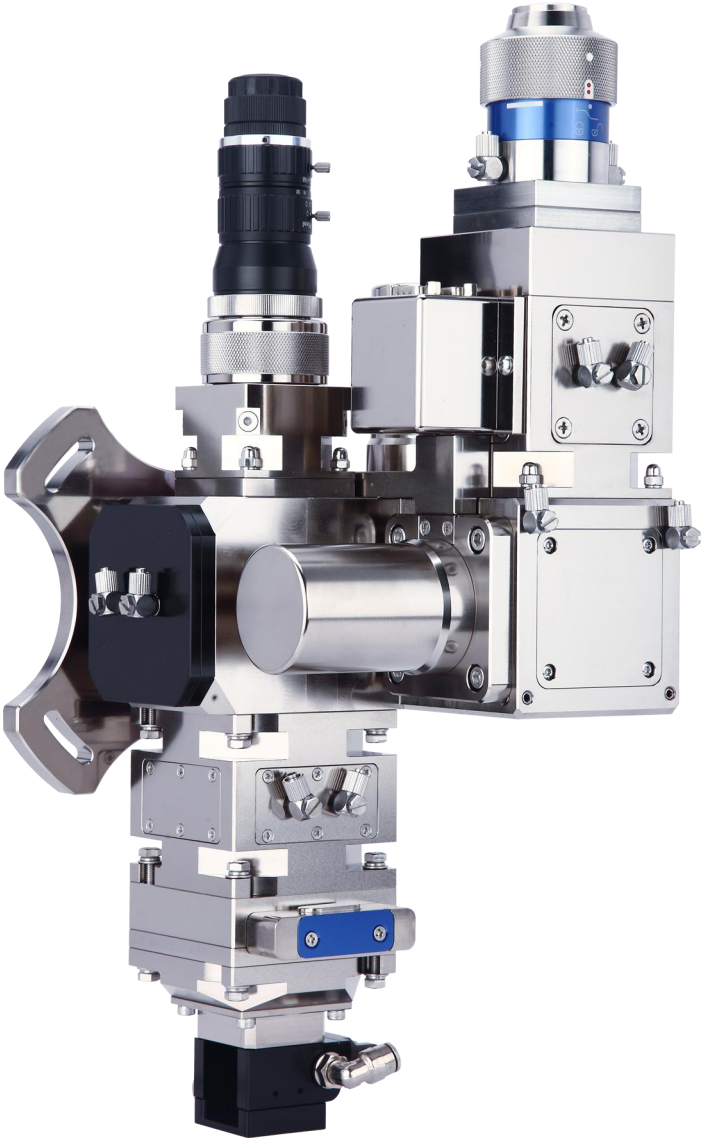
Wobble Welding Head

ND60



User Manual

Shenzhen Worthing Technology Co., Ltd.

Attention

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

Please keep this manual for future operation and maintenance.

ND60

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

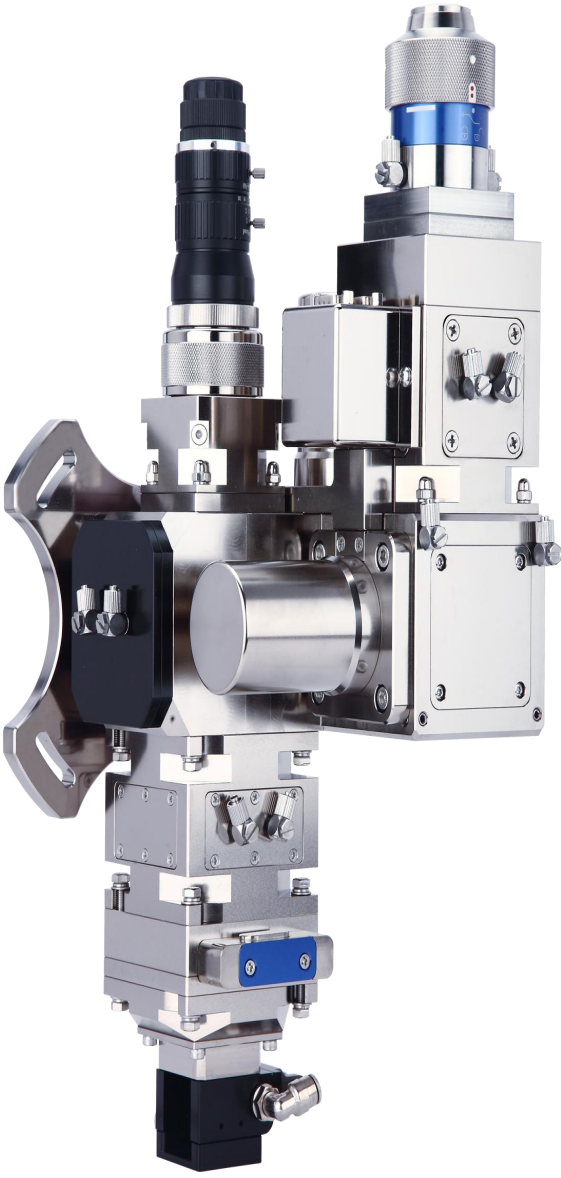
Do not touch the laser head with any body parts when it works!

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

Precision products. Do not strike it!

Product: Wobble Welding Head

Model: ND60



Product Features:

- This welding head has a strong advantage in highly reflective material welding and high power welding. It is an economical and efficient welding head.

- The X/Y axis driven by motor has a variety of swinging modes and allow the workpiece to have irregular weld seam and larger gap. The welding quality can be improved significantly.

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

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

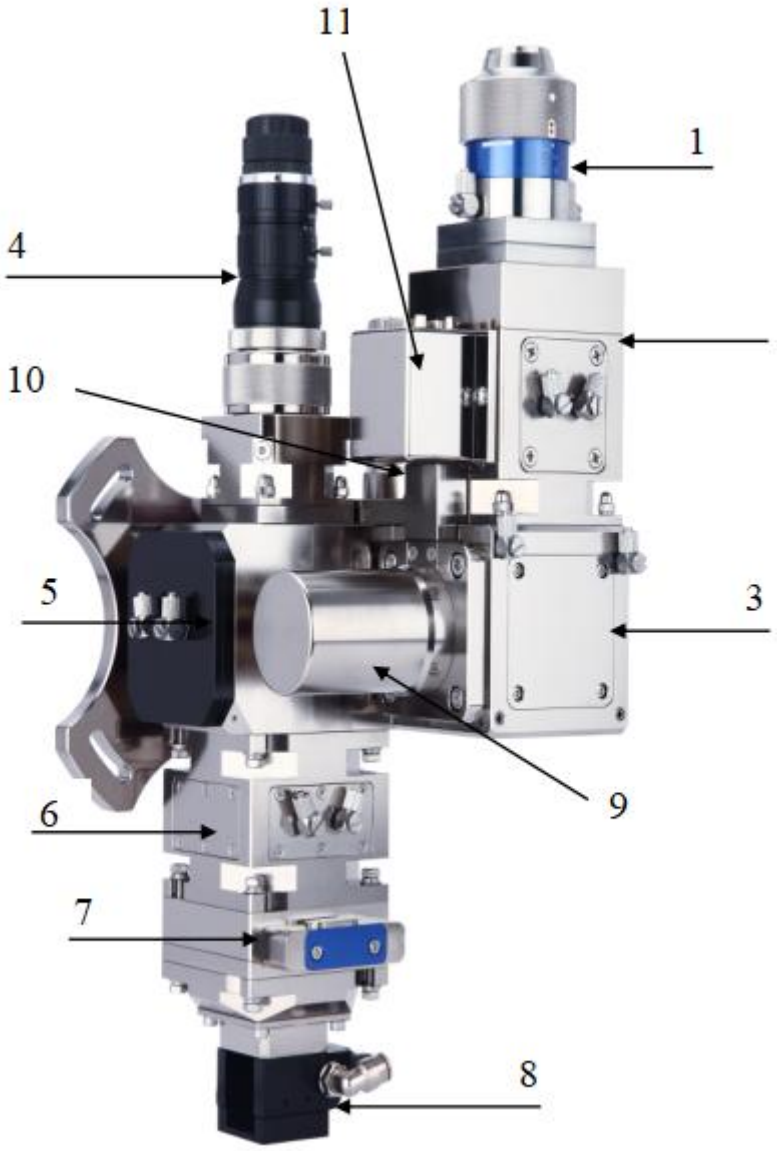
- Protective window is drawer-type and can be replace easily.

