LDC40_H01 User Manual

Product Description

Shenzhen Ospri Intelligent Technology Co., LTD

Foreword

Dear Users:

Welcome to use the LDC40 autofocus swing cutting head products 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:

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

Contents

Chapter 1 General Introduction

1.1 Product Parameter

(1) Product parameters, as shown in Table 1.0.

Name	Fiber laser cutting head
Model	LDC40
Connector Type	QBH
Wavelength	1080±10nm
Rated Power	4KW
Focus Length	150mm/200mm
Collimation Length	100mm
Nozzle	FC-02
Focus Range	- 15mm~+15mm -30mm~+30mm
Centering Range	±1.5mm
Focusing Speed	100mm/s
Gas Pressure	≤2 5Mpa
Wobble range	0-3mm
Wobble speed	＜4000mm/s
Weight	9.4KG

Table 1.0

1.2 Cautions

(1) Please wear special fiber laser safety goggles to ensure human safety when running laser cutting machine.

(2) Precautions and standard operations should be taken to prevent burning of 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 it may cause sensor failure.

(4) When processing products with laser, use protective devices 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. 1:

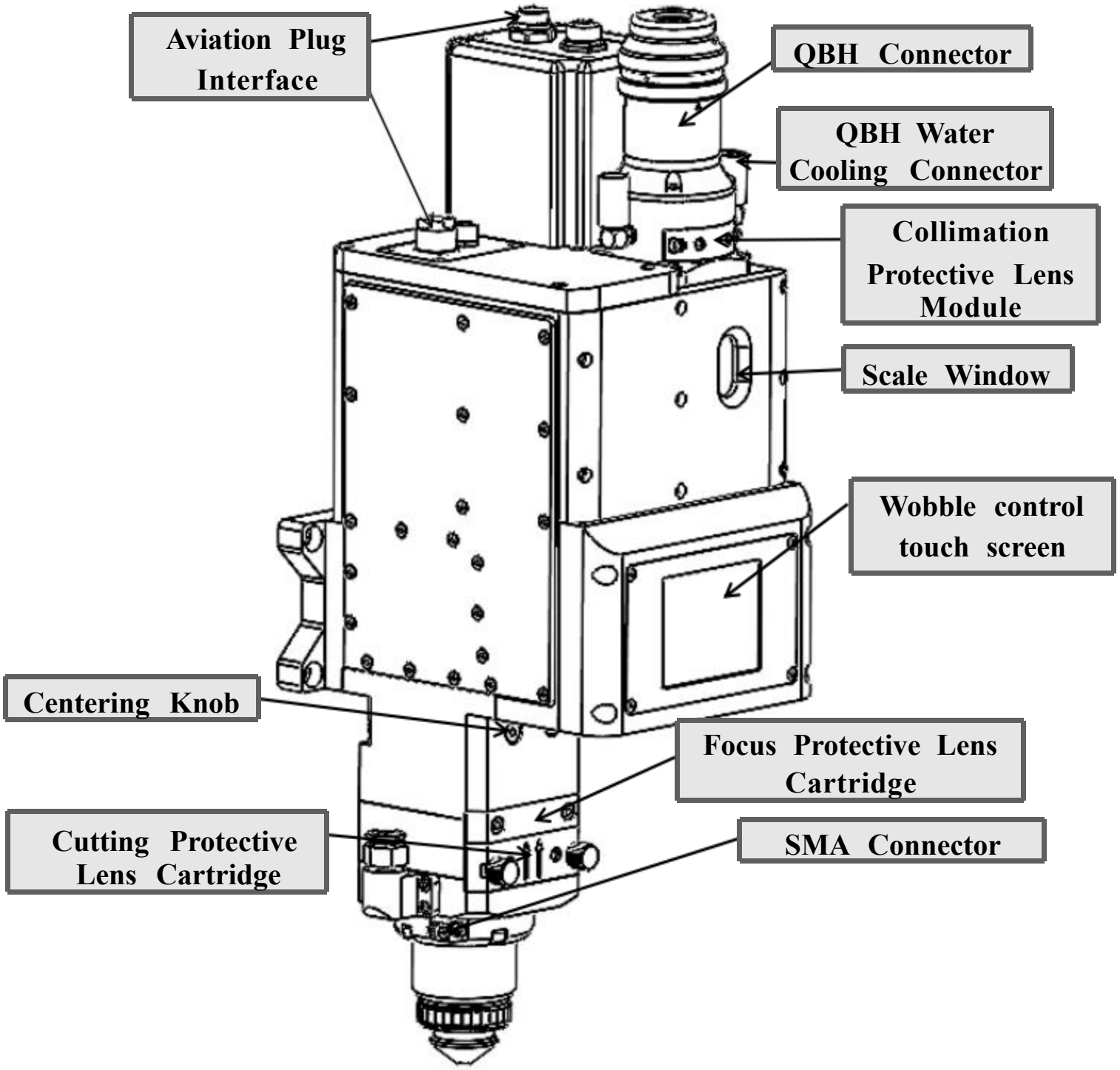


Figure 1.1

2.2 Brief Description of Product Parts

1. Water cooling connector: Cooling for QBH and cutting head.
2. Aviation plug interface: Signal output ports of motor cable, encoder cable and limit cable.
3. Collimation protective lens module: It can avoid the dust from entering into the cutting head for protecting the collimation lenses when pluggin or removing the fiber pigtail.
4. Scale window: Observation window for cutting focus, for reference only.
5. Centering knob: Adjust the center of the light path so that the light beams pass through the center of the nozzle.
6. Focus protective lens cartridge: Protect the focus lens and facilitate fast replacement.
7. Cutting protective lens cartridge: Seal the cutting gas and protect the focus lens.
8. Cutting gas inlet: φ10 mm gas connector for inputting cutting gas, as shown in Figure 1.2.
9. SMA connector: Connect to amplifier.
10. Wobble control touch screen: Control the wobble amplitude and speed.

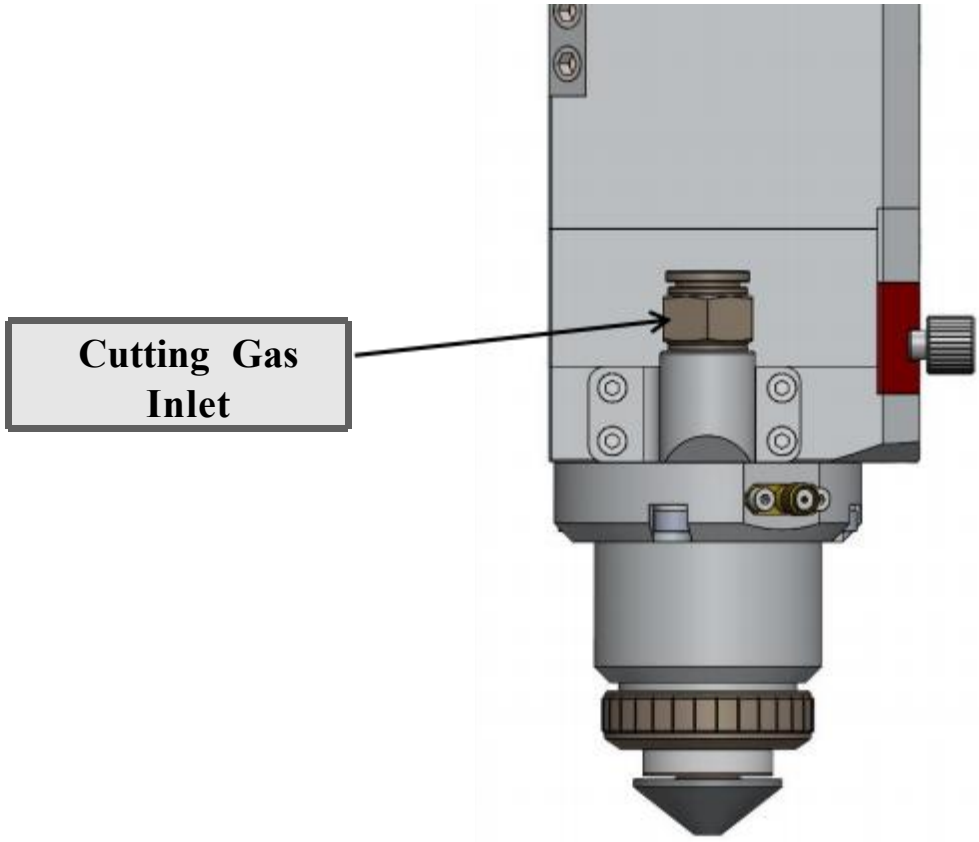
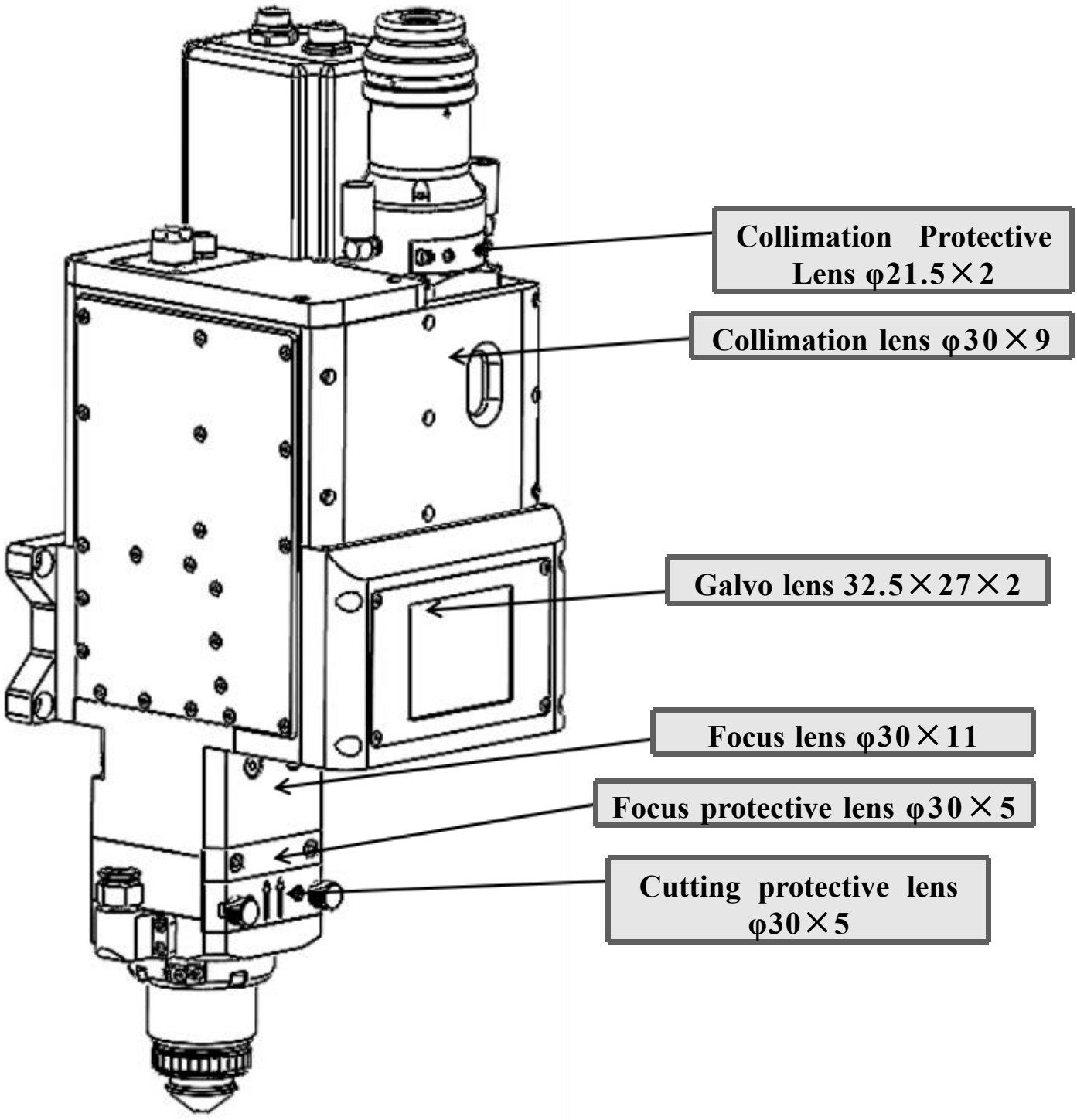


