USB-87P1/2/4/8 User Manual

Version 1.0

March , 2008

Original Writer: Martin Hsu

Last Writer: Janice Hong



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

USB-87P1/2/4/8 User Manual, Version: 1.0

Table of Contents

Chapter 1	Introduction	4
1.1	Specifications	7
Chapter 2	Hardware Configuration	8
2.1	Install USB Driver	8
2.2	View of the USB-87PN	12
2.2.1	Preparation	12
2.2.2	Wire the 87Pn to power and PC	13
2.2.3	USB-87Pn's CPU module:	13
2.2.4	USB-87Pn series CPU Module Description	14
2.2.5	Plug in the I/O modules:	14
2.2.6	Wiring the I/O modules:	15
2.2.7	Installing USB-87Pn extension unit	17
Chapter 3	Software Configuration	18
3.1	Setup USB-87Pn with DCON Utility	18
3.1.1	87Pn Auto Config. Enable:	20
3.1.2	87Pn Auto Config. Disable:	22
3.2	Save & Load 87Pn Configure file	22
3.2.1	Save the Configure file:	23
3.2.2	Load the Configure file	24
3.3	Load & Write the configure file	26
3.4	Operating in off-line mode:	27
Chapter 4	Software Development Kits (SDK)	32
4.1	DCON DLL	32
4.1.1	DLL Use Steps	32
4.1.2	VB Example (Reading an analog input value)	34
4.2	DCON ActiveX	36
4.2.1	Procedure for using the ActiveX	36
4.2.2	VB Example (Reading an analog input value)	37
4.3	DCON LabVIEW	39
4.3.1	Procedure for using DCON_LabVIEW	39
4.3.2	LabVIEW Example (Reading multi-channel analog Input value)	41
4.3.3	LabVIEW Demo Program (Reading multi-channel analog input value)	42
4.4	DCON Indusoft	43
4.4.1	Procedure for using the Indusoft bundled driver	43
4.4.2	Indusoft Example (Reading an analog input value)	44
4.5	NAP OPC Server	47
4.5.1	Procedure for using the OPC server	47
4.5.2	OPC Server Example (Reading an analog input value)	47
Appendix A	: Dimension	49
Appendix B	: Compare USB-87Pn with i-87Kn	53
Appendix C	: Solution for 87K I/O module on the slot	54
Appendix D	: Description For ini Files	58
Appendix E	: Frame Ground	59

FIGURE

Fig.1:View of 87Pn	.12
Fig.2 : Wire the 87Pn to power and PC	.13
Fig.3:87Pn's CPU Module	.13
Fig.4 : USB-87P1/2/4/8 CPU module description	.14
Fig. 5 : Plug in the I/O module	.14
Fig. 6 : Description of LED indicator	.15
Fig. 7:i-87019R - Internal I/O structure	.15
Fig. 8 : i-87019R - Pin assignments & Wire Connection	.16
Fig.9 : I/O module terminal connection	.16
Fig.10 : Installing USB-87Pn extension unit	.17
Fig. 11 : Run Dcon Utility and search 87Pn	.18
Fig.12 : Auto Config. Enable, setup the 87Pn	.20
Fig.13 : Follow 3 steps, write the settings to 87Pn	.20
Fig.14 : Complete the 87Pn configuration then serch again	.21
Fig.15 : After configuring, you can find out the entire module	.21
Fig. 16: When 87Pn Auto Config.: Disable, all the module can external communication	.22
Fig. 17 : Save the configuration file	.23
Fig. 18 : Load the configuration file	.24
Fig. 19: Load & Write the configuration file	.26
Fig. 20 : Configure and save file in off-line mode	.27
Fig. 21 : Load & write Configuration file through other PC	.28
Fig. 22 : Off-line operation	.28
Fig. 23 : Off-line operation – Configure & Save file	.29
Fig. 24 : Load configure file in another PC	.30
Fig. 25 : Write the settings to USB-87Pn	.31
Fig. 26 : i-87K high/low profile series I/O modules	.53
Fig. 27: The search result between 87Pn and modules	.54
Fig. 28 : DCON Utility shows the status of 87Pn expansion slot	.54
Fig. 29 : Frame Ground & Earth Ground	.59

Chapter 1 Introduction

USB-87Pn series is a intelligent I/O expansion unit, it features USB communication interface, hot swap, and most of all, this I/O unit can expand its functions by putting in any kind of i-87K series (High profile) modules. It used for industrial monitoring and controlling applications. There are more than 30 I/O modules supported with the unit, including analog input/output, digital input/output, and counter/frequency I/O modules.

USB-87Pn is designed to be used in harsh and noisy environment, so the hardware is manufactured with wide power input range (10~30VDC) and operating temperature (-25°C ~ +75°C). It simplifies installation and maintenance of I/O modules with hot swap and auto configuration, fault and error detection, dual watchdog, programmable power on and safe values.

Various software development kits (SDK) and demos are provided, such as DLL, ActiveX, Labview driver, Indusoft driver, Linux driver, OPC server, etc. The i-87K series I/O modules plugged in the USB-87Pn can be easily integrated into variant software system.

Features

Hot Swap

The USB-87Pn doesn't need to shut down its power to replace or plug i-87K I/O modules. Therefore, the whole system can keep operating without any interruption.

Auto-Configuration

Configurations of i-87K I/O modules can be pre configured and stored in the nonvolatile memory of the USB-87Pn. When the USB-87Pn is power on or an i-87K I/O module is plug in, the USB-87Pn automatically check and restore these configurations to each i-87K I/O modules on it.

Easy Duplicate System

Using the DCON Utility, you can easily make a backup of the i-87K module configurations and write to another USB-87Pn. This design can easily and quickly duplicate many USB-87Pn.

Easy Maintenance and Diagnostic

The basic configurations (Auto Config, ON/OFF) are set by the DIP switch. The operator can use only one screwdriver to set the USB-87Pn. And there are several LED status indicators to show whether i-87K modules are configured and work properly.

If one i-87K module is damage, the user just need to get the same model number and

good i-87K module to replace the damaged one. And then check the LED indicators to know whether the replacement is performed correctly. The switch and LED design makes it easy for maintenance. There is no PC and Notebook needed.

Communication

USB interface

The USB-87Pn use USB communication interface. It requires no converter, plug and play at run time, very simple and convenient to connect with your PC.

DCON protocol

i-87K series I/O modules plugged in a USB-87Pn provide a simple command/response protocol (Called DCON protocol) for communication. All command/response are in easy used ASCII format.

Rugged Industrial Environment

Dual watchdog design

The i-87K series I/O modules provides module watchdog and host watchdog. The module watchdog is a hardware watchdog; the host watchdog is a software watchdog. The module watchdog is designed to automatically reset the microprocessor when the module hangs. The host watchdog monitors the host controller (PC or PLC). The output of module can go to the safe value state when the host fails.

Programmable power on and safe value

The analog and digital output of modules can be programmed power on and safe value.

■ Wide range power input (10~30 VDC)

Wide range operating temperature (-25 $^{\circ}C$ ~ +75 $^{\circ}C$)

Fully Software Support

The free charge software utility and development kits include

DCON Utility: for configuration

	<u>File</u> <u>C</u> OM H	Port <u>S</u> earch	<u>R</u> un <u>T</u> ermi	nal <u>H</u> elp						
						Start	0	End	255	(Address 0 ~ 255)
	Module	Address	Baudrate	Checksum	Format	Status		Descri	ption	
V	USB-87P4	[1]	115200	Disable	N,8,1	Auto Config. Enab	e (0,0,0,0)	4*Slot	Auto Config	uration USB Unit(DCON)
	87019R	2[2]	115200	Disable	N,8,1	87P4 Slot[0]		8*AI (U	Jniversal mA	,mV,V,Thermocouple)(DCON)
	87018R	3[3]	115200	Disable	N,8,1	87P4 Slot[1]		8*Al (n	nA,mV,V,The	ermocouple)(DCON)
	87024	4[4]	115200	Disable	N,8,1	87P4 Slot[2]		4*AO (mA,V)(DCOI	N)
	87055	5(5)	115200	Disable	N,8,1	87P4 Slot[3]		8*DI +	8*D0(DC0)	N)

-87	-87P4 Hot Swap and Auto Configuration Scanned I/O on Slot								
- 1	/O Write To	87P4	Addr.[Hex]	Slot Configuration Status	Set As Scanned	Write To 87P4			
0	87019R	•	02	[00H] OK	Сору	Configure	87019R		
1	87018R	•	03	[00H] OK	Сору	Configure	87018R		
2	87024	-	04	[00H] OK	Сору	Configure	87024		
3	87055	•	05	[00H] OK	Сору	Configure	87055		
	-	-	-	-	Сору	Configure	-		
	-	-	-	-	Сору	Configure	-		
	-	-	-	-	Сору	Configure	-		
	-	-	-	-	Сору	Configure	-		
S	ave Config	juratio	n Loa	d Configuration	iguration And Wr	ite To 87P4	Help		

OPC Servers:

OPC is an industrial standard interface based on OLE technology. With the OPC server, I/O modules can be easily integrated to any software that has OPC client capability.

