PISO-PS400 快速上手手冊

(Version 2.4)

PISO-PS400 軟體函式庫快速上手
PCI BUS 系列控制卡

ICP DAS CO., LTD.

泓格科技股份有限公司

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目錄

1 PISO-PS400 運動控制卡簡介

1.1 簡介

PS400 是一張支援 4 軸 步進/伺服 馬達運動控制卡，輸出 Pulse 可高達 4M PPS，適合一般運動控制的應用。函式庫本身提供非常多的功能讓客戶使用，例如 2/3 軸直線補間、 2 軸圓(弧)補間、T-profile/S-curve 加減速曲線、多樣組合的同步控制、可規劃的自動歸原點等等，而 PS400 在執行上述功能時，並不需耗用 PC 系統資源，CPU 可同時監控其他執行狀態，由於只耗用少量系統資源，因此可以在 PC 插上多張 PS400 卡（一個系統中最多可控制 16 張 PS400 軸卡），以多軸(4、8....)運動控制於同一 PC 上。泓格亦提供相當多的範例程式及巨集功能，縮短程式設計的時間，以符合低成本高效能的運動控制系統設計平台。

1.2 硬體規格

1.2.1 主要規格

- 控制晶片　MCX314As
- 控制軸數　4 軸,脈波式輸出(步進或伺服馬達)
- 最大輸出脈波速度　4 M PPS

1.2.2 補間功能

2-軸 / 3-軸 直線補間

- 每一軸補間區間　-2,147,483,646 ~ +2,147,483,646
- 補間向量速度　1 PPS ~ 4 M PPS
- 補間精度　± 0.5 LSB

圓弧補間

- 每一軸補間區間　-2,147,483,646 ~ +2,147,483,646
- 補間向量速度　1 PPS ~ 4 M PPS

相關補間功能

- 可以選擇任意軸補間
- 固定向量速度
- 可連續補間

1.2.3 輸出脈衝

- 脈衝輸出速度範圍　1 PPS ~ 4 MPPS

- 脈衝輸出精度 ± 0.1%
- S-曲線衝量(Jerk) 範圍 954 ~ 62.5 x 10^6 PPS/S^2
  477 x 10^3 ~ 31.25 x 10^9 PPS/S^2
- 加減速範圍 125 ~ 1 x 10^6 PPS/S
  62.5×10^3 ~ 500 x 10^6 PPS/S
- 速度精度 1 PPS 到 500PPS(依最高速而定)
- 脈衝輸出數 0 ~ 4,294,967,295 / unlimited
- 速度曲線型態:
  - 定速
  - 對稱與非對稱T-profile型加減速
  - 對稱與非對稱S型加減速
- 減速度模式
  - 自動(對稱線性加減速) Auto
  - 自訂
- 於驅動中途可以動態改變速度及脈波數
- 定數脈波輸出可以用 T-profile/S-curve加減速
- 可選脈波輸出為CW/CCW 或 PULSE/DIR 方式
- 可以選擇邏輯準位（Rising Edge/ Falling Edge）

1.2.4 編碼器輸入

- 可選擇 A/B 相脈衝輸入或 Up/Down（CW/CCW）脈衝輸入
- 可選擇 1、2 及 4 除頻 (A/B 相脈衝輸入)

1.2.5 位置計數器

- 指令位置計數器範圍 -2,147,483,648 ~ +2,147,483,647
- 實際位置(編碼器輸入)計數器範圍 -2,147,483,648 ~ +2,147,483,647
- 提供可設定為環狀計數器的特殊功能(圓位置)
- 編碼器輸入可設定反方向
- 實際位置可利用DI(IN3)輸入清除為零
- 位置計數器可以經由軟體函式讀取及設定

1.2.6 FRnet串列式DI/DO功能

- 可串接遠端DI/DO模組（最多可接128DI及128DO）
- 可讀取遠端DI狀態
- 可控制遠端DO狀態

1.2.7 自動歸原點

- 自動歸原點步驟
  - 步驟 1 (高速找 ”近原點” 感測器)
  - 步驟 2 (低速找 ”原點” 感測器)
  - 步驟 3 (低速找伺服馬達Z相感測器)
  - 步驟 4 (高速到補正值位置)

  雖然自動歸原點只須四個步驟，但是使用者可藉由軟體函式的內容加以變化而形成 10 種以上的歸原點模式，因為每一步驟都可設定要不要執行及其找尋方向

1.2.8 伺服馬達輸入訊號 Servo Motor Input Signal

- 警告 (Alarm)
- 可選擇伺服到位(In Position Check) 或 伺服就序(Servo Ready)
- 可以選擇 有效/無效 及 邏輯準位

1.2.9 極限訊號輸入

- 各軸 2 個極限訊號輸入+ 極限（+EL）, - 極限（-EL）
- 可以選擇 邏輯準位 及碰觸極限後的停止模式為：減速停或急停

1.2.10 其它輸入訊號 Other Input Signals

- 各軸 In3 可以用來做其他用途，如同步控制中之輸入事件

1.2.11 緊急停止訊號輸入, Emergency Stop Signal Input

- 每一模組提供一個緊急停止信號輸入

1.2.12 一般輸出訊號 General Output Signal

- 各軸 nOUT1 作為控制Servo On/Off 信號

1.2.13 整合輸入濾波器Contents of integral type filters

- 對模組中一般DI輸入信號可以設定雜訊數位濾波(時間參數)功能

1.2.14 軟體極限

- 各軸可支援 2 個軟體極限 + 極限（+SEL）, - 極限（-SEL）
  可設定範圍(-2,147,483,646 ~ +2,147,483,646)

1.2.15 手搖輪功能

- A/B相手搖輪功能(Manual pulsar Mode)
- CW/CCW訊號輸入(定量模式)，指定步數輸出(Fixed Pulse Driving Mode)
- CW/CCW訊號輸入(連續模式)，指定驅動速度(Continuous Pulse Driving Mode)
- 關閉手搖輪功能(Disable Mode)

1.2.16 同步作動

- 引發作動時機
  - 位置計數器值 ≥ COMP+ 時
  - 位置計數器值< COMP+ 時
  - 位置計數器值< COMP− 時
  - 位置計數器值≥ COMP− 時
  - 軸驅動啟動時
  - 軸驅動停止時
  - IN3 輸入電位上升時
  - IN3 輸入電位下降時
  - 讀取邏輯位置時
  - Activation command
- 同步處理動作
  - 啟動 +/- 固定脈波輸出
  - 啟動 +/- 連續脈波輸出
  - 驅動減速停止
  - 驅動立即停止
  - 儲存目前位置計數器值(指令位置或編碼器位置)
  - 設定目前位置計數器值(指令位置或編碼器位置)
  - 設定輸出步數
  - 設定輸出頻率
  - 產生中斷信號

任一軸的動作可藉由上述之內容設定，而可指定任意其他軸來觸發

- 中斷信號處理 (不包含補間功能)
  - 引發中斷的原因:
    - 驅動Pulse 輸出時
    - 在加減速驅動模式中加速結束及減速開始時軸驅動停止時
    - 位置計數器值 ≥ COMP- 時
    - 位置計數器值 < COMP- 時
    - 位置計數器值 ≥ COMP+ 時
    - 位置計數器值 < COMP+ 時
    - 自動歸零及同步作動結束時
    - 這些中斷都可以啟動及關閉功能

1.3 環境參數Environment

工作溫度	-20 ~ + 75°C
儲存溫度	-30 ~ +85°C
工作濕度	10 ~ 85%，非結露non-condensing
儲存濕度	5 ~ 90%，非結露non-condensing
I/O 信號隔離	2500Vrms
外部供給電壓	24V DC (接線子板)

1.4 採購資訊Ordering Information

PISO-PS400	4 軸 PCI 運動控制卡
DN-8468	PISO-PS400 端子板
CA-SCSI15	68-pin SCSI-II 接頭線，長度:1.5 m

2 硬體配線

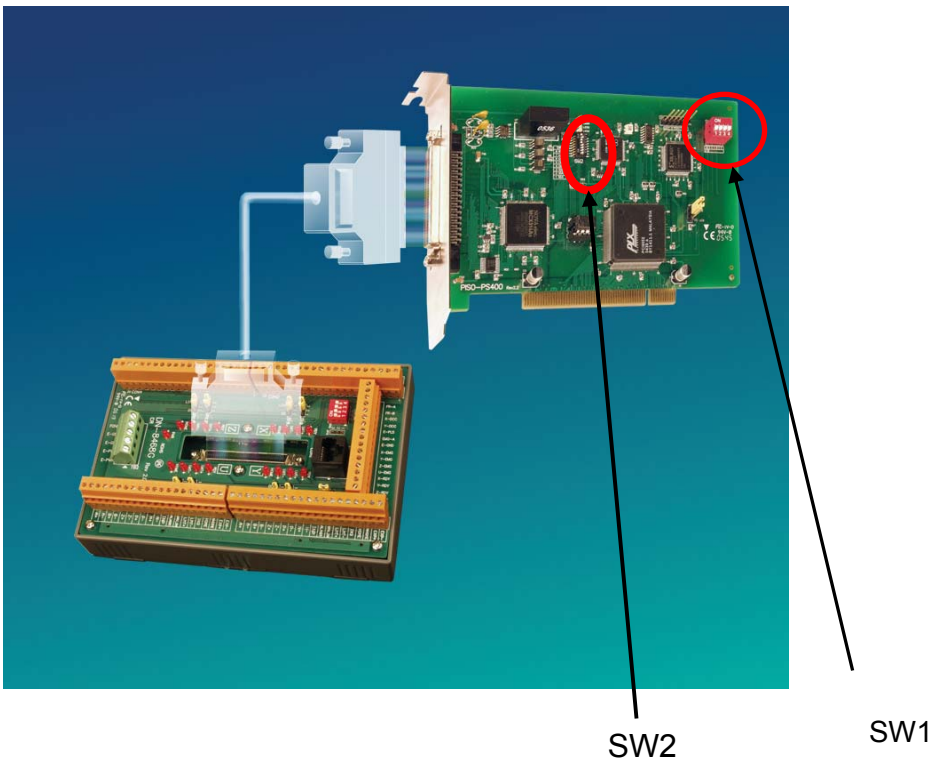
2.1 PISO-400 檢查包裝及安裝

2.1.1 檢查包裝

- PISO-PS400　　PCI 4軸運動控制卡
- DN-8468　　PISO-PS400 配線端子板
- CA-SCSI15　　68-pin SCSI-II 接頭線，長度:1.5 m

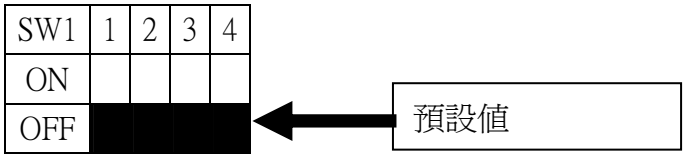
2.1.2 安裝

請先將電腦電源關閉，並選用空的 PCI 插槽插入板卡，並用螺絲鎖緊固定，並用 CA-SCSI15 聯接到 DN-8468 配線端子板，如下圖:



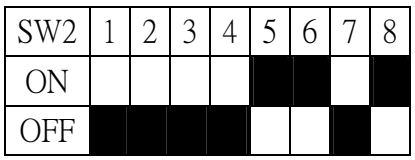
2.1.3 SW1 設定

SW1(1~4)為設定硬體卡號的調整鈕(也就所謂的卡ID, card ID位置請參考2.1.2標示), 使用者可以利用此調整鈕來設卡的ID(出廠預設為1~4皆為OFF, 卡ID=0), 如有其他卡時,請調成不同卡號, 程式設計時,會以此硬體卡號來辨識及下控制指令；設定卡號的範圍為:0~15, 所以一個控制系統最多能插入16張卡;。



2.1.4 SW2 設定

SW2(1~8)為FRnet的設定內容(詳細的SW2位置請參照2.1.2標示), 其中5為設定FRnet的傳輸速率(出廠預設值為ON:代表傳輸速率為250k, 若改為OFF, 則為傳輸速率為1M), 目前此SW2也僅開放給使用者可以設定傳輸率, 因此請勿任意更動其他SW2的內容, 而使用者在設定為1M的傳輸速率時,後端的Slave模組, 必須是支援1M的模組, 這樣才可以運作。



2.2 DN-8468 端子板

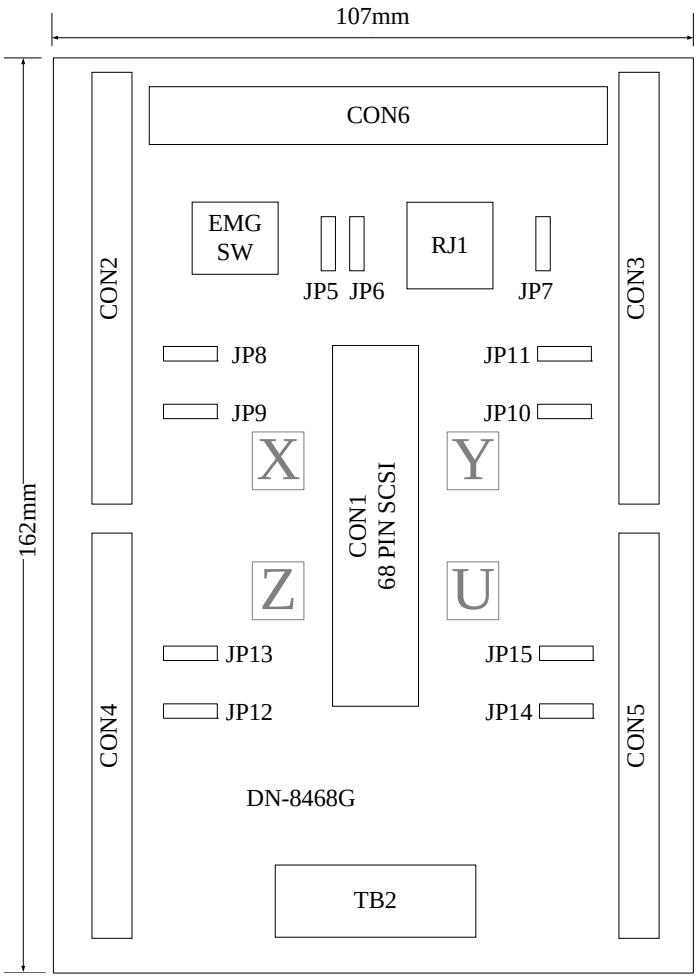


Fig. 2.0 DN-8468 位置圖

2.2.1 腳位定義

■ **CON1：PISO-PS400 卡與 DN-8468 連接接頭**

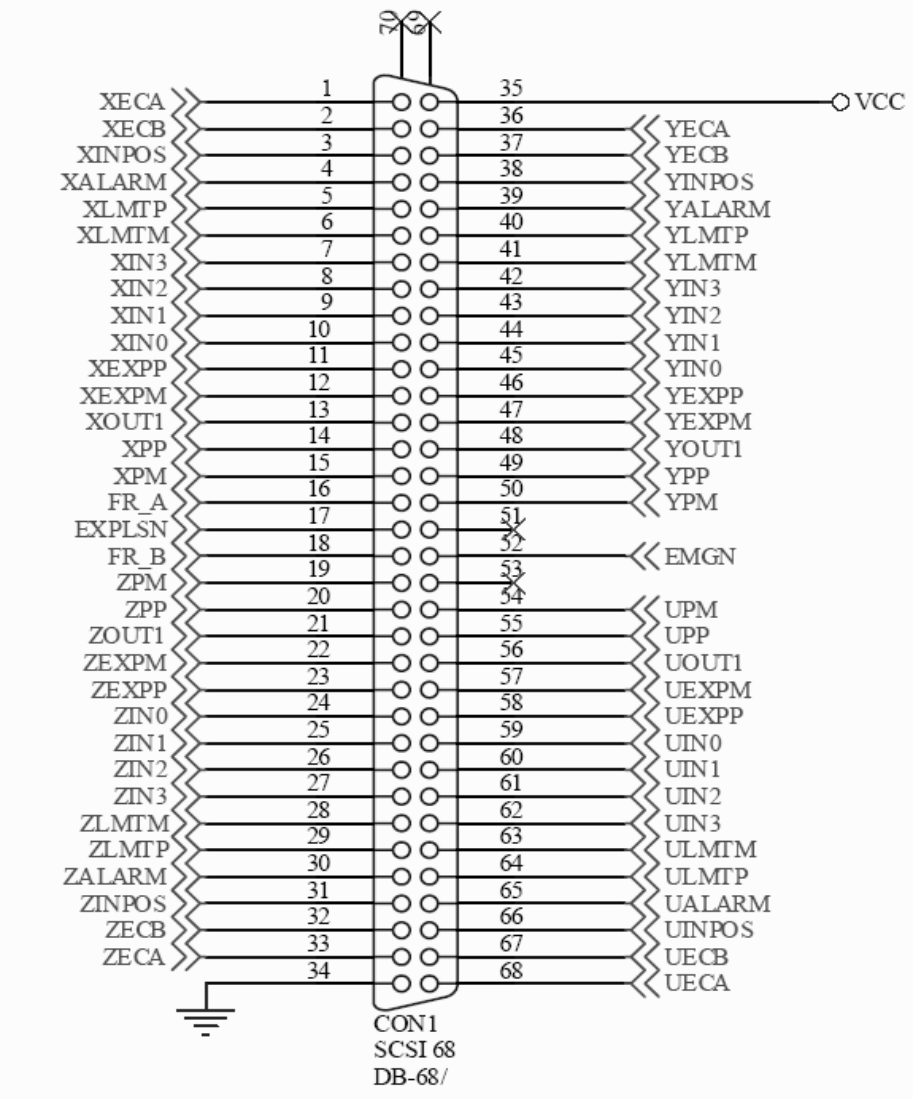


Fig. 2.1 DN-8468 CON1 連接線腳位圖

Table 2.1 DN-8468 CON1 連接線腳位說明 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-8468 CON1 連接線腳位說明 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
FR_A	16	FRnet A
NC	51	Reserved
FR_B	18	FRnet B
NC	53	Reserved
EXPLSN1	17	EXT pulse input signal for interpolation
EMGN1	52	Emergency stop input signal
GND	34	Ground
VCC	35	Module power (+5V)

■ **CON2~5　各軸（X、Y、Z、U）之控制接點【Pulse 輸出（±P/±N）；Encoder 輸入（A±/B±/Z±）】及 I/O 信號接點【INP、ALARM、Home（ORG）、Limit、EXP、IN3 等】**

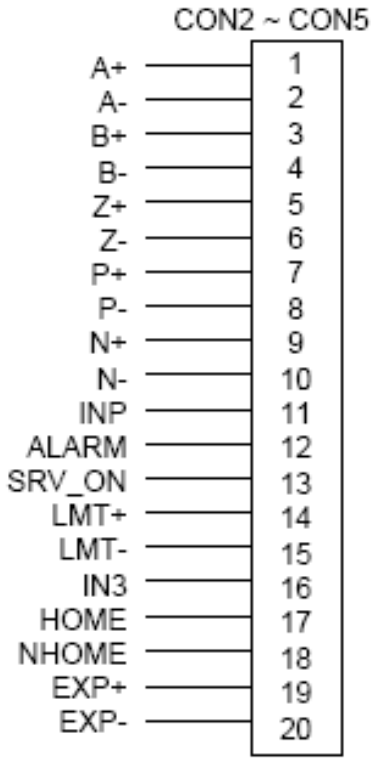


Fig. 2.2　Pin definition for CON2 ~ CON5

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 FRnet 接點：為串列分散式 I/O 控制點，其最大傳輸速率為 1M Hz，且為主動式之固定時間更新 I/O 點資料，每一週期時間為：0.76 Ms；最多可串接 128DI 及 128DO。**

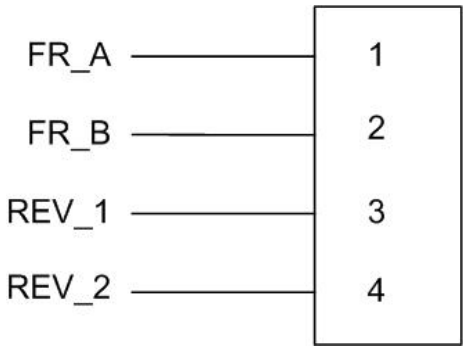


Fig. 2.3 CON6 腳位定義

Table 2.4 CON6

Pin name	Description
FR_A	FRnet A
FR_B	FRnet B
REV_1	Reserved
REV_2	Reserved

如運動控制內建 FR_Net 分散式 DIO 控制器，可以外接高速 FR_Net 模組，128 DI/128 DO 接線端子。

■ **TB2 參考下列腳位圖**

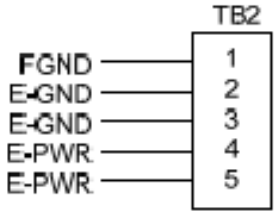


Fig. 2.4 Pin definition for TB2

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 FRnet 接點,參考下列腳位圖**

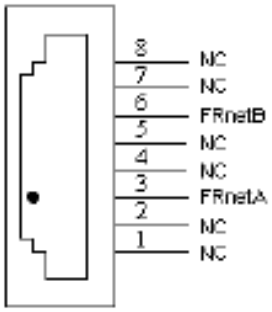


Fig. 2.5 Pin definition for RJ1

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.

2.2.2 功能選擇(跳線設定)

■ JP7

Jumper 7 控制緊急停止輸入由外部提供或直接與GND點連接，1-2pin 短路須經由外部腳位接GND，2-3pin 短路為內部電路直接接GND

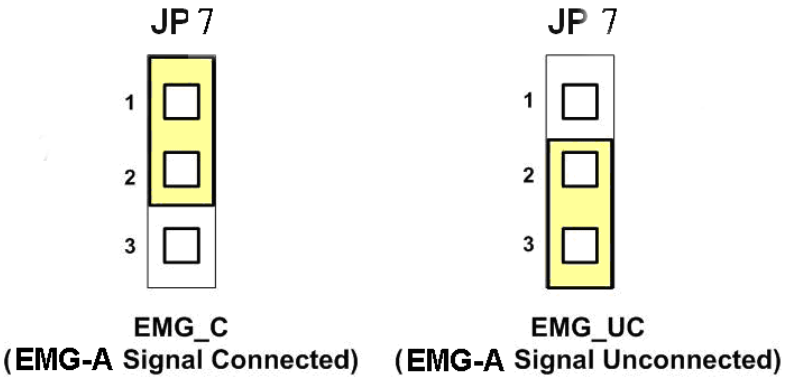


Fig. 2.5 Jumper 7 設定

■ JP8/9, JP10/11, JP12/13, JP14/15

Jumper 8、9 控制X軸(CON1) XPP、XPM訊號模式，2-3pin 短路為差動輸出 (Differential)；1-2pin 短路為開集極輸出(Open Collector)，同理其他各軸設定Y(JP10/11)、Z(JP12/13)、U(JP14/15)亦相同，如下圖範例

注意: 開集極輸出(Open Collector)，P+ (N+)和 EXT_5V 短路，可供外部使用 (參考 Fig 2.10)。

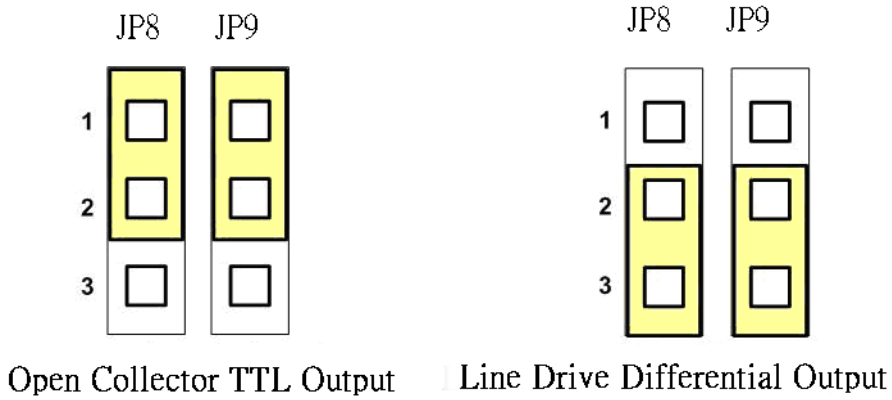


Fig. 2.6 Jumper 8, 9 設定

■ EMG SW

EMG SW 是將伺服馬達所上提供給EMG Stop訊號引出供給客戶配接使用，並非軸卡上之功能，客戶可以撥動EMG SW來選擇將此訊號配接於自行設計的安全開關連接使用或選擇不使用，若選擇不使用則是將此訊號直接短路到端子台的GND，若選擇使用則客戶可以將CON6上的EMG當成配接點來結合使用，請參考下圖:

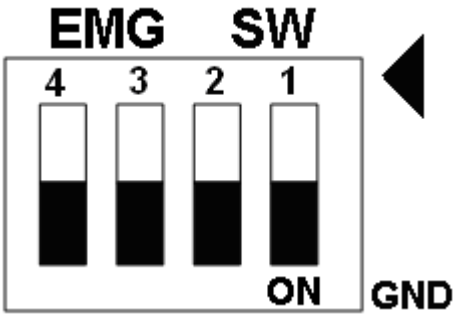


Fig. 2.7 EMG SW 設定爲直接內部接 GND (預設值)

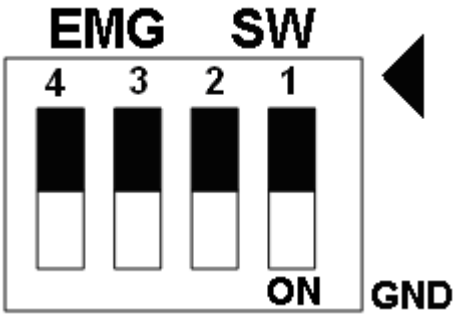


Fig. 2.8 EMG SW 設定爲使用者自行配接點.

