

**HRLASER**



## A3Mi Series Handheld Laser Welding Machine

# USER MANUAL

SHENZHEN HRLASER CO., LTD.

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## Preface

Please read and fully understand the contents of this manual before using the product, familiarizing yourself with all operational and maintenance instructions. HRLASER strongly recommends that all operators pay special attention to the safety information contained herein prior to operation. This user manual provides critical operational and safety information for users, operators, and owners, and should be kept readily available for reference.

If technical assistance is required, please contact HRLASER customer service.

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This manual is intended for all owners and operators of HRLASER equipment, as well as any personnel working in the vicinity of the equipment. This product must be operated only by qualified personnel who have received proper training, regardless of their professional welding experience.

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## Introduction

Thank you for choosing the handheld laser welding products developed and manufactured by Shenzhen HRLASER Co., Ltd. We have prepared this manual to assist you with the optimal operation and maintenance of your equipment. We value your feedback; if you have any suggestions during use, please feel free to contact us to help us continuously improve our products.

Important:

Before operating this product, please carefully read this User Manual to familiarize yourself with all operation and maintenance procedures. HRLASER strongly recommends that all operators read Chapter 2: Safety Information prior to use to prevent unnecessary risks.

**HRLASER**

# Company

Shenzhen HRLASER Co., Ltd. is an independently operated subsidiary of Maxphotonics Co., Ltd. Leveraging Max's 22 years of expertise in laser devices and components, HRLASER brings together top technical talent to drive comprehensive innovation in handheld laser welding equipments. HRLASER is the first—and only—company in China to independently develop and produce its core components, key accessories, and main control systems, achieving deep integration across the entire industry chain. This unique advantage forms the backbone of its products' competitive edge, pioneering a new era of low-power, air-cooled, portable handheld laser welding machines. HRLASER is committed to providing customers worldwide with handheld laser welding devices of outstanding quality and a transformative user experience, continuously advancing welding technology and leading the next revolution in welding tools.

Founded in 2004, Maxphotonics Co., Ltd. is a world-class fiber laser company and one of China's earliest fiber laser manufacturers. Integrating R&D, production, and sales of fiber lasers and core optical components, Maxphotonics is among the few national high-tech enterprises in China to hold independent intellectual property rights and achieve vertical integration in both core technologies. Since its inception, the company has secured over 600 patents and 60 software copyrights, with products sold in more than 50 countries and regions, serving over 5,000 global enterprise clients, and ranking among the top two in international sales. Headquartered in Shenzhen, Maxphotonics also operates R&D and production bases in Suzhou and Anshan, covering a total area of over 66,000 m<sup>2</sup>, including 50,000 m<sup>2</sup> of factory space and 17,000 m<sup>2</sup> of cleanrooms. Guided by the strategy "Innovation Drive, Integration Thrive" and the mission of "Make Technology Benefit All", Maxphotonics continues to meet diverse laser equipment needs, driving efficient industry operations and the upgrading of the manufacturing sector.

For more information, please visit our website: [www.hrlaser.com](http://www.hrlaser.com)



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Product V0.1 is subject to the latest design without further notice.

# Safety Warning

Note:

© Please read the label and instructions carefully before use.

Equipment name: Handheld laser welding machine

Protection level: 4

## 1-Hazards

- |                      |                    |                        |
|----------------------|--------------------|------------------------|
| 1. Burns             | 2. Electric shock  | 3. Crushing/collisions |
| 4. Impact of objects | 5. Laser radiation | 6. Dust                |
| 7. Fire              | 8. Noise           |                        |

## 2-Accident Causes

1. Not wearing protective goggles or gloves may result in eye injury or burns from touching hot parts.
2. Unauthorized opening of the laser source may result in electric shock.
3. Poor safety measures or using faulty equipment may lead to accidents.
4. Poor maintenance, aging electrical components, and damaged insulation may cause accidents.
5. Unauthorized or untrained personnel operating the equipment.
6. Not wearing proper PPE.
7. Poor organization of workspace, placing flammable/explosive items in laser area.
8. Improper grounding.

### Important Notice

Unauthorized personnel are prohibited from operating. Equipment must be inspected.

### **3-Safety Requirements**

1. Laser poses safety hazards to the human body. Professional protective goggles and gloves must be worn during operation, and it is not advisable to directly look at the laser during welding.
2. During welding, there should be no movement of personnel on the front and side of the welding gun. Do not place objects with mirror reflection around the laser system to avoid exposing personnel and flammable and explosive materials to the laser.
3. When stopping laser welding, turn off the laser switch. When repairing the laser, please turn off all power supplies or turn off the laser switch. Do not aim the welding gun at people or other objects, which may cause laser damage
4. The welding protective gas must be clean and dry, and the air pressure should be controlled below 0.5MPa.
5. The body must be reliably grounded.

Before starting welding or debugging, the protective gas must be turned on, otherwise the optical lens will be damaged. When the laser weakens during welding, please check whether the protective lens is damaged. When replacing the protective lens, pay attention to the cleanliness of the lens, and there should be no fingerprints or other contamination.

7. When the finished parts are welded, pay attention to the residual heat temperature of the workpiece and do not touch them directly with your hands to avoid scalding.
8. When taking or placing the welding gun, please handle it gently, do not bend or pull it improperly, and clean the gun head regularly.
9. Unauthorized personnel are not allowed to perform maintenance operations to avoid accidental injury. Before opening the cover, be sure to unplug the power cord from the socket.
10. Environmental requirements: There should be no dust, flying dust, or other small particles floating at the equipment use site.
11. It is recommended that the device be 1 m away from the ground when it is

installed in a dusty environment.

12. Dust removal twice a month (using compressed air and cleaning the dust-proof net)

13. The power supply line of the whole machine should be directly connected to the circuit breaker, and ensure that the wire between the circuit breaker and the electric meter uses a 4 square national standard wire. It is forbidden to connect the three-pin plug without permission to avoid overloading and burning of the indoor wires.



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# Chapter 1

## Description of Features

The A3Mi series is a high-efficiency, high-reliability, and maintenance-free high-power laser series developed by HRLASER. It adopts phase-change heat dissipation, with a wavelength range of 1070 nm to 1090 nm. The laser efficiency is >27 percent.

The A3Mi series lasers belong to Class 4 laser products, which are designed and tested with safety in mind.

The unique properties of lasers may cause safety hazards and cannot be simply regarded as other light sources. All personnel operating or approaching lasers must be aware of these special hazards. Therefore, HRLASER recommends: Please strictly follow all warnings and safety tips in this manual to ensure safe operation and optimal performance. During operation, maintenance, and service of this equipment, do not disassemble the equipment without permission to ensure the safety of operators.

This product does not have any parts, components, or components that need to be repaired by users themselves. HRLASER will not provide warranty for damage to equipment or accessories caused by unauthorized disassembly and installation of lasers.

HRLASER has launched the A3Mi series handheld welding laser system, which consists of a compact welding control unit and a handheld welding gun with ergonomic and lightweight built-in beam swing function. By following this user guide and applying reliable laser safety measures, it can be a safe and reliable device. Due to its special characteristics, it poses more safety hazards than other sources of light. All laser operators and personnel in the vicinity must pay

attention to the hazards of the laser and use personal protective equipment. To ensure the safe operation and optimal performance of the product, follow all instructions in this guide and observe all safety-related warnings. These safety precautions must be observed at all stages. We urge operators to comply with these recommendations and adopt reasonable and safe methods of laser operation. At all times, operators should review safety guidelines and requirements for all welding.

Intended use: Applications include welding and brazing, and the materials treated include stainless steel, carbon steel, galvanized sheet, aluminum, and copper.

HRLASER has proved that this laser has passed thorough testing and inspection. The pre-shipment inspection is in accordance with the published specifications. When you receive the equipment, please check whether the packaging and components are damaged. If so, it may have occurred during transportation. If the damage is obvious, please contact Shenzhen HRLASER Co., Ltd.

## Chapter 2

# Security Information

### 1-Handheld laser welding machine safe use

Handheld laser welding machine is a dangerous, invisible laser Fallout 4 laser product. The emission wavelength of this product 1080 nm infrared laser radiation, and the average power emitted by the welding head is greater than 100 W, can cause damage to the eyes and skin exposed directly or indirectly to such light intensity. This infrared radiation is invisible, and the laser beam can cause irreparable damage to the retina or cornea. Before operating the handheld laser welding machine, please be sure to wear suitable and certified 1080nm near- infrared band laser protective goggles.

Important:

© Never look directly at the fiber output connector, and make sure to wear appropriate protective goggles when using the laser to avoid injury.

© Do not turn on the laser because there are no product parts or accessories inside the laser for user use. All product maintenance and repair can only be performed by authorized service personnel of HRLASER.

© When using this product, please use a suitable grounding power supply and normal voltage. The power supply line of the whole machine should be directly connected to the circuit breaker, and ensure that the wire between the circuit breaker and the electric meter uses a 4 square national standard wire. It is forbidden to connect the three-pin plug without permission to avoid overloading and burning of the indoor wires.

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

- © Do not expose the product to excessively humid environments.
- © The laser uses air cooling. Please ensure that the ambient air is dry and clean.
- © Operations or adjustments beyond the scope specified in this manual may cause dangerous radiation injuries.
- © Keep the output bond head clean. After each use, close the protective cover. Do not touch the bond head lens with your hands and do not use any solvent to clean the lens. When cleaning and maintaining the lens as necessary, be sure to use lens wipes.

Warning:

- © Operation or adjustment beyond the scope specified in this manual may cause radiation damage.

## 2-Safety regulations

As shown in the table below, all safety warning signs (not limited to the signs attached to the laser body) during the operation of the handheld laser welding machine include:

| SYMBOLS                                                                             | NAME                   | DESCRIPTION                                                                                                                                                                                |
|-------------------------------------------------------------------------------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | Electrical hazard      | Warning:<br>Text marked with electrical warning symbol indicates potential personal danger. If you do not follow certain procedures, certain or fatal harm may be caused to you or others. |
|  | Laser radiation hazard | Note:<br>Text with a laser radiation warning symbol indicates a potential personal danger. We have affixed this mark to the laser output end of the product.                               |

|                                                                                                                                                                                                                                                          |                                  |                                                                                                                                                                                                                                                                              |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                         | Warning                          | <p>Note:</p> <p>Text with a warning symbol indicates a potential product hazard. It requires an operating procedure that, if not followed correctly, can result in damage or destruction of the product or component.</p>                                                    |
|                                                                                                                                                                         | laser safety housing             | <p>Note:</p> <p>The operation of the welding device shall be performed only in the laser safe or in the enclosure (or room) with the safety device that has been interlocked. If someone enters unexpectedly, the interlock automatically shuts down the welding system.</p> |
|                                                                                                                                                                         | Direct and Reflected Beam Hazard | <p>Note:</p> <p>symbolic representation A potential danger, indirectly or directly to the eye or the skin is exposed to the laser beam due to welding. Personnel must wear protective equipment and clothing.</p>                                                            |
|                                                                                                                                                                         | Direct Beam Pointing Hazard      | <p>Note:</p> <p>Never look directly at the output welding "gun" or point the gun at other people. This is extremely dangerous behavior and can cause personal injury.</p>                                                                                                    |
|  <div data-bbox="125 1139 242 1182" style="background-color: blue; color: white; padding: 2px; text-align: center;">       Safety Glasses<br/>Must Be Worn     </div> | Wear Laser Safety Glasses        | <p>The symbol indicates that personnel must wear laser safety glasses (Personal Protective Equipment) to prevent laser radiation hazards.</p>                                                                                                                                |
|                                                                                                                                                                       | Wear protective gloves           | <p>The symbol indicates that personnel must wear laser-resistant and heat-resistant protective gloves.</p>                                                                                                                                                                   |

|                                                                                   |                               |                                                                                                     |
|-----------------------------------------------------------------------------------|-------------------------------|-----------------------------------------------------------------------------------------------------|
|  | Wear protective clothing      | The symbol indicates that personnel must wear laser-resistant and heat-resistant protective aprons. |
|  | Wear noise-canceling earplugs | The symbol indicates that personnel must wear anti-noise earplugs to protect against noise injury.  |

### 3-Laser protection

#### 1. Laser protective eyewear requirements

The laser safety goggles should be selected based on the ability to shield the entire wavelength range of the laser emitted by the handheld laser welding machine. When operating this device, please wear suitable laser safety goggles. The selection of suitable laser safety goggles requires the end user to accurately identify the wavelength range emitted by the product. If the device is a tunable laser or Raman product, it emits light in a certain wavelength range. The end user should confirm that the laser safety glasses used are capable of preventing the light emitted by the device over its entire wavelength range. Please check the safety label on the product and verify the personal protective equipment. (i.e., safety cover, observation window or window, goggles, etc.) Whether the power consumption and wavelength range are sufficient. The decision on safety glasses must also take into account any secondary radiation hazards caused by the welding process (see chapter II, sect. 4-1)

#### 2. Laser protection equipment manufacturer

Whether the laser is used in a new facility or retrofit of an existing system, it is the sole responsibility of the end user to determine the suitability of all PPE.

Several laser safety equipment suppliers provide materials or equipment. These include LaserVision USA, Kentek Corporation and Rockwell Laser Industries. There are also other laser personal protective equipment suppliers. HRLASER provides the names of these suppliers for convenience only and does not imply endorsement or recommendation of any of these suppliers, nor does it imply endorsement or recommendation of their products or services. HRLASER assumes no responsibility for their advice, products or services.

## **4-Welding Process Safety**

### **1. Radiation Hazard**

Visible and invisible light radiation is generated during the welding process. The interaction between the high-power laser beam and the target material being welded may produce plasma, which produces ultraviolet radiation and "blue light," which may cause conjunctivitis, retinal photochemical damage, or skin sunburn-like reactions. Welders who are exposed to invisible ultraviolet light without proper protection may suffer permanent eye damage.

### **2. Skin Hazard**

Exposure to infrared and ultraviolet radiation during welding can damage the skin. Infrared and ultraviolet light can cause skin burns, increase the risk of skin cancer for welders and accelerate signs of skin aging. Welding sparks can also cause burns. Laser material processing can transfer a large amount of energy into the part. Even after the cutting process is complete, the parts can be very hot to the touch. Make sure to use appropriate personal protective equipment to prevent potential burns. Take precautions to prevent skin damage by wearing protective clothing such as fire-resistant gloves, hats, leather aprons, and other fire-resistant clothing. The sleeves and collars should be fastened.

### **3. Fire Hazard**

If combustible or combustible materials are close to the welding area, the heat and sparks generated during the welding process can cause fire or explosion.

Laser welding can only be performed if there is no combustible material in the area. Do not weld containers that contain flammable or combustible materials. If the contents of the containers are unknown, they should be assumed to be flammable or combustible. Fire extinguishers should be located nearby, easily accessible, and have personnel trained to use them.

#### **4. Smoke Hazard**

Welding "smoke" can be composed of very fine particles and gases. Welding fumes and gases come from a combination of welding materials or any filler materials used, protective gases used, paints, coatings, chemical reactions, and air pollutants. Welding smoke can have adverse effects on the lungs, heart, kidneys, and central nervous system.

- (1) When welding, keep the head away from smoke. Welding must be done in a well-ventilated area to ensure safe breathing air.
- (2) Use a smoke exhaust system to remove steam, particles, and hazardous debris from the welding processing area.
- (3) In enclosed spaces and other situations, respirators may also be required.
- (4) Routine air monitoring should be conducted to determine the harmful smoke level in the welding area.

#### **5. Gas cylinder safety**

If the cylinder is damaged or placed near the welding area, the cylinder may explode. The protective gas cylinder should be placed in a place that will not be impacted or damaged. Keep them away from heat sources, sparks, or flames. The cylinders must be stored upright and secured to a fixed support. There is a need for a working adjuster suitable for the required gas and pressure. All hoses and fittings shall also be suitable for application and in good working condition.

## 6. Lighting safety index



Important:

© When the power supply (PS) is activated, the laser is in a dangerous state. All precautions must be taken.

Take precautions to prevent accidental exposure to direct and reflected beams. Diffuse and specular reflection can cause severe damage to the retina or cornea, leading to permanent eye damage. Class 4 laser beams also pose a potential risk of fire and skin damage when operating or in the vicinity of the equipment, and all personnel must wear all recommended PPE during operation. Includes safety glasses and a helmet with a mask. To ensure that the information about laser safety is known to you, please use laser control measures correctly to adjust or control the execution of the procedure, otherwise you may be exposed to harmful radiation environments.

## 7. Safety guidance

In order to ensure safe operation and optimize the performance of this product, please strictly observe the following warnings and important information, as well as other information contained in this manual.

Warning:

When using this product, make sure to use a suitable grounded power supply.

Warning:

Users are not allowed to open any components inside this product for repair. If necessary, please contact HRLASER technicians for repair services. Any unauthorized modification to this product will invalidate the warranty.

**Warning:**

The output connector of this product is connected by fiber optic cable and handheld welding connector. Use the hand-held bond head with care. Warning: If this product is not operated according to the instructions in this manual. The protection mechanism provided by this product may be affected. This product must be used only under normal conditions.

**Important:**

When operating the laser welding output joint, (For example, install optical cable connectors, use optical instrumentals detection connector end face and wire filling.)

Make sure to keep the AC power off.

**Warning:**

Never look directly at the fiber output connector and make sure to wear appropriate protective glasses when using laser products to avoid injury.

**Important:**

Performing operations or adjustments beyond the scope specified in this manual may cause radiation damage.

**8. Secondary radiation hazard**

During welding, both visible and invisible radiation are generated. The interaction between a high-power laser beam and target materials can produce ultraviolet radiation and plasma emitting “blue light,” which may cause conjunctivitis, photochemical retinal damage, or sunburn-like skin reactions.

Welders exposed to invisible UV radiation without proper protection may sustain permanent eye damage.

Even brief exposure to invisible UV radiation during welding may cause blurred

vision, burning sensations, tearing, eye pain, and irritation (feeling of sand in the eyes).

## 9. Welding Protection and Hazard Prevention



Warning:

© Personal protective equipment (PPE) must be worn at all times to prevent eye exposure to hazardous radiation during welding!

A combination of welding gloves, helmets, and certified laser safety goggles is required. Ear protection such as noise-reducing earplugs should be used to minimize noise exposure. Helmets also protect welders from heat, metal particles, and sparks. All personnel working near the welding area must wear PPE.



© Hazards during welding-Wear personal protective equipment!



Warning:

© If flammable or combustible materials are present near the welding area, the heat and sparks generated may cause fires or explosions. Laser welding may only be carried out when the area is free of combustible materials.

Never weld on containers holding flammable or combustible substances. If the contents of a container are unknown, they must be assumed flammable. Fire extinguishers must be readily accessible, and personnel should be trained in their use.

## 10. Hazards of Reflected Beams



Warning:

© Secondary laser beams at various angles may be generated near the output aperture. These “specular reflections” occur when the beam hits reflective surfaces. Laser welding, especially with reflective materials, may produce intense reflections capable of damaging eyes, skin, and equipment.

Highly reflective metals such as aluminum and copper can reflect part of the beam energy, requiring additional safety precautions. Multiple reflections may endanger operators.

