NcEditor V12 Laser Cutting CNC System Manufacturer Manual

Version: 2019.3 1st Version
Author: Document Department
Weihong Corporation, All Rights Reserved

1 CNC System Installation 2
1.1 Install Hardware 2
1.2 Install Software 6
1.3 Install Driver 9
1.4 Install a Camera 12
2 Interface Overview 14
2.1 Toolbar 16
2.2 Drawing Window 17
2.3 Running Information Bar 18
2.4 Window Display Buttons 19
2.5 Machine Control Area 19
2.6 Status Bar 25
2.7 Drawing Toolbar 26
2.8 3D View Area 26
3 Machine Tool Commissioning 28
3.1 Modify Port Polarity 28
3.2 Set Drive Parameters 28
3.3 Adjust Pulse Equivalent and Electronic Gear Ratio 50
3.4 Set Speed Parameters 52
3.5 Adjust the Axis Direction 52
3.6 Set the Workbench Stroke 53

WEIHONG

3.7 Compensate Lead Screw Errors 53
3.8 Set Parameters of Air Pressure and Laser Device 56
3.9 Check Machine Tool Setting 58
4 Follow-up 61
4.1 Interface Overview 61
4.2 Commissioning Steps 69
4.3 List of Parameters 73
4.4 FAQs 80
5 List of System Parameters 84
5.1 Basic Parameters 84
5.2 Speed and Accuracy Parameters 96
5.3 External Device Parameters 104
5.4 Advanced Function Parameters 109
6 Electrical Wiring Diagram 113
6.1 Mounting Dimension 113
6.2 Wiring Diagram of Terminal Board 116
6.3 Wiring Diagram of Laser Device 124
6.4 Wiring Diagram of Drive 131

WEIHONG

NcEditor V12 Laser Cutting CNC System is independently developed by Weihong Electronic Technology Co., Ltd., with copyright reserved.

This manual is intended for manufacturers of machine tools.

It mainly includes the following:

- CNC System Installation
- Interface Overview
- Machine Tool Commissioning
- Follow-up
- List of System Parameters
- Electrical Wiring Diagram

WEIHONG

1 CNC System Installation

This section introduces how to install **NcEditor V12 Laser Cutting CNC System**, including the following:

- Install hardware
- Install software
- Install driver
- Optional: Install a camera

1.1 Install Hardware

This section introduces how to install hardware of **NcEditor V12 Laser Cutting CNC System**.

Before installing hardware, do the following:

- Check configuration.
- Confirm installation space.

To install hardware, do the following:

- Connect hardware.
- Install motion control card.

To get details of wiring inside hardware, see Wiring Diagram of Terminal Board, Wiring Diagram of Drive and Wiring Diagram of Laser Device.

1.1.1 Check Configuration

To check whether the hardware that you have received is complete and correct, see the following list:

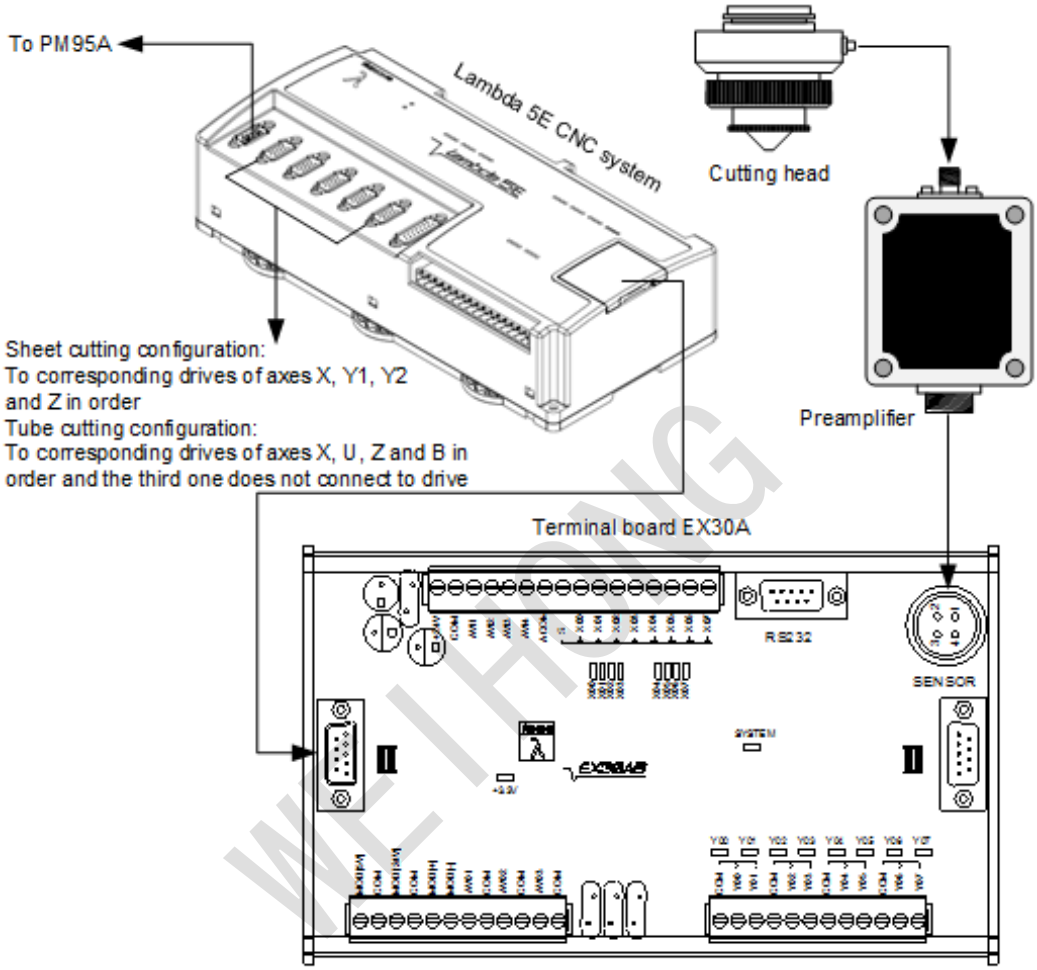
- PM95A motion control card
- Lambda 5E terminal board
- EX30A terminal board (in position loop control mode) / EX33A terminal board (in velocity loop control mode)
- EX31A terminal board (optional when exchanging workbench)
- SE001 follow-up amplifier
- Two DB9M/F communication cables
- One radio frequency cable
- One M16 tow cable with 4-core air plug
- WHB05S wireless handwheel / WHB05L wireless handwheel

WEIHONG

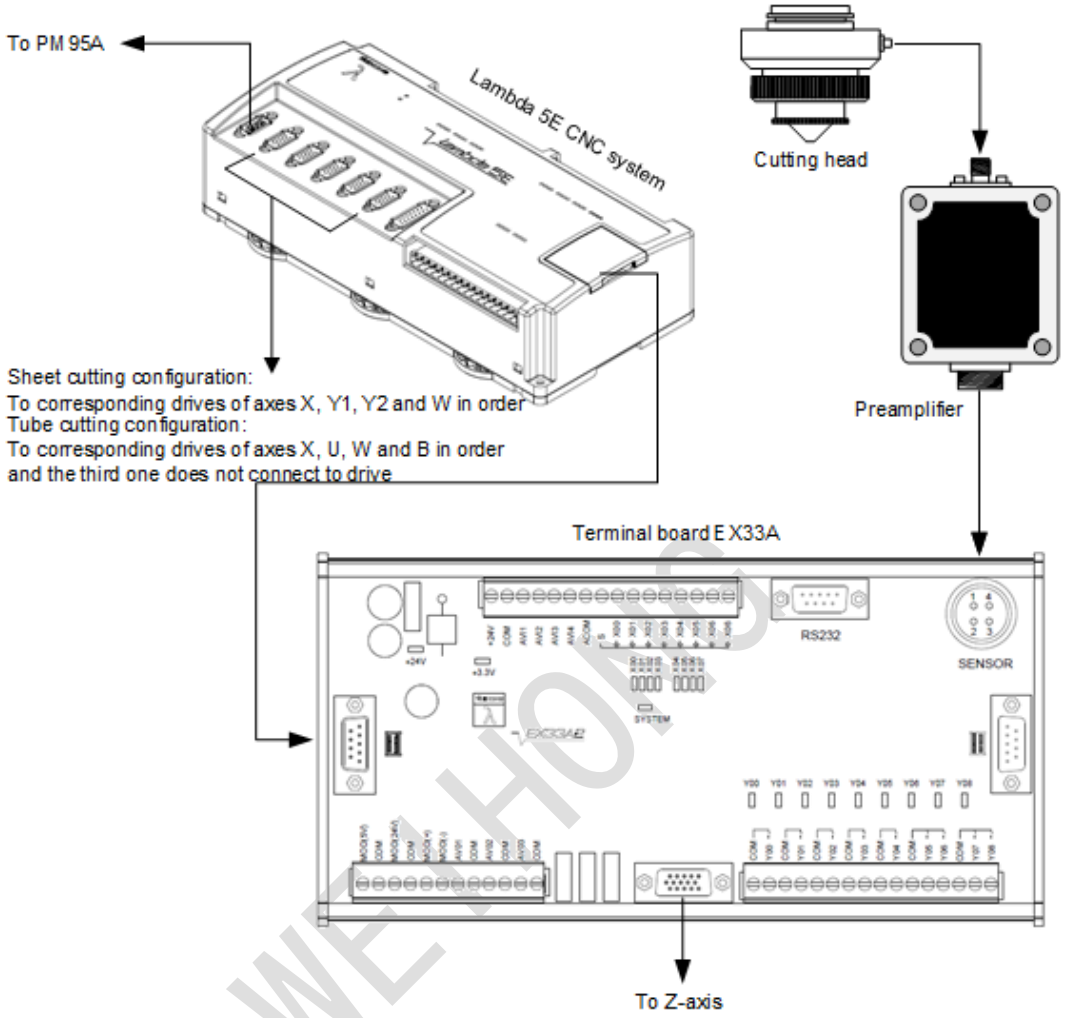
1.1.2 Connect Hardware

To connect hardware, see the following wiring diagrams:

- In position loop control mode

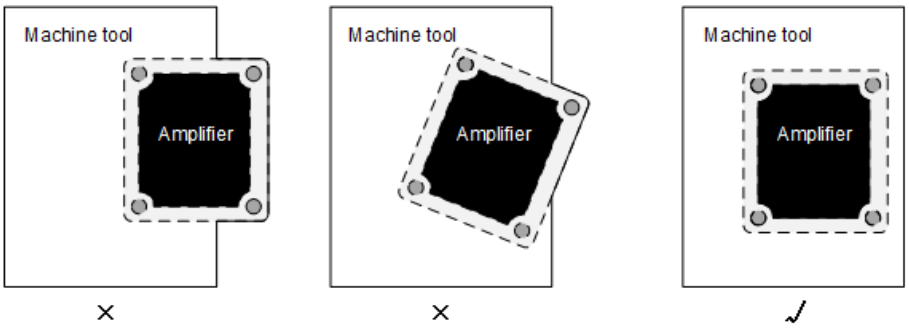


- In velocity loop control mode



W-axis refers to the focus axis and B-axis refers to the rotation axis. To avoid being confused with Y-axis in plane cutting configuration, Y-axis in tube cutting configuration is U-axis.

When installing the follow-up amplifier, you need to ensure the outer metal part of the amplifier surface is well installed on the machine tool because its coat is used to shield all signals that interfere internal circuit. Mounting diagram is as follows:



1.1.3 Install Motion Control Card

NcEditor V12 Laser Cutting CNC System uses PM95A motion control card to mate with NcEditor software, so as to control laser cutting rapidly and accurately.

Before installing motion control card, check whether the computer meets the requirement according to the following list:

- CPU: basic frequency 1G or above
- Memory: above 1G
- Hard disk: above 20G
- Display adapter: 1024*864 at least (longitudinal resolution ≥ 864)
- Display: above VGA 14"
- CD-ROM: 4X or higher (optional)
- Main board extension slot: 1 or more PCI/PCIE slot

To install motion control card, do the following:

1. Power off the host computer and open the computer case.
2. Insert the motion control card into the PCI/PCIE slot.
3. Tighten the mounting screw and lid the computer case.
4. Restart the computer.

If NcEditor software cannot be run normally after the motion control card and driver are installed, turn off the computer and check the connecting finger:

- If it is not clean, clear it with an eraser.
- If it is clean, change the motion control card.

WEIHONG

1.2 Install Software

This section introduces how to install software of **NcEditor V12 Laser Cutting CNC System**, hereinafter referred to as NcEditor software.

Before installing the software, note the following:

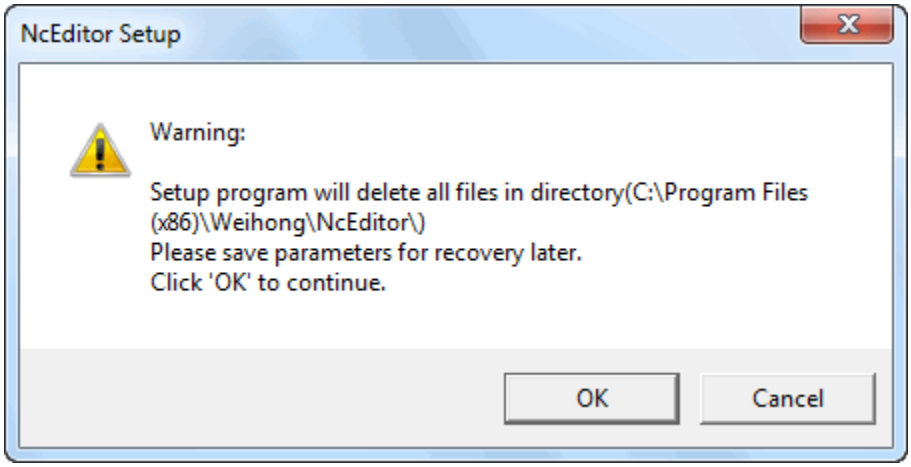
- There must be a D disk in your computer, otherwise the installation will fail.
- NcEditor software is installed under directory *C:\Program Files\Weihong\NcEditor* by default.
- If it is your first time to install the software, you need to install the basic environment package first:

To install the software, do the following (If it is your first time to install the software, skip steps 6 and 7):

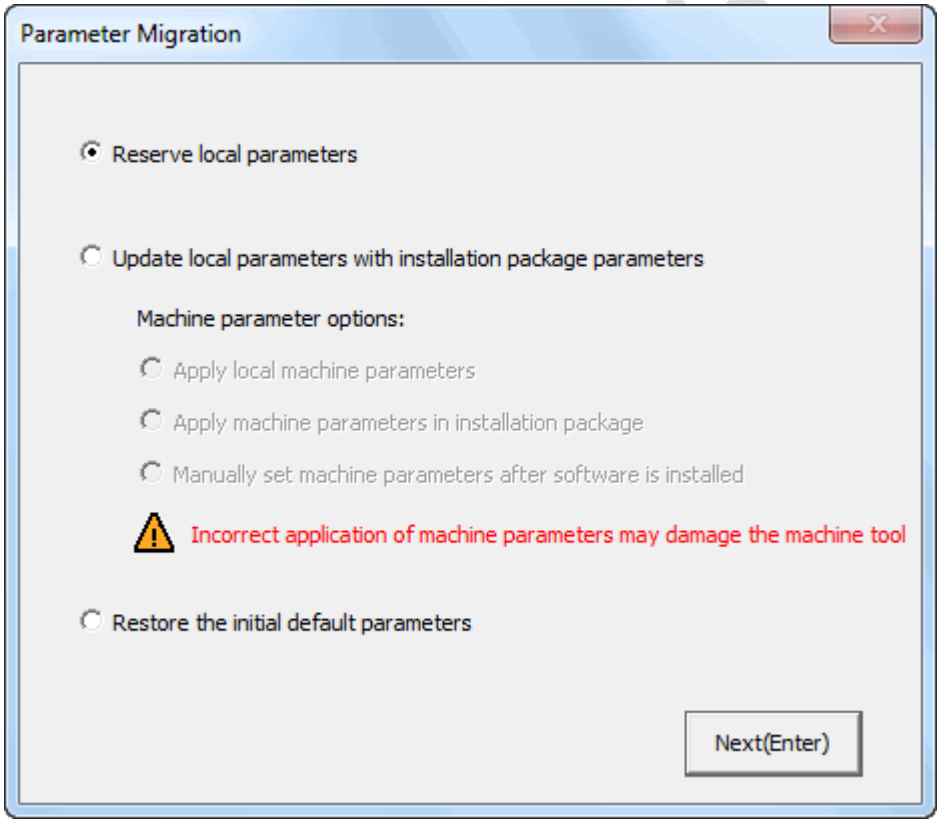
1. Copy the installation package to your computer.
2. Unzip the installation package and double click . **NcEditor Setup** dialog box pops up.
3. According to the prompt, select the display language between Chinese and English.
4. According to the prompt, click **Yes** to start to update the system.
5. **Optional:** Close the running NcEditor software when a prompt **Waiting for closing NcEditor** pops up.

WEIHONG

6. According to the prompt, click **OK** to delete files of the old version software and avoid interfering the installation of the new version software.



7. Select one of the following parameter migration method and click **Next**:



- **Reserve local parameters**： use all parameters at the local.
- **Restore the initial default parameters**: use initial parameters in the software.

- **Update local parameters with installation package parameters**: use application parameters in the installation package:

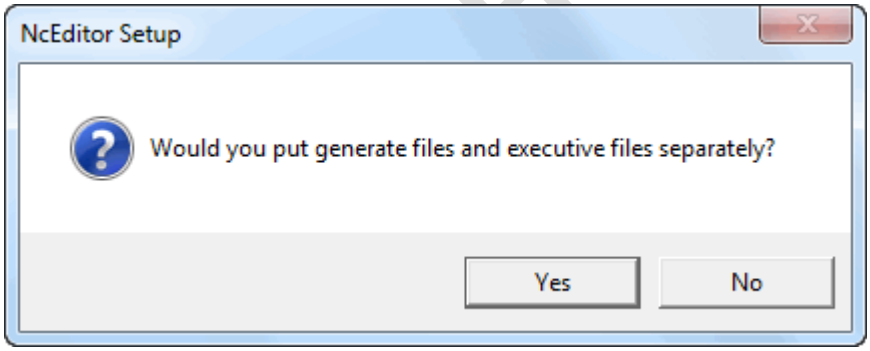
  - **Apply local machine parameters**: use machine tool parameters at the local.
  - **Apply machine parameters in installation package**: use machine tool parameters in the installation package.
  - **Manually set machine parameters after software is installed**: use initialized machine tool parameters.

  Machine parameters include the following:

  - Double Y Origin Error (also called Double Y Gantry Initialization), Detect Double Y Origin
  - Origin Capacitance of Z-axis
  - Parameters related to calibration
  - Screw Error Compensation, Backlash Compensation
  - Absolute Encoder Datum Value

  The system starts to install driver automatically. See Automatically Install Driver for details.

8. Select whether to put generated files and executive files separately according to your need.



9. According to the prompt, click **Yes** to reboot the computer at once.

If you need to uninstall the software, do the following:

1. Delete *NcEditor* folder under directory *C:\Program Files\Weihong*.
2. Delete *NcEditor* shortcut on the desktop.

1.3 Install Driver

This section introduces how to install driver to match the software with the hardware.

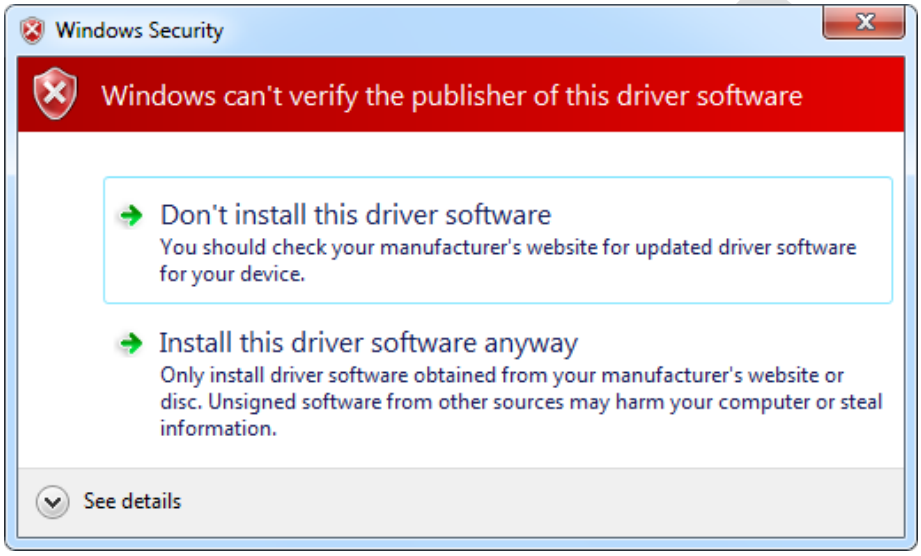
To install driver, do the following:

- Automatically install driver.
- Manually install driver.

During installing NcEditor software, the system automatically installs driver. If the system failed to automatically install driver, you can manually install it.

1.3.1 Automatically Install Driver

Taking Windows 7 as an example, during installing NcEditor software, **Windows Security** dialog box pops up:

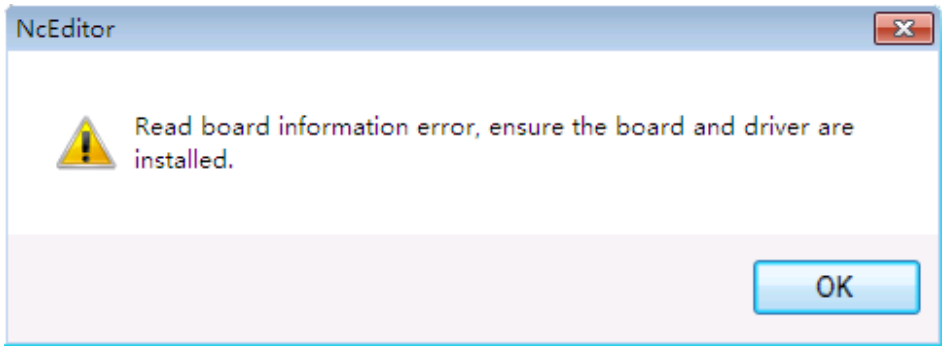


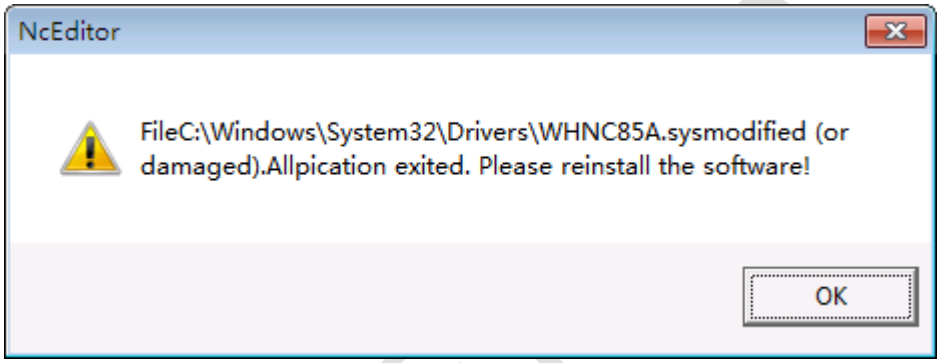
Click **Install this driver software anyway**.

After finishing installing NcEditor software, restart the software.

1.3.2 Manually Install Driver

After installing NcEditor software and motion control card, if the software cannot be opened and one of the following dialog boxes pops up, it indicates that the system may fail to automatically install driver. After eliminating problems such as the motion control card loosens, you can manually install driver to solve the problem.

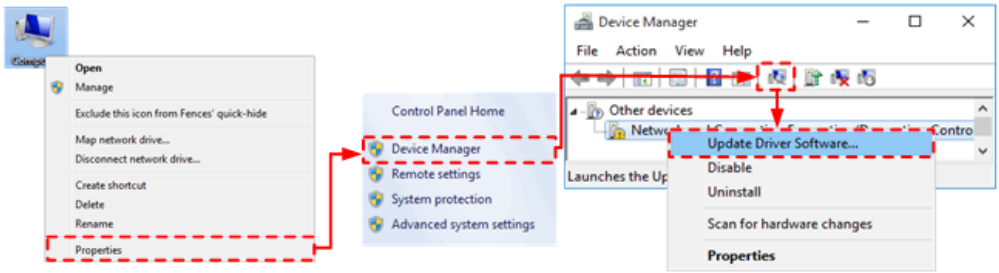




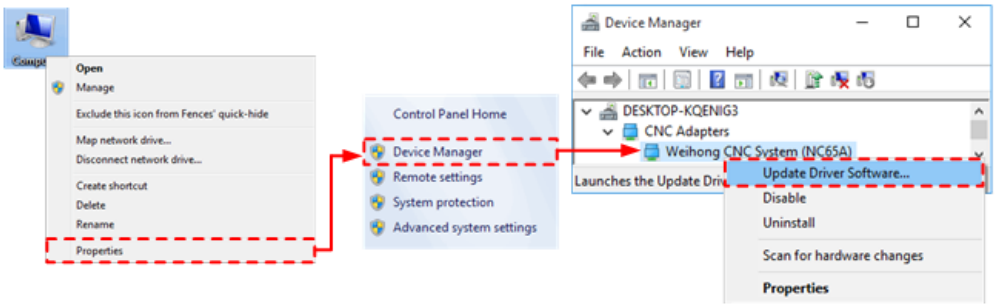
Taking Windows 7 as an example, to manually install driver, do the following:

1. Open *Device Manager* and do one of the following:

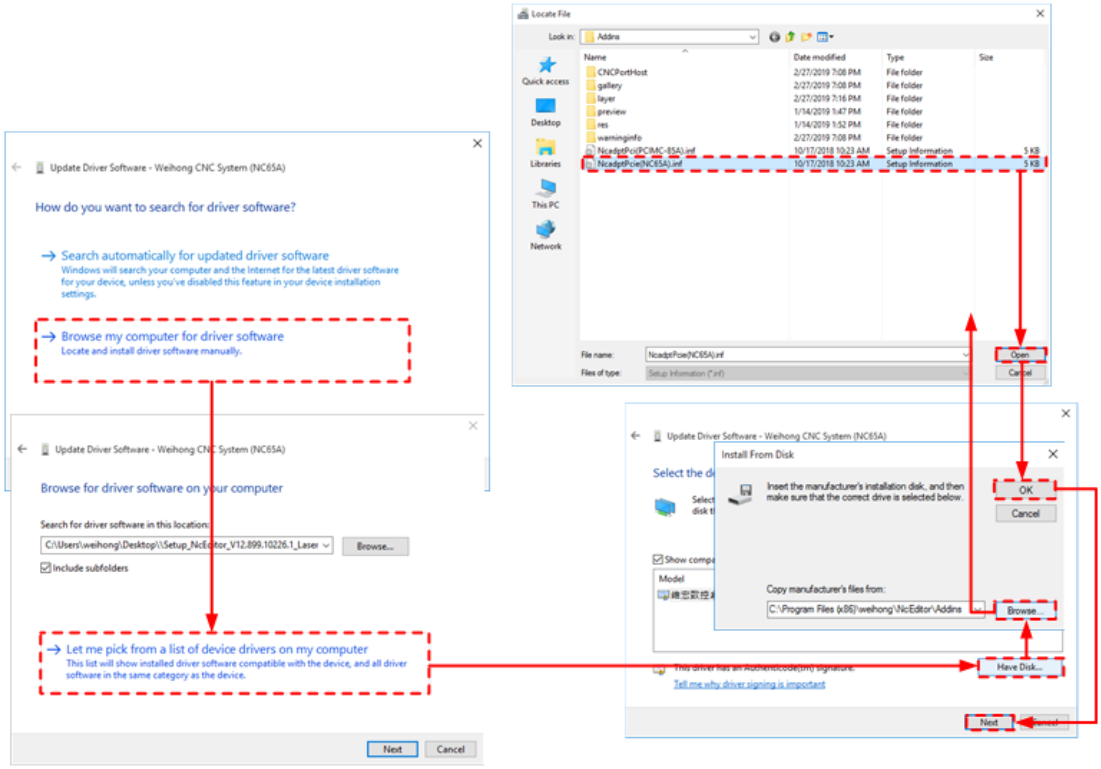
   – If it is your first time to update the driver:



– If it is not your first time to update the driver:

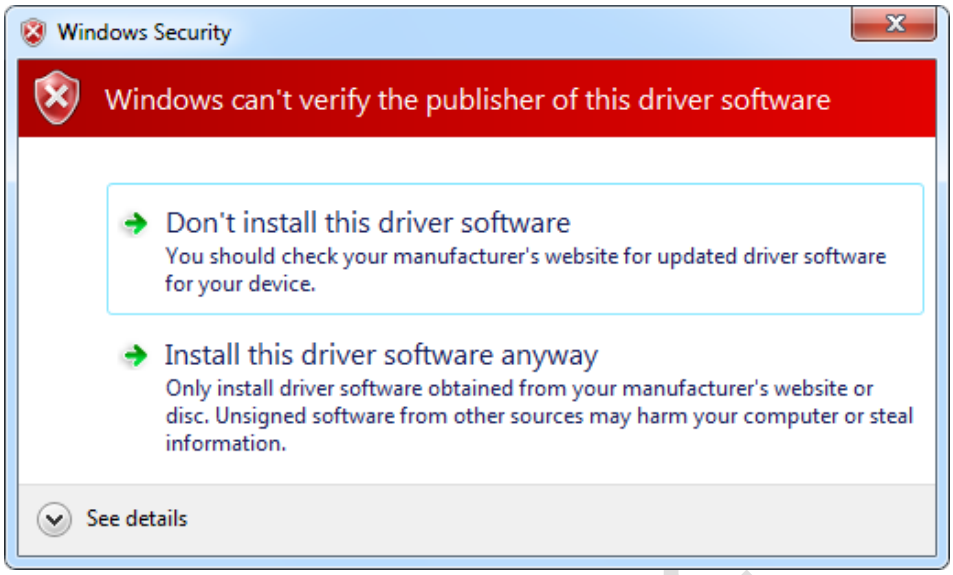


2. Find an INF configuration file as follows:



The folder is under directory *C:\ProgramFiles\Weihong\NcEditor\Addins*.

3. Click **Install this driver software anyway** in **Windows Security** dialog box:

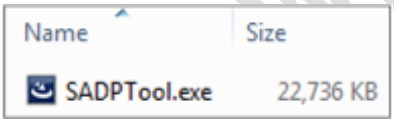


1.4 Install a Camera

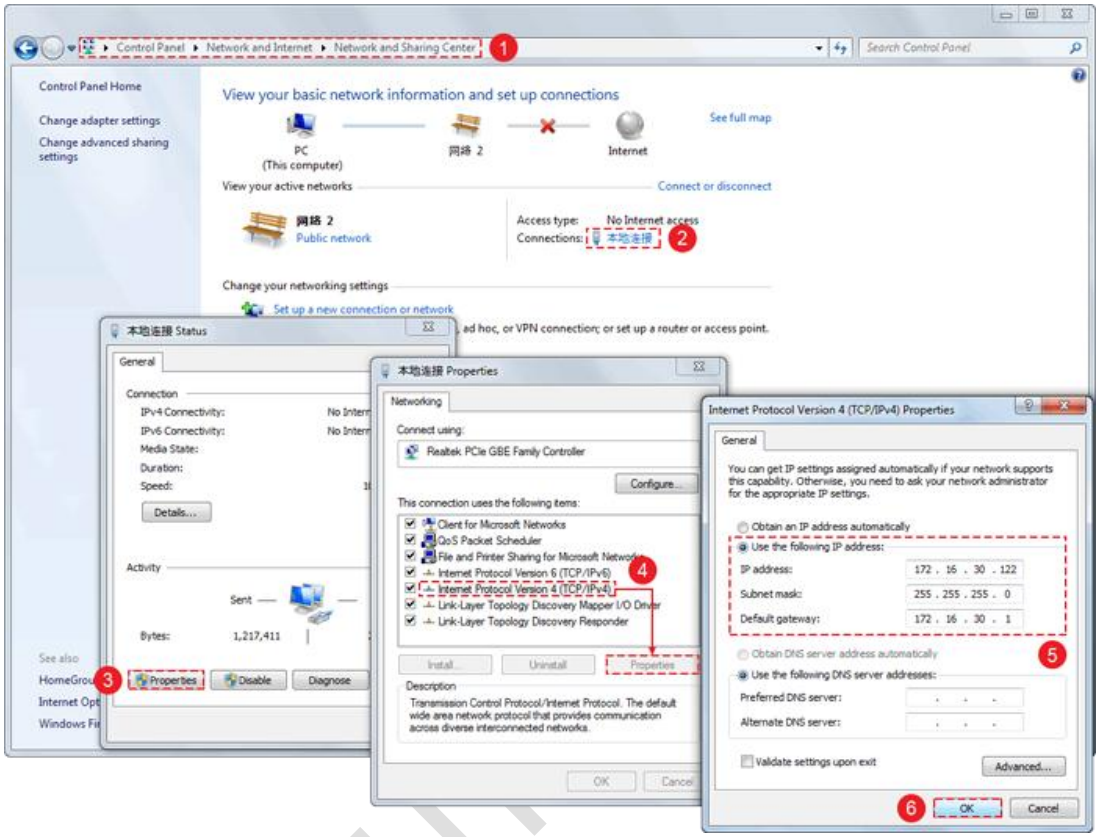
This section introduces how to install a camera and enable camera function, so as to monitor the machining condition and control machining.

