



WEIHONG Manufactures' Manual
Suitable for PCIMC-53B/53C
Motion Control Card

Version: 11

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Shanghai Weihong Electronic Technology Co., Ltd.

Preface

Thank you for your purchase of PCIMC-53B/53C motion control cards, which are reliable stability. PCIMC-53B/53C motion control cards are developed independently by Shanghai Weihong Electronic Technology Co., Ltd. Mating with NcStudioTM motion control software, they are applied to motion control of series of routers, engraving and milling machines, drilling machines and cutting machines, being available of comprehensive function, convenience.

Please carefully read the Introduction after purchase, which will be beneficial in using.

Here we list company address, telephone number and Web site. Any questions, please feel free to contact with us. You will be always welcome.

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1. Components of Motion control systems of PCIMC-53B/53C

- 1) One motion control card of PCIMC-53B/53C
- 2) NcStudio™ Motion Control Card Support CD (Sometime we will not provide if the factory has had this software, except for software upgrade)
- 3) EX1D extended board
- 4) DB37M/F cable (1.5m or 3m)
- 5) SC16--DB15F cable for Manual Pulse Generator (MPG)
- 6) NK-MPG-05 Manual Pulse Generator (Optional, 53B is with MPG function, while 53C is without MPG function)

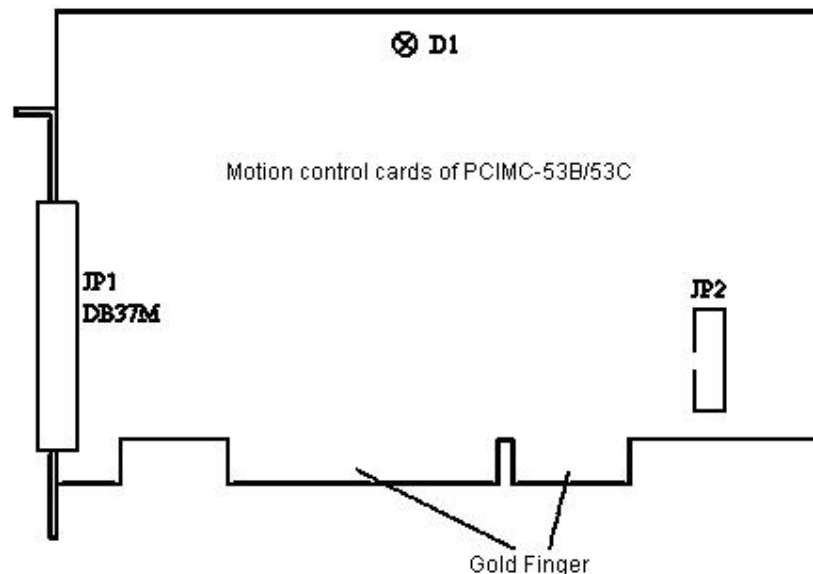


Fig. 1-1 PCIMC-53B\53C Motion Control Card

Shown in Fig. 1-1, PCIMC-53B\53C Motion Control Card uses PCI interface.

The size of 53B control card is 173.7mm*121.1mm. The Control Card has 2 sockets: JP1 is a DB37M socket and can be connected to the EX1D terminal board with the enclosed cable DB37M/F; JP2 is a socket for supporting Manual Pulse Generator (MPG) and can be connected to the host computer with an extended wire SC16--DB15F (with attachment of rail block).

The size of 53C control card is 140mm*95.9mm. With only one socket: JP1, which is a DB37M socket and can be connected to the EX1D terminal board with the enclosed cable DB37M/F.

Note:

There is a red LED D1 in these two motion cards which indicates the work status of control cards:

When NcStudio control system runs normally, D1 turns off;

When NcStudio control system runs abnormally, D1 turn on;

2. Installation

- 1) Insert the software Ncstudio™ CD to the CD driver of computer, and then double click file setup.exe for installation of the software;
- 2) Power off the computer, open the host computer, insert the control card to a white PCI slot and

- fasten it, fasten the rail block screw and then well cover the host computer;
- 3) Power on the computer. The computer will find the new hardware-device and install its driver automatically;
 - 4) Double click the shortcut icon of NcStudioTM on the desktop; if it runs normally, installation is over. (if the control system runs abnormally, please check whether the control card is well inserted and whether the gold pins is clean);

3. Port Instruction

The standard configuration of PCIMC-53B\53C is EX1D terminal board. Then join the extended board to port JP1 on the back of the control card with a DB37M/F cable.

JP2 socket is used for supporting MPG. Educe port JP2 out with an extended wire SC16-DB15F, and then join this SC16-DB15F to DB15 on the handwheel. Handwheel (MPG) is an optional configuration. You are allowed to purchase from Naiky Technology or from other company.

Pins Definition of DB15F on the handwheel is shown below in Table Fig.3-1.

Pins No.	Function	Description
1	+5V	Supply power to MPG encoder
2	HA	Negative terminal of A phase signal of encoder
3	HB	Negative terminal of B phase signal of encoder
4		Not connected
5		Not connected
6	X1	Select X1 ratio mode(0.001)
7	X10	Select X10 ratio mode(0.01)
8	X100	Select X100 ratio mode(0.1)
9		Not connected
10		Not connected
11	GND	Grounded
12	4	Not connected
13	Z	Select Z-axis
14	Y	Select Y-axis
15	X	Select X-axis

Fig. 3-1 Definition for Hand wheel (MPG) Interface

4. Wiring Connections

Guide rail installation is adopted for terminal board, and the size of 6B-EX1 is 154mm*72mm, shown below in Fig. 4-1.

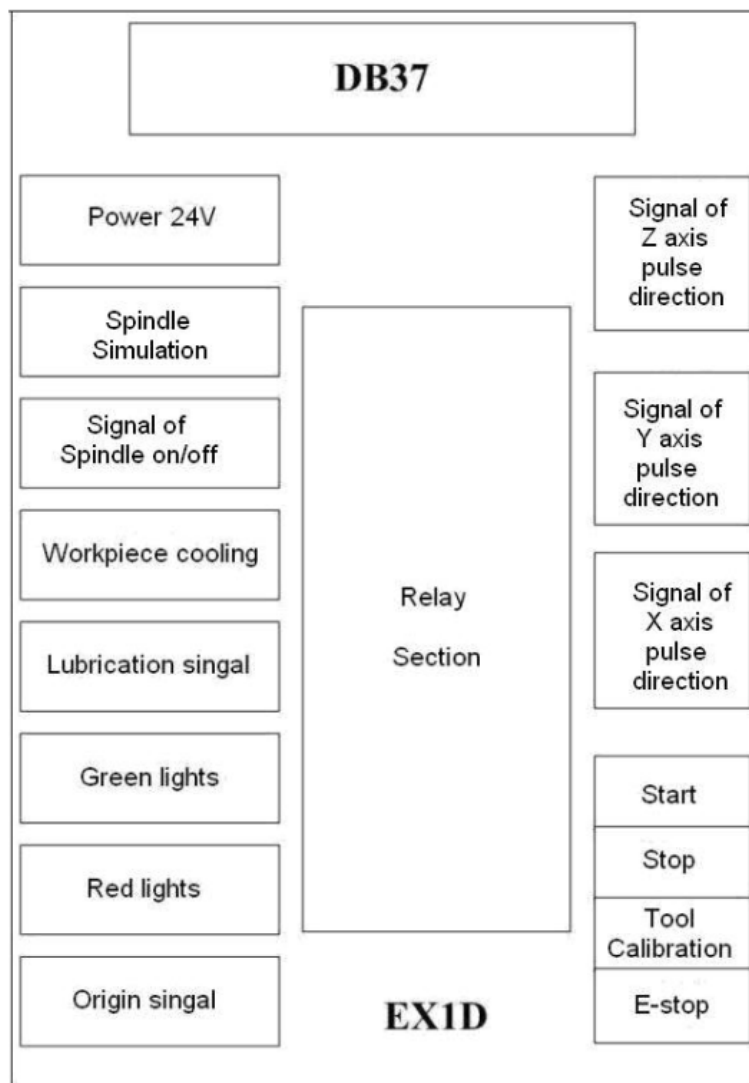


Fig. 4-1 Terminal Board EX1D

The connection between PCIMC-53B\53C Motion Control Card and stepping motor driver is shown below in Fig. 4-2:

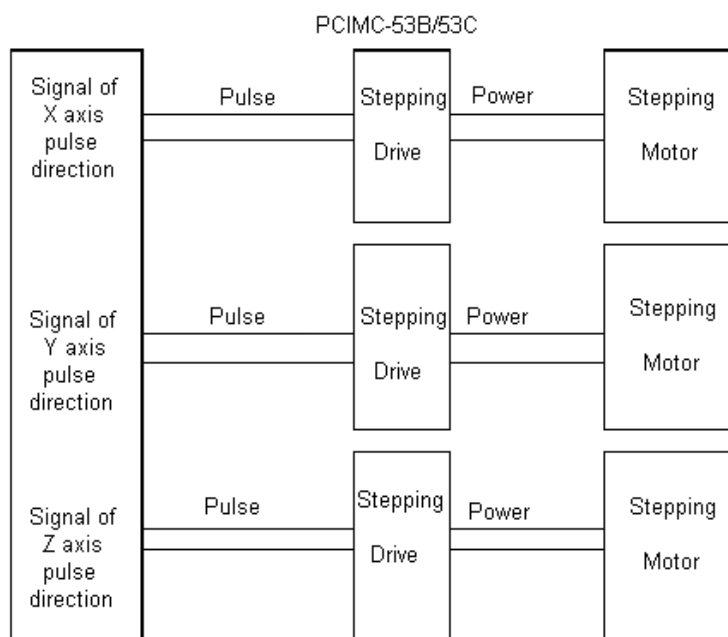


Fig. 4-2 the Connection between PCIMC-53B\53C and Stepping Motor Driver

4.1. Signal types

4.1.1. Switch Value Input Signal

Switch value input signal is only effective in low-level; Supports NO (Normally Opened), NC (Normally Closed) input signal (by modifying the polarity of input port).

When using NO switch, the signal is available as connecting with COM;

When using NC switch, the signal is available as disconnecting with COM.