Understand the expected reflection cone of each workpiece and avoid placing any part of the body within it.



Warning:

© Operators must remain aware of reflections at all times. Improper laser parameter settings may increase reflection hazards.

To ensure safe operation:

1. Select the appropriate mode based on material and thickness.
2. Use the correct wire feeding nozzle and welding nozzle.



Warning:

- © For safety reasons, HRLASER recommends that equipment operators only use HRLASER nozzle tips. The part number of the HRLASER Nozzle Tip Kit is shown in Section 11 of Chapter 4. A replacement nozzle tip can be purchased.
- © For the correct angle and position of the welding gun, see Section 11 of Chapter 4.

## 11. Hazard of Welding Smoke



Warning:

- © Hazards of welding smoke inhalation!

Welding "smoke" can consist of very fine particles and gases. Welding fumes and gases come from a combination of the materials being welded or any filler materials used, shielding gases used, paints, coatings, chemical reactions and air pollutants. Welding fumes can adversely affect the lungs, heart, kidneys and central nervous system. When the laser interacts with the target material, such as plastics, metals, and composite materials, the target material may begin to evaporate. Smoke and fog are often invisible but are very toxic and pose a serious health hazard. Welding in enclosed Spaces with poor ventilation is very

dangerous. Dangerous concentrations of toxic smoke and gas can build up quickly, causing coma or death by suffocation. Ultraviolet light released during welding reacts with oxygen and nitrogen in the air to form ozone and nitrogen oxides, which can be deadly at high concentrations. Shielding gases used during welding may displace air and cause injury or death.

- Keep your head away from smoke during welding. Always weld in a well- ventilated area to ensure that breathing air is safe.
- It is necessary to capture and vent dangerous smoke and steam. Use a smoke exhaust system to remove steam, particles, and hazardous debris from the welding processing area.
- Read and observe the safety data sheets and warning labels for all welding materials used.
- In confined spaces and other situations, respirators may also be required.
- Routine air monitoring shall be performed to determine the level of hazardous smoke in the welding area.

## 12. Gas cylinder safety



Warning:

© If the cylinder is damaged or placed near the welding area, the cylinder may explode. Gas cylinders should be shielded and placed where they cannot be hit or damaged. Keep them away from heat sources, sparks, or flames. The cylinders must be stored upright and secured to a fixed stand. It is necessary to ensure proper storage and pressure regulation of any gas. All hoses and fittings must also be suitable for the type and pressure of gas used in the welding application.

### 13. Optical safety



#### Warning:

© The laser output is transmitted through a window. Make sure the windows are clean and of good quality. Any dust at the end of the head assembly can burn the window and damage the laser. Check the quality of the spot emitted from the laser output at low power levels and gradually increase the power consumption. When the device is powered on, do not directly observe the laser holes such as the output fiber or the soldering head. Always wear safety goggles and a helmet with a mask when handling the product. People in the vicinity must also wear the same safety equipment. Make sure all PPE is suitable for the power consumption and wavelength ranges listed on the laser safety label attached to the product.



#### Warning:

- © When supplying power to the laser, never directly check the output port.
- © Avoid placing the handheld laser welding machine and related optical output devices at the same level as the eyes
- © Avoid using lasers in dark environments.
- © Provide a housing for the laser beam.



Warning:

© When the laser is activated, do not install or terminate the laser head. When performing these tasks, always make sure that the switch is in the "off" position and the unit is disconnected from the AC power supply.

#### 14. Equipment and solvents



Warning:

© Photosensitive components in the equipment, such as cameras, photomultiplier tubes, and photodiodes, can also be damaged by laser irradiation. The laser is strong enough to burn skin and clothes. The laser can cut and weld metal. Laser can ignite volatile solvents such as alcohol, gasoline, and ether. When installing and using the equipment, exposure to solvents or other flammable materials and gases must be avoided.

#### 15. Electrical safety



Warning:

© Before supplying power to the unit, all electrical and welding gas connections must be ensured. In addition, if applicable, all connections must be secured with screws to ensure proper functioning. Ensure that the input voltage of the laser is normal. Otherwise, there are safety risks. All cables and connections should be in normal condition. All components of electrical cables, connectors or equipment enclosures shall be considered to be safety risks.

© Ensure electrical safety: Ensure that the device is properly grounded through the protective conductor of the AC power cable. Protect the grounding terminal, any interruption may cause personal injury.

© Before supplying power to the device, ensure that the correct AC power supply voltage is used. Failure to use the correct voltage may cause damage to the equipment. For the correct power connection, refer to the markings on your specific model.

© There are no parts that can be repaired by the operator internally, and all services are provided by consulting professional technicians from HRLASER. To prevent electric shock, do not remove the protective cover. Any tampering with the product will invalidate the warranty period.

© Connection of external circuits other than power connections: The external connection between this product and other external devices is PELV (protected ultra-low voltage) defined by 61140. Non-power supply for other devices connected to this product

The output should also be PELV or SELV (safe ultra-low voltage).

## 16. Environmental safety



Warning:

© Electronic equipment must be disposed of in accordance with regulations on electronic and electronic waste disposal.

Make sure all PPE is suitable for the power consumption and wavelength range listed on the laser safety label attached to the laser.

© Handle the laser equipment with caution, otherwise the laser may be damaged.

For more information, please refer to the product specification. This device should not be used in places where unprotected persons or children may be present. Keep away from sources of shock or vibration. A suitable housing shall be used to ensure a safe working area for the laser. This includes, but is not limited to, laser safety signs, interlocking devices, appropriate warning devices, and safety procedures. Avoid placing the handheld laser welding machine and related optical output devices at the same level as the eyes.

Humidity requirements: Do not expose the equipment to a high humidity environment (humidity > 85%).

This laser device is air-cooled. Operating at higher temperatures accelerates aging, increases threshold current, and reduces slope efficiency. If the device is overheating, do not use it and call HRLASER for assistance.

Make sure that the working surface is properly ventilated. When a laser beam reacts with any material, it produces steam

sparks and particles. The by-products produced during laser treatment are often toxic and may pose additional safety hazards. This smoke must be discharged from the work area through a ventilation system.

For general information about laser products, please visit the official website of HRLASER!

## 5-Reference standard

### **Electromagnetic compatibility immunity:**

EN IEC 61000-6-4:2019

EN IEC 61000-6-2:2019

### **Power supply safety:**

EN 62368-1:2014+A11:2017

### **Laser Safety:**

ISO 12100:2010

ISO 11553-2017

EN 60204-1:2018

### **Functional Safety:**

EN 60825-1:2014+A11:2021

CDRH 21 CFR 1040.10

Please Note:

© According to EU and national standards and requirements, lasers must be classified according to their output power and laser wavelength. All laser products of the high power MFSC series are Class 4 products (according to EN 60825-1, chapter 8)

## 6-General safety indications

### 1.Mirror reflection

The position of the output port of the handheld laser welding machine may produce a secondary laser beam that radiates outward at multiple angles. This phenomenon of divergent beam generated by the main beam of the handheld laser welding machine after being reflected in the plane is called mirror reflection. Although the energy of the secondary laser beam is much smaller than that of the main laser beam, this intensity can also cause damage to the eyes, skin, or some material surfaces, such as human eyes. When welding high-reflection materials, special attention should be paid to ensure that there is no one on the opposite side and there is no combustible material.

Warning:

© Since the laser radiation is invisible, you must be extra careful to avoid or reduce mirror reflection.

### 2.Parts safety notice

The photosensitive components integrated in the optical components related to handheld laser welding machines may be damaged due to laser exposure, so attention should be paid to the protection of the relevant components.

Warning:

© The output laser intensity of the HRLASER handheld laser welding machine is sufficient to weld metal, burn skin, clothing, and paint, and ignite volatile substances such as alcohol, gasoline, and ether. Therefore, during operation and use, it is necessary to isolate flammable materials around the handheld laser welding machine.

**3. Optical operation instructions HRLASER strongly recommends that you read the following operating points before operating the handheld laser welding machine:**

(1) Do not directly look at the light hole of the handheld laser welding machine;

- (2) Avoid placing the handheld laser welding machine and related optical output devices at the same level as the eyes.
- (3) Select safety protection equipment according to the power consumption and wavelength requirements of the handheld laser welding machine to ensure the safety of operators;
- (4) Warning signs should be pasted in the area where the handheld laser welding machine is placed to limit the safe area for operating the handheld laser welding machine.
- (5) Do not use the handheld laser welding machine in a dark environment.
- (6) Please ensure that the handheld laser welding machine is turned off and the power is disconnected before installing and cleaning the protective lenses, copper nozzles, and wire feeding structural components.
- (7) When performing debugging, calibration, and focusing work, please do it without laser output. After the debugging is completed, turn on the laser.
- (8) Please strictly follow the instructions in this document to operate the equipment. Otherwise, it will weaken the protective device and performance of the equipment, and HRLASER will not provide warranty for this.

**Note:**

© The optical path output of the handheld laser welding machine will be connected to the lens with anti-reflection coating before being emitted. Before using the handheld laser welding machine, please strictly inspect the output head lens and rear-end lens of the handheld laser welding machine to ensure There is no dust or any other debris on the lens. Any visible attachment can cause serious damage to the lens, leading to the burning of the handheld laser welding machine or any secondary optical path equipment.

© Please refer to the "Fiber Connector Inspection and Cleaning Guide" to follow the cleaning and inspection process of the lens.

- © Please be careful of the possible hot phenomenon or molten metal fragments that may occur during the operation of the handheld laser welding machine.
- © When conducting output debugging and calibration of the handheld laser welding machine, it is necessary to set the handheld laser welding machine to detect the quality of the laser output spot through the indicator red light under the condition of no laser output, and then turn on the laser only after there are no abnormalities.

Warning:

- © Reasonable selection of safety protection equipment according to the laser power consumption and wavelength requirements.
- © Do not look directly at the gun head and ensure that safety goggles are worn during each operation.

#### 4. Electrical operation instructions

**HRLASER strongly recommends that you read the following operating points before operating the handheld laser welding machine:**

- (1) Please ensure that the equipment shell is well grounded. Any interruption in the grounding circuit may cause personal injury.
- (2) Before using the power supply connected to the equipment, please make sure that the protective ground is connected;
- (3) In order to reduce the risk of fire, when necessary, replace the fuse of the same type and grade, and cannot be replaced with other fuses or materials.
- (4) Ensure that the input AC voltage of the handheld laser welding machine is the normal AC mains voltage (single-phase voltage 200-240VAC), and the wiring is correct. Any incorrect wiring method may cause personal or equipment injury;
- (5) Except for the consumables of the gun head, all maintenance operations for parts, components, or components that users do not need to repair themselves

need to be completed by professional personnel from HRLASER.

(6) It is strictly forbidden to disassemble and assemble the handheld laser welding machine without authorization, and damage the relevant labels, otherwise there is a risk of electric shock or burns.

(7) There should be no flammable materials near the welding area. The heat and sparks generated during the welding process may cause fires or explosions. Laser welding can only be carried out in areas without combustible materials.

(8) Do not weld on containers containing flammable or combustible materials. If the contents of a container are unknown, you should assume that they are flammable or combustible. Fire extinguishers should be nearby and easily accessible, and personnel should be connected Trained in the use of fire extinguishers.

(9) Any products that have been disassembled and assembled without authorization will no longer enjoy the warranty rights.

**Warning:**

ⓘ The input voltage of the handheld laser welding machine is single-phase AC (200-240VAC), which poses a risk of electric shock. All associated cables and connections have potential hazards.

**5. Operating environment requirements for handheld laser welding machine** This device is commonly used for: (1) Below 2000 meters above sea level, (2) Class II overvoltage, (3) Environmental pollution degree 2, (4) Dry position. For more information, please refer to the product specifications.

**Humidity:** It is strictly forbidden to expose the equipment to high humidity environments (> 85% humidity)

**Cooling and temperature:** The laser device is cooled by air. Operating at higher temperatures accelerates aging, increases threshold current, and reduces slope efficiency. If the device is overheating, do not use it and call HRLASER for

assistance. When the laser temperature is too high, the device triggers an alarm and stops emitting light.

To ensure the safety of the laser work area, the interaction between the laser and the work surface may create additional safety hazards due to the high temperature of gas, sparks, and debris. The corresponding operators need to undergo certain assessment and training, and be familiar with and master the routine safety regulations of laser operation.

**HRLASER recommends that you follow the following measures to extend the service life of the handheld laser welding machine:**

- (1) Please ensure that the work area is properly ventilated and place the handheld laser welding machine in a dry, cool, and clean environment. Do not expose the handheld laser welding machine to high temperature, high humidity, or water ingress hazards.
- (2) During the operation of the handheld laser welding machine, ensure that there are no foreign objects blocking the bottom suction port of the laser, and ensure that there are no debris within 1 meter that affects the smooth air intake. Ensure that the air outlet at the top is smooth within 1 m.
- (3) Ensure that no debris (including liquid) enters the laser inside the top, otherwise it will damage the laser and cause personal injury.
- (4) Operating the equipment at high temperatures will accelerate aging, increase the current threshold, and reduce the sensitivity and conversion efficiency of handheld laser welding machines. If the equipment overheats, stop using it and seek help from HRLASER.

**Note:**

© Please operate the equipment with caution to avoid accidental damage to the equipment.

© The bottom filter of the laser needs to periodically remove dust and dirt from the air inlet.

## 7-More security information

**If you need more laser safety information, please refer to:**

Laser Institute of America (LIA)

13501 Ingenuity Drive, Suite 128

Orlando, Florida 32826

Phone: 407 380 1553, Fax: 407 380 5588

Toll Free: 1 800 34 LASER

American National Standards Institute

ANSI Z136.1, American National Standard for the Safe Use of Lasers

(Available through LIA)

International Electro-technical Commission

IEC 60825-1, Edition 1.2

Center for Devices and Radiological Health

21 CFR 1040.10 - Performance Standards for Light-Emitting Products

US Department of Labor - OSHA

Publication 8-1.7 - Guidelines for Laser Safety and Hazard Assessment.

Laser Safety Equipment

Laurin Publishing

Laser safety equipment and Buyer's Guides

## 8-Important safety information

### 1. Laser radiation

Exposure to lasers can cause severe damage to the retina or cornea, leading to permanent eye damage and possibly skin damage. Safety protocols must be followed to prevent accidental exposure to invisible direct reflections. The system can only operate within the laser control area.

### 2. Eye damage

All personnel in the laser-controlled area, HRLASER recommends wearing personal protective equipment, including safety glasses and helmet protective cover devices, to protect the eyes from any reflection or scattering of laser beams, as well as welding strong light, ultraviolet light, heat, and sparks.

### 3. Skin hazards

Exposure to infrared and ultraviolet radiation can cause serious damage to the skin. HRLASER recommends that operators and all personnel working in the laser-controlled area wear protective clothing, including laser-resistant clothing and heat-resistant gloves, hats, leather aprons, and other laser-resistant and heat-resistant clothing. The sleeves and collars should be buttoned up at all times. The sparks generated by welding may also cause Burns laser beams to penetrate metal parts and reach the surface of objects or people. Do not place the machined parts in a position where the laser penetrates the workpiece, which may cause danger.

### 4. Hazards of reflected beam

Highly reflective metals such as aluminum and copper may cause the reflected energy of the laser to be transferred from the target welding site to the laser source or surrounding area, and may pose a danger to all personnel in the laser control area. PPE must be worn in all individual laser control areas, including safety goggles and welded helmets and masks. The operator should never attempt to observe the welding process from the other side. HRLASER provides professional laser welding operation training and wears all recommended personal protective equipment when operating laser equipment.

All users in the laser control area must read the complete user guide and receive comprehensive training before use. During the welding process, always keep your head away from smoke. Welding requires the use of a ventilation system to remove vapors, particles, and harmful debris from the welding processing area. Heat and sparks generated during other hazardous welding can cause fires or explosions. Laser welding should only be used in areas without combustible or flammable materials in the welding area. Do not operate in areas with flammable or combustible materials. Gas cylinders should only be stored in places that cannot be impacted by welding, ensuring that they are stored correctly and can be pressure-regulated for any gas. All hoses and fittings must also be suitable for the type and pressure of gas used in the welding application.

## Chapter 3

# Dismantling Guide

### 1-Unpacking description of shipping case

If the package shows any signs of external damage, check the unit for damage and notify the shipping agent immediately. When you remove the unit from the box, be careful to ensure that the fiber is not broken or damaged. A comprehensive packing list is included in the system documentation. Upon receipt of the product, please check all items against this list.

If any items are missing or the unit is obviously damaged, please contact HRLASER immediately. Do not attempt to install or operate the laser unit in any case if the unit has obvious or suspected damage.

Warning:

- © When unpacking and removing the laser, be careful to avoid collisions or severe vibrations.
- © When taking out the armored cable coiled by the laser, do not twist, bend, or improperly pull to avoid damage.
- © Before using the laser fiber connector, please check the protective lens of the fiber connector to ensure that there is no dust or any other substance on the lens.
- © Damage to precision components of the laser caused by improper operation is not covered by the warranty.

## 2-Delivery and transportation

The transport package is affixed with the carrier and carrier information. Please check the outside of the crate for obvious damage during transportation.

- Identification-The packaging label is affixed to the top panel of the wooden case to identify the manufacturer's name, address, and telephone number; Provide general product information, such as model, model code, serial number; Indicate the date of shipment (month/day/year).

- Impact indicators-The following labels and indicators are attached to the side or the end of the wooden crate to help provide proper guidance for handling.

The laser is a precision valuable item. HRLASER recommends that you follow the steps below to unpack the packaging box:

- (1) Place the product equipment on a flat ground according to the packaging box label.
- (2) Gradually remove the top cover packaging box according to the markings, and remove the top foam shielding board after removal.
- (3) The laser is connected to the fiber optic cable of the gun head. Please take it out carefully to ensure the bending radius of the fiber optic cable > 175mm.
- (4) Remove the foam shielding board and take out the supporting items.
- (5) Please count the accessories according to the "packing list".
- (6) Please properly store all items after unpacking for future transportation or storage needs.



Lift the box upright



Take out and weld the fitting head





Note:

© Do not use fiber optic cables to lift or pull the equipment.

### 3-Certificate of conformity

HRLASER guarantees that this product has undergone comprehensive testing and inspection before packaging and transportation, and complies with published standards and procedures. After receiving this product, please check the packaging for any signs of external damage, check the equipment for damage, and immediately notify the carrier and HRLASER's after-sales personnel; When you remove this product from the box, you must take special care to ensure that the fiber optic cable is not broken or damaged; Please check the attached packing list. Once the product is received, check all items with this list and do not attempt to install or operate the laser equipment under any circumstances if any items are missing or if the equipment has obvious or suspicious damage.

