LNX Equipment

Professional Laser Welding Solutions

LNX- M4 Air-Cooled Laser Welder

Model No. LNX- M4 | 1600W Fiber Laser Welding System

Rated Output: 1600W



LNX Laser Welding Machine User Manual

Laser Welding Machine User Manual | 2026

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Copyright Notice

This user manual is subject to modification as the product is upgraded.

Users should carefully read this manual when using the product described herein. We are not liable for any direct, indirect, special, incidental, or consequential damages or losses caused by improper use of this manual or this product.

Including, but not limited to:
Improper use of this manual or product by the user;
Losses resulting from the user's failure to follow relevant safety operating procedures;
Losses caused by natural forces that endanger the machine while in motion. The user is responsible for designing effective error-handling and safety protection mechanisms within the machine; we bear no obligation or liability for any incidental or consequential losses arising from such causes.

Certification Statement

CE Certification Statement
This product has obtained EU CE (Conformité Européenne) safety certification. It has undergone the relevant conformity assessment procedures and the manufacturer's declaration of conformity, complying with applicable EU directives.

RoHS Certification Statement
This product has obtained safety certification under the EU's "Restriction of Hazardous Substances" (RoHS) directive, which limits the use of certain hazardous substances in electrical and electronic equipment, and complies with relevant EU environmental regulations.

FCC Certification Statement
This product has obtained safety certification from the US Federal Communications Commission (FCC) and complies with US safety regulations for electronic products.

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Safety Information

Please ensure correct and safe operation when using this system. This document uses certain symbols and text to alert you to hazards and important information.

DANGER:

Indicates a serious hazard. During use, improper operation or incorrect usage may result in severe injury or even death. Users and relevant personnel should not operate until the correct operating method has been confirmed.

WARNING:

Indicates a hazard. During use, improper operation or incorrect usage may result in personal injury. Users and relevant personnel should not operate until the correct operating method has been confirmed.

CAUTION:

Indicates a potential product risk. During use, incorrect usage or improper operation may result in damage to the product or its components. Users and relevant personnel should not operate until the correct operating method has been confirmed.

IMPORTANT:

Indicates important information regarding product usage. Please do not overlook this information, as it provides helpful operational guidance.

Laser radiation; this label is typically affixed to products that emit laser beams. Please exercise caution and prioritize safety when using such equipment.

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Receiving, Unpacking & Inspection

The product uses shock-absorbing soft packaging. If the package shows any signs of external damage, inspect the equipment for damage and notify the carrier in writing of the damage.

IMPORTANT:

Upon receiving the product, check that the outer packaging is intact. After unpacking, verify that the product is complete and all components are in good condition. If any damage is found, contact us immediately.

Remove all items from the packaging and keep the packaging materials and wiring accessories. Exercise care when unpacking and removing goods. After removal, check that all components are complete and intact. If any components are missing or damaged, contact us immediately. If the equipment shows any obvious damage, do not install or attempt to commission the equipment.

The shipping list for the M4 Series Laser Welding System is shown in the table below: (As the product is continuously updated, the shipping list may be adjusted accordingly)

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	Name	Qty	Image
1	Complete Machine (1 Set)	1	
2	T21+1 Stepping Double Wire Feeder	1	
3	Laser Safety Goggles	1	
4	Conduction Ground Clamp Cable	1	
5	Welding Copper Nozzle and Wire Feed Clamp (1 Set), Protective Lens (5 pcs)	1	
6	Wire Feeder Accessory Box (1 Set) (Optional)	1	

Chapter 1 Overview

1.1 Introduction

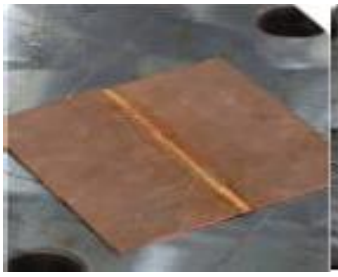
The M4 series Laser Welder system is a new type of Handheld infrared Fiber Laser Welding system. Built into the self-developed Handheld Laser Welding system, the Laser Blade series Optical Fiber Laser is designed for processing different materials, with the most reliable and efficient proprietary ABR and SPP technologies, making this product an ideal choice for processing a variety of materials and welding different materials of varying thicknesses. The design of the M4 series Laser Welder and the testing described in Section 1.3 take safety into account. By following this user guide and applying Laser Safety measures, it can be a safe and reliable device.

To ensure safe operation and optimal performance of the product, please follow the warnings and other information contained elsewhere in this document. These safety precautions must be observed at all stages of operation, maintenance, and repair of the F series Laser Welder.

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1.2 Applications

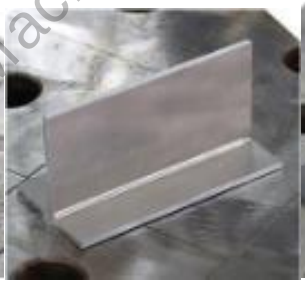
The M4 series Handheld laser welding machines are suitable for welding materials such as steel, aluminum, copper, and stainless steel. Their application areas include pipe processing, kitchen and bathroom fixture manufacturing, hardware processing, guardrail and decorative metalwork, gold and silver processing, vehicle manufacturing, and aerospace manufacturing.



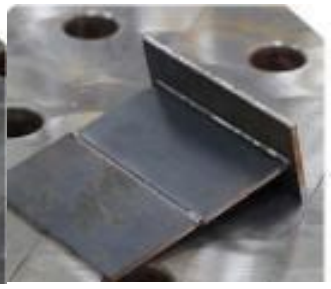
Purple Copper



Stainless Steel



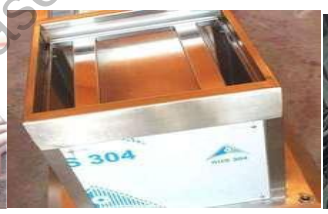
Aluminum Alloy



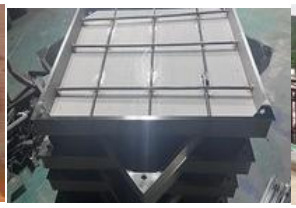
Carbon Steel



Pipeline Welding



Kitchen & Bathroom



Hardware



Guardrail Decoration

1.3 Testing

This equipment has passed the testing and inspection described in Section 1.3. Before packing, it has undergone sufficient testing and confirmed to meet the shipping standards. Upon receiving the equipment, please inspect the packaging and parts for any damage that may have occurred during transportation. If the damage is obvious, please contact the carrier and after-sales personnel immediately.

1.4 Packaging Disassembly Description

If there are any signs of external damage to the packaging, please inspect the equipment for damage and notify the carrier and after-sales personnel immediately; when you take the Laser Welding machine out of the packing box, you must be especially careful to ensure that the Optical Fiber cable is not broken or damaged. Please inspect the accompanying Packing List. Once the product is received, inspect all items against this list. If any item is missing or the equipment has obvious or suspected damage, do not attempt to install or operate the laser equipment under any circumstances, and please contact after-sales personnel immediately.

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Chapter 2 Laser Product Safety

2.1 Laser Product Safety Performance & Conventions

To ensure safe operation and optimal performance of the product, please follow all warnings in this guide. Safety precautions must be observed at all stages of operation, maintenance, and service. Operators must follow these recommendations and apply declared Laser Safety practices at all times, and never open the internal modules of the laser. This product contains no parts, equipment, or assemblies that the user may repair; all internal service and maintenance should only be performed by qualified after-sales personnel.
This user manual uses various texts and symbols designed to alert you to possible dangers or important information.

Safety Performance

Performance	Description
Output Power Monitoring	Monitor output power during laser operation
Overheat Protection	Monitor the internal temperature of the laser to protect internal parts from damage due to exceeding safe operating temperature.
Safety/Warning Labels	Various labels remind and warn users to be careful of possible hazards.

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2.2 Relevant Regulations & Standards

2.2.1 Product Functional Safety

Optical Cable Protection Disconnect (Optical Fiber Interlock): The optical cable protection provides a circuit for interlocking the Optical Fiber Laser with external parts (such as the Handheld Welding Head). The laser welding system will continuously monitor this signal and terminate the operation of external parts (such as the Welding Head) if the Optical Fiber connector is not properly connected.
The described Handheld Laser Welding system provides a protection signal output based on the cable contained in the Optical Fiber cable between the laser equipment and the Handheld Welding Head. If the Optical Fiber cable is not inserted into the Welding Head or is disconnected, the Optical Cable safety interlock circuit will open.

Startup-halt protection: If the system's internal electronic sensors detect an anomaly, the monitoring program triggers an alarm and halts the startup process.
Safe Start/Restart button (Emergency Stop): Used for the emergency shutdown and recovery of the laser welding system.
Rotary switch: Turns the main circuit power of the laser welding system on or off.

2.2.2 Classification of Laser Products

In accordance with IEC/EN 60825-1, this product is classified as a high-power Class 4 laser. It emits invisible infrared light. Lasers of this class can cause injury to the eyes or skin.