Figure 1.2

2.3 Brief Description of Product Parts (Lens Size)



Chapter 3 Product Installation

3.1 Cutting Head Installation

Dimension drawing of the cutting head (Collimation F100/Focus F150) as shown in Figure 1.3:

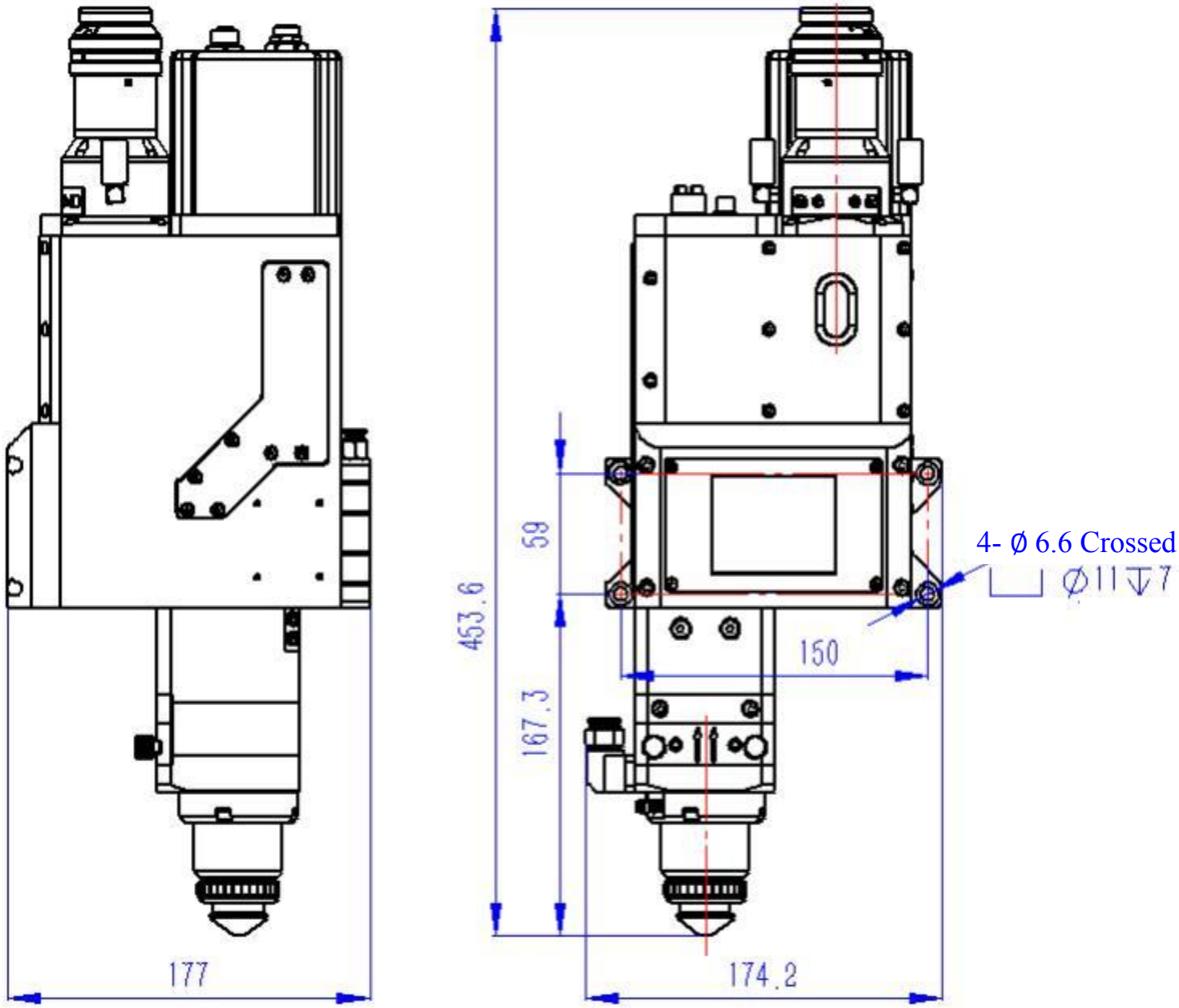


Figure 1.3

3.2 Cutting Head Connection

3.2.1 Cooling Water Connection

① Used for cooling QBH and cutting head, one inlet and one outlet, as shown in Figure 1.4 below:

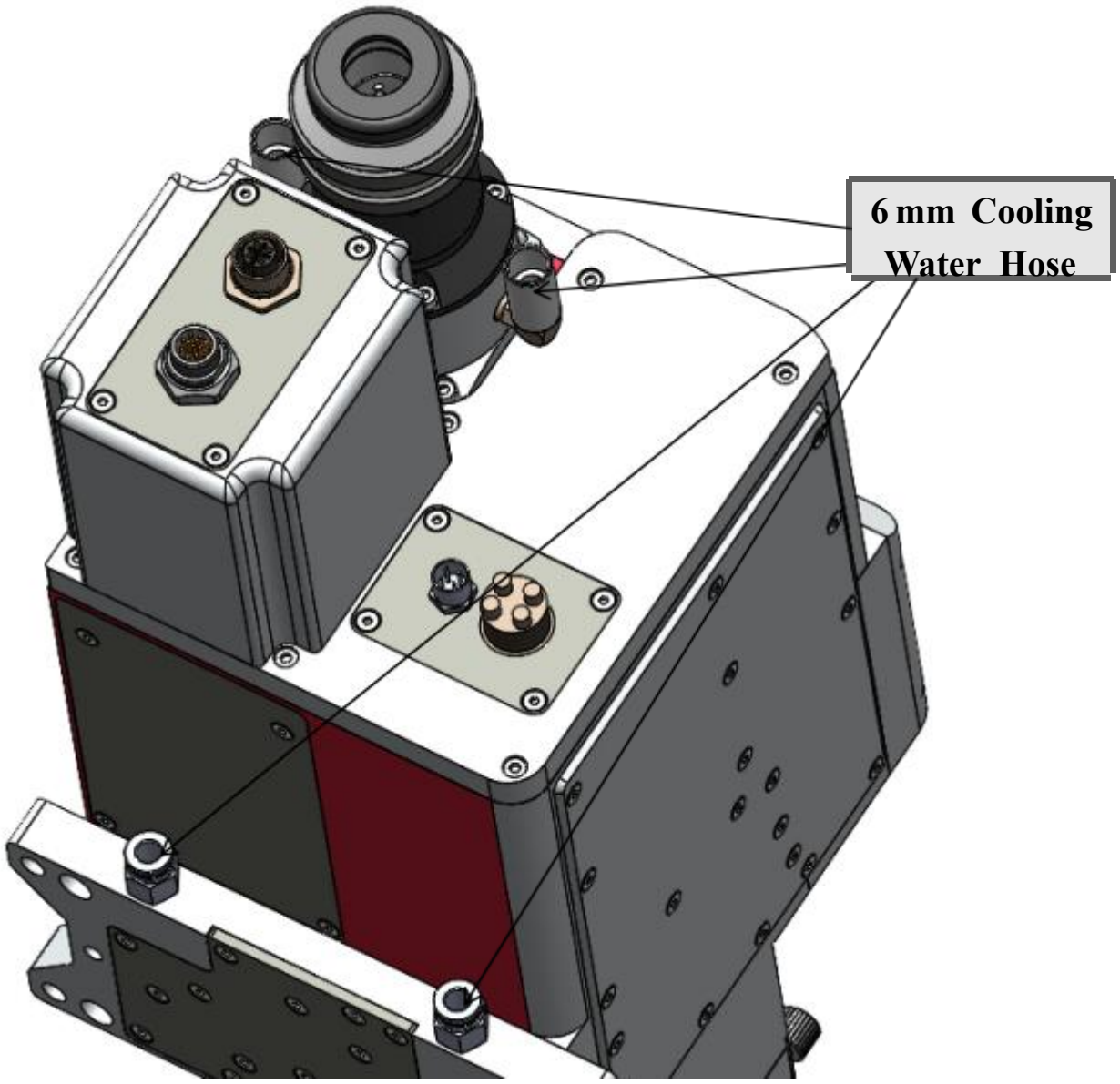


Figure 1.4

3.2.2 Gas Connection

Connect the 10mm air duct inlet as shown in Figure 1.5 for the cutting gas connection. Input pressure <2.5Mpa.
Common gas: Oxygen, nitrogen and compressed air.

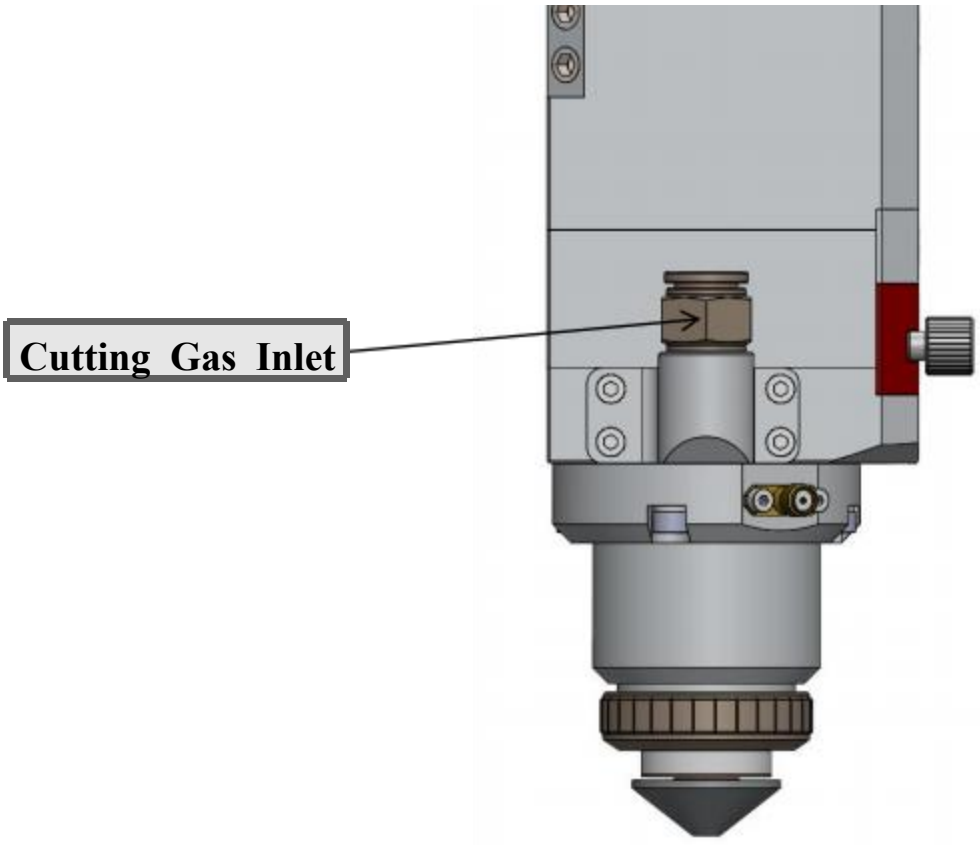


Figure 1.5

Attention: The gas entering the accessory pipe must be filtered and dried, otherwise it will contaminate the protective lens and cause damage to it.

