



# GM08B0-H03 User Manual

## Product Description



# Foreword

Dear Users:

Welcome to use GM08B fiber laser autofocus cutting head produced by Shenzhen Ospri Intelligent Technology Co., LTD. We are honored to have your confidence in our products.

In order to make you have an overall view of the product, convenient for your use, we specifically provide the user manual for you, including product characteristics, structural feature, technical feature, direction for use, maintenance, etc. It's an essential guide when you use this product.

Please read the user manual carefully before use. I'm sure it will be helpful for you to use this product. In addition, if you have any questions during use, please contact us, and we will serve you wholeheartedly.

Declaration:

The contents of User Manual are protected by the Copyright Law. Without the approval of Shenzhen Ospri Intelligent Technology Co., Ltd, any organization or individual shall not copy or tamper it by any means and forms.

In order to ensure your safety and the product works normally, please read the guide book carefully before using.

# Contents

## Chapter 1 Overview

|                              |    |
|------------------------------|----|
| 1.1 Product Parameters ..... | 01 |
| 1.2 Precautions .....        | 01 |

## Chapter 2 Structural Features

|  |    |
|--|----|
| 2.1 Brief Description of Product Structure .....         | 02 |
| 2.2 Brief Description of Product Parts .....             | 03 |
| 2.3 Brief Description of Product Parts (Lens Size) ..... | 04 |

## Chapter 3 Product Installation

|  |    |
|--|----|
| 3.1 Cutting Head Installation .....  | 05 |
| 3.2 Pipeline Connection .....  | 06 |
| 3.2.1 Cooling Pipeline .....   | 06 |
| 3.2.2 Auxiliary Gas Pipeline .....   | 07 |
| 3.3 Wiring of the Cutting Head to the Cypcut Pulse System (Without EtherCAT Bus Module)..... | 08 |
| 3.4 Wiring of the Cutting Head to the Cypcut Pulse System (With EtherCAT Bus Module).....    | 08 |
| 3.5 FSCUT2000C System Wiring (Example: BCL3766).....   | 09 |
| 3.5.1 PCB Board I/O Wiring.....  | 09 |
| 3.5.2 Servo Driver Power Wiring (DC24V).....   | 10 |
| 3.5.3 Signal Line Wiring (Without EtherCAT Bus Module).....                                  | 10 |
| 3.5.4 Signal Line Wiring (With EtherCAT Bus Module).....                                     | 11 |
| 3.5.5 Bus Module Wiring.....   | 11 |
| 3.5.6 PCB Board Axis Port Wiring.....  | 12 |
| 3.5.7 Driver Parameters.....   | 12 |

|   |    |
|---|----|
| 3.6 Wiring of the Cutting Head to the Cypcut Bus System (Without EtherCAT Bus Module).....    | 13 |
| 3.7 Wiring of the Cutting Head to the Cypcut Bus System (With EtherCAT Bus Module).....       | 13 |
| 3.8 FSCUT8000 System Wiring (Example: HPL2720E).....  | 14 |
| 3.8.1 PCB Board I/O Wiring.....   | 14 |
| 3.8.2 Servo Driver Power Wiring (DC24V).....  | 15 |
| 3.8.3 Signal Line Wiring (Without EtherCAT Bus Module).....                                   | 15 |
| 3.8.4 Signal Line Wiring (With EtherCAT Bus Module).....                                      | 16 |
| 3.8.5 Bus Module Wiring.....  | 16 |
| 3.8.6 Driver Parameters.....  | 17 |
| 3.9 Wiring of the Cutting Head to the Weihong Pulse System (Without EtherCAT Bus Module)..... | 18 |
| 4.0 Wiring of the Cutting Head to the Weihong Pulse System (With EtherCAT Bus Module).....    | 18 |
| 4.1 LS6000M Weihong Non-Bus System Wiring (Example: EX41A).....                               | 19 |
| 4.1.1 PCB Board I/O Wiring.....   | 19 |
| 4.1.2 Servo Driver Power Wiring (DC24V).....  | 20 |
| 4.1.3 Signal Line Wiring (Without EtherCAT Bus Module).....                                   | 20 |
| 4.1.4 Signal Line Wiring (With EtherCAT Bus Module).....                                      | 21 |
| 4.1.5 Bus Module Wiring.....  | 21 |
| 4.1.6 PCB Board Axis Port Wiring.....   | 22 |
| 4.1.7 Driver Parameters.....  | 22 |

|   |    |
|---|----|
| 4.2 Wiring of the Cutting Head to the Weihong Bus System (Without EtherCAT Bus Module)..... | 23 |
| 4.3 Wiring of the Cutting Head to the Weihong Bus System (With EtherCAT Bus Module).....    | 23 |
| 4.4 LS6000M Weihong Non-Bus System Wiring (Example: EX41A).....                             | 24 |
| 4.4.1 PCB Board I/O Wiring.....   | 24 |
| 4.4.2 Servo Driver Power Wiring (DC24V).....  | 25 |
| 4.4.3 Signal Line Wiring (Without EtherCAT Bus Module).....                                 | 25 |
| 4.4.4 Signal Line Wiring (With EtherCAT Bus Module).....                                    | 26 |
| 4.4.5 Bus Module Wiring.....  | 26 |
| 4.4.6 Driver Parameters.....  | 27 |
| 4.5 QBH Fiber Laser Head Installation.....  | 28 |

## Chapter 4 Product Debugging

|  |    |
|--|----|
| 4.1 (Example: FSCUT2000C Pulse System).....          | 31 |
| 4.1.1 GM08B Cypcut Platform Configuration .....      | 32 |
| 4.2 Alarm Signal Configuration.....                  | 33 |
| 4.3 FSCUT8000 System Configuration (Bus System)..... | 34 |
| 4.3.1 Focus Control and Limit Configuration.....     | 34 |
| 4.3.2 GM08B Cypcut Platform Configuration.....       | 35 |
| 4.4 Alarm Signal Configuration.....                  | 36 |
| 4.5 LS6000M Non-Bus System Configuration.....        | 37 |
| 4.5.1 W-Axis Parameter Configuration.....            | 37 |
| 4.5.2 GM08B Weihong Platform Configuration.....      | 38 |
| 4.5.3 W-Axis Home Configuration.....                 | 39 |
| 4.5.4 GM08B Weihong Platform Configuration.....      | 40 |
| 4.5.5 Focus Control Configuration.....               | 41 |
| 4.5.6 Focus Control Configuration.....               | 42 |
| 4.5.7 W-Axis No-load Speed Setting.....              | 43 |
| 4.5.8 W-Axis Alarm Signal Association.....           | 44 |
| 4.5.9 W-Axis Alarm Signal Association.....           | 45 |

|   |    |
|---|----|
| 4.6 LS6000M Bus System Configuration.....                                       | 46 |
| 4.6.1 W-Axis Parameter Configuration.....                                       | 46 |
| 4.6.2 GM08B Weihong Platform Configuration.....                                 | 46 |
| 4.6.3 W-Axis Home Configuration.....  | 48 |
| 4.6.4 GM08B Weihong Platform Configuration.....                                 | 48 |
| 4.6.5 Focus Control Configuration.....  | 50 |
| 4.6.6 Focus Control Configuration.....  | 51 |
| 4.6.7 W-Axis No-load Speed Setting.....   | 52 |
| 4.6.8 W-Axis Alarm Signal Association.....                                      | 53 |
| 4.6.9 W-Axis Alarm Signal Association.....                                      | 54 |
| 4.7 Focus Adjustment Instructions .....   | 55 |
| 4.8 Mobile APP Operation Instructions .....                                     | 56 |
| 4.8.1 Mobile APP Software Installation .....                                    | 56 |
| 4.8.2 APP Software Connection .....   | 57 |
| 4.8.3 Software Introduction .....   | 58 |
| 4.8.4 Temperature Parameter Setting and Modification of Equipment<br>Name ..... | 60 |

## Chapter 5 Product Maintenance

|   |    |
|---|----|
| 5.1 Maintenance and Replacement of Protective Lens .....            | 62 |
| 5.1.1 Disassembly and Assembly of Collimation Protective Lens ..... | 62 |
| 5.1.2 Disassembly and Assembly of Focus Protective Lens .....       | 63 |
| 5.2 Maintenance and Replacement of Collimation Lens .....           | 64 |
| 5.2.1 Disassembly and Assembly of Collimation Lens .....            | 64 |
| 5.2.2 Cleaning of Collimation Lens .....                            | 64 |
| 5.3 Maintenance and Replacement of Focus Lens .....                 | 65 |
| 5.3.1 Disassembly of Focus Lens .....                               | 65 |
| 5.3.2 Cleaning of Focus Lens .....                                  | 65 |
| 5.4 Maintenance and Replacement of Cutting Protective Lens .....    | 66 |
| 5.4.1 Disassembly of Protective Lens .....                          | 66 |
| 5.4.2 Cleaning of Protective Lens .....                             | 67 |
| 5.5 Maintenance of Sensory Parts .....                              | 68 |
| 5.5.1 Replacement of Nozzles and Ceramic Body .....                 | 69 |
| 5.5.2 Cleaning of Ceramic Body .....                                | 69 |



# Chapter 1 Overview

## 1.1 Product Parameter

① Product parameters, as shown in Table 1.0:

|                    |                                   |
|--------------------|-----------------------------------|
| Name               | Fiber Laser Cutting Head          |
| Model              | GM08B                             |
| Interface Type     | QBH, QD, G5                       |
| Wavelength         | 1080±10nm                         |
| Rated Power        | ≤8KW                              |
| Focus Length       | 150mm/200mm                       |
| Collimation Length | 100mm                             |
| Nozzle             | Various models and specifications |
| Focusing range     | -15mm~+15mm<br>-35mm~+30mm        |
| Centering range    | ±1.5mm                            |
| Focusing speed     | 100mm/s                           |
| Gas Pressure       | ≤3Mpa                             |
| Weight             | 5KG                               |

Table 1.0

## 1.2 Precautions

- ① Please wear special fiber laser safety goggles to ensure human safety when the cutting head is used in coordination with laser cutting machine.
- ② Precautions should be taken to avoid burning cutting head and laser nozzle due to the deviation of laser beams from central axis.
- ③ Keep the cutting head clean to prevent coolant, condensate or other foreign matters from entering the sensor; otherwise, sensor failure may be caused.
- ④ When processing products with laser, use a protective device to prevent the laser beams from causing injury to human body.

# Chapter 2 Structural Features

## 2.1 Brief Description of Product Structure

Brief description of product structure, as shown in Figure 1.0:

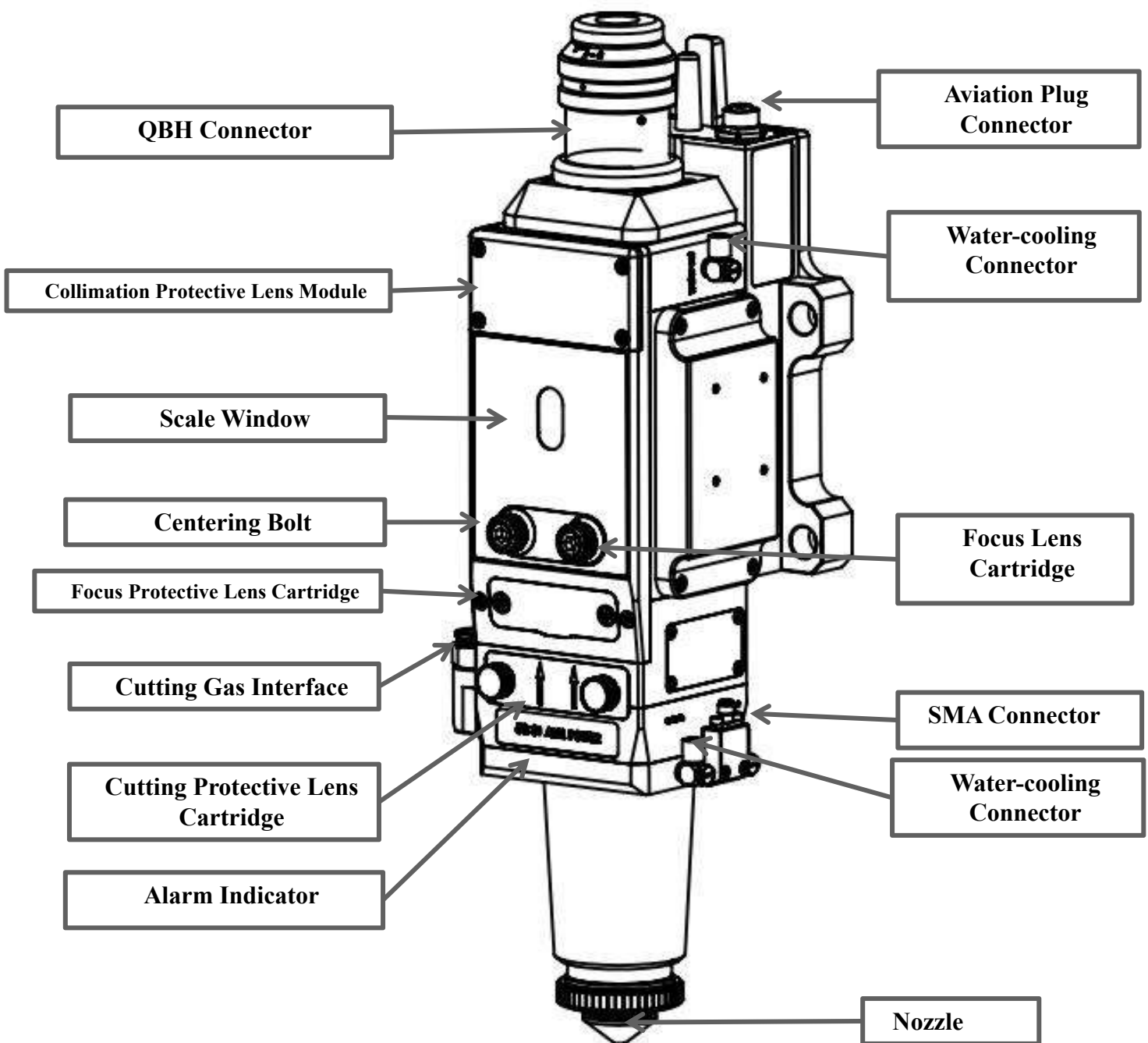


Figure 1.0

## 2.2 Brief Description of Product Parts

1. Water cooling connector: Mainly cool QBH and cutting head.
2. Aviation plug connector: Power lines for motors, encoder lines, and outputs for limit signals.
3. Collimation protective lens module: Prevent the dust from entering into the cutting head for protecting the collimation lenses when plugging or unplugging the fiber splice.
4. Scale window: Observation window for cutting focus, for reference only.
5. Focus lens cartridge: Plugging and unplugging window for replacing and maintaining the focus lens, and center the beam spot.
6. Focus protective lens cartridge: Protect the focus lens for fast replacement.
7. Cutting protective lens cartridge: Seal the cutting gas and protect the focus lens.
8. Cutting gas inlet:  $\phi 10$  mm gas pipe connector for inputting cutting gas, as shown in Figure 1.1.
9. Cooling gas inlet:  $\phi 6$  mm gas connector for cooling the nozzles and ceramic ring during cutting, as shown in Figure 1.1.
10. Centering bolt: Adjust the center so that the light beams pass through the center of the nozzle.
11. SMA connector: Connect to the connector of the amplifier line.
12. Alarm indicator: Show green in normal working state and red in case of alarm.

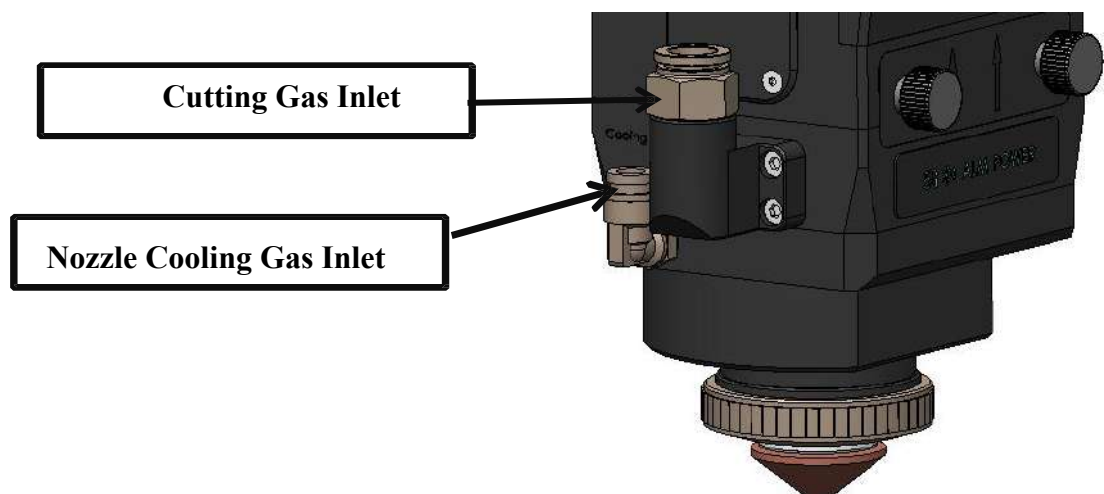


Figure 1.1

## 2.3 Brief Description of Product Parts (Lens Size)

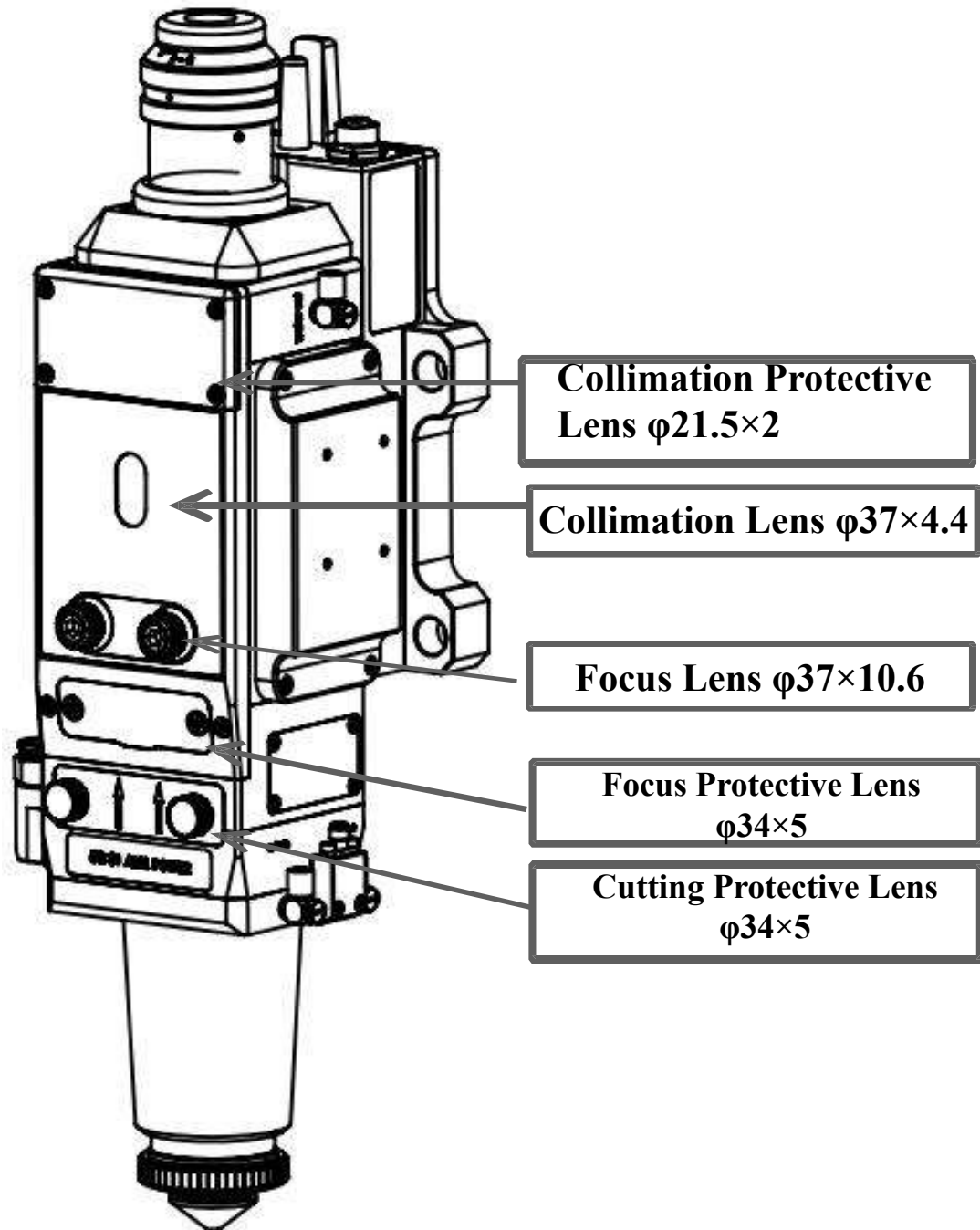


Figure 1.2

# Chapter 3 Product Installation

## 3.1 Cutting Head Installation

Dimension drawing of the cutting head (Collimation F100/Focus F200) as shown in Figure 1.3:

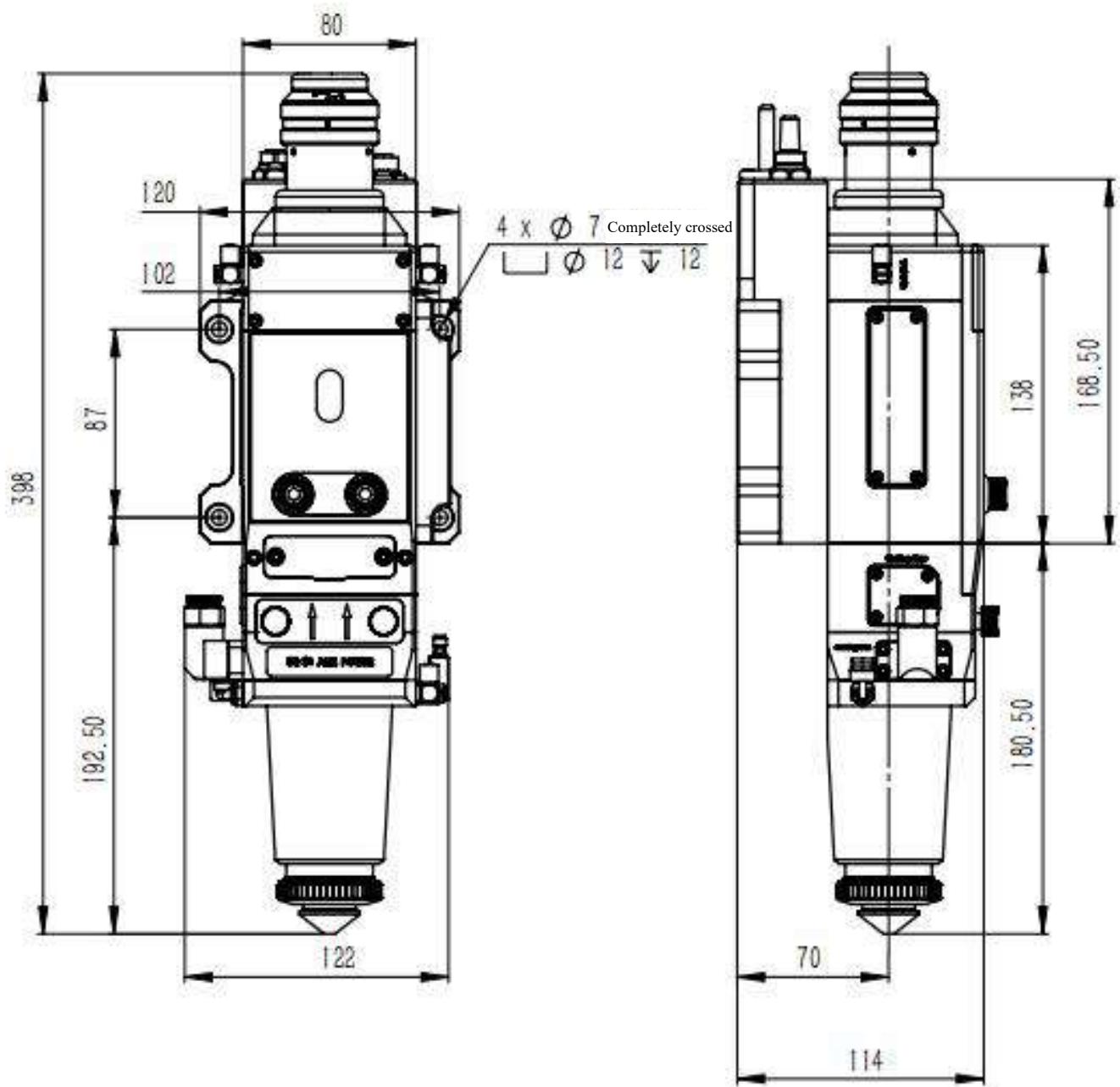


Figure 1.3

## 3.2 Cutting Head Connection

### 3.2.1 Water Cooling Pipeline

- ① Used for cooling the QBH and cutting head, with one inlet and one outlet cooling pipeline, as shown in Figure 1.4:

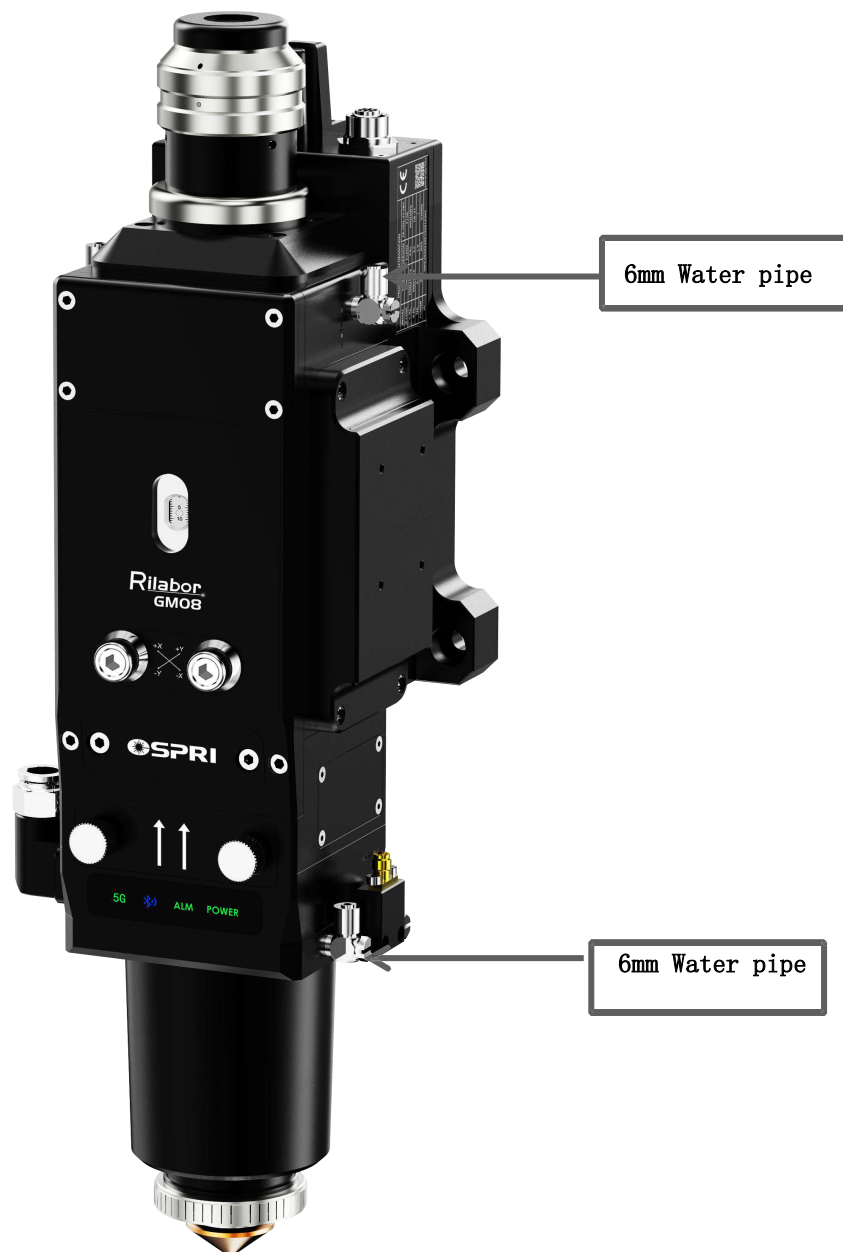


Figure 1.4

### 3.2.2 Gas Connection

- ① The inlet is connected to a 10mm gas pipe, as shown in Figure 1.5, for docking cutting gas, input pressure  $< 3.0\text{Mpa}$ .

Common gas: Oxygen, nitrogen and compressed air.

- ② The inlet is connected to a 6mm gas pipe, as shown in Figure 1.5, for docking cooling gas, input pressure  $< 0.6\text{Mpa}$ .

Common Gas: Compressed air.