Although the emitted light is invisible, it can still cause irreversible corneal damage. Protective eyewear is provided with this product; please ensure you wear it during operation to prevent injury.

2.2.3 Laser Safety Glasses

Please wear appropriate laser safety glasses when operating this device. Selecting the correct laser safety glasses requires the end user to accurately identify the wavelength range emitted by the product.

Secondary laser beams at various angles are often generated near the laser output aperture. These beams, known as "specular reflections," arise when the primary laser beam strikes a surface and reflects. Although the power of these secondary beams may be lower than the laser's total output power, their intensity is sufficient to damage eyes, skin, and materials surrounding the laser. If the device is a tunable laser or a Raman system, it may emit light at other wavelengths. End-users should verify the characteristics of the laser being used.

Safety glasses can protect against the entire wavelength range of light emitted by the equipment. Be careful to avoid and decrease specular reflection. This product emits invisible laser radiation at a wavelength of 1070 nm (infrared) or nearby. In addition, the visible light laser radiation emitted by this product has a wavelength of 600-700 nm (red).

Please inspect the safety labels on the product to confirm that the personal protective equipment and glasses used are sufficient within the output power and wavelength range. Decisions about safety glasses must also take into account the secondary radiation hazards generated during the welding process.

Laser safety glasses must comply with international safety standards, including ANSI Z136.1 (USA) and EN207/EN208/EN60825 (Europe); applicable regulations depend on the location of the laser device.

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2.3 Laser Welding Protection

Eye protection is required during laser welding to protect your eyes from any reflected or scattered Class 4 laser beams, as well as to protect against welding strong light, ultraviolet rays, heat, and sparks.

For laser welding, wearing personal protective equipment that only blocks infrared laser wavelengths is insufficient. During the laser welding process, a combination of face shields, helmets, or goggles offers the best protection. For example, a welding helmet (equipped with appropriate filter lenses) should be worn over laser safety glasses to protect the wearer from ultraviolet and visible light radiation. The welding helmet also protects the welder from hot spatter, metal particles, and sparks. Therefore, personnel working near the laser welding area must wear personal protective equipment.

Exposure to infrared and ultraviolet radiation during welding can damage the skin. Depending

on the intensity of infrared light, skin damage may include thermal burns or excessive skin dryness. Exposure to ultraviolet rays may cause skin similar to sunburn and increase the welder's risk of skin cancer, accelerate signs of skin aging, and welding sparks may also cause burns.

Laser material processing may transfer large amounts of energy to the workpiece. Even after cutting or welding is completed, the workpiece may still be very hot. Ensure appropriate personal protective equipment is used to prevent potential burns. Wear fire-resistant gloves, fire-resistant hats, leather aprons, and other fire-resistant clothing as protective gear to prevent skin damage. Button up sleeves and collars!

2.4 Welding Safety and Hazards

2.4.1 Fire Hazard

If combustible or flammable materials are present near the welding area, the heat and sparks generated during the welding process could cause a fire or explosion. Laser welding must only be performed in areas free of combustible materials.

Never weld on containers holding flammable or combustible materials. If the contents of a container are unknown, assume they are flammable or combustible. Fire extinguishers should be kept nearby and easily accessible, and personnel should be trained in their use.

2.4.2 Fume Hazard

Welding "fumes" can consist of extremely fine particles and gases. These fumes and gases originate from a combination of the base materials, any filler materials used, shielding gases, paints, coatings, chemical reactions, and airborne contaminants. Welding fumes can have adverse effects on the lungs, heart, kidneys, and central nervous system.

When the laser interacts with the target material (such as plastic, metal, or composite material), the target material may start to evaporate. These fumes and particles are usually invisible but highly toxic and pose serious health hazards.

Welding in confined spaces with poor ventilation is very dangerous. The danger of toxic fumes and gases may increase rapidly, causing coma or asphyxiation death. The ultraviolet rays emitted during welding can react with oxygen and nitrogen in the air to form ozone and nitrogen oxides, which may be fatal at high concentrations.

When welding, do not let your head touch the gas. Always weld in well-ventilated areas to ensure the breathing air is safe. Use a fume extraction system to remove vapors, particles, and harmful debris from the welding processing area. Read and follow all safety data sheets and warning labels for welding materials. In confined spaces and other situations, respirators may also be needed. Routine air monitoring should be performed to check harmful fume levels in the welding area.

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2.4.3 Gas Cylinder Safety

If a gas cylinder is damaged or placed near the welding area, an explosion may occur. Protective gas cylinders should be placed where they cannot be struck or damaged. Place them away from heat sources, sparks, or flames. Gas cylinders must be stored upright and fixed to a fixed bracket. A working regulator suitable for the required gas and pressure is needed. All hoses and fittings should also be suitable for the application and kept in good working condition.

2.4.4 Optical Safety

The laser output is emitted through a window part or an optional part with an anti-reflection coating. Ensure the window is clean and of good material quality. Any dust at the end of the head assembly may burn the window and damage the laser. Inspect the quality of the light spot emitted by the laser output at low power, then gradually increase the output power.

Never look directly into the laser beam path (e.g., optical fiber, collimator, or gun tip) when the Start Button or remote "Engineering Start" circuit is activated. Always wear appropriate laser safety glasses when operating the product. All personal protective equipment must be suitable for the output power and wavelength range specified on the laser safety label affixed to the product.

Do not install the laser head when the laser is in an active state.

Light-sensitive components in the equipment, such as cameras, photomultiplier tubes, and photodiodes, can also be damaged by exposure to the laser. The intensity of the laser is sufficient to burn skin, clothing, and paint. The laser may cut and weld metal. The laser may ignite volatile materials such as alcohol, gasoline, ether, and other solvents. During installation and use, avoid contact with solvents or other flammable materials and gases.

2.5 Electrical Safety

The input voltage to the laser system can be lethal. All cables and connections should be treated as carrying hazardous voltage levels. All parts of cables, connectors, or equipment housings must be considered dangerous. Before powering up the equipment, inspect all wiring harnesses for damage and verify the flow of welding shielding gas. Additionally, where applicable, all connections must be securely fastened with screws to ensure proper operation.

Ensure the equipment is grounded via the AC power cord's protective earth conductor. Disconnecting the protective earth conductor from the protective earth terminal may result in personal injury. To maintain fire safety, replace line fuses (if applicable) only with fuses of the same type and rating; the use of other fuses or materials is prohibited. Verify the correct AC supply voltage before powering up the equipment; using the incorrect voltage may cause damage. Refer to the markings on the specific model for correct power connection details. There are no user-serviceable parts inside; refer all servicing to qualified after-sales personnel. Do not remove the cover, as this poses a risk of electric shock. Any tampering with the product voids the warranty.

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2.6 Environmental Safety

Never dispose of this product with household waste. Electronic equipment must be disposed of in accordance with regional directives on electronic and electrical waste. Note that all personal protective equipment must be suitable for the output power and wavelength range listed on the Laser Safety label attached to the laser equipment. Be careful during operation, otherwise the laser may damage the equipment.

This equipment is not suitable for use in places where children may be present. Keep away from shock waves or vibration sources. Appropriate enclosures should be used to ensure the laser safety working area. This includes but is not limited to: Laser Safety signs, appropriate warning devices and training, safety procedures. Do not operate the output Welding Head at eye level. Ensure the laser shield is in place to protect the eyes of personnel working in the area from injury.

2.6.1 Humidity

Do not operate the device in environments with humidity exceeding 85% (see section 3.1, Performance Parameters, for details).

2.6.2 Cooling & Temperature

The M4 series Laser Welder is air-cooled. Operating at higher temperatures will accelerate aging, increase threshold current, and reduce efficiency. If the equipment overheats, do not use it. When the ambient temperature exceeds 50° C, the equipment will automatically alarm and limit operation. Please contact after-sales.