2.3 I/O 輸出入介面

2.3.1 脈波輸出介面及模式

脈波輸出介面有分差動式（Differential-Type）及開集極式（Open-Collector）兩種；而輸出模式也分為兩大類（Pulse/Direction及CW/CCW），我們將對上述內容做個別說明：

◆ 差動脈波輸出接線

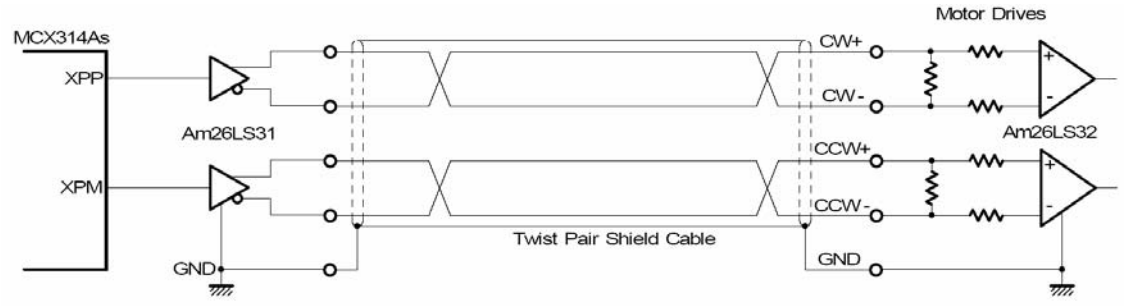


Fig. 2.8 差動脈波輸出接線

◆ 開集極輸出

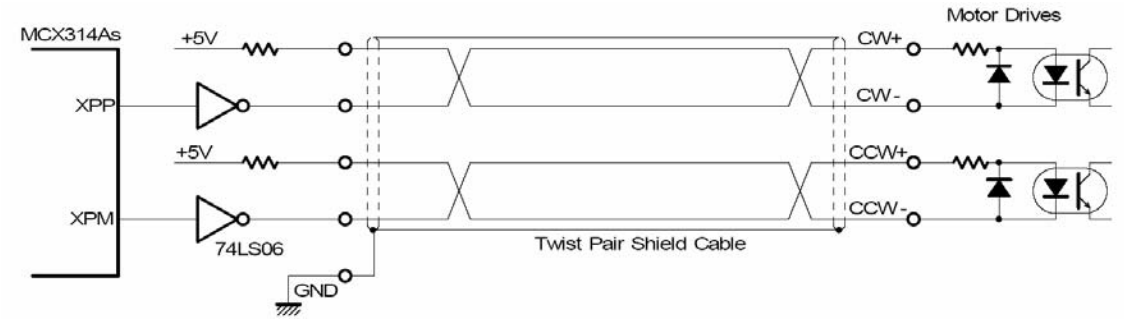


Fig. 2.9 開集極輸出

◆ 脈波信號接線範例

PS400 脈波輸出命令，可以使用 CW/CCW 模式或用 PULSE/DIR 模式。利用 JP2 至 JP9 去選擇各軸為差動或開集極的接法。

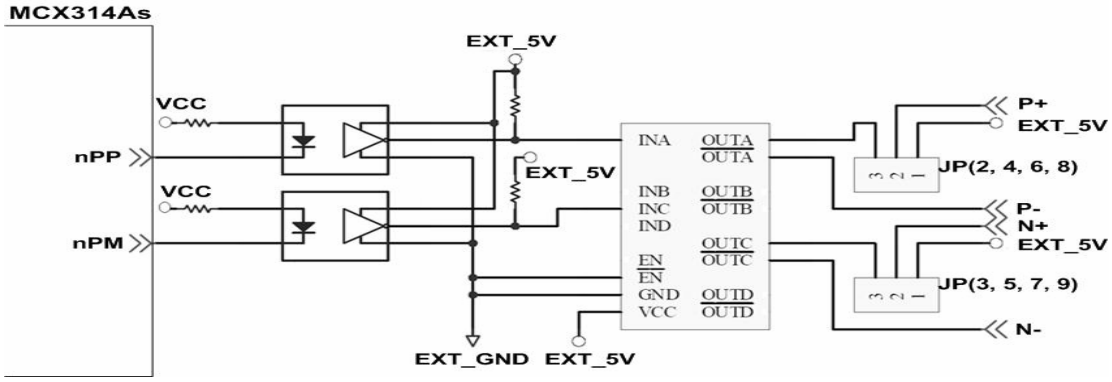
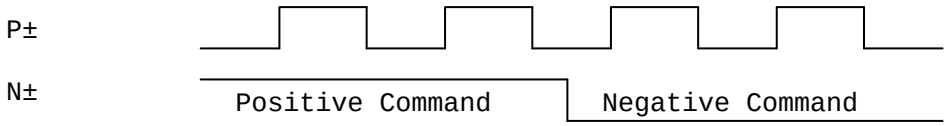


Fig. 2.10 脈波信號接線範例

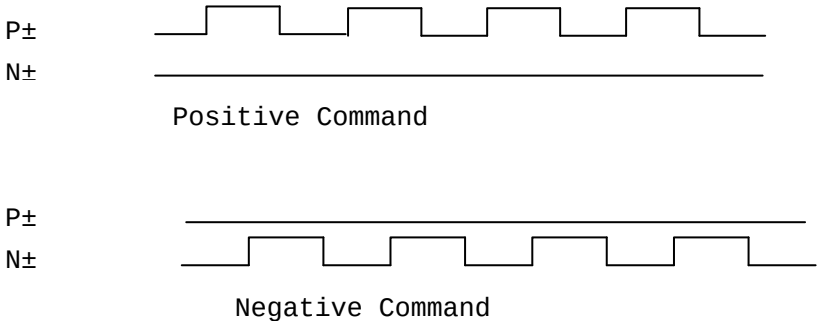
◆ 單一 Pulse 輸出模式（Pulse/Direction）：

此模式脈衝輸出的特色為 Pulse 輸出點固定，皆由 Pulse 點輸出，而決定旋轉方向的部份是由 Direction 之電位來決定。請參考下圖：



◆ 雙 Pulse 輸出模式（CW/CCW）：

此模式的脈衝輸出的特色為 Pulse 輸出點有兩點，而此兩點的輸出同時也決定了旋轉方向，請參考下圖：



2.3.2 極限開關接線(Connection for Limit switch Signal)

使用極限開關去防止機械過動作，設計者能透過本手冊的函式庫，去設定硬體極限開關的動作為 A 接點（Normal open）或 B 接點（Normal close）。下面圖例，極限開關信號的接續迴路是為了要隔離雜訊源。

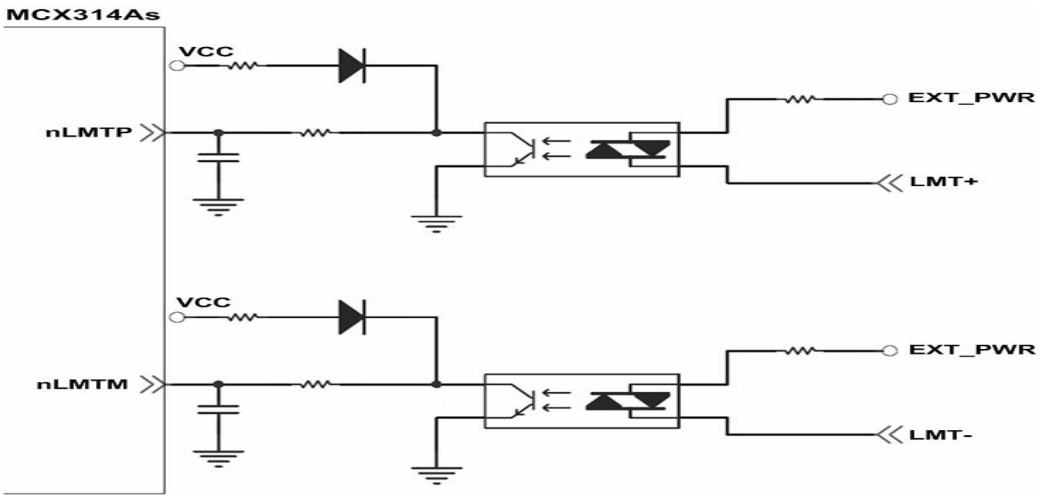


Fig. 2.11 極限開關接線範例

2.3.3 一般DI輸入接線(nINPOS,nALARM)

INPOS 輸入信號，是伺服驅動器 In-Position 的檢查信號。設計者能透過本手冊的函式庫去 enable/disable 這個信號。

ALARM 輸入信號，是伺服驅動器警報輸出信號，當 PS400 收到這個信號可以停止輸出脈波。設計者能透過本手冊的函式庫去 enable/disable 這個信號。

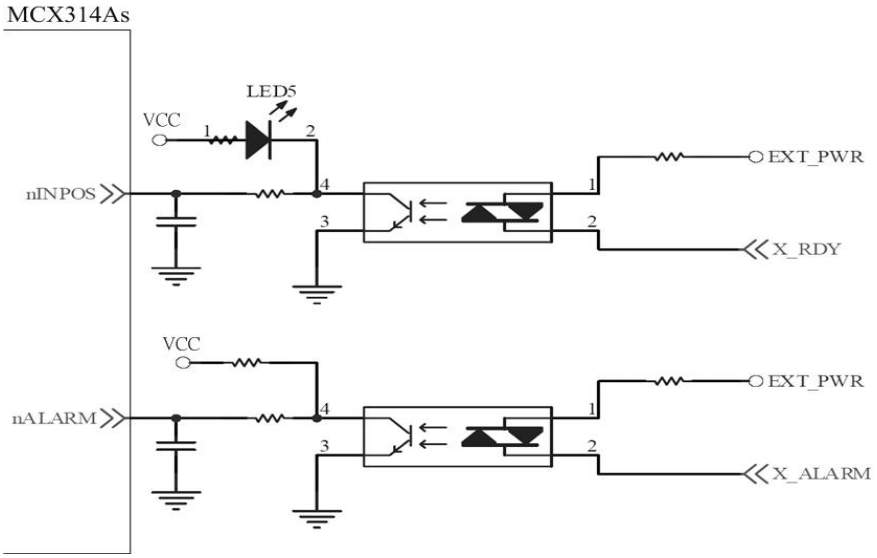


Fig. 2.12 一般 DI 輸入接線範例

2.3.4 Encoder輸入接線(Encoder Signals)

下圖是一個 Encoder 輸入接線範例，是用差動輸入信號接法。要接 Encoder 輸入時，A 相請連接 A+、A-，B 相請連接 B+、B-,經過高速光偶合 IC 就直接連到運動控制晶片。

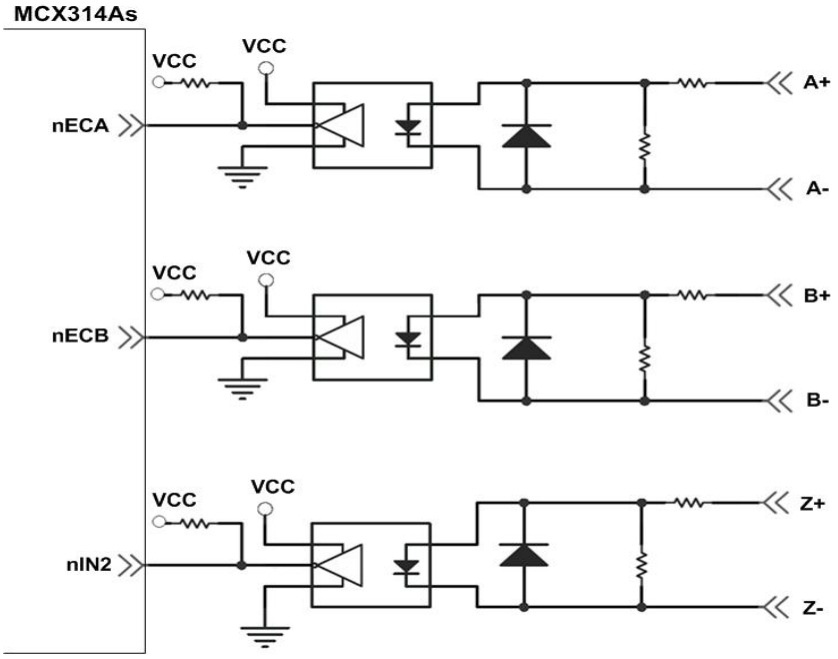


Fig. 2.13 Encoder 接線範例

2.3.5 緊急停止輸入接線(emergency stop signal)

下圖是一個緊急停止輸入接線範例，當緊急停止輸入被按下時，所有軸會立即停止輸出，錯誤旗標將設為 1，這信號經過高速光偶合 IC 就直接連到運動控制晶片。

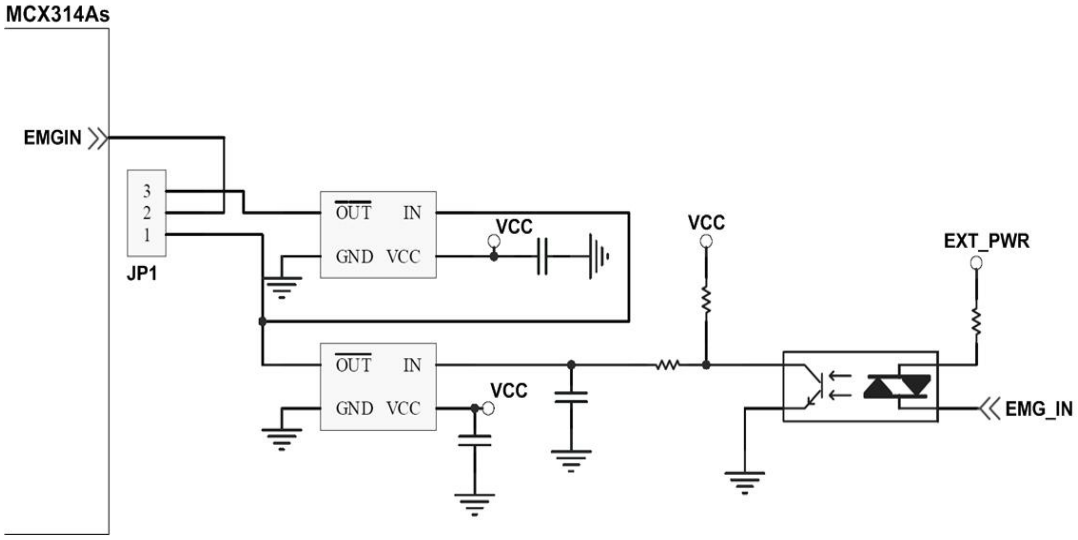


Fig. 2.15 緊急停止輸入接線範例

2.3.6 手搖輪信號輸入接線(EXP+,EXP-)

本信號用於手搖輪輸入驅動，下圖是外部信號 +/- 輸入接線範例，這輸入功能可用 5.1 章節中的固定脈波（CW/CCW）驅動、連續脈波（CW/CCW）驅動、手輪脈波驅動（A/B phase）三個功能可以應用。

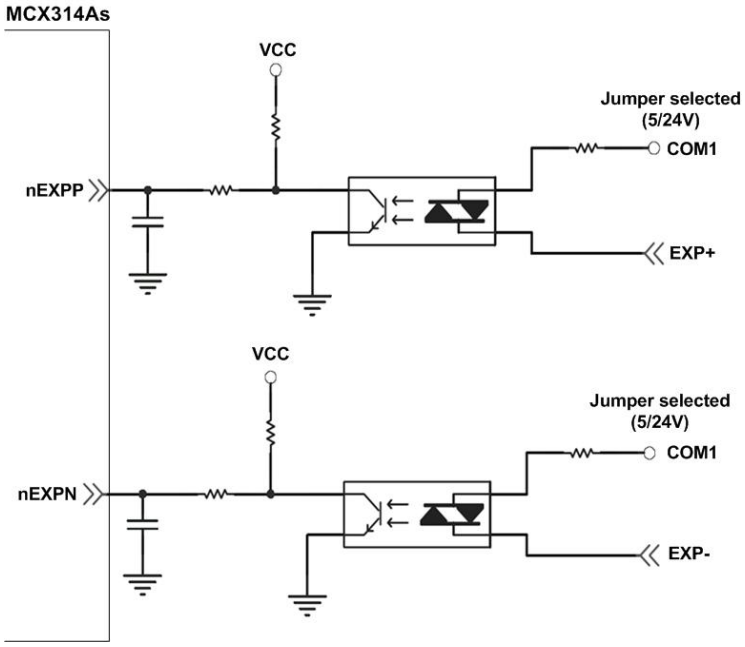


Fig. 2.16 外部信號 +/- 輸入接線範例

2.3.7 Servo On/Off信號輸出接線(ENABLE)

下圖是 Servo On/Off 信號輸出接線範例，這輸出功能用於使每軸伺服馬達伺服啟動/關閉。

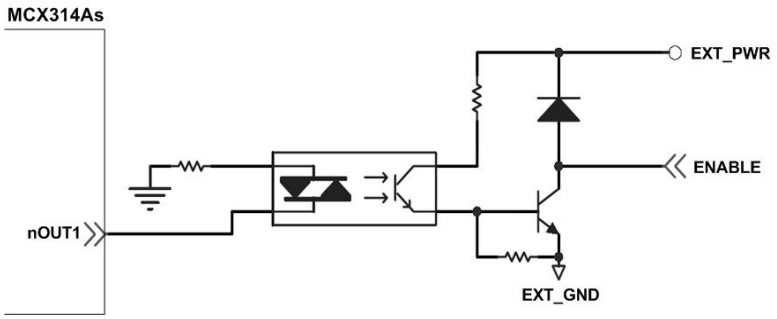


Fig. 2.17 Servo On/Off 信號輸出接線

2.4 接線範例

我們實際示範接 MITSUBISH MR-J2S AC 伺服馬達，連接到 DN-8468 的接線腳位圖

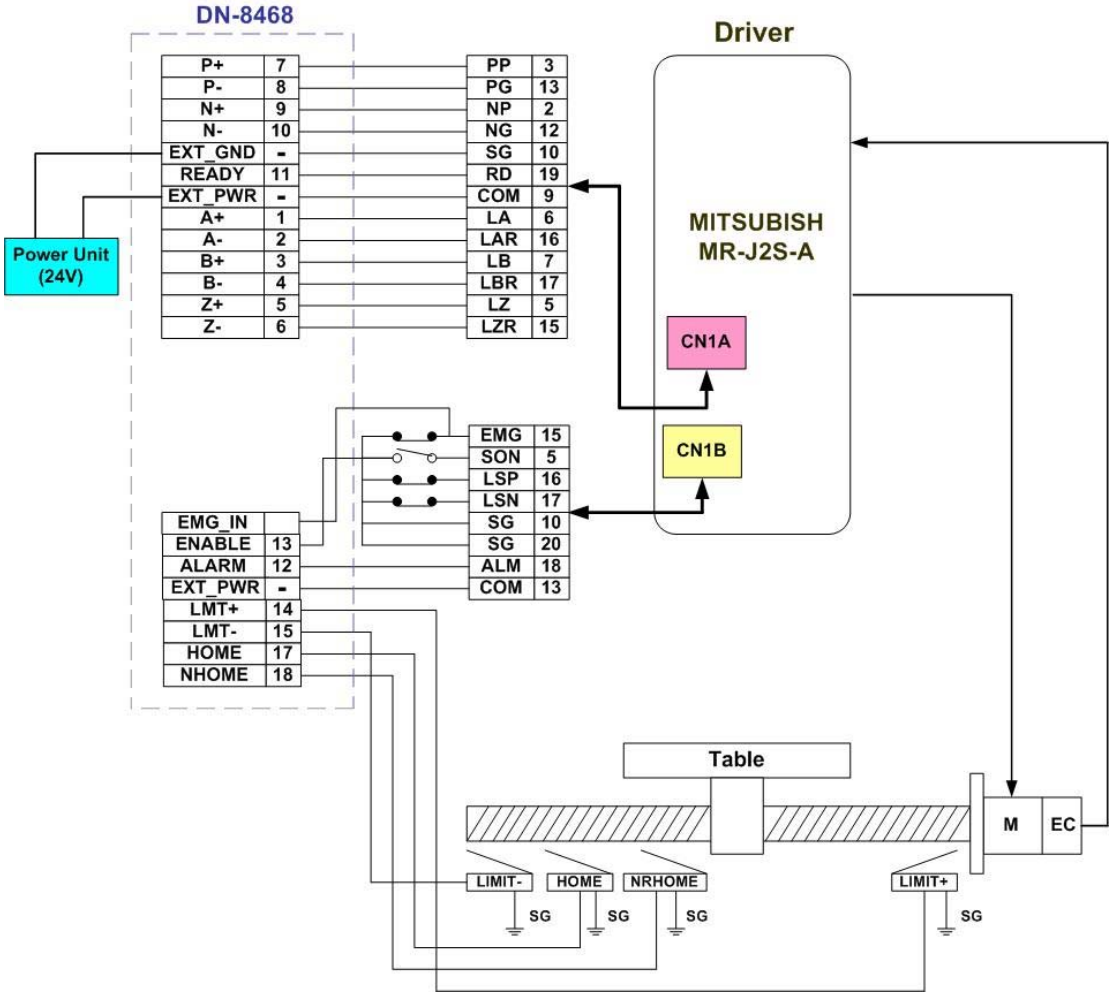
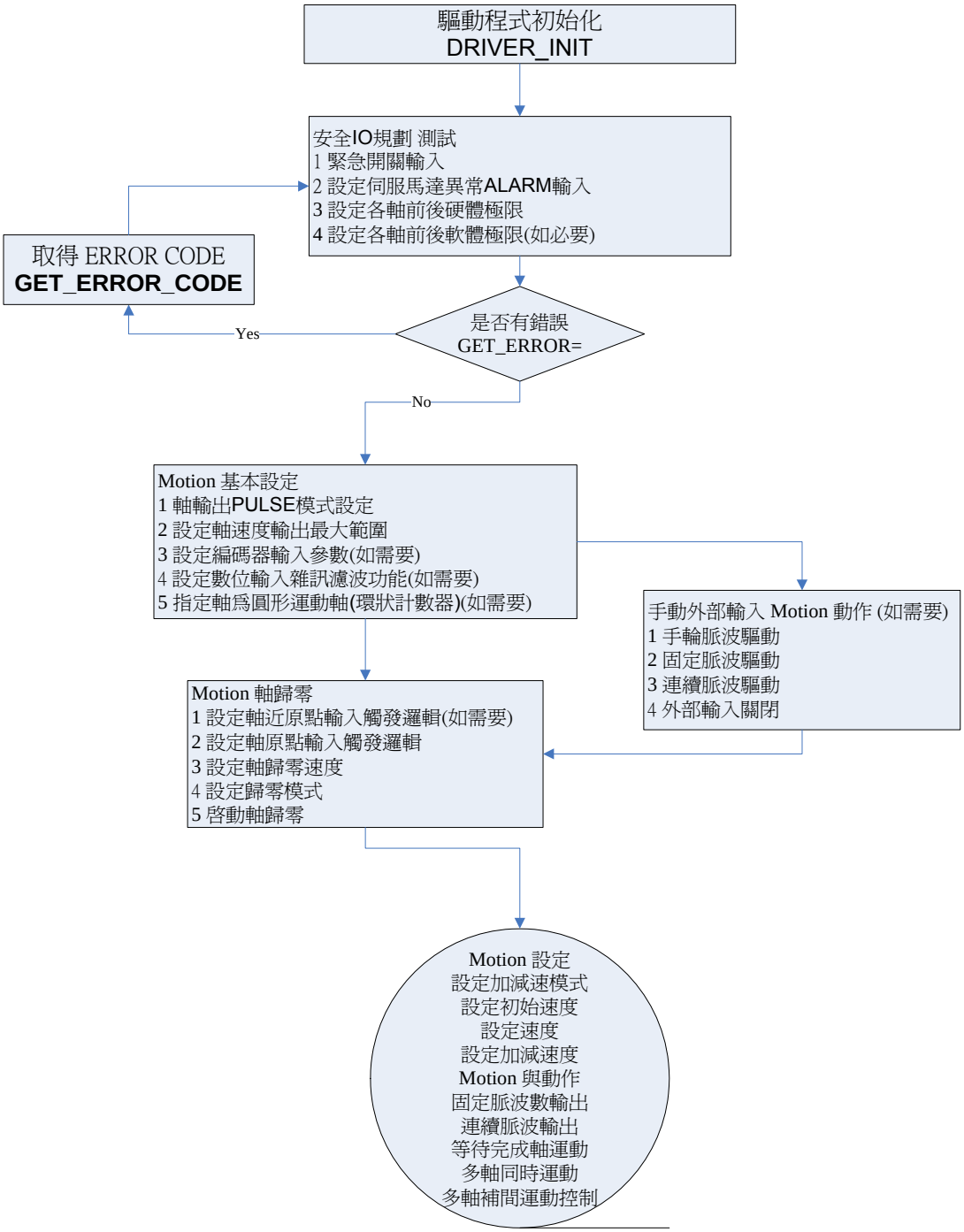


Fig. 2.18 MR-J2S AC 伺服馬達，連接到 DN-8468 的接線腳位圖

3 PISO-400 軟體函式軟體開發程序

3.1 軟體開發測試程序概觀

詳細請參考:demo_start 範例



3.1.1 驅動程式初始化

每一軸卡要使用之前一定要先初始化，才能下其他指令，否則會產生錯誤。

PS400_Card_Init(**void**) ()詳情請參考 “PS400 軟體函式手冊 V2.0” pdf 2.2。

3.2 安全IO規劃(會使Motion不動作原因)

3.2.1 緊急開關（EMG）輸入

緊急開關，是為因應緊急狀況，讓使用者在緊急時可以立即使Motion 動作停止，以保護人機安全。

如果您不用緊急開關，在 2.2.2 的JP1接為2-3pin。

如果您要使用緊急開關，在 2.2.2 的JP1接為1-2pin，EMG_IN 請連到常閉型(N.C.)開關，並將開關安裝到適當位置。

3.2.2 設定伺服馬達異常ALARM輸入參數

是為因應伺服馬達ALARM發生時輸入，讓使用者可以判斷及處理，您可以選擇使用與否，與適當觸發邏輯。詳情請參考 “PS400軟體函式手冊 V2.0” pdf 2.11 PS400_Set_Alm()

3.2.3 設定各軸前後硬體極限（±EL）

在一般機構設計時，為保護機構安全，會在機構的安全行程內設置前後硬體極限開關，讓使用者可以避免超出行程，如碰觸到前後硬體極限開關PS400MF會自動停止，您可以選擇使用適當觸發邏輯。詳情請參考 “PS400軟體函式手冊 V2.0” pdf 2.6 PS400_Set_Limit () 功能

3.2.4 設定各軸前後軟體極限（±SEL）

在一般機構設計時，為保護機構安全，會在機構的安全行程內設置前後硬體極限開關外，可以再加軟體極限，讓使用者可以提早避免超出行程，或免用硬體極限，如碰觸到前後軟體極限PS400會自動停止，您可以選擇使用與否，與設定位置。詳情請參考 “PS400軟體函式手冊 V2.0” pdf 2.8 PS400_Set_Softlimit ()，與PS400_Disable_Softlimit() 功能

3.3 檢查是否有錯誤(GET_ERROR)

檢查是否有錯誤，如有再PS400_Get_Error_Code 取得 ERROR_CODE並查相關原因，相關處理檢查，及正確設定詳情請參考 “PS400軟體函式手冊 V2.0”pdf 3.6
也可以利用“PS400軟體函式手冊 V2.0”pdf 3.6 PS400_Get_Error_Status()讀取目前Error_status狀態確定是否產生，然後使用PS400_Get_Error_Code()取得錯誤內容後查表錯誤內容。

3.4 Motion 基本設定

Motion 基本設定主要是針對一般必要性設定分別如下:

1 軸輸出PULSE模式設定，Pulse/Dir、CW/CCW…

PS400_Set_PulseMode () (詳情請參考 PS400軟體函式手冊 2.5)

2 設定各軸的最高速度限制

PS400_Set_MaxSpeed()(詳情請參考 PS400軟體函式手冊 2.6)

3 設定編碼器輸入參數(如需要)

PS400_Set_EncoderMode()(詳情請參考 PS400軟體函式手冊 2.9)

4 設定數位輸入雜訊濾波功能(如需要)

PS400_Set_Filter ()(詳情請參考 PS400軟體函式手冊 2.13)

5 指定軸為圓形運動軸(環狀計數器)(如需要)

PS400_Set_Vring ()(詳情請參考 PS400軟體函式手冊 2.14)

3.5 Motion 動作測試(手搖輪輸入)(如需要)

實際測試時可用手動驅動功能，做一些基本前後移動動作，確認DI信號是否正常，正負方向是否正確，以便做進一步線路及參數調整，主要有下列三種方法可以選其一運用:

1 手輪脈波驅動: 用A/B相手輪(手動脈波產生器，如附圖)做為前後之控制。

PS400_Set_ManualPulsar ()(詳情請參考 PS400軟體函式手冊 2.17)

2 固定脈波驅動: 利用兩按鈕開關，可設定每按一下走幾步(Pulse)，一按鈕控制Motion前

進，另一按鈕控制後退。

PS400_Set_ManualPulsar ()(詳情請參考 PS400軟體函式手冊 2.17)

3 連續脈波驅動: 利用兩按鈕開關，可設定Pulse輸出速度(Hz)按下輸出，放開即停止，一按鈕控制Motion前進，另一按鈕控制後退。

PS400_Set_ManualPulsar ()(詳情請參考 PS400軟體函式手冊 2.17)

4 外部輸入關閉: 使用完上述三項功能，必須用此指令，將它關閉。

PS400_Set_ManualPulsar ()(詳情請參考 PS400軟體函式手冊 2.17)

3.6 軸歸零

PS400 提供自動歸零功能，只要經適當設定後，即可下指令自動執行，主要步驟如下:

- 以高速尋找近原點開關
- 以低速尋找原點開關
- 以低速尋找伺服馬達 Z 相信號
- 以高速運動到補正值(Offset)位置(程式原點)

設定時，其中步驟可以選擇不執行，以符合客戶實際需求動作，執行時完全自動執行，節省 CPU 資源，及程式設計。雖然自動歸原點只須四個步驟，但是使用者可藉由軟體函式的內容加以變化而形成 10 種以上的歸原點模式，因為每一步驟都可設定要不要執行及其找尋方向

3.6.1 歸零設定

1 設定軸近原點輸入觸發邏輯(如需要)

PS400_Set_Home () (詳情請參考 PS400軟體函式手冊2.7)

2 設定軸原點輸入觸發邏輯

PS400_Set_HomeMode () (詳情請參考 PS400軟體函式手冊 2.7)

3 設定軸歸零速度，包含設定歸零速度值及設定開始啟動速度

PS400_Set_HomeSpeed () (詳情請參考 PS400軟體函式手冊 6.1)

4 設定歸零模式

PS400_Set_HomeMode ()(詳情請參考 PS400軟體函式手冊 6.3)

3.6.2 執行歸零設定

1 啟動軸歸零

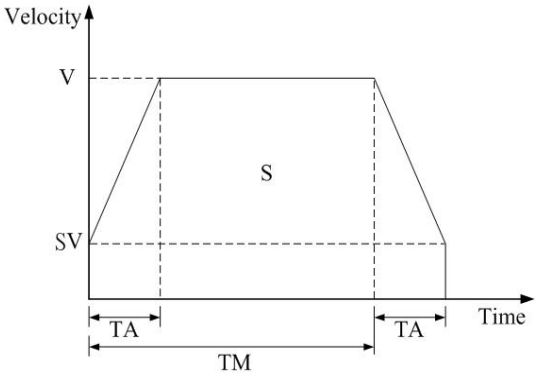
PS400_Home _Start ()(詳情請參考 PS400 軟體函式手冊 6.4)