3.3 Wiring Definition and Requirements

3.3.1 Aviation Plug Interface

(1) Ensure that the power supply is cut off before operating the aviation plug, otherwise the motor may be burnt. Pay attention to the position of the holes when connecting the power cable and signal cable to avoid damaging the pins, as shown in the Figure 1.6 below:

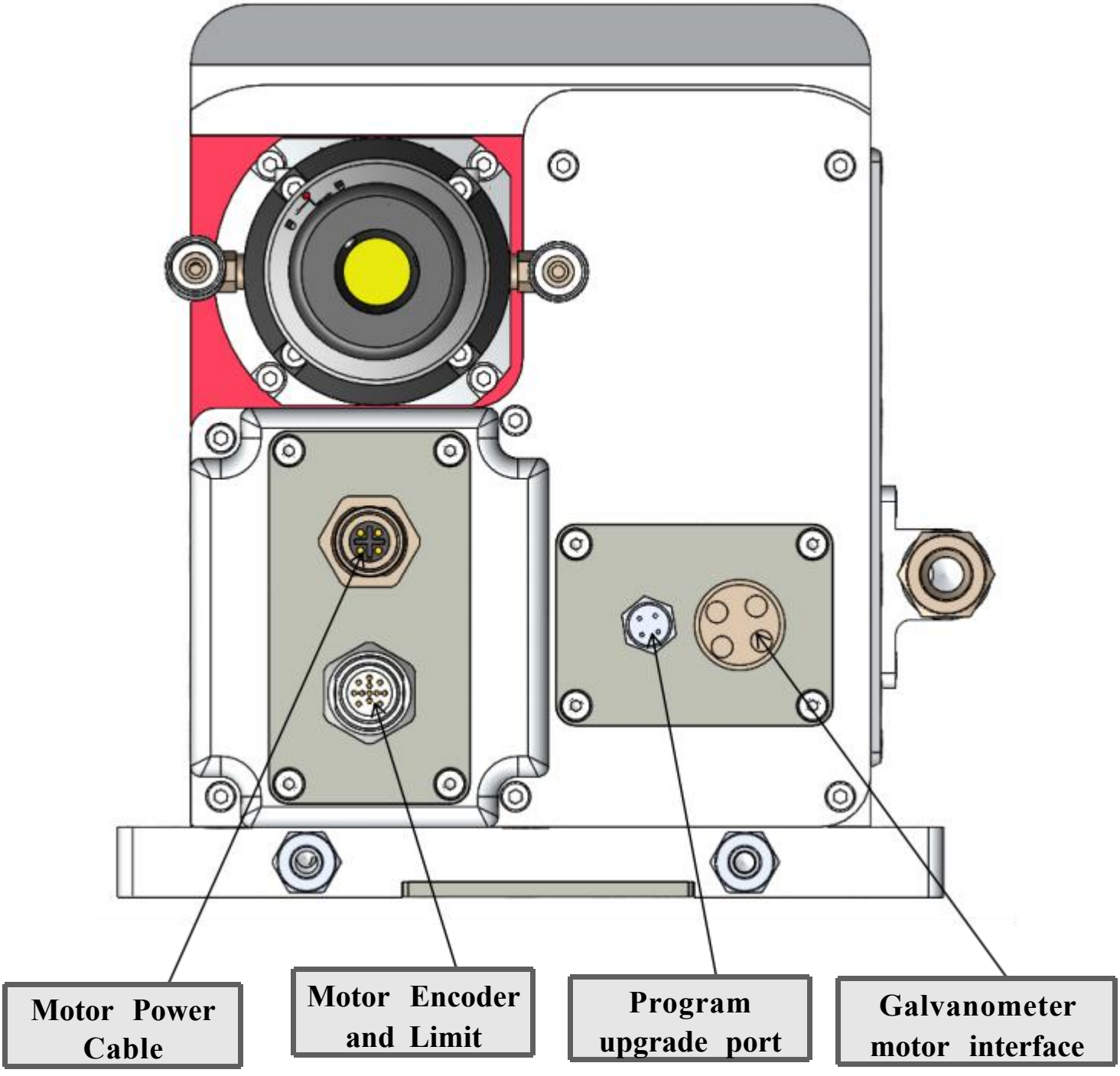


Figure 1.6

3.3.2 Wiring Definition

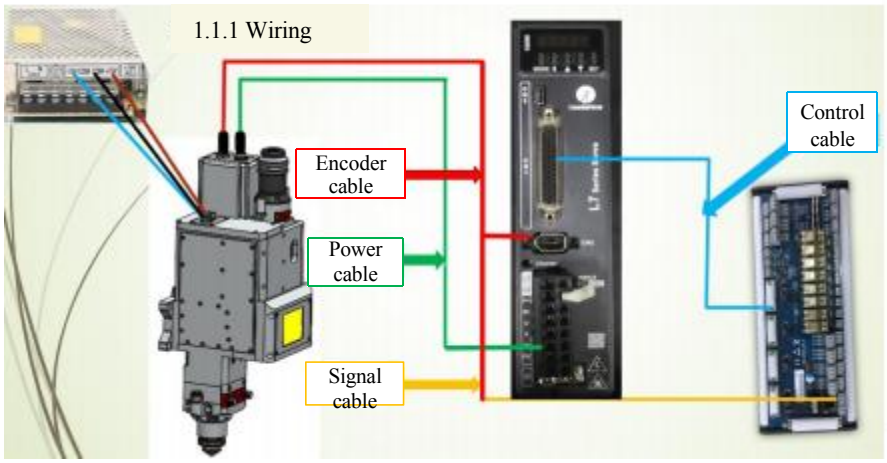


Figure 1.7

① Wiring diagram, as shown in Figure 1.7.

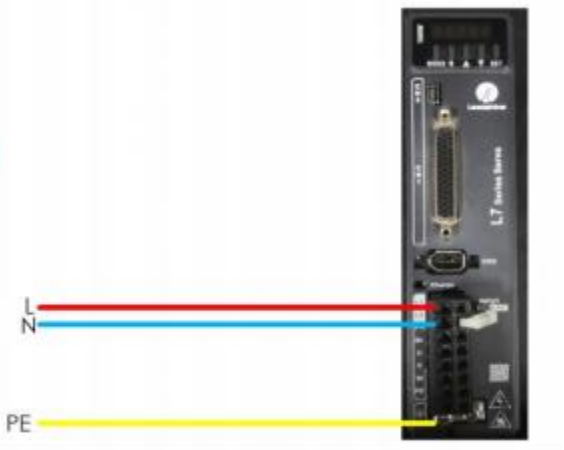


Figure 1.8

② Power cable wiring of servo drive (single phase 220V), as shown in Figure 1.8.

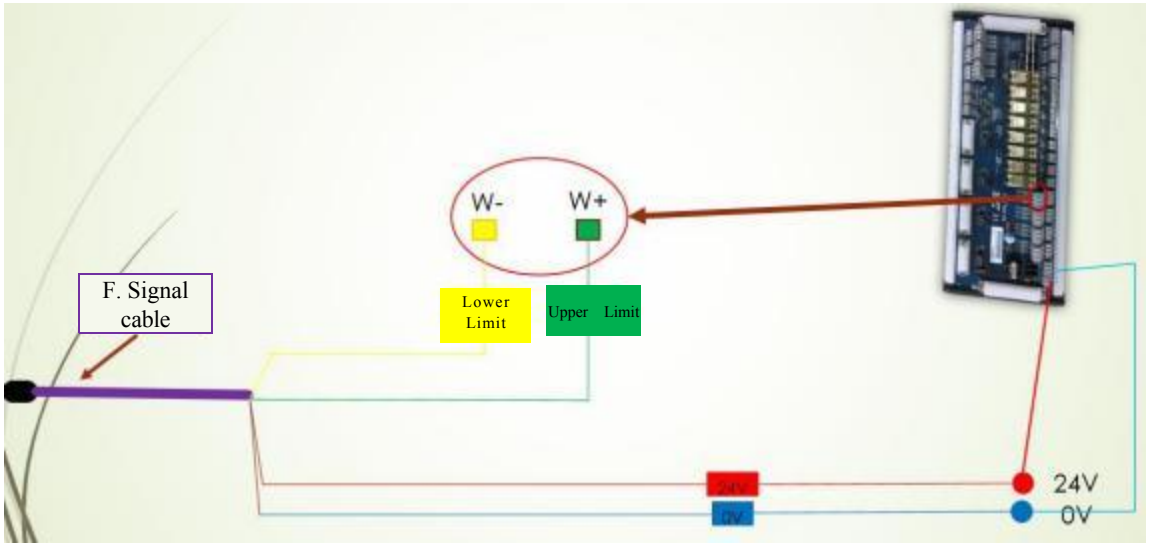


Figure 1.9

③ Signal cable wiring, as shown in Figure 1.9.

(4) Wiring diagram of galvanometer motor, as shown in Figure 2.0.

