

i8094 快速上手手冊

(Version 2.4)

i8094 C++ 巨集指令函式庫快速上手
PAC WinCon-8000、I-8000 系列控制器
(適用於 i8094, i8094F)



ICP DAS CO., LTD.

泓格科技股份有限公司

Warranty

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

Warning

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

Copyright

Copyright 1997-2009 by ICPDAS Inc., LTD. All rights reserved worldwide.

Trademark

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

License

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

目錄

1 I8094 運動控制器模組簡介	7
1.1 i8094 簡介	7
1.2 硬體規格.....	8
1.2.1 主要規格	8
1.2.2 補間功能	8
1.2.3 輸出脈衝	8
1.2.4 編碼器輸入	9
1.2.5 位置計數器	9
1.2.6 自動歸原點	9
1.2.7 伺服馬達輸入訊號 Servo Motor Input Signal	9
1.2.8 極限訊號輸入	9
1.2.9 其它輸入訊號 Other Input Signals	10
1.2.10 緊急停止訊號輸入, Emergency Stop Signal Input	10
1.2.11 一般輸出訊號 General Output Signal	10
1.2.12 整合輸入濾波器 Contents of integral type filters	10
1.2.13 軟體極限	10
1.2.14 手動外部輸入信號驅動	10
1.2.15 模組狀態顯示LED	10
1.2.16 FRnet分散式DI/O (i8094F 專用功能).....	10
1.3 環境參數Environment.....	11
1.4 採購資訊Ordering Information	11
2 硬體接線.....	12
2.1 i8094 檢查包裝,及安裝	12
2.1.1 檢查包裝	12
2.1.2 i8094 安裝	12
2.2 DN-8468 端子板	15
2.2.1 腳位定義	16
2.2.2 功能選擇(跳線設定).....	22

2.3 I/O 輸出入介面.....	24
2.3.1 脈波輸出介面	24
2.3.2 極限開關接線(Connection for Limit switch Signal)	25
2.3.3 一般DI輸入接線(nINPOS,nALARM).....	25
2.3.4 Encoder輸入接線(Encoder Signals)	26
2.3.5 外部輸入脈波接線(external pulse signal)	26
2.3.6 緊急停止輸入接線(emergency stop signal).....	27
2.3.7 外部信號輸入接線(EXP+,EXP-).....	27
2.3.8 Servo On/Off信號輸出接線(ENABLE)	28
2.4 接線範例.....	29
3 I8094 軟體開發程序	30
3.1 軟體開發測試程序概觀	30
3.1.1 註冊軸卡	31
3.2 安全IO規劃(會使Motion不動作原因)	31
3.2.1 緊急開關輸入	31
3.2.2 設定伺服馬達異常ALARM輸入參數.....	31
3.2.3 設定各軸前後硬體極限	31
3.2.4 設定各軸前後軟體極限	31
3.3 檢查是否有錯誤(GET_ERROR).....	32
3.4 Motion 基本設定	32
3.5 Motion 動作測試(手動外部輸入)(如需要)	33
3.6 軸歸零.....	34
3.6.1 歸零設定	34
3.6.2 執行歸零設定	34
3.7 Motion 基本運作	35
3.7.1 一般運動控制速度曲線分類	35
3.7.2 單軸Motion 基本設定	37
3.7.3 單軸Motion 基本動作	37
3.7.4 多軸補間(向量)Motion 基本設定.....	38

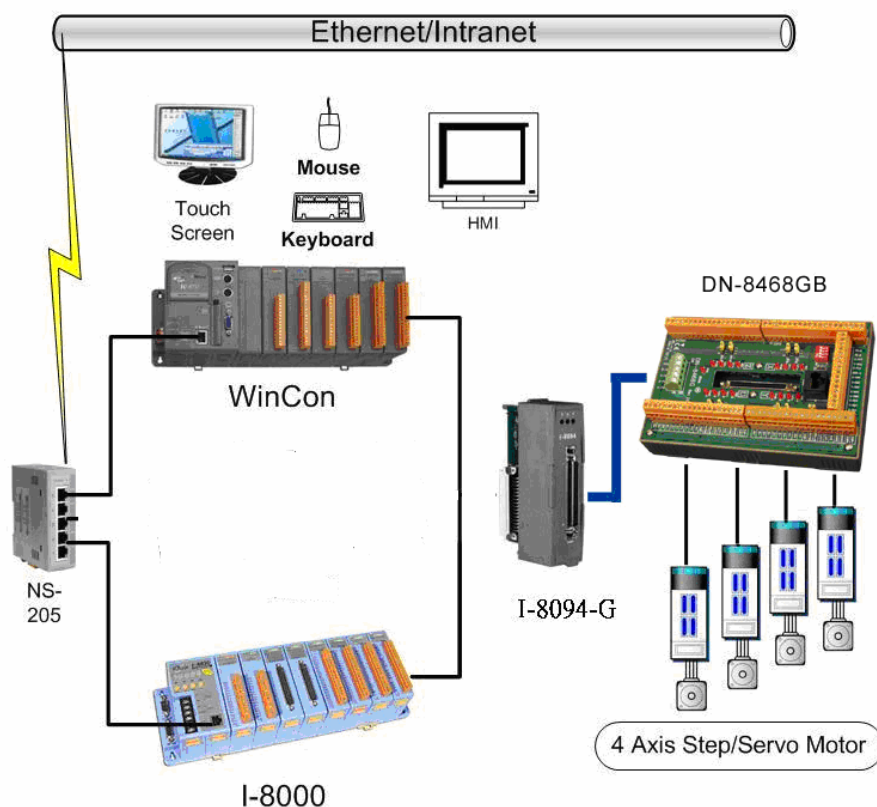
3.7.5 多軸補間Motion 基本動作	39
3.8 Motion 進階運動	39
3.9 Motion 同步運動	39
4 軟體快速上手	40
4.1 WinCon eVC++	40
4.1.1 確認相關檔案	40
4.1.2 新增一eVC++應用程式專案	40
4.1.3 在eVC++專案中加入I8094.h	42
4.1.4 在eVC++專案中加入參考路徑	43
4.1.5 在eVC++專案中開始應用	44
4.1.6 編譯專案成可執行檔	48
4.1.7 下載與執行	48
4.2 WinCon Microsoft Visual Studio .NET 2003(VB.NET , C#)	49
4.2.1 確認相關檔案	49
4.2.2 開一新專案	49
4.2.3 在專案中加入參考DLL	51
4.2.4 開始程式撰寫	53
4.2.5 建置專案	56
4.2.6 下載與執行	56
4.3 I-8000 Turbo C	57
4.3.1 確認相關檔案	57
4.3.2 使用TC ++ 來編譯程式的方式如下:	57
4.3.3 開一新專案	57
4.3.4 撰寫程式	59
4.3.5 撰編譯連結程式	65
4.3.6 Download 程式到I-8000 系列PAC控制器	65
附錄A	67
A.1 I8094 開發環境安裝內容	67
A.1.1 eVC ++ 4.0	67
A.1.2 Visual Studio .NET 2003(VB.NET , C#)	67
A.1.3 Turbo C	67
A.2 I8094 概觀	68

A.3 外觀尺寸.....	69
A.4 版本更新內容註解.....	70
附錄B 其它TERMINAL BOARDS.....	71
B.1 DN-8468M Daughter Board.....	71
B.1.1 Board Layout for DN-8468M.....	71
B.1.2 Signal Connections for DN-8468M.....	72
B.1.3 Jumper and Switch Settings.....	78
B.2 DN-8468P Daughter Board.....	80
B.2.1 Board Layout for DN-8468P.....	80
B.2.2 Signal Connections for DN-8468P.....	81
B.2.3 Jumper and Switch Settings.....	87
B.3 DN-8468Y Daughter Board.....	89
B.3.1 Board Layout for DN-8468Y.....	89
B.3.2 Signal Connections for DN-8468Y.....	91
B.3.3 Jumper and Switch Settings.....	96
B.4 DN-8468D Daughter Board.....	98
B.4.1 Board Layout for DN-8468D.....	98
B.4.2 Signal Connections for DN-8468D.....	99
B.4.3 Jumper and Switch Settings.....	107
B.5 DN-8468FB Daughter Board.....	110
B.5.1 Board Layout for DN-8468FB.....	110
B.5.2 Signal Connections for DN-8468FB.....	111
B.5.3 Jumper and Switch Settings.....	120

1 i8094 運動控制器模組簡介

1.1 i8094 簡介

i8094 是一個支援 4 軸步進/伺服馬達運動控制模組，輸出 Pulse 可高達 4M PPS，配合泓格公司 I-8000 及 WinCon-8000，其中之一控制器上。i8094 運動控制模組適合一般運動控制應用，提供非常多的運動控制功能讓客戶使用，例如 2/3 軸直線補間、2 軸圓(弧)補間、T/S 加減速曲線、多軸組合的同步運動、可規劃的自動歸原點等等，而 i8094 在執行上述功能時，並不需耗用 I-8000 或 WinCon 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 I-8000 或 WinCon-8000 插上多個 i8094 模組，以多軸(4、8....)運動控制於同一控制器上。泓格亦提供相當多的範例程式及巨集功能，以減少程式設計的工時，符合低成本高效能的運動控制系統設計平台。



I8094 與控制器規劃圖 (WinCon-8000、I-8000)

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-曲線衡量(Jerk) 範圍 | 954 ~ 62.5 x 10⁶ PPS/S²
477 x 10³ ~ 31.25 x 10⁹ PPS/S² |
| ■ 加減速範圍 | 125 ~ 1 x 10⁶ PPS/S
62.5x10³ ~ 500 x 10⁶ 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 | |
| ◆ 對稱與非對稱線性加減速 | |
| ◆ 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/S-曲線加減速
- 可選脈波輸出為CW/CCW 或 PULSE/DIR 方式
- 可以選擇邏輯準位

1.2.4 編碼器輸入

- 可選擇 A/B 相脈衝輸入或 Up/Down 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
- 可設定為環狀計數器功能(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
- 位置計數器可以讀取，也可以設定

1.2.6 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)

每一步驟都可設定要不要執行及其找尋方向

1.2.7 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

1.2.8 極限訊號輸入

- 各軸 2 個極限訊號輸入+ 極限, - 極限
- 可以選擇 邏輯準位 及 碰觸極限後可 減速停或急停

1.2.9 其它輸入訊號 Other Input Signals

- 各軸 IN3 可以用來做其他用途，如同期控制中之輸入事件

1.2.10 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

1.2.11 一般輸出訊號 General Output Signal

- 各軸 nOUT1 作為控制 Servo On/Off 信號

1.2.12 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

1.2.13 軟體極限

- 各軸可支援 2 個軟體極限 + 極限, - 極限 (-2,147,483,646 ~ +2,147,483,646)

1.2.14 手動外部輸入信號驅動

- 固定Pulse數驅動(Fixed Pulse Driving Mode)
- 連續Pulse驅動(Continuous Pulse Driving Mode)
- 手輪Pulse驅動(Manual pulsar mode)

1.2.15 模組狀態顯示 LED

- 紅燈 → 電源指示燈
- 橘燈 → Servo Alarm 指示燈 (驅動器輸出ON橘燈亮)
例:三菱驅動器故障(ALM)，無異警時輸出ON，橘燈亮
- 綠燈 → Motion 動作指示燈

1.2.16 FRnet 分散式 DI/O (i8094F 專用功能)

- DI → 128 點
- DO → 128 點
- 可搭配 FRnet I/O 模組動態增減點數

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

- I-8000、W-8000 嵌入式控制器系列主機(請洽相關業務單位)
- i8094 4軸運動控制器模組
- DN-8468GB 一般通用馬達配接端子板
- DN-8468DB 台達馬達專用端子板
- DN-8468MB 三菱J2馬達專用端子板
- DN-8468PB Panasonic A4馬達專用端子板
- DN-8468YB Yaskawa馬達專用端子板
- CA-SCSI15 68-pin SCSI-II 接頭線，長度:1.5 m

2 硬體接線

2.1 i8094 檢查包裝,及安裝

2.1.1 檢查包裝

i8094 是一個支援 4 軸 步進/伺服 馬達運動控制模組，配合泓格公司 I-8000、WinCon-8000、嵌入式控制器系列主機使用，基本上須配和如下主機產品

- I-8000、W-8000 嵌入式PAC控制器系列主機(擇其一)

i8094 需用之產品

- i8094 4軸運動控制器模組
- DN-8468 i8094 配線端子板
- CA-SCSI15 68-pin SCSI-II 接頭線，長度:1.5 m

2.1.2 i8094 安裝

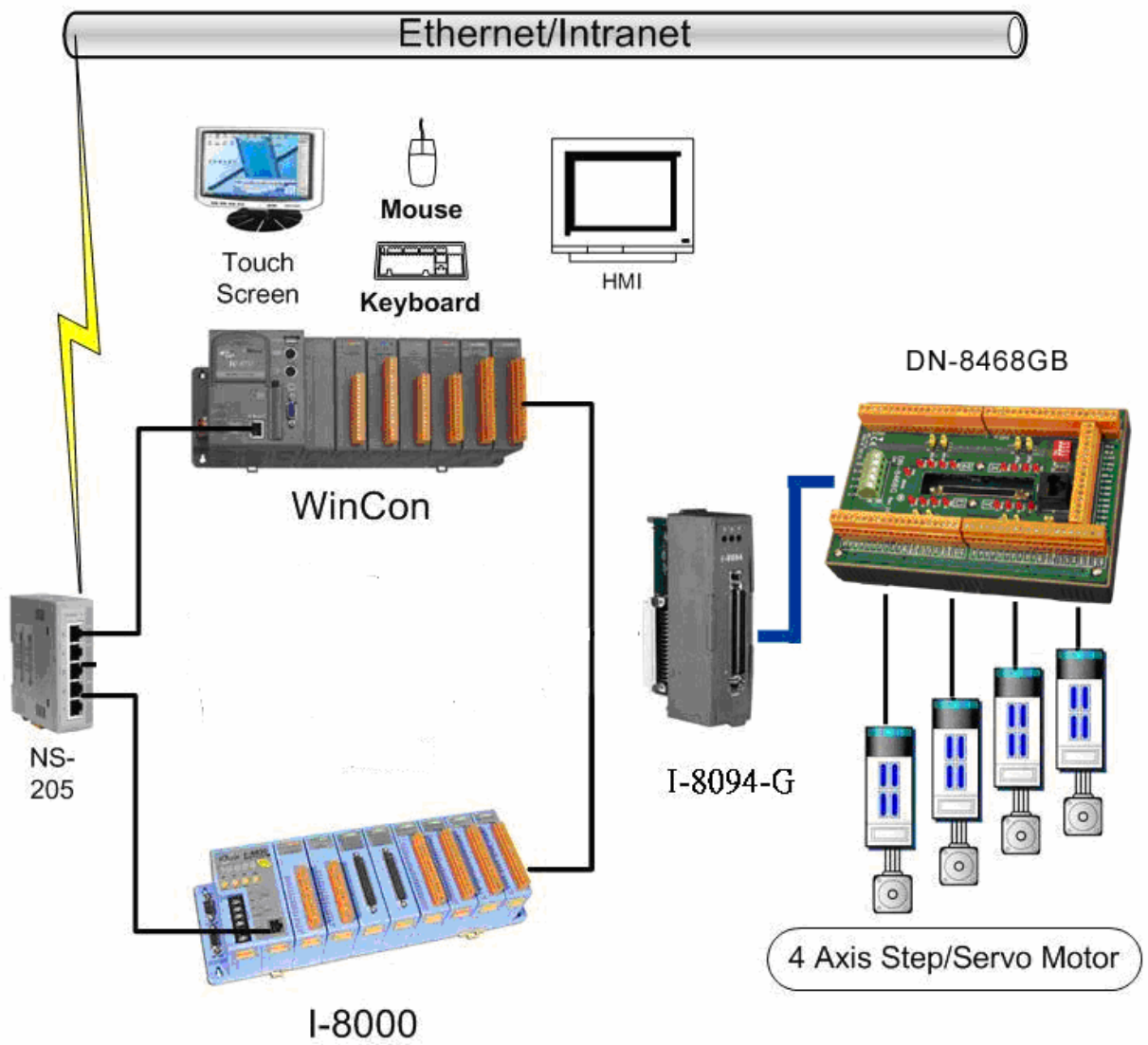
準備控制器

I-8000、W-8000、嵌入式控制器系列主機(擇其一),並選用有空 IO 插槽之型號,請先將電源關閉。

插入模組,及連接線

選一嵌入式控制器空IO插槽，將i8094小心依導槽插入I-8000、W-8000 嵌入式控制器，並用CA-SCSI15聯接到 DN-8468配線端子板，如下圖：





i8094 與控制器規劃圖 (WinCon-8000、I-8000)

2.2 DN-8468 端子板

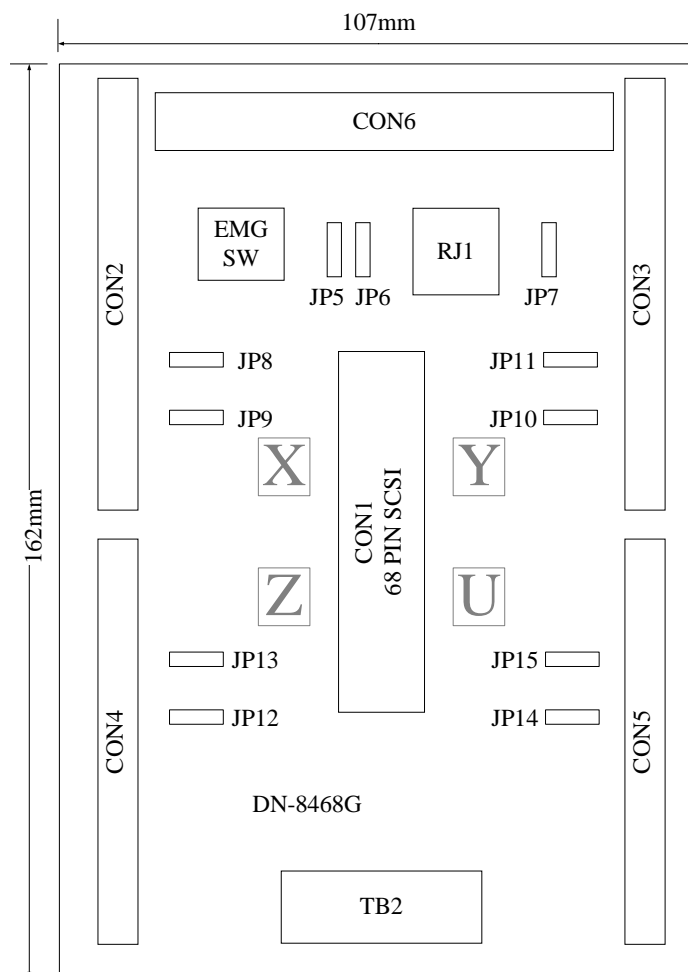


Fig. 2.0 DN-8468 位置圖

2.2.1 腳位定義

■ CON1 : PISO-PS400 卡與 DN-8468 連接接頭

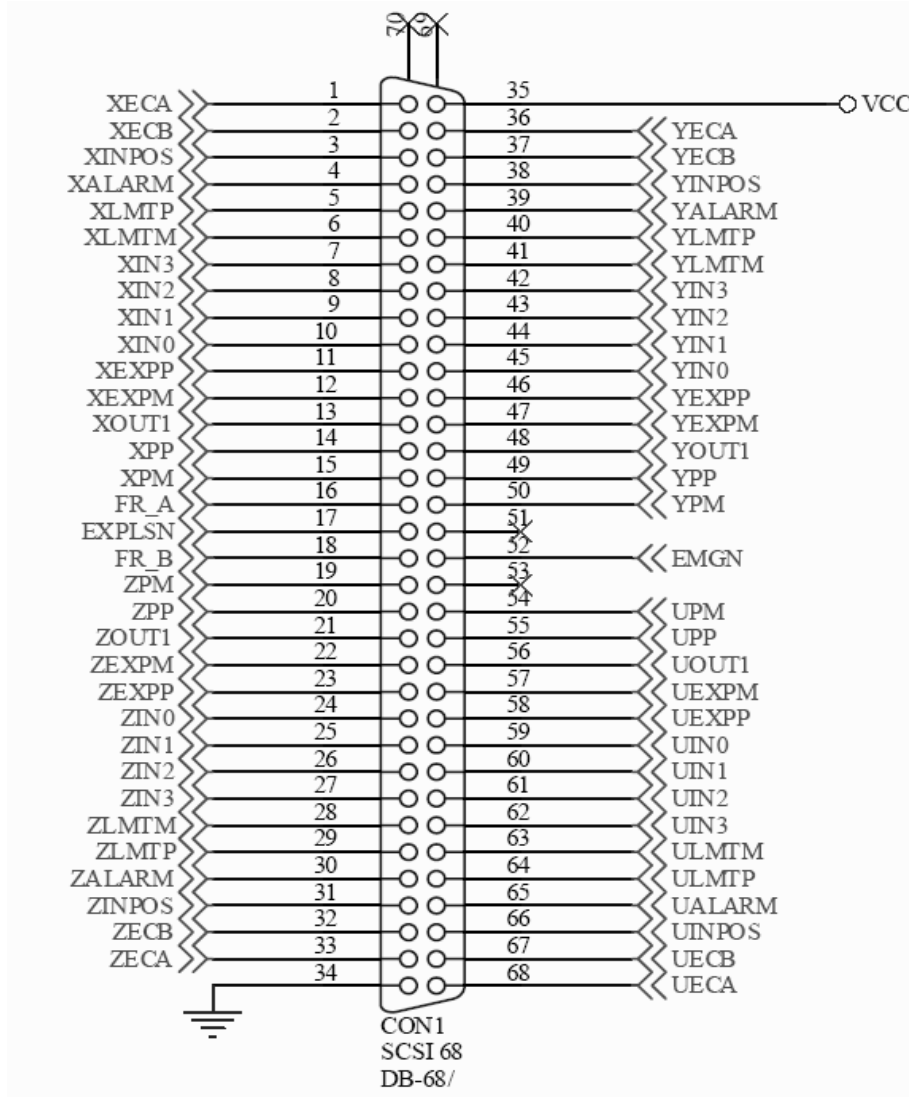


Fig. 2.1 DN-8468 CON1 連接線腳位圖

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
XLMTM	5	Limit switch input signal (+) for X axis
YLMTM	40	Limit switch input signal (+) for Y axis
ZLMTM	29	Limit switch input signal (+) for Z axis
ULMTM	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】

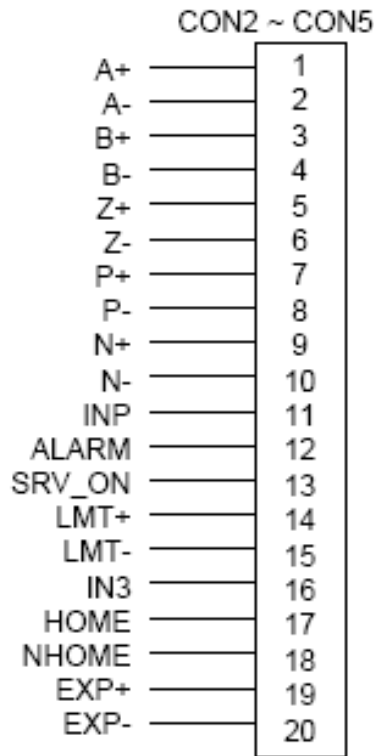


Fig. 2.2 Pin definition for CON2 ~ CON5

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。

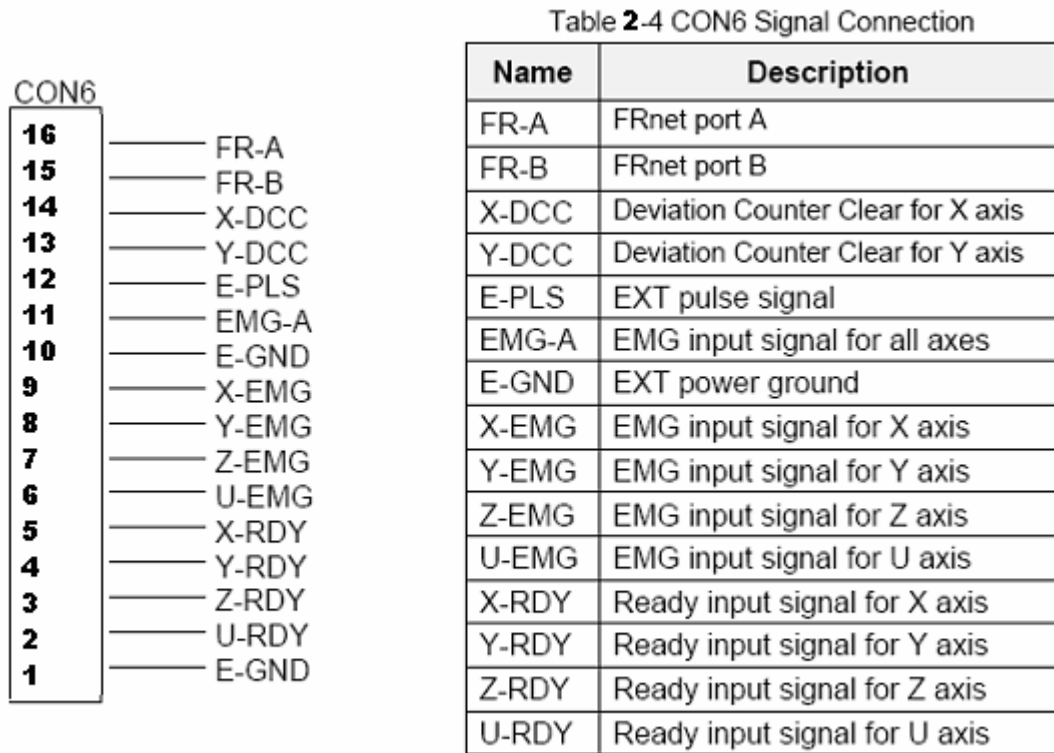


Fig. 2-3 Pin definition for CON6

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**

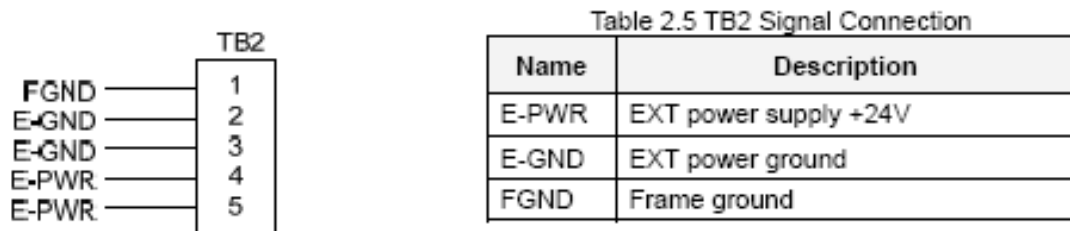


Fig. 2.4 Pin definition for TB2

► **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

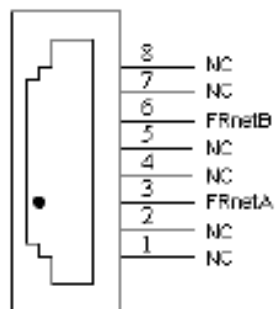


Fig. 2.5 Pin definition for RJ1

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

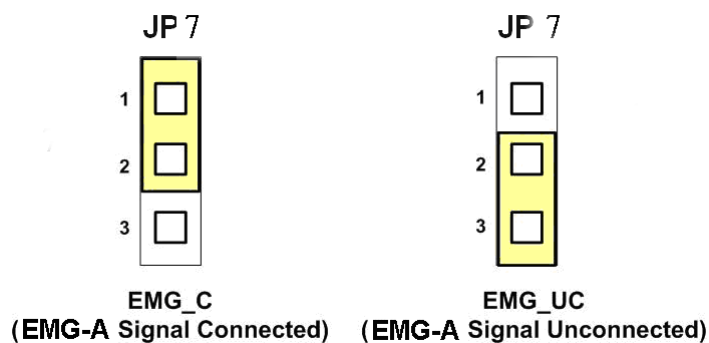


Fig. 2.5 Jumper 7 設定

■ 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)。

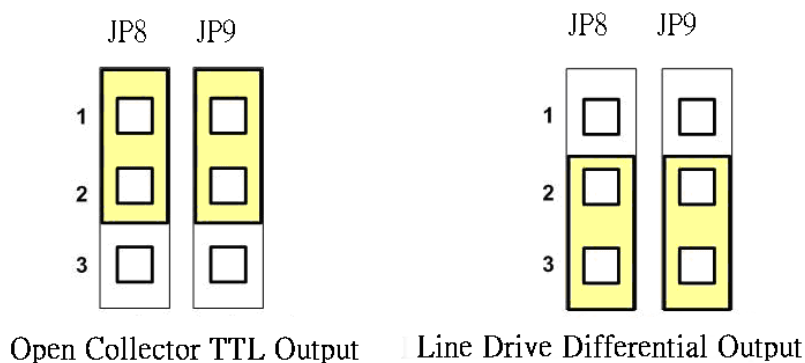


Fig. 2.6 Jumper 8, 9 設定

■ 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：

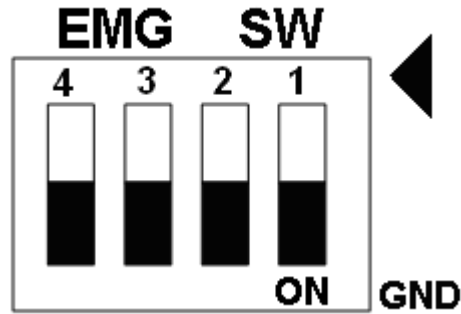


Fig. 2.7 EMG SW 設定為直接內部接 GND (預設值)

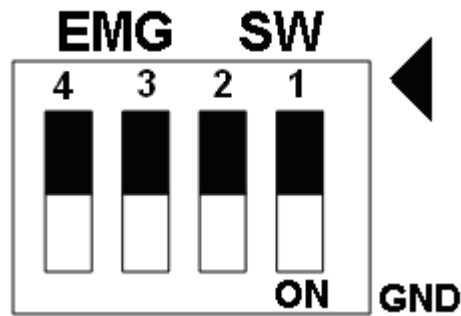


Fig. 2.8 EMG SW 設定為使用者自行配接點.

