User Guide

IQS-2600B

Tunable Laser Source for IQS Platforms

www.EXFO.com

Telecom Test and Measurement

EXPERTISE REACHING OUT

EXFO's Commerce And Government Entities (CAGE) code under the North Atlantic Treaty Organization (NATO) is 0L8C3.

The information contained in this publication is subject to change without notice.

Trademarks

EXFO's trademarks have been identified as such. However, the presence or absence of such identification does not affect the legal status of any trademark.

Units of Measurement

Units of measurement in this publication conform to SI standards and practices.

Version number: 3.0.1

Contents

Certification Information

FCC Information

Electronic test equipment is exempt from Part 15 compliance (FCC) in the United States. However, compliance verification tests are systematically performed on most EXFO equipment.

CE Information

Electronic test equipment is subject to the EMC Directive in the European Union. The IEC 61326-1 standard prescribes both emission and immunity requirements for laboratory, measurement, and control equipment. This unit has undergone extensive testing according to the European Union Directive and Standards.

IMPORTANT

Use of shielded remote I/O cables, with properly grounded shields and metal connectors, is recommended in order to reduce radio frequency interference that may emanate from these cables.

DECLARATION OF CONFORMITY

Application of Council Directive(s):

2006/95/EC – The Low Voltage Directive
2004/108/EC – The EMC Directive
93/68/EEC – CE Marking
And their amendments

Manufacturer's Name and Address:

EXFO Inc.
400 Godin Avenue
Quebec City, Quebec
G1M 2K2 CANADA
Tel.: +1 418 683-0211

EXFO Europe
Omega Enterprise Park, Electron Way
Chandlers Ford, Hampshire
SO53 4SE ENGLAND
Tel.: +44 2380 246810

Equipment Type/Environment: Test & Measurement / Industrial
Trade Name/Model No.: Tunable Laser Source / IQS-2600B

Standard(s) to which Conformity is declared:

EN 61010-1:2001 Edition 2.0	**Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements**
EN 61326-1:2006	**Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements**
EN 60825-1:2007 Edition 2.0	**Safety of laser products – Part 1: Equipment classification and requirements**

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive and Standards.

Manufacturer:

Stephen Bull, E. Eng
Vice-President Research and Development

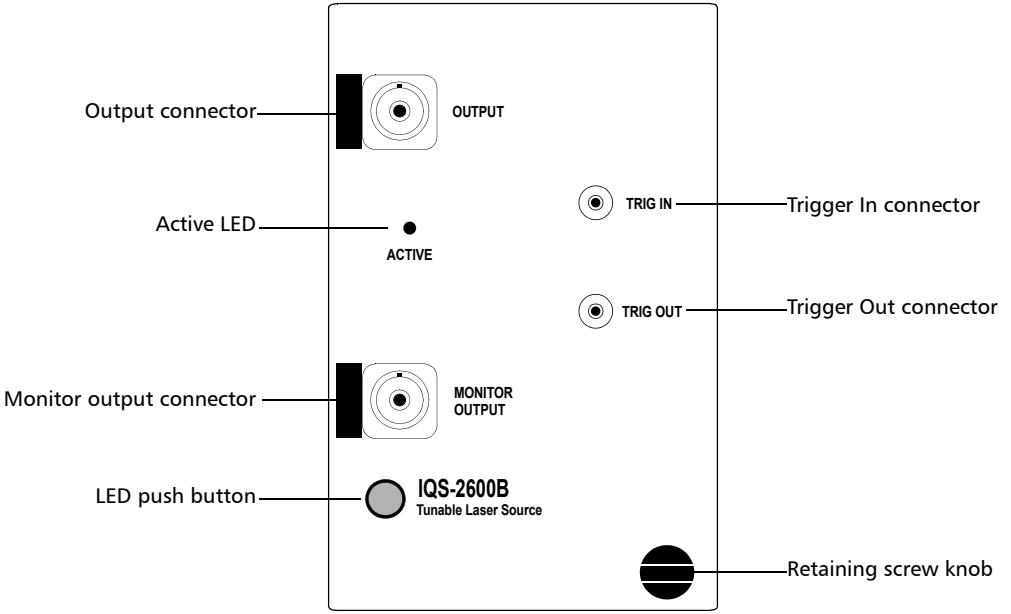
400 Godin Avenue,
Quebec City, Quebec
G1M 2K2 CANADA
February 03, 2009

CE EXFO

1 Introducing the IQS-2600B Tunable Laser Source

General Information

The IQS-2600B Tunable Laser Source addresses the testing requirements for dense WDM component testing in the C- and L-bands.



The source has a medium coherence length that avoids problems such as connector-induced interference and it is relatively immune to vibration. Its linewidth is made up of several longitudinal modes that are present simultaneously, resulting in no mode-hop-related measurement problems. It also features a high-accuracy encoder for consistency in your results.

Your module may also feature the possibility to enable or disable the automatic level control (ALC).

The IQS-2600B Tunable Laser Source supports local control (via the IQS Manager software) and remote control (through GPIB, RS-232, or Ethernet TCP/IP using SCPI commands or the provided LabVIEW drivers). For more information, refer to the *IQS platform* user guide.

Typical Applications

You can use your Tunable Laser Source to perform several tasks, such as the following:

- characterizing filters, multiplexers, Bragg gratings, and other DWDM components
- checking wavelength-dependent gain, noise contribution and saturation properties
- determining the spectral sensitivity of receivers and detectors
- performing high-loss tests on passive components

IQS-2600CT Tunable Laser Source for IQS-12004B DWDM Passive Component Test System

EXFO has modified its IQS-2600B Tunable Laser Source in order to integrate it into the IQS-12004B DWDM Passive Component Test System. To optimize the performance of the IQS-12004B, the optical attenuator ensuring a constant power output from the tunable laser source has been removed.

You can easily identify the type of tunable laser source you have. The unit designed for the IQS-12004B system will bear the mention 2600*CT*, while the stand-alone unit will bear the mention 2600*B*.

Every customer purchasing the IQS-12004B DWDM Passive Component Test System for applications covering both the C- and L-bands will receive an IQS-2600CT model. Even though the tunable laser source has been modified, it can still be used as a stand-alone instrument using an IQS-600 Integrated Qualification System. However, you will notice a warning message when turning the instrument on.

This warning informs you that the power output *is not* monitored and cannot be controlled internally. Also note that the power stability and repeatability values presented in the IQS-2600B specification sheet do not apply to the IQS-2600CT.

Any other functionality or specification, particularly those concerning the accuracy of the instrument and wavelength stability, will not be affected by this design change.

Conventions

Before using the product described in this manual, you should understand the following conventions:

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in *death or serious injury*. Do not proceed unless you understand and meet the required conditions.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in *minor or moderate injury*. Do not proceed unless you understand and meet the required conditions.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in *component damage*. Do not proceed unless you understand and meet the required conditions.

IMPORTANT

Refers to information about this product you should not overlook.

2 Safety Information

While handling optical fibers, laser radiation may be encountered at source output ports and fiber ends. Avoid long-term exposure to laser radiation.

WARNING

Do not install or terminate fibers while a light source is active. Never look directly into a live fiber and ensure that your eyes are protected at all times.

WARNING

Use of controls, adjustments and procedures for operation and maintenance other than those specified herein may result in hazardous radiation exposure or impair the protection provided by this unit.

Your instrument is a Class 1M laser product in compliance with standards IEC 60825-1 and 21 CFR 1040.10. Invisible laser radiation may be encountered at the output port.

The product is safe under reasonably foreseeable conditions of operation but it may be hazardous if you use optics within a diverging or collimated beam. *Do not view directly with optical instruments.*

3 Getting Started with Your Tunable Laser Source

Inserting and Removing Test Modules

CAUTION

Never insert or remove a module while the controller unit and its expansion units are turned on. This will result in immediate and irreparable damage to both the module and unit.

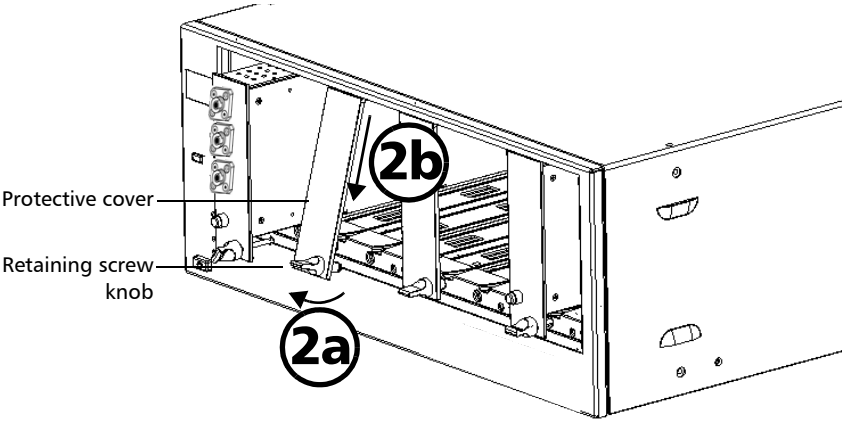
To insert a module into the controller or expansion unit:

1. Exit IQS Manager and turn off all your units.

2. Remove the protective cover from the desired unused module slot.

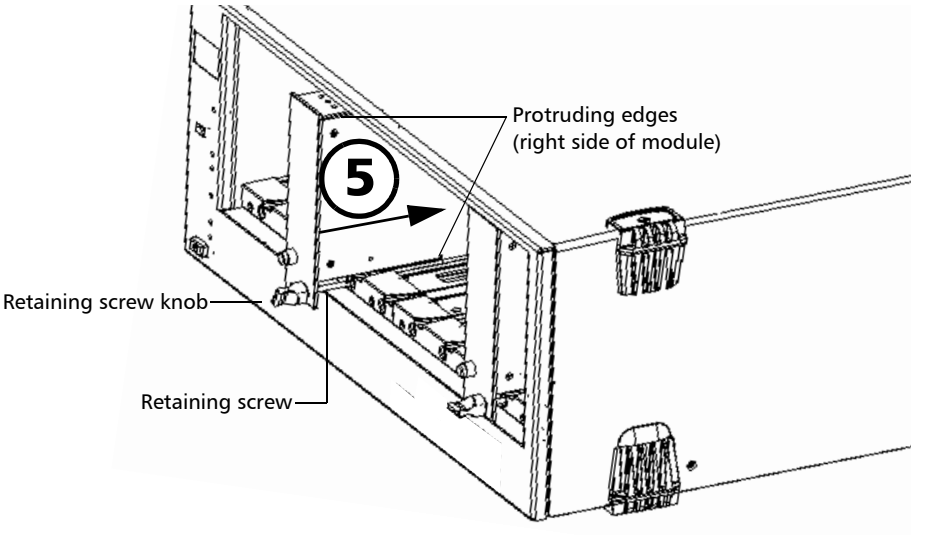
2a. Pull the retaining screw knob firmly towards you and release the bottom of the cover.

2b. Gently pull the top of the protective cover downwards, to remove it from the unit grooves.



