i8094A & i-8094H Getting Started

(Version 1.3)

PAC WinCon-8000 Series Controllers

(Applied to: i8094A & i8094H)

ICP DAS CO., LTD.

泓格科技股份有限公司

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CONTENTS

1 INTRODUCTION OF I8094A/I8094H MOTION CONTROL MODULE 7

1.1 i8094A/i8094H Introduction 7
1.2 Hardware Specification 8
1.2.1 Main Specification 8
1.2.2 Interpolation Function 8
1.2.3 Pulse Output 8
1.2.4 Encoder Input 9
1.2.5 Position counter 9
1.2.6 Auto-Homing 9
1.2.7 Servo Motor Input Signal 10
1.2.8 Limit Switch Input Signal 10
1.2.9 Other Input Signals 10
1.2.10 Emergency Stop Signal Input 10
1.2.11 General Output Signal 10
1.2.12 Integral Input Signal Filters 10
1.2.13 Software Limit 10
1.2.14 Manual Pulse Generator 11
1.2.15 Module status LED Indicators 11
1.2.16 Compare Trigger Output 11
1.2.16 FRnet (i8094F only) 11
1.3 Environment 12
1.4 Ordering Information 12

2 HARDWARE INSTALLATION 13

2.1 i8094A/i8094H Check Package & Installation 13
2.1.1 Check Package 13
2.1.2 i8094A/i8094H Installation 13
2.2 DN-8468GB Terminal Board 15
2.2.1 DN-8468GB Board Layout 15
2.2.2 Pin Assignment 16
2.2.3 Jumper and Switch Settings 22
2.3 Input/Output Connections 24
2.3.1 Pulse output signals 24

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2.3.2 Connection for Limit switch Signal 26
2.3.3 General Purpose DI Signals(nINPOS,nALARM) 27
2.3.4 Encoder Signals 28
2.3.5 External pulse signal 29
2.3.6 Emergency Stop Signal 30
2.3.7 External Pulse Input Signal (EXP+,EXP-) 31
2.3.8 Servo On/Off Output Signal (ENABLE) 32
2.3.9 Compare Trigger Output 32
2.4 Connection Example for Motor Driver 33

3 I8094A/I8094H SOFTWARE DEVELOPMENT 34

3.1 Software development Overview 34
3.1.1 Register Module 35
3.2 Safety IO Setting (Troubleshooting for Motion not working) 35
3.2.2 Configure the Servo ALARM Signals 35
3.2.3 Configure the Limit Switch Signals(±EL) 36
3.2.4 Configure the Software Limit(±SEL) 36
3.3 Error Checking(GET_ERROR) 36
3.5 Manual Pulse Generator Testing (Optional) 38
3.6 Home Search 40
3.6.1 Home Search Configuration 40
3.6.2 Running the Home Search 41
3.7 Basic Motion 42
3.7.1 Speed Profile of the Motion Control 42
3.7.2 Basic Settings For Single Axis 44
3.7.3 Basic Motion of Single Axis 45
3.7.4 Basic Setting of Muti-Axes Interpolation 46
3.7.5 Basic Motion of Muti-Axes Interpolation 47
3.8 Advance Motion 48
3.9 Motion Synchronization Action 49

4 SOFTWARE GETTING STARTED GUIDE 50

4.1 WinCon eVC++ 50
4.1 WinCon eVC++ Guideline 50
4.1.1 Files you will need 50
4.1.2 Create a new eVC++ Application Project 50
4.1.3 Add the Reference Path into eVC++ Application Project 52
4.1.4 Start the eVC++ Sample 53

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4.2 WinCon Microsoft Visual Studio .NET 2003(VB.NET，C#) 55

4.3 I-8000 Turbo C++ 55

5 MPTOOL : EZMAKE 56

5.1 Start EzMake 56
5.2 Specify the I-8094H to be used 56
5.3 Operation Page 57
5.3.1 Tree Diagram 57
5.3.2 Main Menu 58
5.3.3 Function & Parameter Editor 61
5.3.4 Function Library Groups Menu 62
5.3.5 Function Display Menu 62
5.3.6 Message & Status 63
5.4 Download files and programs execution 65
5.4.1 Download the file 65
5.4.2 Program execution 65

APPENDIX A 66

A.1 Setup the Development Environment of I8094A/I8094H 66
A.1.1 eVC ++ 4.0 66
A.2 Appearance and Dimension 67

APPENDIX B DN-8468 SERIES DAUGHTER BOARD. 68

B.1 DN-8468M Daughter Board 68
B.1.1 Board Layout for DN-8468M 68
B.1.2 Signal Connections for DN-8468M 70
B.1.3 Jumper and Switch Settings 76
B.2 DN-8468P Daughter Board 78
B.2.1 Board Layout for DN-8468P 78
B.2.2 Signal Connections for DN-8468P 79
B.2.3 Jumper and Switch Settings 84
B.3 DN-8486Y Daughter Board 86
B.3.1 Board Layout for DN-8468Y 86
B.3.2 Signal Connections for DN-8468Y 87
B.3.3 Jumper and Switch Settings 92
B.4 DN-8468D Daughter Board 94
B.4.1 Board Layout for DN-8468D 94

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B.4.2 Signal Connections for DN-8468D..... 95
B.4.3 Jumper and Switch Settings..... 103
B.5 DN-8468FB Daughter Board.....106
B.5.1 Board Layout for DN-8468FB..... 106
B.5.2 Signal Connections for DN-8468FB..... 107
B.5.3 Jumper and Switch Settings..... 115

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1 Introduction of i8094A/i8094H Motion Control Module

1.1 i8094A/i8094H Introduction

i8094A/i8094H is a motor motion control module with built-in CPU, DPRAM, FRAM and SRAM; it is integrated axis control module that support 4-axis stepper/servo motor motion control; the maximum output Pluse could reach 4M PPS, this module could be applied to ICP DAS WinCon-8000 controllers. I8094A/i8094H motor motion control module is good for motion control applications for general purposes; it provides a lot of motion control features that offers customers easy-to-use and intuitive solutions. These features include: 2/32~3-axes linear interpolation, 2-axes circular interpolation, T/S-curve acceleration/ deceleration, various synchronous actions, automatic homing, and many others.

In addition, i8094H equips with built-in ICP DAS's unique FRnet distributed DI/DO control functions, it could connect externally to 128 DI and 128 DO control points; each with cycle time of 0.74ms. Moreover, when i8094A/i8094H performs functions above, it does not consume WinCon system resources. The CPU could monitor other status at the same time. It require very little system resources, therefore one WinCon-8000 could insert with a couple of i8094A/i8094H modules, to perform control of multi-axis (4,8 ....) motion Control on the same controller.

Besides, this module has a few built-in hardware like CPU, etc, therefore supports a series of macro programming functions. It provides customers multiple sets of macro programming functions, hence will reduce programming effort and enable programmers to develop programs more flexibly. ICP DAS also provides a wide range of demo programs and macro programming functions sets to eliminate programming tasks; making it a highly cost-effective motion control system designed platform.

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1.2 Hardware Specification

1.2.1 Main Specification

- **ASIC Chip** — **MCX314As**
- **CPU** — **80186**
- **FRAM** — **128KB**
- **SRAM** — **512KB**
- **EEPROM** — **512KB**
- **Number of controllable** — **4-Axes, Pulse output (stepping & servo motor)**
- **Up to 4M PPS pulse output** — **4 M PPS**

1.2.2 Interpolation Function

2-axes & 3-axes linear interpolation

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

Circular interpolation

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

Relative interpolation function

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

1.2.3 Pulse Output

- Output speed range — 1 PPS ~ 4 MPPS
- Output precision — ± 0.1%
- Jerk range of S-curve — 954 ~ 62.5 x 10^6 PPS/S^2
477 x 10^3 ~ 31.25 x 10^9 PPS/S^2
- Acceleration/deceleration range — 125 ~ 1 x 10^6 PPS/S
62.5×10^3 ~ 500 x 10^6 PPS/S
- Speed precision — 1 PPS ~ 500PPS(Depends on the max. speed)

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- Output numbers 0 ~ 4,294,967,295 / unlimited
- Velocity profiles mode:
  - Fixed
  - Symmetrical & Asymmetrical Trapezoidal velocity profile
  - Symmetrical & Asymmetrical S-curve velocity profile

- Acceleration & Deceleration mode
  - Auto
  - By user define

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

1.2.4 Encoder Input

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

1.2.5 Position counter

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

1.2.6 Auto-Homing

- Four Steps
  - Step 1 (High-speed ”Near Home” searching)
  - Step 2 (Low-speed ”Home” searching)
  - Step 3 (Low-speed Index Z searching)
  - Step 4 (High-speed offset drive)

By software functions, each step enables user to configure actions and directions, therefore, offers user more than 10 homing modes to choose from.

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1.2.7 Servo Motor Input Signal

- Alarm
- IN2 options: In Position or Servo Ready signal
- Input signal options: Enable/Disable and logical level.

1.2.8 Limit Switch Input Signal

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

1.2.9 Other Input Signals

- IN3 : could be used for other applications; for example: as a trigger of synchronal control, etc.

1.2.10 Emergency Stop Signal Input

- There is an Emergency stop signal for Each module.

1.2.11 General Output Signal

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

1.2.12 Integral Input Signal Filters

- The motion module is equipped with an integral type filter in the input step of each input signal. User can be selected a filter time constant.

1.2.13 Software Limit

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

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1.2.14 Manual Pulse Generator

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

1.2.15 Module status LED Indicators

- Red LED → Power Indicator (will turn on when power is on)
- Orange LED → Servo Alarm Indicator
  Ex: Misuibishi driver, No Alm: Orange LED will turn on.
- Green LED → Running Motion Indicator (will turn on when under Running Motion)

1.2.16 Compare Trigger Output

- **For X-axis and Y-axis only**
- **Output mode: 5V TTL**

1.2.16 FRnet (i8094F only)

- DI → up to 128 connecting points
- DO → up to 128 connecting points

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1.3 Environment

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

1.4 Ordering Information

- **W-8x31-GM1 PAC controllers**
- **i8094A/i8094H 4-axes motion control module**
- **DN-8468GB i8094A/i8094H interface board**
- **DN-8468DB i8094A/i8094H interface board**
- **DN-8468MB i8094A/i8094H interface board**
- **DN-8468PB i8094A/i8094H interface board**
- **DN-8468YB i8094A/i8094H interface board**
- **CA-SCSI15 68-pin SCSI-II cable, length: 1.5 m**
- **CA-SCSI30 68-pin SCSI-II cable, length:3 m**
- **CA-SCSI50 68-pin SCSI-II cable, length:5 m**

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2 HARDWARE INSTALLATION

2.1 i8094A/i8094H Check Package & Installation

2.1.1 Check Package

i8094A/i8094H is a 4-axes stepping/servo motor control module; you will need a WinCON-8000 series PAC to serve as the controller.

You will need:

- **W-8x31-GM1 PAC controller**

You will also need the following items to implement installation of i8094A/i8094H modules:

- **i8094A/i8094H** **4-axes motion control module**
- **DN-8468 series** **i8094A/i8094H interface board**
- **CA-SCSI15** **68-pin SCSI-II cable, length: 1.5 m**

2.1.2 i8094A/i8094H Installation

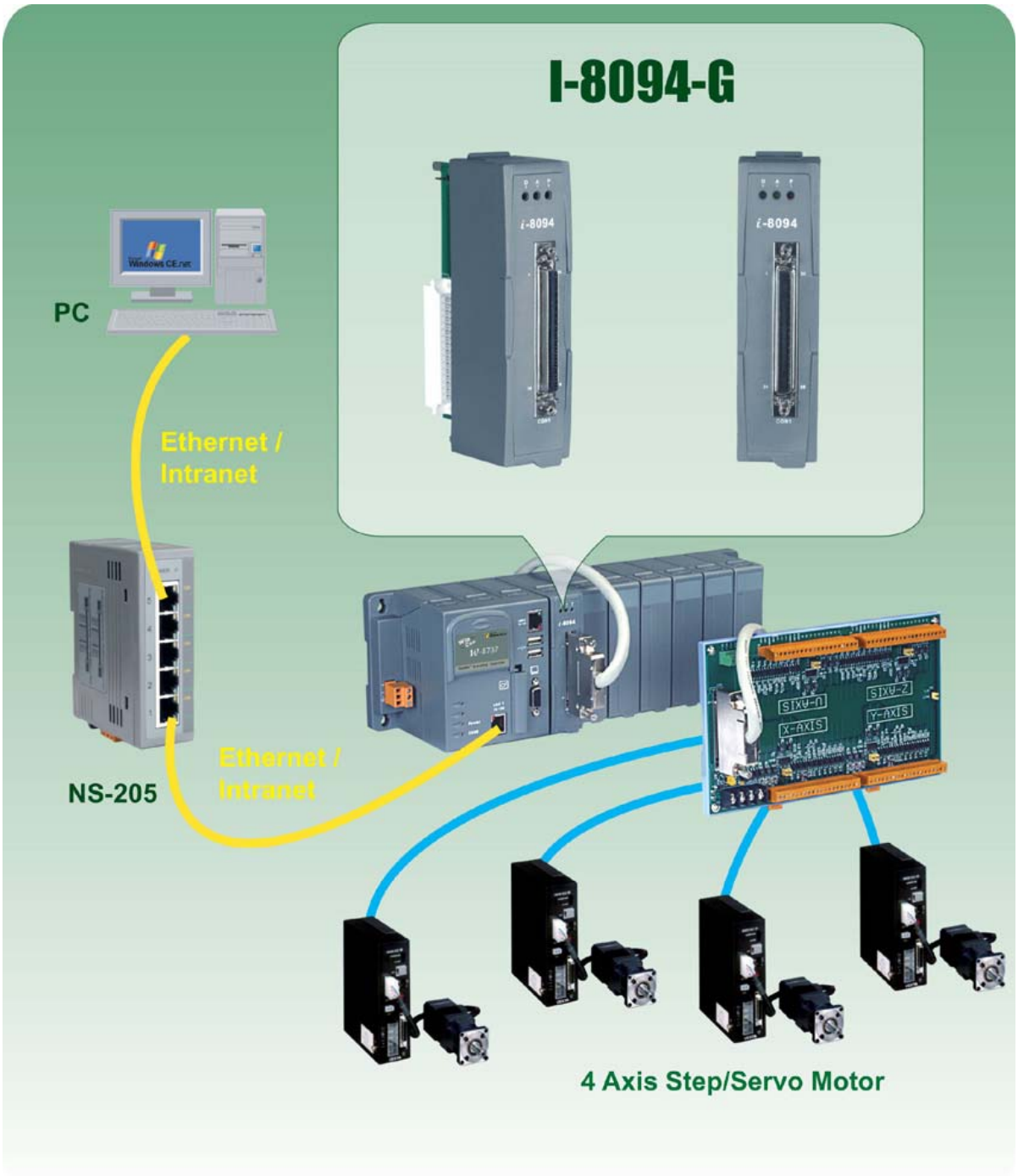
Before Installation

1. You will need a ICP DAS (W-8000series) PAC controller with I/O expansion slot (currently we offer a variety of 3- or 7- slot)
2. Turn off the power.

Modules Installation & Wiring

1. Position the i8094/i8094F module over the I/O Expansion Slot, aligning the module card with the groove at the side of the Expansion Slot.
2. Insert the module into the I/O Expansion Slot, glide the module card along the groove; press down the module until it is completely seated on the Expansion Slot.
3. Secure the module by push down the “LOCK” latch.
4. Connect the i8094/i8094F with DN-8468G by a CA-SCSI15 cable, as the below figure:

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[此圖要修正為I-8094A/H]

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2.2 DN-8468GB Terminal Board

2.2.1 DN-8468GB Board Layout

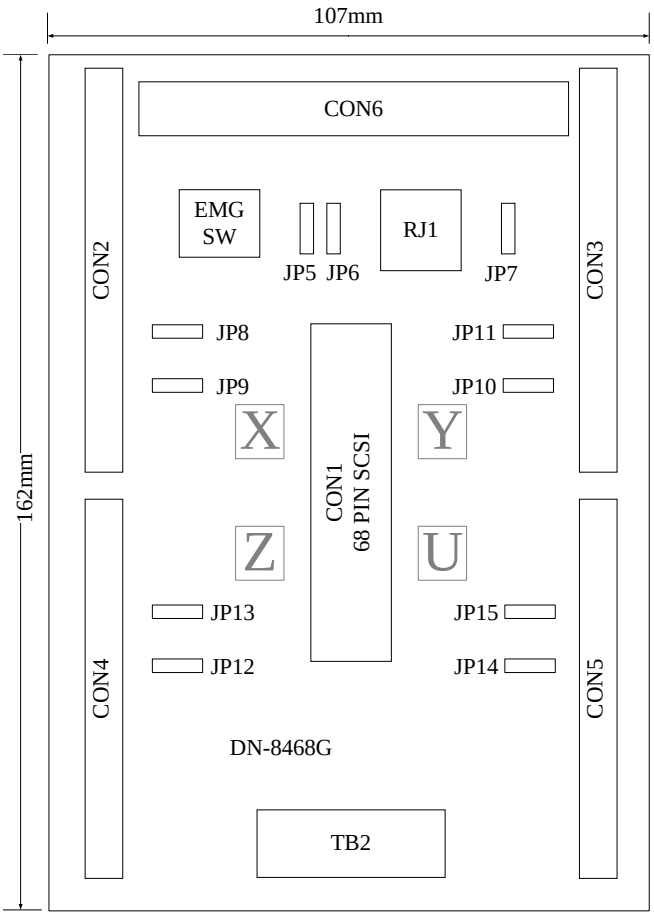


Fig. 2.0 DN-8468G Board layout

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2.2.2 Pin Assignment

■ CON1

68-pin SCSI II Pin Assignment (connector to connect modules and wiring terminal board)

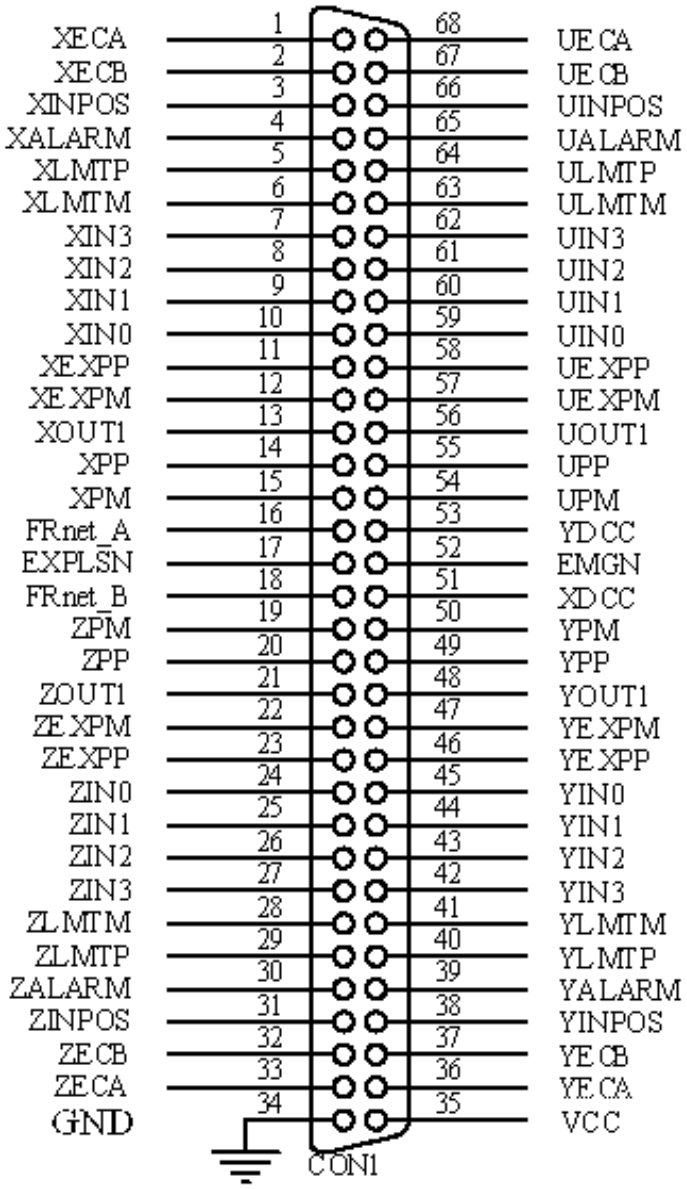


Fig. 2.1 CON1 I/O connector pin assignment

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

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

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

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

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■ CON2 ~ CON5 (AXIS X、Y、Z、U I/O connector Wiring information)

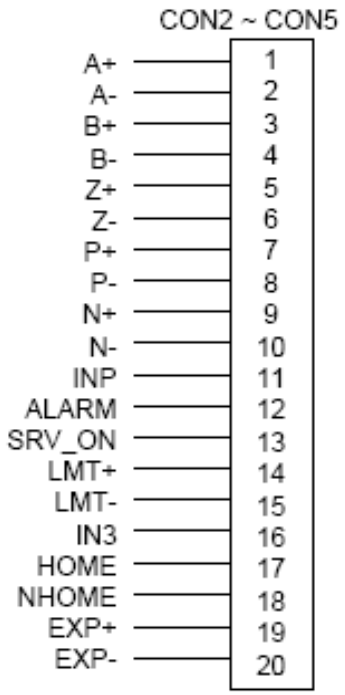


Fig. 2.2 Pin definition for CON2 ~ CON5

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 (-)

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- The connector CON6 is 16-pin connector for you to connect to the RDY & EMG signals, external Pulse input, and FRnet connectors (i8094H only) of the motor drivers, enables to connect with external DI/DO modules, etc.. FRnet(i8094HF)connectors could connect to FRnet series IO modules, such as FR-2053, FR-2057, etc. For more information, please go to website: **http://www.icpdas.com/products/Remote_IO/frnet/frnet_introduction.htm**

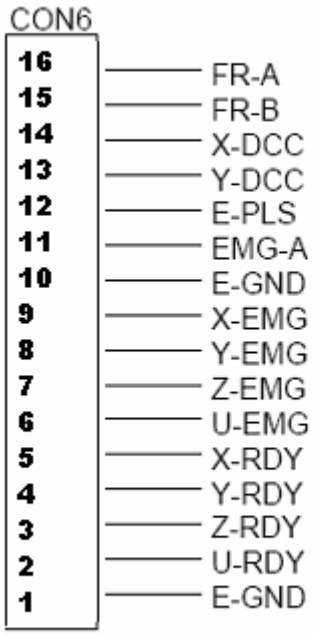


Fig. **2-3** Pin definition for CON6

Table **2**-4 CON6 Signal Connection

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

■ TB2: External power supply input connector

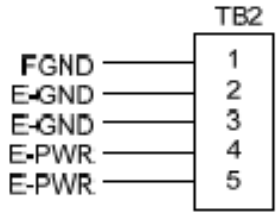


Fig. 2.4 Pin definition for TB2

Table 2.5 TB2 Signal Connection

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

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

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■ **RJ1 (I/O signals of the FRnet):**

It is connector connect to FRnet – an 8-pin RJ45 connector. FRnet (i8094HF) connector could connect to FRnet series IO modules such as FR-2053, FR-2057. For more information, please refer to ICP DAS website:

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

Fig.2.5 Pin assignment for the 8-pin connector on the DN-8468G.

