

# 产品使用 说明手册

PRODUCT  
INSTRUCTION  
MANUAL



## HK20Y

### Fiber optic welding head manual

# **PREFACE**

## **前言**

Thank you very much for using our products! Before use, please read the equipment operation manual carefully to ensure the correct use of the company's equipment. Please keep the manual properly for reference at any time. Due to different configurations, some models do not have some functions listed in this book. Please take the actual products as the standard. Due to the continuous upgrading and improvement of the products, some contents of this book may deviate from the actual products. Please take the actual products as the standard.

This manual provides the user with relevant instructions and precautions for installation, parameter setting and processing operation. In order to ensure the correct installation and operation of the system, please read this manual carefully before installation, and keep it properly or hand it to the user of the software.

For the safety of operators and mechanical equipment, please be sure to install and operate the equipment by professional process engineers. If you have any questions, please contact us in time, and our professionals will be happy to serve you

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**reminder**

Please be sure to read this product manual carefully

Then install, debug and use the product

When operating the laser equipment, you must wear safety glasses. Safety glasses shall be reasonably selected according to the laser wavelength emitted by the laser equipment. If the laser output of the device is beyond the normal wavelength range, it can be tuned for the laser protection. Laser safety glasses shall be selected according to the standard that they can shield the laser within the whole wavelength range emitted by the laser equipment.



# Safety precautions



Before operating the equipment, users must carefully read this manual and relevant operation manuals, strictly abide by the operating procedures, non professionals are not allowed to start the machine, and all connected equipment must be connected to the earth protection line.



This equipment uses four kinds of lasers (strong laser radiation), which may cause the following accidents: introducing surrounding inflammables;

In the process of laser processing, other radiation and toxic and harmful gases may be produced due to different processing objects;

The direct irradiation of laser radiation will cause human injury. Therefore, the place where the equipment is used must be equipped with fire-fighting equipment. It is strictly prohibited to stack inflammable and explosive articles on the workbench and around the equipment. At the same time, it is necessary to keep good ventilation. Non professional operators are not allowed to approach the equipment.



The processing objects and emissions shall meet the requirements of local laws and regulations.

There may be risks in laser processing. Users should carefully consider whether the processed object is suitable for laser operation. There is high voltage or other potential hazards inside the laser equipment. It is strictly prohibited to disassemble it by non manufacturer professionals.

The machine and other associated equipment must be safely grounded before startup. It is forbidden to open any end cover when the equipment is working. During the operation of the equipment, the operator must observe the working conditions of the equipment at any time. In case of abnormal conditions, all power supplies shall be cut off immediately and corresponding measures shall be taken actively. When the equipment is turned on, special personnel must be on duty. It is strictly prohibited to leave without authorization. All power must be cut off before personnel leave.



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**Do not look directly at the laser! Please use goggles conforming to DIN EN 207 and bgvb2 standards!**



**Please do not touch any part of your body with the laser head during exercise!**



**Residual temperature after cutting may burn!**



**The laser head is a precision product. Please do not impact!**



# Catalogue

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# Catalogue

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## ■ Revision History

# 01. Product overview

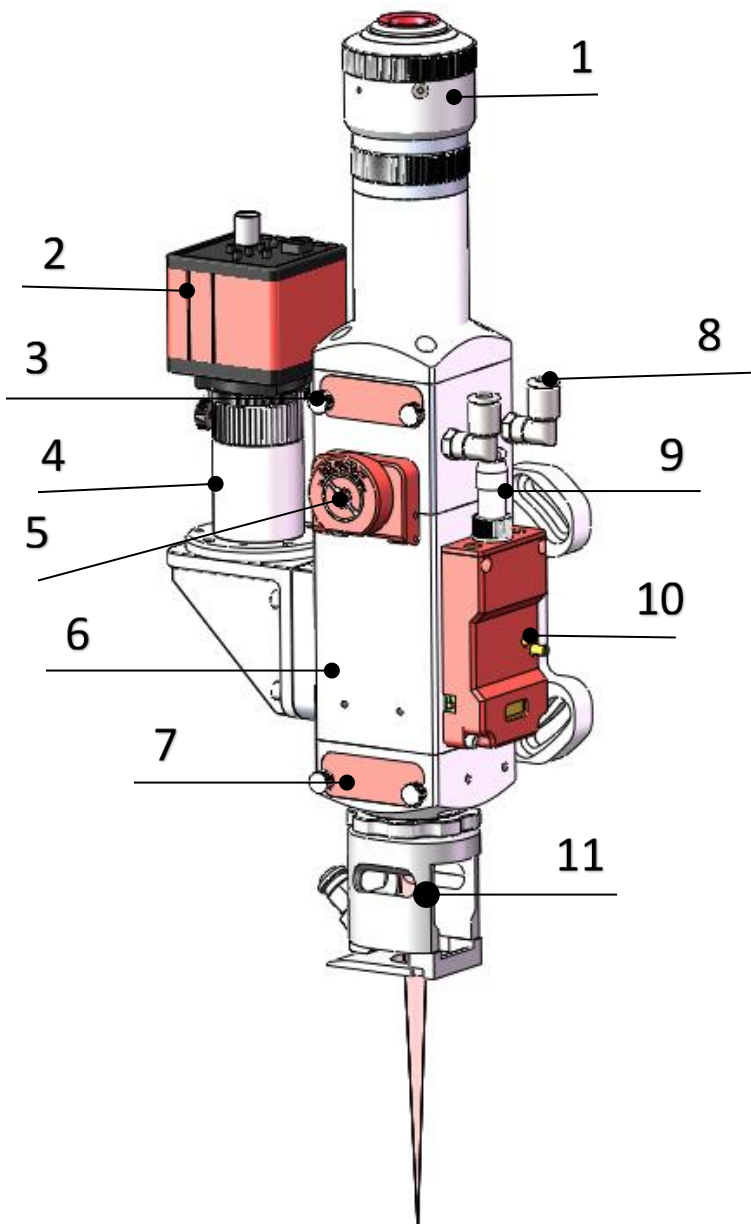
**Product Name: Fibre optic oscillating adjustable welding head**

**Product model: HK20(Y)**

## Product features:

1. drawer type protective mirror design, easy to maintain.
2. Perfect sealing design, full optical and body water-cooling, to improve the stability and service life of the welding head.
3. Automatic wire feeding device can be equipped to complete the wire filling welding; CCD can be equipped.
4. Equipped with air knife and coaxial air blowing method to effectively protect the lens.