- Fit for variety of QBH laser source.

Contents

1. Product Description

1.1 Structure Diagram



No.	Component
1	QBH Connector
2	Collimator Lens Component
3	Galvanometer Component
4	CCD Component
5	Beam Splitter Component
6	Focusing Lens Component
7	Protective Window
8	Air Curtain
9	Motor X Axis
10	Motor Y Axis
11	Junction Box

1.2 Main Function

1.2.1 Components Introduction

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

※Collimator Lens Component
Collimator lens component is assembled inside the laser head; it contains collimator lens cavity, bi-convex lens, gasket and locking coil.

※Galvanometer Component
The X/Y axis driven by motor has a variety of swinging modes and allow the workpiece to have irregular weld seam and larger gap.

※CCD Component
Provide filter light source; provide safe, reliable and real light source to CCD.

※Beam Splitter Cavity Component
Reflect the laser beam onto the machined surface of workpiece.

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

※Protective Window Component
Prevent the welding slag from spattering directly to the focusing lens, protect and prolong the using time of focusing lens.

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

1.2.2 Design & Function

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

All media connections are built inside the laser head.

1.2.3 Auxiliary Medium

※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

Specification	
Max power	6000W
Collimator focal length	100mm/150mm
Focus focal length	200mm/250mm/300mm
Effective Aperture	Φ48mm
Weight	6.5kg

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

3. Installation & Connection

3.1 Safety Instructions

Any maintenance or fault survey should be conducted by professional trained personnel who must have got safety training and be aware of the possible danger and safety measure.

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

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 scaterred by laser.

Do not look directly into the laser beam even if wearing eye protecting equipmemnts.

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

3.2 Unpacking Check

※Unpacking Check

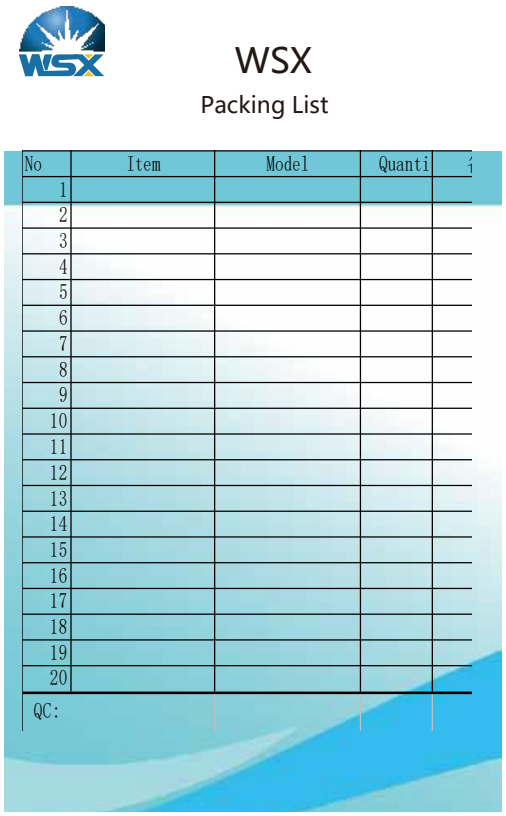
1.Intact box;
2.The sinage should be clear with conformity mark and accord with the purchased models;
3.The upper and lower opening tear-proof seals are not broken or disassembled;
4.If the above does not match, contact the seller.

※开箱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.


WSX
Packing List

No	Item	Model	Quanti	
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

QC:

3.3 Preparation for Installation

※Tools

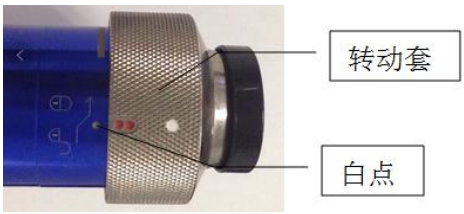
1.A set of metric hexagonal handle;
2.One bag of clean rod, one bottle of anhydrous ethanol(500ml), one package of clean gloves.
3.Clean and dust-free working environment.

※Preparation of installation personel

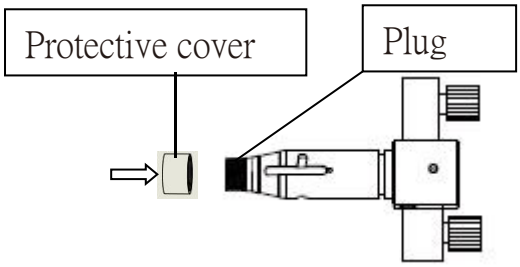
1.Read this manual carefully;
2.Wash hands with soap;
3.Wear dust-free gloves;
4.Wear a mask if necessary.(Note - Dust removal is of utmost importance)

3.4 QBH and Fiber Connection

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



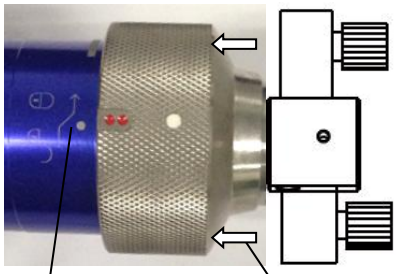
Step two： Remove the dust cover of fiber rod, clean the fiber rod with anhydrous ethanol. Before installing, check the protective cover of fiber plug to see if it is locked, avoid the cover from loosening and effecting the welding performance or burning the fiber and welding head.



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

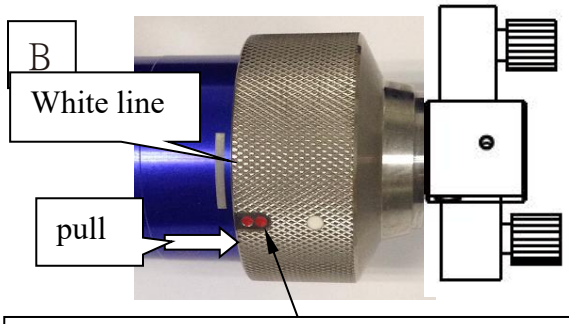
Step four： After inserting the fiber rod into QBH, press the rim gently and turn it about 15 degree along the arrow on the rim. Then pull the rim until its underside is parallel with the top of QBH, turn the rim at the same direction till the limit.

