MFP-100W/200W Laser Cleaning Machine

USER GUIDE

Chapter 1
Product Description

The new generation Laser Cleaning Machine is a high technology product with non- contact laser cleaning. It can remove the grease, dirt, coating, paint, rust, residue, oxide layer, and other target materials with high efficiency, high performance, low cost and without harm to the base material. It can meet the cleaning requirements of complex modeling and fine positioning in the industrial processing field, achieving a cleaner cleaning effect and a lower overall production cost.

It is widely used in industrial area, such as automotive, mechanical, food processing, electronics, historic conservation, ship-building and power generation, etc.

Chapter 2
General Safety Information

1-Laser Safety Class

This device is built- in MFP- 100 /200 laser generatorwhich is classified as a high power Class IV laser instrument. It may emit 1064nm wavelength, peak powerup to 15kW ,and the average power is above 100W . This level of light may cause damage to the eye and skin. Despite the radiation being invisible, the beam may cause irreversible damage to the retina. Laser safety eyewear is not provided with this instrument, but must be worn at all times while the laser is operational. Use appropriate laser safety eyewear when operating this device.

2-Electrical Safety

1 、 Any interruption of the protective ground conductor from the earth terminal can result in personal injury;

2 、 Make sure the instrument is properly grounded through a protective conductor of the AC power cable, or else some fault may be caused including laser alarm, light malfunction or unsteady working.

3 、 Do not work in a high moisture/high temperature environment, or else short circuit or alarm of high moisture/high temperature will be caused and the normal service life of the Laser Eraser will be shortened.

3-Safety Conversions

All safety warning symbols during operating process of the device include:

Symbols	Description
	WARNING: Refers to a potential Electrical Hazard to human body; It requires a procedure that, if not correctly followed, may result in bodily harm to you and/ or others. Do not proceed beyond the WARNING sign until you completely understand and meet the required conditions.
	CAUTION： Refers to a potential hazard on product. It requires a procedure that, if not correctly followed, may result in damage to the product or components. In order to ensure normal use of equipment, do not violate the requirement of the CAUTION sign.
	WARNING: Refers to a potential Laser Hazard. The symbol represents laser radiation. The symbol is pasted on laser output end.
NO SYMBOL	IMPORTANT： Refers to any information regarding the operation of the product. Please do not overlook this information.

NOTE:

This Laser Cleaning Machine can emit the wavelengths ranged from 1060nm to 1100nm. Despite the radiation being invisible, the beam may cause irreversible damage to the retina. We suggest that you use appropriate laser safety eyewear when operating this device.

4-Laser Protection

1、Laser Protection Requirements

You must wear the safety protective glasses while operating the Laser Cleaning Machine, and rationally select the safety protective glasses according to the lasing wavelength of the laser. If the device is a tunable laser or Raman product, it emits light over a range of wavelengths and the end user should confirm the laser safety eyewear used protects against light emitted by the device over its entire range of wavelength.

5-Reference Standard

Electromagnetic Compatibility Emission:

EN 55011：5009+A1：2010

CISPR 11：5009+A1：2010

FCC Class A

Anti−interference Performance on Electromagnetic Compatibility:

EN 61000−3−2:5006+A1:5009+A2:5009

EN 61000−3−3:5008

EN 61326−1:5006

EN 61000−4−2:5009

EN 61000−4−3:5006+A1:5007+A2:2010

EN 61000−4−4:5004+A1:2010

EN 61000−4−5:5006

EN 61000−4−6:5009

EN 61000−4−11:204

Others−Electromagnetic Compatibility:

Classification A of digital instrument complies with Canada ICES−5003

Power Supply Security:

EN 61010−1:5001

Laser Security:

EN 60825−1:5007

CDRH 21 CFR 1040、10

Function Security:

EN ISO 13849−1：5008+A1：5009 Cat、3 / PL d

NOTE:

◎ Performances of The Laser Cleaning Machine meet the CE EMC certification requirements, the EMC requirements specified in "EMC Directive" of European market, the anti-interference requirements specified in "EMC" standard EN55011 emission and EN61326-1: 8006, and the emission requirements of group 1 classification A specified in EN55011.

◎ In accordance with relevant national standards and requirements, the laser must be classified according to its output power and laser wavelength. All MFP-Series laser products with high power belong to Class 4 products (according to section J, 1040.10 (d) of Part II , 21 CFR).

◎ According to the standards of EU, the equipment belongs to Class 4 instrument (according to article 9, EN 60825-1).

6-General Safety Instructions

1、Specular Reflection

There are often numerous secondary laser beams produced at various angles in the output port of the laser. These divergent beams are produced when the primary beam of laser reflects off a smooth surface, and they are called specular reflections. Although these secondary beams may be less powerful than the total power emitted from the primary beam, the intensity may be great enough to cause damage to the eyes and skin as well as surface of materials.

