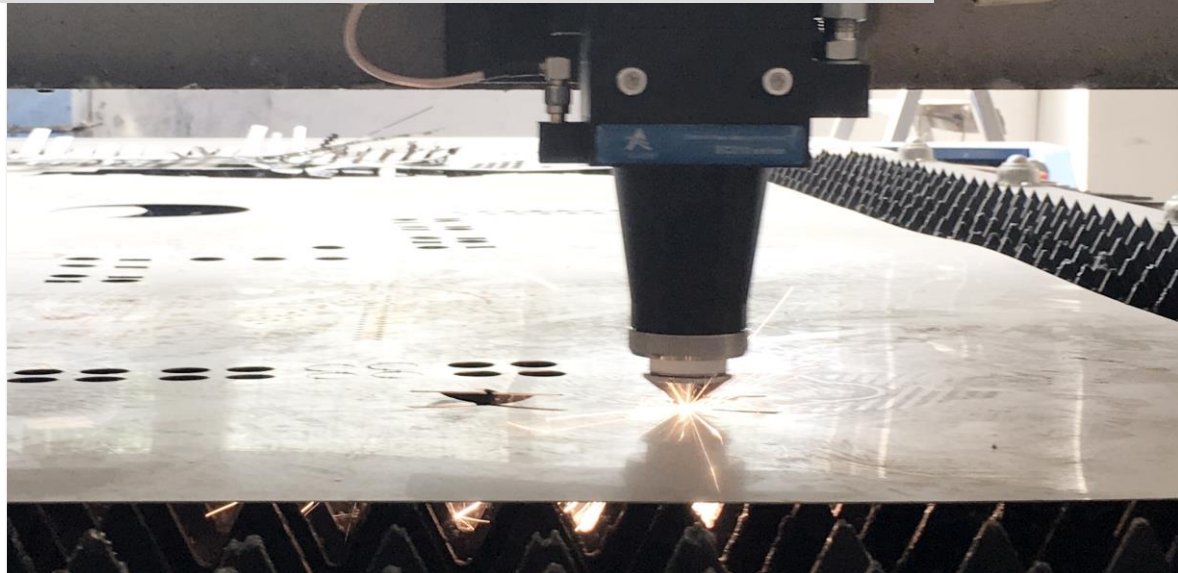




# EC210 Fiber Laser Cutting Head Series User' s Manual



Version: V1.0

A-CUTTER

[www.a-cutter.com](http://www.a-cutter.com)

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# Introduction

## Overview

This document mainly describes the appearance, application scenarios, installation, debugging, operation, maintenance, etc of EC210 fiber laser process head.






## Reader Objects

This document mainly is applicable to the following personnel:

- Installation engineers
- Maintenance engineers
- Operators

## Symbol Descriptions

As for the symbols in the document, their meanings are as follows:

Symbol	Descriptions
 <b>Forbidding</b>	It indicates there is high potential hazard. If it cannot be avoided, the equipment is seriously demanded, even personnel gets hurt.
 <b>Warning</b>	It indicates there is medium or low potential hazard. If it cannot be avoided, personnel may get hurt slightly or moderately.
 <b>Care</b>	It indicates potential hazard. If the texts are ignored, the equipment may demanded; data may lose; the performance of equipment may reduce; or other unpredictable results.
 <b>Tips</b>	It indicates that it can help you solve a certain problems or save your time.
 <b>Illustration</b>	It indicates that it is the overhead information of the text and it is the emphasis and supplement of the text.

## Modification Records

Modification records accumulate the descriptions of the updating of the document. The latest version includes the updating contents of previous versions.



### Version V1.0 of Document (March, 2017)

The second version.

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# 1 Overview

## 1.1 Product Overview

EC210 is a multi-functional fiber laser cutting head series designed by A-Cutter of Germany. Fiber interface is available with QBH connector. Support up to 2000W application.

Figure 1-1 Product Appearance



## 1.2 Product Features

- Support QBH fiber interface
- Focus adjustment designed with heat-resistance and unaffected from plasma Focus module design with high-precision
- Electric centering control module design with precision up to 0.1mm
- Protection lens box can be quickly disassembled
- Optimized smooth gas circuit design; multiple kinds of auxiliary gases; the maximum atmosphere pressure can reach 2.5 MPa
- Support 2 kinds of focal length: 125mm and 150mm

## 1.3 Cutting head parameters

Since different cutting heads have different focal lengths and optical chucks, the following parameters are described with chuck QBH and focal lengths 125mm as an object. For other configuration parameters, please connect the technical engineers of Aut3tech.

