Medium Power Welding Head
ND20

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 andmaintenance.

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： Medium Power Welding Head

Model： ND20

Product Features:

- This welding head has a strong advantage in medium-thin material welding and small or medium size material welding. It is an economical and efficient welding head.

- Full-sealed internal structure protects optical part from pollution by dust.

- Air curtain parts prevent welding slag from entering head inside.

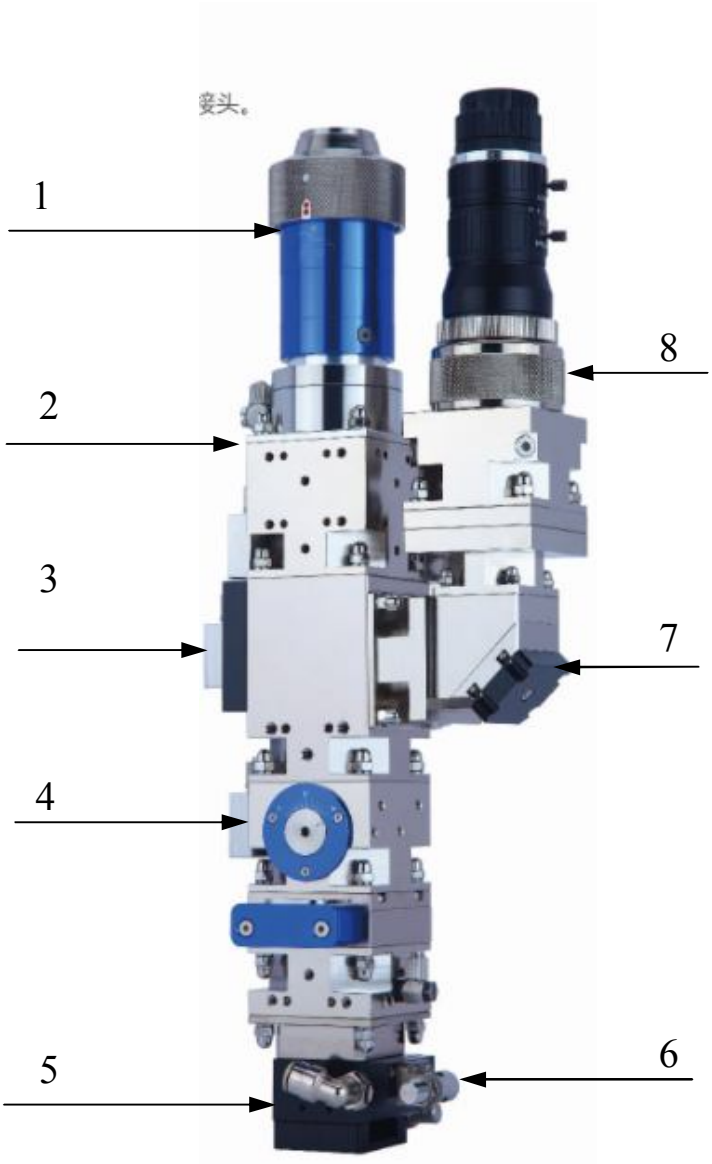
- The focusing adopts the camstructure, which is accurate and convenient to adjust. Protective window is drawer-type and can be replace easily.CCD parts can be configured according to customer needs.

Contents

1. ProductDescription

1.1Structure Diagram

No.	Parts
1	QBH Component
2	Collimator Component
3	Beam Splitting Component
4	Focusing Component
5	Gas Curtain Component
6	Gas Rod Component
7	Reflector Component
8	CCD Component



1.2Main Function

1.2.1 Components Introduction

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

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

※Beam Splitter Cavity 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 tothe protective window.

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

※Reflector Component
Reflex the real-time status of the welding seam to CCD components and monitors 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.

1.2.3Auxiliary 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	75，100，150
Focusing length mm	150，200，250
Clear Aperture mm	24
Weight kg	3.2

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

3.Installation & Connection

.1Safety 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.

Danger - High Pressure !

The gas pressure inside some laser head component can reach to 2.5MPa.

Danger - High Voltage !

Keep the power off during the maintenance and repair.

Danger - 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!

Danger - 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.

3.2Unpacking Check

※Unpacking Check

1.Intact box;
2.The sinage 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.

※Check after opening

1.A packing list inside;
2.Check the products with lists;
3.Please contact us immediately if there are anything unqualified.

3.3Preparation for Installation

※Tools

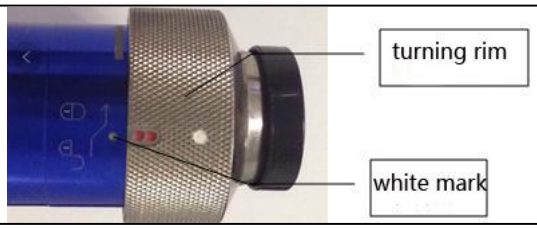
1.A set of metric hexagonal handle;
2.One bag of clean rod, one bottle of anhydrous ethanol(500ml), one package of clean gloves.
3.Clean and dust-free working environment.

※Preparation of installation personel

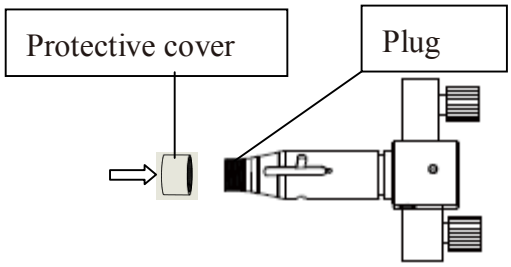
1.Read this manual carefully;
2.Wash hands with soap;
3.Wear dust-free gloves;
4.Wear a mask if necessary.(Note - Dust removal is of utmost importance)

3.4 QBHand Fiber Connection

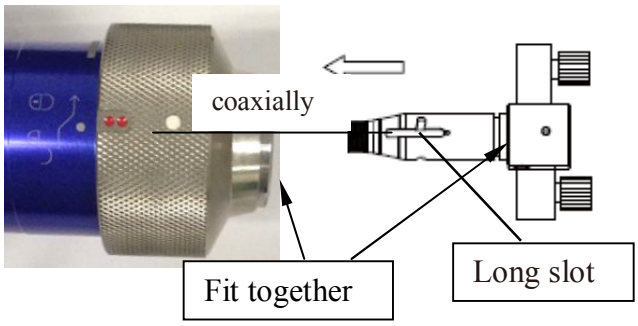
Step one： Before turning the rim as below, make sure the red marks are aligned to the white marks.



