



User's guide for smart laser



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Introduction

Please read and understand this User's Guide before using the product. This User's Guide should stay with the product to provide users and all future users and owners of the product. This User's Guide includes important operating, safety and other information.

▶ NOTICES

All information contained in this document is subject to change and revision without notice. Maxphotonics believes that the information provided is accurate and reliable; however Maxphotonics makes no warranty for some situations in the document, including the products without warranty or a few products for special purposes. Furthermore, Maxphotonics does not assume responsibility for any infringement of patents or other rights of third parties due to use of the information contained in this document. Maxphotonics shall not be liable for errors contained in this document or for damages caused by equipment connection, material performances or use, or for corresponding events.

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Safety Information

- MaxSmart Laser ——a Class IV of laser product!
- MaxSmart Laser transmits 10W/20W/30W/50W invisible light of which the wavelength is about 1060nm.
- Prevent your eyes or skin from being irradiated by direct or scattered radiation light from optical output lenses!
- Don't open the chassis. There are no operator serviceable parts inside. Only Maxphotonics professionals can repair!



▶ Safety Requirement

We use a plurality of nouns and symbols to remind you of dangers and important information, including:

WARNING

Potential hazards to human body; don't continue when there is lack of understanding and conditions; otherwise, it may cause bodily injury to you and/or others.

CAUTION

Refers to a potential hazard on product; don't continue when there is lack of understanding and conditions; otherwise, it may cause damage to the product.



IMPORTANT

Refer to any information regarding the operation of the product. Please do not overlook this information.

This symbol indicates that MaxSmart Laser emits light, and we have attached this symbol to the output end of the laser product.



General Safety Instructions

To ensure safe operation and best performance of the product, except for information included in this text, please observe the following warnings and cautions.

WARNING :

MaxSmart Laser must always works with a power source that is securely grounded.

CAUTION :

Before powering onMaxSmart Laser, please ensure that DC voltage is 24VDC; otherwise, the laser may be damaged.

WARNING :

There are no operator serviceable parts inside. Only relevant qualified Maxphotonics professionals can repair. To prevent short circuit, don't open the shell. Warranty service is unavailable for tampered products.

WARNING :

MaxSmart Laser is provided with an optical output head which is connected through an optical cable. Please handle the output head carefully.

WARNING :

If the laser is used according to the methods not specified in this document, the protection of the laser may not be effective. The product must be used only in a normal environment.

Grading of MaxSmart Laser

The laser belongs to Class IV high-power laser equipment. The product can transmit 10W/20W/30W/50W light with the wavelength of about 1060nm. The light at this level may cause damage to eyes and skin. The transmitted light is invisible, and the light beam may cause irreparable hurt to cornea. Laser goggles are not provided with the product, but you must wear goggles all the time while working withMaxSmart Laser.

WARNING :

Don't install the sight whenMaxSmart Laser is working.

WARNING :

When operating the product, do not star at the output head, and wear laser goggles all the time.

CAUTION :

Except for control, adjustment or performance mentioned in the User's Guide, other operations may cause exposure to radiation.

Safety Tags and Tag Positions

The following shows the pictures of tags and their positions on the product:

Pictures of tags	Tag name	Tag positions
	Light emission tag	On lens of galvanometer
	Warning symbol	On lens of galvanometer

Description

The MaxSmart Laser is one of Maxphotonics' cutting-edge products, and it is revolutionary to integration of the high-speed high-resolution laser marking system.

The MaxSmart Laser edges out traditional intelligent lasers with diode pumped crystal, including neodymium (Nd): YAG intelligent pulse fiber. It uses the structures of the master oscillator and high power fiber amplifier (MOPFA) of the Q-switch.

The MaxSmart Laser has low power consumption and uses practical and durable design, so it suits lab and market use. Boasting compact structure and highly integrated system, it is embedded with a computer system, a laser control system and a motion control system.

The MaxSmart Laser transmits periodical pulse trains with the wavelength of about 1060nm and peak power up to 7KW.

The MaxSmart Laser is an ideal high power source for the laser marking industry. The laser head is equipped with an optoisolator that provides certain isolation effect, and can be directly used for low-reflection materials (such as plastic, wood, and paper) and used to mark partial metals with low reflectivity.

Accessory

Please confirm the accessories of the product according to the Table below:

Item	Quantity
User's Guide and test results	1
Power adapter (optional)	1

Power supply

The power voltage of the MaxSmart Laser is 24VDC.

Before startup, please connect the aviation plug of the power supply.

Note: Before starting MaxSmart Laser, please confirm whether the voltage is normal.

