

Supercontinuum Laser

SL-Pico

Operation Manual

Ver 1.0



*This device complies with part 18 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.*

SLI
SPECTROLIGHT

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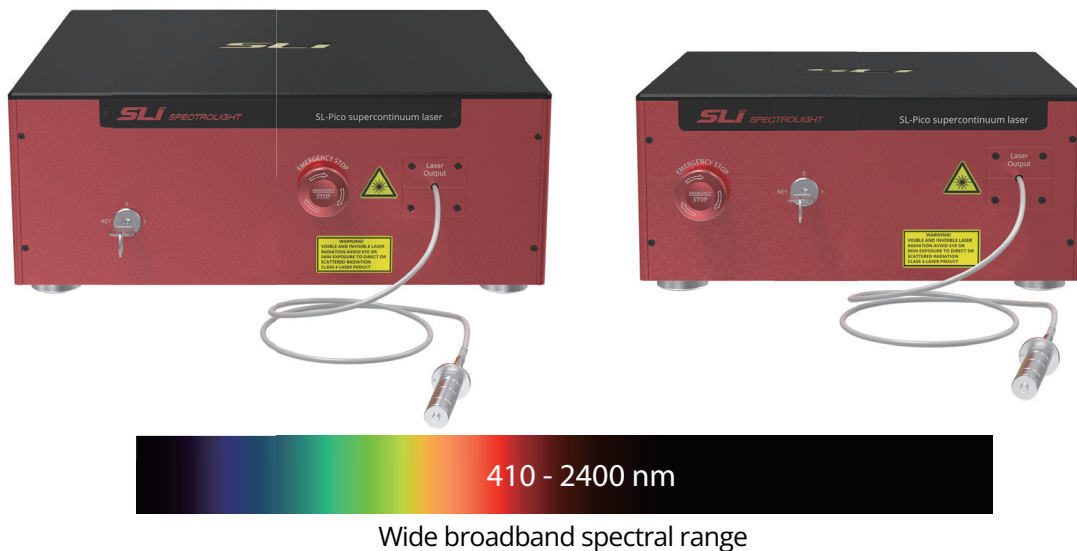
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1. Introduction

1.1 SL-Pico

SL-Pico is a pico-second supercontinuum lasers designed to meet the diverse and dynamic needs of cutting-edge research and industrial applications. This supercontinuum white light laser is highly regarded for wide wavelength range and cost-effectiveness.

SL-Pico offers a spectral range from 410 to 2400 nm, has high power, is very stable, and is capable of delivering power up to 20 W. The SL-Pico's SL series shows relatively high power in the SWIR region. The SL-Pico's SLM series is a mode-locked fiber laser with a fixed repetition rate and stable, uniform power spectrum in visible range. The SL-Pico's SLMV series has a tunable repetition rate in MHz, ensuring compatibility with a wide range of devices. Integrating a tunable bandpass filter such as FWS poly improves the laser's versatility, enabling tunable broadband laser output. This capability is important for a variety of applications, including fluorescence microscopy, TCSPC, hyperspectral imaging, machine vision, semiconductor inspection, sensor development, and more.



SL-Pico Model

Model	Supercontinuum output power		Repetition Rate	Output pulse width (ps)	Spectral Range (nm)
	Visible	Total			
SL10	100 mW	1 W	5 MHz	< 300 ps	450 - 2400 nm
SLM10	250 mW	1 W	10 MHz	< 50 ps	410 - 2400 nm
SLM20	500 mW	2 W	20 MHz	< 50 ps	410 - 2400 nm
SLM40	1 W	4 W	40 MHz	< 50 ps	410 - 2400 nm
SLM35V	1 W	3.5 W	0.01 to 40 MHz	< 50 ps	410 - 2400 nm
SL80V	1 W	8 W	0.01 to 200 MHz	< 300 ps	430 - 2400 nm
SLM70	2 W	7 W	80 MHz	< 50 ps	410 - 2400 nm

* SL-Pico model name meaning

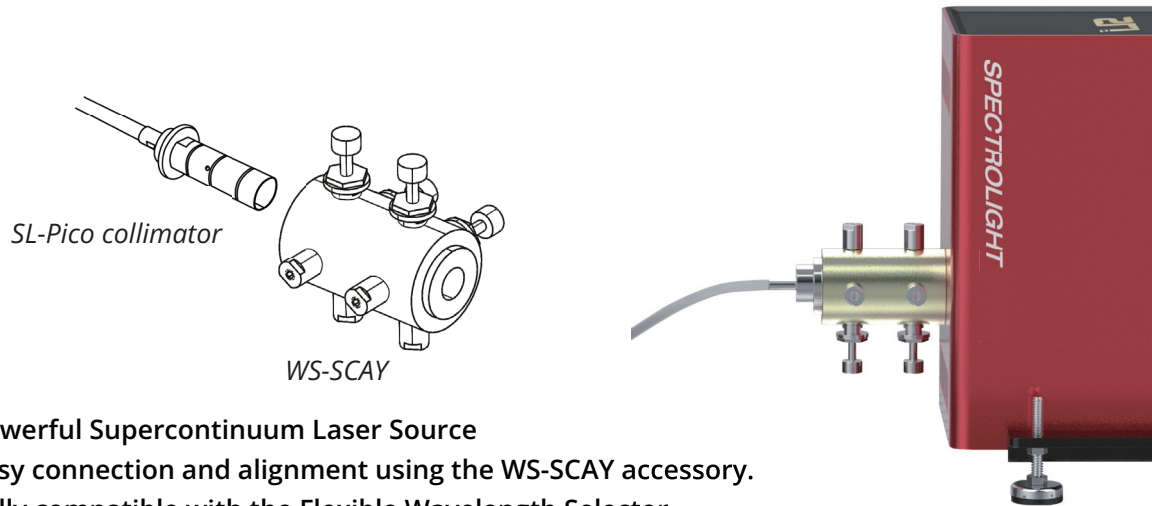
(Example: SLM35V)

- V stands for adjustable repetition rate
- Total output power : 35 means 3.5 W
- Note : if it is Mode-lock version

1. Introduction

SL-Pico applications

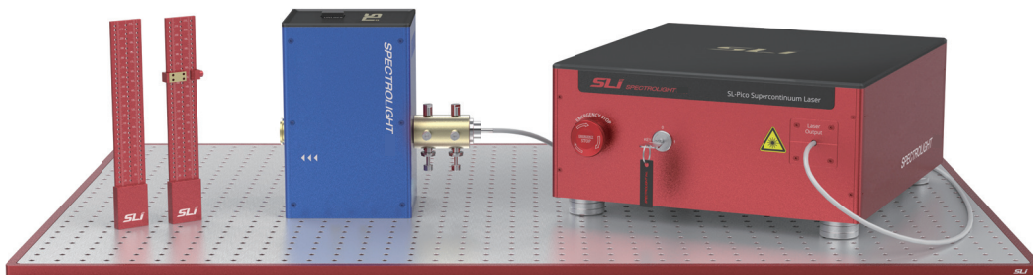
The SL-Pico can be applied to various applications requiring high power and repetition rates, such as low-noise OCT, fluorescence microscopy, nanophotonics, semiconductor inspection, high-resolution imaging capabilities, and other applications.



