Manual for T700 Air-cooled Handheld Laser Welding Machine

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Preamble

Ensure that you read and understand the entire contents of this User Manual and familiarize yourself with the operating and maintenance instructions before using the product. Customer can strongly recommend that all operators of the product to read and pay special attention to the operation of the product before the operation of all the safety information contained in this document to confirm that this user alone will provide you and the operator, the user and the owner of the product has an important important role, safety and management information should be regularly inquired about, such as the need for product technical assistance, please contact is Mindray wake up service.

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This guide applies to all owners and operators of Herolaser laser equipment and to all persons working in the vicinity of the product while it is in use. Use of this product should be limited to operators who are adequately trained in professional and non-professional welding.

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Chapter 1: Characterization

1.Product description

- This product is a laser welding machine developed by Herolaser;
- Adopting phase change heat dissipation method, with a wavelength range of 1070nm~1090nm, and laser efficiency>38%;
- (Class 4) laser products, designed and tested with safety in mind.

2. Safety warnings

- Lasers have maintained safety hazards that require operator attention;
- Strictly observe the warnings and safety instructions in the manual, and prohibit disassembling the equipment on private days;
- Always use personal protective equipment and follow all safety instructions and warnings when using the laser.

3. Repair and warranty

- There are no user-serviceable parts, components or assemblies;
- No warranty will be given to the equipment or accessories commanded by the privately disassembled laser shock.

4.Product characteristics

- Hand-held laser welding system, including welding control unit and hand-held welding torch;
- The system is safe and secure by following user guidelines and laser safety measures.
- Suitable for welding and handling materials including stainless steel, carbon steel, galvanized sheet metal, aluminum and copper.

5. Shipment checks

- Lasers are thoroughly tested and inspected for compliance with published specifications prior to shipment;
- When accepting the equipment, you need to check whether the package and mail are lifted and damaged, if there is any damage, please contact the company in time.

Chapter 2: Security Information

1. Hand-held laser welding machine use safety

1.Product description

- Handheld laser welding machines are classified as hazardous, invisible laser radiation Class 4 laser products;
- Emits infrared laser radiation at a wavelength of 1080nm, and the average power radiated from the welding head is greater than 100W.

2. Safety warnings

- Infrared radiation is invisible and may cause damage to carbon phosphorus and skin;
- Certified 1080nm NIR band laser protective eyewear must be worn before use;
- Never look directly into the fiber optic output connector, and you must wear appropriate eye protection to avoid injury.

3. Operational considerations

- Do not open the laser, maintenance and repairs should only be performed by authorized service personnel;
- Use a properly grounded power source and normal voltage;
- Ensure that the ambient temperature and humidity are within specified limits and avoid exposure to excessive humidity.

4. Maintenance

- Use air cooling and ensure that the ambient air is dry and clean;
- Close the protective cover after each use, do not touch the welding head lens, and use swabs when cleaning.

5. Warning

- Performing operations outside the scope of this manual may result in radiation injury.

2. Security provisions

Safety Marking	Name	Description
	Electrical hazards	Attention:The text labeled with the electrical warning symbol indicates a potential personal hazard. Failure to follow certain unreasonable procedures may result in certain fatal hazards to you.
	Laser radiation hazard	Attention:Text with a laser-followed warning symbol indicates a potential personal risk. We have placed this symbol on the laser output of our products.
	Warnings	Attention:Text with a warning symbol indicates a potential product bitmap. It requires an operating procedure that, without the correct data map, can result in the lifting of bad or stock ring products or components.
	Direct and reflected beam hazard	Attention:The symbols indicate a person in danger, reading or directly causing eye become a hazard for reflecting the reflected laser beam from the country's shoreline. Personnel must wear protective equipment and clothing.
	Direct beam pointing hazard	Attention:Never look directly out of the welder's "gun" or turn your face to anyone else. This house is very dangerous.
	Wear laser safety glasses	The symbol indicates that personnel must wear auroral safety glasses (personal protective equipment) to protect against the hazards of drifting light radiation.
	Wear protective gloves	The symbol indicates that personnel must wear protective gloves that are laser and injury resistant.

3. Laser protection

1. Laser protective eyewear requirements

- Ensure that it is capable of shielding the entire wavelength range of laser light emitted by the hand-held laser welding machine;
- The end user needs to accurately identify the range of wavelengths emitted by the device and select the appropriate laser safety glasses;
- Confirm that the laser safety glasses used protect against light emitted by the device over its entire wavelength range;
- Check the safety labeling on the product and verify that the PPE is adequate for the output power and wavelength range.

2. Laser protection equipment vendors

- The end user is responsible for determining the suitability of all personal protective equipment;
- Some suppliers of laser safety equipment include LaserVision USA, Kentek Corporation and Rockwell Laser Industries.
- Herolaser provides the names of vendors only as an endorsement or recommendation and is not responsible for their advice, products or services.

4. Safety of welding characteristics

1. Radiation hazards

- Visible and invisible light radiation from the welding process may cause eye and skin damage.

2. Skin hazards

- Exposure to radiation during welding can damage the skin and increase the risk of skin cancer and skin aging.

3. Fire hazards

- The proximity of combustible or flammable materials to the welding area may cause a fire or explosion, and it must be ensured that the welding area is free of combustible materials.

4. Smoke hazards

- Welding fumes consist of particles and gases that may cause adverse effects on the respiratory system and the central nervous system;

- Welding fumes consist of particles and gases that may cause adverse effects on the respiratory system and the central nervous system;
- It is recommended that welding be performed in an adequately ventilated area and that a fume extraction system be used to remove fumes;
- Routine air monitoring should be conducted to determine the level of hazardous fumes in the welding area.

5. Gas cylinder safety

- Protective gas cylinders should be placed where they will not be struck or damaged, and they should be kept away from sources of heat, sparks or flames. Cylinders must be stored in an upright position and secured to a fixed support. A working regulator suitable for the gas and pressure required is required. All hoses and fittings should also be suitable for the application and in good working order.

5. Citation standards

- Safety of power supply: EN 62368-1:2014+A11:2017.
- Electrical safety: ISO 12100:2010, ISO 11553-2017, EN 60204-1:2018.
- Laser safety: EN 60825-1:2014+A11:2021, CDRH 21 CFR 1040.10.
- Please be informed:

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

6. General safety instructions

1. Mirror reflection warnings

- The output port of the handheld laser welder may produce a secondary laser beam that radiates outward at multiple angles, called specular reflection;
- Although the secondary laser beam is much less energetic than the primary laser beam, it may still cause damage to eyes, skin or some material surfaces;
- Take special care when welding highly reflective materials, ensuring that no one is around and that there are no combustible materials.

2. Safety instructions for accessories

● The light-sensitive components integrated in the optics of the hand-held laser welding machine may be damaged by laser exposure, so care should be taken to protect the related components.

3. Laser intensity warning

● Handheld laser welders deliver laser output strong enough to weld metal, burn skin, clothing and paint, and even ignite volatile substances.
● Be sure to isolate flammable materials in the vicinity when operating and using the product.

4. Ground power warning

● Use a properly grounded power source to ensure safe operation.

5. Internal component repair warnings

● Users are not allowed to open the internal parts of the product for repair, if you need to repair, please contact the technician of Herolaser, otherwise the warranty will be voided.

6. Warning on use of output connectors

● Be careful when using soldered-on connectors to avoid damage to the part of the fiber optic cable that is connected to the soldered-on connector.