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.

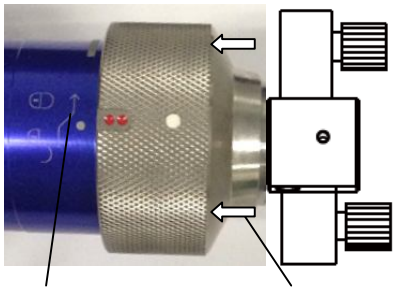


Step three： Remove the dust cover from QBH, place the clean fiber rod and the QBH coaxially, make sure the white mark on the QBH is aligned with the locating slot (long slot on fiber rod), insert the fiber rod into QBH gently, until the fiber rod joints the QBH contact surface.



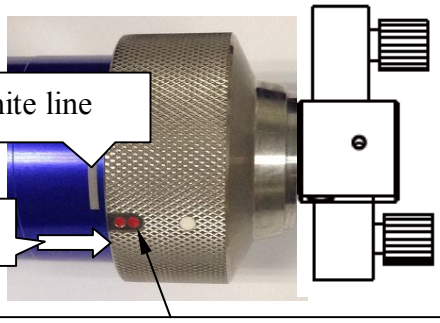
Step four： After inserting the fiber rod into QBH, press the rim gently and turn it about 15 degree along the arrow on the rim. Then pull the rim until its underside is parallel with the top of QBH, turn the rim at the same direction till the limit.

A



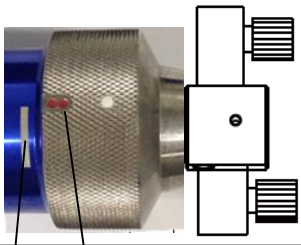
Turn along the arrow | Press the rim

B



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

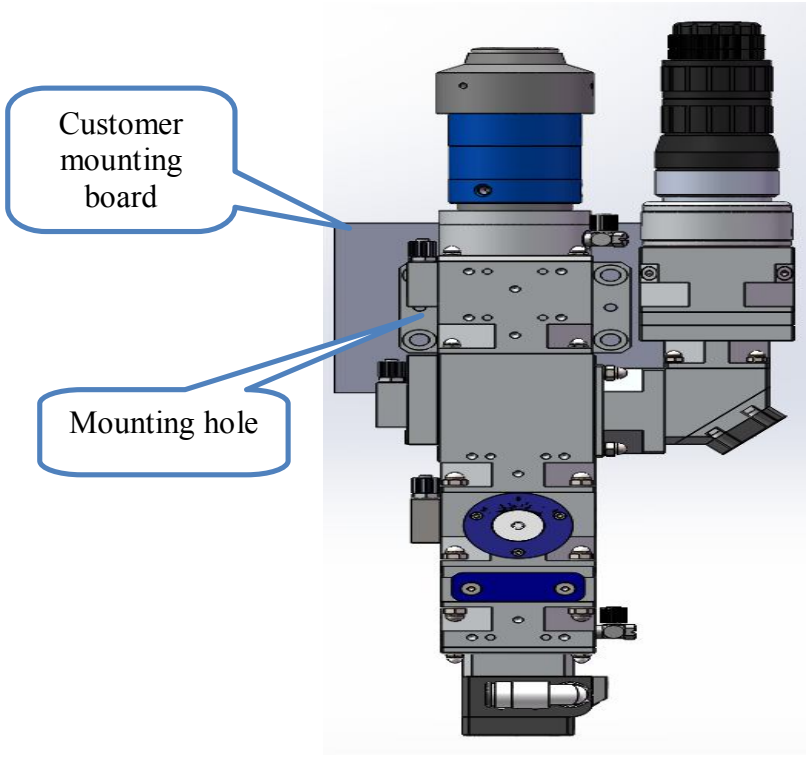
C

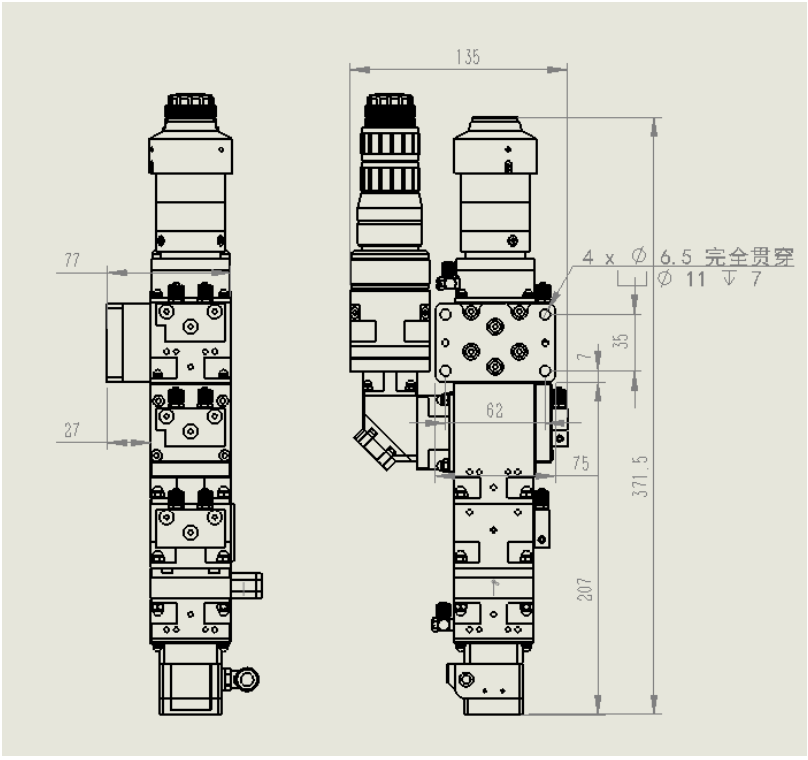


Pull the rim and continue turning, the red dot should be in the scope of the white line or close to the end of white line. The underside of rim should be parallel with the top of QBH.

