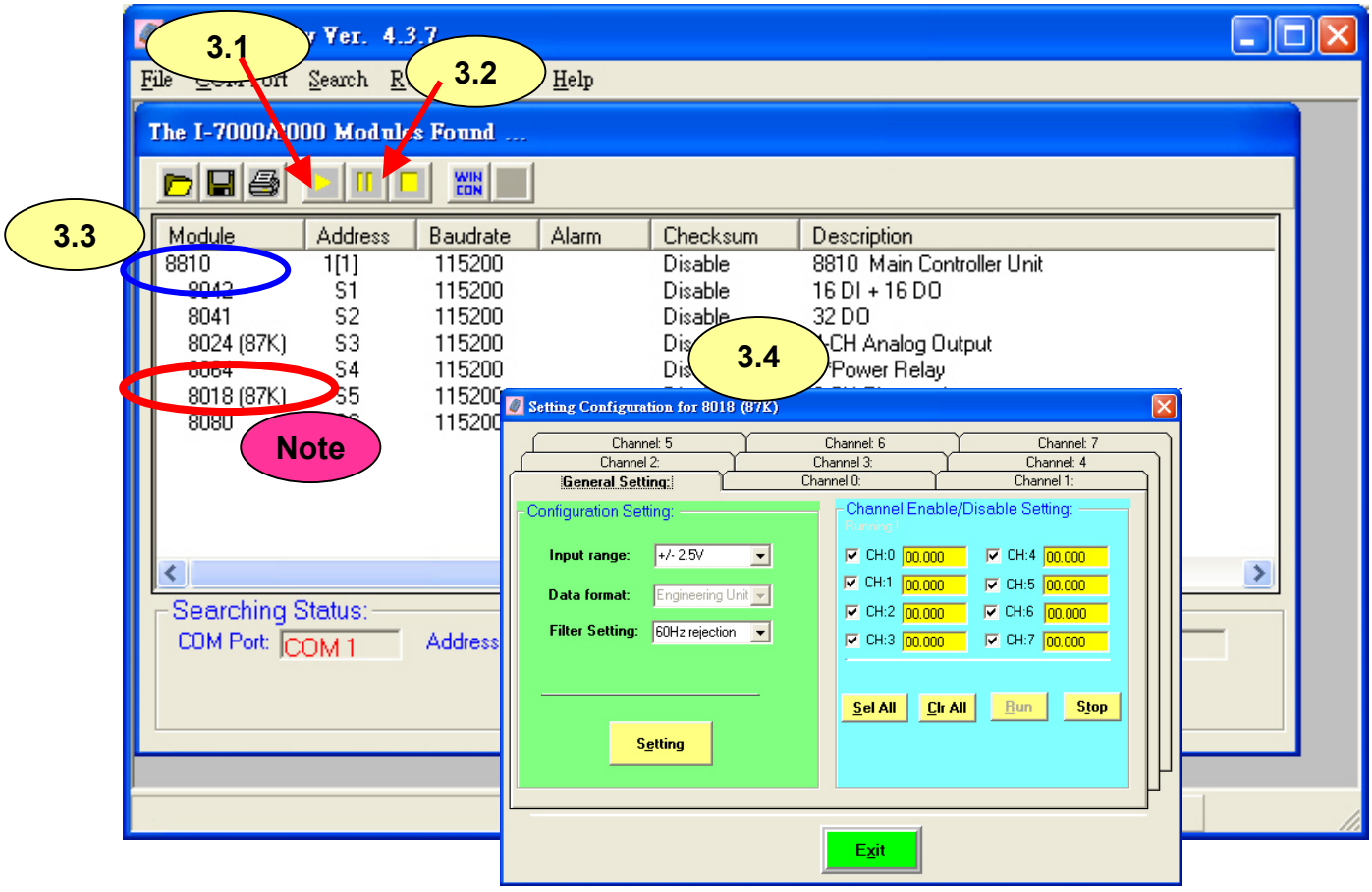
Step1: Wire the 8410/8810 and configure its network ID setting



Step2: Install the DCON Utililty by running CD:\Napdos\Driver\DCON_Utility\Setup\setup.exe and then run it.



Step3: Search for the I/O modules on the 8410/8810. After the modules are found, individually click on them to configure them.

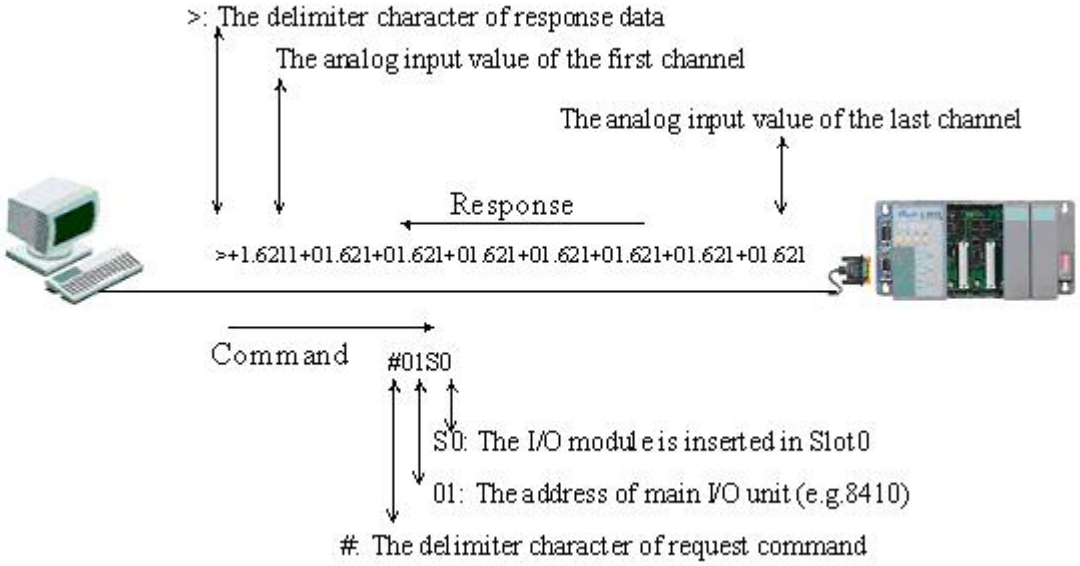


Note: All the 87K I/O modules that connected to 8410/8810 are renamed to 80xx(87K)

Chapter 3. DCON Protocol and Software Development ToolKit (free)

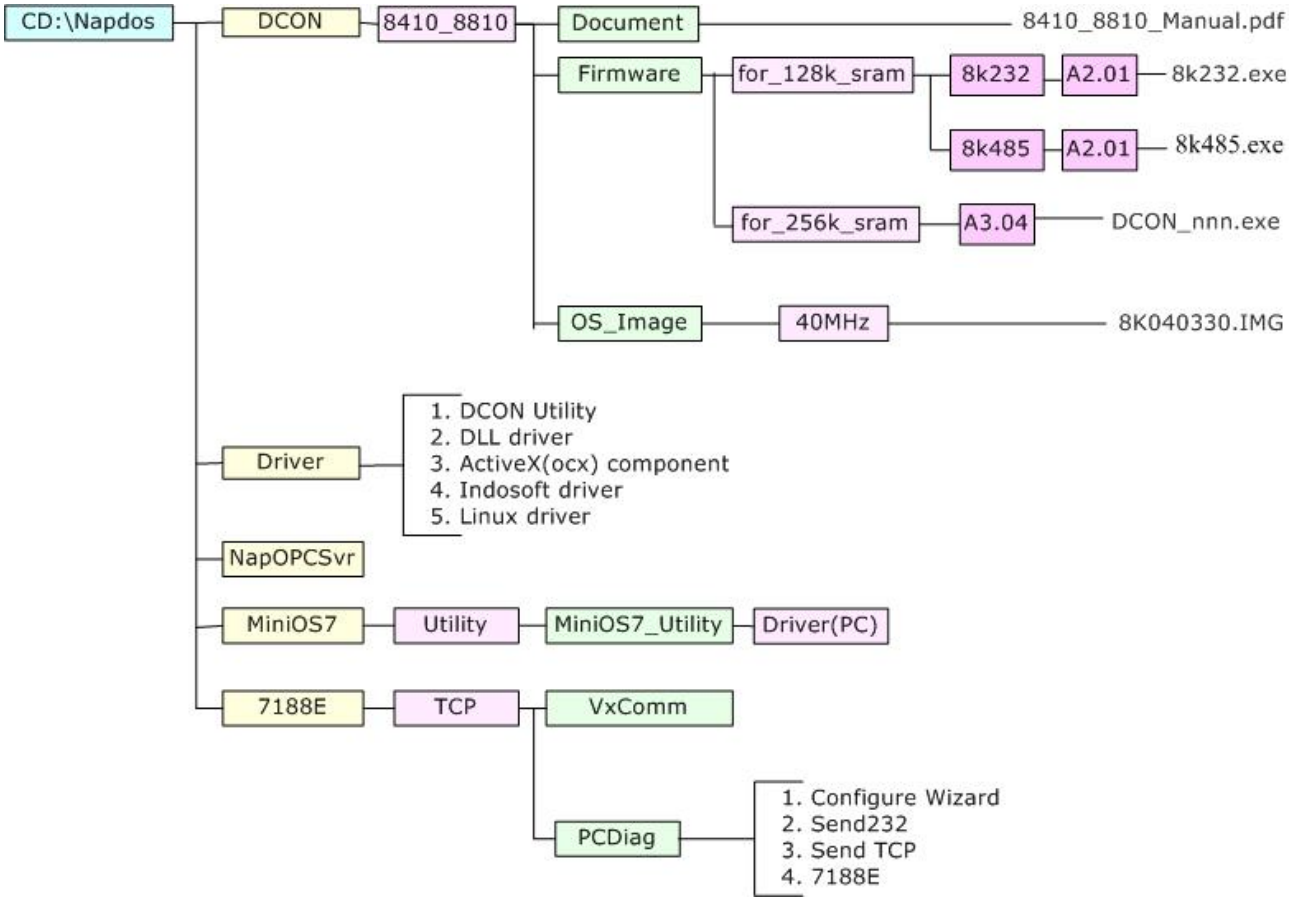
3.1 The feature of using DCON Protocol

The DCON firmware, which uses ASCII Command provided with the 8410/8810, is easy to use and most of application can be developed using toolkits supported by ICPDAS, such as DLL, ActiveX or OPC Server, which can shorten their development time.



3.2 Location of documents and software

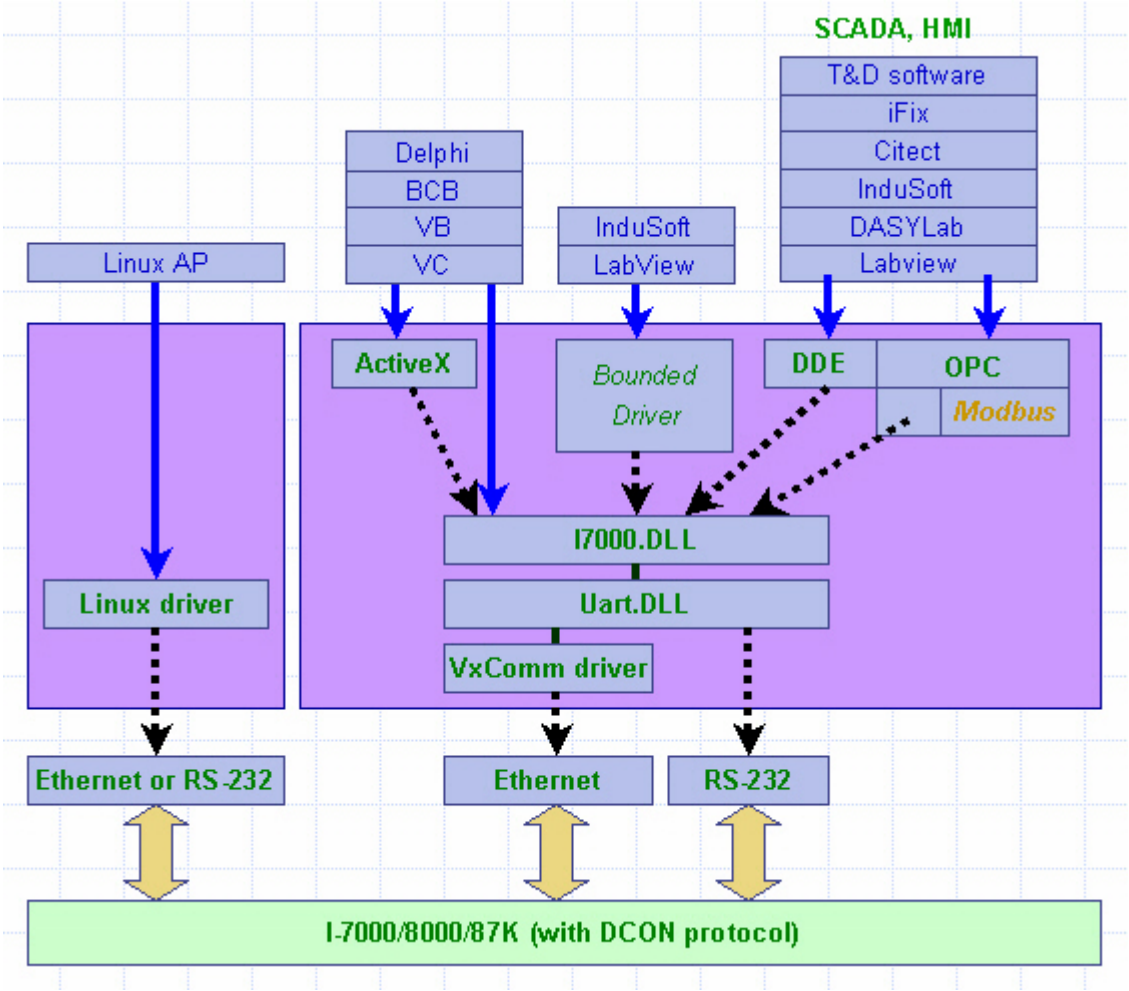
The location of all documents and software related to the 8410/8810 are shown in the following directory tree. The relevant file can quickly be located by referring to the tree.



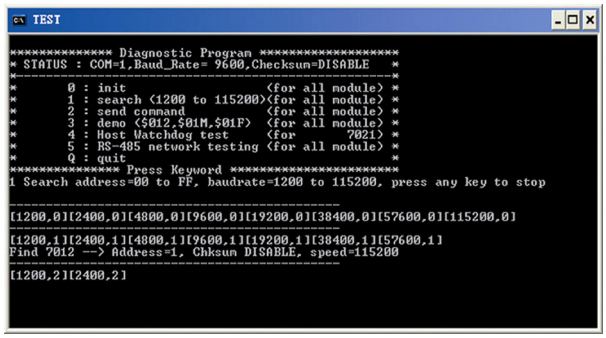
Various SDKs are provided for the DCON protocol, such as DLL, ActiveX, LabVIEW driver, Indusoft driver, Linux driver, OPC server, etc. Each SDK also contains a number of helpful free demo programs and documents, which can be found on the CD included in the package, or can be downloaded from the ICP DAS web site or FTP site..

When planning the development of a system, appropriate software solutions should be chosen to suit different situations. Following chart shows the relation between the software solution and the SDK provided. Refer to the chart to find a solution to meet your requirements.

The diagram below shows the architecture of the SDK.



3.3 DCON Utility (DOS)



DCON Utility (DOS)

DCON Utility (DOS version)

Supported modules:
i-7000/8000/87K series
(with DCON protocol)

Supported demos:
C

Supported OS:
DOS

File location:
CD:\Napdos\Driver\DCON_DOS

3.3.1 Procedure for using the DCON Utility (DOS)

Step 1: Read the basic and important documents

Readme.txt: contains the basic and important information, including:

- What is DCON Utility (DOS)
- What files are installed on the PC

Step 2: Read manuals for how to start

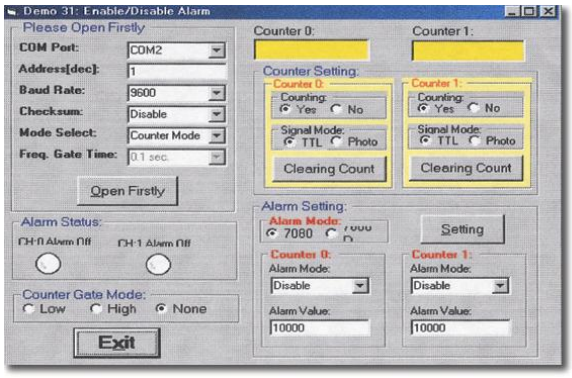
DCON_DOS.pdf:

Explains how to use the DOS version utility to diagnose/configure the I/O modules and how to use the C language to develop your first program running under DOS. The manual explains following details:

- How to include the lib to C
- How to develop a program in C
- Demo list
- Function descriptions and usage

Step 3: Run DCON_DOS\Diag\test.exe to diagnose the I/O modules.

3.4 DCON DLL



DCON DLL

DLL library

Supported modules:

i-7000/8000/87K series (with DCON protocol)

Supported demos:

VB/VC/BCB/Delphi

Supported OS:

Windows 98/NT/2K/XP

File location:

CD:\Napdos\Driver\DCON_DLL

3.4.1 Procedure for using the DLL

Step 1: Read the basic and important documents

Readme.txt: contains most basic and important information, including:

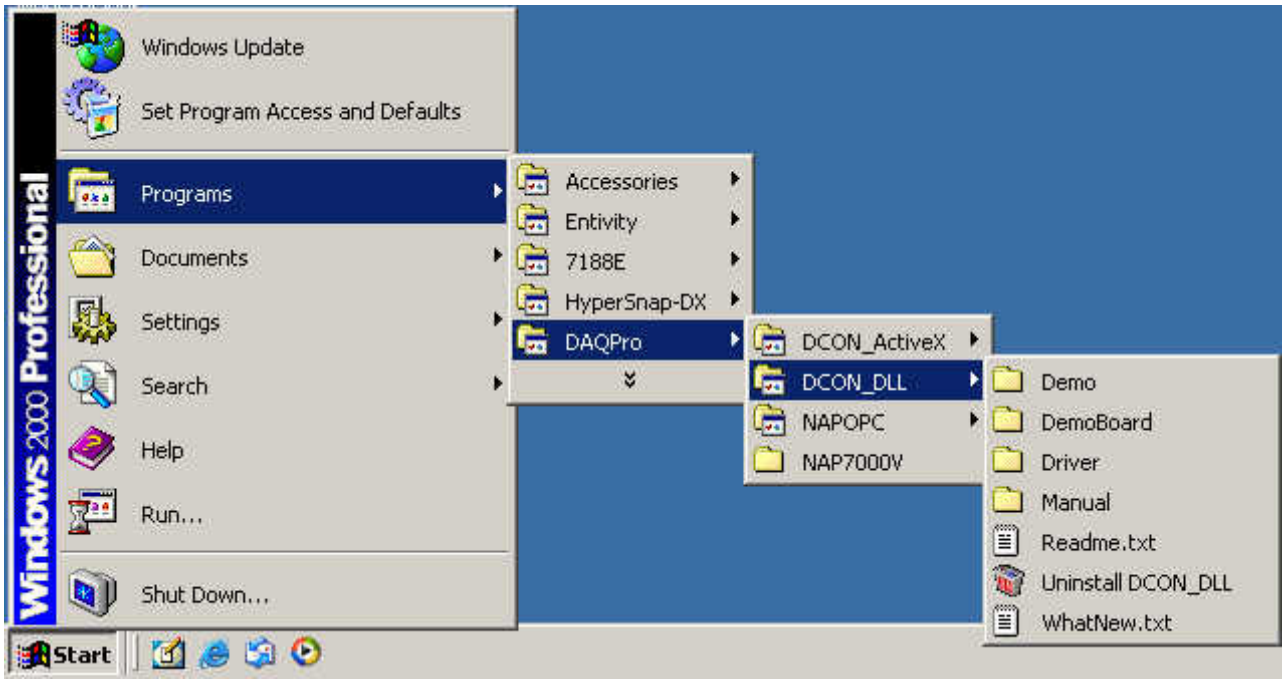
- What is DCON DLL
- What files are installed on the PC
- The directory tree installed on the PC
- Demo list

WhatsNew.txt: contains the version/reversion history information, including

- Bugs fixed
- Demos added or modified
- Updated DLL details

Step 2: Install the DCON DLL by executing:
CD:\Napdos\Driver\DCON_DLL\Setup\setup.exe

After installation, all related information can be found below



QuickStartManual.pdf:

Explains how to develop your first program using the DLL.
DCON_DLL.pdf explains the following details

- How to include the DLL in VB/VC/Delphi/BCB
- How to develop a program in VB/VC/Delphi/BCB
- Demo list
- Function descriptions and usage

FAQ.pdf:

Gives solutions to frequently asked questions.