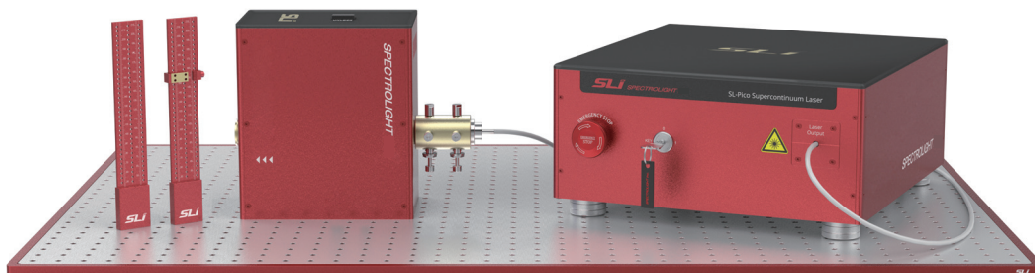
- Powerful Supercontinuum Laser Source
- Easy connection and alignment using the WS-SCAY accessory.
- Fully compatible with the Flexible Wavelength Selector.

Application Idea

- * Adding our FWS(Flexible Wavelength Selector) result in a tunable laser source.



Tunable Laser using FWS-Poly-BLUE(Fixed FWHM 10 or 20 nm)

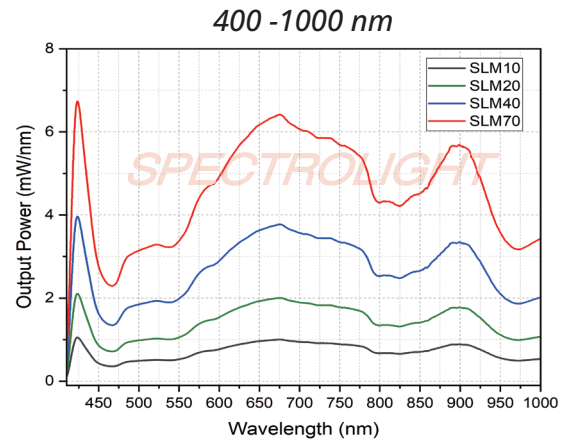
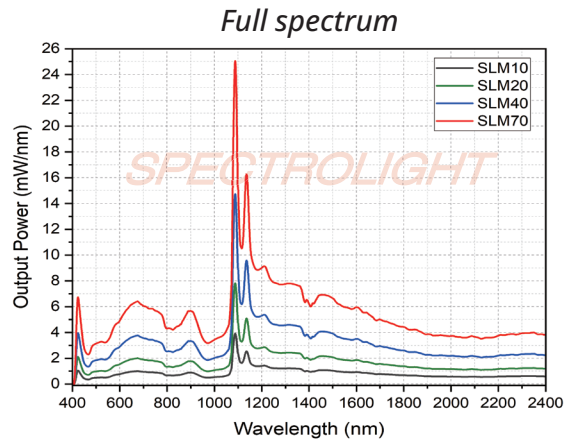


Tunable Laser using FWS-Poly-RED(Adjustable FWHM 2 -15 nm)

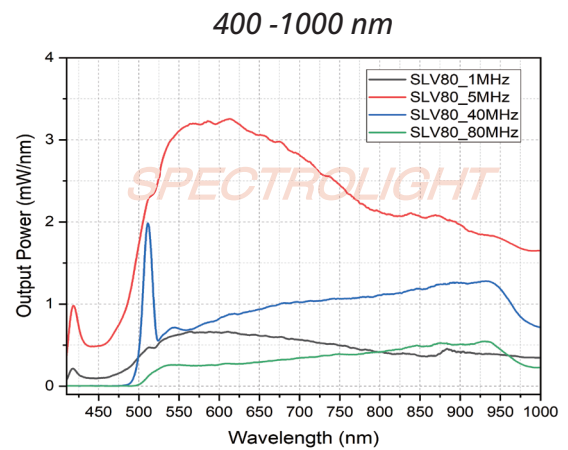
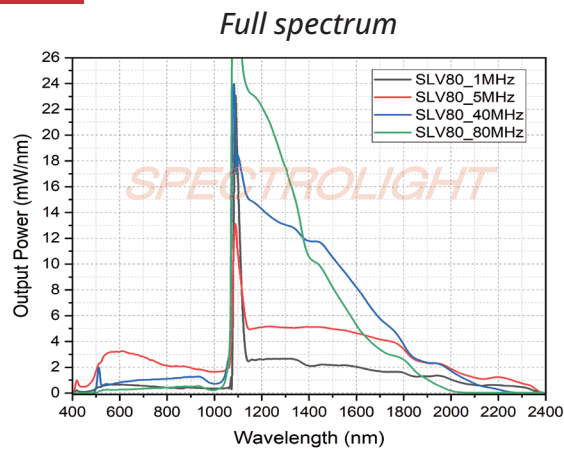
1. Introduction

Typical Output Power Spectrum of SL-Pico

SLM Series



SLV Series

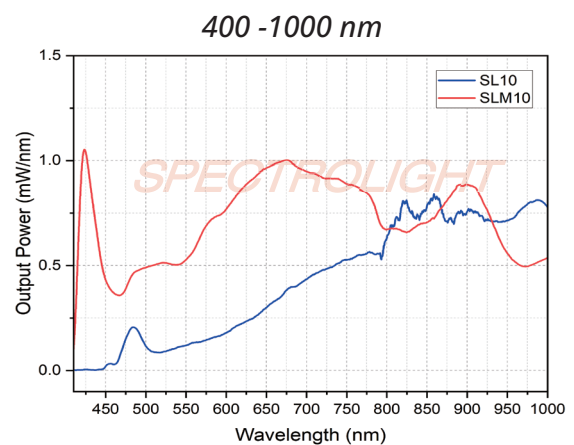
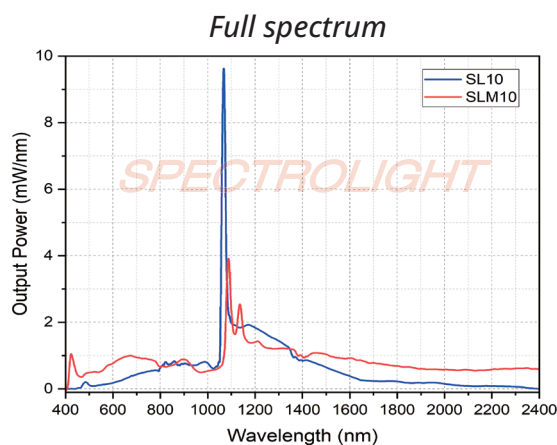


* SL-Pico has a modelocked version. The spectral shape of the SLM modelock model group is relatively stable. Adjustable repetition rate products are also available in the SLM series. (Example: SLM35V)

[SLV80]

If you need high visible light power, 5 MHz and more than 70 % power would be suggested.