## 1.1 Product structure diagram






Serial number	name
1	QBH connector
2	CCD camera
3	Collimating body
4	CCD lens
5	Spot size adjustment port
6	Motor assembly structure
7	Focus on the main structure
8	Cooling waterway inlet and outlet
9	Motor cable entry
10	Integrated drive modules
11	Wind Blade Assembly

**Note:** Adjustment of the spot size is manual and must wait for the motor to come to a complete stop before adjusting. Otherwise, the gears will be damaged and the internal motor will run chaotically.



## 1.2 Product accessories display diagram

## Y-shape

Serial number	name	Specifications	Sample
1	Fibre optic oscillating adjustable welding head	HK20 (Y)	
2	8" monitor	XH-BNC-8	
3	12V power supply	AYD-1220	
4	BNC connection cable	XHBNC-5m	
5	Power shunts	XHPDL-5m	
6	2 pole cable with air plug	XS8-2-8m	
7	Side-shaft blowing	CFDWXJ-00	



## 1.2 Product accessories display diagram

### Y-shape

Serial number	name	Specifications	Sample
8	风刀组件	XHFDD30-00	
9	同轴吹气	XHTZCQM36C-00	
10	蓝光灯	LED-D16-500	
11	保护片	D20*3/D22.35*4	

## 02. technical parameter

Product parameters	technical parameter
maximum power	2000W
Optical fiber interface	QBH/RD
collimation	F50/F70/F100
focusing	F150/F200/F250/F300
Luminous aperture	D17mm
Collimation protection	D20X3mm
Focus protection	D22.35X4mm
Shielding gas pressure	10、15、20、25par
weight	1.786KG

## 03. Installation and connection

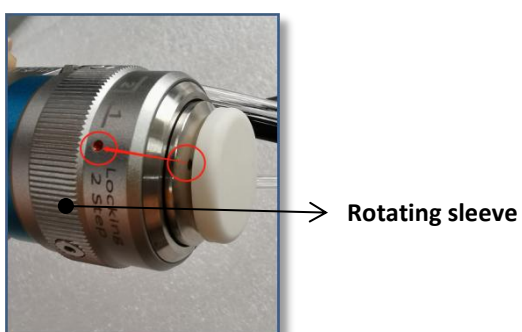
### 3.1 Preparation before installation

#### ► means of preparation

1. One set of metric hexagonal handle;
2. One bag of dust-free cleaning stick, one bottle of absolute ethanol (500ml) and one bag of dust-free gloves;
3. Clean dust-free working environment;

### 3.2 QBH connection

**Step 1:** rotate as shown in the figure below, and confirm that the red dot on the side of the rotating sleeve is in line with the white dot on the outer sleeve.



#### ► Installer preparation

1. Read this manual carefully;
2. Wash hands with hand sanitizer first;
3. Wear dust-free gloves;
4. Wear a mask if necessary. (hint - dust removal is very important)

**Step 2:** clean the head of optical fiber rod and QBH connector with dust-free cleaning rod and absolute ethanol.

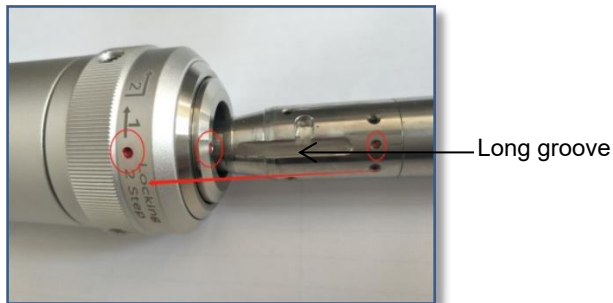


Optical fiber plug

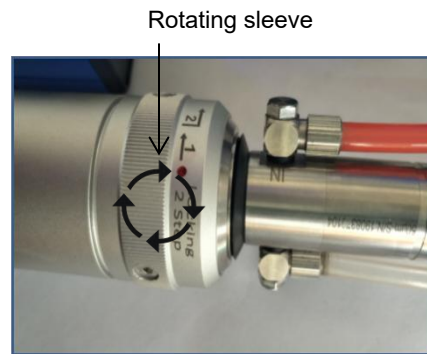


QBH connector

**Step 3:** remove the dust cover of QBH, coaxial the cleaned optical fiber head with QBH, and ensure that the red dot on QBH is in the same line with the positioning slot of optical fiber head (long slot on optical fiber head), and then gently insert the optical fiber head into QBH until the two contact surfaces of optical fiber head and QBH fit.



**Step 4:** after the optical fiber head is inserted into the QBH, lift the rotating sleeve by hand until the bottom surface of the rotating sleeve is basically flush with the top of the QBH, and then rotate the rotating sleeve clockwise until the clamping slot of the optical fiber head is locked. The rotation force should be moderate.



**Note: 1.Plug and unplug the optical fiber head gently;**

**2. When plugging, make QBH and optical fiber connector go in and out of the same axis;**

**3.Keep dust-free during operation**

**4.Place the laser head horizontally when inserting the optical fiber; Ensure that the optical fiber is inserted horizontally**

### 3.3 QBH Connect (new version of QBH installation)

**Note: The laser head must be positioned horizontally when inserting the fibre; ensure that the fibre is inserted horizontally**

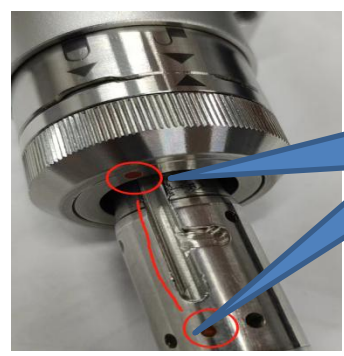
**Step 1:** Inspect QBH connectors and fibre plugs for dirt and wipe them clean promptly with alcohol and cotton swabs (cotton paper).