Maximum power	2000W
Focal length	125mm, 150mm
Collimation focal length	100mm
Diameter of focus lens	Focus lens: 30mm; Collimator lens: 30mm
Nozzle aperture	1mm, 1.5mm, 2mm, 2.5mm
Length of cutting head	336.5mm@FL=125mm and 150mm
Weight	4.3KG@FL=125mm
Maximum atmosphere pressure of auxiliary gas	2.5 MPa
Maximum outer diameter	77mm x 123mm
Available focusing ranges	-9mm to +9mm
Type of optical fiber splice	QBH

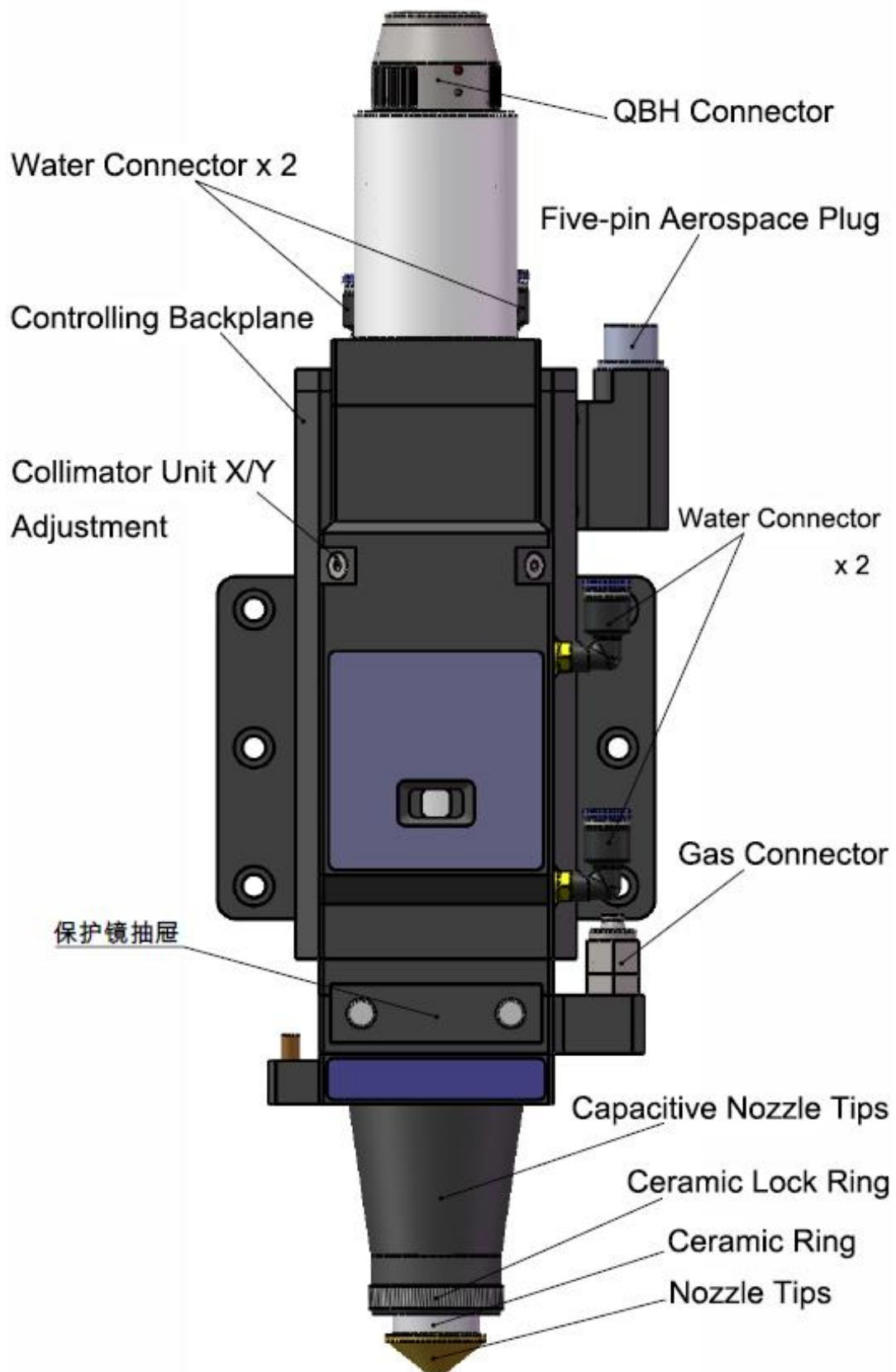
## 2 Structure Specifications

### 2.1 EC210 fiber laser cutting head series brief

EC210 is a multi-functional fiber laser cutting head series. The appearance and functions will be specifically introduced in this part.



### 2.1.1 EC210 QBH cutting head

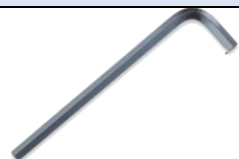



# 3 Installations

## 3.1 Pre-installation preparation

Before installing EC210 cutting head, please ensure fiber-optic chuck is sealed and during installation, never remove sealing.

