

i8094A & i-8094H 快速上手手冊

(Version 1.2)

PAC WinCon-8000 系列控制器

(適用於 i8094A & i8094H)



ICP DAS CO., LTD.

泓格科技股份有限公司

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1 i8094A/i8094H 運動控制器模組簡介

1.1 i8094A/i8094H 簡介

i8094A/i8094H 是一內鍵有 CPU、DPRAM、FRAM 及 SRAM 的整合性軸控模組且支援 4 軸步進/伺服馬達運動控制模組，輸出 Pulse 可高達 4M PPS，配合泓格公司的控制器 WinCon-8000 上。i8094A/i8094H 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，此外，i8094H 更內鍵了泓格公司特有的 FRnet 分散式 DI 及 DO 控制功能，可以外接控制 128DI 及 128DO 點，且每次週期時間為 0.74ms。而 i8094A/i8094H 在執行上述功能時，並不需耗用 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 WinCon-8000 插上多個 i8094A/i8094H 模組，以多軸(4、8....)運動控制於同一控制器上；另外，此模組因具有內鍵 CPU 等硬體設計，所以更支援了一系列的巨集程式功能，可以提供客戶規劃多組的巨集程內容，應用於程式開發時將可減少程式內容，使程式設計者在程式設計可以更靈活。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。

1.2 硬體規格

1.2.1 主要規格

■ 控制晶片	MCX314As
■ CPU	80186
■ FRAM	128KB
■ SRAM	512KB
■ EEPROM	512KB
■ 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
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- 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 $\pm 0.1\%$
- S-曲線衝量(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), 無異常時輸出ON, 橘燈亮
- 綠燈 → Motion 動作指示燈

1.2.16 Compare Trigger Output

- 僅支援X軸及Y軸
- 輸出方式 5V TTL

1.2.17 FRnet分散式DI/O (i8094H 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

- **W-8000** 嵌入式控制器系列主機(請洽相關業務單位)
- **i8094A/i8094H** 4軸運動控制器模組
- **DN-8468GB** i8094A/i8094H 端子板
- **DN-8468DB** i8094A/i8094H 端子板
- **DN-8468MB** i8094A/i8094H 端子板
- **DN-8468PB** i8094A/i8094H 端子板
- **DN-8468YB** i8094A/i8094H 端子板
- **CA-SCSI15** 68-pin SCSI-II 接頭線，長度:1.5 m
- **CA-SCSI30** 68-pin SCSI-II 接頭線，長度:3 m
- **CA-SCSI50** 68-pin SCSI-II 接頭線，長度:5 m
- **i8094AG-G/S** 整組 i8094A + DN-8468GB +CA-SCSI15 (G=灰色)
- **i8094AD-G/S** 整組 i8094A + DN-8468DB +CA-SCSI15 (G=灰色)
- **i8094AM-G/S** 整組 i8094A + DN-8468MB +CA-SCSI15 (G=灰色)
- **i8094AP-G/S** 整組 i8094A + DN-8468PB +CA-SCSI15 (G=灰色)
- **i8094AY-G/S** 整組 i8094A + DN-8468YB +CA-SCSI15 (G=灰色)
- **i8094HG-G/S** 整組 i8094H + DN-8468GB +CA-SCSI15 (G=灰色)
- **i8094HD-G/S** 整組 i8094H + DN-8468DB +CA-SCSI15 (G=灰色)
- **i8094HM-G/S** 整組 i8094H + DN-8468MB +CA-SCSI15 (G=灰色)
- **i8094HP-G/S** 整組 i8094H + DN-8468PB +CA-SCSI15 (G=灰色)
- **i8094HY-G/S** 整組 i8094H + DN-8468YB +CA-SCSI15 (G=灰色)

2 硬體接線

2.1 i8094A/i8094H 檢查包裝,及安裝

2.1.1 檢查包裝

i8094A/i8094H 是一個整合性的 4 軸 步進/伺服 馬達運動控制模組，配合泓格公司 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

- W-8000 嵌入式PAC控制器系列主機

i8094A/i8094H 需用之產品

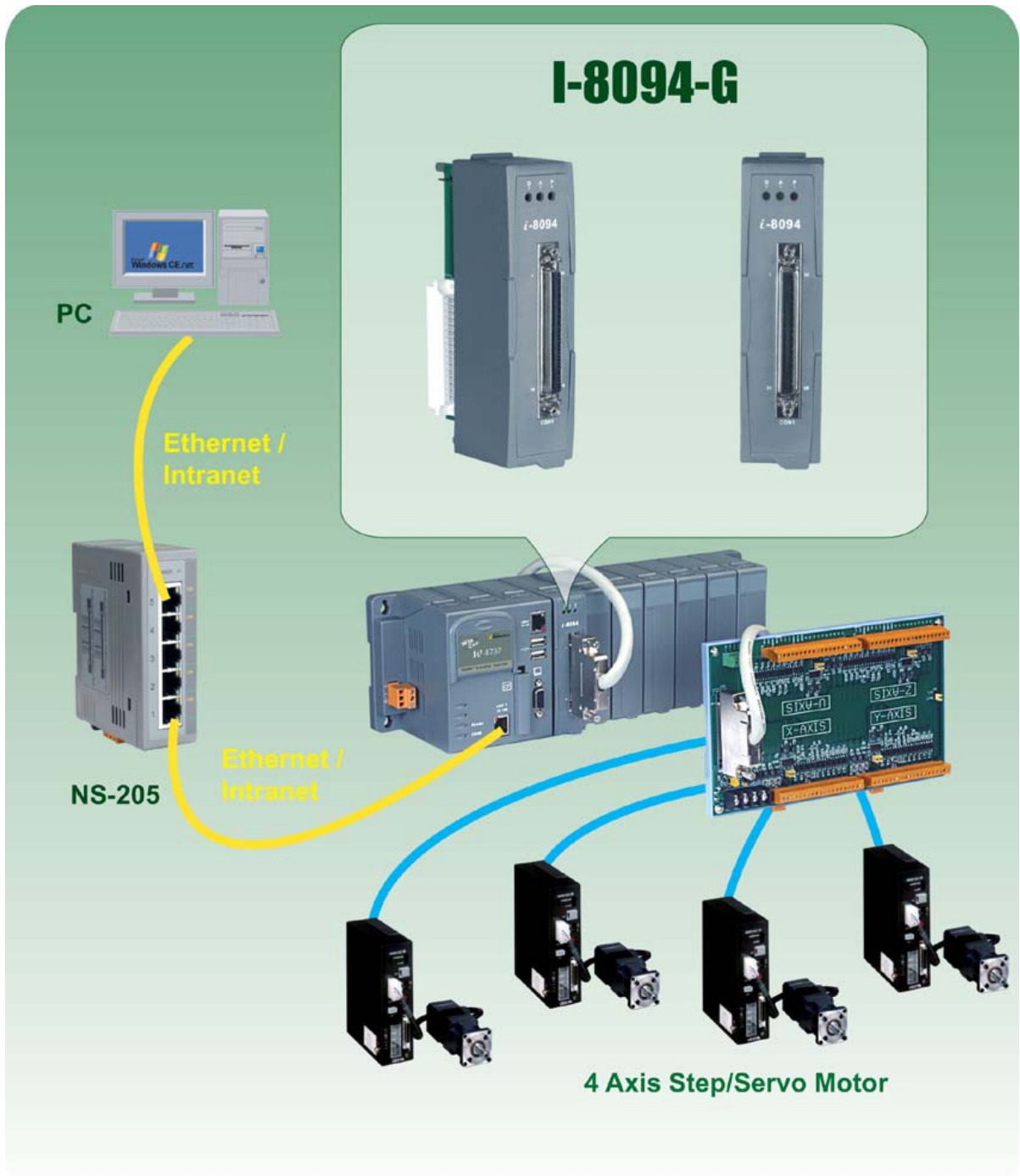
- i8094A/i8094H 整合性4軸運動控制器模組
- DN-8468系列 i8094A/i8094H 配線端子板
- CA-SCSI15 68-pin SCSI-II 接頭線，長度:1.5 m

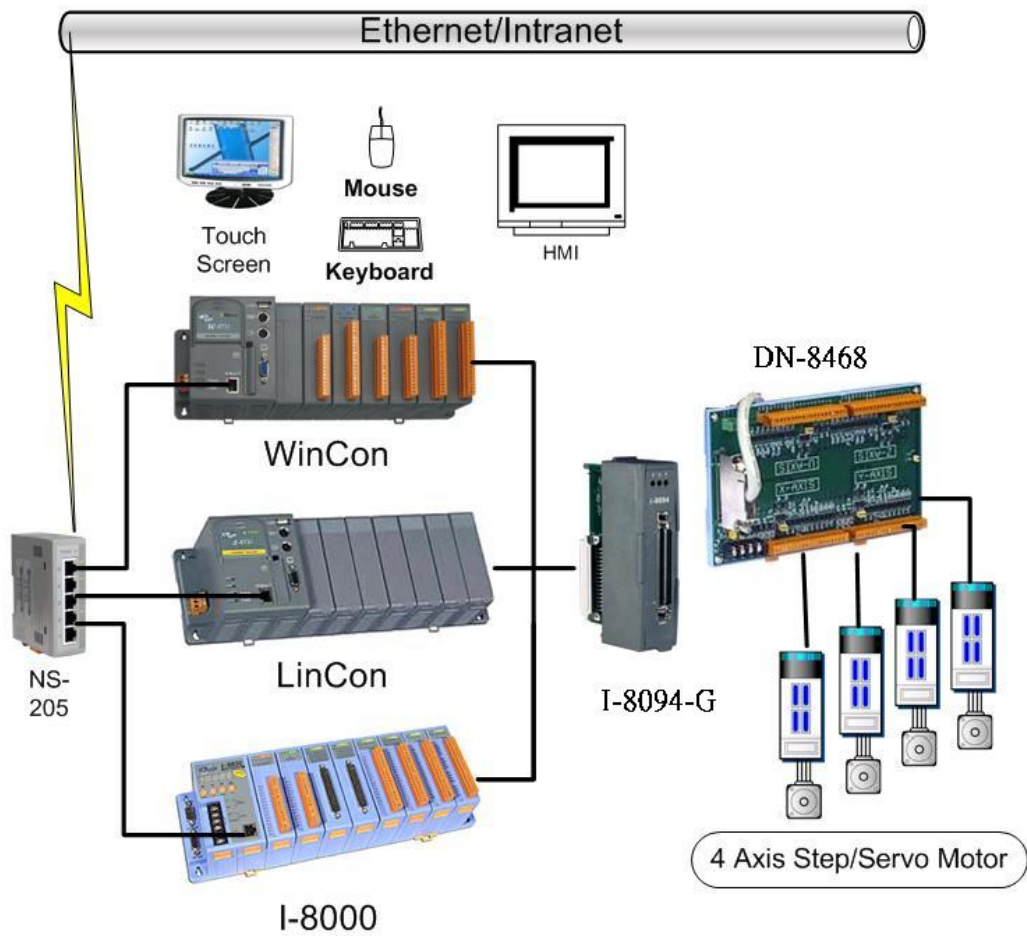
2.1.2 i8094A/i8094H安裝

準備控制器

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i8094A/i8094H小心依導槽插入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:





i8094A/i8094H 與控制器規劃圖 (WinCon-8000、LinCon-8000、I-8000)

2.2 DN-8468GB 端子板

2.2.1 DN-8468GB外觀尺寸圖

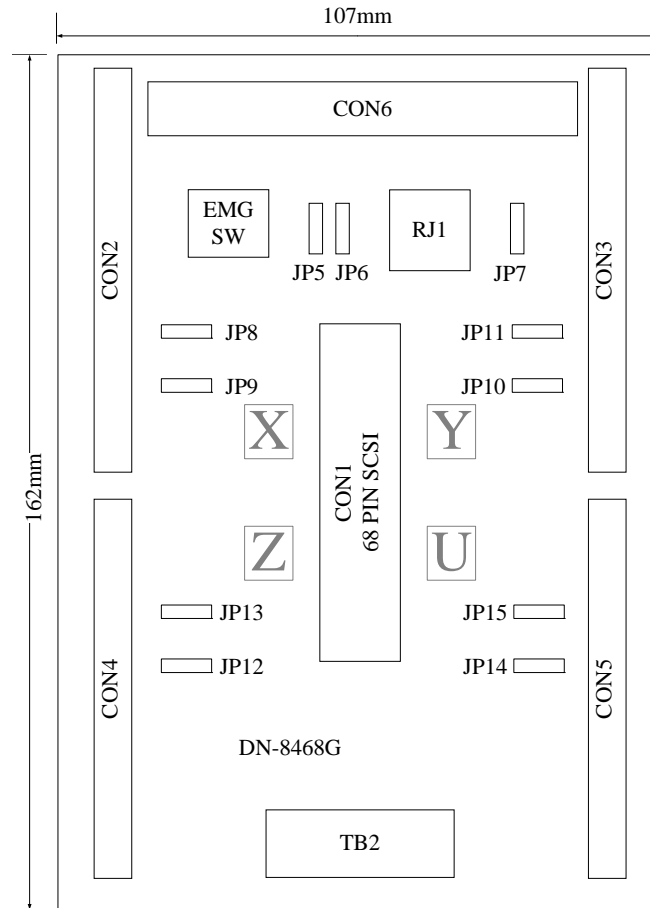


Fig. 2.0 DN-8468G外觀尺寸圖

2.2.2 腳位定義

■ CON1

68-pin 的 SCSI II 接腳定義, 主要是連結控制模組及配線端子台的接頭。

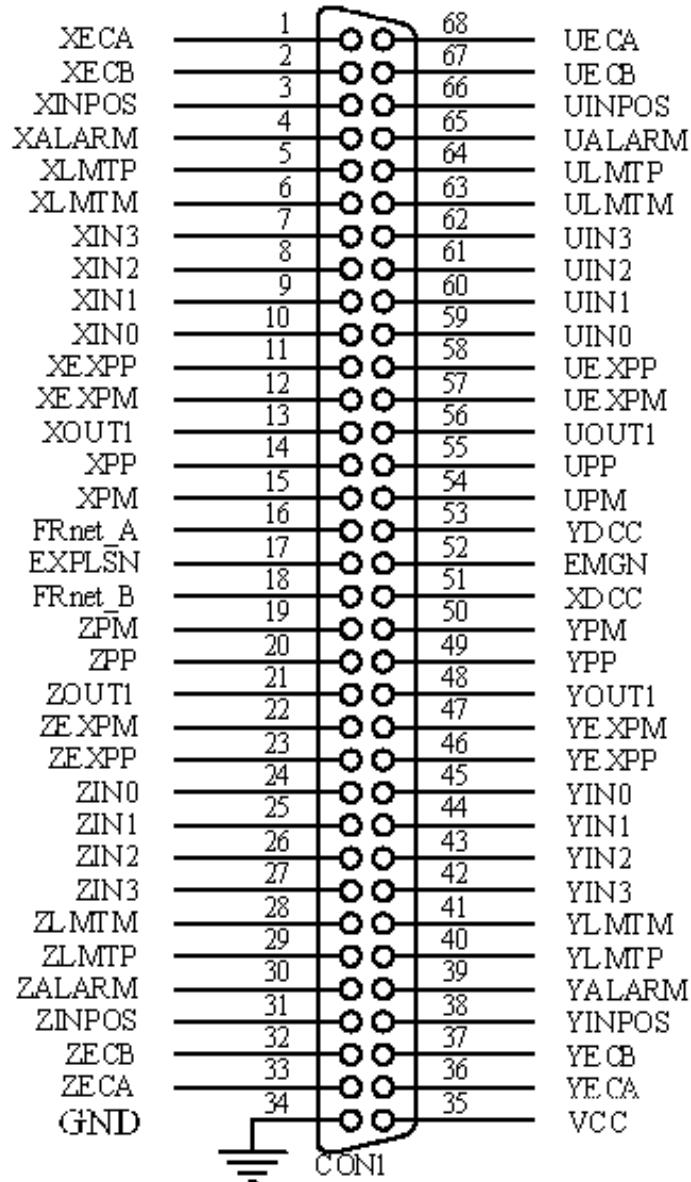


Fig. 2.1 CON1 連接線 I/O 腳位圖

Table 2.1 DN-8468G 連接線 I/O 腳位說明(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 2.2 DN-8468G 連接線 I/O 腳位說明(part 2)

