Supercontinuum Laser

SL-Pico

Operation Manual

Ver 1.2

SPECTROLIGHT

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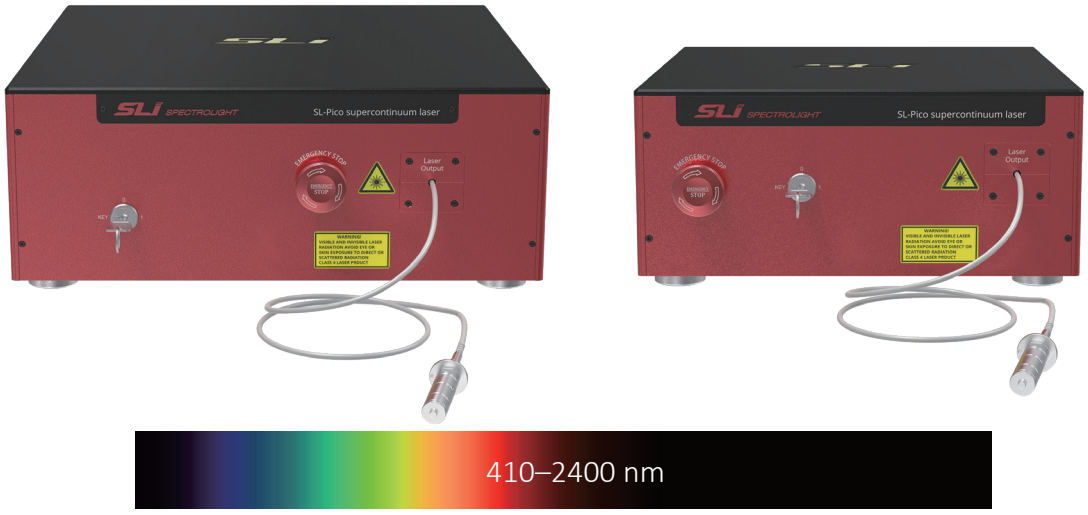
1.1 SL-Pico

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



Wide broadband spectral range

SL-Pico Model

Model	Supercontinuum output power		Repetition Rate	Output pulse width (ps)	Spectral Range (nm)
	Visible	Total			
SL10	100 mW	1 W	2 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

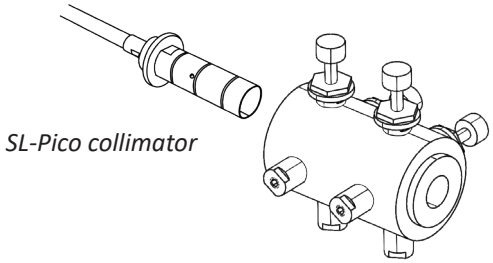
* SL-Pico model name meaning

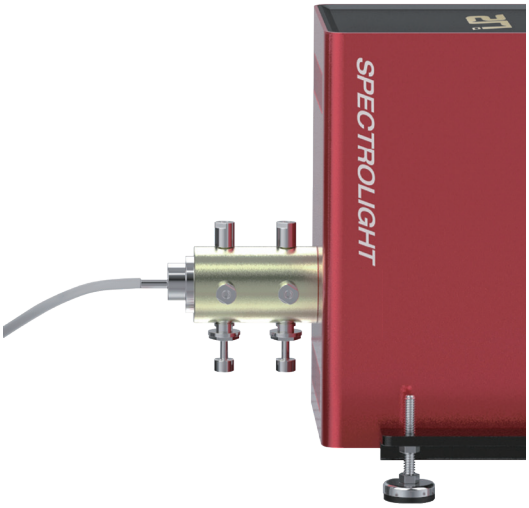
(Example: SLM35V)

- V stands for adjustable repetition rate
- Total output power: 35 means 3.5 W
- Note: This applies to the Mode-locked version.

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, and other applications.

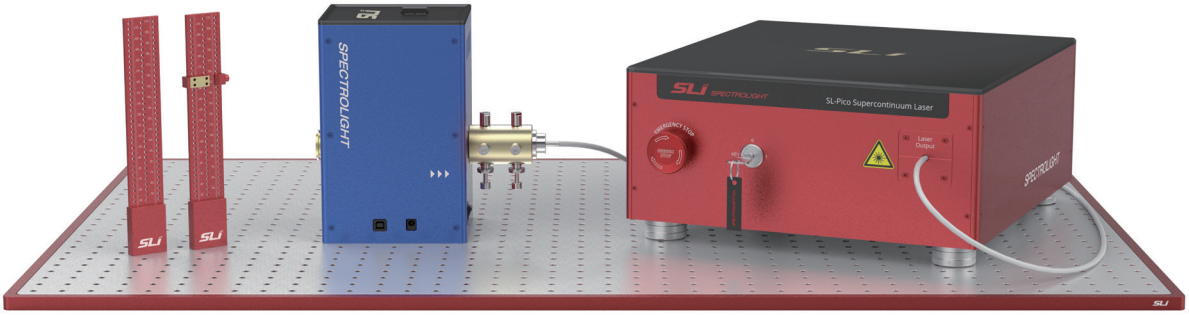




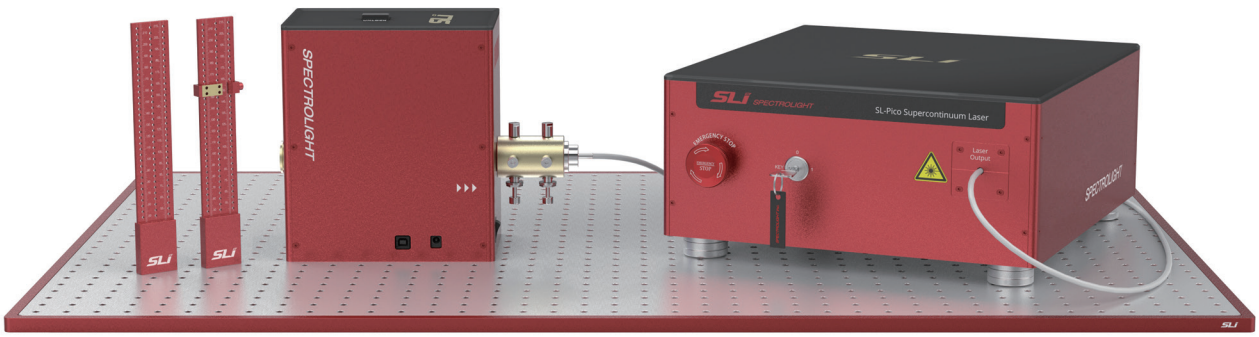
- Powerful Supercontinuum Laser Source
- Easy connection and alignment using the WS-SCAY accessory
- Fully compatible with the Flexible Wavelength Selector

Application Idea

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



Adding FWS-Poly-BLUE results in a tunable laser source (Fixed FWHM 10 or 20 nm).

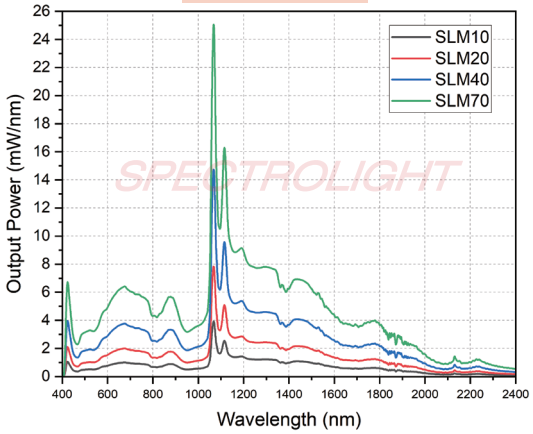


Adding FWS-Poly-RED results in a tunable laser source (Adjustable FWHM 2–15 nm).