External environment and prevention measures

WARNING : The laser must always work with a power source that is securely grounded and is under nominal voltage.

WARNING : The laser is provided with an output optical head which is connected through an optical cable. Please handle the output head carefully.

CAUTION : When using the sight (for example, installing the sight on a clamp, or using the end surface of an optical instrument), please ensure that MaxSmart Laser is closed.

WARNING : Three fans are installed on the rear panel of the laser module to ensure that enough airflow is supplied to cool down the laser. The shortest distance between the protection cover of a fan and an external object is not smaller than 5cm.

WARNING : The ambient temperature and humidity must be in normal ranges before the laser is started.

WARNING : Do not stare at the output head. And wear laser goggles when operating the product.

WARNING : Mark on a high-reflective material in an out-of-focus manner, or you may directly damage MaxSmart Laser.

WARNING : Power outage is very dangerous to the laser. Please ensure uninterrupted power supply while the laser is working.

CAUTION : Except for control, adjustment or performance mentioned in the User's Guide, other operations may cause exposure to radiation.

CAUTION : It is basic for collimated output to ensure an output lens. After use, close the protection cover of the sight. Don't touch the output lens or clean it with any solvent. Please clean the lens with tissue overlay.

CAUTION : If you don't obey the rules above, optical damage caused thereby is not covered by the warranty.

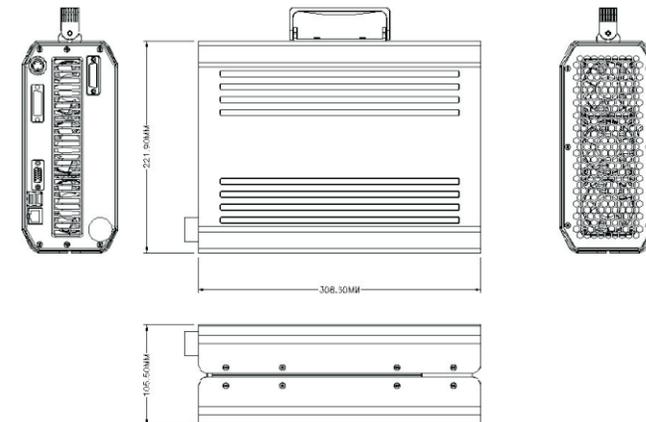
Performance parameters

Parameters	Unit	MFS-10	MFS-20
Central wavelength	nm	1064±4	1064±4
Polarization		Random	Random
Average output power	w	10	20
Energy per pulse	mJ	0.5~0.6	0.8~1.0
Beam quality	m ²	<1.5	<1.7
Facula diameter	mm	6~8	7~9
Power stability	%	<5	<5
Frequency tunable range	kHz	20~60	30~60
Pulse width	ns	80~140	80~140
Pulse tunable range	%	5~100	5~100
Operating voltage	VAC	100-240	100-240
Fiber length	m	1.5	1.5
Cooling mode		forced air	forced air
Operating temperature		0~35°C	0~35°C
Operating humidity		10~95	10~95
Stockpile temperature		-10~60°C	-10~60°C