7. Warnings on conditions of use

● The product must be used under normal conditions, otherwise the protective mechanism may be affected.

8. Important notes when operating laser welded output connectors

● Be sure to turn off the AC power when operating the output connector (e.g., installing a fiber optic cable connector, inspecting the connector end face, wire filling, etc.).

9. Protective eye wear warning

● Never look directly into the fiber optic output connector and always wear appropriate eye protection when working with laser products.

10. Operating range warnings and important reminders

● Performing operations or adjustments outside the scope of this manual may result in radiation injury.

7. Notes on Optical Operation

1. Practical points

● Read and observe the following operating points to ensure safe operation;
● Do not look directly into the handheld laser welder's exit aperture;
● Avoid placing the handheld laser welder and associated optical outputs at eye level;
● Reasonable selection of safety equipment, according to the output power and wavelength requirements of the laser welding machine;
● Post warning signs in the area where the handheld laser welder will be placed to define the safety zone;
● Not to be used in a dark environment to hold the laser welder;
● Clean and maintain after turning off and disconnecting the power supply;
● When commissioning calibration and focusing work, turn off the laser first and then turn it on again when you are finished.

2. Cautions

● Inspect the lenses rigorously before use to ensure that there is no dust or debris on the surface;
● Careful cleaning of the lenses to avoid hot spots or molten metal particles;
● When commissioning and calibrating, check the spot quality of the laser output first and turn on the laser after there is no abnormality.

3. Warning

● Choose safety gear appropriately and avoid looking directly into the head of the gun;
● Always wear safety glasses during each operation.

8. Notes on electrical operation

● Ensure that the equipment enclosure is well grounded to avoid personal injury due to interruption of the grounding circuit;
● Make sure that the protective earth is connected before use, and pay attention to the type and rating when replacing the line fuse;
● Ensure that the input AC voltage is the normal mains voltage and that it is correctly wired to avoid electric shock or equipment damage;
● Do not disassemble the handheld laser welder without authorization, otherwise there is a risk of electric shock or burns;

● Flammable materials must not be present in the vicinity of the welding area, and laser welding must be performed in an area free of flammable materials;
● No warranty rights for products that have been disassembled without authorization.

9. Handheld laser welding machine operating environment requirements

● Operational environmental requirements including altitude, overvoltage, environmental contamination and humidity;
● The equipment needs to be operated in a dry location and must not be exposed to high humidity;
● Use the equipment in a properly ventilated and clean environment, avoiding high temperatures and high humidity;
● Ensure that the bottom and top of the laser are well ventilated to prevent debris from entering and damaging the equipment or causing personal injury;
● High temperature environment will accelerate the aging of the equipment and reduce the sensitivity and conversion efficiency, if the equipment is overheated, it should be stopped and professional help should be sought.

10. More safety information

● If you need to obtain more information on laser safety, 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.

Important safety information

● Laser Radiation: Laser radiation can cause serious eye and skin damage and must be operated following safety protocols and within a laser controlled area;
● Eye Injury: All personnel in the laser control area should wear personal protective equipment, including safety glasses and helmets, to protect their eyes from the laser beam and welding light;
● Skin hazards: Exposure to infrared and ultraviolet radiation can cause serious damage to the skin, and protective equipment such as suits and heat-resistant gloves are recommended;
● Reflected Beam Hazard: Highly reflective metals may cause laser reflections, posing a hazard to those in the vicinity, and the operator must wear appropriate personal protective equipment;
● Operating environment requirements: Laser welding must be performed in an area free of flammable or combustible materials, and cylinders must be stored with care to ensure proper storage and pressure regulation;
● Attention:
All users must read the full user guide and be fully trained to ensure safe operation;
Keep away from fumes during the welding process and use a fume extraction system to remove harmful particles and debris;
All operators must wear the recommended PPE at all times while in the laser control area.

Chapter 3: Product descriptions

1. Introduction to the characteristics

1. Air cooler radiator

- Ensure optimal heat dissipation through finite element calculations;
- Use of specially customized deformation-resistant high-power heat pipes and aerospace-grade phase change filler materials for harsh climatic conditions;
- The structural design and tooth aspect ratio have been optimized to ensure the best heat dissipation under the same size.

2. Combiner

- Coupling and converging multiple pump-source fibers into a single output, which passes through a resonant cavity and outputs a laser;
- Use of imported optical fiber, after continuous light output test and high and low temperature test, to ensure stable light output;
- Ultra-high pump closing efficiency, up to 99% or more.

3. Laser control boards

- Integration of the laser and welding system into a single unit for improved real-time and stability;
- The full potential of the laser system can be fully utilized, with greater expandability and anti-interference capability.

4. Mains power supply

- Communication class power supply, ultra-high efficiency up to 98%, low heat generation, low output ripple;

5. Constant current sources

- High-current constant-current driver boards to drive the laser pump module output power;
- Deluxe configuration with higher current drive capability and lower heat generation.

6. Axial fans

- Customized ultra-high-speed axial fans with fully imported bearings, high-efficiency blades, and brushless pure copper-wound motors;
- Lifespan approaching 100,000 hours.

7. Semiconductor lasers (pump sources)

- It has been subjected to a number of stringent tests and has excellent performance to ensure the stability and reliability of the whole system.

8. Qbh

- Laser transmission role, connecting the gun head and outputting the laser;
- Highly stable, corrosion-resistant material suitable for welding, with high hardness and anti-high-reflective material properties for extra-long life.

Note: Each component is carefully designed and rigorously tested to ensure the stability and reliability of the entire system.

2. Parameters

Project	Parameters
Model	T700
Whole machine power	2.5KW
Laser type	Fiber optic
Laser power	700W
Laser wavelength	1080nm
Fiber length	5M
Working mode	Continuous

Speed range	25mm/s -50mm/s
Cooling method	Air cooling
Working environment temperature	-10 ℃ -40 ℃
Working environment humidity	10% -85%
Welding thickness	2mm(stainless steel, iron), 1mm aluminum
Welding gap	<0.5mm
working voltage	AC110V or 220V
Body size (L * W * H)	466*213*380mm
Body weight	18kg
control mode	Button, APP
Continuous light output time	24-hour

3. Product functional safety

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

4. Certificate of Conformity

1. Packaging inspection

- Check the packaging for any signs of external damage;
- Ensure that packaging is intact.

2. Equipment inspection

- Inspect equipment for damage or obvious suspected damage;
- Ensure that equipment is in good condition.

3. Notification of carriers and after-sales personnel

- If you find any problems with the package or the equipment, immediately notify the carrier and the after-sales personnel of Herolaser.

4. Fiber optic cable inspection

- Take extra care when removing the product to ensure that the fiber optic cable is not cracked or damaged.

5. Inspection of packing list

- Check the accompanying packing list to ensure that all items are complete.

Caveats:

- Do not attempt to install or operate the laser device if you notice any items missing or obvious or suspected damage to the device;
- Ensure safety in all circumstances and promptly notify the relevant responsible party to address the problem.

