I-8094 and I-8094F Getting Started Manual

(Version 2.4)

Hardware & Software & Application
Using I-8094/I-8094F PAC Motion Control Module



ICP DAS CO., LTD.

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Contents of I8094/I8094F

1 INTRODUCTION..... 7

1.1 Introduction 7
1.2 Hardware Specification 8
1.2.1 Main Specification..... 8
1.2.2 Interpolation Function 8
1.2.3 Pulse Output..... 9
1.2.4 Encoder Input 9
1.2.5 Position counter..... 10
1.2.6 Auto-Homing..... 10
1.2.7 Servo Motor Input Signal 10
1.2.8 Limit Switch Input Signal..... 10
1.2.9 Other Input Signals..... 11
1.2.10 Emergency Stop Signal Input 11
1.2.11 General Output Signal 11
1.2.12 Integral Input Signal Filters..... 11
1.2.13 Software Limit..... 11
1.2.14 Manual Pulse Generator..... 11
1.2.15 LED for Module status 12
1.2.16 FRnet (i8094F only)..... 12
1.3 Environment 12
1.4 Ordering Information 13

2 HARDWARE INSTALLATION..... 14

2.1 Checking Package and Installation 14
2.1.1 Checking package 14
2.1.2 Installation 14
2.2 DN-8468G Terminal Board.....17
2.2.1 Board Layout for DN-8468G 17
2.2.2 Signal Connections for DN-8468G..... 18
2.2.3 Jumper and Switch Settings 24
2.3 Input/Output Connections.....26
2.3.1 Pulse output signals..... 26
2.3.2 Connection for Limit switch Signal..... 27
2.3.3 General Purpose Input Signals(nINPOS,nALARM) 28

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2.3.4 Encoder Signals 28
2.3.5 Emergency Stop Signal 29
2.3.6 Manual Pulse Generator Input Signal (EXP+,EXP-) 29
2.3.7 General Purpose Output signals(Servo On/Off) 30
2.4 Connection Example for Motor Driver 31

3 SOFTWARE DEVELOPMENT OVERVIEW 32

3.1 Software development Overview 32
3.1.1 Register Module 33
3.2 Safety IO Setting 33
3.2.1 Emergency Stop Signal Input 33
3.2.2 Configure the Servo ALARM Signals 33
3.2.3 Configure the Limit Switch Signals(±EL) 34
3.2.4 Configure the Software Limite(±SEL) 34
3.3 Error Checking 34
3.4 Basic Configuration of Motion 35
3.5 Manual Pulse Generator Testing 35
3.6 Home Search 37
3.6.1 Home Search Configuration 37
3.6.2 Running the Home Search 38
3.7 Basic Motion 39
3.7.1 Speed Profie of the Motion Control 39
3.7.2 Basic Setting of Single Axis 40
3.7.3 Basic Motion of Single Axis 41
3.7.4 Basic Setting of Muti-Axes Interpolation 41
3.7.5 Basic Motion of Muti-Axes Interpolation 42
3.8 Advance Motion 43
3.9 Synchronization Action 43

4 GETTING STARTED OF SOFTWARE 44

4.1 WinCon eVC++ Guideline 44
4.1.1 Confirm the Relative Files 44
4.1.2 Create a new eVC++ Application Project 44
4.1.3 Add the I8094.h into eVC++ Application Project 46
4.1.4 Add the Reference Path into eVC++ Application Project 47
4.1.5 Start the eVC++ Sample 48
4.1.6 Build the Project 51

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4.1.7 Download and Run 52

4.2 Microsoft Visual Studio .NET 2003(VB.NET，C#) Guideline 53

4.2.1 Confirm the Relative Files..... 53
4.2.2 Create a new VB.NET/C# Application Project 53
4.2.3 Add the DLL into Application Project..... 55
4.2.4 Start the VB.NET/C# Sample..... 57
4.2.5 Build the Project 59
4.2.6 Download and Run 59

4.3 I-8000 Turbo C Guideine 60

4.3.1 Confirm the Relative Files..... 60
4.3.2 Create a new TC ++ Application Project 60
4.3.3 Start the TC Sample 62
4.3.4 Build the Project 68
4.3.6 Download and Run 68

APPENDIX-A SETUP TOOLS & OTHERS..... 70

A.1 Setup the Development Environment of I8094.....70

A.1.1 eVC ++ 4.0 70
A.1.2 Visual Studio .NET 2003(VB.NET，C#) 70
A.1.3 Turbo C 70

A.2 I8094 Surface 71
A.3 Dimensions 72
A.4 The Version Upgrades Note 73

APPENDIX-B OTHERS TERMINAL BOARDS..... 74

B.1 DN-8468M Daughter Board.....74

B.1.1 Board Layout for DN-8468M 74
B.1.2 Signal Connections for DN-8468M 75
B.1.3 Jumper and Switch Settings..... 81

B.2 DN-8468P Daughter Board 83

B.2.1 Board Layout for DN-8468P 83
B.2.2 Signal Connections for DN-8468P..... 84
B.2.3 Jumper and Switch Settings..... 89

B.3 DN-8486Y Daughter Board.....91

B.3.1 Board Layout for DN-8468Y 91
B.3.2 Signal Connections for DN-8468Y..... 92

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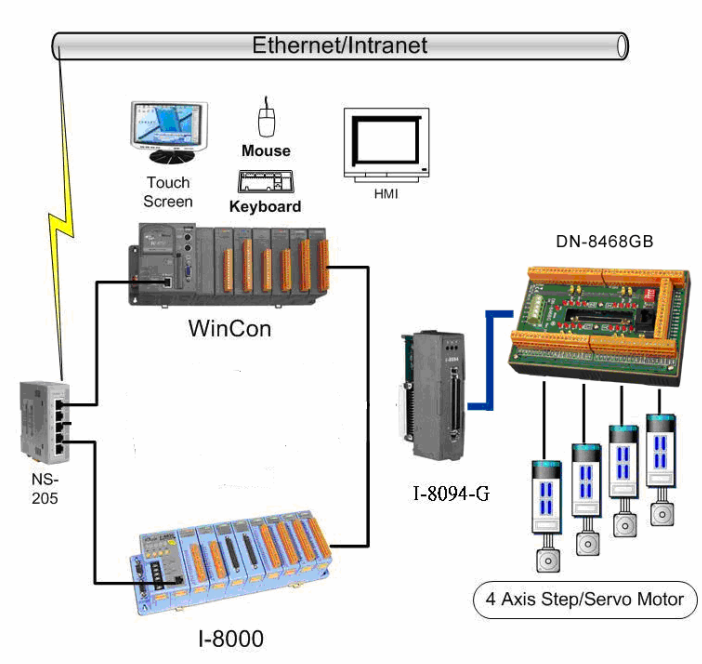
B.3.3 Jumper and Switch Settings 97
B.4 DN-8468D Daughter Board 99
B.4.1 Board Layout for DN-8468D 99
B.4.2 Signal Connections for DN-8468D 100
B.4.3 Jumper and Switch Settings 108
B.5 DN-8468FB Daughter Board 111
B.5.1 Board Layout for DN-8468FB 111
B.5.2 Signal Connections for DN-8468FB 112
B.5.3 Jumper and Switch Settings 120

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1 INTRODUCTION

1.1 Introduction

The I-8094 and I-8094F are the 4-axes pulse-type stepping/servo motor motion control module that can be used on any of the ICPDAS I-8000 and WinCon series controllers, and is suitable for general-purpose motion application. These modules contain a high-performance motion ASIC. Apart from a wide speed range, these intelligent motion controllers have a variety of motion control functions built in, such as 2~3-axes linear interpolation, 2-axes circular interpolation, T/S-curve acceleration/deceleration, various synchronous actions, automatic homing, and others. Besides, it is a module that has full functions of I-8094F plus one port of FRnet. The FRnet port allows this module to expand its fast remote I/O easily. This two-wired FRnet can automatically scan its 128 DI and 128 DO with a period of 0.72/2.88ms. In addition, most of the I-8094 and I-8094F motion control functions are performed with little load on the processor. While driving the motors, the motion status, and the other I/O status on the I-8000 or WinCon controllers, can still be monitored. As a result of the low CPU loading requirements of I-8094 and I-8094F, one or more motion modules may be used on a single I-8000 or WinCon controllers. ICPDAS also has provided a wide range of functions and examples to reduce the need for programming by user, making it a highly cost-effective solution for machine makers.



I8094 with PAC controller (WinCon-8000 and I-8000)

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1.2 Hardware Specification

1.2.1 Main Specification

- ASIC Chip — MCX314As
- Number of controllable — 4-Axes, Pulse output (stepping & servo motor)
- Up to 4M PPS pulse output

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

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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(Depend on the max.speed)
- 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

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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)

Even though there are only 4 steps of the home searching, but user can vary the operations into over 10 homing modes by software function since its configurable action and direction of each step.

1.2.7 Servo Motor Input Signal

- Alarm
- Choose IN2: In Position or Servo Ready signal
- Choose input signal: 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)

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1.2.9 Other Input Signals

- IN3 : other purpose, as a trigger of synchronal control……

1.2.10 Emergency Stop Signal Input

- There is a 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)

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)
- Disable Mode: Disable manual pulse function

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1.2.15 LED for Module status

- Red LED → Power light
- Orange LED → Servo Alarm

  Ex:Misuibishi driver, No Alm: turn Orange LED on
- Green LED → during Running Motion

1.2.16 FRnet (i8094F only)

- Connect to the distributed DI/DO module DI → max up to 128
  DO → max up to 128
- Read the status of distributed DI
- Control the status of distributed DO
- Support interrupt and frequence division function
- Reset function

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)

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1.4 Ordering Information

- I-8000、W-8000 PAC controllers
- i8094 4-axes motion control module
- DN-8468GB For general purpose usage
- DN-8468MB For Mitsubishi Servo motor
- DN-8468PB For Panasonic servo motor
- DN-8468DB For Detal servo motor
- CA-SCSI15 68-pin SCSI-II cable，length:1.5 m

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2 HARDWARE INSTALLATION

2.1 Checking Package and Installation

2.1.1 Checking package

The i8094 and i8094F are a 4-axes stepping/servo motor control module that can be used on any of the ICPDAS I-8000 and WinCon series controllers. The base system package is as below list:

- I-8000、W-8000 Embedded PAC control system series(Two systems choose one)

i8094/i8094F-G/S includes the following item

- i8094/i8094F 4-axes motion module
- DN-8468 Terminal board for i8094 and i8094F
- CA-SCSI15 68-pin SCSI-II cable，length:1.5 m

2.1.2 Installation

Prepare controller

1. Choose a PAC controller of ICPDAS (I-8000 or W-8000series) and have empty slot.
2. Turn power off

Module Plug in controller and wiring

1. Plug in the i8094/i8094F into a empty slot of I-8000/W-8000.
2. Connect the i8094/i8094F with DN-8468G by a CA-SCSI15 cable, as the below figure:

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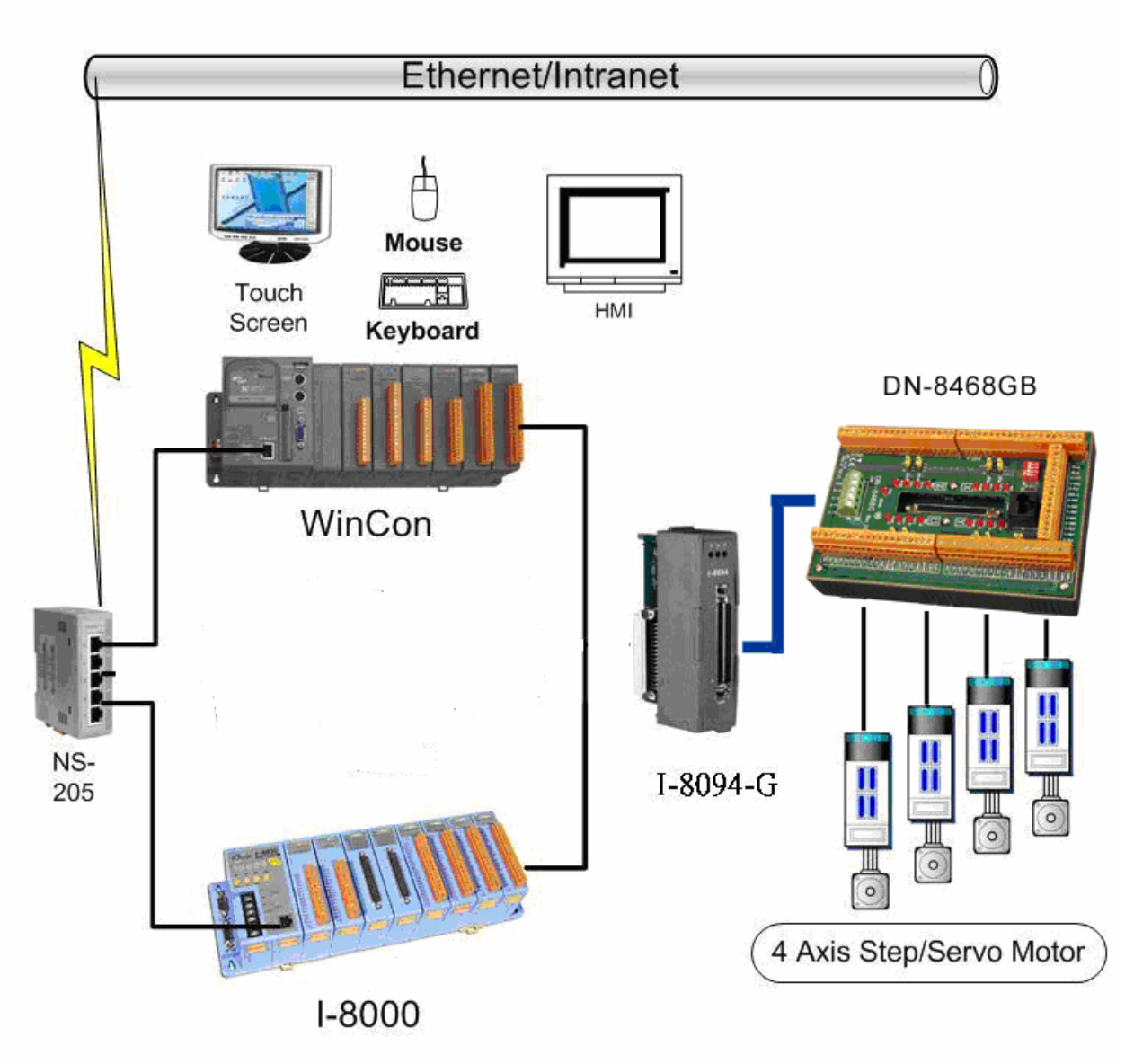


Figure. i8094 with PAC controller (WinCon-8000 and I-8000)

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2.2 DN-8468G Terminal Board

The DN-8468 is the terminal board for general purpose amplifier usage. It has 4-axis I/O signals.

2.2.1 Board Layout for DN-8468G

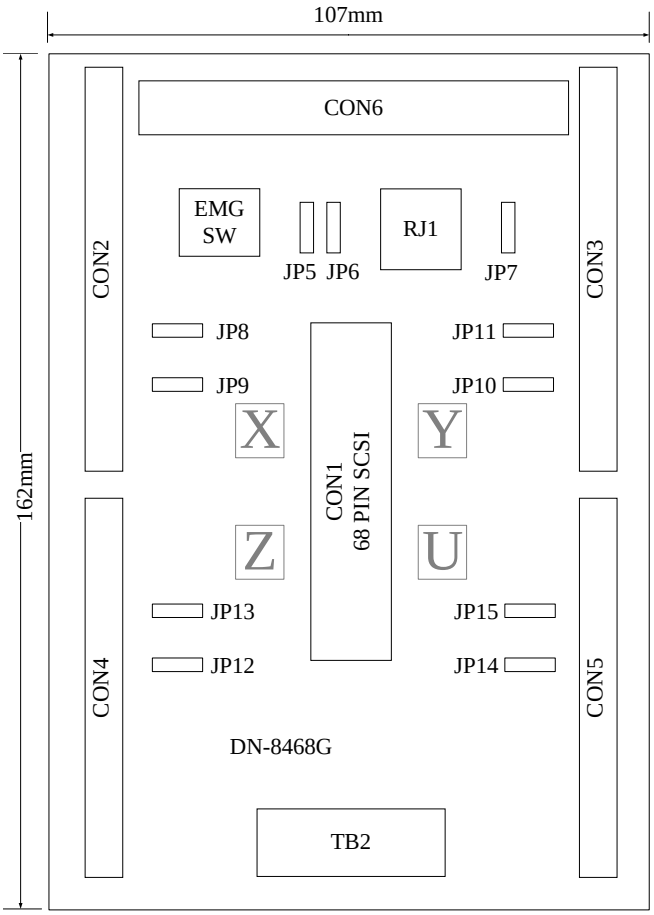


Fig. 2.0 Board layout for the DN-8468G

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2.2.2 Signal Connections for DN-8468G

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-8468G is a 68-pin SCSI II connector that enables you to connect to the I8094/I8094F motion modue. Fig. 2.1 shows the pin assignment for the 68-pin I/O connector on the DN-8468G (or on the PISO-PS400), and refer to Table 2.1, 2.2 for description of each motion I/O signal.

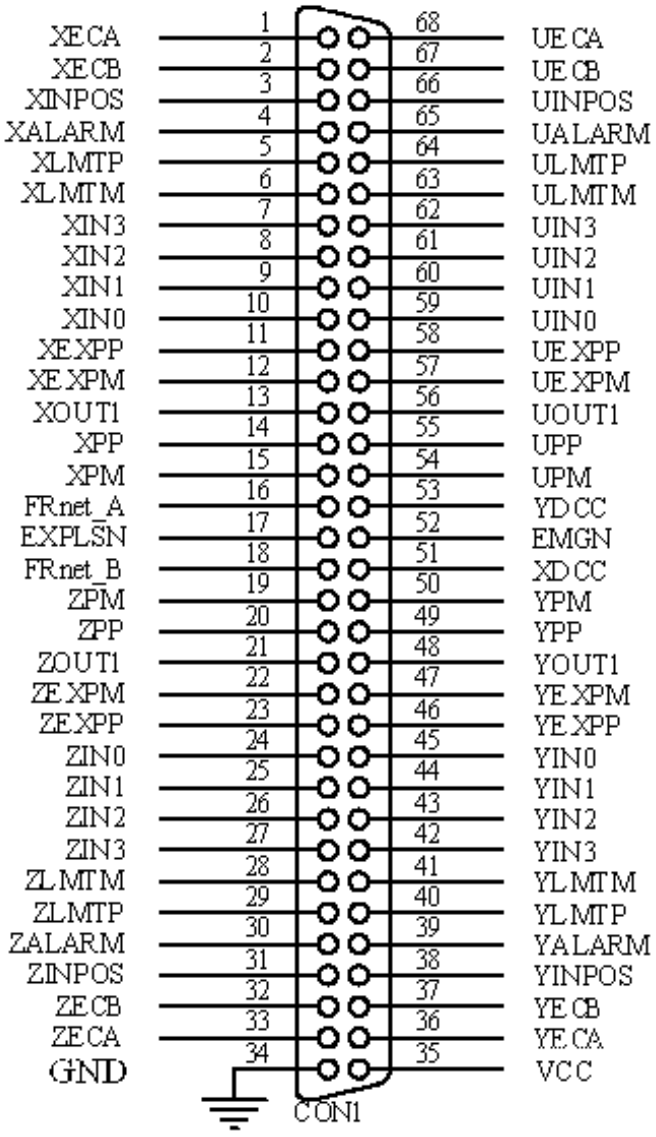


Fig. 2.1 I/O connector pin assignment for the CON1

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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 (I/O connector for each AXIS)

The connectors CON2 ~ CON5 are 20-pin connectors that enable you to connect to the I/O signals for general purpose motor drivers. Fig. 2.2 shows the pin assignment for the 20-pin connector on the DN-8468G, and the Table 2.3 shows its I/O connector signal description.

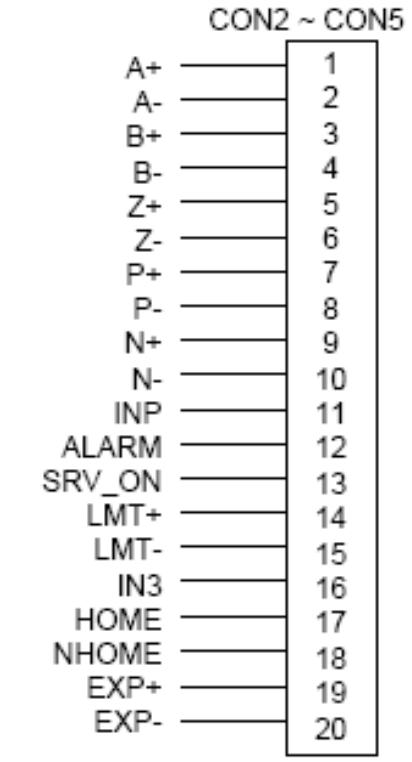


Fig. 2.2 Pin definition for CON2 ~ CON5

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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■ CON6

The connector CON6 is 16-pin connector that enables you to connect to the signals of your motor drivers. The FRnet connectors, FR-A and FR-B, can be used to serially connect a I/O module of FRnet series, as FR-2053,FR-2057…. The more information, please refer to web-site of ICPDAS :

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

Fig.2.3 shows the pin assignment for the 16-pin connector on the DN-8468G, and the Table 2.4 shows its I/O connector signal description.

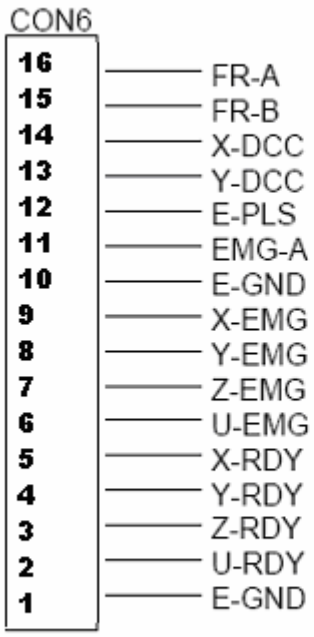


Fig. **2-3** Pin definition for CON6

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

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■ TB2

The connector TB2 is 5-pin connector that enables you to connect to the signals of your motor drivers. Fig.2.4 shows the pin assignment for the 5-pin connector on the DN-8468G, and the Table 2.5 shows its I/O connector signal description.

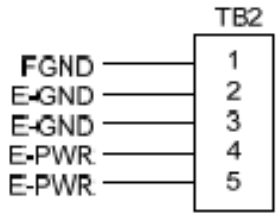


Fig. 2.4 Pin definition for TB2

Table 2.5 TB2 Signal Connection

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

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

■ RJ1 (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. The FRnet connectors, FR-A and FR-B, can be used to serially connect a I/O module of FRnet series, as FR-2053,FR-2057…. The more information, please refer to web-site of ICPDAS:

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

Fig.2.5shows the pin assignment for the 8-pin connector on the DN-8468G, and the Table 2.6 shows its I/O connector signal description.

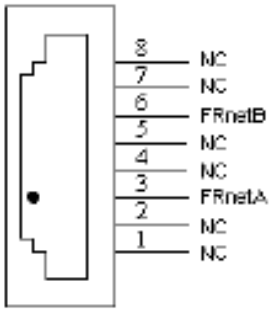


Fig. 2.5 Pin definition for RJ1

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

■ JP7

Jumper 7 controls the EMG-A signal of the CON6 connector. The following diagram is shown the selection condition of the jumper 7.