Step 3: Run the demo programs to test the I/O module and learn the functions

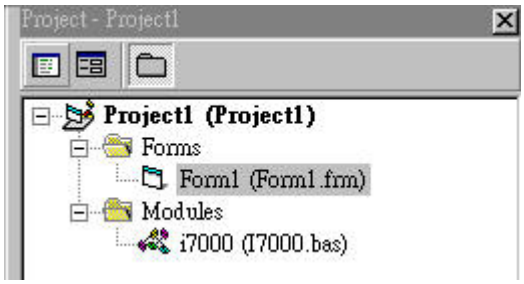
3.4.2 VB Example (Reading an analog input value)

The following is an example of reading analog values from an I-87017 inserted in slot 0 of an 8410/8810.

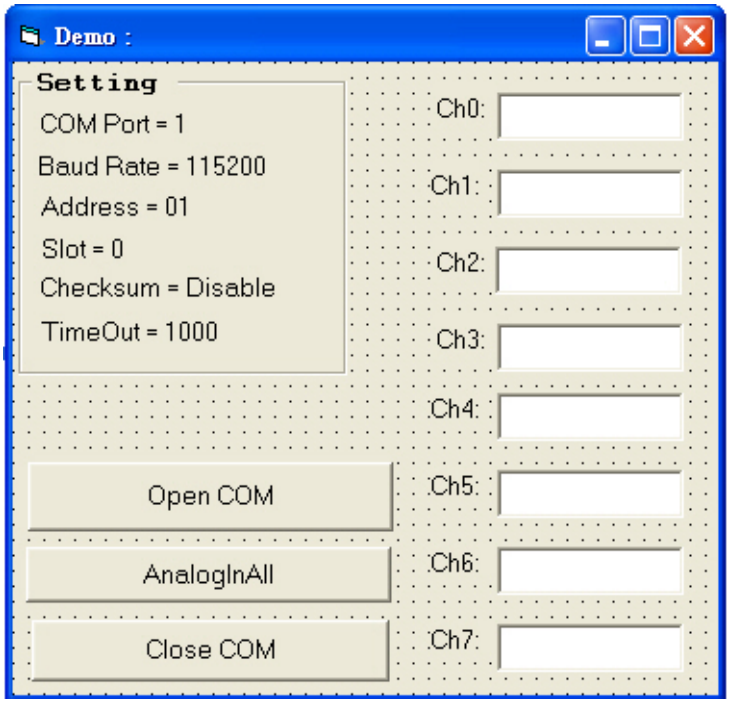
Step 1: Run the DCON Utility to configure the I/O modules

Step 2: Run VB and create a new project (.exe project)

Step 3: Add I7000.bas to the project



Step 6: Arrange all the components on the form



Step 7: Write the program code

VB Step 3

```
Private Sub CmdCloseCOM_Click()
    Close_Com (1)
End Sub
```

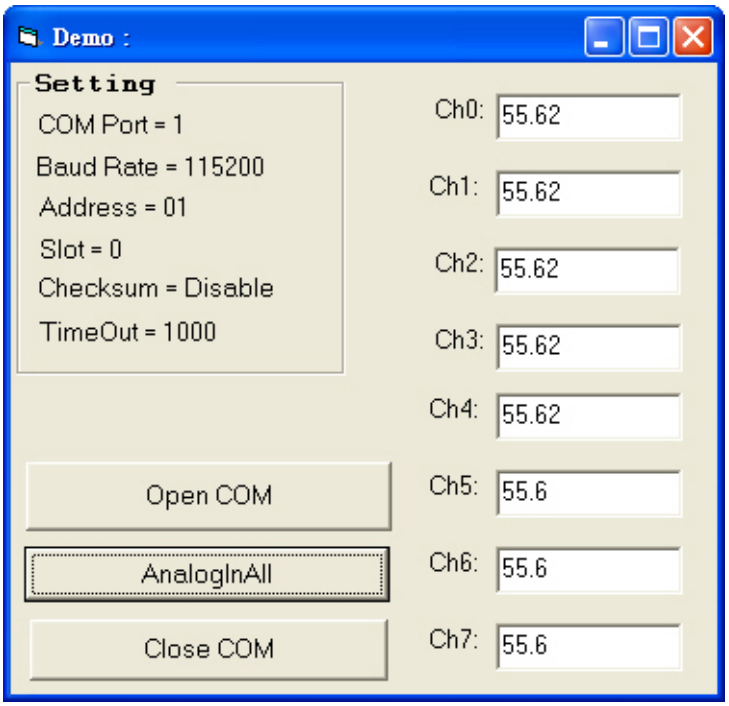
VB Step 1

```
Private Sub CmdOpenCOM_Click()
  Dim iRet As Integer
    iRet = Open_Com(1, 115200, 8, 0, 0)
      'COM Port =1
      'Baudrate= 115200 (depend on 8410/8810 baudrate setting)
      'Data bit = 8 (fixed)
      'Parity = 0 (parity: none  fixed)
      'Stop bit =0 (fixed)     0-> 1stop bit ; 1->1.5 stop bit 2->2 stop
    If iRet > 0 Then
      MsgBox "Open Com port error !!"
    End If
End Sub
```

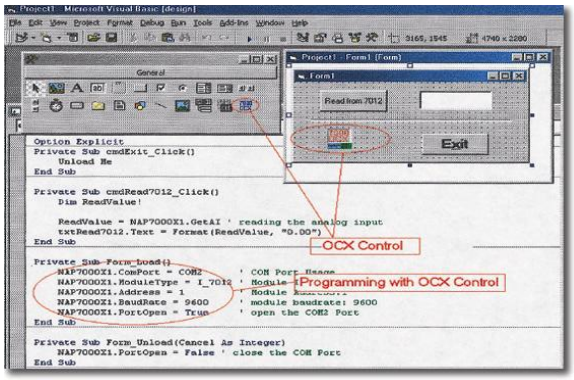
VB Step 2

```
Private Sub CmdAnalogInAll_Click()
  Dim iRet As Integer
  Dim sSendString As String
  Dim sReceiveString As String
  Dim dwCommandBuf(0 To 7) As Long
  Dim fReceiveBuf(0 To 7) As Single

  sSendString = Space(80)
  sReceiveString = Space(80)

  dwCommandBuf(0) = 1              'COM Port = 1
  dwCommandBuf(1) = 1              'Address = 1
  dwCommandBuf(2) = &H8018         'Module ID
  dwCommandBuf(3) = 0              'Checksum = Disable
  dwCommandBuf(4) = 1000           'TimeOut = 1000
  dwCommandBuf(5) = 0              'Channel number don't care in AnalogInAll_8K
  dwCommandBuf(6) = 0              'String debug disabled
  dwCommandBuf(7) = 0              'Module slot = 0

  iRet = AnalogInAll_8K(dwCommandBuf(0), fReceiveBuf(0), sSendString, sReceiveString)
  If iRet <> 0 Then
    MsgBox "AnalogInAll_8K() error  !"
  End If

  txtCh0.Text = fReceiveBuf(0)
  txtCh1.Text = fReceiveBuf(1)
  txtCh2.Text = fReceiveBuf(2)
  txtCh3.Text = fReceiveBuf(3)
  txtCh4.Text = fReceiveBuf(4)
  txtCh5.Text = fReceiveBuf(5)
  txtCh6.Text = fReceiveBuf(6)
  txtCh7.Text = fReceiveBuf(7)
End Sub
```

Step 8: Run the project.



3.5 DCON ActiveX



DCON ActiveX

ActiveX (ocx) component

Supported modules:
i-7000/8000/87K series
(with DCON protocol)

Supported demos:
VB/VC/BCB/Delphi

Supported OS:
Windows 98/NT/2K/XP

File location:
CD:\Napdos\Driver\DCON_ActiveX

3.5.1 Procedure for using the ActiveX

Step 1: Read most basic and important documents

Readme.txt: contains the basic and important information, including:

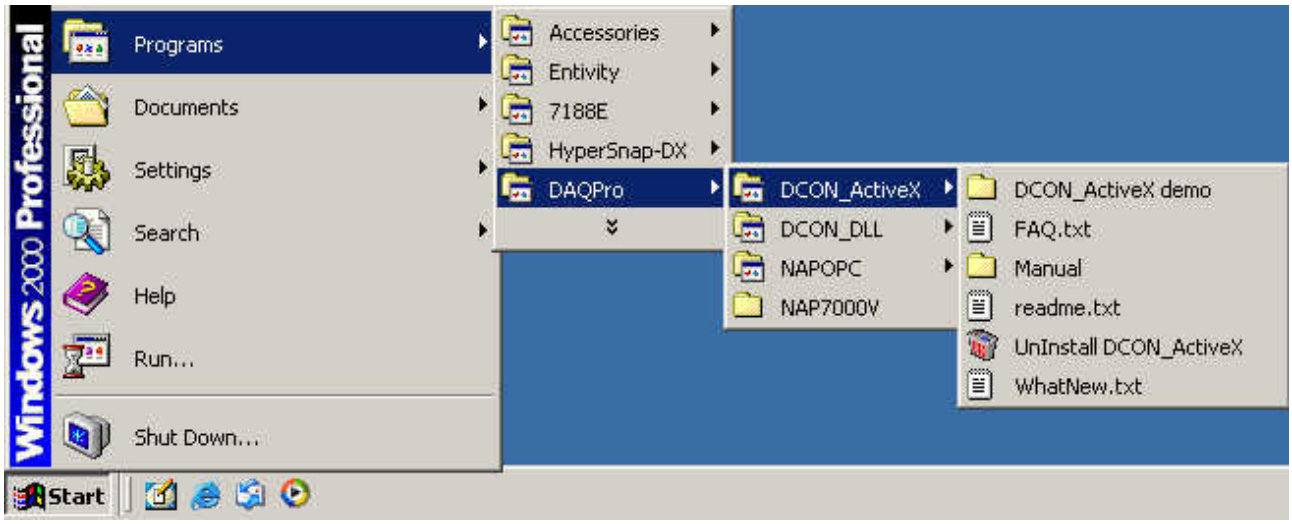
- What is DCON ActiveX
- What files are installed on the PC
- The directory tree installed on the PC
- Demo list

WhatsNew.txt: contains the version/reversion history information, including:

- Bugs fixed
- Demos added or modified
- Updated ActiveX (ocx) details

Step 2: Install the DCON ActiveX by executing:
CD:\Napdos\Driver\DCON_ActiveX\Setup\setup.exe

After installation, all related information can be found below



Step 3: Read the manuals describing how to start

InstallOCX.pdf:
Explains how to install/uninstall the ActiveX (ocx) component in VB/VC/Delphi/BCB
DCON_ActiveX.pdf explains the following details:

- How to include the ActiveX(ocx) in VB/VC/Delphi/BCB
- How to develop a program in VB/VC/Delphi/BCB
- Demo list
- Function descriptions and usage

Step 4: Run the demo programs to test the I/O module and learn the functions

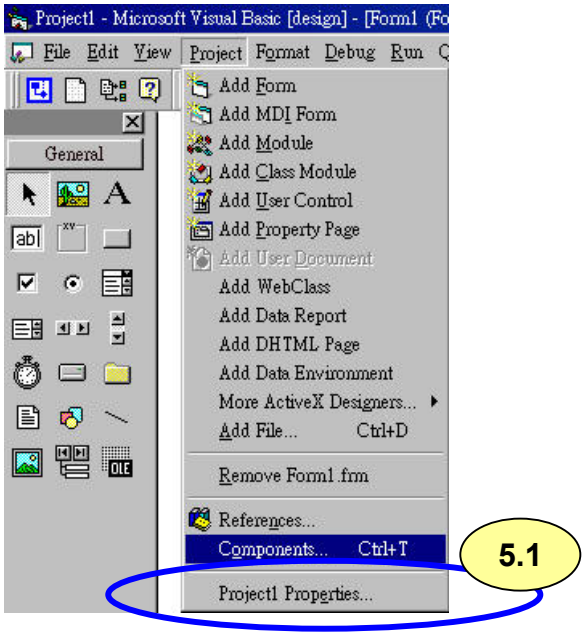
3.5.2 VB Example (Reading an analog input value)

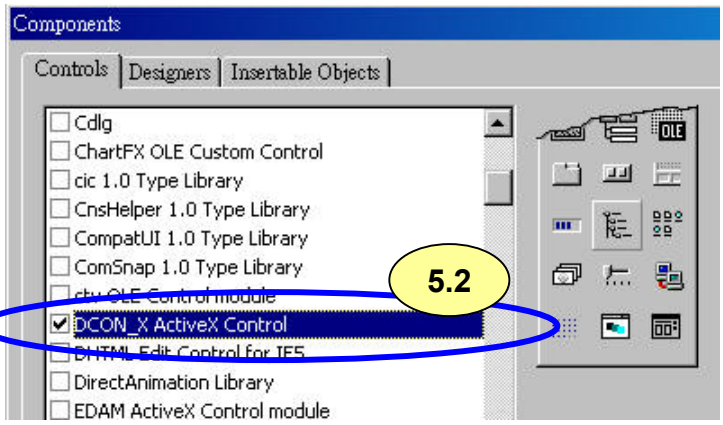
The following is an example of reading analog values from an I-87017 inserted in slot 0 of an 8410/8810.

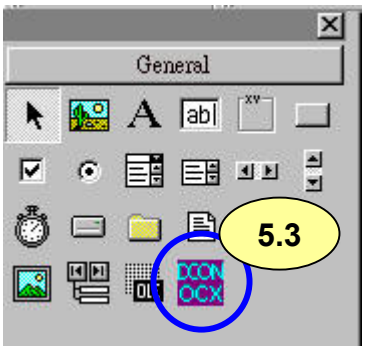
Step 3: Run the DCON Utility to configure the I/O module

Step 4: Run VB and create a new project (.exe project)

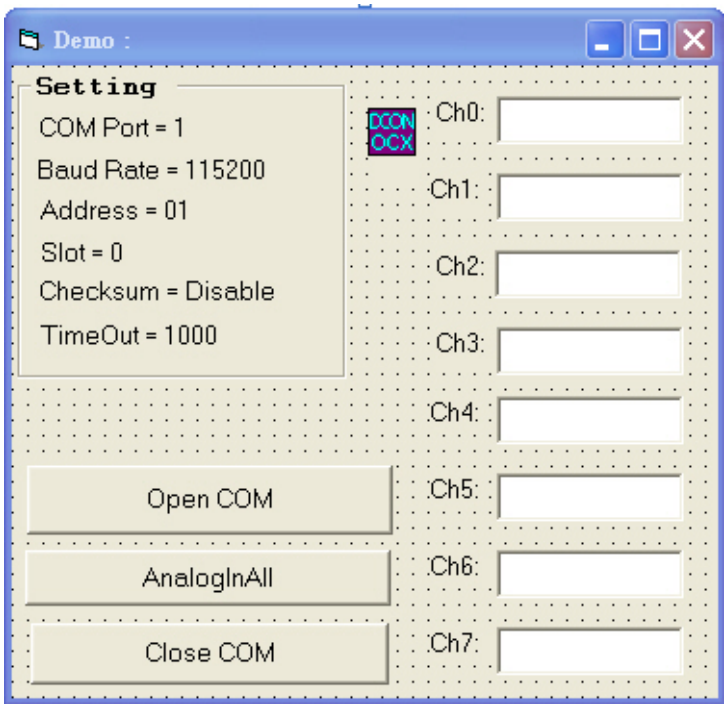
Step 5: Add the ActiveX (ocx) component to the project


Project1 - Microsoft Visual Basic [design] - [Form1 (Fo
File Edit View Project Format Debug Run
General
Add Form
Add MDI Form
Add Module
Add Class Module
Add User Control
Add Property Page
Add User Document
Add WebClass
Add Data Report
Add DHTML Page
Add Data Environment
More ActiveX Designers...
Add File... Ctrl+D
Remove Form1.frm
References...
Components... Ctrl+T
Project1 Properties...
5.1


Components
Controls
Designers
Insertable Objects
Cdlg
ChartFX OLE Custom Control
cic 1.0 Type Library
CnsHelper 1.0 Type Library
CompatUI 1.0 Type Library
ComSnap 1.0 Type Library
DCON_X ActiveX Control
DirectAnimation Library
EDAM ActiveX Control module
5.2


General
5.3

Step 6: Arrange all the components on the form



Step 7: Write the program code

VB Step 2

```
Private Sub cmdAnalogInAll_Click()
    Dim fReceiveBuf(0 To 7) As Single

    DCON_X1.ModuleAddress = 1
    DCON_X1.ModuleID = CLng("&H8018")
    DCON_X1.SlotNo = 0
    DCON_X1.CheckSum = False
    DCON_X1.TimeOut = 1000

    DCON_X1.AnalogInAll fReceiveBuf(0)
    If DCON_X1.ErrorCode = 0 Then
        txtCh0.Text = fReceiveBuf(0)
        txtCh1.Text = fReceiveBuf(1)
        txtCh2.Text = fReceiveBuf(2)
        txtCh3.Text = fReceiveBuf(3)
        txtCh4.Text = fReceiveBuf(4)
        txtCh5.Text = fReceiveBuf(5)
        txtCh6.Text = fReceiveBuf(6)
        txtCh7.Text = fReceiveBuf(7)
    Else
        MsgBox "DCON ActiveX error!"
    End If
End Sub
```

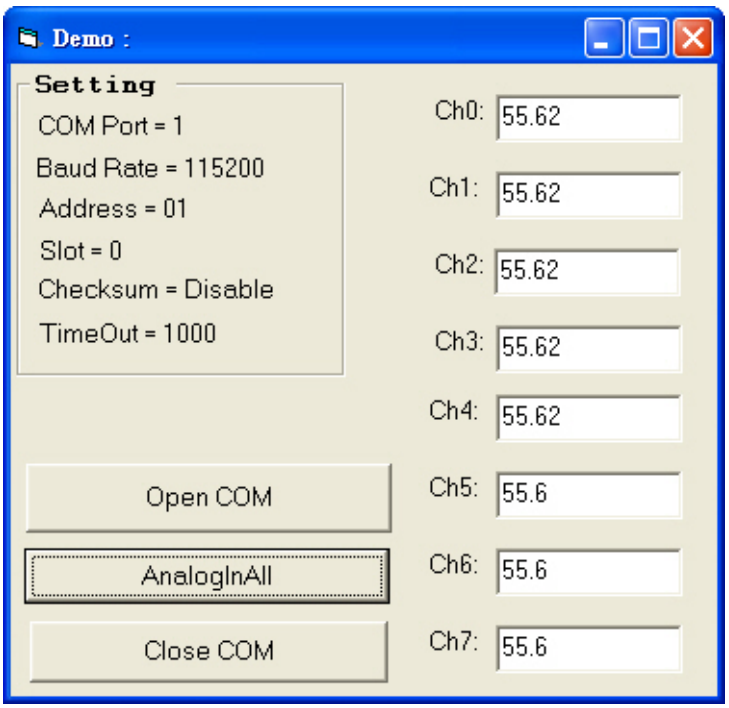
VB Step 3

```
Private Sub cmdCloseCOM_Click()
    DCON_X1.PortOpen = False
End Sub
```

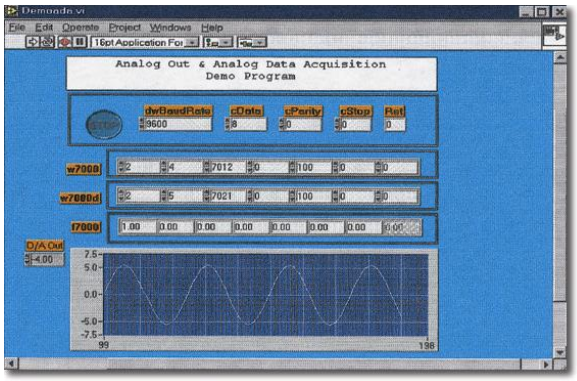
VB Step 1

```
Private Sub cmdOpenCOM_Click()
    DCON_X1.COMPort = 1
    DCON_X1.BaudRate =115200
    DCON_X1.DataBit = 8
    DCON_X1.ParityBit = 0
    DCON_X1.StopBit = 0
    DCON_X1.PortOpen = True
End Sub
```

Step 8: Run the project



3.6 DCON LabVIEW



DCON LabVIEW

Bundled driver for LabVIEW

Supported modules:

i-7000/8000/87K series
(with DCON protocol)

Supported OS:

Windows 98/NT/2K/XP

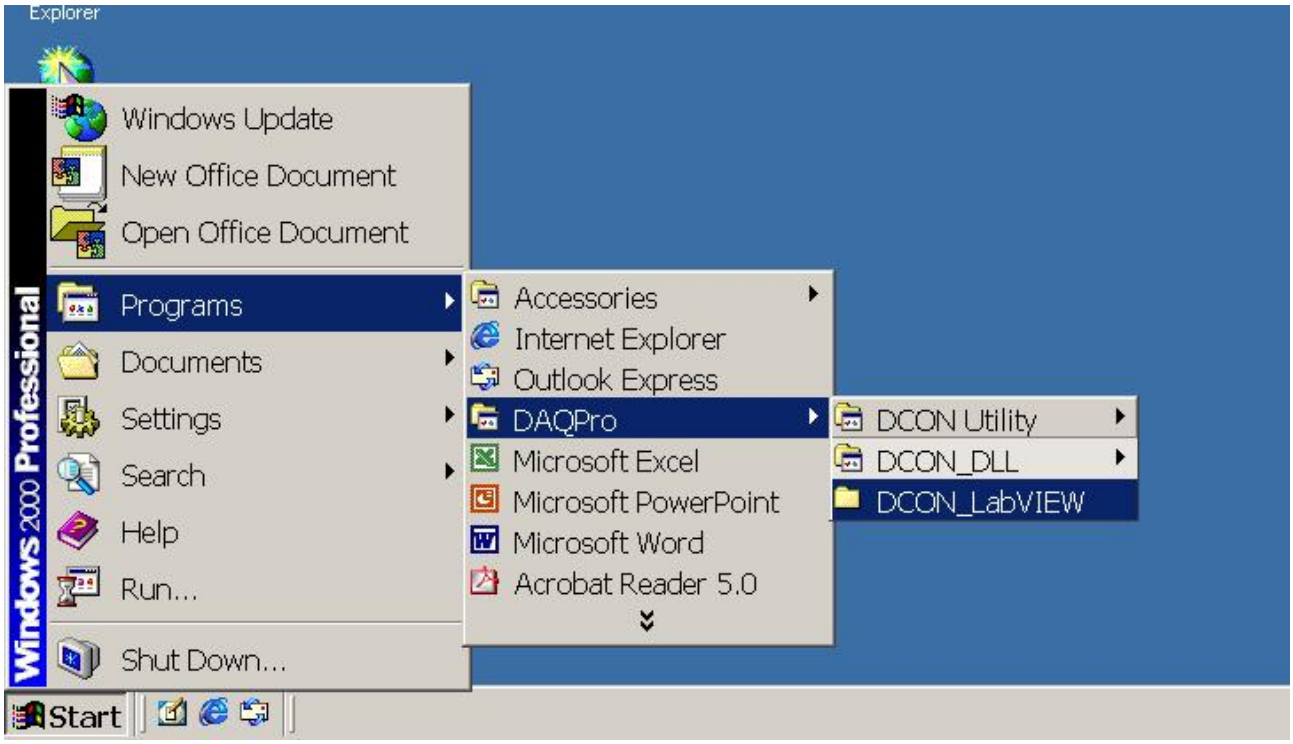
File location:

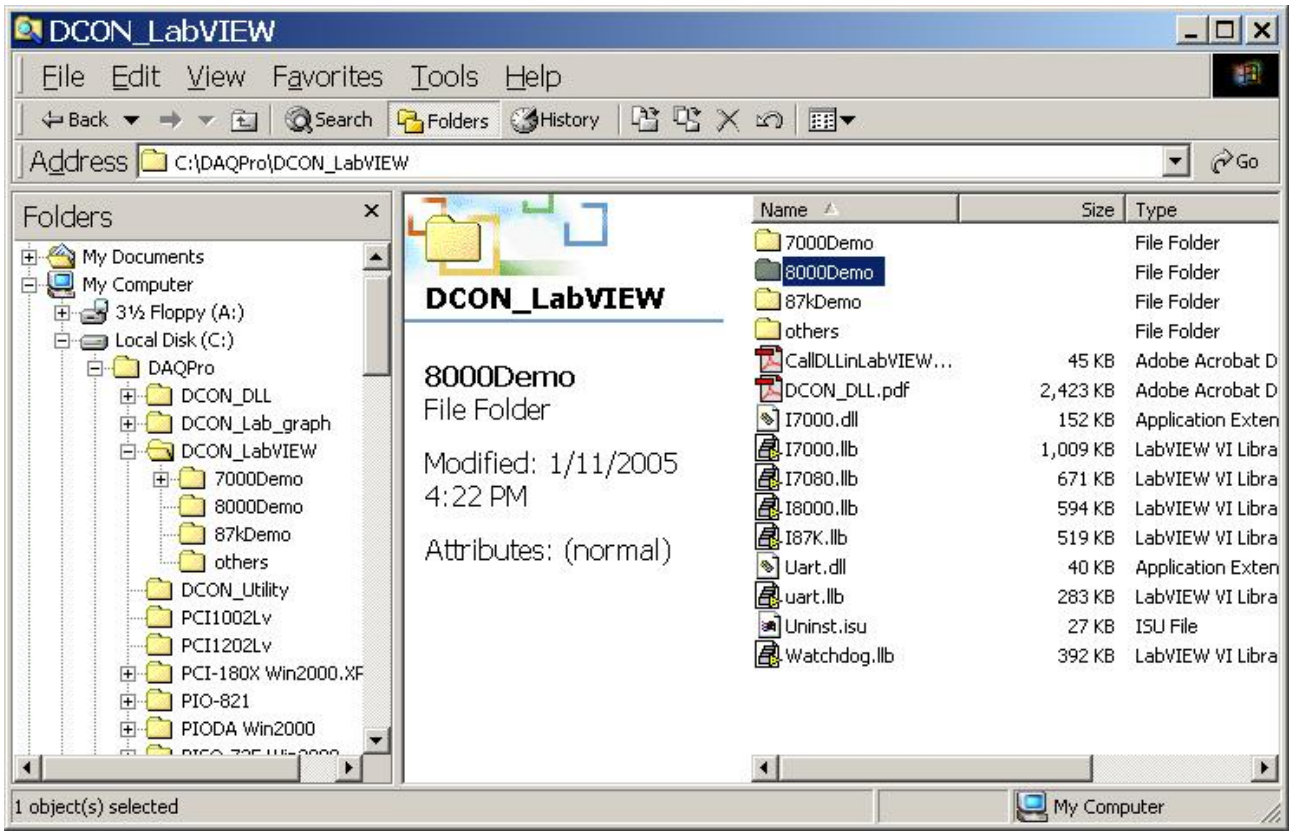
CD:\Napdos\Driver\DCON_Labview

3.6.1 Procedure for using DCON_LabVIEW

Step 1: Install the DCON LabVIEW by executing:
CD:\Napdos\Driver\ DCON_Labview\ DCON_Labview.exe

After installation, the related information can be found as below:





8000Demo: Demo programs for I-8000 I/O modules.

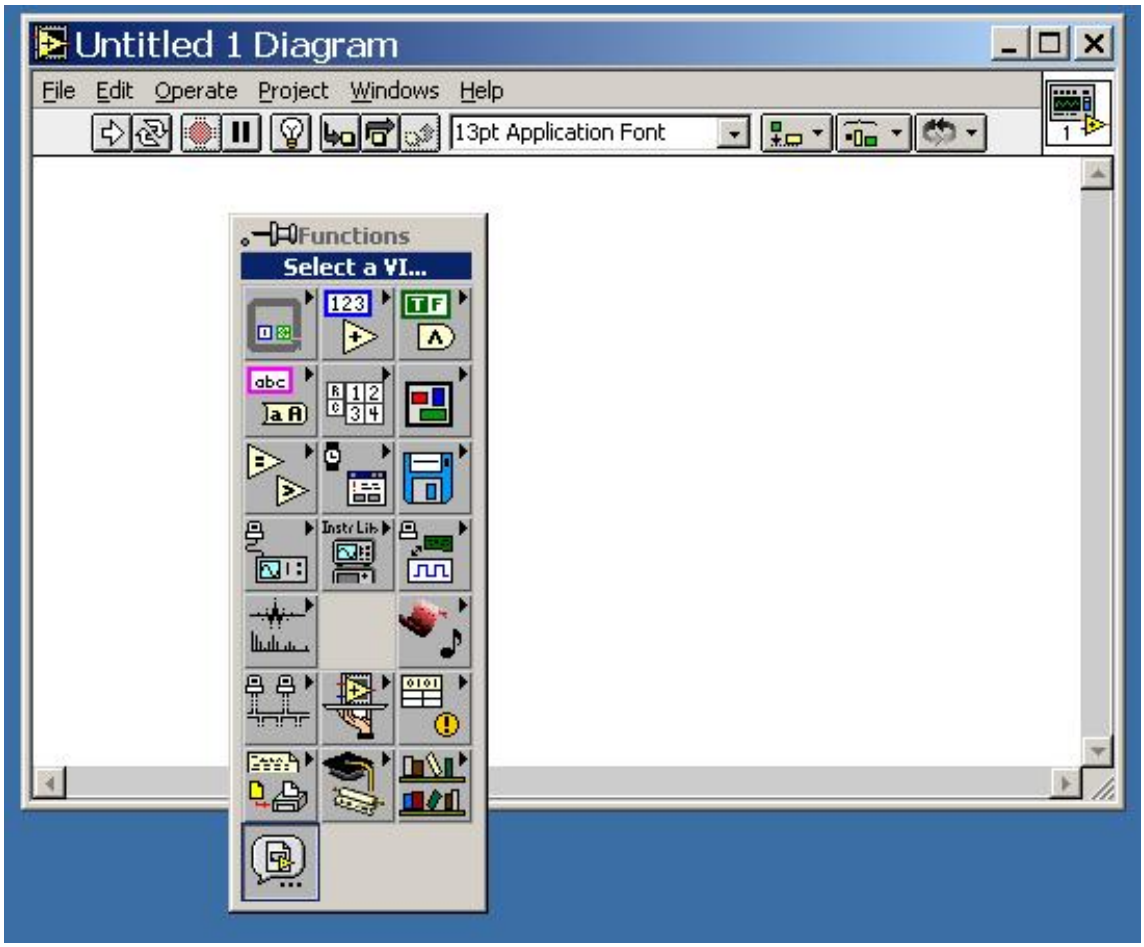
8000.llb: LabVIEW library contains all sub-vi for I-8000 I/O modules

CallDLLinLabVIEW.pdf: Explains how to call a sub-vi of in LabVIEW.

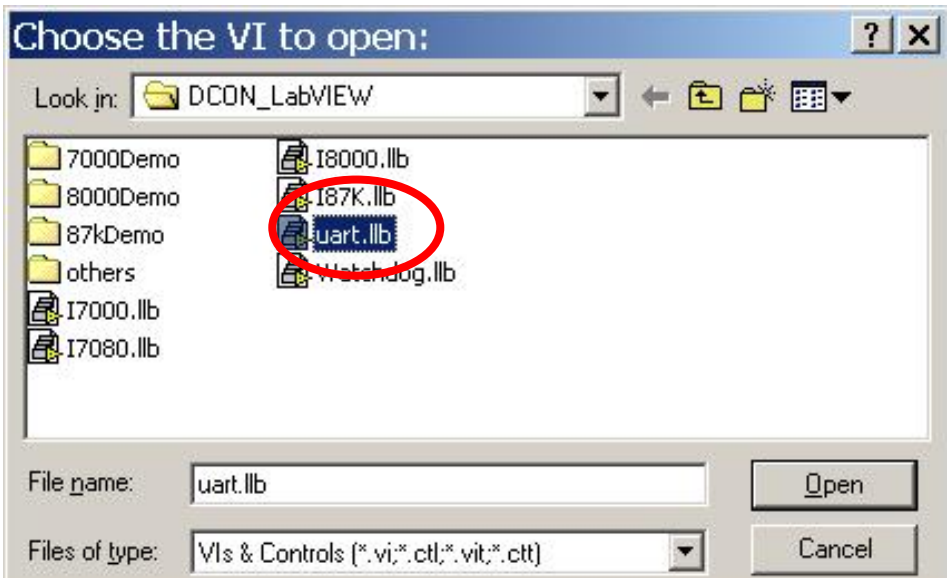
DCON_DLL.pdf: Descriptions of all sub-function in DCON_DLL

Step 2: Create a new LabVIEW program. Refer the DCON_DLL.pdf about detail description of the sub-vi and where to select the sub-vi in various librarys of DCON_LabVIEW.

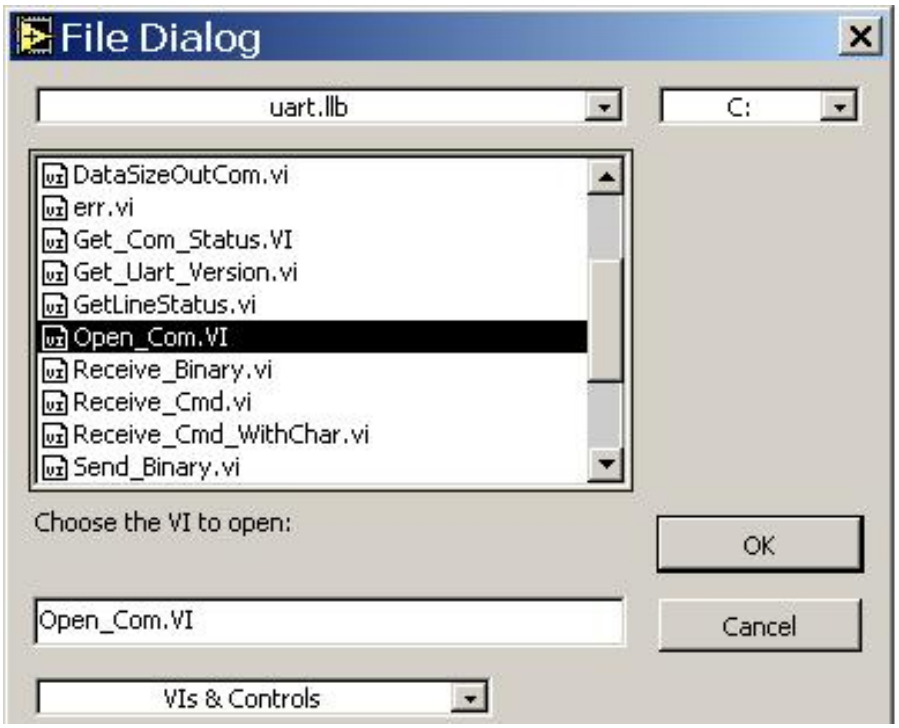
Step3: Select the sub-vi form Functions Palette >> Select a VI…



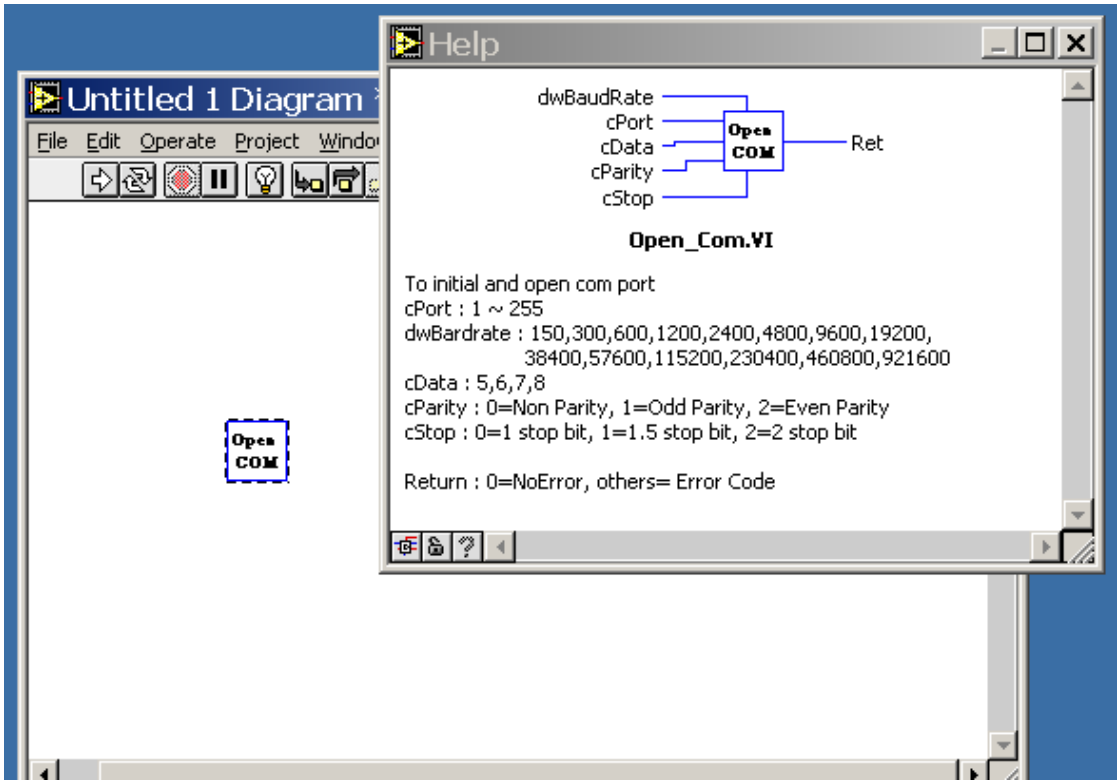
Step4: Select the target *.lib file (LabVIEW library file)



Step5: Select the desired sub-vi



Step6 : Put the icon of selected sub-vi on Block Diagram, refer the “Help” >> “Show Help” or “**DCON_DLL.pdf”** in step1 for detail.

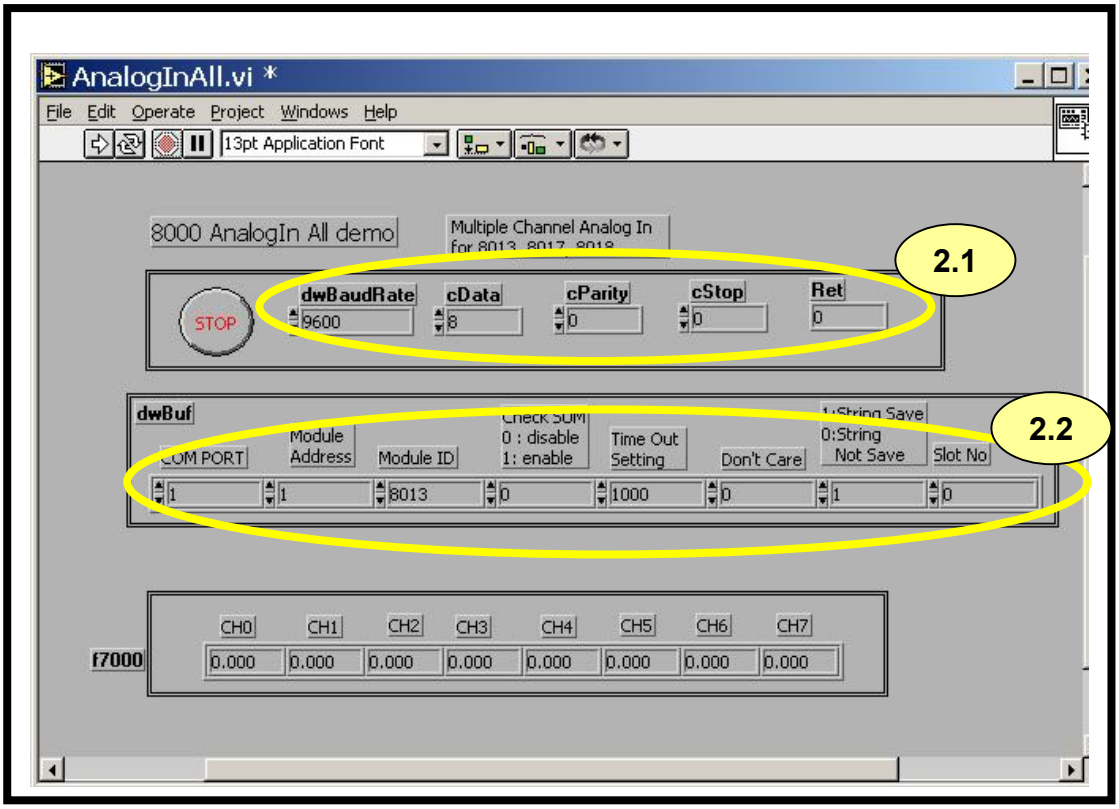


Step7 : Draw the data flow of sub-vi.

