

## DFB-4-B BENCHTOP USER'S MANUAL

**Caution:** The user must read this manual before operating the DFB benchtop unit. Operations other than those described in this manual may result in personal injury and damage to the unit.

**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. Introduction

This manual contains information on the installation and operation of the Optilab DFB-4-B benchtop unit.

## 1.2. Product Overview

The Optilab DFB-4-B series products are Distributed Feedback (DFB) laser sources in bench top housing. They are designed for general laboratory applications. DFB-4-B is a reliable and cost effective DFB laser source for providing up to 4 different DFB wavelengths. With Optilabs comprehensive inventory of high quality DFB lasers, the DFB light source can be ordered from a large variety of wavelengths. DFB lasers operating temperature and drive current are precisely monitored by micro-controller to ensure constant output power and emission wavelength stability. With its simple and intuitive front panel interface, the user can control the DFB light source output power level by adjusting the laser drive current.

## 1.3. Features

- Orderable in a variety of wavelengths and power levels
- Up to four DFB sources per benchtop device
- Front panel power and wavelength adjustment control via touchscreen display
- LabVIEW software interface
- Economical and user friendly

## 1.4. User Safety

1. The DFB-B benchtop unit emits high intensity light from the optical output receptacle. Avoid direct exposure to skin and eyes.
2. The equipment case is fully certified for EMS protection. The user should never open the equipment case; any attempt will void the warranty and may result in electric shock and EMS attack to equipment in the vicinity.
3. The user should avoid using any solvent or vaporizing chemical to clean the equipment panel or case. It may result in damage to the surface and internal circuits.

## 2. Operation

### 2.1. Introduction

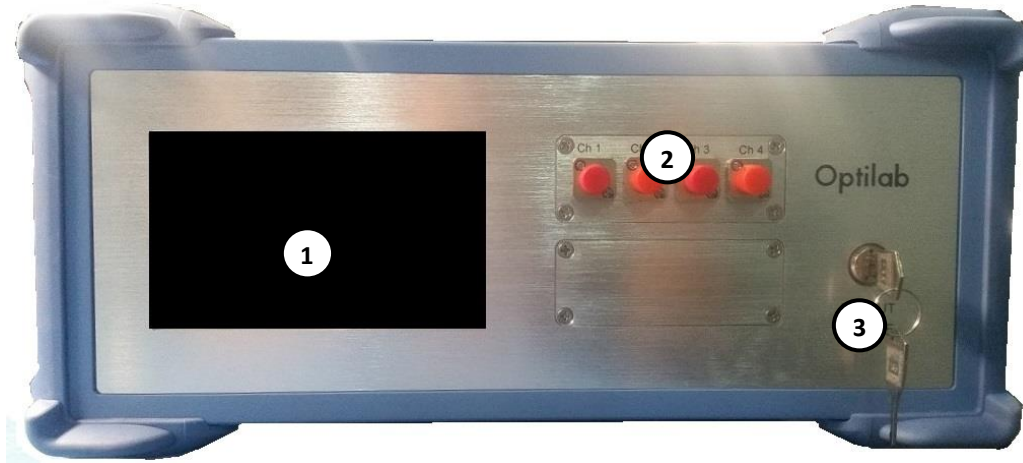
This chapter describes how to operate the DFB-4-B benchtop unit, and discusses the location and function of the controls and connectors.

### 2.2. Initial Inspection

Your DFB-4-B benchtop unit 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.