3. Position the module so that its front panel is facing you and the top and bottom protruding edges are to your right.

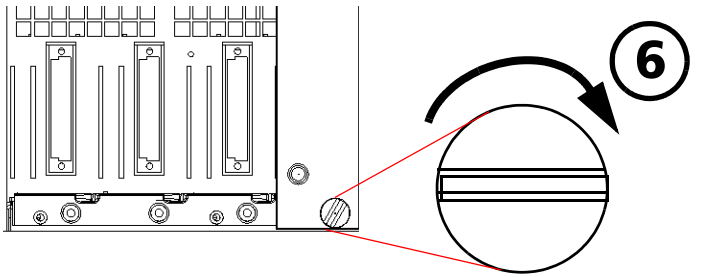
4. Insert the protruding edges of the module into the grooves of the unit's module slot.



5. Push the module all the way to the back of the slot, until the retaining screw makes contact with the unit casing.

6. While applying slight pressure to the module, turn the retaining screw knob (located at the bottom of the panel) clockwise until the knob is horizontal.

This will secure the module into its "seated" position.



The module is correctly inserted when its front panel is flush with the front panel of the controller or expansion unit.

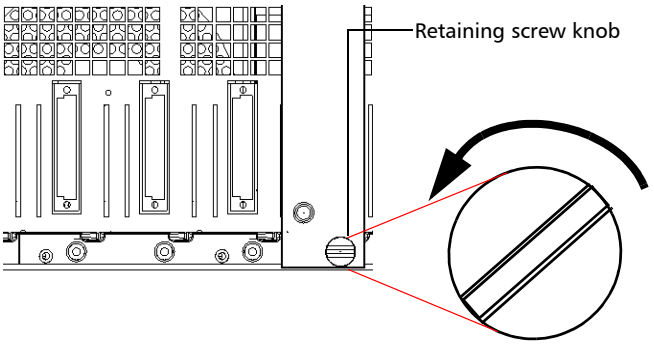
When you turn on the controller unit, the startup sequence will automatically detect your module.

Note: *You can insert IQ modules into your controller or expansion unit; the IQS Manager software will recognize them. However, the IQS-2600B locking mechanism (retaining screw) will not work for IQ modules.*

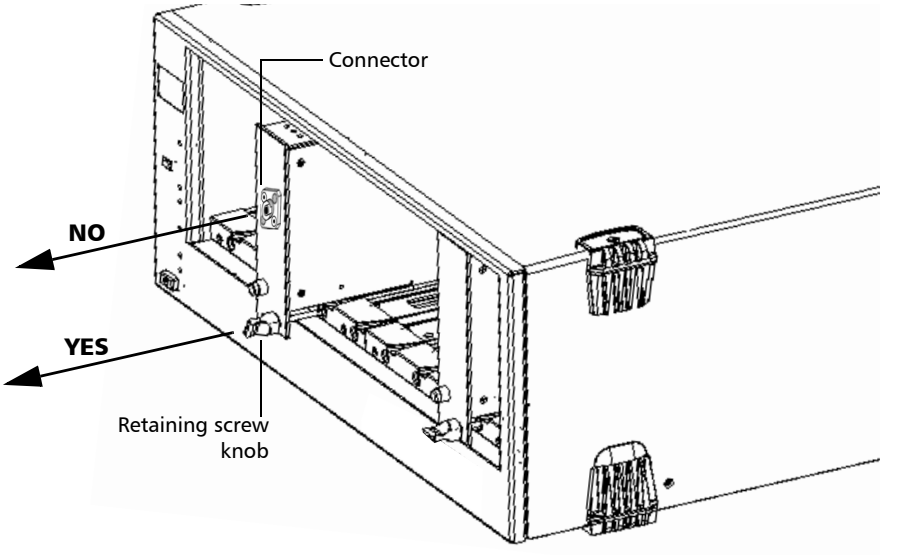
To remove a module from your controller or expansion unit:

1. While pulling gently on the knob, turn it counterclockwise until it stops.

The module will slowly be released from the slot.



2. Place your fingers underneath the module or hold it by the retaining screw knob *(NOT by the connector)* and pull it out.



CAUTION

Pulling out a module by a connector could seriously damage both the module and connector. Always pull out a module by the retaining screw knob.

3. Cover empty slots with the supplied protective covers.

3a. Slide the top of the protective cover into the upper grooves of the unit.

3b. Snap the cover into place by pushing the retaining screw knob.

CAUTION

Failure to reinstall protective covers over empty slots will result in ventilation problems.

Starting the Tunable Laser Source Application

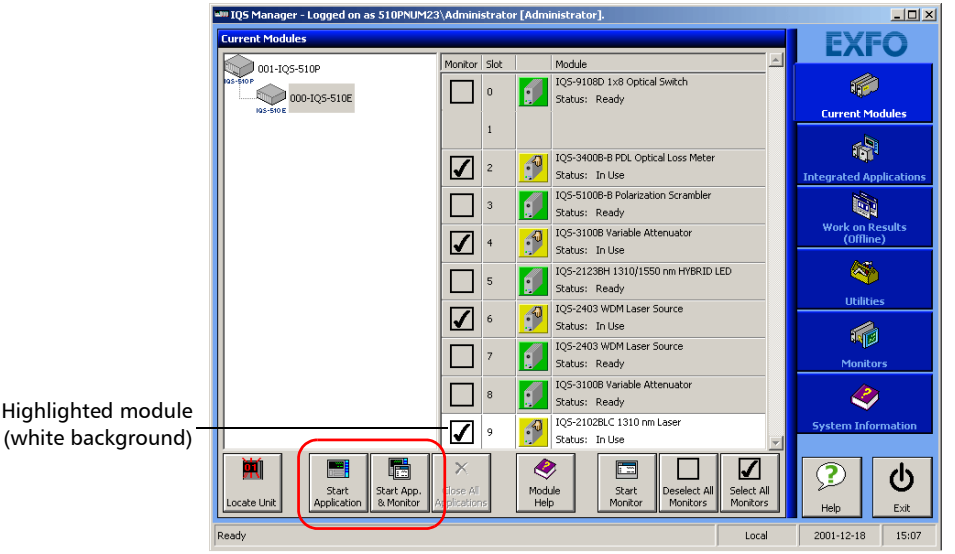
Your IQS-2600B Tunable Laser Source module can be configured and controlled from its dedicated IQS Manager application.

Note: *For details about IQS Manager, refer to the* IQS platform *user guide.*

To start the application:

1. From the **Current Modules** function tab select the module to use.

   It will turn white to indicate that it is highlighted.



Highlighted module (white background)

2. Click **Start Application**.

   OR

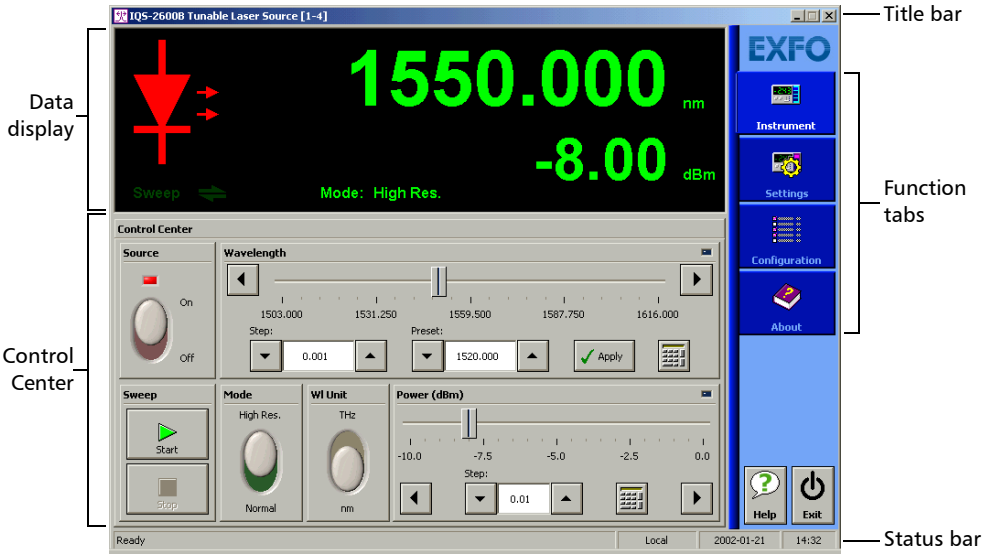
   Press the green LED push button on the front of the corresponding module.

   You can also double-click its row.

Note: *Pressing the LED push button will not activate or turn on the module.*

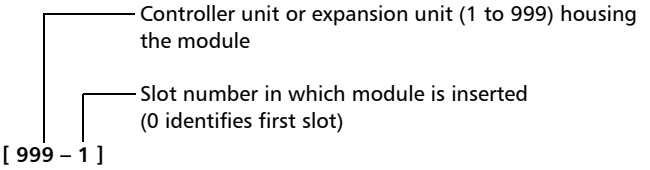
Note: *To start the corresponding monitor window at the same time, click* ***Start App. & Monitor****. The window opens on the* ***Monitors*** *function tab.*

The main window (shown below) contains all the commands required to control the Tunable Laser Source:



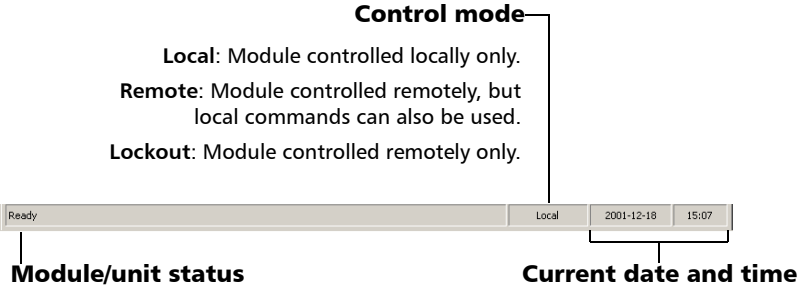
Title Bar

The title bar is located at the top of the main window. It displays the module name and its position in the controller or expansion unit. The module position is identified as follows:



Status Bar

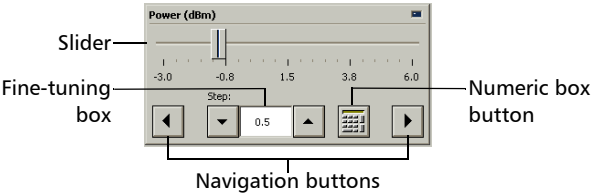
The status bar, located at the bottom of the main window, identifies the operational status of the IQS-2600B Tunable Laser Source.



For more information about automating or remotely controlling the IQS-2600B Tunable Laser Source, refer to your platform user guide.

Entering Values Using Sliders and Numeric Boxes

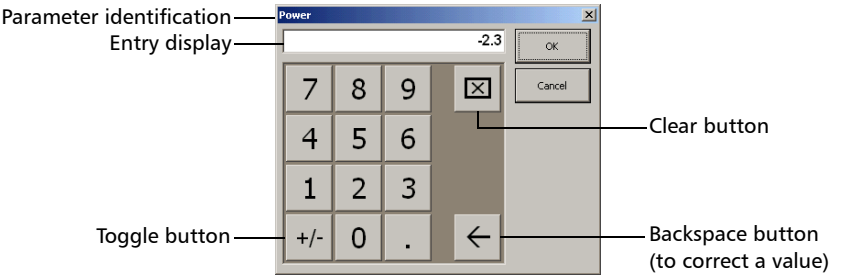
Many parameters in IQS Manager and module applications can be set using the following tools.



