MAX PHOTONICS

MFSC 2000W-3000W (Chassis Type) Single Module CW Fiber Laser

USER GUIDE

Maxphotonics Co.,Ltd.

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Preface

Thank you for using the MFSC Series CW fiber laser 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, your understanding and suggestion to help us make an improvement will be much appreciated . Thank you again for using Maxphotonics' products.

Please take time to read and understand this User's Guide《MFSC 2000W-3000W (Chassis Type) Single Module CW Fiber Laser》 and familiarize yourself with the operating and maintenance instructions before you use the product. We strongly recommend that the operator read the Section 2 titled "Safety Information" prior to op erating 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.

MAX PHOTONICS

Company Profile

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

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

More informations，please visit our website：

http://en.maxphotonics.com

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Chapter 1
Characteristic Explain

MFSC 2000W-3000W (Chassis Type) Single Module CW Fiber Laser is developed by

Maxphotonics, provide a wide range of wavelength from 1060nm to 1100nm. The

lasers are water-cooled and maintenance-free and with the efficiency is more than 30%.

Maxphotonics' MFSC 2000W-3000W (Chassis Type) Single Module CW Fiber Laser 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
	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 :

◎ Maxphotonics' MFSC 3000W (Chassis Type) Single Module CW Fiber Laser . It may emit up to 3000W 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.

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

Anti-interference Performance on Electromagnetic Compatibility:

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

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

EN 61000-3-2:2014

EN 61000-3-3:2013

Power Supply Security:

EN 61010-1:2010

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

Laser Security:

EN 60825-1:2014

CDRH 21 CFR 1040.10

NOTE:

◎ In accordance with relevant EU and national standards and requirements, the laser must be classified according to its output power and laser wavelength. All MFSC-2000W-4000W-Series laser products with high power belong to Class 4 products (according to article 8, 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

The photosensitive elements integrated in laser-related optical accessories may be damaged by laser exposure, such as video cameras, photomultiplier tubes, and photodiodes. Attention should be paid to related device protection.

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 the 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 the laser in darkened environments.

8、Do not turn on the laser without an optical coupling fiber or an optical output connector.

9、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、Do not install or detach cutting heads or collimators when the laser is active

11、Make sure that the laser is shut down and the power is off before you install or detach cutting heads or collimators.

12、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 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:

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 is the voltage of the normal AC mains (Three-phase four-wire 360-440VAC), 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. Any product with unauthorized dismounting shall not be subject to warranty.

WARNING:

◎ The input voltage of the laser is triple-phase AC current (360-440VAC), 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 environment.

2、Operation at higher temperature will accelerate aging, increase threshold current and lower slop efficiency. If the device is overheated, stop operations

and contact Maxphotonics.

3、Ensure that the work surface is properly vented. There may be gases, sparks and debris generated from the interaction between the laser and the work surface, and they could pose additional safety hazard.

CAUTION :

◎ The device may be damaged with incautious operation.

◎ If the laser is placed in an environment below 0°C, be sure to add a corresponding antifreeze to the water tank of the chiller. If the machine is not used for a long time, be sure to drain the water in the inlet and outlet channels (high-pressure air gun is recommended) to prevent the residual water from freezing and damaging the water-passing devices.

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

MFSC Series CW fiber lasers are compact and efficient high power lasers developed for industrial application. Mainly used in the fields of drilling, cutting and welding.

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-Module 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

M - F - S - C - XXX - XX 1 - 2 - 3 - 4 - 5 - 6		
1	Manufacturer's code	M means Maxphotonics

2	Gain media of the laser	F means Fiber Laser
3	Laser Module	S means Single Module
4	Laser state	C means Continue Wave
5	Maximum output power	XXXX W means the maximum output power of the laser
6	Additional message	Can be null

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)
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
ETHERNET	Ethernet interface
AC 380V	360-440VAC power input
POWER	360-440VAC power switch
WATER OUT	Water cooling output port(3/4 inch)
WATER IN	Water cooling input port(3/4 inch)
OPTICAL OUTPUT	Laser output connector

7-Optical Output Terminal

1、Optical Output Head

The fiber head is used in conjunction with the protection window and can be replaced after damage. Be sure to remove the QBH head and tail cap before use, which is usually placed with the laser. Refer to “Fiber Connector Inspection and Cleaning Guide” for protective window cleaning supplies and methods.