The mechanical switch connects with switch value input signal, one end of the mechanical switch connects to the port input of switch value and the other end connects to GND, shown as Fig. 4-3:

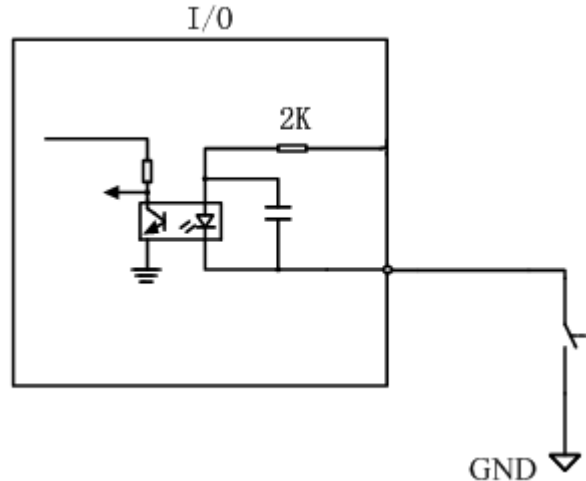


Fig. 4-3 Connection between Mechanical Switch and Switch Value Input Signal

The switch value input signal can be connected with photoelectric switch or proximity switch of NPN (NO) or NPN (NC) switch. The connection diagram is shown below in Fig. 4-4:

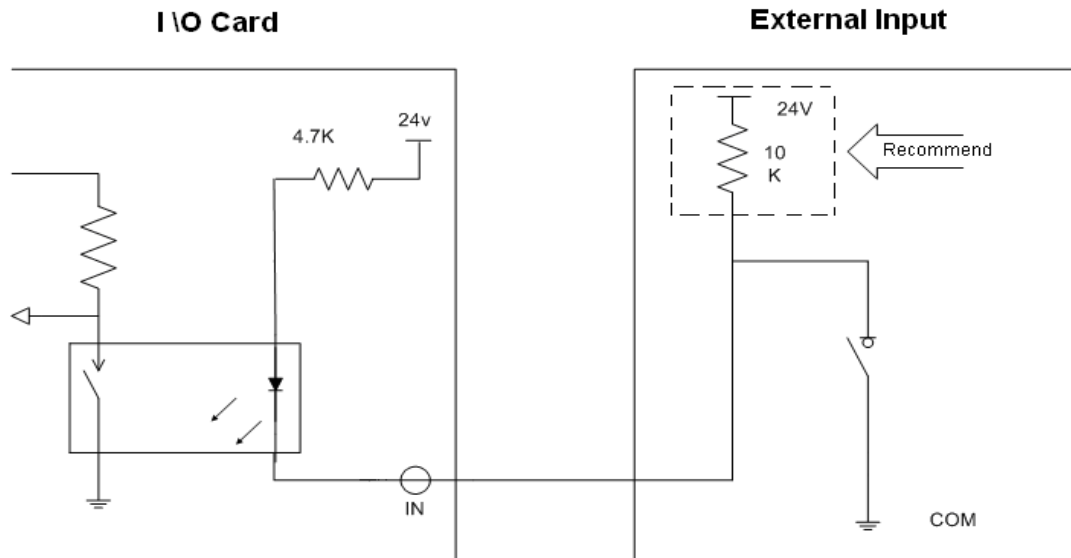


Fig. 4-4 Connection between Switch Value Input Signal and Photoelectric switch (or Proximity Switch)

4.1.2. Signal Output of Relay

Contact output of relay on the terminal board bears load capacity of 10A/250V AC or 10A/30V DC. It can control low-power load of 220V alternating current. To support high-power load, it can be connected to a contactor. Demonstration in details is shown below in Fig.4-5:

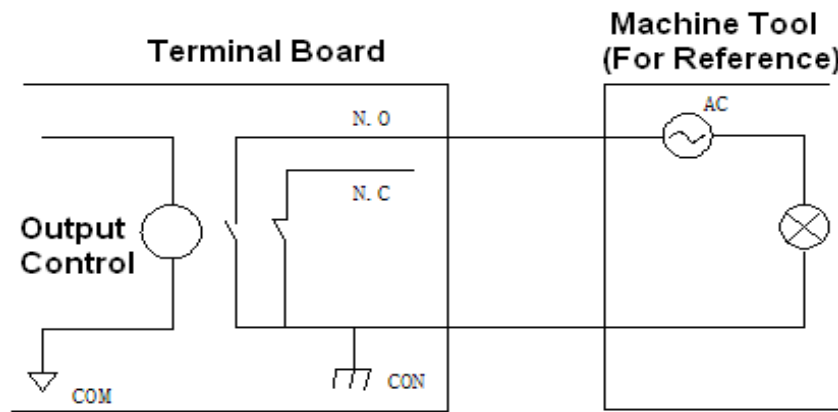


Fig. 4-5 Connection between Contactor and Output of Relay

4.1.3. Differential output signal

Pulse command form: pulse plus direction, negative logic. The maximum pulse frequency: 160KHZ. The sketch map of pulse mode is shown below in Fig. 7:

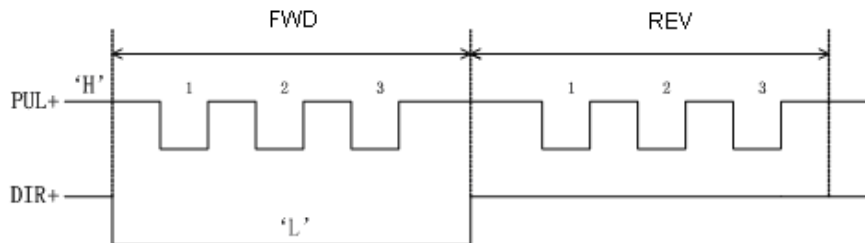


Fig. 4-6 Type of Pulse Command Output

Output mode of differential signal is shown below in Fig.4-7 :

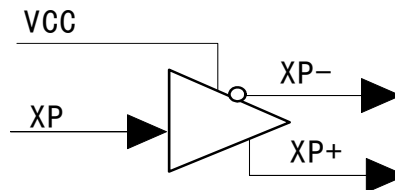


Fig. 4-7 Output Circuit of Pulse Command

4.2. Terminal Description

4.2.1. External Power Supply

Terminal board is powered a 24V external power source.

+24V、COM: Connect to corresponding end of power switch on the machine tool.

4.2.2. Stepping Motor Driver Interface

- XD+/XD-: direction signal of X-axis
- XP+/XP-: pulse signal of X-axis
- YD+/YD-: direction signal of Y-axis
- YP+/YP-: pulse signal of Y-axis
- ZD+/ZD-: direction signal of Z-axis
- ZP+/ZP-: pulse signal of Z-axis
- +5V:+5V power source supplied by the computer or PC.

4.2.3. Operation Interface

- ESTOP: Emergency stop, switch value input signal, usually connect with NC switch, and the ESTOP signal is available when being disconnected with COM;
- CUT: Tool calibration input, switch value input signal;
- START: To start the Motion Control System, it is for connecting with external operating button. The signal is available when it connects with COM;
- STOP: To stop the Motion Control System, it is for connecting with external operating button. The signal is available when it connects with COM;
- COM: Ground, the common terminals of digital switch value signal.

4.2.4. Origin signal

- X0: X axis origin, switch value input, and low level effective.
- Y0: Y axis origin, switch value input, and low level effective.
- Z0: Z axis origin, switch value input, and low level effective.
- COM: Ground, the Common port of above switch value signals.

4.2.5. Spindle control

- SVC: Analogue voltage signal output (0-10V), to control the rotary speed of the spindle motor; It connects with the command input port of analogue voltage frequency of transducer (normally known as AVI/VI). Change the frequency of transducer by altering the voltage, which results in the change of the main spindle speed.
- GND: Analog voltage ground; Connects with analogue ground of transducer (usually known as ACM).
- SPIN: To start/stop the main spindle; being output by relay port; It have two terminals, one connects with the digital ground (usually known as DCM) of transducer and the other connects with forward-rotation input port of transducer (usually known as FOR).
- COOL: spindle cooling, which is started with the opening of spindle.

4.2.6. Signal Lights

- RED: red alarm lamp, when system stopped emergently, the red lamp will light up. It can also be used in the information function of accomplishment of machining.
- GREEN: green working lamp, when machine tool runs normally, the lamp will light up.

4.2.7. Other signals

- OIL: Supply lubrication, to control lubrication supply automatically, relay output, the lamp becomes light when lubrication goes on and becomes out when lubrication stops.

4.3. Wiring diagram

Wiring diagram of EX1 terminal board is shown below in Fig. 4-8. Many auxiliary function of terminal board is optional.

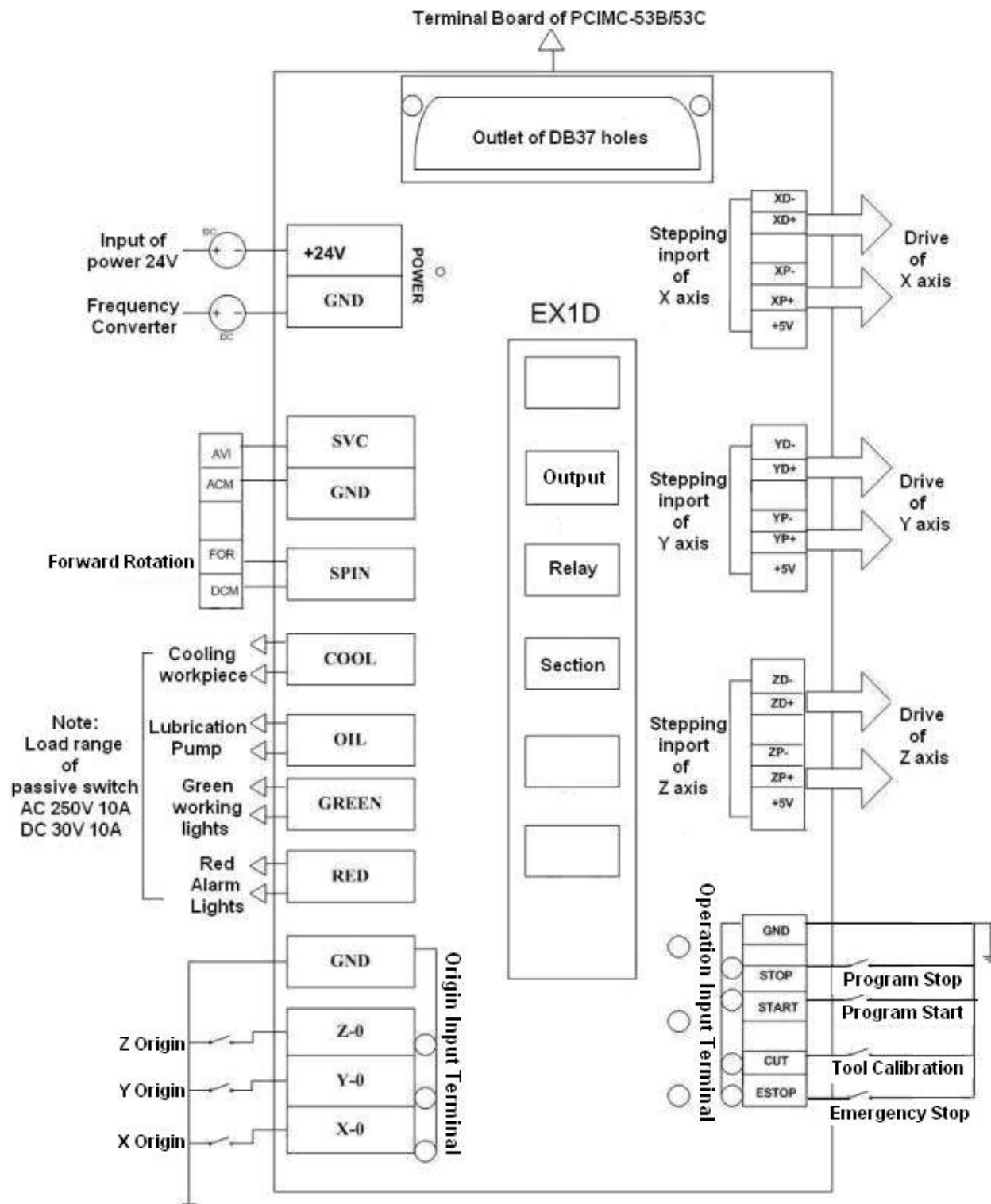


Fig. 4-8 Wiring Diagram of Terminal Board EX1D

4.4. Wiring diagram of EX1D terminal board and stepping drive

4.4.1. Connection of EX1D terminal board and stepping drive with common port

Please see diagram Fig.4-9.