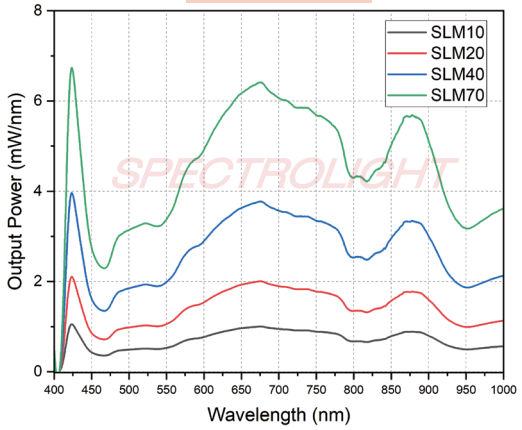
SL-Pico Output Power Spectrum

SL-Pico M-series (Mode-locked Lasers, SLM)

Full spectrum



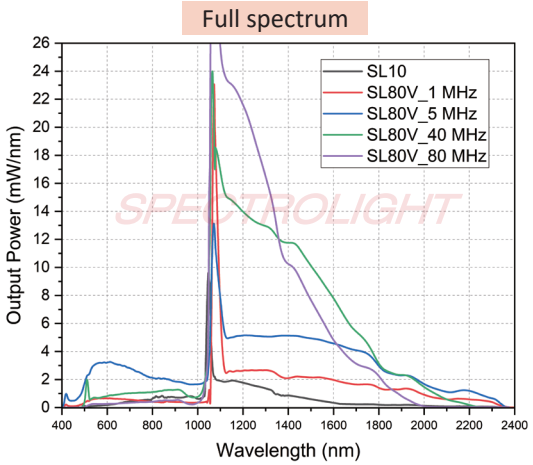
400–1000 nm



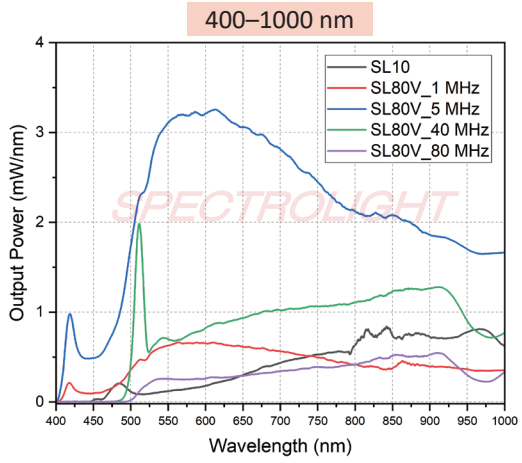
*The **SLM mode-locked model** offers a more stable spectral output profile compared to the **SL gain-switched model**.
*Additionally, **SLM series** models like the **SLM35V** feature an adjustable repetition rate.
*The **SL-Pico M-Series** displays its spectral output profile across all wavelengths at its maximum fixed repetition rate, with customizable repetition rates available at an extra cost.

SL-Pico G-series (Gain-switched Laser, SL)

Full spectrum



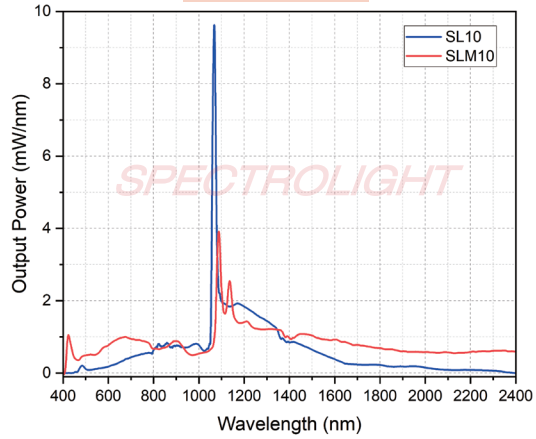
400–1000 nm



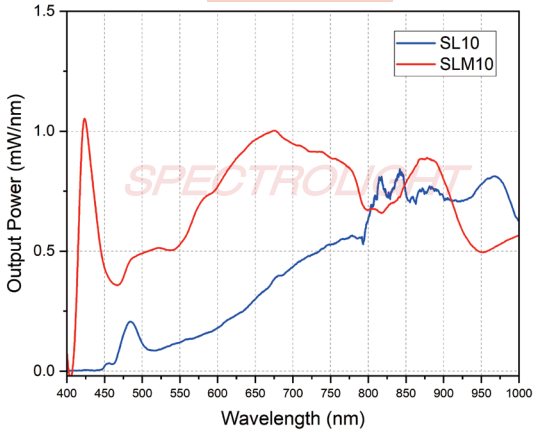
SL10 vs SLM10

* Check out the differences between SL10 and SLM10 at the bottom of the full spectrum.

Full spectrum



400–1000 nm



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	**Key switch**	Key Switch (2 ea)
5	**Interlock plug**	External safety device (1 ea)
6	**USB Flash drive**	Product software, product user manual, etc.

2.2 Front Panel Functions

(Example: SL80V)

A. Key Switch: Rotate exactly 90 degrees clockwise to power on, and 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: This is the collimator output for the laser. It can be connected to the FWS's input linker (WS-SCAY) accessory.

D. Labels: Laser safety

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 frequency; TTL Voltage: 0 to 3.3 V

E. NIM Signal: The SMA interface will output a pulse square wave signal loaded 50 Ω with the same pulse and frequency; NIM Voltage: 0 to -1 V

F. Label: Laser specifications

Product: Supercontinuum Laser
Model: SL-Pico(SL80V)
CWL: 430–2400 nm
S/N: SO80V0000
Ratings: AC 100–240 V, 50/60 Hz

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LASER APERTURE LOCATED AT THE END OF THE FIBER
OUTPUT POWER: ≤ 8 W
WAVELENGTH RANGE: 430–2400 nm
REPETITION RATE: 0.01 to 200 MHz adjustable

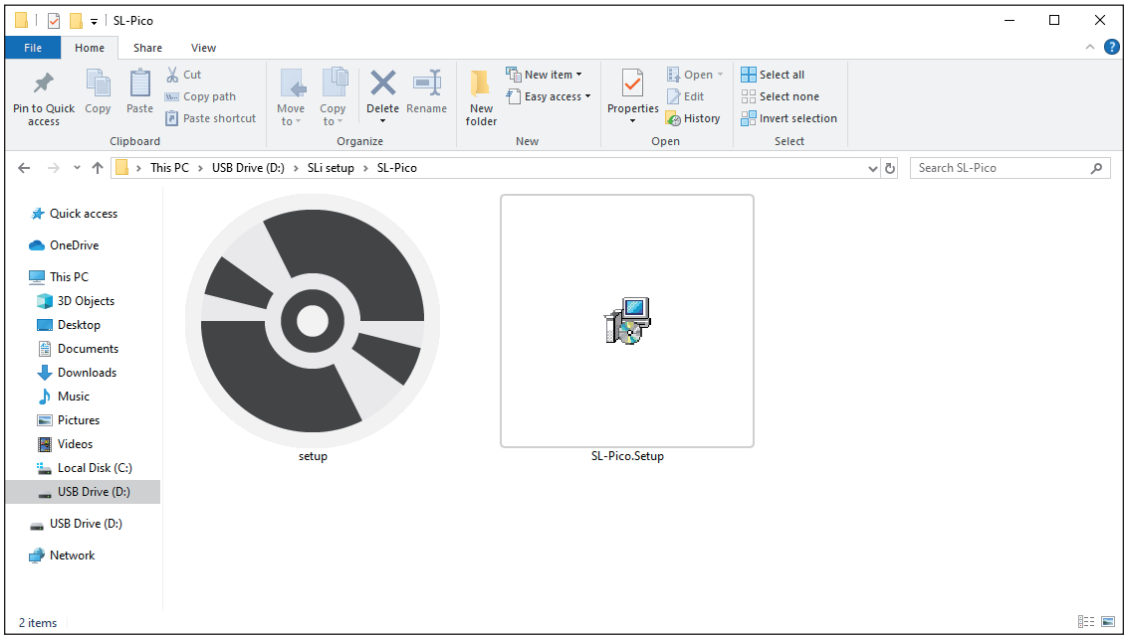
2.4 Specifications

		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 (MHz)		2 MHz	10 MHz	20 MHz	40 MHz	0.01 to 40 MHz adjustable	0.01 to 200 MHz adjustable	80 MHz
Output pulse width (ps)		< 300 ps	< 50 ps	< 50 ps	< 50 ps	< 50 ps	< 300 ps	< 50 ps
Fundamental pulse width (ps)		~ 100 ps	~ 6 ps	~ 6 ps	~ 6 ps	~ 6 ps	~ 100 ps	~ 6 ps
Spectral range (nm)		450–2400 nm	410–2400 nm	410–2400 nm	410–2400 nm	410–2400 nm	430–2400 nm	410–2400 nm
Power stability (%)		< 1 %						
Output power control (%)		0–100 %						
Output type		Armored fiber with collimator						
Beam diameter and quality		~ 2 mm @ 633 nm; M^2 < 1.1						
Beam divergence (mrad)		< 1 mrad (half angle)						
State of polarization		Unpolarized						
Length of output fiber (m)		1.3 m						
Sync(trigger) output		NIM output 0 to-1 V, TTL output 0 to 3.3 V						
Electric requirement		AC 100–240 V, 50/60 Hz						
Power consumption		160 W						
Software		SL-Pico v1.0						
Data interface		USB 2.0						
Dimension (L x W x H, mm)		345x358x153	423 mm x 437 mm x 165 mm					
Weight (kg)		15.5	20.5 kg					

