i-8094 快速上手手冊

(Version 1.0)

i-8094 C++ 巨集指令函式庫快速上手
WinPAC、XPAC Compact Edition 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 1997-2005 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

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 WinPAC 及 XPAC_CE (XPAC Compact Edition)，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 WinPAC 或 XPAC_CE 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 WinPAC 或 XPAC_CE 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。

1.2 硬體規格

1.2.1 主要規格

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

1.2.2 補間功能

2-軸 / 3-軸 直線補間

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

圓弧補間

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

相關補間功能

- 可以選擇任意軸補間
- 固定向量速度
- 可連續補間

1.2.3 輸出脈衝

- 脈衝輸出速度範圍　　　　　　　　　**1 PPS ~ 4 MPPS**
- 脈衝輸出精度　　　　　　　　　　　**± 0.1%**
- S-曲線衝量(Jerk) 範圍　　　　　　**954 ~ 62.5 x 10^6 PPS/S^2**

　　　　　　　　　　　　　　　　　　477 x 10^3 ~ 31.25 x 10^9 PPS/S^2

- 加減速範圍　　　　　　　　　　　　**125 ~ 1 x 10^6 PPS/S**

　　　　　　　　　　　　　　　　　　62.5×10^3 ~ 500 x 10^6 PPS/S

- 速度精度　　　　　　　　　　　　　**1 PPS 到 500PPS(依最高速而定)**
- 脈衝輸出數　　　　　　　　　　　　**0 ~ 4,294,967,295 / unlimited**
- 速度曲線型態:
  - ◆　定速
  - ◆　對稱與非對稱線性加減速
  - ◆　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

- **WP-8000**　　　　　　嵌入式控制器系列主機**(**請洽相關業務單位**)**
- **I-8094**　　　　　　　4軸運動控制器模組（不含**FRnet**功能）
- **i-8094F**　　　　　　 4軸運動控制器模組（內含**FRnet**功能）
- **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**
- **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**

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 **WinPAC** 或 **XPAC_CE** 嵌入式控制器系列主機使用。

2.1.2 i8094 安裝

準備控制器

WinPAC 或 XPAC_CE 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WinPAC或XPAC_CE 嵌入式控制器,並用CA-SCSI15聯接到 DN-8468配線端子板,如下圖:

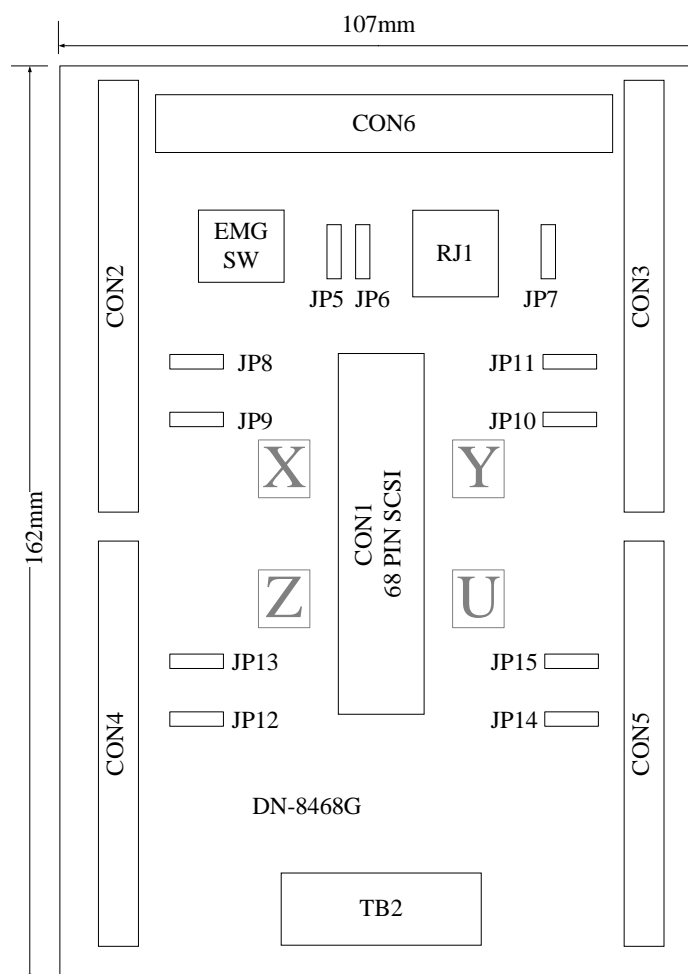**i8094 與控制器規劃圖**

2.2 DN-8468 端子板

Fig. 2.0　DN-8468 位置圖

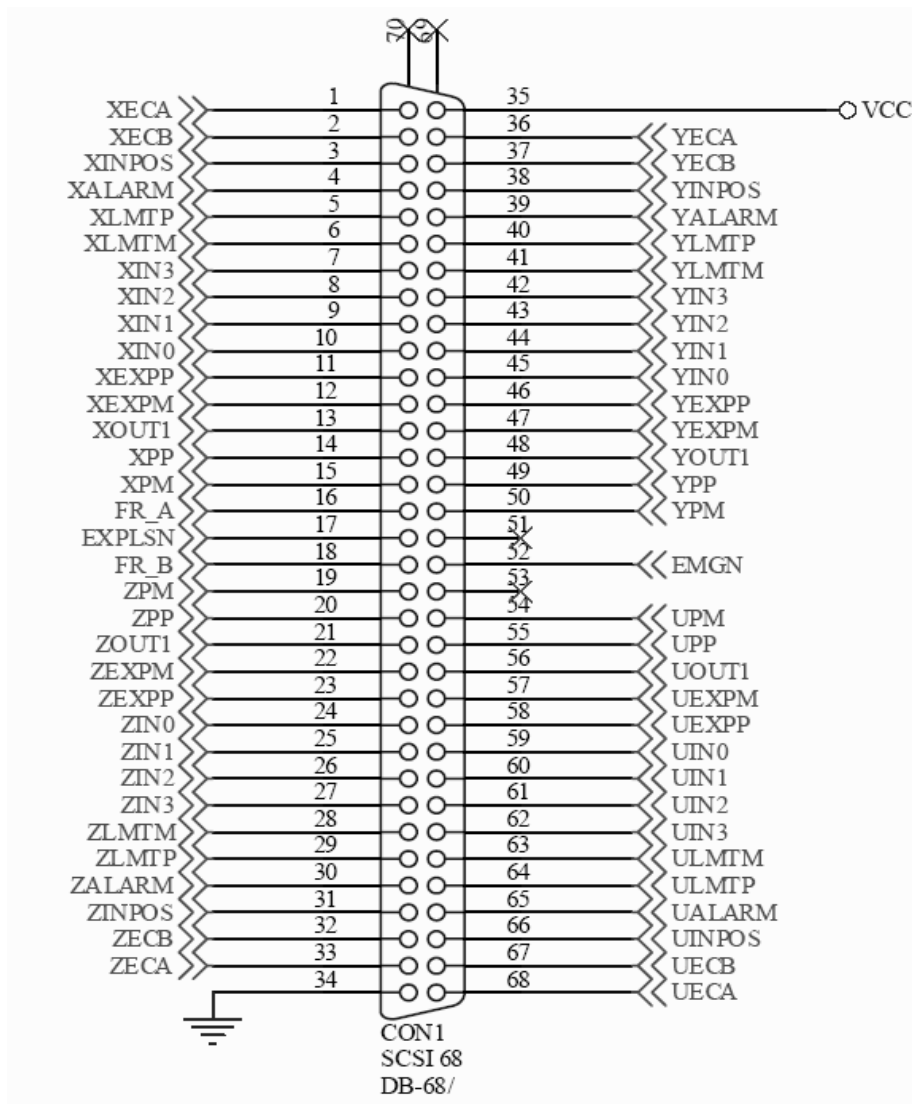## 2.2.1 腳位定義

■ **CON1：i-8094/i-8094F/PISO-PS400 卡與 DN-8468 連接接頭**

Fig. 2.1 DN-8468 CON1 連接線腳位圖

Table 2.1 DN-8468 CON1 連接線腳位說明 1

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

Table 2.2 DN-8468 CON1 連接線腳位說明 2

Pin name	Pin number	Description
XEXPP	11	EXT pulsar input signal (+) for X axis
YEXPP	46	EXT pulsar input signal (+) for Y axis
ZEXPP	23	EXT pulsar input signal (+) for Z axis
UEXPP	58	EXT pulsar input signal (+) for U axis
XEXPM	12	EXT pulsar input signal (-) for X axis
YEXPM	47	EXT pulsar input signal (-) for Y axis
ZEXPM	22	EXT pulsar input signal (-) for Z axis
UEXPM	57	EXT pulsar input signal (-) for U axis
XDRIVE	13	Driver enable signal for X axis
YDRIVE	48	Driver enable signal for Y axis
ZDRIVE	21	Driver enable signal for Z axis
UDRIVE	56	Driver enable signal for U axis
XPP	14	Driving pulsar signal (+) for X axis
YPP	49	Driving pulsar signal (+) for Y axis
ZPP	20	Driving pulsar signal (+) for Z axis
UPP	55	Driving pulsar signal (+) for U axis
XPM	15	Driving pulsar signal (+) for X axis
YPM	50	Driving pulsar signal (+) for Y axis
ZPM	19	Driving pulsar signal (+) for Z axis
UPM	54	Driving pulsar signal (+) for U axis
FR_A	16	FRnet A
NC	51	Reserved
FR_B	18	FRnet B
NC	53	Reserved
EXPLSN1	17	EXT pulse input signal for interpolation
EMGN1	52	Emergency stop input signal
GND	34	Ground
VCC	35	Module power (+5V)

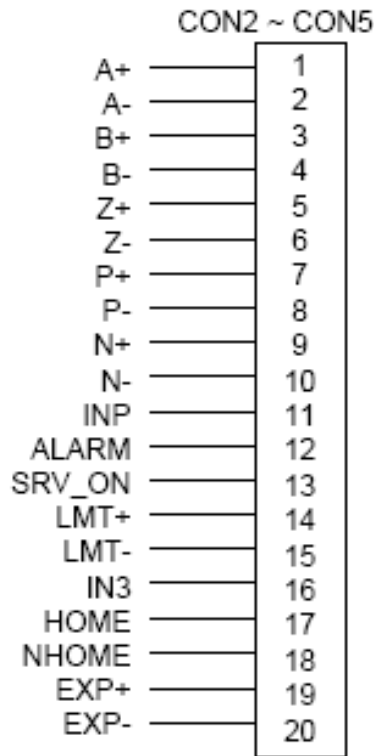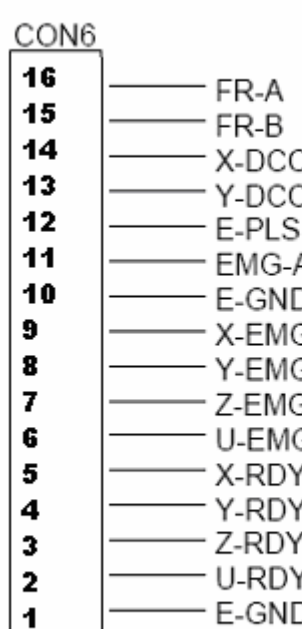■ **CON2~5 各軸（X、Y、Z、U）之控制接點【Pulse 輸出（±P/±N）；Encoder 輸入（A±/B±/Z±）】及 I/O 信號接點【INP、ALARM、Home（ORG）、 Limit、EXP、IN3 等】**

CON2 ~ CON5

A+	1
A-	2
B+	3
B-	4
Z+	5
Z-	6
P+	7
P-	8
N+	9
N-	10
INP	11
ALARM	12
SRV_ON	13
LMT+	14
LMT-	15
IN3	16
HOME	17
NHOME	18
EXP+	19
EXP-	20

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。**
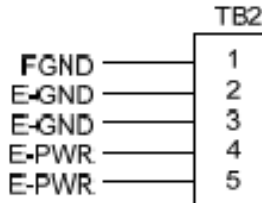
Table **2**-4 CON6 Signal Connection

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

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**

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
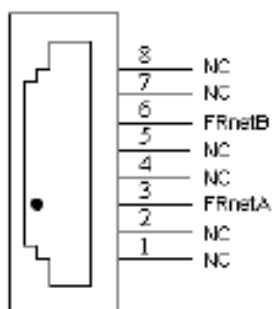
■ RJ1 FRnet 接點,參考下列腳位圖

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

EMG_C　　　　　　　　　**EMG_UC**
(**EMG-A** Signal Connected)　(**EMG-A** Signal Unconnected)
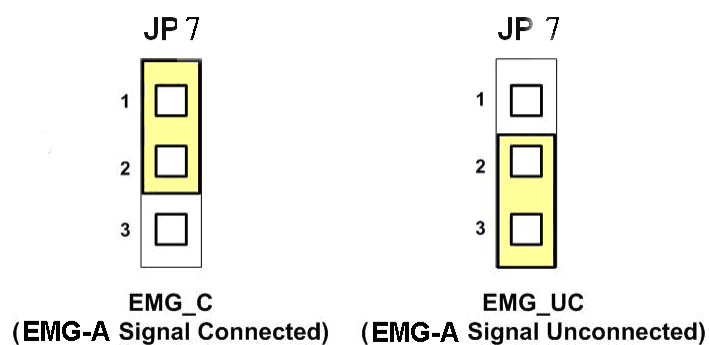
Fig. 2.5 Jumper 7 設定

■ **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)。

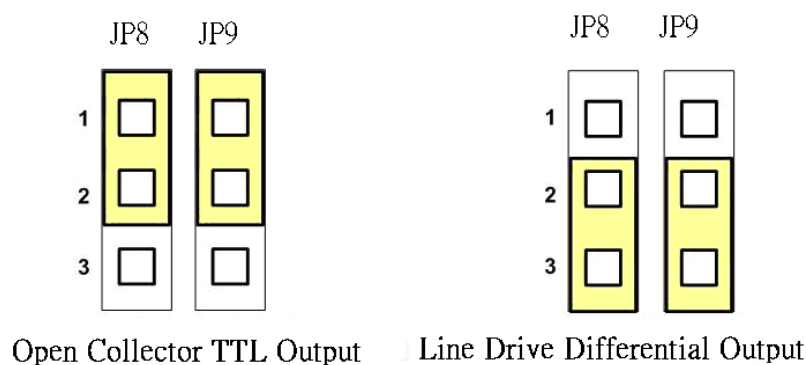Open Collector TTL Output　　Line Drive Differential Output

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
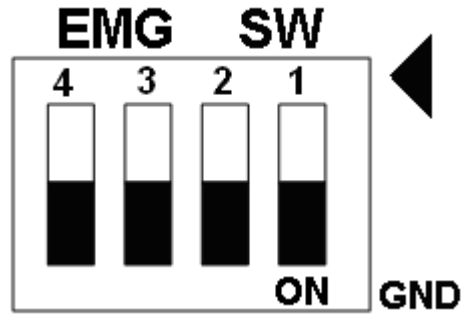擇不使用則是將此訊號直接短路到端子台的GND，若選擇使用則客戶可以將CON6上的EMG當成
配接點來結合使用，請參考下圖:

Fig. 2.7 EMG SW 設定為直接內部接 GND （預設值）

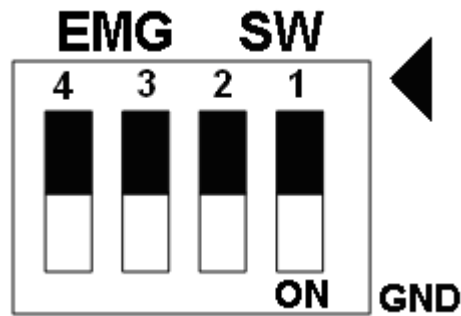Fig. 2.8　EMG SW 設定為使用者自行配接點.

