

User manual

Air-cooled continuous fiber laser



Model: YLPS-1000-A, YLPS-1500-A,
YLPS-2000-A; YLIS-1000-A, YLIS-1500-A, YLIS-2000-A;

Before using this product, please read the user manual carefully and familiarize yourself with the relevant content we have compiled for you. Please refer to the user guide Placed together with the product to provide you and all other users with operational, safety and other important information at all times.

Notice:

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This guide is intended for users responsible for welding in industrial and non-industrial installations.

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Security Information

safety convention

We will use different words and characters to remind you of various potential hazards and important information, including:

WARNING



Suitable for a variety of potential personal injuries. This signal reminds you that you need to use it according to the prescribed usage methods or steps. If you do not follow the instructions correctly, you may cause personal injury to yourself or others. If you do not fully understand and meet the requirements, please do not go beyond WARNINGsymbol to proceed to the next step.

CAUTION



Suitable for potential product damage signals to remind you that you need to follow the prescribed usage methods or steps. If you do not follow the prompts correctly, the product or parts may be damaged. If you do not fully understand and meet the required conditions, please do not proceed past the CAUTION symbol.

IMPORTANT



Various information about using this product. Please do not ignore this information.

WARNING



This symbol represents laser radiation. This symbol appears on products with laser output.

Safety guidance

In order to ensure safe operation and optimize the performance of this product, please strictly comply with the following WARNING and CAUTION, and other information contained in this manual.

WARNING:

When using this product, make sure to use a properly grounded power source.

WARNING:

Users are not allowed to open any parts inside this product for repair. If necessary, please contact GW Laser technicians to provide maintenance service. Any unauthorized modifications to this product will void the warranty.

WARNING:

The output connector of this product is connected to an external connector by an optical fiber cable. Please use handheld welding tips with caution.

WARNING:

If this product is not operated according to the instructions in this manual. The protective mechanisms provided by this product may be affected. This product must and only be used under normal conditions.

CAUTION:

When operating the laser welding output connector (such as installing optical cable connectors, using optical instruments to detect connector end faces, filling wires, etc.), please be sure to maintain AC power is off.

WARNING:

Never look directly into the fiber output connector, and be sure to wear appropriate protective eyewear when using laser products to avoid injury.

CAUTION:

Operation or adjustments outside the scope of this manual may result in radiation damage.

Laser level

According to the 21 CFR 1040.10 and 1040.11 treaty under IEC/EN 60825-1, this product is a high-power Class 4 laser. This product can output up to 2000W of non-visible infrared light. Lasers of this level may cause eye or skin injury. Although the output light is invisible light, it can still cause irreversible damage to the cornea. This product does not provide laser safety goggles, but please be sure to wear appropriate goggles when using the laser to avoid injury.



WARNING:

Never look directly into the fiber output connector, and be sure to wear appropriate protective eyewear when using the laser to avoid injury.

WARNING:

The air-cooled continuous fiber laser is a fourth-level laser product. This product emits invisible laser light up to 2000W with a radiation wavelength between 900nm and 1100nm.

WARNING:

Do not open the laser because there are no product parts or accessories inside the laser for user use. All product maintenance and repairs only. It can be performed by service personnel authorized by GW Laser.

CAUTION:

Operation or adjustments outside the scope of this manual may result in radiation damage.

Usage environment and precautions

WARNING:

Please use a properly grounded power source and normal voltage when using this product.

CAUTION:

Before starting the laser product, please ensure that the ambient temperature and humidity are within the specified range.

CAUTION:

Do not expose the product to excessive moisture.

CAUTION:

Lasers use air cooling. Please ensure that the ambient air used is dry and clean;

CAUTION:

Operation or adjustments outside the scope of this manual may result in hazardous radiation hazards.

CAUTION:

Keep the laser output head clean. Please replace the protective cap after each use. Do not touch the welding head lens with your hands, and do not use any solvent to clean the lens. When cleaning and maintaining the lens when necessary, be sure to use lens wiping paper.

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1. Overview

1.1 Introduce

Air series air-cooled laser is a new industrial-grade handheld infrared fiber laser welding system. Its maximum continuous wave power is $\geq 1950\text{W}$ continuous, and the average power in pulse mode is $\leq 2500\text{W}$.

The Blade series of fiber lasers built into GW's air-cooled lasers are designed for industrial materials processing applications and feature the most reliable and efficient proprietary ABR and SPP technologies. The key innovations of the BLADE series fiber lasers also include proprietary heat treatment, mode filtering technology, and durable and novel fiber laser structures. BLADE fiber lasers include powerful optical engines, comprehensive control and monitoring electronics. The beam delivers the output via a metal-shielded QBH fiber optic cable.

Blade series lasers can provide up to 2000W continuous wave (CW) single-mode output light in the output band between 1070nm and 1080nm. BLADE lasers provide very efficient, high-quality output light. The beam quality M2 output by a single-mode optical cable is preferably less than 1.2, or the output of a high-brightness multi-mode optical cable with BPP < 1.5 . This high beam quality and multi-mode fiber optic cable output options make this product ideal for processing a variety of materials, such as fine cutting, precision welding, cutting and welding of different materials with different thicknesses.

GW air-cooled lasers are designed and tested with safety in mind. By following this user guide and applying laser safety measures, it can be a safe and reliable device.

To ensure safe operation and optimal performance of the product, follow the usage warnings and other information contained elsewhere in this document. These safety precautions must be followed during all phases of operation, maintenance, and repair of the instrument.

1.2 Use

Air series air-cooled lasers are suitable for industrial and professional use. Application areas include welding and brazing, and thin sheet cutting. Materials include steel, aluminum, copper, stainless steel and other metal materials..

1.3 Testing and Certification

GW certifies that this system has been thoroughly tested and inspected. Before packing, it is

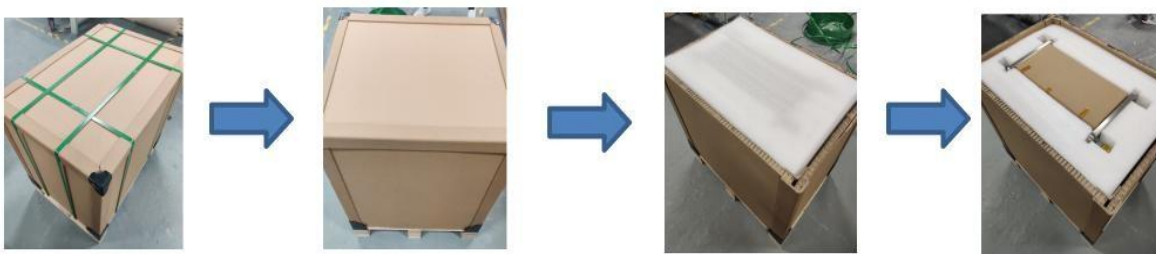
fully inspected and confirmed to meet the shipping standards. When you receive your device, please inspect the packaging and components for damage that may have occurred during shipping. If damage is obvious, please contact the carrier and GW after-sales personnel immediately;

1.4 Packaging Disassembly Instructions

If the packaging shows any signs of external damage, please inspect the device for damage and notify the carrier and GW's after-sales personnel immediately; when you remove this product from the box, special care must be taken to ensure that the fiber optic cable is not cracked or damaged ;Please check the included packing list. Once the product is received, inspect all items with this checklist and if any item is missing or the equipment has obvious or suspected damage, do not under any circumstances attempt to install or operate the laser equipment.

