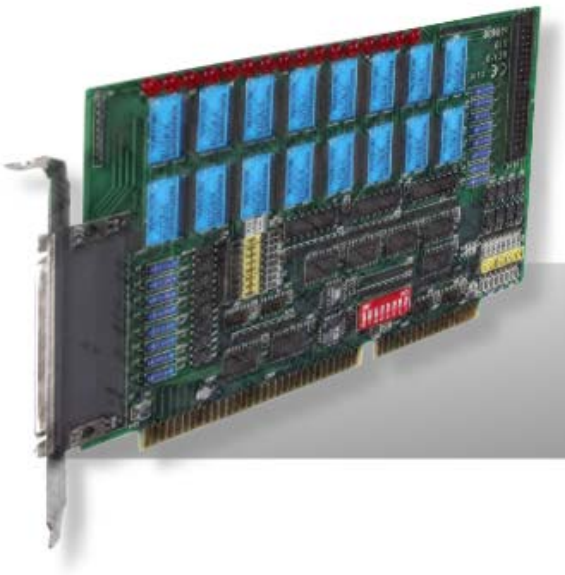

P8R8-DIO
P16R16-DIO

User Manual

Version 1.7
Oct. 2011

Warranty

All products manufactured by ICP DAS are warranted against defective materials for a period of one year from the date of delivery to the original purchaser.

Warning

ICP DAS assumes no liability for damages consequent to the use of this product. ICP DAS reserves the right to change this manual at any time without notice. The information furnished by ICP DAS is believed to be accurate and reliable. However, no responsibility is assumed by ICP DAS for its use, nor for any infringements of patents or other rights of third parties resulting from its use.

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Tables of Contents

1. Introduction

The P8R8-DIO/P16R16-DIO is an 8/16 isolated input and 8/16 relay output interface board designed for control and sensing applications. This interface board is easily installed in any PC/AT/XT or compatible computer. The P8R8-DIO/P16R16-DIO provides 8/16 electromechanical relay outputs and 8/16 optically isolated inputs. The P8R8-DIO/P16R16-DIO can be used in various applications including load switching, external switching, contact closure, etc.

1.1 Features and Applications

1.1.1 Features

- 8 relay outputs channels for P8R8-DIO
- 8 optically isolated inputs channels for P8R8-DIO
- 16 relay outputs channels for P16R16-DIO
- 16 optically isolated inputs channels for P16R16-DIO
- LED indicator for each relay output state
- AC/DC Signals Input
- AC Signal Input With Filter

1.1.2 Applications

- Factory Automation
- Laboratory Automation
- Security Control
- Product Test

1.2 Product Check List

The shipping package includes the following items:

- One P8R8-DIO or P16R16-DIO series card
- One software utility ISA CD.
- One Quick Start Guide.

It is recommended that you read the Quick Start Guide first. All the necessary and essential information is given in the Quick Start Guide, including:

- Where to get the software driver, demo programs and other resources.
- How to install the software.
- How to test the card.

Attention!

If any of these items is missing or damaged, contact the dealer from whom you purchased the product. Please save the shipping materials and carton in case you need to ship or store the product in the future.

1.3 P8R8-DIO Specifications

Model Name	P8R8-DIO
Digital Input	
Isolation Voltage	5000 Vrms
Channels	8
Compatibility	Non-polarized OPTO-isolated
Input Voltage	Logic 0: 0 ~ 1 V_{AC}/V_{DC} Logic 1: 5 ~ 24 V_{AC}/V_{DC}
Input Impedance	1.2 KΩ, 0.5 W
Response Speed	Without Filter: 0.045 MHz With Filter: 0.05 kHz
Relay Output	
Relay Type	4 SPDT 4 SPST
Channels	8
Contact Rating	0.3 A @ 120 V_{AC}/ V_{DC} 1 A @ 30 V_{DC}
Operating Time	5 ms (typical)
Release Time	5 ms (typical)
Insulation Resistance	100 MΩ
Life	Mechanical: 100,000 ops. (min.) Electrical: 100,000 at 1 A @ 30 V, resistive
General Environmental	
I/O Connector	Female DB37 x 1
Dimensions (L x W x D)	150 mm x 97 mm x 22 mm
Power Consumption	160 mA @ +5 V (max.) 150 mA @ +12 V (max.)
Operating Temperature	0 ~ 60 °C
Storage Temperature	-20 ~ 70 °C
Humidity	5 ~ 85% RH, non-condensing

2. P8R8-DIO Installation

This chapter describes the P8R8-DIO unpacking information; P8R8-DIO layout and the jumpers and switches settings for the P8R8-DIO configuration.

2.1 Unpacking

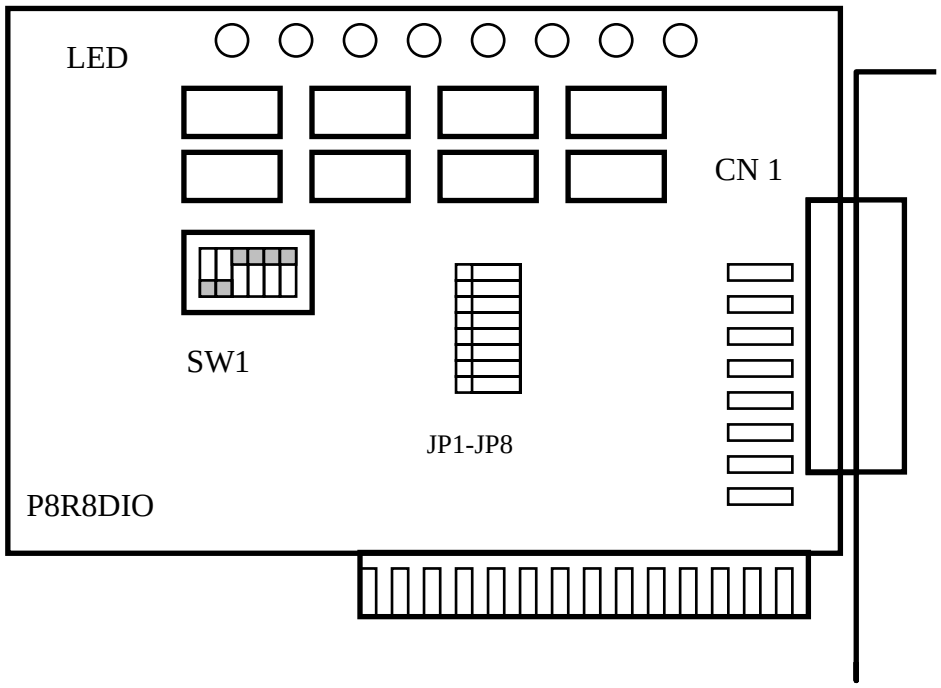
CAUTION:
Your P8R8-DIO card contains sensitive electronic components that can be easily damaged by static electricity.

1. The P8R8-DIO should be done on a grounded anti-static mat.
2. The user should wear an anti-static wristband, grounded at the same point as the anti-static mat.
3. Inspect the carton for obvious damage. Shipping and handing may cause damage to the board. Be sure there are no shipping and handling damages on the board before using.
4. After opening the carton, exact the system board and place it on a grounded anti-static surface and component side up.

CAUTION: Do not apply power to the board if it has been damaged!

5. You are now ready to install your P8R8-DIO.

2.2 P8R8-DIO Layout



- CN1: DIO channels 0~7
- JP1~JP8: Select the input AC or DC signals of D/I channel 0~7
- SW1: Base address DIP switch

2.3 SW1 and Jumper Setting

You can change the P8R8-DIO configuration by setting jumper and switches on the board. The board‘s jumpers are set at the factory. Under normal circumstances, you should not need to change the jumper settings.

2.3.1 Base Address Setting

The P8R8-DIO requires two consecutive I/O addresses, one for output and read back and the other for input. You can set the base address on any 4-byte boundary using the DIP switch (SW1). If you install one more P8R8-DIO boards, you must set a different base address for each board.

The base address switch is preset at 300H (see Figure 2-1).