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
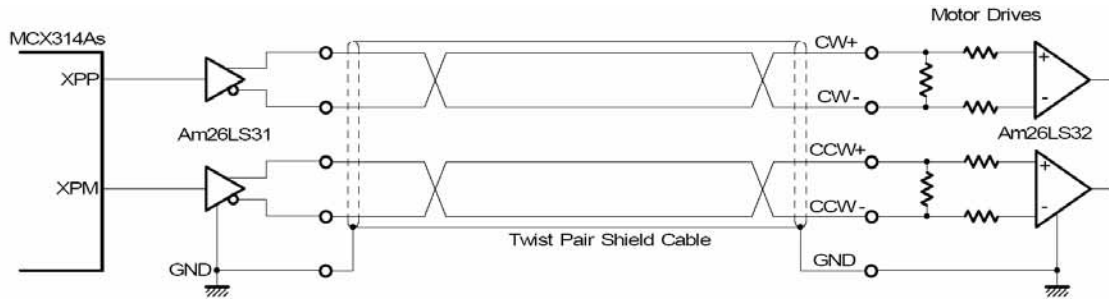
Fig. 2.8 差動脈波輸出接線

開集極輸出
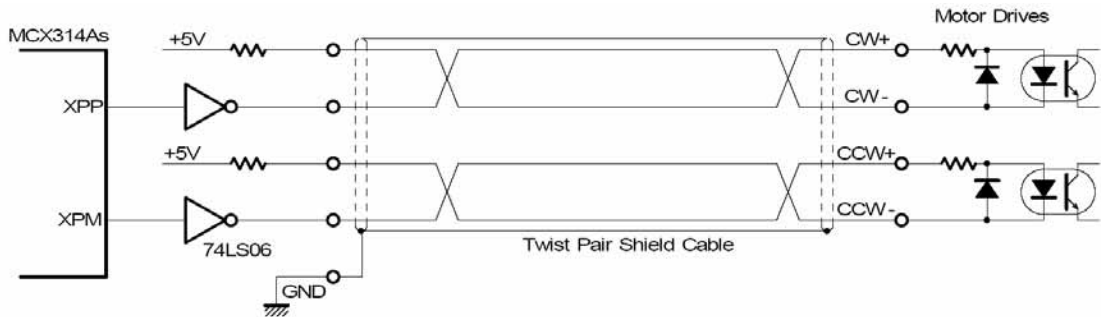
Fig. 2.9 開集極輸出

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。
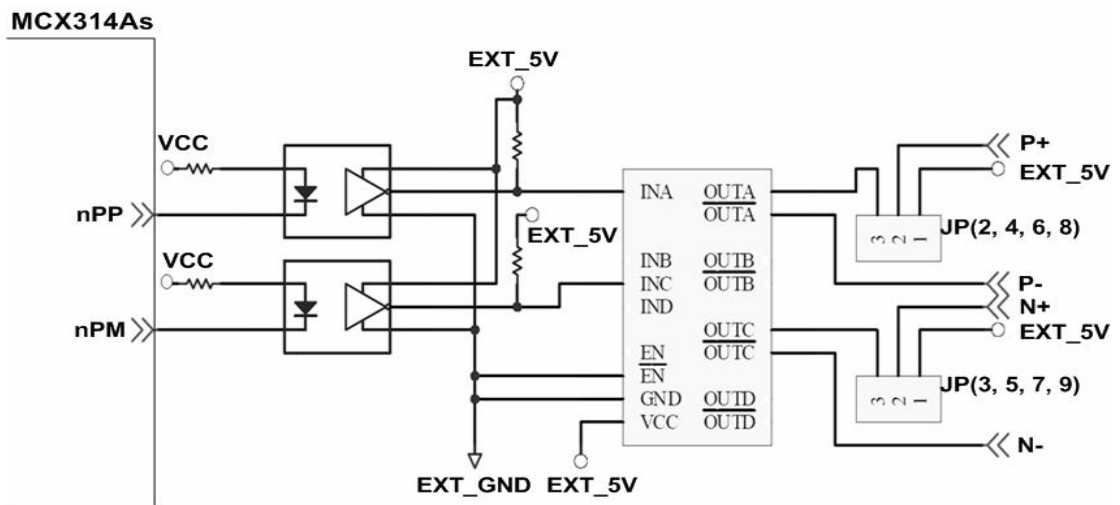
Fig. 2.10 脈波信號接線範例

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。
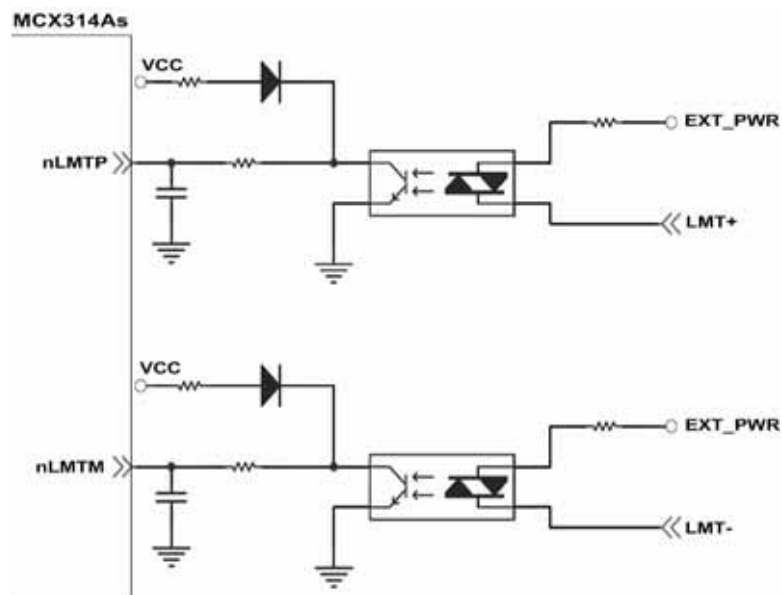
Fig. 2.11 極限開關接線範例

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。
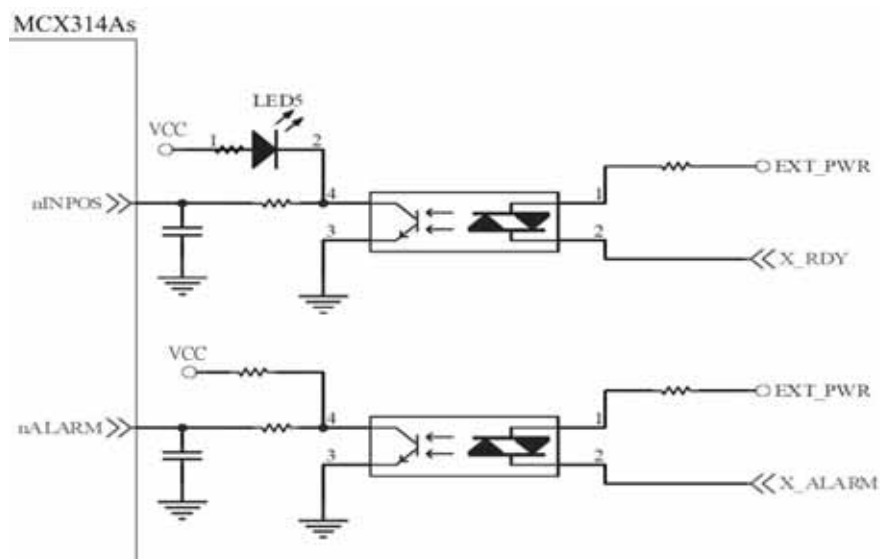
Fig. 2.12 一般 DI 輸入接線範例

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-,經過高速光偶合 IC 就直接連到運動控制晶片。
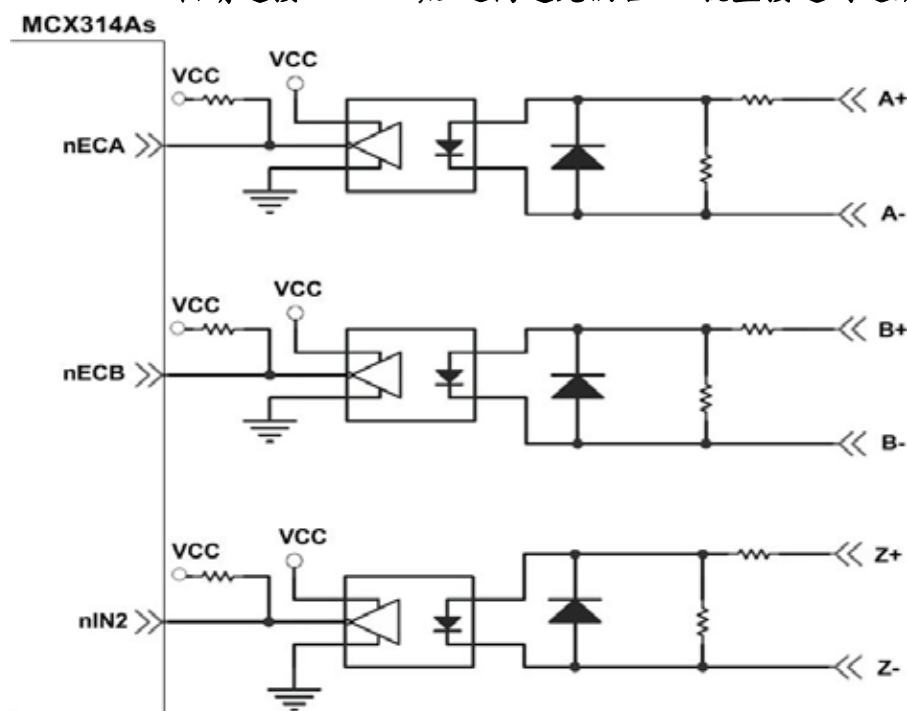
Fig. 2.13 Encoder 接線範例

2.3.5 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，經過高速光偶合 IC 就直接連到運動控制晶片。
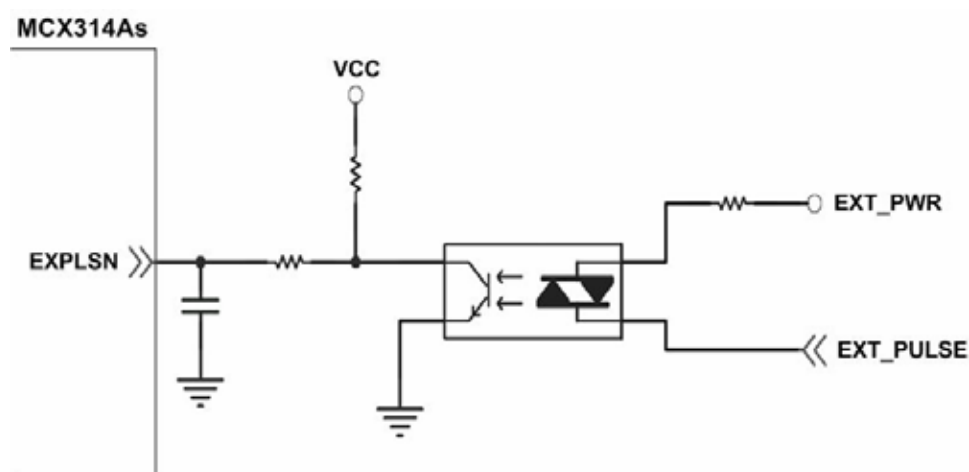
Fig. 2.14 外部輸入脈波接線範例

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**，這信號經過高速光偶合 **IC** 就直接連到運動控制晶片。
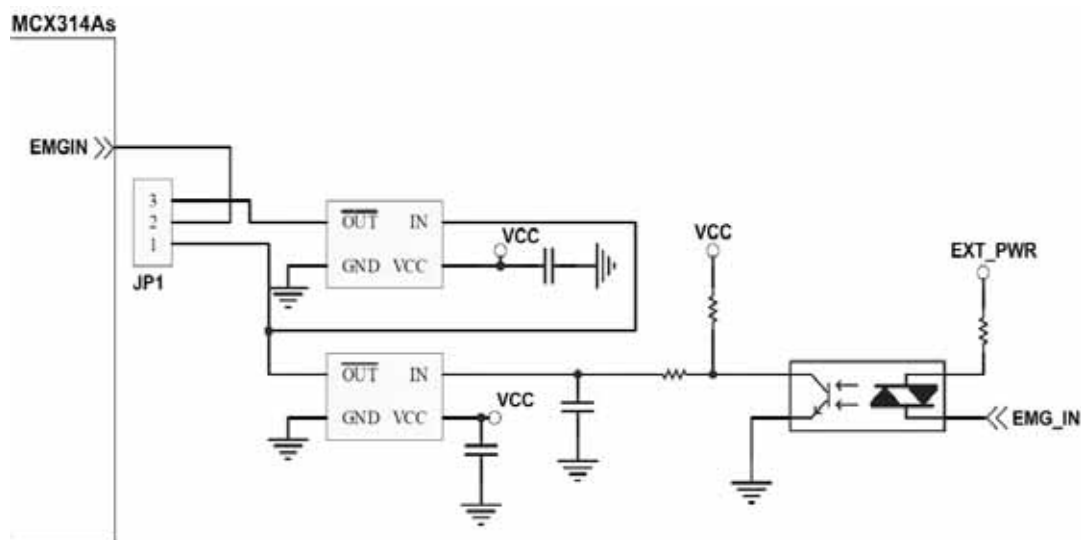
Fig. 2.15 緊急停止輸入接線範例

2.3.7 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。
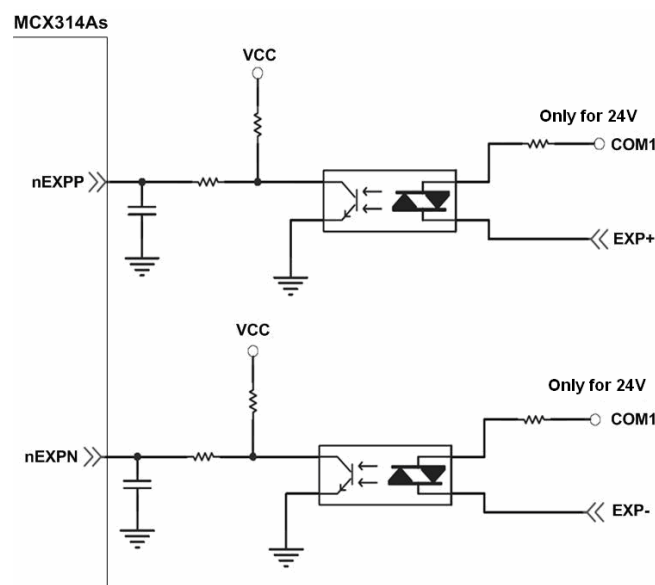
Fig. 2.16 外部信號 **+/-** 輸入接線範例

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。
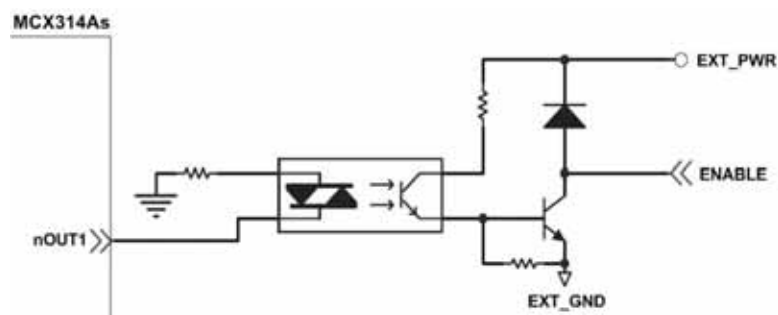
Fig. 2.17 Servo On/Off 信號輸出接線