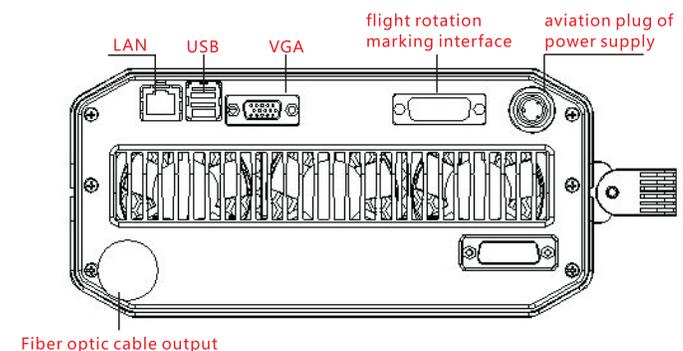
Configuration of Industrial Control PC

Item	CPU	Memory	SSD card
Configuration	Intel Atom Dual Core N2600	2G	64G

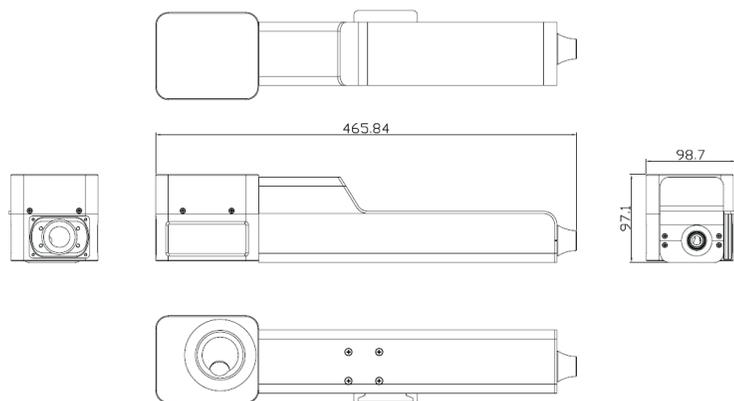
Dimension of laser body



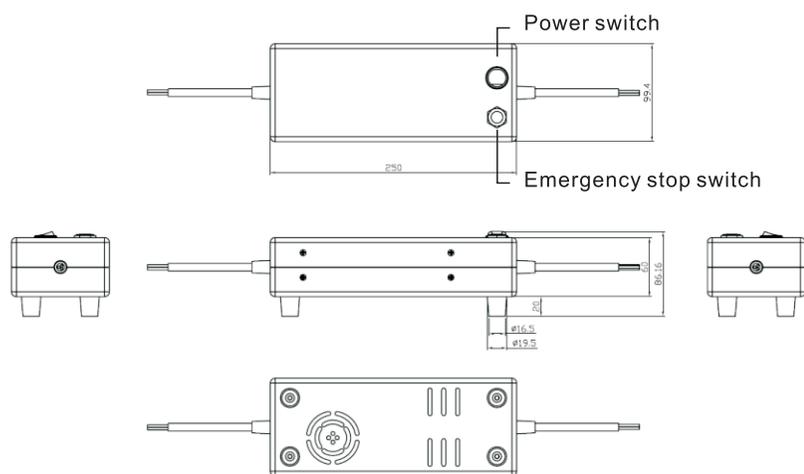
Description of interfaces



Dimensions of cross arm and galvanometer of the laser



Dimensions of the power adapter



Description of external interfaces and pins

Flight/rotation pedal switch interface

J5	1	HOME+
	2	PUISE+
	3	DIRECTION+
	4	EA+
	5	EB+
	6	GND
	7	START_B
	8	EMSTOP
	9	HOME-
	10	PUISE-
	11	DIRECTION-
	12	EA-
	13	EB-
	14	GND
	15	STOP_B

Installation and commissioning of MaxSmart Laser

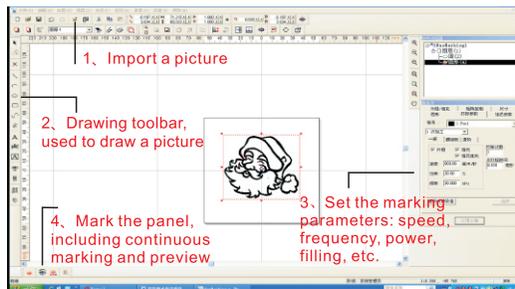
▶ Statement

Maxphotonics promises: the product has undergone complete tests and inspections. Before delivery, it has passed all tests as specified in written quality specifications.

Note: If For any damage to the package or others insidethe product has any damage of external package and internal part, please contact Maxphotonics or the specified agents.

▶ Installation and commissioning of MaxSmart Laser

1. Install and fix the cross arm which is provided with a two-dimensional scanning lens on a bracket.
2. Connect the current aviation plug, display, keyboard, mouse, and cable (if necessary).
3. Press the power button to startMaxSmart Laser.
4. Press the emergency stop button in case of emergency.
5. Double-click the icon  on the display to start the software. When the interface below appears, you can choose to import a picture (as shown in 1 in the following figure) or draw a picture by yourself (as shown in 2 in the following figure). After importing or drawing a picture, set the marking parameters (as shown in 3 in the following figure). Then click Mark or Preview (as shown in 4 in the following figure).



- ▶ The software can identify the imported pictures in the following formats:

AutoCad (*.dxf)	AutoCad (*.dwg)
HPGL (*.plt)	CNC (*.cnc)
Gerber (*.gbr)	Elogic (*.xml)
Adobe Illustrator 3.0 - 8.0 (*.ai)	Gcc Laser (*.rtl)
PostScript (*.ps;*.eps)	Encapsulated PostScript (*.eps)
Windows Bitmap (*.bmp)	OS/2 Bitmap (*.bmp)
LEAD (*.cmp)	CALS (*.cal)
Clipboard (*.clp)	Windows Cursor (*.cur)
Enhanced Metafile (*.emf)	Flash Pix (*.fpx)
Windows ICON (*.ico)	Windows Metafile (*.wmf)
Adobe Photoshop (*.psd)	PNG (*.png)
JPEG (*.jpg)	TIFF (*.tif)
Targa TGA (*.tga)	PCX (*.pcx)
Tajima (*.dst)	

Common faults and troubleshooting method

▶ The intelligent laser does not emit light

Inspect whether the power cable of MaxSmart Laser is correctly connected, +24V and GND cables are inversely connected, and the ground cable is grounded.