Table 2.6 I/O connector signal description.

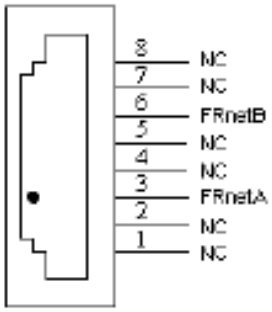


Fig. 2.5 Pin definition for RJ1

Table 2.6 RJ1

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

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

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2.2.3 Jumper and Switch Settings

- **JP 7 provides control over the EMG-A signal of the CON6 connector. The following diagram shows the jumper positions and its corresponding states.**

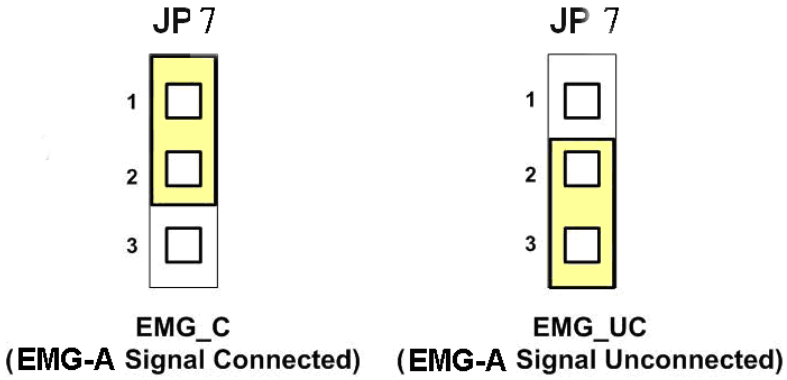


Fig. 2.6 Jumper 7 setting

- **JP8/9, JP10/11, JP12/13, JP14/15: Jumper 8~15 are used to set the signal type of the pulse output signals. The output signal type could be differential line driver output (2-3 Pin short)or open collector output(1-2 Pin short).**

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

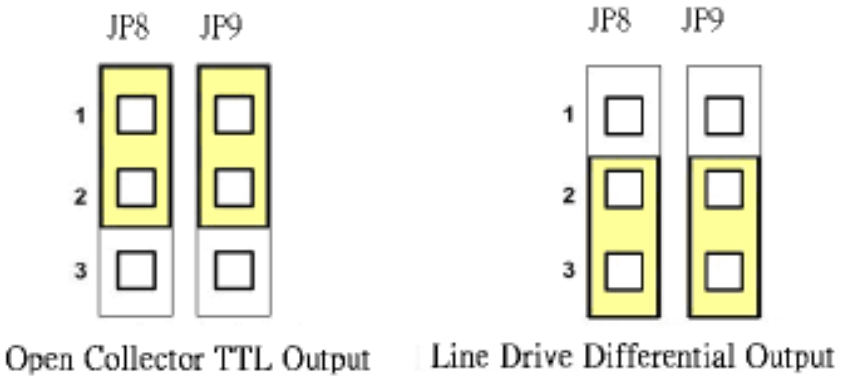


Fig. 2.10 Jumper 8, 9 setting

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■ EMG SW: The EMG signals for motor axes

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

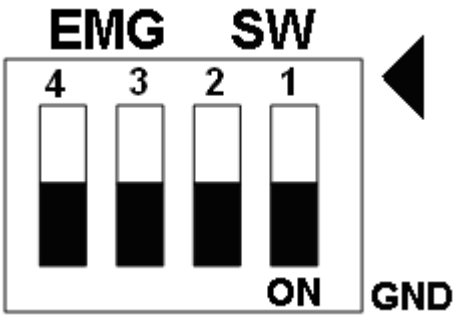


Fig. 2.7 EMG SW setting for normally GND (Default setting)

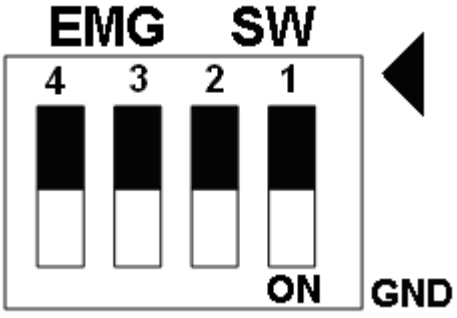


Fig. 2.8 EMG SW setting for user controlled signals.

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2.3 Input/Output Connections

2.3.1 Pulse output signals

Differential-Type pulse output circuit

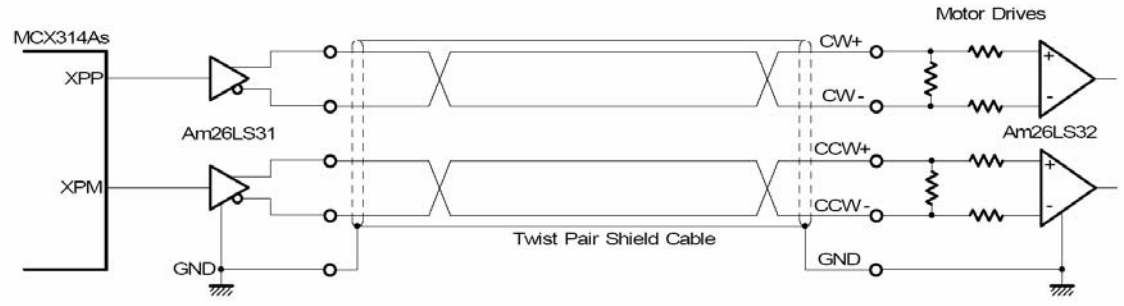


Fig. 2.8 Differential-Type pulse output circuit

Open collector output

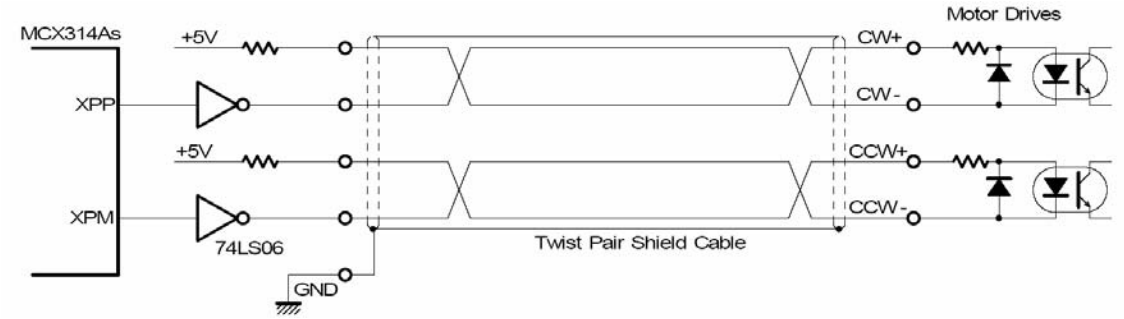


Fig. 2.9 open collector output

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Pulse Signal Wiring Example:

I8094A/I8094H pulse output signal could be sent out by CW/CCW mode or PULSE/DIR mode. The user could choose Differential-Type and Open-Collector Type byJP2 & JP3.

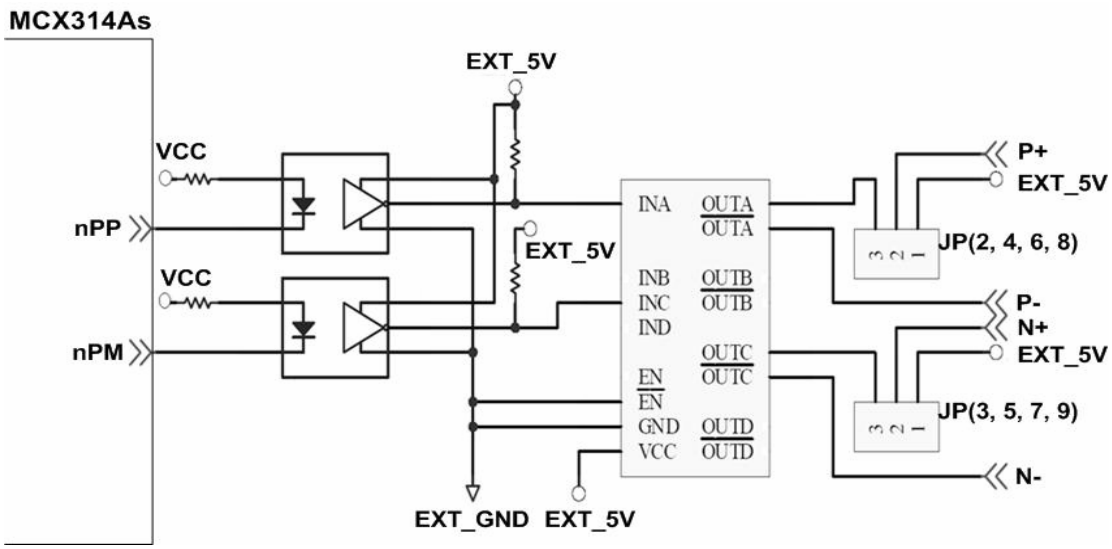


Fig. 2.10 Pulse Signal Wiring Example

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2.3.2 Connection for Limit switch Signal

Limit Switch Signal can be used to prevent over traveling appearance of the motion system. User can set up the hardware limit switch to be normal open or normal close by the Function Library. The following figure shows the photo couplers that are used to keep out the sensor noise of the Limit Switch.

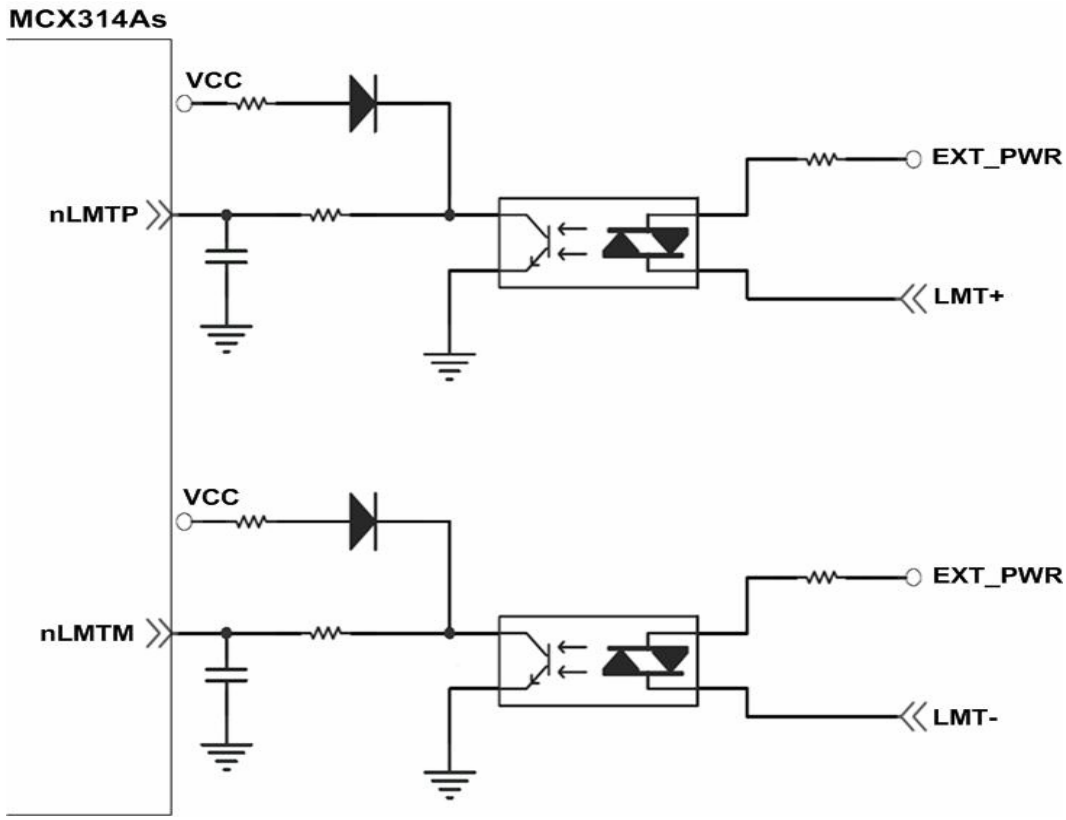


Fig. 2.11 Wiring sample

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2.3.3 General Purpose DI Signals(nINPOS,nALARM)

nINPOS is a digital input signal for servo driver in-Position control. User could enable or disable this function by Function Library.

nALARM is a digital input signal for servo driver alarm signal. The output pulse will be stopped when I8094A/I8094H receives this signal. User could enable or disable this function by Function Library.

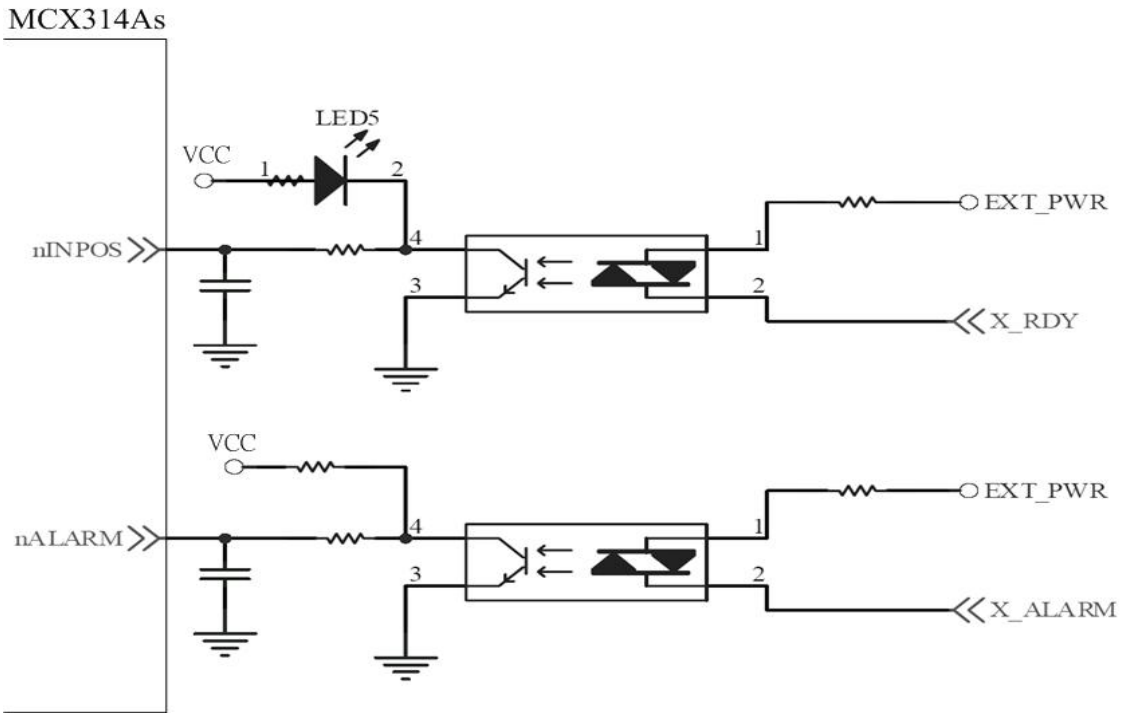


Fig. 2.12 Wiring sample

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2.3.4 Encoder Signals

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

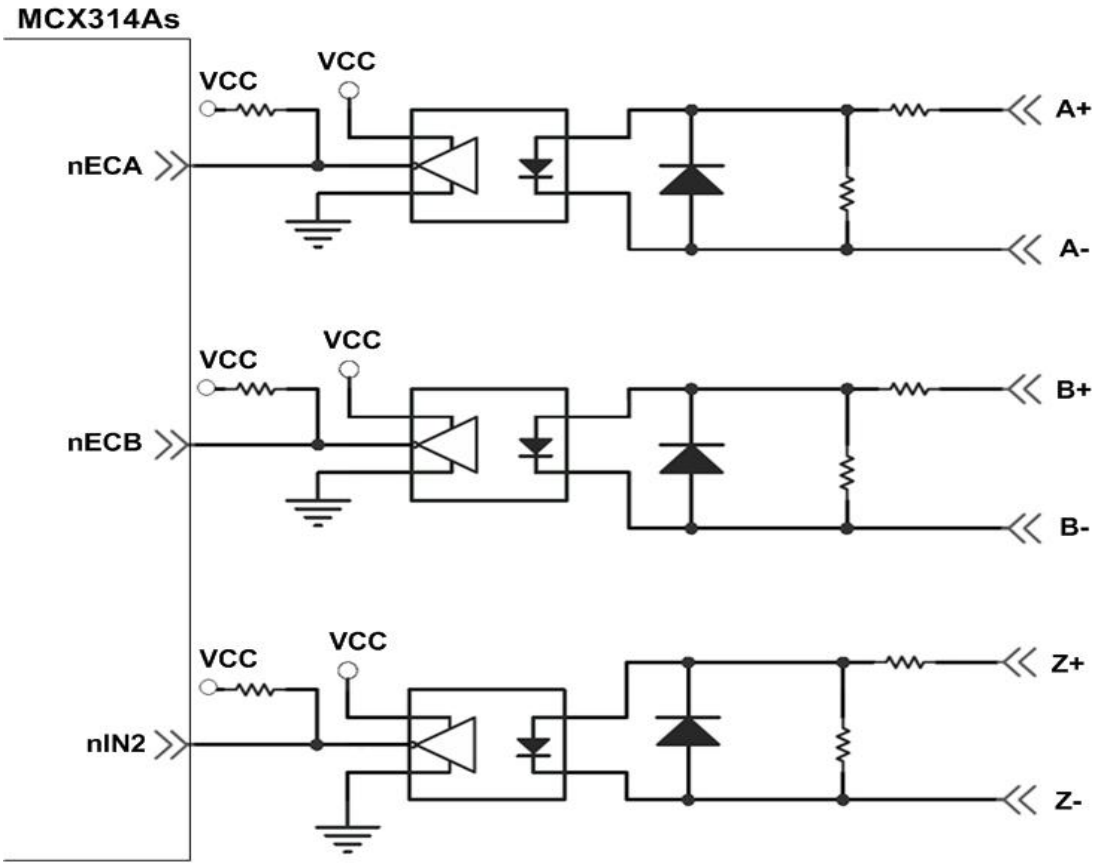


Fig. 2.13 Encoder signal connection

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2.3.5 External pulse signal

The following diagram shows an example for external pulse signal. After the high speed photo coupler isolation, the isolated encoder signals are connected to motion IC of ASIC chip.

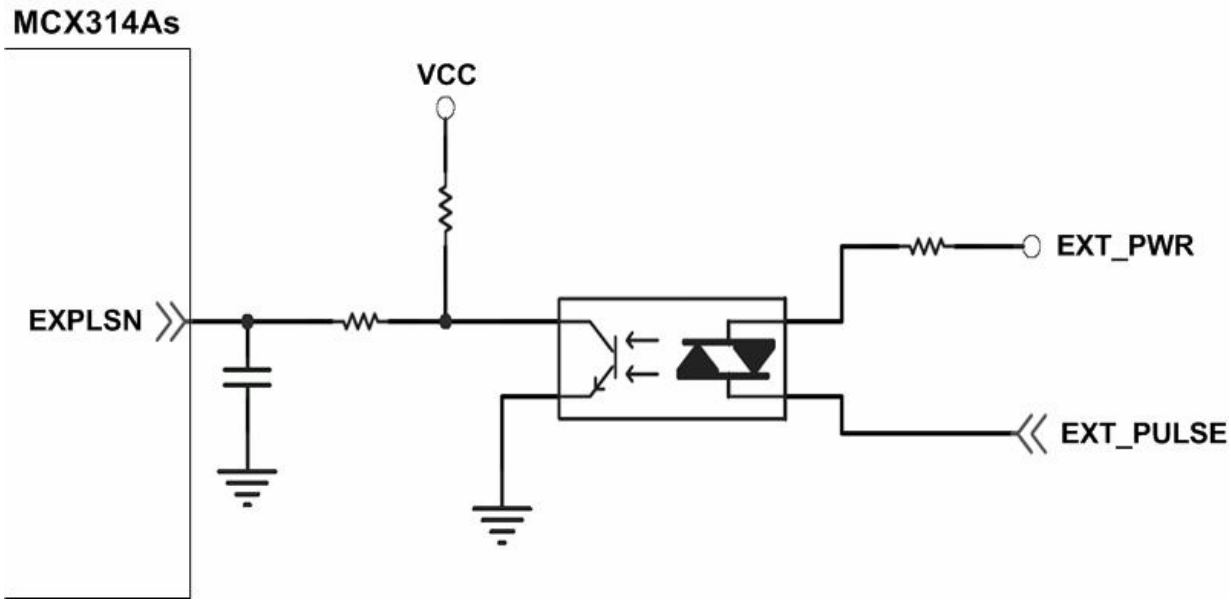


Fig. 2.14 wiring example for external pulse signal

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2.3.6 Emergency Stop Signal

The following diagram shows a wiring example for Emergency STOP signal. When received emergency stop signal, all axes will be stopped and the error flag will be set as 1. After the high speed photo coupler isolation, the isolated encoder signals are connected to motion IC of ASIC chip.

