



MFSC 700W–1500W CW Fiber Laser Series

USER GUIDE

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Preface

Thank you for using the MFSC 700W–1500W Series fiber laser products from 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, and your understanding 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 recommend that the operator read the Section 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

As a large laser manufacturer founded in 2004, Maxphotonics Co., Ltd. specializes in research and development, production and sales of lasers and ancillary products. Maxphotonics owns a number of independent intellectual property rights and patents as well as high-power pulsed fiber laser, high-power fiber laser and high-power fiber amplifier etc.

So far, with intellectual property rights and patents, Maxphotonics owns industrial pulsed fiber laser series, fiber laser for scientific researches, tunable fiber laser, fiber amplifier, ASE light source, etc. Those products are widely applied to fields of laser marking, DTS system and scientific research.

Maxphotonics offers laser, relevant solution and ancillary facility to domestic and foreign customers. We adhere to the enterprise mission statement of "Maxphotonics leads the industry", take customer satisfaction as the start point, completely implement ISO9001 quality management system, introduce ERP information management system and provide all-round pre-sales and after-sales service for customers.

Relying on excellent ability of product design and development, we carry out all-round exchanges and cooperation with international famous laser companies and various research institutions of China, continuously increase the investment of science research, constantly update diversification of production types, lead the trend of the industry and create maximum value for customers, so as to strive perseveringly for the world-class laser manufactures and forge ahead.

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Chapter 1

Characteristic Explain

MFSC CW Fiber Laser (MFSC 700W–1500W) Series products provide a wide range of wavelength from 1060nm to 1100nm. The lasers are water-cooled and maintenance-free and with a wall plug efficiency of more than 30% and deliver high efficiency, high reliability, and high performance.

Maxphotonics' MFSC CW Fiber Laser (MFSC700W–1500W) Series are Class 4 laser products and are designed and tested with safety. By following this User Guide and applying sound laser safety practices, it will be a safe and reliable device.

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 – Safety Conventions

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

SYMBOLS	DESCRIPTION
	<p>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</p>
	<p>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.</p>
	<p>WARNING : Refers to a potential Laser Hazard. The symbol represents laser radiation. The symbol is pasted on laser output end.</p>
<p>NO SYMBOL</p>	<p>IMPORTANT : Refers to any information regarding the operation of the product. Please do not overlook this information.</p>

NOTE :

© This device is classified as a high power Class IV laser instrument. It may emit up to 1500W average power from 1060nm to 1100nm. 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. The manufacturer of the laser system is responsible for the safety compliance according to the applicable standards and regulations.

2-Laser protection

1.Laser Protection Requirements

You must wear the safety protective glasses while operating the laser, 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.

2.Laser Protective Equipment Suppliers

Maxphotonics recommends material or equipments provided by following laser protective equipment suppliers for you, including LaserVision USA, Kentek Corporation, Rochwell Laser Industries, etc. All the supplier information is provided by Maxphotonics only for the convenience to use, so Maxphotonics assumes no responsibility for any problem caused by using the products of abovementioned suppliers.

3–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

Please note:

◎ Performances of Maxphotonics MFSC laser 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 MFSC 700W-1500W 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).

4-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, video cameras,

photomultipliers and photodiodes, need related protections.

WARNING:

© The Maxphotonics MFSC laser light 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:

- (1) Never look directly into the laser output port when the power is turned on.
- (2) Avoid positioning the laser and all optical output components at eye level.
- (3) Equip with laser beam casing.
- (4) Remove the end-cover before switch ON laser. Or else the output head will be damaged irreversibly.
- (5) Ensure that all personal protective equipment is suitable for the output power and wavelength range of the laser.
- (6) Use the laser in a room with access controlled by door interlocks. Post warning signs. Limit the safety areas to operate the laser.
- (7) Please do not operate laser in darkened environments.
- (8) Do not turn on the laser without an optical coupling fiber or the optical output connector.
- (9) Do not install or detach cutting heads or collimators when laser is

active.