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

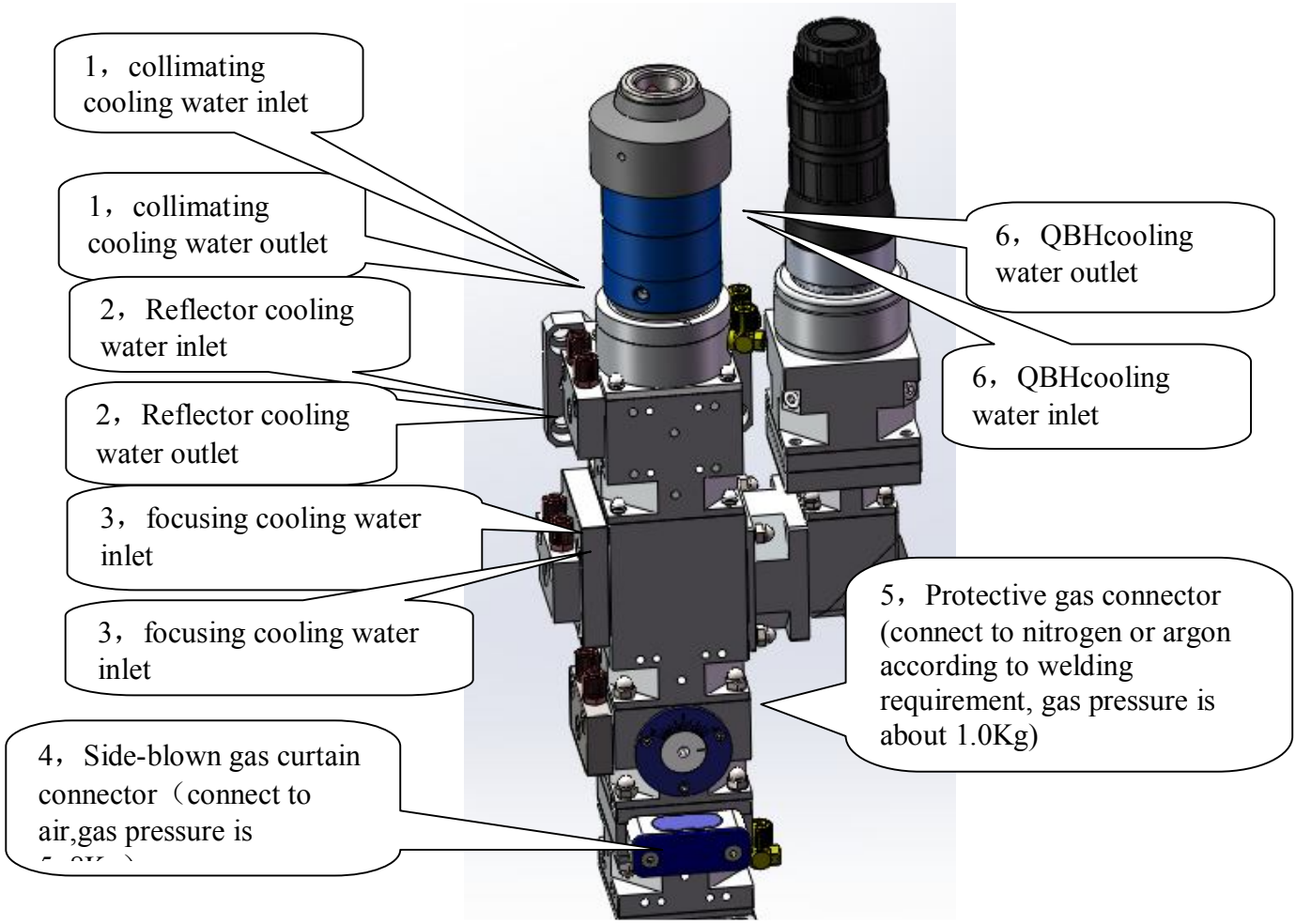




Installation of laser head should be solid and reliable.
The angle of laser head in the vertical direction can be set according to customer requirement.