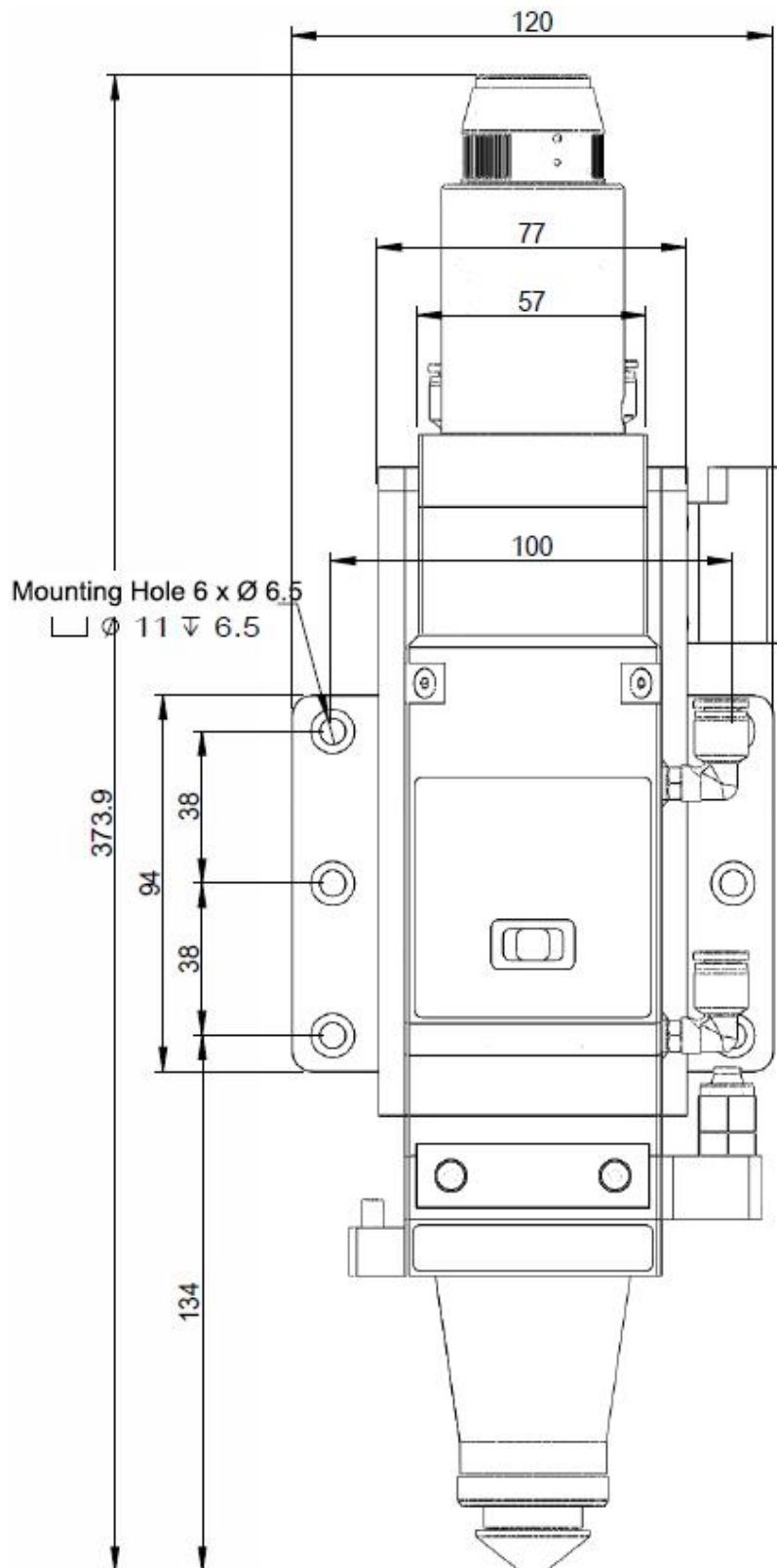
**Table 3-1 List of Tool Preparation**

Name of Tool	Picture	Main Functions
No.6 socket head wrench		Backboard of cutting head connects slipway
Lens only		Disassembly of focus lens and collimator lends
No.6 socket head wrench		Centering control of focus lens

