Dynalasers
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User Manual

Shenzhen Dynalasers Technology Co., Ltd.

Introduction

Welcome to use the handheld laser welding products developed and produced by Shenzhen Dynalasers Technology Co., Ltd We have organized personnel to compile this document in order to facilitate the better use and maintenance of your laser equipment. If you have any comments and suggestions during use, please feel free to give us your advice to help us continuously revise and improve. Thank you again for using Dynalasers' products!

Before using this product, please carefully read the User Manual for Handheld Laser Welding Machine provided by Dynalasers to familiarize yourself with the operation and maintenance of this equipment. We strongly recommend that operators read Chapter 2 Safety Information of this manual before operating the equipment.

This Manual will be provided with the machine to provide important operation, safety and other information for our existing or potential customers.

Please be sure to read the User Manual carefully to prevent unnecessary risks.

Disclaimers

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Company Profile

Shenzhen Dynalasers Technology Co., Ltd is located in Shenzhen City, focusing on the research and development, production and sales of laser intelligent equipment, lasers and related core components, intelligent automation equipment, computer software, hardware and control systems, and artificial intelligent robots. Based on the matching technologies of electronics, mechanics, optics and control systems, the company provides complete solutions according to the needs of the market and customers, involving IT manufacturing, new energy product manufacturing, instrumentation, computer manufacturing, mobile communications, home appliances & kitchen appliances, auto parts, precision equipment, building materials, hardware tools, urban lighting, food and medical industries, etc.

Dynalasers adheres to the people-oriented principle and takes the advantages of technological innovation. It introduces industry elites from home and abroad, invests a lot of money in the field of research and development, and has won many industry technology patents. The company has independent R&D, design, quality, operation and sales teams. The R&D team has a working background in cross-industry and large enterprises such as consumer and industrial industries. The quality management team and operation management team are from well-known companies.

Dynalasers is committed to providing customers with stable, reliable and high-quality products and equipment, perfect customer service, and creating greater value for global customers!

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Chapter 1 Feature Description

The M series, developed by Dynalasers Technology Co., Ltd., is a high-power laser series featuring high efficiency, high reliability, and maintenance-free operation. Utilizing phase-change heat dissipation technology, it operates within a wavelength range of 1070nm to 1090nm with a laser efficiency exceeding 30%.

The Dynalasers M-series lasers are Class 4 laser products, with safety considerations fully integrated into both their design and testing processes.

Laser has unique characteristics and may cause some safety hazards, so it cannot be treated as other light sources. All personnel operating or near the laser must be aware of these special hazards.

Dynalasers advises: Please strictly follow all warnings and safety instructions in this manual to ensure safe operation and optimal performance. During operation, maintenance, or servicing, do not disassemble the equipment without authorization to protect the operator.

Chapter 2 Safety Information

1-Safety Regulations

1. Safety Label Name and Description

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

safety signs	name	description
	Electrical Hazard	Notes: Text with electrical warning symbols indicates potential personal hazards. Failure to follow the specified procedures may cause injury or death to you or others.
	Warn	Notes: Text with a warning symbol indicates a potential product hazard. It requires an operating procedure, and failure to follow it properly may result in damage or destruction of the product or components.
	Harm of Laser Radiation	Notes: Text with a laser radiation warning symbol indicates a potential personal hazard.

2 - Laser Protection

1. Requirements of Laser Safety Goggles

When operating this device, please wear safety goggles. Choosing appropriate laser safety goggles requires the end user to accurately identify the wavelength range emitted by the product. If the device is a tunable laser or Raman product, it will emit laser in a certain wavelength range. The end user should confirm that the laser safety goggles used can prevent the laser emitted by the device over its entire wavelength range. Please check the safety label on the product and verify that personal protective equipment (goggles) is sufficient for the output power and wavelength range.

2. Requirements of Laser Operating Area

The welding operation environment of the user must have a safety zone, and the safety zone must have a protective safety door or similar device. The safety door or similar device needs to be connected to the 7th and 20th pins of the external control **I0 port** of the laser host to form a safety linkage; When the safety door or similar device is triggered, the laser host cannot emit light. (Please refer to the external control//0 interface definition table on 19th page for details)

3 - Reference Standards

Electromagnetic compatibility immunity:

ENIEC 61000 - 6 - 4:2019

EN IEC 61000 - 6 - 2:2019

Electrical safety:

ISO 12100:2010

ISO 11553 - 2017

EN 60204 - 1:2018
Laser safety:
EN 60825 - 1:2014+A11:2021 CDRH 21 CFR 1040.10
Power supply safety:
EN 62368 - 1:2014+A11:2017

Please be aware:
◎ According to EU and national standards and requirements, lasers must be classified according to their output power and laser wavelength. All high-power D series laser products are Class 4 products (according to EN 60825-1)

4-Characteristics of Clean Safety

1. Optical Safety

Warning:

◎ Provide a housing for the laser beam.

◎ When the laser is powered, it is forbidden to look at the output port.

◎ Avoid positioning the laser and all optical components at eye level.

◎ Avoid using the laser in a dark environment.

Warning:

◎ The laser output is delivered through a window. First make sure the window is clean, any dirt at the end of the head assembly risks burning the window and damaging the machine. Check the quality of the spot emitted from the laser output at low power levels, and then gradually increase the output power.

Do not look directly at the welding tip when the equipment is powered on. When operating the product, always wear safety goggles and a helmet with protective functions. People nearby must also wear the same safety equipment. Make sure that all personal protective equipment is suitable for the output power and wavelength range listed on the laser safety label attached to this product.

Warning:

◎ Do not install or terminate the laser output tip when the laser is activated. When the machine is performing a task, make sure the switch is in the "OFF" position and the unit is disconnected from the AC power supply

2. Equipment and Solvents

Warning:

◎ Photosensitive components in the equipment, such as photodiodes, can also be damaged by laser exposure. The intensity of the laser is enough to burn the skin and ignite clothing and paint. Lasers can cut and weld metals. The laser can ignite volatile substances such as alcohol, gasoline, ether and other solvents. When installing and using this equipment, exposure to solvents or other flammable materials and gases must be avoided.

3. Electrical Safety

Warning:

◎ Before supplying power to the unit, all electrical and welding gas connections must be secured. In addition, if applicable, all connections must be secured with screws to ensure

proper function. All parts of electrical cables, connectors or equipment housings should be considered hazardous.

◎ Before supplying power to the unit, all electrical and welding gas connections must be secured. In addition, if applicable, all connections must be secured with screws to ensure proper function.

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

◎ Before supplying power to the equipment, make sure that the correct AC power voltage is used. Failure to use the correct voltage may cause damage to the laser. For the correct power connection, refer to the marking on the product model.

◎ There are no operator-serviceable parts inside, and all services require consultation with Dynalasers after-sales personnel. To prevent electric shock, please do not remove the protective cover, and any tampering with the product will invalidate the warranty.

◎ Connection of external circuits other than power connections: The external connection between this product and other external equipment is PELV (Protected Extra Low Voltage) defined by IEC 61140. The non-power outputs of other devices connected to this product should also be PELV or SELV (Safety Extra Low Voltage).

4. Environmental Safety

Warning:

◎ Electronic equipment must be disposed of in accordance with regional directives on the disposal of electronic and electronic waste.

◎ Make sure all personal protective equipment is suitable for the output power and wavelength range listed on the safety label attached to the laser.

◎ Please be careful when operating the device, or it may cause laser damage.

For more information, please refer to the product specification. This device is not used in places where unprotected people or children may be present. Keep away from shock or vibration sources. Appropriate enclosures should be used to ensure a safe working area for the laser. Do not operate the output welding tip at eye level.

Humidity requirements: Do not expose the device to high humidity environments (> 90% humidity).

This laser device is air-cooled, and operating at higher temperatures will accelerate aging, increase threshold current, and reduce slope efficiency. If the device overheats, stop using it and call Dynalasers for help.

Please ensure proper ventilation when working. Whenever a laser beam reacts with the material being welded, fumes, steam, sparks, and particle fragments are produced. Fumes

produced during laser processing are often toxic and may pose additional safety hazards.

For general information about laser products, please visit Dynalasers' official website!

5. Cylinder Safety

Warning:

© Gas cylinders may explode if damaged or placed near the welding area. Gas cylinders should be placed where they cannot be hit or damaged. Keep away from heat, sparks, or flames. Gas cylinders must be stored upright and secured to the cylinder stand. A working regulator suitable for the required gas and pressure is required. All hoses and fittings should also be suitable and maintained in good working condition.

6. Radiation Hazards

Visible and invisible radiation is generated during welding. The interaction between the high-power laser beam and the material being welded may produce a plasma that produces ultraviolet radiation and "blue light" that may cause conjunctivitis, photochemical damage to the retina, or a sunburn reaction to the skin. Welders exposed to invisible UV light without proper protection may suffer permanent eye damage, so always wear safety gear during welding.

7. Skin Hazards

Exposure to infrared and UV radiation during welding can damage the skin. Infrared and UV light can cause skin burns, increasing welders' risk of skin cancer and accelerated signs of skin aging. Welding sparks can also cause burns. Laser material processing can transfer a lot of energy into the part. Parts can be very hot to the touch even after the cutting process is completed. Make sure to use appropriate personal protective equipment to prevent potential burns. Take precautions to prevent skin damage by wearing protective clothing such as flame-resistant gloves, hats, and leather aprons.

8. Fire Hazards

The heat and sparks generated during welding can cause fire or explosion if flammable or combustible materials are close to the welding area. Laser welding can only be performed when there are no flammable materials in the area. Never weld containers containing flammable or combustible materials. If the contents of the container are unknown, it should be assumed that they are flammable or combustible. Fire extinguishers should be located nearby and easily accessible.

