

NLFS-L-B User's Manual

L Band Narrow Linewidth Tunable Laser



**CAUTION –
USE OF CONTROLS OR ADJUSTMENTS OR PERFORMANCE OF PROCEDURES OTHER
THAN THOSE SPECIFIED HEREIN MAY RESULT IN HAZARDOUS RADIATION
EXPOSURE.**



**THE USER MUST READ THIS MANUAL BEFORE OPERATING THE PRODUCT.
OPERATIONS OTHER THAN THOSE DESCRIBED IN THIS MANUAL MAY RESULT IN
PERSONAL INJURY AND DAMAGE TO THE PRODUCT.**

Note that any attempt to open or fix the equipment without prior approval by Optilab, LLC voids the warranty.

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1. General Information



1.1 SAFETY PRECAUTIONS



This product emits medium laser radiation from the optical connector(s) that classifies it to be a **CLASS 1M** laser product accordingly to IEC 60825-1:2014. **The optical output is hazardous for eyes exposure. Avoid eye exposure to direct or scattered radiation.**



The optical output must be disabled when swapping patch-cord connections.



Ensure the optical output is within the range specified in the test report.

1.2 Introduction

This manual contains information on the operation of the NLFS-L-B unit.

1.3 Product Overview

The Optilab NLFS-L-B is a L band narrow linewidth tunable laser. The laser unit contains an external cavity laser diode and a low noise laser driver. The NLFS-L-B provides up to 40 mW CW optical power in the 1569 - 1608 nm wavelength region in a compact design. The NLFS-L-B can be set to work at low noise mode, and the laser linewidth width can be as narrow as sub-100 kHz. The laser output can be controlled through the LCD touch screen or remotely through a PC. Please contact Optilab for more information.

1.4 Features

- External cavity laser diode
- Narrow linewidth
- 1569 nm to 1608 nm tunable laser wavelength
- 4 to 40 mW tunable laser output power
- LCD touch screen monitor and remote control

2. Operation

2.1 Introduction

This chapter describes how to operate the NLFS-L-B unit and discusses the location and function of the controls and connectors.

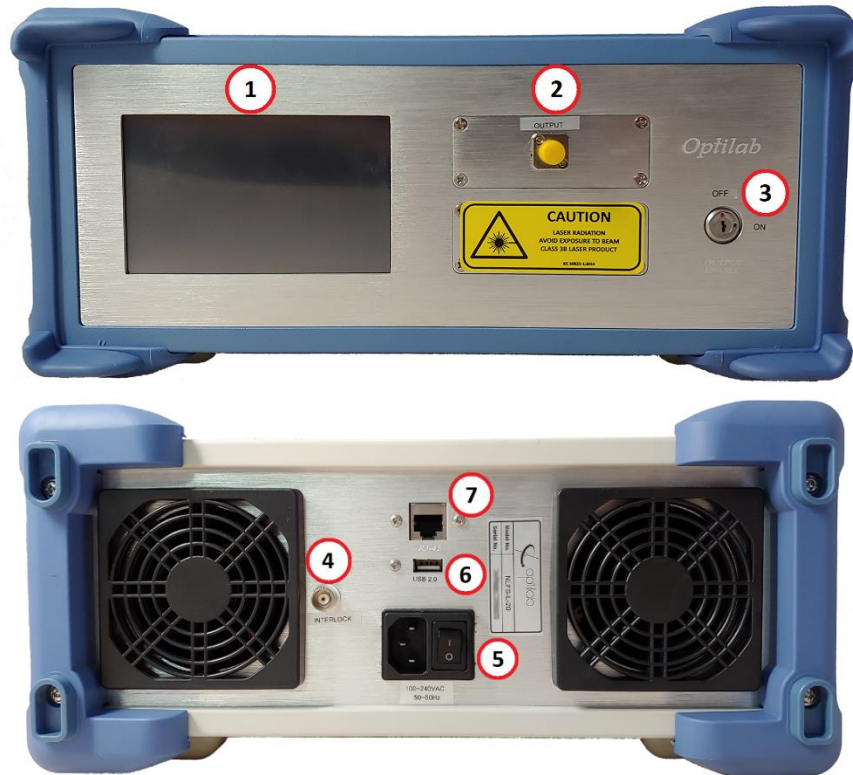
2.2 Initial Inspection

Your NLFS-L-B rackmount was carefully inspected before it left the manufacturer. It should be in proper working order upon receipt. You should, however, inspect the unit for any damage that may have occurred in transit. If the shipping container or the packing material is damaged, keep it until the contents of the shipment have been checked to be free of mechanical and electrical damages. Notify Optilab, LLC promptly if any notable damage is found.