EZ Data Logger



EZ Data Logger is small data logger software. It can be applied to small remote I/O system. With its user-friendly interface, users can quickly and easily build a data logger software without any programming skill.

Support Variant Software Develop Toolkits

The free charge for DLL, ActiveX, Labview driver, Indusoft driver, DasyLab driver, Linux driver.

1.1 Specifications

■ Interface Type :Full speed	d with USB 1.1 sp	pecifications				
Cable	USB type A conr	nector				
Baud rate	115200 bps (def	ault fixed)				
Isolation	3000 VDC					
ESD Protection	+/- 4K Contact E	Discharge and +/- 8K Air Discharge				
■ Switch						
DIP Switch	1 bit *1, For auto	o configuration				
LED Indicators						
Power	Yes					
System Ready	Yes					
Auto-Configuration	Yes					
Slot Status	Yes					
I/O Expansion Slots						
Hot Swap	Yes					
Auto-Configuration	Yes					
Support Module Type	High profile i-87	K module only				
Dimensions (W x H x D)						
USB-87P1 (slot x 1)	64mm x 117mm	x 110mm				
USB-87P2 (slot x 2)	95mm x 132mm	x 111mm				
USB-87P4 (slot x 4)	188mm x 132mr	m x 111mm				
USB-87P8 (slot x 8)	312mm x 132mr	n x 111mm				
■ Power						
Input Range	10~30 VDC (nor	10~30 VDC (non-regulated)				
Reverse polarity protection	Yes					
Isolation	1000 VDC					
Frame Ground	Yes					
Module	Consumption	Power Board Driving				
USB-87P1	1 W	5 W				
USB-87P2	1 W	8 W				
USB-87P4	SB-87P4 2 W 15 W					
USB-87P8	2.4 W	30 W				
Environment						
Operating Temperature	–25°C to +75°C					
Storage Temperature	-30°C to +75°C					
Humidity	5 ~ 95%, non-co	5 ~ 95%, non-condensing				

Chapter 2 Hardware Configuration

2.1 Install USB Driver

Before you setup the USB-87Pn, you must install USB driver. Refer to below path: CD:\Napdos\87pn_io_unit\USB-87Pn ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/87pn io unit/usb-87pn/

Step1: Double click "USB-87Pn DriverInstaller.exe" to enter the installation screen



Step2: Click "Next >" to next step



Step3: Reading the license. If you accepted all of the license items, please click "Yes" to next step.



Step4: In the next screen, please click "Continue Anyway" to continue the Installation.



Step5: In this screen, you already finished the installation, please click "Finish" to exit the program.



Step6: Please check the driver installation in your PC's "Device Manager" screen.



Step7: When you connect the USB-87Pn to your PC, It will show following diagram, please Select "Install from a list or specific location (Advanced)" then click "Next>".



Step8: Without any change, Click "Next>" to next step

Found New Hardware Wizard
Please choose your search and installation options.
⊙ Search for the best driver in these locations.
Use the check boxes below to limit or expand the default search, which includes local paths and removable media. The best driver found will be installed.
Search removable media (floppy, CD-ROM)
Include this location in the search:
F:\ Browse
O Don't search. I will choose the driver to install.
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.
< Back Next > Cancel

Step9: please click "Continue Anyway" to continue the Installation.



Step10: In this screen, you already finished the installation, please click "Finish" to exit the program.

Found New Hardware Wiz	ard .
	Completing the Found New Hardware Wizard The wizard has finished installing the software for:
	Click Finish to close the wizard.
	K Back Finish Cancel

Step10: Please confirm the installation of USB-87Pn and to know which port is connected.

🖳 Device Manager	
File Action View Help	
E - ■ ICP168 T - ■ Computer T - ■ Isk drives	
 	
DE ATA/ATAPI controllers Section 2	
∰ Monitors ∰ Network adapters ■	
Communications Port (COM1)	
USB-87Ph (COM7) Second composition of the second composition	
🕢 🧕 System devices 🗉 😋 Universal Serial Bus controllers	
(54)	

Note: Click the right button on "My Computer" icon → property → Hardware → Add Hardware Wizard → Device Manager

2.2 View of the USB-87PN



Fig.1 : View of 87Pn

2.2.1 Preparation

Power Supply: +10V ~ +30V /DC (Ex: DP-665) http://www.icpdas.com/products/Accessories/power_supply/power_list.htm

CA-USB18: USB connector cable (1.8M Cable)

http://www.icpdas.com/products/Accessories/cable/cable_selection.htm

Install the DCON Utility to PC (Version 4.5.2 or above version) CD:\Napdos\Driver\DCON_Utility or ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/driver/dcon_utility/

(Please removed the old version before installation)

2.2.2 Wire the 87Pn to power and PC

USB-87P4

- 1. +Vs \Leftrightarrow Power Supply : +Vs (+10~30V)
- 2. GND ⇔ Power Supply : GND
- 3. CA-USB18 ⇔ PC's USB port



Fig.2 : Wire the 87Pn to power and PC

2.2.3 USB-87Pn's CPU module:

The factory default value is Auto Config. ON.



Fig.3: 87Pn's CPU Module

2.2.4 USB-87Pn series CPU Module Description

Check the left side of the Power Board for the CPU module LED and Dip Switch description.

Default Setting							
Address Baud Rate Parity Data Length Stop bit Ch							
01	115,200	None	8	1	Disable		

	USB-87P series CPU Board Description									
LED	Description	ON	OFF	Flashing (100ms)	Flashing (2sec)					
S.RDY	System Ready	Ready	/	Configuring	Failure					
Auto Config	Auto Configuration	Enable	Disable	/	/					
Slot	Slot Status	/	Normal	Configuring	Failure					



Fig.4 : USB-87P1/2/4/8 CPU module description

2.2.5 Plug in the I/O modules:

At present, ICPDAS divides most of the same i-87K I/O module into the Low Profile and High Profile two kinds of version, **if you want to use the module on 87Pn expansion slot**, **you must choose the High Profile** to assure "Auto Config." and "Hot Swap" function is normal operation.

The related product information about i-87K I/O module is in the CD. You can refer i-87K High Profile series I/O modules in following path:

<u>CD:\Napdos\DCON\IO_Module\87k_modules.htm</u> or to following web-site <u>ftp://ftp.icpdas.com/pub/cd/8000cd/napdos/dcon/io_module/87k_modules.htm</u>

Example: Plug in i-87019R to Slot 0

p.s. i-87019R is an AI (Analog Input) High Profile module



Fig. 5 : Plug in the I/O module



Fig. 6 : Description of LED indicator

2.2.6 Wiring the I/O modules:

Before wiring the i-87K I/O modules, please check the pin assignment and wiring according to each hardware user manual.

For each i-87K I/O module's hardware user manual please refer to CD:\Napdos\DCON\IO_Module\87k_modules.htm

According to the internal circuitry diagram and wire connection diagram, please connect the power cable or communication cable to each channel on terminal block of I/O module.



2-87019R	Terminal No.	Pin Assignment Name	Voltage Input Wiring
MA 0 1 2 3 4 5 6 7	[, <u>■</u> 01 [, <u>■</u> 02 [, <u>■</u> 03	Vin0+ Vin0- Vin1+	$mV/V - V \qquad \square \qquad \qquad Vin+ \qquad \qquad I \qquad \qquad I \qquad \qquad Vin+ \qquad \qquad I \qquad I \qquad I \qquad I \qquad \qquad$
	G≞ 04 G≞ 05	Vin1- Vin2+	Current Input Wiring
Widb	よ 二 二 二 二 一 0 0 7 0 8 0 9 10	Vin2- Vin3+ Vin3- Vin4+ Vin4-	$mA^+_{-} \textcircled{1}^{I}_{I} $
Visit		Vin5+ Vin5-	Thermocouple Input Wiring
Vid5	13 5 5 7 7 14 15 15 16	Vin6+ Vin6- Vin7+ Vin7-	$ \begin{array}{c c} \bullet & \bullet \\ \bullet & \bullet \\ \bullet & \bullet \\ \bullet & \bullet \\ \hline \bullet \\ \hline \bullet & \bullet \\ \hline \bullet \\ \bullet $

Fig. 8 : i-87019R - Pin assignments & Wire Connection



Fig.9 : I/O module terminal connection

2.2.7 Installing USB-87Pn extension unit

Method 1: using the screw to fixed.