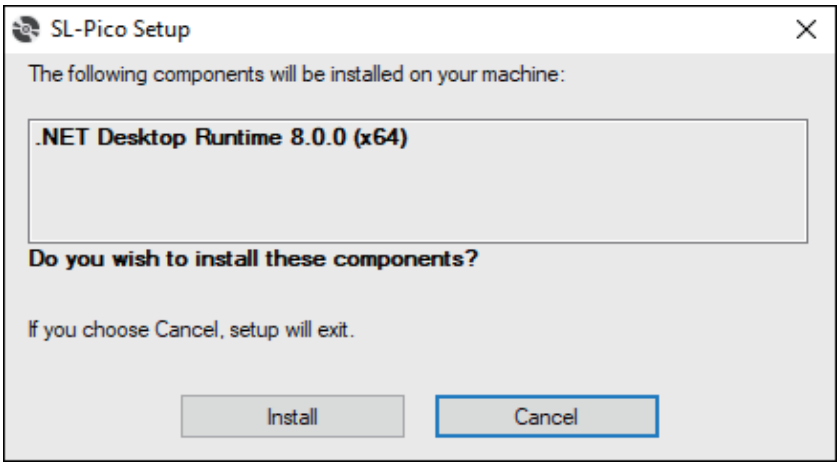
3.1 System Main Components

Use the software in the USB we have provided.

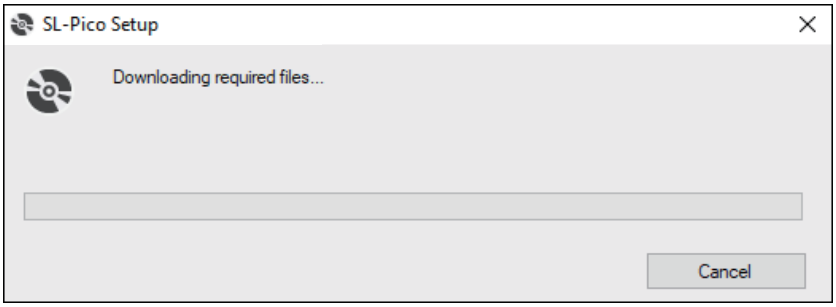
1. Run the “setup” program



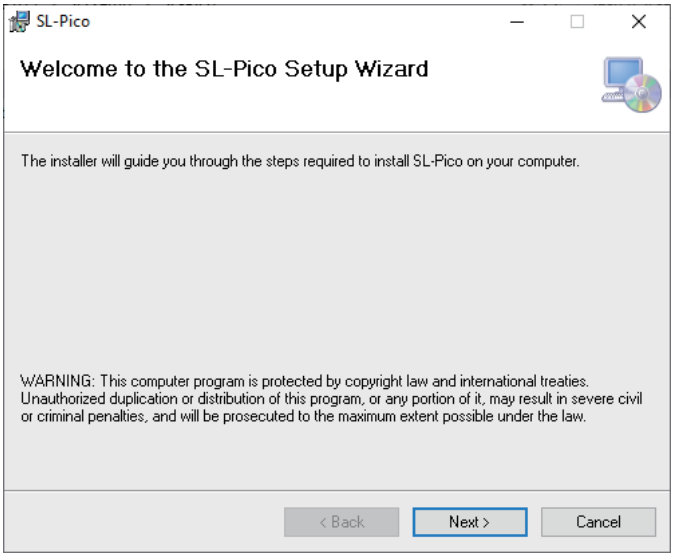
2. Click “Install”



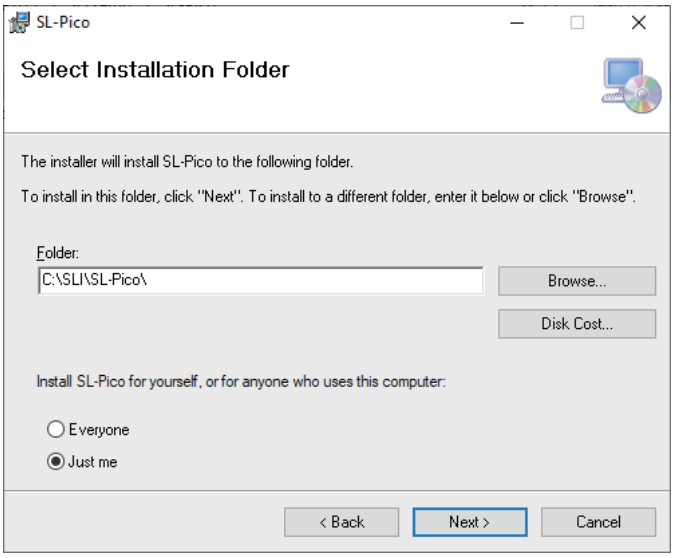
3. During installation if a window pops up, click “Yes”



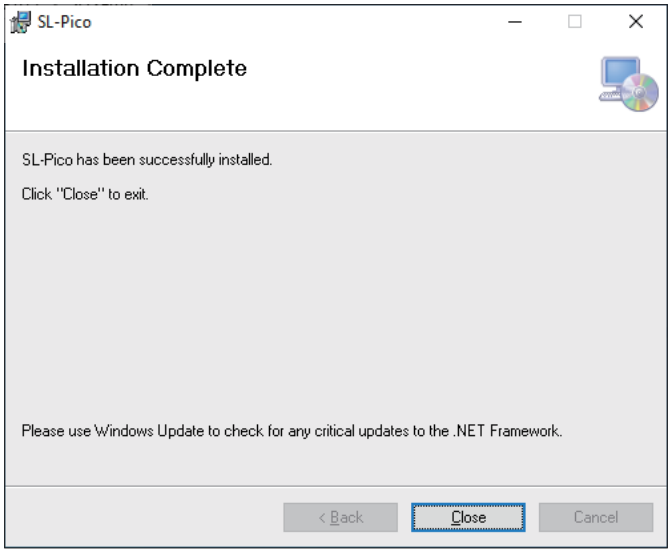
4. Click “Next”