Brown—— +15V
Blue —— - 15V
Black —— COM
Yellow/ green—— PE

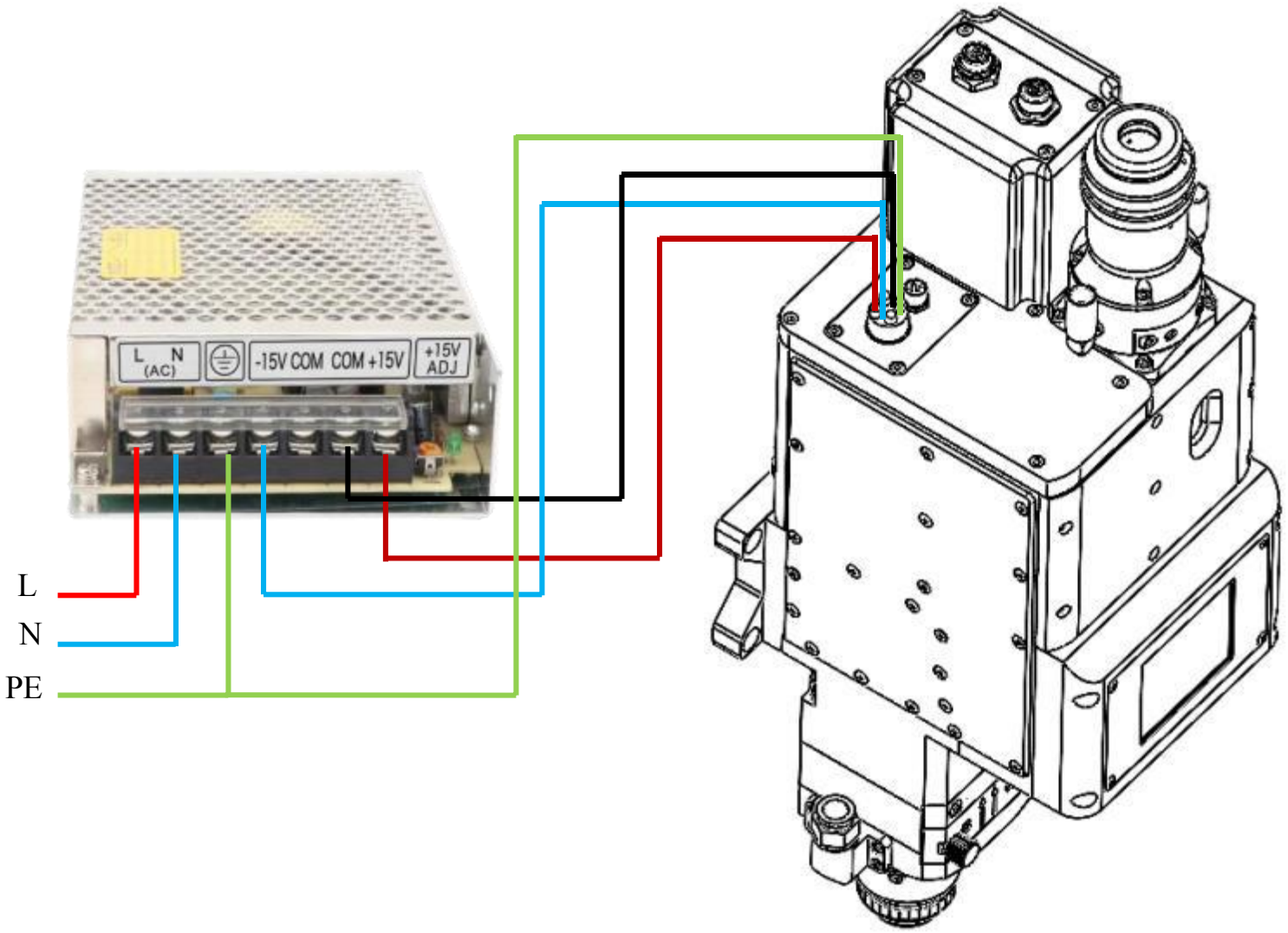


Figure 2.0

3.3.3 Drive IO Connection and Parameter Setting

(1) Cypcut's open-loop IO wiring, as shown in Figure 2.0

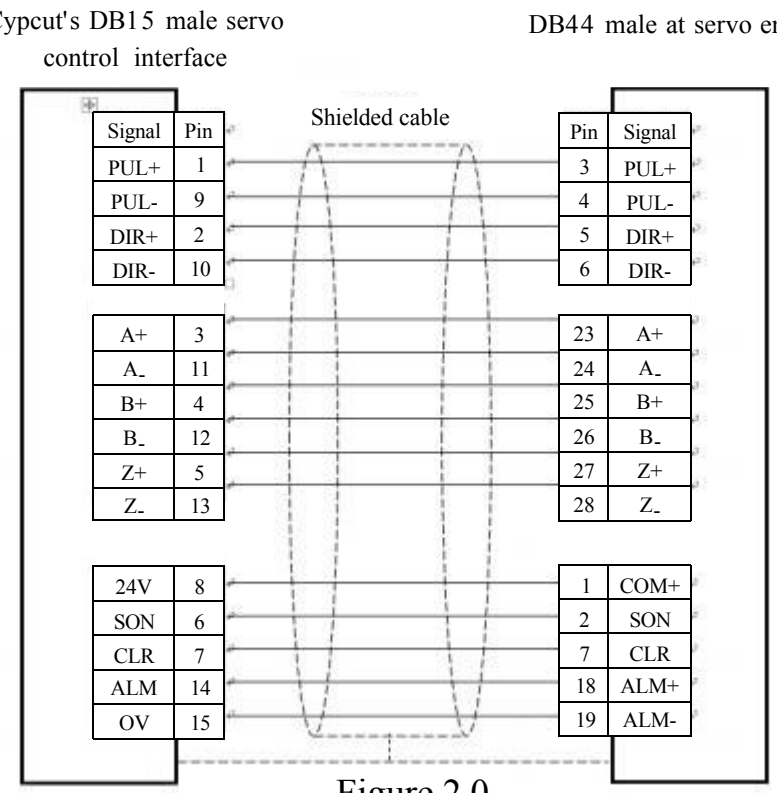


Figure 2.0

(2) Open-loop card parameter settings, as shown in the table.

S/N	Value	Content
PA001	0	Position mode
PA003	18	Rigidity class
PA004	150	Inertia ratio
PA006	0	Rotation direction
PA007	3	Pulse train pattern
PA008	10000	Number of pulses required per circle of motor rotation
PA011	2500	Number of output pulses per circle of motor rotation
PA400	3	Servo enabled
PA410	1	Alarm output signal

(3) Weihong open-loop IO wiring, as shown in Figure 2.1.

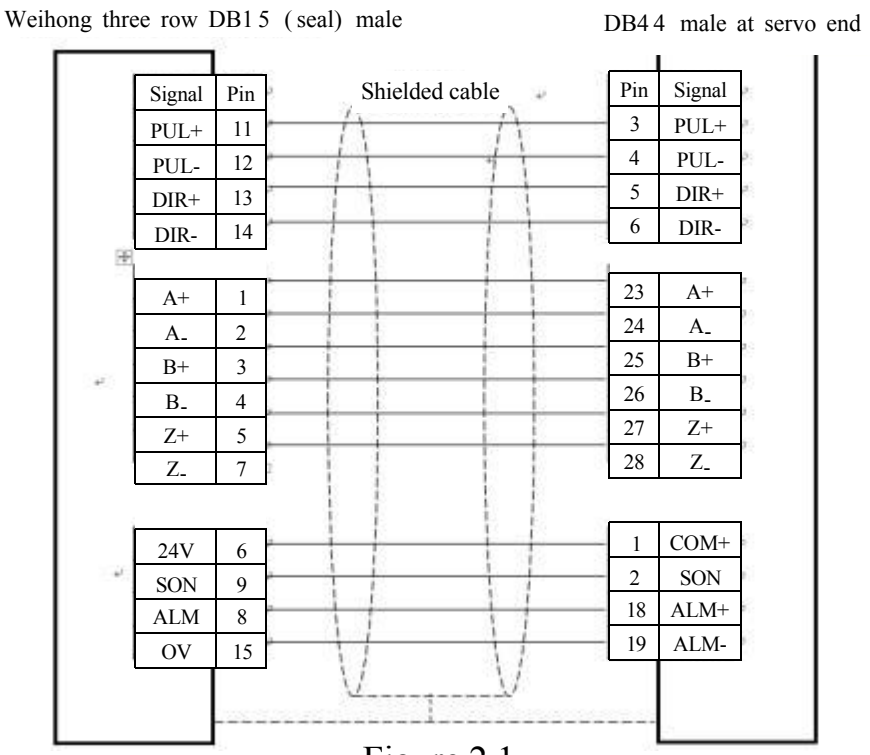
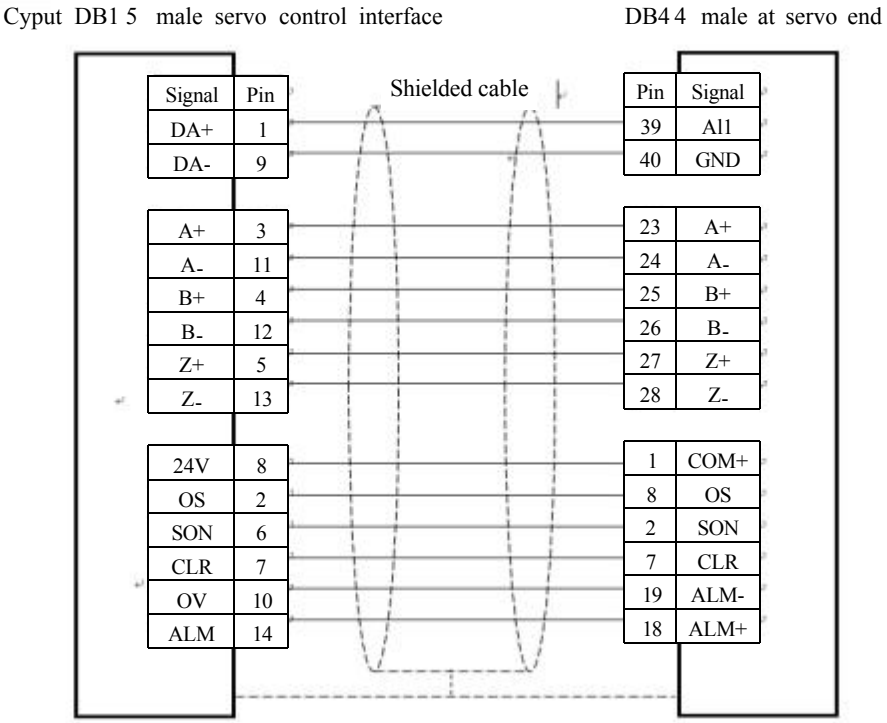


Figure 2.1

(4) Open-loop card parameter settings, as shown in the figure below.

S/N	Value	Content
PA001	0	Position mode
PA003	18	Rigidity class
PA004	150	Inertia ratio
PA006	0	Rotation direction
PA007	3	Pulse train pattern
PA008	10000	Number of pulses required per circle of motor rotation
PA011	2500	Number of output pulses per circle of motor rotation
PA400	3	Servo enabled
PA410	1	Alarm output signal

(5) Cypcut closed-loop card IO wiring as shown in the figure.

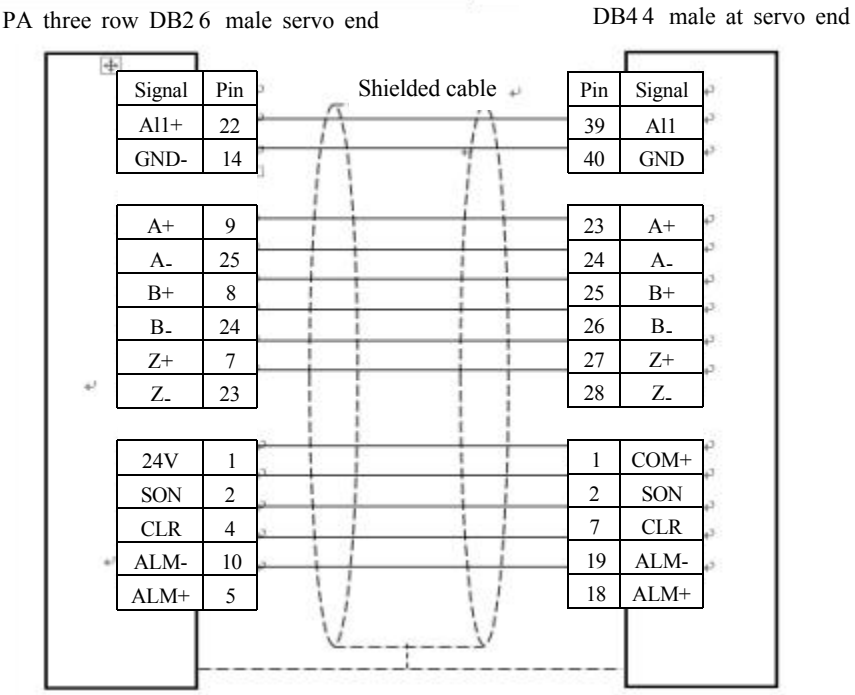


(6) Closed-loop card parameter settings as shown in the table.