To install a camera, do the following:

1. Link at most two cameras to the computer.
2. To get IP address, port, subnet mask and default gateway of the camera, install the following software:



3. To link the camera and the computer, set the computer address according to the information of the camera:



The first three parts of IP address, subnet mask and default gateway should be the same with those of the camera, and the last part of IP address should be different from that of the camera.

After installing a camera, you need to enable camera function by modifying the value of parameter **Enable Camera** to **Yes**.

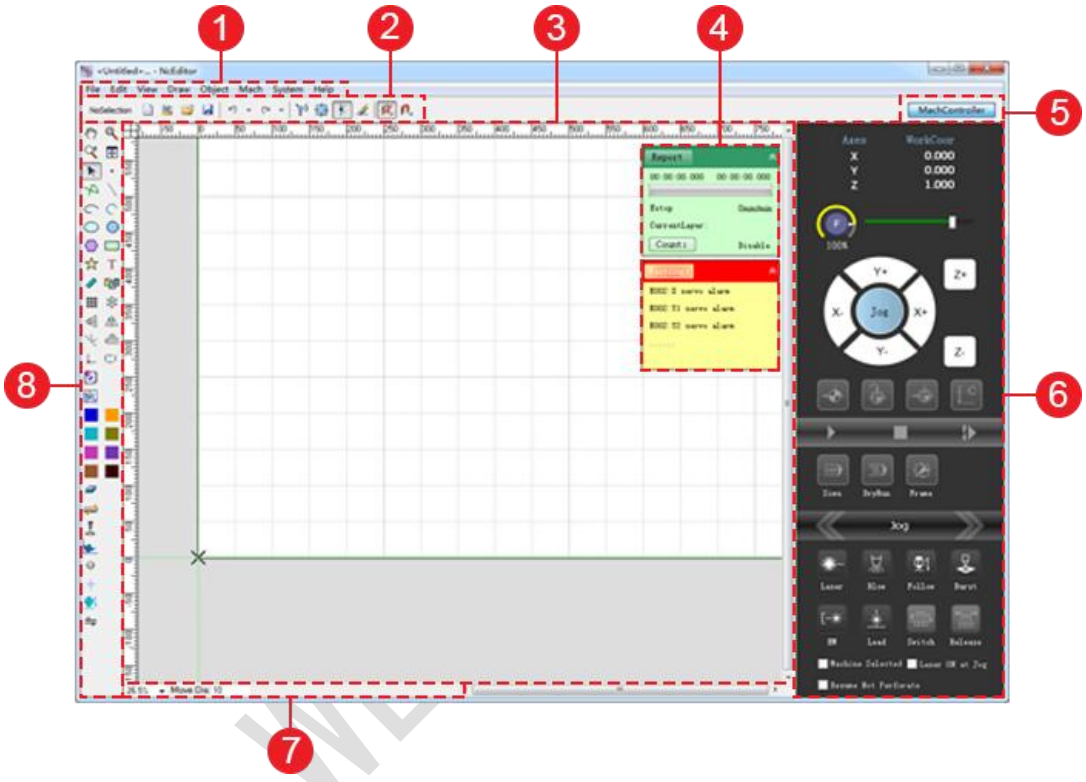
2 Interface Overview

NcEditor V12 Laser Cutting CNC System includes the following interfaces:

- Interface of sheet cutting configuration

  Used to cut sheets.

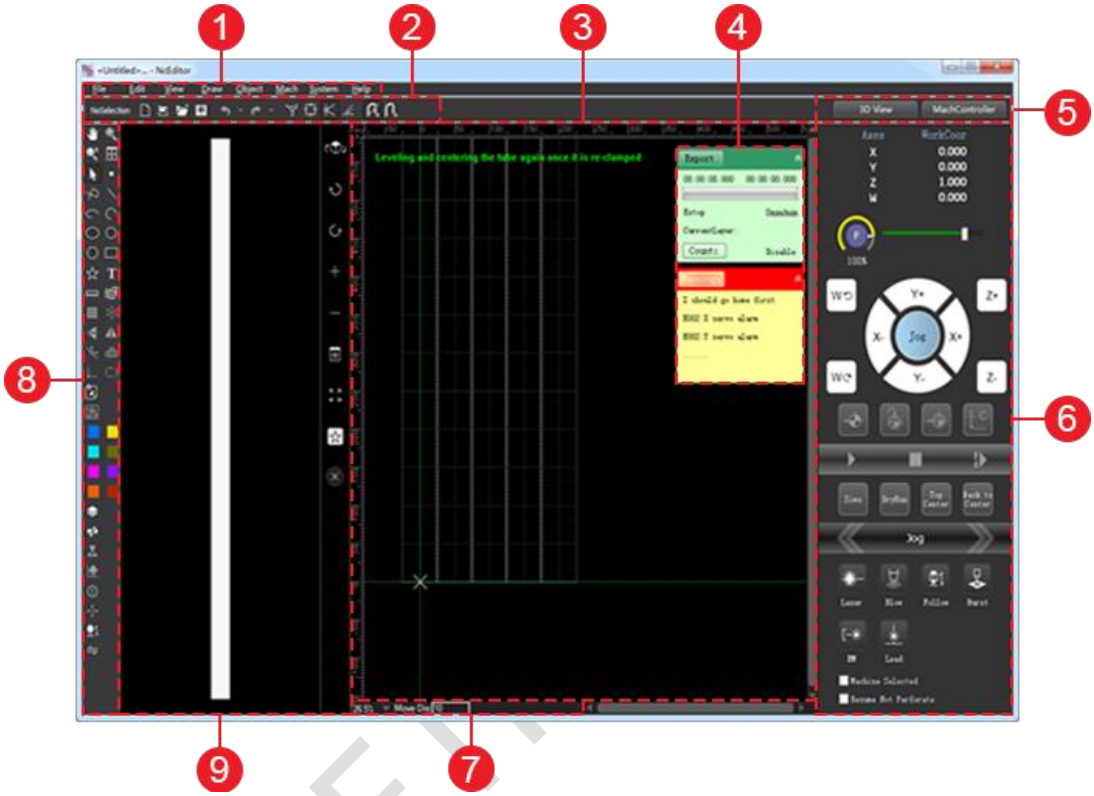
  It is shown as follows:



- Interface of tube cutting configuration

  Used to cut tubes.

  It is shown as follows:



1. Menu bar
2. Toolbar
3. Drawing window
4. Running information bar
5. Window display buttons
6. Machine control area
7. Status bar
8. Drawing toolbar
9. 3D view area

2.1 Toolbar

It is used to show frequently used instructions.

It differs in the number of selected objects:

- If no object is selected, it shows the following:
  - : New

    Used to create a new file.
  - : Import

    Used to import a G/NC/DXF/DWG/PLT/ENG file.
  - : Open

    Used to open a NCE file.
  - : Save

    Used to save a toolpath file.

    A new file is saved as a NCE file.
  - : Undo

    Used to cancel the last operation.
  - : Redo

    Used to recover canceled operations.
  - : Show order

    Used to show/hide the machining order.
  - : Show direction

    Used to show/hide the machining direction.
  - : Hightlight unclosed objects

    Used to hightlight all unclosed objects.
  - : Clear trace

    Used to clear the machining trace.

WEIHONG

- : Catch

  Used to enable/disable catching function.

- : Catch option

  Used to catch option.

- If one or more objects are selected, it shows related information of the objects and the following buttons:

  - Process: Preprocess

    See Preprocess with One Click for details.

  - Group: Group

    See Group or Ungroup Objects for details.

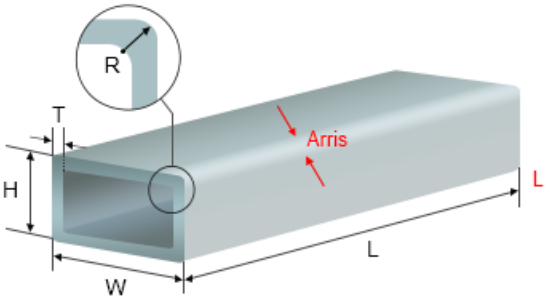
  - Break: Ungroup

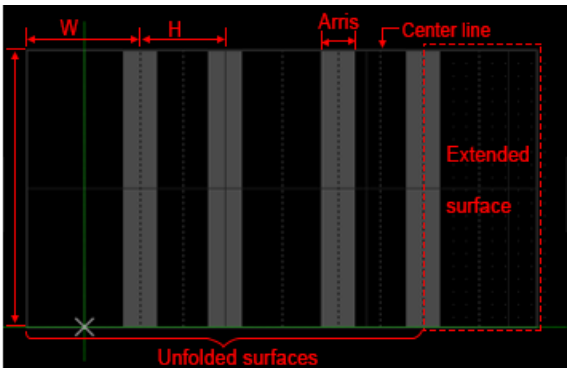
    See Group or Ungroup Objects for details.

2.2 Drawing Window

It is used to draw and preview objects.

In tube cutting configuration, the development effect of a rectangular tube shows in drawing window for ease of drawing:





- Length of an arris: depending on the corner radius and thickness of the rectangular tube.
- Extended face: corresponding to the first face of the actual tube.
- Center line: including face center line and arris center line. It exists on each face. When you drag the object, the center of the object automatically gets close to the center line.

2.3 Running Information Bar

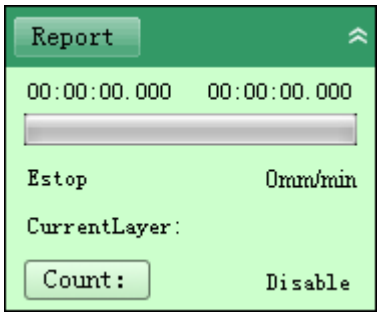
It is used to show running status and alarms of the machine tool.

It includes the following:

- Report bar
- Alarm bar

2.3.1 Report Bar

It is shown as follows:



You can check the following:

- Current machining time
- Remaining machining time
- Current system status
- Current machining speed
- Current machining layer
- Statistics for machining

You can enable counting machining function by clicking **Count**.

2.3.2 Alarm Bar

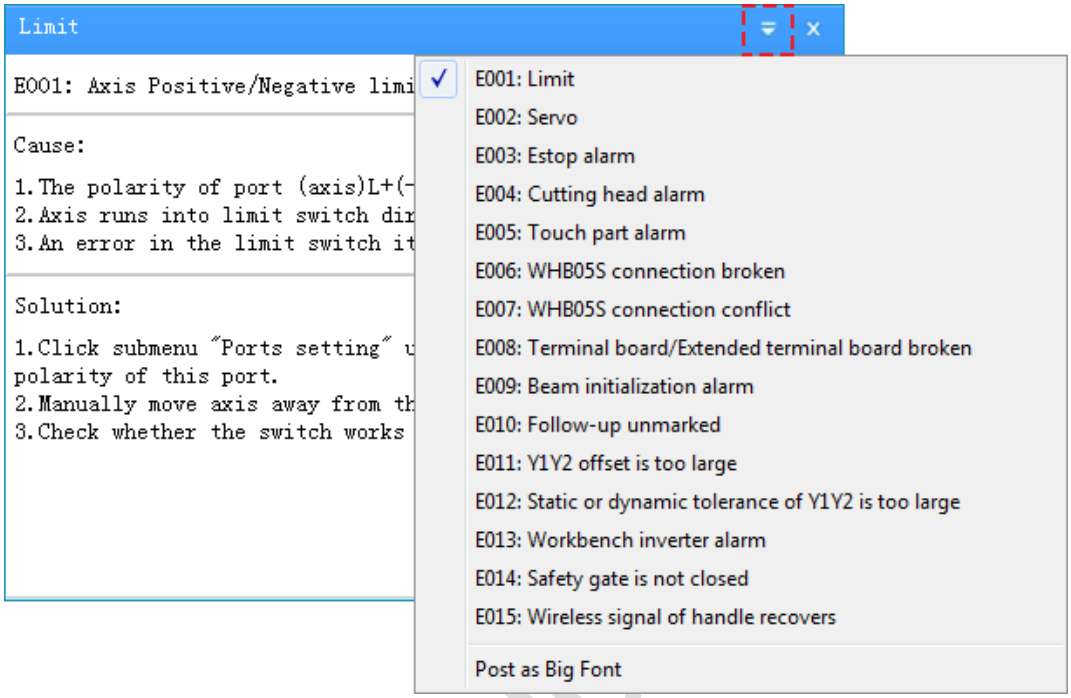
It is shown as follows:

It is used to check alarm information.

You can do the following:

WEIHONG

- To check causes and solutions of alarms, click **Warnings**.
- To check alarm type, click .



2.4 Window Display Buttons

It is used to show/hide the following windows:

- Sheet cutting configuration: machine control area.
- Tube cutting configuration: machine control area and 3D view area.

2.5 Machine Control Area

It includes the following:

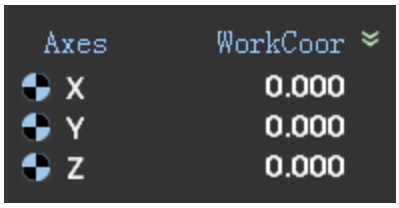
- Axis coordinate display area
- Feed override control bar
- Manual control area
- Common operation buttons
- Machining control area
- Machining selection area

2.5.1 Axis Coordinate Display Area

It is used to show the following:

- Workpiece coordinates
- Machine coordinates

Compared with sheet cutting configuration, W-axis is added in tube cutting configuration. This part takes sheet cutting configuration as an example:



To switch between workpiece coordinates and machine coordinates, do one of the following:

- Click .
- Double click **WorkCoor/MachCoor**.

After returning to the machine origin, sign appears before each axis.

2.5.2 Feed Override Control Bar

It is used to control current feed speed by adjusting current feed override.

It is shown as follows:

The relationship among current feed speed, current feed override and set feed speed is as follows:

```
Current feed speed = Current feed override * Set feed speed
```

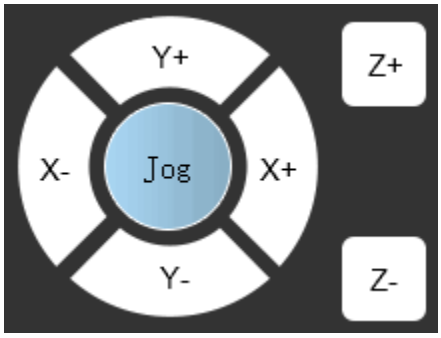
To adjust feed override, do one of the following:

- Drag the slider.
- Click on the target position on the slider repeatedly.
- Click the slider and press ↑/↓ or **PgUp/PgDown** on the keyboard.

2.5.3 Manual Control Area

It is used to move the machine tool manually.

Compared with sheet cutting configuration, B-axis is added in tube cutting configuration. This part takes sheet cutting configuration as an example:

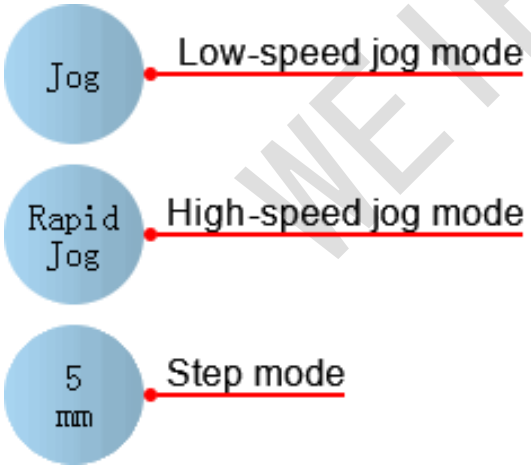


- Axis direction buttons

  Used to move each axis towards positive or nagative direction.

- Feed mode button

  Used to switch among the following feed modes by clicking the circular button in the middle:



  – Jog mode

    Including low-speed jog mode and high-speed jog mode.

    Click an axis direction button. The machine tool moves at jog/rapid jog speed until you release the button.

    Click several axis direction buttons at the same time. The clicked axes move at the same time at jog/rapid jog speed.

WEIHONG

– Step mode

  Click an axis direction button. The machine tool moves the customized step size.

  The default customized step size is 5mm. To customize the step size, double click the feed mode button. The value should not be too large to avoid damage due to misoperation.

Note: Please do not click an axis direction button too frequently because the system needs a certain time to execute the command.

2.5.4 Common Operation Buttons

It is used to execute the following common operations:

- : All to origin

  Used to return all axes to the machine origin.

- : Set workpiece origin

  Used to set the workpiece origin.

- : Workpiece origin

  Used to control the cutting head to return to the workpiece origin.

-

: Calibrate

  Used to set a follow-up height.

2.5.5 Machining Control Area

It includes the following:

- : Start

  Used to start machining from the beginning.

- : Stop

  Used to stop machining.

WEIHONG

- : Breakpoint resume

  Used to resume machining from the exact interrupted position when the power interruption or e-stop occurs and the workpiece origin is secured.

-

: Simulation

  Used to execute simulation to check the toolpath in real-time.

- : Dry run

  Used to run the machine tool without turning on related ports of laser and machining. There is no actual machining.

- : Cut frame

  Used to confirm the machining range by running the system along the frame of the toolpath file.

-

: Leveling and centering

  Used to adjust a tube to horizontal status and find the center line of certain face of the tube.

-

: Return to center

  Used to move each axis to return to the center position of the tube. W-axis turns to horizontal status and X-axis returns to the center line of the tube.

-

: Jog

  Used to switch between jog mode and step mode by clicking .

  In step mode, the default customized step is 10mm. To customize the step size, double click this button.

  Control the machine tool to move along the toolpath towards positive/negative direction with / .

WEIHONG

- : Go forward

  Used to control the machine tool to move along the toolpath towards positive direction.

- : Go backward

  Used to control the machine tool to move backward along the toolpath towards negative direction.

- : Laser

  Used to turn on laser valve.

  Laser valve is turned on automatically when machining starts.

- : Blow

  Used to turn on blow valve.

  Blow valve is turned on automatically when machining starts and is turned off after set time.

- : Follow

  Used to turn on follow valve to keep the distance between the nozzle and the workpiece surface.

  Follow valve is turned on automatically when machining starts.

- : Burst

  Used to turn on laser valve for a certain time.

  Laser valve keeps on for the set burst time until it is turned off automatically.

- : Shutter

  Used to turn on laser shutter manually.

  To eject laser light, first, turn on laser shutter; then, open laser valve.

WEIHONG

- : Lead light

  Used to turn on red light manually, which is a kind of guide light.

  Red light is used to point out the position of laser on the sheet.

- : Exchange workbenches

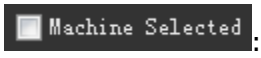
  Used to exchange workbenches, so as to improve the machining efficiency.

- : Release

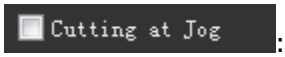
  Used to manually control the machine tool to release workbenches during exchanging workbenches.

2.5.6 Machining Selection Area

It includes the following:

-  : Machine selected objects

  Used to machine the selected objects, including machining, dry run, simulation, cutting frame, machining from the near point and breakpoint resume.

-  : Cutting at jog

  Used to manually control the machine tool with laser on.

- : Resume without piercing

  Used to execute breakpoint resume without piercing during cutting a thick sheet, so as to avoid damage to the sheet and effect on machining.

- : Find edges

  Used to find edges automatically before machining.

2.6 Status Bar

It is used to show the following:

- Related information of current drawing objects: drawing steps and meaning, step result, tuning distance, etc.
- Tips during machining.

WEIHONG

2.7 Drawing Toolbar

It is used to do the following:

- Draw objects
- Execute auxiliary editing operations
- Execute basic editing operations
- Set technics
- Set layers
- Nest toolpaths
- Find edges

2.8 3D View Area

It includes the following:

- View area
- View toolbar

2.8.1 View Area

It is used to check the tube from different perspectives and preview cutting effect.

In this area, you can do the following:

- Press the left button:
  - To rotate the tube, drag the mouse left and right.
  - To move the tube, drag the mouse up and down.
- To zoom in/out the tube, scroll the mouse wheel.

2.8.2 View Toolbar

It includes the following:

- : Switch view

  Used to observe a tube from different perspectives.

- : Rotate CW

  Used to rotate the view in a clockwise direction.

- : Rotate CCW

  Used to rotate the tube view in a counterclockwise direction.

WEIHONG

- : Zoom in

  Used to mnake the view appear larger.

- : Zoom out

  Used to make the view appear smaller.

- : Best view

  Used to adjust 3D view area to the best size, so as to check the toolpath effect.

- : Maximize

  Used to maximize 3D view area and hide drawing window.

- : Restore view

  Used to restore the maximized view to its previous size.

- : Hollow out

  Used to show hollow-out-effect of objects, so as to check the cutting effect.

- : Solid

  Opposite to instruction.

- : Instant Hollowing

  Used to show hollow-out-effect of objects which have been executed machining or dry run, while executing instruction for other objects.

- : Close

  Used to close 3D view area.

WEIHONG

3 Machine Tool Commissioning

This section mainly introduces how to do commissioning for the machine tool.

Before commissioning, click **System** → **Configs** and select the proper configuration.

The machine tool commissioning includes the following:

- Modify port polarity
- Set drive parameters
- Adjust pulse equivalent and electronic gear ratio
- Set speed parameters
- Adjust the axis direction
- Set the workbench stroke
- Compensate lead screw errors
- Set parameters of air pressure and laser device

After commissioning, you need to check machine tool setting.

3.1 Modify Port Polarity

This operation is used to modify the polarity of a port, so as to make the port effective.

Relationship between the status of the machine tool and IO ports is as follows:

- Input port: ● means no signal; while ● means having a signal.
- Output port: ○ means no signal; while ○ means having a signal.

To modify port polarity, do the following:

1. Click **System** → **Ports Setting**. **IO Ports** dialog box pops up.
2. Click **Convert Pol**.

You can conduct or close a simulation test by clicking **Test On** or **Test Off**. The sign **T** next to a port means the port is under testing.

3.2 Set Drive Parameters

This operation is used to run the machine tool according to your need.

Drive parameters differ in the follow-up control mode:

- Drive parameters (in position loop control mode)
- Drive parameters (in velocity loop control mode)

To set the target parameter to the setting value in parameter description, see user manual of each brand for details.

WEIHONG

When setting drive parameters of brands which are not mentioned in this section, do the following:

- Confirm the SON signal type of selected drive and ensure it is active low, i.e., servo is ON when SON and GND of 24V power is conducted.
- Make clear the level of drive alarm output port when there is no alarm:
  - If it is normally low-level, the input port polarity of servo alarm should be **P**.
  - If it is low-level when alarm occurs, the input port polarity of servo alarm should be **N**.
- Confirm the type of pulse signal received in parameters setting of the drive is **pulse + direction**.
- Make clear whether there is external e-stop signal input in the input terminal of drive and the logic of this signal.
- Ensure 24V power supply is provided for the terminal board before the trial run of the drive, because the 24V power for the drive is indirectly provided through the terminal board.

  If the drive still cannot rotate, confirm the drive parameter **Forward and Reverse Rotation Input Prohibited** is set to **No**.

3.2.1 Set Drive Parameters (in Position Loop Control Mode)

This operation is used to set parameters of the following servo drives in position loop control mode:

- WISE servo drive
- YASKAWA Σ-Ⅱ servo drive
- YASKAWA Σ-Ⅴ/Σ-7 servo drive
- Panasonic MINAS A4 servo drive
- Panasonic MINAS A5 servo drive
- Fuji FALDIC-β servo drive
- Fuji ALPHA 5 servo drive
- DELTA ASDA-A servo drive
- DELTA ASDA-A2 servo drive
- DELTA ASDA-B servo drive
- DELTA ASDA-B2 servo drive

WISE Servo Drive

Pr001 Control Mode

1: Position loop control mode

2: Velocity loop control mode

Set value: 1

Pr528 LED Initial Status
Used to monitor if the number of sent and received pulses is correct.

In Weihong control system, the correct quantity of pulse sent by control card is detected by pulse inspection to determine whether there is electrical interference.

Set value: 6

Command Pulse Counts Per Motor Revolution
Pr008 = Screw pitch/(Pulse equivalent * Mechanical reducer ratio)

When it is set to 0, parameters **Pr009** and **Pr010** are valid.

Set value: 0

Pr009 1st Numerator of Electronic Gear / Pr010 Denominator of Electronic Gear
Range: [0, 230]

Example: pitch 5mm, encoder resolution 10000, reducer ration 1:1, pulse equivalent 0.001mm: Pr009=10000, Pr010=Pitch 5mm/Pulse equivalent 0.001mm=5000. Thus, Pr009/Pr010=10000/5000=2/1

Set value: to be calculated.

Pr011 Output Pulse Number Per Motor Revolution
Example: pulse equivalent 0.001mm/p, reducer ratio 1:1, pitch 10mm/p: Pr011=2500; pitch 5mm/p: Pr011=1250.

Set value: 2500/1250

Default value: 2500

Pr100 1st Position Loop Gain
Unit: 0.1/s

Set according to the actual machining situation.

Default value: 480

Pr101 1st Velocity Loop Gain
0.1Hz

Set according to the actual machining situation.

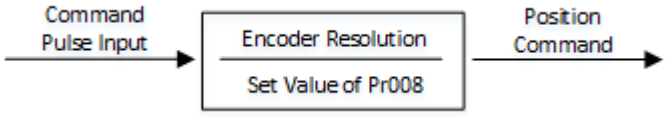
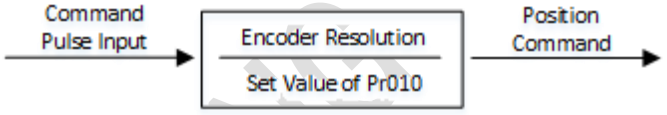
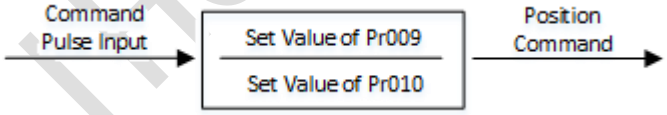
Default value: 270

Pr102 1st Velocity Loop Integrated Time Constant
Unit: 0.1ms

Set according to the actual machining situation.

Default value: 210

Relationship among parameters Pr008, Pr009 and Pr010

Pr008	Pr009	Pr010	Description
1~2^{20}	Invalid	Invalid	 As shown above, the process is undergone in terms of the set value of Pr008, and no affected by the settings of Pr009 and Pr010.
0	0	1~2^{30}	 When the values of Pr008 and Pr009 are both set to “0”, as shown above, the process is undergone in terms of the set value of Pr010.
0	1~2^{30}	1~2^{30}	 When the value of Pr008 is “0”, but the value of Pr009 is not “0”, as shown above, the process is undergone in terms of the set values of Pr009 and Pr010.

YASKAWA Σ-Ⅱ Servo Drive

Fn010 Set Password (To Prevent Arbitary Modification to Parameters)
If it is set to "0000", modification to user parameters "PnXXX" and part of auxiliary function parameters "FnXXX" is permitted.

If it is set to "0001", modification to user parameters "PnXXX" and part of auxiliary function parameters "FnXXX" is prohibited.

Set value: 0000

Un00C Surveillance Mode
Monitor if the number of sent and received pulse is correct by setting this parameter.

In Weihong control system, the correct quantity of pulse sent by control card is detected by pulse inspection to determine whether there is electrical interference.

LXXXX (Hexadecimal system)

Pn000 Direction Selection, Control Mode Selection
Bit 0: set to "0" and CCW rotation is the forward rotation (viewed from the load end of screw ball). Set to "1", the rotation direction of the motor is reversed.

Bit 1: set to "1", position loop cpntrol mode (calculate pulse instruction all the time).

Set value: 0010

Pn200 Select Pulse Instruction Mode
Bit 0: Set 5, select the instruction input mode as "pulse + direction", negative logic.

Bit3: Set 0, input differential signal into filter.

Set value: 0005

Pn50A Selection Function
Bit 1: Set 0, Servo ON /S-ON, input from the 40th pin; Set 7, Servo ON all the time.

Bit 3: Set 8, forward rotation not used and signal input (P-OT) prohibited.

Set value: 8100

Pn50B Selection Function
Bit 0: Set 8, reverse rotation not used and signal input (N-OT) prohibited.

Set value: 6548

WEI HONG

Pn50F Selection Function
Set it when servo motor with brakes.

Bit 2: Set 3, brake interlock signal "/BK" is output from CN1-29, CN1-30 to control 24V relay for brake.

Set value: 0300

Pn50E Selection Function
Set it when servo motor with brakes.

To avoid of CN1-29 and CN1-30 being used for other function and leading to brake ineffective, "3" is not allowed to appear in the 4 digits.

Set value: 0211

Pn506 Servo off, Time Delay of Brake When Motor Stops
Unit: 10ms

Set it when motor with brakes.

Set according to the actual situation.

Pn201 PG Divider Ratio
Example: when pulse equivalent is 0.001, pitch 10mm, without reducer, sets the parameter to 2500; when pitch 5mm, set it to 1250.

Range: [16, 214]

Set value: Set according to PG divider ratio (Weihong system).

Pn202 Electronic Gear Ratio (Numerator), Electronic Gear Ratio (Denominator)
Pn202 = Pulse number of each encoder circle * 4 * Mechanical reducer ratio

Pn203 = (Screw pitch/ Pulse equivalent)

Example:

① Pitch 5mm, encoder 17-bit, coaxial connection between motor and screw, pulse equivalent 0.001mm, Pn202＝16384; Pn203＝625.

② Pitch 5mm, encoder 17-bit, coaxial connection between motor and screw, pulse equivalent 0.0005mm, Pn202＝8192; Pn203＝625.

Set value: to be calculated.

YASKAWA Σ-V /Σ-7 Servo Drive

Fn010 Parameter Input Prohibition Setting
If it is set to "0000", modification to user parameters "PnXXX" and part of auxiliary function parameters "FnXXX" is permitted.

If it is set to "0001", modification to user parameters "PnXXX" and part of auxiliary function parameters "FnXXX" is prohibited.

Set value: 0000

Pn000 Function Selection Basic Switch 0
Bit 0: set 0, positive rotation at positive rotation command.

Bit 1: set 1, position loop control mode (pulse sequence command)

Set value: 0010

Pn200 Format Selection Switch of Position Loop Control Command
Bit 0: set 5, select the instruction mode as "pulse + direction", negative logic.

Set value: 0005

Pn50A Input Signal Selection 1
Bit 1: set 0, Servo ON /S-ON, input from the 40th pin; Set 7, Servo ON all the time.

Bit 3: set 8, positive rotation not used and signal input (P-OT) prohibited.

Set value: 8100

Pn50B Input Signal Selection 2
Bit 0: set 8, negative rotation not used and signal input (N-OT) prohibited.

Set value: 6548

Pn50F Output Signal Selection 2
Set it when servo motor with brakes.

Bit 2: set 3, brake interlock signal "/BK" is output from CN1-29, CN1-30 to control 24V relay used for brake.

Set value: 0300

Pn50E Output Signal Selection 1
Set it when servo motor with brakes.

To avoid of CN1-29 and CN1-30 being used for other function and leading to brake ineffective, 3 is not allowed to appear in the 4 digits.

Set value: 0211

Pn506 Brake Instruction - Servo OFF Time Delay
Set it when servo motor with brakes.

Unit: ms

Set value: Set it according to the actual situation.

Pn20E Electronic Gear Ratio (Numerator), Pn210 Electronic Gear Ratio (Denominator)
Pn20E/Pn210 = (Encoder resolution * Pulse equivalent * Reducer ratio) / Screw pitch

Set value: to be calculated.

Pn212 Pulse Number Allocated by Encoder

Range: [16, 230]

Example: When pulse equivalent is 0.001, pitch 10mm, without reducer, set this parameter to 2500; when pitch 5mm, set it to 1250.

Set it according to PG divider ratio (Weihong system).

Panasonic MINAS A4 Servo Drive

Pr01 LED Initial Status
Monitor if the number of sent and received pulse is correct by setting this parameter.

In Weihong control system, the correct quantity of pulse sent by control card is detected by pulse inspection to determine whether there is electrical interference.

Set value: 12

Pr02 Select Control Mode
0: position mode

1: velocity mode

2: torque mode

Set value: 0

Pr40 Select Command Pulse Input
1: input by differential exclusive circuit

Set value: 1

Pr42 Select Command Pulse Input Mode
3: set command pulse input mode: pulse + direction, negative logic.

Set value: 3

WEIHONG

Pr44 Numerator of Feedback Pulse Frequency Multiplication
Range: [1, 32767]

Example: when pulse equivalent is 0.001, pitch 10mm, without reducer, set this parameter to 2500; when pitch 5mm, set it to 1250.

Set value: set it according to PG divider ratio (Weihong system).