A



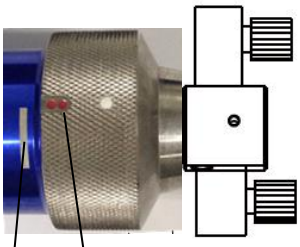
Turn along the arrow　　Press the rim

B



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

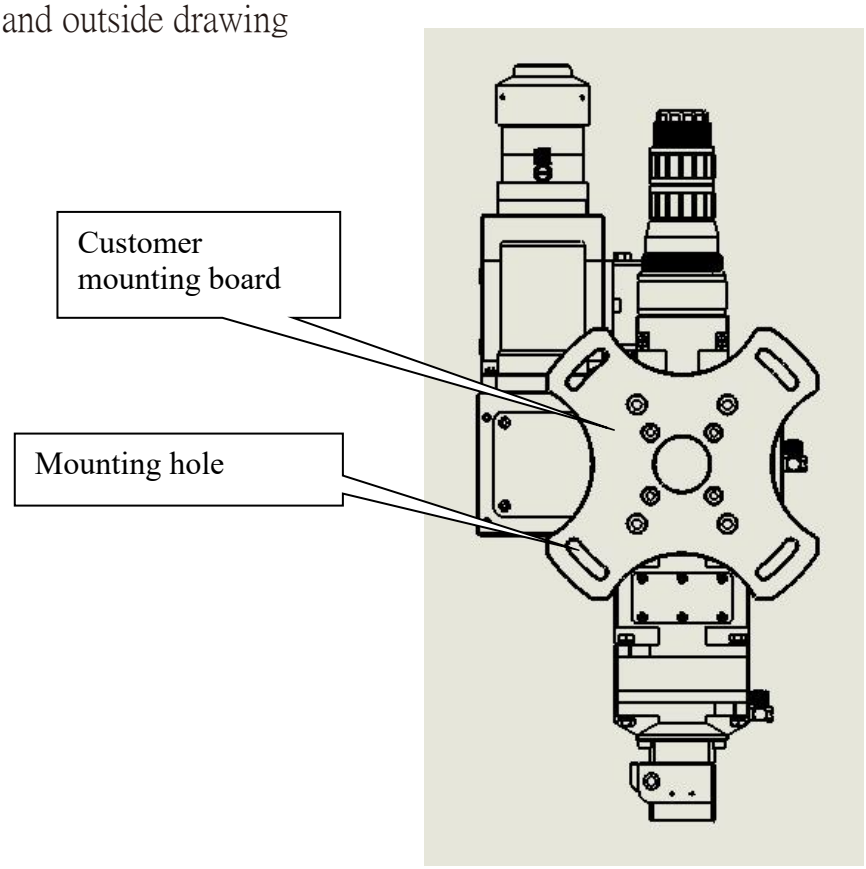
C

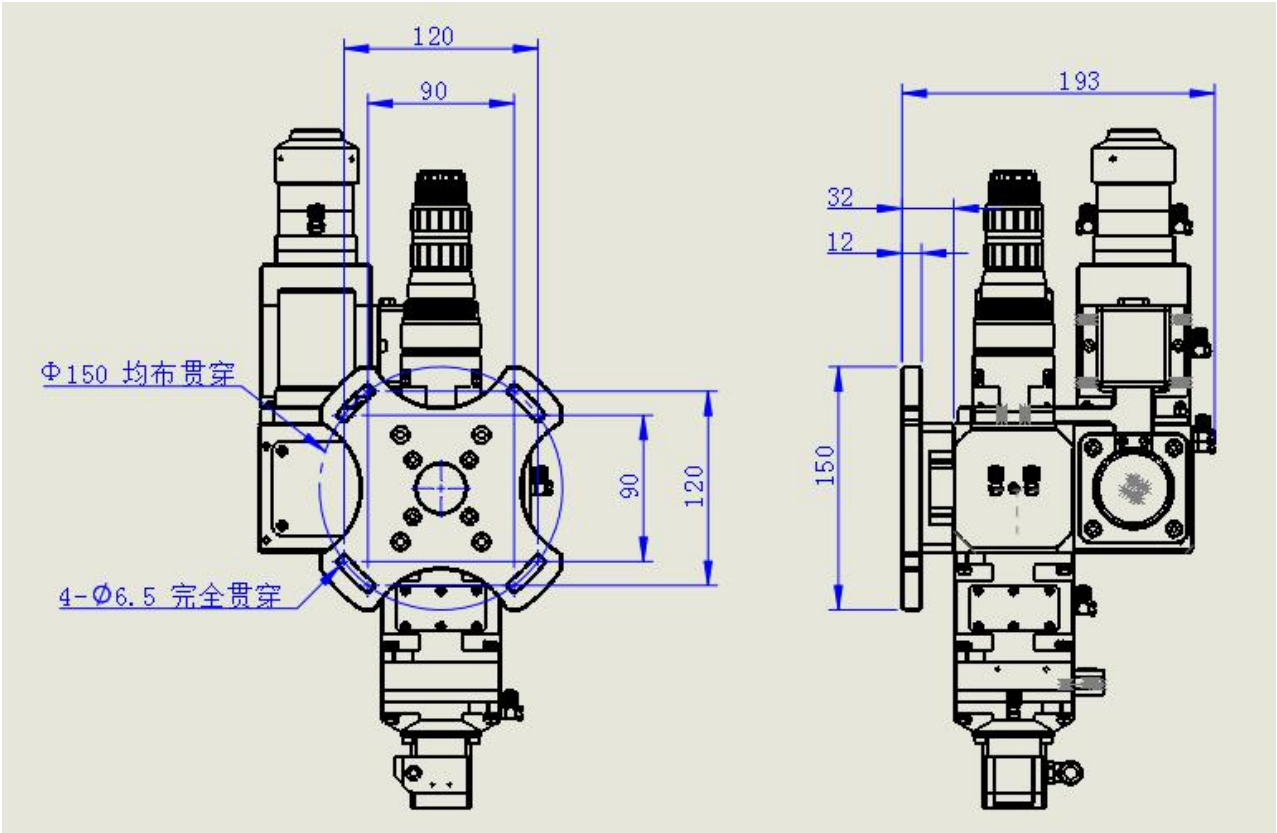


Pull the rim and continue turning, the red dot should be in the scope of the white line or close to the end of white line. The underside of rim should be parallel with the top of QBH.

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.