S/N	Value	Content
PA001	1	Speed mode
PA003	18	Rigidity class
PA004	150	Inertia ratio
PA008	10000	Number of pulses required per circle of motor rotation
PA011	2500	Number of output pulses per circle of motor rotation
PA012	0	Encoder direction
PA300	0	Speed mode selection
PA303	0	Motor rotation direction
PA302	500	Rotation speed corresponding to 1V
PA312	0	Acceleration time
PA313	0	Deceleration time
PA315	1	Zero-speed function selection
PA400	3	Servo enabled
PA402	91	Zero-speed clamp

During inching, if the focus has no response and the system displays an alarm, but the drive has no alarm, change PA402 to 11

(5) PA closed-loop card IO wiring as shown in the figure.



(6) Closed-loop card parameter settings as shown in the table.

S/N	Value	Content
PA001	1	Speed mode
PA003	18	Rigidity class
PA004	150	Inertia ratio
PA008	10000	Number of pulses required per circle of motor rotation
PA011	2500	Number of output pulses per circle of motor rotation
PA012	0	Encoder direction
PA300	0	Speed mode selection
PA303	0	Motor rotation direction
PA302	500	Rotation speed corresponding to 1V
PA312	0	Acceleration time
PA313	0	Deceleration time
PA315	1	Zero-speed function selection
PA400	3	Servo enabled
PA402	91	Zero-speed clamp

During inching, if the focus has no response and the system displays an alarm, but the drive has no alarm, change PA402 to 11

(7) Bus drive parameters, as shown below.

S/N	Value	Content
PA001	9	Control mode
PA003	18	Rigidity class
PA004	150	Inertia ratio
PA006	0	Motor rotation direction
PA008	10000	Number of pulses required per circle of motor rotation
PA011	2500	Number of output pulses per circle of motor rotation
PA023	5	Slave station
PA024	1	Slave station source

Note: If using the electronic gear ratio, the numerator is 131072, and the denominator is 10000.

3.4 QBH Fiber Connection

① Put the cutting 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 2.2:

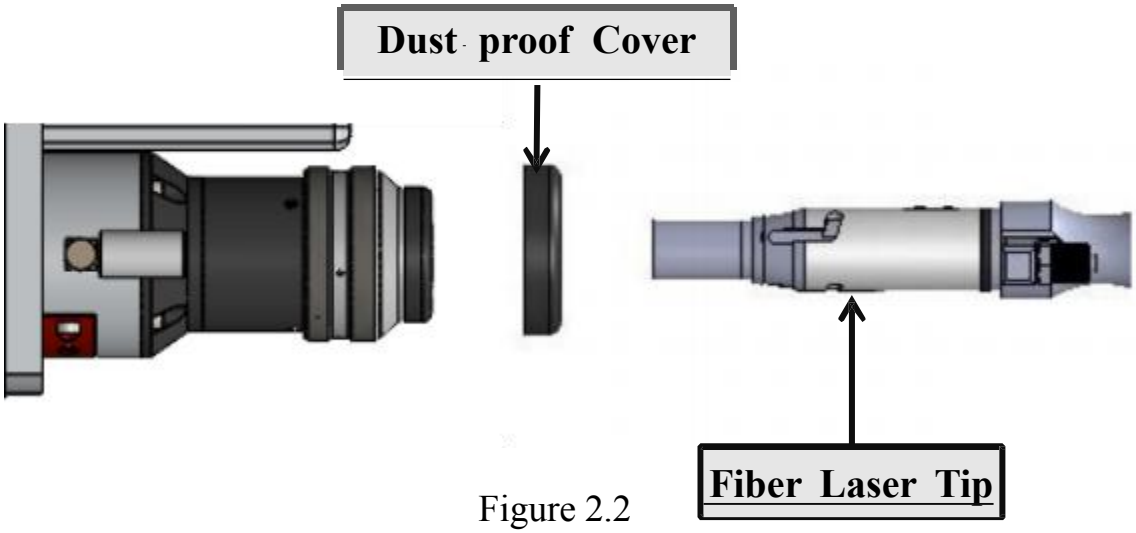


Figure 2.2

② Cover the dust-proof cover which is in the white accessory box, onto the fiber laser tip, as shown in Figure 2.2:

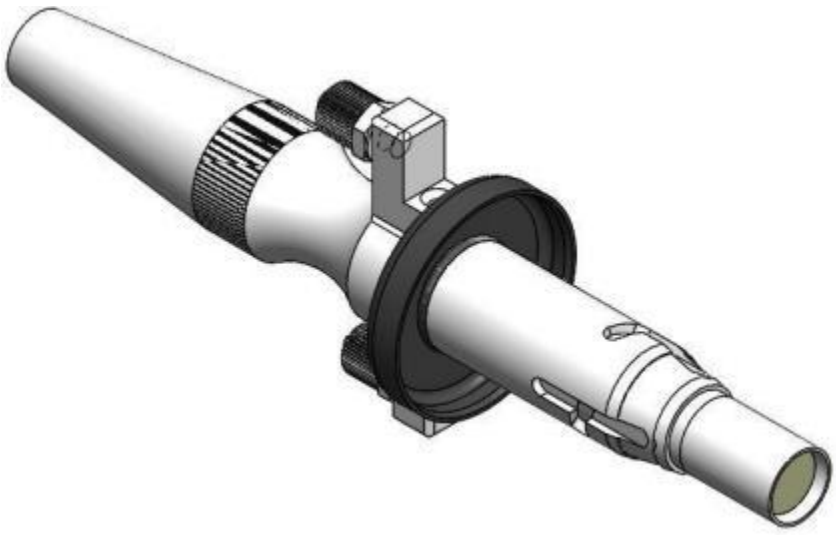


Figure 2.3

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

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 2.4:

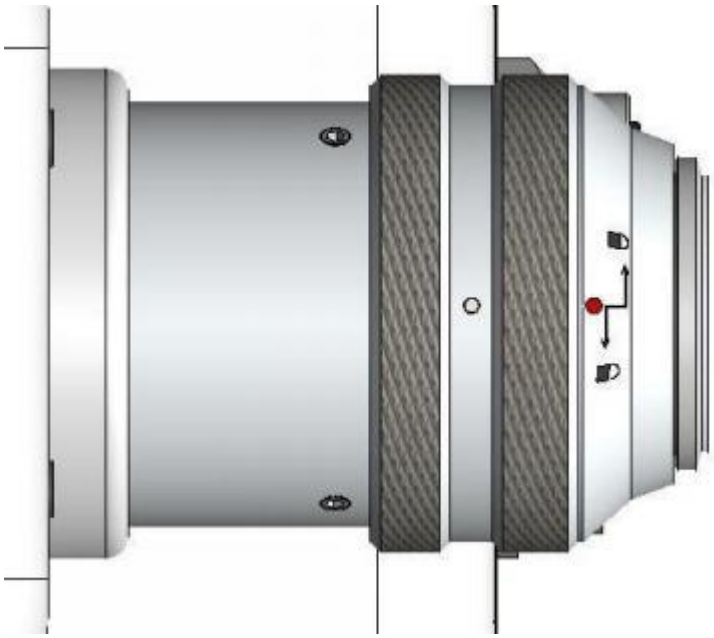


Figure 2.4

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 2.5:

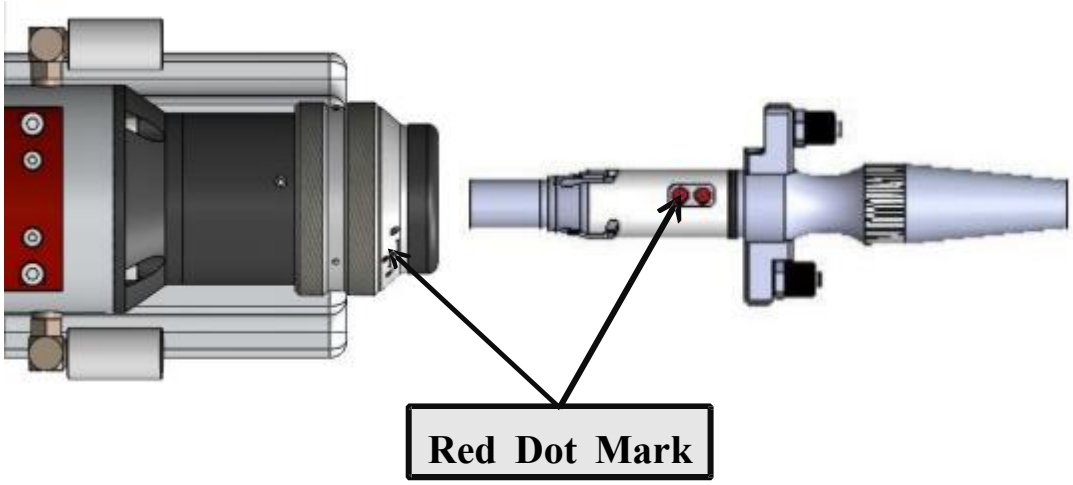
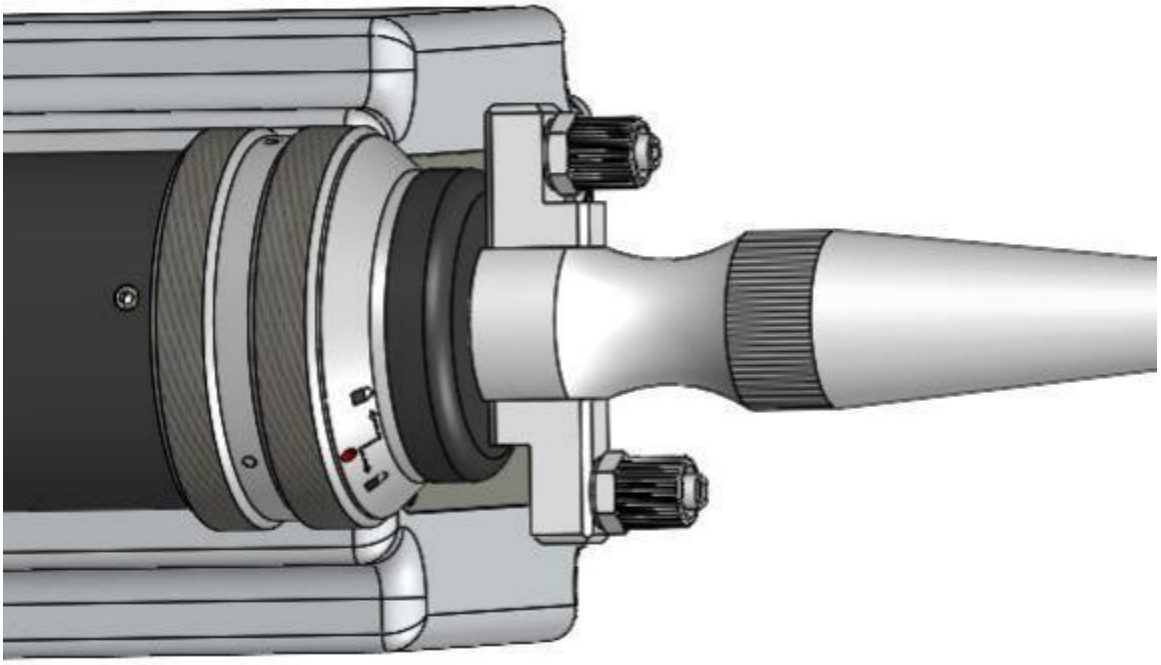


Figure 2.5

⑤ Turn the QBH connector to the locked state, that is, 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 tip is compressed tightly. (Clockwise: toward the direction of the "locked" icon). Do not twist with great force, otherwise the internal structure of the QBH may be damaged.



