THORLABS

TLX1 / TLX2

Tunable Laser Sources

C-Band / L-Band

User Guide



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Chapter 1 Introduction

The emission wavelength of the TLX1 and TLX2 laser sources can be tuned over commonly used telecommunication wavelength ranges. The TLX1 source emits in the C-band, while the TLX2 source emits in the L-band. The optical output has a narrow typical linewidth of 10 kHz, and operation with the frequency dither option stabilizes the laser wavelength. The wavelength tuning resolution is 50 GHz. Complete control over the optical output power is provided by the built-in variable optical attenuator, which can operate in Constant Attenuation or Constant Power modes.

The instrument can be controlled in two ways. The simplest method is directly via the built-in graphical user interface (GUI) and touchscreen. The instrument can also be operated remotely via the RS-232 or USB ports on the back panel. Remote control is enabled using simple SCPI-type serial commands from a PC. See the remote control user guide (RCUG), which can be downloaded from **https://www.thorlabs.com/manuals.cfm**, for details. The most recent firmware and remote control software tool can be downloaded by visiting **https://www.thorlabs.com/navigation.cfm?Guide_ID=2191** and entering the Item # into the search field. Thorlabs' technical support can provide up-to-date information on available firmware revisions and control functions. NOTE: This manual covers both the **TLX1** and **TLX2** models, as their architectures are very similar. Only the wavelength bands are different. Their differences are clearly noted in the following sections.

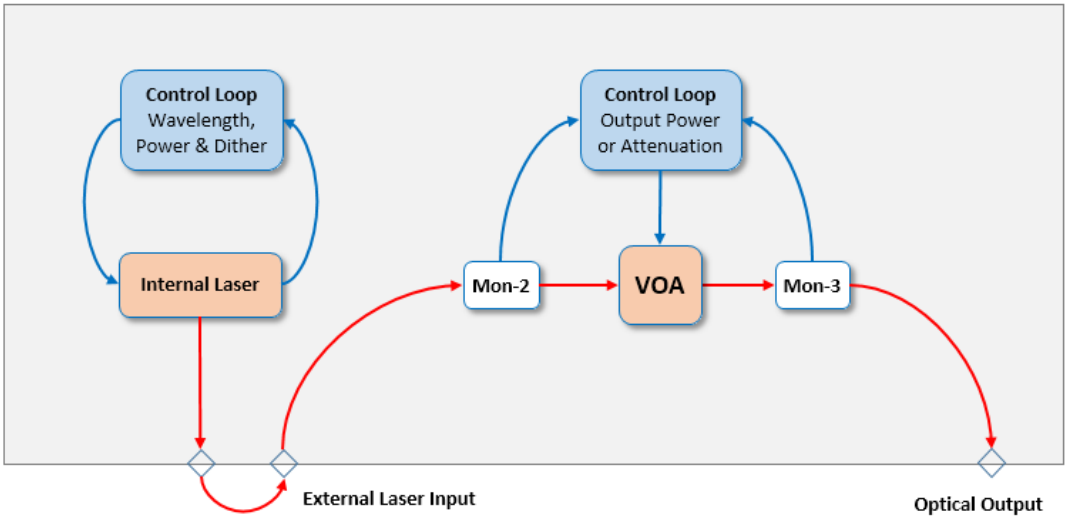
1.1. Parts List

Inspect the shipping container for damage. If the shipping container seems to be damaged, keep it until you have inspected the contents and tested the unit mechanically and electrically. Verify that you have received the following items within the package:

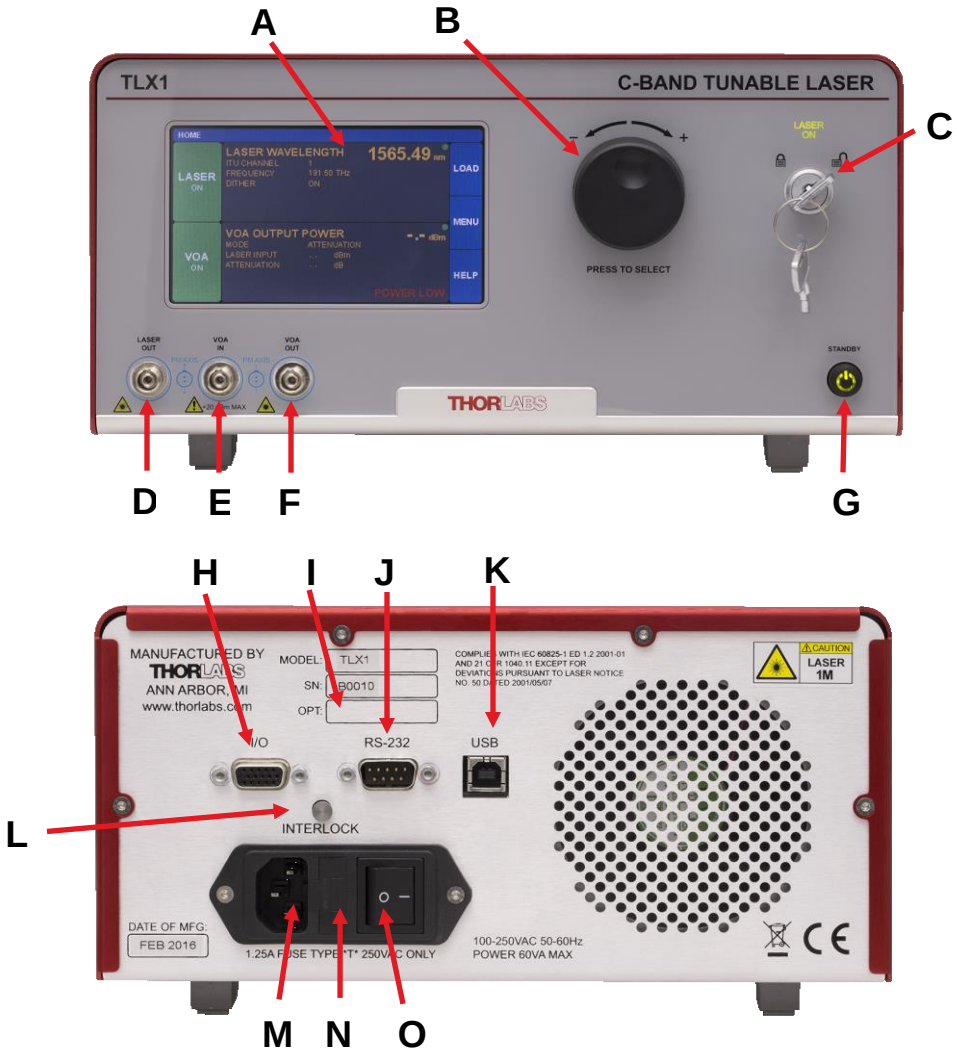
1. TLX1 or TLX2 Tunable Laser Source
2. Power Cord According to Local Power Supply
3. PM Loopback Fiber Optic Cable
4. Interlock Keys
5. 2.5 mm Interlock Pin (Pre-installed in back panel)
6. 1.25 A, 250 VAC Fuse
7. USB Type A to Type B Cable, 6' Long

1.2. Block Diagram

These instruments contain both the laser source and a variable optical attenuator for output power control. The user can also choose to use an external laser source of their own by attaching directly to the Laser Input port instead of using the supplied loop-back fiber patch cord. The Laser In port uses PM fiber with light linearly polarized along the slow axis as shown on the front panel. Maximum input power is 20 dBm (100 mW). Optical power is monitored in two places (Mon) for the purpose of enabling bias output power control. These power values are also available at the I/O port on the rear panel.



1.3. Front and Rear Panel Overview



Label	Description	Detail
A	Touchscreen display	
B	Adjustment knob	
C	Key Switch and Indicator	
D	Laser Output	PM FC/PC
E	VOA Input	PM FC/PC
F	VOA Output	PM FC/PC
G	Standby Button	
H	I/O Port	HD DB-15
I	Option Label	
J	RS-232 Port	DB-9
K	USB Port	Type B
L	Laser Interlock	2.5 mm jack
M	Power Connector	
N	Fuse Tray	
O	Power Switch	

Chapter 2 Safety

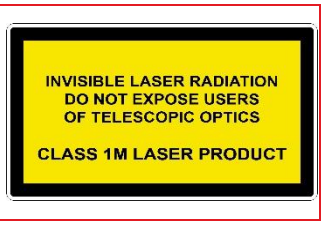
All statements regarding safety of operation and technical data in this instruction manual will only apply when the unit is operated correctly. If equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired. Only with written consent from Thorlabs may changes to single components be carried out or components not supplied by Thorlabs be used

Warning: Risk of Electrical Shock
Before applying power to the instrument, make sure that the protective conductor of the 3 conductor mains power cord is correctly connected to the protective earth contact of the socket outlet. Improper grounding can cause electric shock with damage to your health or even death. Only use mains cable with sufficient current and voltage ratings for this instrument. The local supply voltage must be in the range specified on the rear panel, and the correct fuse must be installed in the fuse holder. If not, please replace the main fuse (see Section 8.3). Do not position equipment in a way that makes it difficult for the user to operate the disconnecting device. Do not remove covers. Refer servicing to qualified personnel.