## 3.2 Installation Dimension of Cutting Head

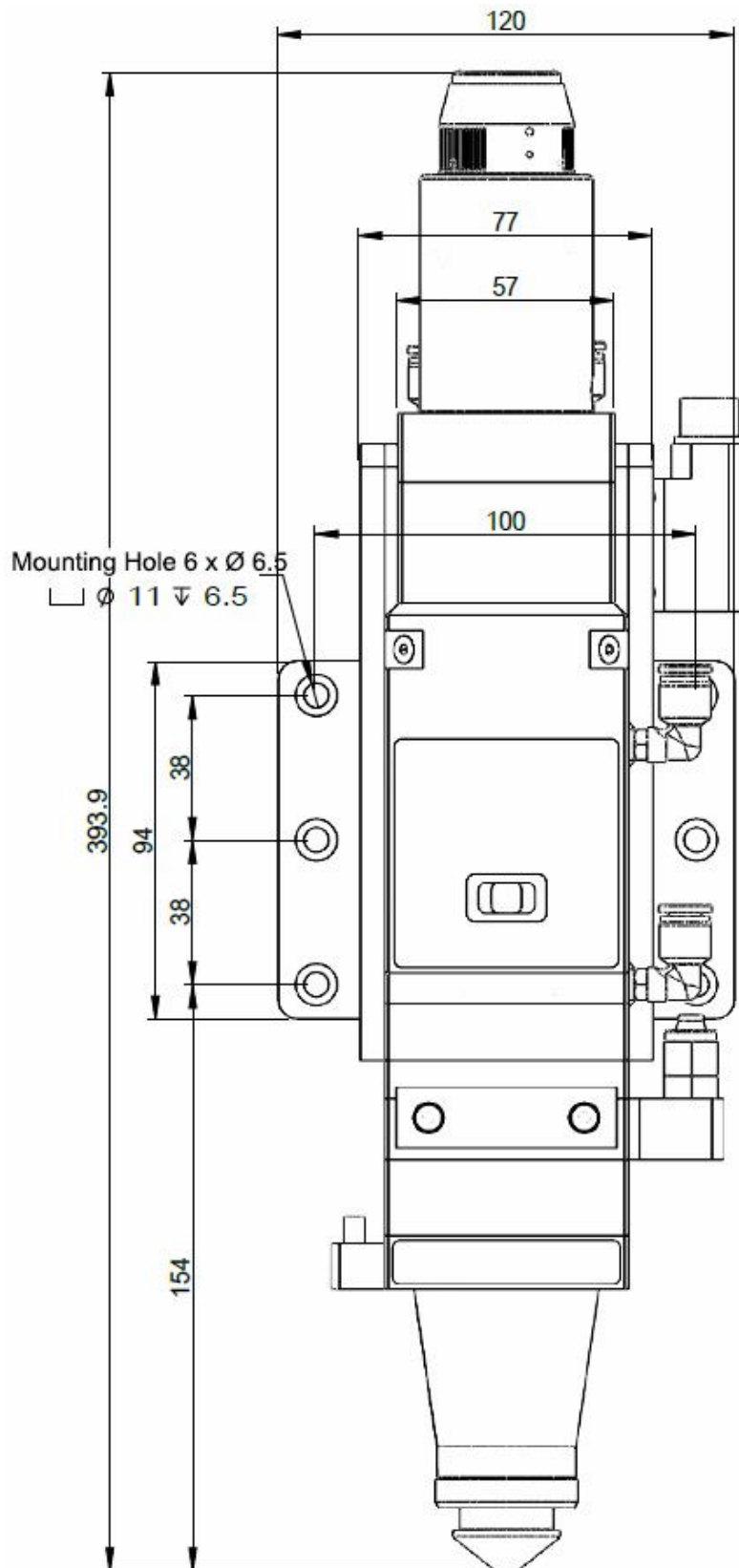
Cutting head and machine tool are fixed by dead plates. On the backboard, there are six M6 fixing holes. Just as shown in the figure, when installing, tight up the corresponding position of screw and Z-axis link block of machine tool; at the same time, installation position can be adjusted according to customer requirements.

### 3.2.1 EC210-QBH100-F125



(Contact us for more details)

### 3.2.2 EC210-QBH100-F150



(Contact us for more details)

