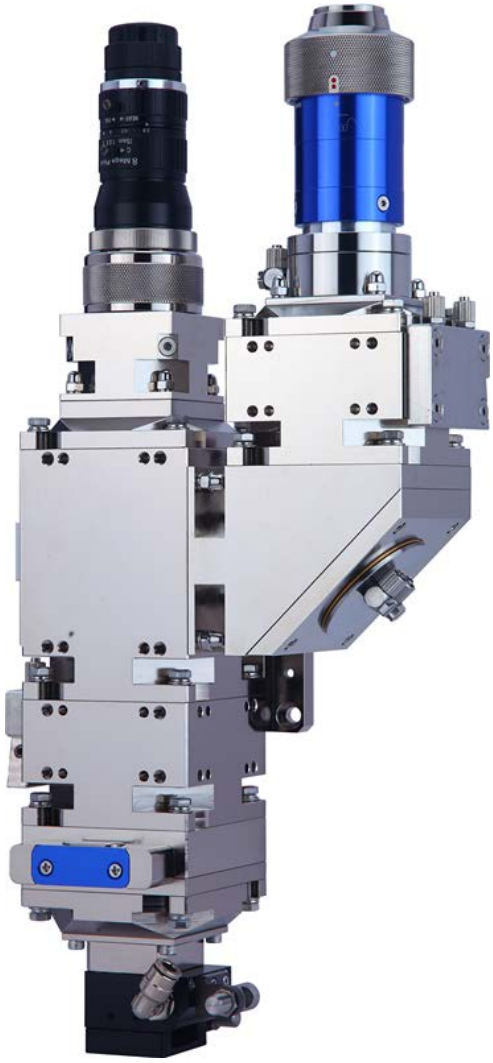
ND41 Laser Welding Head
User Manual

WSX Laser Drives the Future

Shenzhen Worthing Technology Co., Ltd.
www.wsxlaser.com

Contents



Product Name: High power welding head

Product model： ND41

This welding head has a strong advantage in medium and heavy plate welding and large-piece welding applications.

The side-mounted QBH interface makes it easier and more efficient to weld high-reflection materials.

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

Equipped with air curtain components to reduce contamination of the lens by welding fumes and splash residues.

The protective window has a drawer structure and is easy to replace.

It can be equipped with a variety of QBH interface lasers.

Water cooling device is installed to improve product quality.