Optical Output Head (QBH head)

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-2000W	100% CW		2000		W
	Output power MFSC-3000W	100% CW		3000		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	±2	%
8	Long-term power instability	100% CW>24h		±3	±5	%
9	Beam quality BPP	50um-QBH Output		1.1	1.5	mm x mrad
		100um-QBH Output		2.8	3.6	mm x mrad
10	Laser switching ON time			100	150	μs
11	Laser switching OFF time			100	150	μs
12	Modulation rate	100%Output			5	KHz
13	Red guide laser power	100%Output	200			μW
14	Feeding fiber cable length MFSC-2000W	50um-QBH Output		15		m
	Feeding fiber cable length MFSC-3000W	50um-QBH Output		20		m
15	Feeding fiber core size		50（100、200 optional）			μm
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		360	400	440	VAC
2	Input Power MFSC-2000W	100% Output			6.5	KW
	Input Power MFSC-3000W	100% Output			10	KW
3	Operating ambient temperature		10		40	℃
4	Operating ambient relative humidity		10		85	%
5	Cooling method	Water-cooling				
6	Storage temperature		-10		60	℃
7	Dimensions	482.6*850*172 (W*D*H)				mm
8	Weight MFSC-2000W	72 ±3				kg
	Weight MFSC-3000W	80 ±3				kg

3-Water Cooling Condition

No.	Characteristics	Min.		Unit
1	Cooling Method	Water Cooling		
2	Ambient Temperature	⩾ 30	＜ 30	℃
	Chiller Set Temperature	24-26	20-23	℃
3	Hydraulic pressure	⩾ 4		bar
4	MFSC-2000W Water Flow Requirements	20		L/ min
	MFSC-3000W Water Flow Requirements	25		
5	MFSC-2000W Chiller Rated Cooling Capacity Requirements	6.5		kw
	MFSC-3000W Chiller Rated Cooling Capacity Requirements	7.5		kw

CAUTION :

◎ The Chiller needs to meet the requirements of the above table under the conditions of a circulating temperature of 40 ° C and an outlet temperature of 22 ° C.

◎ The above recommended water pressure requires the pressure drop of the main line Δp ≤ 0.5bar. If this value is exceeded, the main circuit water pressure should be increased accordingly.

◎ Cooling water and filter element need to be replaced once a month; replace the cooling water with glycol antifreeze every winter (below 0 ℃ environment). After the 0 ℃ environment is over, replace the antifreeze with pure water and replace the filter to restore the maintenance frequency once a month.

4-QBH Water Cooling Condition

Cooling Method	Water pipe size requirement	Water Flow Rate (L/min)	Hydraulic pressure (bar)	Cooling Temperature (℃)
Water cooling	Outer diameter * inner diameter = Φ6 * Φ4	⩾ 2	⩾ 3	28-30

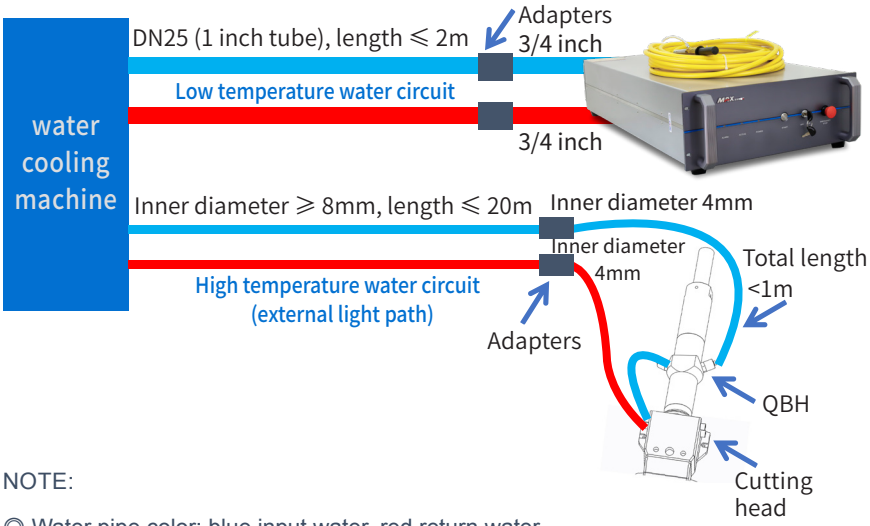
NOTE:

◎ External light path tube inner diameter ≥ 8mm, length ≤ 20m;

◎ The length of the Φ6 pipe connected to the LOE after switching from the external light path is ≤ 1m;

◎ QBH is connected in series with the cutting head;

◎ The above recommended external light path water pressure requires the pressure drop of the cutting head Δp ≤ 1.5bar. If this value is exceeded, the external light path water pressure should be increased accordingly.



NOTE:

◎ Water pipe color: blue input water, red return water.

5-Installation Environment Requirements

1.The ambient air cleanliness grade requirement for optical fiber output head installation: 1000 or more stringent grade. Suggestions for Configuration of Standard Purification Workbench;

2.laser working environment temperature:10°C–40°C;

3.laser working environment humidity:10%-85%;

4.Avoid the condensation environment,the specific control standards are as follows:

环境温度、相对湿度，露点对照表

相对湿度%	30	35	40	45	50	55	60	65	70	75	80	85	90	95
环温(℃)	露点Td(℃)													
10	-7.0	-5.0	-3.0	-1.3	0.0	1.5	2.5	3.6	4.8	5.8	6.7	7.6	8.4	9.2
11	-6.5	-4.0	-2.0	-0.5	1.0	2.5	3.5	4.8	5.8	6.7	7.7	8.6	9.4	10.2
12	-5.0	-3.0	-1.0	0.5	2.0	3.3	4.4	5.5	6.7	7.7	8.7	9.5	10.9	11.2
13	-4.5	-2.0	-0.2	1.4	2.8	4.1	5.3	6.6	7.7	8.7	9.6	10.5	11.4	12.2
14	-3.2	-1.0	0.7	2.2	3.5	5.1	6.4	7.5	8.6	9.6	10.6	11.5	12.4	13.2
15	-2.3	-0.3	1.5	3.1	4.6	6.0	7.3	8.4	9.6	10.6	11.6	12.5	13.4	14.2
16	-1.3	0.5	2.4	4.0	5.6	7.0	8.3	9.5	10.6	11.6	12.6	13.4	14.3	15.2
17	-0.5	1.5	3.2	5.0	6.5	8.0	9.2	10.2	11.5	12.5	13.5	14.5	15.3	16.2
18	0.2	2.3	4.0	5.8	7.4	9.0	10.2	11.3	12.5	13.5	14.5	15.4	16.4	17.2
19	1.0	3.2	5.0	7.2	8.4	9.8	11.0	12.2	13.4	14.5	15.4	16.5	17.3	18.2
20	2.0	4.0	6.0	7.8	9.4	10.7	12.0	13.2	14.4	15.4	16.5	17.4	18.3	19.2
21	2.8	5.0	7.0	8.6	10.2	11.0	12.9	14.2	15.3	16.4	17.4	18.4	19.3	20.2
22	3.5	5.8	7.8	9.5	11.0	12.5	13.8	15.2	16.3	17.3	18.4	19.4	20.3	21.2
23	4.4	6.8	8.7	10.4	12.0	13.5	14.8	16.2	17.3	18.4	19.4	20.4	21.3	22.2
24	5.3	7.7	9.7	11.4	13.0	14.5	15.8	17.0	18.2	19.3	20.4	21.4	22.3	23.1
25	6.2	8.6	10.5	12.3	14.0	15.4	16.8	18.0	19.1	20.3	21.3	22.3	23.2	23.9
26	7.0	9.4	11.4	13.2	14.8	16.3	17.7	19.0	20.1	21.2	22.3	23.3	24.2	25.1
27	8.0	10.3	12.2	14.0	15.8	17.3	18.7	19.9	21.1	22.2	23.2	24.3	25.2	26.1
28	8.8	11.2	13.2	15.0	16.7	18.0	19.6	20.9	22.0	23.0	24.2	25.2	26.2	27.1
29	9.7	12.0	14.0	15.9	17.6	19.2	20.5	21.3	23.0	24.1	25.2	26.2	27.2	28.1
30	10.5	12.9	14.9	16.8	18.5	20.0	21.4	22.8	23.9	25.1	26.2	27.2	28.2	29.1
31	11.4	13.8	15.9	17.8	19.4	20.9	22.4	23.0	24.8	26.0	26.9	28.2	29.2	30.1
32	12.2	14.7	16.8	18.6	20.3	21.9	23.3	24.6	25.8	27.0	28.1	29.2	30.1	31.1
33	13.0	15.6	17.6	19.6	21.3	22.9	24.2	25.6	26.8	28.0	29.0	30.1	32.1	32.1
34	13.9	16.5	18.6	20.5	22.2	23.8	25.2	26.5	27.7	29.0	29.5	31.1	32.1	33.1
35	14.9	17.4	19.5	21.4	23.0	24.6	26.2	27.5	28.7	29.9	31.0	32.1	33.1	34.1
36	15.7	18.1	20.3	22.2	24.0	25.0	27.0	28.4	29.0	30.9	32.0	33.1	34.1	35.2
37	16.6	19.2	21.2	23.2	24.9	26.5	27.9	29.5	30.7	31.8	33.0	34.1	35.2	36.2
38	17.5	19.9	22.0	23.9	25.8	27.4	28.9	30.3	31.5	32.0	33.9	35.1	36.0	37.0
39	18.1	20.8	23.0	24.9	26.6	28.3	29.8	31.2	32.5	33.8	34.9	36.2	36.8	38.1
40	19.2	21.6	23.8	25.8	27.6	29.2	30.7	32.1	33.5	34.7	35.8	36.8	38.1	39.1