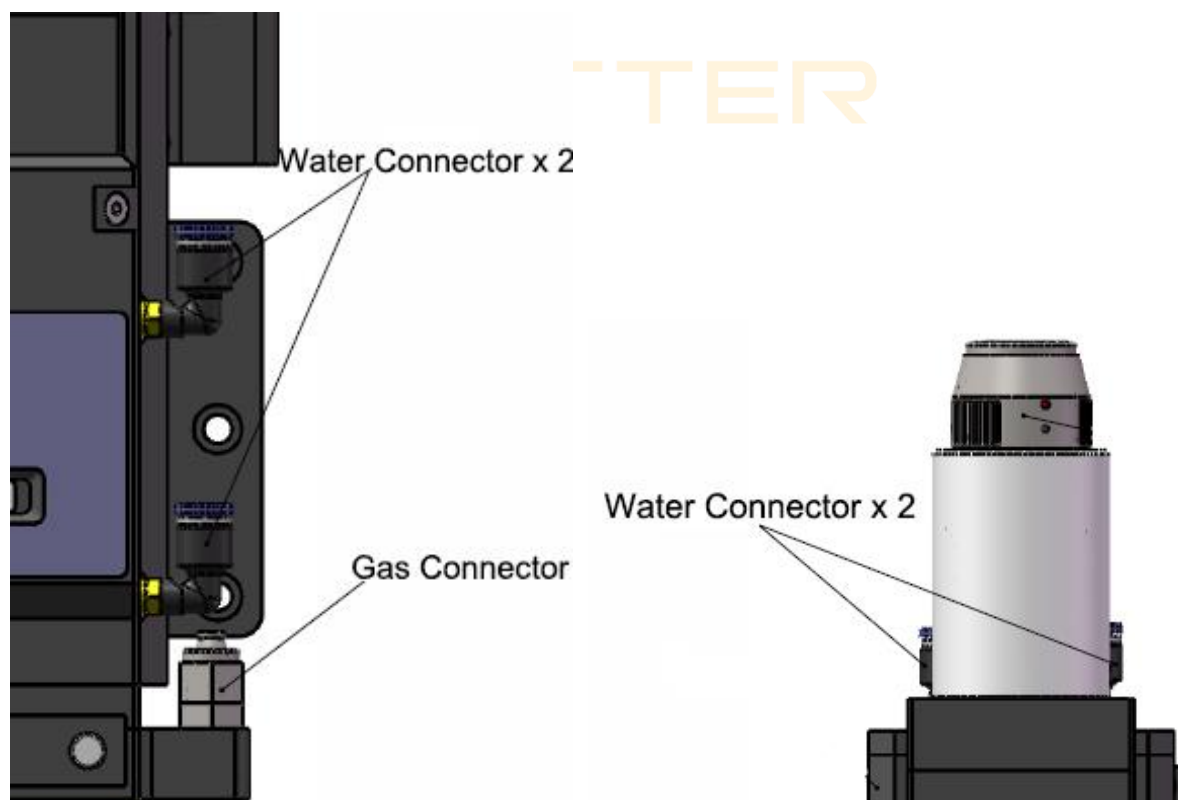
### 3.3 Tube connection of EC210 cutting head

EC210 fiber laser cutting head series is designed with water cooling surrounding optical lens, which can effectively lower the risk from over-heating and lens distortion because of long term working at the same time.

Double water cooling units can protect both focus lens and collimate lens, and the provided fast-twist nozzle unit in diameter 10mm can allow gas pressure 2.5MPa.

Detail information of water cooling environment for EC210 cutting head:

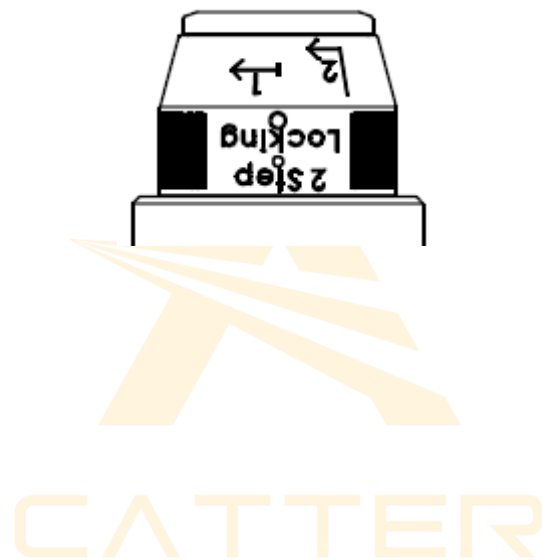
Running speed in minimum	1.5L/Min
Running speed in advice	2.0 L/Min
Water pressure of running speed in advice	1.8 bar
Temperature in advice	15° ~35° ( above the environment's dewing temperature)
Type of running liquid	Pure water
Type of interface	Quickfits water interface in diameter 6mm



### 3.4 QBH Connection

Operation sequence:

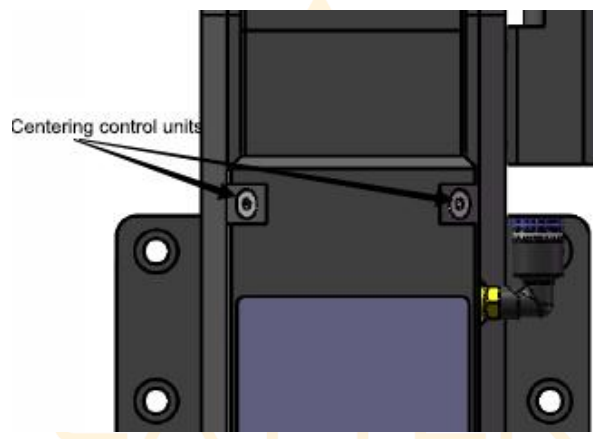
1. Take down the plastic protective cap at the top of link block.
2. Align the small hole on the QBH to the small hole on the link block, red dot to red dot, insert QBH until the end.
3. Tighten up the set screw nut clockwise, just as shown in the figure.
4. Lift up the set screw nut and tighten up it clockwise again.