5.Laser welding machine front and rear panel description

Front Panel Name	Functional Description
① MODE	Switching modes
② ENABLE	Laser enable switch
③ RESET	Alarm Reset
④ LASER POWER	0-700w Power adjustment

⑤ WOBBLE FREQUENCY	0-150hz Oscillation frequency adjustment
⑥ WOBBLE LENGTH	0-5mm Swing width adjustment
⑦ LOOP	Attachment of Safety Clip
⑧ FEEDER	Connecting wire feeder
⑨ COMM	Board communication, blue light
⑩ ENABLE	Laser enable, yellow light
⑪ LOOP	Safety Clip Indicator, green light
⑫ LASER	Output light indicator, white light
⑬ ALARM	Red light

Front Panel

Rear Panel Name	Functional Description
① ON/OFF	Main switch for power supply
② GAS	Air nozzle: Nitrogen input
③ ACPOWER	110v AC input

Rear Panel

6.Operating panel description

1.Wobble length

WOBBLE LENGTH + 0-5mm

2. Wobble frequency

WOBBLE FREQUENCY + 0-150hz

3. Laser power

LASER POWER+ 0-300w

Chapter 4: Software Installation Process

1. Purpose of preparation

The purpose of writing this operation manual is to fully describe the functions that can be realized by this system and its operation environment, so that the user can understand the scope of use and operation of this system, and to provide the necessary information for the maintenance of the software system and equipment.

2. Introduction to the software

AI laser is a mobile application that adjusts device parameters by connecting to Bluetooth on the phone. By connecting to the device through this application, multiple welding requirements can be achieved (within the allowed range of the device). The software is compatible with Android and IOS system

3. Download

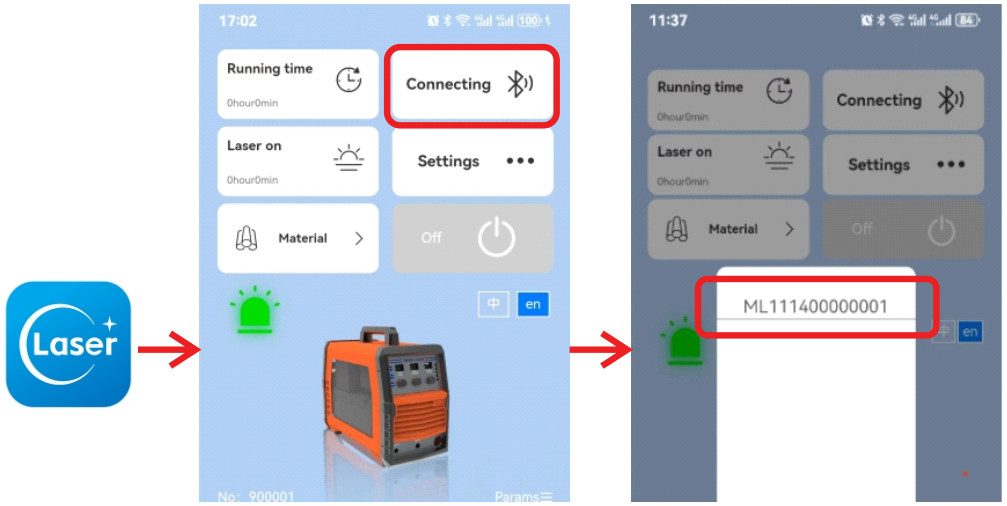
● Android: Browser scan the QR code on the right to download and install it;

● IOS: Search for "AI laser" in the APP store to download and install.

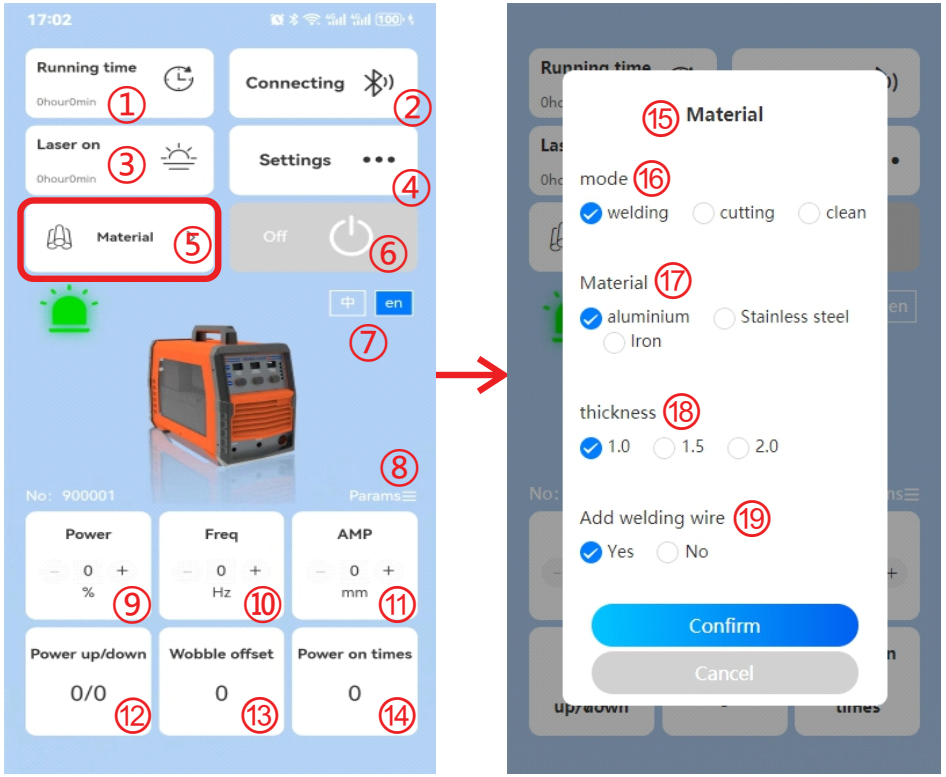
4. Usage steps

Connecting equipment

● (Connection condition: Within 30 meters of obstacle free) The device should be plugged in and turned on; Within 30 meters of the mobile app and device, click the "Connecting" button (If Bluetooth is not turned on, please turn on Bluetooth. A machine number will pop up, and then click on the number to connect the phone to the device;



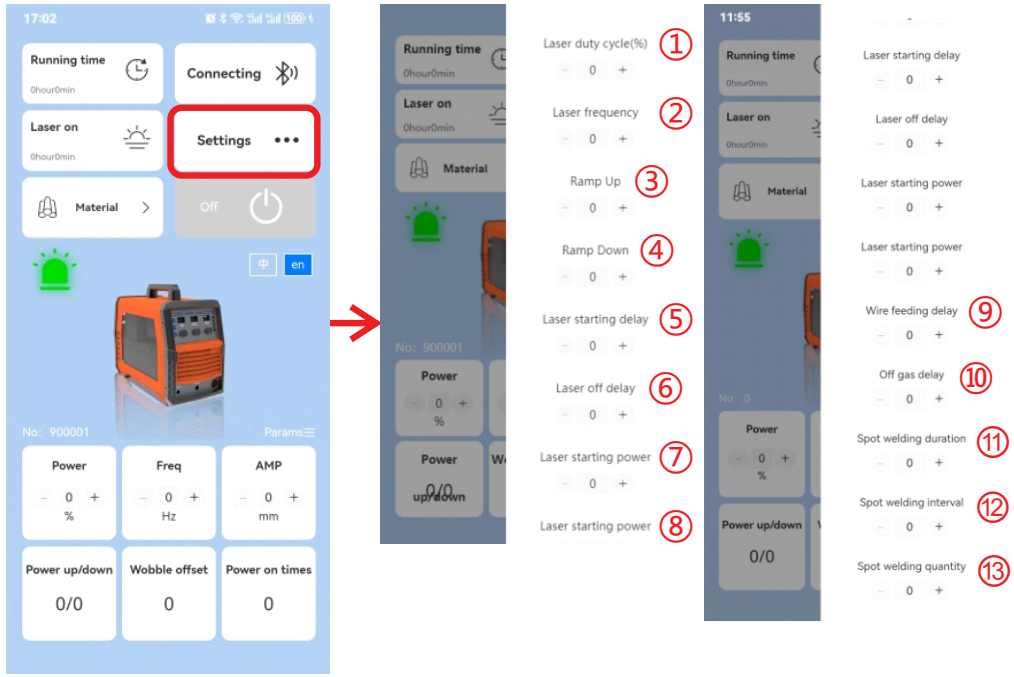
● After successful connection APP will read all the parameters of the device, APP can modify the device parameters, "Material" key can automatically adjust the parameters according to the material and mode;