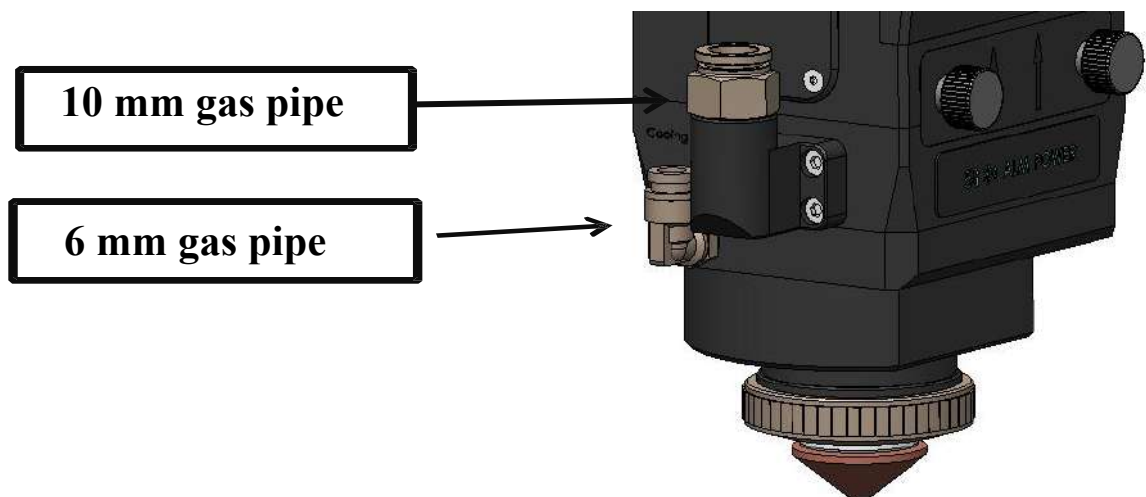
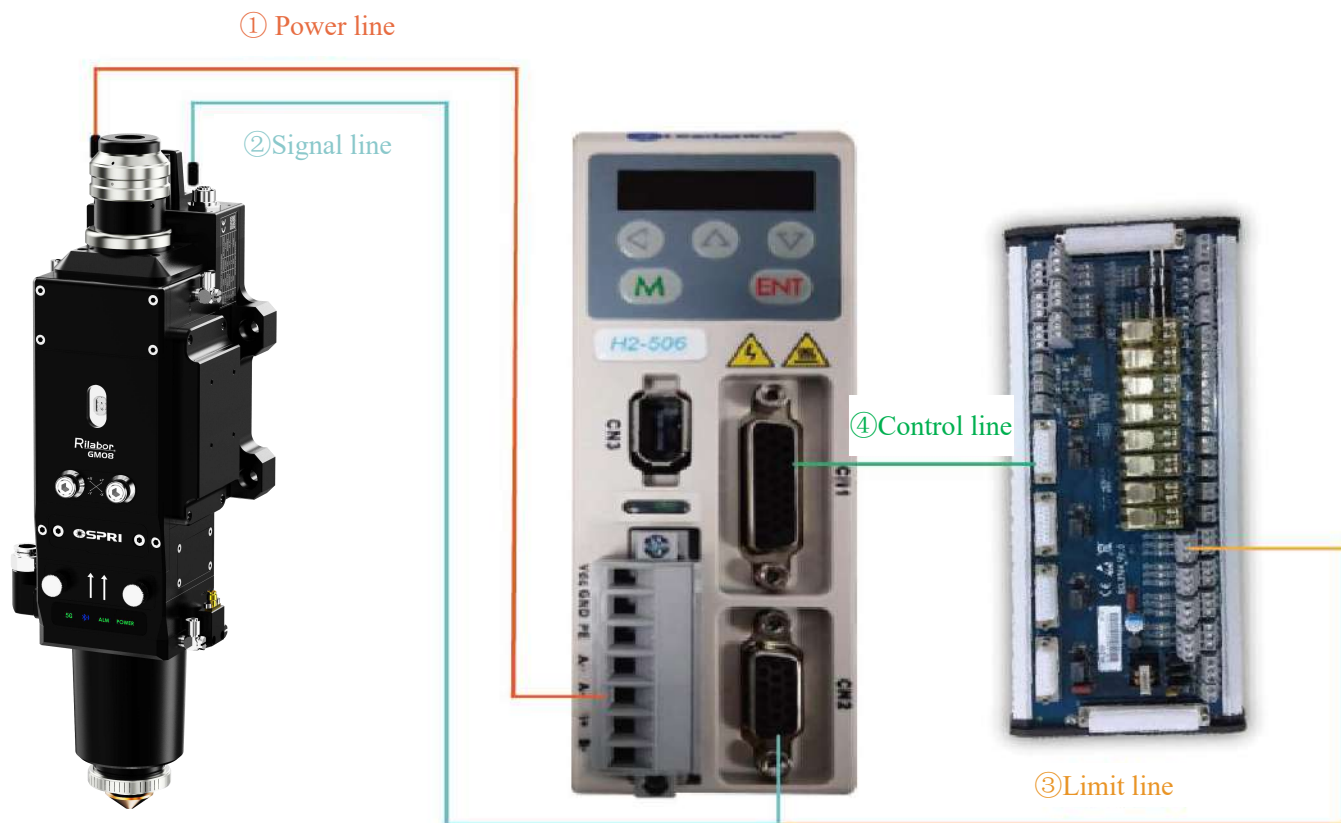


Figure 1.5

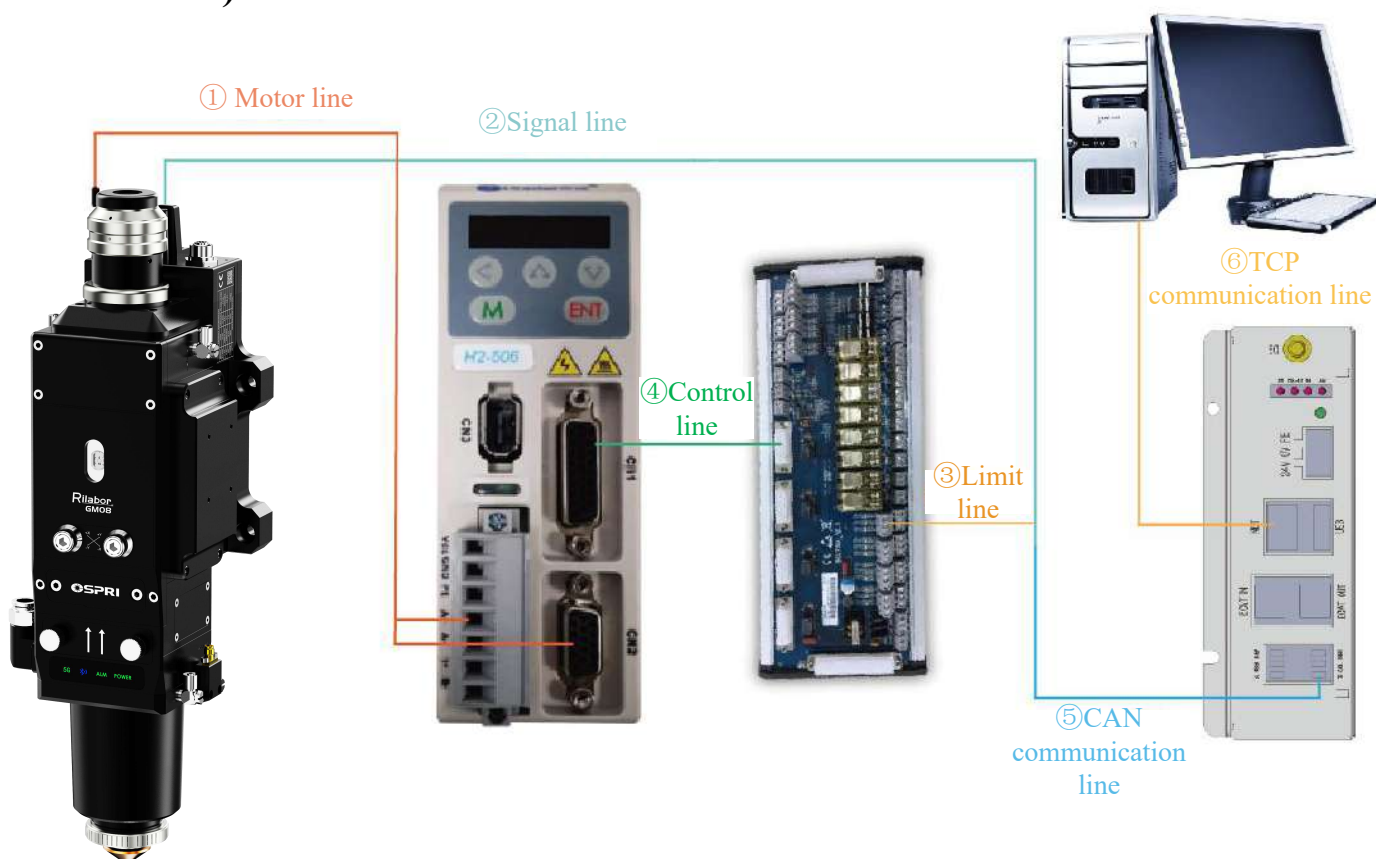
Note: The gas entering auxiliary pipelines must be filtered and dried; otherwise, it will contaminate the protective lens, leading to their damage.



### 3.3 Wiring of the Cutting Head to the Cypcut Pulse System (Without EtherCAT Bus Module)



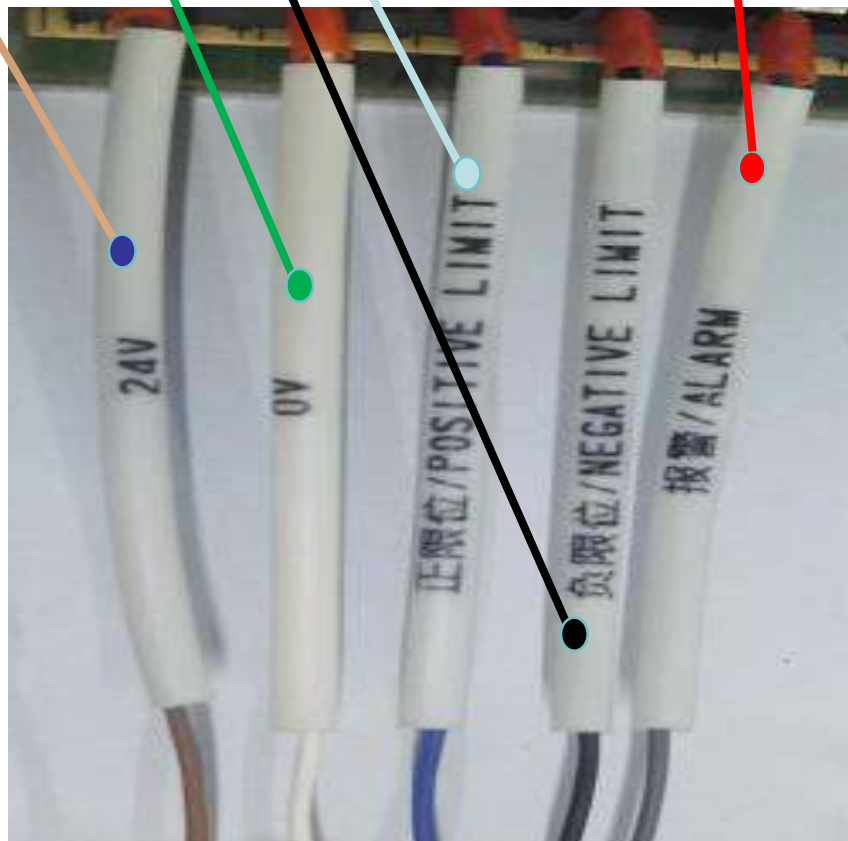
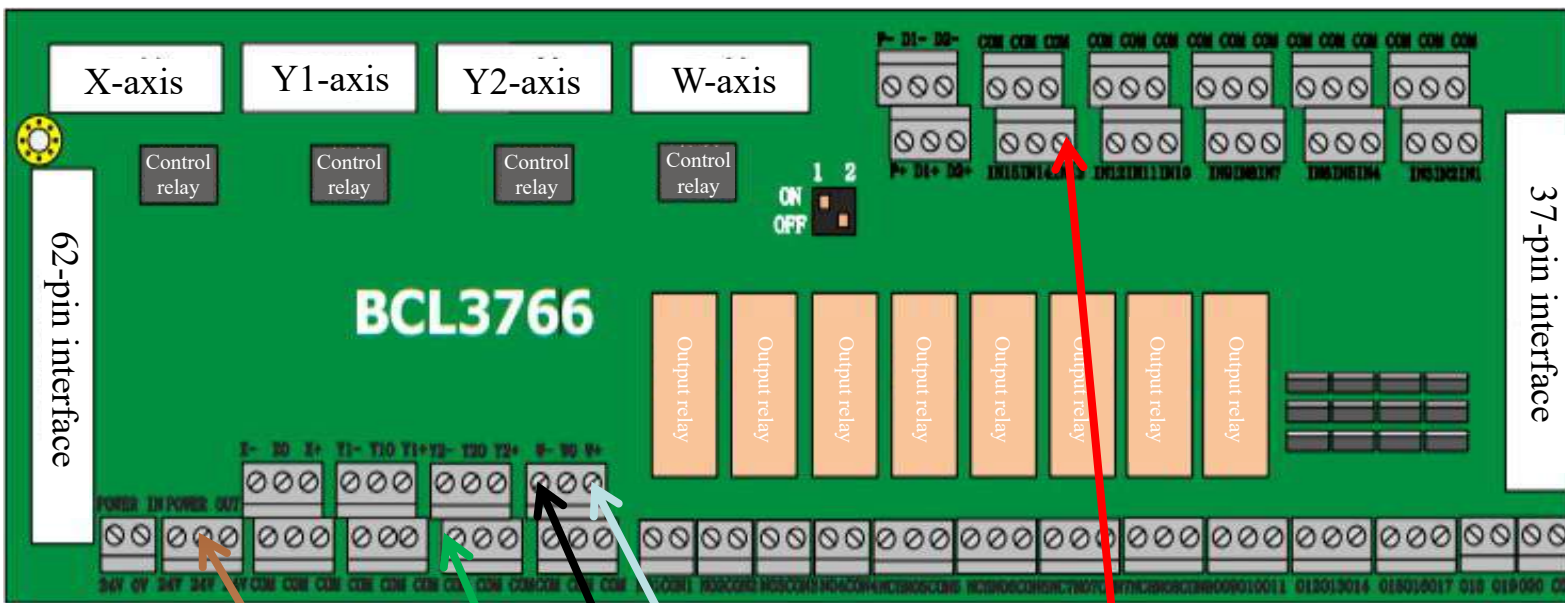
### 3.4 Wiring of the Cutting Head to the Cypcut Pulse System (With EtherCAT Bus Module)





## 3.5 FSCUT2000C System Wiring (Example: BCL3766)

### 3.5.1 PCB Board I/O Wiring

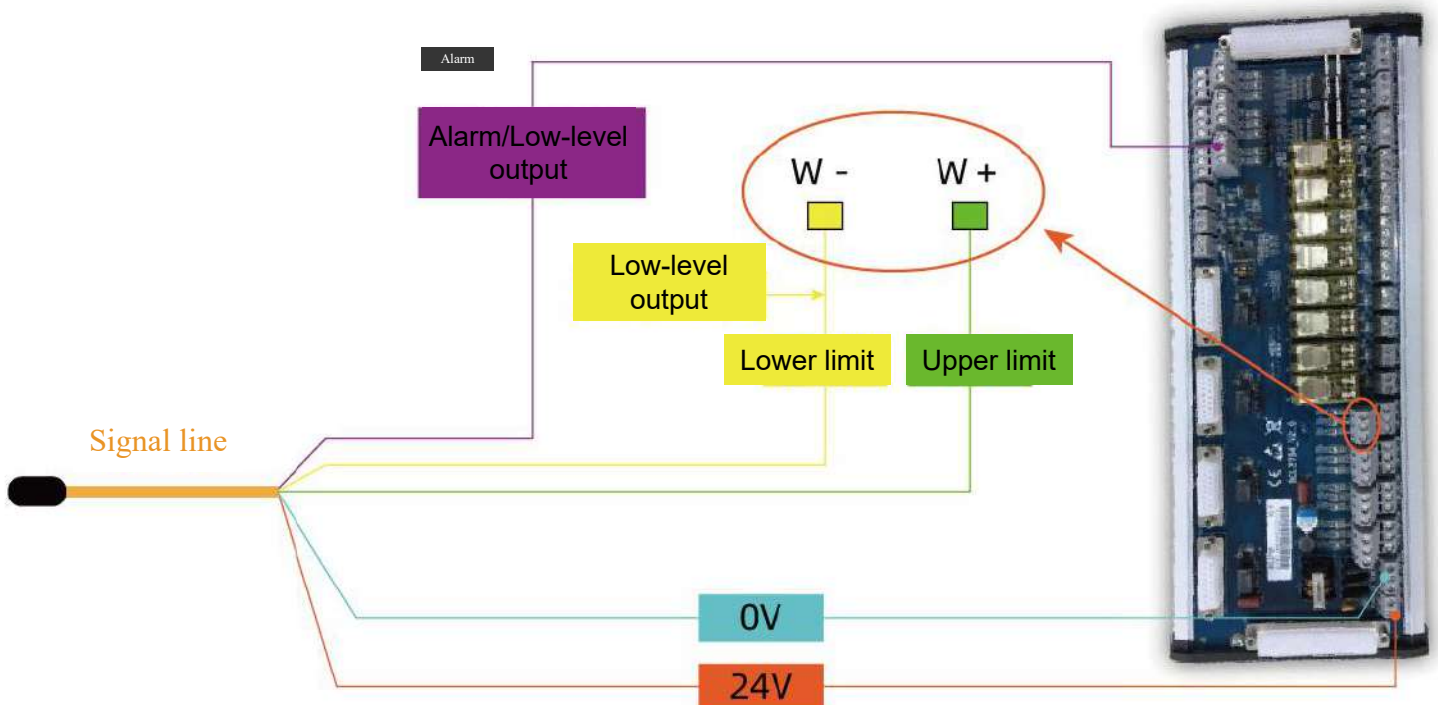


Limit and alarm signals are both NPN outputs; the alarm signal must be connected to the system. If damage to the cutting head occurs due to an unconnected alarm signal, the customer is fully responsible.

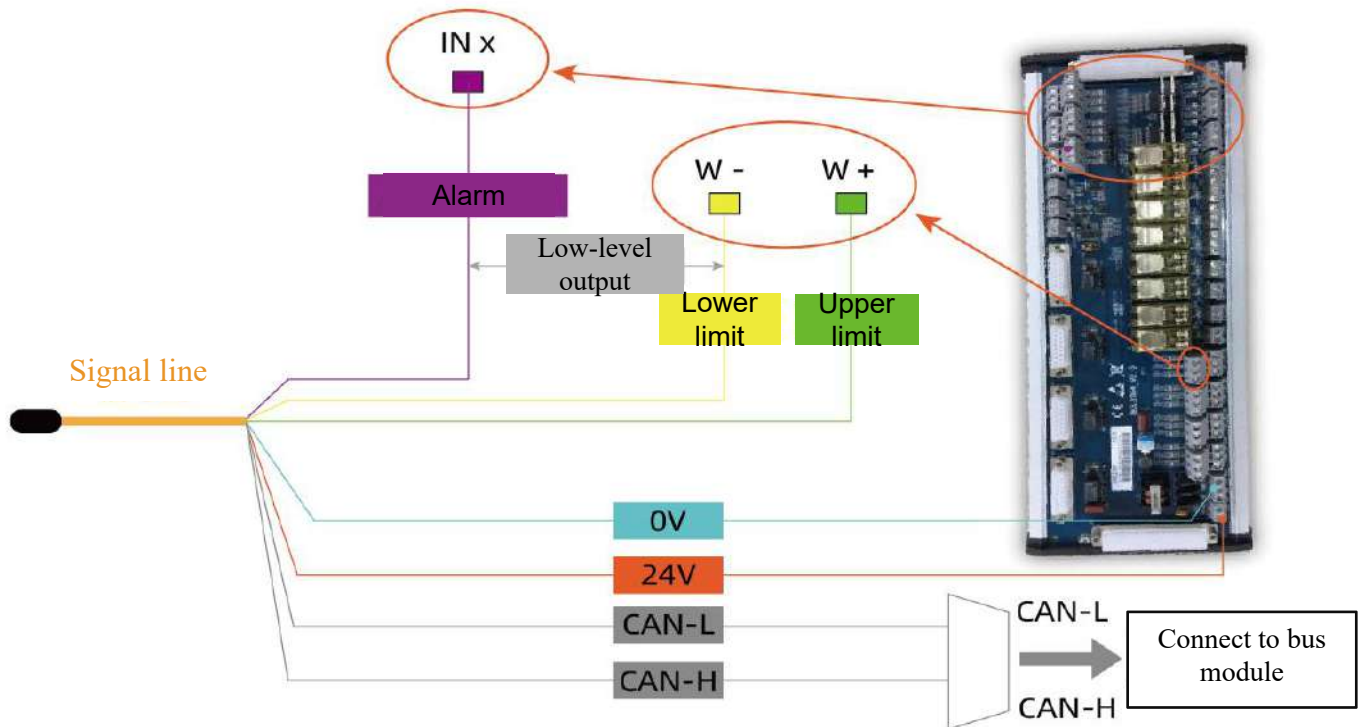
### 3.5.2 Servo Driver Power Wiring (DC24V)



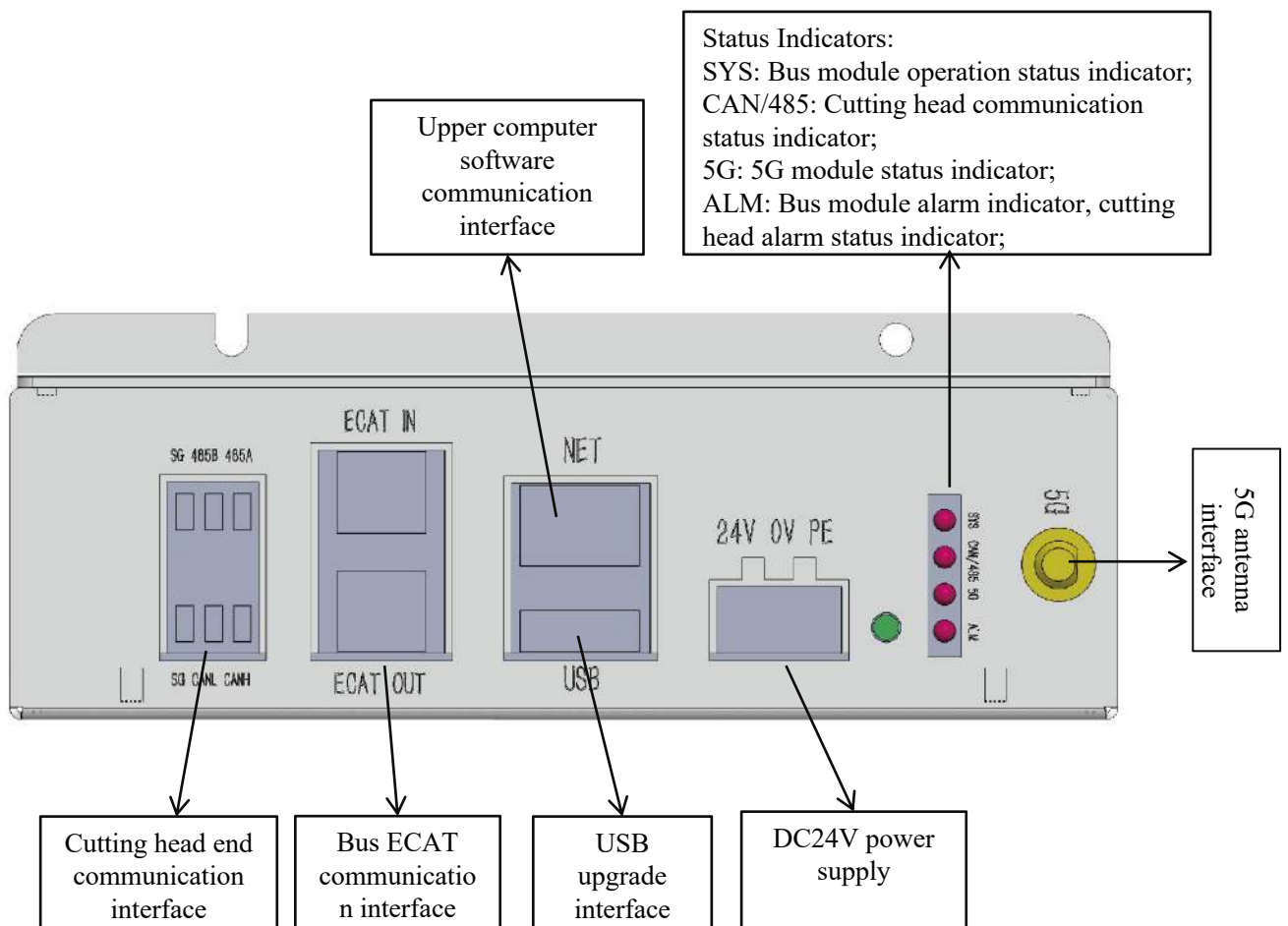
### 3.5.3 Signal Line Wiring (Without EtherCAT Bus Module)



### 3.5.4 Signal Line Wiring (With EtherCAT Bus Module)



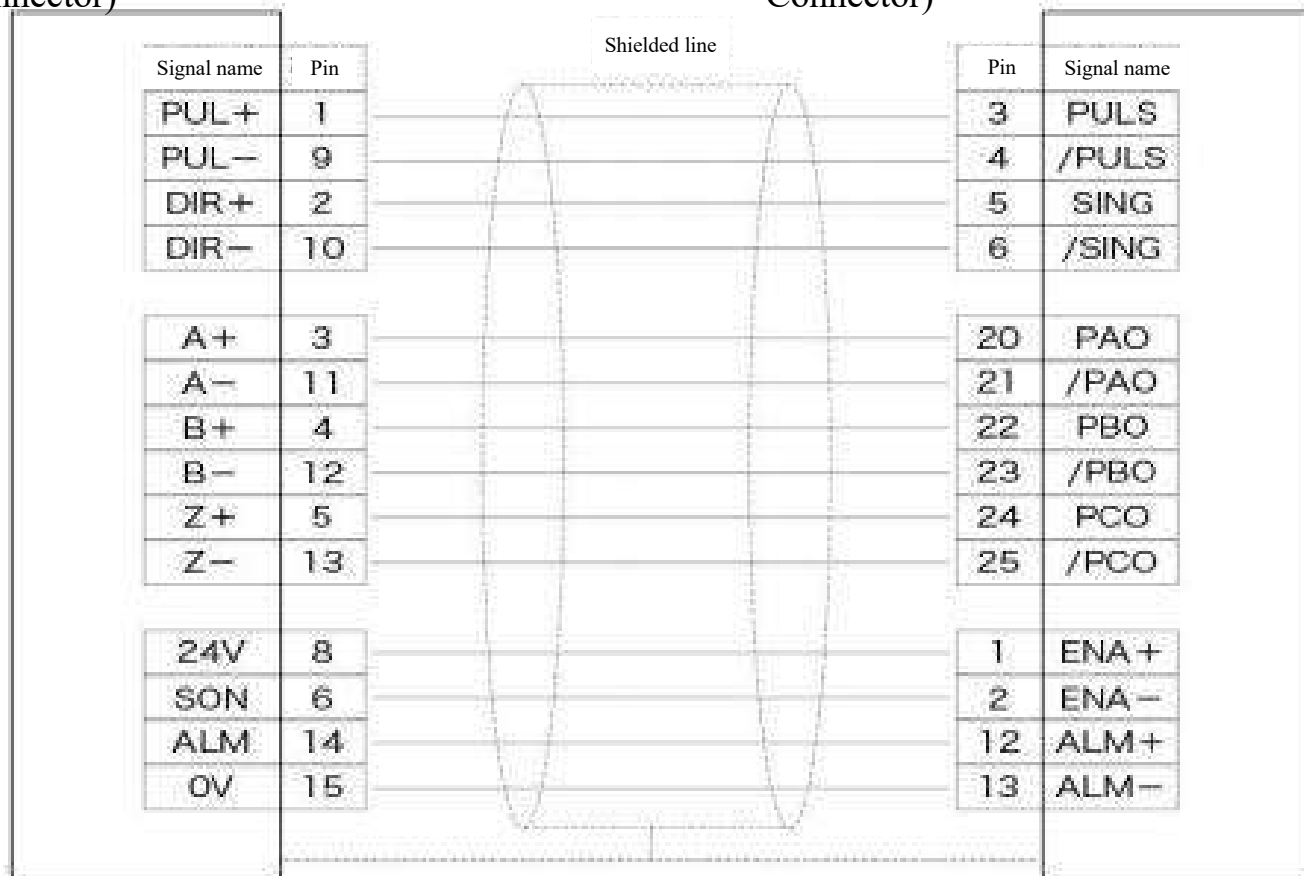
### 3.5.5 Bus Module Wiring



### 3.5.6 PCB Board Axis Port Wiring

Cypcut System End (DB15 Pin Double Row Male Connector)

