PISO-PS400 Getting Started Manual

(Version 2.3)

Hardware & Software & Application
Using PISO-PS400 PCI BUS Motion Control Card

ICP DAS CO., LTD.

泓格科技股份有限公司

Warranty

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

Warning

ICPDAS Inc. assumes no liability for damages consequent to the use of this product. ICPDAS Inc. reserves the right to change this manual at any time without notice. The information furnished by ICPDAS Inc. is believed to be accurate and reliable. However, no responsibility is assumed by ICPDAS Inc. for its use, or for any infringements of patents or other rights of third parties resulting from its use.

Copyright

Trademark

The names used for identification only maybe registered trademarks of their respective companies.

License

The user can use, modify and backup this software on a single machine. The user may not reproduce, transfer or distribute this software, or any copy, in whole or in part.

Contents of PISO-PS400

1 INTRODUCTION

1.1 Introduction

The PISO-PS400 is a 4-axis stepping/pulse-type servo motor PCI motion card with maximum 4M PPS pulse output, and is suitable for general-purpose motion applications. This motion card contains a high-performance motion ASIC. Apart from a wide speed range, this intelligent motion controller also has a variety of motion control functions built in, such as 2~3-axis linear interpolation, 2-axis circular interpolation, T/S-curve acceleration/deceleration, various synchronous actions, automatic homing, and others. Besides, one FRnet port is contained in this motion card. The FRnet port allows this motion card to expand its fast remote I/O easily. The two-wired FRnet signal can automatically scan its 128 DI and 128 DO with a period of 0.72/2.88ms. In addition, most of the PISO-PS400 motion control functions are performed with little load on the processor. While driving the motors, the motion status, and the other I/O status on the PC can still be monitored. As a result of the low CPU loading requirements of PC, one or more motion control card may be used on a single PC (At most 16 PS400 motion card can be added in a PC). Muti-axes (4 or 8 …… axes) motion control algorithm can be achieved in a single PC. ICPDAS has also provided a wide range of functions and examples to reduce the need for programming by users, making it a highly cost-effective solution for machine makers.

1.2 Hardware Specification

1.2.1 Main Specification

- ASIC Chip — MCX314As
- Number of controllable — 4-Axes, Pulse output (stepping & servo motor)
- Up to 4M PPS pulse output

1.2.2 Interpolation Function

2-axes & 3-axes linear interpolation

- Interpolation range — −2,147,483,646 ~ +2,147,483,646
- Vectors speed of interpolation — 1 PPS ~ 4M PPS
- Precision of interpolation — ± 0.5 LSB

Circular interpolation

- Interpolation range — −2,147,483,646 ~ +2,147,483,646
- Vectors speed of interpolation — 1 PPS ~ 4M PPS

Relative interpolation function

- Any 2-axes or 3-axes interpolation
- Fixed vectors speed
- Continuous interpolation

1.2.3 Pulse Output

- Output speed range — 1 PPS ~ 4 MPPS
- Output precision — ± 0.1%
- Jerk range of S-curve — 954 ~ 62.5 x 10^6 PPS/S^2
477 x 10^3 ~ 31.25 x 10^9 PPS/S^2
- Acceleration/deceleration range — 125 ~ 1 x 10^6 PPS/S
62.5×10^3 ~ 500 x 10^6 PPS/S
- Speed precision — 1 PPS ~ 500PPS(In accordance with a highest speed)
- Output numbers — 0 ~ 4,294,967,295 / unlimited
- Velocity profiles mode:
  - Fixed
  - Symmetrical & Asymmetrical Trapezoidal velocity profile
  - Symmetrical & Asymmetrical S-curve velocity profile

- Acceleration & Deceleration mode
  - Auto
  - By user define

- Position & Speed change on the fly
- Fixed pulse output by Trapezoidal and S-curve velocity profile
- Pulse output option: CW/CCW, PULSE/DIR
- Programmable logic level

1.2.4 Encoder Input

- Encoder option: A/B phase, Up/Down (CW/CCW)
- Programmable A/B phase mode: 1, 1/2, and 1/4 A/B phase

1.2.5 Position Counter

- Command counter range −2,147,483,648 ~ +2,147,483,647
- Feedback counter range −2,147,483,648 ~ +2,147,483,647
- Programmable ring counter
- Programmable direction of counter
- Use DI(IN3) to clear feedback counter
- Programmable read & write counter

1.2.6 FRnet

- DI → max up to 128
- DO → max up to 128

1.2.7 Auto-Homing

- Four Steps
  - Step 1 (High-speed to find ”Near Home” sensor)
  - Step 2 (Low-speed to find ”Home” sensor)
  - Step 3 (Low-speed to find Index Z sensor)
  - Step 4 (Execute offset position of high-speed)

Every step can be set to execute or not, and running direction.

1.2.8 Servo Motor Input Signal

- Alarm
- Choose IN2: In Position or Servo Ready signal
- Choose input signle: Enable/disable and logic level

1.2.9 Limit Switch Input Signal

- Two-limit switch signal for each axis: +EL, -EL
- Programmable logic level
- Programmable action mode(slow-down stop or immediately stop)

1.2.10 Other Input Signals

- IN3 : other purpose, as a trigger of synchronal control……

1.2.11 Emergency Stop Signal Input

- There is an Emergency stop signal for Each motion card

1.2.12 General Output Signal

- The Servo-on signal (nOUT1) can be used as servo-on control or general purpose output signal for each axis.

1.2.13 Integral Input Signal Filters

- The motion card is equipped with an integral type filter in the input step for each input signal. User can select a digital filter with different time constant.

1.2.14 Software Limit

- There are two software end-limit for each axis: +SEL & -SEL (Setting range : −2,147,483,646 ~ +2,147,483,646)

1.2.15 Manual Pulse Generator

- Manual pulsar mode (A/B phase pulse mode)
- Fixed Pulse Driving Mode (CW/CCW pulse mode)
- Continuous Pulse Driving Mode (CW/CCW pulse mode)

- Disable Mode: Disable manual pulse function

-

1.2.16 Synchronous Action

The synchronous action can be active from provocative (main) axis

- Provocative (Activation) Factor
  - Position ≥ COMP+ : The logical/real position counter value exceeded the value of COMP + register value.
  - Position < COMP+ : The logical/real position counter value became less than the COMP + register value.
  - Position < COMP- : The logical/real position counter value became less than the COMP − register value.
  - Position ≥ COMP- : The logical/real position counter exceeded the COMP − register value.
  - Driving started.
  - Driving terminated.
  - The nIN3 signal rose from the Low to the High level.
  - The nIN3 signal fell from the High to Low level.

- Synchronous Action
  - Fixed pulse driving in the +/- direction
  - Continuous pulse driving in the +/- direction
  - Stops driving in deceleration
  - Stops driving immediately
  - Saves the current logical or real position counter value in the synchronous buffer register

1.2.17 Interrupt

- Interrupt of each axis can be happened from the following factors:
  - when one pulse outputs... (The interrupt will be generated at the rising edge of

pulse output for + direction driving.

- In the acceleration / deceleration driving mode, when the driving changes from the constant speed region into the decelerating region or from the accelerating region into the constant speed region.
- Once the value of logical / real position counter is larger than or equal to the value of COMP− register (Position ≥ COMP-)
- Once the value of logical/real position counter is smaller than the value of COMP− register (Position < COMP-)
- Once the value of logical / real position counter is larger than or equal to the value of COMP+ register (Position ≥ COMP+)
- Once the value of logical/real position counter is smaller than the value of COMP+ register (Position < COMP+)
- The automatic homing or the driving is finished.
- Each factor of interrupt can be masked to enable or disable.

1.3 Environment

Operating Temp:	-20 ~ + 75°C
Storage Temp:	-30 ~ +85°C
Operating Humidity:	10 ~ 85%，non-condensing
Storage Humidity:	5 ~ 90%，non-condensing
I/O optically isolated	2500Vrms
External Power supply(Input):	24V DC (On Terminal Board)

1.4 Ordering Information

PISO-PS400	4 axes PCI motion card
DN-8468GB	Terminal board for general purpose usage
DN-8468MB	Terminal board for Mitsubishi Servo motor
DN-8468PB	Terminal board for Panasonic Servo motor
DN-8468DB	Terminal board for Detal Servo motor
CA-SCSI15	68-pin SCSI-II cable，length:1.5 m

2 HARDWARE INSTALLATION

2.1 Checking Package and Installation

2.1.1 Check Package

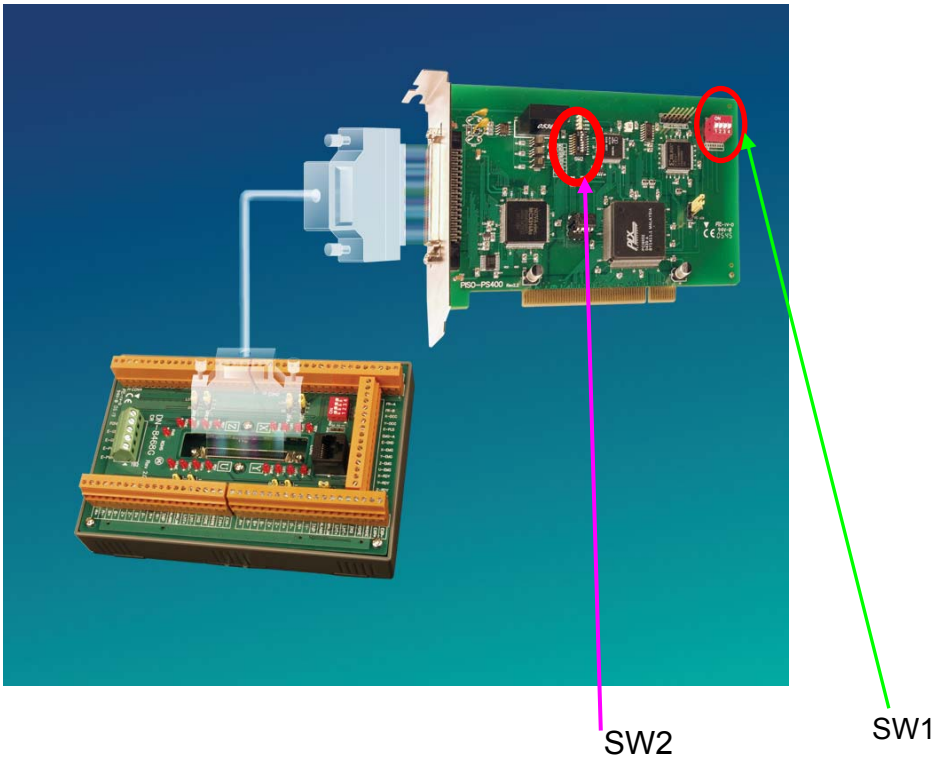
PISO-PS400G/S includes the following item

- PISO-PS400 4-axes PCI motion card
- DN-8468GB Terminal board for general purpose usage
- CA-SCSI15 68-pin SCSI-II cable，length:1.5 m

2.1.2 Installation

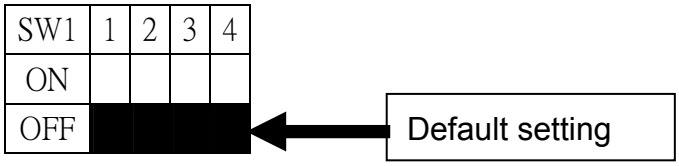
- **Prepare controller**
  1. Choose a personal PC with empty PCI slot.
  2. Turn power off

- **Motion card Plug-in and wiring**
  1. Switch SW1 and SW2 to desired position.
  2. Plug in the PISO-PS400 into an empty PCI slot of PC.
  3. Connect the PISO-PS400 with DN-8468G by a CA-SCSI15 cable, as the below figure:



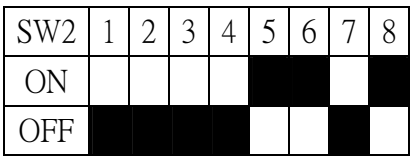
2.1.3 SW1 Setting

The Card ID of each PISO-PS400 motion card is defined by setting the on-board swith SW1 (1~4) shown in section 2.1.2. The default setting of the Card ID is 0 by setting SW1(1~4) to be OFF. If users set 1 and 2 on SW1 to be ON, the Card ID of the motion card is 3. Up to 16 motion cards in the same system can be supported by setting different Card ID (Card ID = 0~15).



2.1.4 SW2 Setting

SW2(1~8) is designed for FRnet setting and is shown in section 2.1.2. Node 5 on SW2 is the transfer rate setting of FRnet. The default setting is ON for 250kHz transfer rate. If users change the node 5 to be OFF, the transfer rate will be 1MHz and the slave module must support 1MHz transfer rate to receive and send signals. Except the node 5 on SW2, the others node are for future extension setting. Do not change the default setting of SW2 except node 5. If users change the switch setting, the FRnet may not keep working.



2.2 DN-8468G Terminal Board

The DN-8468 is the terminal board for general purpose amplifier usage. It has 4-axis I/O signals.

2.2.1 Board Layout for DN-8468G

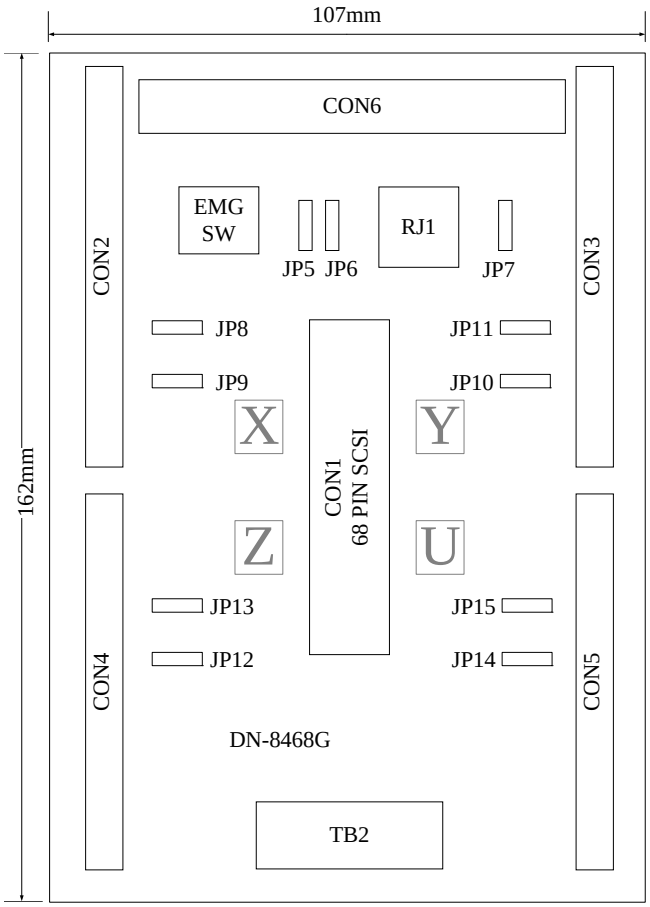


Fig. 2.0 Board layout for the DN-8468G

2.2.2 Signal Connections for DN-8468G

Maintaining signal connections is one of the most important factors in ensuring that your application system is sending and receiving data correctly.

■ Pin Assignment for CON1

The I/O connector on the DN-8468G is a 68-pin SCSI II connector that enables you to connect to the PISO-PS400 motion card. Fig. 2.1 shows the pin assignment for the 68-pin I/O connector on the DN-8468G (or on the PISO-PS400), and refer to Table 2.1, 2.2 for description of each motion I/O signal.

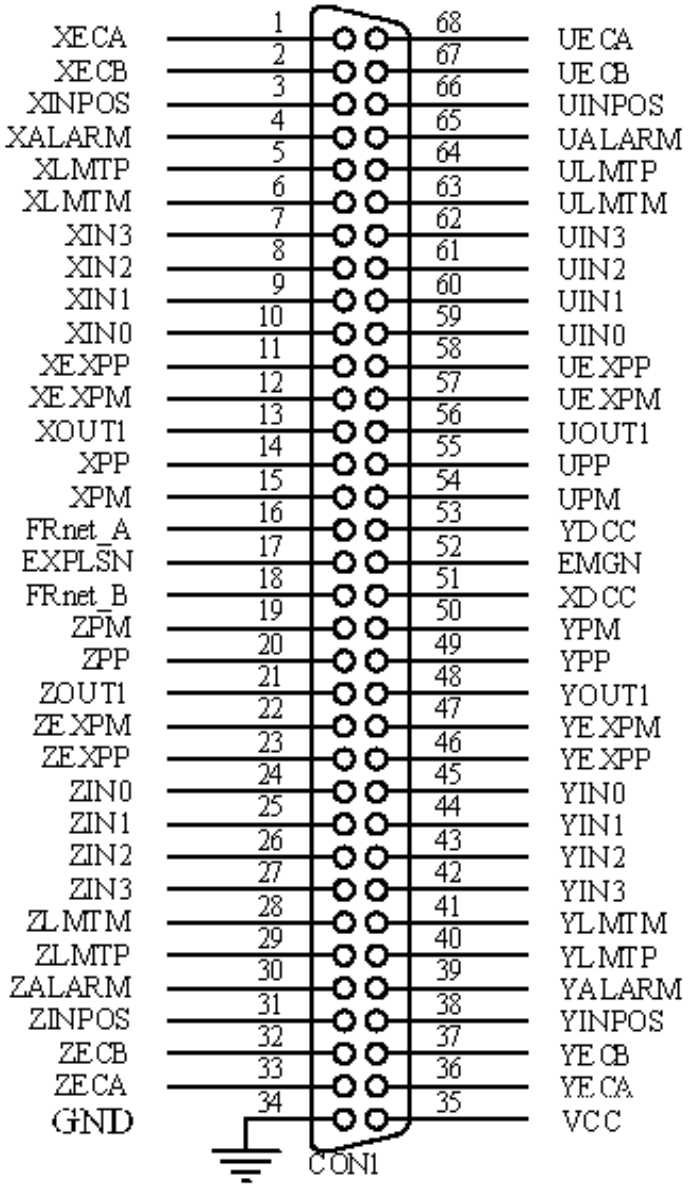


Fig. 2.1 I/O connector pin assignment for the CON1

Table 2.1 DN-8468G I/O connector signal description (part 1)

Pin name	Pin number	Description
XECA	1	Encoder A-phase signal for X axis
YECA	36	Encoder A-phase signal for Y axis
ZECA	33	Encoder A-phase signal for Z axis
UECA	68	Encoder A-phase signal for U axis
XECB	2	Encoder B-Phase signal for X axis
YECB	37	Encoder B-Phase signal for Y axis
ZECB	32	Encoder B-Phase signal for Z axis
UECB	67	Encoder B-Phase signal for U axis
XINPOS	3	In-position signal for X axis
YINPOS	38	In-position signal for Y axis
ZINPOS	31	In-position signal for Z axis
UINPOS	66	In-position signal for U axis
XALARM	4	Alarm signal for X axis
YALARM	39	Alarm signal for Y axis
ZALARM	30	Alarm signal for Z axis
UALARM	65	Alarm signal for U axis
XLMTP	5	Limit switch input signal (+) for X axis
YLMTP	40	Limit switch input signal (+) for Y axis
ZLMTP	29	Limit switch input signal (+) for Z axis
ULMTP	64	Limit switch input signal (+) for U axis
XLMTM	6	Limit switch input signal (-) for X axis
YLMTM	41	Limit switch input signal (-) for Y axis
ZLMTM	28	Limit switch input signal (-) for Z axis
ULMTM	63	Limit switch input signal (-) for U axis
XIN3	7	Input 3 signal for X axis
YIN3	42	Input 3 signal for Y axis
ZIN3	27	Input 3 signal for Z axis
UIN3	62	Input 3 signal for U axis
XIN2	8	Input 2 signal for X axis
XIN2	43	Input 2 signal for Y axis
XIN2	26	Input 2 signal for Z axis
XIN2	61	Input 2 signal for U axis
XIN1	9	Input 1 signal for X axis
YIN1	44	Input 1 signal for Y axis
ZIN1	25	Input 1 signal for Z axis
UIN1	60	Input 1 signal for U axis
XIN0	10	Input 0 signal for X axis
YIN0	45	Input 0 signal for Y axis
ZIN0	24	Input 0 signal for Z axis
UIN0	59	Input 0 signal for U axis

Table 2.2 DN-8468G I/O connector signal description (part 2)

Pin name	Pin number	Description
XEXPP	11	EXT pulsar input signal (+) for X axis
YEXPP	46	EXT pulsar input signal (+) for Y axis
ZEXPP	23	EXT pulsar input signal (+) for Z axis
UEXPP	58	EXT pulsar input signal (+) for U axis
XEXPM	12	EXT pulsar input signal (-) for X axis
YEXPM	47	EXT pulsar input signal (-) for Y axis
ZEXPM	22	EXT pulsar input signal (-) for Z axis
UEXPM	57	EXT pulsar input signal (-) for U axis
XDRIVE	13	Driver enable signal for X axis
YDRIVE	48	Driver enable signal for Y axis
ZDRIVE	21	Driver enable signal for Z axis
UDRIVE	56	Driver enable signal for U axis
XPP	14	Driving pulsar signal (+) for X axis
YPP	49	Driving pulsar signal (+) for Y axis
ZPP	20	Driving pulsar signal (+) for Z axis
UPP	55	Driving pulsar signal (+) for U axis
XPM	15	Driving pulsar signal (+) for X axis
YPM	50	Driving pulsar signal (+) for Y axis
ZPM	19	Driving pulsar signal (+) for Z axis
UPM	54	Driving pulsar signal (+) for U axis
XOUT1	16	Output 1 signal for X axis
YOUT1	48	Output 1 signal for Y axis
ZOUT1	21	Output 1 signal for Z axis
UOUT1	56	Output 1 signal for U axis
EXPLSN1	17	EXT pulse input signal for interpolation
EMGN1	52	Emergency stop input signal
FrnetA	16	FRnet port A
FrnetB	18	FRnet port B
XDCC	51	Deviation Counter Clear for X axis
YDCC	53	Deviation Counter Clear for Y axis
GND	34	Ground
VCC	35	External power (12~24V)

■ CON2 ~ CON5 (I/O connector for each AXIS)

The connectors CON2 ~ CON5 are 20-pin connectors that enable you to connect to the I/O signals for general purpose motor drivers. Fig. 2.2 shows the pin assignment for the 20-pin connector on the DN-8468G, and the Table 2.3 shows its I/O connector signal description.

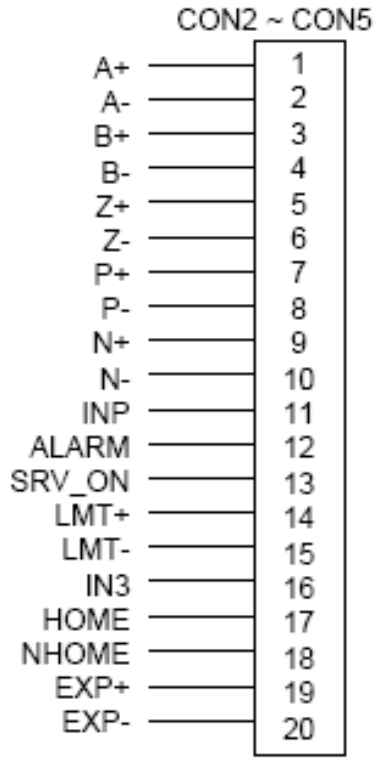


Fig. 2.2 Pin definition for CON2 ~ CON5

Table 2.3 CON2 ~ CON5 Signal Connection

Name	Number	Description
A+	1	Encoder A-Phase (+)
A-	2	Encoder A-Phase (-)
B+	3	Encoder B-Phase (+)
B-	4	Encoder B-Phase (-)
Z+	5	Encoder Z-Phase (+)
Z-	6	Encoder Z-Phase (-)
P+	7	Positive Direction Pulse Output(+)
P-	8	Positive Direction Pulse Output(-)
N+	9	Negative Direction Pulse Output(+)
N-	10	Negative Direction Pulse Output(-)
INP	11	Servo In Position
ALARM	12	Servo Alarm
SRV_ON	13	Servo On
LMT+	14	END Limit Signal (EL+)
LMT-	15	END Limit Signal (EL-)
IN3	16	Input Signal (IN3)
HOME	17	Home Sensor Input Signal
NHOME	18	Near Home Sensor Input Signal
EXP+	19	EXT Positive Direction Pulse (+)
EXP-	20	EXT Negative Direction Pulse (-)

■ CON6

The connector CON6 is 16-pin connector that enables you to connect to the signals of your motor drivers. The FRnet connectors, FR-A and FR-B, can be used to serially connect a I/O module of FRnet series, as FR-2053,FR-2057…. The more information, please refer to web-site of ICPDAS :

http://www.icpdas.com/products/Remote_IO/frnet/frnet_introduction.htm

Fig.2.3 shows the pin assignment for the 16-pin connector on the DN-8468G, and the Table 2.4 shows its I/O connector signal description.

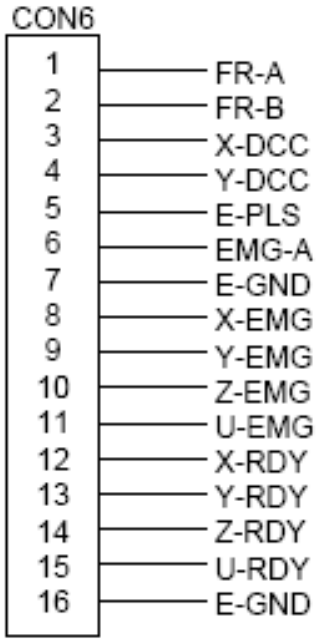


Fig. 2.3 Pin definition for CON6

Table 2.4 CON6 Signal Connection

Name	Description
FR-A	FRnet port A
FR-B	FRnet port B
X-DCC	Deviation Counter Clear for X axis
Y-DCC	Deviation Counter Clear for Y axis
E-PLS	EXT pulse signal
EMG-A	EMG input signal for all axes
E-GND	EXT power ground
X-EMG	EMG input signal for X axis
Y-EMG	EMG input signal for Y axis
Z-EMG	EMG input signal for Z axis
U-EMG	EMG input signal for U axis
X-RDY	Ready input signal for X axis
Y-RDY	Ready input signal for Y axis
Z-RDY	Ready input signal for Z axis
U-RDY	Ready input signal for U axis

■ TB2

The connector TB2 is 5-pin connector that enables you to connect to the signals of your motor drivers. Fig.2.4 shows the pin assignment for the 5-pin connector on the DN-8468G, and the Table 2.5 shows its I/O connector signal description.

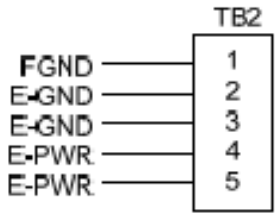


Fig. 2.4 Pin definition for TB2

Table 2.5 TB2 Signal Connection

Name	Description
E-PWR	EXT power supply +24V
E-GND	EXT power ground
FGND	Frame ground

> **Note:** Don't reverse connect signals with E_PWR and E_GND. Serious damage to your motion card and motion controller might be happen

■ RJ1 (The I/O signals of the FRnet)

The connectors RJ1 is an 8-pin RJ45 connector that enable you to connect to the signals of FRnet. The FRnet connectors, FR-A and FR-B, can be used to serially connect a I/O module of FRnet series, as FR-2053,FR-2057…. The more information, please refer to web-site of ICPDAS:

http://www.icpdas.com/products/Remote_IO/frnet/frnet_introduction.htm

Fig.2.5shows the pin assignment for the 8-pin connector on the DN-8468G, and the Table 2.6 shows its I/O connector signal description.

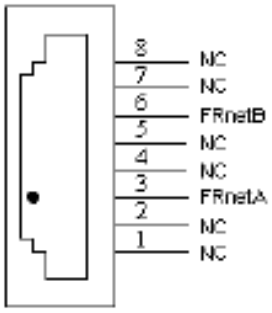


Fig. 2.5 Pin definition for RJ1

Table 2.6 RJ1

Pin name	Description
FRnetA	FRnet port A
FRnetB	FRnet port B
NC	No connection

> **Note:** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

2.2.3 Jumper and Switch Settings

■ JP7

Jumper 7 controls the EMG-A signal of the CON6 connector. The following diagram is shown the selection condition of the jumper 7.

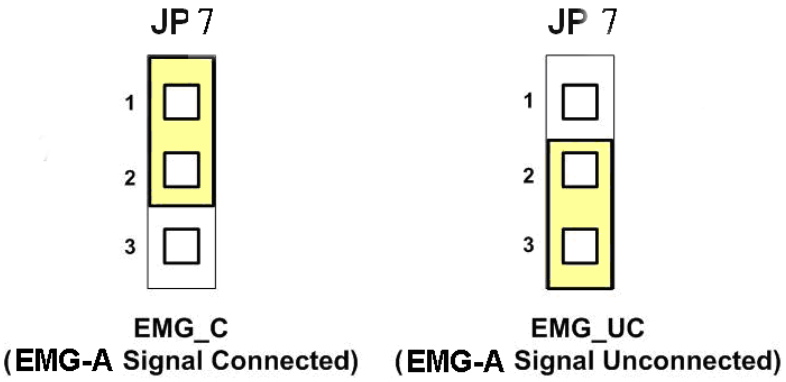


Fig. 2.6 Jumper 7 setting

■ JP8/9, JP10/11, JP12/13, JP14/15

The Jumper8~15 are used to set the signal type of the pulse output signals. The output signal type could be differential line driver output or open collector output. The JP8 ~JP9 are set XPP、XPM for X-axis(CON1), JP10 ~JP11 are for Y-axis, JP12 ~JP13 are for Z-axis and JP14 ~JP15 are for U-axis. The 2-3 Pin short is the differential line driver mode. The 1-2 Pin short is the Open Collector mode, as below example

> ► **note:** Open Collector output，P+ (N+) and EXT_5V short，offer external usage (Refer to section 2.3)。

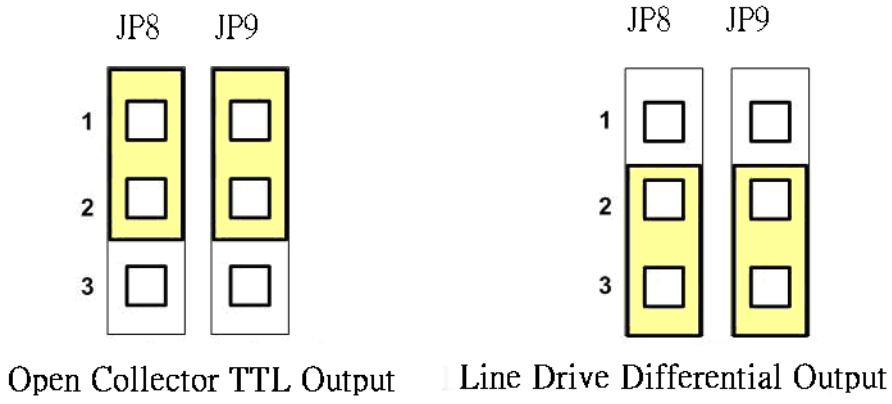


Fig. 2.10 Jumper 8, 9 setting

■ EMG SW

The emergency stop signal for each servo ampilfier can be selected from EMG SW. The number 1, 2 , 3, 4 on EMG SW are denoted as axis X, Y, Z, U, respectively. Fig. 2.7 is the default setting to connect the EMG singals to GND. The EMG signals from CN1 ~ CN4 will not take effect. If the switch is disconnected as shown in Fig. 2.8, the emergency stop signals can be controlled from EMG signals in CON6.

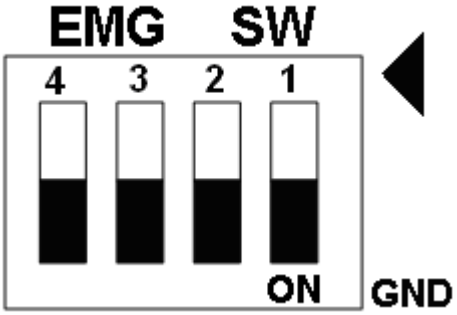


Fig. 2.7 EMG SW setting for normally GND (Default setting)

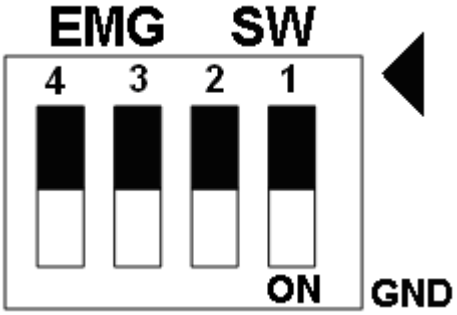


Fig. 2.8 EMG SW setting for user controlled signals.

2.3 Input/Output Connections

2.3.1 Output Pulse Signals

There are 4-axes pulse output signals on PISO-PS400, For every axis, two pairs of CW and CCW signals are used to send the pulse train. The CW and CCW signals can also be programmed as PULSE and DIR signals. Two types of the pulse output signal, Differential-Type and Open-Collector Type, can be selected from JP8/9, JP10/11, JP12/13, and JP14/15 and are described in section 2.2.3. The following wiring diagram is for the CW and CCW signals of the 4-axes.