**Step 2:** The QBH is in the unlocked state (arrow pointing to the unlocked logo) and the red dot of the fibre optic plug is inserted into place against the red dot on the end of the QBH.



QBH in  
unlocked state  
( a r r o w  
p o i n t i n g  
t o  
u n l o c k  
m a r k )

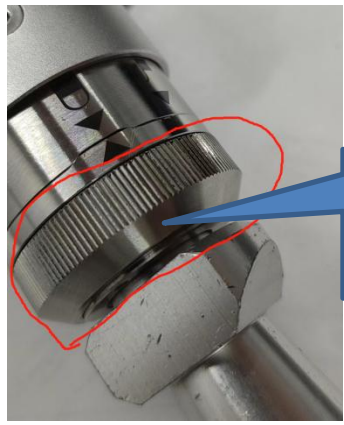


When the red  
dot is on a  
line, then  
insert

**Step 3:** Turn the ring with the lock mark on the QBH connector clockwise until the QBH is in the off-lock position (arrow pointing to the off-lock mark) and finally twist the locking ring to tighten it.



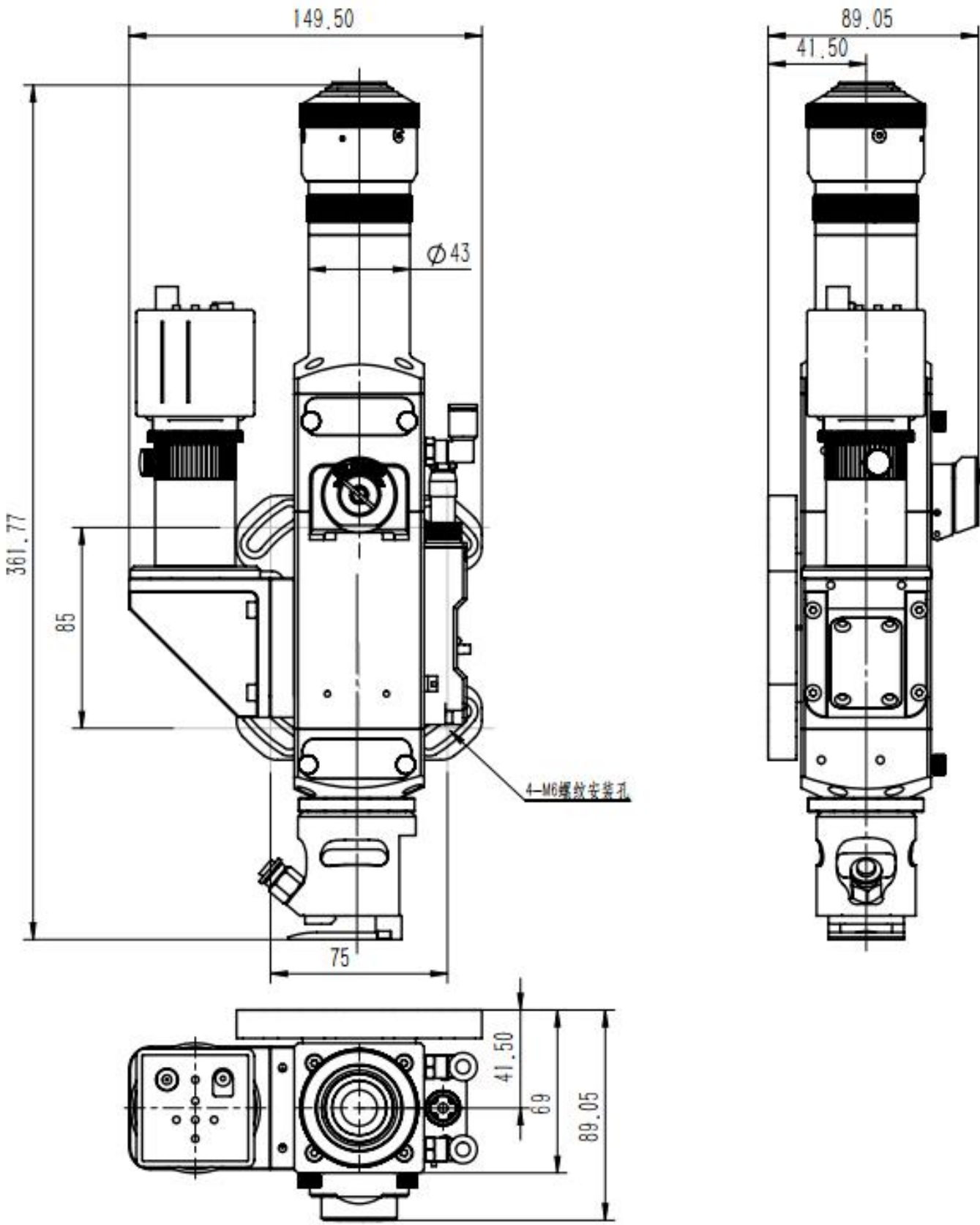
Turn the piece  
clockwise until  
the QBH is in the  
off-lock position  
(arrow pointing  
to the off-lock  
mark)