Functionality	Functional Description
① Power-on time	Accumulated power-on time
② Connected devices	Bluetooth connection to cell phones and other devices
③ Output time	Accumulated light-out time
④ More Settings	Adjustment of process parameters
⑤ Material Selection	Optional, iron, aluminum, stainless steel
⑥ Turn on, turn off	Laser start button blue for start, gray for shutdown
⑦ Language switch	Switch between Chinese and English
⑧ More parameters	More process parameters
⑨ Laser power	0~100% adjustable, 100% power is the maximum power of the machine.
⑩ Oscillation frequency	Laser reciprocating scanning frequency, the maximum scanning frequency is 150Hz under full amplitude state, and the scanning frequency can be raised accordingly under small amplitude.
⑪ Oscillation amplitude	0~5mm adjustable.
⑫ Power Up/Down	Adjusting the power ramp up/ramp down time
⑬ Oscillation bias	Adjust the position of the red light of the gun head at the copper nozzle.
⑭ Number of startups	Machine start-up times
⑮ Material selection	Automatic adjustment of process parameters
⑯ Mode	Adjust welding, cutting, cleaning

⑰ Material	Adjust the choice of material, stainless steel, iron, aluminum
⑱ Thickness	Select the thickness of the plate
⑲ Whether to add silk	Choose whether to add wire if add wire need to connect the gun head to the wire feeder

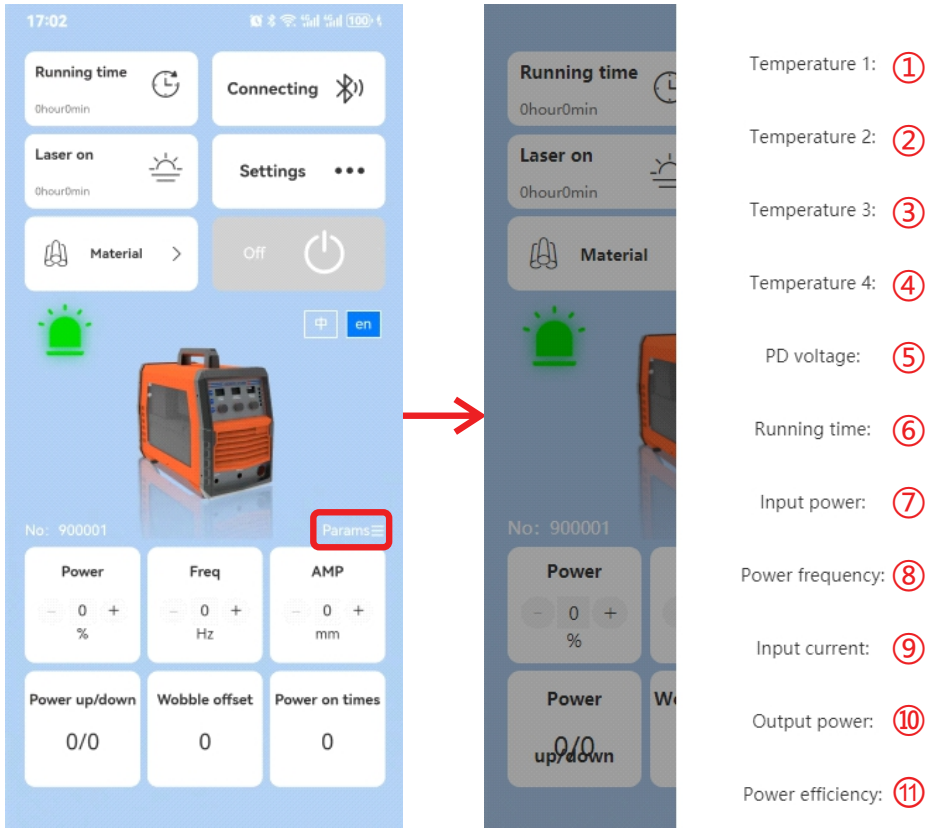
● "Settings": Modify more parameters;



Function	Function Description
① Laser Duty Cycle	Sets the laser output duty cycle in pulse/point mode.
② Laser frequency	Sets the laser output frequency in discontinuous mode.

③ Slow rise time	Sets the laser ramp-up time in welding mode.
④ Slow down time	Sets the laser slow-down time in welding mode.
⑤ Light-Out delay	Sets the delay time between turning on the gas and turning on the laser to prevent dust from entering the barrel.
⑥ Light-off delay	Set the delay time between stopping wire feeding and turning off the laser, used to cut off the welding wire.
⑦ Power on	Sets the starting power for light out, adjusted to prevent initial unevenness of the weld.
⑧ Off power	Set the starting power of light-off and adjust to prevent uneven weld end.
⑨Delayed wire feeding	Set the wire feed delay time
⑩ Delayed gas shutdown	Set the delay time of gas shut-off after laser shut-off.
⑪ Spot welding time	Set the single output laser duration when spot shooting.
⑫ Power Rise and Fall	Sets the time between laser outputs per unit of time when spot shooting.
⑬ Number of Spot Welding	Set the number of laser outputs per unit of time when spot shooting.

● "Params": View more parameters.

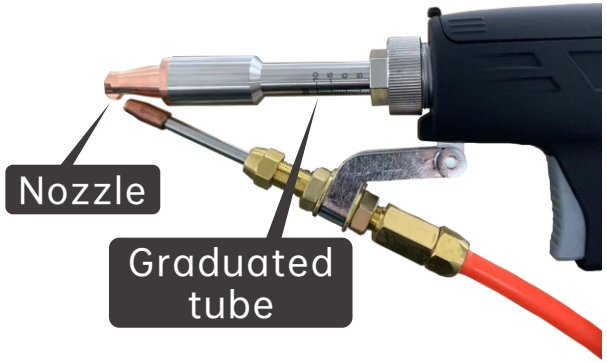


Function	Functional description
① Temperature 1	Pump source 1 temperature
② Temperature 2	Pump source 2 temperature
③ Temperature 3	Optical Chamber Temperature
④ Temperature 4	CPS Temperature
⑤ PD Voltage	Pd voltage display
⑥ Running time	Total laser runtime
⑦ Input power	Laser input power

⑧ Power frequency	Total power frequency
⑨ Input current	Total power input current
⑩ Output power	Total power output power
⑪ Power efficiency	Power supply efficiency display
⑫ Output Voltage	Power supply output voltage adjustment
⑬ Current Limit Percentage	Power supply current limit
⑭ Input voltage	Input Voltage Display

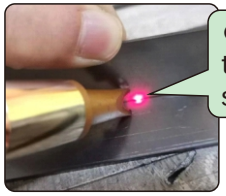
Chapter 5: Welding head description

1. Adjust the extension length of the gun head through the knob to change the amount of defocus so as to obtain different welding effects.
2. Using the correct hand-held position to hold the hand-held gun, index finger placed next to the light switch, to be aligned with the gun (indicating that the red light is the position of the laser light) weld, press the switch can be welded. (Uniform speed forward or pull back)
3. The angle between the gun head and the workpiece is different, and often the welding effect will be different.

