Instruction Manual for LCN03A0 Fiber Laser Cutting Head

Product Description

Shenzhen Ospri Intelligent Technology Co., LTD

Foreword

Dear Users:

Welcome to use LCN03 optical fiber laser 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: Overview

1.1 Product Parameters

Name	Fiber Laser Cutting Head
Model	LCN03A0
Interface types	QBH
Applicable Wavelength	1080±10nm
Rated power	3KW
Focal Length	125 mm/150mm
Collimating Focal Length	100 mm
Nozzle	Various Models and Specifications
Focus Adjustment Range	-7 mm～+6mm
Alignment Adjustment Range	±1mm
Gas Pressure	≤3Mpa
Weight	1.99KG

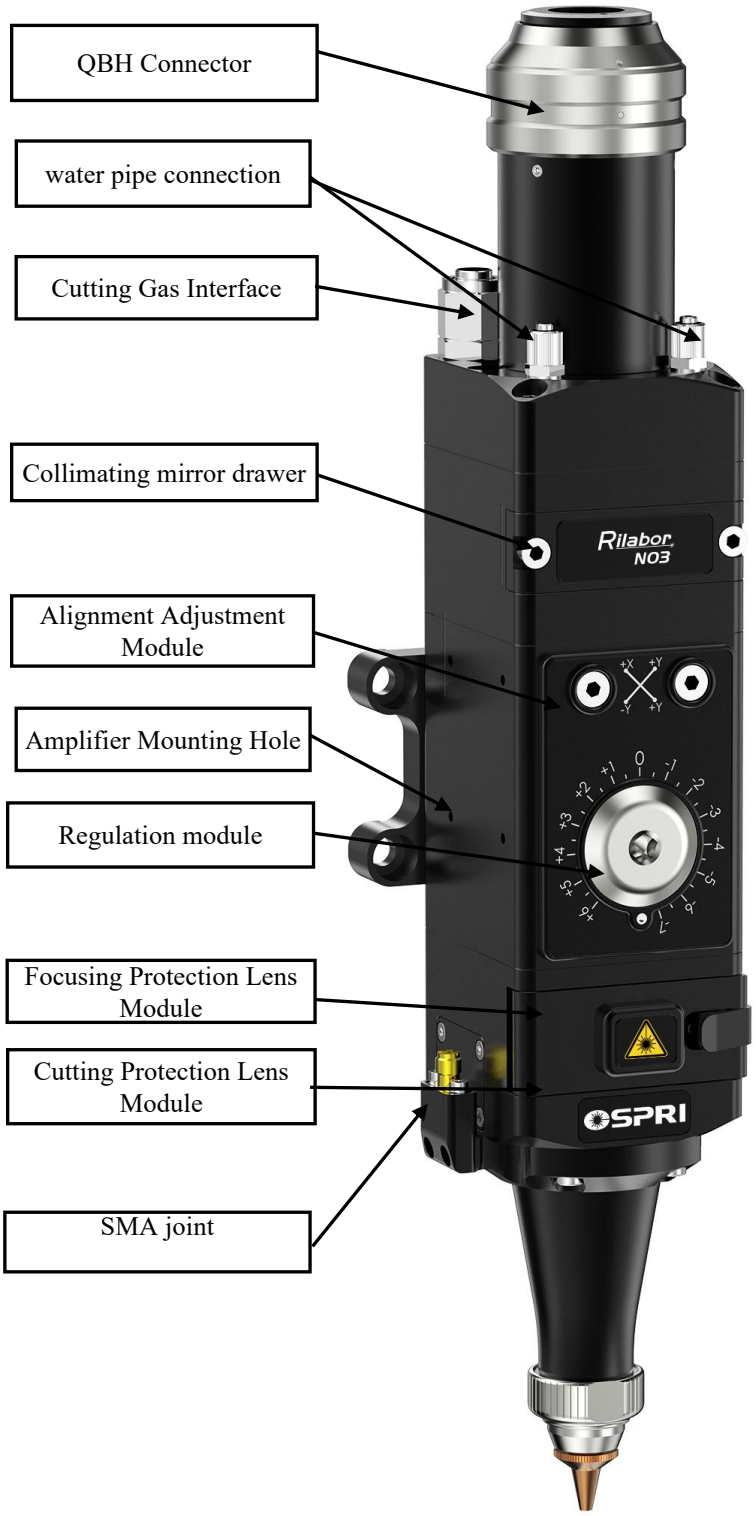
1.2 Precautions

① To ensure personal safety, please wear specialized fiber laser protective glasses when using the cutting head in conjunction with a laser cutting machine.
② Precautions should be taken and operations should be carried out with caution to prevent the cutting head and laser nozzle from being burned due to the laser beam deviating from the central axis.
③ Keep the cutting head clean and prevent coolant, condensed water, or other foreign matter from entering the sensor, as this may cause sensor malfunction.

Warning: When processing products with lasers, please use protective devices to avoid laser beams causing harm to the human body.

Chapter 2 Structural Characteristics

2.1 Brief Description of Product Structure



2.2 Brief Description of Product Components

① QBH Interface: The interface type is QBH.

② Collimation Protection Lens Module: Provides protection for the collimating lens when the fiber optic head is inserted or removed.

③ Amplifier Mounting: For installing the amplifier, with M3 threaded holes at a distance of 31mm*36mm.

④ Alignment Adjustment: Used to adjust the concentricity of the laser and the nozzle.

⑤ Focusing Module: Enables adjustment of the cutting focus.

⑥ Focusing Protection Lens Module: Provides protection for the focusing lens.

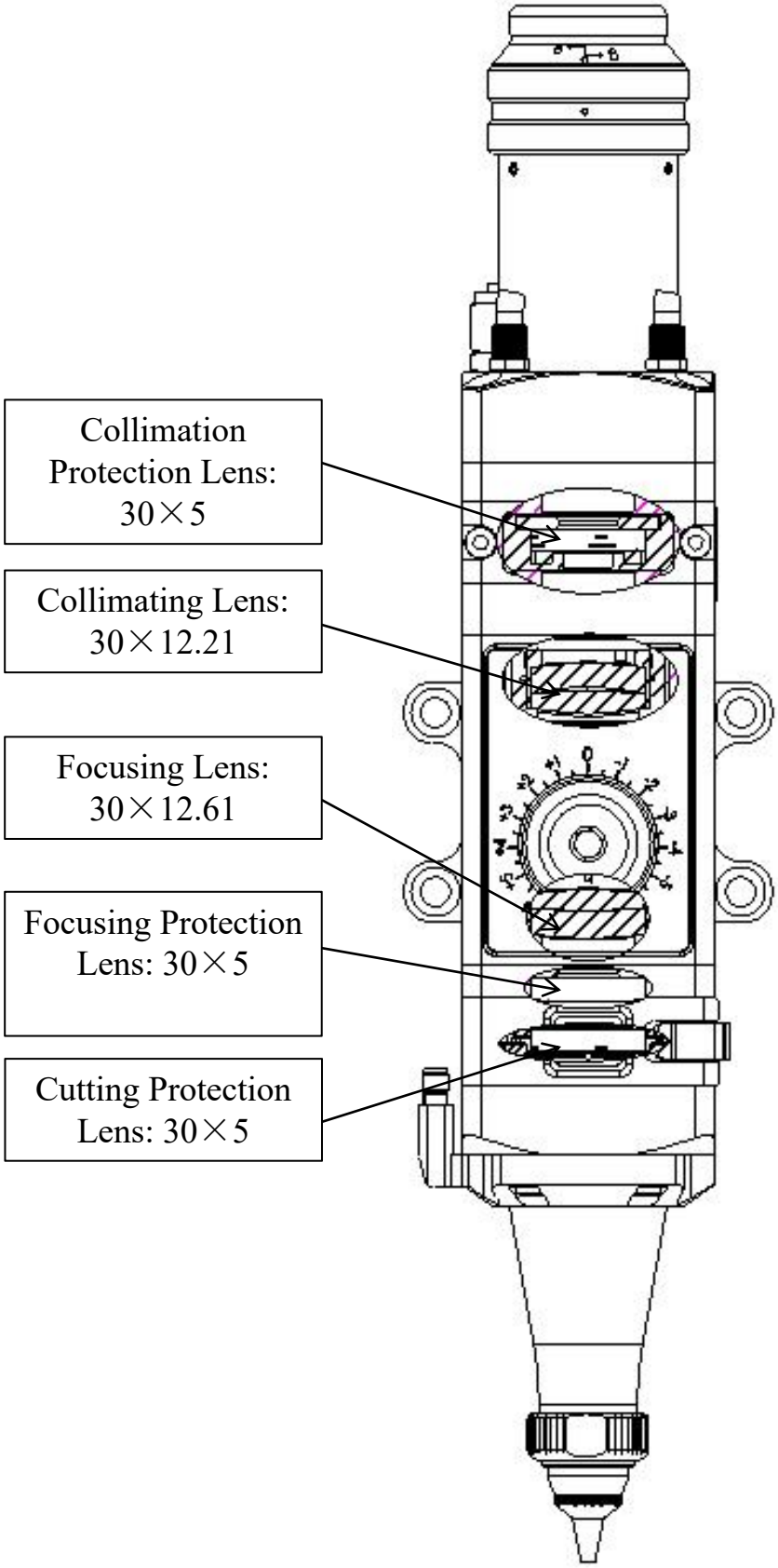
⑦ Cutting Gas Interface: Connects to a 10mm air tube.