Warning: Risk of Explosion
The instrument must not be operated in explosion endangered environments.

Warning: Laser Radiation
Avoid Exposure – Radiation emitted from apertures. Do not look into the laser aperture while the laser is on. Injury to the eye may result. Laser should not be turned on unless there is an optical fiber connected to the laser output port.

Caution – Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



Caution: ESD Sensitive Component
The components inside this instrument are ESD sensitive. Take all appropriate precautions to discharge personnel and equipment before making any connections to the unit. A front panel grounding jack is provided for connection to a wrist strap.

Caution: Components not Water Resistant
This instrument should be kept clear of environments where liquid spills or condensing moisture are likely. It is not water resistant. To avoid damage to the instrument, do not expose it to spray, liquids, or solvents.

Caution: Follow Intended Usage Guidelines
This product is not suitable for household room illumination.

Inputs and outputs must only be connected with shielded connection cables.

Do not obstruct the air ventilation slots in housing.

Mobile telephones, cellular phones or other radio transmitters are not to be used within the range of three meters of this unit since the electromagnetic field intensity may then exceed the maximum allowed disturbance values according to IEC 61326-1.

2.1. Precautions

The following statement applies to the products covered in this manual, unless otherwise specified herein. The statement for other products will appear in the accompanying documentation.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

This product has been tested and found to comply with the limits according to IEC 61326-1 for using connection cables shorter than 3 meters (9.8 feet).

Thorlabs is not responsible for any radio television interference caused by modifications of this equipment or the substitution or attachment of connecting cables and equipment other than those specified by Thorlabs. The correction of interference caused by such unauthorized modification, substitution or attachment will be the responsibility of the user. The use of shielded I/O cables is required when connecting this equipment to any and all optional peripheral or host devices. Failure to do so may violate FCC and ICES rules.

This precision device should only be shipped if packed into the complete original packaging including the custom cut foam padding. If necessary, ask for replacement packing material.

Chapter 3 Quick Start Guide

3.1. Hardware Set-up

For first use, plug the main power cable into the rear panel connector, and then plug the other end into an AC wall receptacle. Flip the power switch on the rear panel to the ON (I) position. The unit will now be in the “Standby” mode, and the front panel standby button should glow amber.





Attach the PM loopback fiber optic cable between the Laser Out and Laser In FC connectors on the front panel. Be sure to clean both ends of the fiber as described in the Maintenance Section of this manual.



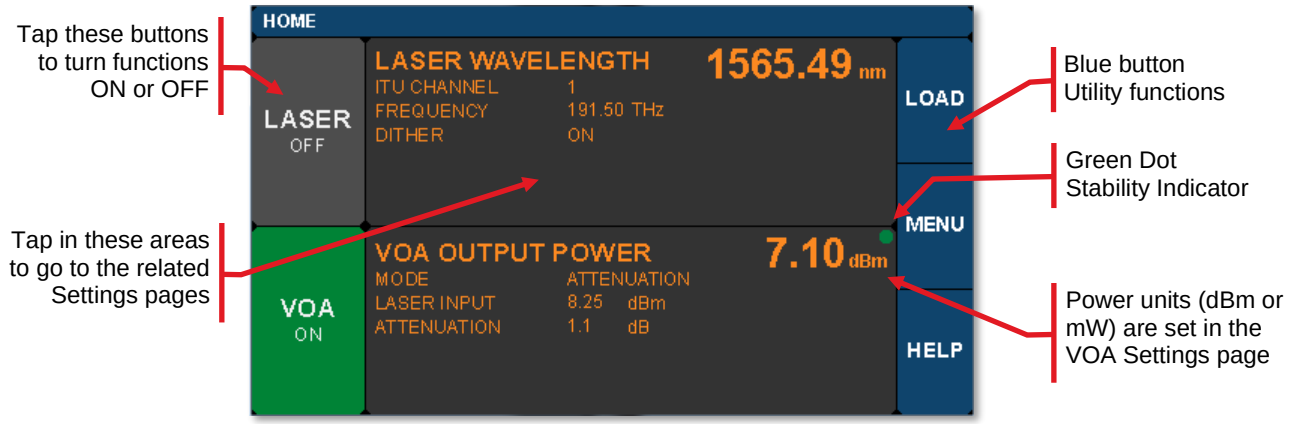
Insert the key into the interlock switch and turn it towards the unlock symbol (🔓). This allows the laser to be turned on, but the LASER ON indicator will not glow green until the laser is actually turned on by using the touchscreen interface. Turn on the unit by pressing the amber standby button on the front panel which will then turn green to indicate the unit is fully on. The touchscreen display will come up with a boot screen for about 5 seconds and then go to the home page. The unit will initialize in the factory default state with all functions OFF.





3.2. Controls on the Home Page

The TLX1 and TLX2 lasers can be fully controlled by using the resistive touchscreen display for all functions. You can use a finger or a plastic stylus to make selections on the screen. In addition, the knob on the front panel can be used in place of the on-screen arrow buttons for quickly changing set-point values. Pressing (clicking) the knob will confirm a new set-point value.



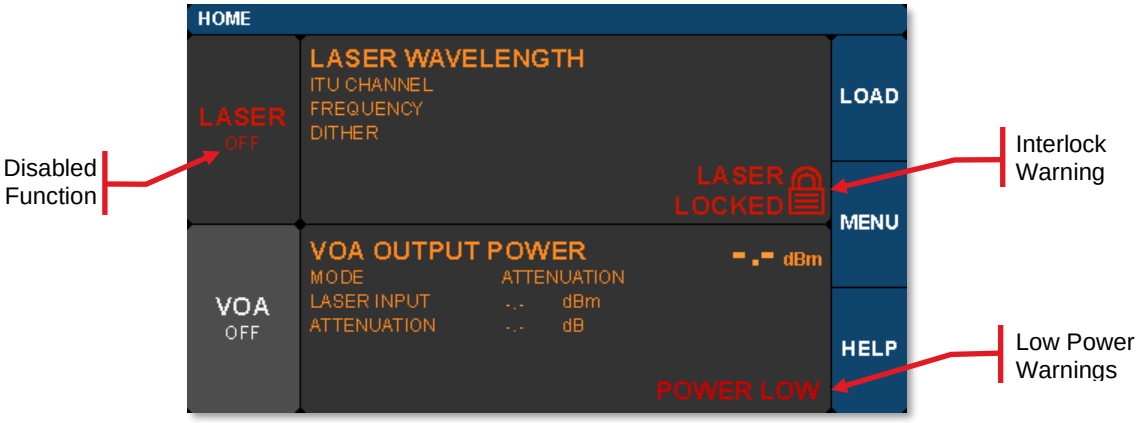
The Home screen (or dashboard) is organized into three main sections.

The left side contains the ON/OFF buttons for each of the main instrument functions. Tapping either of these buttons will toggle the function on and off. The same ON/OFF functionality is also available on the individual Settings pages. The power buttons turn green to indicate the function is ON, and turn red to indicate the function is disabled.

The central section is the main dashboard for reporting operational values of each section. Tapping the screen in this middle area will take the user to the corresponding Settings page for each section. Note that the green dot in each of these sections indicates the function is stable. A blinking green dot indicates the function is still stabilizing.

The right side of the screen provides access to the main utility functions of the box.

The screenshot below shows some of the common warning indicators on the HOME page. Some functions can be disabled when the laser power is low. In this case, buttons may be disabled and warnings indicators may appear.