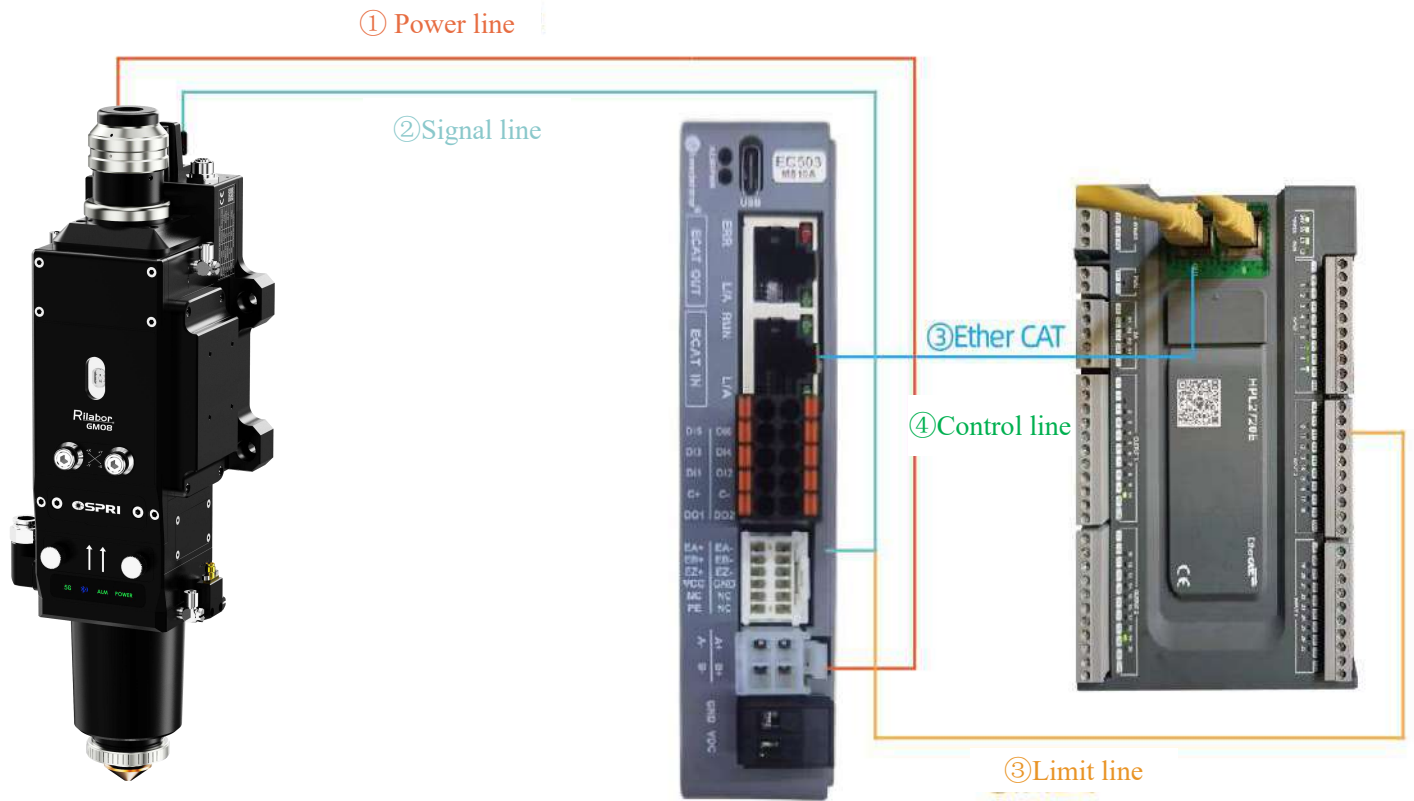
Servo End (DB26 Pin Triple Row Male Connector)



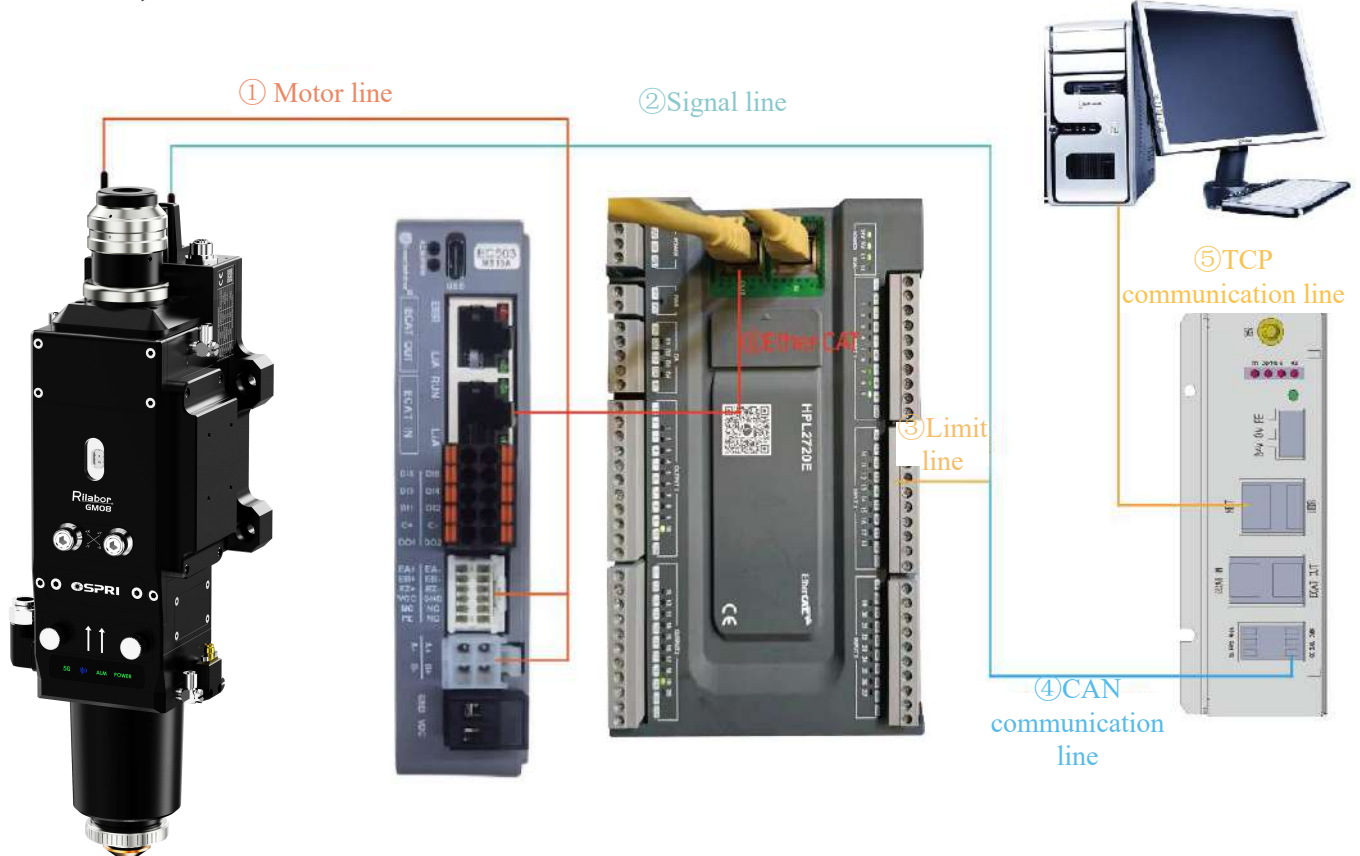
### 3.5.7 Driver Parameters

| Parameter Index | Parameter Value | Parameter Content     |
|-----------------|-----------------|-----------------------|
| PR007           | 10000           | Pulses per revolution |
| PR008           | 4000            | Resolution            |
| PR015           | 0               | Enable level          |
| PR019           | 0               | Motor direction       |
| PR020           | 1               | Bandwidth selection   |
| PR042           | 6               | Motor type            |

### 3.6 Wiring of the Cutting Head to the Cypcut Bus System (Without EtherCAT Bus Module)



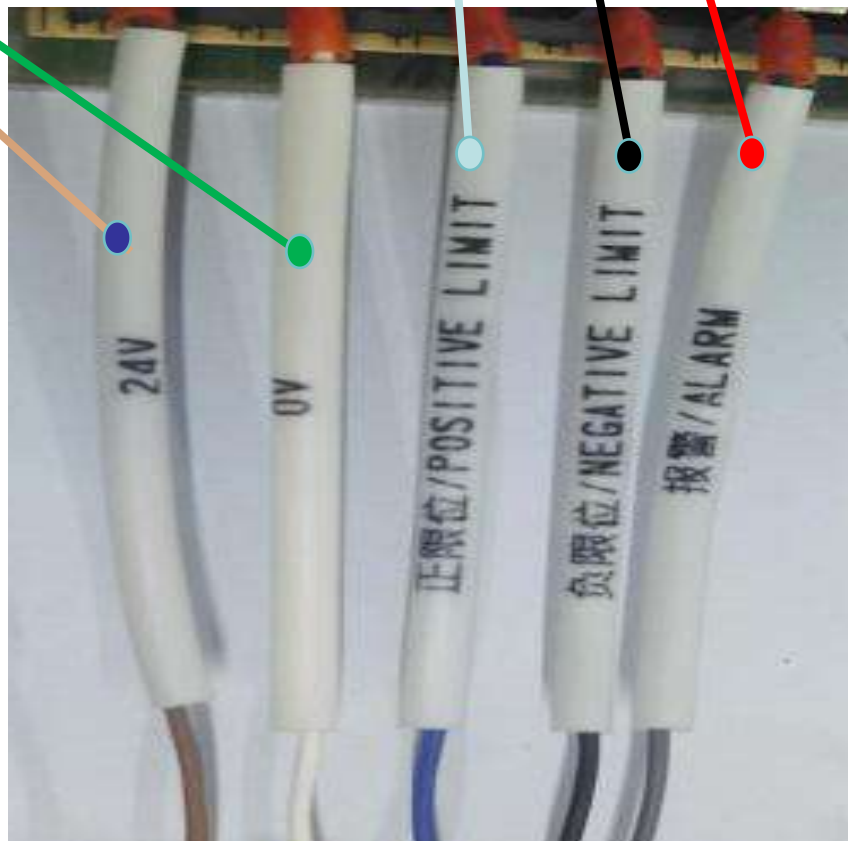
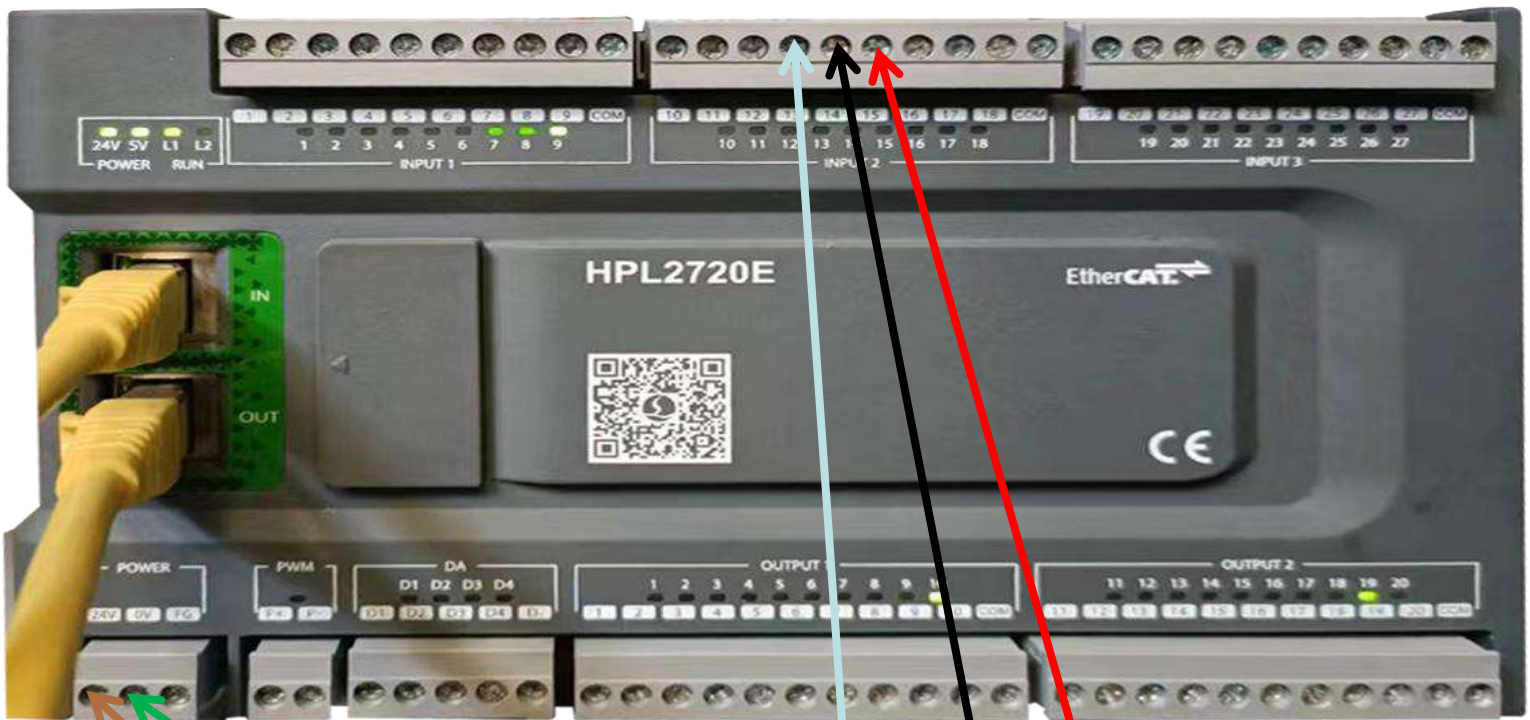
### 3.7 Wiring of the Cutting Head to the Cypcut Bus System (With EtherCAT Bus Module)





### 3.8 FSCUT8000 System Wiring (Example: HPL2720E)

#### 3.8.1 PCB Board I/O Wiring (Example: HPL2720E)

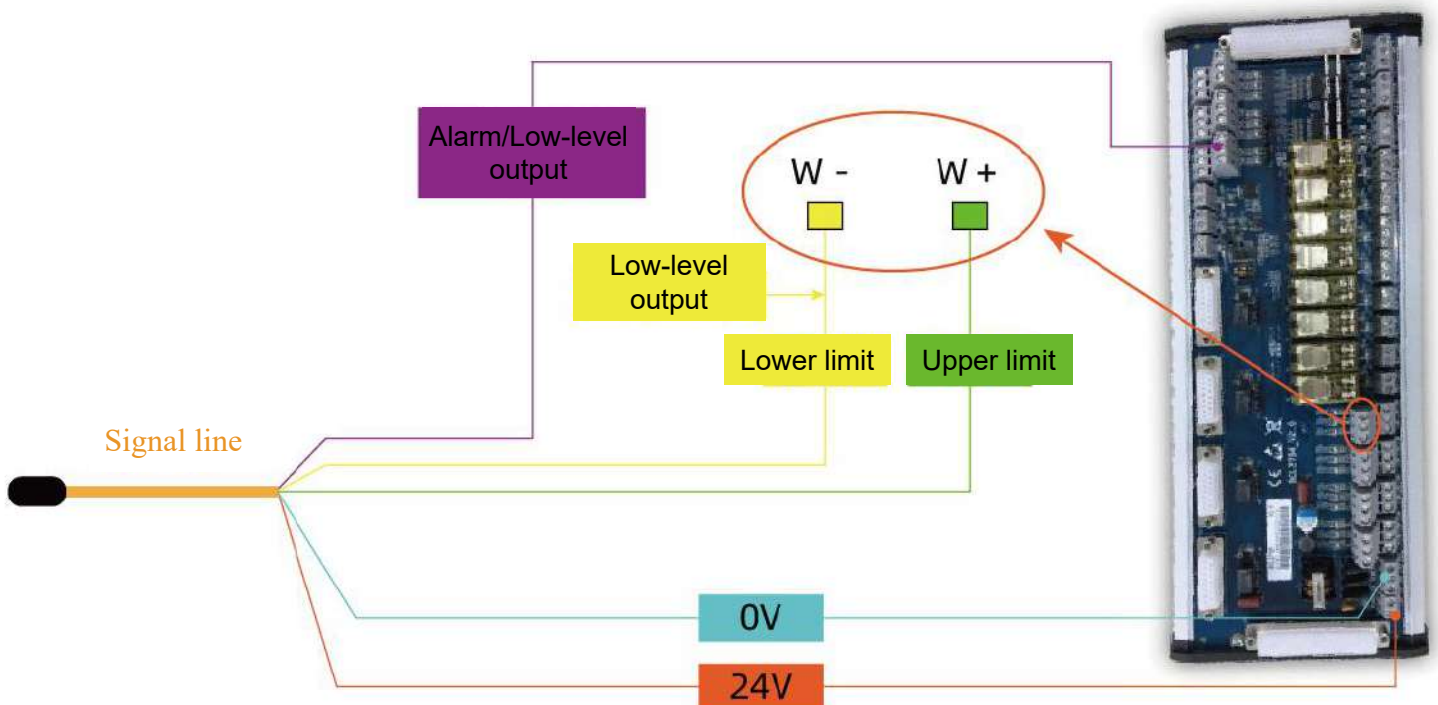


Limit and alarm signals are both NPN outputs; the alarm signal must be connected to the system. If damage to the cutting head occurs due to an unconnected alarm signal, the customer is fully responsible.

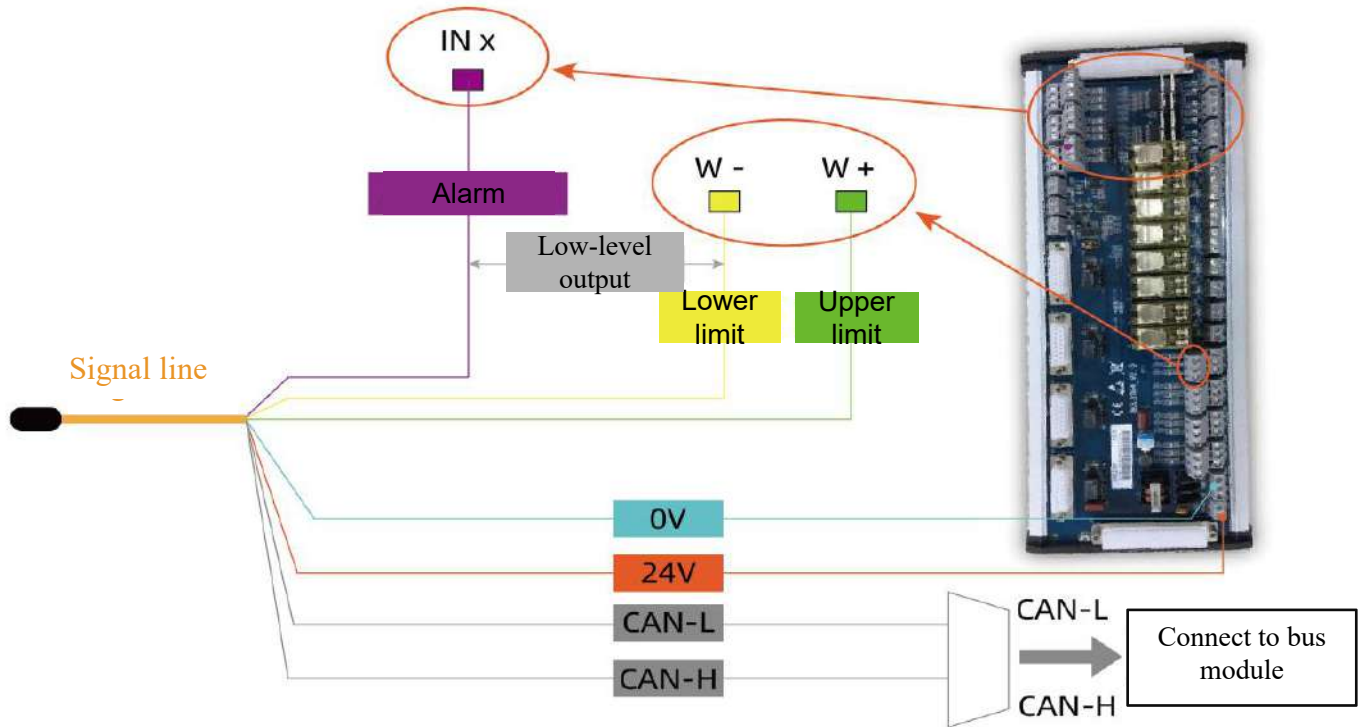
### 3.8.2 Servo Driver Power Wiring (Power Connection: DC24V)



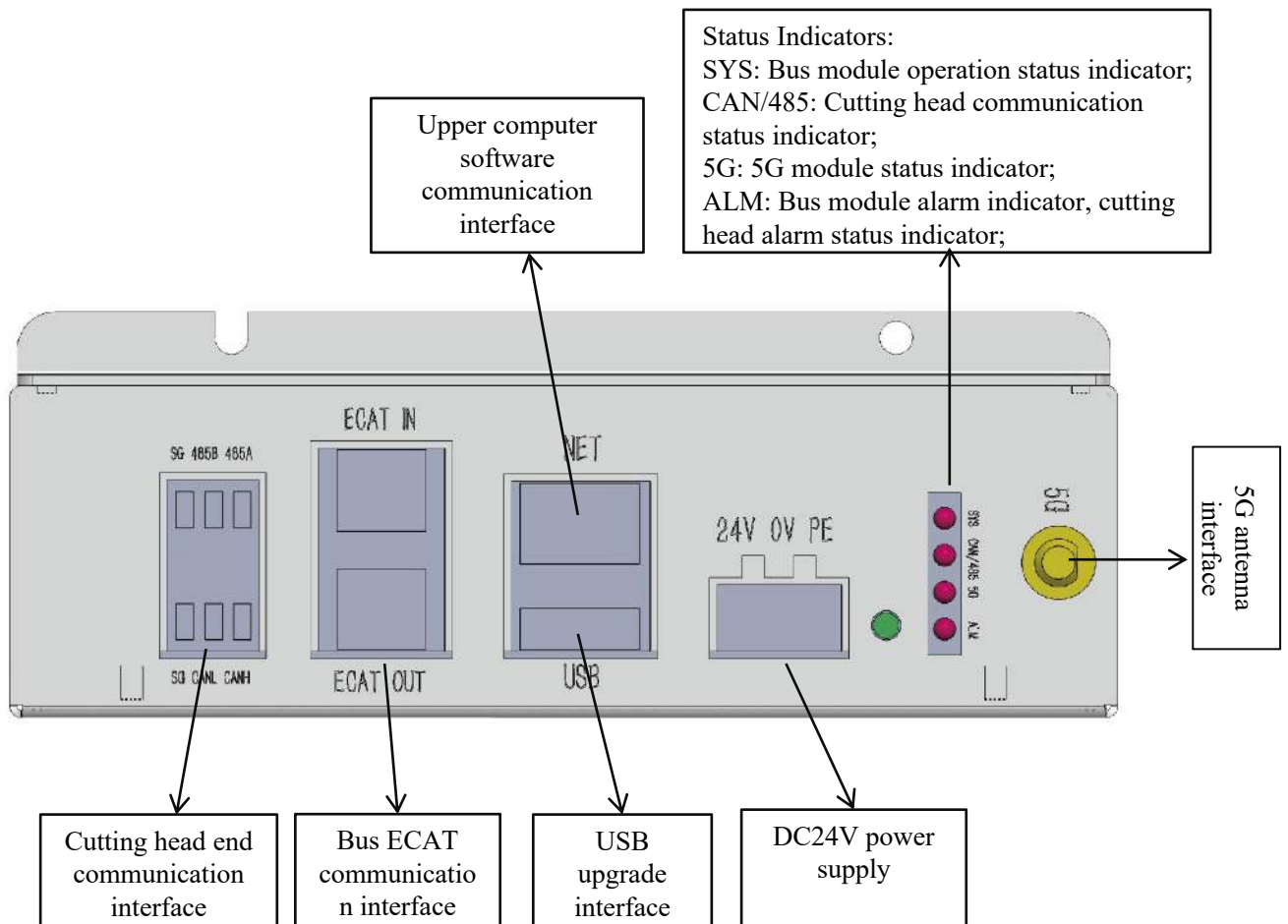
### 3.8.3 Signal Line Wiring (Without EtherCAT Bus Module)



### 3.8.4 Signal Line Wiring (With EtherCAT Bus Module)



### 3.8.5 Bus Module Wiring



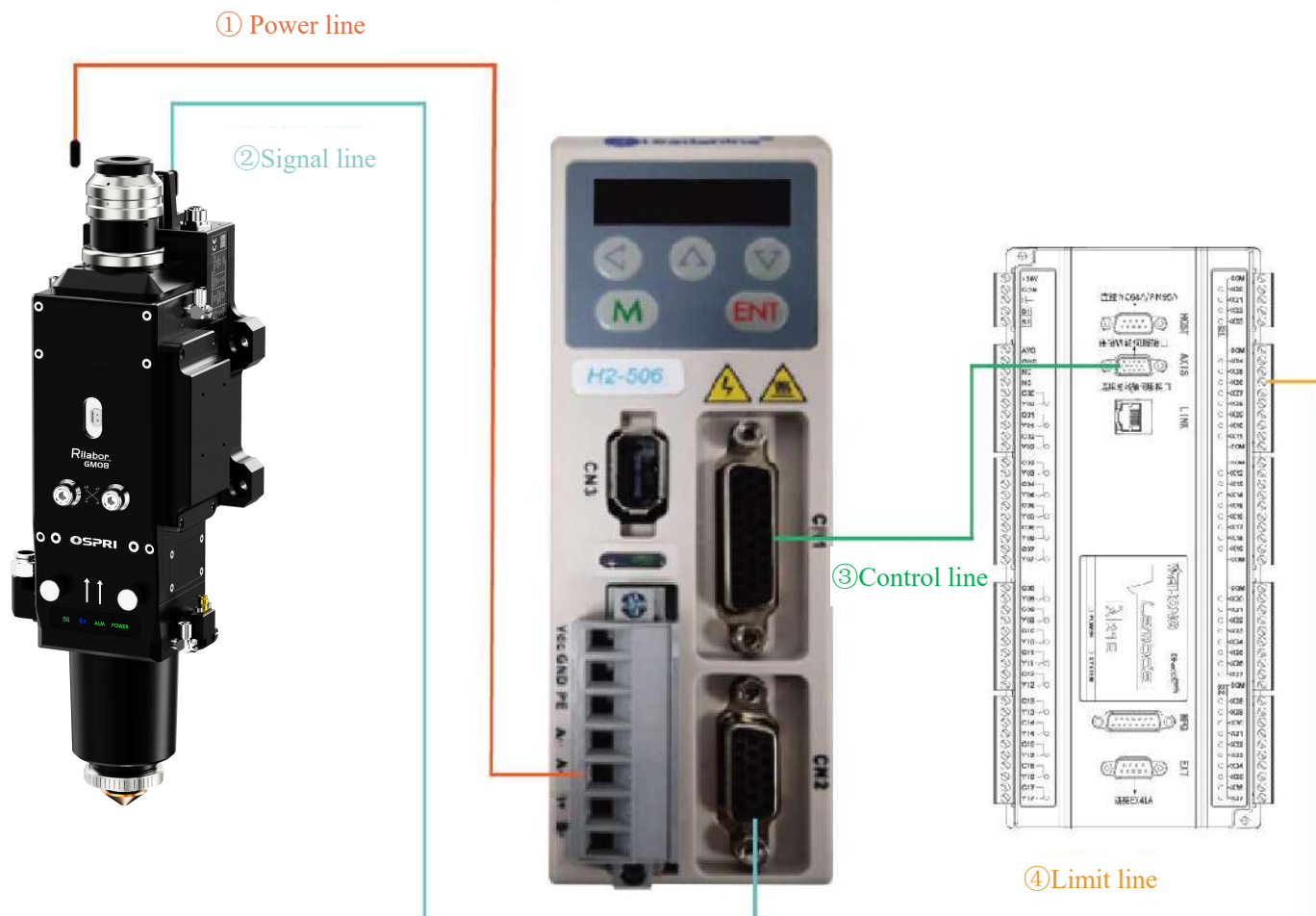


### 3.8.6 Driver Parameters

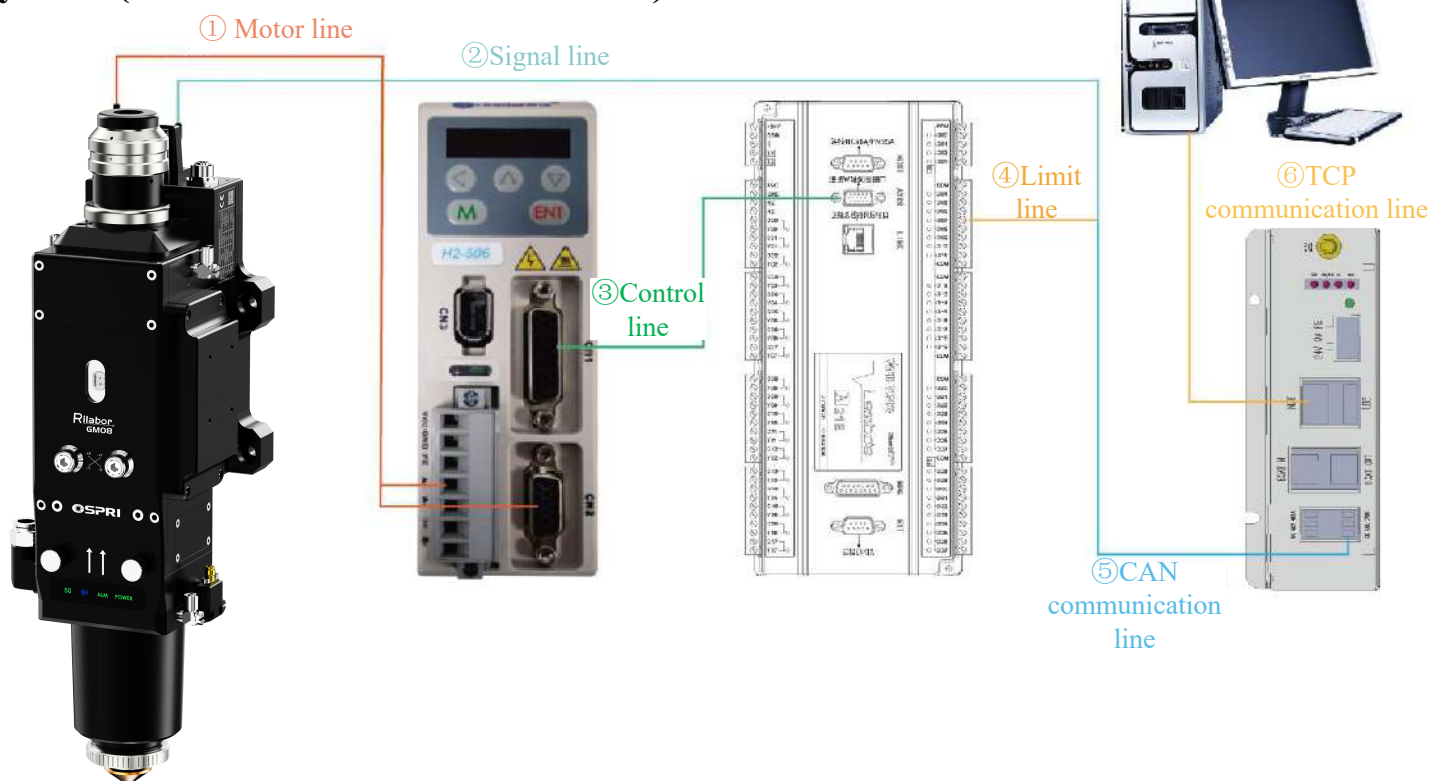
| Parameter Index | Parameter Value | Parameter Content      |
|-----------------|-----------------|------------------------|
| PA000           | 10000           | Pulses per revolution  |
| PA003           | 1               | Rotation direction     |
| PA411           | 81              | Servo alarm logic (NC) |
| PR438           | 0               | Slave source           |

