BF03S Wobble welding held User Manual

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Preface

Dear Users:

Thank you for purchasing our products!

This manual on the sharp figure BF03S swing laser welding head installation debugging made a detailed description, in order to facilitate you to quickly start using this product; If you need to know anything else, you can consult our company directly.

Due to the continuous updating of product functions, the products you receive may differ from the statements in this manual in some aspects. I would like to apologize here!

If you find any errors in this document, please inform us as soon as possible.

The data contained in this manual are intended to describe the product only and should not be considered a declaration of a security interest.

For the benefit of our customers, we are constantly trying to ensure that our products are up to date with the latest technology.

The information provided in this manual includes:

- Product structure characteristics and technical characteristics
- Functional characteristics and maintenance of products
- Electrical connection
- Software instructions for use

This manual is suitable for the following users:

- Installation or wiring personnel
- Commissioning and dispatching personnel
- Maintenance or inspection personnel

Directory

1 Overview

This manual covers BF03S and the corresponding controls for general description.

In the field of laser welding, swing laser welding has fast welding speed, good surface forming, white weld, small radiation, sanitation and environmental protection, and is applied to the welding field of metal materials such as thin stainless steel, iron plate, galvanized sheet, copper plate and aluminum alloy plate;

In recent years, swing laser welding heads are widely used in power batteries, automotive machines, hardware and electrical appliances and other industries.

1.1 Product introduction

1.1.1 Product introduction

Compared with traditional (laser) welding method, using oscillating laser welding head can improve the stability, repeatability and weld forming of welding process. The swinging head widens the weld seam in a controllable way, and even if there is a certain gap between welded workpieces, the swinging head can still realize high-quality welding. At the same time, thanks to its flexibility (adjustable swing mode, amplitude and frequency), it is easier to optimize welding parameters for dissimilar materials and welding workpiece shapes.

The overall structure of the swing laser welding head is shown in Figure 1.1:

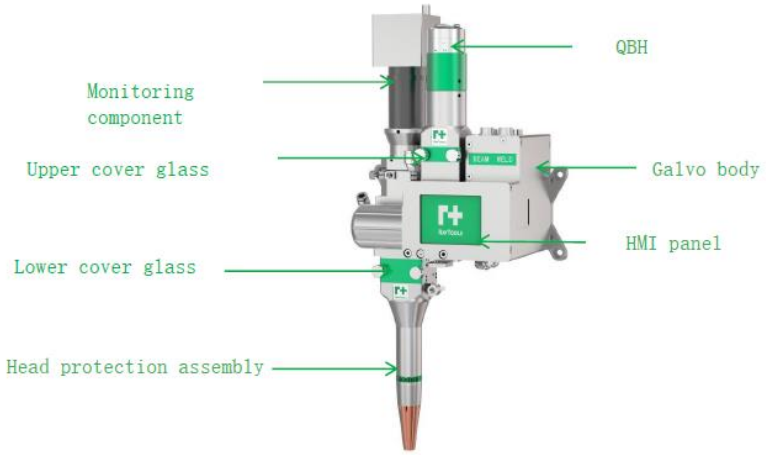


Figure 1.1

1.1.2 Product advantage

Lightweight design, the overall weight of 3KG, greatly reduce the load of the manipulator, motor and drive control integration design, simple wiring

- 8 Swing modes, with its own display screen, easy to operate, and can run automatically offline at the same time
- Built-in motor driver avoids interference caused by external drive and too long signal line between drive and motor, and runs more stably
- Through IO control start-stop and program selection, the control is simple and easy to integrate
- Mechanical fully enclosed design of built-in CCD camera
- Fully enclosed dustproof design to avoid dust pollution on optical parts
- Full body water cooling design, simple water connection

1.2 Product performance

1.1.3 Product parameters

The relevant parameters of BF03S oscillating laser welding head products are shown in Table 1.1:

Model	BF03S
Maximum laser power (W)	3000
Collimation focal length (mm)	100/125
Focal length (mm)	200/250/300
Scanning range	X: 0 ~ 5mm; Y: 0 ~ 5mm
Maximum frequency (Hz)	500
Optical aperture (mm)	20
Interface form	QBH

Table 1.1

1.1.4 Swing mode

■Supports eight wobble modes, as shown in Figure 1.2:

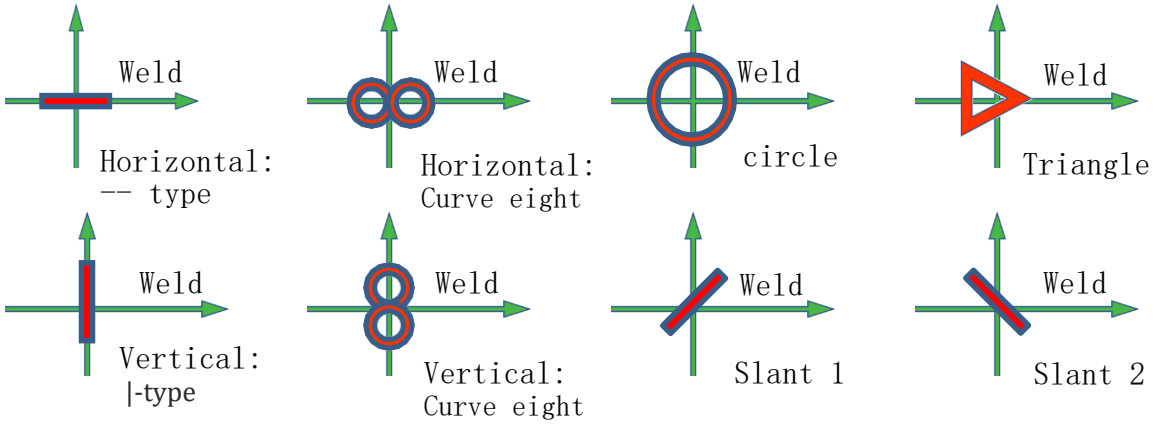


Figure 1.2

■In addition to the swing mode, the swing frequency and swing amplitude can be adjusted to optimize the welding process. Note: The highest frequency is related to the swing amplitude and inversely proportional.

2 Installation description

2.1 Mechanical assembly

2.1.1 Full head installation instructions

The fixing mode of the whole head of swing laser welding head is shown in Figure 2.1 below:

When the reference ratio is 100: 200, the distance between the working plane and the laser head increases by 50mm for every 50mm increase in the focusing distance

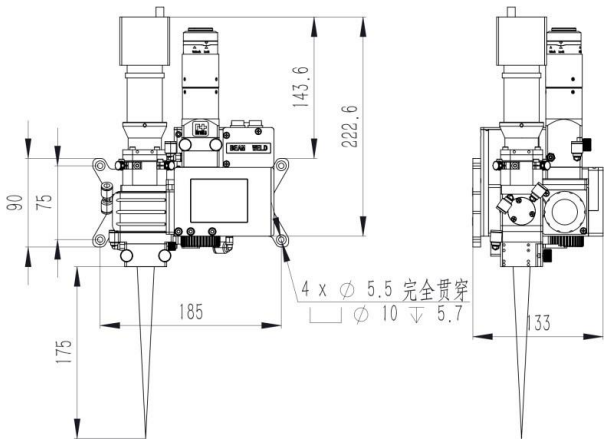


Figure 2.1

2.1.2 Description of optical fiber connection

Oscillating laser welding head adopts full body dustproof design, and QBH connector and optical fiber connection shall be operated according to the following requirements. Remove the optical fiber dust cover and check whether the protective cap protecting the optical fiber crystal head is locked. Check whether the optical fiber crystal head has dirt such as dust, and clean the optical fiber head with dust-free cotton swabs and absolute ethanol, as shown in Figure 2.2.

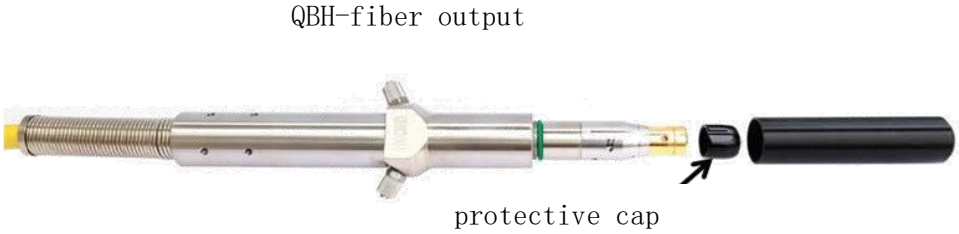
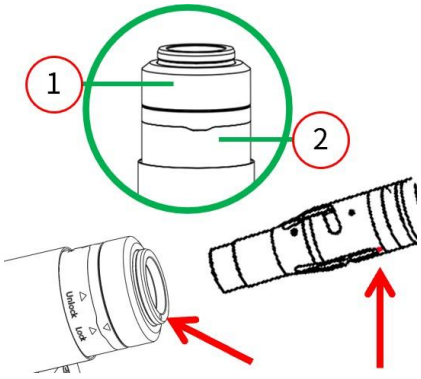


Figure 2.2

Connect laser fiber



⚠	Perform all maintenance on the laser head only at a clean station and maintenance work.
	Before connecting the laser fiber every time, it is necessary to remove the all the dust and dirt.
	In order to prevent dust and dirt from accidentally entering the optical fiber socket, when connecting optical fiber, it is recommended to place the laser head horizontally.

- Place the laser head horizontally and loosen the ① QBH steel sleeve counterclockwise;
- Align the "Unlock" part of the locking ring with the arrow;
- Check the end face of the optical fiber to ensure that the end face of the optical fiber is not contaminated;
- Remove the protective cover on the optical fiber socket;
- Align the red mark of the optical fiber output end with the QBH red mark and insert it directly to the bottom;

- Rotating the locking ring to the "Lock" position;
- Rotate and lock ① QBH steel sleeve clockwise until it is locked;
- Slightly twist the optical fiber output end to ensure that the optical fiber output end is reliably connected with the laser head.