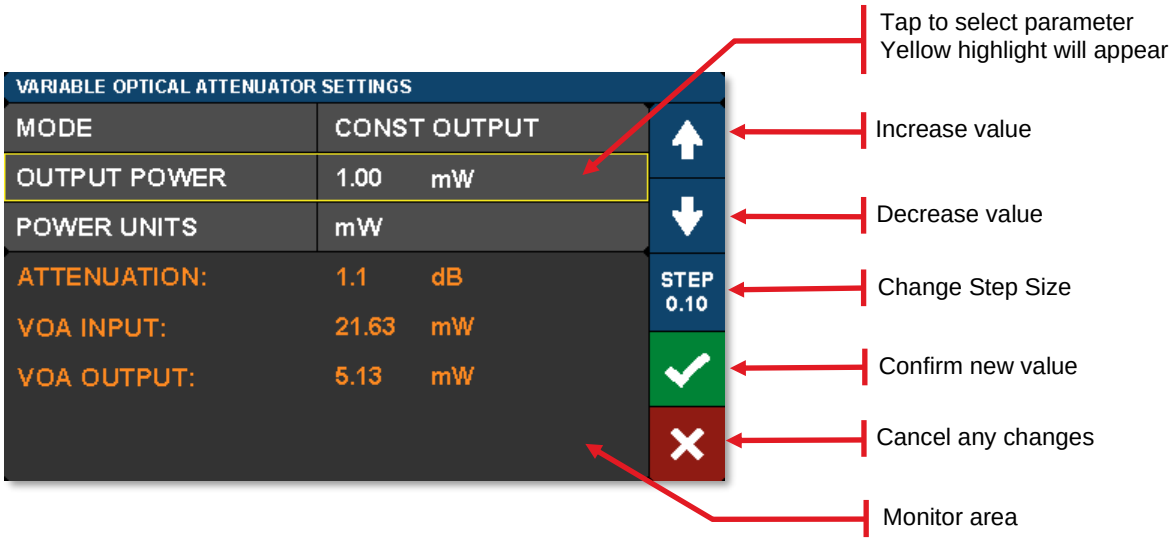


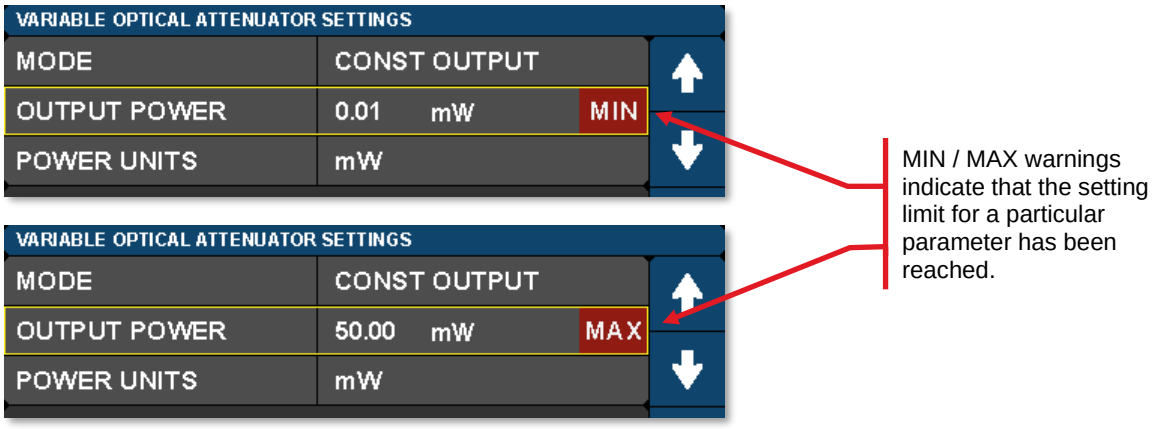
3.3. Controls in the Settings Pages

The Settings pages all follow the same general design and functionality as shown in the example screenshot below. The upper section with white letters displays the parameters that can be changed. Simply tap on the parameter of interest to highlight it, and the controls for that parameter will be presented.

The lower section with amber letters displays selected values that are convenient to monitor on that page.

The right-hand column provides the controls for changing the values for the selected parameters. The main control knob on the front panel can also be used to adjust and confirm selected values. The screenshots below show examples of the touchscreen controls.





Chapter 4 Operating Instructions

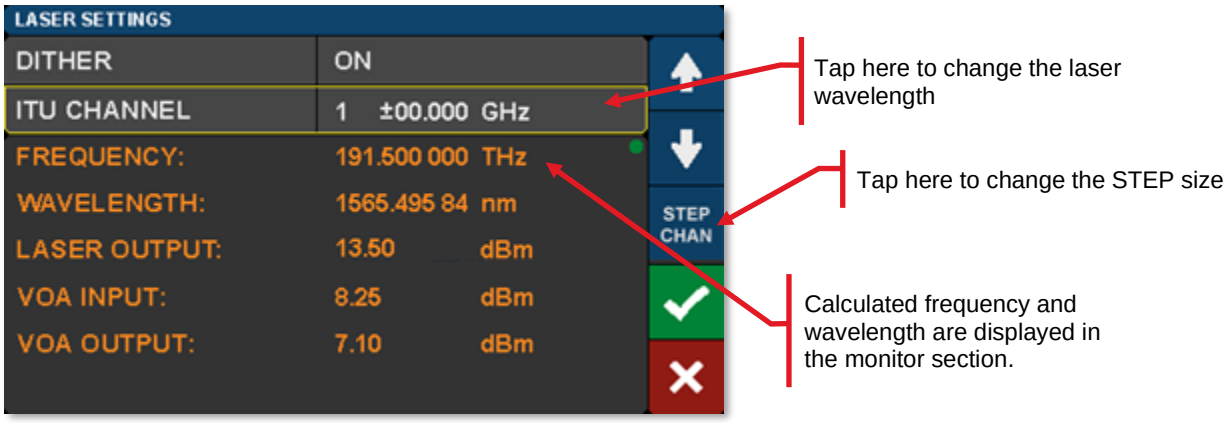
4.1. Laser Settings Page

To access the Laser Settings page, tap on the Laser monitors pane on the Home page. Here the user can control the laser wavelength and choose whether or not to use the dither feature (available for transmitters with C-band or L-band lasers only) to stabilize the wavelength. Turning the dither off will result in lower phase and intensity noise, but the wavelength may drift slightly over time. The monitors on this page provide live readings of many parameters.

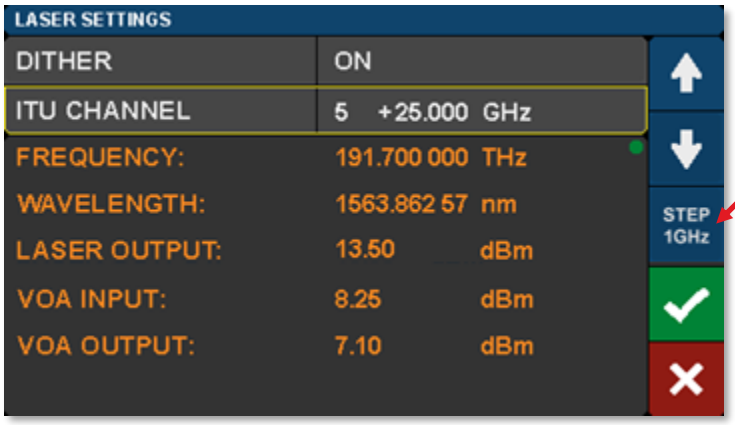
Caution: The laser should not be turned on unless there is an optical fiber connected to the laser output port.

Optical frequency can be set at increments of 50 GHz; these lasers also support a fine tuning frequency offset feature, allowing the frequency to be adjusted by an offset from -30.000 GHz to +30.000 GHz. The ITU channel number on these pages is an index number given only for convenience, which is unique to this instrument; actual frequencies and spacings are specified by the ITU standard.

To adjust the ITU channel, tap on the ITU CHANNEL row and use the arrow buttons to increment or decrement the channel. Press the green check mark to accept the new channel, or the red cancel button to abort the change. You may also use the adjustment knob. Note that you are initially editing by channel, as indicated by the STEP CHAN button. Note that the frequency and wavelength value are estimated based on the laser's nominal 50 GHz channel spacing, not measured by the instrument.