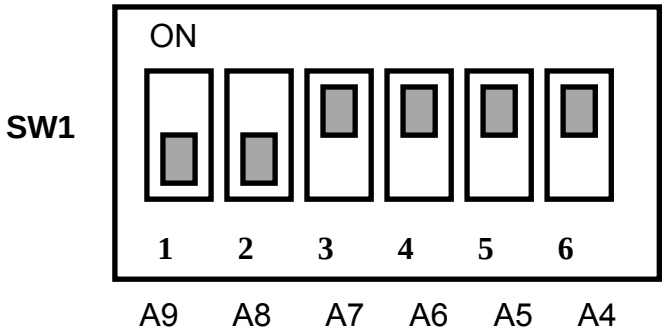


Figure 2-1: Default Base Address 300 Hex

For Example

How to select 3 0 0 (Hex)

OFF → 1
ON → 0

	3		0				0
	OFF	OFF	ON	ON	ON	ON	
→	1	1	0	0	0	0	
	1 A9	2 A8	3 A7	4 A6	5 A5	6 A4	

The detail SW1 base addresses setting. Please refer to **P8R8DIO Base Address Table** (see Table 2-1).

P8R8DIO Base Address Table:

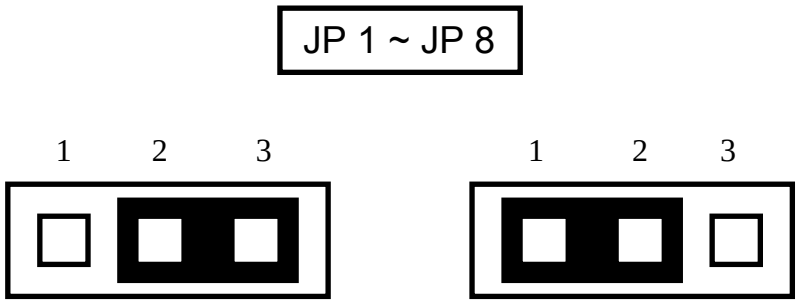
(*): Default Setting

SW1 Dip Switch Address (Hex)	1 A9	2 A8	3 A7	4 A6	5 A5	6 A4
200	OFF	ON	ON	ON	ON	ON
210	OFF	ON	ON	ON	ON	OFF
220	OFF	ON	ON	ON	OFF	ON
230	OFF	ON	ON	ON	OFF	OFF
240	OFF	ON	ON	OFF	ON	ON
250	OFF	ON	ON	OFF	ON	OFF
260	OFF	ON	ON	OFF	OFF	ON
270	OFF	ON	ON	OFF	OFF	OFF
280	OFF	ON	OFF	ON	ON	ON
290	OFF	ON	OFF	ON	ON	OFF
2A0	OFF	ON	OFF	ON	OFF	ON
2B0	OFF	ON	OFF	ON	OFF	OFF
2C0	OFF	ON	OFF	OFF	ON	ON
2D0	OFF	ON	OFF	OFF	ON	OFF
2E0	OFF	ON	OFF	OFF	OFF	ON
2F0	OFF	ON	OFF	OFF	OFF	OFF
300 (*)	**OFF**	**OFF**	**ON**	**ON**	**ON**	**ON**
310	OFF	OFF	ON	ON	ON	OFF
320	OFF	OFF	ON	ON	OFF	ON
330	OFF	OFF	ON	ON	OFF	OFF
340	OFF	OFF	ON	OFF	ON	ON
350	OFF	OFF	ON	OFF	ON	OFF
360	OFF	OFF	ON	OFF	OFF	ON
370	OFF	OFF	ON	OFF	OFF	OFF
380	OFF	OFF	OFF	ON	ON	ON
390	OFF	OFF	OFF	ON	ON	OFF
3A0	OFF	OFF	OFF	ON	OFF	ON
3B0	OFF	OFF	OFF	ON	OFF	OFF
3C0	OFF	OFF	OFF	OFF	ON	ON
3D0	OFF	OFF	OFF	OFF	ON	OFF
3E0	OFF	OFF	OFF	OFF	OFF	ON
3F0	OFF	OFF	OFF	OFF	OFF	OFF

Table 2-1

2.3.2 Jumper Setting

Each digital input channel can be jumper selected, single-pole, RC filter with a time constant of 1.2 ms. Refer to the table 2-2 to see the list of jumper number and it's corresponding digital input channel.



Without Filter
For DC Signal

(Default Setting)

With AC Filter
For AC Signal

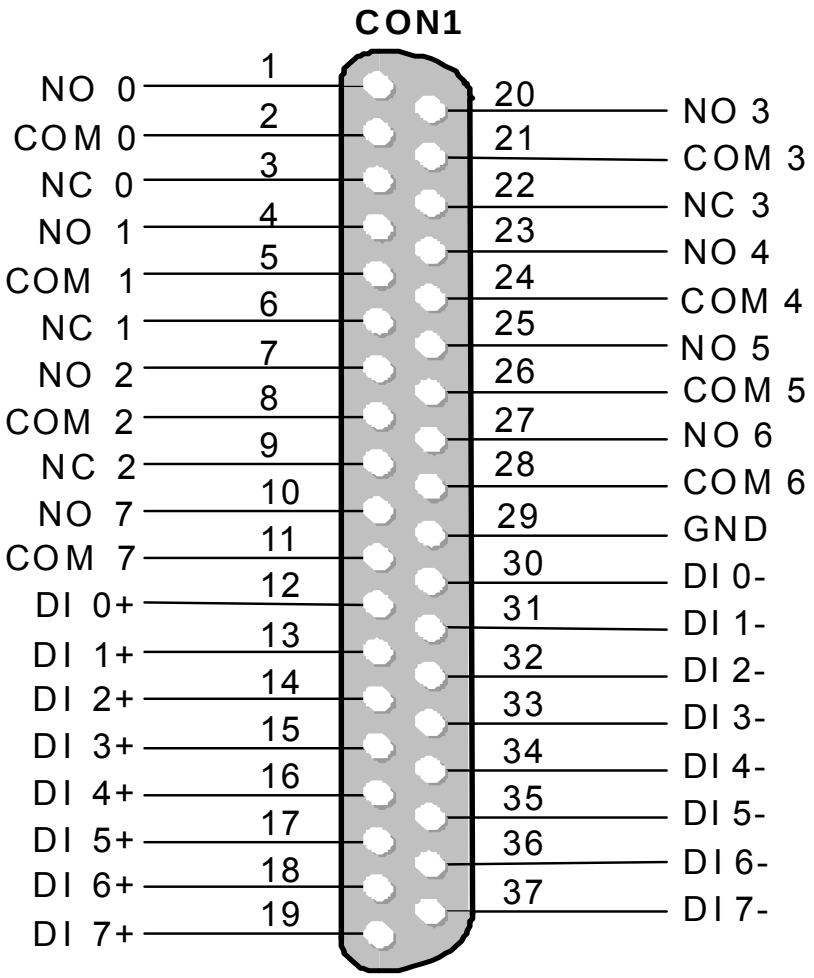
Jumper	Input Channels
JP1	DI 0
JP2	DI 1
JP3	DI 2
JP4	DI 3
JP5	DI 4
JP6	DI 5
JP7	DI 6
JP8	DI 7

Table 2-2.

If you are using AC input signals, you must short the AC FILTER jumper 1-2. If you are using DC input signals, the AC FILTER is optional. If the DC input signals response less than 20 μs, set the filter off. If you want a slow response (about 5 ~ 10 ms) for rejecting noise or contact bouncing, short the AC FILTER jumper 1-2.7

2.4 Pin Assignments

Figure 2-3: CN 1 pin assignments of the P8R8DIO connector.



NO n : Normally open.
COM n : Common.
NC n : Normally close.
DI n : Digital input channel n.

3. P8R8-DIO Programming

This chapter provides the I/O map of P8R8-DIO registers. Example programs and programming information are also included.

3.1 I/O Address Map

The P8R8DIO boards occupy two consecutive addresses in the computer's I/O space. The base address is selected by DIP switch. The I/O map is shown in Table 3-1.

Base Address at 300 Hex

Address	Write	Read
Base + 0	Relay Output (CH 0 ~ CH 7)	Read Back The Output Status
Base + 1	NO FUNCTION	DIGITAL INPUT (CH0 ~ CH7)

Table 3-1. I/O Address Map.