Note: Electronic gear ratio numerator: 8192;  
Electronic gear ratio denominator: 10000;  
Encoder bits: 13;

### 3.9 Wiring of the Cutting Head to the Weihong Non-Bus System (Without EtherCAT Bus Module)

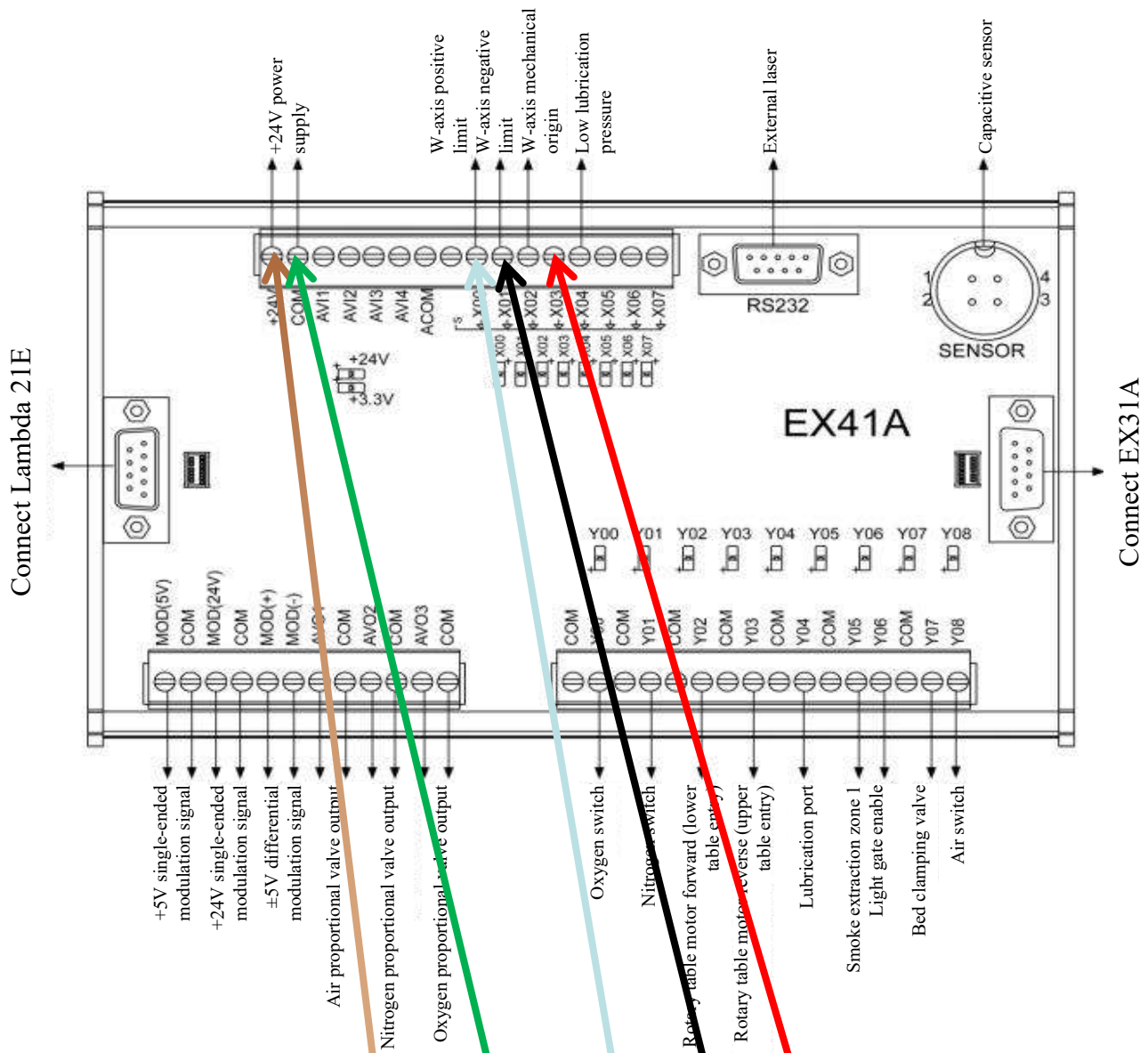


### 4.0 Wiring of the Cutting Head to the Weihong Non-Bus System (With EtherCAT Bus Module)



## 4.1 LS6000M Weihong Non-Bus System Wiring (Example: EX41A)

### 4.1.1 PCB Board Wiring

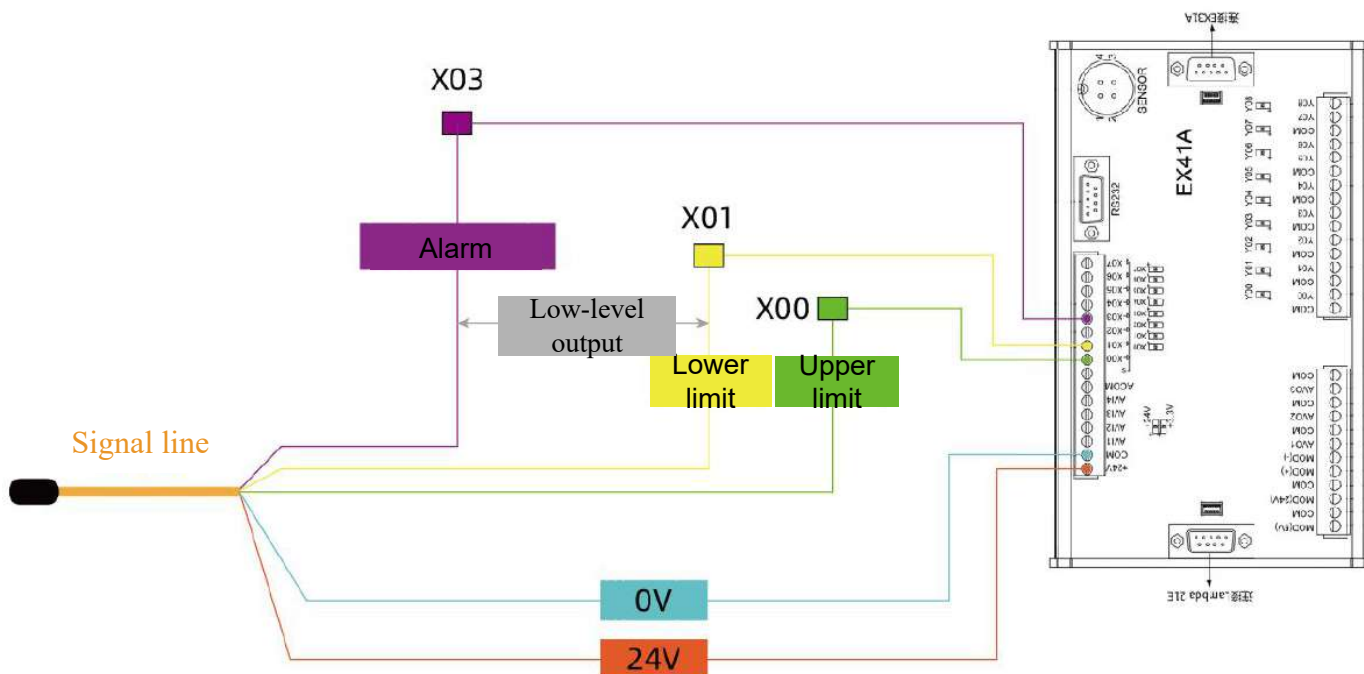


Limit and alarm signals are both NPN outputs; the alarm signal must be connected to the system. If damage to the cutting head occurs due to an unconnected alarm signal, the customer is fully responsible.

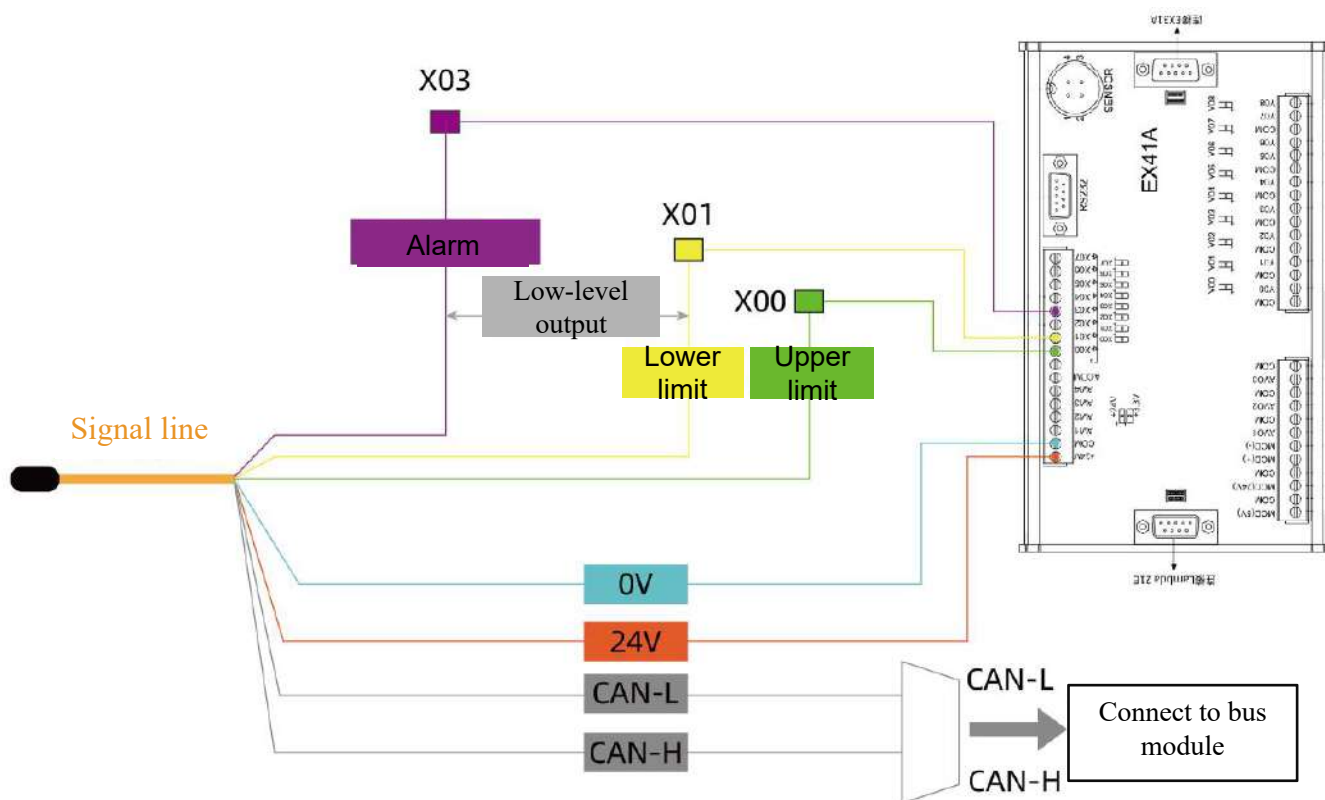
#### 4.1.2 Servo Driver Power Wiring (DC24V)



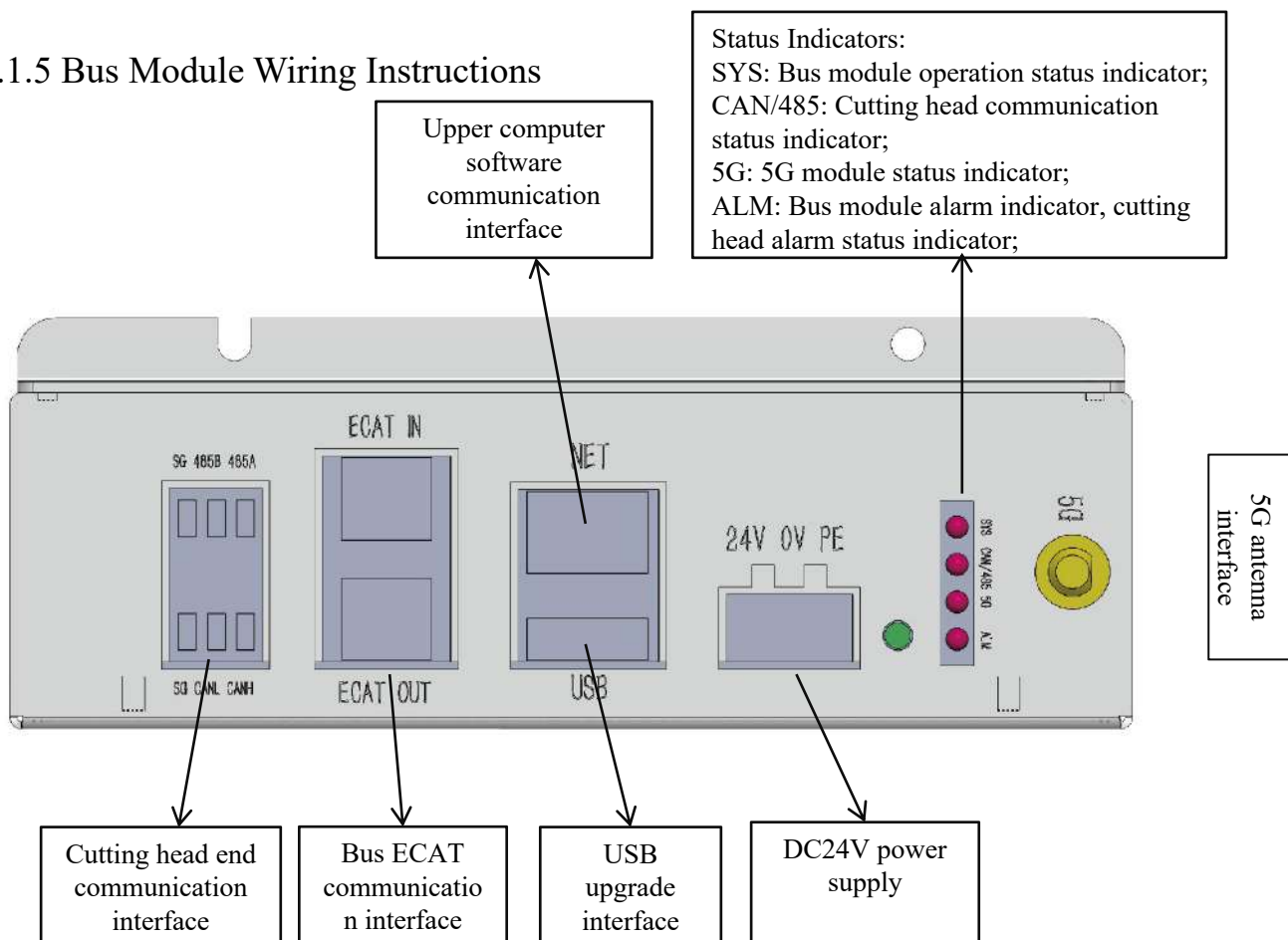
#### 4.1.3 Signal Line Wiring (Without EtherCAT Bus Module)



#### 4.1.4 Signal Line Wiring (With EtherCAT Bus Module)



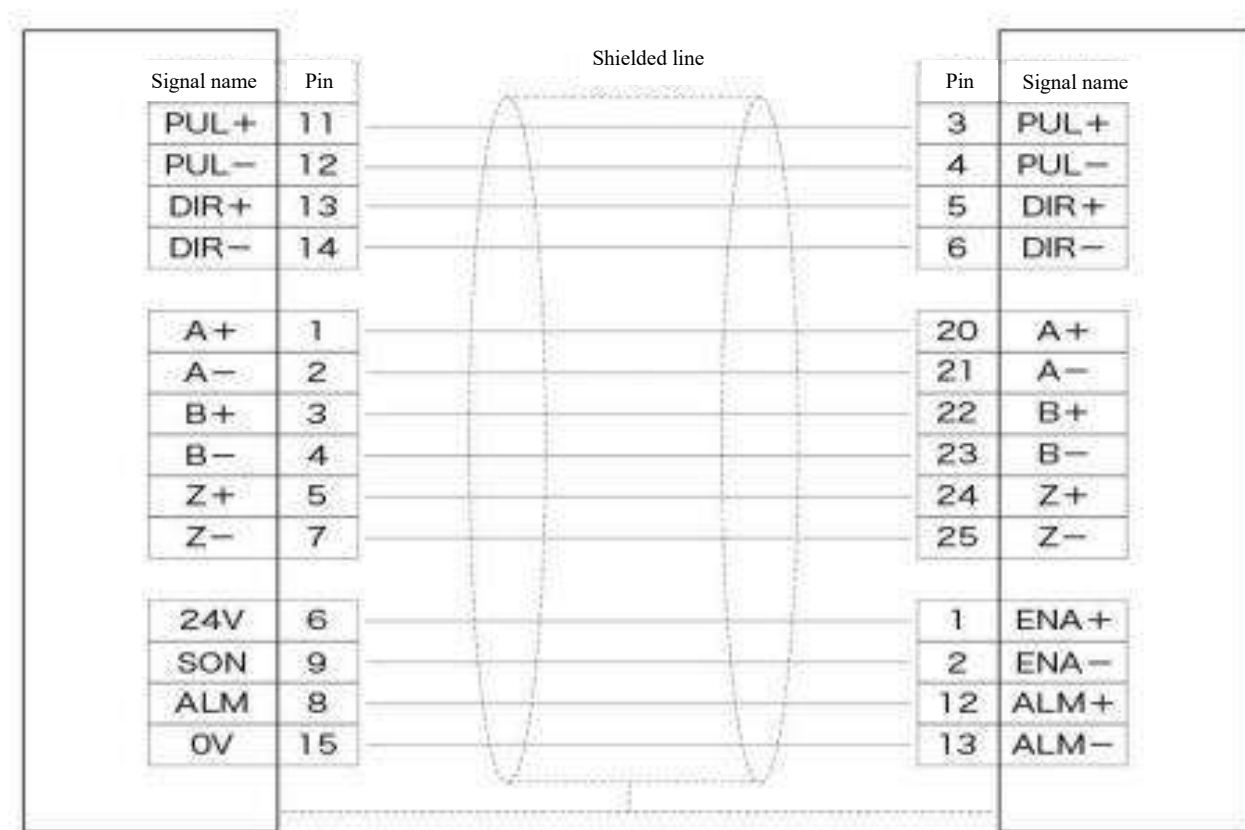
#### 4.1.5 Bus Module Wiring Instructions



#### 4.1.6 PCB Board Axis Port Wiring

Weihong System End (DB15 Pin Triple Row Male Connector)

Servo End (DB26 Pin Triple Row Male Connector)

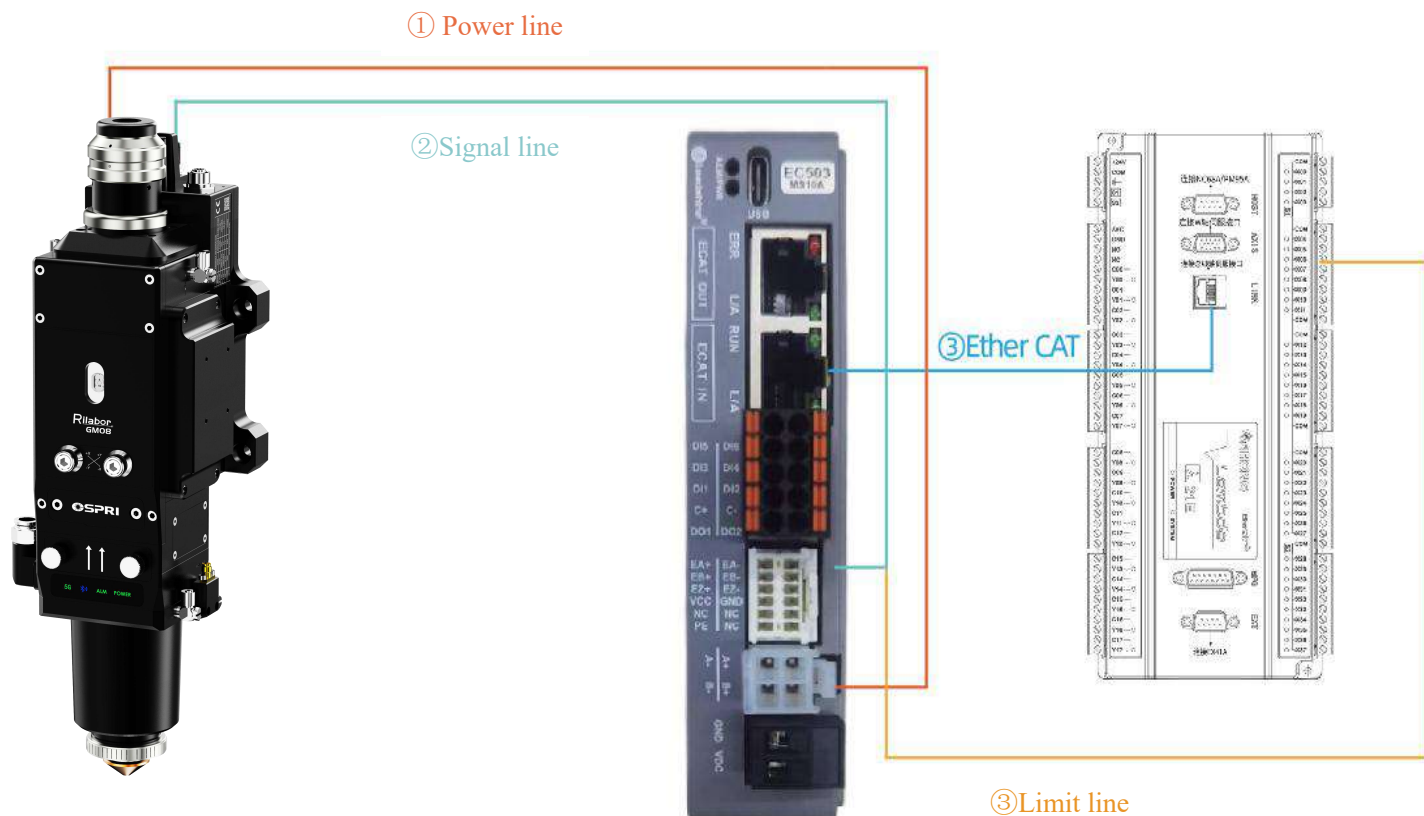


#### 4.1.7 Driver Parameters

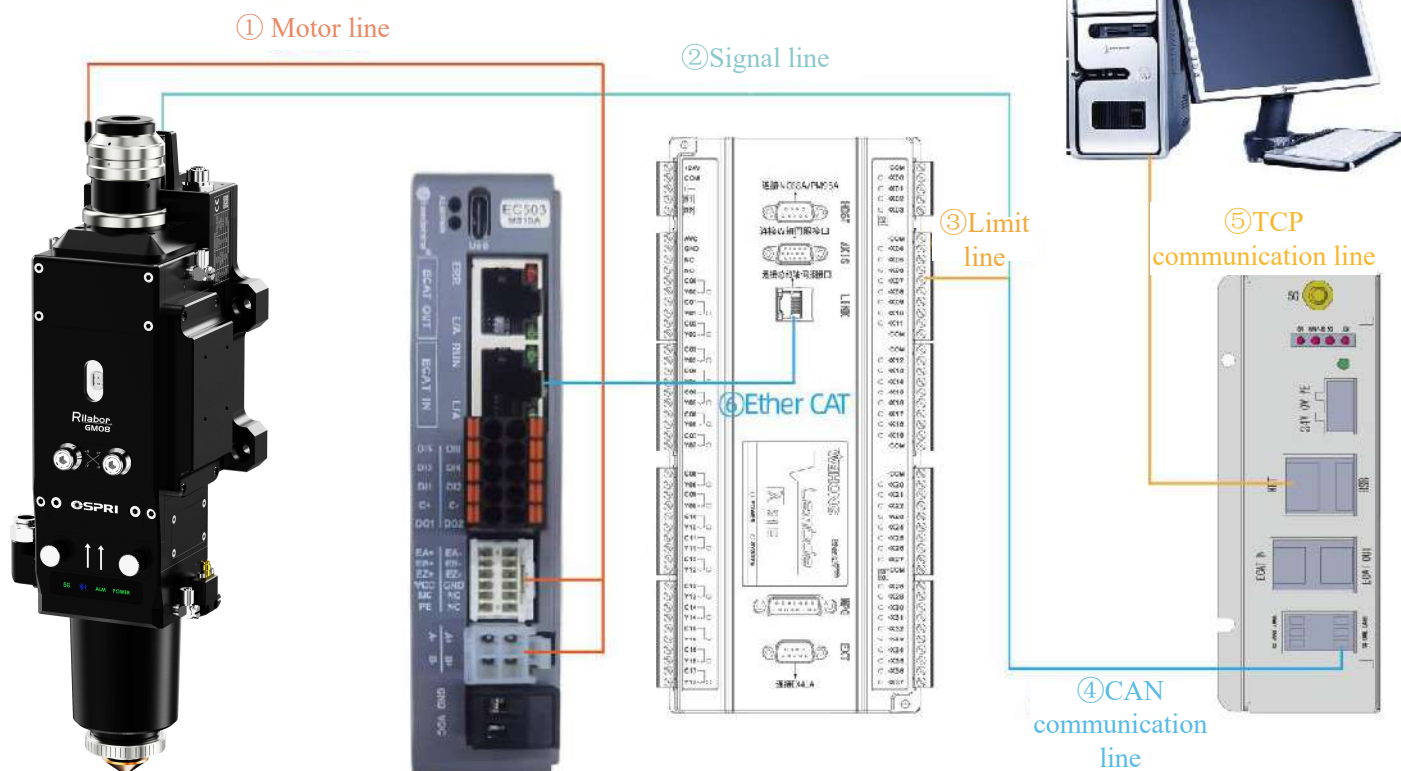
| Parameter Index | Parameter Value | Parameter Content     |
|-----------------|-----------------|-----------------------|
| PR007           | 10000           | Pulses per revolution |
| PR008           | 4000            | Resolution            |
| PR015           | 0               | Enable level          |
| PR019           | 0               | Motor direction       |
| PR020           | 1               | Bandwidth selection   |
| PR042           | 6               | Motor type            |