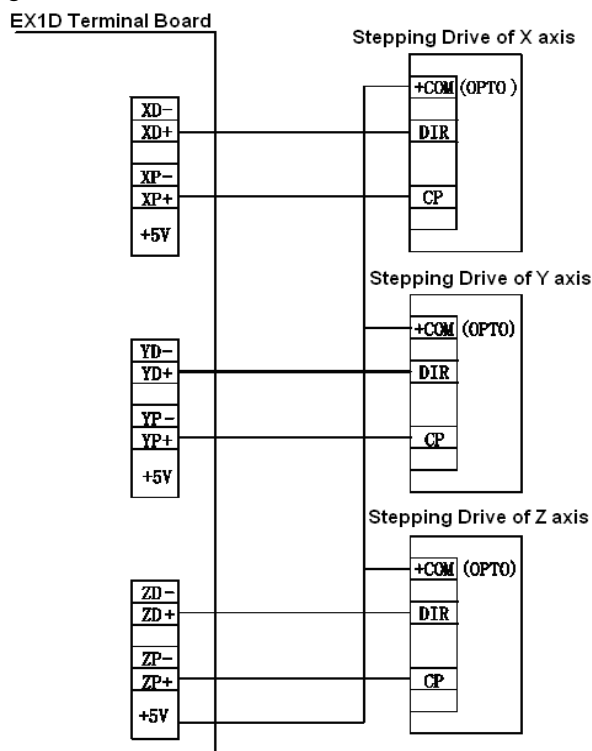


Fig. 4-9 Connection between Terminal Board EX1D and Stepping Motor Driver with Co-terminal of Pulse Signal

4.4.2. Connection of EX1D terminal board and stepping motor driver with differential input

Please see Diagram Fig.4-10.

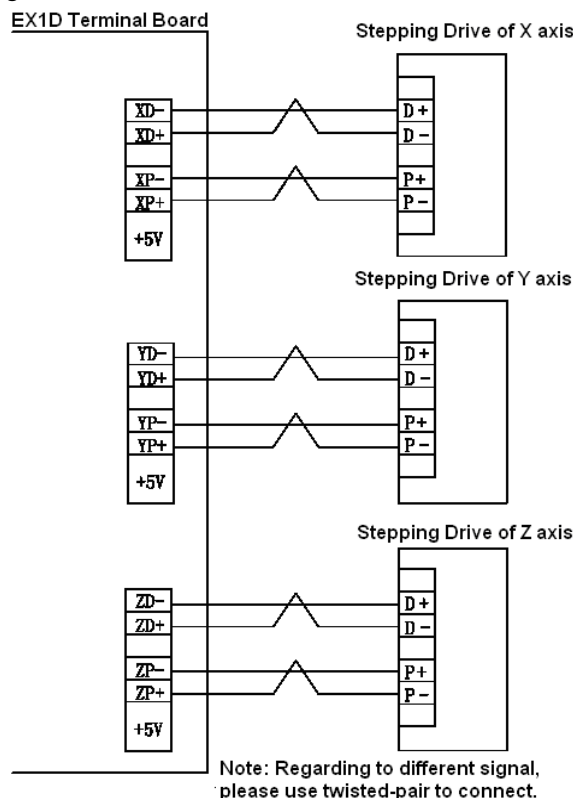


Fig. 4-10 Connection between Terminal Board EX1D and Stepping Motor Driver with Differential Signal

4.5. Wiring Diagram of Terminal Board EX1D and Specific Servo Driver and the Basic Parameters for Servo Driver

4.5.1. Wiring Diagram of Connection between Terminal Board EX1D and YASKAWA Σ -II Servo Driver and Parameter List

- 1) Wiring Diagram of Connection between Terminal Board EX1D and YASKAWA Σ -II Servo Driver is shown as below in Fig. 4-11.

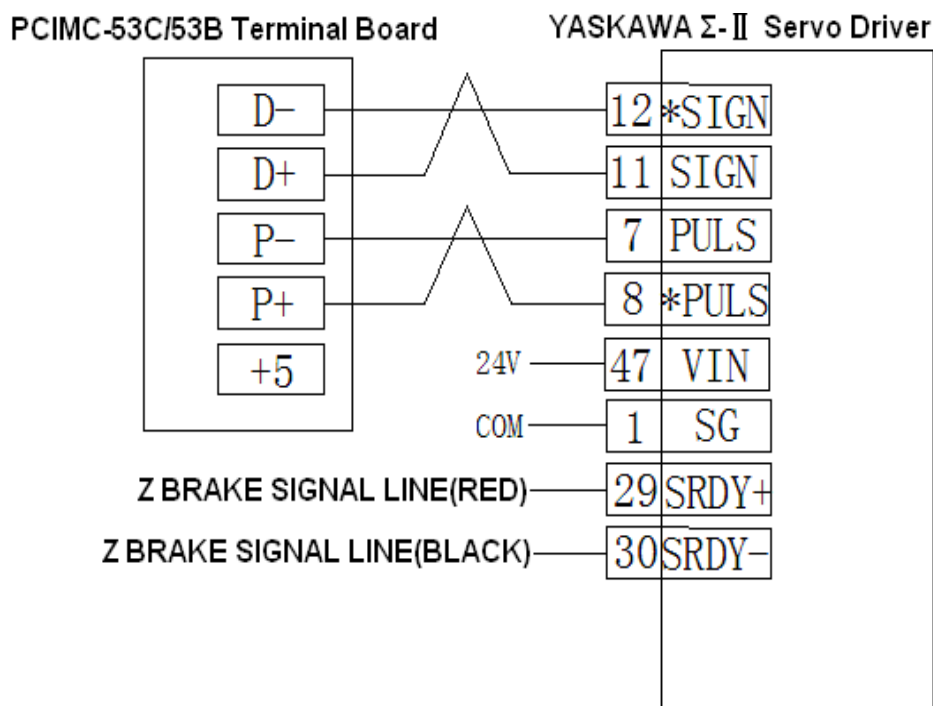


Fig. 4-11 Connection between Terminal Board EX1D and YASKAWA Σ -II Servo Driver

Note: Wiring of X, Y, and Z axis is the same. Only Z axis has two brake signal lines which can be connected to relay to control the brake.

2) Parameter Setting of YASKAWA Σ -II Series Servo Drive

- (1) Set auxiliary function parameters for servo driver, demonstration is shown as Form 2.

Form 2 parameters setting for YASKAWA Σ -II series auxiliary function

Parameter	Function	Contents
Fn010	Password setting (protects parameters from being changed)	Set[0000]: user parameter [PnXXX] and a part of auxiliary function parameter [FnXXX] setting permitted; Set [0001]: user parameter [PnXXX] and a part of auxiliary function parameter [FnXXX] setting prohibited.

- (2) Set user parameters for servo driver, demonstration is shown as Form 3.

For YASKAWA servo driver, machine tool can act after setting the following parameters. To optimize the performance of machine tool, please carefully refer to technology information of servo driver.

Form 3 YASKAWA Σ -II series user setting

Para No.	Function	Setting	Contents
Pn000	Direction Selection Control Method selection	0010	Digit 0: Setting"0", setting CCW as forward direction; Setting"1", setting CW as forward direction (Reverse rotation mode). Digit 1: Setting"1", Position control (calculating pulse instruction)
Pn001	Selection servo off or alarm stop mode	XXX0	Digit 0: Setting"0", stopping the motor by applying dynamic brake(DB); Setting"1", stopping the motor by applying dynamic brake(DB) and then releases DB; Setting"2", making the motor coast to a stop state without using the dynamic brake(DB).
Pn200	Selection pulse direction	XXX5	Digit 0: Setting"5", signing +pulse, negative logic;
Pn50A	Input Signal Selections	8170	Digit 0: Setting"0", using the sequence input signal terminals with standard allocation(Input signal allocation mode); Digit 1: Setting"7", setting signal ON/(S-ON Signal Mapping); Digit 2: Setting"1", setting ON when SIO (CN1-40) input signal is ON/(P-CON Signal Mapping) Digit 3: Setting"8", setting signal OFF (P-OT Signal Mapping)
Pn50B	Input Signal Selections	6548	Digit 0: Setting"8", Reverse run allowed.(N-OT signal Mapping)
Pn50F	Input Signal Selections	0300	Under Brake Reference; Digit 2: Setting"3", Brake interlock signal mapping (/BK) from CN1-29,30, the relay used is 24V.
Pn50E	Input Signal Selections	0000	Under Brake Reference; Number "3" can't be selected to protect CN1-29, CN 1-30 from being used of other functions, leading to disable of brake.
Pn506	Brake Reference-Servo Off Delay Time	Depended	Under Brake Reference; Default setting is "0", setting unit is 10ms.
Pn507	Brake Reference Output Speed Level	Depended	Under Brake Reference; When the motor speed falls below the level set in Pn507 after the servo OFF, BK signal output. Factory setting: [100]. Unit: min^{-1}
Pn508	Timing for Brake Reference Output during Motor Operation	Depended	Under Brake Reference; When the time set in Pn508 is exceeded after the servo OFF, BK signal will be output. Factory setting: [50]. Unit: ms (Note: BK signal output when either of the conditions above-mentioned in PN507 and PN508 is satisfied)
Pn201	PG Dividing Ratio (For 16-bit or less)	Right-side	Gain encoder
			Model A No. of pulse per revolution(P/R) 13bit 2048
			Model B 16bit 16384
			Model C 17bit 32768
Pn202	Electronic gear ratio (Numerator)	Need Calculation	Pulse equivalent: the distance of lead screw traveling when per pulse received by servomotor. Deceleration ratio of the servomotor= rotation of the servomotor / rotation of the load shaft = no. of teeth for following pulley / no. of teeth for driver $\text{Pn202} = [\text{Number of encoder pulses}] \times 4 \times [\text{Decelerator ratio}]$ $\text{Pn203} = (\text{lead screw pitch} / \text{pulse unit})$
Pn203	Electronic gear ratio (Denominator)	Calculation	If the ratio is outside the setting range, reduce the fraction (both numerator and denominator) until you obtain integers within the range from 1~65536

4.5.2. Wiring Diagram of Connection between Terminal Board EX1D and DELTA ASD_A \AB Servo Driver and Parameter List

- 1) Wiring diagram of connection between terminal board EX1D and DELTA ASD_A (little difference in connection between AB series and A series) servo driver is shown below in Fig. 4-12:

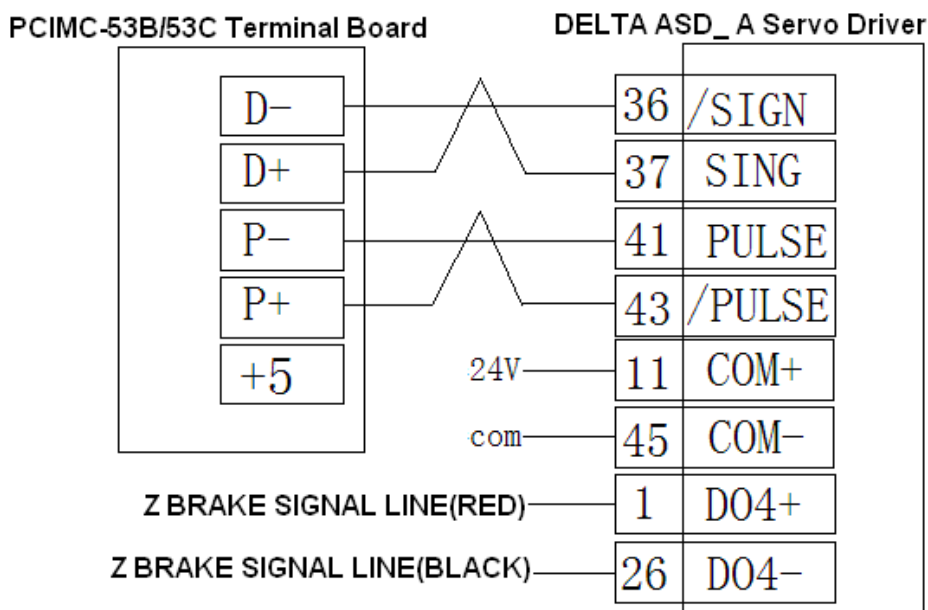


Fig. 4-12 Connection between Terminal Board EX1D and DELTA ASD_A Servo Driver

Note: Wiring of X, Y, Z axis is the same. Only Z axis has two brake signal lines which can be connected to relay to control the brake.