ⓘ	If the site environment is dusty, it is recommended at the optical fiber connection Use masking paper for further sealing treatment.

2.2 Waterway and gas way connection

2.2.1 Waterway connection

The swinging laser welding head adopts the whole body water cooling design, and it needs to connect the water channel to dissipate heat inside the swinging head during operation. The internal water cooling related connection has been strictly connected and a protective pipe cover is added. The user can receive water simply, and only needs to connect the water inlet and the water return port to complete the waterway circulation. The connection mode is shown in Figure 2.4:

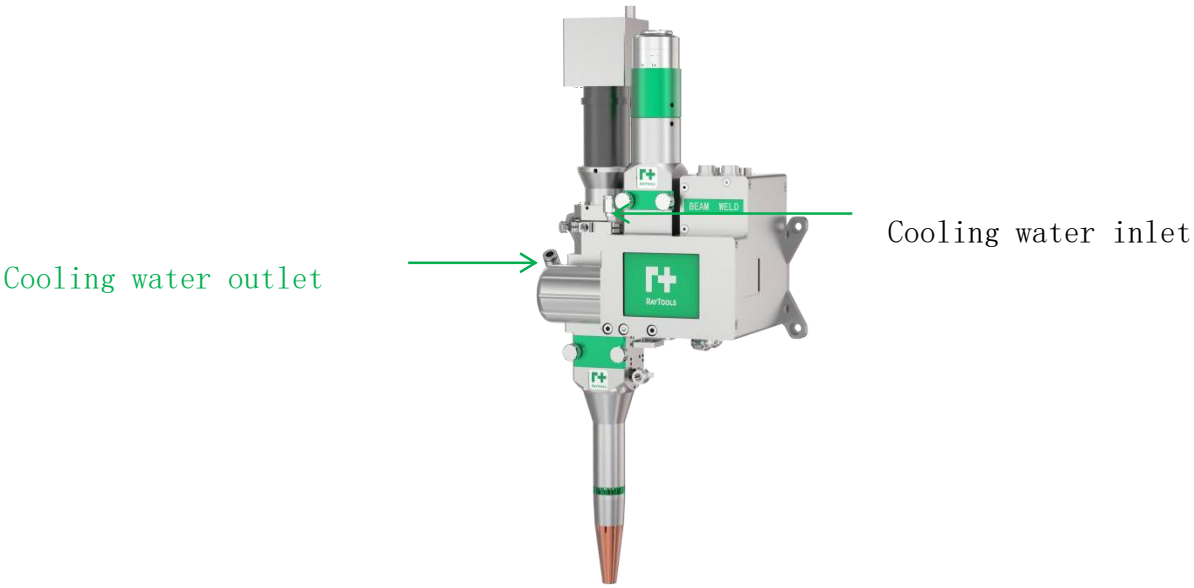


Figure 2.4

2.2.2 Pneumatic connection

If the shielding gas of oscillating laser welding head adopts the air knife mode, it can protect the optical cavity against slag and smoke during the light emitting process, and the air knife needs to be connected with dry and clean compressed air. The interface is shown in Figure 2.5:

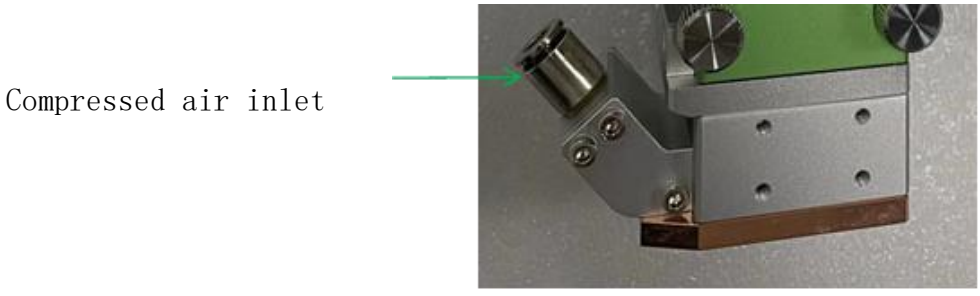


Figure 2.5

If the shielding gas of the swing laser welding head is directly blown, the shielding gas of the direct blowing head needs to be connected with the relevant shielding gas to protect the optical cavity from slag and smoke during the light emitting process. The interface is shown in Figure 2.6:

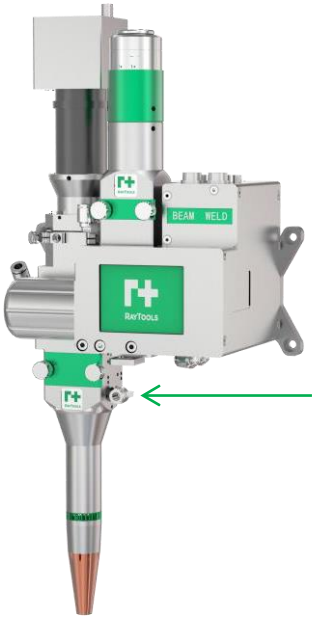


Figure 2.6

2.3 Harness connection

2.3.1 Overall description

As shown in Fig. 2.7, the electrical interfaces of BF03S swing laser welding head are all integrated in the upper panel.