## 4.2 Wiring of the Cutting Head to the Weihong Bus System (Without EtherCAT Bus Module)

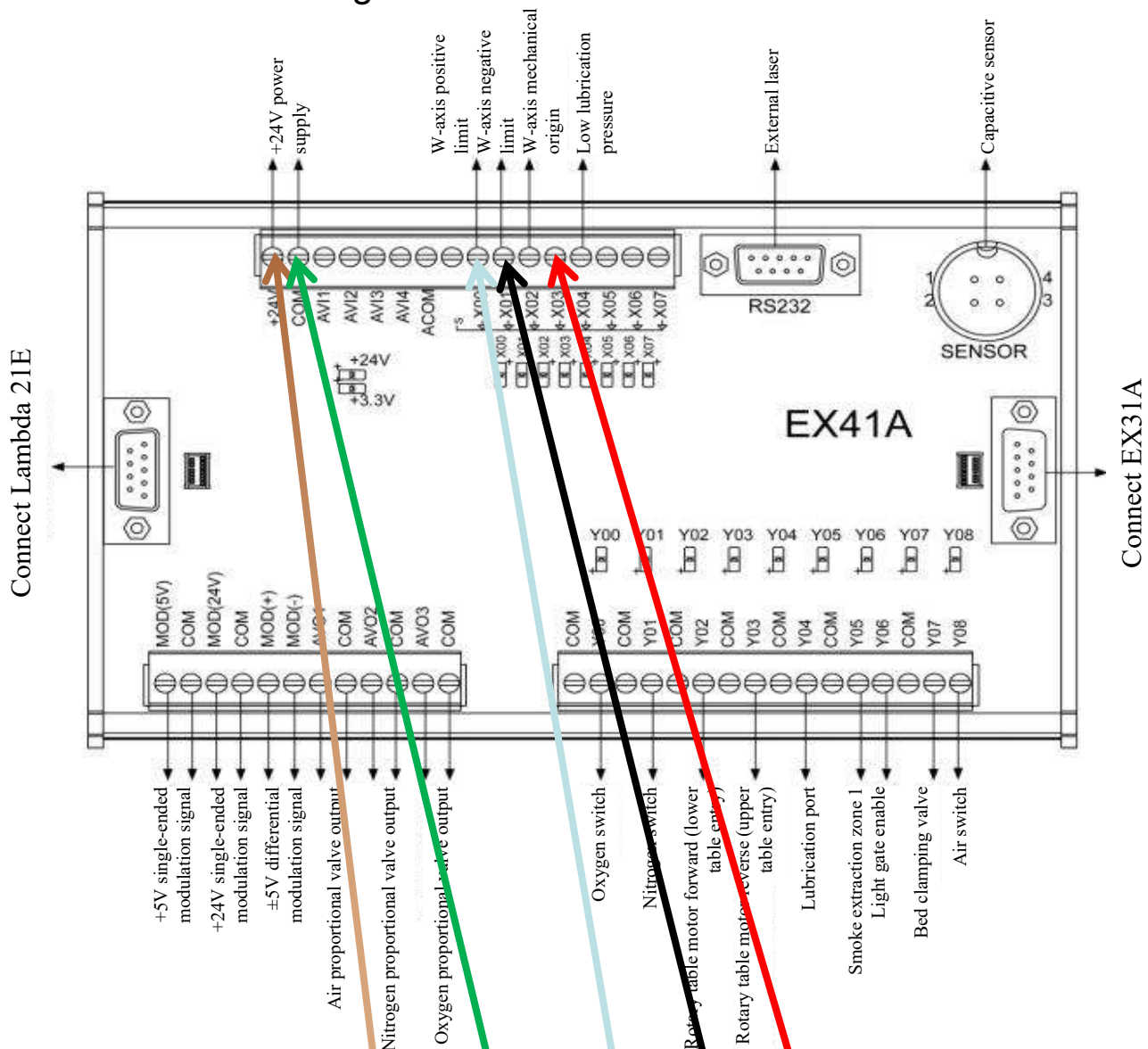


## 4.3 Wiring of the Cutting Head to the Weihong Bus System (With EtherCAT Bus Module)



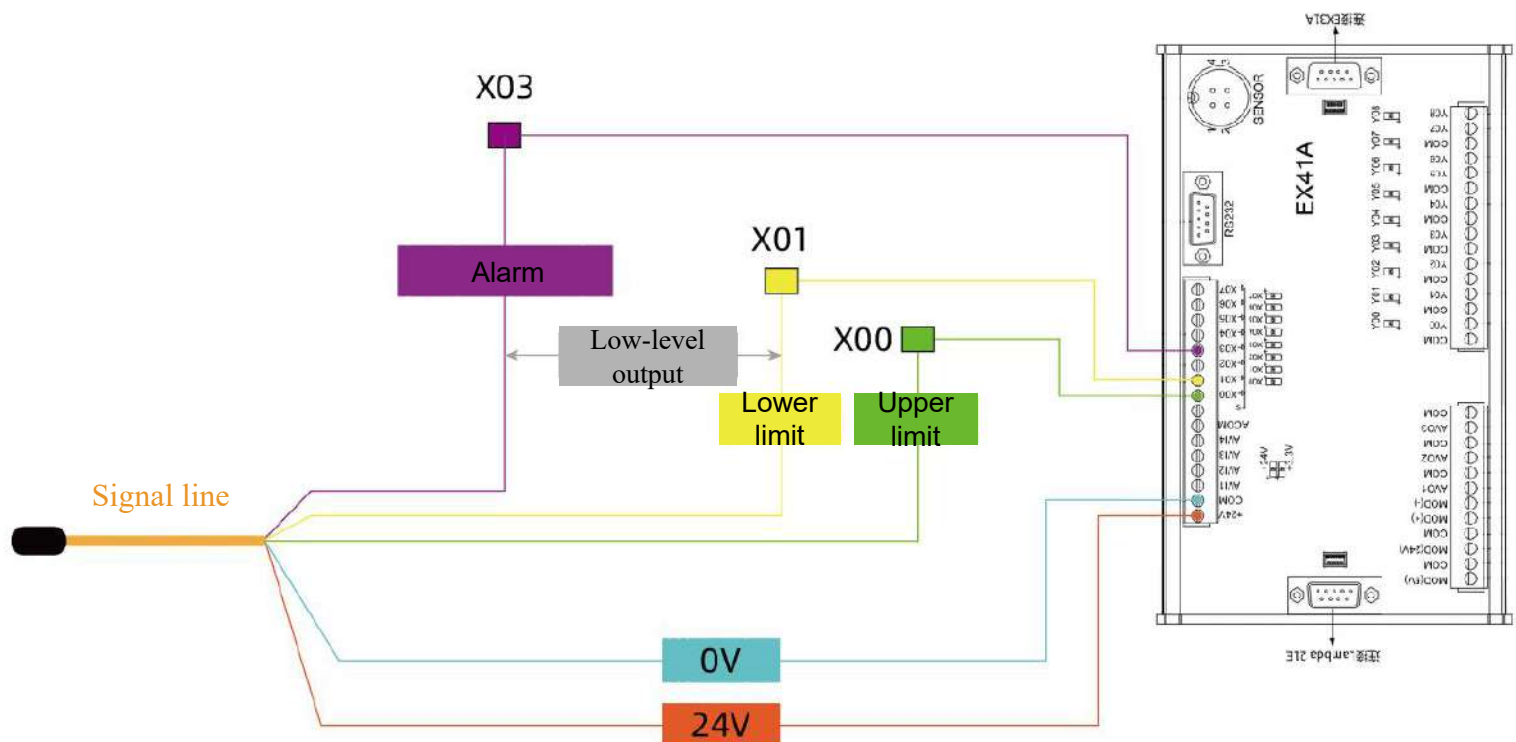
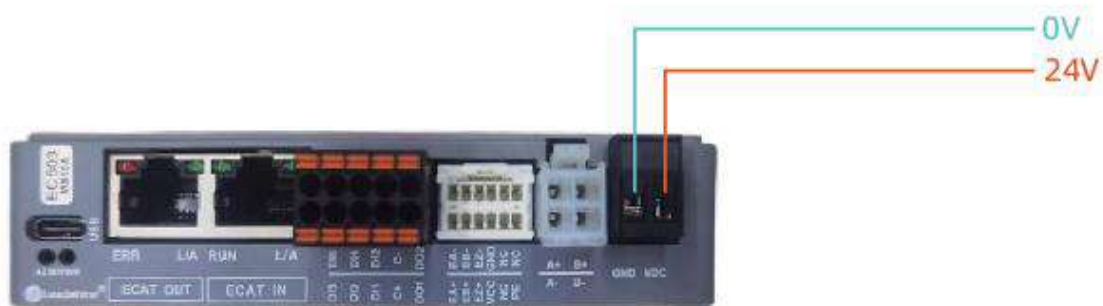
## 4.4 LS6000M Bus System Wiring (Example: EX41A)

### 4.4.1 PCB Board Wiring

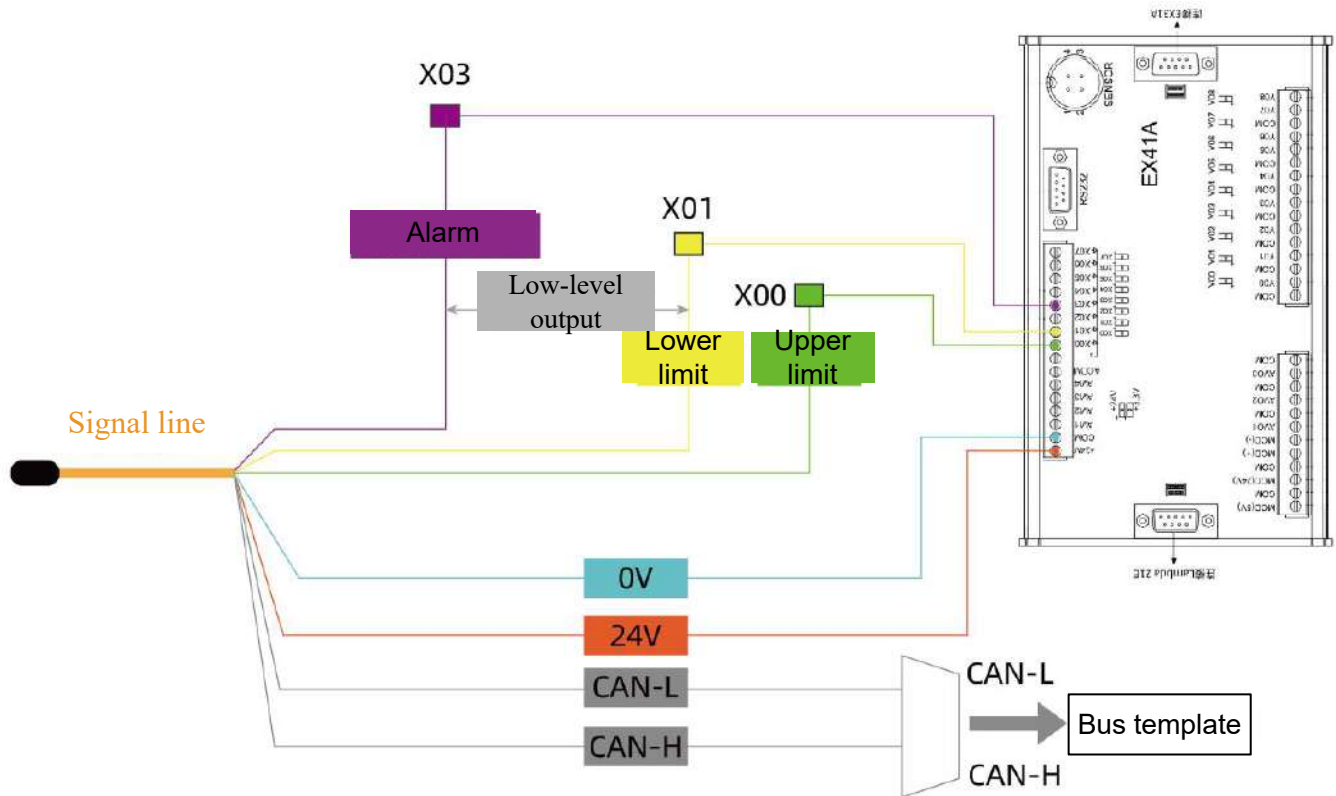


Limit and alarm signals are both NPN outputs; the alarm signal must be connected to the system. If damage to the cutting head occurs due to an unconnected alarm signal, the customer is fully responsible.

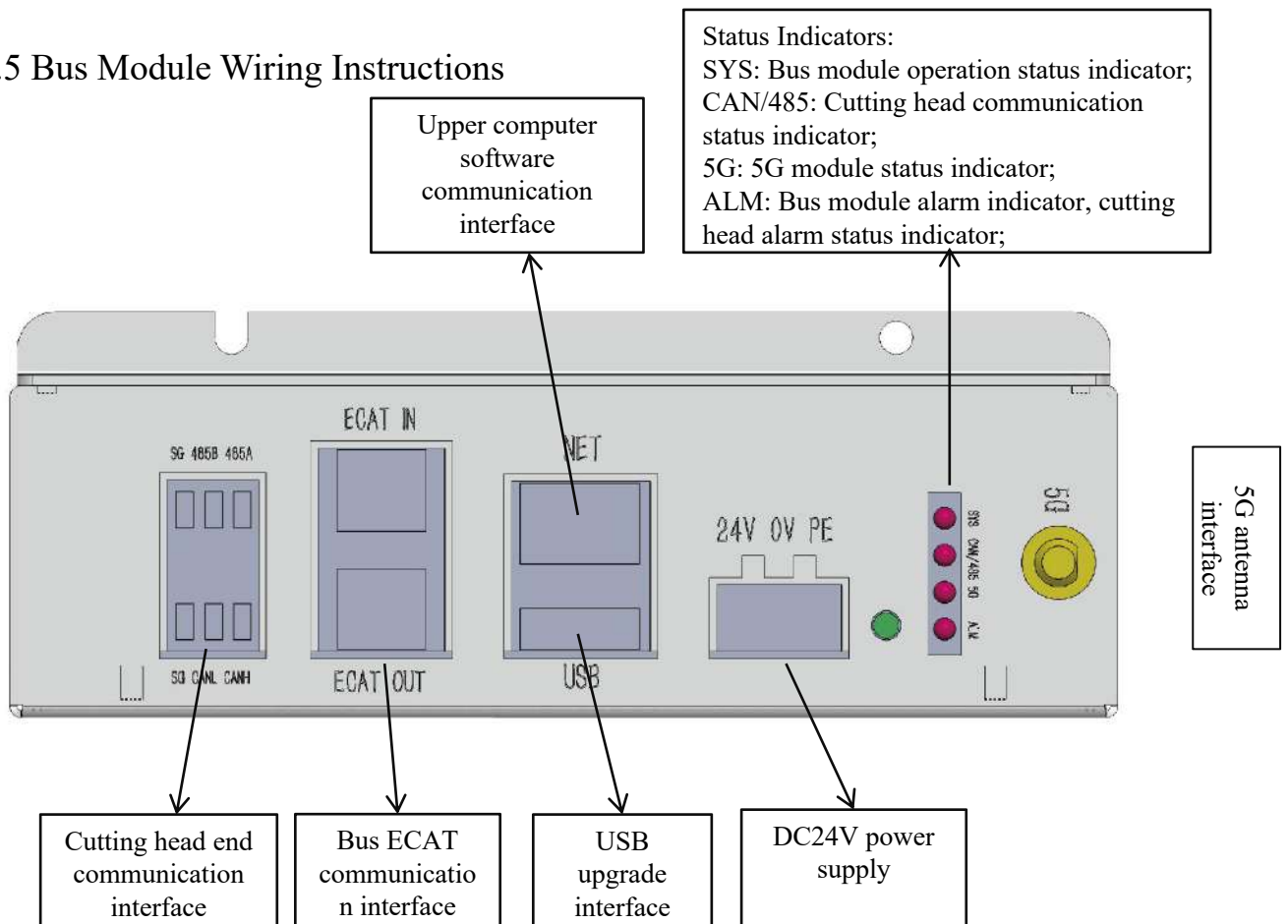




#### 4.4.4 Signal Line Wiring (With EtherCAT Bus Module)



#### 4.4.5 Bus Module Wiring Instructions



#### 4.4.6 Driver Parameters

| Parameter Index | Parameter Value | Parameter Content      |
|-----------------|-----------------|------------------------|
| PA000           | 10000           | Pulses per revolution  |
| PA003           | 1               | Rotation direction     |
| PA411           | 81              | Servo alarm logic (NC) |
| PR438           | 0               | Slave source           |

Note: Electronic gear ratio numerator: 8192;  
Electronic gear ratio denominator: 10000;  
Encoder bits: 13;

## 4.5 QBH Fiber Laser Head Installation

- ① Put the welding head horizontally, remove the white cover and static sticker, and then take out the dust-proof plug and dust-proof cover, as shown in Figure 1.6:

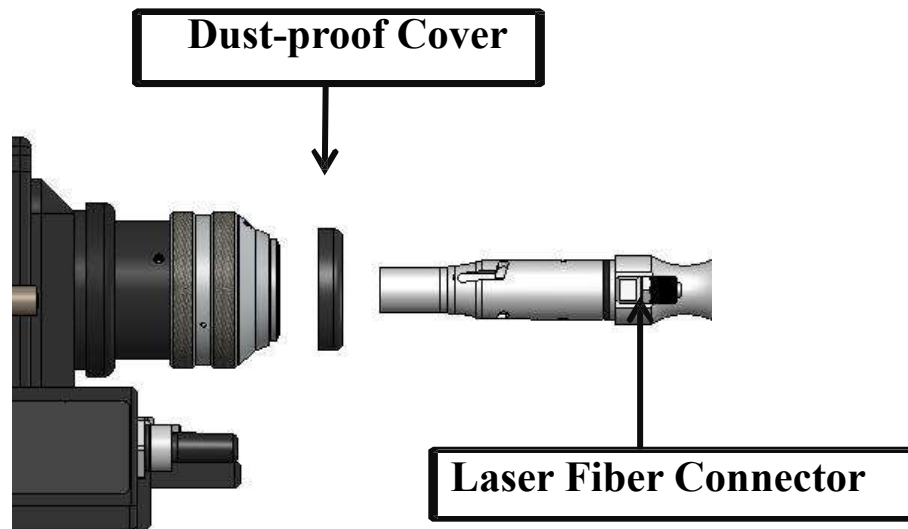


Figure 1.6

- ② Cover the dust-proof cover which is in the white accessory box, onto the fiber laser tip, as shown in Figure 1.7:

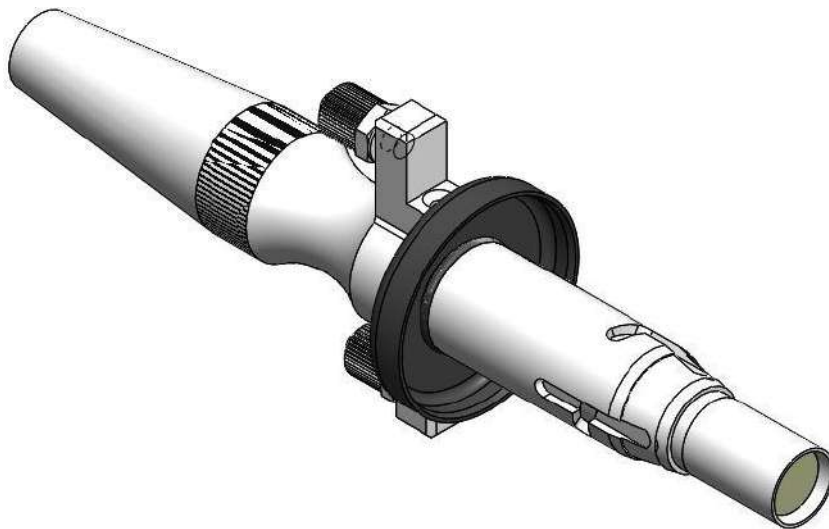


Figure 1.7

Attention: In case the fiber head is with original dust-proof gasket, users can choose whether install dust-proof cover or not according to the actual condition.

- ③ Turn the QBH connector into the open state, that is, turn it to the limit position counterclockwise (a "thud" sound can be heard). Do not twist with great force, otherwise the internal structure of the QBH may be damaged, as shown in Figure 1.8:



Figure 1.8

- ④ Align the red dot on the fiber head with the red dot on the QBH connector, and slowly insert the fiber head into the QBH connector, as shown in Figure 1.9:

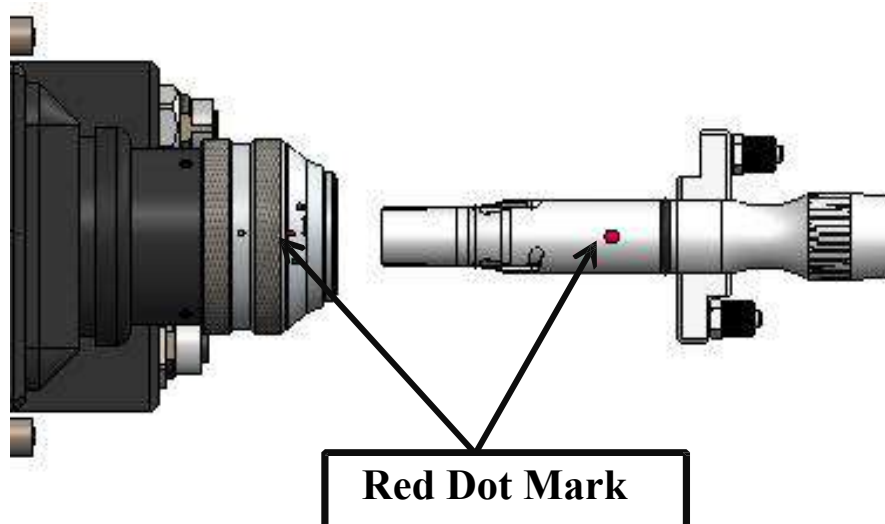


Figure 1.9

- ⑤ Screw it toward the limit position clockwise (a "thud" sound can be heard), then lift the swivel nut up and screw the nut clockwise again until the fiber splice is compacted tightly, and turn the QBH connector to the locked state (Do not twist it with great force, otherwise the internal structure of the QBH may be damaged). As shown in Figure 2.0:

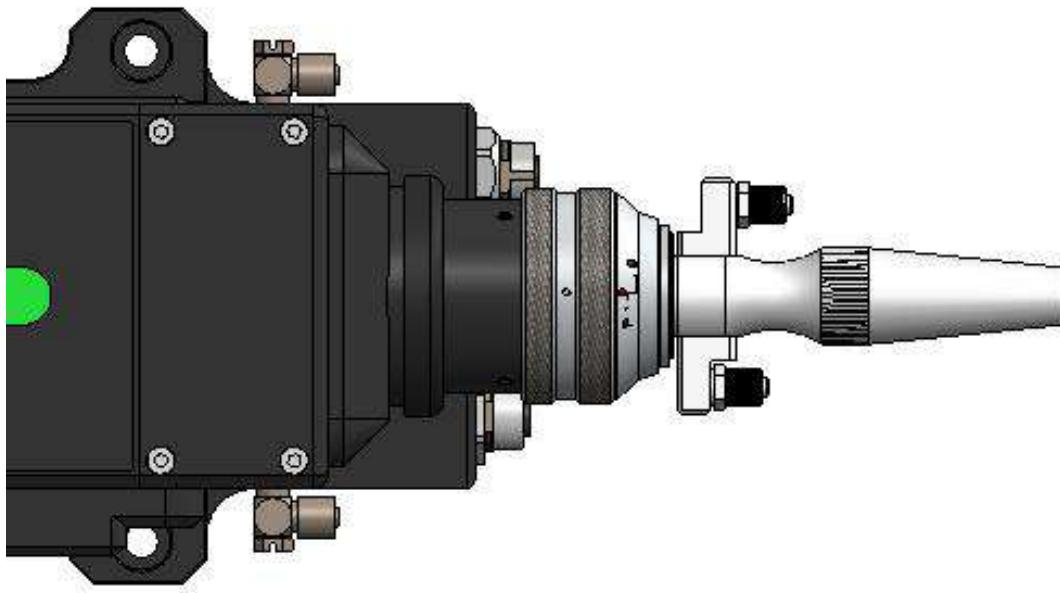


Figure 2.0

Attention: Wrap it with masking tape after plugging fiber to better protect the laser head from dust.

# Chapter 4 Product Debugging

## 4.1 Focusing Instructions (Example: FSCUT2000C Pulse System)

Focus Reset - After powering up the machine, the fourth axis must be reset first to position the focus at zero. The following diagram shows the cutting head platform parameters configuration for collimation 100/focus 200:

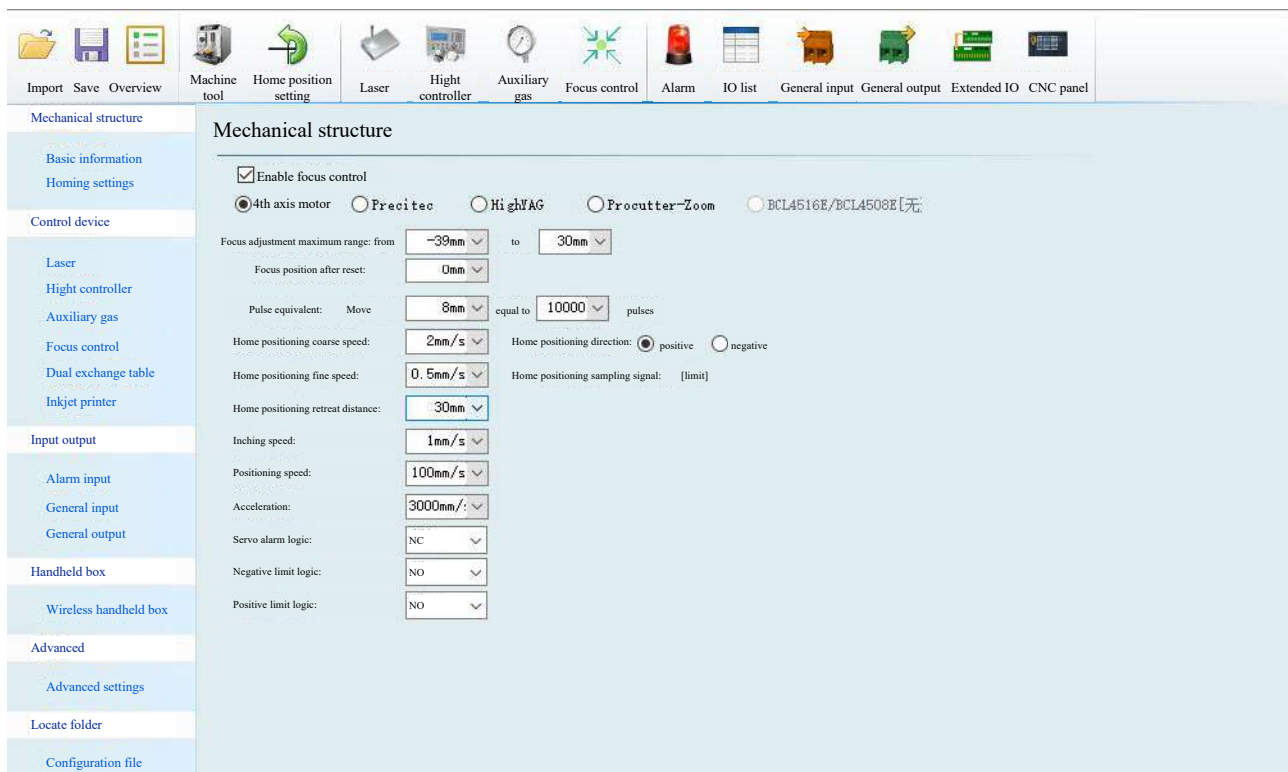


Figure 2.1

- ① Open the software configuration platform, set the focus retraction distance to 30mm (adjustable based on actual conditions) to position the collimation focus at the zero scale (using Cypcut as an example) as shown in Figure 2.1.

Note: The retraction distance should be fine-tuned based on the actual cutting focus.

#### 4.1.1 GM08B Cypcut Platform Configuration

Collimation 100/focus 150:

Maximum focus adjustment range: -15mm to 15mm;

Pulse equivalent: Every 4.5mm movement corresponds to 10,000 pulses;

Home direction: Forward;

Retraction distance: 15mm;

Limit logic: NO;

Collimation 100/focus 200:

Maximum focus adjustment range: -35mm to 30mm;

Pulse equivalent: Every 8mm movement corresponds to 10,000 pulses;

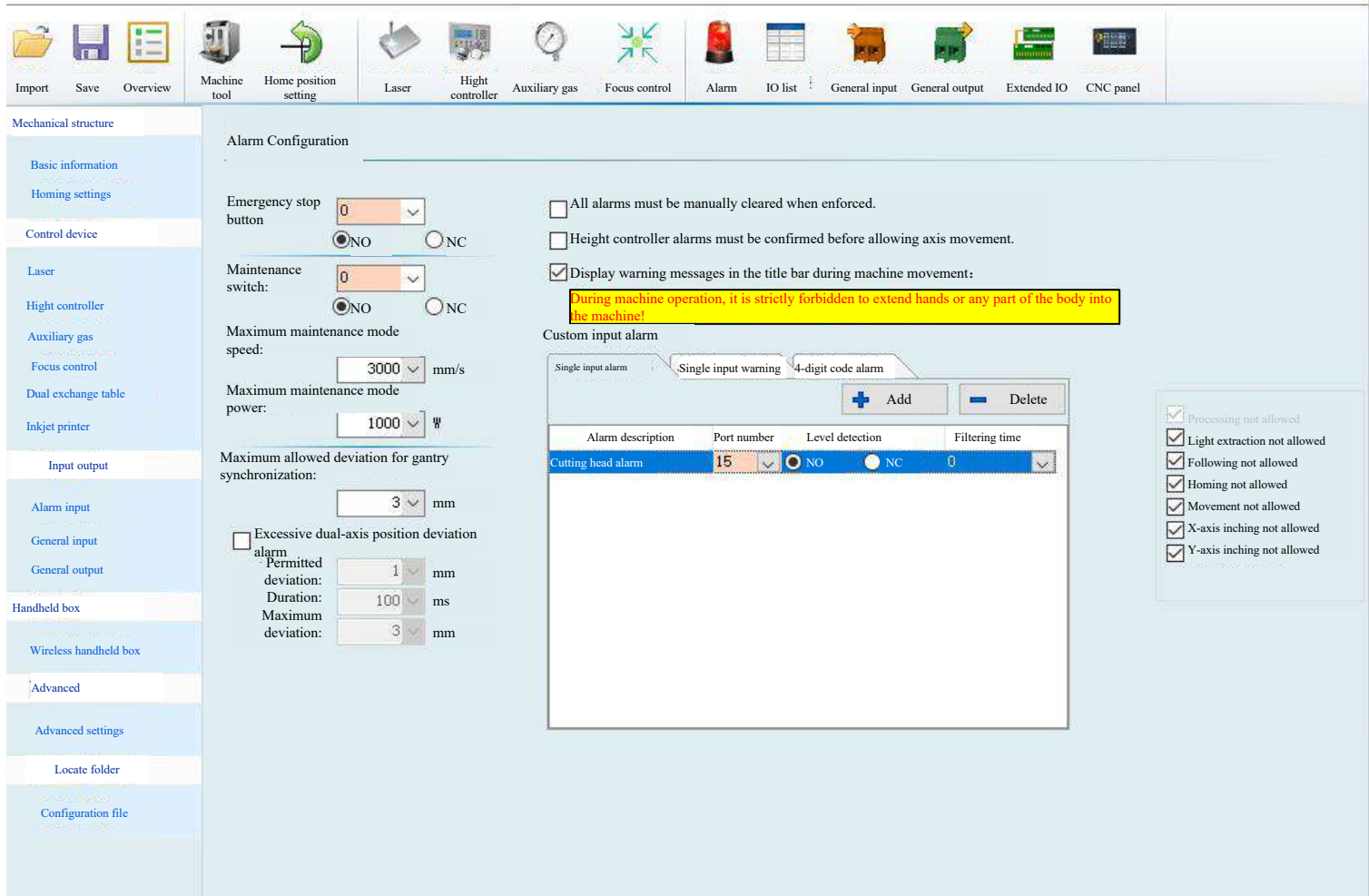
Home direction: Forward;

Retraction distance: 30mm;

Limit logic: NO;



## 4.2 Alarm Signal Configuration



**Alarm Configuration**

Emergency stop button: 0 (NO) NC

Maintenance switch: 0 (NO) NC

Maximum maintenance mode speed: 3000 mm/s

Maximum maintenance mode power: 1000 W

Maximum allowed deviation for gantry synchronization: 3 mm

☐ Excessive dual-axis position deviation alarm

Permitted deviation: 1 mm

Duration: 100 ms

Maximum deviation: 3 mm

☐ All alarms must be manually cleared when enforced.