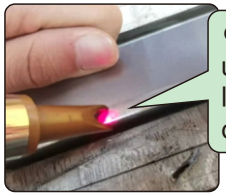


● It is recommended that the angle of the flat plate welding torch be 45℃~60℃ to the plate surface.

(The red light comes out as a 213m line segment, which needs to be perpendicular to the welding direction in order to achieve the desired seam width)



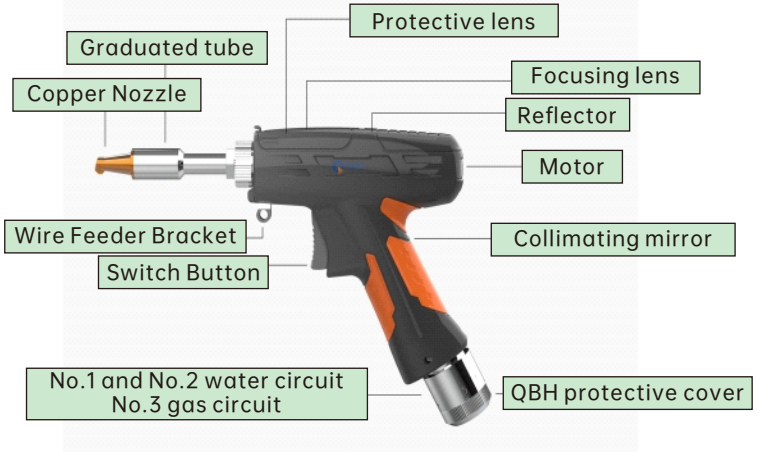
● Right-angle seam welding torch.It should be at 45°C to the riser plate using the angle of the two plates for support to push forward or pull back at an even speed.



● When inserting the workpiece into the nozzle there is usually a deviation of a few millimeters in the focal length, and the nozzle extension should be adjusted accordingly.

Composition of handheld welding torch

● The structure of the handheld torch contains: QBH interface, torch handle, collimation assembly, galvanometer motor assembly, switch button, focusing mirror assembly, lower protective lens, wire feeder bracket, copper nozzle, of which the galvanometer motor and collimating, reflecting, focusing and other optical units in the internal torch body; handheld laser welding torch fiber input interface (QBH) is suitable for the vast majority of industrial laser generators. Structure as shown in the following figure.



Handheld torch features

● The ergonomic design of the handheld head is beautiful; the body is made of soft and hard rubber, lightweight and about 10% lighter than the metal head, with a strong sense of comfort and a comfortable grip on the tiger's muzzle without fatigue;

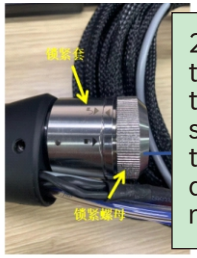
● Temperature safety monitoring system is equipped inside the handheld head, if the temperature of the protective mirror or the gun body exceeds the normal value, an alarm will be alerted, so that the abnormal situation can be detected in time, and the damage of other components can be effectively prevented;

● The modular design of the focusing lens and protective lens not only seals the lens well, but also allows for quick lens replacement.

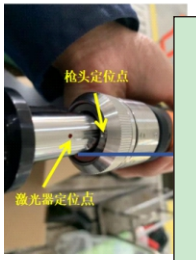
QBH connection

● Remove the dust cover of the fiber optic rod and clean the head of the fiber optic rod with a dust-free cleaning rod and anhydrous ethanol. Before installation, check whether the protective cap of the crystal head of the fiber optic rod is tightly locked to avoid loosening of the cap during the operation of the machine, which may affect the welding effect or even burn the fiber optic;

1. Remove the protective cap and make sure that no dust can enter the gun.



2. Loosen the lock nut by twisting it counterclockwise, then rotate the locking sleeve counterclockwise so that the unlocking mark aligns with the triangular mark on the lock nut.

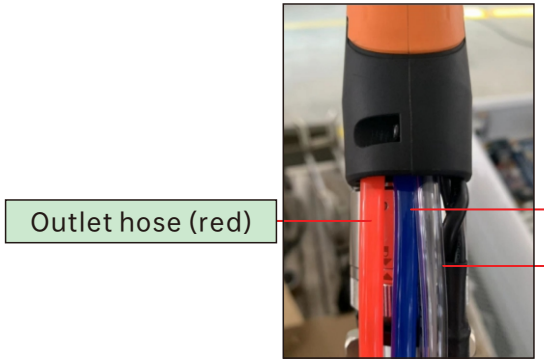


3. The two points are aligned to import the straight groove inserted to the bottom, then twist clockwise after lifting the upper gear, and rotate to lock it.

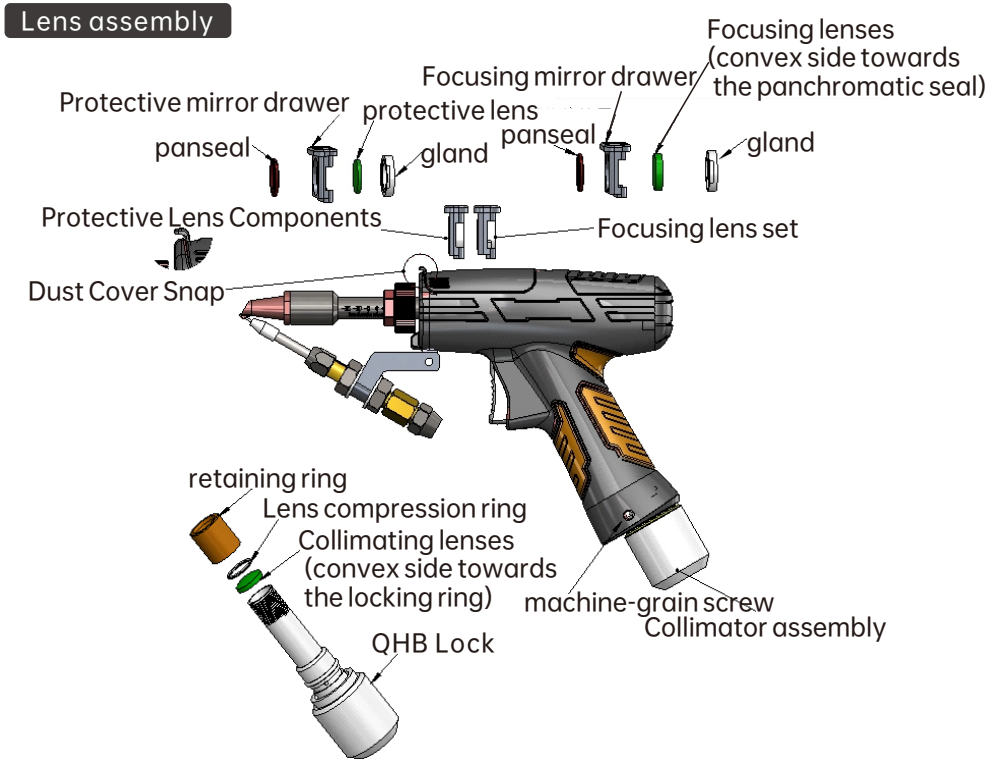
4. Instantly rotate the locking sleeve so that the locking mark is aligned with the triangular marking on the locking nut, and tighten the locking nut by twisting it clockwise.