Pr48 1st Numerator of Command Pulse Frequency Multiplication, Pr4B Denominator of Command Pulse Frequency Multiplication
Range: [1, 10000]

Example: pitch 5mm, encoder resolution 10000, shaft coupling direct drag, pulse equivalent 0.001mm: Pr48=10000, Pr4B=pitch 5mm / pulse equivalent 0.001mm=5000, thus, Pr48/Pr4B=10000/5000=2/1.

Set value: to be calculated.

Panasonic MINAS A5 Servo Drive

Pr5.28 LED Initial Status
Monitor if the number of sent and received pulse is correct by setting this parameter.

In Weihong control system, the correct quantity of pulse sent by control card is detected by pulse inspection to determine whether there is electrical interference.

Set value: 6

Pr0.01 Select Control Mode
0: position mode

1: velocity mode

2: torque mode

Set value: 0

Pr0.05 Select Command Pulse Input
0: photo-coupler input (PULS1, PULS2, SIGN1, SIGN2)

1: exclusive input for line drive (PULSH1, PULSH2, SIGNH1, SIGNH2)

Generally, set it to 1.

Pr0.07 Command Pulse Input Mode Setup
3: set command pulse input mode: pulse + direction, negative logic.

Set value: 3

Pr0.08 Command Pulse Counts Per One Motor Revolution
When it is set as “0”, parameters Pr0.09 and Pr0.10 are valid.

WEIHONG

When it is not set as "0", Pr0.08 = Screw pitch / (Pulse equivalent * Mechanical reducer ratio)

Set value: 0

Pr0.09 1st Numerator of Command Pulse Frequency Multiplication, Pr0.10 Denominator of Command Pulse Frequency Multiplication
Range: [0, 230]

Example: pitch 5mm, encoder resolution 10000, shaft coupling direct drag, pulse equivalent 0.001 mm: Pr0.09＝10000, Pr0.10＝pitch 5mm/ pulse equivalent 0.001mm＝5000. Thus, Pr0.09/Pr0.10=10000/5000=2/1.

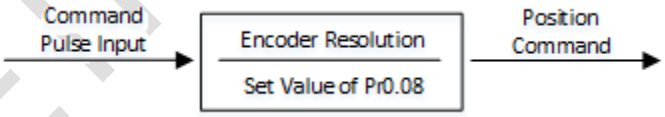
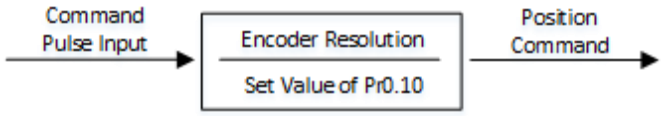
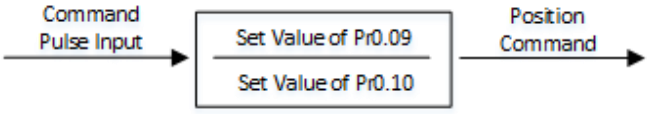
Set value: to be calculated.

Pr0.11 Output Pulse Number Per One Motor Revolution
Range: [1, 262144]

Example: when pulse equivalent is 0.001, pitch 10mm, without reducer, set this parameter to 2500; when pitch 5mm, set it to 1250.

Set value: set it according to PG divider ratio (Weihong system).

Relationship among parameters Pr0.08, Pr0.09 and Pr0.10

Pr0.08	Pr0.09	Pr0.10	Description
$1\sim2^{20}$	Invalid	Invalid	 The process shown above is undergone in terms of the set value of Pr0.08, and not affected by the settings of Pr0.09 and Pr0.10.
0	0	$1\sim2^{30}$	 When the values of Pr0.08 and Pr0.09 are both set as "0", as shown above, the process is undergone in terms of the set value of Pr0.10.
0	Negative	$1\sim2^{30}$	 When the value of Pr0.08 is "0", while the value of Pr0.09 is not "0", as shown above, the process is undergone in terms of the set values of Pr0.09 and Pr0.10.

Fuji FALDIC-β Servo Drive

01 Command Pulse Numerator α, 02 Command Pulse Denominator β
Equal to numerator/denominator of electronic gear ratio.

Calculation formula: **α/β = (Encoder resolution * Pulse equivalent * Mechanical reducer ratio)/ Screw pitch

Example: encoder resolution 65536, pitch 5mm, pulse equivalent 0.001, mechanical reducer ratio 1, α/β=65536×0.001/5=8192/625. Thus, α=8192, β=625.

Range: [1, 32767]

Set value: to be calculated.

03 Pulse String Input Form
Set the input mode of pulse string as: instruction + symbol, that is "pulse + direction".

Set value: 0

04 Direction of Rotation Switch
Set as 0: positive direction: forward rotation (CCW)

Set as 1: positive direction: reverse rotation (CW)

Set value: 0/1

10 CONT1 Signal Distribution
Set as 1: CONT1 is distributed as RUN (i.e. SON); if not distributed, CONT1 will be auto ON if there is no alarming when powered.

Set value: 1

11 CONT2 Signal Distribution
Set as 2: CONT2 is distributed as RST (i.e. servo alarming clearance CLR). When 12, 13, 14 are 0, that is CONT3, CONT4 and CONT5 cannot be distributed as OT over-travel or EMG (external emergency stop).

Set value: 2

15 OUT1 Signal Distribution
Set as 1: OUT1 is distributed as a-contact point of alarming output.

Set as 2: OUT1 is distributed as b-contact point of alarming detection.

Set value: 1

WEI HONG

27 Parameter Write-protection
Whether drive parameters can be modified.

0: write-enable

1: write-protected

74 CONT Always ON 1
When it is set as "1", servo is activated (RUN).

Set value: 1

Fuji ALPHA 5 Servo Drive

PA1_01 Select Control Mode
0: position control mode

1: velocity control mode

Set value: 0

PA1_06 Electronic Gear Ratio (Numerator)(0), PA1_07 Electronic Gear Ratio (Denominator)
Calculation formula: **PA1_06/PA1_07 = (Encoder resolution * Pulse equivalent * Mechanical reducer ratio) / Screw pitch

Example: encoder resolution 65536, pitch 5mm, pulse equivalent 0.001, mechanical reducer ratio 1, PA1_06/PA1_07=65536×0.001/5=8192/625. Thus, PA1_06=8192，PA1_07=625.

Set value: to be calculated.

PA1_03 Command Pulse Form
Set the input mode of pulse string as: instruction + symbol, that is "pulse + direction".

Set value: 0

PA1_04 Direction of Rotation Switch
Set as 0: positive direction: forward rotation (CCW)

Set as 1: positive direction: reverse rotation (CW)

Set value: 0/1

PA3_01 CONT1 Signal Distribution
Set as 1: CONT1 is distributed as RUN (i.e. SON); if not distributed, CONT1 will be auto ON if there is no alarming when powered.

Set value: 1

WEIHONG

PA3_02 CONT2 Signal Distribution
Set as 2: CONT2 is distributed as RST (i.e. servo alarming clearance CLR). When 12, 13, 14 are 0, that is CONT3, CONT4 and CONT5 cannot be distributed as OT over-travel or EMG (external emergency stop).

Set value: 2

PA3_51 OUT1 Signal Distribution
Set as 1: OUT1 is distributed as a-contact point of alarming output.

Set as 2: OUT1 is distributed as b-contact point of alarming detection.

Set value: 1

PA3_26 CONT Always ON 1
When it is set as "1", servo is activated (RUN).

Set value: 1

PA1_08 Output Pulse Number Per One Motor Revolution
Range: [16, 214]

Example: when pulse equivalent is 0.001, pitch 10mm, without reducer, set this parameter to 2500; when pitch 5mm, set it to 1250.

Set value: set it according to PG divider ratio (Weihong system).

DELTA ASDA-A Servo Drive

P0-02 Drive Status Display
Monitor if the number of sent and received pulse is correct by setting this parameter.

In Weihong control system, the correct quantity of pulse sent by control card is detected by pulse inspection to determine if there is electrical interference.

Set value: 02

P1-00 External Pulse Input Type
Format: ZYX

X=2: pulse+direction

Z=0: negative logic

Set value: 102

WEIHONG

P1-01 Control Mode Setup
Format: ZYX1X0

Z=0: during control mode switching, DIO is maintaining the set value. Since switching control mode is not used, Z=0.

Y=0: forward rotation (CCW) (in terms of load).

Y=1: the rotation direction is reversed.

X1X0=00: position control mode.

Set value: 0000

P1-32 Motor Stop Mode
Format: YX

Y=0: when there is no servo enabled, motor dynamic brake occurs; Y=1: motor is free.

X=0: motor stops instantly; X=1: motor stops with deceleration.

Set value: 00

P1-44 Electronic Gear Ratio (Numerator)(N1), P1-45 Electronic Gear Ratio (Denominator) (M)
Calculation formula: **N1/M = (Encoder pulses * 4 * Pulse equivalent * Mechanical reducer ratio) / Pitch screw**

Example: encoder pulses=2500, pitch=5mm, pulse equivalent=0.001, reducer ratio=1: N1/M= 2500×4×0.001/5 = 2/1. Thus, N1=2, M=1.

When the multi-electronic gear ratio is not used, P2-60~P2-62 are not required.

Set value: to be calculated.

P2-10 Digital Input Pin DI1
Format: X2X1X0

X1X0=01: digital input (DI1=SON) corresponds to 9th pin of CN1.

X2=1: set DI1 input as NO (normally open) a-contact point.

Set value: 101

WEIHONG

P2-15 Digital Input Pin DI6, P2-16 Digital Input Pin DI7
Default factory setting of DI6 and DI7 are NC (normally closed) limit signal input pins. Drive cannot run without being connected to pin 32 and pin 31 of CN1.

Format: P2-15=P2-16=X2X1X0

X2=1: set DI6 and DI7 inputs as NO (normally open) a-contact points.

X1X0=00: limit signal input of the drive is not used.

Set value: P2-15=P2-16=100

P2-17 Function Setting for Digital Input Pin DI8
Format: X2X1X0

X2X1X0=100: external EMG stop input is not used.

Set value: 100

P2-21 Function Setting for Digital Output Pin DO4
DO4 corresponds to pin 1 & pin 26, used as clamping-position brake signal of Z-axis.

Format: X2X1X0

X2=1: set DO4 output as NO (normally open) a-contact point.

X2=0: set DO4 output as NC (normally closed) b-contact point.

X1X0=08: set pin 1 and pin 26 as BK+ and BK- respectively.

Set value: 108

P2-22 Function Setting for Digital Output Pin DO5
DO5 corresponds to pin 28 & pin 27, used as servo alarm signal.

Format: X2X1X0

X2=0: set DO5 output as NC (normally closed) b-contact point.

X1X0=07: set pin 28 and pin 27 as ALRM+ and ALRM- respectively.

Set value: 007

P2-51 Servo ON (SON) Setup
0: servo ON must be triggered by numerical input signal.

1: when servo is powered, if there is no alarm signal, servo will be automatically on.

Set value: 0 (set as 1 when there is no SON signal wire)

WEIHONG

DELTA ASDA-A2 Servo Drive

P0-02 Drive Status Display

Monitor if the number of sent and received pulse is correct by setting this parameter.

In Weihong control system, the correct quantity of pulse sent by control card is detected by pulse inspection to determine whether there is electrical interference.

Set value: 02

P1-00 External Pulse Train Input Type

Format: ZYX

X=2: pulse + direction

Z=0: negative logic

Set value: 102

P1-01 Set Control Mode

Format: ZYX1X0

Z=0: during control mode switching, DIO is maintaining the set value. Since switching control mode is not used, Z=0.

Y=0: positive rotation (CCW) (from the view of load).

Y=1: negative rotation (CCW)

X1X0=00: position control mode

Set value: 0000

P1-44 Electronic Gear Ratio (Numerator) (N1), P1-45 Electronic Gear Ratio (Denominator)(M)
: Range: [1, 32767]
: Calculation formula: **P1-44/P1-45 = (Encoder resolution * Pulse equivalent * Mechanical reducer ratio) / Pitch screw**
: Example: encoder resolution 1280000, pitch 5mm, pulse equivalent 0.001: N1/M=2500×4×0.001/5=2/1. Thus, N1=2, M=1.
: When the multi-electronic gear ratio is not used, P2-60~P2-62 are not required.
: Set value: to be calculated.

P1-46 Detector Output Pulse Number Setting

It sets detector output pulse number.

Range: [20, 320000]

Example: pulse equivalent 0.001, pitch 10mm, without reducer, then set this parameter to 10000; when pitch is 5mm, set it to 5000.

WEIHONG

Set value: set it according to PG divider ratio (Weihong system).

P2-10 Digital Input Pin 1 (DI1)
Format: X2X1X0

X1X0=01: digital input (DI1 = SON) corresponds to 9th pin of CN1.

X2=1: set DI1 input as NO (normally open) a-contact point.

Set value: 101

P2-15 Function Setting for Digital Input Pin DI6
Default factory setting of DI6 and DI7 is NC (normally closed) limit signal input. Drive cannot run without being connected to pin 32 and pin 31 of CN1.

Format: X2X1X0

X2=1: set DI6 and DI7 input as NO a-contact points.

X1X0=00: limit input of drive is not used.

Set value: 100

P2-16 Function Setting for Digital Input Pin DI7
Format: X2X1X0

Set value: 100

P2-17 Function Setting for Digital Input Pin DI8
Format: X2X1X0

X2X1X0=100: external EMG stop input is not used.

Set value: 100

P2-21 Function Setting for Digital Output Pin DO4
DO4 corresponds to pin 1 & pin 26, used as clamping-position brake signal of Z-axis.

Format: X2X1X0

X2=1: set DO4 output as NO (normally open) a-contact point.

X2=0: set DO4 output as NC (normally closed) b-contact point.

X1X0=08: set pin 1 and pin 26 as BK+ and BK- respectively.

Set value: 108

WEIHONG

P2-22 Function Setting for Digital Output Pin DO5
DO5 corresponds to pin 28 & pin 27, used as servo alarm signal.

X2=0: set DO5 output as NC b-contact point.

X1X0=07: set pin 28 and pin 27 as ALRM+ and ALRM- respectively.

Set value: 007

DELTA ASDA-B Servo Drive

P0-02 Drive Status Display
Monitor if the number of sent and received pulse is correct by setting this parameter.

In Weihong control system, the correct quantity of pulse sent by control card is detected by pulse inspection to determine whether there is electrical interference.

Set value: 02

P1-00 External Pulse Train Input Type
Format: ZYX

X=2: pulse + direction

Z=1: negative logic

Set value: 102

P1-01 Set Control Mode
Format: YX1X0

Y=0: forward rotation (CCW) (from the view of load)

Y=1: the rotation direction is reversed.

X1X0=00: position control mode

Set value: 0000

P1-32 Motor Stop Mode
Format: YX

Y=0: when there is no servo enabled, motor dynamic brake occurs.

Y=1: motor is free.

X=0: motor stops instantly.

X=1: motor stops with deceleration.

WEIHONG

Set value: 00

P1-44 Electronic Gear Ratio (Numerator)(N1), P1-45 Electronic Gear Ratio (Denominator)(M)
Range: [1, 32767]

Calculation formula: **P1-44/P1-45 = (Encoder resolution * Pulse equivalent * Mechanical reducer ratio) / Pitch screw**

Example: encoder pulses=2500, pitch =5mm, pulse equivalent=0.001, reducer ratio = 1: N1 / M = 2500×4×0.001/5 = 2/1. Thus, N1=2, M=1.

When the multi-electronic gear ratio is not used, P2-60~P2-62 are not required.

Set value: to be calculated.

P2-10 Digital Input Pin 1 (DI1)
Format: X2X1X0

X1X0=01: digital input (DI1 = SON) corresponds to 17th pin of CN1.

X2=1: set DI1 input as NO (normally open) a-contact point.

Set value: 101

P2-15 Function Setting for Digital Input Pin DI6
Default factory setting of DI6 is NC (normally closed) limit signal input. Drive cannot run without being connected to pin 32 and pin 31 of CN1.

X2=1: set DI6 input as NO a-contact point.

X1X0=00: limit input of drive is not used.

Set value: 100

P2-18 Function Setting for Digital Output Pin DO1
DO1 corresponds to the 16th pin, as clamping-position brake signal of Z-axis.

Format: X2X1X0

X2=1: set DO1 output as NO a-contact point.

X2=0: set DO1 output as NC b-contact point.

X1X0=08: set the 16th pin as BK+.

Set value: 108

WEIHONG

P2-20 Function Setting for Digital Output Pin DO3
DO3 corresponds to pin 1, used as servo alarm signal.

X2=0: set DO3 output as NC b-contact point.

X1X0=07: set pin 1 as ALRM+.

Set value: 007

DELTA ASDA-B2 Servo Drive

P0-02 Driver Status Display
Monitor if the number of sent and received pulse is correct by setting this parameter.

In Weihong control system, the correct quantity of pulse sent by control card is detected by pulse inspection to determine whether there is electrical interference.

Set value: 02

P1-00 External Pulse Train Input Type
Format: ZYX

X=2: pulse + direction

Z=1: negative logic

Set value: 102

P1-01 Set Control Mode
Format: ZYX1X0

Z=0: during control mode switching, DIO is maintaining the set value. Since switching control mode is not used, Z=0.

Y=0: forward rotation (CCW) (from the view of load).

Y=1: the rotation direction is reversed.

X1X0=00: position control mode

Set value: 0000

WEIHONG

P1-44 Electronic Gear Ratio (Numerator)(N1), Electronic Gear Ratio (Denominator)(M), P1-45 Electronic Gear Ratio (Denominator)(M)
Range: [1, 32767]

Calculation formula: **P1-44/P1-45 = (Encoder resolution * Pulse equivalent * Mechanical reducer ratio) / Pitch screw**

Example: encoder pulses=40000, pitch =5mm, pulse equivalent=0.001, reducer ratio = 1: N1/M = 40000×4×0.001/5 = 32/1. Thus, N1=32, M=1.

When the multi-electronic gear ratio is not used, P2-60~P2-62 are not required.

Set value: to be calculated.

P1-46 Detector Output Pulse Number Setting
It sets detector output pulse number.

Range: [20, 40000]

Example: pulse equivalent = 0.001mm/p, pitch=10mm, without reducer, set this parameter to 10000; when pitch=5mm, set it to 5000.

Set value: set it according to PG divider ratio (Weihong system).

P2-10 Digital Input Pin DI1
Format: X2X1X0

X1X0=01: digital input (DI1 = SON) corresponds to 9th pin of CN1.

X2=1: set DI1 input as NO (normally open) a-contact point.

Set value: 101

P2-15 Function Setting for Digital Input Pin DI6
Default factory setting of DI6 and DI7 is NC (normally closed) limit signal input. Drive cannot run without being connected to pin 32 and pin 31 of CN1.

X2=0: set DI6 and DI7 inputs as NC b-contact point.

X1X0=00, limit input of drive is not used.

Set value: 000

P2-16 Function Setting for Digital Input Pin DI7
Format: X2X1X0

Set value: 000

WEIHONG

P2-17 Function Setting for Digital Input Pin DI8
Format: X2X1X0

X2X1X0=000: external EMG stop input is not used.

Set value: 000

P2-18 Function Setting for Digital Output Pin DO1
DO1 corresponds to pin 6 & pin 7, used as clamping-position brake signal of Z-axis.

Format: X2X1X0

X2=1: set DO1 output as NO (normally open) a-contact point.

X2=0: set DO1 output as NC (normally closed) b-contact point.

X1X0=08: set pin 6 and pin 7 as BK- and BK+ respectively.

Set value: 108

P2-22 Function Setting for Digital Output Pin DO5
DO5 corresponds to pin 28 & pin 27, used as servo alarm signal.

Format: X2X1X0

X2=0: set DO5 output as NC b-contact point.

X1X0=07: set pin 28 and pin 27 as ALRM+ and ALRM- respectively.

Set value: 007

WEIHONG

3.2.2 Set Drive Parameters (in Velocity Loop Control Mode)

This operation is used to set parameters of the following servo drives in velocity loop control mode:

- WISE servo drive
- YASKAWA Σ-7 servo drive
- Panasonic MINAS A5 servo drive
- Fuji ALPHA 5 servo drive

To reach rated rotational speed with 10V in velocity loop control mode, setting parameters in velocity loop control mode differs from that in position loop control mode in that:

Parameter	WISE	YASKAWA Σ-7	Panasonic MINAS A5	Fuji ALPHA 5
Control Mode	Pr001=2	Pn000=0	Pr0.01=1	PA1_01=1
Command Pulse Count	Pr008=10000	-	Pr0.08=10000	PA1_08=2500
Motor Speed Relative to 10V	Pr302=300	Pn300=1000	Pr3.02=300	PA3-31=10

Parameter **Motor Speed Relative to 10V** is exclusive in velocity loop control mode.

3.3 Adjust Pulse Equivalent and Electronic Gear Ratio

This operation is used to adjust the control precision of the machine tool.

To adjust pulse equivalent and electronic gear ratio, do the following:

- To adjust pulse equivalent, set system parameter **Pulse Equivalent** in NcEditor software.
- To adjust electronic gear ratio, set drive parameter **Electronic Gear Ratio** on the drive.

For details of terms and calculation, see List of Terms and Calculation Formula.

3.3.1 List of Terms

This part introduces terms related to pulse equivalent and electronic gear ratio.

Pulse equivalent
The moving distance of the lead screw or rotation degree of rotary axis corresponding to one pulse sent by CNC system, the minimum available distance controlled by CNC system as well.

The smaller the pulse equivalent is, the higher the machining precision will be. The larger, the faster feedrate will be.

Electronic gear ratio
The ratio represents servo scales up or down the pulse frequency sent by CNC system.

If the value is greater than 1, it means scaling up and vice versa.

Pitch
The moving distance per revolution of the motor.

Mechanical reducer ratio
It is calculated by one of the following:

```
Reducer input speed / Reducer output speed
```

```
Teeth number of driven saw wheel / Teeth number of driving saw wheel
```

```
Motor shaft speed / Screw speed
```

Encoder resolution
Needed pulse number for one circle of servo motor.

See the servo motor label plate and refer to the corresponding manual to confirm its encoder resolution.

Step angle
The rotation degree of the motor corresponding to one pulse sent by CNC system.

Subdivision
During running the motor, the actual step angle is a fraction of the natural step angle (full step).

3.3.2 Calculation Formula

This section introduces calculation formula related to pulse equivalent and electronic gear ratio. The formula differs in motor axis type:

- Linear axis
  - Stepper motor:

    ```
    Pulse equivalent = Pitch / (360/Step angle * Subdivision * Me
    chanical reducer ratio)
    ```

  - Servo motor:

    ```
    Electronic gear ratio = (Encoder resolution * Pulse equivalen
    t) / Pitch * Mechanical reducer ratio
    ```

WEIHONG

- Rotary axis
  - Stepper motor:

    ```
    Pulse equivalent = 360 / (360/Step angle * Subdivision * Mechanical reducer ratio)
    ```

  - Servo motor:

    ```
    Electronic gear ratio = (Encoder resolution * Pulse equivalent) / 360 * Mechanical reducer ratio
    ```

3.4 Set Speed Parameters

This operation is used to control the machining speed of the machine tool, so as to confirm the machining effect.

To set speed parameters, click **System** → **System Parameters** and set parameters under **Speed Accuracy** category.

For details of speed parameters, see Speed and Accuracy Parameters.

3.5 Adjust the Axis Direction

This operation is used to avoid that the axis direction is opposite to the direction judged by **Right Hand Rule**.

To adjust the axis direction, do the following (taking X-axis as an example):

1. Check current value of parameter **Axis Direction** under **1.0.0 X-axis** category.
2. Judge the positive direction of X-axis according to **Right Hand Rule**.
3. Click **X+** in machine control area to move X-axis and observe its moving direction.
4. **Optional:** If the actual moving direction is opposite to the judged direction, modify the set value to the opposite value.

Example

Current value of parameter **Axis Direction** is **1**. Manually move X-axis towards positive direction and find X-axis moves towards the negative direction.

Then, you need to change set value of the parameter to **-1**.

WEIHONG

3.6 Set the Workbench Stroke

This operation is used to set the upper limit and lower limit of the workbench, so as to ensure the machine tool moves within a safe range.

If it is your first time to set the workbench stroke, confirm the actual size of the machine tool before setting.

To set the workbench stroke, do the following:

1. To enable soft limit protection function, modify value of parameter **Enable Soft Limit Protection** of each axis to **YES**.
2. According to the actual size of the machine tool, modify values of parameters **Soft Limit Lower Limit** and **Soft Limit Upper Limit** of each axis.

For details of these parameters, see Basic Parameters.

3.7 Compensate Lead Screw Errors

This operation is used to compensate the following errors when the expected precision is not reached due to errors in the machine tool itself, so as to improve machining precision:

- Screw pitch errors: caused by screw defect and long-term wear, etc.
- Backlash errors: caused by a sudden violent backward movement of the spindle.

Before compensating lead screw errors, modify the value of parameter **Lead Screw Compensation Mode** and **W-axis Lead Screw Compensation Mode** and select a lead screw compensation type:

- If high precision is required, modify it to **1**. The system only compensates backlash errors.

  See Compensate Backlash Errors for details.

- If higher precision is required, modify it to **2**. The system compensates both of these errors, namely comprehensive errors.

  See Compensate Comprehensive Errors for details.

3.7.1 Compensate Backlash Errors

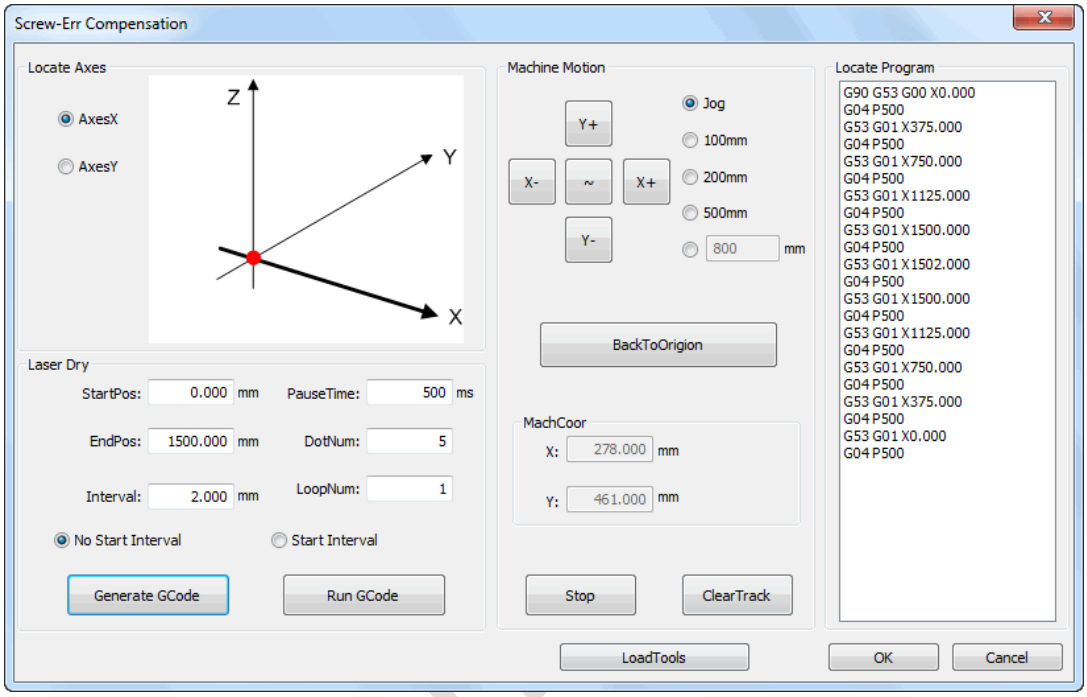
To compensate backlash errors, modify value of parameter **Backlash** of each axis according to the actual situation.

Restart the software to make the setting effective.

3.7.2 Compensate Comprehensive Errors

To compensate comprehensive errors, do the following:

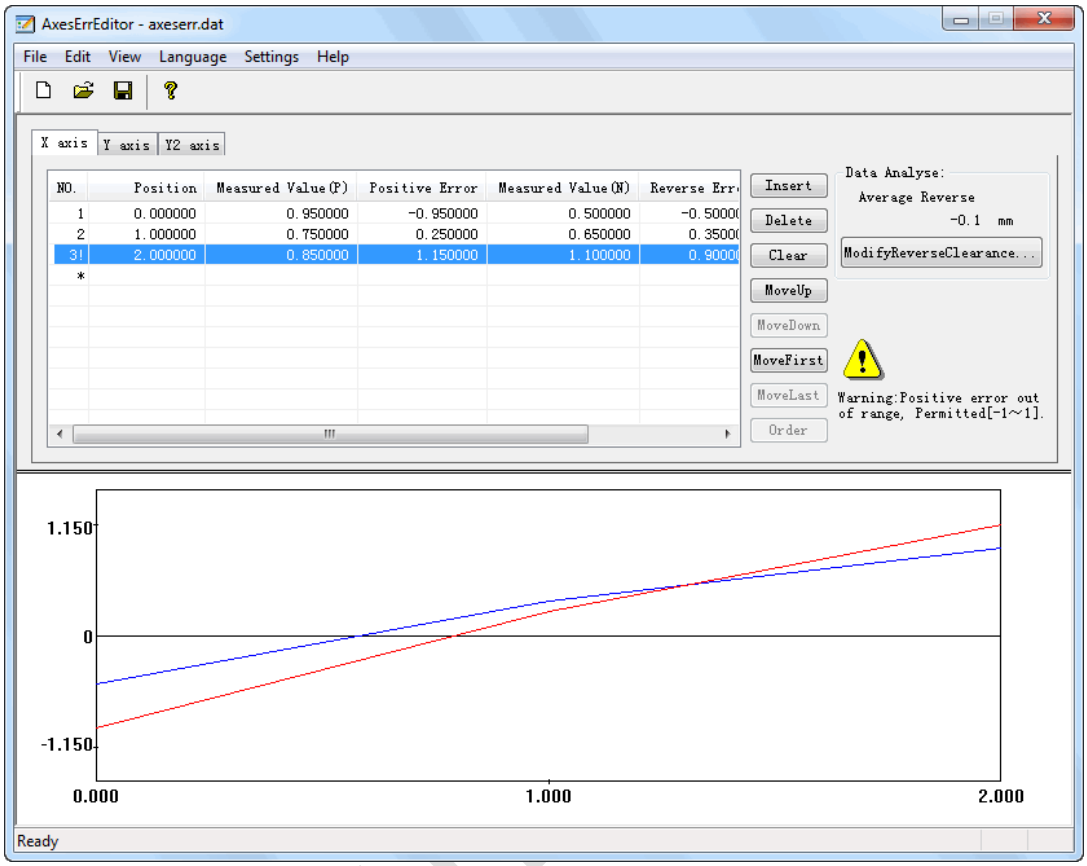
1. Click **System** → **Screw Error Compensation**. **Screw Error Compensation** dialog box pops up:



2. To get the actual measurement data of the machine tool via laser interferometer, do the following:

    1. Select a positioning axis and set parameters in **Laser Interferometer** area.
    2. Click **Generate G Code**. The generated location program appears in **Location Program** area.
    3. Click **Run G Code**. The system starts to move the machine tool according to the generated location program and records location data at the measurement point.
    4. Save the data as a RTL or LIN file in the laser interferometer.

3. Click **Load Tools**. **AxesErrorEditor** dialog box pops up:



4. To import the RTL or LIN file, click **File** → **Import File**. The results include the following:

   - Values of parameters **Position**, **Measured Value(Positive)** and **Measured Value (Negative)** show in the dialog box.
   - Based on the above values, the system automatically calculates values of parameters **Positive Error**, **Negative Error**, **Backlash** and **Average Backlash** and fills into the dialog box.
   - A compensation line chart shows in the dialog box:
     - Red line represents errors in positive direction.
     - Blue line represents errors in the negative direction.

5. **Optional:** Modify values of parameters **Position**, **Measured Value(Positive)** and **Measured Value (Negative)**. The results are the same with those in step 4.

6. Click . The system automatically does the following:

   - Save the information into screw error compensation file as a DAT file with filename **axeserr** under directory *C:\Program Files\Weihong\NcEditor\config*.
   - Compensate comprehensive errors according to the data in the file.