### 4-Packing List for A3MD30i/A3MD40i

| 1  | Air Cooling Laser Source               | 1set          |
|----|----------------------------------------|---------------|
| 2  | Active desiccant                       | 5bag          |
| 3  | Pointed Cotton Swab                    | 1bag          |
| 4  | Round Head Cotton Swab                 | 1bag          |
| 5  | Discarded Masks                        | 2PCS          |
| 6  | Anti-noise Earplugs                    | 1PCS          |
| 7  | Protection Glasses                     | 1PCS          |
| 8  | Protective Lens                        | 5PCS          |
| 9  | Nozzle A+2                             | 1PCS          |
| 10 | Nozzle B+2                             | 1PCS          |
| 11 | Nozzle C 0                             | 1PCS          |
| 12 | Nozzle D 0                             | 1PCS          |
| 13 | Nozzle E-2                             | 1PCS          |
| 14 | Nozzle F-2                             | 1PCS          |
| 15 | Welding Wire 0.8 Wire feed nozzle      | 1PCS          |
| 16 | Welding Wire 1.0 Wire feed nozzle      | 1PCS          |
| 17 | Welding Wire 1.2 Wire feed nozzle      | 1 PCS         |
| 18 | Welding Wire 1.6 Wire feed nozzle      | 1PCS          |
| 19 | F150 Wire feed Rack                    | 1 PCS         |
| 20 | F150 Outer corner welding nozzle       | 1 PCS         |
| 21 | F150 Guide screw                       | 1 PCS         |
| 22 | Hex socket screw set (Include Cushion) | 2 PCS         |
| 23 | Inner hexagon ball head wrench         | 1PCS          |
| 24 | Wrench                                 | 1 PCS         |
| 25 | Masking Tape                           | 1 PCS         |
| 26 | Gloves                                 | 1 pairs       |
| 27 | Trachea                                | 1 PCS (5M)    |
| 28 | Trachea                                | 1 PCS (20 cm) |
| 29 | Two air pipe quick connector           | 1PCS          |
| 30 | Gun Head Rack                          | 1PCS          |
| 31 | Key                                    | 2PCS          |
| 32 | Safe Return Cable                      | 1PCS(5M)      |
| 33 | Ground Wire                            | 1PCS(3M)      |
| 34 | Warning label                          | 1PCS          |
| 35 | Certificate of Conformity              | 1PCS          |
| 36 | External Control Line                  | 1PCS          |

Note: For reasons of product iteration, please refer to the packing list in the box.

## Packing List for A3M50i

| 1  | Air Cooling Laser Source              | 1set          |
|----|---------------------------------------|---------------|
| 2  | Active desiccant                      | 5bag          |
| 3  | Pointed Cotton Swab                   | 1bag          |
| 4  | Round Head Cotton Swab                | 1bag          |
| 5  | Discarded Masks                       | 2PCS          |
| 6  | Anti-noise Earplugs                   | 1PCS          |
| 7  | Protection Glasses                    | 1PCS          |
| 8  | Protective Lens                       | 5PCS          |
| 9  | Nozzle A+2                            | 1PCS          |
| 10 | Nozzle B+2                            | 1PCS          |
| 11 | Nozzle C 0                            | 1PCS          |
| 12 | Nozzle D 0                            | 1PCS          |
| 13 | Nozzle E-2                            | 1PCS          |
| 14 | Nozzle F-2                            | 1PCS          |
| 15 | Welding Wire 0.8 Wire feed nozzle     | 1PCS          |
| 16 | Welding Wire 1.0 Wire feed nozzle     | 1PCS          |
| 17 | Welding Wire 1.2 Wire feed nozzle     | 1 PCS         |
| 18 | Welding Wire 1.6 Wire feed nozzle     | 1PCS          |
| 19 | F150 Wire feed Rack                   | 1 PCS         |
| 20 | F150 Outer corner welding nozzle      | 1 PCS         |
| 21 | Spot welding cuts copper nozzles      | 1 PCS         |
| 22 | F150 Guide screw                      | 1 PCS         |
| 23 | Hex socket screw set(Include Cushion) | 2 PCS         |
| 24 | Inner hexagon ball head wrench        | 1PCS          |
| 25 | Wrench                                | 1 PCS         |
| 26 | Masking Tape                          | 1 PCS         |
| 27 | Gloves                                | 1 pairs       |
| 28 | Trachea                               | 1 PCS (5M)    |
| 29 | Trachea                               | 1 PCS (20 cm) |
| 30 | Two air pipe quick connector          | 1PCS          |
| 31 | Gun Head Rack                         | 1PCS          |
| 32 | Key                                   | 2PCS          |
| 33 | Safe Return Cable                     | 1PCS(5M)      |
| 34 | Ground Wire                           | 1PCS(3M)      |
| 35 | Warning label                         | 1PCS          |
| 36 | Certificate of Conformity             | 1PCS          |
| 37 | External Control Line                 | 1PCS          |

Note: For reasons of product iteration, please refer to the packing list in the box.

## Chapter 4

# Product Use Guide

### 1-Description of features

The handheld laser welding machine integrates the laser, handheld welding gun head, and control system. Compared with traditional handheld welding equipment, it has the significant characteristics of simple configuration, high integration, small size, simple operation, and high degree of intelligence.

#### **Main features:**

- (1) High integration of products
- (2) Excellent artificial mechanical design work
- (3) Continuously adjustable power, fast switch response
- (4) High reliability and excellent beam quality
- (5) High electro-optical conversion rate

#### **Application areas:**

Widely used in hardware, building materials, kitchenware, aerospace, automotive and other industries.

## 2-Laser model description and product functional safety

| Model name                | Meaning of model                                                                                |
|---------------------------|-------------------------------------------------------------------------------------------------|
| A3M-XX-i                  | Indicates the penetration capacity of HRLASER handheld laser welding: XX mm for stainless steel |
| Product functional safety |                                                                                                 |
| electrical safety         | 100: 10<br>SO 11553-2:2015<br>EN 60204-1:2018                                                   |
| laser safety              | EN 60825 - 1:2014+A11 : 2021<br>CDRH 21 CFR 1040.10                                             |

## 3-Description of the front and rear panels of laser welding machine

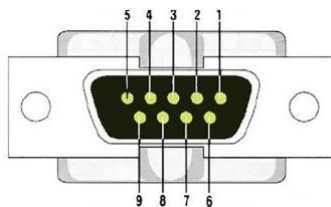
|                                                                                    |                                                                                    |                                                                                    |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|  |  |  |
| A3MD30i                                                                            | A3MD40i                                                                            | A3M50i                                                                             |

| Front panel name      | Description of functions                                                                                                                                     |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ACTIVE/ALARM          | Start-up: blue light; Standby status: green;<br>Laser start: green light; Light output status: red light;<br>Alarm status: blinking red and blue alternately |
| Emergency stop switch | Stop the device light output                                                                                                                                 |
| security key          | Locking the device is forbidden to be used (it is recommended to remove the key when the machine is not in use)                                              |
| LOOP                  | safety loop interface                                                                                                                                        |
| OUTPUT                | gun head interface                                                                                                                                           |

|                                                                                    |                                                                                    |                                                                                    |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
|  |  |  |
| A3MD30i                                                                            | A3MD40i                                                                            | A3M50i                                                                             |

| Back panel name               | Description of functions                                         |
|-------------------------------|------------------------------------------------------------------|
| ON/OFF                        | 200-240VAC AC power switch                                       |
| Ex-CTRL external control port | Interlock emergency stop alarm and external control light output |
| GAS_IN                        | Protection air intake interface                                  |
| POWER                         | 200-240 V AC power input                                         |
| RS232                         | Soldering platform RS232 interface                               |
| FEEDER                        | Wire feeder interface                                            |

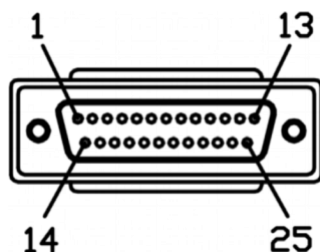
The external control port of this laser welding machine is RS232 interface (DB9), and the interface is defined in the table below.



RS232 interface definition table

| Pin# | Description                 |
|------|-----------------------------|
| 1    | N/A                         |
| 2    | RxD serial port data input  |
| 3    | TxD serial port data output |
| 4    | N/A                         |
| 5    | GND                         |
| 6~9  | N/A                         |

External control I/O interface definition table



| DB25 pin | Color             | Description            | Definition         | Detailed description                       |
|----------|-------------------|------------------------|--------------------|--------------------------------------------|
| 1        | brown and white   | ERROR2                 | Failure output 2   | After failure, foot 1 and 14 are connected |
| 14       | brown             | ERROR1                 | Failure output 1   |                                            |
| 2        | Green and white   | DA(0-10V)input 0~10V-  | 0-10V input -      |                                            |
| 15       | Green             | DA(0-10V)input 0~10V+  | 0-10V input +      |                                            |
| 3        | yellow black      | External laser output- | External light -   | DC24V enable takes effect                  |
| 16       | yellow            | External laser output+ | External light +   |                                            |
| 4        | Black and white   | Modulation input-      | Modulation input - |                                            |
| 17       | Black             | Modulation input+      | Modulation input + |                                            |
| 5        | Red and white     | Emission Enable input- | enable input -     | DC24V enable takes effect                  |
| 18       | Red               | Emission Enable input+ | enable input +     |                                            |
| 6        | orange black      | EMG-                   | Emergency stop -   | Pins 6 and 21 are shorted and valid        |
| 21       | orange            | EMG+                   | Emergency stop +   |                                            |
| 7        | Light green black | EX_LOCK-               | Interlock -        | Pins 7 and 20 are shorted and valid        |
| 20       | Light green       | EX_LOCK+               | Interlock +        |                                            |

|    |                  |                |                             |                                     |
|----|------------------|----------------|-----------------------------|-------------------------------------|
| 8  | Blue and white   | EMG_Check-     | Emergency stop monitoring - | Pins 8 and 19 are shorted and valid |
| 19 | Blue             | EMG_Check+     | Emergency stop monitoring + |                                     |
| 9  | Purple Black     | EX_LOCK_Check- | Interlock monitoring -      | Pins 9 and 22 are shorted and valid |
| 22 | purple           | EX_LOCK_Check+ | Interlock monitoring +      |                                     |
| 10 | Light blue       | STATUS_COM     | State output common end     |                                     |
| 11 | Light blue black | STATUS1        | State output 1              |                                     |
| 23 | Grey             | STATUS2        | State output 2              |                                     |
| 24 | Grey Black       | STATUS3        | State output 3              |                                     |

## 4-Power connection

1. The laser power input cable needs to be connected to single-phase AC power (220VAC), and the industrial power supply is 25A
2. This equipment is a high-current device, and the power supply should not be connected to ordinary sockets. It should be directly connected through a professional distribution box, and ensure good grounding. The wiring should use copper wires of 4 square meters or more to prevent safety accidents such as fires caused by overload!
3. Connect the power line to the specified voltage and phase. L = 220VAC, N = 0VAC, PE = ground. Make sure that the cables are connected correctly before starting the machine. Do not let the PE be connected.
4. To ensure safety features, HRLASER strongly recommends that you connect a 32A circuit breaker (air switch) in series between the power supply unit and the laser. The power supply should be close to the power supply unit of the device so that it can be disconnected.

If you have any further questions about the power connection, please refer to Chapter 5 "Detailed Specifications" to determine the electrical specifications of the product. The electrical connections should be familiar with electrical safety, wire connections, and the wiring should comply with all countries and local regulations.

### 5-Electrostatic grounding connection

The grounding nut of the laser housing must be reliably connected to the ground using a grounding wire to avoid potential damage to the laser caused by static electricity.

The wiring is shown in the figure:

One end of the grounding cable is locked on the laser grounding stud.



One end of the grounding cable is locked on the laser grounding stud.



The other end of the grounding cable is securely clamped to the outdoor grounding pole.

## 6-Secure lock connection

Before turning on the laser, the safety lock must be connected to the laser loop interface. When preparing to emit the laser, the other end of the safety lock (the alligator clamp) needs to be clamped on the workpiece to ensure that the alligator clamp forms a loop with the welding head before the laser can be emitted. The safety clamp can only be clamped on the welded workpiece, and it is strictly forbidden to clamp the safety clamp to the gun head to prevent accidental exposure.

## 7-Gas connection

The welding head is cooled by inert gas, and the gas purity and pressure should be ensured. Generally, nitrogen and argon are used as protective gases, and the purity of the protective gases should reach 99.99%. The input gas pressure should be greater than 80Kpa and less than 500Kpa. In order to ensure the welding effect, a pressure reducing valve with a flow meter (nominal flow rate 25L/min) should be used to accurately control the airflow.

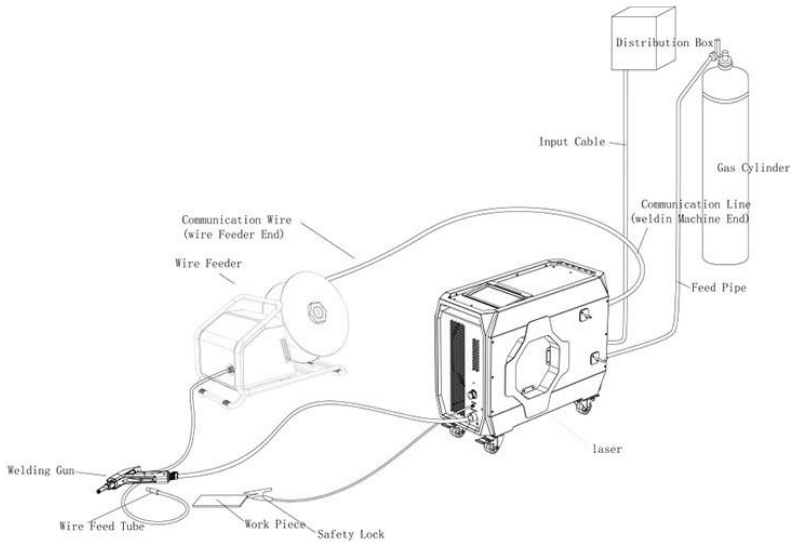
Connect the 6 mm outer diameter air pipe to the Gas in port and adjust the gas flow rate to 15-20 L/min. The valve mode is set to normally open (in the advanced settings interface) to adjust the gas flow rate.

## Laser connection

Here we take the A3MD30i as an example. You can refer to this connection diagram for the A3MD40i and A3M50i models.



### Handheld laser welding machine connection diagram



### 8-Description and installation connection of the wire feeder

The HRLASER welding wire feeding system is a wire feeding system launched in 2022. The system covers the self-developed control system and is equipped with the function of drawing back and filling. HRLASER's multifunctional wire feeder products can be adapted to various handheld laser welding products of HRLASER.

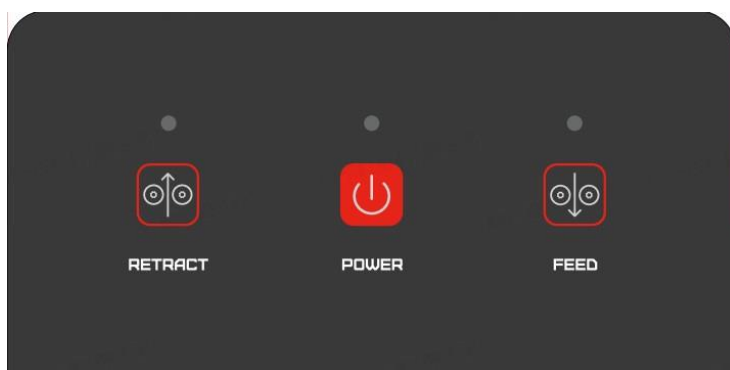
### 1. Running environment and parameters

|                                        |                               |
|----------------------------------------|-------------------------------|
| Power supply voltage (V)               | DC 24V                        |
| Placement environment                  | Flat, no vibration, no impact |
| Operating environment temperature (°C) | -40 ~ 40                      |
| Working environment humidity (%RH)     | < 85                          |
| Storage environment temperature (°C)   | -40~ 85                       |
| Storage environment temperature (%RH)  | < 85                          |
| Maximum supported wire weight          | 25KG                          |

### 2. Attention information

- (1) The wire feeding wheel matches the wire diameter and corresponds to the wire feeding tube.
- (2) Do not bend the wire feeding tube.

### 3. Description of the button of the wire feeder





1. Power button: represents the power button of the wire feeder. When the power is on, the button will light up in green. If the green light is not on, it means the wire feeder is not powered on.



2. Manual feeding button: It represents the manual wire feeding button, which is usually used for daily debugging. When the button is pressed, the green light will be on, indicating that the wire is being fed. Pressing it continuously for 3s will trigger the continuous wire feeding function, and pressing it again will stop the wire feeding.



3. Manual pullback button: It represents the manual wire drawing button, which is usually used for daily debugging. When the button is pressed, the green light will be on, indicating that the button is being pulled back. The manual pullback button adopts a jog design. Pressing it once will pull back once, and continuously pressing it will continue to pull back.

#### 4. Wire feeder size/features



Size: 505.4\*243\*308.09mm

Features:

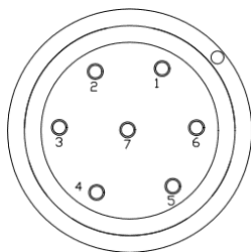
- (1) Laser joint debugging, dual drive force, closed circuit board design, cold-rolled plate shell.
- (2) The feeding/drawing speed is 5 to 50 mm/s, supports continuous wire feeding and pulse wire feeding, and can weld fish scale patterns.
- (3) Supports automatic extraction and automatic feeding functions.

**The wire feeder is mainly used in scenarios where wire feeding is required for welding/welding seams**

Support wire diameter: 0.8 / 1.0 / 1.2 / 1.6mm

Feeding speed adjustment: Turn on the wire feed switch on the touch screen, turn off the laser enable, press and hold the handheld welding head switch, adjust the wire feed speed at low speed (about 10mm/s), and rotate the two adjustable pre-tightening pressure rods to rotate the sleeve according to the tightness of the wire feed. until the silk disk rotates at a uniform speed. (It must be ensured that the wire feeding tube is smooth and there is no bending).

## 5. General definition of circuit connection



| Wiring definition |                                   |
|-------------------|-----------------------------------|
| 1, 2 feet         | Connect to power supply +24V      |
| 3 feet            | Signal input/active low           |
| 4 feet            | GND connected to the power supply |
| 5 feet            | To the shell PE                   |
| 6 feet            | serial port input RX              |
| 7 feet            | serial port output Tx             |

## 6. Mounting of the bond pad/wire feed wheel

Wire Feed Assembly

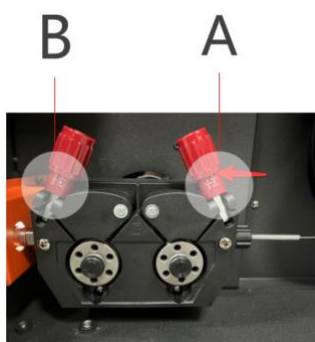


Wire Reel Hub  
Assembly

1. As shown in the above figure, remove the fixing nut of the turntable and place the wire plate on the wire feed turntable.  
and the welding wire is discharged in a clockwise direction, and the fixing nut of the turntable is locked;
2. As shown in the above figure, remove the two red handles, remove the fixing screws of the two wire feeding wheels, take out the wire feeding wheel, take the wire feeding wheel to be replaced, and assemble the wire feeding wheel with

the side corresponding to the welding wire size facing outward, and tighten the screws again. Push down the pressure cover, and push it up with the handle to fix it;

3. Selection of compression wheels: Select the corresponding wire feeding gear according to the wire diameter used. V-shaped gears are used for steel welding wire, and U-shaped gears are used for aluminum welding wire.



| Weld wire diameter                                   | A-bar (adjusting scale) | B-bar (adjusting scale) | Remarks |
|------------------------------------------------------|-------------------------|-------------------------|---------|
| stainless steel/carbon steel/<br>aluminum wire 0.8mm | 2.5                     | 2                       |         |
| stainless steel/carbon steel/<br>aluminum wire 1.0mm | 2.5                     | 2                       |         |
| stainless steel/carbon steel/<br>aluminum wire 1.2mm | 3                       | 2.5                     |         |
| stainless steel/carbon steel/<br>aluminum wire 1.6mm | 3.5                     | 3                       |         |
| aluminum wire 0.8mm                                  | 1.0                     | 1.5                     |         |
| aluminum wire 1.0mm                                  | 1.5                     | 2.0                     |         |
| aluminum wire 1.2mm                                  | 1.5                     | 2.0                     |         |
| aluminum wire 1.6mm                                  | 2.0                     | 2.5                     |         |

**Note:** For different wire diameters, customers can refer to the reference value of the pressure rod adjustment scale. fine-tuning pressure rod according to the actual situation.

