MAX PHOTONICS

X1-MFSC-1500W Handheld Laser Welding Machine

USER GUIDE

Maxphotonics Co.,Ltd.

Copyright Notation

Maxphotonics Co.,Ltd.
Address: Maxphotonics Industrial Park, 3rd Furong Road,
Furong Industrial Area, Shajing, Baoan, Shenzhen, China.518125
E-Mail: info@maxphotonics.com
http://en.maxphotonics.com

Preface

Thank you for using the handheld laser welding products Maxphotonics. We compile this document for you in order that the laser is used and maintained properly. Due to the limited level of the writers, coupled with time constraints, there are some careless mistakes in this document, your understanding and suggestion to help us make an improvement will be much appreciated . Thank you again for using Maxphotonics' products.

Please take time to read and understand this User's Guide and familiarize yourself with the operating and maintenance instructions before you use the product. We strongly recommend that the operator read the Section 2 titled “Safety Information” prior to operating the product.

This User's Guide should stay with the product to provide you and all future users and owners of the product with important operating, safety and other information.

We identify the parts to which you need to pay special attention in the document with underscore. Please notice those information to prevent the unnecessary damages.

Company Profile

Found in 2004, Maxphotonics is one of the first fiber laser manufacturers in China. It is also the first in China to realize independent intellectual property rights and vertical integration in the core technologies of fiber lasers and optical devices. One of the national high-tech enterprises. Maxphotonics has developed into an internationally renowned laser manufacturer that develops, manufactures and sells fiber lasers and core optical components. It is the second largest domestic fiber laser manufacturer in the domestic market.

Maxphotonics specializes in the research, development, production and sales of fiber lasers, including pulsed fiber lasers, continuous fiber lasers and direct diode lasers. It also implements pump sources, combiners, fiber gratings, isolators, laser output heads, and stripping. Optical devices such as molds, acousto-optic modulators, and pattern matchers are produced autonomously. Products are widely used in marking, engraving, cutting, drilling, cladding, welding, surface treatment, rapid prototyping and additive manufacturing processes.

More informations，please visit our website：

http://en.maxphotonics.com

Chapter 1
Characteristic Explain

MFSC series is a series of high-efficiency, high-reliability, maintenance-free high-power lasers developed by Maxphotonics. It adopts phase-change heat dissipation method, the wavelength range is 1060nm~1100 nm, and the laser efficiency is >25%.

Maxphotonics MFSC series lasers belong to Class 4 (Class 4) laser products, and the product design and testing have fully considered safety.

Laser light exhibits unique characteristics that may pose safety hazards. Therefore, the laser light can't be normally associated with other light sources, and all operators and people near the laser must be aware of these special hazards.

In order to ensure the safe operation and optimal performance of the product, please follow all warnings and safety instructions in this guide during process of operation, maintenance and service.

For ensuring the safety of operators, operators are urged not to open the equipment privately at all times. There are no user serviceable parts, equipment or assemblies associated with this product. Lasers of unauthorized disassembly shall not be subject to warranty.

Chapter 2
General Safety Information

1 -Handheld Laser Welding Machine Is Safe To Use

Handheld laser welding machines are classified as hazardous, invisible laser radiation Class 4 laser products. This product emits infrared laser radiation with a wavelength of 1080nm, and the average power radiated by the welding head is greater than 100W, which can cause damage to eyes and skin directly or indirectly exposed to such light intensity. This infrared radiation is invisible, and the laser beam can cause irreversible damage to the retina or cornea. Be sure to wear appropriate and certified 1080nm near-infrared laser safety glasses before operating the handheld laser welding machine.

(1) For the safety of you and others, it is strictly forbidden to point the welding head at yourself or others;

(2) Appropriate and certified 1080nm near-infrared band laser safety glasses and anti-high temperature gloves must be worn before using the handheld laser welding machine;

(3) For the safety of you and others, the alligator clip must be clamped to the welding workpiece before triggering the laser, and it is strictly prohibited to clamp it in other places except the workpiece to avoid safety hazards caused by abnormal light output;

(4) The welding operation of the hand-held laser welding machine should be carried out in an independent space with laser protection; non-welding personnel and combustible and flammable materials should be kept away from the welding

operation table for more than 10 meters, and a fire extinguisher should be placed near the welding area;

(5) Wear a mask when welding highly reflective materials;

(6) Make sure that the hand-held laser welding machine is properly grounded, otherwise it may cause the product shell to be electrified, resulting in personal injury to the operator; if the grounding is not operated as required, it may cause laser alarm, no light, laser instability and other hidden faults;

(7) Please do not work in the environment of rain and direct sunlight, otherwise it may cause high temperature and high humidity alarm or short circuit, affecting the normal use of the laser, and even causing potential safety hazards. .

2 -Safety Conventions

As shown in the table below, all safety warning signs during the operation of the hand-held laser welding machine include:

SYMBOLS	DESCRIPTION
	WARN: Text marked with an electrical warning symbol indicates a potential personal hazard. Failure to follow certain procedures may cause certain or fatal hazards to you or others.
	NOTICE: There is a potential hazard to the product; certain procedures need to be followed, otherwise your equipment or components may be damaged. Do not violate the requirements of the attention signs during operation to ensure the normal use of the equipment.
	This logo represents laser radiation, and we have affixed this logo to the laser output of the product.
 Safety Glasses Must Be Worn	This symbol means wearing protective eyewear, please be sure to wear appropriate and certified 1080nm near-infrared band laser protective eyewear.
NO SYMBOL	IMPORTANT:Refers to any information regarding the operation of the product. Please do not overlook this information.

NOTE :

◎ Maxphotonics handheld laser welding machine, the wavelength range is 1060nm~1100nm, which is not in the visible light range, but these beams may cause irreversible damage to the retina and cornea. Maxphotonics recommends that you must wear qualified and safe protective glasses when operating the handheld welding machine at all times.

3-Laser protection

1.Laser Safety Goggles Requirements

Laser safety goggles should be selected based on the ability to shield the entire wavelength range of the laser emitted by the hand-held laser welding machine. When operating this device, please wear appropriate laser safety goggles. Selecting the appropriate laser safety goggles requires the end user to accurately identify the laser safety goggles. The wavelength range emitted by the product. If the device is a tunable laser or Raman product, it emits light in a range of wavelengths. End users should verify that the laser safety glasses used are capable of blocking light emitted by the device over its entire wavelength range. Please check the safety label on the product and verify that personal protective equipment (i.e. safety shield, viewing window or windows, goggles, etc.) is adequate for output power and wavelength range. Decisions regarding safety glasses must also take into account any secondary radiation hazards posed by the welding process (see Chapter II, Section 4-1)

2.Laser Protective Equipment Suppliers

Whether the laser is being used in a new facility or retrofitting an existing system, the end user is solely responsible for determining the suitability of all personal protective equipment.

There are several suppliers of laser safety equipment that provide materials or

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

4-Weld Feature Safety

1.Radiation Hazard

Visible and invisible radiation is generated during welding. The interaction between the high-power laser beam and the target material to be welded can create a plasma that generates ultraviolet radiation and "blue light," which can lead to conjunctivitis, photochemical damage to the retina, or a sunburn-like reaction to the skin. Welders exposed to invisible UV light without proper protection can suffer permanent eye damage.

2.Skin Hazard

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

3.Fire Hazard

If flammable or flammable materials are near the welding area, the heat and

sparks generated during welding can cause a fire or explosion. Laser welding is only possible if the area is free of combustible materials. Never weld containers containing flammable or combustible materials. If the contents of the containers are unknown, they should be assumed to be flammable or combustible. Fire extinguishers should be located nearby, easily accessible, and have personnel trained in their use.

4.Smoke Hazard

Welding "fume" can consist of very fine particles and gases. Welding fumes and gases come from a combination of welding materials or any filler materials used, shielding gases used, paints, coatings, chemical reactions, and air pollutants. Welding fumes can adversely affect the lungs, heart, kidneys and central nervous system.

(1) When welding, keep the head away from the smoke. Always weld in a well ventilated area for safe breathing air.

(2) Use a fume extraction system to remove vapors, particulates and hazardous debris from the welding process area.