Interfaces include: Upper Computer Interface (IPC), Power Interface (Power), External Control Interface (External Control).

Figure 2.7

2.3.2 Description of power interface and upper computer interface

Power interface: The pin position definition of the 3-core aerial plug-in power cord is shown in Table 2.1. Users need to access a 15V, 3A switching power supply, such as Hengfu HF-100W-D-L positive and negative 15 switching power supply (which can be purchased together with the laser head).

Power cable -3P		
1	+15V	I
2	-15V	I
3	GND	I

Table 2.1

Upper computer interface: If customers have requirements, they can choose the upper computer accessory package or prepare a 4-core aero-plug (male) wire by themselves. The 4-core aero-plug (male) interface is connected with the swing head, and the upper computer and the swing head adopt the same interface, and they can be connected by a straight line. Among them, No.1 foot + 15V does not need to be connected! The pin definition of the 4-core aerial plug is shown in Table 2.2 below:

Pin	Signal	Direction	Remark
1	+15V	output	output+15V from laser head, forming a loop with 4 pin
2	B	Bi-direction	Communication cable B
3	A	Bi-direction	Communication cable A
4	GND	output	＋15V

Table 2.2

2.3.3 External control IO interface description

If customers need external control light, they can use the DB9 external control connection line attached randomly. The pin position definition of DB9 male external control interface is as shown in Table 2.3:

External control interface (DB9 male)			
1	VCC_24V	I	Optocoupler power supply + 24V
2	IN0	I	Start
3	IN1	I	Program 1
4	IN2	I	Program 2
5	IN3	I	Reservation
6	GND24	I	Ground of Optocoupler Power Supply GND24
7	OUT0	O	Ready
8	OUT1	O	Run
9	OUT2	O	Reservation

Table 2.3

2.3.4 Monitor Connection Instructions

1. The complete wiring of the swing laser welding head monitoring system is shown in Figure 2.8:

Figure 2.8

2. The oscillating laser welding head is equipped with the function of monitoring the welding process in real time. The camera wiring situation is shown in Figure 2.9 below:

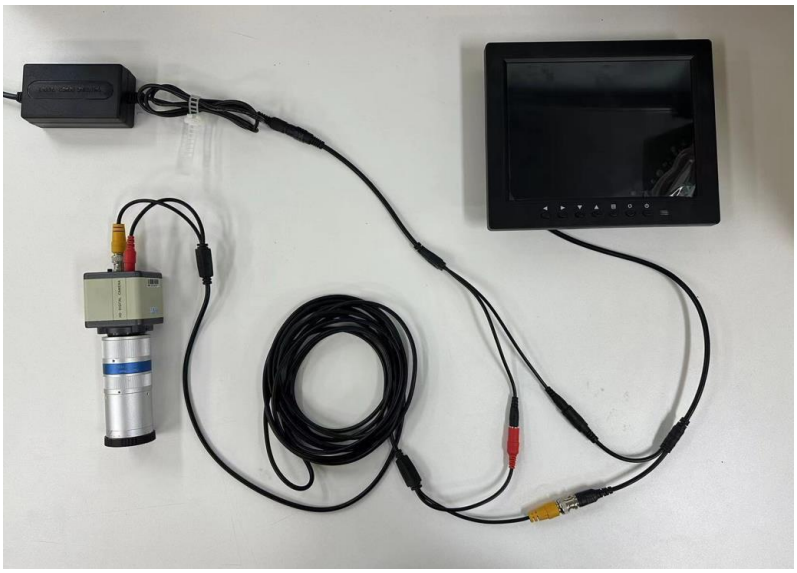


Figure 2.9

2.4 Monitoring adjustment instructions

This oscillating laser welding head provides customers with high-quality optical solutions. CCD and industrial lens configuration are integrated inside the laser head, which can be directly used with external monitors and blue light sources; Mainly for monitoring the specially optimized optical scheme, so that the welding process can be clearly seen. Cameras and industrial lenses have been installed on welded joints and centered before leaving the factory. To provide blue light source, customers need to install and connect (12-24V) by themselves. The blue light source is as shown in the figure

2.10 and Figure 2.11:

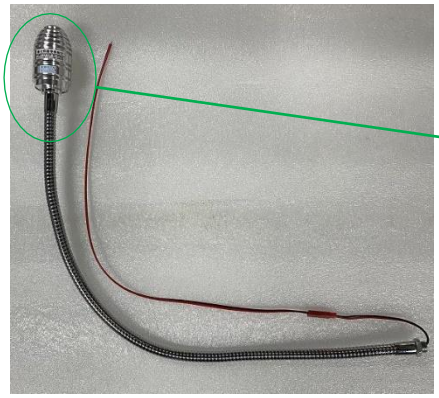


Figure 2.10 Figure 2.11

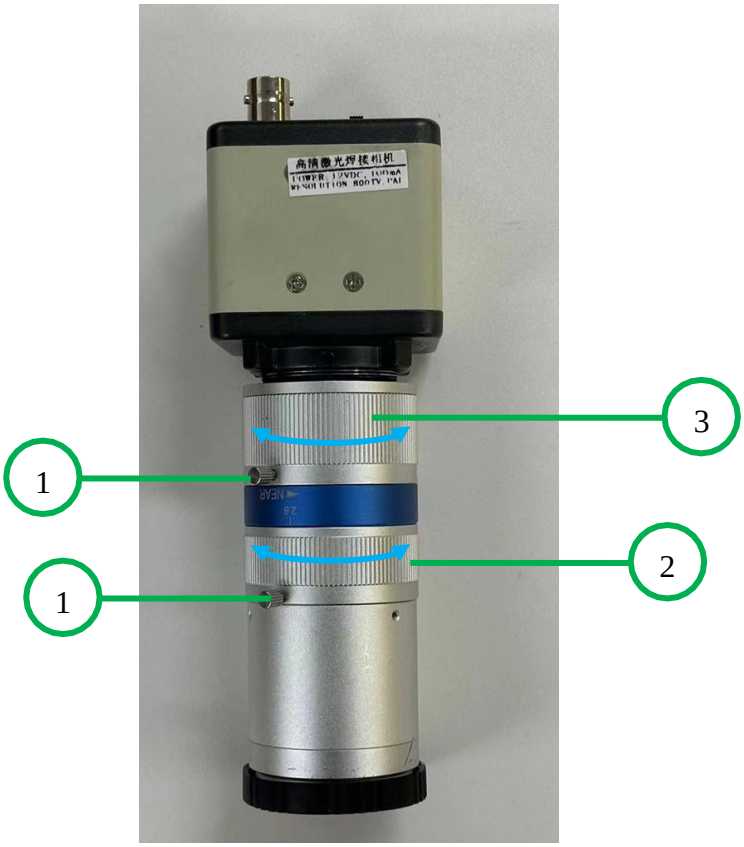
The matching situation and adjustment mode of the monitor are shown in Figure2.12:

Figure2.12

Lens adjustment:

BF03S swing laser welding head uses the design of external monitoring lens. When users use it, they only need to loosen the locking screw according to the actual use situation, and then adjust the focal length of the monitoring module according to the actual process use situation to obtain better visual monitoring effect.

- Adjust the laser head to the working height;
- Loosen the 2 × ① adjusting locking screw;
- Adjust left and right ② Monitor the aperture adjustment sleeve of the lens and adjust it to the appropriate brightness;
- Left and right adjustment ③ Monitor the lens focus adjustment sleeve and adjust it to the appropriate focus;
- Lock the 2 × ① lens locking screw to prevent the focal length and aperture of the lens from shifting due to vibration.



3 Display Operating Instructions

The swinging head developed by our company is controlled by a unified interface, and can be controlled by a touch screen of the swinging head. The swing touch screen can adjust the working state of the swing head, and after adjusting the parameters, it can realize offline work and run stably and reliably. The touch screen can be embedded in the swing head.

3.1 External control display

If the touch screen is in external control mode, the appearance of the swing head touch screen panel is shown in Figure 3.1 below:

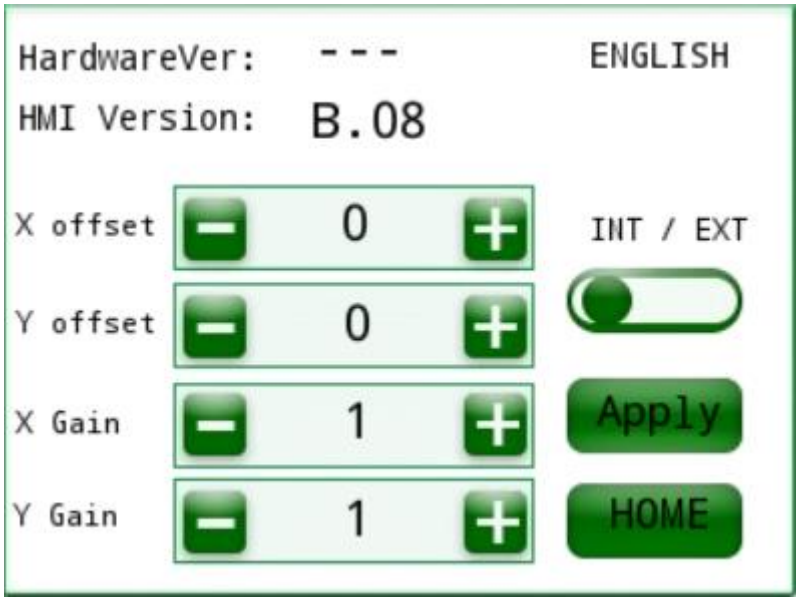


Figure 3.1 Controller Panel

3.2 Main interface

The touch screen of BF03S oscillating laser welding head has three interfaces, which are main interface, system parameter interface and process parameter interface. After the power switch is turned on, the touch screen enters the main interface.