⑧ Cutting Protection Lens Module: Ensures sealing of auxiliary gases and provides protection for the focusing lens.

⑨ SMA Connector: Connects to the amplifier (SMA can be installed symmetrically on both ends).

⑩ Water Cooling Interface: Connects to a 6mm cooling water pipe.

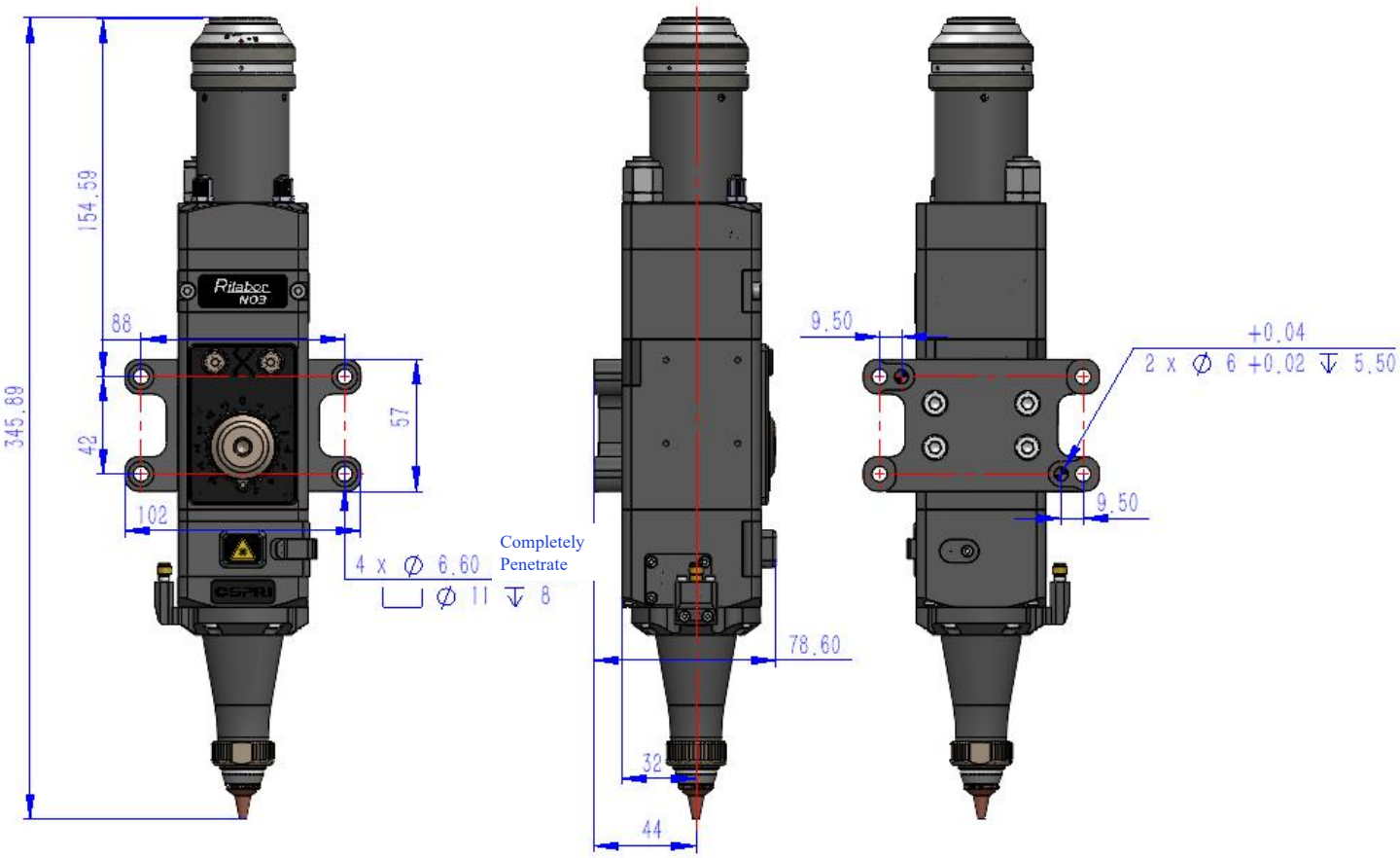
2.3 Brief Description of Product Lenses (Lens Dimensions)



Chapter 3 Product Installation

3.1 Installation of the Cutting Head

① Installation Dimension Diagram of the Cutting Head.



3.2 Pipeline Connection

3.2.1 Cooling Pipelines

① For head cooling of the cutting head, with one inlet and one outlet cooling pipeline.

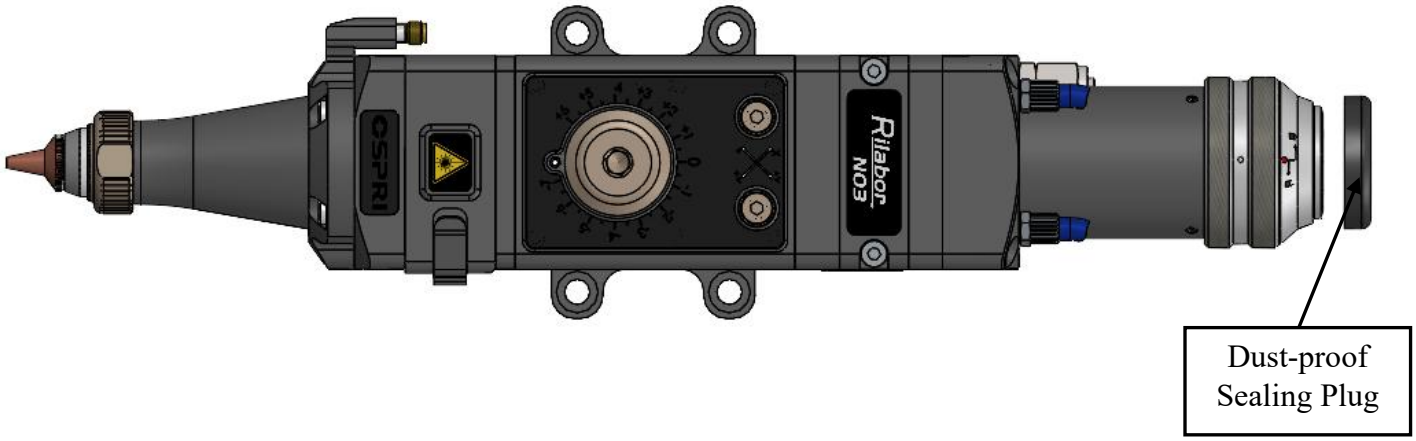
3.2.2 Auxiliary Gas Pipelines

① The input port connects to a 10mm air tube for interfacing with the cutting gas.
Input Pressure: ＜3.0Mpa
Commonly Used Gases: Oxygen, Nitrogen, Compressed Air.

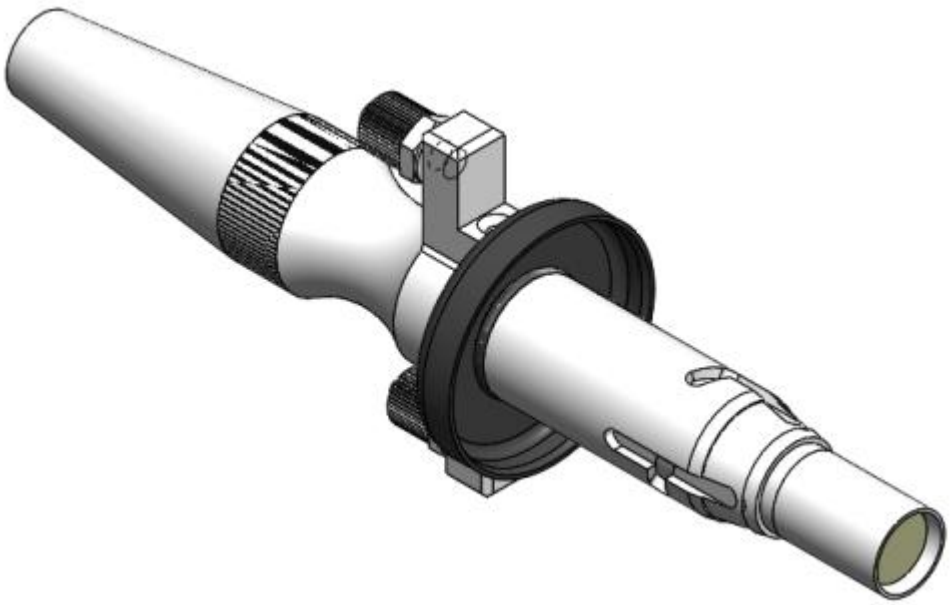
Note: The gas supplied to the auxiliary pipeline must be filtered, cold-dried, and thoroughly dried. Otherwise, it may contaminate and damage the protective lenses.