Air connection

● The gun head is divided into a gas path into a cycle of cooling; the other gas path is a single in single out auxiliary gas, can be connected to pure nitrogen or argon and other gases, open the use of blowing out of the light at the dust, to prevent dust from entering the body of the gun to contaminate the protective lenses.



Lens assembly



Method for adjusting the focal length of handheld laser welding machine

● Explanation:

When the T700 welding machine leaves the factory, the technician will adjust the focal length to around -10 (i.e. welding can be carried out immediately upon startup). However, due to the long transportation distance or other uncontrollable factors, the actual focal length of the machine received may have deviations. Therefore, the following is the method for adjusting the focal length.

● When adjusting the focal length, place the workpiece on the workbench, hold the welding gun, and make it form a 45-60 degree angle with the workpiece. The gun head should be close to the workpiece, press the light button, and observe whether there is a large spark. If not, rotate the dial tube knob clockwise to release it. Then, slowly pull the dial tube towards the gun head with one hand, and press the light button with the other hand. Repeat this process. When you see the maximum spark from the nozzle and hear a loud sound, it indicates that the focal length is appropriate. At this time, rotate the dial tube knob counterclockwise to fix it, so that the focal length is adjusted.

Chapter 6: Detailed parameters

1. Specification Parameter

Item	Unit
Weight	<20KG
Applicable wire diameter	0.8/1.0/1.2mm
Number of predefined process packages	More than 10set
Output method	qbh+torch
Welding Mode	Electric welding/continuous electric welding/pulse welding/continuous welding
Laser power	⩽700w
Wavelength	1080nm
QHB Length	5m

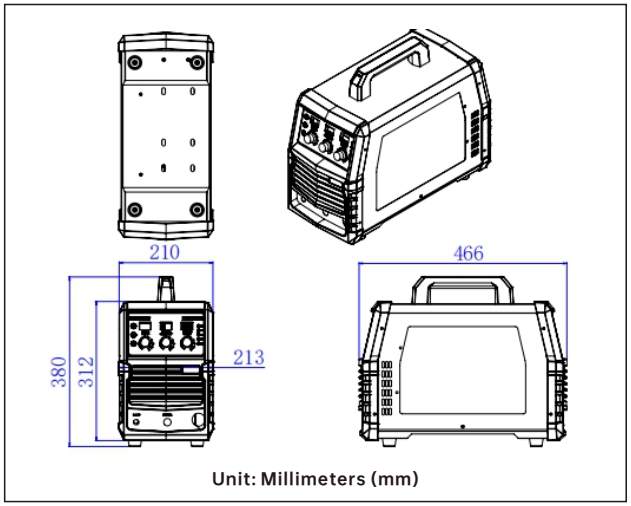
Characteristic Parameters	Test Conditions		Minimum	Typical	Maximum	Unit
Operating mode	continuous/pulse	24	-	-	-	-
polarization state	randomization		-	-	-	-
Output	100% continuous		-	300	350	W
Power Adjustment Range	1% gradient		10	-	100	%
Center wavelength	100% continuous		-	1080	-	nm
Electro-optical efficiency of the whole machine	10-100% linear fit		-	27	-	%
Short-term power stability	100% continuous >1h		-	2	-	%
Laser on time	10% → 90% output		-	50	100	us
Laser off time	90% → 10% output		-	50	100	us
Indicated red power	100% output		200	-	230	μW
Fiber Optic Armor Cable Length	-		4.3			m

Fiber Optic Armor Cable Bend Radius	-	200	-	-	mm

2. General Characteristic Parameters

Item	Parameters
Rated Input Power	Single phase 110v or 220v
Input power frequency	50/60HZ
Rated Input Power	<2500W
Welding speed	20-80cm/min
Cooling Mode	Air cooling
Working Temperature	-20~40℃
Storage temperature	-30~70℃
Working Humidity	0~90%
Size/Weight	446x210x380mm /<20KG

3. Structural layout (three views of the laser machine)



Note: Due to the continuous improvement and development of the product, so the detailed parameters of the product may be slightly different from the description, failing to modify this manual in a timely manner, please prevail in the actual product, please understand.

Chapter 7: Disassembly and assembly guide

1. Unpacking instructions

1. Check the external packaging

● Look for any signs of external damage. Notify the freight forwarder immediately of any damage to the equipment.

2.Remove the device

● Handle with care to avoid fiber optic cable breakage or damage.

3.Package contents

● The equipment is housed in a foam insulated carton. Equipped with foam to prevent shock and vibration dampening and to secure and protect the equipment.

4.Precautions during transportation

● Special care is required when unpacking for transportation. It is recommended to read the instructions in detail to reduce the risk of equipment damage.

2.Delivery and transportation

1.Transportation package inspection

● Verify the carrier information on the shipping package. Examine the outside of the crate for visible damage in transit.

2.Package labeling

● Located on the top panel of the crate and contains the manufacturer's name, address, and phone number. Provide product information such as model number, model code, and serial number. Indicate the date of shipment (mm/dd/yyyy).

Open the case.
Take out the accessories
and Remove the machine

3. Packing list

Item name	Quantities
Handheld Laser Welder	1
Handheld oscillating welding head	1
Hand-held head stand	1

Random distribution	
Item name	Quantities
power cable	1
Air Hose 10 to 6 Fitting	1
Quality control report	1
Instructions	1
Protective lens	7
Copper nozzle	5
Safety goggles	1

Chapter 8: Guidelines for use

1.Cautions

- Select a suitable power supply;
- Check that the laser's peripheral operating configuration environment meets the requirements;
- Wear the supplied noise-isolating earplugs before laser welding.

2.Power connection

- The laser's power input cord needs to be connected to single-phase AC (110VAC);
- It is prohibited to connect the power cord directly to a household plu.
- Connecting the power cord to the specified voltage and phase.

Make sure the wiring is correct before turning on the power, PE leakage is prohibited.

For safety features, Mindray Laser strongly recommends that you connect a 32A circuit breaker (air switch) in series between the power supply unit and the laser. Keep the power supply close to the equipment's power supply unit to allow for disconnection. If you have any further questions about the power connection, determine the electrical specifications of the product. Electrical connections should be made by personnel familiar with electrical safety, wire connections, and wiring should meet all national and local code requirements.

3.Equipment installation and commissioning operation guidelines

1. Pre-installation

- Site requirements

Area: The equipment should be installed in a separate space of not less than 15m², depending on the actual.
Floor: The floor should be level, hard and earthquake-proof.
Signage: A laser protection sign should be affixed to the door.

- Humidity control

Relative humidity: should be controlled below 70% to keep the environment drier.

- Temperature control

Temperature range: The ambient temperature should be maintained between -20 ℃ and 40 ℃ to ensure the optimal working condition of the equipment.

- Environmental requirements

Lighting: The lighting condition in the operation room needs to be good.
Interference: The interference of strong vibration and strong electromagnetic field equipment should be avoided within 20 meters around the equipment.

● Air quality

Air cleanliness: In order to ensure the air cleanliness of the equipment operation room, it is recommended to set up a smoke extraction and exhaust system by yourself according to the site conditions after the equipment is installed and commissioned.

● Power Requirements

Power supply: According to the actual power of the equipment,110V AC power needs to be installed.

