



Optilab TWL-C-MC-PI User's Manual

High Speed Tunable Wavelength Laser Module

Caution: The user must read this manual before operating this 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.

Revision History

VERSION	DATE	SUMMARY
1.0	11/15/2019	Manual introduced.

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1. General Information

1.1. Introduction

This manual contains information on the installation and operation of the TWL-C-MC-PI High Speed Tunable Wavelength Laser demonstration purposes.

1.2. Product Overview

The Optilab TWL-C-MC-PI is a high speed, innovative, all-in-one tunable and programmable laser source with high spectral purity. It operates in CW mode and features ITU-grid channels selection with a jog dial knob. Additionally, the TWL-C-MC-PI may be controlled via remote software through USB connection or Zigbee remote control. Its polarization maintaining output and high wavelength and power stability make it a perfect solution as a seed laser for optical modulation and other test and measurement applications.

1.3. User Safety

1. The TWL-C-MC-PI unit emits high intensity invisible light from the optical output receptacle. Avoid direct exposure to skin and eyes.
2. 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. If requesting to open up the unit for demonstration purposes, please contact Optilab prior to doing so.
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 TWL-C-MC-PI and discusses the location and function of the controls and connectors.

2.2. Initial Inspection

Your TWL-C-MC-PI was carefully inspected before it left the manufacturer. It should be in proper working order upon reception. 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.

The TWL-C-MC-PI shipment should include the following:

- TWL-C-MC-PI device
- AC Power cable
- USB Cable

2.3. Controls

Front Panel & Back Panel



FEATURE	FUNCTION
① SELECTION KNOB	By rotating this knob, the user may change the channel.
② OPTICAL OUTPUT PORT	This port provides the optical output from the high-speed tunable wavelength laser.
③ USB PORT	This USB port is used to communicate with the TWL-C-MC-PI unit and is not necessary for normal operation.
④ ANTENNA PORT	This port is where the antenna (for use with Zigbee connection) is attached. Please contact Optilab if you wish to know more about this feature.
⑤ LCD DISPLAY	This is where information is displayed, such as the wavelength or SN.
⑥ POWER LED	Indicates in the unit is powered on. When lit, the unit is ON.
⑦ LASER LED	Indicates if the laser is powered on. When lit, the laser is outputting optical power.
⑧ POWER SWITCH	This power switch turns ON/OFF the entire module.
⑨ POWER INPUT	This is where the module may be connected to a standard wall outlet with an AC cable (100 ~ 240 VAC, 50/60 Hz).

LCD Display



FEATURE	FUNCTION
① CHANNEL DISPLAY	Displays the current channel number. See section 4.
② WAVELENGTH DISPLAY	Displays the current wavelength in nm.
③ OPTICAL POWER DISPLAY	Displays the current optical power output in dBm.

2.4. Operation Instructions

1.1.1 Start-up Procedure

1. Ensure the back surface of the TWL-C-MC-PI has proper ventilation or heat-sinking.
2. Connect the TWL-C-MC-PI Output (2) to your system or test setup via a patchcord or optical fiber before powering on the unit. The Output (2) connector is FC/APC.
3. Flip the power switch on the back of the unit to the ON position.
4. The power LED and the laser LED will illuminate, and the LCD will display the channel, the wavelength, and the optical power.

1.1.2 Shutdown Procedure

To shut off the TWL-C-MC-PI, simply flip the switch to the off position. Shut off the TWL-C-MC-PI before disconnecting the optical output port to prevent exposure to the high-power laser light.

1.1.3 Patchcord Swapping Procedure

1. Shut off the TWL-C-MC-PI.
2. Swap patchcords as desired. Make sure to clean them as necessary.
3. Make all desired connections to your system or test setup.
4. Power on the TWL-C-MC-PI

3. Remote Control

3.1. Commands

Commands may be sent to the TWL-C-MC-PI via USB cable.