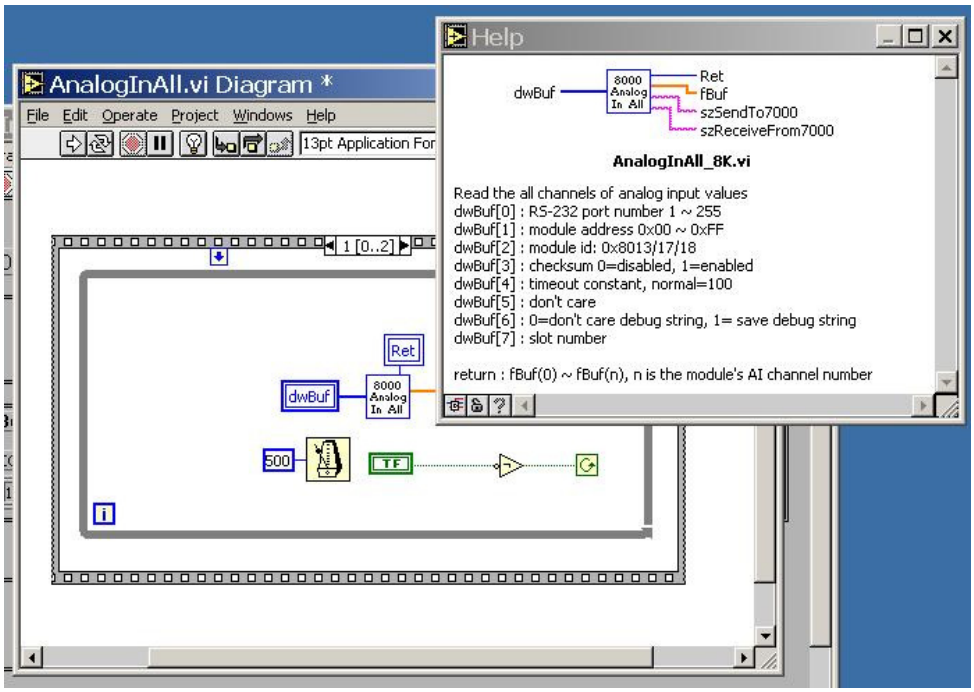
3.6.2 LabVIEW Demo Program (Reading multi-channel analog input value)

Step 1: Select the appropriate demo program by the name according with module’s function.

Step2: Set the parameters

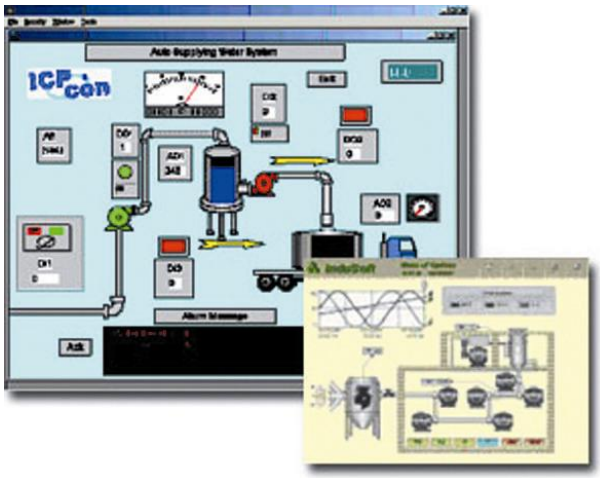


You could also refer the “Help”>>”Show Context Help” for getting the simple description of those parameters.



Step3: Run the demo.

3.7 DCON Indusoft



DCON Indusoft

Bundled driver for Indusoft

Supported Module:

i-7000/8000/87K series
(with DCON protocol)

Supported OS:

Windows 98/NT/2K/XP/CE

File location:

CD:\Napdos\Driver\DCON_Indusoft

3.7.1 Procedure for using the Indusoft bundled driver

Step 1: Read the basic and important documents

Readme.txt: contains the basic and important information, including:

- Files on the shipped CD

Reversion.txt: contains the reversion information, including

- Bugs fixed
- New modules supported

Step 2: Install the Indusoft bundled driver by executing
CD:\Napdos\Driver\DCON_Indusoft\Setup\setup.exe

Step 3: Read the manuals describing how to start

The **DCON.pdf** user's manual describes how to use the Indusoft bundled driver

Step 4: Run the demo programs (ICPDriverTest.zip) to test I/O modules and learn the functions

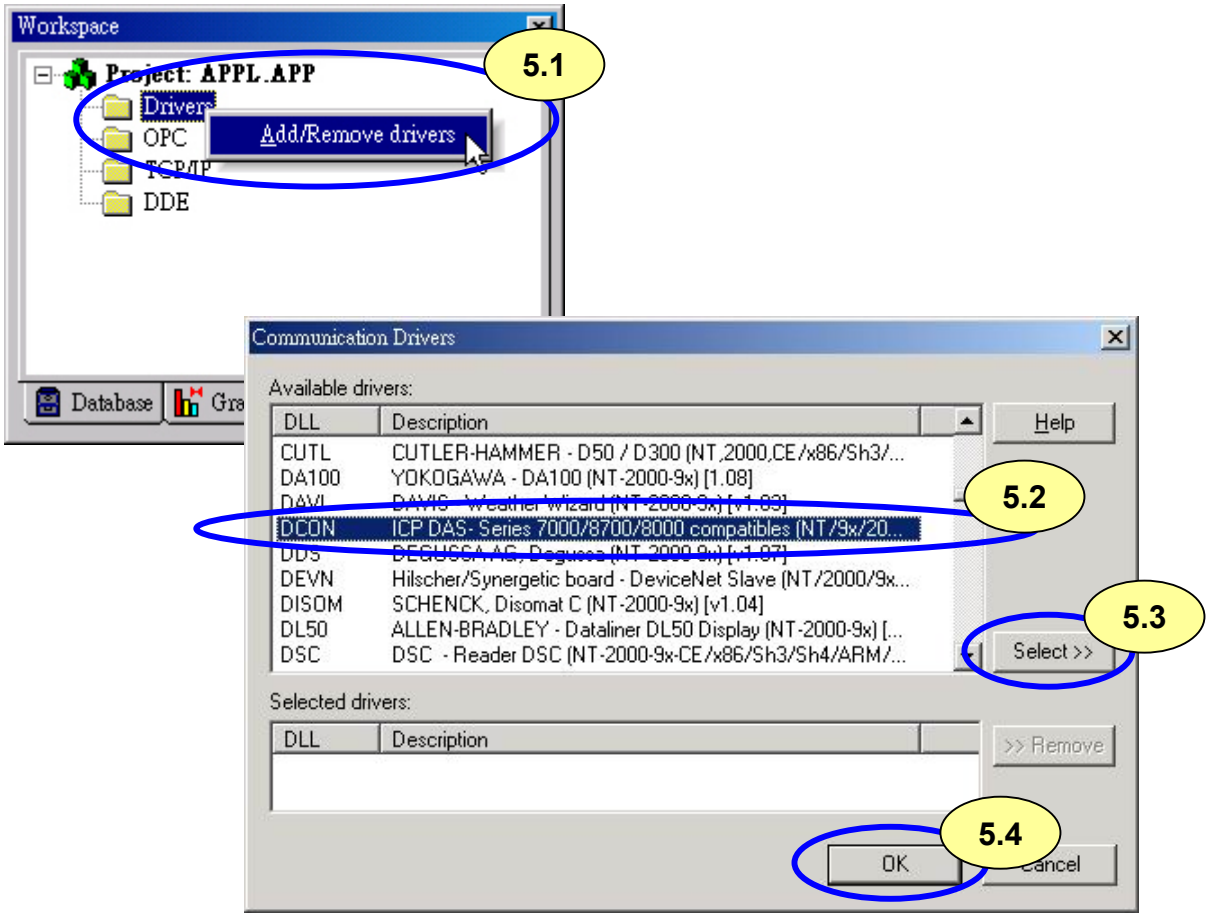
3.7.2 Indusoft Example (Reading an analog input value)

The following is an example of reading analog values from an I-87018 inserted in slot 0 of an 8410/8810.

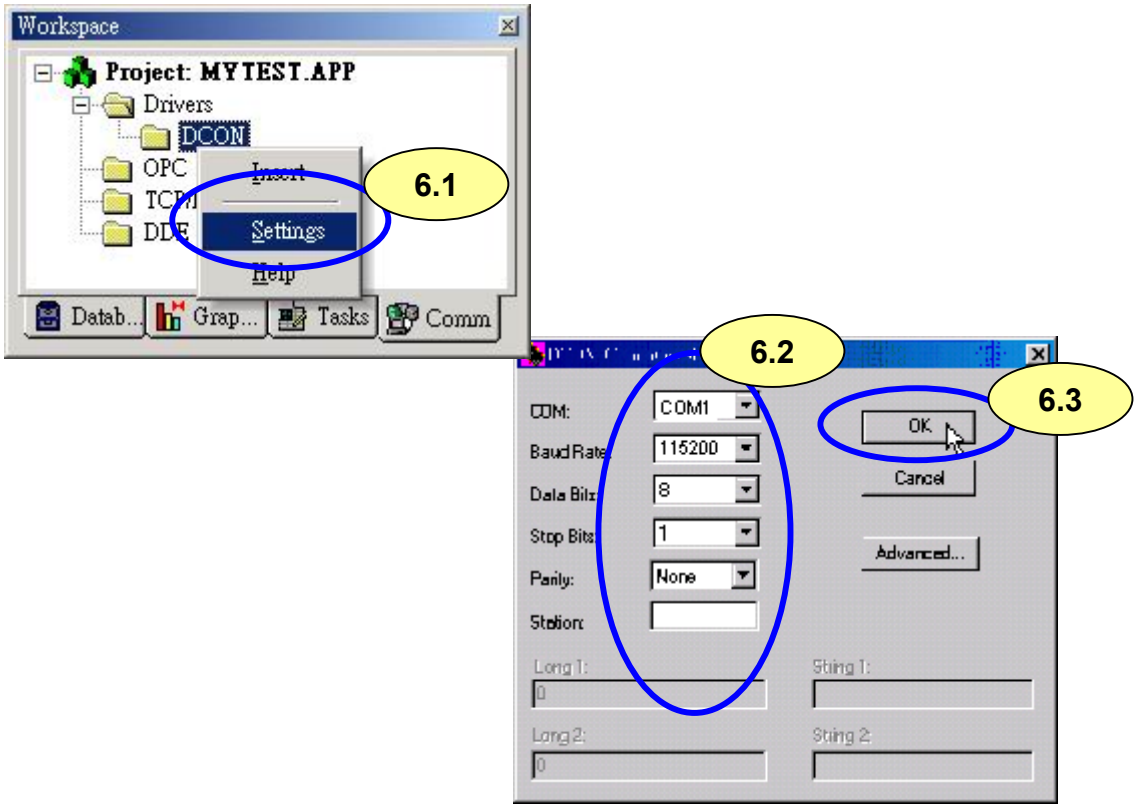
Step 3: Run the DCON Utility to configure the I/O modules

Step 4: Run Indusoft and create a new project

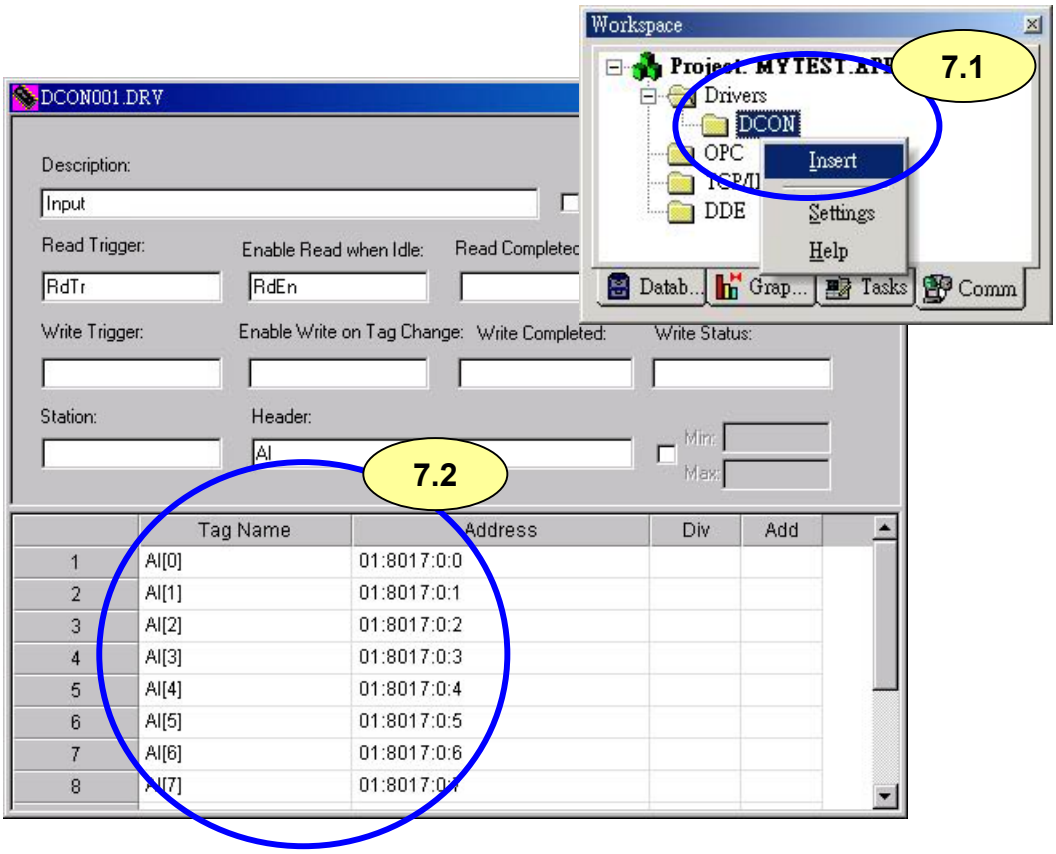
Step 5: Include the DCON driver


Workspace
Project: APPL.APP
Drivers
OPC
TCP/IP
DDE
Add/Remove drivers
5.1
Database
Communication Drivers
Available drivers:
DLL
Description
CUTL
CUTLER-HAMMER - D50 / D300 (NT,2000,CE/x86/Sh3/...
DA100
YOKOGAWA - DA100 (NT-2000-9x) [1.08]
DCON
ICP DAS- Series 7000/8700/8000 compatibles (NT/9x/20...
DEVN
Hilscher/Synergetic board - DeviceNet Slave (NT/2000/9x...
DISOM
SCHENCK, Disomat C (NT-2000-9x) [v1.04]
DL50
ALLEN-BRADLEY - Dataliner DL50 Display (NT-2000-9x) [...
DSC
DSC - Reader DSC (NT-2000-9x-CE/x86/Sh3/Sh4/ARM/...
Help
5.2
5.3
Select >>
Selected drivers:
DLL
Description
>> Remove
5.4
OK
Cancel

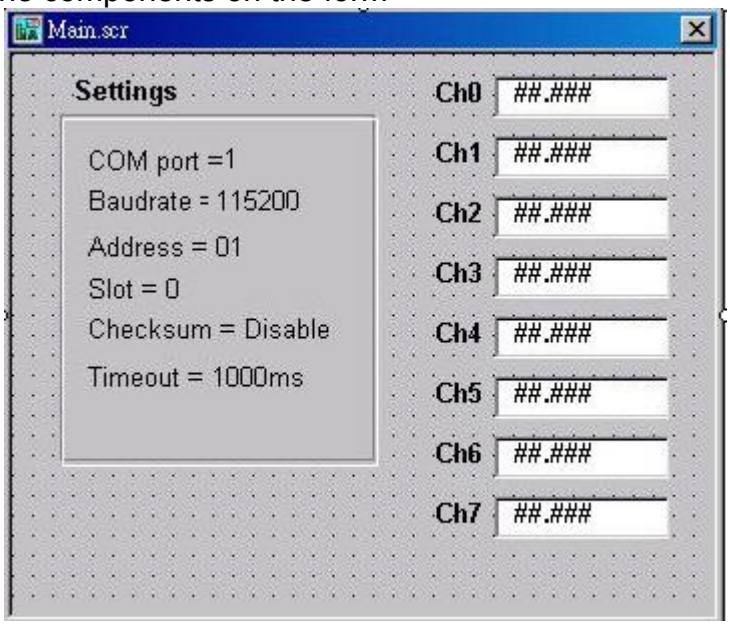
Step 6: Configure the DCON driver



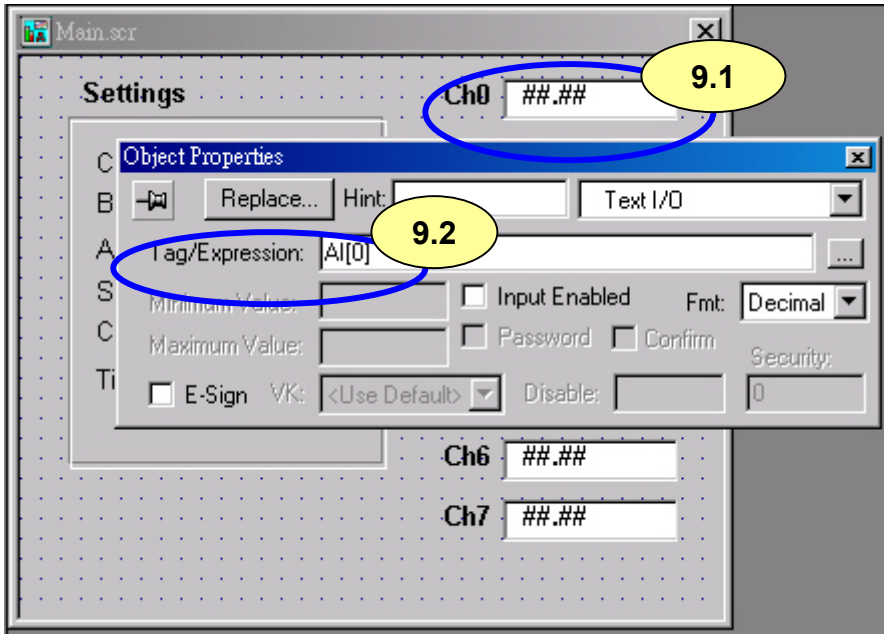
Step7: Insert tags to connect to I/O modules
The address format is [Address : ModuleID : Slot : Channel]



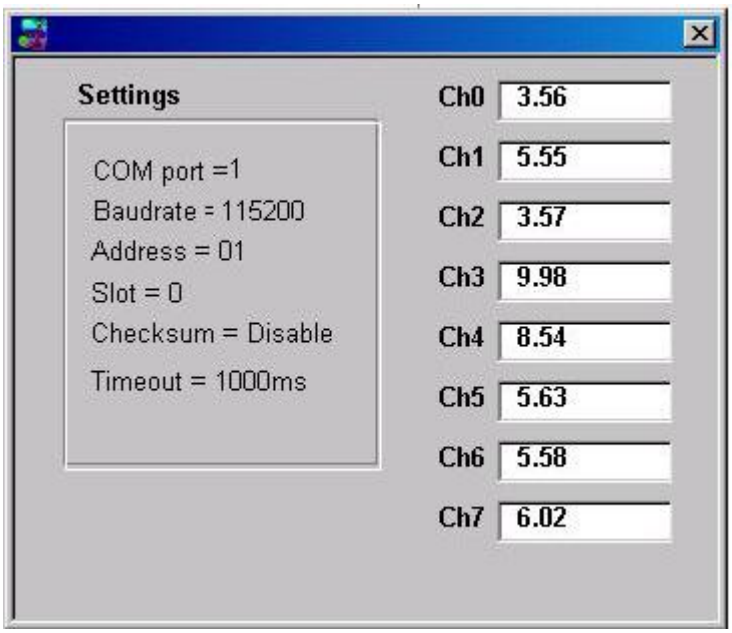
Step8: Arrange all the components on the form



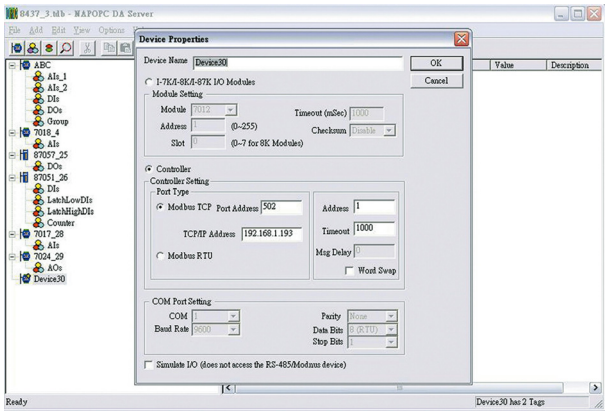
Step9: Double click the text box to assign a tag to it



Step10: Run the project



3.8 NAP OPC Server



NAP OPC server

OPC Server

Supported module:

i-7000/8000/87K series
(with DCON protocol)

Modbus embedded controller

ISaGRAF embedded controller

Supported OS:

Windows 98/NT/2K/XP/CE

File location:

CD:\Napdos\NapOPCSvr

3.8.1 Introduction

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

For accessing the various devices for any application, there are many different mechanisms provided by different vendors, but if vendors provide OPC server for their devices, other application can access the OPC server via “OPC” interface.

framework for software products to be developed. There are now hundreds of OPC Data

Access servers and clients.