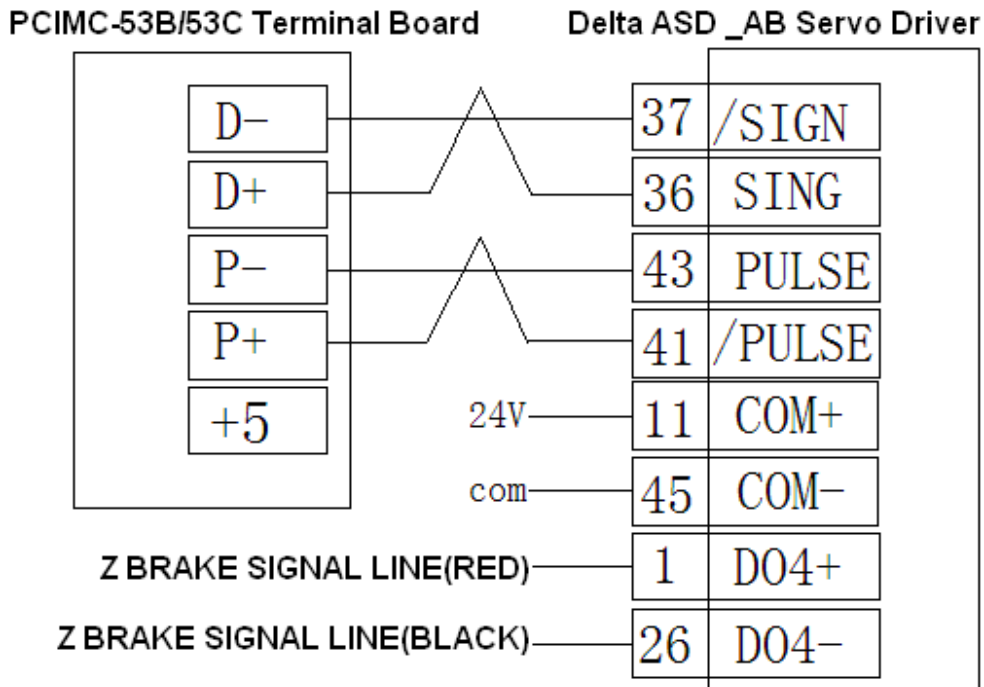


Fig. 4-13 Connection between Terminal Board EX1D and DELTA ASD_AB Servo Driver

2) Parameter Setting of Delta ASD_A \AB Servo Driver

For Delta ASD_A \AB servo driver, machine tool can act after setting the following parameters. To optimize the performance of machine tool, please carefully peruse the User Manual of Delta servo driver. Basic parameter setting is shown below in Form 4:

Form 4 Parameters Setting for Delta ASD_A Servo Driver

Para No.	Function	Format & Range	Value	Description
P1-00	Setting external pulse input type	ZYX	102	X=2: pulse + direction; Y= [0] in A series; Y value in AB series is pulse filter width, the range is 0-3. Z=1: negative logic
P1-01	Control mode selection	ZYX ₁ X ₀	0000	Z=0: when switching control mode, DIO maintains the set value. Y=0: In the point of load, counter-clockwise rotation is forward rotation X1X0=00: position control mode (input by terminal)
P1-32	Motor stop mode selection	YX	00	Y=0: when servo disabled, the motor by applying dynamic brake (DB); Y=1: release DB. X=0: the motor stop momentarily; X=1: the motor stop laggardly.
P1-36	Accel / Decel. S-curve time constant	Unit: ms	20	To make the motor run more smoothly at the process of Accel/Decel S-curve Range: 0~10000 ([0]: close the Accel/Decel S-curve function)
P1-37	Ratio of Load Inertia to Servo Motor	0~200	Depended	J _{load} / J _{motor} , Please refer to manual of Delta.
P1-44	Electronic Gear Ratio (Numerator)(N1)	1~32767	Need calculation	N1 / M= encoder-resolution×4×pulse equivalent ×deceleration ratio of servomotor/ pitch Representative value: encoder resolution 2500, pulse unit 0.001, pitch 5mm, deceleration ratio of servomotor 1; calculating as below: N1 / M = 2500×4×0.001/5 = 2 / 1, N1=2, M=1; When the multi-electronic gear ratio is not used, P2-60 and P2-62 are not required.
P1-45	Electronic Gear Ratio (Denominator) M	1~32767	Need calculation	
P2-10	Digital Input Terminal 1 (DI1)	X ₂ X ₁ X ₀	101	X1X0=01: digital input DI1 = SON, correspond to 9th pin of CN1 X2 = 1: set DI1 input NO(normally opened) as a-contact point
P2-15	Digital Input Terminal 6 (DI6)	X ₂ X ₁ X ₀	100	Factory setting: DI6 and DI7 are NC (normally closed) limit signal input; the driver can not run without the connecting of 32 and 31 pins of CN1. X2=1: set DI6 and DI7 inputs as NO(normally opened) a-contact points X1X0=00, limit signal input of the driver is invalid.
P2-16	Digital Input Terminal 7 (DI7)	X ₂ X ₁ X ₀	100	
P2-17	Digital Input Terminal 8 (DI8)	X ₂ X ₁ X ₀	100	External E-stop input is not used.
P2-21	Digital Output Terminal 4 (DO4)	X ₂ X ₁ X ₀	008	Corresponding pins of D04 are bit 1 and 26th pins, for Z axis' clinch-brake signal; X2=1: set D04 output as NO(normally opened) a-contact point; X2=0: set D04 output as NC(normally closed) a-contact point; X1X0=08: set bit 1st and 26th pins as BK+ and BK-.
P2-51	Servo ON		1	0: Servo ON (SON) is activated via Digital Input signal 1: Servo ON (SON) is activated when control power is applied the servo drive (not via Digital Input signal). when servo powered, S-ON automatically if no alarm signal. Set 1 when no SON signals.

4.5.3. Wiring Diagram of Connection between Terminal Board EX1D and PANASONIC MINAS_A4 Servo Driver and Parameter List

- 1) Wiring diagram of connection between terminal board EX1D and PANASONIC MINAS_A4 servo driver is shown below in Fig. 4-14:

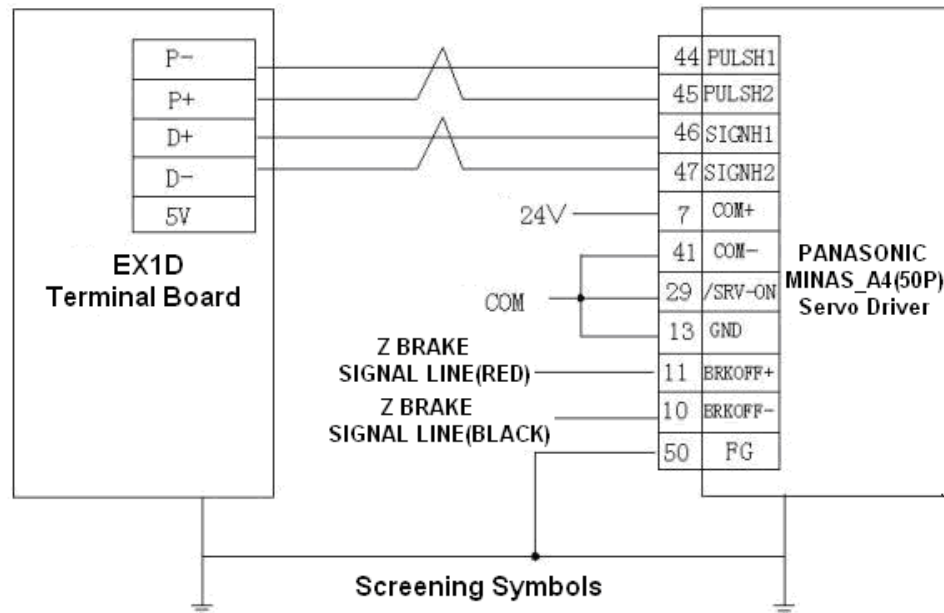


Fig. 4-14 Connection between Terminal Board EX1D and PANASONIC MINAS_A4 Servo Driver

Note: Wiring of X, Y, Z axis is the same. Only Z axis has two brake signal lines which can be connected to relay to control the brake.

- 2) Set Parameters for PANASONIC MINAS_A4 servo driver series

For PANASONIC MINAS_A4 servo driver, machine tool can act after setting the following parameters. To optimize the performance of machine tool, please carefully peruse the User Manual of PANASONIC MINAS_A4 servo driver. Basic parameter setting is shown below in Form 5:

Form 5 Parameters Setting for PANASONIC MINAS_A4 Servo Driver

Para. No.	Function	Value	Description
02	Control mode selection	0	0: position mode 1: velocity mode 2: torque mode
22	Selection of machine stiffness at real-time auto-gain tuning	Need debugging	Ball screw directly connects with the motor: 4~8 Ball screw with hold-in range: 3~6 hold-in range: 2~5 catching of toothed wheels: 1~3 other: 1~3
42	Command pulse input mode selection	3	Command pulse input mode: pulse train + sign, Negative logic
48	1 st numerator of electronic gear	Need calculation 1~10000	f: command pulse counts per one motor revolution. F: internal command pulse counts per motor one revolution. Set up Pr48, Pr4A, and Pr4B so that the internal command (F) may equal to the encoder resolution(10000 or 217): $F = f \times (\text{Pr48} \times 2^{\text{Pr4A}}) / \text{Pr4B}$ thereinto: f = pitch/pulse equivalent. $(\text{Pr48} \times 2^{\text{Pr4A}}) / \text{Pr4B} = \text{encoder resolution} \times \text{pulse equivalent} / \text{pitch}$ For example: pitch 5 mm, encoder resolution 10000, co-axes collection pulse equivalent 0.001 mm $(\text{Pr48} \times 2^{\text{Pr4A}}) / \text{Pr4B} = 2/1$, So Pr48 = 1, Pr4A = 1, Pr4B = 1 That is when the pulse unit is 0.0005, Pr48 = 1, Pr4A = 1, Pr4B = 2. (Note: Maximum numerator is 2621440)
4A	Multiplier for numerator of electronic gear	Need calculation 1~17	
4B	Denominator of electronic gear	Need calculation 1~10000	

After setting the parameters, writing Mode of EEPROM must be selected. Please refer to the following steps:

- ① Press [MODE] button → Select [EEPROM] → Enter mode [EE_SET];
- ② Press SET button, shown as [EEP —];
- ③ Keep pressing up button for approx. 3 seconds, then the bars increase as [EEP ———], then writing starts, displaying [Start].