Each NLFS-L-B shipment should include the following:

- NLFS-L-B laser benchtop unit
- Test Datasheet
- AC Power Cord
- USB cable
- Interlock
- Key Switch

2.3 Panel Control Interface



Feature	Function
1) Touch LCD Screen	This LCD display and control the system setting and status. Refer to Sec. 2.5 for operation instruction.
2) Optical OUT	Optical output port. The output pigtail uses a FC/APC connector with endcap fiber. Mate this connector to a FC/APC fiber connector.
3) Key Switch	Enable and disable the optical power.
4) Interlock	This BNC female connector is a safety interlock. It must be shorted for the pump lasers to enable. Use the provided accessory to short this port or connect it to a compatible interlock device. If the interlock is open during normal operation, the pump lasers will be turned off. To re-enable the pump laser output, turn the key switch in the front panel to "OFF" position first and start over.
5) AC Power Socket and Switch	This receptacle accepts the electrical power input for the 100 to 240 V, 50 / 60 Hz AC power; the switch enables / disables the AC electrical power to the rackmount unit.
6) USB	This USB port provides remote control feature. Refer to Sec. 2.6 for communication instruction.
7) Ethernet port	Not used on this model.

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2.4 Turn On and OFF Operation Instructions



CAUTION!

Read and follow the SAFETY PRECAUTIONS in this manual before operation. Failing to follow the instruction voids the warranty.

2.4.1 Turn on instruction

1. Provide proper placement of the benchtop to ensure the safety of the device and the surrounding environment during operation. Wear proper Personal Protective Equipment (PPE), such as gloves and goggles rated for Class 3B Laser operation.
2. Launch the optical output pigtail. It can be connected to a fiber collimator with FC/APC coupler, or mate to a matching end cap fiber connector using a FC/APC adapter. In either case, thoroughly clean and inspect the end fiber for any dust or contaminants that may ignite upon operation.
3. Once all proper optical connections are made, plug in the AC power cord into the rear panel. Ensure the front panel Main Laser Enable Key is OFF, and the interlock on the back panel is connected properly.
4. Flip the rear panel Main Power Switch to the ON position to enable power to the unit, which should enable the front panel LCD display.
5. Turn on the key switch on the front panel. Adjust the wavelength and power level as needed on the touch screen. For narrow linewidth application, turn on the low noise mode.

2.4.2 Turn off Instruction

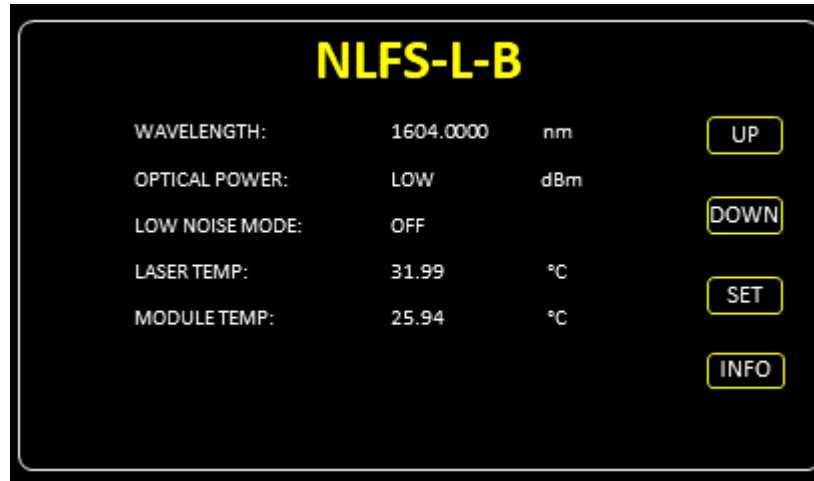
Turn off the switch on the front panel to disable the laser output. Flip the rear panel Main Power Switch to the OFF position.