To reduce the risk of product damage, GW recommends that you use the following procedures to open air-cooled continuous fiber laser products;

- 1.4.1** Use a powered forklift to move the entire packaging box to the unpacking position;
- 1.4.2** Remove the top honeycomb panel cover and top EVA (white foam); Note: The welding head is inside the EVA;
- 1.4.3** The cables and outer box are fixed with fiber ties. The welding headers will also be wrapped. GW recommends using a cutting tool for disassembly;
- 1.4.4** Do not attempt to lift the device using the supplied zip ties or cables;
- 1.4.5** Remove the side panels from the box. Remove the product from the box and use the two handles on the top of the product. GW recommends two people to lift the equipment at any time and be careful when handling ties and welding heads;
- 1.4.6** Check the accompanying details against the items listed on the packing list;
- 1.4.7** Retain all packaging for future shipping or storage;



It is prohibited to use the optical cable attached to the product to lift or position the equipment. Pay attention to the anti-tipping label. It is prohibited to transport and use the equipment at an angle.

2. Laser Product Safety Information

2.1 Laser product safety performance and conventions

To ensure safe operation and optimal performance of your product, follow all warnings in this guide. Safety precautions must be observed during all phases of operation, maintenance and service. Operators must follow these recommendations and apply stated laser safety practices at all times and never open the module. There are no user-serviceable parts, equipment or components in this product, and all internal service and maintenance should be performed only by qualified GW after-sales personnel;

This user guide uses various words and symbols that are intended to alert you to possible hazards or important information.

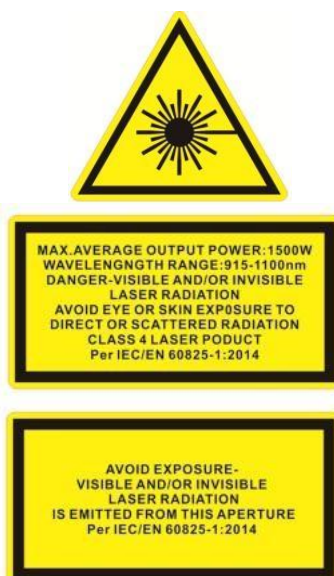
2.1.1 Safety performance

Performance	Description
Output power monitoring	Monitor the output power while the laser is operating.
Overheating protection	Monitor the internal temperature of the laser to protect internal components from damage due to exceeding the safe operating temperature.
Safety/Warning Labels	Various labels alert and warn users of possible hazards.

2.1.2 safety label

Safety labels and label locations:

The following illustration shows the label and its location on the product.



Laser output label

Location:Rear panel/weld header

Certification label

Location:rear panel

Warning sign

Location:Rear panel/weld header



Certification label

Location:rear panel



Warning sign

Location:Rear panel/weld header



GW (SHANGHAI)LASER TECHNOLOGY CO.,LTD.
Assembly in 5/F and 6/F Building 5-1 398
Shuanglian Road Qingpu District Shanghai

Product label

Location:rear panel

NAME : Continuous Fiber Laser
MODEL : YLIS-2000-A-S-2015-A
DATE: Nov.2022
P/N : 110701100
SERIAL NO. : NBA7E2EC
SUPPLY : 220VAC,20A
WEIGHT: 65KG

2.2 Relevant regulations and standards

2.2.1 Product functional safety

Electrical Safety	EN 61010 - 1:2010
laser safety	EN 60825 - 1:2014 CDRH 21 CFR 1040.10

Fiber optic cable protection disconnection (fiber interlocking): The optical cable protects the circuit for interlocking between the fiber laser and external devices (such as handheld welding heads). The laser welding system will continuously monitor this signal and terminate the external device (such as welding heads) if the fiber connector is not connected correctly.

Stop-start protection: Install various electronic sensing devices inside the system. If an abnormality is detected, the monitoring program will alarm. The system stops and continues to start;

Safe start/restart button (emergency stop): Used for emergency shutdown and recovery of air-cooled continuous fiber laser systems.

Key switch: Start/stop the main circuit power supply of the laser system.

2.2.2 Classification of laser products

According to government and industry standard requirements, all lasers are classified according to their output power or energy and laser wavelength.

According to IEC/EN 60825-1, this product is a high-power Class 4 laser. This product can output up to 2000W of non-visible infrared light. Lasers of this level may cause eye or skin injury. Although the output light is invisible light, it still causes irreversible damage to the cornea. This product does not provide laser safety goggles, but please be sure to wear appropriate protective goggles when using laser products to avoid injury.

Class IV Lasers - High-power lasers are the most serious of all laser hazards. Take precautions to prevent accidental exposure leading to immediate Damage caused by light and reflected light.

Diffuse and specular reflection can cause severe retinal and/or corneal damage, resulting in permanent eye damage. Class 4 laser beams are also a potential fire hazard and skin hazard. All personnel must wear appropriate eye protection when operating equipment. For information on laser safety glasses, see Section 2.2.3.

Use of controls, adjustments, or performance of procedures other than those specified in this user's guide may result in exposure to hazardous radiation.

2.2.3 Laser safety glasses

Wear appropriate laser safety glasses when operating this equipment. Choosing the right laser safety glasses requires accurate identification by the end user. The range of wavelengths emitted by this product.

Near the laser output aperture, many secondary laser beams at different angles are usually generated. These beams are called "specular reflections", which is produced when laser light is reflected from the main beam incident on the surface. Although the power of these secondary beams may be less than the total power emitted by the laser, they are powerful enough to cause damage to the eyes, skin, and materials surrounding the laser. If the device is a tunable resonant laser or a Raman product, it emits light in other wavelength ranges. The end user should verify that the laser safety glasses used are capable of protecting the laser emitted by the device.the entire wavelength range of light.

Be careful to avoid/Reduce specular reflections. The product's emission wavelength is Invisible laser radiation at or near 1070nm (infrared). In addition, the visible laser radiation emitted by this product has a wavelength of 600- 700nm (red) or near.

Please check the safety label on the product to confirm that the personal protective equipment used (such as housing, viewing window or hole, glasses, etc.) The power and wavelength range are sufficient. Decisions about safety glasses must also take into account secondary radiation hazards generated during welding

Laser safety glasses must meet international safety standards, including ANSI Z136.1 (USA) and EN207/EN208/EN60825 (Europe). The regulations in effect will depend on the location of the laser installation.

2.3 Laser use protection

Eye protection is required during laser use to protect your eyes from any reflected or scattered Class 4 laser beam, as well as from welding glare, UV rays, heat and sparks.

Exposure to infrared and ultraviolet radiation during laser use can damage the skin. Depending on the intensity of the infrared light, skin damage may include thermal burns or excessive drying of the skin. Exposure to UV rays can cause skin burns similar to those caused by the sun and can increase an operator's risk of skin cancer and accelerate signs of skin aging. Sparks can also cause burns.

Laser materials processing can transfer large amounts of energy to the part. Parts can be extremely hot even after the cutting or welding process is complete. Make sure to use appropriate personal protective equipment to prevent potential burns. Wear protective clothing such as fire-resistant gloves, fire-resistant hats, leather aprons and other fire-resistant clothing to prevent skin damage. Sleeves and collars need to be buttoned!