Method 2: using the DIN rail clips to fixed.



Fig.10 : Installing USB-87Pn extension unit

Chapter 3 Software Configuration

In this chapter, we will use DCON Utility to complete software configuration of the USB-87Pn, please confirm the hardware equipment has connected and 87Pn CPU module has setup completes. (Please refer to <u>Chapter 2</u>)

- 3.1 Setup USB-87Pn with DCON Utility
- 3.2 Save & Load 87Pn configure file
- 3.3 Load & Write configure file
- 3.4 Operating in off-line mode

3.1 Setup USB-87Pn with DCON Utility

At first, please run DCON Utility then click "COM Port" to select COM port and baud rate. You can check your PC's "Device Manager" to know which COM is connecting. Click "OK" to confirm and escape the screen.



Fig. 11 : Run Dcon Utility and search 87Pn

Please click "start search" button to search.

File COM Po	ort <u>S</u> earch	<u>R</u> un <u>T</u> ermi	nal <u>H</u> elp						
	3 📑				Start	0	End	255	(Address 0 ~ 255
Module	Address	Baudrate	Checksum	Format	Status		Desc	ription	

At the first time you can search for "USB-87Pn" only, because the slots of USB-87Pn haven't completed the configuration. The "[X,X,X,X]" of "Status" means the configuration of that slot is not completed or corrected.

Please click "stop search" to stop the search.



Click "USB-87Pn" and open the "Configure Module" screen to setup.



3.1.1 87Pn Auto Config. Enable:

"Auto Config. ON" expressed that the 87Pn's Auto-Configuration function is "enable", "off" means "disable".

Working Distinction:

If i-87K I/O modules didn't pass the 87Pn correct setup, and install into expansion slot under "Auto Config. Enable" mode, it will regard as incorrect module. For guarantee system's normal operation, the 87Pn will forbid this module external communication. You can't search and configure I/O modules directly by DCON Utility.

The "Auto Config. Enable [X,X,X,X]" in Status column, means the module configuration of that slot is not completed or corrected. Click "USB-87P4" and select "Configure Module" to enter configure screen and know the detail settings about module.

<u>F</u> ile	<u>C</u> OM Port	<u>S</u> earch	<u>Run T</u> ermin	al <u>H</u> elp						
6		5		WIN		Start	0	End	255	(Address 0 ~ 255)
Mo	dule /	Address	Baudrate	Checksum	Format	Statue		Descri	iption	
US	B-87P4	1[1]	115200	Disable	N,8,1	Auto Config.	Enable [XXXX	(] 4*Slot	Auto Configu	aration USB Unit(DCON)

Fig.12 : Auto Config. Enable, setup the 87Pn

In 87Pn configure screen, you can see the scanned module name in "Scanned I/O on Slot" column. Click "Set As Scanned" button to assign module name and click "configure" to setup the I/O module according to the user demand. Finally click "write to 87Pn" for the settings to take effect.

-87	7P4 Hot Swap and Auto Configuration 1 Set As Scanned With To 87P4								
1	/O Write	To 87P4 /	Addr.[Hex	Slot Configuration Status	Scanned	write 10 8/P4			
0	Empty	•	02	[01H] Module scanned in Empty slot	Сору	Configure	87019R		
1	Empty	•	03	[01H] Module scanned in Empty slot	Co, 2	Configure	87018R		
2	Empty	•	04	[01H] Module scanned in Empty slot	Сору	Configure	87024		
3	Empty	-	05	[01H] Module scanned in Empty slot	Сору	Configure	87055		
	-	-	-	-	Сору	Configure	-		
	-	-	-	-	Сору	Configure	-		
	-	-	-	-	Сору	Configure	-		
	-	-	-	-	Сору	Configure			
5	Save Co	nfiguratio	o n	oad Configuration	tion And W	rite To 87P4	Help		

Fig.13 : Follow 3 steps, write the settings to 87Pn

-87	P4 Hot S	Swap	and Au	uto Configuration	1		- Scanned I/O on Slot-
1	/O Write To	87P4	Addr.[He	x] Slot Configuration Status	Set As Scanned	Write To 87P4	
0	87019R	-	02	[00H] OK	Сору	Configure	87019R
1	87018R	-	03	[00H] OK	Сору	Configure	87018R
2	87024	-	04	[00H] OK	Сору	Configure	87024
3	87055	•	05	[00H] OK	Configure	87055	
	-				Conu	Configure	-
5 6 7	Configuration Modified ! Image: Configuration Modified ! Configuration Modified ! Image: Configuration of 87P4 has been modified, please search again to confirm the modification. The configuration of 87P4 has been modified, please search again to confirm the modification. Image: Configuration of 87P4 has been modified, please search again to confirm the modification. The configuration of 87P4 has been modified, please search again to confirm the modification. Image: Configuration of 87P4 has been modified, please search again to confirm the modification.						
5	Save Configuration Load Configuration Load Configuration And Write To 87P4 Help Exit						

Fig.14 : Complete the 87Pn configuration then serch again

As above, all the settings for each modules has configured correctly by "DCON Utility", and then search the module again, you can see each plugged I/O module name will be listed under the screen.

<u>File</u> <u>C</u> OM Po	rt <u>S</u> earch	<u>R</u> un <u>T</u> ermi	nal <u>H</u> elp						
			腔		Start	0	End	255	(Address 0 ~ 255)
Module	Address	Baudrate	Checksum	Format	Status		Des	cription	
USP 07F4	1[1]	115200	Disable	N,8,1	Auto Config	Enable [0,0,0,0]	4*SI	ot Auto Config	uration USB Unit(DCON)
87019R	2[2]	115200	Disable	N,8,1	87P4 Slot[0		8*Al	(Universal mA	,mV,V,Thermocouple)(DCON)
87018R	3[3]	115200	Disable	N,8,1	87P4 Slot[1]	8*Al	(mA,mV,V,The	ermocouple)(DCON)
87024	4[4]	115200	Disable	N,8,1	87P4 Slot[2]	4*A0) (mA,V)(DCO)	N)
87055	5[5]	115200	Disable	N,8,1	87P4 Slot[3]	8*DI	1030)00*8 +	4)

Fig.15 : After configuring, you can find out the entire module

The "Auto Config. Enable [0,0,0,0]" of "Status", means "The I/O configuration of each slot is correct. If module is damaged, you don't need to shutdown the power, just remove the damaged one and install the same model number of new module. 87Pn will write the previous settings to the module automatically.



USB-87P1/2/4/8 User Manual, Version: 1.0

3.1.2 87Pn Auto Config. Disable:

Working Distinction:

In 87Pn Auto Config. Disable mode; allow the i-87K I/O modules to external communications even you haven't completed the configuration. Therefore, when you perform searching by DCON Utility, you could find 87Pn CPU module as well as 87K I/O modules on the expansion slot. But you can't click "USB-87P4" to setup the modules in this mode.

<u>File</u> <u>C</u> OM Po	rt <u>S</u> earch	<u>R</u> un <u>T</u> ermi	nal <u>H</u> elp			
			腔		Start 0	End 255 (Address 0 ~ 255)
Module	Address	Baudrate	Checksum	Format	Status	Description
USB-87P4	1[1]	115200	Disable	N,8,1	Auto Corfig. Disable [0,0,0,0]	4*Slot Auto Configuration USB Unit(DCON)
87019R	2[2]	115200	Disable	N,8,1	87P4 Slot[U]	8*AI (Universal mA,mV,V,Thermocouple)(DCON)
87018R	3[3]	115200	Disable	N,8,1	87P4 Slot[1]	8*AI (mA,mV,V,Thermocouple)(DCON)
87024	4[4]	115200	Disable	N,8,1	87P4 Slot[2]	4*A0 (mA,V)(DCON)
87055	5[5]	115200	Disable	N,8,1	87P4 Slot[3]	8*DI + 8*DO(DCON)

Fig. 16 : When 87Pn Auto Config.: Disable, all the module can external communication

In 87Pn "Auto- Config. Disable" mode, doesn't support Auto-Configuration. When the module damaged and replaces another module with the same model number directly. It may be doesn't work well, because of their settings (e.g. Type code) is different. The user must use DCON Utility to re-configure the settings, and replies the normal operation.