Note: Do not hot-plug any optical patch cord or electrical cables. Permanent damage may occur to the unit!

2.5 Touch Screen Operation

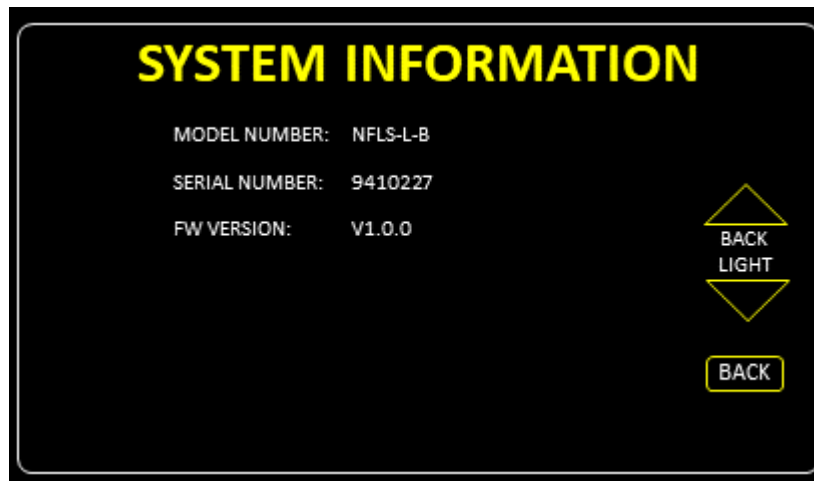
The benchtop unit uses the LCD touch screen for status monitoring and system setting controls. Laser Information Page shows up when the unit is powered on. Flip the Key in the front panel to the ON position before setting the laser parameters.

1. **Laser Information Page:**
This page displays the status of the laser. Use the UP or DOWN button on the right corner to select the setting item and use SET to enter the setting item page. Use the INFO button to enter the system information page.



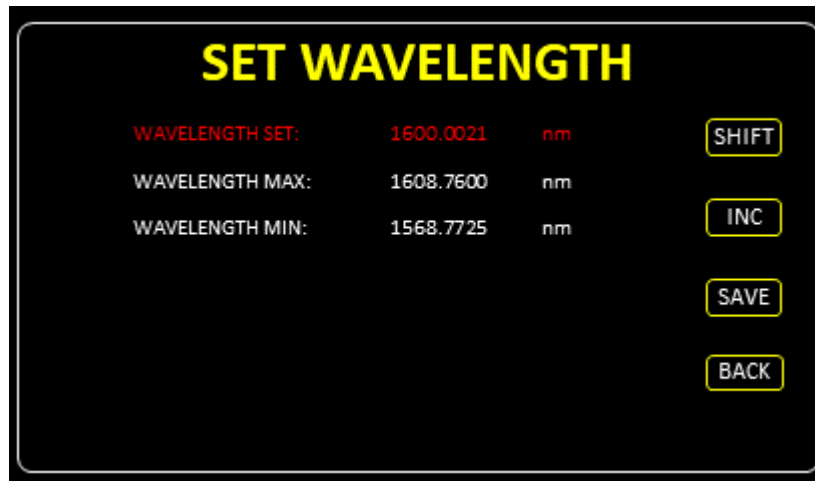
2. System Information Page

This page displays the information of the system. Use the triangle button to turn on or off the back light, use the BACK button to return to the Laser Information Page.