2.4 Welding safety and hidden dangers

2.4.1 Fire hazard

If there are flammable or combustible materials near the laser working area, the heat and sparks generated during laser operation may cause a fire or explosion. Laser work should only be performed in areas free of flammable materials.

Never perform laser welding work on containers containing flammable or combustible materials. If the contents of a container are unknown, you should assume they are flammable or combustible. Fire extinguishers should be nearby and easily accessible, and personnel should be trained in their use.

2.4.2 Smoke hazards

The "smoke" produced during laser use can be composed of very fine particles and gases. Fumes and gases come from a combination of welding or cutting materials or any filler materials used, shielding gases used, paints, coatings, chemical reactions and air pollutants. Smoke can adversely affect the lungs, heart, kidneys and central nervous system.

When the laser interacts with the target material (such as plastics, metals, composites), the target material may begin to evaporate. These fumes and particles are often invisible but are highly toxic and pose serious health hazards.

Welding in a confined space with poor ventilation can be very dangerous. The danger from toxic fumes and gases can quickly increase, leading to coma or death from suffocation.

The ultraviolet rays emitted during the use of lasers can react with oxygen and nitrogen in the air to form ozone and nitrogen oxides, which can cause death in high concentrations.

When laser welding or cutting, do not let your head come into contact with the gas. Always weld in a well-ventilated area to ensure the air is safe to breathe. Use a fume extraction system to remove vapors, particles and harmful debris from the welding process area. Read and obey the safety data sheets and warning labels of all welding materials. Respirators may also be required in confined spaces and other situations. Routine air monitoring should be performed to determine harmful fume levels in the welding area.

2.4.3 Gas cylinder safety

Gas cylinders may explode if damaged or placed in areas near welds. Protective gas bottles should be placed where they cannot be hit or damaged. Keep them away from heat, sparks or flames. Cylinders must be stored upright and secured to a fixed bracket. It is necessary to have a working regulator suitable for the required gas and pressure. All hoses and fittings should also be suitable for the application and maintained in good working order.

2.4.4 Optical safety

Laser output is output through a window or optional anti-reflective coating. Make sure the windows are clean and of good quality. Any dust on the end of the head assembly can burn out the windows and damage the laser. Check the quality of the spot emitted by the laser output at low power, and then gradually increase the output power.

Never look directly into the laser aperture (such as fiber optic, collimator or scan head) when the start button or remote start circuit is activated. Always wear appropriate laser safety glasses when operating the product. All personal protective equipment must be suitable for the output power and wavelength range listed on the laser safety label affixed to the product.

When powering a laser product, do not look directly at the output port; avoid placing the laser and all optical components at eye level; avoid using the laser in a dark environment; when using the output (such as mounting the laser head to a fixture, etc.), Please turn the switch key to the OFF position; as a precautionary measure, during the operation of this product, please gradually increase the output power from low to high;

Do not install the laser head when the laser is active;

Light-sensitive components in equipment, such as cameras, photomultiplier tubes, and photodiodes, can also be damaged by exposure to laser light. Lasers are powerful enough to burn skin, clothing and paint. Lasers can cut and weld metals. Lasers can ignite volatile substances such as alcohol, gasoline, ether, and other solvents. During installation and use, contact with solvents or other flammable materials and gases must be avoided.

2.5 Electrical safety

The laser's input voltage can be lethal. All cables and connections should be considered to be at hazardous levels. All parts of cables, connectors, or equipment enclosures should be considered hazardous. Before supplying power to the equipment, all connecting wire harnesses must be checked for damage and the welding shielding gas must be checked for continuity. Additionally, where applicable, all connections must be secured with screws to ensure proper functionality.

Make sure the equipment is grounded through the protective conductor of the AC power cord. Disconnection of any protective earth conductor from the protective earth terminal may result in personal injury. For continued protection against fire hazard, only replace line fuses with the same type and rating (if applicable); use of other fuses or other materials is prohibited; verify that the correct AC mains voltage is used before powering the equipment; use of incorrect voltages can cause damage to the equipment; see markings on specific models for proper power connections; there are no operator serviceable parts inside; refer all servicing to qualified GW after-sales personnel; to prevent electric shock, do not remove cover; any Any tampering with the product will void the warranty. In addition to the mains connection, the external connections

between this product and other external devices are PELV (Protected Extra Low Voltage) defined by IEC 61140. The non-mains outputs of other equipment connected to this product should also be PELV or SELV (Safety Extra Low Voltage).

2.6 Environment safety

Never dispose of this product with household waste. Electronic equipment must be disposed of in accordance with regional directives on the disposal of electronic and electrical waste. Note that all personal protective equipment must be suitable for the output power and wavelength range listed on the laser safety label affixed to the laser equipment. Use caution when operating or the laser may damage the device.

This equipment is suitable for: (1) Indoor use (2) Use at altitudes below 2000 meters (3) Over voltage Category II (4) Dry locations.

This device is not suitable for use where children may be present. Keep away from sources of shock or vibration. Appropriate enclosures should be used to ensure a safe laser work area. This includes, but is not limited to, laser safety signs, appropriate warning devices and training/safety procedures. Do not operate the output welding head at eye level. Make sure the laser shield is in place to protect the eyes of those working in the area.

2.6.1 Humidity

Do not expose the device to high humidity environments >85% humidity. (See 3.1 Performance Parameters for details)

2.6.2 Cooling and temperature

Air-cooled continuous fiber laser is cooled by refrigerant and air. Operating at higher temperatures will accelerate aging, increase value current and reduce slope efficiency. If the device overheats, do not use it and call 400 for help from after-sales personnel. When the ambient temperature exceeds 50°C, the device will automatically alarm and limit the operation of the device.

3. Description of air-cooled continuous fiber laser

3.1 Air-cooled laser performance parameters

Optical performance parameters	
Output power (watts)	2000W
Operating mode	continuous/pulse
Output power adjustment range (%)	1-100%
Output laser wavelength (nm)	1075±10nm
Power stability	< 5%
Maximum modulation frequency	50kHz
Laser response time	< 10us
Indicated laser wavelength (nm)	650
Indicates the optical power adjustable range (milliwatt)	<1mW
Laser transmission system parameters	
Interface Type	QBH (others can be customized)
Transmission length	standard length 5±0.5m(optional10m)
Work requirements	
Cooling and protective gas	Inert gas
Working environment temperature range	Professional version -20~50°C (regular version 0 - 50°C)
Working environment humidity range	≤85 degrees
Input voltage	220VAC/50Hz/60Hz
Total power	3 KW-6KW
Weight	less than 60 [kg]

3.2 Accessories

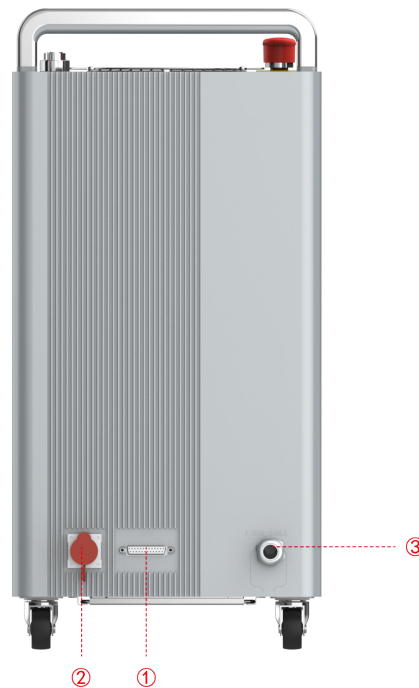
Standard Accessories			
Project	Part Number	Quantity	Please Note
User Guide	N/A	1	current document
power cable	N/A	1	for switching power supply
Other accessories available for purchase			