2.3 I/O 輸出入介面

2.3.1 脈波輸出介面

差動脈波輸出接線

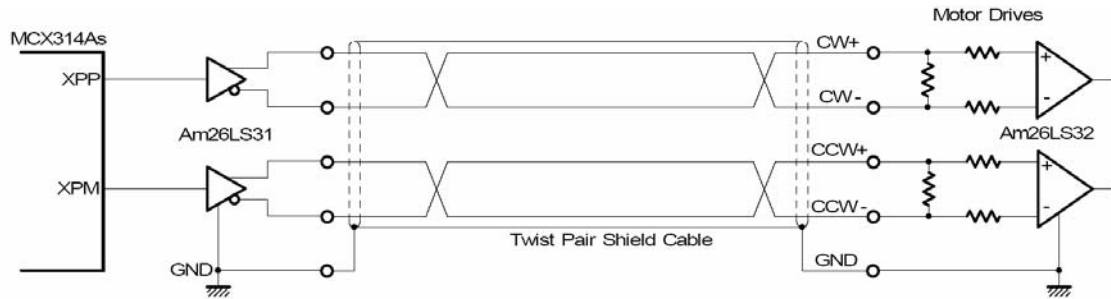


Fig. 2.8 差動脈波輸出接線

開集極輸出

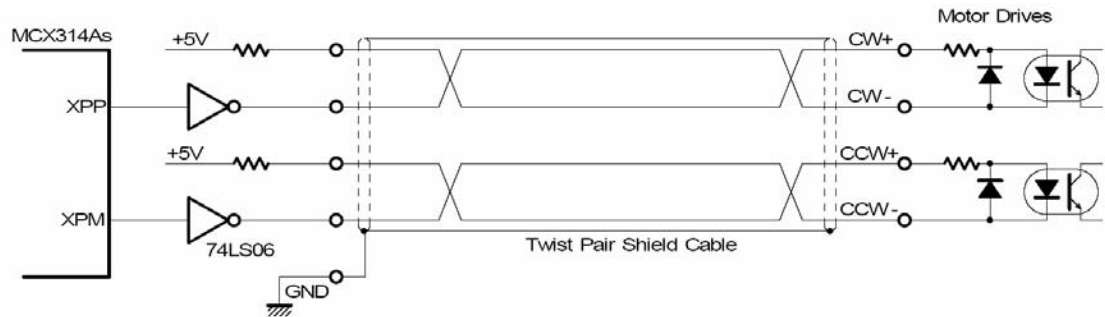


Fig. 2.9 開集極輸出

脈波信號接線範例

I8094 脈波輸出命令，可以使用 CW/CCW 模式或用 PULSE/DIR 模式。利用 JP2 和 JP3 去選擇差動或開集極的接法。

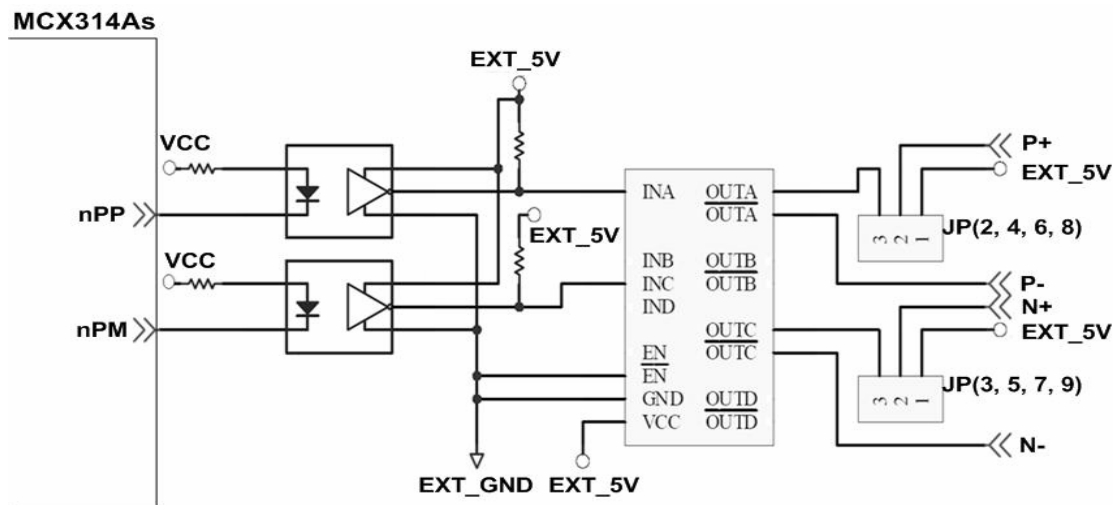


Fig. 2.10 脈波信號接線範例

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等級。下面圖例，極限開關信號的接續迴路是為了要隔離雜訊源。

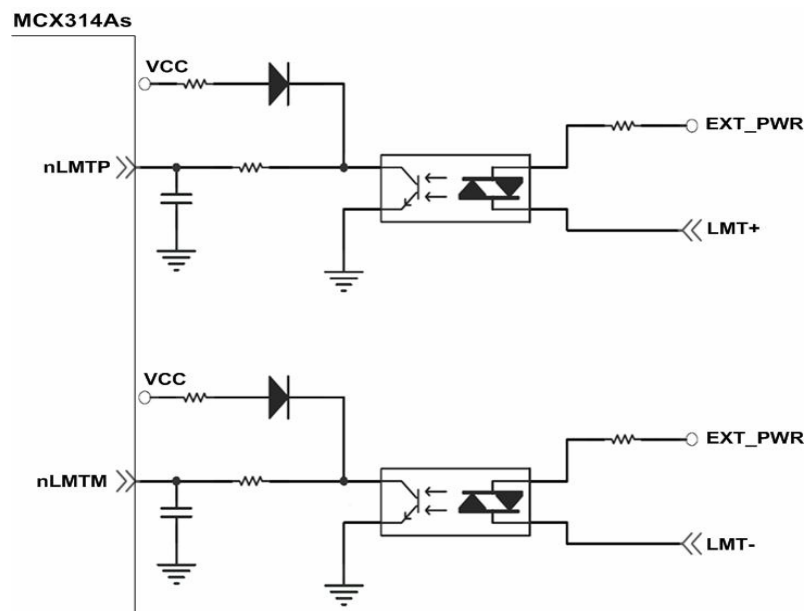


Fig. 2.11 極限開關接線範例

2.3.3 一般 DI 輸入接線(nINPOS,nALARM)

nINPOS 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。

nALARM 輸入信號，是伺服驅動器警報輸出信號，當 I8094 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。

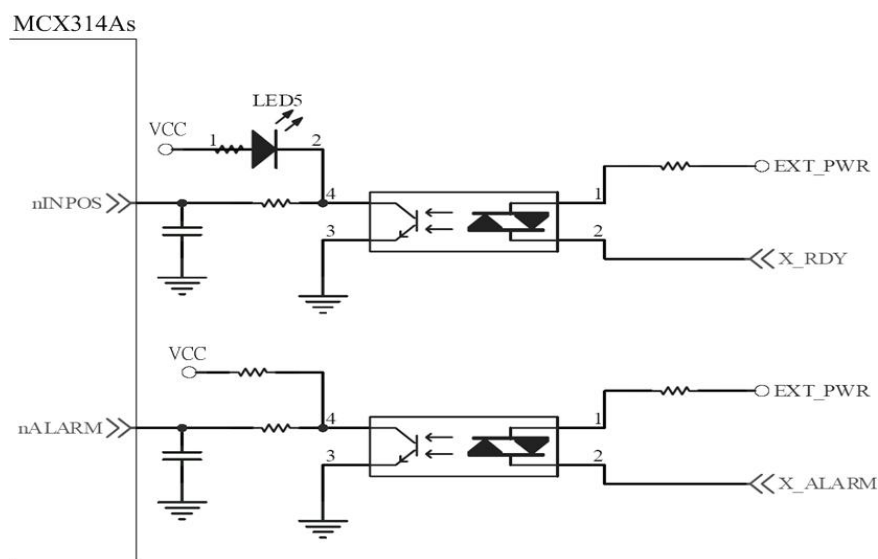


Fig. 2.12 一般 DI 輸入接線範例

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-，經過高速光耦合 IC 就直接連到運動控制晶片。

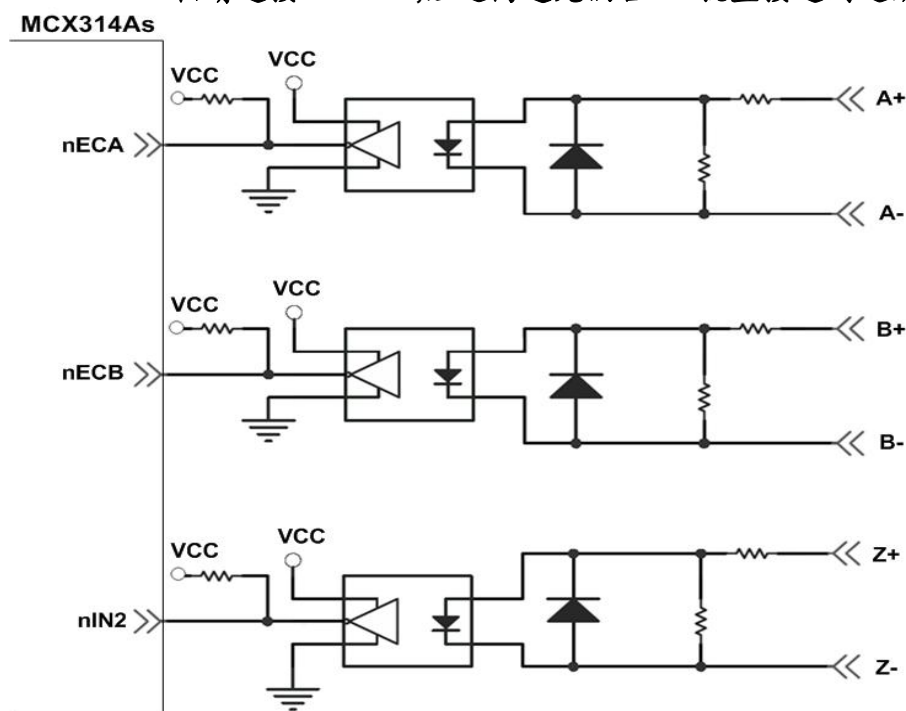


Fig. 2.13 Encoder 接線範例

2.3.5 外部輸入脈波接線(external pulse signal)

下圖是一個外部輸入脈波接線範例，經過高速光耦合 IC 就直接連到運動控制晶片。

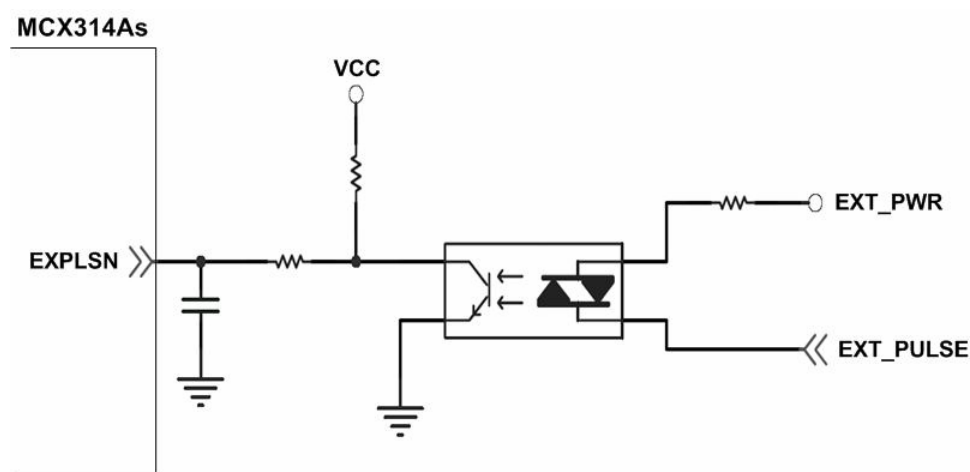


Fig. 2.14 外部輸入脈波接線範例

2.3.6 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，這信號經過高速光耦合 IC 就直接連到運動控制晶片。

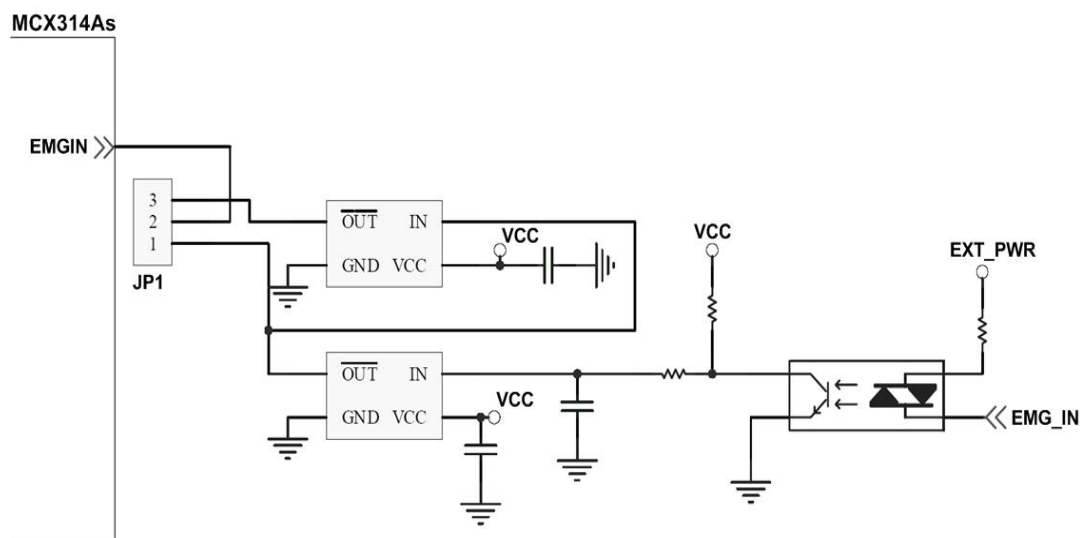


Fig. 2.15 緊急停止輸入接線範例

2.3.7 外部信號輸入接線(EXP+,EXP-)

本信號用於外部輸入驅動，下圖是外部信號 +/- 輸入接線範例，這輸入功能可用 5.1 章節中的固定脈波驅動、連續脈波驅動、手輪脈波驅動三個功能可以應用。

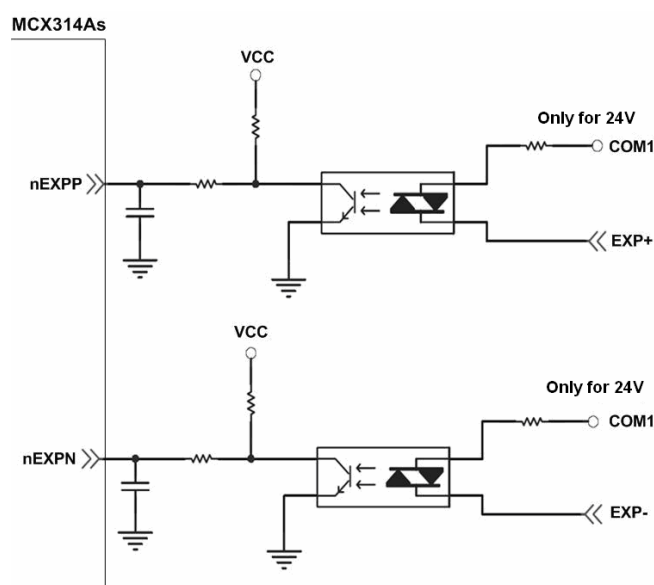


Fig. 2.16 外部信號 +/- 輸入接線範例

2.3.8 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。

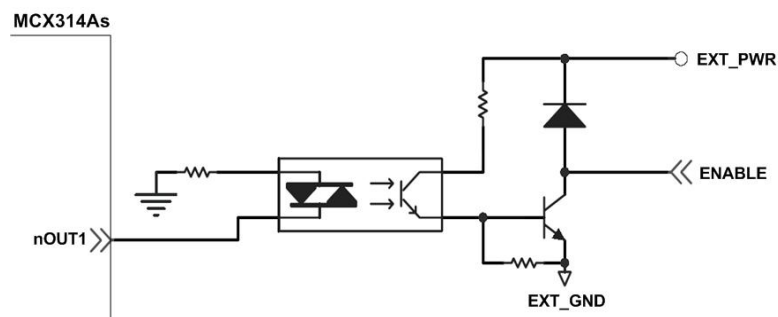


Fig. 2.17 Servo On/Off 信號輸出接線

2.4 接線範例

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

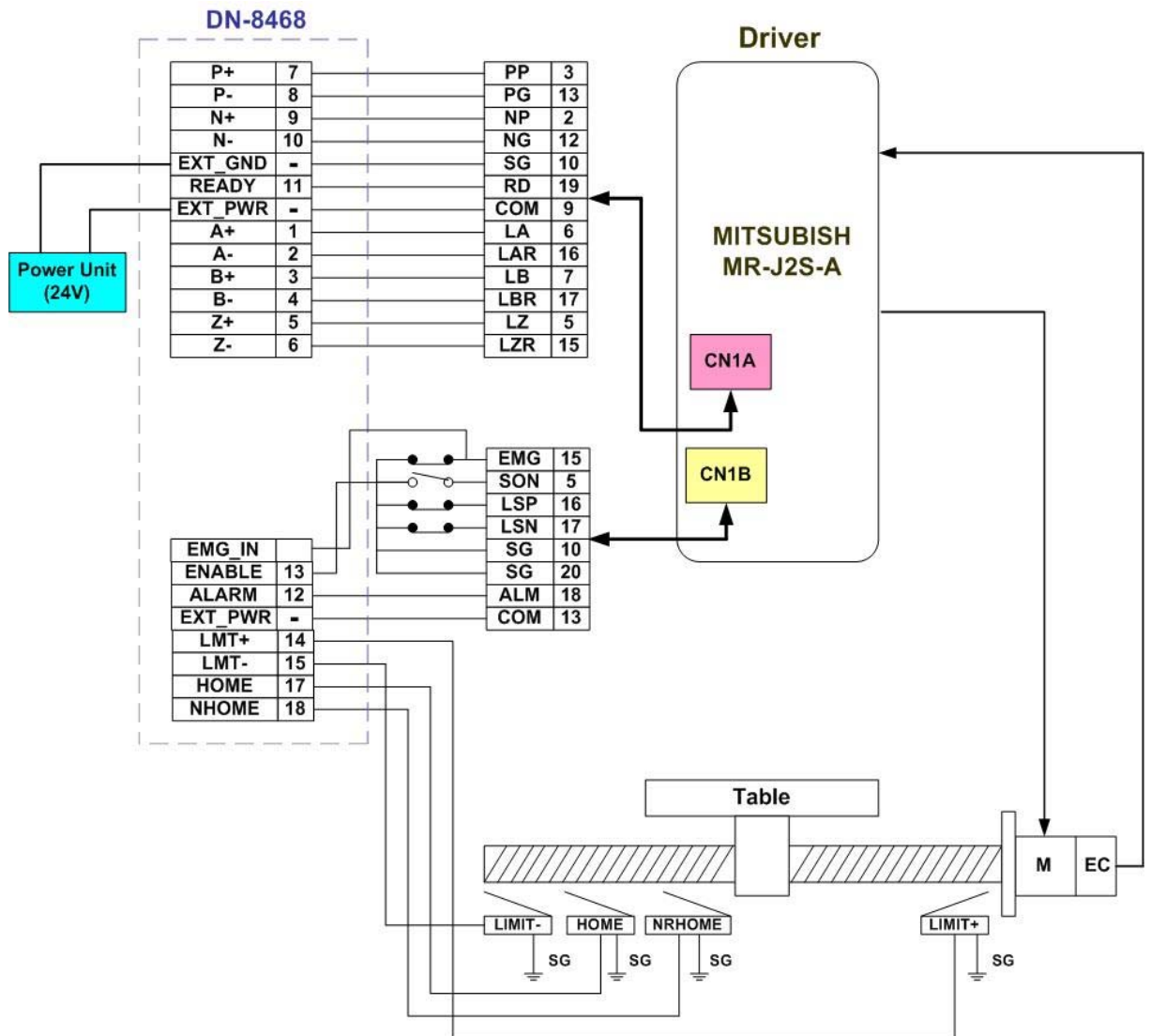
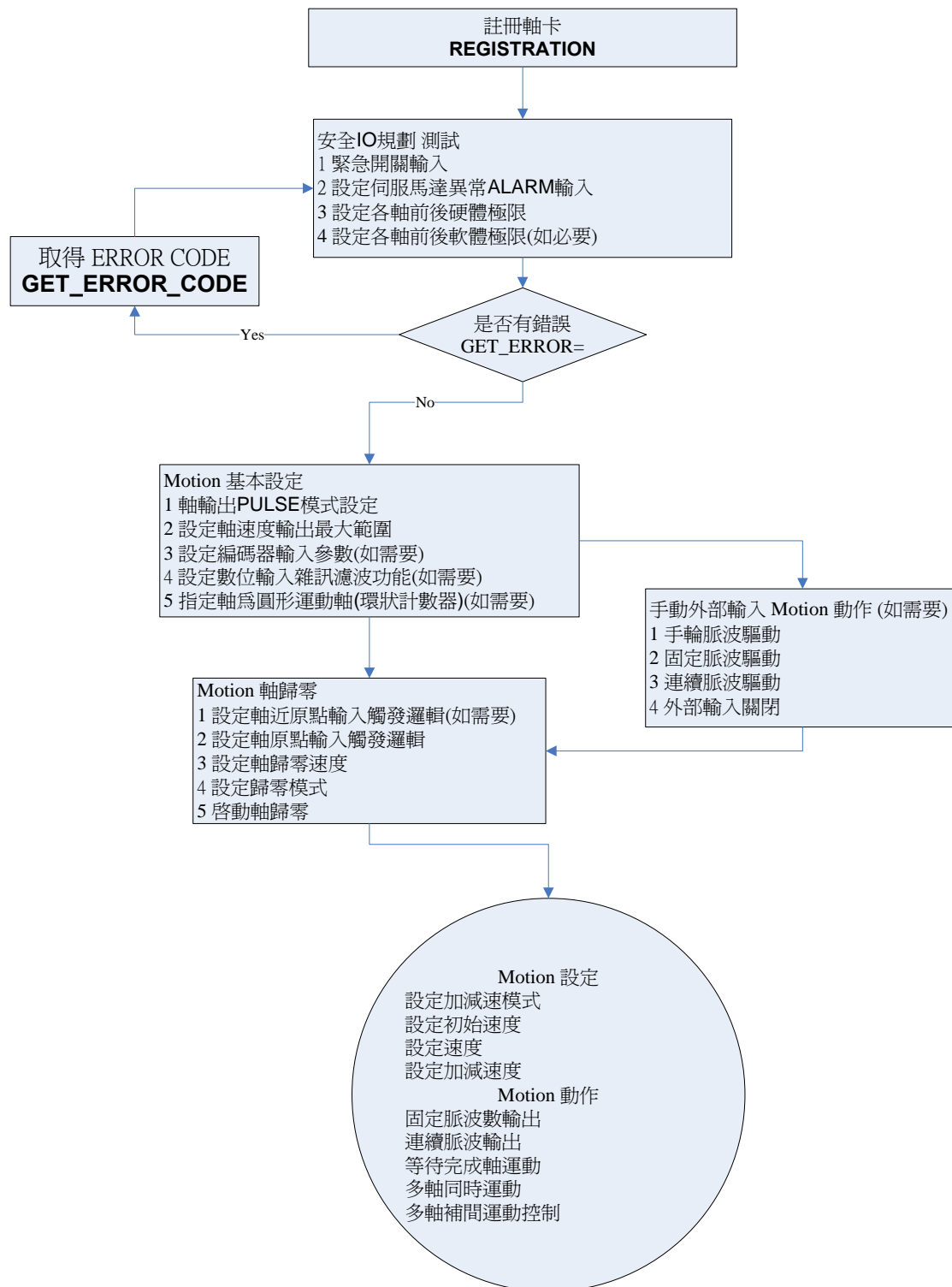


Fig. 2.18 MR-J2S AC 伺服馬達，連接到 DN-8468 的接線腳位圖

3 i8094 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 註冊軸卡

每一軸卡要使用之前一定要先註冊，才能下其他指令，否則會產生錯誤。

i8094MF_REGISTRATION()詳情請參考“i8094 運動控制模組使用手冊” 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 1.2.3 的JP1接為2-3pin。

如果您要使用緊急開關，在 1.2.3 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“i8094運動控制模組使用手冊” pdf 2.13

i8094MF_SET_ALARM()