5. Click “Next”



6. Installation complete

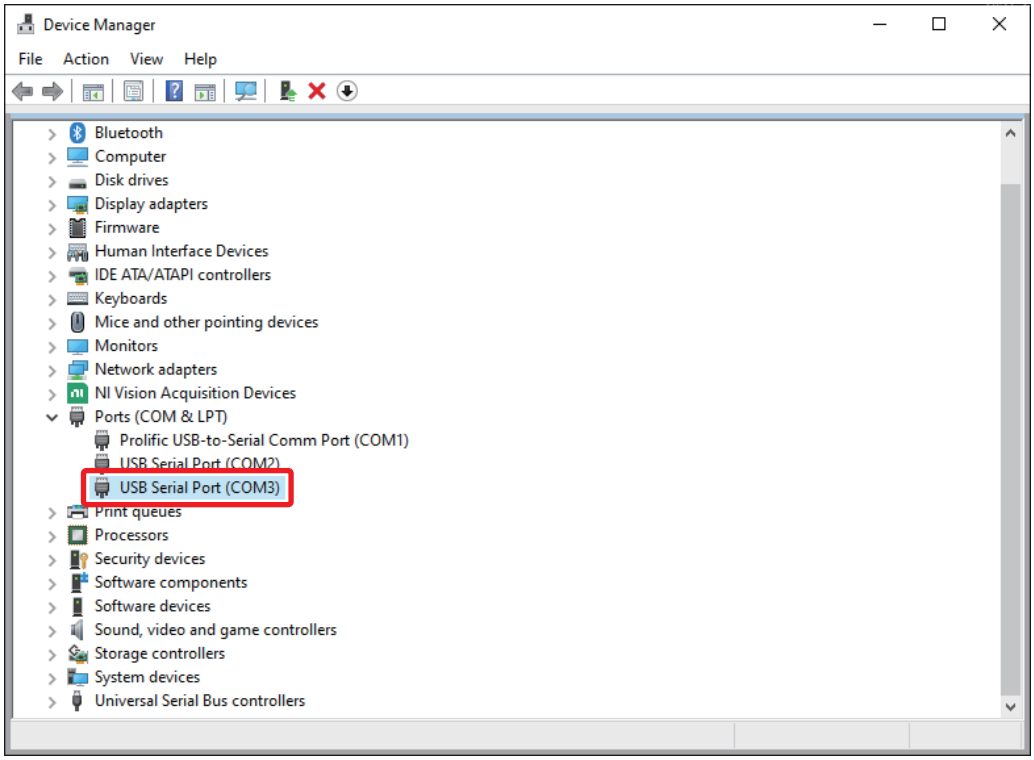


4.1 Turning On Laser

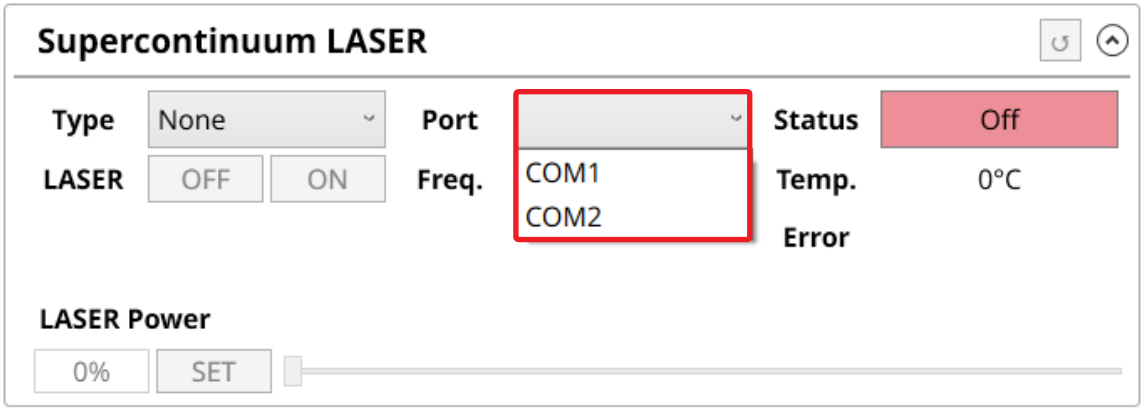
1. Connect the AC power cable to the SL-Pico.
2. Insert the interlock plug into the panel at the back of the SL-Pico and turn on the power switch.
3. Turn on the key switch on the SL-Pico front panel.

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.

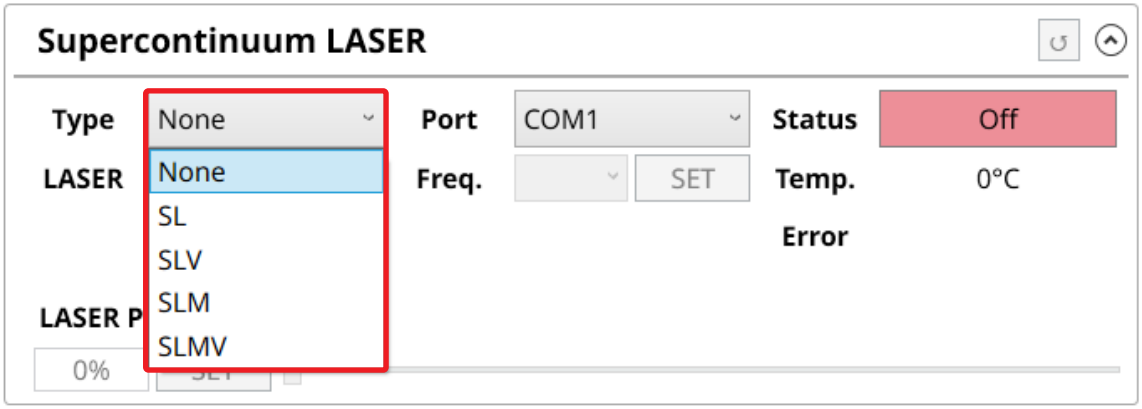


2. Set the Port number same as the COM number.

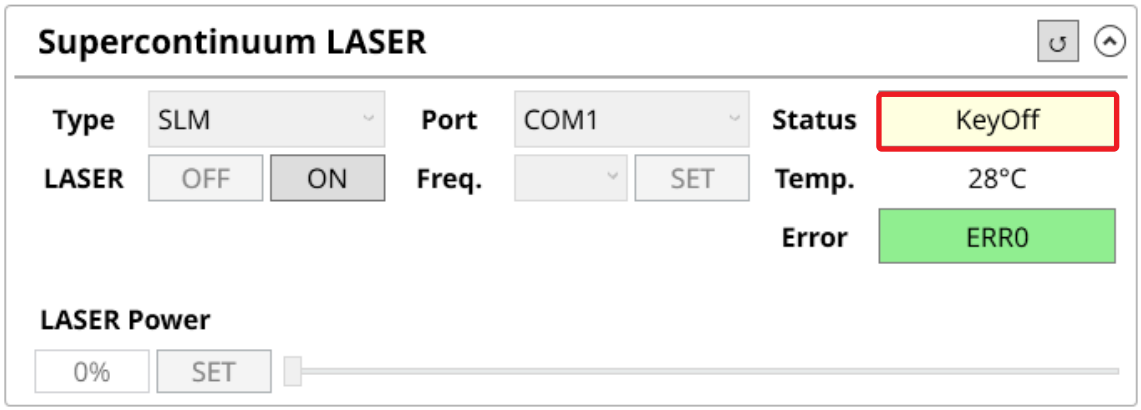


3. Select the laser type and check key status

After connecting the laser, select the appropriate laser type by clicking the **[Type]** dropdown menu.
If you are not sure which laser type to select, please contact us at support@spectrolightinc.com.

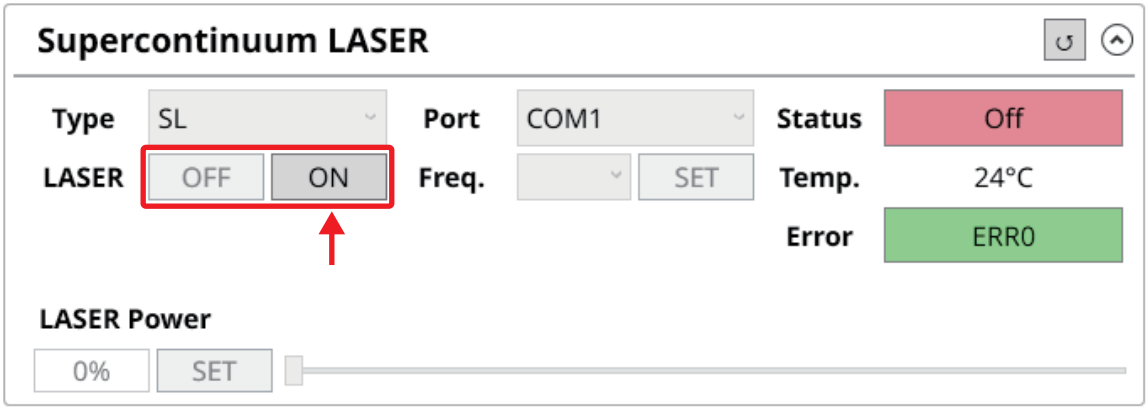


Once the laser is connected, the Status field will automatically update after a few seconds.
If the status displays "KeyOff", turn the physical key switch on the laser's front panel to the ON position before you proceed.