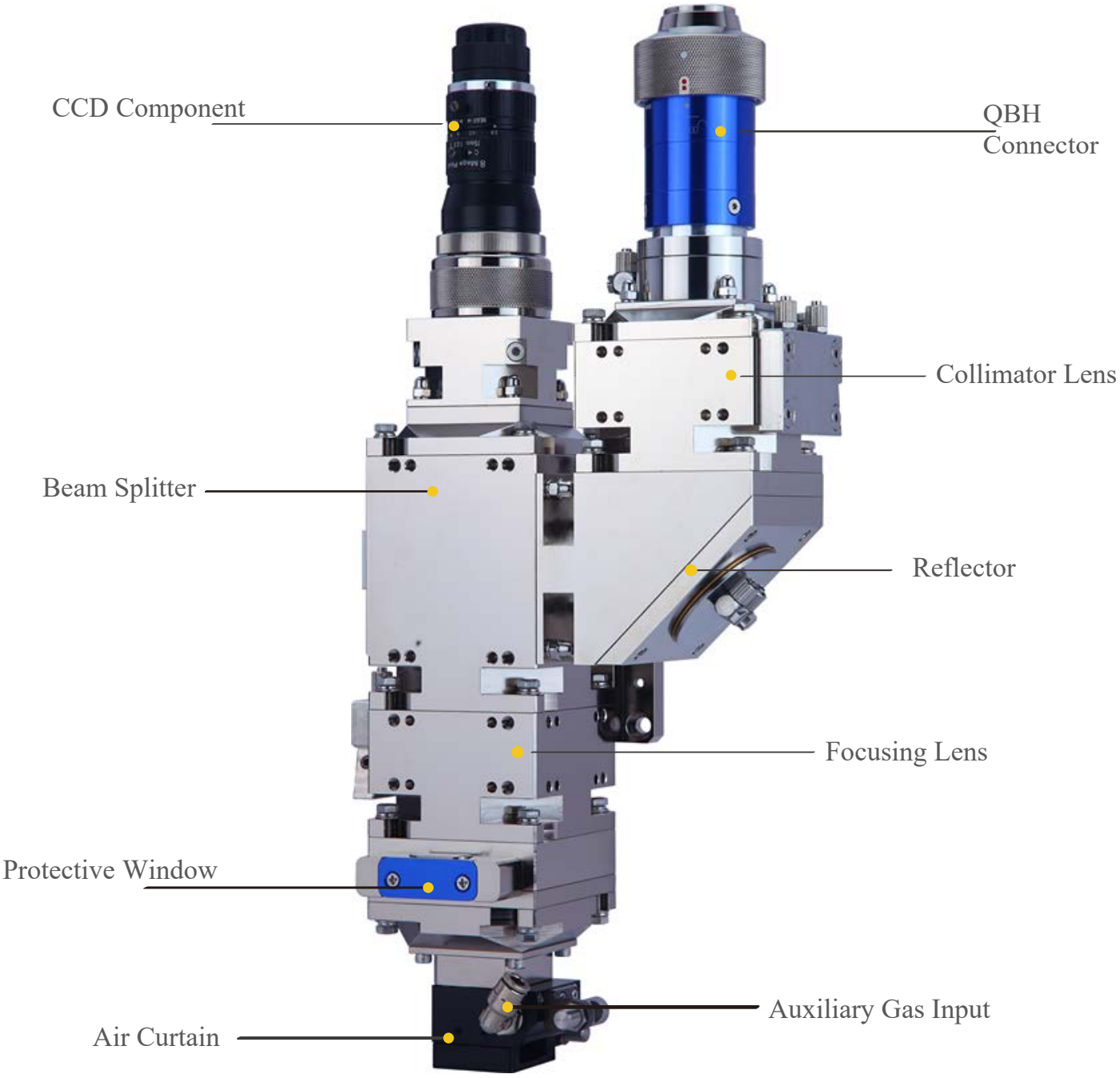
Warm Tips

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.

1. Product Description

1.1 Structure Diagram



1.2Main Function

1.2.1 Structure & Components

QBH Connector

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

Collimator Component

Collimator component is set inside the laser head which contains collimator cavity, collimating lens .

Beam splitter component

Provides a light source of welding status required for the CCD component.

Focusing Component

Focusing component contains focusing lens group, focusing lens cavity, gasket, locking ring and water cooling system of lens.

Side-blow Air Curtain

It blows away the welding slags to provide protection for the protective window.

Auxiliary Gas Input

It provides inert gas during welding.

Reflector component

It reflects the real-time state of the weld on the CCD components and monitors.

CCD Component

It provides filtering and focusing function, safe and reliable light source for CCD.

1.2.2 Design & Function

This laser head uses a fiber laser as a light source to weld metal on a flat machine tool at a controlled distance. This laser head is precision, durable, easy to maintain and adjust.

All media connections are built inside the laser head.

1.2.3 Auxiliary Medium

Protective 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

Max Power：4000W

Collimator Focal Length：100mm/150mm

Focal Length：200mm/250mm/300mm

Clear Aperture：40mm

Weight：4.2kg

Fit for Laser Machine IPG, SPI, Rofin, nLight, Coherent, Raycus and Max 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 not only should obey to the safety requirements stipulated by laws and regulations, but also obey to the safety instructions mentioned by manufacturers.

Users should learn the related safety knowledge and prepare necessary safety devices before using.

Danger – High Pressure!

The gas pressure inside some laser head components 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.

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 signage 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.

Packing List

Welding Head*1	

Check after opening

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

3.3 Preparation for Installation

Tools

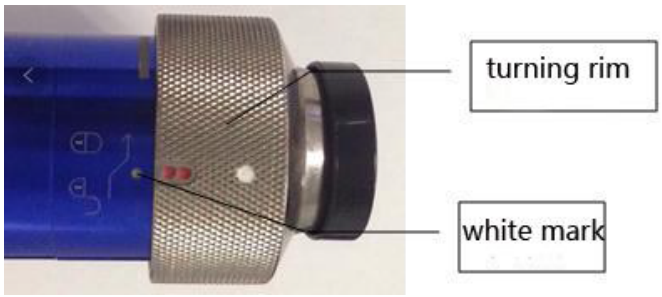
1. A set of metric hexagonal handle;
2. One bag of clean rods,one bottle of anhydrous ethanol(500ml),one package of clean gloves;
3. Clean and dust-free working environment;