3.2.3 設定各軸前後硬體極限

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i8094會自動停止，您可以選擇使用適當觸發邏輯。詳情請參考“i8094運動控制模組使用手冊” pdf 2.6

i8094MF_SET_HLMT () 功能

3.2.4 設定各軸前後軟體極限

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i8094會自動停止，您可以選擇使用與否，與設定位置。詳情請參考“i8094運動控制模組使用手冊” pdf 2.10

i8094MF_SET_SLMT ()，與i8094MF_CLEAR_SLMT() 功能

3.3 檢查是否有錯誤(GET_ERROR)

檢查是否有錯誤，如有再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 “I8094運動控制模組使用手冊 ”pdf 3.6 也可以利用“I8094運動控制模組使用手冊 ”pdf 3.5 讀取目前DI狀態 i8094MF_GET_DI() 確認DI輸入是否正確

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...

i8094MF_SET_PULSE_MODE() (詳情請參考 I8094運動控制模組使用手冊 2.4)

2 設定軸速度輸出最大範圍，設定每一軸最高速度

i8094MF_SET_MAX_V ()(詳情請參考 I8094運動控制模組使用手冊 2.5)

3 設定編碼器輸入參數(如需要)

i8094MF_SET_ENCODER()(詳情請參考 I8094運動控制模組使用手冊 2.11)

4 設定數位輸入雜訊濾波功能(如需要)

i8094MF_SET_FILTER()(詳情請參考 I8094運動控制模組使用手冊 2.15)

5 指定軸為圓形運動軸(環狀計數器)(如需要)

i8094MF_VRING_ENABLE()(詳情請參考 I8094運動控制模組使用手冊 2.16)

3.5 Motion 動作測試(手動外部輸入)(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。

`i8094MF_EXD_MP()`(詳情請參考 I8094運動控制模組使用手冊 2.18.1)



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。

`i8094MF_EXD_FP()`(詳情請參考 I8094運動控制模組使用手冊 2.18.2)

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。

`i8094MF_EXD_CP ()`(詳情請參考 I8094運動控制模組使用手冊 2.18.3)

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。

`i8094MF_EXD_DISABLE()` (詳情請參考 I8094運動控制模組使用手冊 2.18.4)

3.6 軸歸零

I8094 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
- 以歸零速度尋找原點開關
- 以歸零速度尋找伺服馬達 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。

3.6.1 歸零設定

- 1 設定軸近原點輸入觸發邏輯(如需要)

i8094MF_SET_NHOME() (詳情請參考 I8094運動控制模組使用手冊 2.8)

- 2 設定軸原點輸入觸發邏輯

i8094MF_SET_HOME_EDGE() (詳情請參考 I8094運動控制模組使用手冊 2.9)

- 3 設定軸歸零速度

設定歸零速度值 i8094MF_SET_HV() (詳情請參考 I8094運動控制模組使用手冊

- 5.1)

設定開始啟動速度 i8094MF_SET_SV() (詳情請參考 I8094運動控制模組使用手冊 6.1.2)

- 4 設定歸零模式

i8094MF_SET_HOME_MODE()(詳情請參考 I8094運動控制模組使用手冊 5.3)

3.6.2 執行歸零設定

- 1 啟動軸歸零

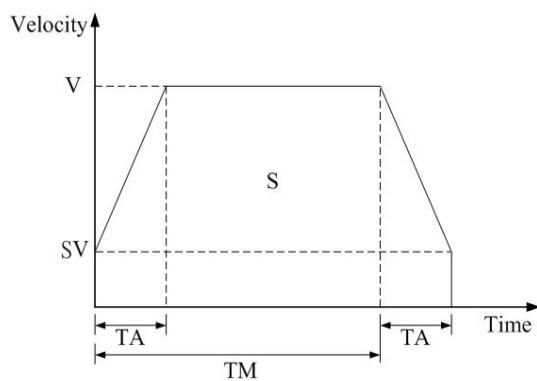
i8094MF_HOME_START()(詳情請參考 I8094 運動控制模組使用手冊 5.4)

- 2 等待完成歸零動作

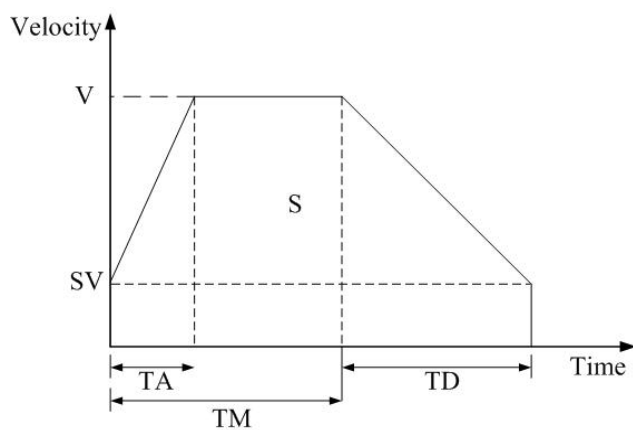
i8094_HOME_WAIT()(詳情請參考 I8094 運動控制模組使用手冊 5.5)

3.7 Motion 基本運作

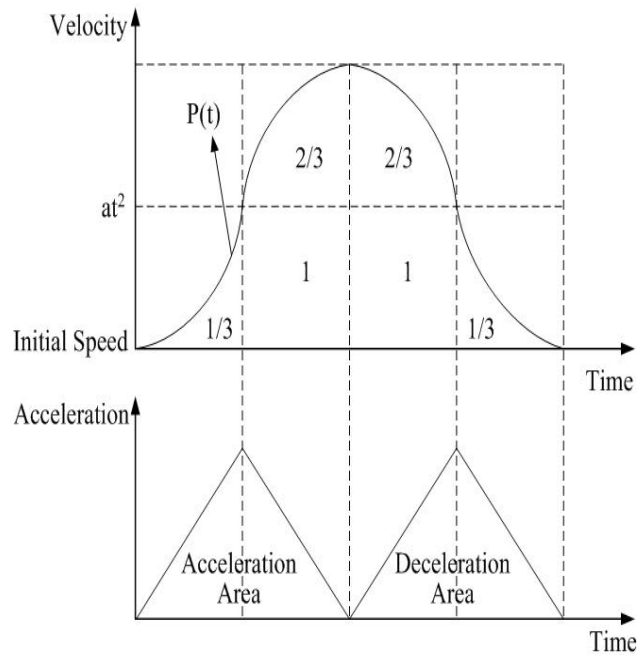
3.7.1 一般運動控制速度曲線分類



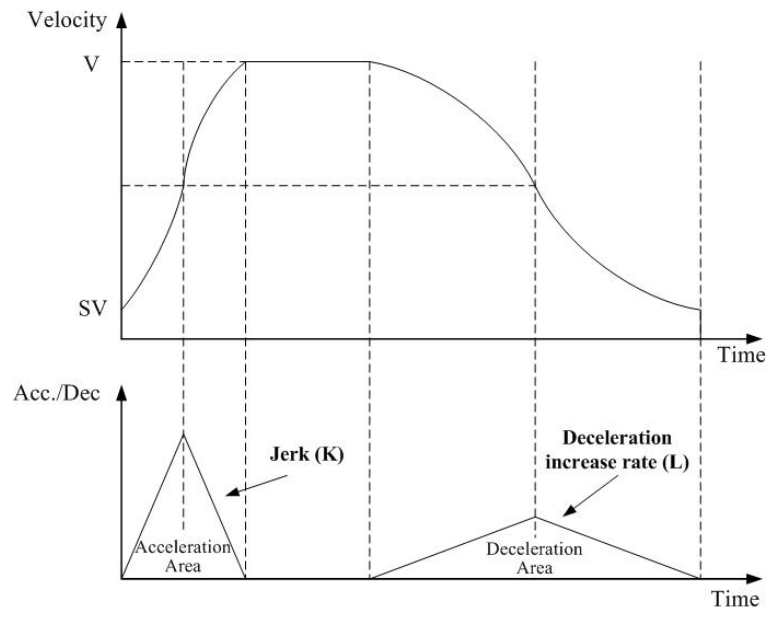
1 對稱 T 型運動控制速度曲線(如 SV 大於等於 V, 將執行定速驅動)



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 基本設定

1 設定加減速模式: 有四種速度模式設定。

0 → 對稱 T 曲線 (SV、V、A、AO)

1 → 對稱 S 曲線 (SV、V、K、AO)

2 → 非對稱 T 曲線 (SV、V、A、D、AO)

3 → 非對稱 S 曲線 (SV、V、K、L、AO)

i8094MF_NORMAL_SPEED()(詳情請參考 I8094運動控制模組使用手冊 6.1.1)

2 設定初始速度: 設定最低速度

i8094MF_SET_SV ()(詳情請參考 I8094運動控制模組使用手冊 6.1.2)

3 設定速度: 指定運動速度

i8094MF_SET_V ()(詳情請參考 I8094運動控制模組使用手冊 6.1.3)

4 設定加減速度: 指定運動時之加減速

i8094MF_SET_A ()(詳情請參考 I8094運動控制模組使用手冊 6.1.4)

i8094MF_SET_D ()(詳情請參考 I8094運動控制模組使用手冊 6.1.5)

3.7.3 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。

i8094MF_FIXED_MOVE()(詳情請參考 I8094運動控制模組使用手冊 6.1.9)

2 連續脈波輸出: 執行單軸連續脈波輸出。

i8094MF_CONTINUE_MOVE ()(詳情請參考 I8094運動控制模組使用手冊 6.1.10)

3 等待完成軸運動: 等待軸完成停止。

i8094MF_STOP_WAIT()(詳情請參考 I8094 運動控制模組使用手冊 6.5.3)

3.7.4 多軸補間(向量)Motion 基本設定

1 設定補間軸: 設定補間軸對象(哪幾軸要補間)。

i8094MF_AXIS_ASSIGN()(詳情請參考 I8094 運動控制模組使用手冊 6.2.1)

2 設定向量加減速模式: 設定向量加減速模式，共有如下12種模式

0 → 二軸(直線&弧&圓)固定向量速度 (VV)

1 → 二軸直線對稱 T 曲線 (VSV、VV、VA、VAO)

2 → 二軸直線對稱 S 曲線 (VSV、VV、VK、VAO)

3 → 二軸直線非對稱 T 曲線 (VSV、VV、VA、VD、VAO)

4 → 二軸直線非對稱 S 曲線 (VSV、VV、VK、VL、VAO)

5 → 二軸(弧&圓)對稱 T 曲線 (VSV、VV、VA、VAO)

6 → 二軸(弧&圓)非對稱 T 曲線 (VSV、VV、VA、VD、VAO)

7 → 三軸直線固定向量速度 (VV)

8 → 三軸直線對稱 T 曲線 (VSV、VV、VA、VAO)

9 → 三軸直線對稱 S 曲線 (VSV、VV、VK、VAO)

10 → 三軸直線非對稱 T 曲線 (VSV、VV、VA、VD、VAO)

11 → 三軸直線非對稱 S 曲線 (VSV、VV、VK、VL、VAO)

i8094MF_VECTOR_SPEED()(詳情請參考 I8094運動控制模組使用手冊 6.2.2)

2 設定向量初始速度: 設定軸之向量初始速度。

i8094MF_SET_VSV()(詳情請參考 I8094運動控制模組使用手冊 6.2.3)

3 設定向量速度: 設定軸之向量定速度。

i8094MF_SET_VV()(詳情請參考 I8094運動控制模組使用手冊 6.2.4)

4 設定向量加減速度: 設定軸之向量加減速度。

i8094MF_SET_VA()(詳情請參考 I8094運動控制模組使用手冊 6.2.5)

i8094MF_SET_VD()(詳情請參考 I8094運動控制模組使用手冊 6.2.6)

3.7.5 多軸補間 Motion 基本動作

1 二軸直線補間: 執行二軸直線補間。

i8094MF_LINE_2D()(詳情請參考 I8094 運動控制模組使用手冊 6.2.10)

2 三軸直線補間: 執行三軸直線補間。

i8094MF_LINE_3D()(詳情請參考 I8094運動控制模組使用手冊 6.2.11)

3 二軸圓弧補間: 執行二軸圓弧補間。

i8094MF_ARC_CW ()(詳情請參考 I8094運動控制模組使用手冊 6.2.12)

i8094MF_ARC_CCW ()(詳情請參考 I8094運動控制模組使用手冊 6.2.12)

4 二軸圓補間: 執行二軸圓補間。

i8094MF_CIRCLE_CW ()(詳情請參考 I8094運動控制模組使用手冊 6.2.13)

i8094MF_CIRCLE_CCW ()(詳情請參考 I8094運動控制模組使用手冊 6.2.13)

3.8 Motion 進階運動

1 二軸矩形連續補間: 執行二軸矩形補間。

i8094MF_RECTANGLE()(詳情請參考 I8094 運動控制模組使用手冊 6.4.1)

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)。

i8094MF_LINE_2D_INITIAL()(詳情請參考 I8094 運動控制模組使用手冊 6.4.2)

執行二軸直線連續補間。

i8094MF_LINE_2D_CONTINUE()(詳情請參考 I8094 運動控制模組使用手冊 6.4.2)

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)。

i8094MF_LINE_3D_INITIAL()(詳情請參考 I8094 運動控制模組使用手冊 6.4.3)

執行三軸直線連續補間。

i8094MF_LINE_3D_CONTINUE() (詳情請參考 I8094 運動控制模組使用手冊 6.4.3)

4 其他補間: 多點連續補間, 三軸螺旋運動, 二軸比例運動 (詳情請參考 I8094 運動控制模組使用手冊 6.4.4~6.4.7)

3.9 Motion 同步運動

i8094 還提供許多同步運動功能,如比較 EP,LATCH....

(詳情請參考 I8094 運動控制模組使用手冊 6.3)

4 軟體快速上手

4.1 WinCon eVC++

4.1.1 確認相關檔案

請確認您有以下相關檔案：

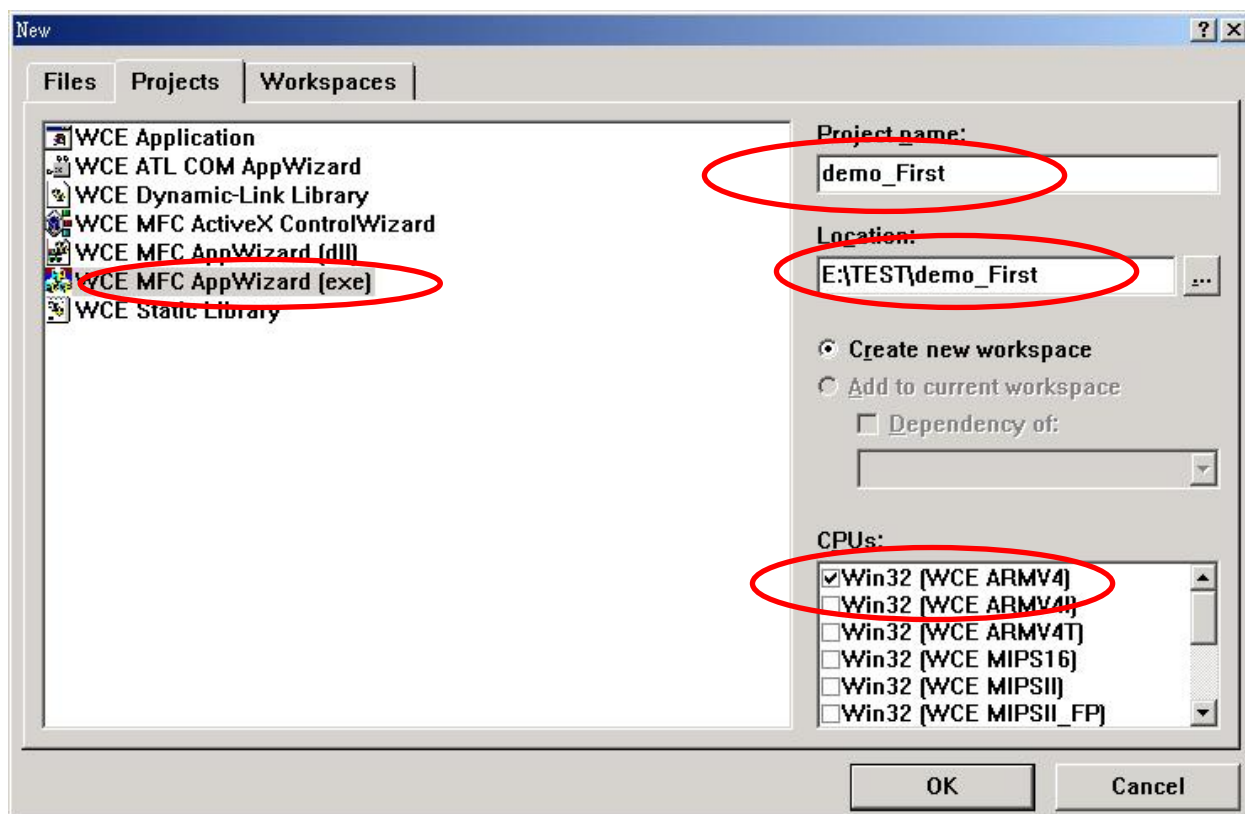
1. I8094.lib
2. I8094.dll
3. I8094.h

如您沒有,請找 CD 或到我們的網站下載最新版本資料

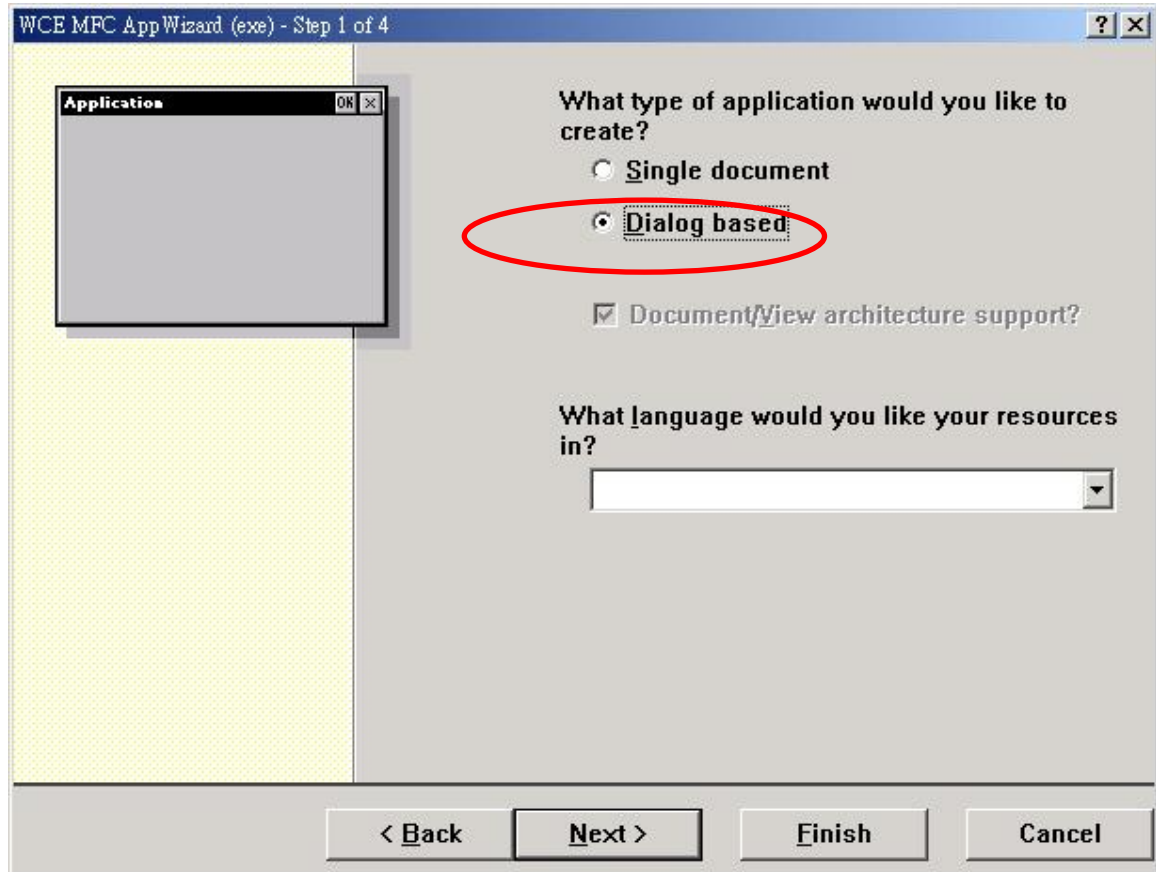
<http://www.icpdas.com/download/download-list.htm>

4.1.2 新增一 eVC++ 應用程式專案

請開啟 eVC++ 4.0 軟體。然後，請按滑鼠鍵“File” -> “New”來開啟新程式。在“Projects”標籤，選擇“WCE MFC AppWizard (exe)”並且設定專案名稱為“Demo_First”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[WCE ARMV4]”，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”



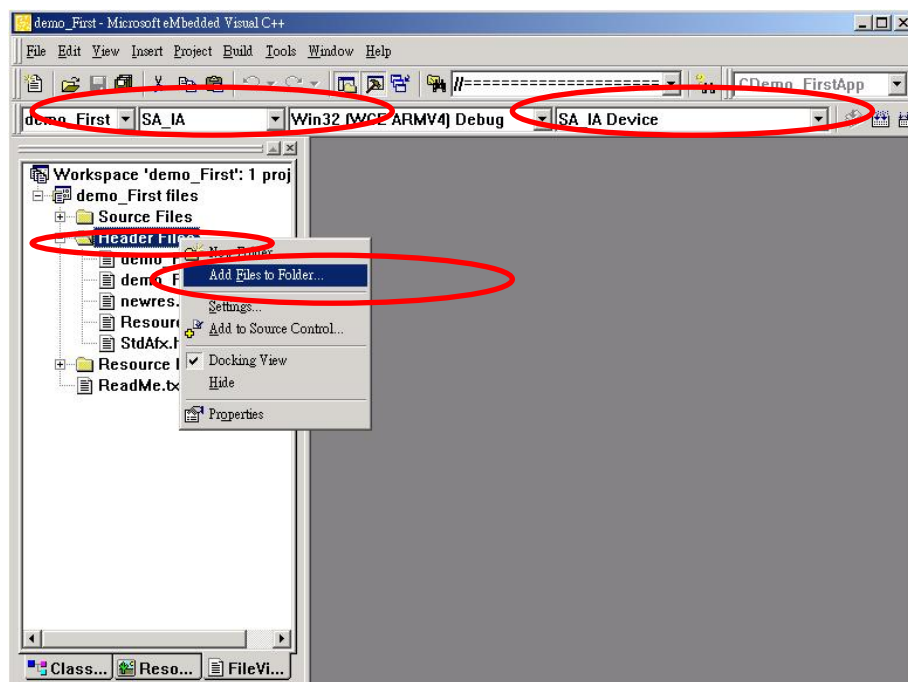
再按“Finish”

即完成開一新專案

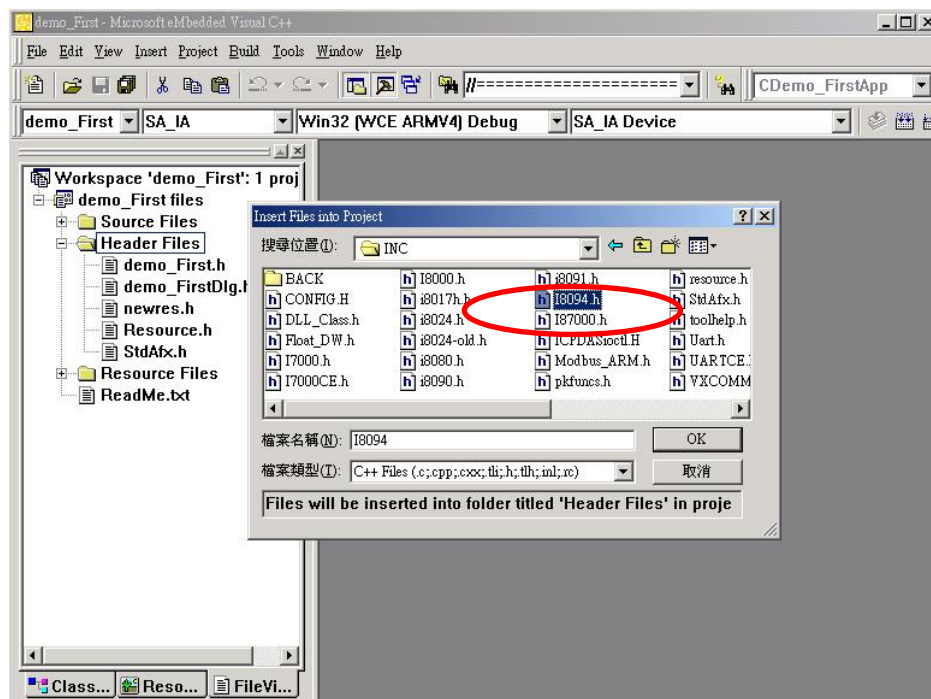
4.1.3 在 eVC++ 專案中加入 I8094.h

在專案的 Workspace 中加入 i8094.h 如下:

在 Header Files 按滑鼠右鍵，選 Add Files to Folder....