SL10 vs. SLM10



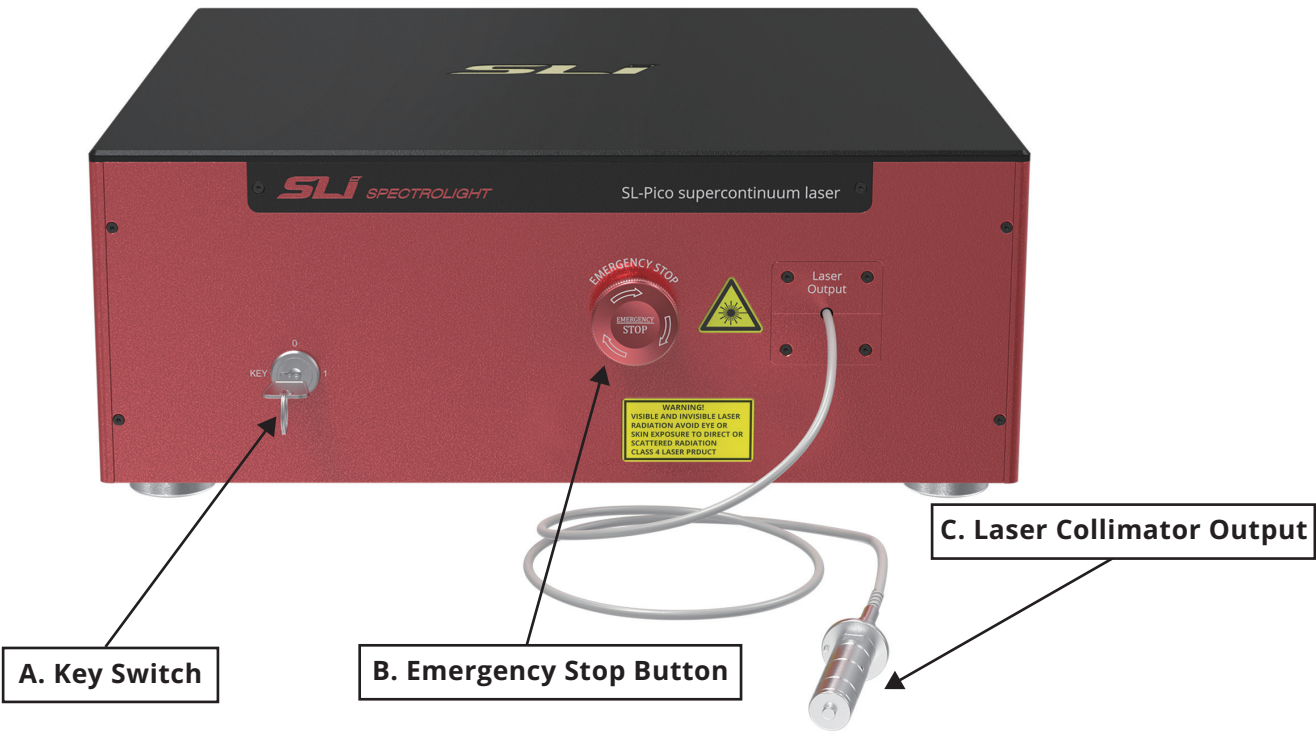
2. System Overview

2.1 System Main Components

1	SL-Pico	Main body
2	Power cable	AC power cable (1 ea)
3	USB cable	USB A to B cable (1 ea)
4	Switch key	Switch Keys (2 ea)
5	Interlock plug	External safety device (1 ea)
6	USB memory	Product software, product user manual, etc.

2.2 Front Panel Functions

(Example: SL80V)



A. Key Switch : Rotate precisely 90 degrees clockwise to power on, and rotate 90 degrees counterclockwise to power off the laser.

B. Emergency Stop Button : Press it in an emergency situation, and you can restore it by rotating it clockwise.

C. Laser Collimator Output : Collimator output for the laser. It can be connected to the FWS's input linker (WS-SCAY) accessory.

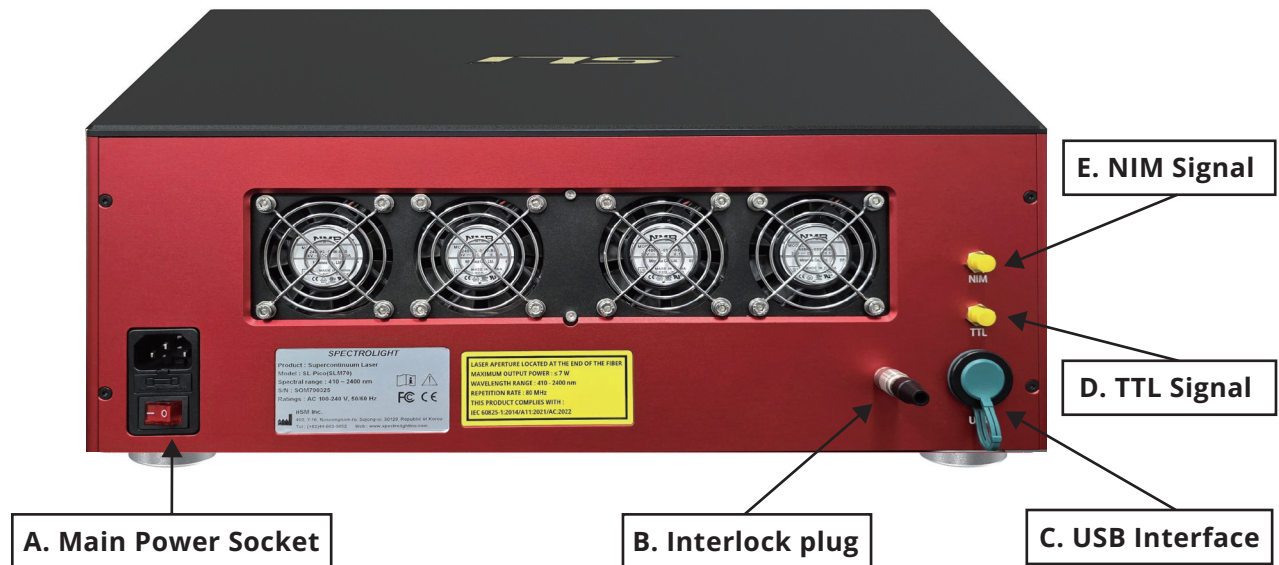
D. Labels : Laser safety



2. System Overview

2.3 Back Panel Functions

(Example: SL80V)



A. Main Power Socket : Plug the power cord into the main socket.

B. Interlock Plug : Connect the interlock plug when using the laser.

C. USB Interface : Connect a USB cable to the computer to control the laser.

D. TTL Signal : The SMA interface will output a pulse square wave signal loaded 50 Ω with the same pulse and the same frequency; LLT Voltage: 0-3.3 V

E. NIM Signal : 0 to -1, square wave with same frequency. 50 Ω .

F. Label : Laser specifications

LASER APERTURE LOCATED AT THE END OF THE FIBER
MAXIMUM OUTPUT POWER : ≤ 8 W
WAVELENGTH RANGE : 430 - 2400 nm
REPETITION RATE : 0.01 to 200 MHz adjustable
THIS PRODUCT COMPLIES WITH :
IEC 60825-1:2014/A11:2021/AC:2022