Preparation of installation personnel

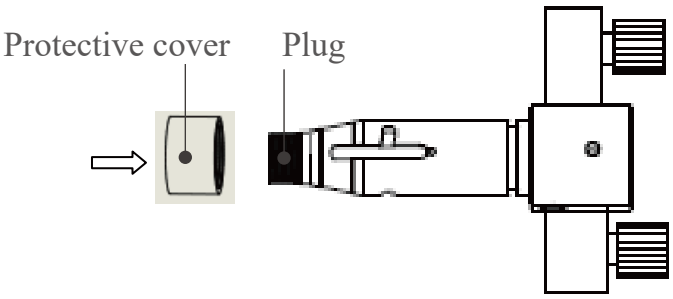
1. Read this manual carefully;
2. Wash hands with Soap;
3. Wear dust-free gloves;
4. Wear a mask if necessary.（Note - Dust removal is of utmost importance.）

3.4 QBH connected to fiber

Step 1: Before turning the rim as below, make sure the red marks are aligned to the white marks.

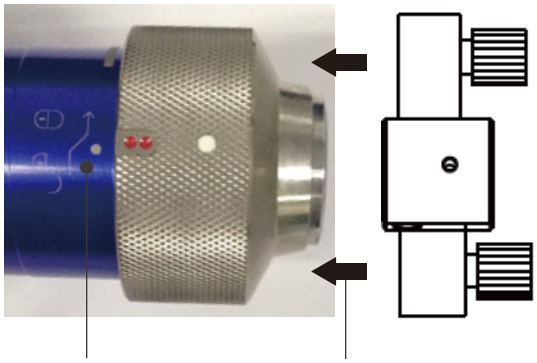


Step 2： Remove the dust cover of fiber rod, clean the fiber rod with anhydrous ethanol. Before installing, check the protective cover of fiber plug to see if it is locked, avoid the cover from loosening and effecting the welding performance or burning the fiber and welding head.

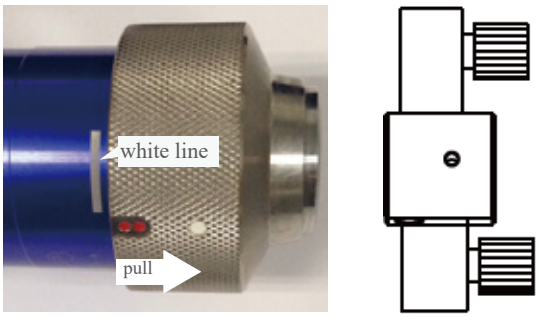


Step 3： Remove the dust cover from QBH, place the clean fiber rod and the QBH coaxially, make sure the white mark on the QBH is aligned with the locating slot (long slot on fiber rod), insert the fiber rod into QBH gently, until the fiber rod joints the QBH contact surface.

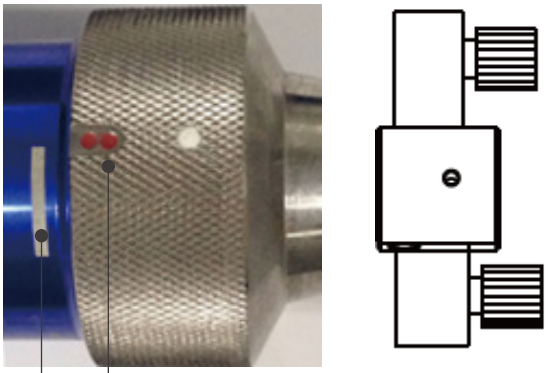
Step 4： After inserting the fiber rod into QBH, press the rim gently and turn it about 15 degree along the arrow on the rim. Then pull the rim until its underside is parallel with the top of QBH, turn the rim at the same direction till the limit.