- Slider: Drag it to the desired value on the scale below.
- Navigation buttons: Click either buttons to move the slider. The slider moves by steps corresponding to the number in the fine-tuning box, which you can change by using the up and down arrow buttons next to the box. You cannot change the list of fine-tuning values from here.
- Numeric box: Click it to display the on-screen numeric pad, which you can use to enter a powe value.

To enter a value using the numeric box:

1. Use the ⊠ button to clear the entry display.



2. Enter the value.

3. Click **OK** to confirm the value.

Exiting the Application

Closing any application that is not currently being used helps freeing system memory.

To close the application from the main window:

Click  in the top right corner of the main window.

OR

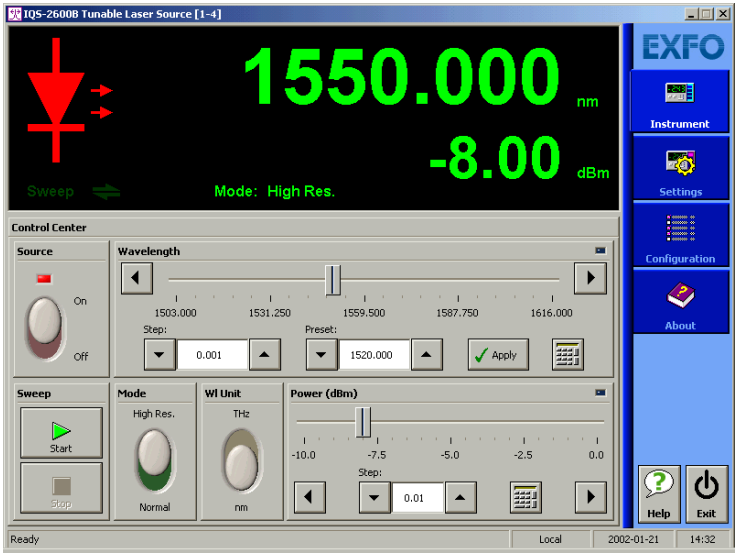
Click the **Exit** button located at the bottom of the function bar.

To close all currently running applications:

From IQS Manager, click **Close All Applications**.

4 Setting Standard Parameters

The standard parameters are set through the **Instrument** function tab.



Switching between Normal and High-Resolution (HR) Modes

You can use two different modes to select your values in your **Instrument** function tab.

- High-Resolution
- Normal

In HR mode, the laser linewidth is reduced by a factor of 20 %. Typically, at 1550 nm, the Normal mode will produce a 1.6 GHz FWHM linewidth, while the HR mode will produce a 1.4 GHz FWHM linewith. The tuning range (or power at extreme wavelength) might be smaller in HR mode than in Normal mode.

To select the operation mode:

Move the switch located in the **Mode** panel of the **Instrument** function tab.

Selecting the Display Unit

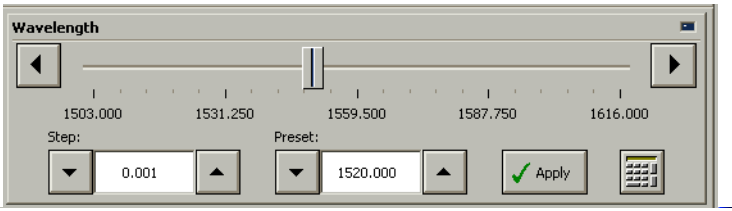
It is possible to select the display unit with which you want to work.

To select the display units, use the switch located in the **Wl. Unit** panel of the **Instrument** function tab.

The THz units are only supported in the main window. Settings in the **Settings** function tab use nm as units.

Selecting a Wavelength

There are several ways to select a wavelength for testing.



Whenever you use controls in the **Wavelength** panel, the LED on the upper right-hand corner will light up to indicate which settings you are changing.

Entering a Wavelength Directly

Any desired wavelength within the operational limits of the source can be entered directly by clicking on the numeric box button in the **Wavelength** panel of the **Instrument** function tab.

If the set power cannot be maintained at the selected wavelength (especially at extreme wavelengths), the displayed power value will flash, a message appears in the status bar, and the power is no longer in constant power mode. The output power stability and level will be the natural laser emission.

To stop the power display from flashing and have the power regulation work again, set the wavelength at an interval where the displayed power can be reached, or decrease the power.

Retrieving a Wavelength from a Stored List

To select a wavelength from the list of wavelengths already saved in the internal memory:

1. In the **Instrument** function tab, use the arrow buttons next to the **Wavelength** panel's **Preset** list and select the wavelength you want.
2. Click **Apply** to use your new settings.

To add a wavelength to the list, see *Adding Items to Lists* on page 24.

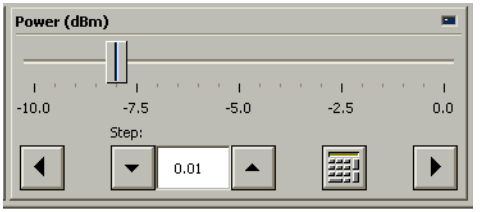
Using a Step Value From a Stored List

To select a step from the list of existing step values:

In the **Instrument** function tab, use the arrow buttons next to the **Wavelength** panel's **Step** list to select the value you want.

Setting the Power

There are several ways to select a power value for testing.



Whenever you use controls in the **Power** panel, the LED on the upper right-hand corner will light up to indicate which settings you are changing.

Entering a Power Value Directly

Any desired power value within the operational limits of the source can be entered directly by clicking on the numeric box button in the **Power** panel of the **Instrument** function tab.

Your source can either be in *Normal Power* mode (where the ALC is enabled), or in *Max. Power* mode (where the ALC is disabled).

To change the **Automatic Level Control** status, click the **Max Power** button.

Retrieving Power Step Value from a Stored List

To select a power step value from the list of existing values:

In the **Instrument** function tab, use the arrow buttons next to the **Power (dBm)** panel's **Step** list to select the value you want.

To add a wavelength to the list, see *Adding Items to Lists* on page 24.

Using the Slider

You can select a power value by using the slider in the **Instrument** function tab.

For a more precise adjustment of your values, use the arrow buttons under the slider.

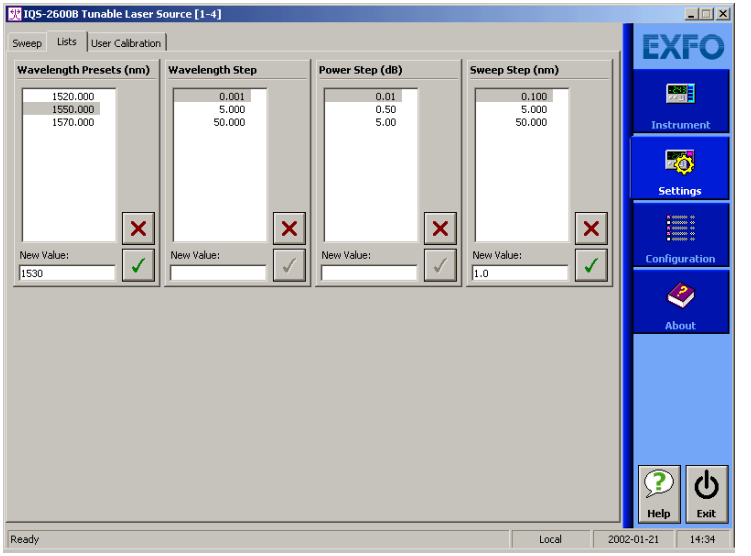
Note: *The power you select will affect the sweep range available. For example, setting the power at 0 dBm will give you a range from 1515 nm to 1610 nm, and setting the power at –10 dBm will give you a range of 1510 nm to 1612 nm. Please keep this in mind as you set the power for your sweep.*

Adding Items to Lists

You can add items to the current **Wavelength Presets, Wavelength Step, Power Step** and **Sweep Step** lists.

To add items:

1. Click the **Settings** function tab.
2. Select the **Lists** tab.



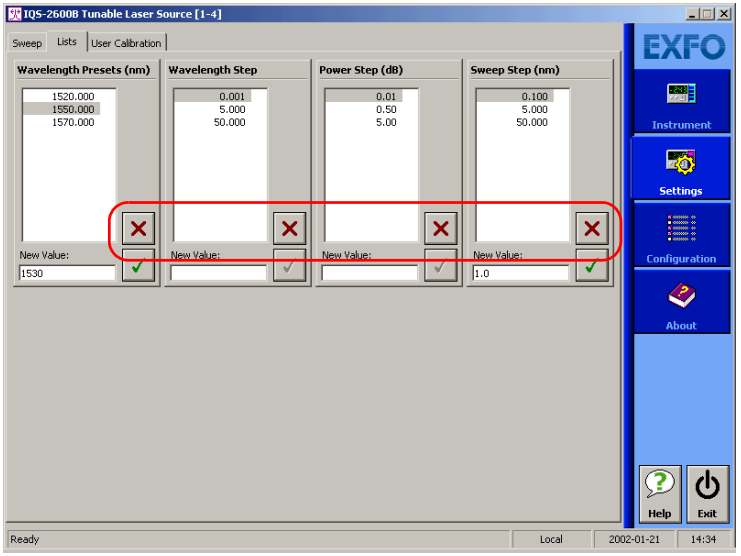
3. In the **Wavelength Presets (nm)**, **Wavelength Step, Power Step (dB)** or **Sweep Step (nm)** panels, depending on where you want to add a value, type in the desired wavelength or step in the **New Value** box.
4. Click ✓ to add the value to the list.
5. Repeat steps 3 and 4 to add more values if needed.

Deleting Items from Lists

You can delete items from the current **Wavelength Presets, Wavelength Step, Power Step** and **Sweep Step** lists.

To delete items:

1. Click the **Settings** function tab.
2. Select the **Lists** tab.



3. In the **Wavelength Presets**, **Wavelength Step, Power Step** or **Sweep Step** panels, select the value to delete.
4. Click ✕ to delete it.

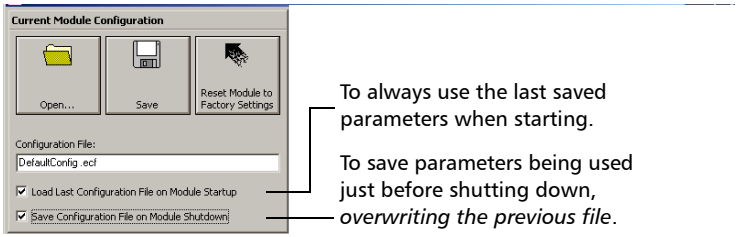
Saving and Recalling Configurations

Once you have set the IQS-2600B Tunable Laser Source parameters, you can save your custom configuration and recall it at any time. You can also recall the factory-defined settings.

Saved configurations include all parameters set in the **Control Center** (**Instrument** function tab) and in the **Settings** function tab (if present).

To save a configuration:

1. Select the **Configuration** function tab.



2. In the **Current Module Configuration** panel, enter the name you wish to use for your configuration file.

It will be saved in
D:\IQS Manager\Configuration Files\(your_module)\.

3. Click **Save**.

To recall a configuration:

1. Select the **Configuration** function tab.
2. Click **Open**.
3. Select the configuration file you wish to recall and confirm your action.

   You are returned to the application and the new parameters are set.

To revert to factory settings:

1. Select the **Configuration** function tab.
2. Click the **Reset Module to Factory Settings** button.

IMPORTANT

Reverting to the factory settings will interrupt any module operation in progress.

IMPORTANT

The operation may take a few seconds to complete.