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

■ CON2 ~ CON5: X、Y、Z、U 軸 I/O 信號接線內容說明

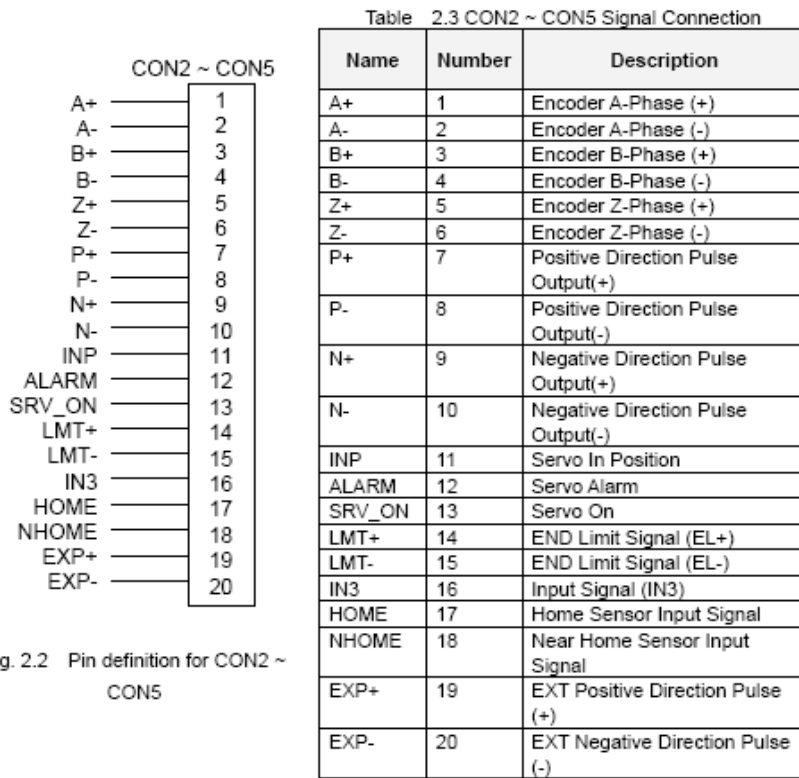


Fig. 2.2 Pin definition for CON2 ~ CON5

- CON6:是一個 16 Pin 的接頭,主要是提供使用者可以外接馬達 RDY 及 EMG 訊號,外部 Pulse 輸入,FRnet 的接點(僅 i8094H 有此功能),讓使用者可以和外部的 DI/DO 模組連接...等等;
FRnet(i8094HF) 接線可以連接 FRnet 系列 IO 模組如 FR-2053,FR-2057....詳情請參考泓格網站:http://www.icpdas.com/products/Remote_IO/frnet/frnet_introduction.htm

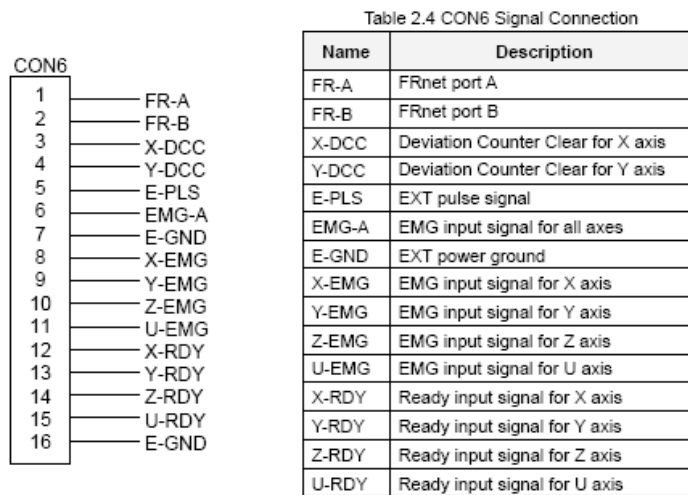


Fig. 2.3 Pin definition for CON6

■ **TB2:外部電源輸入接點**

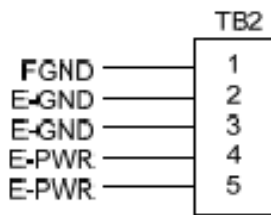


Table 2.5 TB2 Signal Connection

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

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 (The I/O signals of the FRnet):為 FRnet 的接點,是一 8-pin RJ45 接口**

FRnet(i8094HF) 接線可以連接 FRnet 系列 IO 模組如 FR-2053,FR-2057....詳情請參考泓格網站:http://www.icpdas.com/products/Remote_IO/frnet/frnet_introduction.htm

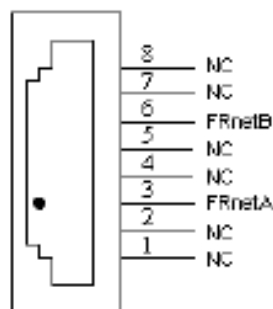


Table 2.6 RJ1

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

Fig. 2.5 Pin definition for RJ1

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

2.2.3 功能選擇(跨接器設定)

■ JP7:設定 CON6 的 EMG-A 訊號功能使用與否

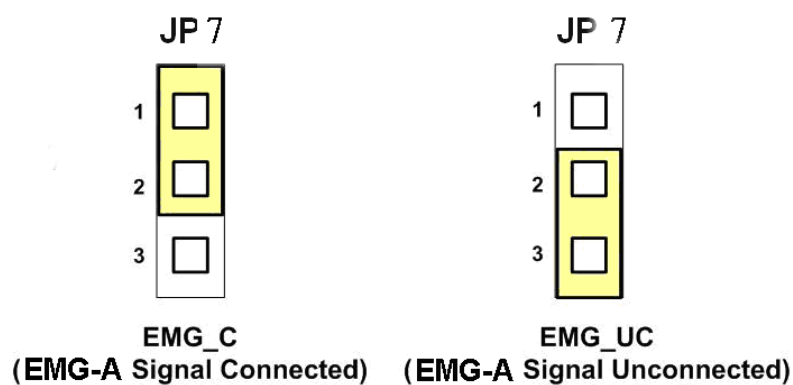


Fig. 2.6 Jumper 7 setting

■ JP8/9, JP10/11, JP12/13, JP14/15:設定各軸的 Pulse 訊號模式為差動輸出(2 & 3 腳位短路)或者是開集極方式輸出(1 & 2 腳位短路)。

▶ note: Open Collector output · P+ (N+) and EXT_5V short · offer external usage (Refer to section 2.3) .

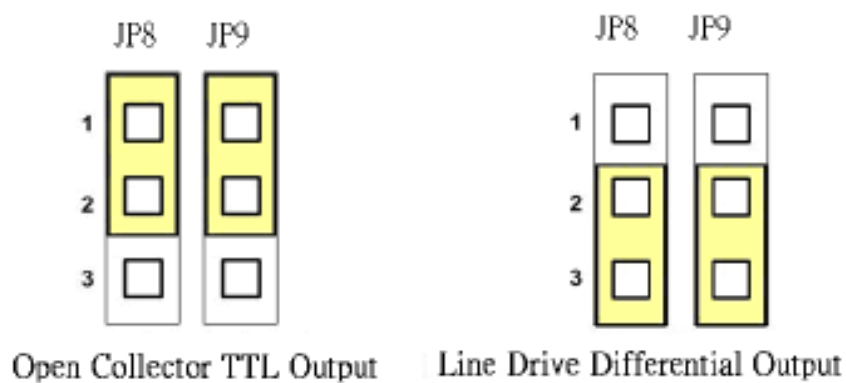


Fig. 2.10 Jumper 8, 9 setting

- **EMG SW:**設定各軸馬達的 EMG 訊號為直接連接到 GND 或者是使用者結合 CON6 的接點自行連接制。

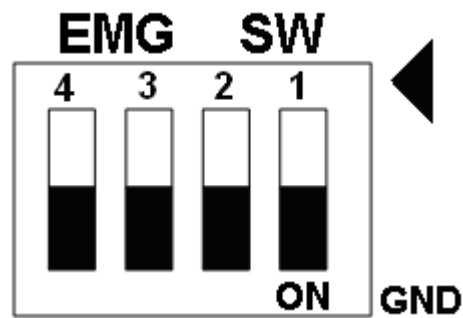


Fig. 2.7 EMG SW setting for normally GND (Default setting)

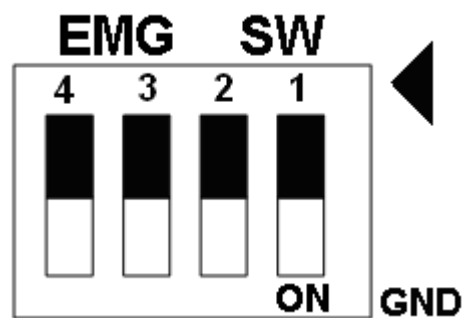


Fig. 2.8 EMG SW setting for user controlled signals.

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

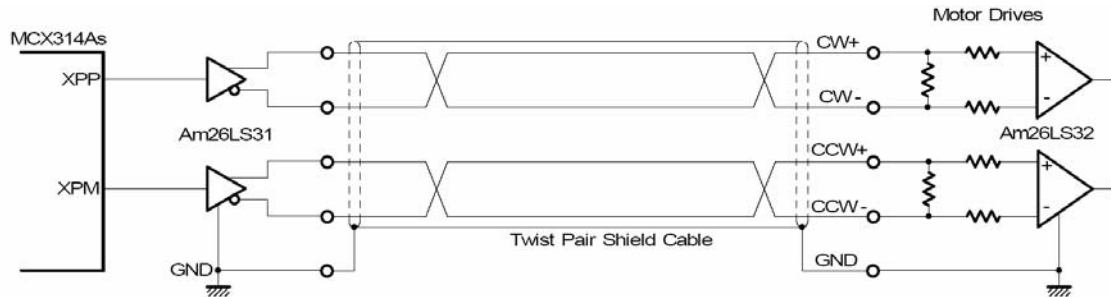


Fig. 2.8 差動脈波輸出接線

開集極輸出

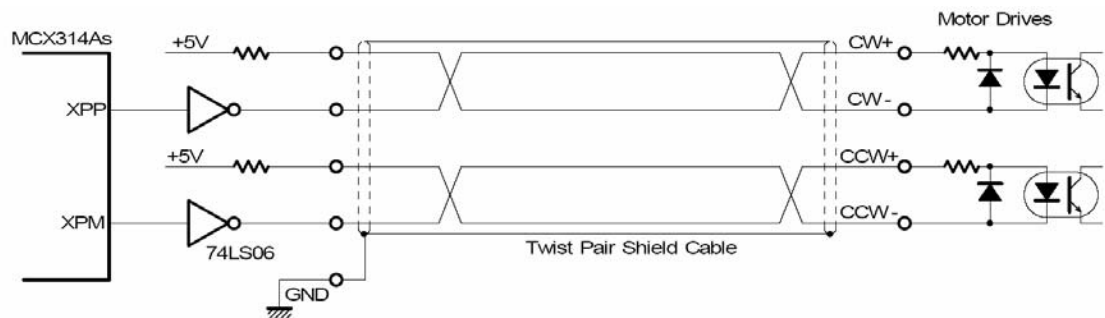


Fig. 2.9 開集極輸出

脈波信號接線範例

I8094A/I8094H 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。

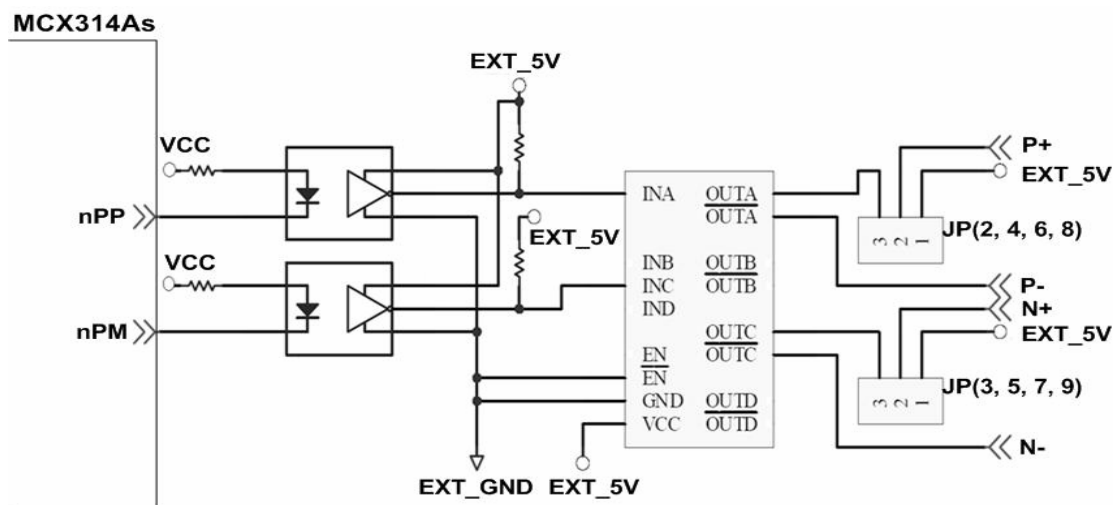


Fig. 2.10 脈波信號接線範例

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。

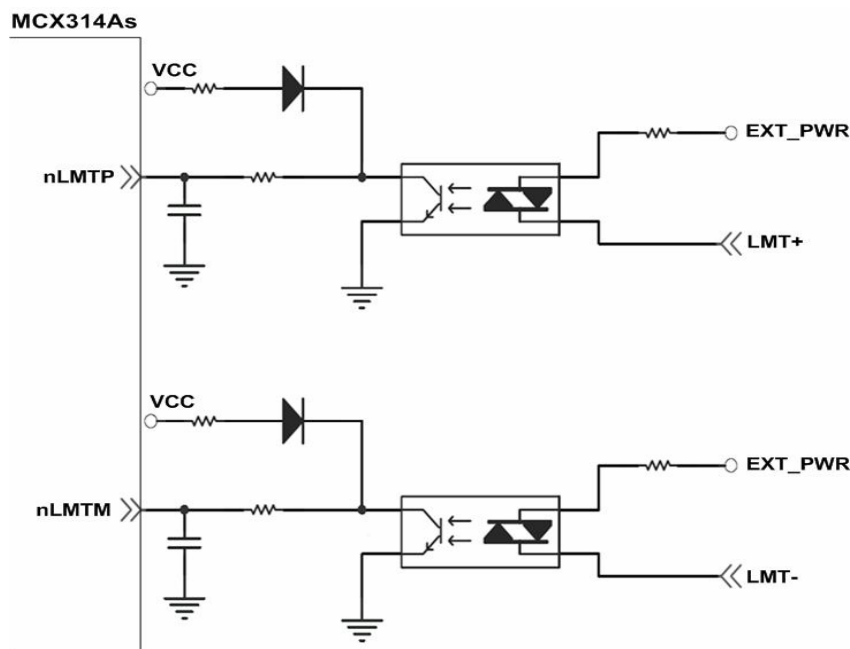


Fig. 2.11 極限開關接線範例

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 I8094A/I8094H 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。