3.5 Installation and outside drawing

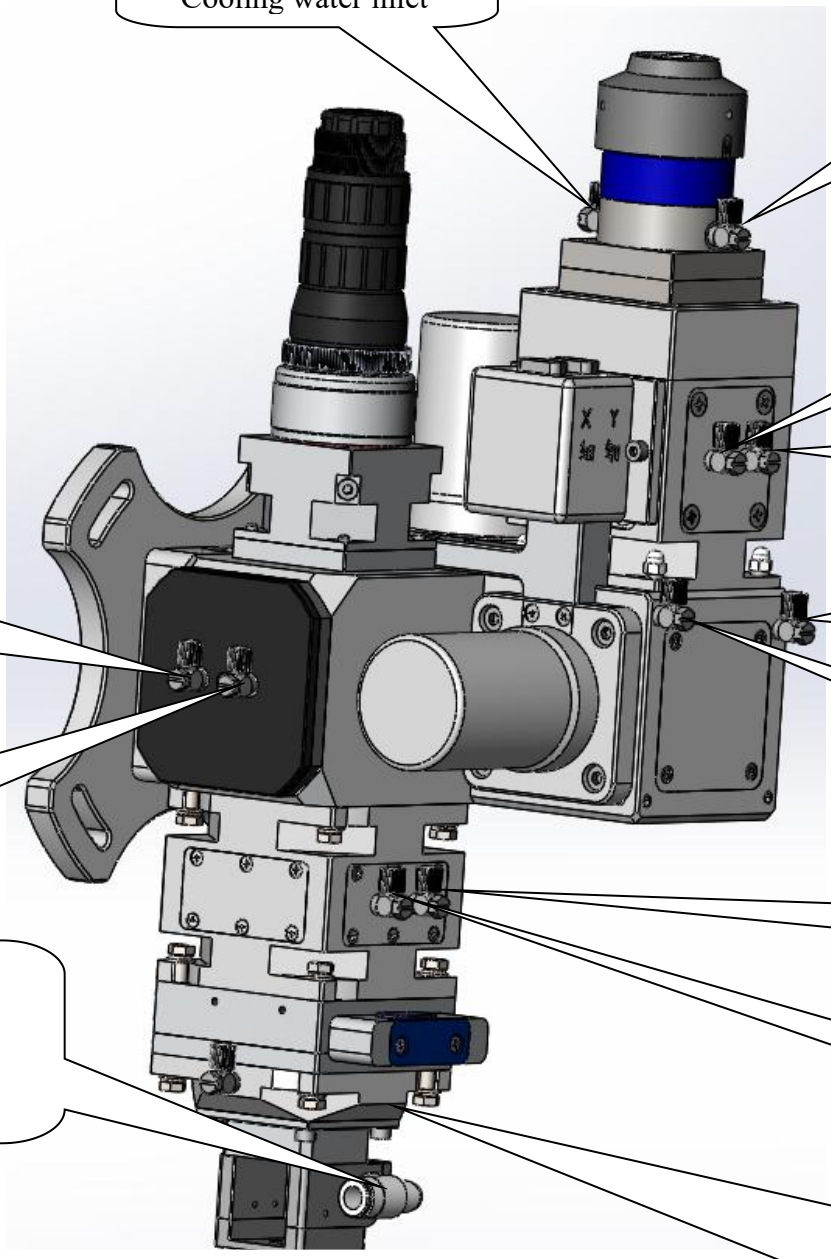




Installation of laser head should be solid and reliable.
The angle of laser head in the vertical direction can be set according to customer requirement.

3.6 Connection of water and gas

Water cooling connector & gas connector diagram



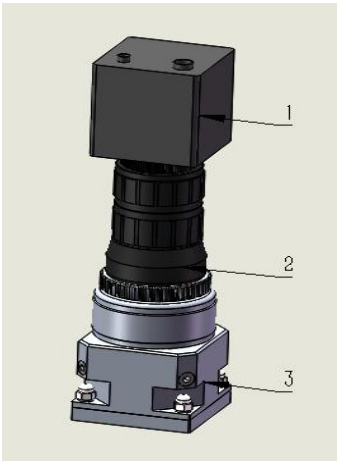
Note:

1, 1~5 is Φ6 water pipe connector, when using must ensure the water quantity is sufficient, the water pressure is above 0.4MPa;

3, 6、7 is Φ8 gas pipe connector;

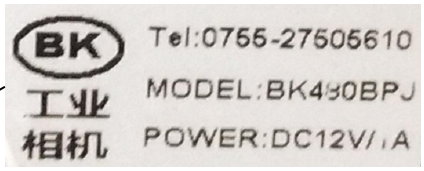
4, Please keep the bending radius of the connected pipeline not less than 30mm.

3.7 CCD component connection



1 相机
2 CCD接口（镜头）
3 安装座

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



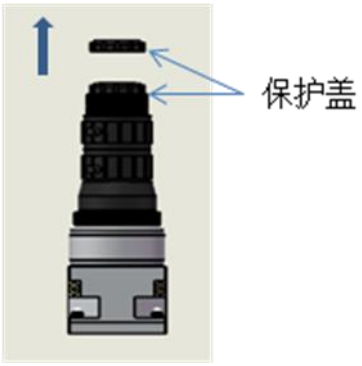
CCD组件

Installation steps of CCD Camera：

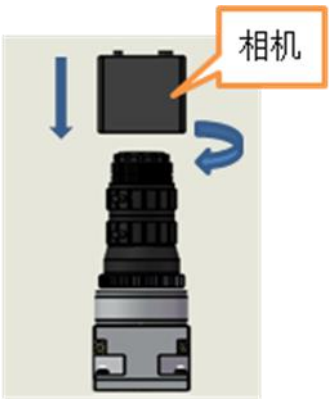
Step 1：Remove the protective cover as shown below

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

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



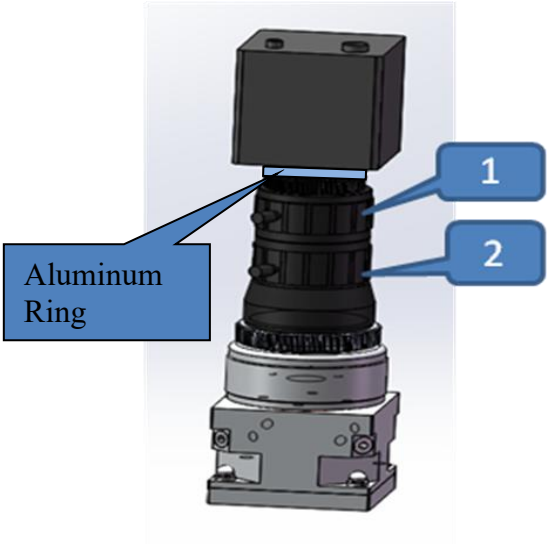
图一



图二

图三

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;

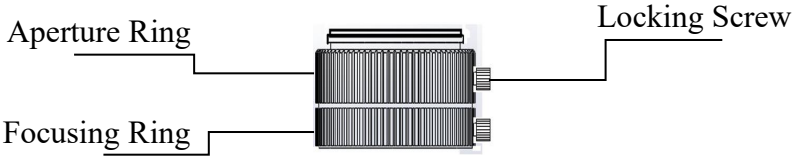
2 、Loosen locking screws on Aperture Ring(1) and Focusing Ring(2);

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 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.