(10) 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.

(11) 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 is delivered through a lens with an anti-reflection coating. If the backward-stage light path of your laser has the optical lens, please strictly inspect the lens of the output head and the backward-stage lens of the laser, 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 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 is under operation. Exercise caution if debris is produced in operation.

◎ When implement commissioning and calibration of laser output, it' s necessary to set the quality of the spot emitted from the laser at low power levels via an infrared viewer, and then gradually increase the output power.

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:

WARNING:

- ⊙ Make sure the shell of this equipment is properly grounded. Any interruption of the ground loop may result in personal injury.
- ⊙ Make sure the power source connecting equipment is properly grounded.
- ⊙ 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.
- ⊙ Make sure that the input AC voltage of the laser is the voltage of the normal AC mains, and wires are connected accurately. Any incorrect wiring method may cause damage to people or instrument.
- ⊙ 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.
- ⊙ To prevent electrical shock, do not remove enclosure, detach the laser without permission and damage the relevant signs.
- ⊙ Any product with unauthorized dismounting shall not be subject to warranty.

WARNING :

- ⊙ The input voltage of the laser 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. Corresponding operators must be trained and examined and know the normal safety specifications for operating the laser.

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:

(1) Do not expose the laser to a high moisture/high temperature environment. Install the laser 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 Maxphotronics.

Caution:

- ◎ Exercise caution to avoid damage to the device.
- ◎ If the laser will be in an environment of less than 0 degrees Celsius, drain all coolant out of laser completely to prevent damage to the laser.

5–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-Features

As high power lasers developed for industrial application, MFSC 700W–1500W Series lasers are compact and efficient. The lasers are mainly applied to the fields of welding, cutting, brazing, etc.

Main Features:

- (1) High-quality laser output
- (2) High power, high efficiency
- (3) High reliability, long service life
- (4) Compact, rugged package
- (5) Extension programming interface

Applications:

- (1) Industrial applications
- (2) Scientific research

2- Modulation Configuration

Maxphotonics offers many configurable modes. This manual will give complete instructions for all modes, please refer to section 6.3–6.6.

3–Laser Model Designation Codes

Model	Model Coding Rules
MFSC-700W	Maxphotonics Single-mode CW Fiber Laser 700W
MFSC-800W	Maxphotonics Single-mode CW Fiber Laser 800W
MFSC-1000W	Maxphotonics Single-mode CW Fiber Laser 1000W
MFSC-1200W	Maxphotonics Single-mode CW Fiber Laser 1200W
MFSC-1300W	Maxphotonics Single-mode CW Fiber Laser 1300W
MFSC-1500W	Maxphotonics Single-mode CW Fiber Laser 1500W

4–Certification

Maxphotonics certifies that this equipment has been thoroughly tested and inspected and meets published specifications prior to shipping. Upon receiving your equipment, check whether the packaging and accessories have been damaged in transit. If damage is apparent, please contact Maxphotonics immediately.

5 – Front Panel Description



EMERGENCY STOP

ITEMS	FUNCTION DESCRIPTION
(OFF ON) Key Switch	Power switch of laser
(EMERGENCY STOP) Emergency Stop Switch	Emergency stop
(START) Start Switch	Start laser (on-off signal of hardware)
Display Screen	Laser operating state indicate
ALARM	Abnormal situation light of laser
ACTIVE	Normal situation light of laser
POWER	Power light of laser

6-Back Panel Description



ITEMS	FUNCTION DESCRIPTION
CTRL	External control connector
RS232	RS232 connector
AC220	220VAC power input
POWER	Leakage protection switch
WATER OUT	Water cooling output port
WATER IN	Water cooling input port
OPTICAL OUTPUT	Laser output connector

7-Optical Output Terminal

1 .Optical Output Head

The optical output head come with a protective window that can be replaced if damaged. Please refer to 6.4 about the cleaning method.