5 Setting Sweep Parameters

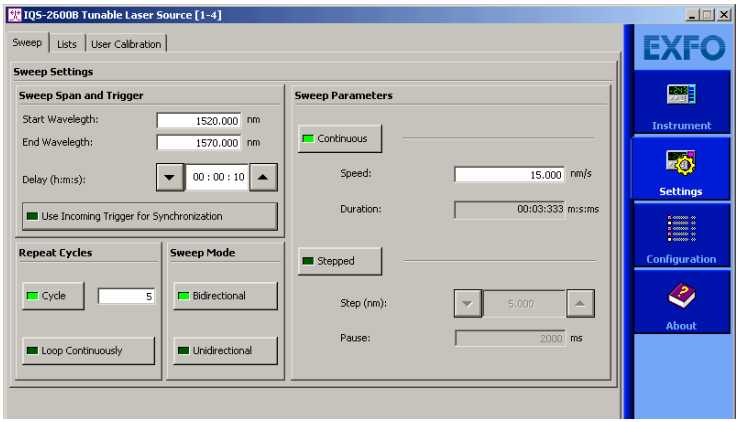
Your Tunable Laser Source allows you to perform automatic wavelength scans according to user-defined parameters. You can perform a continuous sweep (the source will make one or several continuous passes), or you can perform a step-by-step sweep (the signal wavelength changes according to preset increments or steps).

Setting the Start and End Wavelengths

The wavelength scans and their lengths (or duration) depend on the start and end wavelengths you set.

To set the wavelengths for your scans:

1. Click the **Settings** function tab.
2. Select the **Sweep** tab.



3. Enter the desired values in the appropriate boxes.

Note: *The start and end wavelengths of the sweep can be set in ascending or descending order, with a minimum value of 1.0 nm. The sweep will be performed accordingly.*

Setting a Delay for the Sweep

A delay at the beginning of a sweep can allow you to coordinate more than one unit.

To set the delay:

1. Select the **Settings** function tab.
2. In the **Sweep** tab, enter the desired time in the **Delay** box in 99:59:59 format.

If you set the delay to 00:00:00, the sweep will begin immediately upon clicking **Start** in the **Instrument** function tab.

Selecting the Sweep Mode

You can select the sweep mode you want to perform in the **Settings** function tab. The source will use either the *Continuous* or *Stepped* mode.

Using the Continuous Mode

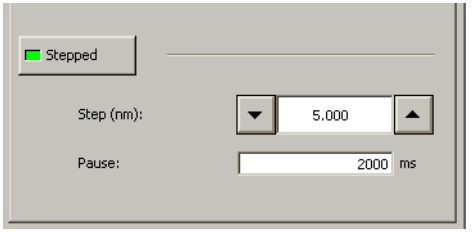
To select the Continuous sweep mode, click the appropriate button in the **Sweep** tab of the **Settings** function tab.

You can now select the speed for the sweep by entering a value in the box (minimum of 10 nm/s and maximum of 50 nm/s).

Note: *You cannot edit the duration of the scan. It will be automatically calculated according to the speed and wavelength range.*

Using the Stepped Mode

To select the Stepped sweep mode, click the appropriate button in the **Sweep** tab of the **Settings** function tab.



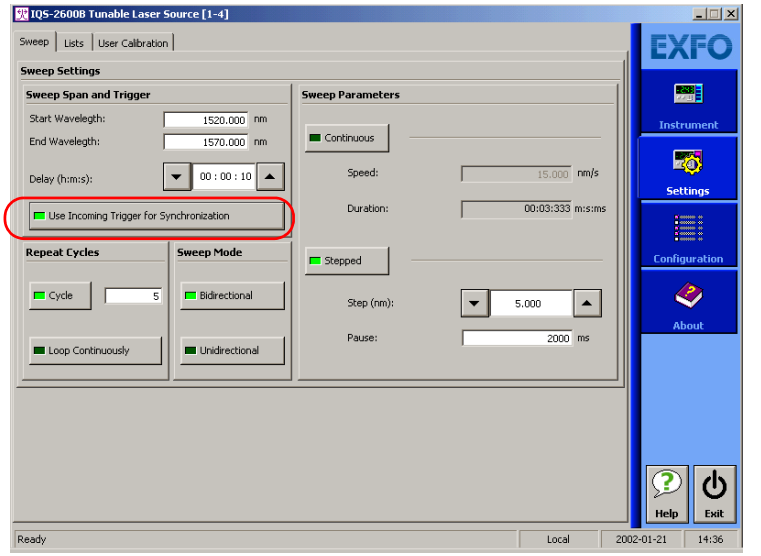
To add or delete steps from the lists, see *Adding Items to Lists* on page 24 and *Deleting Items from Lists* on page 25.

You can also set the **Pause** length between the steps by entering the desired value.

Selecting the Incoming Trigger Option

The incoming trigger option allows you to synchronize your sweeps with signals from other units.

You can switch the incoming trigger option on or off by clicking **Use Incoming Trigger for Synchronization** in the **Sweep** tab of the **Settings** function tab.



For more information about the trigger option on your Tunable Laser Source, see *Trigger Option Theory* on page 129.

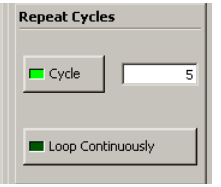
Setting the Cycle Options

The cycle options allow you to specify settings in both continuous and stepped sweep modes.

You can set a specific number of cycles for the sweep to perform.

To set the number of cycles:

1. Click the **Cycle** button.



2. Enter the desired number of cycles in the box next to the button (maximum 99).

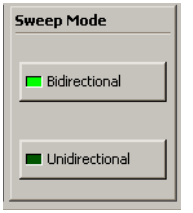
Note: *If you want the sweep to loop continuously, select the* ***Loop Continuously*** *button instead.*

Setting the Sweep Direction

The sweep can be either *unidirectional*, meaning that it will only go in one direction, or *bidirectional*, sweeping back and forth.

To set the direction of the sweep:

Select the desired sweep direction by selecting the appropriate button in the **Sweep** tab of the **Settings** function tab.



6 Operating your Tunable Laser Source

Cleaning and Connecting Optical Fibers

IMPORTANT

To ensure maximum power and to avoid erroneous readings:

- **Always inspect fiber ends and make sure that they are clean as explained below before inserting them into the port. EXFO is not responsible for damage or errors caused by bad fiber cleaning or handling.**
- **Ensure that your patchcord has appropriate connectors. Joining mismatched connectors will damage the ferrules.**

To connect the fiber-optic cable to the port:

1. Inspect the fiber using a fiber inspection microscope. If the fiber is clean, proceed to connecting it to the port. If the fiber is dirty, clean it as explained below.
2. Clean the fiber ends as follows:
   - **2a.** Gently wipe the fiber end with a lint-free swab dipped in isopropyl alcohol.
   - **2b.** Use compressed air to dry completely.
   - **2c.** Visually inspect the fiber end to ensure its cleanliness.

3. Carefully align the connector and port to prevent the fiber end from touching the outside of the port or rubbing against other surfaces.

If your connector features a key, ensure that it is fully fitted into the port's corresponding notch.

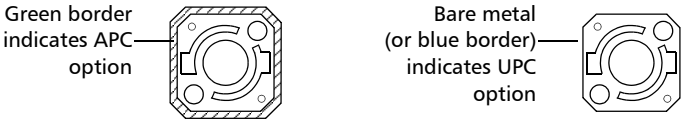
4. Push the connector in so that the fiber-optic cable is firmly in place, thus ensuring adequate contact.

If your connector features a screwsleeve, tighten the connector enough to firmly maintain the fiber in place. Do not overtighten, as this will damage the fiber and the port.

Note: *If your fiber-optic cable is not properly aligned and/or connected, you will notice heavy loss and reflection.*

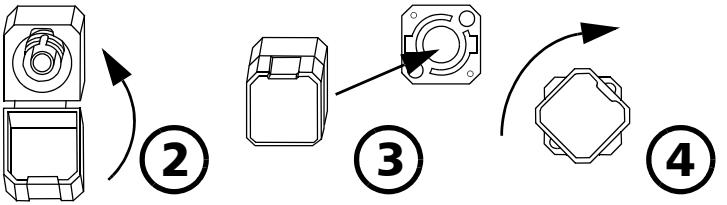
Installing the EXFO Universal Interface (EUI)

The EUI fixed baseplate is available for connectors with angled (APC) or non-angled (UPC) polishing. A green border around the baseplate indicates that it is for APC-type connectors.



To install an EUI connector adapter onto the EUI baseplate:

1. Hold the EUI connector adapter so the dust cap opens downwards.

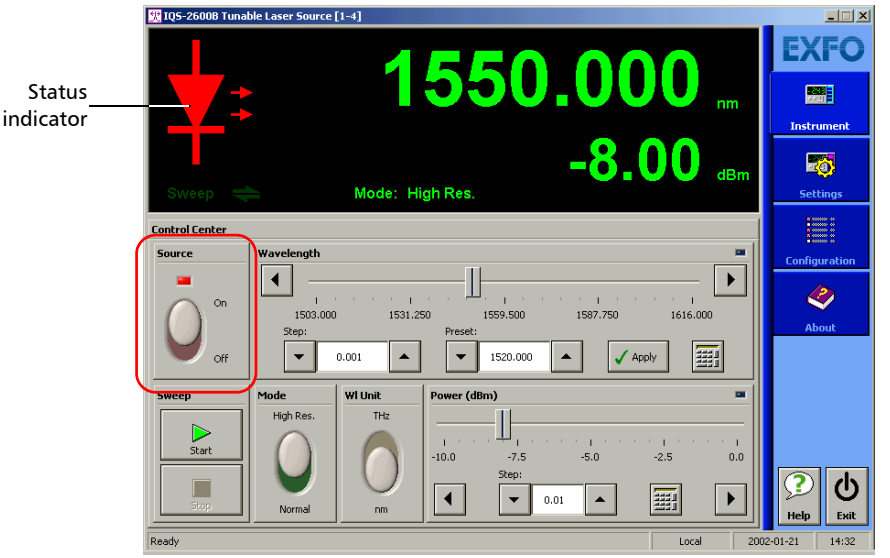


2. Close the dust cap in order to hold the connector adapter more firmly.
3. Insert the connector adapter into the baseplate.
4. While pushing firmly, turn the connector adapter clockwise on the baseplate to lock it in place.

Activating/Deactivating Light Emission

Before turning on the Tunable Laser Source, please read the *Safety Information* on page 5.

To activate or deactivate light emission, use the Source **On**/**Off** switch in the **Instrument** function tab.



When the source is active, the LED on the module front panel lights up and the Status indicator blinks and then appears in red with two arrows pointing to the right. Once the source is deactivated, the LED on the module front panel will turn off, the Status indicator will blink, then appear in dark red, and the arrows will disappear.

IMPORTANT

To obtain optimum stability, a laser source should be allowed to warm up for 60 minutes.

Starting a Sweep

After setting your sweep parameters as explained in *Setting Sweep Parameters* on page 29 and that your source is turned on, you are ready to start your sweep.

To start the sweep, click the **Start** button in the **Instrument** function tab.

To stop the sweep before it is completed, click **Stop**.

Note: *You can stop the sweep at any time. Turning the laser on or off will also stop the sweep.*

7 Monitoring Your Tunable Laser Source

When using your IQS-2600B Tunable Laser Source module, either alone or with other modules in a test setup, you can view module data and status using its monitor window in IQS Manager.