## 2.3. Panel Diagrams and Controls

### **DFB-4-B Benchtop Front Panel**



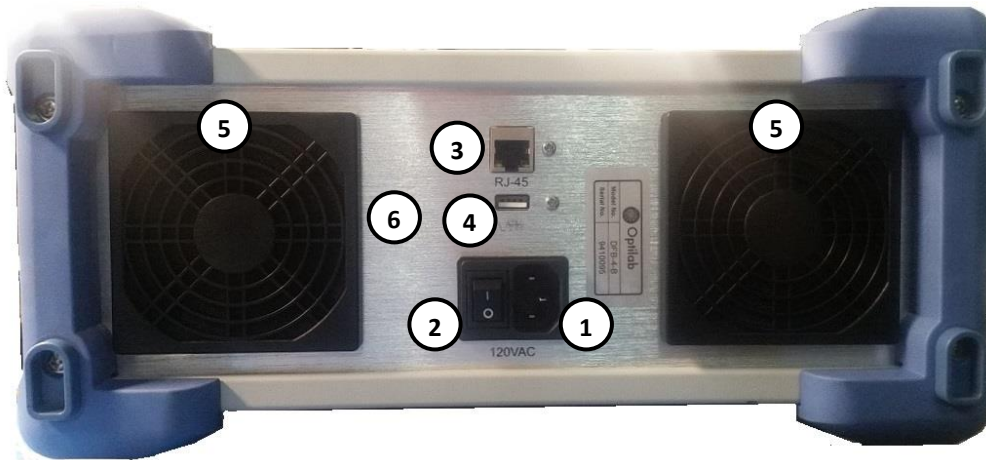
FEATURE	FUNCTION
① MAIN DISPLAY	The LCD display shows the parameters and optical settings of the DFB benchtop unit. This is a touchscreen type display (see section 2.4 for more information)
② OPTICAL OUTPUT PORTS	The optical output receptacles for the benchtop unit. Up to 4 optical ports will be present, one for each laser unit. These particular receptacles are FC/APC type.
③ LASER POWER SWITCH	This switch enables / disables the laser optical output for the DFB lasers. This feature is not enabled on all units.

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### DFB-4-B Benchtop Rear Panel



FEATURE	FUNCTION
① AC POWER SOCKET	The AC power socket is the input for the AC power source. A three-pin standard power cord should be used to connect this equipment to any 110 or 220VAC main supply.
② MAIN AC POWER SWITCH	This switch enables the electrical power to the DFB-4-B unit.
③ LAN PORT	This terminal is used allow for Ethernet connection to the DFB-4-B for remote operation and monitoring. This feature is not enabled on all units.
④ USB FEMALE SOCKET	Using a USB cable, this port allows for remote control and monitoring through a PC workstation. This feature is not enabled on all units.
⑤ VENTILATION FANS	The ventilation fans ensure proper ventilation inside the unit. The back panel of this equipment should be placed at least 3 inches from the wall to dissipate heat effectively.
⑥ INTERLOCK	This BNC female connector is a safety interlock. It must be shorted in order for the DFB 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 output switch on the front panel to "OFF" position first and start over. This feature is not enabled on all units (not pictured).

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## 2.4. Operation Instructions

### Start-up Procedure

1. After plugging in the appropriate power plug into the AC Power Socket, flip the rear panel Main AC Power Switch to the On position to enable electrical power to the unit. The LED Main Display will turn on.

Note: For units that do not have the front panel enable switch activated, the lasers will also be enabled at this time as well.

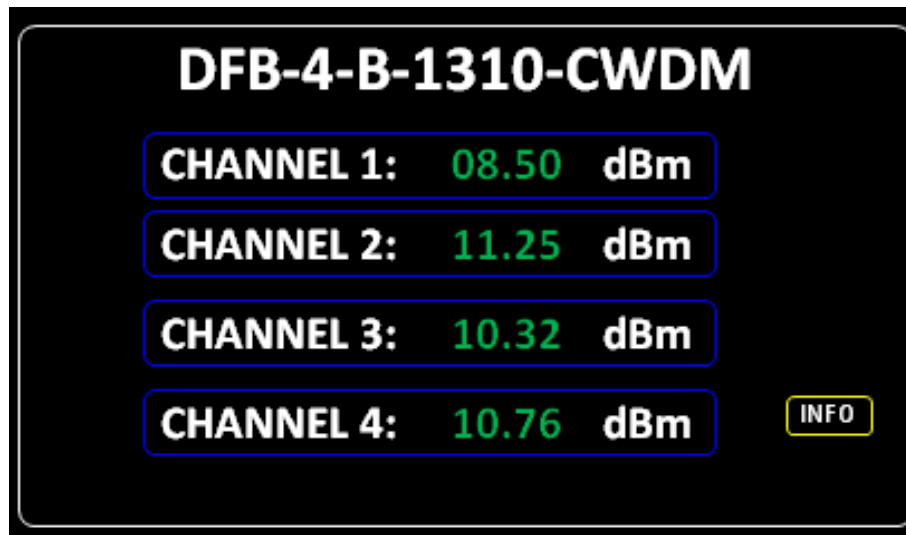
2. Connect the optical output port(s) using the indicated connector patchcords to the appropriate signal destination to utilize the laser output signal(s).