3.6Connection of water and gas

Water cooling connector & gas connector diagram



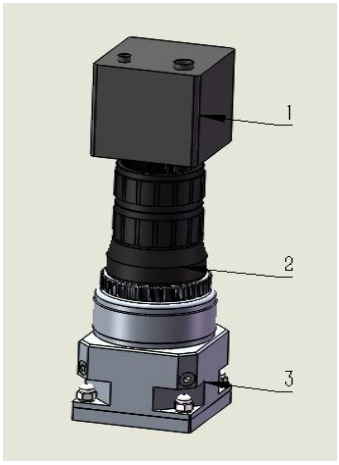
Note：

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



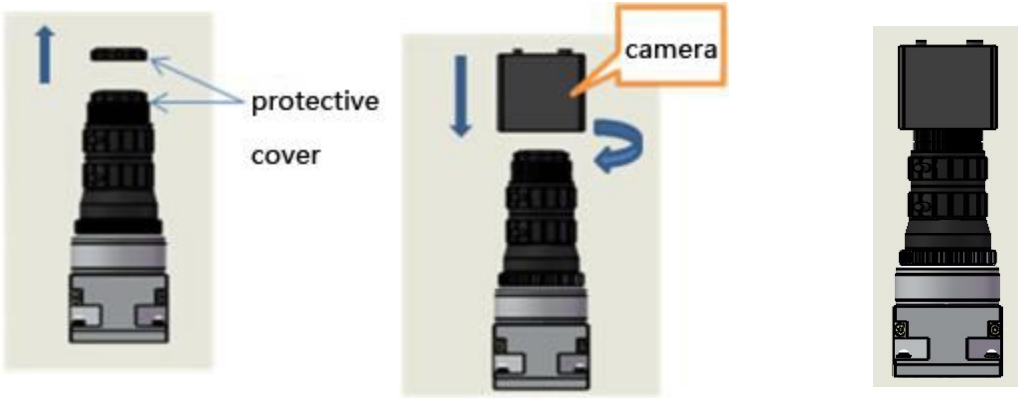
1 Camera
2 CCD interface
3 Mounting base

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.

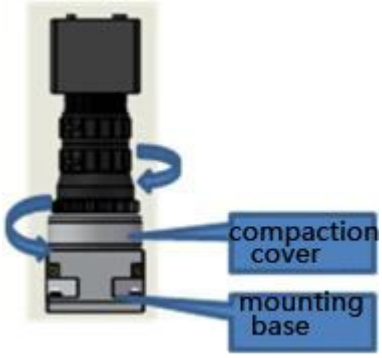


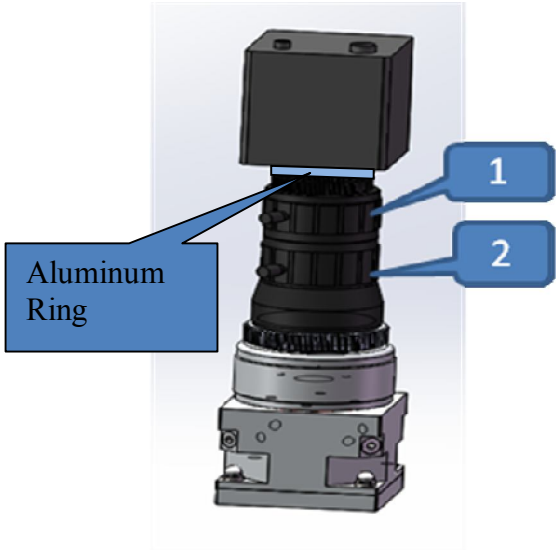
4.Debugging

4.1 CCDDefinition 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;

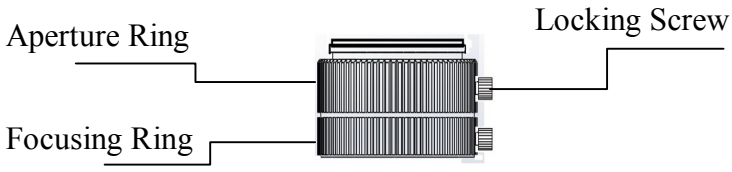
2 、Loosen locking screws on Aperture Ring(1) and Focusing Ring(2);

3 、Adjust Aperture Ring(1) to get a certain brightness;(image is clearly visible on the screen)

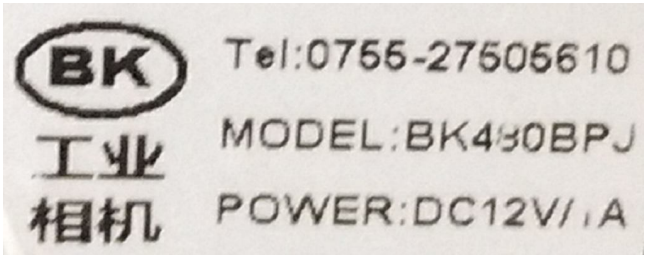
4 、Adjust image distance with Focusing Ring(2) to make the image clear;

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.

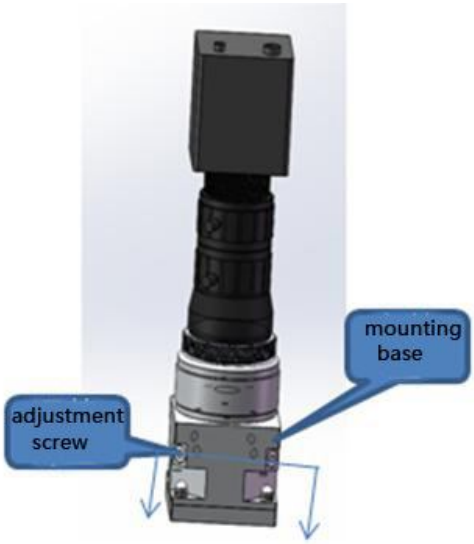
Note：This welding head is equipped with aluminium rings in two different specifications(5mm / 10mm). These are used to increase/decrease image distance. User can assemble or unassemble the aluminium rings to adjust the CCD focusing range according to actual screen display.