3.2 Relay Output

You write data to relays (CH0 - CH 7) as a single Byte. Each of the eight bits within a byte controls a single relay. A high bit (equal to1) energizes (closes the contacts of) a relay while a low bit (equal to 0) turns the relay off.

3.2.1 Output Register

Relay Output register bits are assigned as shown in Table 3-2

Base Address at 300 Hex

Base+0	D7	D6	D5	D4	D3	D2	D1	D0
Output Channel	7	6	5	4	3	2	1	0

Table 3-2. Relay Addresses in the Relay Output Register.

For Example (Basic Language)

REM : Set all relay output is ON , (Output data FFh)

```
Base=&h300                  ‘ Set Base Address at 300 (Hex)
Out Base , &hFF             ‘ Set Relay Output (Ch 0 ~ Ch 7) On
RB= Inp(Base)               ‘ Read Back Relay Output Ch 0 ~ Ch 7
```

REM: Set relay output CH 3 is ON, Output data 8h (00001000 BIN)

```
Out Base, &h8               ‘ Set relay output CH 3 ON
```

(For C Language)

```
outportb(0x300,0x0FF);      /* Set all relay output is On*/
outportb(0x300,0x0);        /* Set all relay output is Off*/
```

3.2.2 Using Relay Output

- **Basic Circuitry : (Current Rating < 0.3 A), Refer to Fig. 3-1.**

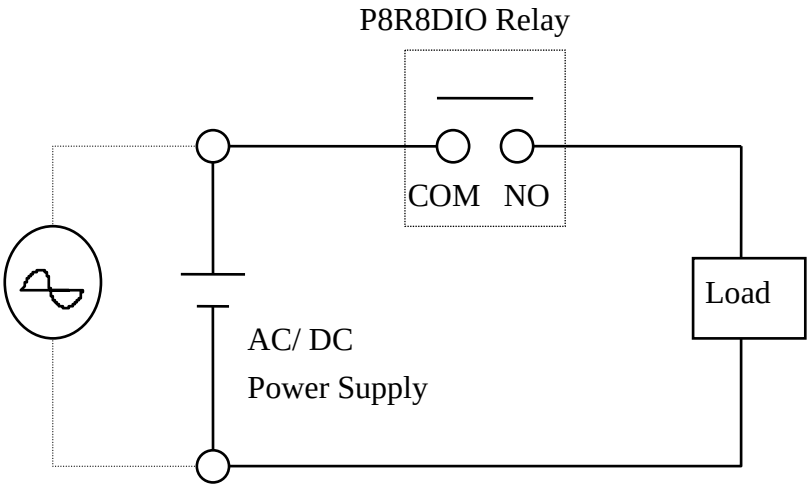


Figure 3-1.

- **Heavy Loading Application (> 0.3 A), Refer to Figure.3-2.**

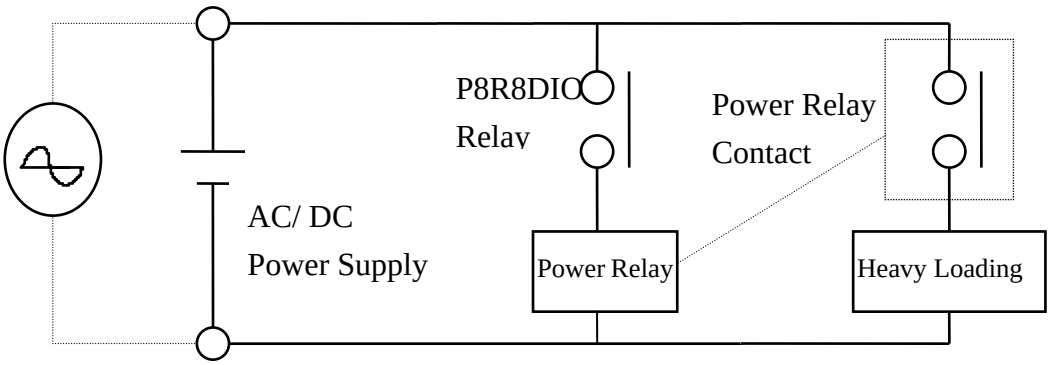


Figure 3-2.

3.3 Isolated Input

The digital input state is read as a single byte from the port at base address+1. Each of the eight bits within the byte corresponds to a particular digital input so that a high bit (equal to 1) represents a high state while a low bit (equal to 0) represents a low state. Register bits are assigned as shown in Table 3-3.

3.3.1 Input Register

Base Address at 300 Hex

Base + 1	D7	D6	D5	D4	D3	D2	D1	D0
Input Channel	7	6	5	4	3	2	1	0

Table 3-3 input addresses in the isolated control input Register.

For Example (Basic Language)

```
Base=&h300              ' Set Base Address at 300 (Hex)
RIH=INP(Base+1)         ' Read Isolated Input Ch 0 ~ Ch 7
```

(C Language)

```
int rih;
rih=inportb(0x301);
```

3.3.2 Using Isolated Input

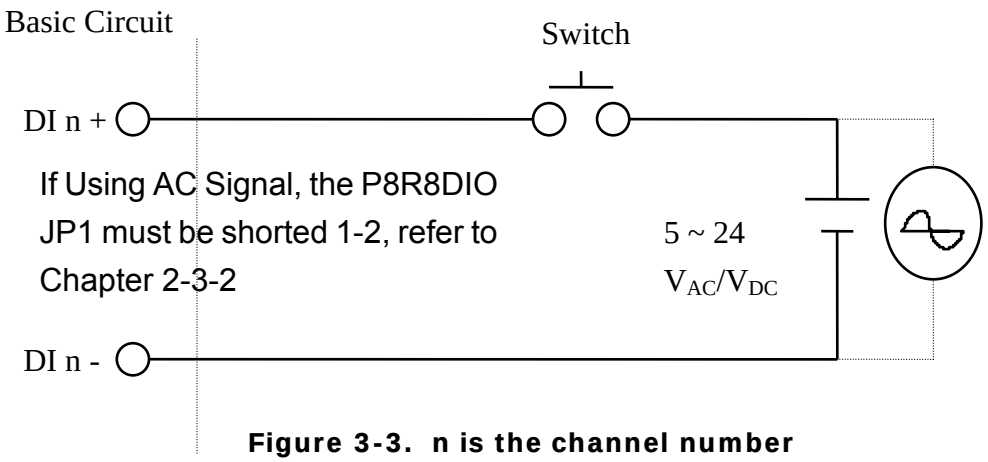


Figure 3-3. n is the channel number

The normal input voltage range is 5 ~ 24 V_{AC} or V_{DC}. The normal input range can be changed by choosing suitable resistor to limit the current through the opto-isolator to about 10 mA(**I**f). The default resistor is 1.2 kΩ / 0.5 W.

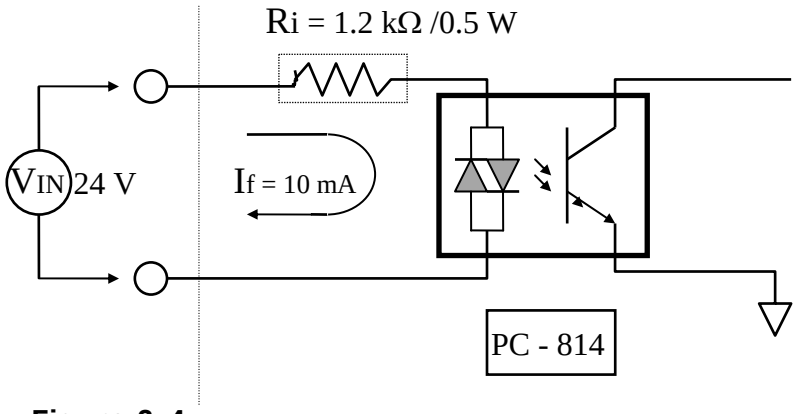


Figure 3-4.