Note : In DCON Utility search screen, the message in status column of 87Pn:

- The meaning of "Auto Config. Enable [0,X,0,0] " as following description:
 - **0** : Means the module configuration on this slot is successful or have no module.
 - X : Means the module configuration on this slot is uncorrected.

If the status column of 87Pn shows "Auto Config. Enable [0,0,0,0]", means the "Auto Config." of Dip Switch is switching to the "On", and the I/O configuration of each slot is correct or has no module.

If the status column of 87Pn shows "Auto Config. Disable [0,0,0,0], means the "Auto Config." of Dip Switch is switching to the "Off", and the I/O configuration of each slot can initialization success or have no module.

3.2 Save & Load 87Pn Configure file

When you completed the module configuration, you can press "Save Configuration" to save all the settings of related modules. It can be use for system recover and system backup. In addition, you can press "Load Configuration" to load the prior configuration file. The related format and detail about configure file, please refer to <u>Appendix D</u>.

3.2.1 Save the Configure file:

When all modules has configured properly, you could save the settings as a file to avoid the settings is carelessly changed or need to duplicate the same content of configure. You can refer <u>3.1.1</u> to configure the modules.

The operation steps is very easy, you check or modify the settings of each I/O module by click "Configure" button, then click "Save Configuration" button and input the description or notes for this configuration file. Finally, input the file name of this project to complete. Please refer to the description as following diagram.

-87	P4 Hot Sy	vap	and Aut	o Configuration			Scanned I/O on Slot-
L.	/O Write To 8	7P4 /	Addr.[Hex]	Slot Configuration Status	Set As Scanned	Write To 87P4	
0	87019R	•	02	[00H] OK	1 🐙	Configure	87019R
1	87018R	•	03	[00H] OK	Сору	Configure	87018R
2	87024	•	04	[00H] OK	Сору	Configure	87024
З	87055	•	05	[00H] OK	Сору	Configure	87055
	-		-	-	Сору	Configure	-
	-		-	-	Сору	Configure	-
	-		-	-	Сору	Configure	-
	-	•	-	-	Сору	Configure	-
Se	ve Configu	ratio	n Loa	d Configuration Load Con	figuration And Wr	ite To 87P4	Help Exit

Fig. 17 : Save the configuration file

Configuration for 87019R Module Version: A201	2
Configuration Setting:	Channel Enable/Disable Setting:
Protocol: DCON	CH: 0 L000 000
Address[dec]: 2	
Baud rate : 115200	CH:1 +000.000
Checksum : Disable	✓ CH:2 +000.000 ▲ +00.00 ▲ +00.00 ▲ +00.00 ▲ +00.00 ▲
Data format : 2's Complement Format	CH:3 +000.000 [0F] T/C K-type +00.00 + +00.000 + +00.00 + +00.000 + +00.000 + +00.000 + +00.000 +
Filter Setting: 60Hz	CH:4 +000.000 [0F] T/C K-type +00.00 ★ +00.00 ★
Setting	✓ CH:5 +000.000 ★ +00.00 ★ +00.00 ★ +00.00 ★ +00.00 ★
Modbus Response Delay Time Setting	CH:6 +000.000 [0F] T/C K-type +00.00 + +00.00 +
Delay Time 0 (0~30 ms) Setting	▼ CH:7 +000.000 [0] T/C K-type +00.00 +00.00 +
Configure CJC Offset : CJC Temperature: +00.00 • Enable CJC Module CJC Offset: +00.00 ÷ C Disable CJC	Select All Clear All Setting Set All as CH:0
Adjustable CJC Increment	Version Information Calibration Exit
Configure only for auto configuration !	

Note: When you change the settings, please click "Setting" to confirm.



3.2.2 Load the Configure file

Yon can use this function when you want to duplicate the same settings to other USB-87Pn or load the prior configuration file in the same USB-87Pn. At first, please click "Load Configuration".

-87	P4 Hot S	Swap	and Aut	to Configuration				Scanned I/O on Slot
1	/O Write To	87P4	Addr.[Hex]	Slot Configuration Status	Set As Sca	nned	Write To 87P4	
0	Empty	-	02	[01H] Module scanned in Empt	<mark>y slot</mark>	Сору	Configure	87019R
1	Empty	-	03	[01H] Module scanned in Empt	<mark>y slot</mark>	Сору	Configure	87018R
2	Empty	-	04	[01H] Module scanned in Empt	<mark>y slot</mark>	Сору	Configure	87024
З	Empty	•	05	[01H] Module scanned in Empt	<mark>y slot</mark>	Сору	Configure	87055
4	-	-	-	-		Сору	Configure	-
5	-	-	-	-		Сору	Configure	-
6	-	-	-	-		Сору	Configure	-
7	-	-	-	-		Сору	Configure	-
			1					
Sa	ave Config	guratio	on Loa	d Configuration Load Conf	iguration A	nd Wri	ite To 87P4	Help Exit

Fig. 18 : Load the configuration file



Click "Configure" to check whether the settings of each module are correct.

Configuration for 87P4 Module Version: A202						
PWR S.RDY	-87P4 Hot Swap and Au I/O Write To 87P4 Addr.[Hex	to Configuration Slot Configuration Status	d	Write To 87P4	Scanned I/O on Slot-	
	0 87019R 🔽 02	[01H] Module scanned in Empty slot	2 🖉	Configure	87019R	
	1 87018R 🔽 03	[01H] Module scanned in Empty slot	Сору	Configure	87018R	
	2 87024 🔽 04	[01H] Module scanned in Empty slot	Сору	Configure	87024	
Auto Config.	3 87055 💽 05	[01H] Module scanned in Empty slot	Сору	Configure	87055	
	4	-	Сору	Configure	-	
	5 - 🔽 -	-	Сору	Configure	-	
	6	-	Сору	Configure	· ·	
	7	-	Сору	Configure	-	
0 0 1 0 2 0 3 0 Slot- USB-87P4 CPLI Module	Save Configuration Lo [SYSTEM] UNIT=87P4 [COMMENTS] Date Time=2008/3/10 下午 03:33:: Description= Write Description For Configuration Fi [Slot0 Comments] ID=87019R Firmware=A201h MODULE CONFIC=	ad Configuration Load Configurati	on And Wr	ite To 87P4	Help Exit	
	<u> </u>					

Click "Write To 87P4" to write the configuration to 87Pn CPU module.

Configuration for 87P4 Mod	lule Version: A202			X
PWR S.RDY	-87P4 Hot Swap and Auto I/0 Write To 87P4 Addr.[Hex]	Configuration Slot Configuration Status Set As	3 Write To 87P4	-Scanned I/O on Slot-
	0 87019R 💌 02	[00H] OK	Copy Configure	87019R
	1 87018R 🔻 03	[00H] OK	Copy Configure	87018R
	2 87024 🔽 04	[00H] OK	Copy Configure	87024
Auto Config.	3 87055 💽 05	[00H] OK	Copy Configure	87055
	4		Copy Configure	-
	5	-	Copy Configure	-
	6	-	Copy Configure	
	7	-	Copy Configure	-
	Save Configuration Load C	Configuration Load Configuratio	on And Write To 87P4	Help Exit
1	Slot 1 OK!	*****		
2	Slot 2 OK!	*****		
USB-87P4	Slot 3 OK !	*****		
	1			

3.3 Load & Write the configure file

If you sure the contents of configure files is what you need, you can load the configuration and write to 87Pn at the same time. As following diagrams, this function is useful for a lot of copy to other 87Pn. Click "Load Configuration And Write To 87P4".