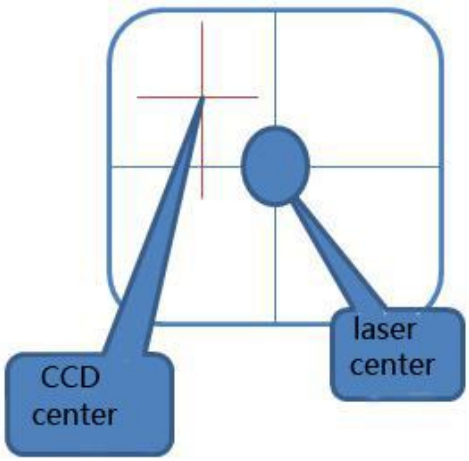


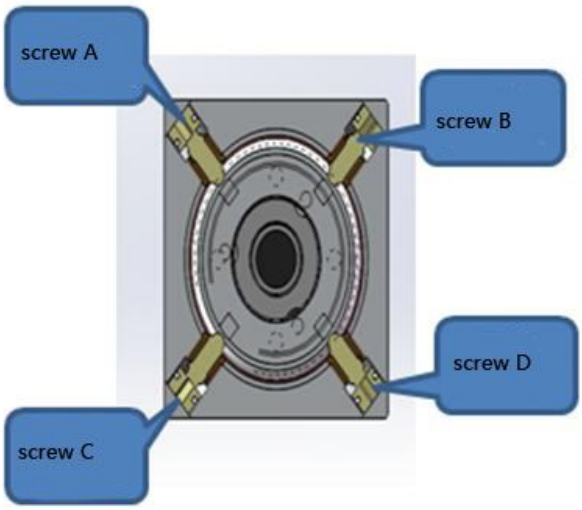
Note： It is recommended to use the CCC digital camera as shown below to make screen images clearer



4.2 CCD image and laser center coincidence adjustment







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 component**s.**

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.

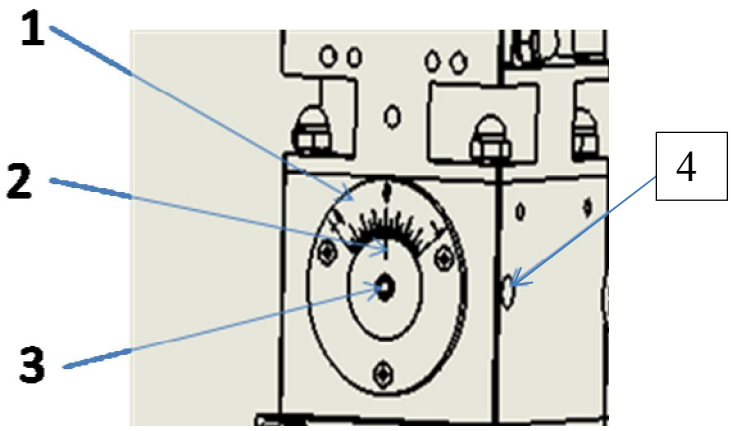
1, Release D screw properly with hexagonal wrench to make room for CCD to move right down；

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.

4.3 Focusing adjustment



1 Dial
2 Focus pointer
3 Focus adjusting hexagonal hole
4 Adjustment locking screw

Adjustment steps：
Step 1: release the **adjustment locking screw 4**.
Step 2: insert the inner hexagonal wrench of the corresponding focus adjusting **hexagonal hole 3** into the focal adjusting **hexagonal hole 3**, turn the hexagonal wrench, so that the focal point pointer 2 stays in the focus position needed by the welding.
Step 3: after finding the focus, lock the **adjustment locking screw 4**to fix the focus position.
Note: when the focus pointer moves in the + direction, the focus moves upward; when the focus pointer moves in the- direction, the focus moves downward.

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.

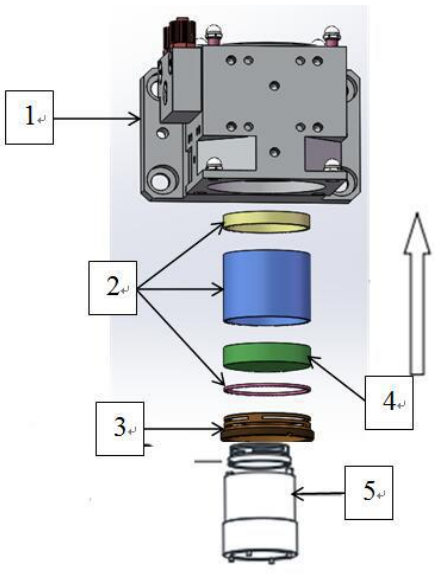
Maintenance of QBH and Fiber Connector

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 Base
2. Backing Ring
3. Spring Pressure Ring
4. Collimating Llens
5. Special Tools



The disassembly process is as follows:

1 Twist the spring pressure ring 3 with the special tool 5 until the spring pressure ring nut is completely disengaged.

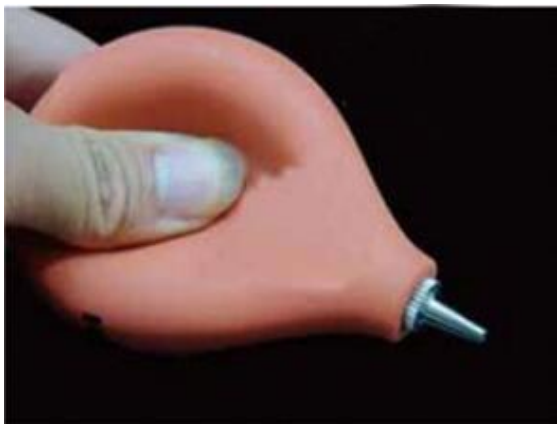
2 Loosen the entire collimating spring pressure ring after loosening the spring pressure ring down on a

clean plane (in this process, the spring pressure ring should be kept in the collimating base), and the collimating base 1 is gently pulled upwards. Be careful not to drop the lens.
3 After removing the ring 2 placed on the lens and removing the lens, the lens can be replaced or maintained.
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 The 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. Use an open-end wrench to remove the four nuts 1 for connecting the focusing assembly and the protective mirror assembly 2;

2, use a special tool to unscrew the locking ring 3 for fixing the focusing lens;