2. System Overview

2.4 Specifications

		SL10	SLM10	SLM20	SLM40	SLM35V	SL80V	SLM70
Output Power	Visible	100 mW	250 mW	500 mW	1 W	1 W	1 W	2 W
	Total	1 W	1 W	2 W	4 W	3.5 W	8 W	7 W
Repetition Rate		5 MHz	10 MHz	20 MHz	40 MHz	0.01 to 40 MHz adjustable	0.01 to 200 MHz adjustable	80 MHz
Output pulse width		< 300 ps	< 50 ps	< 50 ps	< 50 ps	< 50 ps	< 300 ps	< 50 ps
Spectral range		450 - 2400 nm	410 - 2400 nm	410 - 2400 nm	410 - 2400 nm	410 - 2400 nm	430 - 2400 nm	410 - 2400 nm
Power stability		< 1 %						
Sync(trigger) Output		NIM Output 0 - (-1) V, TTL Output 0 - 3.3 V						
Beam diameter and quality		~ 2 mm@633 nm; M2<1.1						
Beam divergence (half angle)		< 1 mrad						
State of polarization		Unpolarized						
Length of output fiber		1.3 m						
Software		SL-Pico ver.1						
Dimension (L x W x H, mm)		345 x 358 x 153	423 x 437 x 165					
Weight (Kg)		15.5	20.5					
Input power		AC 100 - 240 V, 50/60 Hz						
Data interface		USB 2.0						

2.5 Labels

(Example: SL80V)

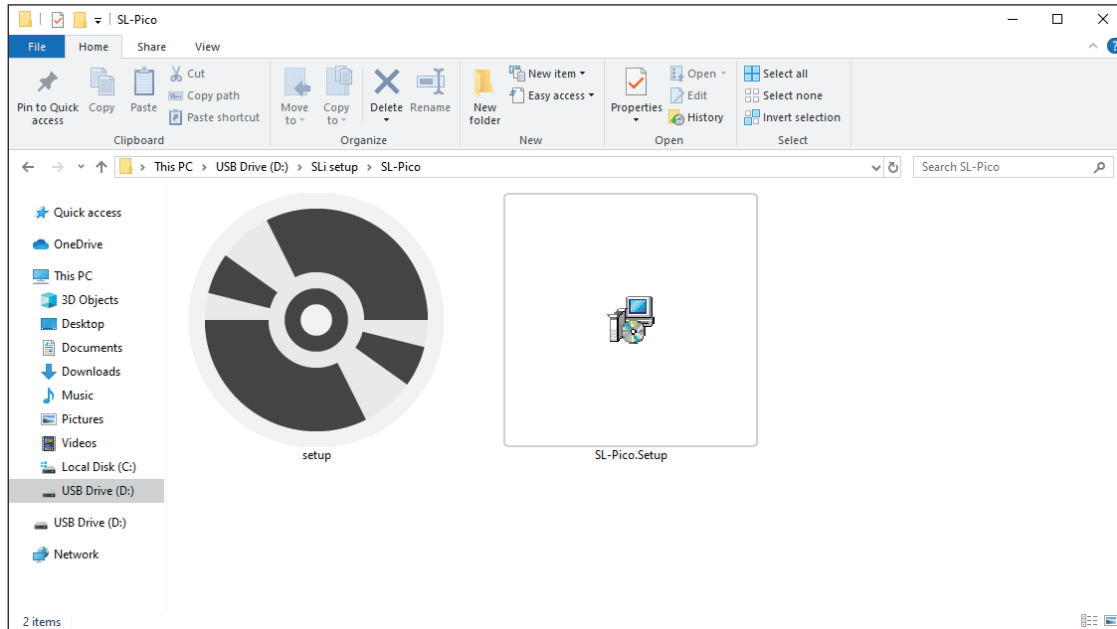
Product : Supercontinuum Laser	   	
Model : SL-Pico(SL80V)		
CWL : 430 - 2400 nm		
S/N : SO80V0125		
Ratings : AC 100 - 240 V, 50/60 Hz		
 iiSM Inc.		
402, 7-16, Naseongnam-ro, Sejong-si, 30129, Republic of Korea		
Tel : (+82)44-863-9852 web : www.spectrolightinc.com		

3. Installation

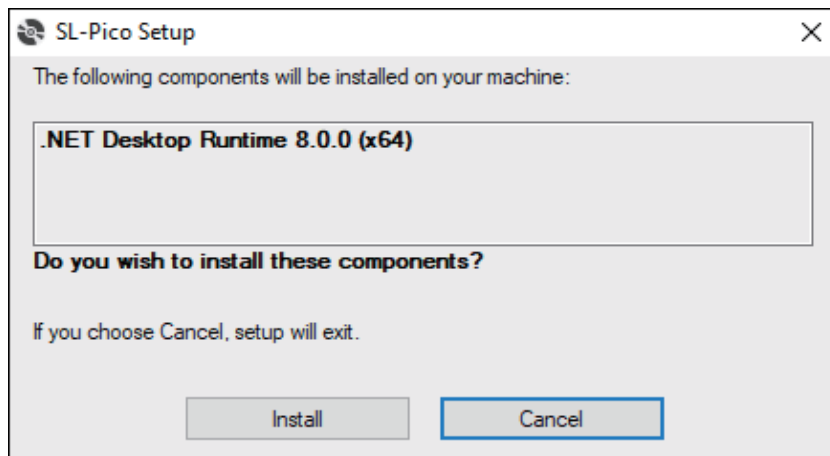
3.1 System Main Components

Use the software in the USB we have provided.