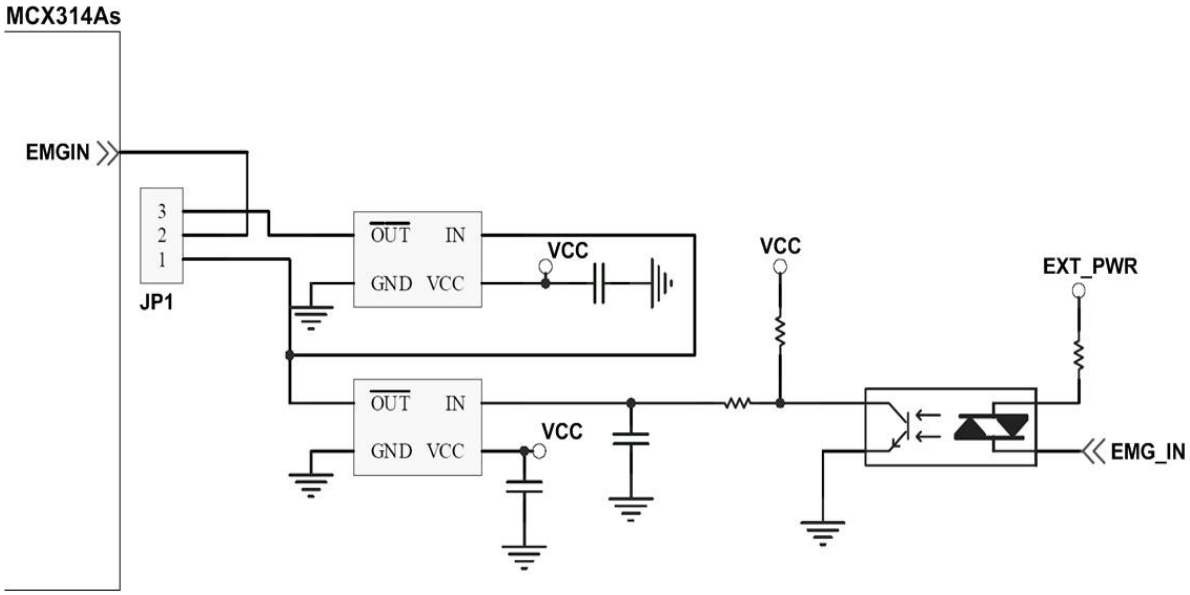


Fig. 2.15 Wiring example for emergency stop signal

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2.3.7 External Pulse Input Signal (EXP+,EXP-)

External pulse input signal is signal for external input driver. The following diagram shows an external signal **+/- input wiring.** User can set the signals as fixed pulse CW/CCW mode, continuous pulse CW/CCW mode, or A/B phase manual pulsar mode (please refer to section 5.1 for detail setting configuration).

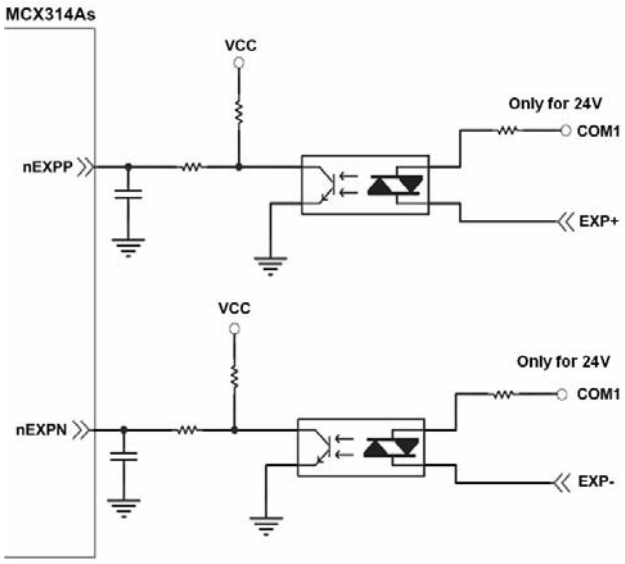


Fig. 2.16 Wiring example for External Pulse Input Signal(EXP+,EXP-)

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2.3.8 Servo On/Off Output Signal (ENABLE)

The following diagram shows a wiring example for output signal. This output signal could be applied to enable or disable the driver.

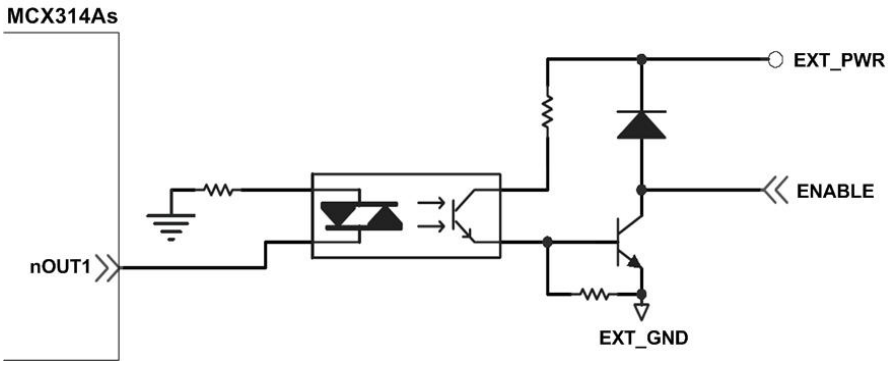


Fig. 2.17 Wiring Diagram for Servo On/Off Output Signal

2.3.9 Compare Trigger Output

The following diagram is a wiring example for Trigger Output Signal. This output signal could be adapted only on axis X and axis Y for Compare Trigger Output for specific applications such as image capture.

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2.4 Connection Example for Motor Driver

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

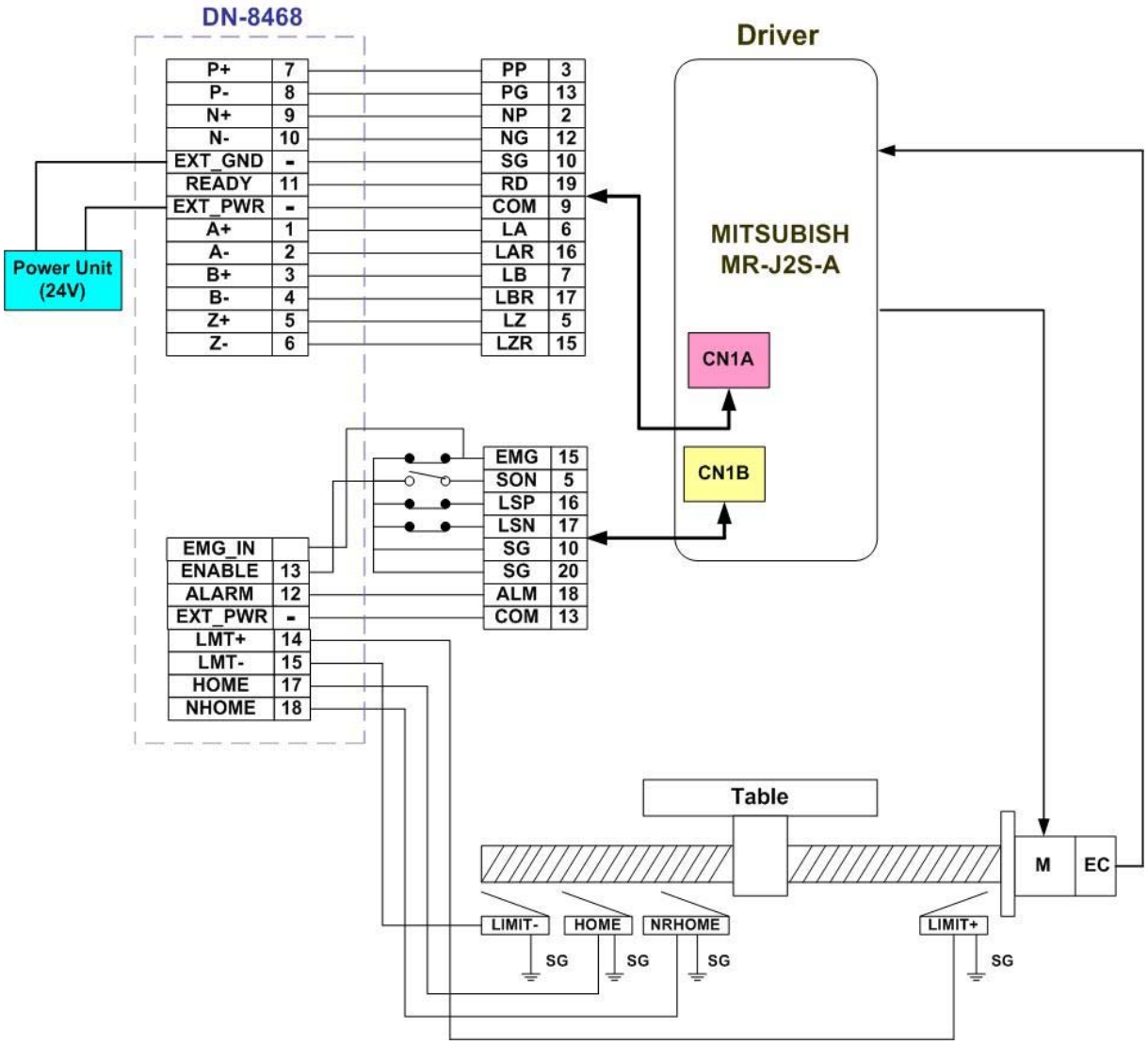


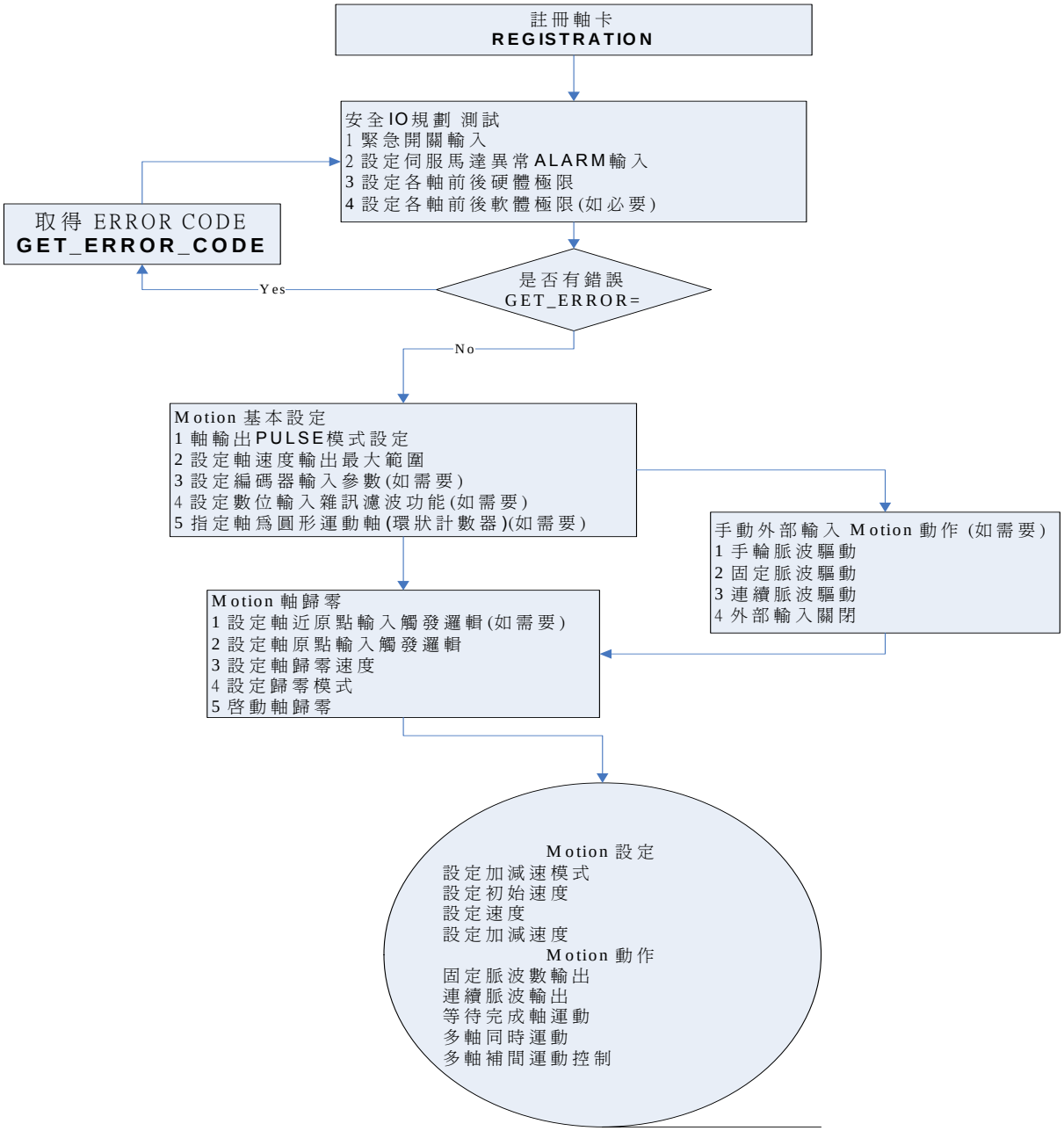
Fig. 2.18 The connection between MR-J2S AC servo driver and DN-8468G extension board.

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3 i8094A/i8094H Software Development

3.1 Software development Overview

For detail information, please refer to **i8094H_star** sample code.



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3.1.1 Register Module

You are required to register your 8094/I8094F module before starting to send any command, or your will receive an error message. Please refer to **“i8094H_Manual_1.3tc.pdf section 2.2” i8094H_REGISTRATION()” for more detail information.**

3.2 Safety IO Setting (Troubleshooting for Motion not working)

3.2.1 Emergency Stop Signal Input

The emergency stop switch is used for stopping an undesired motion for emergency situation; the user could immediately stop Motion action to ensure human/machine safety.
If you would like to disable Emergency Stop Signal, please close breaks between 2 and 3 pin of JP1.
If you would like to enable Emergency Stop Signal, please close breaks between 1 and 2 pin of JP1. Please connect **EMG_IN to (N.C), and install the switch in an appropriate location.**

3.2.2 Configure the Servo ALARM Signals

These signals will be input when there are ALARM occurred on servomotor drivers, therefore the user will be able to get notification immediately for further actions. You could set up operating mode (Enable or Disable) or select proper trigger level of these signals.

Please refer to Manual “**i8094H_Manual_1.3tc.pdf” section 2.13, function i8094H_SET_ALARM() for detail settings.**

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3.2.3 Configure the Limit Switch Signals(±EL)

To insure the safety of machine, hardware limit switches are placed at the both ends of machine traveling range. When the hardware limit switch sensors detect the machine, PISO-PS400 will stop immediately. You could set up operating mode (Enable or Disable) or select proper trigger level of these signals.

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 2.6, function i8094H_SET_HLMT() for detail settings.**

3.2.4 Configure the Software Limit(±SEL)

To insure the safety of machine, hardware limit switches are placed at the both ends of machine traveling range. However, you could also set up software limits for earlier detection before hardware limit can take effect. When it reaches the software limit, PISO-PS400 will stop immediately. You could set up operating mode (Enable or Disable) or select proper trigger conditions of these signals.

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 2.10, function i8094H_SET_SLMT() & i8094H_CLEAR_SLMT() for detail settings.**

3.3 Error Checking(GET_ERROR)

When error occurs, you could get the error-code by *GET_ERROR_CODE()* to check out error message and perform troubleshooting. The user could also check all DI status to ensure DI input accuracy.

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 3.5, function i8094H_GET_DI() for detail settings.**

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3.4 Motion Basic Configuration

Motion basic configuration that required for general purposes are as follow:

1. Pulse output mode setting: Pulse/Dir、CW/CCW…

i8094MF_SET_PULSE_MODE() (Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 2.4, function i8094H_SET_PULSE_MODE() for detail settings.**)

2. Set up Max. speed limitation for each axis

   (Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 2.5, function i8094H_SET_MAX_V () for detail settings.**)

3. Encoder input setting (optional)

   (Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 2.11, function i8094H_SET_ENCODER() for detail settings.**)

4. DI noise filter setting(optional)

   (Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 2.15, function i8094H_SET_FILTER() for detail settings.**)

5. Circular motion declaration(Ring counter)(optional)

   (Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 2.16, function i8094H_VRING_ENABLE() for detail settings.**)

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3.5 Manual Pulse Generator Testing (Optional)

The user could perform pulse generator function manually to drive forward or backward motion. This operation could ensure if the DI signals are functioning normally and if the direction(+/-) is correct, therefore the users could make further adjustments for lines and parameters.

The following gives you further information on three ways to initiate Manual Pulse Generator Testing:

1. A/B phase Manual Pulse Generator:

Use the A/B phase Manual Pulse Generator for forward/backward moving.

(Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 2.18.1, function i i8094H_EXD_MP()for detail settings.**)



2. Fixed-pulse driving Manual Pulse Generator: The users could preset the driving pulses at a fixed intensity and when press the forward or backward button, the motor will move a few steps(Pulse) forward or backward.

(Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 2.18.2, function i i2.18.2" i8094H_EXD_FP() for detail settings.**)

3. Continuous- pulse driving Manual Pulse Generator: The users could preset the output-pulse frequency at a fixed velocity (Hz), the motor will keep on moving forward or backward at fixed velocity when pressing the forward or backward button and the motion will be stopped immediately when releasing the button.

(Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 2.18.3, function i8094H_EXD_CP() for detail settings.**)

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4. Disable external pulse input:

This command is for disabling the external pulse input operated by any of the three functions above.

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 2.18.4, function i8094H_EXD_DISABLE() for detail settings.**

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3.6 Home Search

I8094A/I8094H offers automatic home search function; if providing with proper settings, it would function automatically. The main steps are as bellows:

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

A few steps could be skipped to adjust settings accordingly to meet customers' actual needs. This operation could be performed automatically, therefore economize on CPU resource and reduce programming efforts. Even though there are only four home search steps, by software functions adjustments that offers home search direction configurations and with the variations being made by skipping certain steps, there are actually more than 10 home search modes provided.

3.6.1 Home Search Configuration

1. Logic level setting for Near home sensor and Home sensor (optional)：

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 2.8, function i8094H_SET_NHOME() for detail settings.**

2. Home sensor logic level setting：

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 2.9, function i8094H_SET_HOME_EDGE() for detail settings.**

3. Home-speed setting：

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 5.1, function i8094H_SET_HV() for detail settings.**

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.1.2, function i8094H_SET_SV() for detail settings.**

4. Home mode setting：

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 5.3, function i8094H_SET_HOME_MODE() for detail settings.**

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3.6.2 Running the Home Search

1 Start homing：

Please refer to Manual “**i8094H_Manual_1.3tc.pdf” section 5.4, function i8094H_HOME _START() for detail settings.**

2 Waiting for completing homing operation：

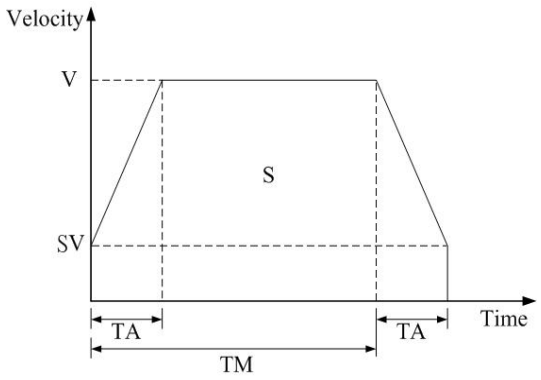
Please refer to Manual “**i8094H_Manual_1.3tc.pdf” section 6.5.3, function i8094H_STOP_WAIT() for detail settings.**

Please refer to Manual “**i8094H_Manual_1.3tc.pdf” section 7.2.7, function i8094H_MP_STOP_WAIT() for detail settings.**

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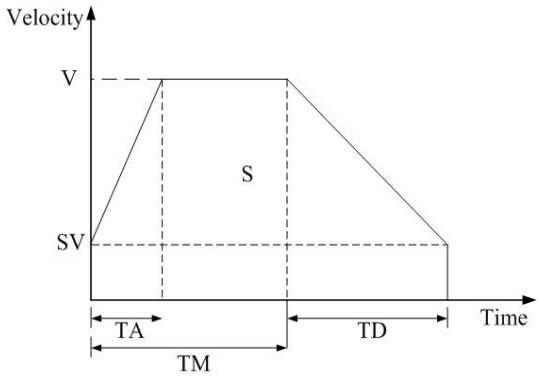
3.7 Basic Motion

3.7.1 Speed Profile of the Motion Control



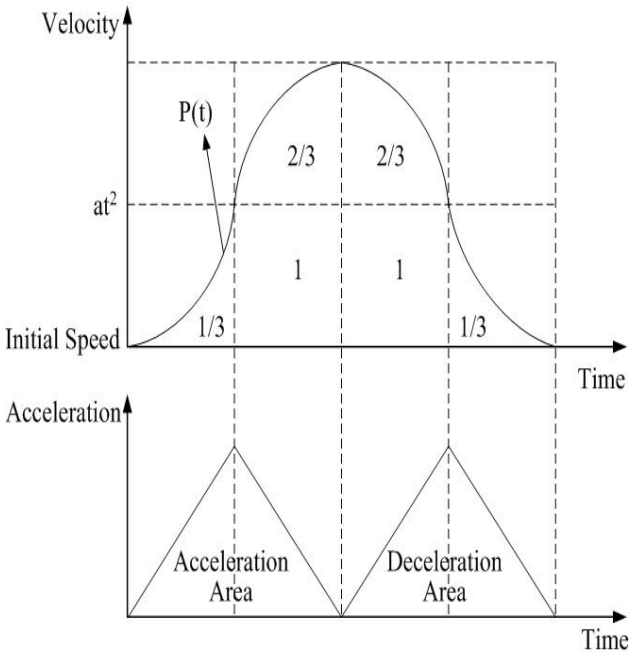
1 Symmetrical T-profile of motion velocity