2.4 接線範例

我們實際示範接 **MITSUBISH MR-J2S AC** 伺服馬達，連接到 **DN-8468GB** 的接線腳位圖
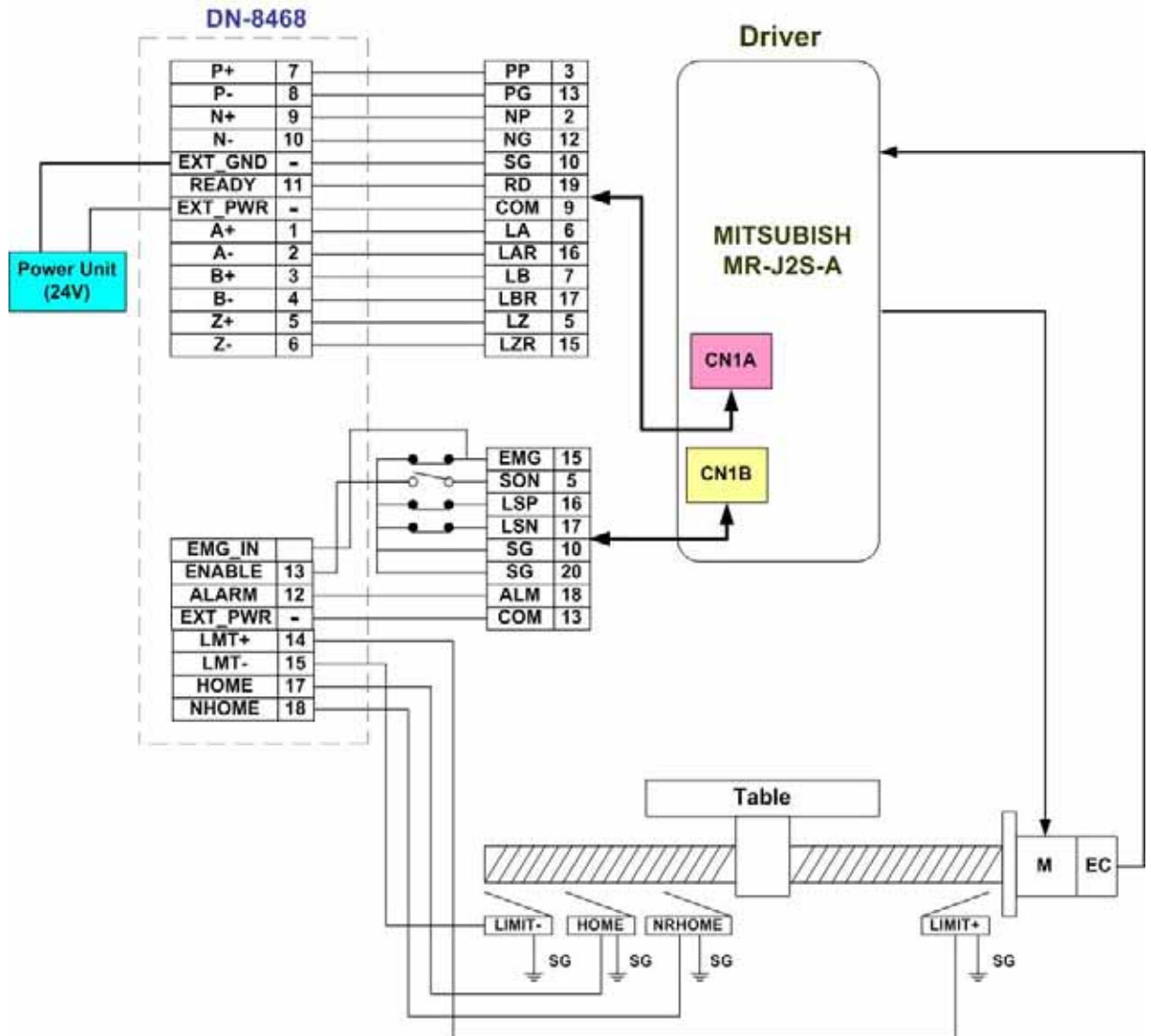
Fig. 2.18 MR-J2S AC 伺服馬達，連接到 **DN-8468** 的接線腳位圖

3 i-8094 軟體函式軟體開發程序

3.1 軟體程式開發流程圖概觀
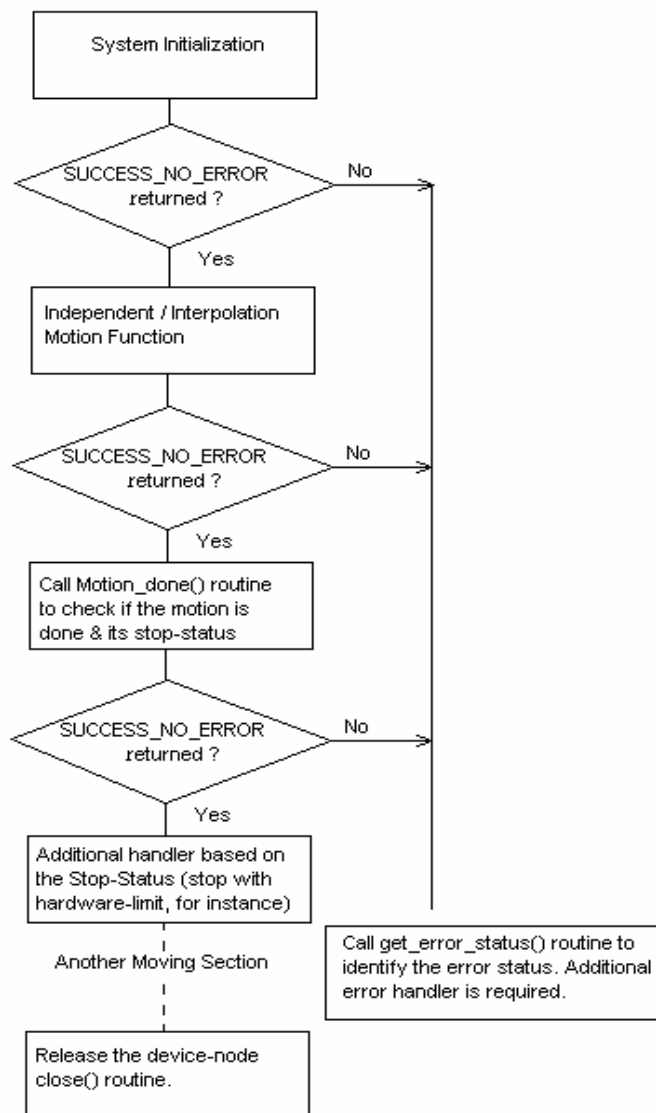
i-8094/F 的軟體目前分為 WinPAC/XPAC_CE 和 Development SDK 兩部份。

WinPAC/XPAC_CE 的部份包括有 WinPAC/XPAC_CE 專用的 Driver、Library 和 Utilities。目前以 CAB 檔的方式將所需的檔案安裝到指定目錄。

Development SDK 的部份則包括有開發程式所需的 宣告檔 (.h)、連結檔(.lib) 和範例程式。目前提供 Installation package 將所需的檔案安裝到指定目錄。

在安裝完成後，可以在 eVC 和 VS2005 子目錄下找到所屬的範例程式。請開啟個別的專案檔，並參考相關的範例程式。

3.2 在 PAC 上安裝所需的軟體

3.2.1 在 XPAC_CE 上安裝 i-8094 所需的軟體

i-8094/F 在 XPAC_CE 上以 CAB 封裝所需的 driver、Library 和 Utilities。在 XPAC_CE 下直接 double-click CAB 封裝檔，XPAC_CE 就會自動安裝 CAB 檔內的內容。
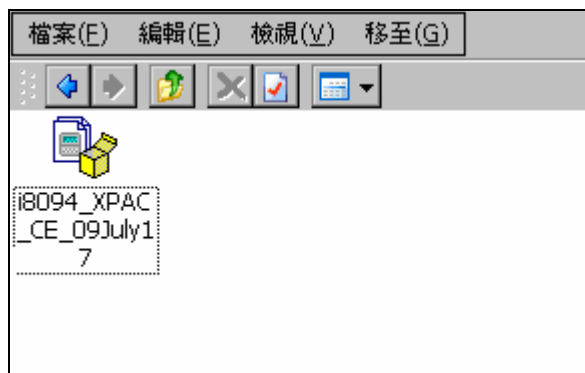
完成安裝後，Drriver 和 Library 會自動安裝到 XPAC_CE 指定的目錄；相關的 Utilities 則是安裝到 \System_Disk\i8094。所安裝的 Utilities 包括：

✧ MotionCfg：用以設定 XPAC_CE 上的 i8094/F 和 i8092F 是否啟用的工具程式。

✧ i8094 EzGo：類似 PISO-PS400 PCEzGo 的工具程式，可以顯示 i-8094/F 模組各軸的狀態，以確認外部感測器的致能極性與演示基本的運動模式。

✧ i8094F EzFRnet：將 FRnet 的功能由 EzGo 工具程式中獨立出來。
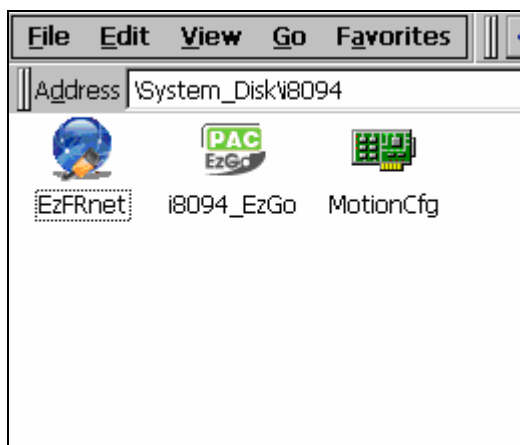
當例用 CAB 進行軟體更新時，XPAC_CE 會先提示並要求確認重新安裝否更新。
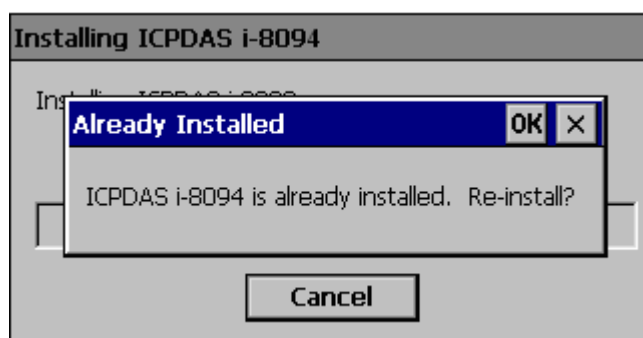
待 WinPAC 重新開機即完成 CAB 檔更新。

3.2.2 在 **WinPAC** 上安裝 **i-8094** 所需的軟體

i-8094 在 WinPAC 上以 CAB 封裝所需的 driver、Library 和 Utilities。在 WinPAC 下直接 double-click CAB 封裝檔，WinPAC 就會自動安裝 CAB 檔內的內容。

```
┌─────────────────────────────────────┐
│ 檔案(F)  編輯(E)  檢視(V)  移至(G)    │
├─────────────────────────────────────┤
│ ◀ ▶ 🔼 ✕ ✓ ▦▼                      │
│                                      │
│  🗔📦                                │
│ WinPAC_i80                           │
│ 94_08Nov27                           │
│                                      │
│                                      │
│                                      │
│                                      │
│                                      │
│                                      │
│                                      │
│                                      │
│                                      │
└─────────────────────────────────────┘
```

〔注意事項〕

WinPAC 只在 OS Ver.1.3.0.0 以上的版本可以支援外掛驅動程式，請先確認 WinPAC 的 OS 版本是否支援。

完成安裝後，Drriver 和 Library 會自動安裝到 WinPAC 指定的目錄；相關的 Utilities 則是安裝到 \System_Disk\i8094。所安裝的 Utilities 包括：

✧ i8094/F MotionCfg：用以設定 WinPAC 上的 i8094/F 是否啟用的工具程式。

✧ i8094/F EzGo：類似 PISO-PS400 PCEzGo 的工具程式，可以顯示 i-8094 模組各軸的狀態，以確認外部感測器的致能極性與演示基本的運動模式。

✧ i8094F EzFRnet：將 FRnet 的功能由 EzGo 工具程式中獨立出來，只支援搭載 FRnet controller 的 i-8094F。

當更新版本時，WinPAC 會先提示是否更新；如果 WinPAC 中有已經正常啟用的 i-8094/F 模組，則 WinPAC 會因為 Driver 正在使用中而出現下列的警告訊息。

請先取消安裝，使用MotionCfg工具程式移除相關設定，執行WinPAC_Utility的 Save and Reboot。待WinPAC重新開機即可以CAB檔更新。

3.3 i8094/F 軸模組設定工具
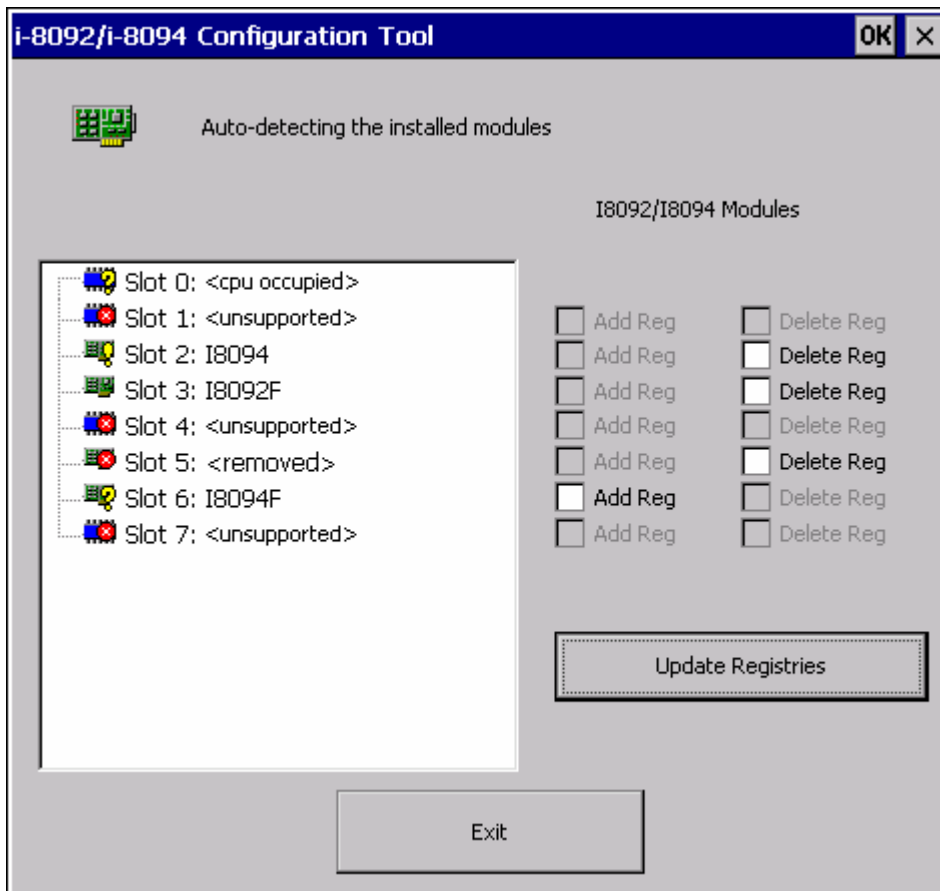
MotionCfg 用以新增/移除 WinPAC 的設定值，藉以啟用/關閉相對應的 i-8094 模組。MotionCfg 會掃瞄 WinPAC 背板上所有的 i-8094/F 模組，比對「WinPAC 內的設定值」與「已啟用的 i-8094/F 模組」，藉以顯示目前背板上 i-8094/F 的狀態，包括有：