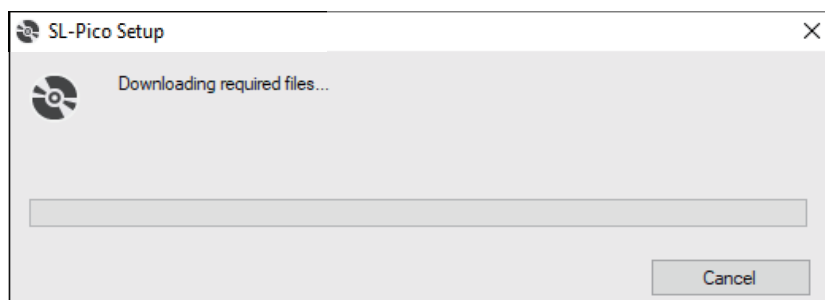
1. Run the “setup” program



2. Click “Install”

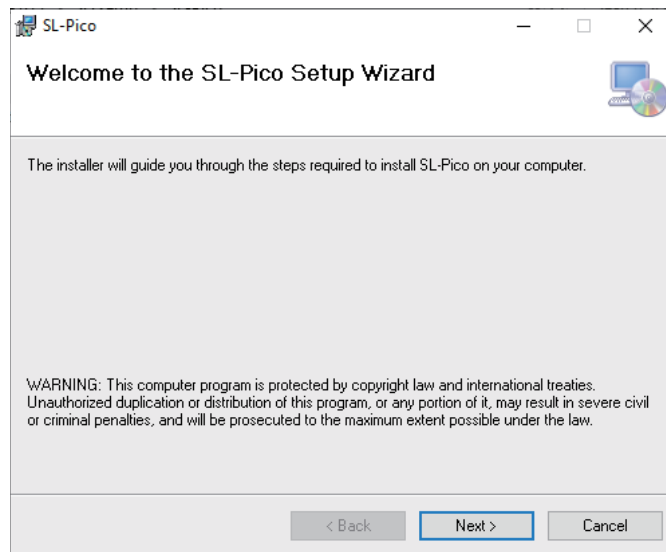


3. During installation if a windows pops up, click “Yes”

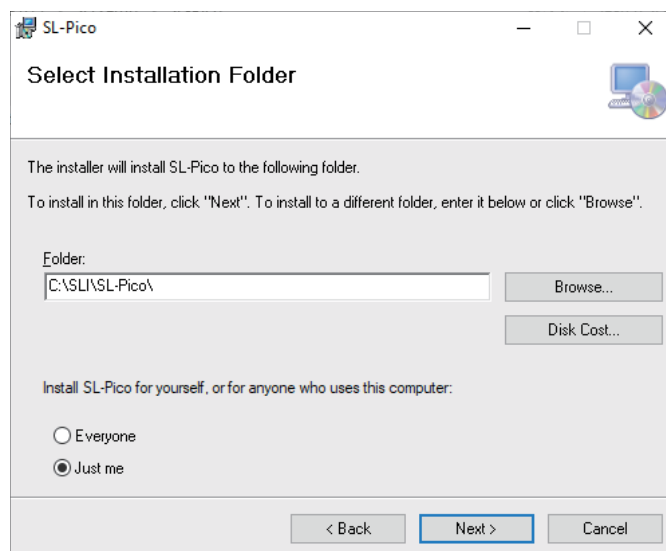


3. Installation

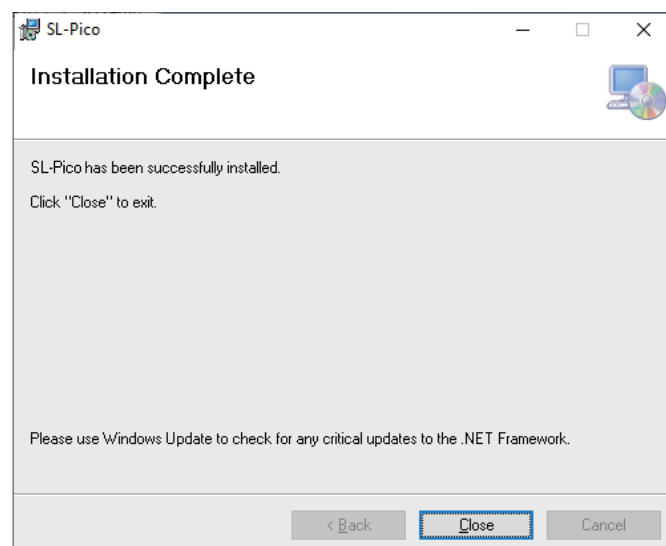
4. Click "Next"



5. Click "Next"



6. Installation complete



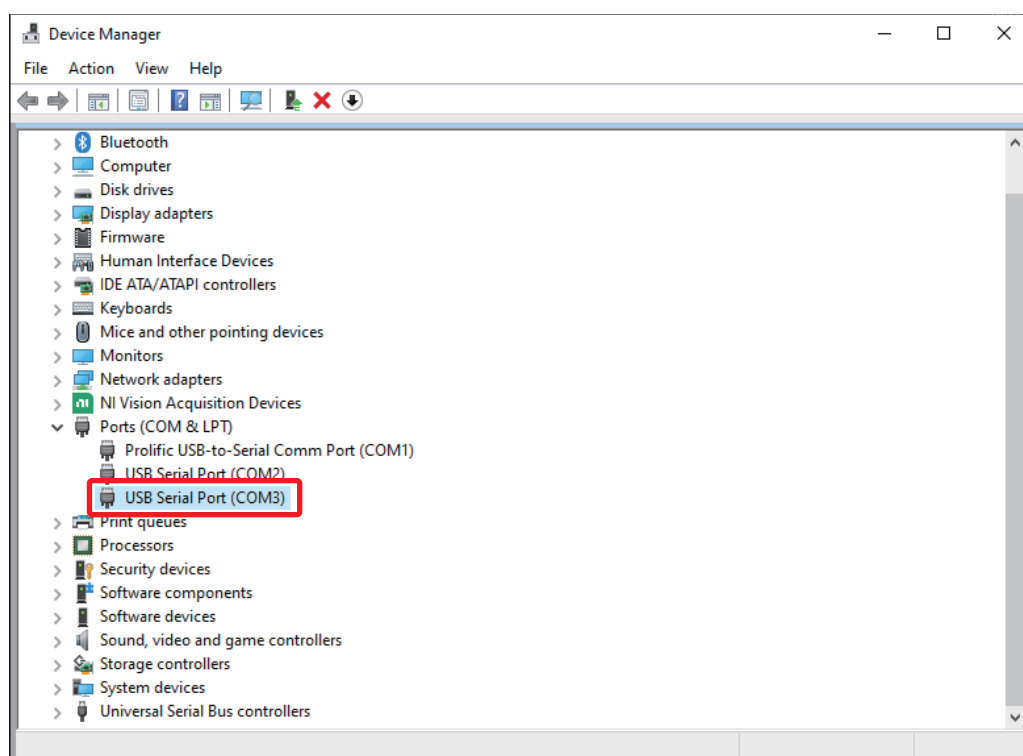
4. Operation

4.1 Turning On Laser

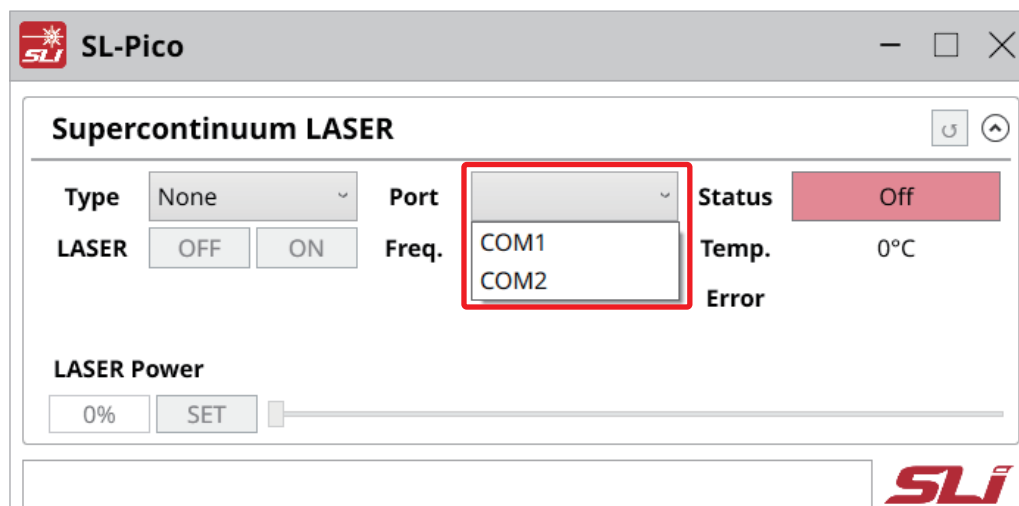
1. Connect the AC power cable to the SL-Pico.
2. Insert the interlock plug into the panel at the back of the SL-Pico and turn on the power switch.
3. Turn on the key switch on the SL-Pico front panel. (0 : OFF, 1 : ON)

4.2 Laser Connection

1. Once the SL-Pico is connected to the PC, open the "Device Manager"
Look under the Ports tab to find the "Prolific USB-to-Serial Comm Port" and check the COM number
(If you cannot find the "Prolific USB-to-Serial Comm Port", please go to 5. Troubleshooting in this manual)
Once you have checked the COM number, open the SL-Pico software.