-87	P4 Hot	Swap	and Aut	to Configuration			Scanned I/O on Slot-
1	/O Write	To 87P4	Addr.[Hex]	Slot Configuration Status	Set As Scanned	Write To 87P4	
0	Empty	-	02	[01H] Module scanned in Empt	y slot Copy	Configure	87019R
1	Empty	-	03	[01H] Module scanned in Empt	y slot Copy	Configure	87018R
2	Empty	•	04	[01H] Module scanned in Empt	y slot Copy	Configure	87024
3	Empty	-	05	[01H] Module scanned in Empt	y slot Copy	Configure	87055
4	-	-	-	-	Сору	Configure	-
5	-	-	-	-	Сору	Configure	-
6	-	-	-	-	Сору	Configure	-
7	-	-	-		Сору	Configure	-
Se	ave Con	figuratio	on Loa	d Configuration	iguration And Wr	ite To 87P4	Help Exit

Fig. 19: Load & Write the configuration file

Open		? 🗙
Look in:	for_users	- 🎫 📩 -
My Recent Documents Desktop My Documents	• 87p4Demo	Select the file name and click "Open" to open the file.
	File name:	87p4Demo 🔽 Open
My Network Places	Files of type:	j.ini

-87	P4 Hot Swap	and Aut	o Configuration			Scanned I/O on Slot-				
1	/O Write To 87P4	Addr.[Hex]	Slot Configuration Status	Set As Scanned	Write To 87P4					
0	87019R 🗾	02	[00H] OK	Сору	Configure	87019R				
1	87018R 🗾	03	[00H] OK	Сору	Configure	87018R				
2	87024 💌	04	[00H] OK	Сору	Configure	87024				
З	87055 💌	05	[00H] OK	Сору	Configure	87055				
4		-	-	Сору	Configure	-				
5		-	-	Сору	Configure	-				
6		-	-	Сору	Configure					
-7		-	-	Сору	Configure	-				
St	Save Configuration Load Configuration Load Configuration And Write To 87P4 Help Exit									
Slot	Slot 0 OK !									
Slot	1	Slot 1								

3.4 Operating in off-line mode:

When you want to use Docn Utility to configure the modules, but your computer did not connect any USB-87Pn. You can configure the settings and save the configuration file in off-line mode.

5E							Save Configuration
87P4 Hot I/0 Write T	Swap an • 87P4 Add	d Auto	Configuration Slot Configuration Status	As Scanned	Write To 87P4	- Scanned I/O on Slot-	[SYSTEM]
0 87019R	•	32	Empty	Сору	Configure		UNIT=87P4
1 87018	•	33	Empty	Сору	Configure		
2 87024	•	04	Empty	Сору	Configure		[COMMENTS] Date Time=2007/9/11 下午 03-56-30
3 37055	•	05	Empty	Сору	Configure		 Description=
4 -	× .	·	1	Сору	Configure		Write Description For Configuration File
5 -		· . [Copy	Configure	1	
6 .	-	·		Сору	Configure	1 · · · · ·	[Slot0 Comments]
7	-	·		Сору	Configure	- · · ·	ID=87019R
Save Con	figuration	1 10	ad Configuration	ation And W	vite To 87PX	Help Exit	Finnware=B201h MODULE_CONFIG=

To Configure 87Pn Offline

To Generate Configured file

Fig. 20 : Configure and save file in off-line mode

USB-87P1/2/4/8 User Manual, Version: 1.0

And then you can copy the file to another computer which connected with 87Pn. Run the DCON Utility and enter "configure module" screen. You can click "Load Configuration And Write To 87P4" to write the settings to 87Pn, this usage is convenient for remote support or system backup.

Note: The configure file will be save to C:\ICPDAS\DCON_Utility\for_users

<u> </u>		87	P4 Hot S	Swap	and Au Addr.[Hex	uto Configuration aj Siet Configuration Status	Set As Scanned	Write To 87P4	-Scanr	ed VO on Slot-
A Real of Development		0	87019R	•	02	[00H] OK	Сору	Configure		87019R
	State St. 5	1	87018R	-	03	[00H] OK	Сору	Configure		87018R
On the other side, I	DCON Utility loads the	2	87024	-	04	[00H] OK	Сору	Configure		87824
, and an and the sound of	witten to 07Dr. dine other	3	87055	-	05	[00H] OK	Сору	Configure		87055
configured file and	writes to 87Ph directly.	-4	-	×			Сору	Configure		
INVOTEN IN		þ	•	*	•		Copy	Configure		
SYSTEM]		6	· ·	-	-	-	Copy	Configure		-
[COMMENTS] Date Time=2007/9/11 下午 03:56:30 Description= Write Description For Configuration File		7 Slot	Save Conf	igurati K I	on	Load Configuration	figuration And V	Configure	Help	Exit
[Slot0 Comments] ID=87019R FirmWare=B201h MODULE_CONFIG=	Load Configuration And Write To 87P4	Slot Slot	1 0 2 0 3 0	кі кі						

Fig. 21 : Load & write Configuration file through other PC

Follow the steps, you can setup & save the configuration file without connected 87pn and then write this file to any 87Pn.

Step1 : Click off-line button and select the Module ID, Address, Baudrate and Checksum.

File COM Port Search Run Terminal Help	\frown		
	Start 0	End 255	(Address 0 ~ 255)
Module Address Baudrate Checks	um Format Status	Description	
	1 1 - 1 1 - 1 1		
	Calest HatCuse Medal		
	- Select HotSwap Model		
	Address: 1		
	Baudrate:	ок	
	1		
<			
Searching Status:	o ri a Devel Deter 0000	Paritur Data Bit	Stop Bit:
COM Porc COM 1 Address: [00 [dec]]	U [hex] Baud Hate: 9600	rangel None Data bic	8 Stop Bit.]

Fig. 22 : Off-line operation

Click "Configure Module" to enter setup screen.

87P4 OFF Line Configura	tion	
PWR S.RDY	Check Module Status	
Auto Config.	For maintenance routine:	
	1.Can check configuration details.	
	2.Can check configuration status(Ok or Error).	
n n		>
	Configure Module	J
	Configure Module For module configuration 1. Can online/offline configure the 87K I/O modules. 2. Can save configuration to file	
0 () 1 () 2 () 3 () Slot-	Configure Module For module configuration 1.Can online/offline configure the 87K I/O modules. 2.Can save configuration to file. 3.Can load configuration from file.	

-87	-Scanned I/O on Slot-					
12	/O Write To 87	P4 Addr.[He] Slot Configuration Status	Set As Scanned	Write To 87P4	
0		• 02	Empty	Сору	Configure	
1		• 03	Empty	Сору	Configure	
2		• 04	Empty	Сору	Configure	
З		• 05	Empty	Сору	Configure	
	-	-	-	Сору	Configure	-
	-	-	-	Сору	Configure	
	-	-	-	Сору	Configure	-
	-	-	-	Сору	Configure	-
Sa	ve Configura	ation Lo	ad Configuration	figuration And Wr	ite To 87P4	Help Exit

Step2 : Select and configure the I/O modules, then click "Save configuration" to save the settings as the file, or else next time when you open the "configure module" screen in off-line mode, the previous settings will be deleted.

-87P4 Hot Swap	and Auto	Configuration			Scanned I/O on Slot
I/D Write To 97F	[Hex]	Slot Configuration Status	Set As Scan	Write To 97P4	
0 87019R	02	Empty		Configure	
1 87018R	03	Empty	Сору	Configure	
2 87024 💽	04	Empty	Сору	Configure	
3 💽	05	Empty	Сору	Configure	
4 87053 <a>1	-	-	Сору	Configure	-
87055	-	-	Сору	Configure	-
87058	-	-	Сору	Configure	-
7 87064		-	Сору	Configure	-
	3				
Save Configuration	on Lo	ad Configuration Load Co	onfiguration And \	Write To 87P4	Help Exit

Fig. 23 : Off-line operation - Configure & Save file

Save As		2 🗙
Save in:	for_users	- III * II - III
My Recent Documents Desktop My Documents My Computer		Input file name and click "Save" to save the file.
(File name: 🧲	off_Line_setup Save
My Network Places	Save as type:	*.ini Cancel

Step3 : Run DCON Utility in another computer which has connected with 87Pn, load the settings by "Load configuration" button.

-87	'P4 Hot S	Swap	and Au	to Configuration			- Scanned I/O on Slot-
	/O Write To	87P4	Addr.[Hex]	Slot Configuration Status	Set As Scanned	Write To 87P4	
0	Empty	-	02	[01H] Module scanned in Emp	ty slot Copy	Configure	87019R
1	Empty	-	03	[01H] Module scanned in Emp	ty slot Copy	Configure	87018R
2	Empty	-	04	[01H] Module scanned in Emp	ty slot Copy	Configure	87024
3	Empty	-	05	[01H] Module scanned in Emp	ty slot Copy	Configure	87055
	-	-	-	-	Сору	Configure	-
	-	-	-	-	Сору	Configure	-
	-	-	-	-	Сору	Configure	-
	-	-	-	-	Сору	Configure	-
			1				
5	Save Confi	igurat	ion C	Load Configuration Load Co	nfiguration And V	Vrite To 87P4	Help

Fig. 24 : Load configure file in another PC

Open			?×
Look in:	C for_users		
My Recent Documents Desktop My Documents		Select file name and click "Open" to open the file.	
My Computer			
	File name:	off_Line_setup	Jpen
My Network Places	Files of type:	iniC ☐ Open as read-only	ancel

USB-87P1/2/4/8 User Manual, Version: 1.0

Click "Configure" button to check whether the settings is correct.