Slot 3: I8092F	Active i-8092F，如上圖 Slot 3
Slot 6: I8094F	None-Configure i-8094/F，表示新插入還未設定的 i-8094/F 模組，如上圖的 Slot 6。
Slot 5: \<removed>	Removed i-8094/F，表示在 WinPAC 所設定的 i-8094/F 模組已經被移除，如上圖的 Slot 5。
Slot 2: I8094F	Failed i-8094/F，表示 WinPAC 無法啟用該 i-8094/F 模組，如上圖的 Slot 2。
Slot 1: \<unsupported>	Unsupported Module / Empty Slot，如上圖的 Slot 1、Slot 4 和 Slot 7。

〔**注意事項**〕

在 WinPAC 上，一旦有改變模組的相關設定值，請**務必**依 MotionCfg 結束前的提示，執行 WinPAC_Utility

儲存 WinPAC 設定值並重新開機。
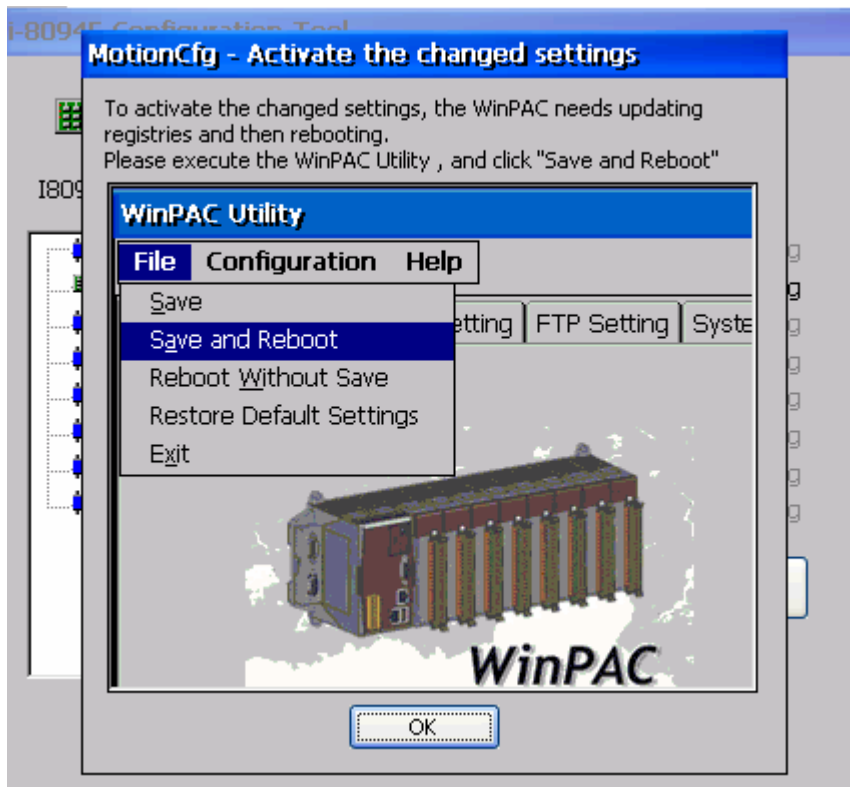
3.4 i8094_EzGo 自我測試程式

I8094_EzGo 以此主畫面為起始點，依功能分類主要可分為 3 種功能項目：

1、初始化設定 (Configuration)：請參閱 3.4.1 節

關於初始化設定對話盒(Configuration Dialog)設定上可分為硬體訊號(Hardware Signals)、軟體極限訊號(Software Limit)、伺服訊號(Servo Input & Enable Signals)、信號濾波器(Input Signal Filter)，和中斷訊號 (Interrupt Factor) 等設定。 詳細說明請參考各節說明。

2、基本運動命令(Basic Operation)：請參閱 3.4.2 節

關於基本運動命令對話盒(Basic Operation Dialog)動作上可分為等速、梯形加減速、S 曲線加減速，原點返回與外部訊號吋動模式。詳細說明請參考各節說明。

3、補間運動命令 (Interpolation)：請參閱 3.4.3 節

關於補間命令對話盒(Interpolation Dialog) 動作上可分為直線及圓弧補間運動。詳細說明請參考各節說明。

3.4.1 初始化設定對話盒(Configuration Dialog)
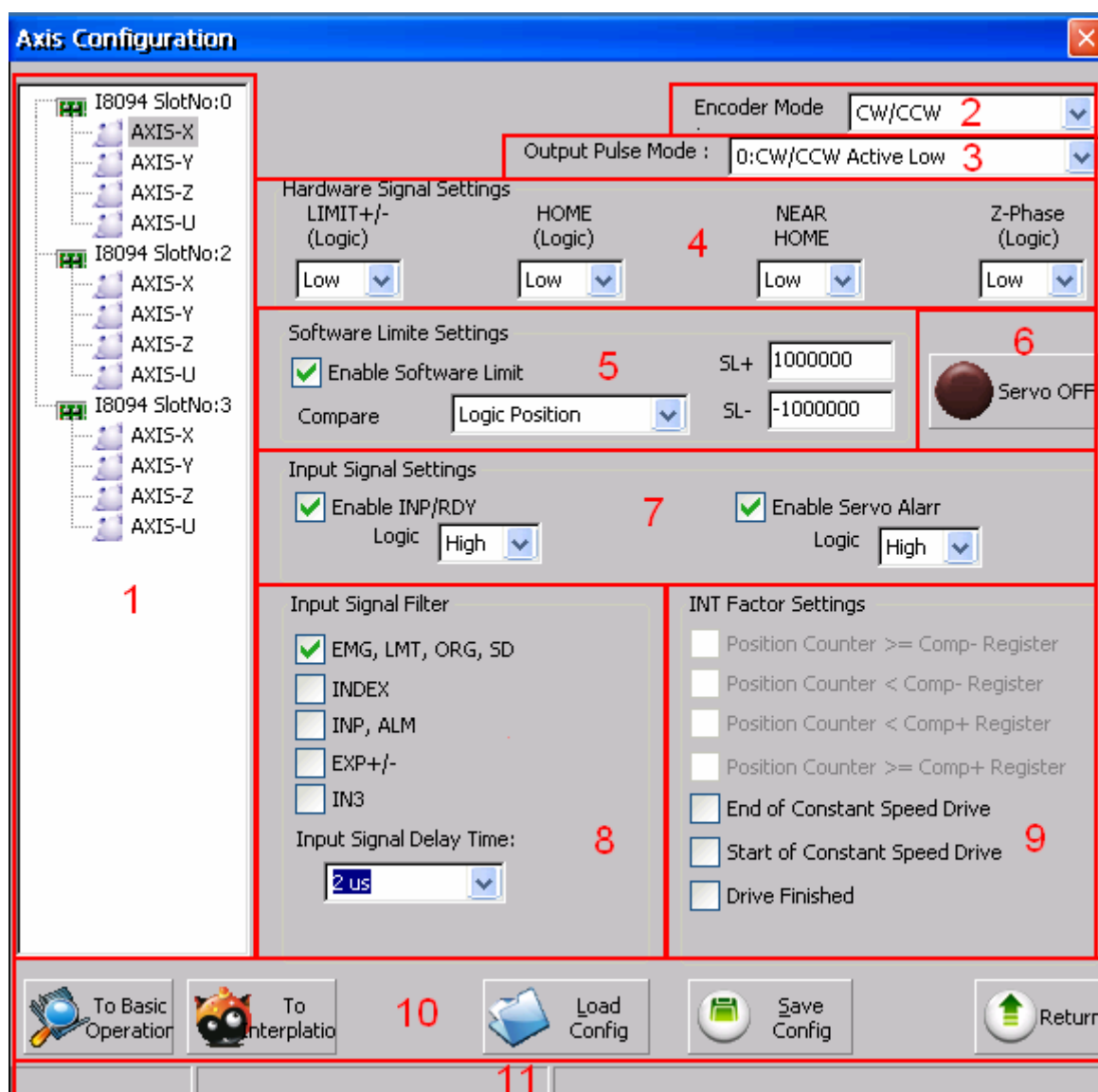
群組定義&使用說明

1. 指定所要設定的軸：
   - 以樹狀結構顯示目前在系統上可使用的 i-8094 模組，用以指定位於特定板卡上所要設定的軸。

2. 編碼器輸入模式(Encoder Mode)：
   - 可分為 4 種模式：1/1 AB Phase、1/2 AB Phase、1/4 AB Phase、CW/CCW。
   - 相關函數指令： i8094_set_enc_cfg()。

3. 脈波輸出模式(Output Pulse Mode)：

- 可分為 6 種模式：0, 1 為 CW/CCW 雙脈波模式；2~5 為 PULSE/DIR 單脈波模式。
- 相關函數指令：i8094_set_pls_cfg()。

4. 硬體訊號設定(Hardware Signals Settings)：
   - 可分為正負極限(LIMIT+/-)、原點訊號(HOME)、接近原點訊號(NEAR HOME)、馬達編碼器 Z 相訊號(INDEX)。以上每個硬體訊號可四軸個別獨立設定其邏輯位準(High/Low)。
   - 相關函數指令：i8094_set_limit()、i8094_set_home_cfg()。

5. 軟體極限設定(Software Signals Settings)：
   - 說明請參考 x.2.4 節。
   - 相關函數指令：i8094_set_softlimit()。

6. 伺服開關訊號(Servo On/Off)：
   - 在所選取的軸上(Card Configuration)啟動或停止伺服馬達。
   - 相關函數指令：i8094_servo_on()。

7. 伺服輸入訊號(Servo Input Signal)：
   - 伺服警告訊號可致能或除能，可選擇邏輯位準。
   - 相關函數指令：i8094_set_alarm()。

8. 輸入信號之數位濾波器(Input Signals Filter Settings)：
   - 設定輸入濾波延遲時間參數如下表所示：

代號	可移除最大雜訊寬(width)	輸入延遲時間
0	1.75μSEC	2μSEC
1	224μSEC	256μSEC
2	448μSEC	512μSEC
3	896μSEC	1.024 mSEC
4	1.792 mSEC	2.048 mSEC
5	3.584 mSEC	4.096 mSEC
6	7.168 mSEC	8.192 mSEC
7	14.336 mSEC	16.384 mSEC

   - 設定數位濾波訊號：
     FE0為緊急停止訊號(EMGN)、左右極限(LMT)、原點訊號(IN1)，以及靠近原點訊號(IN0)。
     FE1為編碼器Z相訊號(IN2)。
     FE2為馬達完成訊號(RDY)和馬達警告訊號(ALM)。
     FE3為外部輸入正負方向訊號(EXP+/EXP-)。FE4為IN3訊號。
   - 相關函數指令：i8094_set_filter()。

9. 中斷向量設定(INT Factor Settings)：

■ i-8094 運動控制模組提供多種中斷事件的設定。包括有位置計數器大於等於負方向比較計數器(Position Counter >= Comp-)、位置計數器小於負方向比較計數器(Position Counter < Comp-)、位置計數器大於等於正方向比較計數器(Position Counter >= Comp+)、位置計數器小於正方向比較計數器(Position Counter < Comp+)、等速段的終點(End of Constant Speed Drive)、等速段的起點(Start of Constant Speed Drive)、驅動結束(Drive Finished)。

■ 相關函數指令： i8094_set_int_factor()、i8094_get_int_status()。

10. 按鈕功能

■ To BasicOperation：切換到 Basic Operation Dialog。

■ To Interpolation：切換到 Interpolation Dialog。

■ LoadConfig：載入預先儲存的設定檔。

■ SaveConfig：儲存相關硬體訊號設定儲存至設定檔。

■ Return：返回起始畫面。

11. 狀態顯示

■ 顯示錯誤軸的狀態。

3.4.2 基本運動命令 (Basic Operation Dialog)
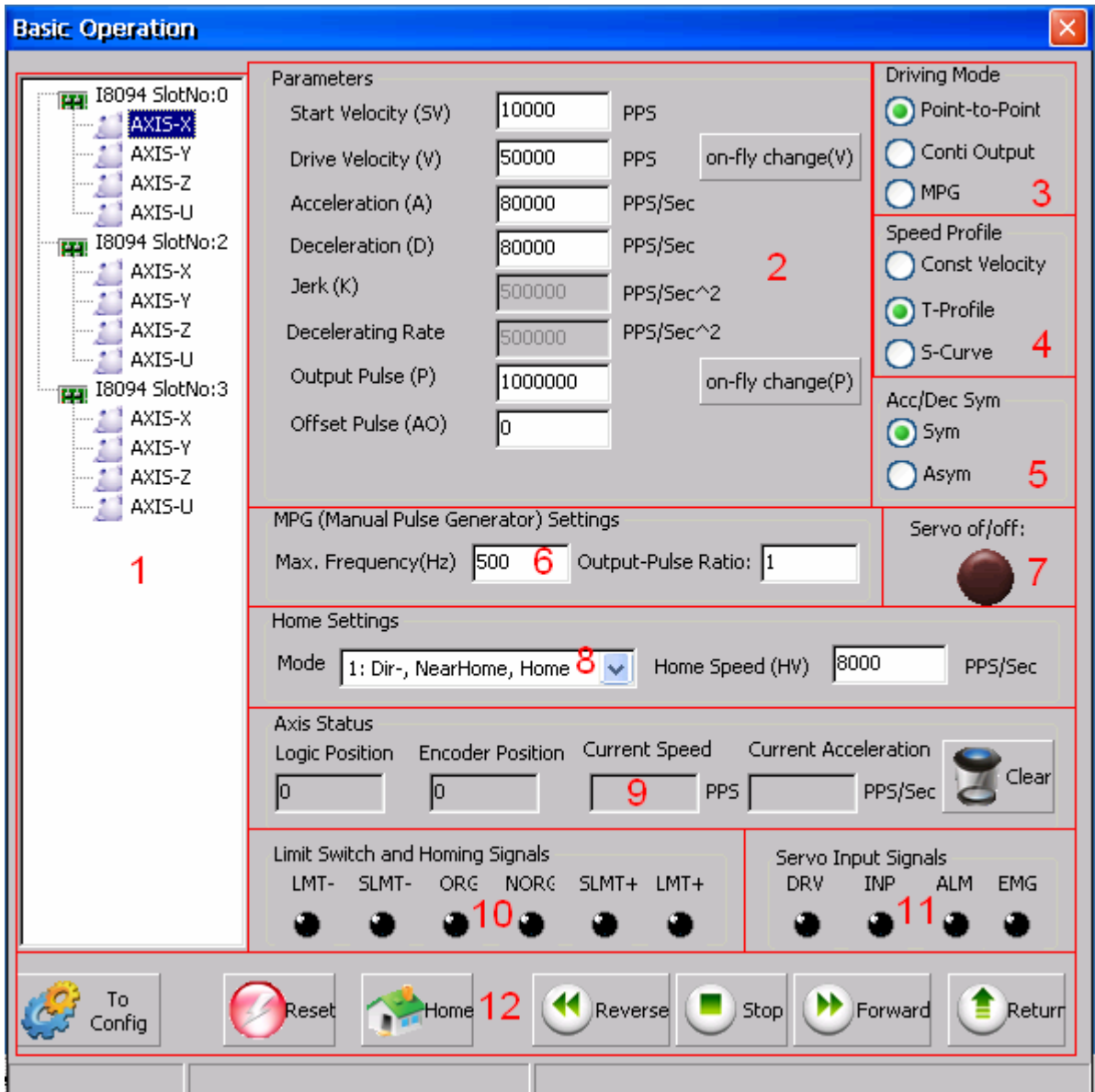
群組定義&使用說明