3.3 Laser unit front view



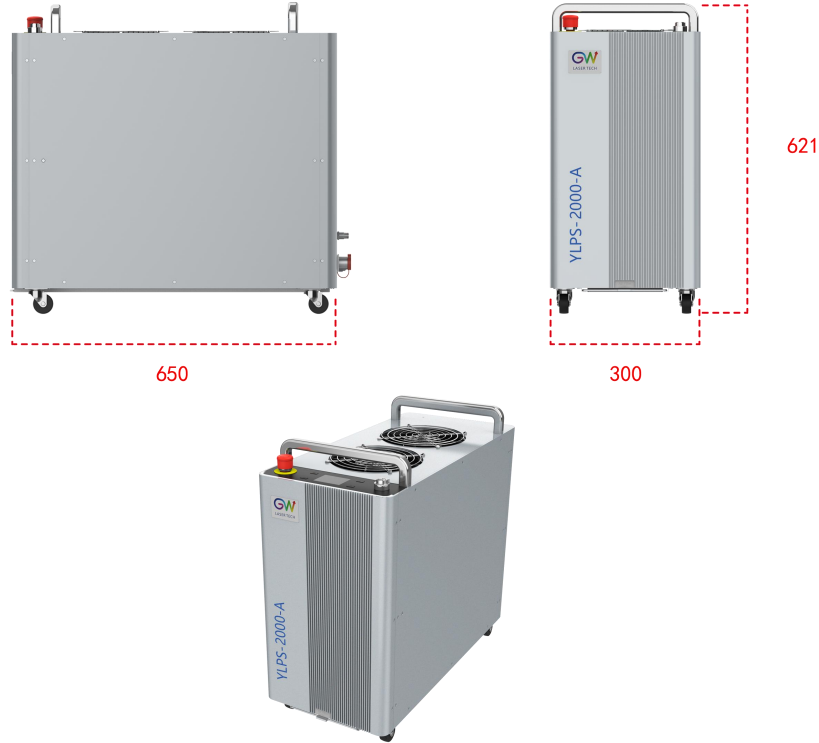
Serial Number	Name	Description
1	Power key switch	Turn the key knob clockwise to (ON) to turn on the power, turn the key knob counterclockwise to (OFF) to turn off the device. When the knob is in the (ON) state, the key is prohibited from being pulled out.
2	Emergency stop switch	When an emergency occurs, you can press the emergency stop button to quickly cut off the equipment main circuit power supply. When the stop button is pressed, turn the button clockwise to reset the emergency stop.button.
3	Cooling fan	When the device is running, the cooling fan will start or stop according to system instructions.During operation, the fan outlet must not be blocked or foreign objects may fall into it.
4	Stainless steel handle	Used for equipment moving and handling operations.
5	Status indication, etc.	Used to indicate the current equipment operating status: Colored light: System is preparing; Green: Ready; Yellow: Safety interlock loop is met, laser is ready/Light status; red: fault alarm; white: main power is not ready; blue: system communication abnormality.
6	LOGO	Product brand identity.
7	Air filter	It is used to filter large particles of dust in the operating environment and needs to be cleaned regularly.

3.4 Product appearance interface diagram



Serial Number	Name	Description
3	User interface (DB25)	Used to connect the input and output of external safety locks and linkage control signals.
4	Device power input port	 AC input socket: AC 220V, 50/60Hz, 23A
7	Output optical cable interface	 Laser input The outgoing optical fiber cable is output through this position and connected to the handheld welding head (QBH output terminal). The outside of the optical fiber cable is protected by a self-rolling braided net.

3.6 Product layout and dimensions



Size	650 x 300 x 621[mm] (L×W×H)
Weight	less than 60 [kg]

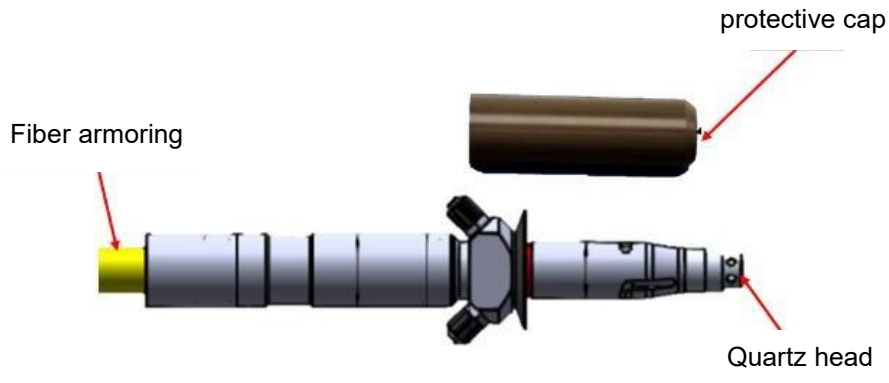
Dimensions unit: mm

3.7 Fiber optic output connection

When the product is delivered to the user, the fiber optic cable has been inserted and connected to the welding head. Although this is not a typical situation, if it is necessary to disconnect and reconnect the fiber (for example, the soldering tip needs to be replaced).

The fiber end connector uses a protective cap to protect the fiber surface and electrical contacts when not in use. Protective caps and sleeves should be removed from the connector immediately before optical cleaning and connection to the output solder header. Every time you disconnect a fiber optic cable from a welding head, you

must inspect the fiber optic terminal for dust, dirt, or damage.



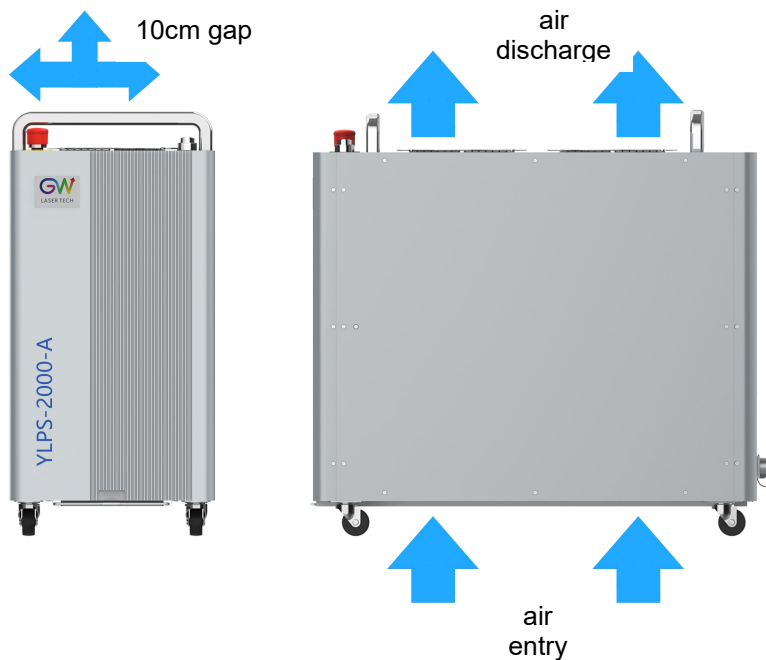
4. Install equipment

4.1 Preparation before installation

Please refer to the relevant power requirements in Section 3.1. Before connecting the power supply, please ensure that the input voltage specification meets the standards stated in it. The equipment must be connected to a sufficient amount of auxiliary gas before it can operate, so as to dissipate the heat load generated during operation and protect the welding joint from damage caused by splash generated during the work. If the equipment is not connected to the gas operation, the equipment will Disable automatic alarm operation.