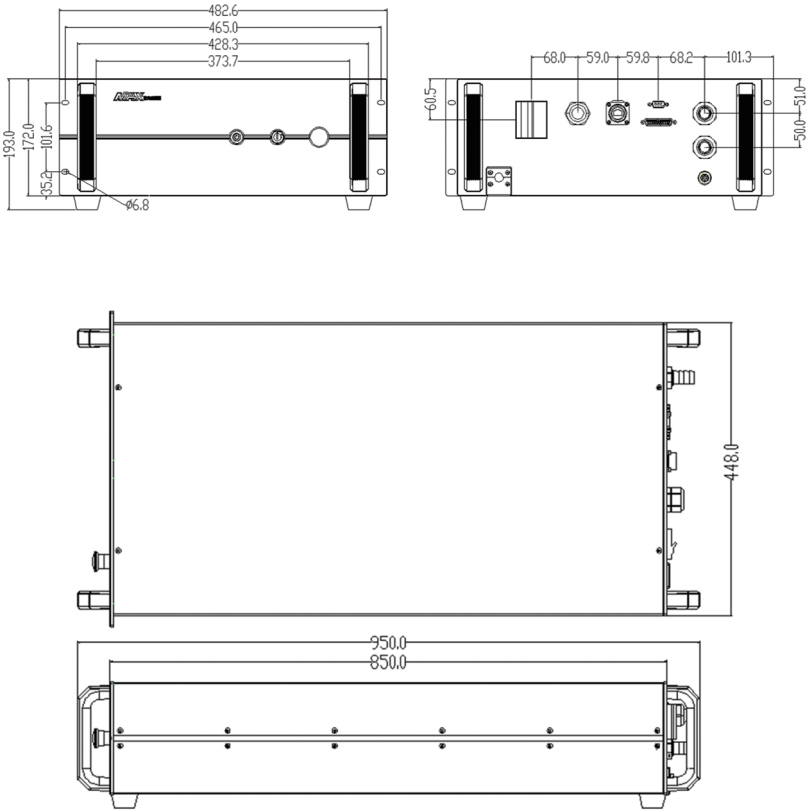
NOTE :