☐ Height controller alarms must be confirmed before allowing axis movement.

☒ Display warning messages in the title bar during machine movement:

During machine operation, it is strictly forbidden to extend hands or any part of the body into the machine!

**Custom input alarm**

| Alarm description  | Port number | Level detection | Filtering time |
|--------------------|-------------|-----------------|----------------|
| Cutting head alarm | 15          | NO              | 0              |

Processing not allowed

Light extraction not allowed

Following not allowed

Homing not allowed

Movement not allowed

















X-axis inching not allowed

Y-axis inching not allowed

Set input port IN15 as the cutting head alarm signal, with NO logic. The I/O is customizable to the corresponding input port.

## 4.3 FSCUT8000 System Configuration (Bus System)

### 4.3.1 Focus Control and Limit Configuration

 Bus scan
  Axis configuration
  Home position
  Laser
  Cutting head
  Auxiliary gas
  Alarm
  Exchange worktable
  General input
  General output
  IO list
  Water chiller
  Wireless handheld box
  Maintenance
  Advanced configuration
  Parameter save

Cutting head selection

Cutting head: AxisK (general) Alignment diagram:  Select Clear

Basic specifications

Focus adjustment range: -39 mm to 30 mm

Focus position after reset: 0 mm

Inching speed: 1 mm/s

Positioning speed: 100 mm/s

加速度: 3000 mm/s<sup>2</sup>

Motor parameters

Axis number: 5

Leadscrew pitch: 8 mm

Pulses per revolution: 10000

Negative limit: A14

Positive limit: A13

Control mode: Position control mode

Reduction ratio: 1

Motor direction: CW

Negative limit logic: NO

Positive limit logic: NO

Servo parameters

☐ Write servo parameters

Motor inertia: 0 kg/cm<sup>2</sup> Inertia ratio: 200 % Rated torque: 0 N·m

Position loop parameters

P proportional gain: 135 1/s

Position loop integral Ti: 0 ms

Position loop differential Td: 0 ms

Velocity feedforward Vff: 100 %

Velocity feedforward compensation offset: 0 %

Velocity loop parameters

Velocity loop gain Kv: 75 1/s

Velocity loop integral Ti: 9 ms

Velocity loop differential Td: 0 ms

Acceleration feedforward Vff: 0 %

Acceleration feedforward compensation offset: 0 %

Home position parameters

Home position direction: Forward

Home position sampling signal: Limit

Coarse positioning speed: 2 mm/s

Fine positioning speed: 1 mm/s

Retreat distance: 30 mm

☐ Use Z phase signal

#### 4.3.2 GM08B Cypcut Platform Configuration

Collimation 100/focus 150:

Maximum focus adjustment range: -15mm to 15mm;

Lead screw pitch: 4.5mm;

Pulses per revolution: 10,000;

Positive limit: A13;

Negative limit: A14;

Limit logic: NO;

Home direction: Forward;

Retraction distance: 15mm;

Collimation 100/focus 200:

Maximum focus adjustment range: -35mm to 30mm;

Lead screw pitch: 8mm;

Pulses per revolution: 10,000;

Positive limit: A13;

















Negative limit: A14;

Limit logic: NO;

Home direction: Forward;

Retraction distance: 30mm;

## 4.4 Alarm Signal Configuration

 Bus scan
  Axis configuration
  Home position
  Cutting head
  Auxiliary gas
  Alarm
  Alarm
  Exchange worktable
  General input
  General output
  IO list
  Water chiller
  Wireless handheld box
  Maintenance
  Advanced configuration
  Parameter save

### Custom input alarm

External emergency stop input

0

☐ NO
 ☐ NC

Internal emergency stop input

0

☐ NO
 ☐ NC

Front grating alarm input

0

☐ NO
 ☐ NC

☐ Detect front grating only when the laser is off and the machine is in motion

Rear grating alarm input 0

0

☐ NO
 ☐ NC

Maintenance switch

0

☐ NO
 ☐ NC

Maximum speed for XY axes in maintenance mode

200

mm/s

Maximum speed for Z axis in maintenance mode

100

mm/s

Maximum power in maintenance mode

1000

W

Safety mode

Maximum no-load speed in safety mode

50

mm/s

☐ Worktable exchange prohibited in safety mode

☐ All alarms must be manually cleared during processing

☐ Height controller alarms must be confirmed before allowing axis movement.

Single input alarm

Single input warning

4-digit offset alarm

Add

Delete

| Alarm description  | Port number | Level detection  | Filtering time |
|--------------------|-------------|--|----------------|
| Cutting head alarm | A15         | <input checked="" type="radio"/> NO <input type="radio"/> NC | 0 ms           |

Processing not allowed

☒ Light extraction not allowed
 ☒ Following not allowed
 ☒ Homing not allowed
 ☒ XY movement not allowed
 ☒ X-axis inching not allowed
 ☒ Y-axis inching not allowed
 ☒ XYZ movement not allowed

Cause of issue

Solution

Set input port IN15 as the cutting head alarm signal, with NO logic. The I/O is customizable to the corresponding input port.

#### 4.5.1 W-Axis Parameter Configuration

37

#### 4.5.2 GM08B Weihong Platform Configuration

##### Collimation 100/focus 150:

Encoder direction: 1;  
Axis direction: 1;  
Pulse equivalent: 0.00045;  
Pulses per revolution: 10,000;  
Feedback pulses per revolution: 4,000;  
Upper soft limit: 15;  
Lower soft limit: -15;  
Soft limit protection enabled: Yes;  
Maximum axis speed: 6000mm/s;

##### Collimation 100/focus 200:

Encoder direction: 1;  
Axis direction: 1;  
Pulse equivalent: 0.0008;  
Pulses per revolution: 10,000;  
Feedback pulses per revolution: 4,000;  
Upper soft limit: 30;  
Lower soft limit: -35;  
Soft limit protection enabled: Yes;  
Maximum axis speed: 6000mm/s;



## 4.5.3 W-Axis Home Configuration

Common parameters

System parameters

Follower control

Laser settings

Regular maintenance reminder for machine tools

Parameter overview

Basic machine tool parameters

1.0 Axis parameter settings

1.1 Home position setting

1.1.0 Common parameters

1.1.1 X-axis origin setting

1.1.2 Y-axis origin setting

1.1.3 Z-axis origin setting

1.1.4 W-axis origin setting

1.2 Error compensation settings

Speed and precision control

External device control

Advanced function parameters

Manufacturer

Search

| Name   | Value | Unit   | Effective time        |
|--|-------|--------|-----------------------|
| 1.1.4 W-axis origin setting                                  |       |        |                       |
| Use Z phase signal (W)                                       | No    |        | Effective immediately |
| Coarse positioning stage direction (W)                       | 1     |        | Effective immediately |
| Coarse positioning stage speed (W)                           | 120   | mm/min | Effective immediately |
| Fine positioning stage speed (W)                             | 3     | mm/min | Effective immediately |
| Retreat distance (W)   | 30    | mm     | Effective immediately |
| Retreat speed (W)  | 3     | mm/min | Effective immediately |
| Minimum distance for coarse and fine positioning signals (W) | 0.5   | mm     | Effective immediately |

Parameter name: Fine positioning stage speed (W)

Value: 3mm/min

Description: Feed speed during the fine positioning stage of returning to the mechanical origin.

Drawing

Machining

Process

Monitoring

Operation report

Settings

Maintenance

Advanced

#### 4.5.4 GM08B Weihong Platform Configuration

##### Collimation 100/focus 150:

Use Z-phase signal: No;  
Coarse positioning direction: 1;  
Coarse positioning speed: 600mm/min;  
Fine positioning speed: 60mm/min;  
Coarse positioning direction: 1;  
Retraction distance: 15;  
Retraction speed: 200mm/min;

##### Collimation 100/focus 200:

Use Z-phase signal: No;  
Coarse positioning direction: 1;  
Coarse positioning speed: 600mm/min;  
Fine positioning speed: 60mm/min;  
Coarse positioning direction: 1;  
Retraction distance: 30;  
Retraction speed: 200mm/min;

## 4.5.5 Focus Control Configuration

Common parameters

System parameters

Follower control

Laser settings

Regular maintenance reminder for machine tools

Search

Parameter overview

Basic machine tool parameters

1.0 Axis parameter settings

1.1 Home position setting

1.1.0 Common parameters

1.1.1 X-axis origin setting

1.1.2 Y-axis origin setting

1.1.3 Z-axis origin setting

1.1.4 W-axis origin setting

1.2 Error compensation settings

Speed and precision control

External device control

3.0 Monitoring

3.1 Lubrication

3.2 Gas control

3.3 Smoke extraction

3.4 Exchange worktable

3.5 Focus control

3.6 Nozzle cleaning

3.7 Buzzer

Advanced function parameters

| Name                           | Value | Unit | Effective time        |
|--------------------------------|-------|------|-----------------------|
| <b>3.5 Focus control</b>       |       |      |                       |
| Enable focus control           | Yes   |      | Effective on restart  |
| Focus control mode             | 0     |      | Effective on restart  |
| Focus position detection delay | 1000  | ms   | Effective immediately |
| Home position detection delay  | 20    | s    | Effective immediately |
| Pulei focus confirmation delay | 100   | ms   | Effective immediately |

Manufacturer

Parameter name: Focus control mode

Value: 0

Description: Focus control mode. 0: Axis control; 1: Pulei auto-focus.

Drawing

Machining

Process

Monitoring

Operation report

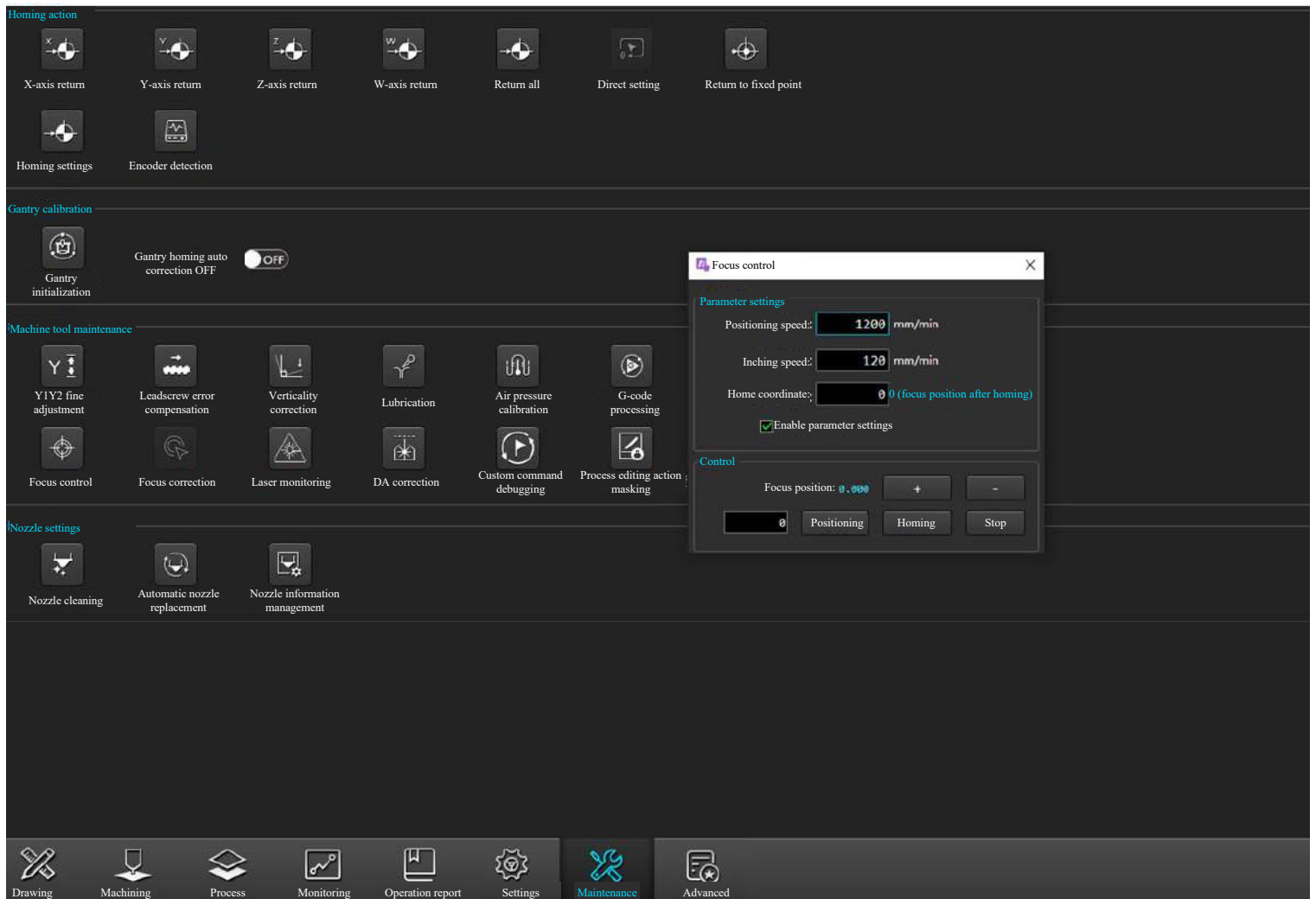
Settings

Maintenance

Advanced

Focus control enabled: Yes;  
Focus control mode: Axis port control;

## 4.5.6 Focus Control Configuration



The screenshot displays the SPRI software interface with the 'Focus control' window open. The interface is organized into several sections:

- Homing action:** Includes icons for X-axis return, Y-axis return, Z-axis return, W-axis return, Return all, Direct setting, and Return to fixed point. Below these are 'Homing settings' and 'Encoder detection'.
- Gantry calibration:** Includes 'Gantry initialization' and a toggle for 'Gantry homing auto correction OFF'.
- Machine tool maintenance:** Includes icons for Y1Y2 fine adjustment, Leadscrew error compensation, Verticality correction, Lubrication, Air pressure calibration, G-code processing, Focus control, Focus correction, Laser monitoring, DA correction, Custom command debugging, and Process editing action masking.
- Nozzle settings:** Includes icons for Nozzle cleaning, Automatic nozzle replacement, and Nozzle information management.

The 'Focus control' window is open, showing the following settings:

- Parameter settings:**
  - Positioning speed: 1200 mm/min
  - Inching speed: 120 mm/min
  - Home coordinate: 0 (focus position after homing)
  - ☒ Enable parameter settings
- Control:**
  - Focus position: 0.000
  - Buttons: +, -, Positioning, Homing, Stop

The bottom of the interface features a navigation bar with icons for Drawing, Machining, Process, Monitoring, Operation report, Settings, Maintenance (highlighted), and Advanced.

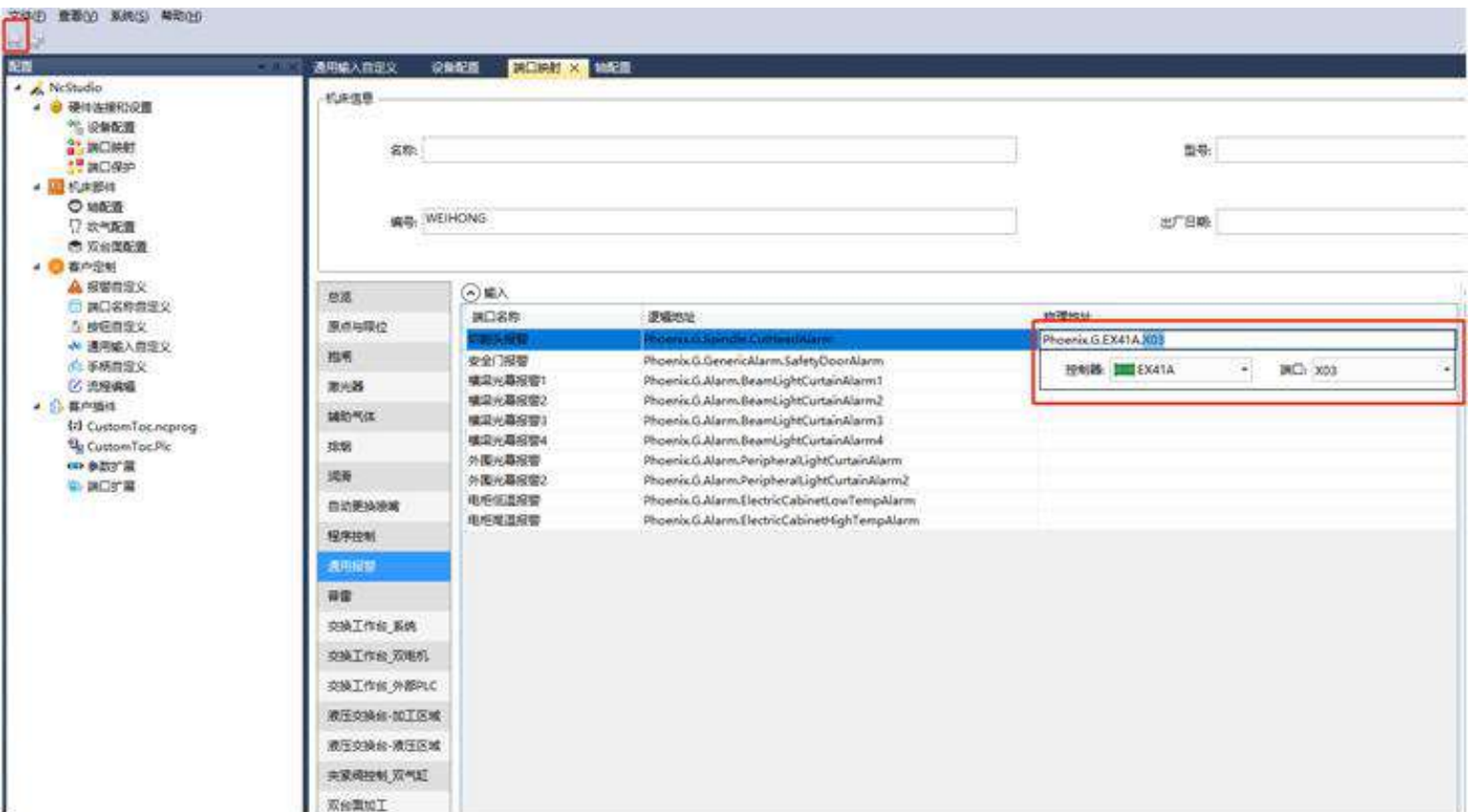
Positioning speed: 1200mm/min;  
Inching speed: 120mm/min;  
Home coordinate: 0;  
Parameter setting enabled: Checked;

## 4.5.7 W-Axis No-load Speed Setting

| Common parameters  |  | System parameters   |  | Follower control |  | Laser settings |  | Regular maintenance reminder for machine tools |  |
|--|--|---|--|------------------|--|----------------|--|--|--|
| <div><div></div><div>Search</div></div>  |  | Name  |  | Value            |  | Unit           |  | Effective time                                 |  |
| <div>Parameter overview</div> <div><div>Basic machine tool parameters</div><div>Speed and precision control</div><div>External device control</div><div>Advanced function parameters</div></div> |  | Manual acceleration change time (X)   |  | 50               |  | ms             |  | Effective immediately                          |  |
|  |  | Manual acceleration change time (Y)   |  | 50               |  | ms             |  | Effective immediately                          |  |
|  |  | Manual acceleration change time (Z)   |  | 50               |  | ms             |  | Effective immediately                          |  |
|  |  | Manual acceleration change time (W)   |  | 250              |  | ms             |  | Effective immediately                          |  |
|  |  | 2.1.0 Machining speed control   |  |                  |  |                |  |  |  |
|  |  | Perimeter traversal speed   |  | 30000            |  | mm/min         |  | Effective immediately                          |  |
|  |  | Machining acceleration  |  | 5000             |  | mm/s^2         |  | Effective immediately                          |  |
|  |  | Maximum speed for reference circle  |  | 5000             |  | mm/min         |  | Effective immediately                          |  |
|  |  | Maximum turning acceleration  |  | 5000             |  | mm/s^2         |  | Effective immediately                          |  |
|  |  | Machine tool rigidity coefficient   |  | 1                |  |                |  | Effective immediately                          |  |
|  |  | 2.1.1 No-load speed control   |  |                  |  |                |  |  |  |
|  |  | Single-axis no-load speed (X)   |  | 30000            |  | mm/min         |  | Effective immediately                          |  |
|  |  | Single-axis no-load speed (Y)   |  | 30000            |  | mm/min         |  | Effective immediately                          |  |
|  |  | Single-axis no-load speed (W)   |  | 6000             |  | mm/min         |  | Effective immediately                          |  |
|  |  | Single-axis no-load acceleration (X)  |  | 10000            |  | mm/s^2         |  | Effective immediately                          |  |
|  |  | Single-axis no-load acceleration (Y)  |  | 10000            |  | mm/s^2         |  | Effective immediately                          |  |
|  |  | Single-axis no-load acceleration (W)  |  | 2000             |  | mm/s^2         |  | Effective immediately                          |  |
|  |  | Single-axis no-load acceleration change time (X)  |  | 50               |  | ms             |  | Effective immediately                          |  |
|  |  | Single-axis no-load acceleration change time (Y)  |  | 50               |  | ms             |  | Effective immediately                          |  |
|  |  | Single-axis no-load acceleration change time (W)  |  | 50               |  | ms             |  | Effective immediately                          |  |
|  |  | 2.2.0 Machining precision control   |  |                  |  |                |  |  |  |
|  |  | Magnification smoothing time  |  | 0                |  | s              |  | Effective immediately                          |  |
|  |  | Deceleration acceleration on stop   |  | 15000            |  | mm/s^2         |  | Effective immediately                          |  |
|  |  | Corner error  |  | 0.05             |  | mm             |  | Effective immediately                          |  |
|  |  | Stop when connection speed is 0   |  | Yes              |  |                |  | Effective immediately                          |  |
| Manufacturer   |  | <div>Parameter name: Single-axis no-load acceleration (W)</div> <div>Value: 2000mm/s^2</div> <div>Description: Maximum no-load acceleration of the W-axis during machining.</div> |  |                  |  |                |  |  |  |

Single axis no-load speed (W): 6000mm/min;  
Single axis no-load acceleration (W): 2000mm/s<sup>2</sup>;  
Single axis no-load acceleration time (W): 50ms;

## 4.5.8 W-Axis Alarm Signal Association



General alarm column, select the cutting head alarm, associate the address. Select the controller, for example EX41A, choose port X03, IO is customized to whichever port and connected to the corresponding input port.



## 4.5.9 W-Axis Alarm Signal Association

External devices

Port settings

Log list

| Address           | Polarity | Sampling | Description                           |
|-------------------|----------|----------|---------------------------------------|
| LD21E-04.Fln6     | NO       | \$:1ms   | Follower error occurring              |
| LD21E-04.Fln7     | NO       | \$:1ms   | Floating head calibration in progress |
| LD21E-04.Fln8     | NO       | \$:1ms   | Follower not calibrated               |
| LD21E-04.Fln9     | NO       | \$:1ms   | Frog jumping                          |
| LD21E-04.Fln10    | NO       | \$:1ms   | Frog jump command error               |
| LD21E-04.Fln11    | NO       | \$:1ms   | Touching plate                        |
| LD21E-04.Fln12    | NO       | \$:1ms   | Follower in position                  |
| LD21E-04.Fln13    | NO       | \$:1ms   | Follower lower limit                  |
| LD21E-04.Fln14    | NO       | \$:1ms   | Capacitance surge                     |
| LD21E-04.Fln15    | NO       | \$:1ms   | Excessive penetration at edge         |
| LD21E-04.Fln16    | NO       | \$:1ms   | Follower upper limit                  |
| LD21E-04.Fln18    | NO       | \$:1ms   | Reached plate surface position        |
| LD21E-04.Fln19    | NO       | \$:1ms   | Nozzle bottom or side close to plate  |
| EX41A.X00         | NO       | \$:4ms   | W-axis positive limit                 |
| EX41A.X01         | NO       | \$:4ms   | W-axis negative limit                 |
| EX41A.X02         | NO       | \$:4ms   | W-axis mechanical origin              |
| EX41A.X03         | NO       | \$:4ms   | Cutting head alarm                    |
| EX41A.X04         | NO       | \$:4ms   | Low lubrication pressure              |
| EX41A.X07         | NO       | \$:1ms   | Time reversal anomaly                 |
| EX31A.X00         | NO       | \$:4ms   | Exchange worktable                    |
| EX31A.X01         | NO       | \$:4ms   | Release bed                           |
| EX31A.X02         | NO       | \$:4ms   | Bed released                          |
| EX31A.X05         | NO       | \$:4ms   | Exchange table locked                 |
| EX31A.X06         | NC       | \$:4ms   | Safety door in position               |
| EX31A.X07         | NO       | \$:4ms   | Z-axis negative limit (upper)         |
| EX31A.X08         | NO       | \$:4ms   | Lower table entry                     |
| EX31A.X09         | NO       | \$:4ms   | Upper table entry                     |
| Output port       |          |          |                                       |
| LD21E-04.Axis0_On |          |          | X-axis servo enabled                  |
| LD21E-04.Axis1_On |          |          | Y-axis servo enabled                  |
| LD21E-04.Axis2_On |          |          | Z-axis servo enabled                  |
| LD21E-04.Axis3_On |          |          | Y2-axis servo enabled                 |

Test on

Test off

Cancel test

Cancel all

Filtering

Change polarity

Machining

Process

Monitoring

Operation report

Settings

Maintenance

Advanced

EX41A.X00

NO (Normally Open)

W-Axis Positive Limit

EX41A.X01

NO (Normally Open)

W-Axis Negative Limit

EX41A.X03

NO (Normally Open)

Cutting Head Alarm

## 4.6 LS6000M Bus System Configuration

### 4.6.1 W-Axis Parameter Configuration

Common parameters
System parameters
Driver settings
Follower control
Laser settings
Regular maintenance reminder for machine tools

Parameter overview
Basic machine tool parameters
1.0 Axis parameter settings
1.0.0 X-axis parameters
1.0.1 Y-axis parameters
1.0.2 Z-axis parameters
1.0.3 W-axis parameters
1.1 Home position setting
1.2 Error compensation settings
Speed and precision control
External device control
Advanced function parameters

Manufacturer

Parameter name: Maximum axis speed (W)  
Value: 6000mm/min  
Description: Maximum speed of W axis

| Name   | Value | Unit   | Effective time        |
|--|-------|--------|-----------------------|
| 1.0.3 W-axis parameters                        |       |        |                       |
| Driver station address 1 (W)                   | 5     |        | Effective on restart  |
| Driver station address 2 (W)                   | 15    |        | Effective on restart  |
| Slave address internal axis offset address (W) | 0     |        | Effective on restart  |
| Axis direction (W)                             | 1     |        | Effective immediately |
| Lead screw pitch (W)                           | 8     | mm     | Effective immediately |
| Encoder resolution (W)                         | 13    |        | Effective immediately |
| Encoder type (W)                               | 0     |        | Effective on restart  |
| Electronic gear ratio numerator (W)            | 8192  |        | Effective immediately |
| Electronic gear ratio denominator (W)          | 10000 |        | Effective immediately |
| Soft limit upper value (W)                     | 30    | mm     | Effective immediately |
| Soft limit lower value (W)                     | -39   | mm     | Effective immediately |
| Enable soft limit protection (W)               | Yes   |        | Effective immediately |
| Maximum axis speed (W)                         | 6000  | mm/min | Effective immediately |
| Check axis encoder error (W)                   | No    |        | Effective immediately |
| Encoder steady state tolerance (W)             | 0.1   | mm     | Effective immediately |
| Encoder dynamic tolerance (W)                  | 40    | mm     | Effective immediately |

Machining
Process
Monitoring
Operation report
Settings
Maintenance
Advanced

Collimation 100/focus 150:

Driver slave address 1 (W): 5;  
Driver slave address 2 (W): 15;  
Axis direction: 1;  
Lead screw pitch: 4.5;  
Encoder bits: 13;  
Encoder type: 0;  
Electronic gear ratio numerator (W): 8192;  
Electronic gear ratio denominator (W): 10,000;;  
Upper soft limit value (W): 15;  
Lower soft limit value (W): -15;  
Soft limit protection enabled (W): Yes;  
Maximum axis speed (W): 6000mm/min;

Collimation 100/focus 200:

Driver slave address 1 (W): 5;

Driver slave address 2 (W): 15;

Axis direction: 1;

Lead screw pitch: 9;

Encoder bits: 13;

Encoder type: 0;

Electronic gear ratio numerator (W): 8192;

Electronic gear ratio denominator (W): 10,000;

Upper soft limit (W): 30;

Lower soft limit (W): -35;

Soft limit protection enabled (W): Yes;

Maximum axis speed (W): 6000mm/min;

### 4.6.3 W-Axis Parameter Configuration

Parameter overview

Basic machine tool parameters

1.0 Axis parameter settings

1.0.0 X-axis parameters

1.0.1 Y-axis parameters

1.0.2 Z-axis parameters

1.0.3 W-axis parameters

1.1 Home position setting

1.1.0 Common parameters

1.1.1 X-axis origin setting

1.1.2 Y-axis origin setting

1.1.3 Z-axis origin setting

1.1.4 W-axis origin setting

1.2 Error compensation settings

Speed and precision control

External device control

Advanced function parameters

Search

| Name   | Value | Unit   | Effective time        |
|--|-------|--------|-----------------------|
| 1.1.4 W-axis parameters                                      |       |        |                       |
| Use Z phase signal (W)                                       | No    |        | Effective immediately |
| Driver station address 1 (W)                                 | 1     |        | Effective immediately |
| Driver station address 1 (W)                                 | 120   | mm/min | Effective immediately |
| Driver station address 2 (W)                                 | 3     | mm/min | Effective immediately |
| Retreat distance (W)   | 30    | mm     | Effective immediately |
| Retreat distance (W)   | 3     | mm/min | Effective immediately |
| Minimum distance for coarse and fine positioning signals (W) | 0.5   | mm     | Effective immediately |
| Enable latching (W)  | Yes   |        | Effective immediately |
| Absolute value encoder back to origin action                 | 1     |        | Effective immediately |

Manufacturer

Parameter name: Coarse positioning phase direction (W)

Value: 1

Description: During the mechanical origin return process, the direction of movement in the coarse positioning phase. 1: Positive direction; -1: Negative direction.