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 focusing component

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

※Lens removal and installation

Disassembly of focusing component:

1、Remove two hex screws(2) on the focusing component with open spanner, loosen the other two, rotate and remove the focusing component;

2、Remove the pressing ring(7) under the focusing ring with special tools;

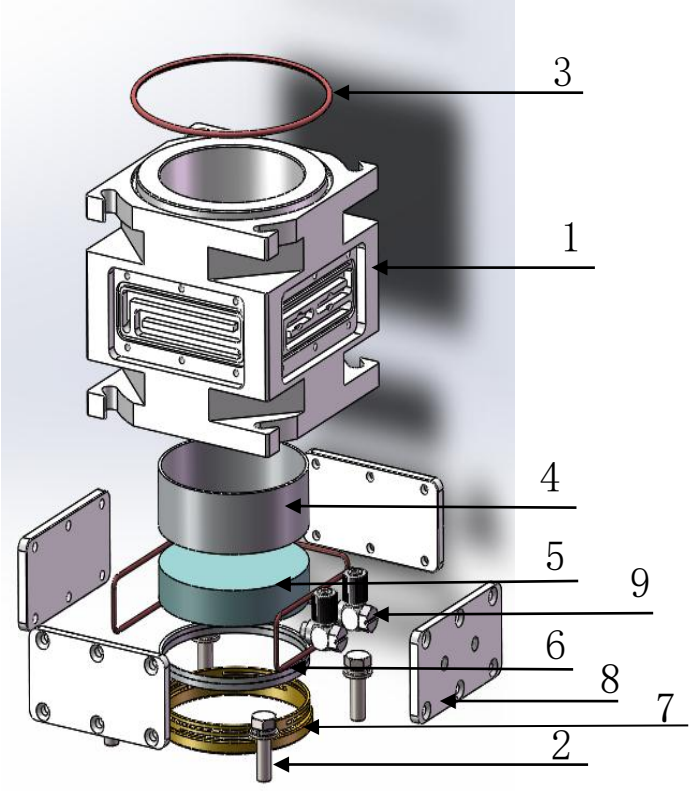
3、Remove the focusing lens gasket(4);

4、Replace or maintain the focusing lens;

5、The installation of focusing lenses and components is carried out in reverse according to the above procedure;

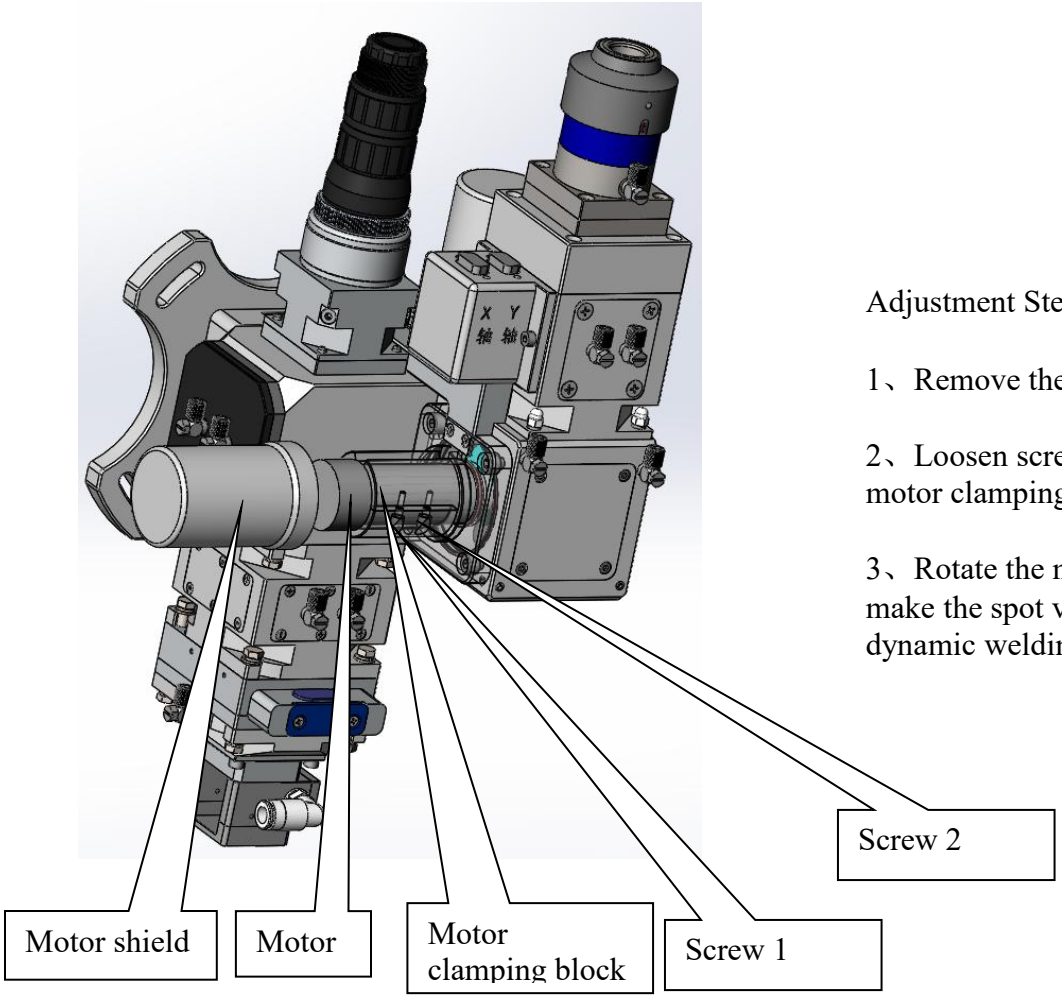
6、When installing the focusing lens, twist the locking coil to the end, then twist in back 1/5 circle, keep the gap Between the locking coil and lens at 0.1~0.15mm;

7、When installing the focusing lens, the flat convex surface of the focusing lens should be lowered.



1、Focusing lens cavity 2、Hex screw 3、O ring 4、Focusing lens gasket 5、Focusing Lens 6、Gasket 7、Pressing ring 8、Water cooling cover board 9、Water pipe connector

5.3Reflection lens angle adjustment



Adjustment Steps：

1、Remove the motor shield;

2、Loosen screws with hex wrench, make the motor clamping block rotatable;

3、Rotate the motor, fine tune reflect angle, make the spot visible in the center and the dynamic welding effect more visually.

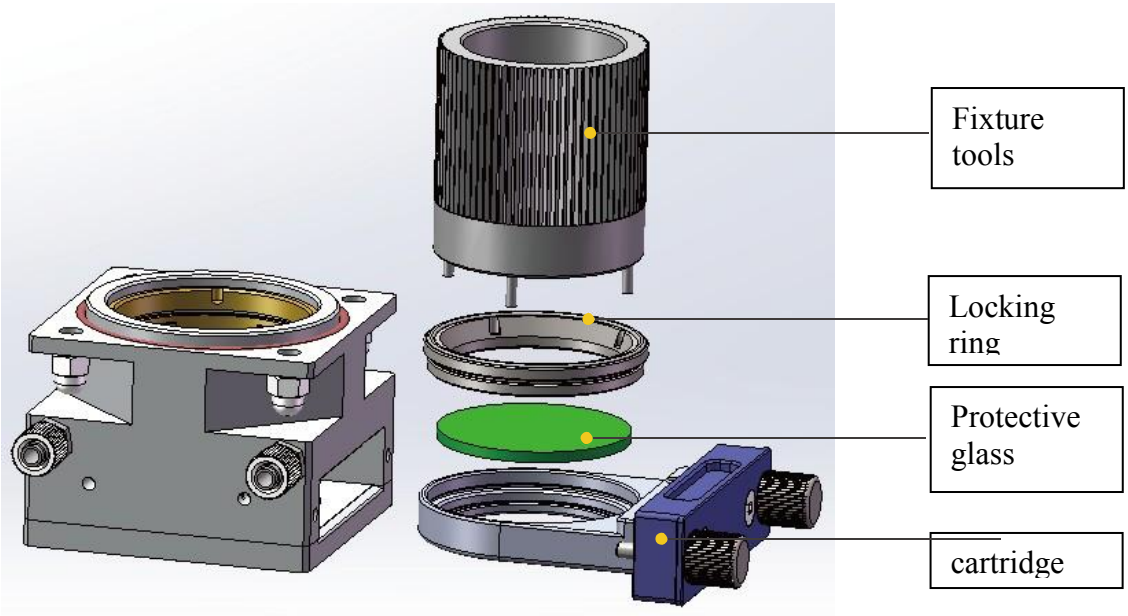
6．Cleaning and installation of protective window