NOTE: Make sure you use the correct type of patchcord to minimize losses when connecting the optical output to its destination. Special patchcords are designed for wavelengths such as 850nm and 980nm to ensure maximum light coupling. Please contact Optilab for more details and ordering options.

3. After checking all physical patchcord connections, turn the front panel Laser Power Switch to the ON position to enable optical output from the DFB-B.
4. The front panel LCD Indicators will show the output of each laser channel; the DFB-B is now ready for operation.

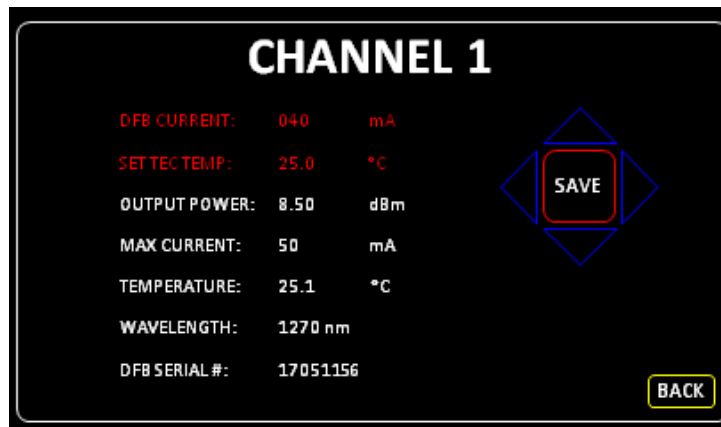
### Optical Output and Wavelength Adjustment Procedure (Front Panel)

1. To adjust the optical output level or the TEC temperature setting for the DFB lasers, please reference the below front panel main screen. Press anywhere in any of the blue boxes to go to the settings page for that channel. Pressing the "INFO" button take you to the system information page. Return to this page at any time by pressing the "ESC/BACK" button.





2. The settings page for each channel screen is shown below:



SETTING	DESCRIPTION
DFB CURRENT	This value displays the current set point that is driving the internal laser diode, and can be adjusted by pressing the “RIGHT” arrow button to select the unit for adjustment, and then pressing the “UP” or “DOWN” arrow buttons to increase or decrease this unit selection. Pressing the “SAVE” button will save this change, otherwise pressing the “BACK” will cancel the parameter editing and return to the home page. <b>NOTE:</b> Changes cannot be made to current unless the laser output is enabled.
SET TEC TEMP	This value displays the current TEC temperature setting. By adjusting the TEC temperature set point, the wavelength can be tuned as desired, please refer to the test datasheet for the allowable range. This feature is adjustable in the same manner as the current setting as noted above.
OUTPUT POWER	The current output power from the internal photodiode reading of the laser. Please refer to an external power meter reading for the most accurate value.
MAX CURRENT	The maximum end user allowable setting for the laser diode driving current.
TEMPERATURE	Shows the current operating temperature of the selected module.
WAVELENGTH AND SN	These fixed values are a reference for the internal RS485 setting on each individual module, as well as each DFB's serial number.

3. When finished editing the parameters of the individual module, pressing the “BACK” button will return to the main screen.

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### **Patchcord Swapping Procedure**