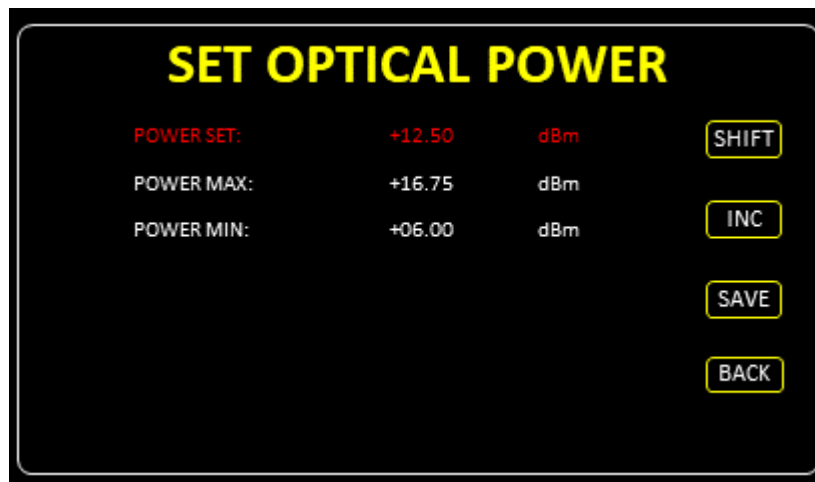
3. Wavelength Setting Page

This page offers the function to set the wavelength, it also displays the minimum and maximum wavelength the laser can work at, the wavelength setting resolution is 0.0001 nm. Use the SHIFT button to select the digit of interest, use the INC to change the value of the digit, and then use the SAVE button to save the settings. Wait 5 sec for the setting to be updated. Use BACK button to return to the Laser Information Page.



4. Optical Power Setting Page

This page offers the function to set the laser power. It also displays the minimum and maximum optical power the laser can output. The optical power setting resolution is 0.01 dBm. Use the SHIFT button to select the digit of interest, use the INC to change the value of the digit, and then use the SAVE button to save the setting. Wait 5 sec for the setting to be updated. Use the BACK button to return to the Laser Information Page.

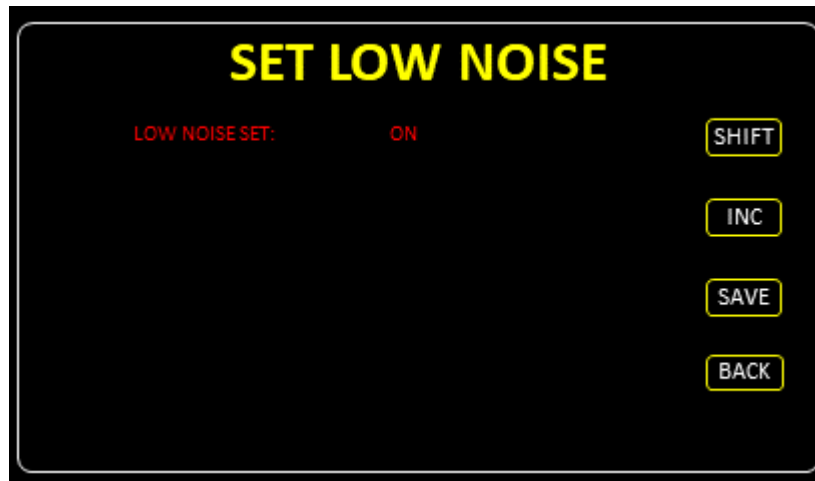


5. Low Noise Mode Setting Page

This page offers the function to set noise mode. Press SHIFT to activate the setting, then use INC button to set the low noise mode on or off, use the SAVE button to save the setting. Wait 5 sec for the setting to be updated.

Note: The laser outputs narrow linewidth only when Low Noise Mode is ON.

Note: Setting the Low Noise Mode to OFF each time when the laser is powered on, then setting the Low Noise Mode to ON or OFF depends on the requirement of the use.



2.6 Remote Control

For the standard NLFS-L-B, connecting the benchtop to an external PC (installed with RS232 Serial Terminal software, i.e. Termit) will allow for the parameter adjustment feature. Using a standard USB cable to connect the USB port on the back panel on the benchtop to the PC. Once the software is running, the benchtop unit will be recognized as a COM port device. Use the Device Manager or similar PC device tool to identify the COM port number. Once COM port number is confirmed, check to see if the operating software find the right device.