Ri = **V**in / **I**f
Pw = **V**in X **I**f

Calculation Example :

If **V**in = 120 V Then **R**i = 120 (V) / 0.01 (A) = 12 kΩ
Pw = 120 (V) X 0.01 (A) = 1.2 W

The **R**i Must Replace By 12 kΩ / 2 W (1.2 W)

4. P16R16-DIO Specifications

Model Name	P16R16-DIO
Digital Input	
Isolation Voltage	5000 Vrms
Channels	16
Compatibility	Non-polarized OPTO-isolated
Input-Voltage	Logic 0: 0 ~ 1 V_{AC}/V_{DC} Logic 1: 5 ~ 24 V_{AC}/V_{DC}
Input Impedance	1.2 KΩ, 0.5 W
Response Speed	Without Filter: 0.045 MHz With Filter: 0.05 kHz
Relay Output	
Relay Type	8 SPDT 8 SPST
Relay Output Channels	16
Contact Rating	0.3 A @ 120 V_{AC}/V_{DC} 1 A @ 30 V_{DC}
Operating Time	5 ms (typical)
Release Time	5 ms (typical)
Insulation Resistance	100 MΩ
Life	Mechanical: 100,000 ops. (min.) Electrical: 100,000 at 1 A @ 30 V, resistive
General Environmental	
I/O Connector	Female DB37 x 1
Dimensions (L x W x D)	175 mm x 121 mm x 22mm
Power Consumption	200 mA @ +5 V (max.) 260 mA @ +12 V (max.)
Operating Temperature	0 ~ 60 °C
Storage Temperature	-20 ~ 70 °C
Humidity	5 ~ 85% RH, non-condensing

5. P16R16-DIO Installation

This chapter describes the P16R16-DIO unpacking information; P16R16-DIO layout and the jumpers and switches settings for the P16R16-DIO configuration.

5.1 Unpacking

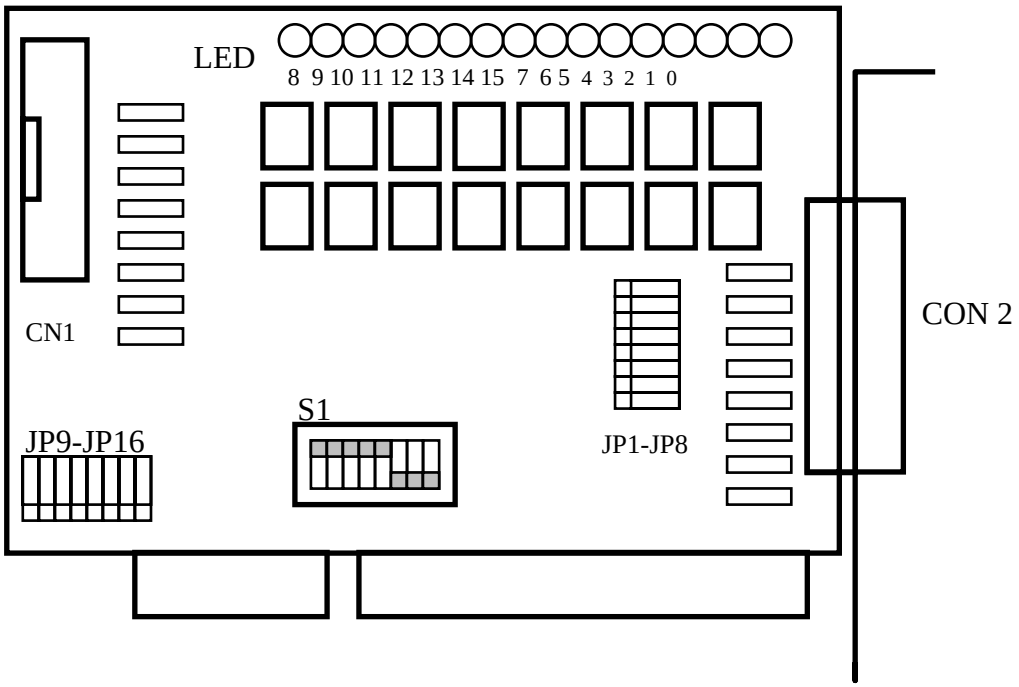
CAUTION:
Your P16R16-DIO card contains sensitive electronic components that can be easily damaged by static electricity.

6. The P16R16-DIO should be done on a grounded anti-static mat.
7. The user should wear an anti-static wristband, grounded at the same point as the anti-static mat.
8. Inspect the carton for obvious damage. Shipping and handing may cause damage to the board. Be sure there are no shipping and handling damages on the board before using.
9. After opening the carton, exact the system board and place it on a grounded anti-static surface & component side up.

CAUTION: Do not apply power to the board if it has been damaged!

10. You are now ready to install your P16R16-DIO.

5.2 P16R16-DIO Layout



- CN1: DIO channels 8~16
- JP8~JP16: Select the input AC or DC signals of D/I channel 8~16 for CON 1
- CN2: DIO channels 0~7
- JP1~JP8: Select the input AC or DC signals of D/I channel 0~7 for CON 2
- S1: Base address DIP switch

5.3 SW1 and Jumper Setting

You can change the P16R16-DIO configuration by setting jumper and switches on the board. The board‘s jumpers are set at the factory. Under normal circumstances, you should not need to change the jumper settings.

5.3.1 Base Address Setting

The P16R16-DIO requires four consecutive I/O addresses, two is for output and read back and the other‘s is for input. You can set the base address on any 4-byte boundary using the DIP switch (S1). If you install one more P16R16-DIO boards, you must set a different base address for each board.

The base address switch is preset at 300H (see Figure 2-1).

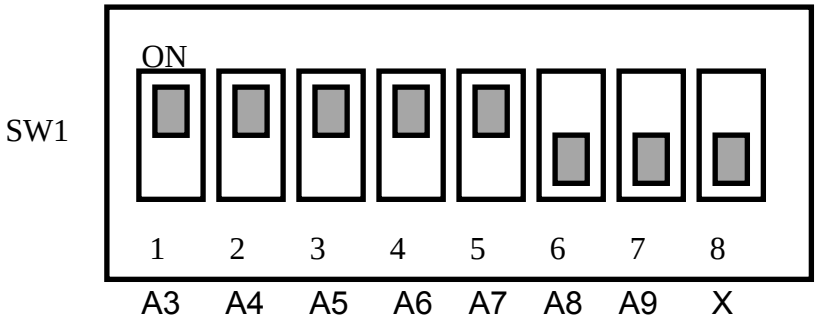


Figure 2-1: Default Base Address 300 Hex

For Example

How to select 3 0 0 (Hex)

OFF → 1
ON → 0

	3		0				0
	OFF	OFF	ON	ON	ON	ON	ON
→	1	1	0	0	0	0	0
	7 A9	6 A8	5 A7	4 A6	3 A5	2 A4	1 A3

The detail SW1 base addresses setting. Please refer to **P16R16-DIO Base Address Table** (see Table 2-1).

P16R16DIO Base Address Table:

(*): Default Setting

S1 Dip Switch Address (Hex)	1 A3	2 A4	3 A5	4 A6	5 A7	6 A8	7 A9	8 X
200	ON	ON	ON	ON	ON	ON	OFF	X
208	OFF	ON	ON	ON	ON	ON	OFF	X
210	ON	OFF	ON	ON	ON	ON	OFF	X
218	OFF	OFF	ON	ON	ON	ON	OFF	X
220	ON	ON	OFF	ON	ON	ON	OFF	X
228	OFF	ON	OFF	ON	ON	ON	OFF	X
230	ON	OFF	OFF	ON	ON	ON	OFF	X
238	OFF	OFF	OFF	ON	ON	ON	OFF	X
240	ON	ON	ON	OFF	ON	ON	OFF	X
248	OFF	ON	ON	OFF	ON	ON	OFF	X
250	ON	OFF	ON	OFF	ON	ON	OFF	X
258	OFF	OFF	ON	OFF	ON	ON	OFF	X
260	ON	ON	OFF	OFF	ON	ON	OFF	X
268	OFF	ON	OFF	OFF	ON	ON	OFF	X
270	ON	OFF	OFF	OFF	ON	ON	OFF	X
278	OFF	OFF	OFF	OFF	ON	ON	OFF	X
280	ON	ON	ON	ON	OFF	ON	OFF	X
288	OFF	ON	ON	ON	OFF	ON	OFF	X
290	ON	OFF	ON	ON	OFF	ON	OFF	X
298	OFF	OFF	ON	ON	OFF	ON	OFF	X
2A0	ON	ON	OFF	ON	OFF	ON	OFF	X
2A8	OFF	ON	OFF	ON	OFF	ON	OFF	X
2B0	ON	OFF	OFF	ON	OFF	ON	OFF	X
2B8	OFF	OFF	OFF	ON	OFF	ON	OFF	X
2C0	ON	ON	ON	OFF	OFF	ON	OFF	X
2C8	OFF	ON	ON	OFF	OFF	ON	OFF	X
2D0	ON	OFF	ON	OFF	OFF	ON	OFF	X
2D8	OFF	OFF	ON	OFF	OFF	ON	OFF	X
2E0	ON	ON	OFF	OFF	OFF	ON	OFF	X
2E8	OFF	ON	OFF	OFF	OFF	ON	OFF	X
2F0	ON	OFF	OFF	OFF	OFF	ON	OFF	X
2F8	OFF	OFF	OFF	OFF	OFF	ON	OFF	X
300(*)	**ON**	**ON**	**ON**	**ON**	**ON**	**OFF**	**OFF**	**X**
308	OFF	ON	ON	ON	ON	OFF	OFF	X
310	ON	OFF	ON	ON	ON	OFF	OFF	X