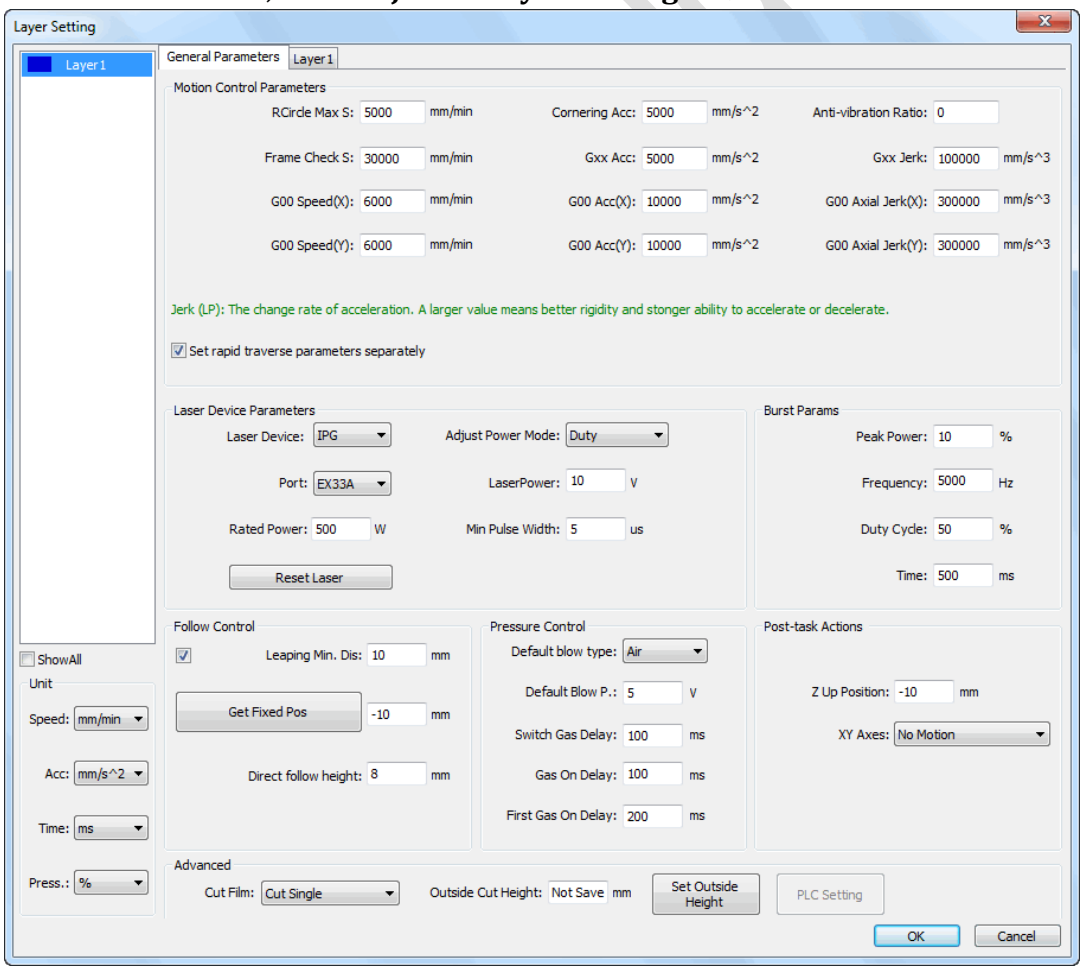
Restart the software to make the compensation effective.

3.8 Set Parameters of Air Pressure and Laser Device

To set parameters of air pressure and laser device, do the following:

1. To enter into **General Parameters** page in **Layer Setting** dialog box, do one of the following:

   - In drawing toolbar, click → **General Parameters**.
   - In menu bar, click **Object** → **Layer Setting** → **General Parameters**.



2. Set parameters in **Pressure Control** area and **Laser Device Parameters** area.

Parameters of air pressure and laser device are as follows:

Default Blow Type
The default gas for blowing.

If the selected gas is oxygen, port **Proportioning Valve Enabled** will be opened.

Default Blow P.
The pressure when the machine tool is in idle status.

Switch Gas Delay
Used for increment piercing and segment piercing.

The delay time for switching gas after piercing if the cutting gas is different from that in piercing, with laser keeping on.

Gas on Delay
The delay time when port **Blow** is switched from off status to on status.

First Gas on Delay
Used to delay blowing for the start point.

Laser Device
Types of laser device.

If the selected laser device is **SPI** or **IPG**, the laser device will be turned on 5s before the laser gate is turned on.

Port
The serial port for communication with the laser device.

The option **None** means the laser device is connected to the machine tool directly.

Modification of the parameter takes effect after the software is restarted.

Adjust Power Mode
Including **Duty Ratio Adjust** and **Analog Adjust**.

If **Duty Ratio Adjust** is selected, the speed power curve adjusts the duty ratio.

If **Analog Adjust** is selected, the speed power curve adjusts the peak power.

Laser Power
The power value when the laser power is 100%.

WEIHONG

Min Pulse Width
The minimum allowable pulse width when the laser power is controlled by duty ratio.

When pulse width is less than this value, this value takes effect.

When pulse width is greater than this value, pulse width in duty ratio takes effect.

Reset Laser
Used to reset the laser device to normal status.

It is required after alarms in laser device are removed.

3.9 Check Machine Tool Setting

After the machine tool commissioning, you need to check whether the machine tool is set correctly by checking the following:

- Check pulse equivalent and electronic gear ratio
- Check pulse
- Check laser technics

3.9.1 Check Pulse Equivalent and Electronic Gear Ratio

This operation is used to check whether the value of electronic gear ratio matches that of pulse equivalent.

To check pulse equivalent and electronic gear ratio, do the following:

1. Make a mark on any axis of the machine tool and set this marked point as the workpiece origin in the software. See Set the Workpiece Origin for details.
2. Move this marked axis for a fixed distance in **Jog** mode or **Handwheel** mode and so on.
3. Measure the actual moving distance with a vernier caliper and compare whether it is equal to the distance shown in the software.

3.9.2 Check Pulse

This operation is used to check whether the system loses any pulse.

To check pulse, select one of the following methods:

- Check pulse through two points

  Check pulse by directly observing two points on a workpiece.

- Check pulse through servo drive

  Check pulse by observing pulse count in a servo drive.

Check Pulse through Two Points

To check pulse through two points, do the following:

1. Make a dot on the surface of a workpiece with laser and set this dot as the workpiece origin.
2. Repeatedly move the machine tool without actual machining, and return to the workpiece origin.
3. Make a dot again with laser and check whether it completely coincides with the marked dot in step 1:
   - If it does, no pulse is lost and the system runs normally.
   - If it does not, pulse lost. You need to check the machine tool.

Check Pulse through Servo Drive

To check pulse through servo drive, do the following:

1. Set drive parameter **Surveillance Mode** to **Input Pulse Count Mode**.

   For a YASKAWA servo drive, the parameter is UN00C.
2. Regulate the servo drive to display lower 4 bits (with "L" before the count value) in count value (hexadecimal system), set the workpiece origin and record the current pulse count.
3. Repeatedly move the machine tool without actual machining, and return to the workpiece origin.
4. Check and compare the current pulse count with the original value:
   - For a YASKAWA servo drive, check whether the difference is greater than 4 (the frequency of pulse sent by servo drive is 1/4 times the frequency of main controller):
     - ≤4: the main controller sends pulses within the tolerance of one pulse and the system runs normally.
     - 4: check the pulse signal type of the servo drive, and make the pulse type received by servo drive the same with the pulse type sent by board card.
   - For other servo drives, check whether the current pulse count is the same with the original count:
     - Same: no pulse is lost and the control system runs normally.
     - Different: check the pulse signal type of the servo drive, and make the pulse type received by servo drive the same with the pulse type sent by board card.

WEIHONG

3.9.3 Check Laser Technics

This operation is used to check whether the technic control of piercing is normal.

It includes the following:

- Whether the state of ports like laser, blow, follow-up and burst is the same with the actual situation.
- Whether parameters of time sequence is correct. See Layer Function for details.
- Whether parameters of laser technics in **Layer Setting** dialog box are appropriate, like time sequence and delay of follow-up, blow and laser. See Layer Function for details.
- Whether voltage change of the laser power control port **AVC** correlates with laser power change.

WEIHONG

4 Follow-up

This section introduces follow-up in **NcEditor V12 Laser Cutting CNC System**, which is used to move Z-axis up and down in real time through the corresponding relationship between capacitance and distance and ensure the relative distance between the cutting head and the workpiece is unchanged.

It introduces follow-up from the following aspects:

- Interface overview
- Commissioning steps
- List of parameters
- FAQs

4.1 Interface Overview

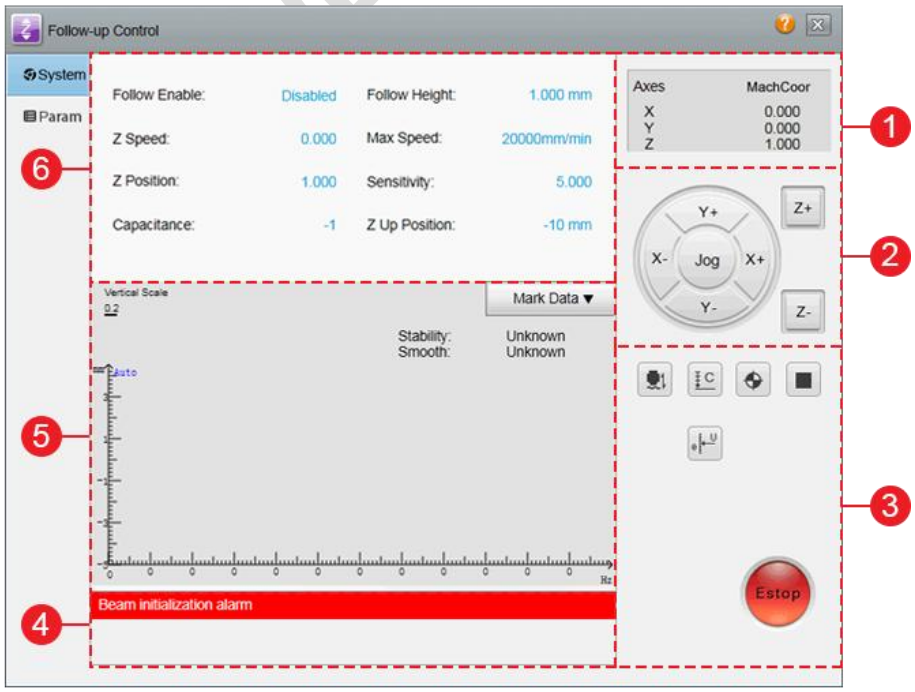
In this section, you can quickly get familiar with **Follow-up Control** dialog box and execute related operations.

To open **Follow-up Control** dialog box, do one of the following:

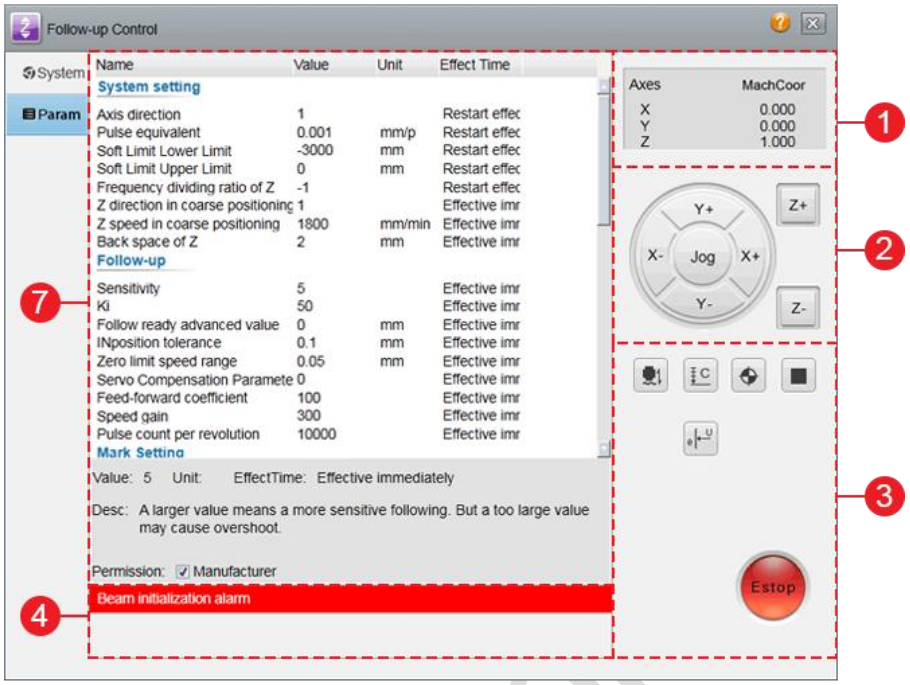
- In drawing toolbar, click .
- In menu bar, click **System** → **Follow Control**.

You can switch between the following interfaces by clicking the buttons on the left:

- **System** interface



- **Param** interface

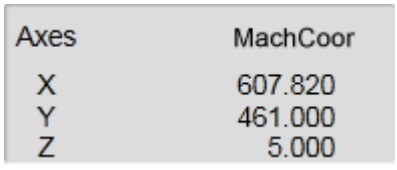


1. Axis coordinate display area
2. Manual control area
3. Follow-up control buttons
4. Alarm display bar
5. Waveform display area
6. Main parameters area
7. Parameters setting area

4.1.1 Axis Coordinate Display Area

It is used to show the following:

- Workpiece coordinates
- Machine coordinates



You can switch between workpiece coordinates and machine coordinates by clicking **WorkCoor/MachCoor**.

4.1.2 Manual Control Area

It is used to move the machine tool manually.

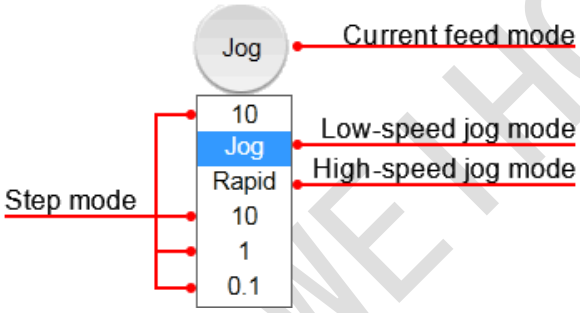
It includes the following:

- Axis direction buttons

  Used to move each axis towards positive or nagative direction.

- Feed mode button

  Used to select one of the following feed mode by clicking the circular button:



  – Jog mode

    Including low-speed jog mode and high-speed jog mode.

    If you click an axis direction button, the machine tool will move at jog/rapid jog speed until you release the button.

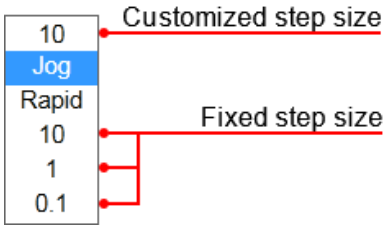
    If you click several axis direction buttons at the same time, the clicked axes will move at the same time at jog/rapid jog speed until you release the buttons.

  – Step mode

    If you click an axis direction button, the machine tool will move the customized step size.

WEIHONG

You can set step size by doing one of the following:



- To customize step size, click the first button, and enter the value in **Customize Step Size** dialog box.
- To set fixed step size, click one of the last three buttons.

4.1.3 Follow-up Control Buttons

It is used to control the machine tool to execute operations related to follow-up.

It includes the following:

- : Follow-up

  After the button is clicked, the system automatically starts to follow at the presence of calibration data.

  To stop following and move Z-axis to the berth point, click the button again.

  To end follow-up with Z-axis stopping at the current position, click .

- : Capacitance Calibration

  After the button is clicked, the system automatically calibrates capacitance.

  To stop automcatic calibration, click the button again.

- : Z-axis Homing

  After the button is click, Z-axis returns to the machine origin.

  To stop returning to the machine origin, click the button again or click .

  After returning to the machine origin, sign appears before Z-axis.

WEIHONG

- : Stop

  After the button is clicked, the system stops machining and enters idle status.

  It is used to normally stop machining task during follow-up control.

- : Servo Calibration

  It is exclusive for velocity loop control mode.

  After the button is clicked, the system executes compensation and eliminate the zero drift of a servo motor.

-

: E-stop

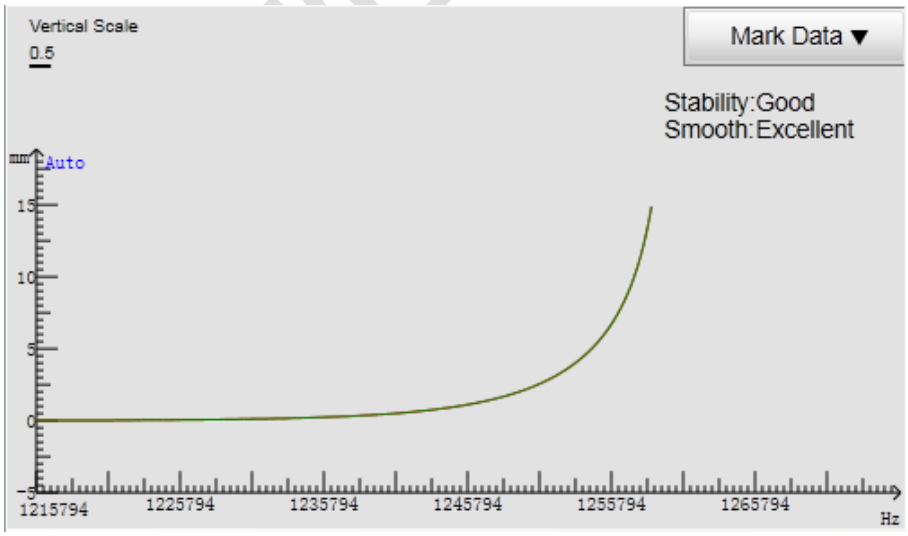
  After the button is clicked, the system stops emergently.

4.1.4 Waveform Display Area

It is used to switch among the following waveform pages by clicking button ▼ on the upper right:

- **Mark Data** page

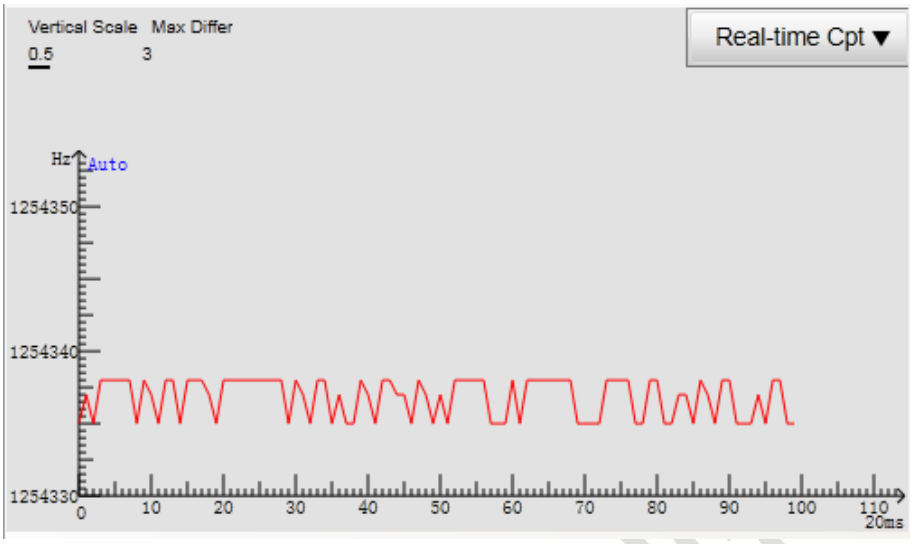
  Used to show the corresponding relationship between capacitance and position between the cutting head and the workpiece during calibrating capacitance.



  X-axis coordinate shows the capacitance while Y-axis coordinate shows the distance between the cutting head and the workpiece.

- **Real-time Capacitance** page

  Used to show real-time change of capacitance in certain time.



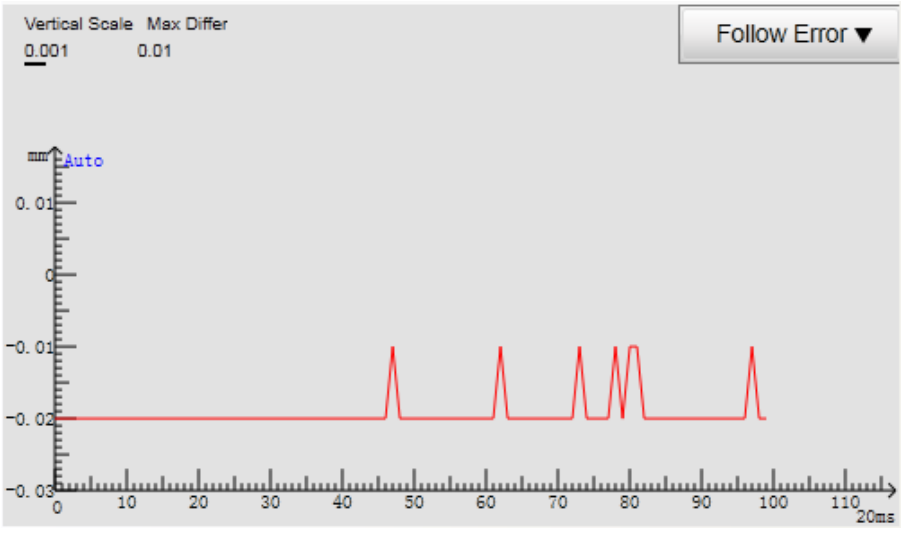
  X-axis coordinate shows time while Y-axis coordinate shows the capacitance.

  Max Differ on the upper left shows the difference between the maximum capacitance and the minimum one when the cutting head and the workpiece are still.

  The larger the value is, the stronger the interference is and the less stable the capacitance measurement is. Thus, the ideal value is no more than 30.

- **Follow Error** page

  Used to show the difference between current follow-up height and the set value of parameter **Follow Height**, so as to reflect the follow-up dynamic precision.



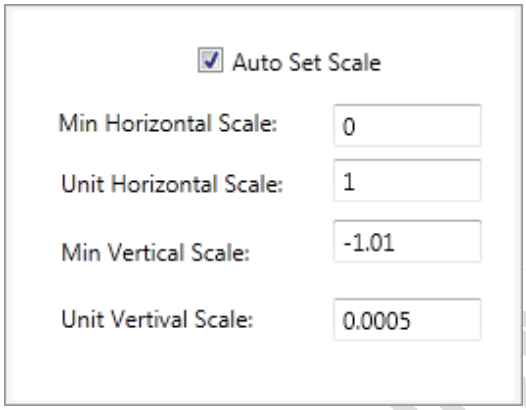
In this page, you can do the following:

- Pause the waveform change:

  If you double click within the coordinate, Auto at the top of Y-axis coordinate will turn into Auto.

- Set scale parameters:

  If you right click within the coordinate, a scale parameter dialog box will pop up:



  - If **Auto Set Scale** is checked, the system will automatically set scale parameters. At this time, you cannot manually modify the parameters.
  - If **Auto Set Scale** is unchecked, Auto at the top of Y-axis coordinate will disappear. At this time, you need to manually modify the parameters.

    To confirm the setting, click your mouse or press **Enter**.

4.1.5 Main Parameters Area

It is used to show parameters for monitoring, including:

- Real-time monitoring parameters (unchangeable):

  - Follow Enable

    Used to show the status of follow-up enabling.

    After is clicked, follow-up enabling is opened and the value of this parameter turns into **Enabled**.

- Z Speed

  Used to show current running speed of Z-axis.

- Z Position

  Used to show current machine coordinate of Z-axis.

- Capacitance

  Used to show current capacitance.

  The smaller the distance between the cutting head and the workpiece is, the smaller the value is.

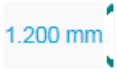
  When the cutting head touches metal workpiece, the value turns into zero.

- Some common used parameters (changeable):

  - Follow Height
  - Max Speed
  - Sensitivity
  - Z Up Position

  See List of Parameter for details.

  You can modify parameters by doing one of the following:

  - Click the current value and enter a value in the dialog box.
  - Move the cursor to the right of the value and click the arrow 

to modify it.

4.1.6 Parameters Setting Area

It is used to show all parameters related to follow-up control. See List of Parameters for details.

According to different permissions and identities, follow-up parameters can be divided into operator parameters and manufacturer parameters. The system shows operator parameters by default.

If you need to check manufacturer parameters, check **Manufacturer** and enter the password.

If you need to modify a parameter, double click the value and enter a value.

WEIHONG

4.2 Commissioning Steps

This section introduces the procedure of follow-up commissioning.

Before commissioning, do the following:

- To get familiar with layout and application of follow-up interface, see Interface Overview for details.
- See Get Preparation for what to prepare.

To do commissioning for follow-up, do the following:

1. To open **Follow-up Control** dialog box, do one of the following:
   - In drawing toolbar, click .
   - In menu bar, click **System** → **Follow Control**.
2. Do the following:
   1. Detect capacitance
   2. **Optional:** Calibrate servo
      This step is unnecessary if the system is in velocity loop control mode.
   3. Calibrate capacitance

After commissioning, see Check Follow-up to check whether the operation is successful.

4.2.1 Get Preparation

To get preparation, do the following:

1. Check and confirm that the hardware has been well connected.

   See Install Hardware for details.

2. Check and confirm that parameters related to drive and follow-up have been set correctly.

   See Set Drive Parameters and List of Parameters for details.

3. To check **PG Frequency Dividing Ratio of Z**, do the following:
   1. Move Z-axis along positive or negative direction in jog mode.

WEIHONG

2. Observe the corresponding step length change of Z-axis coordinate and make a distinct between the increase and decrease of the changing value.

    - If Z-axis coordinate change is different from the specified step length, it indicates that the parameter is wrong and you should modify it. See PG Frequency Dividing Ratio is Set Incorrectly for details.
    - If Z-axis coordinate change is the same with the specified step length, it indicates that the parameter is correct.

4. Check and confirm that there is no alarm and **Current Capacitance** shows in the software.
5. Check and confirm that Z-axis direction is adjusted correctly.

    See Adjust the Axis Direction for details.

6. To ensure basic motion and coordinate display are correct, and Z-axis can return to the machine origin, check system parameters in the software.

4.2.2 Detect Capacitance

This operation is used to observe the capacitance and check its stability.

To detect capacitance, do the following:

1. Move the cutting head to the workpiece and check whether current capacitance changes in real time.

    When the cutting head touches the workpiece, the capacitance should be zero. If it is not zero, see The Capacitance is not 0 when the Cutting Head Touches the Workpiece/The Cutting Head Keeps Moving Downward during Calibration for details.

2. Set parameter **Z Up Position**. See Parameters Setting Area for details.
3. To check whether the current capacitance is stable, do the following:

    1. Move the cutting head to the position 30mm far from the workpiece surface and keep it still.
    2. Observe whether the change of the current capacitance is within 30Hz:

        - If it is, it indicates that the current capacitance is stable.
        - If it is not and the last three numbers of the current capacitance change obviously, it indicates that the electric interference is serious.

WEIHONG

See Electric Interference is Serious for details.

4.2.3 Calibrate Servo

This operation is used to eliminate the zero drift of servo motor caused by velocity loop control.

To judge zero drift, do the following:

1. Turn on the servo motor and enable servo in the software.
2. Observe the display interface of the servo drive. If the value changes greatly, it indicates large outside interference. Proceed to next step.
3. **Optional:** Observe the coupling at the joint of Z-axis motor and screw. You can find that the coupling rotates slightly.

To calibrate servo, do the following:

1. To move the cutting head to the middle of the stroke range and avoid the cutting head exceeding the stroke, click **X+/X-/Y+/Y-** in manual control area.
2. Click . The system automatically generates the value of parameter **Servo Compensation Parameter**.

The cutting head slightly moves back and forth to compensate the error caused by zero drift.

4.2.4 Calibrate Capacitance

This operation is used to measure the corresponding distance between capacitance and position between the cutting head and the workpiece.

Before calibrating capacitance, do the following:

- To decide the workpiece type for calibration, set parameter **Nonmetal Mark**.
- Ensure the capacitance is stable.

To calibrate capacitance, do the following:

1. Move the cutting head to the position about 5mm far from the workpiece surface, and keep the workpiece still all the time.
2. Click . The system starts to calibrate capacitance for 20s.

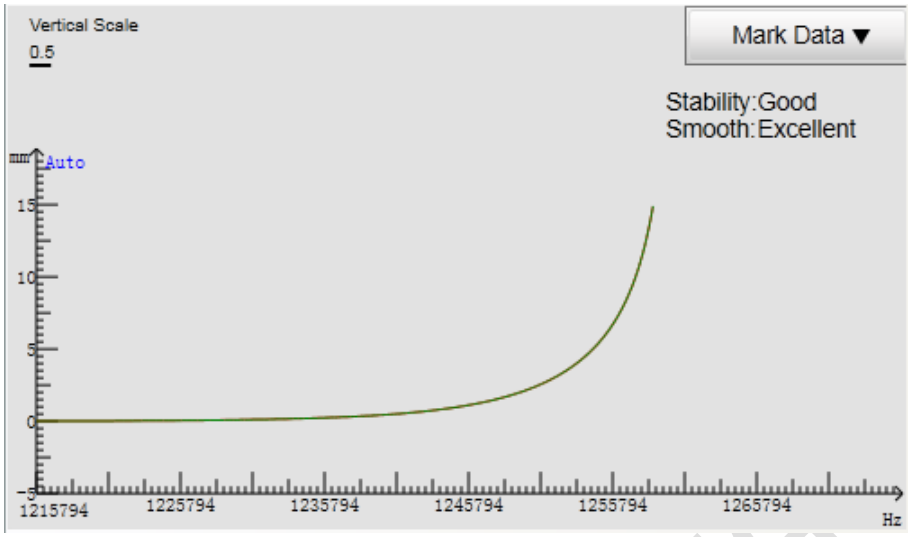
During calibrating capacitance, the cutting head does the following:

1. Move downward slowly to detect and touch the workpiece.
2. Move upward 5mm after it touches the workpiece.
3. Move downward slowly to detect and touch the workpiece again.

WEIHONG

4. Move upward the specified calibration distance after it touches the workpiece.

The system collects the calibration data and generates the calibration data:



- **Stability**

  The difference of the collected data between the segment of the cutting head down 5mm before touching the workpiece and that of the cutting head up 5mm after touching the workpiece.

  The larger the difference is, the smaller the stability is.

  If the stability is **Bad**, the fluctuation may be relatively more unstable or the external interference may be relatively more serious. You need to calibrate capacitance again.

- **Smooth**

  The smoothness of the curve.

  If the smoothness is **Bad**, the curve is not flat with ups and downs or burrs. You need to calibrate capacitance again.

Note: During calibrating capacitance, e-stop button is for use at any time in case of machine tool damage caused by cutting head continuous moving downward if the capacitance for touching the workpiece is incorrect.

4.2.5 Check Follow-up

This operation is used to check if follow-up commissioning succeeds.

Before checking follow-up, ensure the calibration is successful.

To check follow-up, do the following:

1. Turn on and off the follow-up and observe whether the cutting head shakes and whether the follow-up distance is correct.

   It is suggested to move a screw driver or a tiny metal plate back and forth under the cutting head and observe whether the cutting head moves up and down along the position of the screw driver or the metal plate and whether the cutting head shakes.

2. To improve security, set parameter **Out Margin Check** as **Yes**.

3. Draw a toolpath, cut it without turning on laser, and observe whether the cutting head shakes during following.

4.3 List of Parameters

This section introduces all parameters in **System** page in **Follow-up Control** dialog box, including:

- System setting parameters

  See 1.0.2 Z-axis, 1.1.3 Origin Setting (Z), 2.0.0 Jog Speed and 2.0.1 Manual Acceleration for details.

- Follow-up parameters
- Calibration setting parameters
- Follow-up setting parameters
- Real-time state check parameters
- Speed setting parameters
- Manual speed (Z) parameters

  See 1.0.2 Z-axis, 1.1.3 Origin Setting (Z), 2.0.0 Jog Speed and 2.0.1 Manual Acceleration for details.

- Follow-up outside workpiece parameters

WEIHONG

4.3.1 Follow-up Parameters

Sensitivity
A larger value means a more sensitive following.

A too large value may cause overshoot.

Range: [0, 20]

Default value: 10

Ki
Used as down Kp and to control down speed of following.

Range: [0, 65535]

Default: 50

Prefilter Value
Exclusive for position loop control mode.

Used to control capacitance jumps.

The larger the value is, the stronger the ability to control capacitance jumps is and the lower the capacitance sensitivity is.

Default value: 0.1ms

Enable Dynamic Anti-shake
Exclusive for position loop control mode.

Used to control following shake caused by operations such as blowing.

Yes: enable dynamic anti-shake

No: disable dynamic anti-shake

Default value: Yes

Follow Ready Advanced Value
Exclusive for position loop control mode.

Suggested range: [0, 1.5]mm

Default value: 0

WEIHONG

In Position Tolerance
When the detected height is equal to “Follow height ± In position tolerance”, follow-up is in position.

If the follow-up in position signal is not detected in 3s, the values will be doubled and the signal needs to be detected again. At this time, if it is detected in 2s, the system will cut normally; otherwise, an alarm will occur.

Range: [0, 655]mm

Default value: 0.1

Zero Limit Speed Range
Within this range, following motion will not be adjusted.

Range: [0, 0.1]mm

Default value: 0.05

Servo Compensation Parameter
Exclusive for velocity loop control mode.

Generated after servo calibration.

Range: [-255, 255]

Default value: 0

Feed-forward Coefficient
Exclusive for velocity loop control mode.

Used to check whether follow-up is adjusted in advance.

Too large values may lead to follow-up shake, and too small may lead to insensitive response.

Range: [50, 150]

Default value: 100

Speed Gain
Exclusive for velocity loop control mode.

Calculated by “Motor Rated Power” / 10V.

Matching speed command input gain in motor.

Range: [10, 2000]

Default value: 300

WEIHONG

Pulse Count Per Revolution
Exclusive for velocity loop control mode.

Number of pulses for per revolution of motor.