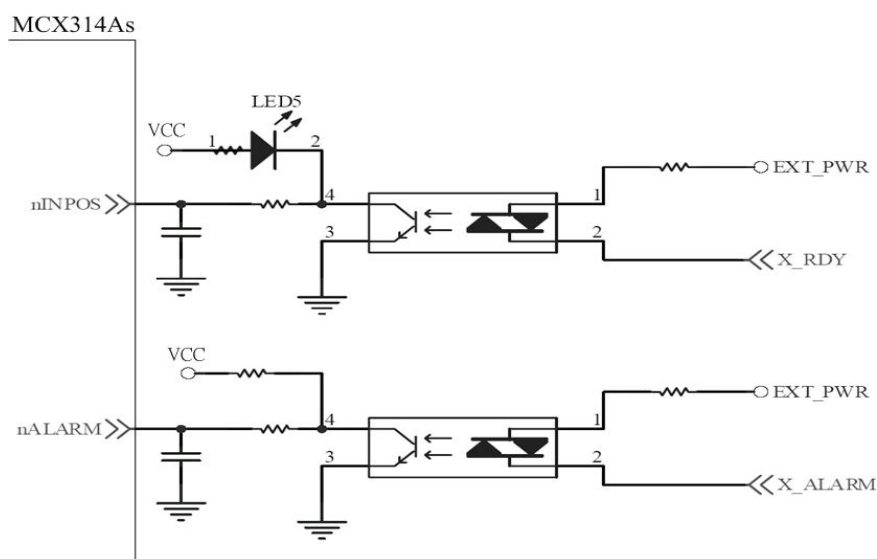


Fig. 2.12 一般 DI 輸入接線範例

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。

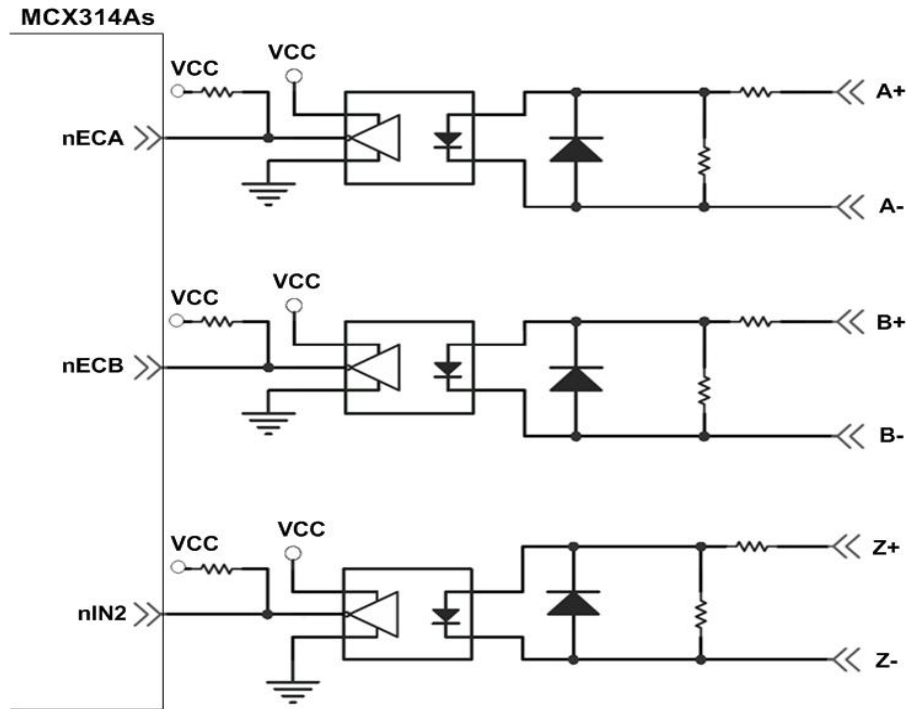


Fig. 2.13 Encoder 接線範例

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。

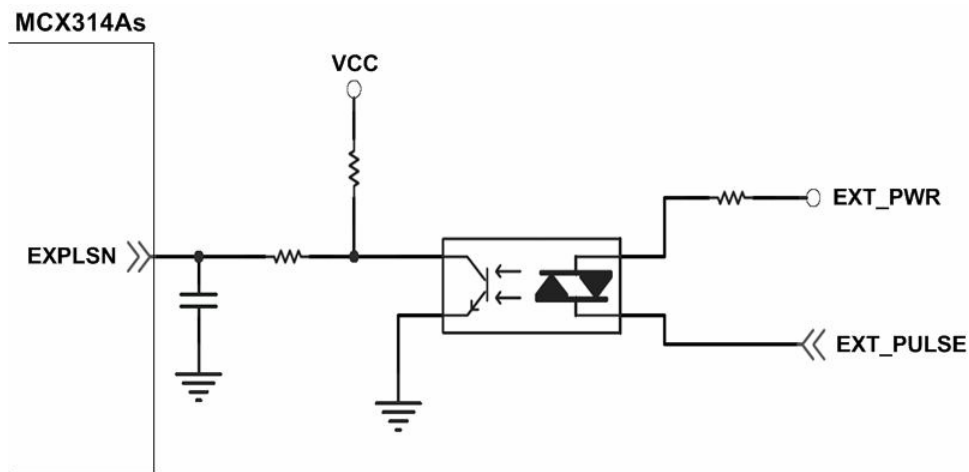


Fig. 2.14 外部輸入脈波接線範例

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。

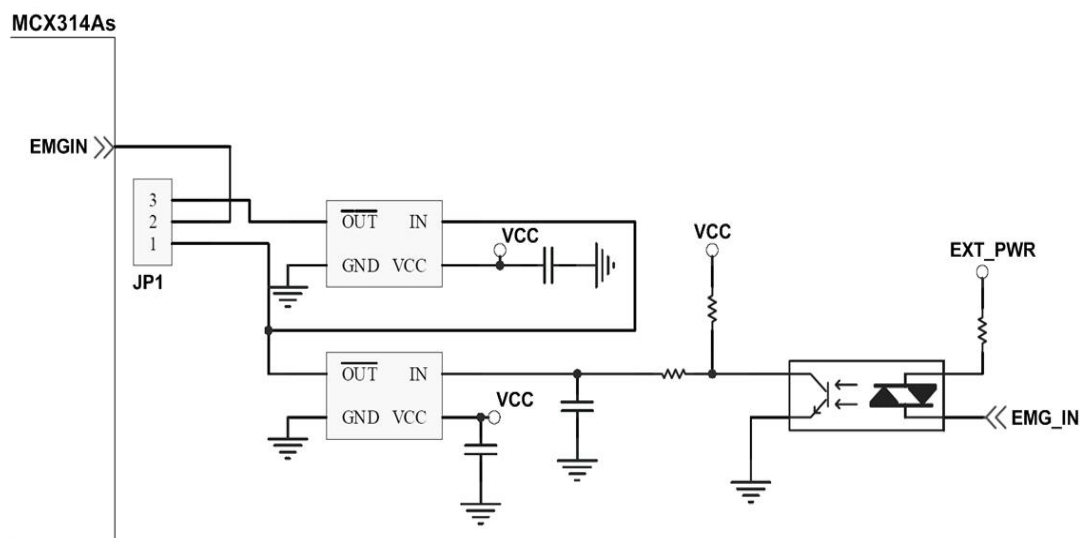


Fig. 2.15 緊急停止輸入接線範例

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。

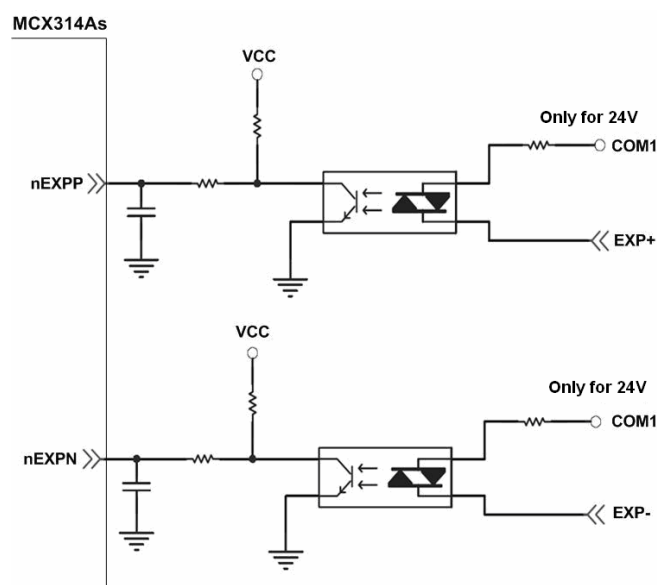


Fig. 2.16 外部信號 +/- 輸入接線範例

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。

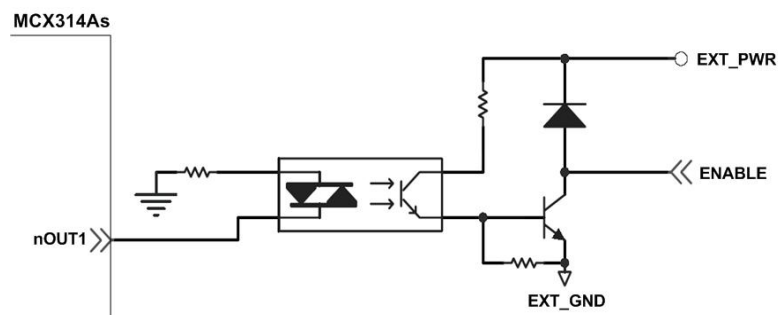


Fig. 2.17 Servo On/Off 信號輸出接線

2.3.9 Compare Trigger Output 信號輸出接線

下圖是 Trigger Out 信號輸出接線範例，此一輸出功能僅支援 X 軸及 Y 軸的 Compare Trigger Output 使客戶可以結合特殊應用，如截取影像等。

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-8468GB 的接線腳位圖

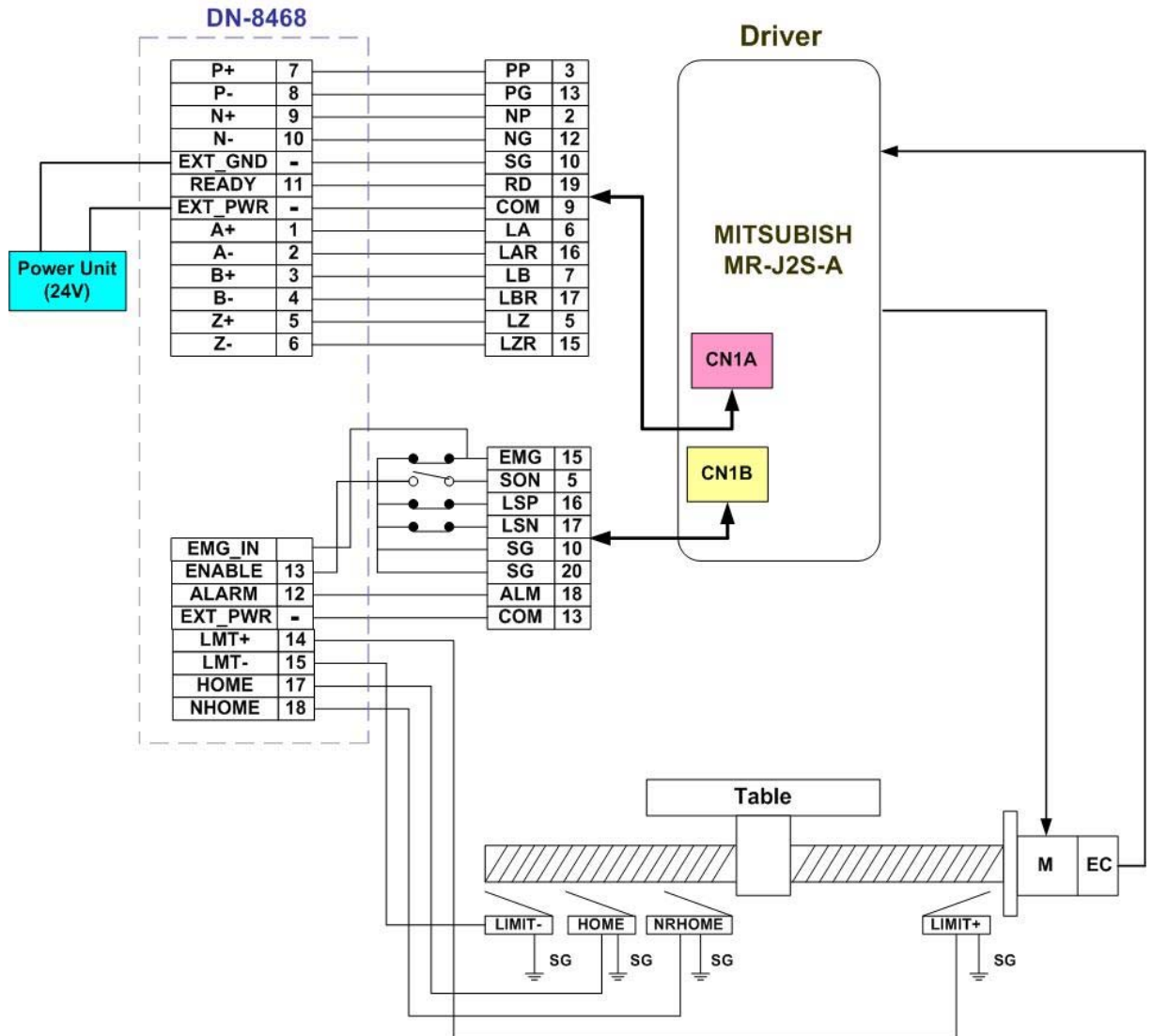
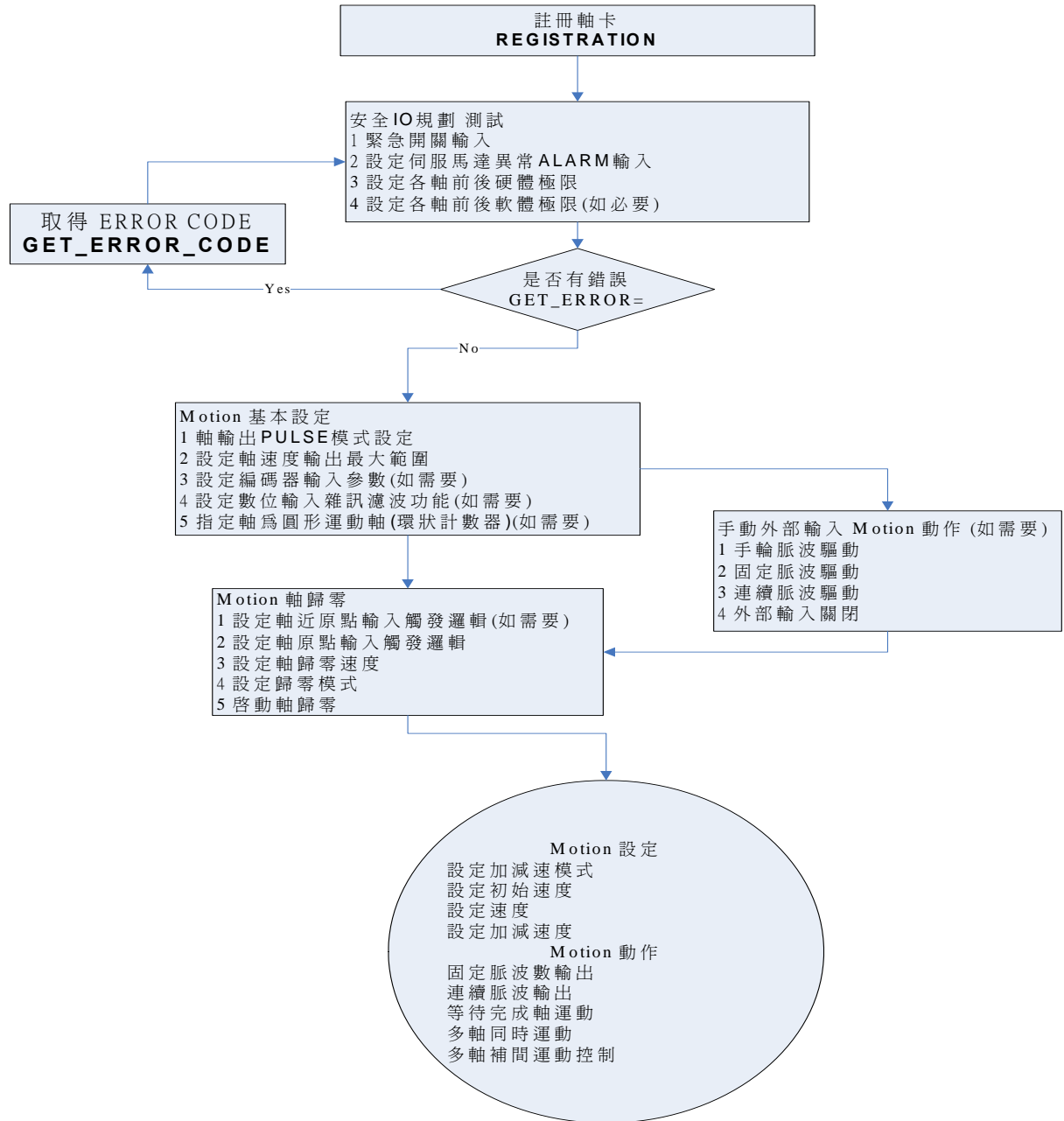


Fig. 2.18 MR-J2S AC 伺服馬達，連接到 DN-8468GB 的接線腳位圖

3 i8094A/i8094H 軟體開發程序

3.1 軟體開發測試程序概觀

詳細請參考”i8094H_start”範例程式



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。
請參考 “i8094H_Manual_1.3tc.pdf 章節 2.2” i8094H_REGISTRATION()。

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。

請參考 “i8094H_Manual_1.3tc.pdf 章節2.13” i8094H_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I8094A/I8094H會自動停止，您可以選擇使用適當觸發邏輯。

請參考 “i8094H_Manual_1.3tc.pdf 章節2.6” i8094H_SET_HLMT()。

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I8094A/I8094H會自動停止，您可以選擇使用與否，與設定位置。

請參考 “i8094H_Manual_1.3tc.pdf 章節2.10” i8094H_SET_SLMT()。

請參考 “i8094H_Manual_1.3tc.pdf 章節2.10” i8094H_CLEAR_SLMT()。

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，也可以讀取目前DI狀態，確認DI輸入是否正確。

請參考 “i8094H_Manual_1.3tc.pdf 章節3.5” i8094H_GET_DI()。

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...