◆ Output to Motor Drivers in Differential Circuit

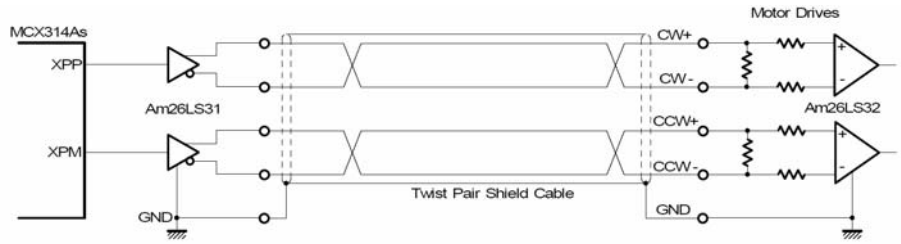


Fig. 2.9 Differential-Type pulse output circuit

◆ Open Collector TTL Output

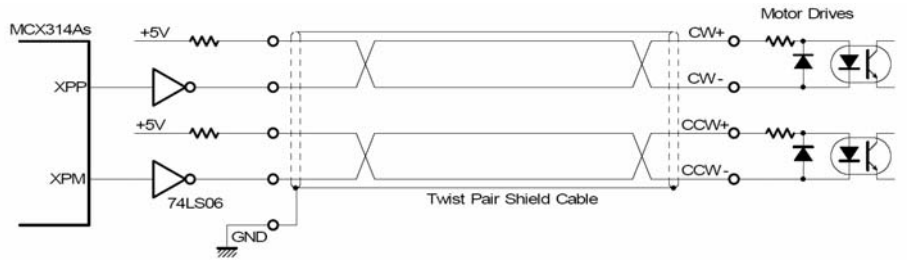


Fig. 2.10 Open-Collector pulse output circuit

◆ **Example: wiring of pulse signal**

Two types of pulse output signal, Differential-Type and Open-Collector Type, can be selected from JP8/9, JP10/11, JP12/13, and JP14/15 for each axis. The following wiring diagram is an example to select pulse type of the output signal.

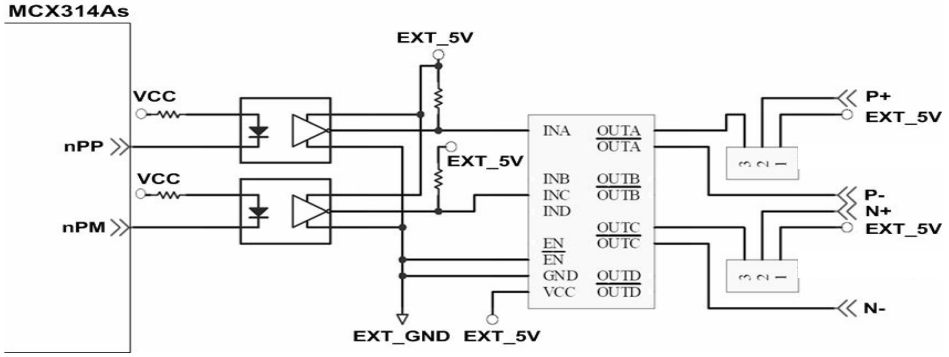
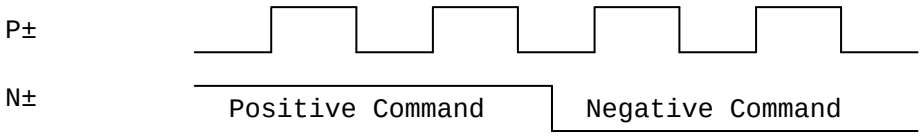


Fig. 2.11 Output pulse example

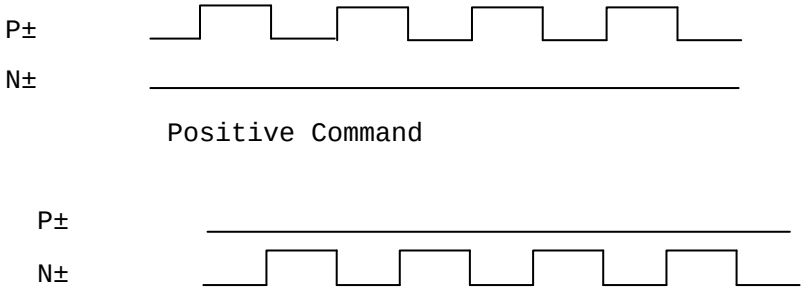
◆ Pulse/Direction pulse output mode:

In Pulse/Direction pulse output mode, the PULSE signal is output only at Pulse pins (P+, P-). The driving direction is decided from the electric potential of Direction pins (N+, N-). The following diagram is example signal of Pulse/Direction pulse output mode.



◆ CW/CCW pulse output mode:

In CW/CCW pulse output mode, the PULSE signal is output at both CW pins (P+, P-) and CCW pins(N+, N-). At the same time, the driving direction is determined directly. The following diagram is example signal of CW/CCW pulse output mode.



2.3.2 Connection for Limit Switch Signal

Limit Switch Signal can prevent the over traveling appearance of the motion system. User can set the hardware limit switch signal to be normal open or normal close by the software instruction in PISO-PS400 software manual. The following figure indicates that the photo couplers are used to keep out the sensor noise of the Limit Switch.

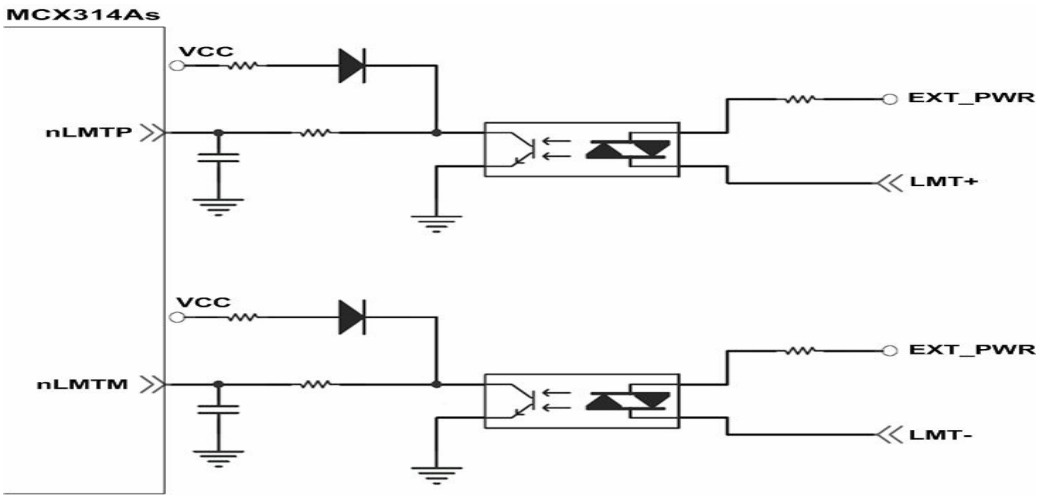


Fig. 2.11 Limit switch signal circuit

2.3.3 General Purpose Input Signal (nINPOS, nALARM)

INPOS is a digital input signal to indicate the In-Position signal of the driver. User can enable or disable the signal from the software instruction in PISO-PS400 software manual.

ALARM is a digital input signal to indicate the servo alarm signal of the driver. The output pulse will be stop if PISO-PS400 receives the ALARM signal. User can enable or disable the signal from the software instruction in PISO-PS400 software manual.

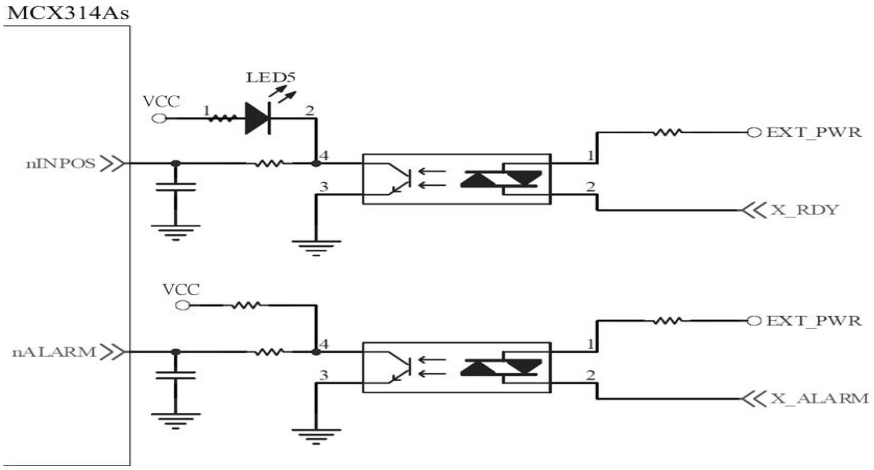


Fig. 2.12 General Digital Input circuit

2.3.4 Encoder Signals

The following diagram is for Differential-Type encoder signals. Connect the Phase A signal to A+ and A- pins and connect Phase B signal to B+ and B- pins. After the high speed photo coupler isolation, the isolated encoder signals are connected to motion IC.

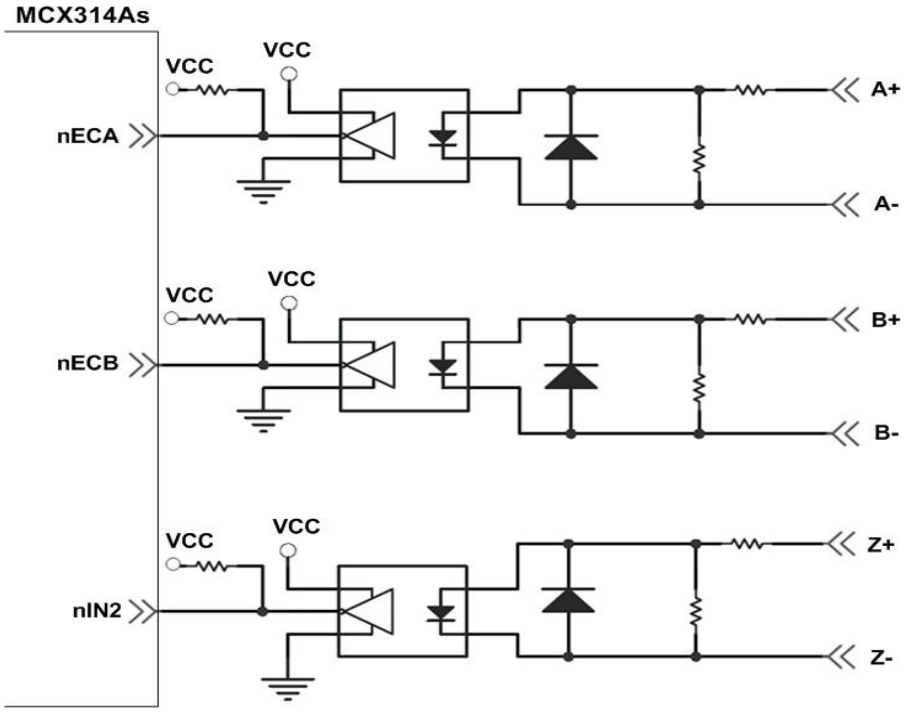


Fig. 2.13 Encoder signal connection

2.3.5 Emergency Stop Signal

The following diagram is for Emergency STOP signal. If the emergency signal is occurred, the output pulse for all axes will be STOP and the error flag will be set as 1. After the photo coupler isolation, the isolated emergency signal is connected to motion IC.

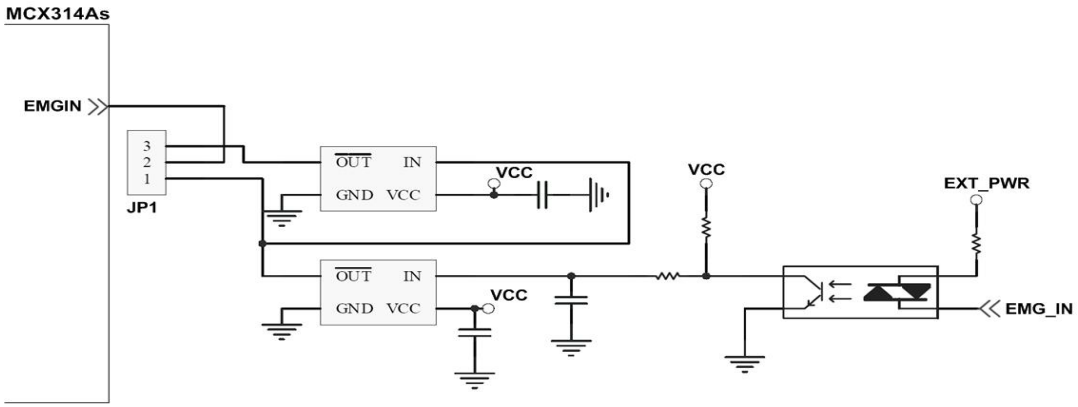


Fig. 2.15 Emergency Stop Signal connection

2.3.6 Manual pulse Generator Input Signals (EXP+,EXP-)

The signals, EXP+ and EXP-, are used for manual pulsar signals. The following diagram is an example connection for the external inputs. User can set the signals as fixed pulse CW/CCW mode, continuous pulse CW/CCW mode, or A/B phase manual pulsar mode by using the setting in section 3.5.

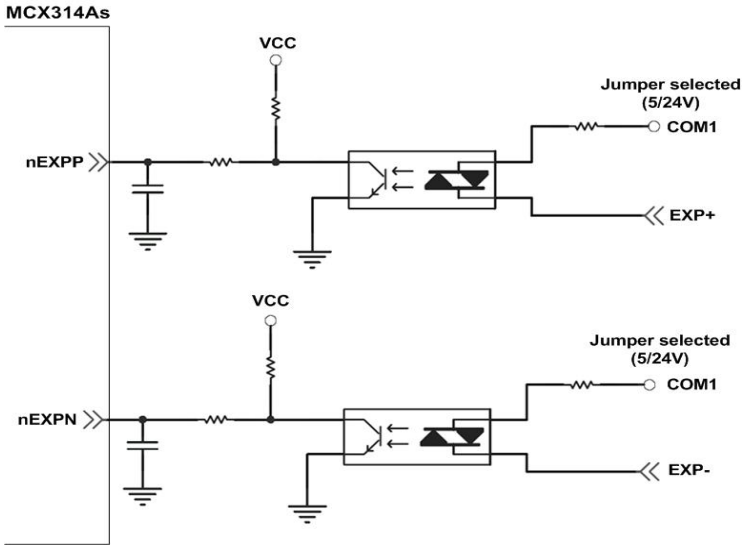


Fig. 2.16 EXP+/- connection diagram

2.3.7 General Purpose Output Signals(Servo On/Off)

The following diagram is a digital output signal for driver Servo On/Off signal. The output signal enable or disable the driver.

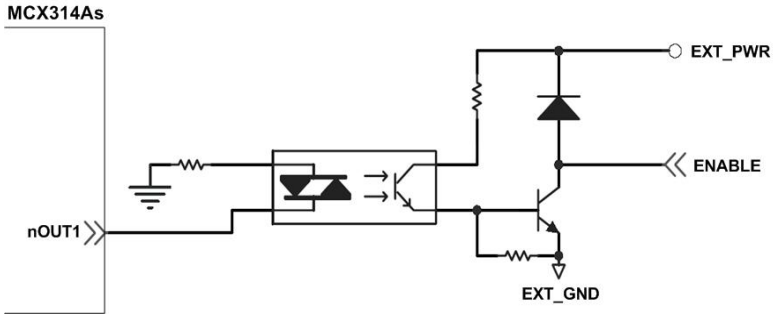


Fig. 2.17 Servo On/Off signal connection diagram

2.4 Connection Example for Motor Driver

The following diagram is the connection example between MITSUBISH MR-J2S AC servo driver and the extension board DN-8468G.

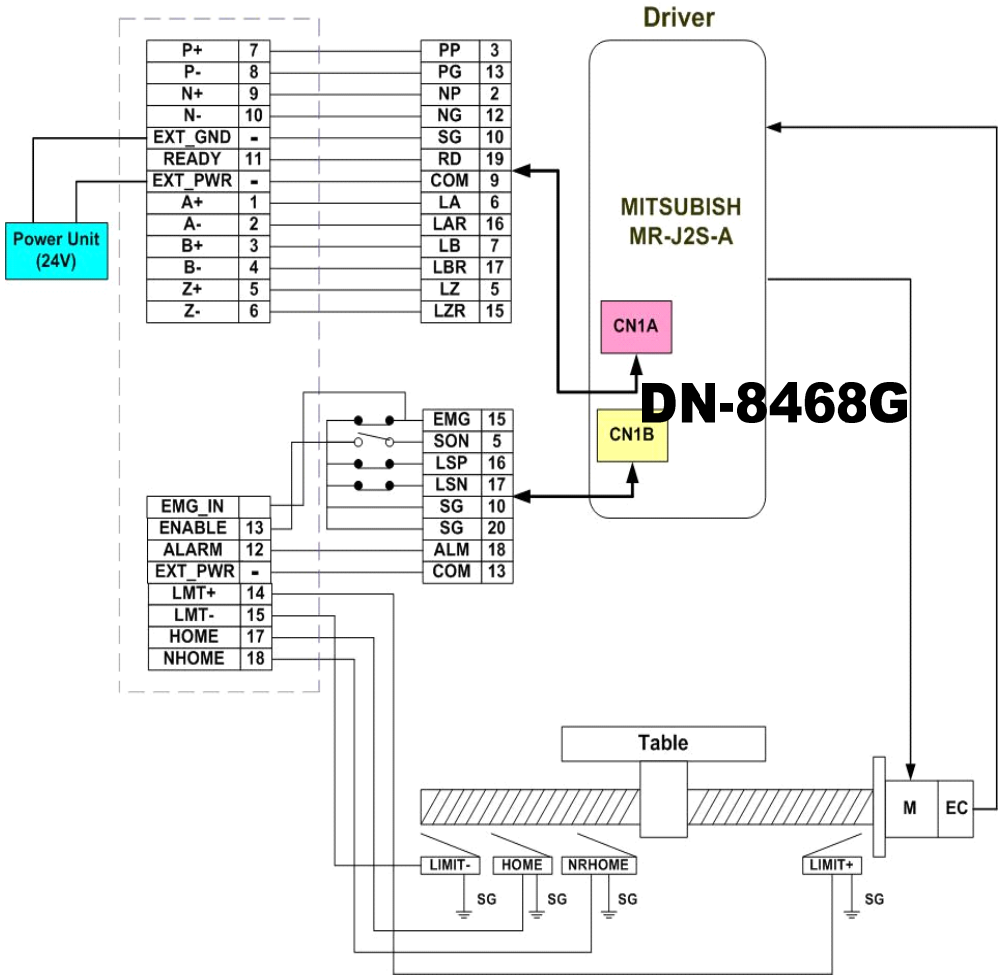
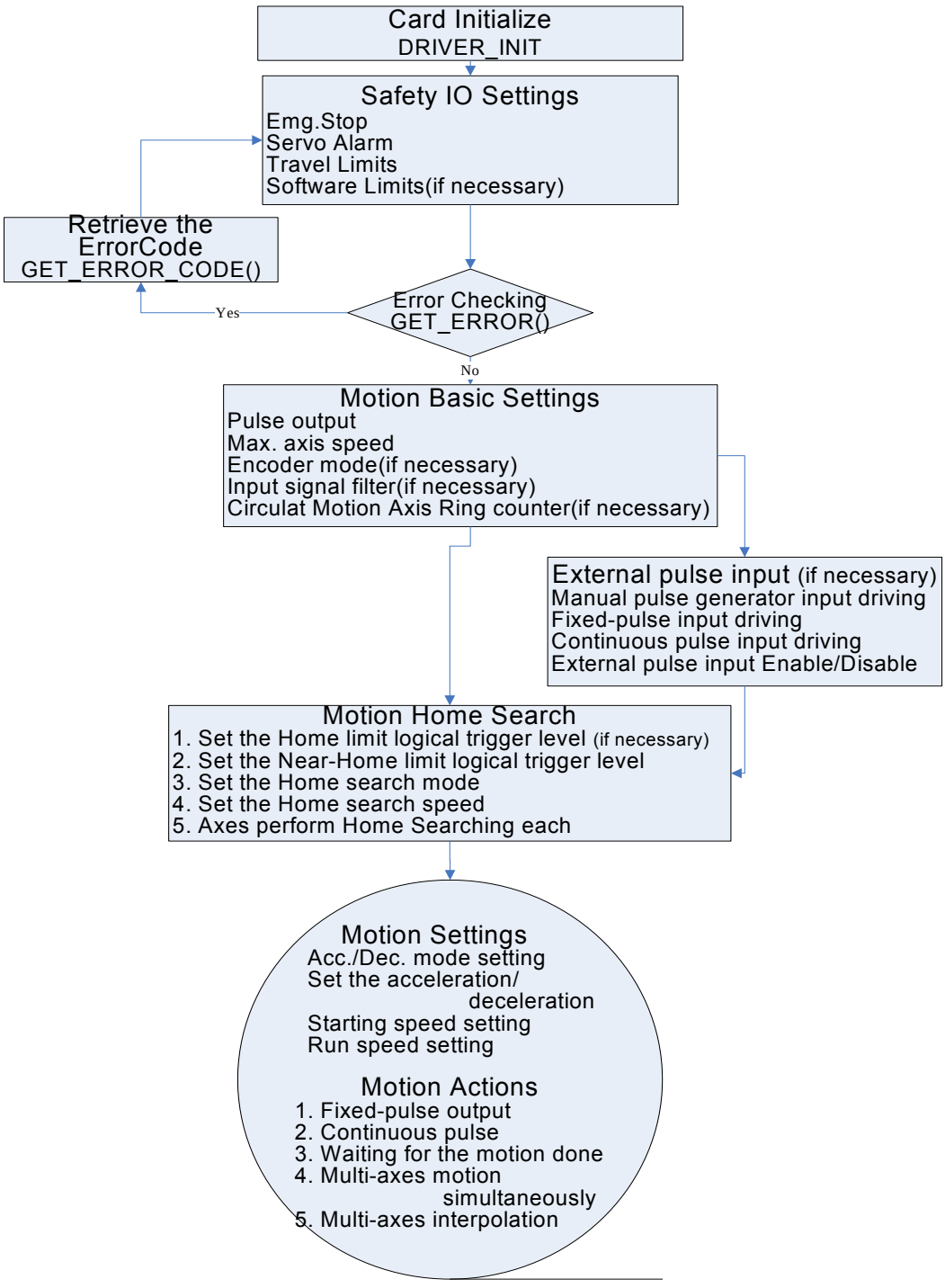


Fig. 2.18 The connection between MR-J2S AC servo driver and DN-8468G extension board.

3 SOFTWARE DEVELOPMENT OVERVIEW

3.1 Software Development Overview

Please refer to the demo_start sample



3.1.1 Card Initialization

Please execute the Card Initialization procedures of each PISO-PS400 motion card before sending command, or the error message will be occurred. Please refer to *PS400_Card_Init()* function, the section 2.2 of PISO-PS400 user manual.

3.2 Safety IO Setting

There are many reasons to stop motion during driving. Some reasons are described in this subsection.

3.2.1 Emergency Stop Signal Input

The EMG-A input signal in CON6 is able to perform the emergency stop function immediately for all of the 4 axes during driving. The emergency stop function can prevent the critical damage occurrence from the critical accident. If user don't use this Emergency stop signal, please closing breaks between 2 and 3 of JP7 jumper. Otherwise, please closing breaks between 1 and 2 of JP7 jumper and connecting the EMG-A signal to CON6.

The EMG-X, EMG-Y, EMG-Z, and EMG-U input signals in CON6 are connected directly to the driver for each axis. These signals are able to perform the emergency stop function immediately for each driver during driving. User have to switch the EMG-SW to normal ON and connect external signal source to enable these signals.

3.2.2 Configure the Servo ALARM Signals

When the ALARM signals are occurred from servomotor drivers, users can be notified by these signals and determine what to do. The operating mode (Enable or Disable) and the proper trigger level of these signals can be set by user. Please refer to *PS400_Set_Alm()* function, the section 2.12 of PISO-PS400 user manual.

3.2.3 Configure the Limit Switch Signals(±EL)

To insure the machine in safety, hardware limit switches are placed at the both ends of machine traveling range. If the machine touch the hardware limit switch sensors, PISO-PS400 will stop immediately. The operating mode (Enable or Disable) and the proper trigger level of these signals can be set by user. Please refer to *PISO-PS400_SET_LIMIT()* function, the section 2.7 of PISO-PS400 user manual.

3.2.4 Configure the Software Limite（±SEL）

To insure the machine in safety, hardware limit switches are placed at the both ends of machine traveling range. In addition, user can set the software limits to avoid the happening of the over range before the hardware limit takes effect. If the machine reach the software limits condition, PISO-PS400 will stop immediately. The operating mode (Enable or Disable) and the proper trigger condition of these signals can be set by user. Please refer to *PISO-PS400_SET_SoftLIMIT()* function, the section 2.9 of PISO-PS400 user manual.

3.3 Error Checking

Check whether there is any error. If there are something wrongs, please use the *PS400_Get_Error_Code()* function to get the error-code, then check the reason and remove it. Please refer to *PS400_Get_Error_Code()* function, the section 3.6 of PISO-PS400 manual.

User also can use *PS400_Get_DI_Stutus()* function to check the all of DI status. Please refer to *PS400_Get_DI_Stutus()* function, the section 3.5 of PISO-PS400 user manual.

3.4 Basic Configuration of Motion

The basic motion configuration must be set for necessarily general settings and are described below:

1. Pulse output mode setting: Pulse/Dir、CW/CCW…
   - ✓ Relative function: *PS400_Set_PulseMode()*

   (Please refer to the section 2.5 of PISO-PS400 user manual)
2. Max. speed limitation setting for each axis
   - ✓ Relative function: *PS400_Set_MaxSpeed()*

   (Please refer to the section 2.6 of PISO-PS400 user manual)
3. Encoder input setting
   - ✓ Relative function: *PS400_Set_EncoderMode()*

   (Please refer to the section 2.10 of PISO-PS400 user manual)
4. DI noise filter setting (If necessary)
   - ✓ Relative function: *PS400_Set_Filter()*

   (Please refer to the section 2.14 of PISO-PS400 user manual)
5. Circular motion declaration (Ring counter) (If necessary)

✓ Relative function: *PS400_Set_Vring()*

(Please refer to the section 2.15 of PISO-PS400 user manual)

3.5 Manual Pulse Generator Testing

User can use the manual pulse generator function directly to drive motion forward or backward. For further wiring and parameter tuning, user have to check the correction of the DI signals and the moving direction.

The manual pulse generator can be achieved from three driving methods described below:

1. A/B phase Manual Pulse Generator:

   Use the A/B phase manual pulse signals for forward/backward moving.

2. Fixed-pulse driving Manual Pulse Generator:

   User have to preset fixed driving pulses. After setting, user can push the forward or backward button to drive fixed pulses for each direction.

3. Continuous- pulse driving Manual Pulse Generator:

   User can preset output-pulse frequency. After setting, user can push the forward or backward button to drive fixed velocity for each direction. If user release the button, the motion will be stop immediately.

ALL the above three methods and the operation mode (enable or disable) from external pulse input can be chosen and set from the function, *PS400_Set_ManualPulsar()* (Please refer to the section 2.18 of PISO-PS400 user manual)

3.6 Home Search

PS400 provides the automatic homing function. After proper settings, the homing function can be operated automatically. Four homing steps are provided for setting and are described bellow:

- Near-home sensor searching under high-speed motion.
- Home sensor searching under low-speed motion.

- Servomotor Z-phase searching under low-speed motion.
- Offset movement to the origin of the working area under high-speed motion.

User can select which steps are ignored when setting for the actual operation. It performs automatically that economize the CPU resource and program code reducing. Although there are four home search steps,but user can create more than 10 types of different home search mode by vary with the software functions. It is attributed to the configurable home search direction and perform it or not of each step.

3.6.1 Home Search Configuration

1. Logic level setting for Near home sensor and Home sensor

   PS400_Set_Home () (Please refer to section 2.8 of PISO-PS400 user manual)

2. Home-speed setting

   PS400_Set_HomeSpeed () (Please refer to section 6.1 of PISO-PS400 user manual)

3. Homing mode setting

   PS400_Set_HomeMode ()(Please refer to section 6.3 of PISO-PS400 user manual)

3.6.2 Running the Home Search

1. Start homing

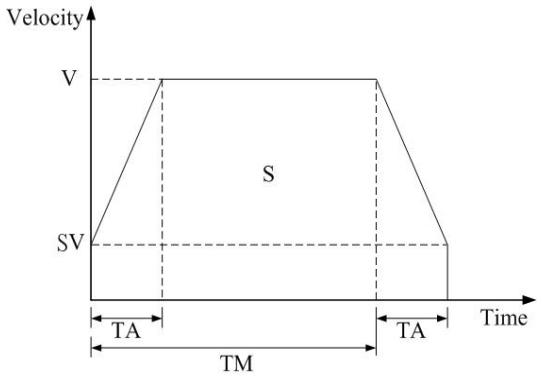
   PS400_Home _Start () (Please refer to section 6.4 of PISO-PS400 user manual)

2. Waiting for homing completion

   PS400_Home_Done () (Please refer to section 6.5 of PISO-PS400 user manual)

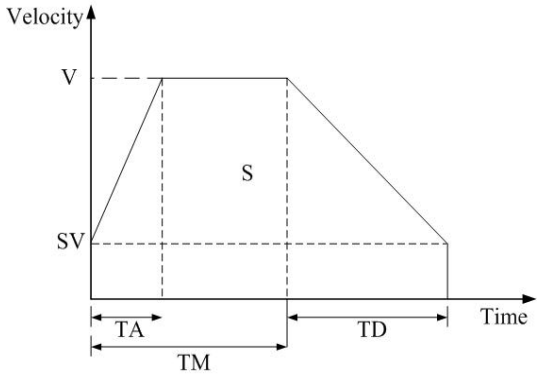
3.7 Basic Motion

3.7.1 Speed Profile of the Motion Control

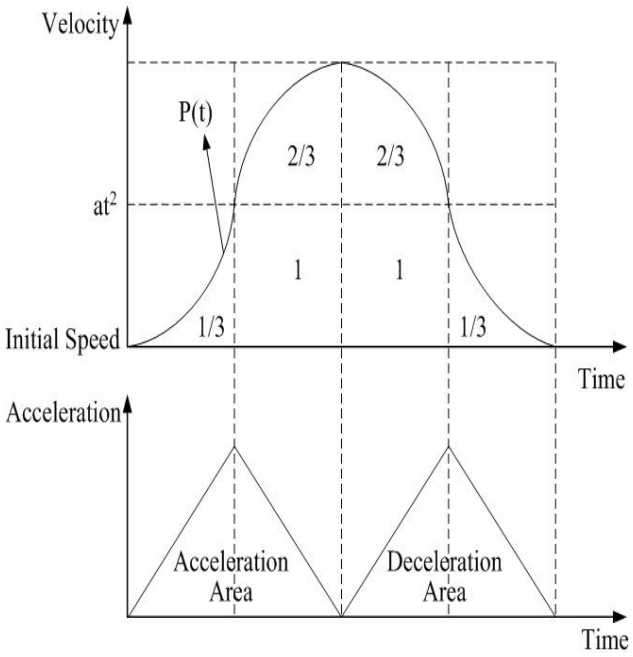


1 Symmetrical T-profile of motion velocity

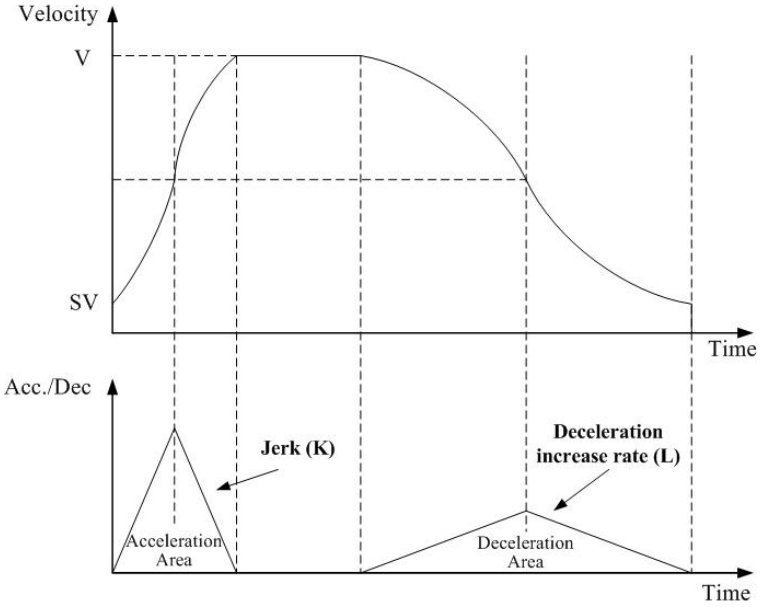
(If SV is larger than or equal to V, perform constant velocity driving)



2 Asymmetrical T-profile of motion velocity



3 Symmetrical S-curve of motion velocity



4 Asymmetrical S-curve of motion velocity

3.7.2 Basic Motion of Single Axis

1. Fixed-pulse driving output: There are five speed profiles

- Constant speed (V)
  - ✓ Relative function: *PS400_Const_Move()*
- Symmetrical T-Profile (SV、V、A、AO)
  - ✓ Relative function: *PS400_T_Move()*
- Symmetrical S-curve (SV、V、K、AO)
  - ✓ Relative function: *PS400_S_Move()*
- Asymmetrical T-profile (SV、V、A、D、AO)

- ✓ Relative function: *PS400_T_As_Move()*

■ Asymmetrical S-curve (SV、V、K、L、AO)

- ✓ Relative function: *PS400_S_As_Move()*

(Please refer to section 7.1~7.3 of PISO-PS400 user manual)

2. Continuous-pulse driving output: Perform continuous pulse output.

- ✓ Relative function: *PS400_Conti_Move()*

(Please refer to section 7.4 of PISO-PS400 user manual)

3. Waiting for motion done: Waiting for the axis driving accomplished.

- ✓ Relative function: *PS400_Motion_Done()*

(Please refer to section 7.9.5 of PISO-PS400 user manual)

3.7.3 Basic Motion of Muti-Axes Interpolation

- 1 2-axes linear interpolation: Perform 2-axes linear interpolation.
  - ✓ Relative function: *PS400_Line2_Move()*, *PS400_Line2_As_Move()*

  (Please refer to section 7.5 of PISO-PS400 user manual)

- 2 3-axes linear interpolation: Perform 3-axes linear interpolation.
  - ✓ Relative function: *PS400_Line3_Move(), PS400_Line3_As_Move()*