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

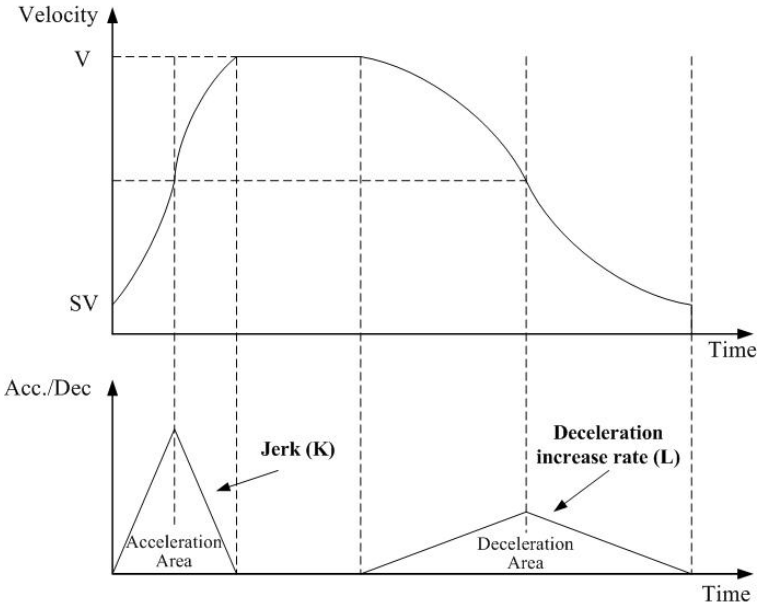


2 Asymmetrical T-profile of motion velocity

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3 Symmetrical S-curve of motion velocity



4 Asymmetrical S-curve of motion velocity

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3.7.2 Basic Settings For Single Axis

1. Setting the mode of Acceleration/deceleration: There are four speed modes of operation：

0 → Symmetrical T-Profile (SV、V、A、AO)
1 → Symmetrical S-curve (SV、V、K、AO)
2 → Asymmetrical T-profile (SV、V、A、D、AO)
3 → Asymmetrical S-curve (SV、V、K、L、AO)

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.1.1, function i8094H_NORMAL_SPEED() for detail settings.**

2. Setting the start velocity: Set lowest speed：

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.1.2, function i8094H_SET_SV() for detail settings.**

3. Setting the Velocity: Set the speed at a certain rate：

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.1.3, function i8094H_SET_V() for detail settings.**

4. Setting the Acceleration/Deceleration speed: Set the Acceleration/Deceleration speed at a certain rate：

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.1.4, function i i8094H_SET_A() for detail settings.**

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.1.5, function i8094H_SET_D() for detail settings.**

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3.7.3 Basic Motion of Single Axis

1. Fixed-pulse driving output: Perform fixed-quantity of single axis pulse output.

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.1.9, function i8094H_FIXED_MOVE() for detail settings.**

2. Continuous-pulse driving output: Perform continuous pulse output of single axis.

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.1.10, function i8094H_CONTIUNE_MOVE ()for detail settings.**

3. Waiting for motion done: Waiting for finishing the axis driving operation.

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.5.3, function i8094H_STOP_WAIT() for detail settings.**

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 7.2.7, function i8094H_MP_STOP_WAIT() for detail settings.**

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3.7.4 Basic Setting of Muti-Axes Interpolation

1. Setting axes of interpolation: Select the axes that are required to perform interpolation.

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.2.1, function i8094H_AXIS_ASSIGN() for detail settings.**

2. Setting the mode of Acceleration/Deceleration of vector: There are twelve modes:

0 → 2-axes(Linear & ARC & Circular) Fixed-vector velocity (VV)
1 → 2-axes linear symmetrical T-profile (VSV、VV、VA、VAO)
2 → 2-axes linear symmetrical S-curve (VSV、VV、VK、VAO)
3 → 2-axes linear asymmetrical T-profile (VSV、VV、VA、VD、VAO)
4 → 2-axes linear asymmetrical S-curve (VSV、VV、VK、VL、VAO)
5 → 2-axes (ARC & Circular) symmetrical T-profile (VSV、VV、VA、VAO)
6 → 2-axes (ARC & Circular) asymmetrical T-profile (VSV、VV、VA、VD、VAO)
7 → 3-axesFixed-vector velocity (VV)
8 → 3-axes linear symmetrical T-profile (VSV、VV、VA、VAO)
9 → 3-axes linear symmetrical S-curve (VSV、VV、VK、VAO)
10 → 3-axes linear asymmetrical T-profile (VSV、VV、VA、VD、VAO)
11 → 3-axes linear asymmetrical S-curve (VSV、VV、VK、VL、VAO)

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.2.2, function i8094H_VECTOR_SPEED() for detail settings.**

3. Setting the start vector velocity: Set the lowest vector speed.

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.3.3, function i8094H_SET_VSV() for detail settings.**

4. Setting the vector velocity: Set the vector speed at a certain rate

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.3.4, function i8094H_SET_VV() for detail settings.**

5. Setting the velocity of Acceleration/Deceleration of vector: Set the speed of Acceleration/Deceleration of vector at a certain rate.

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.3.5, function i8094H_SET_VA() for detail settings.**

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.3.6, function i8094H_SET_VD() for detail settings.**

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3.7.5 Basic Motion of Muti-Axes Interpolation

1. 2-axes linear interpolation: Perform 2-axes linear interpolation.

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.2.10, function i8094H_LINE_2D() for detail settings.**

2. 3-axes linear interpolation: Perform 3-axes linear interpolation.

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.2.11, function i8094H_LINE_3D() for detail settings.**

3. 2-axes ARC interpolation: Perform 2-axes ARC interpolation.

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.2.12, function i8094H_ARC_CW() for detail settings.**

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.2.12, function i8094H_ARC_CCW() for detail settings.**

4. 2-axesCircular interpolation: Perform 2-axes Circular interpolation.

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.2.13, function i8094H_CIRCLE_CW() for detail settings.**

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.2.13, function i8094H_CIRCLE_CCW() for detail settings.**

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3.8 Advance Motion

1. 2-axes continuous interpolation of rectangle: Perform2-axes continuous interpolation of rectangle.

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.4.1, function i8094H_RECTANGLE() for detail settings.**

2. 2-axes continuous interpolation of line:

Initial setting for continuous interpolation of 2-axes line(Symmetrical T-profile).

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.4.2, function i8094H_LINE_2D_INITIAL() for detail settings.**

Perform 2-axes continuous interpolation of line.

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.4.2, function i8094H_LINE_2D_CONTINUE() for detail settings.**

3. 3-axes continuous interpolation of line:

Initial setting for continuous interpolation of line(symmetrical T-profile).

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.4.3, function i8094H_LINE_3D_INITIAL() for detail settings.**

Perform 3-axes continuous interpolation of line.

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.4.3, function i8094H_LINE_3D_CONTINUE() for detail settings.**

4. Others continuous interpolation: Muti-point continuous interpolation, 3-axes Helix interpolation, 2-axes Ratio motion

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.4.4~6.4.10 for detail information.**

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3.9 Motion Synchronization Action

i8094A/i8094H provides a lot of functions that support Synchronization Action, such as comparison of EP, LATCH…and so on.

Please refer to Manual "**i8094H_Manual_1.3tc.pdf" section 6.4.4~6.4.10 for detail informaion.**

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4 SOFTWARE GETTING STARTED GUIDE

4.1 WinCon eVC++

4.1 WinCon eVC++ Guideline

4.1.1 Files you will need

Please make sure you get the following files in your PC:

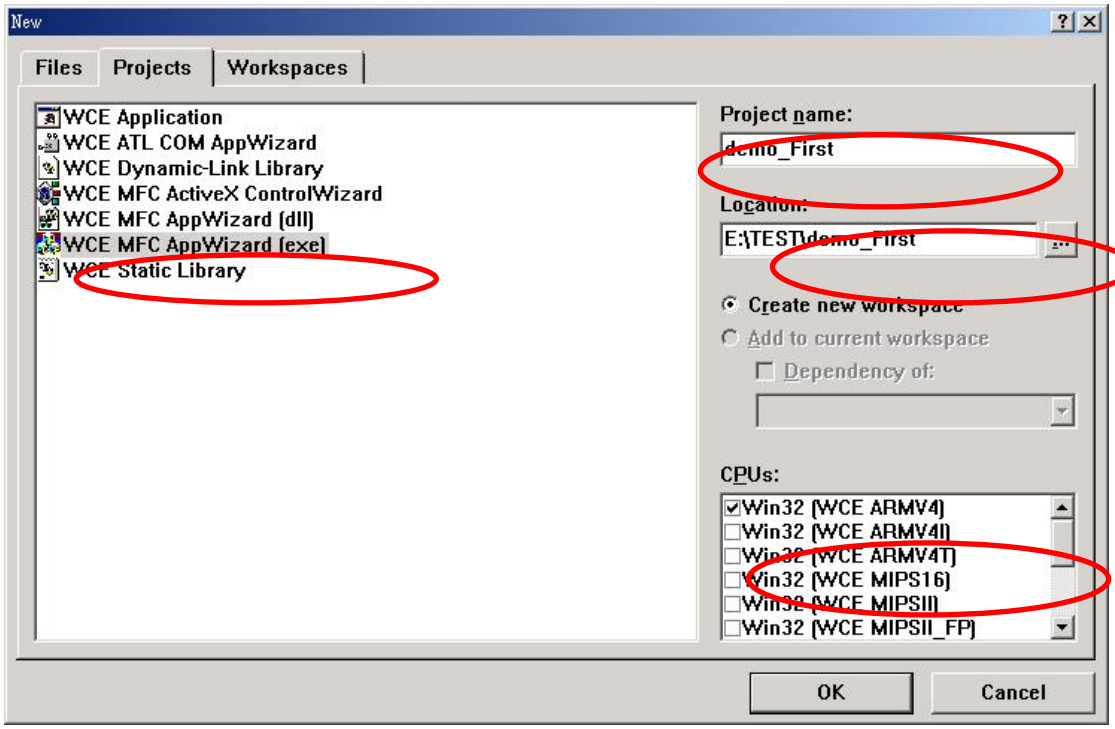
1. I8094h.lib
2. I8094h.dll
3. I8094h.h

If you don't have these files, please find them in the CD that comes along with the device, or you could download the latest version from ICPDAS's website http://www.icpdas.com/download/download-list.htm .

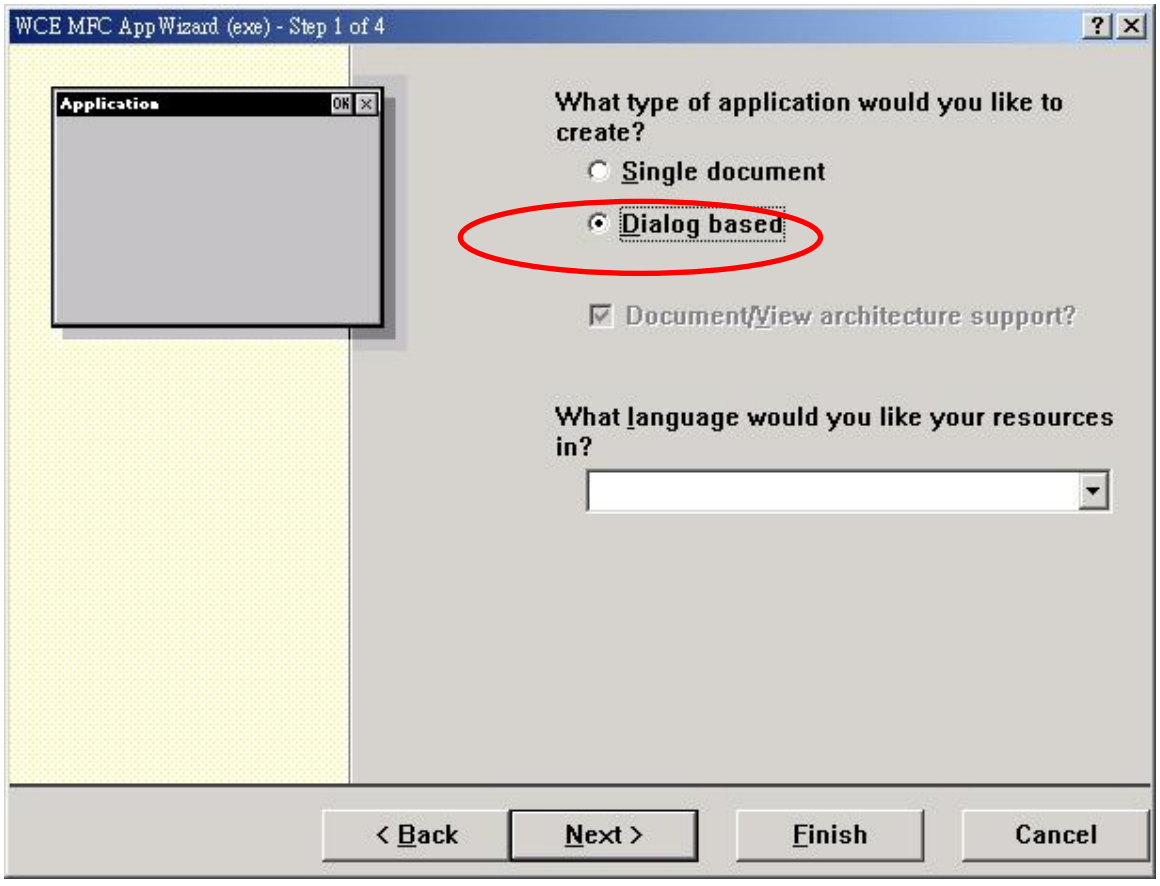
4.1.2 Create a new eVC++ Application Project

1. Install and execute Microsoft eVC++ 4.0.
2. Click **File** -> **New** to create a new application project.
3. In **Projects** property page, select **WCE MFC AppWizard** (exe)
4. In **Projects** property page, specify the project name as **Demo_First**.
5. In **Projects** property page, key in or browse the disk path in the field "Location".
6. In **Projects** property page, check **Win 32[WCE ARMV4]** in CPUs list.
7. If necessary, please also select others options together. And then click **OK**.

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8. Choose **Dialog based** and click **NEXT**

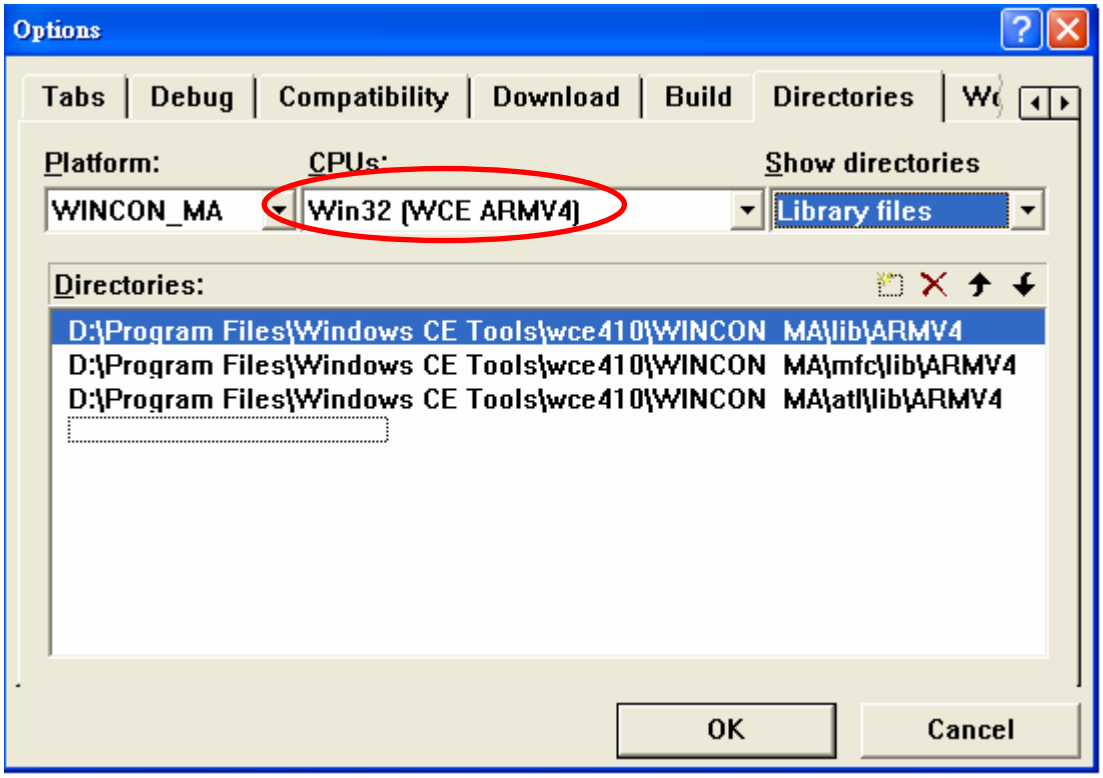


9. Click **Finish** to end establishment of the new project.

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4.1.3 Add the Reference Path into eVC++ Application Project

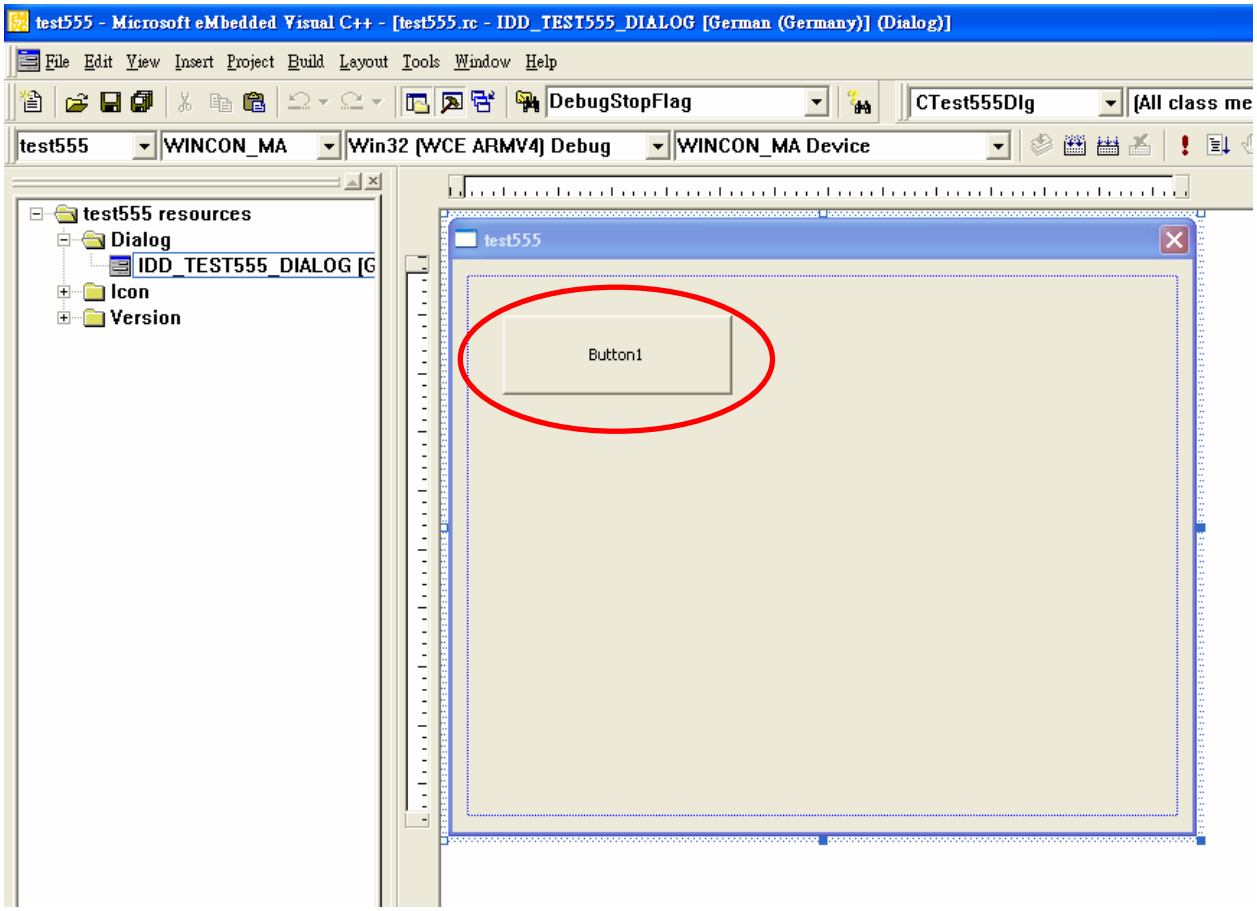
A. On the **Tools** menu, click **Options**. The **Options** popup menu will appears.
B. Click on tab **Directories**, choose Platform to be **WINCON_MA**, select “Win32 **[WCE ARMV4]** in the **CPUs** list.
C. Specify the path of **Include files** and **Library files**. To add the path, double-click on the blank line at the end of the **Directories** list. Please key in the specific path that your header files located. For example, C:\DAQPRO\Wincon\inc.