1. 指定所操作的軸:
   - 以樹狀結構顯示目前在系統上可使用的 i-8094 模組,用以指定位於特定板卡上所要操作的軸。

2. 運動參數設定(Parameter)
   - 可設置初始速度(SV)、驅動速度(V)、加速度(A)、減速度(D)、加速率(Jerk)、減速率(L)、輸出 PULSE(P)、位移 PULSE(AO)的值。

3. 驅動模式設定 (Driving Mode)

■ 可選擇點對點定量模式(point-to-point)、連續模式(conti-output)、手搖輪模式(MPG)。

4. 加速模式設定 (Speed Profile)
   ■ 可選擇定速度運動模式(Const Velocity)、T 曲線模式(T-Profile)、S 曲線模式(S-Curve)。

5. 加減速曲線對稱設定 (Acc/Dec Sym)
   ■ 可選擇對稱模式(Sym)、非對稱模式(Asym)

6. 手搖輪設定 (MPG Setting)
   ■ 設定手搖輪最大頻率與輸出倍率。

7. 伺服啟動狀態 (Servo On/Off)
   ■ 顯示設定軸的伺服馬達啟動狀態。

8. 原點返回設定 (Home Setting)
   ■ 設定返回原點的運動模式與速度。
   ■ 相關函數指令： i8094_set_home_cfg()。

9. 運動軸狀態顯示 (Axis Status)
   ■ 其中位置與速度計數器子頁提供顯示各軸之邏輯位置計數器、編碼器位置計數器、即時速度、即時加速度等資訊。
   ■ 相關函數指令： i8094_get_cmdcounter()、i8094_get_enccounter()、i8094_get_speed()、i8094_get_acc()。

10. 原點與極限點狀態 (Limit Switch and Homing Signals)
   ■ 顯示原點、近原點、軟體極限點與極限點狀態。
   ■ 相關函數指令： i8094_get_mdi_status()。

11. 伺服輸入信號狀態顯示 (Servo Input Signals)
   ■ 顯示伺服輸入信號狀態顯示。

12. 按鈕功能
   ■ To Config：切換到 Axis Configurature Dialog。
   ■ Reset：回復至板卡的初始狀態。
   ■ Home：啟動原點返回。
   ■ Reverse：啟動負方向運動。
   ■ Stop：停止運動。

- ■ Forward：啟動正方向運動。
- ■ Return：返回起始畫面。

3.4.3 補間運動對話盒 (Interpolation Dialog)
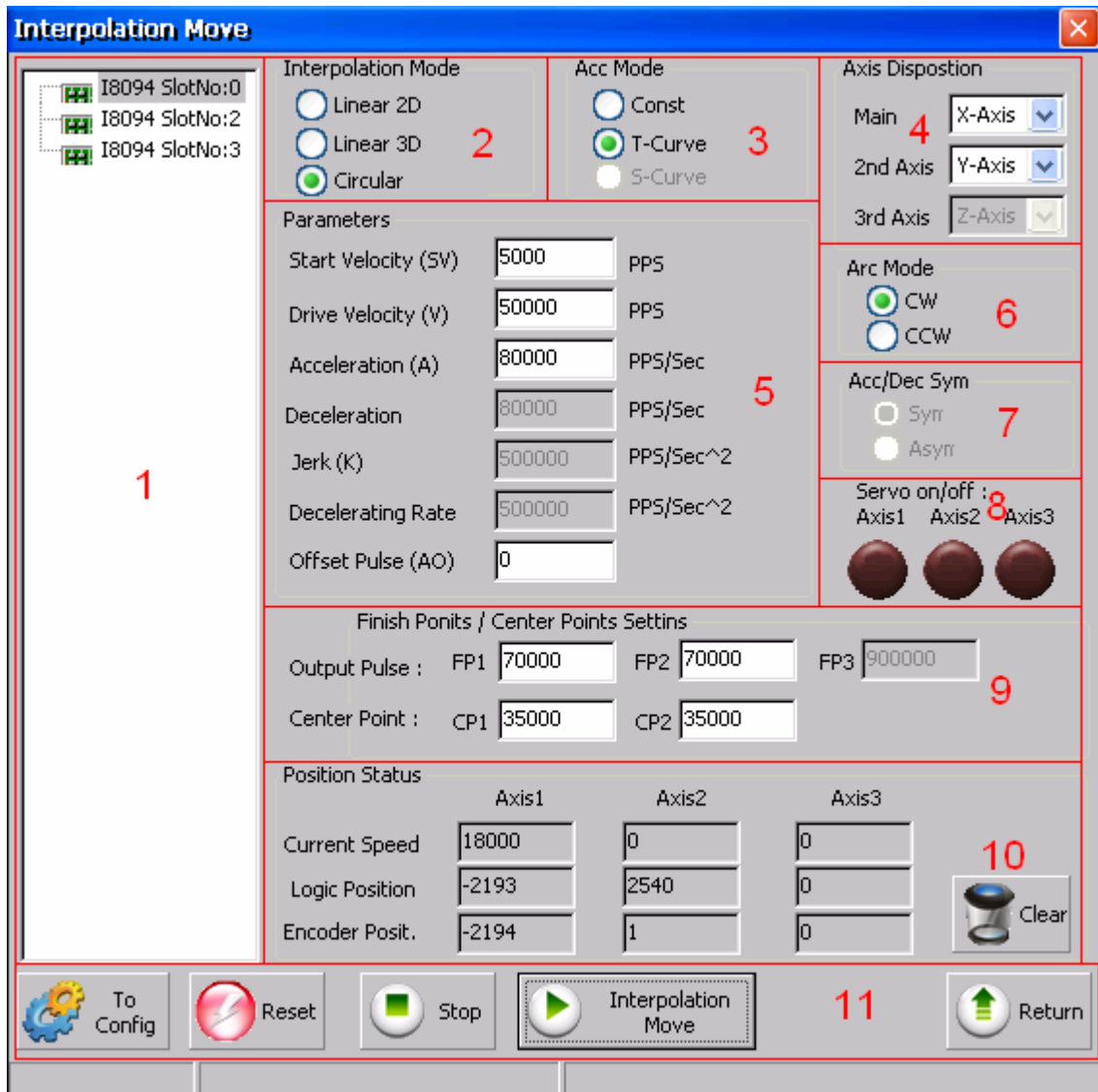
群組定義&使用說明

1. 指定所操作的模組：
   - 以樹狀結構顯示目前在系統上可使用的 i-8094 模組，用以指定所要操作的模組。

2. 補間模式設定 (Interpolation Mode)
   - 提供基本的 2 種補間模式：直線補間(Linear)與圓弧補間(Circular)。
   - 相關函數：i8094_t_line2_move()、i8094_s_line2_move()、i8094_t_line3_move()、i8094_s_line3_move()、i8094_t_arc2_move()。

3. 加速模式設定 (Acc Mode)
   - 補間運動可選擇 3 種加速模式：等速(Const)、梯形加減速(T-Curve)、S-Curve 加減速

(S-Curve)。

4. 補間軸配置 (Axis)
   - 設定補間軸。

5. 補間運動參數設定(Parameters)
   - 可設置初始速度(SV)、驅動速度(V)、加速度(A) 、減速度(D)、加速率(Jerk)、減速率(L)、輸出 PULSE(P)、位移 PULSE(AO)的值。

6. 圓弧補間方向設定 (Arc Mode)
   - 圓弧補間方向可分為順時針方向(CW)與逆時針方向(CCW)。

7. 加減速曲線對稱設定 (Acc/Dec Sym)
   - 可選擇對稱模式(Sym)、非對稱模式(Asym)

8. 伺服啟動狀態 (Servo On/Off)
   - 顯示設定軸的伺服馬達啟動狀態。

9. 圓弧補間參數設定(Finish Points/Center Points Setting)
   - 設定補間的結束點與圓弧補間的原點。

10. 運動軸狀態顯示 (Axis Status)
    - 其中位置與速度計數器子頁提供顯示各軸之邏輯位置計數器、編碼器位置計數器、即時速度等資訊。
    - 相關函數指令： i8094_get_cmdcounter()、i8094_get_position()、i8094_get_speed()。

11. 按鈕功能
    - To Config：切換到 Axis Configurature Dialog。
    - Reset：回復至版卡的初始狀態。
    - Stop：停止運動。
    - Interpolation Move：啟動補間運動。
    - Return：返回起始畫面。

3.5 i8094F_EzFRnet 自我測試程式
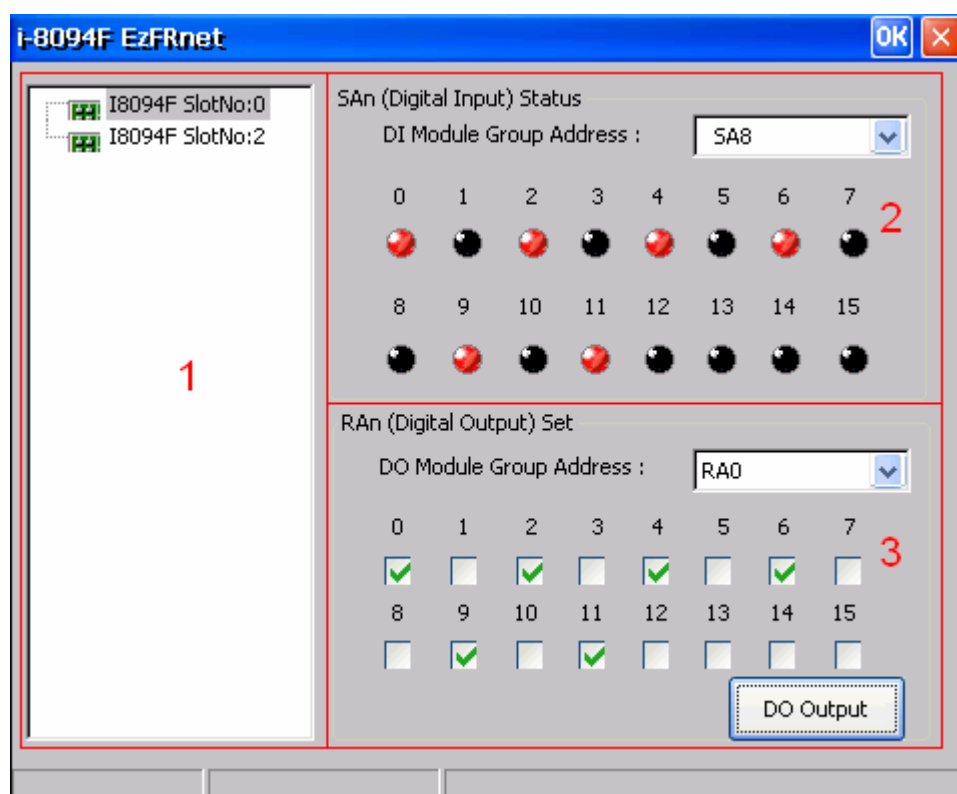
群組定義&使用說明

1. 指定所操作的模組：
   - 以樹狀結構顯示目前在系統上可使用的 i-8094 模組，用以指定所要操作的模組。

2. SAn 數位輸入端 (SAn (Digital Input) Status)
   - 選擇 FRnet DI 模組的群組地址(DI Module Group Address)。
   - 相關函數指令：i8094_get_FRnet_DI()。

3. RAn 數位輸出端 (RAn (Digital Output) Set)
   - 選擇 FRnet DO 模組的群組地址(DO Module Group Address)。
   - 相關函數指令：i8094_set_FRnet_DO()。

3.6 安裝程式軟體開發套件

i-8094/F提供API來協助程式設計師搭配eMbedded Visual C++ 和 Visual Studio C++ 開發程式。在有安裝WinPAC platform SDK的WindowsNT/Wndows200/WindowsXP上執行setup.exe即可自動安裝所需的定義檔(.h) 與 連結檔(.lib)。

安裝完成後，下列的目錄\檔案會出現在所選的安裝路徑 ($Installed_Directory):

$Installed_Directory	Manuals\		Get_started, Function_Rerence 相關的文件
	eVC\	Lib\	eVC 程式開發所須要的連結檔(.lib)
		Include\	eVC 程式開發所須要的定義檔(.h)
		Samples\	eVC 範例程式
	VS2005\	Lib\	VS2005 C++程式開發所須要的連結檔(.lib)
		Include\	VS2005 程式開發所須要的定義檔(.h), C#轉換檔(.vc) 和 VB 模組(.vb)
		Cpp\	VS2005 C++ 範例程式
		CSharp\	簡單的 VS2005 C# 範例程式
		VB\	簡單的 VS2005 VB 範例程式

(例如, 安裝 WinPAC 的開發軟體, 預設的安裝路徑是 C:\ICPDAS\i8094_WinPAC)

開啟該 Project/WorkSpace 則會帶出所有設定，包括有所需要的定義檔的參考目錄、所需要的連結檔檔名與參考目錄 和 所參考的 Platform SDK- PAC270 / XPacSDK_CE。
如果所需的 SDK 沒有出現在相對的欄位，請參考 WinPAC/XPAC_CE 相關的文件安裝所需的 SDK。
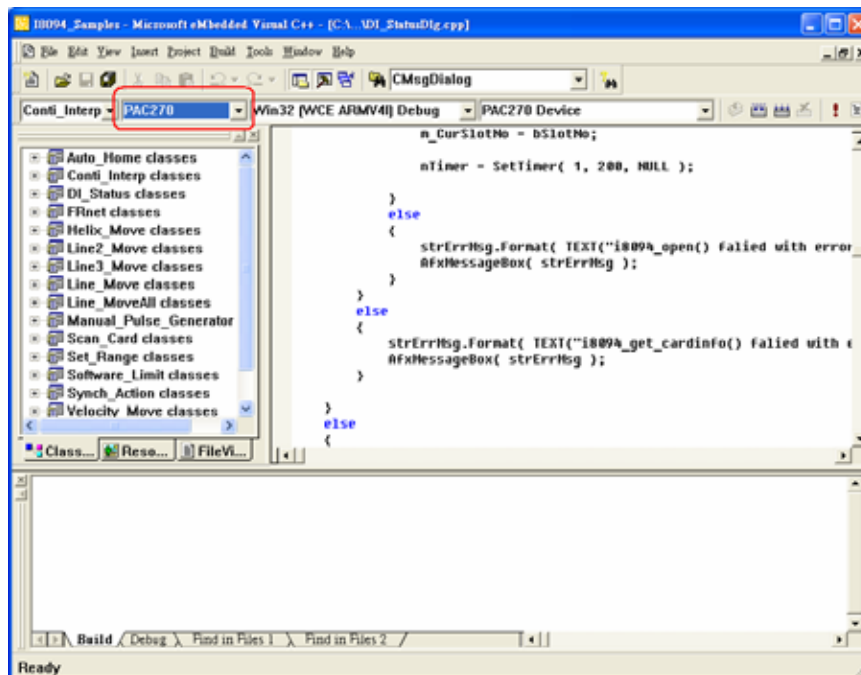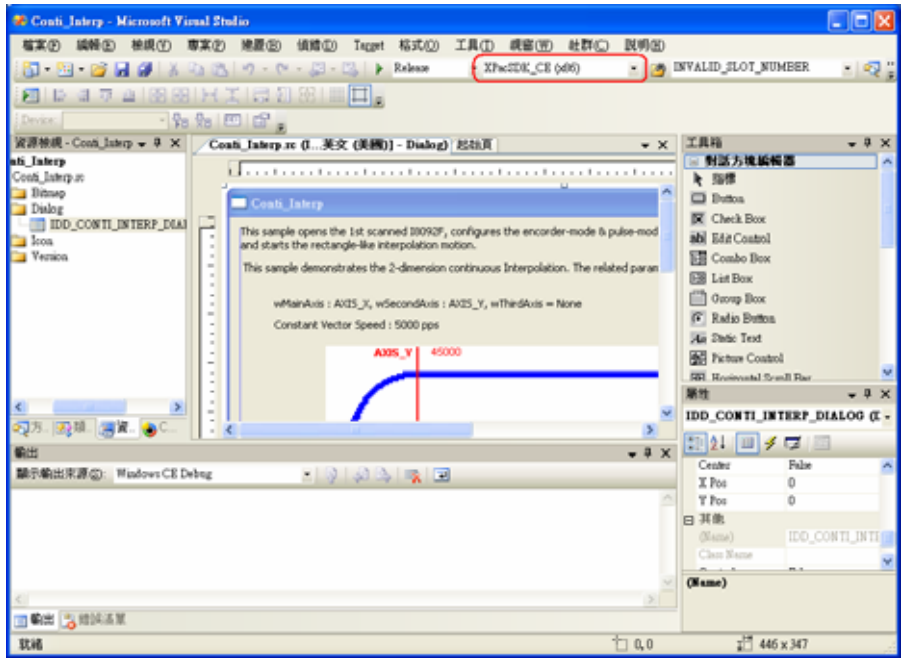
A.1 DN-8468M Daughter Board