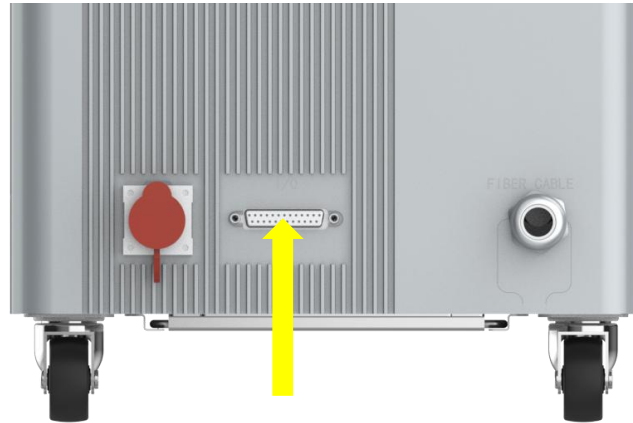
4.2 Airflow and mounting clearance

Air-cooled continuous fiber lasers use refrigerant and air flow to dissipate heat. When choosing a placement location, please operate in a long, non-enclosed and narrow space with good air circulation conditions. Do not place any objects on the top of the machine that may block the exhaust. The air flow direction is as shown in the figure below:



4.6 user interface

The user interface includes a DB25 computer interface for connecting external control signals, and a WI-FI transmission interface. Users can realize safety interlock control through the computer interface of DB25 and external devices, obtain device status and alarm information, and control the execution of external devices and other actions. The WI-FI transmission interface is used to connect to wireless hot spots, connect to the SMAT Cloud cloud service to obtain remote firmware upgrades and obtain remote services, etc.



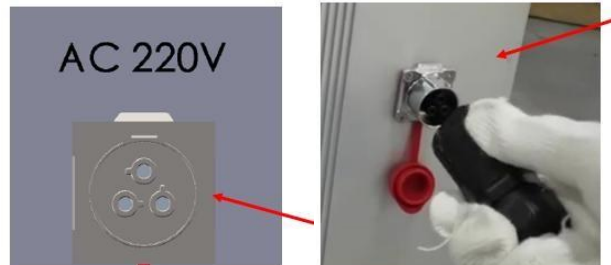
DB25 interface definition

Pin#	Definition	Description	IN/OUT	Comment
1	+24V-IN	IN+24V	IN	N/C
14	+24V-IN	IN+24V	IN	N/C
2	GNDD	0V	IN	digital signal reference potential
15	GNDD	0V	IN	digital signal reference potential
4	S-LAS	laser start	OUT	Output laser start (24V)
17	24V-OUT+	Ext 24V	OUT	Supply 24VDC
5	S-ERR	system error	OUT	System error output (24V)
18	S-WAR	warn	OUT	Close to alarm threshold 90% output warning signal (24V)
6	S-RDY	System ready	OUT	The system is ready for operation
19	P-RST	reset	IN	Reset general errors
7	X-RED	red guide light	IN	Externally controlled red guide light activation (24V)
20	P-LPS	start up LPS	IN	laser ready input 24VDC input turns on the laser source

8	X-STOP	emergency stop	IN	Logic control signal, NC (24V)
21	X-SN	Turn on laser	IN	Externally controlled laser emission activation (24V)
9	M-BIT0	Mode selection encoding BIT0	IN	0: CW mode of external control 1: External control PWM modulation mode
22	X-WAT	Cold water interlock	IN	Logic control signal, NC (24V)
10	X_PULSE	0~24V	IN	Modulation input (0~24V)
23	L-Pout	Laser power output	OUT	Laser output power monitoring 0-10VDC
11	GND A	GND	IN	Analog signal reference potential
24	IN1	Water flow detection	IN	Water flow simulation voltage 0.5V-3.5V input
12	GND A	GND	IN	Analog signal reference potential
25, 26	LPIN	Laser power input	IN	Analog input, 0-10VDC
13	GND A	GND	IN	Analog signal reference potential
3, 16	N/C	N/C	N/C	N/C (useless)

4.7 Power connection

Before connecting the power supply, please ensure that the power supply capacity meets the specifications described in Section 3.1. The device comes with an RVV 3x4mm connection cable. Please follow the following steps to connect correctly according to the cable harness identification:



Main power interface 3-Pin			
Pin#	Function	Wiring color	Voltage
1	phase-to-line voltage	Red (L1)	220VAC
2	neutral voltage	Black(L2/N)	0VAC
3	ground	Green/Yellow(PE)	PE

1. Connect the power input cable to the indicated voltage, phase, frequency 50/60Hz. L1=phase-to-line voltage, L2=neutral voltage, PE=ground;
2. The equipment power input cable connection must be connected to a dedicated AC mains power through a circuit breaker not exceeding 30 amps. Mark the area easily accessible to operators to clearly identify the disconnect device that supplies power to the equipment;
3. Wiring should comply with all state and local code requirements, and electrical connections should be made by personnel skilled in electrical safety practices.

4.8 System startup and shutdown

All electrical connections must be made before powering the device. Where applicable, all connections must be secured with screws or snaps to ensure proper functionality. Make sure you wear appropriate personal protective equipment when handling this product. These include welding helmets, flame retardant protective gloves and laser safety glasses suitable for use at the 1070nm wavelength.

WARNING

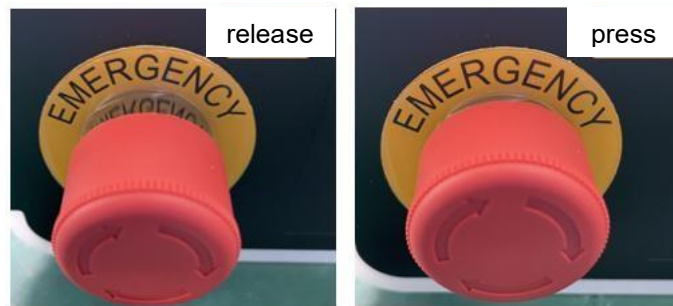


When maintaining the output optical cable, make sure to disconnect the main power supply of the device and unplug the input cable interface. The minimum allowable bending radius of optical cable is 50mm;

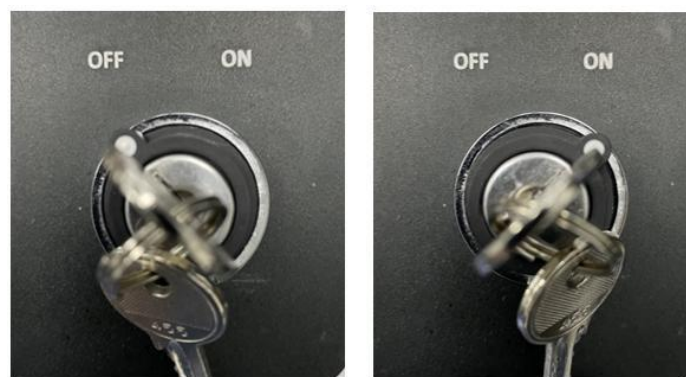
System Startup:

1. Ensure that all connections required for proper operation have been made, including limitations of external safeguards. At the same time, check that the safety protection circuit is connected properly and the external safety interlock circuit is closed.