2. Set the Port number same as the COM number.



4. Operation

3. Select the type of laser by clicking the [Type] tab.

If the repetition rate function is adjustable, select SLV, otherwise select SLF(Repetition rate: Fixed).

(If you are not sure of the laser type, please contact us at support@spectrolightinc.com)

The screenshot shows the 'Supercontinuum LASER' control window. The 'Type' dropdown menu is open, showing options: None, None, SLV, and SLF. The 'SLF' option is highlighted. Other controls include 'Port' (COM1), 'Status' (Off), 'Temp.' (0°C), 'Error', 'Freq.' (with a 'SET' button), and 'LASER Power' (0% with a 'SET' button and a slider).

4. SLF models -

Once the laser is connected, the [LASER] tab should be activated.

Click the "ON" button of the [LASER] tab to turn on the laser.

The screenshot shows the 'Supercontinuum LASER' control window. The 'Type' dropdown is set to 'SLF'. The 'LASER' tab is active, showing 'OFF' and 'ON' buttons. The 'ON' button is highlighted with a red arrow. Other controls include 'Port' (COM1), 'Status' (Off), 'Temp.' (24°C), 'Error' (ERRO), 'Freq.' (with a 'SET' button), and 'LASER Power' (0% with a 'SET' button and a slider).

The laser is now ready for use.

The screenshot shows the 'Supercontinuum LASER' control window. The 'Type' dropdown is set to 'SLF'. The 'LASER' tab is active, showing 'OFF' and 'ON' buttons. The 'ON' button is highlighted. Other controls include 'Port' (COM1), 'Status' (On), 'Temp.' (24°C), 'Error' (ERRO), 'Freq.' (with a 'SET' button), and 'LASER Power' (0% with a 'SET' button and a slider).

4. Operation

SLV models -

Once the laser is connected, the [LASER] and [Freq.] tab should be activated.

Supercontinuum LASER

Type: SLV Port: COM1 Status: Off

LASER: OFF ON Freq.: 0.01 MHz SET Temp.: 25°C Error: ERR0

LASER Power: 0% SET

Select the desired frequency on the [Freq.] tab, then click the "SET" button.

Supercontinuum LASER

Type: SLV Port: COM1 Status: Off

LASER: OFF ON Freq.: 0.01 MHz SET Temp.: 25°C Error: ERR0

LASER Power: 0% SET

0.01 MHz
0.1 MHz
0.2 MHz
0.5 MHz
1 MHz
4 MHz
5 MHz
10 MHz
20 MHz
40 MHz
80 MHz
200 MHz

The frequency can be changed only when the [LASER] is "OFF".

4. Operation

After setting the desired frequency, click the "ON" button of the [LASER] tab to turn the laser on.

Supercontinuum LASER

Type

SLV

Port

COM1

Status

Off

LASER

OFF

ON

Freq.

80 MHz

SET

Temp.

25°C

Error

ERR0

LASER Power

0%

SET

The laser is now ready for use.

Supercontinuum LASER

Type

SLV

Port

COM1

Status

On

LASER

OFF

ON

Freq.

80 MHz

SET

Temp.

25°C

Error

ERR0

LASER Power

0%

SET

4. Operation

4.3 Laser Operation

Once the laser is ready for use, use the [LASER Power] tab to set its desired power.

Users can manually input the power directly and click "SET" button or use the scroll bar on the right.

The figure consists of three vertically stacked screenshots of the 'Supercontinuum LASER' control interface. Each screenshot shows the same settings: Type: SLV, Port: COM1, Status: On, LASER: OFF, Freq.: 80 MHz, Temp.: 25°C, and Error: ERR0. The 'LASER Power' section at the bottom of each interface is highlighted with a red box and an arrow pointing to it.

- Top Screenshot:** The 'LASER Power' input field contains the text '20' and the 'SET' button is highlighted.
- Middle Screenshot:** The 'LASER Power' input field contains the text '20%' and the 'SET' button is highlighted.
- Bottom Screenshot:** The 'LASER Power' input field contains the text '50%' and the slider bar is highlighted.

***NOTE :** When increasing the power of the laser output, it should be gradually raised from 0% to 100%.
For example : 0% → 30% → 50% → 80% → 100%

***NOTE :** When decreasing the power of the laser output, it should be gradually reduced from 100% to 0%.
For example : 100% → 80% → 50% → 30% → 0%

4. Operation

4.4 Turning Off Laser

1. Gradually decrease the power of the laser output. (For example : 100% → 80% → 50% → 30% → 0%)
2. Click "OFF" on the [LASER] tab.

Supercontinuum LASER

Type	SLF	Port	COM1	Status	On
LASER	OFF ON	Freq.	SET	Temp.	24°C
				Error	ERR0

LASER Power

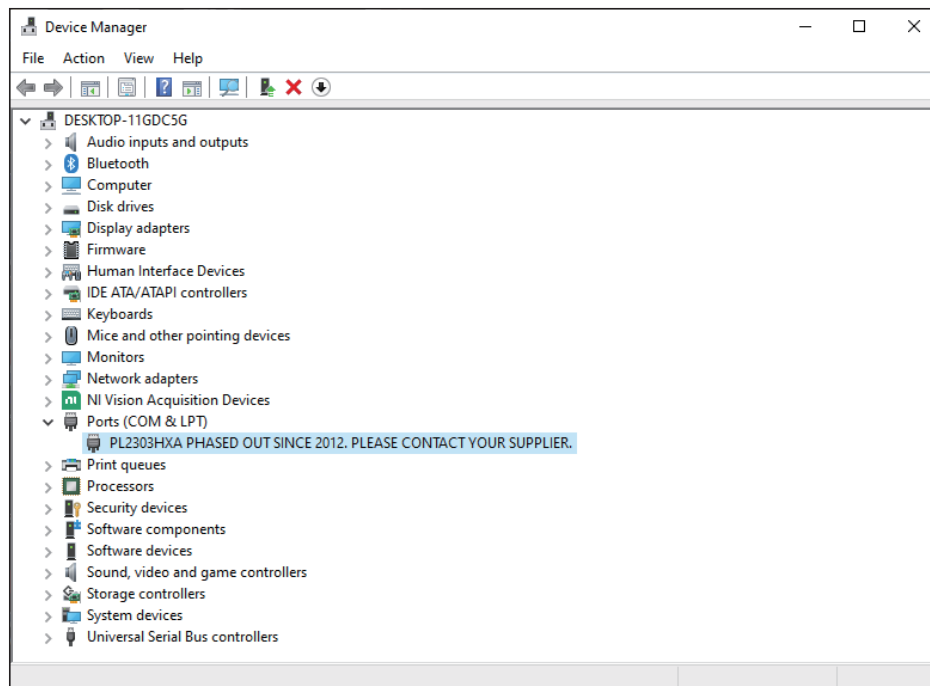
0% SET

3. Turn off the key switch on the front panel of the SL-Pico. (0 : OFF, 1 : ON)
4. Turn off the power switch on the back panel of the SL-Pico.
5. If the SL-Pico will not be used for long time, disconnect the power cord and interlock plug.