Using Monitor Windows

Monitor windows display basic data about modules. A combination of resizable windows allows you to create an integrated data display (refer to the platform user guide).

From the monitor window, you can change module parameters either by:

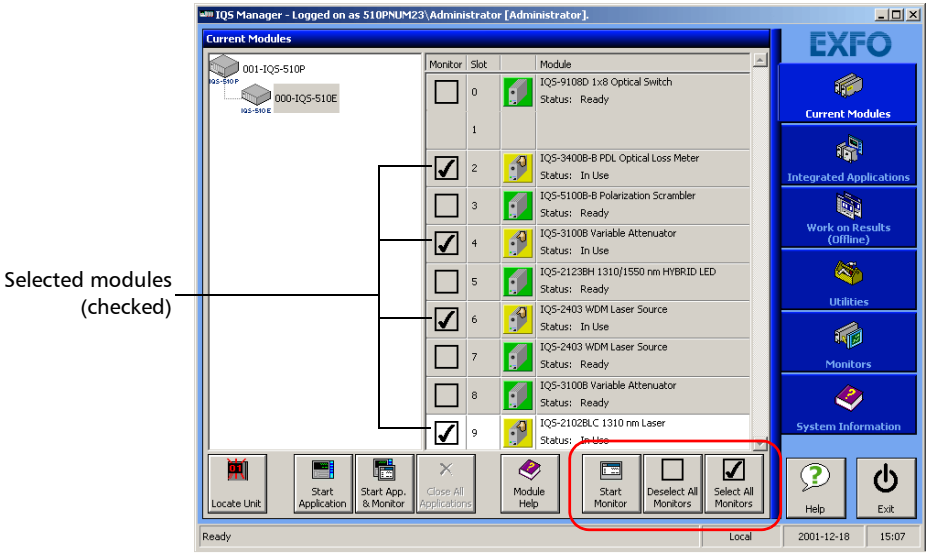
- opening the module application to access all the functions

  OR

- using the QuickTools utility, which provides frequently used functions from the application.

To select modules and display their monitor windows:

1. On the **Current Modules** function tab, select the controller or expansion unit containing the modules you want to monitor.



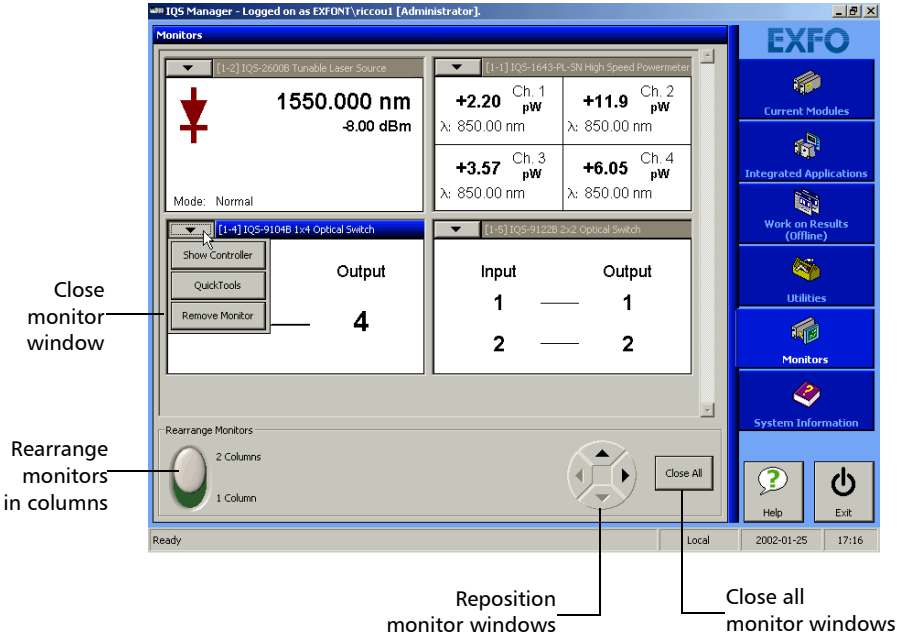
2. In the **Monitor** column, select the box next to each module you want to monitor.

   If you want to monitor all the modules *in the current unit*, click **Select All Monitors**. If you want to clear your choices, click **Deselect All Monitors**.

3. Click **Start Monitor** to apply your selection.

   IQS Manager will display the selected monitor windows on the **Monitors** function tab.

Note: *To start the* highlighted *module's corresponding application at the same time, click* ***Start App. & Monitor****. The application will appear in a different window.*


IQS Manager - Logged on as EXFONT\riccou1 [Administrator].
Monitors
[1-2] IQS-2600B Tunable Laser Source
1550.000 nm
-8.00 dBm
Mode: Normal
[1-1] IQS-1643-PL-SN High Speed Powermeter
+2.20 pW Ch. 1
λ: 850.00 nm
+11.9 pW Ch. 2
λ: 850.00 nm
+3.57 pW Ch. 3
λ: 850.00 nm
+6.05 pW Ch. 4
λ: 850.00 nm
[1-4] IQS-9104B 1x4 Optical Switch
Show Controller
QuickTools
Remove Monitor
Output
4
[1-5] IQS-9122B 2x2 Optical Switch
Input
Output
1
1
2
2
Rearrange Monitors
2 Columns
1 Column
Close All
EXFO
Current Modules
Integrated Applications
Work on Results (Offline)
Utilities
Monitors
System Information
Help
Exit
Ready
Local
2002-01-25
17:16
Close monitor window
Rearrange monitors in columns
Reposition monitor windows
Close all monitor windows

Using QuickTools

With QuickTools, you can fine-tune your module directly, while keeping an eye on your entire test setup.

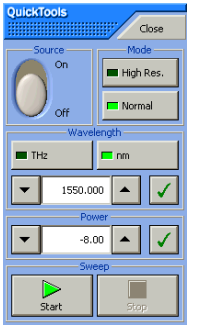
Note: *You can only access QuickTools if the module's monitor window is selected from the* ***Monitors*** *function tab and is currently active.*

To start QuickTools:

1. From the **Monitors** function tab, elect the monitor window of the module you wish to control.
2. Using the arrow button in the upper left corner, select **QuickTools**.

   The corresponding monitor window flashes when QuickTools is activated.

Note: *If you want to open the actual application for your module rather than QuickTools, click* ***Show Controller****.*



To close QuickTools:

Click the **Close** button located at the top of the window.

OR

Click outside the QuickTools window.

To close a monitor window:

Click the button on the upper left of the monitor window and select **Remove Monitor**.

OR

Click the **Close All** button at the bottom of the window.

8 Maintenance

To help ensure long, trouble-free operation:

- Always inspect fiber-optic connectors before using them and clean them if necessary.
- Keep the unit free of dust.
- Clean the unit casing and front panel with a cloth slightly dampened with water.
- Store unit at room temperature in a clean and dry area. Keep the unit out of direct sunlight.
- Avoid high humidity or significant temperature fluctuations.
- Avoid unnecessary shocks and vibrations.
- If any liquids are spilled on or into the unit, turn off the power immediately, disconnect from any external power source, remove the batteries and let the unit dry completely.

WARNING

Use of controls, adjustments, and procedures for operation and maintenance other than those specified herein may result in hazardous radiation exposure.

Cleaning Fixed Connectors

Regular cleaning of connectors will help maintain optimum performance. *Do not try to disassemble the unit. Doing so would break the connector.*

To clean fixed connectors:

1. Fold a lint-free wiping cloth in four to form a square.
2. Moisten the center of the lint-free wiping cloth with *only one drop* of isopropyl alcohol.

IMPORTANT

Alcohol may leave traces if used abundantly. Avoid contact between the tip of the bottle and the wiping cloth, and do not use bottles that distribute too much alcohol at a time.

3. Gently wipe the connector threads three times with the folded and moistened section of the wiping cloth.

IMPORTANT

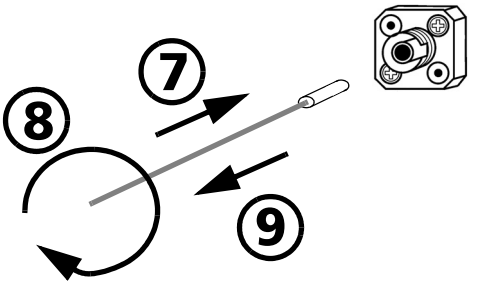
Isopropyl alcohol takes approximately ten seconds to evaporate. Since isopropyl alcohol is not absolutely pure, evaporation will leave microscopic residue. Make sure you dry the surfaces before evaporation occurs.

4. With a dry lint-free wiping cloth, gently wipe the same surfaces three times with a rotating movement.
5. Throw out the wiping cloths after one use.
6. Moisten a cleaning tip (2.5 mm tip) with *only one drop* of isopropyl alcohol.

IMPORTANT

Alcohol may leave traces if used abundantly. Avoid contact between the tip of the bottle and the cleaning tip, and do not use bottles that distribute too much alcohol at a time.

7. Slowly insert the cleaning tip into the connector until it reaches the ferrule inside (a slow clockwise rotating movement may help).



8. Gently turn the cleaning tip one full turn.

9. Continue to turn as you withdraw the cleaning tip.

10. Repeat steps 7 to 9, but this time with a dry cleaning tip (2.5 mm tip provided by EXFO).

Note: *Make sure you don't touch the soft end of the cleaning tip and verify the cleanliness of the cotton tip.*

11. Throw out the cleaning tips after one use.

Cleaning EUI Connectors

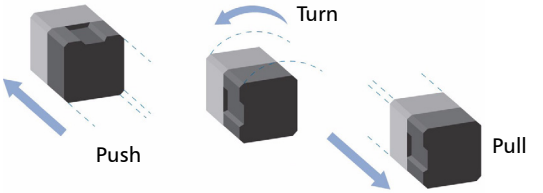
Regular cleaning of EUI connectors will help maintain optimum performance. There is no need to disassemble the unit.

IMPORTANT

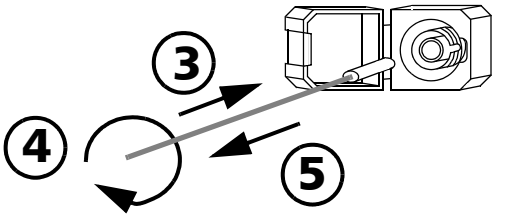
If any damage occurs to internal connectors, the module casing will have to be opened and a new calibration will be required.

To clean EUI connectors:

1. Remove the EUI from the instrument to expose the connector baseplate and ferrule.



2. Moisten a 2.5 mm cleaning tip with *one drop* of isopropyl alcohol (alcohol may leave traces if used abundantly).
3. Slowly insert the cleaning tip into the EUI adapter until it comes out on the other side (a slow clockwise rotating movement may help).



4. Gently turn the cleaning tip one full turn, then continue to turn as you withdraw it.

5. Repeat steps 3 to 4 with a dry cleaning tip.

Note: *Make sure you don't touch the soft end of the cleaning tip.*

6. Clean the ferrule in the connector port as follows:

   6a. Deposit *one drop* of isopropyl alcohol on a lint-free wiping cloth.

IMPORTANT

Isopropyl alcohol may leave residues if used abundantly or left to evaporate (about 10 seconds).