  (Please refer to section 7.5 of PISO-PS400 user manual)

- 3 2-axes ARC interpolation: Perform 2-axes ARC interpolation.
  - ✓ Relative function: *PS400_Arc2_Move ()*

  (Please refer to section 7.6 of PISO-PS400 user manual)

3.8 Synchronized Motion

- Synchronized motion for Muti-axes (more than 2 axes) can be set in the same card by using the following function.
  - ✓ Relative function: *PS400_Set_SyncMotion()*

  (Please refer to section 7.7 of PISO-PS400 user manual)

- Position latch functions for single axis or multi-axes are set in the same card
  - ✓ Relative function: *PS400_Set_Latch(), PS400_Get_Latch()*

  (Please refer to section 7.7 of PISO-PS400 user manual)

- Preset the synchronous condition and data for multi-axes.
  - ✓ Relative function: *PS400_Sync_Preset(), PS400_Preset_Data()*

  (Please refer to section 7.7 of PISO-PS400 user manual)

3.9 Advanced Motion

1. 2-axes continuous rectanglar interpolation:

- Perform the 2-axes rectanglar continuous interpolation.
  - ✓ Relative function: *PS400_Rectangle()*

  (Please refer to section 7.8.1 of PS400 manual)

2. 2-axis linear interpolation with symmetric T-curve:

- Initial setting of the 2-axis linear interpolation with symmetric T-curve
  - ✓ Relative function: *PS400_Set_Line2()*
- Start 2-axis linear interpolation motion
  - ✓ Relative function: *PS400_Line2_Start()*

  (Please refer to section 7.8.2 of PISO-PS400 user manual)

3. 3-axis linear interpolation

- Initial setting of the 3-axis linear interpolation with symmetric T-curve
  - ✓ Relative function: *PS400_Set_Line3()*
- Start 3-axis linear interpolation motion
  - ✓ Relative function: *PS400_Line3_Start()*

  (Please refer to section 7.8.3 of PISO-PS400 user manual)

4. 3-axis helical interpolation

- 3-axis helical interpolation with symmetric T-curve
  - ✓ Relative function: *PS400_Helix3_Move()*

  (Please refer to section 7.8.6 of PISO-PS400 user manual)

5. 2-axis ratio movement

- The initial setting for 2-axis ratio movement with symmetric T-curve
  - ✓ Relative function: *PS400_Set_Ratio2()*
- Start the 2-axis ratio movement
  - ✓ Relative function: *PS400_Ratio2_Start()*

  (Please refer to section 7.8.6 of PISO-PS400 user manual)

4 GETTING STARTED OF SOFTWARE

4.0 PISO-PS400 Installation

Please refer to Appendix A:

4.1 VC 6.0 Guideline

4.1.1 Confirm the Relative Files

Please confirm you have the following relevance files in the relative path:

(C:\ICPDAS\PISO-PS400\Include):

- PS400.h

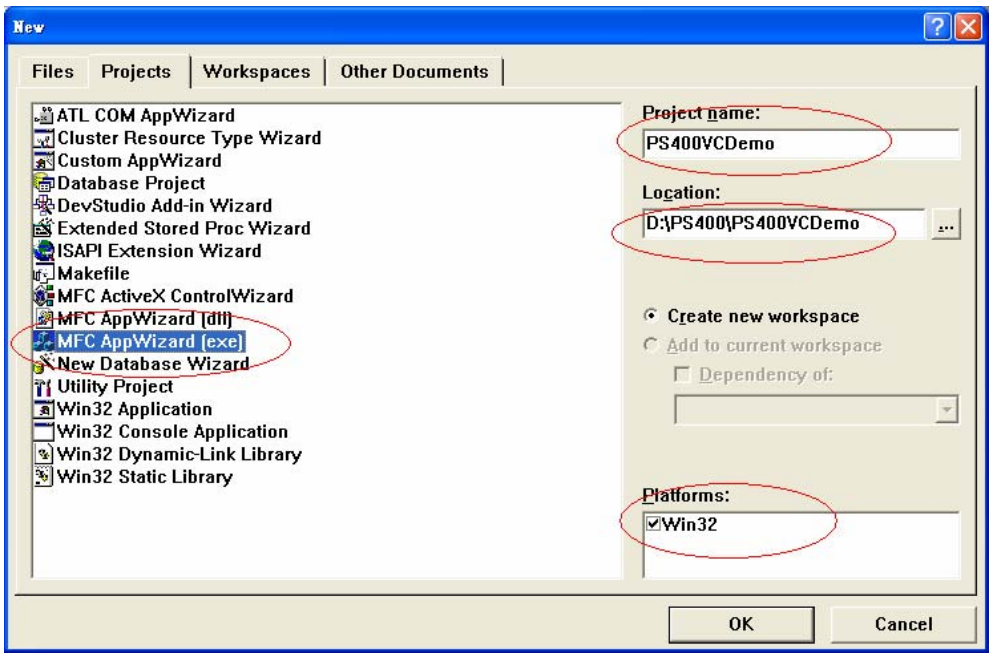
(C:\ICPDAS\PISO-PS400\Lib):

- PS400DLL.lib

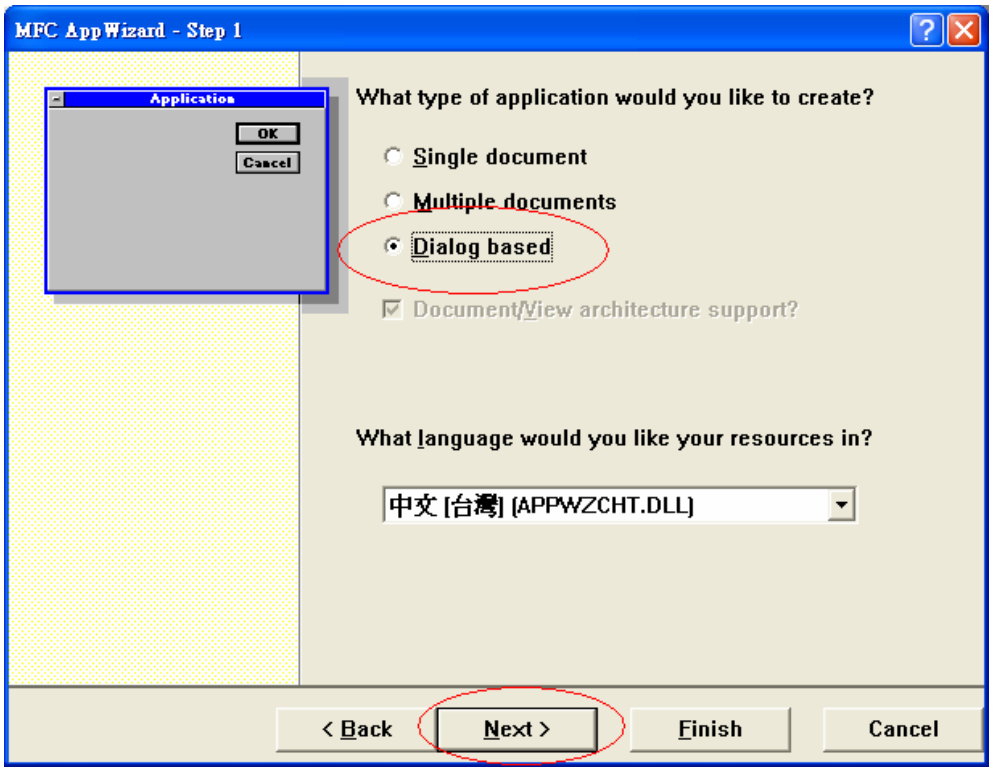
If you don't have, please look for CD or download the latest edition from ICPDAS's website http://www.icpdas.com/

4.1.2 Create a new VC++ Application Project

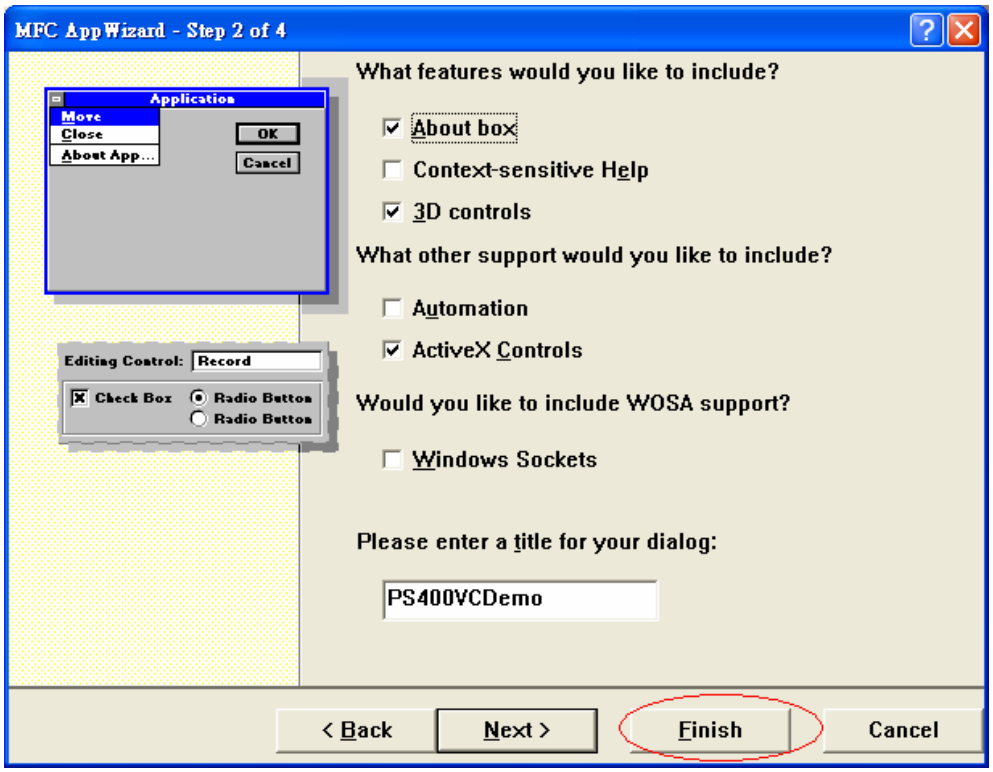
Please execute the Microsoft Visual C++ 6.0. Then click "File" -> "New" to create a new application project. In the "Projects" property page, choose "MFC AppWizard (exe)" option and specify the project name "PS400VCDemo", then key in the disk path in the "Location" field, then select the "Win 32" in CPU list. If necessary, please also select others options together. And then click "OK"


New
Files
Projects
Workspaces
Other Documents
ATL COM AppWizard
Cluster Resource Type Wizard
Custom AppWizard
Database Project
DevStudio Add-in Wizard
Extended Stored Proc Wizard
ISAPI Extension Wizard
Makefile
MFC ActiveX ControlWizard
MFC AppWizard [dll]
MFC AppWizard [exe]
New Database Wizard
Utility Project
Win32 Application
Win32 Console Application
Win32 Dynamic-Link Library
Win32 Static Library
Project name:
PS400VCDemo
Location:
D:\PS400\PS400VCDemo
...
Create new workspace
Add to current workspace
Dependency of:
Platforms:
Win32
OK
Cancel

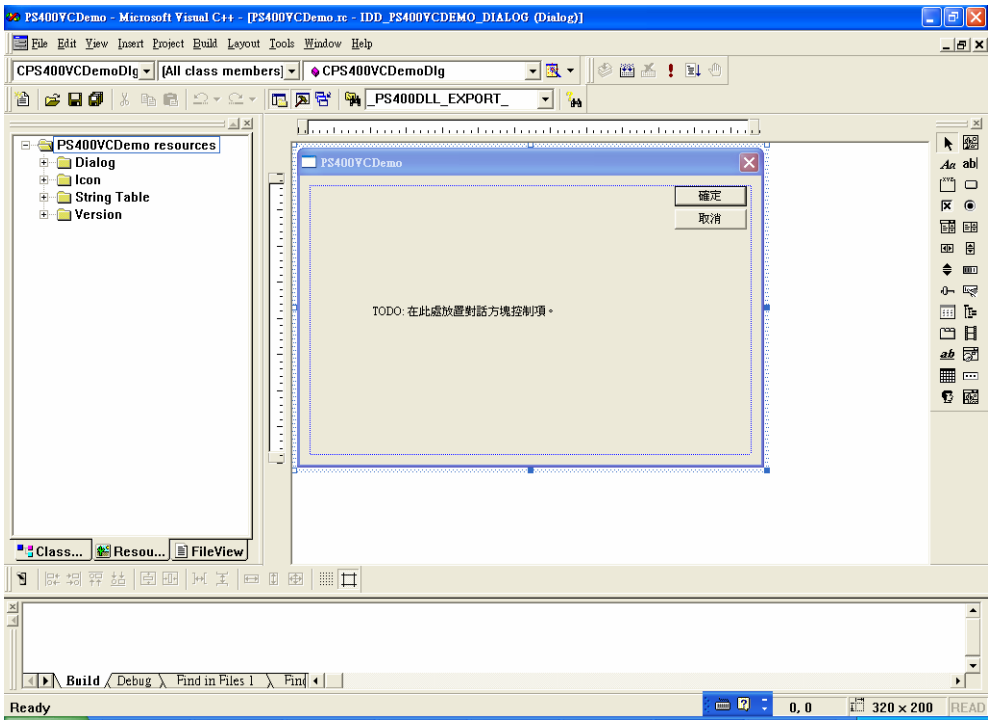
Choose “ Dialog based “ and click “NEXT”



Click “NEXT” following



Click “Finish”.



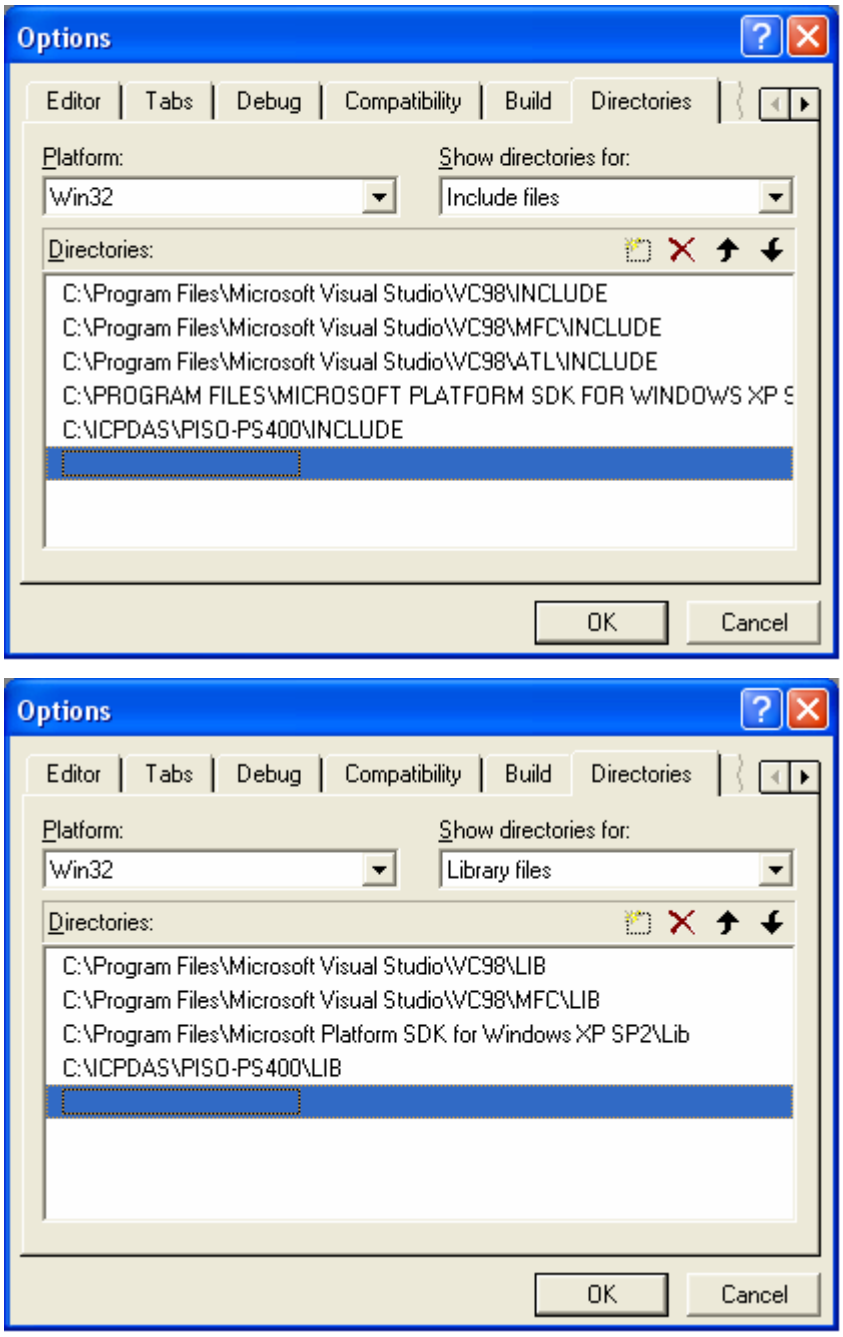
Finish the new project establishment.

4.1.3 Add the Reference Path into VC ++ Application Project

A. Open the “Options” dialog in “Tools” menu and select the ”Directories” item.

B. **Add in the path of including files.** Choose the “Include files” in “Show directories” item and double click at the empty line below the “Directories” (the nearest spare rectangular area as the following figure shown). Key in the path include the files where they installed. (C:\ICPDAS\PISO-PS400\Include).

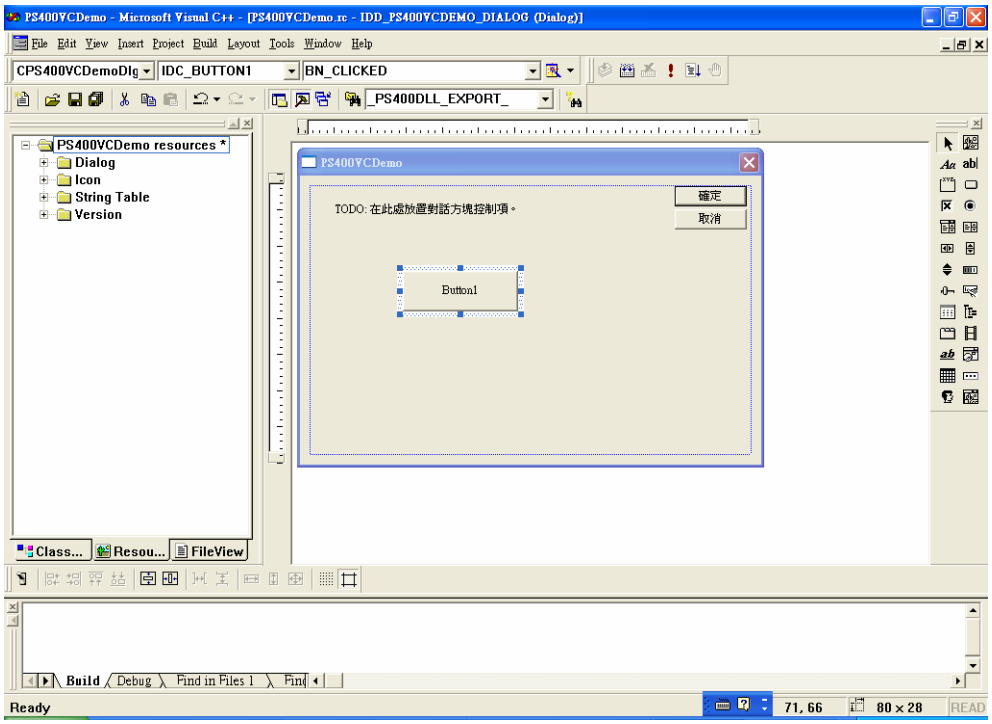
C. **Add in the path of library files.** Choose the “Library files” in “Show directories” item and double click at the empty line below the “Directories” (the nearest spare rectangular area as the following figure shown). Key in the path include the files where they installed. (C:\ICPDAS\PISO-PS400\Lib).


Options
Editor
Tabs
Debug
Compatibility
Build
Directories
Platform:
Win32
Show directories for:
Include files
Directories:
C:\Program Files\Microsoft Visual Studio\VC98\INCLUDE
C:\Program Files\Microsoft Visual Studio\VC98\MFC\INCLUDE
C:\Program Files\Microsoft Visual Studio\VC98\ATL\INCLUDE
C:\PROGRAM FILES\MICROSOFT PLATFORM SDK FOR WINDOWS XP S
C:\ICPDAS\PISO-PS400\INCLUDE
OK
Cancel

Options
Editor
Tabs
Debug
Compatibility
Build
Directories
Platform:
Win32
Show directories for:
Library files
Directories:
C:\Program Files\Microsoft Visual Studio\VC98\LIB
C:\Program Files\Microsoft Visual Studio\VC98\MFC\LIB
C:\Program Files\Microsoft Platform SDK for Windows XP SP2\Lib
C:\ICPDAS\PISO-PS400\LIB
OK
Cancel

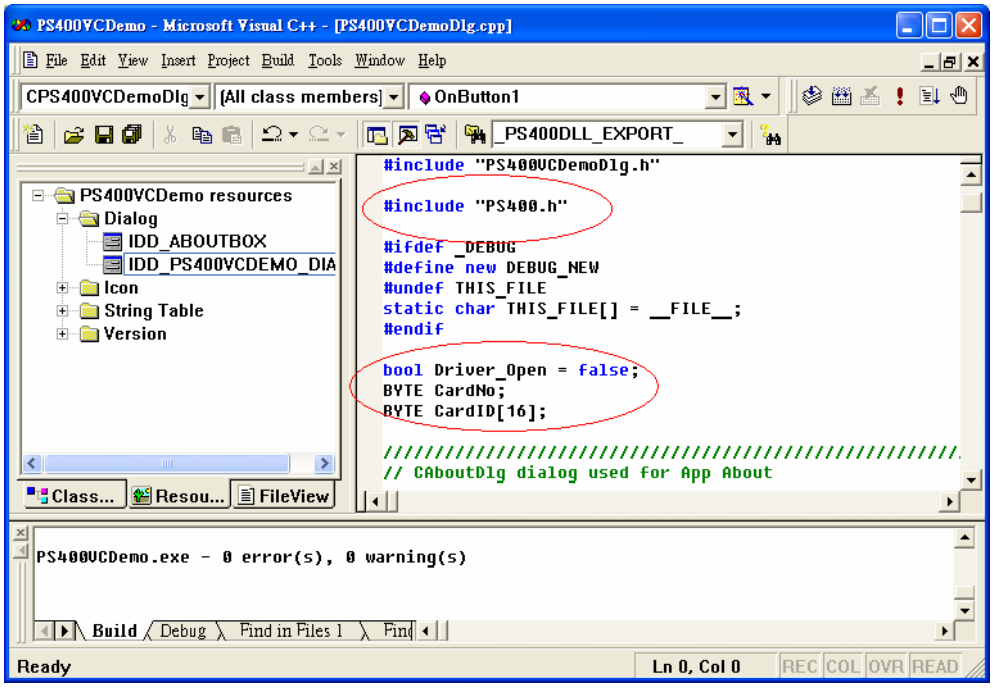
4.1.4 Start the VC++ Example

Add a BUTTON in the Dialog ,as shown below.:

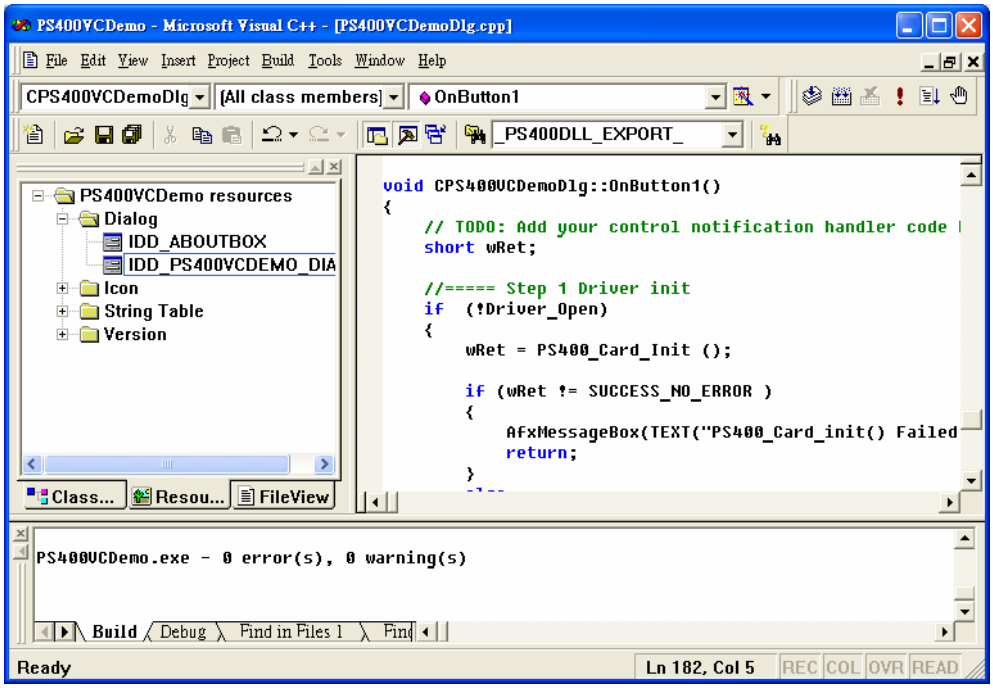


DoubleClick on the BUTTON and create a sub-routine in the code editor.

Add one line ”#include “PS400.h” and declare other variables at the beginning of this file as shown in the following figure



Call the specific function from PS400.DLL library in the OnButton1 sub-routine as shown in following figure:



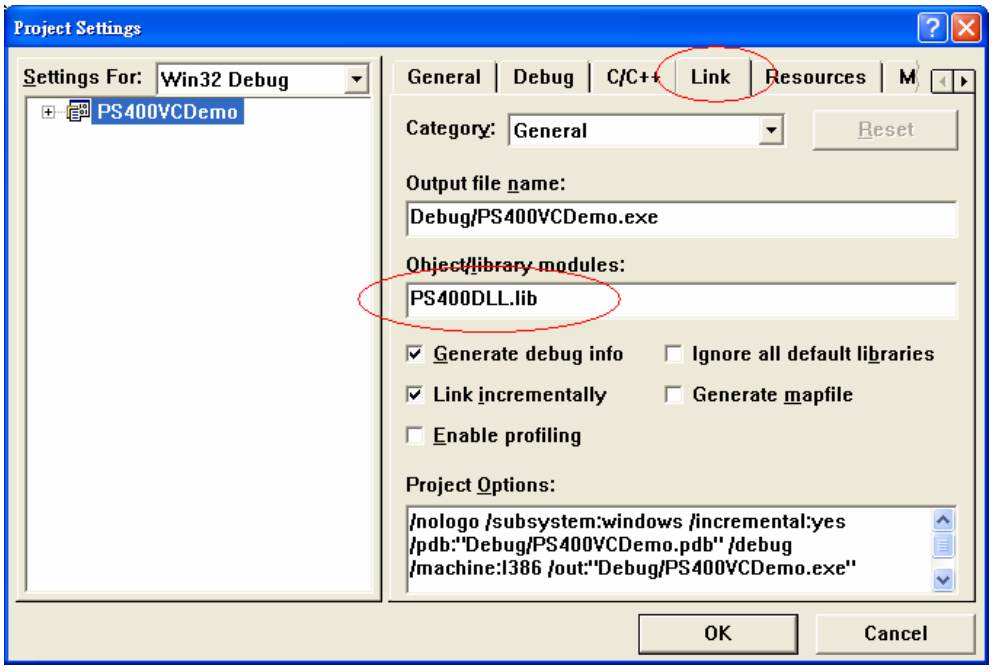
Detailed code as follows:

```
//====='Step 1 Driver init
  short wRet;
  if   (!Driver_Open)
  {
        wRet = PS400_Card_Init ();

        if (wRet != SUCCESS_NO_ERROR )
        {
              AfxMessageBox(TEXT("PS400_Card_init() Failed!") );
              return;
        }
        else
        {
              short card_num = PS400_Total_Card();
              for (short i = 0; i < card_num; i++)
              {
                    CardID[i] = PS400_Get_CardNo((BYTE)i);
              }

              CardNo = CardID[0];    // pick up the 1st motion card
              Driver_Open = true;
        }
```

```
    }
  //====='Step 2 CONFIG IO
    PS400_Reset_Card(CardNo);
    PS400_Set_PulseMode(CardNo, AXIS_XYZU, 2);     //set the pulse output mode
    PS400_Set_Alm(CardNo, AXIS_XYZU, 0, 0);        //disable the SERVO ALARM Input
    PS400_Set_EncoderMode(CardNo, AXIS_XYZU, 0); //set the encoder input type
    PS400_Set_MaxSpeed(CardNo, AXIS_XYZU, 16000); //set the max speed for XYZU
    PS400_T_Move(CardNo, AXIS_XYZU, 500, 10000, 5000, 0, 50000 ); // Starting volecity = 500, Maximum volecity = 10000, Acceleration = 5000, Offset Pulse = 0, Pulse Command = 50000
    PS400_Set_Servo_ON(CardNo, AXIS_XYZU, 1);              //set the Servo_ON to servo motors
  //======'Step 3 Check ERROR
    while (PS400_Motion_Done(CardNo, AXIS_XYZU) == NO)
    {
        Sleep(1000);
        //wait for axis to stop
    }
```

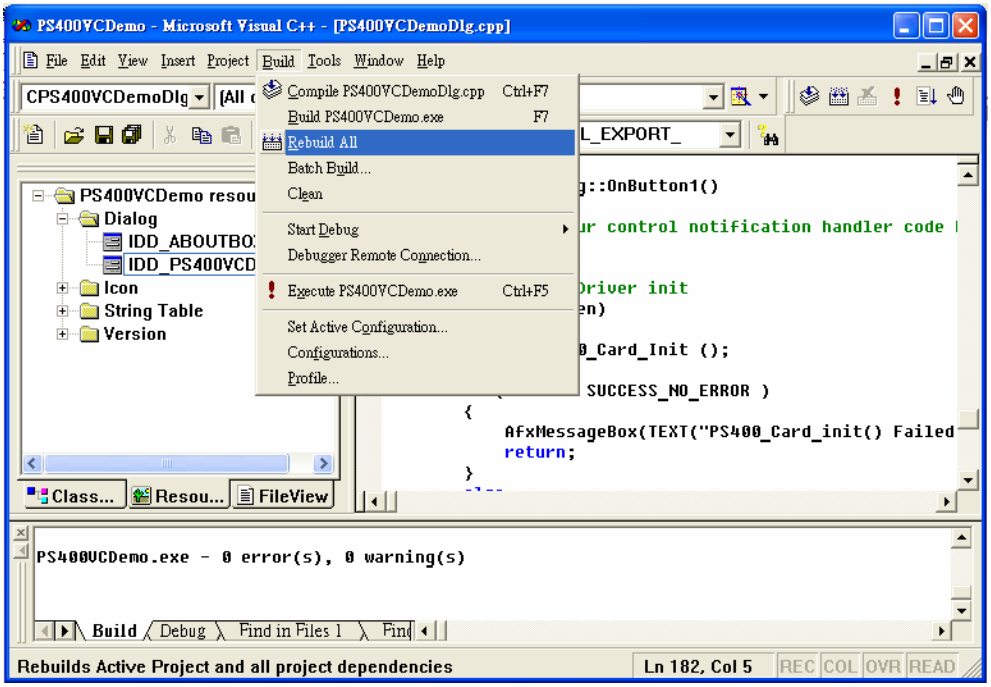
Please refers to the example “First_demo” for detail.

After you finished that, please choose the menu, “Project”->”Setting”. The “Project Settings” dialog is appeared as shown below. Then, select the “Link” item and key in “PS400DLL.lib” into the “Object/library modules” field, and click “OK”.



4.1.5 Build the Project

Please choose “Build”->”Build All” in the menu, then you will be finished this simple program if there is nothing wrong.