請參考 “i8094H_Manual_1.3tc.pdf 章節2.4” i8094H_SET_PULSE_MODE()。

2 設定軸速度輸出最大範圍，設定每一軸最高速度

請參考 “i8094H_Manual_1.3tc.pdf 章節2.5” i8094H_SET_MAX_V ()。

3 設定編碼器輸入參數(如需要)

請參考 “i8094H_Manual_1.3tc.pdf 章節2.11” i8094H_SET_ENCODER()。

4 設定數位輸入雜訊濾波功能(如需要)

請參考 “i8094H_Manual_1.3tc.pdf 章節2.15” i8094H_SET_FILTER()。

5 指定軸為圓形運動軸(環狀計數器)(如需要)

請參考 “i8094H_Manual_1.3tc.pdf 章節2.16” i8094H_VRING_ENABLE()。

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。

請參考 “i8094H_Manual_1.3tc.pdf 章節2.18.1” i8094H_EXD_MP()。



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。

請參考 “i8094H_Manual_1.3tc.pdf 章節2.18.2” i8094H_EXD_FP()。

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。

請參考 “i8094H_Manual_1.3tc.pdf 章節2.18.3” i8094H_EXD_CP()。

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。

請參考 “i8094H_Manual_1.3tc.pdf 章節2.18.4” i8094H_EXD_DISABLE()。

3.6 軸歸零

I8094A/I8094H 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)

請參考 “i8094H_Manual_1.3tc.pdf 章節 2.8” i8094H_SET_NHOME()。

2 設定軸原點輸入觸發邏輯

請參考 “i8094H_Manual_1.3tc.pdf 章節 2.9” i8094H_SET_HOME_EDGE()。

3 設定軸歸零速度

設定歸零速度值和開始啟動速度值：

請參考 “i8094H_Manual_1.3tc.pdf 章節 5.1” i8094H_SET_HV()。

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.1.2” i8094H_SET_SV()。

4 設定歸零模式

請參考 “i8094H_Manual_1.3tc.pdf 章節 5.3” i8094H_SET_HOME_MODE()。

3.6.2 執行歸零設定

1 啟動軸歸零

請參考 “i8094H_Manual_1.3tc.pdf 章節 5.4” i8094H_HOME_START()。

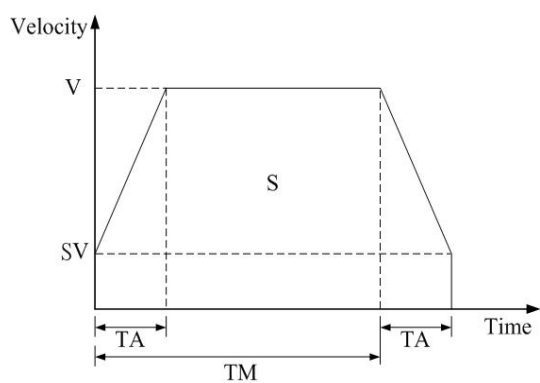
2 等待完成歸零動作

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.5.3” i8094H_STOP_WAIT()。

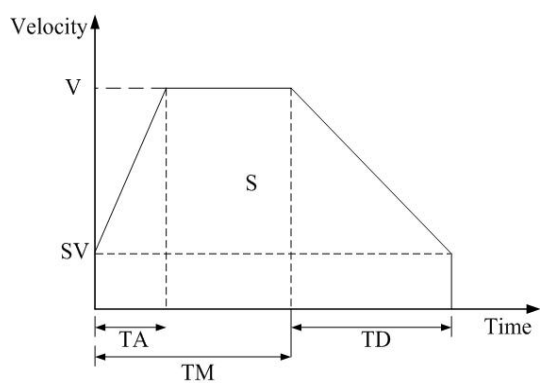
請參考 “i8094H_Manual_1.3tc.pdf 章節 7.2.7” i8094H_MP_STOP_WAIT()。

3.7 Motion 基本運作

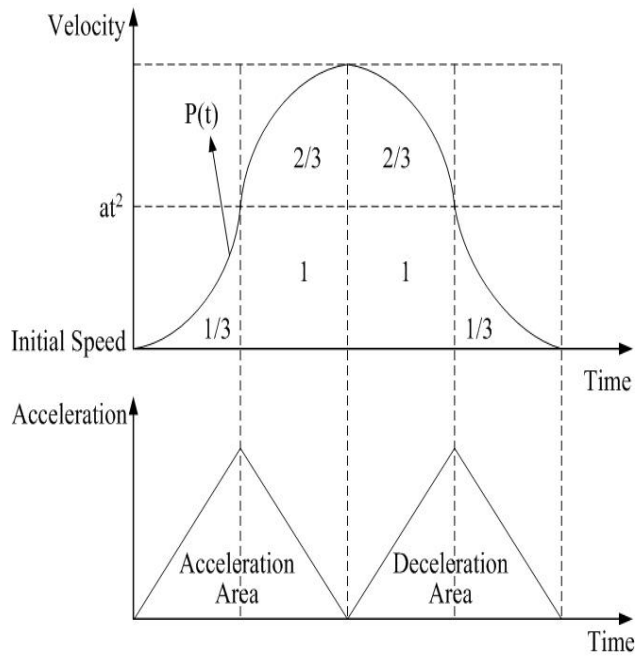
3.7.1 一般運動控制速度曲線分類



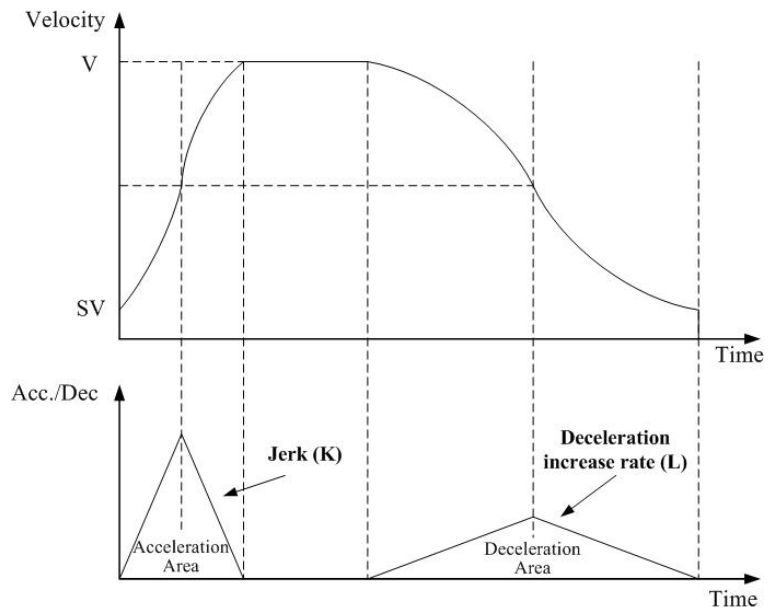
1 對稱 T 型運動控制速度曲線(如 SV 大於等於 V, 將執行定速驅動)



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)

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.1.1” i8094H_NORMAL_SPEED()。

2 設定初始速度: 設定最低速度

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.1.2” i8094H_SET_SV()。

3 設定速度: 指定運動速度

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.1.3” i8094H_SET_V()。

4 設定加減速度: 指定運動時之加減速

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.1.4” i8094H_SET_A()。

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.1.5” i8094H_SET_D()。

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。

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.1.9” i8094H_FIXED_MOVE()。

2 連續脈波輸出: 執行單軸連續脈波輸出。

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.1.10” i8094H_CONTINUE_MOVE()。

3 等待完成軸運動: 等待軸完成停止。

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.5.3” i8094H_STOP_WAIT()。

請參考 “i8094H_Manual_1.3tc.pdf 章節 7.2.7” i8094H_MP_STOP_WAIT()。

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)。

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.2.1” i8094H_AXIS_ASSIGN()。

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)

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.2.2” i8094H_VECTOR_SPEED()。

3 設定向量初始速度: 設定軸之向量初始速度。

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.3.3” i8094H_SET_VSV()。

4 設定向量速度: 設定軸之向量定速度。

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.3.4” i8094H_SET_VV()。

5 設定向量加減速度: 設定軸之向量加減速度。

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.3.5” i8094H_SET_VA()。

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.3.6” i8094H_SET_VD()。

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。

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.2.10” i8094H_LINE_2D()。

2 三軸直線補間: 執行三軸直線補間。

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.2.11” i8094H_LINE_3D()。

3 二軸圓弧補間: 執行二軸圓弧補間。

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.2.12” i8094H_ARC_CW()。

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.2.12” i8094H_ARC_CCW()。

4 二軸圓補間: 執行二軸圓補間。

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.2.13” i8094H_CIRCLE_CW()。

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.2.13” i8094H_CIRCLE_CCW()。

3.8 Motion 進階運動

1 二軸矩形連續補間: 執行二軸矩形補間。

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.4.1” i8094H_RECTANGLE()。

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)。

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.4.2” i8094H_LINE_2D_INITIAL()。

執行二軸直線連續補間。

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.4.2” i8094H_LINE_2D_CONTINUE()。

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)。

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.4.3” i8094H_LINE_3D_INITIAL()。

執行三軸直線連續補間。

請參考 “i8094H_Manual_1.3tc.pdf 章節 6.4.3” i8094H_LINE_3D_CONTINUE()。

4 其他補間: 多點連續補間、三軸螺旋運動、二軸比例運動、同步輸出 Line Scan 運動

詳情請參考 “i8094H_Manual_1.3tc.pdf 章節 6.4.4~6.4.10”。

3.9 Motion 同步運動

i8094A/i8094H 還提供許多同步運動功能,如比較 EP,LATCH....

詳情請參考 “i8094H_Manual_1.3tc.pdf 章節 6.3.1~6.3.5”。

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：

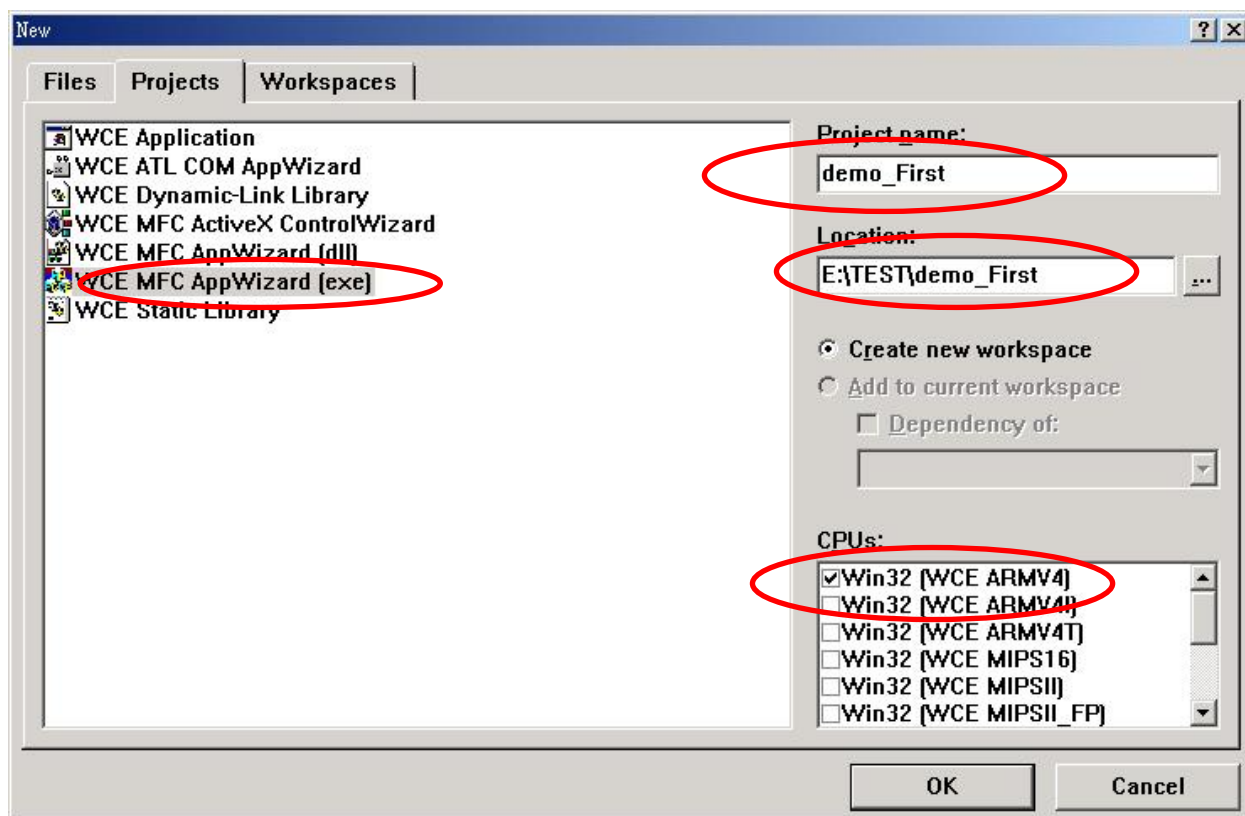
1. i8094H.lib
2. i8094H.dll
3. i8094H.h

如您沒有,請找 CD 或到我們的網站下載最新版本資料

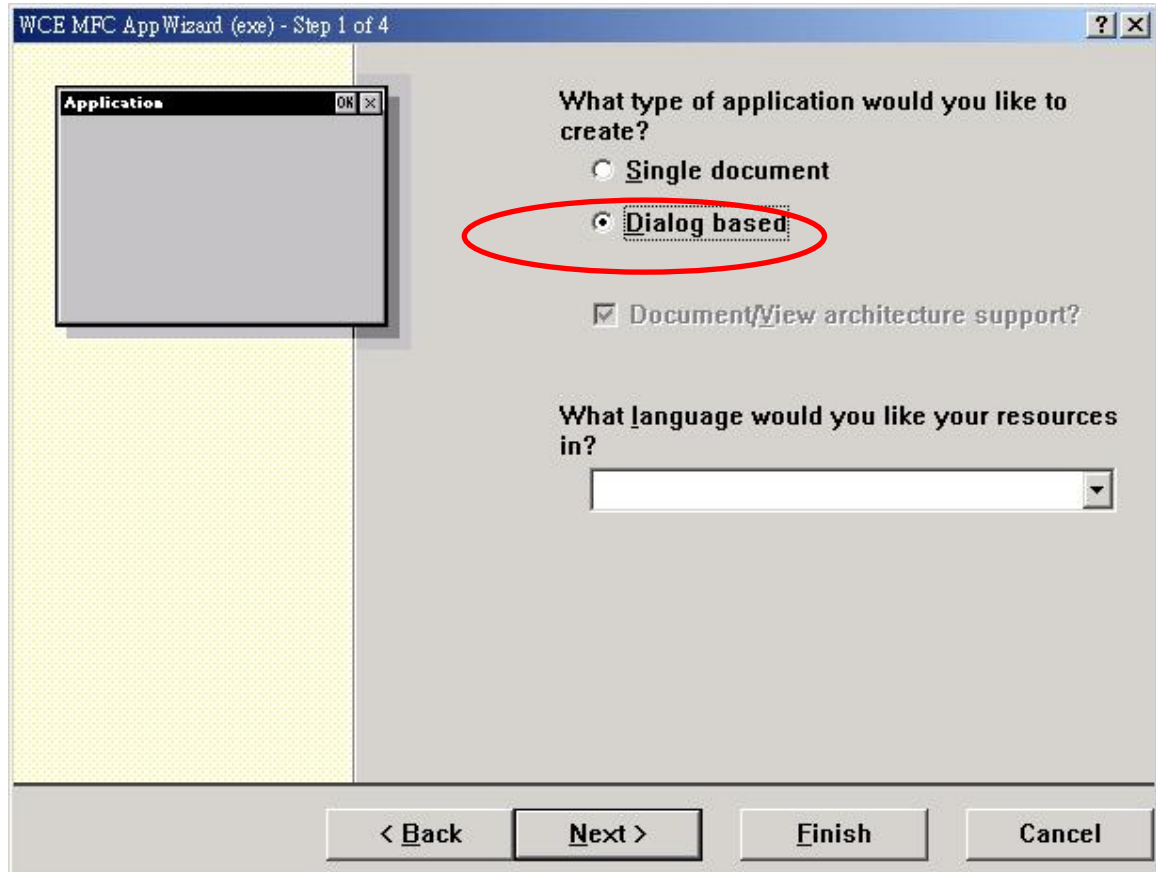
<http://www.icpdas.com/download/download-list.htm>

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”。



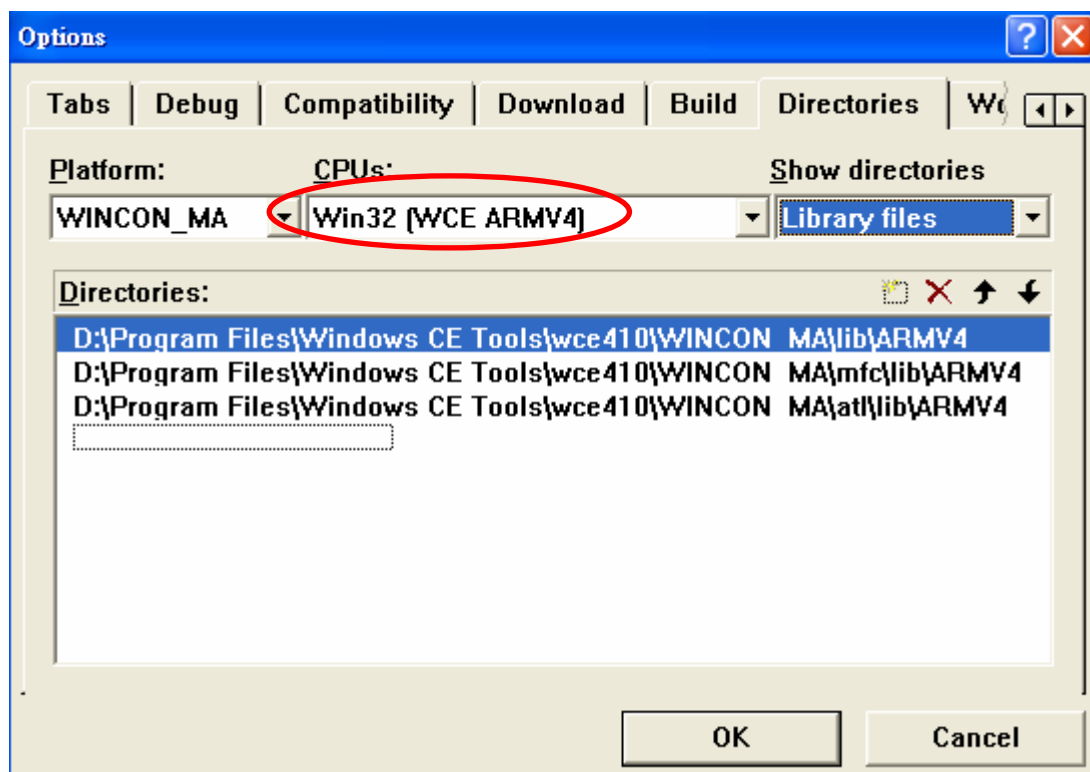
選擇 Dialog based 按“NEXT”