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

Chapter 4 Product Debugging

4.1 Focusing Instruction

Focusing scale reset - First reset the 4th axis after powering on the machine tool to ensure the focus of the focusing scale is at the zero point, specifically as follows:

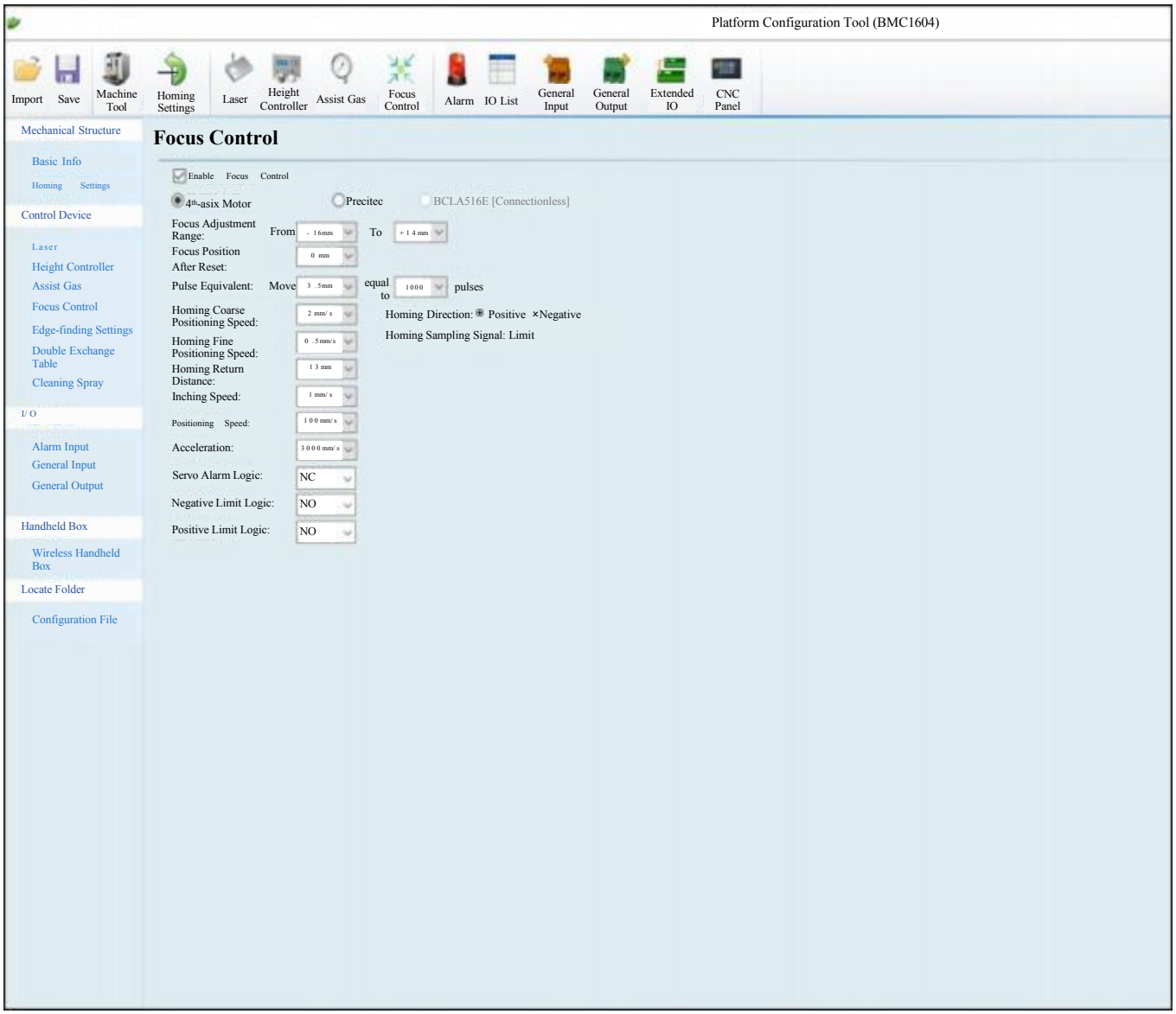


Figure 3.4

① Open the software configuration platform, set the focus retraction distance to 30mm (can be slightly adjusted according to the actual conditions) to ensure that the focus is at the zero point (taking Cypcut as an example), as shown in Figure 3.4.

Attention: The return distance can be slightly adjusted according to the actual cutting focus.

② After setting, open the cutting software and reset the focus to observe whether the focus moves, as shown in Figure 3.5:

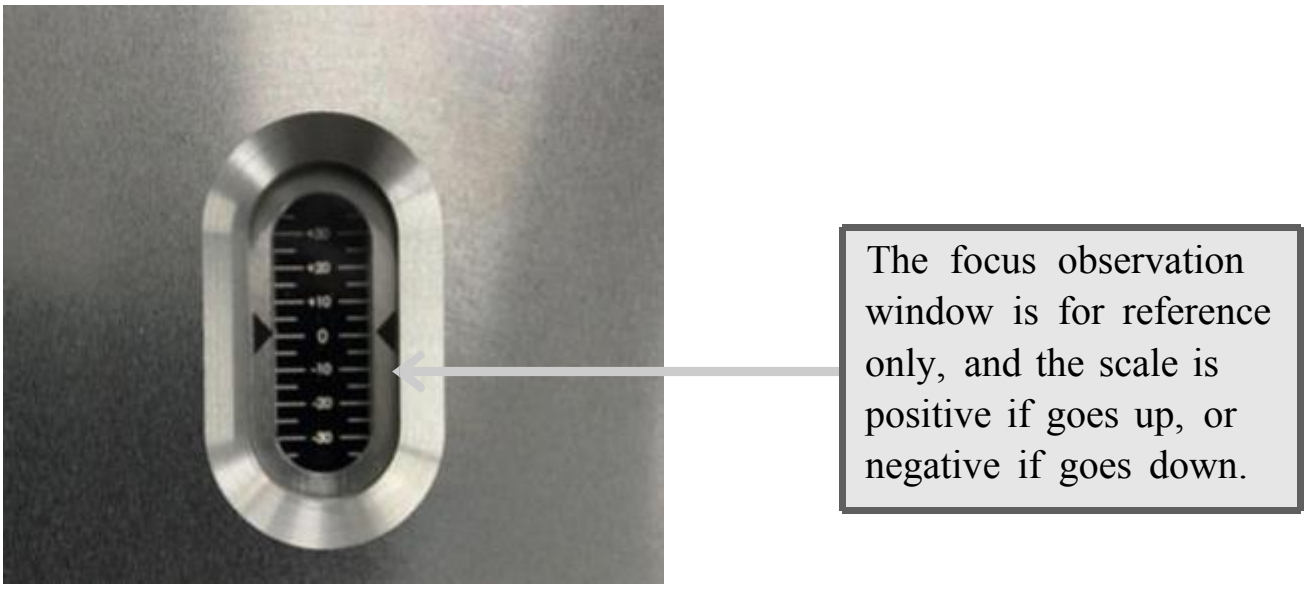


Figure 3.5

Attention: The scale numbers are for reference only, and the actual zero point shall be subject to the actual focus. If looking vertically when the pointer returns to the origin, it must coincide with the zero point.

4.2 Focus Centering Instructions

① To achieve good joint-cutting effect, the laser beam must be kept in the center of the nozzle. When it deviates from the center of the nozzle, it needs to be adjusted through the beam centering module, as shown in Figure 3.6 below.

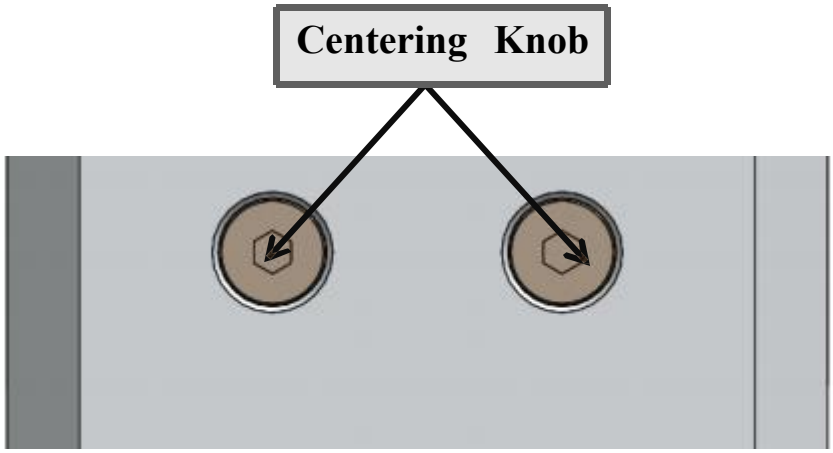


Figure 3.6

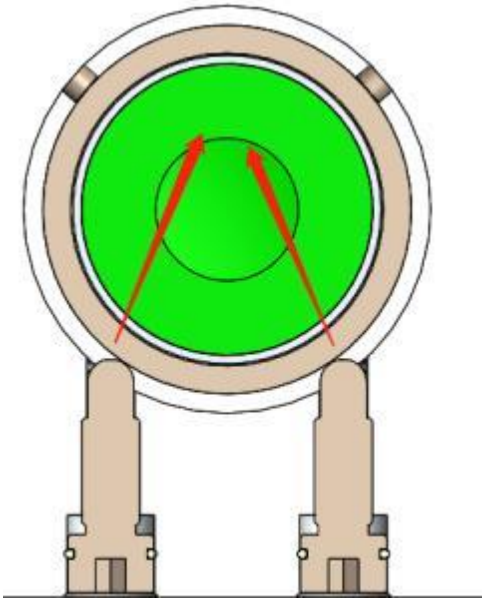


Figure 3.7

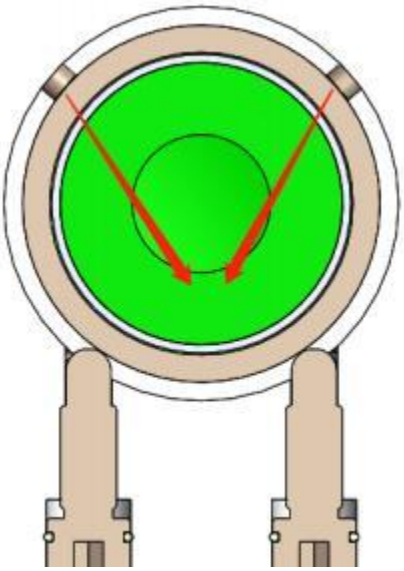


Figure 3.8

Attention: When the centering knob rotates clockwise, the center direction of the lens is shown in Figure 3.7. When the centering knob rotated counterclockwise, the center direction of the lens is shown in Figure 3.8.

4.3 Introduction to Touch Screen Operation Interface

4.3.1 Main Interface (Chinese)

ON/OFF: Click to turn on/off the set spot pattern;

Power-off Save: Click to save the set spot parameters;

Spot Pattern: Click to adjust the cutting pattern, including circle-shape, linear-shape, triangle-shape, and square-shape;

Spot Size: This field is used to set the spot output diameter, ranging from 0 to 5 mm.