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Chapter 3 Equipment Description

3.1 Laser Welder Parameters

Welding Machine Performance Parameters Table			
Welding Thickness	≤ 4mm	Cooling and Shielding Gas	Nitrogen or Argon
Working Mode	Continuous/Pulse/Fish Scale/Energy Storage/Gap	Input Voltage	220V AC 50/60Hz
Output Laser Wavelength (nm)	1080 ± 10nm	Gun Head Model	DWS20
Interface Type	miniQBH	Dimensions	516*318*550mm
Collimating Focal Length	50mm	Weight	55KG
Focusing Focal Length	150mm	Welding Machine Cable Length	5M
Working Environment Humidity Range	≤ 85%	Wire Feeder Cable Length	6M
Working Environment Temperature Range	-20 < Operating temperature < 45° C	Working Gas Pressure	0.25-0.6MPa
Working Voltage	220±10%V AC 50/60Hz	Maximum Power Consumption (W)	≤4800W
Gun Head Swing Amplitude	≤8mm	-	-

Optical Characteristic Parameter Table					
Characteristic Parameters	Test conditions	Minimum	Typical	Maximum	Unit
Working Mode	Continuous/Pulse				
Output Power MFSC-1500X(G6.1)	100% Continuous		1600		W
Power Adjustment Range		10		100	%
Center Wavelength	100% Continuous		1080±10		nm
Modulation Frequency	100% Output			30	KHz
Indicator Red Light Power	100% Output	200			μW
Optical Fiber Cable Length MFSC-1500X(G6.1)		5			m
Output Fiber Core Diameter MFSC-1500X(G6.1)		20			μm

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3.2 Welding Unit Schematic Figure

Serial No.	Name	Description
		
1	7-Inch Display Screen	Used to display the status of each system
2	Emergency Stop Switch	When an emergency occurs, you may press the emergency stop button to quickly cut off the main circuit power supply of the equipment. When the stop button is in the pressed state, rotate the button clockwise to reset the emergency stop button.
3	Conductor wire interface	Used for turning on and off the welding system
4	Knob screen	Complete Machine Main Power Supply Switch
5	Wire feeder interface	Used to connect the conduction ground wire
6	Air inlet	Used to connect the Wire Feeder interface
7	Gun head holder	Laser Cooling Air Inlet

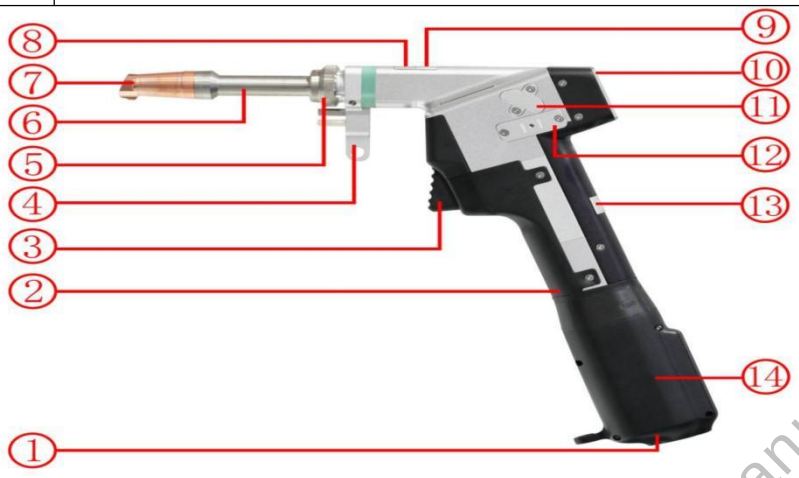
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3.3 Appearance Interface Schematic Figure

Serial No.	Name	Description
		
1	Equipment power interface	AC input socket: AC 220V, 50/60Hz
2	RS485 communication port	RS485 communication backup port
3	Main power switch	Main power switch
4	Gas connector	Used to connect to protective gas nitrogen or argon
5	RS232 communication interface	Used to connect to host computer control software to monitor equipment operation and perform more comprehensive equipment control and monitoring operations.
6	Fiber optic output	Laser fiber optic cable

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3.4 Handheld Welding Head Structure Schematic Figure

Serial No.	Name	Description
		
1	Set Wire Interface	Type-C connector for communication with the gun head.
2	Handle	Hold the entire gun head area with your hand
3	Push-button switch	Activate the shielding/cooling gas flow and initiate laser emission, triggering the laser output after the system-configured delay; maintain clamping pressure throughout the entire welding process. If a closed electrical circuit is not established between the workpiece safety clamp and the Welding Head Nozzle, the laser will not fire, and only wire feeding or retraction will be possible. (Press and hold the button switch to feed wire; press the button switch twice in quick succession to retract wire.)
4	Wire feed clamp fixing block	Used to fix the wire feeding device
5	Locking nut	Used to fix the copper nozzle fixing shaft
6	Copper nozzle fixing shaft	Fix the copper nozzle and adjust the focus
7	Copper nozzle	Uses different copper nozzles for different welding angles and positions
8,9	Protective Lens 1,2	Pull-out protective lens for easy replacement
10	OLED display	Used to display the current process parameters of the welding torch
11	Reflector drawer	Pull-out reflector lens for easy replacement
12	Focusing lens drawer	Pull-out focusing lens for easy replacement
13	Collimating lens drawer	Pull-out collimating lens for easy replacement
14	QBH protective tail shell	Used to protect the QBH from dust entering the optical fiber

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3.6 Welding Machine Internal Structure Figure

Serial No.	Name	Description
		
1	24V power supply	Control system, 15A dedicated power supply for wire feeder
2	Laser power supply	Dedicated power supply for laser (3000W*2)
3	Laser	M4 air-cooled laser

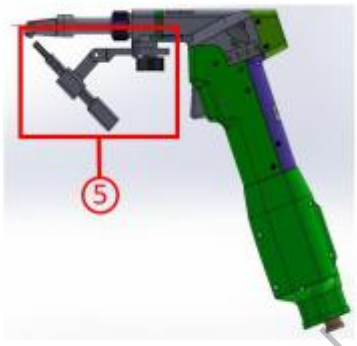
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3.7 Accessories

LNX Equipment					
LNX-M4 Laser Welding Machine Packing List					
	Item Name	Specification/Description	Image	Qty	Yes/No
Main Set Parts	Main Unit	M4		1	
Machine Accessories	Gun Head Accessory Box	F20 Anti-splash Wire Feeding Copper Nozzle 1.6		1	
		F20 Anti-splash Outer Angle Wire Feeding Copper Nozzle 1.6		1	
		F20 Single Wire Feeding Copper Nozzle 1.6		1	
		Cutting Copper Nozzle Assembly		1	
		Fixed Shaft		3	
		Single Wire Feeding Clamp		1	
		Single Wire Feeding Copper Nozzle 1.6/1.2/1.0		1	
		Protective Lens D16T2 (Wavelength 1080±20)		5	
	Protective Lens	DWS20		15	
	External Power Supply Cable	L=7M		1	
	Nitrogen pressure regulator	YQD-06		1	
	Black Air Tube	PU 6*4MM Length: 5m		1	
	Conduit Clamp Cable	6.5m		1	
	Laser Safety Goggles	Protection Laser Wavelength: 1080 nm		1	

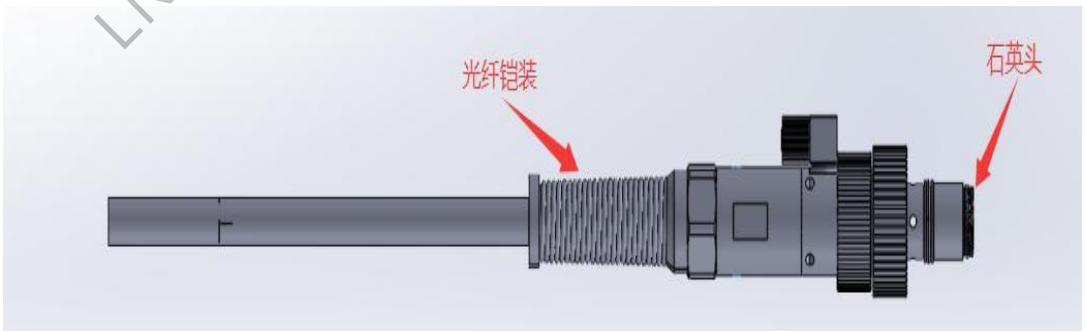
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3.8 Automatic Wire Feeding System for Welding Head (Optional)

序号	名称	说明
 		
1	Wire feed panel	Wire feeder parameter adjustment (enables pulsed or continuous wire feeding)
2	Power switch	Wire feeder main power switch
3	Wire feed conduit connector	Connection for wire feed conduit (for use with the wire feeder)
4	Wire feeder connection cable	Connection for wire feeder power and signal cable
5	Wire feed clamp	For use with the wire feeder

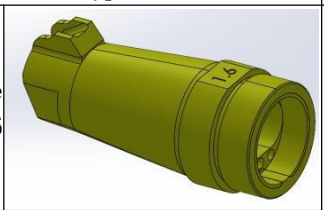
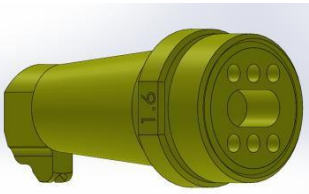
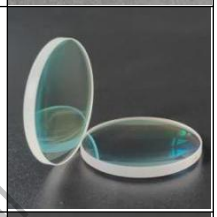
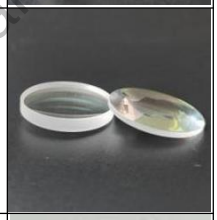
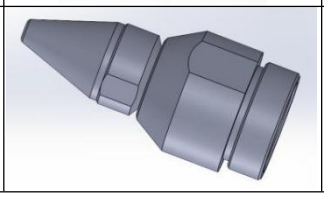
3.9 Optical Fiber Output Connection

When the product is delivered to the user, the optical fiber has been inserted and connected to the Welding Head. Although this is not typical, if it is necessary to disconnect and reconnect the Optical Fiber (for example, replacement of the Welding Head is needed). The Optical Fiber end connector uses a protective cap to protect the optical fiber surface and electrical contact points when not in use. Before performing optical cleaning and connecting to the output Welding Head, the protective cap and set tube on the connector should be removed immediately. Each time the Optical Fiber cable is disconnected from the Welding Head, you must inspect whether the optical fiber terminal has dust, dirt, or damage.