Turn along the arrow Press the rim



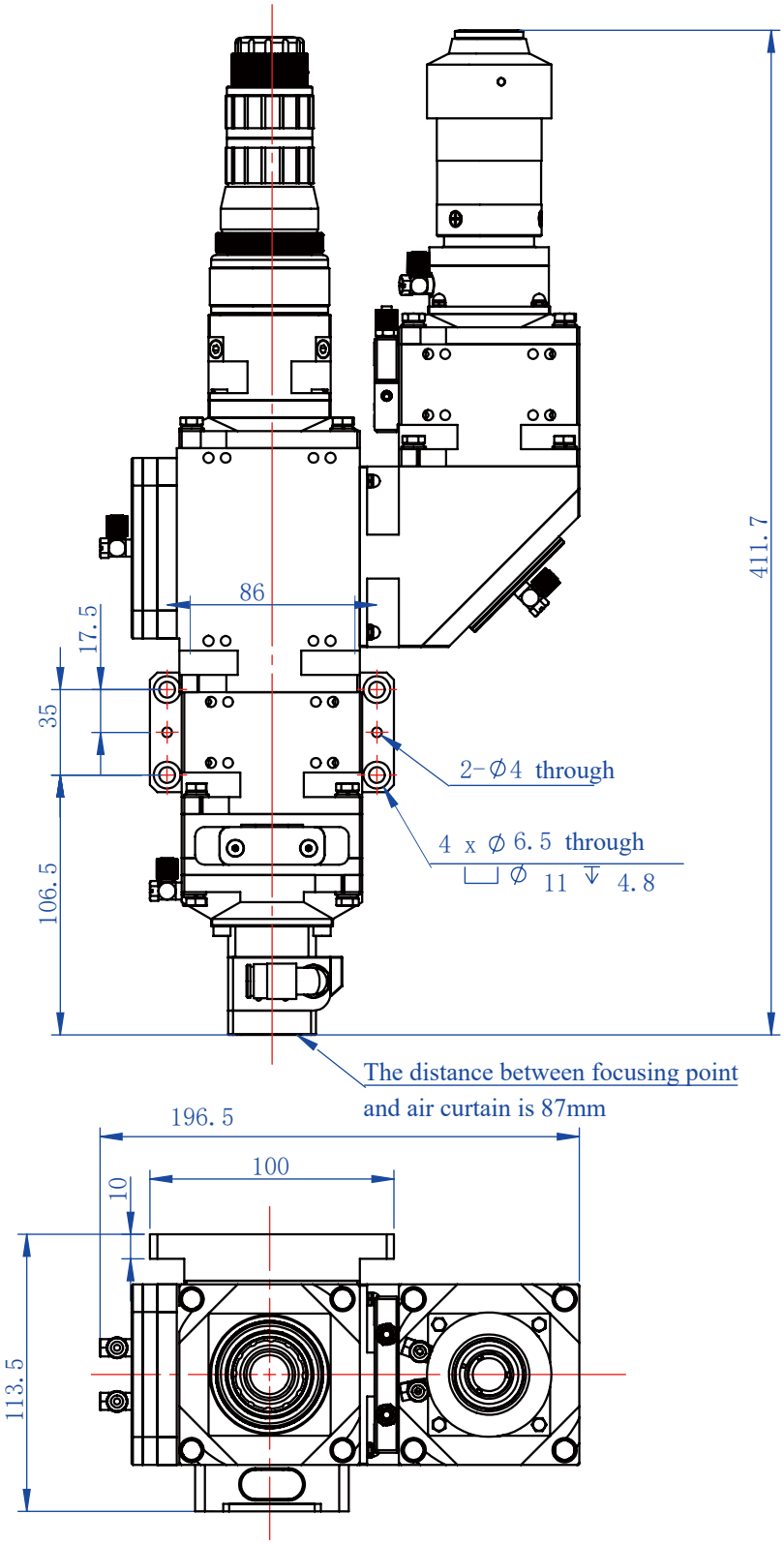
Turn the rim 15 degree, the red dot should be close to white line, pull the rim towards the right.



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 carried out in dust-free environment.