▶ The intelligent laser works with lower power

A: Inspect whether the power supply is steady and the rated operating current is reached.

B: Check whether the collimated output lens of MaxSmart Laser is polluted. If so, lightly scrub it using a swab with absolute ethyl alcohol, and don't scratch the film of the lens.

C: Check whether other optical lenses, such as the red light beam combiner, galvanometer and field lens, are polluted.

D: Inspect whether the output light of MaxSmart Laser is blocked (ensure that the output end of the isolator is horizontal to the port of the galvanometer during installation of the laser).

E: It is normal for the laser to suffer a power attenuation after 20,000-hour use.

F: Disconnections during the marking process may be caused by signal interference; therefore, leads of weak current and strong current cannot be bound or connected on one side. Signal cables must provide the shielding function; or the power cable is not perfectly grounded.

▶ Routine maintenance and Announcements

(1) When MaxSmart Laser is working, don't touch or collide the movable cross beam of the scanning workbench;

(2) MaxSmart Laser and the optical lens are easy to crush, please handle them carefully and don't vibrate;

(3) Stop operating when the laser is faulty, and consult professionals for a solution;

(4) Pay attention to the startup and shutdown order;

(5) Note that the range of the marking machine cannot exceed the operating range;

(6) Note that the indoor environment and surface of machine shall be clean.

▶ The intelligent laser does not display after startup and other software faults occur

A: If there is blank screen for a few seconds after the startup picture appears, it may be caused by problems of the operating system, and in this case please reinstall the operating system.

B: If the laser halts at one screen, please close the marking software and then restart the software or start the laser.

Parameter setting of common marking software

MaxSmart Laser features high speed and high efficiency, so it shall be configured with a high-speed galvanometer to exhibit its performance advantages.

▶ Common boards and parameter setting:

Software	Maxphotonics software			
No.	Parameter/Item	Recommended value	Typical value	Unit
1	Null delay	50~100		Us
2	Marking delay	50~100		Us
3	Transition delay	20~100		Us
4	Laser startup delay	-50~-200		Us
5	Laser shutdown delay	50~150		Us

Warranty

▶ Comprehensive 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.

The faults of the software and the operating system are not included in the warranty scope.

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.

▶ Warranty Limitations

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

Tampered, opened, detached or reconstructed by personnel outside Maxphotonics;

Damaged by inappropriate use, inadvertent operation or accident;

Used beyond the specification and technical requirements of the product;

Indirectly damaged by faults caused by users' software or interfaces;

Used after improper installation or maintenance, or used in other improper operating conditions not included in this User's Guide;

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

Within the warranty scope, purchasers must feed back within 31 days after finding the faults. Maxphotonics does not grant any Third Party rights to repair or replace the parts, the equipment or other Maxphotonics products.

▶ Driver software

Any driver software, which is separately provided now or in future, does not have exclusive permission of Maxphotonics. Using the software means that you agree with the terms provided herein. This driver software is protected by the trade secret law, copyright law and international treaty. Maxphotonics reserve all rights pertaining to the driver software. The owners of the laser are allowed to use the driver software only with the purpose of backing up Maxphotonics' products and programs. Maxphotonics doesn't repair the equipment on which the driver software is modified.

Whatever the reason or other special purposes, the driver software cannot be modified and repaired. Maxphotonics doesn't ensure that the functions of the software can meet the user requirements, or the operation of the equipment or driver software is not disturbed or has no errors. Not all driver software undergoes the normal quantity control or product application procedures of Maxphotonics, and software is delivered at the request of customers. Support is unavailable to end users, and Maxphotonics supposes you have knowledge of one special language. Maxphotonics may modify the driver software but is not obligated to issue the latest version.

Except for the explicit warranty items above, Maxphotonics refuses to provide any other guarantee for buyers, including limitless, any, and all acquiescent guarantee, such as infringement of freedom, or other commercial purposes.

▶ Service and Maintenance

CAUTION:

There are no operator serviceable parts inside. Only relevant qualified Maxphotonics professionals can repair. After fault occurs, please submit application of all maintenance or replacement within the warranty scope to Maxphotonics or the local representative as soon as possible. Upon receiving our authorization, you need to pack the product in a suitable package and return it. You should keep 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.

▶ Modification

We have the right to modify any design or structure of our product at any time, but do not have any obligation to modify the previously sold products. The product is subject to change without prior notice.