Pitch = Number of pulses per revolution * Pulse equivalent

Range: [0, 0.1]

Default value: 10000

4.3.2 Calibration Setting Parameters

Nonmetal Mark
Used to decide the workpiece type for calibration.

Yes: calibrate metal workpieces

No: calibrate nonmetal workpieces

Default value: No

Touch Part Capacitance
Capacitance in MHz when the cutting head touches the workpiece.

Default value: 0Hz

Mark Length
Used to record capacitance data within this range during calibration.

It is suggested to set the value relatively small when the stroke of Z-axis is short.

Range: [0, 25]mm

Default value: 15

Touch Part Speed
Speed when the cutting head touches the workpiece during calibration.

Range: [0, 10000000]mm/min

Default value: 100

Mark Speed
Speed of calibration.

Range: [0, 10000000]mm/min

Default value: 100

WEIHONG

Calibrate Curve Smoothing Point No.
Used to set the number of calibrated points for the calibration curve.

Range: [0, 500]

Default value: 0

4.3.3 Follow Setting Parameters

Z Up Position
After returning to the machine origin, the machine coordinate of Z-axis up position after following is turned off or cutting finishes.

Default value: -10

Safety Height
Safety height to lift Z-aixs before returning to the machine origin.

Range: [0, 100]mm

Default value: 10

Follow Height
The relative distance between the cutting head and the workpiece under follow-up control.

Range: [0, 30]mm

Default value: 1

4.3.4 Real-time State Check Parameters

Out Margin Check
Whether to check the cutting head moving beyond the workpiece margin during following.

If the cutting head moves beyond the workpiece margin, it will stop.

Default value: Yes

Out Margin Tolerance
Compared with the follow-up height position, if the current position is beyond tolerance range, the system will consider the cutting head is beyond the workpiece margin.

Range: [0, 20]mm

Default value: 2

WEIHONG

Out Margin Sensitivity
The larger the value is, the higher the tendency is to judge whether the cutting head is beyond the workpiece margin.

The larger the value is, the higher the tendency for judging out margin is.

Range: [1, 10]

Default value: 5

4.3.5 Speed Setting Parameters

Z-axis G00 Speed
Speed of the cutting head during moving up and down.

A too large value needs calibration length added accordingly for the cutting head to slow down, so as to avoid colliding with the workpiece.

Range: [0, maximum speed of Z-axis]mm/min

Default value: 15000

Max Speed in Follow
Maximum speed during following.

Range: [0, maximum speed of Z-axis]mm/min

Default value: 20000

Max Speed Supported by Z
Maximum value of following speed and G00 speed.

Range: [60, 3932100]mm/min

Default value: 20000

Follow Acceleration
Acceleration during following.

Default value: 10000mm/ s^2

4.3.6 Follow-up Outside Workpiece Parameters

Max Kp in Follow Outside Part
Follow outside workpiece is used to avoid following too fast and plunging too deep.

Used to limit Kp value.

During outside workpiece following, Kp value is limited within this parameter range.

Range: [0, 65535]

WEIHONG

Default value: 100

Max Plugging Depth
Maximum allowable plugging depth of the cutting head relative to the workpiece surface.

If the actual plugging depth exceeds the set value of the parameter, the cutting head will be outside the workpiece and it will be lifted.

Range: [0, 5]mm

Default value: 0

Reference Height in Margin
If current capacitance stays smaller than the capacitance corresponding to the value of this parameter during sense delay, the system considers the cutting head within the workpiece margin and automatically opens follow-up.

Range: [0, 5]mm

Default value: 0

Sense Delay in Margin
Needed delay time for detecting whether the cutting head is within the workpiece margin.

A too large large value leads to lag during following and a too small value leads to too sensitive response.

Range: [1, 500]ms

Default value: 10

Reference Height Out Margin
If current capacitance stays larger than the capacitance corresponding to the value of this parameter during sense delay, the system considers the cutting head beyond the workpiece margin and closes follow-up.

Range: [Reference height in margin, 20]mm

Default value: 5

Sense Delay Out Margin
Needed delay time for detecting whether the cutting head is beyond the workpiece margin.

A too large value will cause that the cutting head detects the margin intensitively and plugs too deep.

Range: [1, 500]ms

WEIHONG

Default value: 50

4.4 FAQs

This section mainly answers the following common questions that you may encounter during follow-up commissioning:

- PG frequency dividing ratio is set incorrectly
- Electric interference is serious
- The capacitance is not 0 when the cutting head touches the workpiece / The cutting head keeps moving downward during calibration
- The actual follow-up height is different from the calibrated follow-up height
- The cutting head keeps moving downward during calibration
- The cutting head frequently stops working while the capacitance feedback is normal, the calibration result is well and no alarm occurs
- The cutting head shakes substantially during cutting a thin sheet, which causes the distortion of the contour of the cutting workpiece
- An alarm “follow-up process at error status” occurs when Z-axis moves in jog mode or the follow-up is turned on directly

4.4.1 PG Frequency Dividing Ratio is Set Incorrectly

Cause

Parameter **PG Frequency Dividing Ratio** is set incorrectly.

Solution

Modify its value by adjusting related drive parameters according to the following calculation formula:

Drive	Calculation formula
WISE servo drive	$\text{Dividing Frequency Ratio} = \frac{\text{Pr008}}{\text{(Pr011)*4÷Mechanical Reducer Ratio}}$
Panasonic MINAS A5 servo drive	$\text{Dividing Frequency Ratio} = \frac{\text{Pr0.08}}{\text{(Pr0.11)*4÷Mechanical Reducer Ratio}}$
YASKAWA Σ-V/Σ-7 servo drive	$\text{Dividing Frequency Ratio} = \frac{\text{Pitch/Pulse Equivalent}}{\text{(Pr212)*4÷Mechanical Reducer Ratio}}$
DELTA servo drive	$\text{Dividing Frequency Ratio} = \frac{\text{Pitch/Pulse Equivalent}}{\text{(Pr1-46)*4÷Mechanical Reducer Ratio}}$

WEIHONG

4.4.2 Electric Interference is Serious

Cause

- Physical hardware
    1. The drive, Lambda 5E terminal board and EX33A terminal board are not well grounded.
    2. The cable shielding layer is not well treated, that is, the shielding layer is broken and the shielding nest is not wired to the outer metal frame.
    3. The No.4 pin of M16 tow cable with 4-core air plug and follow-up amplifier are not well connected.
    4. The follow-up amplifier and the machine tool are not connected tightly and completely.
    5. The cable does not work well.
    6. The machine tool is not well grounded.
- Software setting
    1. Value of parameter **Sensitivity** is too large.
    2. Value of parameters **In Position Tolerance** and **Zero Limit Speed Range** are too small.

Solution

- Physical hardware
    1. Reconnect the hardware.
    2. Fix the shielding layer and wire the shielding nest to the outer metal frame.
    3. Connect the No.4 pin of M16 tow cable with 4-core air plug and the follow-up amplifier.

       The resistance value between the two should be very small, and **0** is the best.
    4. Connect the follow-up amplifier and the machine tool tightly and completely.
    5. Change the cable.
    6. Find out the cause for being not well grounded, and solve it.

WEIHONG

- Software setting

    1. Slightly reduce the value of parameter **Sensitivity**.
    2. Slightly increase the values of parameters **In Position Tolerance** and **Zero Limit Speed Range**.

    Note: Please be careful. Because these operations may lead to lower precision of follow-up and cutting separately.

4.4.3 The Capacitance is not 0 when the Cutting Head Touches the Workpiece / The Cutting Head Keeps Moving Downward during Calibration

Cause

- The workpiece and the machine tool are not connected or not well connected.
- Insulator like rust and paint exists on the calibrating position of the workpiece.

Solution

1. Manually move the cutting head downward with small step size like 0.1 until it touches the workpiece, and check current capacitance.
2. Set the value of parameter **Touch Part Capacitance** greater than current capacitance.

4.4.4 The Actual Follow-up Height is Different from the Calibrated Follow-up Height

Cause

Enormous change of the environment temperature causes the deviation of the calibration curve.

Solution

Calibrate the distance again.

See Commissioning Steps for details.

4.4.5 The Cutting Head Frequently Stops Working while the Capacitance Feedback is Normal, the Calibration Result is Well and No Alarm Occurs

Cause

The external force caused by gas that flows through the cutting head leads to poor connection between the contact inside the ceramic ring and the cutting head signal port, and then an alarm of touching workpiece occurs. As a result, the cutting head stops working even though the nozzle does not touch the workpiece during cutting.

WEIHONG

Solution

Change the ceramic ring.

4.4.6 The Cutting Head Shakes Substantially during Cutting a Thin Sheet

Cause

The air pressure is high.

Solution

Set parameter **Sensitivity** as **2** (default value: 5) and parameter **In Position Tolerance** as **0.2** (default value: 0.1).

4.4.7 An Alarm *Follow-up Process at Error Status* Occurs when Z-axis Moves in Jog Mode or the Follow-up is Turned on Manually

Cause

- The axis direction of the drive is incorrect and outside interference leads to zero drift.
- Outside interference leads to zero drift.

Solution

Do the following (taking a Panasonic A6 series servo drive as an example):

1. To judge whether the axis direction of the drive is correct and solve the problem, do the following:
    1. Click **Z+** / **Z-** in the software and see whether the cutting head moves:
        - If it does, it indicates the direction is correct.
        - If it does not, it indicates that the direction is incorrect. Proceed to next step.
    2. **Optional:** Modify the value of parameter **Axis Direction** and restart the drive.
2. To adjust zero drift, do the following:
    1. Ensure the value of parameter **Pr3.15** is the default value **0**.
    2. Turn on the drive, and automatically adjust zero drift **AF_oF1**, **AF_oF2** and **AF_oF3**.

       Turning on the software is not required in this step.

WEIHONG

5 List of System Parameters

This section introduces all parameters under **System → System Parameters** menu in **NcEditor V12 Laser Cutting CNC System**, including:

- Basic parameters
- Speed and accuracy parameters
- External device parameters
- Advanced function parameters

5.1 Basic Parameters

This section introduces basic parameters of the machine tool under **Basic Param** category, including the following:

- 1.0 Axis Parameters
  - 1.0.0 X-axis
  - 1.0.1 Y-axis
  - 1.0.2 Z-axis
  - 1.0.3 B-axis
- 1.1 Homing
  - 1.1.0 General Parameters
  - 1.1.1 Origin Setting (X)
  - 1.1.2 Origin Setting (Y)
  - 1.1.3 Origin Setting (Z)
  - 1.1.4 Origin Setting (B)
- 1.2 Error Compensation Setting
- 1.3 Double Y Error Setting

WEIHONG

5.1.1 X-axis

Moving Distance Per Revolution of Motor
Moving diatance per revolution of motor on load axis.

Range: (0, 200]mm

Default value: 100

Pulse Equivalent
Displacement or angle caused by per pulse in X-axis.

Range: [1E-08, 1000]mm/p

Default value: 0.002

Axis Direction
Moving direction of X-axis.

If the moving direction of X-axis is opposite to the direction judged by **Right Hand Rule** when the machine tool is moved manually, modify the value of the this parameter.

1: Positive

-1: Negative

Default value: 1

PG Frequency Dividing Ratio of X
Ratio of sending pulse to feedback pulse in X-axis.

Positive value: positive direction of axis encoder

Negative value: negative direction of axis encoder

0: not enable encoder feedback

Range: [-10000, 10000]

Default value: -1

Max. Speed
Maximum allowable speed of X-axis.

Range: (0, maximum speed supported by hardware]mm/min

Default value: 60000

Enable Soft Limit Protection
Used to prevent the machine tool from colliding with hard limit switch.

Yes: enable

No: not enable

Default value: Yes

Soft Limit Lower Limit
Lower limit of soft limit.

Range: [-999999, soft limit upper limit)mm

Default value: 0

WEI HONG

Soft Limit Upper Limit
Upper limit of soft limit.

Range: (soft limit lower limit, 999999]mm

Default value: 1500

5.1.2 Y-axis

Enable Single Y Configuration
Whether to enable single Y configuration.

Yes: single Y configuration

No: double Y configuration

Default value: No

Moving Distance Per Revolution of Motor
Moving diatance per revolution of motor on load axis.

Range: (0, 200]mm

Default value: 100

Pulse Equivalent
Displacement or angle caused by per pulse in Y-axis.

Range: [1E-08, 1000]mm/p

Default value: 0.002

Axis Direction
Moving direction of Y-axis.

If the moving direction of Y-axis is opposite to the direction judged by **Right Hand Rule** when the machine tool is moved manually, modify the value of the this parameter.

1: Positive

-1: Negative

Default value: -1

WEIHONG

PG Frequency Dividing Ratio of Y
Ratio of sending pulse to feedback pulse in Y-axis.

Positive value: positive direction of axis encoder

Negative value: negative direction of axis encoder

0: not enable encoder feedback

Range: [-10000, 10000]

Default value: -1

Max. Speed
Maximum allowable speed of Y-axis.

Range: (0, maximum speed supported by hardware]mm/min

Default value: 60000

Enable Soft Limit Protection
Used to prevent the machine tool from colliding with hard limit switch.

Yes: enable

No: not enable

Default value: Yes

Enable Soft Limit Protection
Used to prevent the machine tool from colliding with hard limit switch.

Yes: enable

No: not enable

Default value: Yes

Soft Limit Lower Limit
Lower limit of soft limit.

Range: [-999999, soft limit upper limit)mm

Default value: 0

Soft Limit Upper Limit
Upper limit of soft limit.

Range: (soft limit lower limit, 999999]mm

Default value: 3000

WEIHONG

5.1.3 Z-axis

Pulse Equivalent
Displacement or angle caused by per pulse in Z-axis.

Range: [1E-08, 1000]mm/p

Default value: 0.001

Axis Direction
Moving direction of Z-axis.

If the moving direction of Z-axis is opposite to the direction judged by **Right Hand Rule** when the machine tool is moved manually, modify the value of the this parameter.

1: Positive

-1: Negative

Default value: 1

PG Frequency Dividing Ratio of Z
Ratio of sending pulse to feedback pulse in Z-axis.

Positive value: positive direction of axis encoder

Negative value: negative direction of axis encoder

0: not enable encoder feedback

Range: [-10000, 10000]

Default value: -1

Encoder Feedback Tolerance
Tolerance of encoder feedback position and current position.

Range: [0, 10000]mm

Default value: 0.001

Max. Speed
Maximum allowable speed of Z-axis.

Range: (0, maximum speed supported by hardware]mm/min

Default value: 36000

WEIHONG

Enable Soft Limit Protection
Used to prevent the machine tool from colliding with hard limit switch.

Yes: enable

No: not enable

Default value: Yes

Soft Limit Lower Limit
Lower limit of soft limit.

Range: [-999999, soft limit upper limit)mm

Default value: -3000

Soft Limit Upper Limit
Upper limit of soft limit.

Range: (soft limit lower limit, 999999]mm

Default value: 0

5.1.4 W-axis

Pulse Equivalent
Displacement or angle caused by per pulse in W-axis.

Range: [1E-08, 1000]mm/p

Default value: 0.001

Axis Direction
Moving direction of W-axis.

If the moving direction of W-axis is opposite to the direction judged by **Right Hand Rule** when the machine tool is moved manually, modify the value of the this parameter.

1: Positive

-1: Negative

Default value: 1

Max. Speed
Maximum allowable speed of W-axis.

Range: (0, maximum speed supported by hardware]mm/min

Default value: 36000

WEIHONG

Enable Soft Limit Protection
Used to prevent the machine tool from colliding with hard limit switch.

Yes: enable

No: not enable

Default value: Yes

Soft Limit Lower Limit
Lower limit of soft limit.

Range: [-999999, soft limit upper limit)mm

Default value: -3000

Soft Limit Upper Limit
Upper limit of soft limit.

Range: (soft limit lower limit, 999999]mm

Default value: 0

5.1.5 General Parameters

Force Homing before Machining
Whether returning to the machine origin is required before machining.

Used to retrieve machine coordinate system, so as to solve the problem that in case of e-stop or power faiure during machining, deviation occurs after the incremental machine tool is restarted.

Yes: force

No: not force

Default value: No

Limit Switch Used as Home Switch
Whether limit saitch can be used as home switch as well. That is, exclusive home switch can be absent, and limit switch signal serves as home switch signal in homing.

Yes: used

No: not used

Coarse Fine Positioning Minimum Distance
Minimum distance between coarse positioning and fine positioning signals.

Range: (0, 10]mm Default value: 2

WEIHONG

5.1.6 Origin Setting (X)

X Direction in Coarse Positioning
Moving direction of X-axis in coarse positioning stage during returning to the machine origin.

1: Positive

-1: Negative

Default value: -1

X Speed in Coarse Positioning
Feedrate of X-axis in coarse positioning stage during returning to the machine origin.

Range: [0.06, 9000]mm/min

Default value: 6000

X Speed in Precision Positioning
Feedrate of X-axis in fine positioning stage during returning to the machine origin.

Range: [0.06, 6000]mm/min

Default value: 600

Back Distance of X
X-axis additional displacement after fine positioning stage during returning to the machine origin.

Positive value: X-axis moving direction in retract stage is opposed to that in coarse positioning stage.

Negative value: X-axis moving direction in retract stage is the same with that in coarse positioning stage.

Range: [-2000, 2000]mm

Default value: 2

5.1.7 Origin Setting (Y)

Y2-axis Homing Mode
Coarse positioning mode of Y2-axis returning to the machine origin.

0: use Y1-axis machine origin

1: use Y2-axis machine origin

Default value: 0

WEIHONG

Y Direction in Coarse Positioning
Moving direction of Y-axis in coarse positioning stage during returning to the machine origin.

1: Positive

-1: Negative

Default value: -1

Y Speed in Coarse Positioning
Feedrate of Y-axis in coarse positioning stage during returning to the machine origin.

Range: [0.06, 9000]mm/min

Default value: 6000

Y Speed in Precision Positioning
Feedrate of Y-axis in fine positioning stage during returning to the machine origin.

Range: [0.06, 6000]mm/min

Default value: 600

Back Distance of Y
Y-axis additional displacement after fine positioning stage during returning to the machine origin.

Positive value: Y-axis moving direction in retract stage is opposed to that in coarse positioning stage.

Negative value: Y-axis moving direction in retract stage is the same with that in coarse positioning stage.

Range: [-100, 1000]mm

Default value: 2

5.1.8 Origin Setting (Z)

Z Direction in Coarse Positioning
Moving direction of Z-axis in coarse positioning stage during returning to the machine origin.

1: Positive

-1: Negative

Default value: 1

WEIHONG

Z Speed in Coarse Positioning
Feedrate of Z-axis in coarse positioning stage during returning to the machine origin.

Range: [0.06, 9000]mm/min

Default value: 1800

Z Speed in Precision Positioning
Feedrate of Z-axis in fine positioning stage during returning to the machine origin.

Range: [0.06, 6000]mm/min

Default value: 60

Back Distance of Z
Z-axis additional displacement after fine positioning stage during returning to the machine origin.

Positive value: Z-axis moving direction in retract stage is opposed to that in coarse positioning stage.

Negative value: Z-axis moving direction in retract stage is the same with that in coarse positioning stage.

Range: [-100, 1000]mm

Default value: 2

5.1.9 Origin Setting (W)

W Direction in Coarse Positioning
Moving direction of W-axis in coarse positioning stage during returning to the machine origin.

1: Positive

-1: Negative

Default value: -1

W Speed in Coarse Positioning
Feedrate of W-axis in coarse positioning stage during returning to the machine origin.

Range: [0.06, 9000]mm/min

Default value: 600

WEIHONG

W Speed in Precision Positioning
Feedrate of W-axis in fine positioning stage during returning to the machine origin.

Range: [0.06, 6000]mm/min

Default value: 60

Back Distance of W
W-axis adjusting displacement after fine positioning stage during returning to the machine origin.

Range: [-100, 1000]mm

Default value: 2

5.1.10Error Compensation Setting

Lead Screw Compensation Mode
Mode used to compensate lead screw error.

0: no compensation

1: backlash compensation

2: screw error compensation

Backlash X
Valid only when lead screw compensation mode is set as backlash compensation.

Range: [0, 0.1]mm

Default value: 0

Backlash Y
Valid only when lead screw compensation mode is set as backlash compensation.

Range: [0, 0.1]mm

Default value: 0

Backlash W
Valid only when lead screw compensation mode is set as backlash compensation.

Range: [0, 0.1]mm

Default value: 0

WEIHONG

W-axis Lead Screw Compensation Mode
Mode used to compensate lead screw error.

0: no compensation

1: backlash compensation

2: screw error compensation

Screw Error Compensation Positioning Speed
Positioning speed of laser interferometer in screw error compensation wizard.

Range: [0.06, maximum value in X-axis and Y-axis maximum speed values]mm/min

Default value: 1800

5.1.11Double Y Error Setting

Y1Y2 Feedback Pulse Same Direction
Whether directions of feedback pulses in Y1-axis and Y2-axis are the same.

Yes: same direction

No: opposite direction

Default value: No

Double Y Tolerance
Range of double Y encoder origin error.

Range: [0, 10000]mm

Default value: 5

Enable Double Y Error Detect
Whether to enable double Y error detection.

Yes: enable

No: disable

Default value: Yes

Y1Y2 Static Tolerance
When Y1-axis and Y2-axis are steady, if the difference between the feedback value and output value is greater than the value, alarm will occur.

Range: (0,100)mm

Default value: 3

WEIHONG

Y1Y2 Dynamic Tolerance
When Y1-axis and Y2-axis are moving, if the difference between the feedback value and output value is greater than the value, alarm will occur.

Range: [10, 1000]ms

Default value: 3

Double Y Error Detect Cycle
Cycle for detecting double Y error.

If the value is too large, alarm will not occur in time and the machine tool will be damaged.

Range: [10, 1000]ms

Default value: 100

5.2 Speed and Accuracy Parameters

This section introduces parameters of speed and accuracy under **Speed and Accuracy** category, including the following:

- 2.0 Manual Speed
  - 2.0.0 Jog Speed
  - 2.0.1 Manual Acceleration
  - 2.0.2 Manual Axial Jerk
- 2.1 Machining Speed
- 2.2 Machining Accuracy

5.2.1 Jog Speed

XY-axis Rapid Jogging Speed
Speed in rapid jog mode.

Range: [Jogging speed, Maximum value of maximum speeds between XY-axes]mm/min

Default value: 18000

XY-axis Jogging Speed
Default speed in jog mode.

Parameter **XY-axis Rapid Jogging Speed** takes its value before returning to the machine origin.

Range: [0.06, Rapid jogging speed]mm/min

Default value: 6000

WEIHONG

XY-axis Stepping Speed
Step speed in step mode.

Range: [0.06, Maximum value of maximum speeds between XY-axes]mm/min

Default value: 6000

Z-axis Rapid Jogging Speed
Speed in rapid jog mode.

Range:

Default value: 1800

Z-axis Jogging Speed
Default speed in jog mode.

Range: [0.06, Rapid jogging speed]mm/min

Default value: 1200

Z-axis Stepping Speed
Step speed in step mode.

Range: [0.06, Minimum value of maximum speeds among all axes]mm/min

Default value: 1200

W-axis Jogging Speed
Default speed in jog mode.

Range: [0.06, Rapid jogging speed]mm/min

Default value: 120

5.2.2 Manual Acceleration

X-axis Manual Feed Acceleration
Acceleration in jog mode.

Used to control the acceleration in jog mode.

Range: [16, 100000]mm/ s^2

Default value: 2000

WEIHONG

Y-axis Manual Feed Acceleration
Acceleration in jog mode.

Used to control the acceleration in jog mode.

Range: [16, 100000]mm/ s^2

Default value: 2000

Z-axis Manual Feed Acceleration
Acceleration in jog mode.

Used to control the acceleration in jog mode.

Range: [8, 100000]mm/ s^2

Default value: 2000

W-axis Manual Feed Acceleration
Acceleration in jog mode.

Used to control the acceleration in jog mode.

Range: [0, 100000]mm/ s^2

Default value: 400

5.2.3 Manual Axial Jerk

X-axis Manual Feed Jerk
Jerk in jog mode.

Used to control the jerk in jog mode.

Range: [16, 100000]mm/ s^3

Default value: 10000

Y-axis Manual Feed Jerk
Jerk in jog mode.

Used to control the jerk in jog mode.

Range: [16, 100000]mm/ s^3

Default value: 10000

WEIHONG

Z-axis Manual Feed Jerk
Jerk in jog mode.

Used to control the jerk in jog mode.

Range: [16, 100000]mm/ s^3

Default value: 10000

W-axis Manual Feed Jerk
Jerk in jog mode.

Used to control the jerk in jog mode.

Range: [16, 100000]mm/ s^3

Default value: 10000

5.2.4 Machining Speed

G00 Speed
Default speed during positioning.

Range: [0.06, Maximum value of maximum speeds between XY-axes]mm/min

Default value: 30000

G00 Acc
Maximum acceleration of each axis during machining.

Range: [100, 100000]mm/ s^2

Default value: 10000

G00 Jerk
Change rate of single axis acceleration during rapid traverse.

Range: [0.001, 9999999]mm/ s^3

Default value: 100000

WEIHONG

Gxx Acc
Single axis acceleration is used to describe the acceleration/deceleration capability of single feed axis.

Decided by the physical feature of the machine tool, such as quality of motion part, torque and resistance of the feed motor.

The larger the value is, the less time the machine tool spends in acceleration/deceleration during motion process, and the higher the efficiency is.

Set a smaller value at first, and repeatedly execute typical motions for a period of time. If there is no abnormal situation, you can gradually increase the value. If abnormal condition occurs, you should reduce the value, with 50%~100% insurance allowance.

Range: [100, 100000]mm/ s^2

Default value: 5000

Cornering Acc
Maximum acceleration when feed motion is on two adjacent axes.

Recommended value is 1~2 times of single axis acceleration.

Range: [0.001, 100000]mm/ s^3

Default value: 5000

Gxx Jerk
Change rate of single axis acceleration during machining.

Range: [0.001, 9999999]mm/ s^3

Default value: 100000

Speed of Z Motion
Motion speed of Z-axis during machining.

Range: [0.06, Maximum speed of Z-axis]mm/min

Default value: 15000

G00 Acc of B-axis
Single axis acceleration in positioning.

Range: [100, 100000]mm/ s^2

Default value: 400

WE I HONG

W-axis G00 Jerk
Change rate of single axis acceleration during rapid traverse.

Range: [0.001, 9999999]mm/ s^3

Default value: 100000

Pause Deceleration Time
Required time from running status to pause status or stop status.

Too short time may cause collision.

Range: [0.001, 10]s

Default value: 0.5

Frame Check S
Speed when cut frame.

Range: [0, Maximum value of maximum speeds among all axes]mm/min

Default value: 30000

X-axis Starting Speed
Range: [0, Maximum speed of X-axis]mm/min

Default value: 0

Y-axis Starting Speed
Range: [0, Maximum speed of Y-axis]mm/min

Default value: 0

Z-axis Starting Speed
Range: [0, Maximum speed of Z-axis]mm/min

Default value: 0

W-axis Starting Speed
Range: [0, Maximum speed of W-axis]mm/min

Default value: 0

WEIHONG

5.2.5 Machining Accuracy

Max. Look-ahead Paths
Maximum number of path to calculate distance.

Range: [1, 1000]

Default value: 300

Enable B-spline Interpolation
Used to enable B-spline interpolation to segment that matches B-spline curve characteristic, so as to improve machining efficiency.

1: Yes

0: No

Default value: 1

Corner Error
The greater the value is, the larger the corner error is.

Range: [0, 0.3]mm

Default value: 0.1

Anti-vibration Ratio
The greater the value is, the lower the mechanical vibration is, and greater value can smooth the sharper corner.

Range: [0, 10]

Default value: 0

Acceleration Factor
Used to adjust startup acceleration.

The greater the value is, the faster the startup acceleration is.

Range: [0, 0.5]

Default value: 0.1

WEIHONG

Max. Angle of High-speed Connection
If the angle of two adjacent segments are larger than the value during machining, the speed of machining joint is startup speed.

If smaller than the value, an appropriate connection speed will be calculated according to the connection angle.

Range: [0, 180]deg

Default value: 180

Circular Speed Limit
When it is enabled, parameters **Max. Look-ahead Paths**, **Max Speed of Ref Circle** and **Min Speed of Ref Circle** work.

Yes: enable

No: disable

Default value: Yes

Max Speed of Ref Circle
When an arc is machined, the machine tool will vibrate due to centripetal force. To reduce this kind of vibration, the software limits machining speed during machining an arc in terms of centripetal acceleration.

Take default setting as an example, the maximum line velocity of the reference circle (diameter: 10mm) is 1800mm/min. The formula to calculate centripetal acceleration is $\alpha=v^2/r$; among it, r=(10/2)mm, v=1800mm/min. Thus centripetal acceleration α can be calculated; when other arcs are processed, this centripetal acceleration is the maximum allowable centripetal acceleration. Arc apeed will be limited if it is too large causing centripetal acceleration larger than α calculated in this formula.

Range: (1, Minimum value of maximum speeds between XY-axes]mm/min

Default value: 5000

5.3 External Device Parameters

This section introduces parameters of external device under **External Device** category, including the following:

- 3.0 Monitoring
- 3.1 Lube
- 3.2 Gas Control
- 3.3 Exhaust
- 3.4 Exchange Workbench
- 3.5 Focus Control
- 3.6 Follow-up
- 3.7 Laser Device

5.3.1 Monitoring

Enable Camera
Whether to enable camera fuction.

Default value: No

5.3.2 Lube

Enable Lubricate
Used to select the mode of lubrication.

0: Not enable lubrication

1: Automatic lubrication

2: Manual lubrication

Default value: 0

Lubricate Len
Distance between lubrication happening

Range: [1, 999999]m

Default value: 100

Lubricate Time
Duration of each lubrication

Range: [1, 100]s

Default value: 5

WEIHONG

5.3.3 Gas Control

Default Blow Type
Gas type when the button **Blow** is clicked.

0: Air

1: Nitrogen

2: Oxygen

Default value: 0

Default Blow P.
Default value of air pressure in idle status.

Range: [0, 10]V

Default value: 5

Max Pressure of Proportioning Valve
Maximum air pressure of the proportioning valve, also the air pressure corresponding to 100% analog.

Range: [0.1, 10]MPa

Default value: 3

Oxygen Proportioning Valve Output
0: Not use analog control

1: Use AVO1

2: Use AVO2

3: Use AVO3

Default value: 1

Nitrogen Proportioning Valve Output
0: Not use analog control

1: Use AVO1

2: Use AVO2

3: Use AVO3

Default value: 1

WEIHONG

Analog AVO1/2/3
Voltage of analog AVO1/2/3 when the analog rate is 100%.

Range: [Pressure in idle status, 10]V

Default value: 10

5.3.4 Exhaust

Enable Auto Exhaust
Whether to enable automatic exhaust.

Default value: No

Disable Exhaust Delay
Delay time before disabling exhaust port when leaving out of the area.

Range: [1, 1000]ms

Default value: 1

Start Position of Exhausting
Starting position of exhausting area, in machine coordinate.

Range: [Lower limit of Y-axis, Upper limit of Y-axis]mm

Default value: 0

Exhausting Interval1
Length of No.1 exhausting area.

Range: [10, 10000]

Default value: 1000

Exhausting Interval2
Length of No.2 exhausting area.

Range: [10, 10000]

Default value: 1000

Exhausting Interval3
Length of No.3 exhausting area.

Range: [10, 10000]

Default value: 1000

WEIHONG

5.3.5 Exchange Workbench

Enable Exchange Workbench
Whether to exchange workbench.

Default value: No

5.3.6 Focus Control

Enable Focus Control
Whether to enable focus control function.

Default value: No

5.3.7 Follow-up

Empty Move Collide Sensitivity
Used to control the sensitivity of touching workpiece signal during rapid traverse process.

The greater the value is, the lower the sensitivity will be.

Range: [1, 10000]ms

Default value: 100

Cutting Collide Sensitivity
Used to control the sensitivity of touching workpiece signal during cutting.

The greater the value is, the lower the sensitivity will be.

During cutting a metal workpiece, the metal slag on the nozzle leads to an alarm of touching workpiece. Set the value larger.

Range: [1, 10000]ms

Default value: 200

5.3.8 Laser Device

Laser Power
Voltage that corresponds to 100% laser power.

Range: [0, 10]V

Default value: 10

WEIHONG

Min Pulse Width
Minimum allowable pulse width when laser power is controlled by duty ratio.

When pulse width is smaller than this value, this value is used.

When pulse width is larger than this value, pulse width in duty ratio is used.

Range: [0, 1000000]μs

Default value: 5

Adjust Power Mode
During analog adjustment, AVC output = Laser power * Cutting power * Speed power curve, Duty ratio = PWM duty ratio

During duty ratio adjustment, AVC output = Laser power * Cutting power, Duty ratio = PWM duty ratio * Speed power curve

0: Analog adjustment

1: Duty ratio adjustment

Default value: 1

Power Increasing Speed
Time for power to increase from 0% to 100%, which can be used to solve the problem of over burning at the start point.