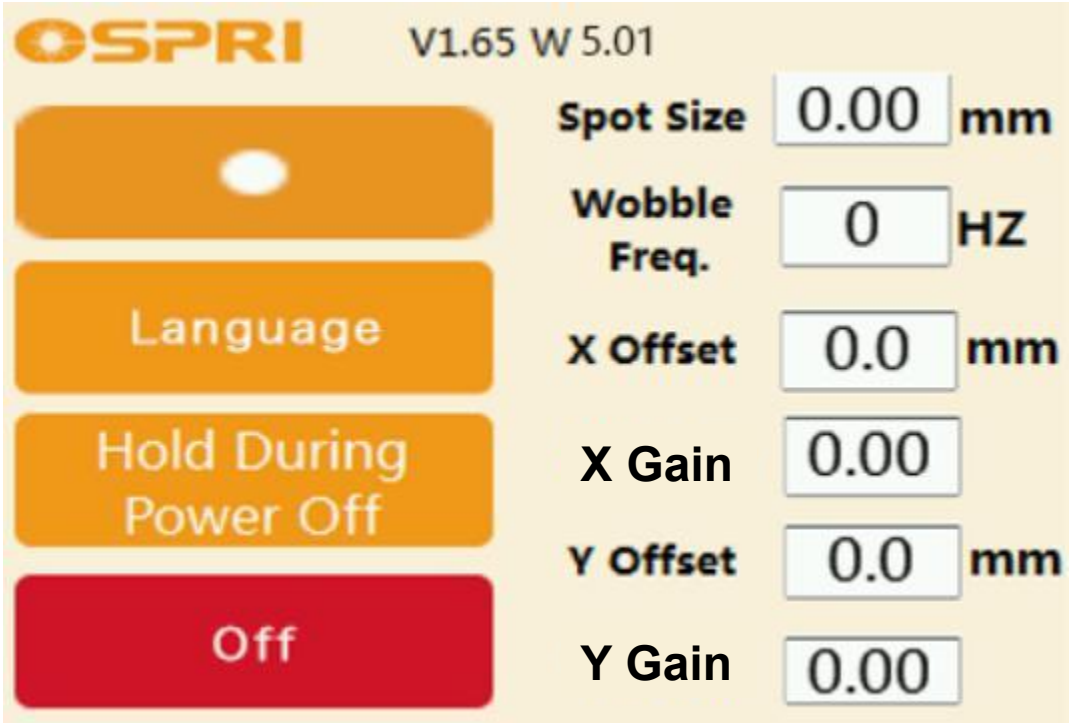
Wobble Frequency: This field is used to set the wobble frequency of galvo motor, with the setting range of ≤1200 Hz.

X/Y Offset: This field is used to adjust the position of the focus center;

X/Y Gain: This field is used to adjust the spot size;

Language: This field is used to adjust the language of the main interface. Currently, the product only supports three languages, i.e. Chinese, English and Korean.

4.3.2 Main Interface (English)



4.4 Introduction to Touch Screen (External 7-inch Screen) Operation Interface

1. Main interface

ON/OFF: Click to turn on/off the set spot pattern;

Power-off Save: Click to save the set spot parameters;

Spot Pattern: Click to adjust the cutting pattern, including circle-shape, linear-shape, triangle-shape, and square-shape;

Spot Size: This field is used to set the spot output diameter, ranging from 0 to 5 mm.

Wobble Frequency: This field is used to set the wobble frequency of galvo motor, with the setting range of ≤1200 Hz.

X/Y Offset: This field is used to adjust the position of the focus center;

X/Y Gain: This field is used to adjust the spot size;

Language: This field is used to adjust the language of the main interface. Currently, the product only supports three languages, i.e. Chinese, English, Korean and Spanish;

Program Group: There are 8 groups of process parameters, which can be selected manually or switched through the external IO.


SPRI
V2.1
W5.01
Spot size
0.00
mm
Wobble Frep
0
HZ
Power off save
X axis offset
0.0
mm
OFF
Y-axis offset
0.0
mm
Language selecti
X-axis gain in
1.0
english
Y-axis gain in
1.0
parameter group
0

Chapter 5 Product Maintenance

5.1 Maintenance and Replacement 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 drawer to check the lens. Before checking, use a clean cloth dampened with alcohol to wipe the exterior clean.

5.1.1 Disassembly of collimation protective lens, as shown in Figures 3.9 and 4.0 below.

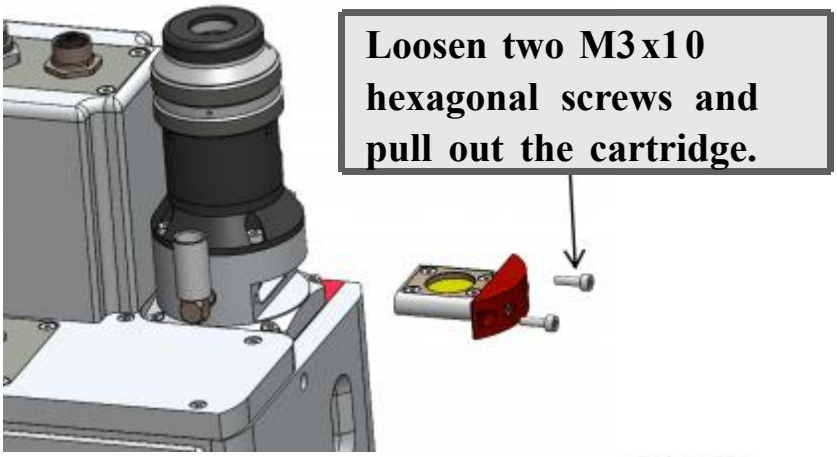


Figure 3.9

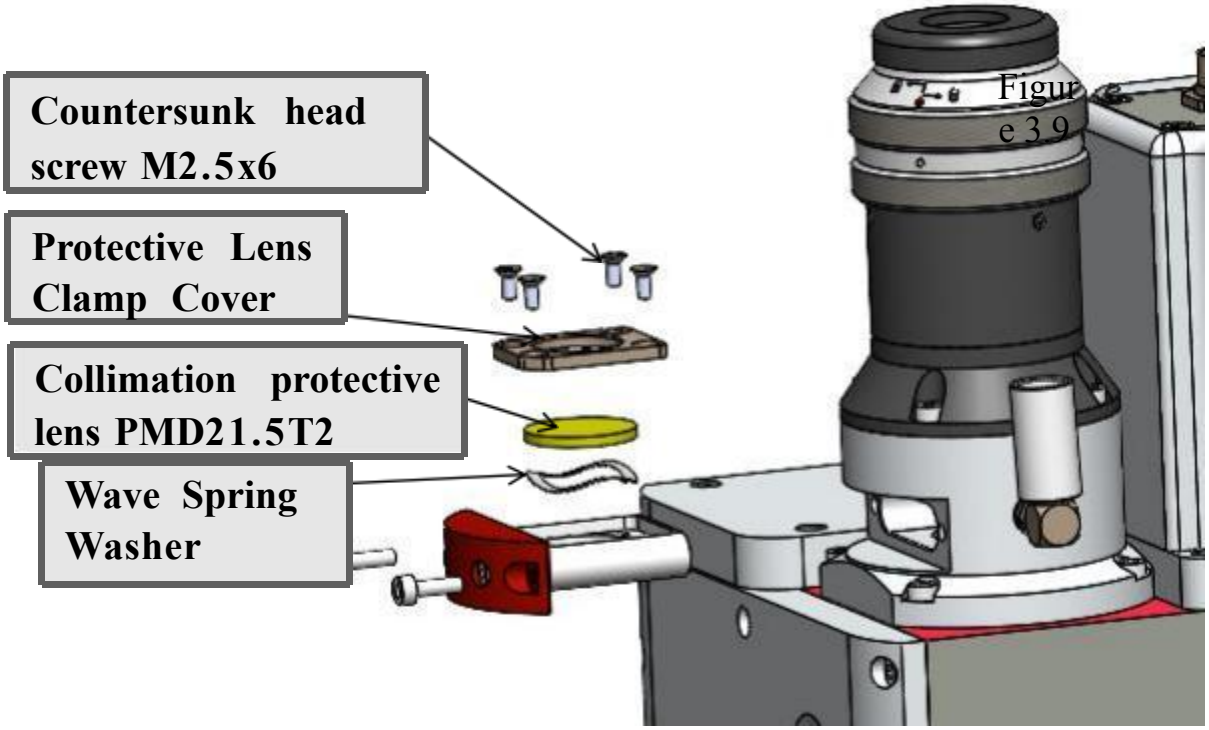


Figure 4.0

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 (PMD37T7), as shown in Figures 4.1 and 4.2 below.