(3) Respirator may also be required in confined spaces and other situations.

(4) Routine air monitoring should be performed to determine the level of noxious fumes in the welding area.

5.Cylinder Safety

The gas cylinder may explode if damaged or placed near the welding area. Shielding gas cylinders should be placed where they will not be bumped or damaged. Keep them away from heat, sparks or flames. Cylinders must be stored upright and secured to a fixed stand. A working regulator for the required gas and pressure is required. All hoses and fittings should also be suitable for the application and in good working order.

5-Reference Standard

Electromagnetic compatibility immunity:

EN 61000-6-4:2007+A1:2011

EN 61000-6-2:2005 + AC: 2005

EN 61000-3-2:2014

EN 61000-3-3:2013

Power supply safety:

EN 61010-1:2010

EN60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013

Laser Safety:

EN 60825-1:2014

CDRH 21 CFR 1040.10

Functional Safety:

EN 60950-1:2006+A11:2009+A1:2010+A12:2011+A2:2013

Please Note:

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

6-General Safety Instructions

1.Reflection Of Mirror

The location of the hand-held laser welder's output port may generate a secondary laser beam that radiates outward at multiple angles. This phenomenon that the main beam of the handheld laser welding machine produces a divergent beam after being reflected on a plane is called specular reflection. Although the energy of the secondary laser beam is much less than that of the primary laser beam, this intensity can also cause damage to, for example, human eyes, skin, or some material surfaces.

WARNING :

◎ Since the laser radiation is invisible, you must exercise extreme care to avoid or reduce specular reflections.

2.Accessories Safety Instructions

The photosensitive elements integrated in the optical accessories related to the hand-held laser welding machine may be damaged due to laser exposure, and related device protection should be paid attention to.

WARNING :

◎ The output laser intensity of Maxphotonics handheld laser welding machine is enough to weld metal, burn skin, clothing and paint, and ignite volatile substances such as alcohol, gasoline, ether, etc. Therefore, during operation and use, be sure to isolate the flammable items around the handheld laser welding machine.

3.Optical Handling Precautions

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

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

(2) Avoid placing the hand-held laser welding machine and related optical output devices on the same level as the eyes;

(3) Reasonable selection of safety protective equipment according to the output power and wavelength requirements of the handheld laser welding machine to ensure the safety of operators;

(4) A warning sign should be pasted in the area where the handheld laser welding machine is placed to limit the safe area for operating the handheld laser welding machine;

(5) Do not use the handheld laser welding machine in a dark environment;

(6) It is strictly forbidden to turn on the hand-held laser welding machine without installing the optical coupling fiber or optical output connector;

(7) Please ensure that the protective lens, copper nozzle and wire feeding structure are installed and cleaned when the handheld laser welding machine is turned off and the power supply is disconnected;

(8) When debugging, calibrating and focusing, please do it without the laser, and turn on the laser after the debugging is completed;

(9) Please operate the equipment strictly in accordance with the instructions in this document, otherwise the protection device and performance of the equipment will be impaired, and Maxphotonics will not guarantee this.

NOTICE:

◎ The optical output of the hand-held laser welding machine will be sent out after receiving the lens with anti-reflection coating. Dust and any other debris present. Any visible attachments will cause serious damage to the lens, resulting in burning the handheld laser welding machine or any subsequent optical path equipment.

◎ Please refer to the "Optical Fiber Connector Inspection and Cleaning Guide"

to follow the lens cleaning inspection process.

◎ Please be careful with the hot phenomenon or molten metal particles that may be generated during the cleaning operation of the hand-held laser welding machine.

◎ When debugging and calibrating the output of the hand-held laser welding machine, it is necessary to set the hand-held laser welding machine to detect the spot quality of the laser output through the indicating red light under the condition of no laser light, and then turn on the laser if there is no abnormality.

WARNING :

◎ Reasonable selection of safety protection equipment according to the laser output power and wavelength requirements.

◎ Do not look directly at the tip of the gun, and ensure that safety glasses are always worn during each operation.

4.Electrical Operating Instructions

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

(1) Please ensure that the equipment shell is well grounded, any interruption in the grounding loop may cause personal injury;

(2) Please make sure that the power supply connected to the device is connected to the protective ground before use;

(3) In order to reduce the risk of fire, when necessary, the replacement of line fuses can only be of the same type and level, and cannot be replaced by other fuses or materials;

(4) Make sure that the input AC voltage of the handheld laser welding machine is the normal AC mains voltage (single-phase voltage 200-240VAC), and the wiring is correct. Any wrong wiring method may cause personal or equipment injury;

(5) Except for the gun head consumables, the user does not need to repair

the parts, components or components by themselves, and all maintenance operations need to be completed by professionals from Maxphotonics;

(6) It is strictly forbidden to disassemble and assemble the hand-held laser welding machine without authorization, and damage the relevant labels, otherwise there will be a danger of electric shock or burns;

(7) There should be no flammable materials near the welding area. The heat and sparks generated during the welding process may cause fire or explosion. Laser welding can only be performed in areas free of combustible materials.

(8) Never weld on containers containing flammable or combustible materials. If the contents of a container are unknown, you should assume they are flammable or combustible. Fire extinguishers should be nearby, easily accessible, and personnel trained to use them.

(9) Any product that has been disassembled without permission no longer enjoys the warranty rights.

WARNING :

◎ The input voltage of the hand-held laser welding machine is single-phase alternating current (200-240VAC), and there is a danger of electric shock. All associated cables and connections are potentially hazardous.

5.Operating Environment Requirements for Handheld Laser Welding Machines

This equipment is commonly used in: (1) below 2000 meters above sea level, (2) overvoltage category II, (3) environmental pollution degree 2, (4) dry location. For more information, please refer to the product specifications.

Humidity: Do not expose the device to high humidity (>85% humidity)

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

When the temperature of the laser is too high, the device will trigger an alarm and stop emitting light.

To ensure a safe laser work area, the interaction between the laser and the work surface, which can create additional safety hazards due to the high temperatures that generate gases, sparks and debris. The corresponding operators need to go through certain assessment and training, and be familiar with and master the general safety regulations of laser operation.

Maxphotonics recommends that you take the following measures to prolong the service life of the handheld laser welding machine:

(1) Please ensure that the working area is properly ventilated and place the hand-held laser welding machine in a dry, cool and clean environment. Do not expose the hand-held laser welding machine to high temperature, high humidity, and water hazards.

(2) During the operation of the hand-held laser welding machine, ensure that there is no foreign matter blocking the air suction port at the bottom of the laser, and ensure that there is no debris within 1 meter that affects the smooth air intake; ensure that the top air outlet is 1M high.

(3) It is necessary to ensure that no debris (including liquid) on the top enters the laser, otherwise it will damage the laser and cause personal injury;

(4) Running the equipment at high temperature will accelerate aging, increase the current threshold, and reduce the sensitivity and conversion efficiency of the handheld laser welding machine. If the device overheats, please stop using it and seek help from Maxphotonics.

NOTICE :

◎ Please operate the equipment carefully to avoid accidental damage to the equipment.

◎ The filter at the bottom of the laser needs to remove dust and dirt from the air inlet from time to time.

7-More Safety Information

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

Laser Institute of America (LIA)

13501 Ingenuity Drive, Suite 128

Orlando, Florida 32826

Phone: 407 380 1553, Fax: 407 380 5588

Toll Free: 1 800 34 LASER

American National Standards Institute

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

(Available through LIA)

International Electro-technical Commission

IEC 60825-1, Edition 1.2

Center for Devices and Radiological Health

21 CFR 1040.10 - Performance Standards for Light-Emitting Products

US Department of Labor - OSHA

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

Laser Safety Equipment

Laurin Publishing

Laser safety equipment and Buyer's Guides

Chapter 3
Product Description

1-Features

The hand-held laser welding machine integrates the laser, the hand-held welding torch and the control system. Compared with the traditional hand-held welding equipment, it has the remarkable characteristics of simple configuration, high integration, small size, simple operation and high degree of intelligence.

Main Features:

(1) Highly integrated product

(2) Excellent artificial mechanics design work

(3) Continuously adjustable power, fast switching response

(4) High reliability and excellent beam quality

(5) High electro-optical conversion rate

Applications:

Widely used in hardware, building materials, kitchen utensils, aerospace, automobile and other industries.

2-Module Configuration

Maxphotonics provides many configurable modes, all modes will be explained in detail in this manual, please refer to Chapter 6 "Usage Guide".

3-Laser Model Designation Codes

Model	Model Coding Rules
X1-MFSC-1500W	Means Maxphotonics 1500W Handheld Laser Welding Machine

4-Certification

Maxphotonics guarantees that this product has been thoroughly tested and inspected before packaging and transport, and that it complies with the published standards and procedures. After you receive this product, please check the packaging for any signs of external damage, please check whether the equipment is damaged, and immediately notify the carrier and Maxphotonics after-sales personnel; when you take this product out of the box, you must Take extra care to ensure that the fiber optic cables are not cracked or damaged; please check the included packing list. Once the product is received, check all items against this checklist, and under no circumstances attempt to install or operate the laser equipment if any item is missing or the equipment has obvious or suspected damage.

5 - Front And Back Panel Description Of Laser Welding Machine

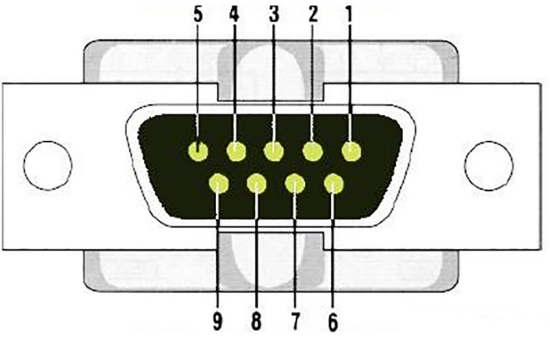
Front Panel Name	Function Description
ACTIVE/ALARM	Normal working status (green light)/abnormal alarm status indicator (red light) (standby, no laser output, red and green lights flash alternately)
Emergency stop switch	Emergency stop equipment work
LOOP	Safety Loop Line Interface
OUTPUT	Tip interface

Rear Panel Name	Function Description
ON/OFF	200-240VAC AC power switch
GAS_IN	Protective gas inlet port
POWER(1000X-1500X)(G5.0)	200-240VAC AC power input
RS232	Welding platform RS232 interface
FEEDER	Wire feeder interface

The external control port of this laser welding machine is RS232 interface (DB9), and the interface definition is as follows.

RS232 interface definition table

Pin#	Describe
1	N/A
2	RxD Serial data input
3	TxD Serial data output
4	N/A
5	GND
6~9	N/A



6-Operation Panel Description

This machine is equipped with a 7-inch industrial screen, which is connected to the host through the uart interface to realize equipment control and status monitoring functions.

There are a total of 5 operation pages, namely the main interface, the advanced setting page, the process parameter page, the machine information page and the manufacturer setting page.

(1) Main interface

The picture is the display page in normal working state, this page can realize machine switch control; common process parameter setting; working state information and alarm prompt function.

Functional Classification	Function Description	Remark
Action button	Work switch	It is located at the upper right of the screen. The orange button and the word standby are displayed by default when the machine is turned on, which means that it is in a standby state. In this state, the working button of the tip does not work. Click the button, it will be displayed in red + start words, the machine will enter the working state, and the button of operating the pipette tip can work normally
Setting item	Laser power	0~100% adjustable, 100% power setting is the nominal maximum power of the machine.
	Scanning frequency	Laser reciprocating scanning frequency, the maximum scanning frequency is 220Hz under full amplitude state, and the scanning frequency can be increased correspondingly under small amplitude.
	Sweep amplitude	0~4mm adjustable.
	Laser enabled	The working laser switch button is mainly used for adjusting the machine, and other parameters are adjusted when the laser is not in the state.
Numerical state	Air pressure	Indicates the current shielding gas pressure.
	Protective mirror temperature	Indicates the current tip guard temperature.
	Laser power	Indicates the current laser output power.
Enable state	Laser	Green: Laser firing, Gray: Standby
	Red light	Green: red light is emitting, gray: standby
	Blow air	Green: shielding gas output, gray: standby
	Wire feed	Green: wire feeding, gray: standby
	Gun tip communication	Green: Communication, Gray: Standby
	Security lock	Green: safety lock closed state, gray: safety lock open state
	Gun head switch	Green: the tip switch is pressed, gray: the tip switch is not pressed
	Proximity sensing	Green: Handheld tip detected, Grey: Handheld tip not detected

Alarm information	Laser	The laser generator works abnormally, please contact the after-sales service.
	Communication	The communication between the laser and the hand-held welding torch is abnormal, please check whether the connection is abnormal, and contact the after-sales service after confirming that it is correct.
	Galvo	If the galvanometer works abnormally, please contact the after-sales service.
	Wire feed	If the wire feeding is abnormal, please check the power supply of the wire feeder, whether the welding wire is short of wire or contact the after-sales service. (Only support the abnormal alarm of the built-in wire feeder)
	Protective gas	If the pressure of the protective gas is abnormal, please check whether the protective gas is turned on and whether the gas cylinder is short of gas, and contact the after-sales service after confirming that it is correct.
	Protective mirror temperature	The temperature of the protective mirror is abnormal, please check 1. Whether the protective gas is turned on, whether the pressure is normal, 2. Whether the protective mirror is dirty; 3. After confirming that it is correct, contact the after-sales service.

(2) Advanced settings interface

This page is used to adjust other working parameters, including mode, enable, and process, which are explained as follows.

Functional Classification	Function Description	Remark
Mode adjustment	light mode	There are three types of light output modes: continuous, burst, and pulse. Continuous: Continuously output the laser at the set power; Shooting: output the laser once according to the set shooting time; Pulse: Continuously output pulse laser according to the set duty cycle;
	way to control	Control method: welding
	valve mode	There are two types of air valve modes: normally open and synchronous. Always open mode: keep blowing. Synchronous mode: The shielding gas and the laser are turned on at the same time, and the gas is turned off within a certain time after the laser is turned off according to the setting of the gas-off delay.
Enable	Wire feed enable	In the ON state, the wire feeding is synchronized with the laser, and in the OFF mode, no wire is fed.
	Aspirated enable	In the ON state, the air supply is synchronized with the laser, and in the OFF mode, there is no air supply.

Process parameters	Laser frequency	Sets the laser output frequency in discontinuous mode.
	duty cycle	Sets the laser output duty cycle in pulse/burst mode.
	Shot duration	Set the burst duration in burst mode.
	Ramp up time	Sets the laser ramp-up time in pulsed mode.
	Blow delay	Sets the lead time for gassing before the laser is fired.
	Air off delay	Sets the delay time for shutting off the gas after the laser is turned off.
	Light off delay	Sets the delay time from stopping wire feeding to turning off the laser for cutting the wire.
	wire feed speed	Set the wire feeding speed (this function only works on the built-in wire feeding head)

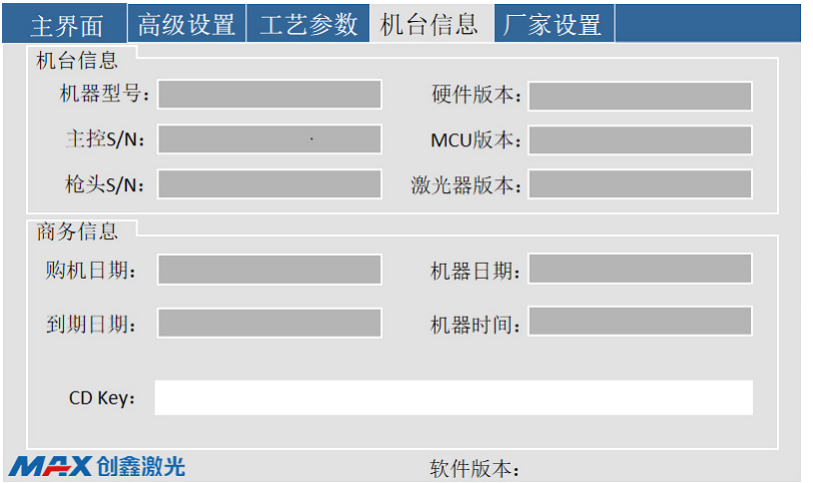
(3) Process parameter interface

This page can preset 32 groups of fixed process parameters. To adapt to different welding needs.

Functional Classification	Function Description	Remark
Process parameters	configure	Apply the parameters of the page to the main interface, that is, call the current parameters
craft mode	serial number button	Groups 1 to 8, after a group is selected, the button will be displayed in dark color, and the previously set process parameters will be loaded into the edit box on the right. After modifying the parameters on the right, click the save button, and the process data will be saved in the currently selected group. Click the configuration button, the process parameters will be loaded into the main interface as the current parameters and executed
	page up and down	The laser presets 8 groups of welding process parameters, and the capacity of the remaining 24 groups can be increased and modified by the user. to suit customer application scenarios.

(4) Machine information interface

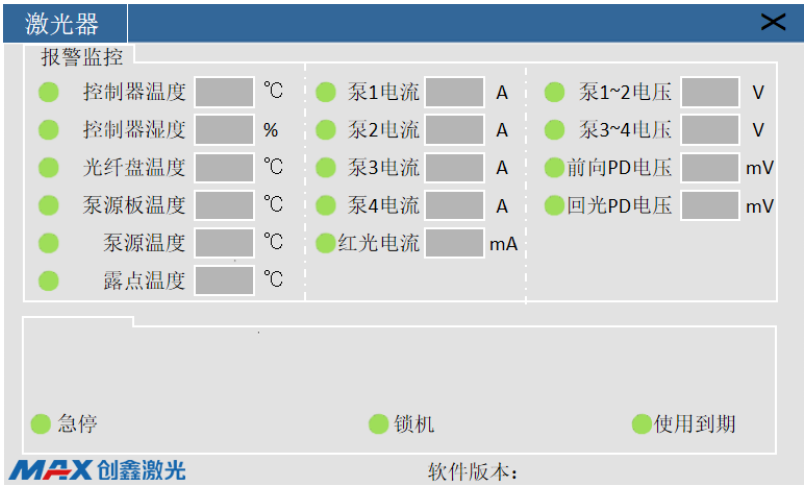
This page displays machine information, which is used for product repair report analysis. Enter the authorization code to unlock the working validity period of the machine.



Functional Classification	Function Description	Remark
Machine information	Machine type	Machine type
	Hardware version	Machine hardware version number
	MCU version	Machine firmware version number
	Tip S/N	Serial number of the tip (unique number for each tip)
	Master S/N	Machine serial number (unique number for each host)
	Laser version	Machine version number
Business information	Purchase date	Machine factory date
	Machine date	The current date of the machine's built-in clock
	Machine time	Machine built-in always current time
	Date of Expiry	Expiration lock warning time
	CD Key	Enter an authorization code from the business to extend the expiration date.

(5) Laser alarm monitoring interface

This page is used to monitor the working status and alarm information of the laser, and is entered from the "Laser" button on the main interface.



Functional Classification	Function Description	Remark
Laser usage alarm	Emergency stop monitoring	The laser emergency stop alarm, please check whether the emergency stop switch is pressed, and contact the after-sales service after confirming that it is correct.
	Lock machine monitoring	Laser lock alarm, please do not weld high-reflection plates, and try again after restoring to factory settings.
	Use expiration monitoring	The laser usage expires alarm, please check whether the machine has expired, and after confirming it is correct, contact the after-sale service to obtain an authorization code to extend the usage time.
Temperature and humidity alarm	Optical Module Temperature Monitoring	Alarm when the temperature exceeds the threshold, please check whether the air outlet is blocked and whether the filter is dirty, and clean the air outlet and filter in time; do not work for a long time in a place with high ambient temperature; check whether all fans are running normally, if there is any abnormality, please contact After-sales processing.
	Optical Module Humidity Monitoring	
	Electric cold plate temperature monitoring	
	Light cold plate temperature monitoring	
	Pump source temperature monitoring	
Current alarm	Pump 1 current monitoring	If the current exceeds the threshold, please try again after restoring the factory settings. If the fault still exists, please contact the after-sales service.
	Pump 2 current monitoring	
	Pump 3 current monitoring	
	Pump 4 current monitoring	
	Red photocurrent monitoring	

Voltage alarm	Pump 1~2 Voltage Monitoring	The voltage exceeds the threshold alarm, please restore the factory settings and try again. If the fault still exists, please contact the after-sales service.
	Pump 3~4 voltage monitoring	
	Forward PD Voltage Monitoring	
	Back light PD voltage monitoring	

7-Solder Head Instructions

1. Proximity sensor
2. Laser trigger button
3. Copper mouth
4. Extension tube
5. Protective mirror
6. Status indicator

The indicator light on the welding head can show different working states. When the communication between the welding head and the laser is successful and the working state of the equipment is normal, the indicator light will light up in white; when the safety lock and the copper nozzle are in contact with the material to be welded at the same time, the safety lock guide When the welding head or laser is abnormal, the indicator light is on red.

NOTICE :

◎ The welding head is the contact part of the welding operation. When using, the copper nozzle of the welding gun and the workpiece must be in direct contact with the workpiece to form a loop before using the safety detection. It is recommended that the surface of the welding workpiece is smooth to reduce wear and tear.

Welding head indicator light description:

Indicator Color	Illustrate
White	Standby Mode
Green	Laser Light
Red	Fault State

Chapter 4
Specification

1 -Optics Characteristic Parameters

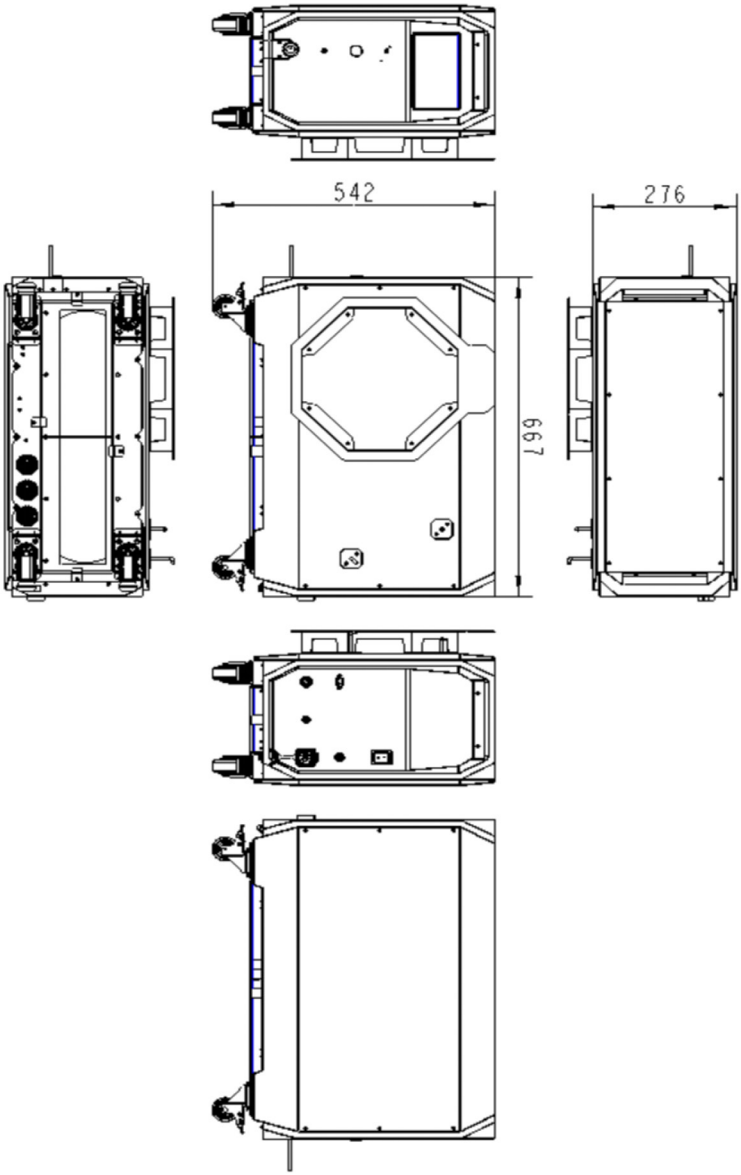
No.	Characteristics	Test conditions	Min.	Nom.	Max.	Unit
1	Operation mode	CW/Modulated				
2	Polarization	Random				
3	Output Power MFSC-1500W (G5.0)	100% CW	1450	1500	1550	W
4	Tuning range of output power		10		100	%
5	Emission wavelength	100% CW	1070	1080	1090	nm
6	Spectrum width(3dB)	100% CW		3	5	nm
7	Short-term power instability	100% CW>1h		±1	±1.5	%
8	Long-term power instability	100% CW>24h		±2	±3	%
9	Beam quality BPP	50um-QCS output		1.2	1.5	mmxmrad
10	Laser switching ON time	10%→90%Output		50	100	μs
11	Laser switching OFF time	90%→10%Output		50	100	μs
12	Modulation frequency	100%Output			10	KHz
13	Red guide laser power	100%Output	400			μW
14	Feeding fiber cable length MFSC-1500W(G5.0)		5.6			m
15	Feeding fiber core size		50			μm
16	Feeding fiber cable bending radius		175			mm
17	Output form	QCS integrated with the tip				
18	Continuous light output time (S)	Light out 60S, stop light 6S				

2 -General Characteristic Parameters

No.	Characteristics	Test conditions	Min.	Nom.	Max.	Unit
1	Operating Voltage MFSC-1500W(G5.0)		200	220	240	VAC
2	Input Power MFSC-1500W(G5.0)	100% Output			6.0	KW
3	Operating Ambient Temperature		10		40	℃
4	Operating Ambient Relative Humidity		10		85	%
5	Laser cooling method	Phase change heat dissipation				
6	Cooling method of tip	Inert gas cooling				
7	Storage Temperature		-10		60	℃
8	Dimensions	667*276*542				mm
9	Weight	39				kg

3-Structural Layout

Laser Three Views.（Unit：mm）



Chapter 5
Disassembly Guide

1-Disassembly Step

If the packaging shows any signs of external damage, inspect the unit for damage and notify the shipping agent immediately. When you take the unit out of the box, take extra care to ensure that the fibers are not broken or damaged.

A comprehensive packing list is included with the system documentation. After receiving the product, please check all items against this list, if any item is missing or the unit is obviously damaged, please contact Maxphotonics immediately. Do not attempt to install or operate a laser unit under any circumstances if the unit is visibly damaged or suspected of being damaged.

Lasers are precision valuables. Maxphotonics recommends that you follow the steps below to disassemble and pack the boxes:

(1) Place the equipment of this product on a flat floor according to the packaging box logo.

(2) Step by step according to the logo of the top cover packing box, and remove the top foam shielding plate after dismantling.

(3) The laser has an optical fiber cable connected to the gun head, please take it out carefully to ensure that the bending radius of the optical fiber armored cable is >175mm.

(4) Remove the foam shield and take out the supporting items.

(5) Please check the accessories against the "Packing List".

(6) Please keep all unpacked items properly in case of future transportation or storage needs.

Lift the box upright →

Take out the welding head and accessories →

Disassembly Process

CAUTION:

◎ If any damage of the external package and internal parts has been found upon receipt of product, please contact Maxphotonics Co., Ltd. or designated agent immediately.

2-Packing List

No.	Names of fittings	Description	Unit	Quantity
1	Handheld Laser	X1-MFSC-1500W	Pc	1
2	Welding Gun	Welding torch	Pc	1
3	Power Cable	10 meters	Pc	1
4	Ground Wire	10 meters	Pc	1
5	Eye Protection	Support 0D6+	Pc	3
6	Gun Head Rack	Including hexagon socket head countersunk head screws (4pcs)	Pc	1
7	Armored Cable Rack	Including hexagon socket countersunk head screws (8pcs)	Pc	1
8	Gun Nozzle	Copper nozzles 1, 3, A, B and flat nozzles	Pc	5
9	Protective Lens	φ20*3	Pc	5
10	Lock Ring Wrench	/	Pc	1
11	Filament Nozzle Assembly	0.8/1.0/1.2/1.6mm wire feed nozzle and wire frame	Pc	1
12	Tip Holder	Disassembly and assembly of collimating focusing lens	Pc	1
13	Cotton Swab 1	25 sticks	Pc	1
14	Cotton Swab 2	25 sticks	Pc	1
15	Wire Feeder (individually Packaged)	Including wire feeding tube and wire feeding wheel	Pc	1
16	Soundproof Earplugs	3M brand	Pc	5
17	Dust Mask	Advanced dustproof	Pc	2
18	Screwdriver	Inner hexagon	Pc	1

Chapter 6
Operation Guide

1 - Notice

Caution:

◎ Please refer to Chapter 4 "Detailed Specifications" to select a suitable power supply.

◎ Please refer to Chapter 2 "Safety Information" to check whether the peripheral working environment of the laser meets the requirements.

◎ Please wear the delivered soundproof earplugs before laser welding.

2 - Electrical Power Connection

A power input cord of the laser shall be connected to single-phase AC current. Please make sure the grounding cord is perfectly connected, or the laser may be damaged potentially.

For ensuring the safety feature, Maxphotonics recommends you connect a 32A circuit breaker (air switch) in series between the power supply unit and the laser. This electric power shall be in close proximity to the power supply unit of the equipment and can be easily disconnected.

Refer to Section "Detail Specification Table" to determine your electrical specification if you have any problem about wiring.

3- Securely Lock The Connection

Before turning on the laser, the safety lock must be connected to the loop interface of the laser. When preparing the laser, the other end of the safety lock (crocodile clip) needs to be clamped on the workpiece to ensure that the alligator clip and the welding head form a loop before the laser can be output. laser.

4- Gas Connection

The welding head is cooled by inert gas, and it is necessary to ensure the welding purity and welding pressure. Generally, nitrogen and argon are used as shielding gas. The purity of shielding gas must meet 99.99%, and the inlet air pressure must be greater than 80kpa.

Connect the 6mm trachea to the Gasin port to ensure that the gas flow is greater than or equal to 15L/min. The gas valve control mode on the software interface can be selected to be normally open to adjust the protective gas pressure.

Device Connection Diagram

5-Wire Feeder Connection

For the convenience of users, the device integrates the wire feeder power cable and signal cable into a 5PIN aerial plug, which can be directly connected to the laser FEEDER port.

1.Operation panel introduction

Wire Feeder Appearance

(1) Description of buttons and indicator lights

"Setting" key: function cycle switch key, you can switch the indicator light display in a circular way, switch the indicator light to the specified position, the group of data is in the state of adjustable parameters, at this time, you can use the "+" "-" keys to change the parameters .

"Run" key: Press this key after parameter change to confirm that the setting is completed.

"Manual wire feed" key: Press to feed welding wire continuously and quickly, release it to stop wire feeding.

"Manual retraction" key: Press to retract the welding wire continuously and rapidly, release it to stop retracting the welding wire.

"Simulation Run" key: Press the button to continuously feed the wire according to the set parameters, and release it to withdraw and stop according to the set parameters, that is, to simulate the wire feeding withdrawal state during welding under this parameter setting.

"Wire feeding speed" indicator light: It will light up after the setting switch is selected. When this light is always on, the wire feeding speed can be adjusted by the "+" and "-" keys.

"Wire feeding delay" indicator light: It will light up after the setting switch is selected. When this light is always on, you can adjust the wire feeding delay by pressing the "+" and "-" keys.

"Fixing distance" indicator light: It will light up after the setting switch is selected. When this light is always on, you can adjust the distance of the supplementary wire by pressing the "+" and "-" keys.

"Retraction distance" indicator light: When the setting switch is selected, it lights up. When this indicator is always on, the retraction distance can be adjusted by the "+" and "-" keys.

"Running" indicator light: In normal operation state, the running indicator light flashes, and it is always on when the parameters are set.

"Setting" indicator: in the state of setting parameters, the running indicator flashes.

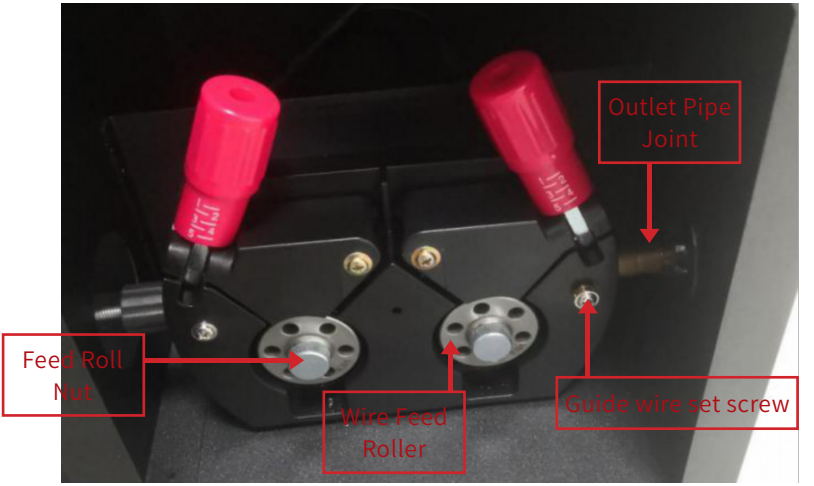
"Three-digit digital tube" display screen: switch the button selection according to the setting, display each function parameter, and display the wire feeding speed fixed in the working state.

(2) Operating environment and parameters

The Main Technical Parameters	
Model	DM-BWT16
Voltage	DC24V
Phase	Simplex
Motor	DC permanent magnet
Rotating speed	1200rpm (optional)
Wire size	0.8/1.0/1.2/1.6mm
Wire feed speed	0.1-18M/min (optional)
Dimensions	440*250*580MM
Weight	15kg

2.Wire feeder assembly

The internal structure of the wire feeder includes wire feed tube, adjustable pre-tightening pressure rod, wire outlet tube joint, wire feed wheel nut, wire feed wheel, etc.



Internal Structure Of Wire Feeder

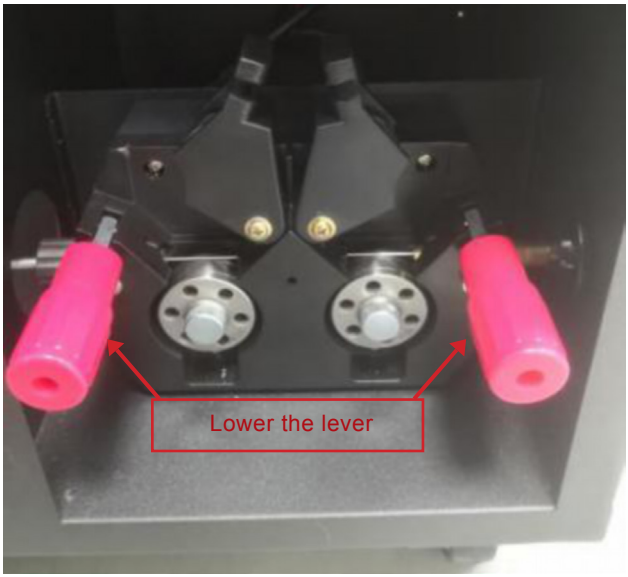
Step 1: Select the appropriate wire feed roller according to the diameter of the welding wire

1. Loosen the two adjustable preload pressure rods

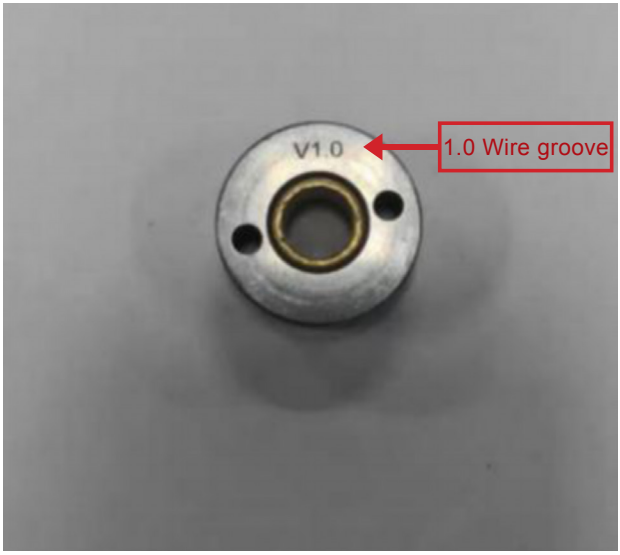
2. Unscrew the wire feed wheel nut and remove the wire feed wheel

3. Replace the appropriate wire feed wheel, turn the side of the wire feed slot of the corresponding specification and model inward, and then screw

Tighten the nut.

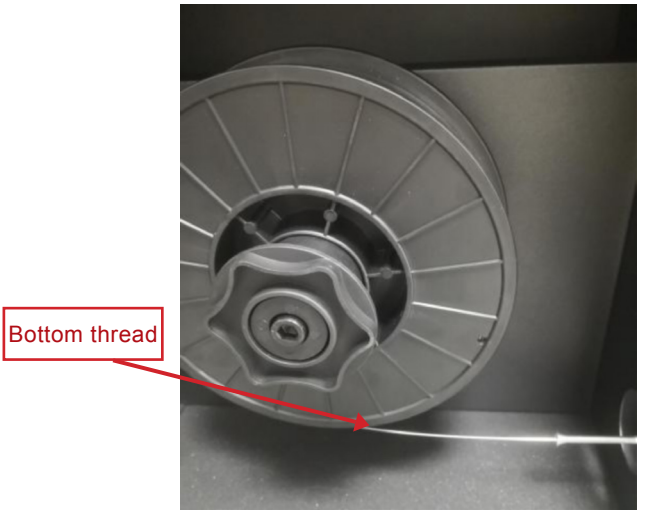


Release lever



Feed Roller Model

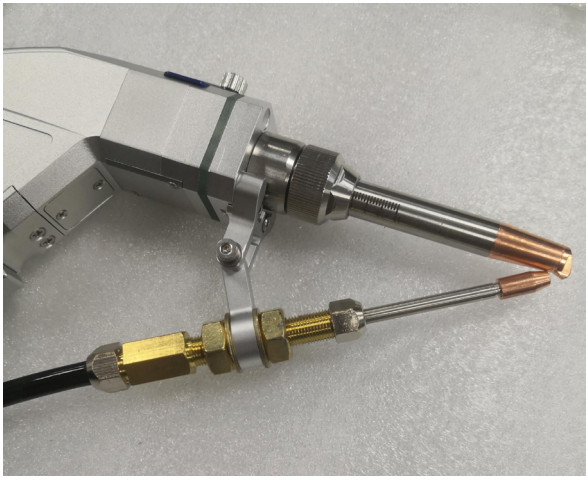
Step 2: Install the appropriate wire reel, pay attention to the installation direction of the wire reel, the welding wire needs to pass through the bottom of the wire reel, insert the hole of the wire reel into the pin on the wire feeder, and pass the welding wire through the wire feed wheel, as the picture shows.



Wire assembly

The third step: adjust the pressure of the pressure rod, so that the welding wire can be sent out smoothly, and the welding wire is sent to the wire nozzle position in manual mode.

6-Wire Feeder And Hand Welding Connection



Overall Assembly Drawing

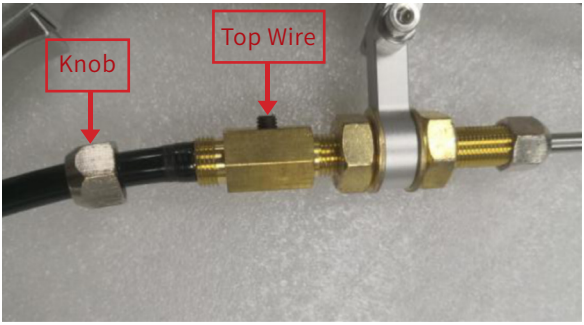
Fixed wire feed tube

Loosen the wire feeder feed knob

1. Loosen the wire feeder knob;

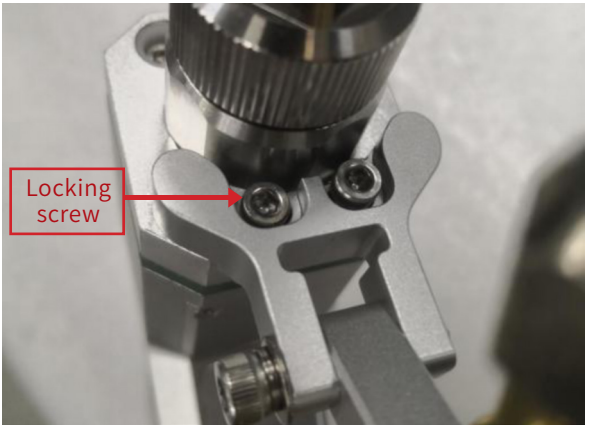
2. Loosen the top wire of the wire feeder;

3. Pass the wire guide tube through the knob and fix it, and lock the top wire at the same time.



Wire feed tube assembly

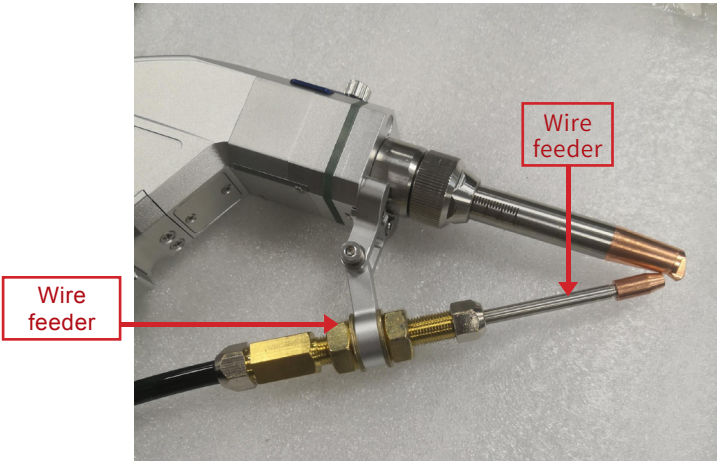
Fixed wire feeder



Wire feeder assembly

Adjust the wire feed frame position

First determine the welding focus, then adjust the wire feeding movable frame to the middle part, and finally adjust the length of the wire feeding tube so that the wire feeding nozzle is close to the welding copper nozzle.



Adjust the wire feed frame position

Choose the right wire feeder and welding tip

Wire feed nozzle 0.8-1.6mm

Welding copper nozzle

Wire feeding speed adjustment: turn on the wire feeding switch on the touch screen, turn off the laser enable, press and hold the hand-held welding head switch, adjust the wire feeding speed at low speed (about 10mm/s), and turn left and right according to the tightness of the wire feeding The two adjustable preload pressure rods turn the sleeve until the wire reel rotates at a constant speed (make sure that the wire feeding tube is smooth and cannot be bent).

7-Startup Steps

WARN:

◎ Make sure that all electrical connections (including protective gas, plugging in the ground wire) have been connected before use. If conditions permit, all connectors must be tightened and fixed with screws.

◎ When operating the laser, do not look directly at the laser output port, and strictly wear safety glasses and soundproof earplugs.

◎ When wiring, please turn off all the power switches of the laser first.

The startup process is as follows:

(1) Connect the power input to the indicated voltage, phase and frequency;

(2) The connection is securely locked to the loop interface, and the wire feeding power cord is connected to the FEEDER interface;

(3) Connect the protective gas tube (6mm) to the gas in port, and open the gas valve;

(4) Turn on the power switch on the rear panel of the laser;

(5) Release the emergency stop switch on the front panel of the laser;

(6) Click on the touch screen to enter the software interface, and adjust the corresponding parameters (laser power, swing amplitude, swing frequency,

parameters such as air blowing and closing air delay, power rising and falling slowly, light output mode, etc.);

(7) Adjust the air valve mode to normally open, and adjust the protective gas flow rate ≥ 15L/min;

(8) Clamp the alligator clip on the workpiece to be welded;

(9) Turn on the laser start button and the laser enable switch;

(10) Touch your hand to the position of the infrared sensor switch at the handle of the gun head, and then press and hold the gun head switch.

8-Welding Process Parameters

Handheld laser welding process parameter table								
Material type	Welding form	Thickness (mm)	Laser power percentage (%)	Swing range (mm)	Swing frequency (hz)	Defocus amount (mm)	Air flow volume (L/min)	welding Effect
Carbon Steel (Q235B)	Stitch welding	1	30	2-3	60~80	-1~1	15~20	Penetration
	Stitch welding	2	60	2-3	60~80	-1~1	15~20	Penetration
	Stitch welding	3	85	2-3	60~80	-1~1	15~20	Penetration
	Stitch welding	4	100	2-3	60~80	-1~1	15~20	Penetration
Stainless steel (SUS304)	Stitch welding	1	30	2-3	60~80	-1~1	15~20	Penetration
	Stitch welding	2	60	2-3	60~80	-1~1	15~20	Penetration
	Stitch welding	3	85	2-3	60~80	-1~1	15~20	Penetration
	Stitch welding	4	100	2-3	60~80	-1~1	15~20	Penetration
Brass	Stitch welding	1	50	2-3	50~70	-1~1	15~20	Penetration
	Stitch welding	2	75	2-3	50~70	-1~1	15~20	Penetration
	Stitch welding	3	100	2-3	50~70	-1~1	15~20	Penetration
Galvanized sheet	Stitch welding	1	40	2-3	60~80	-1~1	15~20	Penetration
	Stitch welding	2	80	2-3	60~80	-1~1	15~20	Penetration
	Stitch welding	3	100	2-3	60~80	-1~1	15~20	Penetration
Aluminum alloy (Al6061)	Stitch welding	1	55	2-3	50~70	-1~1	15~20	Penetration
	Stitch welding	2	80	2-3	50~70	-3~-1	15~20	Penetration
	Stitch welding	3	100	2-3	50~70	-3~-1	15~20	Penetration

Remark	1. The welding form is splicing welding, the welding head ratio is 50:150, and the core diameter of the 1500W laser fiber is 50 microns 2. Welding shielding gas: nitrogen (purity 99.99%) 3. Power percentage (1500w) 10-100%, swing amplitude 0-4mm (recommended 2-3mm), swing frequency 0-220hz (recommended manual welding frequency 40-80hz, air flow not less than 15l/min), other parameters are not In the case of change, the swing amplitude or welding speed increases, and the laser power also needs to be increased accordingly 4. Welding speed=welding length/welding time 5. Due to the difference in welding process (air pressure, manual speed, defocusing degree, welding angle) of different customers, this data is for reference only.

NOTICE:

◎ Stack welding, fillet welding, lap welding, etc. can refer to the above process parameters.

Handheld laser welding process parameter table - wire feeding

Material	Material thickness	wire feed speed	Laser power percentage	Scanning width	Scanning frequency	Defocus amount	Air flow volume	Welding consumables	Wire diameter	Welding effect
	mm	mm/s	%	mm	HZ	mm	L/min	/	mm	Penetration
Stainless steel (SUS304)	1	7~15	40	2.5-3.5	40~70	-1~1	15~20	Stainless steel	1.0	Penetration
	2	7~15	70	2.5-3.5	40~70	-1~1	15~20	Stainless steel	1.2	Penetration
	3	7~15	90	2.5-3.5	40~70	-1~1	15~20	Stainless steel	1.0	Penetration
	4	7~10	100	2.5-3.5	40-70	-3~-1	15~20	Stainless steel	1.0	Penetration
Carbon Steel (Q235B)	1	7~15	40	2.5-3.5	40~70	-1~1	15~20	Stainless steel	1.0	Penetration
	2	7~15	70	2.5-3.5	40~70	-1~1	15~20	Stainless steel	1.2	Penetration
	3	7~15	90	2.5-3.5	40~70	-1~1	15~20	Stainless steel	1.0	Penetration
	4	7~10	100	2.5-3.5	40~70	-3~-1	15~20	Stainless steel	1.0	Penetration
Galvanized sheet	1	7~15	45	2.5-3.5	40~70	-1~1	15~20	Stainless steel	1.0	Penetration
	2	7~15	75	2.5-3.5	40~70	-1~1	15~20	Stainless steel	1.2	Penetration
	3	7~15	100	2.5-3.5	40~70	-1~1	15~20	Stainless steel	1.0	Penetration
Aluminum (Al6061)	1	12~20	65	2.5-3.5	40~70	-3~-1	15~20	Aluminum alloy	1.0	Penetration
	2	12~20	85	2.5-3.5	40~70	-3~-1	15~20	Aluminum alloy	1.2	Penetration
	3	12~20	100	2.5-3.5	40~70	-3~-1	15~20	Aluminum alloy	1.2	Penetration

Remark	1. The welding form is splicing welding, the welding head ratio is 50:150, and the core diameter of the 1500W laser fiber is 50 microns 2. Welding shielding gas: nitrogen (purity 99.99%) 3. Power percentage (1500w) 10-100%, swing amplitude 0-4mm (recommended 2-3.5mm), swing frequency 0-220hz (recommended manual welding frequency 40-70hz, airflow not less than 15l/min), other parameters Under the same condition, if the swing amplitude or wire feeding speed increases, the laser power also needs to increase accordingly 4. The wire feeding machine needs to adjust the wire feeding speed. By adjusting the pressure of the wire feeding wheel, in the automatic mode, the wire feeding speed is uniform, the wire feeding is smooth, and there is no jamming phenomenon. 5. Due to the differences in various equipment configurations (wire feeder differences) and welding methods (wire feeding speed, air pressure, defocusing degree, welding angle) adopted by different customers, this data is for reference only.

NOTICE:

◎ Stack welding, fillet welding, lap welding, etc. can refer to the above process parameters.

9-Product Accessory Inspection And Cleaning Guide

1.Product accessories inspection

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

(1) Powder-free rubber gloves or finger cots

(2) Lint-free fiber cleaning cloth and cotton swab

(3) Absolute ethanol, namely alcohol (optical grade, purity >99.5%)

(4) Light source (torch or mobile phone indicator)

(5) Masking tape

(6) Microscope

NOTICE:

◎ Before using this product, please check the cleaning status and damage degree of the protective lens. Using a dusty or damaged protective lens will damage the welding torch head (focusing lens, extension tube, etc.) and affect the welding effect.

◎ Unauthorized disassembly of the gun head and laser products will no longer enjoy the warranty rights of Maxphotonics.

◎ Please wear powder-free gloves or finger cots to clean the product in a dust-free environment. Maxphotonics will not warrant damage to the tip due to improper operation or use of incorrect cleaning procedures.

◎ When cleaning, the concentration of absolute ethanol should be greater than 99.5%.

2.Steps

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

(1) Turn off the laser switch and cut off the power supply;

(2) Rotate the locking screw on the protective mirror housing from the gun head and pull out to protect the mirror holder (at this time, the protective mirror drawer is sealed with clean masking tape to prevent dust from entering), and then use

an optical cleaning cloth dipped in alcohol , and wipe the entire protective mirror window surface;

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

(4) Adjust the focal length of the microscope with the right hand, so that the surface of the protective lens can be clearly imaged under the microscope;

(5) Carefully observe the surface of the protective lens, if dust or tiny particles are found, use a cotton swab to clean it.

Proceed as follows:

① Dip a cotton swab with a sufficient amount of alcohol to shake off excess alcohol;

② Through the microscope, put the cotton swab on the dust place to protect the lens;

③ Gently wipe the dust with a cotton swab, move it to the edge of the protective lens, and replace the cotton swab in time after use;

④ After wiping all the dirt, put it under the microscope for the final confirmation.

(6) Put the wiped protective lens into the protective lens holder;

(7) Insert the protective lens holder into the lens cavity seat of the gun head and fasten the locking screw on the lens holder shell to prevent the protective lens holder from loosening and affecting the use.

IMPORTANT:

◎ Do not reuse lint-free cotton cloth or cotton swab.

◎ Do not touch the protective lens of the welding torch head with your fingers.

◎ Do not blow the dirt on the lens surface directly with your mouth, which may bring new dirt.

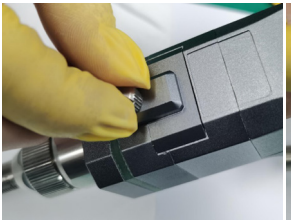
◎ Do not touch the tip of the cleaning swab with your fingers.

◎ Please do not forget to clean when you replace the protective cover and sleeve.

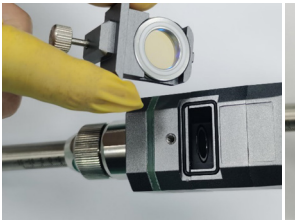
◎ When using compressed air, do not blow the dirt directly from the front, but

use the side blowing method to avoid the dirt from sneaking into the surface.

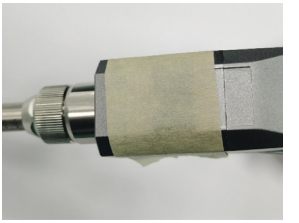
◎ If the protective lens holder cannot be put back on the optical components immediately, please seal the lens cavity shell with textured paper.



1.Loosen the locking screw of the protective lens holder shell



2.Take out the protective lens holder



3.Masking paper package to protect the lens seat cavity

4. Gently wipe the front of the lens with a clean cotton swab or clean cloth dipped in alcohol

5. Take out the protective mirror holder and wipe the other side of the protective mirror

6. Put the protective mirror into the protective mirror holder, push it into the protective mirror holder cavity, and tighten the screws

Chapter 7
Service and Maintenance

1-Maintenance Notes

CAUTION :

◎ No operator serviceable parts inside. Refer all servicing to qualified Maxphotonics personnel.

◎ For ensuring that the repairs or replacement within the warranty scope can be carried out, and perfectly maintaining your interests, please submit application to the Maxphotonics or the local representative after finding the faults. Upon receiving our authorization, you need to pack the product in a suitable package and return it.

◎ You should keep the proof when finding any damage after receiving the product, so as to claim the rights to shippers.

IMPORTANT :

◎ Do not send any product to Maxphotonics without RMA.

◎ If the product is beyond the warranty period or the warranty scope, customers shall be responsible for the repairing cost.

CHANGE :

◎ We have the rights to change any design or structure of our product, and the information is subject to change without notice.

2-Service Statements

More problems regarding the safety, set-up, operation or maintenance please reading this "User Guide" carefully and flowing the operation steps stictly. Please call the Customer Service Department for other questions.

Please call the Customer Service Department for other questions: 400-900-9588.

Your problems will be follow-up by our technical support group after verified. If the problems cannot be solved , you may need to return the product to Maxphotonics for further troubleshooting.

Chapter 8
Warranty Statements

1-General Items

Maxphotonics Co.,Ltd. carries out warranty for any defect of the product caused by its material and production technology within the warranty period agreed in contract, and ensures that its product meet the relevant quality and specification requirements specified in the document under normal use condition.

Maxphotonics Co.,Ltd. rationally determines to repair or replace the products with faults caused by its material or production technology within the warranty period, and repairs or replacement of all the products within the warranty scope are carried out according to the rest of the warranty period of primary products.

2-Warranty Limitations

Under the following circumstances, the products, parts (including the fiber connectors) or equipment are not within the warranty scope:

（1）Tampered, opened, detached or reconstructed by personnel outside Maxphotonics;

（2）Damaged from misuse, neglect or accident;

（3）Used beyond the specification and technical requirements of the product;

（4）Indirectly damaged from users' software or interfaces;

（5）Improper installation or maintenance, or operating under conditions not

included in this manual;

（6）The fittings and the fiber connectors are not included in the warranty scope.

Customers are obligated to understand the information above and operate according to the User Guide and specification, or the faults arising therefrom are not included in the warranty scope.

IMPORTANT :

◎ Within the warranty scope, purchasers must feedback within 31 days after finding the product defect.

◎ Maxphotonics does not grant any Third Party rights to repair or replace the parts, the equipment or other Maxphotonics products.