Range: [0, 1000]ms

Default value: 0

WEIHONG

5.4 Advanced Function Parameters

This section introduces parameters of advanced function under **Advanced Function** category, including the following:

- 4.0 Habitual Setting
- 4.1 Simulation
- 4.2 Fixed Point
- 4.3 Resume
- 4.4 Leap Frog
- 4.5 Scan Cutting
- 4.7 Edge Finding

5.4.1 Habitual Setting

Prompt Type When Tack End
Red light is on after machining.

0: No prompt

1: Res light on for 3s

2: Red light always on until there is input from mouse or keyboard

Default value: 0

Auto Clear Workcoor
Whether to clear workpiece coordinate when machining, cutting frame or dry run starts.

0: No

1: Yes

Default value: 0

Enable Breakpoint Check
Check breakpoint when machining starts. If breakpoint exists, a prompt box will pop up.

Default value: No

Enable Handle
Whether to enable handle control.

Default value: Yes

WEIHONG

Screen Switch
Used to switch between landscape mode and portait mode.

0: Landscape mode

1: Portrait mode

Default value: 0

5.4.2 Simulation

Simulation Speed
Speed during executing simulation.

Range: [0, 100000]mm/min

Default value: 1000

5.4.3 Fixed Point

X Machine Coordinate
X-axis machine coordinate of the fixed point.

Range: [-99999, 99999]mm

Default value: 0

Y Machine Coordinate
Y-axis machine coordinate of the fixed point.

Range: [-99999, 99999]mm

Default value: 0

5.4.4 Resume

Enable Breakpoint Resume Not Perforate
Whether to enable resume without piercing during cutting.

Default value: No

Back Distance at Breakpoint Resume
Retract distance during executing breakpoint resume.

Range: [0, 10000]mm

Default value: 2

Positioning Breakpoint Speed
Positioning speed during executing breakpoint resume.

Range: [10, Maximum value of maximum speed between X-axis and Y-axis]mm/min

Default value: 30000

WEIHONG

Forward/Retract Speed
Speed during moving forward/backward.

Range: [10, Maximum value of maximum speed between X-axis and Y-axis]mm/min

Default value: 3000

5.4.5 Leap Frog

Enable Frog Leaping
Whether to enable leapfrog.

It is modified synchronously with frogleap function in **Layer Setting** dialog box. See Layer Function for details.

Default value: Yes

Leaping Min. Dis
When the distance between the start point and the end point is smaller than this value, Z-axis jumps to the machining point instead of executing leapfrog.

Range: [0.01, 100]mm

Default value: 10

5.4.6 Scan Cutting

Scan Type
Used to change the terminal board during scan cutting.

1: 1st generation-LD5S

2: 2nd generation-LD5E

Default value: 1

Wiring of S Port of Terminal Board
Used to select the wiring type of port S of the terminal board.

0: COM

1: 24V

Default value: 1

Laser on Lead Time for Scan Cutting
It can be set larger when some workpiece is left uncut at trace start.

Range: [0, 10]

Default value: 2

WEIHONG

Laser off Lag Time for Scan Cutting
It can be set larger when some workpiece is left uncut in trace end.

Range: [0, 10]

Default value: 1

The Buffer Count for Scan Cutting
Modify this parameter when cutting trace is dislocated.

Set it larger when laser is turned on early and set it smaller when laser is turned on late.

Range: [40, 128]

Default value: 95

5.4.7 Edge Finding

Auto Find Edge Before Machining
Whether to automatically find edges before machining.

Default value: No

WEIHONG

6 Electrical Wiring Diagram

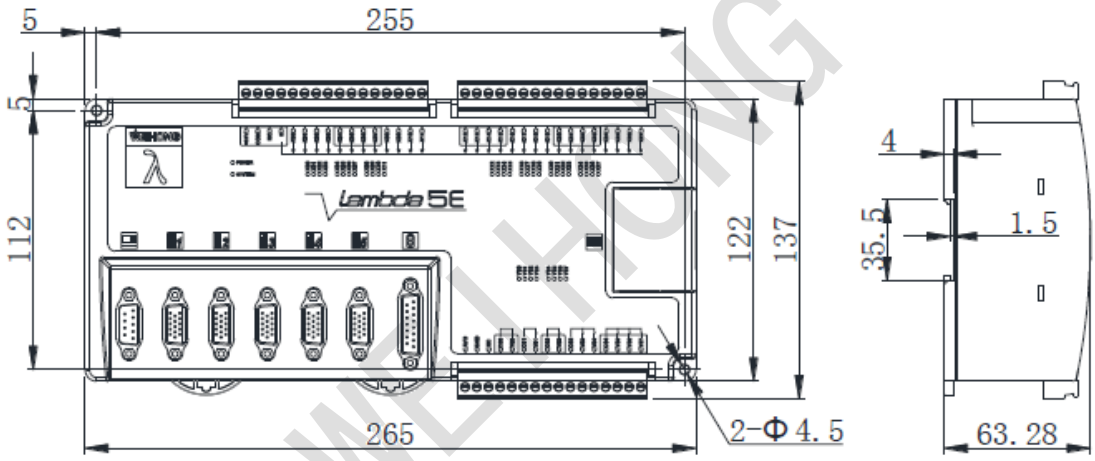
This section introduces the following information about hardware installation in **NcEditor V12 Laser Cutting CNC System**:

- Mounting dimension
- Wiring diagram of terminal board
- Wiring diagram of laser device
- Wiring diagram of drive

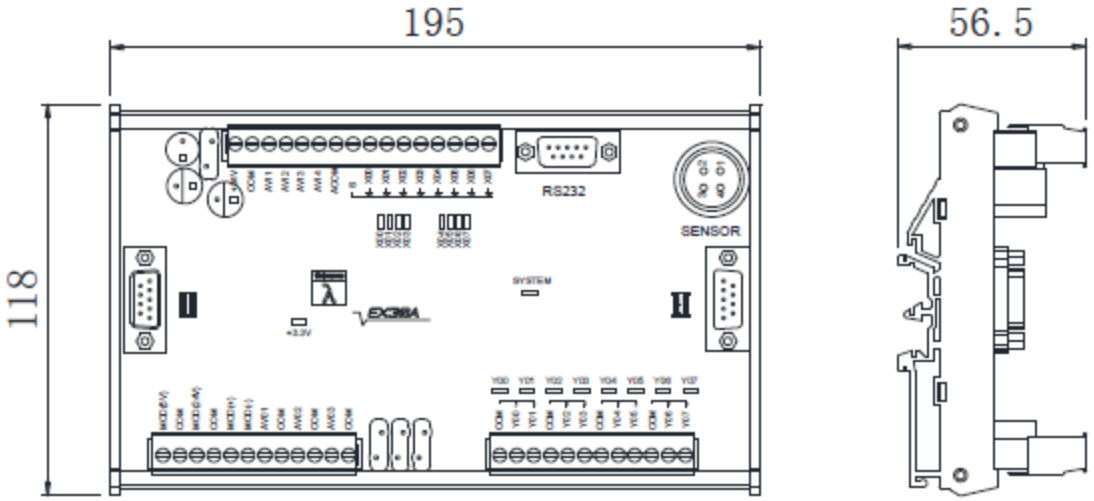
6.1 Mounting Dimension

In this section, you can quickly know about the dimension of hardware, so as to confirm the space is sufficient during installation.

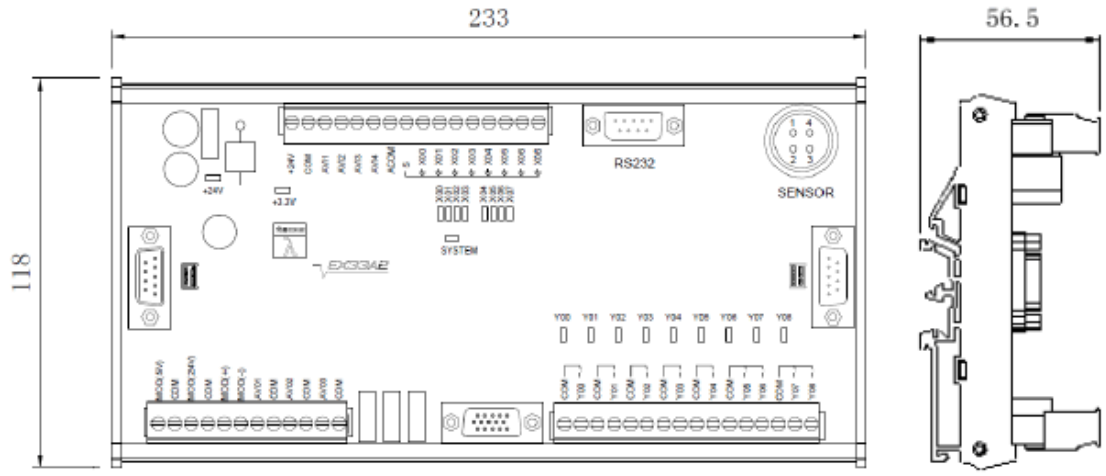
Mounting dimension of Lambda 5E terminal board is as follows:



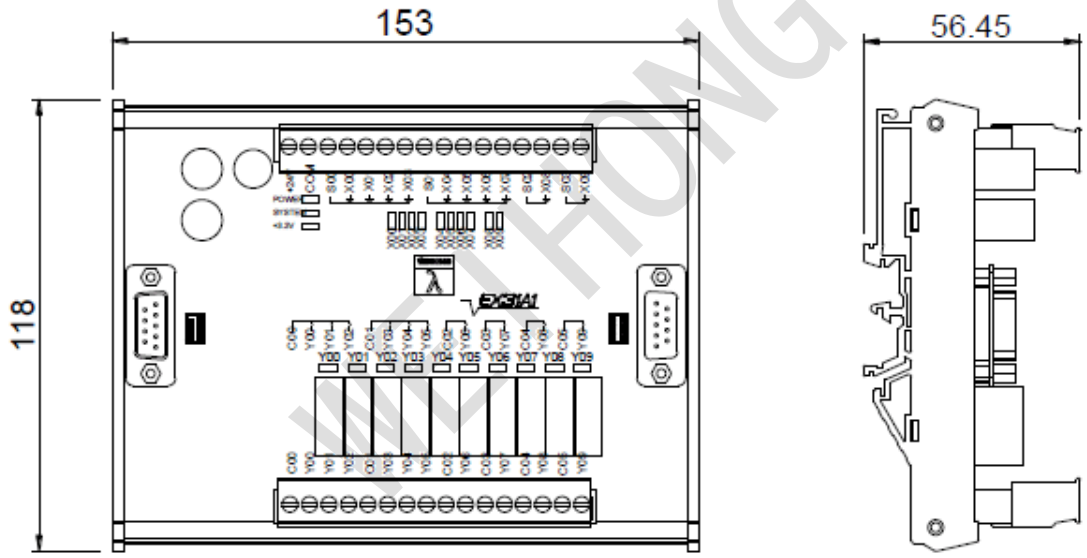
Mounting dimension of EX30A terminal board is as follows:



Mounting dimension of EX33A terminal board is as follows:

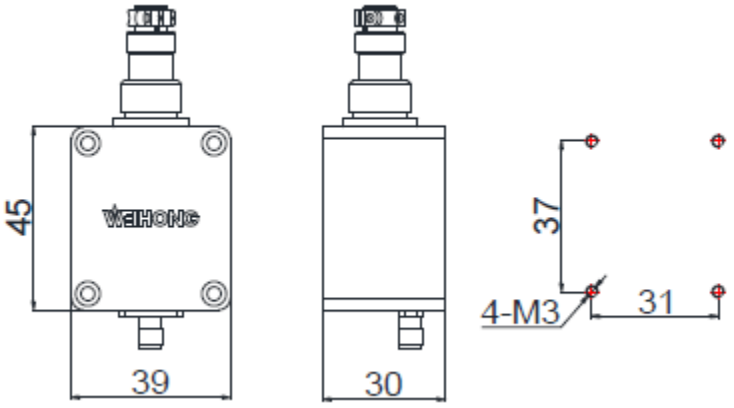


Mounting dimension of EX31A terminal board is as follows:

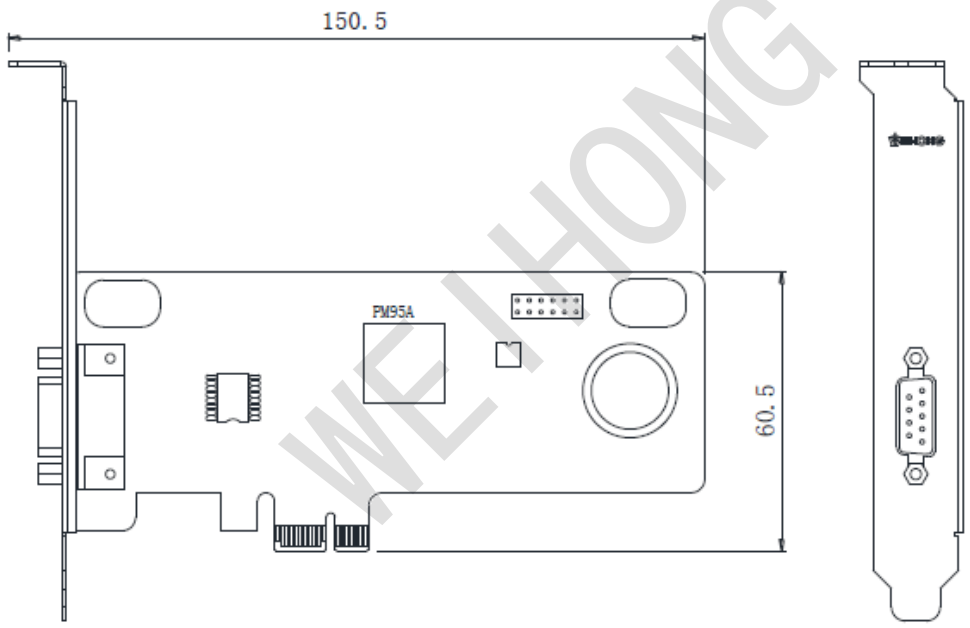


WEIHONG

Mounting dimension of follow-up amplifier is as follows:



Mounting dimension of PM95A motion control card is as follows:



WEIHONG

6.2 Wiring Diagram of Terminal Board

In this section, you can quickly know about how to connect I/O ports of each terminal board.

According to the configuration, wiring diagram of terminal board can be divided into the following:

- Wiring diagram of terminal board (in sheet cutting configuration)
- Wiring diagram of terminal board (in tube cutting configuration)

Terminal board differs in follow-up control mode:

- In position loop control mode, the terminal board is EX30A terminal board.
- In velocity loop control mode, the terminal board is EX33A terminal board.

To enable exchanging workbench function, EX31A terminal board must be added.

6.2.1 Wiring Diagram of Terminal Board (in Sheet Cutting Configuration)

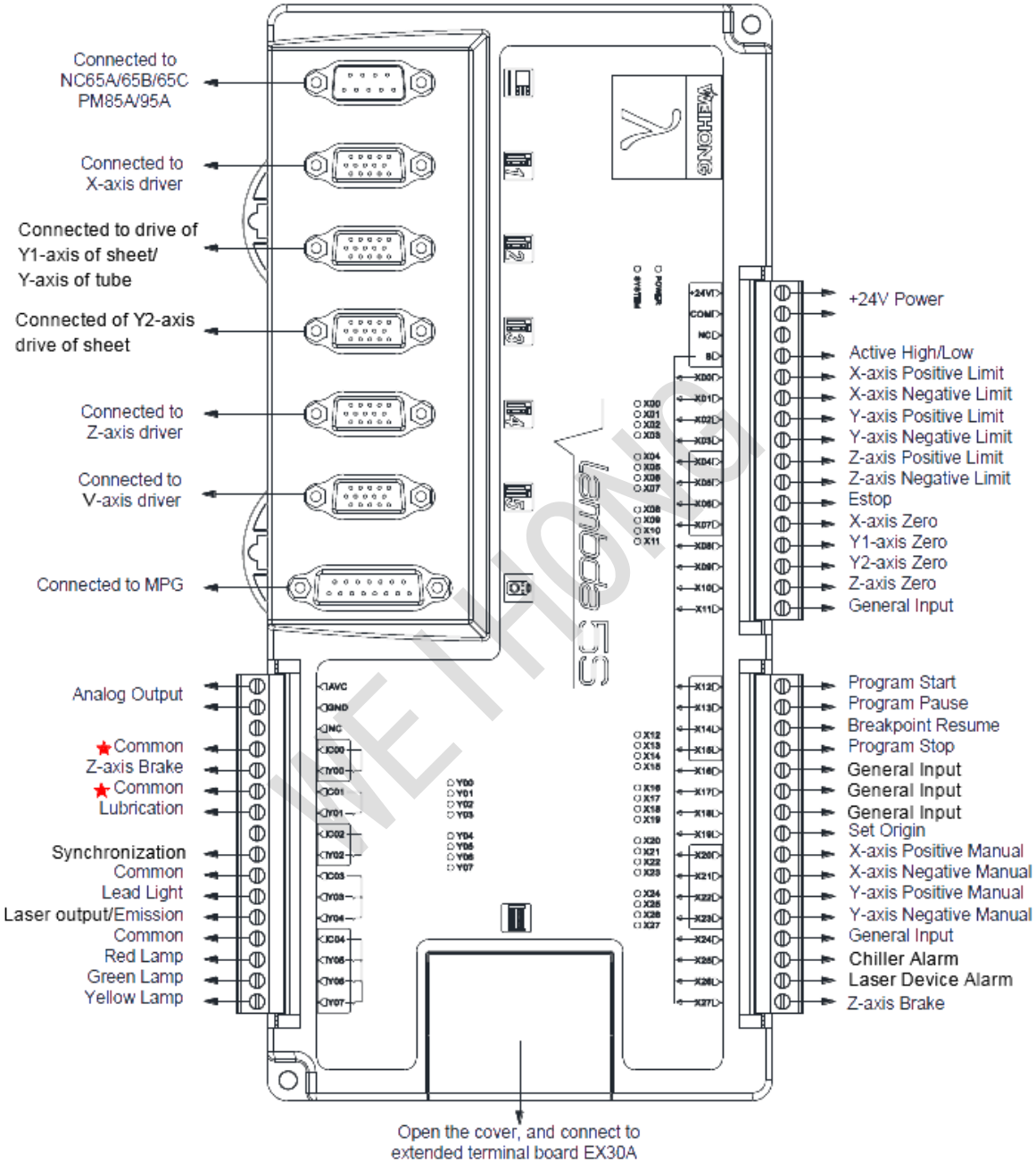
In sheet cutting configuration, wiring diagram of terminal board includes the following:

- Wiring diagram of Lambda 5E terminal board
- Wiring diagram of EX30A terminal board
- Wiring diagram of EX33A terminal board
- Wiring diagram of EX31A terminal board

WEIHONG

Wiring Diagram of Lambda 5E Terminal Board

In double Y configuration, wiring diagram of Lambda 5E terminal board in position loop control mode is as follows:



Wiring diagram in velocity loop control mode differs from that in position loop control mode in that:

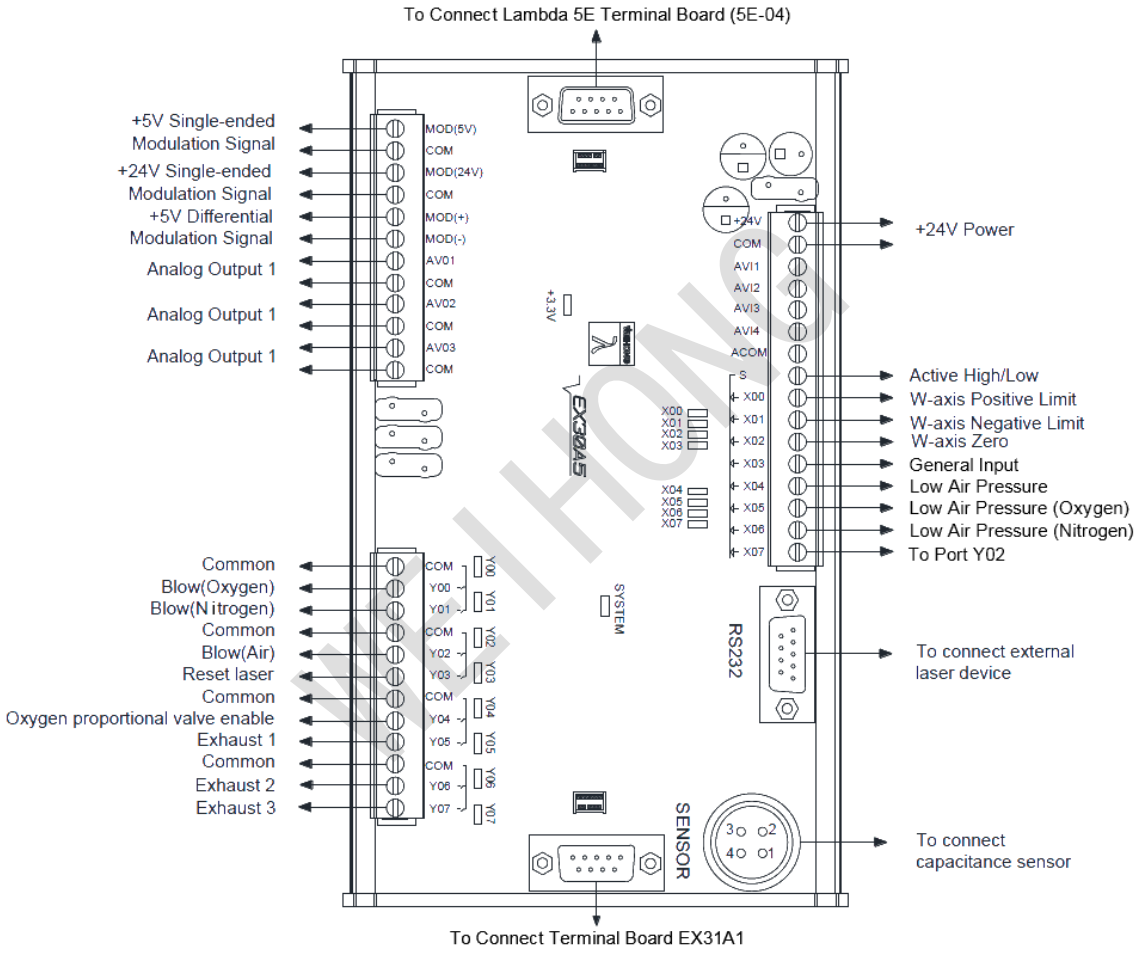
- Port **Connected to Z-axis driver** is not connected.
- The connected terminal board is EX33A.

Wiring diagram in single Y configuration differs from that in double Y configuration in that:

- X-axis, Y-axis and Z-axis servo interfaces should be connected to axis servo interfaces 1, 2 and 4.
- Port X08 is the origin of Y-axis and port X09 is general input port.

Wiring Diagram of EX30A Terminal Board

Wiring diagram of EX30A terminal board is as follows:

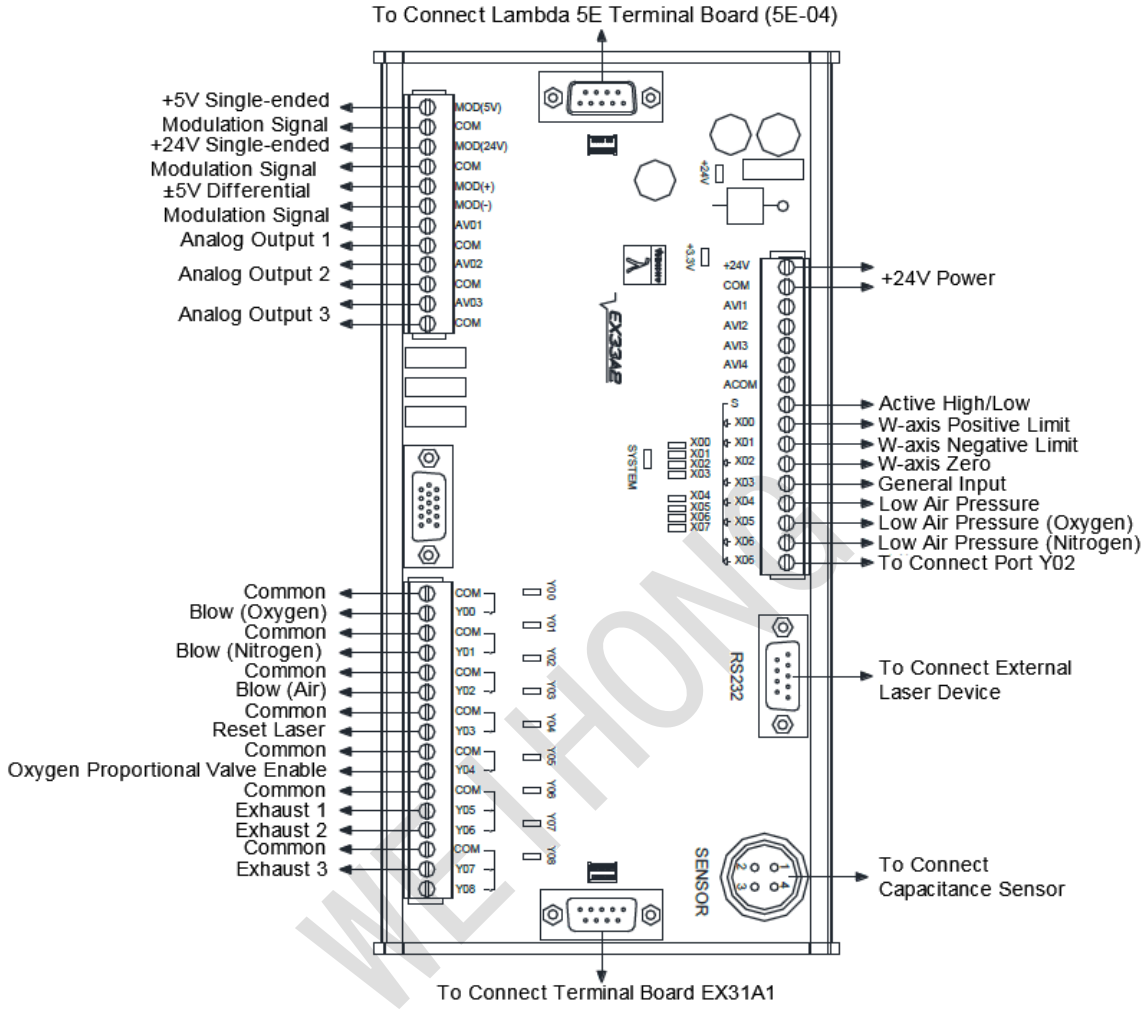


Among the ports:

- The outputs of EX30A terminal board are Darlington outputs and their load current cannot be more than 0.4A.
- Outputs Y00~Y05 should be conneted to relays.
- In configuration with follow-up, Y02 is set as **Blow (Air)**.
- In configuration without follow-up, Y02 is set as **Follow Control Switching**.

Wiring Diagram of EX33A Terminal Board

Wiring diagram of EX33A terminal board is as follows:

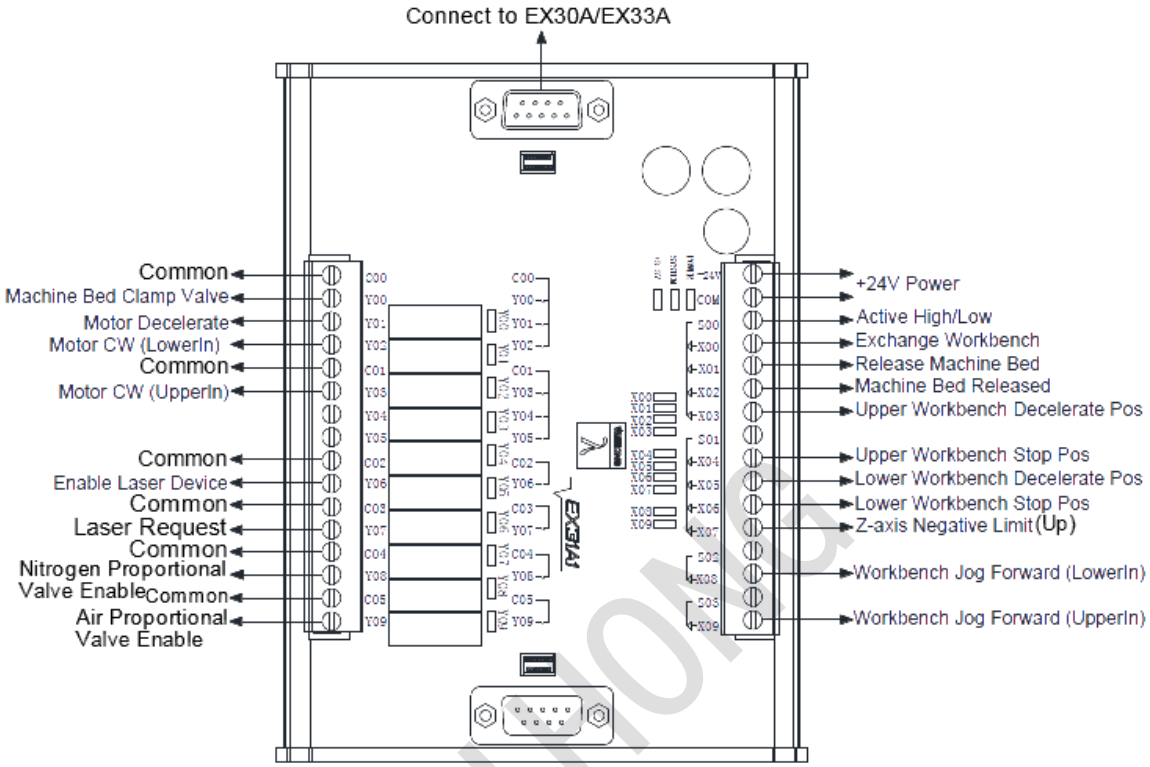


Among the ports:

- Outputs Y00~Y05 should be conneted to relays.
- In configuration with follow-up, Y02 is set as **Blow (Air)**.
- In configuration without follow-up, Y02 is set as **Follow Control Switching**.

Wiring Diagram of EX31A Terminal Board

Wiring diagram of EX31A terminal board is as follows:



Among the ports:

- C00~C05 are common ports.
- Y04~Y09 are reserved output ports.
- S00~S03 are active high/low ports.