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

A.1.1 Board Layout for DN-8468M
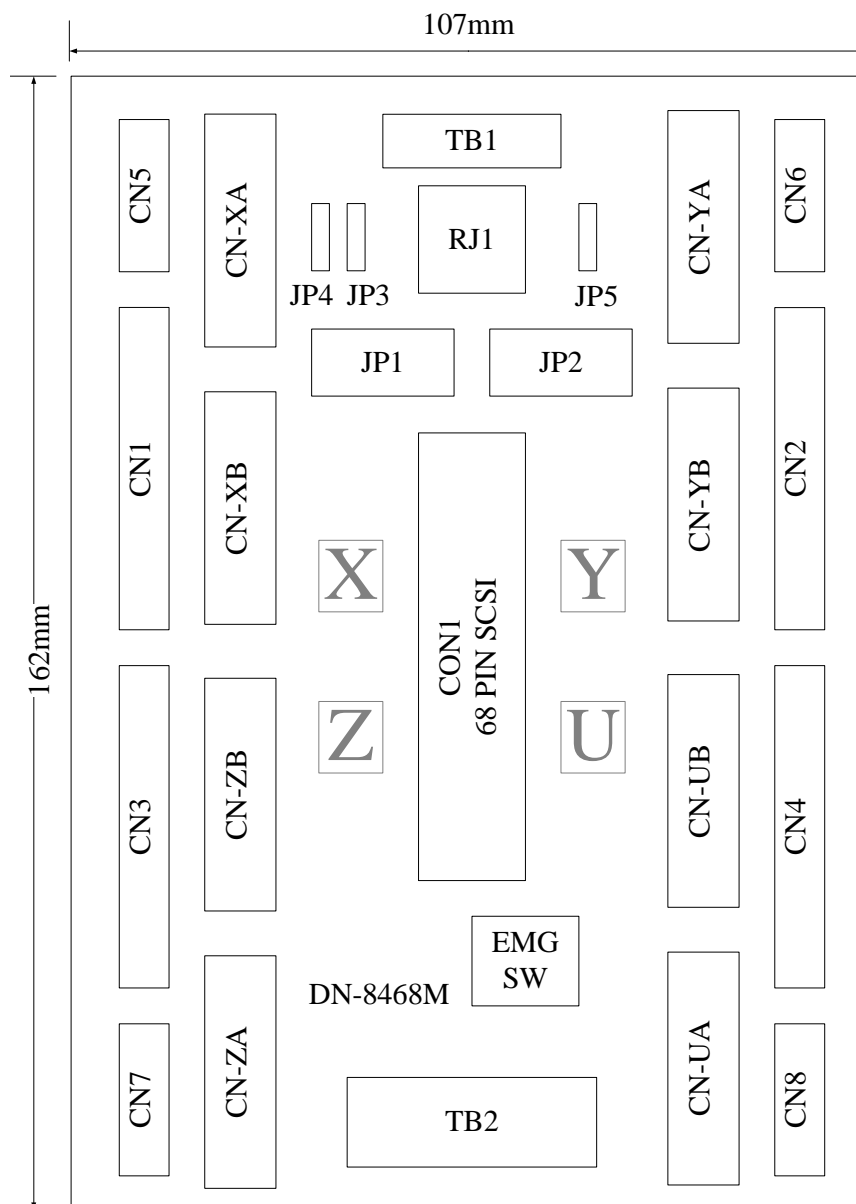
Fig. 1-1   Board layout for the DN-8468M

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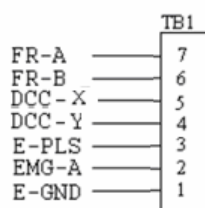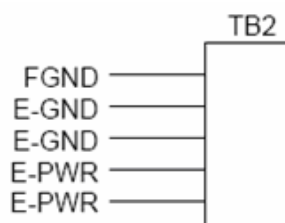
Table 1-7 CNB Signal Connection
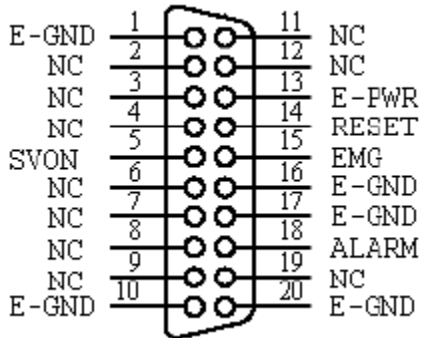
Pin	Pin	Description
SVON	5	Servo On
RESET	14	Servo Reset
EMG	15	Emergent Stop
ALARM	18	Servo Alarm
E-PWR	13	EXT power +24V
E-GND	1, 10, 16,17, 20	EXT power ground
NC	2, 3, 4, 6, 7, 8, 9, 11, 12, 19	No connection

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.
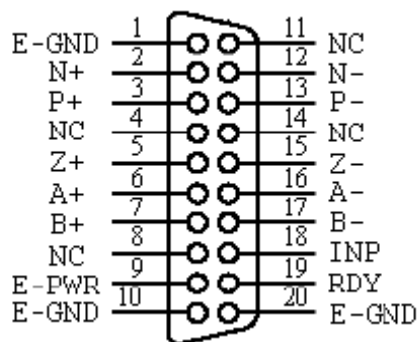
Table 1-8 CN1~4 Signal Connection

Fig 1-7 Pin definition for CN1~ CN4

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

■ 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.
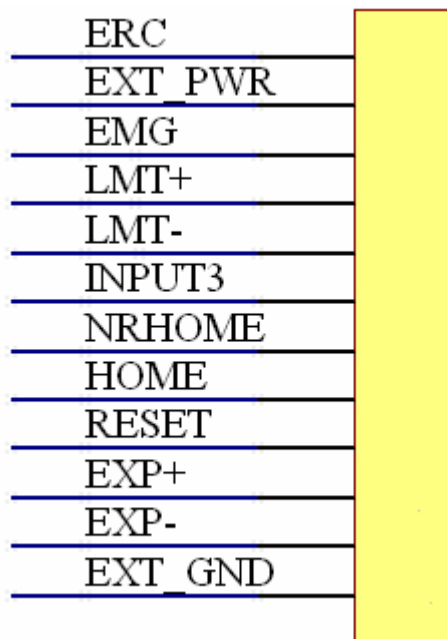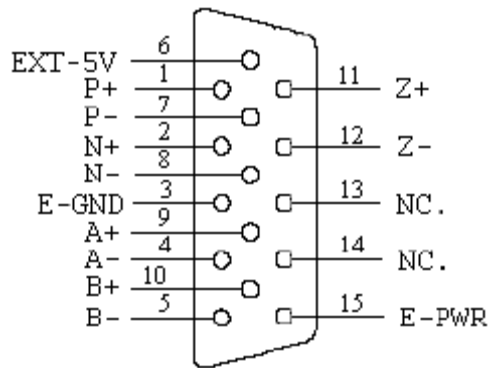

Fig. 1-9 Pin definition for RJ1

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

Table 1-10 RJ1

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

A.1.3 Jumper and Switch Settings

■ JP5

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

Fig. 1-10 Jumper 5 setting

■ JP1, JP2

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

Fig. 1-11 Primary encoder signals setting

Fig. 1-12 External encoder signals setting

■ EMG SW

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

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

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

A.2 DN-8468P Daughter Board

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

A.2.1 Board Layout for DN-8468P
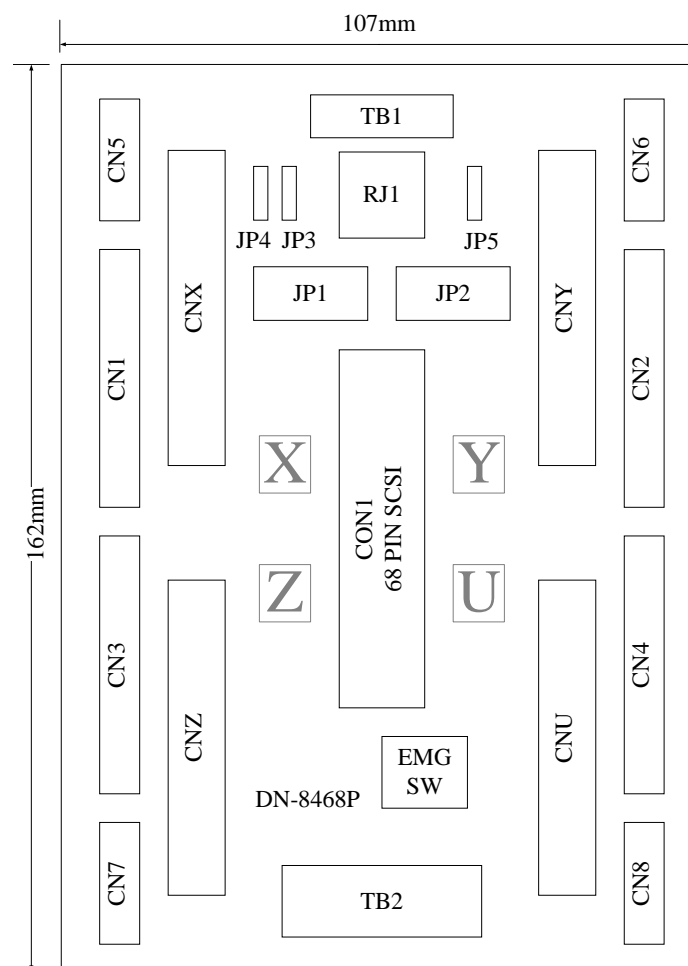
Fig. B2-1   Board layout for the DN-8468P

A.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.
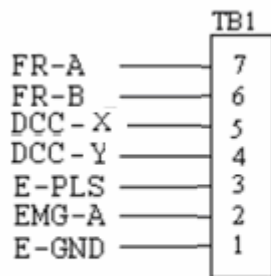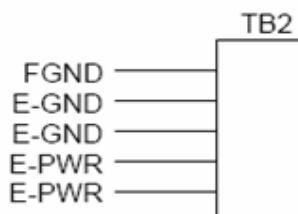

Fig.1-7 Pin definition for CN1 ~ CN4

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.
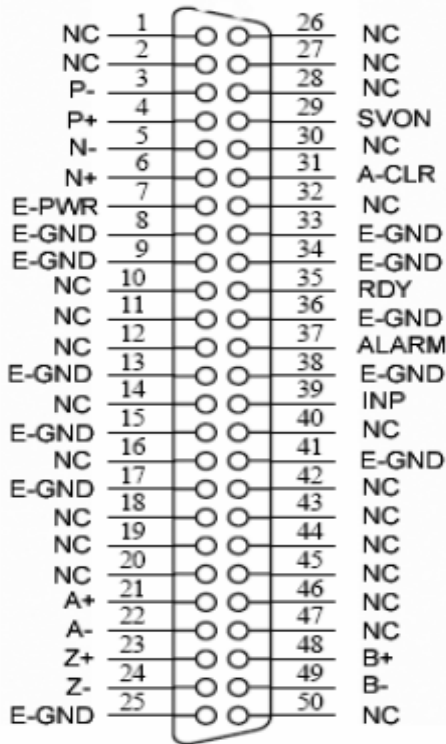

Fig. 1-8 Pin definition for CN5 ~ CN8

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.

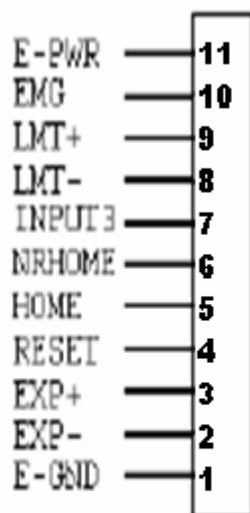Table 1-10 RJ1

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.

A.2.3 Jumper and Switch Settings

■ **JP5**

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

Fig. 1-10 Jumper 5 setting

■ **JP1, JP2**

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

Fig. 1-11 Primary encoder signals setting

Fig. 1-12 External encoder signals setting

■ EMG SW

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

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

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

A.3 DN-8486Y Daughter Board

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

A.3.1 Board Layout for DN-8468Y
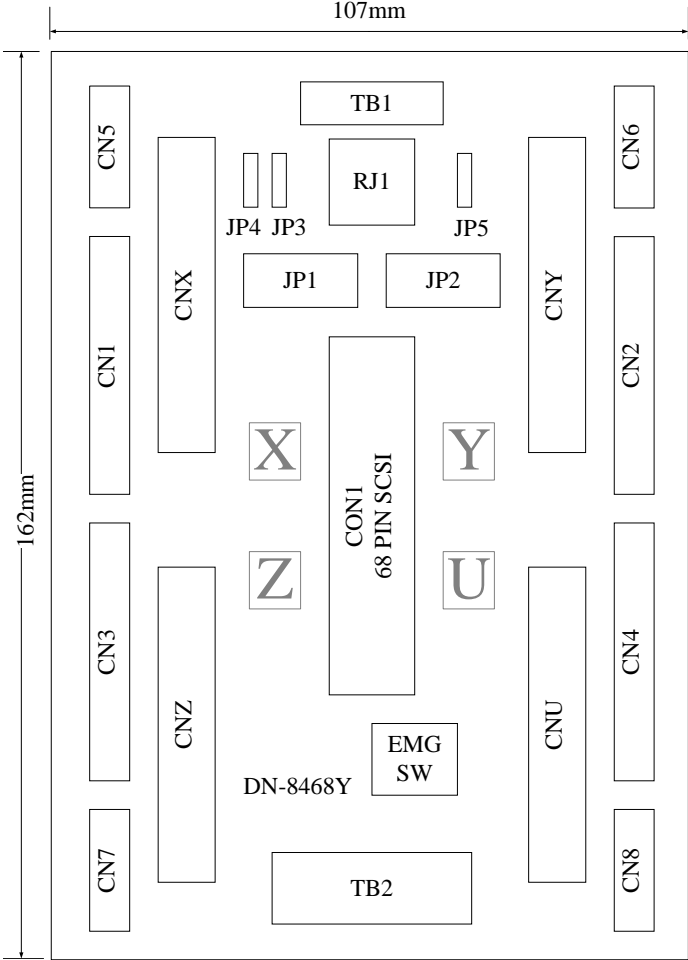
Fig. 3-1   Board layout for the DN-8468Y

A.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.