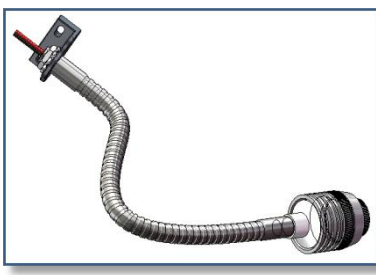
Torque the  
locking ring

### 3.3 Dimensional drawing of weld head installation Y-shape

Note: Mounting adapter plate hole 85X75-M6,



### 3.4 Diagram of blue light installation, gimbal side blow installation



Blue light  
installation diagram

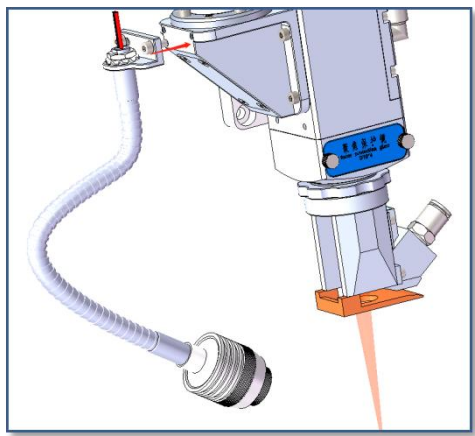
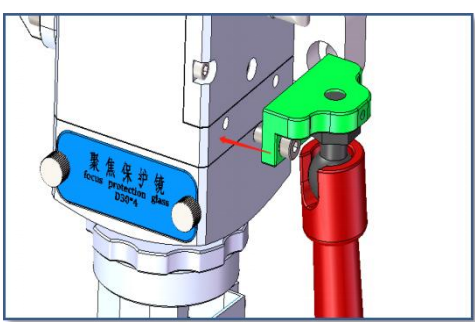
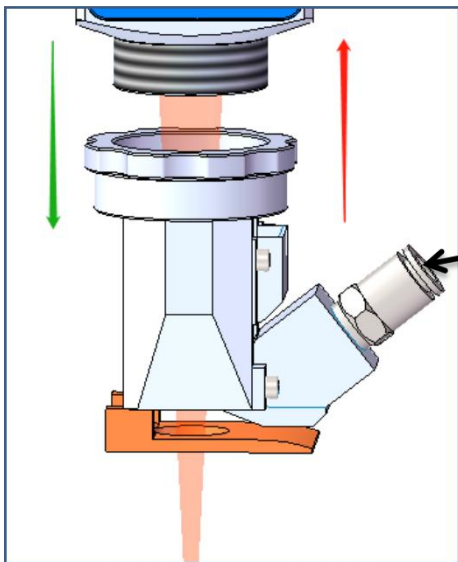


Diagram of universal joint  
side blow installation

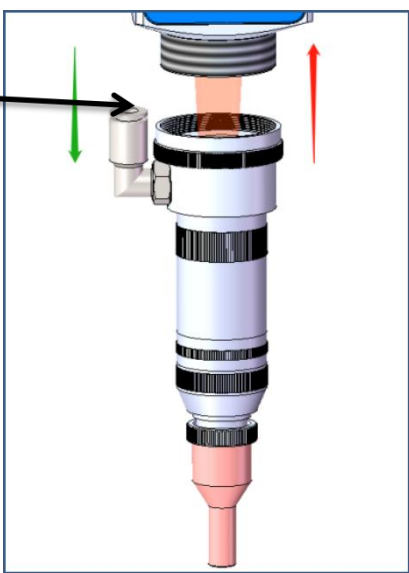


### 3.5 wind knife, coaxial switching



Airway  
connections  
D6/D8

Airway  
connections  
D6/D8



**Wind knife:** for the protection of the air curtain, usually used in long distance laser welding, clean compressed air can be used, air pressure: 10, 15, 20, 25 par, can be controlled according to the actual.

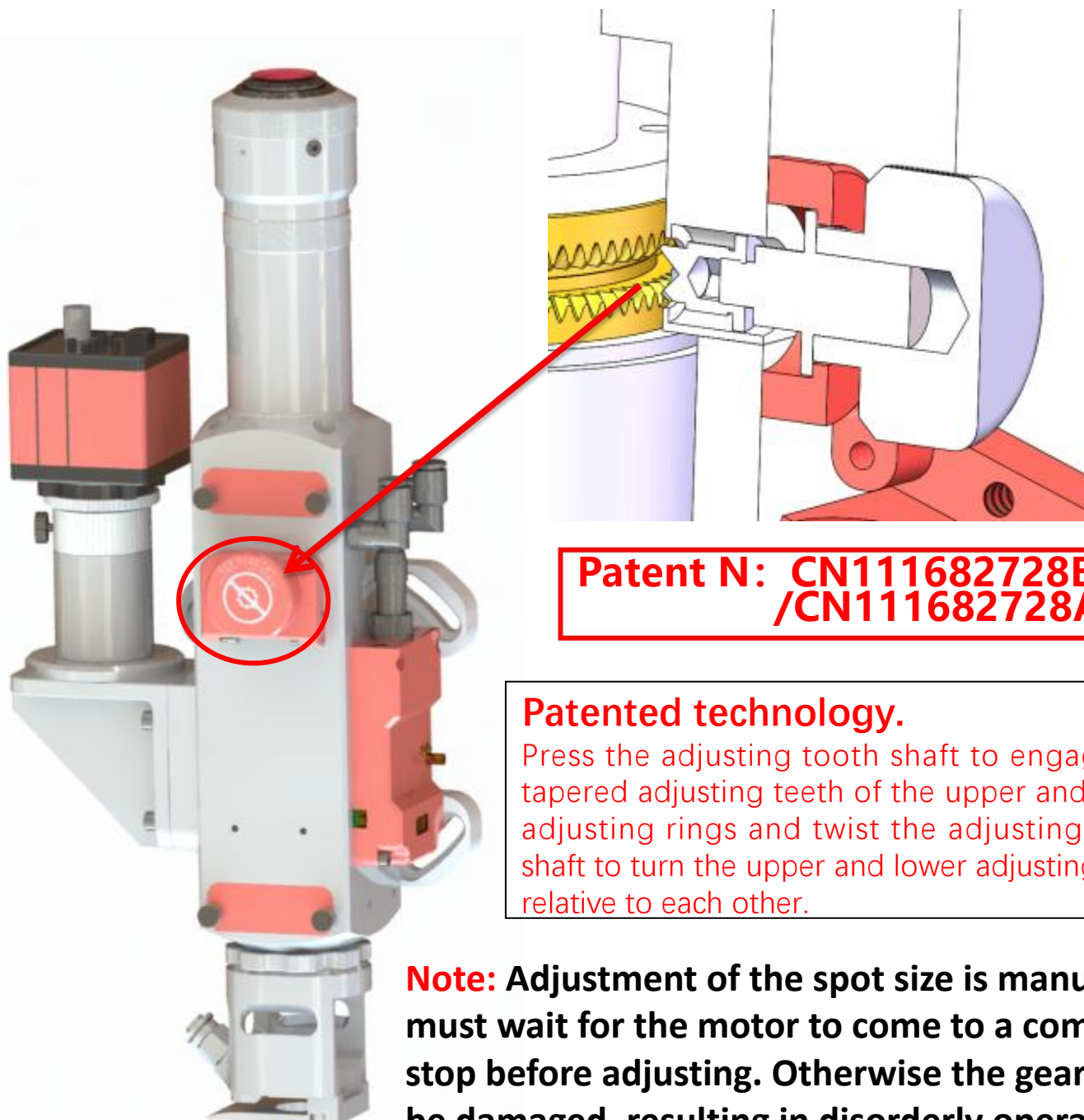
**Coaxial:** coaxial blowing gas for concentric protection gas, if you need a bright and bright weld pattern, available coaxial blowing gas, with protective gas, argon, nitrogen, CO2 and other inert gas b air pressure: 10, 15, 20, 25par, according to the actual demand control