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;

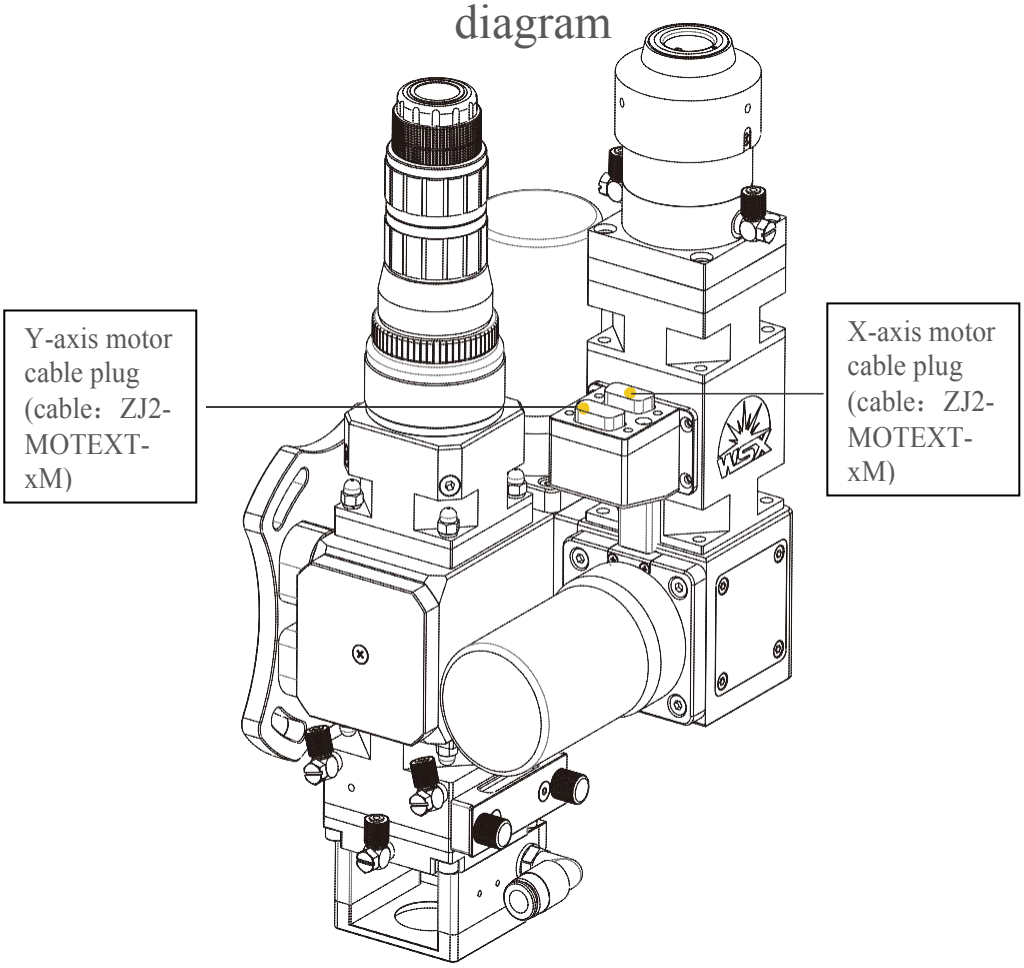
4、If the protective window can not be cleaned or it is damaged, user must change a new one.



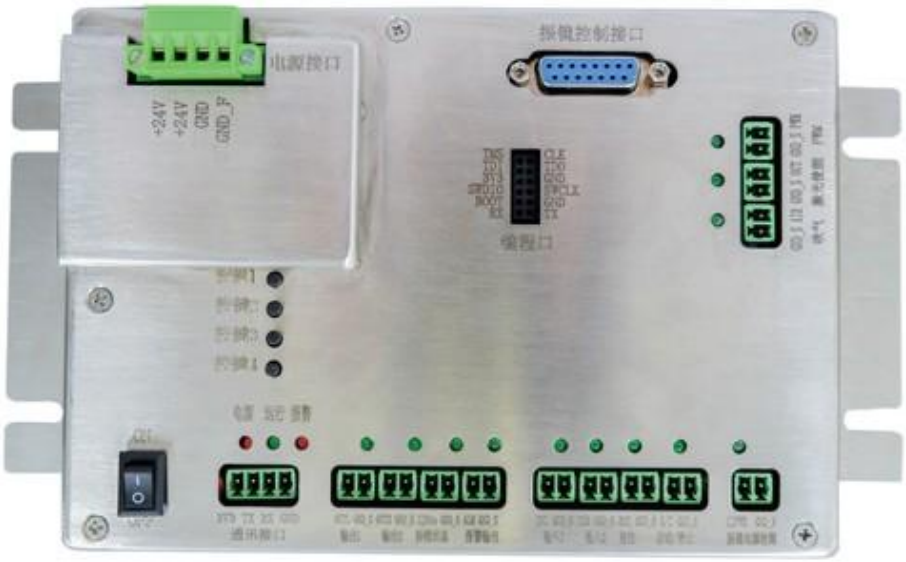
1. Unscrew the locking studs of the protective glass cartridge;
2. Note: quickly seal the opening after the cartridge is removed with a non-adhesive protective film;
3. Put the protective glass cartridge (including protective glass) in a clean environment for maintenance;
4. Remove the locking ring with a special fixture.
5. Tear off the protective film of the protective glass, put the maintained protective glass into the cartridge and lock it, and then insert the entire cartridge into the focusing assembly;
6. Note the direction of the protective glass cartridge, if the direction is incorrect, it will not be able to insert;

electrical Instructions

diagram



WARNING! Be sure to ground before powering on!