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3.10 Consumable Parts

Copper Nozzle Type		Lens Type	
Semi-funnel double wire feed copper nozzle 1.6		Protective lens D16T2 (wavelength 1080±20)	
F20 single wire feed copper nozzle 1.6		Focusing lens D16F220T3.5 (wavelength 1080±20)	
Wire feed copper nozzle 1.2/1.6		Collimating lens D16F50T3.5 (wavelength 1080±20)	
Cutting copper nozzle		Motor lens: 15.2*15.2*1.6 (lower limit), coating angle 45° (wavelength 1080±20)	

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Chapter 4 Installation Welding Equipment

4.1 Preparation Before Installation

Please refer to the power requirements outlined in Section 3.1 and ensure the input voltage complies with the specified standards before connecting the power supply. Operation requires a supply of auxiliary gas (nitrogen or argon) equipped with a pressure regulator; this gas is essential for shielding the weld bead, dissipating heat generated during the process, and protecting the Welding Head from potential damage caused by spatter. The system will trigger an alarm and prevent operation if the gas supply is not connected.

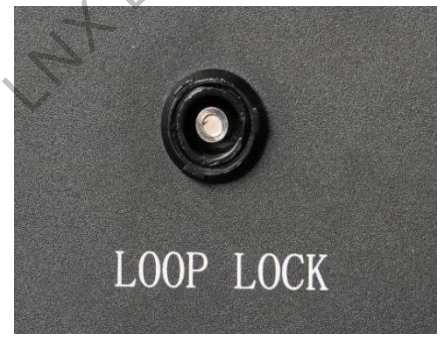
4.2 Gas Flow and Installation Clearance

The M4 series Laser Welder uses air cooling for heat dissipation. When selecting the placement location, please operate in a space with good air circulation and that is not confined or narrow. Do not place any objects on top of the heat dissipation fan that may block air exhaust or gas discharge, and ensure sufficient heat dissipation space.

4.3 Connect the grounding clamp cable assembly

A grounding clamp connection point is provided on the equipment panel, as shown in the figure below. Before activating the laser, the grounding clamp must be connected to both the grounding terminal and the workpiece. When the copper nozzle of the Handheld welding gun is placed against the workpiece, the safety circuit closes, and the laser system enters a ready state, indicated by a light on the equipment panel. Laser emission is possible only when the safety circuit is active—meaning the copper nozzle maintains contact with the workpiece while the grounding clamp is connected. If the safety circuit is not closed, pressing the trigger on the Handheld welding gun will only allow the flow of auxiliary gas.

As shown in the figure, the operator must connect the workpiece safety cable to the safety protection interface on the equipment's rear panel. The safety protection circuit is active when the Handheld Welding Head's copper nozzle is in contact with the workpiece. If the operator lifts the copper nozzle away from the workpiece during the process, the safety circuit is broken, and the laser will automatically shut off.





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4.4 Connect Welding Auxiliary Gas

The welding gas input port only supports connection using an 8mm air tube. As shown in the figure below, insert the air tube into the quick connector of the gas inlet. Once connected, opening the external gas valve will supply gas. It is recommended to use Nitrogen and Argon

during normal welding work to protect the weld quality during the welding process. The input gas pressure should be greater than 0.25 MPa and less than 0.6 MPa. The output air tube must be connected to the Handheld Welding Head to perform work. The output air tube is protected externally by a self-rolling braided mesh.
As shown in the figure:





4.5 User Interface

The device features an RS232 communication interface and a Wi-Fi transmission interface. Users can utilize the DB25 computer interface to implement safety interlock controls, monitor device status and alarm information, and command external equipment operations. The RS232 interface allows connection to host-side control software for advanced monitoring capabilities, while the Wi-Fi interface connects to wireless hotspots to access SMAT Cloud services, enabling remote firmware upgrades and remote support.



4.6 Power Supply Connection

Before connecting the power supply, please ensure the power supply capacity meets the specification requirements described in Section 3.1. The equipment comes with one RVV 3x4mm² 3-core connection cable. Please connect correctly according to the cable harness markings in the following steps:



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Main Power Cable Interface (3-Pin)		
Pin	Function	Wiring Number
1	Phase Line Voltage	L1
2	Neutral Line Voltage	N
3	Grounding	PE

1. Connect the power input cable according to the specified voltage, phase, and frequency (50/60 Hz): L1 = Phase, N = Neutral, PE = Protective Earth.
2. The equipment must be connected to a dedicated AC mains supply via a circuit breaker rated at no more than 30 amperes. Clearly mark the disconnecting device supplying power to the equipment in a location easily accessible to the operator.
3. Wiring must comply with all national and local regulations, and electrical connections must be performed by qualified personnel trained in safe electrical practices.

4.7 System Start and Close

All electrical connections must be made before powering the device. Where applicable, all connections must be secured with screws or locking mechanisms to ensure proper functionality. Ensure you wear appropriate personal protective equipment (PPE) when operating this product; this includes flame-resistant protective gloves and laser safety glasses suitable for use at a wavelength of 1070 nm.

1. Ensure all connections required for normal operation are completed, including restrictions of external safety protection devices. Also inspect that the safety protection circuit is connected normally and the external safety interlock circuit is in the closed state.
2. Ensure the emergency stop button is not pressed. If pressed, rotate clockwise to reset the emergency stop button.





3. Rotate the switch to the (ON) position





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4. Start: The rear panel indicator light and display screen will light up. System start completion will convert to a steady green light state, at which point the equipment may enter the working state.

System Close:
To shut down the laser welding system, the user must stop laser emission after welding is complete: 1. Release the trigger switch on the Handheld head; the system will stop emitting the laser and cease gas flow (if a gas post-flow parameter is set, the gas flow will stop after the designated time). Turn the key switch counter-clockwise to the "OFF" position, remove the key from the unit, and keep it secure to prevent unauthorized use.

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Chapter 5 Operation Laser Welding System

5.1 Control Panel Operation

The control panel of the M4 series laser welding system features a 7-inch touchscreen with a sophisticated, elegant design. It incorporates multiple alarm and detection functions and allows for the configuration of laser and wobble head parameters, as well as the selection of continuous or pulsed emission modes. Operation is simple and convenient; users can weld directly by selecting the appropriate material and thickness, eliminating the need to program complex process parameters.

Main interface:

Trigger: Handheld welding gun button signal indicator; the green "gun" light on the display illuminates when the button is pressed.

Continuity: Ground clamp continuity signal indicator; the green "continuity" light illuminates when the clamp is attached to the workpiece, completing the circuit with the welding gun's copper nozzle.

Alarm: Tap to enter the alarm interface to view active alarms; normal laser emission resumes after alarms are cleared.

Shutter: The shutter must be open (indicator lit) for the laser to emit.

Gas: When gas is enabled, the gas valve port outputs 24V; manual activation during welding is unnecessary, as gas flows automatically before laser emission.

Wire Feed: When enabled, wire feeding operates normally during welding.

(Note: When wire feed is enabled but the continuity indicator is off: press and hold the gun button for a 500 ms delay followed by continuous wire feed; press the button twice rapidly—holding it down on the second press—for a 500 ms delay followed by wire retraction.)

Preview: Activates the red-light preview to visualize the weld location and adjust positioning before welding begins.

Process Packages: Includes four common materials, plus "Custom" and "Other" categories; thickness and parameter details are as follows:

Stainless Steel (SUS): "SUS/1.0mm" indicates 1.0mm stainless steel; similarly, "SUS/3.5mm" indicates 3.5mm stainless steel.

Carbon Steel (CS): "CS/1.0mm" indicates 1.0mm carbon steel; similarly, "CS/3.5mm" indicates 3.5mm carbon steel.

Galvanized Sheet (SECC): "SECC/1.0mm" indicates 1.0mm galvanized sheet; similarly, "SECC/3.5mm" indicates 3.5mm galvanized sheet.

Aluminum Sheet (AL): "AL/1.0mm" indicates 1.0mm aluminum sheet; similarly, "AL/3.5mm" indicates 3.5mm aluminum sheet.

Custom (UDC): Allows users to edit parameters and save custom process settings for easy retrieval during welding. Other (OTS): Features built-in proprietary manufacturer processes, allowing for the selection of specialized procedures to weld special materials.