The main interface displays the current parameter number (0 ~ 3), control mode (internal control, external control), and switch buttons (start/stop), "system parameters" button, "process parameters" button. The interface is shown in Figure 3.2:

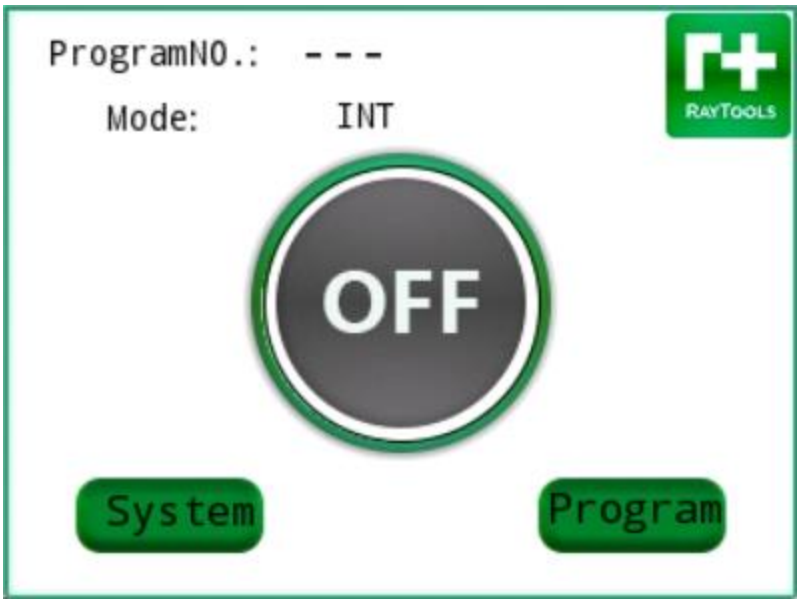


Figure 3.2

3.3 System parameters

The system parameter interface is mainly used to set various system parameters and display the current version number. The interface is shown in Figure 3.3:

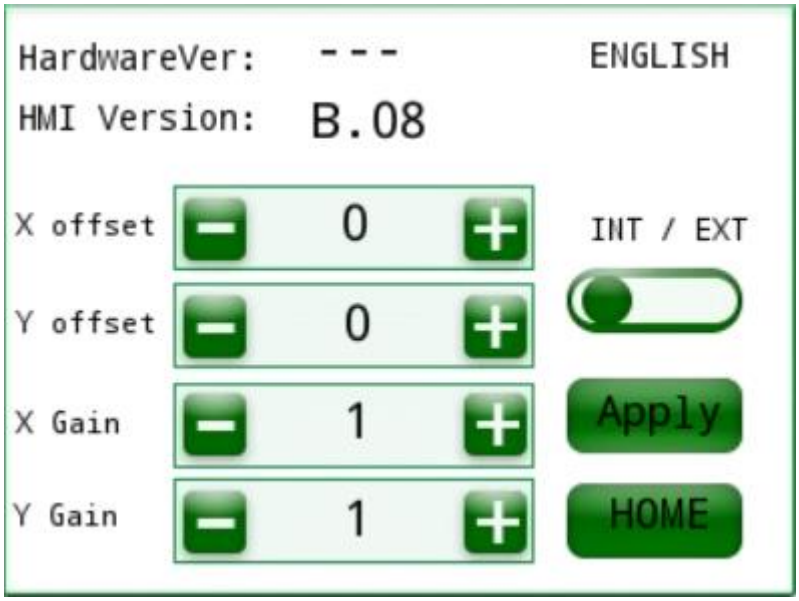


Figure 3.3

The specific meaning and adjustment range of parameters are shown in Table 3.1 below:

Parameter	Meaning	Scope	Default value
Version number of welded joint	Display version number of welded joint	Version control of welding head	-
Touch screen version number	Display touch screen version number	Touch screen program control	-
X-offset	X-offset (Unit: 0.1 mm)	-100 ~ +100	0
Y-offset	Y-offset (Unit: 0.1 mm)	-100 ~ +100	0
X-gain	X gain coefficient	0.2 ~ 1.99	0.63
Y gain	Y gain coefficient	0.2 ~ 1.99	0.63
Control mode	Switch internal and external control	Internal/external control	Internal control
Main interface	Return to the main interface		
Application	Apply the set parameters		

Table 3.1

3.4 Main process parameters

The swing head can save 4 groups of program numbers, which are 0 ~ 3 respectively. The interface is shown in Figure 3.4 below:

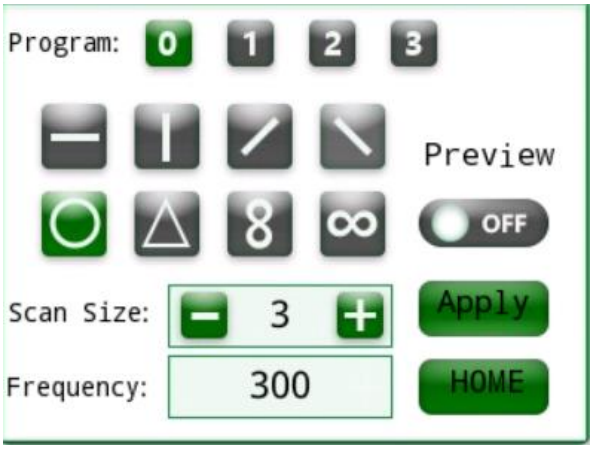


Figure 3.4

Click on the parameter number to select one of the parameters for setting. The four groups of parameters can be set independently, and can be switched on the screen or selected with external IO in actual use.

Swing trajectories are selected by directly clicking on the corresponding graphics. At present, eight swing trajectories are supported, which are 0, 3, 8,

,\,/.

The scanning size can be input by keyboard, and the range is between 0 ~ 5mm.

The wobble frequency can be input by keyboard, and the range is between 1 ~ 500Hz. The actual swing frequency is related to the scanning size, and the highest frequency can reach 500Hz when the size is less than or equal to 1.5 mm; When the diameter is larger than 1.5 mm, the highest frequency can reach 300Hz.

4 Safety instructions and maintenance

4.1 Safety instructions

This product belongs to Class 4 laser control products. Improper use will cause damage to eyes and skin. Please carry out safety protection according to EU EN 60825-1 standard.

1.Do not use it in humid environment. When the electrical part meets water, it may cause electric shock or short circuit. When there are abnormal phenomena such as burnt odor, abnormal sound, abnormal heat and smoke, please turn off the power supply and stop running, otherwise it is easy to cause electric shock, fire and other dangers.

2.After the indicator light is turned on, it is strictly forbidden to expose your eyes to the indicator light, so as not to cause injury.

3.The laser is infrared invisible light. After the laser is turned on, it is strictly forbidden to expose any part of the body to the laser to avoid personal injury.

4.It is recommended to wear laser protective glasses during laser processing. Please select protective glasses according to the wavelength range of shielding. It is strictly forbidden to hold the muzzle at any part

of the human body. After the end of processing, the welded workpiece is still in a high temperature state, so please do not touch the workpiece to prevent high temperature scalding.

5. Please ensure that the PE line of the power cord is reliably grounded to avoid losses.

6.Please do not damage the anti-disassembly label on the controller housing, so as not to lose the warranty right.

4.2 Maintenance and overhaul

Protective lens cleaning or replacement:

7.As shown in Figure 4.1, the protective lenses should be regularly checked for dirt before being used for the first time every day, and if they are dirty, they should be cleaned or replaced; When the power is weakened or the effect is not good during use, check whether the two protective lenses are dirty or damaged, and then clean or replace them.

8.Loosen the protective mirror screw manually, and after the screw is separated from the cavity. Pull out the drawer of protective mirror. Seal the connecting part with drawer with masking paper to prevent dust from entering, then remove the floodplug, and carefully take out the protective mirror to clean or replace it.

9. Re-place the cleaned or replaced protective lens in the protective lens drawer, press in the floodplug, then tear off the tattoo glue, insert the drawer into the cavity, and finally lock the protective lens screws.