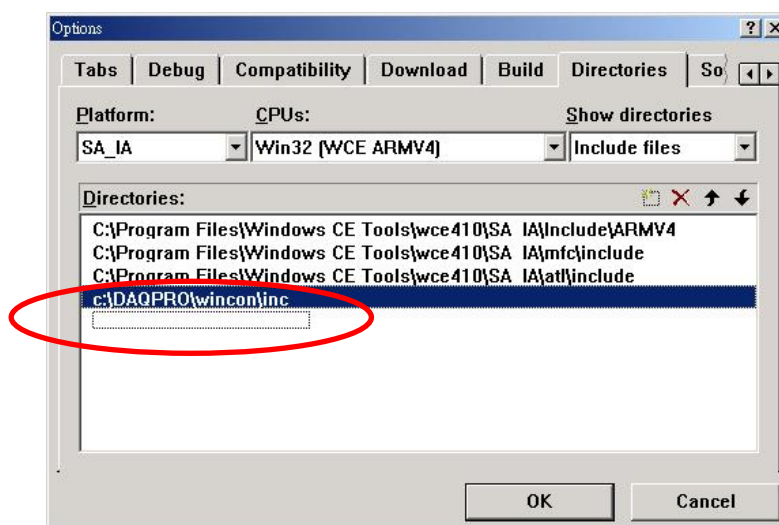


出現選檔對話框，找到並選擇 I8094.h 檔並按 OK

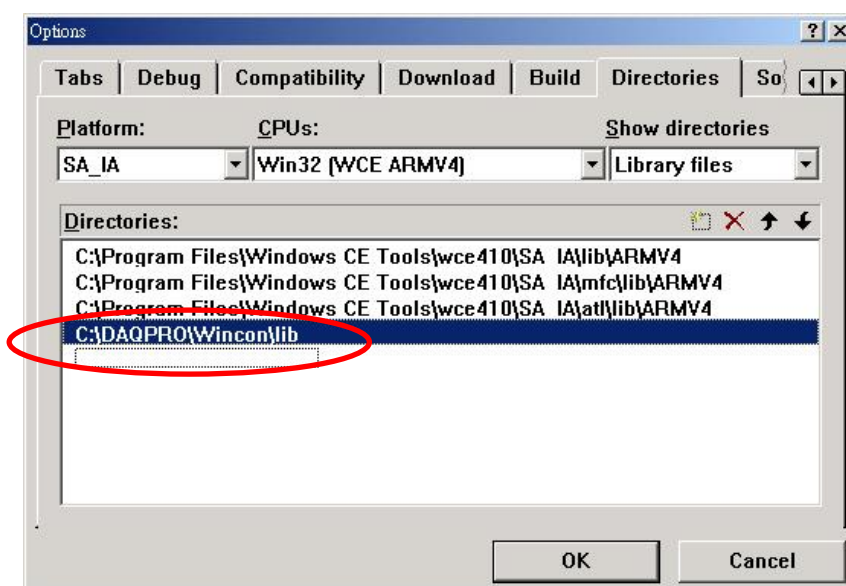


4.1.4 在 eVC++ 專案中加入參考路徑

- A. 在“Tools” 工能表中開啟“Options” 對話框。
- B. 選“D irectories“ 標籤，在 “Platform” 項目選擇 “SA_IA”， 在 “CPUs”項目選擇“Win32 [WCE ARMV4]”和在“include files”項目選擇“Show directories“。
- C. 增加含括檔的路徑，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驅動程式的檔案路徑。
- D. 再來，於“Show directories”項目中選擇“Library files”。

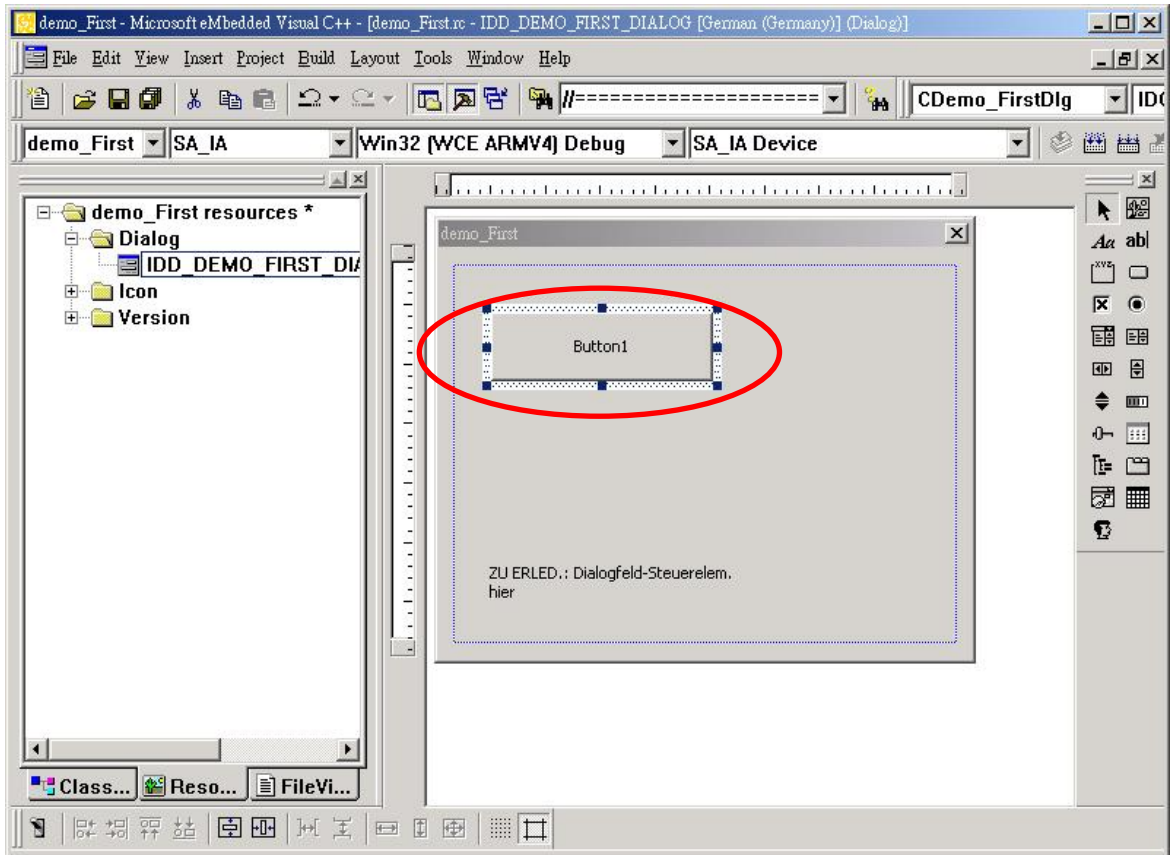


- E. 增加程式庫的檔案路徑，在 “Directories” 下方空行處 (指出附近空的長方形)雙擊-按滑鼠鍵，輸入包括含有用戶安裝程式庫的檔案路徑，如下圖。

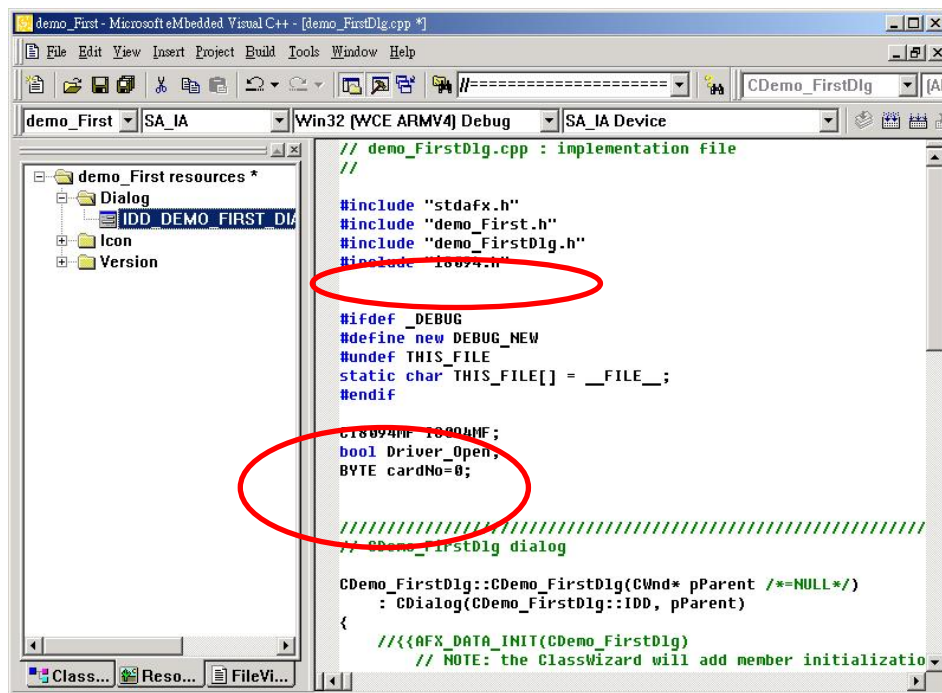


4.1.5 在 eVC++ 專案中開始應用

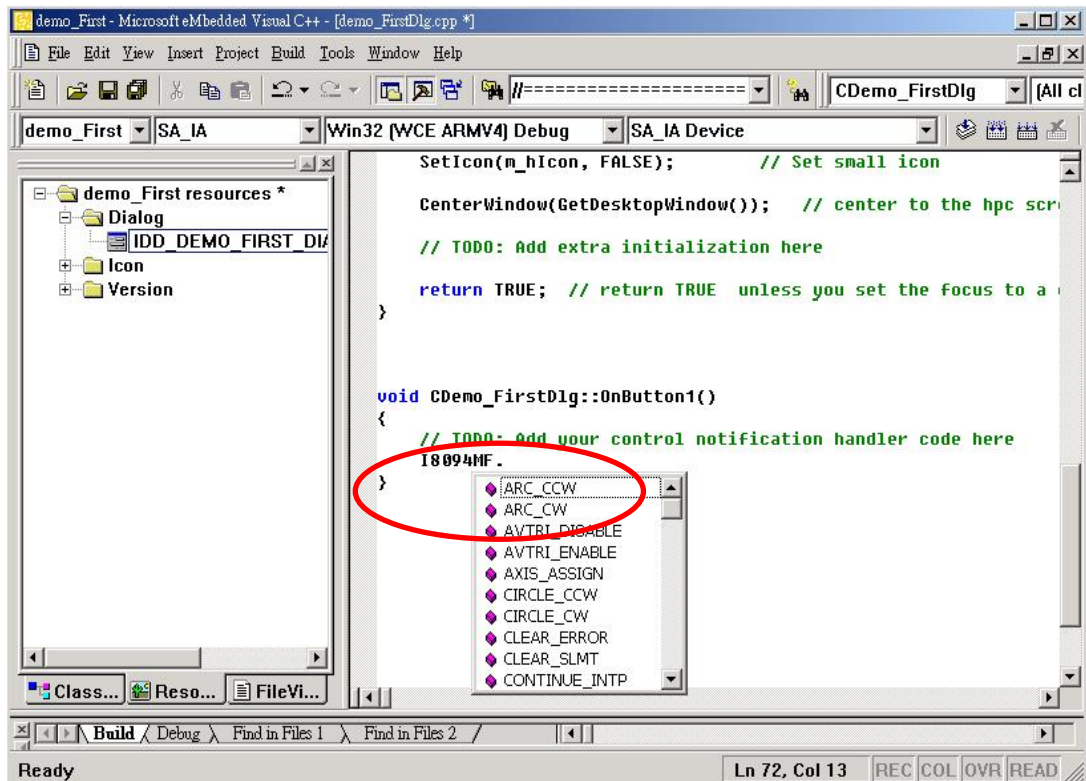
在 Dialog 中加入一 BUTTON 如下圖：



在 BUTTON 快按兩下，並產生一副程式，並在檔案起始位置加入”#include “i8094.h”
“WinConSDK.h”及宣告 CI8094MF I8094MF; bool Driver_Open;
BYTE cardNo=0;變數，如下圖：



由於我們有另建一類別(Class) **CI8094MF**(For 巨集指令)，方便導引程式設計，使用者也可以直接使用手冊指令。在 **BUTTON** 快按兩下，並產生一副程式中，鍵入”I8094MF.”及會出現引導視窗，協助您選用相關指令。



請選 “i8094MF.REGISTRATION”與輸入”(cardNo,3); “ 表示插在第 3 Slot 的 i8094 註冊為第 0 卡，輸入詳細程式如下:

```

//====='Step 1 Driver init
if (!Driver_Open)
{
    I8094MF.REGISTRATION(cardNo,3);
    Driver_Open = true;
}

//====='Step 2 CONFIG IO
I8094MF.RESET_CARD (cardNo);
I8094MF.SET_PULSE_MODE (cardNo, AXIS_XYZU, 2); //set the pulse output mode
I8094MF.SET_ALARM (cardNo, AXIS_XYZU, 0, 0); //disable the SERVO ALARM Input
I8094MF.SET_ENCODER (cardNo, AXIS_XYZU, 0, 0, 0); //set the encoder input type
I8094MF.SET_MAX_V (cardNo, AXIS_XYZU, 16000); //set the max speed for XYZU
I8094MF.EXD_DISABLE (cardNo, AXIS_XYZU); //set the external input Off
I8094MF.SET_LP (cardNo, AXIS_XYZU, 0); //set the Logic position =0
I8094MF.SET_EP (cardNo, AXIS_XYZU, 0); //set the Encogger position =0
I8094MF.SET_A (cardNo, AXIS_XYZU, 1000); //set the Acc =1000
    
```

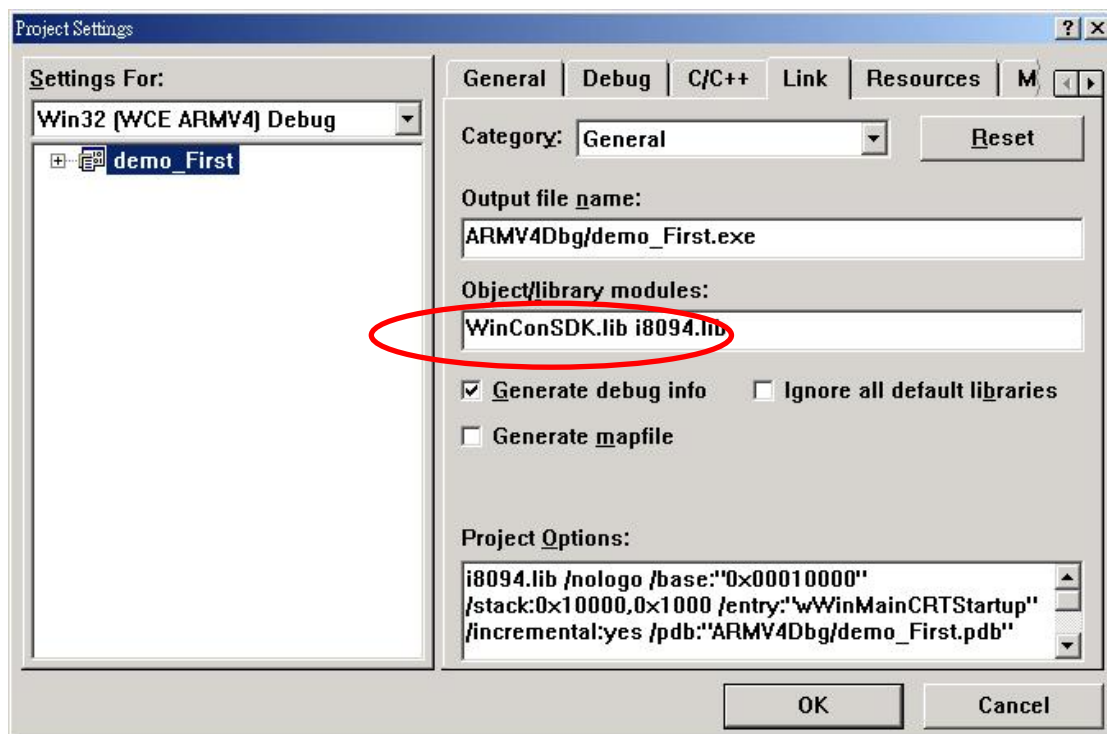
```

I8094MF.SERVO_ON (cardNo, AXIS_XYZU);           //set the Servo_ON to servo motors
//=====Step 3 Check ERROR
WORD KK=0;
KK= I8094MF.GET_ERROR(cardNo);
CString MSGG;
if (KK != YES)
{
    //No ERROR: Step 4 Move X axis
    BYTE axis=AXIS_X; //for AXIS_X it can be to AXIS_XYZU
    I8094MF.SET_MAX_V(cardNo, axis, 20000);
    I8094MF.NORMAL_SPEED(cardNo, axis, 0);      //set axis as Symmetrical T curve mode
    I8094MF.SET_V(cardNo, axis, 20000);        //set v=10000 PPS
    I8094MF.SET_A(cardNo, axis, 100000);       //set acc=100000 PPS/S
    I8094MF.SET_SV(cardNo, axis, 10);          //set start speed=1000 PPS
    I8094MF.SET_AO(cardNo, axis, 0);           //set offset pulse (at SV speed)= 0 PS
    I8094MF.FIXED_MOVE(cardNo, axis, 10000);   //run the fixed 10000 Pulse move.
    while (I8094MF.STOP_WAIT(cardNo, axis) == NO)
    {
        DoEvents();
        Sleep(1);
        //wait for axis to stop
    }
    long AA= I8094MF.GET_LP(cardNo,axis);       //Get X Now position
}
else
{
    //Please check the ERROR CODE
    //Get X ERROR CODE
    KK= I8094MF.GET_ERROR_CODE(cardNo, AXIS_X);
    //Get Y ERROR CODE
    KK= I8094MF.GET_ERROR_CODE(cardNo, AXIS_Y);
    //Get Z ERROR CODE
    KK= I8094MF.GET_ERROR_CODE(cardNo, AXIS_Z);
    //Get U ERROR CODE
    KK= I8094MF.GET_ERROR_CODE(cardNo, AXIS_U);
    //=====
}

```

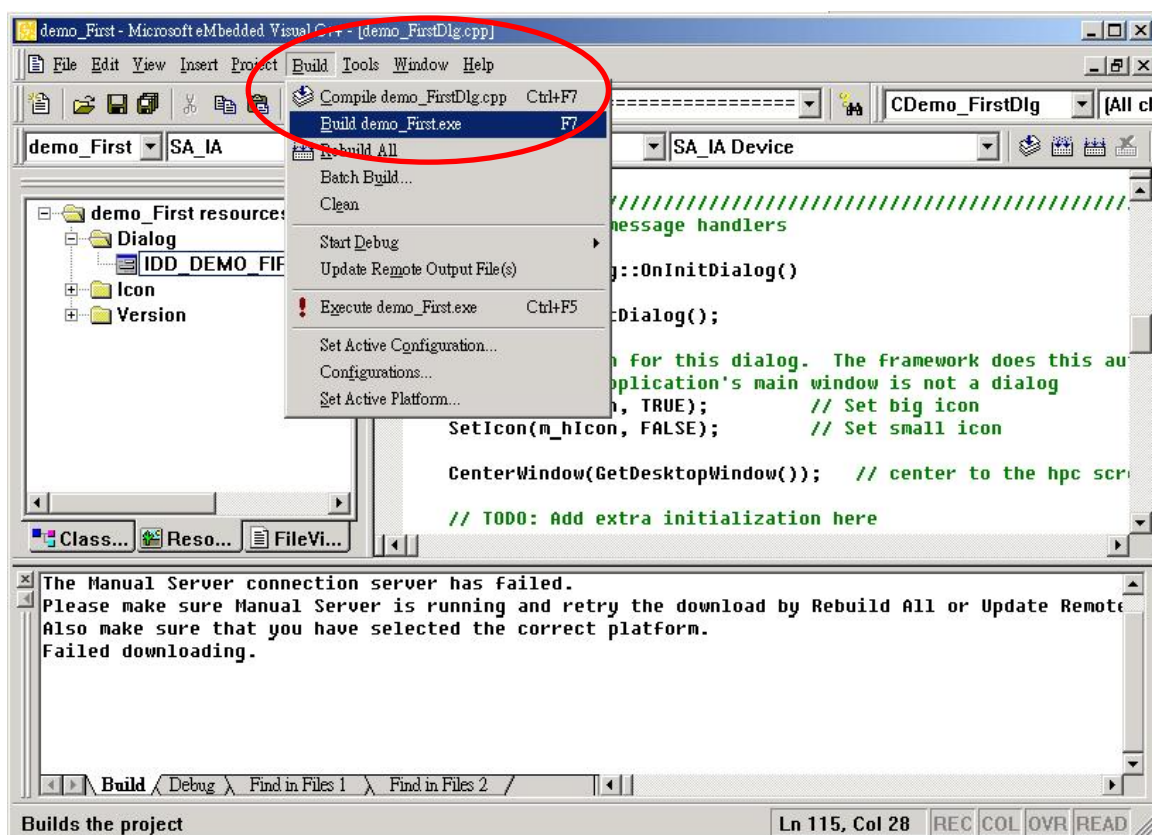
詳細請參考: demo_First 範例

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 WinConSDK.lib i8094.lib(如下圖)，並按 OK



4.1.6 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



4.1.7 下載與執行

請將執行檔“i8094Demo.exe”與動態連結檔“i8094.dll”複製到 WinCon 同一目錄中 (可用 eVC++ Online Download，或 FTP，或 USB 行動碟)，並用執行即可。

4.2 WinCon Microsoft Visual Studio .NET 2003(VB.NET , C#)

因 Microsoft Visual Studio .NET 2003 開發環境相似，因此我們以 VB.NET 作示範

4.2.1 確認相關檔案

請確認您有以下相關檔案：

i8094.dll

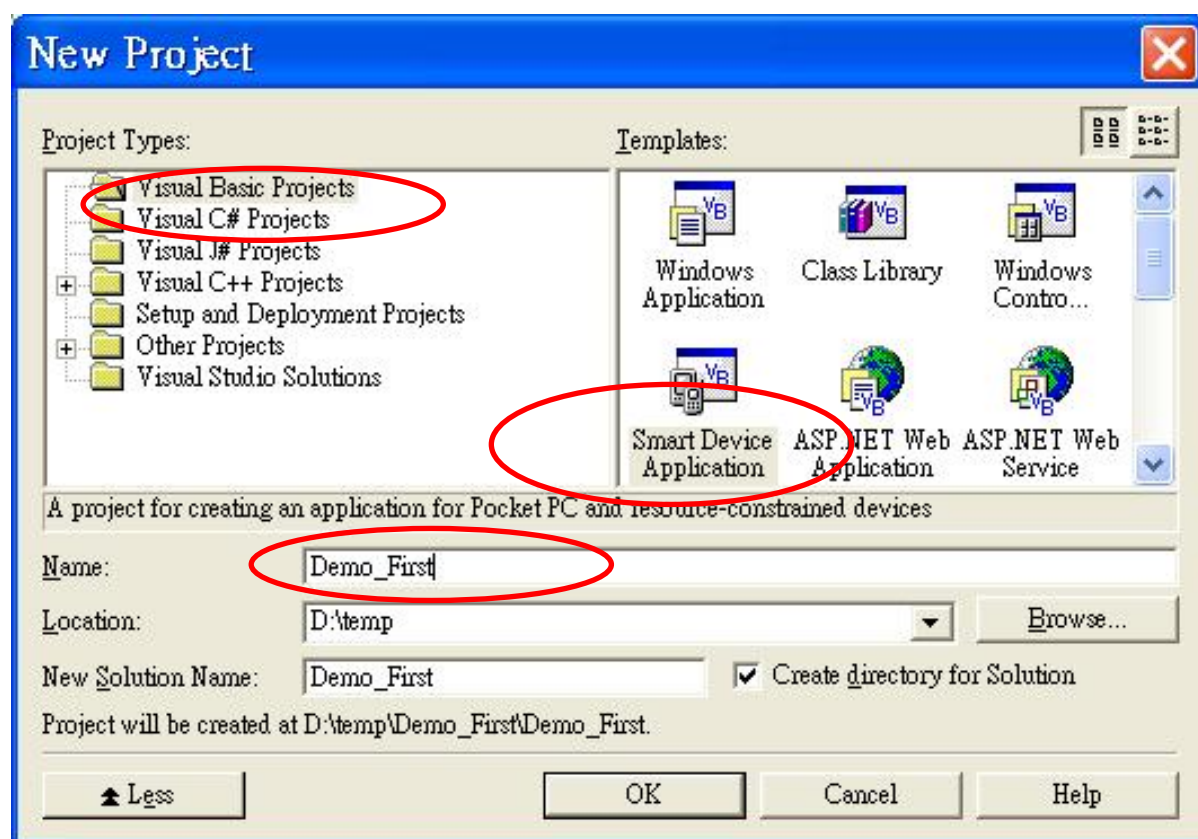
i8094_NET.dll

如您沒有,請找 CD 或到我們的網站下載最新版本資料

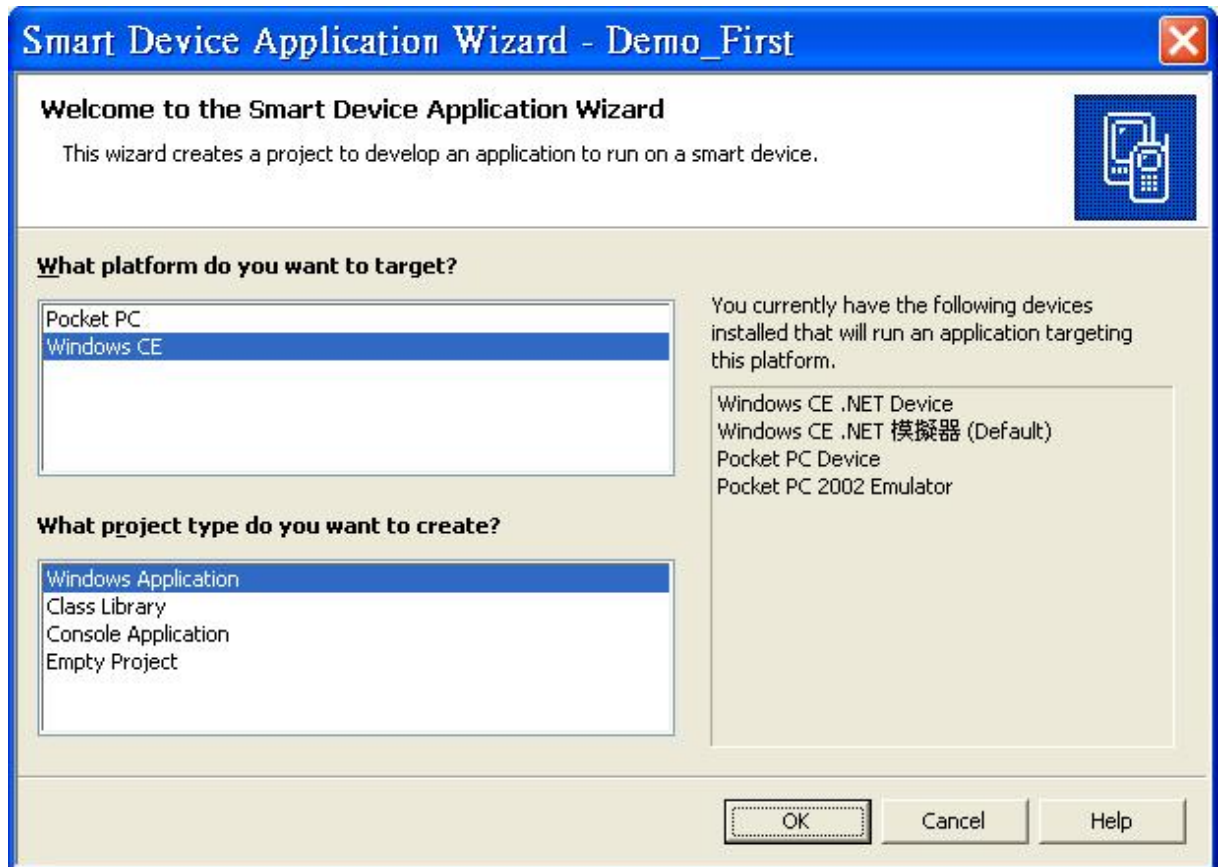
<http://www.icpdas.com/download/download-list.htm>