The main interface offers a variety of modes to choose from, including continuous welding mode, pulse welding mode and Fish Scale mode

Click on Professional Mode to access Laser Head Control and System Control. Parameters can

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be adjusted in the corresponding interfaces.
Laser Head Control:
L: Graphic length setting.
Graphic Frequency: Sets the motor oscillation frequency.
Restore Defaults: Restores the factory settings for single-page parameters after entering the editing page. Save: Saves the motor settings after parameter settings are complete.
Preview: Enables red light preview, allowing you to preview the welding position in advance and adjust it before welding. Return: Returns to the previous screen.
System Control:
Power: Sets the peak power of the laser during welding.
Frequency: Sets the frequency of the laser PWM modulation signal. Duty Cycle: Sets the pulse width of the laser PWM modulation signal.
Rise-up Time: The laser power gradually reaches its peak power after the set rise-up time.
Fall-down Time: The laser energy gradually decreases after the laser power is turned off.
Laser Shutdown Delay: When the laser is turned off at 100 ms, there is still 100 ms of full power input after shutdown, optimizing the wire breakage function.
Gas Lead Time: Gas can be turned on earlier when starting processing. When the external start button is pressed, gas is blown for a delay before the laser starts.
Gas Delay Amount: Gas can be delayed when stopping processing. When processing stops, laser output stops first, and after a delay, gas blowing stops.
Laser Shutdown Power Boost: Related to the laser shutdown delay. For example, setting the delay power boost to 10% increases the power by 10% after the laser is turned off, resulting in 20% power. The maximum is 100%, which is full power output at 10V, and the minimum is 0%, meaning no power increase.

The following information can be adjusted by setting the number of sides.
System Information:
System SN (Serial Number): The factory-set identifier for the Handheld welding unit, used for system activation/decryption. Firmware Version: The version currently running on the system.
Display Version: The version currently used by the display screen.
Validity Period (Days): The duration for which the system is usable; all functions will cease to operate once this period expires. (An automatic reminder appears upon startup when expiration is within 7 days.) Registration Code: Used for activation/decryption; simply enter the code and click "Confirm" to activate the system.
Language: Choice of 23 languages, with the ability to switch between them at will (including Chinese, English, Russian, Korean, Vietnamese, Japanese, etc.).

Alarm Information:
Alarm Abnormal Display: You may view detailed abnormal alarm parameters for Motor, Gas Pressure, Power Supply DC, Focusing Lens, Reflecting Mirror, Protective Lens: Laser post-set parameter details; you may observe laser status through parameters

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System Settings:
Air Pressure Alarm Level: Toggle between high and low voltage levels to match external alarm signals (PNP/high level, NPN/low level, or short-circuit); this function can also be disabled (though not recommended).
Conduction Setting: The conduction function can be enabled or disabled via the H/L toggle (disabled by default for Handheld welding due to safety considerations; suitable for platform or robotic arm welding).
Shutter Timer Function: When enabled, the shutter automatically closes after 15 minutes of inactivity; otherwise, the shutter must be closed manually.
Temperature Alarm Threshold: The upper limit for the welding gun temperature alarm; for example, if set to 40° C, an alarm will trigger on the display interface when the temperature at the welding gun's protective lens or motor lens reaches 40° C.

Red Light Offset Setting:
Red Light Offset Setting: If the red light is not centered on the nozzle, you can adjust it by setting the X and Y coordinates for the red light offset. Start Calibration: Reset the X and Y coordinates to zero.
Clear Calibration: Clear the calibration performed in the previous step.

Troubleshooting When the Alarm Indicator Lights Red
1. Troubleshooting for red light alarms on the laser head, air pressure, PD1, and PD2.
Laser head malfunction: Gun head motor alarm.
Air pressure malfunction: Air pressure monitoring alarm indicator light illuminates red when there is no gas or insufficient gas pressure. PD1/PD2: Laser PD alarm.
2. Troubleshooting for welding torch temperature 1, welding torch temperature 2, LD temperature, and red light alarm for expired permit.
Welding torch temperature 1/2: This alarm sounds when the heat generated by the welding torch during operation or its operating temperature exceeds or falls below a preset threshold. LD temperature: Pump source temperature alarm.
3. Troubleshooting for wire feeder offline, welding torch offline, power supply abnormality, and red alarm light.
Wire feeder offline: Communication between the wire feeder and the equipment is abnormal.
Welding torch offline: Communication between the welding torch and the equipment is abnormal.
Power supply malfunction: The power supply is malfunctioning.

Mechanical Knob Operation Interface
1. Two-way Control Interaction
Parameters can be directly adjusted via the knob screen, while also allowing for digital input and interface adjustments on the touchscreen. When operating on the touchscreen, the knob screen provides synchronous feedback on the adjustment action.

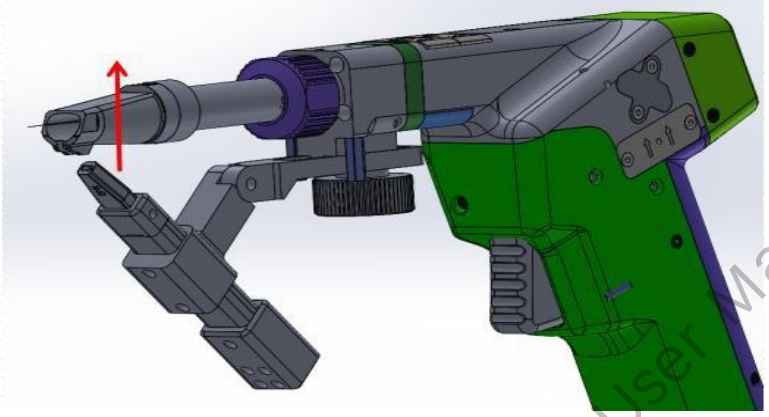
2. Mechanical Knob Operation Instructions:
Left/Right Turn: Used to increase or decrease the value.
Left Turn: Decrease the currently selected parameter value.

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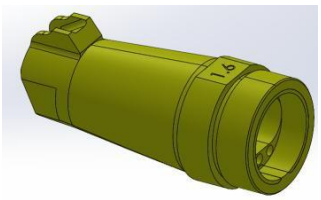
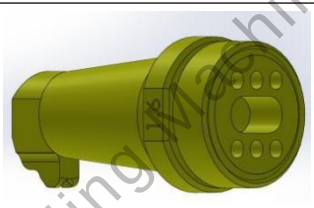
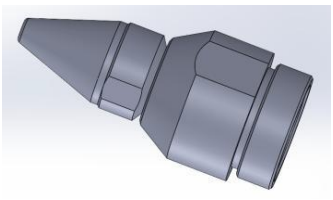
Right Turn: Increase the currently selected parameter value.
Short Press: Confirm the current operation/enter the next menu level.
Long Press for 2 seconds: Return.
Power: Sets the peak power of the laser during welding (rotary adjustment).
Wire Feed Speed: Sets the wire feed speed of the wire feeder (rotary adjustment).

5.2 Welding Head Usage Operation

5.2.1 Install the copper nozzle

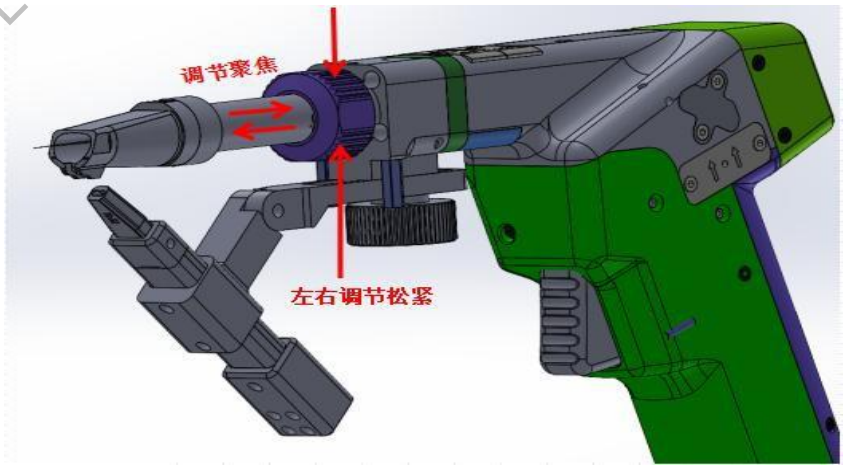


There are two types of copper nozzles, as shown in the picture below.

		
Semi-funnel double wire feed copper nozzle 1.6	F20 single wire feed copper nozzle 1.6	Cutting copper nozzle

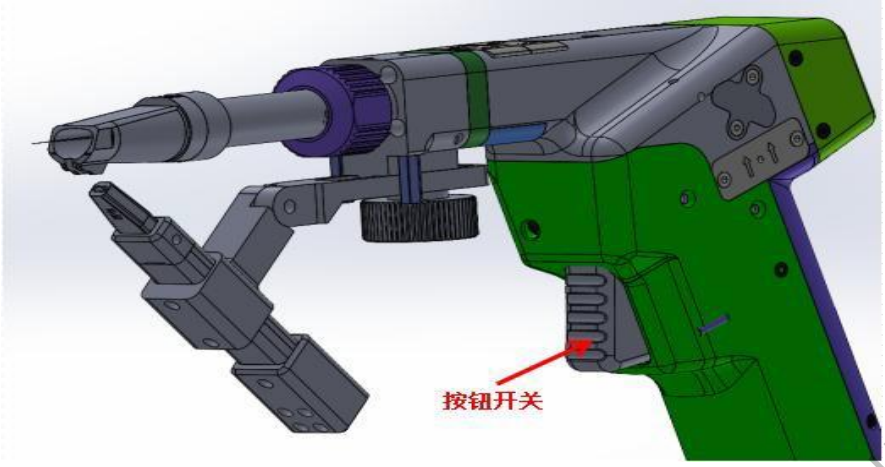
5.2.2 Adjust the copper nozzle assembly

Before installing the nozzle, please turn off the machine using the key switch button. When adjusting the copper nozzle, first loosen the nut, and once it is correctly positioned, tighten the nut to lock the copper nozzle in place, as shown in the figure.