Machining

Process

Monitoring

Operation report

Settings

Maintenance

Advanced

### 4.6.4 GM08B Weihong Platform Configuration

Collimation 100/focus 150:

- Use Z-phase signal: No;
- Coarse positioning direction: 1;
- Coarse positioning speed: 600mm/min;
- Fine positioning speed: 60mm/min;
- Coarse positioning direction: 1;
- Retraction distance: 15;
- Retraction speed: 200mm/min;

Collimation 100/focus 200:

Use Z-phase signal: No;  
Coarse positioning direction: 1;  
Coarse positioning speed: 600mm/min;  
Fine positioning speed: 60mm/min;  
Coarse positioning direction: 1;  
Retraction distance: 30;  
Retraction speed: 200mm/min;

## 4.6.5 Focus Control Configuration

Common parameters

System parameters

Driver settings

Follower control

Laser settings

Regular maintenance reminder for machine tools

▼

Search

Parameter overview

Basic machine tool parameters

1.0 Axis parameter settings

1.1 Home position setting

1.2 Error compensation settings

Speed and precision control

External device control

3.0 Monitoring

3.1 Lubrication

3.2 Gas control

3.3 Smoke extraction

3.4 Exchange worktable

3.5 Focus control

3.5.1 Common parameters

3.5.2 Cutting head

3.5.3 General focusing parameters

3.5.4 Focusing parameters

3.6 Nozzle cleaning

3.7 Buzzer

3.9 Safety door

Advanced function parameters

Manufacturer

Parameter name: Enable focus control

Value: Yes

Description: Whether to enable the focus control feature. Yes: Enabled; No: Disabled.

| Name                              | Value | Unit | Effective time        |
|-----------------------------------|-------|------|-----------------------|
| 3.5.1 Common parameters           |       |      |                       |
| Enable focus control              | Yes   |      | Effective on restart  |
| Focus control mode                | 2     |      | Effective on restart  |
| 3.5.2 Cutting head                |       |      |                       |
| Cutting head type                 | 0     |      | Effective on restart  |
| COM port name                     |       |      | Effective on restart  |
| 3.5.3 General focusing parameters |       |      |                       |
| Focus compensation type           | 1     |      | Effective on restart  |
| 3.5.4 Focusing parameters         |       |      |                       |
| Focus position detection delay    | 1000  | ms   | Effective immediately |
| Home position detection delay     | 20    | s    | Effective immediately |
| Pulei focus confirmation delay    | 100   | ms   | Effective immediately |
| Preleigh focusing delay           | 15    | ms   | Effective immediately |
| Preleigh cutting head type        | 0     |      | Effective immediately |

Machining

Process

Monitoring

Operation report

Settings

Maintenance

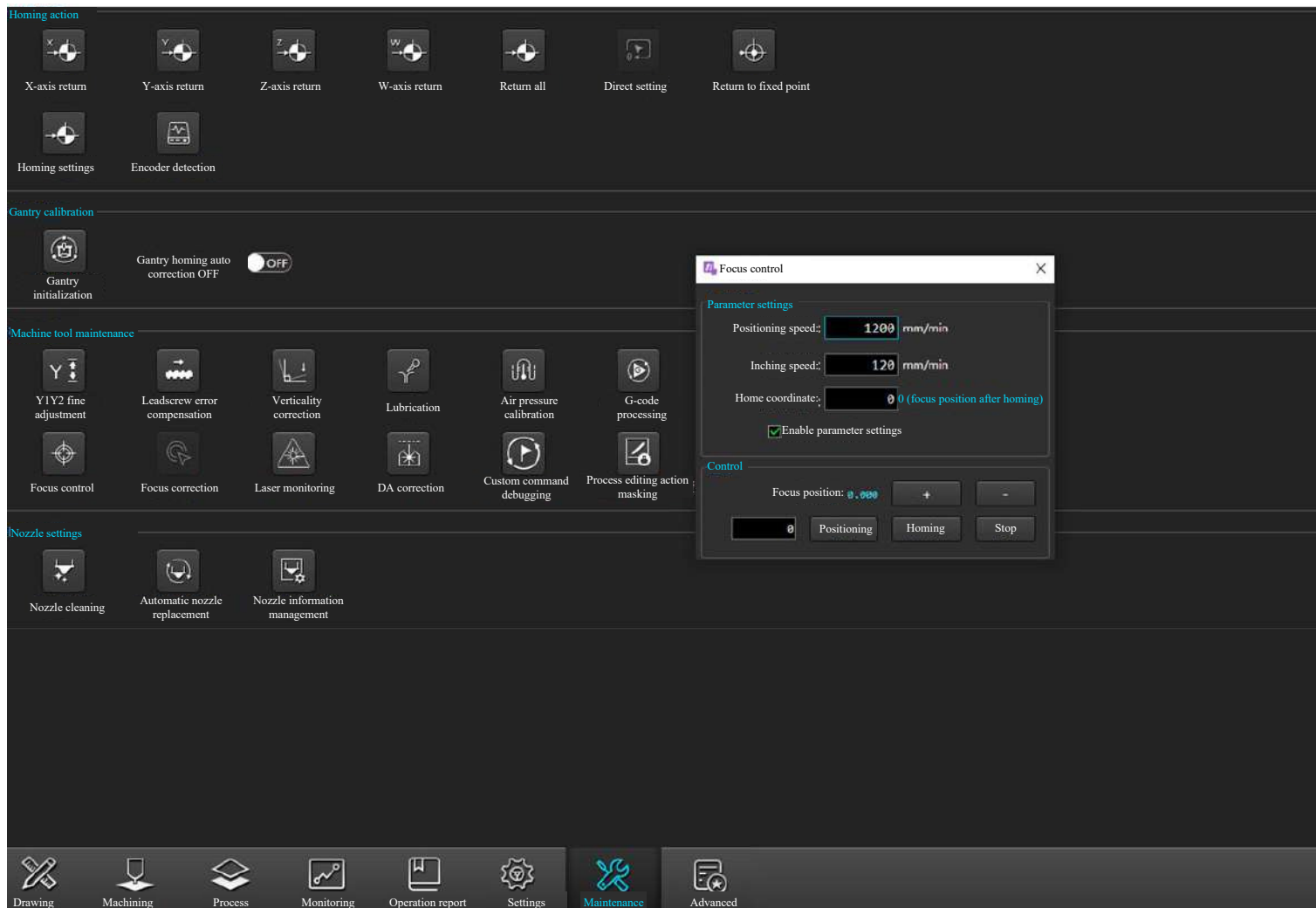
Advanced

Focus control enabled: Yes;

Focus control mode: EtherCAT Bus



## 4.6.6 Focus Control Configuration



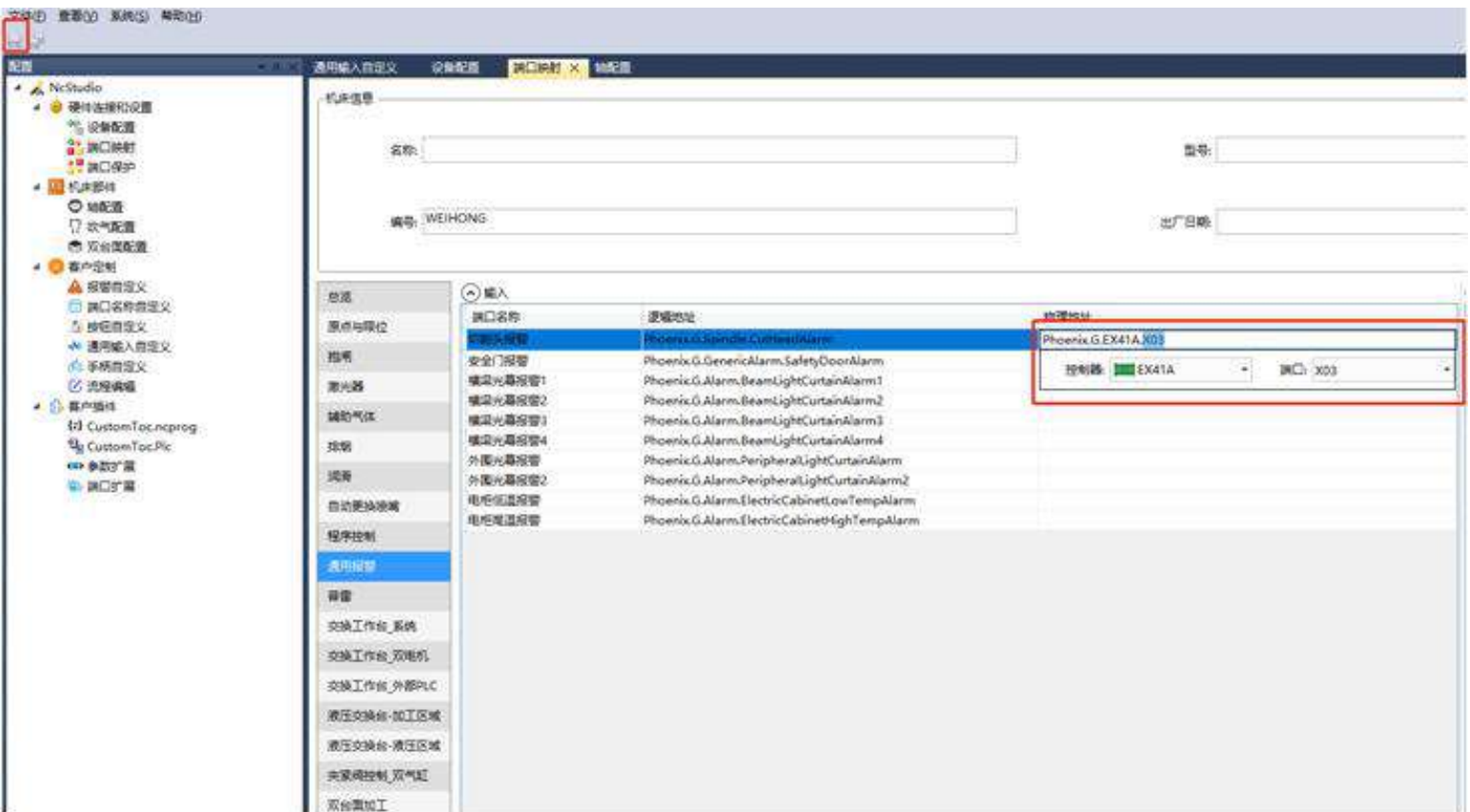
Positioning speed: 1200mm/min;  
Inching Speed: 120mm/min;  
Home coordinate: 0;  
Parameter setting enabled: Checked;

## 4.6.7 W-Axis No-load Speed Setting

| Common parameters   | System parameters   | Follower control | Laser settings        | Regular maintenance reminder for machine tools |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
|---|---|------------------|-----------------------|--|----------------|-------------------------------|--|--|--|-------------------------------------|----|----|-----------------------|-------------------------------------|----|----|-----------------------|-------------------------------------|----|----|-----------------------|-------------------------------------|-----|----|-----------------------|-------------------------------|--|--|--|---------------------------|-------|--------|-----------------------|------------------------|------|--------|-----------------------|------------------------------------|------|--------|-----------------------|------------------------------|------|--------|-----------------------|-----------------------------------|---|--|-----------------------|-----------------------------|--|--|--|-------------------------------|-------|--------|-----------------------|-------------------------------|-------|--------|-----------------------|-------------------------------|------|--------|-----------------------|--------------------------------------|-------|--------|-----------------------|--------------------------------------|-------|--------|-----------------------|--------------------------------------|------|--------|-----------------------|--|----|----|-----------------------|--|----|----|-----------------------|--|----|----|-----------------------|-----------------------------------|--|--|--|------------------------------|---|---|-----------------------|-----------------------------------|-------|--------|-----------------------|--------------|------|----|-----------------------|---------------------------------|-----|--|-----------------------|---|--|--|
| <div>Parameter overview<ul style="list-style-type: none"><li>Basic machine tool parameters</li><li>Speed and precision control</li><li>External device control</li><li>Advanced function parameters</li></ul></div> | <div>Search</div> <table><thead><tr><th>Name</th><th>Value</th><th>Unit</th><th>Effective time</th></tr></thead><tbody><tr><td colspan="4">2.1.0 Machining speed control</td></tr><tr><td>Manual acceleration change time (X)</td><td>50</td><td>ms</td><td>Effective immediately</td></tr><tr><td>Manual acceleration change time (Y)</td><td>50</td><td>ms</td><td>Effective immediately</td></tr><tr><td>Manual acceleration change time (Z)</td><td>50</td><td>ms</td><td>Effective immediately</td></tr><tr><td>Manual acceleration change time (W)</td><td>250</td><td>ms</td><td>Effective immediately</td></tr><tr><td colspan="4">2.1.0 Machining speed control</td></tr><tr><td>Perimeter traversal speed</td><td>30000</td><td>mm/min</td><td>Effective immediately</td></tr><tr><td>Machining acceleration</td><td>5000</td><td>mm/s^2</td><td>Effective immediately</td></tr><tr><td>Maximum speed for reference circle</td><td>5000</td><td>mm/min</td><td>Effective immediately</td></tr><tr><td>Maximum turning acceleration</td><td>5000</td><td>mm/s^2</td><td>Effective immediately</td></tr><tr><td>Machine tool rigidity coefficient</td><td>1</td><td></td><td>Effective immediately</td></tr><tr><td colspan="4">2.1.1 No-load speed control</td></tr><tr><td>Single-axis no-load speed (X)</td><td>30000</td><td>mm/min</td><td>Effective immediately</td></tr><tr><td>Single-axis no-load speed (Y)</td><td>30000</td><td>mm/min</td><td>Effective immediately</td></tr><tr><td>Single-axis no-load speed (W)</td><td>6000</td><td>mm/min</td><td>Effective immediately</td></tr><tr><td>Single-axis no-load acceleration (X)</td><td>10000</td><td>mm/s^2</td><td>Effective immediately</td></tr><tr><td>Single-axis no-load acceleration (Y)</td><td>10000</td><td>mm/s^2</td><td>Effective immediately</td></tr><tr><td>Single-axis no-load acceleration (W)</td><td>2000</td><td>mm/s^2</td><td>Effective immediately</td></tr><tr><td>Single-axis no-load acceleration change time (X)</td><td>50</td><td>ms</td><td>Effective immediately</td></tr><tr><td>Single-axis no-load acceleration change time (Y)</td><td>50</td><td>ms</td><td>Effective immediately</td></tr><tr><td>Single-axis no-load acceleration change time (W)</td><td>50</td><td>ms</td><td>Effective immediately</td></tr><tr><td colspan="4">2.2.0 Machining precision control</td></tr><tr><td>Magnification smoothing time</td><td>0</td><td>s</td><td>Effective immediately</td></tr><tr><td>Deceleration acceleration on stop</td><td>15000</td><td>mm/s^2</td><td>Effective immediately</td></tr><tr><td>Corner error</td><td>0.05</td><td>mm</td><td>Effective immediately</td></tr><tr><td>Stop when connection speed is 0</td><td>Yes</td><td></td><td>Effective immediately</td></tr></tbody></table> | Name             | Value                 | Unit   | Effective time | 2.1.0 Machining speed control |  |  |  | Manual acceleration change time (X) | 50 | ms | Effective immediately | Manual acceleration change time (Y) | 50 | ms | Effective immediately | Manual acceleration change time (Z) | 50 | ms | Effective immediately | Manual acceleration change time (W) | 250 | ms | Effective immediately | 2.1.0 Machining speed control |  |  |  | Perimeter traversal speed | 30000 | mm/min | Effective immediately | Machining acceleration | 5000 | mm/s^2 | Effective immediately | Maximum speed for reference circle | 5000 | mm/min | Effective immediately | Maximum turning acceleration | 5000 | mm/s^2 | Effective immediately | Machine tool rigidity coefficient | 1 |  | Effective immediately | 2.1.1 No-load speed control |  |  |  | Single-axis no-load speed (X) | 30000 | mm/min | Effective immediately | Single-axis no-load speed (Y) | 30000 | mm/min | Effective immediately | Single-axis no-load speed (W) | 6000 | mm/min | Effective immediately | Single-axis no-load acceleration (X) | 10000 | mm/s^2 | Effective immediately | Single-axis no-load acceleration (Y) | 10000 | mm/s^2 | Effective immediately | Single-axis no-load acceleration (W) | 2000 | mm/s^2 | Effective immediately | Single-axis no-load acceleration change time (X) | 50 | ms | Effective immediately | Single-axis no-load acceleration change time (Y) | 50 | ms | Effective immediately | Single-axis no-load acceleration change time (W) | 50 | ms | Effective immediately | 2.2.0 Machining precision control |  |  |  | Magnification smoothing time | 0 | s | Effective immediately | Deceleration acceleration on stop | 15000 | mm/s^2 | Effective immediately | Corner error | 0.05 | mm | Effective immediately | Stop when connection speed is 0 | Yes |  | Effective immediately | <div>Manufacturer</div> <div>Parameter name: Single-axis no-load acceleration (W)<br/>Value: 2000mm/s^2<br/>Description: Maximum no-load acceleration of the W-axis during machining.</div> |  |  |
| Name  | Value   | Unit             | Effective time        |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| 2.1.0 Machining speed control   |   |                  |                       |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| Manual acceleration change time (X)   | 50  | ms               | Effective immediately |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| Manual acceleration change time (Y)   | 50  | ms               | Effective immediately |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| Manual acceleration change time (Z)   | 50  | ms               | Effective immediately |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| Manual acceleration change time (W)   | 250   | ms               | Effective immediately |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| 2.1.0 Machining speed control   |   |                  |                       |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| Perimeter traversal speed   | 30000   | mm/min           | Effective immediately |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| Machining acceleration  | 5000  | mm/s^2           | Effective immediately |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| Maximum speed for reference circle  | 5000  | mm/min           | Effective immediately |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| Maximum turning acceleration  | 5000  | mm/s^2           | Effective immediately |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| Machine tool rigidity coefficient   | 1   |                  | Effective immediately |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| 2.1.1 No-load speed control   |   |                  |                       |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| Single-axis no-load speed (X)   | 30000   | mm/min           | Effective immediately |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| Single-axis no-load speed (Y)   | 30000   | mm/min           | Effective immediately |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| Single-axis no-load speed (W)   | 6000  | mm/min           | Effective immediately |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| Single-axis no-load acceleration (X)  | 10000   | mm/s^2           | Effective immediately |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| Single-axis no-load acceleration (Y)  | 10000   | mm/s^2           | Effective immediately |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| Single-axis no-load acceleration (W)  | 2000  | mm/s^2           | Effective immediately |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| Single-axis no-load acceleration change time (X)  | 50  | ms               | Effective immediately |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| Single-axis no-load acceleration change time (Y)  | 50  | ms               | Effective immediately |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| Single-axis no-load acceleration change time (W)  | 50  | ms               | Effective immediately |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| 2.2.0 Machining precision control   |   |                  |                       |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| Magnification smoothing time  | 0   | s                | Effective immediately |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| Deceleration acceleration on stop   | 15000   | mm/s^2           | Effective immediately |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| Corner error  | 0.05  | mm               | Effective immediately |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |
| Stop when connection speed is 0   | Yes   |                  | Effective immediately |  |                |                               |  |  |  |                                     |    |    |                       |                                     |    |    |                       |                                     |    |    |                       |                                     |     |    |                       |                               |  |  |  |                           |       |        |                       |                        |      |        |                       |                                    |      |        |                       |                              |      |        |                       |                                   |   |  |                       |                             |  |  |  |                               |       |        |                       |                               |       |        |                       |                               |      |        |                       |                                      |       |        |                       |                                      |       |        |                       |                                      |      |        |                       |  |    |    |                       |  |    |    |                       |  |    |    |                       |                                   |  |  |  |                              |   |   |                       |                                   |       |        |                       |              |      |    |                       |                                 |     |  |                       |   |  |  |

Single axis no-load speed (W): 6000mm/min;  
 Single axis no-load acceleration (W): 2000mm/s<sup>2</sup>;  
 Single axis no-load acceleration time (W): 50ms;

#### 4.6.8 W-Axis Alarm Signal Association



General alarm column, select the cutting head alarm, associate the address. Select the controller, for example EX41A, choose port X03, IO is customized to whichever port and connected to the corresponding input port.

## 4.6.9 W-Axis Alarm Signal Association

External devices

Port settings

Log list

| Address           | Polarity | Sampling | Description                           |
|-------------------|----------|----------|---------------------------------------|
| LD21E-04.Fln6     | NO       | S:1ms    | Follower error occurring              |
| LD21E-04.Fln7     | NO       | S:1ms    | Floating head calibration in progress |
| LD21E-04.Fln8     | NO       | S:1ms    | Follower not calibrated               |
| LD21E-04.Fln9     | NO       | S:1ms    | Frog jumping                          |
| LD21E-04.Fln10    | NO       | S:1ms    | Frog jump command error               |
| LD21E-04.Fln11    | NO       | S:1ms    | Touching plate                        |
| LD21E-04.Fln12    | NO       | S:1ms    | Follower in position                  |
| LD21E-04.Fln13    | NO       | S:1ms    | Follower lower limit                  |
| LD21E-04.Fln14    | NO       | S:1ms    | Capacitance surge                     |
| LD21E-04.Fln15    | NO       | S:1ms    | Excessive penetration at edge         |
| LD21E-04.Fln16    | NO       | S:1ms    | Follower upper limit                  |
| LD21E-04.Fln18    | NO       | S:1ms    | Reached plate surface position        |
| LD21E-04.Fln19    | NO       | S:1ms    | Nozzle bottom or side close to plate  |
| EX41A.X00         | NO       | S:4ms    | W-axis positive limit                 |
| EX41A.X01         | NO       | S:4ms    | W-axis negative limit                 |
| EX41A.X02         | NO       | S:4ms    | W-axis mechanical origin              |
| EX41A.X03         | NO       | S:4ms    | Cutting head alarm                    |
| EX41A.X04         | NO       | S:4ms    | Low lubrication pressure              |
| EX41A.X07         | NO       | S:1ms    | Time reversal anomaly                 |
| EX31A.X00         | NO       | S:4ms    | Exchange worktable                    |
| EX31A.X01         | NO       | S:4ms    | Release bed                           |
| EX31A.X02         | NO       | S:4ms    | Bed released                          |
| EX31A.X05         | NO       | S:4ms    | Exchange table locked                 |
| EX31A.X06         | NC       | S:4ms    | Safety door in position               |
| EX31A.X07         | NO       | S:4ms    | Z-axis negative limit (upper)         |
| EX31A.X08         | NO       | S:4ms    | Lower table entry                     |
| EX31A.X09         | NO       | S:4ms    | Upper table entry                     |
| Output port       |          |          |                                       |
| LD21E-04.Axis0_On |          |          | X-axis servo enabled                  |
| LD21E-04.Axis1_On |          |          | Y-axis servo enabled                  |
| LD21E-04.Axis2_On |          |          | Z-axis servo enabled                  |
| LD21E-04.Axis3_On |          |          | Y2-axis servo enabled                 |

Test on

Test off

Cancel test

Cancel all

Filtering

Change polarity

Machining

Process

Monitoring

Operation report

Settings

Maintenance

Advanced

EX41A.X00

NO (Normally Open)

W-Axis Positive Limit

EX41A.X01

NO (Normally Open)

W-Axis Negative Limit

EX41A.X03

NO (Normally Open)

Cutting Head Alarm

## 4.7 Focus Adjustment Instructions

- ① The laser beam must be kept in the center of the nozzle to achieve good joint-cutting effect. When it deviates from the center of the nozzle, it needs to be adjusted through the beam centering module, as shown in Figure 2.2 below.

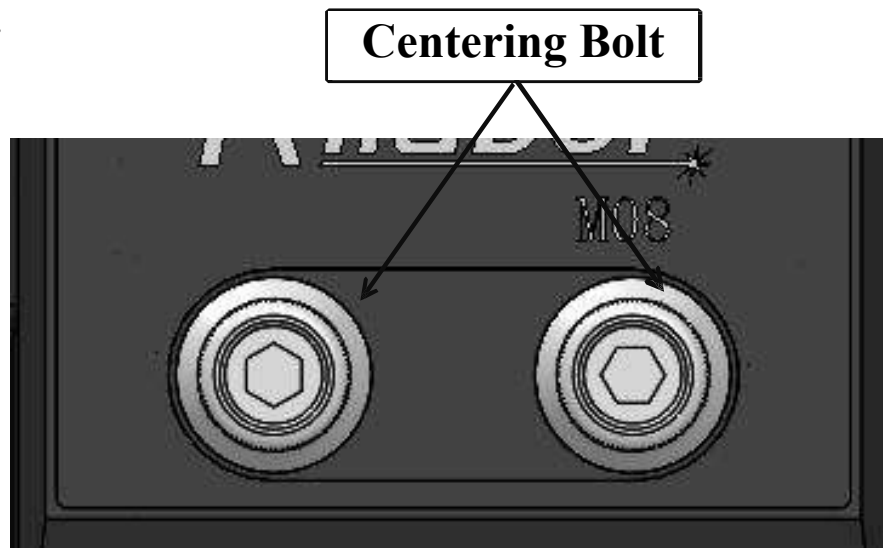


Figure 2.2

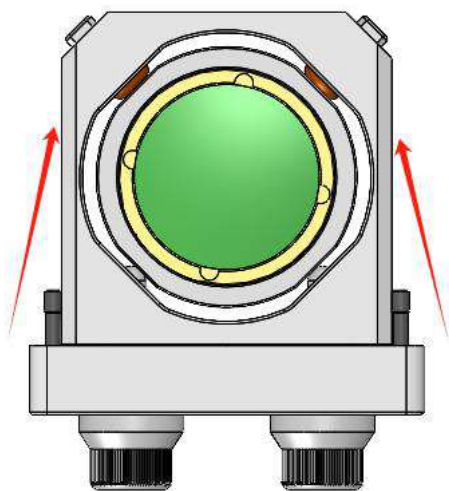


Figure 2.3

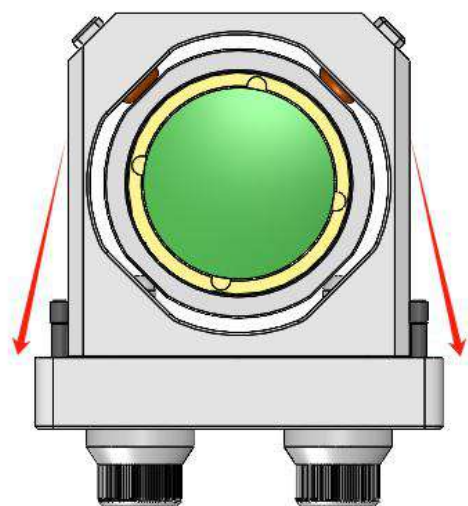


Figure 2.4

Note: When the centering bolt rotates clockwise, the center direction of the lens is shown in Figure 2.3. When the centering bolt rotated counterclockwise, the center direction of the lens is shown in Figure 2.4.

## 4.8 Mobile APP Operation Instructions

### 4.8.1 Mobile APP Software Installation.

- ① After installation, the icon appears as shown in Figure 2.5; continue by clicking 'Install', and the icon after installation is shown in Figure 2.6. This APP currently only supports installation on Android devices.