4.2.2 開一新專案

請啟動 Microsoft Visual Studio .NET 2003，並新增一 VB 專案並選 ”智慧型裝置” 如下圖選項：



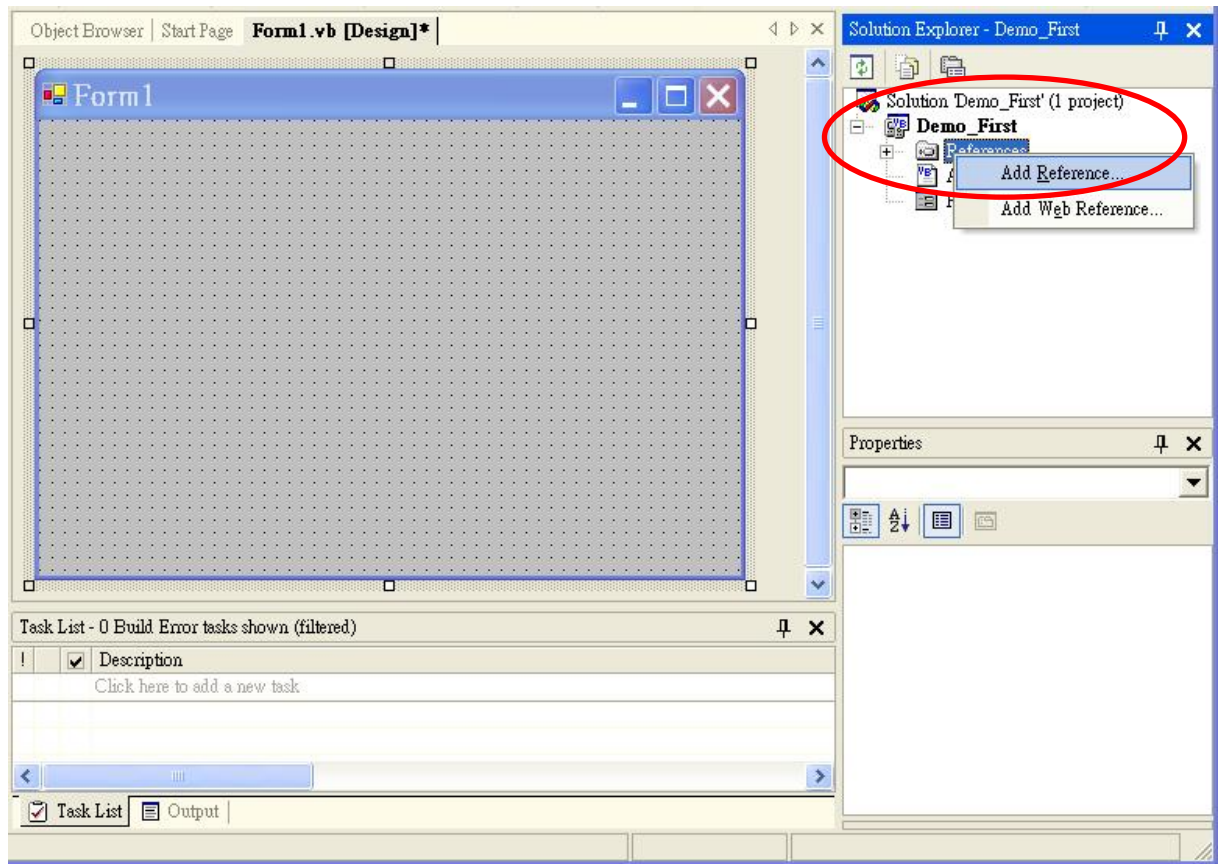
選 ”確定” 後



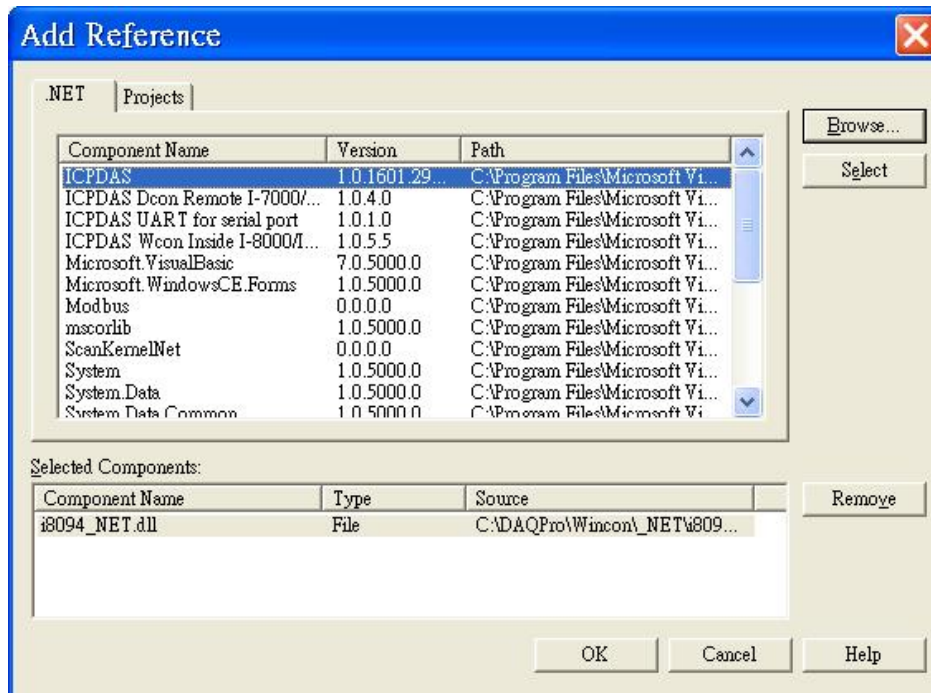
再選 **WinDows CE** 及 **Windows Application**，再選 “確定”

4.2.3 在專案中加入參考 DLL

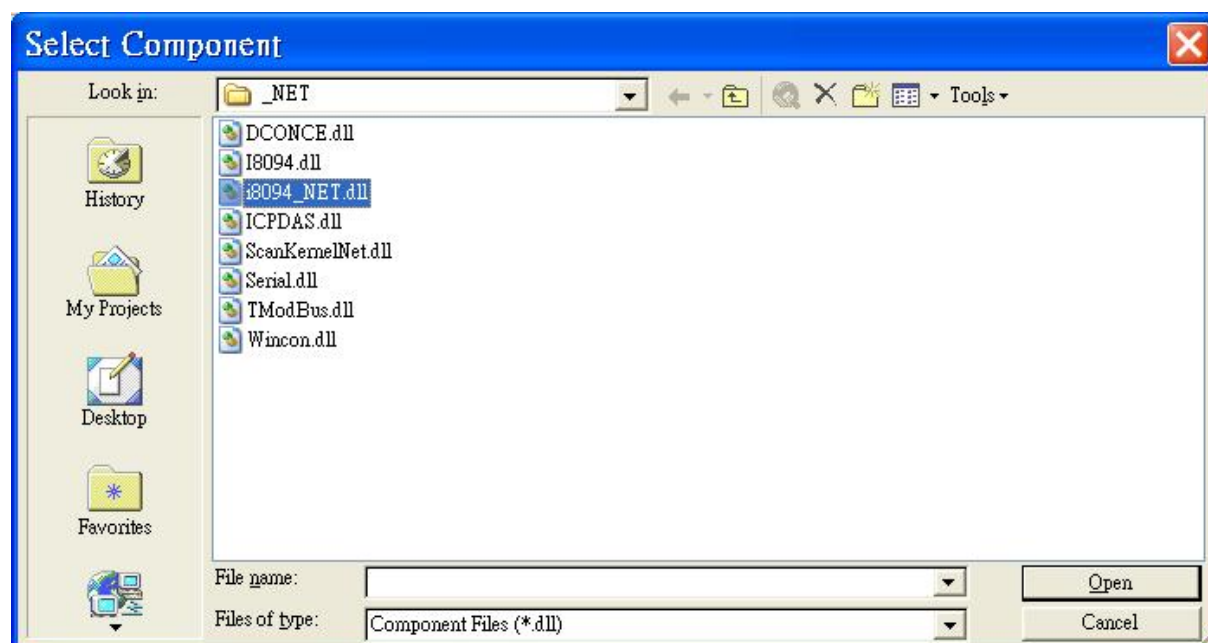
在方案總管中之參考上按滑鼠右鍵=>add Reference



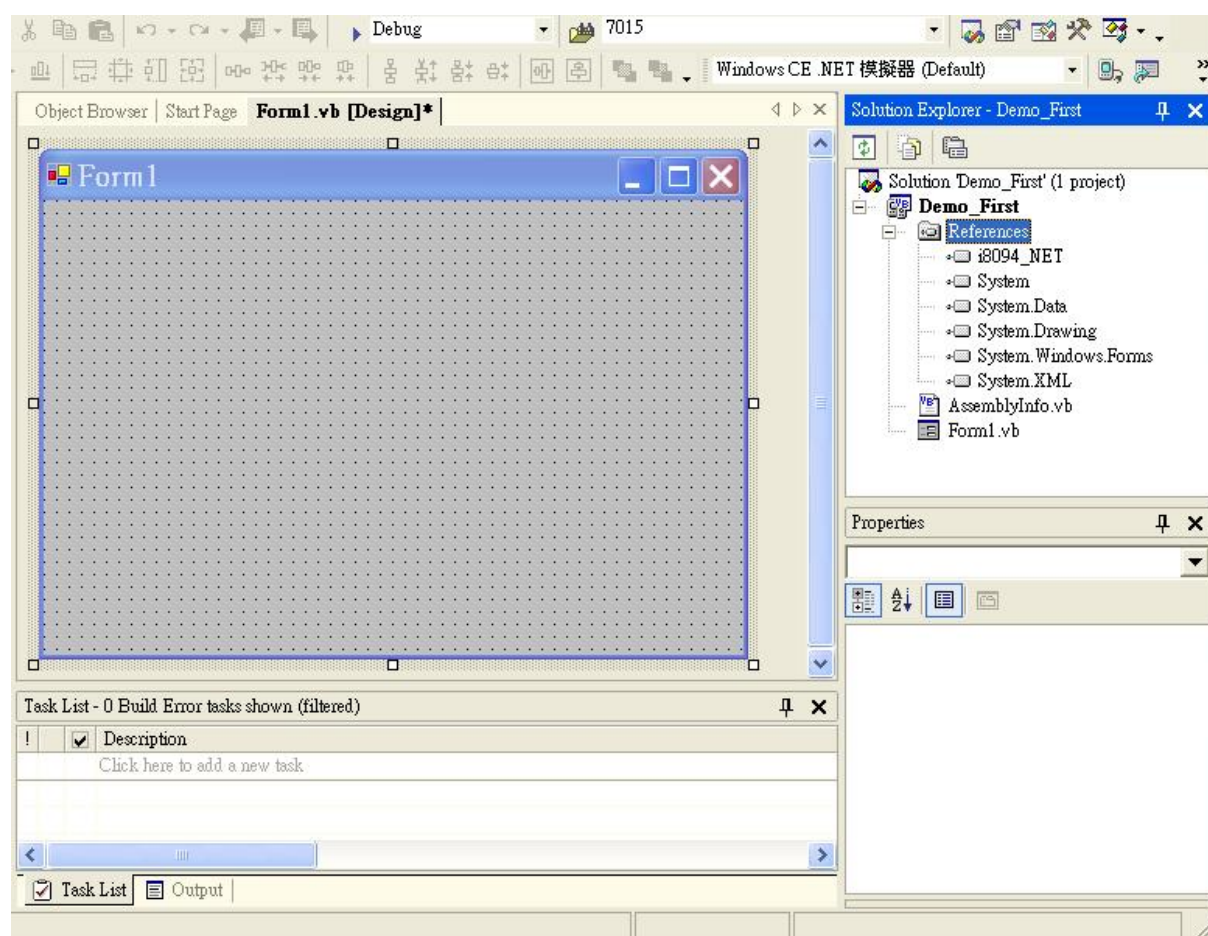
=>選擇 Browse



選擇 i8094_NET.DLL

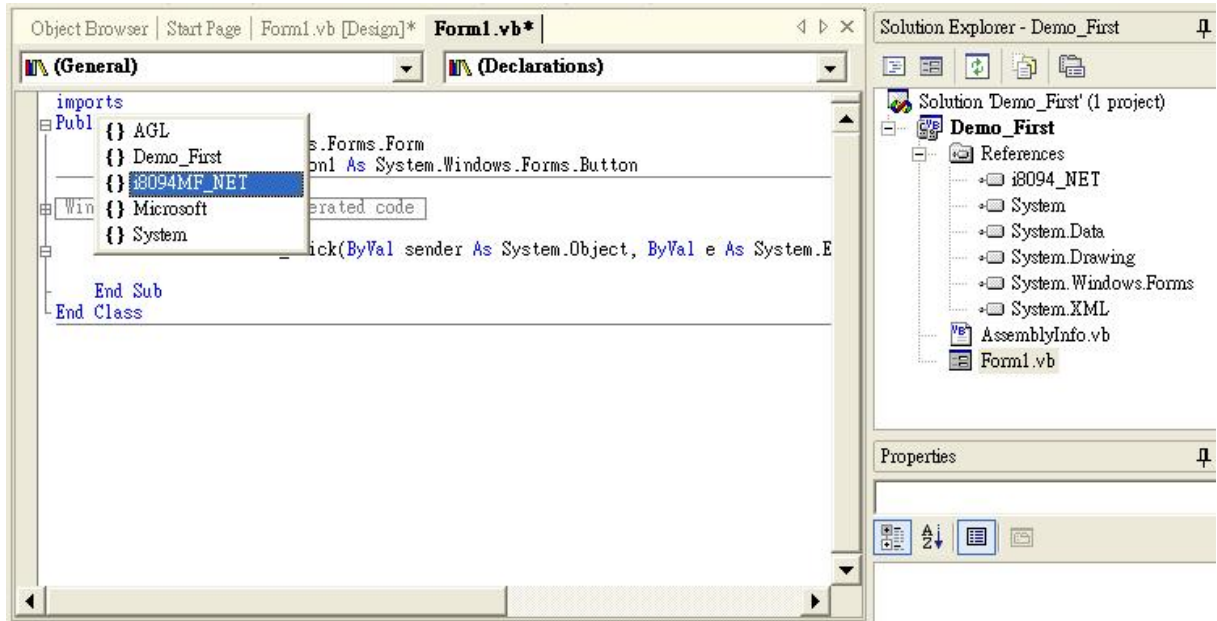


選擇 “Open” 如下圖：

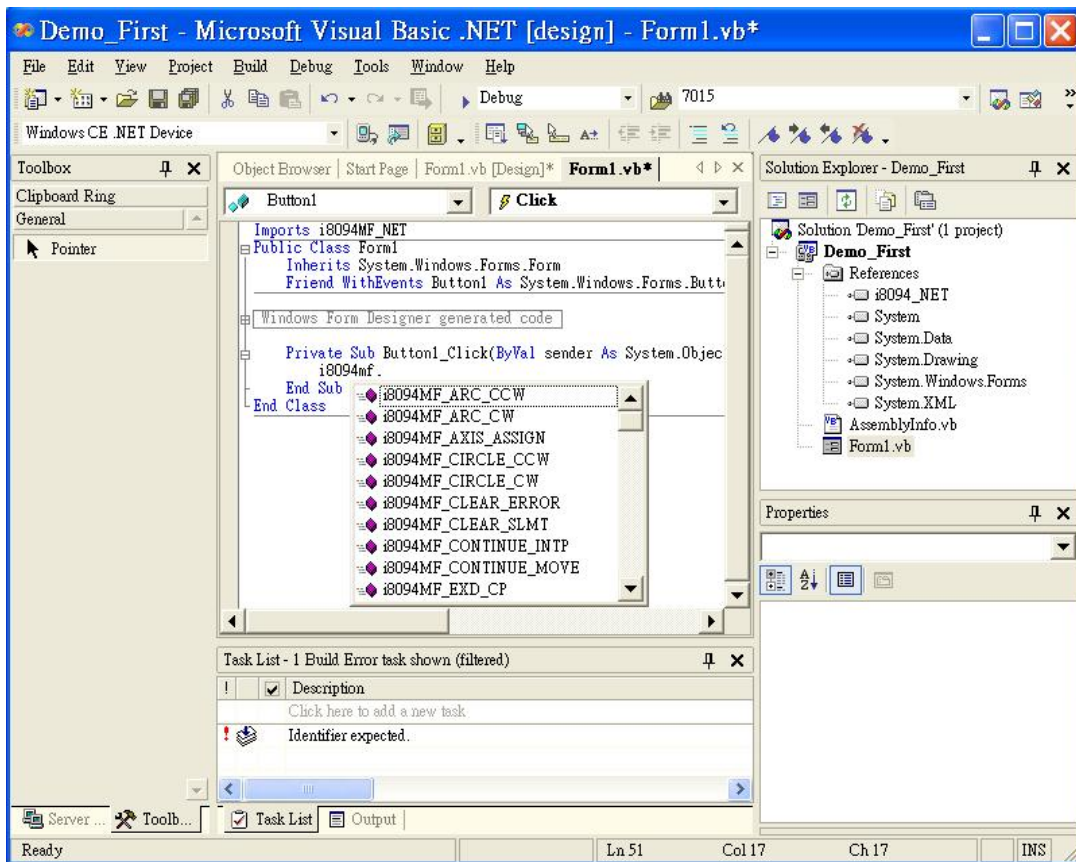


4.2.4 開始程式撰寫

在 Form1 中加入一 "BUTTON" 物件，並雙擊 BUTTON，出現 Form1.vb 程式碼，並在最前面加入 "imports i8094MF_NET" 如下圖：



在 Button1_Click 中加入輸入程式 "i8094MF." 及會出現下拉式功能表，可以引導進行程式設計，



例如:程式輸入為 → I8094MF.i8094MF_REGISTRATION(1, 3)

輸入詳細程式如下:

'=====Step 1 Driver init

If Not Driver_Open Then

i8094MF.i8094MF_REGISTRATION(cardNo, 1)

Driver_Open = True

End If

'=====Step 2 CONFIG IO

i8094MF.i8094MF_RESET_CARD(cardNo)

i8094MF.i8094MF_SET_PULSE_MODE(cardNo, AXIS_XYZU, 2) 'set the pulse output mode

i8094MF.i8094MF_SET_ALARM(cardNo, AXIS_XYZU, 0, 0) 'disable the SERVO ALARM Input

i8094MF.i8094MF_SET_ENCODER(cardNo, AXIS_XYZU, 0, 0, 0) 'set the encoder input type

i8094MF.i8094MF_SET_MAX_V(cardNo, AXIS_XYZU, Convert.ToUInt32(16000)) 'set the max speed for XYZU

i8094MF.i8094MF_EXD_DISABLE(cardNo, AXIS_XYZU) 'set the external input Off

i8094MF.i8094MF_SET_LP(cardNo, AXIS_XYZU, 0) 'set the Logic position =0

i8094MF.i8094MF_SET_EP(cardNo, AXIS_XYZU, 0) 'set the Encoger position =0

i8094MF.i8094MF_SET_A(cardNo, AXIS_XYZU, Convert.ToUInt32(1000)) 'set the Acc =1000

i8094MF.i8094MF_SERVO_ON(cardNo, AXIS_XYZU) 'set the Servo_ON to servo motors

'=====Step 3 Check ERROR

Dim KK As Long = 0

KK = i8094MF.i8094MF_GET_ERROR(cardNo)

Dim MSGG As String

If (KK <> YES) Then

'No ERROR: Step 4 Move X axis

Dim axis As UInt16 = AXIS_X 'for AXIS_X it can be to AXIS_XYZU

i8094MF.i8094MF_SET_MAX_V(cardNo, axis, Convert.ToUInt32(20000))

i8094MF.i8094MF_NORMAL_SPEED(cardNo, axis, Convert.ToUInt16(0)) 'set axis as Symmetrical T curve

mode

i8094MF.i8094MF_SET_V(cardNo, axis, Convert.ToUInt32(20000)) 'set v=10000 PPS

i8094MF.i8094MF_SET_A(cardNo, axis, Convert.ToUInt32(100000)) 'set acc=100000 PPS/S

i8094MF.i8094MF_SET_SV(cardNo, axis, Convert.ToUInt32(10)) 'set start speed=1000 PPS

i8094MF.i8094MF_SET_AO(cardNo, axis, 0) 'set offset pulse (at SV speed)= 0 PS

i8094MF.i8094MF_FIXED_MOVE(cardNo, axis, 10000) 'run the fixed 10000 Pulse move.

Do While (i8094MF.i8094MF_STOP_WAIT(cardNo, axis) = NO)

i8094MF.system.DoEvents()

System.Threading.Thread.Sleep(1)

'wait for axis to stop

Loop

Dim AA As Long = i8094MF.i8094MF_GET_LP(cardNo, axis) 'Get X Now position

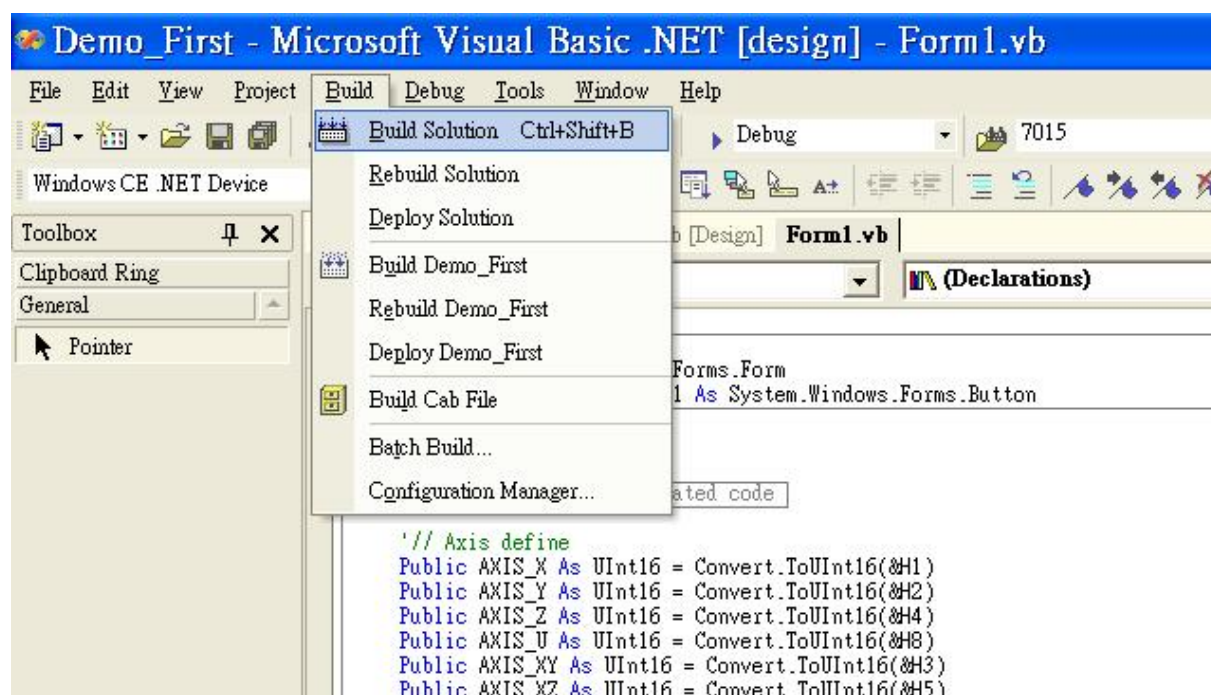
Else

```
'Please check the ERROR CODE
'Get X ERROR CODE
KK = Convert.ToInt32(i8094MF.i8094MF_GET_ERROR_CODE(cardNo, AXIS_X))
'Get Y ERROR CODE
KK = Convert.ToInt32(i8094MF.i8094MF_GET_ERROR_CODE(cardNo, AXIS_Y))
'Get Z ERROR CODE
KK = Convert.ToInt32(i8094MF.i8094MF_GET_ERROR_CODE(cardNo, AXIS_Z))
'Get U ERROR CODE
KK = Convert.ToInt32(i8094MF.i8094MF_GET_ERROR_CODE(cardNo, AXIS_U))
'=====
End If
```

詳細請參考: demo_First 範例

4.2.5 建置專案

在功能表上選擇“建置”→“建置專案”如沒問題即可產生執行檔



4.2.6 下載與執行

請將執行檔“Demo_First.exe”與動態連結檔“l8094.dll”“l8094_NET.dll”複製到 WinCon 同一目錄中(可用 VS.NET Online Download，或 FTP，或 USB 行動碟)，執行即可。

4.3 I-8000 Turbo C

4.3.1 確認相關檔案

請確認您有以下相關檔案：

I8094.lib

I8094.h

I8000.lib

I8000.h

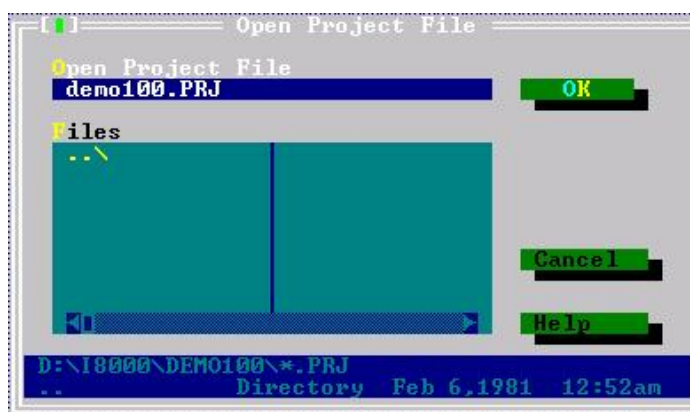
如您沒有,請找 CD 或到我們的網站下載最新版本資料

<http://www.icpdas.com/download/download-list.htm>

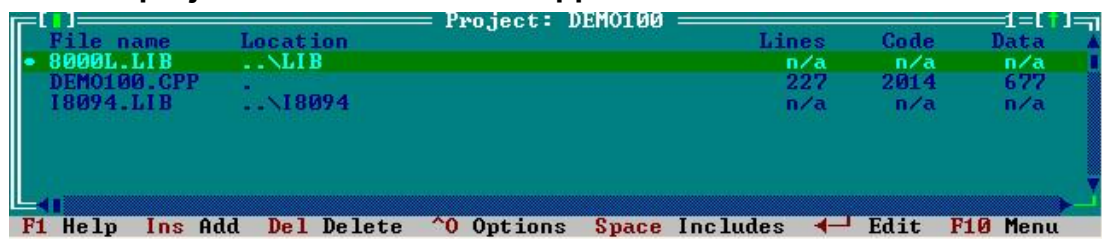
4.3.2 使用 TC ++ 來編譯程式的方式如下：

4.3.3 開一新專案

1. 在 demo100 這個目錄下執行 TC.EXE，建一個新的 Project，demo100.prj

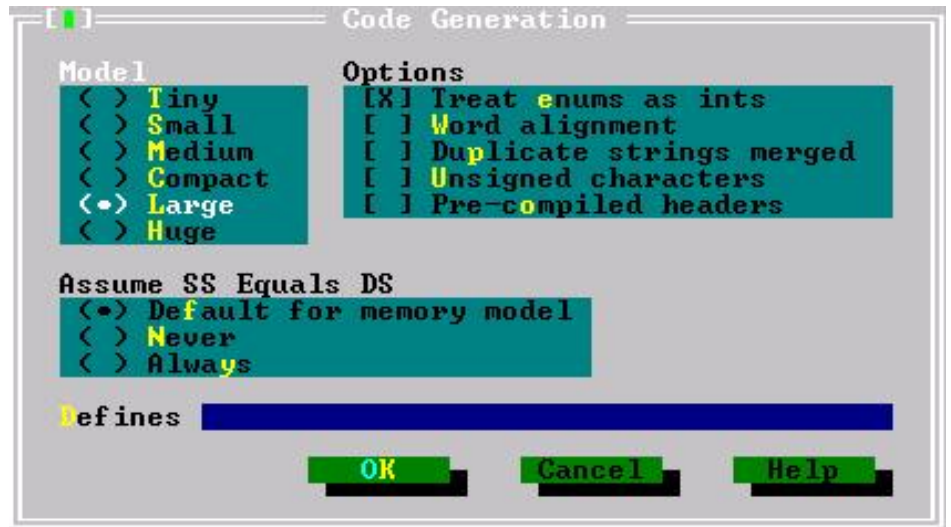


2. 加入 project 的內容：demo100.cpp 及 ..\lib\8000l.lib，I8094.lib

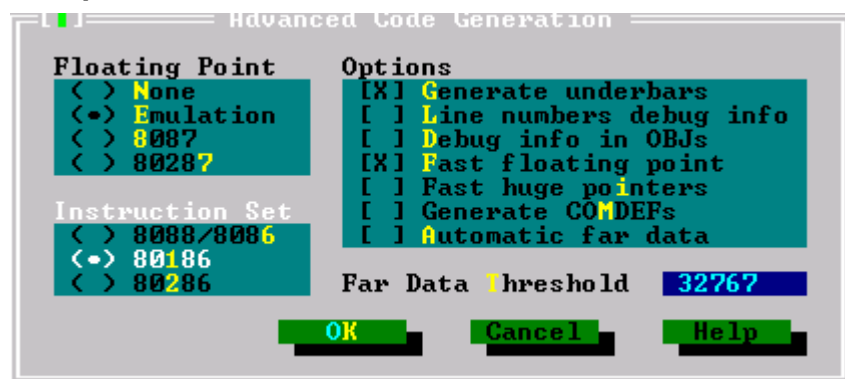


3. 設定有關的選項 (option)。

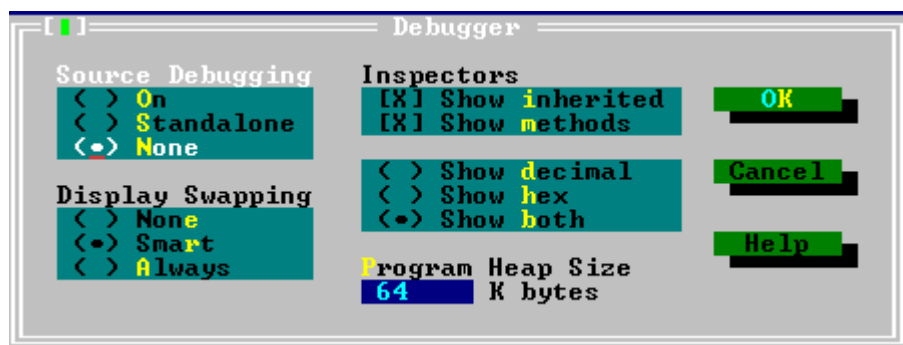
- **Compiler -> Code Generation** 的選項如下：