Make sure that the black end cap of the QBH head is removed prior to use and is usually arranged with the laser.



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-700W	100% CW		700		W
	Output power MFSC-800W	100% CW		800		W
	Output power MFSC-1000W	100% CW		1000		W
	Output power MFSC-1200W	100% CW		1200		W
	Output power MFSC-1300W	100% CW		1300		W
	Output power MFSC-1500W	100% CW		1500		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	± 3	%
8	Long-term power instability	100% CW>24h		± 2	± 5	%
9	Beam quality M ²	100%CW (20u-QBH)			1.3	
		100%CW (50u-QBH)			2.8	
10	Laser switching ON time	10% → 90%Output		50	100	μ s
11	Laser switching OFF time	90% → 10%Output		50	100	μ s
12	Modulation rate	100%Output			20	KHz

13	Red guide laser power	100%Output	150			μ W
14	Feeding fiber cable length			15		m
15	Feeding fiber core size		50 (30/100 optional)			μ m
16	Feeding fiber cable bending radius		200			mm
17	Output form	Standard QBH (LOC)				

2 –General Characteristic Parameters

No.	Characteristics	Test conditions	Min.	Nom.	Max.	Unit
1	Operating voltage		180	220	240	VAC
2	Nominal power consumption MFSC-700W	100% Output			2.5	KW
	Nominal power consumption MFSC-800W	100% Output			2.8	KW
	Nominal power consumption MFSC-1000W	100% Output			3.5	KW
	Nominal power consumption MFSC-1200W	100% Output			4	KW
	Nominal power consumption MFSC-1300W	100% Output			4.5	KW
	Nominal power consumption MFSC-1500W	100% Output			5	KW
3	Operating ambient temperature		10		40	$^{\circ}$ C
4	Operating ambient relative humidity		10		85	%
5	Cooling method	Water-cooling				
6	Storage temperature		-10		60	$^{\circ}$ C
7	Dimensions	800*482.6*193.2				mm
8	Weight	50 \pm 3				kg

3–Water Cooling Condition

Maxphotronics Version						
No.	haracteristics	Laser Model	Min.	Typ.	Max.	Unit
1	Method	Water Cooling				
2	Cooling Water Temperature	300W–1500W	26		28	°C
		2500W–6000W	25		26	
3	Water Flow Rate for laser cooling	300W /500W	10			L/min
		800W/1000W	12			
		1500W	15			
		2500W	30			
		4000W	42			
		6000W	65			
4	Minimum head of delivery	300W /500W	21			m
		800W/1000W	30			
		1500W	38			
		2500W	45			
		4000W	45			
		6000W	53			
5	Refrigerating capacity of cooling machine	300W /500W	2			HP
		800W/1000W	2.5			
		1500W	3			
		2500W	4			
		4000W	5			
		6000W	8			