#### 4. Introduction to the wire feeding wheel (pressing wheel):



0.8/1.0V



0.8/1.0U



1.2/1.6V



1.2/1.6U

0.8/1.0V wire feeding wheel (pressing wheel): For steel wire with diameter of 0.8mm and 1.0mm

0.8/1.0U wire feeding wheel (pressing wheel): Suitable for 0.8mm and 1.0mm wire diameter aluminum welding wire

1.2/1.6V wire feed wheel (pressing wheel): Steel wire for 1.2mm and 1.6mm wire diameter

1.2/1.6U wire feeding wheel (pressing wheel): Fits 1.2mm and 1.6mm wire diameter aluminum welding wire

## 9-Wire feed tube installation

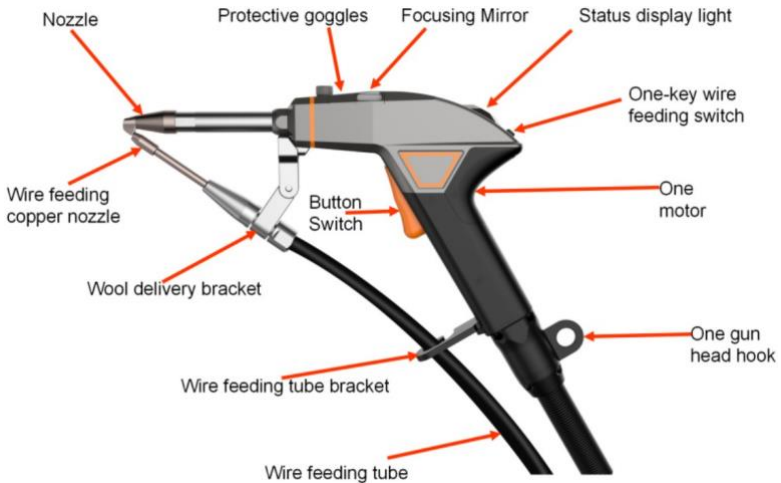
### 1.Wire feeder end

thread feeding  
pipe socket



1. Place the wire feeder communication line (rear) in the direction of the above figure. (The red dot of the cable plug corresponds to the upward direction of the female socket.) Connect the other end to the laser wire feeding interface.
2. Connect the wire feeding pipeline (front) to the right interface according to the above figure, and connect the other end to the gun head;
3. The wire feed tube is a stainless steel tube.

## 10-Solder Head Description



The indicator light on the welding head can show different working states. When the communication between the welding head and the laser is successful and the working status of the equipment is normal, the indicator light is green. When the safety lock and the copper nozzle contact the material to be welded at the same time, the safety lock conducts. At this time, hold the gun head and press the laser trigger button to emit light, and the indicator light will turn red. When the bond head or laser is abnormal, the indicator light is on red and green flashes alternately.

Note:

© The welding head is a contact component for welding operations. When using it, the copper nozzle of the welding gun must form a loop when in direct contact with the workpiece before it can be used for safety testing. It is recommended that the surface of the welded workpiece be smooth to reduce wear.

Soldering head indicator light description:

| LED color               | Description        |
|-------------------------|--------------------|
| Green                   | Standby state      |
| Red                     | laser light output |
| Red and green alternate | Failure status     |

11-Wire feeding support and hand-held welding connection



Overall assembly drawing

Choosing the right welding nozzle and thread feeding nozzle

Note: For workpiece wire feeding welding, use a wire slotted copper nozzle to ensure smooth wire direction and wire feeding.



A+2 copper mouthpiece: Indicates that the positive defocus is 2mm, suitable for use with 0.8-1.0mm welding wire

B+2 copper mouthpiece: Indicates that the positive defocus is 2mm, suitable for 1.2-1.6mm welding wire

C0 copper mouthpiece: It indicates positive focus and is suitable for use with 0.8mm-1.0mm welding wire

D0 copper mouthpiece: Indicates the positive focus, suitable for 1.2mm-1.6mm welding wire

E-2 copper mouthpiece: It represents a negative defocus of 2mm, suitable for use with 0.8mm-1.0mm welding wire, and can achieve deeper penetration with this copper nozzle.

F-2 copper mouthpiece: It represents a negative defocus of 2mm and is suitable for use with 1.2mm-1.6mm welding wire. Using this copper nozzle can achieve deeper penetration depth.

F150 external corner welding copper nozzle: It is suitable for external corner welding without wire feeding.



**Wire feeding nozzle-corresponding to welding wire 0.8-1.6mm**

0.8 Filament nozzle: For wire with a diameter of 0.8mm

1.0 Silk feeding nozzle: For wire with a diameter of 1.0mm

1.2 Filament nozzle: For 1.2mm wire diameter

1.6 Filament nozzle: Fits with 1.6mm wire diameter aluminum wire

### Installation steps of the A-type wire feeding component

(1) Prepare the wire feeding nozzle, wire feeding bracket, copper nozzle, internal hexagonal ball head wrench, guide rod, and M4\*10 internal hexagonal screw.

As shown in the figure below:



(2) First, insert the wire feeding tube into the nut of the wire feeding bracket, ensuring that the exposed part of the steel wire is about 2.5 centimeters.



(3) Install the steel wire into the wire feeding component and tighten the machine screw.



(4) After heating and softening the black outer skin of the wire feeding tube, install it next to the thread of the wire feeding bracket.



(5) Use a wrench to tighten the nut of the wire feeding component.



(6) Unscrew the fixing part at the front end of the wire feeding assembly, insert it into the wire guide tube, and then screw it into the wire feeding assembly. Screw the wire feeding nozzle onto the wire feeding extension tube.

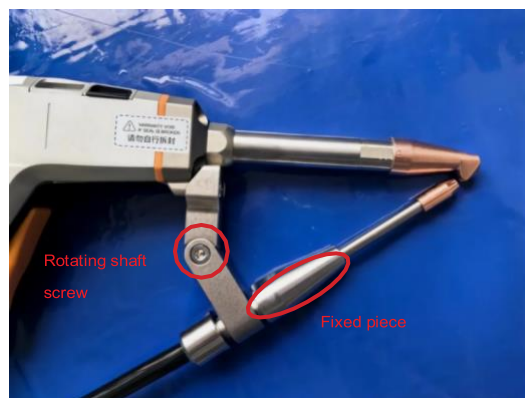


(7) Use M4\*10 internal hex screws and internal hex ball head wrenches to fix the wire feeding component on the second-generation gun body;



(8) Adjustments: Pay attention to align the wire feeding nozzle with the wire slot of the copper nozzle. Refer to the following techniques Adjust the left and right deviation of the wire feeding component, align the wire feeding nozzle with the wire feeding slot, and then tighten the internal hexagon screw;

After loosening the fixing piece, extend the wire guide tube to an appropriate length and then tighten the fixing piece (the wire can be sent out first to align with the slot), adjust the rotation axis of the wire feeding component to an appropriate angle, and then tighten the screws; Assemble as shown in the following figure:



(9) When the welding gun is not in use, it can be placed on the gun head placement rack to better protect the welding gun.



### Installation steps of the B-type wire feeding component

(1) Prepare the wire feeding nozzle, wire feeding tube, wire feeding bracket, guide rod, copper nozzle, internal hexagonal ball head wrench, and M4\*10 internal hexagonal screw, as shown in the figure below:



(2) Install the wire feeding tube into the wire feeding assembly and tighten the machine screw.



(3) Unscrew the fixing part at the front end of the wire feeding assembly, insert it into the wire guide tube, and tighten the fixing part by hand. Screw the wire feeding nozzle onto the wire feeding extension tube.



- (4) Use M4\*10 internal hex screws and internal hex ball head wrenches to fix the wire feeding component on the second-generation gun body.



- (5) Adjustments: Pay attention to align the wire feeding nozzle with the wire slot of the copper nozzle. Refer to the following techniques Adjust the left and right deviation of the wire feeding component, align the wire feeding nozzle with the wire feeding slot, and then tighten the internal hexagon screw; After loosening the fixing piece, extend the wire guide tube to an appropriate length and then tighten the fixing piece (the wire can be sent out first to align with the slot), adjust the rotation axis of the wire feeding component to an appropriate angle, and then tighten the screws; Assemble as shown in the following figure:



## 12-Startup Steps

Warning:

- © Before use, ensure that all electrical connections (including protective gas and grounding) are connected. If conditions permit, all connections must be tightened and fixed with screws.
- © When operating the laser, do not directly look at the laser output port. Strictly wear safety goggles, soundproof earplugs, and masks before operation.
- © When performing wiring operations, please turn off all power switches of the laser first.
- © The laser will pause for 6 seconds after each continuous light output for 120 seconds.

**The startup process is as follows:**

- (1) Connect the power input to the indicated voltage, phase, and frequency;
- (2) Connect the safe lock to the loop interface, and connect the wire feeding power line to the feeder interface;
- (3) Connect the protective gas pipe (outer diameter 6mm) to the gas in interface and open the gas valve;
- (4) Turn on the power switch on the back panel of the laser;
- (5) Release the emergency stop switch on the front panel of the laser;
- (6) Click on the touch screen to enter the software interface and adjust the corresponding parameters (laser power, swing amplitude, swing frequency, etc.) Parameters such as air blowing and shut-off delay, power gradual increase and decrease, and light output mode;
- (7) Adjust the air valve mode to normally open, and adjust the protective air flow rate to 15-20L/min;
- (8) Clamp the alligator clamp on the workpiece that needs to be welded;
- (9) Turn on the laser start button and laser enable switch;
- (10) Press and hold the gun head switch to emit light.

### 13-Soldering process parameters

| A3MD30i Welding Procedure Library (Wire Feed) |                |                            |                  |                      |                    |                        |                 |                   |
|-----------------------------------------------|----------------|----------------------------|------------------|----------------------|--------------------|------------------------|-----------------|-------------------|
| Material type                                 | Thickness (mm) | Laser power percentage (%) | Swing range (mm) | Swing frequency (hz) | Wire diameter (mm) | Wire feed speed (mm/s) | Welding process | Wire material     |
| Stainless Steel                               | 1              | 40                         | 2.5              | 80                   | 1                  | 12                     | Butt Weld       | Stainless Steel   |
|                                               | 2              | 65                         | 2.5              | 60                   | 1                  | 12                     | Butt Weld       | Stainless Steel   |
|                                               | 3              | 100                        | 2.5              | 60                   | 1                  | 12                     | Butt Weld       | Stainless Steel   |
|                                               | 1              | 45                         | 2.5              | 60                   | 1                  | 12                     | Fillet Weld     | Stainless Steel   |
|                                               | 2              | 80                         | 2.5              | 60                   | 1                  | 12                     | Fillet Weld     | Stainless Steel   |
|                                               | 3              | D2                         | 2.5              | 60                   | 1                  | 10                     | Fillet Weld     | Stainless Steel   |
| Carbon Steel                                  | 1              | 50                         | 2.5              | 60                   | 1                  | 15                     | Butt Weld       | Carbon Steel      |
|                                               | 2              | 75                         | 3.0              | 60                   | 1                  | 15                     | Butt Weld       | Carbon Steel      |
|                                               | 3              | 100                        | 3.0              | 60                   | 1                  | 12                     | Butt Weld       | Carbon Steel      |
|                                               | 1              | 50                         | 2.5              | 60                   | 1                  | 15                     | Fillet Weld     | Carbon Steel      |
|                                               | 2              | 70                         | 2.5              | 60                   | 1                  | 15                     | Fillet Weld     | Carbon Steel      |
|                                               | 3              | 100                        | 2.5              | 60                   | 1                  | 10                     | Fillet Weld     | Carbon Steel      |
| Aluminum                                      | 1              | 60                         | 2.0              | 60                   | 1                  | 20                     | Butt Weld       | 5 Series Aluminum |
|                                               | 2              | 80                         | 2.5              | 60                   | 1                  | 15                     | Butt Weld       | 5 Series Aluminum |
| Aluminum                                      | 1              | 60                         | 2.0              | 60                   | 1                  | 20                     | Fillet Weld     | 5 Series Aluminum |
|                                               | 2              | 80                         | 2.5              | 60                   | 1                  | 15                     | Fillet Weld     | 5 Series Aluminum |
| Stainless Steel                               | 1              | 50                         | 2.5              | 60                   | 1.2                | 15                     | Butt Weld       | Stainless Steel   |
|                                               | 2              | 70                         | 3.0              | 60                   | 1.2                | 12                     | Butt Weld       | Stainless Steel   |
|                                               | 3              | D2                         | 3.0              | 60                   | 1.2                | 10                     | Butt Weld       | Stainless Steel   |
|                                               | 1              | 55                         | 3.0              | 60                   | 1.2                | 12                     | Fillet Weld     | Stainless Steel   |
|                                               | 2              | 75                         | 2.5              | 60                   | 1.2                | 10                     | Fillet Weld     | Stainless Steel   |
|                                               | 3              | D2                         | 2.5              | 60                   | 1.2                | 8                      | Fillet Weld     | Stainless Steel   |
| Carbon Steel                                  | 1              | 50                         | 2.5              | 60                   | 1.2                | 15                     | Butt Weld       | Carbon Steel      |
|                                               | 2              | 85                         | 3.0              | 60                   | 1.2                | 12                     | Butt Weld       | Carbon Steel      |
|                                               | 3              | D2                         | 3.0              | 60                   | 1.2                | 10                     | Butt Weld       | Carbon Steel      |
|                                               | 1              | 55                         | 2.0              | 80                   | 1.2                | 15                     | Fillet Weld     | Carbon Steel      |
|                                               | 2              | 80                         | 3.0              | 60                   | 1.2                | 15                     | Fillet Weld     | Carbon Steel      |
|                                               | 3              | D2                         | 3.0              | 60                   | 1.2                | 12                     | Fillet Weld     | Carbon Steel      |
| Aluminum                                      | 1              | 55                         | 2.5              | 60                   | 1.2                | 20                     | Butt Weld       | 5 Series Aluminum |
|                                               | 2              | 85                         | 3.0              | 60                   | 1.2                | 15                     | Butt Weld       | 5 Series Aluminum |
| Aluminum                                      | 1              | 65                         | 2.5              | 60                   | 1.2                | 20                     | Fillet Weld     | 5 Series Aluminum |
|                                               | 2              | 85                         | 3.0              | 60                   | 1.2                | 15                     | Fillet Weld     | 5 Series Aluminum |

## A3MD40i Welding Procedure Library (Wire Feed)

| Material type          | Thickness (mm) | Laser power percentage (%) | Swing range (mm) | Swing frequency (hz) | Wire diameter (mm) | Wire feed speed (mm/s) | Welding process | Wire material     |
|------------------------|----------------|----------------------------|------------------|----------------------|--------------------|------------------------|-----------------|-------------------|
| Stainless Steel        | 1              | 35                         | 2.5              | 80                   | 1                  | 12                     | Butt Weld       | Stainless Steel   |
|                        | 2              | 50                         | 2.5              | 60                   | 1                  | 12                     | Butt Weld       | Stainless Steel   |
|                        | 3              | 70                         | 2.5              | 60                   | 1                  | 12                     | Butt Weld       | Stainless Steel   |
|                        | 4              | 100                        | 2.5              | 60                   | 1                  | 10                     | Butt Weld       | Stainless Steel   |
| Carbon Steel           | 1              | 35                         | 2.5              | 80                   | 1                  | 15                     | Butt Weld       | Carbon Steel      |
|                        | 2              | 60                         | 2.5              | 60                   | 1                  | 15                     | Butt Weld       | Carbon Steel      |
|                        | 3              | 75                         | 2.5              | 60                   | 1                  | 10                     | Butt Weld       | Carbon Steel      |
|                        | 4              | 100                        | 2.0              | 60                   | 1                  | 8                      | Butt Weld       | Carbon Steel      |
| Galvanized steel plate | 1              | 40                         | 2.5              | 100                  | 1                  | 15                     | Butt Weld       | Carbon Steel      |
|                        | 2              | 50                         | 2.5              | 100                  | 1                  | 12                     | Butt Weld       | Carbon Steel      |
|                        | 3              | 75                         | 2.5              | 100                  | 1                  | 10                     | Butt Weld       | Carbon Steel      |
|                        | 4              | D2                         | 2.5              | 100                  | 1                  | 10                     | Butt Weld       | Carbon Steel      |
| Aluminum               | 1              | 45                         | 2.5              | 60                   | 1                  | 20                     | Butt Weld       | 5 Series Aluminum |
|                        | 2              | 60                         | 2.5              | 60                   | 1                  | 15                     | Butt Weld       | 5 Series Aluminum |
|                        | 3              | 90                         | 2.5              | 60                   | 1                  | 15                     | Butt Weld       | 5 Series Aluminum |
| Stainless Steel        | 1              | 45                         | 2.5              | 80                   | 1.2                | 12                     | Butt Weld       | Stainless Steel   |
|                        | 2              | 55                         | 2.5              | 60                   | 1.2                | 12                     | Butt Weld       | Stainless Steel   |
|                        | 3              | 80                         | 3.0              | 60                   | 1.2                | 10                     | Butt Weld       | Stainless Steel   |
|                        | 4              | D2                         | 3.0              | 60                   | 1.2                | 10                     | Butt Weld       | Stainless Steel   |
| Aluminum               | 1              | 45                         | 2.5              | 60                   | 1.2                | 15                     | Butt Weld       | 5 Series Aluminum |
|                        | 2              | 55                         | 2.5              | 60                   | 1.2                | 15                     | Butt Weld       | 5 Series Aluminum |
|                        | 3              | 95                         | 3                | 60                   | 1.2                | 15                     | Butt Weld       | 5 Series Aluminum |
| Carbon Steel           | 1              | 45                         | 2.5              | 80                   | 1.2                | 12                     | Butt Weld       | Carbon Steel      |
|                        | 2              | 55                         | 2.5              | 80                   | 1.2                | 12                     | Butt Weld       | Carbon Steel      |
|                        | 3              | 80                         | 2.5              | 80                   | 1.2                | 10                     | Butt Weld       | Carbon Steel      |
|                        | 4              | D2                         | 3                | 80                   | 1.2                | 10                     | Butt Weld       | Carbon Steel      |
| Galvanized steel plate | 1              | 45                         | 2.5              | 80                   | 1.2                | 12                     | Butt Weld       | Carbon Steel      |
|                        | 2              | 60                         | 2.5              | 60                   | 1.2                | 12                     | Butt Weld       | Carbon Steel      |
|                        | 3              | 80                         | 2.5              | 60                   | 1.2                | 10                     | Butt Weld       | Carbon Steel      |
|                        | 4              | D2                         | 3                | 60                   | 1.2                | 10                     | Butt Weld       | Carbon Steel      |
| Brass                  | 1              | 55                         | 2.5              | 80                   | 1                  | 12                     | Butt Weld       | Silicon bronze    |
|                        | 2              | 80                         | 2.5              | 80                   | 1                  | 10                     | Butt Weld       | Silicon bronze    |