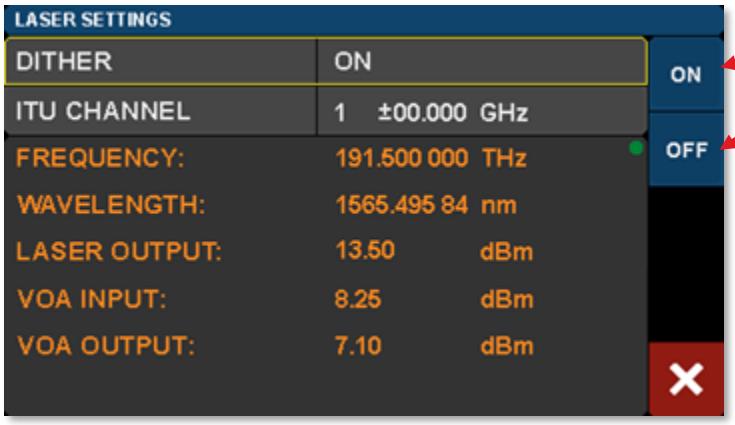
To apply a fine-tuning frequency offset, tap the STEP CHAN button. The button will cycle to the next mode, STEP 10GHz. In this mode, using the up or down arrows or control knob will adjust the most significant digit of the frequency offset. Tapping the button repeatedly will cycle through the STEP 1GHz, STEP 100MHz, STEP 10MHz, and STEP 1MHz modes, allowing you to edit the offset in finer units of 1GHz, 100MHz, 10MHz, or 1MHz. Tapping the button one more time will cycle back to STEP CHAN mode.



In "STEP 1GHz" mode you can edit the fine-tuning frequency offset in steps of 1 GHz.

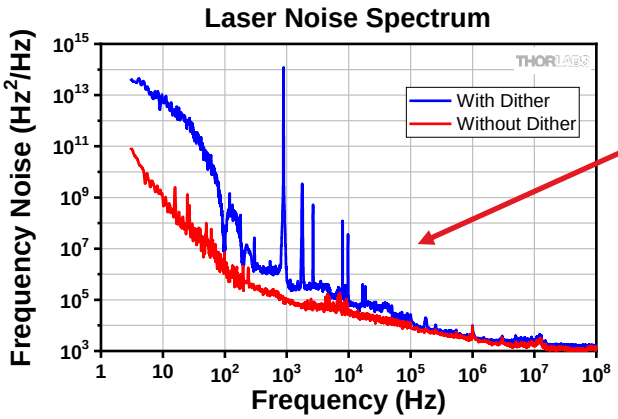
Note that while these lasers can have their frequency adjusted by increments as small as 1 MHz, the laser's actual tuning accuracy is not this fine. See Section 5.1 below for more information.

To turn the dither setting on or off, tap on the DITHER row and use the ON or OFF buttons to change the setting, or the red cancel button to abort the change.



Use these buttons to toggle the dither function On/Off

The plot below shows laser frequency noise as a function of optical frequency when the laser is operated with and without dither enabled. The red trace shows low noise operation when dither is turned off. Wavelength stability is improved by operating with dither, but the blue trace shows that this comes at the expense of added noise.

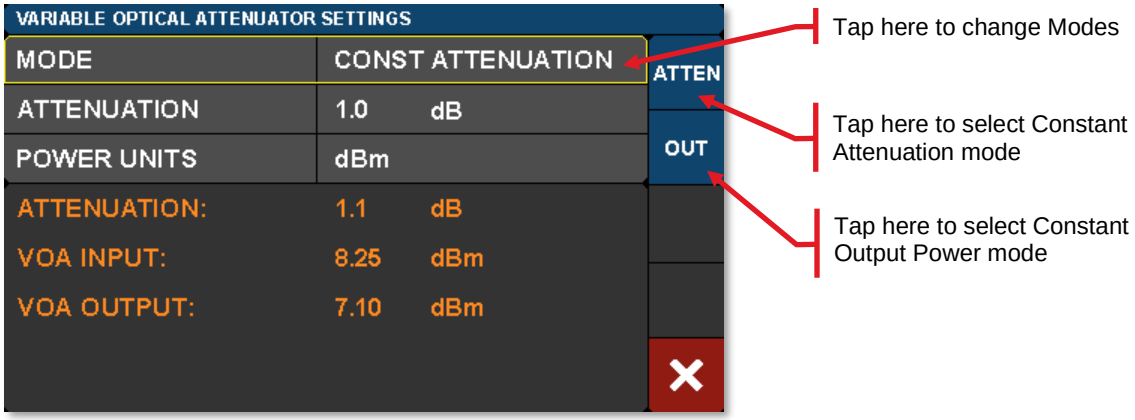


FM Noise Spectrum with and without dither. Wavelength stability is improved with dither, but at the expense of adding noise (blue line). Red line show Low Noise operation with dither turned off.

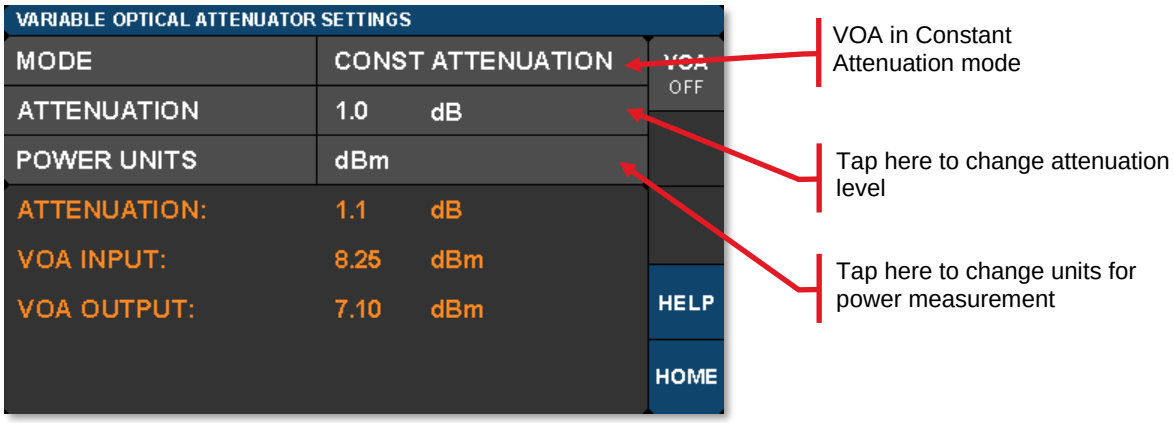
4.2. Variable Optical Attenuator Settings Page

To get to the Variable Optical Attenuator (VOA) Settings page tap in the VOA monitors pane on the Home page. The VOA provides the means for adjusting and stabilizing either the attenuation or the output power.
Note that the power measurement units for the entire interface are set on this page.

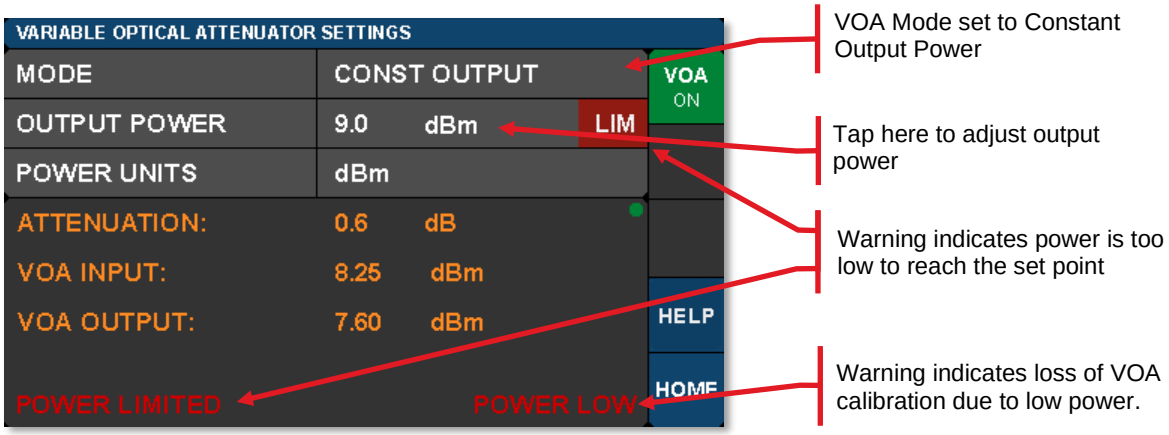
The VOA can operate in either of two modes: 1) Constant Attenuation, or 2) Constant Output Power.



Constant Attenuation Mode maintains a fixed attenuation level between the output of the laser and the output of the VOA. Any fluctuations at the input are transferred to the output.