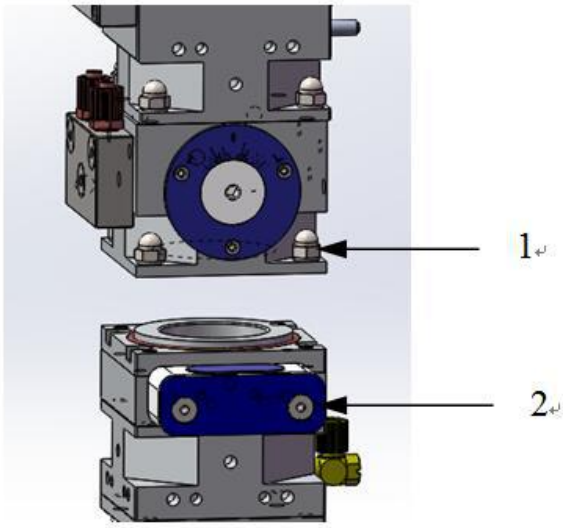
3. Gently remove the washer 4 in the downward direction until the focus lens 6 slowly slides out of the focus holder;

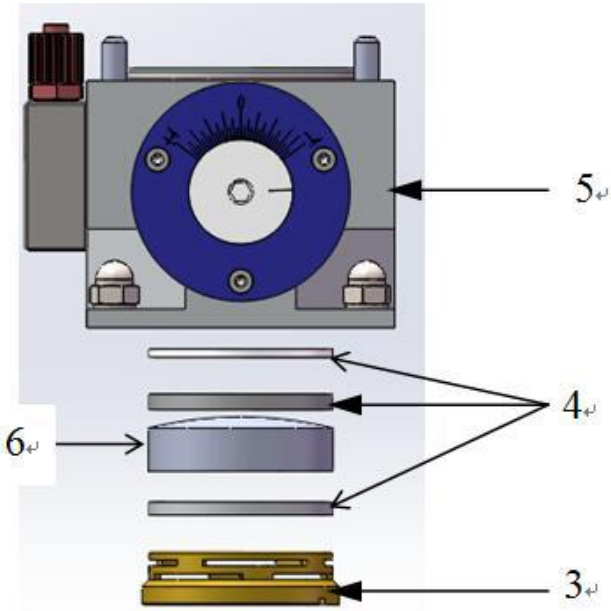
4. Care or replace the focusing lens 6.

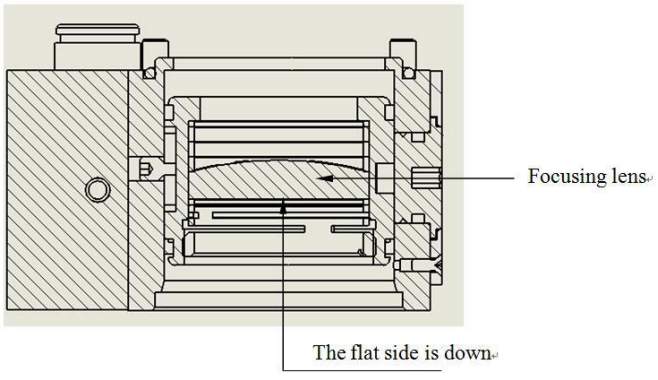
5, the installation of the focusing lens 6 and the components are reversed according to the above process;

6. When the focusing lens 6 is installed, when the locking ring 3 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 3 and the focusing lens 6;

7. When the focusing lens 6 is mounted, the convex surface of the focusing lens 6 should be flat.







1. Nut;

2. Protective window component;

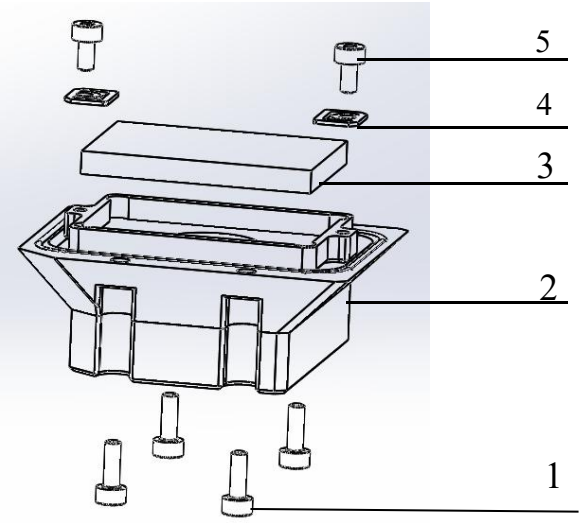
3. locking ring;

4. Washer;

5. Focusing base;

6. Focusing lens

5.4 Maintenance of reflective components



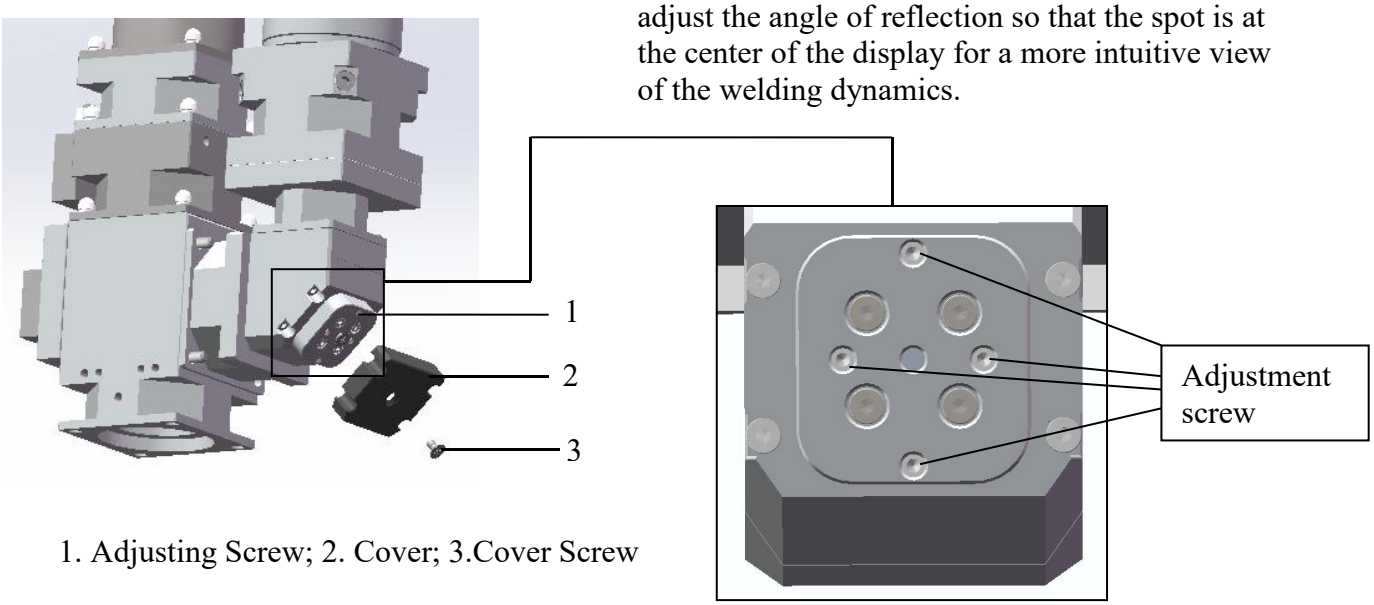
1. M2-6 socket head cap screws
2. Lens assembly tray holder
3. Lens
4. Lens buckle
5. M2-4 socket head cap screws