4.2 VB 6.0 Guideline

4.2.1 Confirm the Relative Files

Please confirm you have the following relevance files in the relative path:

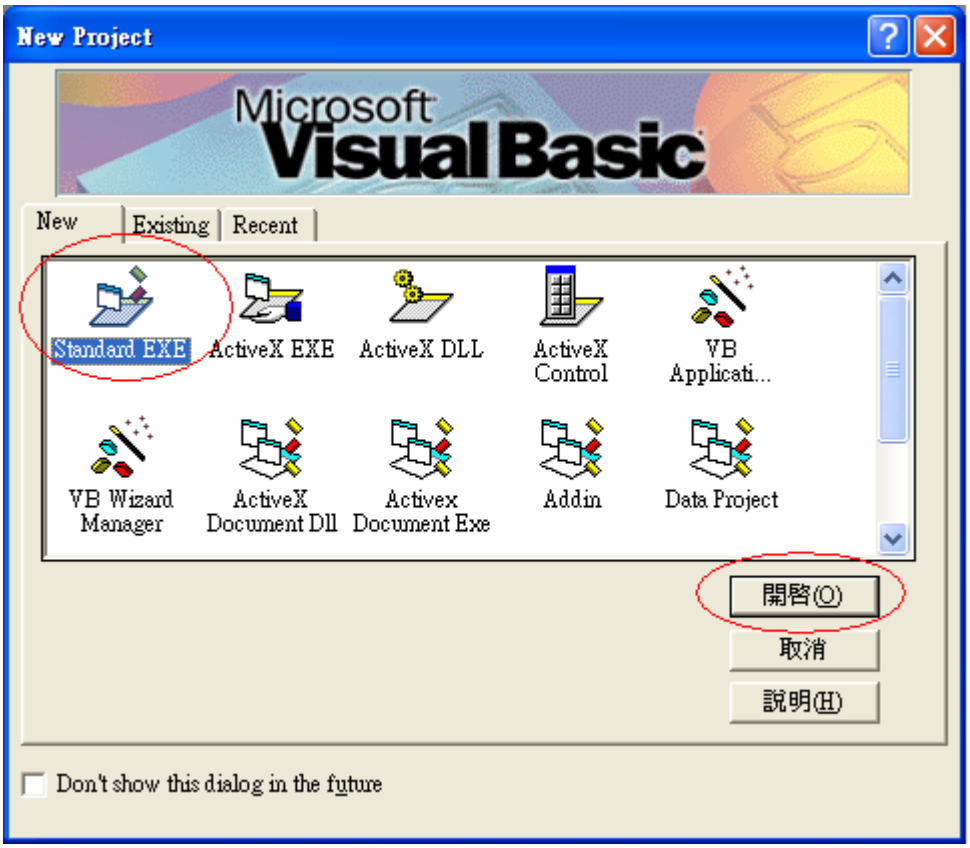
(C:\ICPDAS\PISO-PS400\Include)

PS400.bas

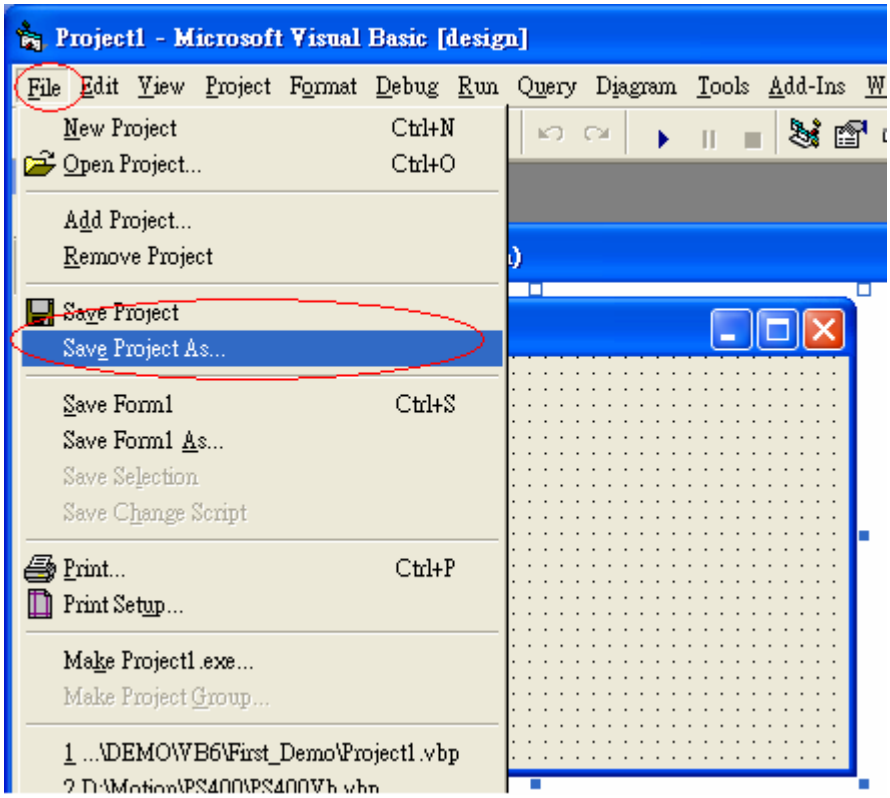
If you don't have, please look for CD or download the latest edition from ICPDAS's website http://www.icpdas.com/**.**

4.2.2 Create a New VB Application Project

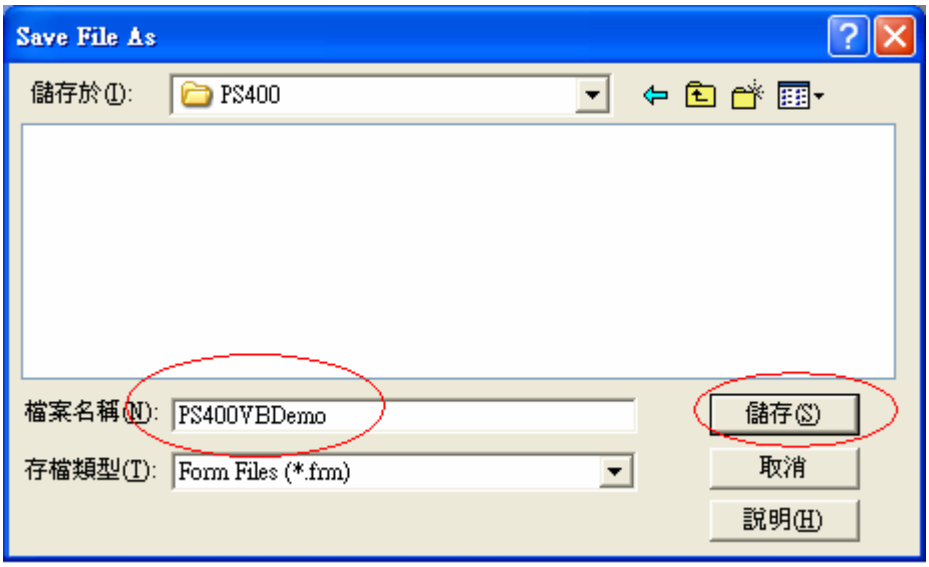
Please execute the Microsoft Visual Basic 6.0. Then click "File" -> "New Project" to create a new application. In the "New Projects" dialog, choose "Standard EXE" template, and click "OK" in the end.



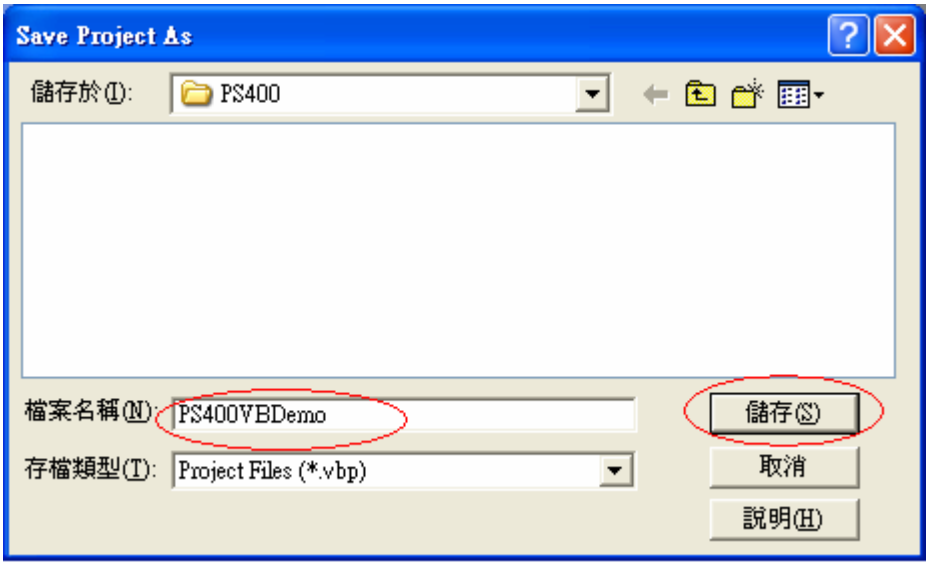
Select the ”File”➔”Save Project” in pull-down menu.



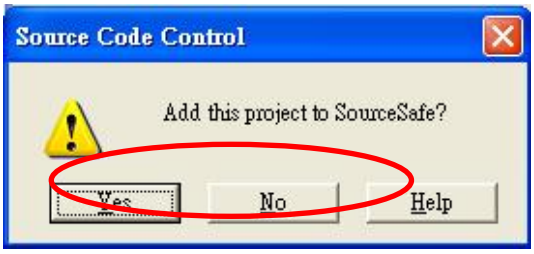
Specify the file name of the form as ”PS400VBDemo”, then click “Save”.



Specify the file name of the Project as ”PS400VBDemo” then click “Save”.



Choose ”Yes” or “No” to determine adding the source code into the SourceCodeControl.

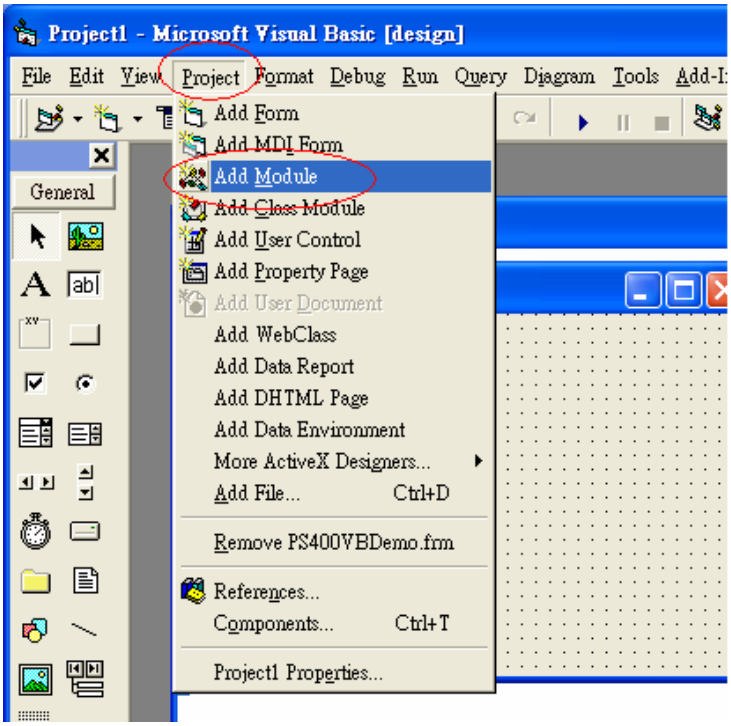


A new project establishment is finished.

4.2.3 Add The PS400.BAS into the VB Application Project

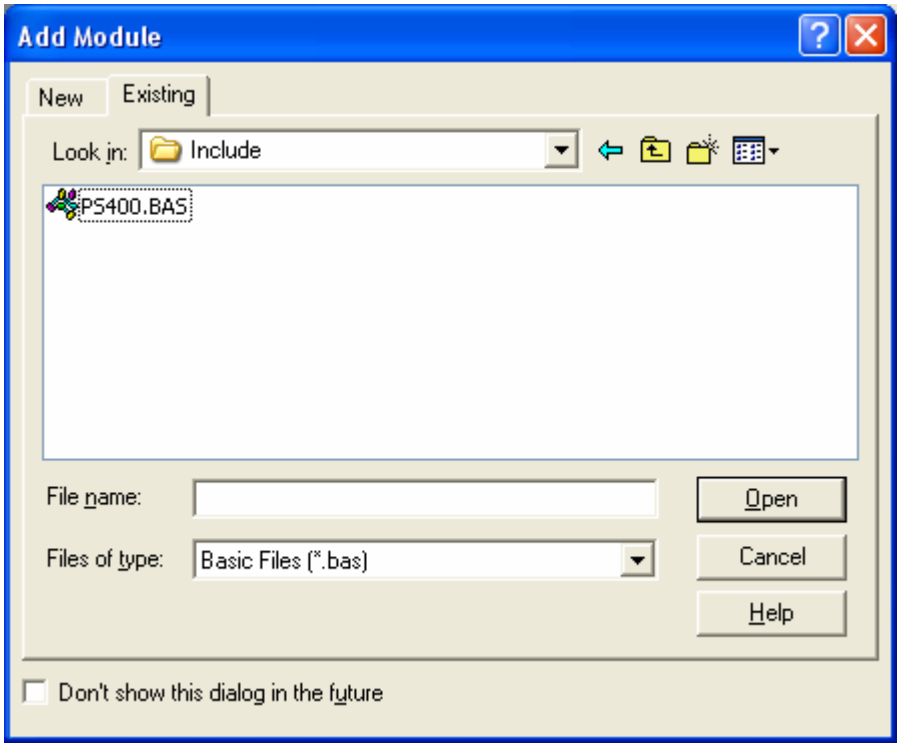
Append the “PS400.BAS” to the project as below:

Select the ” Project”➔”Add Module” in pull-down menu.



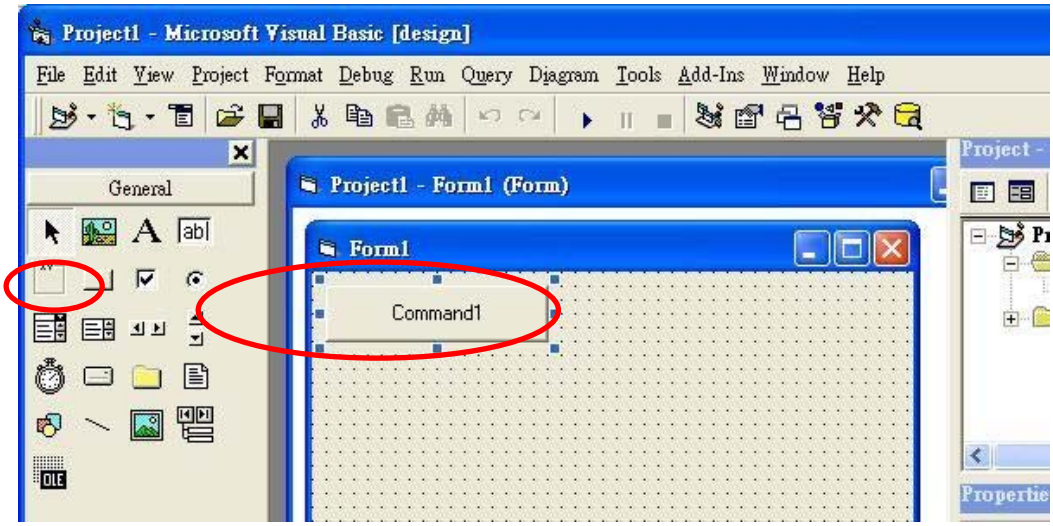
In “Add Module” popup dialog, choose ”Existing” page and found the file, “PS400.BAS” in the specified directory.

(C:\ICPDAS\PISO-PS400\Include)



4.2.4 Start the VB Sample

Add a BUTTON in the Dialog, as shown below:

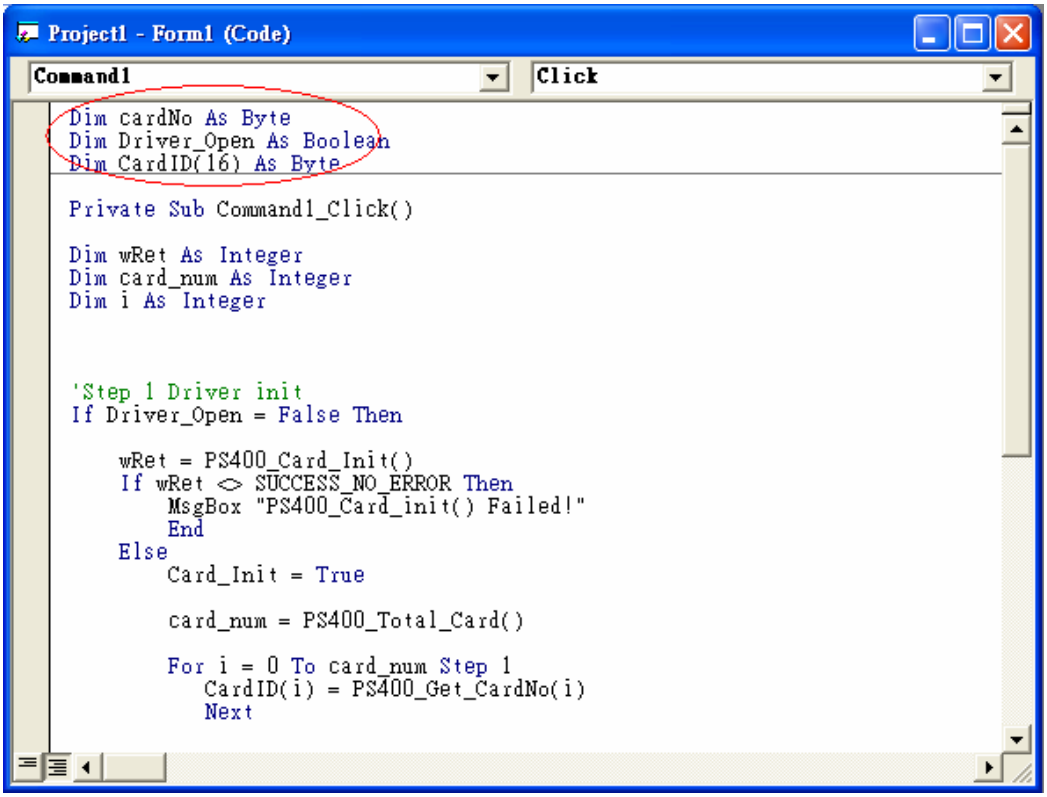


Double click the “BUTTON” and create a sub-routine in the code editor.

Add the declarations

```
Dim cardNo As Byte
Dim Driver_Open As Boolean
Dim CardID(16) As Byte
```

at the beginning of this file. Call the specific function of PS400DLL library in the “command1_Click” sub-routine as shown in the following figure:



Detailed code are presented below:

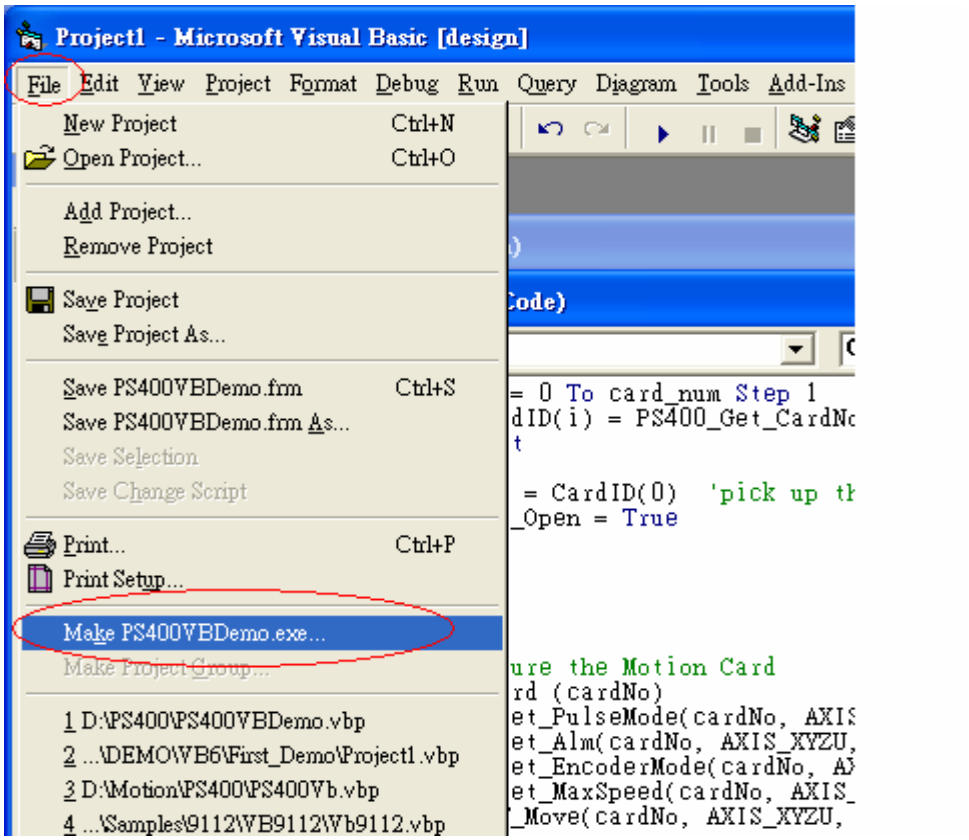
```
Dim wRet As Integer
Dim card_num As Integer
Dim i As Integer

'Step 1 Driver init
If Driver_Open = False Then

    wRet = PS400_Card_Init()
    If wRet <> SUCCESS_NO_ERROR Then
        MsgBox "PS400_Card_init() Failed!"
        End
    Else
        Card_Init = True

        card_num = PS400_Total_Card()

        For i = 0 To card_num Step 1
            CardID(i) = PS400_Get_CardNo(i)
            Next
```

```
            cardNo = CardID(0)    'pick up the 1st motion card
            Driver_Open = True

        End If

    End If

    'Step 2 Configure the Motion Card
    PS400_Reset_Card (cardNo)
    wRet = PS400_Set_PulseMode(cardNo, AXIS_XYZU, 2)    'set the pulse output mode
    wRet = PS400_Set_Alm(cardNo, AXIS_XYZU, 0, 0)        'disable the SERVO ALARM Input
    wRet = PS400_Set_EncoderMode(cardNo, AXIS_XYZU, 0)           'set the encoder input type
    wRet = PS400_Set_MaxSpeed(cardNo, AXIS_XYZU, 16000)          'set the max speed for XYZU
    wRet = PS400_T_Move(cardNo, AXIS_XYZU, 500, 10000, 5000, 0, 50000)   'Starting volecity = 500, Maximum
    volecity = 10000, Acceleration = 5000, Offset Pulse = 0, Pulse Command = 50000

    wRet = PS400_Set_Servo_ON(cardNo, AXIS_XYZU, 1)     'set the Servo_ON to servo motors

    'Step 3 Waiting for Motion done
    Do While PS400_Motion_Done(cardNo, AXIS_XYZU) <> NO
        Sleep (1000)
    Loop
```

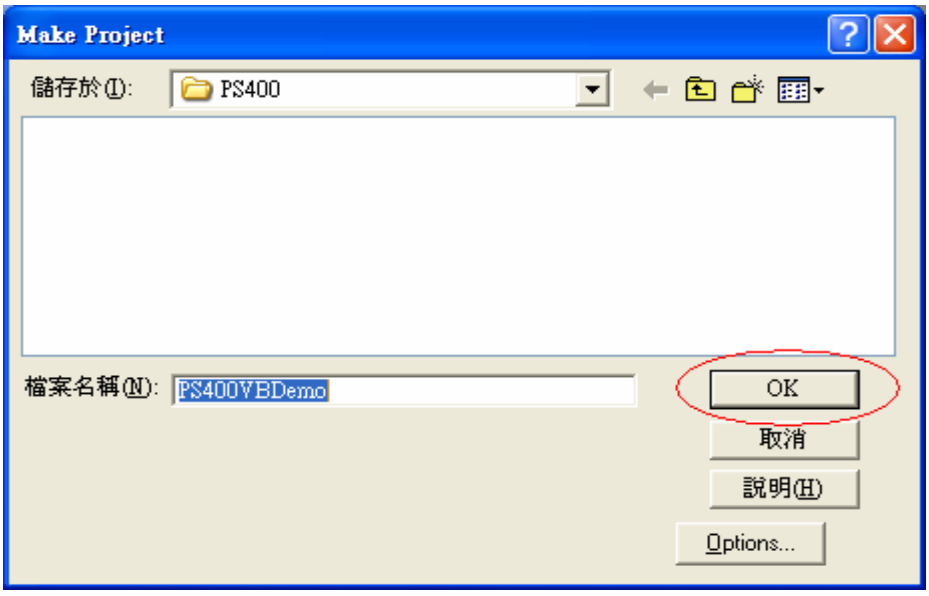
Please refer to the example “First_demo” for further details

4.2.5 Build the Project

Select the ”File”➔” Make PS400VBDemo.exe” in pull-down menu.



After pressing the button “OK”, this simple program is finished, if there is no error message happened.



4.3 BCB 6 Guideline

4.3.1 Confirm The Relative Files

Please confirm you have the following relevance files in the relative path:

(C:\ICPDAS\PISO-PS400\Include):

- PS400BCB.h

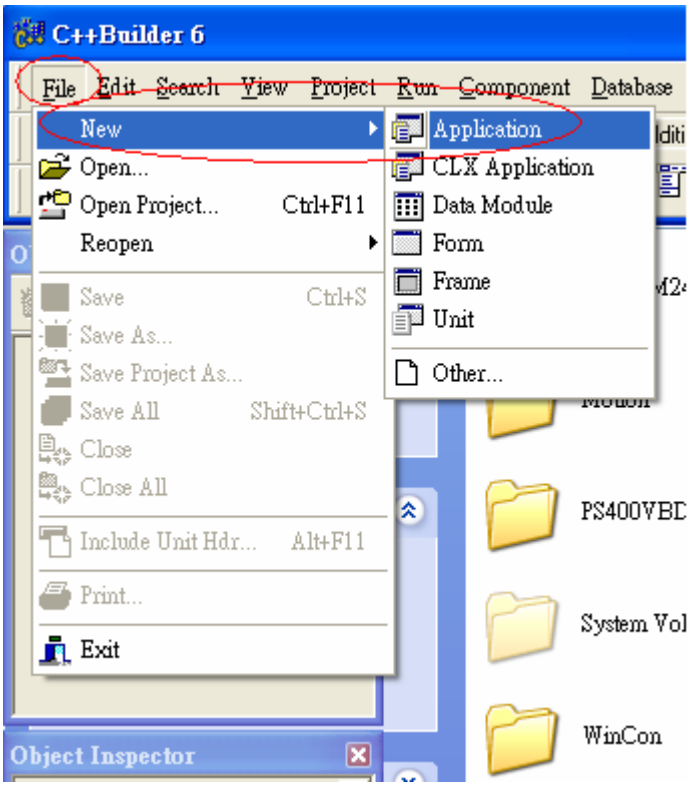
(C:\ICPDAS\PISO-PS400\Lib):

- PS400BCB.lib

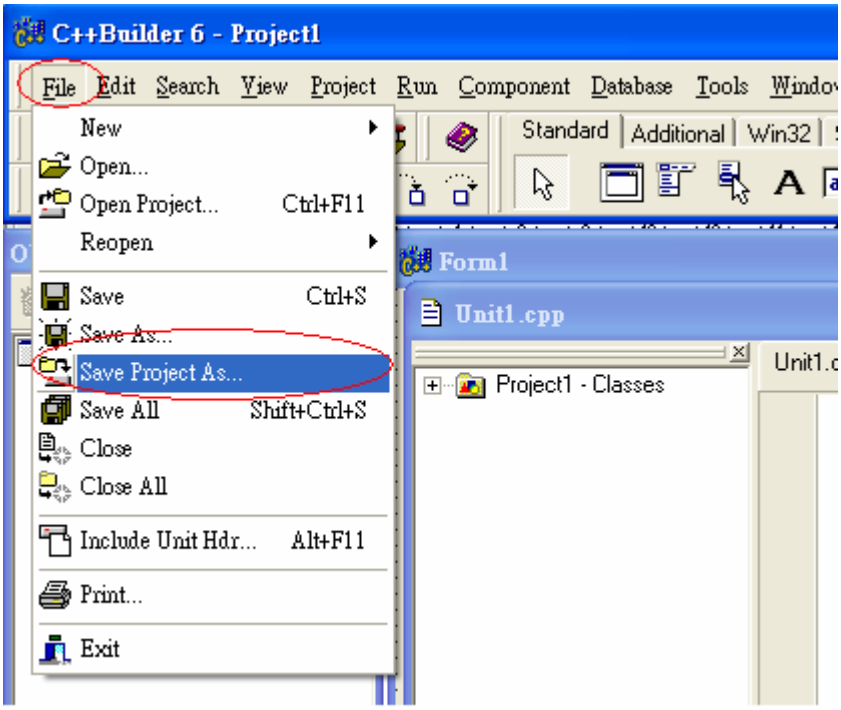
If you don't have, please look for CD or download the latest edition from ICPDAS's website http://www.icpdas.com/**.**

4.3.2 Create a New BCB Application Project

Please execute the Borland C++ Builder 6.0, then click "File" ➔ "New" ➔ "Application" to create a new project.

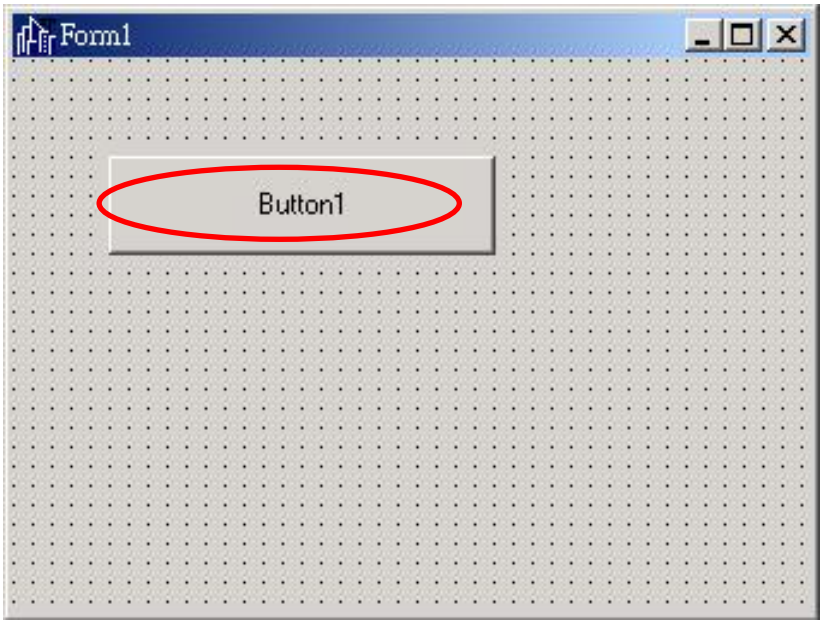


Select the ”File”➔”Save Project As…” in pull-down menu and save this project.



4.3.3 Start the BCB Sample

Drag an UI component “Tbutton” from VCL ToolBox, and draw it on the FORM as shown below:



DoubleClick “button1” on the Form1 to popup the code editor window as shown below:

Double Click “button1” on the “Form1” dialog. The code editor window will be popup as shown

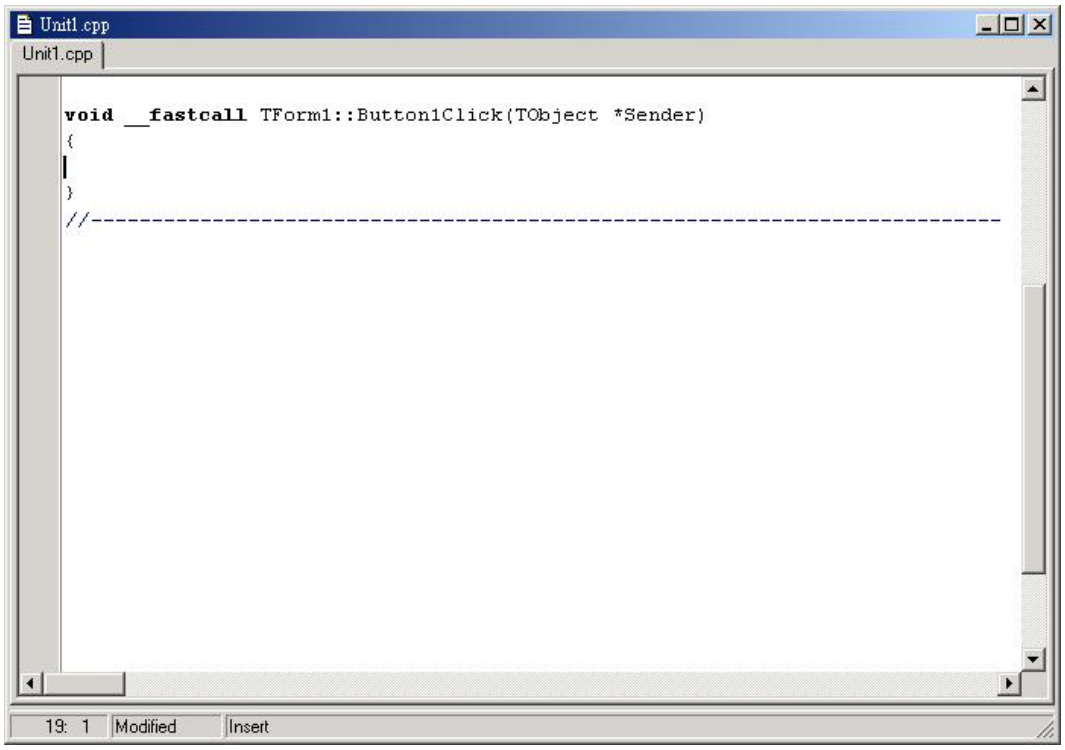
below:

Double click the “BUTTON” and create a sub-routine in the code editor.

Add the declarations

```
Dim cardNo As Byte
Dim Driver_Open As Boolean
Dim CardID(16) As Byte
```

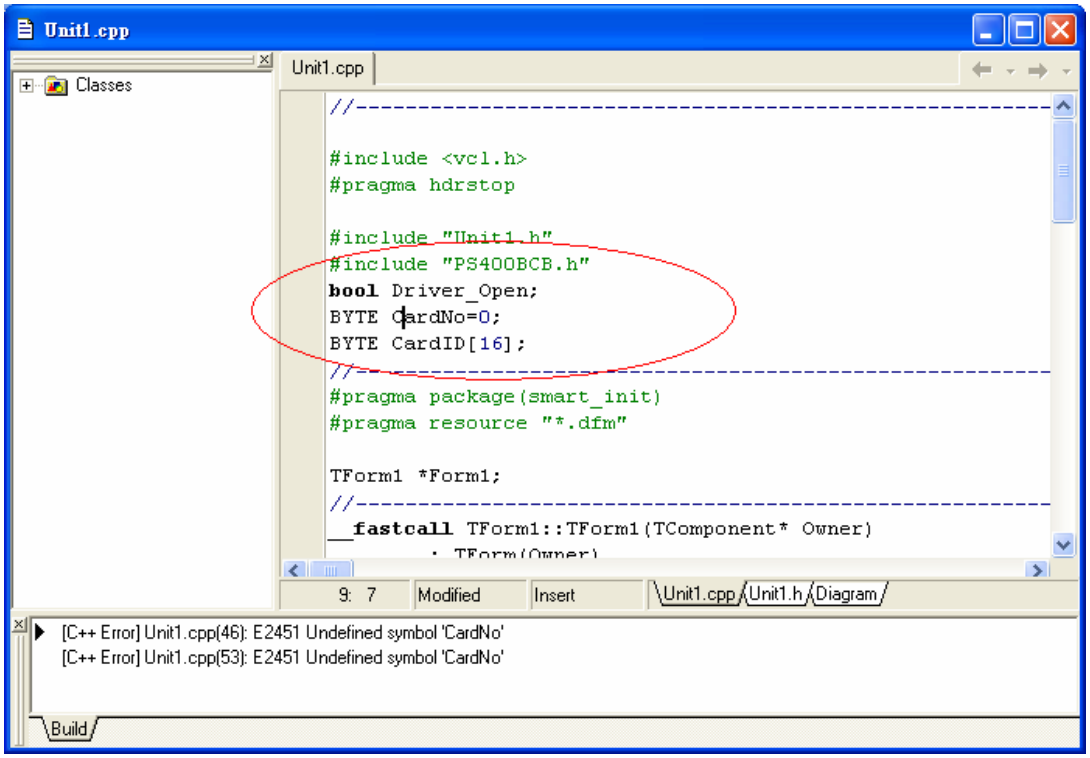
at the beginning of this file. Call the specific function of PS400DLL library in the “command1_Click” sub-routine as shown in the following figure:



Add the declarations

```
#include "PS400BCB.h"
bool Driver_Open;
BYTE CardNo=0;
BYTE CardID[16];
```

at the beginning of this file.