再按“Finish”
即完成開一新專案

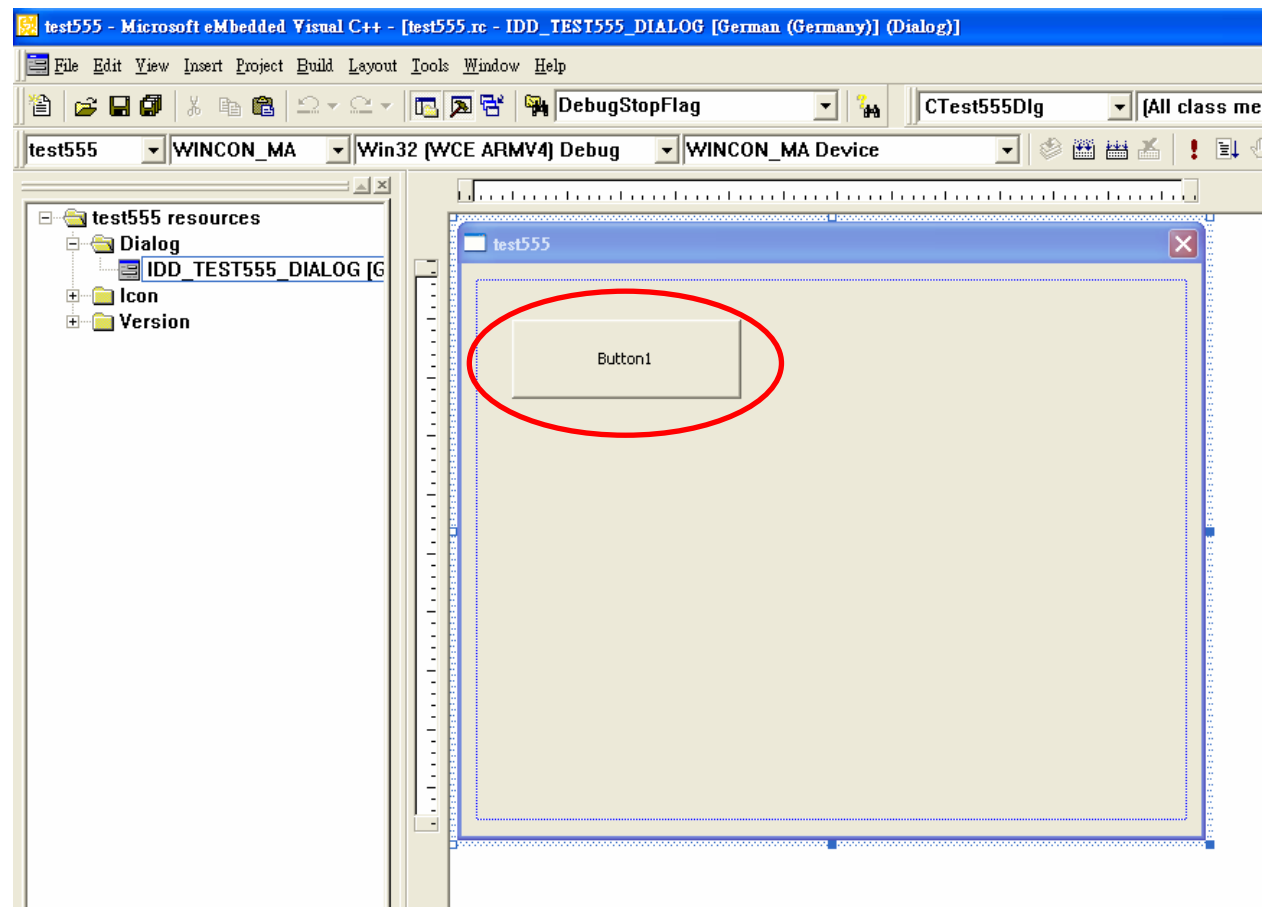
4.1.3 在eVC++ 專案中Lib參考路徑

- A. 在“Tools” 工能表中開啟“Options” 對話框。
- B. 選“Directories” 標籤，在 “Platform” 項目選擇 “WINCON_MA”， 在 “CPUs” 項目選擇“Win32 [WCE ARMV4]”。
- C. 分別確認“Include files”和“Library files”的路徑位置。



4.1.4 在eVC++ 專案中開始應用

在 Dialog 中加入一 BUTTON 如下圖：

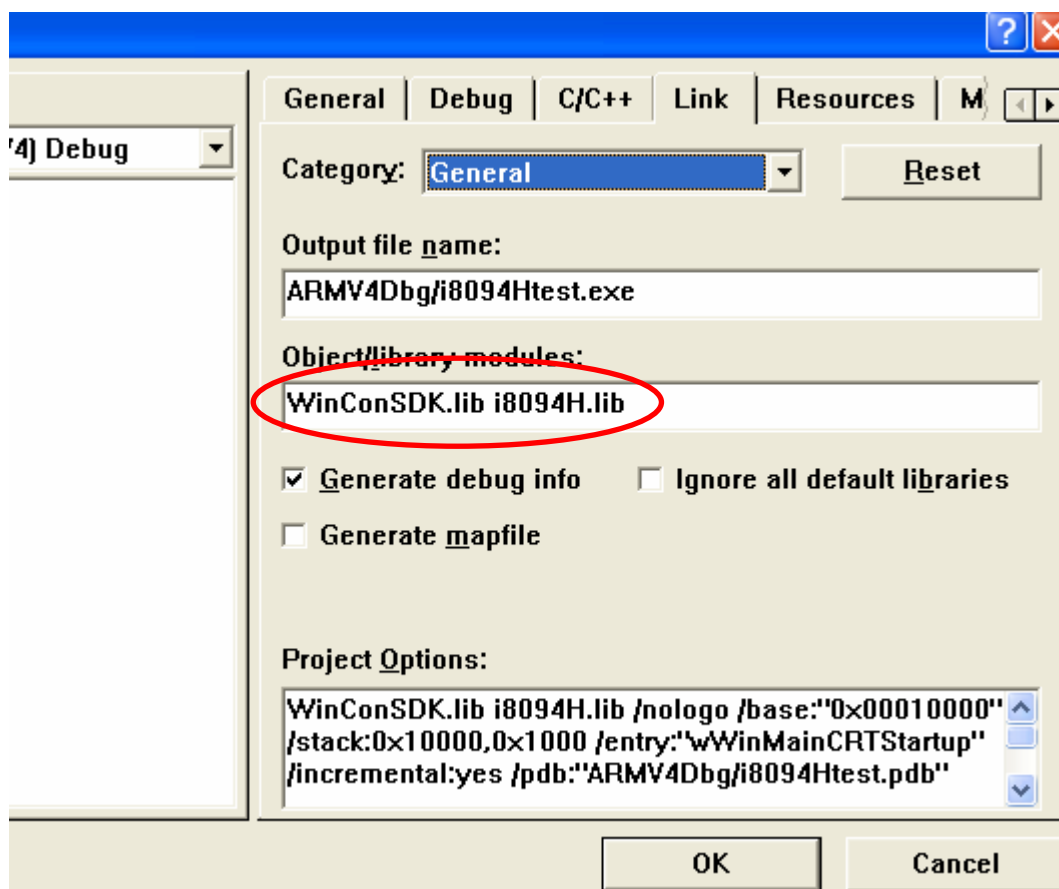


在 BUTTON 快按兩下，並產生一副程式，並在檔案起始位置加入”

```
#include "WinConSDK.h"
```

```
#include "i8094H.h"
```

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、i8094H.lib(如下圖)，並按 OK。後續請配合第五章 EzMake 所產生的 MP(Macro Program)使用!



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

Reserved

4.3 I-8000 Turbo C++

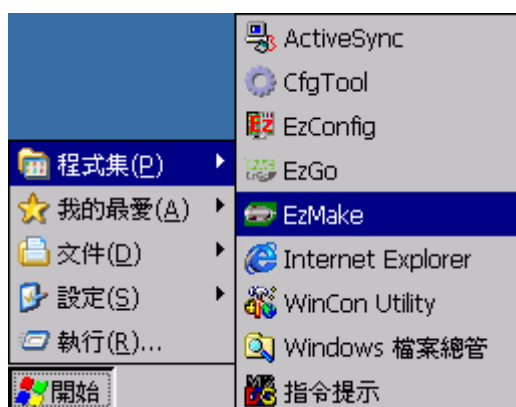
Reserved

5 MP 產生工具 EzMake

5.1 執行 EzMake

方法一:按下開始鍵-->選擇程式集→選擇 EzMake

方法二:直接由放置 EzMake 的資料夾中執行
\\CompactFlash\EzProg-\\EzMake\EzMake.exe



5.2 選擇 I-8094H

在 EzMake 首頁(Fig. 5.1)會出現 Wincon 上一共有多少 I-8094H,選擇要使用的 I-8094H 後按下 OK

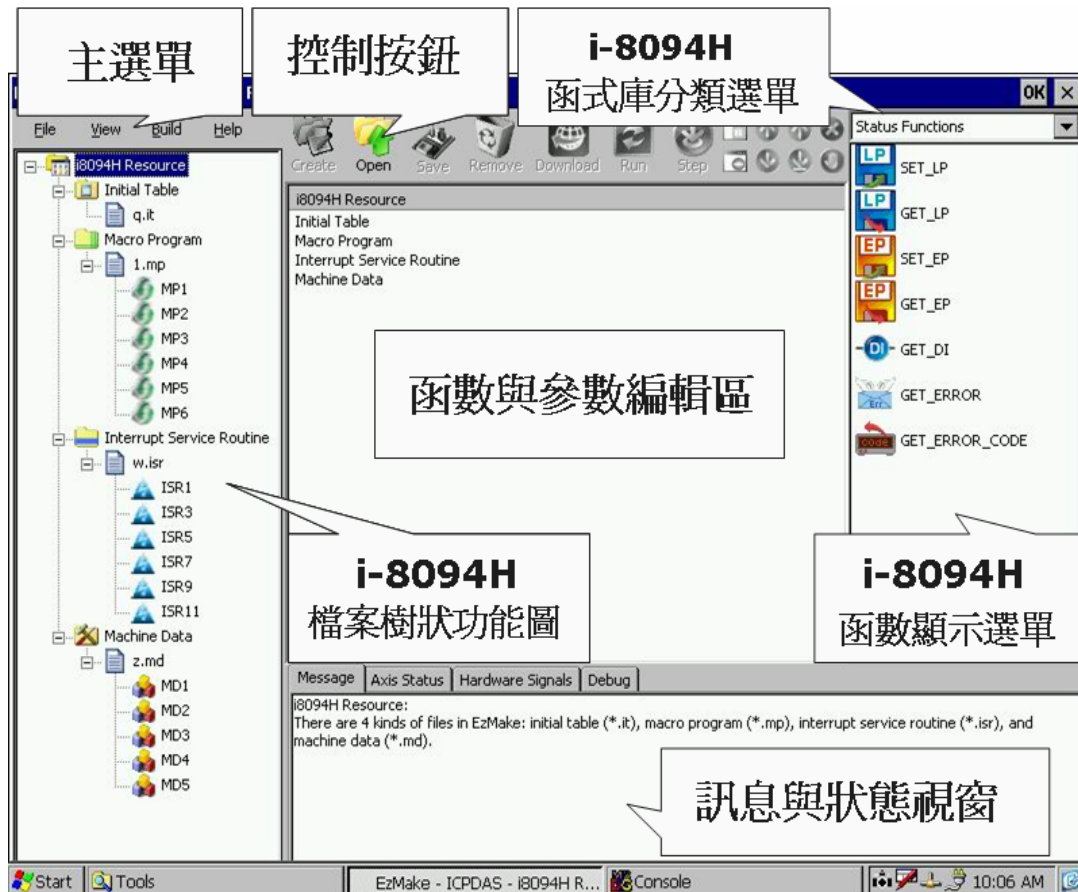
注:只有使用的 I-8094H 會出現”Used”,其餘皆不顯示



Fig. 5.1 EzMake 首頁

5.3 操作頁介紹

操作頁分成 7 個區塊:操作順序一般為樹狀圖→主選單→控制按鈕→函式庫分類選單
選單→函數顯示選單→函數與參數編輯區→訊息與狀態視窗



5.3.1 樹狀圖

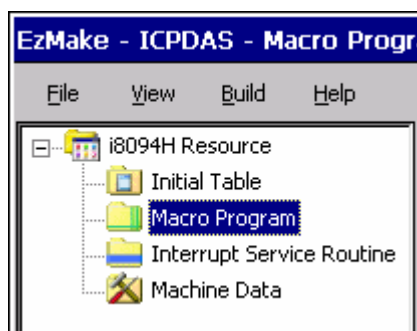
一進到 EzMake 後, 在沒開啟任何檔案情況下樹狀圖有四個分支,分別有四個功能:

Initial Table: 編輯 I-8094H 的初始設定

Macro Problem: 產生 MP 的部份

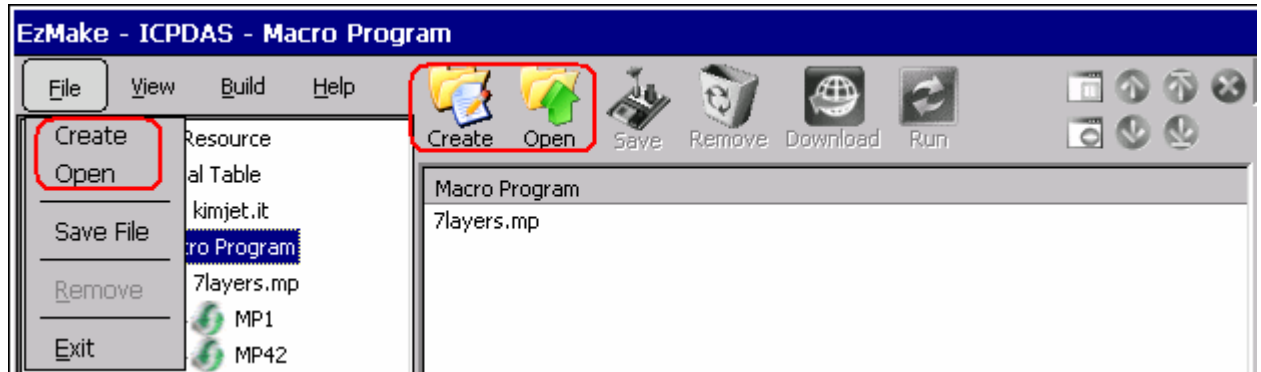
Interrupt Service Routine: 產生 ISR 的部份

Machine Data: 編輯斷電保持資料



5.3.2 主選單

在樹狀圖選擇要開啟(Open)或新建(Create)的檔案類型後,可以在主選單或控制按鈕來選擇要執行的動作



5.3.2.1 新建檔案

新建檔案步驟如下:

Initial Table

每一個 **Initial Table** 都只能對畫面上函數與參數編輯區的函數進行編輯(Fig. 5.2)