3.3 QBH Fiber Connection

① Place the cutting head horizontally, remove the dust cover, and peel off the QBH dust-proof sticker as shown in the following figure:



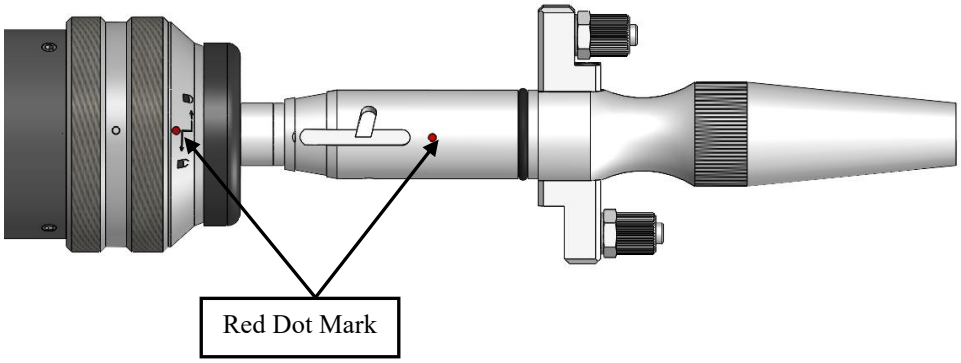
② Insert the dust cover from the accessory box onto the fiber optic head as shown in the following figure:



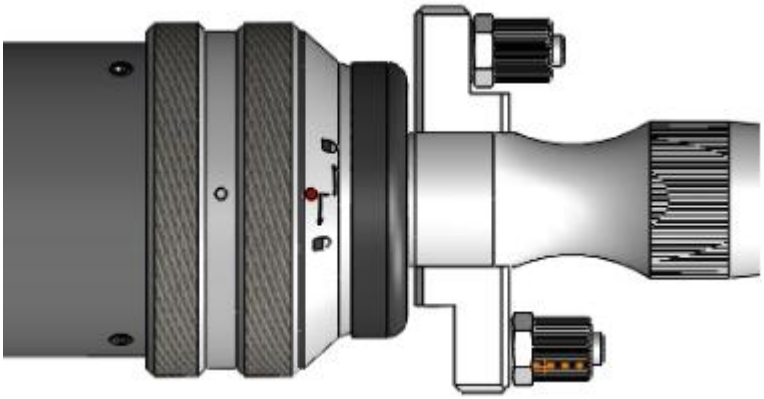
Attention: In case the fiber head is with original dust-proof gasket, users can choose whether to install dust-proof cover or not.

③ Twist the QBH connector to the open position: Rotate it counterclockwise to the extreme position (you can feel a "click" sound). Note to only rotate it to the proper position and avoid excessive force, as it may damage the internal structure.

④ Align the red dot on the fiber optic head with the red dot on the QBH connector, and slowly insert the fiber optic head into the QBH connector.



⑤ Twist the QBH connector to the locked position: Rotate it clockwise to the extreme position (you can feel a "click" sound), then lift up the rotating nut and rotate it clockwise again until the fiber optic head is securely pressed down. (Note: Only rotate it to the proper position and avoid excessive force, as it may damage the internal structure.)



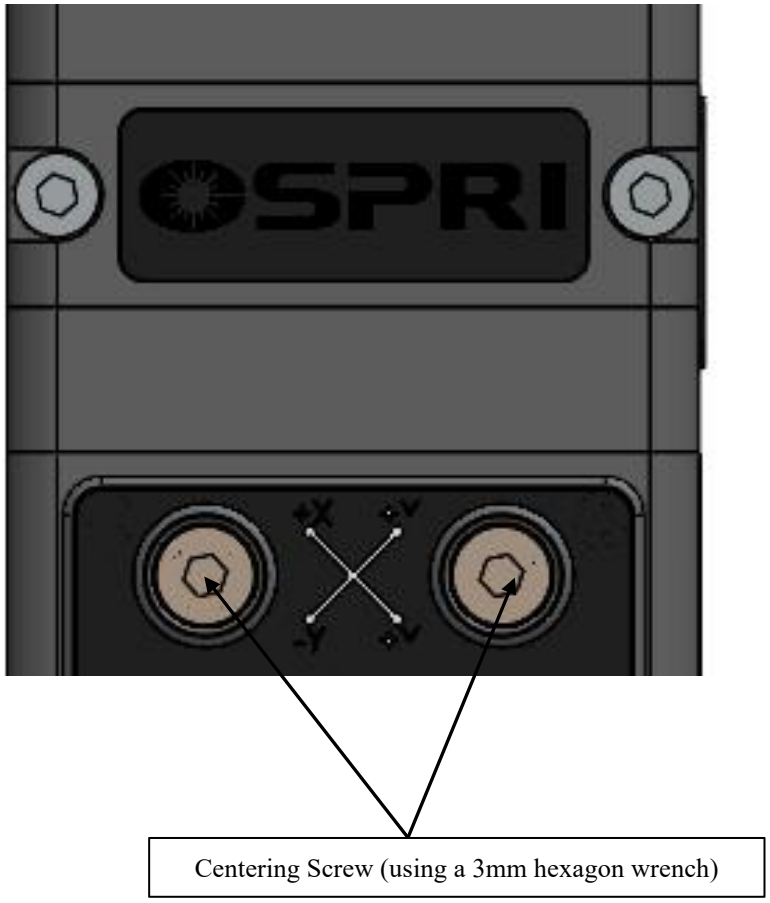
Note: After inserting the fiber optic, you can wrap it with masking tape for a few turns! !

Chapter 4: Product Debugging

4.1 Instructions for Focusing Adjustment

4.1.1 Beam Centering

To achieve a good cutting seam effect, the laser beam must be kept at the center of the nozzle. When it deviates from the center of the nozzle, it needs to be centered using the beam centering module.



Relationship between Beam Position and Adjustment Knobs:

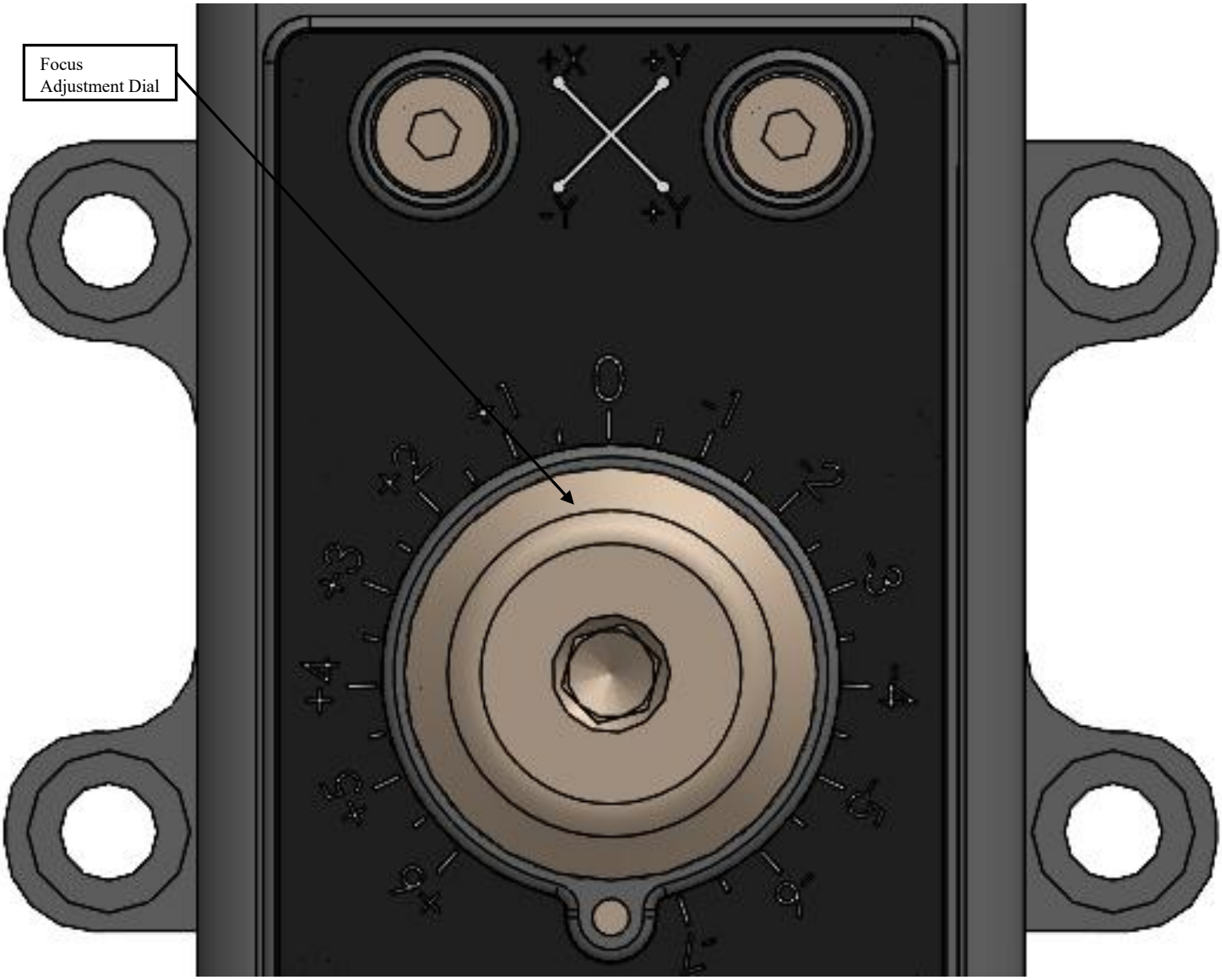
① There are a total of 2 centering adjustment knobs.