- **Compiler -> Advance Code Generation** 的選項如下：



- **Debugger** 的設定如下，把 **Source debugging** 關掉。



4.3.4 撰寫程式

1. 在 demo100.cpp 檔頭加入參考宣告:

```
#include <dos.h>
#include <math.h>
#include "8000.h"
#include "I8094.h"
```

```
BYTE cardNo;
```

```
long x_value, y_value, z_value, u_value;
```

2. 在主程式中加入相關程式(請參考demo100.cpp):

```
void main ()
{
    //===== I-8000 =====
    //Set (slot0~slot7) = cardNO (1~8) 。
    BYTE slot;
    int Found = 0;
    for (slot = 0; slot < 8; slot++)
    {
        cardNo = slot + 1;
        if (i8094MF_REGISTRATION(cardNo, slot) == YES)
        {
            //Found Axis Card 。
            i8094MF_RESET_CARD(cardNo);
            Found++;
        }
    }
    if (Found == 0)
    {
        //Not Found 。
        Print("I-8094 card not found ! \r\n");
        return;
    }
    cardNo = 1;
    i8094MF_INIT_CARD(cardNo);
    i8094MF_SET_PULSE_MODE(cardNo, AXIS_XYZU, 2);
    i8094_IN3_LEVEL(cardNo,AXIS_XYZU, 1);
    i8094MF_SET_ALARM(cardNo, AXIS_XYZU, 1, 1);
    i8094MF_SET_ENCODER(cardNo, AXIS_XYZU, 0, 0, 0);
}
```

```

i8094MF_SET_MAX_V(cardNo, AXIS_XYZU, 16000);
//=====
BYTE ret1 = 0;
BYTE chkey;
DWORD sv; //PPS
DWORD v; //PPS
DWORD a; //PPS/s
i8094MF_SERVO_ON(cardNo, AXIS_XYZU);
do
{
    Print(" (0:Exit, 1:HELIX_3D_1, 2:HELIX_3D_2, 3:RATIO, 4:FRnet output, 5:FRnet input)
\r\n");
    Print(" (6:Reset Encoder, 7:Stop, 8:Clear Error) \r\n");
    Print(" (X:Jog X, Y:Jog Y, Z:Jog Z, U:Jog U, S:Stop Jog) \r\n");
    Print("\n");
    Print("-----LOGIC AND REAL POSITION COUNTER-----\n");
    x_value = i8094MF_GET_LP(cardNo, AXIS_X);
    y_value = i8094MF_GET_LP(cardNo, AXIS_Y);
    z_value = i8094MF_GET_LP(cardNo, AXIS_Z);
    u_value = i8094MF_GET_LP(cardNo, AXIS_U);
    Print("LOGIC POSITION: x=%10ld, y= %10ld, z= %10ld, u=%10ld \r\n", x_value, y_value,
z_value, u_value);
    x_value = i8094MF_GET_EP(cardNo, AXIS_X);
    y_value = i8094MF_GET_EP(cardNo, AXIS_Y);
    z_value = i8094MF_GET_EP(cardNo, AXIS_Z);
    u_value = i8094MF_GET_EP(cardNo, AXIS_U);
    Print("REAL POSITION: x=%10ld, y= %10ld, z= %10ld, u=%10ld \r\n", x_value, y_value,
z_value, u_value);
    while (!Kbhit());
    chkey=Getch();
    Print("%s\r\n",&chkey);
    switch (chkey)
    {
        case '0':
            i8094MF_RESET_CARD(cardNo);
            Print("EXIT! \r\n");
            return;
    }
}
//-----

```

```

case '1':
    v=50000;//PPS ◦
    i8094MF_SET_MAX_V(cardNo, AXIS_XYZU,160000L);
    ret1=i8094MF_HELIX_3D(cardNo, AXIS_Y, AXIS_Z, AXIS_X, 1, v, 0,
1000, 5, -2000);

    Delay(1000);
    Print("HELIX_3D_1 ! \r\n");
    Print("ret1= %d \r\n",ret1);
    break;

//-----
case '2':
    v=100000;//PPS ◦
    i8094MF_SET_MAX_V(cardNo, AXIS_XYZU,160000L);
    ret1=i8094MF_HELIX_3D(cardNo, AXIS_Y, AXIS_Z, AXIS_U, 1, v, 0,
25000, 10, 3600);

    Delay(2000);
    Print("HELIX_3D_2 ! \r\n");
    Print("ret1= %d \r\n",ret1);
    break;

//-----
case '3':
    sv=300;//PPS ◦
    v=30000;//PPS ◦
    a=500000;//PPS/s ◦
    int loop1;
    int loop2;
    float ratio;
    i8094MF_SET_MAX_V(cardNo, AXIS_XYZU,160000L);
    Print("RATIO_2D ratio ? \r\n");
    Scanf("%f", &ratio);
    Print("ratio= %f \r\n",ratio);
    i8094MF_RATIO_INITIAL(cardNo,AXIS_U, AXIS_X, sv, v, a, ratio);
    for (loop2 = 0; loop2 < 5; loop2++)
    {
        for (loop1 = 0; loop1 < 5; loop1++)
        {
            i8094MF_RATIO_2D(cardNo, 0, 3600, 0);
            i8094MF_RATIO_2D(cardNo, 0, 3600, 1);

```

```

        }
        i8094MF_RATIO_2D(cardNo, 0, 7200, 0);
        i8094MF_RATIO_2D(cardNo, 0, 3600, 1);
    }
    i8094MF_RATIO_2D(cardNo, 1, 7200, 1);
    Delay(3000);
    Print("RATIO_2D OK ! \r\n");
    break;

//-----
case '4':

    WORD wSA;
    WORD data;
    Print("FRnet wSA ? \r\n");
    Scanf("%d", &wSA);
    Print("FRnet 16 bits data ? \r\n");
    Scanf("%d", &data);
    i8094MF_FRNET_SA(cardNo, wSA, data);
    break;

//-----
case '5':

    WORD wRA;
    Print("FRnet wRA ? \r\n");
    Scanf("%d", &wRA);
    long data1 = i8094MF_FRNET_RA(cardNo, wRA);
    Print("FRnet 16 bits data = %10ld \r\n", data1);
    break;

//-----
case '6':

    i8094MF_SET_LP(cardNo, AXIS_XYZU, 0);
    i8094MF_SET_EP(cardNo, AXIS_XYZU, 0);
    Print("RESET Encoder ! \r\n");
    break;

//-----
case '7':

    i8094MF_STOP_SLOWLY(cardNo, AXIS_XYZU);
    Print("STOP! \r\n");
    break;

//-----

```

```

case '8':

    i8094MF_CLEAR_ERROR(cardNo);
    Print("CLEAR ERROR ! \r\n");
    break;

```

```
//-----
```

```

case 88:
case 120:

```

```

    BYTE m_Axis=AXIS_X;
    i8094MF_SET_MAX_V(cardNo, m_Axis, 32000);
    i8094MF_NORMAL_SPEED(cardNo, m_Axis, 0);    //set axis as

```

Symmetrical T curve mode

```

    i8094MF_SET_A(cardNo, m_Axis, 50000);//set Acc =50000 PPS/S
    i8094MF_SET_V(cardNo, m_Axis, 50000);
    i8094MF_EXD_MP(cardNo, AXIS_X, 100);
    i8094MF_EXD_DISABLE(cardNo, AXIS_Y);
    i8094MF_EXD_DISABLE(cardNo, AXIS_Z);
    i8094MF_EXD_DISABLE(cardNo, AXIS_U);
    break;

```

```
//-----
```

```

case 89:
case 121:

```

```

    m_Axis=AXIS_Y;
    i8094MF_SET_MAX_V(cardNo, m_Axis, 32000);
    i8094MF_NORMAL_SPEED(cardNo, m_Axis, 0);    //set axis as

```

Symmetrical T curve mode

```

    i8094MF_SET_A(cardNo, m_Axis, 50000);//set Acc =50000 PPS/S
    i8094MF_SET_V(cardNo, m_Axis, 100000);
    i8094MF_EXD_MP(cardNo, AXIS_Y, 100);
    i8094MF_EXD_DISABLE(cardNo, AXIS_X);
    i8094MF_EXD_DISABLE(cardNo, AXIS_Z);
    i8094MF_EXD_DISABLE(cardNo, AXIS_U);
    break;

```

```
//-----
```

```

case 90:
case 122:

```

```

    m_Axis=AXIS_Z;
    i8094MF_SET_MAX_V(cardNo, m_Axis, 32000);
    i8094MF_NORMAL_SPEED(cardNo, m_Axis, 0);    //set axis as

```

Symmetrical T curve mode

```
i8094MF_SET_A(cardNo, m_Axis, 50000); //set Acc =50000 PPS/S
i8094MF_SET_V(cardNo, m_Axis, 10000);
i8094MF_EXD_MP(cardNo, AXIS_Z, 100);
i8094MF_EXD_DISABLE(cardNo, AXIS_X);
i8094MF_EXD_DISABLE(cardNo, AXIS_Y);
i8094MF_EXD_DISABLE(cardNo, AXIS_U);
break;
```

```
//-----
```

```
case 85:
```

```
case 117:
```

```
m_Axis=AXIS_U;
i8094MF_SET_MAX_V(cardNo, m_Axis, 32000);
i8094MF_NORMAL_SPEED(cardNo, m_Axis, 0); //set axis as
```

Symmetrical T curve mode

```
i8094MF_SET_A(cardNo, m_Axis, 50000); //set Acc =50000 PPS/S
i8094MF_SET_V(cardNo, m_Axis, 10000);
i8094MF_EXD_MP(cardNo, AXIS_U, 5);
i8094MF_EXD_DISABLE(cardNo, AXIS_X);
i8094MF_EXD_DISABLE(cardNo, AXIS_Y);
i8094MF_EXD_DISABLE(cardNo, AXIS_Z);
break;
```

```
//-----
```

```
case 83:
```

```
case 115:
```

```
i8094MF_EXD_DISABLE(cardNo, AXIS_X);
i8094MF_EXD_DISABLE(cardNo, AXIS_Y);
i8094MF_EXD_DISABLE(cardNo, AXIS_Z);
i8094MF_EXD_DISABLE(cardNo, AXIS_U);
break;
```

```
//-----
```

```
default:
```

```
break;
```

```
}
```

```
} while (1);
```

```
}
```


4.3.5 撰編譯連結程式

最後按下 **F9** 就會進行編譯，LINK 成 demo100.EXE。

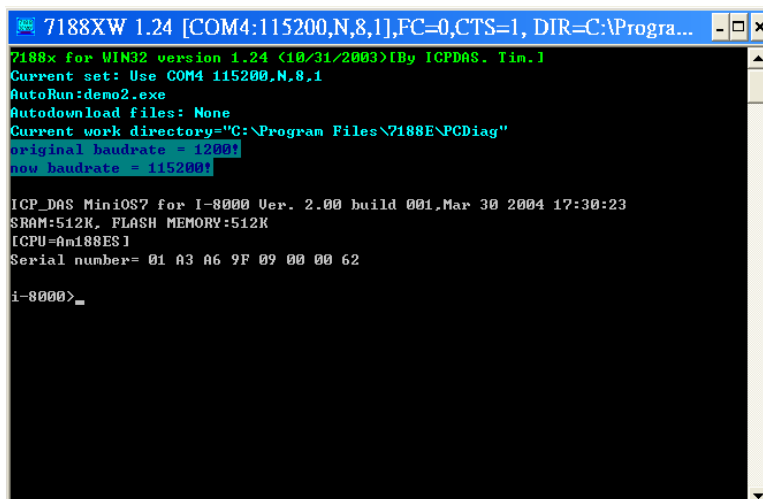
```
Linking
EXE file : ..\..\TCPP\DEMO100.EXE
Linking  : \TCPP\LIB\CL.LIB

          Total      Link
Lines compiled: 0      PASS 2
Warnings: 0          0
Errors: 0           0

Available memory: 1928K
Success : Press any key
```

4.3.6 Download 程式到 I-8000 系列 PAC 控制器

1. 請在 PC 端執行 7188x.EXE (這是一個 DOS 模式的執行檔，可以在純 DOS 下或 WIN9x 或 WIN-NT 或 WIN2K 的 DOS BOX 下執行) 或是 7188xw.EXE (這是一個 win32 的執行檔，要在 WIN9x 或 WIN-NT 或 WIN2K 下執行)。
2. 請將依實際接線將 COM PORT 設成 COM1(ALT_1) 或 COM2(ALT_2)。傳輸速度設成 115200,N,8,1。
3. 打開 I-8000 的電源。此時有兩種可能的狀況：
 - 如果 INIT* 接腳有接到 INIT*COM 將會出現 MiniOs7 的版本訊息。然後出現 I-8000>。
 - 如果 INIT* 接腳不接，I-8000 將會開始執行 AUTOEXEC.BAT 所設定的命令。執行完後一樣出現 I-8000>。
4. 當出現 I-8000> 後就可以下命令給 I-8000 了如下圖。

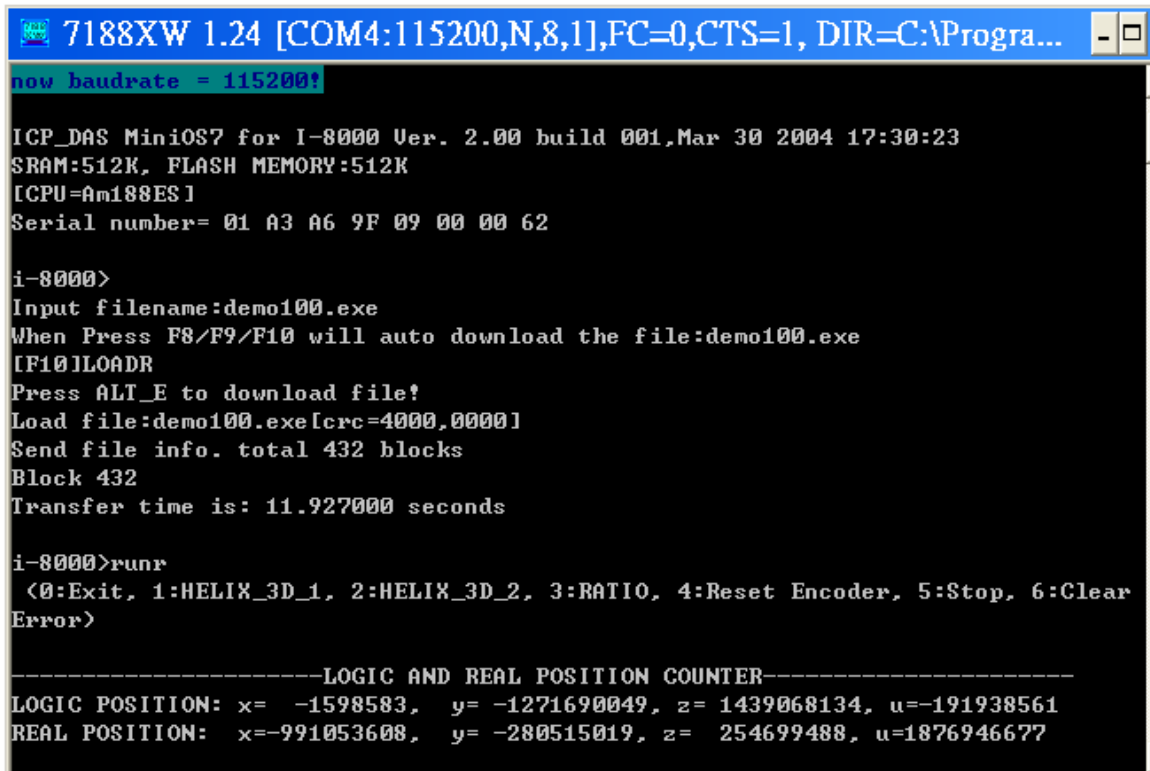


```
7188XW 1.24 [COM4:115200,N,8,1],FC=0,CTS=1, DIR=C:\Progra...
7188x For WIN32 version 1.24 (10/31/2003)[By ICPDAS, Tim.]
Current set: Use COM4 115200,N,8,1
AutoRun:demo2.exe
Autodownload files: None
Current work directory="C:\Program Files\7188E\PCdiag"
original baudrate = 1200
now baudrate = 115200

ICP_DAS MiniOS7 for I-8000 Ver. 2.00 build 001,Mar 30 2004 17:30:23
SRAM:512K, FLASH MEMORY:512K
ICPU=Am188ES1
Serial number= 01 A3 A6 9F 09 00 00 62

i-8000>
```

5. 按下 F2 鍵，輸入 demo100.exe，再按 F10 自動 download 並執行 demo100.exe 如下圖：



```
7188XW 1.24 [COM4:115200,N,8,1],FC=0,CTS=1, DIR=C:\Progra...
now baudrate = 115200!

ICP_DAS MiniOS7 for I-8000 Ver. 2.00 build 001,Mar 30 2004 17:30:23
SRAM:512K, FLASH MEMORY:512K
[CPU=Am188ES]
Serial number= 01 A3 A6 9F 09 00 00 62

i-8000>
Input filename:demo100.exe
When Press F8/F9/F10 will auto download the file:demo100.exe
[F10]LOADR
Press ALT_E to download file!
Load file:demo100.exe[crc=4000,0000]
Send file info. total 432 blocks
Block 432
Transfer time is: 11.927000 seconds

i-8000>runr
<0:Exit, 1:HELIK_3D_1, 2:HELIK_3D_2, 3:RATIO, 4:Reset Encoder, 5:Stop, 6:Clear
Error>

-----LOGIC AND REAL POSITION COUNTER-----
LOGIC POSITION: x= -1598583, y= -1271690049, z= 1439068134, u=-191938561
REAL POSITION: x=-991053608, y= -280515019, z= 254699488, u=1876946677
```

詳情請參考:I8000 CD 中 \Napdos\7188e\MiniOS7\doc\big5\index.htm 選左手邊“7188E 入門手冊”有詳盡說明。

附錄 A

A.1 I8094 開發環境安裝內容

A.1.1 eVC ++ 4.0

1. 微軟 eVC++ 4.0: 至少到 ServPack2(目前已到 ServPack4)
2. WinCon8000_EVC4_SP1: WinCon 在 eVC++ 開發環境(SA_IA)
3. WinConSDK:WinCon 軟體開發工具(inc,lib,dll,demo...)

A.1.2 Visual Studio .NET 2003(VB.NET , C#)

1. 微軟 Visual Studio.NET 2003 專業版以上, 須包含有 "智慧型裝置應用程式" (SmartDeviceApplication)選項
2. 連線偵錯工具: Windows CE .NET Utilities v1.1 for Visual Studio .NET 2003
3. WinConSDK:WinCon 軟體開發工具(inc,lib,dll,demo...)

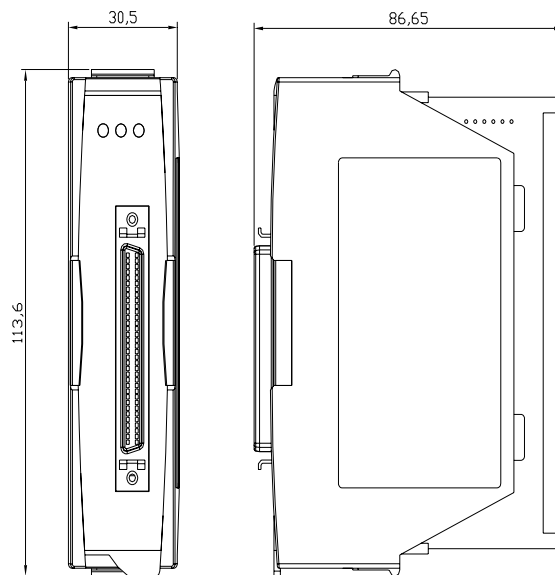
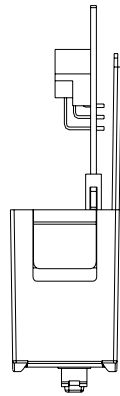
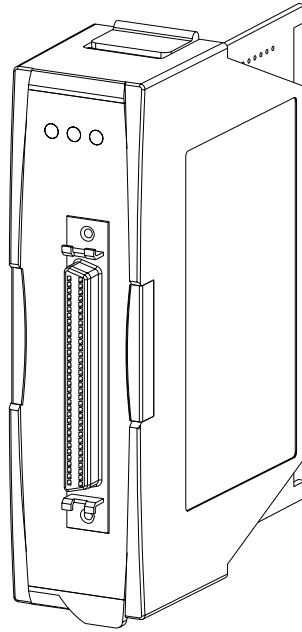
A.1.3 Turbo C

1. 寶蘭 Turbo C 2.0 以上

A.2 I8094 概觀



A.3 外觀尺寸



A.4 版本更新內容註解

//===== V 1.5.1.1 =====

變更 FUNCTION 參考手冊章節(配合 i8094_Manual_1.5tc 改版)

新增 3.9 Motion 同步運動

//===== V 1.4.0.1 =====

i8094_* ==>i8094MF_* (所有巨集指令)

i8094_MF.DLL ==>i8094.DLL

i8094_MF.h ==>i8094.h

i8094_MF_NET.DLL ==>i8094_NET.DLL

i8094 巨集指令手冊 ==> i8094 運動控制模組使用手冊

Demo_First 變更(eVC++ 及 VB.NET)

新增 5.1 i8094 開發環境安裝內容

附錄 B 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

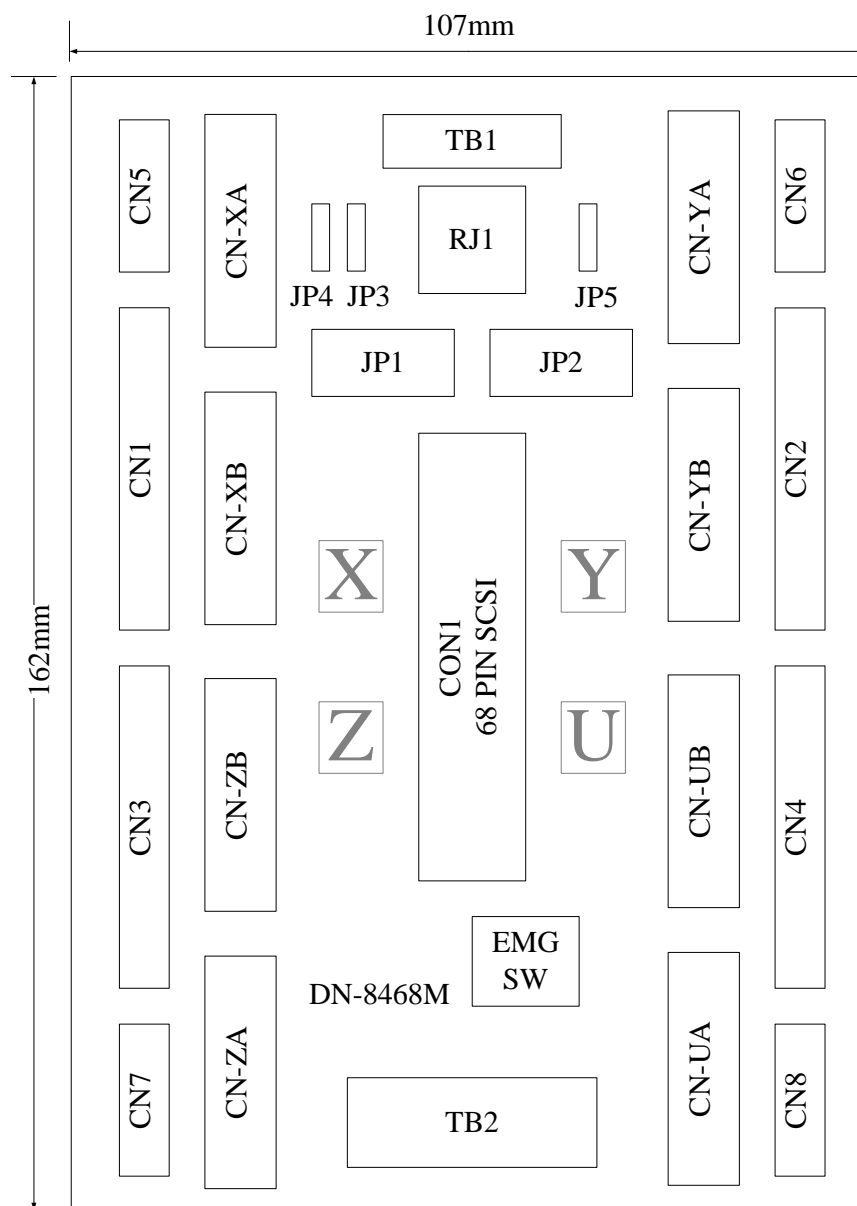


Fig. 1-1 Board layout for the DN-8468M

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.

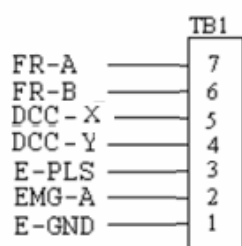


Fig. 1-3 Pin definition for TB1

Table 1-4 TB1 Signal Connection

Name	Description
FR-A	FRnet port A
FR-B	FRnet port B
DCC-X	Deviation Counter Clear for X axis
DCC-Y	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.

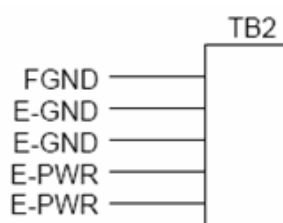


Fig. 1-4 Pin definition for TB2

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.

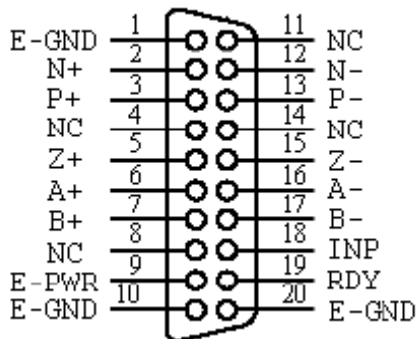


Table 1-6 CNA Signal Connection

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

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

- ▶ **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.