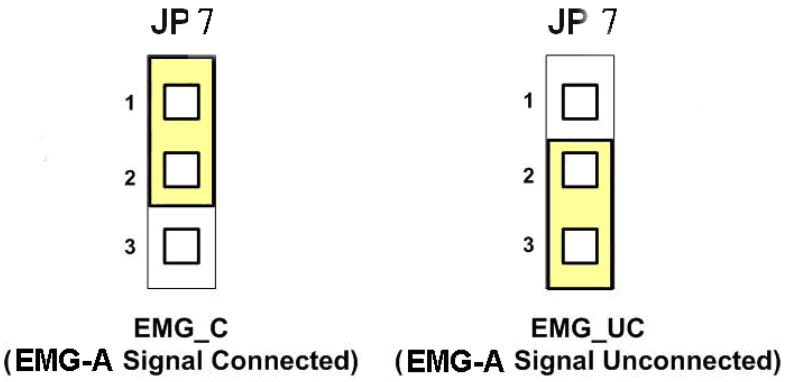


Fig. 2.6 Jumper 7 setting

■ JP8/9, JP10/11, JP12/13, JP14/15

The Jumper8~15 are used to set the signal type of the pulse output signals. The output signal type could be differential line driver output or open collector output. The JP8 ~JP9 are set XPP、XPM for X-axis(CON1), JP10 ~JP11 are for Y-axis, JP12 ~JP13 are for Z-axis and JP14 ~JP15 are for U-axis. The 2-3 Pin short is the differential line driver mode. The 1-2 Pin short is the Open Collector mode, as below example

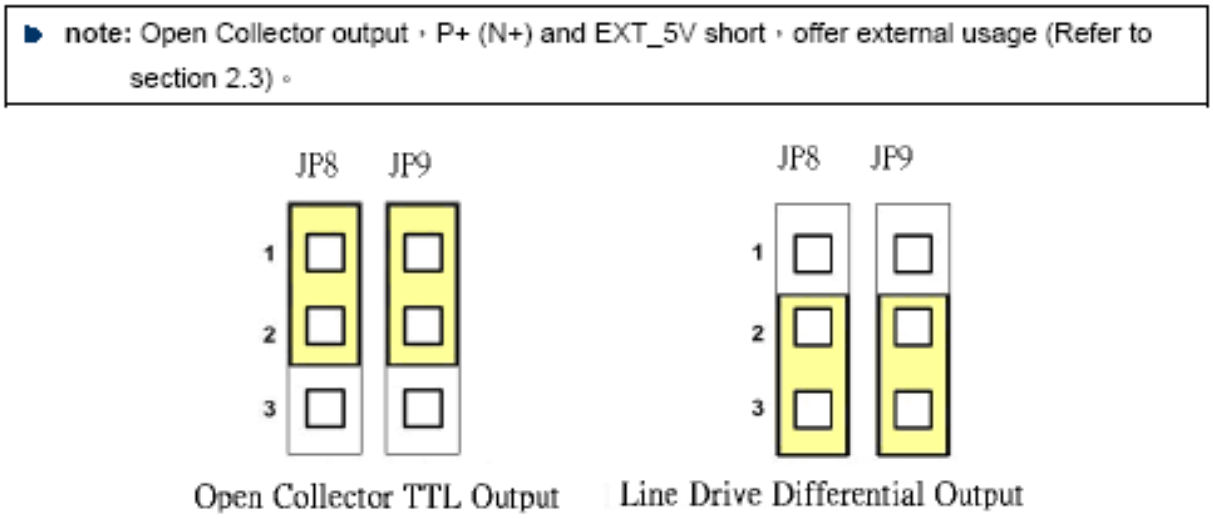


Fig. 2.10 Jumper 8, 9 setting

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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. 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.

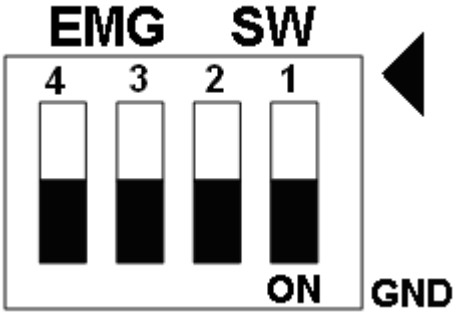


Fig. 2.7 EMG SW setting for normally GND (Default setting)

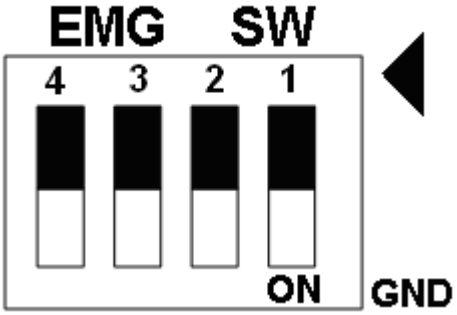


Fig. 2.8 EMG SW setting for user controlled signals.

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2.3 Input/Output Connections

The signal connections of all the I/O signals are described in this chapter. Please refer the contents of this chapter befor wiring the cable between the i8094/i8094F and the motor drivers.

2.3.1 Pulse output signals

There are 4-axes pulse output signals on I8094/I8094F, For every axis, two pairs of CW and CCW signals are used to send the pulse train. The CW and CCW signals can also be programmed as PULSE and DIR signals pait. Two types of the pulse output signal, Differential-Type and Open-Collector Type, can be selected from JP8/9, JP10/11, JP12/13, and JP14/15 and are described in section 2.2.3. The following wiring diagram is for the CW and CCW signals of the 4-axes.

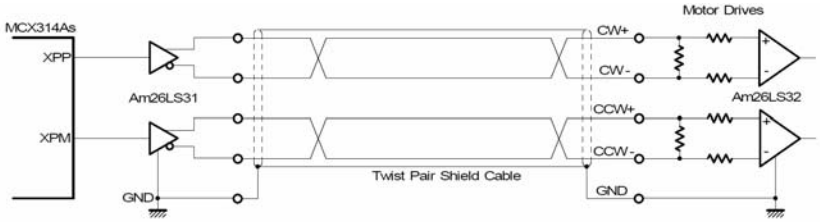


Fig. 2.8 Differential-Type pulse output circuit

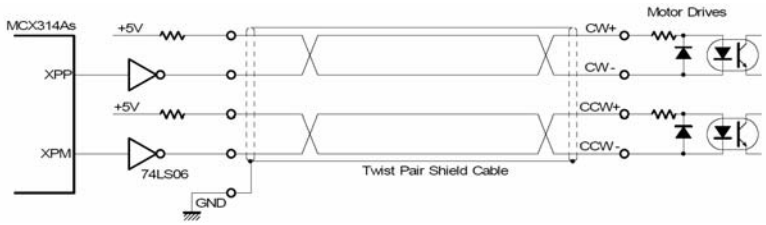


Fig. 2.9 The wiring is open collector output

■ Example: wiring of pulse signal

Two types of pulse output signal, Differential-Type and Open-Collector Type, can be selected from JP8/9, JP10/11, JP12/13, and JP14/15 for each axis. The following wiring diagram is an example to select pulse type of the output signal.

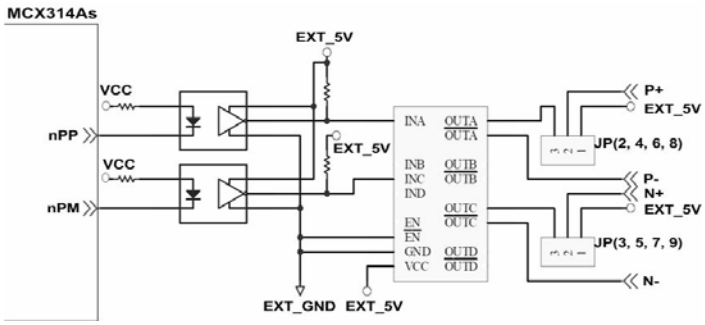
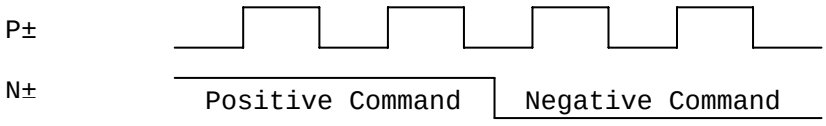


Fig. 2.10 Output pulse example

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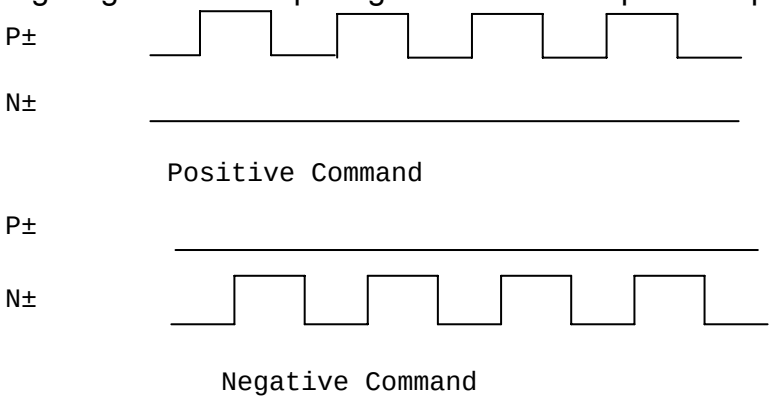
◆ Pulse/Direction Pulse Output Mode:

In Pulse/Direction pulse output mode, the PULSE signal is output only at Pulse pins (P+, P-). The driving direction is decided from the electric potential of Direction pins (N+, N-). The following diagram is example signal of Pulse/Direction pulse output mode.



◆ CW/CCW Pulse Output Mode:

In CW/CCW pulse output mode, the PULSE signal is output at both CW pins (P+, P-) and CCW pins(N+, N-). At the same time, the driving direction is determined directly. The following diagram is example signal of CW/CCW pulse output mode.



2.3.2 Connection for Limit switch Signal

Limit Switch Signal can prevent the over traveling appearance of the motion system. User can set the hardware limit switch signal to be normal open or normal close by the software instruction in I8094/I8094F software manual. The following figure indicates that the photo couplers are used to keep out the sensor noise of the Limit Switch.

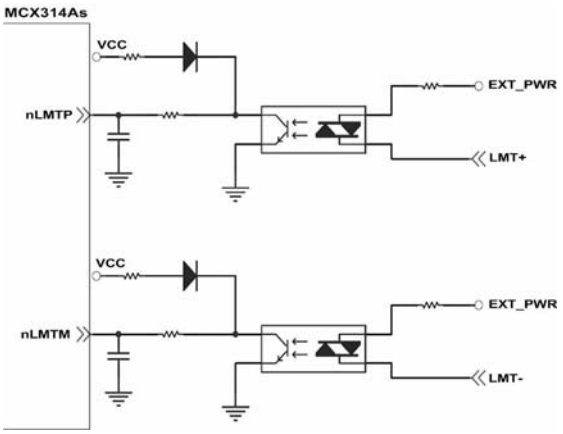


Fig. 2.11 Limit switch signal circuit

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2.3.3 General Purpose Input Signals(nINPOS,nALARM)

INPOS is a digital input signal to indicate the In-Position signal of the driver. User can enable or disable the signal from the software instruction in I8094/I8094F software manual.

ALARM is a digital input signal to indicate the servo alarm signal of the driver. The output pulse will be stop if PISO-PS400 receives the ALARM signal. User can enable or disable the signal from the software instruction in I8094/I8094F software manual.

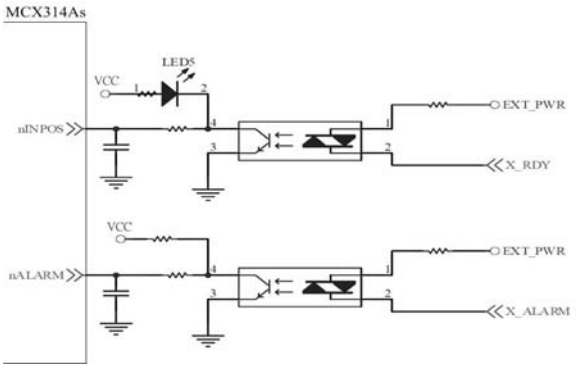


Fig. 2.12 General Digital Input circuit

2.3.4 Encoder Signals

The following diagram is for 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.

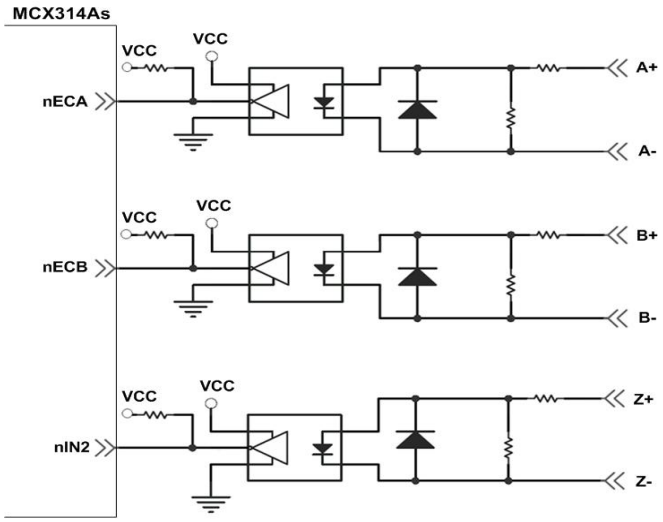


Fig. 2.13 Encoder signal connection

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2.3.5 Emergency Stop Signal

The following diagram is for Emergency STOP signal. If the emergency signal is occurred, the output pulse for all axes will be STOP and the error flag will be set as 1. After the photo coupler isolation, the isolated emergency signal is connected to motion IC.

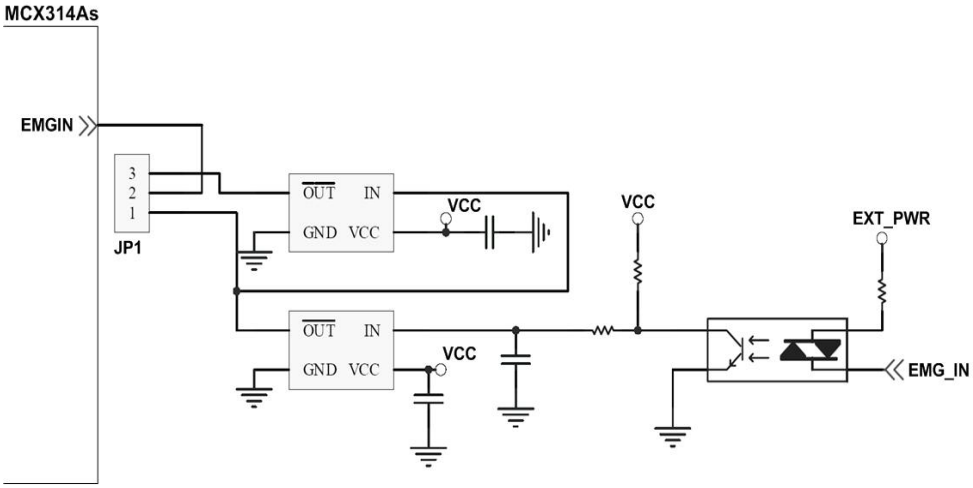


Fig. 2.14 Emergency Stop Signal connection

2.3.6 Manual Pulse Generator Input Signal (EXP+,EXP-)

The signals, EXP+ and EXP-, are used for manual pulsar signals. The following diagram is an example connection for the external inputs. User can set the signals as fixed pulse CW/CCW mode, continuous pulse CW/CCW mode, or A/B phase manual pulsar mode by using the setting in section 3.5.

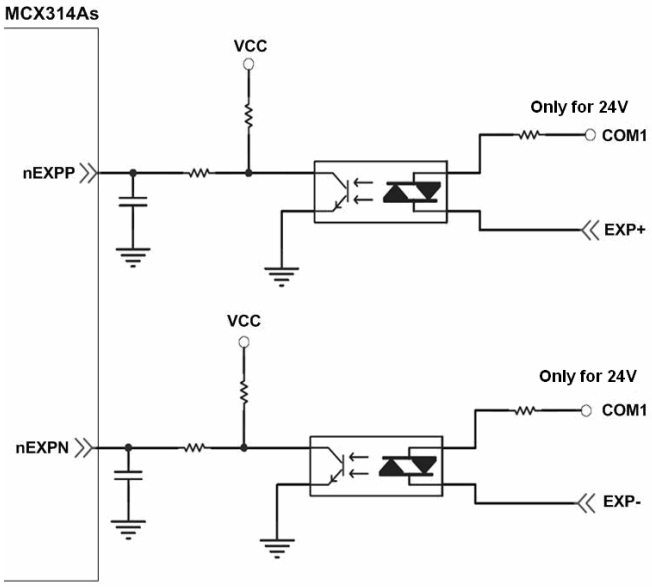


Fig. 2.15 EXP+/- connection diagram

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2.3.7 General Purpose Output signals(Servo On/Off)

The following diagram is a digital output signal for driver Servo On/Off signal. The output signal enable or disable the driver.

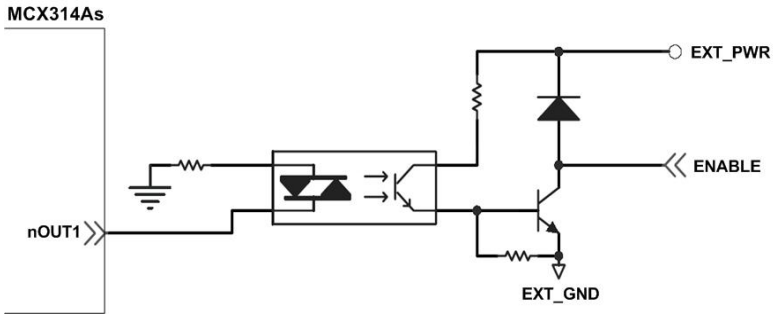


Fig. 2.16 Servo On/Off signal connection diagram

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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.

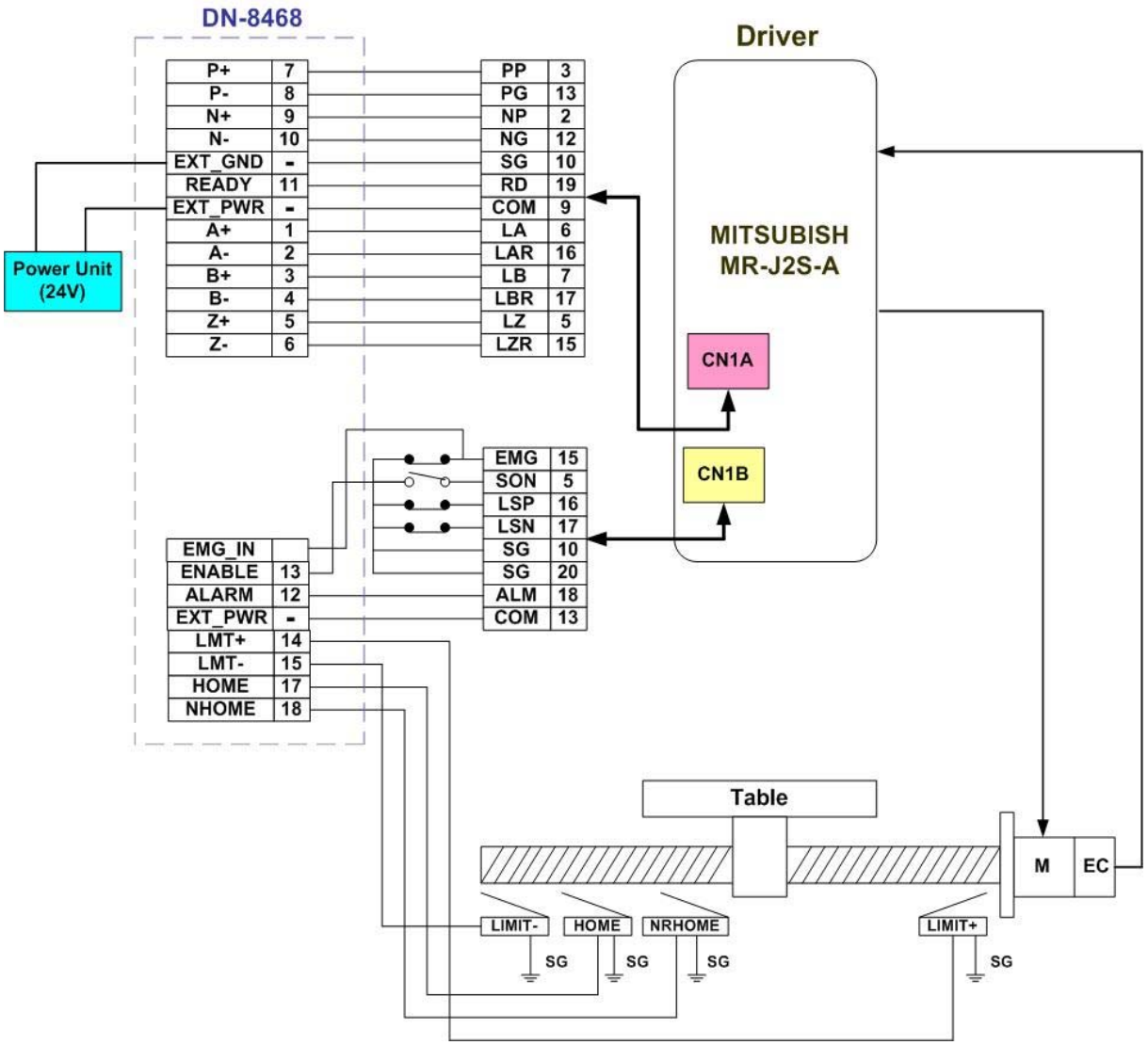


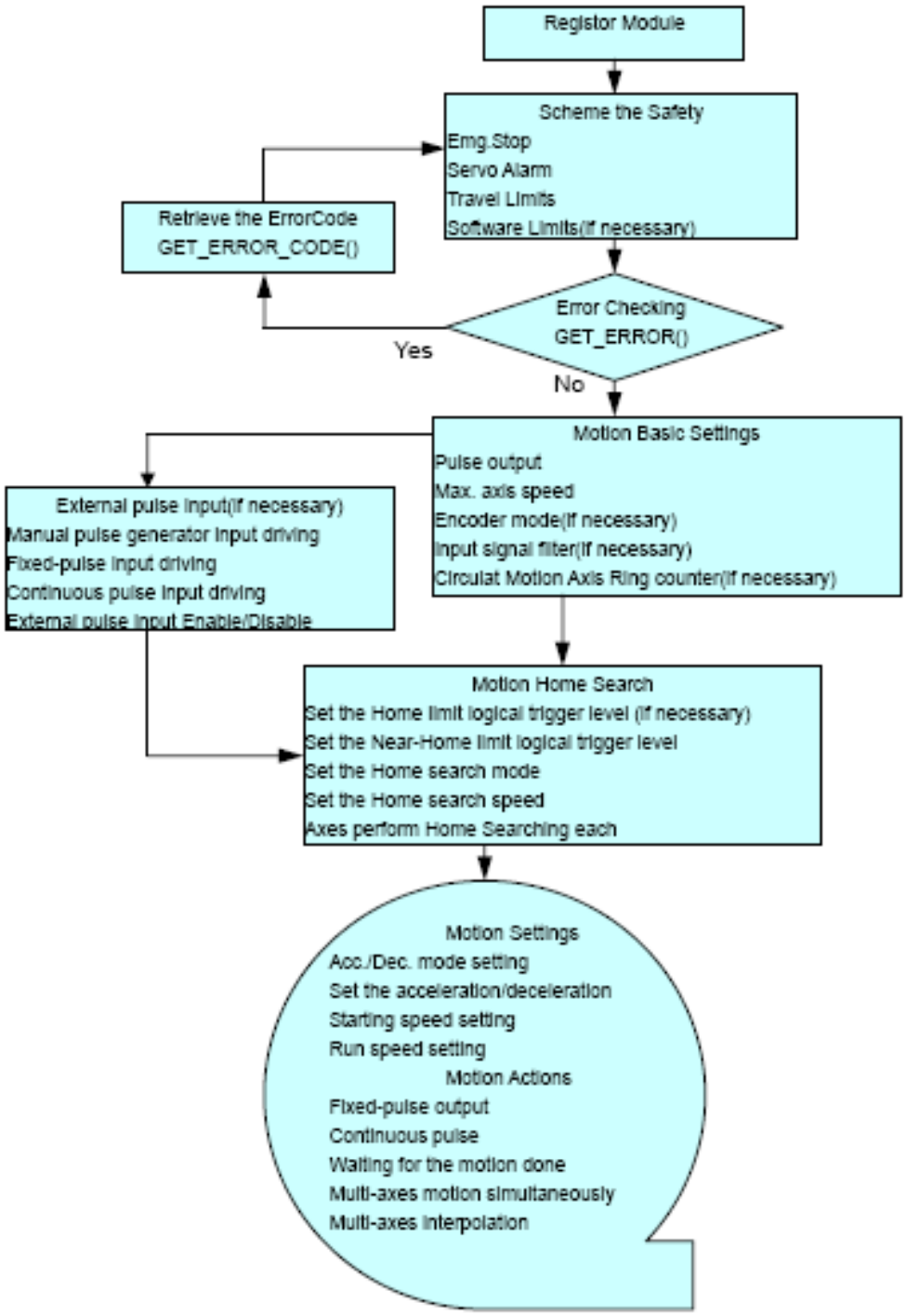
Fig. 2.17 The connection between MR-J2S AC servo driver and DN-8468G extension board.

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3 Software Development Overview

3.1 Software development Overview

Please refer to the demo_start sample



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3.1.1 Register Module

User must register for each I8094/I8094F module before sending command otherwise user will get error. Please refer to *i8094MF_REGISTRATION()* function, the section 2.2 of I8094/I8094F user manual.

3.2 Safety IO Setting

There are many reasons to stop motion during driving. Some reasons are described in this subsection.

3.2.1 Emergency Stop Signal Input

The EMG-A input signal in CON6 is able to perform the emergency stop function immediately for all of the 4 axes during driving. The emergency stop function can prevent the critical damage occurrence from the critical accident. If user don't use this Emergency stop signal, please closing breaks between 2 and 3 of JP7 jumper. Otherwise, please closing breaks between 1 and 2 of JP7 jumper and connecting the EMG-A signal to CON6.