◎ In order to ensure a good operating environment of the laser, to reduce the probability of failure due to condensation. We recommende to prepare an air-conditioned room for the laser, so that the temperature in the air-conditioned room is ≤ 28 °C, and the relative humidity is ≤ 50%. The water cooler should be placed in a different space from the laser. It is forbidden to place the water cooler in the air-conditioned room;

◎ The laser head works at circulating temperature. In order to avoid condensation on the laser head, it is necessary to adjust the temperature of the cooling water of the external light path to room temperature. It is forbidden to cool the laser head with low-temperature cooling water.

6-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 package containing the laser equipment on a horizontal platform, such as a floor or a large table.

2. Open the primary box and remove the foam cover,take out the fittings.

3. Check the fittings according to the "Packing List".

4. QBH and fiber optic cable are placed on the top plate of the laser. Please take it out carefully to ensure that the minimum bending radius of the fiber optic cable is >200mm. When taking out, it is recommended that the three people cooperate to operate, two people lift the laser body, and the other person is responsible for taking out the cable.

5. Please ensure that the laser is in a dry, ventilated, dust-free environment. The space around the laser is unobstructed. The front of the laser and the operator's position are unobstructed. There is no obstruction under the laser. There is no dripping on the laser. The laser is located. The position of the drainage is smooth and convenient, and there is no water accumulation.

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.

◎ When the laser is turned off, the water cooler should also be turned off to prevent condensation from occurring due to excessive temperature difference.

RECOMMENDATION:

Change the working temperature or humidity of the laser to keep the laser away from the dew point. (For example, install the laser in an air-conditioned room.)

2 -Packing List

No.	Names of fittings	Description	Unit	Quantity
1	Fiber Laser	MFSC -xxxx	Pc	1
2	External signal wire		Pc	1
3	Power Keys		Pc	2
4	Lens cleaning paper		Pc	4
5	Sample of water pipe of laser	Φ19.1*Φ29mm	Pc	1
6	QBH water pipe sample tube	Φ6x4mm	Pc	1
7	Cable	10m	Pc	1
8	Hose clamp	American hose clamp, clamping range Φ26-Φ38	Pc	2

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

The laser power input line needs to be connected to three-phase four-wire AC. Make sure that the live wire is properly connected according to the wire mark and the ground wire is well connected. Poor contact of the ground wire may cause potential damage to the laser.

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

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

3- Extension Interface

Laser The CTRL interface is a high quality DB25 interface that provides a variety of signals for functional control of the laser, as described below:

2000W-3000W DB25 interface

Ctrl Interface Pin	Wire Color	Function Description	Notes
18	Red	Enable input +	HIGH:20VDC ≤ V ≤24VDC LOW:0VDC ≤ V ≤ 5VDC 5mA ≤ I ≤15mA
5	Red And White	Enable input -	
17	Black	Modulation input +	HIGH:20VDC ≤ V ≤24VDC LOW:0VDC ≤ V ≤ 5VDC 5mA ≤ I ≤15mA
4	Black And White	Modulation input -	
16	Yellow	External light +	HIGH:20VDC ≤ V ≤24VDC LOW:0VDC ≤ V ≤ 5VDC 5mA ≤ I ≤15mA
3	Yellow Black	External light -	
15	Green	DA (0-10V) input +	Control laser output power (1V-10%, 10V-100%)
2	Green And White	DA (0-10V) input -	
14	Brown	Fault output 1	Dry contact output, ON-fault, OFF- normal, (contact voltage V ≤ 30VDC, contact current I ≤ 100mA)
1	Brown And White	Fault output 2	
8	Orange	EX LOCK+	±Short connection: the laser normally controls the light output ±Disconnected: the laser is locked and cannot emit light
19	Orange black	EX LOCK-	
Ground wire	Green Yellow	Ground wire	

4-Start Steps

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.

◎ When operating the laser, do not directly look at the output fiber and wear safety glasses. When wiring, please turn off all power switches of the laser.