WARNING:

◎ You must exercise caution to avoid/minimize specular reflections as these laser radiations are invisible.

2、Safety Instructions of Accessories

Optical accessories relevant to the laser, such as light-sensitive elements that may be damaged from exposure to the laser light,such as video cameras, photomultipliers and photodiodes, need related protections.

WARNING:

◎ The output light of Laser Cleaning Machine is strong enough to cut or weld metal, burn skin, clothing and paint. In addition, this light can ignite volatile substances such as alcohol, gasoline, ether and other solvents. During the operating process, the flammable materials around the laser must be isolated.

3、Optical Operating Instructions

We strongly recommend that you read the following procedures before operating the Laser Cleaning Machine:

(1) Never look directly into the Laser Cleaning Machine output port when the power is turned on;

(2) Avoid positioning the Laser Cleaning Machine and all optical output components at eye level;

(3) Equip with laser beam casing;

(4) Ensure that all personal protective equipment is suitable for the output power and wavelength range of the Laser Cleaning Machine;

(5)) Use the Laser Cleaning Machine in a room with access controlled by door interlocks. Post warning signs. Limit the safety areas to operate the Laser Cleaning Machine;

(6) Please do not operate the Laser Cleaning Machine in darkened environments;

(7) Do not turn on the Laser Cleaning Machine without an optical coupling fiber or an optical output connector;

(8) Do not install or detach cutting heads or collimators when the Laser Cleaning Machine is active;

(9) Carry out commissioning, calibration and focusing at low output Carry out commissioning, calibration and focusing at low output power and then increase the output power gradually when the calibrating and focusing work is done;

(10) If the equipment is operated in a manner not specified in this document, the protection devices and performance of the equipment may be impaired and the warranty will be voided.

CAUTION:

◎ The output of the Laser Cleaning Machine is delivered through a lens with an anti-reflection coating. If the backward-stage light path of your Laser Cleaning Machine has the optical lens, please strictly inspect the lens of the output head and the backward-stage lens of the Laser Cleaning Machine, and ensure that there is no dust and any other impurity on the lens. Please note that any macroscopic attachment may cause extreme damage to lens or burn the Laser Cleaning Machine or any backward-stage light path equipment.

◎ For cleaning instructions of the lens, please refer to the "Optical Fiber Connector Inspection and Cleaning Guide".

◎ Hot or molten pieces of metal may be produced when the Laser Eraser is under operation. Exercise caution if debris is produced in operation.

◎ When you carry out commissioning and calibration of the laser output, you must set the laser output at low power level and then gradually increase the output power during checking the quality of the light spot emitted from the laser via an infrared viewer.

WARNING:

◎ Make sure that the individual protective equipment meets the output power and wavelength range of the laser.

◎ Never look directly into the optical fiber or the collimator, and make sure you wear the safety protective glasses in each operation.

4、Electrical Operating Instructions

We strongly recommend that you read the following procedures before operating the Laser Cleaning Machine:

（1）Make sure the shell of this equipment is properly grounded. Any interruption of the ground loop may result in personal injury;

（2）Make sure the power source connecting equipment is properly grounded;

（3）In order to further reduce fire hazard, replace the line fuses (if applicable) with the same types and ratings. The use of other fuses or material is prohibited;

（4）Make sure that the input AC voltage of the Laser Cleaning Machine is the voltage of the normal AC mains, and wires are connected accurately. Any incorrect wiring method may cause damage to people or instrument;

（5）The equipment does not have any part which can be maintained by operators, and all the maintenance operations must be finished by the professionals of Maxphotonics Co., Ltd;

（6）To prevent electrical shock, do not remove enclosure, detach the laser without permission and damage the relevant signs;

（7）Any product with unauthorized dismounting shall not be subject to warranty.

WARNING:

◎ The input voltage of the Laser Eraser is single-phase AC current (220V AC), which may cause risk of electric shock. All the relevant cables and connection wires have potential hazards.

5、Environment Conditions and Precautions

For ensuring the safety of the laser working area, suitable enclosures shall be applied, including but not limited the laser safety signs and the

interlocking devices. The gases, sparks and debris that can be generated from interaction between the laser and the work surface can pose additional safety hazards. Corresponding operators must be trained and examined and know the normal safety specifications for operating the Laser Eraser.

Meanwhile, it is important that the output components shall not be installed at eye level. Because of interaction of the laser and the metal material, the radiation of high-level ultraviolet light or visible light may be produced. Make sure that the laser is provided with the protective cover to prevent the eyes or other parts of human bodies from damage by radiation.

We recommend that you comply with the following operating measures to prolong the service life of the Laser Cleaning Machine:

(1) Do not expose the Laser Cleaning Machine to a high moisture/ high temperature environment. Install the Laser Cleaning Machine in the cabinet with the function of temperature-humidity control and dust-free.