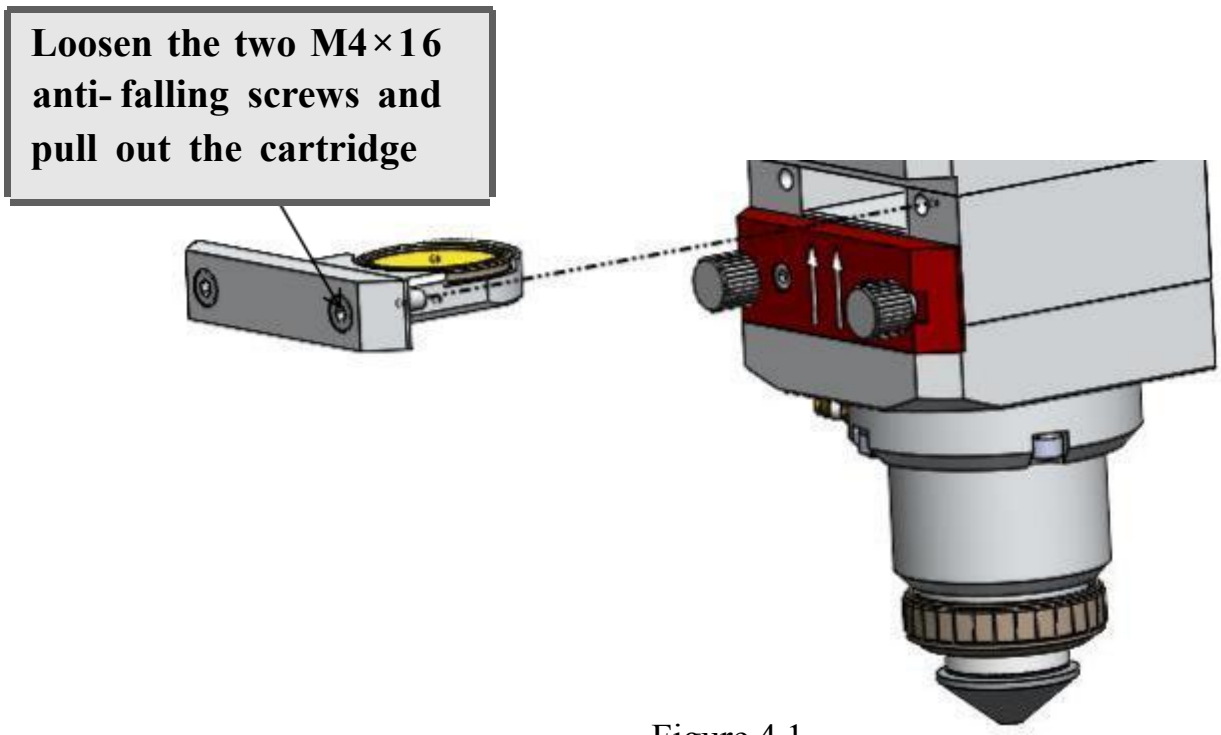


Figure 4.1

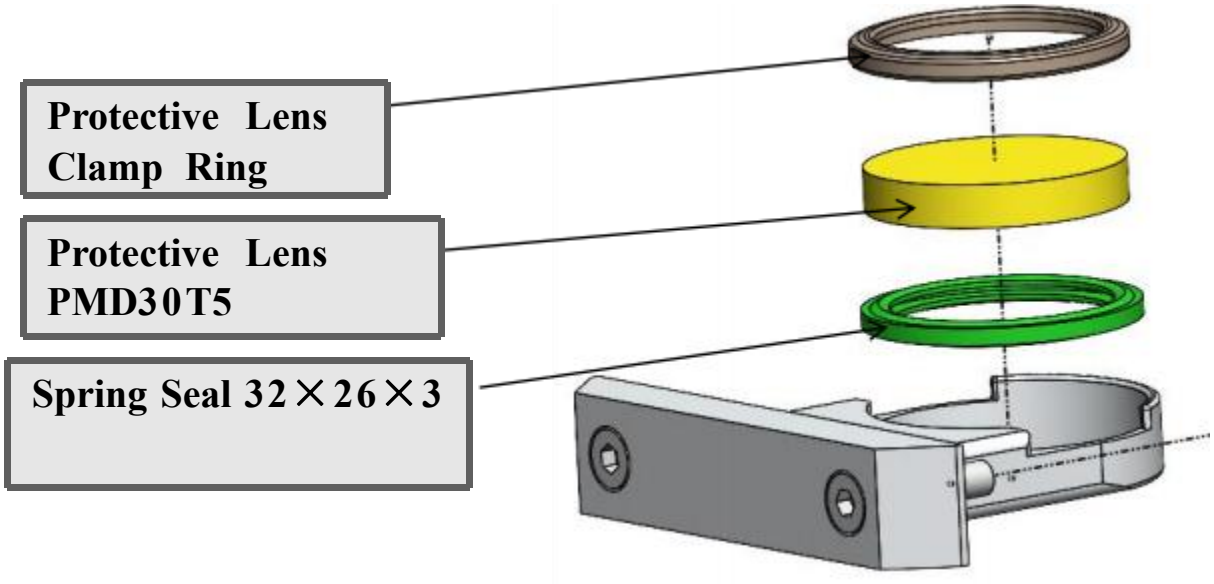


Figure 4.2

5.2 Maintenance and Replacement of Collimation Lens

5.2.1 Disassembly of Collimation Lens

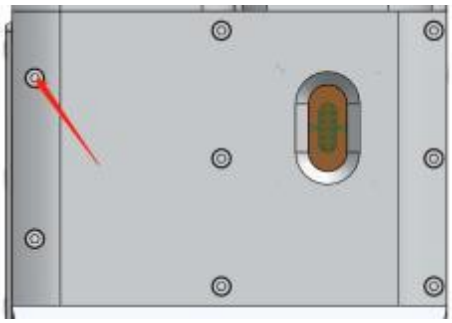


Figure 4.3

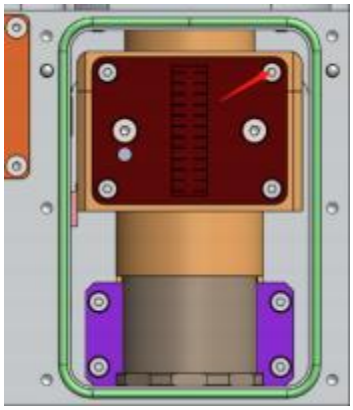


Figure 4.4

Loosen the six M3*8 screws in sequence as shown above, and then loosen the M2.5*8 screws, as shown in Figures 4.3 and 4.4; and pull out the collimation lens cartridge for maintenance. Please mind the proper direction of collimation lens when assembling it.

5.2.2 Cleaning of Collimation Lens

Figure 4.5

Figure 4.6

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 both sides 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 4.5.

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 4.6.

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.

5.3 Maintenance of Cutting Protective Lens

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

5.3.1 Disassembly of Protective Lens

Loosen the thumb screws with hand, hold the screws and slowly pull out the focus protective lens assembly, and move it to a clean and dust-free environment, as shown in Figure 5.0. The detailed diagram of replacing lens is as shown in Figure 5.1.

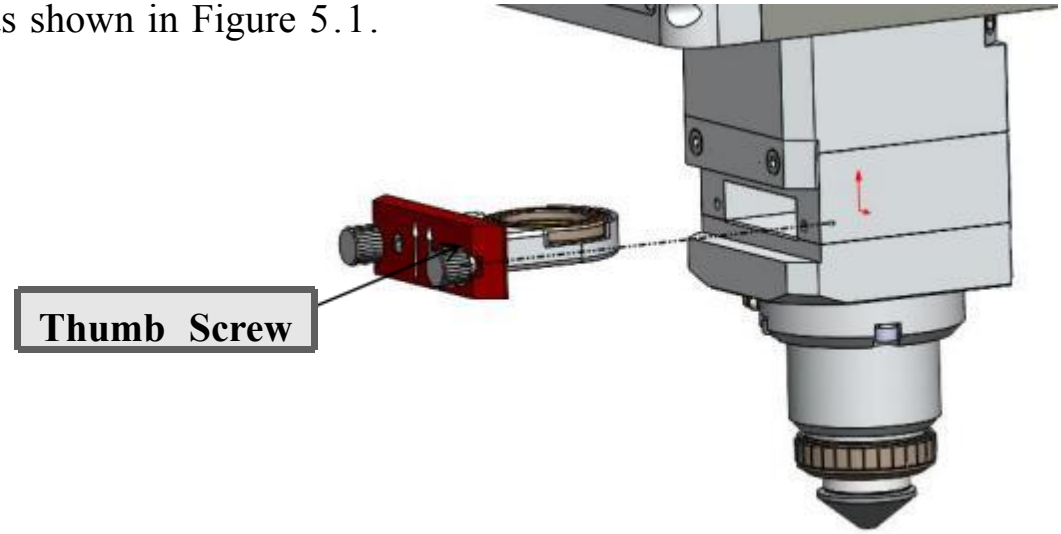


Figure 5.0

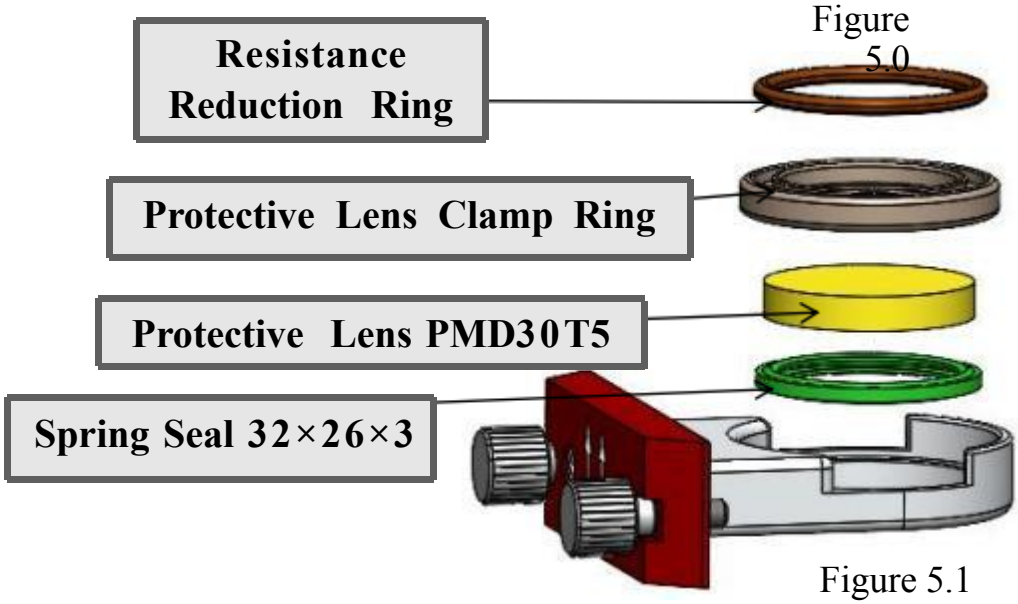


Figure 5.1

The assembly sequence is as shown in the figure above

5.4 Cleaning of Protective Lens

Figure 5.2

Figure 5.3

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 both sides 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 5.2.

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 5.3.

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. The focus lens, collimation lens and cutting lens are generally forbidden to be disassembled. If lenses may be contaminated, users can first test the lenses with ceramic piece, or contact with our technical staff if necessary.

5.5 Maintenance of Sensor Parts

Ceramic ring is a vulnerable part but can be replaced after damage. It shall be aligned with the two locating pins of the body in the process of installation. Otherwise, the ceramic ring 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 part. It is a vulnerable part through the connection of the thread and the body. After working for a period of time, it is necessary to remove the bonded slag in time and replace it in time when the burning loss is serious.

After assembling the ceramics, the locking nut should be tightened and the evenly exposed ceramic is about 2-3 mm.

The following cautions should be taken in the operation:

① Dry and clean auxiliary gas should be used when cutting. If there is water, oil and other impurities in the gas, the mutations may occur at working clearance, even causing 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 should be cleaned after being defaced, with clean and dry cotton wipers. Do not use liquid to clean the cutting head and ceramic, and then connect to the proper assembly after cleaning.

③ The ceramic ring can be replaced after being damaged. Initialization of electrical system together with the amplifier should be conducted through a reset operation.

④ Prescriptive cutting nozzle should be used because the shape and size of it would directly affects the characteristics of the sensor.

5.5.1 Replacement of Nozzle and Ceramic Ring

① Remove the nozzle counterclockwise, as shown in Figure 5.4.

② Remove the ceramic clamp ring counterclockwise, as shown in Figure 5.4.

③ Remove the ceramic ring vertically downward, as shown in Figure 5.4.

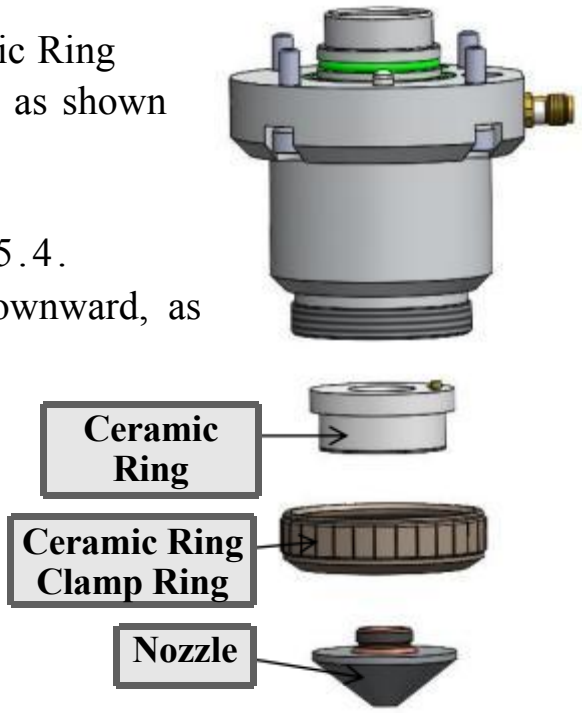


Figure 5.4

5.5.2 Cleaning of Ceramic Ring

① Take out the ceramic ring and clean it with anhydrous alcohol or isopropyl alcohol, as shown in Figure 5.5.

② Spray isopropyl alcohol onto the dust-free swab, remove the ceramic ring and clean it with the swab, as shown in Figure 5.6.

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.

Figure 5.5

Figure 5.6

Figure 5.7

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

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