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4.1.4 Start the eVC++ Sample

Add a **BUTTON** on Dialog, as below:

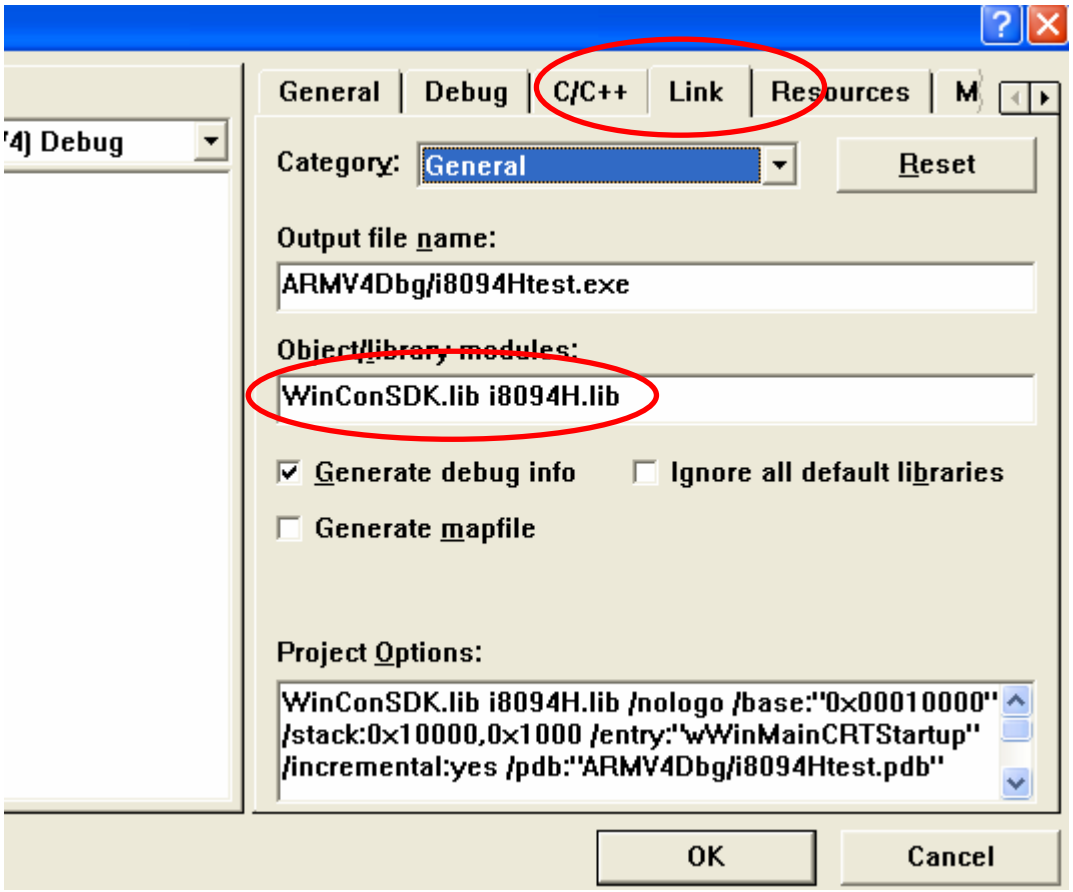


Double-click on BUTTON to create a subprogram; declare the following header files.

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


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On the **Tools** menu, click **Options**. The **Options** popup menu will appears. Select menu **Project**->**Setting**, will bring up a dialog box as below, click on tab **Link**, key in **WinConSDK.lib i8094.lib**(showing as below) into the **Object/library modules** box and the click **OK**.



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

Reserved

4.3 I-8000 Turbo C++

Reserved

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5 MPTool : EzMake

5.1 Start EzMake

To start your EzMake, you could:

1. **Start→Programs→ EzMake**, click on **EzMake** to start the program.
2. Go to **\CompactFlash\EzProg-I\EzMake\EzMake.exe**, double click on the file **EzMake.exe** to start the program.



5.2 Specify the I-8094H to be used

All the **I-8094H** modules will be display on **EzMake** default page, select the I-8094H in use and click on **OK**.

Note: the **I-8094H** in use will display **Used.**

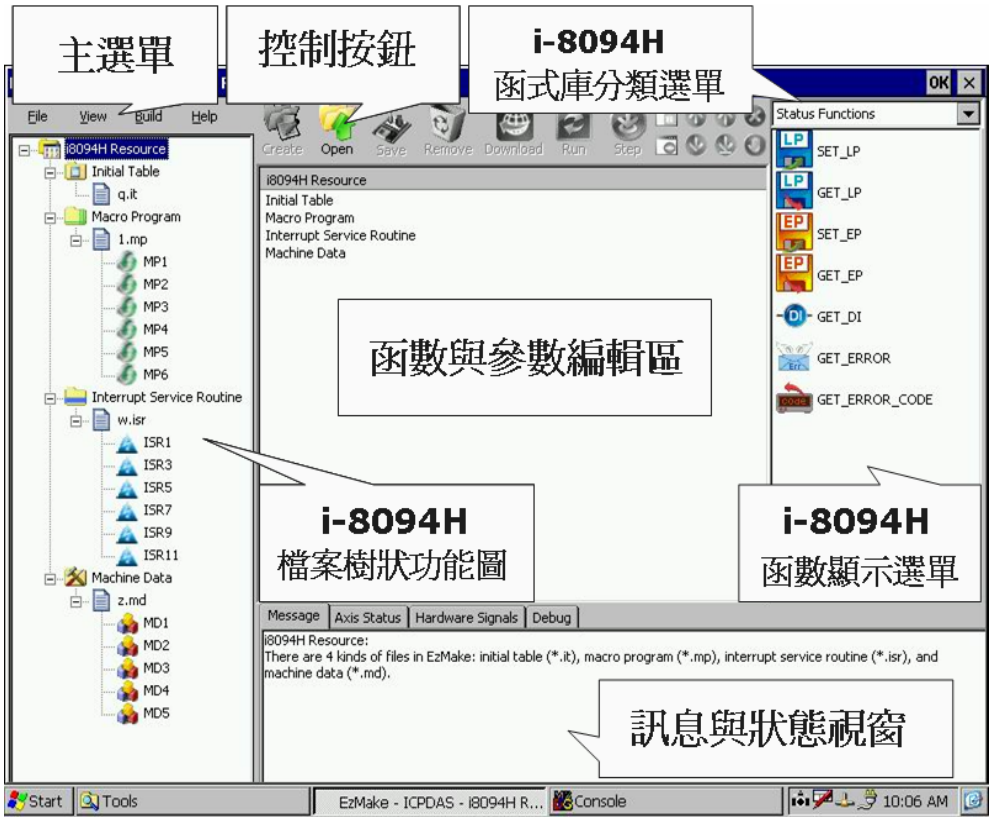


Fig. 5.1 EzMake default page

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5.3 Operation Page

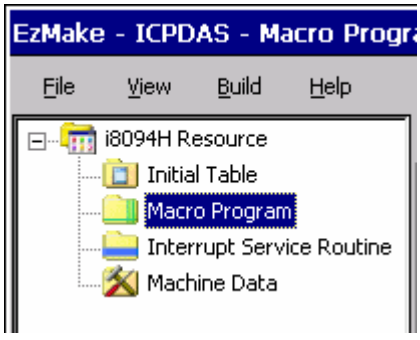
There are 7 blocks, the general operation order is as follow: Tree Diagram → Main Menu → Control Button →Function Library Groups Menu→Function Display Menu →Function & Parameter Editor →Message & Status



5.3.1 Tree Diagram

There are four branches under the Tree Diagram

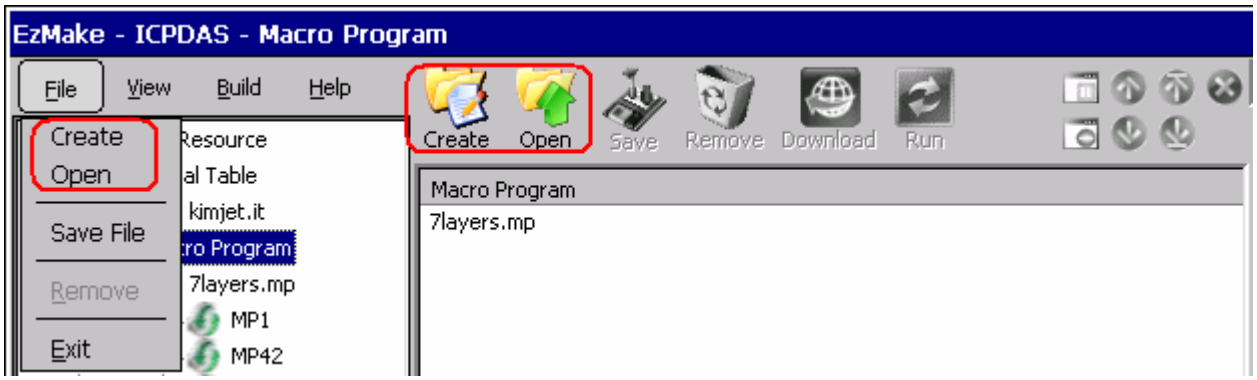
Initial Table: Edit I-8094Hinitial settings
Macro Problem: Create MP
Interrupt Service Routine: Create ISR
Machine Data: Edit `data for power outage carry-over`



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5.3.2 Main Menu

After you select the file type to open or create a file, you could select the operations to be performed from Main Menu or buttons on toolbar.



5.3.2.1 Create a File

Please follow the steps to create a file:

In **Initial Table**, you could only edit functions that is displayed in **Functions & Parameters Editor** (Fig. 5.2)

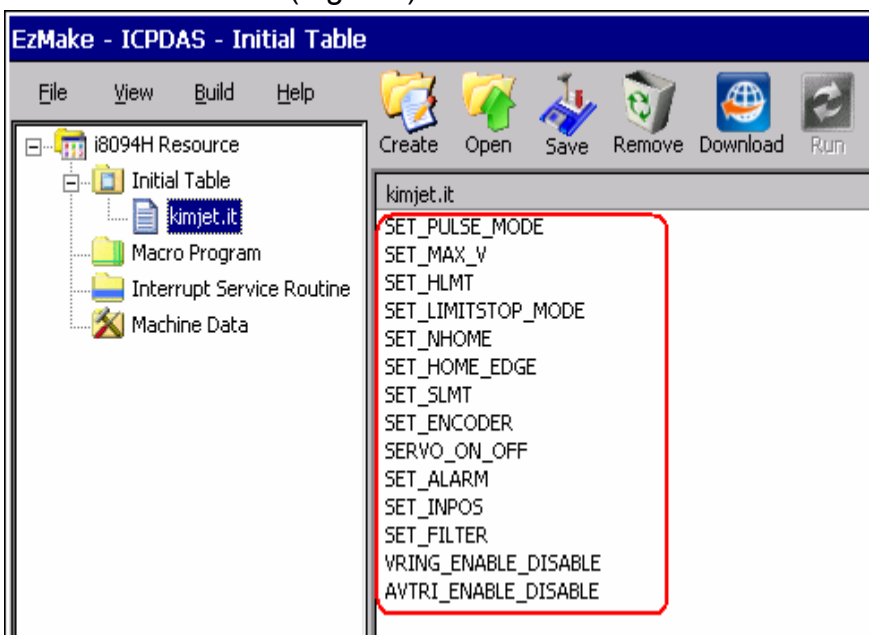


Fig. 5.2 Initial Table

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Macro Program & Interrupt Service Routine

1. Input filename (less than 10 characters), as shown in Fig. 5.3

2. Select the MP you would like to add on (MP1~MP157), among158 MP, there are totally 5 categories stacks(8/16/32/128/512), add them according to requirements. For ISR, it is similar to MP, however the number of Functions and ISR are less.

3. You could edit **Description** after you adding on MP.

4. Press **OK** to finish creating file.

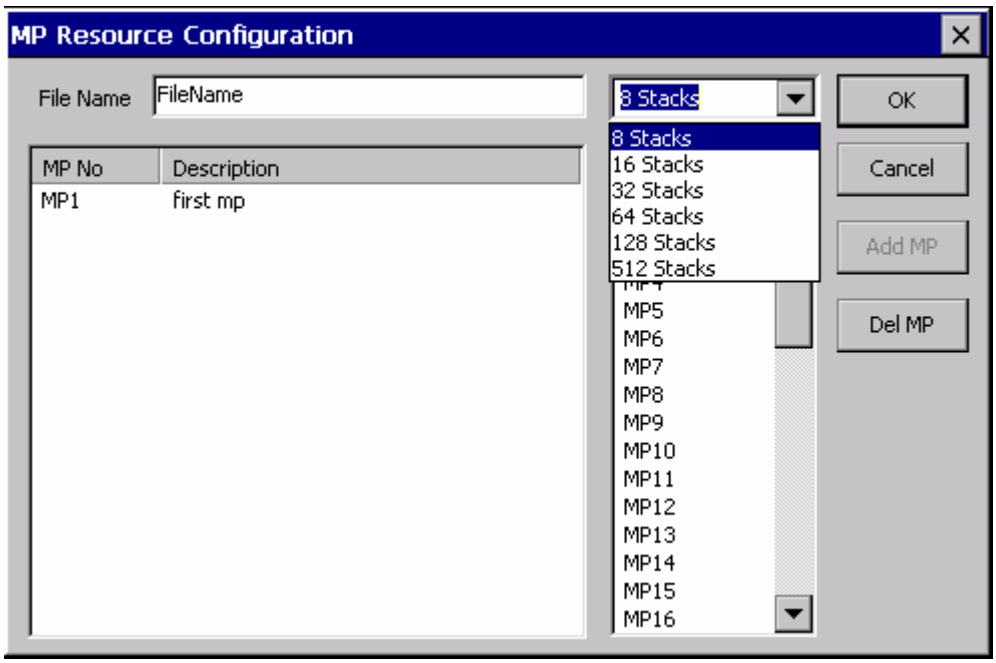
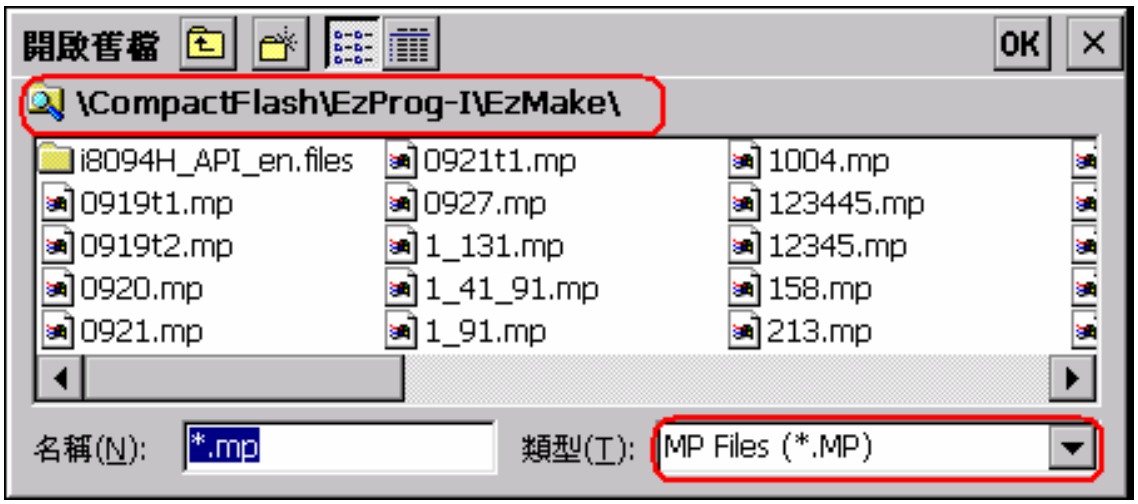


Fig. 5.3 MP Resouse Configuration

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5.3.2.2 Open a file

The default path for saving files will be: **CompactFlash\EzProg-I\EzMake**
If you select MacroProgram in Tree Diagram, you could only open the file with .mp extension name.



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5.3.3 Function & Parameter Editor

You could edit the parameters in **Function & Parameter Editor.**

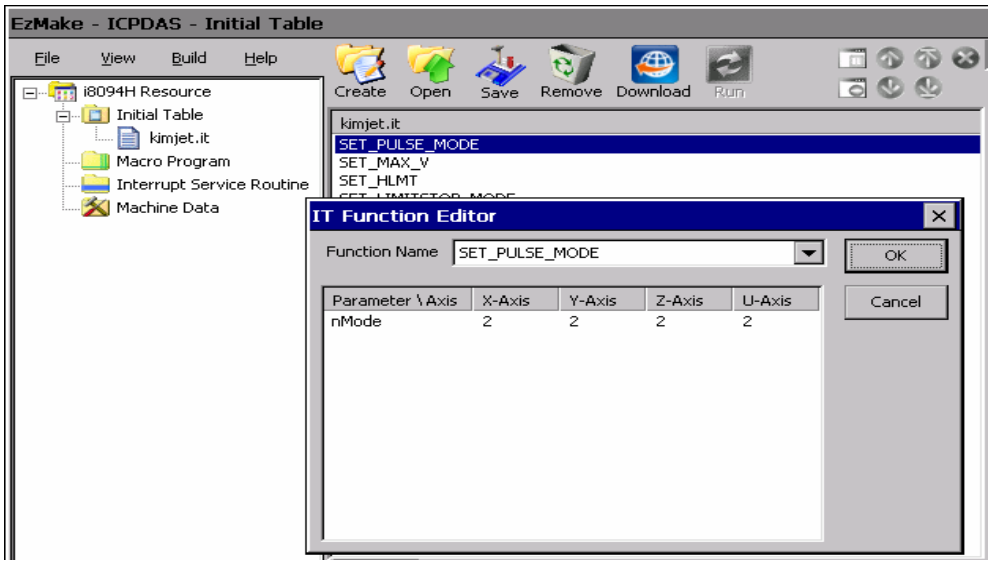


Fig. 5.4

Fig. 5.4 shows the Initial Table, you could edit the functions displayed, but you could not add or delete the functions. To edit the functions, double click on the function you would like to edit will bring up a editor window, input the parameters you'd like to make a change of. You could also edit Macro Program and Interrupt Service Routine. Note that Machine Data is for data storage, it is different the other three(Fig. 5.5)

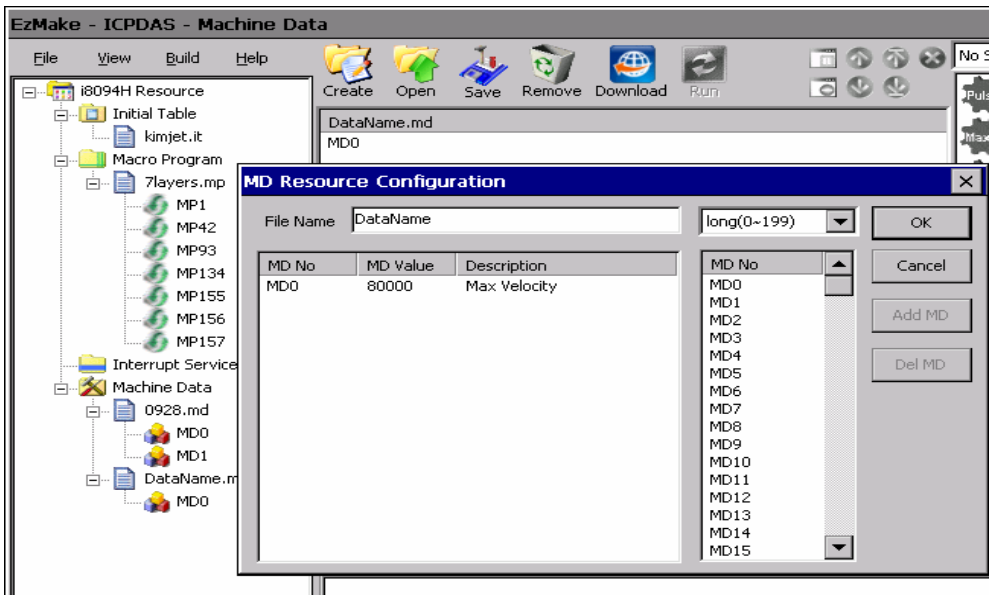
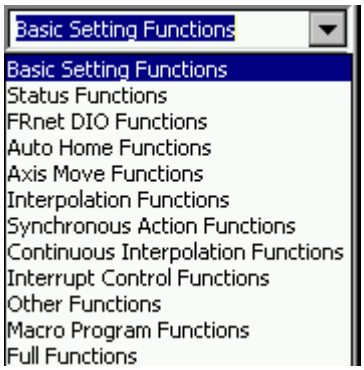


Fig. 5.5 MD Resource Configuration

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5.3.4 Function Library Groups Menu

After you create a new file, you could add the functions you need.



In **Function Library Groups Menu**, you could select the Functions by groups or choose the last one (Full Functions) to select all functions.

5.3.5 Function Display Menu

When you click on the Function groups displayed on **Function Library Groups Menu**, it will shows all functions in this group, select the function you'd like to add on and edit its parameters.