[Finish] will be displayed when change of parameter setup will be validated only after the reset. Turn off the power of the driver, then reset it. When writing error occurs, repeat the writing. If the writing error persists, the console might be a failure.

4.5.4. Wiring Diagram of Connection between Terminal Board EX1D and Mitsubishi MR-E Servo Driver and Parameter List

- 1) Wiring diagram of connection between terminal board EX1D and Mitsubishi MR-E servo driver is shown below in Fig. 4-15:

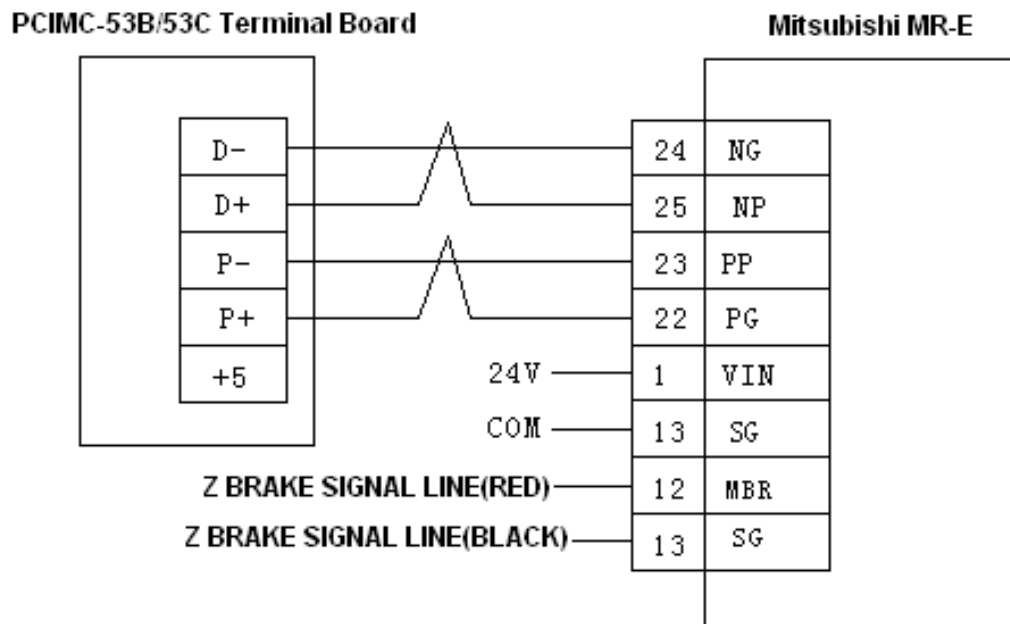


Fig. 4-15 Connection between Terminal Board EX1D and Mitsubishi MR-E Servo Driver

Note: Wiring of X, Y, Z axis is the same. Only Z axis has two brake signal lines which can be connected to relay to control the brake.

- 2) Set parameters for Mitsubishi MR-E servo driver series

For Mitsubishi MR-E servo driver, machine tool can act after setting the following parameters. To optimize the performance of machine tool, please carefully peruse the User Manual of Mitsubishi MR-E servo driver.

Parameters of Mitsubishi MR-E Servo driver are divided into: Basic Parameters (NO.1~19), Extended Parameters 1 (NO.20~49) and Extended Parameters 2 (NO.50~84). Basic Parameters (set NO.19 as 0000) can be set by user after exported from factory. If the alteration of gain is needed, please set the value of parameter No.19. Basic parameter setting is shown below in Form 6:

Form 6 Parameters Setting for Mitsubishi MR-E Servo Driver

Para. No.	Code	Function	Value	Description
0	*STY	Control mode, regenerative brake option selection	X0X0	bit 0: Setting [0]: position control, bit 1, motor series: setting [0]: HV-KFE; setting [1]: HC-SFE; bit 3, regenerative brake option selection, setting [0]: not use bit 4, power of motor
1	*OP1	Used to select the input signal filter, pin CN1-12 function.	0012	When the brake of motor acts on, set electromagnetic brake interlock signal as available. That is bit 1 = 1 and pin CN1-12 as MBR output of brake interlock signal. Bit0: [2] represents input filter, 3.555ms
2	ATU	Setting the response level and execution of auto tuning.	Need debugging	
3	CMX	Electronic gear numerator	Need calculation	CMX/CDV=command unit × servo motor resolution × mechanical reduction ratio / pitch e.g., pitch 5 mm, resolution 10000, co-axes collection, pulse unit 0.001 mm, CMX/CDV=10000×0.001/5 = 2/1;
4	CDV	Electronic gear denominator	Need calculation	When pulse equivalent = 0.0005mm, CMX/CDV= 1/1. Electronic gear ratio range: 1/50 ~ 500
19	*BLK	Parameter block	000C	0000: Only basic parameters can be red and written. 000C: Expansion parameters 1 can be red and written. 000E: Expansion parameters 1 and Expansion parameters 2 can all be red and written.
21	*OP3	Function selection 3 (command pulse selection)	0011	Command pulse train input form: pulse train + sign, negative logic
41	*DIA	Input signal automatic on selection, used to set automatic on of SON, LSP and LSN.	0111	bit 0: Servo-ON signal input selection. [0]: switched on by external input; [1]: switched on automatically in servo internal; bit 1: Forward rotation stroke end signal (LSP) input selection [1]: switched on automatically in servo internal (no need of external wiring). bit 3: Reverse rotation stroke end signal (LSN) input selection. [1]: switched on automatically in servo internal (no need of external wiring).

(Note: Regarding to Parameters with symbol "*" in front, when being reset, its value can be validated by restarting the power supply)

4.5.5. Wiring Diagram of Connection between Terminal Board EX1D and FUJI FALDIC-β Servo Driver and Parameter List

- 1) Wiring diagram of connection between terminal board EX1D and FUJI FALDIC-β servo driver is shown below in Fig. 4-16:

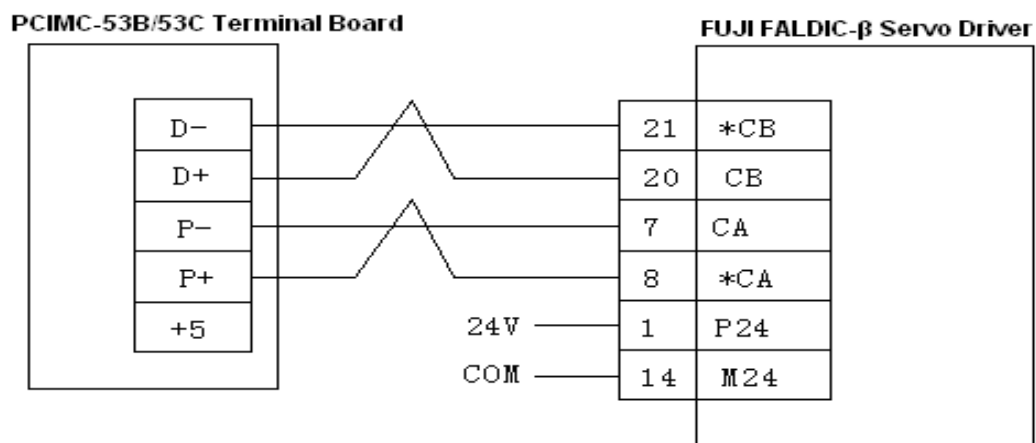


Fig. 4-16 Connection between Terminal Board EX1D and FUJI FALDIC-β Servo Driver

Note: Wiring of X, Y, Z axis is the same, while the brake of Z axis is internally controlled.

2) Set parameters for FUJI FALDIC-β Servo Driver

Typical parameters setting of FUJI servo driver is shown in the following table. if it is needed to adjust the gain of servo system by semi-automation or by manual, please carefully peruse the User Manual of FUJI FALDIC-β Servo Driver. Basic parameter setting is shown below in Form 7:

Form 7 Parameters Setting of FUJI FALDIC-β Servo Driver

Para. No.	Parameter Name	Value	Description
01	Command pulse numerator α	Need calculation 1~32767	α: command pulse numerator, namely electronic gear ratio numerator. β: command pulse denominator, namely electronic gear ratio denominator. α/β= encoder resolution × pulse equivalent× mechanical speed reduction ratio / pitch
02	Command pulse denominate β	Need calculation 1~32767	e.g., encoder resolution 65536, pulse unit 0.001, pitch 5 mm, α/β=65536×0.001/5=8192/625 So a=8192, b=625.
03	Pulse train input form	0	Set pulse input mode as pulse with direction
04	Rotation direction	0 or 1	[0]: anticlockwise forward rotation [1]: clockwise reverse rotation
05	Tuning mode	0	Auto tuning
06	Load-inertia ratio	Need not being set	Load-inertia ratio setting by motor automatically
07	Auto-tuning gain	Need debugging	When selecting auto tuning, need to set auto tuning gain. 1~20
10	CONT1 signal assignment	0	CONT1 is assigned as RUN (SON) , and when not being assigned, after powered on and no alarm, it will be on automatically.
11	CONT2 signal assignment	2	CONT2 is assigned RST (CLR). Parameters of 12th, 13th, 14th set as 0, that is CONT3, CONT4, CONT5 can't be assigned as OT excess of stroke, or EMG external E-STOP.
15	OUT1 signal assignment	1	[1]: OUT1 assigned as a contact of alarm output. [2]: OUT1 assigned as b contact of alarm output.
27	Parameter rewriting inhibit	0 or 1	[0]: parameter write enable [1]: parameter write prohibited

Note: FUJI servo doesn't have brake signal line, so you needn't to set any parameters of them. Directly power the Br pin (Tail 5 and 6) with 24V power supply is ok.

4.5.6. Wiring Diagram of Connection between Terminal Board EX1D and Stone GS Servo Driver and Parameter List

- 1) Wiring diagram of connection between terminal board EX1D and Stone GS servo driver is shown below in Fig. 4-17.

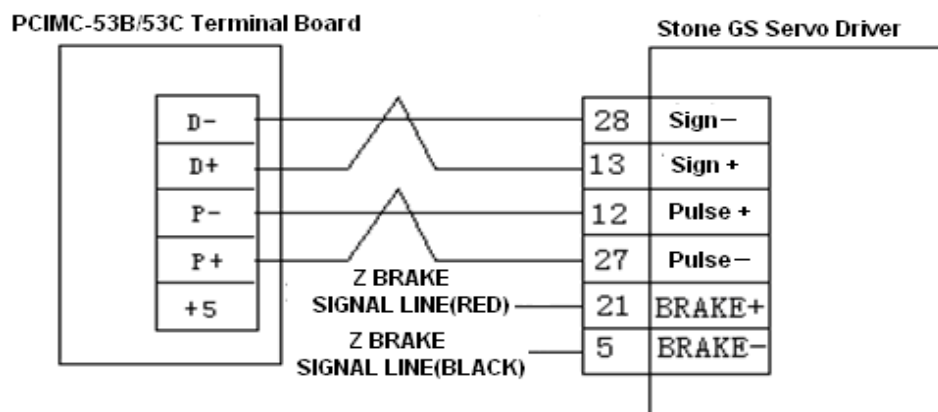


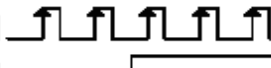
Fig. 4-17 Connection between Terminal Board EX1D and Stone GS Servo Driver

Note: Wiring of X, Y, Z axis is the same, while the brake of Z axis is internally controlled.