# 4 Focus Adjustments

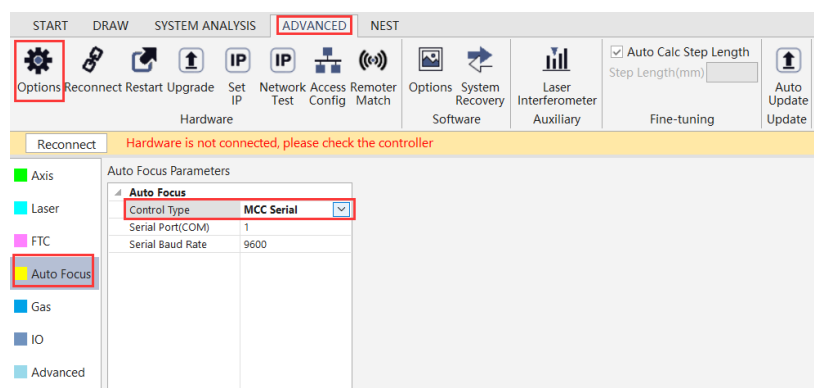
## 4.1 Focus centering

The centering control of all EC210 fiber laser cutting head series are finished by the two adjusting screws just as shown in the following figure. When centering, No.3 socket head wrench is used. Clockwise adjustment makes focus move to the direction of backboard and counterclockwise adjustment makes focus move to the opposite direction. There are a total of two adjusting screws. The first calibration is made before delivery, and when using, only a slight readjustment is needed.