The EMG-X, EMG-Y, EMG-Z, and EMG-U input signals in CON6 are connected directly to the driver for each axis. These signals are able to perform the emergency stop function immediately for each driver during driving. User have to switch the EMG-SW to normal ON and connect external signal source to enable these signals.

3.2.2 Configure the Servo ALARM Signals

When the ALARM signals are occurred from servomotor drivers, users can be notified by these signals and determine what to do. The operating mode (Enable or Disable) and the proper trigger level of these signals can be set by user. Please refer to *i8094MF_SET_ALARM()* function, the section 2.13 of I8094/I8094F user manual.

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3.2.3 Configure the Limit Switch Signals(±EL)

To insure the machine in safety, hardware limit switches are placed at the both ends of machine traveling range. If the machine touch the hardware limit switch sensors, PISO-PS400 will stop immediately. The operating mode (Enable or Disable) and the proper trigger level of these signals can be set by user. Please refer to *i8094MF_SET_HLMT ()* function, the section 2.6 of I8094/I8094F user manual.

3.2.4 Configure the Software Limite(±SEL)

To insure the machine in safety, hardware limit switches are placed at the both ends of machine traveling range. In addition, user can set the software limits to avoid the happening of the over range before the hardware limit takes effect. If the machine reach the software limits condition, PISO-PS400 will stop immediately. The operating mode (Enable or Disable) and the proper trigger condition of these signals can be set by user. Please refer to i8094MF_*SET_SLMT ()* and *i8094MF_CLEAR_SLMT()* function, the section 2.10 of I8094/I8094F user manual.

3.3 Error Checking

Check whether there is any error. If there are something wrongs, please use the *GET_ERROR_CODE()* function to get the error-code, then check the reason and remove it. Please refer to *GET_ERROR_CODE()* function, the section 3.6 of I8094/I8094F manual.

User also can use *i8094MF_GET_DI()* function to check the all of DI status. Please refer to *i8094MF_GET_DI()* function, the section 3.5 of I8094/I8094F user manual.

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3.4 Basic Configuration of Motion

The basic Motion configuration is mainly aimed for general necsseary setting, as below:

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

i8094MF_SET_PULSE_MODE() (Please refer to the section 2.4 of I8094/I8094F user manual)

2 Max. speed limitation setting for each axis

i8094MF_SET_MAX_V ()(Please refer to the section 2.5 of I8094/I8094F user manual)

3 Encoder input setting

i8094MF_SET_ENCODER()(Please refer to the section 2.11 of I8094/I8094F user manual)

4 DI noise filter setting(If necessary)

i8094MF_SET_FILTER()(Please refer to the section 2.15 of I8094/I8094F user manual)

5 Circular motion declaration(Ring counter)(If necessary)

i8094MF_VRING_ENABLE()(Please refer to the section 2.16 of I8094/I8094F user manual)

3.5 Manual Pulse Generator Testing

User can use the manual pulse generator function directly to drive motion forward or backward. For further wiring and parameter tuning, user have to check the correction of the DI signals and the moving direction.

The manual pulse generator can be achieved from three driving methods described below:

1. A/B phase Manual Pulse Generator:

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

i8094MF_EXD_MP()(Please refer to the section 2.18.1 of I8094/I8094F user manual)

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2. Fixed-pulse driving Manual Pulse Generator:

   User have to preset fixed driving pulses. After setting, user can push the forward or backward button to drive fixed pulses for each direction.

   i8094MF_EXD_FP()(Please refer to the section 2.18.2 of I8094/I8094F usere manual)

3. Continuous- pulse driving Manual Pulse Generator:

   User can preset output-pulse frequency. After setting, user can push the forward or backward button to drive fixed velocity for each direction. If user release the button, the motion will be stop immediately.

   i8094MF_EXD_CP ()(Please refer to section 2.18.3 of I8094/I8094F user manual).

4 Disable external pulse input:

   Disable external pulse input by this command after operating anyone of three functions above.

   i8094MF_EXD_DISABLE() (Please refer to section 2.18.4 of I8094/I8094F user manual)

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3.6 Home Search

I8094 provides the home function of automatic search. Operate that automatically after setting properly. The main steps is as bellow:

- 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.

User can select which steps are ignored when setting for the actual operation. It performs automatically that economize the CPU resource and program code reducing. Although there are four home search steps,but user can create more than 10 types of different home search mode by vary with the software functions. It is attributed to the configurable home search direction and perform it or not of each step.

3.6.1 Home Search Configuration

1. Logic level setting for Near home sensor and Home sensor (If necessary)

   i8094MF_SET_NHOME() (Please refer to section 2.8 of I8094/I8094F user manual)

2 Home sensor logic level setting

   i8094MF_SET_HOME_EDGE() (Please refer to section 2.9 of I8094/I8094F user manual)

3 Home-speed setting

   i8094MF_SET_HV() (Please refer to section 5.1 of I8094/I8094F user manual)

   i8094MF_SET_SV() (Please refer to section 6.1.2 of I8094/I8094F user manual)

4 Home mode setting

   i8094MF_SET_HOME_MODE()(Please refer to section 5.3 of I8094/I8094F user manual)

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3.6.2 Running the Home Search

1 Start homing

i8094MF_HOME _START()(Please refer to section 5.4 of I8094/I8094F user manual)

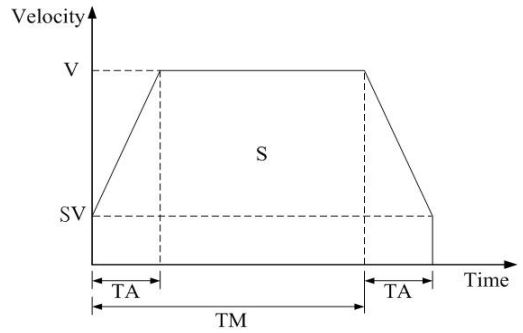
2 Waiting for homing completion

i8094 _HOME_WAIT()(Please refer to section 5.5 of I8094/I8094F user manual)

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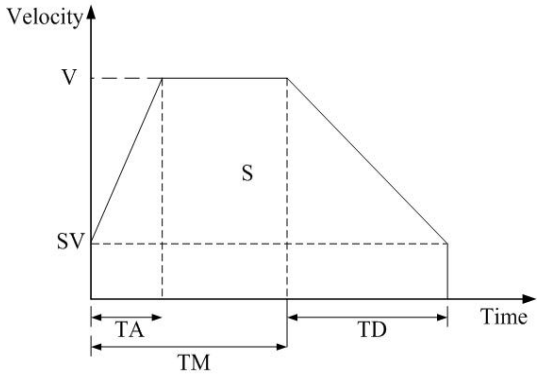
3.7 Basic Motion

3.7.1 Speed Profie of the Motion Control

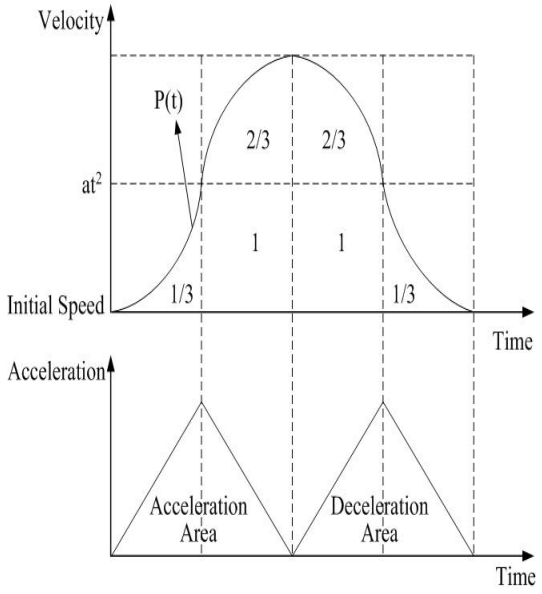


1 Symmetrical T-profile of motion volicety

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

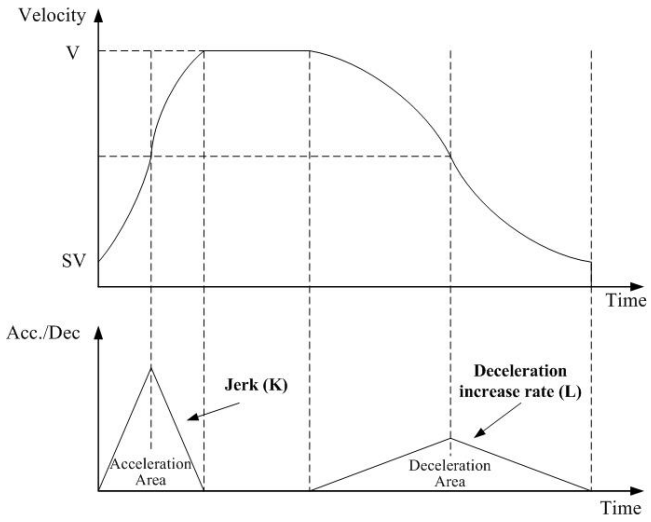


2 Asymmetrical T-profile of motion velocity



3 Symmetrical S-curve of motion velocity

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4 Asymmetrical S-curve of motion velocity

3.7.2 Basic Setting of Single Axis

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

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)

i8094MF_NORMAL_SPEED()(Please refer to section 6.1.1 of I8094/I8094F user manual)

2 Setting the start velocity: Set lowest speed

i8094MF_SET_SV ()(Please refer to section 6.1.2 of I8094/I8094F user manual)

3 Setting the Velocity: Set the desired speed

i8094MF_SET_V ()(Please refer to section 6.1.3 of I8094/I8094F user manual)

4 Setting the Acceleration/Deceleration speed: Set the Acceleration/Deceleration speed.

i8094MF_ SET_A ()(Please refer to section 6.1.4 of I8094/I8094F user manual)

i8094MF_ SET_D ()(Please refer to section 6.1.5 of I8094/I8094F user manual)

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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.

i8094MF_FIXED_MOVE()(Please refer to section 6.1.9 of I8094/I8094F user manual)

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

i8094MF_CONTIUNE_MOVE ()(Please refer to section 6.1.10 of I8094/I8094F user manual)

3 Waiting for motion done: Waiting for the axis driving accomplished.

i8094MF_STOP_WAIT()(Please refer to section 6.5.3 of I8094/I8094F user manual)

3.7.4 Basic Setting of Muti-Axes Interpolation

1 Setting axes of interpolation: Select axes to do the interpolation.

i8094MF_AXIS_ASSIGN()(Please refer to section 6.2.1 of I8094/I8094F user manual)

2 Setting the mode of Acceleration/Deceleration of vector: There are twelve mode as below:

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)

i8094MF_VECTOR_SPEED()(Please refer to section 6.2.2 of I8094/I8094F user manaul)

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

i8094MF_SET_VSV()(Please refer to section 6.2.3 of I8094/I8094F user manual)

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3 Setting the vector velocity: Set the desired vector speed

i8094MF_SET_VV()(Please refer to section 6.2.4 of I8094/I8094F user manual)

4 Setting the velocity of Acceleration/Deceleration of vector: Set the speed of Acceleration/Deceleration of vector.

i8094MF_SET_VA()(Please refer to section 6.2.5 of I8094/I8094F user manual)

i8094MF_SET_VD()(Please refer to section 6.2.6 of I8094/I8094F user manual)

3.7.5 Basic Motion of Muti-Axes Interpolation

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

i8094MF_LINE_2D()(Please refer to section 6.2.10 of I8094/I8094F user manual)

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

i8094MF_LINE_3D()(Please refer to section 6.2.11 of I8094/I8094F user manual)

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

i8094MF_ARC_CW ()(Please refer to section 6.2.12 of I8094/I8094F user manual)

i8094MF_ARC_CCW ()(Please refer to section 6.2.12 of I8094/I8094F user manual)

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

i8094MF_ CIRCLE _CW ()(Please refer to section 6.2.13 of I8094/I8094F user manual)

i8094MF_ CIRCLE _CCW ()(Please refer to section 6.2.13 of I8094/I8094F user manual)

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3.8 Advance Motion

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

i8094MF_RECTANGLE()(Please refer to section 6.4.1 of I8094/I8094F user manual)

2 2-axes continuous interpolation of line:

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

i8094MF_LINE_2D_INITIAL()(Please refer to section 6.4.2 of I8094/I8094F user manual)

Perform 2-axes continuous interpolation of line.

i8094MF_LINE_2D_CONTINUE()(Please refer to section 6.4.2 of I8094/I8094F user manual)

3 3-axes continuous interpolation of line:

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

i8094MF_LINE_3D_INITIAL()(Please refer to section 6.4.3 of I8094/I8094F user manual)

Perform 3-axes continuous interpolation of line.

i8094MF_LINE_3D_CONTINUE() (Please refer to section 6.4.3 of I8094/I8094F user manual)

4 Others continuous interpolation: Muti-point continuous interpolation, 3-axes Helix interpolation, 2-axes Ratio motion (Please refer to section 6.4.4~6.4.7 of I8094/I8094F user manual)

3.9 Synchronization Action

i8094 also offer many function of Synchronization Action, as compare EP, LATCH….and so on(Please refer to section 6.3 of I8094/I8094F user manaul)

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4 GETTING STARTED OF SOFTWARE

4.1 WinCon eVC++ Guideline

4.1.1 Confirm the Relative Files

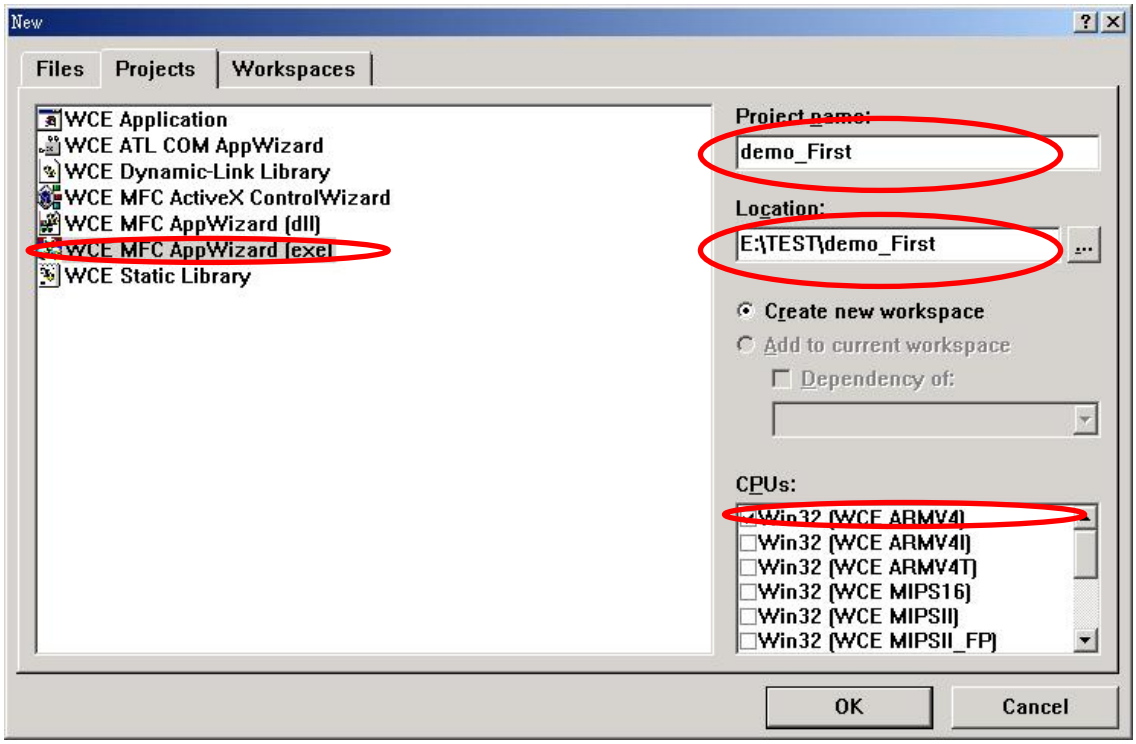
Please confirm you have the following relevance files:

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

If you don't have, please look for CD or download the latest edition from ICPDAS's website http://www.icpdas.com/download/download-list.htm .

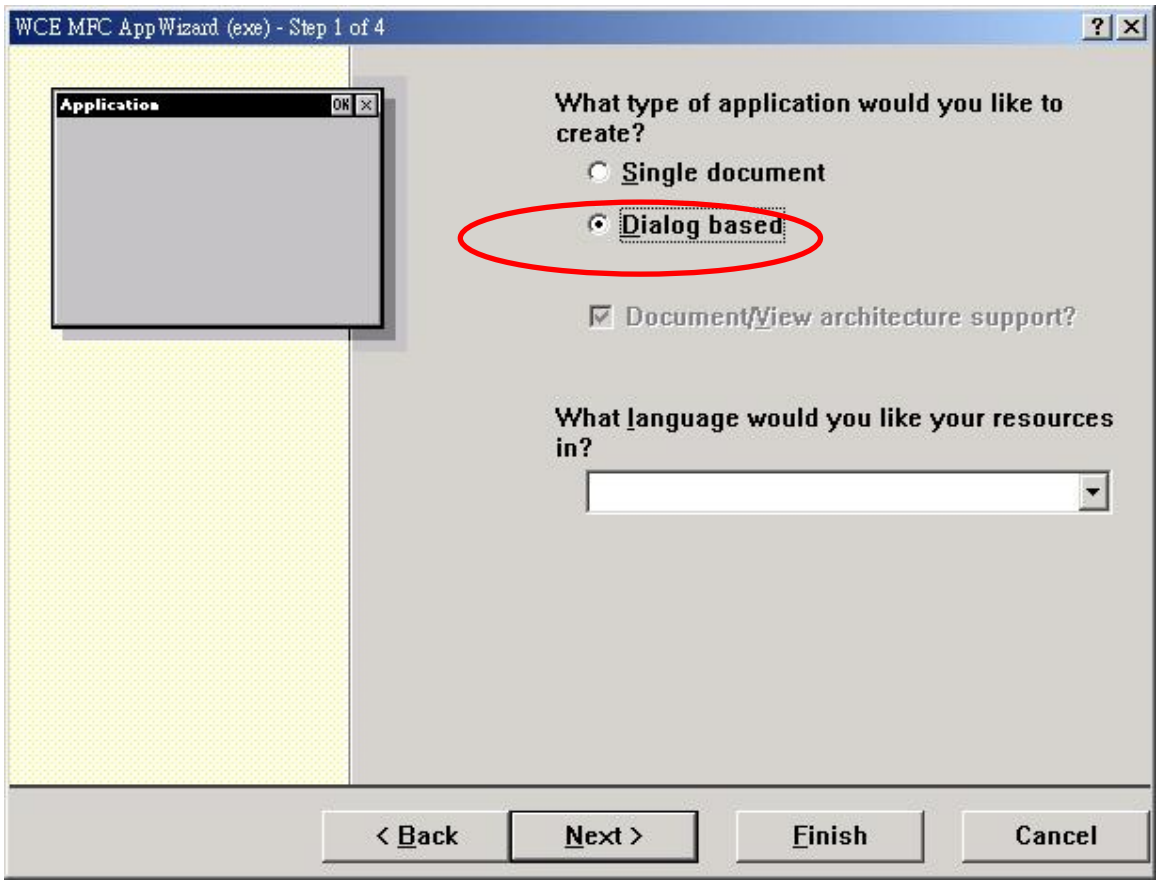
4.1.2 Create a new eVC++ Application Project

Please execute the Microsoft eVC++ 4.0. Then click"File" -> "New" to create a new application project. In the "Projects" property page, choose "WCE MFC AppWizard (exe)" option and specifythe project name "Demo_First", then key in the disk path in the "Location" field, then select the "Win 32[WCE ARMV4]" in CPU list. If necessary, please also select others options together. And then click " OK" .



Choose " Dialog based " and click "NEXT"

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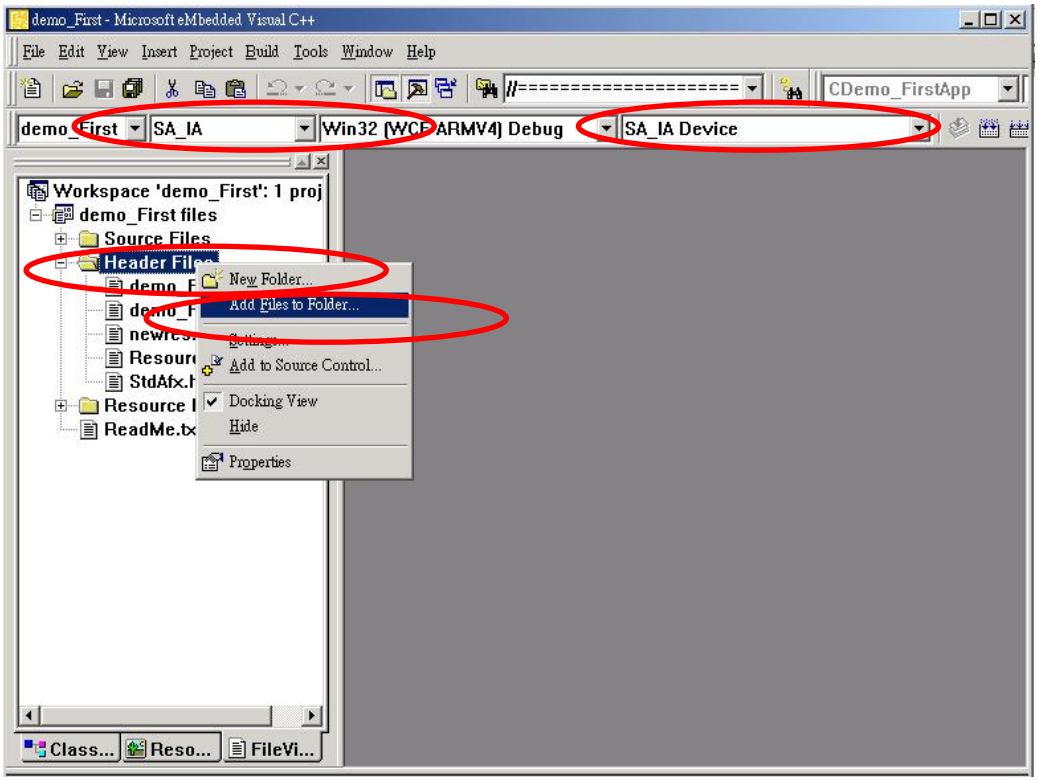


Click “Finish” and finish the new project establishment.

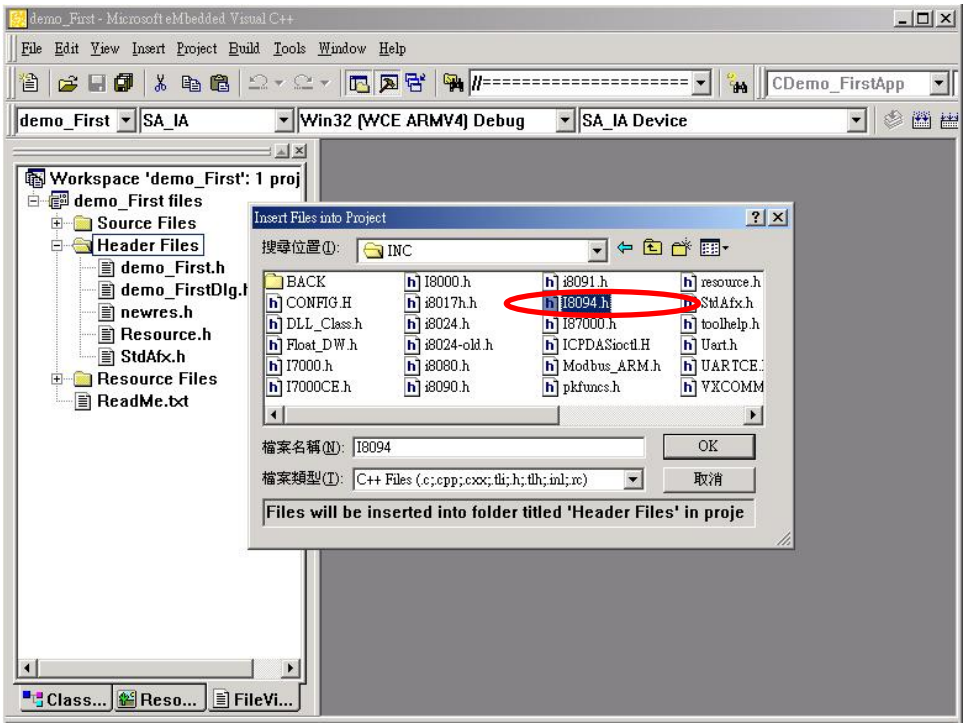
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4.1.3 Add the I8094.h into eVC++ Application Project

Add the i8094h into the WorkSpace of application project, as below:
Click the right key of mouse on Header Files, then choose “Add Files to Folder….”



It will appear on a dialog of selecting file, find out the I8094.h and click OK.