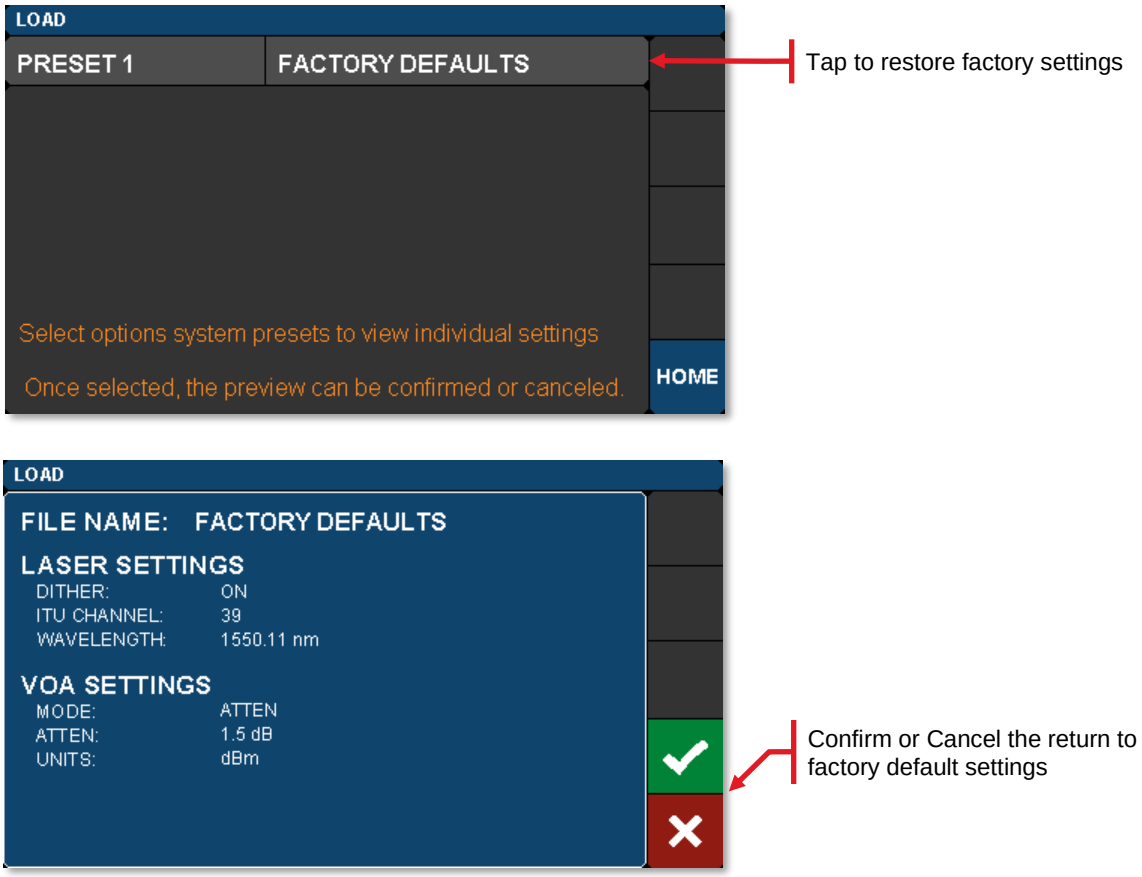


Constant Output Power Mode acts as a stabilizer by holding the final optical power constant independent of input fluctuations (within controllable limits such as input power and attenuation).



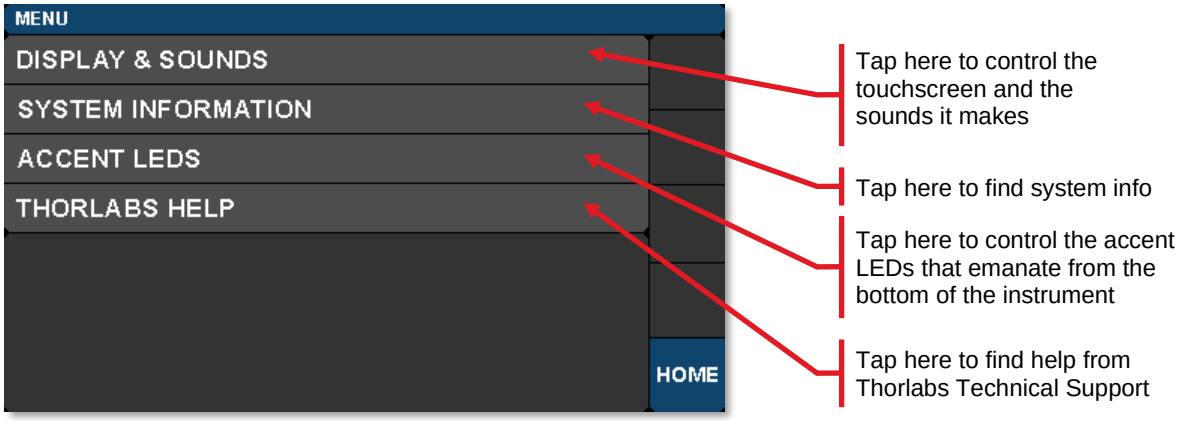
4.3. Load Page

To get to this page, tap the blue Load button on the Home page. The Load page allows the user to revert back to the factory default settings. Future firmware revisions will have the ability to store and load instrument states defined by the user.



4.4. Menu Page

To get to this page, tap the blue Menu button on the Home page. The Menu page has links to several pages that allow the user to control the display, sounds, lights, and get help information. The following sections describe these functions in more detail.



4.4.1. Display and Sound Settings Page

Path here: Home > Menu > Display & Sounds.



DISPLAY BRIGHTNESS controls the overall brightness of the touch-screen display. Adjusting the brightness to 0 forces the display to enter Sleep mode. Exit Sleep mode by touching the display or turning/pressing the adjustment knob.

DISPLAY SLEEP toggles the ability to enter Sleep mode (On/Off). When On, Sleep mode will be entered when the sleep time has expired due to no user interaction with the touch-screen display or adjustment knob. When Sleep mode is entered, the touch-screen display turns off while allowing the unit to continue to function. Exit Sleep mode by touching the display or turning/pressing the adjustment knob.

DISPLAY SLEEP TIME controls how long the touch-screen display is visible before entering Sleep mode.

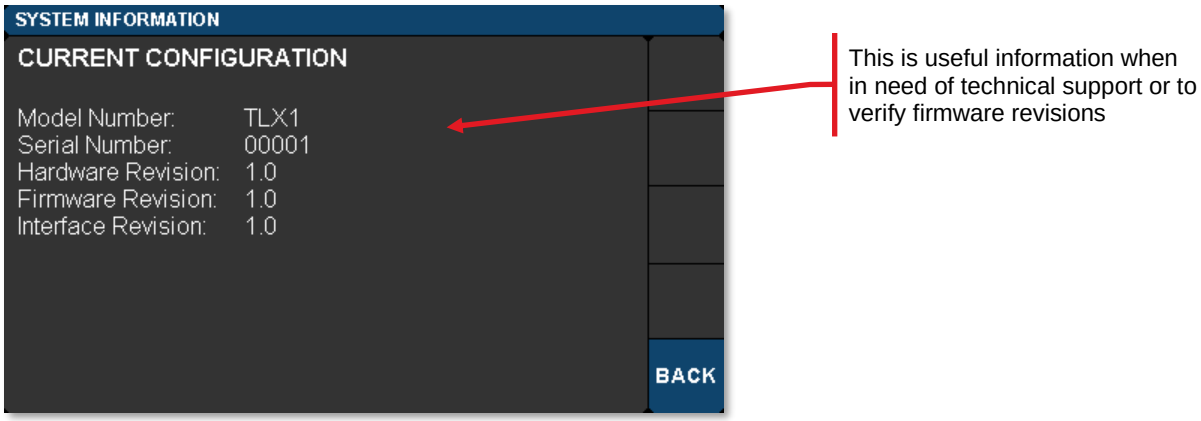
KNOB CLICK toggles the sound produced when turning the adjustment knob (On/Off).

NOTIFICATION BEEP toggles the sound associated with on-screen notifications (On/Off). Any notification or error that appears on the screen will produce a beep (MIN/MAX adjustment, Power Limited, Power Low, etc).

4.4.2. System Information Page

Path here: Home > Menu > System Information.