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5.2.3 Operate Handheld Welding Head



When the safety interlock circuit is disconnected, pressing the button switch on the welding head for more than 2 seconds will only allow the wire feeder to feed wire. Holding the button switch twice consecutively for more than 2 seconds will only cause the wire feeder to retract the wire; laser emission and execution of the set operating program will not be permitted during this time. Laser emission is only permitted after all safety interlock control conditions are met and the set gas exhaust delay has ended. During welding, the operator must continue to hold the switch pressed to maintain laser emission. Releasing the trigger switch or failure of the safety interlock circuit will stop laser emission.

5.3 Important Safety Features

5.3.1 Safety protection circuit between the workpiece connection clamp cable and the Handheld Welding Head

This safety circuit ensures that the Handheld Welding Head emits a laser beam only when the copper nozzle is in contact with the workpiece. The operator must secure the workpiece fixture onto the metal part to be processed; when the Welding Head's copper nozzle touches the workpiece, the circuit formed by the nozzle and the workpiece's conductive line closes, activating the system. If the operator moves the copper nozzle away from the workpiece, this safety interlock circuit opens, automatically shutting off the laser and preventing further emission.

5.3.2 Limitations on Handheld Unit Button Functions

When the safety interlock circuit mentioned above is open, pressing the button on the handheld Laser Welding Head for 2 seconds allows the wire feeder to feed wire only; pressing the button twice in succession and holding it for 2 seconds causes the wire feeder to retract wire only. In this state, laser emission and the execution of the preset operating program are disabled. If the safety interlock conditions are met, the button serves as the trigger for program execution; pressing the trigger button initiates the preset gas-flow delay sequence based on user-defined parameters, and the laser fires only after this delay concludes. To complete the welding task, the operator must keep the trigger button pressed to maintain laser emission.

5.4 Start Welding

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All personnel in the welding area must wear personal protective equipment to guard against invisible infrared laser radiation as well as any secondary visible or invisible radiation generated during the welding process. Appropriate laser safety eyewear and welding helmets equipped with suitable filters are required. Safety equipment for welding operators also includes welding helmets, fire-resistant protective clothing, and gloves.

1. Check that the safety circuit is functioning correctly; the panel indicator will appear dim if the circuit is abnormal, whereas a green light indicates the system is ready for operation.
2. Select the appropriate copper welding nozzle and attach it to the extension tube of the Welding Head.
3. Use the user interface to select the preset parameters for processing a 1mm-thick aluminum sheet in continuous laser mode.
4. Place the workpiece on the welding table and clamp it securely. Ensure there is minimal gap between parts and that they are in as tight contact as possible during the welding process.
5. Ensure the "continuity clamp" is connected to the workpiece or the conductive welding table upon which the workpiece rests.
6. Touch the tip of the copper nozzle to the area to be welded. This closes the safety interlock circuit between the workpiece clamp and the Handheld Welding Head; the system is now ready, and the continuity indicator light on the display illuminates.
7. Press the trigger button on the Handheld Welding Head to activate the shielding gas, then wait for the laser to start.
8. Once the laser fires, move the Welding Head slowly to perform the weld. Keep the trigger button pressed throughout the process; releasing it will interrupt the welding program and stop the laser. The continuity indicator on the display remains lit during operation.
9. Since the infrared laser beam is invisible, use the red guide beam to correctly position the copper nozzle on the part. The image below illustrates the proper angle—approximately 45° —for positioning the nozzle against the workpiece.



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To further refine the process, operators can use the buttons on the 7-inch display panel to adjust process settings—such as laser power, oscillation frequency, and oscillation width —by increasing or decreasing these parameters.

Chapter 6 Setting of Process Parameters

6.1 Process Parameter Settings

For specific parameter process settings, please refer to each item in (5. Operation Handheld Laser Welding System)

In addition to the default parameters provided by the system, you may customize the running program with set parameters. The operator may arbitrarily select a group of programs to modify until the working requirements are met. The parameters set by the user will also be saved in the system by default for reuse next time.

Parameter Data Table:

Serial No.	Parameter Name	Unit	Minimum	Maximum	Adjustment Amount	Remarks
1	Laser Power	%	0	100	1	
2	Oscillation Frequency	Hz	0	30	1	
3	Oscillation Width	MM	0	5	0.2	Standard 0-5MM
4	Ramp-up Time	ms	0	3000	1	
5	Ramp-down Time	ms	0	3000	1	

It is recommended to weld stainless steel with material thickness of 0~5mm, aluminum of 0~4mm, and copper material of 0-1mm. For welding materials exceeding this thickness, please consult other models of laser welding machine products. (Laser types include: forced air cooling laser, refrigerant air cooling laser, water cooling laser, copper welding dedicated laser)

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6.2 Welding Process Parameters: For Reference Only

No.	Materialthickness	Weldingmode	Laserpower	Oscillationfrequency	Weldingwiremodel	Wirefeedspeed	Oscillationwidth	Gaspressure
1	Stainless Steel 1.0	Line mode	28%	16Hz	Single 0.8	14mm/s	1.2mm	0.20mpa
	Stainless Steel 1.5	Line mode	38%	14Hz	Single 0.8	12mm/s	1.8mm	0.20mpa
	Stainless Steel 2.0	Line mode	48%	12Hz	Single 0.8	10mm/s	2.2mm	0.25mpa
	Stainless Steel 2.5	Line mode	64%	12Hz	Single 0.8	10mm/s	2.6mm	0.25mpa
	Stainless Steel 3.0	Line mode	80%	10Hz	Single 0.8	10mm/s	2.8mm	0.25mpa
2	Carbon Steel 1.0	Line mode	28%	16Hz	Single 0.8	14mm/s	1.2mm	0.20mpa
	Carbon Steel 1.5	Line mode	38%	14Hz	Single 0.8	12mm/s	1.8mm	0.20mpa
	Carbon Steel 2.0	Line mode	48%	12Hz	Single 0.8	10mm/s	2.2mm	0.25mpa
	Carbon Steel 2.5	Line mode	64%	12Hz	Single 0.8	10mm/s	2.6mm	0.25mpa
	Carbon Steel 3.0	Line mode	80%	10Hz	Single 0.8	10mm/s	2.8mm	0.25mpa
3	Galvanized sheet 1.0	Line mode	28%	16Hz	Single 0.8	14mm/s	1.2mm	0.20mpa
	Galvanized sheet 1.5	Line mode	38%	14Hz	Single 0.8	12mm/s	1.8mm	0.20mpa
	Galvanized sheet 2.0	Line mode	48%	12Hz	Single 0.8	10mm/s	2.2mm	0.25mpa
	Galvanized sheet 2.5	Line mode	64%	12Hz	Single 0.8	10mm/s	2.6mm	0.25mpa
	Galvanized sheet 3.0	Line mode	80%	10Hz	Single 0.8	10mm/s	2.8mm	0.25mpa
4	Aluminum Plate 1.0	Line mode	33%	16Hz	Single 0.8	14mm/s	1.2mm	0.20mpa
	Aluminum Plate 1.5	Line mode	43%	14Hz	Single 0.8	12mm/s	1.8mm	0.20mpa
	Aluminum Plate 2.0	Line mode	53%	12Hz	Single 0.8	10mm/s	2.2mm	0.25mpa
	Aluminum Plate 2.5	Line mode	67%	12Hz	Single 0.8	10mm/s	2.6mm	0.25mpa
	Aluminum Plate 3.0	Line mode	82%	10Hz	Single 0.8	10mm/s	2.8mm	0.25mpa
5	Stainless Steel 1.0	Line mode	30%	16Hz	Single 1.0	14mm/s	1.2mm	0.20mpa
	Stainless Steel 1.5	Line mode	40%	14Hz	Single 1.0	12mm/s	1.8mm	0.20mpa
	Stainless Steel 2.0	Line mode	50%	12Hz	Single 1.0	10mm/s	2.2mm	0.25mpa
	Stainless Steel 2.5	Line mode	65%	12Hz	Single 1.0	10mm/s	2.6mm	0.25mpa
	Stainless Steel 3.0	Line mode	80%	10Hz	Single 1.0	10mm/s	2.8mm	0.25mpa
6	Carbon Steel 1.0	Line mode	30%	16Hz	Single 1.0	14mm/s	1.2mm	0.20mpa
	Carbon Steel 1.5	Line mode	40%	14Hz	Single 1.0	12mm/s	1.8mm	0.20mpa
	Carbon Steel 2.0	Line mode	50%	12Hz	Single 1.0	10mm/s	2.2mm	0.25mpa