Avoid contact between the tip of the bottle and the wiping cloth, and dry the surface quickly.

   6b. Gently wipe the connector and ferrule.

   6c. With a dry lint-free wiping cloth, gently wipe the same surfaces to ensure that the connector and ferrule are perfectly dry.

   6d. Verify connector surface with a portable fiber-optic microscope (for example, EXFO's FOMS) or inspection probe (for example, EXFO's FIP).

WARNING

Verifying the surface of the connector WHILE THE UNIT IS ACTIVE WILL result in permanent eye damage.

7. Put the EUI back onto the instrument (push and turn clockwise).

8. Throw out cleaning tips and wiping cloths after one use.

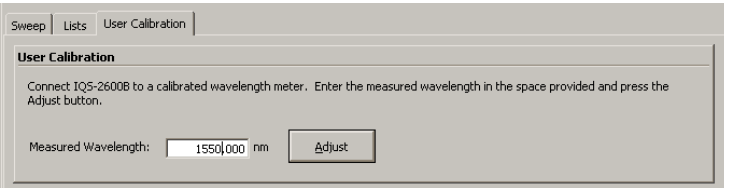
Adjusting Your Unit According to Wavelength

It is possible to introduce an offset in your Tunable Laser Source to correct a wavelength deviation as measured by a reference wavelength meter.

Note: *A calibrated wavelength meter is required to perform a user calibration on your unit.*

To adjust your module at a certain wavelength:

1. Turn your Tunable Laser Source on.
2. Set your Tunable Laser Source at the desired wavelength as explained in *Selecting a Wavelength* on page 20.
3. Select the **Settings** function tab.
4. Click the **User Calibration** tab.



5. Connect your IQS-2600B to a calibrated wavelength meter and enter the measured wavelength in the corresponding box.
6. Click **Adjust**. Your unit will verify if there is a difference between the value you have entered and its current wavelength position. If there is a difference, it will add an offset to compensate.

This user-performed calibration feature can help you achieve better absolute wavelength accuracy if, for example, you feel that conditions outside the unit may have affected the calibration.

The difference between the pre-selected wavelength and the measured wavelength cannot be greater than ± 0.200 nm. If the difference between the measured and preselected wavelengths is greater than ± 0.200 nm (for example, if you have entered the wrong value), an error message will be generated.

IMPORTANT

Note that the offset introduced into the Tunable Laser Source with this software feature cannot be disabled. To correct for a handling error during the procedure, you must repeat the steps described above with a calibrated wavelength meter.

Recalibrating the Unit

Manufacturing and service center calibrations are based on the ISO/IEC 17025 Standard, which states that calibration documents must not contain a recommended calibration interval, unless this has been previously agreed upon with the customer.

Validity of specifications depends on operating conditions. For example, the calibration validity period can be longer or shorter depending on the intensity of use, environmental conditions and unit maintenance. You should determine the adequate calibration interval for your unit according to your accuracy requirements.

Under normal use, EXFO recommends calibrating your unit every year.

Recycling and Disposal (Applies to European Union Only)

For complete recycling/disposal information as per European Directive WEEE 2002/96/EC, visit the EXFO Web site at www.exfo.com/recycle.

9 Troubleshooting

Solving Common Problems

If you encounter one of the problems listed below, try to solve it first with the given information. In all cases, if the problem persists after performing a recommended action, contact EXFO immediately.

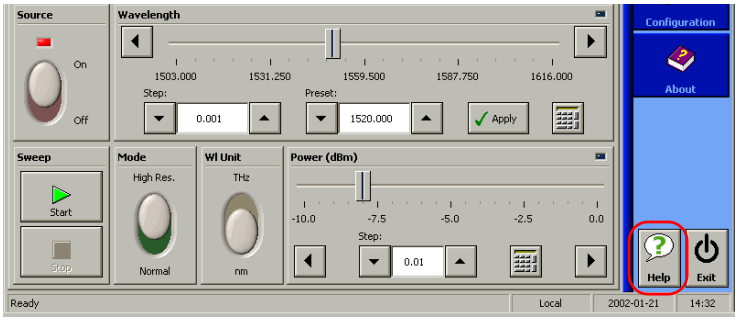
Problem	Probable Cause	Recommended Action
Source appears unstable.	Stabilization time was insufficient.	Wait at least 60 minutes for optimum stabilization.
	Reflection is destabilizing the source.	Use an optical isolator with your source.
	There was an ambient temperature variation.	Control ambient temperature.

Viewing Online Documentation

An online version of the IQS-2600B Tunable Laser Source user guide is available at all times from the application.

To access the online user guide:

Click **Help** in the function bar.



Contacting the Technical Support Group

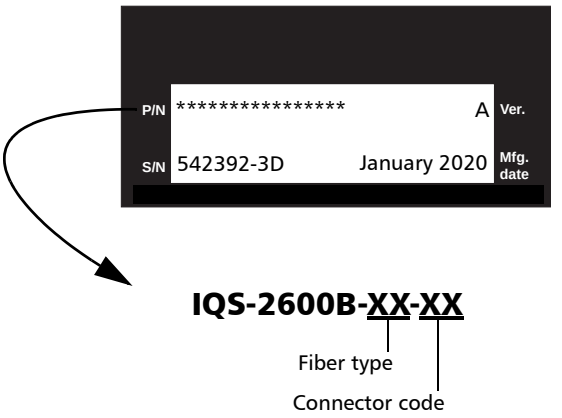
To obtain after-sales service or technical support for this product, contact EXFO at one of the following numbers. The Technical Support Group is available to take your calls from Monday to Friday, 8:00 a.m. to 7:00 p.m. (Eastern Time in North America).

For detailed information about technical support, visit the EXFO Web site at www.exfo.com.

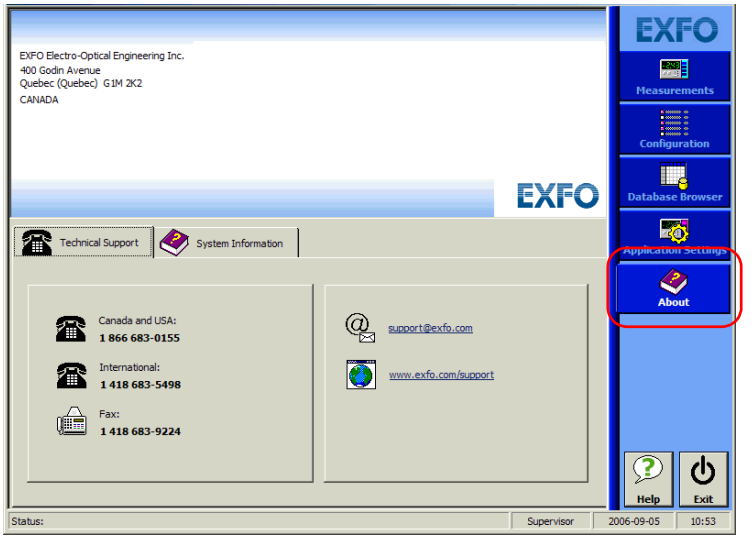
Technical Support Group
400 Godin Avenue
Quebec (Quebec) G1M 2K2
CANADA

1 866 683-0155 (USA and Canada)
Tel.: 1 418 683-5498
Fax: 1 418 683-9224
support@exfo.com

To accelerate the process, please have information such as the name and the serial number (see the product identification label—an example is shown below), as well as a description of your problem, close at hand.



You may also be requested to provide software and module version numbers.This information, as well as technical support contact information, can be found in the **About** function tab.



➤ Select the **Technical Support** tab to view phone numbers and active Internet links to EXFO's Technical Support Group. Use these links to send an information request by e-mail or to access EXFO's web site.

➤ Select the **Module Information** tab to view the module identification, serial number and firmware version.

Transportation

Maintain a temperature range within specifications when transporting the unit. Transportation damage can occur from improper handling. The following steps are recommended to minimize the possibility of damage:

- Pack the unit in its original packing material when shipping.
- Avoid high humidity or large temperature fluctuations.
- Keep the unit out of direct sunlight.
- Avoid unnecessary shocks and vibrations.

10 Warranty

General Information

EXFO Inc. (EXFO) warrants this equipment against defects in material and workmanship for a period of two years from the date of original shipment. EXFO also warrants that this equipment will meet applicable specifications under normal use.

During the warranty period, EXFO will, at its discretion, repair, replace, or issue credit for any defective product, as well as verify and adjust the product free of charge should the equipment need to be repaired or if the original calibration is erroneous. If the equipment is sent back for verification of calibration during the warranty period and found to meet all published specifications, EXFO will charge standard calibration fees.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL EXFO BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

Liability

EXFO shall not be liable for damages resulting from the use of the product, nor shall be responsible for any failure in the performance of other items to which the product is connected or the operation of any system of which the product may be a part.

EXFO shall not be liable for damages resulting from improper usage or unauthorized modification of the product, its accompanying accessories and software.

Exclusions

EXFO reserves the right to make changes in the design or construction of any of its products at any time without incurring obligation to make any changes whatsoever on units purchased. Accessories, including but not limited to fuses, pilot lamps, batteries and universal interfaces (EUI) used with EXFO products are not covered by this warranty.

This warranty excludes failure resulting from: improper use or installation, normal wear and tear, accident, abuse, neglect, fire, water, lightning or other acts of nature, causes external to the product or other factors beyond the control of EXFO.

Certification

EXFO certifies that this equipment met its published specifications at the time of shipment from the factory.

Service and Repairs

EXFO commits to providing product service and repair for five years following the date of purchase.

To send any equipment for service or repair:

1. Call one of EXFO's authorized service centers (see *EXFO Service Centers Worldwide* on page 64). Support personnel will determine if the equipment requires service, repair, or calibration.
2. If equipment must be returned to EXFO or an authorized service center, support personnel will issue a Return Merchandise Authorization (RMA) number and provide an address for return.
3. If possible, back up your data before sending the unit for repair.
4. Pack the equipment in its original shipping material. Be sure to include a statement or report fully detailing the defect and the conditions under which it was observed.
5. Return the equipment, prepaid, to the address given to you by support personnel. Be sure to write the RMA number on the shipping slip. *EXFO will refuse and return any package that does not bear an RMA number.*

Note: *A test setup fee will apply to any returned unit that, after test, is found to meet the applicable specifications.*

After repair, the equipment will be returned with a repair report. If the equipment is not under warranty, you will be invoiced for the cost appearing on this report. EXFO will pay return-to-customer shipping costs for equipment under warranty. Shipping insurance is at your expense.

Routine recalibration is not included in any of the warranty plans. Since calibrations/verifications are not covered by the basic or extended warranties, you may elect to purchase FlexCare Calibration/Verification Packages for a definite period of time. Contact an authorized service center (see *EXFO Service Centers Worldwide* on page 64).

EXFO Service Centers Worldwide

If your product requires servicing, contact your nearest authorized service center.