2. Make sure the emergency stop button is not pressed. If pressed, turn clockwise to reset the emergency stop button.



3. Turn the key switch clockwise to the (ON) position;



4. After startup, the panel indicator light and display screen will light up. During the startup process, the indicator light will be in a colored flowing state. After the system is started, it will convert to a solid green light state. At this time, the device can enter the working state.

*If other status is displayed, please check the description information in Section 3.3 or the error message in Section 7.1. If it cannot be eliminated, please contact service personnel.

System shutdown:

To turn off the laser system, the user must stop emitting laser light after the work is completed; turn the key switch counterclockwise to the (OFF) position and remove the key from the product and secure the key to prevent unauthorized use.


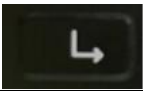


5. Operating the laser system

5.1 Control panel operations

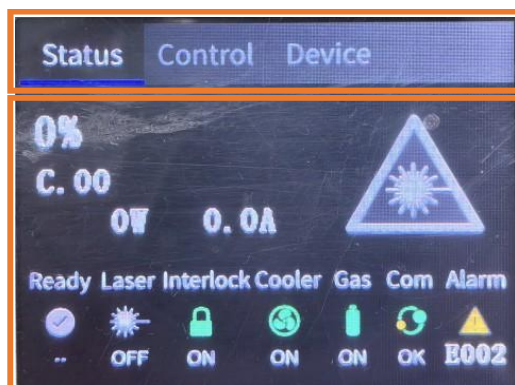
There are 4 jog buttons on the equipment operation panel and an LCD screen, which are used to view equipment status, equipment information and adjust system operating parameters.



A. Introduction to button functions:

Button Legend	Function Description
 Menu	When the user interface is on a non-status page, it is used to return to the upper-level menu of the currently displayed page. Continue tapping will eventually return you to the status page.
 Enter	Used for user interface menus, confirmation after parameter selection, entering the advanced parameter setting interface, and parameter selection. Save the modified data.
 Up key	Select the menu in the user interface and add parameters. Press and hold on the parameter selection and parameter adjustment pages to increase the parameters in x10 increments.
 Down key	Select the menu in the user interface and reduce the parameters. Long press on the parameter selection and parameter adjustment pages will reduce the parameters in x10 increments.

B. User interface introduction:



Menu navigation area

Content display area

As shown in the figure above, the user operation interface is mainly divided into a menu navigation area and a content display area. The display content will change according to user operations. After the device is started, it will be displayed on the status page by default to display the current operating information of the device. Use the up and down arrow buttons on the panel to switch between different menu pages. The panel buttons are only used to view information and have no control or selection of operating modes. Waiting for functions!

5.2 Start operation

1. Remove the protective cap of the laser output connector (QBH) and check the quartz glass and QBH connector. Cleanliness.
2. Please make sure to wear appropriate eye protection and protective clothing.
3. AC power supply for fiber laser (emergency stop and key switch).
4. Set the laser control mode and working mode.

Control method:

Internal control: Use the DB9 serial port cable to connect the laser to the computer, open the GW HMI software on the computer, and control the laser through HMI.

External control: Control the laser by connecting the DB25 connector on the rear panel of the laser.

Operating mode:

CW mode: Also called continuous mode, the output power will remain constant after selecting this mode. In internal control mode, its constant power value is set by HMI; in external control mode, its constant power value is controlled by the analog signal (0.1V=1% and 10V=100%) on pin 1 of DB25.

Modulation mode: After selecting this mode, the output power will vary between IDLE (low modulation signal) and ON (high modulation signal) values. The ON value is determined by the setting value of the selected working mode.

To learn more about the operation details of control methods and working modes, please refer to Chapter Section 5.2: Time series.

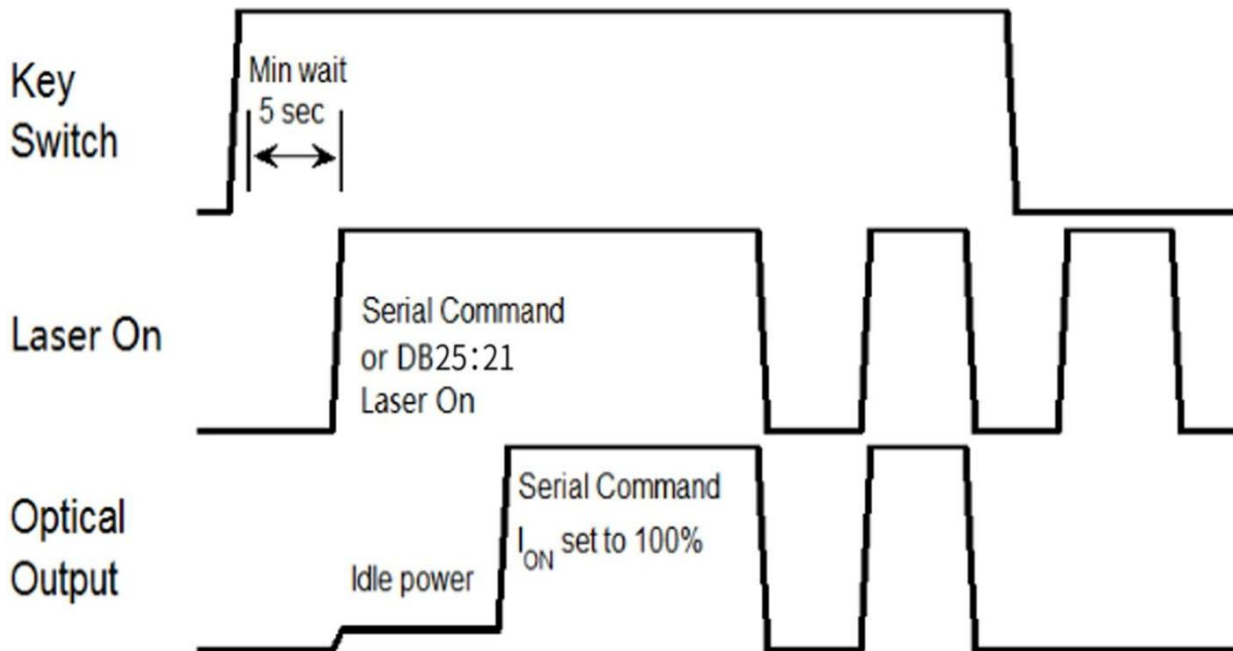
5. Please ensure that the Laser_On signal light is off (DB25 PIN2 input OV).
6. Enable the laser output through RS-232 commands or providing 24V voltage to DB-25 PIN1 and 2.
7. Through DB25 pin 4, you can get the status of whether the laser is started.

5.1.1 Operating mode settings

YLPS series lasers provide different operating modes according to power control and output mode settings. When the power control is selected as "external control", the user can select different control modes through DB 25 pin9.