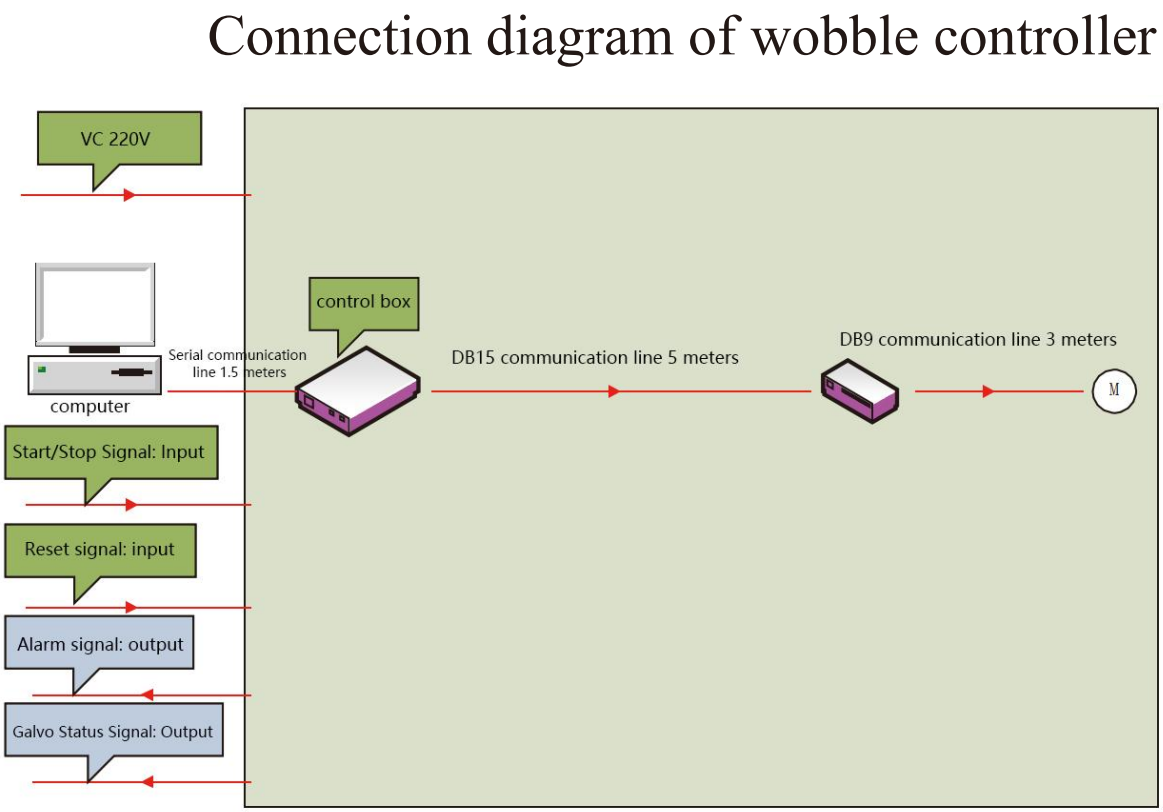


1.Hardware overview

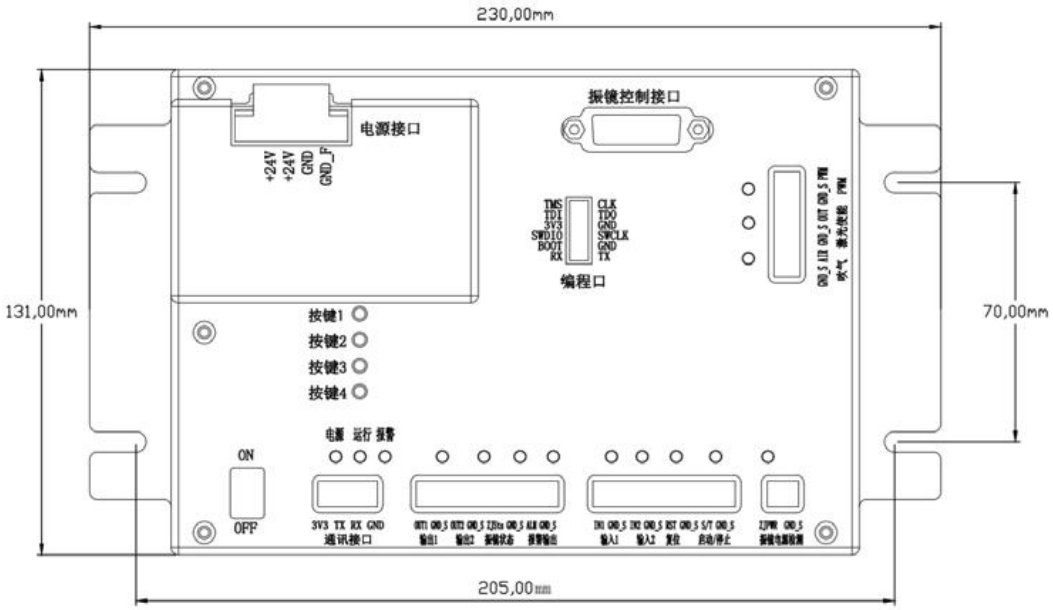
1.1 part list

Wobble controller(WSX-SGLZJ-XT01)				
No.	Item	qty	Signal definition	Specifications
1	Wobble controller	1		
2	Wobble controller cable	1	24V/GND/GND-S	0.75 square wire, pure copper. One end is equipped with UT1-4U type crimping terminal, the other end is equipped with 5.08mm plug-in terminal, the signal wire end sleeve is marked with sleeve
3	The 8-pin control signal cable	1	1.Start / Stop 2.Reset 3.GND 4.Alarm 5.control state 6.GND 7.Galvo state 8.GND	TRVVP high-flexibility shielded drag chain cable 8-core 0.3 square flexible wire, one end with screwless spring-type PCB terminal block KF2EDGKD(M)-2P 3.81MM, signal cable end head cover sleeve marking sleeve
4	USB to TTL level serial cable	1	1.TX 2.RX 3.GND	USB to TTL level 3.3V, length: 2.0 meters

1.2 connection



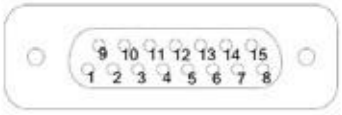
1.3 Structure and size



1.4 port definition

Galvo interface (1 circuit in total)

15pin definition as follows：



CLK+	1	9	CLK-
Sync+	2	10	Sync-
X-CH-	3	11	X-CH+
Y-CH+	4	12	Y-CH-
ZJ_Power	5	13	GND_S
ZJ-INA	6	14	GND_S
ZJ-INB	7	15	GND_S
ZJ_Power_GND	8		

clk+/-:Clock of the galvo signal

Sync+/-:Synchronization of the galvo signal

X-CH+/-:Galvo signal: X-axis data signal

Y-CH+/-:Galvo signal: Y-axis data signal

ZJ_Power：Power detection input pin of the galvo drive

ZJ-INX：Galvo X-axis motor working status detection input pin

ZJ-INY：Galvo Y-axis motor working status detection input pin

ZJ_Power_GND：Galvo drive power GND

Power interface

1	2	3	4
GND-FG	GND_24V	24V	24V

Indicator

Indicator	function
power	This light is always on when the 24V power supply is normal
Running	This light will flash when there is port output, otherwise it is always on when power on.
Alarm	This light will be on when the control card system detects an abnormal stop of the output; abnormal conditions Yes: 1. There is no power supply to the motor driver, 2. The motor is running abnormally.
Output 4	reserved
Output 3	reserved
Galvo output state	Lights up when the galvo vibrates

Alarm status	light will be on when alarm
Input 4	reserved
Input 3	reserved
Reset state	Lights up when reset
Running control state	Lights up when the start vibration signal is valid
Motor drive power	（Reserved function）
PWM	reserved
Enable	reserved
Gas	reserved

Output control port

Alarm output	When there is an alarm, this port outputs a low level. High level is 24V
GND_S	Grounding
Galvo running state output	When the galvo is output, this port outputs a low level. High level is 24V
GND_S	Grounding
Output 1/2	Reserved
GND_S	Grounding

Input control port

Start / Stop	This port is connected to a low level to enable the output of all ports. High level is 24V
GND_S	Grounding
Reset	When this port is connected to low level, the system resets the parameters of all ports to factory settings, the graph is a circle, and the radius is 3mm. High level is 24V.
GND_S	Grounding
Input 1/2	Reserved
GND_S	Grounding

Laser control port

PWM	Reserved
Enable	
Output control	

Serial port

power	reserved
RX	receive
TX	transmit
GND	grounding

Note: Please refer to the software interface for details. User can set the parameters of a single port on the host computer, and can also control the on and off of a single port to switch between different ports.