9. Fumes Hazards

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

（1）Keep your head away from the fumes while welding. Always weld in an area that is adequately ventilated to ensure safe breathing air.
（2）Respirators may also be required in confined spaces and other situations.

(3) Routine air monitoring should be performed to determine hazardous fume levels in the welding area.

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

10. Safety Instructions

To ensure safe operation and optimize the performance of this product, please strictly follow the following warnings and important instructions, as well as other information contained in this manual.

Warning 1:

The output connector of this product is connected to the handheld welding connector by a fiber optic cable. Please use the handheld welding connector with caution.

Warning 2:

When using this product, please ensure that you use a properly grounded power supply.

Warning 3:

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

Warning 4:

If this product is not operated in accordance with the instructions in this manual, The protection mechanism provided by this product may be affected. This product must and can only be used under normal conditions.

Warning 5:

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

Important 1:

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

Important 2:

Operation or adjustment outside the scope of this manual may cause radiation damage.

11. Light emission safety indicators

Important:

◎ When the power is activated, the laser is in a dangerous state. All precautions must be taken.

Take precautions to prevent accidental exposure to direct and reflected beams. Diffuse and specular reflections can cause severe retinal or corneal damage, leading to permanent eye damage. Class 4 laser beams also have potential fire and skin damage hazards when operating or near the equipment. When operating, all personnel must wear all recommended PPE, including safety goggles and helmets with masks. To ensure that the information on laser safety is known to you, please use the laser control measures correctly to adjust or control the execution of the program, or you may be exposed to harmful radiation environments.

12. Welding Protection and Hazard Prevention in Welding Process

Warning:

◎ Personal protective equipment must be worn during welding to avoid exposing eyes to dangerous environments! Wear masks, gloves, welding helmets and laser safety goggles. To avoid the influence of equipment wind speed noise, please wear noise-proof earplugs when welding, which can provide the best protection during laser welding (machine noise<90dB). Welding helmets can also protect welders from injuries caused by hot spatter, metal particles and sparks. All personnel working near the laser welding area must also wear personal protective equipment.

Warning:

◎ If there are flammable or combustible materials near the welding area, the heat and sparks generated during welding may cause fire or explosion. Laser welding should only be performed in areas free of flammable materials. Never weld on containers that contain flammable or combustible materials. If the contents of the container are unknown, it should be assumed that they are flammable or combustible. Fire extinguishers should be near the welding area and welders should be trained in the use of professional fire extinguishers.

13. Hazards of Reflective Beams During Welding

Warning:

◎ A large number of secondary laser beams can usually be generated at different angles near the laser output aperture. These beams are called "specular reflections" and are generated when the laser is reflected from the surface where the main beam is incident. Laser welding systems may produce specular reflections due to the interaction between the laser beam and the processed parts. Although the power of these secondary beams is not as high as the total power emitted by the laser, their intensity is sufficient to cause damage to the eyes, skin, and materials around the laser.

Highly reflective metals, such as aluminum and copper, may cause part of the beam energy to be reflected from the target weld site and require additional precautions. Specular reflections may also be dangerous to the operators if any part of the beam is reflected from multiple surfaces. Take precautions to understand the expected specular reflection cone for each processed part and do not attempt to view the part or place any part of the body within the expected specular reflection cone.

◎ Operators and observers must also be aware of reflections at all times. If the laser parameters are not set properly to achieve melting of the target part, more reflections may occur.

To achieve safe operating conditions: 1. Select the appropriate mode according to the material and thickness; 2. Appropriate nozzle selection based on the joint geometry.

Warning:

◎ For safety reasons, Dynalasers recommends that equipment operators only use Dynalasers nozzle tips.

5-General Safety Instructions

1. Specular Reflection

A secondary laser beam may be generated at the output port of the handheld laser welding machine and radiate outward at multiple angles. This phenomenon of divergent beams generated after the main beam of the handheld laser welding machine is reflected on a flat surface is called specular reflection. Although the energy of the secondary laser beam is much smaller than that of the main laser beam, this intensity may also cause damage to people's eyes, skin or some material surfaces. Pay special attention when welding highly reflective materials, and make sure that there is no persons and no flammable objects opposite when welding.

Warning:

◎ Since the laser radiation light is invisible, you must operate with extreme caution to avoid or reduce specular reflection.

2. Accessory Safety Instructions

The photosensitive components integrated in the optical accessories of the handheld laser welding machine may be damaged by laser exposure, so please pay attention to the protection of related devices.

Warning:

◎ The output laser intensity of Dynalasers 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, please be sure to isolate flammable items around the handheld laser welding machine.

3. Optical Operation Instructions

Dynalasers strongly recommends that you read the following key notes for operation before operating the handheld laser welding machine:

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

(2) Avoid placing the handheld laser welding machine and related optical output devices at the same level as your eyes;

(3) Reasonably select safety protection equipment according to the output power and wavelength requirements of the handheld laser welding machine to ensure the safety of the operator;

(4) Warning signs must be posted in the area where the handheld laser welding machine is placed to limit the safe area for operating the handheld laser welding machine;

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

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

(7) When performing commissioning, calibration and focusing, please perform them without laser emitting. After commissioning is completed, turn on the laser;

(8) Please strictly follow the instructions in this document to operate the equipment, or the protective device and performance of the equipment will be weakened, for which Dynalasers will not provide any warranty.

Notes:

◎ The optical output of the handheld laser welding machine will be connected to the lens with

anti-reflective coating and then emitted. Before using the handheld laser welding machine, please strictly check the output lens and the rear lens of the handheld laser welding machine to ensure that there is no dust or any other debris on the lens. Any attachment visible to the naked eye will cause serious damage to the lens, resulting in burning of the handheld laser welding machine or any rear optical path equipment.

◎ Please refer to the Fiber Optic Connector Inspection and Cleaning Guide and follow the lens cleaning inspection process.

◎ Please be careful of the hot or molten metal particles that may be generated during the cleaning operation of the handheld laser welding machine.

◎ When commissioning and calibrating the output of the handheld laser welding machine, it is required to set the handheld laser welding machine to detect the quality of the laser output spot through the indicator red light without laser output, and then turn on the laser after there is no abnormality.

Warning:

◎ Reasonably select safety protection equipment according to the output power and wavelength requirements of the laser.

◎ Do not look directly at the gun tip, and make sure to wear safety goggles during each operation.

4. Electrical Operation Instructions

Dynalasers strongly recommends that you read the following key notes for operation before operating the handheld laser welding machine:

(1) Make sure that the equipment housing is well grounded. Interruption at any point in the grounding loop may cause personal injury;

(2) Before using the power supply connected to the equipment, please make sure that it is connected to the protective ground;

(3) To reduce the risk of fire, when necessary, replace the circuit fuse with the same type and grade, and do not use other fuses or materials instead;

(4) Ensure that the input AC voltage of the handheld laser welder is the normal municipal AC voltage, and the wiring is correct. Any incorrect wiring method may cause personal injury or equipment damage. In the AC220V municipal power environment, the live wire identification line of the equipment is connected to the live wire terminal of the wiring box; the neutral wire identification line of the equipment is connected to the neutral wire terminal of the wiring box; the ground wire identification line of the equipment is connected to the ground wire terminal of the wiring box. In the AC110V municipal power environment, the live wire identification line of the equipment is connected to the live wire terminal of the wiring box; the neutral wire identification line of the equipment is connected to any one of the other two phase live wire terminals inside the wiring box, and the ground wire identification line of the equipment is connected to the ground wire terminal of the wiring box.

(5) Except for the gun tip consumables, this product does not require the user to repair

parts, components or assemblies by themselves. All maintenance work must be completed by Dynalasers personnel;

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

(7) There must 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 without flammable materials.

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

(9) Any product that has been disassembled or assembled without permission will no longer be covered by the warranty.

Warning:

◎ The input voltage of the handheld laser welding machine is single-phase AC (200 - 240VAC), which poses a risk of electric shock. All related cables and connecting wires are potentially hazardous.

5. Operating environment requirements for handheld laser welding machine

The equipment is commonly used in: (1) Environmental pollution degree 2 (2) Dry location, (3) Altitude below 2000 meters, (4) Class II overvoltage. For more information, please refer to the product specifications.

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

Cooling and temperature: The laser device is cooled by air. Operating at higher temperatures will accelerate aging, increase threshold current and reduce slope efficiency. If the device overheats, do not use it and call Dynalasers for help. When the laser temperature is too high, the device will trigger an alarm and stop emitting light.

To ensure the safety of the laser working area, the interaction between the laser and the work surface will produce gas, sparks and debris due to high temperature, which may pose additional safety hazards. The corresponding operators are required to undergo certain assessment and training, and be familiar with and master the general safety regulations for laser operation.

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

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

(2) When the handheld laser welding machine is in operation, ensure that there is no foreign object blocking the air intake at the bottom of the laser, and ensure that there is no debris within 1 meter around that affects the smooth air intake; ensure that the top air outlet is smooth within 1M height;

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

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

Notes:

◎ Please operate the equipment with caution 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.

Chapter 3 Product Description

1 - Introduction to Features

The handheld laser welding machine integrates the laser, handheld welding gun tip and control system. Compared with traditional handheld welding equipment, it features simple configuration, high integration, small size, simple operation and high intelligence.

Main features:

(1) Stable output power and good consistency;

(2) Accurate power regulation, linear stepless power regulation;

(3) Integrated linkage safety mechanism, higher safety;

(4) Overall high-level protection;

(5) Modular components, building block-style replacement and repair;

Application areas:

Widely used in hardware, building materials, kitchenware, aerospace, automobile, shipbuilding, medical and other industries.

2 - Module Configuration

Dynalasers provides many configurable modes. This manual will explain all modes in detail. Please refer to Chapter 6 User Guide.