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No.	Materialthickness	Weldingmode	Laserpower	Oscillationfrequency	Weldingwiremodel	Wirefeedspeed	Oscillationwidth	Gaspressure
	Carbon Steel 2.5	Line mode	65%	12Hz	Single 1.0	10mm/s	2.6mm	0.25mpa
	Carbon Steel 3.0	Line mode	80%	10Hz	Single 1.0	10mm/s	2.8mm	0.25mpa
7	Galvanized sheet 1.0	Line mode	30%	16Hz	Single 1.0	14mm/s	1.2mm	0.20mpa
	Galvanized sheet 1.5	Line mode	40%	14Hz	Single 1.0	12mm/s	1.8mm	0.20mpa
	Galvanized sheet 2.0	Line mode	50%	12Hz	Single 1.0	10mm/s	2.2mm	0.25mpa
	Galvanized sheet 2.5	Line mode	65%	12Hz	Single 1.0	10mm/s	2.6mm	0.25mpa
	Galvanized sheet 3.0	Line mode	80%	10Hz	Single 1.0	10mm/s	2.8mm	0.25mpa
8	Aluminum Plate 1.0	Line mode	33%	16Hz	Single 1.0	14mm/s	1.2mm	0.20mpa
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	Stainless Steel 3.0	Line mode	82%	10Hz	Single 1.2	10mm/s	2.8mm	0.25mpa
10	Carbon Steel 1.0	Line mode	33%	16Hz	Single 1.2	14mm/s	1.2mm	0.20mpa
	Carbon Steel 1.5	Line mode	43%	14Hz	Single 1.2	12mm/s	1.8mm	0.20mpa
	Carbon Steel 2.0	Line mode	53%	12Hz	Single 1.2	10mm/s	2.2mm	0.25mpa
	Carbon Steel 2.5	Line mode	67%	12Hz	Single 1.2	10mm/s	2.6mm	0.25mpa
	Carbon Steel 3.0	Line mode	82%	10Hz	Single 1.2	10mm/s	2.8mm	0.25mpa
11	Galvanized sheet 1.0	Line mode	33%	16Hz	Single 1.2	14mm/s	1.2mm	0.20mpa
	Galvanized sheet 1.5	Line mode	43%	14Hz	Single 1.2	12mm/s	1.8mm	0.20mpa
	Galvanized sheet 2.0	Line mode	53%	12Hz	Single 1.2	10mm/s	2.2mm	0.25mpa
	Galvanized sheet 2.5	Line mode	67%	12Hz	Single 1.2	10mm/s	2.6mm	0.25mpa
	Galvanized sheet 3.0	Line mode	82%	10Hz	Single 1.2	10mm/s	2.8mm	0.25mpa
12	Aluminum Plate 1.0	Line mode	35%	16Hz	Single 1.2	14mm/s	1.2mm	0.20mpa

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No.	Materialthickness	Weldingmode	Laserpower	Oscillationfrequency	Weldingwiremodel	Wirefeedspeed	Oscillationwidth	Gaspressure
	Aluminum Plate 1.5	Line mode	45%	14Hz	Single 1.2	12mm/s	1.8mm	0.20mpa
	Aluminum Plate 2.0	Line mode	55%	12Hz	Single 1.2	10mm/s	2.2mm	0.25mpa
	Aluminum Plate 2.5	Line mode	70%	12Hz	Single 1.2	10mm/s	2.6mm	0.25mpa
	Aluminum Plate 3.0	Line mode	85%	10Hz	Single 1.2	10mm/s	2.8mm	0.25mpa
13	Stainless Steel 1.0	Line mode	35%	16Hz	Single 1.6	14mm/s	1.2mm	0.20mpa
	Stainless Steel 1.5	Line mode	45%	14Hz	Single 1.6	12mm/s	1.8mm	0.20mpa
	Stainless Steel 2.0	Line mode	55%	12Hz	Single 1.6	10mm/s	2.2mm	0.25mpa
	Stainless Steel 2.5	Line mode	70%	12Hz	Single 1.6	10mm/s	2.6mm	0.25mpa
	Stainless Steel 3.0	Line mode	85%	10Hz	Single 1.6	10mm/s	2.8mm	0.25mpa
14	Carbon Steel 1.0	Line mode	35%	16Hz	Single 1.6	14mm/s	1.2mm	0.20mpa
	Carbon Steel 1.5	Line mode	45%	14Hz	Single 1.6	12mm/s	1.8mm	0.20mpa
	Carbon Steel 2.0	Line mode	55%	12Hz	Single 1.6	10mm/s	2.2mm	0.25mpa
	Carbon Steel 2.5	Line mode	70%	12Hz	Single 1.6	10mm/s	2.6mm	0.25mpa
	Carbon Steel 3.0	Line mode	85%	10Hz	Single 1.6	10mm/s	2.8mm	0.25mpa
15	Galvanized sheet 1.0	Line mode	35%	16Hz	Single 1.6	14mm/s	1.2mm	0.20mpa
	Galvanized sheet 1.5	Line mode	45%	14Hz	Single 1.6	12mm/s	1.8mm	0.20mpa
	Galvanized sheet 2.0	Line mode	55%	12Hz	Single 1.6	10mm/s	2.2mm	0.25mpa
	Galvanized sheet 2.5	Line mode	70%	12Hz	Single 1.6	10mm/s	2.6mm	0.25mpa
	Galvanized sheet 3.0	Line mode	85%	10Hz	Single 1.6	10mm/s	2.8mm	0.25mpa
16	Aluminum Plate 1.0	Line mode	35%	12Hz	Single 1.6	11mm/s	1.6mm	0.20mpa
	Aluminum Plate 1.5	Line mode	45%	12Hz	Single 1.6	10mm/s	1.8mm	0.20mpa
	Aluminum Plate 2.0	Line mode	55%	12Hz	Single 1.6	9mm/s	2.4mm	0.25mpa
	Aluminum Plate 2.5	Line mode	70%	10Hz	Single 1.6	7mm/s	2.6mm	0.25mpa
	Aluminum Plate 3.0	Line mode	85%	8Hz	Single 1.6	6mm/s	3.0mm	0.25mpa

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Chapter 7 Troubleshooting/Maintenance

7.1 Fault Troubleshooting

If an alarm occurs, the status indicator on the equipment display screen panel will light red. You need to check the alarm items displayed on the display screen panel to identify which alarm bit caused the specific error for troubleshooting.

Inspect the alarm display on the display screen panel. Inspect the cause of the warning for the corresponding item according to the specific warning item. Many alarms may be eliminated by one of the following two methods.

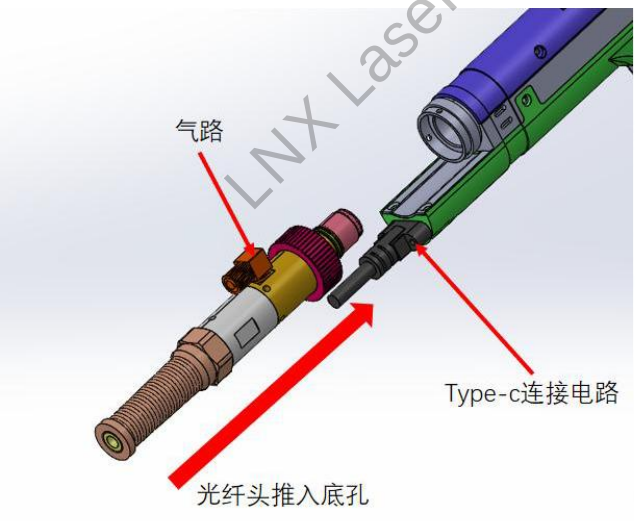
1. After power off, restart the welding system. The first thing it will do is try to automatically clear any alarms. As long as the parts causing the error are resolved, the error should be cleared.
2. Connect via a computer serial port and use the HMI software provided by LNX Equipment to clear the alarm.

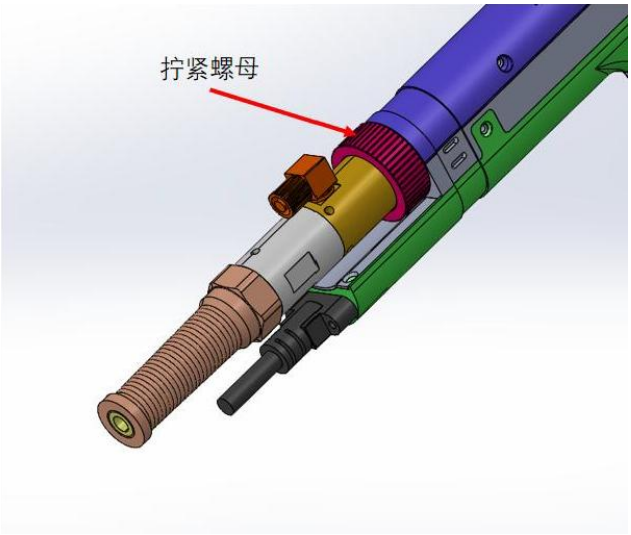
Using Restart: A small part of these alarms can only be cleared by restarting the unit. If the parts causing it are not resolved, the alarm may occur again. If this is the case, please contact after-sales personnel for help!