Start steps are as follows:

1、Start the Chiller;

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、 Turn the rear panel power switch (POWER) to the ON position;

6、Place the Key Switch of the front panel on position "ON";

7、Press the START button on the front panel.

5-Mode Description

The working modes of the laser are as follows:

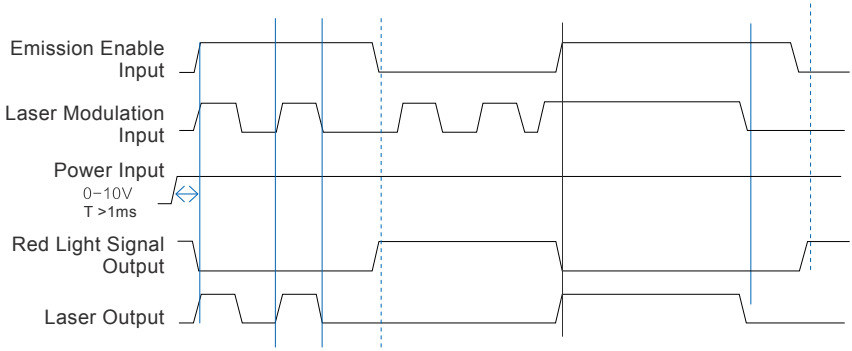
1. Continuous mode: the emitted light is continuous and can be used for cutting.

2. Pulse mode: The emitted light is pulsed. When the pulse frequency is greater than a certain value, the actual application is used to control the average output

power of the laser (pulse width adjustment, when the external control, the modulation signal corresponds to the mode).

3, external control: specific parameter settings through the board software interface.

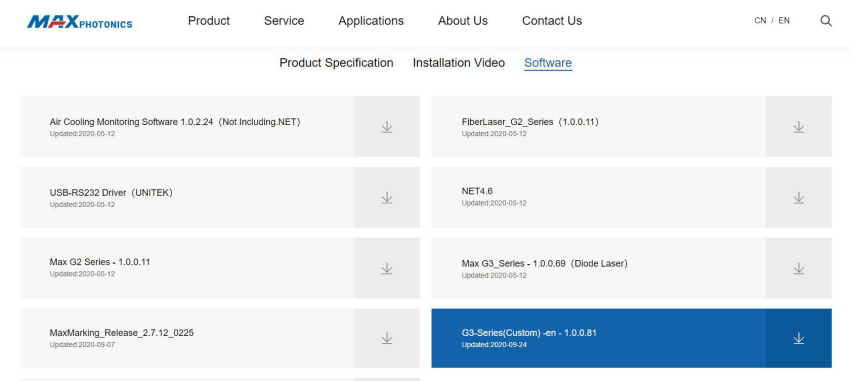
External Control Signal Timing



6-Software Description

(1) Enter "Chuangxin Laser Official Website"-"Download Center"-"Install Software", and download "G3 Series-Software Installation Guide", "NET4.6", "G3-Series-n.n.n.n". (The version is updated from time to time, subject to the official website announcement without notice.)

URL：http://en.maxphotonics.com/En/Software.html



(2) Decompress the downloaded compressed package, and install the operating environment (NET4.6) and monitoring software (G3-Series-n.n.n.n) referring to the "G3 Series-Software Installation Guide". (Win10 system or system with .NET 4.6 installed, no need to install NET4.6).

(3) After installing the operating environment and monitoring software, a "G3-Series" shortcut will appear on the desktop.

(4) Check whether the communication interface of the laser backplane is RS232 or EtherNet, connect it to the computer, and power on the laser.

(5) Double-click the desktop "G3-Series" shortcut to open the monitoring software and enter the following connection interface.