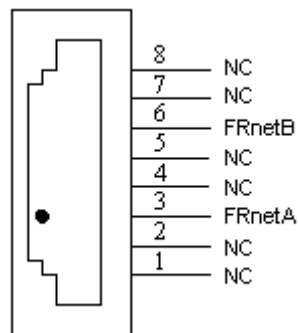Fig. 1-3   Pin definition for TB1

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	1,2,6,10, 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.
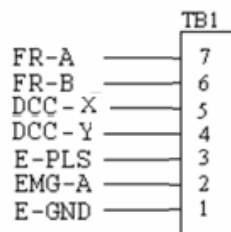

Fig.3-7 Pin definition for CN1 ~ CN4

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.
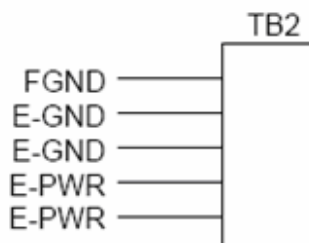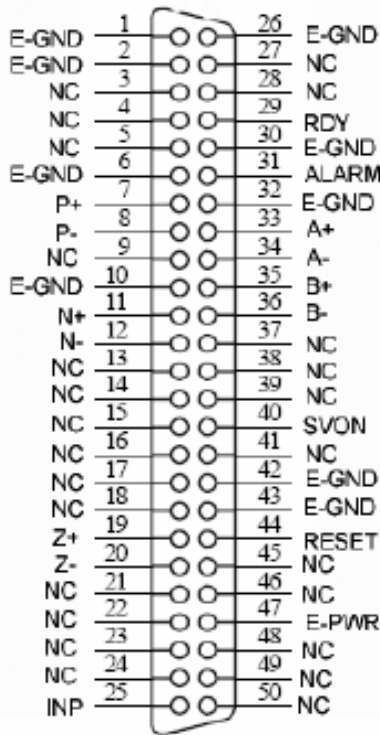
Fig. 3-8 Pin definition for CN5 ~ CN8

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.
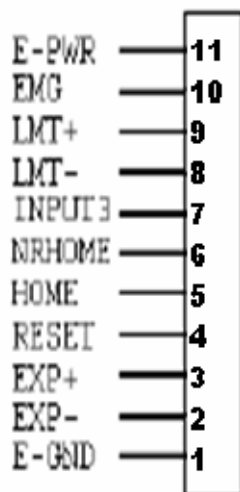

Fig. 3-9 Pin definition for RJ1

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.

A.3.3 Jumper and Switch Settings

■ **JP5**

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

Fig. 3-10 Jumper 5 setting

■ **JP1, JP2**

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

Fig. 3-11 Primary encoder signals setting

Fig. 3-12 External encoder signals setting

■ **EMG SW**

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

Fig. 3-13   EMG SW setting for normally GND   (Default setting)
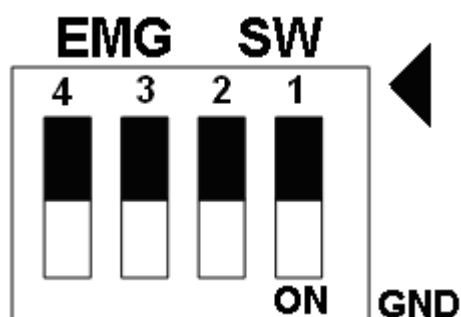
Fig. 3-14   EMG SW setting for user controlled signals.

A.4 DN-8468D Daughter Board

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

A4.1 Board Layout for DN-8468D
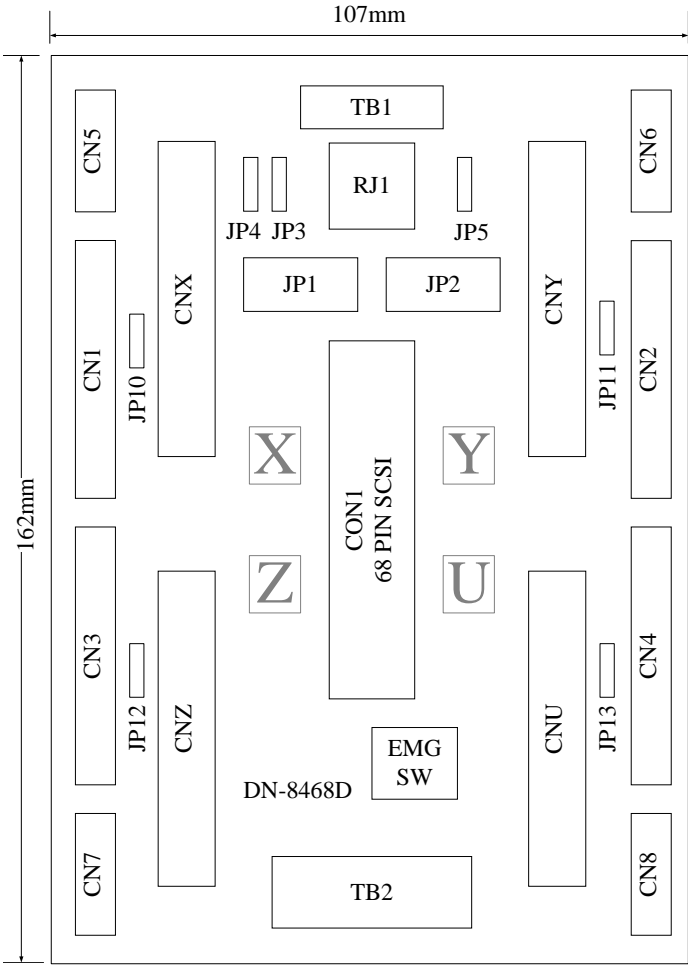
Fig. 3-1   Board layout for the DN-8468D

A4.2 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.

Left Signal	Pin		Pin	Right Signal
XECA	1		68	UECA
XECB	2		67	UECB
XINPOS	3		66	UINPOS
XALARM	4		65	UALARM
XLMTP	5		64	ULMTP
XLMTM	6		63	ULMTM
XIN3	7		62	UIN3
XIN2	8		61	UIN2
XIN1	9		60	UIN1
XIN0	10		59	UIN0
XEXPP	11		58	UEXPP
XEXPM	12		57	UEXPM
XOUT1	13		56	UOUT1
XPP	14		55	UPP
XPM	15		54	UPM
FRnet_A	16		53	YDCC
EXPLSN	17		52	EMGN
FRnet_B	18		51	XDCC
ZPM	19		50	YPM
ZPP	20		49	YPP
ZOUT1	21		48	YOUT1
ZEXPM	22		47	YEXPM
ZEXPP	23		46	YEXPP
ZIN0	24		45	YIN0
ZIN1	25		44	YIN1
ZIN2	26		43	YIN2
ZIN3	27		42	YIN3
ZLMTM	28		41	YLMTM
ZLMTP	29		40	YLMTP
ZALARM	30		39	YALARM
ZINPOS	31		38	YINPOS
ZECB	32		37	YECB
ZECA	33		36	YECA
GND	34		35	VCC

CON1

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

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

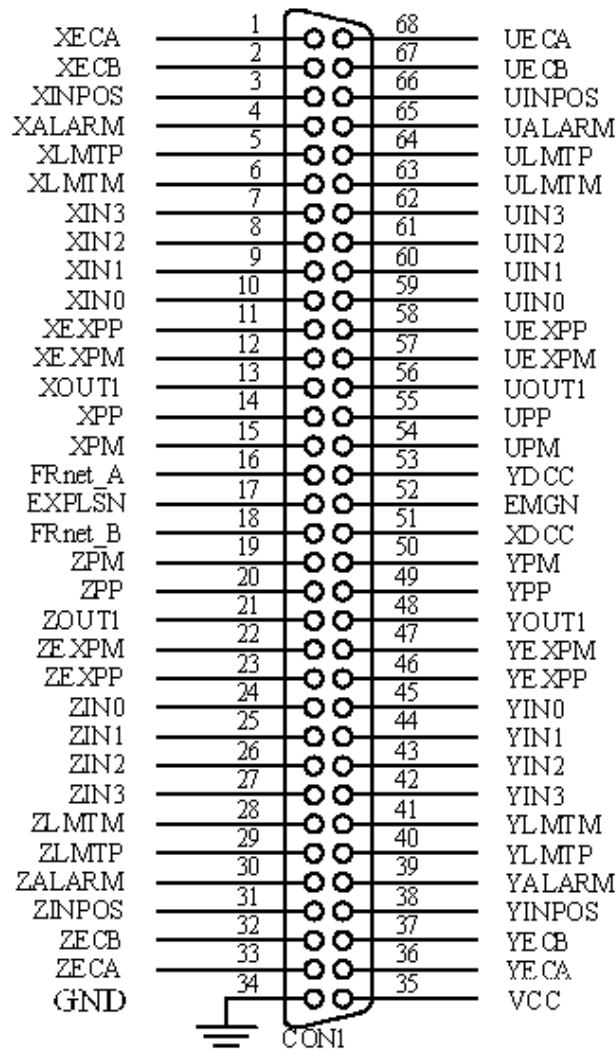| Pin name	Pin number	Description
XECA	1	Encoder A-phase signal for X axis
YECA	36	Encoder A-phase signal for Y axis
ZECA	33	Encoder A-phase signal for Z axis
UECA	68	Encoder A-phase signal for U axis
XECB	2	Encoder B-Phase signal for X axis
YECB	37	Encoder B-Phase signal for Y axis
ZECB	32	Encoder B-Phase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

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

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

■ TB1

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

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

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.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.

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.

■ 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.
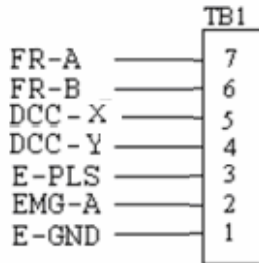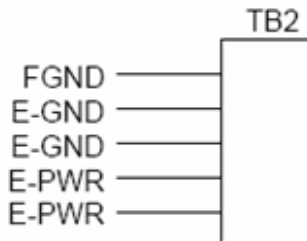

Fig. 3-5   Pin definition for CNX, CNY, CNZ, CNU

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.
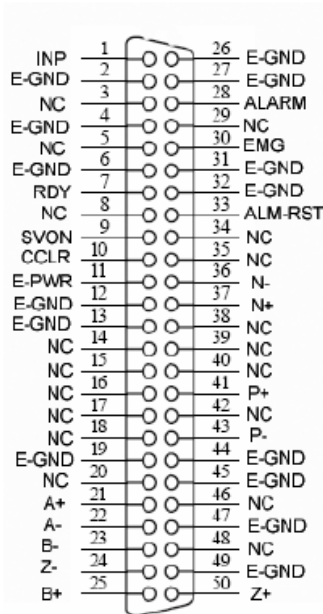

Fig.1-7 Pin definition for CN1 ~ CN4

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.
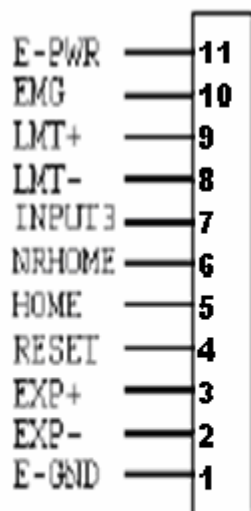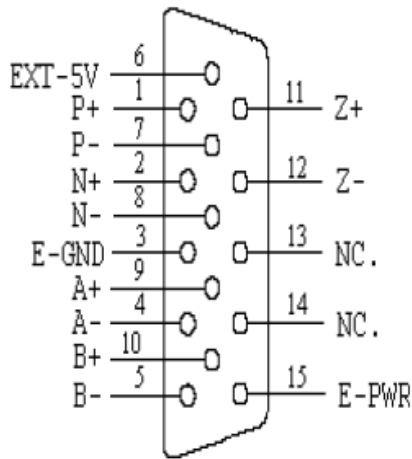
Table 3-9 CN5~8

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

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

<table>
<tr><td rowspan="8">

8 — NC
7 — NC
6 — FRnetB
5 — NC
4 — NC
3 — FRnetA
2 — NC
1 — NC

</td></tr>
</table>

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.

A4.3 Jumper and Switch Settings

■ JP5

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

Fig. 3-10 Jumper 5 setting

■ JP1, JP2

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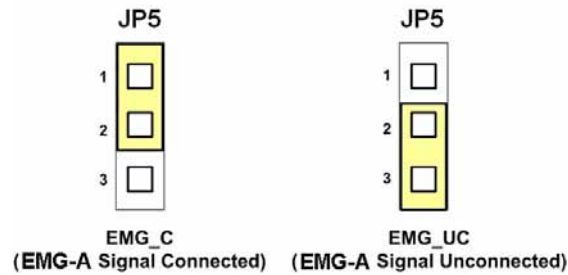

Fig. 3-11 Primary encoder signals setting
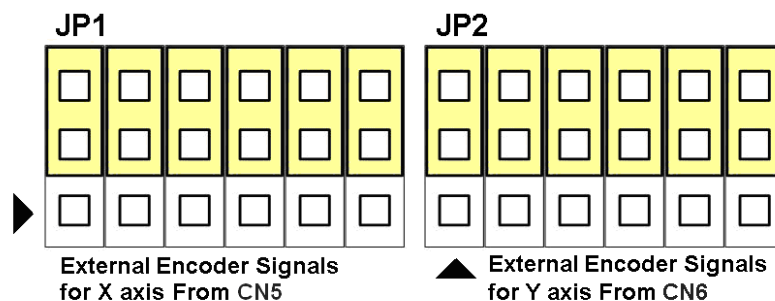
Fig. 3-12 External encoder signals setting

◼ SW1

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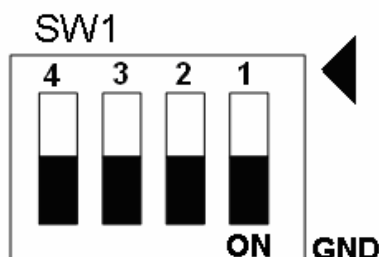
Fig. 3-13   SW1 setting for normally GND   (Default setting)
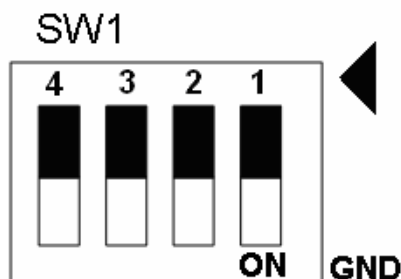
Fig. 3-14   SW1 setting for user controlled signals.