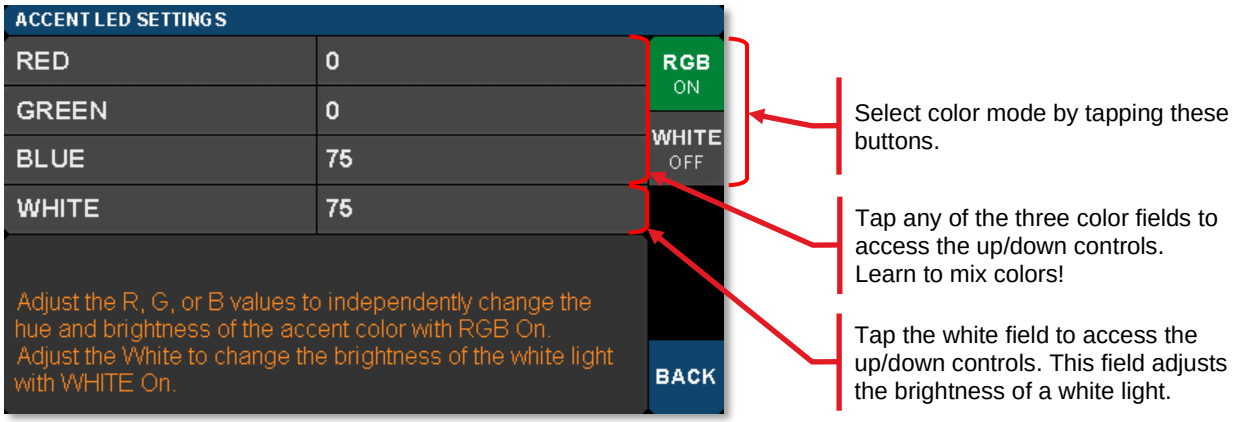
The System Information page displays the installed hardware and software versions



4.4.3. Accent LED Settings Page

Path here: Home > Menu > Accent LEDs

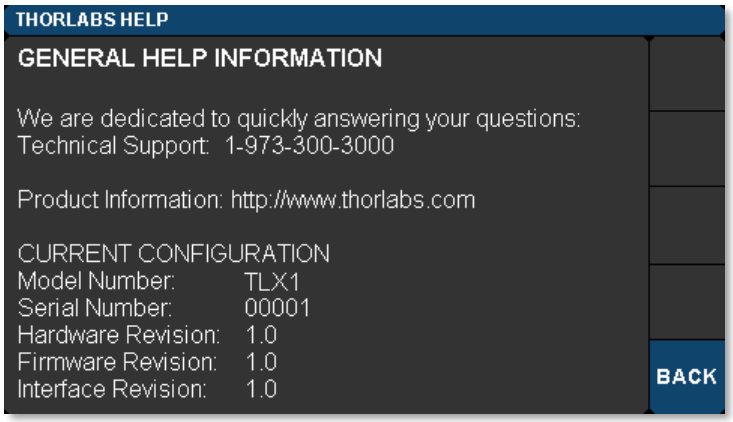
The accent LED settings control the intensity of the color LEDs that emanate from the bottom of the instrument. These are a fun aesthetic feature. You can set them to your favorite color.



4.4.4. Thorlabs Help Page

Path here: Home > Menu > Thorlabs Help

The Thorlabs Help page displays the Tech Support phone number, Thorlabs web site, and the installed hardware and software versions. This information will be useful when speaking with Tech Support.



Chapter 5 Specifications

All Specifications are at 1550 nm and 25 °C ambient temperature, unless otherwise noted. C-band specifications apply to the model TLX1, and L-band specifications apply to the model TLX2.

5.1. Laser Specifications

Parameter	Value			
	Unit	Min	Typ.	Max
Optical Output Power	dBm	12.5	13.5	14.5
Frequency Range (C-band)	THz	191.5	-	196.25
Wavelength Range (C-band)	nm	1527.6	-	1565.5
Frequency Range (L-band)	THz	186.35	-	190.95
Wavelength Range (L-band)	nm	1570.0	-	1608.8
Frequency Accuracy	GHz	-1.5	-	1.5
Tuning Resolution	GHz	-	50	-
Tuning Speed (Between Wavelengths)	s	-	10	-
Fine Tuning Resolution	MHz	-	1	-
Fine Tuning Speed	GHz/s	-	1	-
Fine Tuning Range	GHz	-30	-	30
Side Mode Suppression Ratio (SMSR)	dB	40	55	-
Optical Signal Noise Ratio (OSNR)	dB	40	60	-
Intrinsic Linewidth	kHz	-	10	15
Relative Intensity Noise (RIN)	dB/Hz	-	-	-145
Back Reflection	dB	-	-	-14
Polarization Extinction Ratio	dB	18	-	-

5.2. General Specifications

Parameter	Typical Values	Notes
Optical Input Power	20 dBm Max	22 dBm Abs. Max
External Laser Wavelength Range	1525 nm - 1610 nm	
Optical Insertion Loss	0.7 dB Typical	VOA IN to VOA OUT
Power Monitors Accuracy	±0.5 dBm	@ 1550 nm
Power Monitors Resolution	0.01 dBm	
VOA Response Time	1 s	

5.3. Power and Environmental Specifications

Parameter	Min	Max
Main AC Voltage	100 VAC	250 VAC
Power Consumption	-	60 VA
Line Frequency	50 Hz	60 Hz
Operating Temperature	10 °C	40 °C
Storage Temperature	0 °C	50 °C
Relative Humidity[1]	5%	85%

[1] *Non-Condensing Environment*

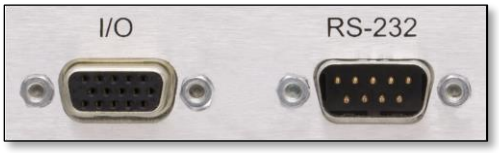
Chapter 6 Control & PC Connections

6.1. General Purpose I/O, RS-232, and USB Connections

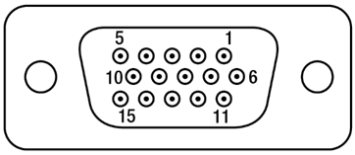
The back panel has connectors for monitor and control functions, as well as for upgrading the firmware. Both the RS-232 and the USB connections can be used for remotely controlling the TLX series lasers via SCPI type serial commands. Which connector to choose for remote control operation depends on the demands of the application and the user's preference. See the remote control user guide (RCUG), which can be downloaded from **https://www.thorlabs.com/manuals.cfm**, for information about the commands and connecting the laser to a PC.

The most recent firmware and remote control software tool are available through Thorlabs' website: visit **https://www.thorlabs.com/navigation.cfm?Guide_ID=2191** and enter the Item # into the search field. The laser's firmware can be updated by uploading the new version from a PC via the USB port. Thorlabs' technical support can provide up-to-date information on available firmware revisions and control functions.

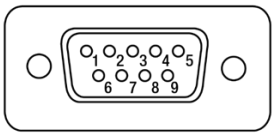
The 15-pin I/O connector provides outputs from the power monitors in the optical path (see the block diagram in Chapter 3). The power monitors provide a voltage that is proportional to the optical power with one of two gain settings. These values are available on the I/O DB15 connector. The gain setting for each monitor is determined by software, and reported on the corresponding Gain Indicator pins. 0.0 V indicates Low Gain (40 V/W) and 3.3 V indicates High Gain (4000 V/W). Maximum output voltage at the monitor pin is less than 12 V (into a high impedance). Power monitor bandwidth is limited to about 150 Hz.