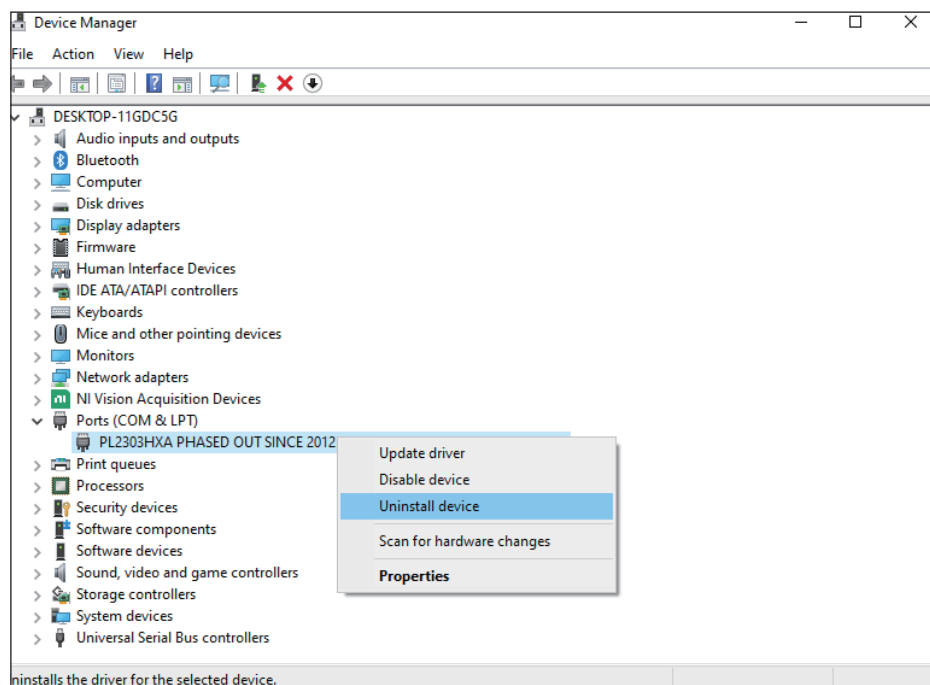
5. Trouble Shooting

5.1 Laser Connection Error

- If you are experiencing issues with laser connection, check the "Ports (COM & LPT)" section in Device Manager to ensure the laser is properly recognized and configured.

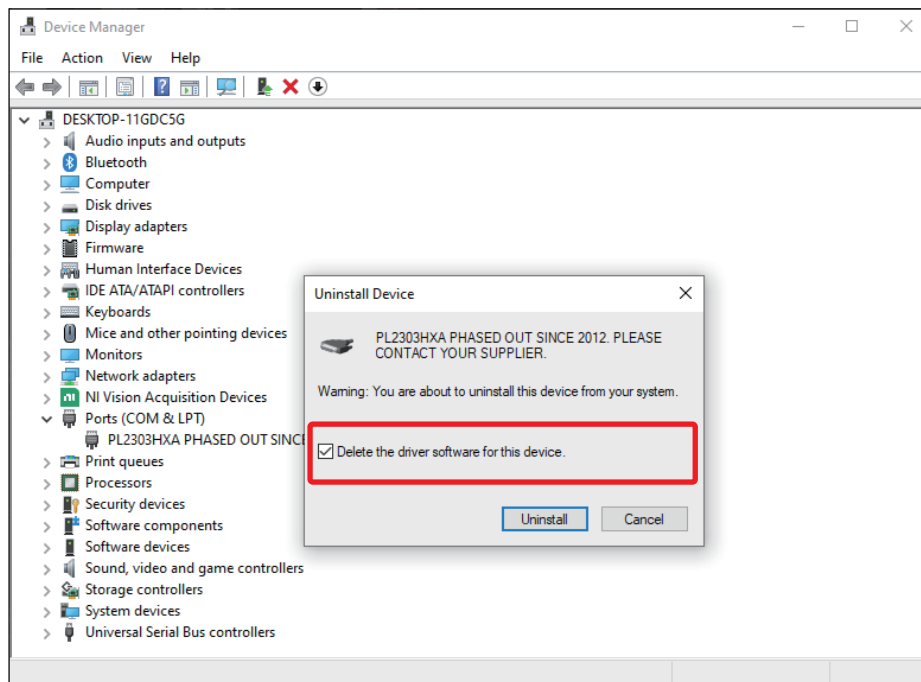


- If the name of the port is as follows, right click on the respective port and click "Uninstall device".

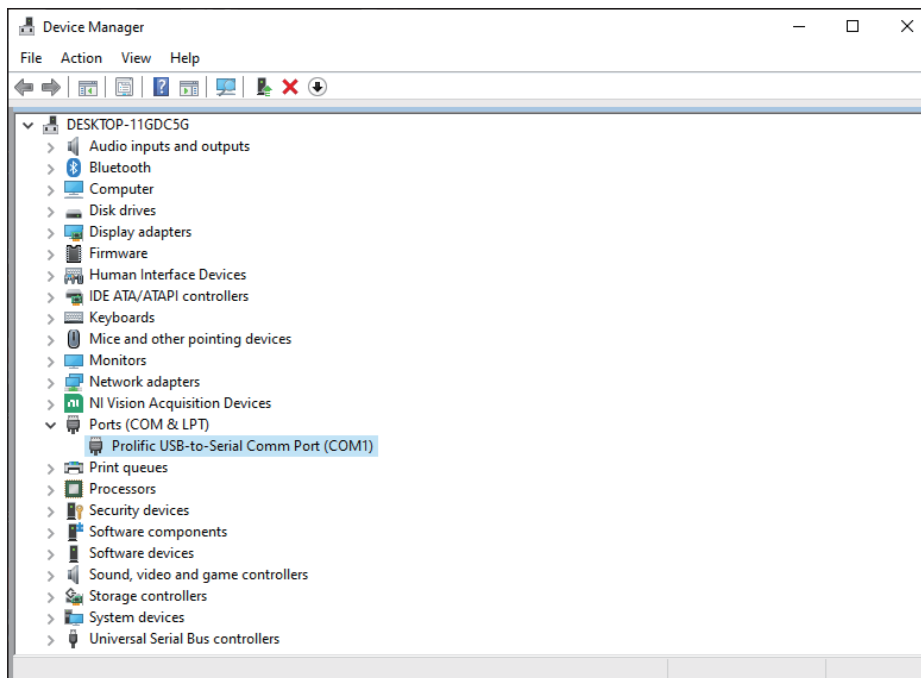


5. Trouble Shooting

- When the following screen pops up, be sure to check the box and click “Uninstall”.