(2) Operation at higher temperature will accelerate aging, increase threshold current and lower slop efficiency. If the device is overheated, stop operation and contact.

CAUTION:

◎ Exercise caution to avoid damage to the device.

◎ If the Laser Eraser will be in an environment of less than 0 degrees Celsius, drain all coolant out of laser completely to prevent damage to the laser.

7-Additional Safety Information

For additional information regarding Laser Safety, please refer to the list below:

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-Standard Data of Non-handheld Eraser

Base Material	Surface	Effective DOF (mm)	Low Speed (mm²/s)	Normal Speed (mm²/s)	High Speed (mm²/s)	Effect
Cast iron	Severe rust (0.05mm thick)	10	1800	2200	3500	Clean surface and no harm to base material
Carbon steel	Moderate rust (0.05mm thick)	10	1800	2000	2500	Clean surface and no harm to base material
Stainless steel	Greasy dirt, slight rust	10	1800	2200	3000	Clean surface and no harm to base material
Mould–steel gear	Moderate greasy, iron residue	10	1800	1800	2500	Clean surface and no harm to base material
Aluminum	Oxide, Dirty surface	10	1500	1800	2200	Clean surface and no harm to base material
Paint without putty	white Plain paint (0.1mm thick)	10	2000	2200	3000	Clean surface and no harm to base material

The data listed above is only for reference. Practical data will differ because of the application complexity.

2-General Characteristic Parameters

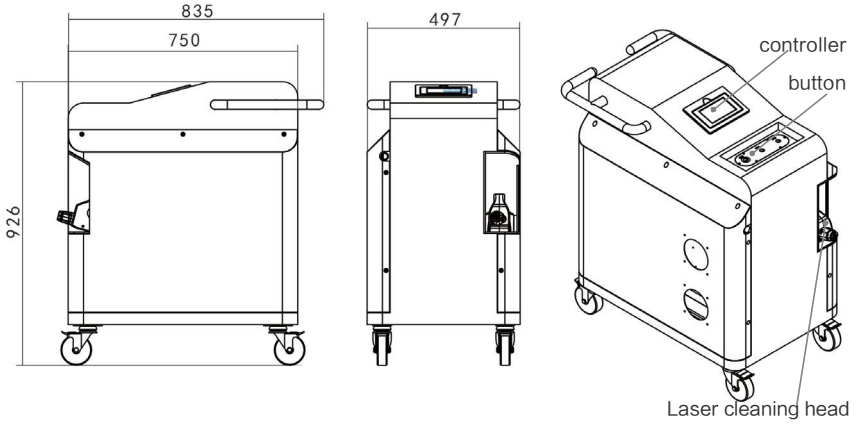
No.	Characteristics	Test Conditions	Min.	Nom.	Max.	Unit
1	Operating Voltage	220	210	220	230	AC
2	Maximum Current Consumption	Pout=Pnom	4	5	6	A
3	Operating Ambient Temperature		0		+40	℃
4	Storage Temperature		−10		+60	℃
5	Cooling Method	Air Cooling				
6	Warm up Time	−Operate the machine after the warning tone stop	10			s
		−work steady	3			min
7	Relative Humidity		10		96	%
8	Dimensions	100W	390*150*485（W*D*H）			mm
		200W				
9	Weight	100W	87			kg
		200W	93			

3-Structural Layout

1、Dimensions of the 100W–200W Laser Eraser

Dimensions of the head of the Laser Cleaning Machine (unit: mm)

Dimensions of the cabinet of the Laser Cleaning Machine (unit: mm)



The size of the structure is subject to the final product.

Chapter 4
Operating Steps

1-Power Supply

Connect the Laser Cleaning Machine with 220V AC power.

2-Startup Steps

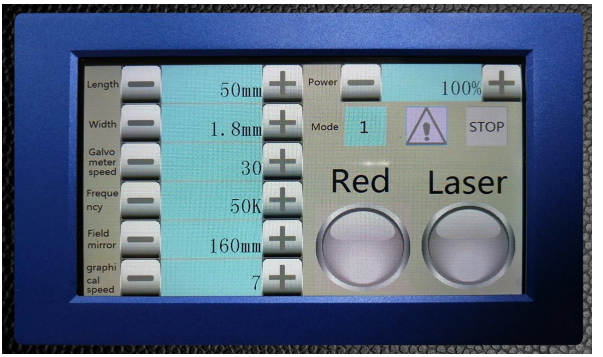
1. Release the red Emergency Stop Switch;

2. Turn the power key to the right, the machine power on while the warning tone ring out, do not operate the machine until the warning tone stop;

3. The “Start” button is working button, press when the machine is working, keep the button in upspring state when the machine is standby.