## A3M50i Welding Procedure Library (Wire Feed)

| Material type   | Thickness (mm) | Laser power percentage (%) | Swing range (mm) | Swing frequency (hz) | Wire diameter (mm) | Wire feed speed (mm/s) | Welding process    | Wire material     |
|-----------------|----------------|----------------------------|------------------|----------------------|--------------------|------------------------|--------------------|-------------------|
| Stainless Steel | 1              | 35                         | 2.5              | 80                   | 1.2                | 12                     | Butt Weld          | Stainless Steel   |
|                 | 2              | 45                         | 2.5              | 60                   | 1.2                | 12                     | Butt Weld          | Stainless Steel   |
|                 | 3              | 60                         | 3.0              | 60                   | 1.2                | 10                     | Butt Weld          | Stainless Steel   |
|                 | 4              | 80                         | 3.0              | 60                   | 1.2                | 10                     | Butt Weld          | Stainless Steel   |
|                 | 5              | 90                         | 3.0              | 60                   | 1.2                | 10                     | Butt Weld          | Stainless Steel   |
|                 | 1              | 35                         | 2.5              | 60                   | 1.2                | 15                     | Inside corner weld | Stainless Steel   |
|                 | 2              | 45                         | 2.5              | 60                   | 1.2                | 12                     | Inside corner weld | Stainless Steel   |
|                 | 3              | 60                         | 3.0              | 60                   | 1.2                | 10                     | Inside corner weld | Stainless Steel   |
|                 | 4              | 81                         | 2.5              | 60                   | 1.2                | 10                     | Inside corner weld | Stainless Steel   |
|                 | 5              | 95                         | 2.5              | 60                   | 1.2                | 10                     | Inside corner weld | Stainless Steel   |
| Carbon Steel    | 1              | 33                         | 2.5              | 80                   | 1.2                | 12                     | Butt Weld          | Carbon Steel      |
|                 | 2              | 43                         | 2.5              | 80                   | 1.2                | 12                     | Butt Weld          | Carbon Steel      |
|                 | 3              | 60                         | 2.5              | 80                   | 1.2                | 10                     | Butt Weld          | Carbon Steel      |
|                 | 4              | 85                         | 3.0              | 80                   | 1.2                | 10                     | Butt Weld          | Carbon Steel      |
|                 | 5              | 95                         | 3.0              | 80                   | 1.2                | 10                     | Butt Weld          | Carbon Steel      |
|                 | 1              | 38                         | 2.5              | 80                   | 1.2                | 15                     | Inside corner weld | Carbon Steel      |
|                 | 2              | 52                         | 2.5              | 60                   | 1.2                | 10                     | Inside corner weld | Carbon Steel      |
|                 | 3              | 66                         | 2.5              | 60                   | 1.2                | 10                     | Inside corner weld | Carbon Steel      |
|                 | 4              | 85                         | 3.0              | 60                   | 1.2                | 10                     | Inside corner weld | Carbon Steel      |
|                 | 5              | 95                         | 3.0              | 60                   | 1.2                | 10                     | Inside corner weld | Carbon Steel      |
| Aluminum        | 1              | 36                         | 2.5              | 60                   | 1.2                | 15                     | Butt Weld          | 5 Series Aluminum |
|                 | 2              | 50                         | 2.5              | 60                   | 1.2                | 15                     | Butt Weld          | 5 Series Aluminum |
|                 | 3              | 68                         | 3.0              | 60                   | 1.2                | 15                     | Butt Weld          | 5 Series Aluminum |
|                 | 4              | 86                         | 2.5              | 60                   | 1.2                | 12                     | Butt Weld          | 5 Series Aluminum |
| Aluminum        | 1              | 40                         | 2.5              | 60                   | 1.2                | 20                     | Inside corner weld | 5 Series Aluminum |
|                 | 2              | 50                         | 3.0              | 60                   | 1.2                | 15                     | Inside corner weld | 5 Series Aluminum |
|                 | 3              | 75                         | 3.0              | 60                   | 1.2                | 15                     | Inside corner weld | 5 Series Aluminum |
|                 | 4              | 85                         | 3.0              | 60                   | 1.2                | 12                     | Inside corner weld | 5 Series Aluminum |
| Brass           | 1              | 35                         | 2.5              | 80                   | 1.0                | 12                     | Butt Weld          | Silicon bronze    |
|                 | 2              | 45                         | 2.5              | 80                   | 1.0                | 12                     | Butt Weld          | Silicon bronze    |
| Purple copper   | 1              | 55                         | 2.5              | 60                   | 1.0                | 10                     | Butt Weld          | Silicon bronze    |
|                 | 2              | 85                         | 2.5              | 60                   | 1.0                | 10                     | Butt Weld          | Silicon bronze    |

Note:

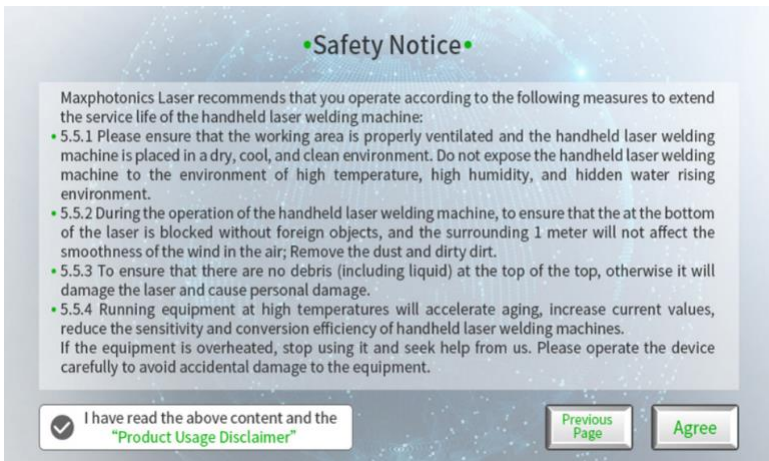
© Overlay welding, angle welding, lap welding, etc. can all refer to the above process parameters.

## 14-Description of the laser operation panel

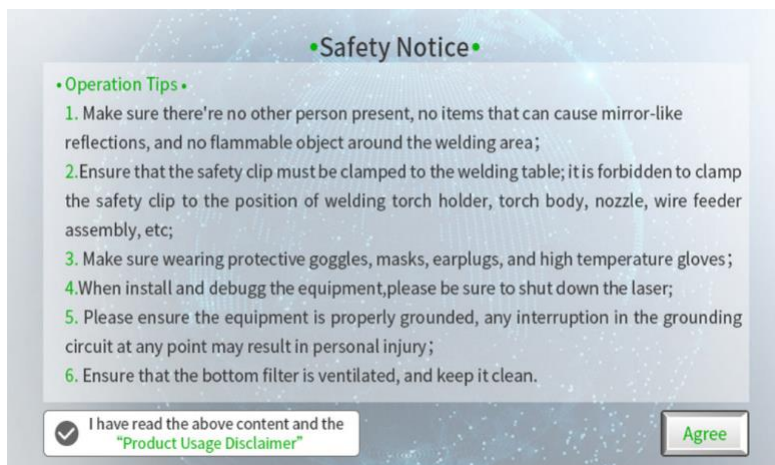
This machine is equipped with a 7-inch industrial screen, which is connected to the host through the uart interface to achieve equipment control and status monitoring functions. The connection with the equipment should be done when the machine is powered off to prevent damage from surge impact.

### 1. Start-up safety notice

The detailed security instructions page will be displayed when you start up for the first time. Please read and learn the security instructions carefully. After reading and agreeing, please click the "The above security instructions have been read and understood" button, and then click the "Agree" button to enter the simplified mode operation interface.



Each time you start the system, a simplified security notice page will be displayed. Please read and learn the security notice carefully. After reading and agreeing, please click the "Agree" button to enter the simplified mode operation interface.



## 2. Operation interface

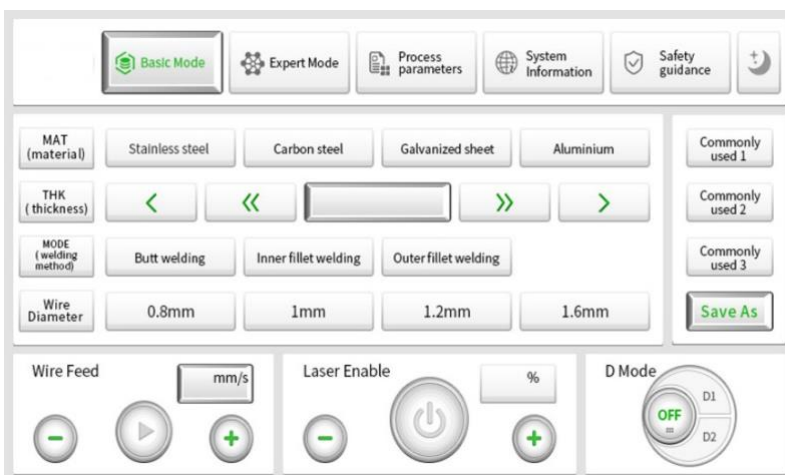
There are two operation modes on the operation interface: simplified mode and professional mode.

### (1) Streamlined mode

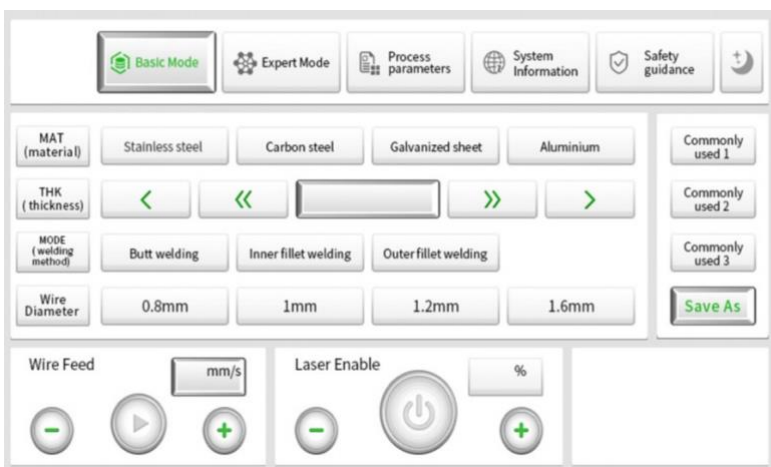
The simplified mode is easy to operate. You only need to select the corresponding material, plate thickness, welding wire gauge, and welding method separately, and then click the system switch button in the middle of the interface. If all parts of the machine are working normally, welding can start. Click the button in the upper right corner of the simplified mode to switch to the night mode. After selection, the silk feed enable is enabled by default. There is no need to turn on the wire feed button separately. If the wire feed is not needed, you can cancel the wire feed function.

Switch to the operation interface of professional mode to perform more professional and detailed operation settings. When we have set the parameters, click the laser start button to start laser welding.

The following figure shows the operation interface of the simplified mode.

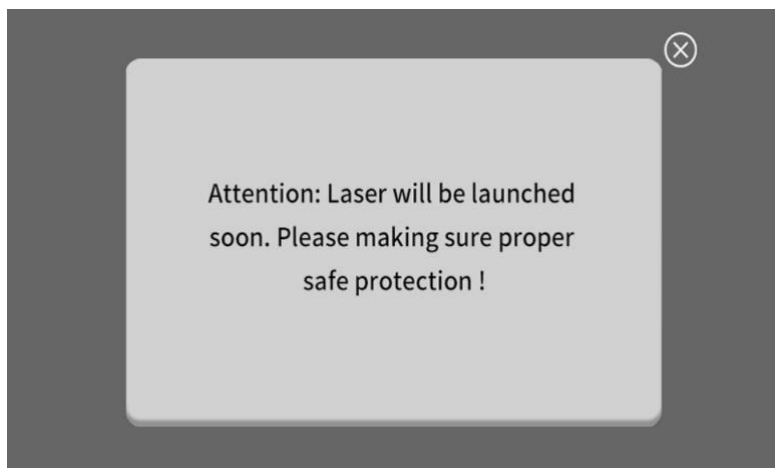


Page for A3MD30i&A3MD40i



Page for A3M50i

Click the system switch button on the simplified mode interface, and a "device is about to start" prompt pop-up window will pop up, as shown in the figure below. Pay attention to security protection, and click the close button again to officially start.



## (2) The professional model

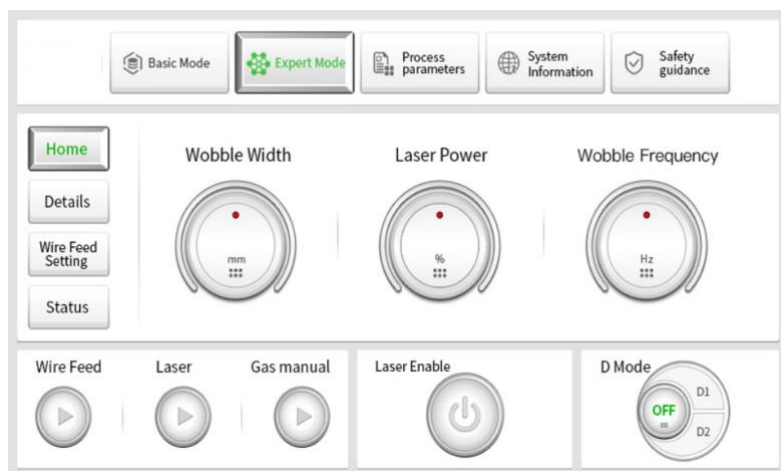
The operation interface of professional mode can perform some professional welding settings.

The professional mode has the main interface, process parameter page, advanced setting page, and machine information page. Click the icon at the top of the interface to switch.

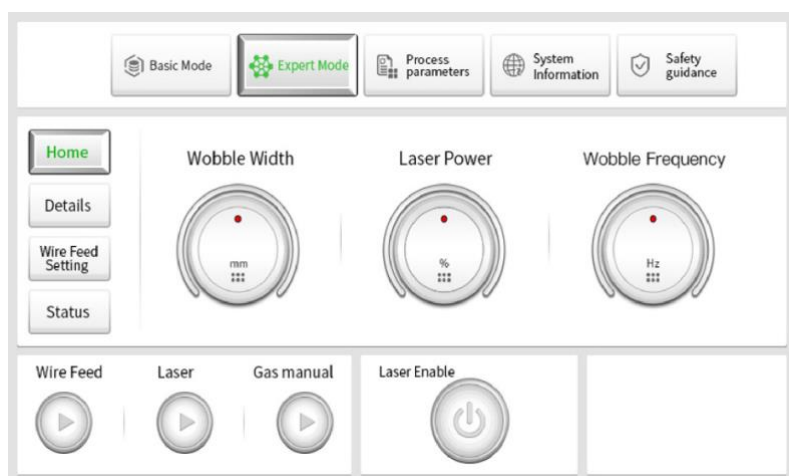
### ☉ Main interface

The main interface is divided into five sub-interfaces: professional mode home page and details, wire feeding setting, status, and alarm. Click the status

The alarm button is displayed only when the button is clicked.



Page for A3MD30i&amp;A3MD40i



Page for A3M50i

● Home interface: You can set the scanning amplitude, laser power, and scanning frequency. Clicking on the font area in the middle of the dial will bring up the numeric keypad, where you can enter the corresponding number.

| Functional classification | Description of functions | Remarks                                                                                                                                                |
|---------------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operation button          | laser start-up           | The laser start button is used to start laser welding. Green means the laser is on, and gray means the laser is off.                                   |
| Setting Items             | laser power              | 0 to 100% adjustable, the nominal maximum power of the machine is set at 100% power.                                                                   |
|                           | scan frequency           | The laser reciprocating scanning frequency is adjustable from 0 to 220Hz, and the maximum scanning frequency is 220Hz.                                 |
|                           | scan range               | 0 to 4mm adjustable.                                                                                                                                   |
|                           | laser enabling           | Work Laser Enable - Used for machine setup without laser emission. Green indicates laser enabled, Gray indicates disabled.                             |
|                           | manual air supply        | The manual air supply can be enabled or disabled. Green enables manual air supply and gray disables.                                                   |
|                           | silk feed enable         | You can enable or disable the wire feed. Green enables wire feed, gray disables.                                                                       |
|                           | D mode                   | D1 、 D2 and Off are optional at power between 90 and 100%, and other values are<br>The status is closed.<br>A3M50i machine doesn't have this function. |

● Detailed interface: The detailed parameters of the current professional mode are displayed. and the function of modifying parameters. Note:

The laser power, scanning frequency, and scanning amplitude on this interface are consistent with the values on the main page.

Adjustable parameters for continuous light output mode:

The screenshot shows the 'Expert Mode' interface. At the top, there are five tabs: 'Basic Mode', 'Expert Mode' (highlighted with a green border), 'Process parameters', 'System Information', and 'Safety guidance'. Below the tabs, there are several buttons: 'Home', 'Wire Feed' (with a play icon), 'Light Mode' (with 'CW' selected), 'Shooting', 'Pulse', and 'Cutting'. On the left side, there is a vertical menu with 'Details' (highlighted), 'Wire Feed Setting', 'Status', and 'Warning'. The main area contains two columns of adjustable parameters:

| Parameter        | Unit | Parameter            | Unit                     |
|------------------|------|----------------------|--------------------------|
| Laser Power      | %    | Light Off Delay      | ms                       |
| Wobble Frequency | Hz   | Ramp Up Period       | ms                       |
| Wobble Width     | mm   | Ramp Down Period     | ms                       |
| Gas on Delay     | ms   | Swing Delay          | ms                       |
| Gas Off Delay    | ms   | Swing Welding Enable | <input type="checkbox"/> |

At the bottom right, there is a 'Save As' button.

Adjustable parameters of point emission light mode:

The screenshot shows the 'Expert Mode' interface with 'Shooting' selected under 'Light Mode'. The layout is similar to the previous one, but with different parameters:

| Parameter        | Unit | Parameter         | Unit |
|------------------|------|-------------------|------|
| Laser Power      | %    | Shooting time     | ms   |
| Wobble Frequency | Hz   | Shooting interval | ms   |
| Wobble Width     | mm   |                   |      |
| Gas on Delay     | ms   |                   |      |
| Gas Off Delay    | ms   |                   |      |

At the bottom right, there is a 'Save As' button.