2 等待完成歸零動作

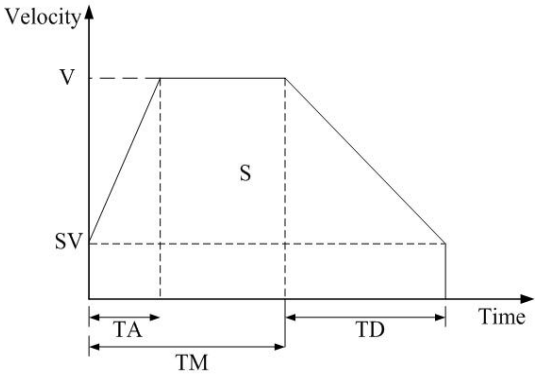
PS400_Home_Done ()(詳情請參考 PS400 軟體函式手冊 6.5)

3.7 Motion 基本運作

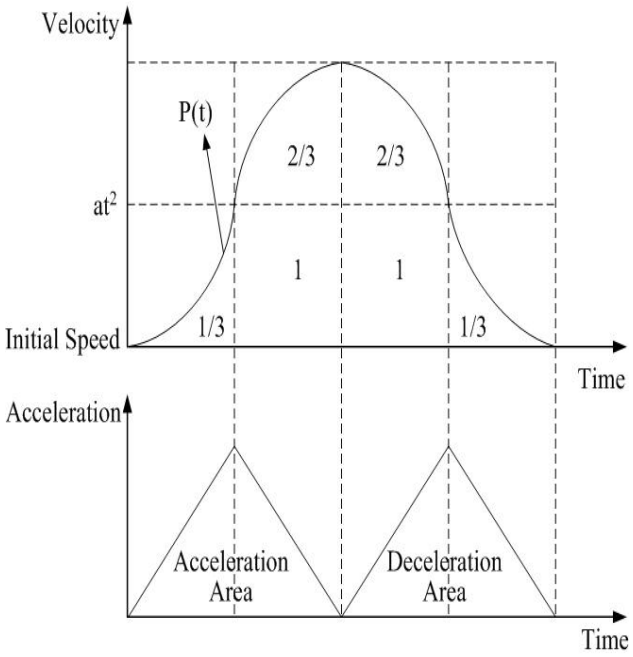
3.7.1 一般運動控制速度曲線分類



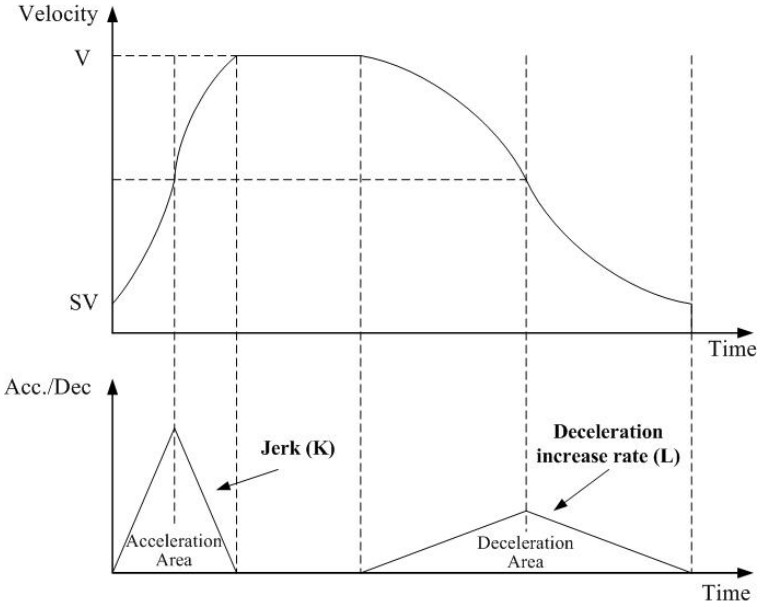
1 對稱 T 型運動控制速度曲線(如 SV 大於等於 V,將執行定速驅動)



2 非對稱 T 型運動控制速度曲線



3 對稱 S 型運動控制速度曲線



4 非對稱 S 型運動控制速度曲線

3.7.2 單軸Motion 基本動作

1 固定脈波數輸出: 執行單軸固定步數輸出，有五種速度模式可選擇使用以下相關函式。

等速度曲線(V) → PS400_Const_Move()

對稱 T 曲線 (SV、V、A、AO) → PS400_T_Move()

對稱 S 曲線 (SV、V、K、AO) → PS400_S_Move()

非對稱 T 曲線 (SV、V、A、D、AO) → PS400_T_As_Move()

非對稱 S 曲線 (SV、V、K、L、AO) → PS400_S_As_Move()

(詳情請參考 PS400 軟體函式庫手冊 7.1~7.3)

2 連續脈波輸出: 執行單軸連續脈波輸出。

相關函式：PS400_Conti_Move()

(詳情請參考 PS400軟體函式庫手冊7.4)

3 等待完成軸運動: 等待軸完成停止。

相關函式：PS400_Motion_Done()

(詳情請參考 PS400 軟體函式庫手冊 7.9.5)

3.7.3 多軸補間Motion 基本動作

1 二軸直線補間: 執行二軸直線補間。

相關函式：PS400_Line2_Move()

PS400_Line2_As_Move()

(詳情請參考 PS400 軟體函式庫手冊 7.5)

2 三軸直線補間: 執行三軸直線補間。

相關函式：PS400_Line3_Move()

PS400_Line3_As_Move()

(詳情請參考 PS400軟體函式庫手冊 7.5)

3 二軸圓弧補間: 執行二軸圓弧補間。

相關函式：PS400_Arc2_Move ()

(詳情請參考 PS400軟體函式庫手冊7.6)

3.8 Motion 同步運動

提供使用者可以設定2軸(含)以上同步運動條件因子

相關函式: PS400_Set_SyncMotion()

(詳情請參考 PS400軟體函式庫手冊7.7)

提供使用者可以住意設定單軸或多軸運動位置拴鎖

相關函式：PS400_Set_Latch()

PS400_Get_Latch()

(詳情請參考 PS400軟體函式庫手冊7.7)

提供使用設定2軸(含)以上同步重新設定位置或速度值

相關函式：PS400_Sync_Preset()

PS400_Preset_Data()

(詳情請參考 PS400軟體函式庫手冊7.7)

3.9 Motion 進階運動

1 二軸矩形連續補間: 執行二軸矩形補間。

相關函式：PS400_Rectangle()

(詳情請參考 PS400 軟體函式庫手冊 7.8.1)

2 二軸直線連續補間:

二軸直線連續補間初始設定(對稱 T 曲線加減速)。

相關函式：PS400_Set_Line2()

執行二軸直線連續補間。

相關函式：PS400_Line2_Start()

(詳情請參考 PS400 軟體函式庫手冊 7.8.2)

3 三軸直線連續補間:

三軸直線連續補間初始設定(對稱 T 曲線加減速)。

相關函式：PS400_Set_Line3L()

執行三軸直線連續補間。

相關函式：PS400_Line3_Start()

(詳情請參考 PS400 軟體函式庫手冊 7.8.3)

4 三軸螺旋運動:

三軸螺旋運動(對稱 T 曲線加減速)。

PS400_Helix3_MoceL()(詳情請參考 PS400 軟體函式庫手冊 7.8.4)

5 2 軸比例運動:

二軸比例運動初始設定(對稱 T 曲線加減速)。

PS400_Set_Ratio2()

執行二軸比例運動。

PS400_Ratio2_Start()(詳情請參考 PS400 軟體函式庫手冊 7.8.5)

4 軟體快速上手

4.0 PISO-PS400 驅動程式安裝

請參考附錄:

4.1 VC 6.0 開始範例

4.1.1 確認相關檔案

請確認您有以下相關檔案安裝路徑

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

- PS400.h

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

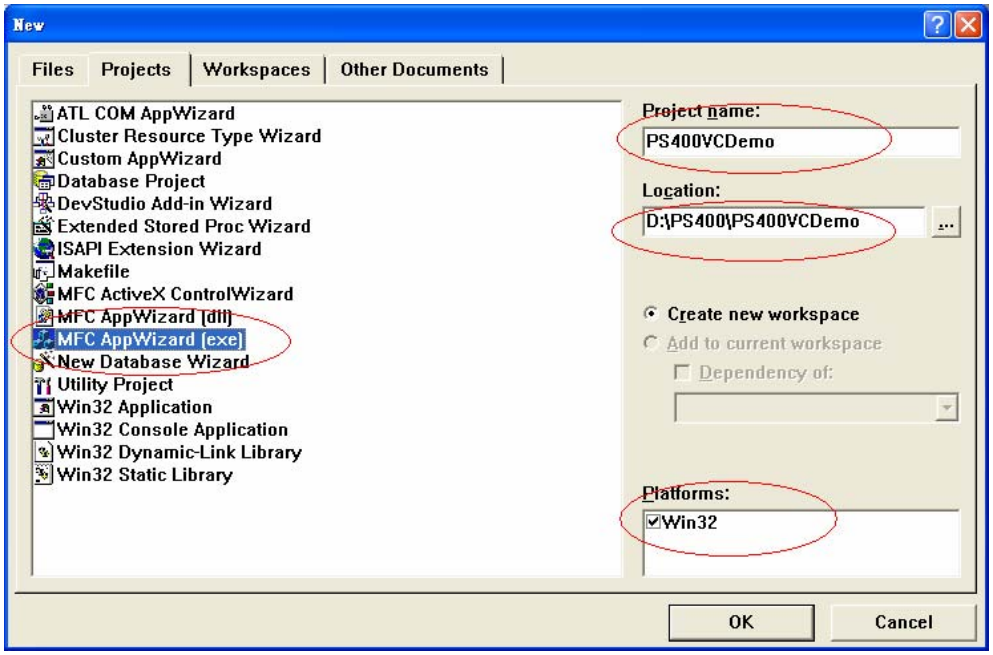
- PS400DLL.lib

如您沒有,請找 CD 或到我們的網站下載最新版本資料

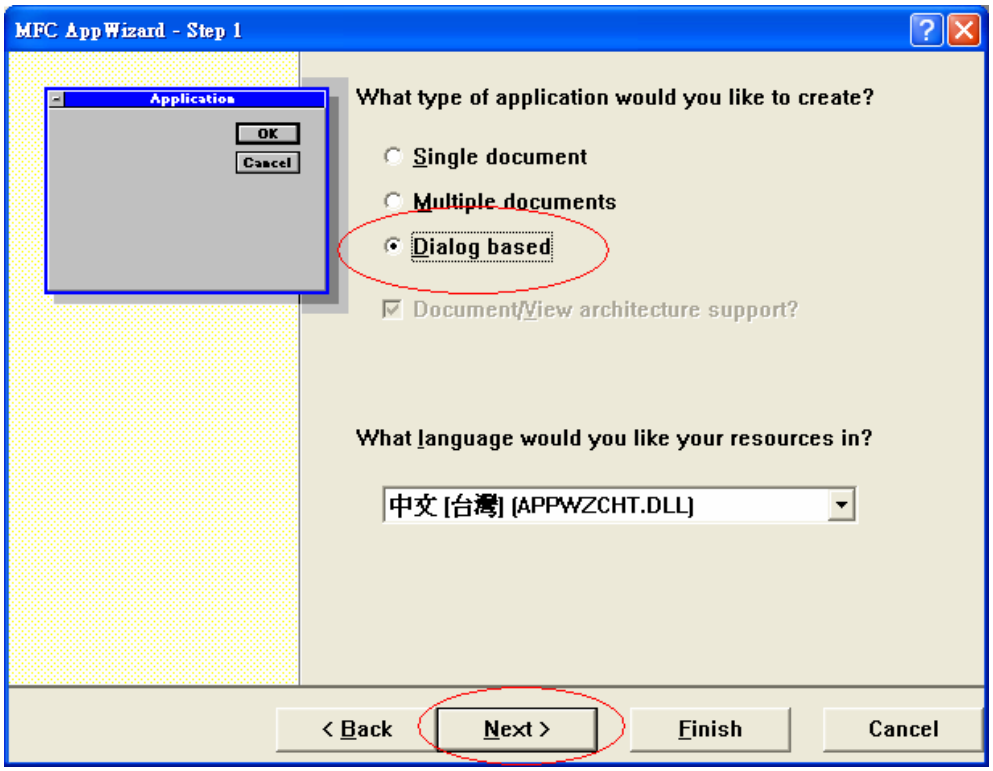
http://www.icpdas.com/

4.1.2 新增一VC應用程式專案

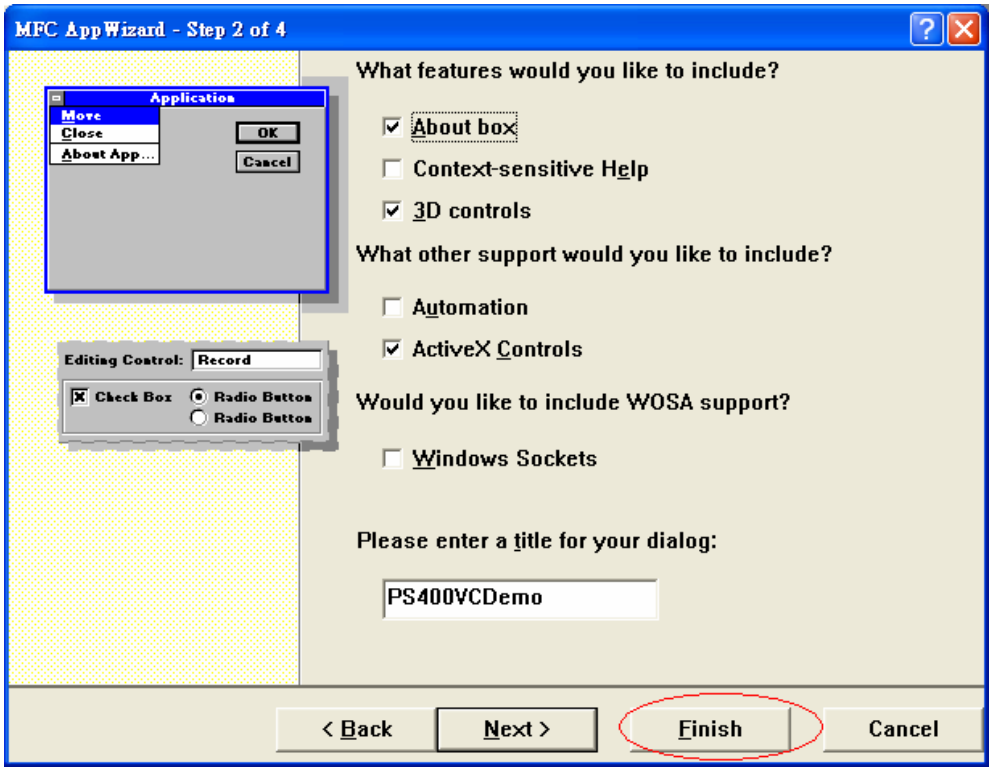
請開啟 VC++ 6.0 軟體。然後，請按滑鼠鍵“File” -> “New”來開啟新程式。在“Projects“ 標籤，選擇 “MFC AppWizard (exe)” 並且設定專案名稱為 ”PS400VCDemo”並在“Location” 填入它的檔案路徑。然後，在中央處理器列表框中選擇 “Win 32“ ，如果必要的話也一起勾選其他的選項。最後按滑鼠鍵 ” OK” 。



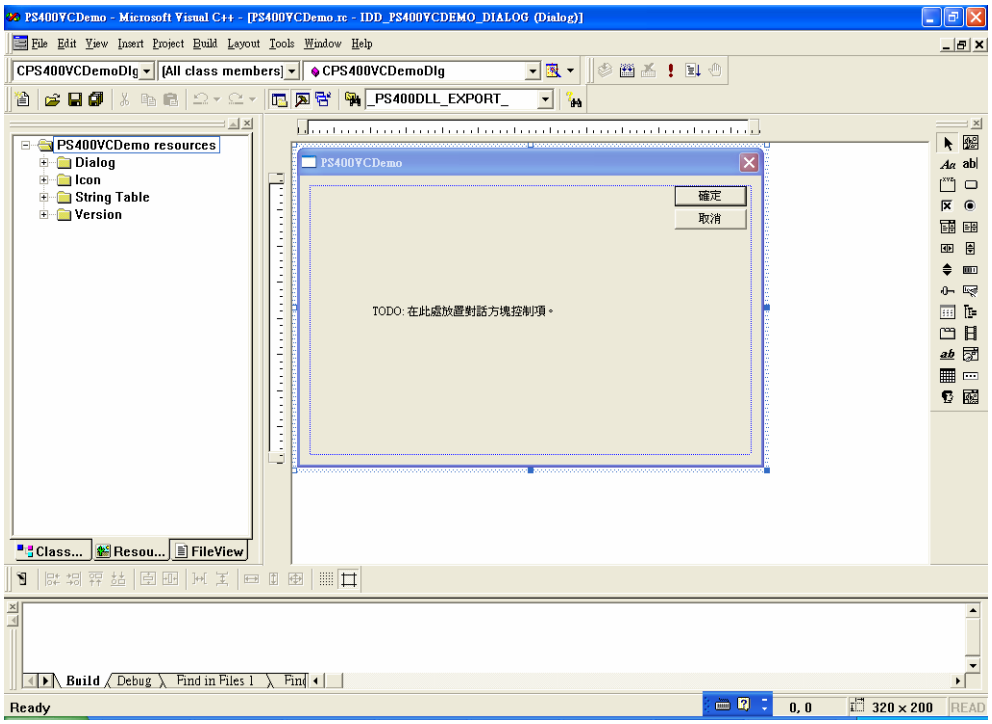
選擇 Dialog based 按“NEXT”



再按“NEXT”



再按“Finish”



即完成開一新專案

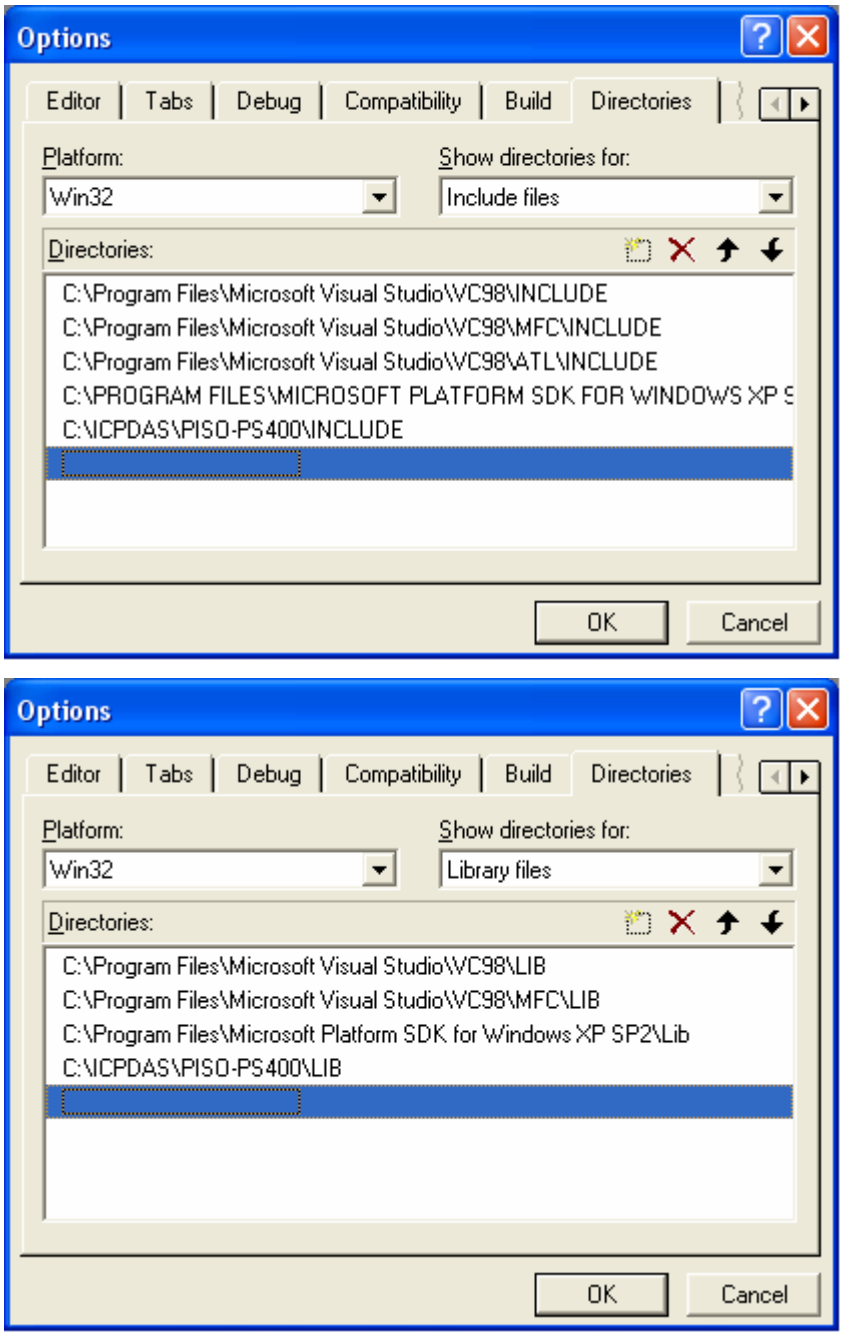
4.1.3 在VC ++ 專案中加入參考路徑

A. 在“Tools”功能表中開啟“Options”對話框，選擇“Directories”頁籤。

B. 增加含括檔的路徑。於“Show directories”項目中選擇“Include files”，並在“Directories”下方空行處 (指出附近空的長方形)雙擊-按滑鼠鍵，如顯示在下列的圖片；請輸入包括用戶安裝檔案的路徑 (C:\ICPDAS\PISO-PS400\Include)。

C. 增加函式庫的路徑。於“Show directories”項目中選擇“Library files”。

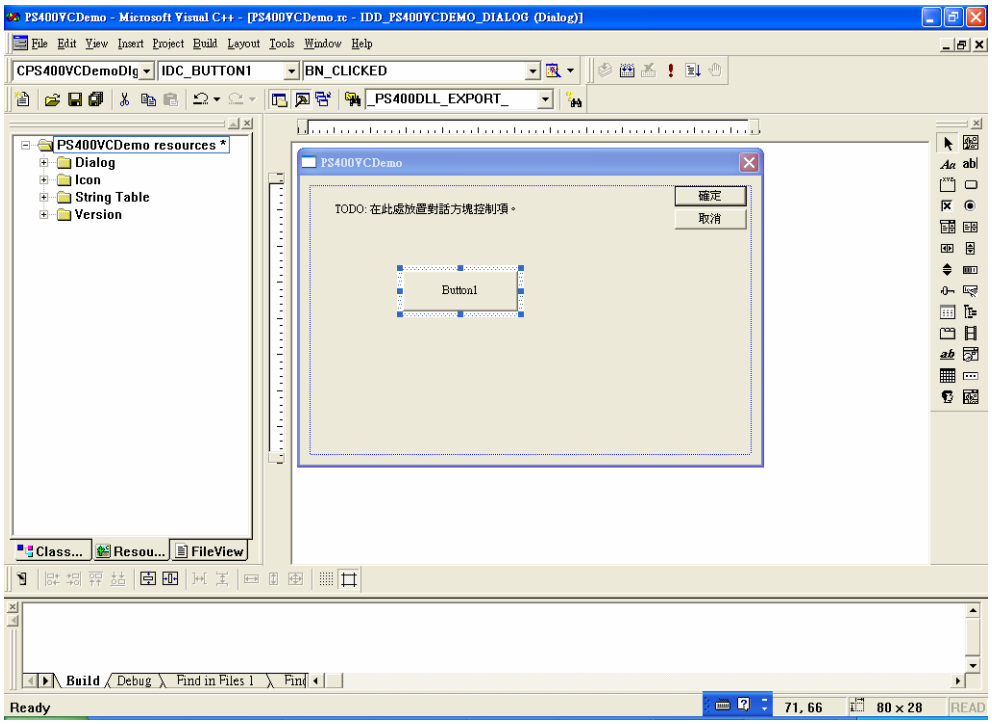
D. 增加程式庫的檔案路徑，在“Directories”下方空行處 (指出附近空的長方形)雙擊-按滑鼠鍵，輸入包括含有用戶安裝程式庫的檔案路徑 (C:\ICPDAS\PISO-PS400\Lib)，如下圖。


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

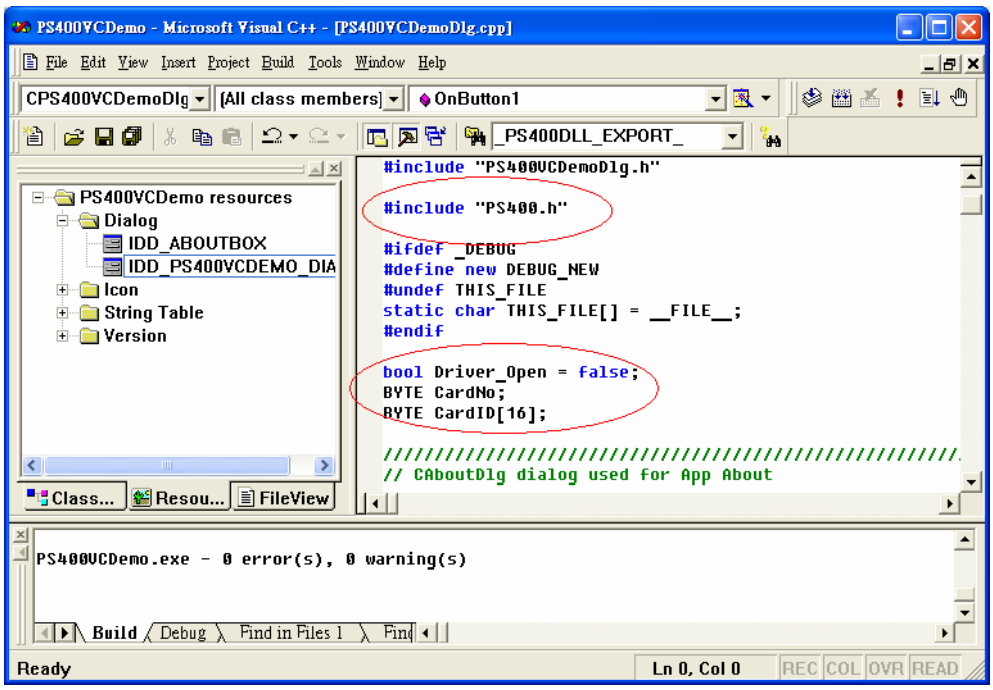
Options
Editor
Tabs
Debug
Compatibility
Build
Directories
Platform:
Win32
Show directories for:
Library files
Directories:
C:\Program Files\Microsoft Visual Studio\VC98\LIB
C:\Program Files\Microsoft Visual Studio\VC98\MFC\LIB
C:\Program Files\Microsoft Platform SDK for Windows XP SP2\Lib
C:\ICPDAS\PISO-PS400\LIB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

4.1.4 在專案中開始應用

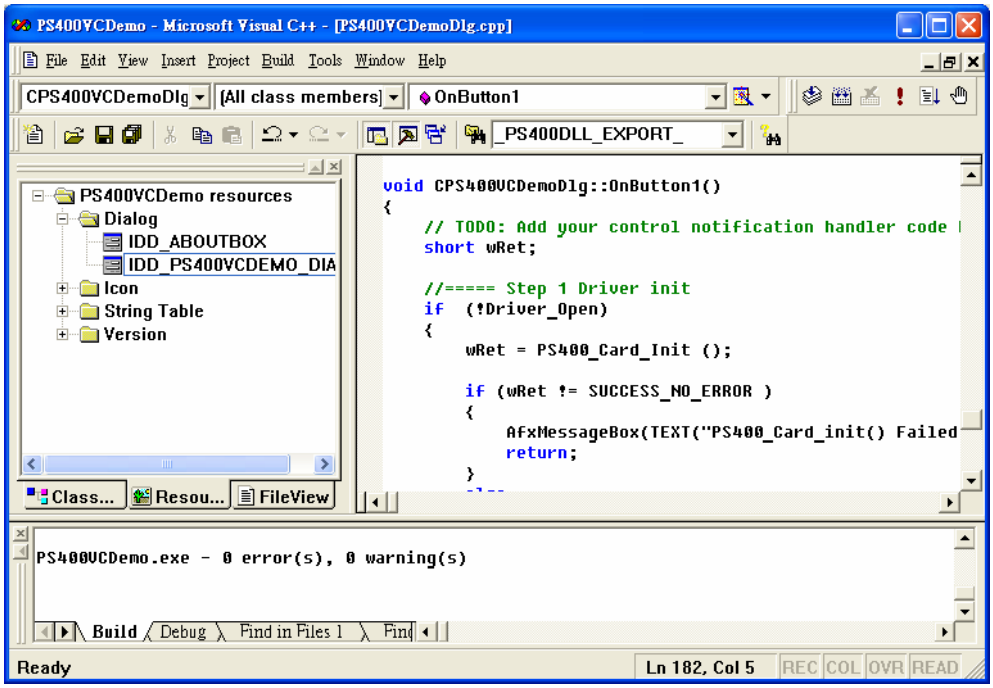
在 Dialog 中加入一 BUTTON 如下圖:



在 BUTTON 快按兩下，並產生一副程式，並在檔案起始位置加入"#include "PS400.h"及宣告其他輔助變數，如下圖:



在 OnButton1 處理副程式呼叫 PS400DLL 的函數，如下圖:



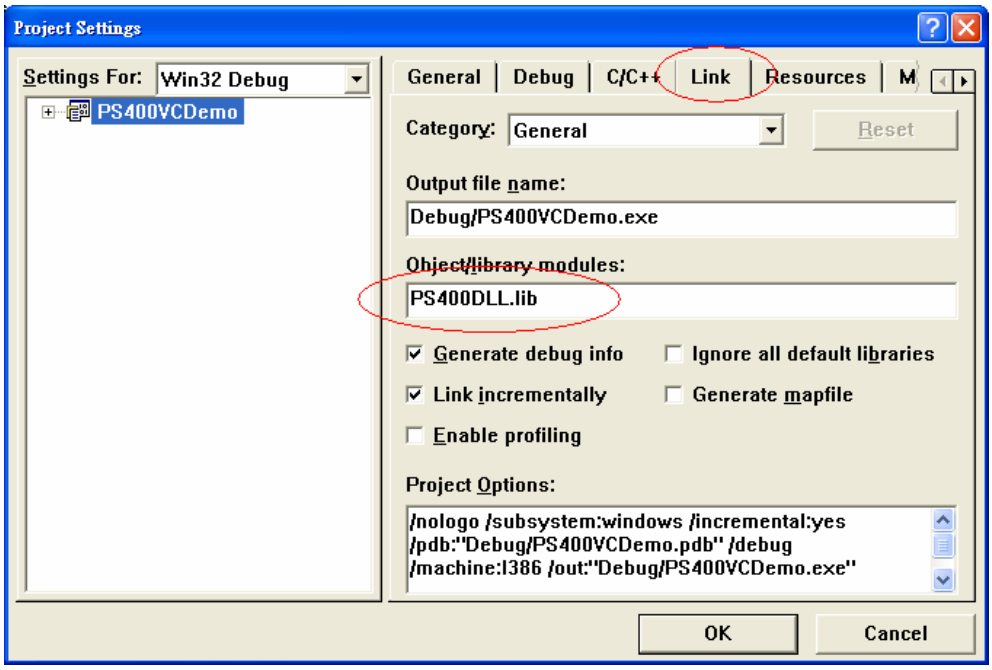
輸入詳細程式如下:

```
//====='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
    }
```

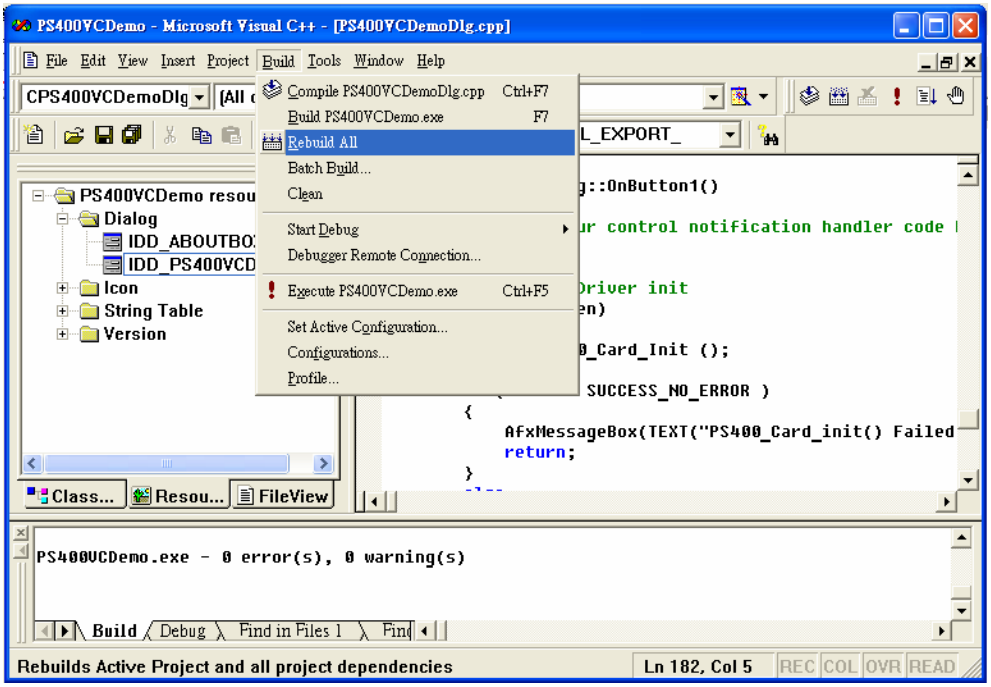
詳細請參考:First_demo 範例

完成後，請在功能表中選 “Project”->”Setting”出現如下對話框，選”Link”頁籤，並在 Object/library modules:輸入 PS400DLL.lib (如下圖)，並按 OK



4.1.5 編譯專案成可執行檔

請在功能表中選 “Build”->”Build All”如沒問題話，即完成這簡單的程式



4.2 VB 6.0 開始範例

4.2.1 確認相關檔案

請確認您有以下相關檔案:

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

PS400.bas

如您沒有,請找 CD 或到我們的網站下載最新版本資料

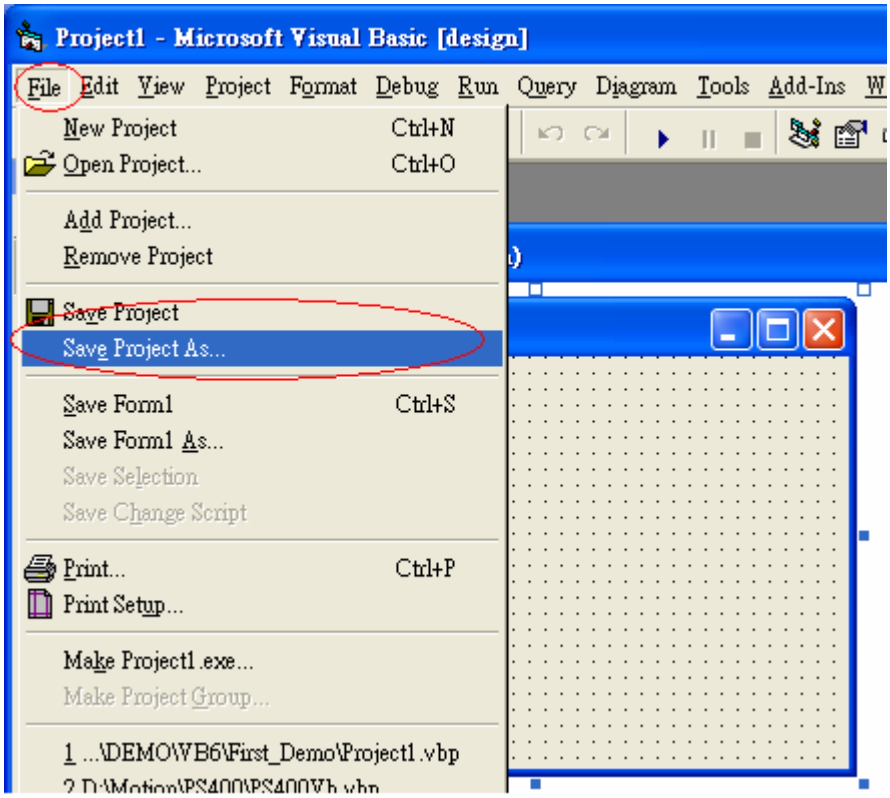
http://www.icpdas.com/

4.2.2 新增一VB應用程式專案

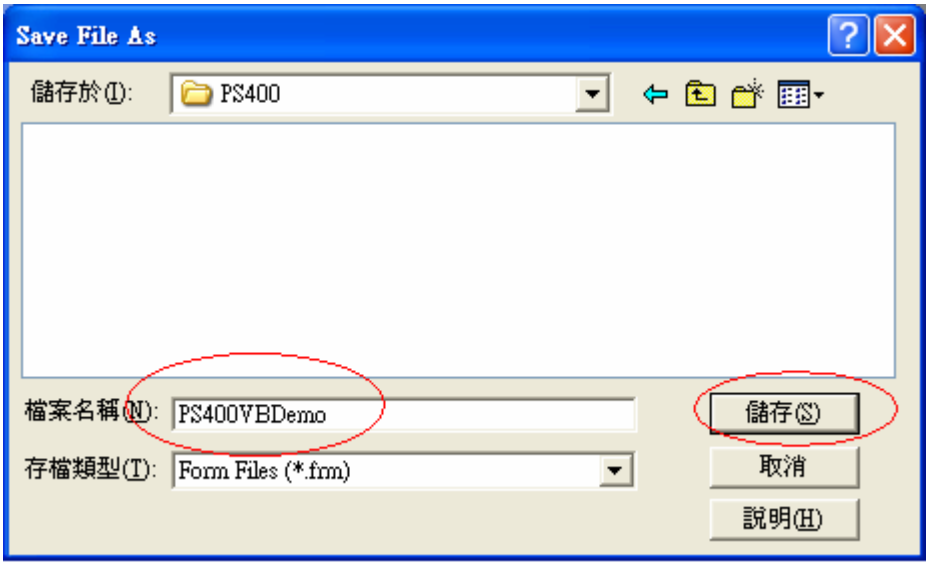
請開啟 VB 軟體。然後，請按滑鼠鍵“File” -> “New Project”來開啟新程式。在“New

Projects“ 對話框中，選擇 “Standard EXE” 按滑鼠鍵 ” OK” 。

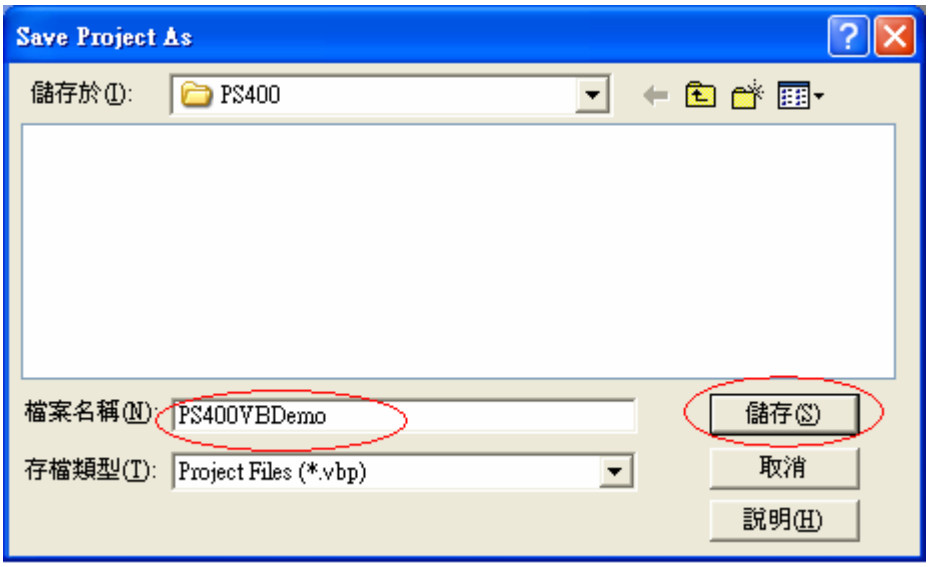
在下拉式功能表中選”File”➔”Save Project”



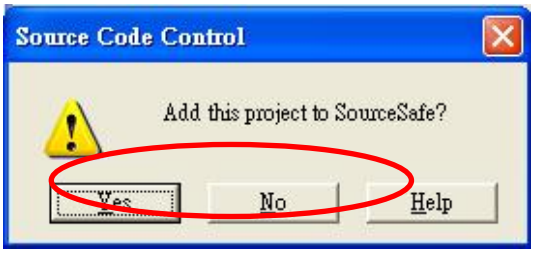
並且設定 form 檔案名稱為 ”PS400VBDemo” 並按”儲存”



並且設定 Project 檔案名稱為 ”PS400VBDemo” 並按”儲存”



原始碼是否加入管理,請選 ”Yes” 或 “No”

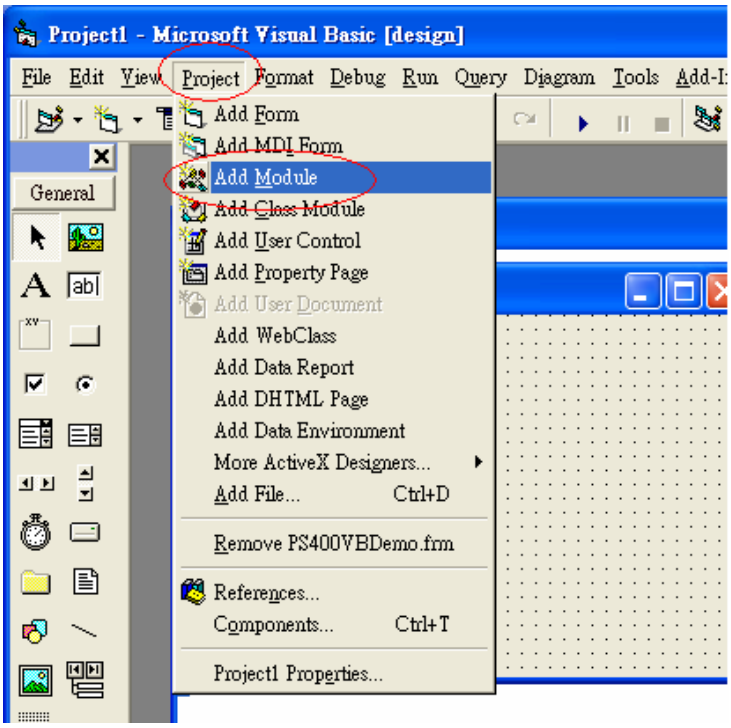


即完成開一新專案

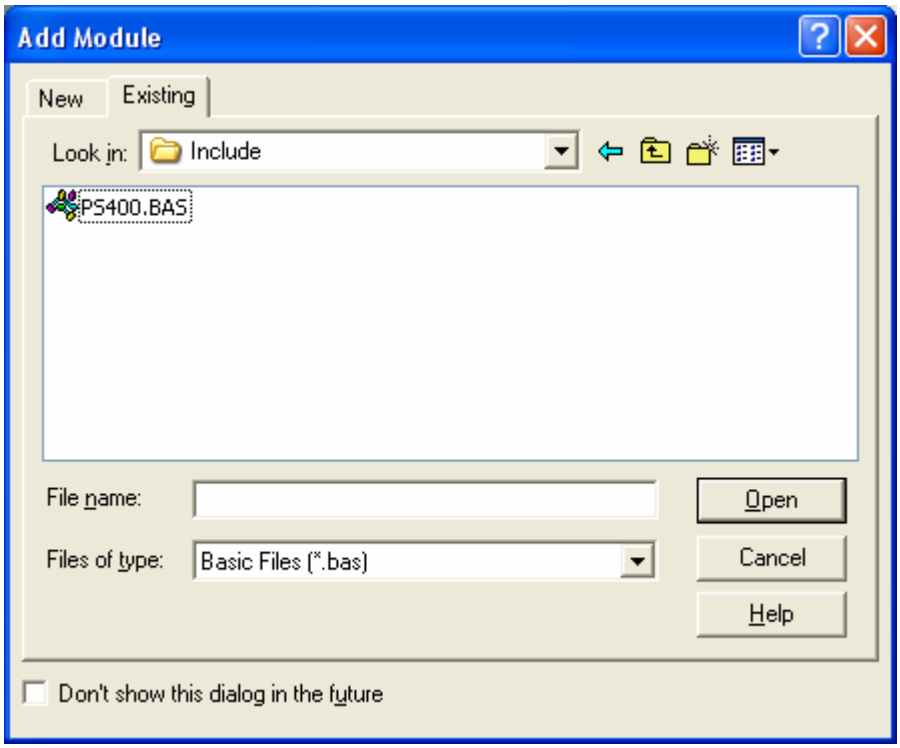
4.2.3 在專案中加入PS400. BAS

在專案中加入 PS400.BAS 如下:

在下拉式功能表中選”Project”➔”Add Module”

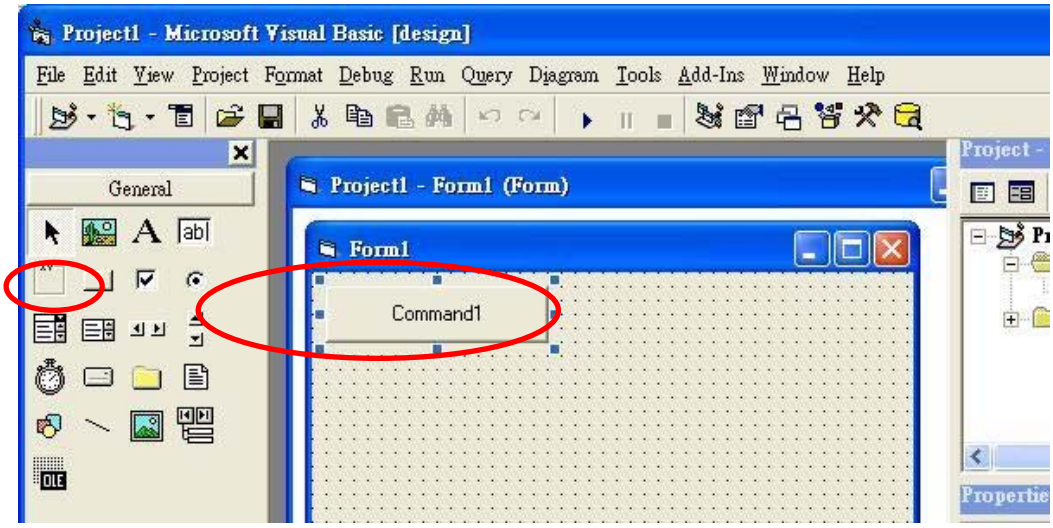


出現選檔對話框，選擇”Existing” 找到並選擇 PS400.BAS 檔並按開啟 (C:\ICPDAS\PISO-PS400\Include)



4.2.4 在專案中開始應用

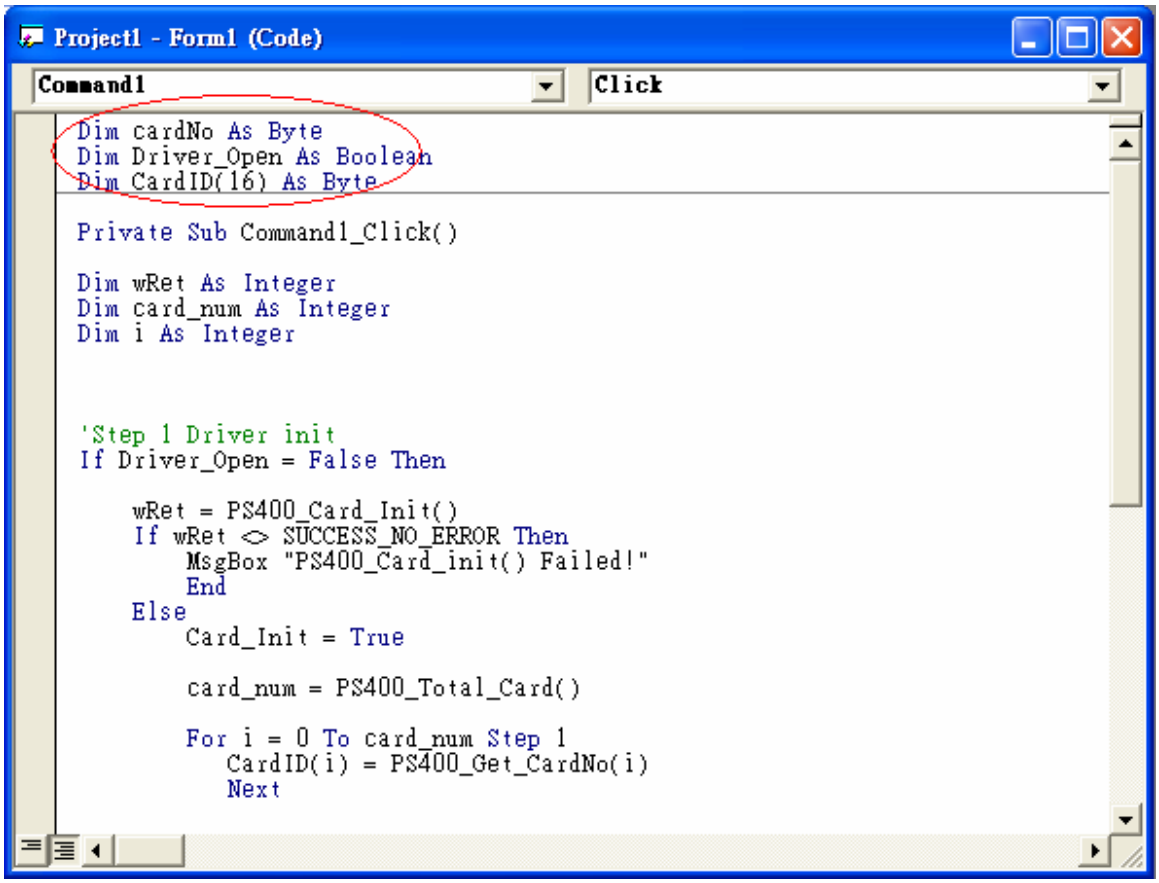
在 Dialog 中加入一 BUTTON 如下圖:



在 BUTTON 快按兩下，並產生一副程式，輸入程式，如下:

在檔案最前端輸入　　Dim cardNo As Byte
　　Dim Driver_Open As Boolean
　　Dim CardID(16) As Byte

並在 command1_Click 處理副程式呼叫 PS400DLL 的函數，如下圖



輸入詳細程式如下

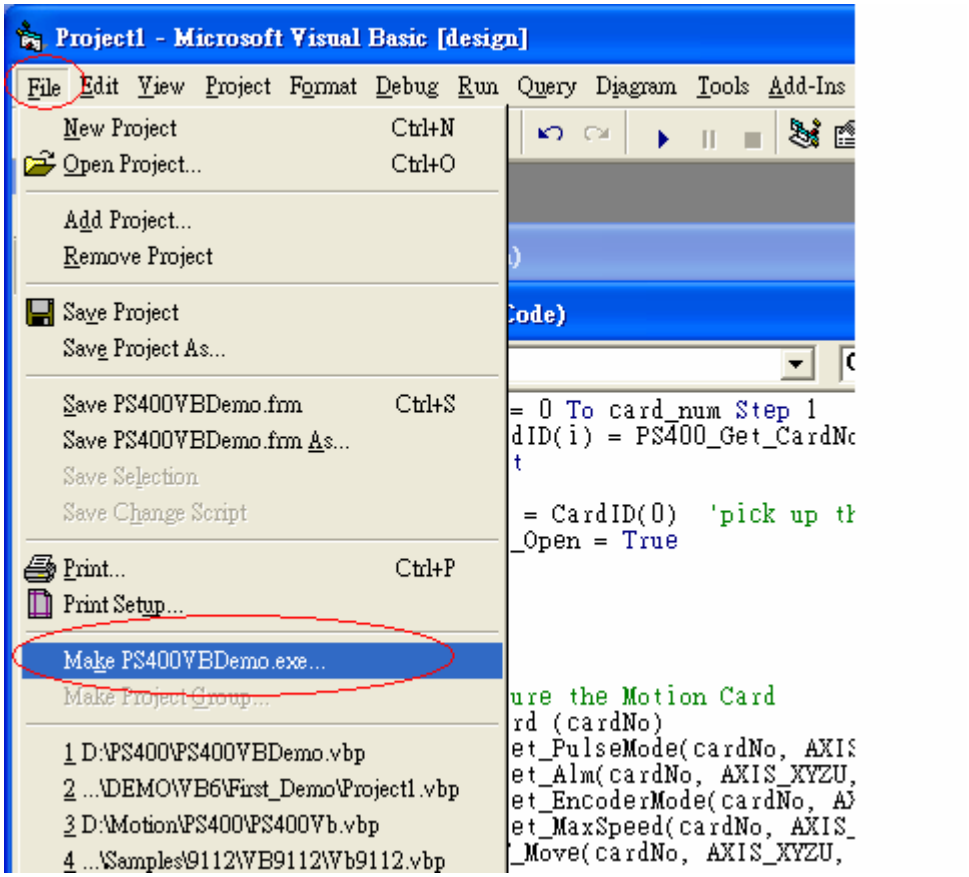
```
Dim wRet As Integer
Dim card_num As Integer
Dim i As Integer

'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
```

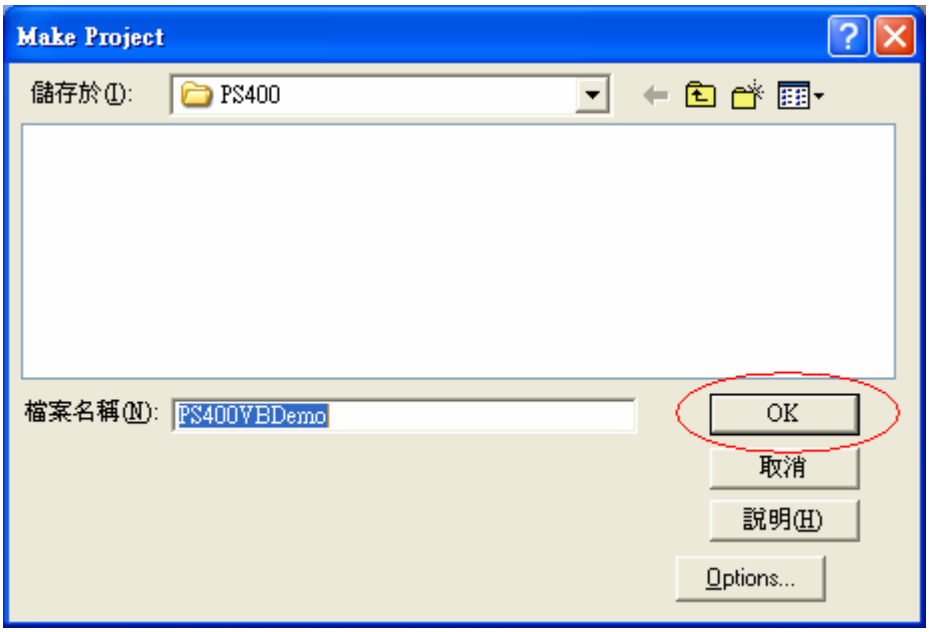
詳細請參考:First_demo 範例

4.2.5 編譯專案成可執行檔

請在下拉式功能表中選”File”➔”Make PS400VBDemo.exe”



按下 OK 後，如沒問題話，即完成這簡單的程式



4.3 BCB 6 開始範例

4.3.1 確認相關檔案

請確認您有以下相關檔案安裝路徑
(C:\ICPDAS\PISO-PS400\Include):

- PS400BCB.h

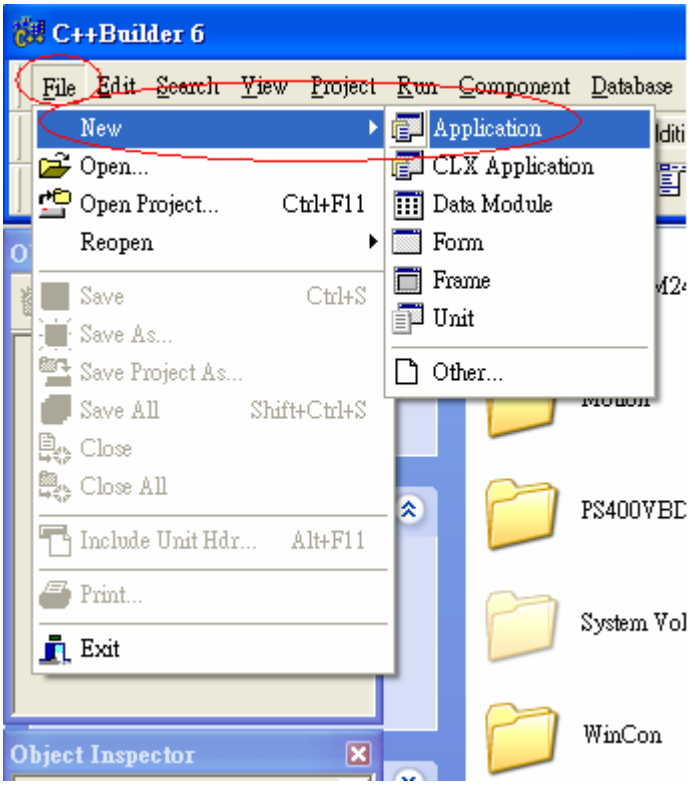
(C:\ICPDAS\PISO-PS400\Lib):