## 04.Adjustment method of the ring function

### Introduction to the laser ring adjustment function.

Changing the single welding method of spot laser welding, changing the traditional spot light method to a swinging O-shape light, better achieving the "fish scale welding" effect and expanding the welding width; and adding the welding spot can change the single welding method of fixed spot size laser welding to achieve multi-directional, different welding seam conditions, a variety of welding conditions can be achieved.



**Patent N: CN111682728B  
/CN111682728A**

#### Patented technology.

Press the adjusting tooth shaft to engage the tapered adjusting teeth of the upper and lower adjusting rings and twist the adjusting tooth shaft to turn the upper and lower adjusting rings relative to each other.

**Note:** Adjustment of the spot size is manual and must wait for the motor to come to a complete stop before adjusting. Otherwise the gears will be damaged, resulting in disorderly operation of the internal motor.



## Patent certificate display:

证书号第 4325097 号



# 发明专利证书

发明名称：一种光斑可调的激光电机

发明人：李高文

专利号：ZL 2020 1 0539717.9

专利申请日：2020 年 06 月 15 日

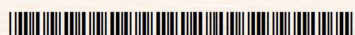
专利权人：武汉兴弘光电技术有限公司

地址：430000 湖北省武汉市东湖高新技术开发区光谷大道 3 号激光工程设计总部二期研发楼 06 幢 06 单元 13 层 06 号 (45 号)

授权公告日：2021 年 03 月 26 日 授权公告号：CN 111682728 B

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局长  
申长雨

申长雨



第 1 页 (共 2 页)