318	OFF	OFF	ON	ON	ON	OFF	OFF	X
320	ON	ON	OFF	ON	ON	OFF	OFF	X
328	OFF	ON	OFF	ON	ON	OFF	OFF	X
330	ON	OFF	OFF	ON	ON	OFF	OFF	X
338	OFF	OFF	OFF	ON	ON	OFF	OFF	X
340	ON	ON	ON	OFF	ON	OFF	OFF	X
348	OFF	ON	ON	OFF	ON	OFF	OFF	X
350	ON	OFF	ON	OFF	ON	OFF	OFF	X
358	OFF	OFF	ON	OFF	ON	OFF	OFF	X
360	ON	ON	OFF	OFF	ON	OFF	OFF	X
368	OFF	ON	OFF	OFF	ON	OFF	OFF	X
370	ON	OFF	OFF	OFF	ON	OFF	OFF	X
378	OFF	OFF	OFF	OFF	ON	OFF	OFF	X
380	ON	ON	ON	ON	OFF	OFF	OFF	X
388	OFF	ON	ON	ON	OFF	OFF	OFF	X
390	ON	OFF	ON	ON	OFF	OFF	OFF	X
398	OFF	OFF	ON	ON	OFF	OFF	OFF	X
3A0	ON	ON	OFF	ON	OFF	OFF	OFF	X
3A8	OFF	ON	OFF	ON	OFF	OFF	OFF	X
3B0	ON	OFF	OFF	ON	OFF	OFF	OFF	X
3B8	OFF	OFF	OFF	ON	OFF	OFF	OFF	X
3C0	ON	ON	ON	OFF	OFF	OFF	OFF	X
3C8	OFF	ON	ON	OFF	OFF	OFF	OFF	X
3D0	ON	OFF	ON	OFF	OFF	OFF	OFF	X
3D8	OFF	OFF	ON	OFF	OFF	OFF	OFF	X
3E0	ON	ON	OFF	OFF	OFF	OFF	OFF	X
3E8	OFF	ON	OFF	OFF	OFF	OFF	OFF	X
3F0	ON	OFF	OFF	OFF	OFF	OFF	OFF	X
3F8	OFF	OFF	OFF	OFF	OFF	OFF	OFF	X

Table 2-1

5.3.2 Jumper Setting

Each digital input channel can be jumper selected, single-pole, RC filter with a time constant of 1.2 ms. Refer to Figure 2-2 to see the lost of jumper and it's corresponding digital input channel number.