- PS400BCB.lib

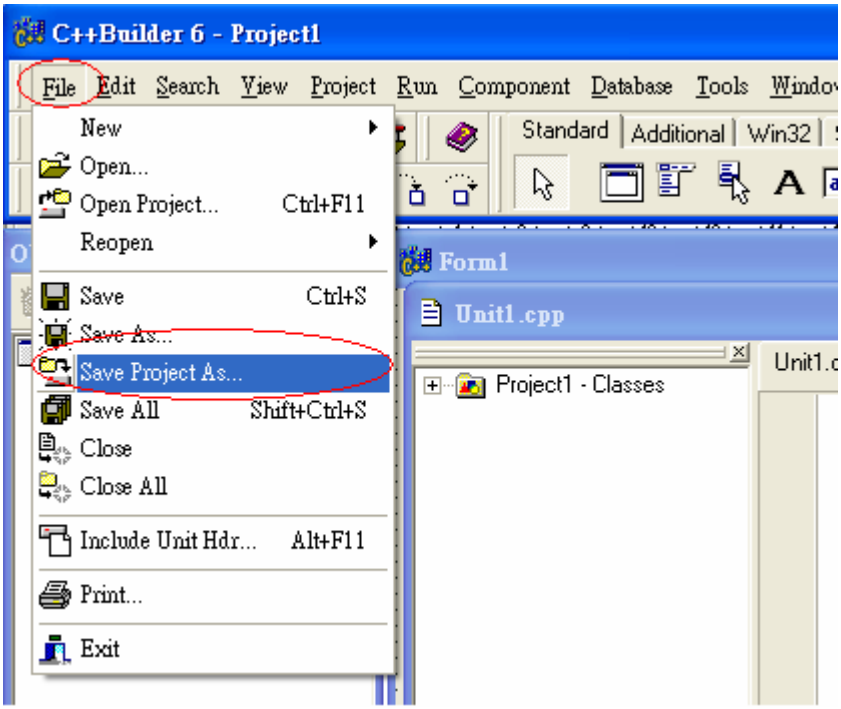
如您沒有,請找 CD 或到我們的網站下載最新版本資料
http://www.icpdas.com/

4.3.2 新增一BCB應用程式專案

請開啟 BCB 6 軟體。然後，請按滑鼠鍵“File” ➔ “New” ➔ “Application”來開啟新專案。

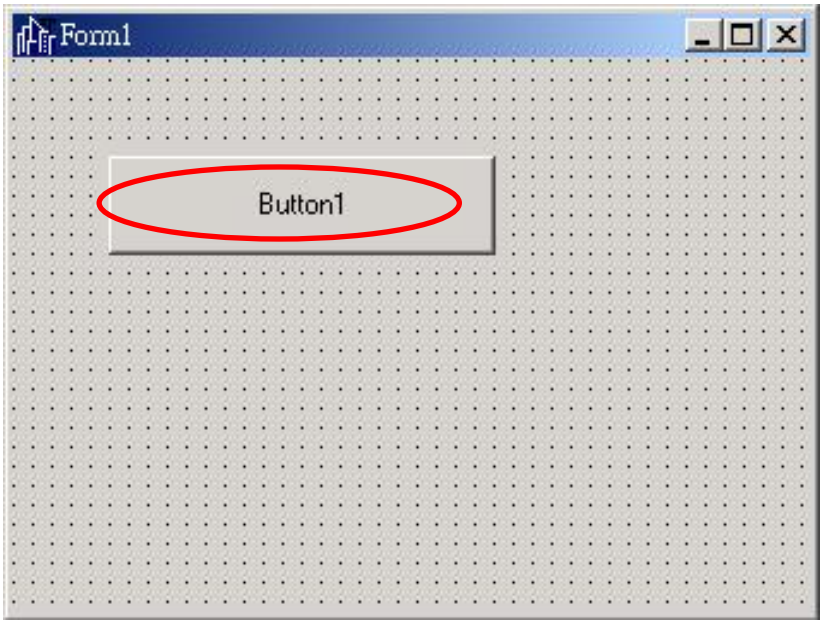


請在下拉式功能表中選"File"➔"Save Project As…"儲存專案。

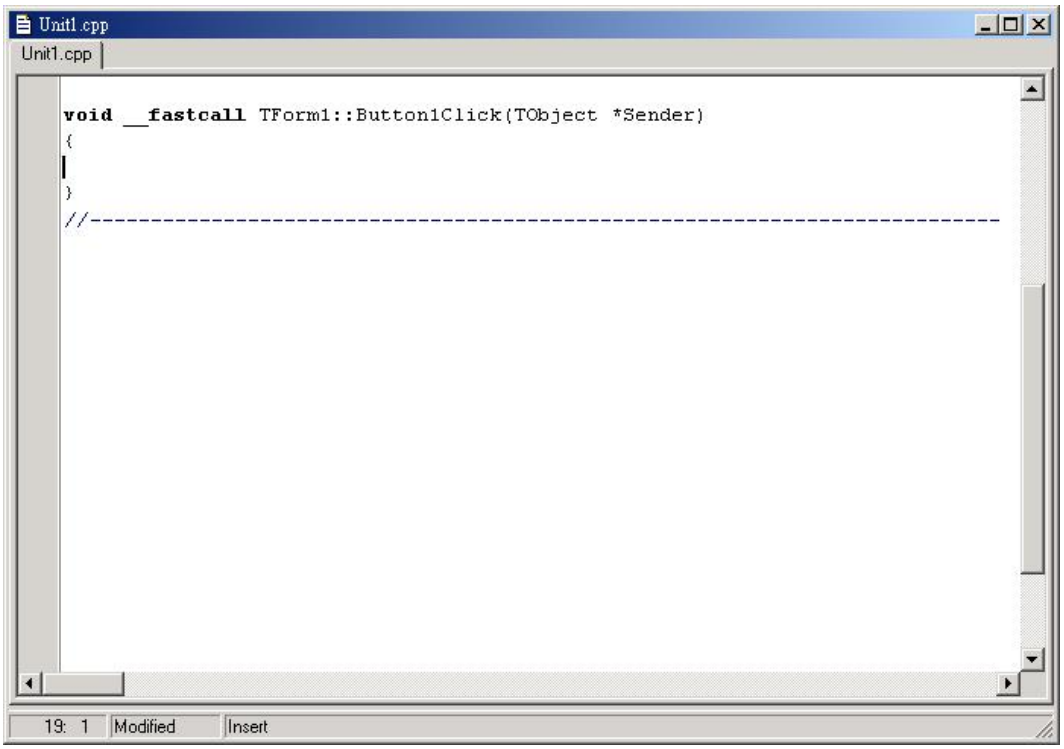


4.3.3 在專案中開始應用

在 VCL 工具 上拖拉一 Tbutton 物件到 FORM 上如下圖:

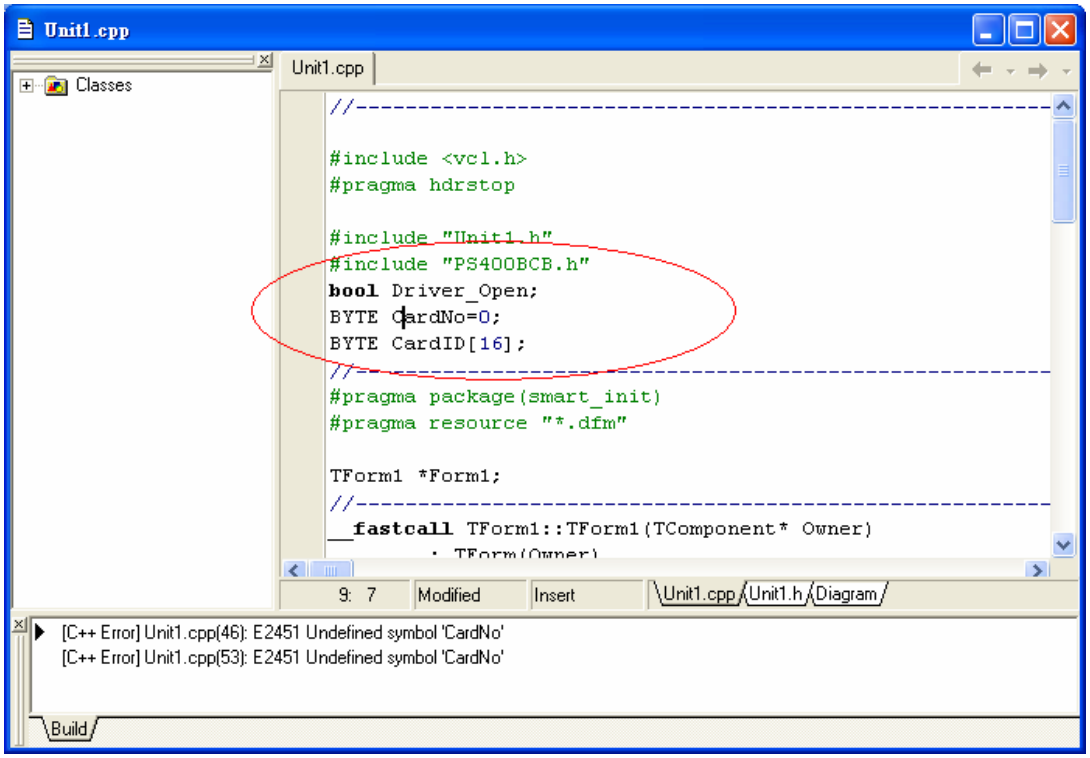


在 Form1 快按兩下 “button1” 出現程式視窗如下:



移至程式頭加入 PS400BCB.h 宣告及變數如下:

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



在 Button1Click 中輸入程式碼:

```
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
}
```

詳細請參考:First_demo 範例

4.3.4 在專案中加入加入參考路徑

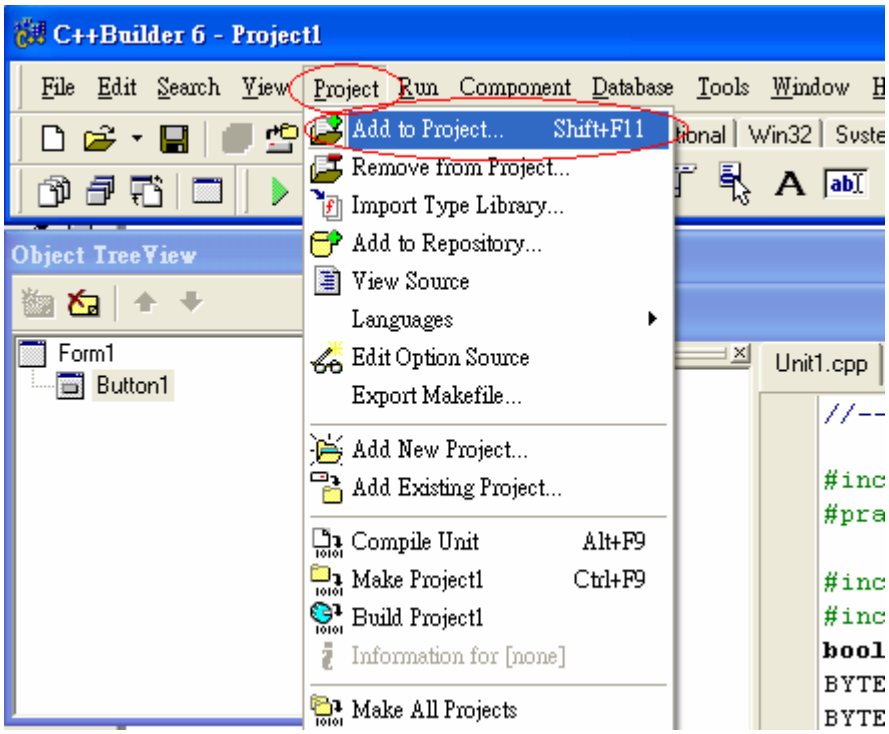
參考路徑可利用“Project” ➔ “Options” 選單，選擇 “Directories/Conditional” 頁籤。

將用戶安裝檔案的路徑(C:\ICPDAS\PISO-PS400\Include,

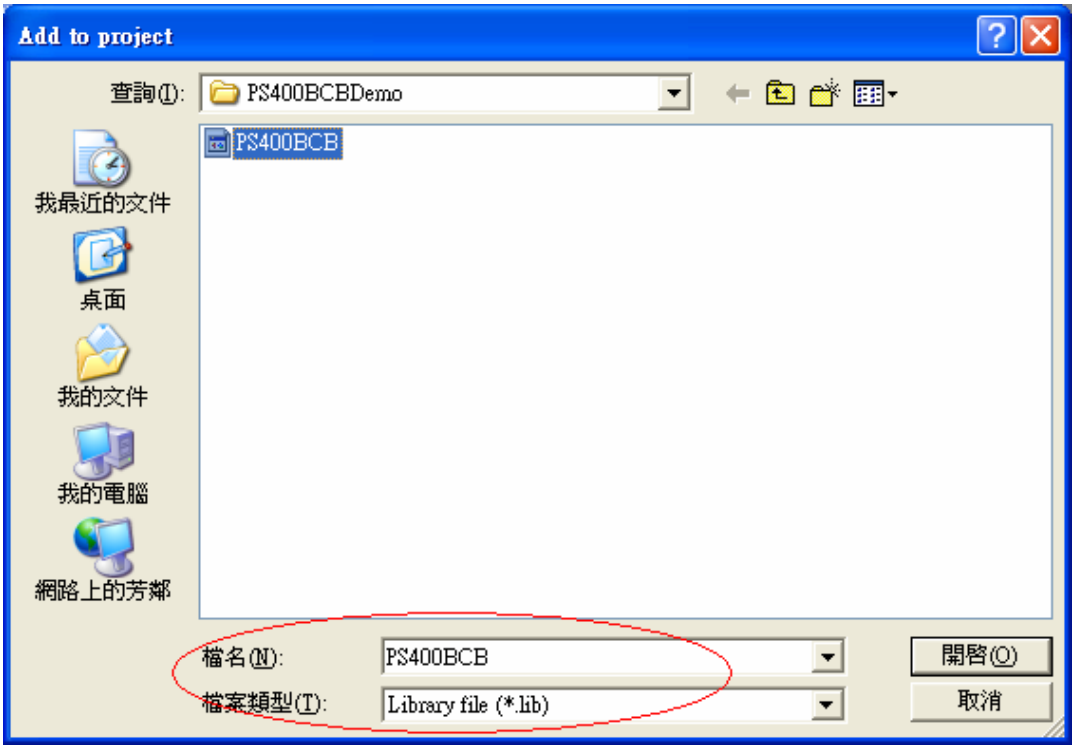
C:\ICPDAS\PISO-PS400\Lib)加入 Include path 與 Library path。

4.3.5 在專案中加入 PS400BCB.lib

在下拉式功能表中選擇“Project” ➔ “Add to Project…”

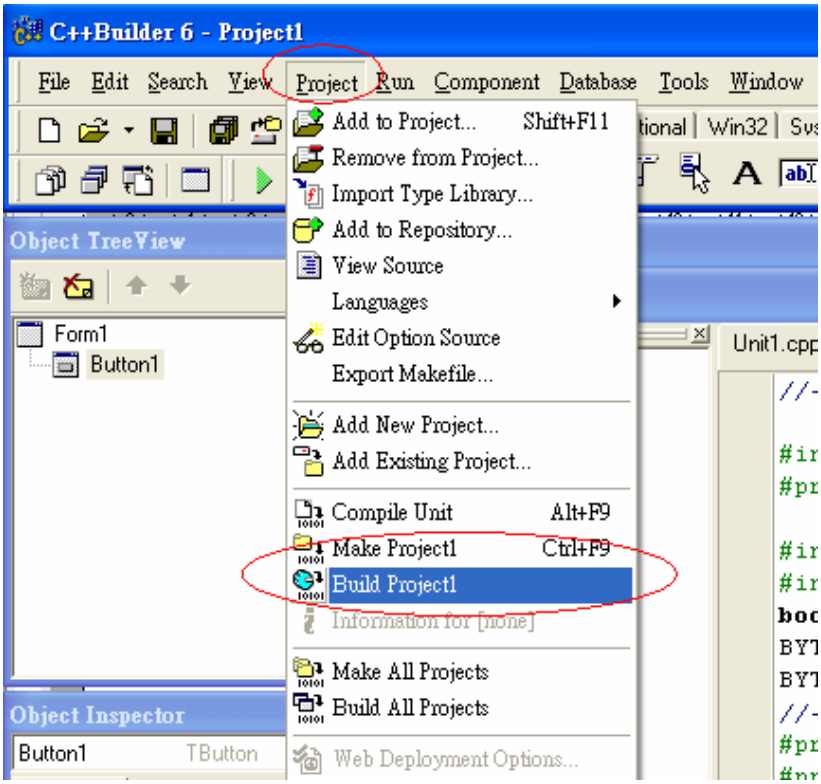


在檔案類型的下拉選單選取”Library File (*.lib)”，並選擇 PS400BCB.lib 然後按”開啟”。



4.3.5 編譯專案成可執行檔

請在功能表中選 “Project” ➔ “Build Project1” 。如沒問題話，即完成這簡單的程式。


C++Builder 6 - Project1
File Edit Search View Project Run Component Database Tools Window
Add to Project... Shift+F11
Remove from Project...
Import Type Library...
Add to Repository...
View Source
Languages
Edit Option Source
Export Makefile...
Add New Project...
Add Existing Project...
Compile Unit Alt+F9
Make Project1 Ctrl+F9
Build Project1
Information for [none]
Make All Projects
Build All Projects
Web Deployment Options...
Object TreeView
Form1
Button1
Object Inspector
Button1 TButton
Unit1.cpp

5 PISO-PS400 PCEzGo(by Basic Function)

PISO-PS400 PCEzGo 以此主畫面為起始點，依功能分類主要可分為 4 種測試項目：

一、初始化設定 (Initial Setting)：5.1.1~5.1.4

關於初始化設定對話盒(Initial Setting Dialog)可分為 4 個子項目。其四子頁分別為系統註冊與硬體訊號(Registration and Hardware Signals)、伺服輸入訊號(Servo Input Signals)、比較暫存器(Compare Register Counters)，和中斷訊號設定(Interrupt Configuration)。 詳細說明請參考各節說明。

二、一般運動命令與進階運動命令 (Command)：5.2.1~5.2.3

關於運動命令對話盒(Command Dialog)可分為 3 個子項目。其三子頁分別為加減速運動(可分為等速、梯形加減速、S 曲線加減速)，原點返回與外部訊號吋動模式，和同步運動。詳細說明請參考各節說明。

三、補間運動命令 (Interpolation)：5.3.1~5.3.2

關於補間命令對話盒(Interpolation Dialog)可分為 2 個子項目。其二子頁分別為直線圓弧補間運動和模擬兩軸運動平面的軌跡曲線圖。詳細說明請參考各節說明。

四、FRnet 測試 (FRnet Demo)：5.4

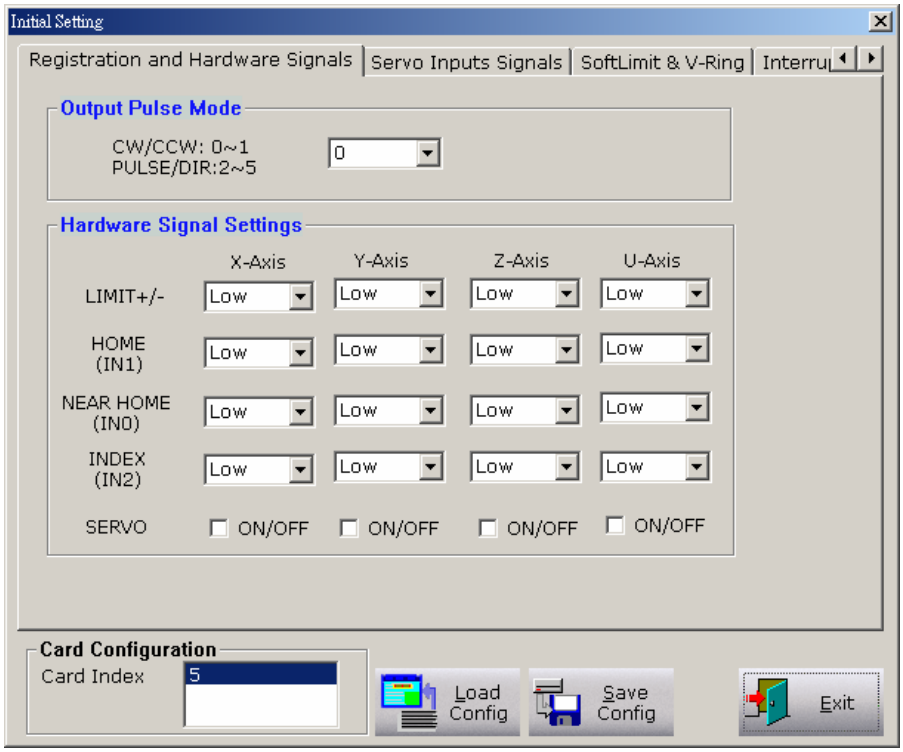
關於 FRnet 測試對話盒，為遠端 I/O 的資料傳輸測試，FRnet 不需 CPU 處理通訊且以固定的時間掃描動態資料，配合運動控制，我們將 FRnet 的 DIO 功能當作背景程式，使用者可配合

中斷程式使用。詳細說明請參考各節說明。

5.1 初始化設定對話盒(Initial Setting Dialog)

初始化設定以下可分為 4 個子頁，分別為系統註冊與硬體訊號(Registration and Hardware Signals)、比較暫存器(Compare Register Counters)、伺服輸入訊號(Servo Input Signals)，和中斷訊號設定(Interrupt Configuration)。使用者重新執行此 PCEzGo 時，應先進去此初始化對話盒設定頁面做相關的設定，始能執行之後的運動控制功能。

5.1.1 系統註冊與硬體訊號(Registration and Hardware Signals)



群組定義&使用說明

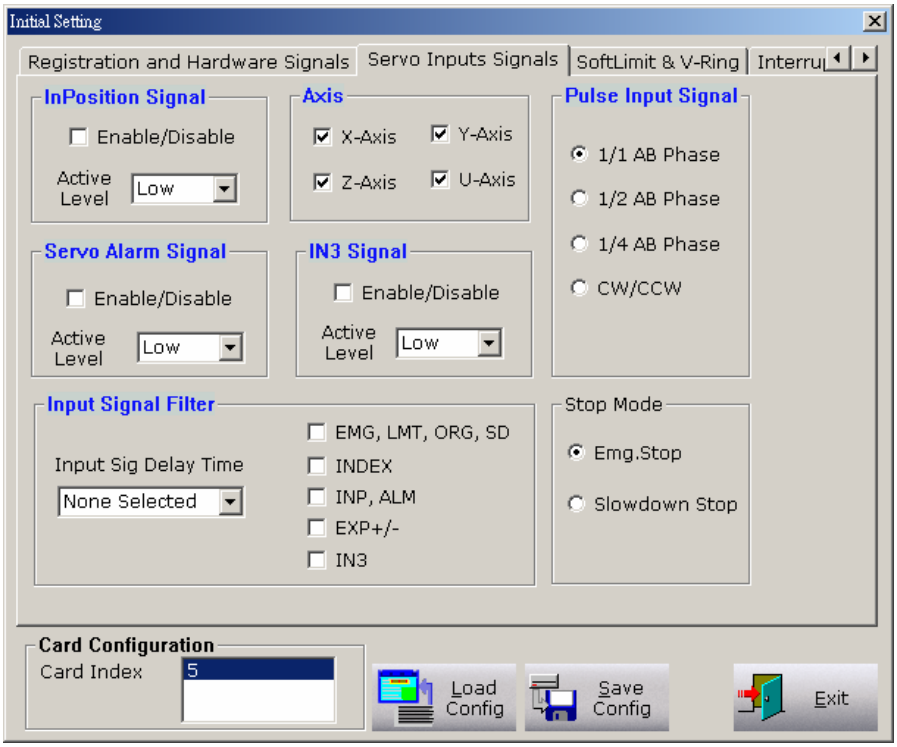
1. 版卡配置(Card Configuration)：
   - 按下 InitCard 按鈕後可尋找出所有的 PISO-PS400 運動控制卡，依照尋找次序排列，並顯示出版卡上面的 ID 編號。待使用者選擇 ID 編號後即完成選擇版卡動作。
   - 相關函數指令：PS400_Card_Init(), PS400_Toatal_Card(), PS400_Get_CardNo()。

2. 脈波輸出模式(Output Pulse Mode)：
   - 脈波輸出模式可分為 6 種模式：0, 1 為 CW/CCW 雙脈波模式；2~5 為 PULSE/DIR 單脈波模式。
   - 相關函數指令：PS400_Set_PulseMode()。

3. 硬體訊號設定(Hardware Signals Settings)：
   - 硬體訊號設定可分為左右極限(LIMIT+/-)、原點訊號(HOME)、接近原點訊號(NEAR HOME)、馬達編碼器 Z 相訊號(INDEX)和伺服開關訊號(SERVO ON/OFF)。以上每個硬體訊號可四軸個別獨立設定其邏輯位準(Hi/Low)。
   - 相關函數指令：PS400_Set_Limit(), PS400_Set_Home()。

5. 按鈕功能
   - LoadConfig：載入特定的 ini 檔案。
   - SaveConfig：儲存相關硬體訊號設定至 ini 檔案。
   - Exit：離開此對話盒視窗。

5.1.2 伺服輸入訊號 (Servo Input Signals)



群組定義&使用說明

1. 伺服完成訊號
   - 伺服警告訊號可致能或除能，可選擇邏輯位準。
   - 相關函數指令：PS400_Set_Inp()。

2. 軸配置 (Axis)
   - 配合各群組設定指定運動軸。

3. 伺服警告訊號 (Servo Alarm Signals)

- 伺服警告訊號可致能或除能，可選擇邏輯位準。
- 相關函數指令：PS400_Set_Alm()。

4. 脈波輸入訊號 (Pulse Input Signal)

- 設定編碼器輸入模式: AB 相輸入或上下計數輸入(CW/CCW)，模式為 AB 相輸入時,指定除頻: 0=1:1, 1=1:2, 2=1:4。
- 相關函數指令：PS400_Set_FBposition()。

5. 輸入訊號之數位濾波器

- 設定輸入濾波延遲時間參數如下表所示：

代號	可移除最大雜訊寬(width)	輸入延遲時間
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

- 設定數位濾波訊號：FE0為緊急停止訊號(EMGN)、左右極限(LMT)、原點訊號(IN1)，以及靠近原點訊號(IN0)。FE1為編碼器Z相訊號(IN2)。FE2為馬達完成訊號(RDY)和馬達警告訊號(ALM)。FE3為外部輸入正負方向訊號(EXP+/EXP-)。FE4為IN3訊號。
- 相關函數指令：PS400_Set_Filter()。