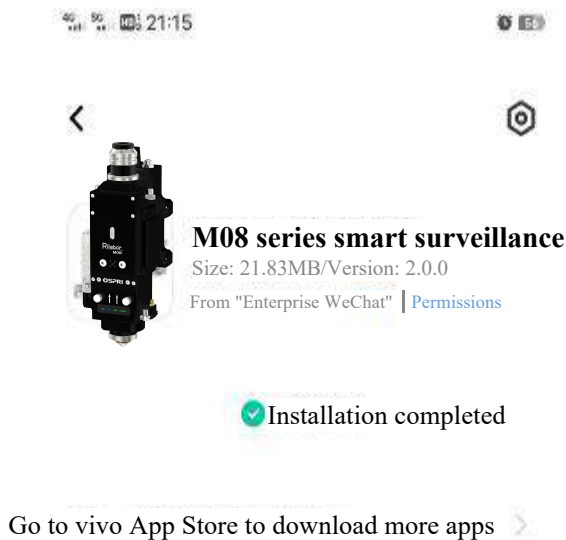


Figure 2.6

Icon is displayed after installation

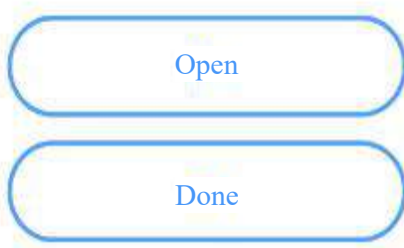


Figure 2.5



## 4.8.2 APP Software Connection.



Figure 2.7

- ① Click the Bluetooth icon to open the Bluetooth connection interface, as shown in Figure 2.7.

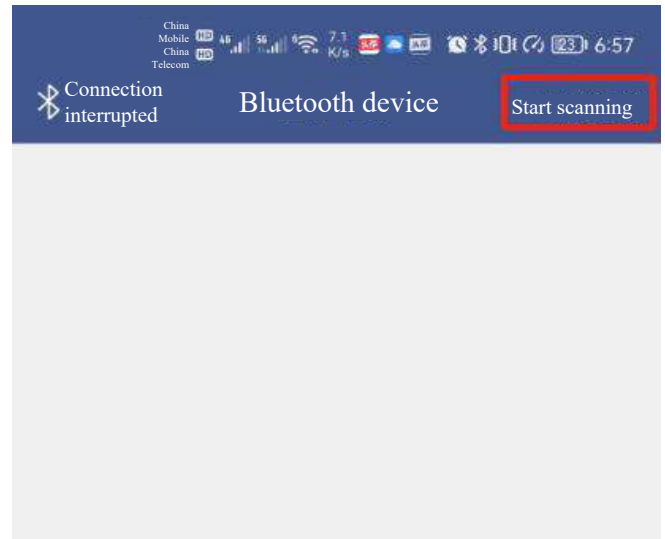


Figure 2.8

- ② Start scanning; if nothing is displayed, click it for another more times, as shown in Figure 2.8.

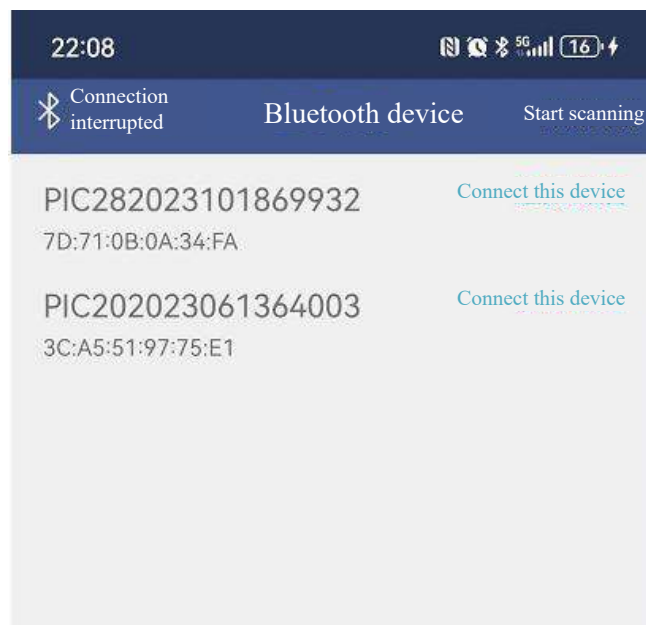


Figure 2.9

- ③ After the device is scanned, select the device to connect and click the [Connect Device] button, and then the mobile phone can communicate with the device in real time, as shown in Figure 2.9.

### 4.8.3 Software Introduction.

- ① After running the GM08B APP, the progress bar color on the main interface will change according to the actual temperature value monitored, as shown in Figure 3.0.
- Green: The lens temperature is monitored to be normal and the software can be used normally.
- Yellow: The lens temperature is too high, and attention should be paid to check if the lens is contaminated.
- Red: The lens temperature is too high and the software cannot continue to be used. The machine must be stopped for checking.



Figure 3.0

### 4.8.3 Software Introduction.

#### Description of Bluetooth APP Functions:

- (1) Cutting protective lens temperature: If the cutting protective lens shows yellow or red, check if it is contaminated.
- (2) Upper protective lens temperature: If the upper protective lens shows yellow or red, check if it is contaminated.
- (3) Lower protective lens astigmatism: Monitor the astigmatism value of the lower protective lens. If it shows yellow or red, first check if the cutting protective lens is contaminated, then check the focus protective lens for contamination.
- (4) Cutting air pressure: Real-time monitoring of cutting air pressure, feedback to the system for a closed-loop air path control.

#### 4.8.4 Temperature Parameter Setting and Modification of Equipment Name.

- ① This APP has temperature setting function. You can set different temperature thresholds according to actual situation . Click "Parameter Setting" and input the password "85225225" to enter the temperature settings interface, as shown in Figure. 3.1.
- ② The software can also monitor the real-time dimensions of the electronic scale, internal temperature and humidity of the cavity, cutting gas pressure, and detect any leaks in the cutting gas.

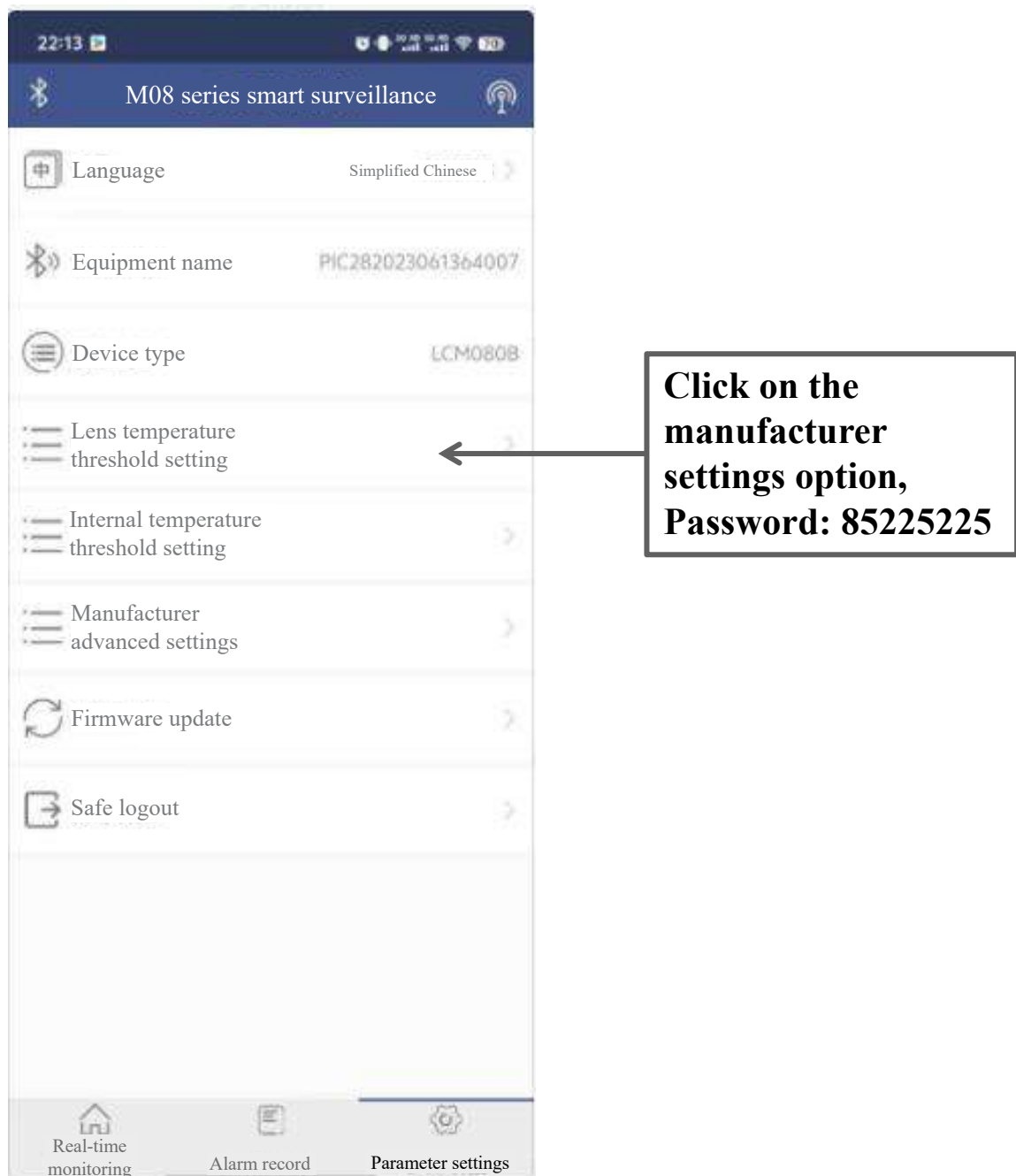


Figure 3.1

- ② Enter temperature setting interface to set the temperature according to the actual conditions. The forewarning value must be lower than the alarm value.

After settings, click "Confirm". This window also allows for setting of the cutting head encoding; when the Bluetooth mode is disconnected, it automatically switches to the 5G model state, as shown in Figure 3.2:



**Green Light: Normal**  
**Yellow Light: Warning**  
**Red Light: Alarm**

Figure 3.2

# Chapter 5 Product Maintenance

## 5.1 Maintenance of Protective Lens

In case poor cutting performance occurs while cutting protective lens is normal, but burning points on the ceramic piece, the collimation protective lens or focus protective lens possibly is polluted or damaged. In this condition, please pull out the protective lens cartridge to check the lens. Before checking, use a clean cloth dampened with alcohol to wipe the exterior clean.

5.1.1 Disassembly and Assembly of Collimation Protective Lens, as shown in Figures 3.3 and 3.4.

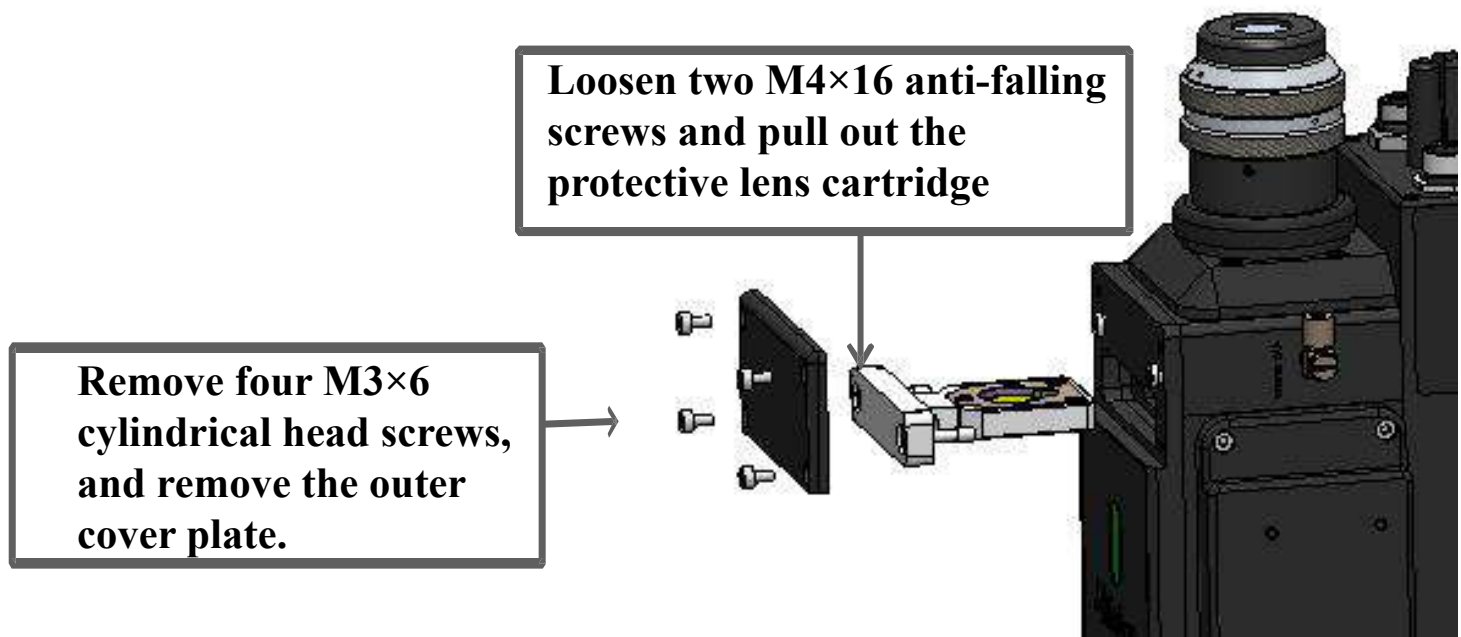


Figure 3.3

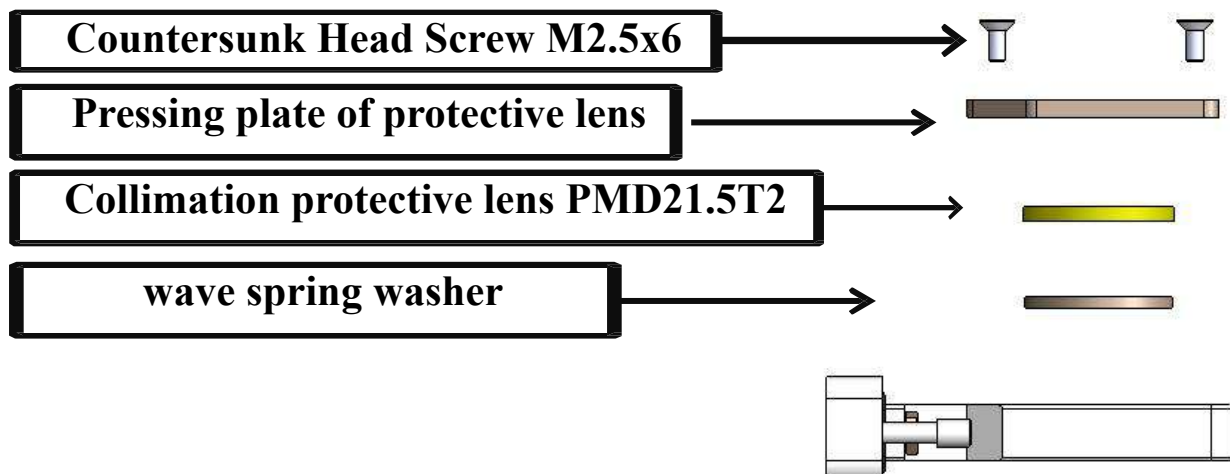


Figure 3.4

### 5.1.2 Disassembly of Focus Protective Lens

Loosen the two M4×16 hexagon socket anti-falling screws, pull out the protective lens cartridge, and replace the protective lens (PMD34T5), as shown in Figures 3.5 and 3.6 below.

**Loosen two M4×16 anti-falling screws and pull out the protective lens cartridge**

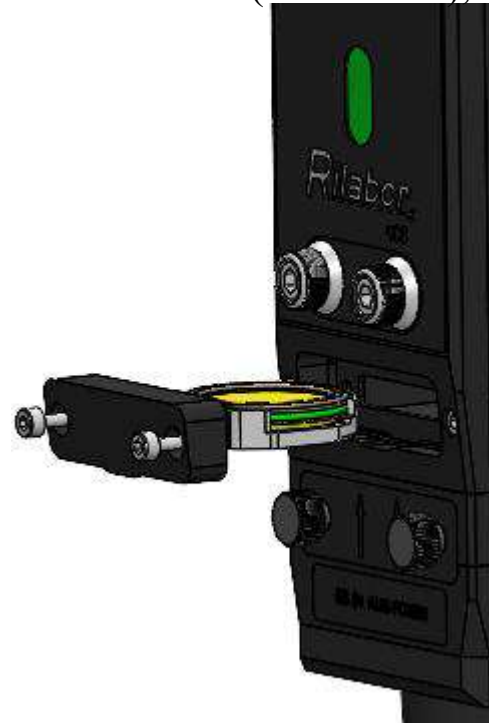


Figure 3.5

**Protective Lens Clamp Ring**



**Protective lens PMD34T5**



**Spring seal 38.6\*30.5\*3.8.**

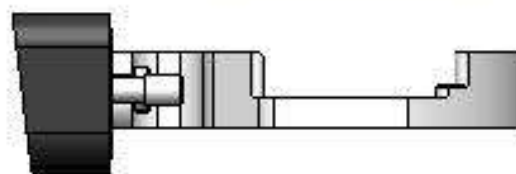


Figure 3.6



## 5.2 Maintenance of Collimation Lens

### 5.2.1 Disassembly and Assembly of Collimation Lens

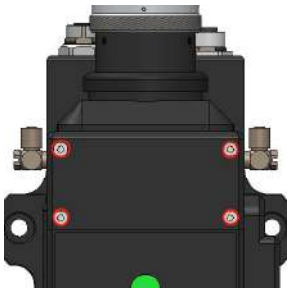


Figure 3.7



Figure 3.8

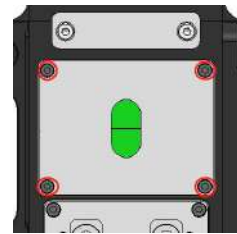


Figure 3.9

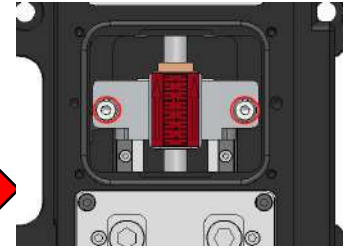


Figure 4.0

Sequentially remove the screws as shown in Figures 3.7, 3.8, 3.9, and 4.0: four M3X6 screws, then four M4X8 screws, loosen four M3X12 anti-falling screws, loosen two M4X16 anti-falling screws, pull out the collimation lens cartridge for maintenance, and be careful about the orientation of the collimation lens cartridge during installation to avoid reversing it.

### 5.2.2 Cleaning of Collimation Lens



Figure 4.1



Figure 4.2

- ① Tools: Dust-free wiping swabs, isopropyl alcohol, dry and pure compressed air.
- ② Spray isopropyl alcohol onto the dust-free wiping swabs.
- ③ Gently pinch the side edge of the lens with the left thumb and index finger, and hold the wiping swabs with right hand to gently wipe both sides of the lens in a single direction from bottom to top or from left to right, as shown in Figure 4.1.
- ④ After wiping, blow the lens surface again with filled dry and pure compressed air to ensure that the cleaned lens surface is free of any foreign matter, as shown in Figure 4.2.
- ⑤ The cleaned collimation lens must be installed into the collimation lens base and inserted into the cutting head as soon as possible.

## 5.3 Maintenance and Replacement of Focus Lens

### 5.3.1 Disassembly of Focus Lens

As shown in Figure 4.3, use an Allen wrench to sequentially remove four M3X6 screws, then four M4X8 screws, loosen four M3X12 anti-falling screws, and after removing the focus lens holder, take out the focus lens.

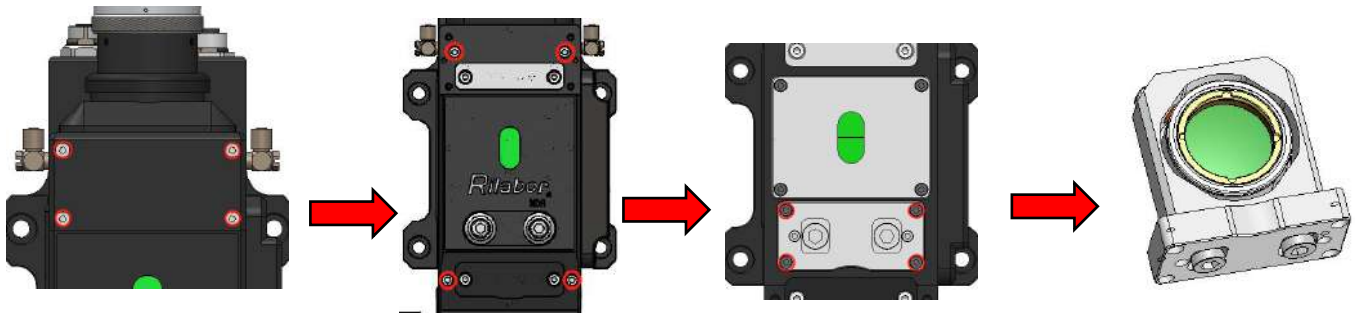


Figure 4.3

### 5.3.2 Cleaning of Focus Lens



Figure 4.4



Figure 4.5

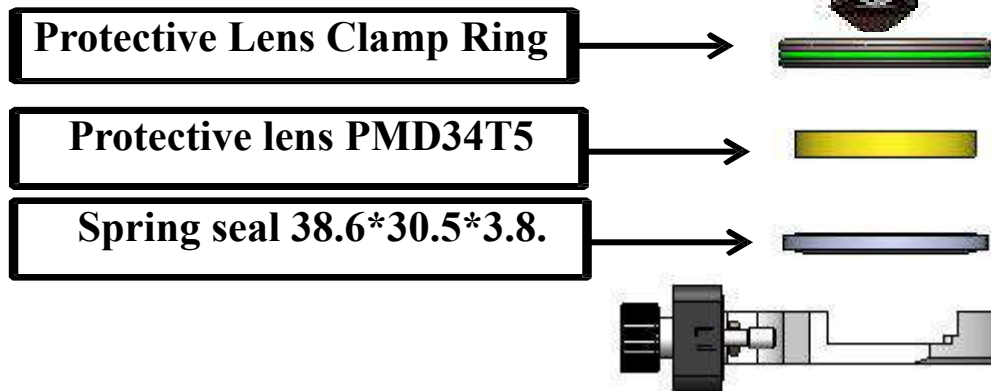
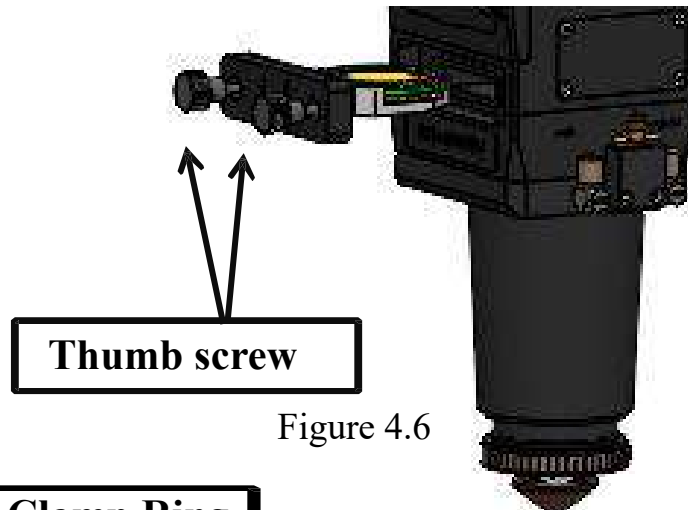
- ① Tools: Dust-free wiping swabs, isopropyl alcohol, dry and pure compressed air.
- ② Spray isopropyl alcohol onto the dust-free wiping swabs.
- ③ Gently pinch the side edge of the lens with the left thumb and index finger, and hold the wiping swabs with right hand to gently wipe both sides of the lens in a single direction from bottom to top or from left to right, as shown in Figure 4.4.
- ④ After wiping, blow the lens surface again with filled dry and pure compressed air to ensure that there are not foreign matters on the lens surface, as shown in Figure. 4.5.
- ⑤ The cleaned focus lens must be installed into the focus lens base and inserted into the cutting head as soon as possible.

## 5.4 Maintenance of Cutting Protective Lens

When the protective lens has impurities or foreign matters, they will absorb laser and heat up, resulting in damage to protective lens. Therefore, it is recommended to clean the protective lens once a week. Besides, the protective lens is a wearing part and should be replaced in time if damaged.

### 5.4.1 Disassembly of Protective Lens

Loosen the thumb screws, hold the screws with both hands, slowly pull out the protective lens base, and move it to a clean and dust-free environment, as shown in Figure 4.6 below. The detailed diagram of replacing lens is shown in Figure 4.7.



Assembly sequence as shown in Figure 4.7.

### 5.4.2 Cleaning of Protective Lens



Figure 4.8

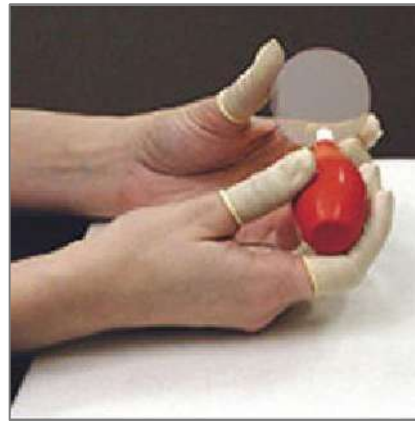


Figure 4.9

- ① Tools: Dust-free wiping swabs, isopropyl alcohol, dry and pure compressed air.
- ② Spray isopropyl alcohol onto the dust-free wiping swabs.
- ③ Gently pinch the side edge of the lens with the left thumb and index finger, and hold the wiping swabs with right hand to gently wipe both sides of the lens in a single direction from bottom to top or from left to right, as shown in Figure 4.8.
- ④ After wiping, blow the lens surface again with filled dry and pure compressed air to ensure that the cleaned lens surface is free of any foreign matter, as shown in Figure 4.9.
- ⑤ The cleansed lens must be installed into the cutting head's body as soon as possible or stored in other clean and sealed container.

Attention: When cleaning and replacing the protective lens, avoid the grease on hands or dust in the environment from contaminating the protective lens. In principle, the focus lens, collimation lens and cutting lens are forbidden to be disassembled. If lenses may be contaminated, users can first test the lenses with trial case lens, or contact with our technical staff if necessary.

## 5.5 Maintenance of Sensory Parts

Ceramic body is a wearing part but can be replaced after being damaged. The ceramic body should be aligned with the two locating pins of the body in the installation process. Otherwise, the ceramic body cannot be properly installed in place, thus causing operating failure of the sensor component. When locking the ceramic, tighten it with the locking nut. The different degree of tightness on locking nuts would directly affect the operating parameters of the sensor parts.

The laser nozzle is the sensitive element of the sensing component and is connected to the body through the thread. It is a wearing part. After it has worked for a period of time, it is necessary to remove the bonded slag and replace it in time when the burning loss is serious.

After assembling the ceramics, tighten the locking nut and expose the ceramic evenly about 2-3mm.

### **The following cautions should be taken in use:**

- ① Dry and clean auxiliary gas should be used when cutting. If there is water, oil and other impurities in the gas, mutations may occur at working clearance, and even cause work disorder of the sensor. It is suggested to use high purity oxygen and configure the gas dryer, oil-water separator and other devices.
- ② The sensor after being defaced should be cleaned with clean and dry cotton cloths, etc. Do not use liquid to clean the cutting head and ceramic, and then connect and assemble it properly after cleaning.
- ③ The ceramic body can be replaced after being damaged. After ceramic body is replaced, an initialization of electrical system together with the amplifier should be conducted through a reset operation.
- ④ The shape and size of the cutting nozzle would directly affect the characteristics of the sensor. Therefore, specified cutting nozzle must be used.



### 5.5.1 Replacement of Nozzle and Ceramic Body

- ① Remove the nozzle counterclockwise, as shown in Figure 5.0.
- ② Unscrew the ceramic clamp ring counterclockwise, as shown in Figure 5.0.
- ③ Remove the ceramic body vertically downward, as shown in Figure 5.0.

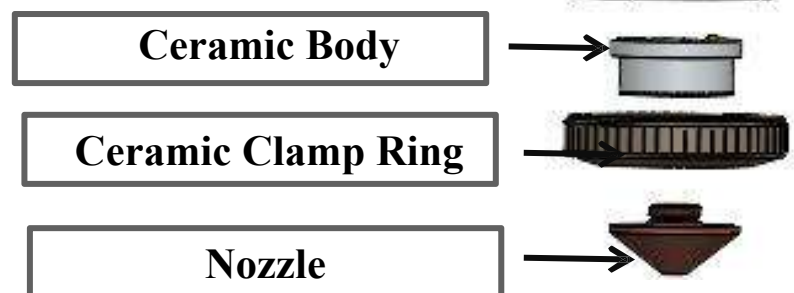


Figure 5.0

### 5.5.2 Cleaning of Ceramic Ring

- ① Take out the ceramic and clean it with anhydrous alcohol or isopropyl alcohol, as shown in Figure 5.1.
- ② Spray isopropyl alcohol onto the dust-free swab, remove the ceramic ring and clean it with the swab, as shown in Figure 5.2.
- ③ After wiping, blow the ceramic ring with filled dry and pure compressed air to clean it and ensure that the ceramic surface is clean and dry without moisture before installation, as shown in Figure 5.3.



Figures 5.1



Figure 5.2



Figure 5.3

**Note:** Cleanliness of ceramic surface is directly related to the operating performance of the following system. It is necessary to clean the dirt timely on the ceramic surface in order to ensure the working performance of the system.



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Shenzhen