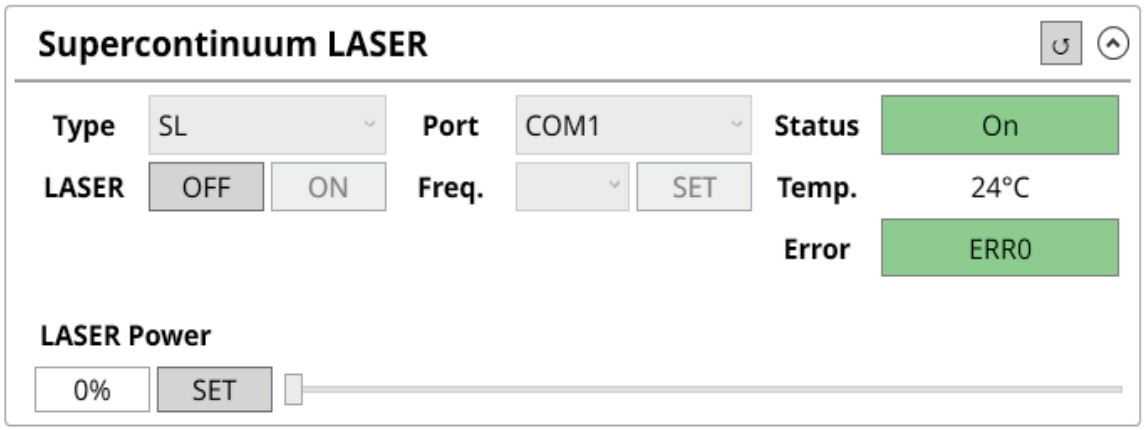


4. Turn on the laser (Status: Off → On)
When the physical key switch on the laser's front panel is in the ON position and the laser type has been selected, the device is ready to be powered on by using software.
The method for turning on the laser may vary depending on the model series.
Please refer to the instructions below for your specific laser series.

4-1. **SL-Pico G-Series** (Gain-switched Laser, SL/SLV)
Once the laser is connected to the software and operating, the [LASER] tab will activate.
The laser status will show as "Off."
To turn on the laser, click the "ON" button on the [LASER] tab.



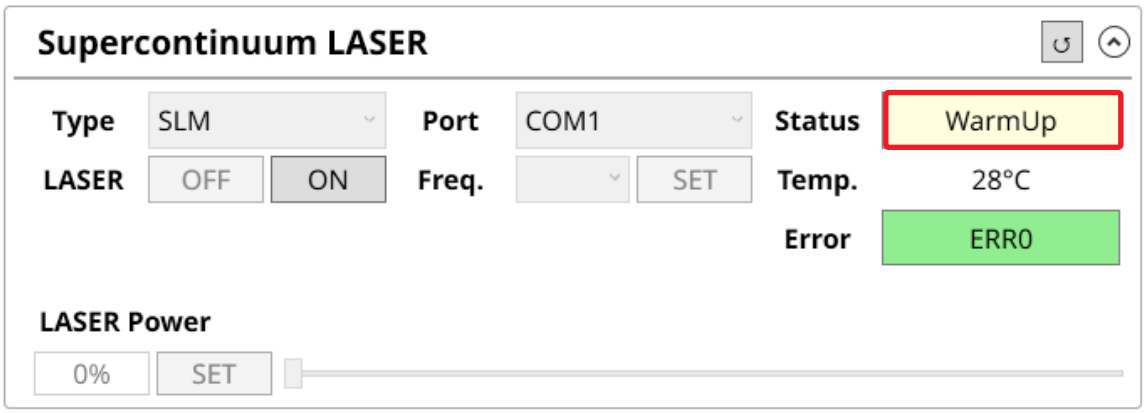
The laser is now ready for use.



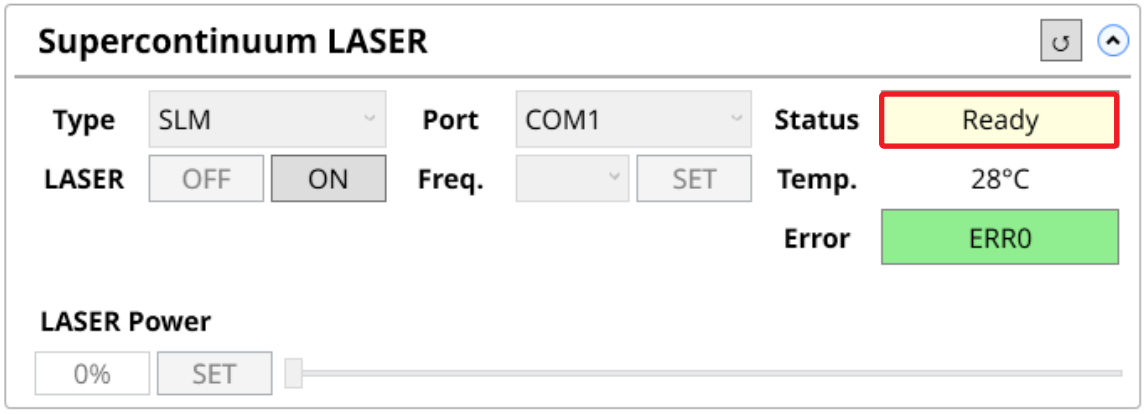
4-2. **SL-Pico M-Series** (Mode-locked Laser, SLM/SLMV)
Turn on the laser starting from the "OFF" state

Status: OFF
After you set the laser type to SLM or SLMV and the physical Key switch on the laser's front panel is in the ON position (in step 3), the laser status will be "Off".

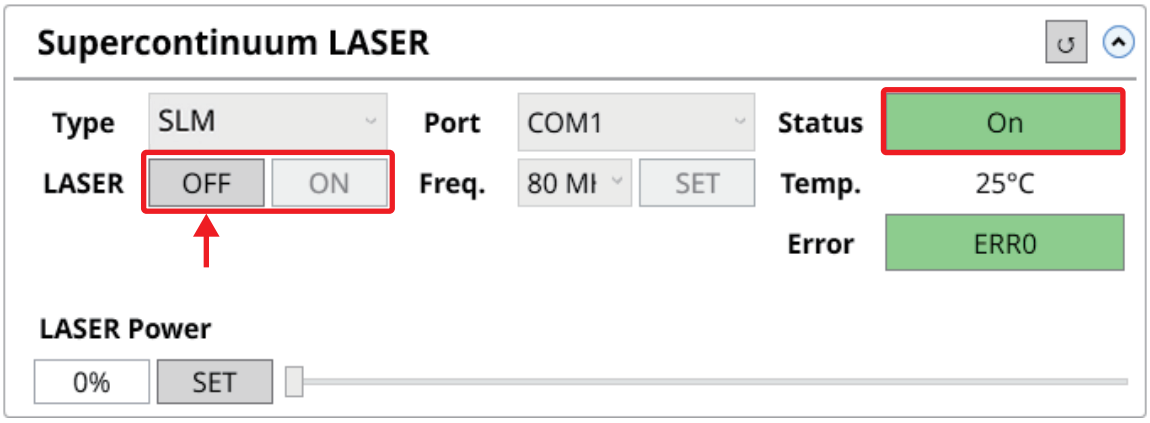
Status: WarmUp
Once the key switch is turned on, the status will automatically change to "WarmUp".
This stage may take a few minutes depending on the ambient conditions and internal initialization.
During WarmUp, the laser cannot be activated. Please wait until the warm-up is complete.



Status: Ready
When the warm-up process is complete, the status will automatically change to “Ready”.