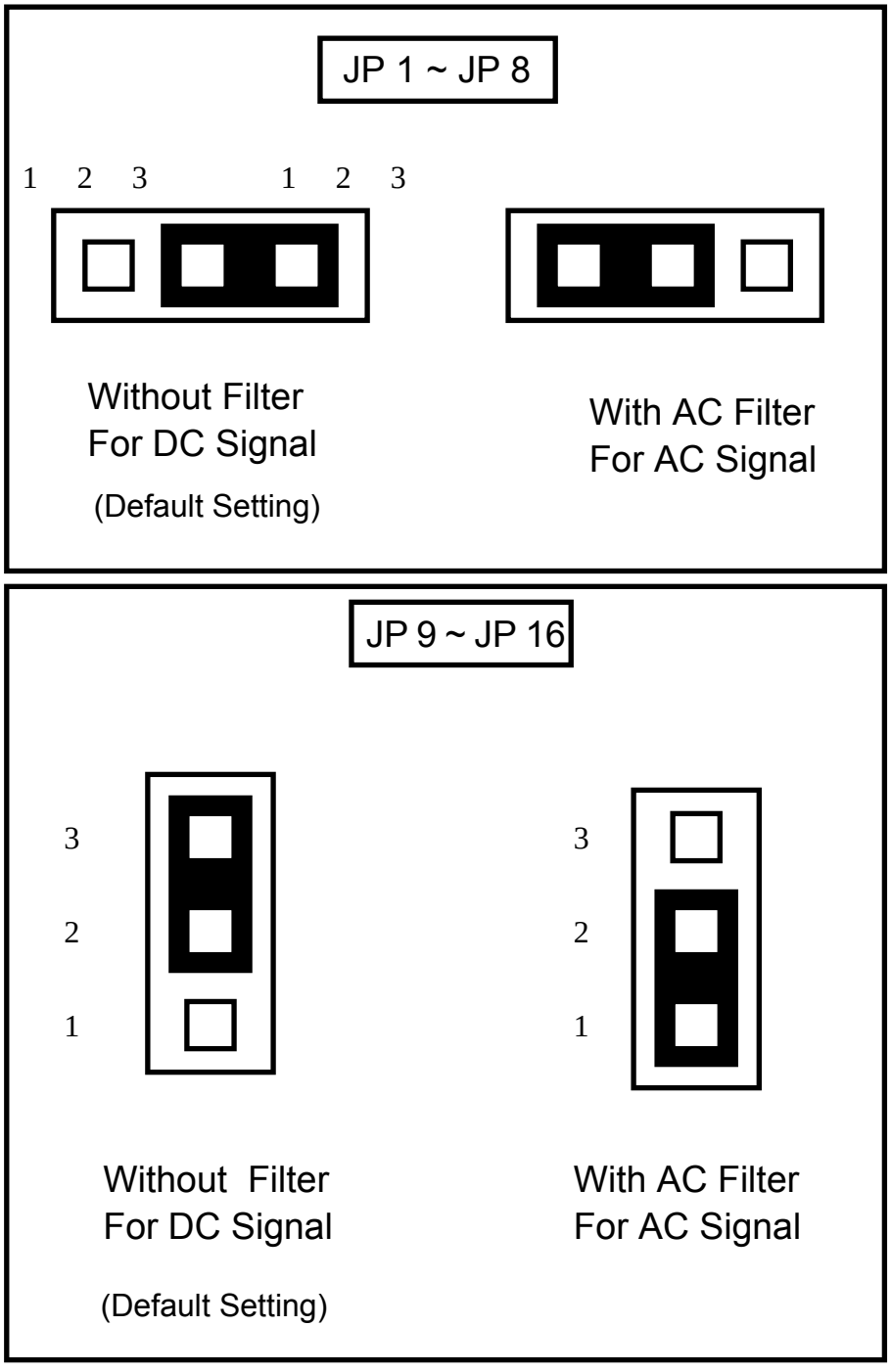


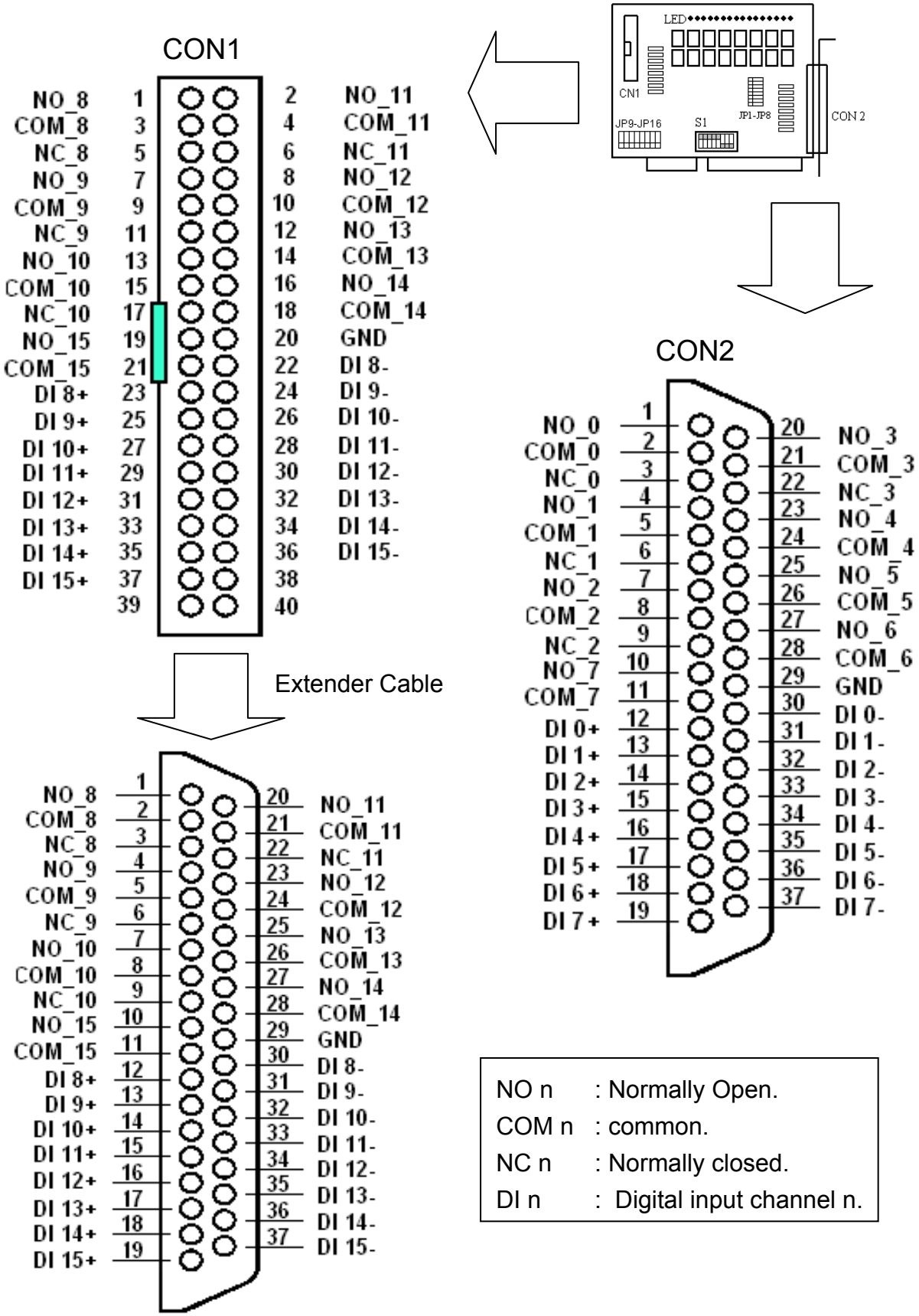
Figure 2-2

Jumper	Input Channels	Jumper	Input Channels
JP1	DI 0	JP9	DI 8
JP2	DI 1	JP10	DI 9
JP3	DI 2	JP11	DI 10
JP4	DI 3	JP12	DI 11
JP5	DI 4	JP13	DI 12
JP6	DI 5	JP14	DI 13
JP7	DI 6	JP15	DI 14
JP8	DI 7	JP16	DI 15

Table 2-2.

If you are using AC input signals, you must short the AC FILTER jumper 1-2. If you are using DC input signals, the AC FILTER is optional. If the DC input signals response less than 20 μs, set the filter off. If you want a slow response (about 5 ~ 10 ms) for rejecting noise or contact bouncing short the AC FILTER jumper 1-2.

5.4 Pin Assignments



NO n	: Normally Open.
COM n	: common.
NC n	: Normally closed.
DI n	: Digital input channel n.

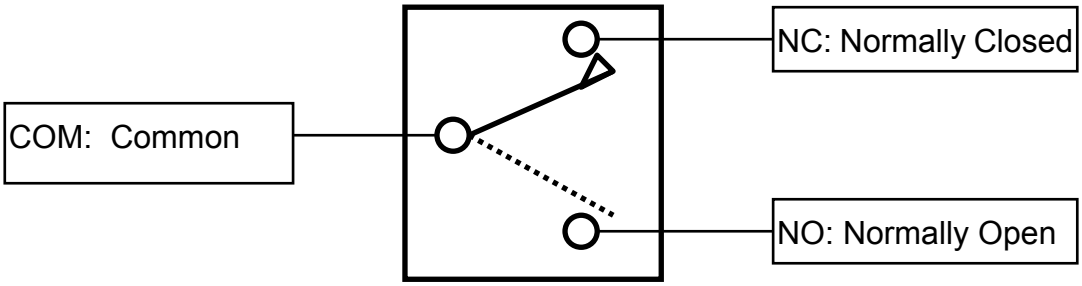


Figure 3-4. SPDT RELAY: Single Pole Double Throw.

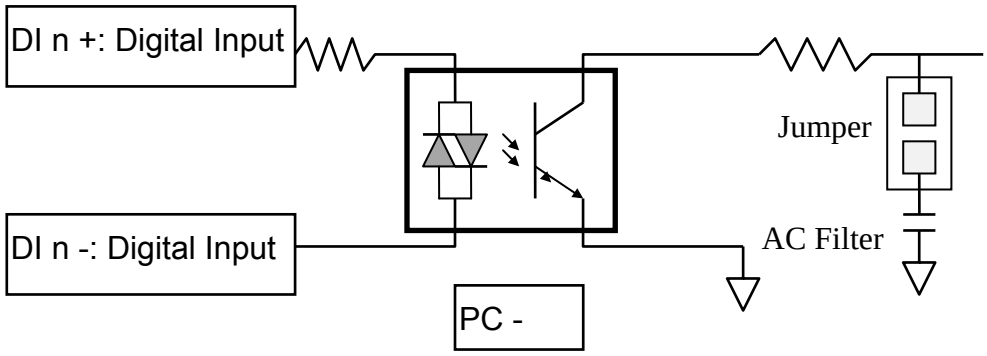


Figure 3-5. Isolated Input.

6. P16R16-DIO Programming

This chapter provides the I/O map of P16R16-DIO registers. Example programs and programming information are also included.

6.1 I/O Address Map

The P16R16DIO boards occupy four consecutive addresses in the computer's I/O space. The base address is selected by DIP switch, The I/O map are shown in Table 3-1.

P16R16DIO Base Address at 300 Hex

Address	Write	Read
Base + 0	Relay Output (CH 0 ~ CH 7)	Read Back The Output Status
Base + 1	Relay Output (CH 8 ~ CH15)	Read Back The Output Status
Base + 2	No Function	Digital Input (CH0~CH7)
Base + 3	No Function	Digital Input (CH8~CH18)

Table 3-1. P16R16DIO I/O Address Map.

6.2 Relay Output

You write data to relays as a single Byte. Each of the eight bits within a byte controls a single relay. A high bit (equal to1) energizes (closes the contacts of) a relay while a low bit (equal to 0) turns the relay off.

6.2.1 Output Register

Relay Output register bits are assigned as shown in Table 3-2.

P16R16DIO Base Address at 300 Hex

Base+0	D7	D6	D5	D4	D3	D2	D1	D0
Output Channel	7	6	5	4	3	2	1	0
Base+1	**D7**	**D6**	**D5**	**D4**	**D3**	**D2**	**D1**	**D0**
Output Channel	15	14	13	12	11	10	9	8

Table 3-2 P16R16DIO Relay Addresses in the Relay Output Register.