Reflecting component and disassembly steps:

1. Remove four M2-6 screws with a hexagon socket screwdriver.
2. Remove the lens assembly tray holder from the welding head by hand and place it on the table top or flat work surface;
3. Use a hexagonal screwdriver to remove the two M2-4 screws and remove the lens crimp;
4, gently remove the lens for lens maintenance or replacement;
5. After the lens is repaired or replaced, the tray holder with the lens installed can be reversely loaded into the welding head according to the above method.

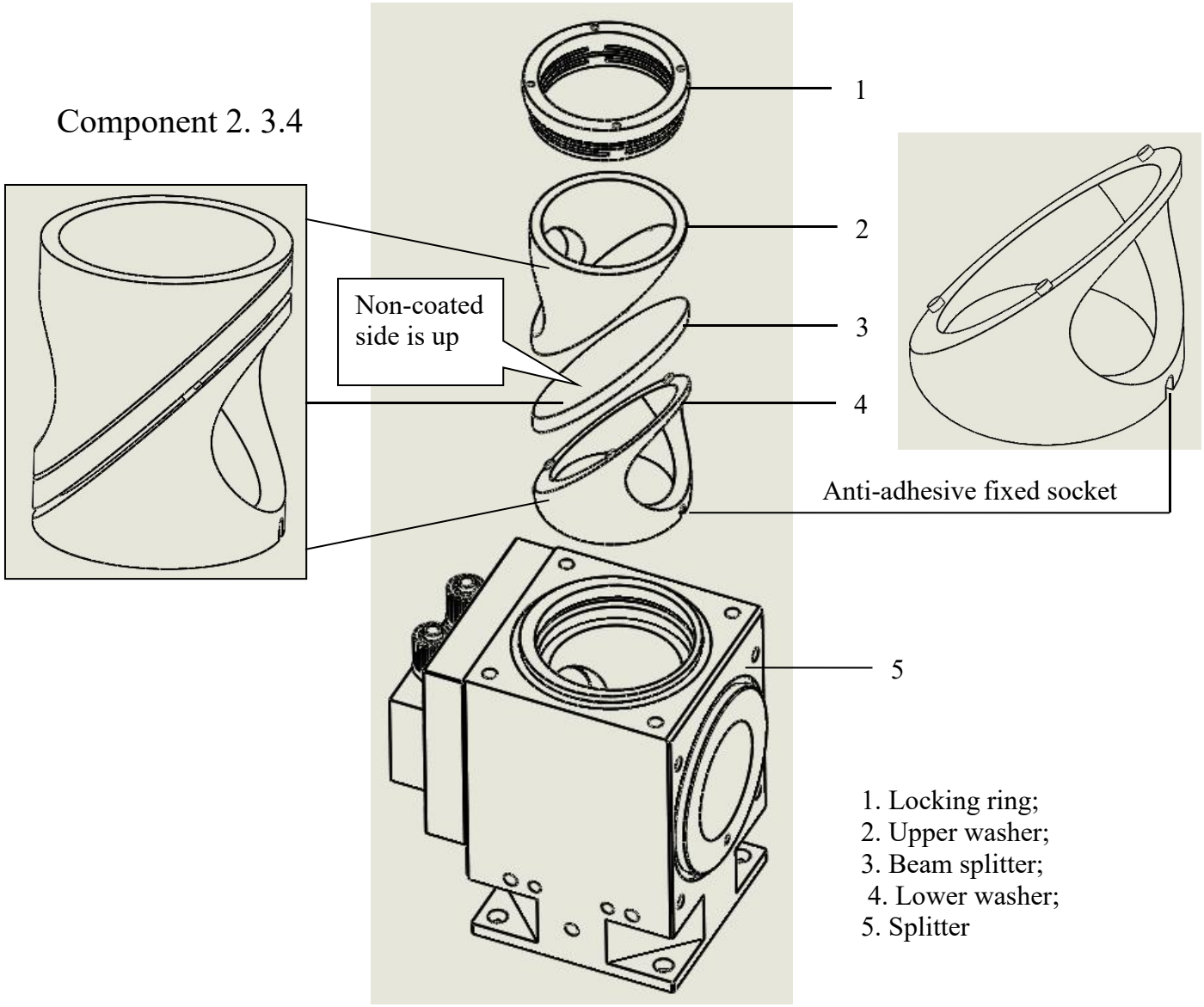
5.5 Reflective lens angle adjustment

5.5 Reflective lens angle adjustment
Reflective lens angle adjustment steps:
1. Loosen the reflector lens cover screw with a screwdriver;
2. Remove the reflective lens cover;
3. Use a screwdriver to gently rotate the four screws on the reflective lens on the tray holder to adjust the angle of reflection so that the spot is at the center of the display for a more intuitive view of the welding dynamics.