EXFO Headquarters Service Center
400 Godin Avenue
Quebec (Quebec) G1M 2K2
CANADA

1 866 683-0155 (USA and Canada)
Tel.: 1 418 683-5498
Fax: 1 418 683-9224
support@exfo.com

EXFO Europe Service Center
Omega Enterprise Park, Electron Way
Chandlers Ford, Hampshire S053 4SE
ENGLAND

Tel.: +44 2380 246810
Fax: +44 2380 246801
support.europe@exfo.com

EXFO Telecom Equipment (Shenzhen) Ltd.
3rd Floor, Building 10,
Yu Sheng Industrial Park (Gu Shu Crossing), No. 467,
National Highway 107,
Xixiang, Bao An District,
Shenzhen, China, 518126

Tel: +86 (755) 2955 3100
Fax: +86 (755) 2955 3101
support.asia@exfo.com

A Technical Specifications

IMPORTANT

The following technical specifications can change without notice. The information presented in this section is provided as a reference only. To obtain this product's most recent technical specifications, visit the EXFO Web site at *www.exfo.com*.

WAVELENGTH

Range (nm)		1510 to 1612
Display resolution (pm)		1
Effective spectral linewidth FWHM[b] (GHz)		1.3 (typical)
Repeatability[c] (pm)	10 measurements	±2.5 (Δ = 5)
Stability[c] (pm)	1 hour	±6 (Δ = 12)
Uncertainty[d] (pm)		±15
Sweep rate[e] (nm/s)	Maximum	50
	Minimum	2
Tuning time[f] (ms)		75 (typical)

POWER

Output power[g, h] (dBm)	From 1515 nm to 1610 nm	≥ 0
	From 1510 nm to 1612 nm	≥ −10
Stability[c] (dB)	15 minutes	±0.005 (Δ = 0.01)
	1 hour	±0.01 (Δ = 0.02)
Repeatability for a wavelength change[c] (dB)	10 measurements	±0.015 (Δ = 0.03)
Signal to SSE[g, i] (dB)	From 1515 nm to 1610 nm	≥ 75 (typical)
±1 nm from peak with RBW 0.1 nm	From 1550 nm to 1610 nm	≥ 80 (typical)
Signal to total SSE (dB)		≥ 45
		50 (typical)

INTERNAL VARIABLE ATTENUATOR

Attenuation range (dB)	10
Linearity with attenuation (dB)	±0.3 (typical)
Repeatability for specific wavelength[c] (dB)	±0.005 (Δ = 0.010) (typical)
Response time[k] (s)	0.5 (typical)

Notes

a. Specifications are valid at 23 °C ± 1 °C after one-hour warmup time.

b. FWHM: full width at half maximum. The specification is valid at 1580 nm, where it corresponds to 12 pm.
Given in HR mode.
Typical 700 MHz at 1610 nm and 2 GHz at 1520 nm.
Linewidth is Gaussian-like and produces a coherence length of about 15 cm when propagating into SMF-28 fiber type.

c. Expressed as ± half the difference between the maximum and minimum values measured.

d. User calibration may be required.

e. Operating in continuous sweep.

f. 1 nm step, one complete step through GPIB in manual mode with FLS-2600B.

g. In normal mode. Operating in high-resolution mode (HR) typically reduces power level at extreme wavelengths, therefore shortening the tuning range by a few nanometers.

h. At connector output of the source.

i. In the 1515 nm to 1610 nm range.
SSE: source spontaneous emission
RBW: spectral resolution bandwidth

j. ALC: Automatic level (or power) control.

k. For 1 dB step 10 % to 90 % response time.

GENERAL SPECIFICATIONS

Output fiber type	SMF-28	
Operating temperature	10 °C to 40 °C	(50 °F to 104 °F)
Storage temperature	–10 °C to 50 °C	(14 °F to 122 °F)
Dimensions (H x W x D)		
IQS	125 mm x 74 mm x 282 mm	(4 $^{15}/_{16}$ in x 2 $^{15}/_{16}$ in x 11 $^{1}/_{8}$ in)
FLS	117 mm x 222 mm x 333 mm	(4 $^{5}/_{8}$ in x 8 $^{3}/_{4}$ in x 13 $^{3}/_{8}$ in)
Weight	1.4 kg (3.1 lb)	3.4 kg (7.4 lb)

Instruments Drivers

LabVIEW™ drivers and SCPI commands

Remote Control

With FLS-2600B: GPIB (IEEE-488.1, IEEE-488.2) and RS-232.
With IQS-500 or IQS-600: GPIB (IEEE-488.1, IEEE-488.2), Ethernet and RS-232.

Standard Accessories

User Guide, Certificate of Compliance and AC power cord

WAVELENGTH

Range (nm)		1510 to 1612
Display resolution (pm)		1
Effective spectral linewidth FWHM [b] (GHz)		1.3 (typical)
Repeatability [c] (pm)	10 measurements	±2.5 (Δ = 5)
Stability [c] (pm)	1 hour	±6 (Δ = 12)
Uncertainty [d] (pm)		±15
Sweep rate [e] (nm/s)	Maximum	50
	Minimum	2
Tuning time [f] (ms)		75 (typical)

POWER

Output power [g, h] (dBm)	From 1515 nm to 1610 nm	≥ 0
	From 1510 nm to 1612 nm	≥ −10
Stability [c] (dB)	15 minutes	±0.005 (Δ = 0.01)
	1 hour	±0.01 (Δ = 0.02)
Repeatability for a wavelength change [c] (dB)	10 measurements	±0.015 (Δ = 0.03)
Signal to SSE [g, i] (dB)	From 1515 nm to 1610 nm	≥ 75 (typical)
±1 nm from peak with RBW 0.1 nm	From 1550 nm to 1610 nm	≥ 80 (typical)
Signal to total SSE (dB)		≥ 45
		50 (typical)

INTERNAL VARIABLE ATTENUATOR

Attenuation range (dB)	10
Linearity with attenuation (dB)	±0.3 (typical)
Repeatability for specific wavelength [c] (dB)	±0.005 (Δ = 0.010) (typical)
Response time [k] (s)	0.5 (typical)

Notes

a. Specifications are valid at 23 °C ± 1 °C after one-hour warmup time.

b. FWHM: full width at half maximum. The specification is valid at 1580 nm, where it corresponds to 12 pm.
Given in HR mode.
Typical 700 MHz at 1610 nm and 2 GHz at 1520 nm.
Linewidth is Gaussian-like and produces a coherence length of about 15 cm when propagating into SMF-28 fiber type.

c. Expressed as ± half the difference between the maximum and minimum values measured.

d. User calibration may be required.

e. Operating in continuous sweep.

f. 1 nm step, one complete step through GPIB in manual mode with FLS-2600B.

g. In normal mode. Operating in high-resolution mode (HR) typically reduces power level at extreme wavelengths, therefore shortening the tuning range by a few nanometers.

h. At connector output of the source.

i. In the 1515 nm to 1610 nm range.
SSE: source spontaneous emission
RBW: spectral resolution bandwidth

j. ALC: Automatic level (or power) control.

k. For 1 dB step 10 % to 90 % response time.

GENERAL SPECIFICATIONS

Output fiber type	SMF-28	
Operating temperature	10 °C to 40 °C	(50 °F to 104 °F)
Storage temperature	–10 °C to 50 °C	(14 °F to 122 °F)
Dimensions (H x W x D)		
IQS	125 mm x 74 mm x 282 mm	(4 $^{15}/_{16}$ in x 2 $^{15}/_{16}$ in x 11 $^{1}/_{8}$ in)
FLS	117 mm x 222 mm x 333 mm	(4 $^{5}/_{8}$ in x 8 $^{3}/_{4}$ in x 13 $^{3}/_{8}$ in)
Weight	1.4 kg (3.1 lb)	3.4 kg (7.4 lb)

Instruments Drivers

LabVIEW™ drivers and SCPI commands

Remote Control

With FLS-2600B: GPIB (IEEE-488.1, IEEE-488.2) and RS-232.
With IQS-500 or IQS-600: GPIB (IEEE-488.1, IEEE-488.2), Ethernet and RS-232.

Standard Accessories

User Guide, Certificate of Compliance and AC power cord

B SCPI Command Reference

This appendix presents detailed information on the commands and queries supplied with your IQS-2600B Tunable Laser Source.

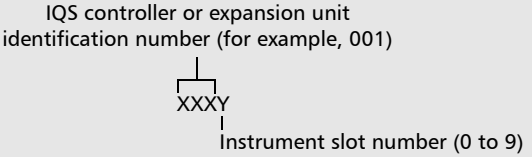
IMPORTANT

Since the IQS controllers and expansion units can house many instruments, you must explicitly specify which instrument you want to remotely control.

You must add the following mnemonic *at the beginning of any command or query* that you send to an instrument:

LINStrument<LogicalInstrumentPos>:

where *<LogicalInstrumentPos>* corresponds to the identification number of the instrument.



For information on modifying unit identification, refer to your platform user guide.

Quick Reference Command Tree

Command						Parameter(s)	P.
ABORt[1..n]							72
CALibration[1..n]	WAVelength					<ReadoutValue>	73
INITiate[1..n]	[IMMediate]						75
SOURce[1..n]	POWer	ALC	[STATe]			<State>	76
			[STATe]?				77
		[LEVel]	[IMMediate]	[AMPLitude]		<OutputPower[<wsp>DBM]>|MAXimum|MINimum|DEFault	78
				[AMPLitude]?		[MAXimum|MINimum|DEFault]	80
		STATe				<PowerState>	82
		STATe?					83
	WAVelength	[CW]				<Wavelength[<wsp>M|HZ]>|MAXimum|MINimum|DEFault	84
		[CW]?				[MAXimum|MINimum|DEFault]	86
		MODE				NORMal|HRESolution	88
		MODE?					89
		SWEep	MODE			CONTinuous|STEPped	90
			MODE?				91
			CYCLe			<Cycle>|MAXimum|MINimum|DEFault	92
			CYCLe?			[MAXimum|MINimum|DEFault]	94
			DIRection			ONEWay|TWOWay	96
			DIRection?				97

Command						Parameter(s)	P.
			REPeat			CONTinuous|NCONtinuous	99
			REPeat?				100
			STARt			<StartWavelength[<wsp>M|HZ]>|MAXimum|MINimum|DEFault	101
			STARt?			[MAXimum|MINimum|DEFault]	103
			STOP			<StopWavelength[<wsp>M|HZ]>|MAXimum|MINimum|DEFault	105
			STOP?			[MAXimum|MINimum|DEFault]	107
			SPEed			<Speed>|MAXimum|MINimum|DEFault	109
			SPEed?			[MAXimum|MINimum|DEFault]	110
			STATe			<State>	112
			STATe?				114
			TIME?				115
			STEP	[WIDTh]		<StepWidth[<wsp>M|HZ]>|MAXimum|MINimum|DEFault	116
				[WIDTh]?		[MAXimum|MINimum|DEFault]	118
			DWELl			<DwellTime[<wsp>S]>|MAXimum|MINimum|DEFault	120
			DWELl?			[MAXimum|MINimum|DEFault]	122
TRIGger[1..n]	[SEQuence]	INPut				DISabled|SSWeep	124
		INPut?					125
UNIT[1..n]	SPECtrum					M|HZ	126
	SPECtrum?						127

Product-Specific Commands—Description

:ABORt[1..n]	
Description	This command is used to stop running scan. ABORt is an event and cannot be queried as there is no state associated with it.
Syntax	:ABORt[1..n]
Parameter(s)	None
Example(s)	SOUR:WAV:SWE:REP NCON SOUR:WAV:SWE:DIR BOTH SOUR:WAV:SWE:CYCL 12 SOUR:WAV:SWE:STAR 1523.45NM SOUR:WAV:SWE:STOP 1600.45NM SOUR:WAV:SWE:SPE 25.56NM SOUR:WAV:SWE:MODE CONT TRIG SEQ:INP DISABLED INIT:IMM ABORT (abort sweep)
See Also	INITiate[1..n][:IMMediate] SOURce[1..n]:WAVelength:SWEep:STATe? SOURce[1..n]:WAVelength:SWEep:STATe

:CALibration[1..n]:WAVelength

Description	This command introduces an offset to correct a wavelength deviation as measured by an external wavelength meter. INITiate[:IMMediate] is an event and cannot be queried as there is no state associated with it.
Syntax	:CALibration[1..n]:WAVelength<wsp><ReadoutValue>
Parameter(s)	*ReadoutValue:* The program data syntax for <ReadoutValue> is defined as a <DECIMAL NUMERIC PROGRAM DATA> element. This parameter is the wavelength value in meters read by a calibrated wavelength meter.