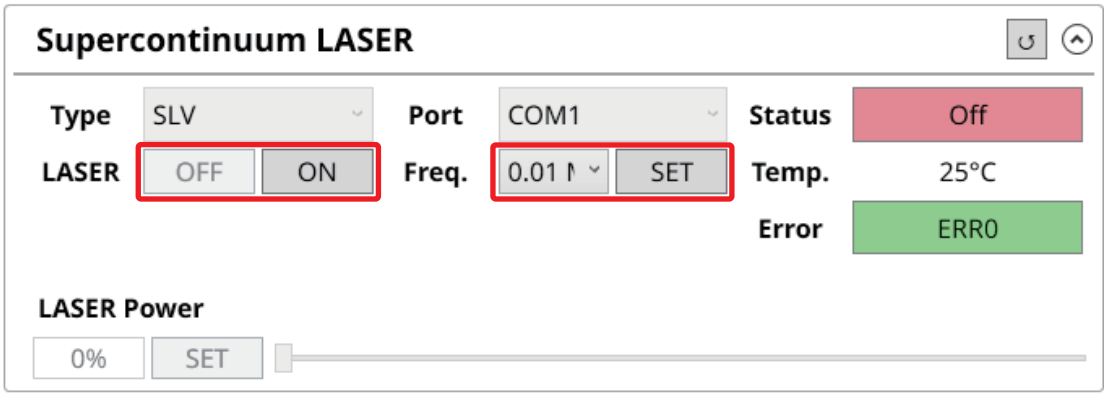


Press [ON]
Once the status is “Ready”, click the [ON] button in the [LASER] tab to turn on the laser.



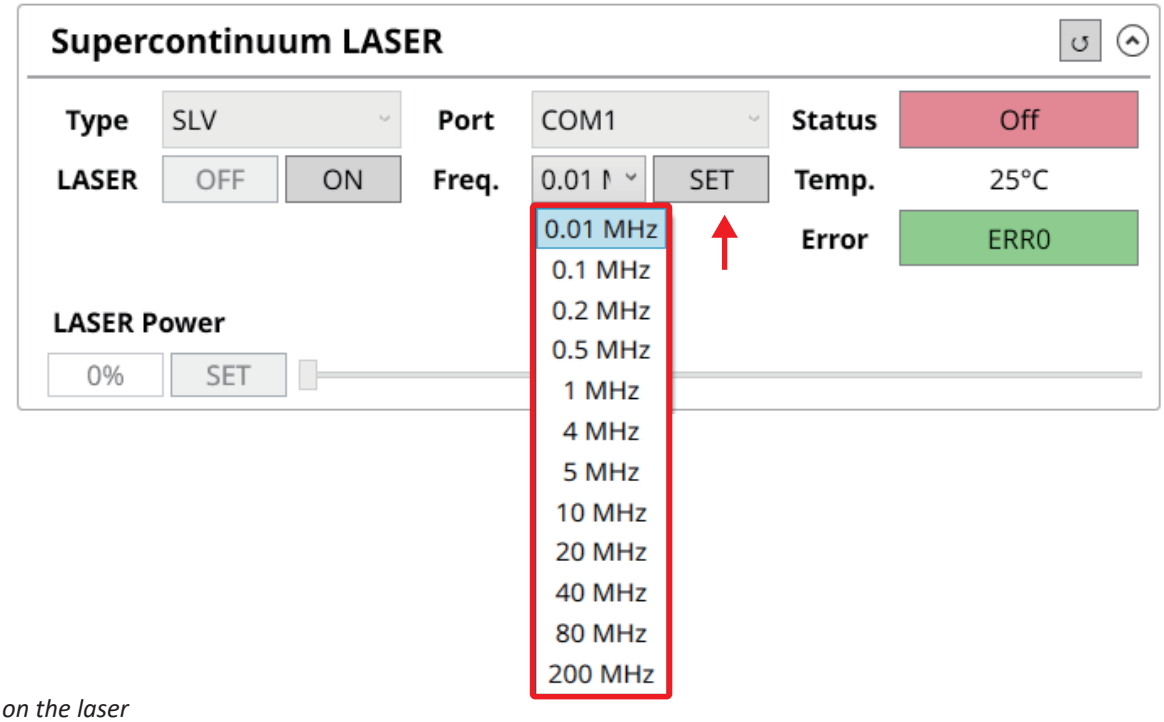
5. Set the Repetition Rate (Variable Models: SLV/SLMV)
This step applies only to Variable models (SLV / SLMV) that allow adjustment of the repetition rate.
The repetition rate determines the pulse frequency of the laser output.

***Note*: OFF state required**
The repetition rate can only be set or changed when the laser status is OFF. If you need to adjust the frequency during use, first turn the laser OFF, then change the repetition rate, and finally turn it ON again.



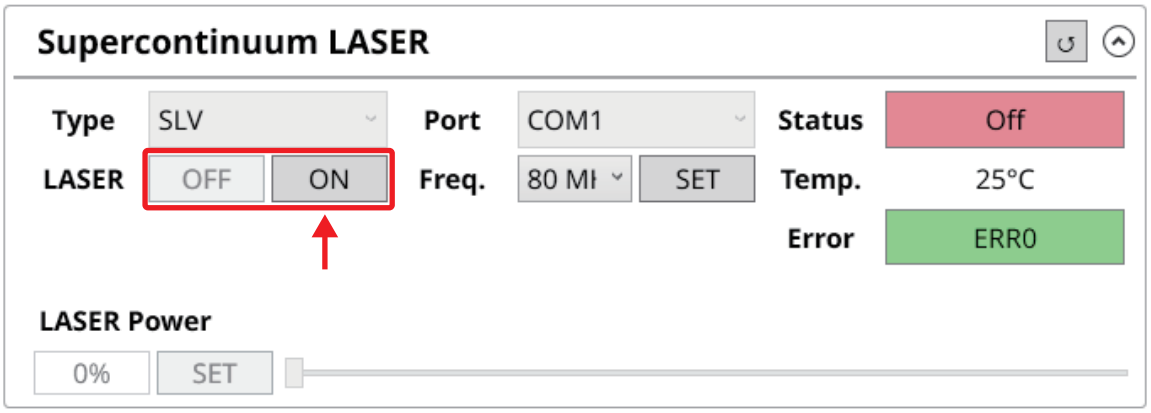
Access the [Freq.] tab

Once the laser is connected, the [LASER] and [Freq.] tabs are activated.
Select the desired frequency from the dropdown menu (e.g., 80 MHz).
Click the [SET] button to apply.

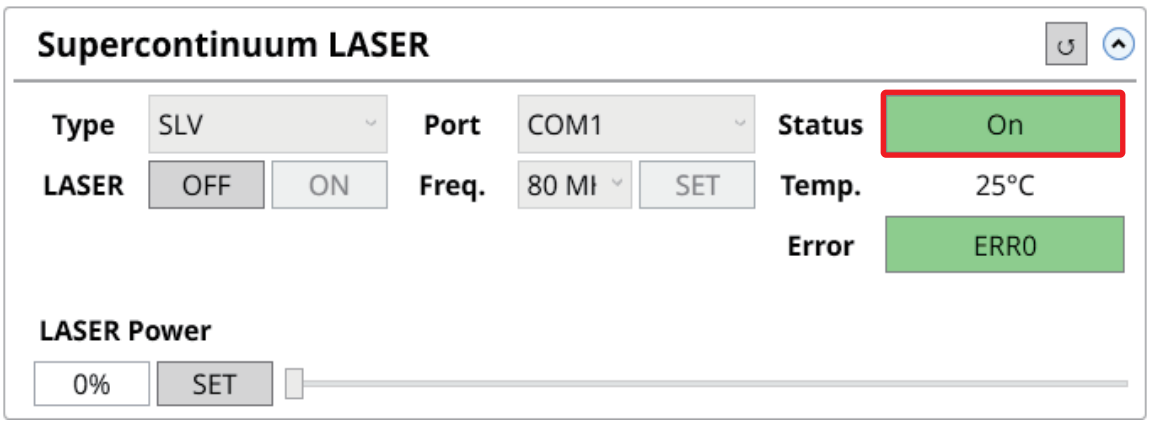


Turn on the laser

After setting the frequency, press the [ON] button in the [LASER] tab.



The Status will change from “Off” to “On”, confirming the laser is running with the selected repetition rate.