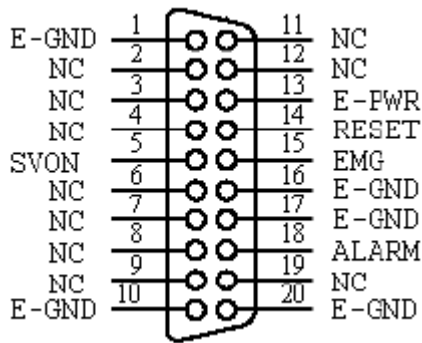


Table 1-7 CNB Signal Connection

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

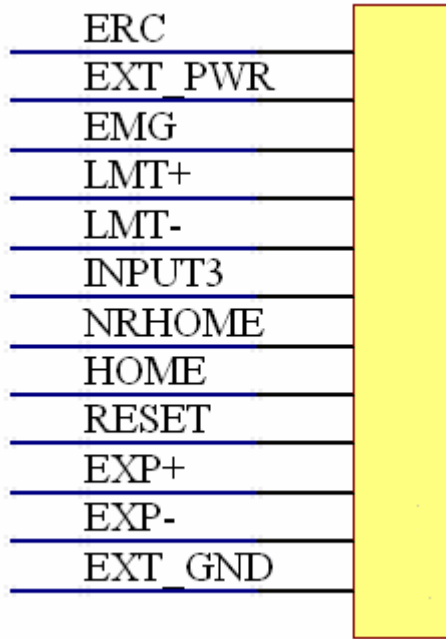
Fig. 1-6 Pin definition for CN-XB, CN-YB
CN-ZB, CN-UB

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

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

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

Table 1-8 CN1~4 Signal Connection



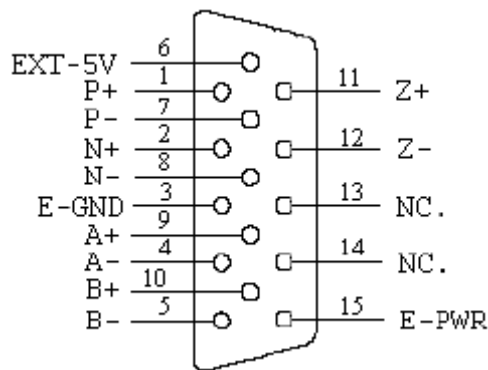
Name	Number	Description
ERC	12	Error Count Clear
EXT_PWR	11	EXT POWER 24V
EMG	10	Emergent Stop
LMT+	9	Limit switch Input Signal(+)
LMT-	8	Limit switch Input Signal(-)
INPUT3	7	Input Signal (IN3)
NRHOME	6	Near HOME Sensor Input Signal
HOME	5	HOME Sensor Input Signal
RESET	4	RESET Input Signal
EXP+	3	EXT Positive Direction Pulse(+)
EXP-	2	EXT Positive Direction Pulse(-)
EXT_GND	1	EXT POWER Ground

Fig 1-7 Pin definition for CN1~ CN4

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

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

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

Fig. 1-8 Pin definition for CN5~CN8

- ▶ **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.

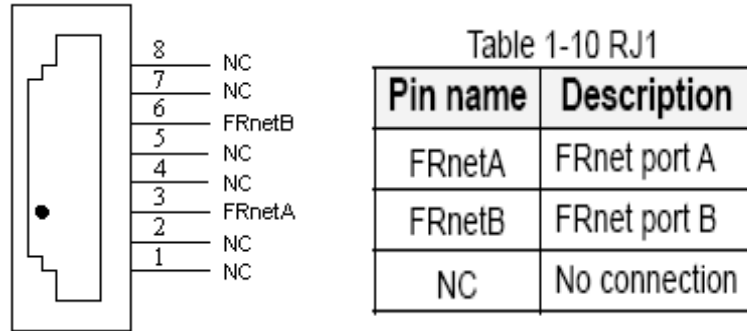


Fig. 1-9 Pin definition for RJ1

► **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.

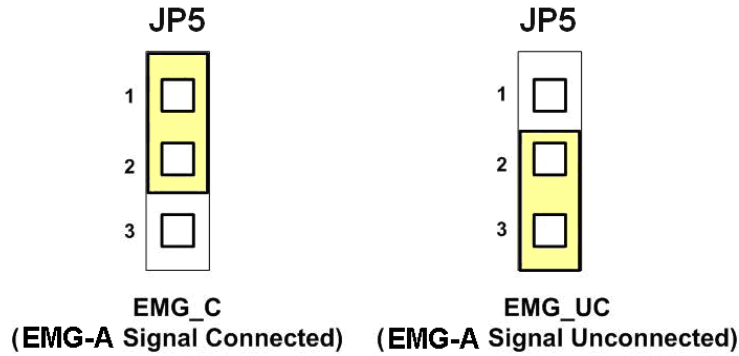


Fig. 1-10 Jumper 5 setting

■ 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.

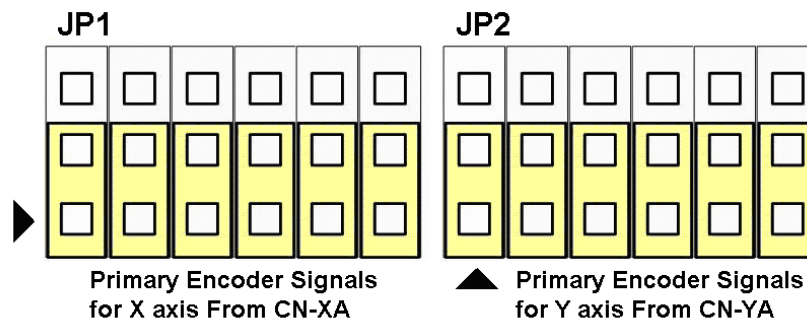


Fig. 1-11 Primary encoder signals setting

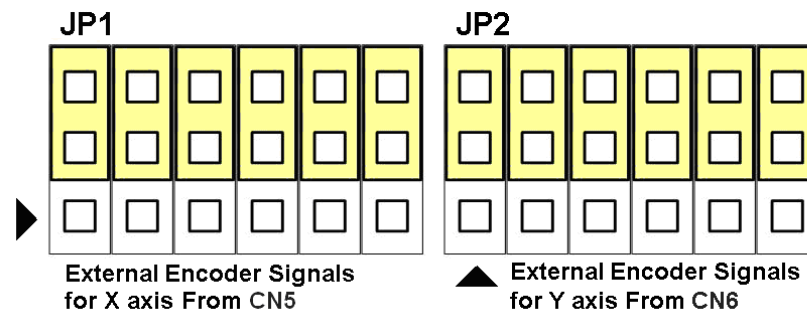


Fig. 1-12 External encoder signals setting

■ EMG SW

The emergency stop signal for each servo amplifier 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 signals 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)

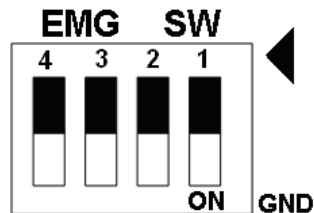


Fig. 1-14 EMG SW setting for user controlled signals.

B.2 DN-8468P Daughter Board

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

B.2.1 Board Layout for DN-8468P

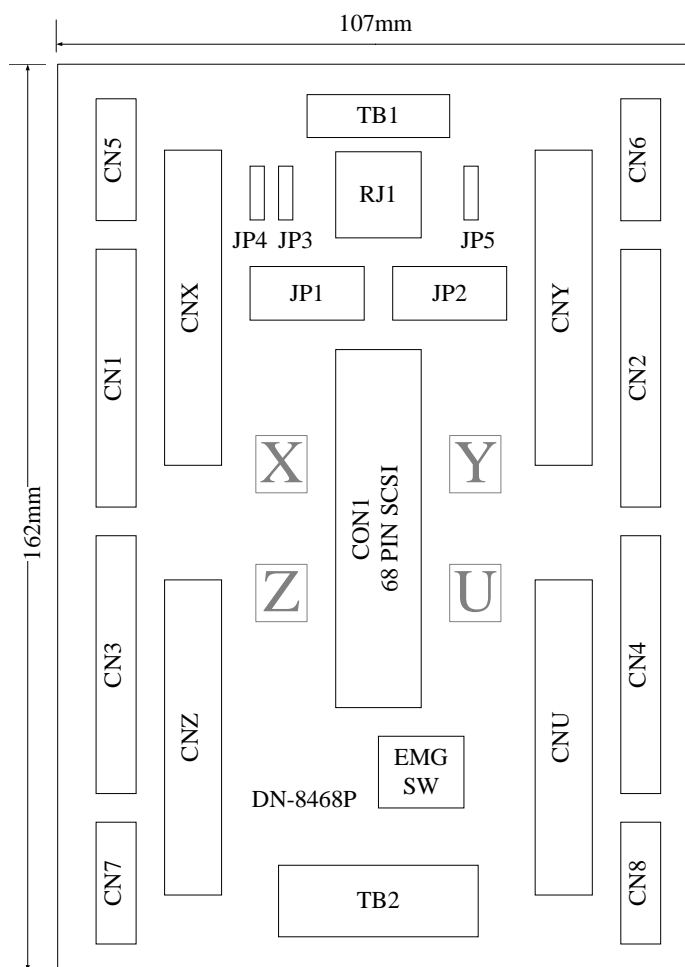


Fig. B2-1 Board layout for the DN-8468P

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.

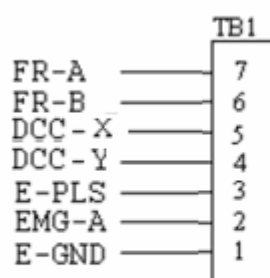


Fig. 1-3 Pin definition for TB1

Table 1-4 TB1 Signal Connection

Name	Description
FR-A	FRnet port A
FR-B	FRnet port B
DCC-X	Deviation Counter Clear for X axis
DCC-Y	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.

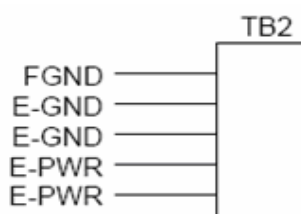


Fig. 1-4 Pin definition for TB2

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.

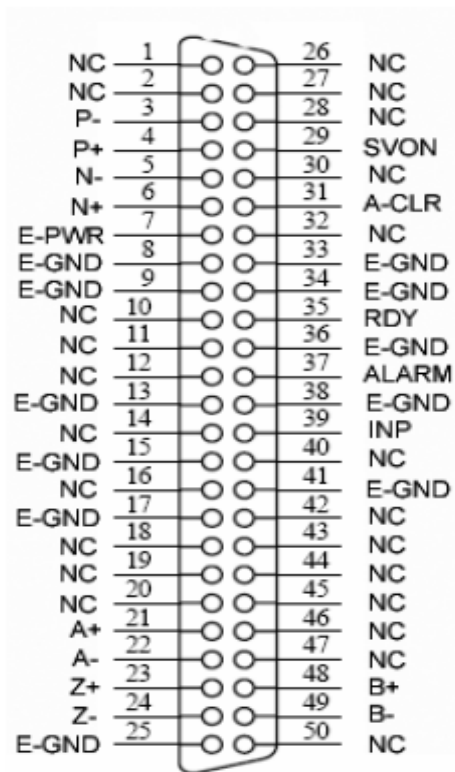


Fig. 1-5 Pin definition for CNX, CNY, CNZ, CNU

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.

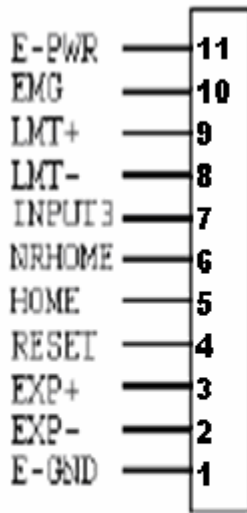


Fig.1-7 Pin definition for CN1 ~ CN4

Table 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.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.

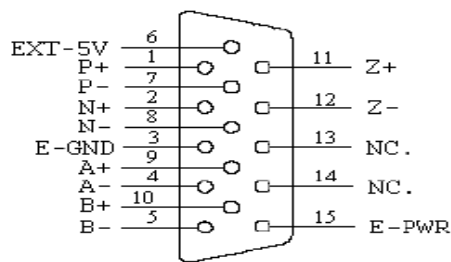


Fig. 1-8 Pin definition for CN5 ~ CN8

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.

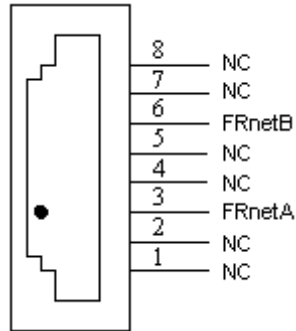


Table 1-10 RJ1

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

Fig. 1-9 Pin definition for RJ

► **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.

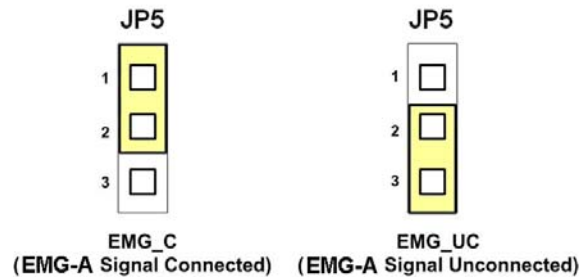


Fig. 1-10 Jumper 5 setting

■ 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.

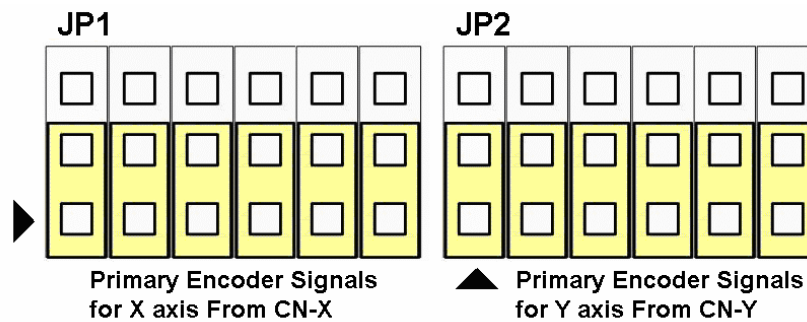


Fig. 1-11 Primary encoder signals setting

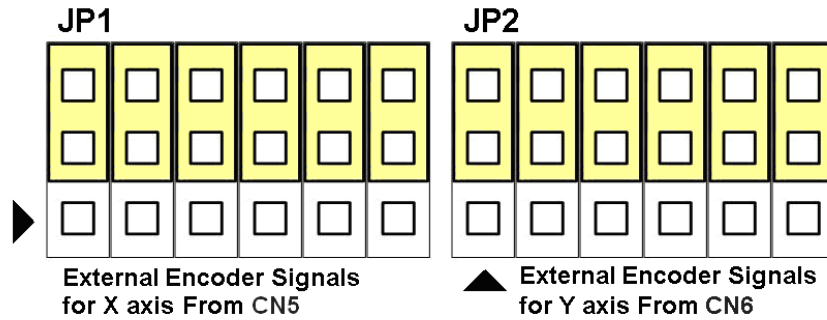


Fig. 1-12 External encoder signals setting

■ EMG SW

The emergency stop signal for each servo amplifier 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 signals 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.

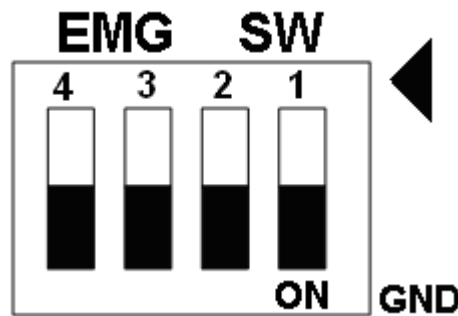


Fig. 1-13 EMG SW setting for normally GND (Default setting)

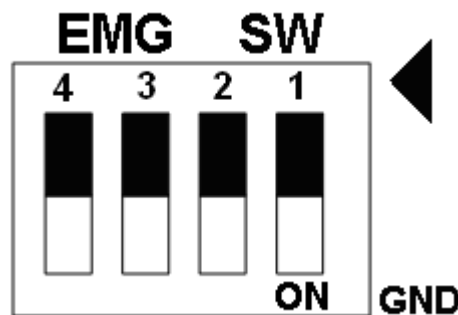


Fig. 1-14 EMG SW setting for user controlled signals.

B.3 DN-8486Y Daughter Board

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

B.3.1 Board Layout for DN-8468Y

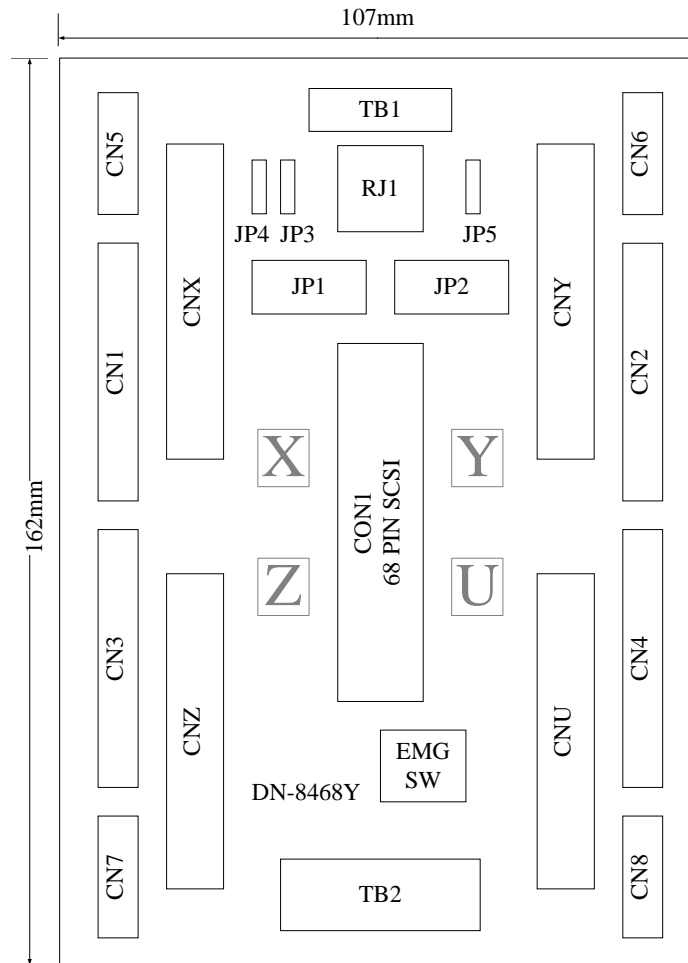


Fig. 3-1 Board layout for the DN-8468Y

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.

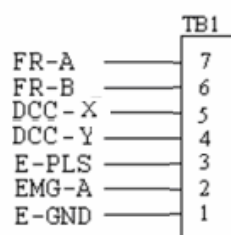


Fig. 1-3 Pin definition for TB1

Table 1-4 TB1 Signal Connection

Name	Description
FR-A	FRnet port A
FR-B	FRnet port B
DCC - X	Deviation Counter Clear for X axis
DCC - Y	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.

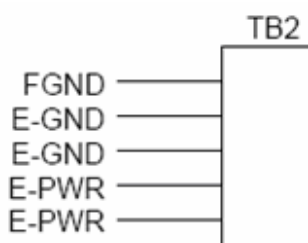


Fig. 1-4 Pin definition for TB2

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.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.

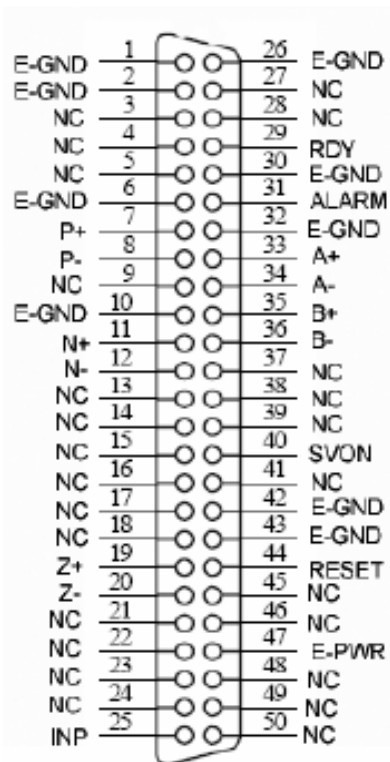


Fig. 3-5 Pin definition for CNX, CNY, CNZ, CNU

Table 3-6 CN1 Signal Connection

Name	Number	Description
A+	33	Encoder A-Phase (+)
A-	34	Encoder A-Phase (-)
B+	35	Encoder B-Phase (+)
B-	36	Encoder B-Phase (-)
Z+	19	Encoder Z-Phase (+)
Z-	20	Encoder Z-Phase (-)
P+	7	Positive Direction Pulse Output(+)
P-	8	Positive Direction Pulse Output(-)
N+	11	Negative Direction Pulse
N-	12	Negative Direction Pulse Output(-)
INP	25	Servo In Position
RDY	29	Servo Ready
SVON	40	Servo On
RESET	44	Parameter Reset
ALARM	31	Servo Alarm
E-PWR	47	EXT power +24V
E-GND	1,2,8,10, 28, 30,32, 42,43	EXT power ground
NC	3,4,5,9, 13,14,15, 18,17,18, 21,22,23, 24,27,28, 37,38,39, 41,45,48, 48,49,50,	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.

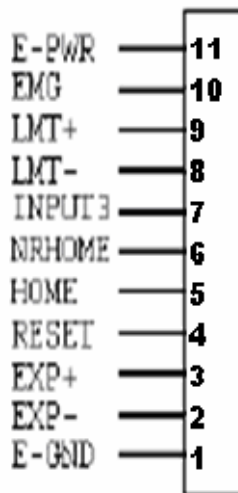


Fig. 1-7 Pin definition for CN1 ~ CN4

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.

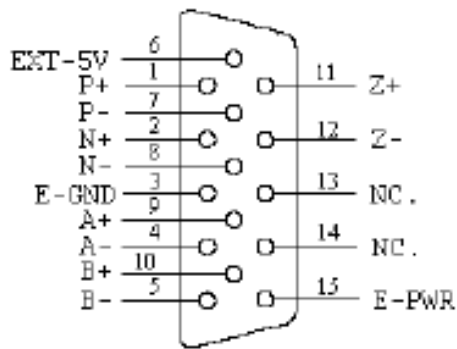


Fig. 3-8 Pin definition for CN5 ~ CN8

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.

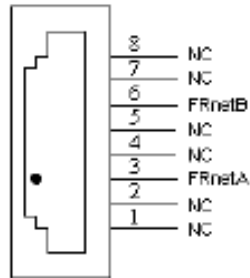


Table 3-10 RJ1

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

Fig. 3-9 Pin definition for RJ1

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

B. 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.

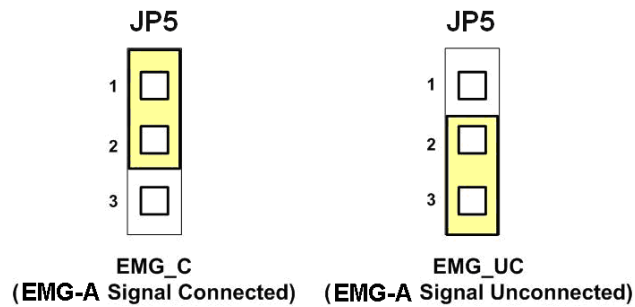


Fig. 3-10 Jumper 5 setting

■ 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.

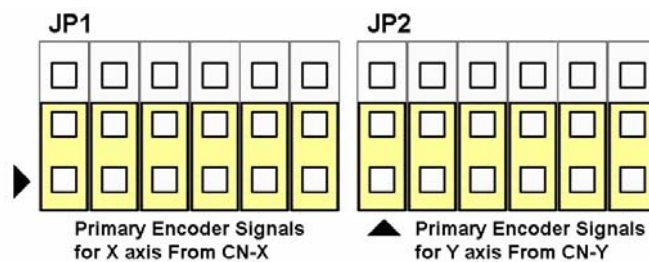


Fig. 3-11 Primary encoder signals setting

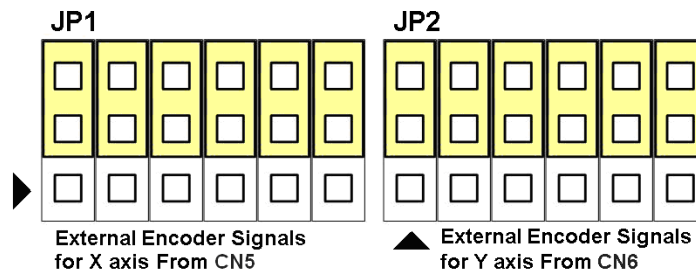


Fig. 3-12 External encoder signals setting

■ EMG SW

The emergency stop signal for each servo amplifier 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 signals 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.

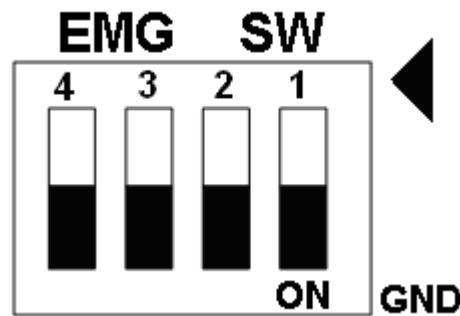


Fig. 3-13 EMG SW setting for normally GND (Default setting)

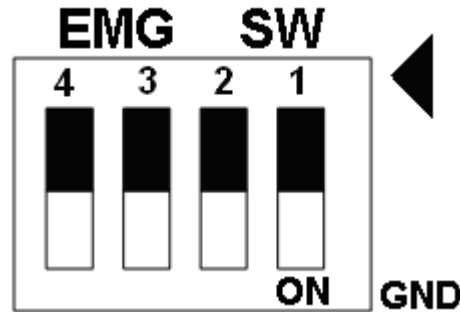


Fig. 3-14 EMG SW setting for user controlled signals.