Adjustable parameters of pulse output mode:

The screenshot shows the software interface with the 'Expert Mode' tab selected. The 'Pulse' button is highlighted in the 'Light Mode' section. The left sidebar contains buttons for 'Home', 'Details' (highlighted), 'Wire Feed Setting', 'Status', and 'Warning'. The main area displays the following adjustable parameters:

| Parameter        | Unit |
|------------------|------|
| Laser Power      | %    |
| Wobble Frequency | Hz   |
| Wobble Width     | mm   |
| Gas on Delay     | ms   |
| Gas Off Delay    | ms   |
| Light Off Delay  | ms   |
| Ramp Up Period   | ms   |
| Ramp Down Period | ms   |
| Laser Frequency  | Hz   |
| Duty Cycle       | %    |

A 'Save As' button is located at the bottom right of the parameter area.

Adjustable parameters of the cutting light mode:

The screenshot shows the software interface with the 'Expert Mode' tab selected. The 'Cutting' button is highlighted in the 'Light Mode' section. The left sidebar contains buttons for 'Home', 'Details' (highlighted), 'Wire Feed Setting', 'Status', and 'Warning'. The main area displays the following adjustable parameters:

| Parameter        | Unit |
|------------------|------|
| Laser Power      | %    |
| Gas on Delay     | ms   |
| Gas Off Delay    | ms   |
| Light Off Delay  | ms   |
| Ramp Up Period   | ms   |
| Ramp Down Period | ms   |

A 'Save As' button is located at the bottom right of the parameter area.

The interface is as shown in the figure. After editing, click Save As. The edited document will be saved to the customized module Face.

| Functional classification             | Description of functions | Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Mode adjustment                       | Light output mode        | <p>The light output modes are as follows: There are four types: continuous, spot, pulse, and cutting.</p> <p>Continuous: Continuously output laser according to the set power.</p> <p>Point shooting: When point shooting, laser is output in a single time.</p> <p>Pulse: Continuously output pulse laser according to the set duty cycle.</p> <p>Cutting: The scanning frequency and scanning amplitude are both 0, and then the light is continuously emitted according to the set power.</p> |
|                                       | silk feed                | Green state: the silk feed is synchronized with the laser; gray state: No silk feed in mode                                                                                                                                                                                                                                                                                                                                                                                                      |
| The current parameters of the machine | laser power              | Set the laser power, adjustable from 0 to 100%, and 100% power is the nominal maximum power of the machine.                                                                                                                                                                                                                                                                                                                                                                                      |
|                                       | scan frequency           | Setting the laser scanning frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|                                       | scan range               | Setting the laser scanning range                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                       | Air blowing delay        | Set the advance time for air delivery before laser emission.                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                       | Air shut-off delay       | Set the delay time for shutting down the gas after the laser is turned off.                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                       | Light-off delay          | Set the delay time from stopping wire feeding to turning off the laser, which is used to cut the wire.                                                                                                                                                                                                                                                                                                                                                                                           |
|                                       | laser frequency          | Setting the laser frequency                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                       | Duty ratio               | Set the laser output duty cycle in pulse mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                       | shooting duration        | Set the shooting duration in the shooting mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                       | Slow rise duration       | Set the laser rise time in the continuous mode, pulse mode, and cutting mode.                                                                                                                                                                                                                                                                                                                                                                                                                    |
|                                       | slow down duration       | Set the laser slow-down time in the continuous mode, pulse mode, and cutting mode.                                                                                                                                                                                                                                                                                                                                                                                                               |
|                                       | swing delay              | Setting of the time for the safety clamp to be disconnected under the condition of rocking welding enabled (If the safety clamp is disconnected for more than the set value, the light will be cut off.)                                                                                                                                                                                                                                                                                         |
|                                       | Rocking Weld enable      | Set whether to enable or disable the swing bond function. Green means enabled and gray means disabled.                                                                                                                                                                                                                                                                                                                                                                                           |
|                                       | shot interval            | Set the shot interval in shot mode.                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

Click the "wire feeding setting" column to enter the wire feeding parameter setting interface, as shown in the following figure.

Note: To modify the wire feeding parameters, the machine must be successfully connected to the wire feeding machine to complete the parameter modification!

The screenshot shows the 'Wire feeding setting' interface. At the top, there are five tabs: 'Basic Mode', 'Expert Mode' (selected), 'Process parameters', 'System Information', and 'Safety guidance'. On the left, there is a vertical menu with buttons: 'Home', 'Details', 'Wire Feed Setting' (selected), 'Status', and 'Warning'. The main area is titled 'Wire feeding mode' and contains two sub-mode buttons: 'CW Mode' (selected) and 'Pulsed Mode'. Below these, there are four parameter settings, each with a text label and a numeric input field with a unit: 'Wire Feed Speed' (mm/s), 'Wire Refeed Delay' (ms), 'Withdraw Length' (mm), and 'Wire Feed Delay' (ms). The 'Refeed Length' field is present but empty.

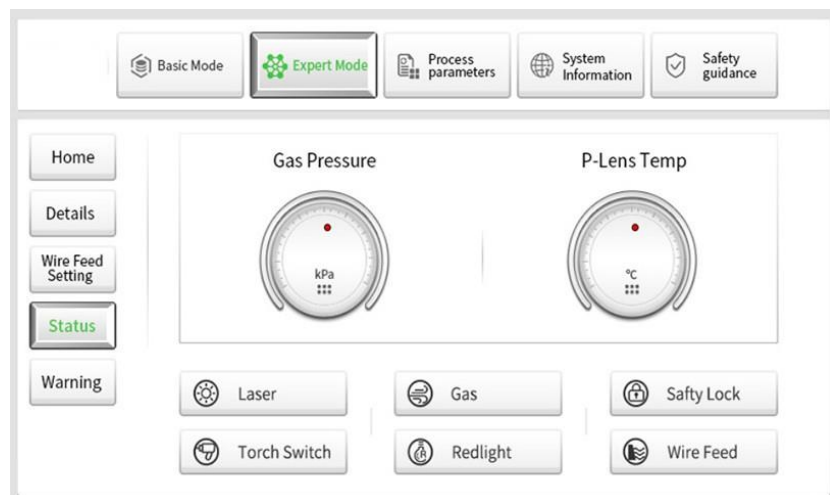
| Parameter         | Unit |
|-------------------|------|
| Wire Feed Speed   | mm/s |
| Wire Refeed Delay | ms   |
| Withdraw Length   | mm   |
| Wire Feed Delay   | ms   |
| Refeed Length     | mm   |

The screenshot shows the 'Wire feeding setting' interface in 'Pulsed Mode'. The layout is identical to the previous screenshot, but the 'Pulsed Mode' button is selected instead of 'CW Mode'. The parameter settings are: 'Wire Feed Speed' (mm/s), 'Wire Refeed Delay' (ms), 'Withdraw Length' (mm), 'Wire Feed Delay' (ms), and 'Pulse Duration' (ms). The 'Texture Smoothness' field is present and set to '%'. The 'Refeed Length' field is present but empty.

| Parameter          | Unit |
|--------------------|------|
| Wire Feed Speed    | mm/s |
| Wire Refeed Delay  | ms   |
| Withdraw Length    | mm   |
| Wire Feed Delay    | ms   |
| Pulse Duration     | ms   |
| Texture Smoothness | %    |
| Refeed Length      | mm   |

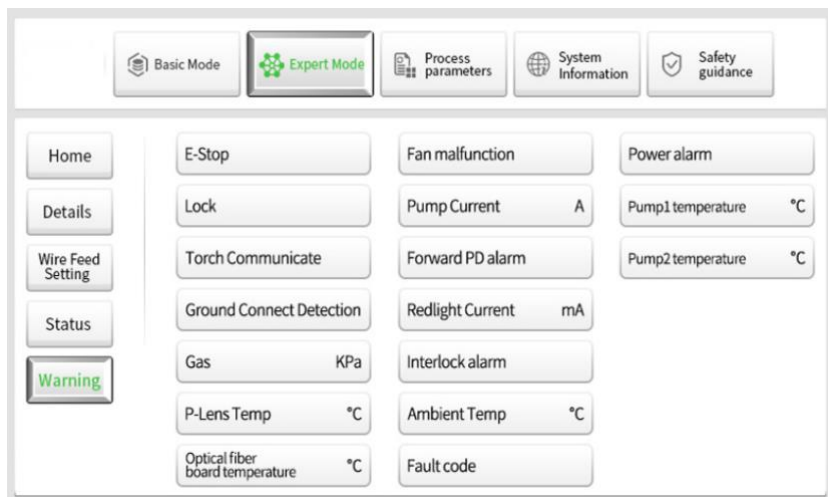
| Functional classification                             | Description of functions | Remarks                                                                                                                                                          |
|-------------------------------------------------------|--------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Setting of wire feed parameters                       | wire feeding mode        | Continuous: continuous feeding<br>Pulse: break the wire according to the set pulse period.                                                                       |
| Wire Feed Parameter Setting<br>- Continuous Feed Mode | silk feed speed          | Set the feeding speed. (This function is only effective for the self-contained wire feeding head)                                                                |
|                                                       | silk delivery delay      | Setting the wire delivery delay                                                                                                                                  |
|                                                       | Filament delay           | Set Fill-in Wire Delay; prevents secondary wire sticking, indicates the waiting time between retraction and fill-in feeding.                                     |
|                                                       | Pullback length          | Set the extraction length. The length of the soldering wire is drawn back after welding.                                                                         |
|                                                       | Filament length          | Set the length of the filament; Indicates the length of the threading to the red light position.                                                                 |
| Wire Feed Parameter Setting<br>- Pulse Feed Mode      | pulse period             | Set Pulse Cycle; adjusts the bead overlap rate, which determines the size of individual weld beads. A higher value results in larger beads.                      |
|                                                       | Pulse Wire Feed Speed    | Set the pulse feed speed                                                                                                                                         |
|                                                       | pulse smoothness         | Set Pulse Smoothness; indicates the smoothness of the ripple pattern in the weld bead. A higher value yields a smoother appearance with less pronounced ripples. |

- Status interface: Display the air pressure and the real-time temperature of the welding head lens; Shows some operating status of the machine.



| Functional classification | Description of functions | Remarks                                                                          |
|---------------------------|--------------------------|----------------------------------------------------------------------------------|
| Value status              | air pressure             | Indicate the current protective gas pressure.                                    |
|                           | Lens temperature         | Indicate the temperature of the current gun head protection mirror.              |
| Enabling status           | laser                    | Green: laser emission, black: standby                                            |
|                           | Red light                | Green: red light emitting, black: standby                                        |
|                           | blow air                 | Green: protection gas output, black: standby state                               |
|                           | silk feed                | Green: silk delivery, black: standby                                             |
|                           | safety lock              | Green: security lock closed state, black: safety lock open state                 |
|                           | gun head switch          | Green: the gun head switch is pressed, black: The gun head switch is not pressed |

- Alarm interface: Shows some alarm information of the machine.



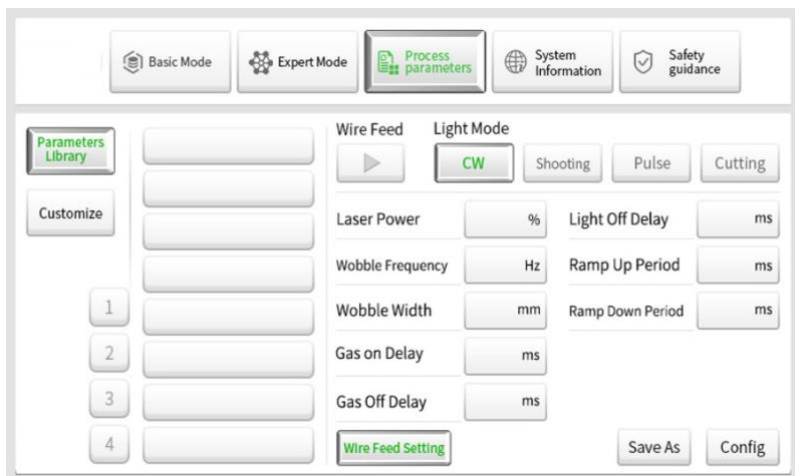
| Description of functions      | Remarks                                                                                                                                                                                                                                                                                     |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Emergency stop                | If the laser emergency stop alarm is generated, please check whether the emergency stop switch is pressed, and contact the after-sales service after confirming that it is correct.                                                                                                         |
| Locking machine               | After the machine is locked, please contact the after-sales service.                                                                                                                                                                                                                        |
| gunhead communication         | The communication between the laser and the handheld welding gun is abnormal. Please check whether the connection is normal and contact the after-sales service.                                                                                                                            |
| Ground line detection         | If the local wire is not properly connected, the machine will alarm. If the grounding is confirmed to be normal, the machine will still alarm. Please contact the after-sales service for handling.                                                                                         |
| protective gas                | If the pressure of the protective gas is abnormal, please check whether the protective gas is turned on and whether the gas cylinder is short of gas. After confirming that there is no error, contact the after-sales service for handling.                                                |
| Protection mirror temperature | The temperature of the protective mirror is abnormal. Please check:<br>1. Whether the protective gas is turned on and whether the pressure is normal; 2. Check if the protective mirror is dirty. 3. After confirming that there are no errors, contact after-sales service for processing. |

|                              |                                                                                                                                                                                                                                                                                                                                     |
|------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| fiber optic disc temperature | If the optical fiber disk temperature exceeds the threshold, check whether the air outlet is blocked and whether the filter is dirty. Clean the air outlet and filter in time. Check whether all fans are running properly. If any abnormality occurs, contact the after-sales service.                                             |
| Fan failure                  | If the fan is faulty, contact the after-sales service.                                                                                                                                                                                                                                                                              |
| pump source temperature      | If the temperature exceeds the threshold, check whether the air outlet is blocked, whether the filter is dirty, and clean the air outlet and filter. Do not work for a long time in a place with high ambient temperature; Check whether all fans are running properly. If any abnormality occurs, contact the after-sales service. |
| Ambient temperature          |                                                                                                                                                                                                                                                                                                                                     |
| pump source current          | If the current exceeds the threshold, please restore the factory settings and try again. If the fault persists, contact the after-sales service.                                                                                                                                                                                    |
| red light current            |                                                                                                                                                                                                                                                                                                                                     |
| forward PD alarm             | If an optical path alarm is generated, restore the factory settings and try again. If the fault persists, contact the after-sales service.                                                                                                                                                                                          |
| Interlock alarm              | If the external control function is enabled and the external control line is not connected, the machine will give an alarm. If the external control line is connected properly, the machine still alarms, please contact the after-sales service for handling.                                                                      |
| Failure code                 | 1: hardware failure 2: power alarm                                                                                                                                                                                                                                                                                                  |
| Power alarm                  | The power supply is abnormal. Please restore the factory settings and try again. If the fault persists, contact the after-sales service.                                                                                                                                                                                            |

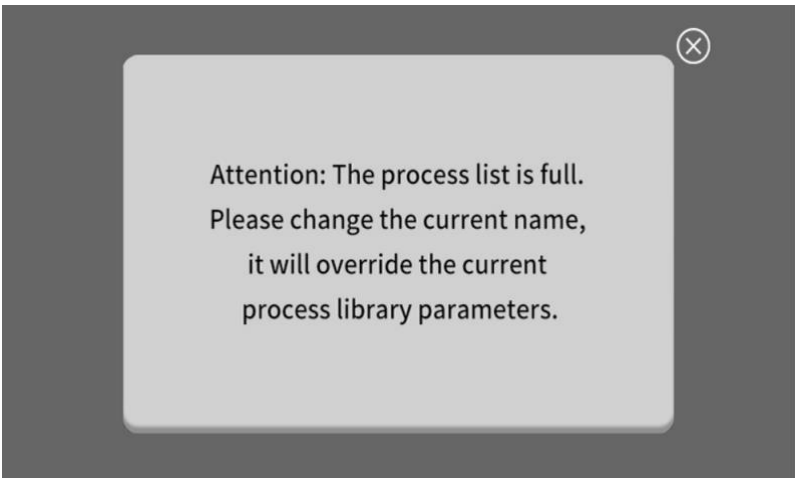
### (3) Interface of process parameters

The process parameter interface is divided into two sub-interfaces: process library and user-defined.

- Process library: It has four pages and can store 32 different sets of data to suit different welding needs.



Click the name of any parameter document in the process library column to view the detailed parameters of the process item on the right. After the parameters are modified, click Save As. A dialog box is displayed, indicating that the operation is successful. If the stored parameters are full, the system will pop up a dialog box after you click Save As to modify the file. At this time, changing the existing name to "EMPTY" will clear the process entry.



| Functional classification | Description of functions             | Remarks                                                                                                                                                                                          |
|---------------------------|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| process parameters        | Toggle Page                          | The procedure library comes pre-loaded with 32 sets of welding parameters, allowing customers to select the appropriate one for various working conditions.                                      |
| process mode              | parameter documents                  | Click on any procedure entry, then click "Configure Parameters" to apply the settings to the detailed interface of Expert Mode.                                                                  |
|                           | Parameter Documentation Modification | Click any process item, modify the parameters, click Save As, and the modified name will pop up. After modifying the name, click OK. The process item will be saved to the customized interface. |

Click Save to display a dialog box. Click Cancel to return to the customized interface. Click Save to overwrite the current modified parameters. Change the name and click Save As. The parameters will be saved to the parameter customization page.

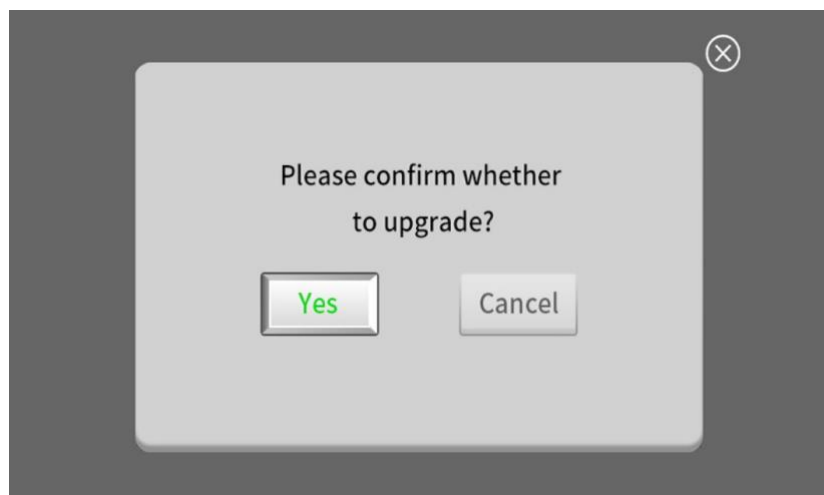
#### (4) Machine information interface

The machine information interface includes three sub-interfaces: bonder information, laser information, and check update.