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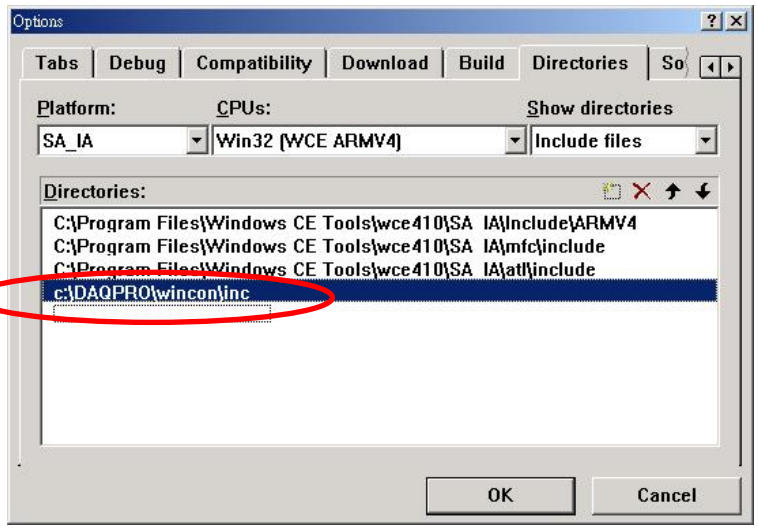
4.1.4 Add the Reference Path into eVC++ Application Project

A. Open the “Options” dialog in “Tools” menu.

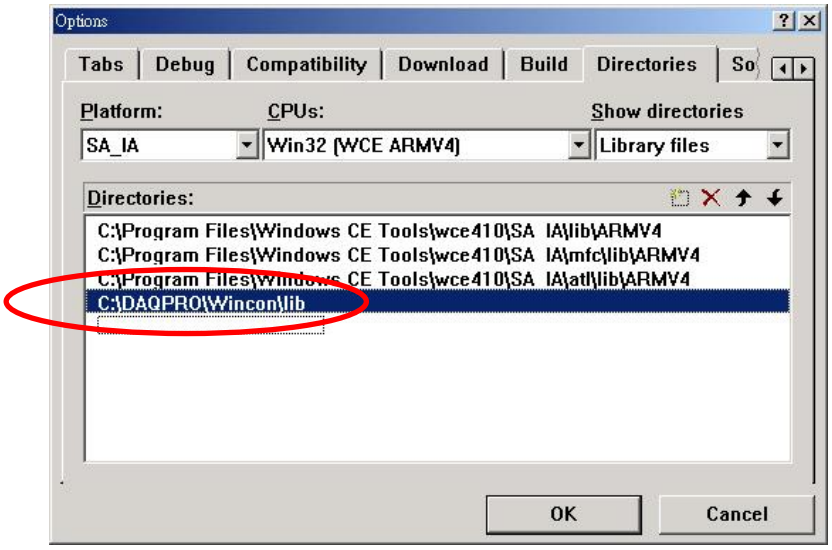
B. Select “Directories“ , then select the “SA_IA” in “Platform” item. Then select the “Win32 [WCE ARMV4]” in “CPUS” item and select the “include files” in “Show directories“ item.

C. Add in the path of including files. Double-click the rectangle in the buttom of Directories” List-Box. Please key in the specific path that your header files located. For instance, C:\DAQPRO\Wincon\inc, as below snapshot.

D. Then select the “Library files” in “Show directories” item.



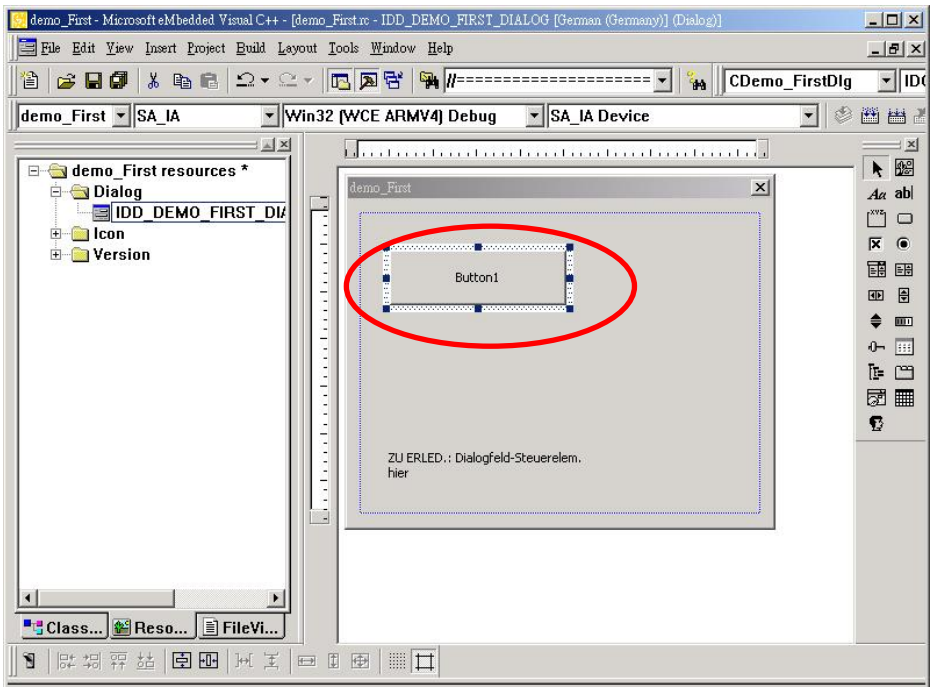
E. Add in the path of library files. Double-click the rectangle in the buttom of Directories” List-Box. Please key in the specific path that your header files located. For instance, C:\DAQPRO\Wincon\lib, as below snapshot.



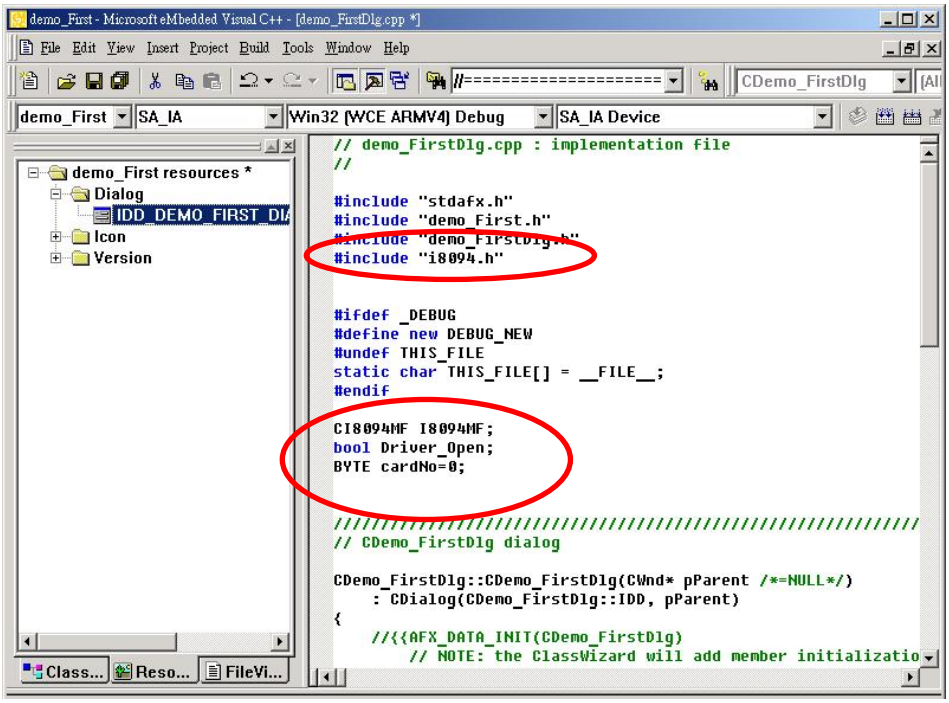
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4.1.5 Start the eVC++ Sample

Add a BUTTON on Dialog, as below snapshot:



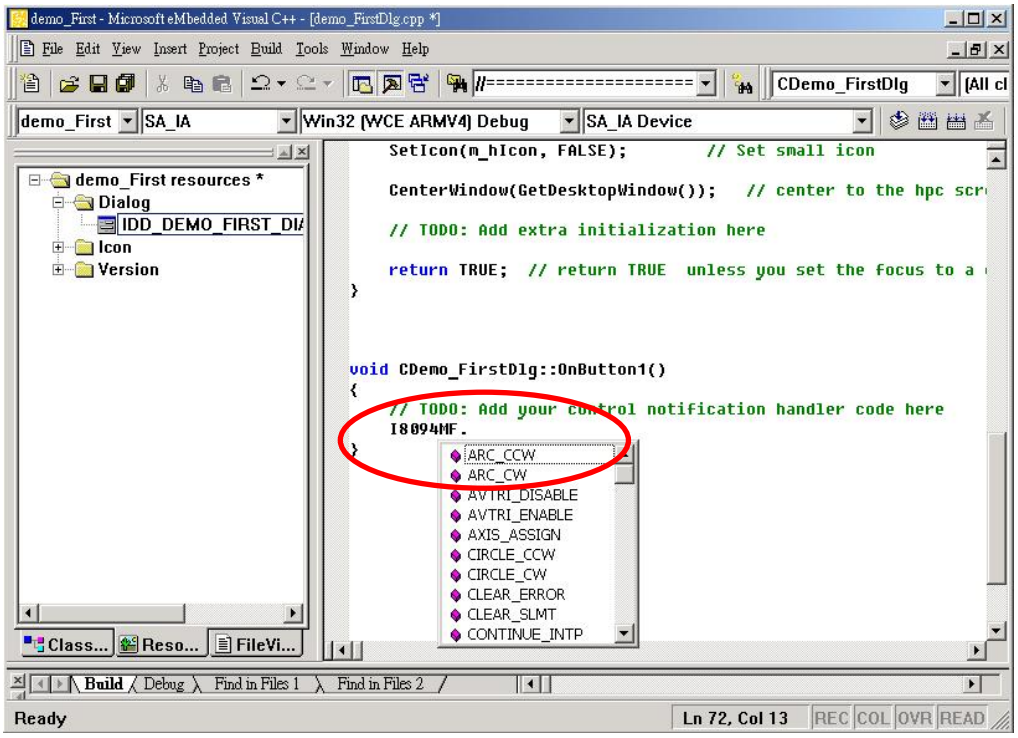
Double-click on BUTTON and generate subprogram, then add ”#include “i8094.h”, “WinConSDK.h”, and declare CI8094MF I8094MF & bool Driver_Open & BYTE cardNo=0 in start point, as below snapshot:



Because we have built a class “CI8094MF(For Macro function)”, it is convenient to guide in designing program. User also can use the function of manual directly. Double-click on

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BUTTON that will generate a subprogram, then key in “I8094MF”, then it will appear a windows guide to help user to select a relevance function.



Select “i8094MF.REGISTRATION” and key in (cardNo,3), that indicate the i8094(or i8094F) on third slot is registered to 0th module. The detailed procedure is as below:

```
//====='Step 1 Driver init
if   (!Driver_Open)
{
      I8094MF.REGISTRATION(cardNo,3);
      Driver_Open = true;
}
//====='Step 2 CONFIG IO
I8094MF.RESET_CARD (cardNo);
I8094MF.SET_PULSE_MODE (cardNo, AXIS_XYZU, 2);      //set the pulse output mode
I8094MF.SET_ALARM (cardNo, AXIS_XYZU, 0, 0);        //disable the SERVO ALARM Input
I8094MF.SET_ENCODER (cardNo, AXIS_XYZU, 0, 0, 0);   //set the encoder input type
I8094MF.SET_MAX_V (cardNo, AXIS_XYZU, 16000);       //set the max speed for XYZU
I8094MF.EXD_DISABLE (cardNo, AXIS_XYZU);            //set the external input Off
I8094MF.SET_LP (cardNo, AXIS_XYZU, 0);              //set the Logic position =0
I8094MF.SET_EP (cardNo, AXIS_XYZU, 0);              //set the Encoger position =0
I8094MF.SET_A (cardNo, AXIS_XYZU, 1000);            //set the Acc =1000
I8094MF.SERVO_ON (cardNo, AXIS_XYZU);               //set the Servo_ON to servo motors
//======'Step 3 Check ERROR
```