② Adjustment Method: Forward and Backward Adjustment.

③ The movement of the laser beam position is consistent with the direction of the knob movement.

4.1.2 Focus Adjustment

To achieve good cutting results for different materials and thicknesses, it is necessary to adjust the focus through the focus adjustment module.



Relationship between Focus Position and Adjustment Knob

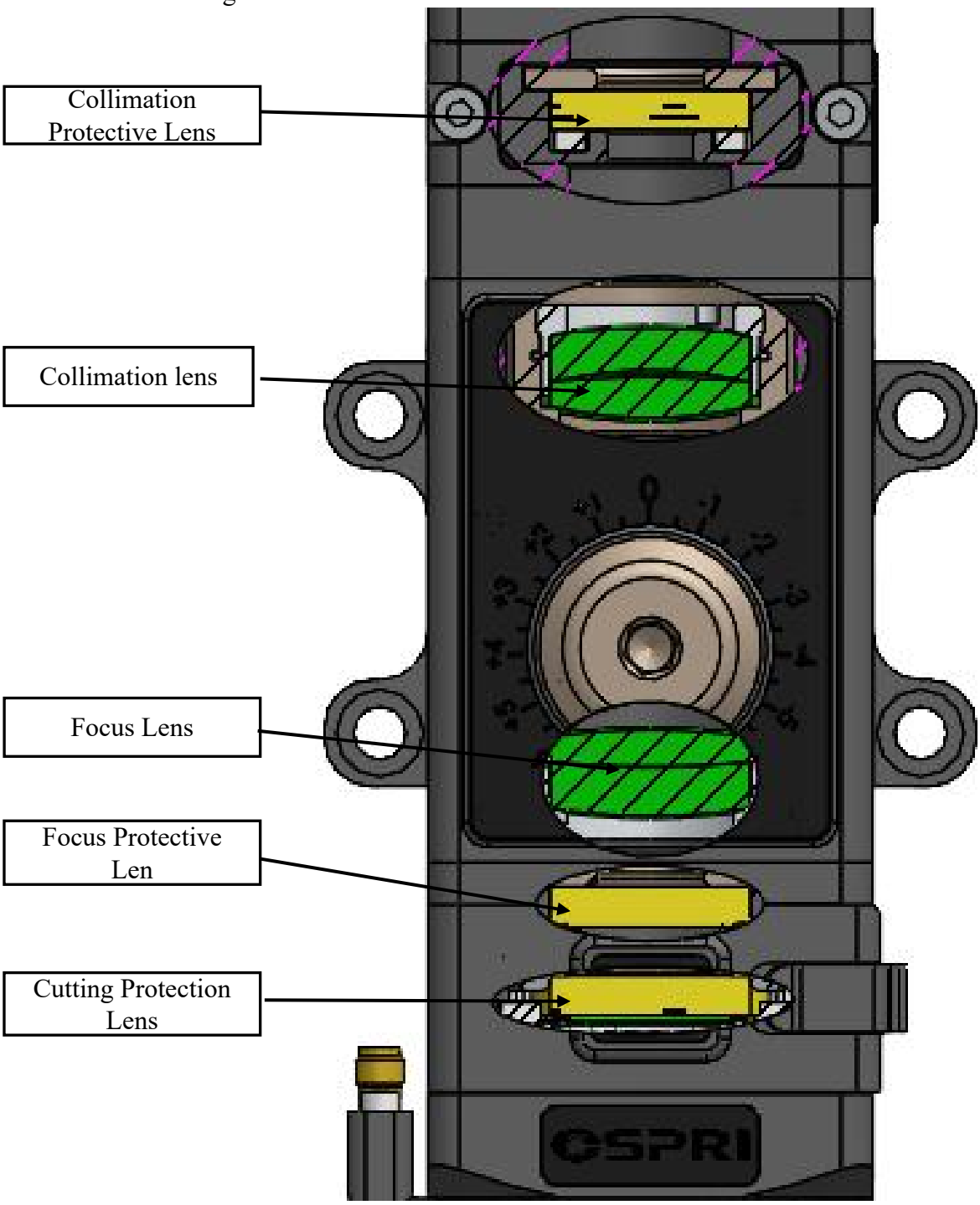
① The rotation angle of the adjustment knob is 0-300 degrees.
② The adjustment range for the focus position is 13mm.
③ The minimum scale increment is 0.5mm. When the scale reads 0, the focus is positioned at the end plane of the nozzle.
④ When the scale is adjusted clockwise to +6, the focus is located at the topmost position (6mm inside the plane of the nozzle).
⑤ When the scale is adjusted counterclockwise to -7, the focus is located at the bottommost position (7mm outside the plane of the nozzle).

Chapter 5: Maintenance and Servicing

5.1 Lens Structure

All components of the company's cutting heads are assembled in a dust-free workshop. Except for the protective lens drawer, which can be freely assembled and disassembled, other modules are prohibited from being disassembled in principle. If it is necessary to inspect the collimating lens and focusing lens, please move the cutting head to a windless and clean environment before removing them.

Schematic Diagram of Lens Structure:

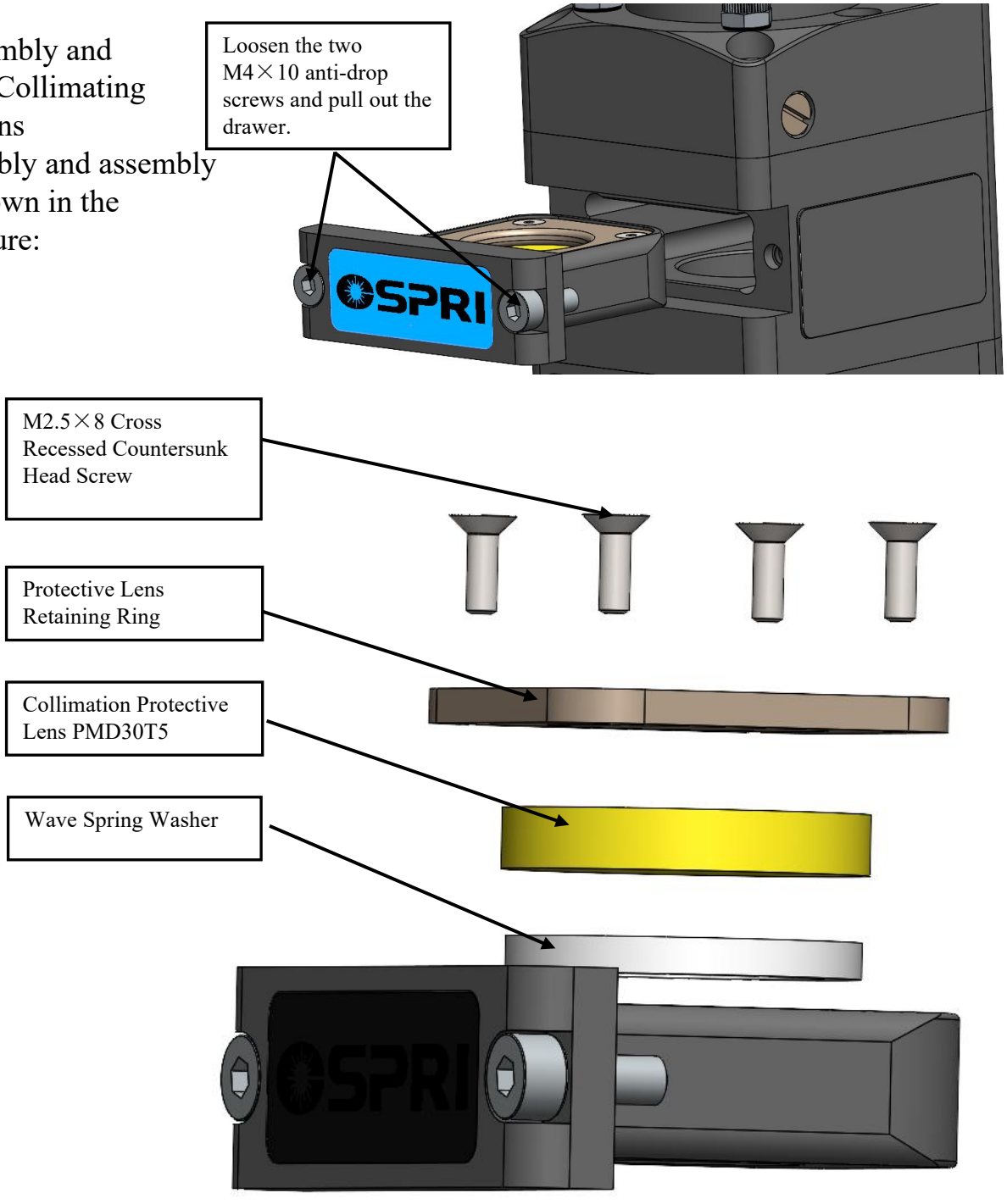


5.2 Maintenance and Replacement of Protective Lenses

When the cutting effect is not good, but the cutting protection lens is normal, and a burnout spot is detected using a test lens. In general, it means that the collimating protection lens or focusing protection lens is contaminated. In this case, the after-sales personnel need to check if there are burnout spots on these lenses. Before checking, use a clean cloth dampened with alcohol to wipe the exterior clean.

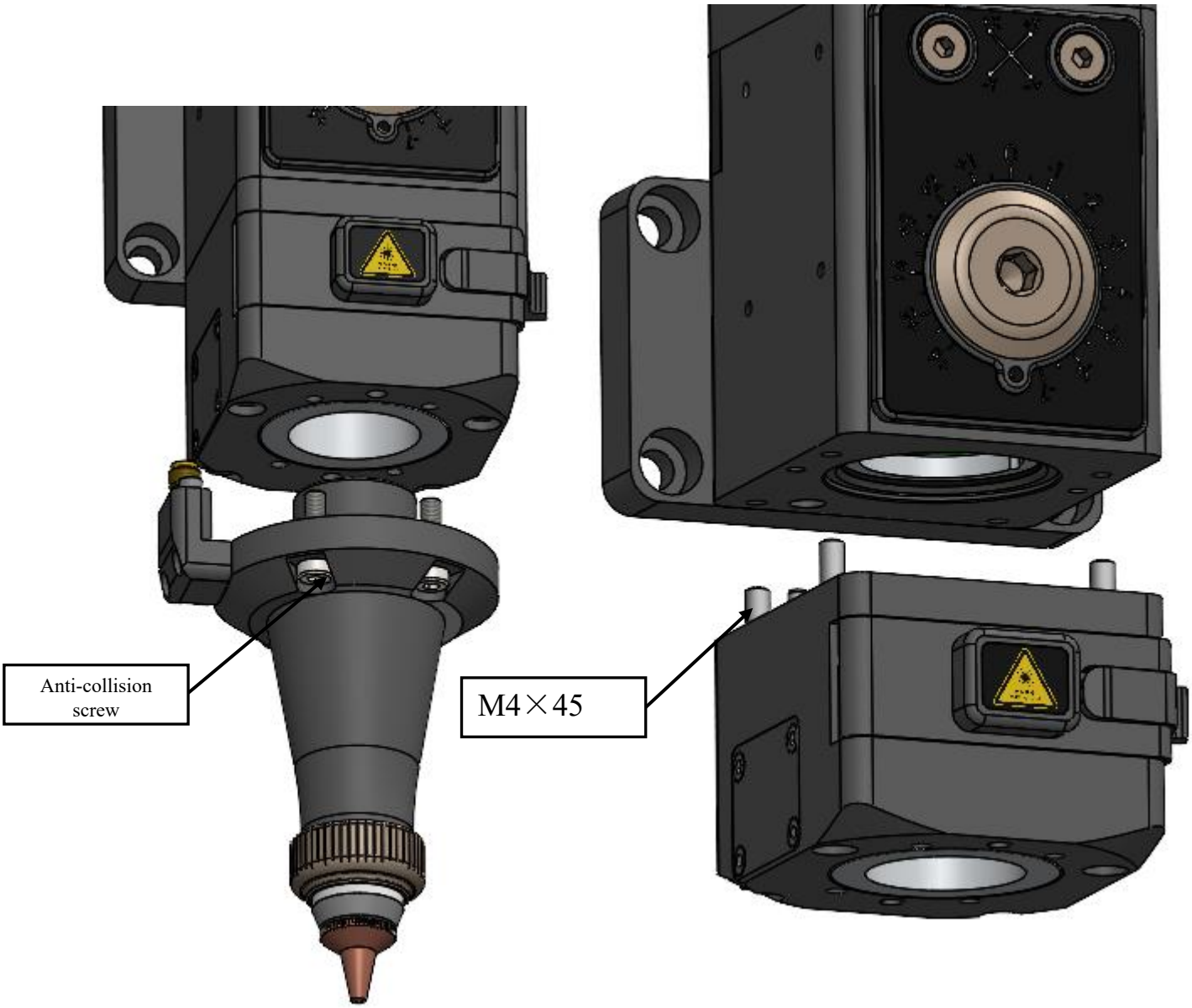
5.2.1 Disassembly and Assembly of Collimating Protection Lens

The disassembly and assembly method is shown in the following figure:

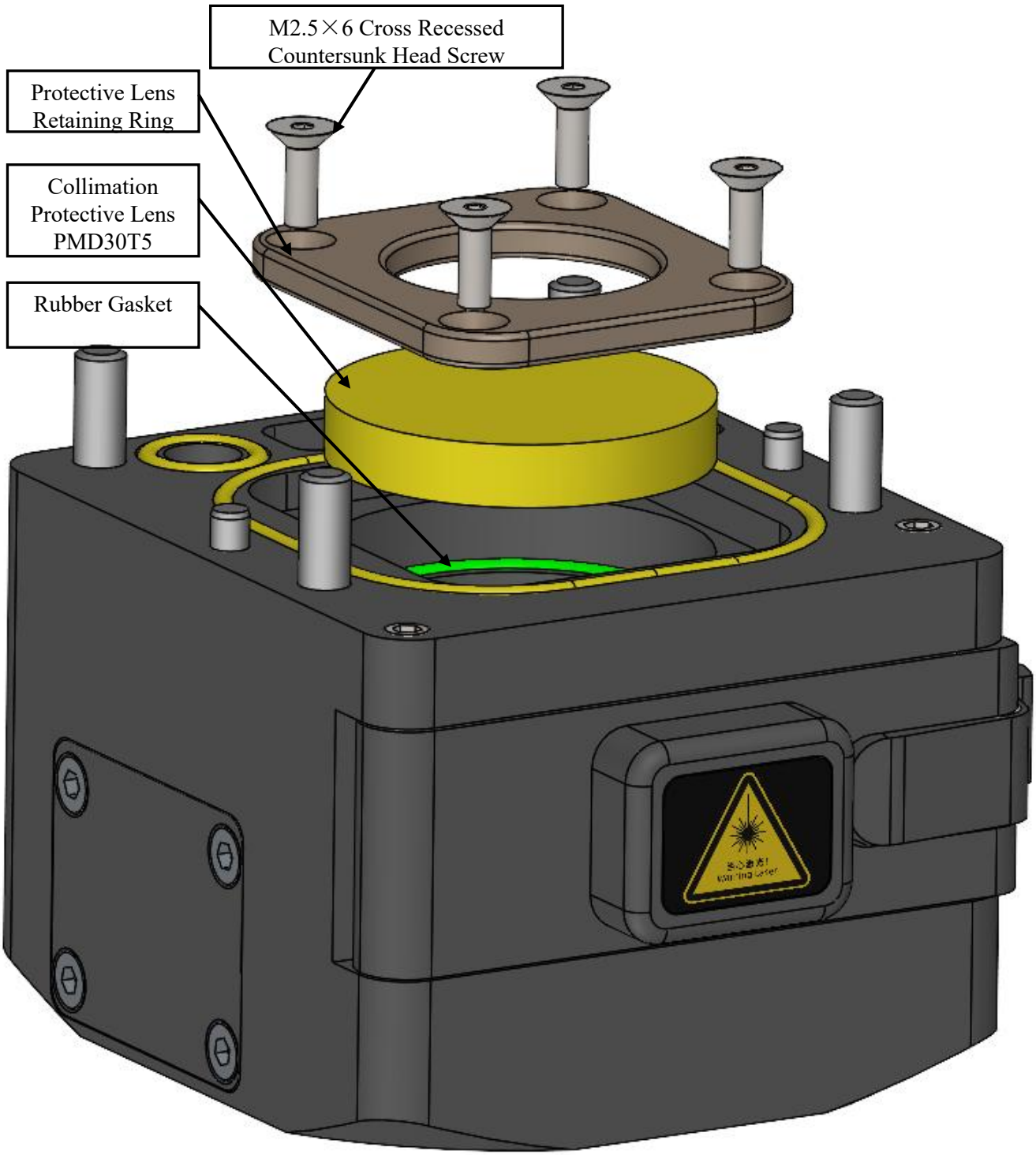


5.2.2 Disassembly and Assembly of Focusing Protection Lens

1.Remove the four 01.01.01.067235 2.0 anti-collision screws (20240322ZLY-35-C18), take off the sensor, and then unscrew the four M4×45 hexagon socket screws to detach the lower focusing seat assembly.



2.The assembly sequence is shown in the diagram on the right. Replace the focusing protection lens (specification PMD30T5).

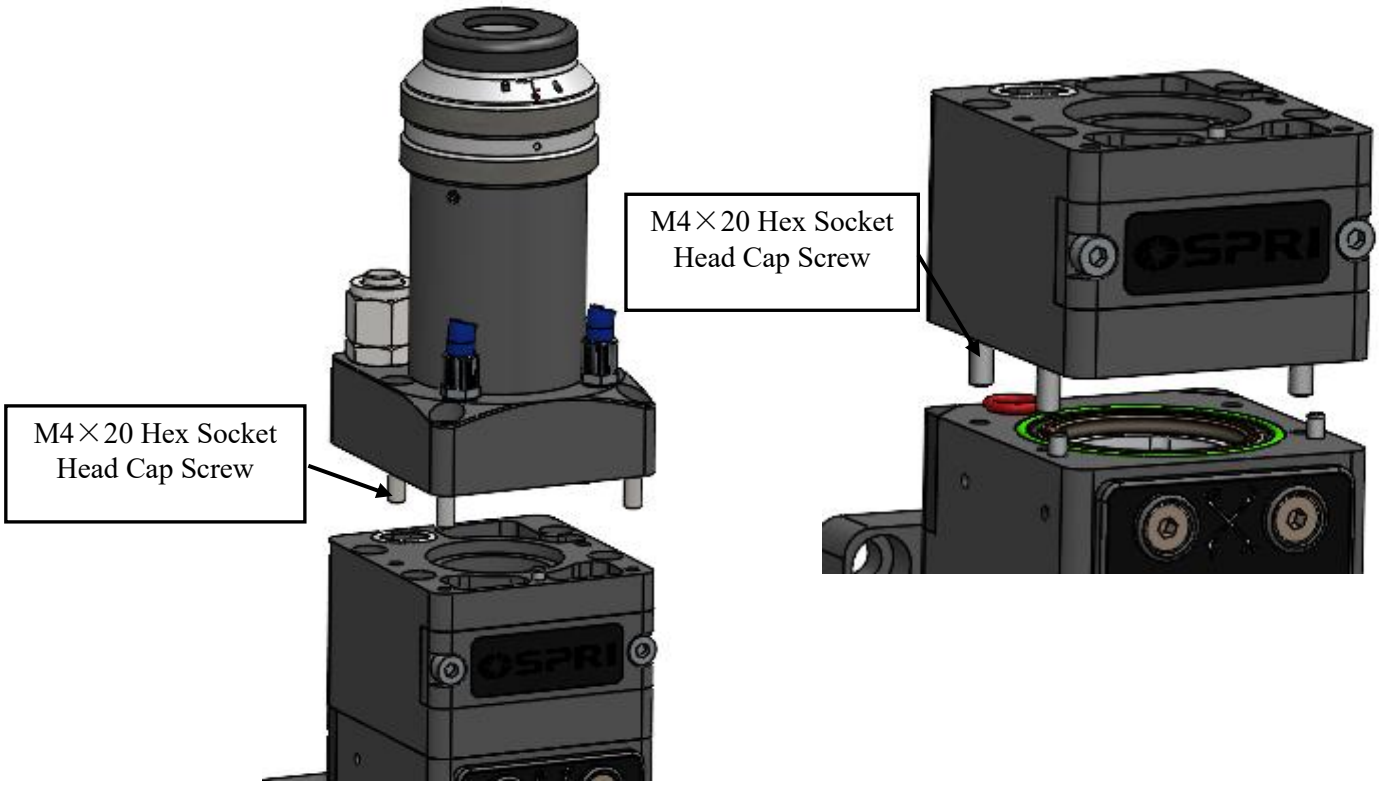


5.3 Maintenance and Replacement of Collimating Lens

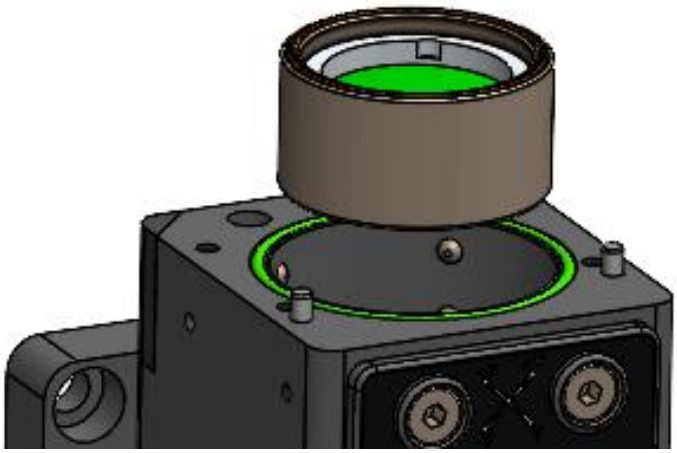
5.3.1 Disassembly and Assembly of Collimating Lens, as shown in the figure below:

① First, use an allen wrench to loosen the four M4×20 hexagon socket head cap screws, and split the cutting head into two halves.

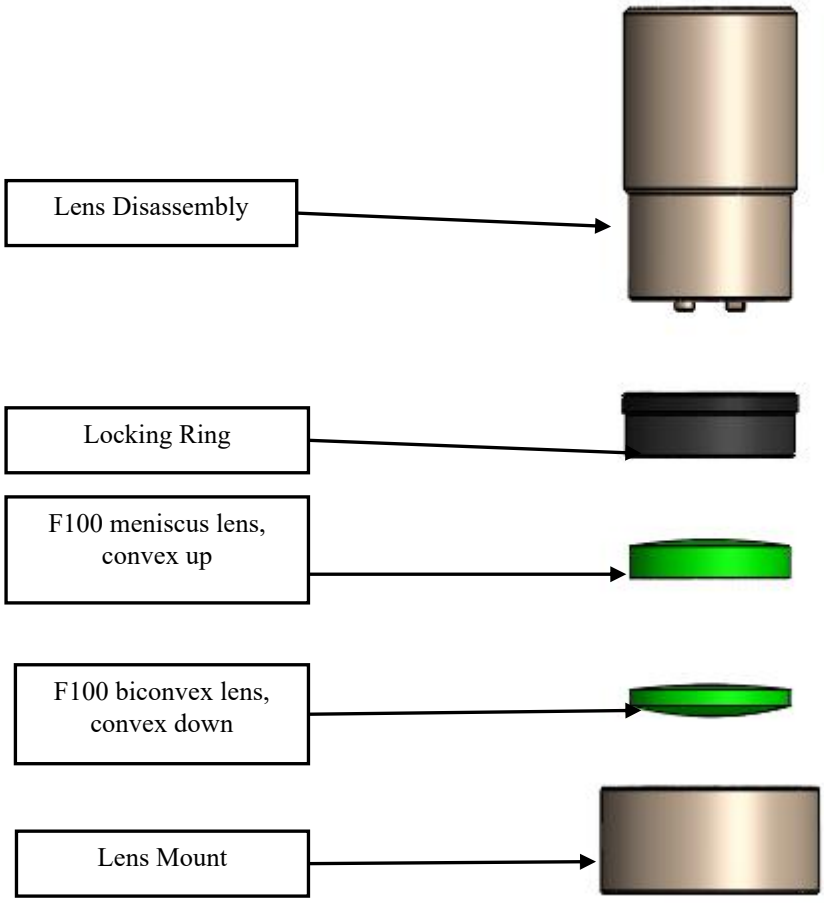
② Use a 3mm allen wrench to loosen the two centering screws and remove the collimating mounting module.



③ Use a 3mm allen wrench to loosen the two centering screws and take out the collimating installation module.



③ Lens Installation, as shown in the following diagram:



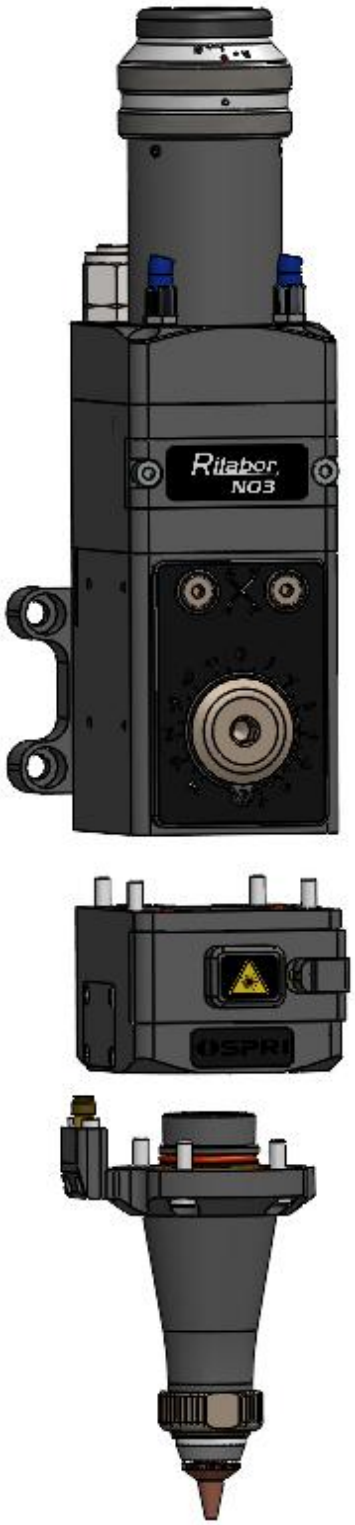
5.3.2 Cleaning of Collimation Lens

① Tools used: Dust-free wiping swabs, isopropyl alcohol, and canned dry, purified compressed air.
② Spray isopropyl alcohol onto the dust-free wiping swab.
③ Use the thumb and index finger of your left hand to gently pinch the side edge of the lens.
④ Hold the dust-free wiping swab in your right hand and gently wipe the front and back surfaces of the lens in a single direction, either from bottom to top or from left to right. Use canned dry, purified compressed air to blow on the lens surface and confirm that there are no foreign objects on the lens after cleaning.
⑤ The cleaned collimating lens should be installed into the collimating lens mount and inserted into the cutting head body as soon as possible, or stored in another clean, sealed container.

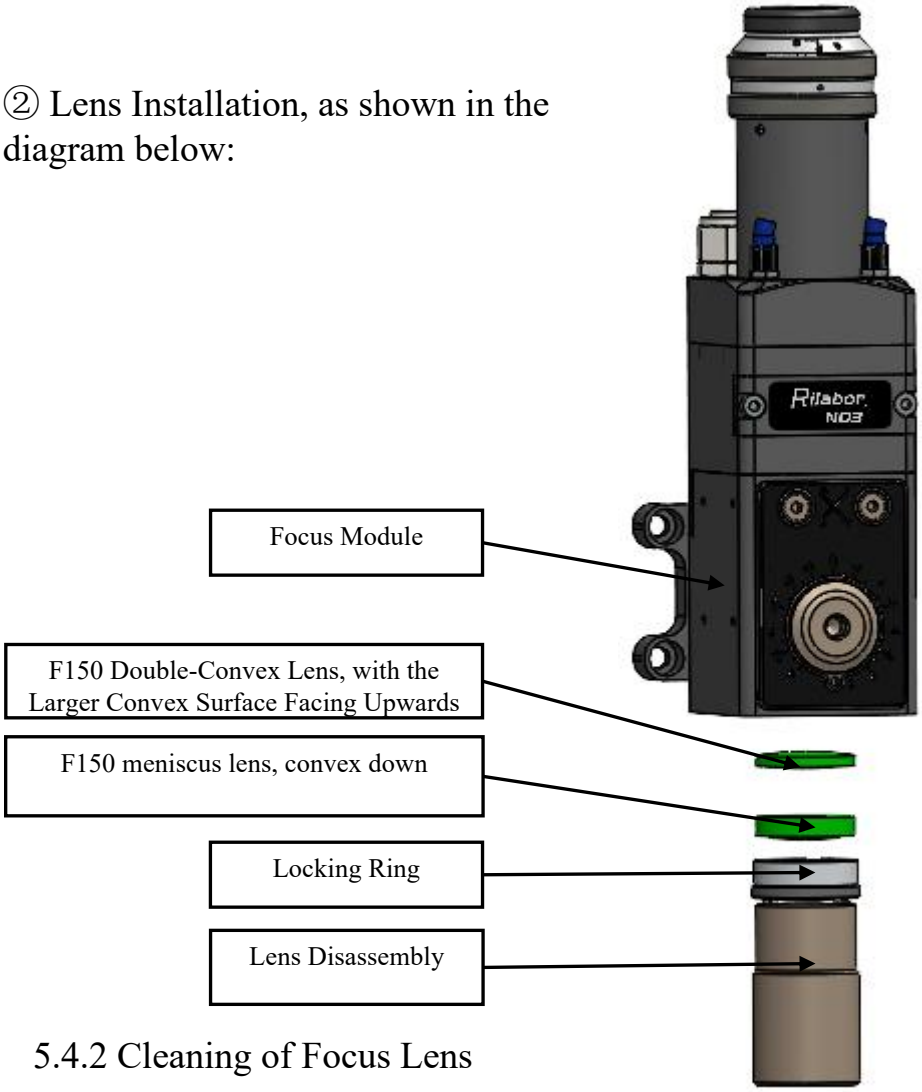
5.4 Maintenance of Focus Lens

5.4.1 Disassembly of Focusing Lens

① First, use an allen wrench to loosen the four anti-collision hex socket head cap screws, remove the sensor, and then unscrew the M4×45 hex socket head cap screws. At this point, the cutting head will be divided into two halves.



② Lens Installation, as shown in the diagram below:



5.4.2 Cleaning of Focus Lens

① Tools used: Dust-free wiping swabs, isopropyl alcohol, and canned dry, purified compressed air.
② Spray isopropyl alcohol onto the dust-free wiping swab.
③ Use the thumb and index finger of your left hand to gently pinch the side edge of the lens.
④ Hold the dust-free wiping swab in your right hand and gently wipe the front and back surfaces of the lens in a single direction, either from bottom to top or from left to right. Use canned dry, purified compressed air to blow on the lens surface and confirm that there are no foreign objects on the lens after cleaning.
⑤ The cleaned collimating lens should be installed into the collimating lens mount and inserted into the cutting head body as soon as possible, or stored in another clean, sealed container.

In principle, disassembly and assembly of the focusing lens and collimating lens are prohibited. If you suspect that the lenses are contaminated, you can first check them using a test lens. If necessary, please contact our company's technical support! ！ ！

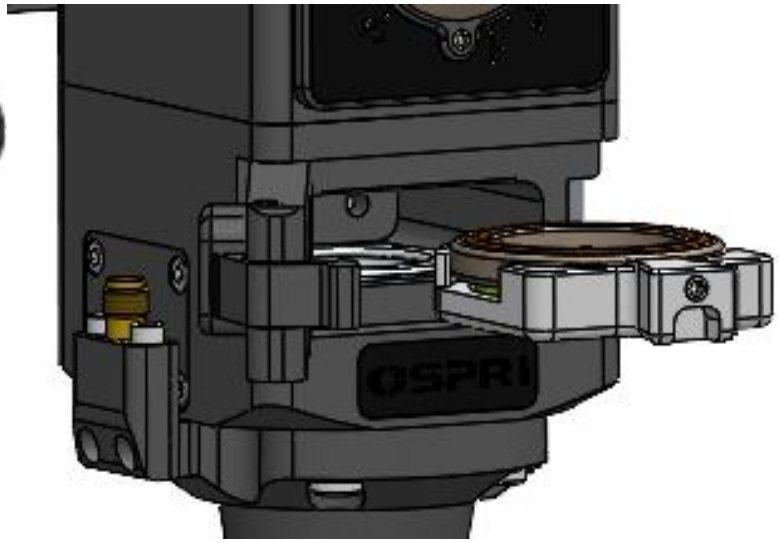
5.5 Maintenance and Replacement of Cutting Protection Lens

When impurities or foreign objects adhere to the protective lens, they can absorb laser heat and cause damage to the lens. Therefore, it is necessary to clean the protective lens regularly, with a recommended cleaning cycle of once a week. Besides, the protective lens is a wearing part and should be replaced in time if damaged.