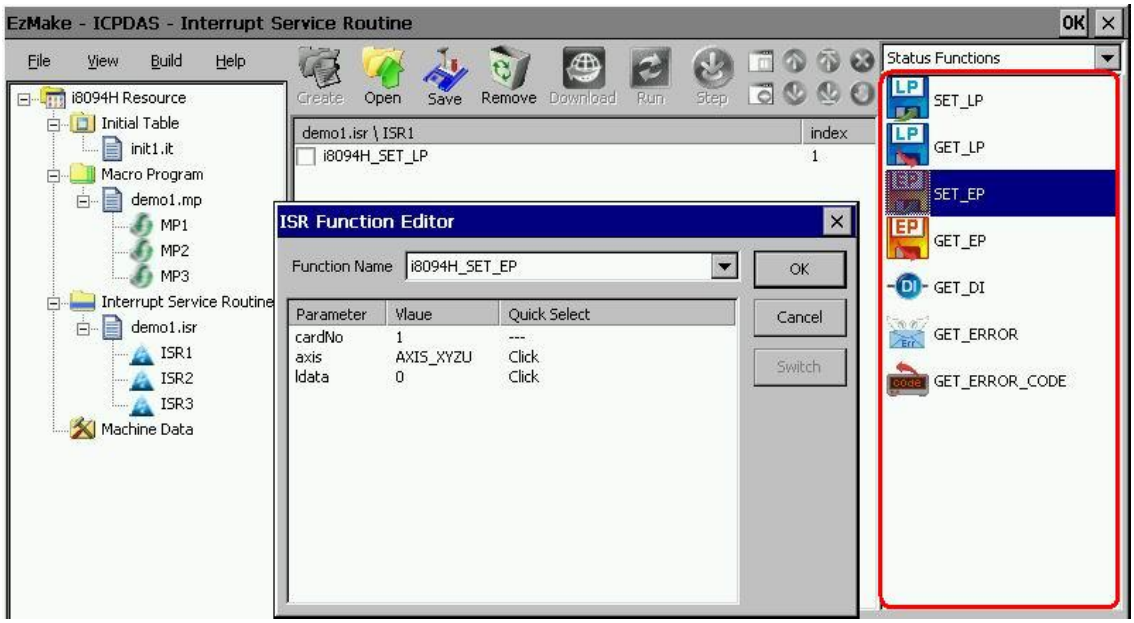


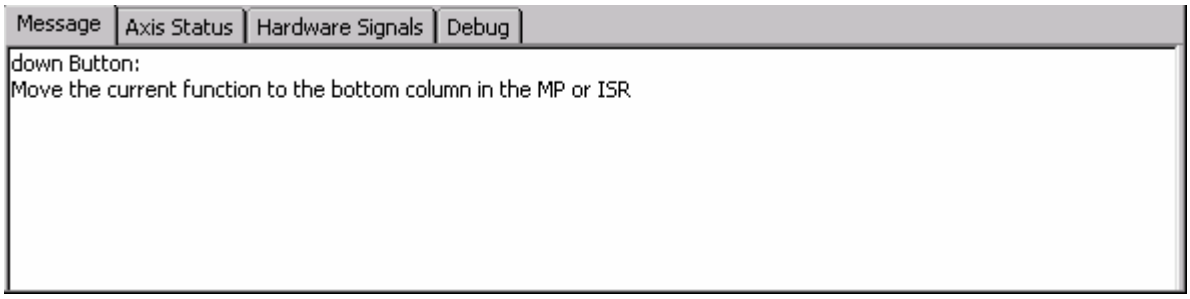
Fig. 5.6

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5.3.6 Message & Status

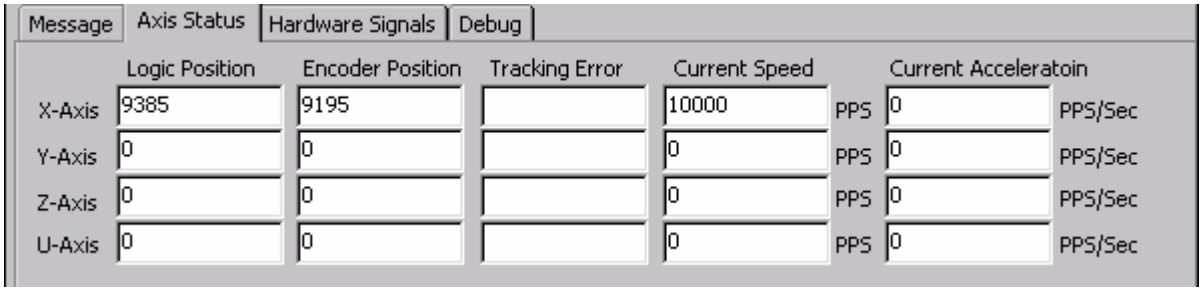
5.3.6.1 Message

If you place your mouse cursor over any button, the detail function information will be displayed in this window.



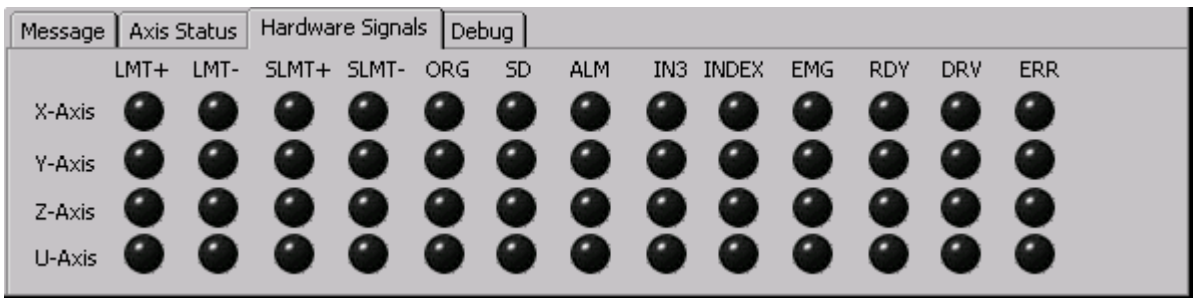
5.3.6.2 Axis Status

After you execute MP or ISR, various statuses will be shown in the window.



5.3.6.3 Hardware Signals

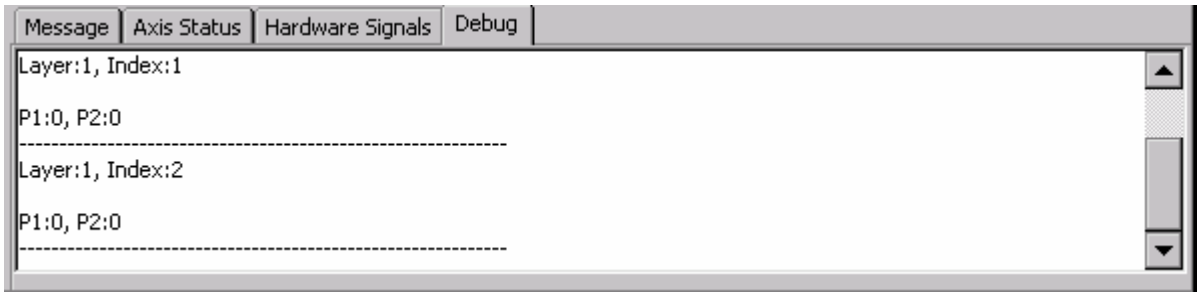
After you execute MP or ISR, the corresponding LED indicators for Axes statuses and locations will be light-on.



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5.3.6.4 Debug

After you execute MP or ISR, this window will display the location where the executed functions being made a change of.



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5.4 Download files and programs execution

5.4.1 Download the file



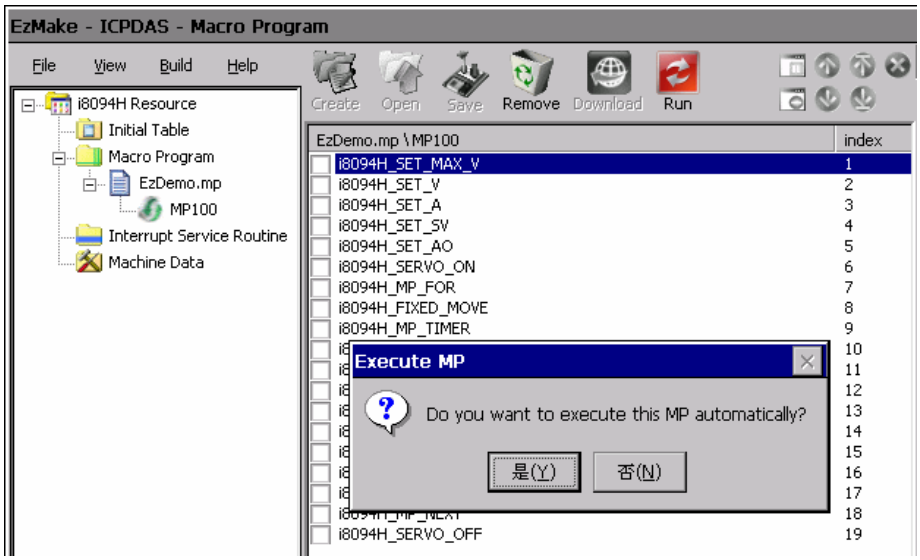
Select the file(*.it/*.mp/*.isr/*.md) you'd like to download, click 

to download the program (Fig. 5.7)



Fig. 5.7 Downloading

5.4.2 Program execution



Select the files (MPxx/ISRxx) you want to download, click 

, the program will be executed immediately.

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APPENDIX A

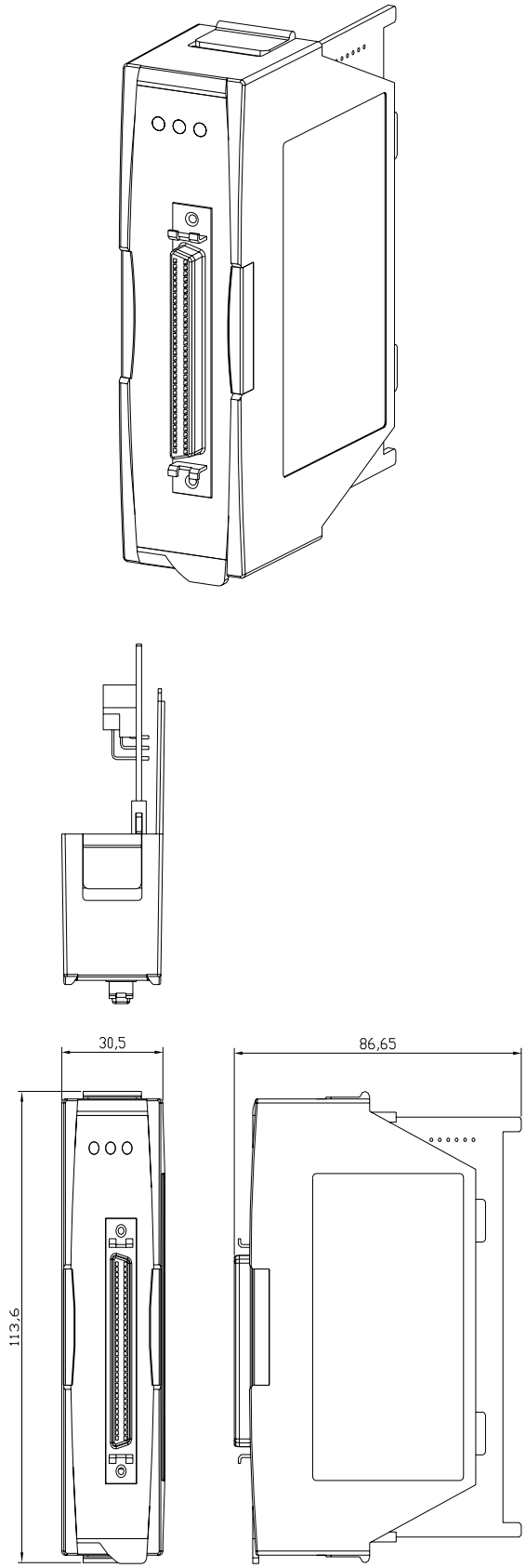
A.1 Setup the Development Environment of I8094A/I8094H

A.1.1 eVC ++ 4.0

1. Microsoft eVC++ 4.0: ServicPack2 or above (current version: ServicPack4)
2. WinCon8000_EVC4_SP1: WinCon in eVC++ Development Environment (SA_IA)
3. WinConSDK:WinCon Software Tool(inc,lib,dll,demo…)

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A.2 Appearance and Dimension



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APPENDIX B DN-8468 series daughter board

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

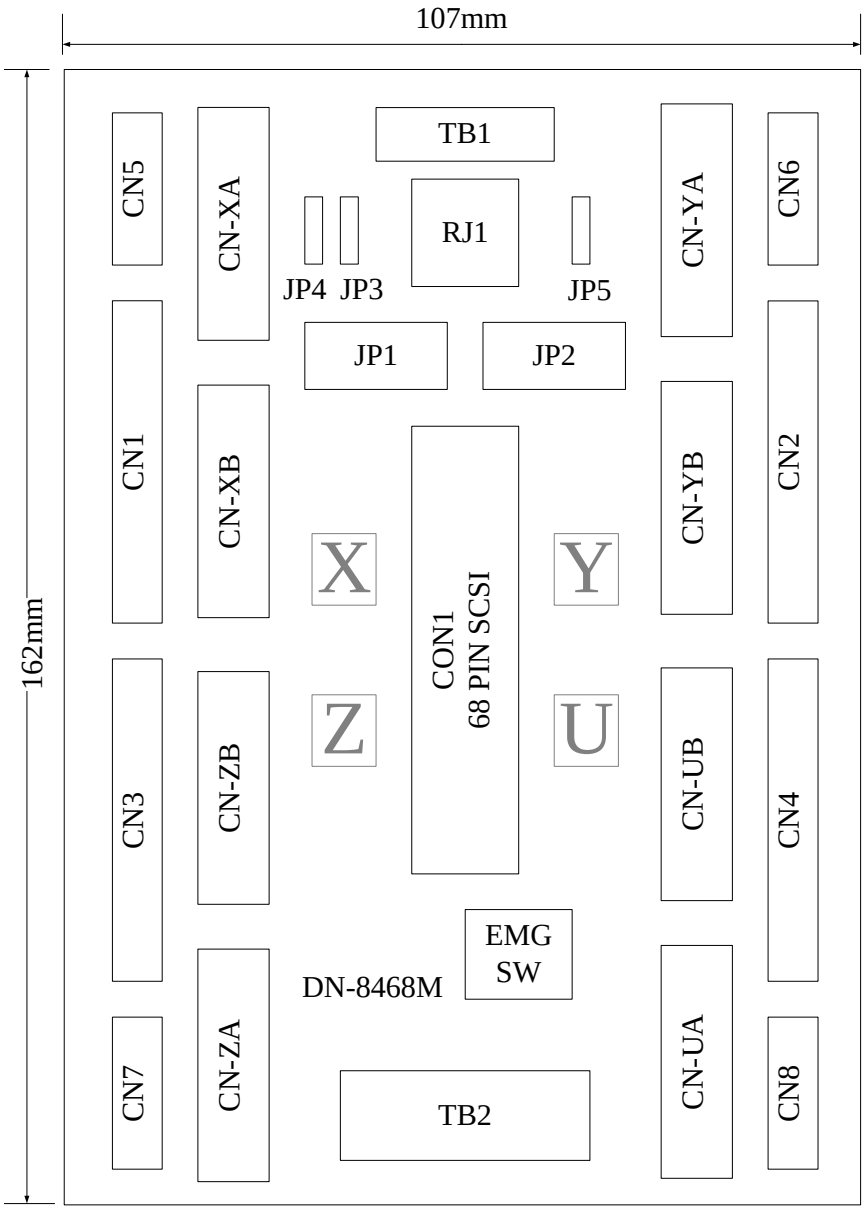


Fig. 1-1 Board layout for the DN-8468M

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B.1.2 Signal Connections for DN-8468M

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

■ Pin Assignment for CON1

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

■ TB1

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

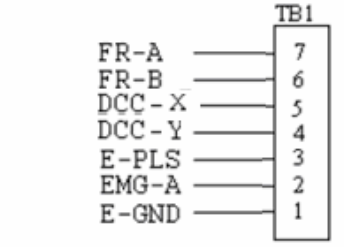


Fig. 1-3 Pin definition for TB1

Table 1-4 TB1 Signal Connection

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

■ TB2

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

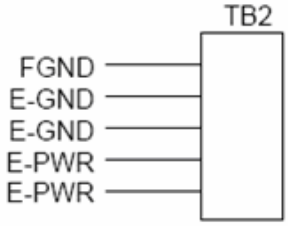


Fig. 1-4 Pin definition for TB2

Table 1-5 TB2 Signal Connection

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

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

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

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

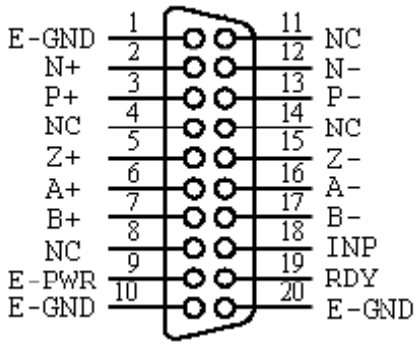


Fig. 1-5 Pin definition for CN-XA, CN-YA, CN-ZA, CN-UA

Table 1-6 CNA Signal Connection

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

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

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

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

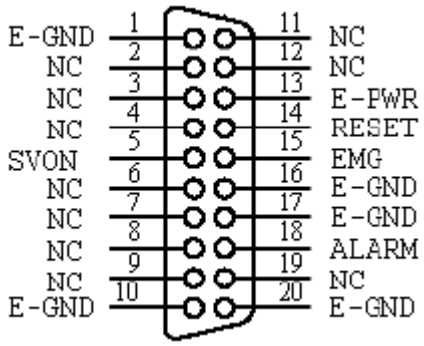


Fig. 1-6 Pin definition for CN-XB, CN-YB CN-ZB, CN-UB

Table 1-7 CNB Signal Connection

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

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

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

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

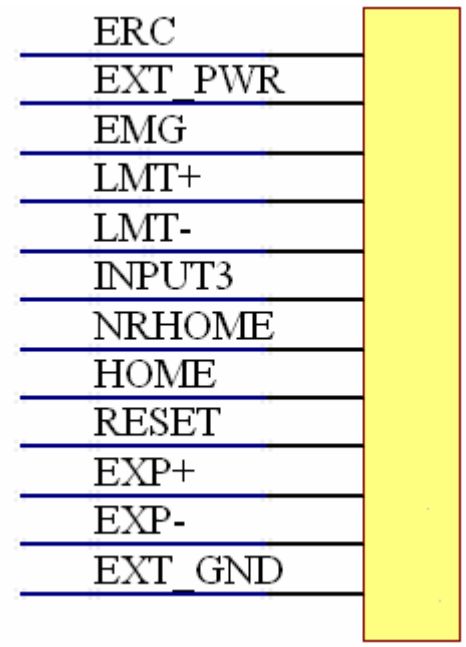


Fig 1-7 Pin definition for CN1~ CN4

Table 1-8 CN1~4 Signal Connection

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

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

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

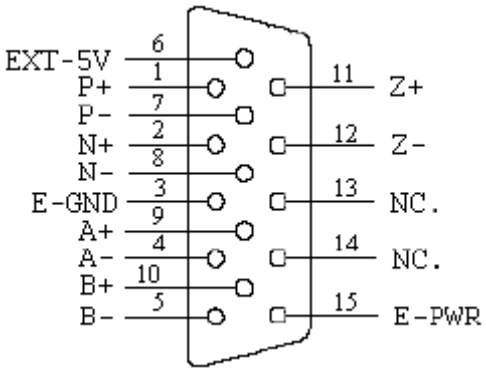


Fig. 1-8 Pin definition for CN5~CN8

Table 1-9 CN5~8

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

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

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■ RJ1 (The I/O signals of the FRnet)

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

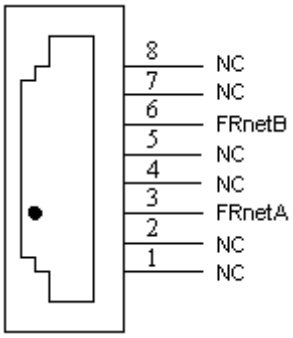


Table 1-10 RJ1

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

Fig. 1-9 Pin definition for RJ1

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

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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.

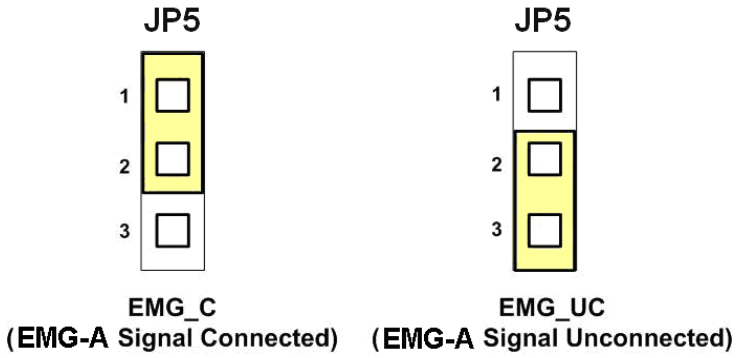


Fig. 1-10 Jumper 5 setting

■ 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.

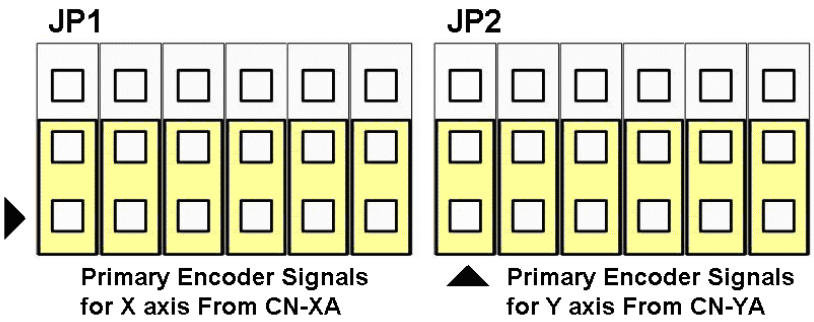


Fig. 1-11 Primary encoder signals setting

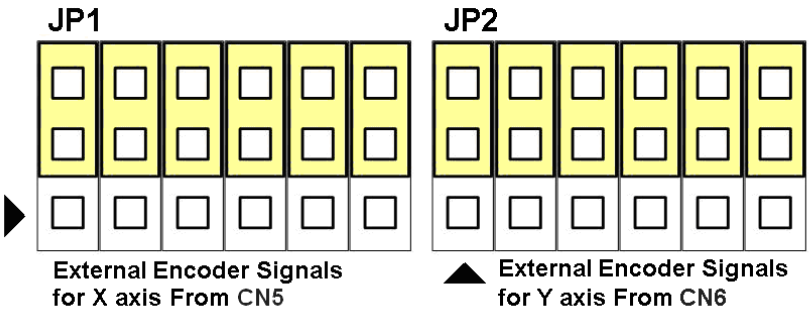


Fig. 1-12 External encoder signals setting

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■ 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.