Configuration for 87P4 Mod	lule Version: A202			
PWR S.RDY	-87P4 Hot Swap and Aut	o Configuration		Scanned I/O on Slot-
	I/O Write To 87P4 Addr.[Hex]	Slot Configuration Status Set As Sca	2 Write Lo 8/P4	
	0 87019R 🔽 02	[01H] Module scanned in Empty slot	Configure	87019R
	1 87018R 🔽 03	[01H] Module scanned in Empty slot	Copy Configure	87018R
	2 87024 🔽 04	[01H] Module scanned in Empty slot	Copy Configure	87024
Auto Config.	3 87055 🔽 05	[01H] Module scanned in Empty slot	Copy Configure	87055
	4		Copy Des Gene	-
	5 - 🔽 - 🗍		Copy Configure	-
	6 - 🔽 -	-	Copy Configure	-
	7 - 🔽 -	-	Copy Configure	-
	Save Configuration	d Configuration	nd Write To 87P4	Help Exit
	[SYSTEM] UNIT=87P4 [COMMENTS] Date Time=2008/3/10 下午 03:33:32			
	Description= Write Description For Configuration File [SlotD Comments]			
USB-87P4 CPU Module	ID=87019R Firmware=A201h MODULE_CONFIG=			
	L			

🖉 Configuration for 87P4 Module Version: A202							
	87P4 Hot Swap and Auto 1/0 Write To 87P4 Addr.[Hex]	Configuration Slot Configuration Status	3 Write To 87	-Scanned I/O on Slot-			
	0 87019R 🔽 02	[00H] OK	Copy Configure	87019R			
	1 87018R 🔽 03	[00H] OK	Copy Configure	87018R			
	2 87024 🔽 04	[00H] OK	Copy Configure	87024			
Auto Config.	3 87055 🔽 05	[00H] OK	Copy Configure	87055			
	4	-	Copy Configure	-			
	5 - 🔽 -	-	Copy Configure	-			
	6	-	Copy Configure	-			
	7	-	Copy Configure	-			
0 () 1 () 2 () 3 () Slot-	Save Configuration Load Slot 0 OK ! Slot 1 OK ! Slot 2 OK ! Slot 3 OK !	d Configuration Load Configuratio	n And Write To 87P4	Help Exit			
USB-87P4 CPU Module				_			

Fig. 25 : Write the settings to USB-87Pn

Chapter 4 Software Development Kits (SDK)

The ICPDAS provides a series of free software development kits, enables the customer to be fast and simply completes the system setup. Related software tools are in the CD, please refer to following diagram:



4.1 DCON DLL

DCON DLL provide program developers to read the program interface which used on control I/O modules, the position of CD place provides a few basic and simple examples, user can understand how to read the control I/O module through the DLL in following examples:

4.1.1 DLL Use Steps

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

Step 2: Install the DCON DLL by executing:

CD:\Napdos\Driver\DCON_DLL_New\Setup\setup.exe

After installation, all related information can be found below

-	Windows Update								
1	Set Program Access and Defaults								
	Programs	•	Accessories Entivity	۲ ۲	ŧ.				
	Documents	•	7188E	٠					
EL	Settinas		HyperSnap-DX	•	0			i	
2444			DAQPro	•		DCON_ActiveX	•		
	Search	•	×		C.	DCON_DLL	Þ	\square	Demo
		1				NAPOPC	•		DemoBoard
Ø.	Help					NAP7000V		\square	Driver
	Pup								Manual
<u>a</u>	Nam								Readme.txt
5	Shut Down							1	Uninstall DCON_DL
	SHOC DOWIL							(00)	

Step 3 : Read manuals for how to start

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.



4.1.2 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



Step4: Arrange all the components on the form

Step 1: Open COM Port	Step 4: Set Module Parameters RS-485 Address of Module
Open COM Port Close COM Step 2: Set Communication Parameters Checksum © Disable © Enable TimeOut 300	Slot (for module insert into i-8000 0 The Channel want to be read 0 Data Format of Module
Step 3: Select Module Type	Step 5: Read Al

Step5: Write the program code

		Private Sub cmdOpen_Click()	
VB Step 1	<pre>{</pre>	iPort = 5 lBaudrate = 115200 Open_Com 5, 115200, 8, 0, 0	'Use COM Port = 5 'Use Baud Rate = 115200 'To Open COM Port
	ι	End Sub	
VB Step 2		Private Sub cmdRead_Click() Dim iRet As Integer Dim iVal As Integer Dim iVal As Single Dim iSlot As Integer Dim iTotal As Integer Dim iTotal As Integer Dim iAddress As Integer Dim iFormat As Integer iAddress = 3 iCheckSum = 0 iTimeOut = 300 iSlot = -1 iCh = 0 iTotal = 8 iFormat = 0 iRet = DCON_Read_AI(iPort, f iCheckSum, iTimeOut If iRet = 0 Then txtRead.Text = Str(fVal) Else txtRead.Text = "Error" + Stropents	'Module Address = 3 'CheckSum Disable 'Timeout For Response 'Don't Need to Assign Slot For 87K I/O 'Read Channel 0 AI Value 'Total Channel Of AI Module iAddress, iSlot, iCh, iTotal, it, iFormat, fVal, iVal) 'The Queried AI Value (iRet)
VB Step 3	{	Private Sub cmdClose_Click() Close_Com (5) End Sub	'To Close COM Port

Step 6: Run the project.

🐂 frm AI COM 5 Opened !	×				
Step 1: Open COM Port	Step 4: Set Module Parameters				
COM Port 5 BaudRate 115200	RS-485 Address of Module				
Open COM PortClose COM	Slot (for module insert into i-8000				
Checksum © Disable C Enable	The Channel want to be read 0 Data Format of Module Engineering •				
Step 3: Select Module Type	Step 5: Read Al				
Exit					

4.2 DCON ActiveX

2	Project Form (Form)	
	Read from 7012	-
Option Explicit Private Sub cmdExit_Click() Unload He End Sub		Exit
Private Sub cmdRead7012_Click Dim ReadValue ! ReadValue = NAP7000X1.GetJ txtRead7012.Text = Format End Sub	() AI ' reading the analog input (ReadValue, "0.00")	
Private Sub-Form boad () NiF7000X1.ComPort = CON NAF7000X1.NoduleType = I_ NAF7000X1.Address = 1 NAF7000X1.Address = 1 NAF7000X1.PortOpen = True	* Coll Port Hanne * Gogule Programming with OC * Gogule baudratel 9600 * open the Coll Port	Control



ActiveX (ocx) component Supported module: 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

4.2.1 Procedure for using the ActiveX

Step 1: Read the basic and important documents

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

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

Step 2: Install the DCON DLL by executing:

CD:\Napdos\Driver\DCON_ActiveX_New\Setup\setup.exe

After installation, all related information can be found below



Step 3: Read manuals for 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

4.2.2 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 module

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

Step 3: Add the ActiveX (ocx) component to the project





Step 4 : Arrange all the components on the form

Step 1: Set Communicate Parameter	r Step 2: Set Module paramete
ComPort 1	Address 1
Baudrate 9600	Slot -1
Open Com Close Com	Total 8 Channel
CheckSum © Disable © Enable	Data Format 0. engineer format 💌
	Step 3: Read Al Value
PC connect module/controller	Channel number
7K/87K module C 1-8000 + firmware	Read 🕅

Step 5: Write the program code

	Private Sub CmdOpenCom_Click() DCONPC_X1.ComPort = 5 DCONPC_X1.Baudrate = 115200 DCONPC_X1.PortOpen = True End Sub	'Use COM Port = 5 'Use Baud Rate = 115200 'True To Open COM Port
	Private Sub Read_AI_Click() Dim AIVal As Single Dim AIVal_Hex As Integer, iDataforma	t As Integer
VB Step 2	DCONPC_X1.ComPort = 5 DCONPC_X1.Address = 1 DCONPC_X1.SlotNo = -1 DCONPC_X1.AlTotalChannel = 8 DCONPC_X1.Checksum = False DCONPC_X1.Timeout = 300 iDataformat = 0 AIVal = DCONPC_X1.AnalogIn(0) TextReadAI.Text = AIVal	'Use COM Port = 5 'Module Address = 1 ' 'Don't Need to Assign Slot For 87K I/O 'Total Channel Of AI Module 'CheckSum Disable 'Timeout For Response '0: Use Engineering Format 'Read Channel 0 AI Value
VB Step 3	If DCONPC_X1.ErrorCode <> 0 Then Exit Sub End If End Sub	
VB Step 1	Private Sub CmdCloseCom_Click() DCONPC_X1.PortOpen = False End Sub Private Sub DCONPC_X1_OnError(ByVa MsgBox "Error Code: " + Str(IErrorCode + "Error Message: " + DCONPC_X1 End Sub	'False To Close COM Port l lErrorCode As Long) e) + Chr(13) _ l.ErrorString
	2110 200	

🐂 AI	
Step 1: Set Communicate Parameter	Step 2: Set Module parameter
ComPort 5	Address ³
Baudrate 115200	Slot ⁻¹
Open Com Close Com	Total 8 Channel
CheckSum	
Disable C Enable	Format
	Step 3: Read Al Value
limeout 300 (ms)	Channel
PC connect module/controller	number j°
	Read 4.834

4.3 DCON LabVIEW





4.3.1 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:





8000 Demo: Demo programs for i-8000 I/O modules. **8000.IIb:** LabVIEW library contains all sub-vi for i-8000 I/O modules **CalIDLLinLabVIEW.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 library of DCON_LabVIEW.
- Step3: Select the sub-vi form Functions Palette >> Select a VI...