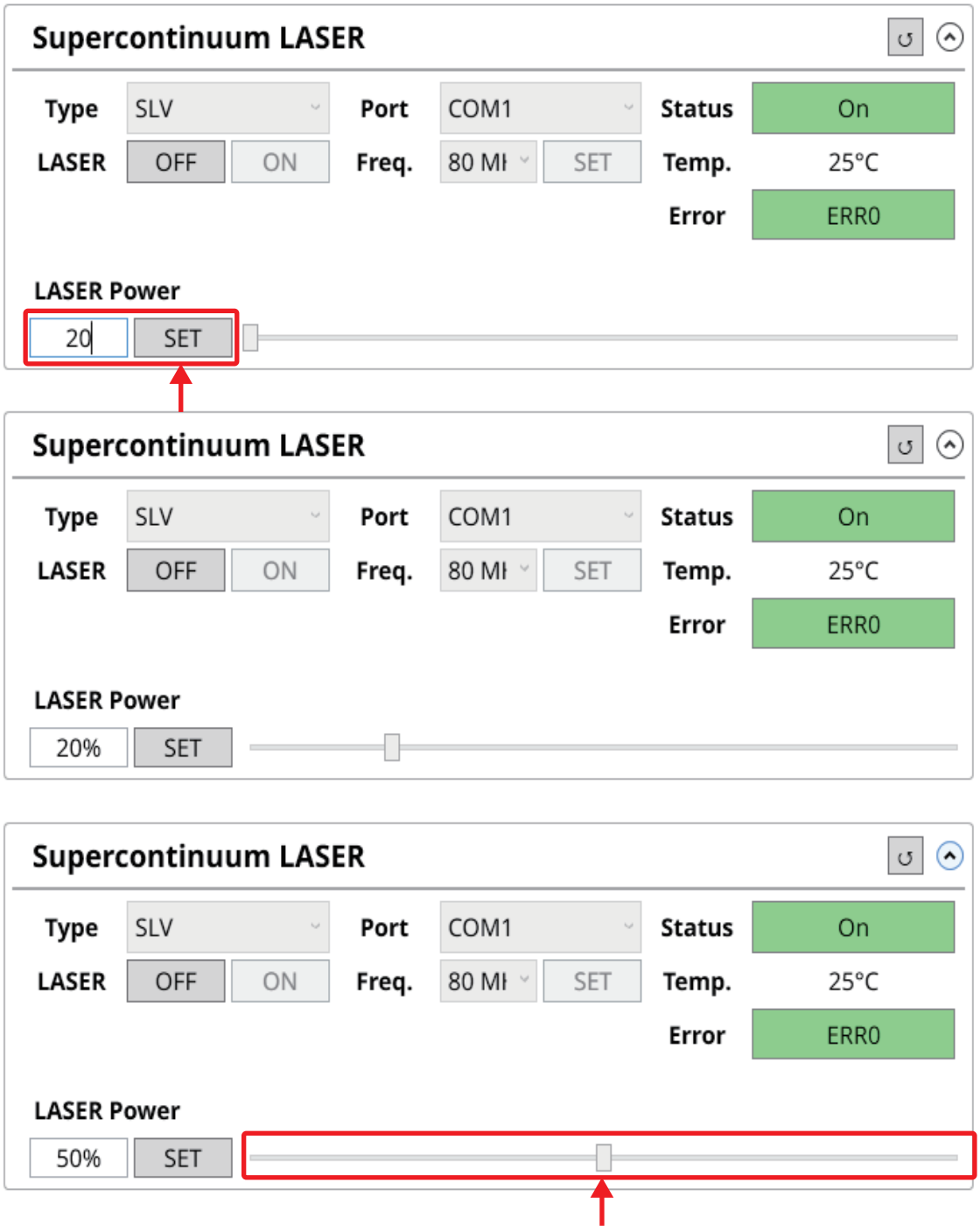


Verify operation

Confirm that the Status is “On” and that the selected frequency is displayed in the [Freq.] field.
The laser is now ready for use with the specified repetition rate.

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.

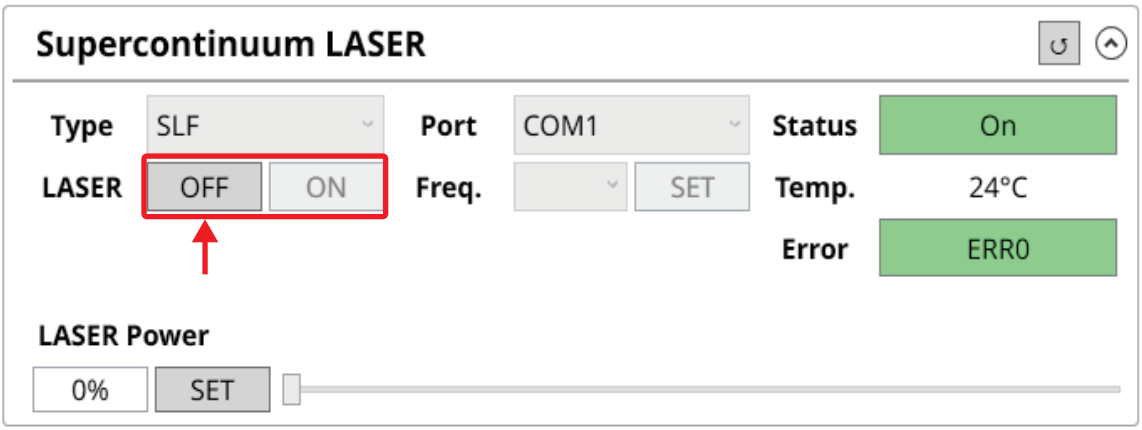


*NOTE: When increasing the power of the laser output, it should be gradually raised from 0% to 100%.
For example: 0% → 30% → 50% → 80% → 100%

*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%

4.4 Turning Off Laser

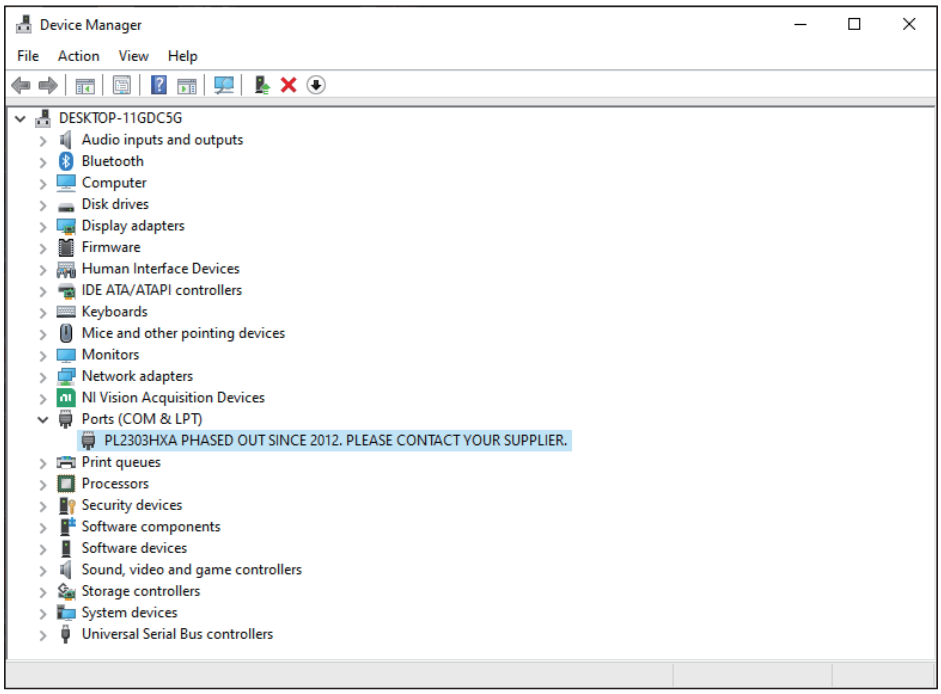
1. Gradually decrease the laser output power. (*For example: 100% → 80% → 50% → 30% → 0%*)
2. Click “OFF” on the [LASER] tab.