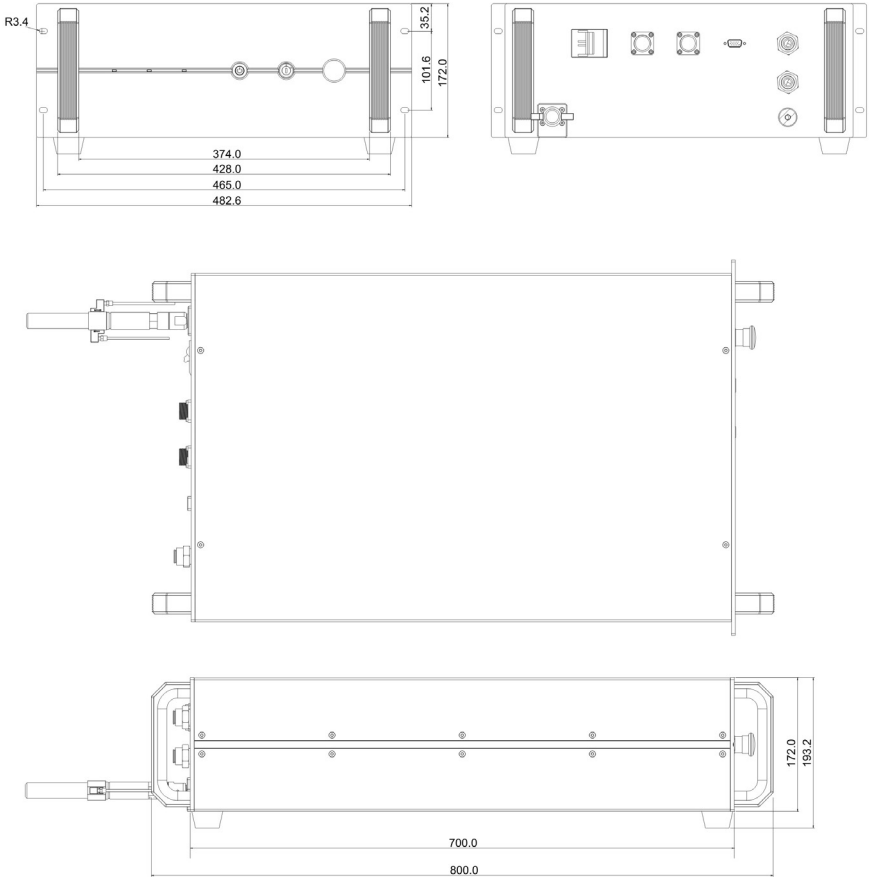
Dew Point										
Environment Tem.	Maximum relative humidity									
	10%	20%	30%	40%	50%	60%	70%	80%	90%	95%
10°C	-20	-11.9	-6.8	-3.0	0.6	2.6	4.8	7.6	8.4	9.2
15°C	-16.4	-7.9	-2.4	1.5	4.7	7.3	9.6	11.6	13.4	14.2
20°C	-12.5	-3.7	1.9	6.0	9.25	12.0	14.4	16.4	18.3	19.2
25°C	-8.7	0.5	6.2	10.5	13.8	16.7	19.1	21.3	23.2	24.1
30°C	-5.0	4.6	10.5	15.0	18.4	21.4	23.9	26.2	28.2	29.1
40°C	2.6	12.7	19.1	23.8	27.6	30.7	33.5	35.9	38.0	39.0
50°C	10.0	20.8	27.6	32.6	36.7	40.0	43.0	45.6	47.9	49.0
	Operation Temperature Range									

CAUTION:

© This chart can be consulted for the dew point (temperature at which moisture will precipitate or condense out of ambient air) in different working environment. If the temperature of the laser lower than the crossing temperature in the chart, there is risk of condensation within the laser.

4-Structural Layout

Laser Three Views. (Unit: mm)



Chapter 5

Disassembly Guide

1-Disassembly Step

The laser belongs to the precise valuables, so Maxphotonics recommends the following steps to unpack the packing box.

Please unpack according to the following steps:

- (1) Place the packing box containing the laser on a horizontal platform such as the floor or a large table.
- (2) Open the primary box and remove the foam cover.
- (3) Since there is fiber on top of the laser, please carefully take it out from the box and ensure that the maximum bending radius of the optical armoured cable is greater than 400mm. The fiber shall be taken out under cooperation of three employees, with two employees lifting the main body of the laser and another employee taking out the armoured cable.
- (4) Remove the form cover and take out the fittings.
- (5) Check the fittings according to the "Packing List".
- (6) Keep all objects after unpacking for future transportation or storage needs.