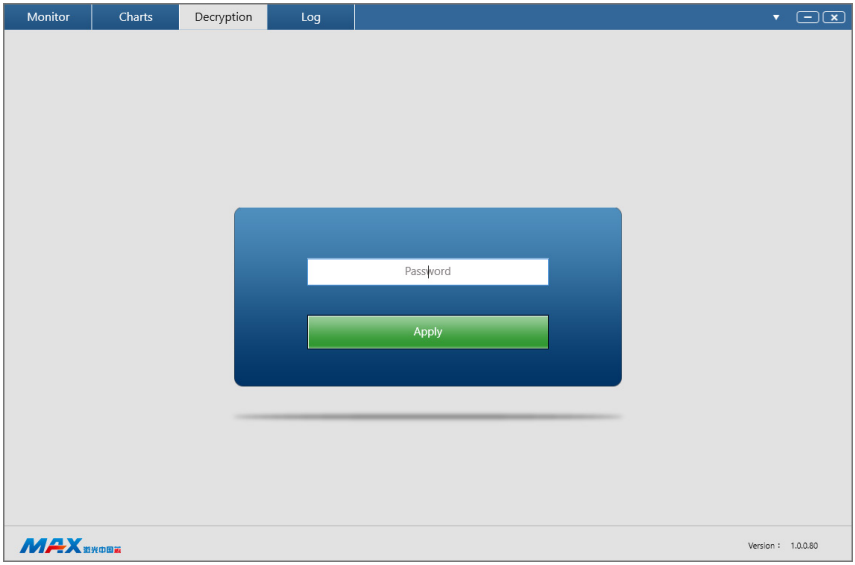
(6) If the laser backplane is an RS232 interface, the monitoring software communication mode is selected as COM (the default is COM), and the corresponding COM number is selected, and then click the "Login" button to try to connect with the laser.

(7) If the laser backplane is an EtherNet interface, select the communication mode of the monitoring software as IP2, enter the laser IP address (default is 192.168.0.178), and click the "Login" button to try to connect with the laser.

If the laser is powered on and the model can match the monitoring software, it will enter the following monitoring interface.

(8) Click the "Login" button to connect the laser and enter the following monitoring interface.

(9) Decrypt the page.



Tips: For the specific details of software installation and instructions, please refer to the relevant instructions of the official website software.

7-Error List

The fault alarm points set by the laser include:

No.	Message	Description	Trouble shooting
1	PD alarm	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	Water flow warning of the chiller	The chiller is not started or water flow is not sufficient	Start the chiller and make sure that there is sufficient water flow in the water line.
3	Overheat alarm	Overheat fault of the laser	For the internal overheat fault of the laser, please check whether the pre-set temperature of the chiller meets the requirements. Shut down the laser and do not restart it until the heat accumulated during operation dissipates thoroughly.
4	Overcurrent alarm	Overcurrent fault of the laser	If "0-10V" DA value exceeds the pre-set value, the internal overcurrent fault will occur.
5	QBH installation alarm	Install error of the QBH	The fault will be produced when QBH head is not inserted into the cutting head or at the wrong place.
6	Emergency stop alarm	The emergency stop switch is pressed	Release the emergency stop switch, the laser will work again after being restarted.
7	Communication error of RS232	Communication error between the laser and the PC	Check the RS232 interface and cable of the computer.

Note:

◎ All the alarm message will be displayed on the Monitor Software. Please pay attention and contact our service personnel if you need.

Chapter 7
Fiber Connector Inspection and Cleaning Guide

1-Notice

It is imperative that the fiber connector is checked for dust, dirt, or damage every time it is connected to any optical device, before use. The use of a dirty or damaged fiber connector can result in serious injury and/or laser damage. Maxphotonics is not responsible for any damage due to contaminated connectors.

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、Ahydrous ethanol (Optical level, pure >99.5%)

4、Acetone (Optical level, pure >99.5%)

5、Compressed air (oil free, water free)

6、Microscope

7、Light source

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. Ahydrous ethanol and acetone should be managed and stored according to the local law and

instructions.

2-Operating Procedures

Clean and maintain the fiber laser 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;（7-1）

4、Remove the protective inner cap from the connector;（7-2）

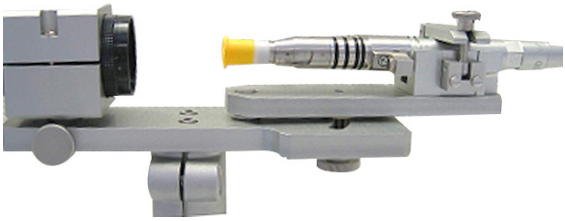
5、Focus the microscope onto the connector surface;

6、Use a light source to illuminate the face of the fiber connector so that the light is reflected off the surface of the endface. This is achieved if you see a bright golden shine from the QBH connector endface.