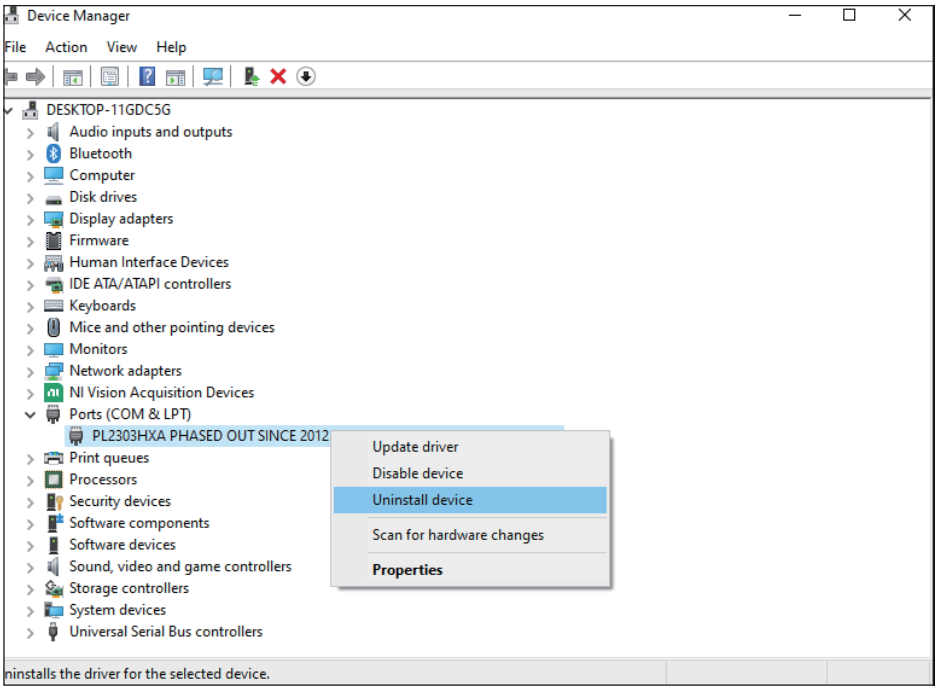
3. Turn off the key switch on the front panel of the SL-Pico.
4. Turn off the power switch on the back panel of the SL-Pico.
5. If the SL-Pico will not be used for long time, disconnect the power cord and interlock plug.

5.1 Laser Connection Error

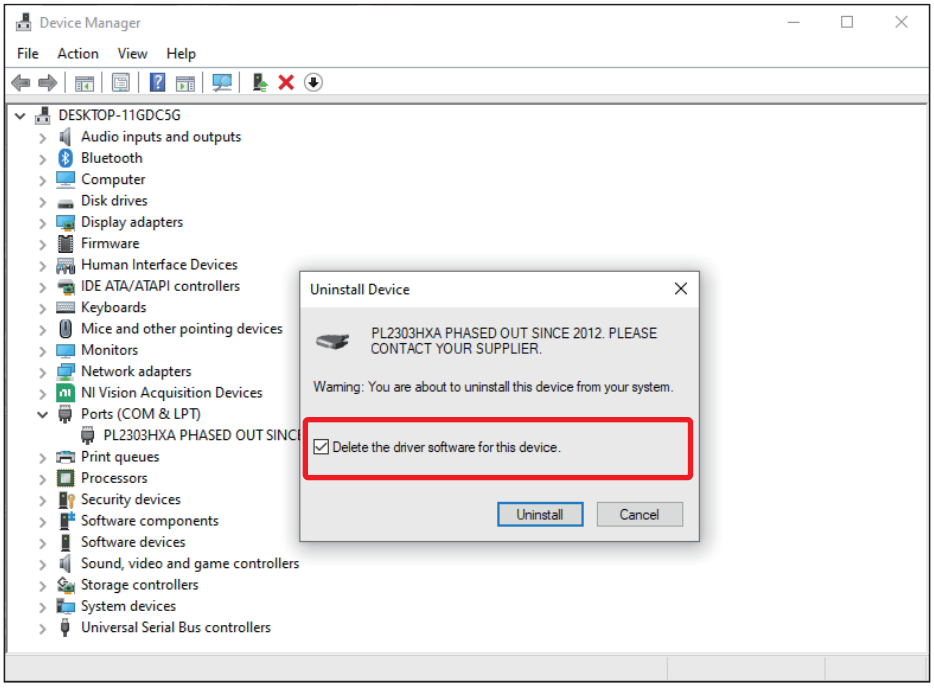
- If you are having difficulty setting up a laser connection, check the "Ports (COM & LPT)" section of Device Manager for the presence and proper configuration of the laser.



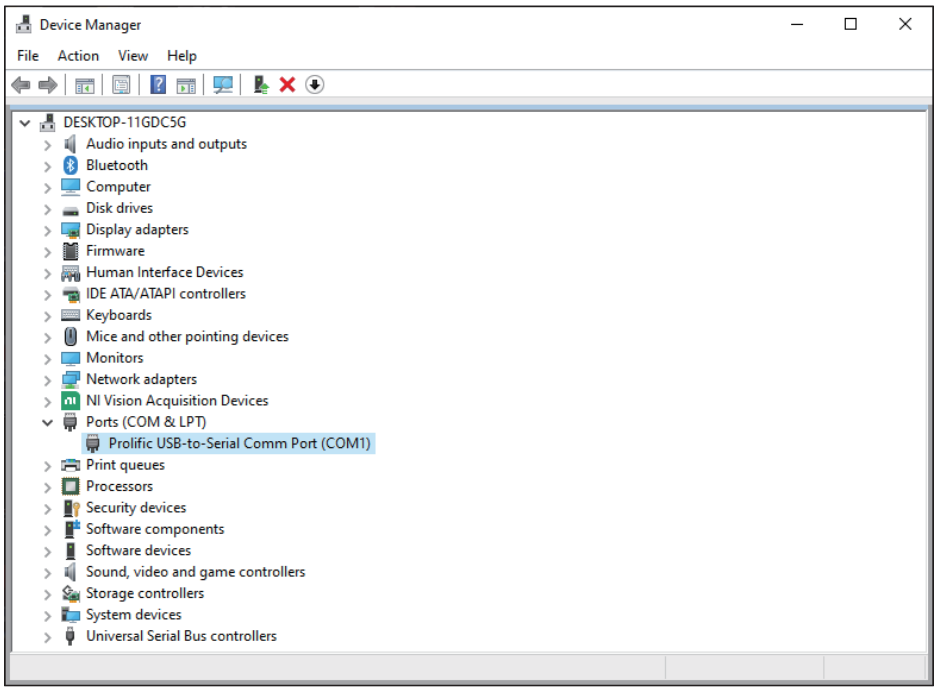
- If the name of the port is as follows, right click on the respective port and click “Uninstall device”.



- 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 it.
- 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 corresponding 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℃ 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, ERR31, ERR41, ERR51, ERR61, ERR81:

Parameter alarm. Turn off the power and restart. if the alarm persists, please contact SLi.

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. A strong reflected laser beam back into the SL-Pico output may damage the laser.
2. Do not look directly at the output of the SL-Pico at any time, under any circumstances.
3. Do not put things in the air passage in case it gets 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 powered down as the laser may emit invisible infrared and ultraviolet light that can be harmful to your eyes.
7. Be sure that the laser is powered down before checking the device.
8. Do not stare at the emission port directly even if you wear the laser protective glasses.
9. Do not place any flammable substances on the laser, such as flammable or explosive materials.
10. Ensure the laser is placed where non-professionals cannot touch it.
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-sleeved white lab coat. This will help prevent your clothes from burning and reduce the risk of fire in case of accidental laser exposure.

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

To ensure optimal long-term performance, safety, and testing accuracy of the instrument, please consider the following environmental guidelines:

1. Protect from Contaminants: Avoid exposure to dust and direct sunlight, as these can compromise the unit's optical performance.

2. Minimize Vibration: Prevent excessive vibration, which may affect the mechanical integrity of the unit.

3. Avoid Corrosive Environments: Do not expose the unit to situations or environments containing corrosive gases.

4. Ensure Proper Ventilation: Do not block the fan vents. If the unit is rack-mounted, ensure it has adequate ventilation.

5. Maintain Operating Temperature: The recommended operating temperature is 10–30 ℃.

6. Retain Packaging for Transport: Keep the original packing material for future transport or shipment. If unavailable, contact support@spectrolightinc.com to obtain a factory-approved shipping case.

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 and must 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. Do not allow the body or power adapter to come into contact with water.

STORAGE CONDITIONS

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

OPERATION CONDITIONS

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

ELECTRICAL CHARACTERISTICS

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

CERTIFICATIONS

CE Mark – Declaration of Conformance for EMI, Safety (EEC) and RoHS

FCC Mark – 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.

SPECTROLIGHT

CE FC

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