4.3.2 LabVIEW Example (Reading multi-channel analog Input value)

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

Choose t	he VI to open:		? ×
Look in: 🔂	DCON_LabVIEW		* 📰 🔻
7000Demo 8000Demo 87kDemo others 87kDemo 17000.llb	a Alasono.llb Bark.llb Alast.llb Alast.llb Alast.llb Alast.llb Alast.llb		
File <u>n</u> ame:	uart.llb		<u>O</u> pen
Files of <u>type</u> :	VIs & Controls (*.vi;*.ctl;*.vit;*.	ott) 💌	Cancel

Step5 : Select the desired sub-vi

uart.llb	•	C:	*
DataSizeOutCom.vi			
uigerr.vi DiCat. Com Status VI			
Get Hart Version vi			
GetLineStatus.vi			
🖬 Open_Com.VI			
Receive_Binary.vi			
Receive_Cmd.vi			
withChar.vi CalSend Binary vi	-		
Choose the VI to open:		OK	
Open_Com.VI		Cancel	

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

🔁 Untitled 1 Diag	Help	_ 🗆 🗙
File Edit Operate Project 수관 🛞 💷 😨 🖟	dwBaudRate CPort cData CParity cStop	*
Opes COM	Upen_Com.v1 To initial and open com port cPort : 1 ~ 255 dwBardrate : 150,300,600,1200,2400,4800,9600,19200, 38400,57600,115200,230400,460800,921600 cData : 5,6,7,8 cParity : 0=Non Parity, 1=Odd Parity, 2=Even Parity cStop : 0=1 stop bit, 1=1.5 stop bit, 2=2 stop bit Return : 0=NoError, others= Error Code	*
	æ 8 ? ·	<u> </u>
1		

Step7: Draw the data flow of sub-vi.

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

Step 1: Select the appropriate demo program (ex. AnalogInAll.vi) by the name according with module's function (ex. i-8017 / Al).

Step2: Set the parameters	
---------------------------	--

🛃 Analogi	InAll.vi *	ĸ								-	- 🗆 ×
Ele Edit Oper	rate Project		Help		12.10	et					
(SARA)	in hotes	oppiication			1-00 1	() · ·]					-
8	000 Analog	gIn All d	emo	Multiple for 801	Channel /	Analog In	Ĩ		1		
Γ	STOP	dwBa \$9600	udRate	cData 8	cf \$0	Parity	cStop D	F	let	5	
L					-19 2.912					2	
dwi	Buf	Module	Module	mi	Check SUM 0 : disable	Time O	ut on	of Caral	1:5tring Sav 0:String Not Save	Slot Nol	
		1	8013)	1 Second	- 00 \$0	in care	1	\$ 0	
Γ	CH0	CH1	CH2	СНЗ	CH4	CHS	CH6	CH7			
<u>f7000</u>	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000			_
L											
4											•

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

	▶ Help	- I X
E AnalogInAll.vi Diagram * Fie Edt Operate Project Windows Help 순간 한테 양 바라가라 13pt Application For	dwBuf	14
	Read the all channels of analog input values dwBuf[0] : RS-232 port number 1 ~ 255 dwBuf[1] : module address 0x00 ~ 0xFF dwBuf[2] : module id: 0x6013/17/18 dwBuf[3] : checksum 0=disabled, 1=enabled dwBuf[4] : timeout constant, normal=100 dwBuf[5] : don't care dwBuf[6] : 0=don't care debug string, 1= save debug string dwBuf[7] : slot number return : fBuf(0) ~ fBuf(n), n is the module's AI channel number	2

Step3 : Run the Demo.