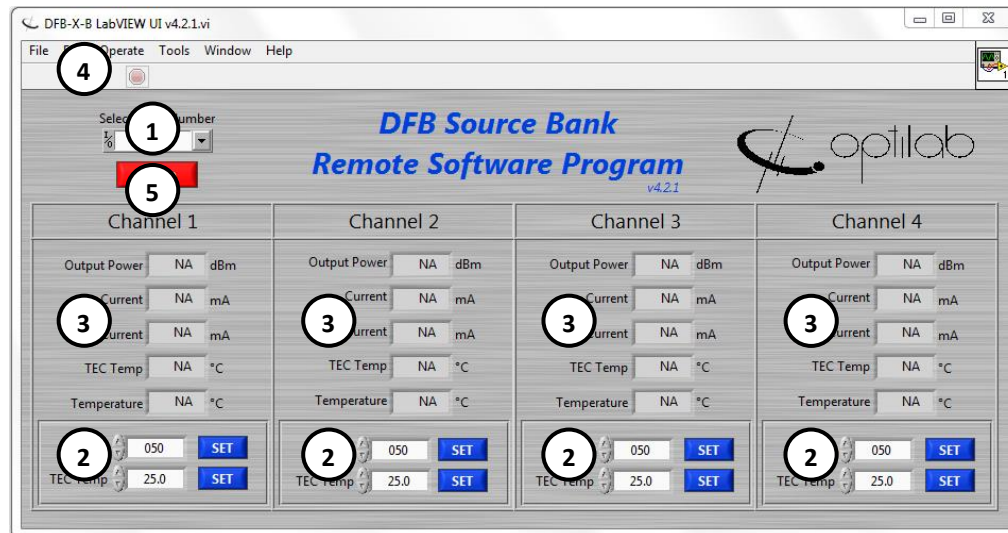
1. Turn the Laser Power Switch to the Off position.
2. Swap patchcords as desired. Only connect the indicated connector patchcords to the optical input ports, cleaning them as necessary.
3. Turn the Laser Power Switch to the On position to re-enable the laser.
4. For units that the front panel Laser Power Switch is not enabled, turning the rear panel AC switch is necessary to disable and re-enable the DFB lasers.


### 2.5. PC Connection Mode (OPTIONAL)

As an optional feature, the DFB-4-B unit is capable connecting to an external PC to allow for parameter monitoring and laser diode adjustments. If you have a DFB-4-B unit with additional software control, please refer to the following below for the software connection option.

1. Using the USB port on the rear panel, connect the DFB-4-B to a PC, directly to the USB port with an appropriate USB to USB cable.
2. By using the Device Manager (or other similar PC device tool), the DFB-4-B should be recognized as COM Port device. If the DFB-4-B does not appear as a COM Port device, you may need to install the necessary RS232 drivers included on the software package.
3. A command set for the DFB-4-B unit can be found in section 5 of this manual. Please refer to this command set if using an RS232 communication tool such as termite or similar.
4. A LabVIEW executable is also available for communicating with the DFB-4-B unit. If applicable, refer to the DFB-4-B software DVD and run the setup.exe file in the installer folder. This executable will install the appropriate run-time engines and/or support files as well as the DFB-4-B LabVIEW program and a shortcut will be created on the desktop for all users.

5. After the LabVIEW setup is installed, then the DFB-4-B executable software file can be opened, with the following screen displayed, with the appropriate adjustments options noted below.



SETTING	DESCRIPTION
① COM PORT SETTING	Select the appropriate COM Port for the DFB-B determined earlier in this manual. Set this value first before running the program.
② LASER DIODE CURRENT AND TEC TEMP SETTINGS	<p>These boxes are for entering in the desired laser diode driving current and TEC temperature values. Adjusting the Current setting will increase or decrease the optical output power, and changing the TEC temperature will set the TEC to the desired value, affecting the wavelength.</p> <p>The maximum setting for the current is limited by the hardware, and the TEC Point is limited between 15-35C.</p> <p>Please note that the changes are not set in place until the adjacent Set button is pressed; any changes will go into effect in about 2-3 seconds.</p> <p><b>NOTE:</b> Changes cannot be made to current unless the laser output is enabled.</p>
③ CHANNEL MONITORS	These display the current set points and optical output power readings for each individual laser channel module.
④ RUN BUTTON	Shaped as a  button, press this will initialize the program, and allow for the settings to be adjusted.
⑤ STOP BUTTON	Pressing this button will stop the program, however the individual lasers will still be active. You will need to turn off the benchtop system to disable the laser output.