3-Control board setting parameters

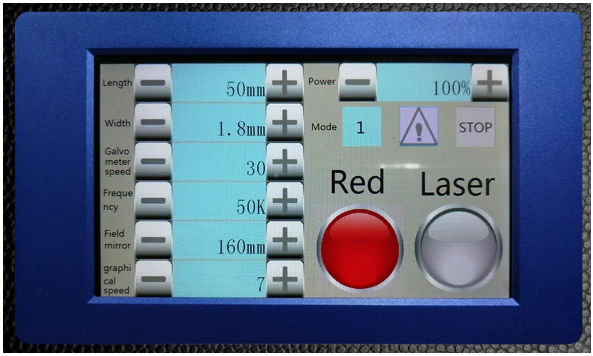
1. Graphic length：Max 68mm
2. Graphic width：Max 3.0mm
3. Galvanometer speed：Fastest Speed 32
4. Laser frequency：25KHz-200KHz
5. Field Lens selection：160mm、254mm（default）、330mm
6. Graphics speed：1-12
7. Laser Power：5%-100%
8. Mode setting: After setted the parameters, click the sequence number next to the mode. Enter the mode save interface, click Save, then click Read . This machine can be setted 10 modes.



4-Turn On the Ted Light for Preview

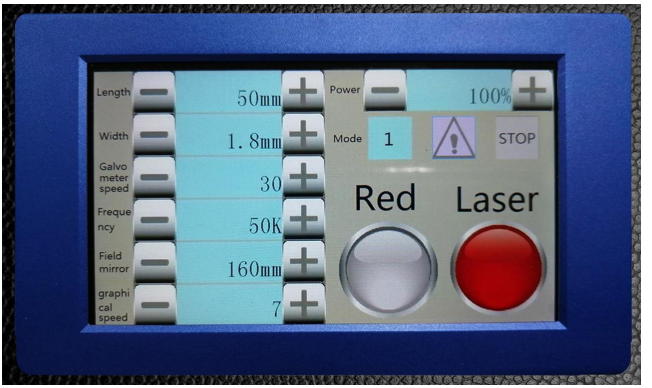
1. Open the protection cover of the laser cleaning head;

2. Click on the red button on the touch screen , the hand-held the laser cleaning head indicate red light.



5-Cleaning Operation

1. Turn off the control board "Red Light";
2. Turn on the control board "laser";
3. Press the "handle laser button";
4. After used , press the “Handle Laser Button” again.



6-Applications

1- Rust Erasing

Sample：angle iron

Base material: Q235

Laser Eraser: Standard Type

Erasing Efficiency: 1800mm²/s

Erasing Effects: surface undamaged and no rust left behind

Sample：propeller gear shaft

Base material: 40Cr

Laser Eraser: Standard Type

Erasing Efficiency: 1800mm²/s

Erasing Effects: surface undamaged and no rust left behind

Sample：carbon steel tube
Base material: carbon steel
Laser Eraser: Standard Type
Erasing Efficiency: 2000mm²/s
Erasing Effects: surface undamaged and no rust left behind

Sample：chuck
Base material: alloy steel Laser
Eraser: Standard Type Erasing
Efficiency: 2000mm²/s
Erasing Effects: surface undamaged and no rust left behind

2- Paincoat Cleaning

Sample：bending sheet metal

Base material: carbon steel(paintcoat)

Laser Eraser: Standard Type

Erasing Efficiency: 2200mm2/s

Erasing Effects: paintcoat remove completely, no damage to the base material

Sample：gif box

Base material：cold-roll steel sheets

Laser Eraser：Standard Type Erasing

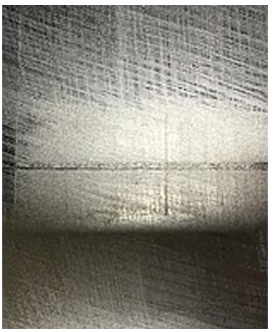
Efficiency：1800mm2/s

Erasing Effects: paintcoat remove completely, no damage to the base material

3- Pre and Post Treatment of Welding

Sample：water pipe joint
Base material: alloy cast iron
Laser Eraser: Standard Type
Erasing Efficiency: 2200mm²/s
Erasing Effects: surface polished and no stained layer left behind

Sample：stainless steel trough
Base material: SUS304
Laser Eraser: Standard Type
Erasing Efficiency: 2200mm²/s
Erasing Effects: surface polished and no oxide residue left behind



4– Oxide Erasing

Sample: vane of air blower

Materials: 2Cr13

Laser Eraser: Standard Type

Erasing Efficiency: 1500mm²/s

Erasing Effects: surface polished without any oxide residue

Sample: Aluminum alloy plate

Materials: 6033

Laser Eraser: Standard Type

Erasing Efficiency: 1800mm²/s

Erasing Effects: surface polished without any oxide residue