I/O Conn.	*Pin #*	*Description*
HD DB15	1	Reserved for Future Use
HD DB15	2	Power Monitor 2
HD DB15	3	Power Monitor 3
HD DB15	4	Reserved for Future Use
HD DB15	5	Analog Ground
HD DB15	6	Analog Ground
HD DB15	7	Analog Ground
HD DB15	8	Analog Ground
HD DB15	9	Analog Ground
HD DB15	10	Analog Ground
HD DB15	11	Reserved for Future Use
HD DB15	12	Reserved for Future Use
HD DB15	13	Reserved for Future Use
HD DB15	14	Mon 2 Gain Indicator
HD DB15	15	Mon 3 Gain Indicator



RS-232	*Pin #*	*Description*
DB9	1	N/C
DB9	2	RS232 Input
DB9	3	RS232 Output
DB9	4	N/C
DB9	5	Digital Ground
DB9	6	N/C
DB9	7	N/C
DB9	8	N/C
DB9	9	N/C



6.2. The Laser Safety Interlock

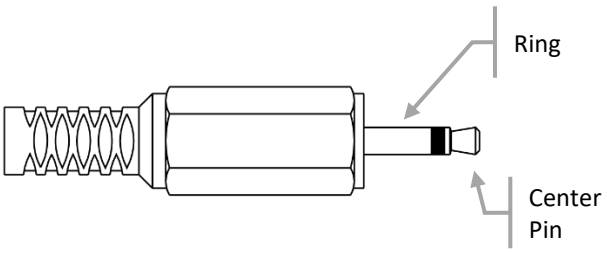
The instrument is equipped with a remote interlock connector located on the rear panel. In order to enable the laser source, a short circuit must be applied across the terminals of the Remote Interlock connector. In practice this connection is made available to allow the user to connect a remote actuated switch to the connector. The switch (which must be normally open) has to be closed in order for the laser to be enabled. If the switch changes to an open state, the laser source will automatically shut down. If the switch returns to a closed condition the laser source must be turned on again in the touchscreen GUI.

All units shipped from Thorlabs are configured with a shorting device installed in the Interlock connector. If you are not going to use this feature, then leave the shorting device installed. The unit will operate normally as described in the procedures above.

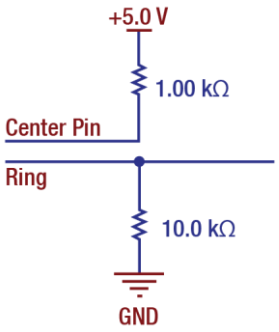
If you wish to make use of the Interlock feature, you will need to acquire the appropriate 2.5 mm plug, wire it to the remote interlock switch, and then plug it in to the back-panel interlock jack in place of the shorting plug. This type of plug is readily available at most electronics stores. The electrical specifications for the interlock input are shown in the following table.

Specification	***Value***
Type of Mating Connector	2.5 mm Mono Phone Jack
Open Circuit Voltage	<5 VDC (on barrel of plug)
Short Circuit Current	7 mA (Typical)
Connector Polarity	Tip is Ground, Barrel is at 5 VDC max.
Interlock Switch Requirements	Must be normally open dry contacts Apply no external voltages to the interlock input

The user's safety circuit must be attached to the phono plug and wired such that the ring and center pin are shorted when it is safe to enable the laser. The laser will be enabled when connection is closed. If it changes to an open state, the laser source will turn off.

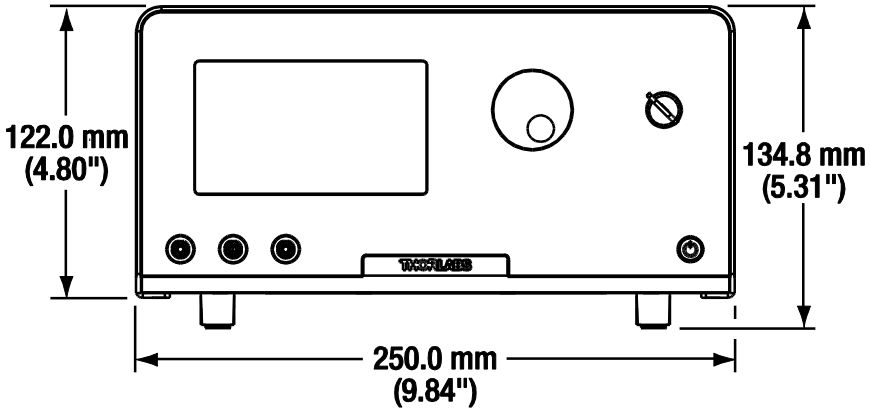


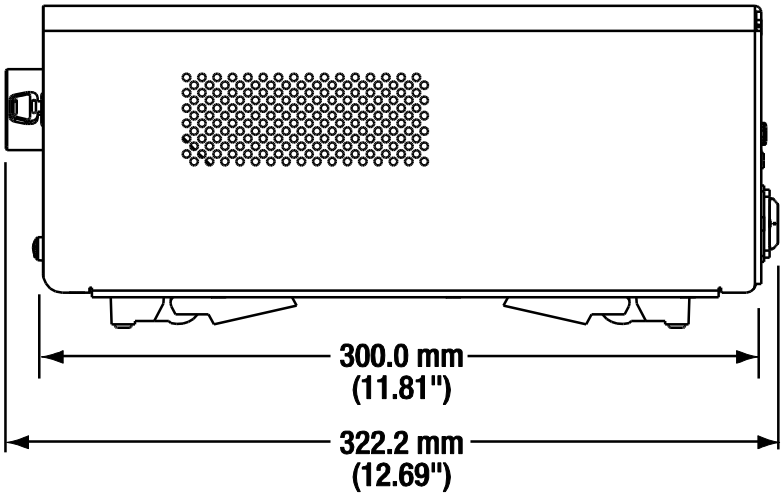
(a) Diagram of a Phono-Type Plug

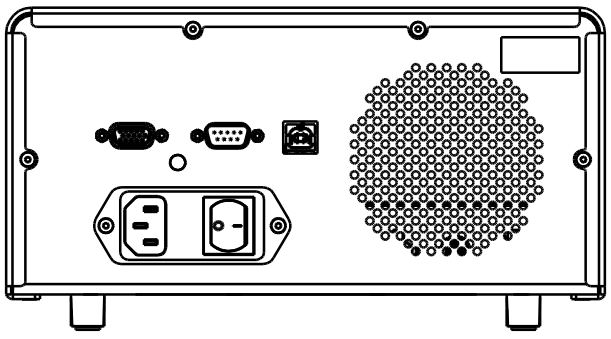


(b) Internal Electrical Connections of the Interlock Jack

Chapter 7 Mechanical Drawings







Chapter 8 Maintenance, Repair & Fuses

8.1. Maintenance & Repair

The instrument should not need regular maintenance by the user. If necessary, the display, housing, and front panel can be cleaned using a soft cloth moistened with normal, mild glass cleaner. Do not use any chemical solvents or harsh cleaners on the display. Do not spray any cleaning solutions directly onto any part of the unit.

The instrument does not contain any modules that can be repaired by the user. If a malfunction occurs, please contact Thorlabs Technical Support and arrangements will be made to investigate the problem. Do not remove the cover. There are no user serviceable components inside.

Optical patch cords used to connect to the front panel of the instrument should have their end faces cleaned every time a new connection is made. The end faces of the internal fiber connectors can easily be damaged by the use of dirty fiber ends. If damage occurs, the instrument will need to be sent back for repair. We suggest using a fiber end-face cleaning product such as the Thorlabs FCC-7020 shown below. Alternatively, a lint-free cloth moistened with isopropyl alcohol or methanol can be used. Never use acetone.



Thorlabs FCC-7020
Fiber end-face cleaner for patch cords

The optical connectors on the front panel may be cleaned using a 2.5 mm bulkhead cleaner such as the Thorlabs FBC250. This allows the user to clean the fiber end-face without removing it from the internal bulkhead adapter.



Thorlabs FBC250
Fiber End-Face Cleaner for Bulkheads

8.2. Replacement Parts

The following parts can be obtained by contacting Thorlabs Technical Support

- SMA 50Ω loads (used for front panel RF connectors)
- PM Loopback Fiber Patch Cord for Front Panel
- Laser Interlock Keys for Front Panel Switch
- 2.5 mm Interlock Pin (for Back Panel)
- 1.25 A, 250 VAC Fuse for Main Power
- Instrument IEC Main Power Cord
- Instrument Flip Foot

8.3. Replacing the Main Fuse

The system is protected by a main fuse located in the power entry module where the main power cable plugs into the back panel of the instrument. If the instrument does not appear to power-up, especially after a power outage or storm, you can check the condition of the main power fuse without removing the cover of the instrument by following the following steps.

1. Put the instrument in “Standby” mode by pressing the standby button on the front of the instrument. Wait until the button turns from green to amber.
2. Turn the power off using the switch on the back panel of the instrument.
3. Unplug the main power cable.
4. Carefully remove the fuse holder slide from the power entry module (use a flat screwdriver).





5. Investigate the fuse. This can be done with a simple continuity check. If in doubt, replace the fuse. A spare fuse is stored in the fuse holder. Additional replacement fuses can be purchased from Thorlabs. **Always use fuses of the same type as the original**.