3.8.2 Procedure for using the OPC server

Step 1: Read the basic and important documents

Readme.txt: contains the basic and important information, including
- Files on the shipped CD

WHATSNEW.txt: contains the reversion information, including
- Bugs fixed
- New modules supported

Step 2: Install the OPC server by executing
CD:\Napdos\NapOPCSvr\NapOPCServer.exe
Note: If there is an older version of Nap OPC Server installed on the PC, It must be uninstalled before installing the new version.

Step 3: Read the manuals describing how to start

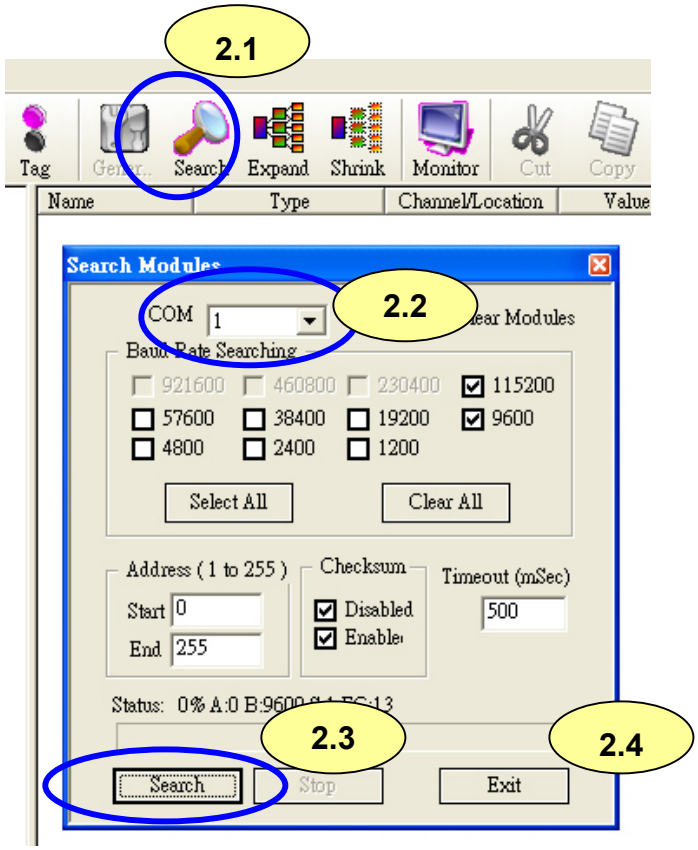
The **NapOPCSvr.pdf** is the user's manual describing how to use the OPC server

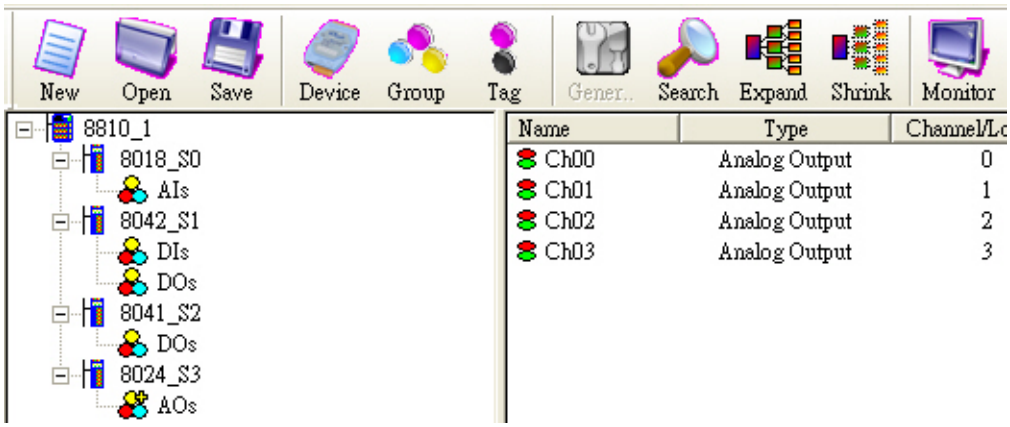
3.8.3 OPC Server Example (Reading an analog input value)

The following is an example of reading analog values from an I-87018 inserted in slot 0 of an 8410/8810.

Step 1: Run the DCON Utility to configure the I/O modules

Step 2: Run the OPC server to search for I/O modules on COM1





Step 3: Save the configuration and close the OPC Server

Step 4: Run SCADA software to connect to the OPC Server

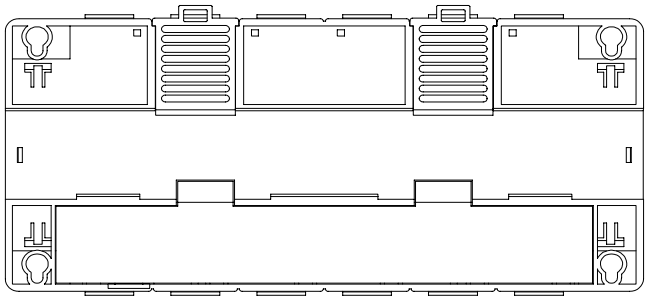
The OPC Server user's manual lists the procedures for the following SCADA software:

- **LabVIEW**
- **National**
- **WIZCON**
- **iFix**
- **Indusoft**
- **Citect**

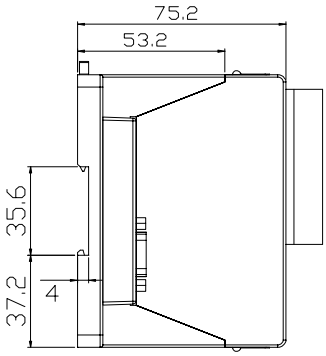
Please refer to "Chapter 4 Connecting to the OPC Server" for more details.

Appendix A: Dimensions

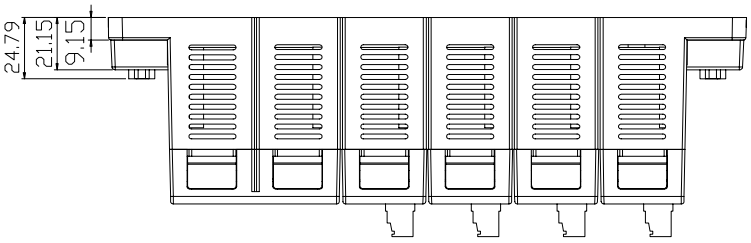
i-8410 :



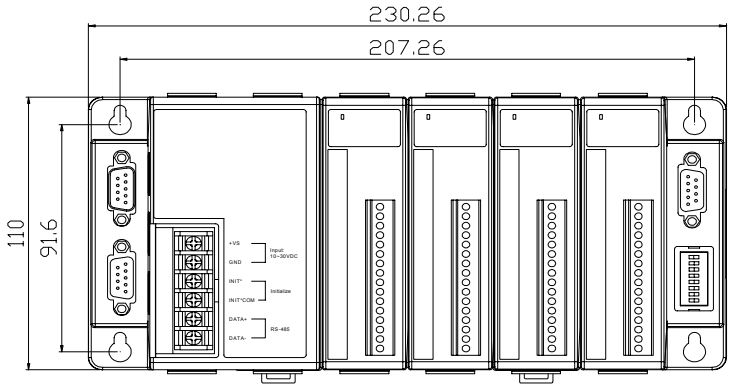
Back View



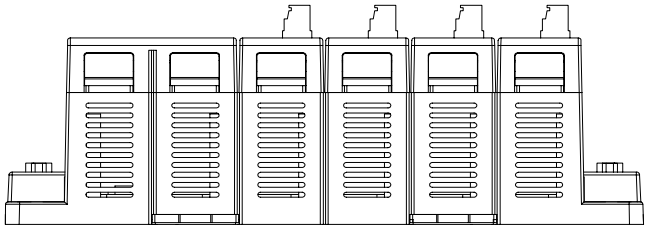
Side View



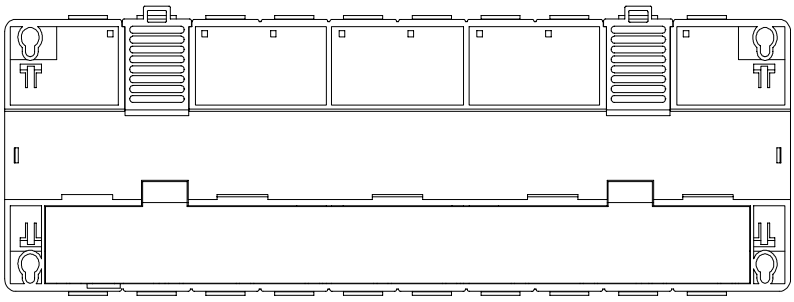
Top View



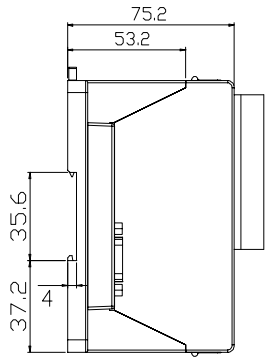
Front View



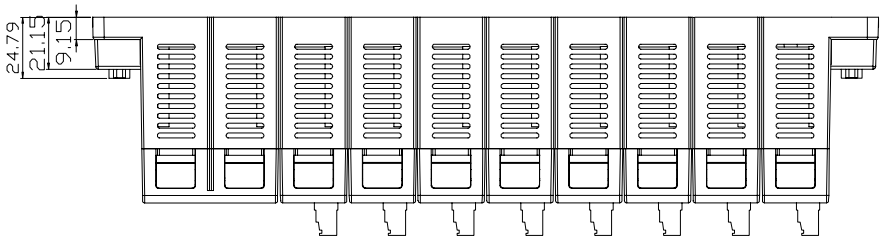
i-8810:



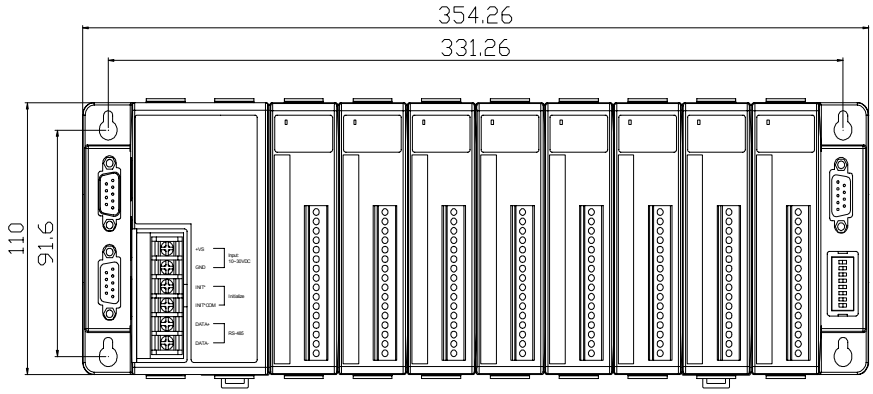
Back View



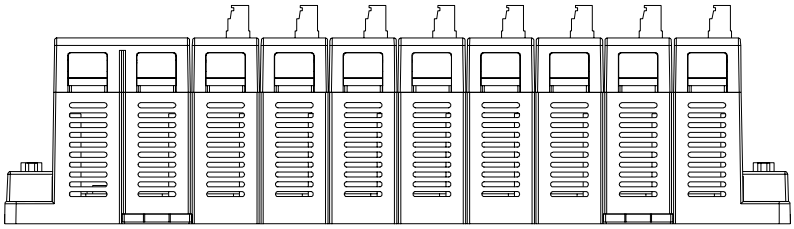
Side View



Top View



Front View



Appendix B: Frame Ground

Electronic circuits are constantly vulnerable to Electro-Static Discharge (ESD), which become worse in a continental climate area. Some I-7000 ,M-7000 and I-8000 series modules feature a new design for the frame ground, which provides a path for bypassing ESD, allowing enhanced static protection (ESD) capability and ensures that the module is more reliable.

The following options will provide a better protection for the module:

The i-8000 controller has a metallic board attached to the back of the plastic basket as shown in the Figure 2-1 below. When mounted to the DIN rail, connect the DIN rail to the earth ground because the DIN rail is in contact with the upper frame ground as shown in the Figure 2-2 below.

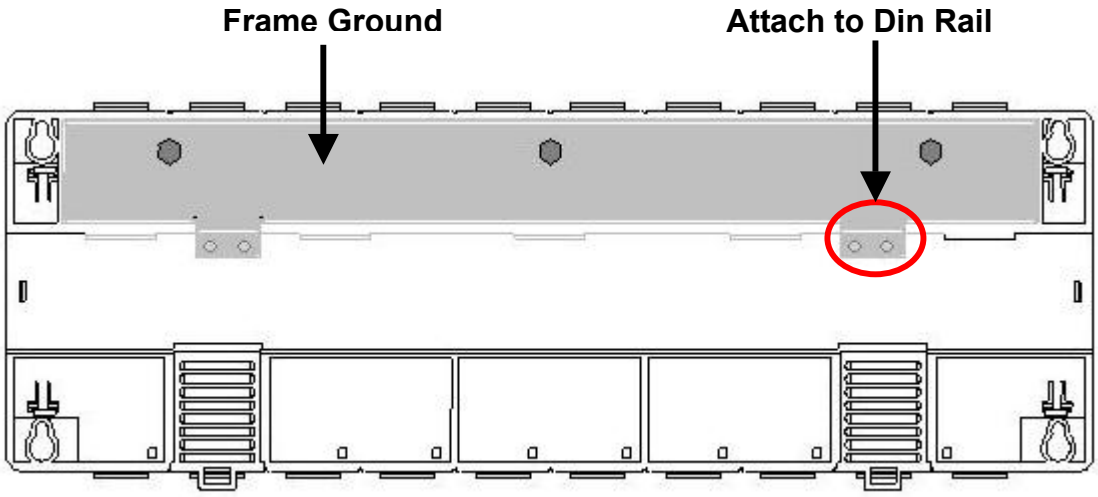


Figure B-1

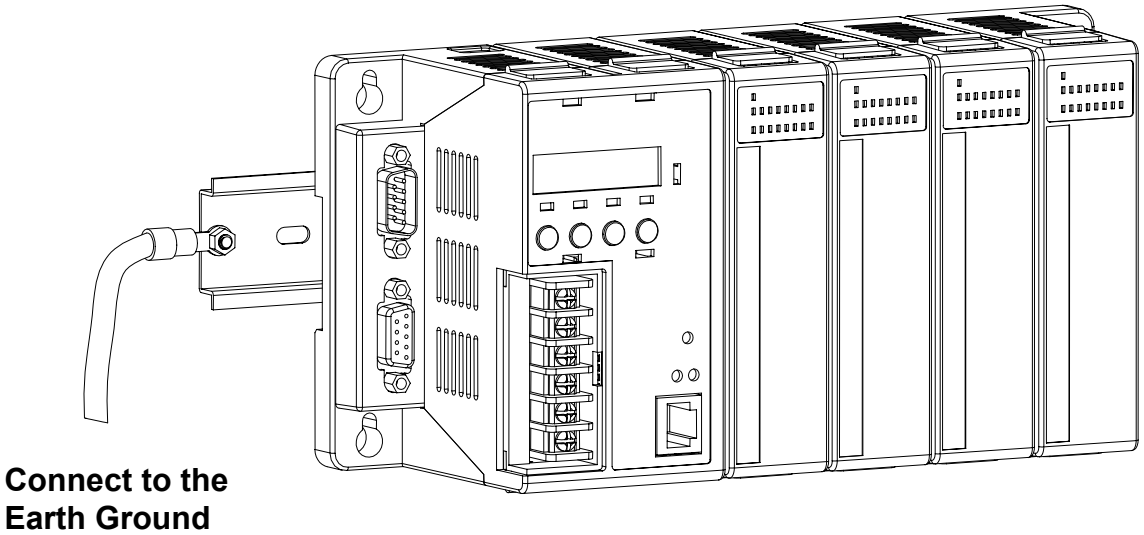


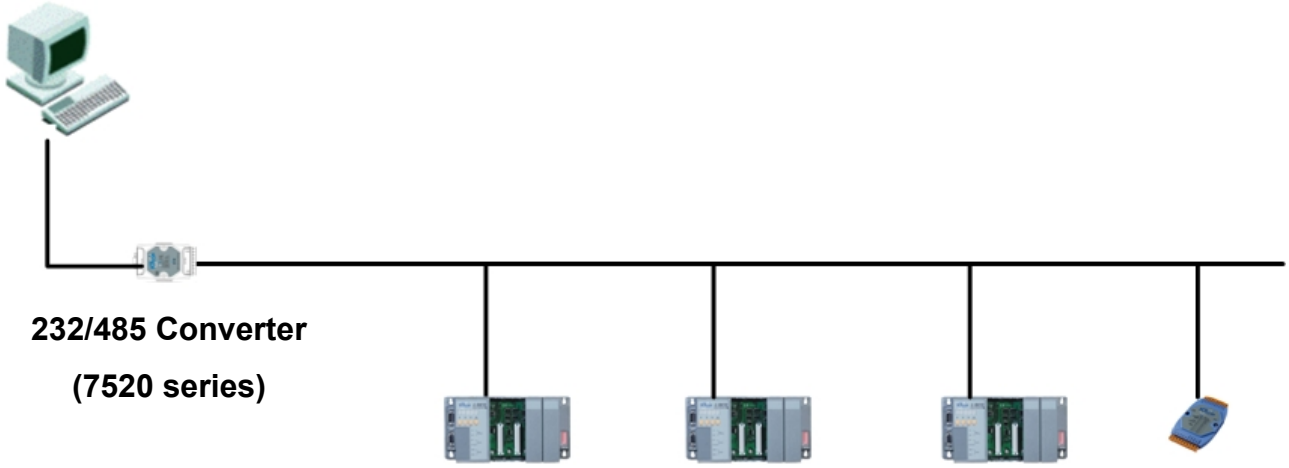
Figure B-2

Appendix C: Application of RS-485 Network

The RS-485 length can be up to 4000 ft or 1.2 km over a single set of twisted –pair cables, if the RS-485 network is over 4000 ft or 1.2Km, the RS-485 repeater must be added to extend the RS-485 network.

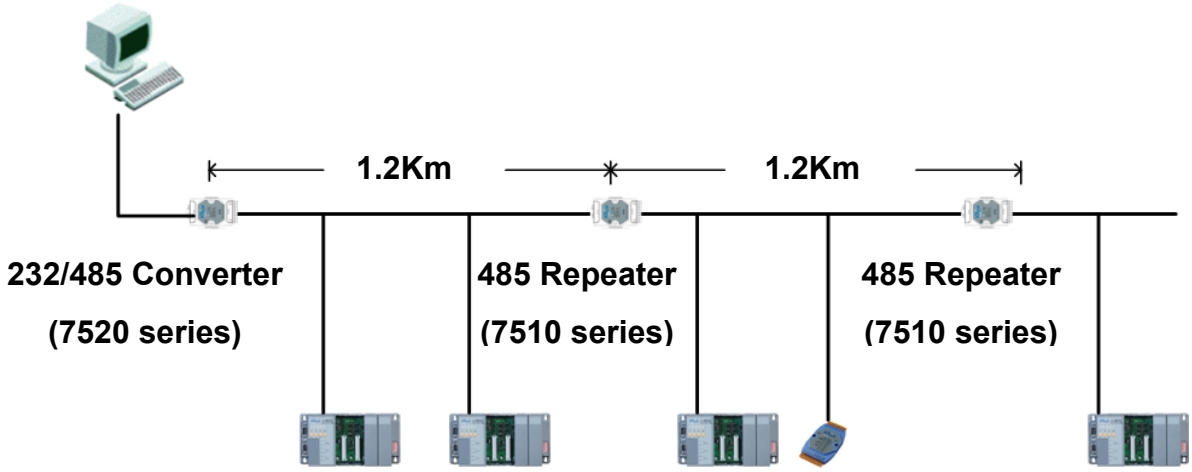
C.1: Basic RS-485 network

The basic component of the RS-485 network consist of a Master Controller (or using a PC as Host controller), and some RS-485 devices.