1. Connect the power cable and the USB cable to the device, with the USB cable connected to the USB port of a computer.
2. Upon connecting to a computer for the first time, the device will automatically begin driver installation for several minutes. Once this completes, the device will be recognized as a COM port. Using Device Manager (or a similar application), the COM port number may be identified.
3. Use an RS232 terminal with the following settings:
 - Baud rate: 9600 bps
 - Data bits: 8
 - Stop bits: 1

Command	Description	Example	Response
READSYS	Returns information regarding the device.	READSYS	Optilab LLC FW Ver: 1.0.2 Model Number: TWL-C-MC-PI Serial Number: XXXXXXXX
READSTA	Returns the current channel, wavelength, and optical power.	READSTA	Channel: C12 Wavelength: 1567.95nm Power: +12.97dBm
SETCH:XXX	Sets the channel. Refer to Sec. 4 for the channel wavelength table.	SETCH:H45	Successful

- Parity: none
 - Flow control: none
 - Append: CR-LF
4. Using the RS232 terminal, the commands in the following table may be sent to the device.

3.2. Zigbee Wireless Control

Please contact Optilab, LLC for more information.

4. ITU Grid Tuning

CH Num	λ (nm) 50 GHz	CH Num	λ (nm) 50 GHz	CH Num	λ (nm) 50 GHz	CH Num	λ (nm) 50 GHz
H11	1568.36	C24	1558.17	H36	1548.11	C49	1538.19
C12	1567.95	H24	1557.77	C37	1547.72	H49	1537.79
H12	1567.54	C25	1557.36	H37	1547.32	C50	1537.40
C13	1567.13	H25	1556.96	C38	1546.92	H50	1537.00
H13	1566.72	C26	1556.55	H38	1546.52	C51	1536.61
C14	1566.31	H26	1556.15	C39	1546.12	H51	1536.22
H14	1565.90	C27	1555.75	H39	1545.72	C52	1535.82
C15	1565.50	H27	1555.34	C40	1545.32	H52	1535.43
H15	1565.09	C28	1554.94	H40	1544.92	C53	1535.04
C16	1564.68	H28	1554.54	C41	1544.53	H53	1534.64
H16	1564.27	C29	1554.13	H41	1544.13	C54	1534.25
C17	1563.86	H29	1553.73	C42	1543.73	H54	1533.86
H17	1563.45	C30	1553.33	H42	1543.33	C55	1533.47
C18	1563.05	H30	1552.93	C43	1542.94	H55	1533.07
H18	1562.64	C31	1552.52	H43	1542.54	C56	1532.68
C19	1562.23	H31	1552.12	C44	1542.14	H56	1532.29
H19	1561.83	C32	1551.72	H44	1541.75	C57	1531.90
C20	1561.42	H32	1551.32	C45	1541.35	H57	1531.51
H20	1561.01	C33	1550.92	H45	1540.85	C58	1531.12
C21	1560.61	H33	1550.52	C46	1540.56	H58	1530.72
H21	1560.20	C34	1550.12	H46	1540.16	C59	1530.33
C22	1559.79	H34	1549.72	C47	1539.77	H59	1529.94
H22	1559.39	C35	1549.32	H47	1539.37	C60	1529.55
C23	1558.98	H35	1548.91	C48	1538.98	H60	1529.16
H23	1558.58	C36	1548.51	H48	1538.58	C61	1528.77

5. Troubleshooting

SYMPTOM	POSSIBLE CAUSE AND SOLUTION
OPTICAL OUTPUT POWER FROM TRANSMITTER NOT HIGH ENOUGH.	C: Optical output connector is dirty. S: Disable optical output and clean optical connectors.
	C: Use of incorrect optical adapter or connector. S: Use only the indicated optical adapter and connector. If measurement instruments accept different connector type, then use a hybrid patchcord.
	C: Optical output connector damaged. S: Measure optical output power with power meter and compare with original test data. Return to Optilab for repair if the difference is high (>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.
UNIT DOES NOT POWER UP.	C: Insufficient electrical voltage. S: Check that the electrical supply is 110/220 VAC.
	C: Power cord is loose. S: Plug power cord is firmly into the unit.
UNIT RESETS OR BLINKS ON AND OFF	C: Insufficient electrical voltage. S: Check that the electrical supply is at least 110/220 VAC.

6. Service and Support

6.1. Warranty

Optilab, LLC guarantees its TWL-C-MC-PI 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.

6.2. Service and Calibration

Your TWL-C-MC-PI 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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6.3. 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 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, adaptors, 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.