5.1.1.1 Internal power control, "CW" output mode

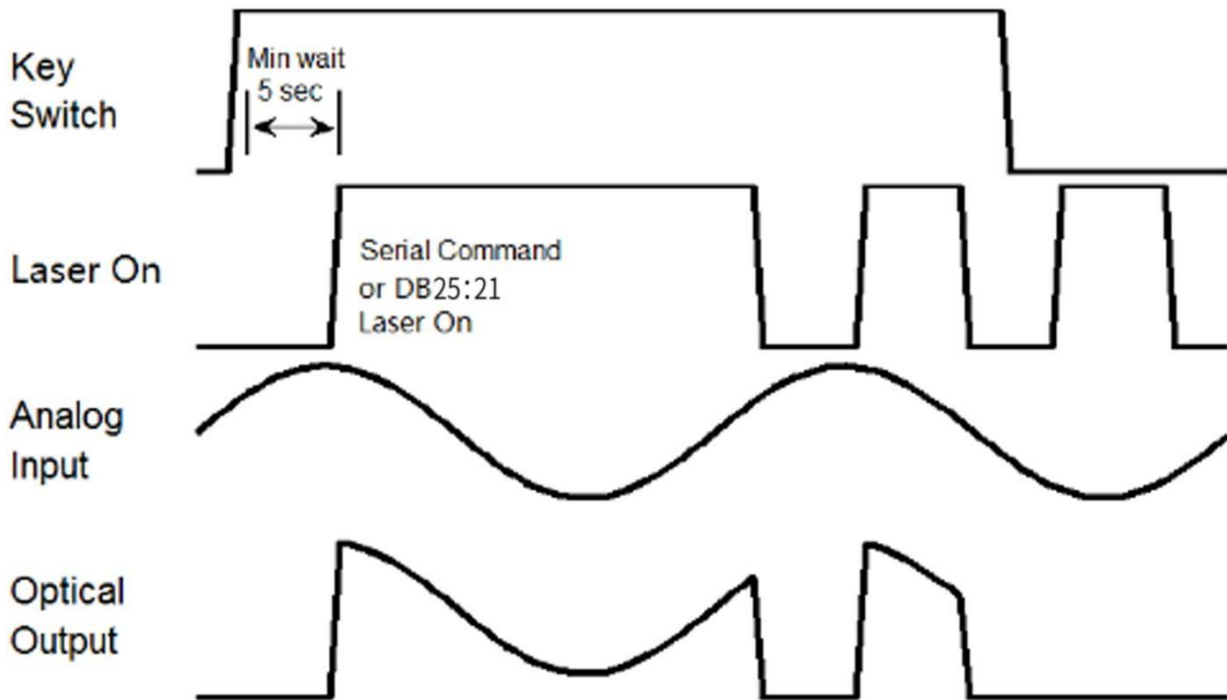
When the power control is internal control and the external control output mode is "CW", the external control output mode can be set through the HMI on the host computer. When Laser-ON is activated, the laser output power will be determined by the corresponding value set by the HMI on the host computer, and the output value can be changed at any time while the laser is emitting. When the laser starts, the IoN value is equal to the IDLE power value.



Internal power control and default "CW" mode time series

5.1.2 "External" power control, "CW" output mode

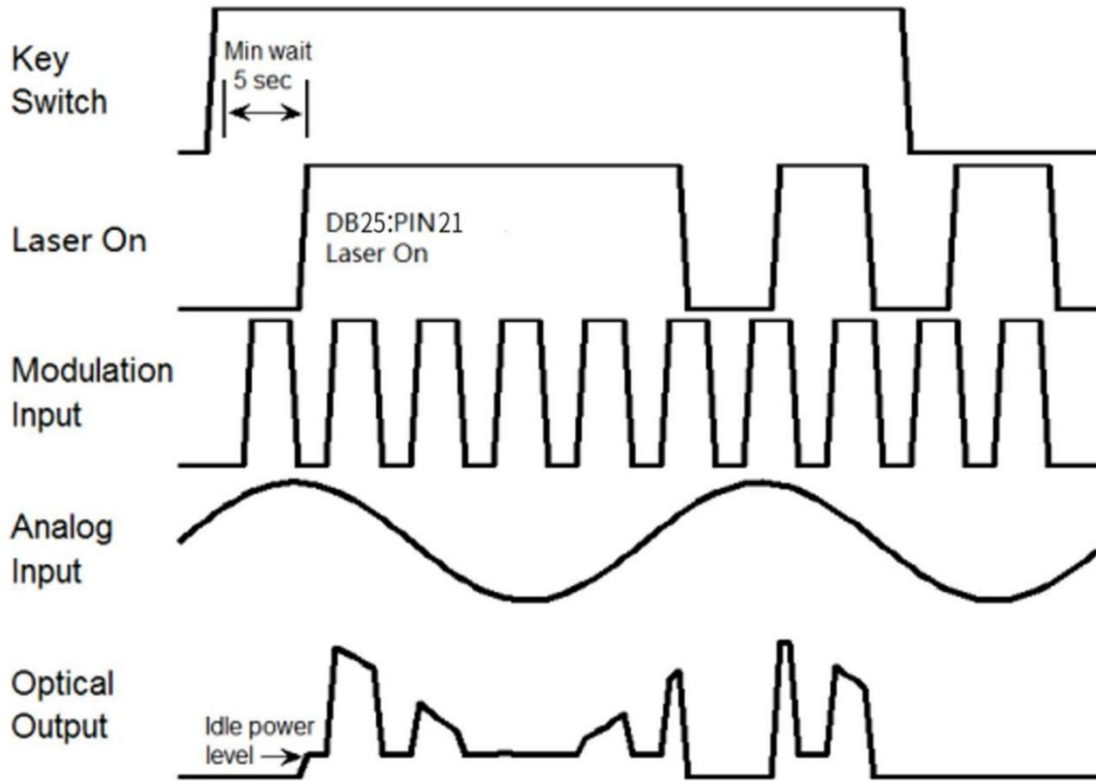
When pin 9 of DB25 is open or grounded, the YLPS laser will work in CW mode. When the power mode is "external control" and the output mode is "CW", it is necessary to delay the output of the Laser-On command (RS-232 or DB-25) for 5 seconds. When the Laser-ON command is started, the laser output power will be determined by the analog input control voltage. If the analog input voltage is lower than the lowest value set by the program, the YLPS laser controller will temporarily turn off the Laser-On until the analog input signal exceeds the limit again. The minimum value set by the program.



Modulates "external" power control and "CW" output mode time sequences

5.1.3 External control mode, "pulse" working mode

The laser is in external control mode by default, and can also be switched between internal control and external control through HMI. When DB25 PIN15 is connected to 24VDC and DB25 PIN16 is open circuit or grounded, the YLPS laser operates in pulse mode. When the PIN13 pin of DB25 is connected to 24V and the Laser-On command is started, the laser output power will be determined by the synthesis of the voltage signal of the PIN1 analog input pin of DB25 and the pulse signal of the PIN14 pin of DB25.



Timing diagram of pulse working mode in external control mode

5.2 Important safety features

5.2.1 Optical cable connection interlock

Optical fiber connection interlocking is a safety protection loop between the external interface and the equipment's optical cable interface. It is used to limit the equipment from emitting lasers without connecting external optical devices. It is a way to ensure the interlocking protection between the optical cable output interface and the external interface method. If the output optical cable of the equipment is not correctly connected to the external connector (cutting, welding, cleaning, etc.), laser emission is prohibited, and the system will display the interlocking status of the output signal on the user interface to inform the user whether the current loop is normal.