7、Inspect the endface surface carefully. Contamination will lead to dark spots/burns on the surface and possibly damage to the fiber and/or laser. If contamination is visible on the endface, cleaning is necessary.

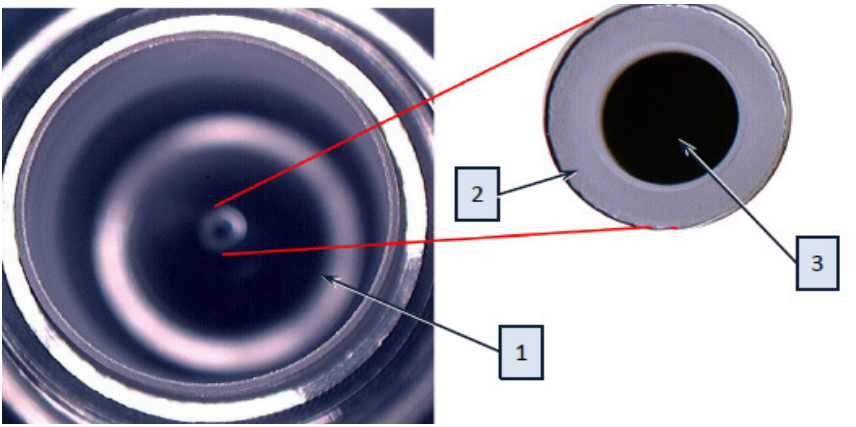
8、Take out the cap and sleeve, then connect the fiber connector with the cutting head quickly and fasten them. (Place the cap face down on a clean surface or a lint-free wipe.)

7-1 Take off the protective sleeve and cap of the fiber connector



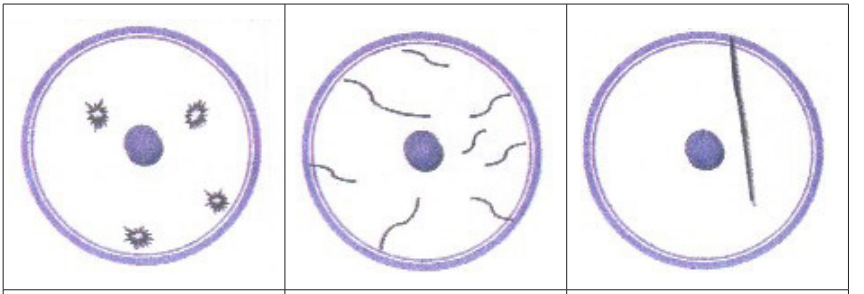
7-2 Install the fiber connector under microscope

7-3 Cleaning protective lens with swabs



1、quartz 2、fiber cladding 3、fiber core

7-4 Actual image of the fiber



surface damaged	coating damaged	scratch

7-5 Endface may be damaged

IMPROTANT :

◎ Do not reuse a lint-free optical wipe or swab.

◎ Do not touch the protective lens of the fiber connector.

◎ Do not blow directly, or else new dirty will be brought.

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

◎ Cleaning is necessary before place the protective cover and sleeve.

◎ Never blow air directly at the surface, because you could imbed contaminants into the surface. Always blow across the surface!

◎ If the fiber connector could not be installed in optical system immediately, please cover it with the protective cap cleaned with compressed air.

CAUTION :

◎ 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.

Chapter 8
Service and Maintenance

1-Maintenance Notes

CAUTION :

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

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

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

IMPORTANT :

◎ Do not send any product to Maxphotonics without RMA.

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

CHANGE :

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

2-Service Statements

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

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

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

Chapter 9
Warranty Statements

1-General Clauses

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

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

2-Warranty Limitations

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

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

（2）Damaged from misuse, neglect or accident;

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

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

（5）Improper installation or maintenance, or operating under conditions not included in this manual;

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

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

IMPORTANT:

◎ Within the warranty scope, purchasers must feed back 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.