2) Set typical parameters for Stone GS servo driver

If it is needed to adjust the gain of servo system by semi-automation or by manual, please refer to User Manual of Stone GS Driver, Basic parameter setting is shown below in Form 8:

Form 8 Parameters Setting of Stone GS Servo Driver

Para. No.	Parameter Name	Value	Description		
F0f	Electronic gear ratio numerator	2	Electronic gear ratio of position mode: 4×pulse frequency feedback by servo encoder = command pulse frequency×F0f/F10; Value of F0f/F10 must be within 1/100~100.(calculation with pitch 10mm)		
F10	Electronic gear ratio denominator	1			
F00	Control mode selection	2	0: External speed running mode; setting the value and direction of motor velocity according to the external analog —10V~+10V signal of CN2-16、17; 1: Internal speed running mode; setting the value and direction of motor velocity according to the setting of parameter F33, F35, F37, F39 and the port status of CN2-9, CN2-25; 2: Position pulse running mode; accepting the input of external position pulse and direction level signal; 3: Jog mode; make sure the motor speed in terms of parameter setting F3b, and control the rotation direction by the direction keystroke ▼ and ▲; 4: Torque mode; setting the value and direction of motor torque according to the external analog —10V~+10V signal of CN2-43、1; 5~10: Mixed mode; selecting mode according to the port input status of CN2-24:		
			F00 Value	CN2-24 Interface Status	
				OFF (Mode One)	ON (Mode Two)
			5	Position Pulse Mode	External Speed Running Mode
			6	Position Pulse Mode	Internal Speed Running Mode
			7	Position Pulse Mode	Torque Mode
			8	Internal Speed Running mode	External Speed Running Mode
			9	Internal Speed Running mode	Torque Mode
			10	External Speed Running Mode	Torque Mode
		F2e	Pulse input mode selection	2	Command pulse string mode selection of position mode: 1 - signal pulse string positive logic pulse 12 27 

4.5.7. EX4A Terminal Board

Comparing with EX1D terminal board, Ex4A terminal board strengthens output function of terminal board, extending formal single X axis to 4 X axes, formal single to double Y axes, formal single Z axis to 4 Z axes; other functions remain the same.

The wiring diagram of EX4A terminal board is as following:

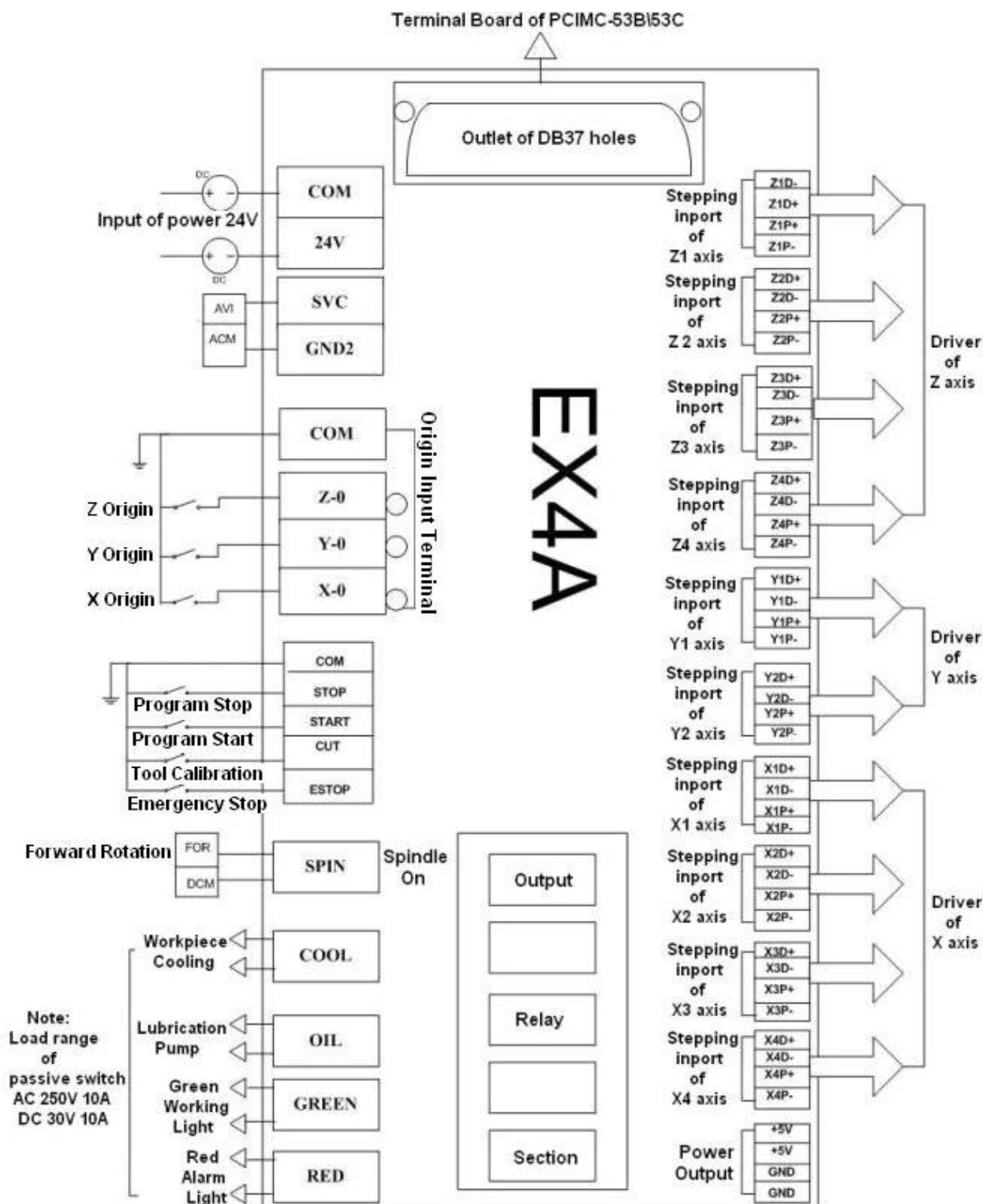


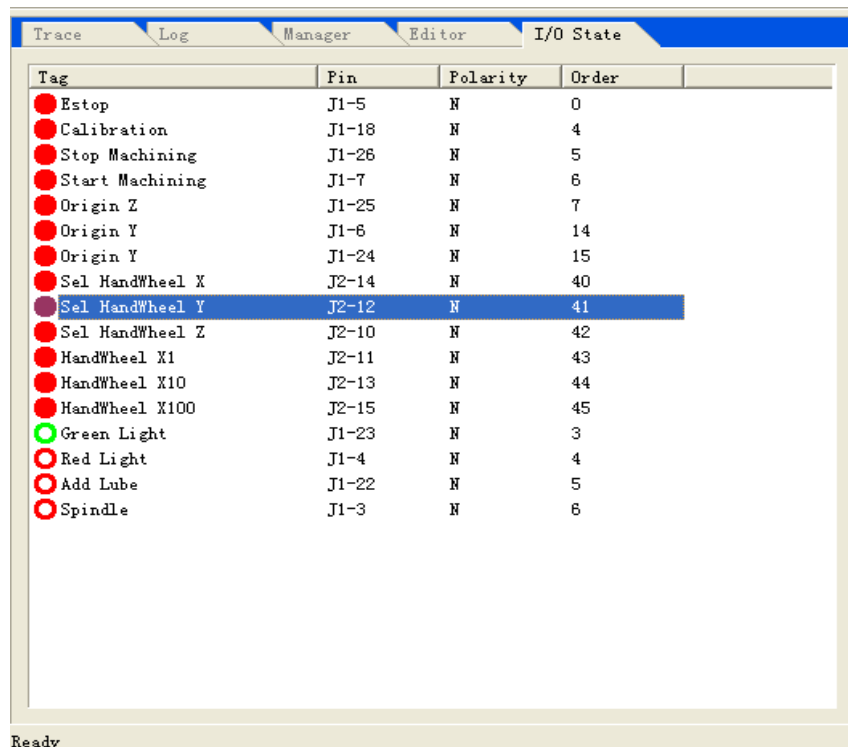
Fig. 4-18 wiring diagram of EX4A terminal board

5. Whole Machine Debugging

After finishing the wiring in accordance with the instruction above, start to debug the whole machine tool, specific steps as below:

1. Join the extended board to port JP1 on the card with DB37M/F cable, add 24V power supply for the extended board, and power on the machine signal system (proximity switch, etc). Examine the input signal LED of extended board: If the origin switch connected is normally closed, three LEDs of X0、Y0、Z0 will be on, you are allowed triggering the origin switch through artificially imitation. (For travel switch, artificial compression can be used to observe whether signals can be received. For photoelectrical switch, artificially obstruct the light to see if the signals can be gotten. For metal proximity switch, artificially touch it with metal to see if the signals can be gotten). If the corresponding LED is out, it indicates the original signals have been sent to the extended board. If the original switch connected is normally opened, LED should be usually out, and by artificially touching the switch, LED will become light, which shows the origin signals have been received by extended board. Same method can be taken to test other ports, besides, to ensure the correctness of the wiring between extended board and machine tool can greatly shorten the debugging time.

2. Power on the computer, drive NcStudio software, and then switch to "I/O status" window, many input and output signals will be displayed. Solid dots represent input signals, hollow dots represent output signals; Dots in red indicate the signals is invalid at the time (no input or output signals), while dots in green indicate the signals is valid at the time. Shown in Fig.5-1 below is the I/O window (This is only for reference. because of the different software version and different hardware board type, ports displayed in "I/O status window" will be varied correspondingly. Please be subject to our final product.)



Tag	Pin	Polarity	Order
● Estop	J1-5	N	0
● Calibration	J1-18	N	4
● Stop Machining	J1-26	N	5
● Start Machining	J1-7	N	6
● Origin Z	J1-25	N	7
● Origin Y	J1-6	N	14
● Origin Y	J1-24	N	15
● Sel HandWheel X	J2-14	N	40
● Sel HandWheel Y	J2-12	N	41
● Sel HandWheel Z	J2-10	N	42
● HandWheel X1	J2-11	N	43
● HandWheel X10	J2-13	N	44
● HandWheel X100	J2-15	N	45
○ Green Light	J1-23	N	3
○ Red Light	J1-4	N	4
○ Add Lube	J1-22	N	5
○ Spindle	J1-3	N	6

Fig. 5-1 "I/O Status Window" of NcStudio™ Software

3. Alter the input port polarity of the software in terms of the button you have selected, such as origin switch or E-STOP button: the polarity of normally opened input port is N; the polarity of normally closed output port is P. The way to alter the polarity (for V8 version) is shown below: press Ctrl , Alt and Shift at the same time, right click the signal which needs to modify its polarity, at the time a menu will pop up, please choose “alter polarity”. After all the polarity modification has been finished, shut down NcStudio, then restart, the modified polarity will come into effect immediately.

4. Electrify the electrical box. The dots showing in red in front of the input signals, such as origin signal, E-STOP signal, program start/stop signal and calibration signal of the three axes, indicate that all these signals are invalid. Otherwise, it is necessary to test the correctness of electrical circuitry and signals polarity. If the electrical circuitry has no problem, you need to alter the corresponding signal polarity to ensure the dots in front of the signals show in red.