6. Troubleshooting/Maintenance

If an alarm occurs, the "Error" status indicator on the device panel will light up red. There are 44 possible alerts. To determine which alert bit caused a specific error:

1. Check the laser power display on the front panel. The error code will be displayed on the LCD panel and will begin with the letter "E" followed by three digits (for example, E003 for a 3-digit alarm). Many alarms can be dismissed in one of two ways
2. Restart the welding system after a power outage and the first thing it will do is attempt to automatically

clear any alarms. As soon as the condition that caused the error is resolved, the error should be cleared.

3. Connect through the computer serial port and use the HMI software provided by GW to clear the alarm.

Using Restart: A small number of these alarms can only be cleared by restarting the unit. If the conditions that caused it are not addressed, the alert may occur again. If this is the case, please contact GW after-sales personnel for assistance!

For the front panel error display, as the number of errors increases, the severity of the warning increases. E027 is more serious than E001. If multiple alarms occur, the alarm number with a higher level will be displayed on the front panel.

6.1 Error messages and troubleshooting

Air-cooled laser fault alarm code

Code	Description	Solution
S028	Laser lock	Connect GW after-sales personnel
E001	No. 1 driver board communication failure	Connect GW after-sales personnel
E002	No. 2 driver board communication failure	Connect GW after-sales personnel
E003	No. 3 driver board communication failure	Connect GW after-sales personnel
E004	No. 4 driver board communication failure	Connect GW after-sales personnel
E005	AD board communication failure	Connect GW after-sales personnel
E006	Diode module over temperature	Connect GW after-sales personnel
E007	Drive module over temperature	Connect GW after-sales personnel
E008	Water temperature is too high	Connect GW after-sales personnel
E009	Optical fiber temperature over temperature	Connect GW after-sales personnel
E010	Laser reflected energy exceeds upper limit	If the alarm still cannot be eliminated after cleaning the collimator, please contact GW after-sales service personnel
E011	The energy output of the laser exceeds the lower limit	If the alarm still cannot be eliminated after cleaning the collimator, please contact GW after-sales personnel
E012	Diode short circuit fault	Connect GW after-sales personnel
E013	Fiber disconnected	Connect GW after-sales personnel
E014	Super humid	Confirm the ambient humidity. If the alarm still cannot be eliminated, please contact GW after-sales personnel
E016	Emergency stop	If the emergency stop button is pressed and the alarm still cannot be eliminated, contact GW after-sales service personnel
E017	Air pressure failure	Connect GW after-sales personnel

E018	Narrow pulse protection	Connect GW after-sales personnel
E019	Driver board over voltage	Connect GW after-sales personnel
E020	Internal temperature failure	Connect GW after-sales personnel
E021	Driver short circuit	Connect GW after-sales personnel
E022	fault lock	Connect GW after-sales personnel
E023	Radiator does not start	Connect GW after-sales personnel
C001	Control system communication failure	Connect GW after-sales personnel
E901	Radiator over current	Connect GW after-sales personnel
E902	Radiator out of step	Connect GW after-sales personnel
E904	Radiator out of phase	Connect GW after-sales personnel
E905	DC voltage too low	Connect GW after-sales personnel
E906	DC voltage too high	Connect GW after-sales personnel
E907	Temperature sensor over temperature	Connect GW after-sales personnel
E908	Temperature sensor abnormality	Connect GW after-sales personnel
E909	Communication abnormality	Connect GW after-sales personnel
E910	AC out of phase or CT short line	Connect GW after-sales personnel
E911	AC current over current	Connect GW after-sales personnel
E912	AC input voltage too low	Connect GW after-sales personnel
E913	High voltage switch abnormality	Connect GW after-sales personnel
E914	IPM Over temperature protection	Connect GW after-sales personnel
E915	PFC module over temperature protection	Connect GW after-sales personnel
E917	Diode temperature sensor failure	Connect GW after-sales personnel
E918	Ambient temperature fault	Confirm the ambient temperature and humidity. If the alarm still cannot be eliminated, please contact GW after-sales personnel
E919	Radiator inlet temperature failure	Connect GW after-sales personnel
E920	Radiator port temperature failure	Connect GW after-sales personnel
E921	Diode temperature is too low	Connect GW after-sales personnel
E922	Radiator failure	Connect GW after-sales personnel

7. Warranty

7.1 General warranty

A. GW (Shanghai) Laser Technology Co., Ltd. guarantees that after the product is shipped, GW (Shanghai) Laser Technology Co., Ltd. will not have any lien or encumbrance on the product.

B. Unless otherwise specified by GW (Shanghai) Laser Technology Co., Ltd., GW (Shanghai) Laser Technology Co., Ltd. provides a 24-month warranty (from the day of shipment) for all products against material defects and quality problems. According to the tenth paragraph of the sales terms of GW (Shanghai) Laser Technology Co., Ltd., GW (Shanghai) Laser Technology Co., Ltd. will choose to 1) repair 2) replace 3) return the products that are confirmed to be defective and are still within the warranty period. payment. All repaired or replaced products will continue to have the original warranty period of the original repaired product, that is, free repairs can only be made during the remaining warranty period of the original repaired product. The buyer must make a written repair report within 30 days of discovering product quality problems. All repair requests must be submitted directly by the buyer. GW (Shanghai) Laser Technology Co., Ltd. will not accept any third party repair requests.

C. The above repair report does not apply to product problems caused by the following situations: 1) Incorrect or inappropriate maintenance or calibration performed by non-GW (Shanghai) Laser Technology Co., Ltd. personnel 2) Software and interfaces provided by customers or third parties or power supply 3) unauthorized modification; incorrect operation outside the limits of product parameters; 4) abuse, neglect, accident, loss or damage in transit; or 5) unauthorized maintenance or repair.

D. The above warranty regulations are unique. In addition, GW (Shanghai) Laser Technology Co., Ltd. will not assume any form of (whether express or tacit) written or oral maintenance liability proposed by regulations or laws. terms. GW (Shanghai) Laser Technology Co., Ltd. expressly disclaims the repair liability and terms of the legal implied warranties, including (but not limited to) the implied warranties of merchantability and fitness for purpose.

E. The technical guidance and services provided by GW (Shanghai) Laser Technology Co., Ltd. to customers will not affect the warranty terms provided by GW (Shanghai) Laser Technology Co., Ltd.

7.2 Service and repair

CAUTION:

There are no built-in user serviceable parts. All repairs should be performed by GW (Shanghai) Laser Technology Co., Ltd. personnel. Therefore, any repair or replacement requirements within the warranty scope must be notified to GW Company or the service representative in your area as soon as possible when the problem is discovered. Approved return products must be placed in the appropriate box. If you find any damage to the goods received, you should promptly report it to the carrier in writing.

IMPORTANT:

Please do not return products to GW Company without a Return Merchandise Authorization (RMA). If the product warranty has expired, or the product is no longer within the scope of repair, the buyer will be responsible for the cost of repair.

7.3 Change

We reserve the right to change the design and structure of our products, and we will not assume any responsibility for modifications to products of the same model that have already been sold.