3.5 Installation and outside drawing

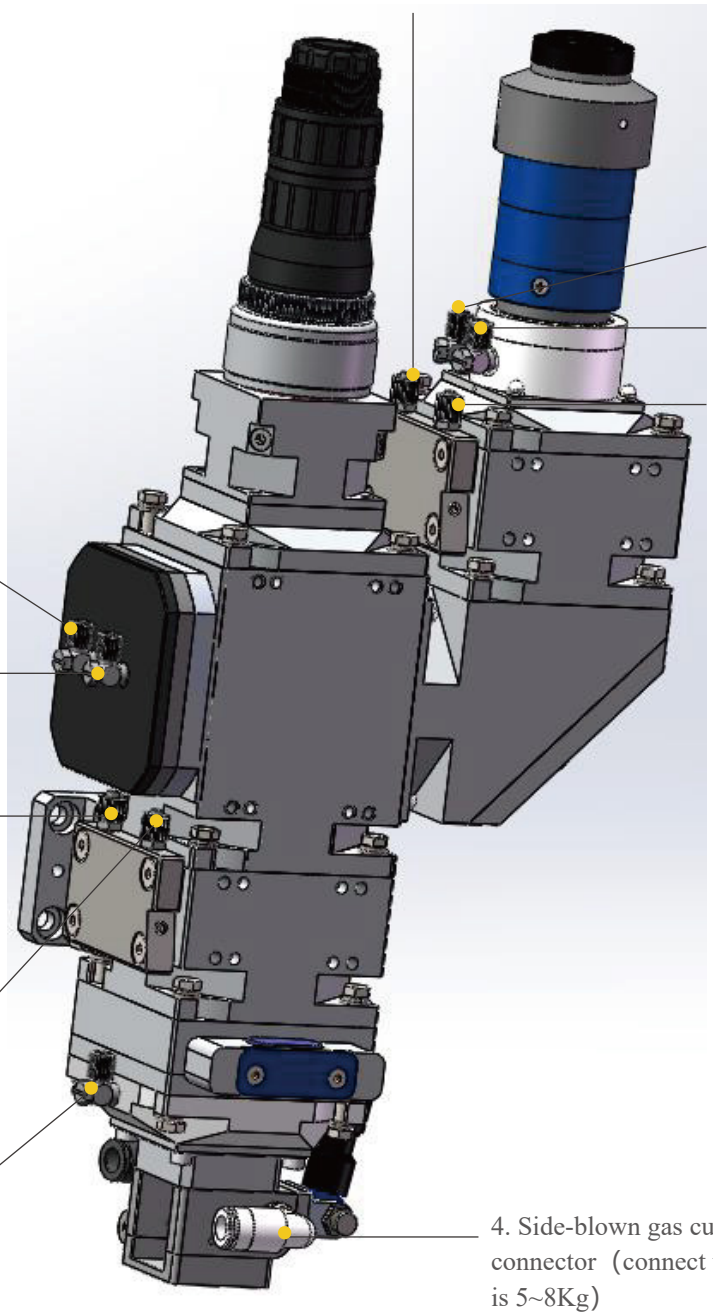


Installation of laser head should be solid and reliable.

The angle of laser head in the vertical direction can be set according to customer requirement.

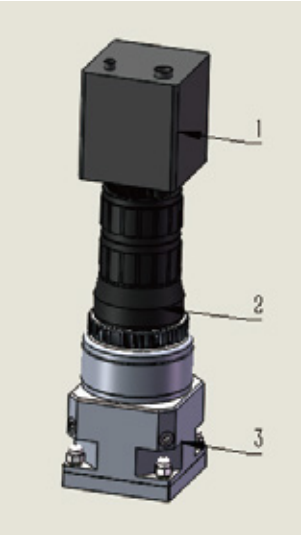
3.6 Connection of water and gas

Water cooling connector & gas connector diagram



Note: 1/2/3/6 is Φ6 water pipe connector, when using must ensure the water quantity is sufficient, the water pressure is above 0.4MPa;

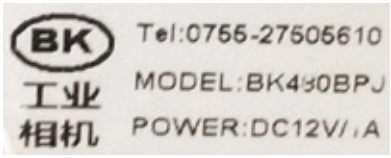
4/5 is Φ8 gas pipe connector; Please keep the bending radius of the connected pipeline not less than 30mm.



1、Camera

2、CCD Interface

3、Mounting Base



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

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.

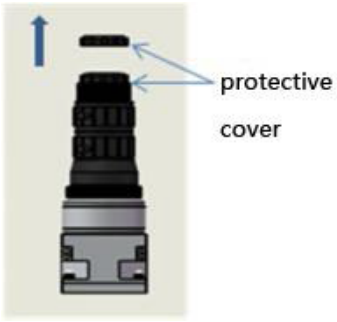


Fig. 1

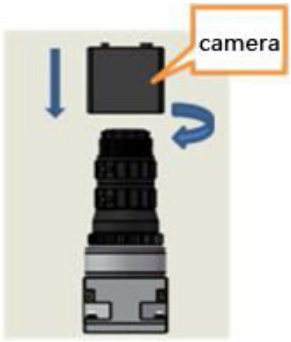
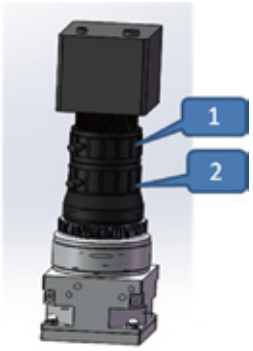