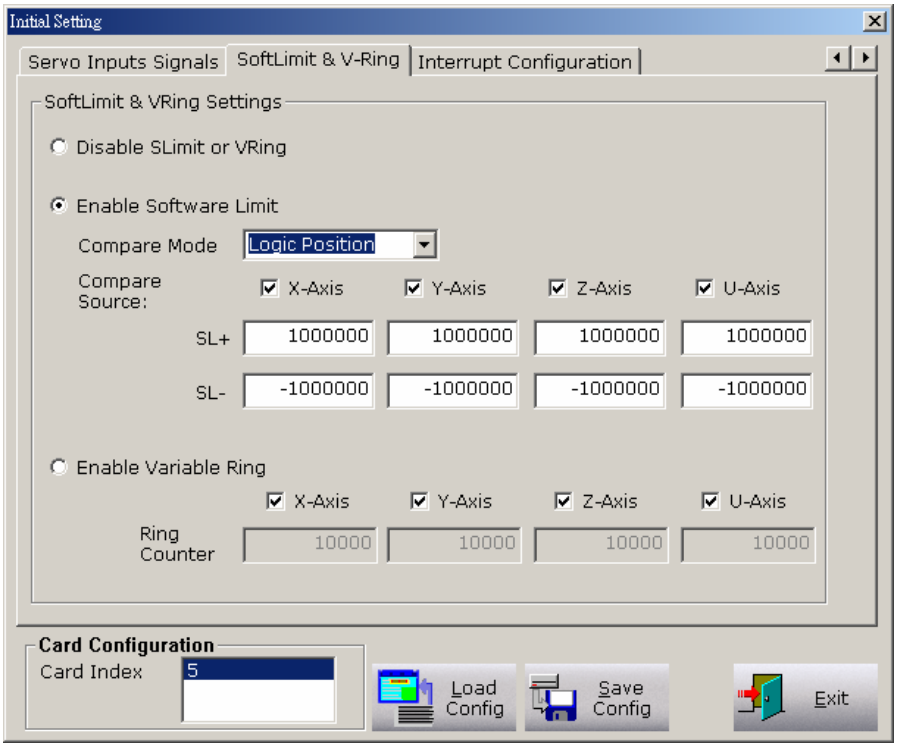
6. IN3 訊號 (IN3 Signal)

- IN3 訊號可致能或除能，可選擇邏輯位準。
- 相關函數指令：PS400_Set_Input()。

7. 按鈕功能

- LoadConfig：載入特定的 ini 檔案。
- SaveConfig：儲存相關硬體訊號設定至 ini 檔案。

5.1.3 軟體極限暫存器與可變環狀計數器 (SoftLimit & V-Ring)



群組定義&使用說明

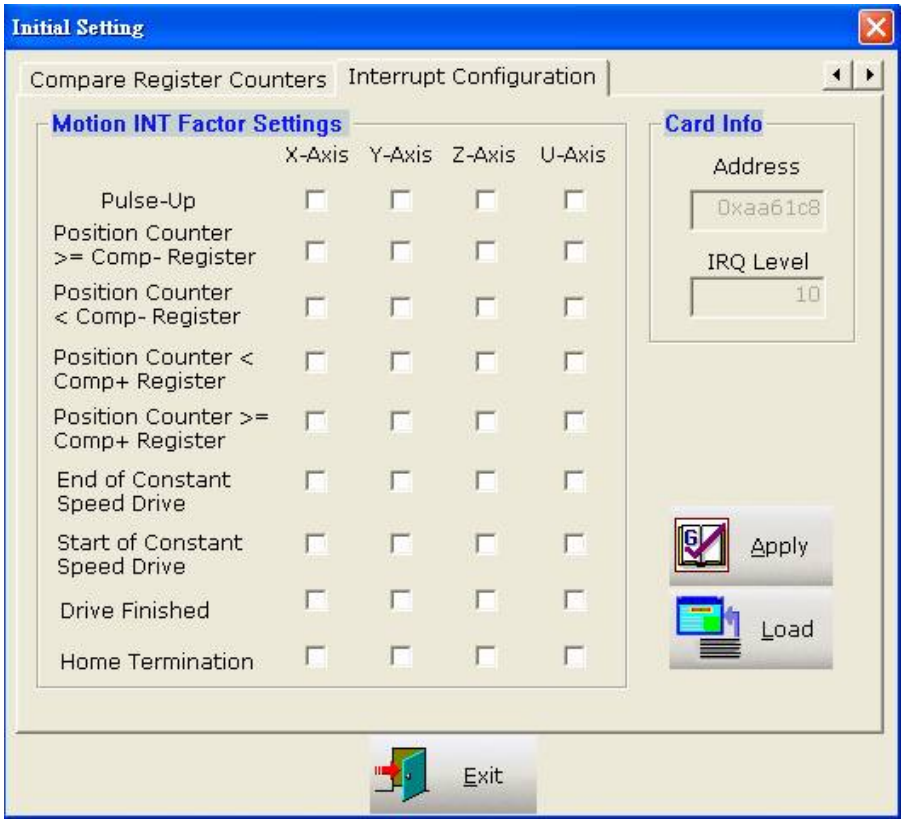
1. Disable SLimit or VRing (除能軟體極限暫存器或可變環狀位置計數器)：
   - 功能相關函數指令： PS400_Disable_SoftLimit(),PS400_Set_Vring();

2. Enable Software Limit (致能軟體極限)：
   - Counter Mode：可選擇比較戰存器的對象為邏輯位置(Logic Position)或實際位置 (Real Position)，(即馬達編碼器位置)。
   - 分別設置 4 軸的正負軟體極限值至 4 軸的比較暫存器中。
   - 功能相關函數指令：PS400_Set_SoftLimit(),PS400_Set_Compare()。

3. EnableVariable Ring (致能可變環狀位置計數器極限暫存器)：
   - 分別設置 4 軸的可變環狀位置計數器。
   - 相關函數指令：PS400_Set_Vring()。

4. 按鈕功能
   - LoadConfig：載入特定的 ini 檔案。
   - SaveConfig：儲存相關硬體訊號設定至 ini 檔案。

5.1.4 中斷配置 (Interrupt Configuration)



群組定義&使用說明

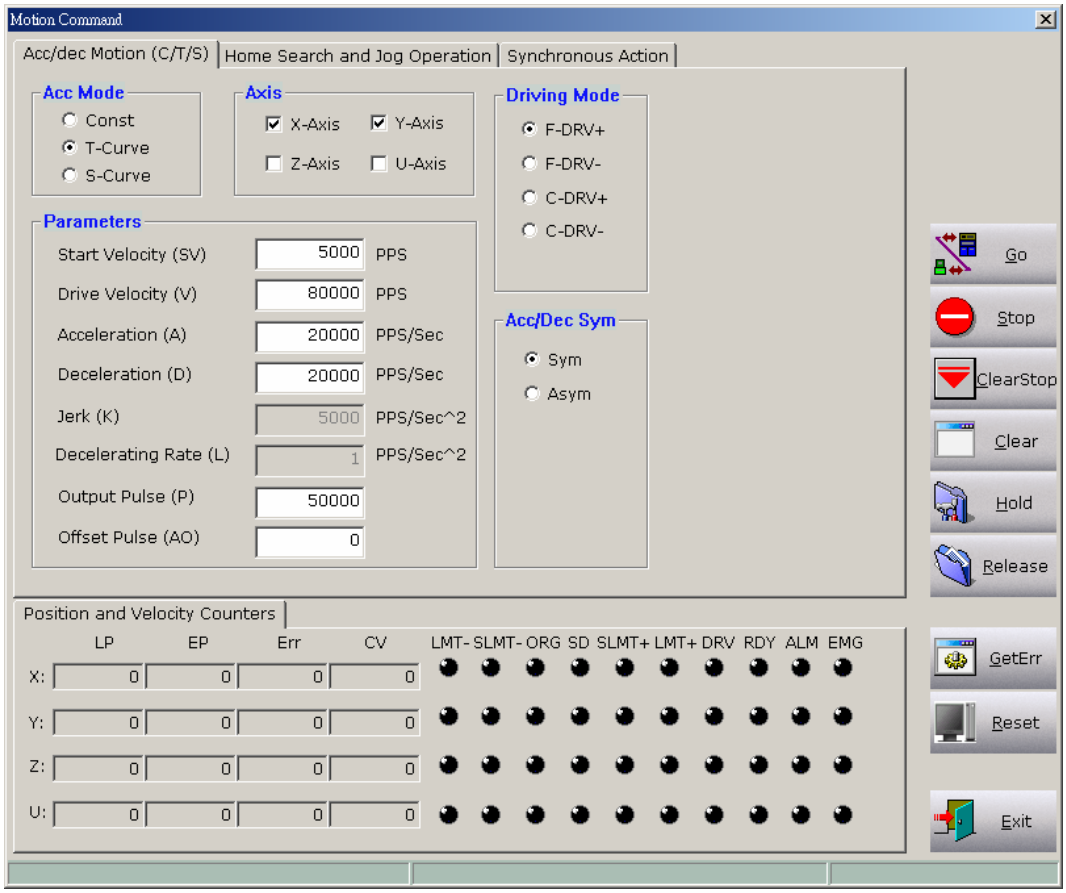
1. 中斷因子設定(Interrupt Factor Setting)

PISO-PS400 運動控制卡提供 10 種中斷事件的設定。包括起始脈波輸出(Pulse-Up)、位置計數器大於等於負方向比較計數器(Position Counter >= Comp- Counter)、位置計數器小於負方向比較計數器(Position Counter < Comp- Counter)、位置計數器大於等於正方向比較計數器(Position Counter >= Comp+ Counter)、位置計數器小於正方向比較計數器(Position Counter < Comp+ Counter)、等速段的終點(End of Constant Speed Drive)、等速段的起點(Start of Constant Speed Drive)、驅動結束(Drive Finished)、原點返回結束(Home Termination)，以及同步運動(Synchronous Action)的中斷事件。使用者可利用多執行緒的觀念,自行撰寫中斷服務常式(ISR)執行緒中,配合呼叫中斷函數指令即可簡單達到中斷功能。

- 相關函數指令：PS400_Set_INT_Factor(), PS400_Enable_INT(),PS400_Disable_INT(), PS400_Is_INT_Active(), PS400_Get_INT_Flag(), PS400_Clear_INT_Flag()。

5.2 命令對話盒 (Command Dialog)

5.2.1 加減速運動 (Acc/Dec Motion)



群組定義&使用說明

1. 加速模式設定 (Acc Mode)

   PISO-PS400 提供基本的三種加減速模式：等速(Const)、梯形加減速(T-Curve)、S 曲線加減速(S-Curve)

2. 軸配置 (Axis)

   - 配合各群組設定指定運動軸。

3. 驅動模式設定 (Driving Mode)

   - PISO-PS400 提供了 4 種驅動模式：正方向定量驅動、負方向定量驅動、正方向連續驅動、負方向連續驅動。
   - 相關函數指令：PS400_Const_Move(), PS400_T_Move(),PS400_T_Move()
   - PS400_T_As_Move(), PS400_S_Move(), PS400_S_As_Move(),

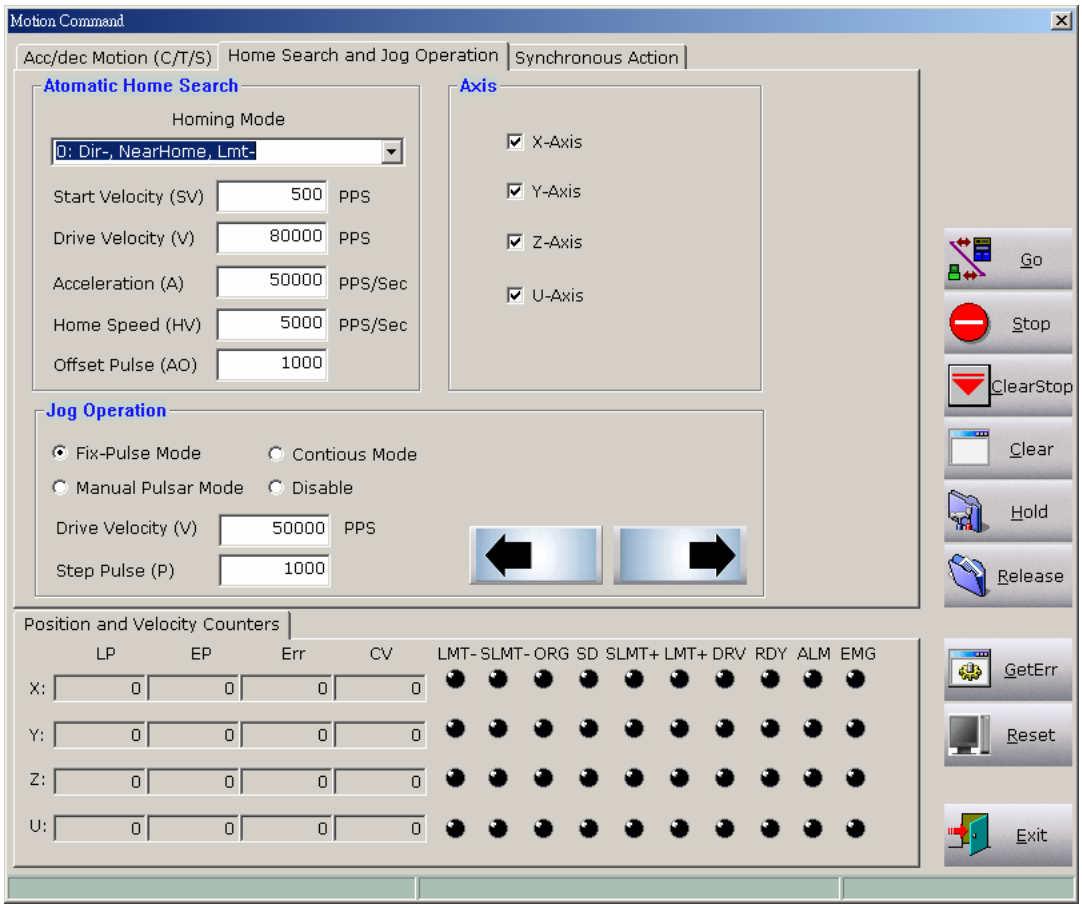
PS400_Conti_Move()。

4. 加減速曲線對稱設定 (Acc/Dec Sym)
   - 加減速曲線預設為對稱(Sym)，當設置為非對稱時(ASym)時需設定減速度(D)減速度變化率(L)等相關參數。

5. 位置與速度計數器 (Position and Velocity Counters)
   - 對話盒下方可分為兩個子頁位置與速度計數器和 I/O 訊號狀態顯示。
   - 其中位置與速度計數器子頁提供顯示各軸之邏輯位置計數器、實際位置計數器、位置誤差、即時速度等資訊。

6. 按鈕功能
   - Go：執行各軸之運動。
   - Stop：停止運動。
   - ClearStop：f 清除停止命令旗標，按下 Stop 按鍵後，需再按下 ClearStop 按鍵方能再次執行運動命令。
   - Clear：清除 4 軸之邏輯與實際位置暫存器
   - Hold：按下 Go 鍵之前先按下 Hold 鍵，可將運動命令保留待 LetOut 鍵被觸發始開始運動。
   - Release：除能 Hold 鍵。
   - GetError：按下可於下方狀態列中第 3 格檢視運動錯誤代碼。
   - Reset：回復至版卡的初始狀態。
   - Exit：離開此對話盒視窗。

5.2.2 原點返回與手動操作模式 (Home Search and Jog Operation)



群組定義&使用說明

1. 自動原點返回運動 (Automatic Home Search)

   ■ PISO-PS400 提供數十種的原點返回模式，使用者可將 4 步驟自行組合，PCEzGo 則僅提供 12 種模式供使用者便於使用和測試。歸零模式如下表說明。

模式0/1	硬體訊號	執行/不執行	運動方向
步驟1	**近原點(NearHome,IN0)**	**Yes**	**－/＋**
步驟2	原點 (Home,IN1)	No	－/＋
步驟3	編碼器Z相訊號(Index)	No	－/＋
步驟4	**調整偏移脈波數(Offset Pulse)**	**Yes**	**自訂**
模式2/3	硬體訊號	執行/不執行	運動方向
步驟1	近原點(NearHome,IN0)	No	－/＋
步驟2	**原點 (Home,IN1)**	**Yes**	**－/＋**
步驟3	編碼器Z相訊號(Index)	No	－/＋
步驟4	**調整偏移脈波數(Offset Pulse)**	**Yes**	**自訂**
模式4/5	硬體訊號	執行/不執行	運動方向

步驟1	**近原點(NearHome,IN0)**	**Yes**	**－/＋**
步驟2	**原點 (Home,IN1)**	**Yes**	**－/＋**
步驟3	**編碼器Z相訊號(Index)**	**No**	**－/＋**
步驟4	**調整偏移脈波數(Offset Pulse)**	**Yes**	**自訂**
模式6/7	硬體訊號	執行/不執行	運動方向
步驟1	**近原點(NearHome,IN0)**	**No**	**－/＋**
步驟2	**原點 (Home,IN1)**	**Yes**	**－/＋**
步驟3	**編碼器Z相訊號(Index)**	**Yes**	**－/＋**
步驟4	**調整偏移脈波數(Offset Pulse)**	**Yes**	**自訂**
模式8/9	硬體訊號	執行/不執行	運動方向
步驟1	**近原點(NearHome,IN0)**	**Yes**	**－/＋**
步驟2	**原點 (Home,IN1)**	**No**	**－/＋**
步驟3	**編碼器Z相訊號(Index)**	**Yes**	**－/＋**
步驟4	**調整偏移脈波數(Offset Pulse)**	**Yes**	**自訂**
模式10/11	硬體訊號	執行/不執行	運動方向
步驟1	**近原點(NearHome,IN0)**	**Yes**	**－/＋**
步驟2	**原點 (Home,IN1)**	**Yes**	**－/＋**
步驟3	**編碼器Z相訊號(Index)**	**Yes**	**－/＋**
步驟4	**調整偏移脈波數(Offset Pulse)**	**Yes**	**自訂**

- 相關函數指令：PS400_Set_HomeSpeed(), PS400_Set_HomeMode(), PS400_Home_Start()。

2. 軸配置 (Axis)
   - 配合各群組設定指定運動軸。

3. 吋動操作模式 (Jog Operation)
   - 由外部訊號(EXP+/EXP-)，使用者可搭配硬體利用手動輪或其他按鈕開關配合此 PCEzGo 模擬使用。吋動操作模式可分為除能(Disable)、定量驅動(Fix-Pulse Mode)、連續驅動模式(Continuous Mode)、手輪脈波驅動模式(Manual Pulsar Mode)等四種。
   - 相關函數指令：PS400_Set_ManualPalsar().
   -

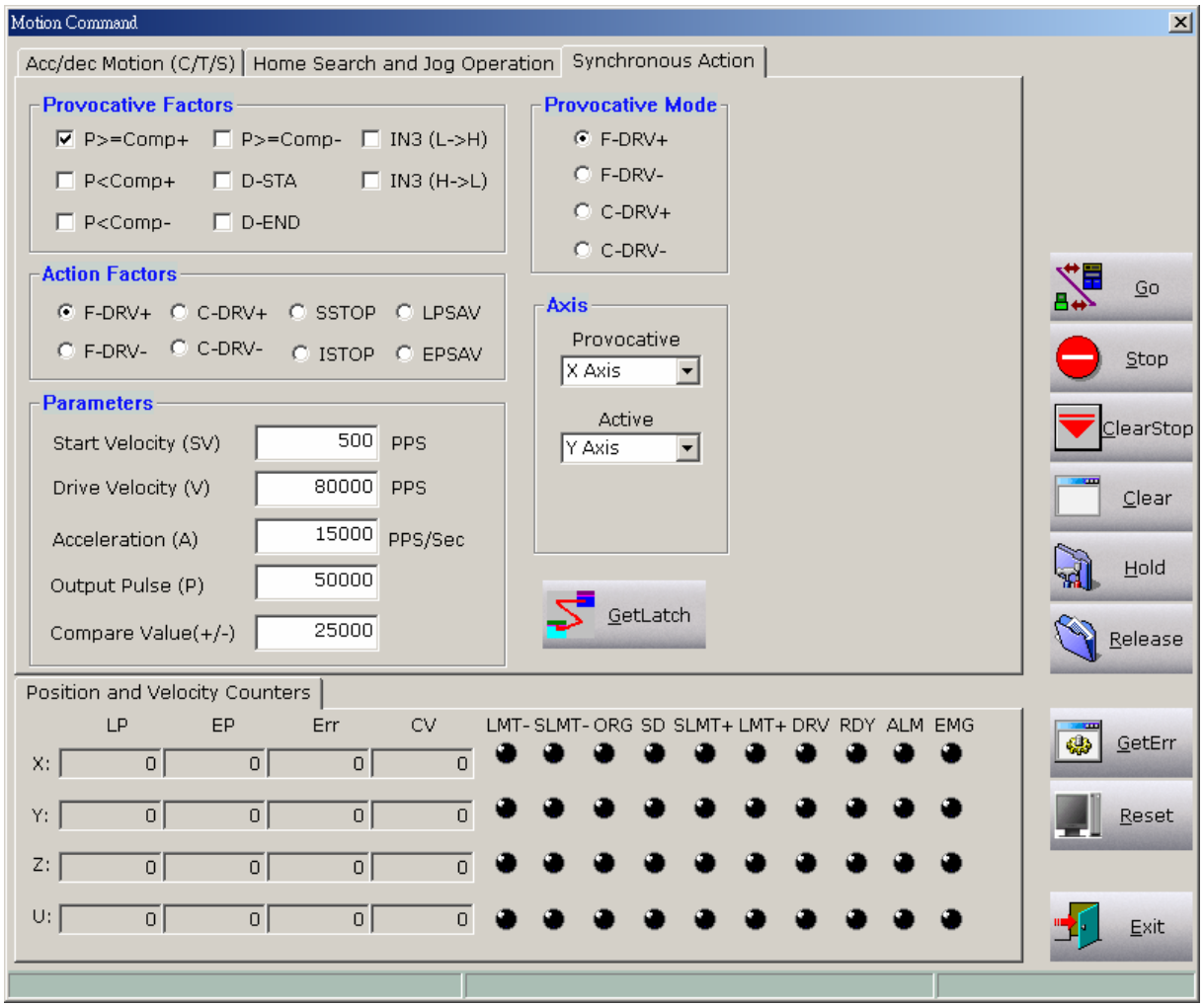
4. 參數設定
   - 原點返回運動包括初速度(SV)、驅動速度(V)、加速度(A)、偏移脈波數(Offset Pulse)；吋動操作模式則只需設置驅動速度(V)(等速方式運動)和單步的脈波數(Step Pulse)

5. I/O 信號狀態 (I/O Signal Status)
   - PISO-PS400 提供了各軸的軟硬體訊號和伺服訊號的燈號顯示。軟硬體訊號包括正負硬體極限、正負軟體極限、原點、近原點；伺服訊號則包括驅動訊號、伺服完成訊號、伺服警告訊號、和緊急停止訊號。
   - 相關函數指令：PS400_Get_DI_Status()。

6. 按鈕功能

- 同 5.2.1 節按鈕功能說明。

5.2.3 同步功能運動 (Synchronous Action)



群組定義&使用說明

1. 致動軸的觸發項目 (Provocative Factors)

- 制動軸項目包括：正方向定量驅動(FDRV+)、負方向定量驅動(PDRV--)、位置計數器大於等於負方向比較暫存器(P<COMP-)、驅動開始(D-STA)、驅動結束(D-END)、IN3 正緣觸發(IN3 L→H)、IN3 負緣觸發(IN3 H→L)。

2. 致動軸的運動模式 (Provocative Mode)

- 致動軸運動包括：正方向定量驅動(F-DRV+)、負方向定量驅動(F-DRV-)、正方向連續驅動(C-DRV+)、負方向連續驅動(C-DRV-)。

3. 運動軸的運動項目 (Action Factors)

- 致動軸運動包括：正方向定量驅動(F-DRV+)、負方向定量驅動(F-DRV-)、正方向連續驅動(C-DRV+)、負方向連續驅動(C-DRV-)、驅動停止(STOP)。
- 相關函數指令：PS400_Set_SyncMotion(), PS400_Set_Latch(), PS400_Get_Latch()。

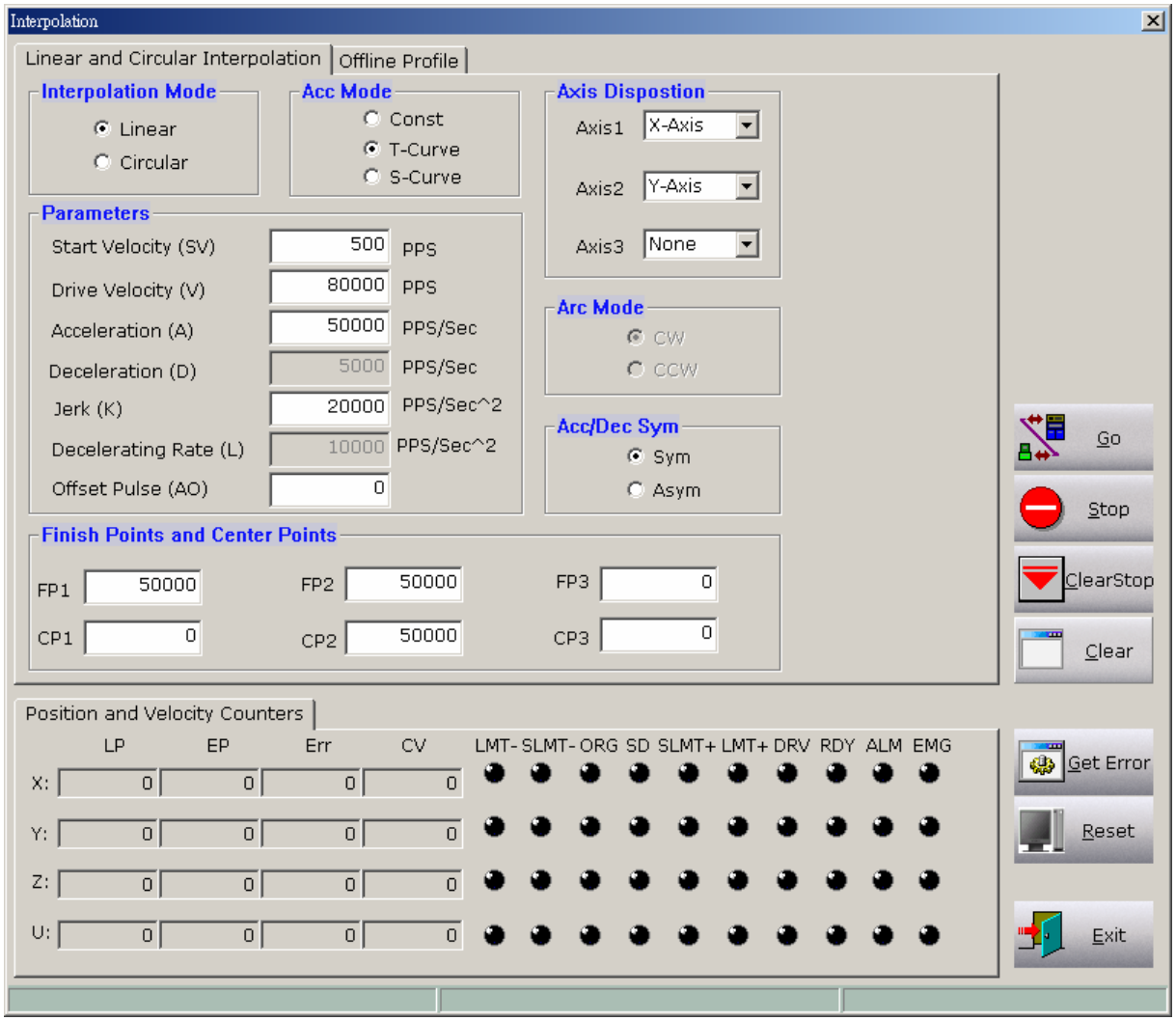
4. 軸配置 (Axis)
   - 配合各群組設定指定致動軸與運動軸。

5. 參數設定 (Parameters)
   - 可設置初始速度(SV)、驅動速度(V)、加速度(A)、驅動脈波(Output Pulse)，和比較計數器(Compare Counter)的值。

6. 按鈕功能
   - 同 5.2.1 節按鈕功能說明。

5.3 補間運動對話盒 (Interpolation Dialog)

5.3.1 直線補間與圓弧補間



群組定義&使用說明

1. 補間模式設定 (Interpolation Mode)

   PISO-PS400 PCEzGo 提供基本的 2 種補間模式：直線補間(Linear)與圓弧補間(Circular)。

   相關函數：PS400_Line2_Move(), PS400_Line2_As_Move(), PS400_Line3_Move(), PS400_Line3_As_Move(), PS400_Arc2_Move()。

2. 加速模式設定 (Acc Mode)

   ■ 補間運動可選擇 3 種加速模式：等速(Const)、梯形加減速(T-Curve)、S-Curve 加減速(S-Curve)。

3. 軸配置 (Axis)