Base+0	D7	D6	D5	D4	D3	D2	D1	D0
Read back channel	7	6	5	4	3	2	1	0
Base+1	**D7**	**D6**	**D5**	**D4**	**D3**	**D2**	**D1**	**D0**
Read back channel	15	14	13	12	11	10	9	8

Table 3-3. Relay output read back register.

For Example (Basic Language)

REM: Set all relay output is ON , (Output data FFh)

```
Base=&h300              ' Set Base Address at 300 (Hex)
Out Base , &hFF         ' Set Relay Output (Ch 0 ~ Ch 7) On
Out Base +1, &hFF       ' Set Relay Output (Ch 8 ~ Ch 15) On
RBL= Inp(Base)          ' Read Back Relay Output Ch 0 ~ Ch 7
RBH= Inp(Base+1)        ' Read Back Relay Output Ch 8 ~ Ch 15
```

REM : Set relay output CH 3 is ON ,Output data 8h (00001000 BIN)

```
Out Base,&h8            ' Set relay output CN2 D3 ON
```

6.2.2 Using Relay Output

- **Basic Circuitry: (Current Rating < 0.3 A), Refer to Figure 3-1.**

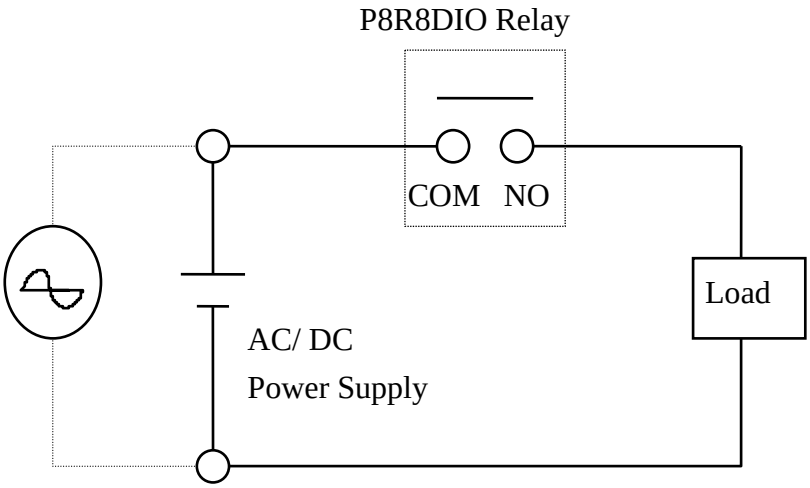


Figure 3-1.

- **Heavy Loading Application (>0.3 A). Refer to Figure 3-2.**

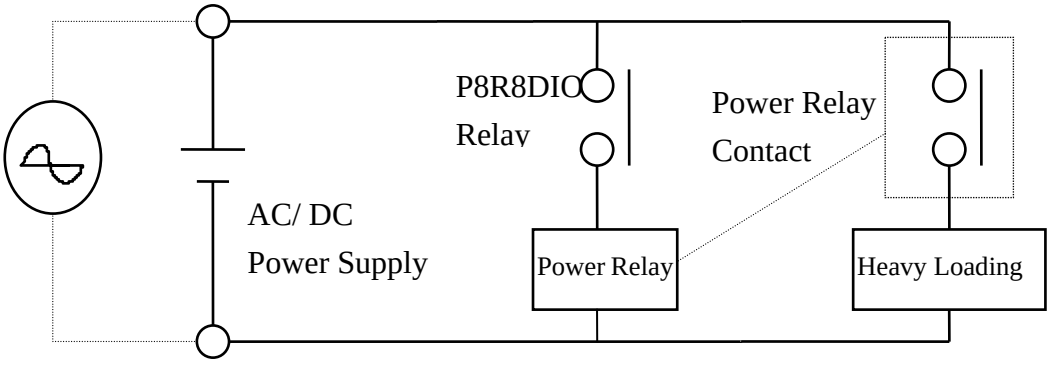


Figure 3-2.

6.3 Isolated Input

The digital input state are read as a single byte from the port at base address+1 . Each of the eight bits within the byte corresponds to a particular digital input so that a high bit (equal to 1) represent a high state while a low bit (equal to 0) represent a low state . Register bits are assigned as shown in Table 3-3

6.3.1 Input Register

Base Address at 300 Hex

Base + 1	D7	D6	D5	D4	D3	D2	D1	D0
Input Channel	7	6	5	4	3	2	1	0

Table 3-3. input addresses in the isolated control input Register.

For Example (Basic Language)

```
Base=&h300              ‘ Set Base Address at 300 (Hex)
RIH=Inp(Base+1)         ‘ Read Isolated Input Ch 0 ~ Ch 7
```

6.3.2 Using Isolated Input

Basic Circuit

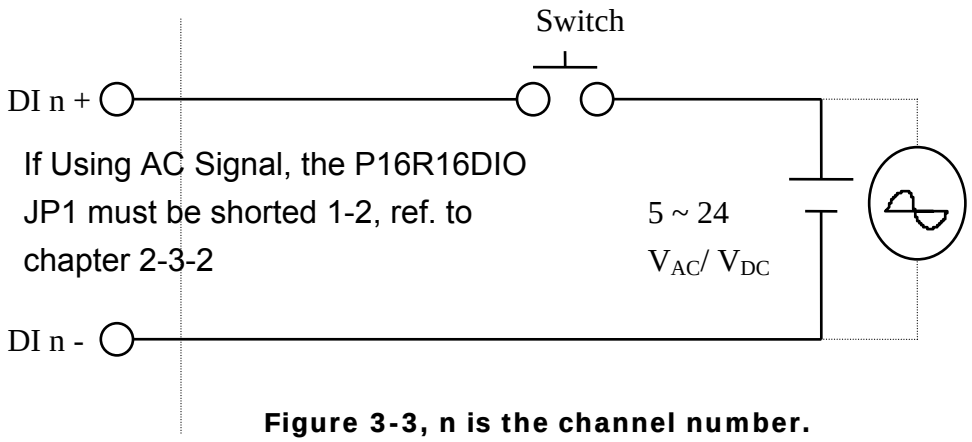


Figure 3-3, n is the channel number.

The normal input voltage range is 5 ~ 24 V_{AC} or V_{DC}. The normal input range can be changed by choosing suitable resistor to limit the current through the opto-isolator to about 10 mA(**I**f). The default resistor is 1.2 kΩ / 0.5 W.

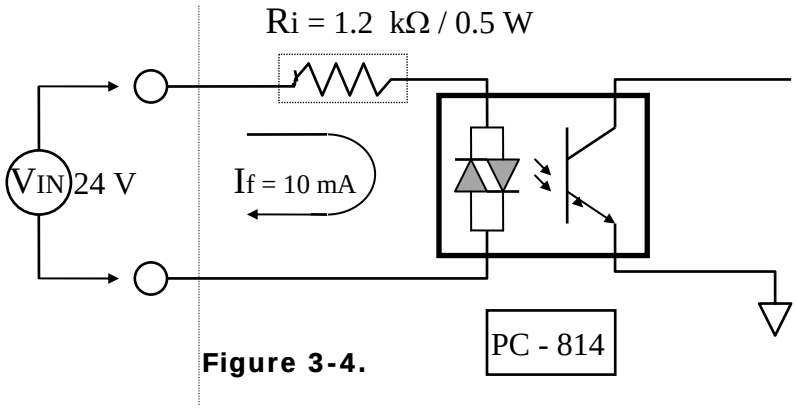


Figure 3-4.

Ri = **V**in / **I**f
Pw = **V**in X **I**f

Calculation Example:

If **V**in = 120 V Then **R**i = 120 (V) / 0.01 (A) = 12 kΩ
Pw = 120 (V) X 0.01 (A) = 1.2 W
The **R**i Must Replace By 12 kΩ / 2 W (1.2 W)

7. Troubleshooting

If your P8R8DIO board is not operating properly, use the information in this chapter to isolate the problem.