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

Names of fittings	Description	Unit	Quantity
Fiber Laser	MFSC(1200–1500) Series	Pc	1
220VAC power wire	3 M	Pc	1
External signal wire	3.5 M	Pc	1
RS232 signal wire	Shielded RS232 cable with Female head on both ends	Pc	1
Power Keys		Pc	2
USB disk	16 G	Pc	1
Lens cleaning paper		Pc	4
Sample of QBH water pipe	Φ6x4mm	Pc	1
Sample of water pipe of laser	Φ12x10mm	Pc	1
Manual	MFSC 700W–1500W User Manual	Pc	1
Qualified Report	MFSC 700W–1500W Testing Report	Pc	1

Chapter 6

Operation Guide

1 – Notice

Caution:

- ◎ Please refer to Section "Detail Specification Table" for proper electrical power.
- ◎ Refer to Section "General Safety Instructions" for inspecting whether the configuration environment of peripheral work of the laser meets the requirements.

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 20A 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- Extension Interface

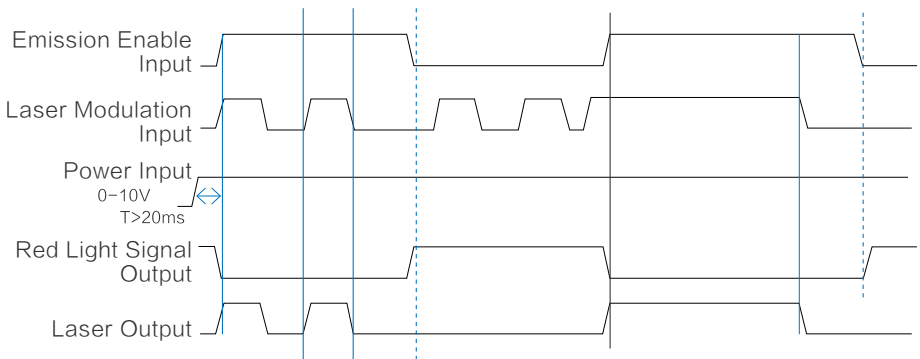
For ensuring the communication between the laser and the board card, Maxphotonics adopts the high-quality HARTING terminal and provides the CTRL interface connectors. The interface definition is shown in the figure below.

CTRL Interface Definition

CTRL	WIRE COLOR	FUNCTION DESCRIPTION	REMARK
1	Red	Emission enable input (positive) +	24VDC high level voltage valid
2	Red and White	Emission enable input (negative) -	
3	Black	Modulation input (positive)	24VDC high level voltage valid
4	Black and white	Modulation input (negative)	
5	Yellow	External laser output (positive)	This interface is equivalent the function of "START" button on laser front panel
6	Black and yellow	External laser output (negative)	

7	Green	DA(0–10V) input (positive)	analog signal, control output power percentage
8	Green and white	DA(0–10V) input (negative)	
9	Brown	Fault output 1	Fault output 1 and 2 off when alarm on Fault output 1 and 2 on when alarm off
10	Brown and white	Fault output 2	
11	Blue	NC	
12	Blue and white	NC	

External Control Signal Timing



4–Fiber Connector Inspection and Cleaning Guide

1.Tools

For cleaning a fiber connector you need the following materials:

- (1) Powder-free rubber gloves or fingerstall
- (2) Lint free optical cleaning wipes and/or swabs
- (3) Anhydrous ethanol (Optical level, pure >99.5%)
- (4) Compressed air (oil free, water free)

(5) Microscope

(6) Light source

CAUTION :

- ◎ It is imperative that the protective lens are checked for dirt, dust, or damage before you use the fiber connector. It will lead to heavy damage if the laser equipped with dirty or damaged fiber connector.
- ◎ The use of a dirty fiber connector can result in laser damage, which is not covered by the Maxphotonics' warranty.
- ◎ The laser will not be covered by the Maxphotonics' warranty if the buyer change the laser without permission.

IMPORTANT :

- ◎ It is imperative that you wear powder-free rubber gloves during this cleaning procedure! It is hereby stated that damage to the fiber connector can occur due to mishandling, the use of incorrect cleaning procedures, or chemicals for cleaning. This is not covered by the Maxphotonics' warranty.
- ◎ Ethanol concentration should be above 99.5% during cleaning.