5. Press the program-start button, observe whether the dot color of the signal changes. When the button is pressed, the dot color shows in green, and in red if released. If there is no change with the dot color, please turn to step 1 above to check whether the LED on extended board is in normal reaction at the time of the button being pressed. When every thing on extended board is under good condition, it indicates that the software has not received the signals from extended board. Examine the connection of cable DB37M/F with card and extended board. Similar method can be taken to examine program stop signal and emergency stop signal.

In accordance with step 5, open I/O window and simulate to trigger the original signal according to step 1. Observe the dots in front of the original signal should turn into green when the original button is being pressed. Be sure of well collection of all the original signals of X, Y, and Z axes. Inside the system calibration signal has been changed into pulse signal. Therefore, while debugging the calibration signal, the dot color of calibration signal will turn into green instantaneously and then resume red.

6. Set transducer parameters, make it work under 0~10V analog voltage control mode. Start/stop controlling adopts forward-rotation terminal control mode. Press down the spindle-start button in the software, observe in I/O window whether the color of signal dot in front of the spindle turns green, on the terminal board whether the corresponding output green signal lamp LED of relay become brightening, and the spindle should start to rotate. If the spindle does not rotate, please check the connection of transducer. Adjust the spindle speed in the software and the rotation speed of spindle will be correspondingly changed, otherwise, examine the connection and the parameters setting of transducer. If the spindle rotates in a wrong direction, please exchange the connection between spindle and transducer: Usually, there are three wires connected with the spindle. Any two wires of them being exchanged will alter the rotation direction of the spindle.

7. Move the machine tool manually to make sure the correctness of each axis' moving direction. Notice NcStudio adopts “right hand” coordinates system. For X-axis, right movement is the positive direction; For Z-axis, upward movement is the positive direction; While the positive direction of Y-axis is to move away from the operator (if movement of Y-axis is the movement of worktable, its positive

position is when worktable moves close to the operator). If this direction is not correct, you can alter the moving direction by exchanging the two wires of winding in stepping motor.

8. After confirming the moving direction of each axis, set the travel range of worktable by setting manufacturer parameters according to the actual size of machine tool and make use of software limit. The password of manufacturer parameter is “ncstudio”.

9. Set subdivision value of stepping motor driver, usually, the larger the subdivision value, the higher the resolution. But if the subdivision value is too large, it will affect the maximum feed speed. Generally speaking, regarding the pulse equivalent of die machine, user can take 0.001mm/P into consideration, (the maximum feedrate is 9600mm/min at this time) or 0.0005mm/P (the maximum feedrate is 4800mm/min); For those who are not very critical about the accuracy, the pulse unit can be set a little larger, such as 0.002mm/P (the maximum feedrate is 19200mm/min) or 0.005mm/P (the maximum feedrate is 48000mm/min). For two phase stepping motor, the Computational Methods of pulse unit is shown below: pulse equivalent = pitch of lead screw / subdivision value / 200.

10. Taking-off speed: this parameter is corresponding to the taking-off frequency of stepping motor. Taking-off frequency means the direct maximum start up frequency of stepping motor without acceleration. Reasonable parameter setting will greatly improve machining efficiency and can avoid of stepping motor's poor movement-feature of low-speed. If the parameter is too large, the machine tool will be stagnated. Therefore, the parameter setting should be feasible. Usually, the reset setting include taking-off frequency parameter, but this value may be changed after the installation of machine tool, normally it will be decreased especially when the machine tool runs with load. All in all, you'd better refer to the default motor parameters and your actual measurement before setting this parameter.

11. Acceleration of single axis: It is used to describe the single axis ability to accelerate/decelerate, with unit mm/s². The value is determined by the physical characteristic of machine tool, such as quality of movement part, torque of feed-motor, resistance, cutting load, and so on. The larger the value, the less time spent in the process of acceleration/deceleration, and the higher the efficiency. Usually, for stepping motor, the value is between 100 and 500; for servo motor system, the value is between 400 and 1200. Please set the value smaller at the beginning, through a period of operation, repeat several typical movements, carefully observe it. When there is no abnormality, increase the value gradually, otherwise, decrease the value and reserve 50% ~ 100% allowance for safety.

12. Curve acceleration: It is used to describe the ability of acceleration/deceleration of multiple feed-axes' chain reaction, with unit mm/s². The value limits the maximum speed of machine tool along circular movement. The larger this value, the higher the maximum speed limited on circular movement. Usually, for stepping motor system, the value is between 400 and 1000; for servo motor system, the value is between 1000 and 5000; for heavy machine tool, the value should be smaller. Please set the value smaller at the beginning, through a period of operation, repeat various of typical chain-reaction movements, carefully observe it. When there is no abnormality, increase the value

gradually, otherwise, decrease the value and reserve 50% ~ 100% allowance for safety.

Usually, allowing for the drive ability of stepping motor, friction of machine assembly, and endurance capacity of mechanical components, modification to the maximum speed of each axis in manufacturer parameters is allowable to limit the speed in actual process.

13. Set back to Mechanical Origin parameters in manufacturer parameters according to the installation position of zero sensors of three axes. After the correct setting, perform the "Move to Mechanical Origin". At the beginning, only single axis returns. The other two axes will continue to return on condition that the moving direction is correct; otherwise, returning will be stopped. Please reset the reference point return parameters in manufacturer parameters until all axes can return to the Mechanical Origin.

14. Set the parameter of auto lubrication (set value smaller, such as once every 5 seconds). Observe if the auto lubrication is right, if it works in good condition, then you can continue to set the parameter of auto lubrication according to actual need.

15. Examine whether electronic gears match with pulse unit. Make a mark on any axis of the machine tool and set this marked point as workpiece origin of the workpiece coordinates. Drive this marked axis to move a fixed distance by direct command input, jog or handwheel, and so on. Measure the actual moving distance with vernier caliper and compare whether it is equal to the distance shown in the software.

16. Examine if any pulse is lost. Direct method: mark a little dot on the surface of rough workpiece with a dagger, set this point as workpiece origin of workpiece coordinates, lift up Z-axis, set the coordinate of Z-axis as 0; repeatedly move the machine tool, for example, dry run with a typical procedure (Including chain reaction of three axes is much better), pause or termination during processing is permitted, back to workpiece origin, descend Z-axis slowly, observe whether the knifepoint matches with the marked dot. If deviation exists, please check the type of pulse signal received by stepping motor driver and the connection between extended board and driver. If the stagnation or stepping-lost still exists, Please turn to step 10, 11, 12 to adjust the parameters, such as acceleration.

If there is any problem with running the machine tool, please check every part carefully according to the steps above of the whole machine debugging.

6. Manufacture Parameters

6.1. Operation Parameters

【N0011】 Inport No. of Spindle Over Temperature

Type	Float
Unit	None
Range	-1~63
Default	-1
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting the inport No. of spindle over temperature

【N4000】 Mobile Calibrator Block Thickness

Type	Float
Unit	mm
Range	-1000~1000
Default	0
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting the thickness of Mobile Calibrator Block

【N4004】 Maximum Tool Calibration Tolerance

Type	Bool
Unit	None
Range	0~10
Default	0.1
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting maximum tolerance during tool calibration

【N4010】 Fixed Calibrator Block Thickness

Type	Float
Unit	mm
Range	-1000~1000
Default	0
Valid time	Be valid after restarting the system
Instruction	Setting the height difference between fixed calibrator and surface of working table.

【N4016】 Support extended keyboard type

Type	Integer
Unit	None
Range	0: None 1: Mini keyboard 2: Extended keyboard
Default	0
Valid time	Be valid after restarting the system
Instruction	Setting the type of support extended keyboard

【N4017】 Calibration Speed

Type	Bool
Unit	mm/min
Range	0~99999
Default	60
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting the speed of the tool when it approaches the surface of tool calibrator

【N4019】 Auto Start Lubrication Periodically

Type	Bool
Unit	None

Range	True: able False: disable
Default	False
Valid time	Be valid after restarting the system
Instruction	Setting if start auto lubrication periodically

【N4020】Permit lubrication only when machine moving

Type	Bool
Unit	None
Range	True: invalid False: valid
Default	False
Valid time	Be valid after restarting the system
Instruction	Setting if permit lubrication when machine moving

【N4021】Interval between start lubrication

Type	Bool
Unit	Sec
Range	3.6~3.6e+006
Default	18000
Valid time	Be valid after restarting the system
Instruction	Setting interval between lubrication

【N4022】Lubrication start time

Type	Float
Unit	Sec
Range	1~100
Default	5
Valid time	Be valid after restarting the system

Instruction	Setting start time of lubrication
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【N4023】 Lubrication Oil Level Inport Index

Type	Float
Unit	None
Range	-1~63
Default	-1
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting Inport Index of Lubrication Oil Level

【N4024】 Startup Feedrate

Type	Float
Unit	mm/min
Range	0~100000
Default	0
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting the minimum feedrate in machining

【N4036】 Deceleration Displacement

Type	Float
Unit	mm
Range	0~999
Default	5
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting the distance from spindle start deceleration point to the target during positioning process

【N4037】 Speed while approaching to workpiece

Type	Float
------	-------

Unit	mm/min
Range	0.001~99999
Default	300
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting the feed speed during positioning process when the tool is almost approaching to the workpiece

【N4052】 Z axis excluded in workpiece origin operation

Type	Bool
Unit	None
Range	True: Excluded False: Included
Default	True
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting not to modify the data of Z-axis while saving or resuming W.C. origin.

【N4053】 Linear Acceleration

Type	Float
Unit	mm/s ²
Range	0.001~100000
Default	300
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting the maximum acceleration of each feed axis

【N4054】 Curve Acceleration

Type	Float
Unit	mm/s ²
Range	0.001~100000
Default	800

Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting the maximum acceleration of adjacent two axes, recommend 1~2 times of the single axis acceleration.