6. Reinstall the fuse holder slide into the power entry module, taking care that it fully seats until the top is flush with the rest of the power entry module.
7. Plug the main power cable back into the unit and power on as described in the *Getting Started* section of the manual.

If the fuse blows repeatedly, it is likely that an internal failure has occurred. Do not attempt to bypass the fuse as this can create a dangerous situation that could further damage the instrument or harm personnel. In this case, please contact Technical Support for directions.

Chapter 9 Troubleshooting

General Troubleshooting

In case you experience any problems, below are a few checks to help in troubleshooting the problem. If you have any questions, please contact your local Thorlabs Technical Support office.

If the unit does not appear to turn on correctly, please check the following items:

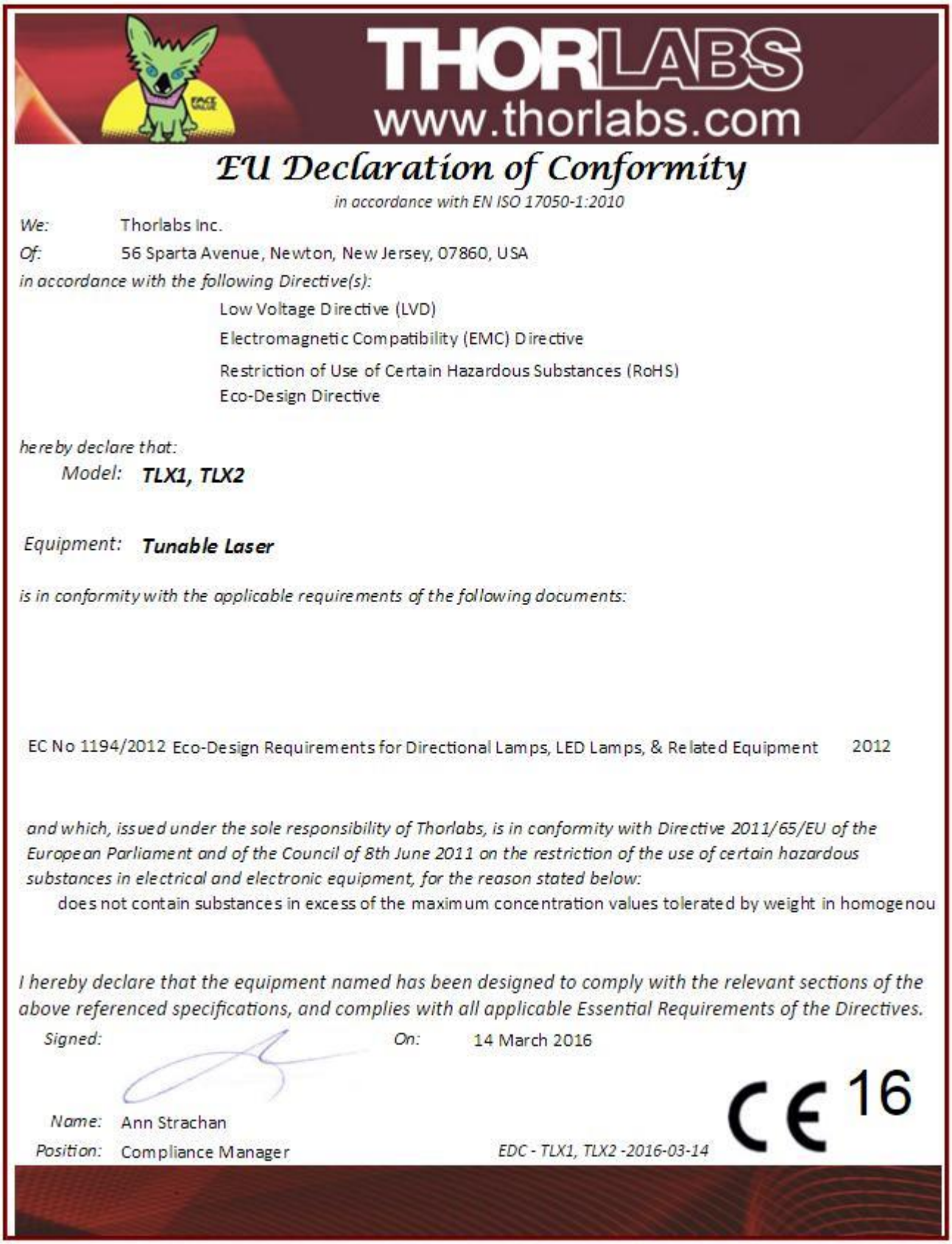
- Ensure that the main AC receptacle is powered
- Ensure that main power cable is fully seated at both ends
- Ensure that rear power switch is in the "I" position
- Check the main power fuse (see Maintenance & Repair section)

The front panel standby button color also indicates certain conditions as follows:

Standby Button Color	***Condition***
Solid Green	Indicates normal ON state
Solid Amber	Indicates unit is in Standby Mode Press the button to turn the instrument ON
Blinking Green	Indicates the main AC power is unstable. When the AC power is restored, the instrument will return to the standby mode (amber)
Blinking Amber	Indicates the instrument is overheated. Make sure the fan is running and none of the vents are blocked. If there are no ventilation issues, then the box should cool itself and return to the standby. Do not operate, or leave the instrument in standby mode, in an environment above 40°C.
Blinking Amber/Green	Indicates the instrument is both overheated and the main AC power is unstable (see individual troubleshooting for these conditions above).
Fading Amber/Green	Indicates the instrument is in the firmware upgrade mode If this condition appears after attempting to upgrade the firmware, the update may have failed, or the unit may have been left in the update mode. Try running the firmware update again. This condition may have also been reached by holding down the standby button for a long time while turning on the power. In this case, turn the unit off, wait for a few seconds, and turn it back on. If this condition for any other reason, turn the unit off, wait for a few seconds, and turn it back on. If these attempts to recover continue to fail, the instrument's firmware may have been corrupted. Contact Tech Support for help.

If the optical power at any point of the system is lower than expected, resolving the problem always starts by cleaning the optical fiber ends. Contaminated fiber ends, which attenuate the intensity of the transmitted light, are a very common issue when using single-mode fibers. Follow the suggestions provided in the Maintenance and Repair section of this manual to clean the optical fiber ends.

Chapter 10 Declaration of Conformity



THORLABS
www.thorlabs.com

EU Declaration of Conformity

in accordance with EN ISO 17050-1:2010

We: Thorlabs Inc.

Of: 56 Sparta Avenue, Newton, New Jersey, 07860, USA

in accordance with the following Directive(s):

Low Voltage Directive (LVD)

Electromagnetic Compatibility (EMC) Directive

Restriction of Use of Certain Hazardous Substances (RoHS)

Eco-Design Directive

hereby declare that:

Model: ***TLX1, TLX2***

Equipment: ***Tunable Laser***

is in conformity with the applicable requirements of the following documents:

EC No 1194/2012 Eco-Design Requirements for Directional Lamps, LED Lamps, & Related Equipment 2012

and which, issued under the sole responsibility of Thorlabs, is in conformity with Directive 2011/65/EU of the European Parliament and of the Council of 8th June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, for the reason stated below:

does not contain substances in excess of the maximum concentration values tolerated by weight in homogenou

I hereby declare that the equipment named has been designed to comply with the relevant sections of the above referenced specifications, and complies with all applicable Essential Requirements of the Directives.

Signed: *On:* 14 March 2016

Name: Ann Strachan

Position: Compliance Manager

EDC - TLX1, TLX2 -2016-03-14

CE 16

Chapter 11 Thorlabs Worldwide Contacts

For technical support or sales inquiries, please visit us at **www.thorlabs.com/contact** for our most up-to-date contact information.



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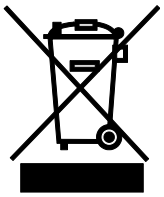
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Thorlabs verifies our compliance with the WEEE (Waste Electrical and Electronic Equipment) directive of the European Community and the corresponding national laws. Accordingly, all end users in the EC may return “end of life” Annex I category electrical and electronic equipment sold after August 13, 2005 to Thorlabs, without incurring disposal charges. Eligible units are marked with the crossed out “wheelie bin” logo (see right), were sold to and are currently owned by a company or institute within the EC, and are not dissembled or contaminated. Contact Thorlabs for more information. Waste treatment is your own responsibility. “End of life” units must be returned to Thorlabs or handed to a company specializing in waste recovery. Do not dispose of the unit in a litter bin or at a public waste disposal site.



Annex I


UNLEASHED