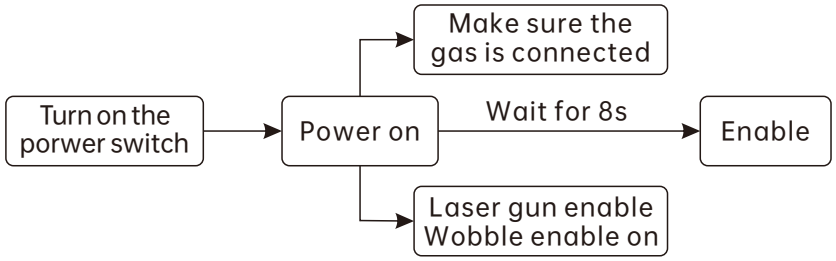
Grounding wire: It is required to have reliable grounding and a separate grounding wire.If the power supply does not have a grounding wire, the machine cannot be turned on for production in order to prevent static electricity from causing damage to the machine.

2.Installation process

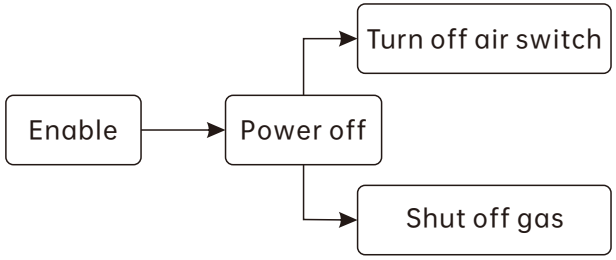
● The device will be equipped with a matching power cord and air hose, as long as the power cord and air hose are connected, it can be turned on and used.

3. Start-up and shutdown process

● Start-up process



● Shutdown process



4.Process operating procedures

● Note* The laser appears when the handheld torch head button is pressed, and the laser stops when the button is released. (Do not aim at people or flammable objects)

● The operator should wear laser protective glasses before starting the welding operation.

5. Safe Operating Procedures

● Operating requirements: Wear protective eyewear and gloves. Avoid looking directly at the laser in welding. Keep away from combustible materials. Do not look inside the output end of the gun with your eyes.Do not point the torch at people, animals or flammable materials.

● Power requirements: Use 220V ± 10V(or 110V ± 10V), 50/60Hz AC power supply. Strictly observe the safety regulations on electricity consumption.

● Operation standard: Do not leave your post without authorization when the equipment is running. Turn off the laser or light gate when not processing. Keep the area around the equipment clean.

● Equipment Maintenance: Ensure that equipment vents are clear before starting. Keep at least 1m ventilation clearance.

● Welding operation requirements: Turn on the protective gas (dry, clean, gas pressure control between 0.4 ~ 0.6Mpa). Check the protective lens, replace it in time if it is damaged, and ensure that the lens is clean. Avoid twisting the fiber optic cable, bending less than 120 degrees, improper pulling and dragging, the minimum bend diameter of the fiber optic cable should not be less than 30 centimeters.

● Restrictions on the use of the equipment: the equipment is not used for more than thirty minutes, the power should be turned off. Untrained personnel should not operate the equipment without authorization.

● Welding Safety: Avoid the presence of uninvolved personnel in the operating area while welding. Avoid operating errors that could result in injury.

● The importance of safe operation of equipment: the need to protect personal

and equipment safety. Ensure that the laser equipment works properly and gives full play to the processing advantages.

● Duties of the operator: Must undergo pre-job training and master the structure and performance of the equipment. The operator must be licensed and qualified to operate the machine independently.

● Personal protective measures: Wear labor protective equipment as required. Protective eyewear must be worn in the vicinity of the laser beam.

● Environmental conditions: Recommended for use in an environment of no more than 40℃. Avoid continuous full-power use in high-temperature, high-humidity environments. Prevent the equipment from being exposed to the sun or rain. Avoid obvious dust, flying dust, oil pollution, etc. at the work site.

● Gas use regulations: Avoid crushing wires and cables or gas pipes, and prevent leakage of electricity and gas. The use and transportation of gas cylinders should comply with the gas cylinder monitoring regulations

● Abnormal handling: Stop the equipment immediately when abnormalities are found. Reduce abnormal damag.

● Precautions for operation: Maintain concentration during operation. Avoid behavior unrelated to work.

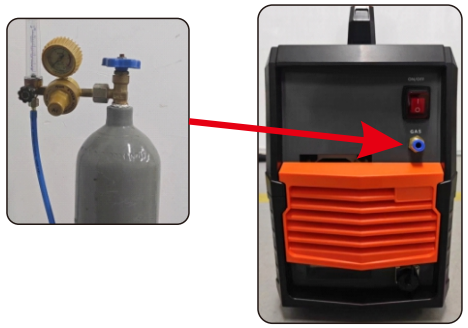
● Emergency: Emergency stop takes precedence over other control operations. Disconnect the laser enable and stop the system control.

6. Safety Ground Lock Connection

● Before turning on the laser, the safety lock must be connected to the laser loop interface. When preparing to discharge the laser, the other end of the safety lock needs to be clamped onto the workpiece to ensure that the safety clamp forms a circuit with the welding head before the laser can be discharged. The safety clip can only be clamped onto the welded workpiece, and it is strictly prohibited to clamp the safety clip onto the gun head to prevent the risk of accidental light exposure.

7. Gas connection

● The welding head is cooled by inert gas, so it is necessary to ensure the purity of the gas and the size of the gas pressure, generally using nitrogen and argon as the protective gas, the purity of the protective gas should meet >99.9%, the input gas pressure should be more than 80Kpa and less than 500Kpa. In order to ensure the welding effect, it is necessary to use a pressure reducing valve with a flowmeter (nominal flow rate of 25L/min) to accurately control the size of the gas flow. Connect the 6mm OD gas line to the gas port and adjust the gas flow rate to 15-20L/min.



Chapter 9: Guide to Lens replacement and cleaning

1.Replacement of lenses precautions

● When replacing the lens, pay attention to the surrounding environment, make good preparations for dustproof and windproof, prevent dust from entering the gun body, and it is best to replace the lens in a dust-free environment.

1.Focusing Lens Replacement Procedure

● 1.Unsnap the top cover, open the dust cover, remove the focusing lens drawer assembly, and seal the drawer opening with tape to prevent dust from entering;

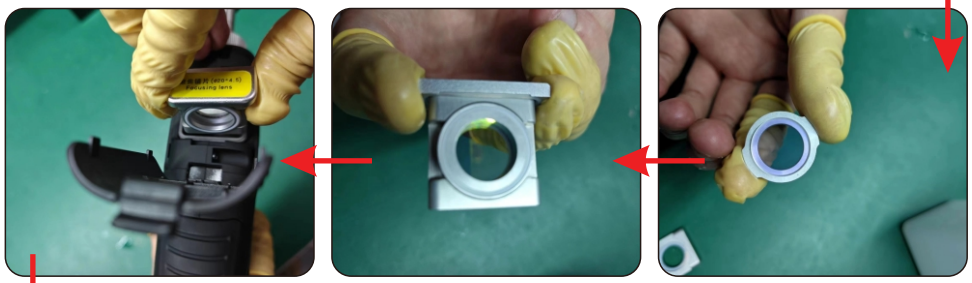
● 2.Rotate the protruding parts on both sides of the gland to the position of the drawer notch and take it away;

● 3.Remove the focusing lens and replace it with the one you need to use, paying attention to checking that the surface of the lens is clean and free of

dust, that the raised side of the lens is facing the direction of the flood seal, and that the concave side of the lens is facing the direction of the gland;

● 4.Remove the tape from the focusing lens drawer opening and install the focusing lens drawer assembly, taking care that the side of the flood seal faces the direction of the welding nozzle;

Unsnap the top cover clips | Remove drawer assembly | Apply masking tape



With concave side facing the lid | Align slots and rotate to secure | Insert the new lens