Fig. 2

Fig. 3

4. CCD definition debugging



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;

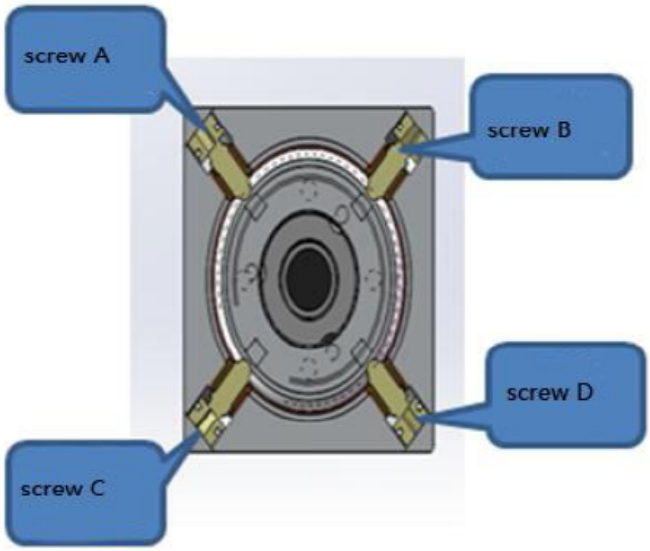
2、Loosen locking screws on Aperture Ring(1) and Focusing Ring(2);

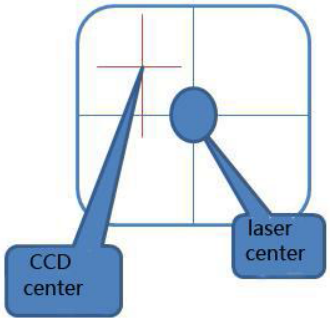
3、Adjust Aperture Ring(1) to get a certain brightness;(image is clearly visible on the screen)

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 aluminum rings in two different specifications(5mm / 10mm). These are used to increase/decrease image distance. User can assemble or unassemble the aluminum rings to adjust the CCD focusing range according to actual screen display.





Note: 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.

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 above 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.

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.

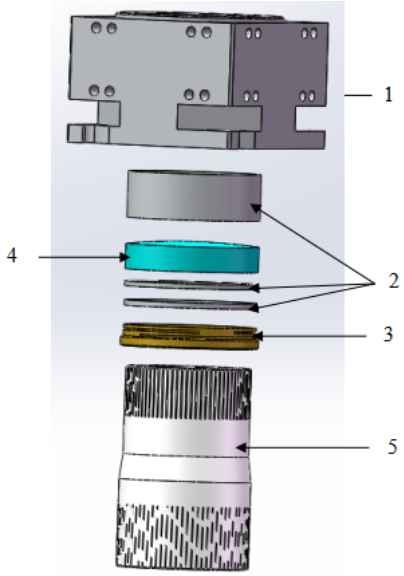
2、Fiber connector water cooling pipe must be connected well to prevent leaking. If QBH has water inside accidentally, please stop using immediately and send it to the factory to handle with.

5.2 Maintenance of Collimator Component

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

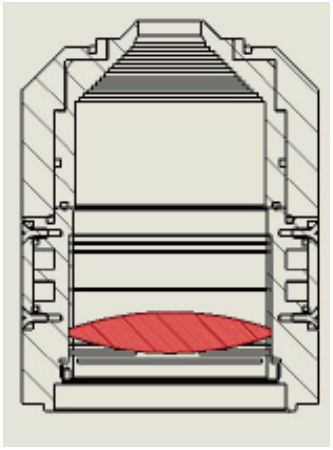
1，First, clean the surface of the laser head with anhydrous ethanol，
loosen the four nuts and use a special tool to remove the collimating lens, as shown in the picture on the right;

1 Collimator Cavity
2 Pressing Ring
3 Spring Pressing Ring
4 Collimating Lens
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).