- Once the uninstall is complete, disconnect the USB cable of the SL-Pico and reconnect.
- Reopen the Device Manager and check under “Ports (COM & LPT)”.



- If the laser port name is “Prolific USB-to-Serial Comm Port”, check the COM port number and choose the respective number in the SL-Pico software.

5.2 Laser Error Messages

- ERR0 : No error
- ERR1 : Parameters alarm turn off power and restart, if still alarm please contact SLi
- ERR3 : Parameters alarm please contact SLi
- ERR4 : Parameters alarm please contact SLi
- ERR6 : Frequency alarm turn off power and restart, if still alarm please contact SLi
- ERR7 : Temperature alarm Switch off the laser and ensure the laser temperature is less than 40°C before use
- ERR8 : INTERLOCK alarm Please insert interlock, then turn off the power and restart
- ERR9 : Voltage alarm turn off power and restart, if still alarm please contact SLi
- ERR10 : Time limited please contact SLi
- ERR19 : 24 V voltage alarm turn off power and restart, if still alarm please contact SLi
- ERR29 : 5 V voltage alarm please contact SLi
- ERR39 : 10 W pump and 2 V voltage alarm please contact SLi
- ERR49 : 3.3 V voltage alarm please contact SLi
- ERR59 : VCC 5 V voltage alarm please contact SLi
- ERR69 : 1.2 V voltage alarm please contact SLi
- ERR79 : 27 W pump and 11 V voltage alarm please contact SLi
- ERR11 : Parameters alarm turn off power and restart, if still alarm please contact SLi
- ERR31 : Parameters alarm turn off power and restart, if still alarm please contact SLi
- ERR41 : Parameters alarm turn off power and restart, if still alarm please contact SLi
- ERR51 : Parameters alarm turn off power and restart, if still alarm please contact SLi
- ERR61 : Parameters alarm turn off power and restart, if still alarm please contact SLi
- ERR81 : Parameters alarm turn off power and restart, if still alarm please contact SLi

6. Safety Guidelines

6.1 Laser Safety

The following general safety precautions must be observed during all phases of the operation of this instrument. Failure to comply with these precautions or specific warnings elsewhere in this manual violates safety standards for the instrument's intended use.

Safety Symbols



Avoid Exposure : Do not expose yourself to the direct or reflected output beam. Direct exposure to the laser radiation emitted from this unit may be harmful.

Shielding and Optics : Ensure that the appropriate output beam shields and optics are properly installed before energizing the unit.

Interlocks : All interlocks must be satisfied prior to operation. Failure to comply may lead to hazardous conditions.



Always read and understand the manual before working on or with this device.

iiSM Inc. has no liability for the customer's failure to comply with these requirements.

1. Before the operation, review the instrument and manual for safety markings and instructions. You must follow these to ensure safe operation and to maintain the instrument in safe condition.
2. Avoid direct exposure to the beam.
3. Always wear protective goggles or eyeglasses appropriate for working with laser light.
4. Avoid looking at the beam directly.

Warning : A strong reflected laser beam back into the SL-Pico output may damage the laser.

Safety considerations

1. Strong reflected laser beam back into the SL-Pico output may damage the SL-Pico.
2. Do not look directly at the output of the SL-Pico at any time in any case.
3. Do not put things in the air passage in case it's clogged.
4. Do not place heavy objects on the laser body.
5. Do not put the output collimator toward people or any other reflective surface in case causing any personal injury.
6. Do not check the laser directly with your eyes unless you are sure the device is in power-down state as the laser may emit invisible infrared and ultraviolet light that can be harmful to your eyes.
7. Be sure that the laser is out of power before checking the device.
8. Do not stare at the emission port directly even you wear the laser protective glasses.
9. Do not put any low ignition substance on the laser such as the flammable, explosive materials etc.
10. Be sure that the laser is placed in non-professionals can't touch.
11. Do not direct the laser light at glass surfaces, as normal glass has approximately 4 % reflectivity and can reflect light back into your eyes, causing harm.
12. Please remove your watch when using the laser to prevent the watch surface from reflecting light into your eyes.
13. Please use a detector or conversion film to locate the laser light since the light beyond 800 nm is totally invisible.
14. We strongly recommend wearing laser goggles with a specific wavelength protection rating to protect your eyes when operating the laser.
15. We recommend that you wear a long suit of white clothes. This will prevent your clothes from burning and potentially causing a fire if the laser irradiates your body.

6.2 Electrical Safety

1. The respective modules, boards, or RF inputs and outputs are susceptible to damage by electrostatic discharge (ESD) and require proper protection procedures for storage and handling.
2. To completely shut off electrical power to the unit, disconnect the power cord.

6.3 Environmental Considerations

Consider the following environmental conditions that may impact the system's performance or safety.

Environmental Considerations

To maximize the long-term performance and overall testing accuracy of this instrument, the following environmental safeguards should be considered.

1. Avoid dust and direct sunlight. The optical performance of the unit may be compromised by long-term exposure to direct sunlight and dust.
2. Avoid excess vibration that might compromise the mechanical integrity of the unit.
3. Avoid exposing the unit to situations or environments that may result in contact with corrosive gases.
4. Do not block fan vents. If the unit is racked, make sure it has proper ventilation.
5. The recommended operating temperature is 10 - 35°C.
6. Keep original packing material for transport or shipment. If original packing is not available, please contact us at support@spectrolightinc.com to have a factory-approved shipping case delivered to you.

7. Technical Support

7.1 Contact Information

Technical support:

iiSM Inc.

402, 7-16, Naseongnam-ro,

Sejong-si, 30129, Republic of Korea

Tel: +82 44 863 9852

Email: support@spectrolightinc.com

7.2 Warranty Information

2 years from ship date.

DISCLAIMER

This device is designed for use in laboratory and industrial environments. This is not a medical device, so it should not be used or applied to humans in any way.

WARNINGS AND PRECAUTIONS

- Operate the device using 100-240 V AC, 50/60 Hz, 2 A / Output 24 V DC, 6.67 A.
- Always use the grounded power supply cord set provided to connect the system to a grounded outlet.
- Do not expose the device to rain or moisture.
- Never look into the optical pathway of the light sources used.
- Do not connect or disconnect the cables while the device's power is turned ON.
- Always allow free flow of fresh air on all sides.
- Operating/Storage conditions: Indoor use only

CLEANING AND MAINTENANCE

Please cover the output head with the dust-cap to avoid dust pollution while it's in idle state. Keep the laser body clean, don't let the body and power adapter touch water.

STORAGE CONDITIONS

Temperature: 25 °C (± 20 °C), Humidity: 60 % or less.

OPERATION CONDITIONS

Temperature: 25 °C (± 5 °C), Humidity: 60 % or less.

ELECTRICAL CHARACTERISTICS

INPUT: 100 – 240 V AC, 50/60 Hz, 2 A
Power dissipation: 160 W



SPECTROLIGHT

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Sales	Phone : +82.44.863.9852
	E-mail : sales@spectrolightinc.com
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	E-mail : support@spectrolightinc.com