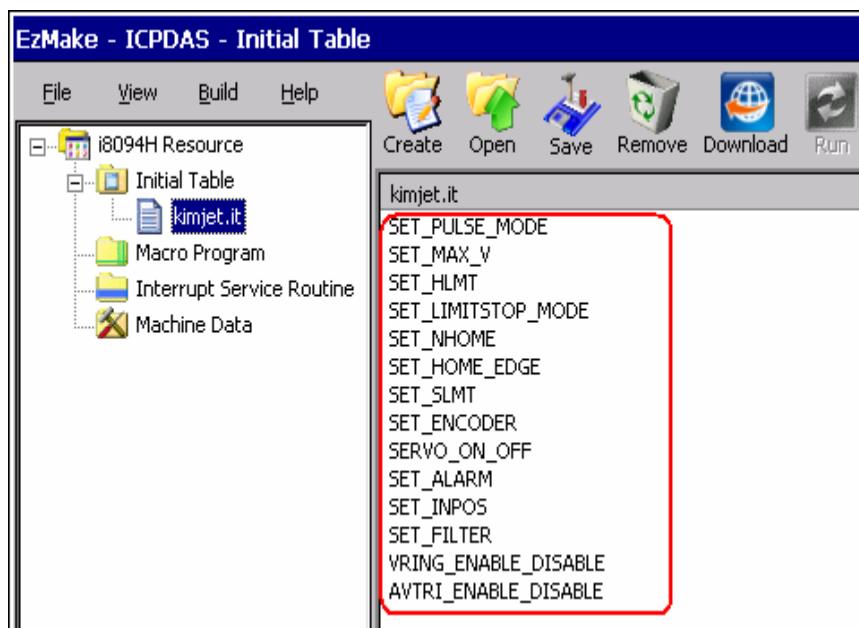


Fig. 5.2 Initial Table

Macro Program & Interrupt Service Routine

1. In Fig. 5.3 首先在 File Name 的地方輸入小於 10 個 characters 的檔名
2. 在 MP1~MP157 選擇要加入的 MP, 158 個 MP 共有 5 種 stacks(8/16/32/128/512), 依所需加入
ISR 的部分和 MP 相同, 只是 Function 數和 ISR 數目變少
3. MP 加入後可以編輯 Description
4. 按下 OK, 完成創建

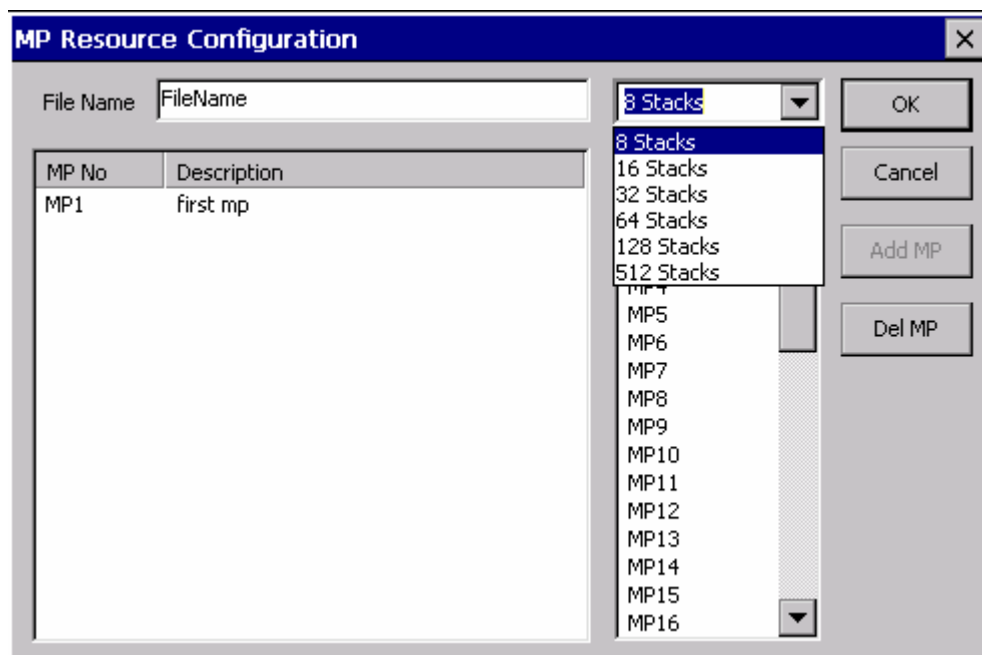
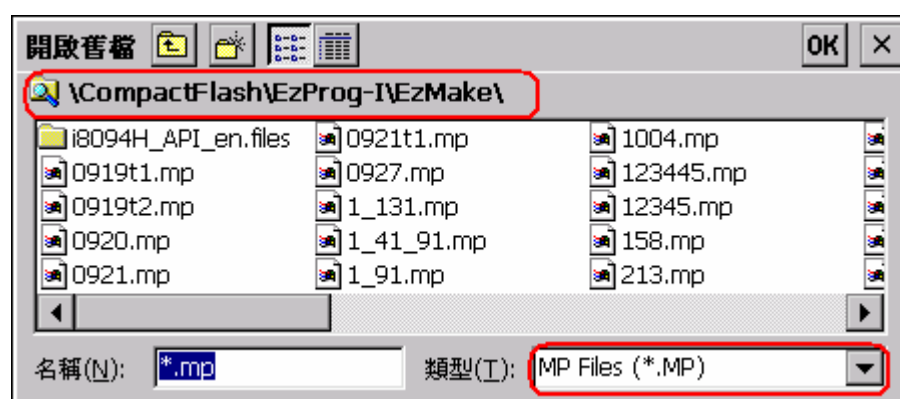


Fig. 5.3 MP Resource Configuration

5.3.2.2 開啟檔案

Save 檔案時預設路徑為 \CompactFlash\EzProg-I\EzMake\, 所以除了使用者另外儲存不同地方, 檔案都是放在這個路徑下

開啟檔案時, 如果在樹狀圖已先點選 MacroProgram, 那麼開啟的類型會限定只有副檔名是 mp 的檔案



5.3.3 函數與參數編輯區

檔案開啟後在函數與參數編輯區可以編修參數

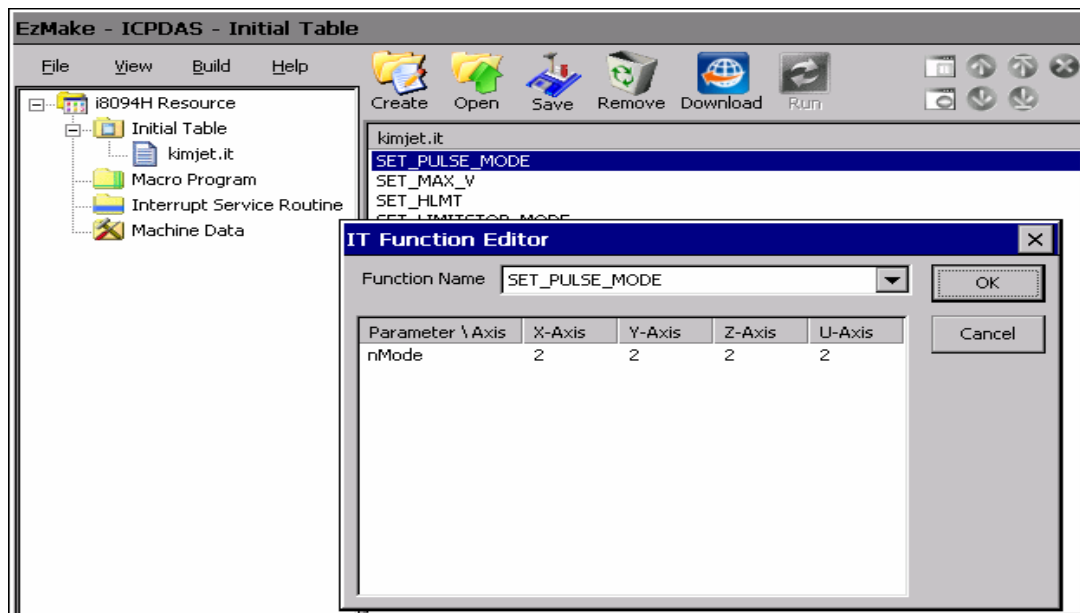


Fig. 5.4

圖 5.4 為 Initial Table 的畫面,只能針對畫面上的函數編輯修改,不能增加減少函數

編修時,只要左鍵雙擊要編修的函數兩下就會出現編修畫面,接著再依照要輸入的參數更改即可,Macro Program 和 Interrupt Service Routine 的編輯修改和 Initial Table 一樣,Machine Data 是資料儲存所以不同於其他三類(圖 5.5)

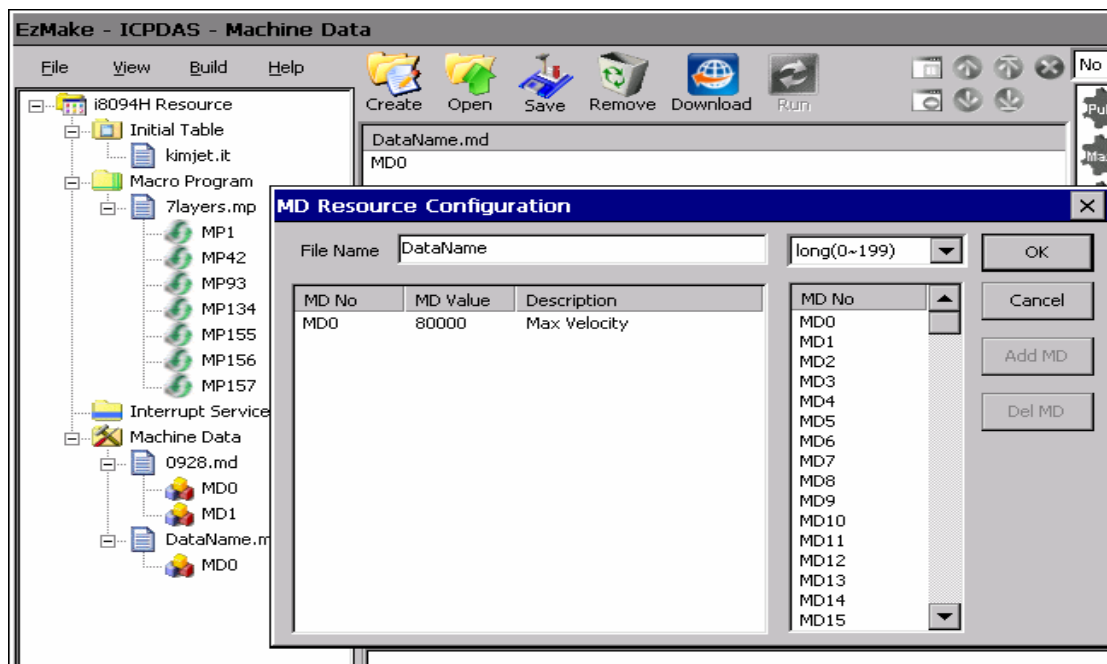
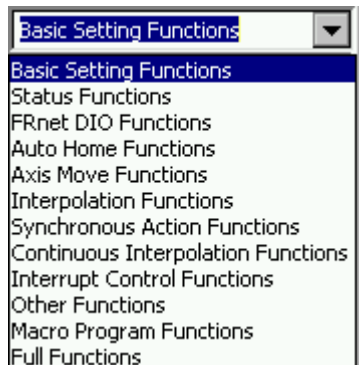


Fig. 5.5 MD Resource Configuration

5.3.4 函式庫分類選單

完成創建新檔之後,接著就是加入所需函數



在函式庫分類選單區可以依要加入函數之所屬類別選擇,或者選最後一項(全部函數)

5.3.5 函數顯示選單

選定函數類別後,在函數顯示選單內(Fig. 5.6 紅色圈選區)會出現該類別所有的函數,點選要加入的函數,再設定參數值後即完成編輯

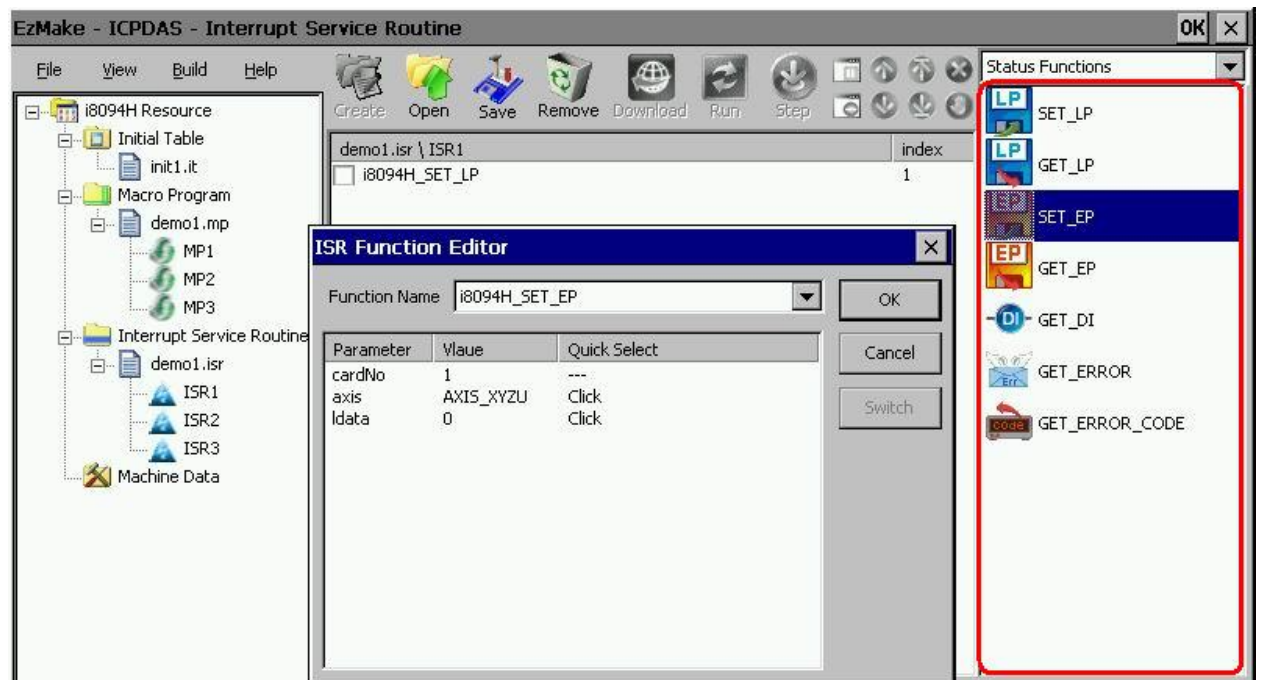
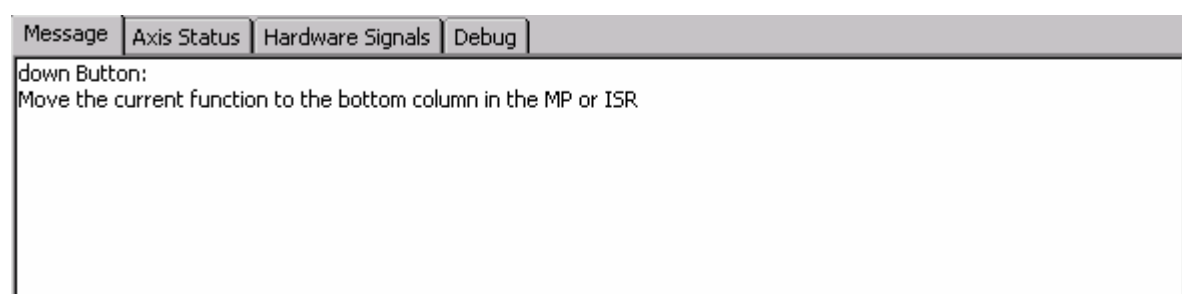


Fig. 5.6 函數顯示選單

5.3.6 訊息與狀態視窗

5.3.6.1 Message

當滑鼠移到任一 button 時,此視窗會顯示該 button 功能



5.3.6.2 Axis Status

當 MP 或是 ISR 開始執行後,在視窗內會顯示當時的各種狀態

	Logic Position	Encoder Position	Tracking Error	Current Speed		Current Acceleratoin	
X-Axis	9385	9195		10000	PPS	0	PPS/Sec
Y-Axis	0	0		0	PPS	0	PPS/Sec
Z-Axis	0	0		0	PPS	0	PPS/Sec
U-Axis	0	0		0	PPS	0	PPS/Sec

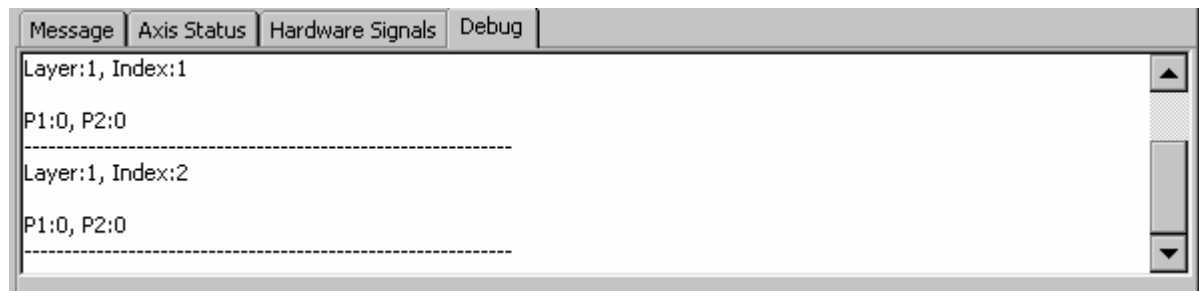
5.3.6.3 Hardware Signals

當 MP 或是 ISR 開始執行後,視窗內會依各軸狀態及位置顯示燈號

	LMT+	LMT-	SLMT+	SLMT-	ORG	SD	ALM	IN3	INDEX	EMG	RDY	DRV	ERR
X-Axis	●	●	●	●	●	●	●	●	●	●	●	●	●
Y-Axis	●	●	●	●	●	●	●	●	●	●	●	●	●
Z-Axis	●	●	●	●	●	●	●	●	●	●	●	●	●
U-Axis	●	●	●	●	●	●	●	●	●	●	●	●	●