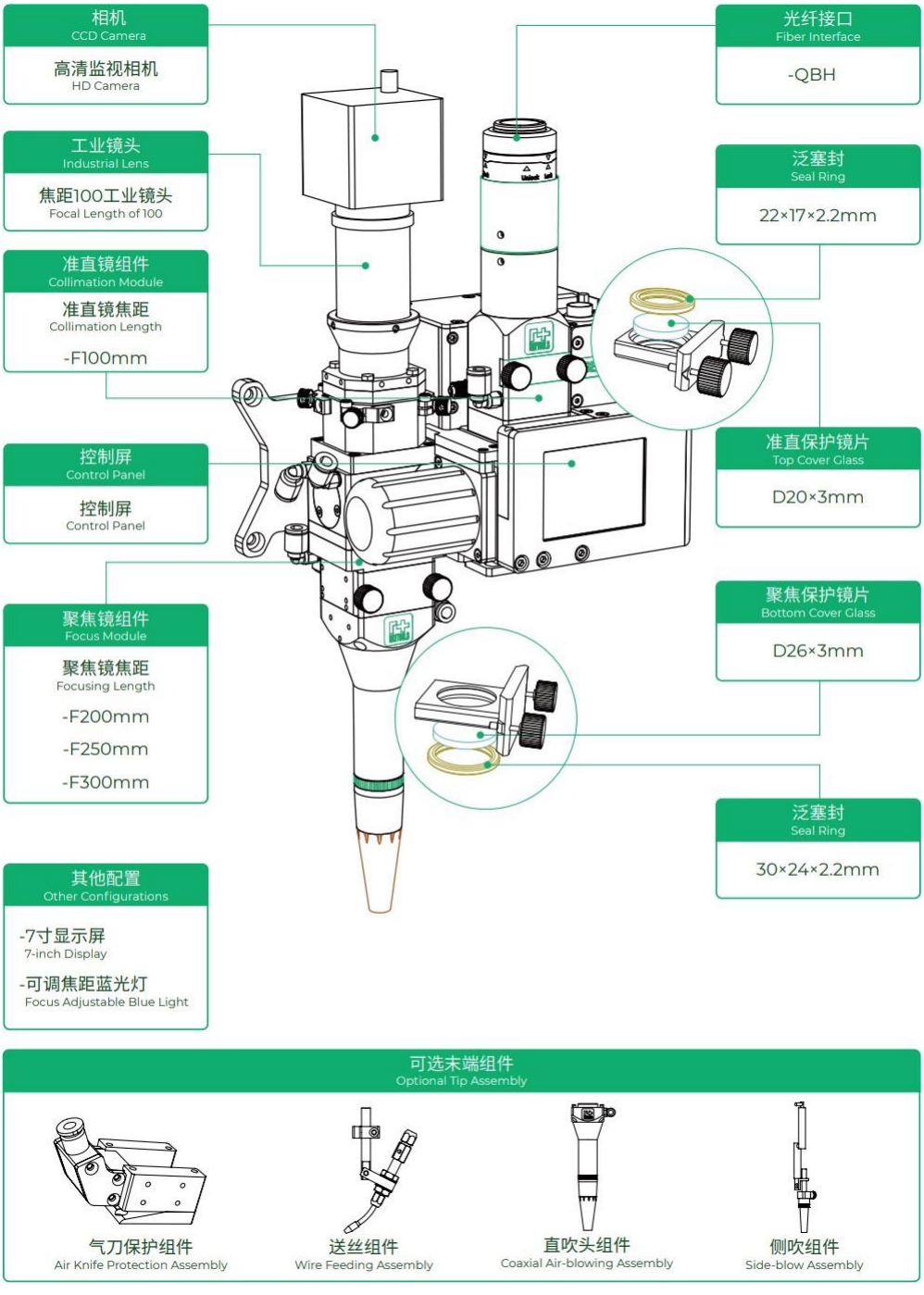

相机
CCD Camera
高清监视相机
HD Camera
工业镜头
Industrial Lens
焦距100工业镜头
Focal Length of 100
准直镜组件
Collimation Module
准直镜焦距
Collimation Length
-F100mm
控制屏
Control Panel
控制屏
Control Panel
聚焦镜组件
Focus Module
聚焦镜焦距
Focusing Length
-F200mm
-F250mm
-F300mm
其他配置
Other Configurations
-7寸显示屏
7-inch Display
-可调焦距蓝光灯
Focus Adjustable Blue Light
光纤接口
Fiber Interface
-QBH
泛塞封
Seal Ring
22×17×2.2mm
准直保护镜片
Top Cover Glass
D20×3mm
聚焦保护镜片
Bottom Cover Glass
D26×3mm
泛塞封
Seal Ring
30×24×2.2mm
可选末端组件
Optional Tip Assembly
气刀保护组件
Air Knife Protection Assembly
送丝组件
Wire Feeding Assembly
直吹头组件
Coaxial Air-blowing Assembly
侧吹组件
Side-blow Assembly

Figure 4.1

Alarm message:

After the power is turned on, the touch screen will read the current state of the swing head, and if there is an alarm information, it will be displayed. If there is an alarm message, please contact our after-sales personnel to solve it.

Precautions:

1. When plugging and unplugging the connector, please turn off the power first, and prohibit live plugging and unplugging.

2. If the main interface cannot display the current status, it means that the communication connection is unsuccessful. At this time, check whether the connection line between the swing head and the controller is connected well, and try to connect again.

Instructions for lighting:

Please read the following contents and safety guidelines before lighting operation.

- After the red light is turned on, it is strictly forbidden to expose your eyes to the indicating light to avoid injury;
- The laser is infrared invisible light. After the laser is turned on, it is strictly forbidden to expose any part of the body to the laser to avoid personal injury;
- When processing laser equipment, it is recommended to wear special protective glasses that can effectively shield the corresponding laser wavelength;
- Please ensure that the PE line of the power line is reliably grounded to avoid losses;
- Please check the lenses before using them for the first time every day to ensure that the lenses are pollution-free and burn;
- Before light, please turn on the red light swing to check the red light swing and check whether the red light swing is blocked;
- When it is necessary to enter the laser emission range for operation, it must be ensured that the laser switch has been turned off.

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