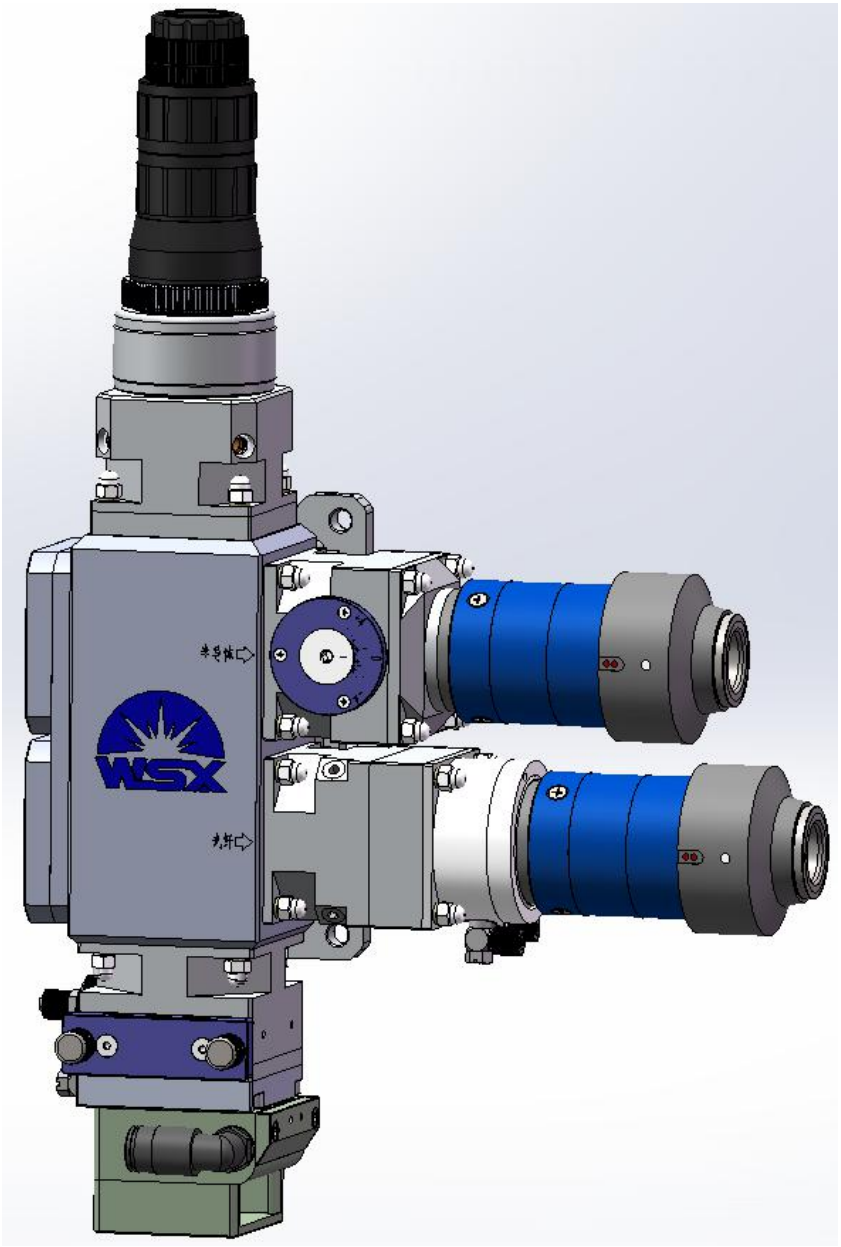
Hybrid Welding Head
ND30



User Manual

Shenzhen Worthing Technology Co., Ltd.

Attention

Please read this manual carefully and make sure you understand its contents before using the laser head.

Please keep this manual for future operation and maintenance.

Do not stare into beam!
Please wear goggles of DIN EN 207 and BGV B2 standard!

Do not touch the laser head with any body parts when it works!

Take care not to be burned by the remaining heat after welding!

Precision products. Do not strike it!

Product：Hybrid Welding Head

Model No.：ND30

Product Features:

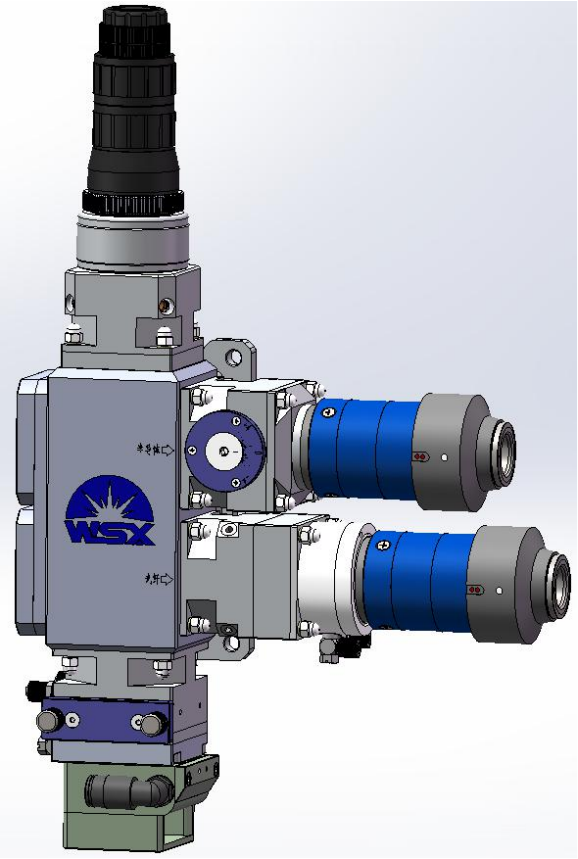
This welding head uses two wavelengths of laser for composite welding, which has great advantages in welding thin high reverse material, less welding defects and high efficiency.

The internal structure of the welding head is completely sealed to avoid dust contamination of the optical part。

Equipped with air curtain parts to avoid dust contamination of optical parts.

The cam structure is used to adjust the focus accurately and conveniently.

The protective window adopts drawer-type structure easy to replace.

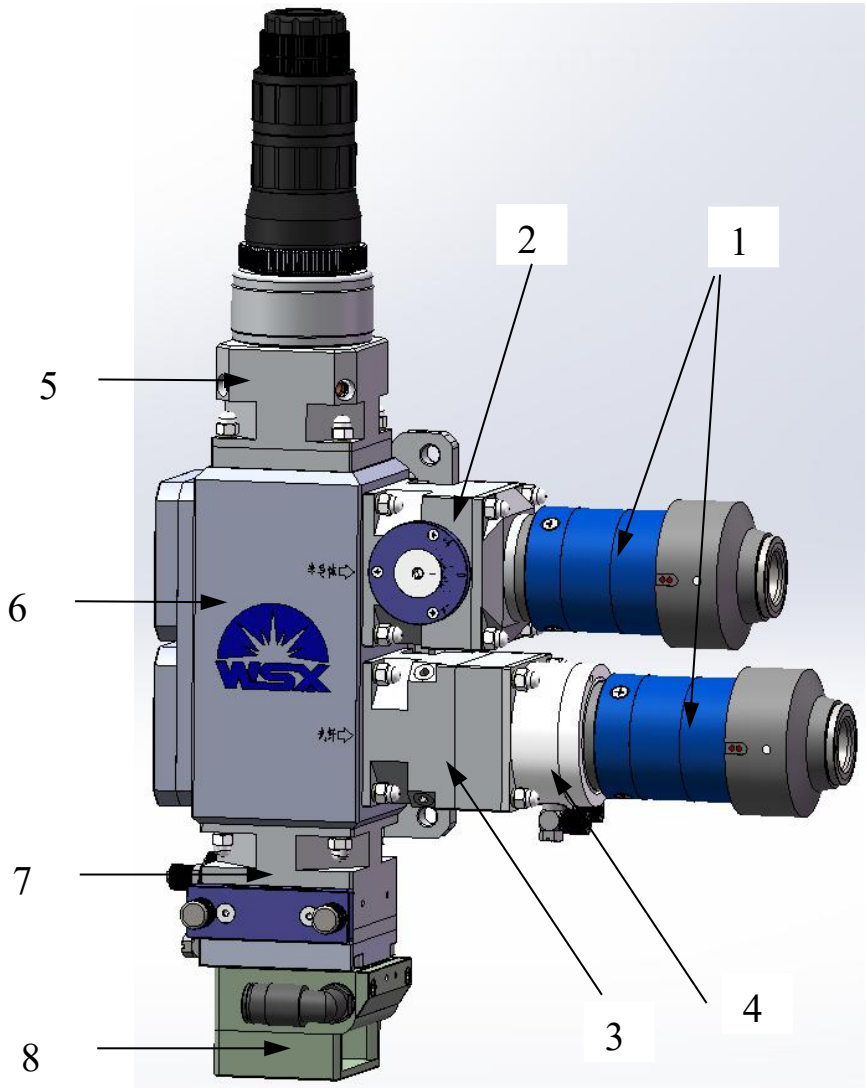


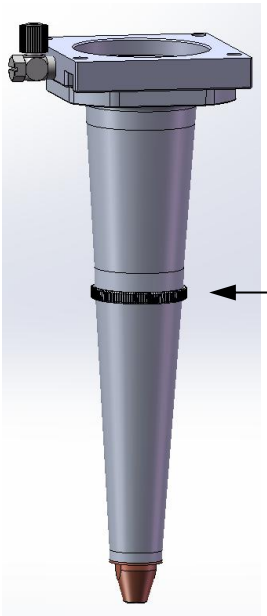
Contents

1. Product Description

1.1 Structure Diagram

No.	Parts
1	QBH component
2	Semiconductor collimating component
3	Fiber collimating component
4	Water cooling component
5	CCD component
6	Reflector component
7	Focusing component
8	Air curtain component





Coaxial nozzle (optional)

1.2 Main Function

1.2.1 Components Introduction

※QBH Component
It is the core connector which connects to fiber laser and provides standard fiber access.

※Collimator Lens Component
Collimator lens component is assembled inside the laser head; it contains collimator lens cavity and
collimator lens group.

※Reflector Component
Provide filter light source for CCD.

※Focusing Component
Focusing component is assembled inside the laser head.It contains adjustment structure, focusing locking device, focusing lens group, focusing lens cavity and water cooling system. The focusing adopts the cam structure, which is accurate and convenient to adjust.

※Gas Curtain Component
Blow away the bouncing welding slag, provide protection to the protective window.

※Gas Rod Component
Provide inert gas to protect welding seam during welding.

※CCD Component
Provide filtering, focusing function; provide safe, reliable and real light source to CCD.

1.2.2 Design & Function

This laser head uses fiber laser machine as light source and weld the metal on plain machine table in controlled distance.It features high welding precision, outstanding durability, ease maintenance and adjustment.
All media connections are built inside the laser head.

1.2.3 Auxiliary Medium

※Inert gas
◎In order to protect the welding position from oxidation, the protective gas should not have any harmful chemical reaction with welding material.

◎ The protective gas must meet the Standard of ISO 8573-1:2010, Class 2.4.3 without

impurity particles, water and oil. High purity protective gas will prolong the lifespan of protective window.

2 Technical Specification

	Parameter
Power/W（max）	2000
Collimating length/mm	75 / 100
Focusing length/mm	200 / 250
Vertical focusing adjustment range/ mm	±4
Weight / kg	3.2

Fit for Raycus, MAX, GW, JPT, Coherent, IPG, SPI, Rofin, nLight, etc.

3. Installation & Connection

3.1 Safety Instructions

Any maintenance or fault survey should be conducted by professional trained personnel who must have got safety training and be aware of the possible danger and safety measure. Users should learn the related safety knowledge and prepare necessary safety devices before using.

Caution - High Pressure !
The gas pressure inside some laser head component can reach to 2.5MPa.

Caution - High Voltage !
Keep the power off during the maintenance and repair.

Caution - Pinching Hand !
During maintenance and repair, do not put hands or any other body parts under the laser head or forward direction of the moving axis!

Caution - Laser !
Keep the power off during the maintenance and repair. The laser machine will generate level 4 laser while working.
Keep the eyes or skins from being directly shot or scattered by laser.
Do not look directly into the laser beam even if wearing eye protecting equipment.
Please wear the goggles which meet the standard of DIN EN 207 & BGV B2.

Caution - High Cleanliness Optical Lens
Do not touch the high cleanliness area of optical lens inside the laser head with bare hands.
Dust or dirt attached on the lens may cause scorch damage.
It is allowed to touch the nonsensitive area of lens only if wearing protective gloves.

3.2 Unpacking Check

※Unpacking Check

1.Intact box;
2.The label should be clear with conformity mark and accord with the purchased models;
3.The upper and lower opening tear-proof seals are not broken or disassembled;
4.If the above does not match, contact the seller.

※Open the box
1.The signage surface points to opening surface;
2.Open the box with a knife, and the depth of knifepoint cutting into the box shall not exceed 2mm.

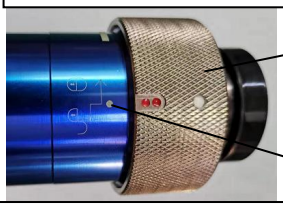
3.3Preparation for Installation

※Tools
1.A set of metric hexagonal handle;
2.One bag of clean rod, one bottle of anhydrous ethanol(500ml), one package of clean gloves.
3.Clean and dust-free working environment.

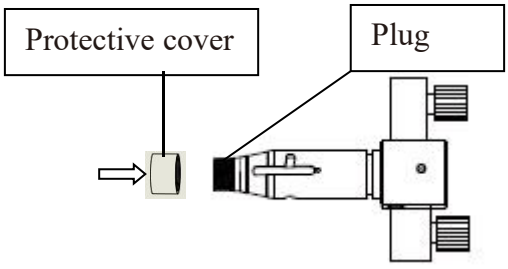
※Preparation of installation personnel
1.Read this manual carefully;
2.Wash hands with soap;
3.Wear dust-free gloves;
4.Wear a mask if necessary.(Note - Dust removal is of utmost importance)

3.4 QBH and Fiber Connection

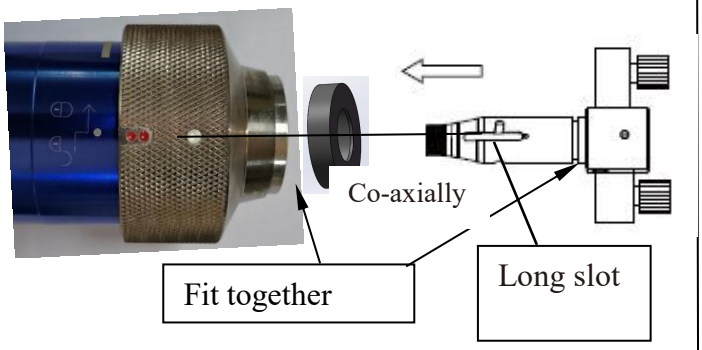
Step one： Before turning the rim as below, make sure the red marks are aligned to the white marks.



Step two： Remove the dust cover of fiber rod, clean the fiber rod with anhydrous ethanol. Before installing, check the protective cover of fiber plug to see if it is locked, avoid the cover from loosening and effecting the welding performance or burning the fiber and welding head.

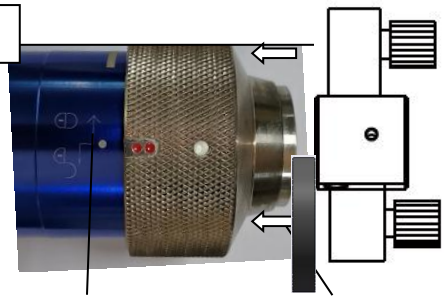


Step three： Remove the dust cover from QBH, place the clean fiber rod and the QBH coaxially, make sure the white mark on the QBH is aligned with the locating slot (long slot on fiber rod), insert the fiber rod into QBH gently, until the fiber rod joints the QBH contact surface.

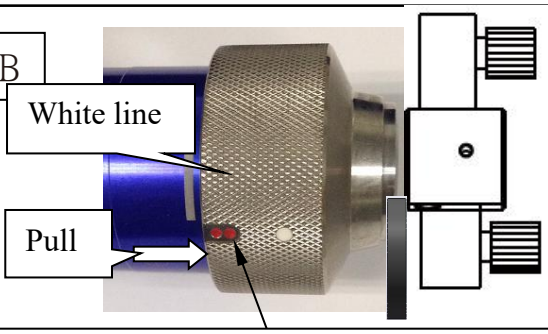


Step four： After inserting the fiber rod into QBH, press the rim gently and turn it about 15 degree along the arrow on the rim. Then pull the rim until its underside is parallel with the top of QBH, turn the rim at the same direction till the limit.

A

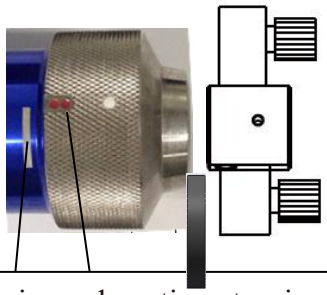


B



Turn the rim 15 degree, the red dot should be close to white line, pull the rim towards the right.

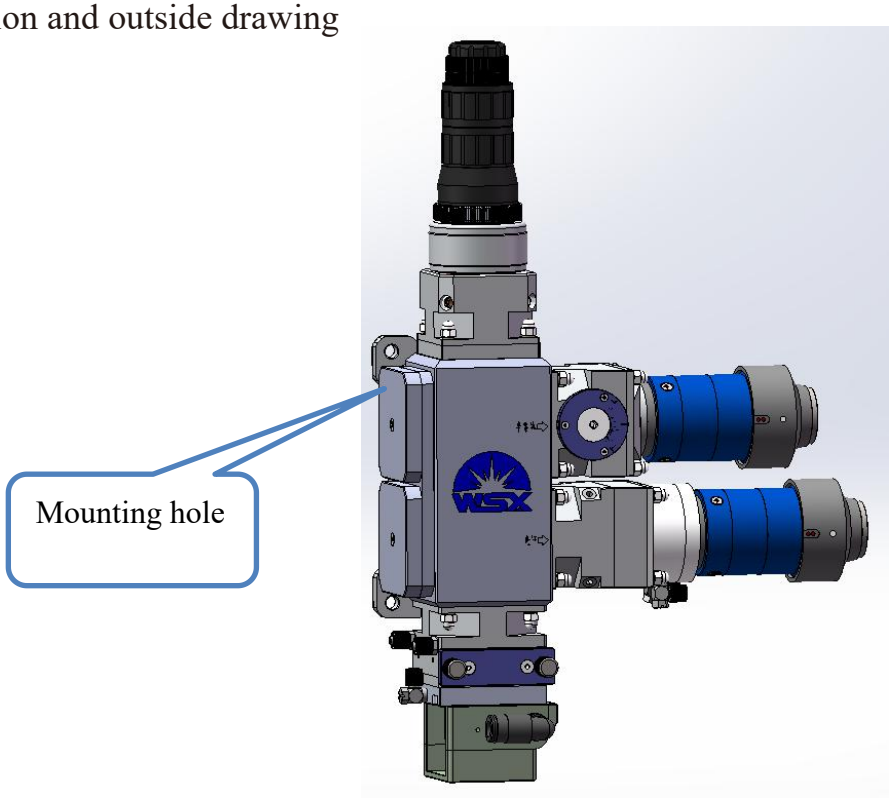
C

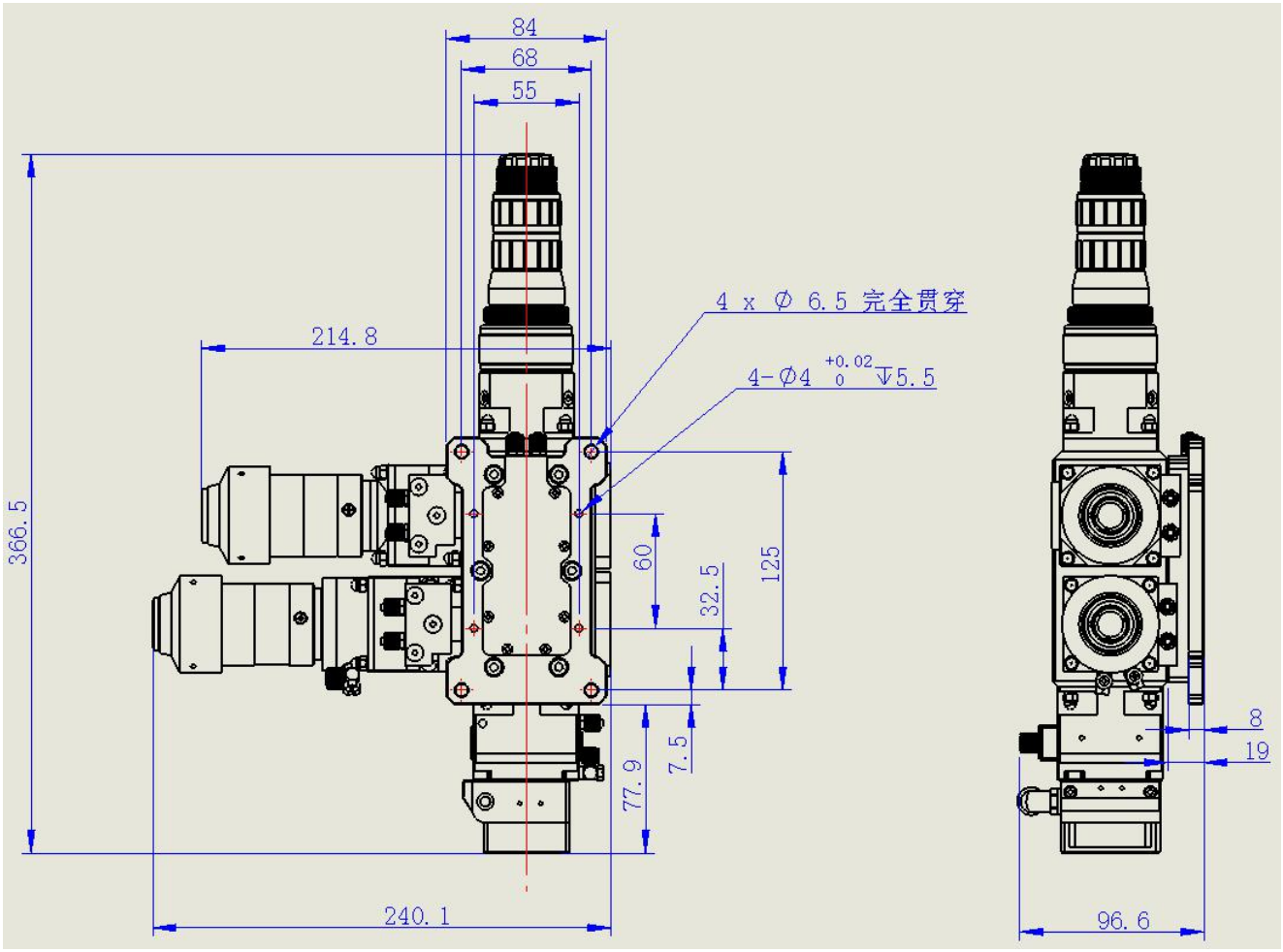


Pull the rim and continue turning, the red dot should be in the scope of the white line or close to the end of white line. The underside of rim

Note：1. Insert or pull out the fiber rod gently;
2. When inserting or pulling out, QBH and fiber rod should be coaxially;
3. The operation should be kept as dust-free as possible.

3.5Installation and outside drawing

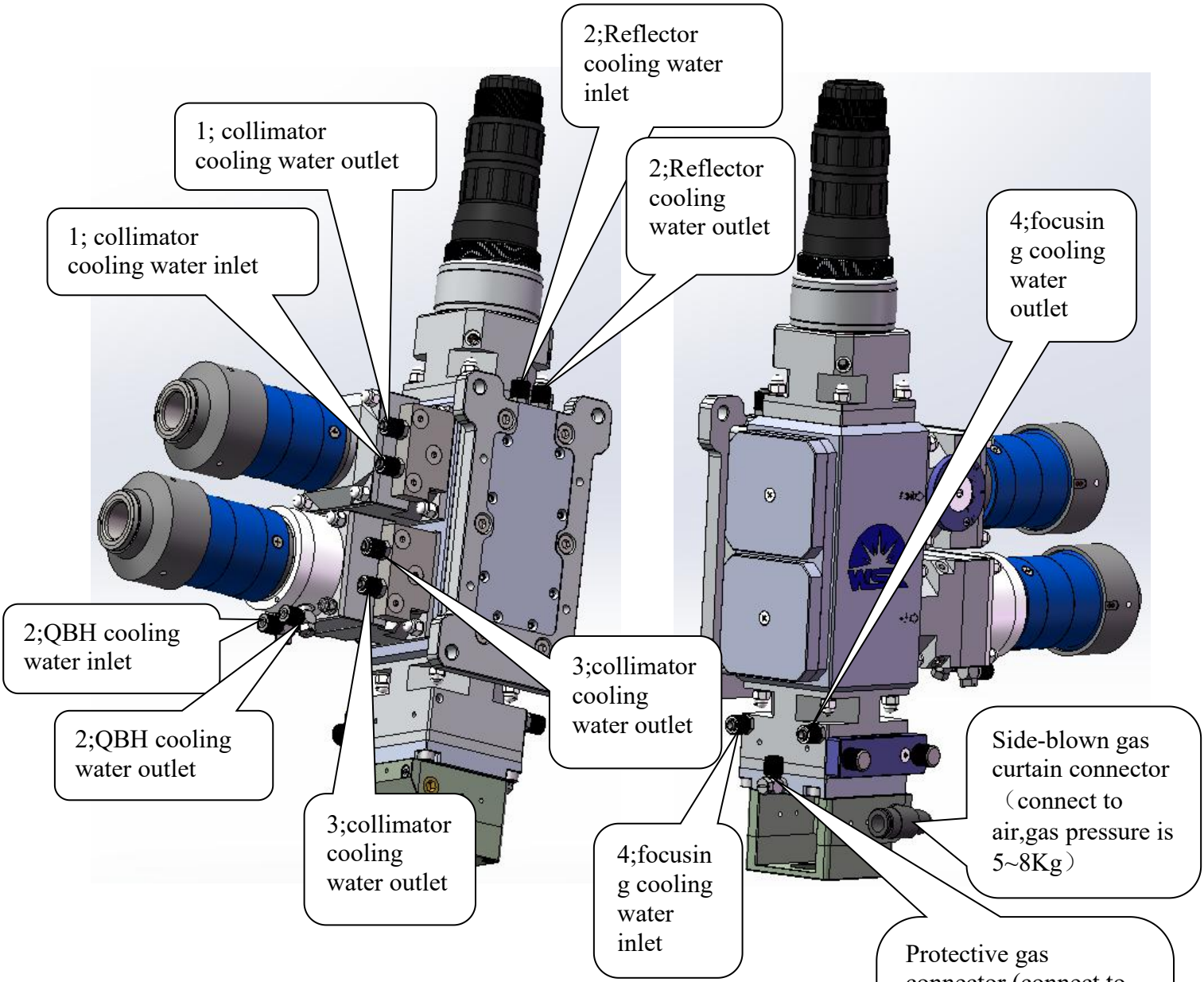




Installation of laser head should be solid and reliable.
The angle of laser head in the vertical direction can be set according to customer requirement.

3.6 Connection of water and gas

Water cooling connector & gas connector diagram



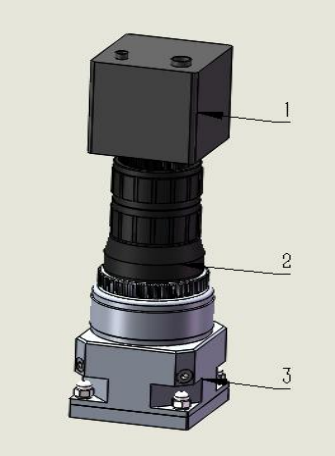
Note:

1） 1~3 and 6 is Φ6 water pipe connector，when using must ensure the water quantity is sufficient, the water pressure is above 0.4MPa；

2）4、5 is Φ8 gas pipe connector；

3, Please keep the bending radius of the connected pipeline not less than 30mm.

3.7 CCD component connection



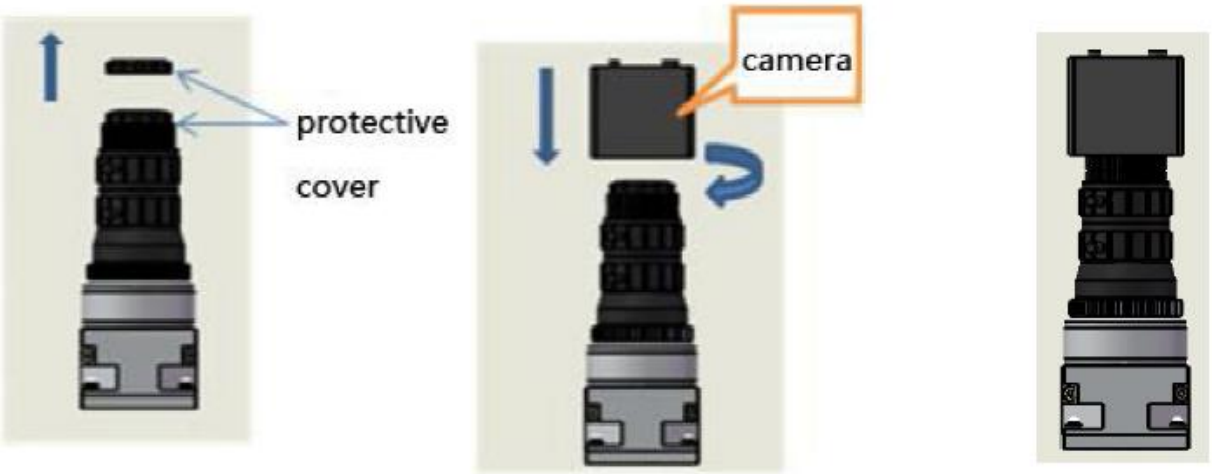
1 Camera
2 CCD interface
3 Mounting base

Installation steps of CCD Camera：

Step 1：Remove the protective cover as shown below;

Step 2：Tighten the camera to the lens after removing the cover, keep the camera and lens close.

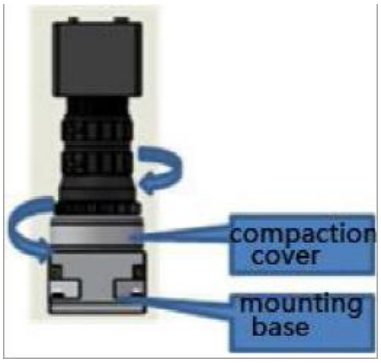
Note：Tighten in moderate intensity, avoid loose or damage caused by improper force.

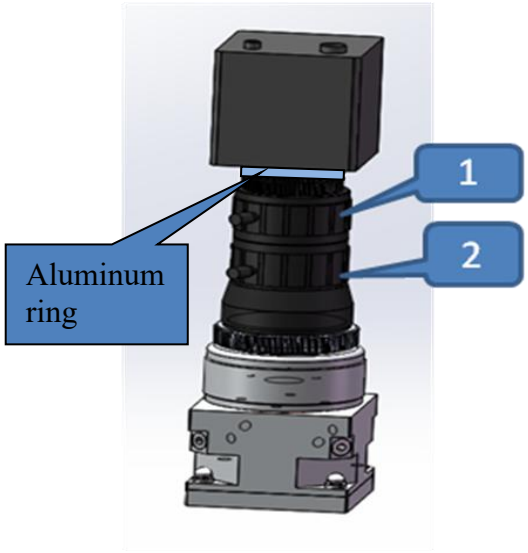


4.Debugging

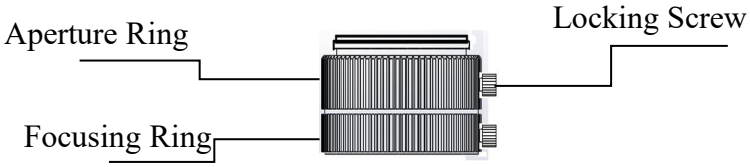
4.1 CCD Definition Debugging

Camera angular adjustment：
If the camera is tightened at an angle to the mounting seat, loosen the compaction cover as the left picture, turn the lower part of the camera clockwise, make one of the vertical planes of the camera parallel to the mounting seat.（As shown on the right）

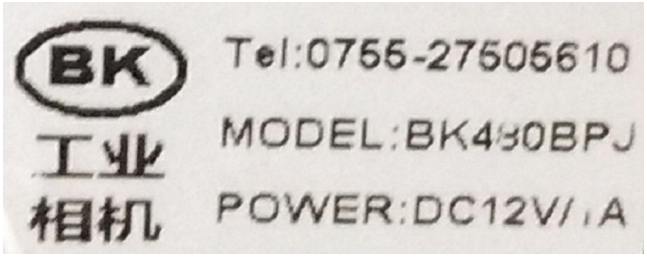




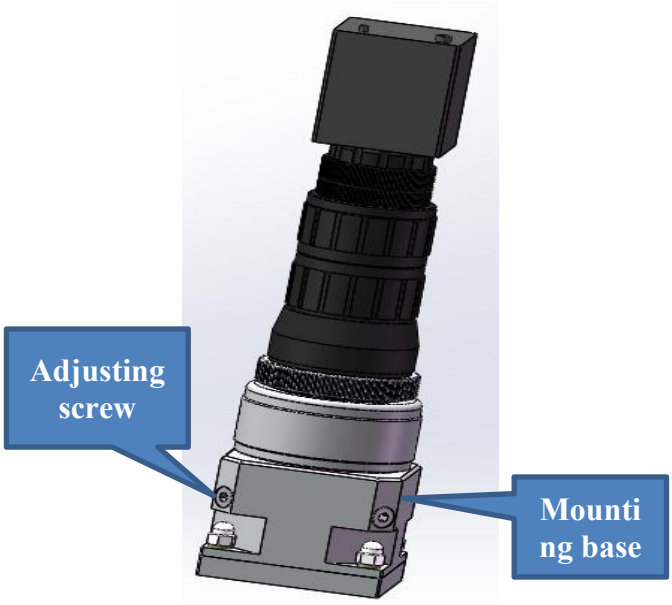
CCD definition debugging
Purpose：To make the image clear on the display, adjust as following steps.Adjustment steps（left picture）：
1、Install industrial camera to the lens properly;
2、Loosen locking screws on Aperture Ring(1) and Focusing Ring(2);
3、Adjust Aperture Ring(1) to get a certain brightness;(image is clearly visible on the screen)
4、Adjust image distance with Focusing Ring(2) to make the image clear;
If the image is not clear enough, repeat the above step 1,2,3, then tighten the locking screws on Aperture Ring and Focusing Ring.
Note：This welding head is equipped with aluminium rings in two different specifications(5mm / 10mm). These are used to increase/decrease image distance. User can assemble or unassemble the aluminium rings to adjust the CCD focusing range according to actual screen display.

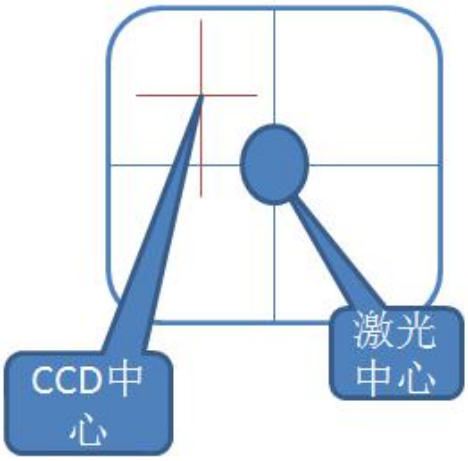


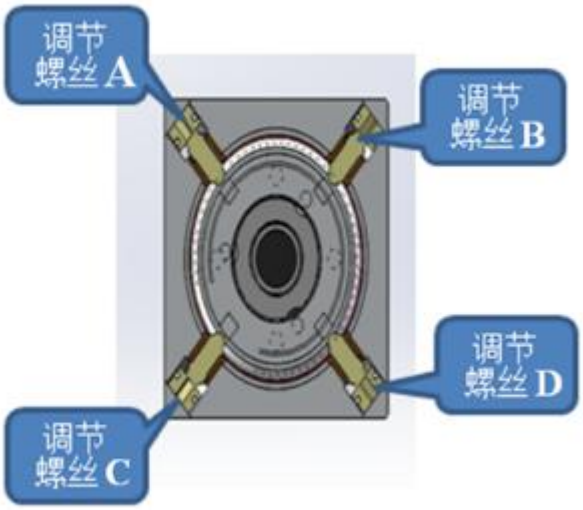
Note：It is recommended to use the CCC digital camera as shown below to make screen images clearer



4.2 CCD image and laser center coincidence adjustment



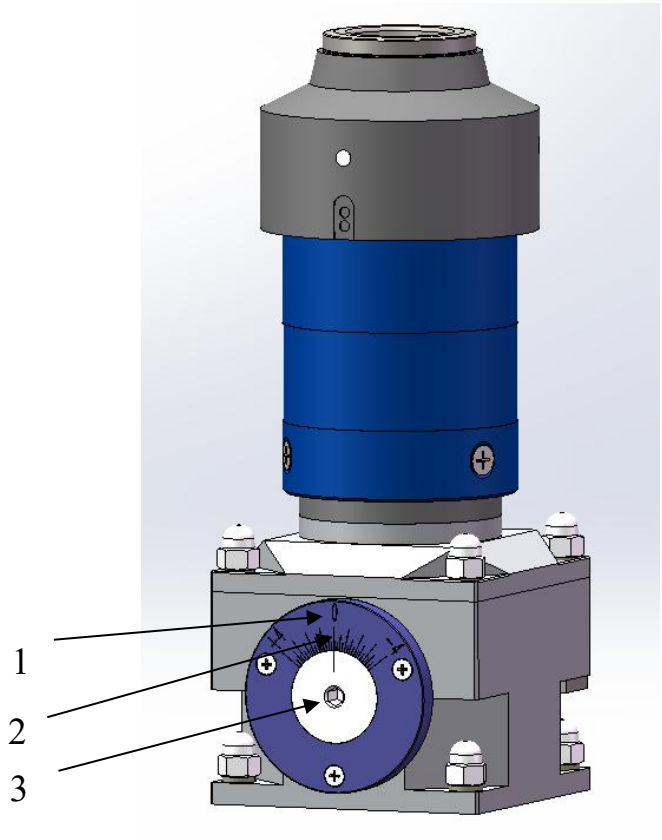




In the process of welding, the CCD image center (cross intersection) must coincide with the laser center.
Adjustment method as follow：
As shown above, the cross point of the CCD on the screen is on the upper left of the laser center and can be adjusted with four adjustment screws mounted on the quadrangle of the seat in the left image.
1, Release D screw properly with hexagonal wrench to make room for CCD to move right down;
2, Tighten the A screw with a hexagonal wrench, forcing CCD to move right down until the intersection of the CCD cross coincides with the center of the laser;
3, If the above two steps fail to adjust the CCD cross intersection to the laser center point or the CCD cross crossing point to move below the laser center position, then use a hexagonal wrench to properly loosen the B screw to make room for the CCD cross crossing point to move up to the right, Then tighten the C screw with a hexagonal wrench, forcing the cross point of the CCD cross to move up to the right until the intersection of the CCD cross coincides with the center of the laser.
4, When the cross crossing of CCD deviates from other positions in the center of the laser, use the hexagonal wrench to adjust the cross point of the CCD cross by loosing the diagonal screw first and then tightening the adjusting screw to adjust the cross point of the CCD cross.

Special attention:before using the adjustment screw, the diagonal screw must be released to make room for CCD component movement. Avoid blindly tightening adjustment screws and damage CCD components.

4.3 Focusing adjustment



1 Dial
2 Focus pointer
3 Focus adjusting hexagonal hole

Adjustment method: insert the inner hexagonal wrench of the corresponding focus adjustment hexagonal hole 3 into the focus adjustment hexagonal hole 3 and rotate the hexagonal wrench so that the position of the focus pointer 2 is the focus position needed for the welding joint.

Note: when the focus pointer is in the +direction, the focus moves up; when the focus pointer is in the -direction, the focus moves down.

5. Maintenance

5.1 Maintenance of QBH and Fiber

Clean and dust-free working environment is required!

Any laser circuit equipment fitted with a laser head must be carefully dedusted!

Assembly or replacement of lens or other components must be conducted in clean working environment!

Prepare new lens component before removing the old one!

Users could purchase spare lens components from us!

In case that user could not meet the above requirements, it is advised to use nonstick protective film to seal the opening after the removing of the lens immediately.

Minimize the time of laser path being exposed to the air to prevent the dust and dirt entering into the laser head.

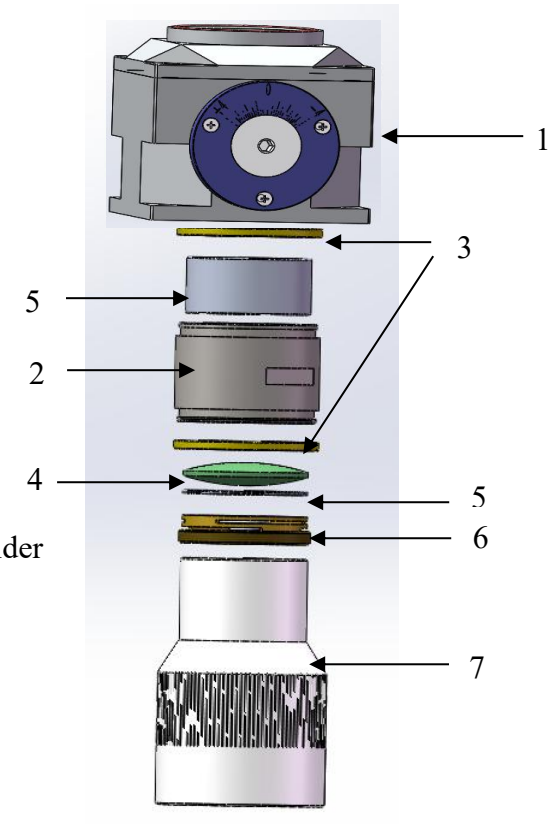
If any safety or protection device has been removed, it must be reinstalled before the equipment being operated or debugged and checked whether the device could run well.

Maintenance of QBH and Fiber Connector

1、Use self-adhesive paper to cover the junction of QBH and fiber connector to prevent dust from entering the gap.

2、Fiber connector water cooling pipe must be connected well to prevent leaking. If QBH has water inside accidentally, please stop using immediately and send it to the factory to handle with.

When disassembling, please record the relative position of the parts in order to facilitate the correct installation after maintenance.



1 collimating lens cavity 2 collimating lens holder 3 bearing plug seal 4 double concave lens 5 washer 6 locking ring 7 special fixture

The removal process is as follows:

1. use special tool 7 to twist the locking ring 6 until the spring ring screw are completely removed.

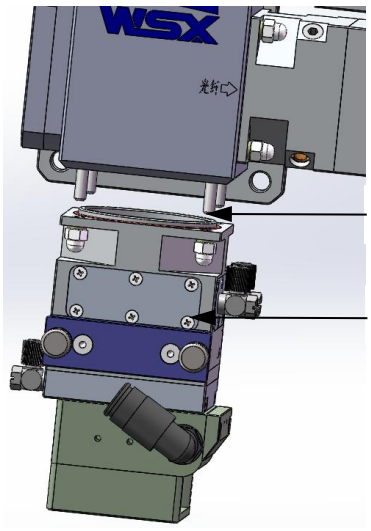
2. After loosen the spring ring, put the whole collimator coil upside down on the clean plate (keep the coil in the collimator base during this process), draw up the collimating lens cavity 1 gently, be careful not to drop the lenses.
3. remove the washer 5 on the lens and remove the lens to replace or maintain the lens.
4. After repairing or replacing the lens, please reverse the installation in the order of disassembly, and lock the spring pressure ring to be lighter to avoid damage to the lens.
5. After the spring pressure ring is turned to the end, please retract 1/5 times to ensure that the spring pressure ring 3 has a gap (0.1~0.15mm).

Note: Keep the original order between the parts, the lens should be the same direction as the original!

Cleaning and installation of protective window

1. Use a dust-free clean rod dipped in isopropyl alcohol solvent to clean the lens;
2. Use a hand bellows to draw clean air and blow the attached granules or other foreign matters off the lens;
3. Repeat the above steps several times, until the lens is clean;
4. If the protective window can not be cleaned or it is damaged, user must change a new one.

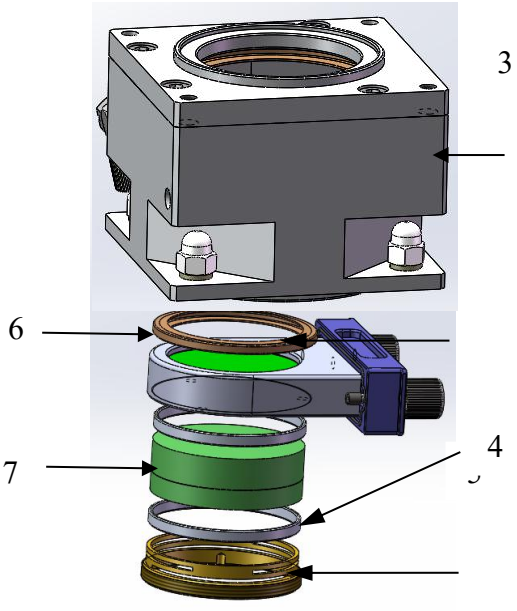
5.3 Maintenance of the focus component



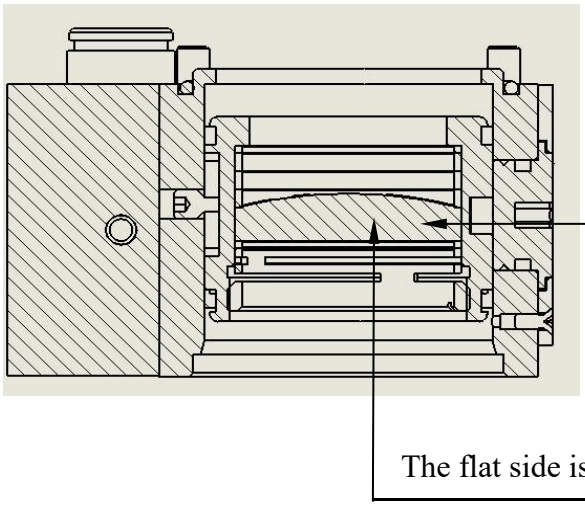
Before disassembly, do remember the relative position sequence of each component to facilitate proper replacement of the components after the focus lens is maintenance.

※Disassembly and installation of focusing lens

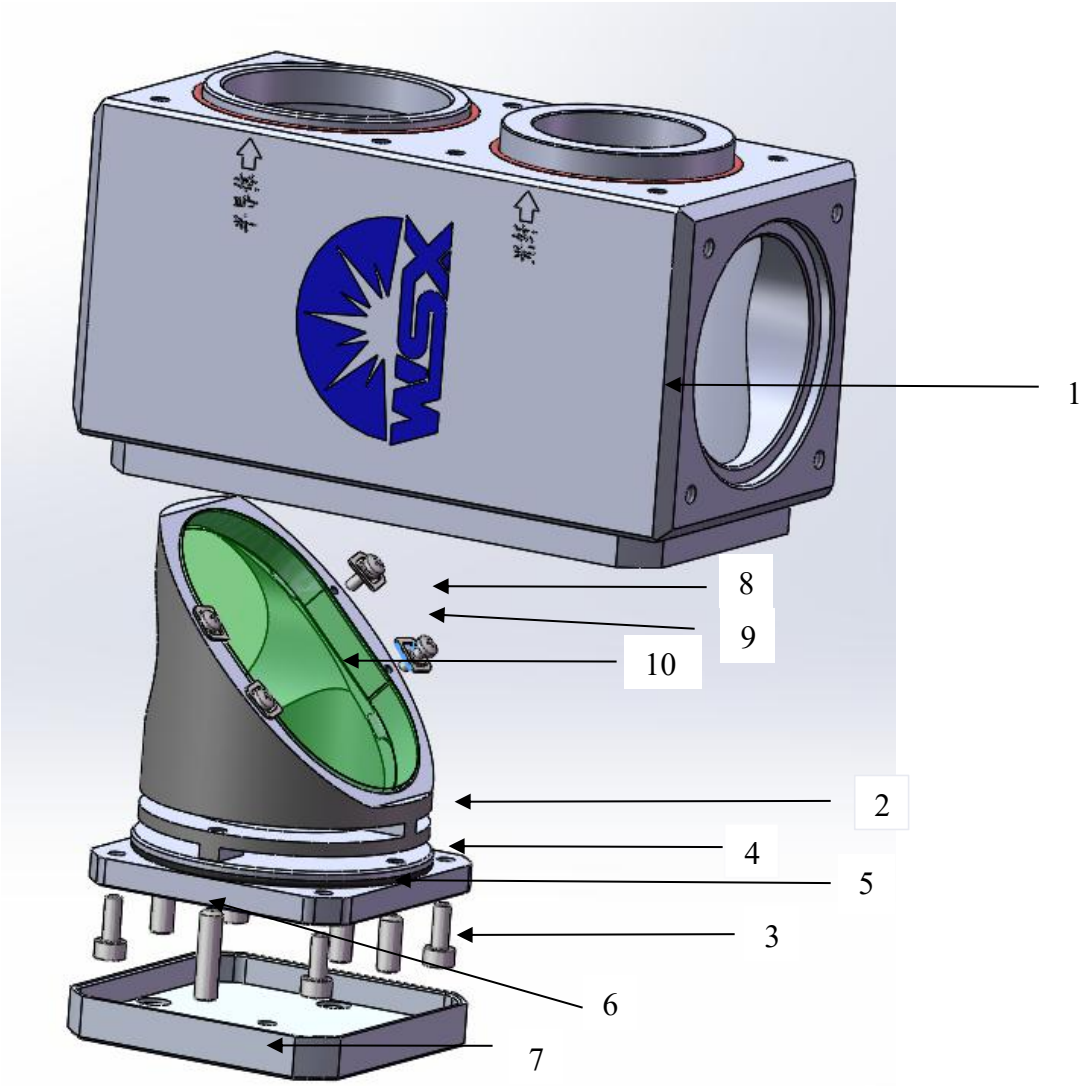
Disassemble the focusing mirror assembly process:
1, Remove four nuts for connecting the reflector component with an open wrench1;
2, Unscrew locking rings for fixing focusing lenses with special tools;
3, Gently remove the washer in the downward direction until the focus lens slowly slides out of the focus holder;
4.Care or replace the focusing lens .
5, the installation of the focusing lens and the components are reversed according to the above process;
6, When the focusing lens is installed, when the locking ring is twisted to the end, it needs to be twisted 1/5 times to maintain a gap of 0.1~0.15 between the locking ring and the focusing lens;
7.When the focusing lens is mounted, the convex surface of the focusing lens should be flat.



1, nut ,2, protective window component ,3 focusing component ,4, gasket ,5 locking ring ,6, elastic sealing ring ,7 focusing lens group



5.4 Maintenance of reflector components



1, reflector cavity; 2, reflector base; 3,cover; 4,Hexagon cylinder screw; 5, screws1; 6,screws2； 7, cross screws; 8,cross screws; 9, press buckle; 10, reflector lens

Reflector component and disassembly steps:

1、Remove cross screw 7 with cross screwdriver and remove cover 3;

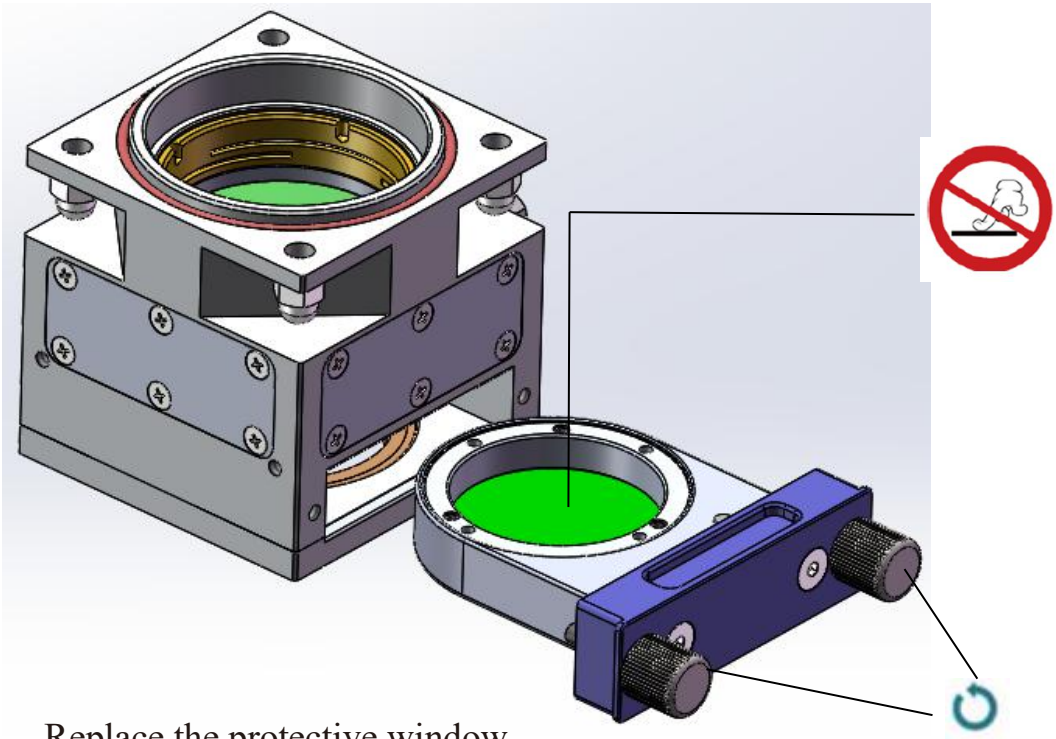
2、Remove the four inner hexagonal cylinder screws 4 with an inner hexagonal wrench and remove the reflector base;

3、Remove the four cross head screws 7 and the pressure buckle 9 of the fixed reflector lens with a cross screwdriver, and remove the reflector lens to replace or maintain the lens

4、After the lens maintenance or replacement is completed, the lens assembly is installed in reverse according to the above disassembly method, and the reflection angle of the lens is adjusted by adjusting the height of the four meter screws. When locking the lens, the force should be moderate to prevent the damage of the lens

6. Maintenance of the protective window

1. Use a dust-free clean rod dipped in isopropyl alcohol solvent to clean the lens;
2. Use a hand bellows to draw clean air and blow the attached granules or other foreign matters off the lens;
3. Repeat the above steps several times, until the lens is clean;
4. If the protective window can not be cleaned or it is damaged, user must change a new one.



Replace the protective window.

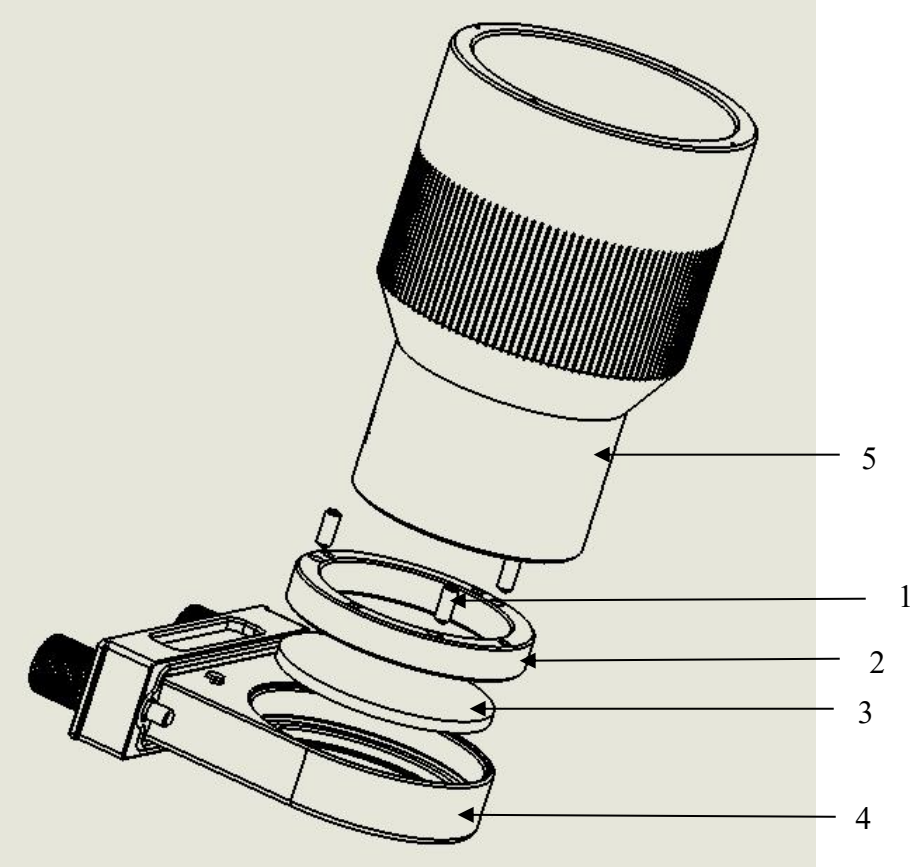
1 Open the pressure ring and take out the lens

2 and put it into a clean container. The lens cannot be in contact with non-gas materials.

2 Check the seal ring for deformation or gap. If it is defective, replace it.

3 Ensure that the components are clean. After installing the sealing ring, install the lens in the original direction and press the pressure ring.

Note: In the process of operation, keep the environment clean and the parts clean. The protective window needs to be installed in the direction and cannot be reversed.



Installation of protective lens

1. ball head plunger ;2, lens press ring ;3 protect lens ;4, protect lens seat ;5, special tool

Removal and installation of protective lenses:

1. Twist the ball head plunger 1 with the inner hexagonal wrench, do not need to remove the screw, loose to the half lens of the screws;

2. the four pin holes of the lens pressure ring 2 are stuck with the special tool 5, the lens pressure ring 2 can be replaced or maintained by right rotation.

3. lens maintenance or replacement is completed, reverse install the spectroscopic lens assembly according to the above disassembly method.

Note: in the use of special tools 5 fixed lens pressure ring 2 fastening force should be moderate to prevent damage to the lens!

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