7.2 Maintenance and replacement of the Welding Head

Before performing any maintenance on the Handheld Welding Head, maintenance personnel must turn off the equipment and disconnect the AC power supply. To detach the optical cable (laser output cable) from the Handheld welding unit, rotate the silver nut counterclockwise, as shown in the figure below.

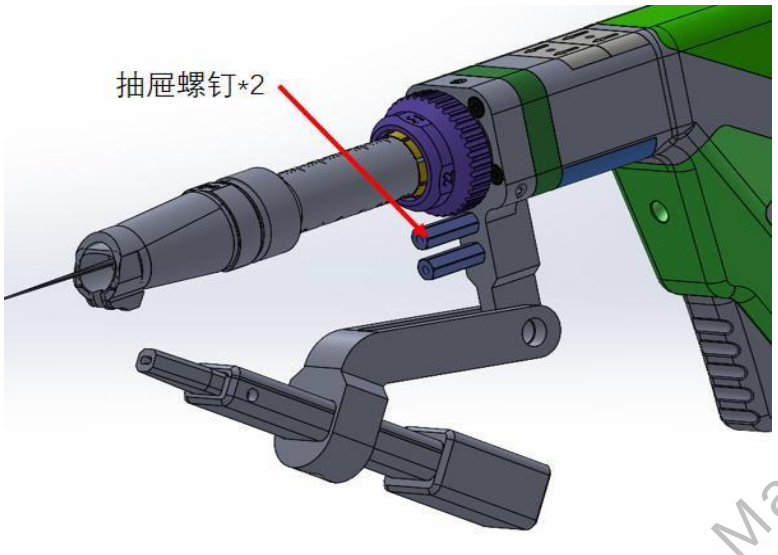
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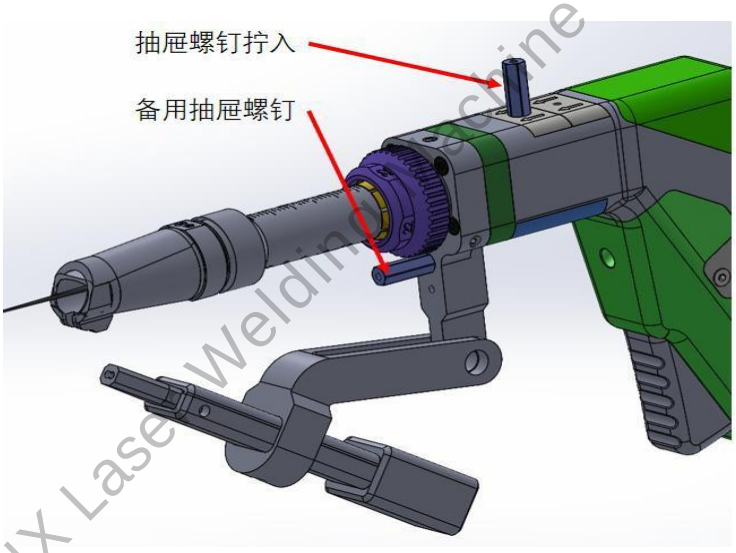


7.3 Maintenance and replacement of protective lenses

Protective Lens Parts Drawer and Focusing Lens Parts Drawer Screw Placement Position.

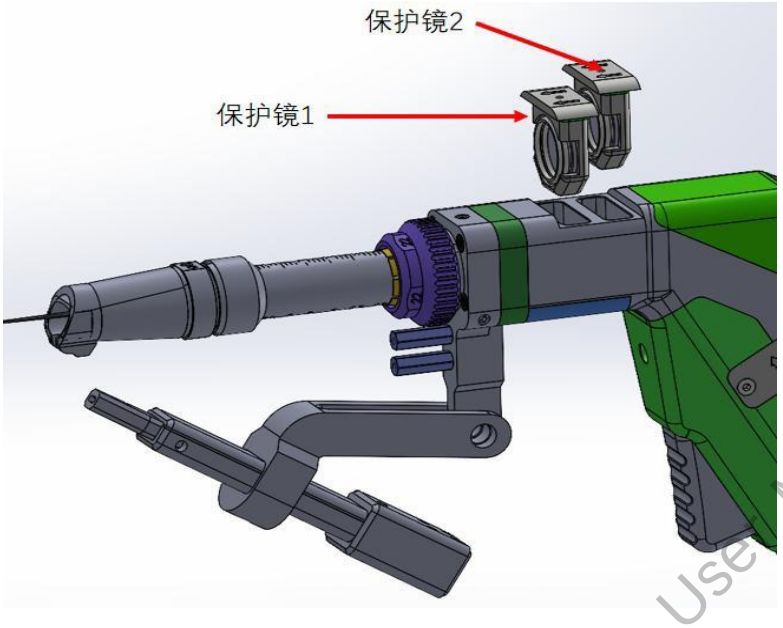


The drawer screw can be extracted and locked into the screw hole of the protective lens/focusing drawer for easy insertion and removal of the protective lens parts/focusing drawer.



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Replacement Steps:
Replacement of protective lens 1 should be performed in a dust-free workshop or a relatively clean space.



After extracting the protective lens 1 drawer, seal the drawer opening with masking tape to prevent dust from entering the gun body.



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After loosening the screw fixing the lens parts, take out the gasket parts and lens parts. When replacing the lens parts, dust-free finger cots should be worn. If no dust-free finger cots are available, avoid contact between fingers and the lens surface.



When taking out the new lens parts, inspect whether there are dust or fingerprint marks. If there are dust or fingerprint marks, wipe clean with a cotton swab dipped in alcohol (anhydrous ethanol), then place the lens parts and gasket parts back into the drawer, tighten the fixing screw, and reinstall into the gun body.



Protective Lens 2 is the same as above.

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Usage Precautions and Maintenance Instructions

1. The M4 series laser welding machine comprises a laser source, a laser welding system, a Laser Welding Head, and various control modules. To prevent interference, keep the unit away from argon arc welders, MAG/MIG welders, and other equipment that generates significant electromagnetic interference; maintain a safety distance of at least 5 meters. If conditions permit, provide a dedicated space for the laser welding machine.
2. To minimize electrical leakage or static electricity, ensure the equipment is properly grounded.
3. Verify that all cable connectors are securely connected and locked; wrap the connections with insulating tape after locking.
4. Check that the laser head and optical fiber are securely connected; once verified, seal the connection with masking tape to prevent dust from entering the laser head cavity.
5. Do not loosen or remove equipment screws without authorization from professionally trained personnel.
6. Inspect the protective lens drawer for proper function and ensure the sealing ring is intact and effective. When replacing the protective lens, wipe the exterior of the laser head with alcohol at least five times to remove contaminants; perform the replacement only in a dust-free, draft-free environment.
7. The interior of the laser head is highly complex; to avoid short circuits, keep the unit away from water sources and ensure no liquids are sprayed onto the laser head.
8. Do not use strong air blasts to clean the laser head; use only alcohol and a lint-free cloth for wiping.
9. The laser head contains an internal digital motor; handle the unit with care to avoid damaging the motor.
10. When the laser head is not in use, purge it repeatedly with system gas to expel dust; remove the copper nozzle and seal the opening with sealing tape. Before using it again, reinstall the nozzle and perform at least two purge cycles.
11. Refer to the official website videos for procedures and precautions regarding the inspection and replacement of protective lenses.
12. Refer to the official website videos for maintenance and care instructions regarding the welding copper nozzle and internal cavity.
13. Periodically inspect the electrical circuits for faults or signs of aging (every 30 days).
14. When cleaning the equipment housing, use a clean, soft cloth and a specialized cleaning agent to carefully wipe the interior and exterior surfaces, ensuring all dust and stains are thoroughly removed.

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Warranty Description:

The warranty period begins from the date of manufacture. If the product malfunctions during the warranty period, please contact us promptly for a solution. All lenses (such as collimating lenses, focusing lenses, reflective lenses, protective lenses, motor lenses, fiber optic lenses, etc.), external parts (chassis and welding torch, etc.)), and consumables (copper nozzles, stainless steel tubing, and other easily consumable items) are not covered by the warranty.

The user manual is subject to modification as the product is upgraded.

Changes to this product information will not be notified separately.

If users have any comments or suggestions regarding the product or instruction manual during use, please contact us.

Sales:Sales@lnxequipment.com
Service:Support@lnxequipment.com

Website: lnxequipment.com

WhatsApp: +86 185 0728 8166

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