2.Operating Procedures

Cleaning and maintaining according to the following procedures:

- (1) Switch off the laser power, and place the key switch on position of "OFF";
- (2) Remove the black outer protective sleeve and leave the white inner cap on and clean the fiber connector exterior with optical cleaner, wipe it with a clean optical wipe and dry it with compressed air.
- (3) Place fiber connector in the holder of the microscope, remove the white inner cap from the connector.
- (4) Focus the microscope onto the connector surface so that the

protective lens can be seen clearly from the microscope.

(5) Check the surface carefully. If some contamination is visible on the surface, cleaning is necessary:

1. Put a few drops of alcohol onto the lint free swabs and throw away the excessive alcohol.
2. Place the swabs on the dust via microscope.
3. Cleaning the dust carefully, and move it to the edge of lens.
4. Repeat these cleaning steps until all contamination is removed. Take a final check under the microscope.

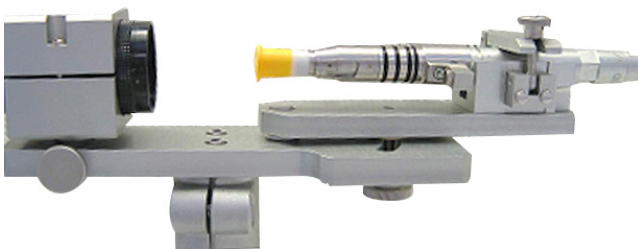
(6) Reinstall the inner cap and the outer sleeve onto the cleaned fiber connector.

(7) Take out the cap and sleeve, then connect the fiber connector with cutting head quickly and fasten them. (Place the cap face down on a clean surface or a lint-free wipe.)

Take out the cap and sleeve



Install fiber connector under microscope



Cleaning protective lens with swabs



IMPORTANT:

- ◎ Do not reuse a lint-free optical wipe or swab.
- ◎ 2) Do not touch the protective lens of the fiber connector.
- ◎ Do not blow directly, or else new dirt will be brought.
- ◎ Do not touch the tip of the cleaning swab with your fingers and use each swab only once.
- ◎ Cleaning is necessary before placing the protective cover and sleeve. Never blow air directly at the surface, because you could embed contaminants into the surface. Always blow across the surface!
- ◎ If the fiber connector could not be installed in the optical system immediately, please cover it with the protective cap cleaned with compressed air.

5–Start Step

WARNING:

- ⊙ Make sure that all the electrical connections (including cooling water connections) are connected prior to use. All the connectors must be held steady with screws if possible.
- ⊙ NEVER look directly into the output fiber and make sure that you wear the laser safety eyewear while operating the product.
- ⊙ Make sure all power is removed from the laser when wiring.

Starting procedures are as follows:

- (1) Start the water–cooling machine;
- (2) Remove the end cap of the collimator;
- (3) Make sure that the end surface of the collimator is clean and not covered with impurities;
- (4) Make sure that the emergency stop switch is turned on;
- (5) Open the power supply of the laser;
- (6) Place the key switch of the front panel on position "ON".
- (7) Press the START button on the front panel. (For external control method)

6– Mode Description

The working modes of the laser are as follows:





- (1) Internal control: Control the output of the laser via control software. This mode is used for checking whether the laser is normal or not, and testing the laser power.
- (2) External Control: Control the output of the laser via external control line (EE, modulation, 0–10V analog voltage and START button). This mode is used for cutting and welding.

7-Software Description

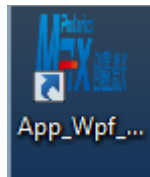
(1) Software setup save in USB DISK.



(2) Click right button to unzip the files to D.