4.4 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
```

4.4.1 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

4.4.2 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 1: Run the DCON Utility to configure the I/O modules

Step 2: Run Indusoft and create a new project

Step 3: Include the DCON driver



Step 4: Setup DCON driver

	🍓 D'' AV C'''	constants and a	×
Workspace X	DOM: Baud Rate:	Сом1 2 115200 2	
Project: MYTEST.APP	Dala Bilx: Stop Bits: Panily:	8 T 1 T None T	Advanced
TCPA DIE Settings			Stiing T:
📓 Datab 👫 Grap 📑 Tasks 🕵 Comm	Lang 2:		Sting 2:

Step 5 : Insert tags to connect to I/O modules

The address format is [Address : Module ID : Slot : Channel]

Vorkspace					
Drivers DCON OPC TCP/II DDE Settings	Description: Input Read Trigger:	Enable Read when Idle:	Read Completed:	ase priority Read Statu	یا۔ «:
<u>H</u> elp B Datab H Grap N Tasks 💇 Co:	RdTr Write Trigger:	Enable Write on Tag Change: Write Completed:		Write Status:	
	Station:	Header:			
		Tag Name	Address	Div	Add
	1 AI[0] 2 AI[1] 3 AI[2]	01:8017: 01:8017: 01:8017: 01:8017:	:0:0 :0:1 :0:2		
	4 AI[3] 5 AI[4]	01:8017 01:8017	:0:3 :0:4		
	6 AI[5] 7 AI[6] 8 A[7]	01:8017: 01:8017: 01:8017: 01:8017:	0:5 0:6 0/		

Step6 : Arrange all the components on the form

Settings	Ch0 ##.###
COM port =1	Ch1 ##.###
Baudrate = 115200	Ch2 ##.###
Address = 01 Slot = 0	Ch3 ##.###
Checksum = Disable	Ch4 ##.###
Timeout = 1000ms	Ch5 ##.###
	Ch6 ##.###
	Ch7 ##.###

Step7: Double click the text box to assign a tag to it.

lein.scr			n ## ##	×	
C Object Pro	operties Replace	Hint	Textl	/0	×
A Tag/E: S Minimu C Maximu Ti E-S	kpression: A m Value: A um Value: A iign VK: K	Use Default>	Input Enabled Password Co Disable:	Fmt: Deci onfirm Sec	imal 💌
		Ch	6		

Step8 : Run the project

Settings	Ch0	3.56
COM port =1	Ch1	5.55
Baudrate = 115200	Ch2	3.57
Address = U1 Slot = 0	Ch3	9.98
Checksum = Disable	Ch4	8.54
Timeout = 1000ms	Ch5	5.63
	Ch6	5.58
	Ch7	6.02

4.5 NAP OPC Server

alatetol al pla	Device Properties	W
(a) (b) (b) (b) (b) (b) (c) (b) (b) (c) (b) (b) (c) (b) (b) (c) (c) (c) (c) (c) (c)	Conce See See See See See See See See See S	al Yengen
	COM http://www.interester.com/com/com/com/com/com/com/com/com/com/	



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

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. The COM/DCOM technologies provided the framework for software products to be developed. There are now hundreds of OPC Data.

4.5.1 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
- Reversion.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

4.5.2 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

USB-87P1/2/4/8 User Manual, Version: 1.0

Step 1: Run the DCON Utility to configure the I/O modulesStep 2: Run the OPC server to search for I/O modules on COM1

	Tag Ge	h Modules	nd Shrink Monitor	c Cut Copy Location Value	
	3	Address (1 to 255) Start 0 End 255 Status: 0% A:0 B:960	3400 □ 19200 ♥ 400 □ 19200 ♥ 400 □ 1200 Clear Al Checksum Tim Ø Disabled Ø Enable 100 S:1 EC:13	2 115200 2 9600 11 eout (mSec) 500 Exit	
New Open	Save 1	Device Group	Tag Gener.	Search Expand	Shrink Monitor
8810_1			Name	Туре	Channel/L
📄 📙 8018_S0)		8 Ch00	Analog Ou	tput O
📙 🍰 Als			8 Ch01	Analog Ou	tput 1
B 1 8042_S1	L.		8 Ch02	Analog Ou	tput 2
DIs DOS 005 005 005 005 005 005 005 005 005 00	: 2 : 3		S Ch03	Analog Ou	tput 3

Step 3: Save the configuration and close the OPC ServerStep 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	
iFix	Indusoft	Citect

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

Appendix A : Dimension

A.1 – USB-87P1



A.2 – USB-87P2



Top View





Front View



Right Side View



Front View

Right Side View

A.4 – USB-87P8



Front View



Appendix B : Compare USB-87Pn with i-87Kn

Note: i-87K I/O module has divides into the high profile (new version) and the low profile (old version) two kinds, only i-87K high profile series I/O modules can support Hot Swap and Auto-Configuration function correctly.

USB-87Pn & i-87Kn I/O unit comparison

Supported	USB-87Pn with Auto Config. Enable	USB-87Pn with Auto Config. Disable	i-87Kn
i-87K Low Profile module			
i-87K High Profile module		0	Ü
i-87K module Hot Swap	3	3	
Auto- Communication parameter Setup	0	0	
Auto-Configuration			



Fig. 26 : i-87K high/low profile series I/O modules

Please refer to web page : http://www.icpdas.com/products/PAC/i-8000/8000_IO_modules.htm

Appendix C : Solution for 87K I/O module on the slot

When insert the module on the expansion slot of 87Pn, the same time 87Pn CPU will detect the module name and respond the status of interacting between 87Pn and module. As following diagram, the search result only find out the USB-87P4 and a 87019R which on slot 0, the Status column shows Auto Config. Enable [0,X,X,X]

<u>File</u> <u>C</u> OM I	ort <u>S</u> earch	<u>R</u> un <u>T</u> ermi	nal <u>H</u> elp				
					Start 0	End 255	(Address 0 ~ 255)
Module	Address	Baudrate	Checksum	Format	Status	Description	
USB-87P4	1[1]	115200	Disable	N,8,1	Auto Config. El able [0XXX]] 🚽 🖉 Slot Auto Configu	ration USB Unit(DCON)

Fig. 27 : The search result between 87Pn and modules

Click the name "USB-87P4" entering the operation screen to know the settings of 87Pn and the status detected by 87Pn CPU, the module status code in "Slot Configuration Slot" column means the different error message.

🖉 Configuration for 87P4 Module Version: A202				
PWR S.RDY	87P4 Hot Swap and Auto Configuration 1/0 Write To 87P4 Addr.[Hex] Slot Configuration Status Set As Scanned Write To 87P4			- Scanned I/O on Slot-
	0 87019R 🔽 02	[00H] OK	Copy Configure	87019R
	1 87024 🔽 03	[06H] Can not find module	Copy Configure	Empty
	2 87055 🔽 04	[07H] Incorrect module name	Copy Configure	87024
Auto Config.	3 Empty 🔽 05	[01H] Module scanned in Empty slot	Copy Configure	87055
	4	-	Copy Configure	-
	5	-	Copy Configure	-
	6	-	Copy Configure	-
	7	-	Copy Configure	
Save Configuration Load Configuration Load Configuration And Write To 87P4 Help E				Help Exit
You may click "Help" to inquire the solution and the meaning of error code.				

Fig. 28 : DCON Utility shows the status of 87Pn expansion slot

As following table, you can accord the error code and LED lamp status to find out the problem solution.

Table 1 : The Error Code in Auto Config. Enable mode

Error Code	Slot LED (Red)	Status	Description	Solution
00H	Dark (ok)	ОК	ОК	None
		Module scanned in Empty Slot	 There is a module scanned in this empty setting slot. 	1. Remove the module
01H	Flashing			Reconfigure it with DCON Utility.
(Warning,	(warning)		2. The first time to setup, no initial value.	 Click "Set As Scanned" button and configure module again Click "Write To 87Pn" button to write settings to 87Pn.
		Commands	Configure failure:	1. Check the i-87K I/O module's firmware.
02H	Flashing		This is a 87K I/O module firmware compatibility problem	 * Run Dcon Utility→Terminal→Dcon command Line→ setup Baud Rate→Command: \$AAF (EX. 01F) →Send
(Warning)	comparable	Some commands at this slot might be too	* You can see the version, Respond=!01A1.9	
		new for this old firmware of 87K I/O module, but it is not serious for system operation.	 Update the 87K I/O module with a new firmware version. 	
			Configure failure:	
03H Bright (Error)	Bright <mark>(Error)</mark>	right Configuration rror) Failed	Some commands are not supported by this 87K I/O module and this error will be serious for system operation.	 Check the 87K I/O module firmware Update the 87K I/O module with a new firmware version.
04H Bright (Error)	wrong	Configure failure:	1. Run DCON Utility.	
	Bright (Error)	Configuration format	The format of configured commands is wrong for DCON Protocol.	 Click the "Write To 87Pn" button to write the settings to 87Pn CPU again.
05H	Bright	Read	The memory data is failed:	1. Run DCON Utility.

	(Error)	Configuration failed	The configured commands are wrong for DCON Protocol.	 Click the "Write To 87Pn" button to write the settings to 87Pn CPU again.
06Н	Bright <mark>(Error)</mark>	Can not find module	The configured module at this slot has been removed. It is empty now.	 Please insert a correct module as previous configured one. Or configure with DCON Utility as "Empty" and click the "Write To 87Pn" button to write the configuration to 87Pn CPU.
			Configure failure:	
07H	Bright <mark>(Error)</mark>	Incorrect module name	The module inserted in this slot is not the same as previous configured.	The insert & configure module name are different, insert the correct one or run the Dcon Utility to modify the settings accord with the module name.
			Configure failure:	1. Please restart the power to initialize to I/O module
08H Bright (Error)	Bright <mark>(Error</mark>)	Internal INIT* pin failed	The INIT Pin is failed to connect with the GND and module failed to initialize.	 If it still failed to initialize, send it back to factory to check. Note: USB-87Pn only supports high profile 87K I/O modules.
09H	Bright <mark>(Error</mark>)	Module address over 255 (FFh)	The module address is over 255 (FFh).	The maximum address of 87P1 is 254 (FEh) 87P2 is 253 (FDh) 87P4 is 251 (FBh) 87P8 is 247 (F7h)
ОАН	Bright <mark>(Error</mark>)	The command count saved to 87Pn is not the same as DCON Utility	 This error might be caused by following reasons. 1. Command length error. 2. Command checksum error. 3. Communication error during the process of writing commands to 87Pn. 	Please configure this 87K I/O module with DCON Utility, and click the "Write To 87Pn" button to write the configuration to 87Pn CPU again.

Table 2 : The Error Code in Auto Config. Disable mod	ble 2 : The Error Code in Auto Config. [Disable mode
--	--	--------------

Error Code	Slot LED (Red)	Status	Description	Solution
80H	Dark (ok)	Initialize ok	setup success	None
81H	Bright <mark>(Error)</mark>	Internal INIT* pin failed	The INIT Pin is failed to connect with the GND and module failed to initialize.	If it still fails after restart the 87Pn many times, please send the 87K I/O module back to factory to check.
82H	Bright <mark>(Error</mark>)	Module address over 255 (FFh)	The module address is over 255 (FFh).	The maximum address of 87P1 is 254 (FEh) 87P2 is 253 (FDh) 87P4 is 251 (FBh) 87P8 is 247 (F7h)

You can see the LED signals on 87Pn CPU module to know whether the 87Pn is operating properly. Please refer to appendix.

	Auto Config. LED (Green)	S.RDY LED (Green)	Slot Status LED (Red)		
Auto Config. Enable					
No Error		Always ON	Always OFF		
Warning	Always ON	Always ON	Flash		
Failed		Flash	Always ON		
Auto Config. Disable					
No Error		Always ON	Always OFF		
Failed	Always OFF	Flash	Always ON		

Appendix D : Description For ini Files

While you save the configuration file, the DCON Utility will save as .ini file. The default path of file as below :

C:\ICPDAS\DCON_Utility\for_users

The INI file explains as follows:



Appendix E : 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 USB-87Pn controller has a metallic board attached to the back of the plastic basket. 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 29 below



Fig. 29 : Frame Ground & Earth Ground