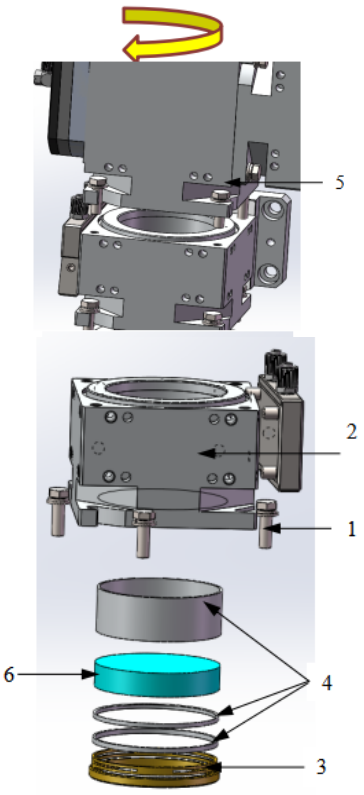
Note: Keep the original order between the parts, the lens should be the same direction as the original!

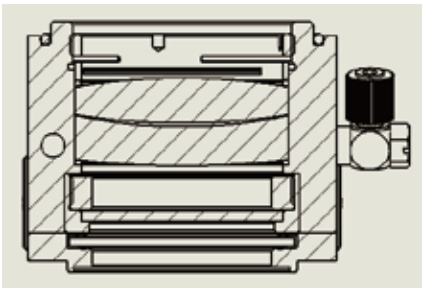
5.3 The maintenance of the focus component

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:

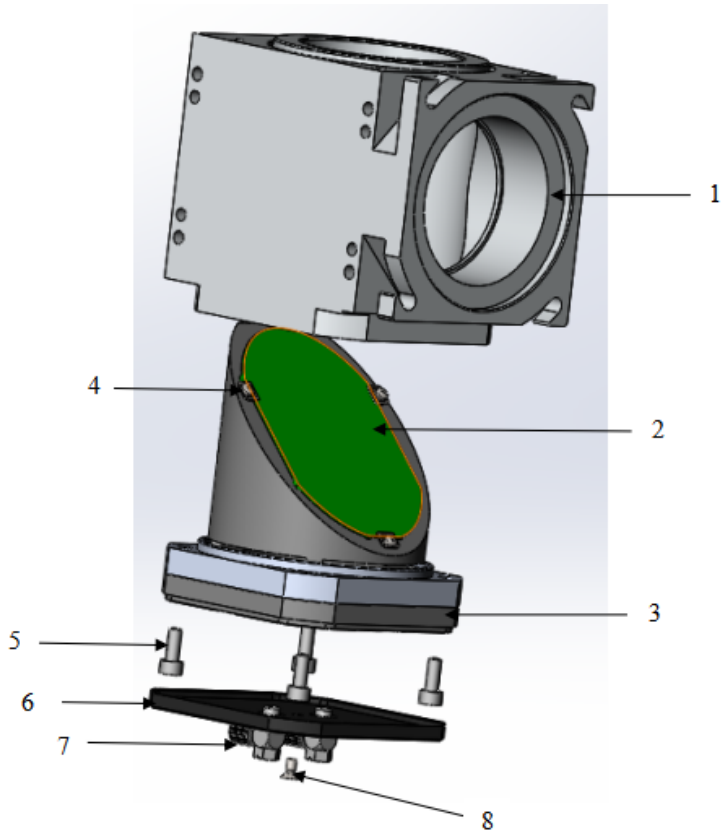
1. Remove the eight "outer hexagon screws M5*16" (1) used for connecting the focusing module, protective window module and the splitter cavity with an open wrench, and right rotate the focusing lens cavity;
2. Use a special tool to unscrew the locking ring 3 for fixing the focusing lens;
3. Gently remove the gasket 4 in the downward direction until the focus lens 6 slowly slides out of the focusing holder;
4.Main 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 installing the focusing lens 6, twist the locking ring 3 to the end, retract 1/5 times to make 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 flat surface of the focusing lens 6 should be downward.





1, hexagonal screw; 2, protective window assembly; 3, locking spring ring; 4, washer; 5, beam splitter cavity; 6, focusing lens.

5.4 Maintenance of the Beam Splitter

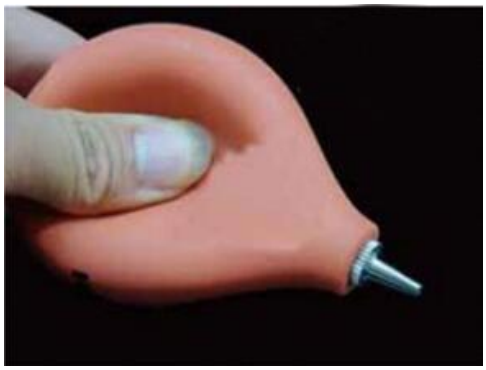


1. beam splitter cavity;
2. beam splitter;
3. beam splitter holder;
4. Phillips pan head screw and press button;
5. hexagon socket head screw
6. decorative cover
7. water pipe bending joint
8. cross flat head screw
9. machine meter screw

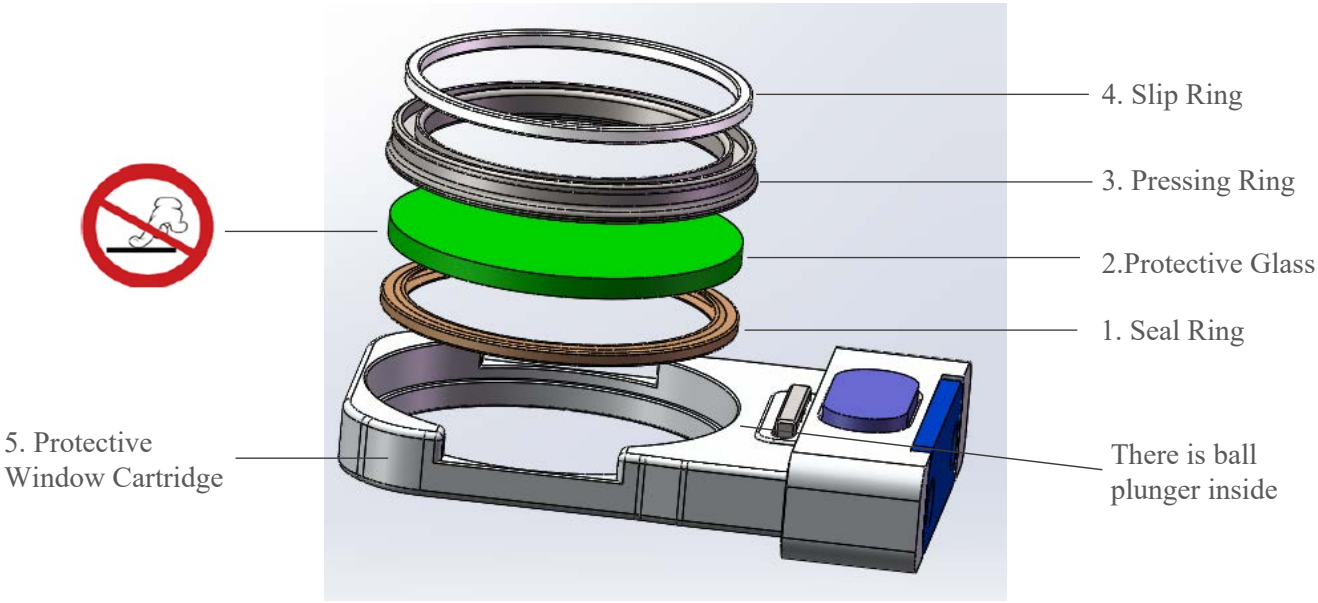
Beam splitter disassembly and installation process:

1. Use a Phillips screwdriver to loosen the cross-head screw 8 until the tooth pattern is completely loose, and remove the decorative cover 6;
2. Loosen the water pipe bending joint 7 connected to the beam splitter seat 3 by hand, and loosen the hexagon socket head cap screw 5 with an Allen key to remove the beam splitter seat;
3. Gently lift the 2, 3, and 4 split lens assemblies upward from the splitter holder, and prevent the lens from slipping during the ejection process;
4. 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.
5. 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. Adjust the reflection angle of the spectroscopic lens by adjusting the height of the four machine screws. Note that when locking the spectroscopic lens, the force should be moderate to prevent damage to the lens.

6. 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.



Replace the protective window:
1. Remove the protective window from the protective window cartridge in the order of 4, 3, 2; the pressing ring has a groove, it can be conveniently removed. Place the protective window in a clean container without contact with non-gaseous substances.
2. Check the seal ring for deformation or notch, and if there is a defect, it needs to be replaced.
3. Make sure all the parts are clean, install the sealing ring and protective window in the original direction, press the pressing ring, and hear the "click" sound (the pressing ring and the ball plunger contact sound) .
Note: in the operation process, pay attention to keep the environment clean and parts clean. Protective window need to be installed in the right direction.

scan for more information

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