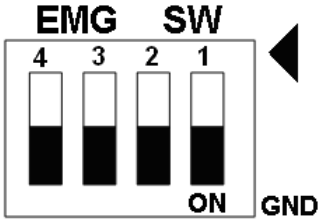


Fig. 1-13 EMG SW setting for normally GND (Default setting)



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

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B.2 DN-8468P Daughter Board

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

B.2.1 Board Layout for DN-8468P

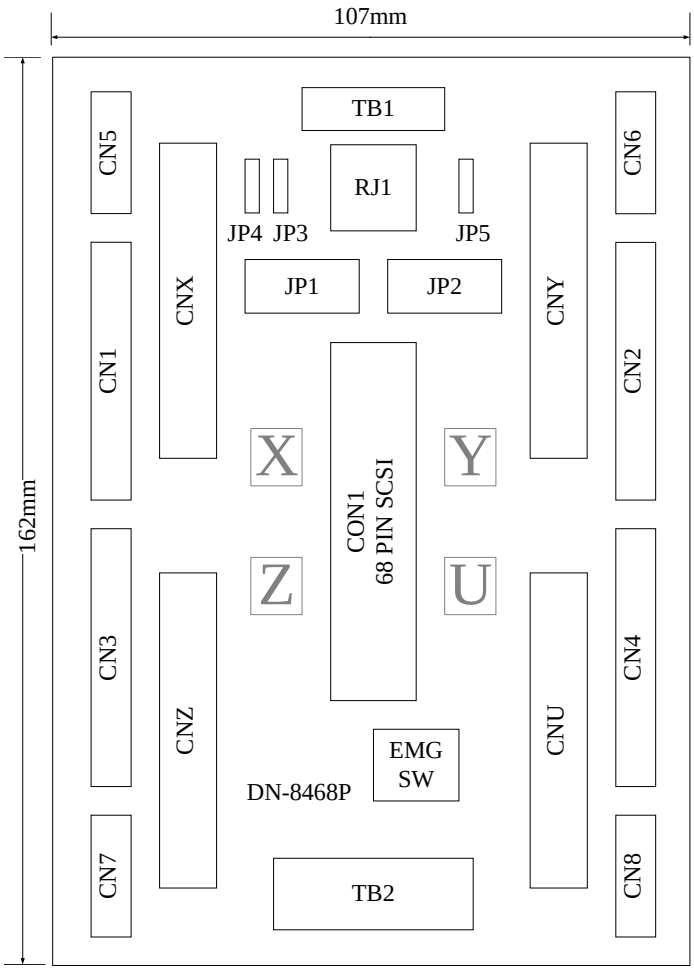


Fig. B2-1 Board layout for the DN-8468P

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B.2.2 Signal Connections for DN-8468P

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

■ Pin Assignment for CON1

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

■ TB1

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

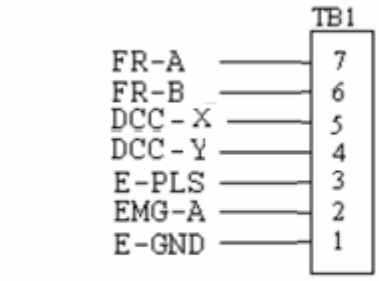


Fig. 1-3 Pin definition for TB1

Table 1-4 TB1 Signal Connection

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

■ TB2

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

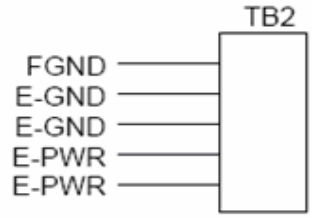


Table 1-5 TB2 Signal Connection

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.

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■ 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.

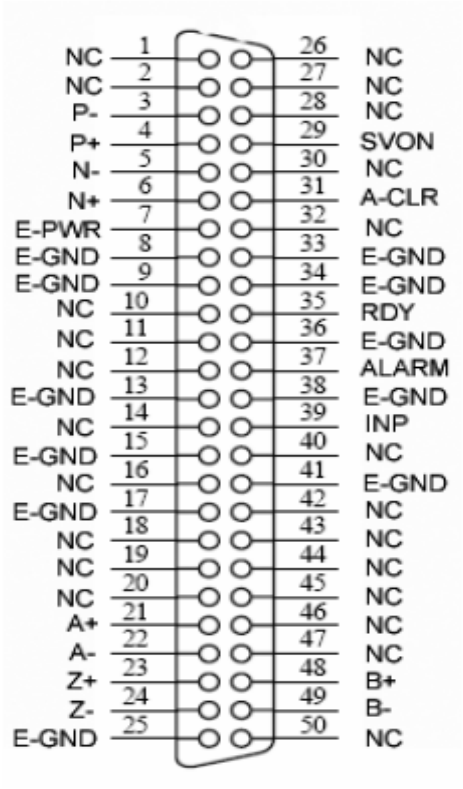


Fig. 1-5 Pin definition for CNX, CNY, CNZ, CNU

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.

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■ 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.

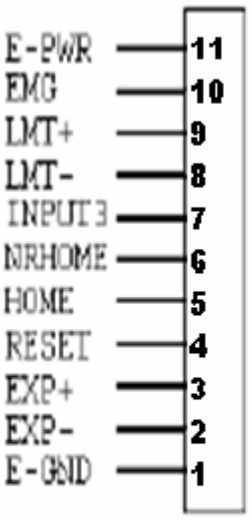


Fig.1-7 Pin definition for CN1 ~ CN4

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

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■ 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.

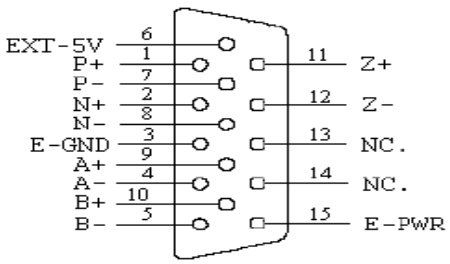


Fig. 1-8 Pin definition for CN5 ~ CN8

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.

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■ RJ1 (The I/O signals of the FRnet)

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

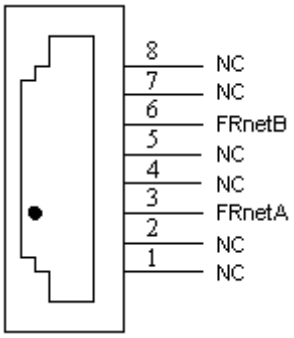


Fig. 1-9 Pin definition for RJ

Table 1-10 RJ1

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

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

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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.

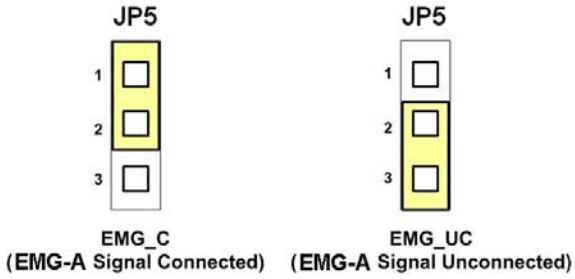


Fig. 1-10 Jumper 5 setting

■ 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.

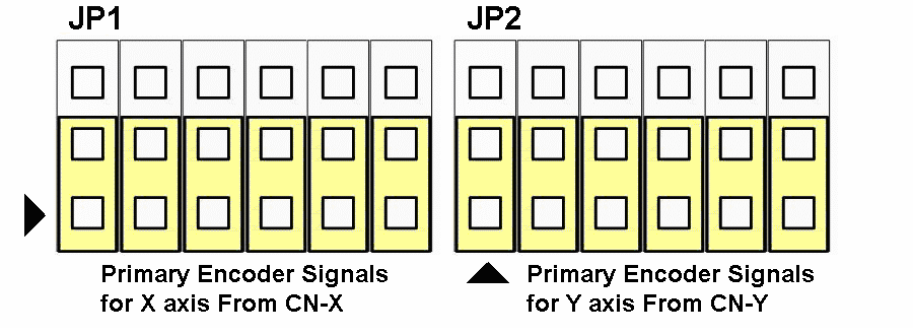
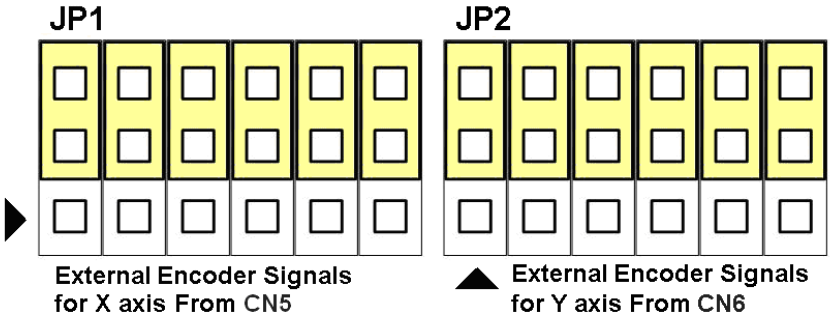


Fig. 1-11 Primary encoder signals setting



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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.

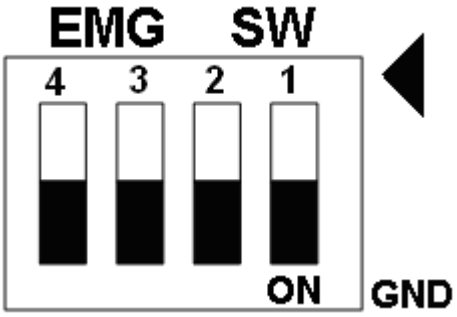


Fig. 1-13 EMG SW setting for normally GND (Default setting)

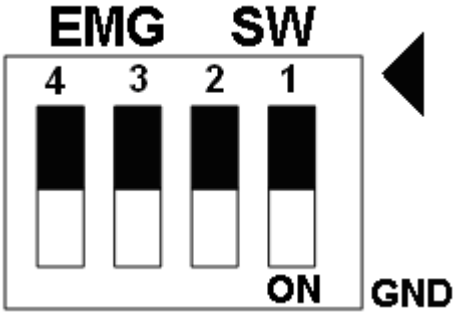


Fig. 1-14 EMG SW setting for user controlled signals.

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B.3 DN-8486Y Daughter Board

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

B.3.1 Board Layout for DN-8468Y

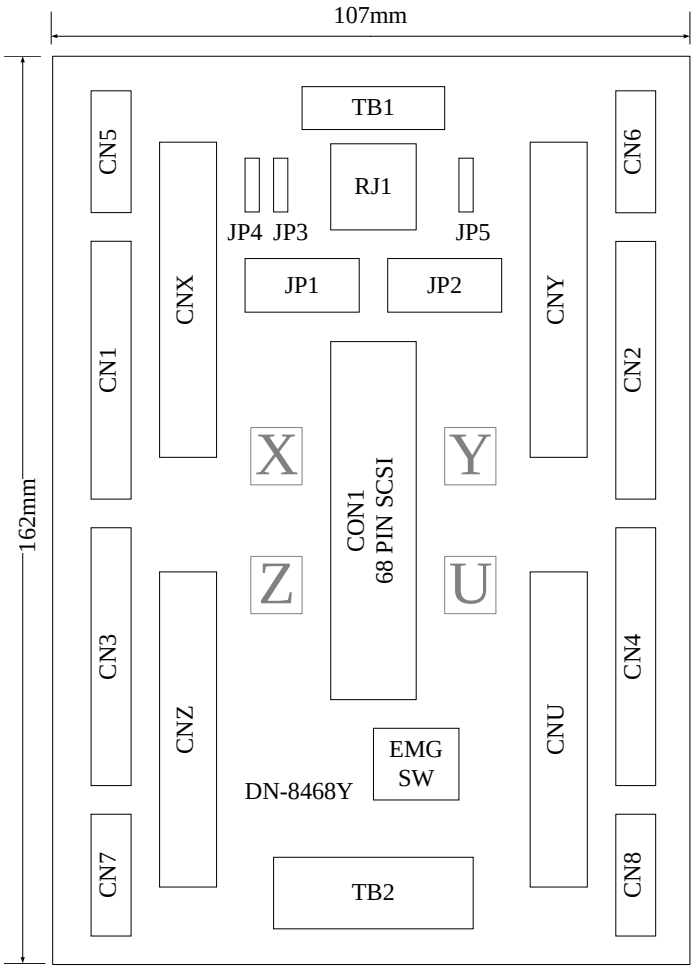


Fig. 3-1 Board layout for the DN-8468Y

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B.3.2 Signal Connections for DN-8468Y

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

■ Pin Assignment for CON1

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

■ TB1

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

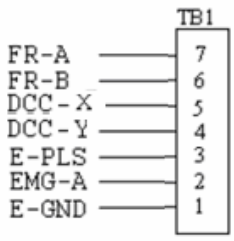


Fig. 1-3 Pin definition for TB1

Table 1-4 TB1 Signal Connection

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

■ TB2

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

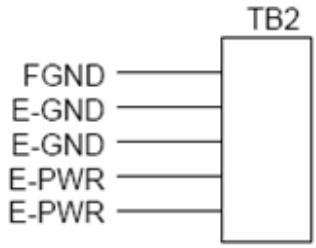


Fig. 1-4 Pin definition for TB2

Table 1-5 TB2 Signal Connection

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

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

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■ 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.

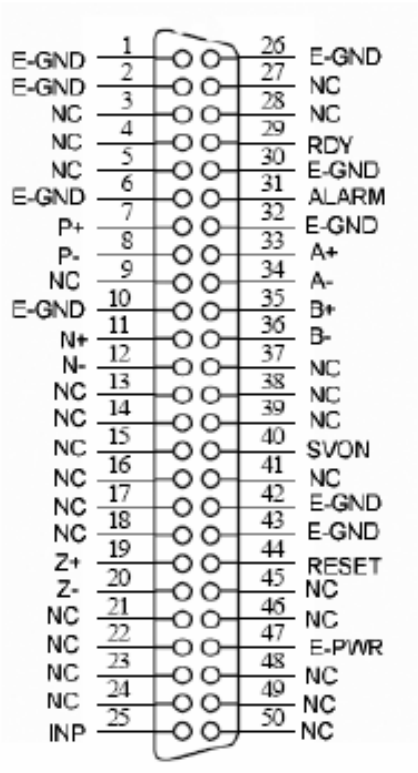


Fig. 3-5 Pin definition for CNX, CNY, CNZ, CNU

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.

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■ 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.

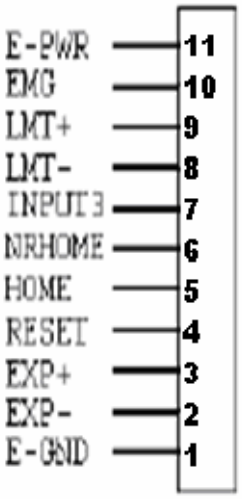


Fig.3-7 Pin definition for CN1 ~ CN4

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

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■ 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.

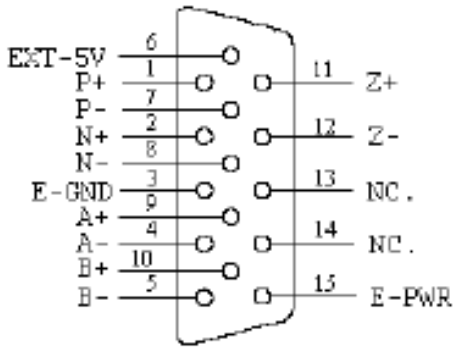


Fig. 3-8 Pin definition for CN5 ~ CN8

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.

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■ 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.

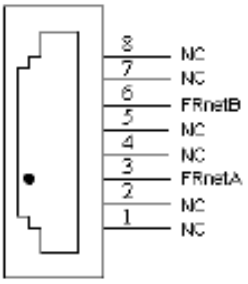


Fig. 3-9 Pin definition for RJ1

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.

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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.

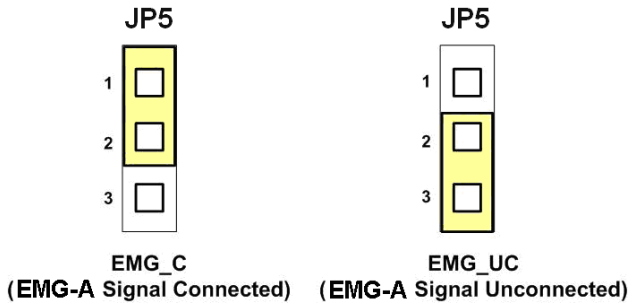


Fig. 3-10 Jumper 5 setting

■ 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.

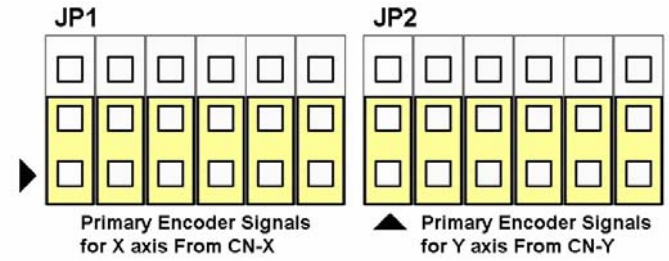


Fig. 3-11 Primary encoder signals setting

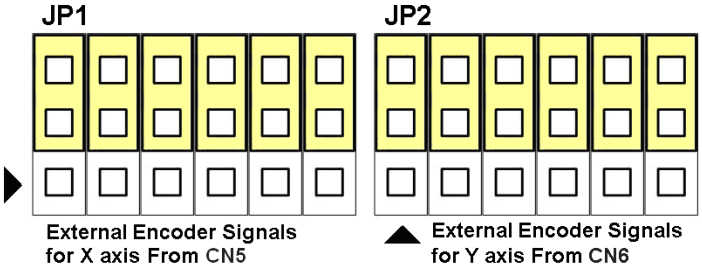


Fig. 3-12 External encoder signals setting

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■ 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.

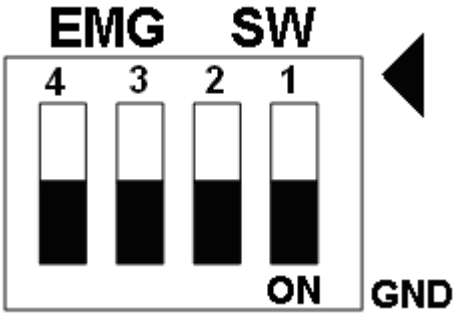


Fig. 3-13 EMG SW setting for normally GND (Default setting)

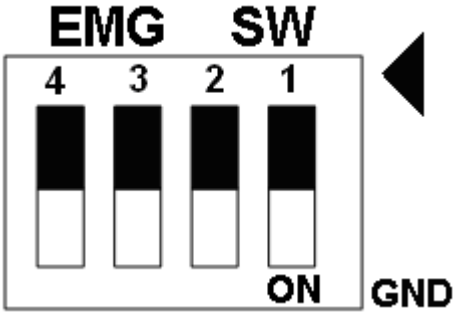


Fig. 3-14 EMG SW setting for user controlled signals.

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B.4 DN-8468D Daughter Board

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

B.4.1 Board Layout for DN-8468D

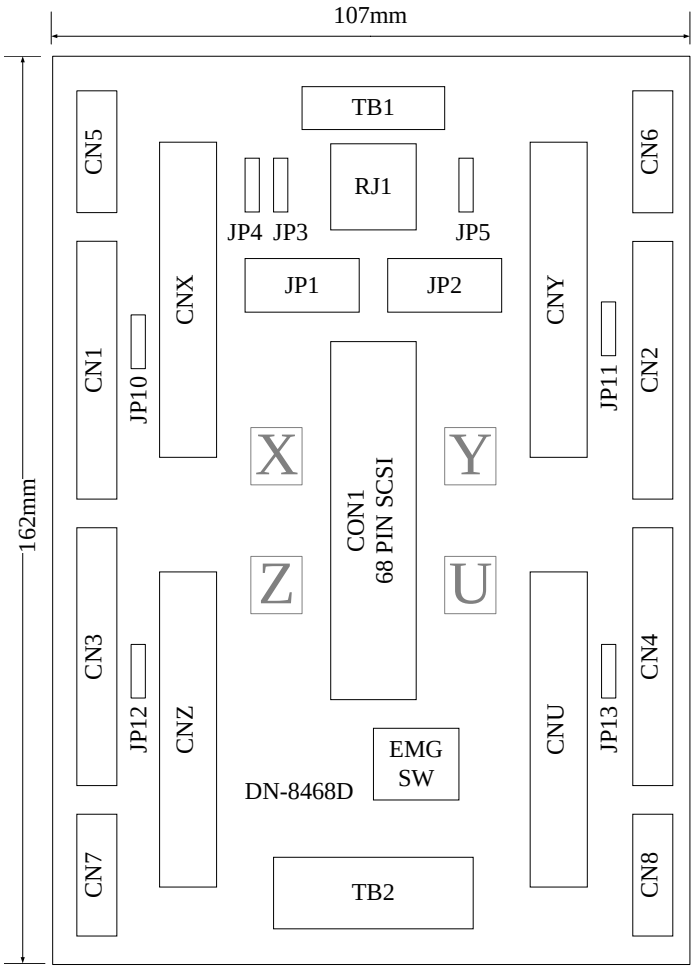


Fig. 3-1 Board layout for the DN-8468D

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B.4.2 Signal Connections for DN-8468D

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

■ Pin Assignment for CON1

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

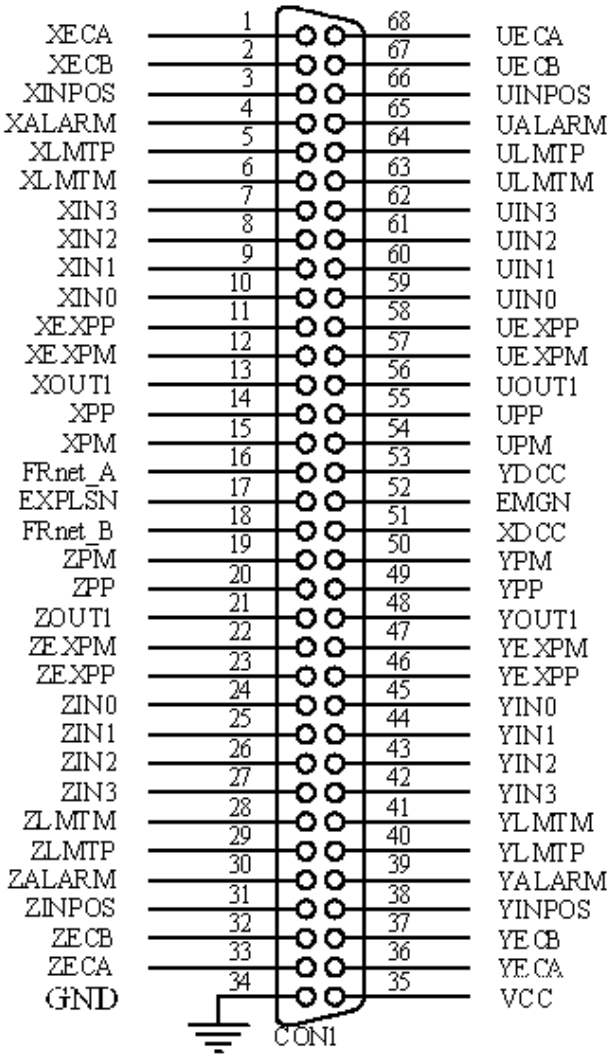


Fig. 3-2 I/O connector pin assignment for the CON1

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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

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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)

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■ TB1

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

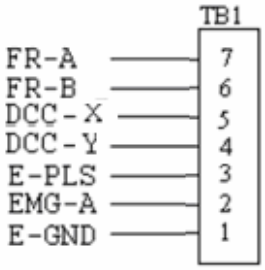


Fig. 1-3 Pin definition for TB1

Table 1-4 TB1 Signal Connection

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

■ TB2

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

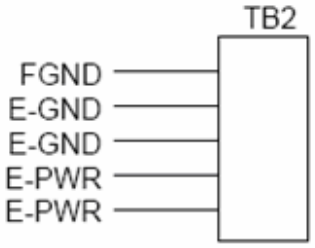


Fig. 1-4 Pin definition for TB2

Table 1-5 TB2 Signal Connection

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

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

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■ 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.