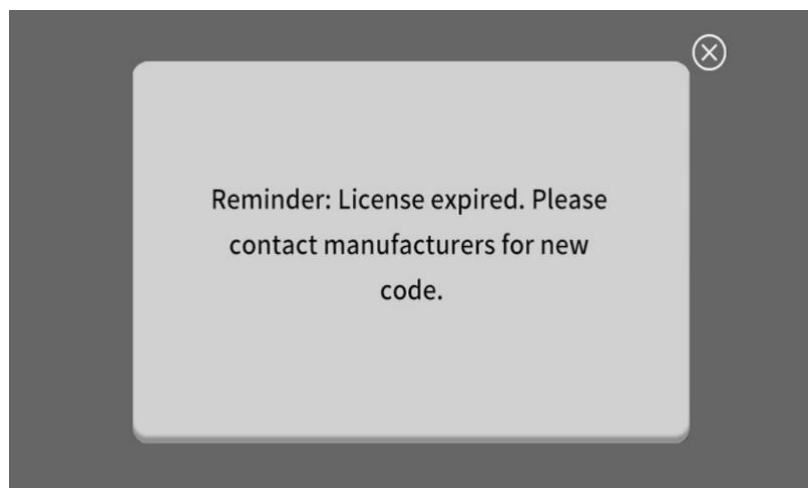
● Welding machine information: This interface mainly displays the information about the station, business information, and the validity period of the station by entering the authorization code.

The screenshot displays the 'System Information' sub-interface. At the top, there is a navigation bar with five buttons: 'Basic Mode', 'Expert Mode', 'Process parameters', 'System Information' (which is highlighted with a green border), and 'Safety guidance'. Below the navigation bar, the interface is divided into two main sections: 'System Information' on the left and 'Normal information' on the right. The 'System Information' section contains four rows of labels and input fields: 'Model', 'Mainboard S/N', 'Torch S/N', and 'System version' on the left; 'HW version', 'MCU version', 'Laser version', and 'Wire feeder Version' on the right. The 'Normal information' section contains four rows of labels and input fields: 'Order date', 'Expired date', 'Machine date', and 'Machine time' on the left; and 'Authorization Code' on the right. At the bottom of the 'Normal information' section, there is a 'Check for Updates' button with a green circular arrow icon, and a 'Config' button with a gear icon.

The screenshot displays the 'Check for Updates' sub-interface. It features the same navigation bar at the top as the previous screenshot, with 'System Information' highlighted. The main content area is titled 'Check for Updates' and contains a list of components with their current versions and 'Upgrade' buttons. The components are: 'Main MCU', 'Auxiliary MCU', 'Torch Main MCU', 'Torch Auxiliary MCU', 'Wire Feed Firmware', and 'Display Screen'. Each component has a text input field for the version and a corresponding 'Upgrade' button. At the bottom left, there is a back button with a green left-pointing arrow.



When the authorization code of the device is about to expire, the system displays a dialog box. In this case, contact the manufacturer to release the authorization code again to ensure that the device can be used normally.



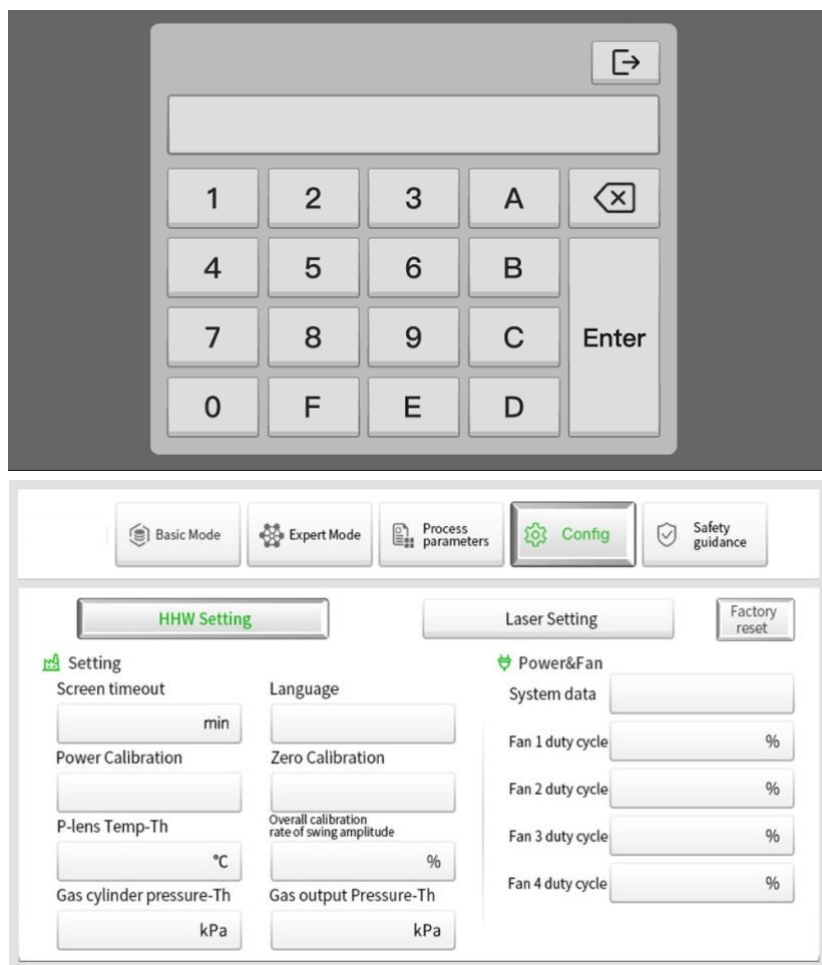
| functional classification | Description of functions | Remarks                                                                                                                                                                                                                               |
|---------------------------|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Machine information       | Machine model            | Machine model                                                                                                                                                                                                                         |
|                           | hardware version         | Machine hardware version number                                                                                                                                                                                                       |
|                           | MCU version              | Machine firmware version number                                                                                                                                                                                                       |
|                           | Head S/N                 | Gun head serial number (unique number for each gun head)                                                                                                                                                                              |
|                           | Main control S/N         | Machine serial number (unique number for each host)                                                                                                                                                                                   |
|                           | laser version            | Machine version number                                                                                                                                                                                                                |
|                           | System version           | Machine software system version number                                                                                                                                                                                                |
|                           | Wire feeder version      | System version number of the wire feeder software                                                                                                                                                                                     |
| Business information      | Purchase date            |                                                                                                                                                                                                                                       |
|                           | machine date             | The current date of the machine's built-in clock                                                                                                                                                                                      |
|                           | machine time             | The current time that is always built into the machine                                                                                                                                                                                |
|                           | Expiration date          | Expiration lock warning time                                                                                                                                                                                                          |
|                           | Authorized code          | The authorization code is used to log in and unlock the machine's working validity date. Incorrect authorization code.<br>The system displays the following message: The authorization code is incorrect. Please check and try again. |

|                   |                                  |                                                                                                                                                                                                                                         |
|-------------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Check for updates | mainMain<br>Control Board        | If the latest version is detected, the version number of the latest firmware will be displayed and the upgrade will be performed<br>The button will light up. Click Upgrade to upgrade the software according to the upgrade operation. |
|                   | Auxiliary<br>Control Board       | If the latest version is detected, the version number of the latest firmware will be displayed and the upgrade will be performed<br>The button will light up. Click Upgrade to upgrade the software according to the upgrade operation. |
|                   | board<br>mainTorch<br>Main Board | If the latest version is detected, the version number of the latest firmware will be displayed and the upgrade will be performed<br>The button will light up. Click Upgrade to upgrade the software according to the upgrade operation. |
|                   | Torch Auxiliary<br>Board         | If the latest version is detected, the version number of the latest firmware will be displayed and the upgrade will be performed<br>The button will light up. Click Upgrade to upgrade the software according to the upgrade operation. |
|                   | Wire feed<br>machine<br>firmware | If the latest version is detected, the version number of the latest firmware will be displayed and the upgrade will be performed<br>The button will light up. Click Upgrade to upgrade the software according to the upgrade operation. |
|                   | display screen                   | If the latest version is detected, the version number of the latest firmware will be displayed and the upgrade will be performed<br>The button will light up. Click Upgrade to upgrade the software according to the upgrade operation. |

### (5) System setting interface

First, click on the login interface, and the input box will pop up. You need to enter the login password.

1. You can enter the setting interface only after the password is entered successfully.
2. The following message is displayed when the password is incorrect: The login password is incorrect. Please check and try again. The setup interface includes two sub-interfaces: bonder setup and laser setup.



● Welding machine settings: It provides the functions of viewing the factory settings, power supply and fan status, and restoring the factory settings. It is recommended that each parameter be modified under the guidance of after-sales professionals.

| Functional classification | Description of functions                | Remarks                                                                                                                                                                                                                                                                                                                                    |
|---------------------------|-----------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| manufacturer settings     | screen saver time                       | Users can customize the screen saver timer (adjustable from 1 to 120 minutes) to allow the system to enter standby mode during periods of inactivity.                                                                                                                                                                                      |
|                           | language settings                       | The default language is Chinese and cannot be changed.                                                                                                                                                                                                                                                                                     |
|                           | External Full Power Calibration         | It is used to control the full power calibration value of the external control. The parameter can be set to the following range: 1-4095; Note: After the factory settings are restored, the external control full power calibration can be reset. The input range is 1 to 4095.                                                            |
|                           | zero point correction                   | It is used to set the zero point correction value. The parameter can be set in the following range: -300 to 300; note: You cannot reset this data by clicking the restore factory settings button.                                                                                                                                         |
|                           | Protective Window Temperature Threshold | The user can customize the temperature threshold of the protective mirror. The parameter can be set within the following range: 0-100 °C; The value of this parameter is associated with the value on the alarm interface. Note: Recovering<br>After the factory setting, the temperature threshold of the protective mirror can be reset. |
|                           | Overall calibration ratio of swing      | Perform rate compression or expansion on the basis of the original swing, input range 70%-130%, note: Click the restore factory settings button. The reset cannot be performed This value.                                                                                                                                                 |
|                           | Gas cylinder pressure threshold         | It is used to set the gas cylinder pressure threshold. The parameter can be set in the following range: 0-500KPa; The value of this parameter is associated with the value on the alarm interface.                                                                                                                                         |
|                           | Air blow pressure threshold             | This parameter is used to set the air pressure threshold. The value range is as follows: 0-500KPa.                                                                                                                                                                                                                                         |

|                           |                            |                                                                                                                                                                                                                     |
|---------------------------|----------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power Supply & Fan Status | System data                | The unit is 10 minutes. This value shows the total machine usage time.                                                                                                                                              |
|                           | Fan duty cycle             | Shows the current fan duty cycle of the machine. The larger the value, the faster the fan.                                                                                                                          |
| Other                     | Restoring factory settings | Click to restore factory settings. The machine resets data and restores to factory settings. Click 'Restore Factory Defaults' to reset the machine's data and return all parameters to their factory preset values. |

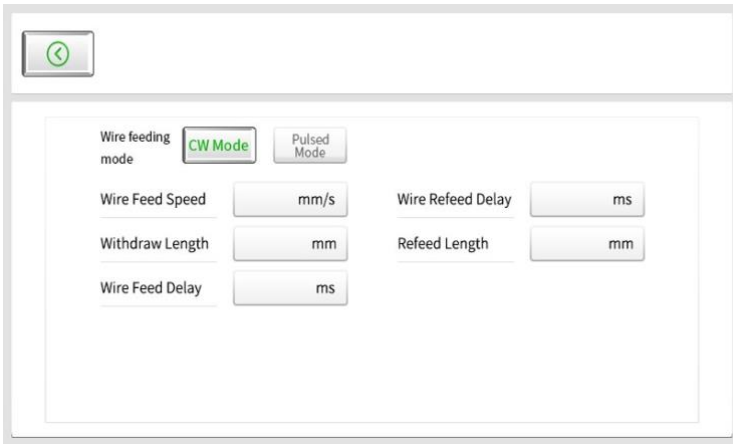
● **Laser settings:** This interface contains a series of information settings for reference points and alarm points.

It is recommended that each parameter be modified under the guidance of after-sales professionals.

The screenshot displays the 'Laser Setting' interface. At the top, there are five navigation buttons: 'Basic Mode', 'Expert Mode', 'Process parameters', 'System Information' (which is highlighted with a green border), and 'Safety guidance'. Below these, there are three sub-tabs: 'HHW Setting', 'Laser Setting' (highlighted with a green border), and 'Factory reset'. The 'Laser Setting' tab is divided into two main sections. The left section, 'Benchmark Setting', contains several input fields: 'Overcurrent limit value' (unit A), '10% PD reference voltage' (unit V), 'Permitted Forward Alarm Times' (with a calendar icon), 'Redlight Current', 'InCtrl Full Power Ref' (unit mA), 'Exctrl Full Power Ref', and 'Exctrl Power Display Ref'. The right section, 'Alarm point', contains three input fields: 'Pump Temp' (unit °C), 'Ambient Temp' (unit °C), and 'Fiber Disk Temp' (unit °C). At the bottom right of the interface, there is a 'System Information' button with a globe icon.

| Functional classification | Description of functions                   | Remarks                                                                                                                                                                               |
|---------------------------|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| reference point setting   | Overcurrent reference voltage              | It is used to set the overcurrent threshold. The value range is 0.0-50.0<br>Note: The value of this parameter cannot be restored to factory settings.                                 |
|                           | 10% PD reference voltage                   | It is used to set the 10% reference voltage value, with a range of 0-2.5<br>Note: The value of this parameter cannot be restored by clicking the return exit setting.                 |
|                           | Continuous Forward Optical Interlock Count | It is used to set the number of times of continuous forward optical lock. The value range is 0-5<br>Note: The value of this parameter cannot be restored to factory settings.         |
|                           | Internal Full Power Calibration            | It is used to set the full power calibration value of internal control. The value range is 0-255<br>Note: The value of this parameter cannot be restored to factory settings.         |
|                           | red light current                          | It is used to set the red light current value. The value range is 0-150<br>Note: The value of this parameter cannot be restored to factory settings.                                  |
|                           | External Full Power Calibration            | It is used to set the full power calibration value of the external control. The value range is 0 to 100<br>Note: The value of this parameter cannot be restored to factory settings.  |
|                           | External Power Display Calibration         | It is used to set the calibration value of the external control power display. The value range is 50-150<br>Note: The value of this parameter cannot be restored to factory settings. |
|                           |                                            |                                                                                                                                                                                       |
| alarm point setting       | pump source temperature                    | It is used to set the pump source temperature alarm value. The value range is 0 to 100<br>Note: The value of this parameter cannot be restored to factory settings.                   |
|                           | fiber optic disc temperature               | It is used to set the temperature alarm value of the fiber disk. The value range is 0 to 100<br>Note: The value of this parameter cannot be restored to factory settings.             |
|                           | Ambient temperature                        | It is used to set the ambient temperature alarm value. The value range is 0 to 100<br>Note: The value of this parameter cannot be restored to factory settings.                       |

## 15-Wire feeder software operation



CW mode:



When the continuous mode is selected, this button is displayed in green, and when the non-selected mode is displayed in gray. Click the button to switch the mode to distinguish the current continuous/pulse mode.

### 1. Feeding speed:

Control the speed of wire feeding during welding. Range: 5-50 mm/s, You can click "number" to enter directly from the number pad. Note: All parameters on this page can be directly clicked on the values, the same below.

### 2. Wire delivery delay:

Controls the length of time for delaying the start of the wire feeder after pressing the trigger of the welding gun. The value ranges from 0 to 2000 ms. Generally, the value is 0. For example, if the start delay is set to 1000ms, after pressing the trigger of the welding gun, wait for 1s to start feeding.

### 3. Filament delay:

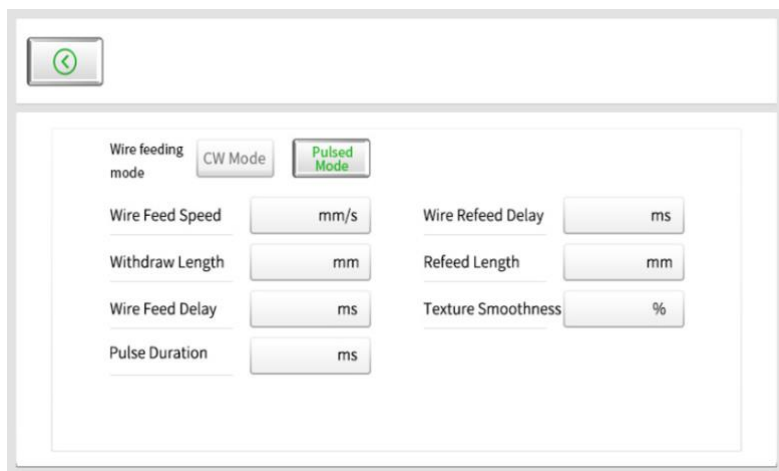
Control the interval time between compensating wire feeding and withdrawing broken wire when the wire is broken, which is used to improve the effect of wire breaking due to premature compensating wire feeding, which leads to the second adhesion of the welding wire to the weld seam. The value ranges from 0 to 2000 ms. It is usually set to 0.

### 4. Pullback length:

controlling the length of the wire feeding machine to pull back the broken wire when the wire is broken to help break the wire; The range is 0-100mm, usually set to 15mm, and can be increased according to the thickness of the welding wire and the length of the wire feeding tube on site.

### 5. Filament length:

Control the length of the wire feed after the wire feed machine pulls back when the wire is broken, which is used to compensate for the influence of the "retraction length" and maintain the consistency of the joint during the next welding. The value ranges from 0 to 100 mm, and is usually set to 14 mm.



The screenshot displays a control interface for a wire feeding machine. At the top left, there is a button with a green circular arrow icon. Below it, the 'Wire feeding mode' section contains two buttons: 'CW Mode' and 'Pulsed Mode', with 'Pulsed Mode' currently selected and highlighted in green. The main settings area is organized into two columns. The left column includes 'Wire Feed Speed' (mm/s), 'Withdraw Length' (mm), 'Wire Feed Delay' (ms), and 'Pulse Duration' (ms). The right column includes 'Wire Refeed Delay' (ms), 'Refeed Length' (mm), and 'Texture Smoothness' (%). Each parameter is accompanied by a text input field and a unit label.

| Parameter          | Unit |
|--------------------|------|
| Wire Feed Speed    | mm/s |
| Withdraw Length    | mm   |
| Wire Feed Delay    | ms   |
| Pulse Duration     | ms   |
| Wire Refeed Delay  | ms   |
| Refeed Length      | mm   |
| Texture Smoothness | %    |

Pulse mode:



When the pulse mode is selected, this button will be displayed in green, and when the mode is not selected, it will be displayed in gray. Click the button to switch the mode to distinguish the current continuous/pulse mode. The pulse mode mainly adjusts the pulse period, pulse feeding speed, and pulse smoothness to achieve fish scale welding.

#### 1. Pulse period:

Control the size of a single fish scale pattern. The larger the cycle, the larger the single fish scale pattern. Range: 50-1000ms, usually set to 140ms.

#### 2. Pulse feed speed:

The average speed in pulse mode controls the speed of wire feeding during welding. Range: 5-50 mm/s, You can click "Number" to enter the number directly from the number pad, usually set to 10 mm/s.

#### 3. Smoothness:

Control the fluctuation between two fish scales. The smaller the value, the more obvious the overall effect. The value ranges from 10 to 80 and is usually set to 20.

4. In summary, the "pulse mode" is mainly used for fish scale welding services. The above parameters are for reference only. In actual use, it is necessary to adjust the welding wire material, welding wire model, laser power, and weld width appropriately to achieve the desired effect. Other keys and parameters are the same as those in continuous mode. (In pulse mode, the parameters of automatic pullback speed, pullback length, automatic feeding speed, feeding length, feeding delay, and feeding delay are the same as those in continuous mode.)