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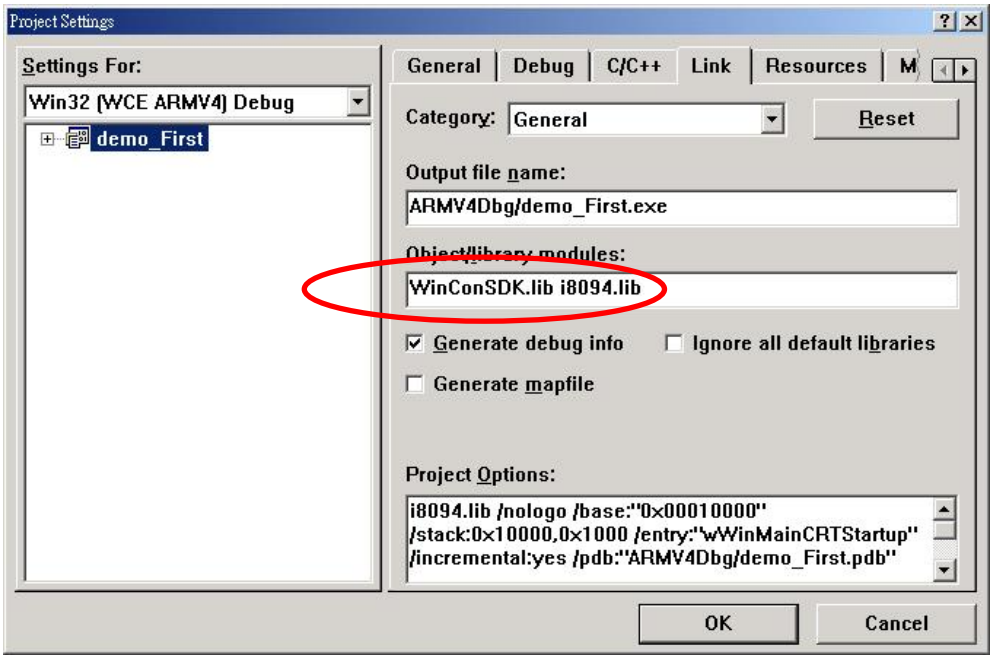
```
WORD KK=0;
KK= I8094MF.GET_ERROR(cardNo);
CString MSGG;
if (KK != YES)
{
    //No ERROR: Step 4 Move X axis
    BYTE axis=AXIS_X;   //for AXIS_X it can be to AXIS_XYZU
    I8094MF.SET_MAX_V(cardNo, axis, 20000);
    I8094MF.NORMAL_SPEED(cardNo, axis, 0);          //set axis as Symmetrical T curve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

Please refer to the example “demo_First”

After you finished that, please choose the “Project”->”Setting” menu will appear the a

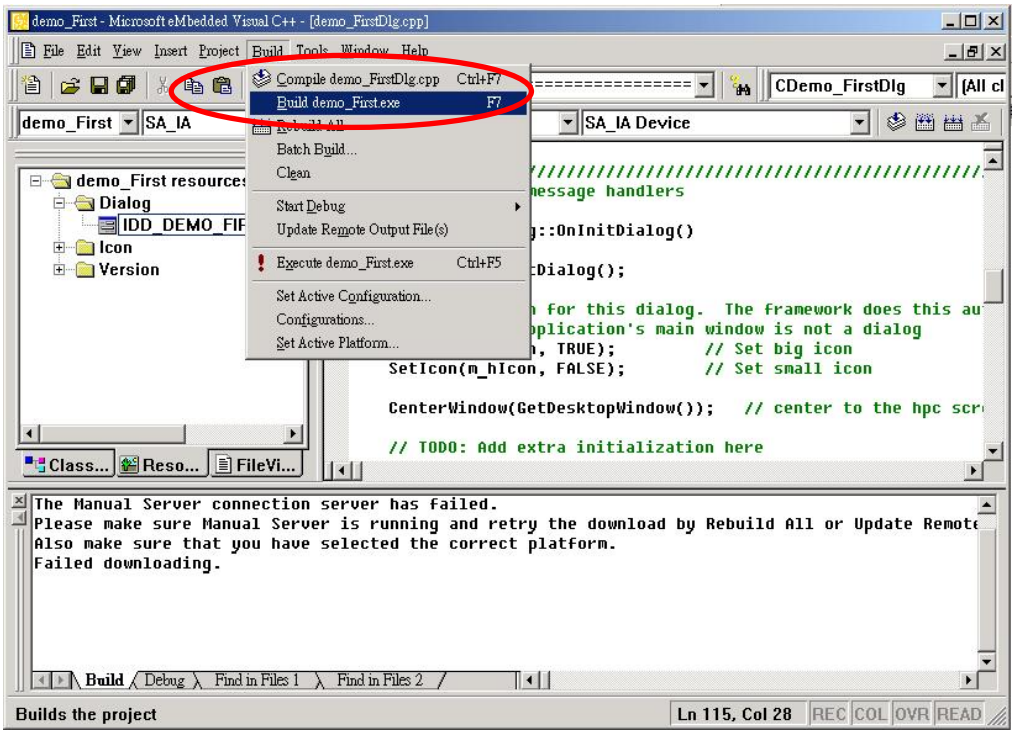
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dialgo as below, then select the “Link” item and key in “WinConSDK.lib i8094.lib”(as below snapshot) into the Object/library modules box and the click OK.



4.1.6 Build the Project

Please select the “Build” -> ”Build All” in the menu, then you will be finished this example program if there isn’t any wrong.



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4.1.7 Download and Run

Please copy the ”i8094Demo.exe” and “I8094.dll” into the same floder of WinCon (User can use the eVC++ Online Download/FTP/USB disk to do), then execute it.

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

Because the Microsoft Visual Studio .NET 2003 has similar environment, therefore we make an example with VB.NET.

4.2.1 Confirm the Relative Files

Please confirm you have the following relevance files:

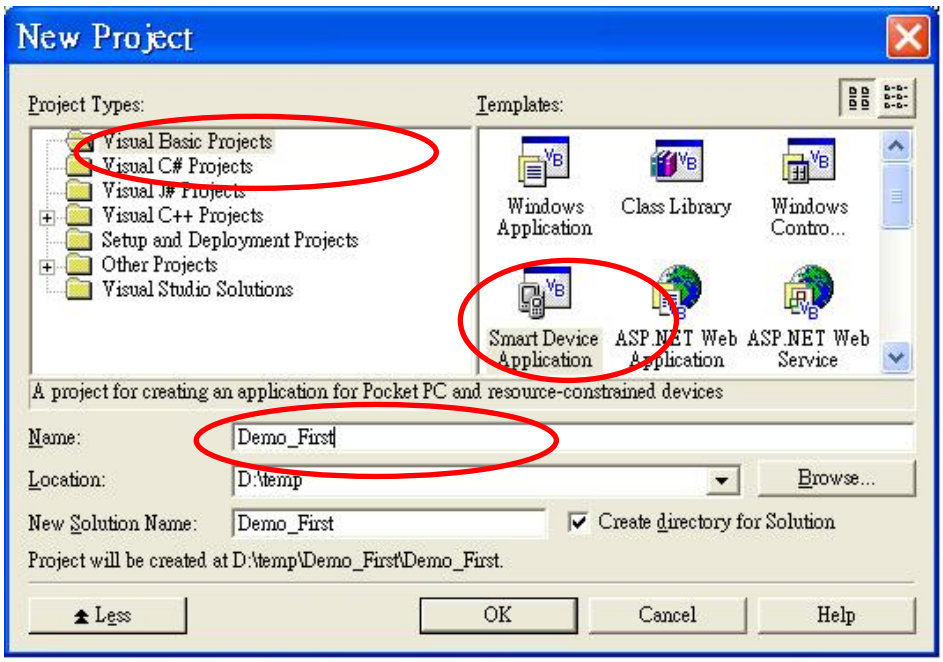
i8094.dll

i8094_NET.dll

If you don't have, please look for CD or download the latest edition from ICPDAS's website http://www.icpdas.com/download/download-list.htm

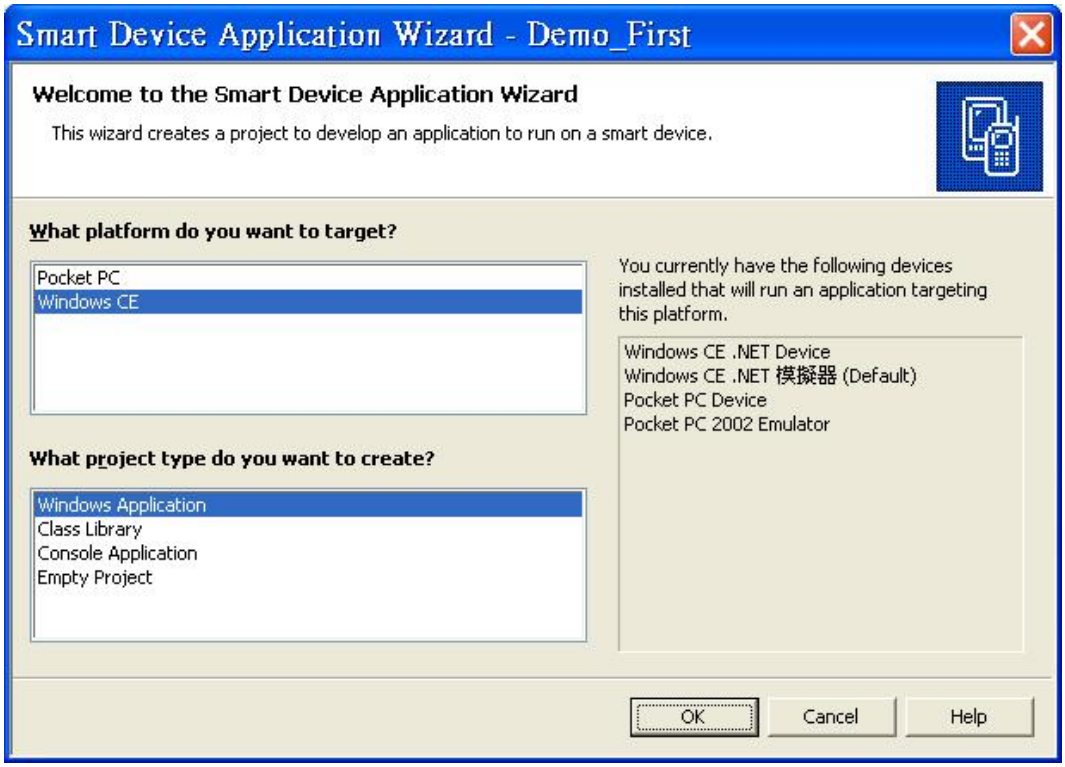
4.2.2 Create a new VB.NET/C# Application Project

Please execute the Microsoft Visual Studio .NET 2003. Then create a new application project of VB and select " Smart Device Application", as below snapshot:



Click "OK" after finishing all of the selecting, then go to next step.

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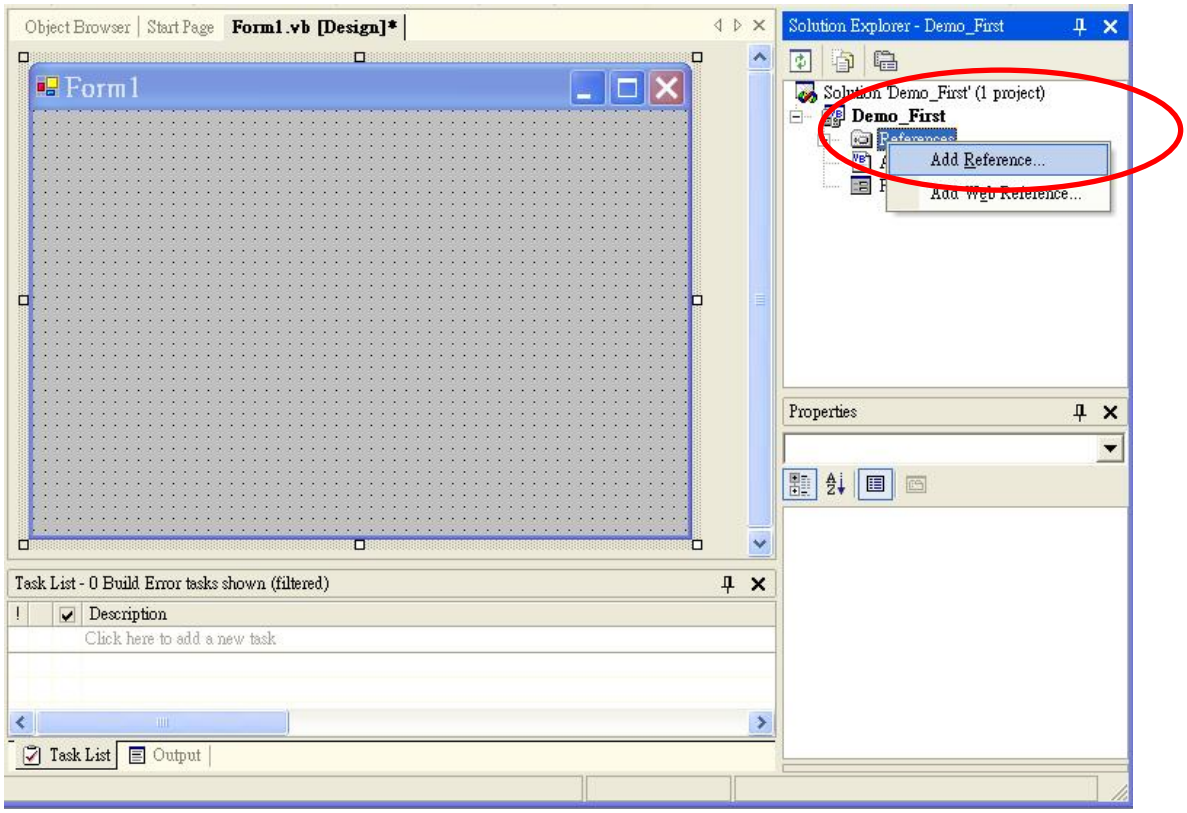


Select the “WinDows CE” and “Windows Application”, then click “OK”.

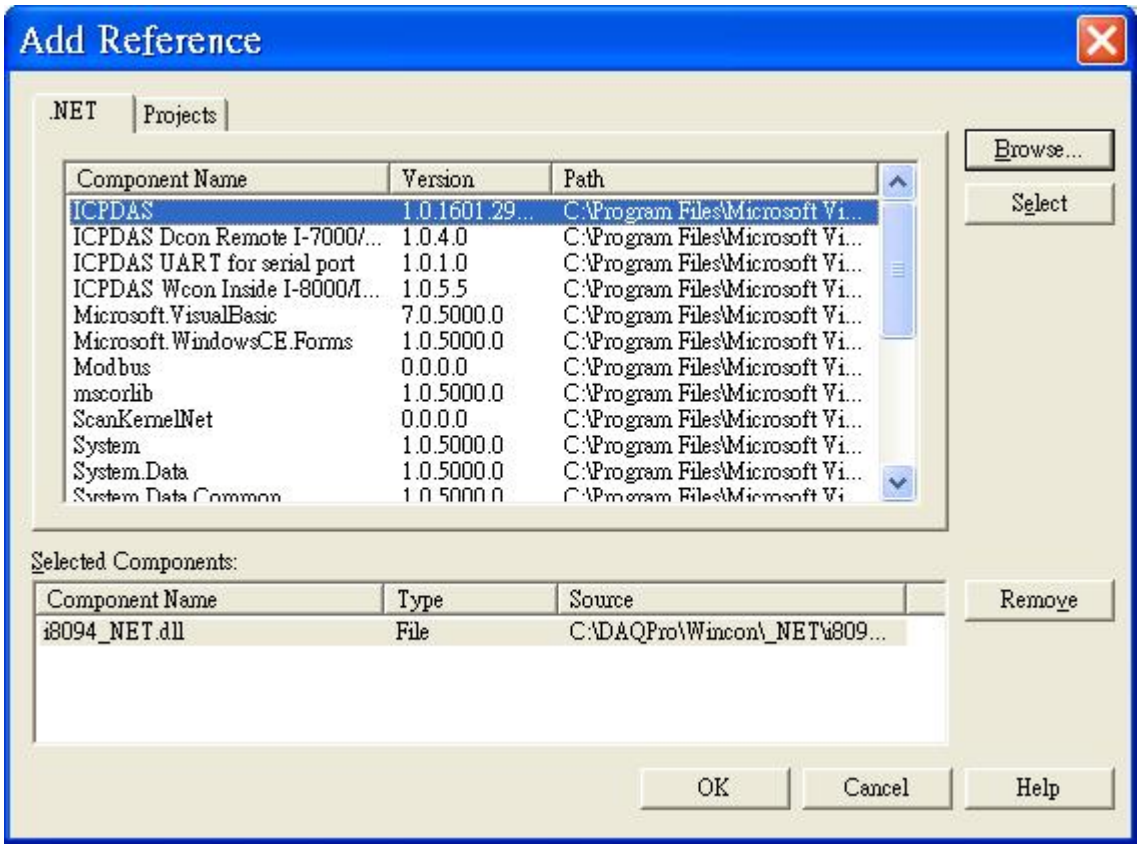
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4.2.3 Add the DLL into Application Project

Click the right key of mouse on”Solution Explorer” =>add Reference

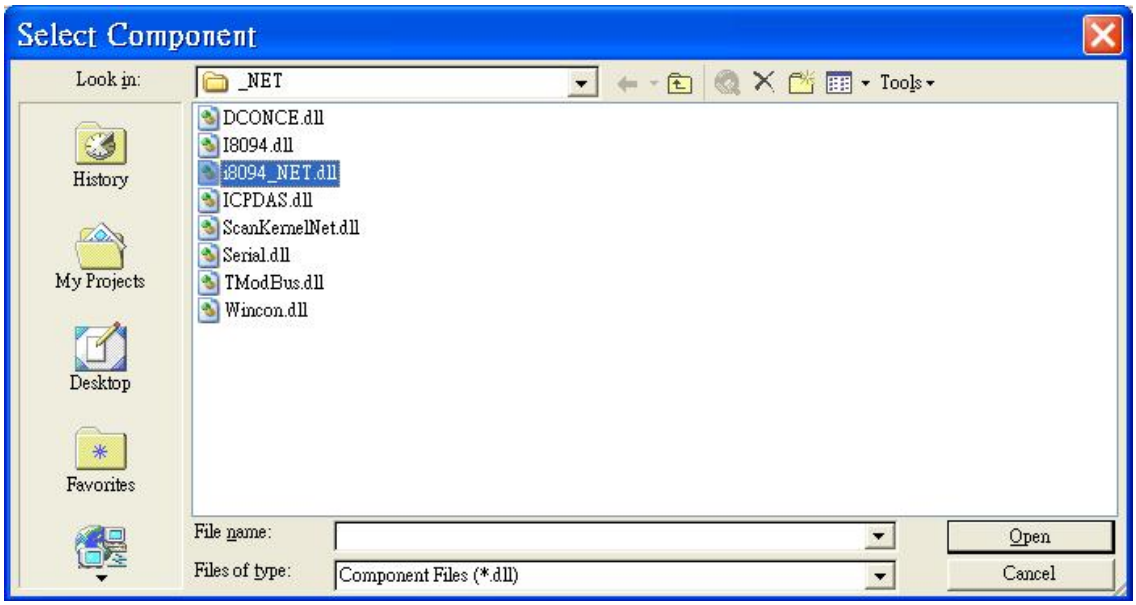


=>Select “Browse” button.

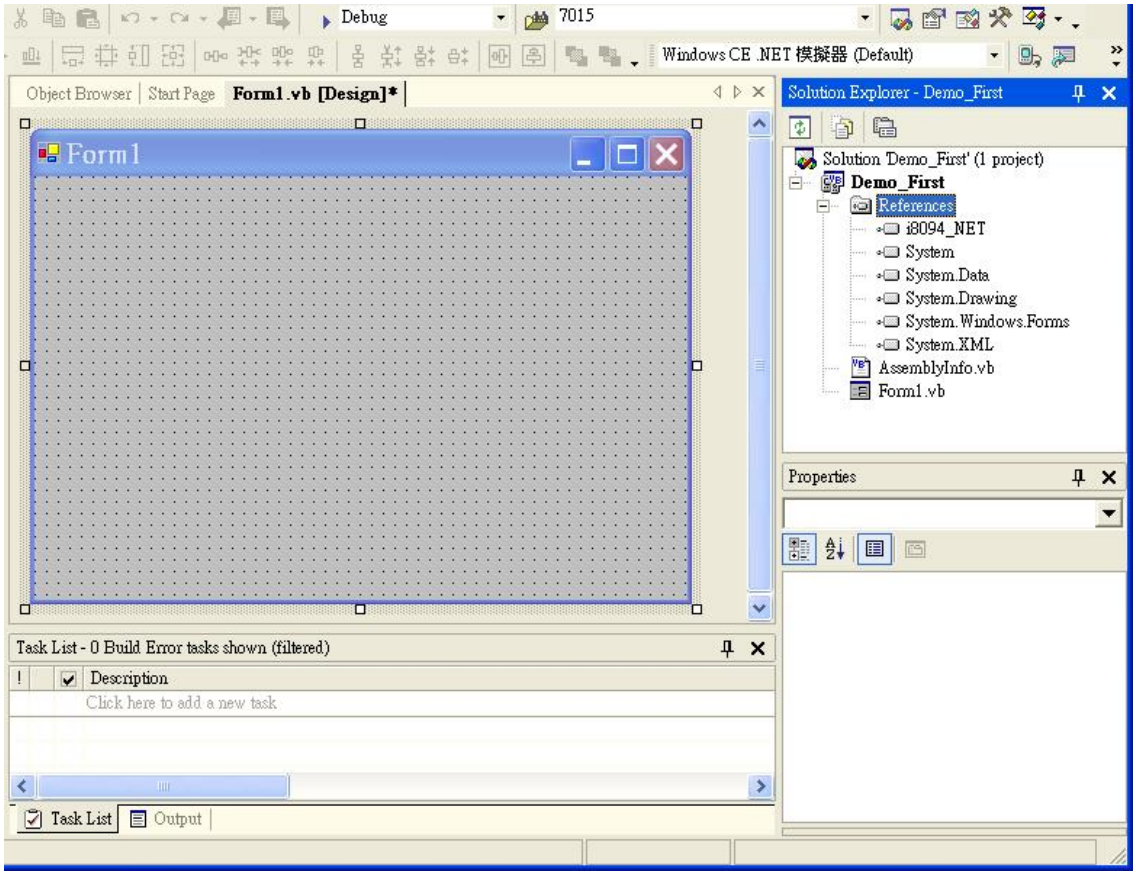


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Select the i8904 _NET.DLL



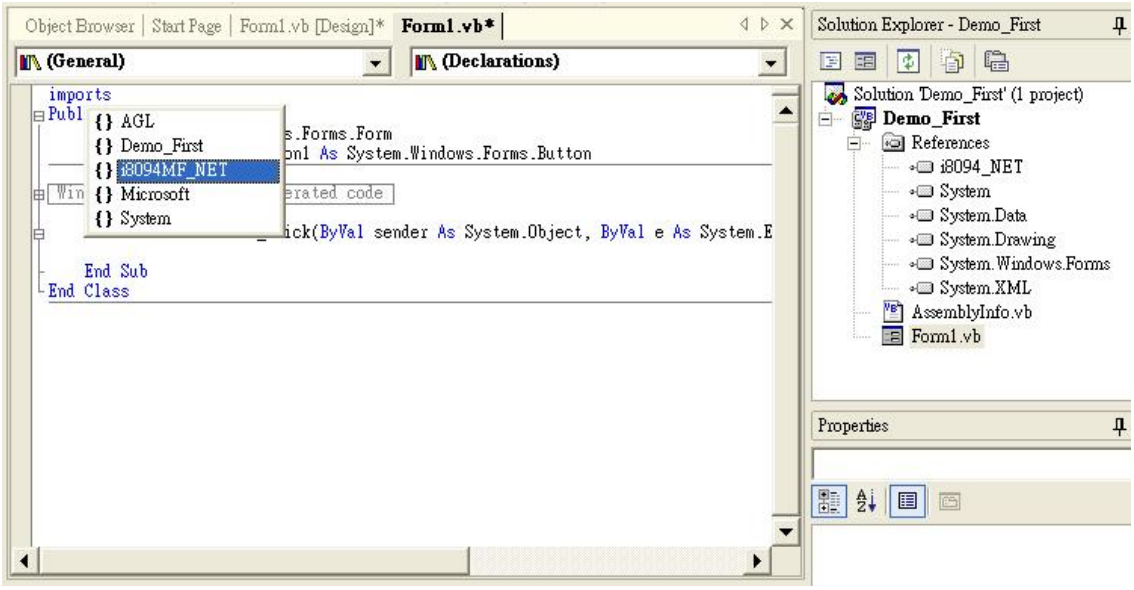
Select the “Open” button, as above snapshot:



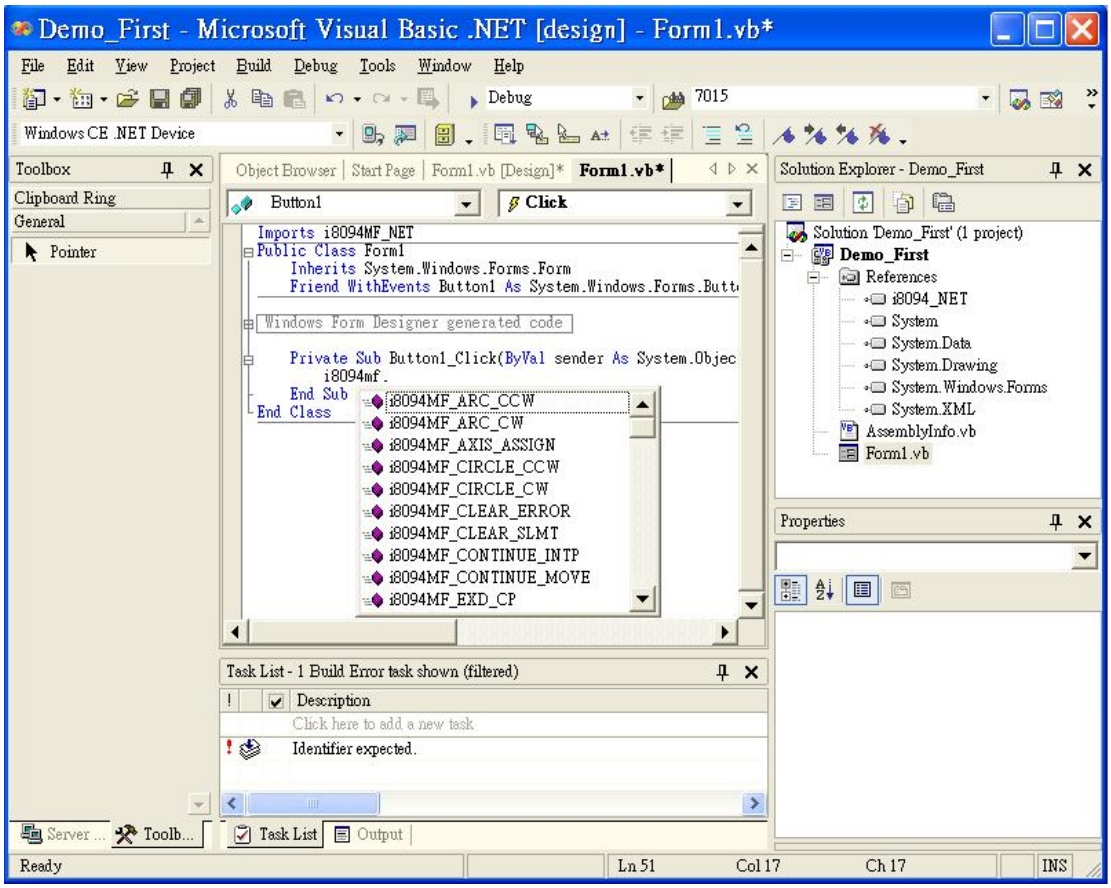
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4.2.4 Start the VB.NET/C# Sample

Add a “BUTTON” on the Form1, then double-click the BUTTON, then it will appear a code of Form1.vb, then add the “imports i8094MF_NET” in top, as below snapshot:



Add the “i8094MF” into the Button1_Click, then it will appear a windows guide to help user to select a relevance function.



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Detailed code as below:

```
'====='Step 1 Driver init
        If Not Driver_Open Then
            i8094MF.i8094MF_REGISTRATION(cardNo, 1)
            Driver_Open = True
        End If
        '====='Step 2 CONFIG IO
        i8094MF.i8094MF_RESET_CARD(cardNo)
        i8094MF.i8094MF_SET_PULSE_MODE(cardNo, AXIS_XYZU, 2)   'set the pulse output mode
        i8094MF.i8094MF_SET_ALARM(cardNo, AXIS_XYZU, 0, 0)   'disable the SERVO ALARM Input
        i8094MF.i8094MF_SET_ENCODER(cardNo, AXIS_XYZU, 0, 0, 0) 'set the encoder input type
        i8094MF.i8094MF_SET_MAX_V(cardNo, AXIS_XYZU, Convert.ToUInt32(16000))   'set the max speed for XYZU
        i8094MF.i8094MF_EXD_DISABLE(cardNo, AXIS_XYZU)    'set the external input Off
        i8094MF.i8094MF_SET_LP(cardNo, AXIS_XYZU, 0)       'set the Logic position =0
        i8094MF.i8094MF_SET_EP(cardNo, AXIS_XYZU, 0)       'set the Encoger position =0
        i8094MF.i8094MF_SET_A(cardNo, AXIS_XYZU, Convert.ToUInt32(1000))    'set the Acc =1000
        i8094MF.i8094MF_SERVO_ON(cardNo, AXIS_XYZU)      'set the Servo_ON to servo motors
        '======'Step 3 Check ERROR
        Dim KK As Long = 0
        KK = i8094MF.i8094MF_GET_ERROR(cardNo)
        Dim MSGG As String
        If (KK <> YES) Then
            'No ERROR: Step 4 Move X axis
            Dim axis As UInt16 = AXIS_X 'for AXIS_X it can be to AXIS_XYZU
            i8094MF.i8094MF_SET_MAX_V(cardNo, axis, Convert.ToUInt32(20000))
            i8094MF.i8094MF_NORMAL_SPEED(cardNo, axis, Convert.ToUInt16(0))   'set axis as Symmetrical T curve
mode
            i8094MF.i8094MF_SET_V(cardNo, axis, Convert.ToUInt32(20000))   'set v=10000 PPS
            i8094MF.i8094MF_SET_A(cardNo, axis, Convert.ToUInt32(100000))   'set acc=100000 PPS/S
            i8094MF.i8094MF_SET_SV(cardNo, axis, Convert.ToUInt32(10))    'set start speed=1000 PPS
            i8094MF.i8094MF_SET_AO(cardNo, axis, 0)    'set offset pulse (at SV speed)= 0 PS
            i8094MF.i8094MF_FIXED_MOVE(cardNo, axis, 10000) 'run the fixed 10000 Pulse move.
            Do While (i8094MF.i8094MF_STOP_WAIT(cardNo, axis) = NO)
                i8094MF.system.DoEvents()
                System.Threading.Thread.Sleep(1)
                'wait for axis to stop
            Loop
            Dim AA As Long = i8094MF.i8094MF_GET_LP(cardNo, axis)    'Get X Now position
        Else
```

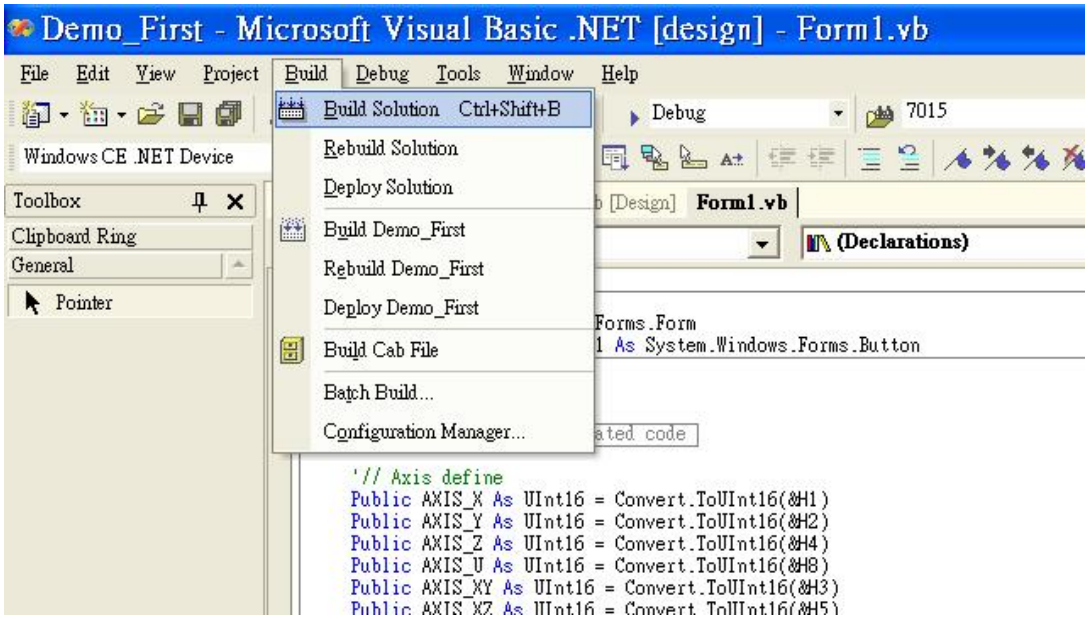

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```
'Please check the ERROR CODE
'Get X ERROR CODE
KK = Convert.ToInt32(i8094MF.i8094MF_GET_ERROR_CODE(cardNo, AXIS_X))
'Get Y ERROR CODE
KK = Convert.ToInt32(i8094MF.i8094MF_GET_ERROR_CODE(cardNo, AXIS_Y))
'Get Z ERROR CODE
KK = Convert.ToInt32(i8094MF.i8094MF_GET_ERROR_CODE(cardNo,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

Please refer to a example “ demo_First”

4.2.5 Build the Project

Please select the “Build” -> ”Build Solution” in pull-down menu, then you will be finished this example program if there isn’t any wrong.



4.2.6 Download and Run

Please copy the ”Demo_First.exe”, “I8094.dll” and “I8094_NET.dll” into the same floder of WinCon (User can use the VS.NET Online Download/FTP/USB disk to do), then execute it.

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4.3 I-8000 Turbo C Guideine

4.3.1 Confirm the Relative Files

Please confirm you have the following relevance files:

I8094.lib

I8094.h

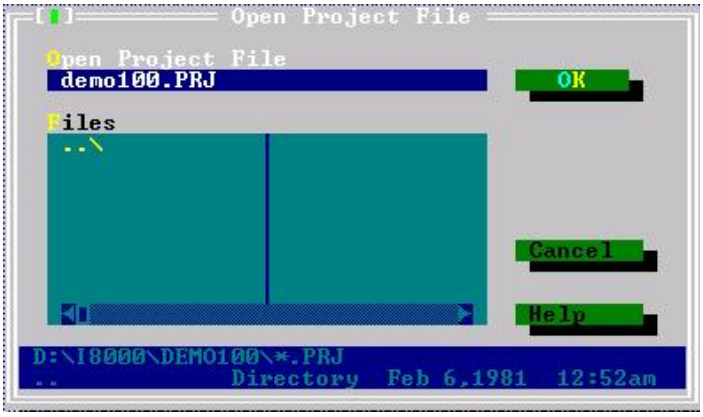
I8000.lib

I8000.h

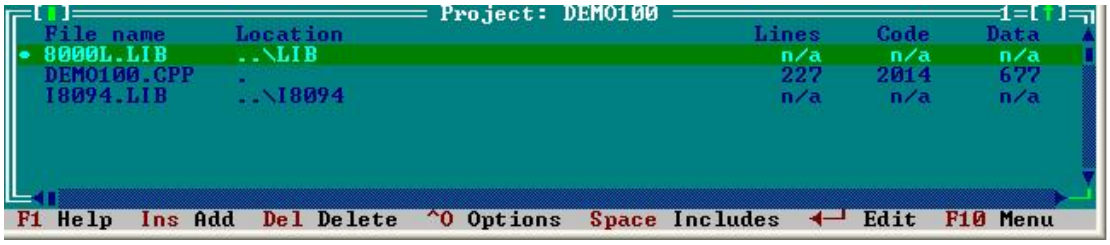
If you don't have, please look for CD or download the latest edition from ICPDAS's website http://www.icpdas.com/download/download-list.htm

4.3.2 Create a new TC ++ Application Project

1. Execute the TC.EXE in the demo100 folder, then create a new Project(demo100.prj).



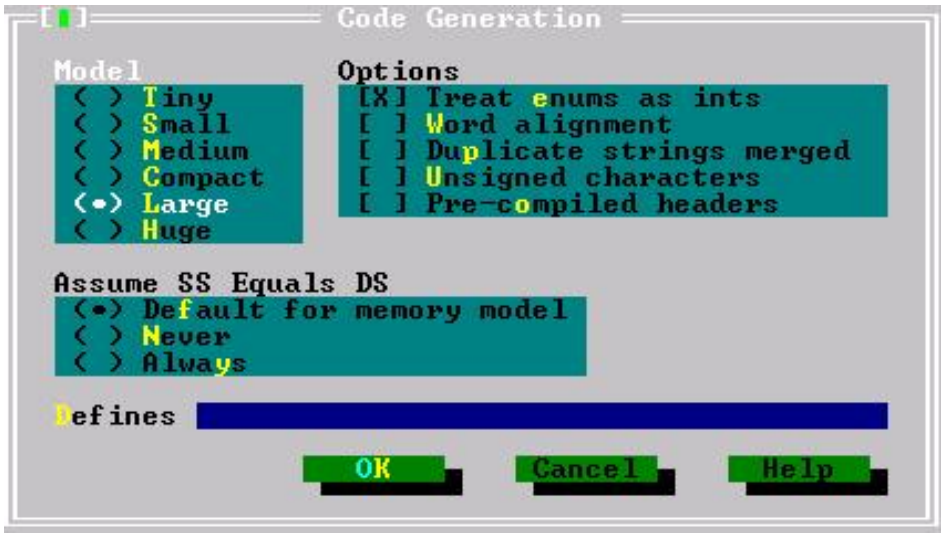
2. Add the contents of project：demo100.cpp and ..\lib\8000l.lib，I8094.lib



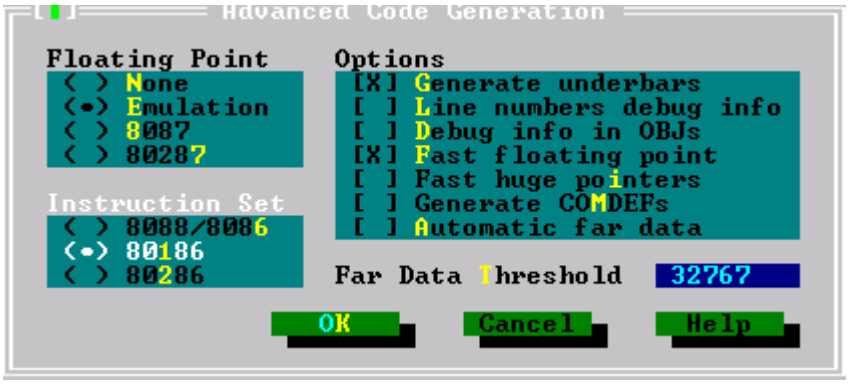
3. Setting the relevance option

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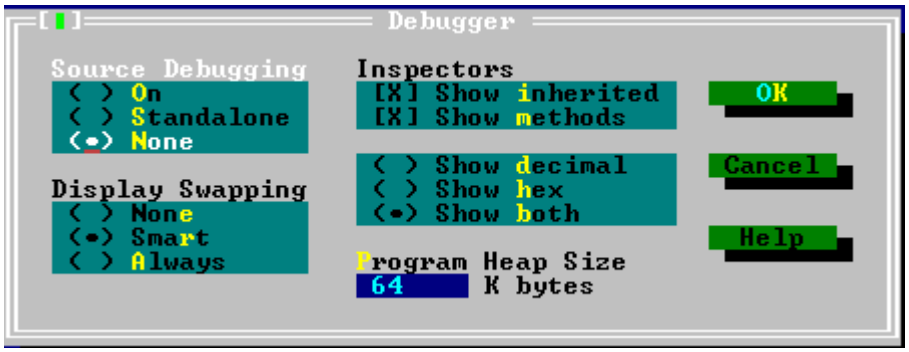
- Compiler -> Code Generation item as below：



- Compiler -> Advance Code Generation item as below：



- Debugger setting as below, close the Source debugging.



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4.3.3 Start the TC Sample

1. Add the declared contents into the demo100.cpp:

```
#include <dos.h>
#include <math.h>
#include "8000.h"
#include "I8094.h"
BYTE cardNo;
long   x_value, y_value, z_value, u_value;
```

2. Add the relevance code into the main program(Please refer to demo100.cpp):

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


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```
        i8094MF_SET_ALARM(cardNo, AXIS_XYZU, 1, 1);
       i8094MF_SET_ENCODER(cardNo, AXIS_XYZU, 0, 0, 0);
       i8094MF_SET_MAX_V(cardNo, AXIS_XYZU, 16000);
        //=========================================================================
        BYTE ret1 = 0;
        BYTE chkey;
        DWORD sv;     //PPS
        DWORD v;      //PPS
        DWORD a;      //PPS/s
        i8094MF_SERVO_ON(cardNo, AXIS_XYZU);
        do
        {
              Print(" (0:Exit, 1:HELIX_3D_1, 2:HELIX_3D_2, 3:RATIO, 4:FRnet output, 5:FRnet input)
\r\n");
              Print(" (6:Reset Encoder, 7:Stop, 8:Clear Error) \r\n");
              Print(" (X:Jog X, Y:Jog Y, Z:Jog Z, U:Jog U, S:Stop Jog) \r\n");
              Print("\n");
              Print("----------------------LOGIC AND REAL POSITION COUNTER----------------------\n");
              x_value = i8094MF_GET_LP(cardNo, AXIS_X);
              y_value = i8094MF_GET_LP(cardNo, AXIS_Y);
              z_value = i8094MF_GET_LP(cardNo, AXIS_Z);
              u_value = i8094MF_GET_LP(cardNo, AXIS_U);
              Print("LOGIC POSITION: x=%10ld,    y= %10ld, z= %10ld, u=%10ld \r\n", x_value, y_value,
z_value, u_value);
              x_value = i8094MF_GET_EP(cardNo, AXIS_X);
              y_value = i8094MF_GET_EP(cardNo, AXIS_Y);
              z_value = i8094MF_GET_EP(cardNo, AXIS_Z);
              u_value = i8094MF_GET_EP(cardNo, AXIS_U);
             Print("REAL POSITION:    x=%10ld,    y= %10ld, z= %10ld, u=%10ld \r\n", x_value, y_value,
z_value, u_value);
              while (!Kbhit());
              chkey=Getch();
              Print("%s\r\n",&chkey);
              switch (chkey)
              {
                    case '0':
                                  i8094MF_RESET_CARD(cardNo);
                                  Print("EXIT! \r\n");
```


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```
                    return;
            //-------------------------------------------------------------
            case '1':
                    v=50000;//PPS。
                    i8094MF_SET_MAX_V(cardNo, AXIS_XYZU,160000L);
                    ret1=i8094MF_HELIX_3D(cardNo, AXIS_Y, AXIS_Z, AXIS_X, 1, v, 0,
1000, 5, -2000);
                    Delay(1000);
                    Print("HELIX_3D_1 ! \r\n");
                    Print("ret1= %d \r\n",ret1);
                    break;
            //-------------------------------------------------------------
            case '2':
                    v=100000;//PPS。
                    i8094MF_SET_MAX_V(cardNo, AXIS_XYZU,1600000L);
                    ret1=i8094MF_HELIX_3D(cardNo, AXIS_Y, AXIS_Z, AXIS_U, 1, v, 0,
25000, 10, 3600);
                    Delay(2000);
                    Print("HELIX_3D_2 ! \r\n");
                    Print("ret1= %d \r\n",ret1);
                    break;
            //-------------------------------------------------------------
            case '3':
                    sv=300;//PPS。
                    v=30000;//PPS。
                    a=500000;//PPS/s。
                    int loop1;
                    int loop2;
                    float ratio;
                    i8094MF_SET_MAX_V(cardNo, AXIS_XYZU,160000L);
                    Print("RATIO_2D ratio ? \r\n");
                    Scanf("%f", &ratio);
                    Print("ratio= %f \r\n",ratio);
                    i8094MF_RATIO_INITIAL(cardNo,AXIS_U, AXIS_X, sv, v, a, ratio);
                    for (loop2 = 0; loop2 < 5; loop2++)
                    {
                        for (loop1 = 0; loop1 < 5; loop1++)
                        {
```


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```
                    i8094MF_RATIO_2D(cardNo, 0, 3600, 0);
                    i8094MF_RATIO_2D(cardNo, 0, 3600, 1);
                }
                i8094MF_RATIO_2D(cardNo, 0, 7200, 0);
                i8094MF_RATIO_2D(cardNo, 0, 3600, 1);
            }
            i8094MF_RATIO_2D(cardNo, 1, 7200, 1);
            Delay(3000);
            Print("RATIO_2D OK ! \r\n");
            break;
//-------------------------------------------------------------
case '4':
            WORD wSA;
            WORD data;
            Print("FRnet wSA ? \r\n");
            Scanf("%d", &wSA);
            Print("FRnet 16 bits data ? \r\n");
            Scanf("%d", &data);
            i8094MF_FRNET_SA(cardNo, wSA, data);
            break;
//-------------------------------------------------------------
case '5':
            WORD wRA;
            Print("FRnet wRA ? \r\n");
            Scanf("%d", &wRA);
            long data1 = i8094MF_FRNET_RA(cardNo, wRA);
            Print("FRnet 16 bits data = %10ld \r\n", data1);
            break;
//-------------------------------------------------------------
case '6':
            i8094MF_SET_LP(cardNo, AXIS_XYZU, 0);
            i8094MF_SET_EP(cardNo, AXIS_XYZU, 0);
            Print("RESET Encoder ! \r\n");
            break;
//-------------------------------------------------------------
case '7':
            i8094MF_STOP_SLOWLY(cardNo, AXIS_XYZU);
            Print("STOP! \r\n");
```


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```
                    break;
            //-------------------------------------------------------------
            case '8':
                    i8094MF_CLEAR_ERROR(cardNo);
                    Print("CLEAR ERROR ! \r\n");
                    break;
            //-------------------------------------------------------------
            case 88:
            case 120:
                    BYTE m_Axis=AXIS_X;
                    i8094MF_SET_MAX_V(cardNo, m_Axis, 32000);
                    i8094MF_NORMAL_SPEED(cardNo, m_Axis, 0);//set axis as
Symmetrical T curve mode
                    i8094MF_SET_A(cardNo, m_Axis, 50000);//set Acc =50000 PPS/S
                    i8094MF_SET_V(cardNo, m_Axis, 50000);
                    i8094MF_EXD_MP(cardNo, AXIS_X, 100);
                    i8094MF_EXD_DISABLE(cardNo, AXIS_Y);
                    i8094MF_EXD_DISABLE(cardNo, AXIS_Z);
                    i8094MF_EXD_DISABLE(cardNo, AXIS_U);
                    break;
            //-------------------------------------------------------------
            case 89:
            case 121:
                    m_Axis=AXIS_Y;
                    i8094MF_SET_MAX_V(cardNo, m_Axis, 32000);
                    i8094MF_NORMAL_SPEED(cardNo, m_Axis, 0);     //set axis as
Symmetrical T curve mode
                    i8094MF_SET_A(cardNo, m_Axis, 50000);//set Acc =50000 PPS/S
                    i8094MF_SET_V(cardNo, m_Axis, 100000);
                    i8094MF_EXD_MP(cardNo, AXIS_Y, 100);
                    i8094MF_EXD_DISABLE(cardNo, AXIS_X);
                    i8094MF_EXD_DISABLE(cardNo, AXIS_Z);
                    i8094MF_EXD_DISABLE(cardNo, AXIS_U);
                    break;
            //-------------------------------------------------------------
            case 90:
            case 122:
                    m_Axis=AXIS_Z;
```

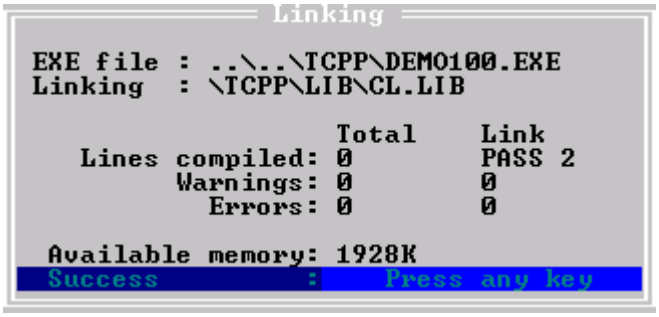

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```
                    i8094MF_SET_MAX_V(cardNo, m_Axis, 32000);
                    i8094MF_NORMAL_SPEED(cardNo, m_Axis, 0);     //set axis as
Symmetrical T curve mode
                    i8094MF_SET_A(cardNo, m_Axis, 50000);//set Acc =50000 PPS/S
                    i8094MF_SET_V(cardNo, m_Axis, 10000);
                    i8094MF_EXD_MP(cardNo, AXIS_Z, 100);
                    i8094MF_EXD_DISABLE(cardNo, AXIS_X);
                    i8094MF_EXD_DISABLE(cardNo, AXIS_Y);
                    i8094MF_EXD_DISABLE(cardNo, AXIS_U);
                    break;
            //-------------------------------------------------------------
            case 85:
            case 117:
                    m_Axis=AXIS_U;
                    i8094MF_SET_MAX_V(cardNo, m_Axis, 32000);
                    i8094MF_NORMAL_SPEED(cardNo, m_Axis, 0);     //set axis as
Symmetrical T curve mode
                    i8094MF_SET_A(cardNo, m_Axis, 50000);//set Acc =50000 PPS/S
                    i8094MF_SET_V(cardNo, m_Axis, 10000);
                    i8094MF_EXD_MP(cardNo, AXIS_U, 5);
                    i8094MF_EXD_DISABLE(cardNo, AXIS_X);
                    i8094MF_EXD_DISABLE(cardNo, AXIS_Y);
                    i8094MF_EXD_DISABLE(cardNo, AXIS_Z);
                    break;
            //-------------------------------------------------------------
            case 83:
            case 115:
                    i8094MF_EXD_DISABLE(cardNo, AXIS_X);
                    i8094MF_EXD_DISABLE(cardNo, AXIS_Y);
                    i8094MF_EXD_DISABLE(cardNo, AXIS_Z);
                    i8094MF_EXD_DISABLE(cardNo, AXIS_U);
                    break;
            //-------------------------------------------------------------
            default:
                    break;
        }
    } while (1);
}
```


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4.3.4 Build the Project

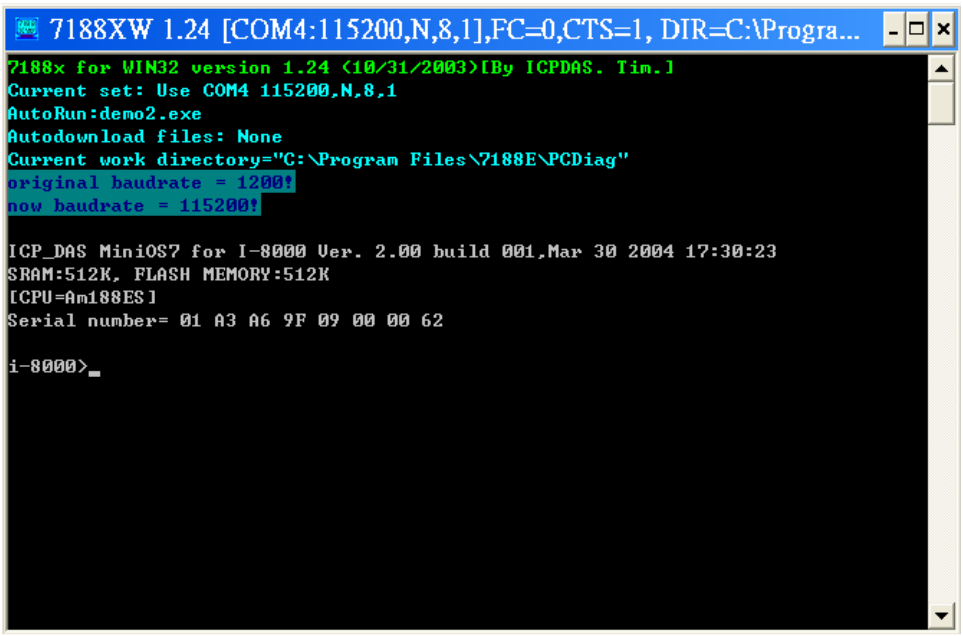
Click F9 to compile program, LINK or demo100.EXE。



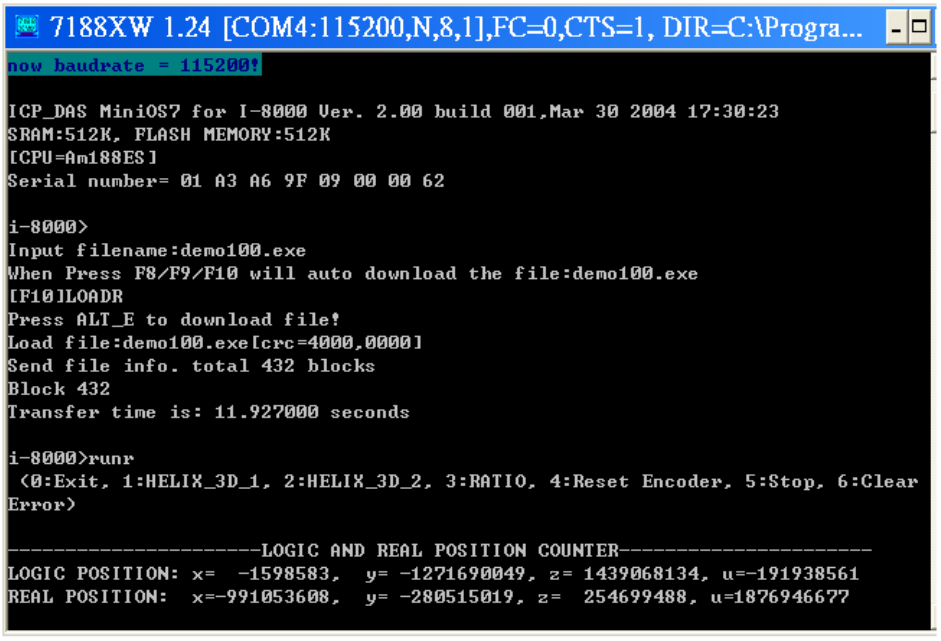
4.3.6 Download and Run

1. Please execute the “7188.EXE” on computer （The “7188.EXE” is a executed file of DOS, it can be used in DOS or DOS BOX of Win9X/WINNT/WIN2K）.
2. Please depend on actual wiring "COM PORT" that assign to "COM1(ALT_1)" or "COM2(ALT_2)" and set the transmission speed to “115200,N,8,1”.
3. Turn on the power of I-8000. It will have two situation：
   - It will appear a version of MiniOs7 message if the ” INIT*” connected to “ INIT*COM”, then appear I-8000>。
   - The I-8000 will run the “AUTOEXEC.BAT” if the “INIT*“ unconnected, then appear I-8000>。
4. User can start to make a command of I-8000 after appearing the “I-8000>”, as below drawing:

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5. Press the F2 button on the keyboard, then key in “demo100.exe”, then press the F10 button to download and execute demo100.exe, as following drawing:



Please refer to the 7188 getting started manual.

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APPENDIX-A Setup Tools & Others

A.1 Setup the Development Environment of I8094

A.1.1 eVC ++ 4.0

1. Microsoft eVC++ 4.0: at least ServicPack2 (Have already got at present ServicPack4)
2. WinCon8000_EVC4_SP1: WinCon in eVC++ Development Environment (SA_IA)
3. WinConSDK:WinCon Software Tool(inc,lib,dll,demo…)

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

1. Above Microsoft Visual Studio.NET 2003 professional, including a SmartDeviceApplication item
2. Debug Tool: Windows CE .NET Utilities v1.1 for Visual Studio .NET 2003
3. WinConSDK:WinCon software Tool(inc,lib,dll,demo…)

A.1.3 Turbo C

1. Above boland Turbo C 2.0

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A.2 I8094 Surface



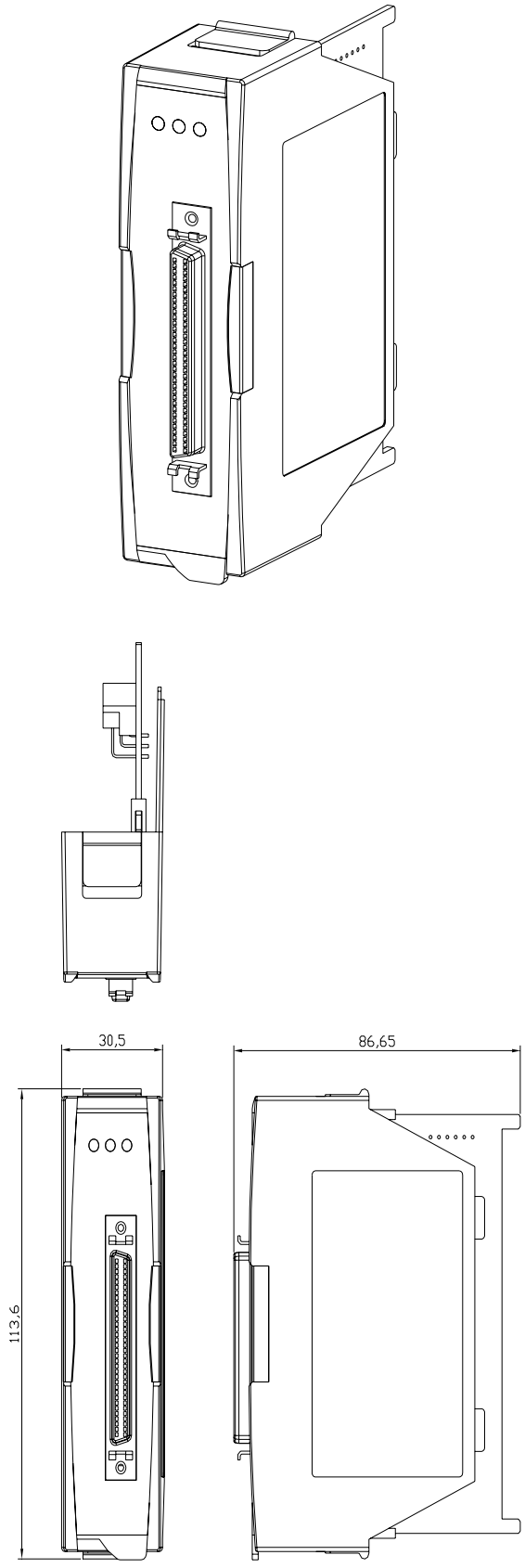






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A.3 Dimensions



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A.4 The Version Upgrades Note

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

Changed the FUNCTION section

Add section 3.9 Synchronization Motion

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

i8094_* ==>i8094MF_* (All Macro Function)

i8094_MF.DLL ==>i8094.DLL

i8094_MF.h ==>i8094.h

i8094_MF_NET.DLL ==>i8094_NET.DLL

i8094 Macro Function Manual ==> Getting Start manual of i8094 motion controlmodule

Demo_First Changed(eVC++ and VB.NET)

Add section 5.1 Setup the Development Environment of I8094

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APPENDIX-B Others Terminal Boards

B.1 DN-8468M Daughter Board

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

B.1.1 Board Layout for DN-8468M

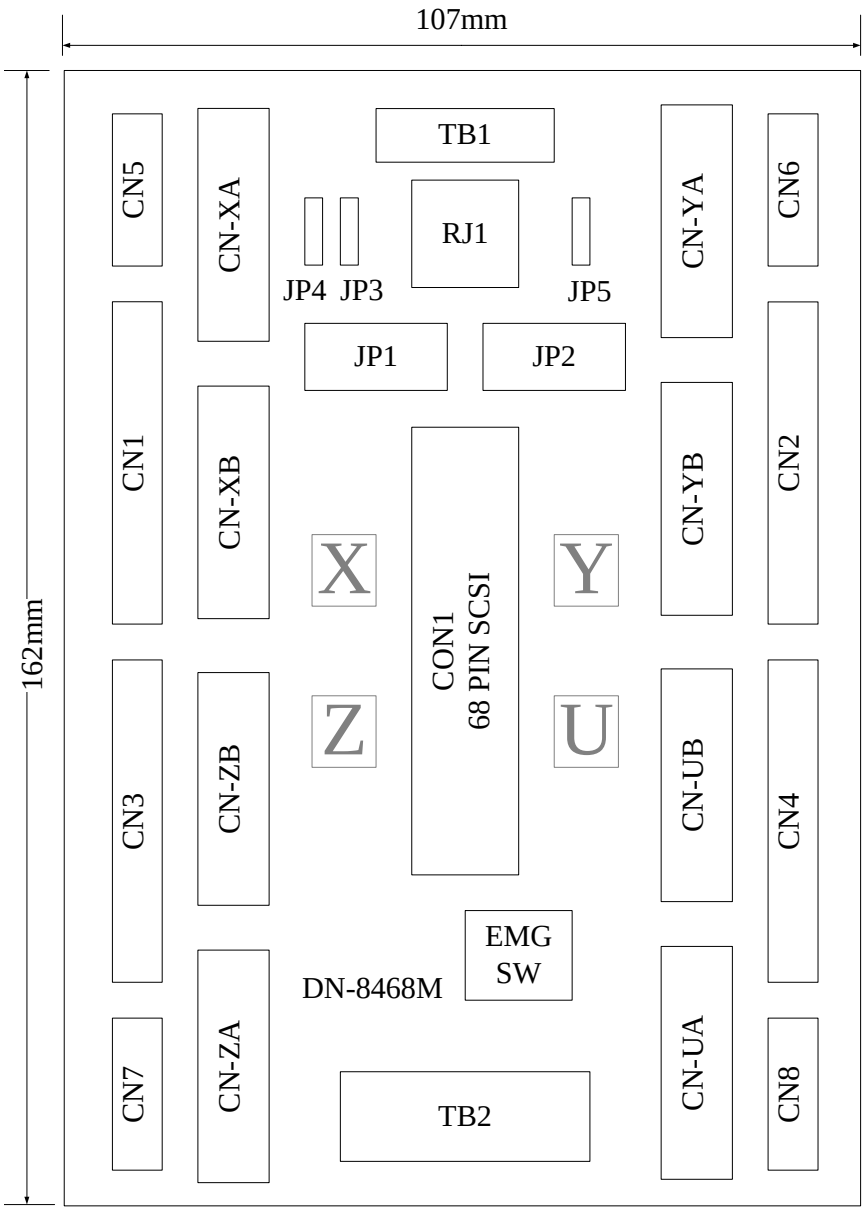


Fig. 1-1 Board layout for the DN-8468M

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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.