### 3. Troubleshooting

SYMPTOM	POSSIBLE CAUSE AND SOLUTION
OPTICAL OUTPUT POWER NOT HIGH ENOUGH.	<p><b>C:</b> Optical output connectors dirty.  <b>S:</b> Disable optical output and clean optical connectors.</p>
	<p><b>C:</b> Use of incorrect optical adapters or connectors.  <b>S:</b> Use only the indicated optical adapters and connectors. If measurement instruments accept different connector type, then use hybrid patchcords. For shorter wavelengths (&lt;1300nm), use of special coupling patchcords with matching wavelength will be necessary to couple the light efficiently.</p>
	<p><b>C:</b> Optical output connector damaged.  <b>S:</b> Measure optical output power with power meter and compare with readout on Main Display. Return to Optilab for repair if the difference is high (&gt;4 dB) and cannot be corrected by cleaning or replacing the optical connectors. Always apply dust cover plugs to unused optical receptacles to prevent the damage of internal optical connectors.</p>
MAIN DISPLAY GOES BLANK	<p><b>C:</b> Static electrical discharge.  <b>S:</b> Wait 10 to 30 seconds for the display to refresh.</p>
	<p><b>C:</b> Insufficient ventilation.  <b>S:</b> Place unit in well ventilated area or supply additional fans for ventilation.</p>
OPTICAL OUTPUT POWER UNSTABLE.	<p><b>C:</b> Insufficient optical output isolation.  <b>S:</b> Connect isolator of corresponding wavelength to optical output connector. The use of angled patchcords (APC) will help minimize the light being reflected back into the laser and improve stability.</p>
UNIT DOES NOT POWER UP.	<p><b>C:</b> Blown fuse.  <b>S:</b> Contact Optilab, LLC for fuse replacement procedure.</p>
	<p><b>C:</b> Insufficient electrical voltage.  <b>S:</b> Check that the electrical supply is at least 110 VAC.</p>
	<p><b>C:</b> Power cord is loose.  <b>S:</b> Plug the power cord firmly into the unit.</p>
UNIT RESETS OR BLINKS ON AND OFF.	<p><b>C:</b> Insufficient electrical voltage.  <b>S:</b> Check that the electrical supply is at least 110 VAC.</p>

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## 4. Service and Support

### 4.1. Warranty

Optilab, LLC guarantees its DFB-4-B benchtop 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 DFB-4-B benchtop 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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### 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 blot 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.
3. Place the moist wipe on work surface, and place 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, adaptors, or other connection points, insert the moistened swab and rotate the tip 1/2 turn clockwise and counter-clockwise 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.

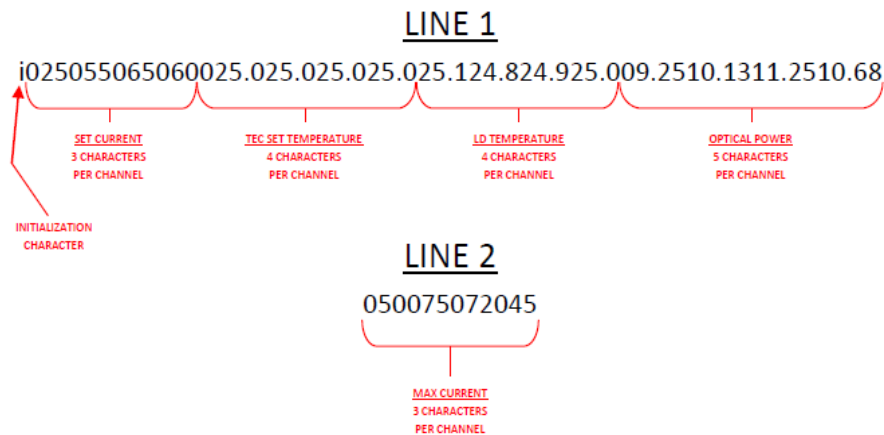
## 5. DFB-4-B Command Set

### 5.1. Serial Port Connection Details

- Baud Rate: 9600
- Data Bits: 8
- Stop Bits: 1
- Parity: None
- Flow Control: None

### 5.2. Query Commands

**READ{CR/LF}** – Read the device information (see format below)



**HELP{CR/LF}** – Read the device command set

```

.....
DEVICE COMMAND SET
.....
READ{CR/LF} - Read Device Information

SETCXXX{CR/LF} - Set Drive Current (mA)
e.g. SETC.075{CR/LF}

SETTXXX{CR/LF} - Set TEC Temperature (C)
e.g. SETT.28.3{CR/LF}
  
```

(EXAMPLE)

### 5.3. Set Commands

**SET[ADD]C:XXX{CR/LF}** – Set the laser drive current in mA; 3 digits required.  
e.g. SET2C:075{CR/LF} – Sets the drive current of channel 2 to 75mA.

**SET[ADD]T:XX.X{CR/LF}** – Set the TEC temperature in C; First 2 digits required.  
e.g. SET3T:28.2{CR/LF} – Sets the TEC temperature of channel 3 to 28.2°C.