◼ JP10 ~ JP13

Jumper 10 ~ Jumper 13 can select the reset function in CN1 ~ CN4 for each axis.   The following diagram is shown the selection condition of the JP10.
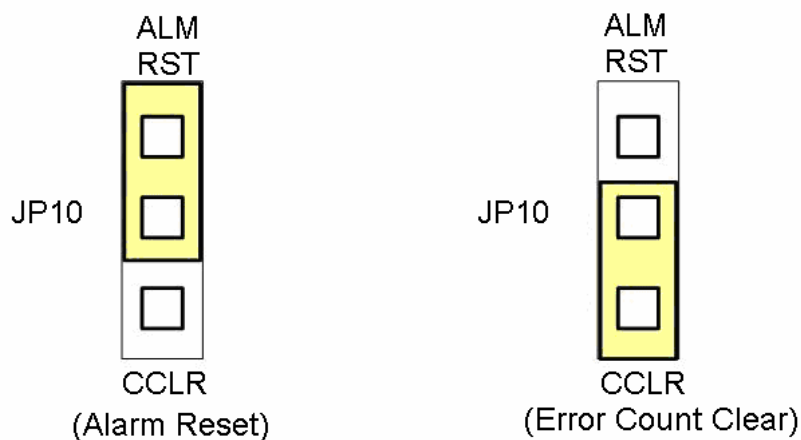
Fig. 3-15 JP 10 ~ 13 setting

A.5 DN-8468FB Daughter Board

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

A.5.1 Board Layout for DN-8468FB
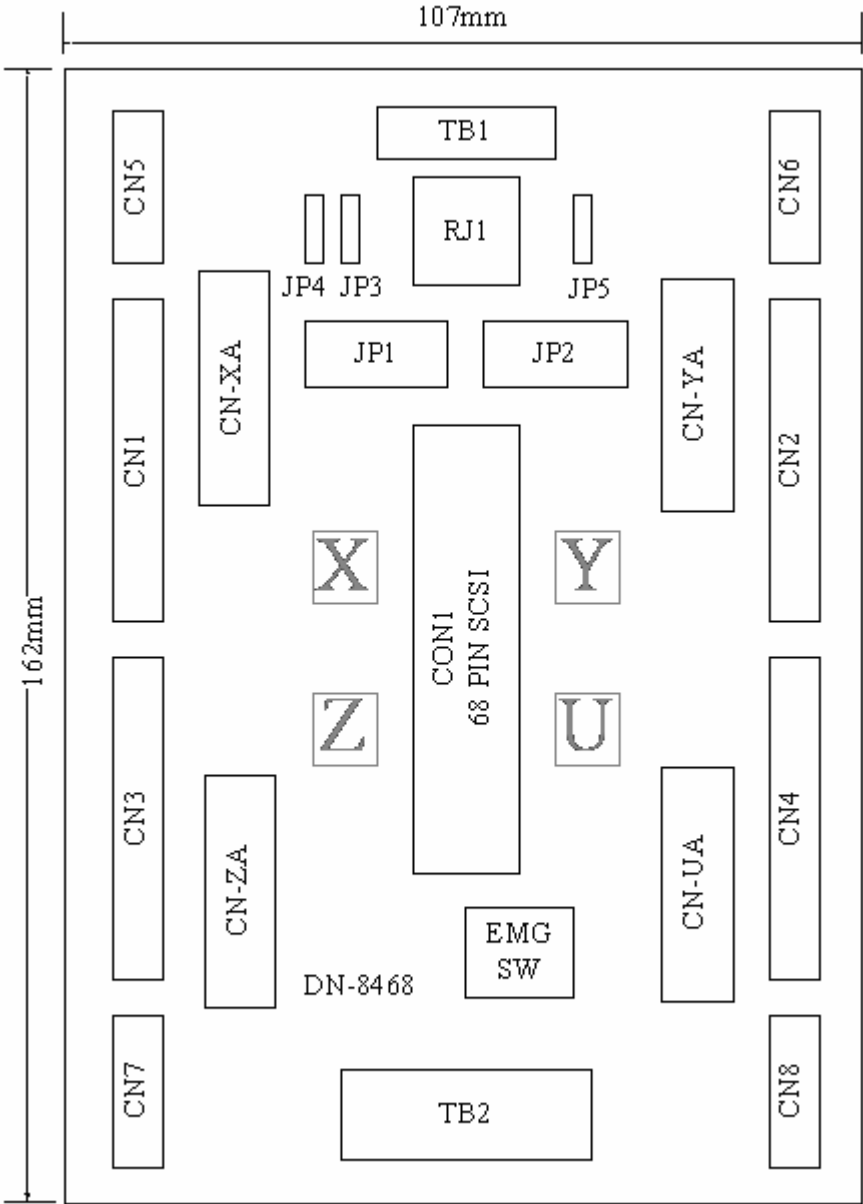
Fig. 3-1   Board layout for the DN-8468FB

A.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.

|			
XECA	1	68	UECA
XECB	2	67	UECB
XINPOS	3	66	UINPOS
XALARM	4	65	UALARM
XLMTP	5	64	ULMTP
XLMTM	6	63	ULMTM
XIN3	7	62	UIN3
XIN2	8	61	UIN2
XIN1	9	60	UIN1
XIN0	10	59	UIN0
XEXPP	11	58	UEXPP
XEXPM	12	57	UEXPM
XOUT1	13	56	UOUT1
XPP	14	55	UPP
XPM	15	54	UPM
FRnet_A	16	53	YDCC
EXPLSN	17	52	EMGN
FRnet_B	18	51	XDCC
ZPM	19	50	YPM
ZPP	20	49	YPP
ZOUT1	21	48	YOUT1
ZEXPM	22	47	YEXPM
ZEXPP	23	46	YEXPP
ZIN0	24	45	YIN0
ZIN1	25	44	YIN1
ZIN2	26	43	YIN2
ZIN3	27	42	YIN3
ZLMTM	28	41	YLMTM
ZLMTP	29	40	YLMTP
ZALARM	30	39	YALARM
ZINPOS	31	38	YINPOS
ZECB	32	37	YECB
ZECA	33	36	YECA
GND	34	35	VCC

CON1

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

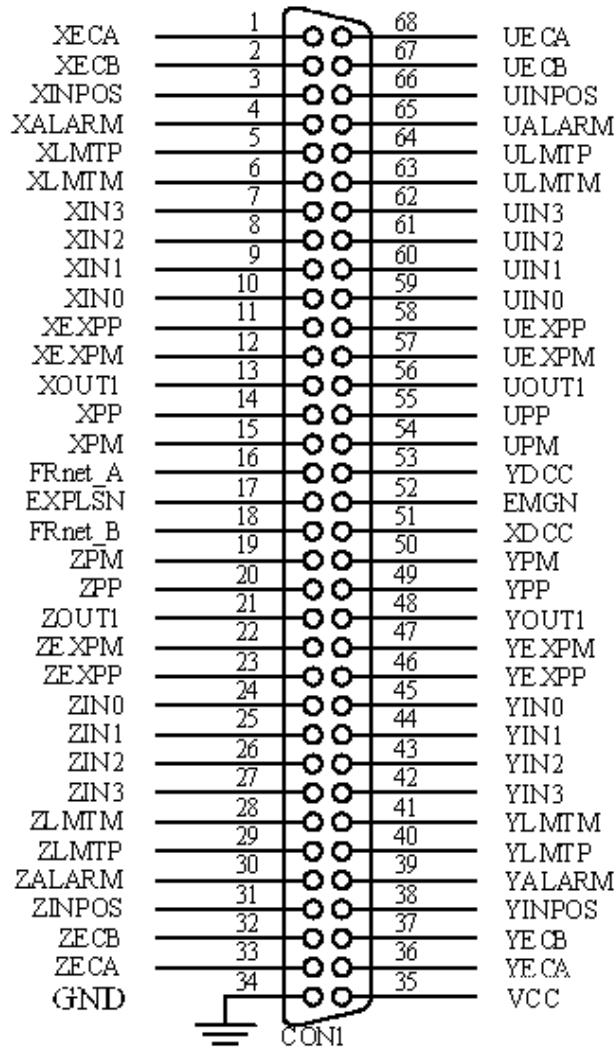Table 3-2 DN-8468FB I/O connector signal description (part 1)

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
XLMTP	5	Limit switch input signal (+) for X axis
YLMTP	40	Limit switch input signal (+) for Y axis
ZLMTP	29	Limit switch input signal (+) for Z axis
ULMTP	64	Limit switch input signal (+) for U axis
XLMTM	6	Limit switch input signal (-) for X axis
YLMTM	41	Limit switch input signal (-) for Y axis
ZLMTM	28	Limit switch input signal (-) for Z axis
ULMTM	63	Limit switch input signal (-) for U axis
XIN3	7	Input 3 signal for X axis
YIN3	42	Input 3 signal for Y axis
ZIN3	27	Input 3 signal for Z axis
UIN3	62	Input 3 signal for U axis
XIN2	8	Input 2 signal for X axis
XIN2	43	Input 2 signal for Y axis
XIN2	26	Input 2 signal for Z axis
XIN2	61	Input 2 signal for U axis
XIN1	9	Input 1 signal for X axis
YIN1	44	Input 1 signal for Y axis
ZIN1	25	Input 1 signal for Z axis
UIN1	60	Input 1 signal for U axis
XIN0	10	Input 0 signal for X axis
YIN0	45	Input 0 signal for Y axis
ZIN0	24	Input 0 signal for Z axis
UIN0	59	Input 0 signal for U axis

Table 3-3 DN-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.
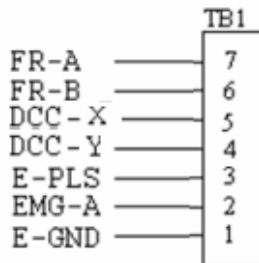

Fig. 1-3 Pin definition for TB1

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.
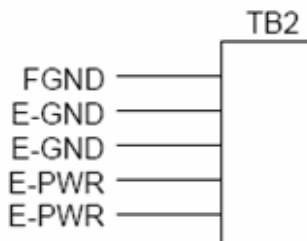

Fig. 1-4 Pin definition for TB2

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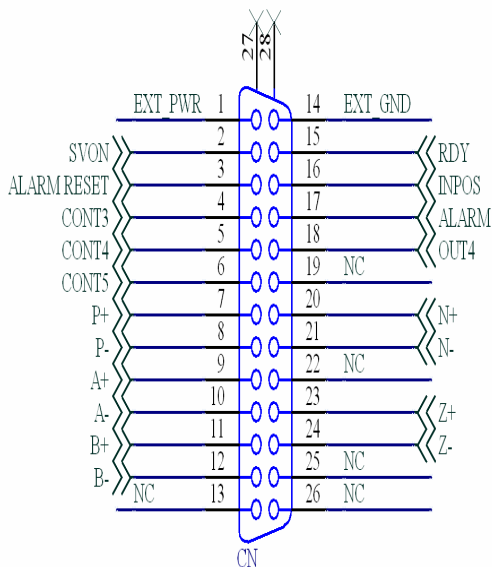
Table 3-6 CN-X ,CN-Y ,CN-Z ,CN-U

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.
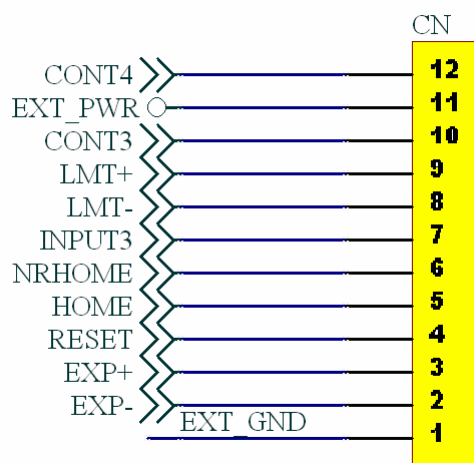
Table 3-8   CN1~CN4

Fig 3-7 Pin definition for 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

■ 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.
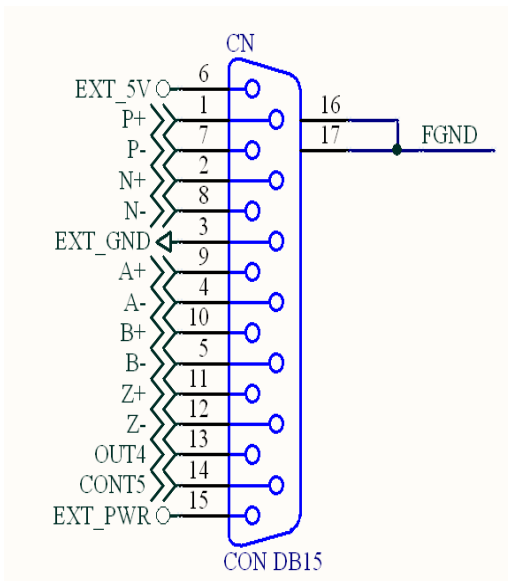
Table 3-9   CN5~CN8

Fig 3-8 Pin definition for 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

▶ **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.
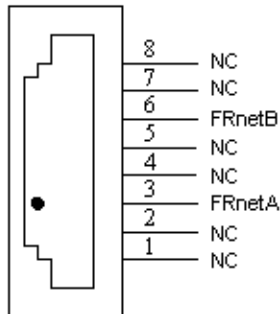
Table 3-10 RJ1

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.

A.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.
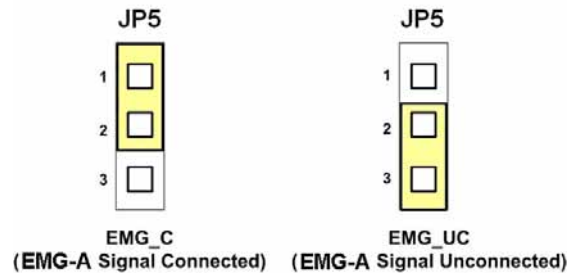

Fig. 3-10 Jumper 5 setting

■ **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.
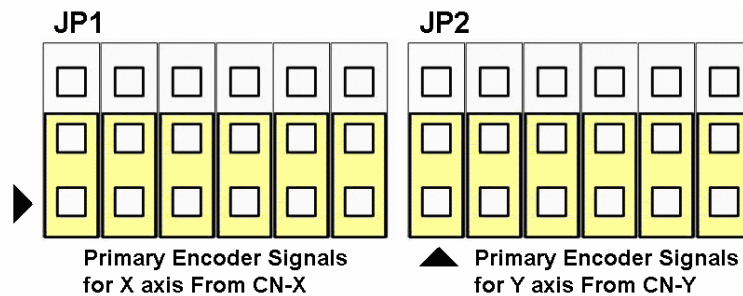

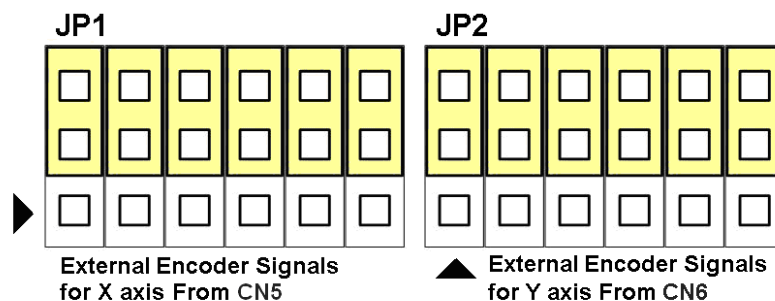Fig. 3-11 Primary encoder signals setting

Fig. 3-12 External encoder signals setting

■ SW1

The CONT3 for each servo ampilfier can be selected from SW1.   The number 1, 2 , 3, 4 on SW1 are denoted as axis X, Y, Z, U, respectively.   Fig. 3-13 is the default setting to connect the CONT3 singals 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.
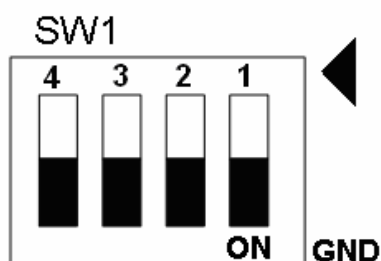
Fig. 3-13   SW1 setting for normally GND   (Default setting)

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