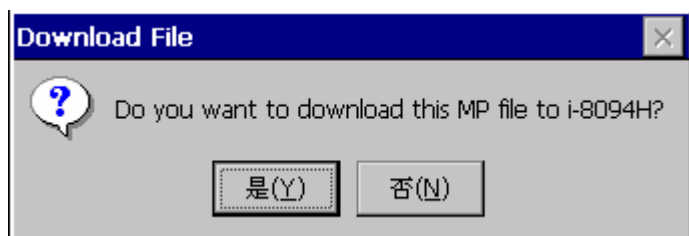
5.3.6.4 Debug

當 MP 或是 ISR 開始執行時, 此視窗會顯示當時執行的函數被編輯的位置



5.4 程式下載與執行

5.4.1 程式下載



在樹狀圖選擇要下載的檔案(*.it/*.mp/*.isr/*.md),按下  後,程式便開始下載(Fig. 5.7)

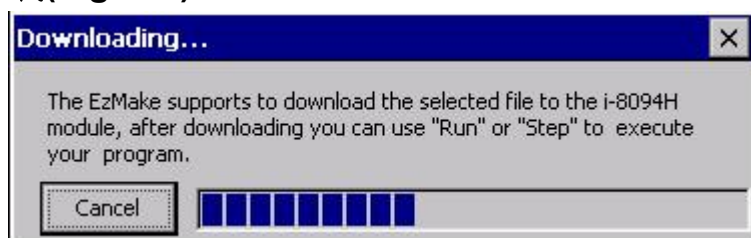
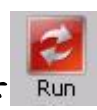
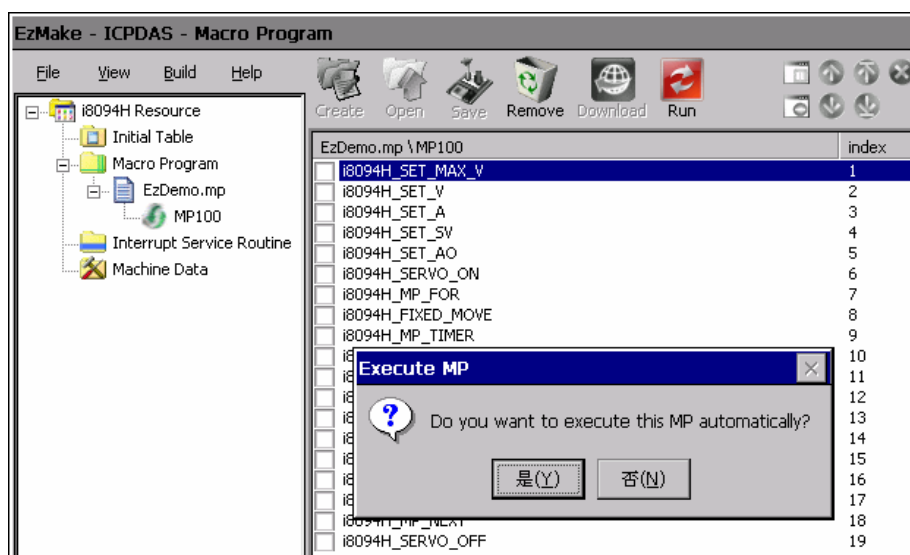


Fig. 5.7 Downloading

5.4.2 程式執行



在樹狀圖選擇要下載的檔案(MPxx/ISRxx),按下  後,程式便開始執行

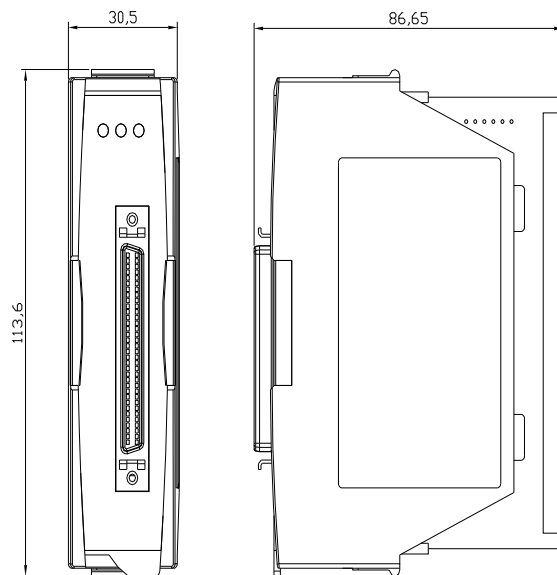
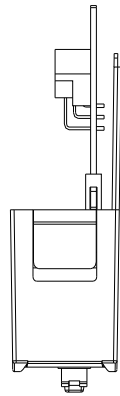
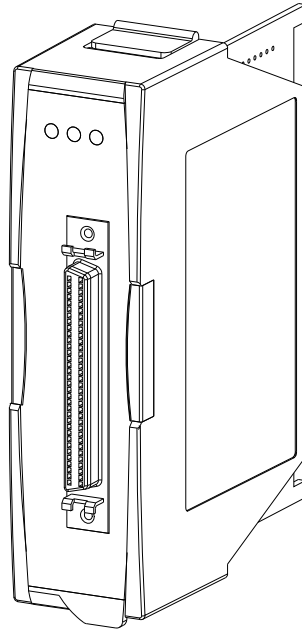
附錄A

A.1 I8094A/I8094H開發環境安裝內容

A.1.1 eVC ++ 4.0

1. 微軟 eVC++ 4.0: 至少到 ServicPack2(目前已到 ServicPack4)
2. WinCon8000_EVC4_SP1: WinCon 在 eVC++ 開發環境(WINCON_MA)
3. WinConSDK:WinCon 軟體開發工具(inc,lib,dll.....)

A.2 外觀尺寸



附錄B DN-8468 系列端子台

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

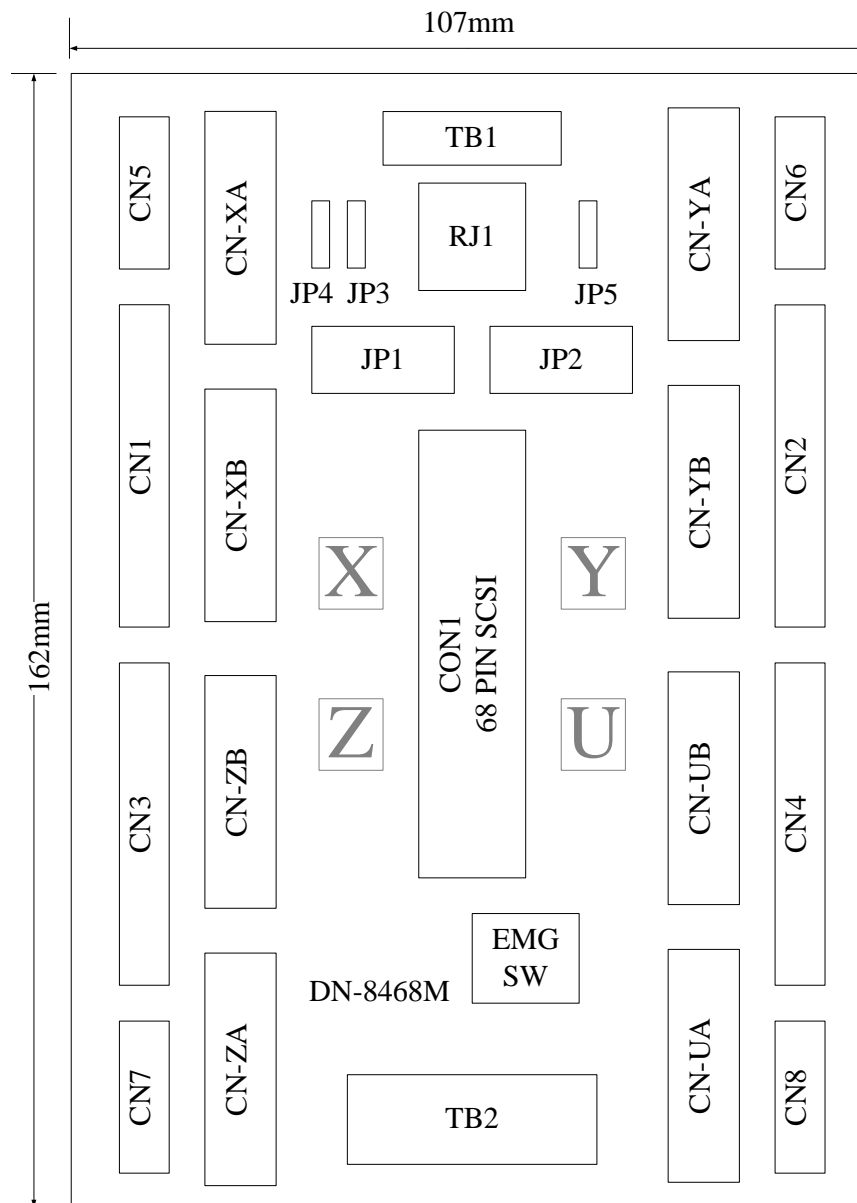


Fig. 1-1 Board layout for the DN-8468M

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.

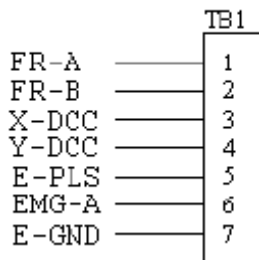
■ Pin Assignment for CON1

The I/O connector on the DN-8468M is a 68-pin SCSI II connector that enables you to connect to the I-8094/I8094F motion card. Please refer to the section 2.2.2(page 14).

■ 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.

Table 1-4 TB1 Signal Connection



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

Fig. 1-3 Pin definition for TB1

■ 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.

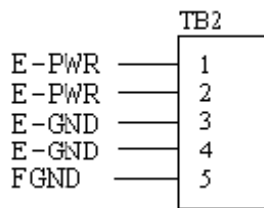


Table 1-5 TB2 Signal Connection

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

Fig. 1-4 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 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.

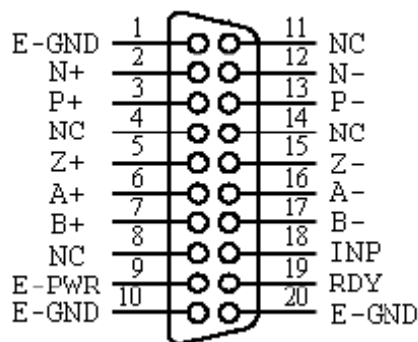


Table 1-6 CNA Signal Connection

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

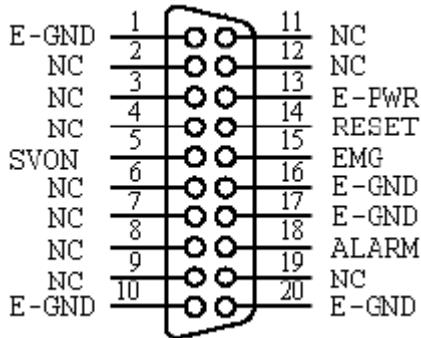
Fig. 1-5 Pin definition for CN-XA, CN-YA, CN-ZA, CN-UA

- ▶ **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

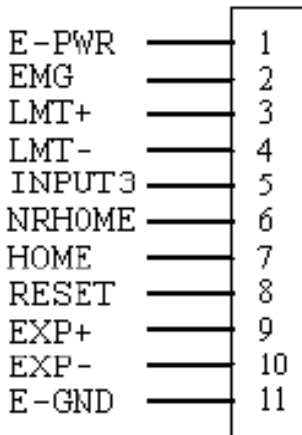
Fig. 1-6 Pin definition for CN-XB, CN-YB
CN-ZB, CN-UB

▶ **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



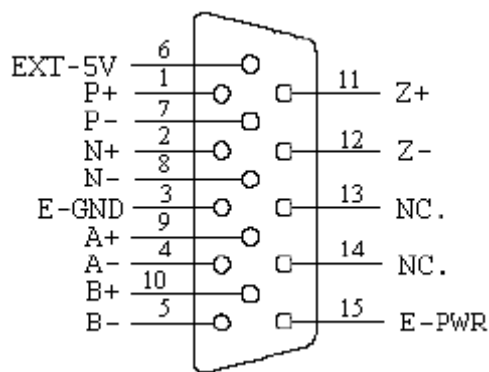
Pin name	Description
E-PWR	EXT power supply +24V
EMG	EMG input signal
LMT+	Limit Switch Input Signal (+)
LMT-	Limit Switch Input Signal (-)
INPUT3	Input Signal (IN3)
NRHOME	Near Home Sensor Input Signal
HOME	Home Sensor Input Signal
RESET	Reset input signal
EXP+	EXT Positive Direction Pulse (+)
EXP-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

Fig. 1-7 Pin definition for CN1~CN4

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

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

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.

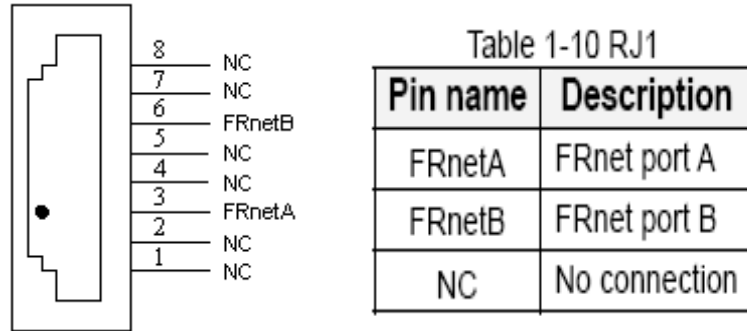


Fig. 1-9 Pin definition for RJ1

► **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.

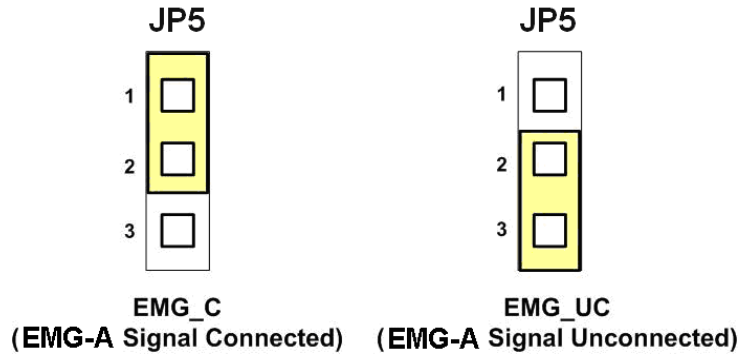


Fig. 1-10 Jumper 5 setting

■ 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.

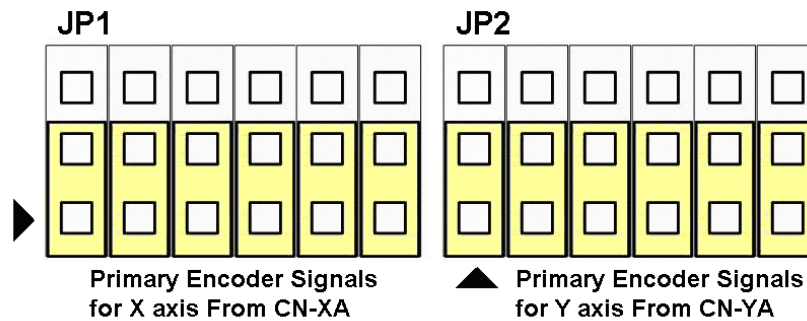


Fig. 1-11 Primary encoder signals setting

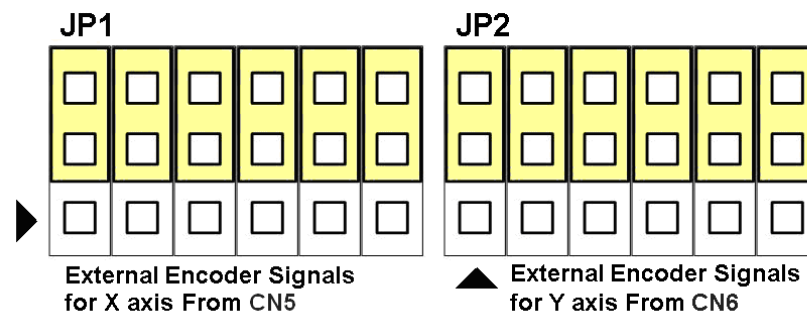


Fig. 1-12 External encoder signals setting

■ 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.

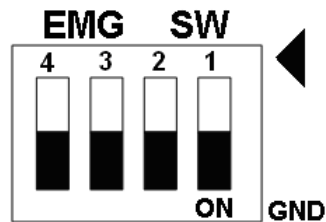


Fig. 1-13 EMG SW setting for normally GND (Default setting)

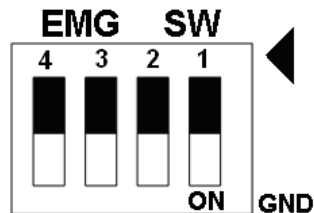


Fig. 1-14 EMG SW setting for user controlled signals.