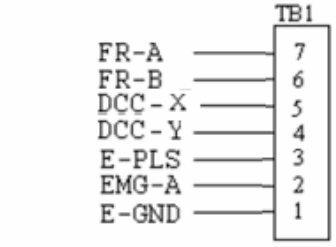


Fig. 1-3 Pin definition for TB1

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.

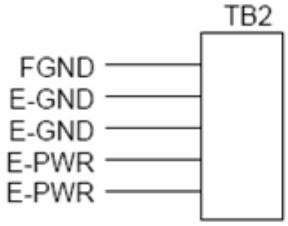


Fig. 1-4 Pin definition for TB2

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.

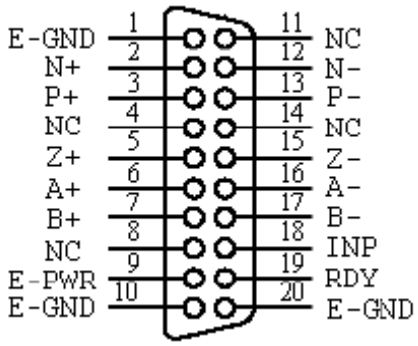


Fig. 1-5 Pin definition for CN-XA, CN-YA, CN-ZA, CN-UA

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.

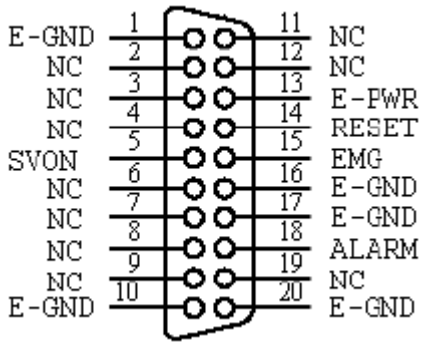


Fig. 1-6 Pin definition for CN-XB, CN-YB CN-ZB, CN-UB

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.

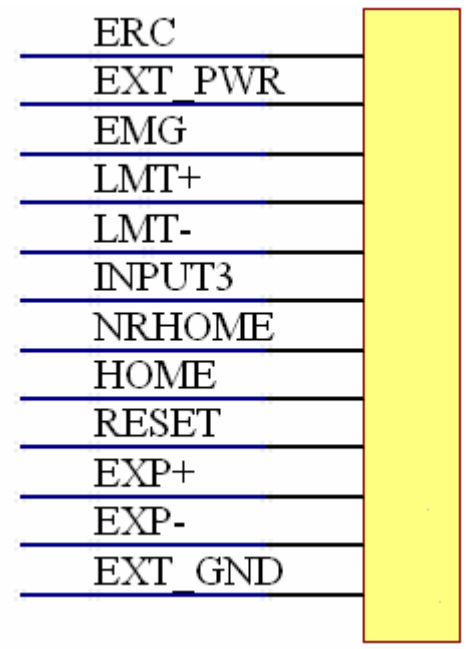


Fig 1-7 Pin definition for CN1~ CN4

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.

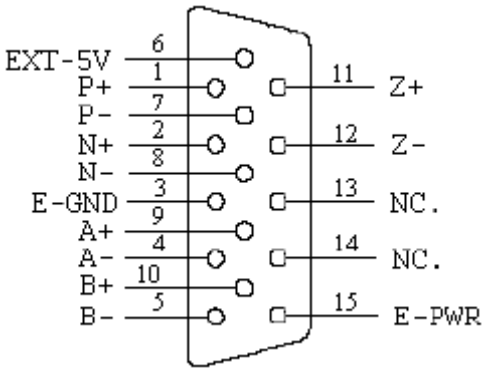


Fig. 1-8 Pin definition for CN5~CN8

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.

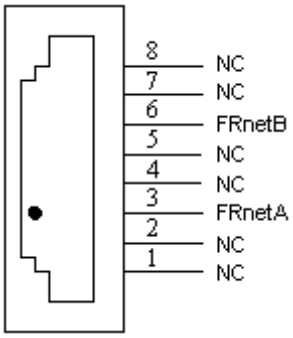


Table 1-10 RJ1

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.

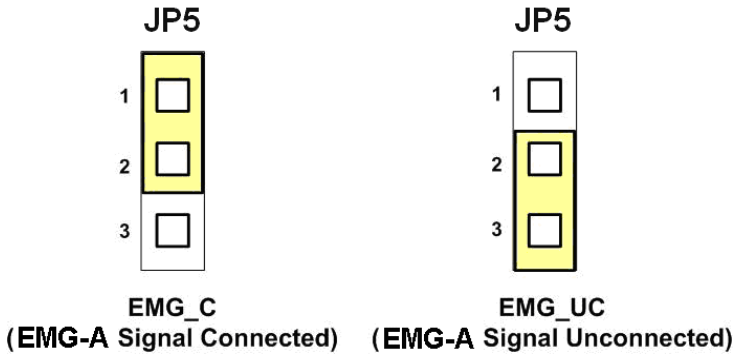


Fig. 1-10 Jumper 5 setting

■ 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.

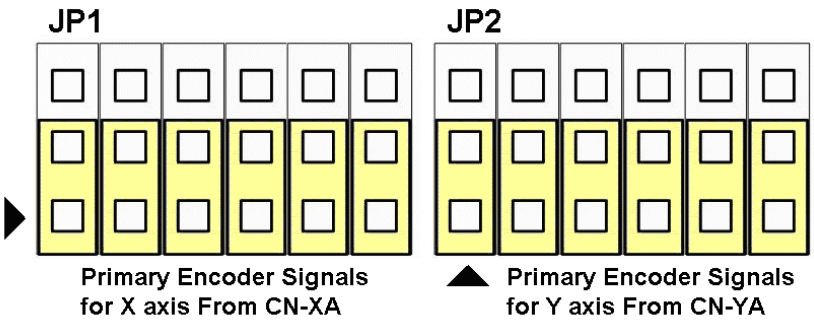


Fig. 1-11 Primary encoder signals setting

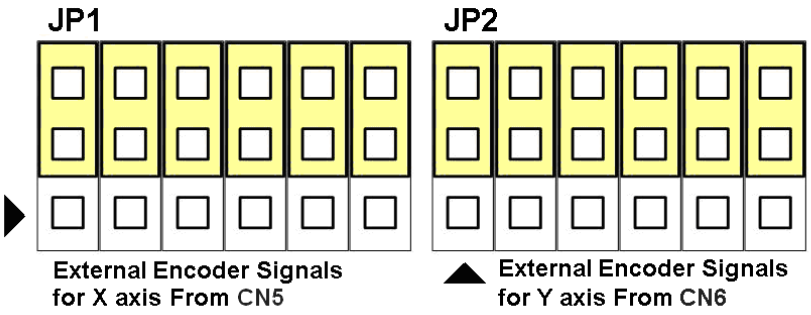


Fig. 1-12 External encoder signals setting

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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.

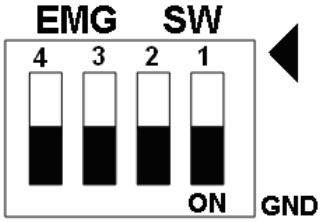


Fig. 1-13 EMG SW setting for normally GND (Default setting)



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

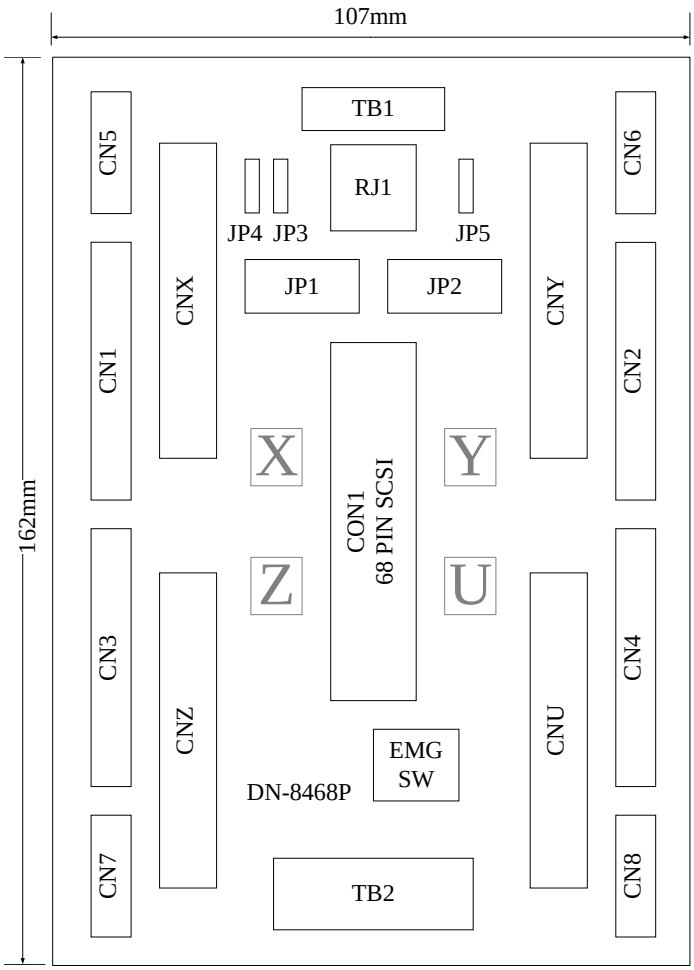


Fig. B2-1 Board layout for the DN-8468P

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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.

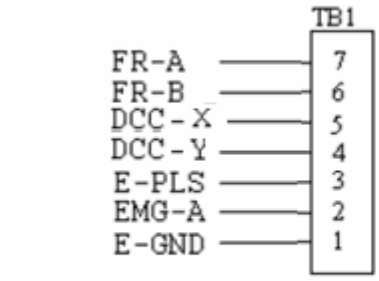


Fig. 1-3 Pin definition for TB1

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.

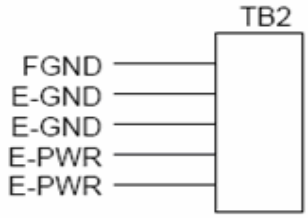


Fig. 1-4 Pin definition for TB2

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.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.

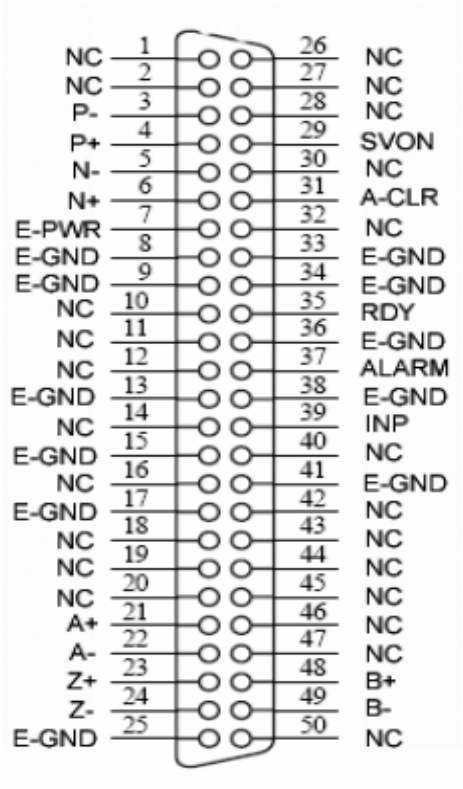


Fig. 1-5 Pin definition for CNX, CNY, CNZ, CNU

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.

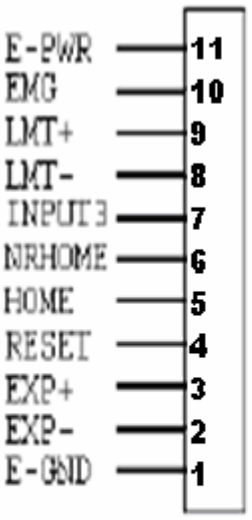


Fig.1-7 Pin definition for CN1 ~ CN4

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.

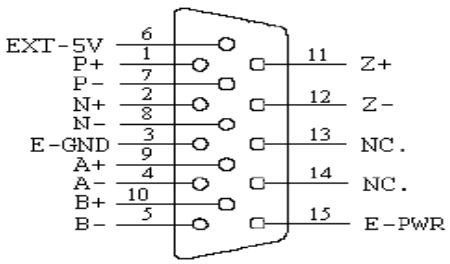


Fig. 1-8 Pin definition for CN5 ~ CN8

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.

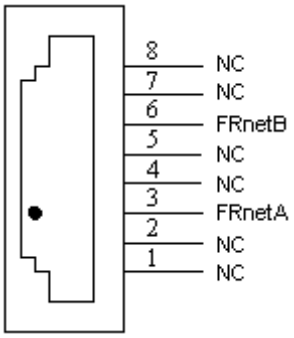


Fig. 1-9 Pin definition for RJ

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.

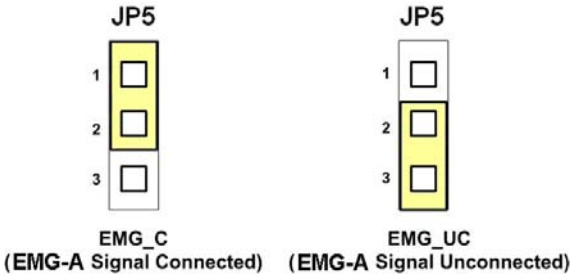


Fig. 1-10 Jumper 5 setting

■ 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.

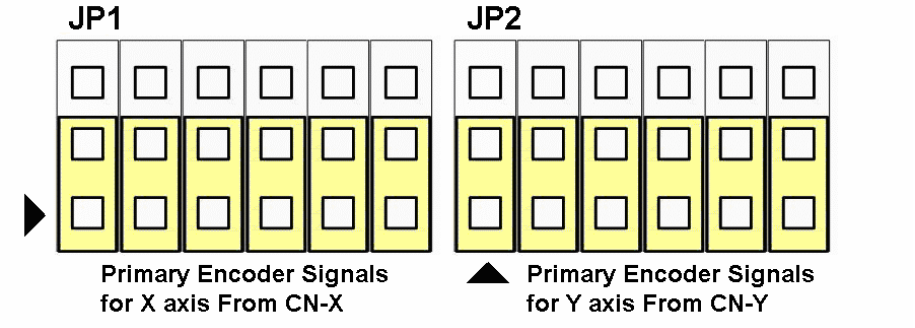
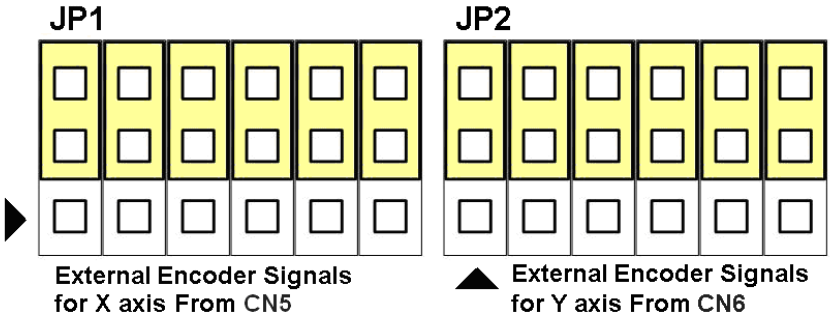


Fig. 1-11 Primary encoder signals setting



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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.

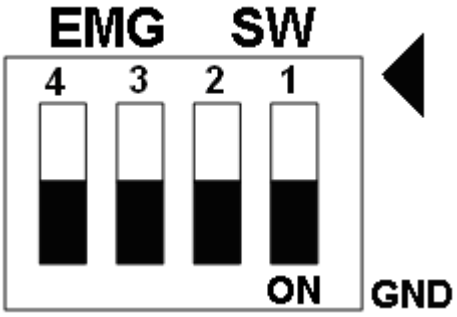


Fig. 1-13 EMG SW setting for normally GND (Default setting)

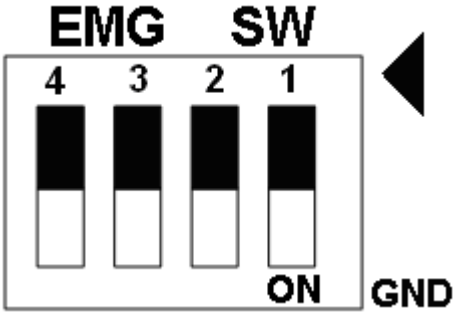


Fig. 1-14 EMG SW setting for user controlled signals.

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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

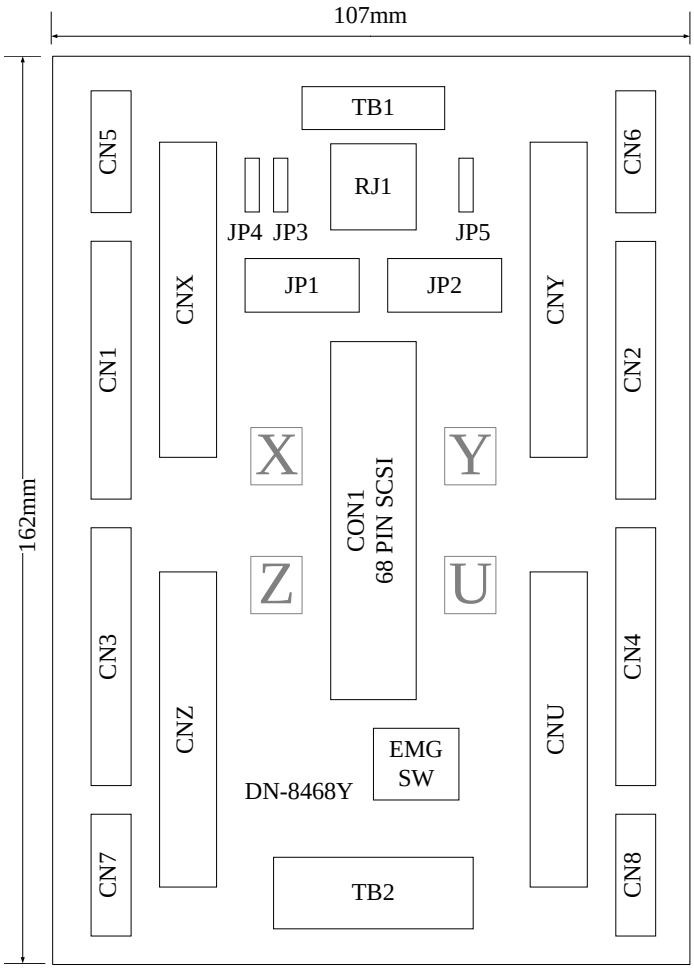


Fig. 3-1 Board layout for the DN-8468Y

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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.

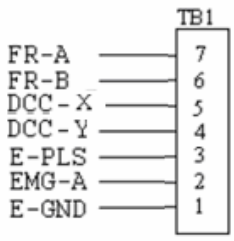


Fig. 1-3 Pin definition for TB1

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.

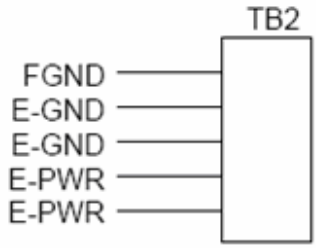


Fig. 1-4 Pin definition for TB2

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.

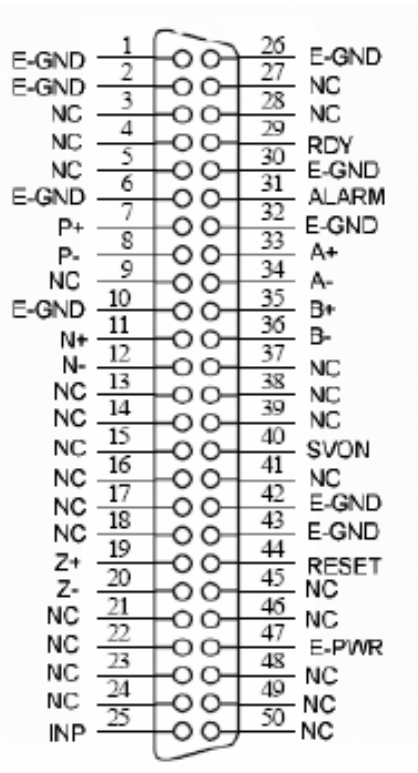


Fig. 3-5 Pin definition for CNX, CNY, CNZ, CNU

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.

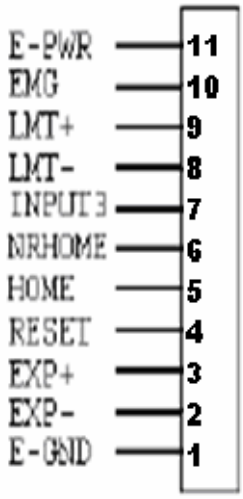


Fig.3-7 Pin definition for CN1 ~ CN4

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.

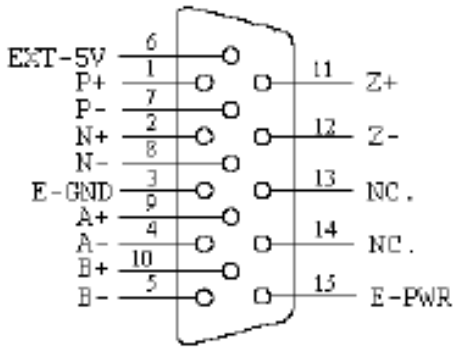


Fig. 3-8 Pin definition for CN5 ~ CN8

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.

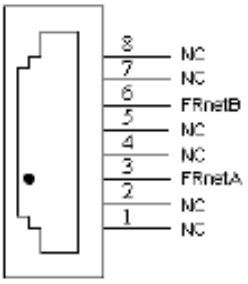


Fig. 3-9 Pin definition for RJ1

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.

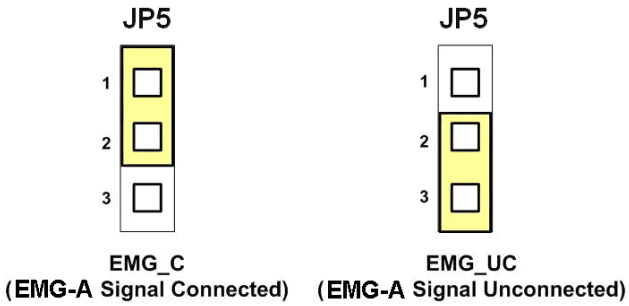


Fig. 3-10 Jumper 5 setting

■ 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.

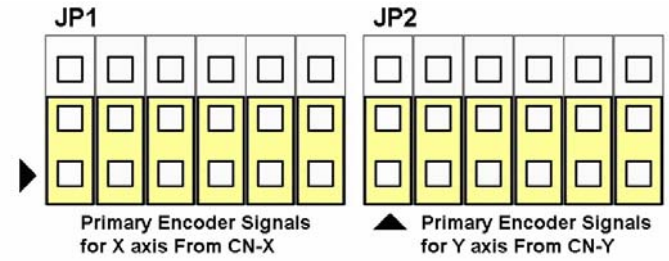


Fig. 3-11 Primary encoder signals setting

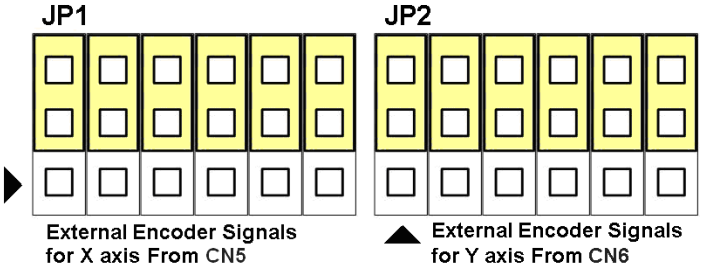


Fig. 3-12 External encoder signals setting

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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.

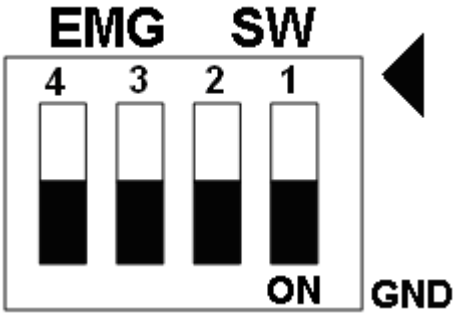


Fig. 3-13 EMG SW setting for normally GND (Default setting)

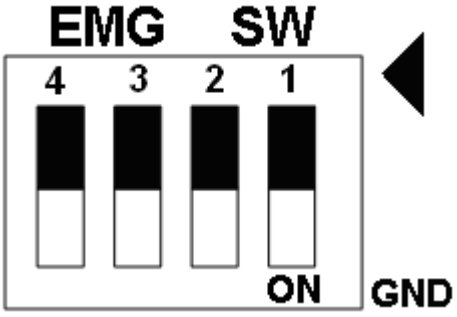


Fig. 3-14 EMG SW setting for user controlled signals.