3 - Laser Model Description and Functional Safety

Model naming	Model Name
M75	/
Product Functional Safety	
Electrical Safety	ISO12100:2010 ISO11553-2:2015EN60204-1:2018
Laser Safety	EN60825-1:2014+All：2021CDRH21CFR1040.10

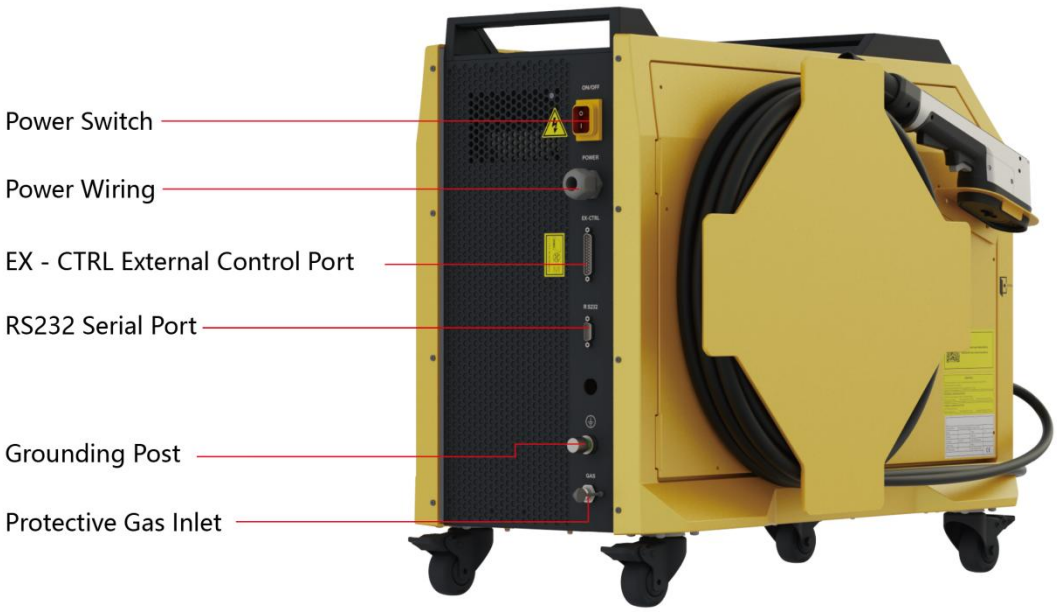
4-Certificate of Conformity

Dynalasers guarantees that this product has been fully tested and inspected before packaging and transportation, and complies with published standards and procedures. After receiving this product, please check the packaging for any signs of external damage. If the equipment has any damage, immediately notify the carrier and Dynalasers's after-sales personnel; when you take out this product from the packaging box, you must be particularly careful to ensure that the fiber optic cable is not broken or damaged; please check the attached packing list. Once you receive the product, check all items against this list. If any items are missing or the equipment is obviously or suspected of damage, do not attempt to install or operate the laser equipment under any circumstances.

5-Description of the Front and Rear Panel of the Laser Cleaning Machine

Front panel name	Function description

ACTIVE/ALARM	Normal laser emitting state: green light, standby state: yellow light, alarm state: red light
E-stop switch	Stop laser emitting
Safety key	Lock the device and prohibit use (it is recommended to remove the key when the machine is stopped)
LOOP	Safety loop circuit line interface
Laser outlet	Armored cable

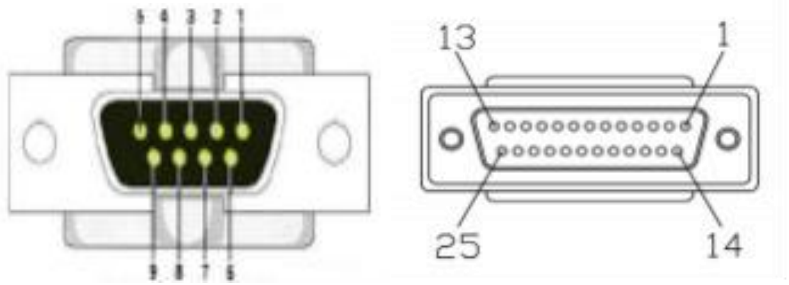


Rear Panel Name	Function Description
ON/OFF	200 - 240VAC AC power switch
External control I/O	Interlock emergency stop alarm and external control laser emitting protection
GAS_IN	Shielding gas inlet interface
POWER	200 - 240VAC AC power input

RS232	Welding platform RS232 interface

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

This laser welding machine has an external control port of RS232 Interface (DB9), interface definition as shown in the table above. Definition of RS232 interfaces



Definition of external control I/O interfaces

DB25 pinout	Description	Definition
1	ERROR2	Fault output 2
14	ERROR1	Fault output 1
3	CONTROL -	Laser emitting control -
16	CONTROL+	Laser emitting control +
5	ENABLE -	Enable control -
18	ENABLE+	Enable control +
6	EMG_OFF_EN1 -	Emergency stop 1 -
19	EMG_OFF_EN1+	Emergency stop 1 +
7	EX_LOCK1 -	Interlock 1 -

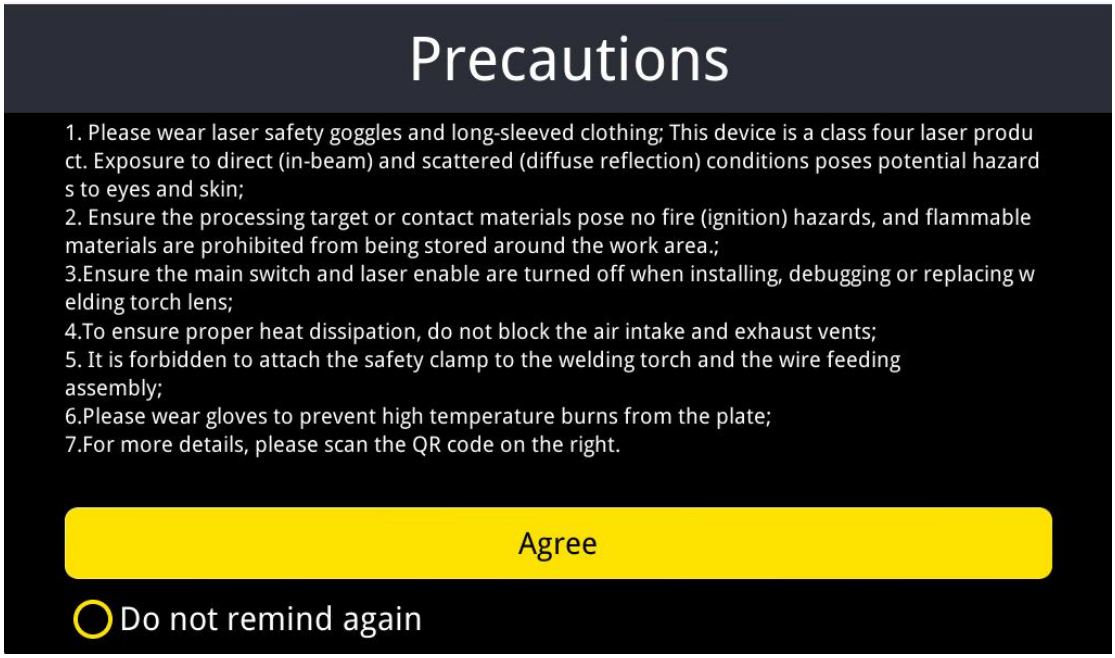
20	EX_LOCK1+	Interlock 1 +
8	EMG_OFF_EN2 -	Emergency stop 2 -
21	EMG_OFF_EN2+	Emergency stop 2 +
9	EX_LOCK2 -	Interlock 2 -
22	EX_LOCK2+	Interlock 2 +

6-Operation Panel Description

This machine comes with a 7-inch industrial screen, which is connected to the host through a serial interface to realize device control and status monitoring functions. The connection with the device must be carried out when the machine is powered off to prevent surge damage.

1. Power-on safety instructions

The detailed safety instructions page will be displayed when the machine is powered on for the first time. Please read and study the safety instructions carefully. After reading, click the "Agree" button to enter the operation interface.



If you click "Do not remind again", the safety instructions page will be skipped every time you power on the machine afterwards and jump directly to the operation interface.

2. Operation Interface

The operation interface has 2 operation modes, namely simplified mode and professional mode.

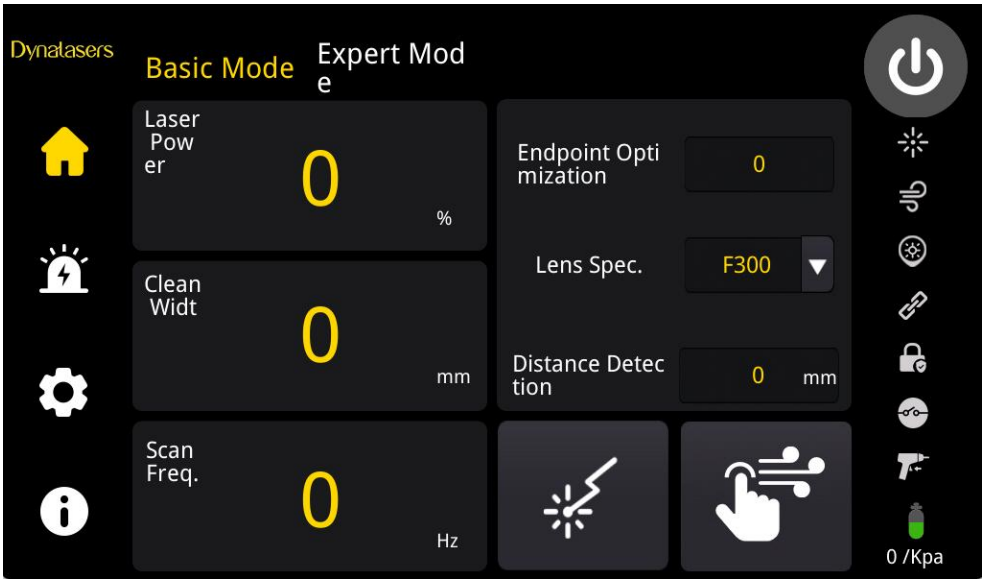
(1) Simplified mode

The simplified mode is easy to operate. You only need to select the corresponding material, plate thickness, and welding method, then click the "Laser Enable" switch button in the lower left corner of the interface, and click the main switch button in the upper right corner of the interface. If all parts of the machine are working properly, you can start welding.

After selection, the wire feeding is enabled by default; there is no need to turn on the wire feeding button separately. If you do not need to use wire feeding, you can cancel the wire feeding enable. Click the fish scale effect button below to enable fish scale effect welding.

Switch to the professional mode interface to make some more professional and detailed

operation settings. After we configure all the parameters, click the laser start button and the main switch button to start laser welding.



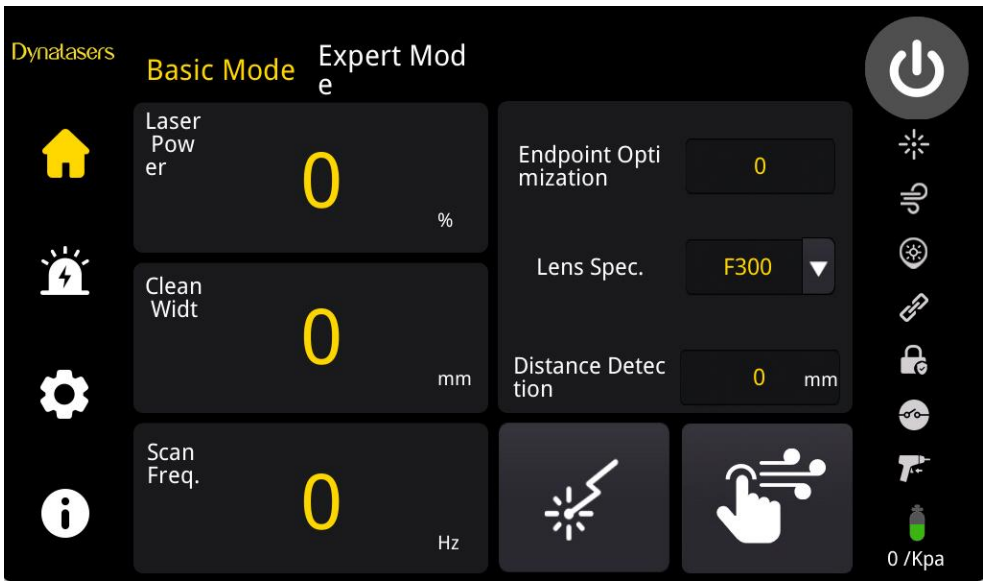
(2) Professional mode

The professional mode operation interface allows making some professional welding settings.

Click the icon at the top of the interface to switch to professional mode.

◎ Main interface

The main interface is divided into four sub-interfaces: homepage, alarm, setting, and information.



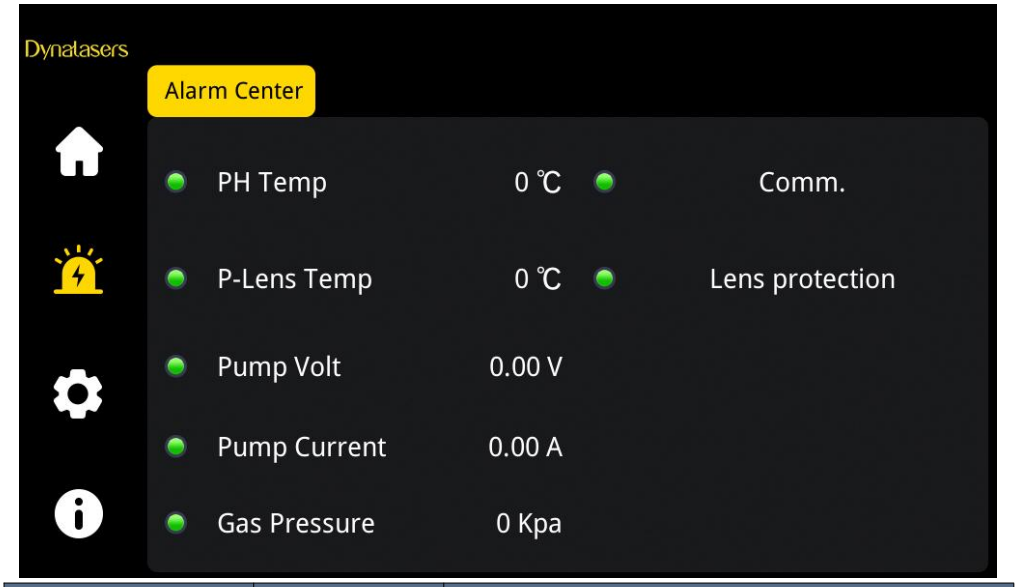
●Home page: laser power, scanning amplitude, scanning frequency and wire feeding speed

can be set.

functional classification	function declaration	remarks
Operation button	laser start	Laser start button to initiate laser cleaning. Yellow indicates laser on, gray indicates laser off.
	laser enable	The working laser is enabled and is mainly used for machine adjustment when the laser is not on. The yellow laser is enabled, and the gray laser is off.
	manual air supply	Enable or disable manual air supply. Yellow enables manual air supply, gray disables it.
Settings	laser power	Adjustable from 10% to 100%, with 100% power setting being the machine's rated maximum power.
	hunting frequency	The maximum scanning frequency of laser reciprocating scanning is 200Hz under full amplitude, and the scanning frequency can be raised correspondingly under small amplitude.
	Cleaning width	Adjustable from 0 to 300 mm.
Caption		This icon represents "laser"
		This icon means "blow"
		This icon indicates "red light"
		This icon indicates "interlock"
		This icon indicates a "lockout"
		This icon represents the external control switch
		This icon indicates the cleaning gun switch

● Status bar ：

functional classification	function declaration	remarks
enable state	laser	Green: Laser emission, Gray: Standby
	glow	Green: Emitting red light; Gray: On standby
	scavenging	Green: Protection gas output, Gray: Standby
	security keylock	Green: Safe lock closed state, Gray: Safe lock open state
	Cleaning gun switch	Green: The trigger switch is pressed. Gray: The trigger switch is not pressed.



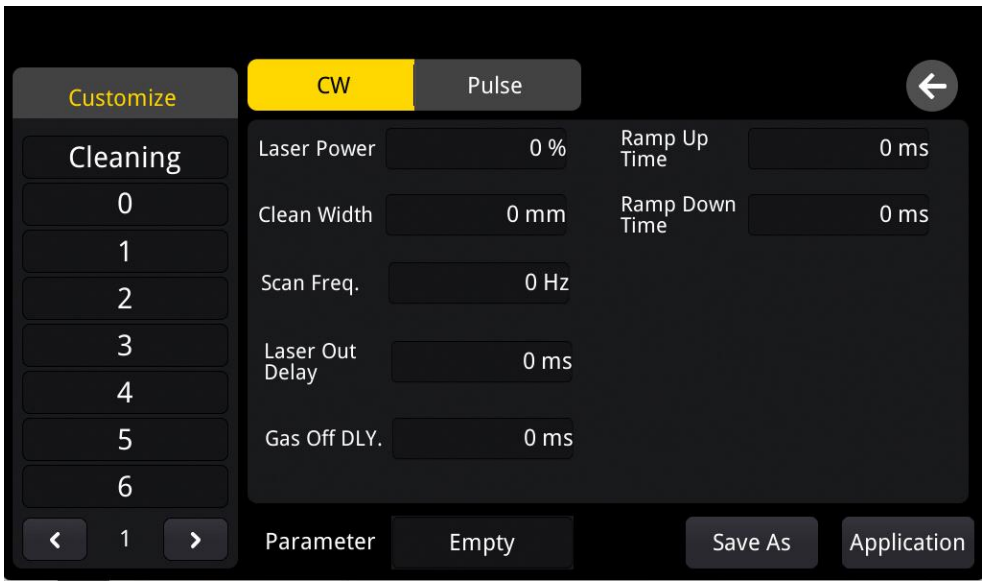
functional classification	function declaration	remarks
Laser usage alarm	Protective lens	If the protective lens is abnormal, please contact after-sales service.
	Lock machine	If the machine is locked, please contact after-sales service.
	Ground wire abnormal	If the ground wire connection is abnormal, the machine will alarm. If it is confirmed that there is no abnormality in the grounding, but the machine still alarms, please contact after-sales service.
	Optical fiber abnormal	If the fiber is abnormal, please contact after-sales service.
	Cleaning torch communication	The communication between the laser and the handheld cleaning gun tip is abnormal. Please check whether the connection is abnormal and contact after-sales service after confirmation.
	key	The key is not unlocked and the alarm is triggered. If the key is confirmed to be unlocked but the alarm persists, please contact customer service for assistance.
	E-stop	Laser emergency stop alarm, please check whether the e-stop switch is turned on, and contact after-sales service after confirmation.
Temperature Alarm	Protective lens temperature	If the protective lens temperature is abnormal, please check: 1. Whether the protective gas is turned on and the pressure is normal; 2. Whether the protective lens is dirty; 3. Contact after-sales service after confirmation.
	Pump source shell temperature	If it alarms because the temperature exceeds the threshold value, please check whether the air outlet is blocked, whether the filter is dirty, and clean the air outlet and filter; do not work for a long time in a place with high ambient temperature; check whether all fans are running normally, if there is any abnormality, please contact after-sales service.
	MOS overheating	
	Pump source shell temperature	
Current Alert	Power supply	If it alarms because the current exceeds the threshold

	communication	value, please restore the factory settings and try again. If the fault still exists, please contact after-sales service.
	Pump source current	
Voltage alarm	pump source voltage	The voltage exceeds the threshold and triggers an alarm. Reset to factory settings and try again. If the issue persists, contact customer service.
	PD voltage	

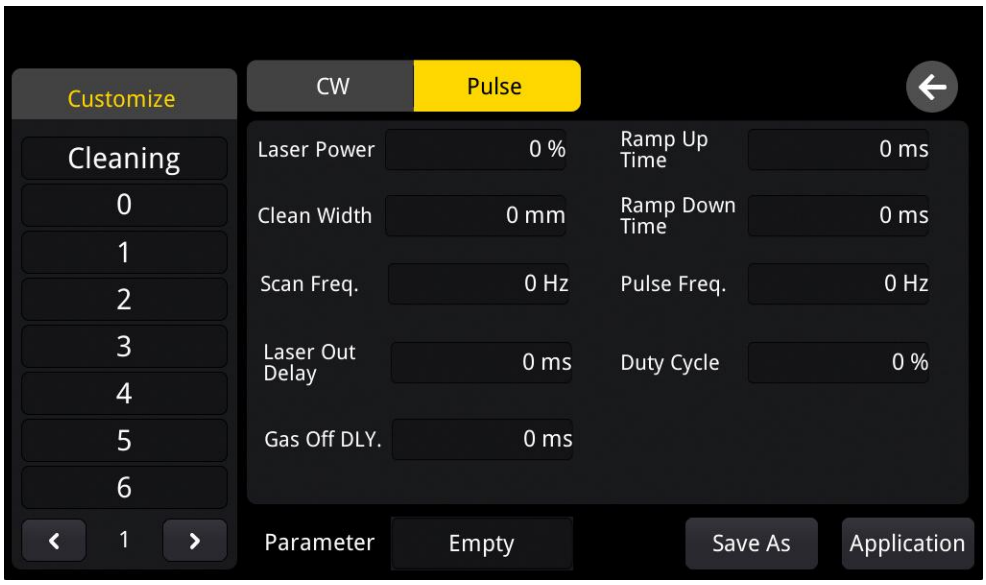
●Professional mode interface: Displays the detailed parameters of the current professional mode settings; and the function of modifying parameters.

Note: The laser power, scanning frequency, scanning amplitude, and cleaning width in this interface are consistent with the values of the main page.

Adjustable parameters for continuous light output mode:



Adjustable parameters of pulse light output mode:



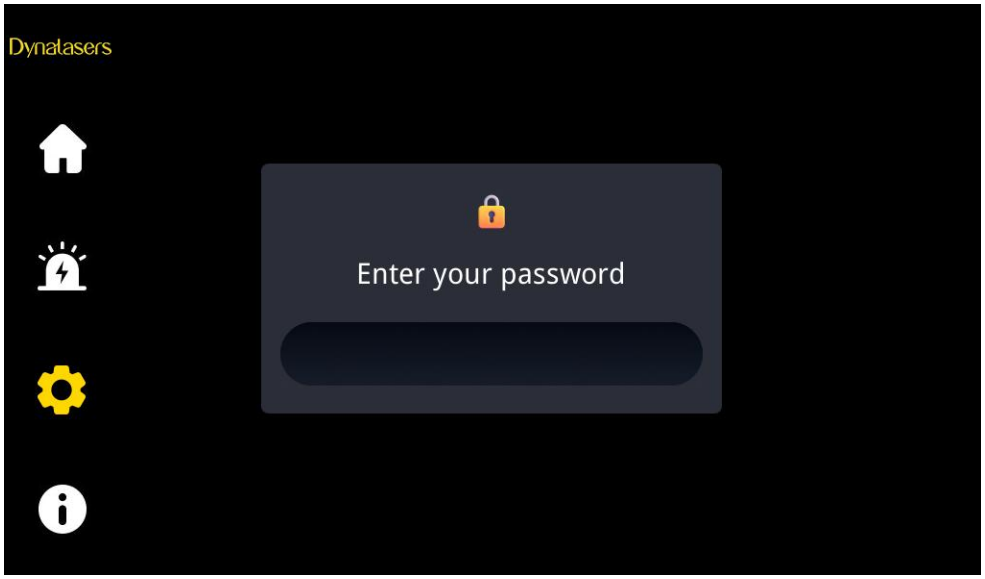
functional classification	function declaration	remarks
Mode adjustment	Laser output mode	Laser output mode includes: continuous, burst, and pulse. Continuous: Continuously output laser at the set power. Burst: Single laser output when bursting. Pulse: Continuously output pulse laser according to the set duty cycle.
Current machine parameters	Laser Power	Set the laser output power.
	Scanning Frequency	Set laser scan frequency
	Cleaning width	Set laser scan amplitude
	Laser output delay	Set the advance time before the laser is emitted.
	Air shut-off delay	Set the delay time for gas-off after the laser is turned off.
	Laser shut-off delay	Set the delay time from stopping wire feeding to turning off the laser, which is used to cut the welding wire.
	Slow rise duration	Set the slow rise time of laser.
	Slow fall duration	Set the slow fall time of laser.
	Laser frequency	Set the laser frequency
	Duty cycle	Set the laser output duty cycle in pulse mode.

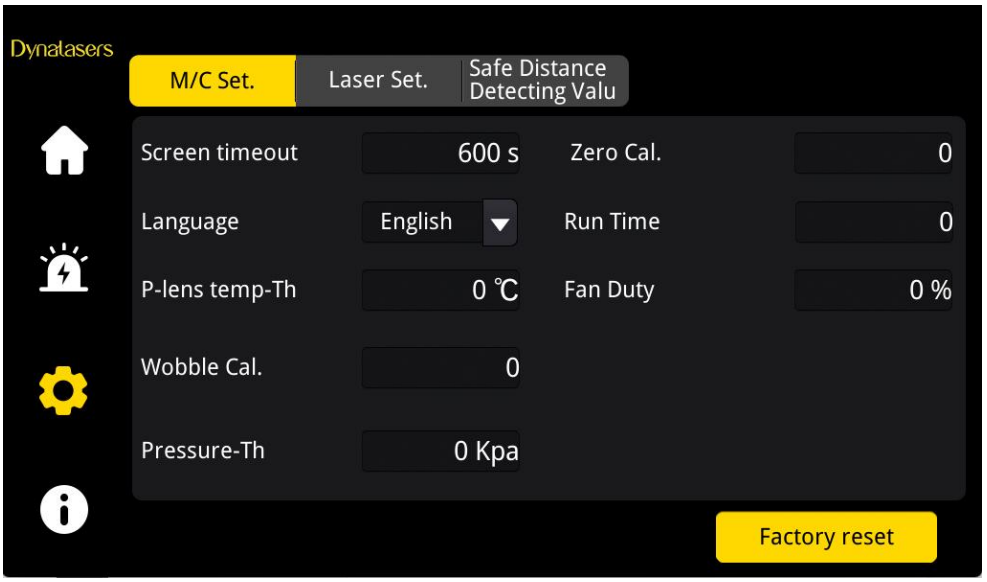
3. Setting interface

First, click the setting interface, and an input box will pop up. You need to enter the password：0205.

1. You can enter the setting interface only after the password is successfully entered.

2. If the password is entered incorrectly, the prompt is: Wrong password, please re-enter. The setting interface contains two sub-interfaces: machine setting and laser setting.



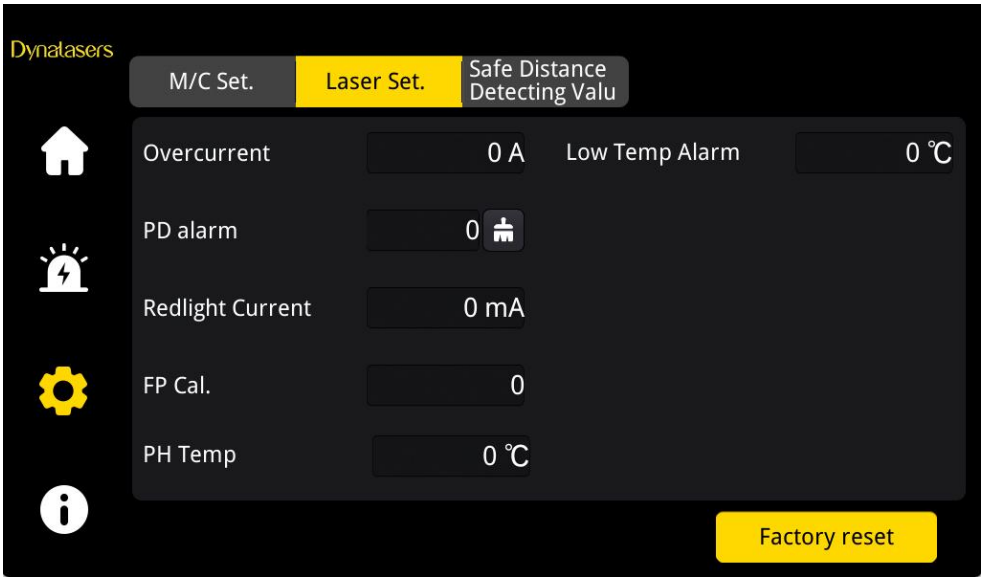


● Machine setting: It includes the functions of viewing reference point and alarm point information and restoring factory settings.

functional classification	function declaration	remarks
Vendor settings	Screen saver time	Users can customize the screen saver time. The parameter value range is: 5 - 60000s. So that it can enter the standby state when not in use.

	Zero point calibration	Users can customize the zero point correction value. The parameter setting range is: - 500 ~ 500; Note: Clicking the restore factory setting button cannot reset this data.
	Galvanometer full swing calibration	Users can customize the galvanometer full swing correction value, and the parameter setting range is: - 100 - 100; Note: Clicking the restore factory setting button cannot reset this data.
	Protective lens temperature threshold	Users can customize the protective lens temperature threshold, and the parameter setting range is: 35 - 55℃; This parameter value is associated with the alarm interface value. Note: Clicking the restore factory setting button cannot reset this data.
	Blowing air pressure threshold	Users can customize the blowing air pressure threshold, and the parameter setting range is: 0 - 500KPa.
	Language settings	Users can customize the language. Note: Clicking the restore factory setting button cannot reset this data.
Power & Fan Status	Running time	Unit: 10 minutes. This value shows the total usage time of the machine.
	Current power supply voltage	Shows the current power supply voltage of the machine.
	Current power supply current	Shows the current power supply current of the machine.
	Current power supply temperature	Shows the current power supply temperature of the machine.
	Fan duty cycle	Displays the current machine fan duty cycle. The larger the value, the faster the fan.
Others	Restore Factory setting	Click Restore Factory setting to reset the machine data and restore to factory settings

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



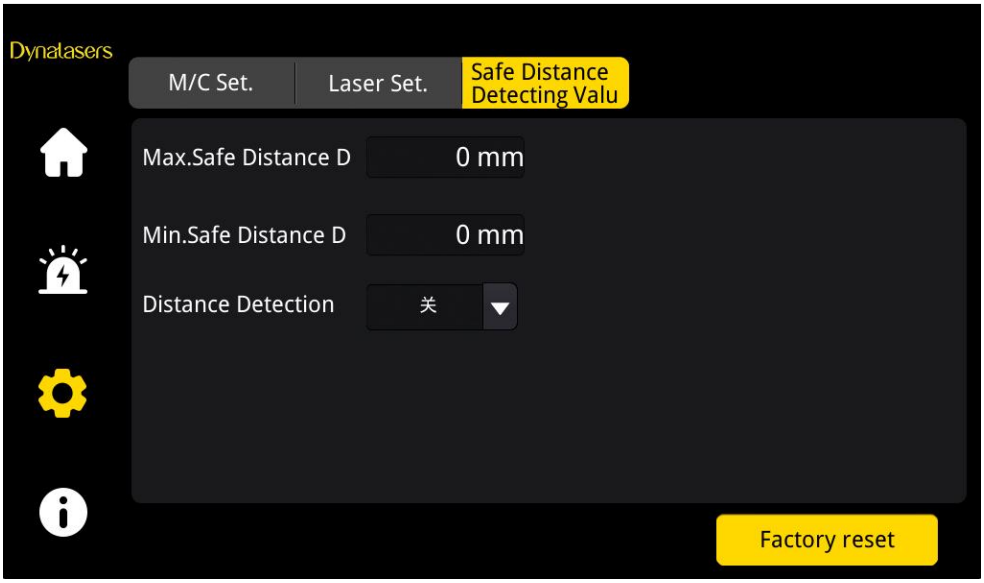
● Safety Distance Settings: This interface allows you to configure maximum and minimum safe distance thresholds.

Function classification	Function description	Remarks
Reference point setting	Overcurrent	Users can customize the overcurrent reference current value, and the setting range is 0 - 45A. Note: Clicking the Restore Factory setting button cannot reset this parameter value.
	PD alarm	Users can customize the PD alarm count value, and the setting range is 0 - 3. Note: Clicking Restore Factory setting cannot reset this parameter value.
	Restore PD alarm	Restore the PD alarm count.
	Red light current	Users can customize the red light current, and the setting range is 0 - 150mA. Note: Clicking Restore Factory setting cannot reset this parameter value.
	Full power calibration	Users can customize the full power calibration value, and the setting range is 0 - 120. Note: Clicking Restore Factory setting cannot reset this parameter value.
Alarm point setup	Low temperature alarm	Users can customize the low temperature alarm value, and the setting range is - 20 - 0. Note: Clicking Restore Factory setting cannot reset this parameter value.
	Pump source shell temperature	Users can customize the pump source board temperature alarm value, and the setting range is 40 - 65. Note: Clicking Restore Factory setting cannot reset this parameter value.

When the "Distance Detection Alarm Switch" is turned on, the cleaning gun will adjust its focus according to the detected distance. If the distance exceeds the range, the gun will stop

emission.

When the "Distance Detection Alarm Switch" is turned off, the distance detection function will be off.

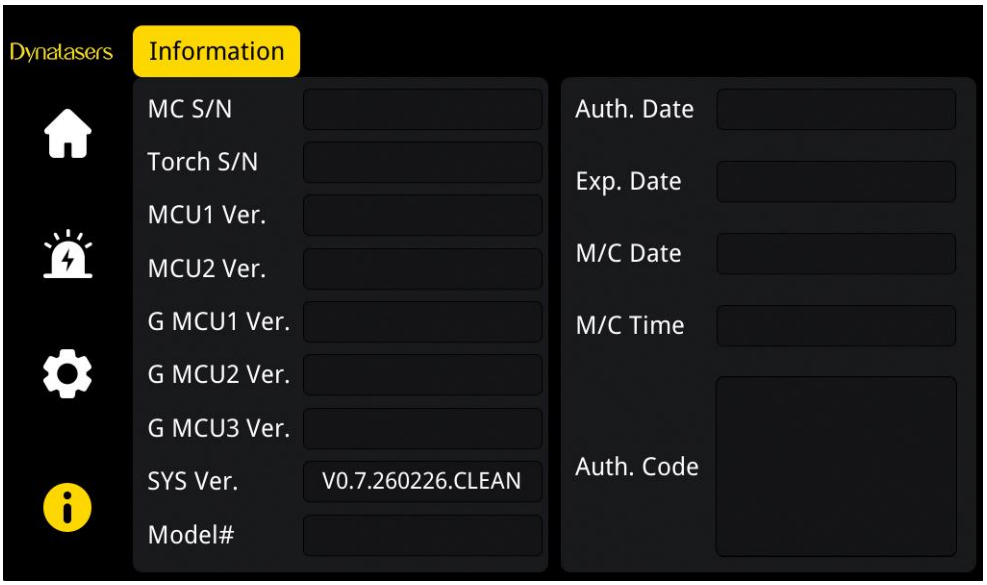


The relationship between the working distance and scanning width of different focusing lenses is as follows:

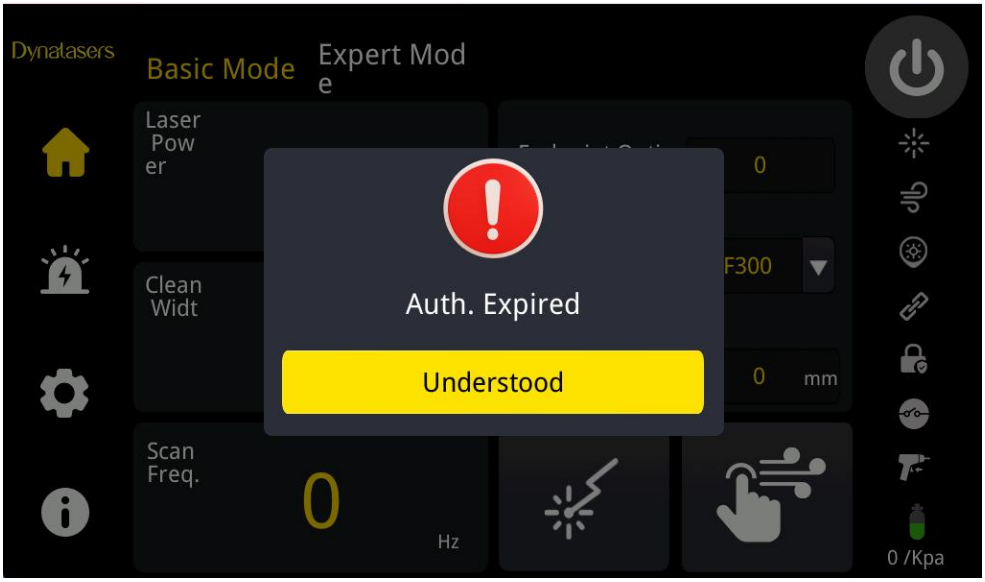
Focus lens Spec.	F300	F400	F600	F800
Operate Distance(mm)	300	400	600	800
Scan Width(mm)	120	150	225	300

4. Information interface

The information interface includes machine information and business information.



The device authorization code is about to expire, and the system will pop up a box to remind you. In this case, please contact the manufacturer to release the authorization code again to ensure that the machine can be used normally.



Functional Classification	Function declaration	Remarks
Machine Information	Machine model	Machine model
	System version	Machine system version number
	MCU1 version	Machine firmware version number

	MCU2 version	Machine firmware version number
	MCU1 version	Machine firmware version number
	MCU2 version	Machine firmware version number
	MCU3 version	Machine firmware version number
	Master Control S/N	Machine serial number (unique number for each host)
	Cleaning head S/N	Cleaning head serial number (unique identifier for each head)
Business Information	Authorization Date	Machine authorization date
	Machine Date	The current date of the built-in clock
	Machine Time	The current time of the built-in clock
	Due Date	Expiration lock warning time
	Authorization Code	Valid date for logging in and unlocking the machine with the authorization code If the authorization code is entered incorrectly, the system pops up a prompt: Authorization code error, please check and try again

7-Cleaning Tip Description

The indicator light on the cleaning gun can show different working states. When the welding gun and the laser communicate successfully and the working state of the equipment is normal, the indicator light is yellow; when the safety lock and the copper nozzle are in contact with the material to be welded at the same time, the safety lock is turned on. At this time, hold the gun tip and press the laser trigger button to emit laser, and the indicator light is green; when the welding tip or laser is abnormal, the indicator light is red.

Description of cleaning tip indicator light:

Indicator light color	Indicator light color	Explanation
Green	Green	Laser emitting
Red	Red	Fault alarm
Yellow	Yellow	Standby

Chapter 4: Detailed Specifications

1-Optical Characteristic Table

order number	natural parameter	test condition		least value	representative value	crest value	unit
1	Operating mode	Continuous/Pulse	Ambient temperature 25 ℃				
2	Polarization state	stochastic					
4	Power adjustment range	1% gradient		10		100	%
5	Center wavelength	100% continuous			1080		nm
6	Electro-optical efficiency of the whole machine	10-100% linear fit			27		%
7	Spectral bandwidth (3dB)	100% continuous		3		5	nm
8	Short Time Power Stability	100% continuous for>1 hour			2		%
9	M²	100% continuous		1.1			
10	Laser activation time	10%→90% output		50	100	us	us
11	Laser Off Time	90%→10% output		50	100	us	us
12	Indicated Red Power	100% output		300		1000	uw
13	Length of Optical Fiber Cable			10			M
14	Bending Radius of Optical Fiber Cable			135			mm
15	Output method	QBH					

2- Lens Specifications

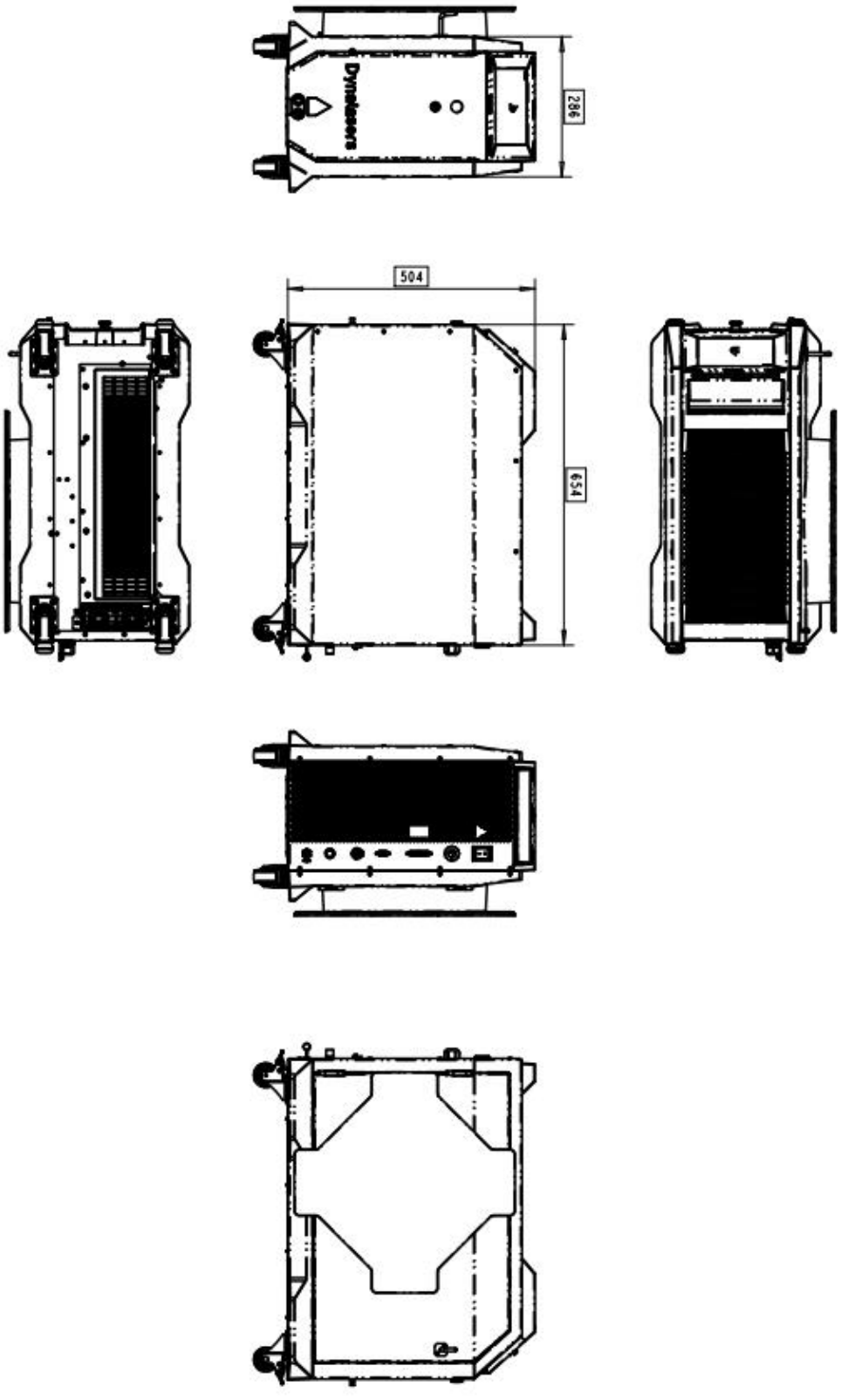
S/N	Lens Name	Lens Specification	Usage
1	Protective Lens	D30*T5	1
2	Focusing Lens	D20*F800*T4.5	1
3	Collimating Lens	D16*F50*T5	1
4	Reflective Mirror	长23.2宽16厚2	1

3-General Characteristics Parameter Table

order number	natural parameter	test condition	least value	representative value	crest value	unit
1	Operating Voltage		200	220	240	VAC
2	Input power	100% output			3	KW
3	Ambient temperature for operating		-15		40	℃
4	Working environment relative humidity		10		85	%
5	Laser cooling method	phase change heat dissipation				
6	Gun tip cooling method	nitrogen and argon gas cooling				
7	Storage temperature		-20		85	℃
8	Machine dimensions	653*286*574			mm	
9	Total weight of the machine	≤46			kg	
10	welding torch weight	≤480			g	

4-Structural Layout

Laser three-view (unit: mm)



Chapter 5: Disassembly Guide

1-Instructions for unboxing the shipping container

If the package shows any signs of external damage, check the device for damage and notify the freight forwarder immediately. When removing the device from the package, special care must be taken to ensure that the fiber optic cable is not broken or damaged.

The device is in a foam-insulated wooden box with foam shock absorbers and shock indicators to help fix and ensure safe handling during transportation. It is recommended to be particularly careful for the software package when unpacking the package for shipping. In order to minimize the risk of damage to the device, Dynalasers recommends that you read this instruction in detail.

2 - Delivery and transportation

The shipping package is labeled with the carrier and carrier information. However, these markings may not be the correct information. Please check whether the outside of the crate has obvious damage during transportation. When the packaging is not unpacked, it is recommended to use a forklift for moving; If it is a bare machine, it is recommended to push it or lift it with two people on flat ground

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

• Impact indicators - The following labels and indicators are affixed to the side panels or ends of the wooden crate to help provide guidance for proper handling.

Notes:

© Do not use the accessory optical cable to lift or position the equipment.

3-Accessories List

name of material	dosage	unit
Goggles	1	pcs
Round cotton swab	1	bag
Masking tape	1	roll
Protective lens	3	pcs
F800 focusing lens	1	pcs
Tracheal adapter 10 to 6	1	pcs
Trachea D10	0.1	m
Air tube	5	m
Grounding wire	1	pcs

Chapter 6: User Guide

1 - Precautions

Notes:

◎ Please refer to Chapter 4 Detailed Specifications to select the appropriate power supply.

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

◎ Please wear the noise-isolating earplugs provided before performing laser welding operations.

2 - Power connection

1. The laser power input line needs to be connected to single-phase AC (220VAC), and the power supply cable diameter should be no less than 4 square millimeters copper core wire (current carrying capacity should be no less than 30A).

2. It is forbidden to connect the power cord directly to the household power strip;

3. Connect the power cord to the specified voltage and phase, L=220VAC, N=0VAC, PE= ground. Make sure the wiring is correct before turning on the machine, and PE is not allowed to be missed.

To ensure safety features, Dynalasers strongly recommends that you connect a 32A circuit breaker (air switch) in series between the power supply unit and the laser.

If you still have other questions about the power connection, please refer to Chapter 4 Detailed Specifications to determine the electrical specifications. The electrical connection should be operated by personnel familiar with electrical safety and wire connection, and the wiring should comply with all national and local regulations.

3-Static grounding connection

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

Wiring is as shown:

One end of the grounding wire is locked on the grounding screw.

The clip at the other end of the grounding wire is securely clamped onto the outdoor grounding post.

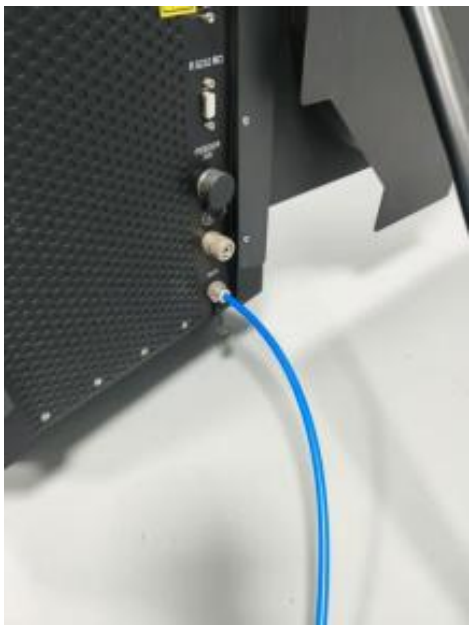
4-Gas Connection

The gas can be supplied using compressed air, with the protective gas kept clean and dry at a pressure of 300kPa to 800kPa.

Connect the 6mm outer diameter air pipe to the Gasin port and adjust the gas pressure to

300kPa-800kPa. Set the valve mode to normally open (in the advanced settings interface) to control the gas flow rate.

Device connection diagram:



5-Daily Maintenance

(1) Inspection of wire feeding wheel and clamping wheel:

Check the wear of the wire feeding wheel groove and clamping wheel, and check whether there are impurities in the groove. If the wear is serious, it needs to be replaced in time.

(2) Inspection of wire feeding tube:

Check whether the joints at both ends of the wire feeding tube are loose, whether the stainless steel tube (graphite tube) is blocked, and a small amount of metal chips can be cleaned with compressed air. If the blockage is serious, the wire feeding tube needs to be replaced.

(3) Motor inspection: Check whether the motor has abnormal noise.

(4) The equipment needs to be purged and cleaned at least once a month.

6-Start steps

Warning:

◎ Make sure all electrical connections (including shielding gas and ground wire) are

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. Be sure to wear safety goggles, noise-isolating earplugs, and masks before operating.

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

The startup process is as follows:

(1) Connect the power input to the air switch;

(2) Connect the protective gas hose (outer diameter 6mm) to the hose fitting and open the gas valve;

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

(4) Release the emergency stop switch on the front panel of the laser and turn on the key;

(5) Tap the touchscreen to access the software interface and adjust parameters including laser power, oscillation amplitude, oscillation frequency, air supply/deactivation delay, power ramping, and light emission mode.

(6) Set the air valve to normally open mode and adjust the protection pressure to 300kPa-800kPa.

(7) Turn on the main display switch and the laser enable switch;

(8) Light emission occurs when the switch is pressed twice consecutively;

7-Product Accessories Inspection and Cleaning Guide

1. Product Accessories Inspection

To clean the lens protector window, you need the following equipment:

(1) Non-fiber optic cleaning cloth and cotton swab

(2) Anhydrous ethanol

(3) Adhesive tape

pay attention to ：

Before using this product, inspect the cleanliness and damage level of the protective lens. Using a lens with dust or damage may damage the cleaning nozzle (focusing lens, extension tube, etc.), affecting the cleaning performance.

Unauthorized disassembly of the gun head or laser product will void any warranty rights under Dynalasers.

Please clean the product in a dust-free environment using powder-free gloves or finger cots. Dynalasers will not provide warranty for any damage to the gun tip caused by improper operation or incorrect cleaning procedures.

◎For cleaning, the concentration of anhydrous ethanol must be at least 99.5%.

2. Steps to perform

Follow these steps to clean and maintain the laser cleaning machine:

(1) Turn off the laser and disconnect the power supply;

(2) Loosen the protective lens/focusing lens cover from the gun head and remove the protective lens holder (seal the protective lens drawer position with clean masking tape to prevent dust ingress), then use an optical cleaning cloth dipped in alcohol to wipe the entire surface of the protective lens window;

(3) Hold the window slide in the left hand and place it under the microscope (with a magnification of 20×);

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

(5) Carefully inspect the surface of the protective lens. If dust or micro-particles are detected, clean it with a cotton swab.

The steps are as follows:

① Dip the cotton swab thoroughly with alcohol and shake off excess alcohol;

②Through the microscope, place the cotton swab on the dust area of the protective lens;

③ Gently wipe off dust with a cotton swab and move it to the edge of the protective lens. The cotton swab should be replaced promptly after use;

④ After wiping off all contaminants, place the specimen under the microscope for final confirmation.

(6) Insert the cleaned protective lens into the protective lens holder;

(7) Insert the protective lens holder into the gun head lens cavity and tighten the locking screw on the holder housing to prevent loosening that may affect usage.

Important:

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

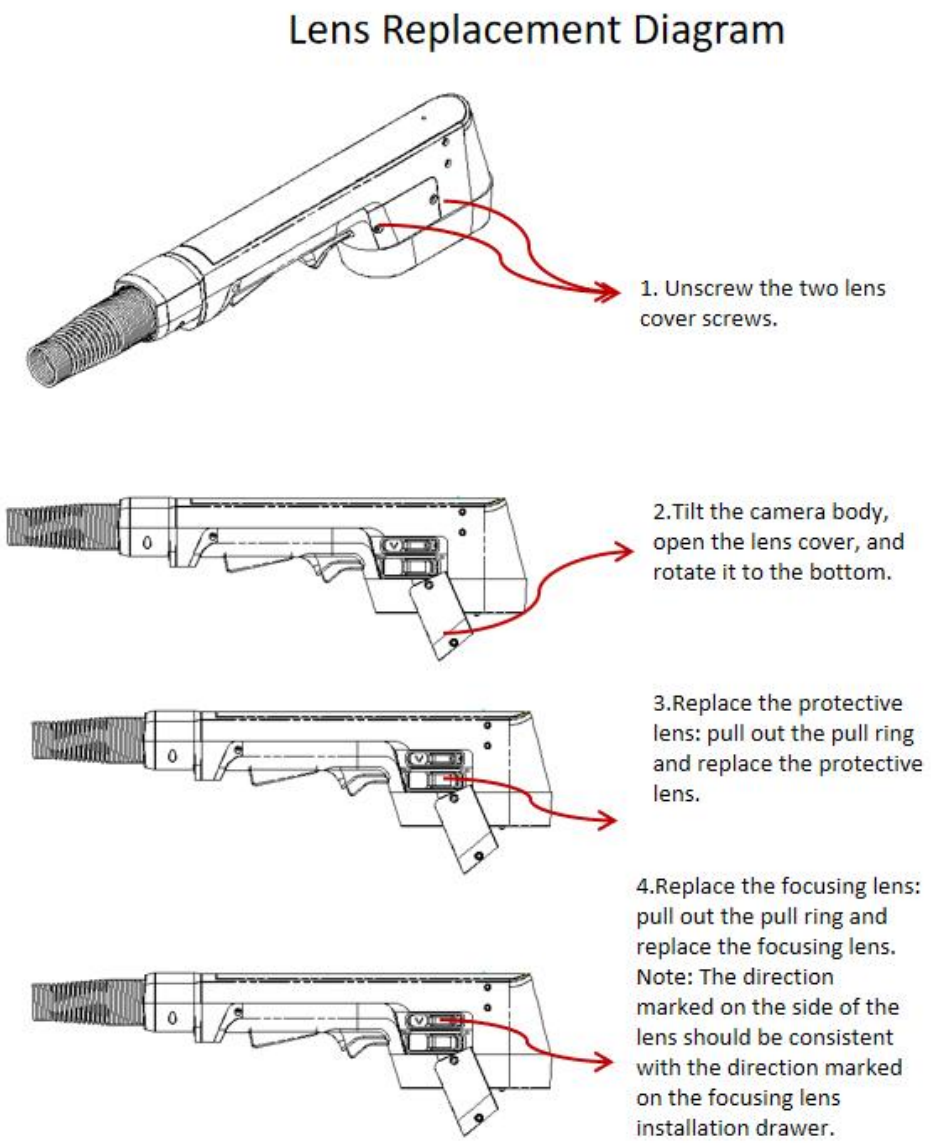
◎ Do not touch the focusing lens of the welding gun tip with your fingers.

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

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

◎ Do not forget to clean the protective cover and sleeve when you replace them.

◎ If the focusing lens cannot be immediately installed on the optical component, please seal the lens cavity shell with masking tape. When installing the focusing lens, make sure the convex surface faces the gun muzzle.



Chapter 7 Service and Maintenance

1-Maintenance Instructions

Notes:

◎ This product has no user serviceable parts, components or assemblies. All maintenance work must be completed by Dynalasers personnel.

◎ To protect your rights, please be sure to contact Dynalasers or the local representative as soon as possible after discovering the fault and apply for product repair or replacement service. After authorization by Dynalasers, please send the warranty products in matching packages back to Dynalasers.

◎ If any damage is found after receiving the products, you must keep the certification documents so that you can claim your rights from the carrier. Important:

◎ Do not send any product back to Dynalasers without communication and confirmation.

◎ If the product is not within the warranty period or warranty coverage, please be responsible for the product repair costs.

Changes:

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

2 - Service Statement

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

If you have any questions, please call Dynalasers Customer Service Department: +86) 0755-400 000 3207 or send e-mail to this mailbox: info@dynalasers.com.

After the problem you reported is confirmed by Dynalasers Customer Service Department, it will be followed up by the technical support team. If your problem cannot be solved after communicating with the technical support team, you may need to send the product back to Dynalasers for further investigation.

Chapter 8 Warranty Statement

1 - General Terms

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

Shenzhen Dynalasers Technology Co., Ltd provides repair or replacement services for products that fail due to materials or production processes during the contract warranty period. The repair or replacement of products within the warranty scope shall still be guaranteed according to the remaining warranty period of the original product.

2 - Warranty Limitation

Products, components (including fiber connectors) or equipment is not covered by the warranty in the following cases:

(1) Tampered, opened, disassembled or modified by personnel other than Dynalasers;

(2) Damaged due to improper use, negligence or accident;

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

(4) Indirect damage to the laser caused by failure of user software or interface;

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

(6) Accessories and fiber connectors are not covered by the warranty.

The customer is responsible for understanding the above information and operating in accordance with the user manual, or the product failure caused thereby will not be covered by the warranty.

Important:

◎ Within the warranty scope, the customer must provide feedback within one month of discovering the failure.

◎ Dynalasers does not grant any third party or individual the authority to repair or replace our products.

Chapter 9 Scrap Notes

1 – Machine Scrap

The main methods for handling waste laser equipment include selecting professional recycling, following environmental principles and taking preventive measures.

The best way to dispose of discarded laser tubes is to choose a professional electronic waste recycling service. These services usually have the qualifications and technology to handle hazardous substances, ensuring that laser tubes are safely and environmentally treated. Recycling companies will classify, dismantle, and refine waste laser tubes, and recycle useful materials to reduce the pressure on natural resource extraction.