【N4055】Rate Of Acceleration

Type	Float
Unit	mm/s ³
Range	0.001~1e+011
Default	10000
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting the growth rate of acceleration

【N4058】Maximum speed of reference circle

Type	Float
Unit	mm/min
Range	0.001~100000
Default	1000
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting the maximum allowable speed of the reference circle

【N4059】Minimum Speed in circular motion

Type	Float
Unit	mm/min
Range	0.001~100000
Default	180
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting the Minimum speed when the spindle moves along arcs

【N4060】Exact Stop Time

Type	Float
Unit	S
Range	0
Default	0~999
Valid time	Be valid immediately. Need not to restart the system
Instruction	This parameter is used to offset the lag effect caused by servo system

【N4061】 Interpolation Algorithm Selection

Type	Integer
Unit	None
Range	0: Laddertype 1: s_type 2: Lep
Default	2
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting type of Interpolation Algorithm

【N4064】 Radius Tolerance

Type	Float
Unit	mm
Range	0~9999
Default	1
Valid time	Be valid after restarting the system
Instruction	Setting the maximum radius tolerance of the start point and the end point during IJK programming

【N4066】 Flat Time

Type	Float
Unit	S

Range	0~0.064
Default	0
Valid time	Be valid immediately. Need not to restart the system
Instruction	The longer the time, the smoother the surface of the workpiece. But some of the details may be weakened;

【N4067】Track Corner Tolerance

Type	Float
Unit	mm
Range	0~0.1
Default	0
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting the integral smoothness of workpiece, in the connections of every two blocks, tool may not back to accurate target position, when distance between tool position and target position is within the range of this parameter, system will consider it as the finish of this segment

【N4069】Maximum Machining Feedrate

Type	Float
Unit	mm/min
Range	0~100000
Default	0
Valid time	Be valid immediately. Need not to restart the system
Instruction	The maximum machining feeding speed when machining (not the positioning speed), when the value is [0], this function is disabled

【N4250】X 【4251】Y 【N4252】Z Maximum Feedrate of each axis

Type	Float
Unit	mm/min
Range	0.001~100000

Default	60000
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting the maximum feedrate of each axis

【N4400】 Inport Index Of Lubrication Oil pump Check

Type	Float
Unit	None
Range	-1~63
Default	-1
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting inport index of lubrication oil pump check

6.2. Feedrate Parameters

【N1000】 Coordinate Offset Mode

Type	Integer
Unit	None
Range	0: compatible 1: SWST 2: MWST 3: SWMT 4: MWMT
Default	1
Valid time	Be valid after restarting the system
Instruction	Setting Coordinate Offset Mode

【N1004】 when limited forbidden movement to limited direction

Type	Bool
Unit	None
Range	True: able False: disable
Default	True

Valid time	Be valid after restarting the system
Instruction	If the spindle continues moving when it reaches limit point, it may damage the machine tool

【N1100】 X 【N1101】 Y 【N1102】 Z Axes Direction

Type	Bool
Unit	None
Range	
Default	-1
Valid time	Be valid after restarting the system
Instruction	Setting each axis direction

【N1110】 X 【N1111】 Y 【N1112】 Z Pulse Equivalent

Type	Float
Unit	mm/p
Range	9e-007~999
Default	0.001
Valid time	Be valid after restarting the system
Instruction	Setting pulse equivalent of each axis

【N1120】 X 【N1121】 Y 【N1122】 Z Check Work Bench Range

Type	Bool
Unit	None
Range	True: able False: disable
Default	True
Valid time	Be valid after restarting the system
Instruction	Setting if work bench range check is valid

【N1130】 X 【N1131】 Y 【N1132】 Z Work Bench Range Lower Limit

Type	Float
Unit	mm
Range	-99999~99999
Default	X/Y:0 Z:-350
Valid time	Be valid after restarting the system
Instruction	Setting work bench range lower limit of each axis

【N1140】 X 【N1141】 Y 【N1142】 Z Work Bench Range Upper Limit

Type	Float
Unit	mm
Range	-99999~99999
Default	X:800 Y:600 Z:0
Valid time	Be valid after restarting the system
Instruction	Setting work bench range upper limit of each axis

6.3. Spindle Parameters

【N0001】 Maximum Revolution

Type	Float
Unit	Rmp
Range	0~999999
Default	24000
Valid time	Be valid after restarting the system
Instruction	Setting the maximum revolution of spindle

【N0002】 Default Revolution

Type	Float
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Unit	Rmp
Range	0~999999
Default	12000
Valid time	Be valid after restarting the system
Instruction	Setting the default revolution of spindle

【N0003】 Delay Time For Spindle Startup

Type	Float
Unit	Sec
Range	0~60
Default	5
Valid time	Be valid immediately. Need not to restart the system
Instruction	Set the delay time for the spindle from receiving a startup order to reaching a designated speed, by which to let the spindle reach a much higher speed

【N0009】 Spindle Outport Index

Type	Float
Unit	None
Range	-1~63
Default	6
Valid time	Be valid after restarting the system
Instruction	Setting the outport index of spindle

【N0010】 Delay Time For Spindle Stopping

Type	Float
Unit	Sec
Range	0~60

Default	5
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting the delay time for the spindle from receiving a stop order to a full stop, by which to let the spindle come to a full stop at the end

6.4. Handwheel Parameters

【N5000】 Handwheel Valid

Type	Bool
Unit	None
Range	True: valid False: invalid
Default	True
Valid time	Be valid after restarting the system
Instruction	Setting if the handwheel is valid or not

【N5001】 Strictly Count Handwheel Pulse

Type	Bool
Unit	None
Range	True: strictly count handwheel pulse False: move when handwheel rotates
Default	False
Valid time	Be valid after restarting the system
Instruction	If true, the machine will move strictly the specified distance corresponding to the motion of the handwheel. Otherwise, the machine moves when the handwheel rotates.

【N5002】 Handwheel Pulse Direction

Type	Bool
Unit	None
Range	
Default	1

Valid time	Be valid after restarting the system
Instruction	Setting the handwheel pulse direction

【N5003】 Handwheel Multiple X 1

Type	Float
Unit	mm
Range	0.001~10
Default	0.001
Valid time	Be valid after restarting the system
Instruction	Setting override of handwheel multiple X 1

【N5004】 Handwheel Multiple X 10

Type	Float
Unit	mm
Range	0.001~10
Default	0.01
Valid time	Be valid after restarting the system
Instruction	Setting override of handwheel multiple X 10

【N5005】 Handwheel Multiple X 100

Type	Float
Unit	mm
Range	0.001~10
Default	0.1
Valid time	Be valid after restarting the system
Instruction	Setting override of handwheel multiple X 100

【N5006】 Numerator**【N5007】 Denominator**

Type	Float
Unit	None
Range	1~1000
Default	1
Valid time	Be valid after restarting the system
Instruction	Setting the leading multiplier of handwheel

【N5010】 Handwheel Acceleration

Type	Float
Unit	mm/s ²
Range	1~1000
Default	200
Valid time	Be valid after restarting the system
Instruction	Setting the handwheel acceleration

6.5. Compensation Parameters

【N3000】 Lead Screw Error Compensation Valid

Type	Bool
Unit	None
Range	True: valid False: invalid
Default	True
Valid time	Be valid after restarting the system
Instruction	Setting if Lead Screw Error Compensation is valid

【N3001】 Only Backlash Valid

Type	Bool
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Unit	None
Range	True: valid False: invalid
Default	True
Valid time	Be valid after restarting the system
Instruction	Setting if backlash is valid

【N3002】 Across Quadrant Compensation Valid

Type	Bool
Unit	None
Range	True: valid False: invalid
Default	False
Valid time	Be valid after restarting the system
Instruction	Setting if across quadrant compensation is valid

【N3004】 Cutter Compensation Valid

Type	Bool
Unit	None
Range	True: valid False: invalid
Default	False
Valid time	Be valid after restarting the system
Instruction	Setting if cutter compensation is valid

【N3100】 X 【N3101】 Y 【N3103】 Z Backlash

Type	Float
Unit	mm
Range	0~1

Default	0
Valid time	Be valid after restarting the system
Instruction	Setting the value of backlash of each axis

Group 0- Group 5 Across Quadrant Compensation**【N3110】【N3120】【N3130】【N3140】【N3150】【N3160】 Compensation time**

Type	Float
Unit	Sec
Range	0~10
Default	0
Valid time	Be valid after restarting the system
Instruction	Setting compensation time in across quadrant compensation

【N3111】【N3121】【N3131】【N3141】【N3151】【N3161】 Compensation Quantity

Type	Float
Unit	mm
Range	0~10
Default	0
Valid time	Be valid after restarting the system
Instruction	Setting compensation quantity of across quadrant compensation

【N3112】【N3122】【N3132】【N3142】【N3152】【N3162】 Compensation Delay Time

Type	Float
Unit	Sec
Range	0~10
Default	0
Valid time	Be valid after restarting the system

Instruction	Setting compensation delay time in across quadrant compensation
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【N3113】【N3123】【N3133】【N3143】【N3153】【N3163】 Compensation Intension

Type	Float
Unit	None
Range	0.01~0.99
Default	0.75
Valid time	Be valid after restarting the system
Instruction	Setting Compensation Intension in across quadrant compensation

6.6. Tool Parameters**【N6000】 Tool Magazine Capacity**

Type	Float
Unit	None
Range	0~256
Default	10
Valid time	Be valid after restarting the system
Instruction	Setting tool magazine capacity

【N6001】 CT Up

Type	Float
Unit	mm
Range	-99999~99999
Default	0
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting upper position of changing tool

【N6002】 CT Down

Type	Float
Unit	mm
Range	-99999~99999
Default	0
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting the lower position of changing tool

Matrix Tool Magazine Parameters

【N6003】X position of reference tool

Type	Float
Unit	mm
Range	-99999~99999
Default	0
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting X Position of refer Tool

【N6004】Y position of reference tool

Type	Float
Unit	mm
Range	-99999~99999
Default	0
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting Y position of reference tool

【N6005】Tool X Direction Space Between

Type	Float
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Unit	mm
Range	0~99999
Default	10
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting tool X direction space between

【N6006】Tool Y Direction Space Between

Type	Float
Unit	mm
Range	0~99999
Default	10
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting tool Y direction space between

【N6013】Change Tool Speed

Type	Float
Unit	mm/min
Range	-99999~99999
Default	60
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting Spindle Speed When Change Tool (used for straight-line tool magazine)

【N6014】X 【N6015】Y 【N6016】Z Change Tool Ahead Position

Type	Float
Unit	mm
Range	0~99999

Default	10
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting ahead position of changing tool

6.7. Other Parameters

【N7007】Coolant Pump Output Index

Type	Float
Unit	None
Range	-1~63
Default	14
Valid time	Be valid after restarting the system
Instruction	Setting output index of coolant pump

【N7008】Lubrication Pump Output Index

Type	Float
Unit	None
Range	-1~63
Default	5
Valid time	Be valid after restarting the system
Instruction	Setting output index of lubrication pump

【N7009】Light Control Output Index

Type	Float
Unit	None
Range	-1~63
Default	19

Valid time	Be valid after restarting the system
Instruction	Setting output index of light control

【N7010】Red Lamp Output Index

Type	Float
Unit	None
Range	-1~63
Default	4
Valid time	Be valid after restarting the system
Instruction	Setting output index of red lamp

【N7011】Coordinate Benchmark

Type	Integer
Unit	None
Range	0: Programming value based 1: Accumulative value based 2: Feedback value based
Default	0
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting The coordinate accumulative method during moving

【N7015】Break Off Calibration Wire Output Index

Type	Float
Unit	None
Range	
Default	-1
Valid time	Be valid after restarting the system
Instruction	Setting output index of breaking off calibration wire

【N7020】 Green Lamp Outport Index

Type	Float
Unit	None
Range	-1~63
Default	3
Valid time	Be valid after restarting the system
Instruction	Setting outport index of green lamp

【N7021】 Yellow Lamp Outport Index

Type	Float
Unit	None
Range	-1~63
Default	-1
Valid time	Be valid after restarting the system
Instruction	Setting outport index of yellow lamp

【N7022】 Yellow Lamp Light After Initiated

Type	Bool
Unit	None
Range	True: Yellow lamp light False: Yellow lamp out
Default	False
Valid time	Be valid immediately. Need not to restart the system
Instruction	Setting if the yellow lamp is light after initiated

7. Customized Setup Installation Package

A tool, named Nchelper.exe, is under installation folder, which enables customized setup installation package. Such as, when you are in the process of using Ncstudio, some value of parameters need alternation as well as being default value in order to enable the best status of performance of machine tool, which is made as a package, then you just need to double-click Nchelper.exe tool and select default configuration.

Our company is not only willing to support complete solution in control system for our customers, but also offering developing other Electrical Control System for customers. After all, your trust will be our best satisfaction.

If you are encountering any problems when using of our product, welcome to consult:

Our Inquiry Service line: 400-880-9188