Coding in the “Button1Click” function section :

```
short wRet;
//===== Step 1 Driver init
if   (!Driver_Open)
{
      wRet = PS400_Card_Init ();
      if (wRet != SUCCESS_NO_ERROR )
      {
          Application->MessageBox( "PS400_Card_init() Failed!", "ERROR", MB_OK );
          return;
      }
      else
      {
          short card_num = PS400_Total_Card();
          for (short i = 0; i < card_num; i++)
          {
                CardID[i] = PS400_Get_CardNo((BYTE)i);
          }
          CardNo = CardID[0];    // pick up the 1st motion card
          Driver_Open = true;
      }
}
//====='Step 2 Configure the Motion Card
PS400_Reset_Card(CardNo);
PS400_Set_PulseMode(CardNo, AXIS_XYZU, 2);        //set the pulse output mode
```

```
PS400_Set_Alm(CardNo, AXIS_XYZU, 0, 0);              //disable the SERVO ALARM Input
PS400_Set_EncoderMode(CardNo, AXIS_XYZU, 0); //set the encoder input type
PS400_Set_MaxSpeed(CardNo, AXIS_XYZU, 16000); //set the max speed for XYZU
PS400_T_Move(CardNo, AXIS_XYZU, 500, 10000, 5000, 0, 50000 ); // Starting volecity = 500, Maximum volecity = 10000, Acceleration = 5000, Offset Pulse = 0, Pulse Command = 50000
PS400_Set_Servo_ON(CardNo, AXIS_XYZU, 1);              //set the Servo_ON to servo motors

//======'Step 3 Waiting for Motion done
while (PS400_Motion_Done(CardNo, AXIS_XYZU) == NO)
{
    Sleep(1);
    //wait for axis to stop
}
```

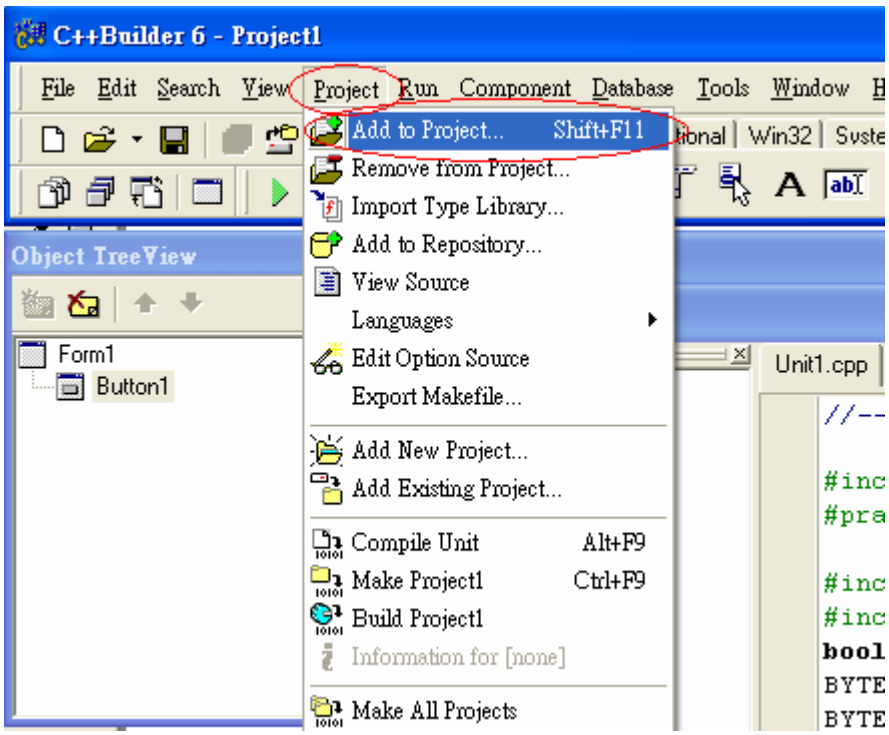
Please refer to the example “First_demo” for further details

4.3.4 Add The Reference Path into the BCB Application Project

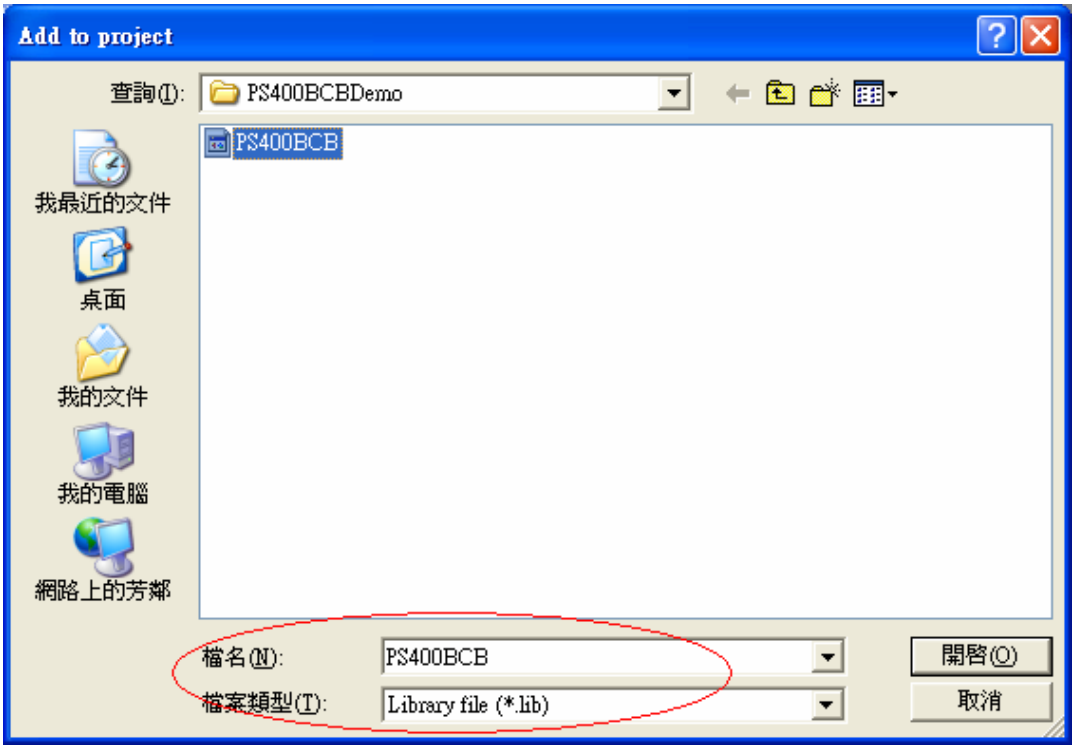
Please selecting the “Directories/Conditional” Tab in the menu “Project” ➔ “Options” to add the installation path (C:\ICPDAS\PISO-PS400\Include, C:\ICPDAS\PISO-PS400\Lib) into the Include path and Library path.

4.3.5 Add the PS400BCB.lib into the project

Select the ” Project” ➔ “Add to Project…” in pull-down menu.

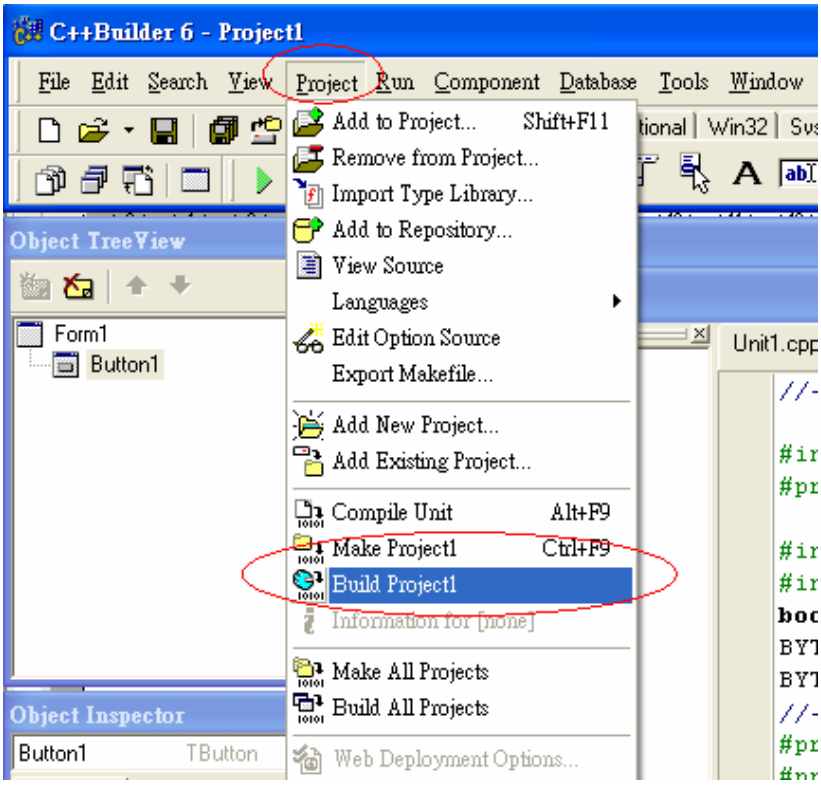


Select ”Library File (*.lib)” from the file-type-filter ComboBox. Choose the file “PS400BCB.lib” and click “Open”.



4.3.6 Build the Project

Please choose “Project” ➔ “Build Project1” in the menu. This simple program is finished, if there is no error message happened.



5 PISO-PS400 PCEzGo(by Basic Function)

The initial frame of PISO-PS400 PCEzGo is shown in the following figure. Four categories of test function are displayed in the initial frame.

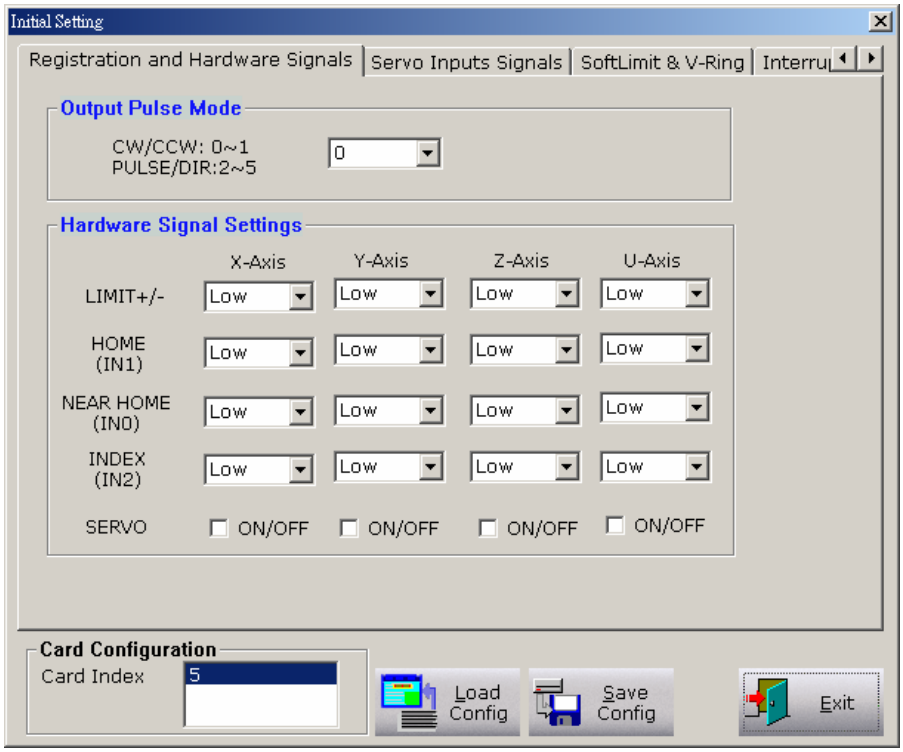
1. Initial Settings: (in section 5.1.1 ~ 5.1.4)
   Four sub-items, "Registration and Hardware Signals", "Servo Input /Output Signals", "Compare Register Counters", and "Interrupt Configuration", are individually presented in "Initial Settings" Dialog. Please refer to the illustrations of each section for further detail.
2. Command: (in section 5.2.1 ~ 5.2.3)
   This category is set the Common Motion commands and the advanced commands. Three sub-items, "Acc/Dec Motion" (Constant , T-profile , S-curve), "Automatic Home Search", and "Jog Operation", are individually presented in "Command" Dialog. Please refer to the illustrations of each section for further detail.
3. Interpolation: (in section 5.3.1 ~ 5.3.2)
   This category is set the Interpolation commands. Two sub-items, "Linear and Circular interpolation" and "Offline profiling", are individually presented in "Interpolation" dialog. Please refer to the illustrations of each section for further detail.
4. FRnet Demo: (In section 5.4)
   The FRnet DI/DO dialog is for the FRnet remote I/O data transmission test. The FRnet can scan the dynamic data directly at a constant period without CPU communicating. Therefore, the FRnet DI/DO transmission can be regarded as a background daemon to provide the DI/DO data for motion control. And also the FRnet DI/DO module in this motion card provides an interrupt signal with different timer base. Please refer to the illustrations of each

section for further detail.

5.1 Initial Settings Dialog

There are four sub-items, “Registration and Hardware Signals”, ”Servo Input /Output Signals”, ”Compare Register Counters”, and ”Interrupt Configuration”, in “Initial Settings” Dialog. The initial settings must be finished to continue the following motion operations if the PCEzGo is executed again. Please refer to the illustrations of each section for further detail.

5.1.1 Registration and Hardware Signals



Group definition and brief description

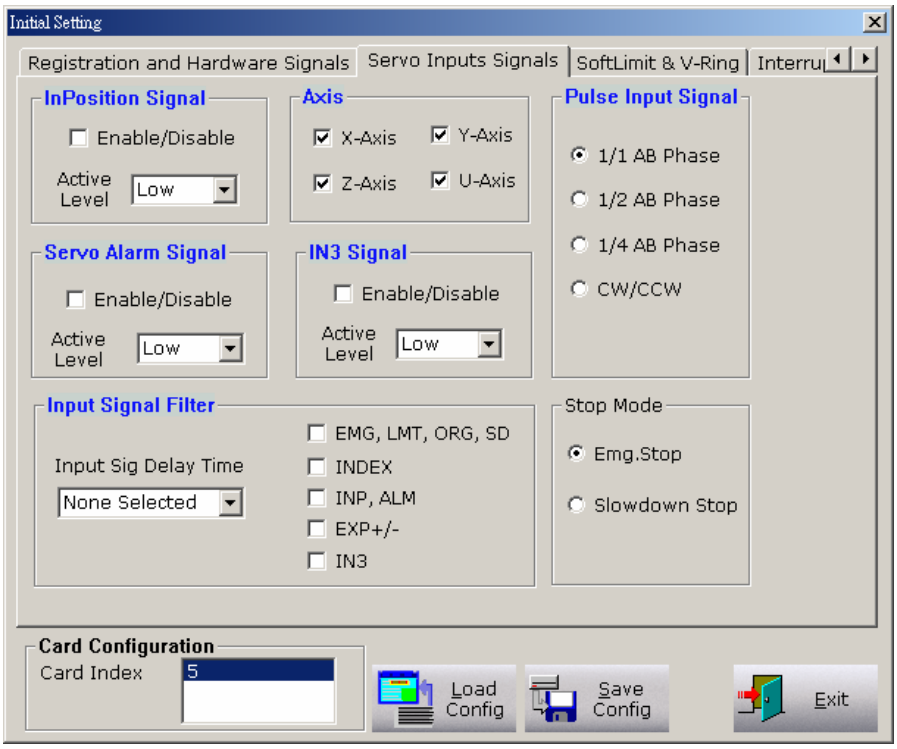
1. Card Configuration:
   - Press the “InitCard” button to search all PISO-PS400 motion cards plugged in the PC. The searched cards are listed its ID number in order. Choose the ID number of the controlled motion card and press “Apply” to finish the Card Configuration.
     - ✓ Relative Functions: PS400_Card_Init(), PS400_Toatal_Card(), PS400_Get_CardNo()。
2. Output Pulse Mode:
   - The types of pulse output are classified into 6 modes: 0, 1 is CW/CCW dual channel mode, 2~5 is PULSE/DIR single channel mode. Finish the operation choice of pulse output mode after determining the mode ID and clicking the button, “Apply”.

✓ Relative Function: PS400_Set_PulseMode()。

3. Hardware Signals Settings:
   - The logical trigger level (Hi/Low) of the hardware signals, front/rear traveling limits(LIMIT+/-), home limit sensor(HOME), near home limit sensor(NEAR HOME), servo motor Z-phase signal(INDEX), and servo on/off (SERVO ON/OFF), are set in this sub-item. The logical trigger level (Hi/Low) of each signals for each axis can be set individually. Finish the hardware signals settings after determining the logical trigger level and clicking the button, “Apply”.
     ✓ Relative Function: PS400_Set_Limit(), PS400_Set_Home(), PS400_Set_Servo_ON()

4. Function of Buttons
   - Apply: designate the card number and apply all of the setting values of this dialog.
   - Load: Load the preserve setting values which are stored previously.
   - SaveConfig: Reserve settings of the hardware signals into the ini file.
   - Exit: Exit this dialog window.

5.1.2 Servo Input Signals



Group definition and brief description

1. Servo InPosition Signal
   - Configurable feature enable/disable and logical trigger level of the Servo In-position signal.
     - ✓ Relative Function: PS400_Set_Inp().

2. Axis Setting
   - To assign the axes to set properties of the input signals.

3. Servo Alarm Signals
   - Configurable feature enable/disable and logical trigger level of the Servo Alarm signal.
     - ✓ Relative Function: PS400_Set_Alm().

4. IN3 Signal
   - Configurable feature enable/disable and logical trigger level of the IN3 signal.
     - ✓ Relative Function: PS400_Set_Input().

5. Pulse Input Signal
   - Configure the encoder input mode as AB phase or CW/CCW (Up/Down count). Specify the frequency division at AB phase mode.(0=1:1 , 1=1:2 , 2=1:4)
     - ✓ Relative Function: PS400_Set_EncoderMode().

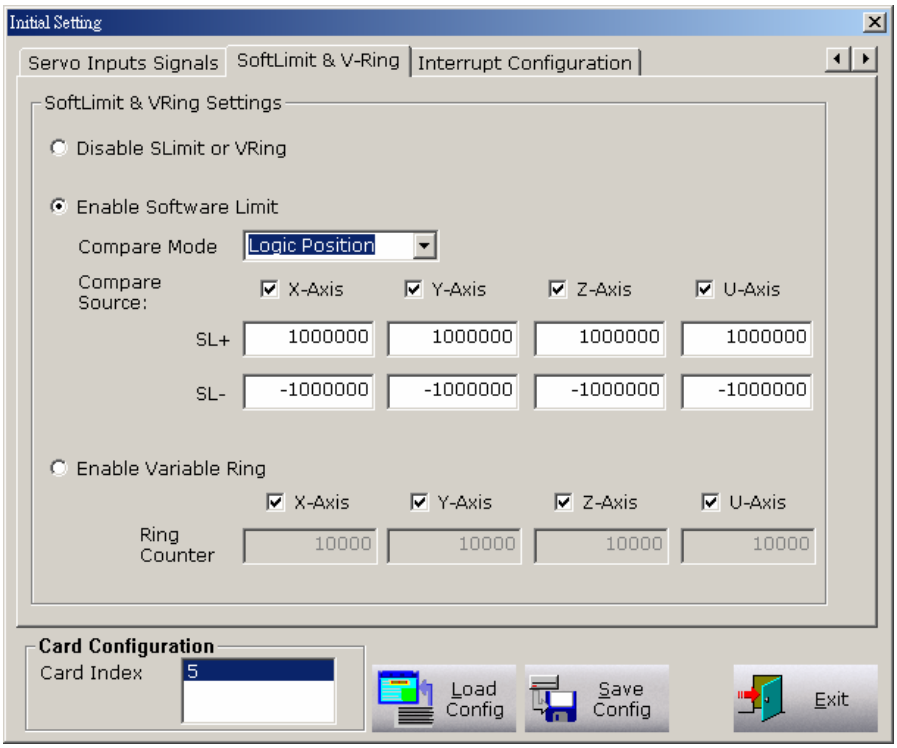
6. Digital filters of the input signals
   - Setting the delay time of each input signal filter:
     The suitable delay time and the related removable maximum noise width are listed in the following table:

Code	Removable max. noise width	Input signal delay time
0	1.75μSEC	2μSEC
1	224μSEC	256μSEC
2	448μSEC	512μSEC
3	896μSEC	1.024 mSEC
4	1.792 mSEC	2.048 mSEC
5	3.584 mSEC	4.096 mSEC
6	7.168 mSEC	8.192 mSEC
7	14.336 mSEC	16.384 mSEC

- Setting the input signals with digital filter:
  There are five check box (FE0 ~ FE4) to set the input signals to use digital filter.
  FE0 is for Emg. Signal (EMGN), +/- limits (LMT±), Home limit(IN1), and Near Home limit(IN0)
  FE1 is for Encoder Z phase signal (IN2)
  FE2 is for Servo In-position signal (INP) and Servo alarm signal (ALM).
  FE3 is for +/- external pulse input(EXP+/EXP-).
  FE4 is for IN3 signal.
  - ✓ Relative Function: *PS400_Set_Filter()*。

7. Function of Buttons
   - LoadConfig: Load the preserve setting values which are stored previously.
   - SaveConfig: Reserve settings of the hardware signals into the ini file.

5.1.3 Setting SoftLimit & V-Ring Function



Group definition and brief description

1. Disable SLimit or VRing:
   - SLMT+/-: Disable the software limit.

- ✓ Relative function: *PS400_Disable_SoftLimit()*,

- VRing: Disable the VRing.
  - ✓ Relative function: PS400_Set_Vring();

2. Enable Software Limit
   - Counter Mode：Choose the compare register source: Logic Position or Real Position.
   - To set the SLMT+/- value of 4-axes to the compare register counter.
   - Relative function: *PS400_Disable_SoftLimit()*,,PS400_Set_Compare().

3. Enable Variable Ring:
   - To set the Variable Ring counter value of 4-axes.
   - Relative Function: PS400_Set_Vring()

4. Function of Buttons
   - LoadConfig: Load the particular Files(.ini) which are stored by user previously..
   - SaveConfig: Save the relative hardware signal setting to the .ini file.

5.1.4 Interrupt Configuration

Group definition and brief description

1. Interrupt Factor Setting

   Ten kinds of interrupt event settings are provided in PISO-PS400 motion card.

   1. **Pulse-Up:** the interrupt is produced as the first pulse happened.
   2. **Position Counter >= Comp- Counter:** Position counter is greater than or equal to the negative direction compared register.
   3. **Position Counter < Comp- Counter:** Position counter is less than the negative direction compared register.
   4. **Position Counter >= Comp+ Counter:** Position counter is greater than or equal to the positive direction compared register.
   5. **Position Counter < Comp+ Counter:** Position counter is less than the positive direction compared register.
   6. **End of Constant Speed Drive,**
   7. **Start of Constant Speed Drive,**
   8. **Drive Finished,**
   9. **Home Termination,**
   10. **Interrupt event in Synchronous action.**

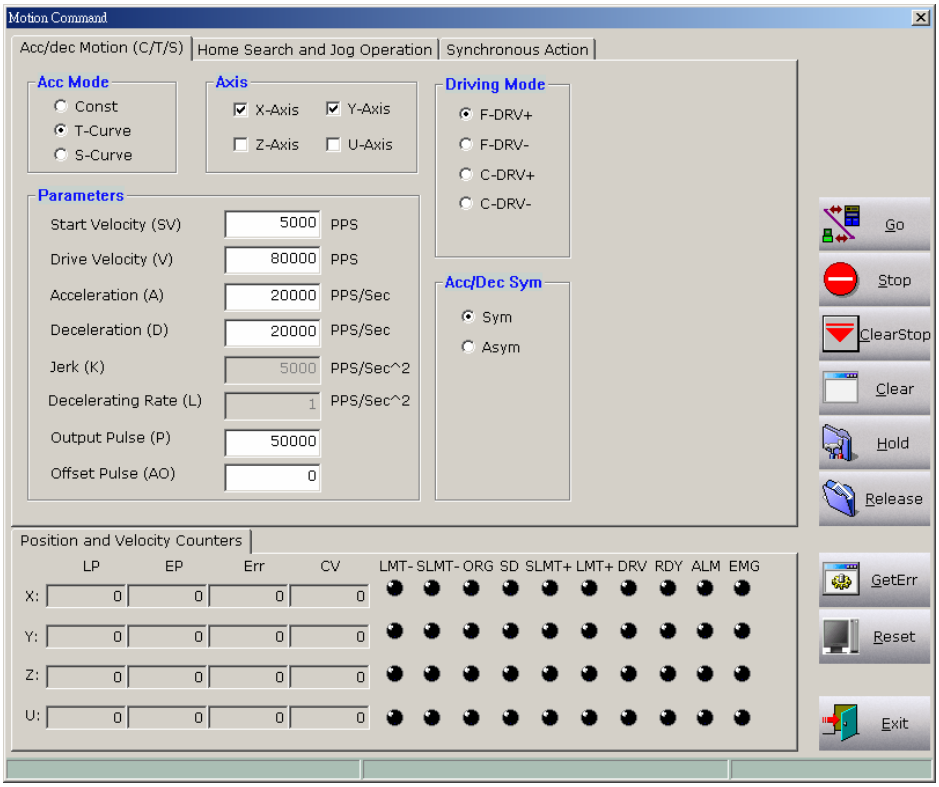
   User can exercise the multi-thread concept to program the interrupt service routine in threads and co-operate with the called interrupt function.

   - ✓ Relative Function: *PS400_Set_INT_Factor(), PS400_Enable_INT(),*

PS400_Disable_INT(), PS400_Is_INT_Active(), PS400_Get_INT_Flag(), PS400_Clear_INT_Flag().

5.2 Command Dialog

5.2.1 Acc/Dec Motion



Group definition and brief description

1. Acc Mode

   PISO-PS400 provides 3 basic modes of the Acc./Dec. profile: Const. speed, T-Curve, and S-Curve.

2. Axis

   - To assign the axes to set the desired command.

3. Driving Mode

   - PISO-PS400 provides 4 driving modes:
     fixed-amount driving in positive direction,
     fixed-amount driving in negative direction,
     continuous driving in positive direction, and

continuous driving in negative direction.

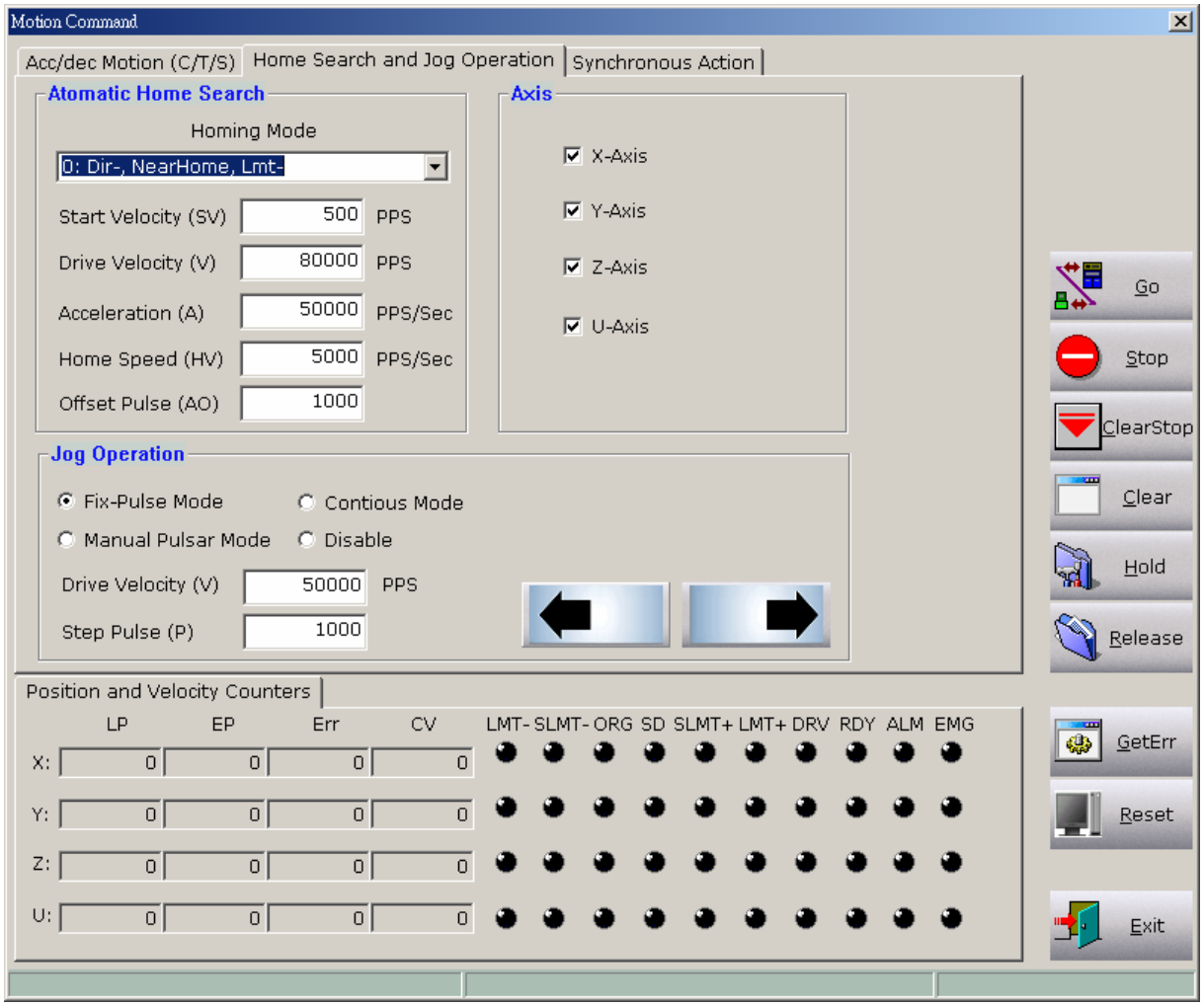
- ✓ Relative Function: *PS400_Const_Move(), PS400_T_Move(), PS400_T_Move(), PS400_T_As_Move(), PS400_S_Move(), PS400_S_As_Move(), PS400_Conti_Move()*.

4. Acc/Dec Sym
   - The default Acc./Dec. profile is symmetrical. User can specify the relative parameters, deceleration (D) and deceleration rate (L), to configure as asymmetrical (Asym) profile.
     - ✓ Relative Function: *PS400_T_As_Move(), PS400_S_As_Move().*

5. Position and Velocity Counters
   - The dialog is separated into two sub-pages: “position and velocity counters” and “I/O Signal Status”.
   - The position/velocity counter sub-page displays the motion information for each axis, such as the logical position counter (LP), physical position counter (EP), position error (Error), and current velocity (Current Speed).
   - The I/O Signal Status sub-page displays the I/O signals of motion, such as the hardware limit switch, Home, NRHome, IN3, Alarm, EMG….etc..

6. Function of Buttons
   - Go: Perform the motion operation after click “Apply”.
   - Stop: Stop motion immediately.
   - ClearStop: Clear the flag of the Stop command.
     After you click “Stop”, you must click “ClearStop” for performing motion later.
   - Clear: Clear logical and actual register of the 4 axes.
   - Hold: Press “Hold” before click “Go”. This will suspend motion commands until the “Release” button is pressed.
   - Release: Release the “Hold” operation.
   - GetError: Click it to check the ErrorCode displayed in the 3rd column of StatusBar on the screen below.
   - Reset: Restore PS400 to the initial state
   - Exit: Exit this dialog window.

5.2.2 Home Search and Jog Operation



Group definition and brief description

1. Automatic Home Search

   - PISO-PS400 provides several Homing modes, user can compose these 4 steps by himself. PCEzGo only provides 12 modes for application and testing.