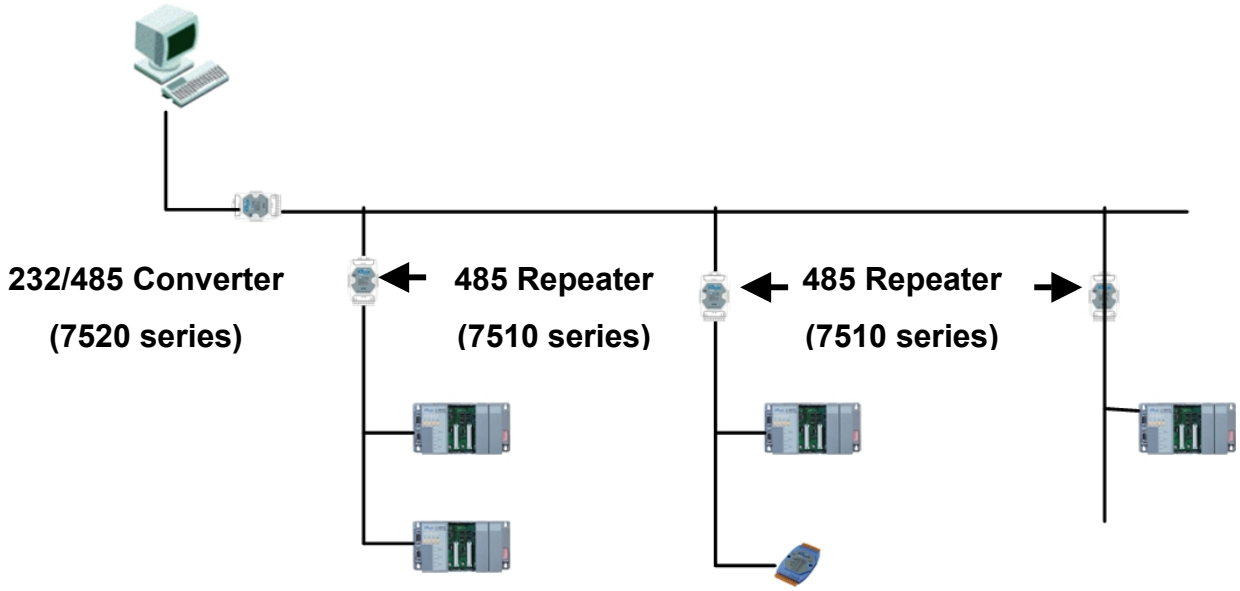
C.2: Daisy chain RS-485 network

All RS-485 devices are wired directly to the main wire, If the network is up to 1.2 Km, it will need a repeater (**i-7510**) to extend the network.

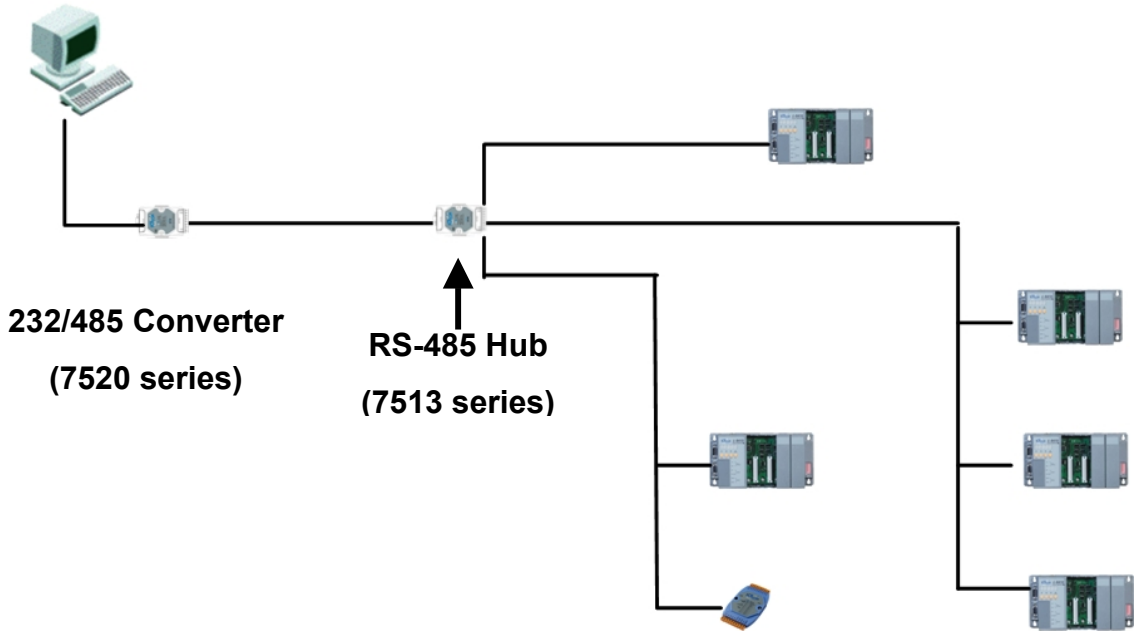


C.3: Star type RS-485 network

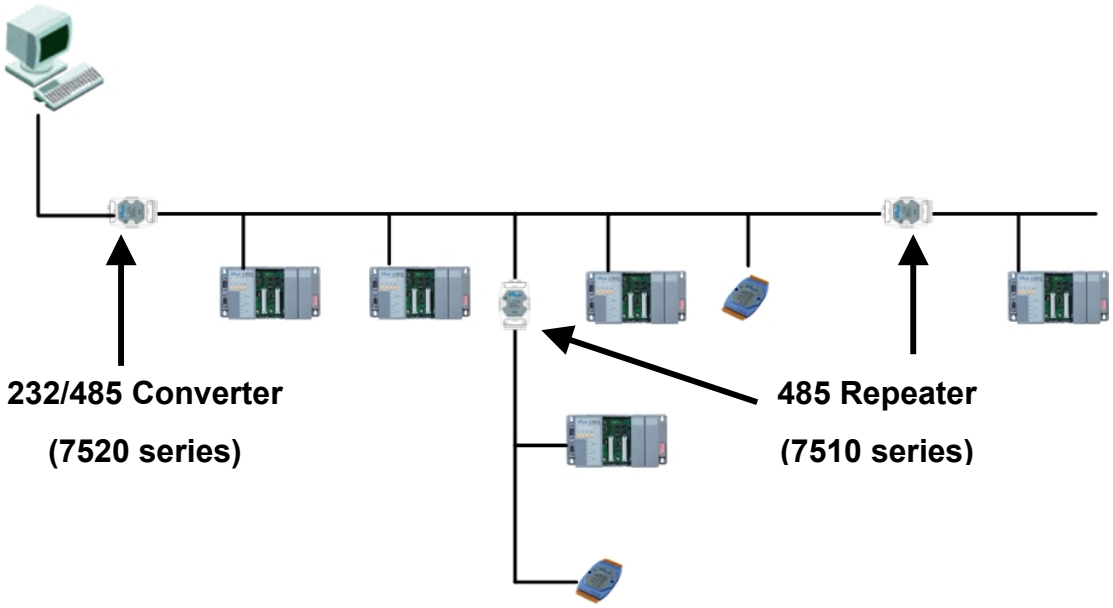
There are branches along the main wire. In this case, it is better to have a repeater to isolate or filter the noise that is made by devices.



There is a better choice to use 7513 as a RS-485 hub on start type network.



C.4: Random RS-485 network



C.5: pull-high/pull-low resistor

1. There must be at least one master to have a pull-high/pull-low resistor.
   1.1. For most of application, when using one 7520 series as RS-232/485 converter, it will have default pull-high/pull-low resistors to be enabled on 7520 converter; on the other hand the 8410/8810/8411/8811 and all the other devices on this network will be set to slave mode, the pull-high/pull-low resistors have to be disabled. Please refer to the Figure 5-1 to show the location and the jumpers' setting of the pull-high/pull-low resistors which are located at the power board of 8410/8810/8411/8811.

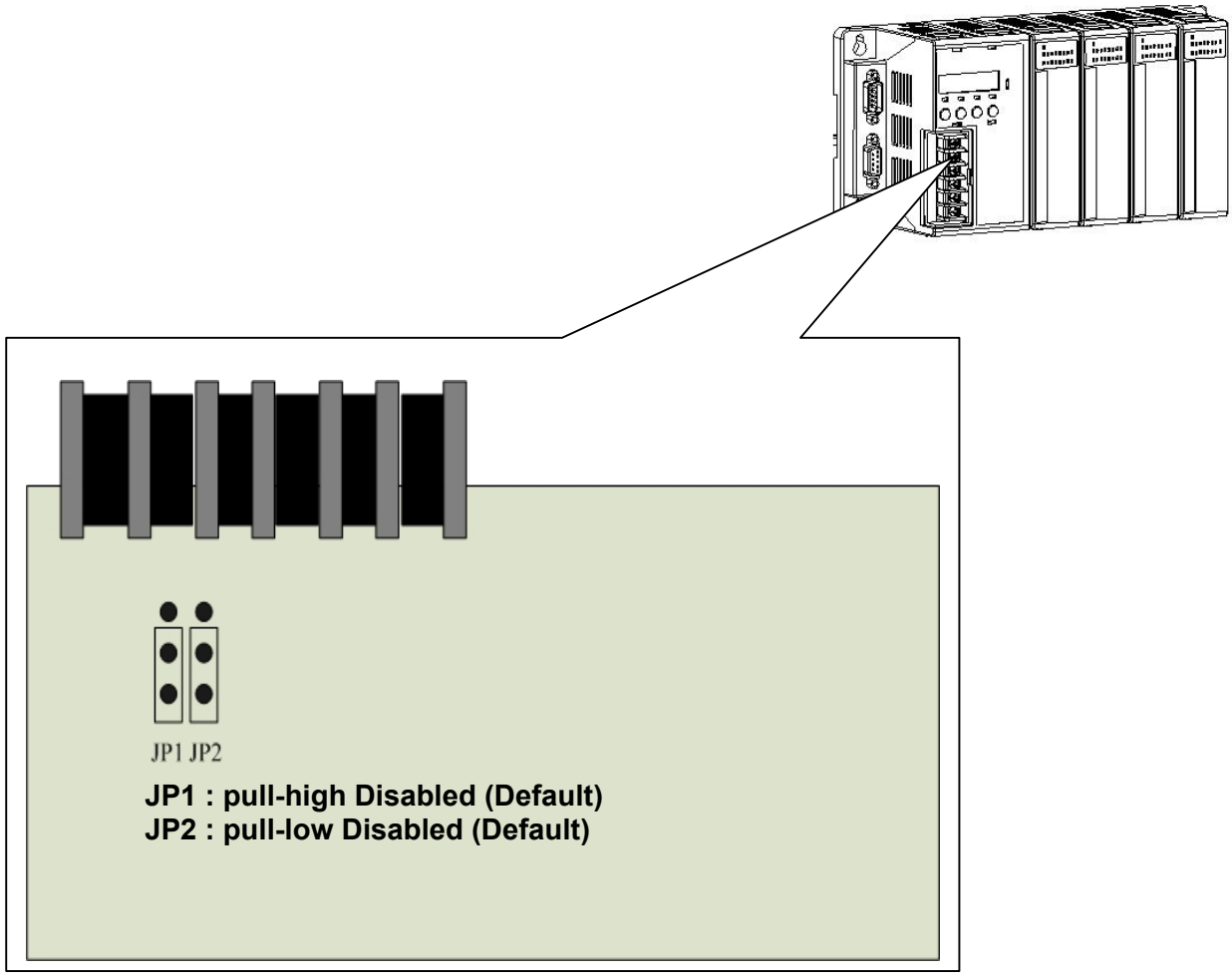
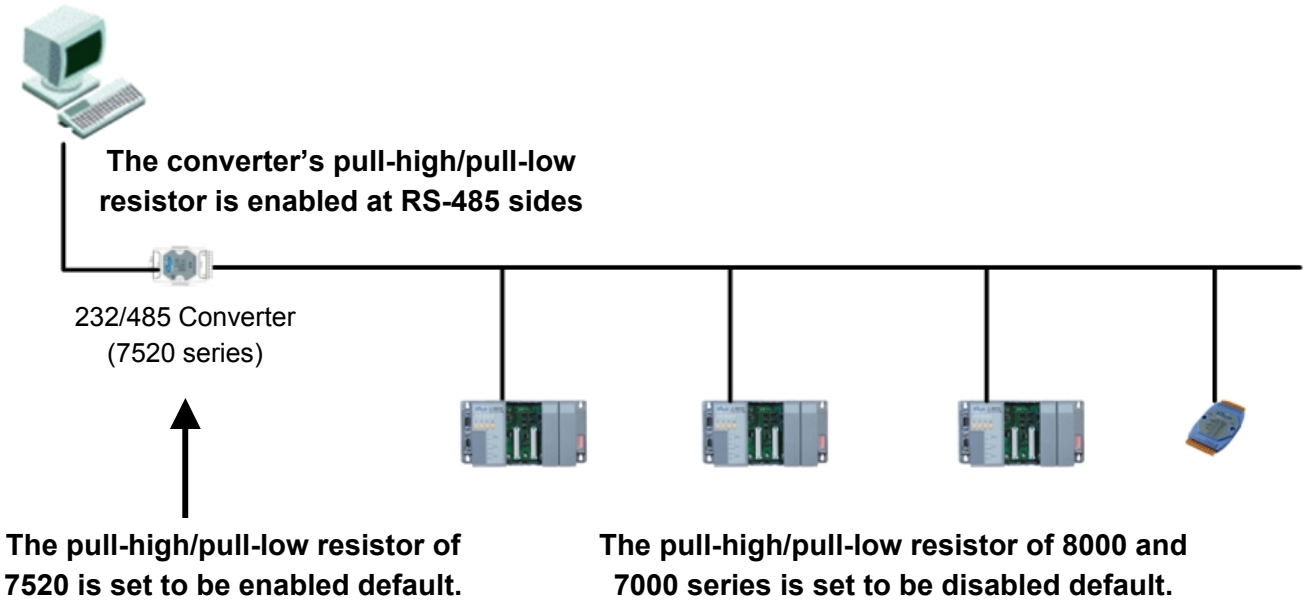
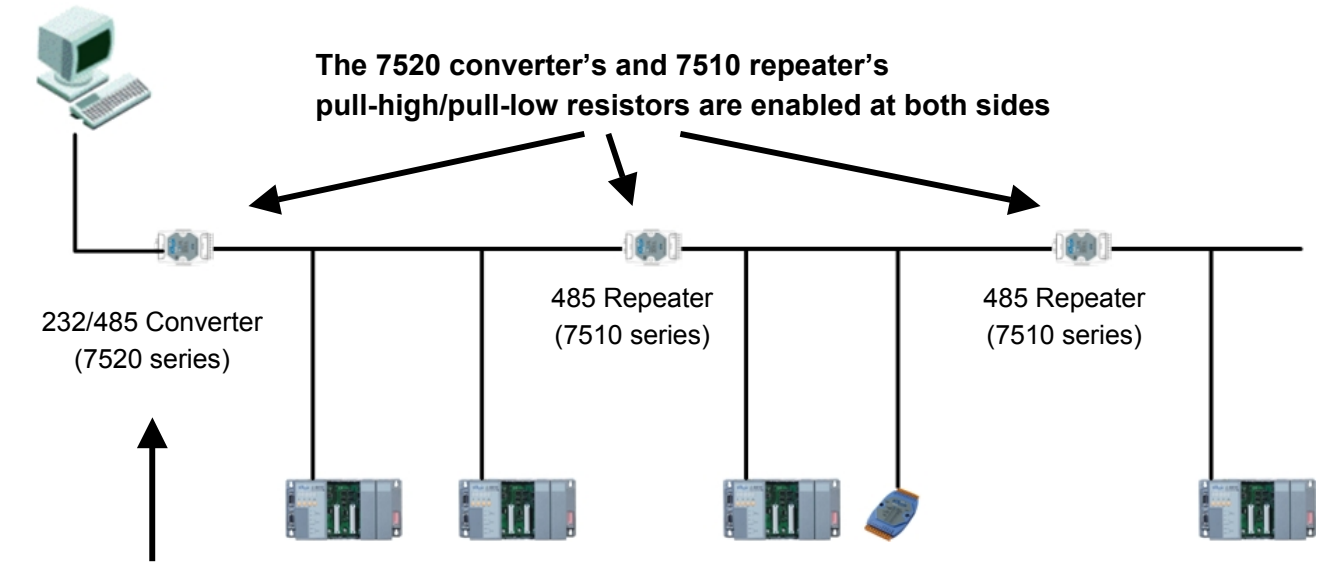


Figure C-1



If there are repeaters on the RS-485 network, there will be pull-high/pull-low resistors on both sides of the repeaters (i-7510)



1.2..When one of 8410/8810/8411/8811 is set to master and all the other device on the network will be set as slave mode, then the master one's (8410/8810/8411/8811) pull-high/pull-low resistors have to adjust to enabled. Please refer to the Figure 5-2 to show the location and the jumpers' setting of the pull-high/pull-low resistors which are located at the power board of 8410/8810/8411/8811.

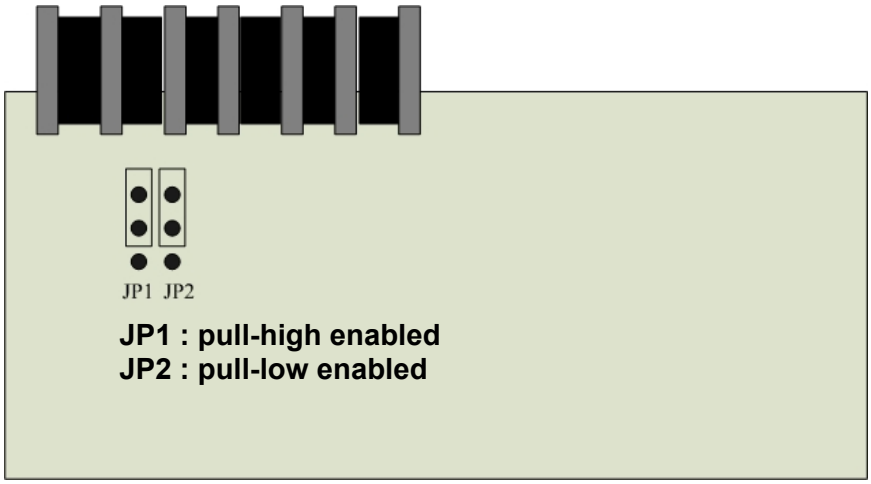
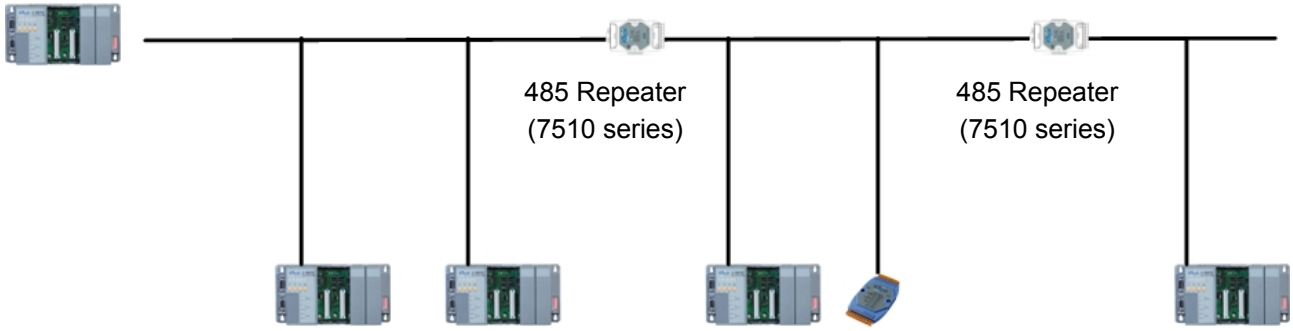


Figure C-2

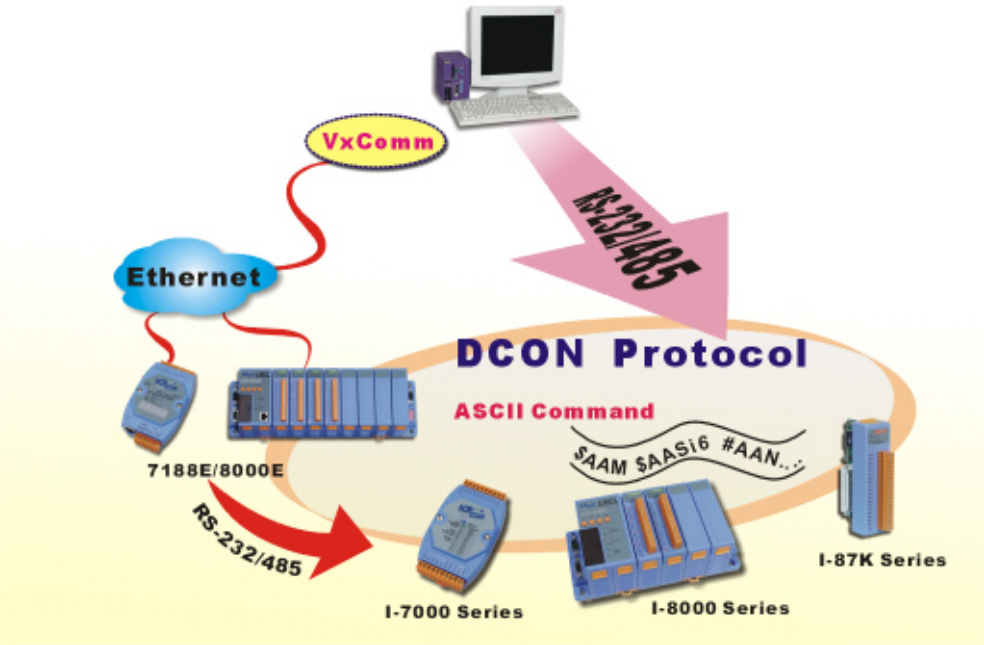
When 8000 unit is used as a master controller, the pull-high/pull-low resistors must set to be enabled

The 7510 repeater pull-high/pull-low resistors are enabled at both side



The pull-high/pull-low resistor of 8000 and 7000 series is set to be disabled default.

Appendix D: DCON Protocol



The DCON protocol is a request/reply communication protocol for the I-7000/8000/87K series I/O modules, and uses a simple ASCII format such as $AAN, $AASi6, #AAN, #AASiCj ...etc. The protocol format is defined as follows:

Basic Command Format

Command Format:

Leading Character	Module Address	Command	[CHKSUM]	CR

Response Format:

Leading Character	[Module Address]	[Data]	[CHKSUM]	CR

The Leading Character can include '@', '#', '$', '%', '~', '!'

Checksum A 2-character checksum and is present when the checksum option is enabled.

Address 0x00 ~ 0xFF

CR Carriage return (0x0D)

D.1 Command Set

The full DCON protocol command sets for i-8000 series can be found in

CD:\Napdos\DCON\IO_Module\
ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/dcon/io_module/

Frequently used Command table reference:

Command	Command Description
$AAM	Reads the Module Name
$AAF	Reads the Firmware Version
#AASi	Reads the analog input or counter / frequency values for all channels of a specified slot
#AASiCj	Reads the analog input or counter/frequency module data from specified slot and the specified channel in the I-8000 unit.
#AASiCj(data)	Sets the analog voltage output module data from the specified slot and channel in the I-8000 unit. The data format is in engineering units only.
#AASi6	Read Digital input and output status at specified slot
#AASi00(data)	Sets the multiple Digital output of a specified slot
# AASiBjDS	Sets the single Digital output of a specified slot

#AASi

Command	#AASi	
Description	Reads the analog input or counter/frequency module data for all channels from specified slot in the I-8000 unit.	
Syntax	#AASi[CHK](cr)	
	#	A delimiter character
	AA	A 2-character HEX module address for the specified I-8000 system, ranging from 01 to FFh
	Si	The specified slot number. i = 0 to 3 (4 slots) or i = 0 to 7 (8 slots)
	[CHK]	2-characters of checksum
	(cr)	Character Return (0x0D) for denote the end of command
	Valid Command	>(data)[chk](cr)
	Invalid Command	?AA[CHK](cr)
	Syntax error or communication error may get no response.	
	>	A delimiter for valid command
	?	A delimiter for invalid command
	AA	A 2-character HEX module address
	(data)	A return string from the RTD input module in engineering mode.
	[CHK]	A 2-character checksum
	(cr)	Carriage Return(0x0D) to denote the end of response
Example	Command	*#01S3*
	Response	*>+2.1234+2.1234 +2.1234 +2.1234 (cr)*
	Description	The data read from analog data input module i-87013 (4 channels analog input module) in slot 3 of the I-8000 system at address 01h is *+2.1234+2.1234 +2.1234 +2.1234*.
Note:	i-87013 ➔ 4-Channel RTD Analog Input Module i-8017H ➔ Fast 8-Channel mV/V/mA Analog Input Module i-87017 ➔ 8-Channel mV/V/mA Analog Input Module i-87018 ➔ 8-Channel mV/V/mA and Thermocouple Analog Input Module i-8080 ➔ 8-Channel Counter/Frequency Module	

#AASiCj

Command	#AASiCj	
Description	Reads the analog input or counter/frequency module data from specified slot and the specified channel in the I-8000 unit.	
Syntax	#AASiCj[CHK](cr)	
	#	A delimiter character
	AA	A 2-character HEX module address for the specified I-8000 unit, ranging from 01 to FFh
	Si	The specified slot number. i = 0 to 3 (4 slots) or i = 0 to 7 (8 slots)
	Cj	specified channel number. i-87013 ➔ j = 0 to 3 i-8017H ➔ j = 0 to 7 i-87017 ➔ j = 0 to 7 i-87018 ➔ j = 0 to 7 i-8080 ➔ j = 0 to 7
	[CHK]	The 2-character of Checksum
	(cr)	Carriage Return (0x0D) for denote the end of the command
	Valid Command	>(data)[chk](cr)
	Invalid Command	?AA[CHK](cr)
	Any syntax or communication error may receive no response.	
	>	A delimiter for valid command
	?	A delimiter for invalid command
	AA	A 2-character HEX module address
	(data)	A return string from RTD input module in engineering mode.
	[CHK]	A 2-character checksum
	(cr)	Carriage Return (0x0D) to denote the end of the response
Example	Command	*#01S3C0*
	Response	*>+2.1234(cr)*
	Description	The data read from the analog data input module in slot 3 and channel 0 of the I-8000 unit at address 01h is +2.1234.
Notes:	i-87013 ➔ 4-Channel RTD Analog Input Module i-8017H ➔ Fast 8-Channel mV/V/mA Analog Input Module i-87017 ➔ 8-Channel mV/V/mA Analog Input Module i-87018 ➔ 8-Channel mV/V/mA and Thermocouple Analog Input Module i-8080 ➔ 8-Channel Counter/Frequency Module	

#AASiCj

Command	#AASiCj(data)	
Description	Sets the analog voltage output module data from the specified slot and channel in the I-8000 unit. The data format is in engineering units only.	
Syntax	#AASiCj(data)[CHK](cr)	
	#	A delimiter character
	AA	A 2-character HEX module address for the specified I-8000 unit, ranging from 01 to FFh
	Si	The specified slot number. i = 0 to 3(4 slots) or i = 0 to 7(8 slots)
	Cj	The specified channel number. i-87022 ➔ j = 0 to 1 i-87024 ➔ j = 0 to 3 i-87026 ➔ j = 0 to 3 i-8024 ➔ j = 0 to 3
	(data)	A decimal value, always engineer unit
	[CHK]	A 2-character checksum
	(cr)	Carriage Return (0x0D) to denote the end of command
	Valid Command	> [chk](cr)
	Invalid Command	?AA[CHK](cr)
	Any syntax or communication error may receive no response.	
	>	A delimiter for valid command
	?	A delimiter for invalid command
	AA	A 2-character HEX module address
	[CHK]	A 2-character of checksum
	(cr)	Carriage Return (0x0D) to denote the end of response
Example 1:	Command	*#01S3C1+09.000*
	Response	*> (cr)*
	Description	This example sends the positive value +9.000V to the Analog Data output Module in slot 3 and channel 1 of the I-8000 unit at address 01h. The response indicates the command is valid
Example 2:	Command	*#01S3C1-05.000*
	Response	*> (cr)*
	Description	This example sends the negative value -5.000V to the Analog Data output Module in slot 3 and channel 1 of the I-8000 unit at address 01h. The response indicates the command is valid

$AASi6

Command	$AASi6	
Description	Read back the Digital Output module value and read the Digital Input module value of a specified slot in the I-8000 unit.	
Syntax	$AASi6[CHK](cr)	
	$	A delimiter character
	AA	A 2-character HEX module address for the specified I-8000 unit, ranging from 01 to FFh
	Si	The specified slot number. i = 0 to 3 (4 slots) or i = 0 to 7 (8 slots)
	6	A Command to read the data
	[CHK]	A 2-character checksum
	(cr)	Carriage Return (0x0D) to denote the end of command
	Valid Command	!0D0E00[CHK](cr) for 8-bit DIO modules !DD0000[CHK](cr) for 8-bit (or less than 8 bits) DO modules !EE0000[CHK](cr) for 8-bit (or less than 8 bits) DI modules !DDEE00[CHK](cr) for 16-bit DIO modules !DDDD00[CHK](cr) for 16-bit DO modules !EEEE00[CHK](cr) for 16-bit DI modules !DDDDEEEE[CHK](cr) for 32-bit DIO modules !DDDDDDDD[CHK](cr) for 32-bit DO modules !EEEEEEEE[CHK](cr) for 32-bit DI modules
	Invalid Command	?AA[CHK](cr)
	Any syntax or communication error may receive no response.	
	!	A delimiter for valid command
	?	A delimiter for invalid command
	D	4-bit output value (0~Fh)
	E	4-bit input value (0~Fh)
	DD	8-bit output value (00~FFh)
	EE	8-bit input value (00~FFh)
	DDDD	16-bit output value (0000~FFFFh)
	EEEE	16-bit input value (0000~FFFFh)
	DDDDDDDD	32-bit output value (00000000~FFFFFFFFh)
	EEEEEEEE	32 bit input value (00000000~FFFFFFFFh)
	[CHK]	A 2-character checksum
	(cr)	Carriage Return (0x0D) to denote the end of response
Example	Command	$01S16
	Response	!0155AA00
	Description	The example reads the digital I/O module value from slot 1 of the I-8000 unit at address 01h. The second 2-character value 55h (01010101) indicate the I/O module channels 1,3,5,7 are ON and channels 0,2,4,6 are OFF.

AASi00(data) For multiple channels DO output

Command	#AASi00(data)	
Description	Sends the value to the digital output module for multiple channels output of a specified slot in the I-8000 unit	
Syntax	#AASi00(data)[CHK](cr)	
	$	A delimiter character
	AA	A 2-character HEX module address for the specified I-8000 unit, ranging from 01 to FFh
	Si	The specified slot number. i = 0 to 3(4 slots) or i = 0 to 7(8 slots)
	00	00 that for multiple channels' DO output
	(data)	A 2-character or 4-character HEX for digital output value. For output from all channels, the data will be 2-character HEX for channel count is less than or equal to 8 bits, 4-character for channel count is 16 bits and greater than 8 bits. The data bit is corresponds to the output module channel.
	[CHK]	2-characters of Checksum
	(cr)	Carriage Return (0x0D) to denote the end of the command
	Valid Command	>[chk](cr)
	Invalid Command	?AA[CHK](cr)
	Any syntax or communication error may receive no response.	
	>	A delimiter for valid command
	?	A delimiter for invalid command
	[CHK]	A 2-character of checksum
	(cr)	Carriage Return (0x0D) to denote the end of the response
Note	If any channel of digital output module (*1) is configured for an analog input alarms then this command has no effect on the specified channel. The channel is always used for analog input alarms and can not be configured again unless it is disconnected. Refer to: Analog Input Alarm (*1) For digital output modules not support analog input alarm are: i-8041, i-87041, i-87042, i-8050	
Example	Command	*#01S30042*
	Response	*>(cr)*
	Description	This example is for an 8-channel digital output module. The Digital output Module in slot 3 and channel 2 and channel 6 of the I-8000 unit at address 01h will be set to ON. This example is only for output modules where the channel number is less than or equal to 8.
	Command	*#01S300AA55(cr)*
	Response	*>(cr)*
	Description	

		This example is for a 16-channel digital output module. The Digital output Module in slot 3 and channels 0,2,4,6 (55h), 9, 11, 13, 15 (AAh) of the I-8000 unit at address 01h will be set to ON. Channels 1, 3, 5, 7, 8, 10, 12, 14 are set to OFF. This example just for output module channel number is greater than 8 and less then or equal to 16.

AASiBjDS For single channel DO output

Command	#AAS**i**BjDs	
Description	This command sends the value to the digital output module of the specified channel and slot of the I-8000 unit. This command is only for output modules which the channel number is less than or equal to 16.	
Syntax	#AASi1BDs[CHK](cr)	
	$	A delimiter character
	AA	A 2-character HEX module address for the specified I-8000 unit, ranging from 01 to FFh
	Si	The specified slot number. i = 0 to 3(4 slots) or i = 0 to 7(8 slots)
	Bj	The channel to be set will contain two characters.The first character 'B' is always be number 1, and the second character 'j' indicates the channel will be set and ranging from 0 to F.
	Ds	For single channel output the data will contain two characters. The first character 'D' is always 0. The second character is ether 0 or 1. 0 => OFF, 1 => ON.
	[CHK]	2-characters of Checksum
	(cr)	Carriage Return (0x0D) to denote the end of the command
	Valid Command	>[chk](cr)
	Invalid Command	?AA[CHK](cr)
	Any syntax or communication error may receive no response.	
	>	A delimiter for valid command
	?	A delimiter for invalid command
	[CHK]	A 2-character of checksum
	(cr)	Carriage Return (0x0D) to denote the end of the response
Note	If any channel of digital output module (*1) is configured for an analog input alarms then this command has no effect on the specified channel. The channel is always used for analog input alarms and can not be configured again unless it is disconnected. Refer to: Analog Input Alarm (*1) For digital output modules not support analog input alarm are : i-8041, i-87041, i-87042, i-8050	
Example	Command	*#01S31C01*
	Response	*>(cr)*
	Description	This example is for a single channel. The Digital output Module in slot 3 and channel 12 (0Ch) of the I-8000 unit at address 01h will be set to ON. This example is only for output modules which the channel number is less than or equal to 16.
	Command	*#01S31A00(cr)*
	Response	*>(cr)*

	Description	This example is for a single channel. The Digital output Module in slot 3 and channel 10 (0Ah) of the I-8000 unit at address 01h will be set to OFF. This example is only for output modules where the channel number is less than or equal to 16.

The table below show to use command #AASiBjs to set 16-channel digital output module of the specified channel and slot of the I-8000 unit.

Command	Channel Status	Command	Channel Status
#01S31000	Set the Channel 0 DO OFF	#01S31001	Set the Channel 0 DO ON
#01S31100	Set the Channel 1 DO OFF	#01S31101	Set the Channel 1 DO ON
#01S31200	Set the Channel 2 DO OFF	#01S31201	Set the Channel 2 DO ON
#01S31300	Set the Channel 3 DO OFF	#01S31301	Set the Channel 3 DO ON
#01S31400	Set the Channel 4 DO OFF	#01S31401	Set the Channel 4 DO ON
#01S31500	Set the Channel 5 DO OFF	#01S31501	Set the Channel 5 DO ON
#01S31600	Set the Channel 6 DO OFF	#01S31601	Set the Channel 6 DO ON
#01S31700	Set the Channel 7 DO OFF	#01S31701	Set the Channel 7 DO ON
#01S31800	Set the Channel 8 DO OFF	#01S31801	Set the Channel 8 DO ON
#01S31900	Set the Channel 9 DO OFF	#01S31901	Set the Channel 9 DO ON
#01S31A00	Set the Channel 10 DO OFF	#01S31A01	Set the Channel 10 DO ON
#01S31B00	Set the Channel 11 DO OFF	#01S31B01	Set the Channel 11 DO ON
#01S31C00	Set the Channel 12 DO OFF	#01S31C01	Set the Channel 12 DO ON
#01S31D00	Set the Channel 13 DO OFF	#01S31D01	Set the Channel 13 DO ON
#01S31E00	Set the Channel 14 DO OFF	#01S31E01	Set the Channel 14 DO ON
#01S31F00	Set the Channel 15 DO OFF	#01S31F01	Set the Channel 15 DO ON

D.2 Hardware interface

The hardware interface used to access the I-7000/8000/87K series I/O modules can be divided into the following:

- **RS-232:** I-8000 MCU with DCON_nnn.exe or 8K232.exe firmware.
  Baud Rate: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200bps.
  Data format is: 1 start bit, 8 data bits, non-parity, 1 stop bit

- **RS-485:** I-7000/87K series I/O modules and I-8000 MCU with DCON_nnn.exe (or 8K485.exe) firmware
  Baud Rate: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200bps.
  Data format is: 1 start bit, 8 data bits, non-parity, 1 stop bit

- **Ethernet:** I-8000E MCU with E10M_nnn.exe (or 8KE10.exe) firmware
  Speed: 10Mbps

Note:

1. I-8000 MCU includes 8410, 8411, 8810, 8811, 8430,8431, 8830, 8831, 8KE4, 8KE8.

2. 8000E means an I-8000 MCU equipped with an Ethernet port, such as 8430, 8431, 8830, 8831, 8KE4, 8KE8.

3. Both the I-8000 and I-87K series I/O modules can be inserted into the I-8000 MCU simultaneously.

4. When the I-87K series I/O module is inserted into the I-8000 MCU, it uses the same commands as the I-8000 series I/O modules.

5. The 87K series expansion unit series includes 87K4, 87K5, 87K8, and 87K9.

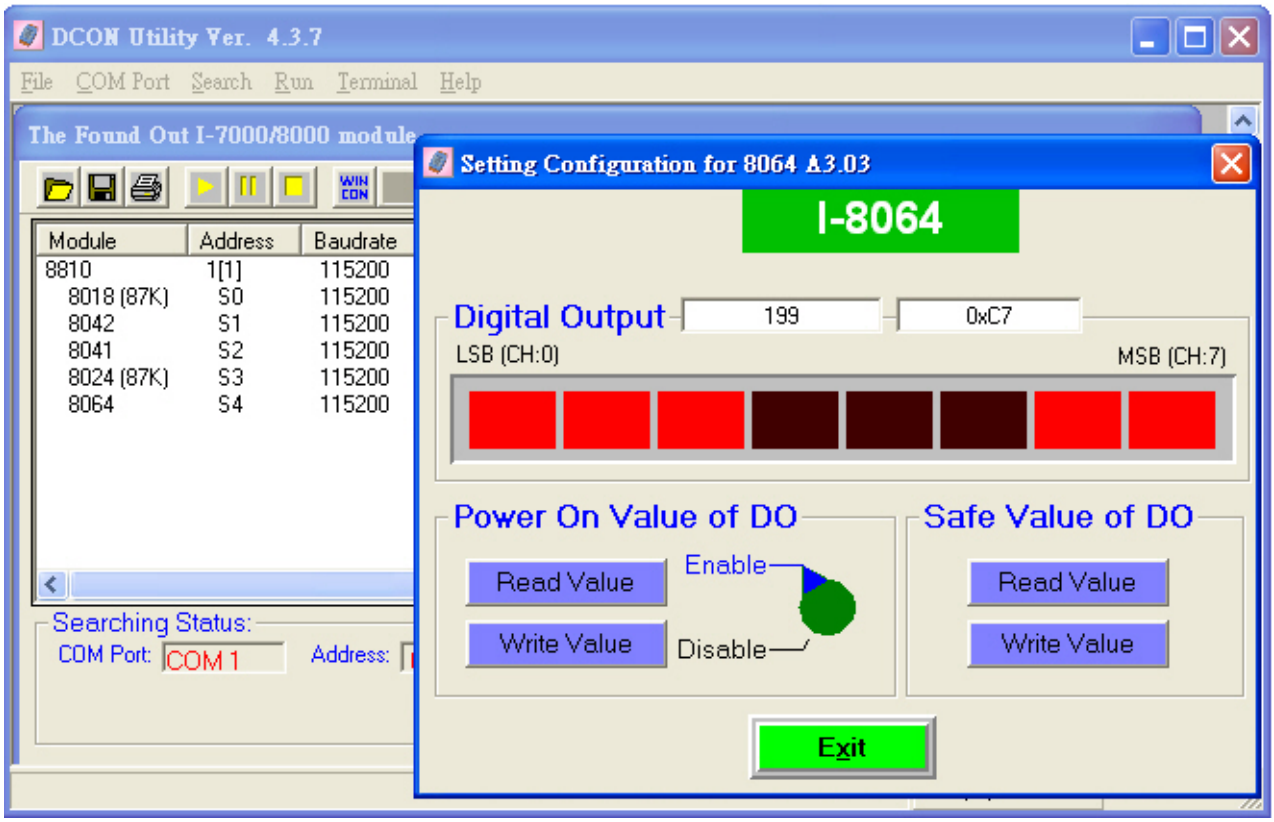
6. The I-87K series I/O modules use different commands when they are inserted into the I-8000 MCU and the I-87K expansion unit.

Appendix E: i-8K and i-87K series I/O modules

The DCON firmware (DCON_nnn.exe, 8K232.exe or 8K485.exe) supports both 8K and 87K series I/O modules. The two series I/O modules can be plug in same I-8000 MCU. The modules for DI, DO, DIO, AI, AO and Counter/Frequency purpose are supported. Other modules such as multi-serial port (8112, 8144, 8142, 8144), MMC (8073), motion (8090, 8091) are not supported. The file in the shipped CD lists details.

CD:\Napdos\Driver\DCON_Utility\DCON_Utility_Module_List.htm

The DCON firmware only accepts 4 digits numbers. Thus both 8K and 87K series are recognized as 4 digits numbers. When using the DCON Utility to search I/O modules, the screen shown as following:



The differences between I-8000 and I-87K series I/O modules are

Item	**i-8000 series**	**i-87K series**
Microprocessor	No	Yes (8051)
Communication interface	Parallel bus (Note1)	Serial bus (Note2)
Communication speed	Fast	Slow
DI latched function	No	Yes
Counter input (for digital input module)	No	Yes (100 Hz)
Power on value	Yes (Note3)	Yes
Safe value	Yes (Note3)	Yes
Host watchdog	Yes	Yes
Module watchdog	No	Yes
Programmable slew-rate for AO module	No	Yes

Note:

1. The 8000 series and 87K I/O modules can both be connected into the same i-8000 MCU, for there are two types of buses on i-8000 series main-board. Through the parallel bus, the CPU can communicate with I/O modules very fast. For digital I/O modules, the communication time takes less than 0.012 ms. For analog I/O modules, it depends on the modules. For example, I-8017H's scan rate is 50K samples per second and I-8024's throughput is 2100 samples per second.

2. Through the serial bus (RS-485), the communication speed is 115200 bps Maximum. The communication time depends on the command and response length (bytes). Normally, for digital I/O modules, one module takes less then 1 ms; for analog I/O modules, one sample takes less than 2 ms.

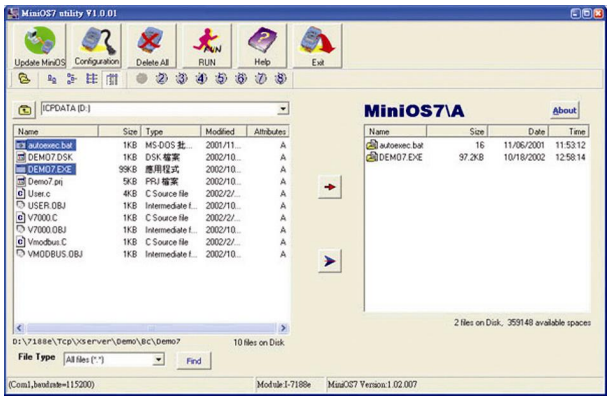
3. The hardware design of the I-8000 series I/O modules doesn't have the power on value and safe value. Running the DCON firmware on the I-8000 MCU, they can have the functions.

Appendix F: Updating firmware and MiniOS7 image

In following situations, we release the new version firmware and MiniOS7 image.

- Supporting new I/O modules
- Adding new functions
- Fixing bugs

The tool to update firmware and MiniOS7 image is MiniOS7 Utility.



File location of MiniOS7 Utility
CD:\Napdos\MiniOS7\Utility\MiniOS7_Utility\MiniOS7_Utility.exe or
ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/minios7/utility/minios7_utility/

F.1 Access the controller

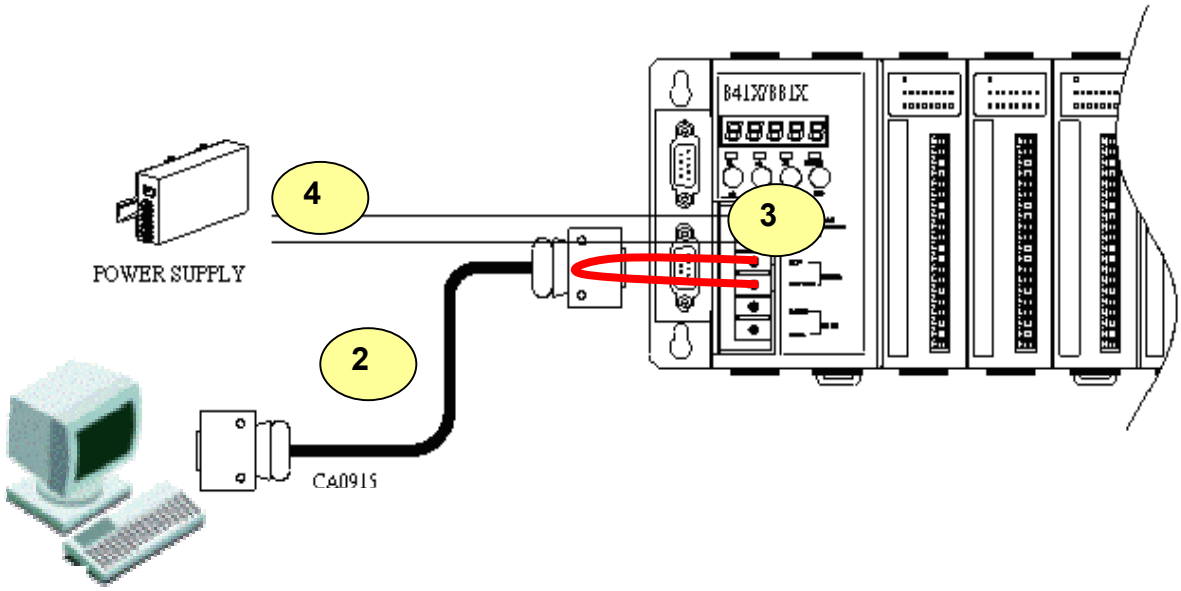
Please follow the steps to do the updating procedure.

Step1: Install MiniOS7 Utility

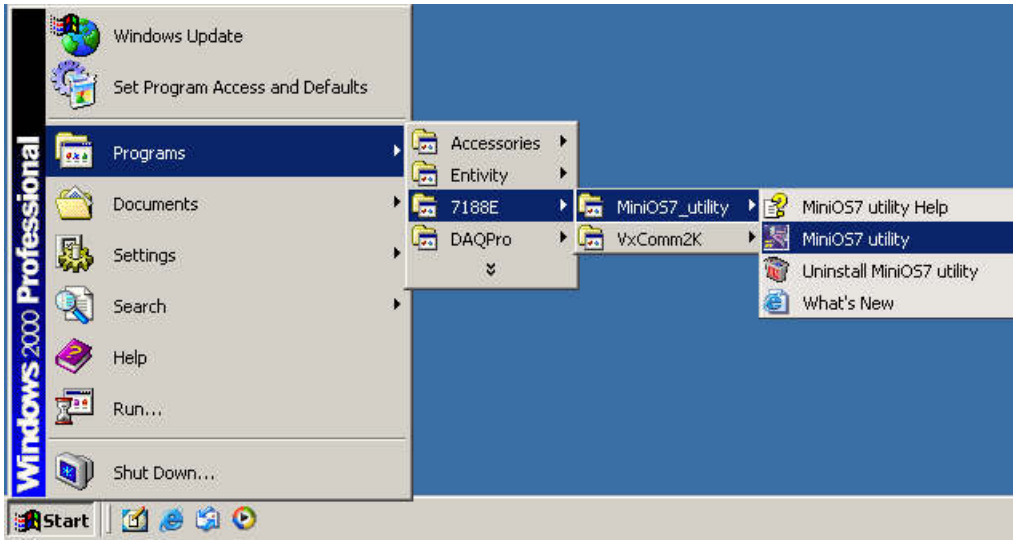
Step2: Use CA-0915 to connect 8410/8810 to COM1/2 of the host PC.

Step3: Short Init* and Init*COM.

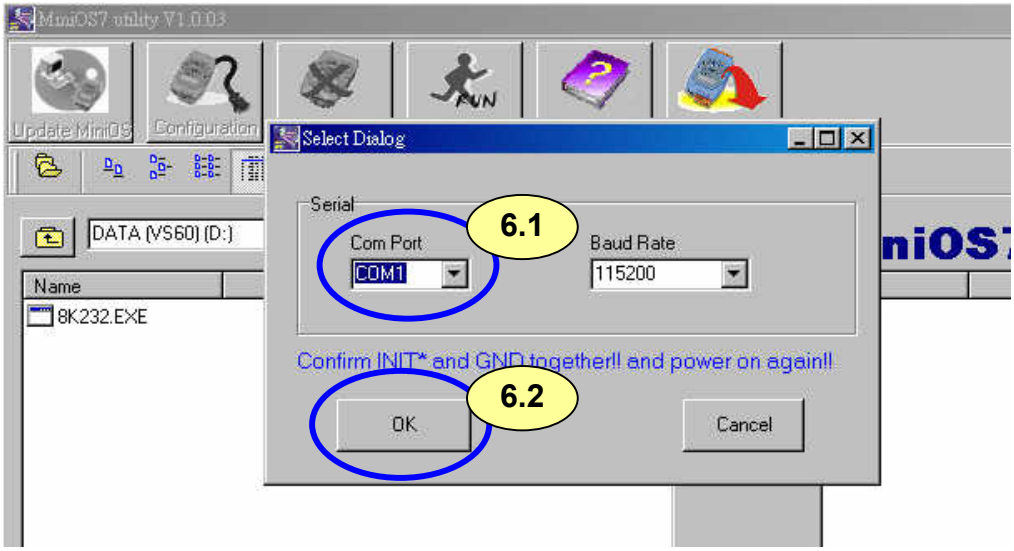
Step4: Power off and then power on the 8410/8810 The CPU doesn't run the autoexec.bat while power on stage.



Step5: Run MiniOS7 Utility

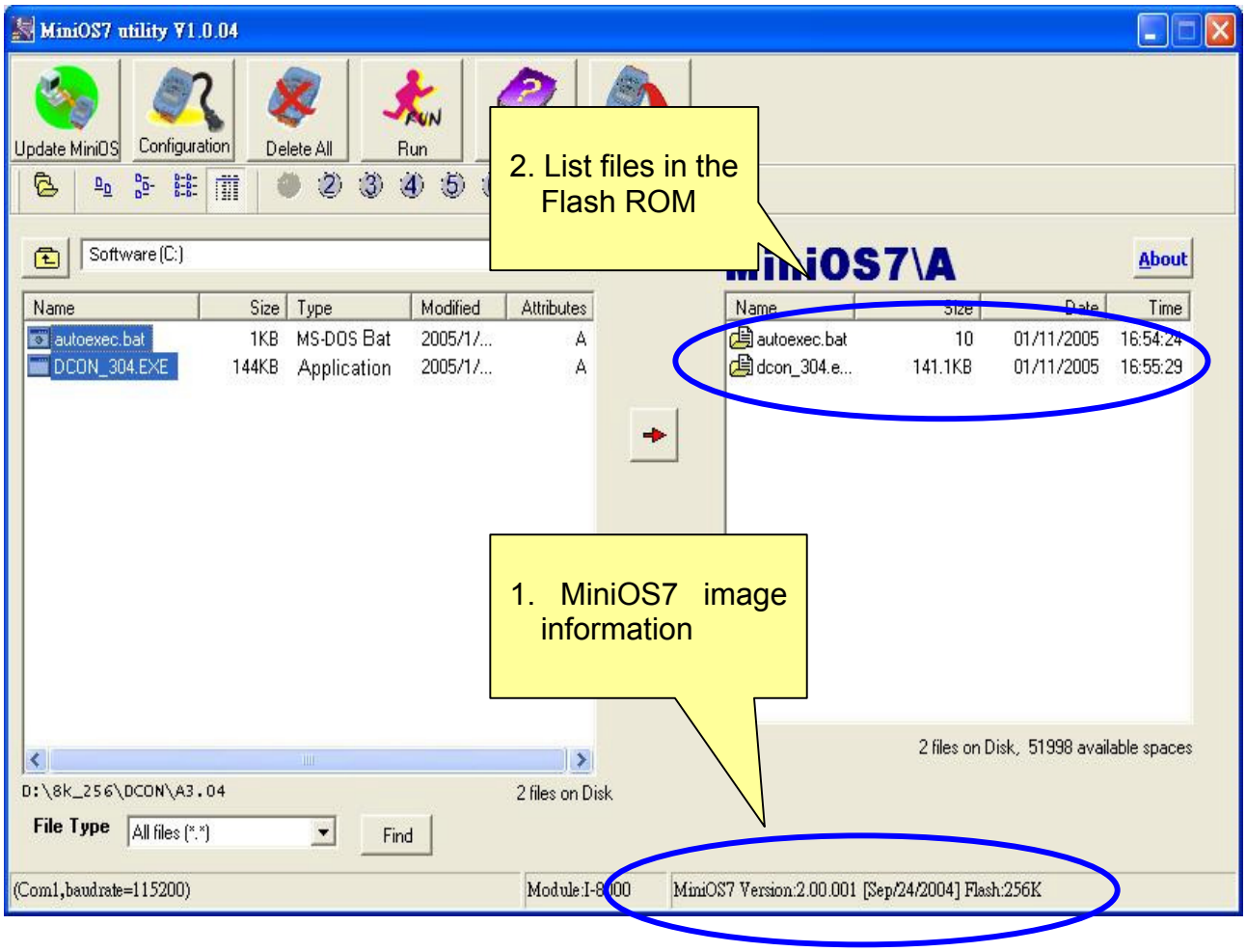


Step6: Select the COM port of the host PC.



After opening the COM port, the MiniOS7 Utility will show informations as below:

i. MiniOS7 image version of the 8410/8810.
ii. Files in the Flash ROM



F.2 Updating MiniOS7 image

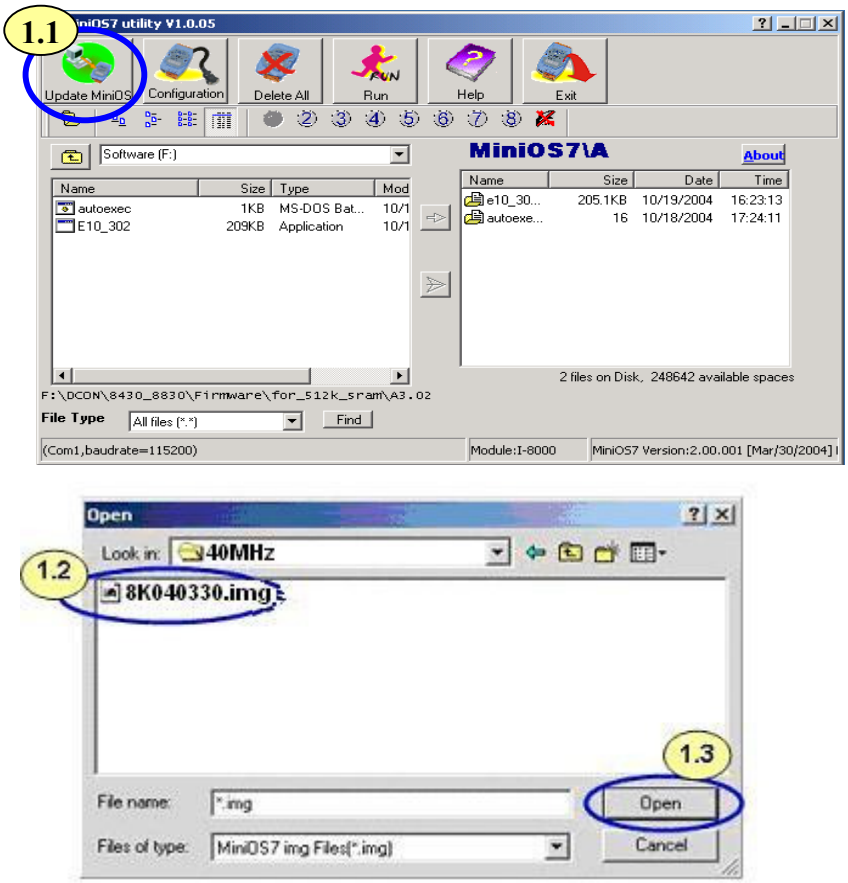
After setup MiniOS7 Utility and initial the 8410/8810. please follow the steps to do the updating MiniOS7 image.

Step1: Click

and select the file to update MiniOS7.

8410/8810: CD:\Napdos\DCON\8410_8810\OS_Image\40MHz\8K040330.img)

ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/dcon/8410_8810/os_image/40mhz/8k040330.img



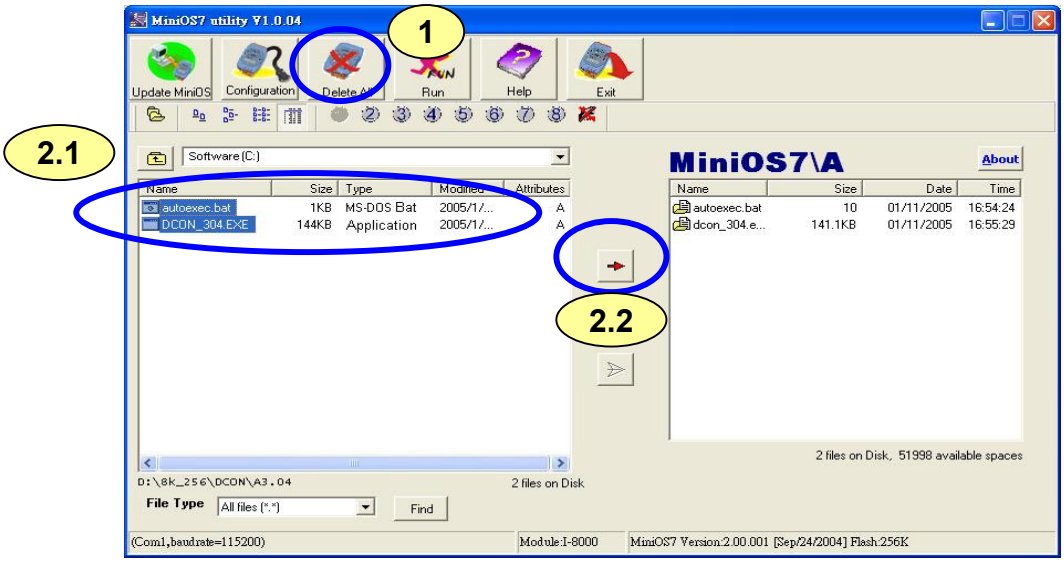
For 8410/8810 the OS image is for 40MHz used and file name: 8K040330.img

F.3 Download firmware

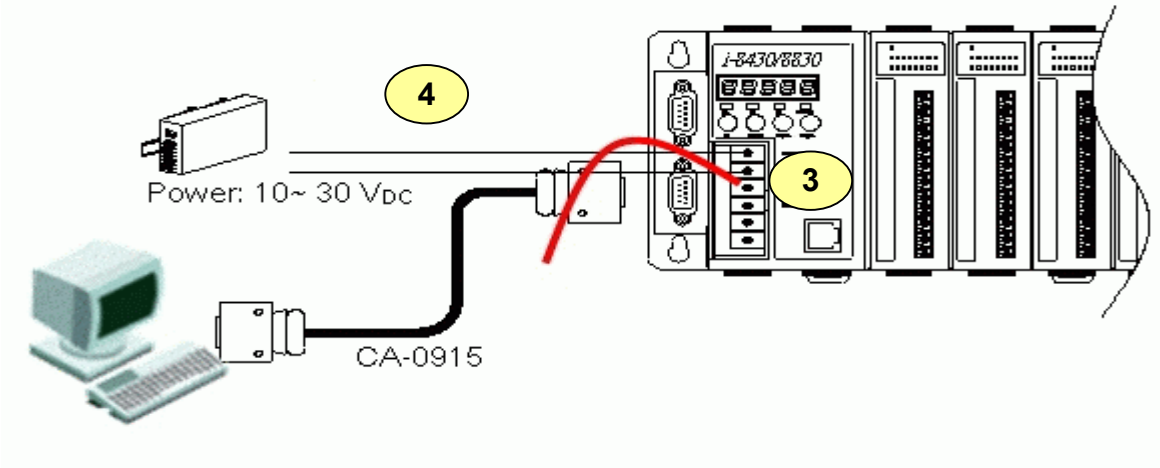
Please follow the steps to download the firmware to the Flash ROM.

Step1: Delete all files in the Flash ROM.

Step2: Select the firmware files and autoexec.bat and click to download the files into the Flash ROM



Step3: Disconnect Init* and Init*COM



Step4: Run the firmware

Method 1: Power off and then power on the 8410/8810. The CPU will run the autoexec.bat in the Flash ROM.

Method 2: Click

to run the firmware.