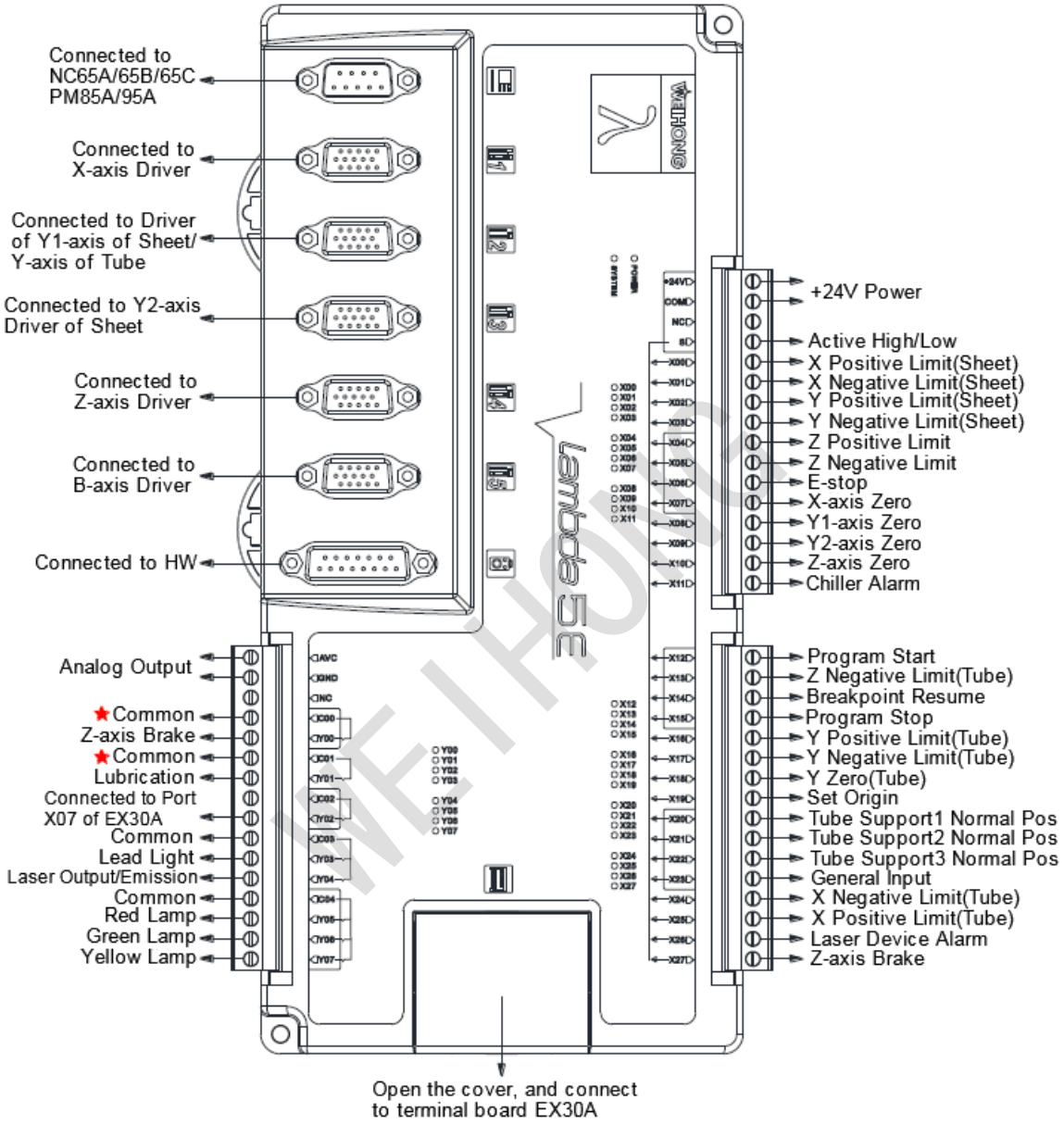
6.2.2 Wiring Diagram of Terminal Board (in Tube Cutting Configuration)

In tube cutting configuration, wiring diagram of terminal board includes the following:

- Wiring diagram of Lambda 5E terminal board
- Wiring diagram of EX30A terminal board
- Wiring diagram of EX33A terminal board
- Wiring diagram of EX31A terminal board

Wiring Diagram of Lambda 5E Terminal Board

Wiring diagram of Lambda 5E terminal board in position loop control mode is as follows:

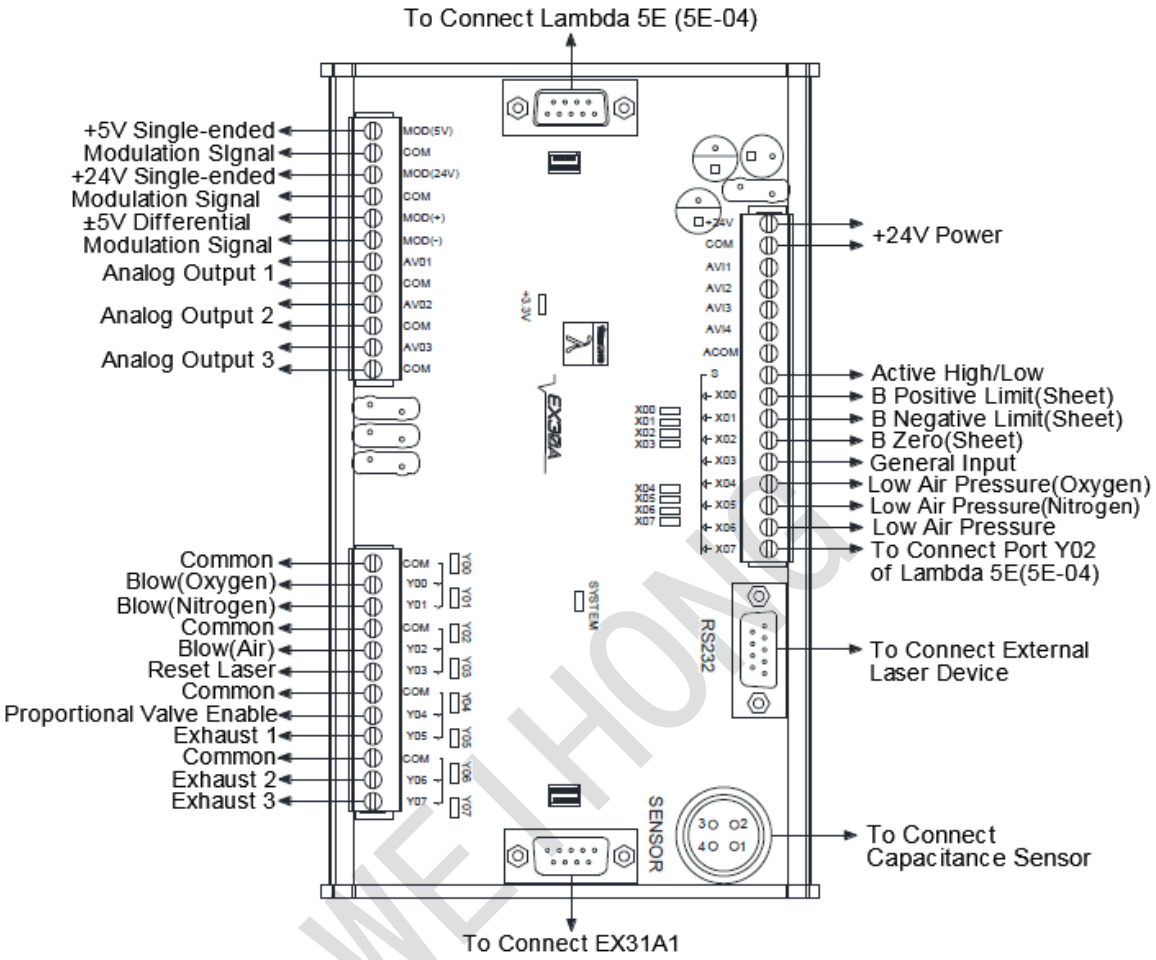


Wiring diagram in velocity loop control mode differs from that in position loop control mode in that:

- Port **Connected to Z-axis driver** is **Connected to W-axis driver**.
- The connected terminal board is EX33A.

Wiring Diagram of EX30A Terminal Board

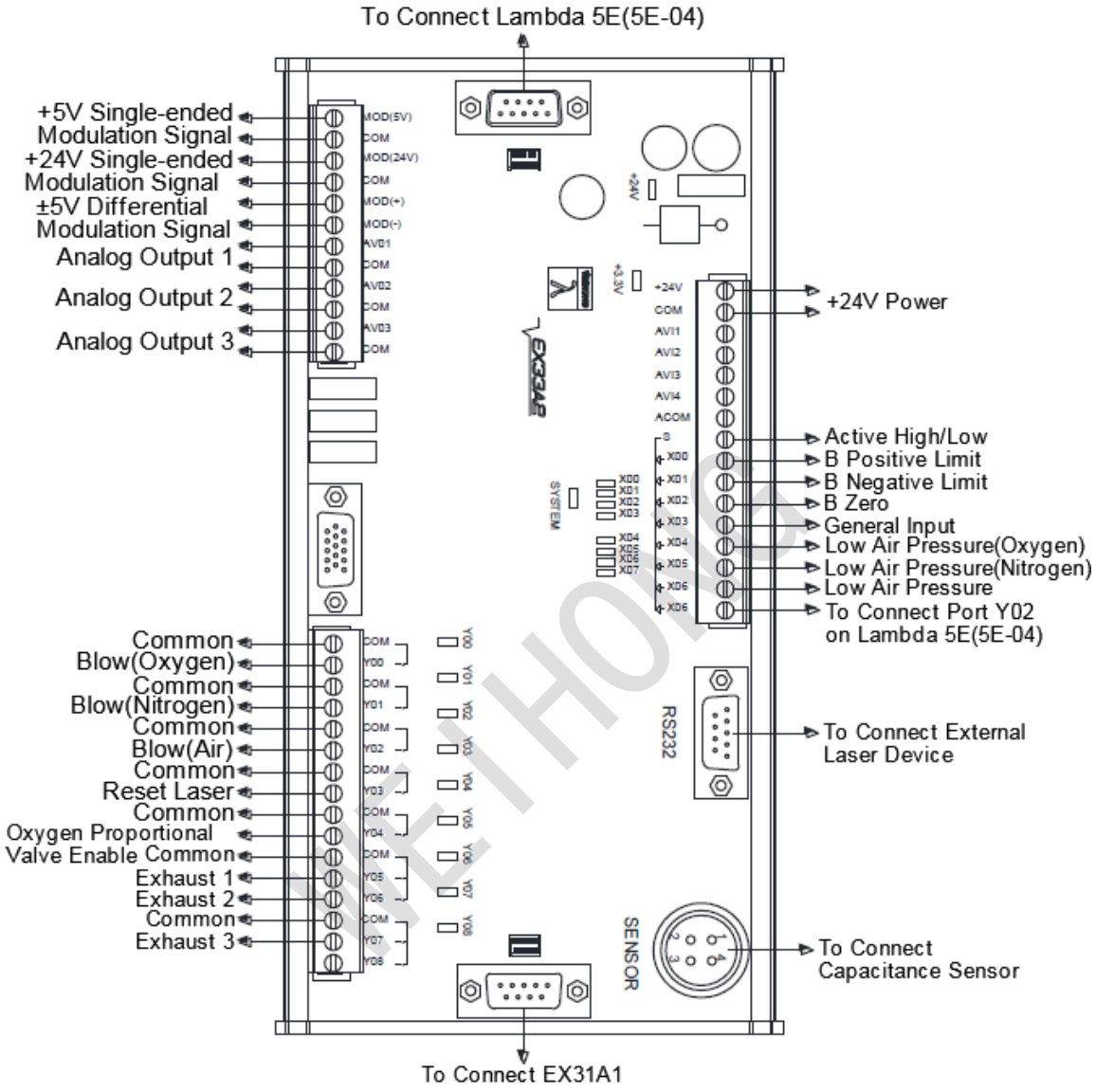
Wiring diagram of EX30A terminal board is as follows:



WEIHONG

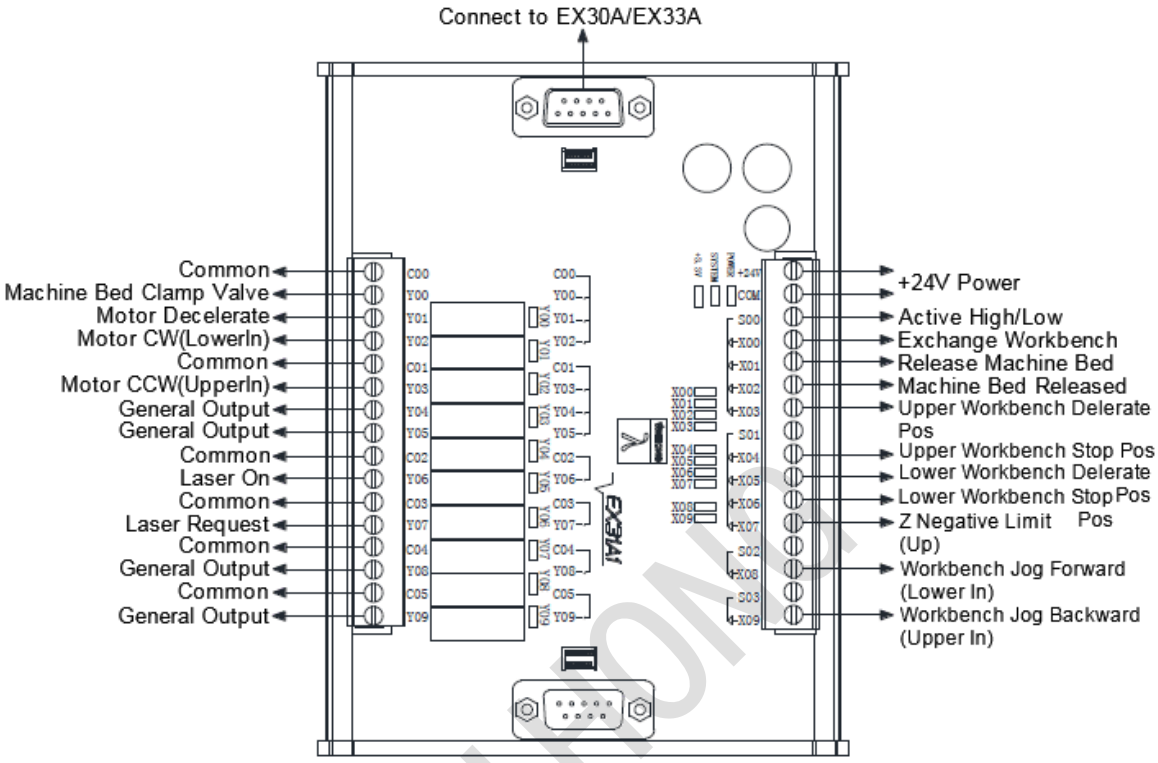
Wiring Diagram of EX33A Terminal Board

Wiring diagram of EX33A terminal board is as follows:



Wiring Diagram of EX31A Terminal Board

Wiring diagram of EX31A terminal board is as follows:



6.3 Wiring Diagram of Laser Device

In this section, you can quickly know about how to connect different laser devices.

Before connecting laser devices, do the following:

- Select and connect proper pulse modulation signals for different laser devices.

  The relationship between pulse modulation signals provided by **NcEditor V12 Laser Cutting CNC System** and corresponding interfaces on EX30A/EX33A termninal board is as follows:

  - +24V single-ended signal: MOD(24V) & COM
  - +5V single-ended signal: MOD(5V) & COM
  - ±5V differential signal: MOD(+) & MOD(-)

WEIHONG

- If the laser device supports RS232 communication, connect RS232 interface on the laser device to RS232 on EX30A/EX33A terminal board via a DB9 cable, so as to realize communication between the laser device and the software.

  RS-232-C is the standard for serial communication, which is jointly made by EIA, AT&T (Bell System), modem manufacturers and computer terminal manufacturers. It is suitable for communication with transfer rate within the range of 0~20000 b/s and generally adopted by communication within 20m.

Wiring diagrams of the following laser devices are provided:

- IPG-YLR series laser device
- FEIBO MARS-500W laser device
- Raycus laser device
- JK/GSI-500W-FL laser device
- Maxphotonics laser device
- SPI-500W-R4 laser device
- HFB 1000-1500W laser device
- GW SMATLas 3S laser device

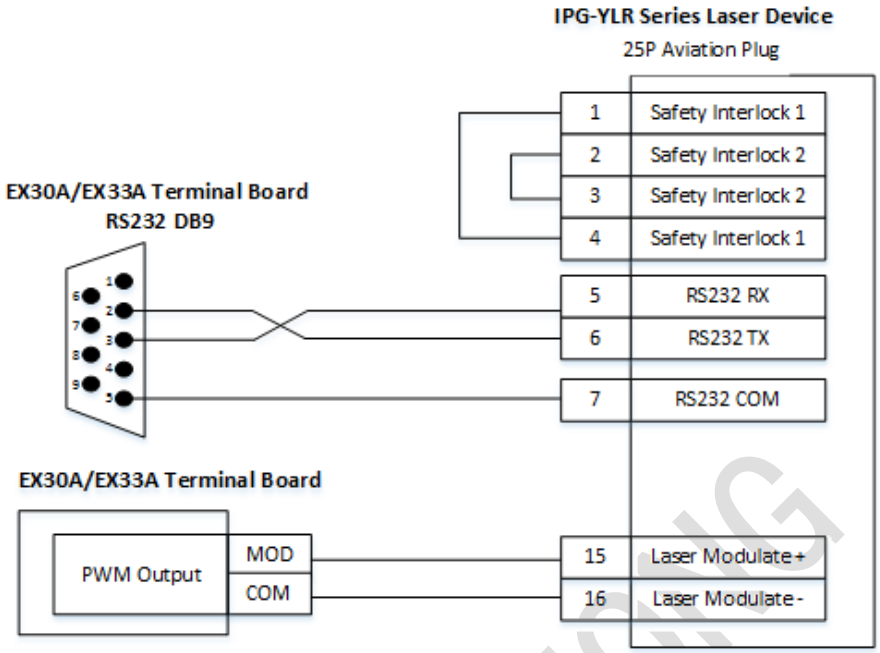
During connecting laser devices, please note the following:

- Wiring of pin 2 and 3 of RS232 interface male head on terminal board of which the version is higher than EX30A4 need not to be overlapped. Thus, you need not need to make a special wire.
- Wiring of pin 2 and 3 of RS232 interface female head on EX30A4 terminal board need to be overlapped. Thus, you need to make a special wire.
- The MOD pin of EX30A/EX33A terminal board in wiring diagrams of this section is MOD (24V).

WEIHONG

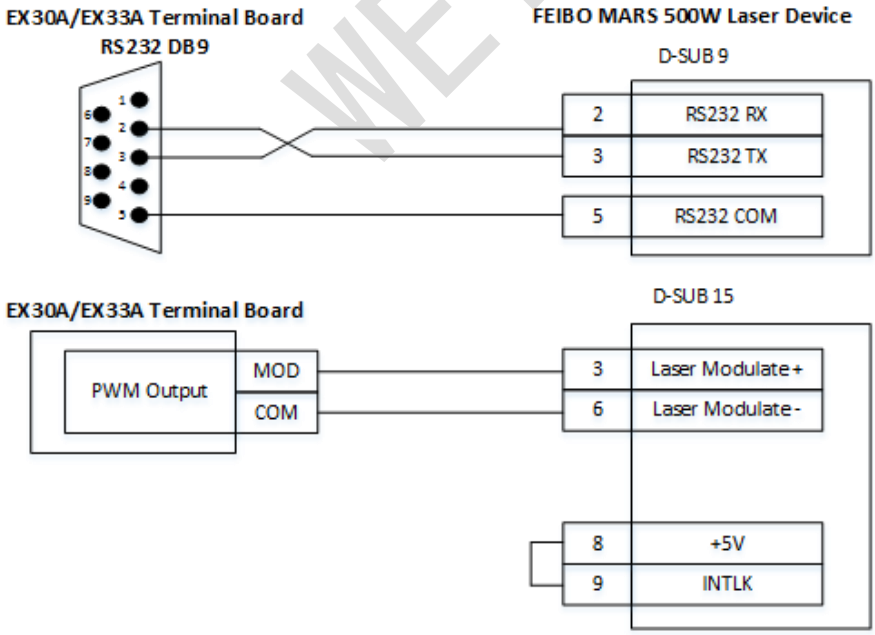
6.3.1 Wiring Diagram of IPG-YLR Series Laser Device

Wiring diagram is as follows:



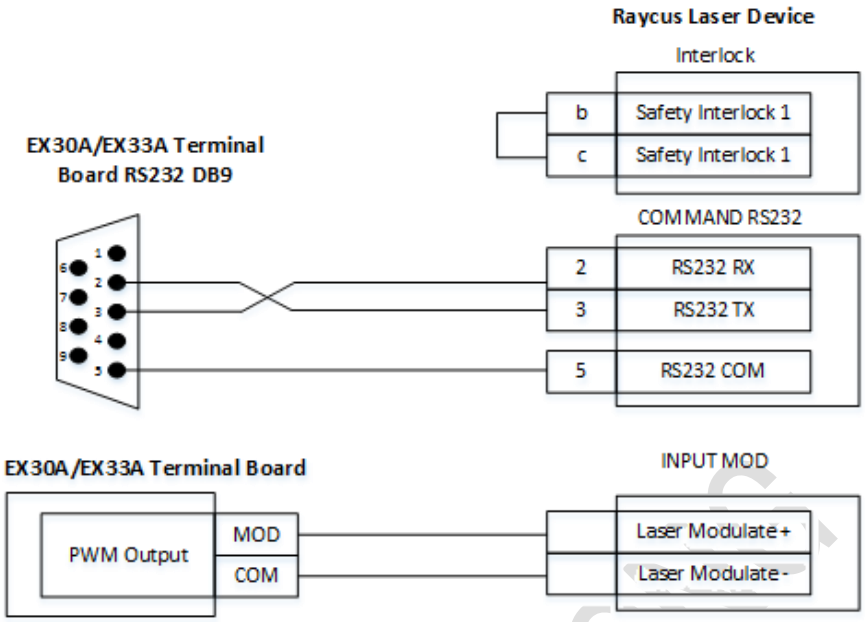
6.3.2 Wiring Diagram of FEIBO MARS-500W Laser Device

Wiring diagram is as follows:



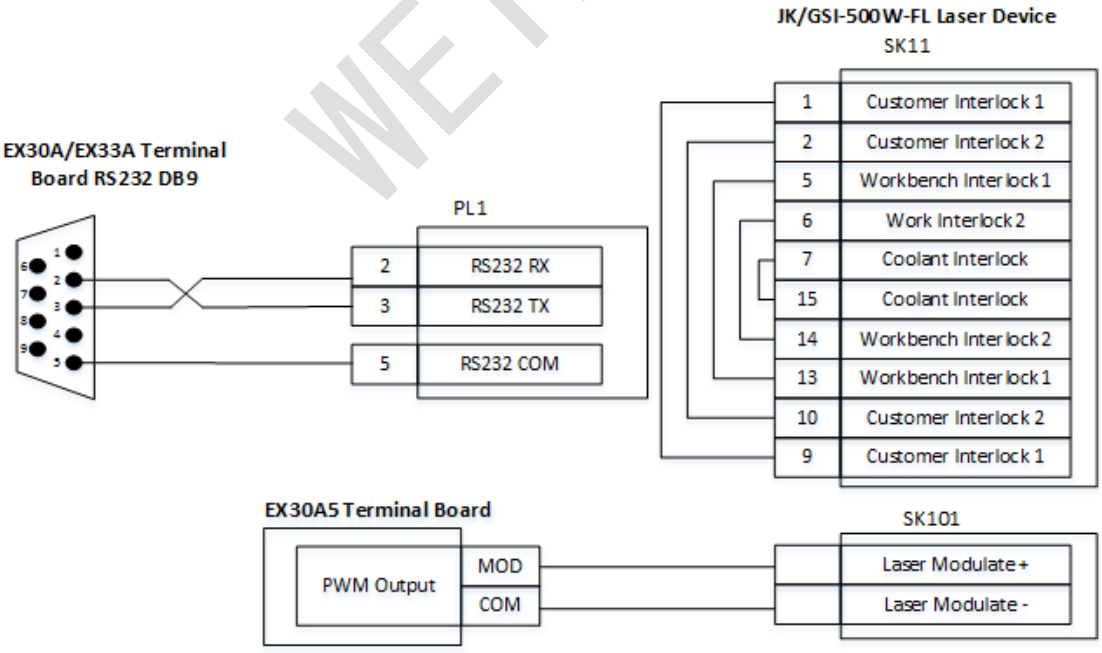
6.3.3 Wiring Diagram of Raycus Laser Device

Wiring diagram is as follows:



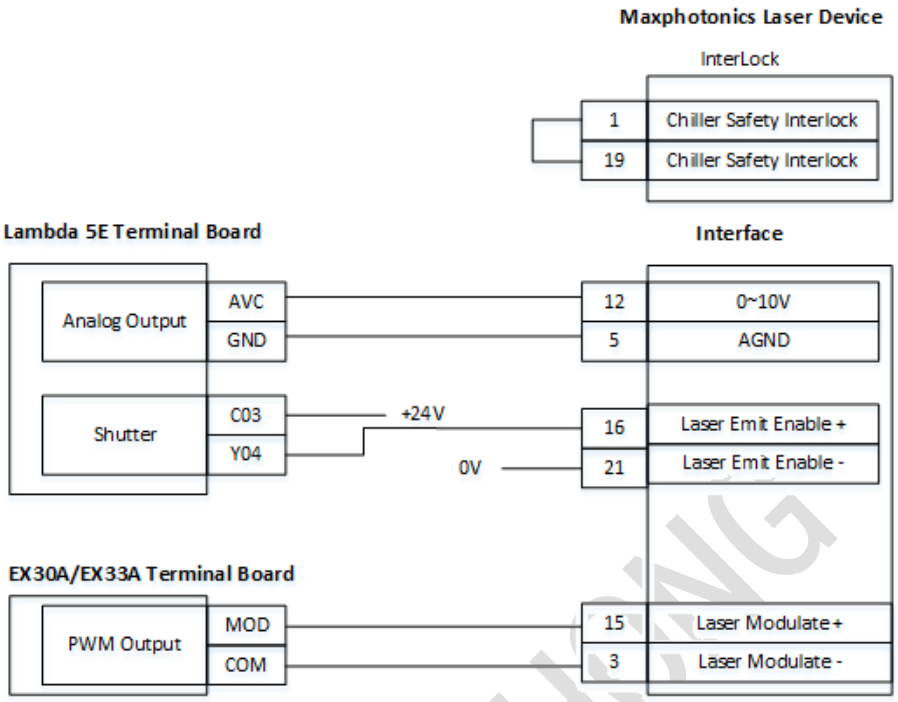
6.3.4 Wiring Diagram of JK/GSI-500W-FL Laser Device

Wiring diagram is as follows:



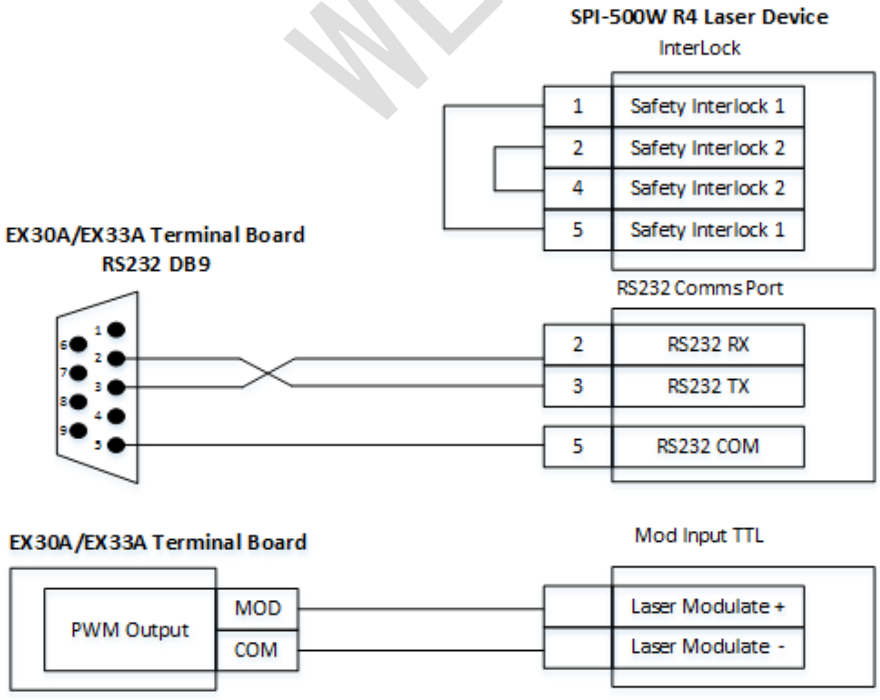
6.3.5 Wiring Diagram of Maxphotonics Laser Device

Wiring diagram is as follows:



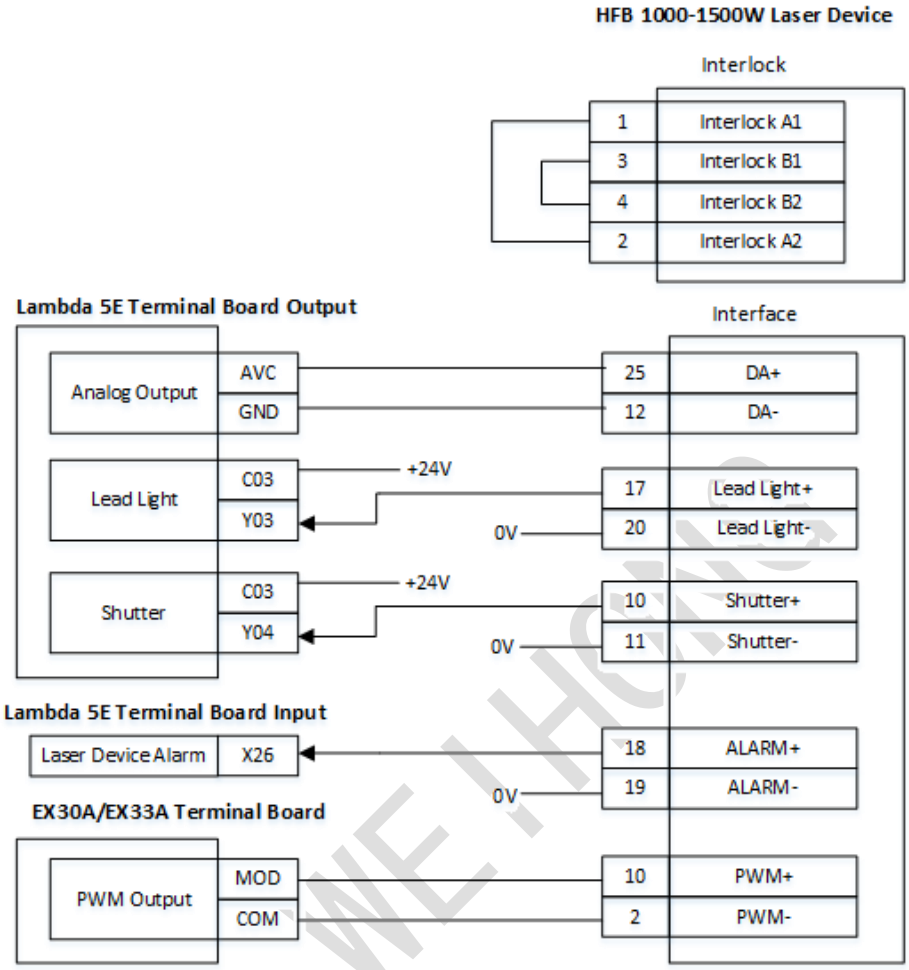
6.3.6 Wiring Diagram of SPI-500W-R4 Laser Device

Wiring diagram is as follows:



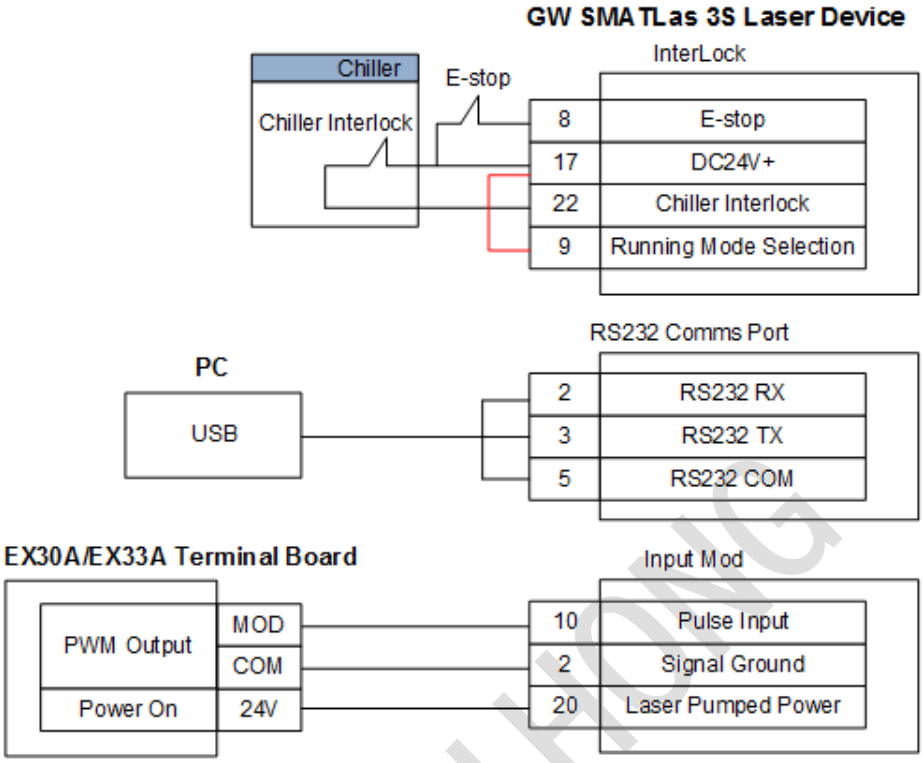
6.3.7 Wiring Diagram of HFB 1000-1500W Laser Device

Wiring diagram is as follows:



6.3.8 Wiring Diagram of GW SMATLas 3S Laser Device

Wiring diagram is as follows:



WEIHONG

6.4 Wiring Diagram of Drive

In this section, you can quickly know how to connect WEIHONG DB15 drive interface to different servo motors.

Before connecting, you need to know the definition of drive interface. See Definition of Drive Interface for details.

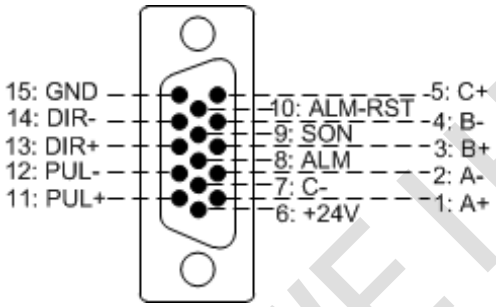
Wiring of drive differs in follow control mode. Thus, wiring diagram of drive includes the following:

- Wiring diagram of drive (in position loop control mode)
- Wiring diagram of drive (in velocity loop control mode)

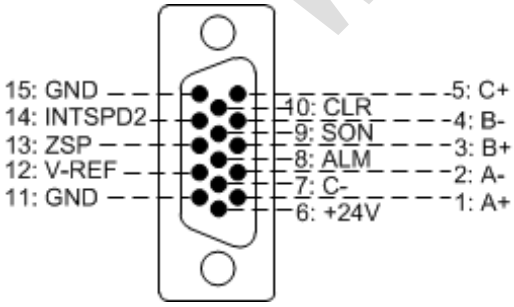
6.4.1 Definition of Drive Interface

The socket of servo drive joint is three-row DB15 holes. Its interface definition is shown as follows:

- In position loop control mode:



- In velocity loop control mode:



WEIHONG

Remark of drive interface is as follows:

Signal	Definition	Input/Output	Remark
A+, A-	Feedback signal of encoder phase A	Input, differential signal transmission mode	It is used to receive the differential output of encoder phase A signal from driver frequency divider (equal to RS422).
B+, B-	Feedback signal of encoder phase B	Input, differential signal transmission mode	It is used to receive the differential output of encoder phase B signal from driver frequency divider (equal to RS422).
C+, C-	Feedback signal of encoder phase C	Input, differential signal transmission mode	It is used to receive the differential output of encoder phase C signal from driver frequency divider (equal to RS422).
ALM	Drive alarm signal	Input	When the drive detects failure, this output (transistor) switch will be closed or disconnected.
SON	Servo ON signal	Output	It is used to turn on (power on) and turn off (power off) servo motor. When it is connected to COM, dynamic brake will be released and the drive is allowed to work (servo enabled).
CLR	Drive alarm clear signal	Output	It is used to remove alarms/warnings.
PUL+, PUL-	Pulse output	Output, differential signal transmission mode	-
DIR+, DIR-	Direction output	Output, differential signal transmission mode	-
INTSPD2	Internal command speed option 2	Output	-
ZSP	Speed zero clamp detection signal	Output	In speed zero clamp detection status, the output transistor is turned on.