其他事项参见续页

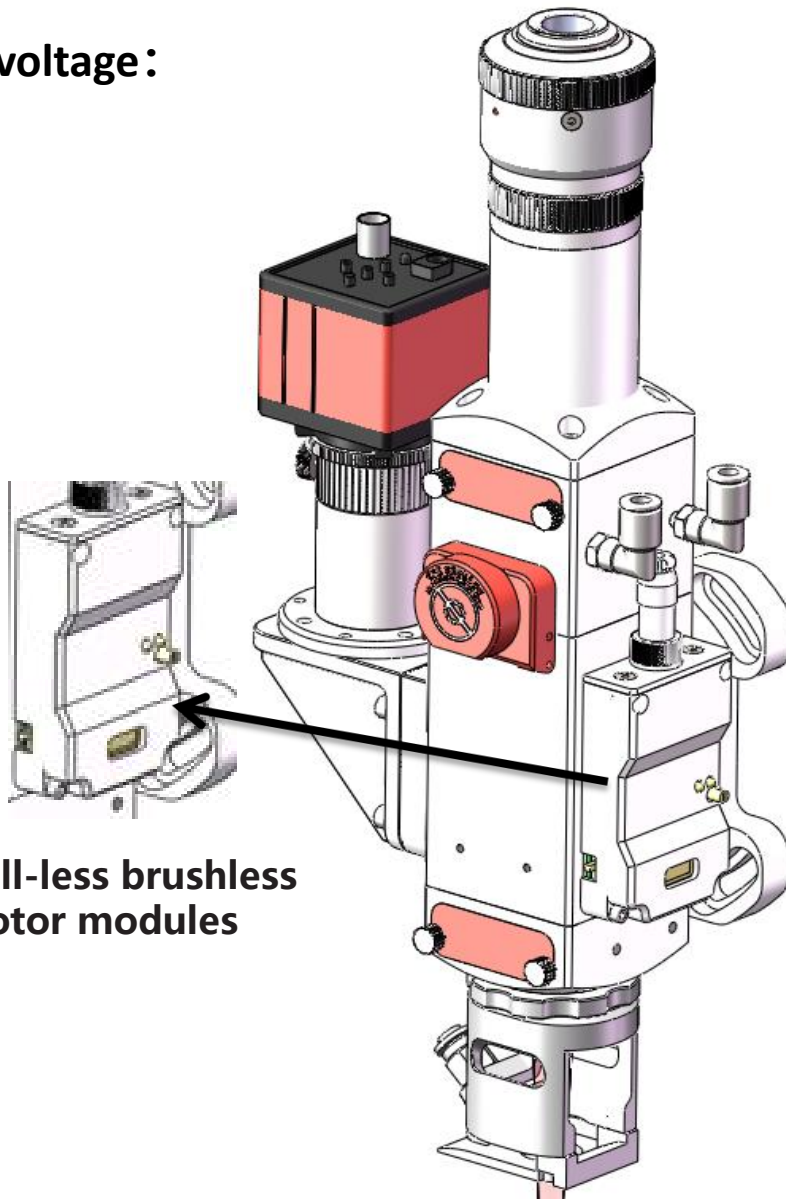
# 05. Instructions for use of the drive

**Motor type: Hall-less brushless motor (for **HK20Y platform oscillating welding head**)**

**Controller models: XHGD-DRIVE**

**Basic Properties:** Maximum motor speed: 13000RPM, minimum resolution bit: 100RPM.

**Supply voltage:**  
24V



**Hall-less brushless  
motor modules**

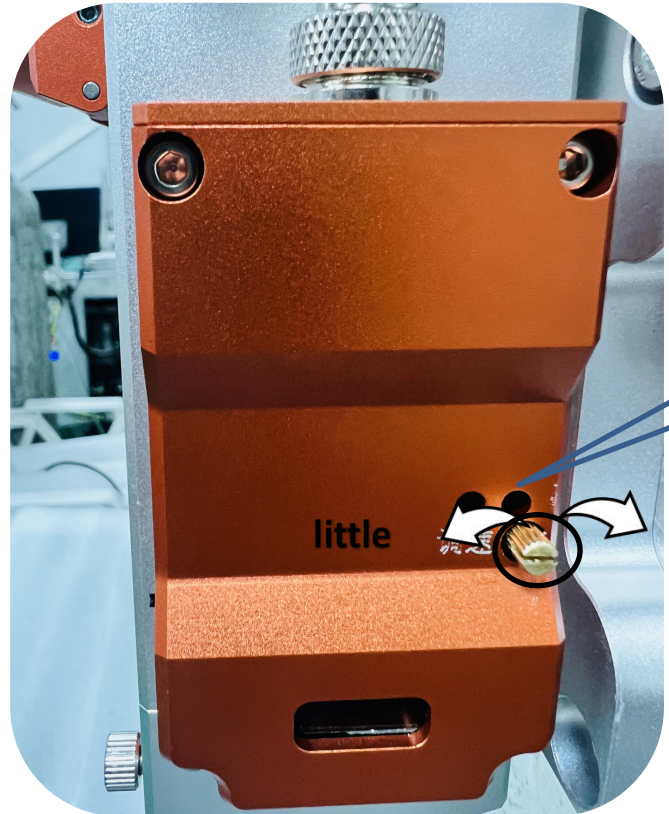
**HK20Y platform swing welding head**

## 5.2 The way the drive is speed regulated

✳: The motor speed is adjusted by rotating the potentiometer on the drive, the speed becomes smaller to the left and vice versa (as shown in the diagram below)



Old Version



New Version

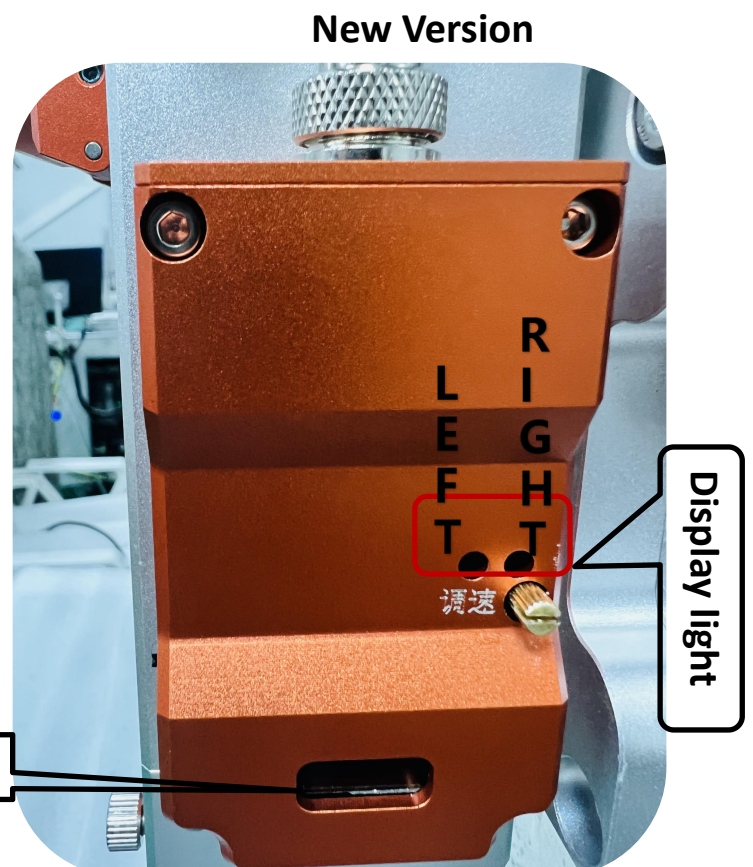


## 5.3 Introduction to OLED display content

1. under normal motor operation the drive OLED display shows the current motor running speed and operating status (running normal), the right side of the display shows green;
  2. in case of motor failure the drive OLED display shows the current motor running operating status (fault), the left side of the display shows red.
2. When the motor is faulty the drive OLED display shows the current motor operating status (faulty) and the left side of the display shows red. **(as shown in the diagram below)**