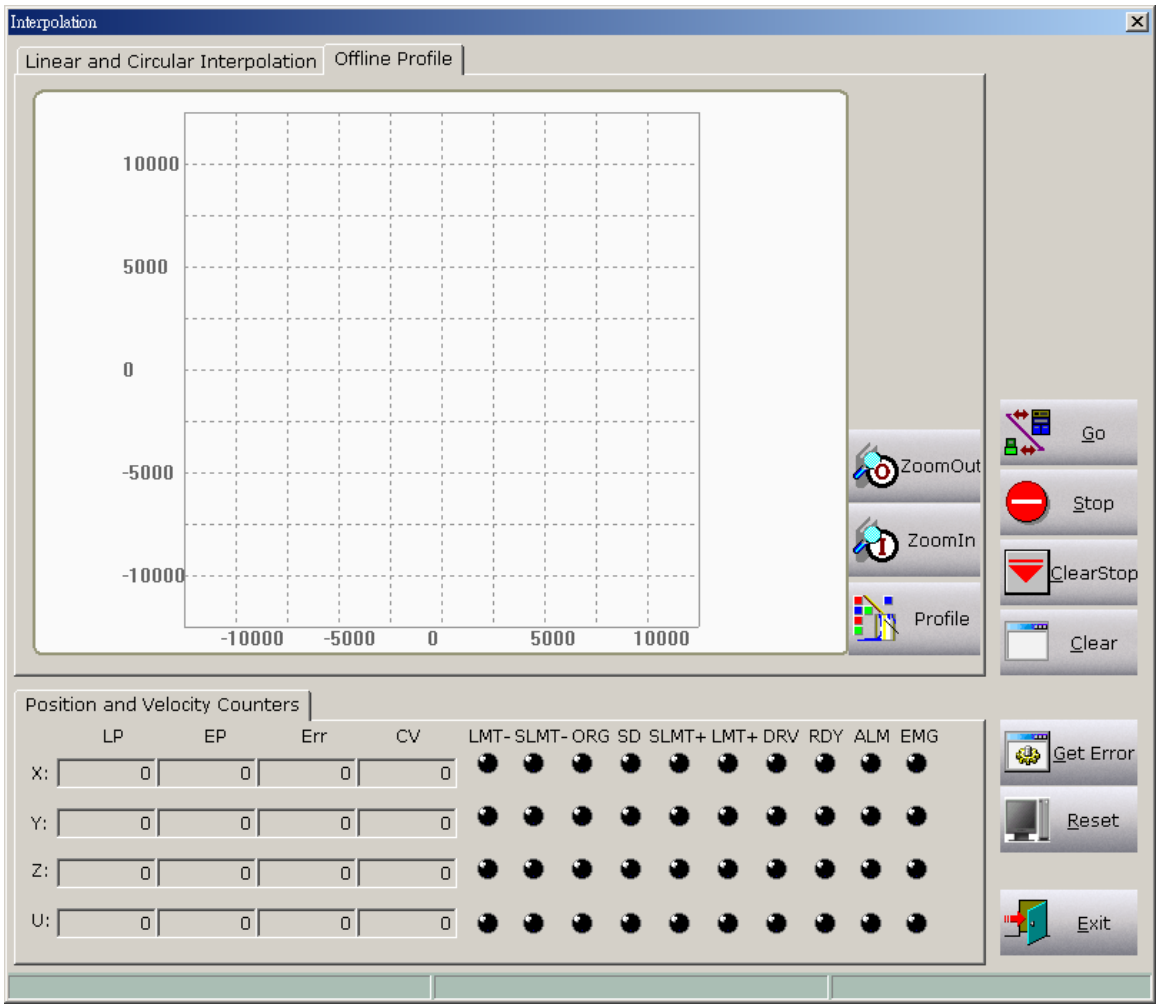
   ■ 配合各群組設定指定運動軸。

4. 圓弧補間方向設定 (Arc Mode)

   ■ 圓弧補間方向可分為順時針方向(CW)與逆時針方向(CCW)。

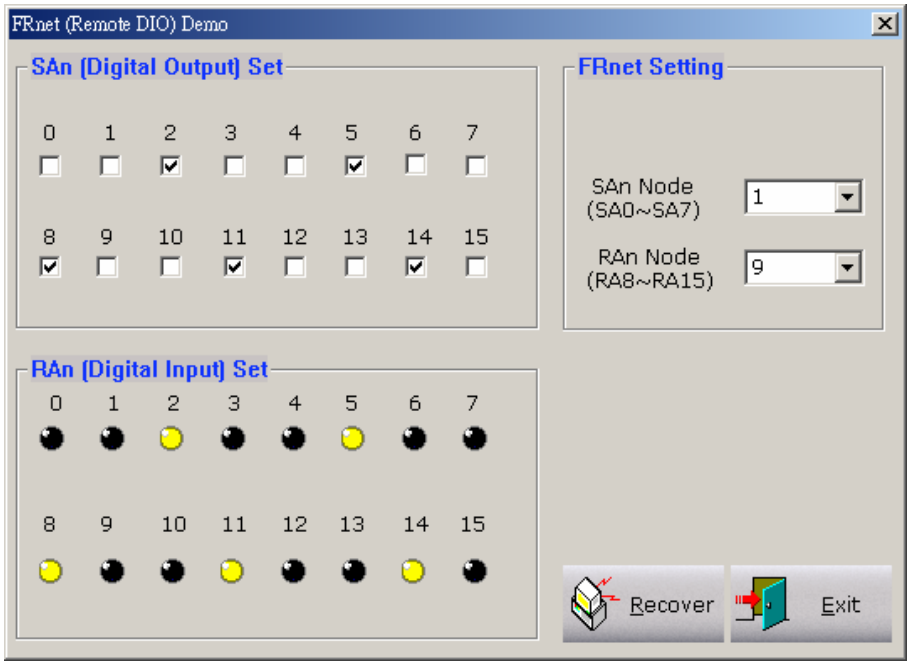
5. 位置與速度計數器 (Position and Velocity Counters)
   - 對話盒下方可分為兩個子頁位置與速度計數器和 I/O 訊號狀態顯示。
   - 其中位置與速度計數器子頁提供顯示各軸之邏輯位置計數器、實際位置計數器、位置誤差、即時速度等資訊。
   - 相關函數指令：PS400_Get_Cpmmand(), PS400_Get_Position(), PS400_Get_Speed()。
6. 按鈕功能
   - Go：後執行各軸之運動。
   - Stop：停止運動。
   - ClearStop：f 清除停止命令旗標，按下 Stop 按鍵後，需再按下 ClearStop 按鍵方能再次執行運動命令。
   - Clear：清除 4 軸之邏輯與實際位置暫存器
   - GetError 按下可於下方狀態列中第 3 格檢視運動錯誤代碼。
   - Reset：回復至版卡的初始狀態。
   - Exit：離開此對話盒視窗。

5.3.2 兩軸平面軌跡圖



1. 按鈕功能
   - Profile：顯示補間運動的邏輯位置命令軌跡曲線。
   - ZoomIn：放大軌跡曲線。
   - ZoomOut：縮小軌跡曲線。

5.4 FRnet DI/DO對話盒 (FRnet DI/DO Demo)

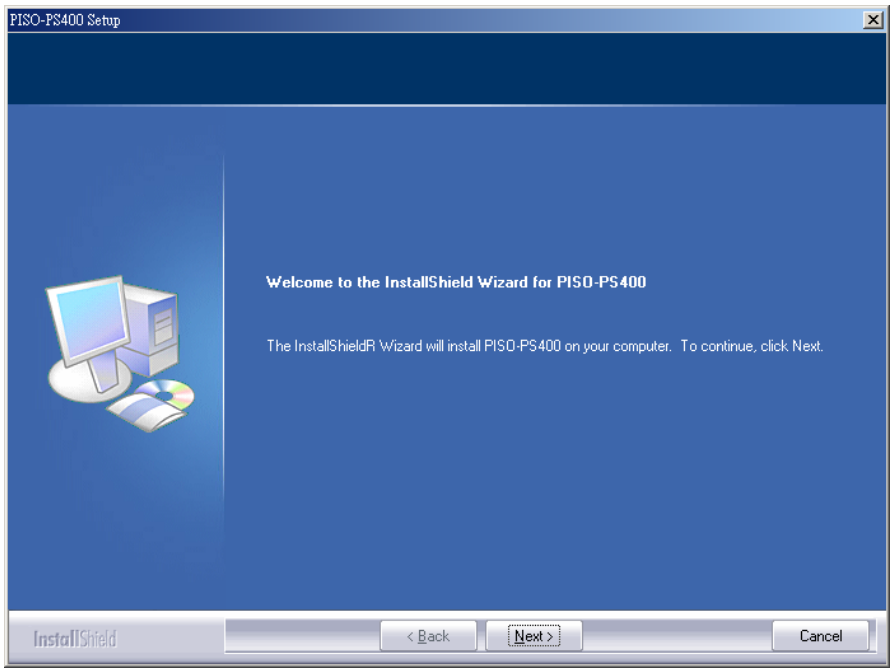


群組定義&使用說明

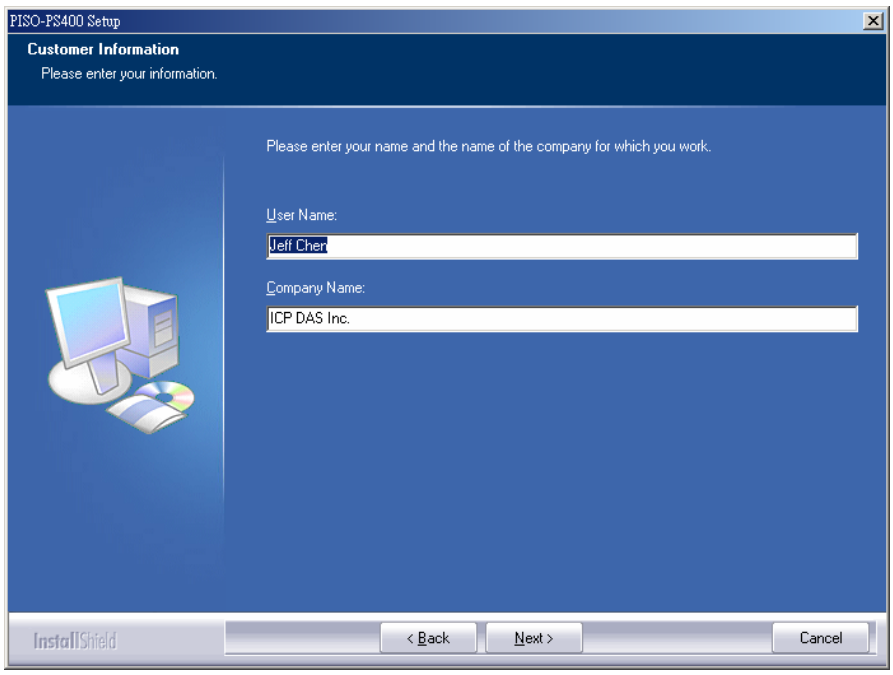
1. SAn 數位輸出端 (San, (Digital Output) Set)
   - PISO-PS400 提供 FRnet 通訊功能：數位輸出端共有 128 點(16×8)可供使用。
   - 相關函數指令：PS400_Write_FRnet()。
2. RAn 數位輸入端 (Ran, (Digital Input) Set)
   - PISO-PS400 提供 FRnet 通訊功能：數位輸入端共有 128 點(16×8)可供使用。
   - 相關函數指令：PS400_Read_FRnet()。
3. FRnet 群組設定 (FRnet Setting)
   - 提供現在使用中的卡號資訊和選擇數位輸出輸入群組等功能。

附錄 A PISO-PS400 驅動程式安裝

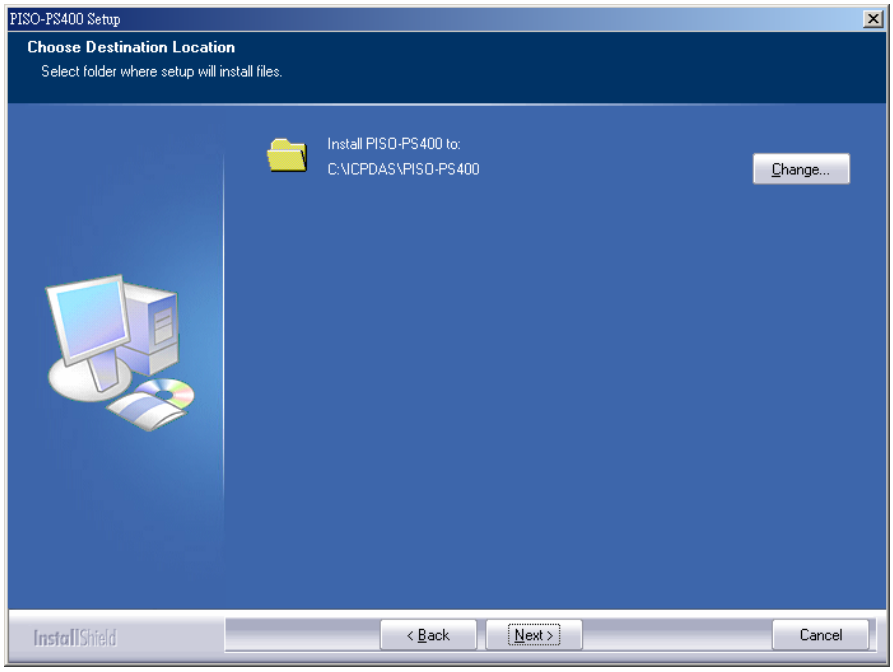
請從 CD //PC_BASE/PCI/PISO-PS400/中執行: setup.exe ,按”NEXT”



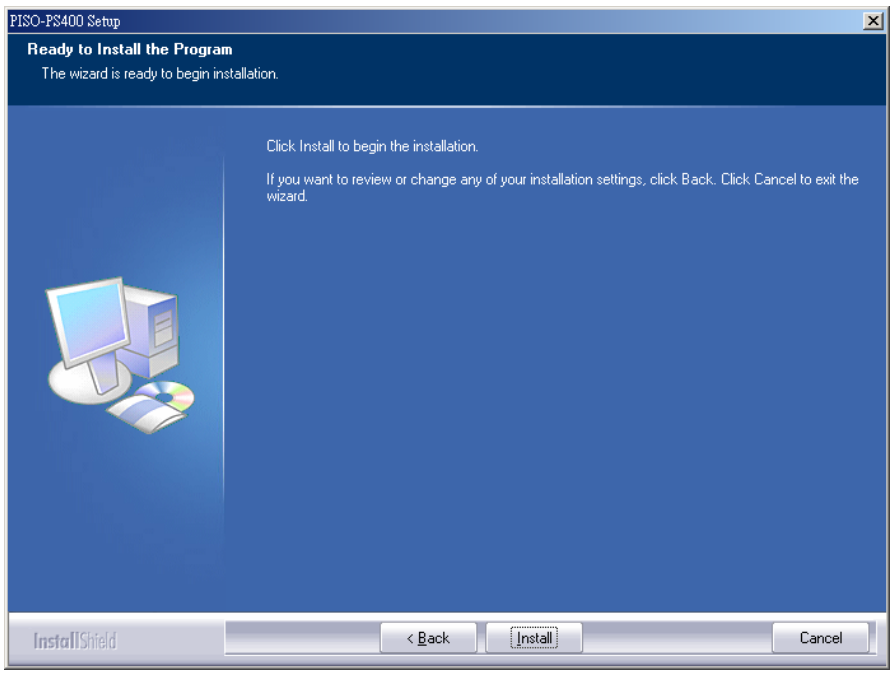
輸入使用者名稱及公司名稱,按”NEXT”



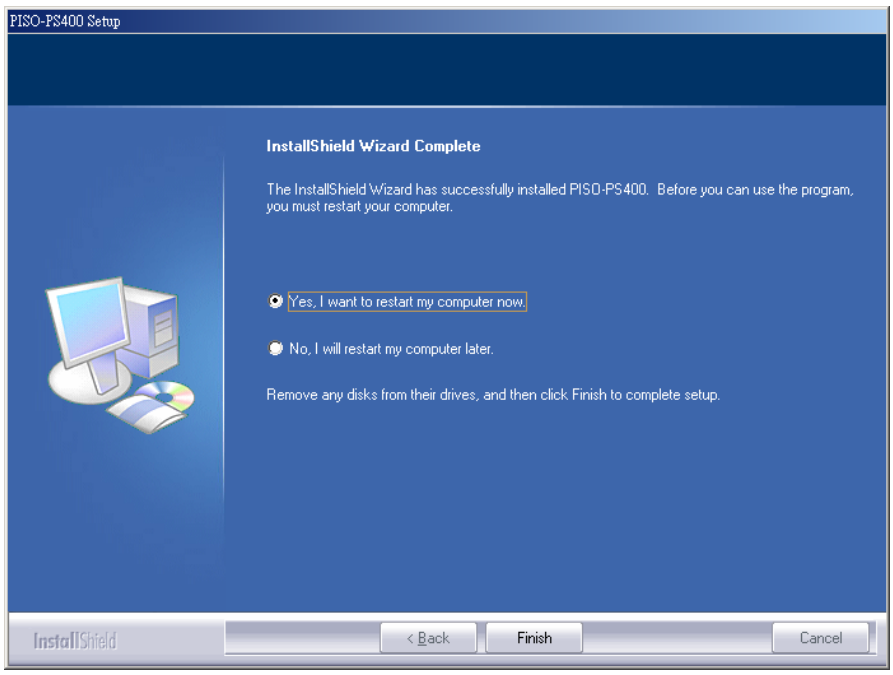
指定安裝路徑後,按”NEXT”



按”Install” 開始安裝



安裝完成後請按”Finish”重新開機即可



安裝後檔案如下:

C:\ICPDAS\PISO-PS400

```
├──Include                          開發應用程式所須要 Header Files
├──LIB                              開發應用程式所須要Library Files
├──Drivers                          驅動程式 與 註冊資訊檔
│    ├──Win2K                       Windows 2000 的 WDM driver 與 INF 註冊資訊檔
│    └──WinXP                       Windows XP 的 WDM driver 與 INF 註冊資訊檔
├──Manuals                          軟硬體說明手冊
├──Samples                          基本功能的範例程式
│    └──VC6                         VC6 範例程式
│    │    ├──First_Demo.dsw         列於本文的基本範例程式 Workspace
│    │    ├──PS400_VC6.dsw          VC 6.0 Dialog based 範例 Workspace
│    │    └──PS400_INT_Console.dsw  VC 6.0 Console 中斷範例 Workspace
│    ├──VB6                         VB6 範例程式
│    │    └──First_demo             VB 6.0 開始範例
│    └──BCB6                        BCB6 範例程式
│         └──First_Demo             BCB 6.0 開始範例
└──Ultility                         PCEzGo.exe
```

附錄 B PISO-PS400 其它 Terminal Boards

B.1 DN-8468M Daughter Board

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

B.1.1 Board Layout for DN-8468M

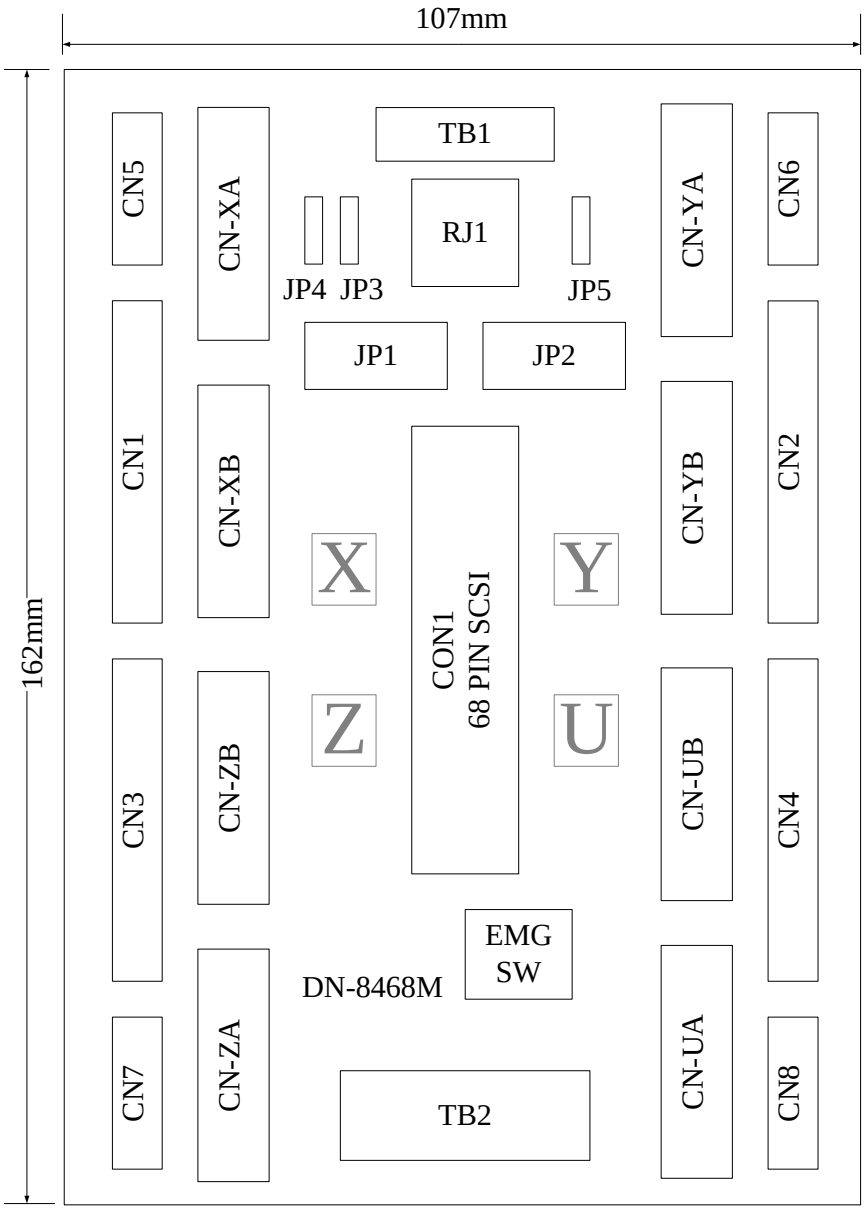


Fig. 1-1 Board layout for the DN-8468M

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.

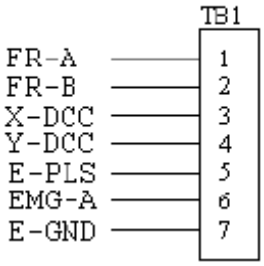


Fig. 1-3 Pin definition for TB1

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.

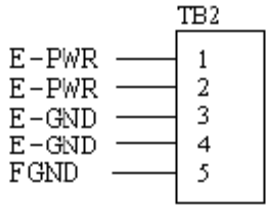


Fig. 1-4 Pin definition for TB2

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.

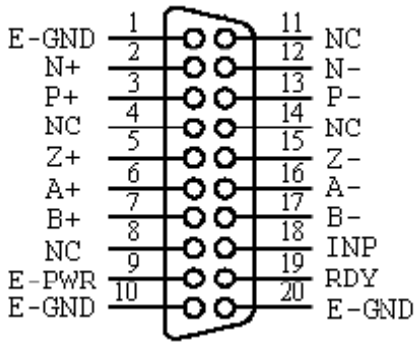


Fig. 1-5 Pin definition for CN-XA, CN-YA, CN-ZA, CN-UA

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.

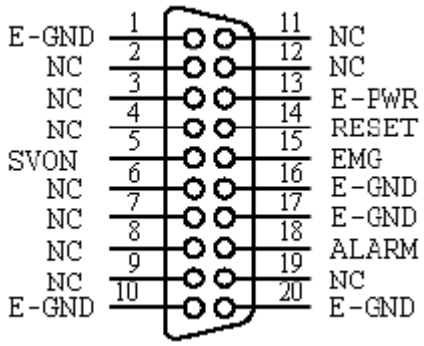


Fig. 1-6 Pin definition for CN-XB, CN-YB CN-ZB, CN-UB

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.

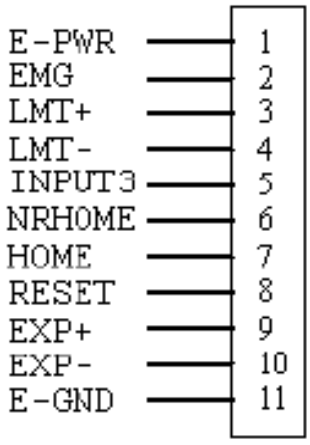


Fig. 1-7 Pin definition for CN1~CN4

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-8468M, and the Table 1-9 shows its I/O connector signal description.

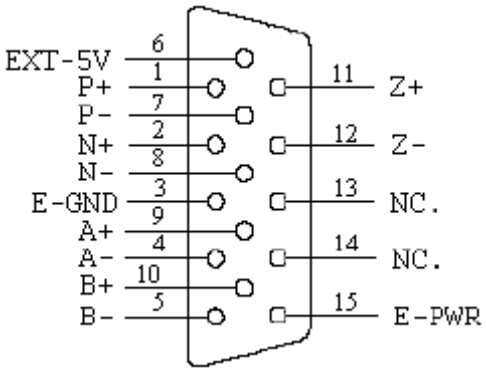


Fig. 1-8 Pin definition for CN5~CN8

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.

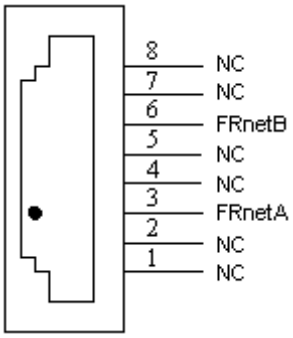


Table 1-10 RJ1

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.

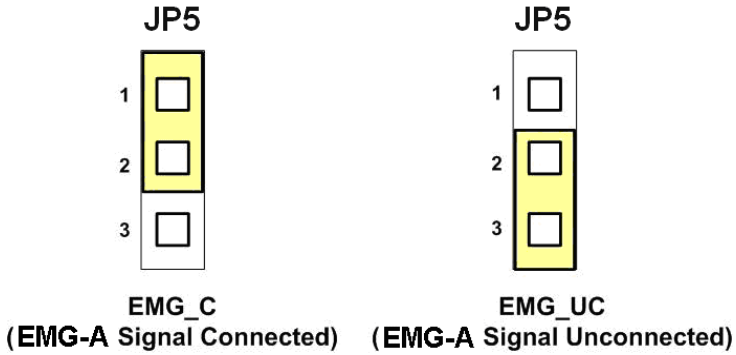


Fig. 1-10 Jumper 5 setting

■ 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.

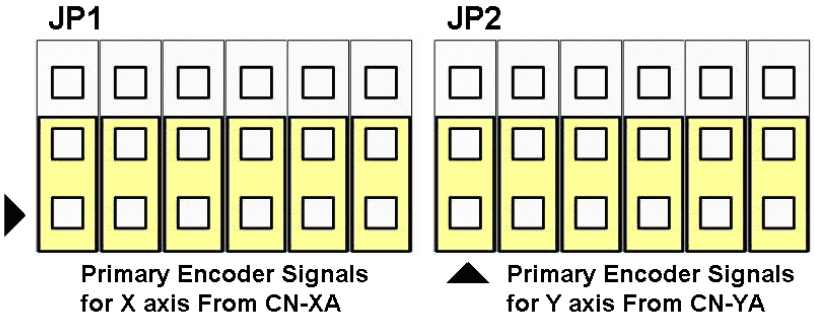


Fig. 1-11 Primary encoder signals setting

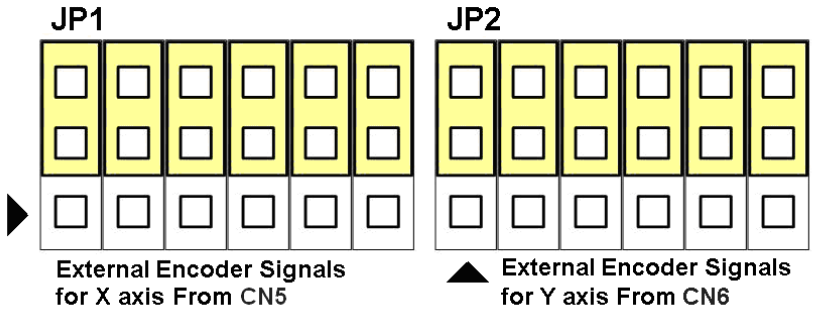


Fig. 1-12 External encoder signals setting

■ 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.

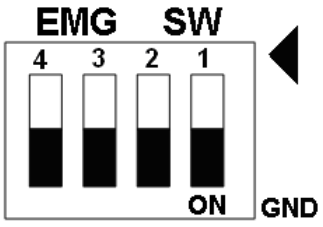


Fig. 1-13 EMG SW setting for normally GND (Default setting)

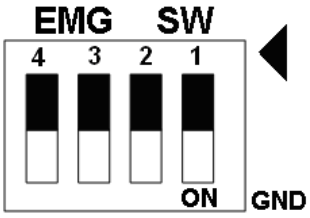


Fig. 1-14 EMG SW setting for user controlled signals.