WEIHONG

Signal	Definition	Input/Output	Remark
V-REF	Analog speed command	Output	-
+24V, GND	DC 24V power	Output	It is connected to drive.

6.4.2 Wiring Diagram of Drive (in Position Loop Control Mode)

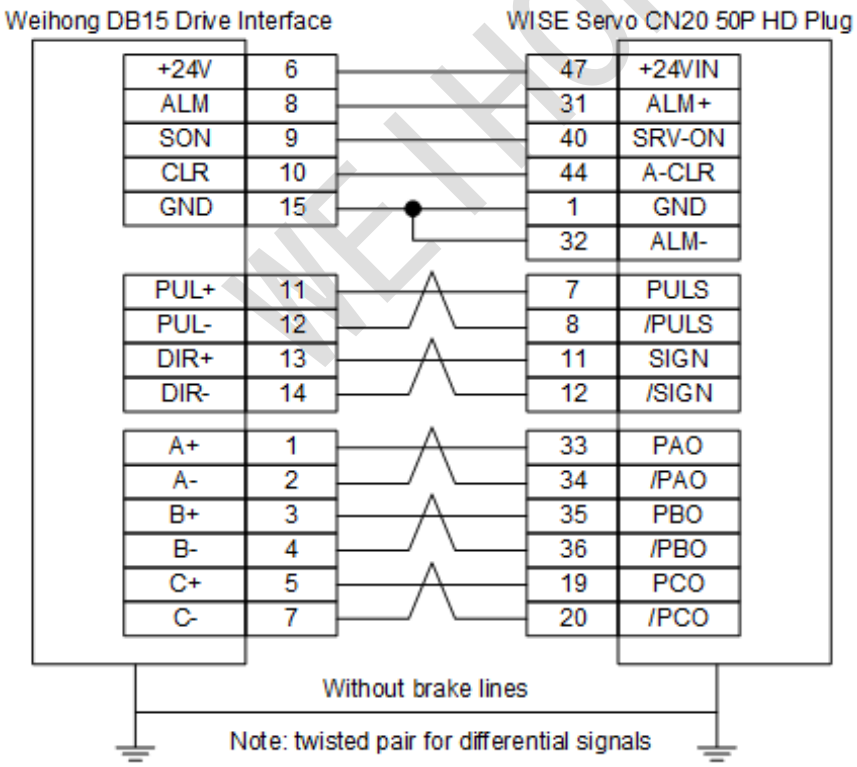
This section introduces wiring diagrams of the following drives:

- WISE servo drive
- YASKAWA Σ-Ⅱ/Σ-Ⅴ/Σ-7 servo drive
- Panasonic AC servo drive
- Fuji servo drive
- DELTA servo drive

Wiring Diagram of WISE Servo Drive

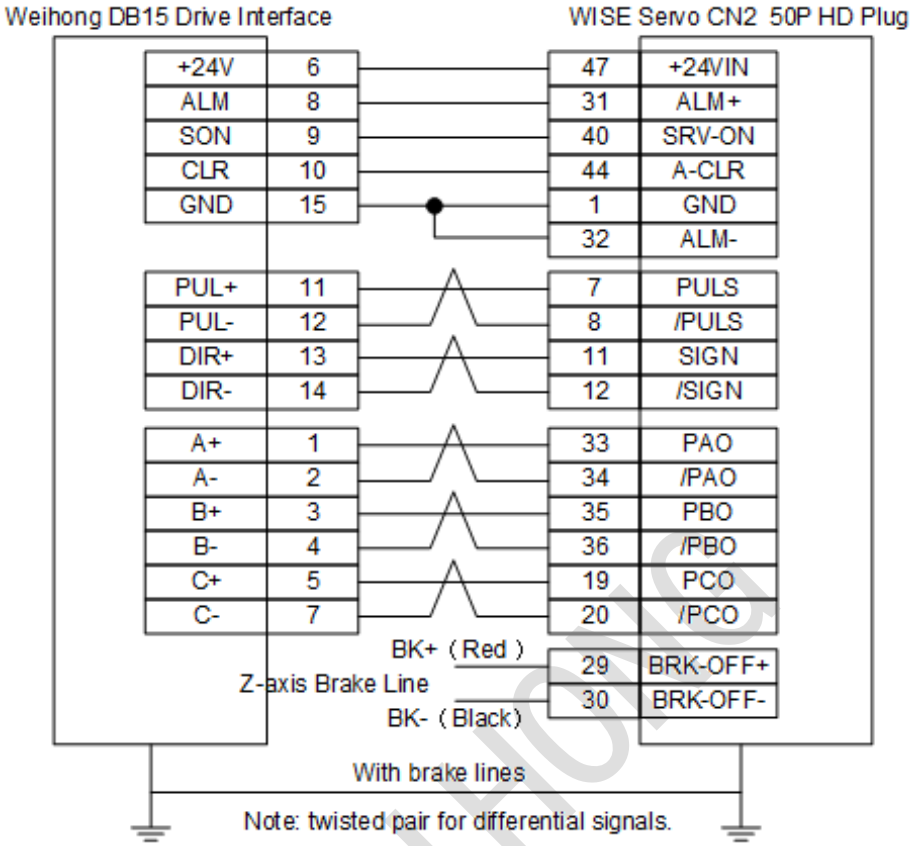
Wiring diagram is as follows:

- Without brake lines



WEIHONG

- With brake lines

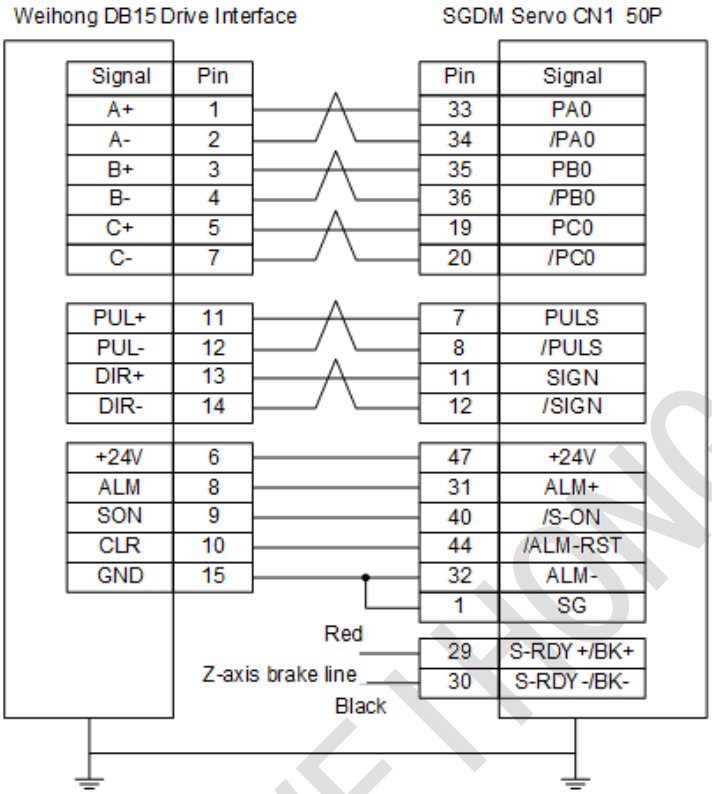


WEIHONG

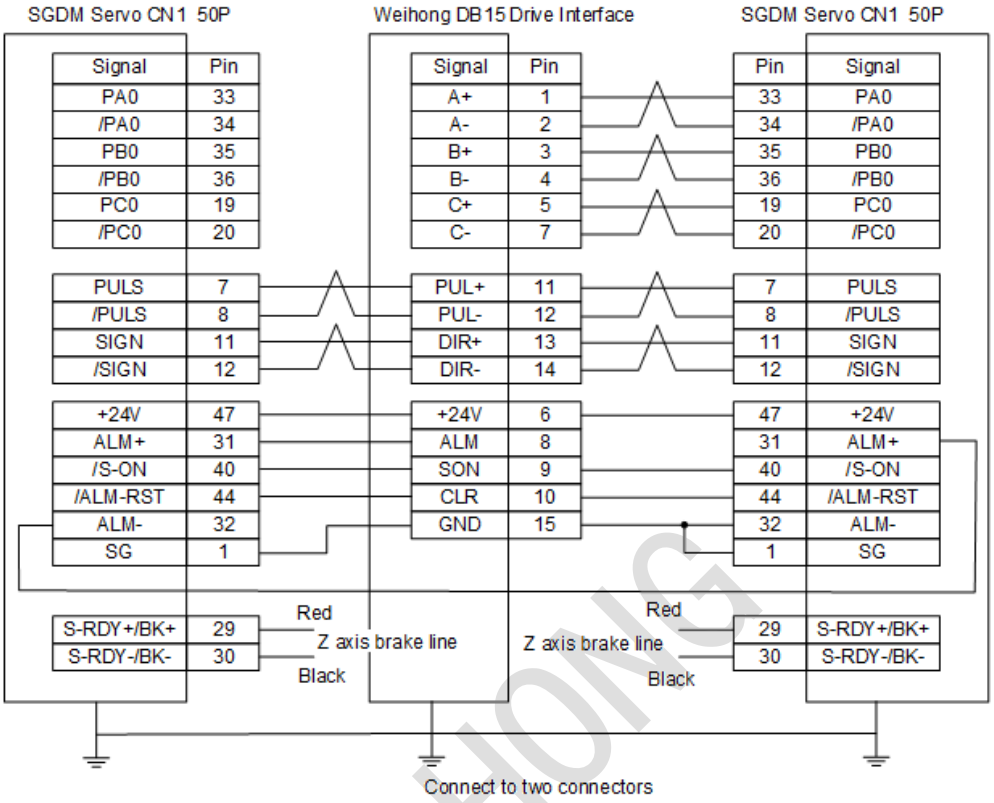
Wiring Diagram of YASKAWA Σ-Ⅱ/Σ-Ⅴ/Σ-7 Servo Drive

Wiring diagram is as follows:

- Connect to one connector



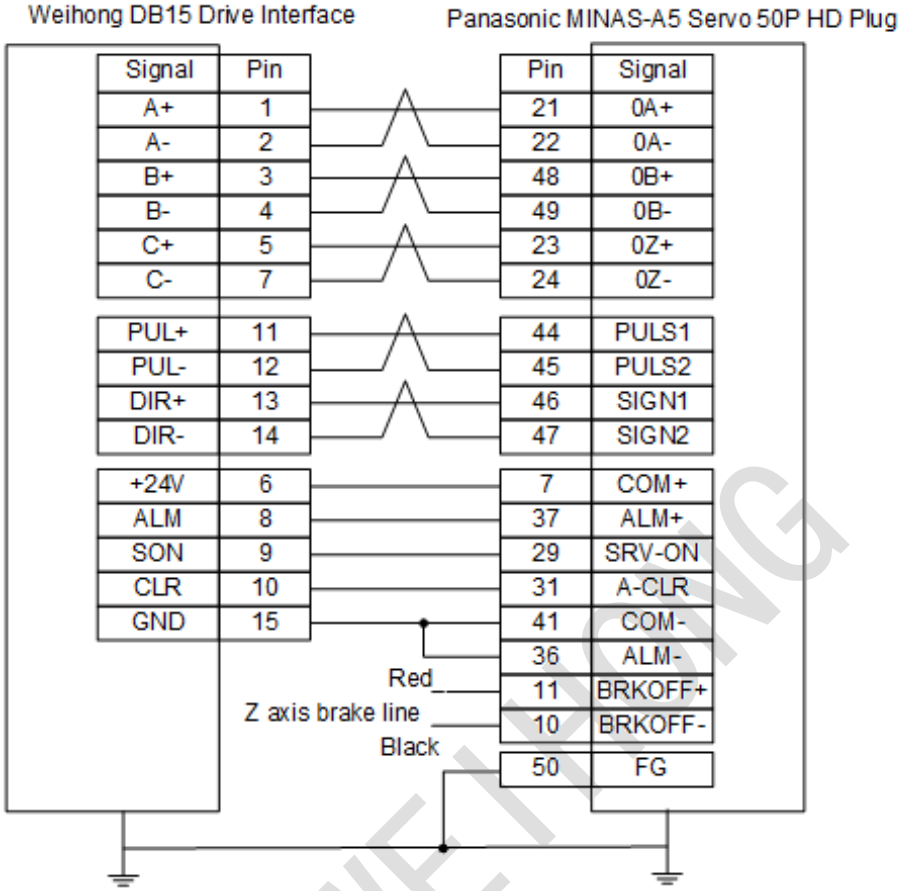
- Connect to two connectors



WEIHONG

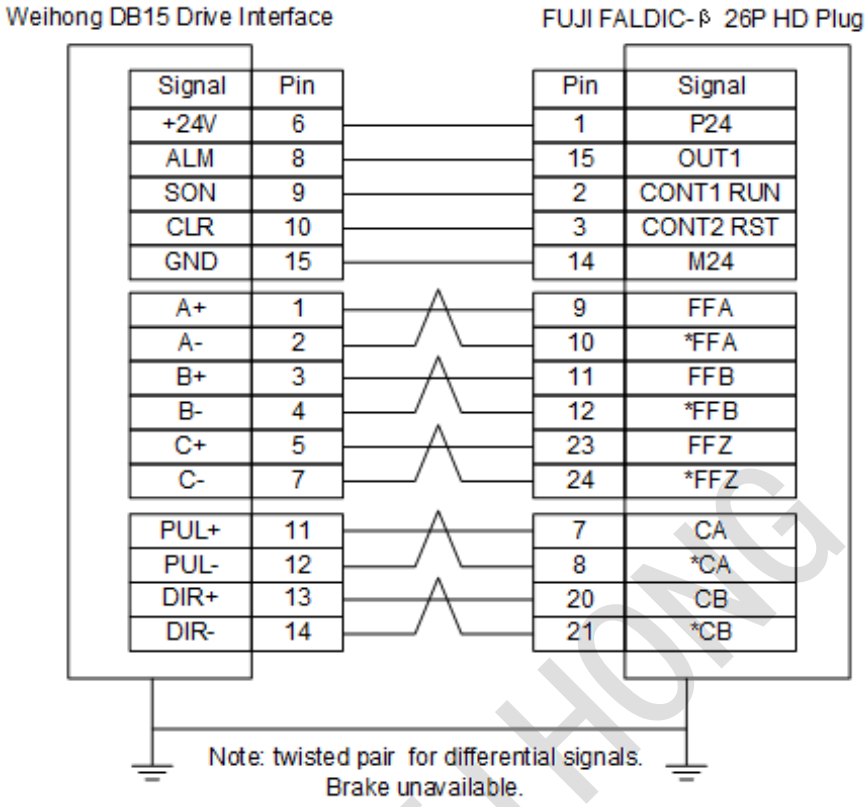
Wiring Diagram of Panasonic AC Servo Drive

Wiring diagram is as follows:



Wiring Diagram of Fuji Servo Drive

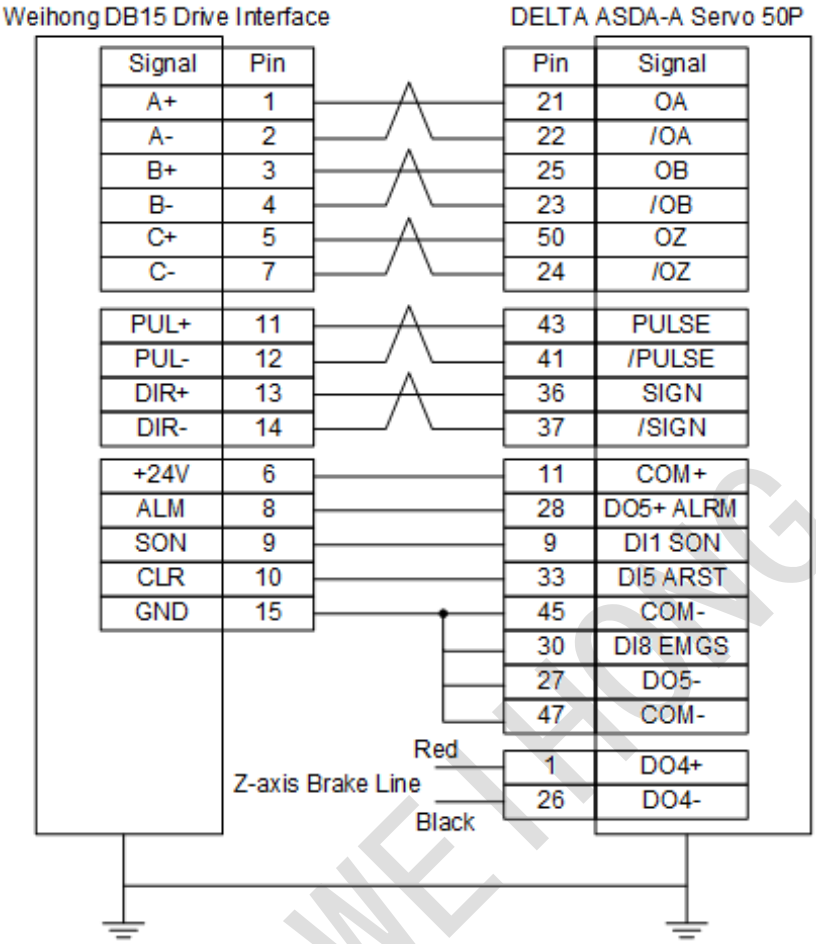
Wiring diagram is as follows:



WEIHONG

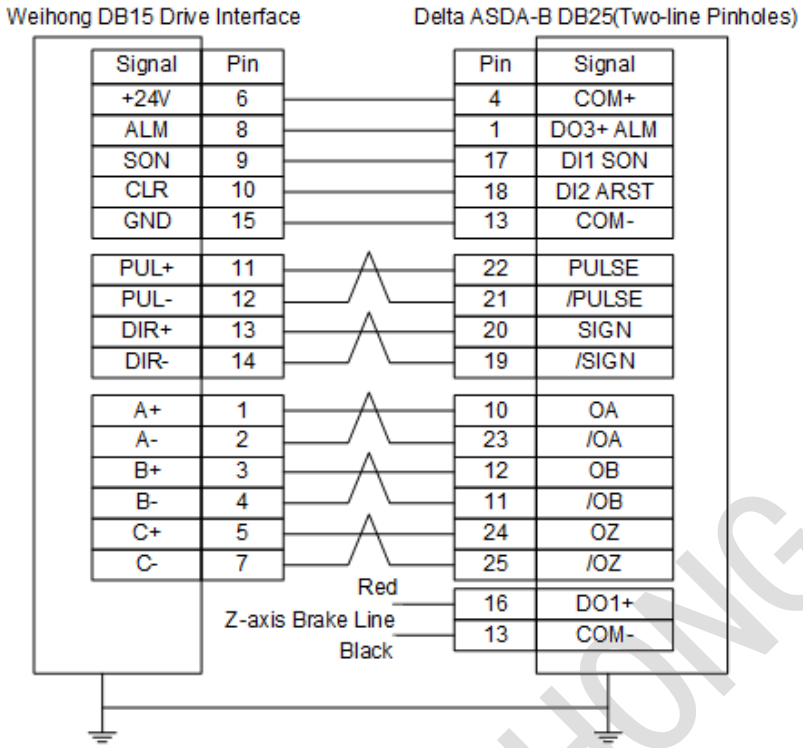
Wiring Diagram of DELTA Servo Drive

Wiring diagram of DELTA ASDA-A servo drive is as follows:

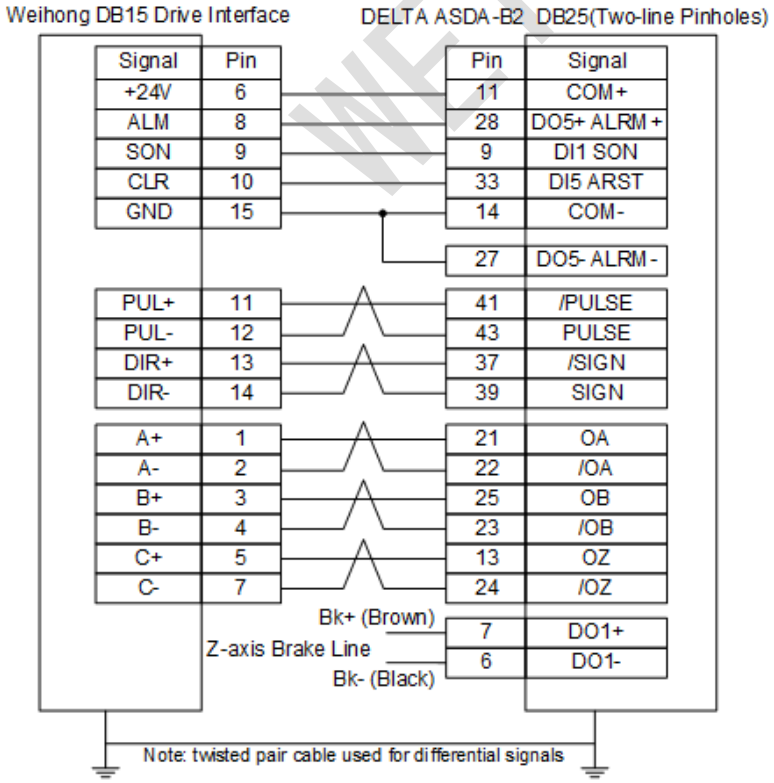


DELTA ASDA-A, ASDA-A2 and ASDA-AB share the same wire. Among them, ASDA-A2 and ASDA-AB have the same wiring pin while ASDA-A has the contrary pulse pin, with PULSE 43, /PULSE 41.

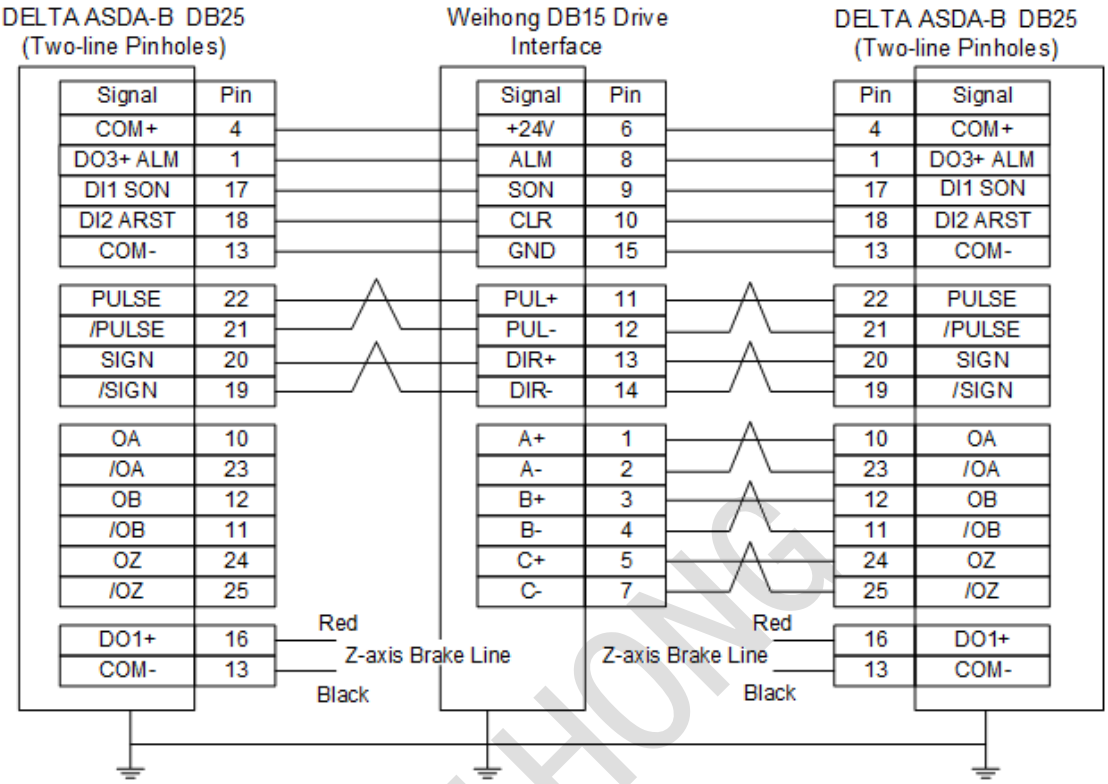
Wiring diagram of DELTA ASDA-B servo drive is as follows (connecting to one connector):



Wiring diagram of DELTA ASDA-B2 servo drive is as follows:



Wiring diagram of DELTA ASDA-B servo drive is as follows (connecting to two connectors):



6.4.3 Wiring Diagram of Drive (in Velocity Loop Control Mode)

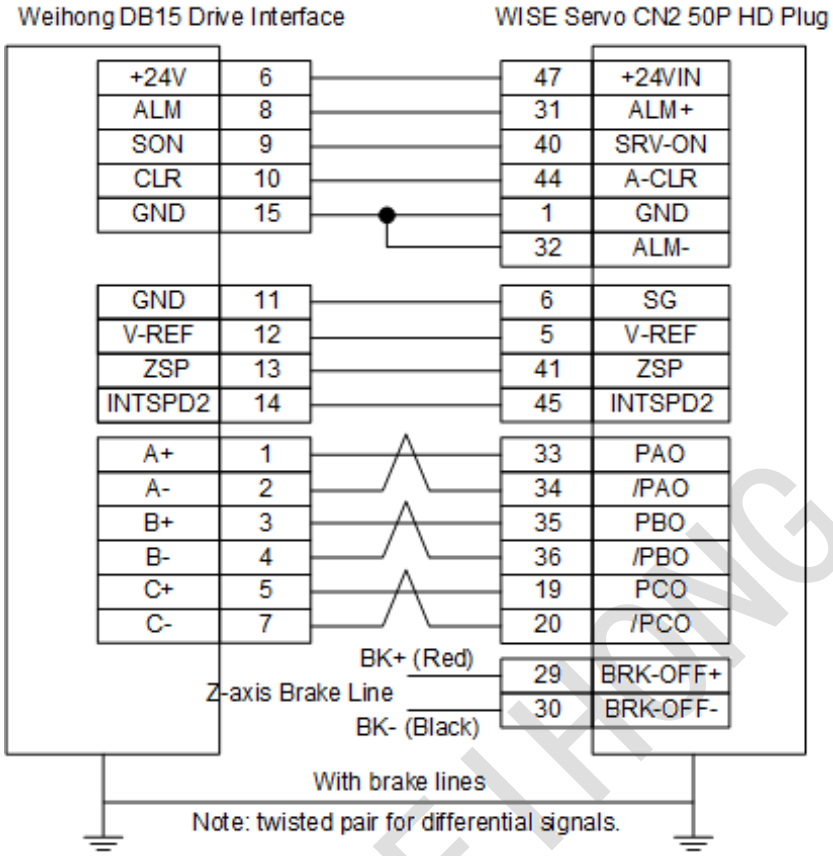
This section introduces wiring diagrams of the following drives:

- WISE servo drive
- YASKAWA Σ-7 servo drive
- Fuji servo drive

WEIHONG

Wiring Diagram of WISE Servo Drive

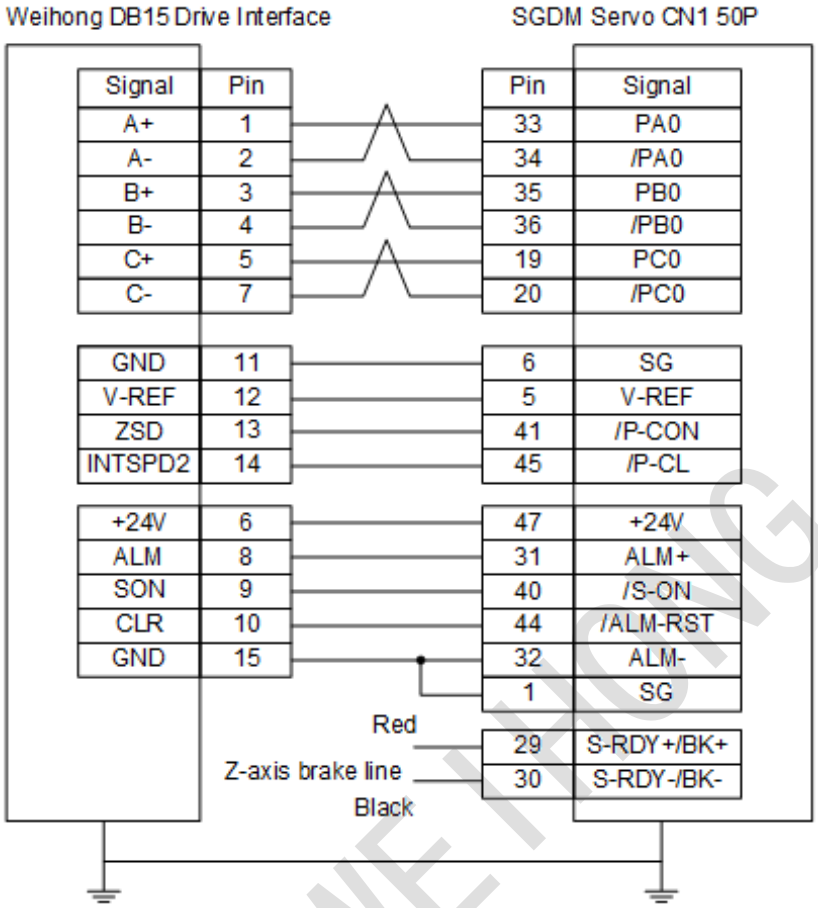
Wiring diagram is as follows:



WEIHONG

Wiring Diagram of YASKAWA Σ-7 Servo Drive

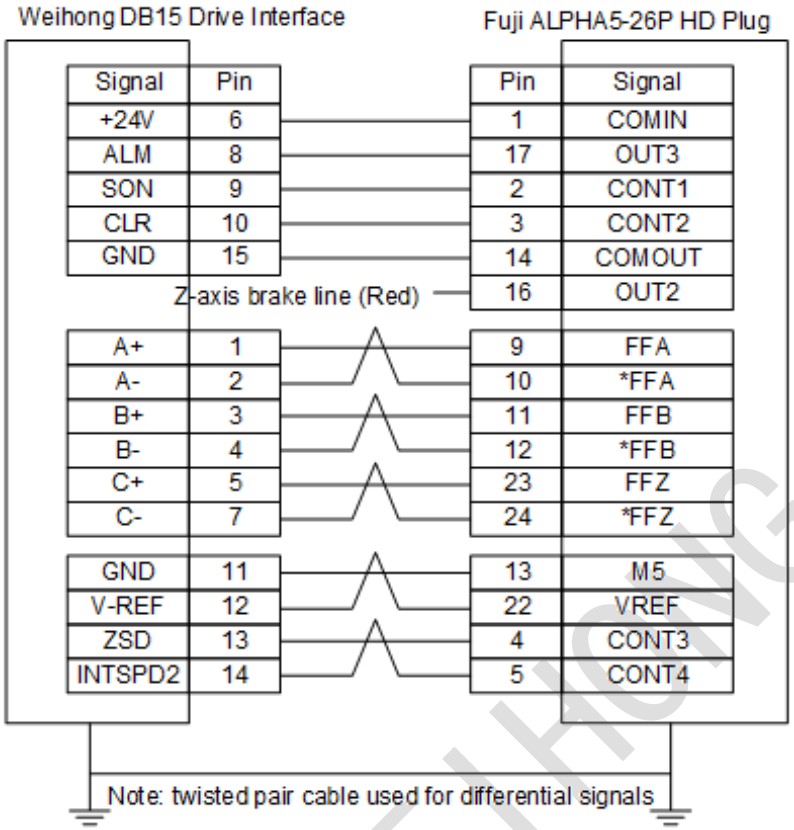
Wiring diagram is as follows:



WEIHONG

Wiring Diagram of Fuji Servo Drive

Wiring diagram is as follows:



WEIHONG

SPECIALIZED / CONCENTRATED / FOCUSED

Shanghai Weihong Electronic Technology Co., Ltd.

Address: No. 1590, Huhang Rd., Fengxian, Shanghai, China, 201401

Hot-line: 400 882 9188

Website: www.weihong.com.cn/en