B.4 DN-8468D Daughter Board

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

B.4.1 Board Layout for DN-8468D

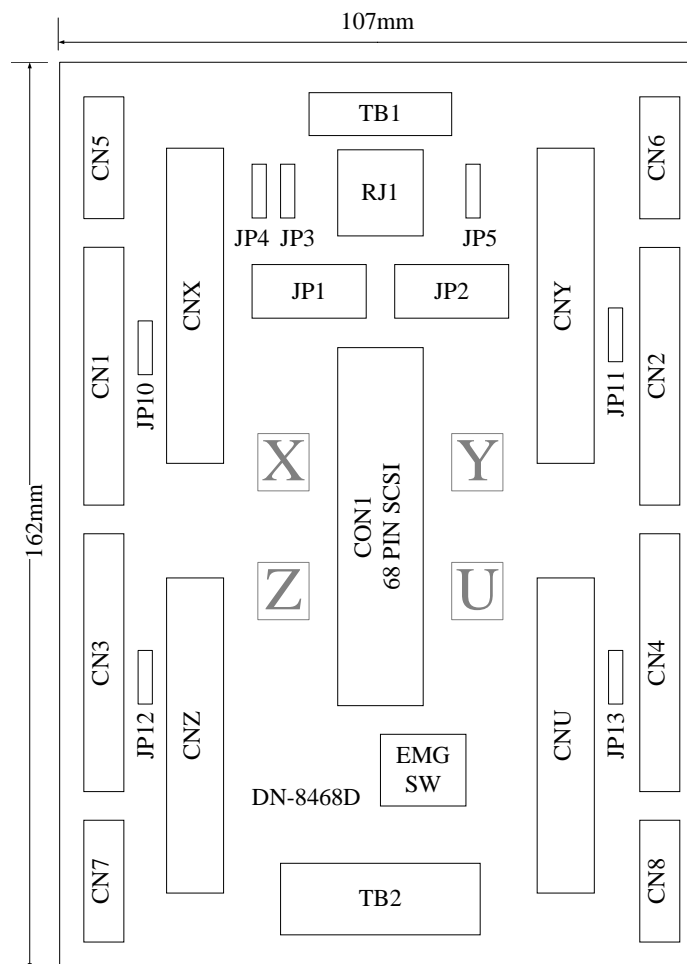


Fig. 3-1 Board layout for the DN-8468D

B. 4. 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.

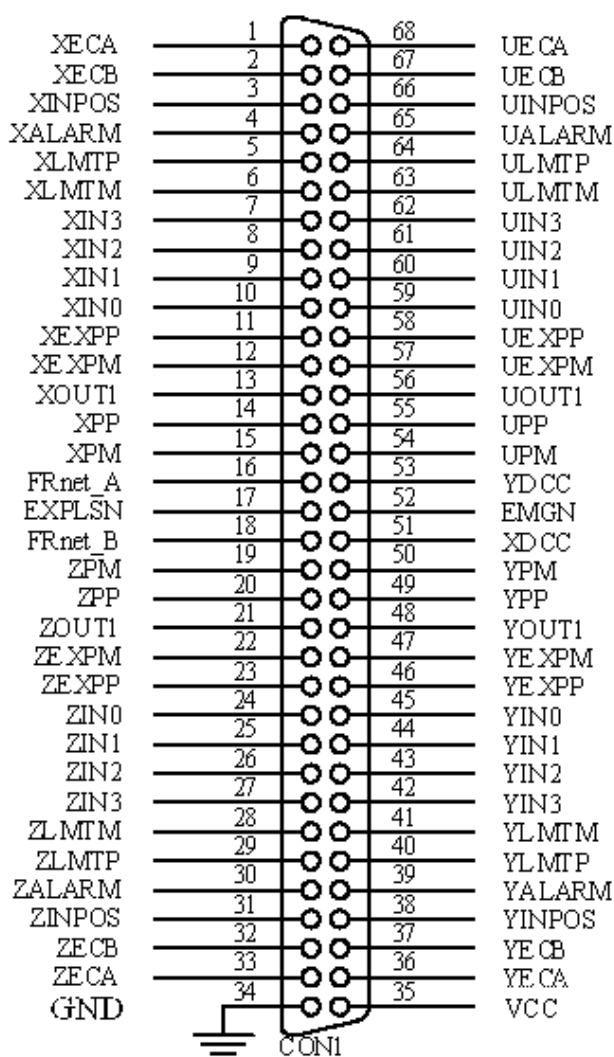


Fig. 3-2 I/O connector pin assignment for the CON1

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
XLMTM	5	Limit switch input signal (+) for X axis
YLMTM	40	Limit switch input signal (+) for Y axis
ZLMTM	29	Limit switch input signal (+) for Z axis
ULMTM	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.

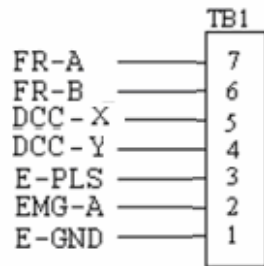


Fig. 1-3 Pin definition for TB1

Table 1-4 TB1 Signal Connection

Name	Description
FR-A	FRnet port A
FR-B	FRnet port B
DCC - X	Deviation Counter Clear for X axis
DCC - Y	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.

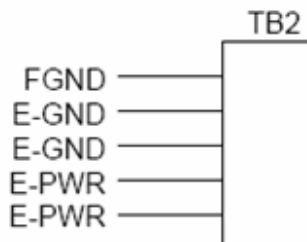


Fig. 1-4 Pin definition for TB2

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 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.

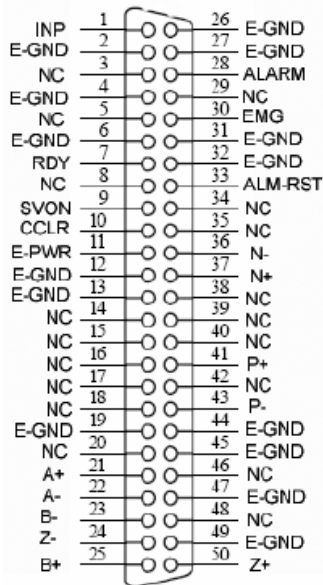


Fig. 3-5 Pin definition for CNX, CNY, CNZ, CNU

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.

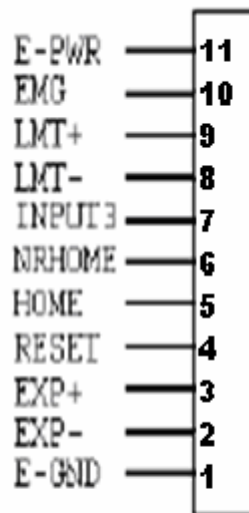


Fig.1 -7 Pin definition for CN1 ~ CN4

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.

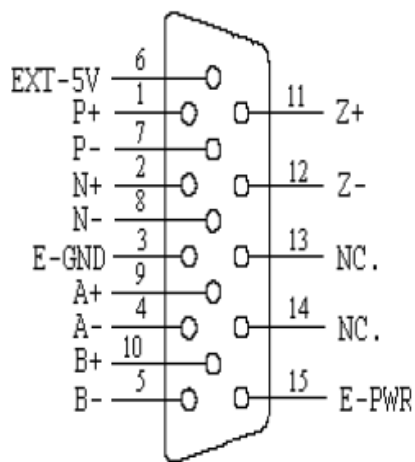


Fig. 3-8 Pin definition for CN5 ~ CN8

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.

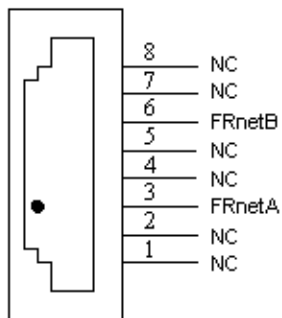


Fig. 3-9 Pin definition for RJ1

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.

B. 4. 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.

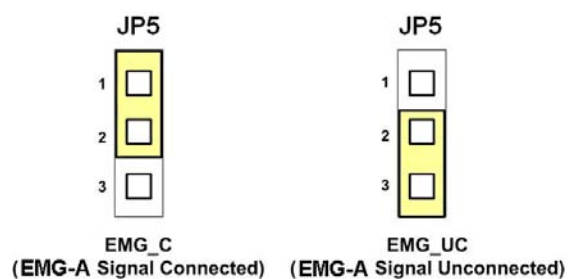


Fig. 3-10 Jumper 5 setting

■ 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.

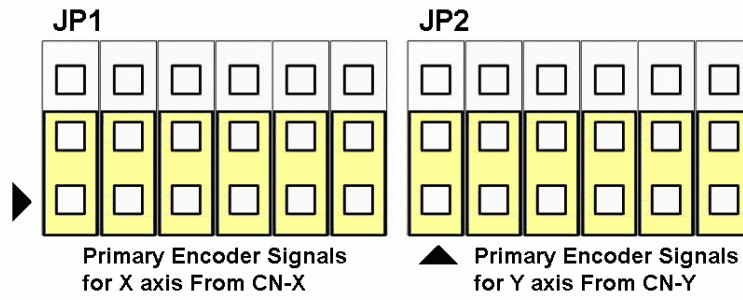


Fig. 3-11 Primary encoder signals setting

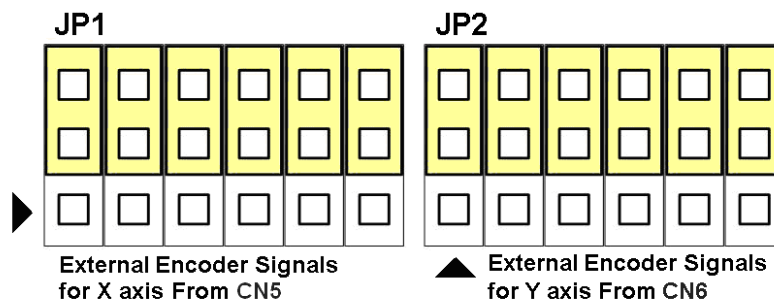


Fig. 3-12 External encoder signals setting

■ SW1

The emergency stop signal for each servo amplifier 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 signals 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.

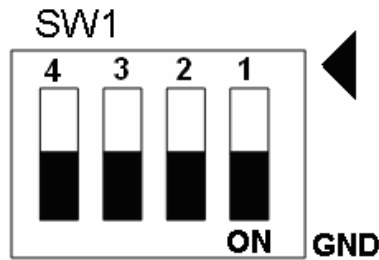


Fig. 3-13 SW1 setting for normally GND (Default setting)

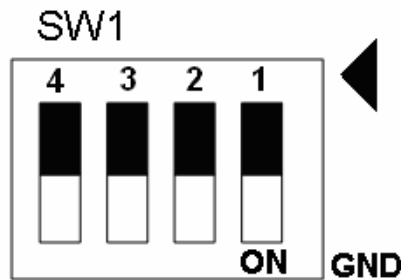


Fig. 3-14 SW1 setting for user controlled signals.

■ 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.

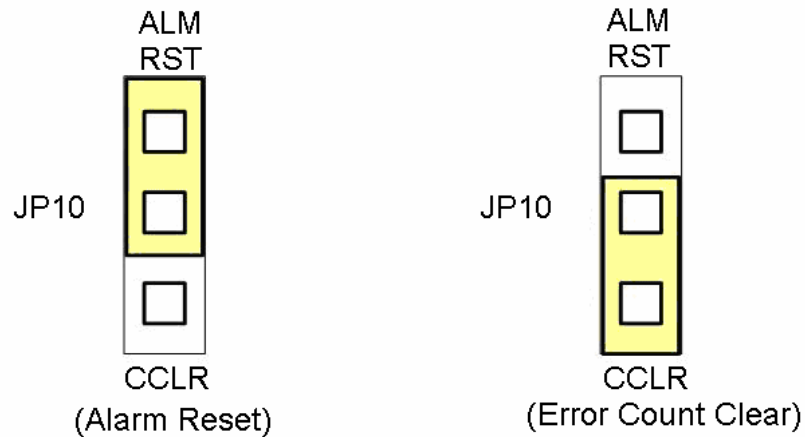


Fig. 3-15 JP 10 ~ 13 setting

B.5 DN-8468FB Daughter Board

The DN-8468FB is the daughter board for FUJI FALDIC-W Series Amplifier. It has 4-axis I/O signals.

B.5.1 Board Layout for DN-8468FB

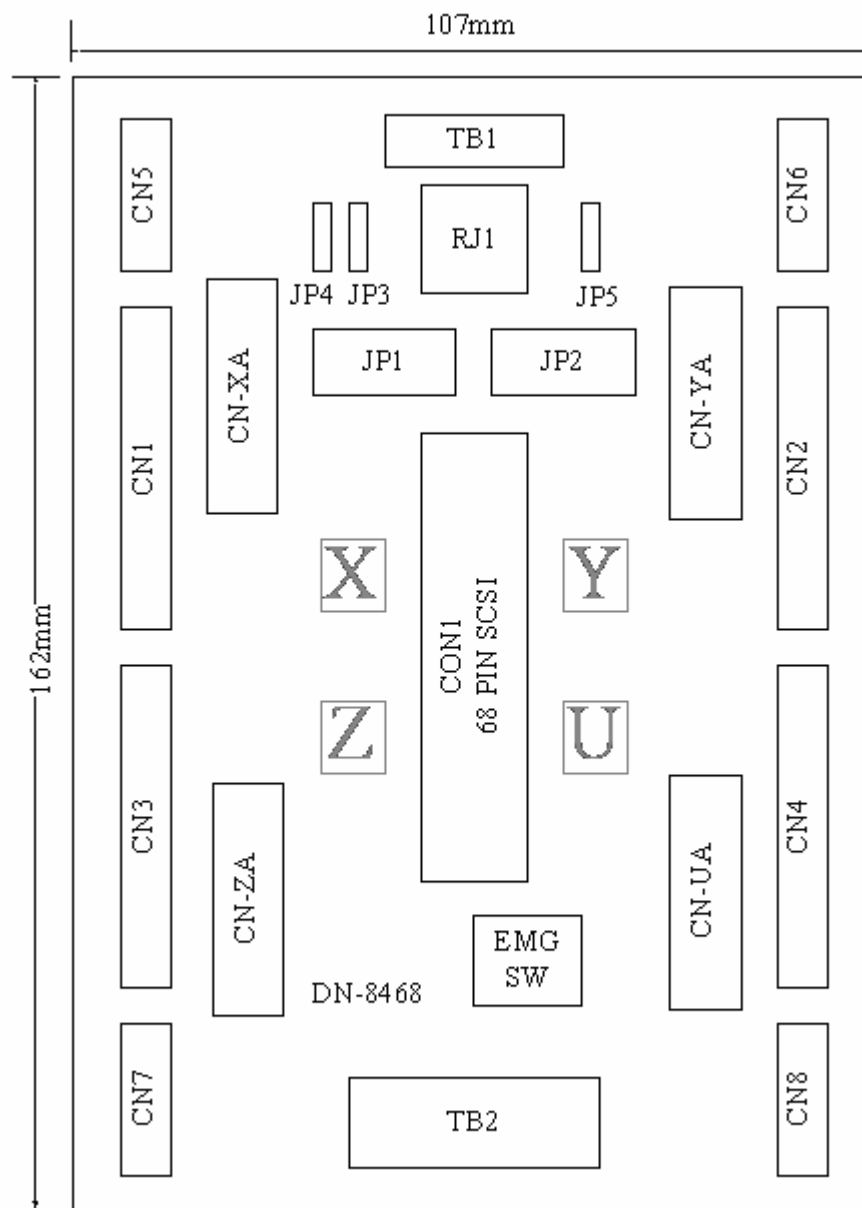


Fig. 3-1 Board layout for the DN-8468FB

B.5.2 Signal Connections for DN-8468FB

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-8468FB 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-8468FB (or on the I-8094), and refer to Table 3-2, 3-3 for description of each motion I/O signal.

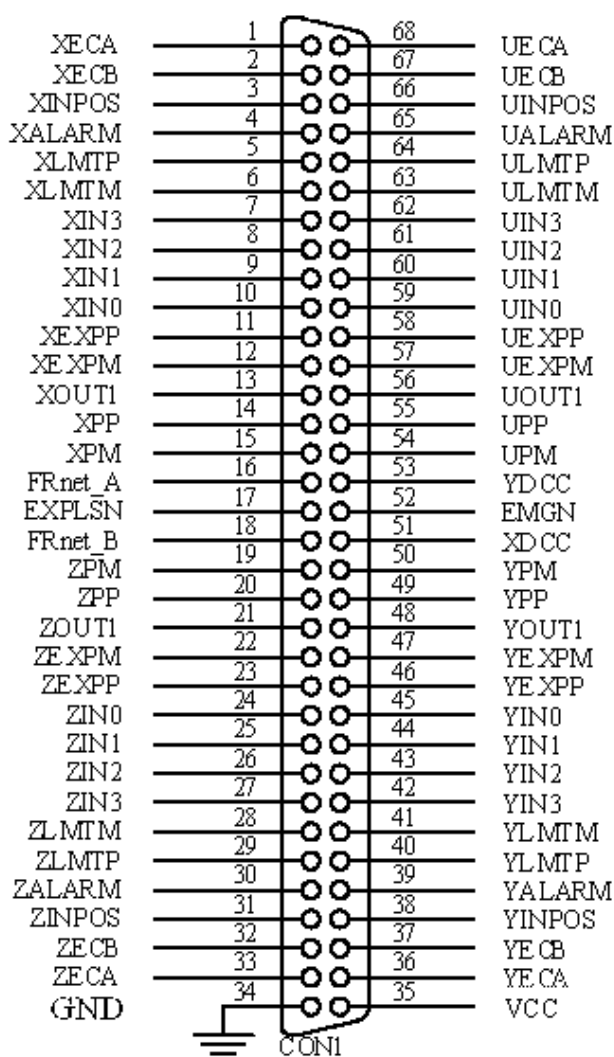


Fig. 3-2 I/O connector pin assignment for the CON1

Table 3-2 DN-8468FB 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
XLMTM	5	Limit switch input signal (+) for X axis
YLMTM	40	Limit switch input signal (+) for Y axis
ZLMTM	29	Limit switch input signal (+) for Z axis
ULMTM	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-8468FB 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-8468FB, and the Table 3-4 shows its I/O connector signal description.

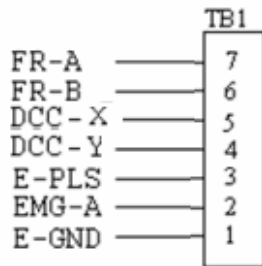


Fig. 1-3 Pin definition for TB1

Table 1-4 TB1 Signal Connection

Name	Description
FR-A	FRnet port A
FR-B	FRnet port B
DCC - X	Deviation Counter Clear for X axis
DCC - Y	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-8468FB, and the Table 3-5 shows its I/O connector signal description.

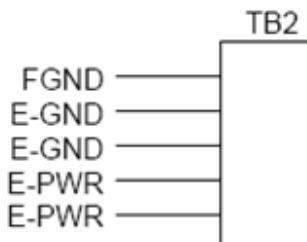


Fig. 1-4 Pin definition for TB2

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-X, CN-Y, CN-Z, CN-U (CN1 connector for each AXIS in Driver)**

The connectors CN-X, CN-Y, CN-Z, and CN-U are 26-pin connectors that enable you to connect to the CN1 connector of FUJI FALDIC-W series motor drivers. Fig.3-5 shows the pin assignment for the 26-pin connector on the DN-8468FB, and the Table 3-6 shows its I/O connector signal description.

Table 3-6 CN-X ,CN-Y ,CN-Z ,CN-U

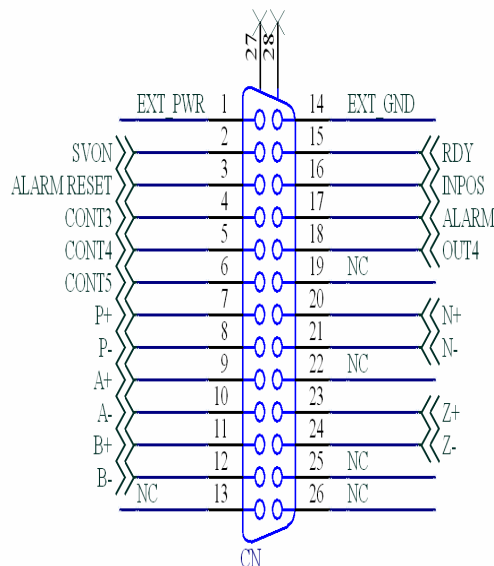


Fig 3-5 Pin definition for CN-X, CN-Y, CN-Z, CN-U

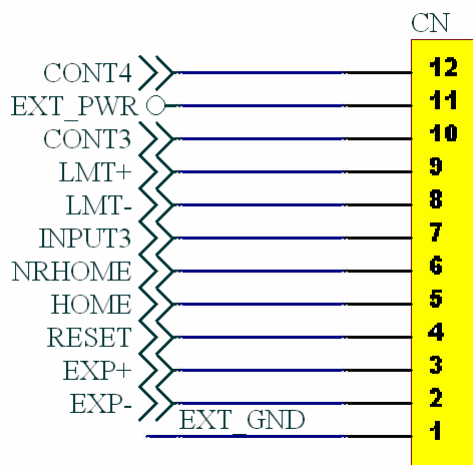
Name	No	Description
EXT_PWR	1	EXT POWER 24V
SVON	2	CONT1 of Servo Motor (default: SVON)
ALARM RESET	3	CONT2 of Servo Motor (default: ALARM RESET)
CONT3	4	CONT3 of Servo Motor
CONT4	5	CONT4 of Servo Motor
CONT5	6	CONT5 of Servo Motor
P+	7	Positive Direction Pulse (+)
P-	8	Positive Direction Pulse (-)
A+	9	Encoder A-phase (+)
A-	10	Encoder A-phase (-)
B+	11	Encoder B-phase (+)
B-	12	Encoder B-phase (-)
NC	13	No connection
EXT_GND	14	EXT POWER Ground
RDY	15	OUT1 of Servo Motor (default: RDY)
INPOS	16	OUT2 of Servo Motor (default: INPOS)
ALARM	17	OUT3 of Servo Motor (default: ALARM)
OUT4	18	OUT4 of Servo Motor
NC	19	No connection
N+	20	Negative Direction Pulse (+)
N-	21	Negative Direction Pulse (-)
NC	22	No connection
Z+	23	Encoder Z-phase (+)
Z-	24	Encoder Z-phase (-)
NC	25	No connection
NC	26	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 12-pin connectors that enable you to connect to the signals of your motor drivers. Fig.3-7 shows the pin assignment for the 12-pin connector on the DN-8468FB, and the Table 3-8 shows its I/O connector signal description.

Table 3-8 CN1~CN4



Name	Number	Description
CONT4	12	CONT4 of Servo Motor
EXT_PWR	11	EXT POWER 24V
CONT3	10	CONT3 of Servo Motor
LMT+	9	Limit switch Input Signal(+)
LMT-	8	Limit switch Input Signal(-)
INPUT3	7	Input Signal (IN3)
NRHOME	6	Near HOME Sensor Input Signal
HOME	5	HOME Sensor Input Signal
RESET	4	RESET Input Signal
EXP+	3	EXT Positive Direction Pulse(+)
EXP-	2	EXT Positive Direction Pulse(-)
EXT_GND	1	EXT POWER Ground

Fig 3-7 Pin definition for CN1~ CN4

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

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

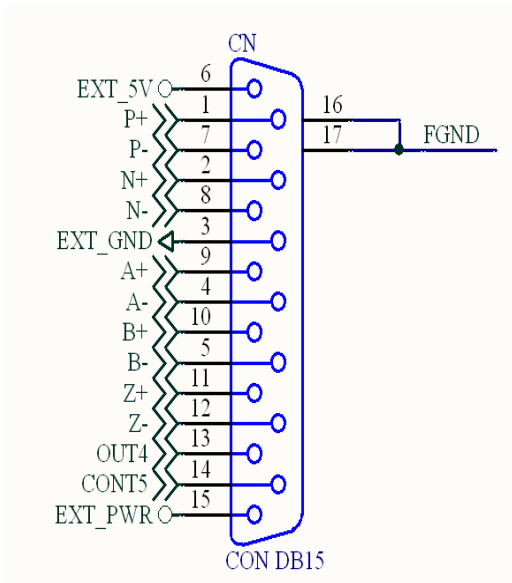


Table 3-9 CN5~CN8

Name	Number	Description
P+	1	Positive Direction Pulse(+)
N+	2	Negative Direction Pulse(+)
EXT_GND	3	EXT POWER Ground
A-	4	Encoder A-phase(-)
B-	5	Encoder B-phase(-)
EXT_5V	6	EXT POWER 5V
P-	7	Positive Direction Pulse(-)
N-	8	Negative Direction Pulse(-)
A+	9	Encoder A-phase(+)
B+	10	Encoder B-phase(+)
Z+	11	Encoder Z-phase(+)
Z-	12	Encoder Z-phase(-)
OUT4	13	OUT4 of Servo Motor
CONT5	14	CONT5 of Servo Motor
EXT_PWR	15	EXT POWER 24V

Fig 3-8 Pin definition for CN5~ CN8

- ▶ **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-8468FB, and the Table 3-10 shows its I/O connector signal description.

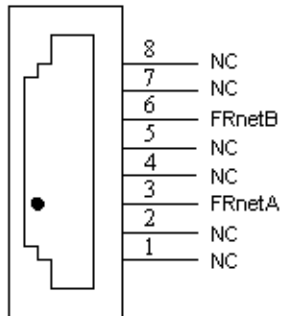


Fig. 3-9 Pin definition for RJ1

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. 5. 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.

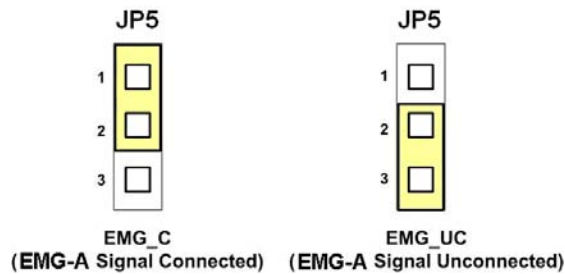


Fig. 3-10 Jumper 5 setting

■ 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.

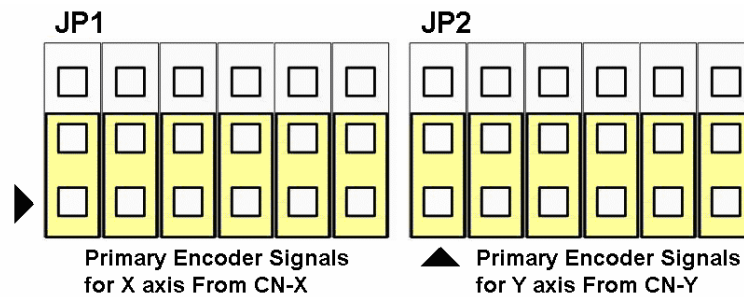


Fig. 3-11 Primary encoder signals setting

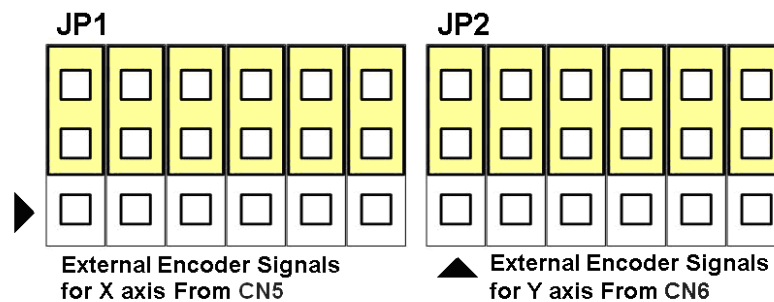


Fig. 3-12 External encoder signals setting

■ SW1

The CONT3 for each servo amplifier 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 CONT3 signals to GND. The CONT3 signals from CN1 ~ CN4 will not take effect. If the switch is disconnected as shown in Fig. 3-14, the CONT3 signals can be controlled from CONT3 signals in CN1 ~ CN4.

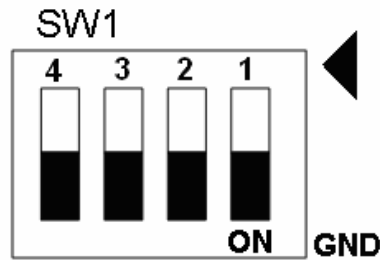


Fig. 3-13 SW1 setting for normally GND (Default setting)

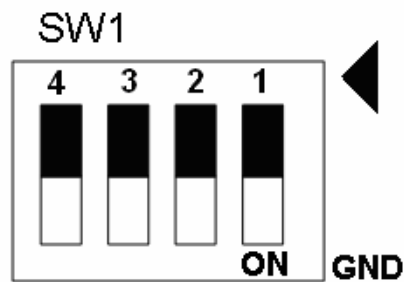


Fig. 3-14 SW1 setting for user controlled signals.