Use the following RS232 settings:

Baud Rate = 9600

Data Bits: 8

Stop Bits:1

Polarity: None

Append carrier return (CR) and line feed (LF) to each command.

The following commands can then be executed, with a corresponding confirmation of the command afterwards (Syntax is CMD:XX, case sensitive)

Command	Description	Example
READ	Read the information of the SN, Model type, and the driver temperature	READ
READL	Read the status of the laser, including wavelength, optical power, LD temperature and noise mode status	READL

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SETLW	Set the Laser Wavelength	SETLW:XXXX.XXXX XXXX.XXXX= wavelength in nm
SETLP	Set the Laser Power	SETLP:+XX.XX +XX.XX= optical power in dBm
SETLN	Set the low noise mode ON or OFF	SETLN:ON ON = Low noise mode is ON OFF= Low noise mode is OFF

3. Technical Specifications

Optical Specifications	
Operating Wavelength	1569 nm to 1608 nm tunable
Optical Output Level	4 to 40 mW adjustable
Laser Linewidth (FWHM)	100 kHz typ., 200 kHz max.
Mechanical Specifications	
Power Supply Requirements	100 to 240 VAC, 50/60 Hz
Optical Connectors	FC/APC
Output Fiber	Panda PM-15
Operating Temperature	10°C to +40°C (Standard)
Storage Temperature	-20°C to +70°C
Control	LCD touch screen, USB

4. Service and Support

4.1 Warranty

Optilab, LLC guarantees its NLFS-L-B unit to be free of defects for 1 year from the date of shipment. The guarantee does not cover any damages resulting from the misuse or improper handling of the equipment, or any incidental or consequential loss. Note that the warranty will be void upon any attempt to open or to fix the equipment by the user without prior approval of Optilab, LLC.

4.2 Service and Calibration

Your NLFS-L-B unit has been designed to provide years of trouble-free operation. No internal maintenance is required provided that the equipment is properly handled, operated, and kept away from contamination. For any questions regarding the operation and performance of the unit, please contact Optilab, LLC at:

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600 E. Camelback Road
Phoenix, AZ 85012
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4.3 Care of Fiber-optic Connectors

Damage to optical connectors account for more than 70 percent of equipment performance degradation. To avoid such damage, the user should use only industrial grade 99% pure isopropyl alcohol and follow the procedures below to keep the connectors, adaptors, and receptacles clean.

Cleaning Optical Connector End-face with Wipe and Alcohol

To properly clean optical connectors utilizing lens tissue grade wipes and alcohol follow the procedure below. The moist wipe removes dust particles, oil and contaminants that may damage or block the end-face of the connector during connection. The dry wipe removes residual alcohol that may be ignited by optical emission.

1. Disable the optical output and turn off unit to prevent accidental exposure or damage to the optical connector by optical emission.
2. Moisten a wipe with alcohol by placing on top of the alcohol dispenser and push down to saturate the wipe.

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3. Place the moist wipe on a work surface and place a second dry wipe next to it.
4. Wipe the optical connector, end-face down on the moist wipe 3 times and then repeat on the dry wipe.
5. Visually inspect the end-face of the optical connector with an optical microscope to verify cleanliness. Repeat steps 2 to 5 as needed.

Cleaning Optical Connector Sides, Receptacles, Adaptors with Swab and Alcohol

Dust or particles can adhere to the insides of receptacles and adaptors or the sides of the optical connector ferrule. Their presence can affect the alignment of the optical fiber connectors and increase connection loss. To properly clean optical connectors, receptacles, and adaptors utilizing a swab and alcohol follow the procedure below:

1. Disable the optical output and turn off unit to prevent accidental exposure or damage to the optical connector by optical emission.
2. Moisten the swab by placing it on top of the alcohol dispenser and push down to saturate the swab.
3. For receptacles, adapters, or other connection points, insert the moistened swab and rotate the tip 1/2 turn clockwise and counterclockwise 6 times while applying light but firm pressure.
4. For fiber connectors, rotate the tip of the moistened swab 5 revolutions around the connector while applying light but firm pressure.
5. Visually inspect the end face of the connector with an optical microscope to verify cleanliness. Clean end-face as needed.