7.1 Problem Isolated

You can use an ohmmeter to check operation of the relay outputs and a low voltage power supply to check the isolated inputs. You can use DOS DEBUG program to exercise relay outputs or read the input ports, or you can use the INP and OUT commands of the BASIC language. For example, using DEBUG for a P8R8-DIO at a base address set to &H300 is as follows:

```
O   300 FF      'Turn On all Relays.
O   300 0       'Turn Off all Relays.
O   300 08      'Turn On Bit D3 Relay.

I   300         'Read back Relay status
I   301         'Read Digital Input Data
```

8. Software/Hardware Installation

The can be used in DOS and Windows 98/ME/NT/2K and 32-bit Windows XP/2003/Vista/7. The recommended installation procedure for windows is given in Sec. 8.1 ~8.2. Or refer to Quick Start Guide (CD:\NAPDOS\ISA\DIO\Manual\QuickStart\).

http://ftp.icpdas.com/pub/cd/iocard/isa/napdos/isa/dio/manual/quickstart/

8.1 Software Installing Procedure

P8R8DIO/P16R16DIO Windows driver (Windows 98/NT/2K and 32-bit Windows XP/2003/ Vista/7):

Step 1: Insert the companion CD into the CD-ROM drive and after a few seconds the installation program should start automatically. If it doesn't start automatically for some reason, double-click the **AUTO32.EXE** file in the **NAPDOS** folder on this CD.

Step 2: Click the item: "**Install Toolkits (Softwares)/Manuals**".

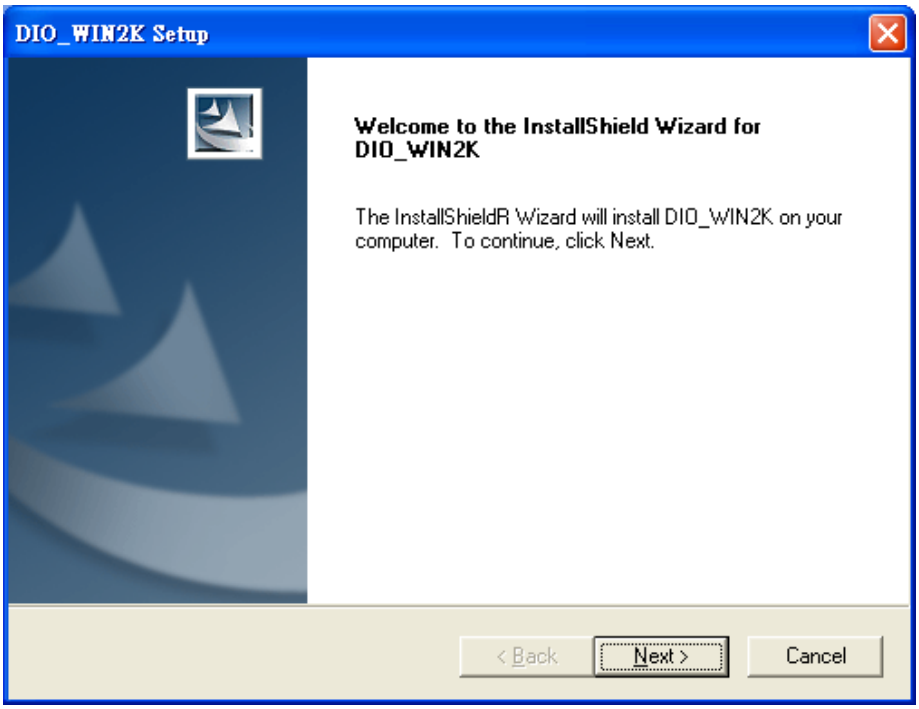
Step 3: Click the item: "**ISA Bus DAQ Card**".

Step 4: Click the item: "**DIO**".

Step 5: Choose the "**Install Toolkit for Windows 95/98、NT or 2000**" for setup according to your PC platform and then install driver.

Notes:

1. **The P8R8DIO/P16R16DIO Windows driver site location:**
   http://ftp.icpdas.com/pub/cd/iocard/isa/napdos/isa/dio/dll/
2. **The Windows 2000 (Win2K) driver support Windows 2000 and 32-bit Windows XP/2003/Vista/7.**



Step 6: Click **"Next>"** button to start installation.
Step 7: Click **"Next>"** button to install driver into the default folder.
Step 8: Click **"Next>"** button to continue installation.
Step 9: Select **"No, I will restart my computer late"** and then click **"Finish"** button.

8.2 Hardware Installing Procedure

Please set the base address on the P8R8DIO/P16R16DIO card before insert P8R8DIO/P16R16DIO card into the ISA slot in the computer. For detailed base address information refer to Section 2.3.1 "P8R8DIO Base Address Setting" and 5.3.1 "P16R16DIO Base Address Setting".

For example: base address is 0x300.

Step 1: Shout down and power off your computer.
Step 2: Remove all covers from the computer.
Step 3: Select an empty ISA slot.
Step 4: Care fully insert your P8R8DIO/P16R16DIO card into the ISA slot.
Step 5: Replace the PC covers.
Step 6: Power on the computer.

Adding Hardware

Notes: adding hardware for working on Windows 2000 and 32-bit Windows XP/2003/Vista/7 only. Windows 95/98/Me/NT users should install correct version of the driver on the CD-ROM, and skip these "Adding Hardware" procedures.

Step 7: Open the "**Control Panel**" by click the item "**Start >> Settings >> Control Panel** ".

Step 8: Double-click the item "**Add Hardware**" and click the **"Next>**" button.

Step 9: Select the item "**Yes, I have already connected the hardware**" and click the "**Next>**" button.

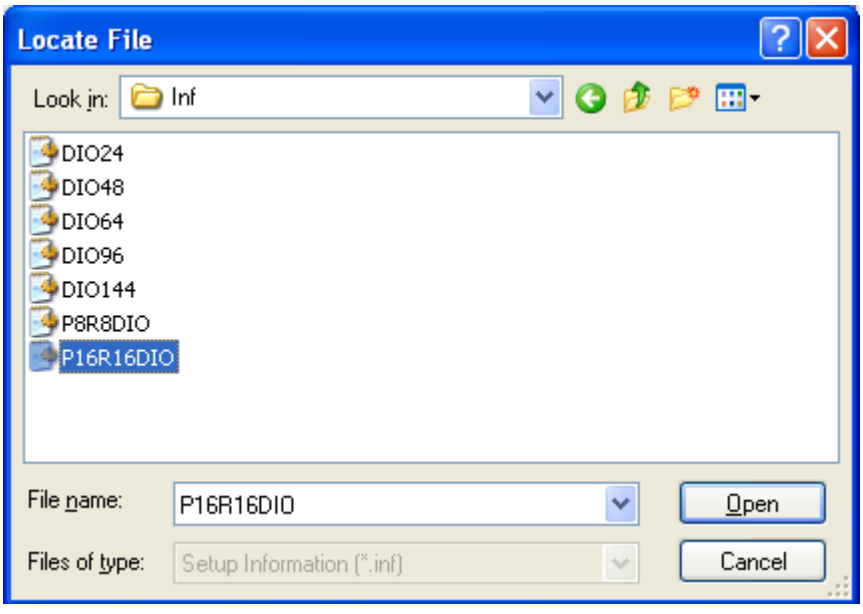
Step 10: Selection the item "**Add a new hardware device**" and click the "**Next>**" button.

Step 11: Selection the item "**Install the hardware that I manually select from a list [Advanced]**" and click the "**Next>**" button.

Step 12: Selection the item "**Show All Devices**" and click the "**Next>**" button.

Step 13: Click the "**Have Disk...**" button.

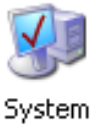
Step 14: Click the "**Browse...**" button to select the **.Inf** file default path is **C:\DAQPRO\DIO_Win2K\Inf** and click the "**Open**" and "**OK**" button.



Step 15: Selection then correct device from the "**Models:**" listbox and click the "**Next>**" button.

Step 16: Click the "**Next>**" button and then click the "**Finish**" button.

Modify the device properties



Step 17: Double-click the "**System**" icon in the "**Control Panel**".

Step 18: Click the "**Hardware**" tab and then click the "**Device Manager**" button.

Step 19: Click the "**DAQCard**" tab and then double-click "**ICPDAS P16R16-DIO Digital I/O Card**" (or ICPDAS P8R8-DIO Digital I/O Card).

Step 20: Select the "**Resources**" tab and then setting as follows: