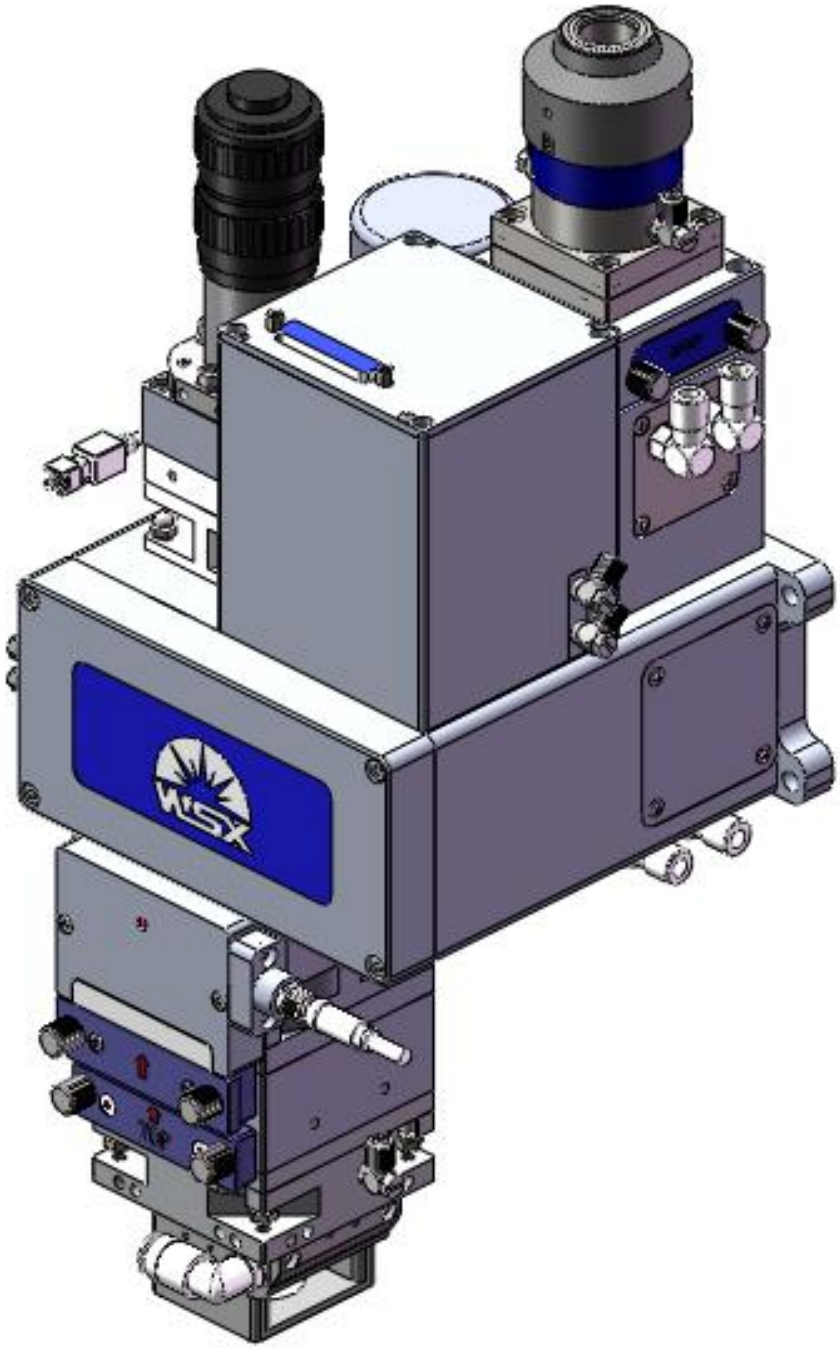
Circular Spot Wobble Welding Head
HB66



User Manual

Shenzhen Worthing Technology Co., Ltd.

Do not look directly at the laser!
Use goggles in accordance with DIN EN207and BGVB2!

Do not bring any part of your body into contact with the laser head while it is in motion!

Residual heat after welding may cause burns!

The laser head is a precision product, please avoid impact!

Product: Circular Spot Wobble Welding Head

Model: HB66

Product Features:

This welding head has strong advantages in aluminum alloy welding, high power welding applications, and is a cost effective welding head.

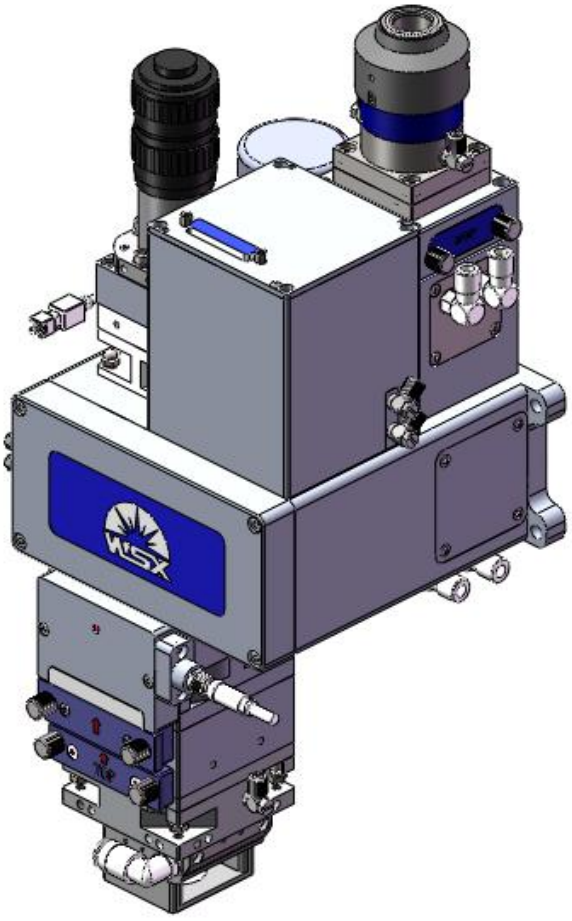
The welding head adopts motor-driven X , Y axis wobble lens, with a variety of swing mode, and wobble welding allows the workpiece to have irregular welds, larger gaps and other processing parameters can significantly improve the quality of welding.

The internal structure of the welding head is completely sealed, which prevents the optical part from being contaminated by dust.

Equipped with air curtain and coaxial nozzle to minimize the contamination of the lens by welding fumes and spatter residue.

The protective lenses are of drawer type structure, easy to replace.

Can be equipped with various lasers with QBH connectors.



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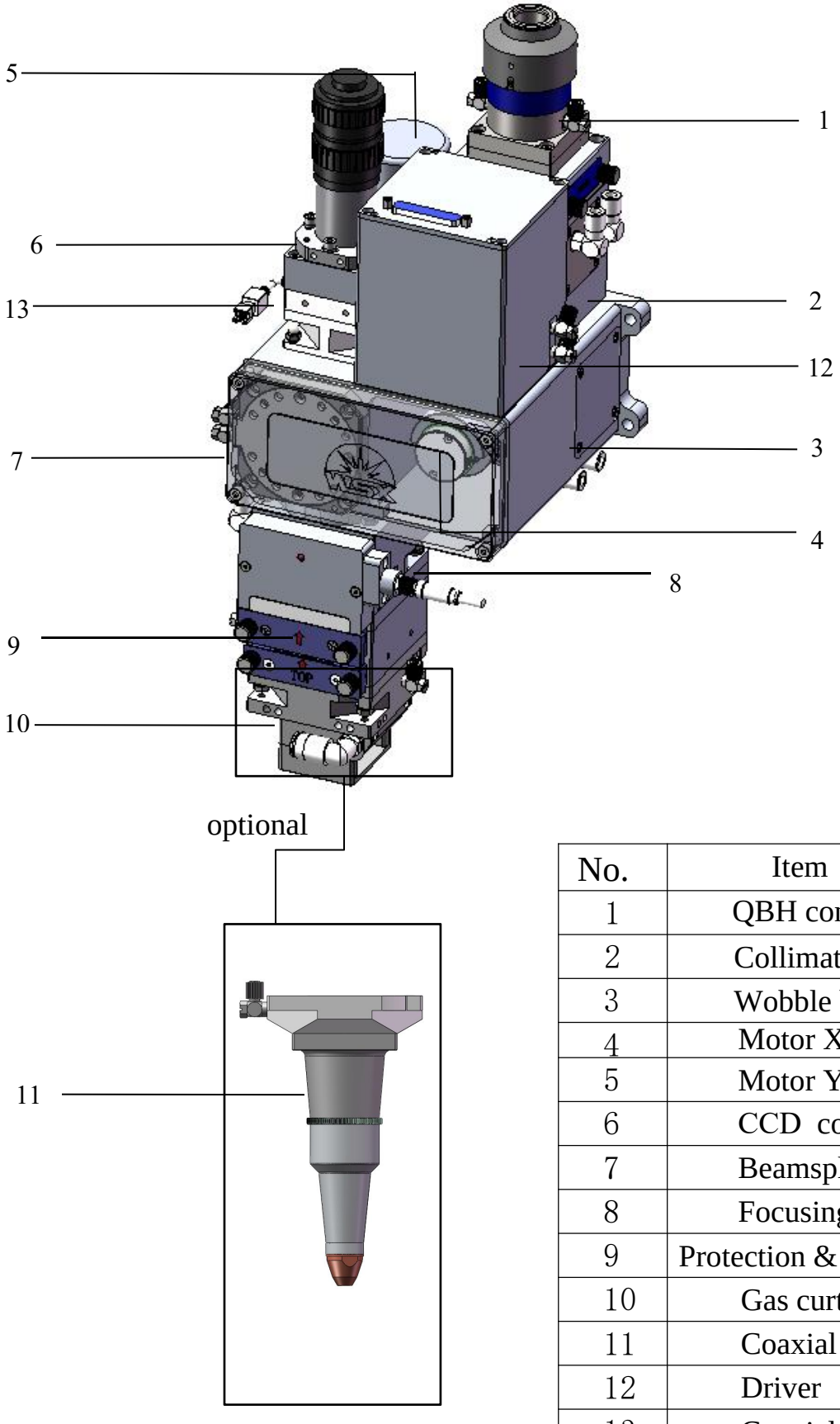
1.Product Description

1.1 Product Structure Diagram



No.	Item
1	QBH connector
2	Collimator block
3	Wobble block
4	Motor X axis
5	Motor Y axis
6	CCD connector
7	Beamsplitter
8	Focusing block
9	Protection & temp. measure
10	Gas curtain
11	Coaxial nozzle
12	Driver
13	Coaxial blue light

1.2 Main functions

1.2.1 Components

※QBH connector
Core connector for fiber connection to lasers, providing industry standard fiber access.

※Collimator Lens
Collimator lens component is assembled inside the laser head; it contains collimator lens cavity, collimator lens group, gasket and locking spring.

※Wobble block
Adopts motor-driven X and Y axis wobble lens with multiple swing modes to expand the area of the weld seam, allowing the workpiece to have irregular weld seams and larger gaps.

※CCD block
Provides safe, reliable filtered light source for CCD.

※Reflector
Reflect the laser to the workpiece surface.

※Focusing lens
Focusing component is assembled inside the laser head. It contains focusing lens group , focusing lens cavity, gasket and locking spring,and water cooling system.

※Dual protection lenses and temperature measurement block
Prevents welding slags from splashing directly onto the focusing lens, protecting and e xtending the life of the focusing lens. Dual protection lens can adapt to more severe en vironment, temperature measurement and monitoring protection lens stabilization.

※Gas curtain
Blows away the bouncing welding slags, provides protection to the lens.

※Drive box
Controls the wobble motors.

※Coaxial blue light
Welding head built-in blue light, so that the CCD imaging clearer, to avoid installation of inconvenience caused by the interference between the external blue light and the workpiece.

1.2.2 Design & Function

This laser head uses a fiber laser as a light source to weld metal on a flat bed machine at a controlled distance. The laser head is precise, durable, easy to maintain and easy to adjust.
All media connections are built into the laser head!

1.2.3 Auxiliary Medium

※Protection gas

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

◎ The protection gas must meet the Standard of ISO 8573-1:2010, Class 2.4.3 without impurity particles, water and oil. High purity protection gas will prolong the lifespan of protection lens.

2. Technical Specification

Specification	
Max working power	6KW
Inner and outer ring power	2+2, 3+3, 4+2KW
Collimation focal length	100mm
Focusing focal length	200mm, 250mm, 300mm
Weight	7.1kg
Clear Aperture	¢27
Swing frequency	0-500Hz
Adjustable spot size	0-5.0mm

Can be used for various ring spot fiber lasers and ordinary fiber lasers.

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 - Mind your 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.

3.3 Preparation for Installation

※Tools

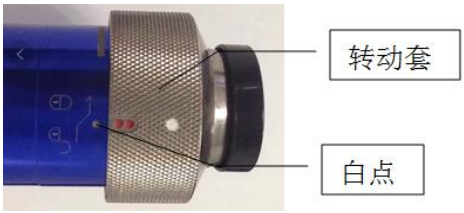
1.A set of metric hexagonal handle;
2.One bag of clean rod, one bottle of anhydrous ethanol(500ml), one package of clean gloves.
3.Clean and dust-free working environment.

※Preparation of installation personnel

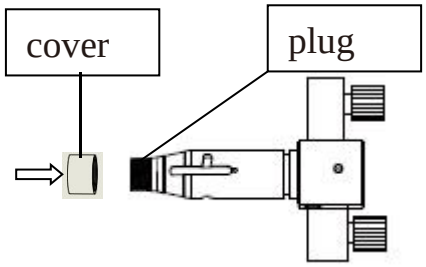
1.Read this manual carefully;
2.Wash hands with soap;
3.Wear dust-free gloves;
4.Wear a mask if necessary. (Note - Dust removal is of utmost importance)

3.4 QBH and Fiber Connection

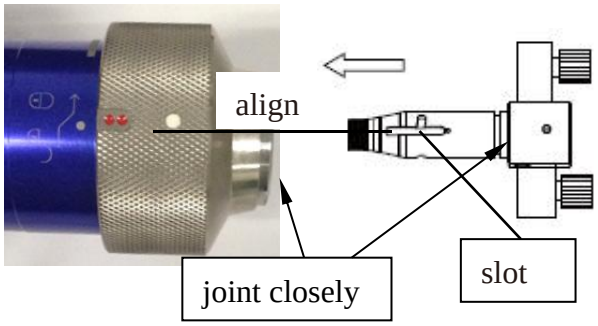
Step 1：Before turning the rim as below, make sure the red marks are aligned to the white marks.



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.

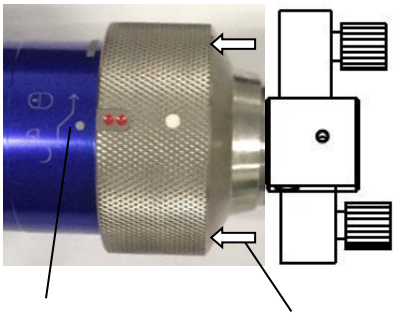


Step three：Remove the dust cover from QBH, place the clean fiber rod and the QBH coaxially, make sure the white mark on the QBH is aligned with the locating slot (long slot on fiber rod), insert the fiber rod into QBH gently, until the fiber rod joints the QBH contact surface.



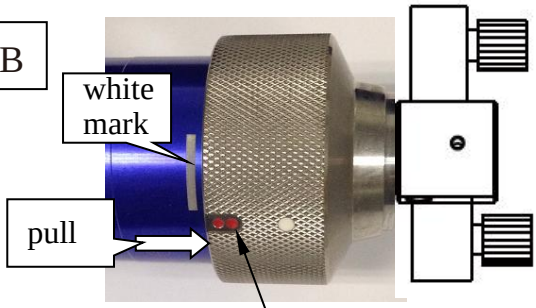
Step 4：After inserting the fiber rod into QBH, press the rim gently and turn it about 15 degree along the arrow on the rim. Then pull the rim until its underside is parallel with the top of QBH, turn the rim at the same direction till the limit.

A



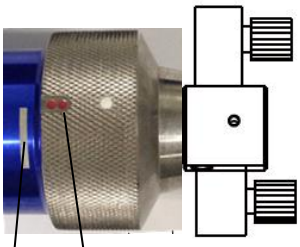
Turn along the arrow Press the rim

B



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

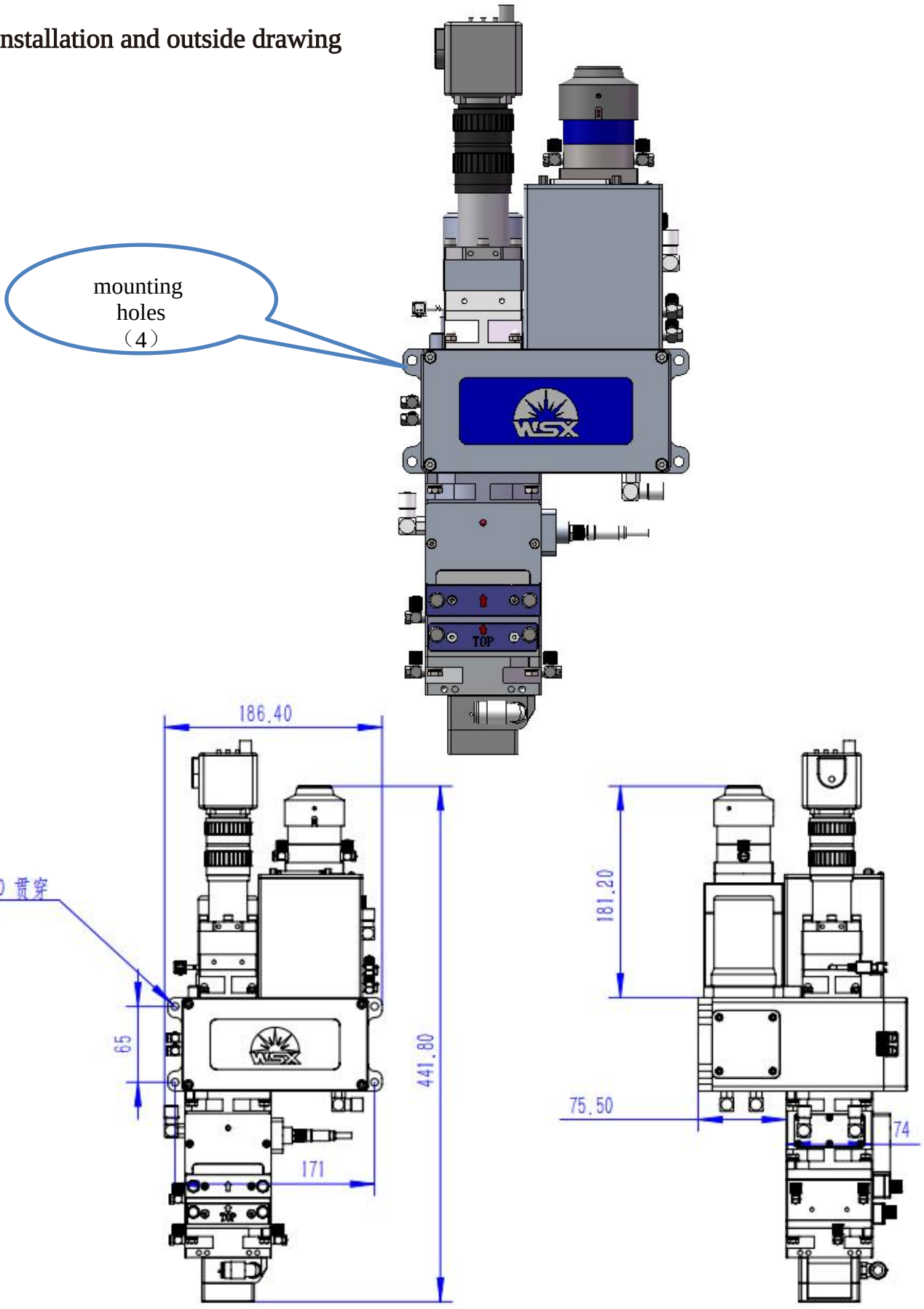
C



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 undersideof rim

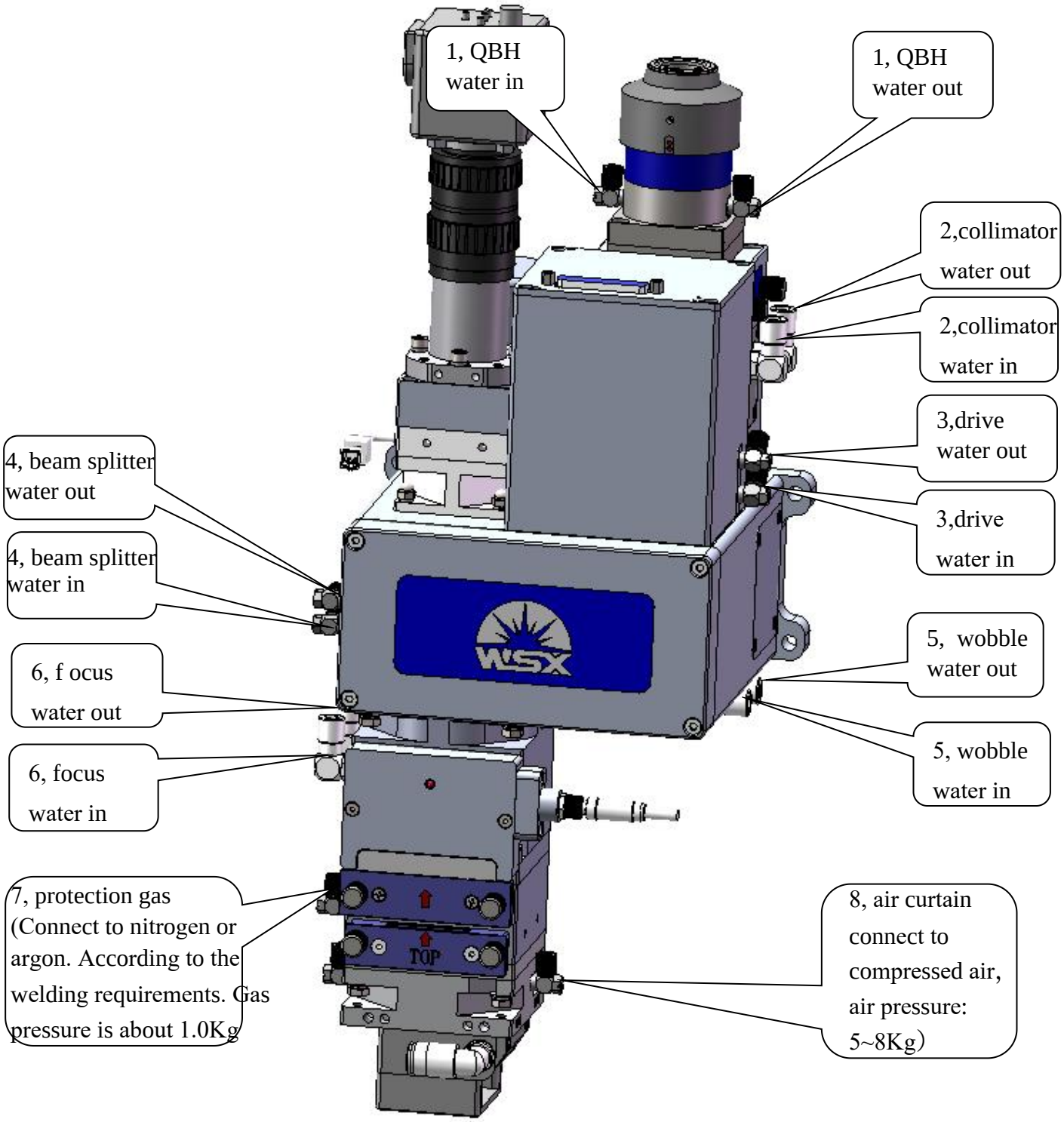
Note: 1. Insert or pull out the fiber rod gently; 2. When inserting or pulling out, QBH and fiber rod should be coaxially; 3. The operation should be kept as dust-free as possible.

3.5 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



Note：

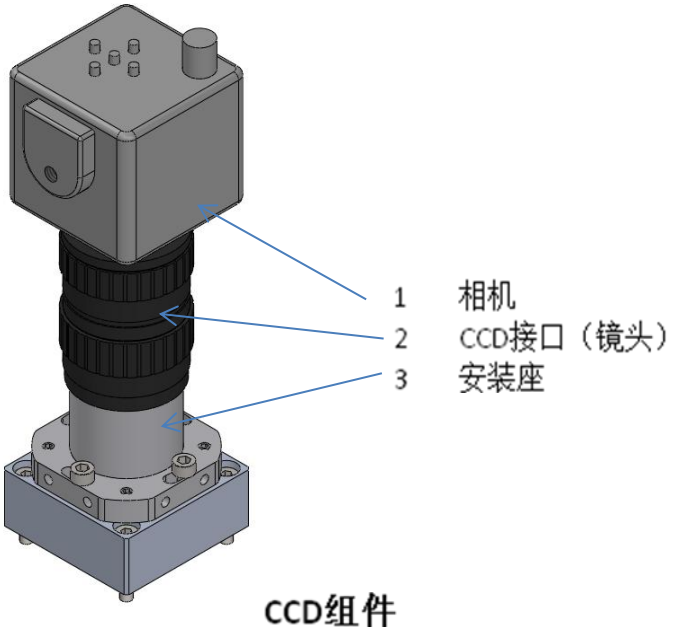
1） 1~4 and 6 is Φ6 water pipe connector， when using must ensure the water quantity is sufficient, the water pressure is above 0.4MPa；

2）7 is Φ6 gas pipe connector；

3）8 is Φ8 gas pipe connector;

4) Please keep the bending radius of the connected pipeline not less than 30mm.

3.7 CCD connection



CCD组件

Installation steps of CCD Camera:

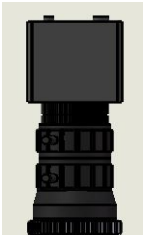
Step 1：Remove the protective cover as shown below;

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

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

图一

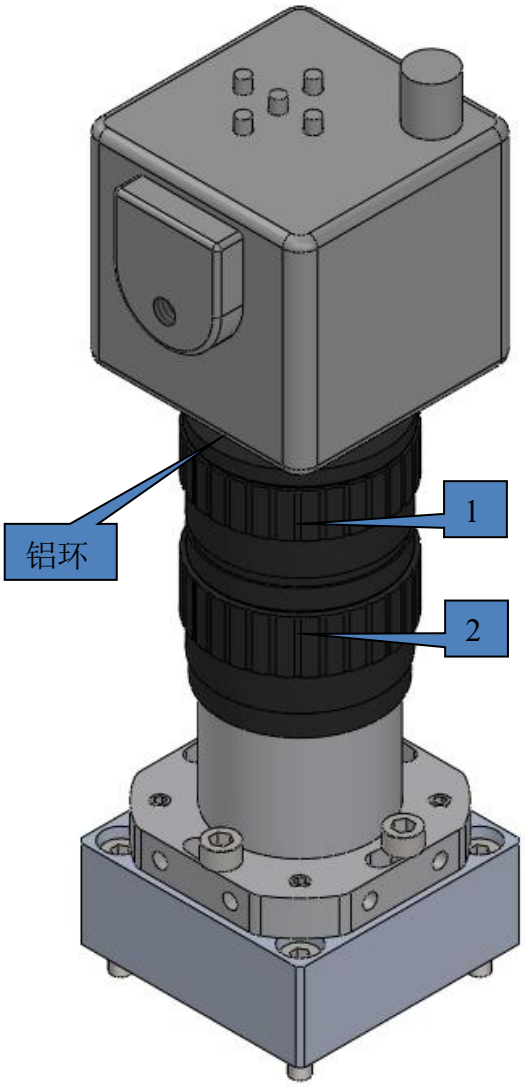
图二



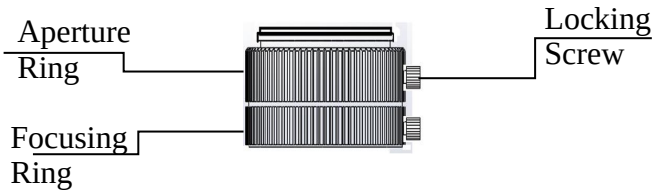
图三

4. Debugging

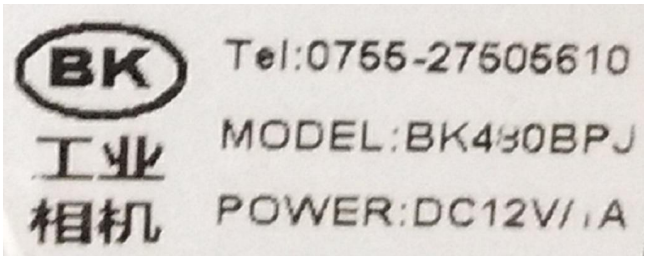
4.1 CCD Definition



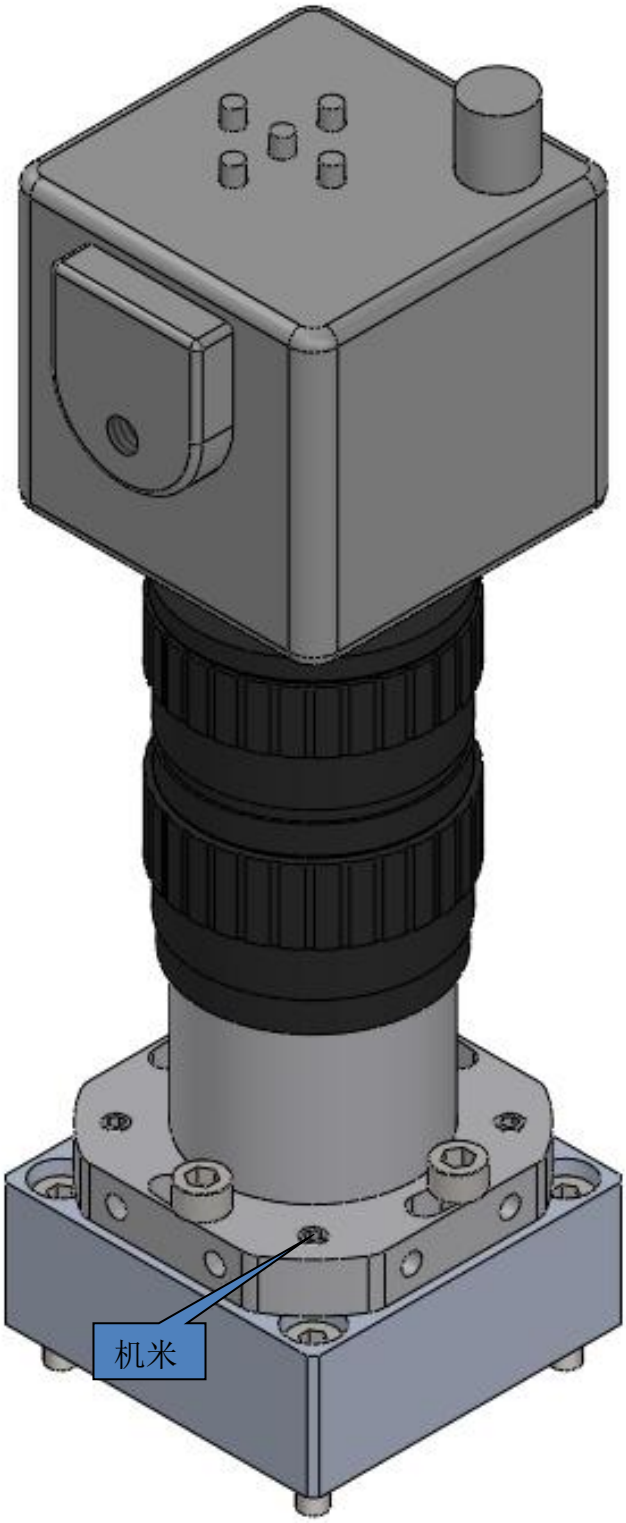
CCD definition debugging
Purpose：To make the image clear on the display, adjust as following steps.
Adjustment steps（left picture）：
1、Install industrial camera to the lens properly;
2、Loosen locking screws on Aperture Ring(1) and Focusing Ring(2);
3、Adjust Aperture Ring(1) to get a certain brightness;(image 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.

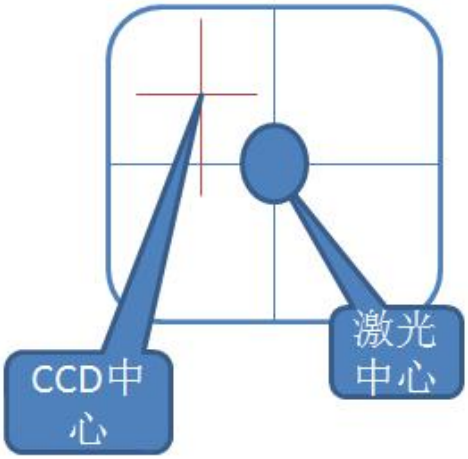


Note: It is recommended to use a CCC digital camera as shown below to make the screen image clearer.



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 adjust ment 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.

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.

5.1 Maintenance of QBH and Fiber Connector

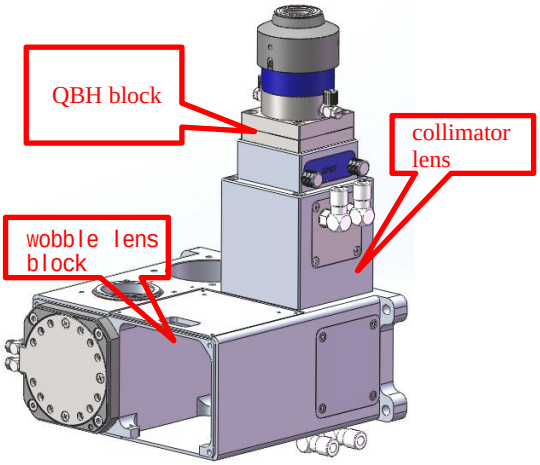
1、Use self-adhesive paper to cover the junction of QBH and fiber connector to prevent dust from entering the gap.
2、Fiber connector water cooling pipe must be connected well to prevent leaking. If QBH has water inside accidentally, please stop using immediately and send it to the factory to handle with.

5.2 Maintenance of focusing lens

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

※ Removal and installation of lens：

First wipe the surface of the laser head clean with anhydrous ethanol, then loosen the four screws with an Allen wrench to separate the collimator block from the wobble lens block, as shown in Figure



The disassembly process is as follows:

1. Unscrew the spring pressure ring 3 with the special tool 5 until the spring pressure ring screw threads are completely disengaged.

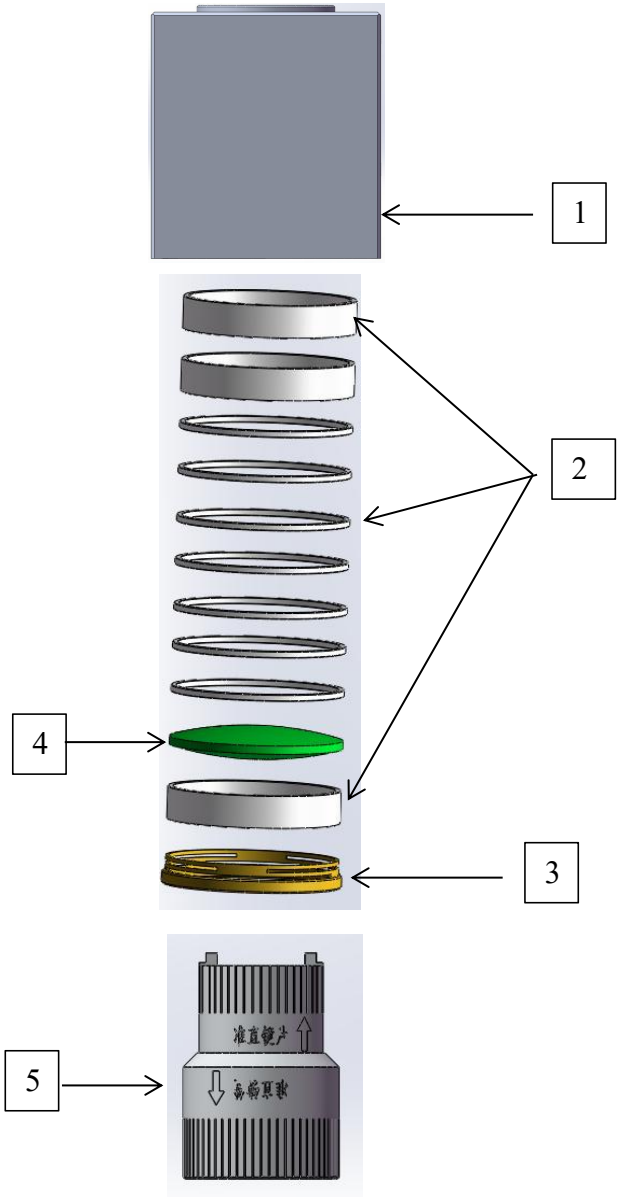
2. Turn the entire collimator spring pressure ring after loosening it upside down on a clean flat surface (keep the spring pressure ring inside the collimator base during this process), and gently pull out the collimating base 1 upwards, taking care not to let the lens fall out.

3. Replace or maintain the lens by removing the gasket 2 placed on the lens and then remove the lens.

4. After maintaining or replacing the lenses, please install the lenses in the reverse order of disassembly, and be gentle when locking the spring pressure ring to avoid damaging the lenses.

5. After the spring pressure ring is screwed to the bottom, please back out 1/5 turn to ensure that the spring pressure ring 3 has a clearance (0.1~0.15mm).

Note: Keep the original order between the parts and the lenses in the same direction as the original!



1. Collimator base 2. Gasket 3. Spring pressure ring
4. Collimator lens 5. Special tool

5.3 Maintenance of Focusing lens

Before and during disassembly, it is important to memorize the order of the relative positions of the components to facilitate proper assembly of the components after focusing lens maintenance.

※Focusing Lens Removal and Installation
Process of the focusing lens removal:

1. Use an open-end wrench to remove the four nuts 1 used to connect the focusing block to the protection lens block 2;

2. Unscrew the locking ring 3 for fixing the focusing lens with the special tool;

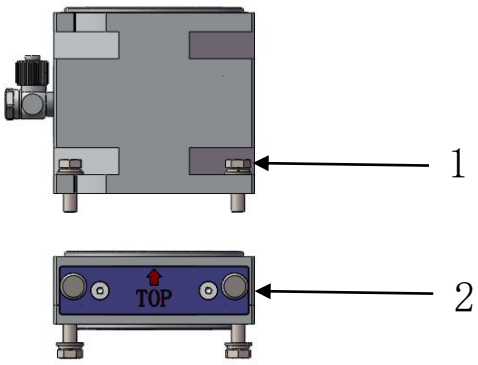
3. Gently remove the gasket 4 in a downward direction until the focusing lens 6 slowly slides out from the focusing base;

4. Maintain or replace focusing lens.

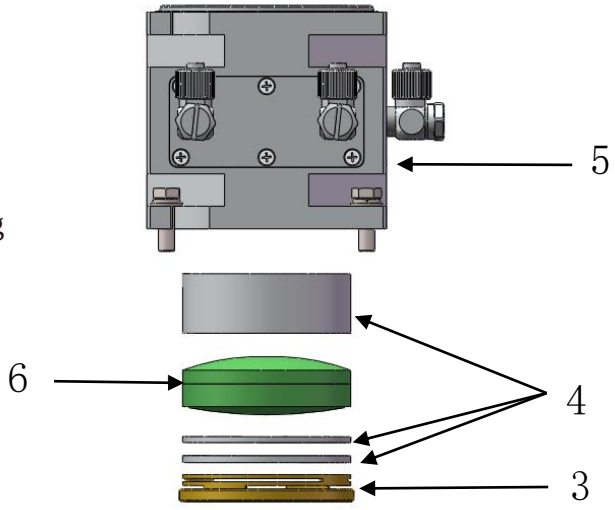
5. Installation of the focusing lens 6 and components is carried out in the reverse direction of the process described above.

6. When installing the focusing lens 6, when the locking ring 3 is twisted to the bottom, it needs to be twisted back 1/5 turn to keep a gap of 0.1~0.15 between the locking ring 3 and the focusing lens;

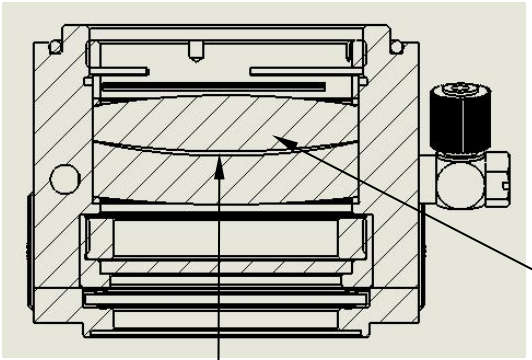
7. When installing the focusing lens 6, the flat side of convex surface should be downward.



1, nuts 2, protection lens block



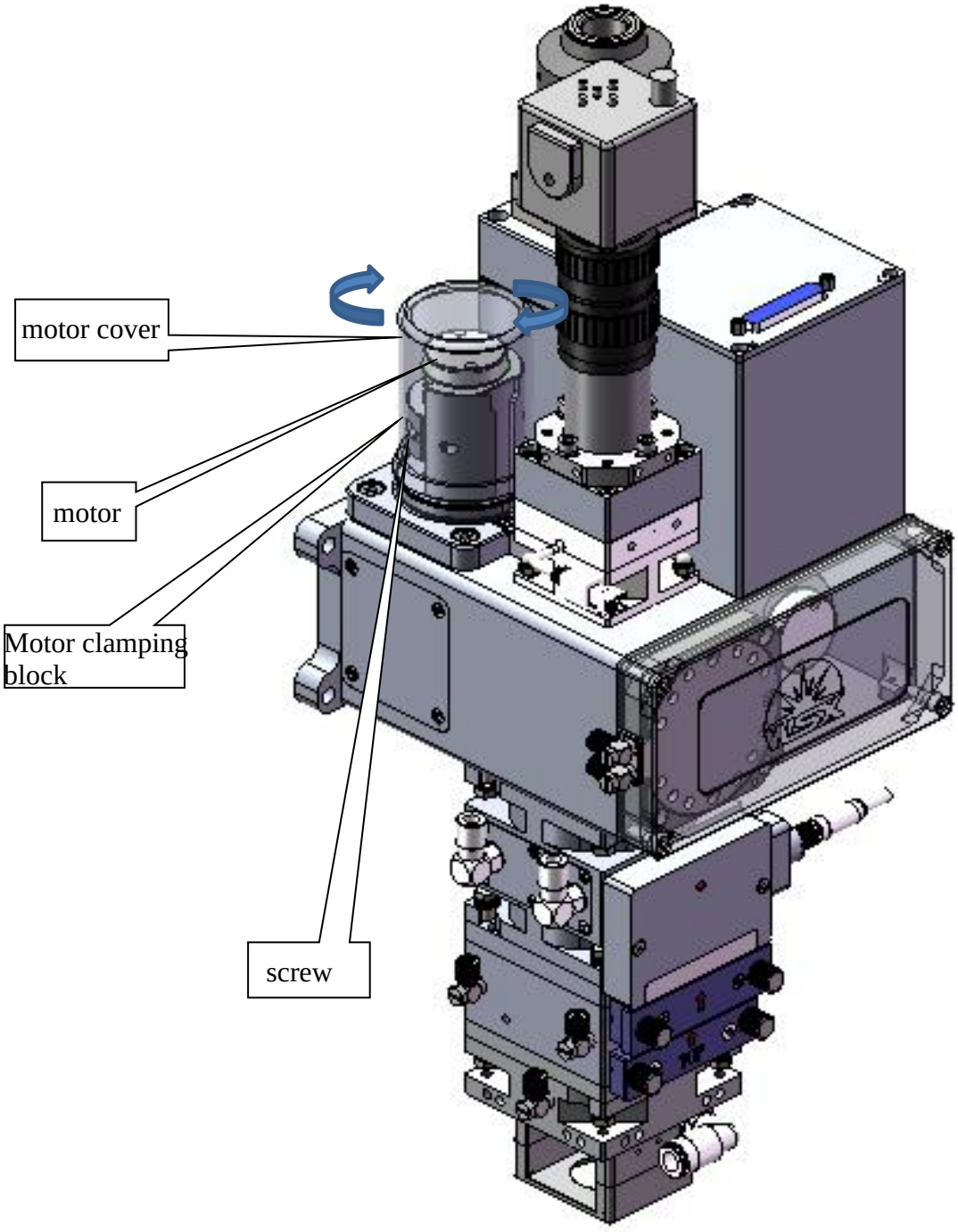
3, locking spring; 4,gasket;
5, focsuing base ; 6,focusing lens



focusing lens

flat side should be downward

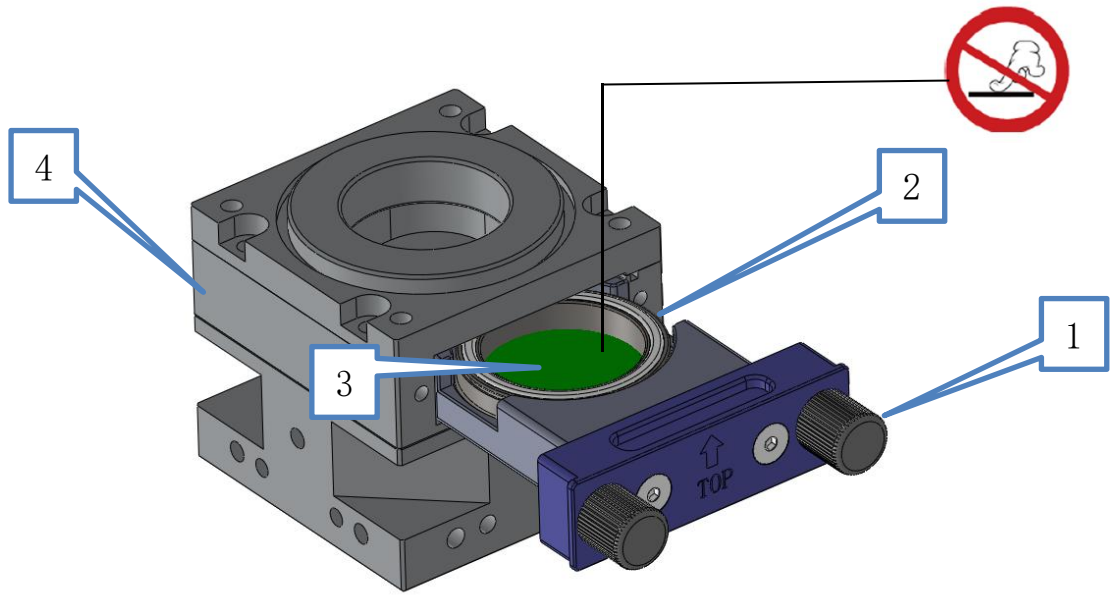
5.4 Angle Adjustment of Reflector



1. Rotate and remove the motor cover;
2. Loosen the screw with an Allen wrench so that the motor clamping block can be rotated;
3. Rotate the motor and fine-tune the reflection angle, so that the light spot is displayed in the center, and the dynamic effect of welding can be viewed more intuitively;
4. The X-axis and Y-axis reflector angles are adjusted in the same way.

5.5 Maintenance of protective glass

1. Dip the isopropyl alcohol solvent with a dust-free cleaning stick to clean the glass,
2. Then use the skin tiger to suck clean air to blow off the attached particles and other foreign objects;
3. Repeat several times until the lens is clean;
4. If the protective lens is impossible to clean or damaged, it must be replaced with a new lens.



1 锁紧螺柱　2镜片压圈　3 保护镜片 4保护镜腔座

保护镜片保养：

1　用手拧松两个锁紧螺柱1，把保护镜组件从保护镜腔座4里抽出来。

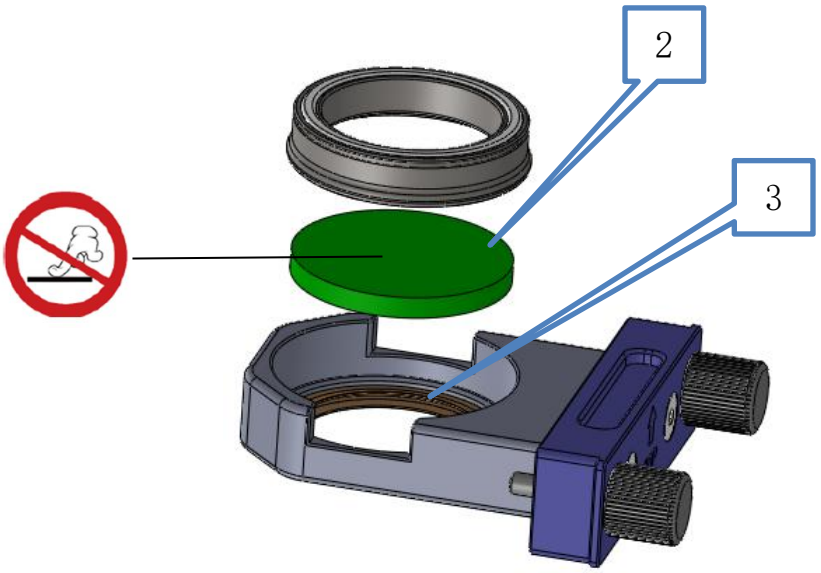
2　注意：迅速用不粘胶保护膜封住镜片移除后的开口！

3　将保护镜组件放到洁净的环境下保养。

4　撕掉保护镜组件入口的不粘胶保护膜，将保养好的保护镜组件平着插入入口，直到插入到底，最后拧紧两个锁紧螺柱1把保护镜组件锁紧。

注意：要检查保护镜组件有没有锁紧（没有锁紧的保护镜组件可以拔出的）。

5.6 保护镜更换



更换保护镜片：

1 掀开压圈1，把镜片2取出来放入干净容器内，镜片2不能与非气体性物质接触。

2 检查密封圈3是否有变形或缺口，如有缺陷，需更换。

3 保证组件干净，装好密封圈后把镜片2按原来方向装好，压上压圈1。

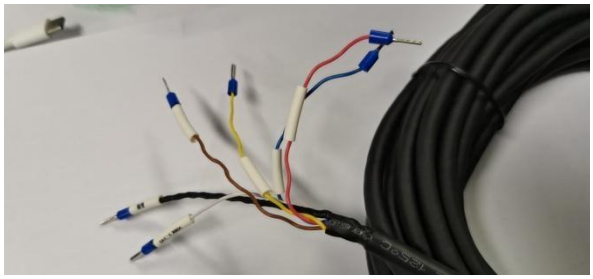
注意：在操作过程中注意保持环境洁净和零部件的洁净，保护镜片需要按方向安装，不能装反。

※清洁保护镜片

1.用无尘清洁棒蘸取异丙醇溶剂，清洁镜片，然后用皮老虎（如图 ）吸取干净空气吹掉附着的粒子等异物；
2.重复多次，直到镜片干净；
3.准直镜片为复合双片组合，请注意方向；
4.如果保护镜片已经不可能清洁干净，或是受损，则必须更换新镜片。

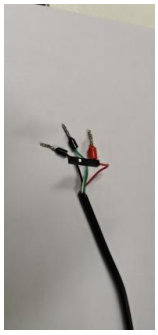
6.电气篇

6.1.1温控模块通电并连接上位机



温控数据线

（或ND36通讯延长线）

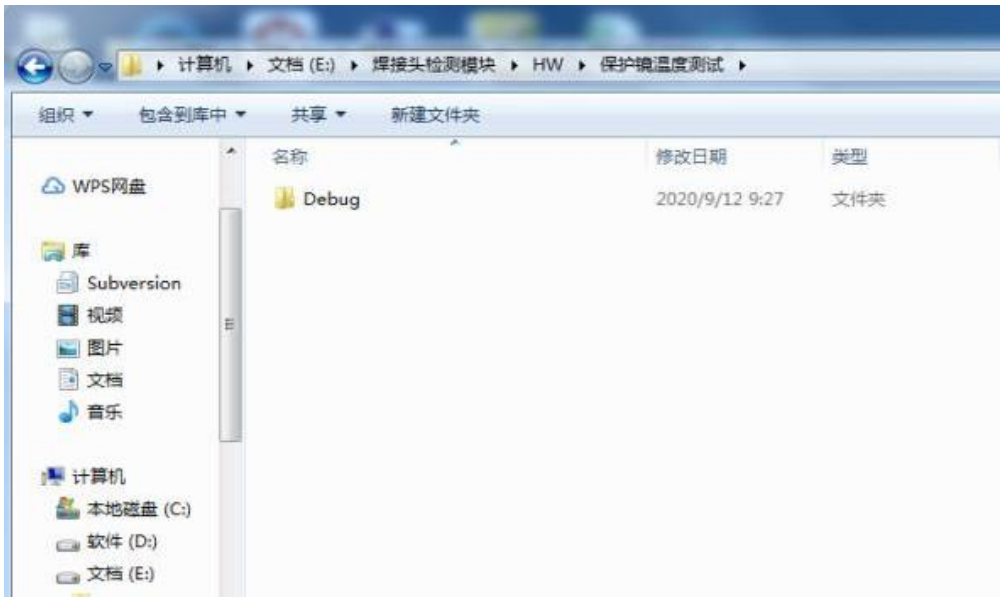


USB转TTL线

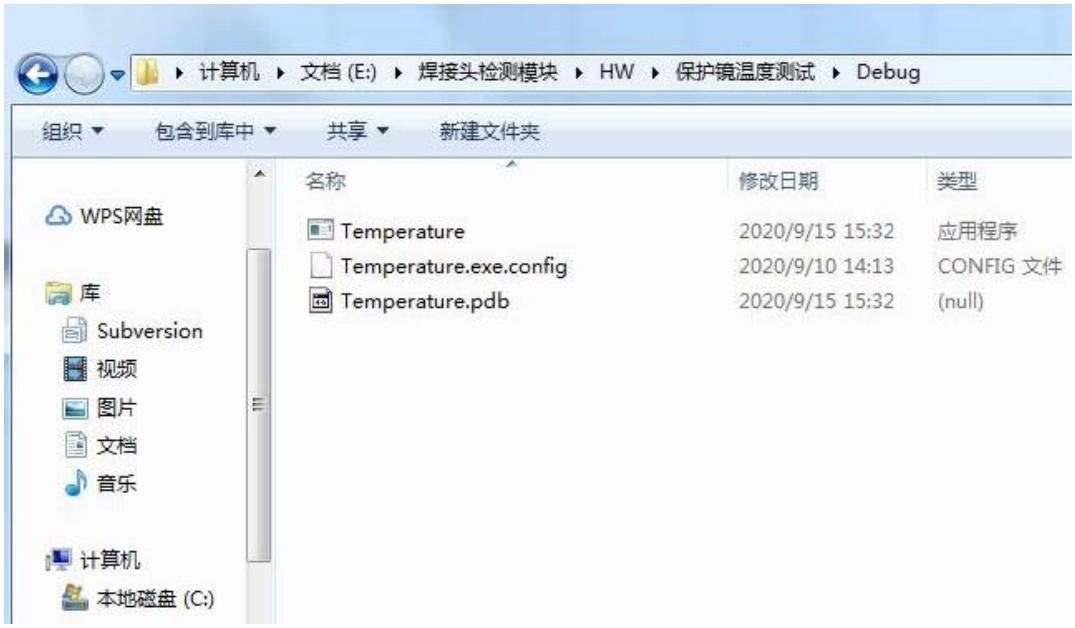
7.1.2温控数据线接线方法：

线色	外接
VCC（粉红）	接24V+
GND（蓝）	接电源地；
SCL/TXD（黄）	接USB线 TXD(绿）
SDA/RXD(棕）	接USB线 RXD(白）
备注：其他线色不用接	

6.1.3点击打开“保护镜温度测试”文件夹



6.1.4 继续打开“Debug”



6.1.5 双击“Temperature”，显示如下图

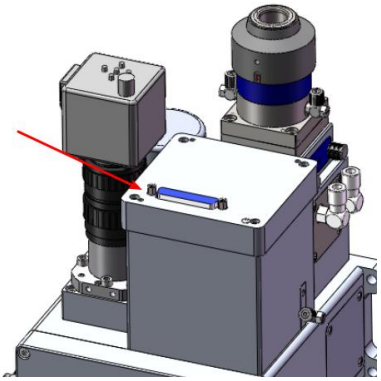
6.1.6 USB线插入电脑，选择对应的串口号

可设置报警温度，可显示当前温度。当前温度超过设置温度时，会发出报警声！

2、焊接头配件图示

①

②

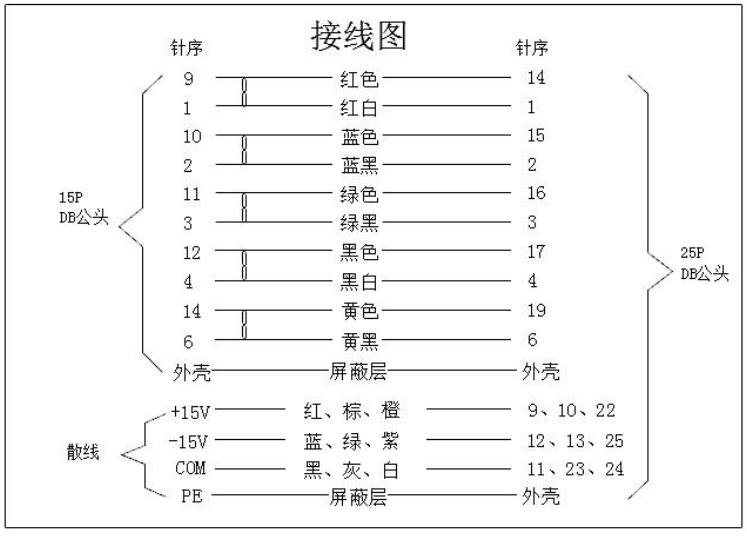


③

① ±15V开关电源　② DA电源&信号外线束　③焊接头控制接口

3、电气连接图

①控制线束内部接点图示



CLOCK+
CLOCK-
SYNC+
SYNC-
Xchannel+
Xchannel-
Ychannel+
Ychannel-
STATUS+
STATUS-

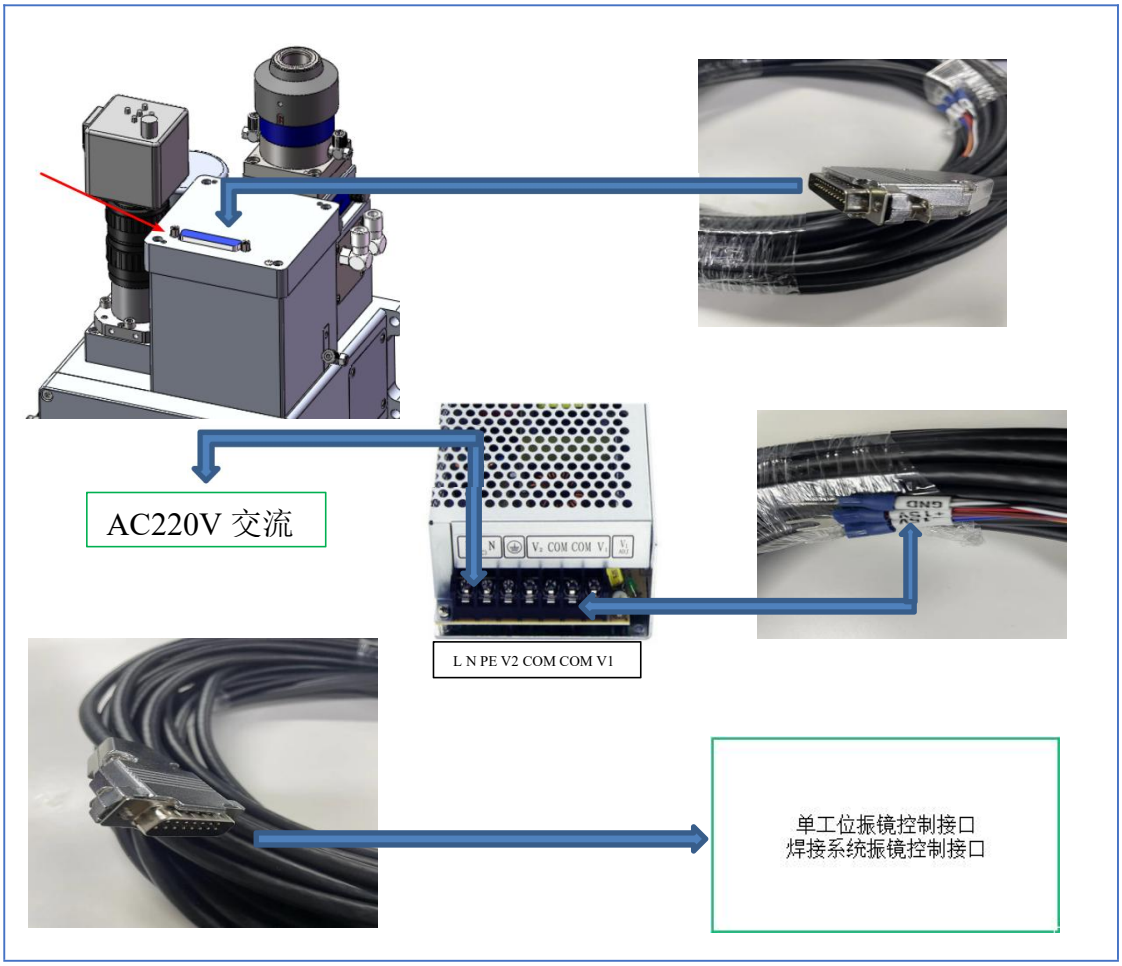
+15V
-15V
COM

DB15，外部控制接口

DB25，接焊接头控制接口

（+15V接V1,-15V接V2）

②焊接头外部控制接线示意图



环形光斑晃动焊接头用户手册

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