Button

Speed composite	1: Press the +/- buttons at the same time to control the signal output of the galvanometer port on or off. 2: Press and hold button 1 first, then press button +/- to increase/decrease the port's swing speed, and each time you press the button, increase/decrease by one unit; 3: Press and hold button 2 first , and then press the button +/- to increase/decrease the size of the graphics output by the port. Each time you press the button 1, it increases/decreases by one unit;
Output graphics switching	
“+”	
“-”	

2、Quick guide

2.1 Features

1. Convenient operation, improve work efficiency and avoid misoperation;
2. Simple installation interface, the control box can be directly installed on the guide rail, and all use pluggable wiring ports, which is convenient for wiring;
3. Work offline, user just imports data, which effectively improves the convenience;

2.2 Install the software

2.2.1 Serial port drive installation mode

Select the "Computer" icon on the desktop of the computer you are using, right-click, select "Properties" in the pop-up menu, click Properties, the pop-up menu will appear in the red box as shown in the figure below. Select the corresponding installation package to install, as shown in the figure below, the computer is win7 64-bit system:

2.Turn off the anti-virus software;

3.Change the directory to: ..\galvo controller software V21_serial port driver\galvanometer host computer serial port driver

4.Decompress .NET_Framework4.5.zip, enter the decompression directory, double-click . NET_Framework4.5, enter the installation, until the installation is complete.

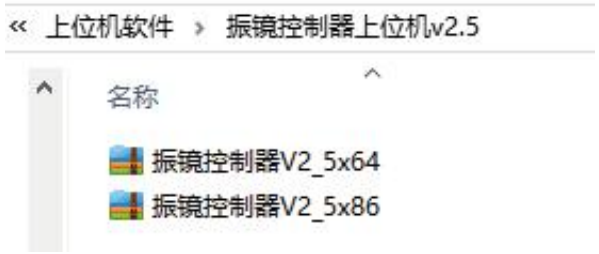
Change the directory to: ..\V21_serial port driver of the host computer of the galvanometer controller\serial port driver of the galvanometer host computer\PL2303HX Select windows7_vista_32_64), enter the corresponding directory, double-click to execute the program, and enter the installation until the installation is completed. :

5.Connect a serial cable between the computer USB port and the control board, and the control board is connected as follows:

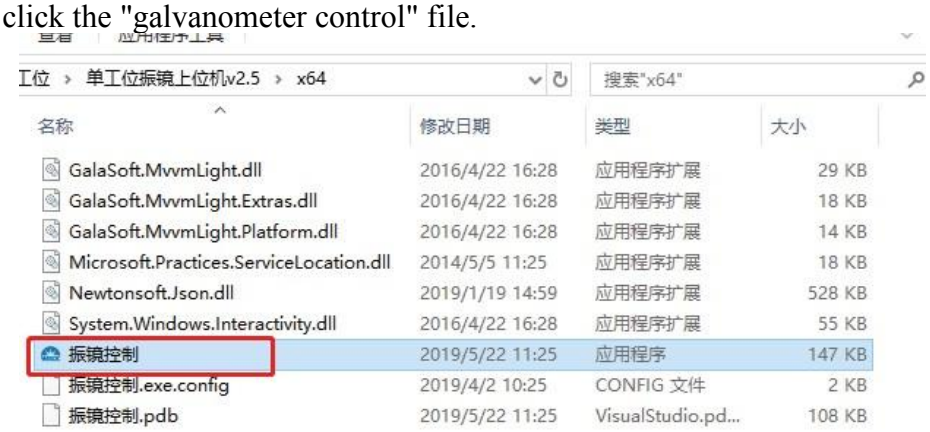
6.The directory is switched to: ..\V21_serial port driver for the host computer software of the galvanometer controller, according to the computer system confirmed in step 1, select the corresponding host computer software (as shown in the figure below):

A. Galvo controller V2_x64 can be used in 64-bit computer system;

B. Galvo controller V2_x86 can be used for 32-bit computer system;



Unzip the corresponding compressed package, switch the directory to the pressurized folder, and double-click the "galvanometer control" file.



7. After executing the host computer software, there will be the following interface. If the connection is successful, there will be a specific com number in the box behind the serial port number, such as com1, com2 and so on. If the connection is unsuccessful, there will be no specific com number displayed here.

2.3

2.3.1 UI

Click the advanced parameters, enter the login interface, and enter the advanced parameter setting interface after login

Note: Advanced parameter password: 27702280, parameter range setting password: 27702280

2.3.2 Operation overview

serial number：	Display serial number	Connect the device	Link with the control card through a host computer
Output port	Displays the currently used output ports		
Shape	Select the shape of the wobble figure	Galvo on	Turn on the galvo
Direction	Select the direction of the wobble figure		
Angle of rotation	Select the angle	Read the parameters	Read the parameters for the current device
Motion speed	Set the galvo wobble speed		
X-axis compression ratio	Adjust the compression ratio of the X-axis	Set up parameters	Import the set parameters to the current device
Y-axis compression ratio	Adjust the compression ratio of the Y-axis		
Trapezoid correction ratio	Adjust the trapezoid correction ratio	Import parameters	Import the file parameters into the software
Rhomboid correction ratio	Adjust the rhomboid correction ratio		
Length	Set the length of the wobble figure	Export parameters	Export the software-set files to a folder
Width	Set the width of the wobble figure		
Advanced parameters	Set the advanced parameters for the system	Parameter range settings	Set the maximum speed and swing range

3、Appendix

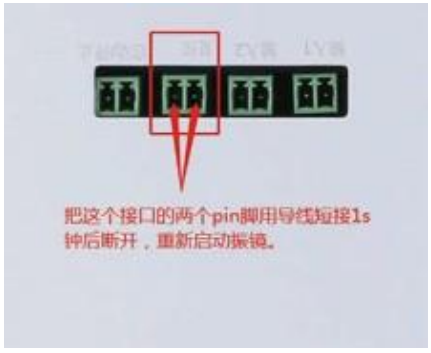
3.1 Troubleshoot

If a certain output port has no graphic output

Solution:

A，Connect the serial port tool, open the host computer software, switch the output port to the problematic port, and confirm that the motion speed and the diameter of the corresponding graphics cannot be zero.

B. Short-circuit the two pins of the reset port with wires for 1 second, then disconnect, and restart the galvanometer output to confirm.



After the above two countermeasures have been tried, if the problem is not solved, then please confirm whether it is a hardware problem.

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