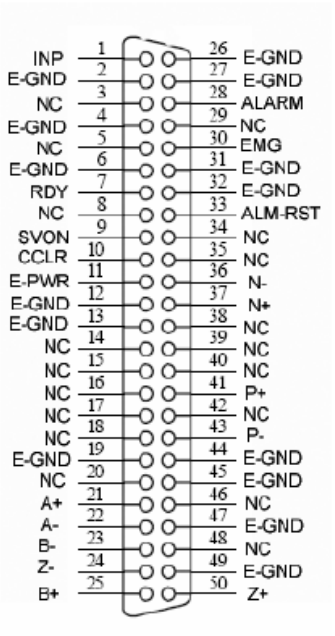


Fig. 3-5 Pin definition for CNX, CNY, CNZ, CNU

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

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

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

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

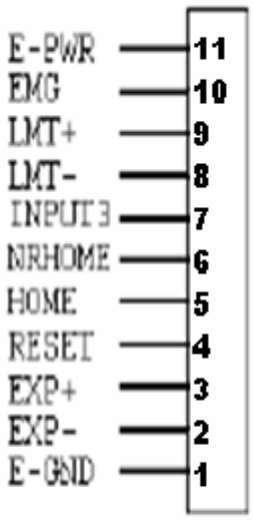


Fig.3-7 Pin definition for CN1 ~ CN4

Table 3-8 CN1~4 Signal Connection

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

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

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

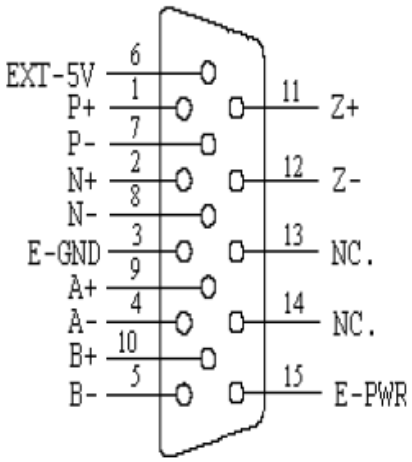


Fig. 3-8 Pin definition for CN5 ~ CN8

Table 3-9 CN5~8

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

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

■ RJ1 (The I/O signals of the FRnet)

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

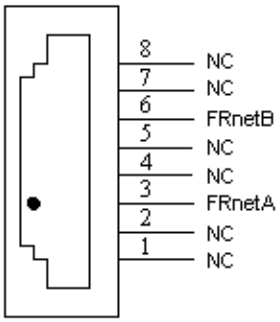


Fig. 3-9 Pin definition for RJ1

Table 3-10 RJ1

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

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

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B.4.3 Jumper and Switch Settings

■ JP5

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

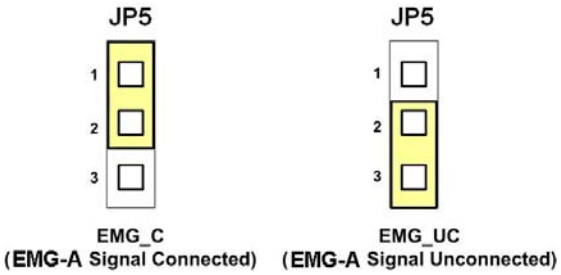


Fig. 3-10 Jumper 5 setting

■ JP1, JP2

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

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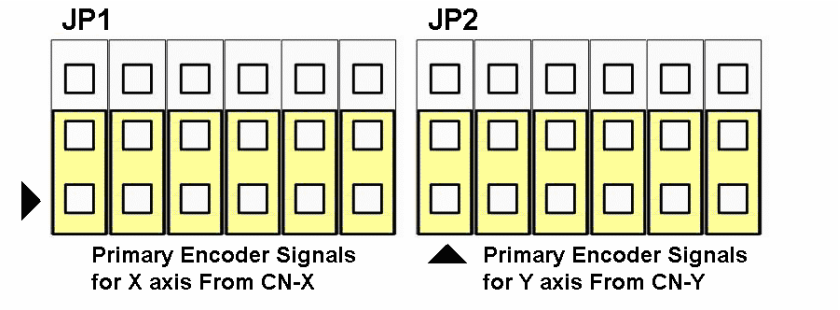


Fig. 3-11 Primary encoder signals setting

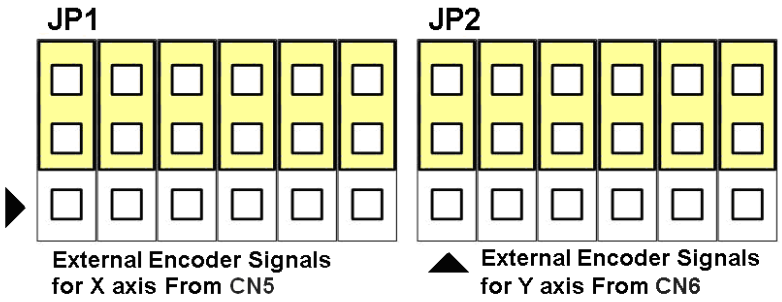


Fig. 3-12 External encoder signals setting

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■ 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.

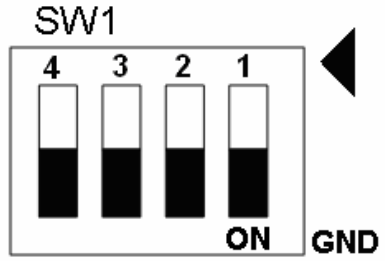


Fig. 3-13 SW1 setting for normally GND (Default setting)



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.

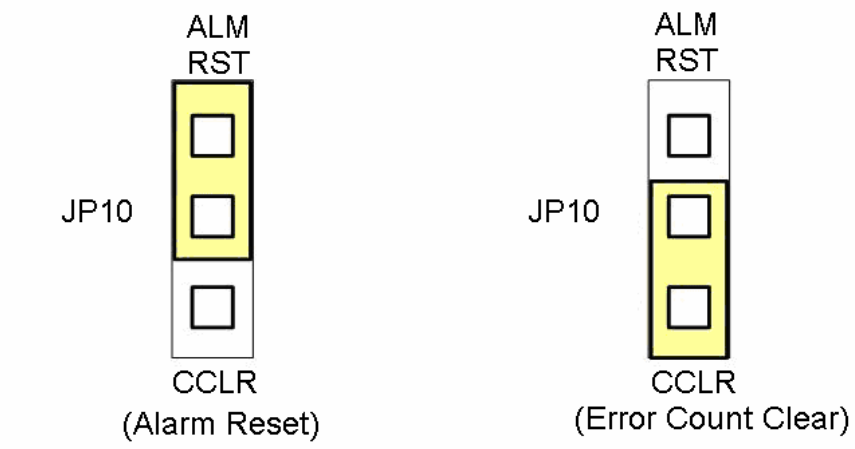


Fig. 3-15 JP 10 ~ 13 setting

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B.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.

B.5.1 Board Layout for DN-8468FB

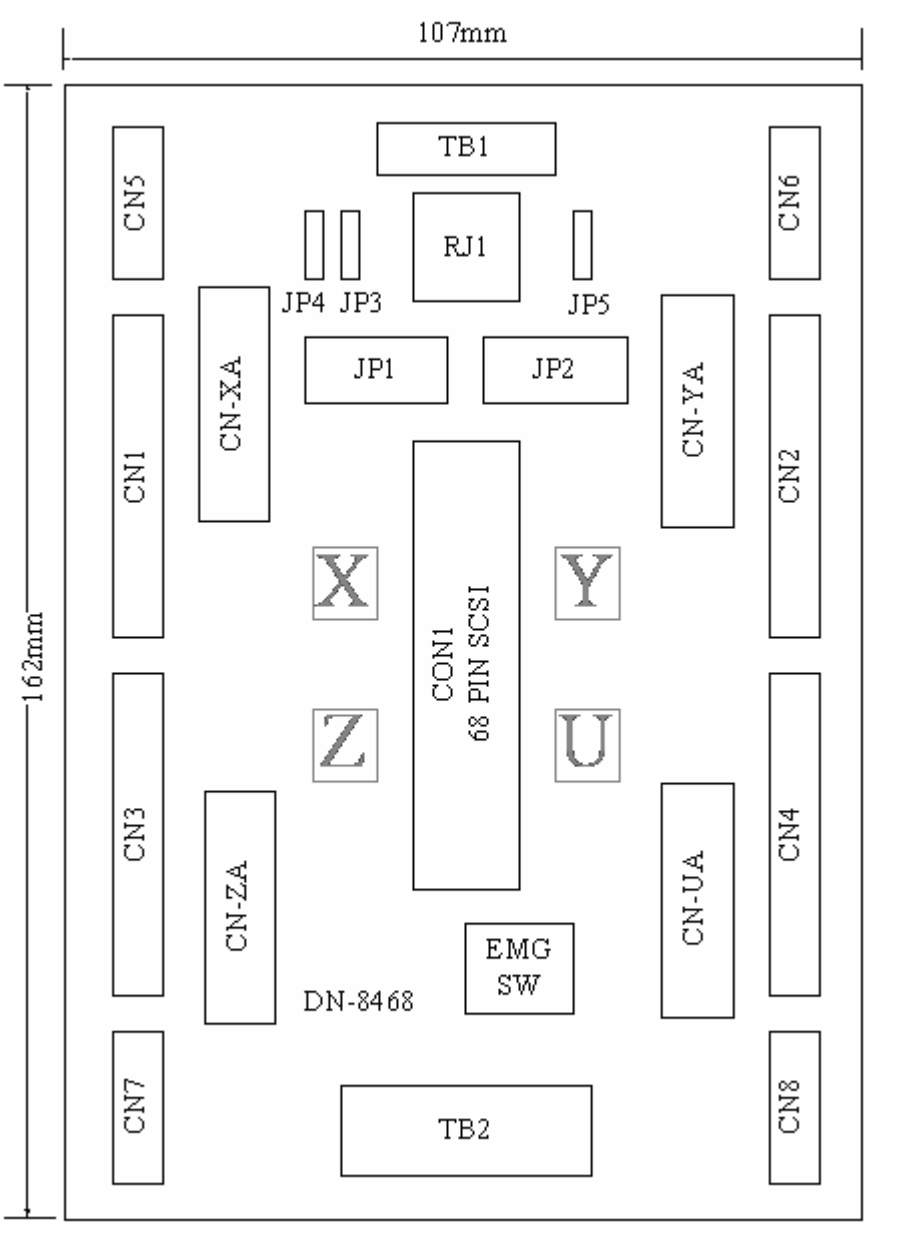


Fig. 3-1 Board layout for the DN-8468FB

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B.5.2 Signal Connections for DN-8468FB

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

■ Pin Assignment for CON1

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

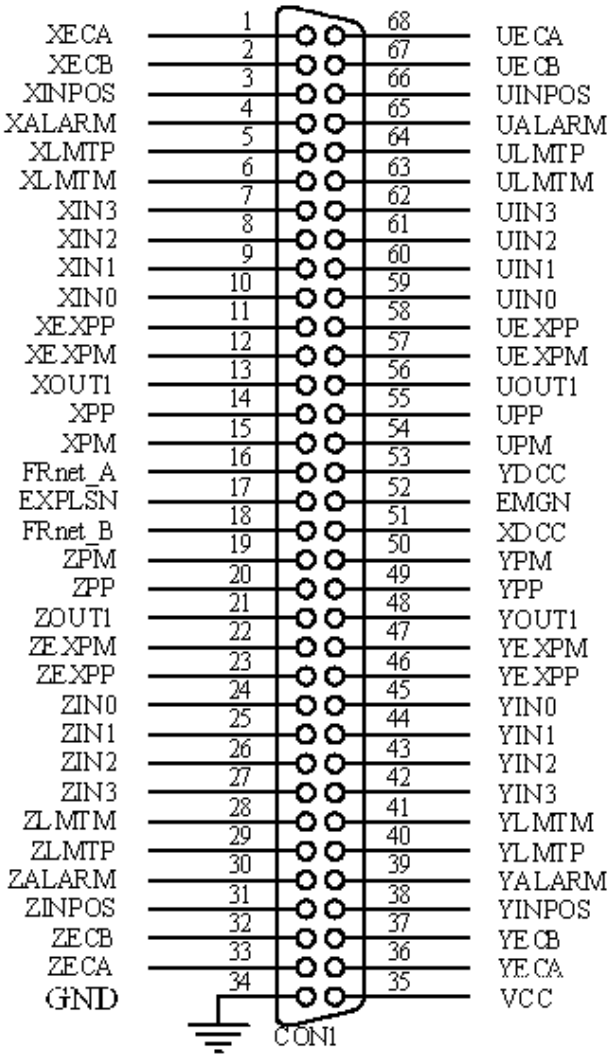


Fig. 3-2 I/O connector pin assignment for the CON1

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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

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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)

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■ 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.

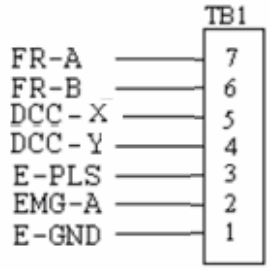


Fig. 1-3 Pin definition for TB1

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.

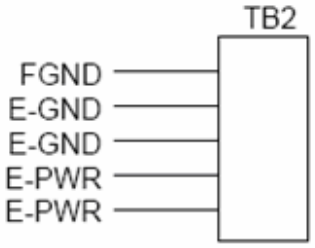


Fig. 1-4 Pin definition for TB2

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.

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■ 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.

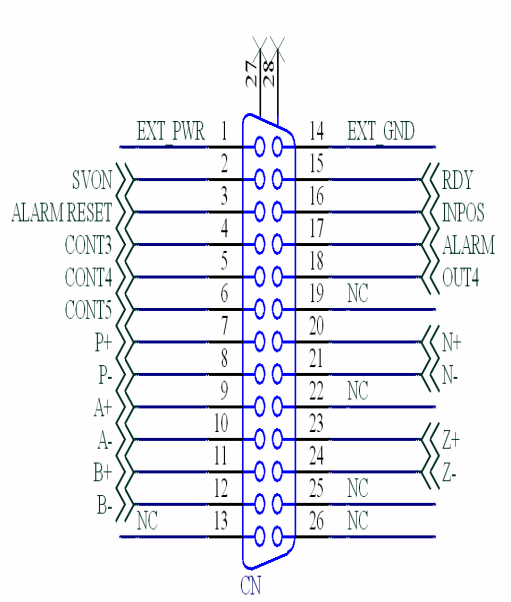


Fig 3-5 Pin definition for CN-X, CN-Y, CN-Z, CN-U

Table 3-6 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.

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■ 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.

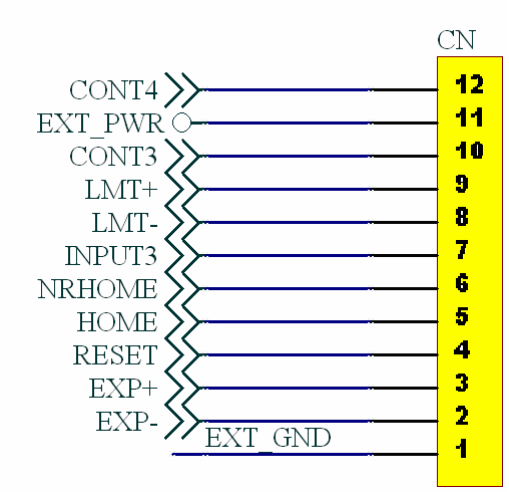


Fig 3-7 Pin definition for CN1~ CN4

Table 3-8 CN1~CN4

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

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■ 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.

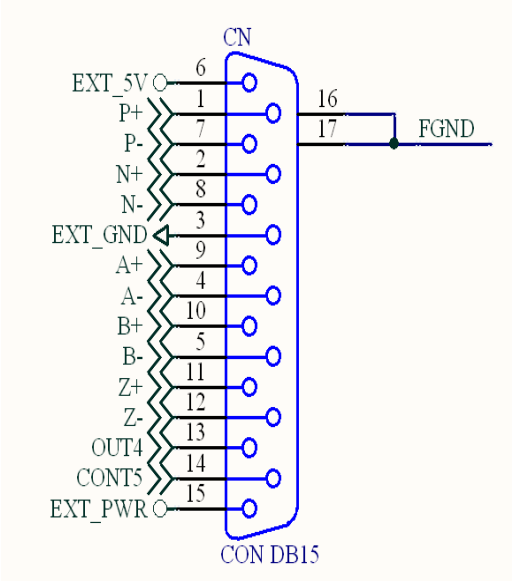


Fig 3-8 Pin definition for CN5~ CN8

Table 3-9 CN5~CN8

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

- **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.

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■ RJ1 (The I/O signals of the FRnet)

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

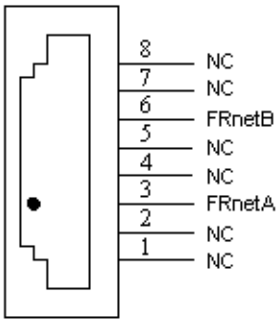


Fig. 3-9 Pin definition for RJ1

Table 3-10 RJ1

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

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

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B.5.3 Jumper and Switch Settings

■ JP5

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

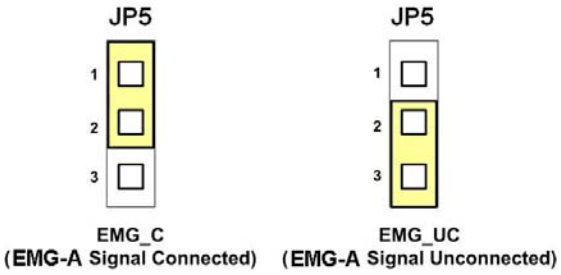


Fig. 3-10 Jumper 5 setting

■ JP1, JP2

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

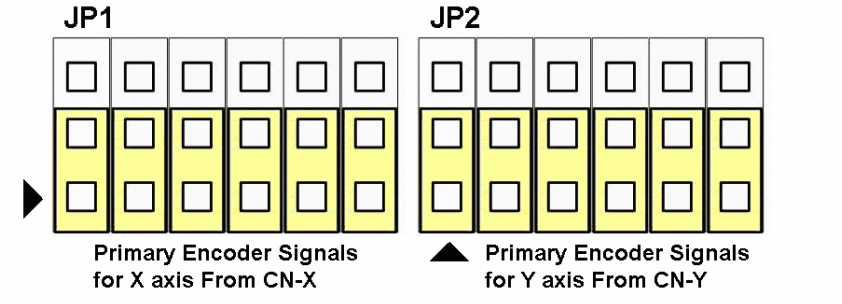


Fig. 3-11 Primary encoder signals setting

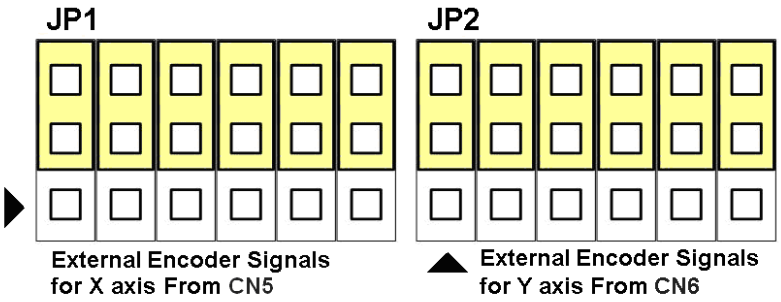


Fig. 3-12 External encoder signals setting

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■ 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.

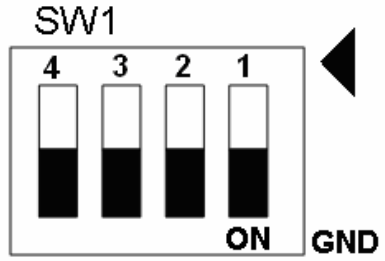


Fig. 3-13 SW1 setting for normally GND (Default setting)

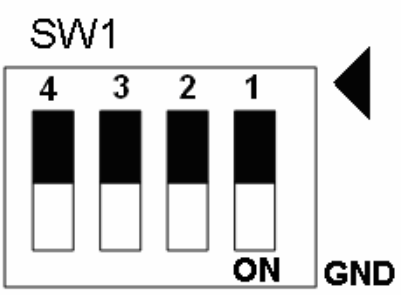


Fig. 3-14 SW1 setting for user controlled signals.

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