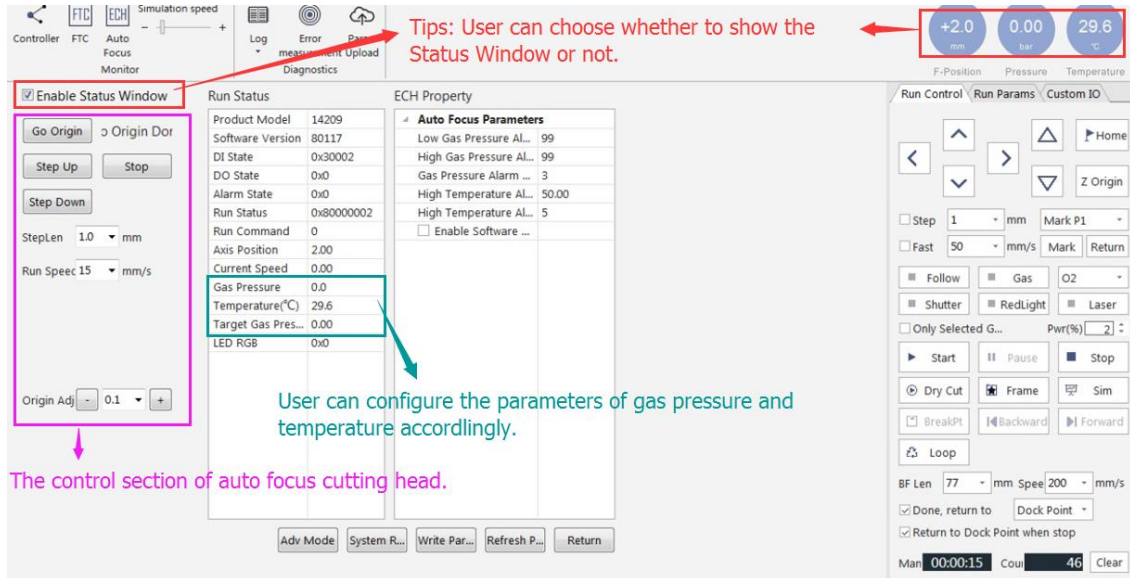


## 4.2 Z position adjustment

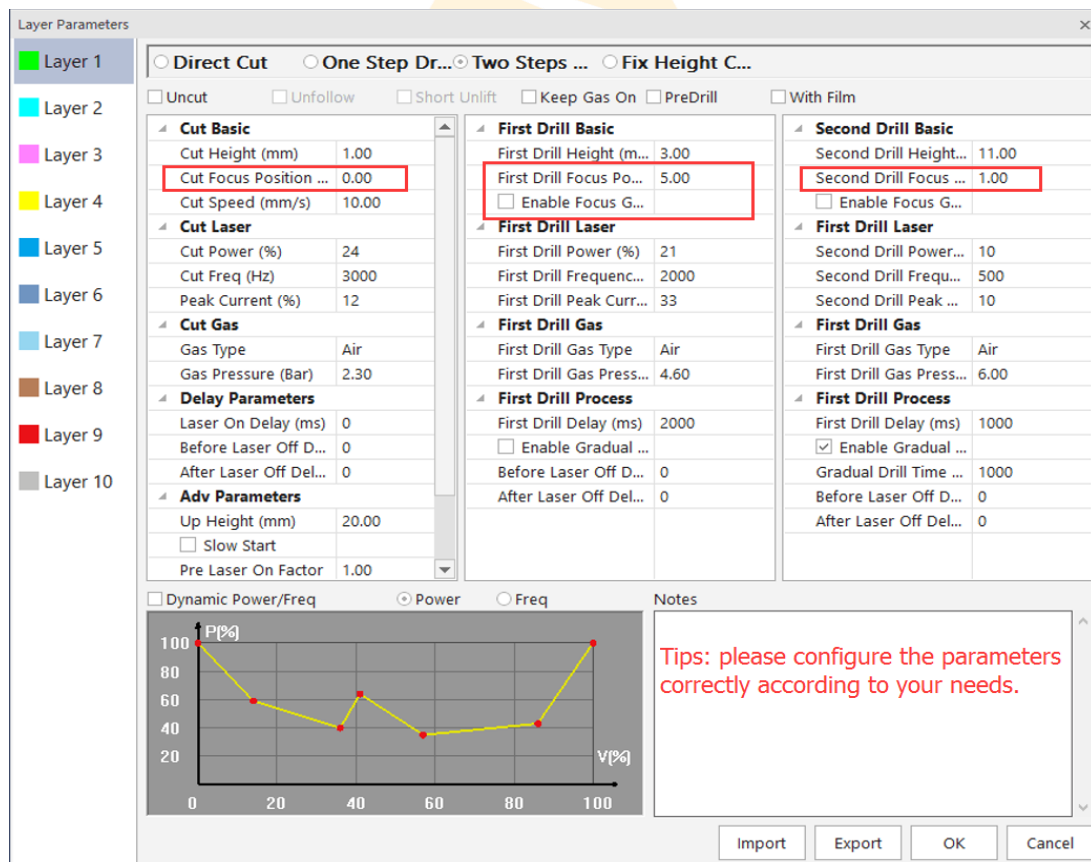
1. Please open the CNC system software-SC1000, choose from **“ADVANCED”-“Options”**, and **“Enter the password”**: **“0000”**, click **“Auto Focus”**-and choose the **“Control Type”** as **“MCC Serial”**.



- Please configure the parameters accordingly. Generally the parameters have all been settled and there's no need to reconfigure it, here's the detail steps just in case.
- Make sure the auto focus cutting head has been correctly connected with the motion control card, then choose **"SYSTEM ANALYSIS"- "Auto Focus Monitor"**, you'll see the operation interface shows as below:



- After all the movements of auto focus cutting head like "Go Origin", "Step Up", "Stop", "Step Down" can be done correctly, please configure the parameters of cutting process accordingly.
- Click "Layer", you'll see the interface shows as below:

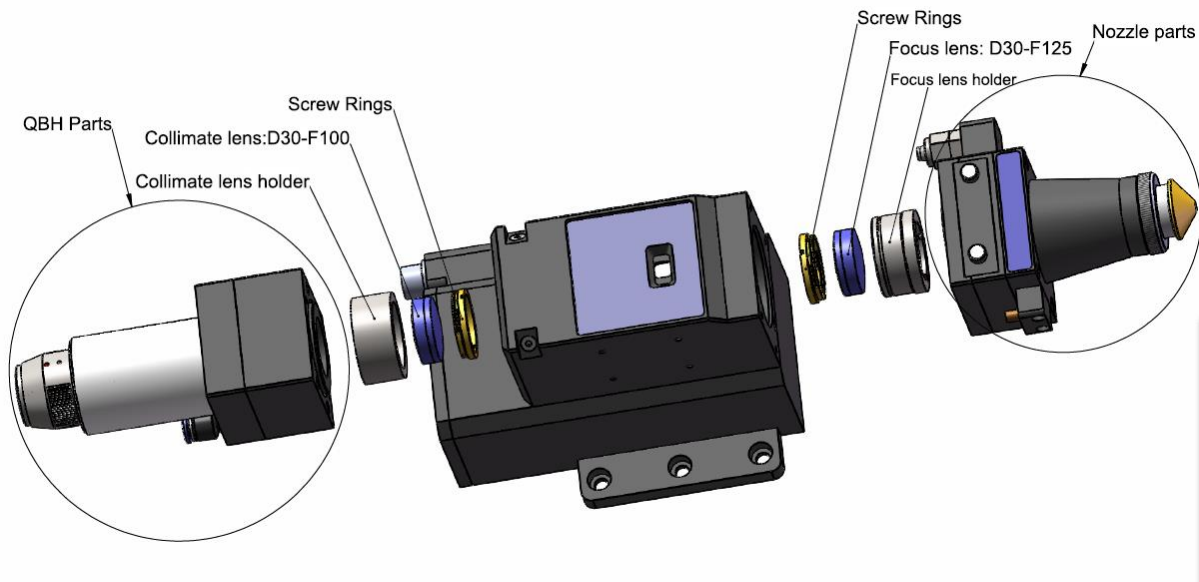


PS: the parameters of focus position for each stage can be configured separately.

# 5 Operation & Maintenance

## 5.1 Maintenance of Protective windows

Protective window is at the bottom of focusing module. When lens sticks to impurities or foreign matters, they cause damage to lens. Therefore, regular maintenance of window is needed. It is suggested to clean it once a week. As for the structure of windows, please refer the figure below.



Protective windows are vulnerable parts and in case of damage, we need to replace it. During maintenance/replacement, be sure to wear dust-proof gloves or finger stall so as to avoid the oil stain and dust on hand from polluting lens.

### 5.1.1 Taking out of windows

Wear dust-proof gloves or finger stall; counterclockwise loosen the two set screws at the red protective lens drawer; draw out protective lens slowly and steadily; move it to clean and tidy indoor.

### 5.1.2 Disassembly of windows

1. Put the side with seal ring adown and hold lens base with left hand.
2. Gently squeeze the edge of the windows with right thumb from the top down (Note: be sure to squeeze the edge, since squeezing the center cannot make the windows fall off), place the index finger of right hand on the opposite direction of thumb so as to protect the lens from slipping.
3. Keep on pressing down gently with thumb until seal ring and the lens fall off.

### 5.1.3 Clean Lens

- A. Tools: dust-proof gloves/finger stall, continuous fiber absorbent cotton swab, isopropanol and rubber air-blower.
- B. Cleaning methods:
1. Wear finger stall on thumb and index finger of left hand.
  2. Spray isopropanol onto fiber degreasing cotton swab.
  3. Gently hold the edge of the side face of protective lens with thumb and index finger of left hand.

Notes: finger stall cannot touch the surface of lens to avoid leaving a mark.

4. Make the lenses directly face eyes, hold fiber absorbent cotton well with right hand, from left to right or from down to up, gently clean the lens with the single direction (Never rub backwards and forwards so as to avoid secondary pollution to lens), and blow the lens surface with rubber air-blower. Both sides should be cleaned. After cleaning, it should be ensured that there is no any following residue: detergents, absorbent cotton, foreign bodies and impurities.

Notes: after cleaning, the lens can't be exposed in the air, it should be installed as soon as possible according to the method shown in 5.1.4 or temporarily kept in dry clean sealed container.

### **5.1.4 Front and back side are irrespective for the installation of protective lens since both sides are plane.**

1. Place protective lens base, lens, seal ring from bottom to top in turn, and compact them just as shown in figure.
2. Refill into the bottom of lens module, and clockwise tighten the set screw by hand

## **5.2 Collimator and focus lens maintain**

EC210 fiber laser process head has excellent leak tightness, so regular inspection of its population is unnecessary. But if the machine tool is frequently moved, the cleanness of the lens should be inspected in the dust-free room before pulling in or pulling out fiber and re-installation.

### **5.2.1 Take out of lens holder**

First unload the four M4 socket head screws shown in above figure with No.1.5 socket head wrench, wear dust-proof gloves/finger stall, loosen the XY adjusting screw and take out lens holder and replace it.

### **5.2.2 Assemble the lens holder**

After finishing cleaning the lens by the steps of cleaning protective lens, wear dust-proof gloves/finger stall, back-step by the steps of taking out lens and install the focusing lens well. Be sure the plane of the lens adown during installation.

## 6 Technical Indexes

Table6-1 Technical Indexes

Parameter Class	Name	Descriptions
Environmental conditions	Operating temperature	Cutting head: -10℃~+55℃
	Storage temperature	-20℃~+70℃(non-condensation)
	Relative humidity	5%RH~95%RH, Without condensation
	Atmosphere pressure	70kPa~106kPa
	Others	Without conductive dust and corrosive gas, as well as explosion hazard
Reliability index	MTBF	≥10,000 hours
	Annual repair rate	<1%
	Water-proof & dust-proof	IP20(Users maintain operative surface normally)

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