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

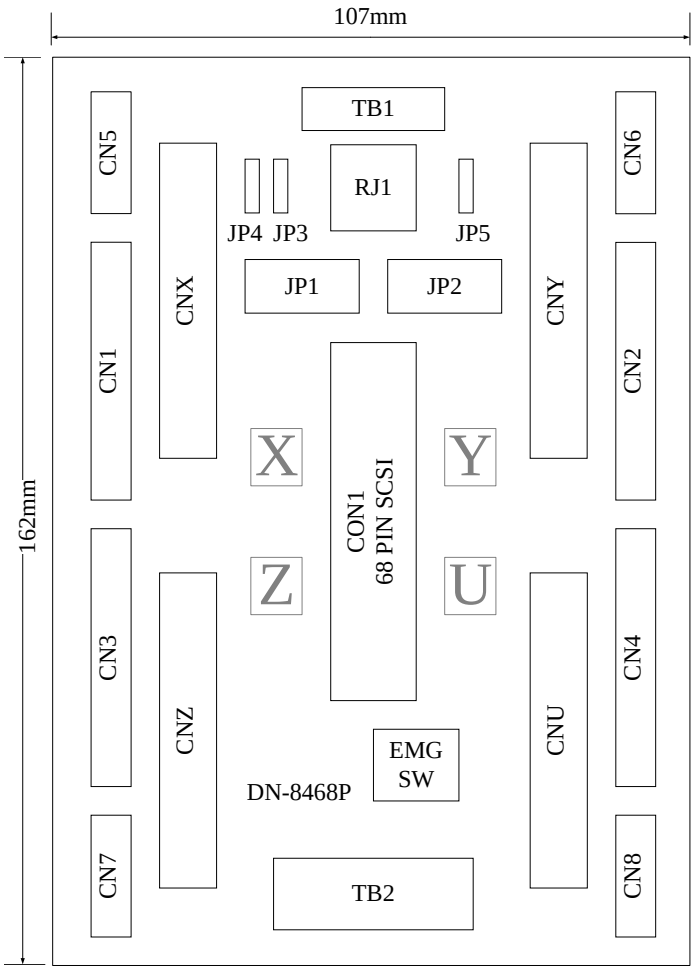


Fig. B2-1 Board layout for the DN-8468P

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.

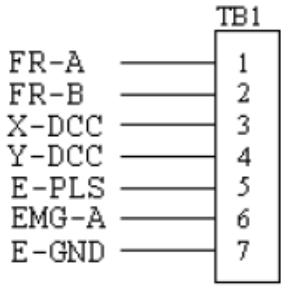


Fig. 1-3 Pin definition for TB1

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-8468P, and the Table 1-5 shows its I/O connector signal description.

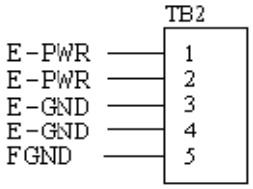


Fig. 1-4 Pin definition for TB2

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.

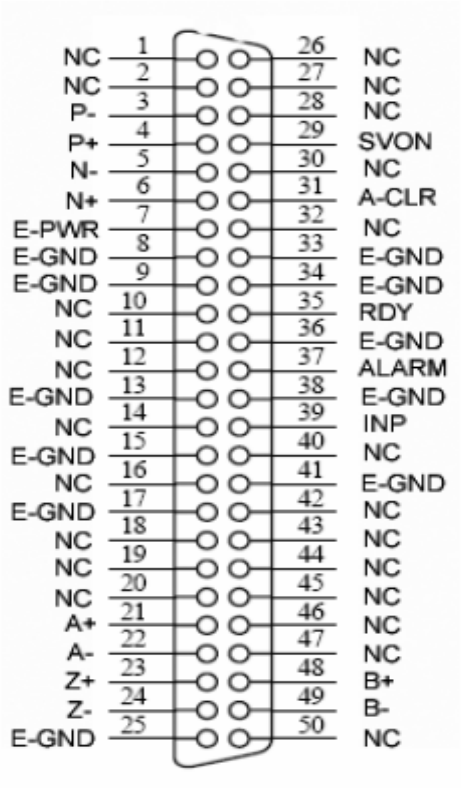


Fig. 1-5 Pin definition for CNX, CNY, CNZ, CNU

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.

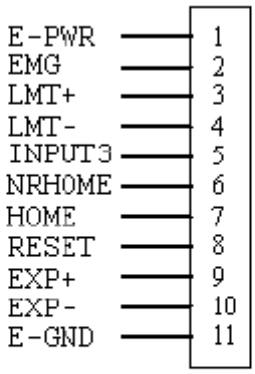


Fig. 1-7 Pin definition for CN1 ~ CN4

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.

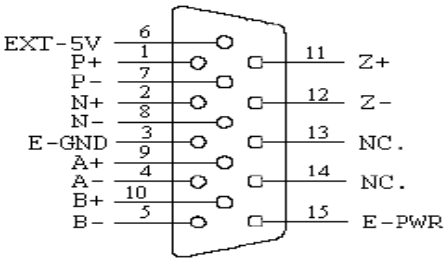


Fig. 1-8 Pin definition for CN5 ~ CN8

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.

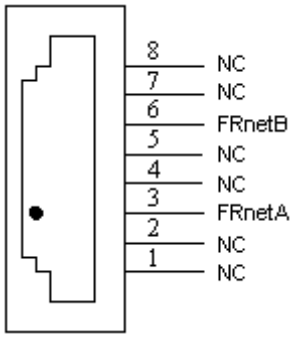


Fig. 1-9 Pin definition for RJ

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.

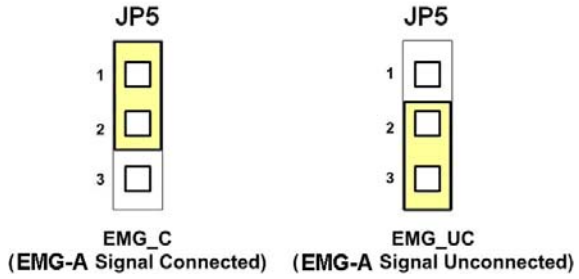


Fig. 1-10 Jumper 5 setting

■ 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.

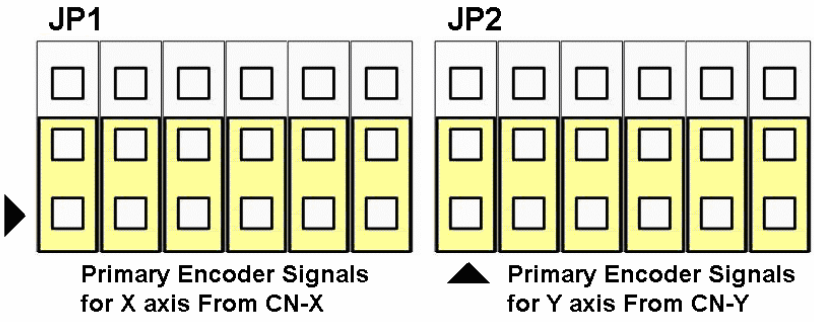


Fig. 1-11 Primary encoder signals setting

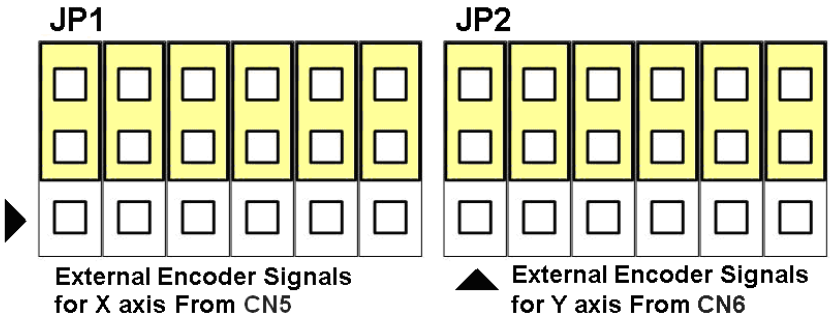


Fig. 1-12 External encoder signals setting

■ 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.

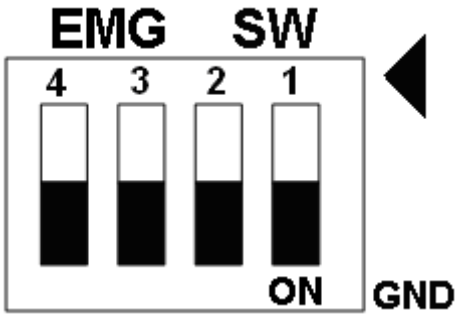


Fig. 1-13 EMG SW setting for normally GND (Default setting)

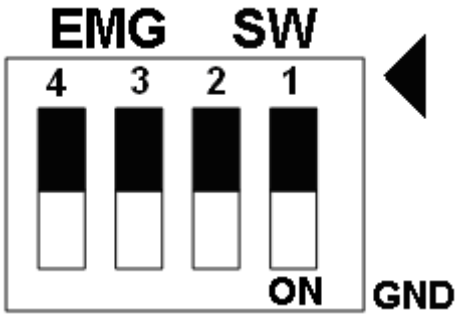


Fig. 1-14 EMG SW setting for user controlled signals.

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

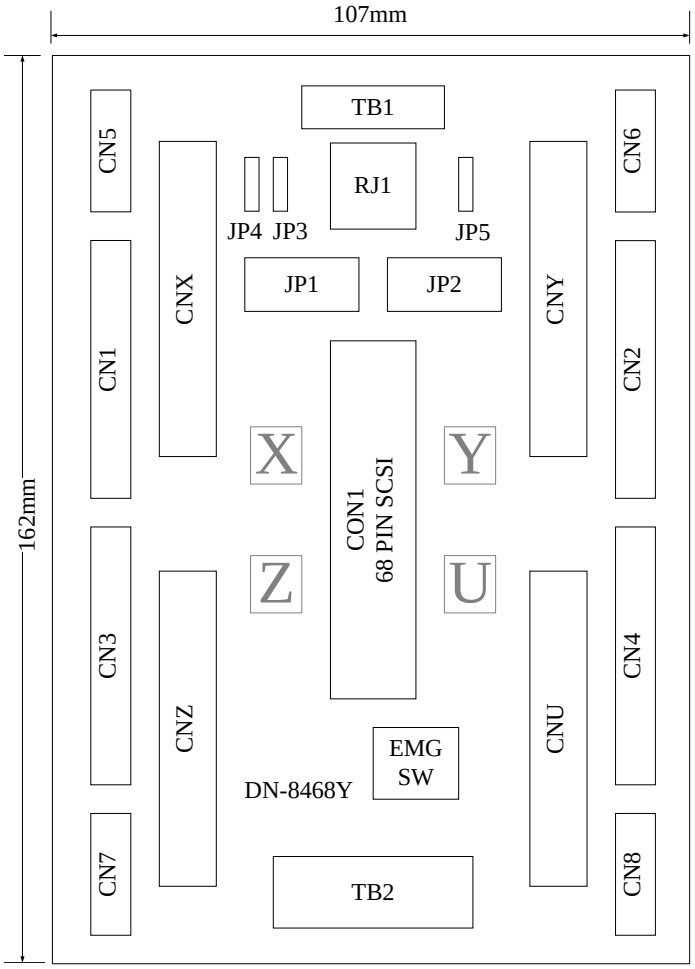


Fig. 3-1 Board layout for the DN-8468Y

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.

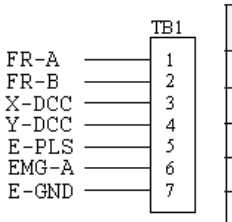


Fig. 3-3 Pin definition for TB1

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.

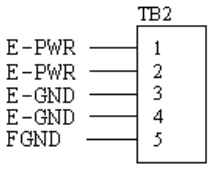


Fig. 3-4 Pin definition for TB2

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.

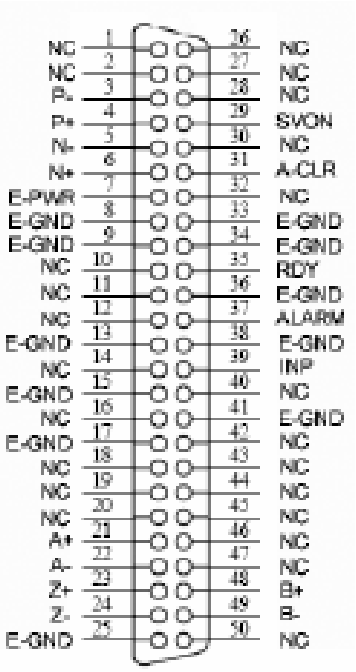


Fig. 3-5 Pin definition for CNX, CNY, CNZ, CNU

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.

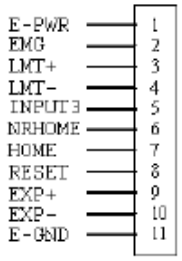


Fig. 3-7 Pin definition for CN1 ~ CN4

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.

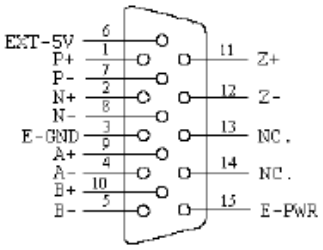


Fig. 3-8 Pin definition for CN5 ~ CN8

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.

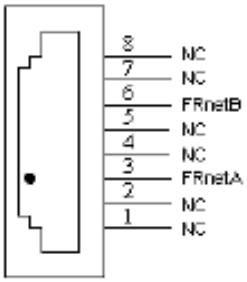


Fig. 3-9 Pin definition for RJ1

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.

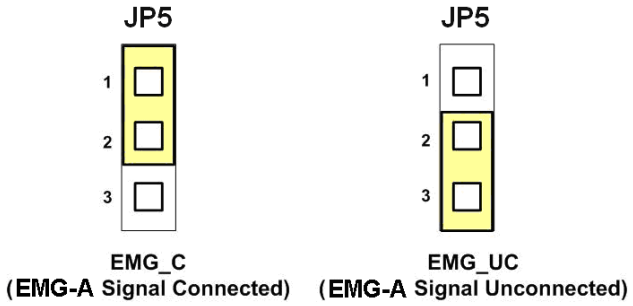


Fig. 3-10 Jumper 5 setting

■ 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.

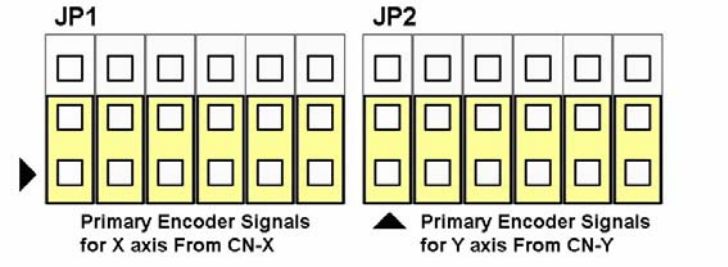


Fig. 3-11 Primary encoder signals setting

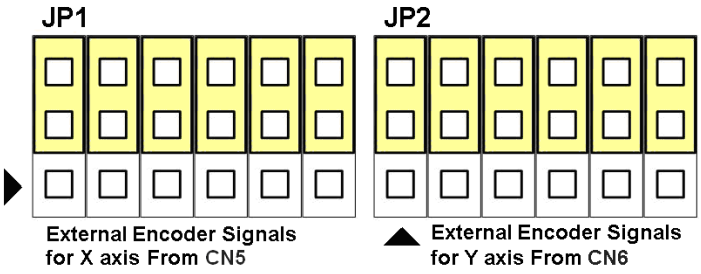


Fig. 3-12 External encoder signals setting

■ 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.

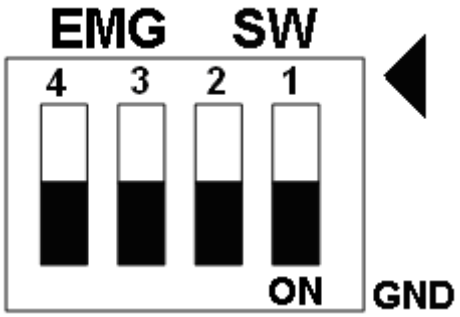


Fig. 3-13 EMG SW setting for normally GND (Default setting)

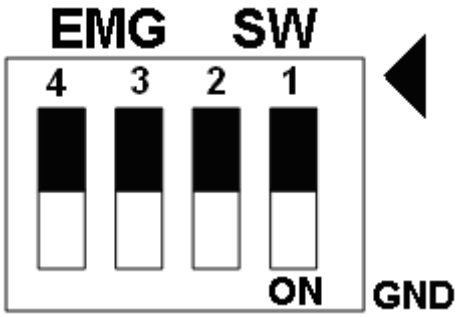


Fig. 3-14 EMG SW setting for user controlled signals.

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

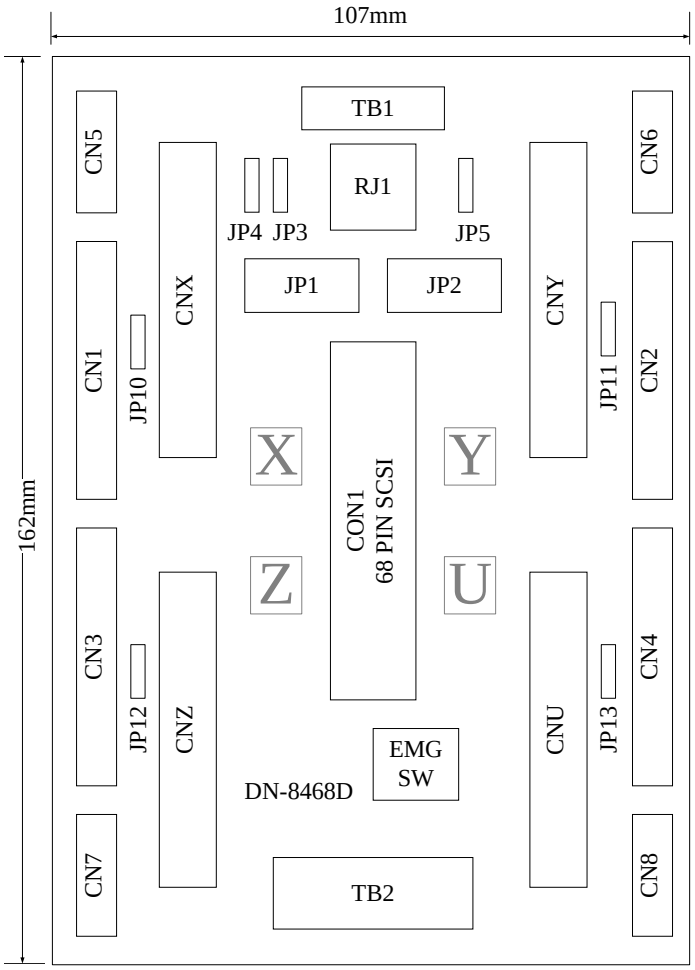


Fig. 3-1 Board layout for the DN-8468D

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.

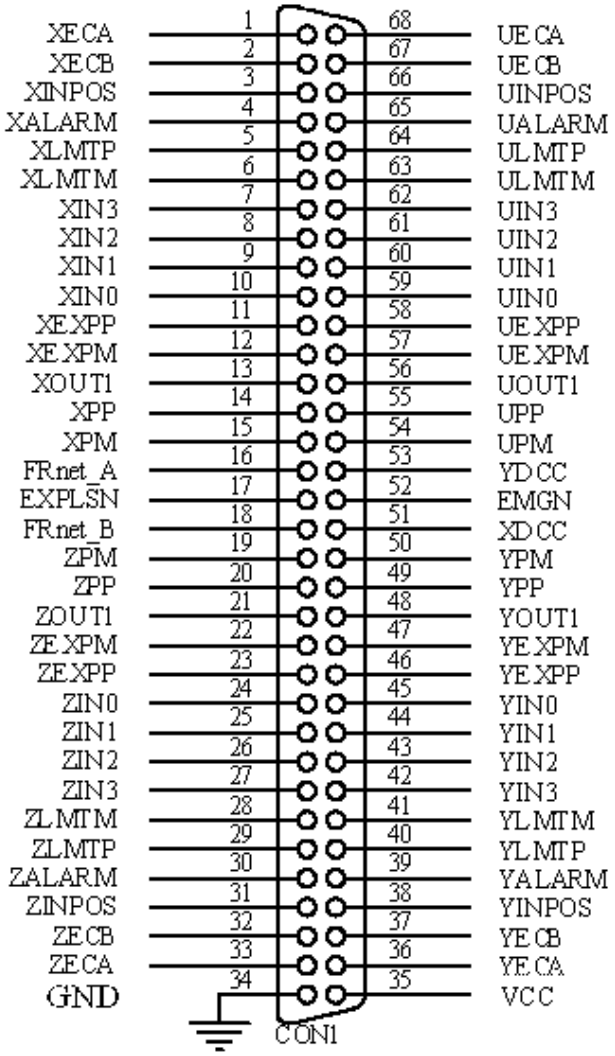


Fig. 3-2 I/O connector pin assignment for the CON1

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.

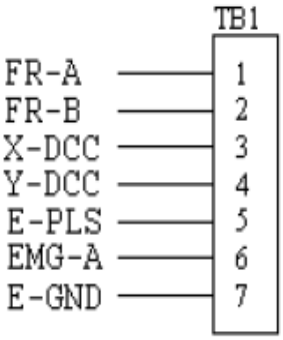


Fig. 3-3 Pin definition for TB1

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.

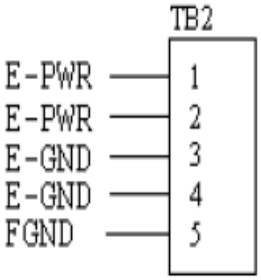


Fig. 3-4 Pin definition for TB2

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.

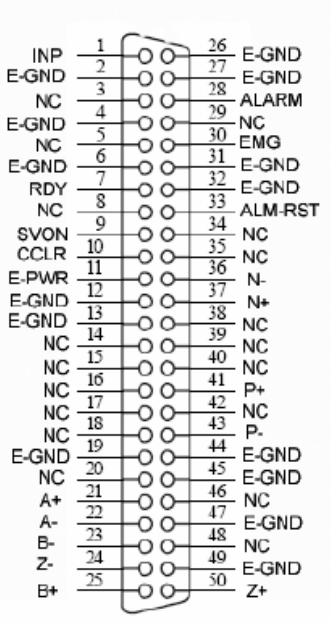


Fig. 3-5 Pin definition for CNX, CNY, CNZ, CNU

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 48	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.

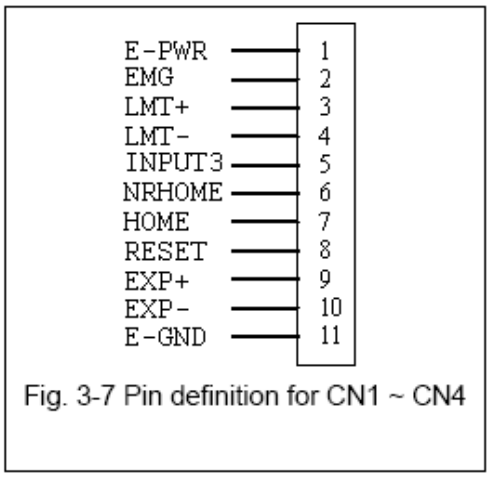


Fig. 3-7 Pin definition for CN1 ~ CN4

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.

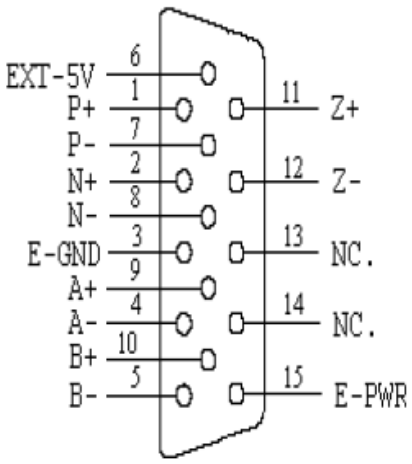


Fig. 3-8 Pin definition for CN5 ~ CN8

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.

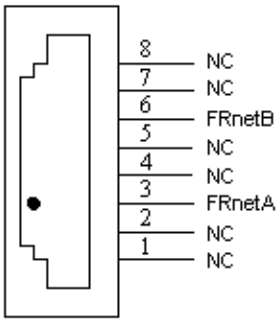


Fig. 3-9 Pin definition for RJ1

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.

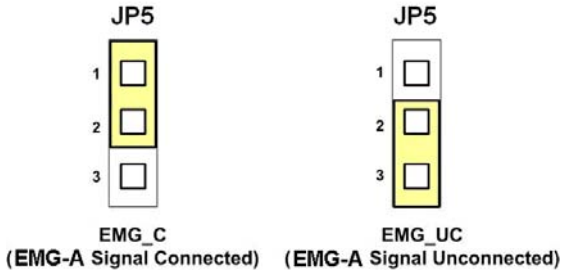


Fig. 3-10 Jumper 5 setting

■ 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.

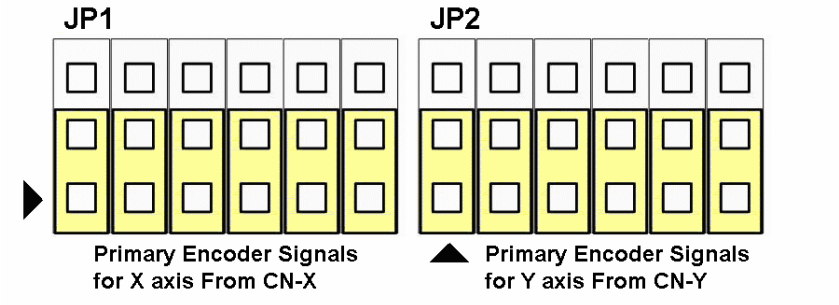


Fig. 3-11 Primary encoder signals setting

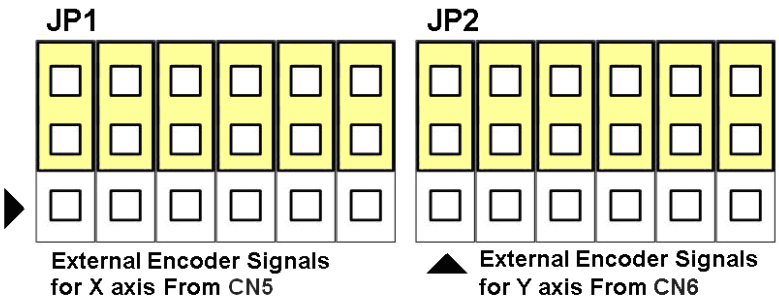


Fig. 3-12 External encoder signals setting

■ 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.

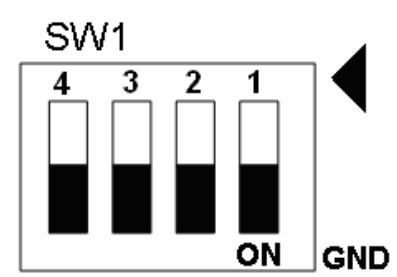


Fig. 3-13 SW1 setting for normally GND (Default setting)

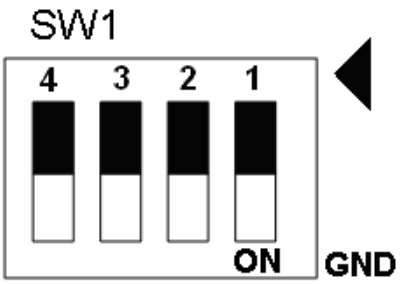


Fig. 3-14 SW1 setting for user controlled signals.

■ 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.

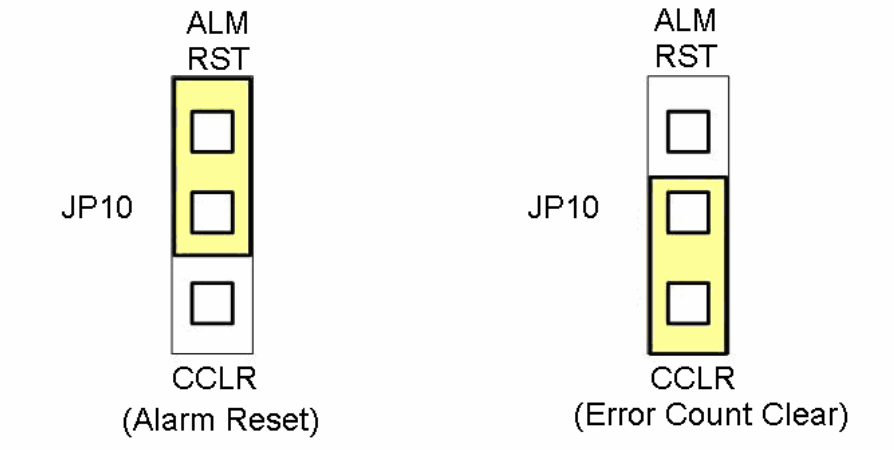


Fig. 3-15 JP 10 ~ 13 setting