Name	Date modified	Type	Size
 DotNetFX40Client	2018/3/30 10:09	File folder	
 WindowsInstaller3_1	2018/3/30 10:09	File folder	
 MFSC-1500W Setup.msi	2018/3/30 8:52	Windows Installer ...	5,797 KB
 setup.exe	2018/3/30 8:52	Application	421 KB

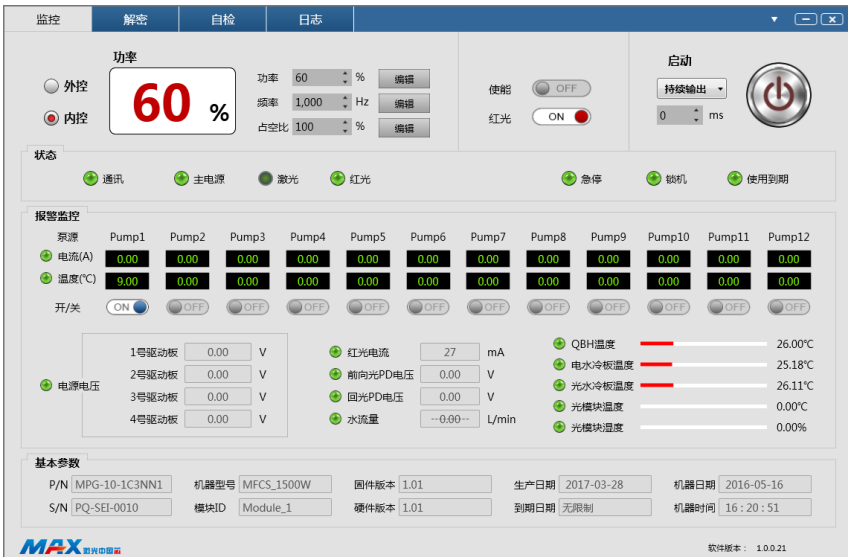
(3) Double click setup document, finish installment guide.



(4) Double click desktop shortcut to open the program, access to the following connect interface:



(5) Use the serial interface cable which is enclosed with the device, connect the laser and PC, select a port number, click “connect” button.



8-Error Listing

The fault alarm points set by the laser include:

SN.	Message	Description	Trouble shooting
1	Front lamp warning	Laser internal light path testing fault	Operation leads to low output power of laser such as low modulation frequency, low peak power, low cutting power
2	Pump overheat warning	Overheat fault of laser	For the internal overheat fault of the laser, please check whether the pre-set temperature of water-cooling machine meets the requirements; if this cause is excluded, please contact Maxphotronics.
3	Water cooling plate overheat warning	Overheat fault of water cooling plate	For overheat fault of water cooling plate, please check whether the pre-set temperature of water-cooling machine meets the requirements
4	Emergency stop alarm	The emergency stop switch is pressed	Release the emergency stop switch, the laser will work again after being restarted; if this fault still exists, please contact Maxphotronics.
5	Water flow error	Pipeline fault of chiller or laser	Please check whether the water pressure is normal, the water pipeline is clear and replace the bad water switch if need.
6	Overcurrent warning	Overcurrent fault of laser	If "0-10V" DA value exceeds the pre-set value, the internal overcurrent fault will occur; if the fault is not caused by this reason, please contact Maxphotronics.

7	Overvoltage	Overvoltage fault of laser	If the laser has internal overvoltage, please check whether the AC Voltage is within the range of 200~210V.if this cause is excluded, please contact Maxphotonics.
8	QBH warning	Install error of QBH	The fault will be produced when QBH head is not inserted in the internal part of the cutting head; if this cause is excluded, please contact Maxphotonics.

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 can be solved by carefully reading this "User Guide". Please call the Customer Service Department for other questions.

If your problems cannot be solved over the telephone with our technical support group, you may need to return the product to Maxphotonics for further troubleshooting.

Chapter 8

Warranty Statements

1-General Items

Maxphotonics 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 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.