   - 12 Home search modes are descript as the below table:

mode 0/1	Hardware signal	Enable/Disable	Direction
step1	**Near Home (IN0)**	**Yes**	**−/+**
step2	Home (IN1)	No	−/+
step 3	Z-phase Index	No	−/+
step 4	**Offset Pulse**	**Yes**	**User define**
mode 2/3	Hardware signal	Enable/Disable	Direction

step 1	Near Home (IN0)	No	−/+
step 2	**Home (IN1)**	**Yes**	**−/+**
step 3	Z-phase Index	No	−/+
step 4	**Offset Pulse**	**Yes**	**User define**
mode 4/5	Hardware signal	Enable/Disable	Direction
step 1	**Near Home (IN0)**	**Yes**	**−/+**
step 2	**Home (IN1)**	**Yes**	**−/+**
step 3	Z-phase Index	No	−/+
step 4	**Offset Pulse**	**Yes**	**User define**
mode 6/7	Hardware signal	Enable/Disable	Direction
step 1	Near Home (IN0)	No	−/+
step 2	**Home (IN1)**	**Yes**	**−/+**
step 3	**Z-phase Index**	**Yes**	**−/+**
step 4	**Offset Pulse**	**Yes**	**User define**
mode 8/9	Hardware signal	Enable/Disable	Direction
step 1	**Near Home (IN0)**	**Yes**	**−/+**
step 2	Home (IN1)	No	−/+
step 3	**Z-phase Index**	**Yes**	**−/+**
step 4	**Offset Pulse**	**Yes**	**User define**
mode10/11	Hardware signal	Enable/Disable	Direction
step 1	**Near Home (IN0)**	**Yes**	**−/+**
step 2	**Home (IN1)**	**Yes**	**−/+**
step 3	**Z-phase Index**	**Yes**	**−/+**
step 4	**Offset Pulse**	**Yes**	**User define**

✓ Relative Function: *PS400_Set_HomeSpeed(), PS400_Set_HomeMode(), PS400_Home_Start()*.

2. Axis
   - ■ Specify the motion axes for home search and jog operation.

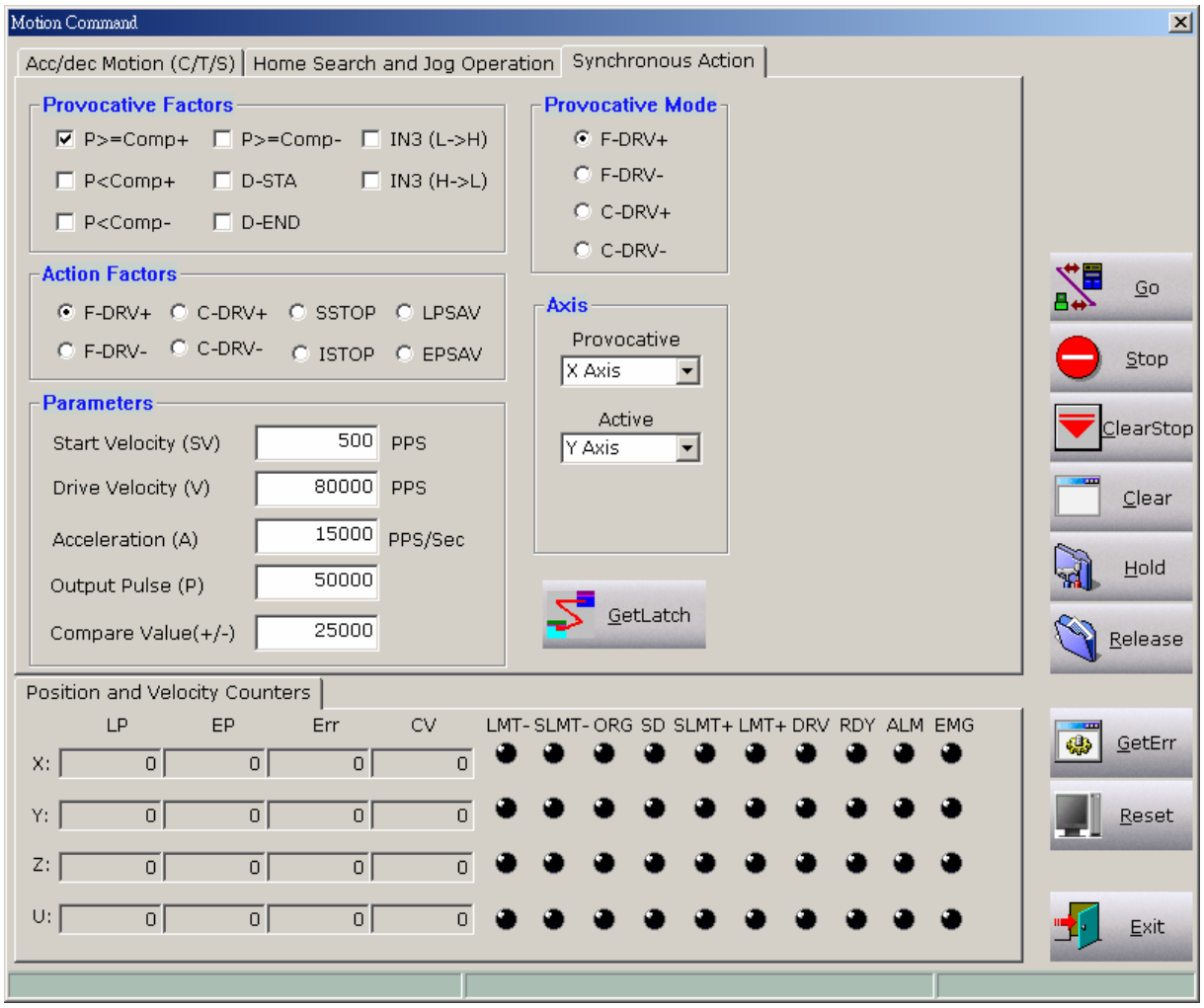
3. Jog Operation
   - ■ The operation in PCEzGo can be operated from the external signals (EXP+ / EXP-) input which can be produced from an external hardware, such as the Manual Pulse Generator or switch buttons. Four driving modes are provided in this jog operation: JOG Disable, Fix-Pulse Mode, Continuous Mode, and Manual Pulse Mode.
     ✓ Relative Function: *PS400_Set_ManualPalsar()*.

4. Parameter settings
   - Homing parameters includes starting velocity (SV), driving velocity (V), home speed (HV), acceleration(A), and offset pulse (AO), are set in “Automatic Home Search” sub-page. For Jog operation, only driving velocity (V) at constant velocity and step pulse (P) are needed to be written in the “Jog Operation” sub-page.

5. I/O Signal Status
   - PS400 provides the LED indication of HW/SW signals and Servo status of each axis. The HW/SW signals includes the hardware limit switch sensors (LMT+/LMT-), software limit (SLMT+/SLMT-), Home limit switch sensors (Home) and Near Home limit switch sensor (NRHome). Servo status signals includes the pulse-driving (DRV), servo in position (INP), servo alarm (ALARM), and Emergency stop (EMG).
     - ✓ Relative Function: *PS400_Get_DI_Status().*

6. Function of Buttons
   - The same as the illustration in section 5.2.1.

5.2.3 Synchronous Action



Group definition and brief description

1. Provocative Factors

   - Eight provocative factors can induce the synchronous action. These factors are described as:

     P≥COMP+: Pulse counter is greater than or equal to COMP+,

     P<COMP+: Pulse counter is smaller than COMP+,

     P<COMP-: Pulse counter is smaller than COMP-,

     P≥COMP-: Pulse counter is greater than or equal to COMP-,

     D-STA: Constant speed starts,

     D-END: Deceleration is ended,

     IN3 (L→H): nIN3 is in rising edge,

     IN3 (H→L): nIN3 is in falling edge

2. Provocative Mode

- There are four driving modes of the provocative axis. They are

  F-DRV+: Fixed pulse movement in positive direction,

  F-DRV-: Fixed pulse movement in negative direction,

  C-DRV+: Positive continuous movement,

  C-DRV-: Negative continuous movement.

3. Action Factors

- Specify the action of the active axis as the provocative factors happened. Six actions are acted in synchronous mode. They are

  F-DRV+: Fixed pulse movement in positive direction,

  F-DRV-: Fixed pulse movement in negative direction,

  C-DRV+: Positive continuous movement,

  C-DRV-: Negative continuous movement,

  SSTOP: Deceleration stop,

  ISTOP: Immediate stop.

  In latch mode, another two actions can also work. They are

  LPSAV: Store the current logic position，[Command → BR]

  EPSAV: Store the feedback position [Position → BR]

  ✓ Relative Function: PS400_Set_SyncMotion(), PS400_Set_Latch(), PS400_Get_Latch()。

4. Axis

- Specify the provocative (main) axis and the active (synchronous) axes.

5. Parameters

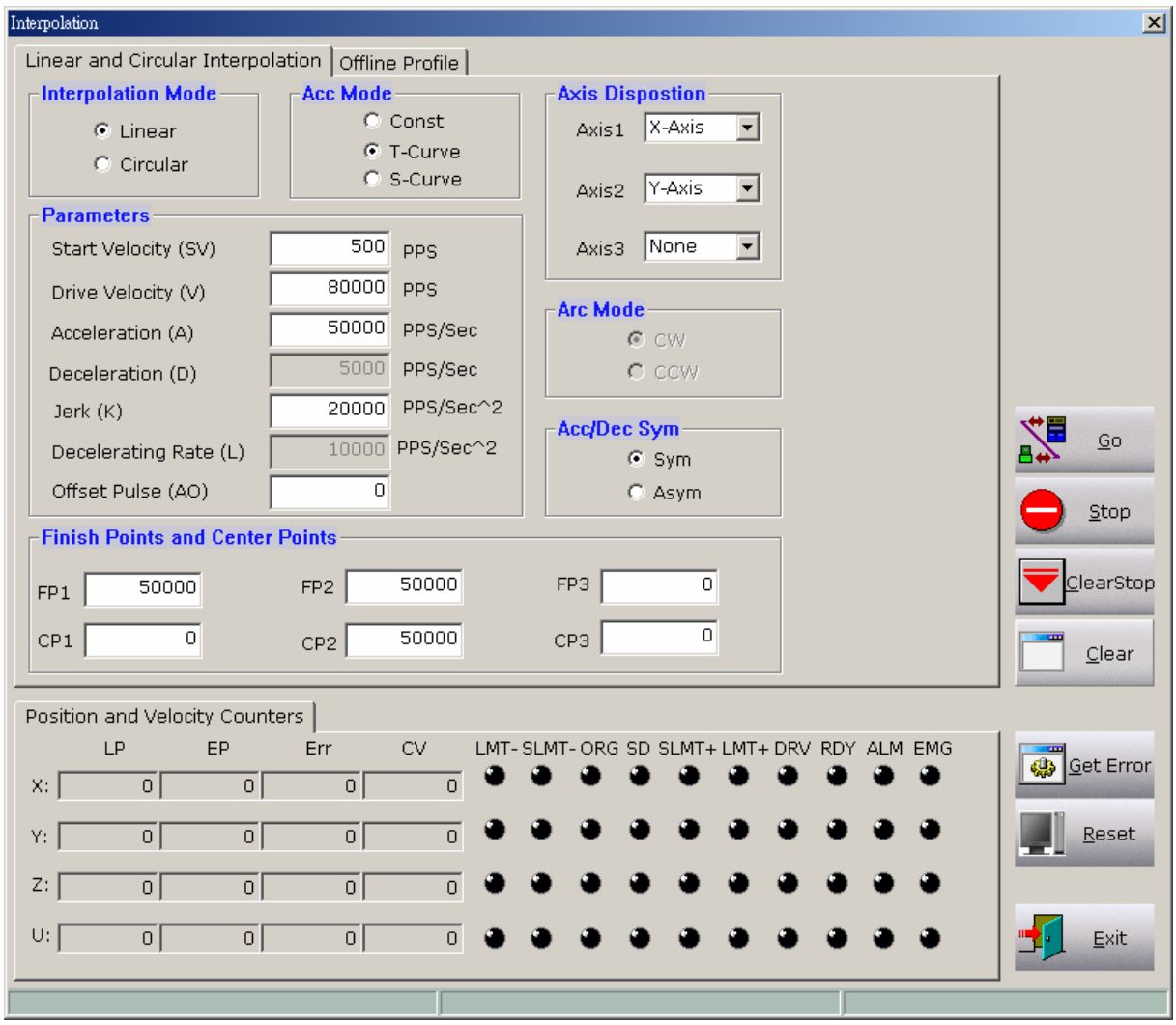
- The parameters, Starting Velocity (SV), Driving Velocity (V), Acceleration(A), Output Pulse (P), and the Compare Value are set in this sub-page.

6. Function of Buttons

- The same as the illustration in section 5.2.1.

5.3 Interpolation Dialog

5.3.1 Linear Interpolation and Circular Interpolation



Group definition and brief description

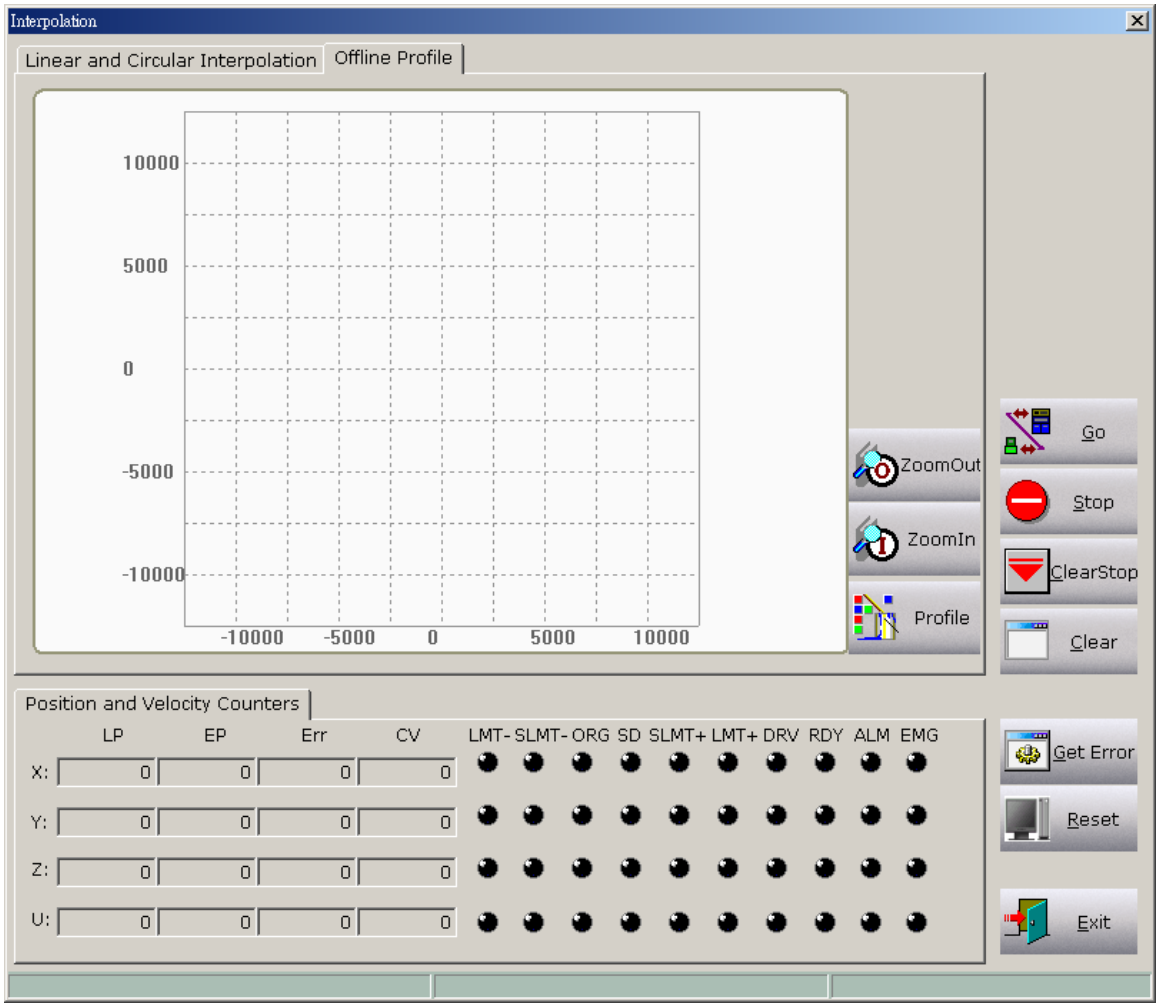
1. Interpolation Mode Setting
   - ■ PISO-PS400 PCEzGo offers two interpolation modes: Linear and Circular interpolation.
   - ✓ Relative Function: PS400_Line2_Move(), PS400_Line2_As_Move(), PS400_Line3_Move(), PS400_Line3_As_Move(), PS400_Arc2_Move()。
2. Acc. Mode Setting
   - ■ Three Acc. Modes can be chosen for interpolation: Const. Mode, T-Curve Model, and S-Curve Mode.
3. Axis Configuration
   - ■ Specify the motion axes for interpolation.

4. Direction setting of Arc Mode
   - Direction of Arc interpolation can be configured into CW or CCW.

5. Position and Velocity Counters
   - There are 2 tab-pages of the dialog which monitors position, velocity counters and the I/O status.
   - The position/velocity counters tab-page displays the information of logic position, actual position, position error and current speed of each axis.
     - ✓ Relative Function: *PS400_Get_Cpmmand(), PS400_Get_Position(), PS400_Get_Speed()*。

6. Function of Buttons
   - Go: Perform the motion operation after click “Apply”.
   - Stop: Stop motion immediately.
   - ClearStop: Clear the flag of the Stop command. After you click “Stop”, you must click “ClearStop” for performing motion later.
   - Clear: Clear logical and actual register of the 4 axes.
   - GetError: Click it to check the ErrorCode displayed in the 3rd column of StatusBar on the screen below.
   - Reset: Restore PS400 to the initial state
   - Exit: Exit this dialog window.

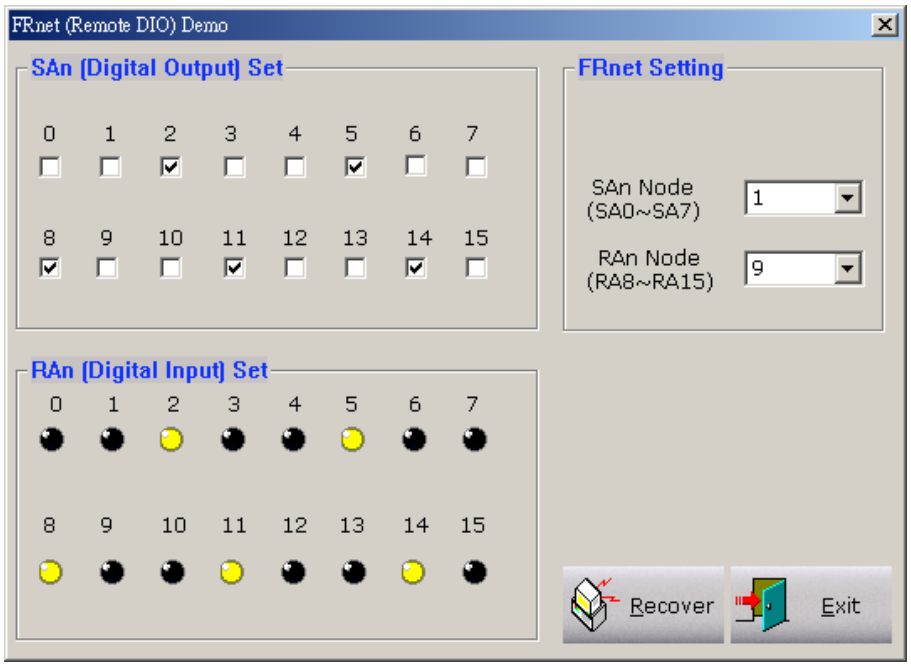
5.3.2 Two axes path plane diagram



1. Function of Buttons

- Profile: Draw the logical position of interpolation.
- Zoom In: Enlarge view of the axes path.
- Zoom Out: Shrink view of the axes path.

5.4 FRnet DI/DODemo



Group definition and brief description

1. SAn (Digital Output) Set

- FR-net Communication feature: 128 (16×8) digital input totally.
  - ✓ Relative Function: PS400_Write_FRnet()。

2. RAn (Digital Input) Set

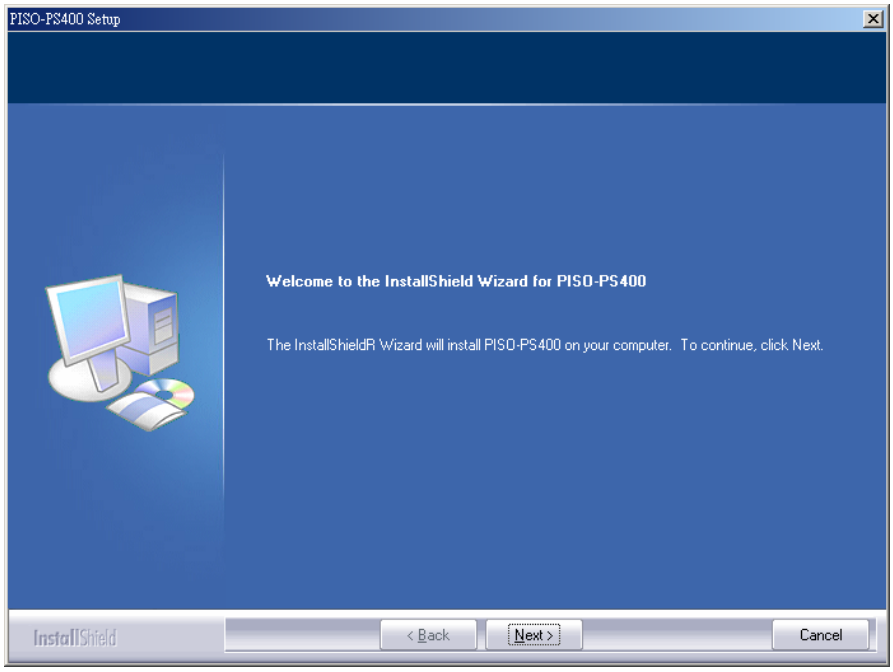
- FR-net Communication feature: 128 (16×8) digital output totally.
  - ✓ Relative Function: PS400_Read_FRnet()。

3. FRnet Settings

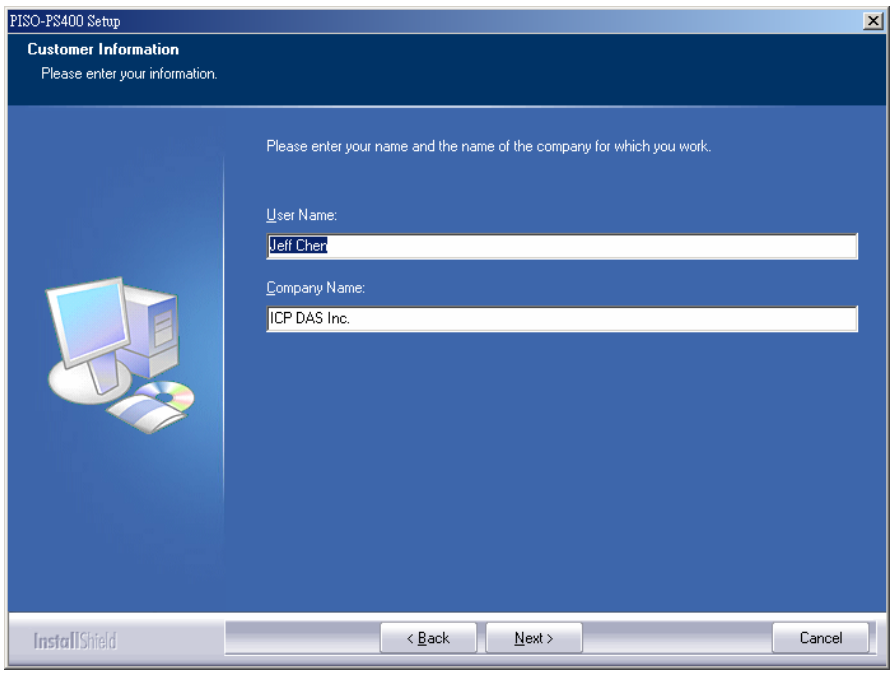
- Active Cardno is displayed in this tab-page.
- User can select the RAn node (RA8~RA15) and the SAn node (SA0~SA7) for DI/DO.

APPENDIX-A PISO-PS400 Installation

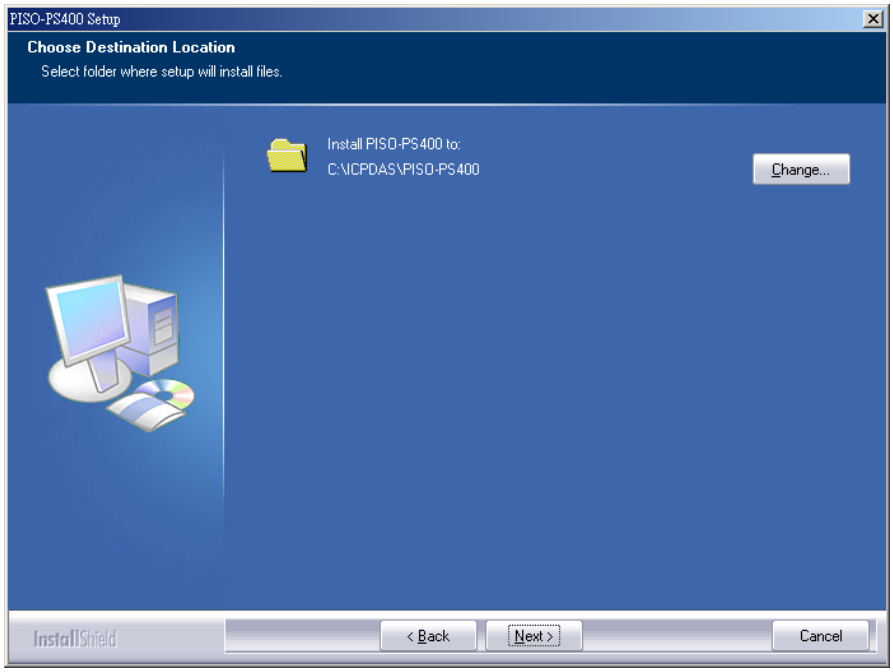
Please execute “setup.exe” from the directory “//PISO-PS400/Setup_2K_XP/” in CD and click ”Next”.



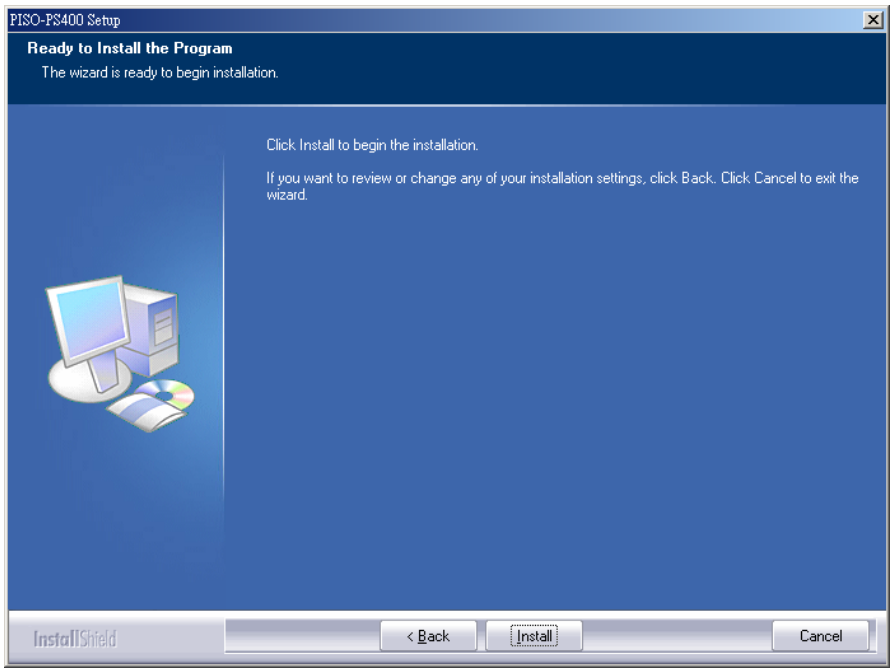
Key-in User Name and Company Name, then click “Next”.



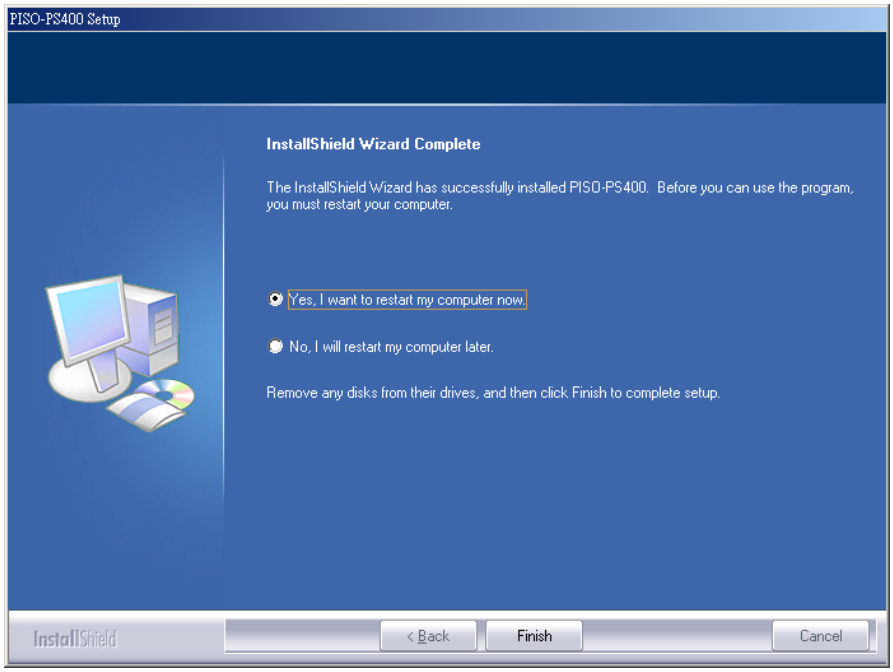
Specify the desired path for installation, then click the ”Next” button.



Click ”Install” to begin the installation.



Please click the ”Finish” button for reboot after installation accomplished



File tree after installation:

C:\ICPDAS\PISO-PS400

├──Include	Header Files
├──LIB	Library Files
├──Drivers	PISO-PS400 drivers and registration information file
│ ├──Win2K	The WDM for Windows 2000
│ └──WinXP	The WDM for Windows XP
├──Manuals	HW/SW manuals
├──Samples	Sample Code
│ └──VC6	VC6 sample code
│ │ ├──First_Demo.dsw	detailed sample code Workspace
│ │ ├──PS400_VC6.dsw	VC 6.0 Dialog basedsampleWorkspace
│ │ └──PS400_INT_Console.dsw	VC 6.0 Console interrupt sample Workspace
│ ├──VB6	VB6 sample code
│ │ └──First_demo	Development and testing demo code
│ └──BCB6	BCB6 sample code
│ └──First_Demo	BCB 6.0 first program sample code
└──Ultility	PCEzGo.exe

APPENDIX-B Others Terminal Boards

B.1 DN-8468M Daughter Board

The DN-8468M is the daughter board for Mitsubishi J2 Series Amplifier. It has 4-axis I/O signals.

B.1.1 Board Layout for DN-8468M

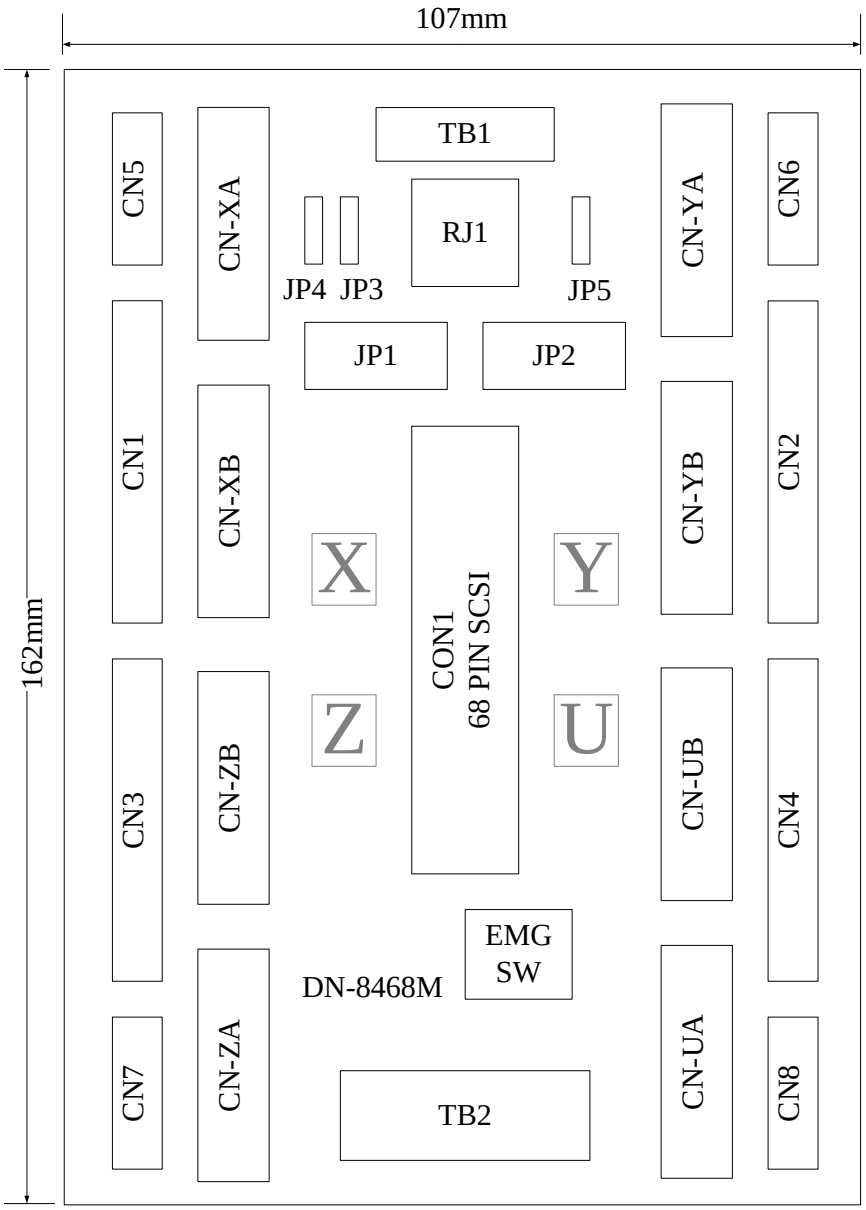


Fig. 1-1 Board layout for the DN-8468M

B.1.2 Signal Connections for DN-8468M

Maintaining signal connections is one of the most important factors in ensuring that your application system is sending and receiving data correctly.