Old Version



OLED displays

## 5.4 Introduction to toggle switches

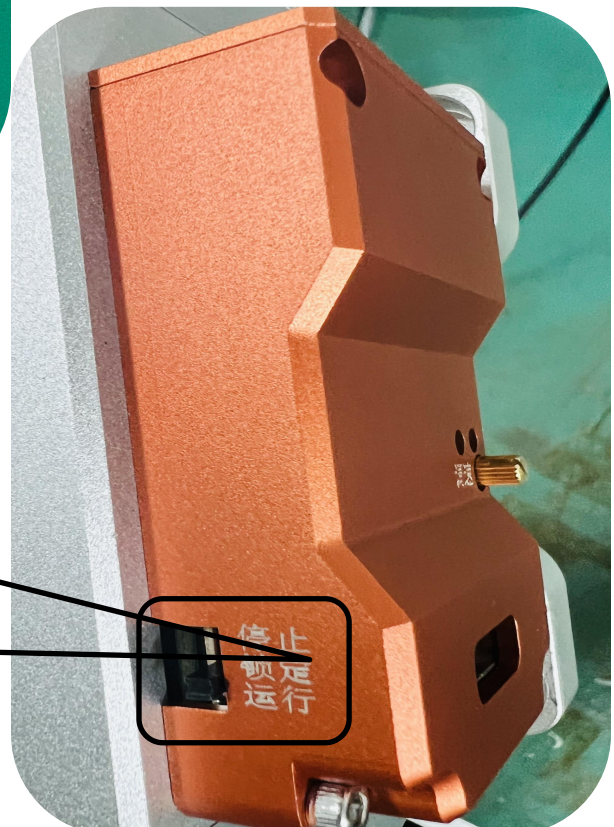
※: The three toggle switches on the **old version** of the drive controlled motor run, lock and stop respectively; the toggle switch was in the middle with the motor locked inactive, toggle up to start the motor running and toggle down to stop the motor turning. The sequence of the three-stage prompter toggle switches on the **new version** of the drive is the reverse of the old version (**Version**)