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

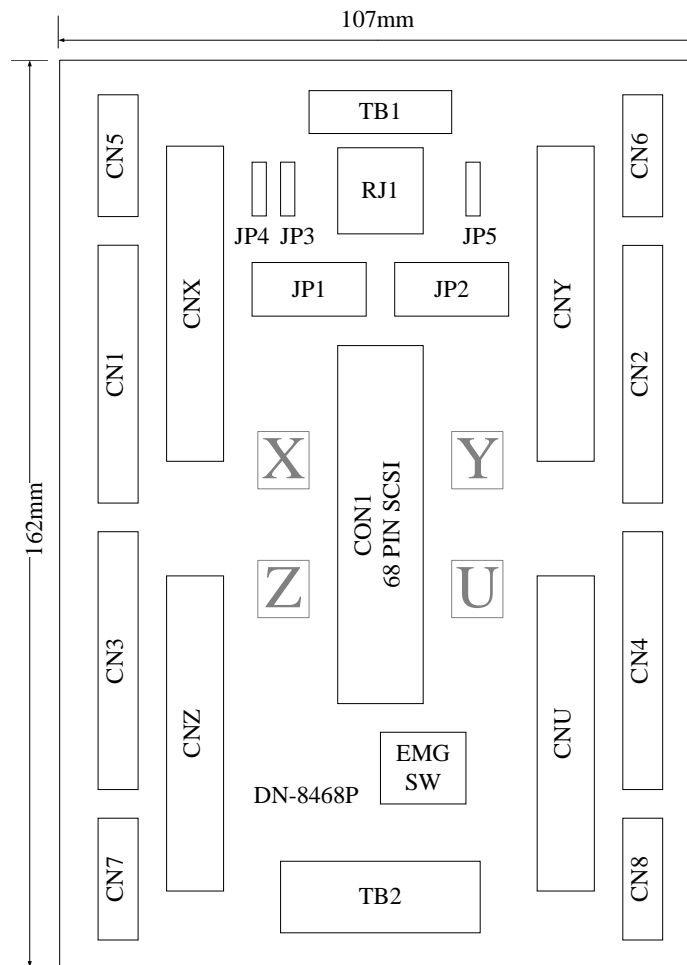


Fig. 1-1 Board layout for the DN-8468P

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 I-8094/I8094F motion card. Please refer to the section 2.2.2(page 14).

■ 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.

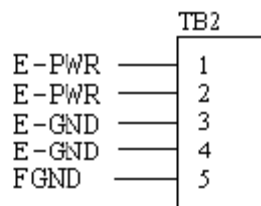


Fig. 1-4 Pin definition for TB2

Table 1-5 TB2 Signal Connection

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

■ TB2

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

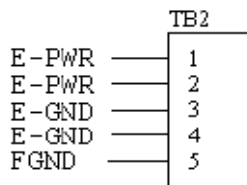


Fig. 1-4 Pin definition for TB2

Table 1-5 TB2 Signal Connection

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

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

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

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

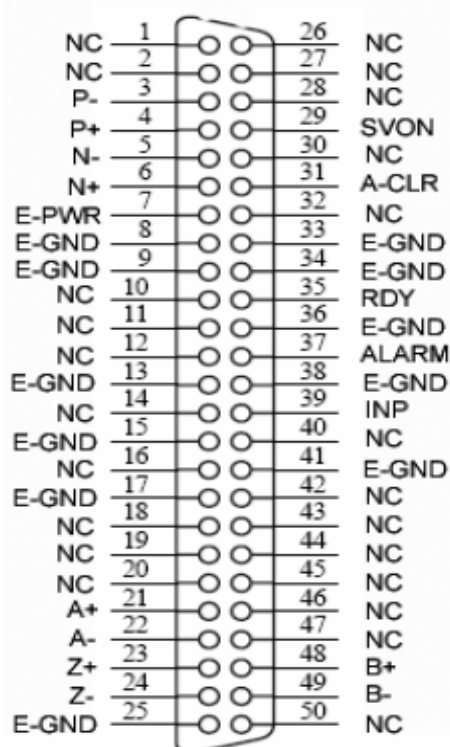


Fig. 1-5 Pin definition for CNX, CNY, CNZ, CNU

Table 1-6 CN X5 Signal Connection

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

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

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

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

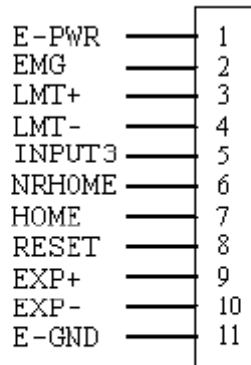


Fig. 1-7 Pin definition for CN1 ~ CN4

Table 1-8 CN1~4 Signal Connection

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

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

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

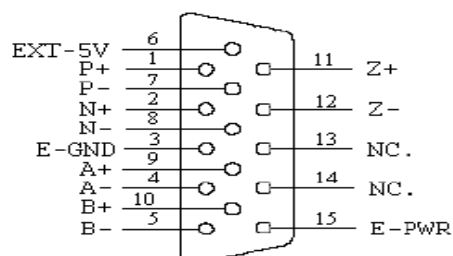


Fig. 1-8 Pin definition for CN5 ~ CN8

Table 1-9 CN5~8

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

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

■ RJ1 (The I/O signals of the FRnet)

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

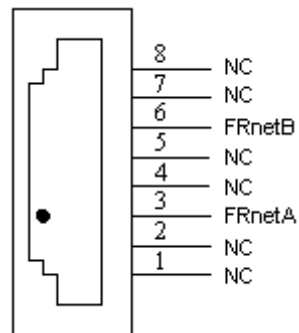


Table 1-10 RJ1

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.

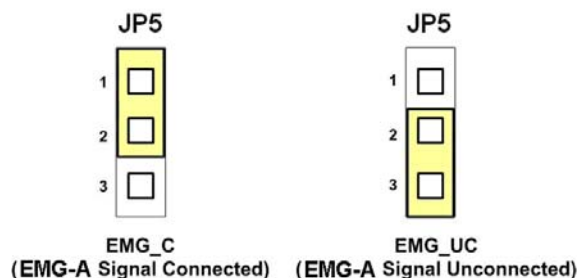


Fig. 1-10 Jumper 5 setting

■ 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.

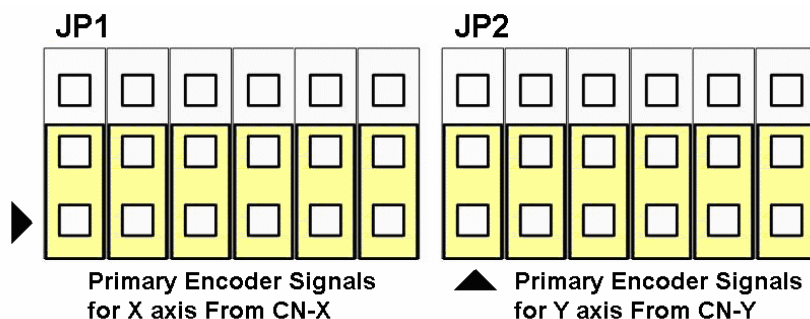


Fig. 1-11 Primary encoder signals setting

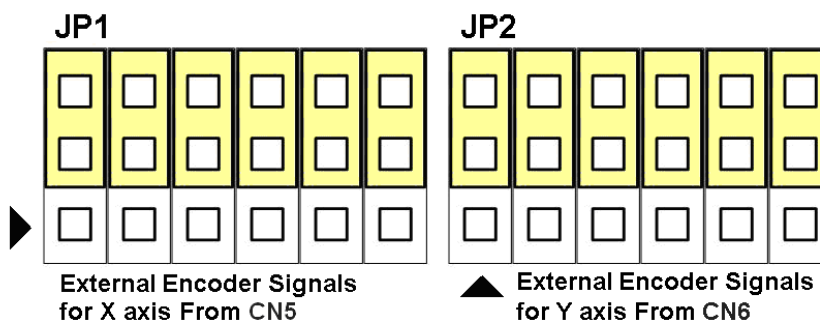


Fig. 1-12 External encoder signals setting

■ 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.

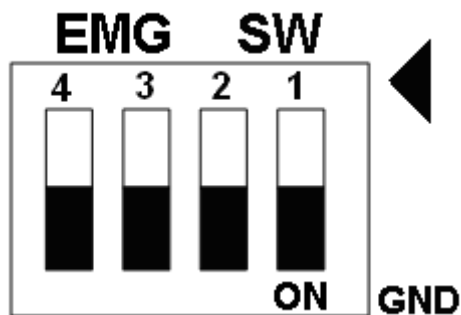


Fig. 1-13 EMG SW setting for normally GND (Default setting)



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

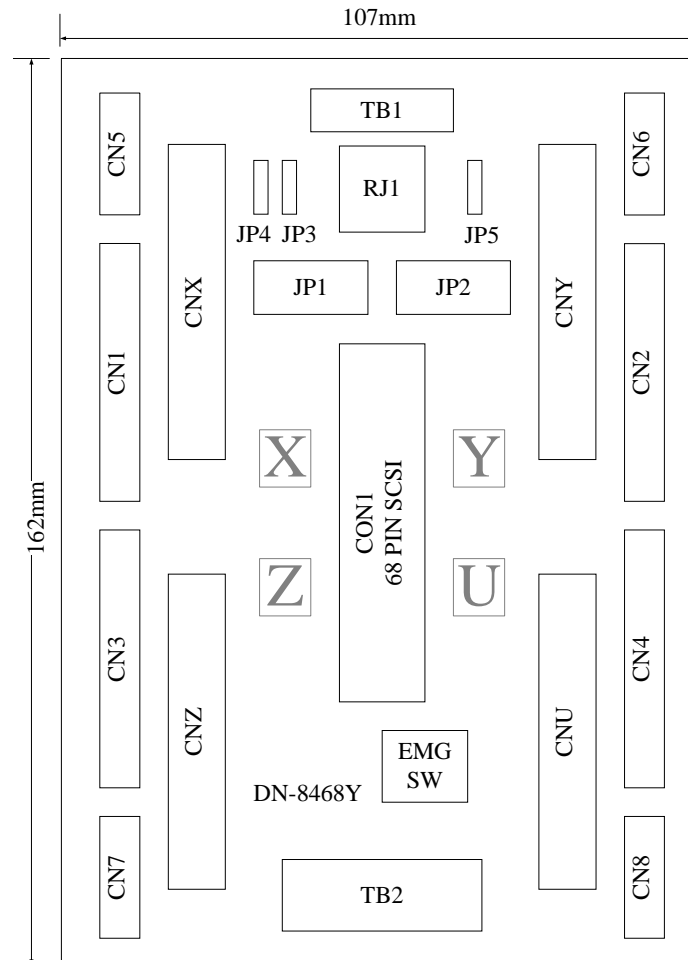


Fig. 3-1 Board layout for the DN-8468Y

B.3.2 Signal Connections for DN-8468Y

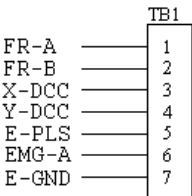
Maintaining signal connections is one of the most important factors in ensuring that your application system is sending and receiving data correctly.

■ 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 I-8094/I8094F motion card. Please refer to the section 2.2.2(page 14).

■ 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.

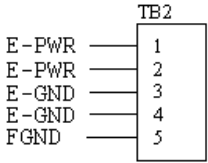


Name	Description
FR-A	FRnet port A
FR-B	FRnet port B
X-DCC	Deviation Counter Clear for X axis
Y-DCC	Deviation Counter Clear for Y axis
E-PLS	EXT pulse signal
EMG-A	EMG input signal for all axes
E-GND	EXT power ground

Fig. 3-3 Pin definition for TB1

■ 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.



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

Fig. 3-4 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 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.

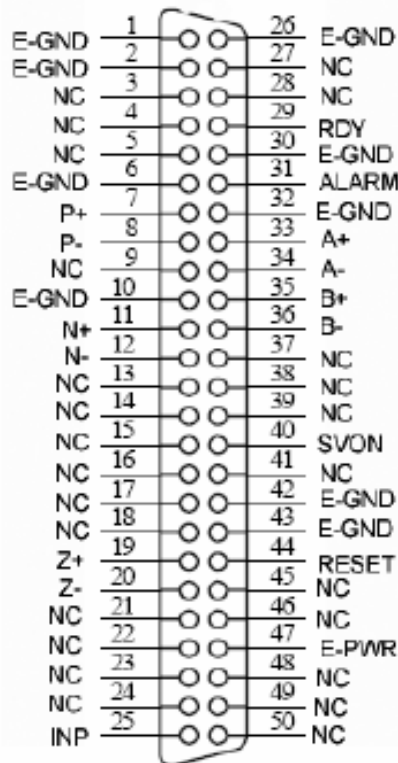


Fig. 3-5 Pin definition for CNX, CNY, CNZ, CNU

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, 26, 30,32, 42,43	EXT power ground
NC	3,4,5,9, 13,14,15, 16,17,18, 21,22,23, 24,27,28, 37,38,39, 41,45,46, 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.

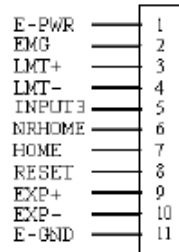


Fig. 3-7 Pin definition for CN1 ~ CN4

Table 3-8 CN1~4 Signal Connection

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

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

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

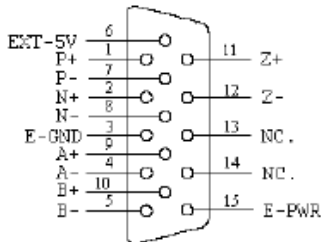


Fig. 3-8 Pin definition for CN5 ~ CN8

Table 3-9 CN5~8

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

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

■ RJ1 (The I/O signals of the FRnet)

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

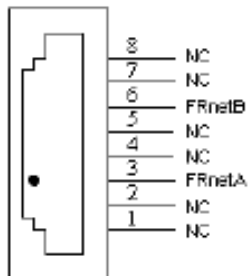


Fig. 3-9 Pin definition for RJ1

Table 3-10 RJ1

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

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

B.3.3 Jumper and Switch Settings

■ JP5

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

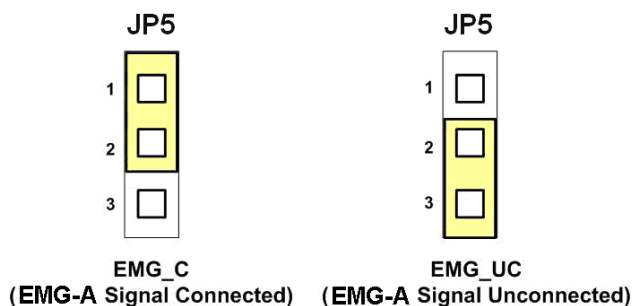


Fig. 3-10 Jumper 5 setting

■ JP1, JP2

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

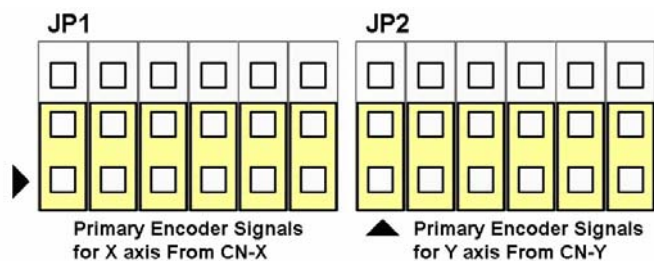


Fig. 3-11 Primary encoder signals setting

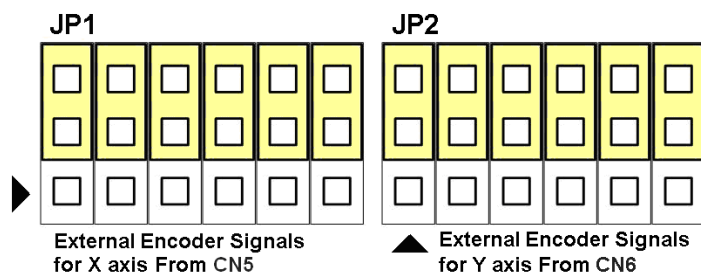


Fig. 3-12 External encoder signals setting

■ EMG SW

The emergency stop signal for each servo 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.

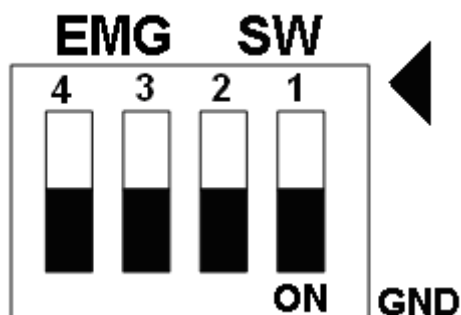


Fig. 3-13 EMG SW setting for normally GND (Default setting)



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