■ Pin Assignment for CON1

The I/O connector on the DN-8468M is a 68-pin SCSI II connector that enables you to connect to the PISO-PS400 motion card. Please refer to the section 2.2.1(page 15).

■ TB1

The connector TB1 is 7-pin connector that enables you to connect to the signals of your motor drivers. Fig.1-3 shows the pin assignment for the 7-pin connector on the DN-8468M, and the Table 1-4 shows its I/O connector signal description.

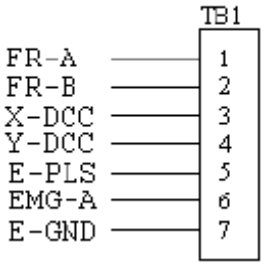


Fig. 1-3 Pin definition for TB1

Table 1-4 TB1 Signal Connection

Name	Description
FR-A	FRnet port A
FR-B	FRnet port B
X-DCC	Deviation Counter Clear for X axis
Y-DCC	Deviation Counter Clear for Y axis
E-PLS	EXT pulse signal
EMG-A	EMG input signal for all axes
E-GND	EXT power ground

■ TB2

The connector TB2 is 5-pin connector that enables you to connect to the signals of your motor drivers. Fig.1-4 shows the pin assignment for the 5-pin connector on the DN-8468M, and the Table 1-5 shows its I/O connector signal description.

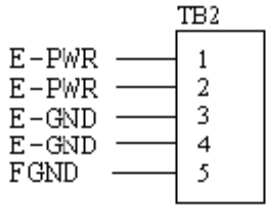


Fig. 1-4 Pin definition for TB2

Table 1-5 TB2 Signal Connection

Pin name	Description
E-PWR	EXT power supply +24V
E-GND	EXT power ground
FGND	Frame ground

Note: Don't reverse connect signals with E_PWR and E_GND. Serious damage to your motion card and motion controller might be happened.

■ CN-XA, CN-YA, CN-ZA, CN-UA (CNA connector for each AXIS)

The connectors CN-XA, CN-YA, CN-ZA, and CN-UA are 20-pin connectors that enable you to connect to the CNA connector of Mitsubishi motor drivers. Fig.1-5 shows the pin assignment for the 20-pin connector on the DN-8468M, and the Table 1-6 shows its I/O connector signal description.

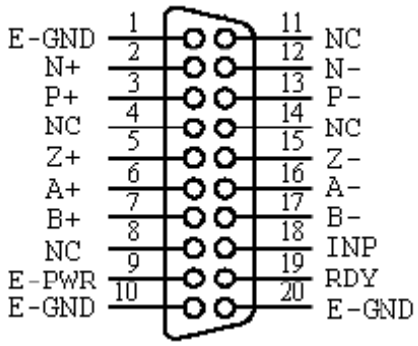


Fig. 1-5 Pin definition for CN-XA, CN-YA, CN-ZA, CN-UA

Table 1-6 CNA Signal Connection

Name	Number	Description
A+	6	Encoder A-Phase (+)
A-	16	Encoder A-Phase (-)
B+	7	Encoder B-Phase (+)
B-	17	Encoder B-Phase (-)
Z+	5	Encoder Z-Phase (+)
Z-	15	Encoder Z-Phase (-)
P+	3	Positive Direction Pulse Output(+)
P-	13	Positive Direction Pulse Output(-)
N+	2	Negative Direction Pulse Output(+)
N-	12	Negative Direction Pulse Output(-)
INP	18	Servo In Position
RDY	19	Servo Ready
E-PWR	9	EXT power +24V
E-GND	1, 10, 20	EXT power ground
NC	4,8,11,14	No connection

> **Note 1:** There are two sets encoder signals for X and Y axes. In X axis, one is from CN-XA and the other is from CN5. In Y axis, one is from CN-YA and the other is from CN6. Users can select encoder signals from JP1 and JP2, respectively.
>
> **Note 2:** In Z and U axes, only one set of encoder signals is used for each axis. In Z axis, do not connect CN-ZA and CN7 at the same time. In U axis, do not connect CN-UA and CN8 at the same time.
>
> **Note 3 :** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

■ CN-XB, CN-YB, CN-ZB, CN-UB (CNB connector for each AXIS)

The connectors CN-XB, CN-YB, CN-ZB, and CN-UB are 20-pin connectors that enable you to connect to the CNB connector of your motor drivers. Fig.1-6 shows the pin assignment for the 20-pin connector on the DN-8468M, and the Table 1-7 shows its I/O connector signal description.

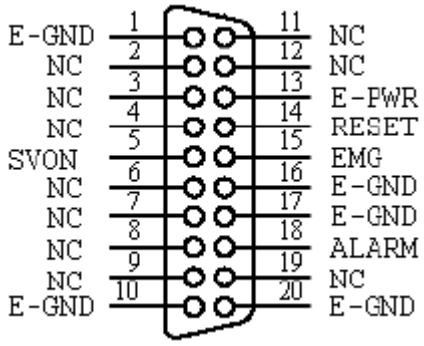


Fig. 1-6 Pin definition for CN-XB, CN-YB CN-ZB, CN-UB

Table 1-7 CNB Signal Connection

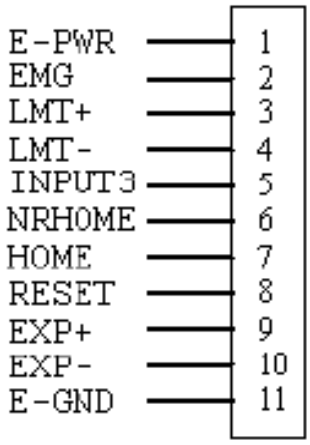
Pin	Pin	Description
SVON	5	Servo On
RESET	14	Servo Reset
EMG	15	Emergent Stop
ALARM	18	Servo Alarm
E-PWR	13	EXT power +24V
E-GND	1, 10, 16,17, 20	EXT power ground
NC	2, 3, 4, 6, 7, 8, 9, 11, 12, 19	No connection

> **Note:** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

■ CN1~CN4 (The I/O signals of the X, Y, Z, U AXIS)

The connectors CN1~CN4 are 11-pin connectors that enable you to connect to the signals of your motor drivers. Fig.1-7 shows the pin assignment for the 20-pin connector on the DN-8468M, and the Table 1-8 shows its I/O connector signal description.

Table 1-8 CN1~4 Signal Connection



Pin name	Description
E-PWR	EXT power supply +24V
EMG	EMG input signal
LMT+	Limit Switch Input Signal (+)
LMT-	Limit Switch Input Signal (-)
INPUT3	Input Signal (IN3)
NRHOME	Near Home Sensor Input Signal
HOME	Home Sensor Input Signal
RESET	Reset input signal
EXP+	EXT Positive Direction Pulse (+)
EXP-	EXT Negative Direction Pulse (-)
E-GND	EXT power ground

Fig. 1-7 Pin definition for CN1~CN4

■ CN5~CN8 (The I/O signals of the X, Y, Z, U AXIS)

The connectors CN5~CN8 are 15-pin connectors that enable users to connect the signals to external motor drivers. Fig.1-8 shows the pin assignment for the 15-pin connector on the DN-8468M, and the Table 1-9 shows its I/O connector signal description.

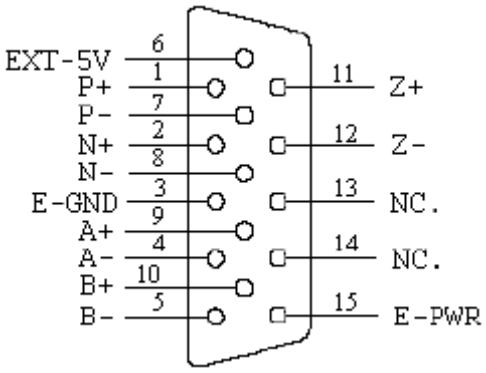


Fig. 1-8 Pin definition for CN5~CN8

Table 1-9 CN5~8

Name	No.	Description
A+	9	Encoder A-Phase (+)
A-	4	Encoder A-Phase (-)
B+	10	Encoder B-Phase (+)
B-	5	Encoder B-Phase (-)
Z+	11	Encoder Z-Phase (+)
Z-	12	Encoder Z-Phase (-)
P+	1	Positive Direction Pulse Output(+)
P-	7	Positive Direction Pulse Output(-)
N+	2	Negative Direction Pulse Output(+)
N-	8	Negative Direction Pulse Output(-)
E-PWR	15	EXT power +24V
E-GND	3	EXT power ground
EXT-5V	6	EXT power +5V
NC	13, 14	No connection

- **Note 1:** There are two sets encoder signals for X and Y axes. In X axis, one is from CNX and the other is from CN5. In Y axis, one is from CNY and the other is from CN6. Users can select encoder signals from JP1 and JP2, respectively.
- **Note 2:** In Z and U axes, only one set of encoder signals is used for each axis. In Z axis, do not connect CNZ and CN7 at the same time. In U axis, do not connect CNU and CN8 at the same time.
- **Note 3 :** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

■ RJ1 (The I/O signals of the FRnet)

The connectors RJ1 is an 8-pin RJ45 connector that enable you to connect to the signals of FRnet. Fig.1-9 shows the pin assignment for the 8-pin connector on the DN-8468M, and the Table 1-10 shows its I/O connector signal description.

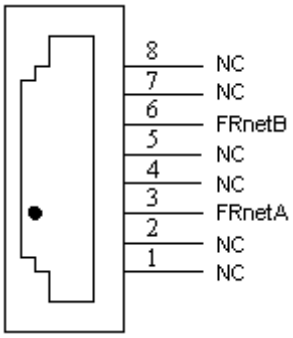


Table 1-10 RJ1

Pin name	Description
FRnetA	FRnet port A
FRnetB	FRnet port B
NC	No connection

Fig. 1-9 Pin definition for RJ1

> **Note:** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

B.1.3 Jumper and Switch Settings

■ JP5

Jumper 5 controls the EMG-A signal of the TB1 connector. The following diagram is shown the selection condition of the jumper 5.

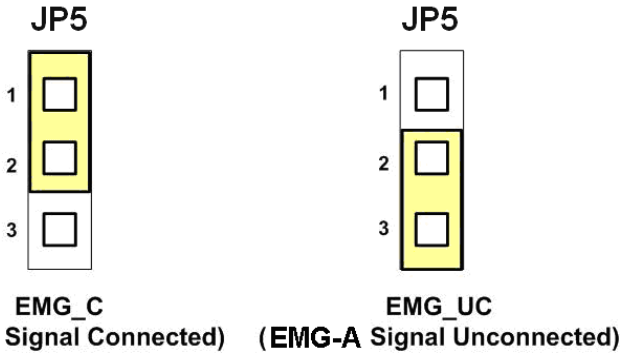


Fig. 1-10 Jumper 5 setting

■ JP1, JP2

The encoder signals of axis X and axis Y can be chosen from servo driver encoder or external encoder. Fig. 1-11 shows that the encoder signals are selected from servo driver encoder. In meantime, Fig. 1-12 shows that the encoder signals are selected from external encoder.

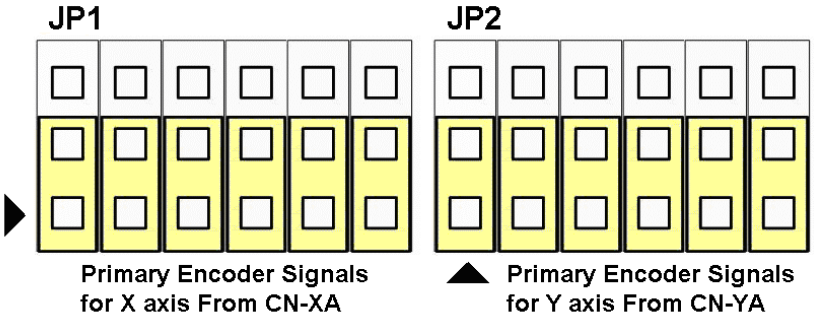


Fig. 1-11 Primary encoder signals setting

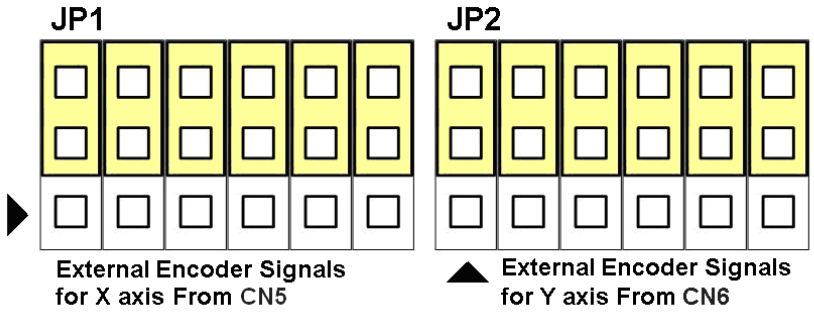


Fig. 1-12 External encoder signals setting

■ EMG SW

The emergency stop signal for each servo ampilfier can be selected from EMG SW. The number 1, 2 , 3, 4 on EMG SW are denoted as axis X, Y, Z, U, respectively. Fig. 1-13 is the default setting to connect the EMG singals to GND. The EMG signals from CN1 ~ CN4 will not take effect. If the switch is disconnected as shown in Fig. 1-14, the emergency stop signals can be controlled from EMG signals in CN1 ~ CN4.

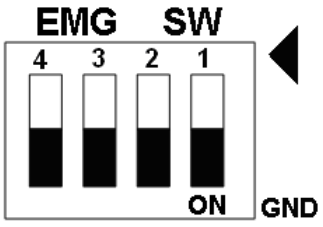


Fig. 1-13 EMG SW setting for normally GND (Default setting)

Fig. 1-14 EMG SW setting for user controlled signals.

B.2 DN-8468P Daughter Board

The DN-8468P is the daughter board for Panasonic A4 Series Ampilifier. It has 4-axis I/O signals.

B.2.1 Board Layout for DN-8468P

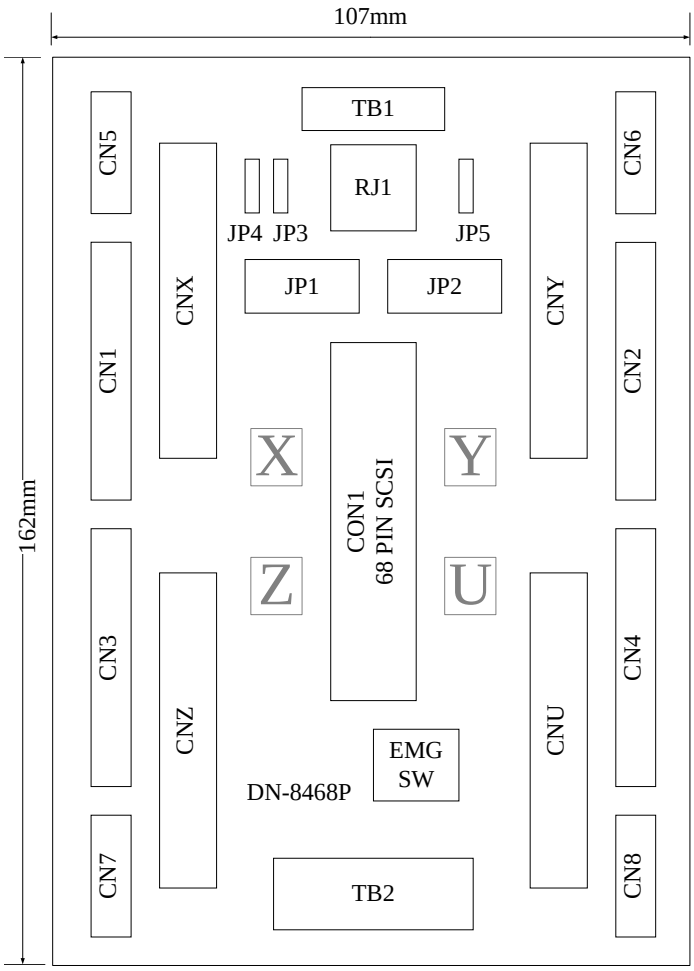


Fig. B2-1 Board layout for the DN-8468P

B.2.2 Signal Connections for DN-8468P

Maintaining signal connections is one of the most important factors in ensuring that your application system is sending and receiving data correctly.

■ Pin Assignment for CON1

The I/O connector on the DN-8468P is a 68-pin SCSI II connector that enables you to connect to the PISO-PS400 motion card. Please refer to the section 2.2.1(page 15).

■ TB1

The connector TB1 is 7-pin connector that enables you to connect to the signals of your motor drivers. Fig.1-3 shows the pin assignment for the 7-pin connector on the DN-8468P, and the Table 1-4 shows its I/O connector signal description.

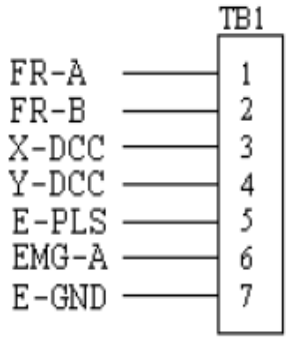


Fig. 3-3 Pin definition for TB1

Table 3-4 TB1 Signal Connection

Name	Description
FR-A	FRnet port A
FR-B	FRnet port B
X-DCC	Deviation Counter Clear for X axis
Y-DCC	Deviation Counter Clear for Y axis
E-PLS	EXT pulse signal
EMG-A	EMG input signal for all axes
E-GND	EXT power ground

TB2

The connector TB2 is 5-pin connector that enables you to connect to the signals of your motor drivers. Fig.1-4 shows the pin assignment for the 5-pin connector on the DN-8468P, and the Table 1-5 shows its I/O connector signal description.

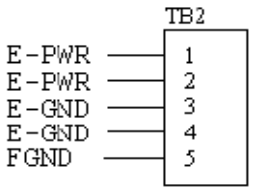


Fig. 1-4 Pin definition for TB2

Table 1-5 TB2 Signal Connection

Pin name	Description
E-PWR	EXT power supply +24V
E-GND	EXT power ground
FGND	Frame ground

Note: Don't reverse connect signals with E-PWR and E-GND. Serious damage to your motion card and motion controller might be happened.

■ CNX, CNY, CNZ, CNU (CN X5 connector for each AXIS in Driver)

The connectors CNX, CNY, CNZ, and CNU are 50-pin connectors that enable you to connect to the CN X5 connector of Panasonic motor drivers. Fig.1-5 shows the pin assignment for the 50-pin connector on the DN-8468P, and the Table 1-6 shows its I/O connector signal description.

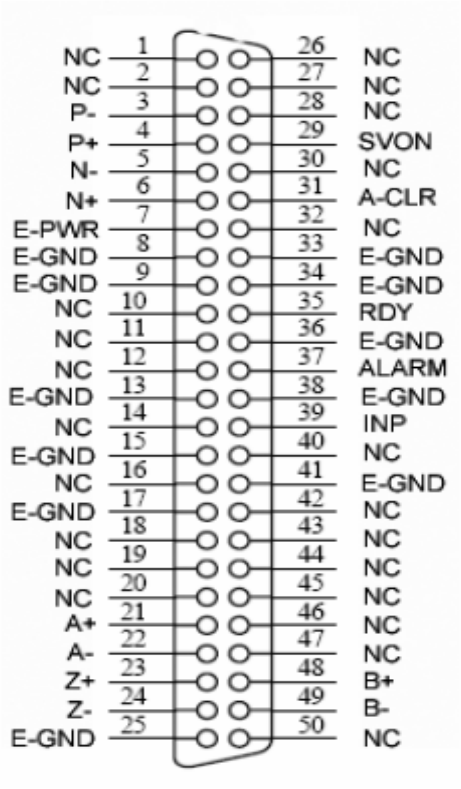


Fig. 1-5 Pin definition for CNX, CNY, CNZ, CNU

Table 1-6 CN X5 Signal Connection

Name	Number	Description
A+	21	Encoder A-Phase (+)
A-	22	Encoder A-Phase (-)
B+	48	Encoder B-Phase (+)
B-	49	Encoder B-Phase (-)
Z+	23	Encoder Z-Phase (+)
Z-	24	Encoder Z-Phase (-)
P+	4	Positive Direction Pulse Output(+)
P-	3	Positive Direction Pulse Output(-)
N+	6	Negative Direction Pulse
N-	5	Negative Direction Pulse Output(-)
INP	39	Servo In Position
RDY	35	Servo Ready
SVON	29	Servo On
A-CLR	31	Alarm Clear
ALARM	37	Servo Alarm
E-PWR	7	EXT power +24V
E-GND	8, 9, 13, 15,17, 25, 33,34, 36, 38,41	EXT power ground
NC	1,2,10,11, 12,14,16, 18,19,20, 26,27,28, 30,32,40, 42,43,44, 45,46,47, 50	No connection

- **Note 1:** There are two sets encoder signals for X and Y axes. In X axis, one is from CNX and the other is from CN5. In Y axis, one is from CNY and the other is from CN6. Users can select encoder signals from JP1 and JP2, respectively.
- **Note 2:** In Z and U axes, only one set of encoder signals is used for each axis. In Z axis, do not connect CNZ and CN7 at the same time. In U axis, do not connect CNU and CN8 at the same time.
- **Note 3 :** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

■ CN1~CN4 (The I/O signals of the X, Y, Z, U AXIS)

The connectors CN1~CN4 are 11-pin connectors that enable you to connect to the signals of your motor drivers. Fig.1-7 shows the pin assignment for the 20-pin connector on the DN-8468P, and the Table 1-8 shows its I/O connector signal description.

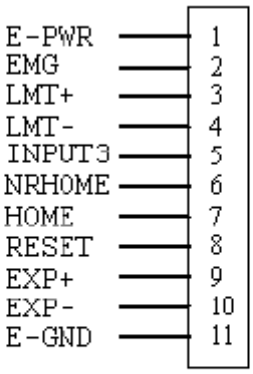


Fig. 1-7 Pin definition for CN1 ~ CN4

Table 1-8 CN1~4 Signal Connection

Pin name	Description
E-PWR	EXT power supply +24V
EMG	EMG input signal
LMT+	Limit Switch Input Signal (+)
LMT-	Limit Switch Input Signal (-)
INPUT3	Input Signal (IN3)
NRHOME	Near Home Sensor Input Signal
HOME	Home Sensor Input Signal
RESET	Reset input signal
EXP+	EXT Positive Direction Pulse (+)
EXP-	EXT Negative Direction Pulse (-)
E-GND	EXT power ground

■ CN5~CN8 (The I/O signals of the X, Y, Z, U AXIS)

The connectors CN5~CN8 are 15-pin connectors that enable users to connect the signals to external motor drivers. Fig.1-8 shows the pin assignment for the 15-pin connector on the DN-8468P, and the Table 1-9 shows its I/O connector signal description.

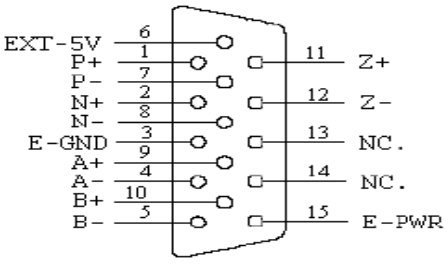


Fig. 1-8 Pin definition for CN5 ~ CN8

Table 1-9 CN5~8

Name	No.	Description
A+	9	Encoder A-Phase (+)
A-	4	Encoder A-Phase (-)
B+	10	Encoder B-Phase (+)
B-	5	Encoder B-Phase (-)
Z+	11	Encoder Z-Phase (+)
Z-	12	Encoder Z-Phase (-)
P+	1	Positive Direction Pulse Output(+)
P-	7	Positive Direction Pulse Output(-)
N+	2	Negative Direction Pulse Output(+)
N-	8	Negative Direction Pulse Output(-)
E-PWR	15	EXT power +24V
E-GND	3	EXT power ground
EXT-5V	6	EXT power +5V
NC	13, 14	No connection

- **Note 1:** There are two sets encoder signals for X and Y axes. In X axis, one is from CNX and the other is from CN5. In Y axis, one is from CNY and the other is from CN6. Users can select encoder signals from JP1 and JP2, respectively.
- **Note 2:** In Z and U axes, only one set of encoder signals is used for each axis. In Z axis, do not connect CNZ and CN7 at the same time. In U axis, do not connect CNU and CN8 at the same time.
- **Note 3 :** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

■ RJ1 (The I/O signals of the FRnet)

The connectors RJ1 is an 8-pin RJ45 connector that enable you to connect to the signals of FRnet. Fig.1-9 shows the pin assignment for the 8-pin connector on the DN-8468P, and the Table 1-10 shows its I/O connector signal description.

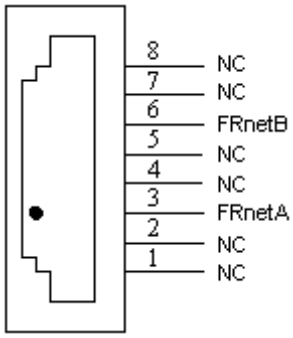


Fig. 1-9 Pin definition for RJ

Table 1-10 RJ1

Pin name	Description
FRnetA	FRnet port A
FRnetB	FRnet port B
NC	No connection

- **Note:** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

B.2.3 Jumper and Switch Settings

■ JP5

Jumper 5 controls the EMG-A signal of the TB1 connector. The following diagram is shown the selection condition of the jumper 5.

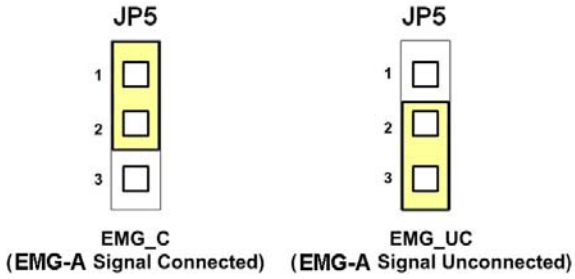


Fig. 1-10 Jumper 5 setting

■ JP1, JP2

The encoder signals of axis X and axis Y can be chosen from servo driver encoder or external encoder. Fig. 1-11 shows that the encoder signals are selected from servo driver encoder. In meantime, Fig. 1-12 shows that the encoder signals are selected from external encoder.

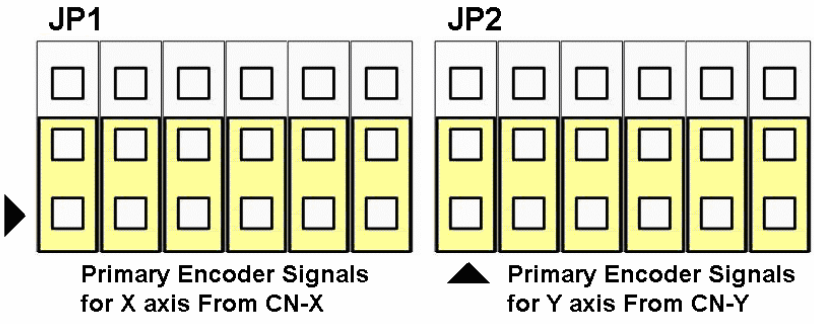


Fig. 1-11 Primary encoder signals setting

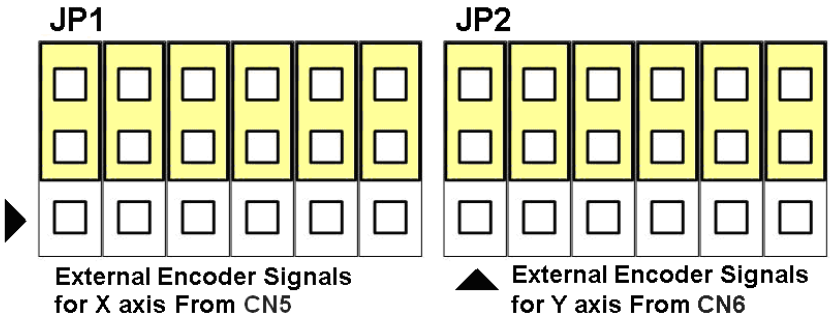


Fig. 1-12 External encoder signals setting

■ EMG SW

The emergency stop signal for each servo ampilfier can be selected from EMG SW. The number 1, 2 , 3, 4 on EMG SW are denoted as axis X, Y, Z, U, respectively. Fig. 1-13 is the default setting to connect the EMG singals to GND. The EMG signals from CN1 ~ CN4 will not take effect. If the switch is disconnected as shown in Fig. 1-14, the emergency stop signals can be controlled from EMG signals in CN1 ~ CN4.

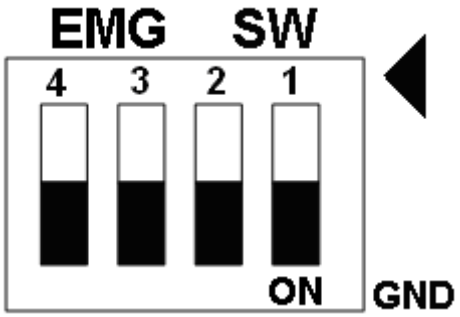


Fig. 1-13 EMG SW setting for normally GND (Default setting)

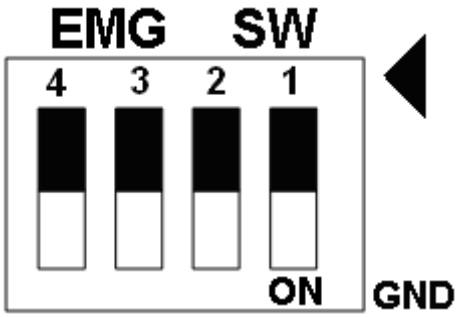


Fig. 1-14 EMG SW setting for user controlled signals.

B.3 DN-8486Y Daughter Board

The DN-8468Y is the daughter board for Yaskawa Ampilifier. It has 4-axis I/O signals.

B.3.1 Board Layout for DN-8468Y

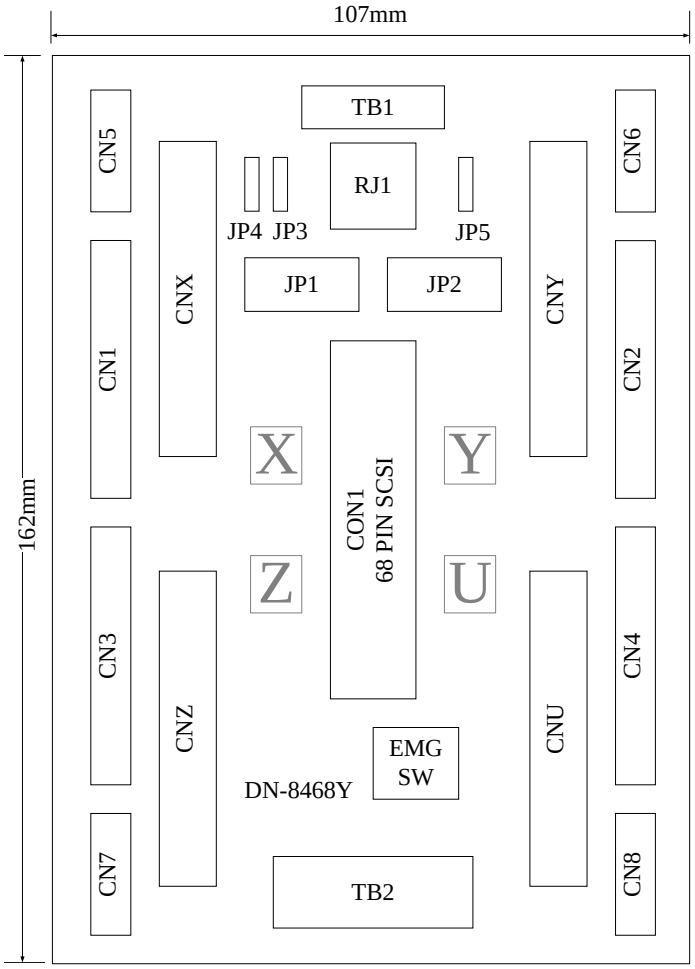


Fig. 3-1 Board layout for the DN-8468Y

B.3.2 Signal Connections for DN-8468Y

Maintaining signal connections is one of the most important factors in ensuring that your application system is sending and receiving data correctly.

■ Pin Assignment for CON1

The I/O connector on the DN-8468Y is a 68-pin SCSI II connector that enables you to connect to the PISO-PS400 motion card. Please refer to the section 2.2.1(page 15).

■ TB1

The connector TB1 is 7-pin connector that enables you to connect to the signals of your motor drivers. Fig.3-3 shows the pin assignment for the 7-pin connector on the DN-8468Y, and the Table 3-4 shows its I/O connector signal description.

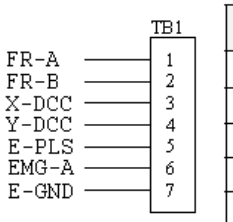


Fig. 3-3 Pin definition for TB1

Table 3-4 TB1 Signal Connection

Name	Description
FR-A	FRnet port A
FR-B	FRnet port B
X-DCC	Deviation Counter Clear for X axis
Y-DCC	Deviation Counter Clear for Y axis
E-PLS	EXT pulse signal
EMG-A	EMG input signal for all axes
E-GND	EXT power ground

■ TB2

The connector TB2 is 5-pin connector that enables you to connect to the signals of your motor drivers. Fig.3-4 shows the pin assignment for the 5-pin connector on the DN-8468Y, and the Table 3-5 shows its I/O connector signal description.

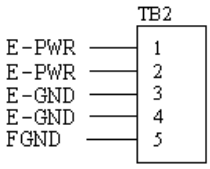


Fig. 3-4 Pin definition for TB2

Table 3-5 TB2 Signal Connection

Pin name	Description
E-PWR	EXT power supply +24V
E-GND	EXT power ground
FGND	Frame ground

▶ **Note:** Don't reverse connect signals with E-PWR and E-GND. Serious damage to your motion card and motion controller might be happened.