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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

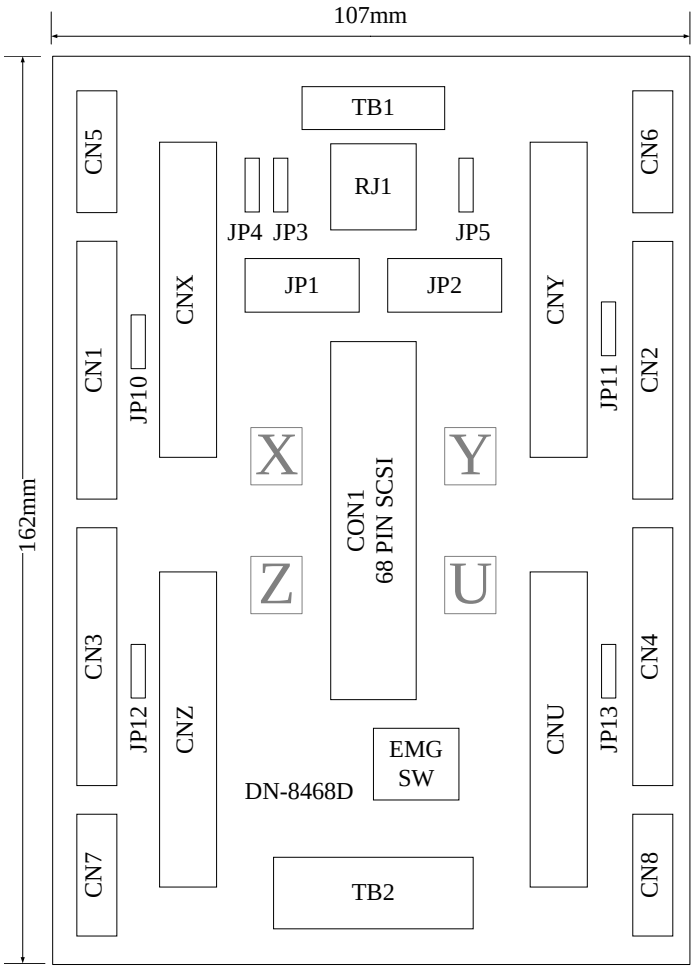


Fig. 3-1 Board layout for the DN-8468D

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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.

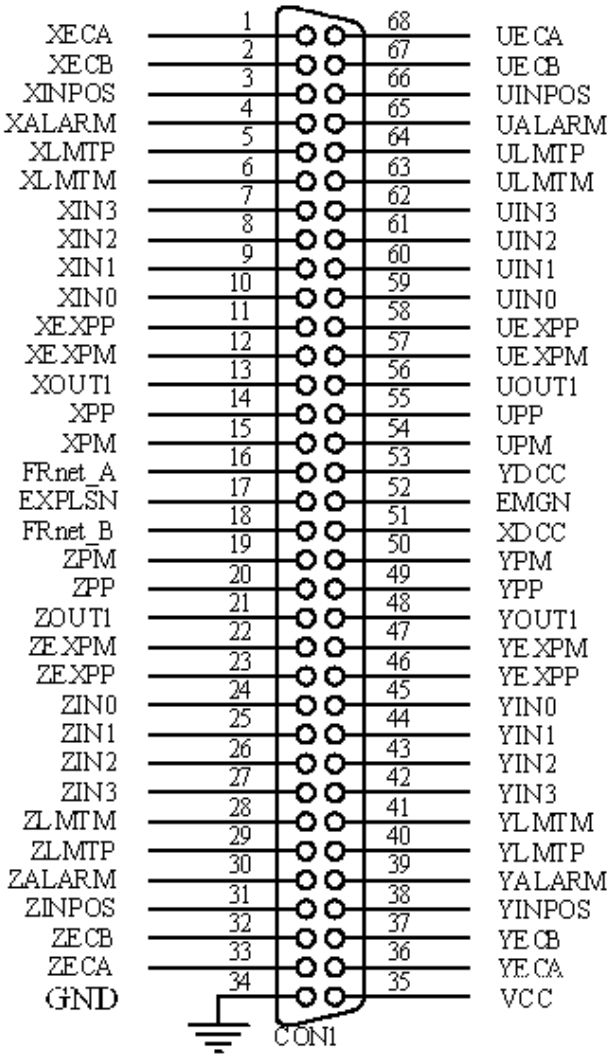


Fig. 3-2 I/O connector pin assignment for the CON1

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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.

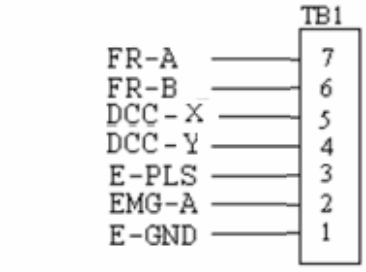


Fig. 1-3 Pin definition for TB1

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.

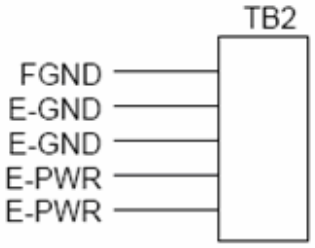


Table 1-5 TB2 Signal Connection

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 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.

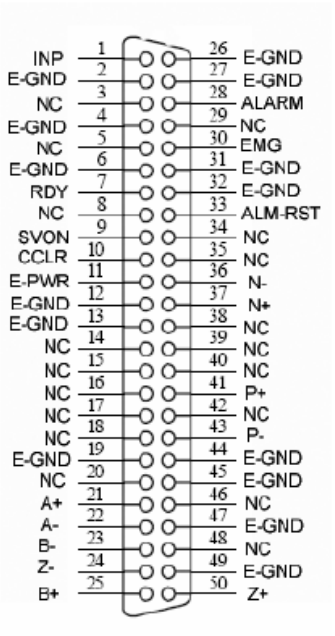


Fig. 3-5 Pin definition for CNX, CNY, CNZ, CNU

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.

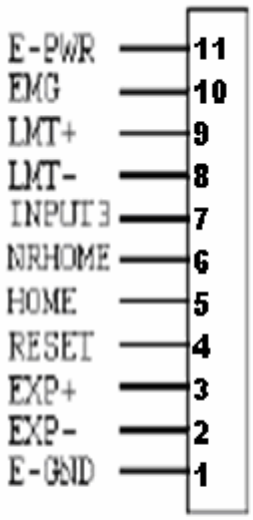


Fig.3-7 Pin definition for CN1 ~ CN4

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.

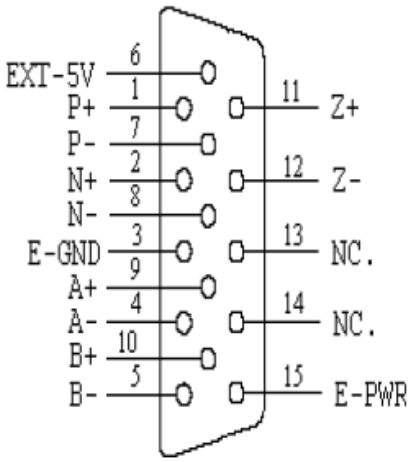


Fig. 3-8 Pin definition for CN5 ~ CN8

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.

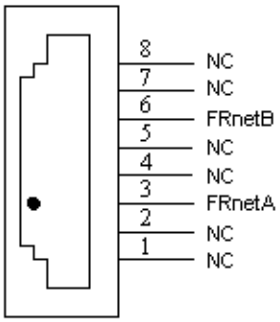


Fig. 3-9 Pin definition for RJ1

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.

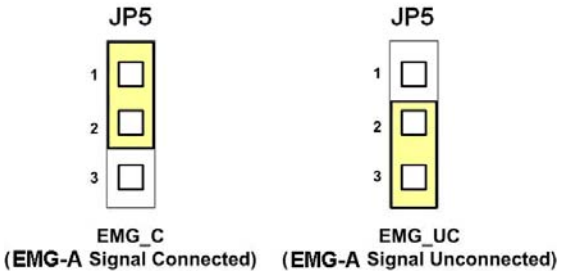


Fig. 3-10 Jumper 5 setting

■ 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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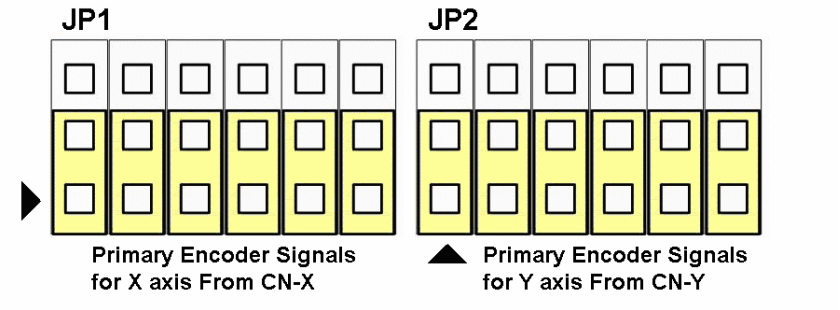


Fig. 3-11 Primary encoder signals setting

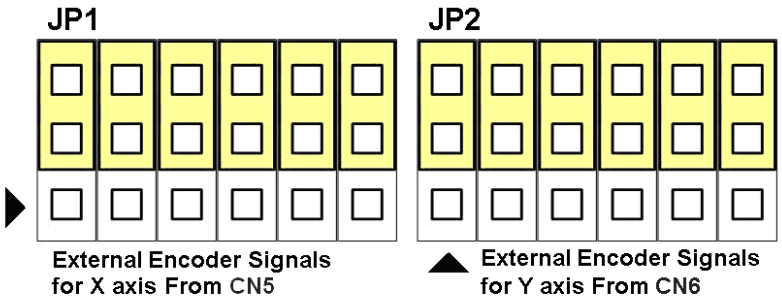


Fig. 3-12 External encoder signals setting

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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.

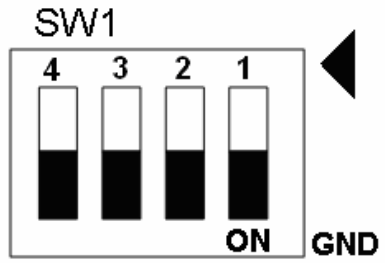


Fig. 3-13 SW1 setting for normally GND (Default setting)

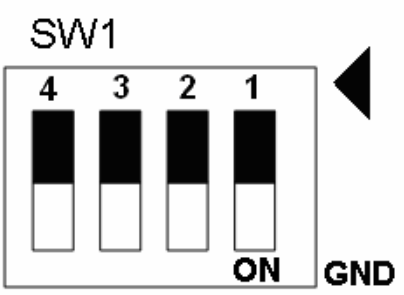


Fig. 3-14 SW1 setting for user controlled signals.

■ 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.

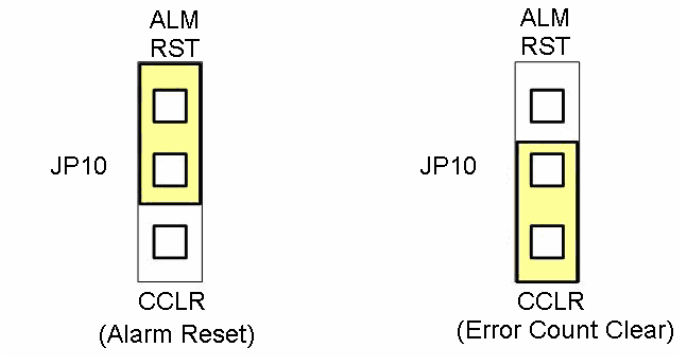


Fig. 3-15 JP 10 ~ 13 setting

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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

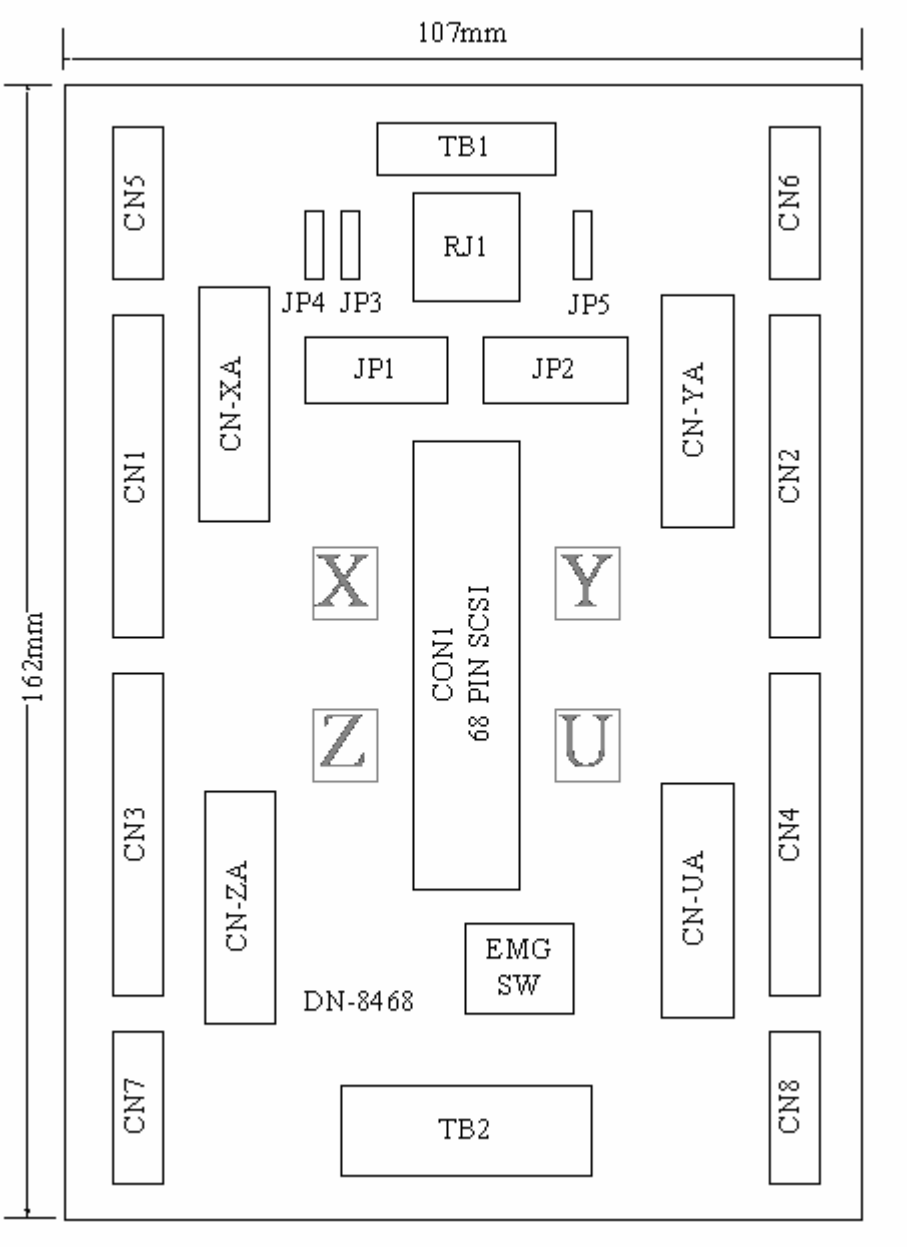


Fig. 3-1 Board layout for the DN-8468FB

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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.

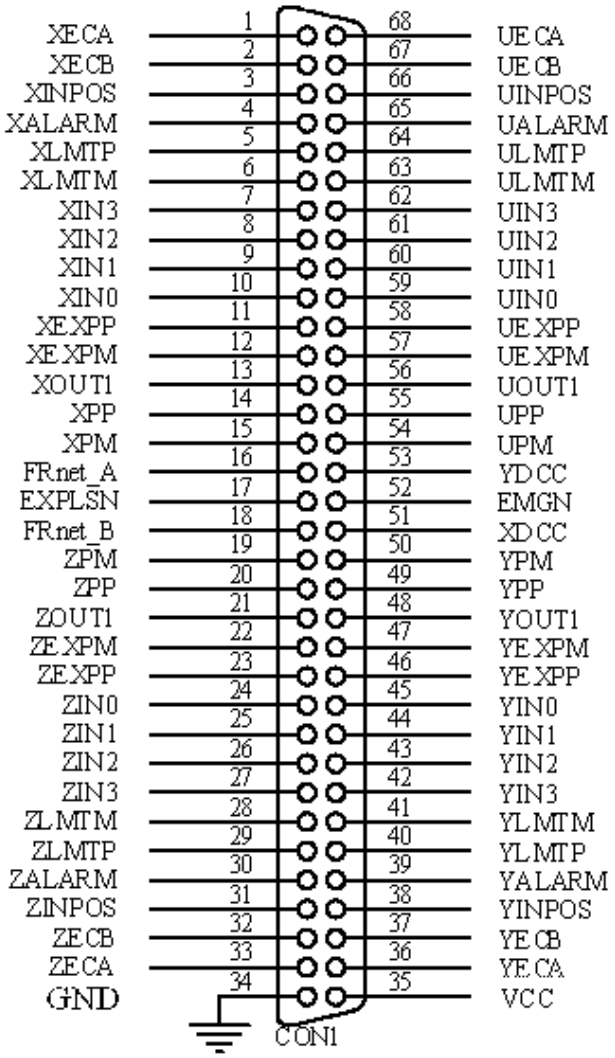


Fig. 3-2 I/O connector pin assignment for the CON1

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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.

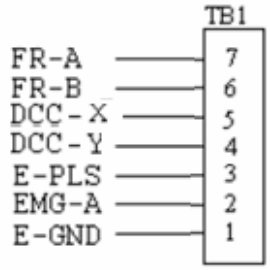


Fig. 1-3 Pin definition for TB1

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.

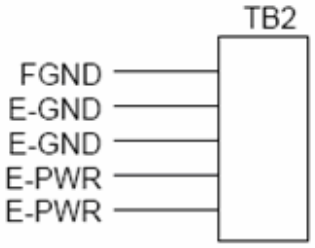


Table 1-5 TB2 Signal Connection

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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■ 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.

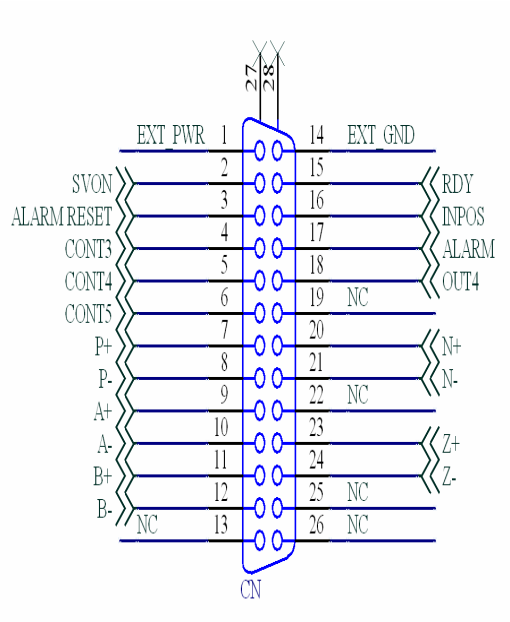


Fig 3-5 Pin definition for CN-X, CN-Y, CN-Z, CN-U

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

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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 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.

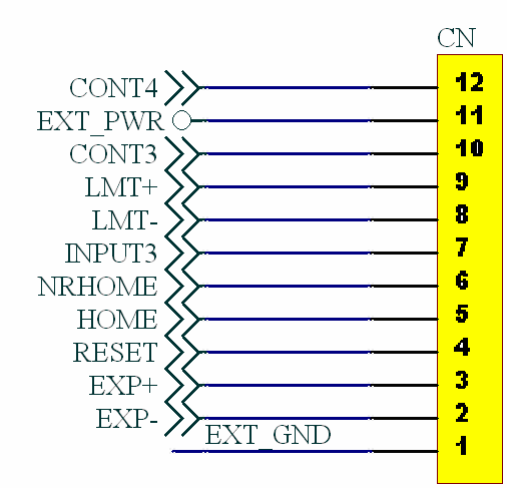


Fig 3-7 Pin definition for CN1~ CN4

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.

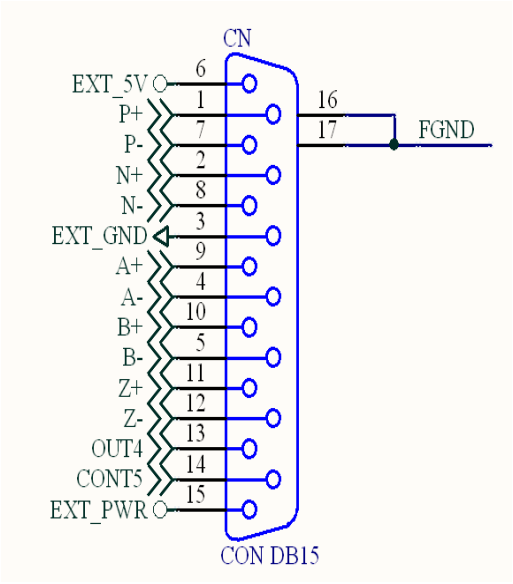


Fig 3-8 Pin definition for CN5~ CN8

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.

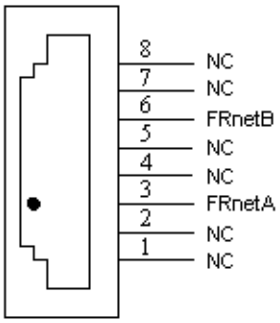


Fig. 3-9 Pin definition for RJ1

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.

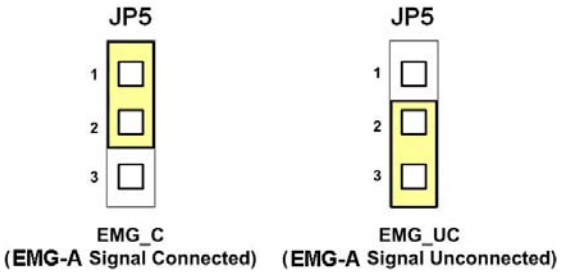


Fig. 3-10 Jumper 5 setting

■ 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.

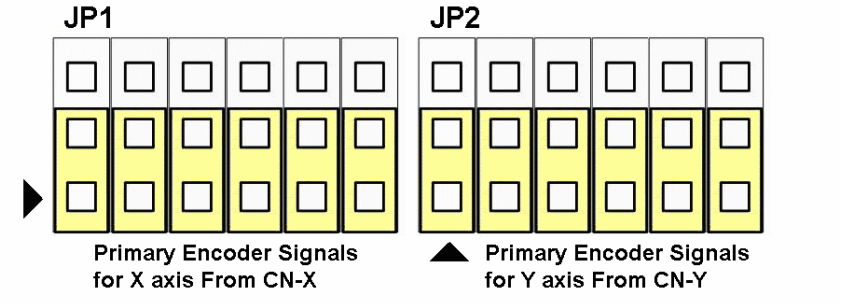


Fig. 3-11 Primary encoder signals setting

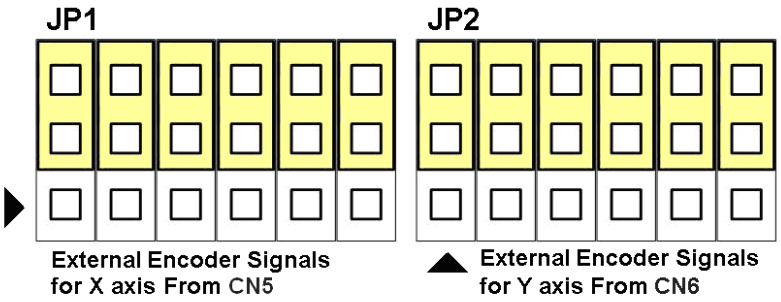


Fig. 3-12 External encoder signals setting

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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.

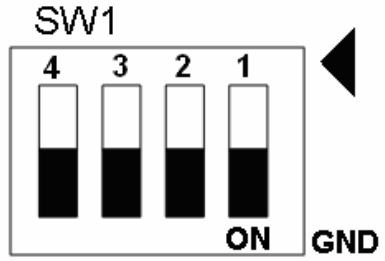


Fig. 3-13 SW1 setting for normally GND (Default setting)

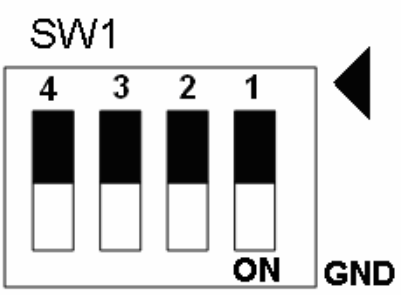


Fig. 3-14 SW1 setting for user controlled signals.

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