## 16-How to use the fish scale feature

### Method 1: Use pulse wire feeding mode (recommended).

The parameters of the wire feeder are selected as "pulse" pulse period: 140ms

Pulse feed speed: 10mm/s pulse smoothness: 20%

Note: The wire feeder uses pulse mode, and the laser output must be set to continuous output mode.

### Method 2: Enter the professional mode settings.

Set a reasonable shot duration and shot interval in the settings

Shooting duration: 150ms (this parameter affects the size of the weld pattern)

Interval time: 40ms (this parameter affects the interval between two stripes)

Set the pullback length, feed length, feed delay and feed delay in the feed setting to 0.

the fish scale pattern welding effect can be produced.

Note: It is recommended to use fish scale pattern welding at 50% power, increase air flow, reduce welding splash, and extend the service life of the protective lens.



## Chapter 5

### Detailed specifications

**1-Specification parameters table**

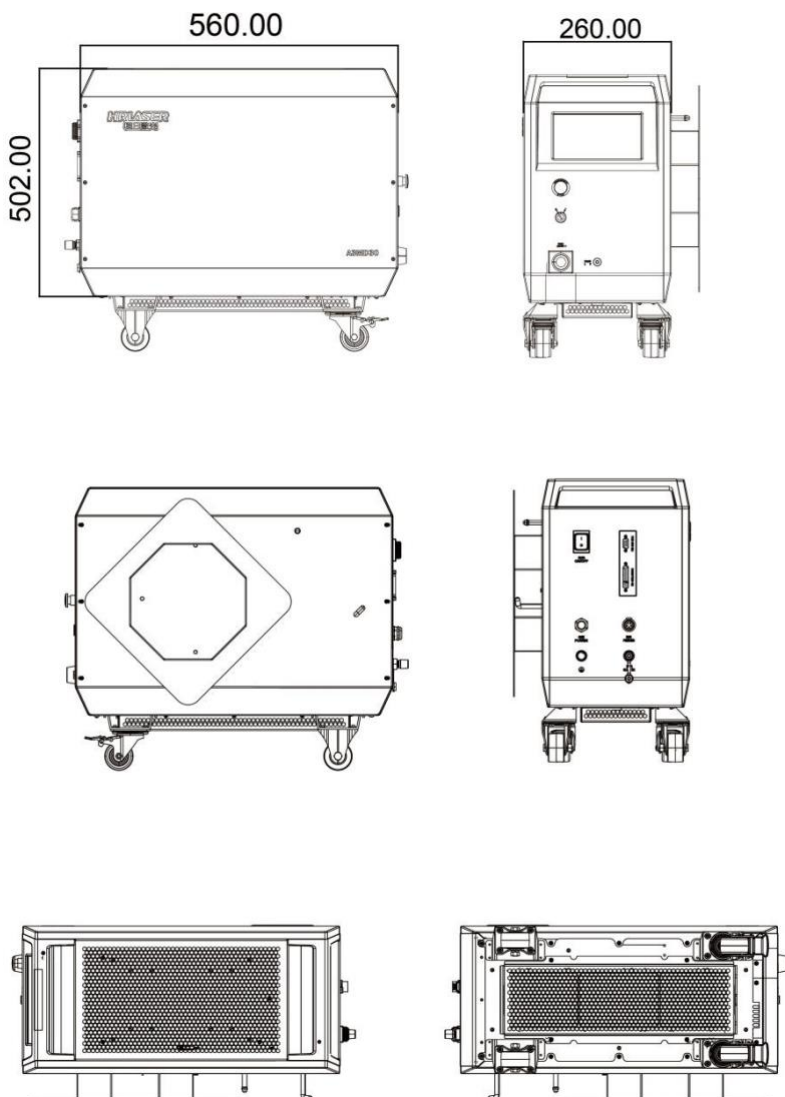
| NO. | CHARACTERISTICS                               | TEST CONDITIONS         |                                 | MIN. | NOM. | MAX. | UNIT |
|-----|-----------------------------------------------|-------------------------|---------------------------------|------|------|------|------|
| 1   | operation mode                                | CW/Modulated            |                                 |      |      |      |      |
| 2   | Polarization                                  | Random                  |                                 |      |      |      |      |
| 3   | output                                        | 100% CW                 | The ambient temperature is 26°C |      | 800  |      | W    |
|     |                                               |                         |                                 |      | 1200 |      |      |
|     |                                               |                         |                                 |      | 1500 |      |      |
| 4   | Power adjustment range                        | 1% gradient             |                                 | 10   |      | 100  | %    |
| 5   | Central wavelength                            | 100% CW                 |                                 |      | 1080 |      | nm   |
| 6   | Short-term Power stability                    | 100% CW >1h             |                                 |      | 3    |      | %    |
| 7   | Laser switching oN time                       | 10% to 90% output       |                                 |      | 50   | 100  | ms   |
| 8   | Laser switching oFF time                      | 90% to 10% output       |                                 |      | 50   | 100  | ms   |
| 9   | Indicating red light power                    | 100% CW                 |                                 | 300  |      | 1000 | μW   |
| 10  | Length of optical fiber armored cable         | A3MD30i&A3MD40i &A3M50i |                                 | 6.0  |      |      | m    |
| 11  | Bending radius of optical fiber armored cable |                         |                                 | 200  |      |      | mm   |

## 2-General characteristic parameters

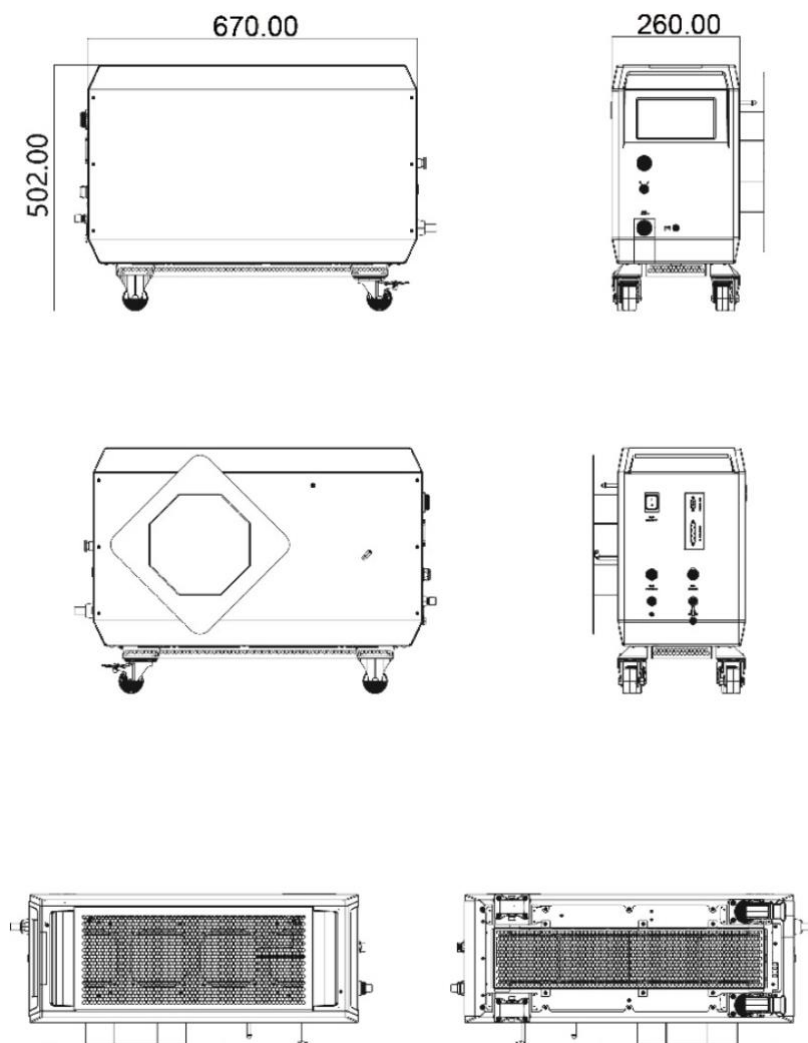
| NO. | CHARACTERISTICS                       | TEST CONDITIONS                | MIN.          | NOM. | MAX. | UNIT |
|-----|---------------------------------------|--------------------------------|---------------|------|------|------|
| 1   | Working Voltage                       |                                | 200           | 220  | 240  | VAC  |
| 2   | Input Power                           | 100% output/A3MD30i            |               |      | 3.2  | KW   |
|     |                                       | 100% output/A3MD40i            |               |      | 4.6  |      |
|     |                                       | 100% output/A3M50i             |               |      | 5.2  |      |
| 3   | Working Environment Temperature       |                                | -15           |      | 40   | ℃    |
| 4   | Working Environment Relative Humidity |                                | 10            |      | 85   | %    |
| 5   | Laser Cooling Mode                    | Fan cooling                    |               |      |      |      |
| 6   | Gun Head Cooling Method               | Nitrogen and argon gas cooling |               |      |      |      |
| 7   | Storage Temperature                   |                                | -40           |      | 85   | ℃    |
| 8   | Overall Size                          | A3MD30i                        | 560*260*502mm |      |      | mm   |
|     |                                       | A3MD40i                        | 560*260*502mm |      |      |      |
|     |                                       | A3M50i                         | 670*260*502mm |      |      |      |
| 9   | Weight of the Whole Machine           | A3MD30i                        | ≤29           |      |      | kg   |
|     |                                       | A3MD40i                        | ≤33           |      |      |      |
|     |                                       | A3M50i                         | ≤39           |      |      |      |

### 3-Structural Layout

A3MD30i & A3MD40i Laser Three Views (Unit: mm)



A3M50i Laser Three Views (Unit: mm)



## Chapter 6

# Daily Product Maintenance

### 1-The maintenance and trouble handling of the wire feeder

#### 1. Regular inspection:

Check the following points for damage before the wire feeder is put into use:

- (1) Control line and control line plug
- (2) Power supply and wire sending and withdrawing button function
- (3) Pressure rod of wire feeding assembly

### 2-Daily maintenance

- (1) Inspection of wire feeding wheel and pressing wheel:

Check the wear of the thread feeding wheel groove and the pressing wheel, and whether there are impurities in the groove. If the wear is severe, it needs to be replaced in time.

- (2) Inspection of wire feeding tube:

Check whether the stainless steel tube is blocked. If a small amount of metal chip is blocked, use compressed air to clean the tube. If the blockage is severe, replace the tube.

- (3) Motor inspection: Whether the motor has abnormal noise.

- (4) The equipment should be cleaned at least once a month.

### 3-Product accessories inspection and cleaning guide

#### 1. Product accessories inspection

To clean the gun head protection mirror window, you need the following equipment:

- (1) Powder-free rubber gloves or finger cots
- (2) lint-free fiber cleaning cloth and cotton swab
- (3) Anhydrous ethanol, i.e. alcohol (optical grade, purity > 99.5%)
- (4) Light source (flashlight or mobile phone indicator light)
- (5) Beauty tape
- (6) Microscope

notes:

© Before using this product, please check the cleanliness and damage of the protective lens. The use of dusty or damaged protective lenses will damage the welding gun head (focusing lens, extension tube, etc.) and affect the welding effect.

© Unauthorized disassembly of gun heads and laser products will no longer enjoy HRLASER's warranty rights.

© Please wear powder-free gloves or finger cot cleaning products in a dust-free environment. HRLASER will not provide warranty for damage to the gun head due to improper operation or use of incorrect cleaning procedures.

© When cleaning, the concentration of anhydrous ethanol should be greater than 99.5%.

#### 2. Operation Steps

**Please follow the following process to clean and maintain the laser welding machine:**

- (1) Turn off the laser switch and cut off the power supply;
- (2) Rotate the locking screw on the protective mirror housing from the gun head and pull out the protective mirror seat. (At this time, the protective mirror drawer is sealed with clean decorative paper tape to prevent dust from entering.) Then,

use an optical cleaning cloth dipped in alcohol and wipe the entire surface of the protective mirror window.

(3) Hold the window plate in the left hand and place it under the microscope (magnification is 20 times);

(4) Adjust the focal length of the microscope with the right hand to ensure that the surface of the protective lens can be clearly imaged under the microscope.

(5) Carefully observe the surface of the protective lens. If dust or tiny particles are found, use a cotton swab to clean it. The steps are as follows:

1. Dip a cotton swab in enough alcohol and shake off the excess alcohol.

2. Use a microscope to place the cotton swab in the dust area of the protective lens.

3. Gently wipe off the dust with a cotton swab and move it to the edge of the protective lens. Replace the cotton swab in time after use.

4 After wiping all dirt, place it under a microscope for final confirmation.

(6) Install the clean protective lens into the protective lens seat.

(7) Insert the protective mirror seat into the lens cavity seat and tighten the locking screws on the lens seat housing to prevent the protective mirror seat from loosening and affecting its use.

Important:

⊙ Do not reuse lint-free cotton cloth or cotton swabs.

⊙ Do not touch the protective lens of the welding gun head with your fingers.

⊙ Do not blow the dirt on the surface of the protective lens directly with your mouth, as it may bring new dirt.

⊙ Do not touch the tip of the cleaning cotton swab with your fingers.

⊙ Please do not forget to clean the protective cover and sleeve when reinstalling.

⊙ When using compressed air, do not blow dirt directly from the front. Use side blowing to prevent dirt from entering the surface.

⊙ If the protective lens base cannot be immediately installed back on the optical components, please seal the lens cavity housing with decorative paper.



1. Unscrew the protective mirror seat screw



2. Take out the protective mirror base



3. Beauty paper packaging  
Protecting mirror seat cavity



4. Use a dust-free cotton swab dipped in alcohol or a dust-free cloth to gently wipe the front of the protective lens



5. Take out the protective mirror fixing piece for protection  
Wipe the other side of the goggles



6. Put the protective mirror base into the cavity, and tighten the screws of the protective mirror base

### 3.Operation procedure for replacing the focus lens.

**Please follow the following process to clean and maintain the focusing mirror of the laser welding machine gun head:**

- (1) Turn off the laser switch and cut off the power supply;
- (2) Remove the focusing lens from the gun head (see the disassembly steps as shown in the figure below), then use an optical cleaning cloth dipped in alcohol and wipe the entire surface of the focusing lens;
- (3) Hold the focusing lens in your left hand and place it under the microscope (magnification is 20 times);

(4) Adjust the focal length of the microscope with the right hand to ensure that the surface of the focusing lens can be clearly imaged under the microscope.

(5) Carefully observe the surface of the focusing lens. If dust or tiny particles are found, use a cotton swab to clean it. The steps are as follows:

1. Dip a cotton swab in enough alcohol and shake off the excess alcohol.
2. Use a microscope to place the cotton swab in the dust area of the protective lens.
3. Gently wipe off the dust with a cotton swab and move it to the edge of the protective lens. Replace the cotton swab in time after use.
- 4 After wiping all dirt, place it under a microscope for final confirmation.

(6) Install the clean focusing lens into the gun head (as shown in the figure below for assembly steps).

Important:

- © Do not reuse lint-free cotton cloth or cotton swabs.
- © Do not touch the focusing lens of the welding gun head with your fingers.
- © Do not blow the dirt on the surface of the focusing lens directly with your mouth, as it may bring new dirt.
- © Do not touch the tip of the cleaning cotton swab with your fingers.
- © Please do not forget to clean the gun barrel and shell when reinstalling.
- © When using compressed air, do not blow dirt directly from the front. Use side blowing to prevent dirt from entering the surface.
- © If the focusing lens cannot be immediately installed back on the optical component, please seal the lens cavity shell with decorative paper. When installing the focusing lens, pay attention to the convex surface facing upwards.

#### 4-Focus mirror cleaning steps



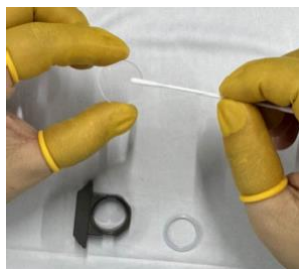
1. Use a screwdriver to disassemble the focusing lens base screw \* 2, and then remove the focusing lens base.



2. Seal the focusing lens cavity with decorative glue to prevent dust from entering.



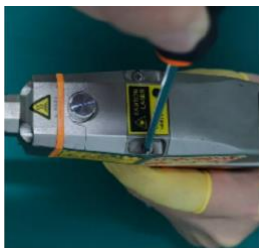
3. Use a dust-free cotton swab or cloth dipped in alcohol to wipe the front of the focusing lens.



4. Take out the fixing part of the focusing lens and wipe the other side of the focusing lens.



5. After cleaning, install the focusing lens with the convex side facing downwards, and then insert the pan plug.



6. Install the focusing lens in the direction shown in the figure, and then tighten the screws \* 2.

## Chapter 7

# Service and Maintenance

### 1-Service Notice

Note:

© This product does not have any parts, components, or components that need to be repaired by users themselves. All maintenance operations need to be completed by professionals from HRLASER.

© To protect your rights and interests, please contact HRLASER or the local representative as soon as possible after discovering a malfunction, and apply for product repair or replacement services. After being authorized by HRLASER, please package the warranty products in a matching package and send them back to HRLASER.

© When any damage is found upon receipt of the product, proof documents must be kept to claim rights from the carrier. Important:

© Do not send any products without communication confirmation.

© If the product is not within the warranty period or within the warranty scope, the customer is responsible for the product repair costs.

Changes:

HRLASER reserves the right to make any changes to the design or structure of the product without prior notice.

## **2-Service statement**

For issues related to the safety, setting, operation, or maintenance of HRLASER products, please read this manual carefully and strictly follow the operating instructions to solve them.

If you have any questions, please call HRLASER Customer Service Department:  
400-900-9588

After your feedback is confirmed by the HRLASER Customer Service Department, the technical support team will follow up. If your problem cannot be resolved after communicating with the technical support team, you may need to send the product back to HRLASER for further investigation.

## Chapter 8

# Warranty Statements

### 1-Comprehensive terms

Shenzhen HRLASER Co., Ltd. provides warranty services for products with defects caused by materials or production processes during the warranty period, and guarantees that the products meet the relevant quality and specification requirements mentioned in the document under normal use.

Shenzhen HRLASER Co., Ltd. provides repair or replacement services for products that have malfunctions due to materials or production processes during the warranty period. The repair or replacement of products within the warranty scope will still be carried out according to the remaining warranty period of the original product.

### 2-Warranty restrictions

Products, components (including fiber optic connectors) or equipment are not covered by warranty if:

- (1) Artificially tampered with, opened, disassembled, or modified by personnel other than HRLASER;
- (2) Damage caused by improper use, negligence, or accidents;
- (3) Use beyond the scope of product specifications and technical requirements;
- (4) Indirect damage to the laser due to user software or interface failures;
- (5) Used under abnormal operating conditions not included in this manual due to incorrect installation, maintenance, or other abnormal operating conditions;
- (6) Accessories and fiber optic connectors are not covered by the warranty.

The customer has the responsibility to understand the above information and operate according to the user manual. Otherwise, the product failure caused will not be covered by the warranty.

Important:

© Within the warranty scope, customers must provide feedback within 31 days of discovering the fault.

© HRLASER does not grant any third party or individual the right to repair or replace Our company products.