■ CNX, CNY, CNZ, CNU (CN X5 connector for each AXIS in Driver)

The connectors CNX, CNY, CNZ, and CNU are 50-pin connectors that enable you to connect to the CN X5 connector of Panasonic motor drivers. Fig.3-5 shows the pin assignment for the 50-pin connector on the DN-8468Y, and the Table 3-6 shows its I/O connector signal description.

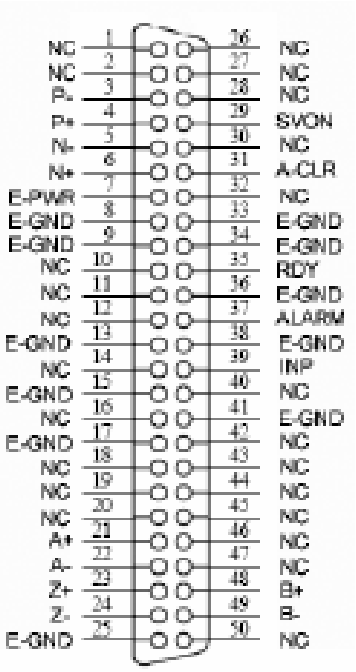


Fig. 3-5 Pin definition for CNX, CNY, CNZ, CNU

Table 3-6 CN X5 Signal Connection

Name	Number	Description
A+	21	Encoder A-Phase (+)
A-	22	Encoder A-Phase (-)
B+	48	Encoder B-Phase (+)
B-	49	Encoder B-Phase (-)
Z+	23	Encoder Z-Phase (+)
Z-	24	Encoder Z-Phase (-)
P+	4	Positive Direction Pulse Output(+)
P-	3	Positive Direction Pulse Output(-)
N+	6	Negative Direction Pulse
N-	5	Negative Direction Pulse Output(-)
INP	39	Servo In Position
RDY	35	Servo Ready
SVON	29	Servo On
A-CLR	31	Alarm Clear
ALARM	37	Servo Alarm
E-PWR	7	EXT power +24V
E-GND	8, 9, 13, 15,17, 25, 33,34, 36, 38,41	EXT power ground
NC	1,2,10,11, 12,14,16, 18,19,20, 26,27,28, 30,32,40, 42,43,44, 45,46,47, 50	No connection

- **Note 1:** There are two sets encoder signals for X and Y axes. In X axis, one is from CNX and the other is from CN5. In Y axis, one is from CNY and the other is from CN6. Users can select encoder signals from JP1 and JP2, respectively.
- **Note 2:** In Z and U axes, only one set of encoder signals is used for each axis. In Z axis, do not connect CNZ and CN7 at the same time. In U axis, do not connect CNU and CN8 at the same time.
- **Note 3 :** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

■ CN1~CN4 (The I/O signals of the X, Y, Z, U AXIS)

The connectors CN1~CN4 are 11-pin connectors that enable you to connect to the signals of your motor drivers. Fig.3-7 shows the pin assignment for the 20-pin connector on the DN-8468Y, and the Table 3-8 shows its I/O connector signal description.

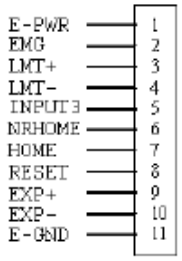


Fig. 3-7 Pin definition for CN1 ~ CN4

Table 3-8 CN1~4 Signal Connection

Pin name	Description
E-PWR	EXT power supply +24V
EMG	EMG input signal
LMT+	Limit Switch Input Signal (+)
LMT-	Limit Switch Input Signal (-)
INPUT3	Input Signal (IN3)
NRHOME	Near Home Sensor Input Signal
HOME	Home Sensor Input Signal
RESET	Reset input signal
EXP+	EXT Positive Direction Pulse (+)
EXP-	EXT Negative Direction Pulse (-)
E-GND	EXT power ground

■ CN5~CN8 (The I/O signals of the X, Y, Z, U AXIS)

The connectors CN5~CN8 are 15-pin connectors that enable users to connect the signals to external motor drivers. Fig.3-8 shows the pin assignment for the 15-pin connector on the DN-8468Y, and the Table 3-9 shows its I/O connector signal description.

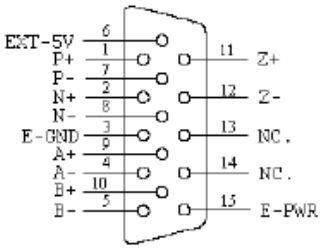


Fig. 3-8 Pin definition for CN5 ~ CN8

Table 3-9 CN5~8

Name	No.	Description
A+	9	Encoder A-Phase (+)
A-	4	Encoder A-Phase (-)
B+	10	Encoder B-Phase (+)
B-	5	Encoder B-Phase (-)
Z+	11	Encoder Z-Phase (+)
Z-	12	Encoder Z-Phase (-)
P+	1	Positive Direction Pulse Output(+)
P-	7	Positive Direction Pulse Output(-)
N+	2	Negative Direction Pulse Output(+)
N-	8	Negative Direction Pulse Output(-)
E-PWR	15	EXT power +24V
E-GND	3	EXT power ground
EXT-5V	6	EXT power +5V
NC	13, 14	No connection

- **Note 1:** There are two sets encoder signals for X and Y axes. In X axis, one is from CNX and the other is from CN5. In Y axis, one is from CNY and the other is from CN6. Users can select encoder signals from JP1 and JP2, respectively.
- **Note 2:** In Z and U axes, only one set of encoder signals is used for each axis. In Z axis, do not connect CNZ and CN7 at the same time. In U axis, do not connect CNU and CN8 at the same time.
- **Note 3 :** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

■ RJ1 (The I/O signals of the FRnet)

The connectors RJ1 is an 8-pin RJ45 connector that enable you to connect to the signals of FRnet. Fig.3-9 shows the pin assignment for the 8-pin connector on the DN-8468Y, and the Table 3-10 shows its I/O connector signal description.

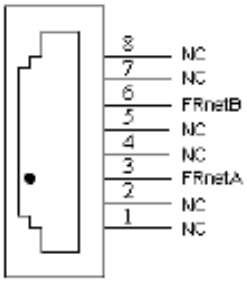


Fig. 3-9 Pin definition for RJ1

Table 3-10 RJ1

Pin name	Description
FRnetA	FRnet port A
FRnetB	FRnet port B
NC	No connection

Note: Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

B.3.3 Jumper and Switch Settings

■ JP5

Jumper 5 controls the EMG-A signal of the TB1 connector. The following diagram is shown the selection condition of the jumper 5.

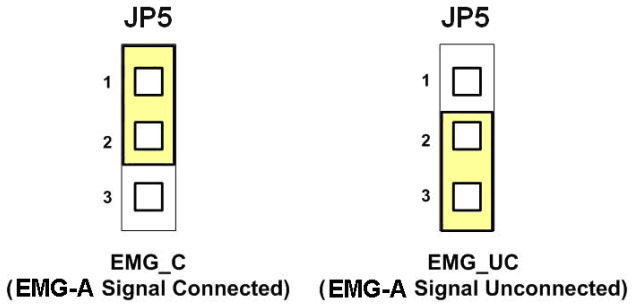


Fig. 3-10 Jumper 5 setting

■ JP1, JP2

The encoder signals of axis X and axis Y can be chosen from servo driver encoder or external encoder. Fig. 3-11 shows that the encoder signals are selected from servo driver encoder. In meantime, Fig. 3-12 shows that the encoder signals are selected from external encoder.

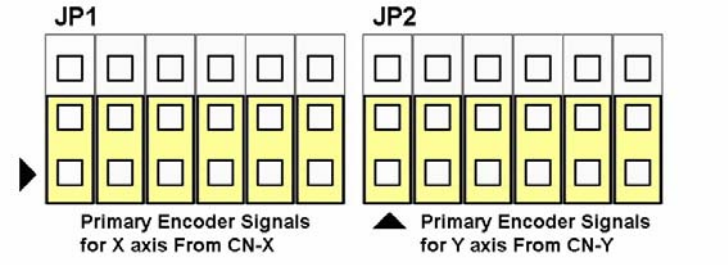


Fig. 3-11 Primary encoder signals setting

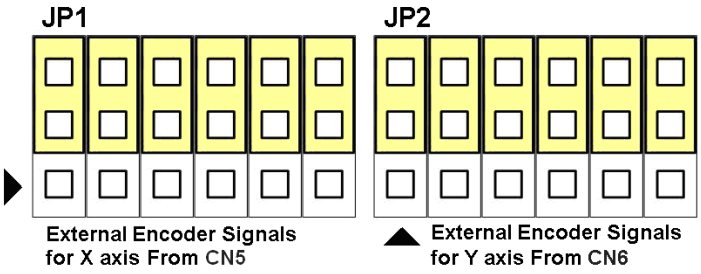


Fig. 3-12 External encoder signals setting

■ EMG SW

The emergency stop signal for each servo ampilfier can be selected from EMG SW. The number 1, 2 , 3, 4 on EMG SW are denoted as axis X, Y, Z, U, respectively. Fig. 3-13 is the default setting to connect the EMG singals to GND. The EMG signals from CN1 ~ CN4 will not take effect. If the switch is disconnected as shown in Fig. 3-14, the emergency stop signals can be controlled from EMG signals in CN1 ~ CN4.

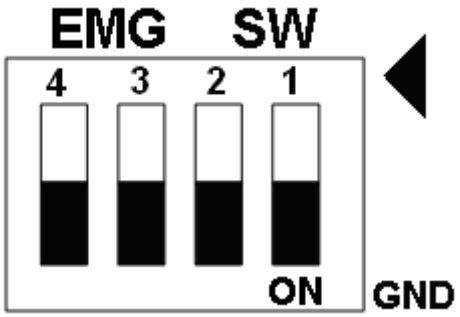


Fig. 3-13 EMG SW setting for normally GND (Default setting)

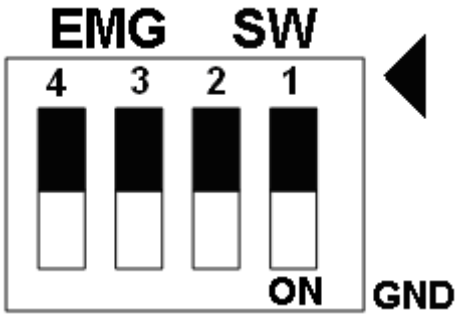


Fig. 3-14 EMG SW setting for user controlled signals.

B.4 DN-8468D Daughter Board

The DN-8468D is the daughter board for Delta ASDA-A Series Ampilifier. It has 4-axis I/O signals.

B4.1 Board Layout for DN-8468D

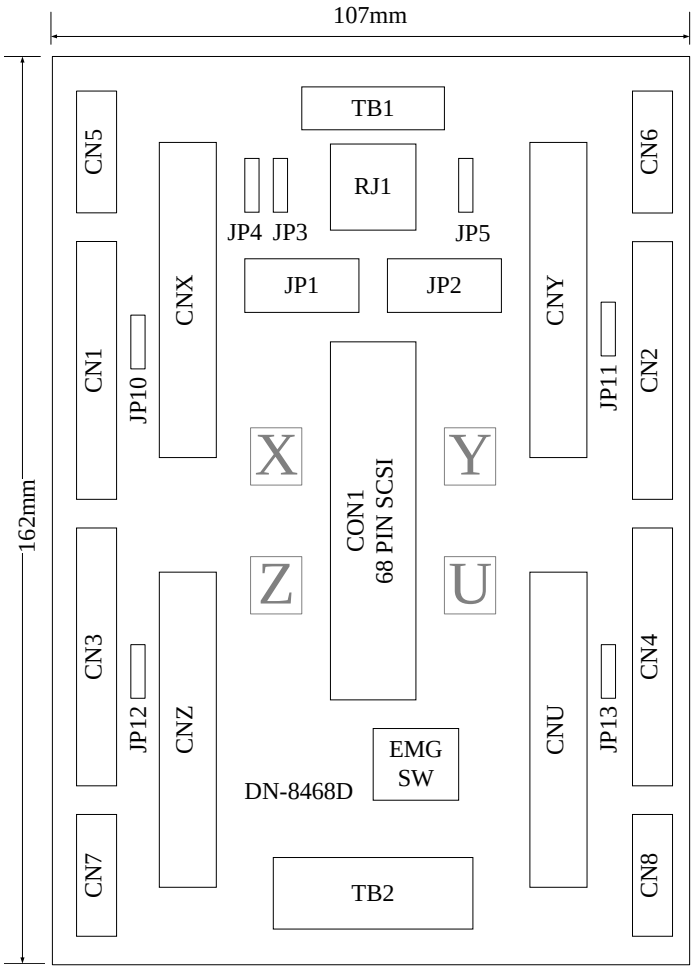


Fig. 3-1 Board layout for the DN-8468D

B4.2 Signal Connections for DN-8468D

Maintaining signal connections is one of the most important factors in ensuring that your application system is sending and receiving data correctly.

■ Pin Assignment for CON1

The I/O connector on the DN-8468D is a 68-pin SCSI II connector that enables you to connect to the I-8094 motion card. Fig. 3-2 shows the pin assignment for the 68-pin I/O connector on the DN-8468D (or on the I-8094), and refer to Table 3-2, 3-3 for description of each motion I/O signal.

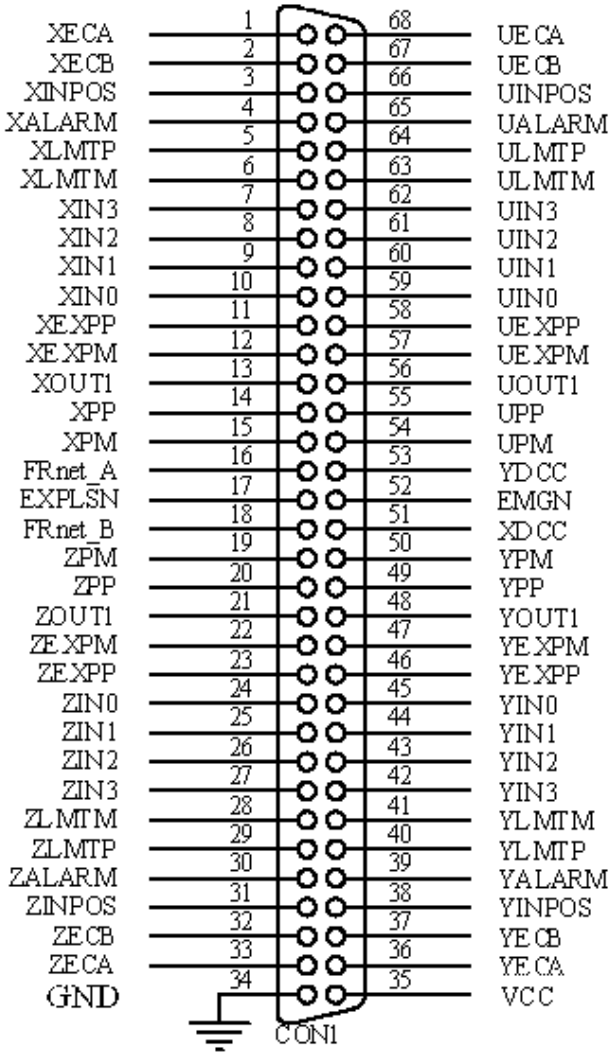


Fig. 3-2 I/O connector pin assignment for the CON1

Table 3-2 DN-8468D I/O connector signal description (part 1)

Pin name	Pin number	Description
XECA	1	Encoder A-phase signal for X axis
YECA	36	Encoder A-phase signal for Y axis
ZECA	33	Encoder A-phase signal for Z axis
UECA	68	Encoder A-phase signal for U axis
XECB	2	Encoder B-Phase signal for X axis
YECB	37	Encoder B-Phase signal for Y axis
ZECB	32	Encoder B-Phase signal for Z axis
UECB	67	Encoder B-Phase signal for U axis
XINPOS	3	In-position signal for X axis
YINPOS	38	In-position signal for Y axis
ZINPOS	31	In-position signal for Z axis
UINPOS	66	In-position signal for U axis
XALARM	4	Alarm signal for X axis
YALARM	39	Alarm signal for Y axis
ZALARM	30	Alarm signal for Z axis
UALARM	65	Alarm signal for U axis
XLMTP	5	Limit switch input signal (+) for X axis
YLMTP	40	Limit switch input signal (+) for Y axis
ZLMTP	29	Limit switch input signal (+) for Z axis
ULMTP	64	Limit switch input signal (+) for U axis
XLMTM	6	Limit switch input signal (-) for X axis
YLMTM	41	Limit switch input signal (-) for Y axis
ZLMTM	28	Limit switch input signal (-) for Z axis
ULMTM	63	Limit switch input signal (-) for U axis
XIN3	7	Input 3 signal for X axis
YIN3	42	Input 3 signal for Y axis
ZIN3	27	Input 3 signal for Z axis
UIN3	62	Input 3 signal for U axis
XIN2	8	Input 2 signal for X axis
XIN2	43	Input 2 signal for Y axis
XIN2	26	Input 2 signal for Z axis
XIN2	61	Input 2 signal for U axis
XIN1	9	Input 1 signal for X axis
YIN1	44	Input 1 signal for Y axis
ZIN1	25	Input 1 signal for Z axis
UIN1	60	Input 1 signal for U axis
XIN0	10	Input 0 signal for X axis
YIN0	45	Input 0 signal for Y axis
ZIN0	24	Input 0 signal for Z axis
UIN0	59	Input 0 signal for U axis

Table 3-3 DN-8468D I/O connector signal description (part 2)

Pin name	Pin number	Description
XEXPP	11	EXT pulsar input signal (+) for X axis
YEXPP	46	EXT pulsar input signal (+) for Y axis
ZEXPP	23	EXT pulsar input signal (+) for Z axis
UEXPP	58	EXT pulsar input signal (+) for U axis
XEXPM	12	EXT pulsar input signal (-) for X axis
YEXPM	47	EXT pulsar input signal (-) for Y axis
ZEXPM	22	EXT pulsar input signal (-) for Z axis
UEXPM	57	EXT pulsar input signal (-) for U axis
XDRIVE	13	Driver enable signal for X axis
YDRIVE	48	Driver enable signal for Y axis
ZDRIVE	21	Driver enable signal for Z axis
UDRIVE	56	Driver enable signal for U axis
XPP	14	Driving pulsar signal (+) for X axis
YPP	49	Driving pulsar signal (+) for Y axis
ZPP	20	Driving pulsar signal (+) for Z axis
UPP	55	Driving pulsar signal (+) for U axis
XPM	15	Driving pulsar signal (+) for X axis
YPM	50	Driving pulsar signal (+) for Y axis
ZPM	19	Driving pulsar signal (+) for Z axis
UPM	54	Driving pulsar signal (+) for U axis
XOUT1	16	Output 1 signal for X axis
YOUT1	48	Output 1 signal for Y axis
ZOUT1	21	Output 1 signal for Z axis
UOUT1	56	Output 1 signal for U axis
EXPLSN1	17	EXT pulse input signal for interpolation
EMGN1	52	Emergency stop input signal
FRnetA	16	FRnet port A
FRnetB	18	FRnet port B
XDCC	51	Deviation Counter Clear for X axis
YDCC	53	Deviation Counter Clear for Y axis
GND	34	Ground
VCC	35	External power (12~24V)

■ TB1

The connector TB1 is 7-pin connector that enables you to connect to the signals of your motor drivers. Fig.3-3 shows the pin assignment for the 7-pin connector on the DN-8468D, and the Table 3-4 shows its I/O connector signal description.

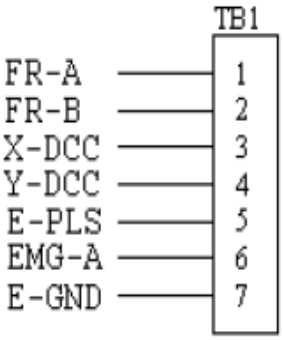


Fig. 3-3 Pin definition for TB1

Table 3-4 TB1 Signal Connection

Name	Description
FR-A	FRnet port A
FR-B	FRnet port B
X-DCC	Deviation Counter Clear for X axis
Y-DCC	Deviation Counter Clear for Y axis
E-PLS	EXT pulse signal
EMG-A	EMG input signal for all axes
E-GND	EXT power ground

■ TB2

The connector TB2 is 5-pin connector that enables you to connect to the signals of your motor drivers. Fig.3-4 shows the pin assignment for the 5-pin connector on the DN-8468D, and the Table 3-5 shows its I/O connector signal description.

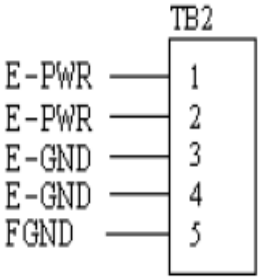


Fig. 3-4 Pin definition for TB2

Table 3-5 TB2 Signal Connection

Pin name	Description
E-PWR	EXT power supply +24V
E-GND	EXT power ground
FGND	Frame ground

▶ **Note:** Don't reverse connect signals with E-PWR and E-GND. Serious damage to your motion card and motion controller might be happened.

■ CNX, CNY, CNZ, CNU (CN 1 connector for each AXIS in Driver)

The connectors CNX, CNY, CNZ, and CNU are 50-pin connectors that enable you to connect to the CN1 connector of Delta ASDA-A series motor drivers. Fig.3-5 shows the pin assignment for the 50-pin connector on the DN-8468D, and the Table 3-6 shows its I/O connector signal description.

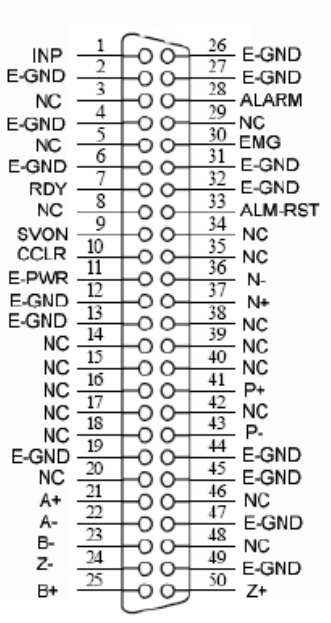


Fig. 3-5 Pin definition for CNX, CNY, CNZ, CNU

Table 3-6 CN 1 Signal Connection

Name	Number	Description
A+	21	Encoder A-Phase (+)
A-	22	Encoder A-Phase (-)
B+	25	Encoder B-Phase (+)
B-	23	Encoder B-Phase (-)
Z+	50	Encoder Z-Phase (+)
Z-	24	Encoder Z-Phase (-)
P+	41	Positive Direction Pulse Output(+)
P-	43	Positive Direction Pulse Output(-)
N+	37	Negative Direction Pulse Output(+)
N-	36	Negative Direction Pulse Output(-)
INP	1	Servo In Position
RDY	7	Servo Ready
SVON	9	Servo On
ALM-RST	33	Alarm Reset
CCLR	10	Error Counter Clear
ALARM	28	Servo Alarm
EMG	30	Emergent Stop
E-PWR	11	EXT power +24V
E-GND	2,4,6,12, 13,19,26, 27,31,32, 44,45,47, 49	EXT power ground
NC	3,5,8,14, 15,16,17, 18,20,29, 34,35,38 39,40,42, 46	No connection

- **Note 1:** There are two sets encoder signals for X and Y axes. In X axis, one is from CNX and the other is from CN5. In Y axis, one is from CNY and the other is from CN6. Users can select encoder signals from JP1 and JP2, respectively.
- **Note 2:** In Z and U axes, only one set of encoder signals is used for each axis. In Z axis, do not connect CNZ and CN7 at the same time. In U axis, do not connect CNU and CN8 at the same time.
- **Note 3 :** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

■ CN1~CN4 (The I/O signals of the X, Y, Z, U AXIS)

The connectors CN1~CN4 are 11-pin connectors that enable you to connect to the signals of your motor drivers. Fig.3-7 shows the pin assignment for the 20-pin connector on the DN-8468D, and the Table 3-8 shows its I/O connector signal description.

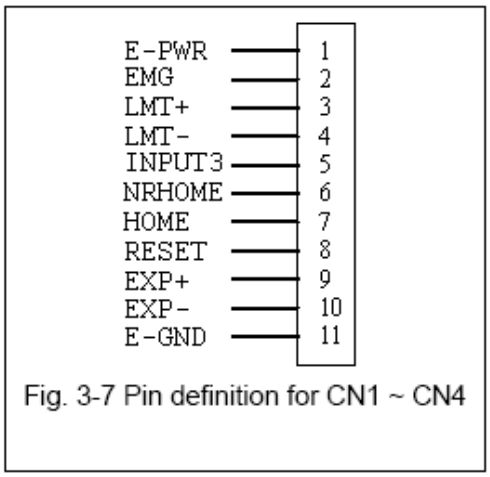


Fig. 3-7 Pin definition for CN1 ~ CN4

Table 3-8 CN1~4 Signal Connection

Pin name	Description
E-PWR	EXT power supply +24V
EMG	EMG input signal
LMT+	Limit Switch Input Signal (+)
LMT-	Limit Switch Input Signal (-)
INPUT3	Input Signal (IN3)
NRHOME	Near Home Sensor Input Signal
HOME	Home Sensor Input Signal
RESET	Reset input signal
EXP+	EXT Positive Direction Pulse (+)
EXP-	EXT Negative Direction Pulse (-)
E-GND	EXT power ground

■ CN5~CN8 (The I/O signals of the X, Y, Z, U AXIS)

The connectors CN5~CN8 are 15-pin connectors that enable users to connect the signals to external motor drivers. Fig.3-8 shows the pin assignment for the 15-pin connector on the DN-8468D, and the Table 3-9 shows its I/O connector signal description.

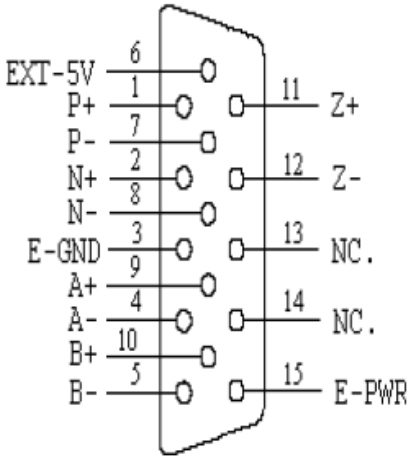


Fig. 3-8 Pin definition for CN5 ~ CN8

Table 3-9 CN5~8

Name	No.	Description
A+	9	Encoder A-Phase (+)
A-	4	Encoder A-Phase (-)
B+	10	Encoder B-Phase (+)
B-	5	Encoder B-Phase (-)
Z+	11	Encoder Z-Phase (+)
Z-	12	Encoder Z-Phase (-)
P+	1	Positive Direction Pulse Output(+)
P-	7	Positive Direction Pulse Output(-)
N+	2	Negative Direction Pulse Output(+)
N-	8	Negative Direction Pulse Output(-)
E-PWR	15	EXT power +24V
E-GND	3	EXT power ground
EXT-5V	6	EXT power +5V
NC	13, 14	No connection

- **Note 1:** There are two sets encoder signals for X and Y axes. In X axis, one is from CNX and the other is from CN5. In Y axis, one is from CNY and the other is from CN6. Users can select encoder signals from JP1 and JP2, respectively.
- **Note 2:** In Z and U axes, only one set of encoder signals is used for each axis. In Z axis, do not connect CNZ and CN7 at the same time. In U axis, do not connect CNU and CN8 at the same time.
- **Note 3 :** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

■ RJ1 (The I/O signals of the FRnet)

The connectors RJ1 is an 8-pin RJ45 connector that enable you to connect to the signals of FRnet. Fig.3-9 shows the pin assignment for the 8-pin connector on the DN-8468D, and the Table 3-10 shows its I/O connector signal description.

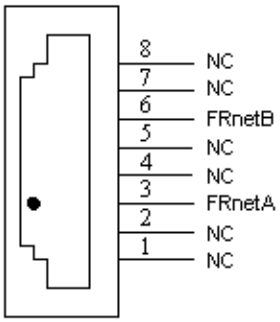


Fig. 3-9 Pin definition for RJ1

Table 3-10 RJ1

Pin name	Description
FRnetA	FRnet port A
FRnetB	FRnet port B
NC	No connection

> **Note:** Don't connect NC (not connected) signals. Connecting these signals could cause permanent damage to your motion controller.

B4.3 Jumper and Switch Settings

■ JP5

Jumper 5 controls the EMG-A signal of the TB1 connector. The following diagram is shown the selection condition of the jumper 5.

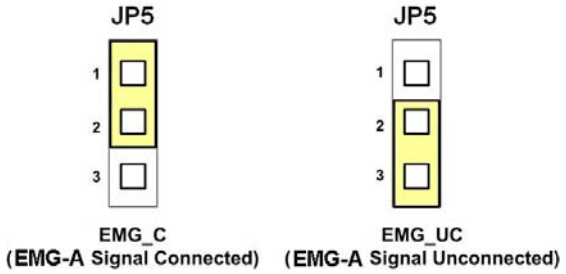


Fig. 3-10 Jumper 5 setting

■ JP1, JP2

The encoder signals of axis X and axis Y can be chosen from servo driver encoder or external encoder. Fig. 3-11 shows that the encoder signals are selected from servo driver encoder. In meantime, Fig. 3-12 shows that the encoder signals are selected from external encoder.

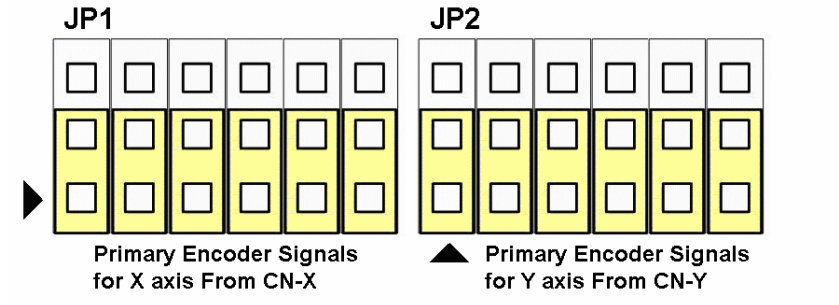


Fig. 3-11 Primary encoder signals setting

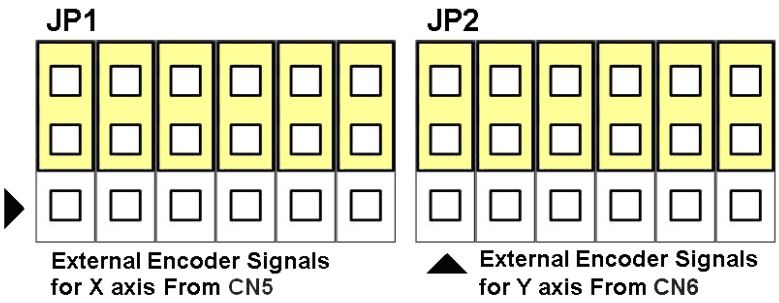


Fig. 3-12 External encoder signals setting

■ SW1

The emergency stop signal for each servo ampilfier can be selected from SW1. The number 1, 2 , 3, 4 on SW1 are denoted as axis X, Y, Z, U, respectively. Fig. 3-13 is the default setting to connect the EMG singals to GND. The EMG signals from CN1 ~ CN4 will not take effect. If the switch is disconnected as shown in Fig. 3-14, the emergency stop signals can be controlled from EMG signals in CN1 ~ CN4.

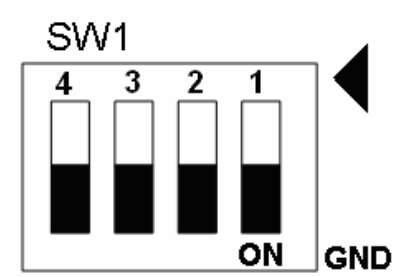


Fig. 3-13 SW1 setting for normally GND (Default setting)

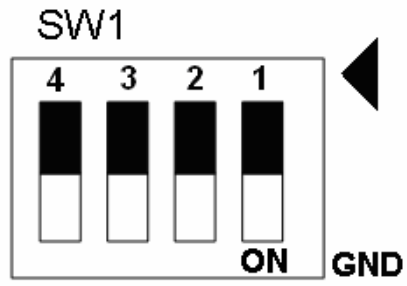


Fig. 3-14 SW1 setting for user controlled signals.

■ JP10 ~ JP13

Jumper 10 ~ Jumper 13 can select the reset function in CN1 ~ CN4 for each axis. The following diagram is shown the selection condition of the JP10.

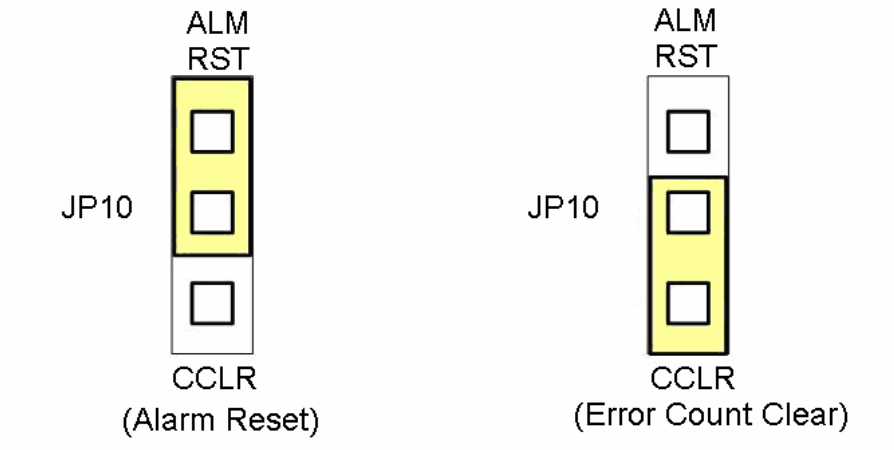


Fig. 3-15 JP 10 ~ 13 setting