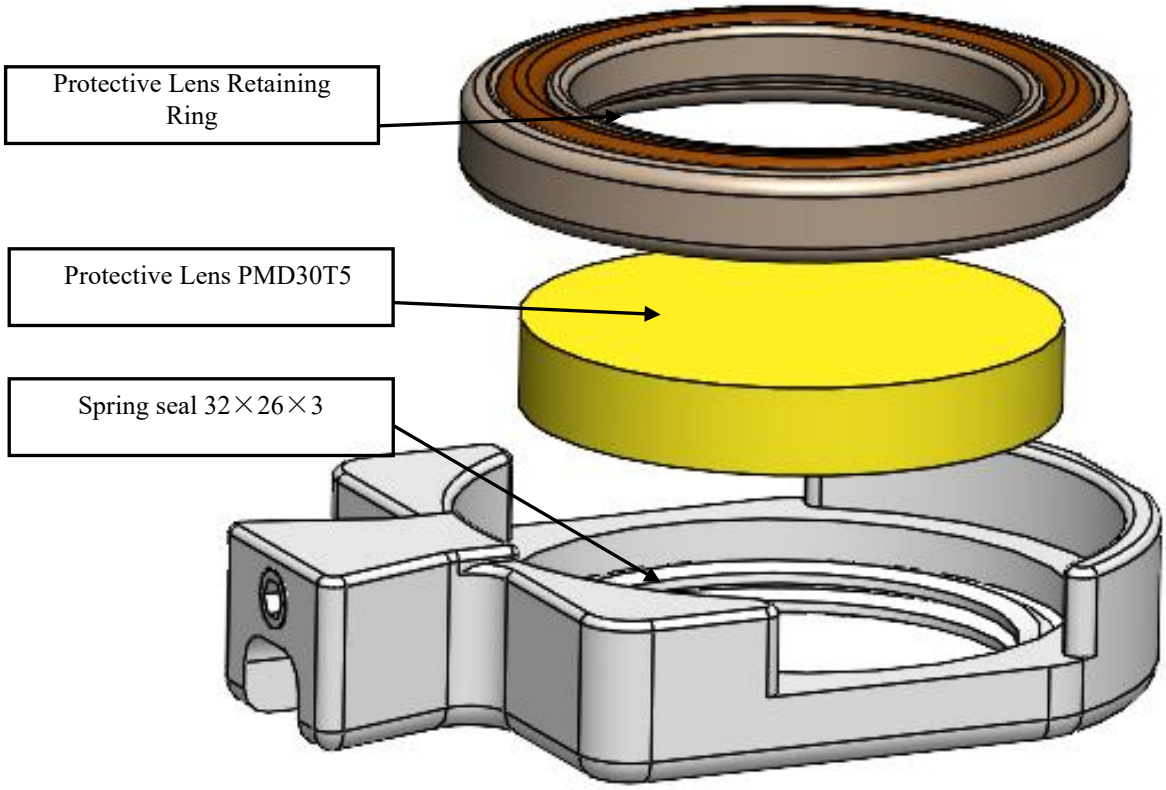
Attention:
When cleaning or replacing the protective lens, avoid contaminating it with oil from your hands or dust from the environment.

5.5.1 Disassembly of Protective Lens

① Unlatch the buckle, then slowly and smoothly pull out the protective lens drawer and move it to a clean, dust-free environment.



② The assembly sequence is shown in the diagram below:



5.5.2 Cleaning of Protective Lens

① Tools used: Dust-free wiping swabs, isopropyl alcohol, and rubber bulb dust blower.
② Spray isopropyl alcohol onto the dust-free wiping swab.
③ Use the thumb and index finger of your left hand to gently pinch the side edge of the protective lens.
④ Hold the dust-free wiping swab in your right hand and gently wipe the front and back surfaces of the lens in a single direction, either from bottom to top or from left to right. Use the rubber bulb dust blower to blow on the lens surface and confirm that there are no foreign objects on the lens after cleaning.
⑤ After cleaning, the protective lens should be installed back into its holder and inserted into the cutting head as soon as possible.

5.6 Maintenance of Sensing Components

The ceramic body is a wearable part and can be replaced after damage. When installing the ceramic body, it is necessary to align it with the two positioning pillars on the main body. Otherwise, the ceramic body cannot be installed correctly in place, which may cause the sensing components to fail. When tightening the ceramic body, make sure to use the locking nut to secure it tightly. Inconsistent tightness of the locking nut will directly affect the operating parameters of the sensing components.

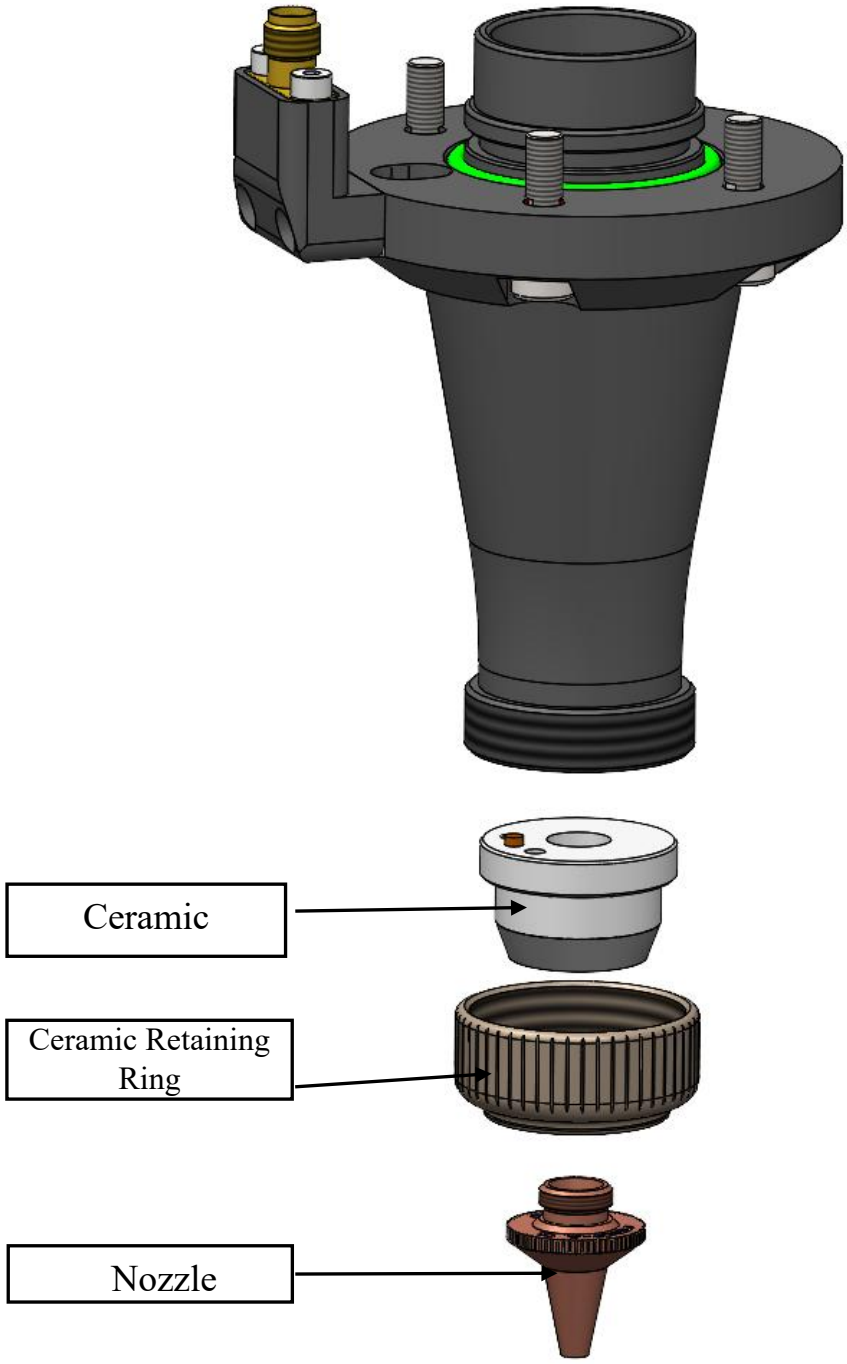
The laser nozzle is the sensitive element of the sensing component and is connected to the main body through threading. It is a wearable part. After working for a period of time, it is necessary to promptly remove the bonded slag. If the burnout is severe, it should be replaced in a timely manner.
After assembling the ceramic, tighten the locking nut so that the ceramic is evenly exposed by about 2-3mm.

During use, the following precautions should be taken:

① Dry and pure auxiliary gas should be used during cutting operations. When the gas contains impurities such as water or oil, the working gap may undergo sudden changes, and may even cause the sensor to malfunction. It is recommended to use high-purity oxygen, and to also equip gas dryers, oil-water separators, and other devices.
② The sensor should be cleaned after it becomes contaminated. Use a clean, dry cotton cloth or similar material for cleaning. Do not use liquids to clean the cutting head or ceramic. After cleaning, ensure proper connection and assembly.
③ The ceramic body can be replaced if damaged. After replacement, the electrical system should be initialized through a reset operation along with the amplifier.
④ The shape and size of the cutting nozzle directly affect the characteristics of the sensor. Therefore, it is necessary to use the specified cutting nozzle.

5.6.1 Replacement of Nozzle and Ceramic

① Rotate counterclockwise to remove the nozzle;
② Unscrew the ceramic retaining ring counterclockwise;
③ Remove the ceramic vertically downwards.



5.6.2 Cleaning of Ceramic

The cleanliness of the ceramic surface directly affects the performance of the tracking system. When there is contamination on the ceramic surface, it needs to be cleaned promptly to ensure the system's operational performance.

① After removing the ceramic, clean it with anhydrous alcohol or isopropyl alcohol.

② After cleaning, ensure that the ceramic surface is clean, dry, and free of moisture before installation.

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