1. Adjusting Screw; 2. Cover; 3.Cover Screw

5.6 Maintenance of the beam splitter



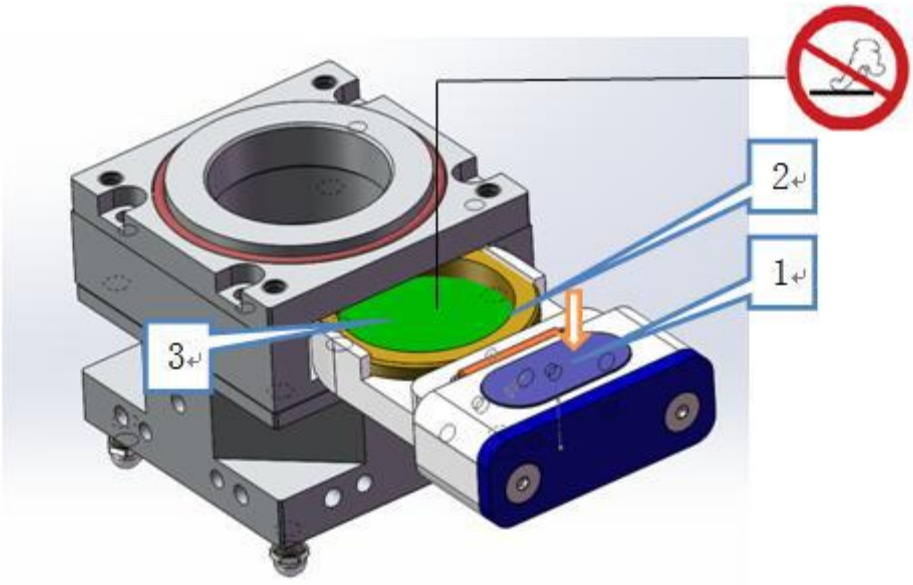
Beam splitter disassembly and installation process

1. Twist the 1 locking ring with a professional tool until the tooth pattern is completely loose;
2, the 2, 3, 4 spectroscopic lens assembly is gently lifted upward from the entire beam splitting seat, and the lens needs to be prevented from slipping during the lifting process;
3. Place the lifted lens assembly on the table or flat workbench, then remove the upper washer and remove the lens from the lower washer to replace or maintain the lens.
4. After the lens is repaired or replaced, the spectroscopic lens assembly is installed in the reverse direction according to the above disassembly method, that is, the lens replacement or maintenance work is completed. Note that when locking the ring, the force should be moderate to prevent damage to the lens;
5, After the locking spring ring is screwed to the bottom, it needs to be rotated 1/5 times, so that the locking spring ring and the upper washer have a gap of 0.1~0.15;
6. When the spectroscopic lens assembly consisting of 2, 3, and 4 is installed, the anti-sliding socket of the lower washer should be aligned with the positioning pin.
7. Before installing the beam splitter, you must distinguish the correct direction of the beam splitter: the surface of the coating is facing down, which is R470; the non-coated side is facing up, it is T1064.

6. Protective Window Maintenance:

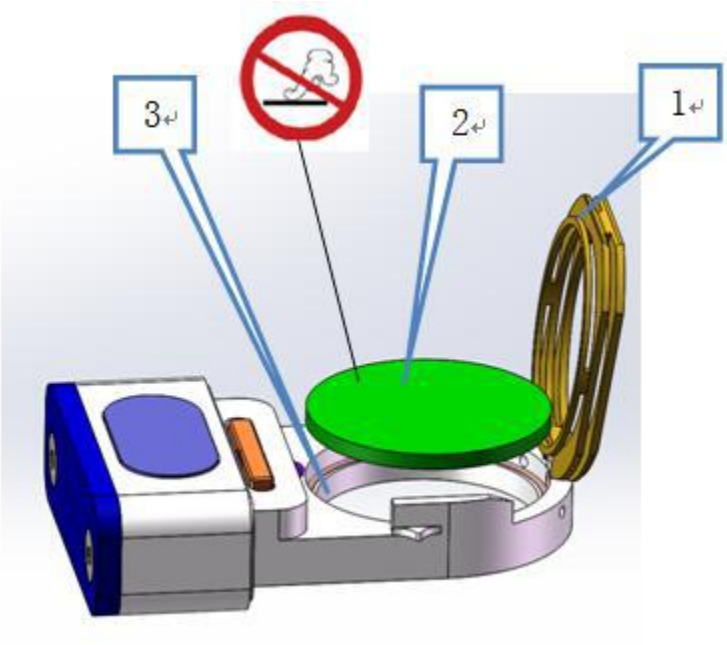
1. Press the lock button 1 by hand to pull the protective window component out of the protective window mount 4.
2. Note: Quickly seal the opening after lens removal with a non-adhesive protective film!
3. Place the protective window component in a clean environment for maintenance.
4. Remove the non-adhesive protective film from the entrance of the protective window component, insert the guarded protective window component into the inlet, and press the lock button 1 during the insertion process until it is inserted into the end. Release the pressed lock button 1 the protective window component is locked.

Note: Check that the protective window component is locked (the protective window component without locking can be pulled out without pressing the locking button 1).



1. Lock button
2. Lens press ring
3. Protective Window

Protective Window Replacement:



Replace the protective window.

1 Open the pressure ring 1 and take out the lens

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

2 Check the seal ring 3 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 2 in the original direction and press the pressure ring 1.

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.

地　　址：广东省深圳市龙华新区大浪街道浪口工业园青年梦工厂3栋3楼
Address：Floor 3, Building 3, Langkou Industrial Zone, Dalang, Longhua District, Shenzhen
电话 Tel：+86 0755 27702280
传真 Fax：+86 0755 27702881
网址 Web：www.szworthing.com.cn
邮箱 Email：info@szworthing.com.cn