Install the focusing lens holder into the chamber

2.Replacement of Protective Lens

● 1.Unsnap the top cover, open the dust cover, remove the protective lens drawer assembly, and seal the drawer opening with tape to prevent dust from entering;

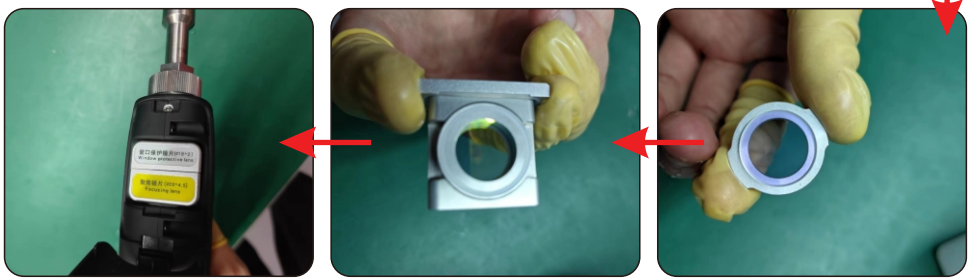
● 2.Rotate the protruding parts on both sides of the gland to the position of the drawer notch and take it away;

● 3.Remove the protective lens and replace it with the one you need to use,

paying attention to checking that the surface of the lens is clean and free of dust;

● 4.Remove the tape from the protective lens drawer opening and install the protective lens drawer assembly, taking care that the side of the flood seal faces the direction of the welding nozzle;

Remove the lens assembly | Wrap the protective lens holder cavity with masking tape. | Unwrap the new lens



Insert the protective lens holder into the cavity | Align the slot and rotate to secure | Insert the new lens

2. Cleaning and replacement of protective lenses

1. Cleaning steps for protective lenses

●In the process of lens installation and cleaning, the operator is not rigorous enough, any little sticky material, fingerprints or oil droplets, will affect the lens transmittance, thereby reducing the service life and affecting the quality of laser processing, so the following precautions must be adopted:

1. Do not install lenses with bare fingers; wear powder-free finger cots or rubber/latex gloves;
2. Do not use suction instruments to avoid scratching the surface of the lens;
3. Do not touch the membrane and lens surface when holding the lens, you should hold the edge of the lens and should always place the lens on a swab;
4. Talking over the lenses should be avoided and all contaminants should be

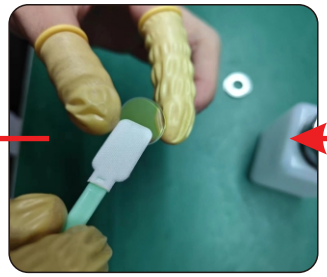
kept away from the working environment as far as possible;
5. Acid and vinegar will only dissolve the contaminants and will not harm the lenses;
6. Try to operate in a dust-free environment when cleaning lenses.

Unsnap the top cover clips

Remove lens drawer assembly

Tape the protective lens holder cavity

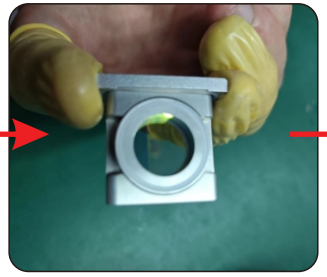
Insert the protective lens into the gland



Remove the focusing lens holder and wipe the other side of the protective lens.

Wipe the front side of the protective lens with an alcohol-impregnated cotton swab or cloth.

Align the gland with the protective lens drawer slot.



Rotate and secure

Insert the protective mirror holder into the chamber

● It is important to use light and even pressure when wiping. You can practice with a used laser protection lens mirror. However, no matter how careful you are, wiping will always damage the surface coating of the lens;
● When mounting or dismounting lenses, be sure to do so in a dust-free environment, avoiding direct contact between your hands and the mirror surface;
● Regularly check the extent of damage to the lens surface so that it can be cleaned and replaced in a timely manner;
● For the existing dust on the lens: blow away the dust with a blow balloon first, and use a dry cotton swab to pick off the dust carefully if it cannot be blown away individually, and be sure to be careful and not to use force;
● For existing stains on the lens: take a dry cotton swab, dip it in anhydrous ethanol, and carefully stick off the stains stuck on the lens. Make sure there are no visible particles of dust on the surface before wiping a large area. Wipe the surface in a spiral pattern from the center of the lens, not back and forth. Then, while the lens surface is still wet, use a dry cotton swab to gently rub the surface in the same manner. If you are not satisfied with the result, you can try again, but do not use the cotton ball again. If you are still not satisfied with the water stains left on the lenses, you can use anhydrous ethanol and anhydrous ether to remove them.If you are still not satisfied with the water stains left on the lenses, you can use a mixture of anhydrous ethanol and anhydrous ether as a final treatment.

2.Maintenance tools

Balloon for cleaning

Medical alcohol

Cotton swabs

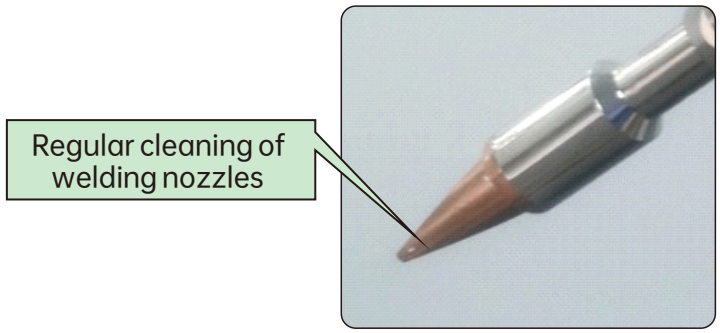
3. Regular clearance matters

1. Dedusting of equipment

● Regularly clean the dust to ensure ventilation and heat dissipation.

2. Welding nozzle cleaning

● Long-time use of the tip of the gun nozzle wil l result in obvious slagging, which will cause th e protective gas to not flow smoothly, affecting the energy of the laser irradiated to the surface of the material.



Chapter 10: Service and maintenance

1. Basic Troubleshooting

●1.No response after power on: check the power supply, and then test the power supply power supply, no power supply needs to replace the power supply, but also to check whether the open wire is loose.

●2.Fan noise: check whether the fan inside the foreign body or fan fixing screws are loose;

●3.Burned lenses: check whether the fan is not working.

●4.After lifting the gun, there is afterglow: Check whether the parameters of the slow-down time of th e equipment are adjusted very long;

●5.Temperature alarm: check the fan and filter is blocked by the object air intake is not smooth, and then check the current temperature of the equipment to see if the detection is accurate, such as temperature is accurate, then return to the manufacturer.

2. Warranty limitations

● Products, mailings (including fiber optic splices), or equipment are not covered:

(1) Artificially tampered with, opened, disassembled or modified by persons other than HEROLASER;

(2) Damage caused by improper use, negligence or accident;

(3) Used outside the scope of product specifications and technical requirements;

(4) Faults caused by user software or interfaces that indirectly cause damage to the laser;

(5) Used under abnormal operating conditions due to improper installation, maintenance, or other conditions not covered in this manual;

(6) Accessories and fiber optic connectors are not covered under warranty.

It is the customer's responsibility to understand the above information and to follow the user's manual, otherwise the product failure caused will not be covered by the warranty.

● Important:

◎ Within the warranty, the customer must provide feedback within 31 days of the discovery of the fault.

◎ Herolaser does not grant any third party organization or individual the right to repair or replace our products.