Old Version

Up: Stop  
Medium: Locked  
Down: Running

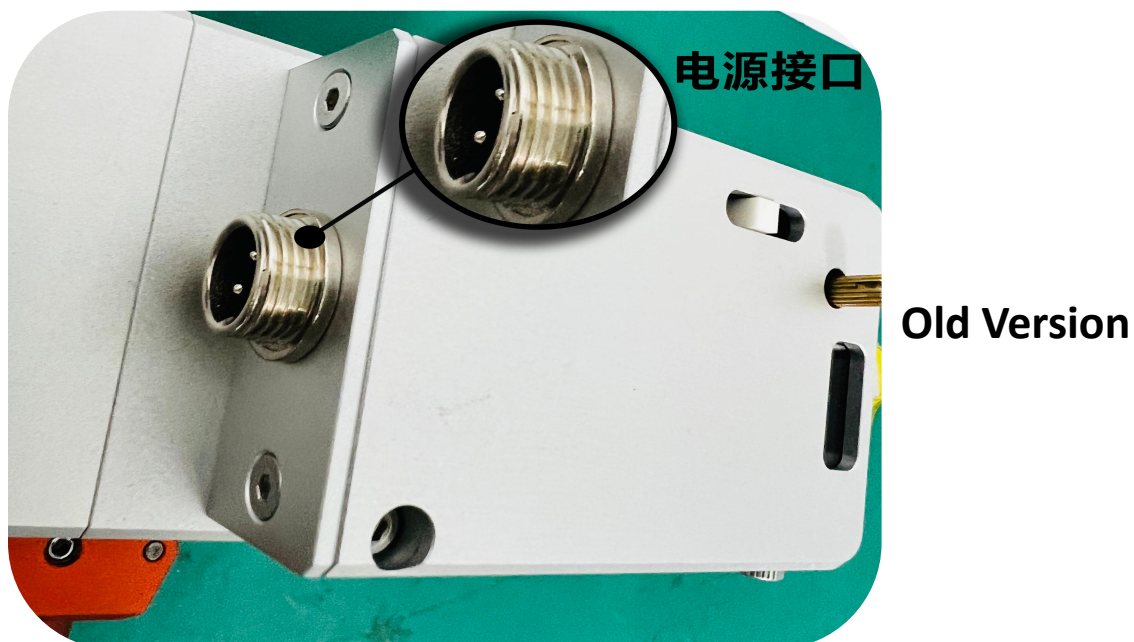
New Version



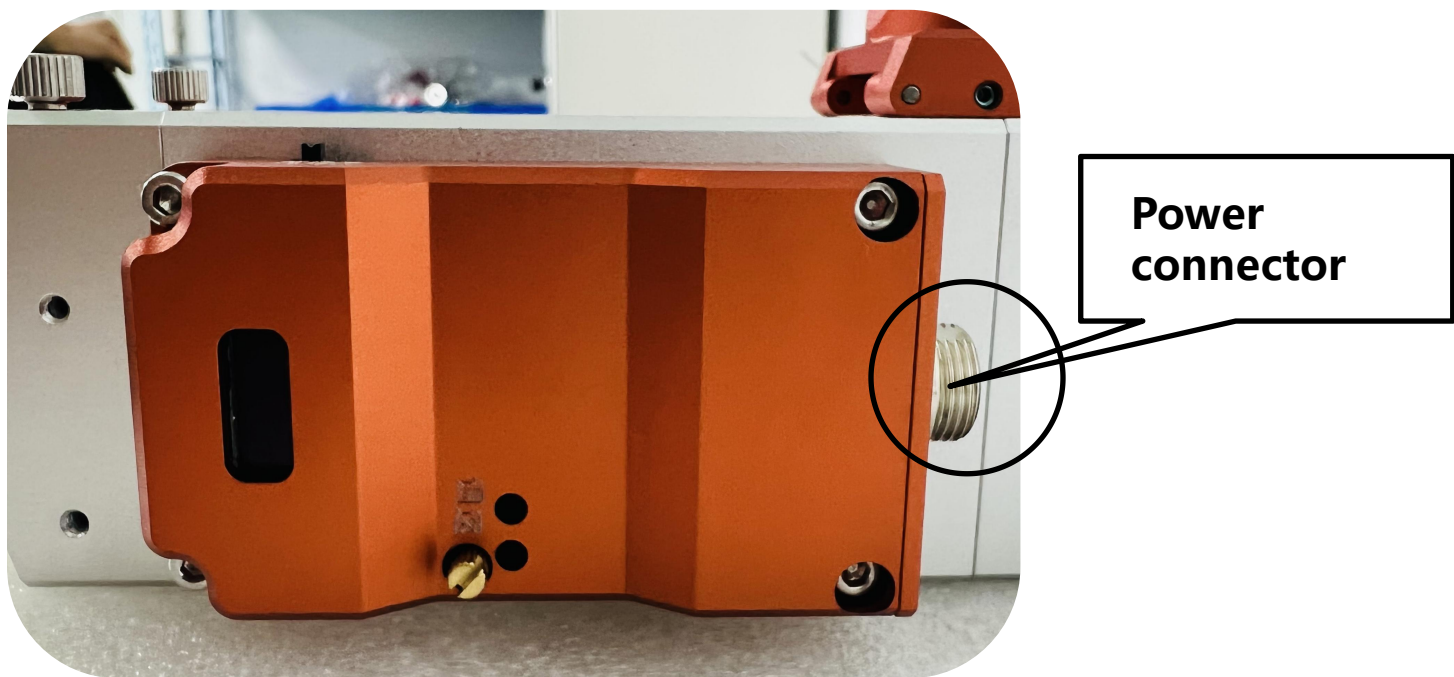


## 5.5 Interface definitions

⚠: This integrated driver has only one external two-pronged power connector, where the line number 24V is connected to the 24V switching power supply V+, and 0V is connected to the 24V switching power supply V-, please do not reverse the connection, otherwise the driver may be damaged. (As shown in the diagram below)



New Version



## 06. Replacement and maintenance of protective lenses

### ► Tools for cleaning and replacing protective lenses

1. powder-free rubber gloves or finger gloves, lint-free cleaning rags and cotton swabs.
2. Isoethanol (optical grade, water-free), acetone (optical grade, water-free).
3. compressed air (oil-free, water-free).
4. microscope, light source.

### ► Cleaning of protective lenses

1. Clean the lenses with a dust-free cleaning cuvette, using isopropyl alcohol solvent, and then use compressed air to suck up clean air and blow off any foreign objects such as attached columns;
2. Repeat several times until the lenses are clean.
3. The collimating lenses are a combination of two lenses, please note the direction;
4. If the protective lenses are no longer possible to clean or are damaged, they must be replaced with new lenses.

### Protective lens care

1. Loosen the two locking nuts on the protective lens assembly by hand and pull out the protective lens drawer;
2. Note: Quickly seal the opening after the lens has been removed with a non-stick protective film!
3. Place the protective lens drawer (including the protective lens) in a clean environment for maintenance.
4. Remove the protective film from the laser head and insert the well maintained protective lens cover (including the lens) flat into the laser head and lock it in place.
5. Note: the direction of the protective lens cover, if the direction is reversed, it will not be inserted!
6. Hand tighten the two fasteners on the protective lens assembly with the appropriate force.



## The process of replacing and removing protective lenses is as follows.

1. Use a special tool to unscrew the spring press ring until the spring press ring is completely unscrewed.
2. Place the entire collimator, unscrewed, upside down on a clean surface (keeping the collimator in the collimator during the process) and gently pull the collimator<sup>1</sup> upwards, taking care not to drop the lens.
3. After removing the gasket placed on the lens, the lens can be replaced or serviced.
4. Once the lenses have been serviced or replaced, install them in the same order as they were removed, in reverse order to avoid damage to the lenses.
5. After screwing the spring-loaded ring to the end, back off 1/5 of a turn to ensure that the spring-loaded ring 3 has a gap (0.1~0.15mm).

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

### **Cautions:**

- ★ Do not repeatedly wipe the protective lenses with a lint-free cotton cloth or swab.
- ★ Do not touch the protective lenses with your fingers.
- ★ Do not blow directly on the surface of the protective lenses with your mouth, as this may introduce new dirt.
- ★ Do not touch the tip of the cleaning swab with your fingers.
- ★ Do not forget to clean the protective lens drawer when putting it back on.
- ★ When using compressed air, please do not blow directly on the dirt from the front, but use a side blowing method to avoid dirt diving into the surface.
- ★ **It is specifically stated that** powder-free gloves or finger gloves must be worn when cleaning the product. It is now expressly stated that if damage is caused by, for example, improper handling or use of incorrect cleaning procedures or chemical usage, damage due to such causes is not covered by the warranty.

## 07. Use and maintenance

### 7.1 Cautions

1. Any parts fitted to the laser head must be carefully dusted!
2. If lenses have to be replaced, the work must be carried out in a clean environment!
3. Any assembly or component replacement must be carried out in a clean environment!
4. Before removing the old lens assembly, prepare a new one or, if no spare lens assembly is available, recommend purchasing one from our company!
5. When conditions are difficult to meet, seal the openings after removal of the lenses with a non-stick protective film!
6. Minimise the exposure of the laser head path to air to prevent the ingress of dust and dirt!
7. Any safety or protective equipment that has been removed must be reinstalled, checked and confirmed to be in good working order prior to operation or commissioning of the equipment.

### 7.2 Care and maintenance of QBH and fibre optic connectors

1. the connection between QBH and the fibre optic connector is covered with self-adhesive paper to avoid dust from entering and making maintenance more difficult.
2. Connect the cooling water pipe of the fiber optic connector well, no water leakage, if the QBH accidentally gets water, please stop using it immediately and return it to our company for treatment.

### 7.3 Precautions for regular maintenance of welding heads

1. regularly check the protective lenses for contamination and replace them if contaminated (daily check).
2. regularly check if the QBH connector is loose (every 3 days)
3. no water should enter the connection line, pay attention to the protection of the interface part.

# Revision History

Date	Revised content	Software Versions
20220104	First Edition (First Release)	<b>V1.0</b>
20220516	Version 2 (replacement of drive wiring definition, drive X-Q02 replaced with drive XMDDC V3.1)	<b>V1.1</b>
20220630	Version 3 (driver XMDDC V3.1 replaced by integrated driver XHGD-DRIVE)	<b>V1.2</b>
<p style="text-align: center;"><b>Wuhan Xinghong Photoelectric Technology Co., Ltd.</b></p> <p>TEL: 13343495092(After Sales Manager of South China Office)            18971055224(After Sales Manager of East China Office)            18086021608(After Sales Manager of North China Office)</p>		



兴弘光电

XINGHONG OPTOELECTRONIC



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