:CALibration[1..n]:WAVelength	
Example(s)	SOUR:POW:STATE ON - Wait for the power on operation to be complete. SOUR:WAV:CW 1560E-009 - Wait for one hour. - To recalibrate the complete wavelength range, EXFO recommends using 1560.000 nm as the reference. - In this example, the output wavelength measurement is taken. Supposing that the measurement wavelength is 1560.023, then: CAL:WAV 1560.023E-009
Notes	This function cannot be performed while the module is sweeping. The difference between the current wavelength and the measured wavelength cannot be greater then ± 0.200 nm. EXFO recommends to calibrate the module at 1560 nm.

:INITiate[1..n][:IMMediate]

Description	This function starts the sweep program, which performs a sweep from a start wavelength to a stop wavelength, as specified in the sweep parameters. At *RST, a sweep in progress is aborted.
Syntax	:INITiate[1..n][:IMMediate]
Parameter(s)	None
Example(s)	SOUR:WAV:SWE:REP NCON SOUR:WAV:SWE:DIR BOTH SOUR:WAV:SWE:CYCL 12 SOUR:WAV:SWE:STAR 1523.45NM SOUR:WAV:SWE:STOP 1600.45NM SOUR:WAV:SWE:SPE 25.56NM SOUR:WAV:SWE:MODE CONT TRIG SEQ:INP DISABLED INIT:IMM
Notes	The sweep can be started even if the optical laser is off.
See Also	ABORt[1..n] SOURce[1..n]:WAVelength:SWEep:STATe? SOURce[1..n]:WAVelength:SWEep:STATe

:SOURce[1..n]:POWer:ALC[:STATe]

Description	This command activates the laser output Automatic Leveling Control (ALC). The source is either in ALC mode or Maximum Power mode. At *RST, the mode is ALC.
Syntax	:SOURce[1..n]:POWer:ALC[:STATe]<wsp><State>
Parameter(s)	*State:* The program data syntax for <State> is defined as a <Boolean Program Data> element. The <State> special forms ON and OFF are accepted on input for increased readability. ON corresponds to 1 and OFF corresponds to 0. The <state> parameter is the new state of the ALC. ON or 1, the power automatic leveling control is active. OFF or 0, the power automatic leveling is not active (maximum power).
Example(s)	SOUR:POW:ALC ON
Notes	This function cannot be performed while the module is sweeping. This command is for modules equipped with the PMF output only.
See Also	SOURce[1..n]:POWer:ALC[:STATe]?

:SOURce[1..n]:POWer:ALC[:STATe]?

Description	This query returns state of the power's Automatic Leveling Control (ALC). At *RST, the power ALC is active.
Syntax	:SOURce[1..n]:POWer:ALC[:STATe]?
Parameter(s)	None
Response Syntax	<State>
Response(s)	*State:* The response data syntax for <State> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <state> response is the current state of the powers ALC. ON or 1, the power automatic leveling control is active. OFF or 0, the power automatic leveling is not active (maximum power).
Example(s)	SOUR:POW:ALC? returns 1 (the power automatic leveling control is active)
Notes	This query is for modules equipped with the PMF output only. For modules not equipped with this option, the returned value is always 1.
See Also	SOURce[1..n]:POWer:ALC[:STATe]

:SOURce[1..n]:POWer[:LEVel][:IMMediate][:AMPLitude]

Description

This command sets the source output power level. This value can be set even if the source is off.

At *RST, the power level is -8.0 dBm.

Syntax

:SOURce[1..n]:POWer[:LEVel][:IMMediate][:AMPLitude]<wsp><OutputPower[<wsp>DBM]>|MAXimum|MINimum|DEFault

Parameter(s)

OutputPower:

The program data syntax for <OutputPower> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is DBM. The <OutputPower> special forms MINimum, MAXimum and DEFault are accepted on input.

MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.

DEFault allows the instrument to select a value for the <OutputPower> parameter.

This parameter is the new source output power value in dBm.

:SOURce[1..n]:POWer[:LEVel][:IMMediate][:AMPLitude]

Example(s)	SOUR:POW:LEV:IMM:AMPL -6.35 SOUR:POW -1.25
Notes	This function cannot be performed while the module is sweeping.
See Also	SOURce[1..n]:POWer[:LEVel][:IMMediate][:AMPLitude]?

:SOURce[1..n]:POWer[:LEVel][:IMMediate][:AMPLitude]?

Description	This query returns the current source output power level. At *RST, the output power level is -8.0 dBm.
Syntax	:SOURce[1..n]:POWer[:LEVel][:IMMediate][:AMPLitude]?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<OutputPower>

:SOURce[1..n]:POWer[:LEVel][:IMMediate][:AMPLitude]?

Response(s)	*OutputPower:* The response data syntax for <OutputPower> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <OutputPower> response is the current source output power value in dBm.
Example(s)	SOUR:POW:LEV:IMM:AMPL -6.35 SOUR:POW:LEV:IMM:AMPL? returns -6.350000E+000 SOUR:POW -.25 DBM SOUR:POW? returns -2.500000E-001
See Also	SOURce[1..n]:POWer[:LEVel][:IMMediate][:AMPLitude]

:SOURce[1..n]:POWer:STATe

Description	This command turns the optical source on or off. When source is on, the red LED (Active) on the front of the module lights up. At *RST, the power state is off.
Syntax	:SOURce[1..n]:POWer:STATe<wsp><PowerState>
Parameter(s)	*PowerState:* The program data syntax for <PowerState> is defined as a <Boolean Program Data> element. The <PowerState> special forms ON and OFF are accepted on input for increased readability. ON corresponds to 1 and OFF corresponds to 0. The <PowerState> parameter is the new power state of the source.
Example(s)	SOUR:POW:STAT OFF
See Also	SOURce[1..n]:POWer:STATe?

:SOURce[1..n]:POWer:STATe?

Description	This query returns a value indicating the state of the optical source (on or off). At *RST, the power state is off.
Syntax	:SOURce[1..n]:POWer:STATe?
Parameter(s)	None
Response Syntax	<PowerState>
Response(s)	*PowerState:* The response data syntax for <PowerState> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <PowerState> response is the state of the source power. 0, the source is off. 1, the source is on.
Example(s)	SOUR:POW:STAT OFF SOUR:POW:STAT? returns 0 (the source is off)
See Also	SOURce[1..n]:POWer:STATe

:SOURce[1..n]:WAVelength[:CW]

Description

This command selects the source's output wavelength (in meters) or frequency (in Hz).

At *RST, the wavelength is device-dependent.

Syntax

:SOURce[1..n]:WAVelength[:CW]<wsp><Wavelength[<wsp>M|HZ]>|MAXimum|MINimum|DEFault

Parameter(s)

Wavelength:

The program data syntax for <Wavelength> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> elements are: M|HZ. The <Wavelength> special forms MINimum, MAXimum and DEFault are accepted on input.

MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.

DEFault allows the instrument to select a value for the <Wavelength> parameter.

The parameter represents the spectrum value in meters or in hertz.
DEF = 1550 nm.

:SOURce[1..n]:WAVelength[:CW]

Example(s)	SOUR:WAV 0.00000155 SOUR:WAV 1550NM SOUR:WAV MAX
Notes	This function cannot be performed while the module is sweeping.
See Also	SOURce[1..n]:WAVelength[:CW]?

:SOURce[1..n]:WAVelength[:CW]?

Description

This query returns the output wavelength of the currently selected source in meters.

At *RST, the wavelength is device-dependent.

Syntax

:SOURce[1..n]:WAVelength[:CW]?[<wsp>MAXimum|MINimum|DEFault]

Parameter(s)

Parameter 1:

The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault.

MINimum is used to retrieve the instrument's smallest supported value.
MAXimum is used to retrieve the instrument's greatest supported value.
DEFault is used to retrieve the instrument's default value.

Response Syntax

<Wavelength>

Response(s)

Wavelength:

The response data syntax for <Wavelength> is defined as a <NR3 NUMERIC RESPONSE DATA> element.

A value representing the current wavelength in meters or in hertz.

:SOURce[1..n]:WAVelength[:CW]?

Example(s)	SOUR:WAV?
Notes	This function cannot be performed while the module is sweeping.
See Also	SOURce[1..n]:WAVelength[:CW]

:SOURce[1..n]:WAVelength:MODE

Description	This command is used to toggle between normal (NORMal) and High Resolution (HRESolution) modes. At *RST, resolution mode is NORMal.
Syntax	:SOURce[1..n]:WAVelength:MODE<wsp>NORMal|HRESolution
Parameter(s)	*SourceMode:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: NORMal|HRESolution. This parameter is the sources new resolution mode. NORMal sets the source to normal operation mode. HRESolution sets the source to high resolution operation mode.
Example(s)	SOUR:WAV:MODE HRES
See Also	SOURce[1..n]:WAVelength:MODE?

:SOURce[1..n]:WAVelength:MODE?

Description	This query returns the current source mode. At *RST, resolution mode is NORMal.
Syntax	:SOURce[1..n]:WAVelength:MODE?
Parameter(s)	None
Response Syntax	<SourceMode>
Response(s)	*SourceMode:* The response data syntax for <SourceMode> is defined as a <CHARACTER RESPONSE DATA> element. The <SourceMode> response is the current source resolution mode. NORMal, the source is in Normal operation mode. HRESolution, the source is in High Resolution operation mode.
Example(s)	SOUR:WAV:MODE HRES SOUR:WAV:MODE? returns HRESOLUTION (the source is in High Resolution operation mode)
See Also	SOURce[1..n]:WAVelength:MODE

:SOURce[1..n]:WAVelength:SWEep:MODE

Description	This command allows you to select the sweep mode. At *RST, sweep mode is continuous.
Syntax	:SOURce[1..n]:WAVelength:SWEep:MODE<wsp>CONTinuous|STEPped
Parameter(s)	*SweepMode:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: CONTinuous|STEPped. This parameter is a value representing the sweep mode: CONTinuous selects Continuous sweep mode. STEPped selects the Step-by-Step sweep mode.
Example(s)	SOUR:WAV:SWE:MODE CONT
Notes	This function cannot be performed while the module is sweeping.
See Also	SOURce[1..n]:WAVelength:SWEep:MODE?

:SOURce[1..n]:WAVelength:SWEep:MODE?

Description	This query returns the current sweep mode. At *RST, sweep mode is continuous.
Syntax	:SOURce[1..n]:WAVelength:SWEep:MODE?
Parameter(s)	None
Response Syntax	<SweepMode>
Response(s)	*SweepMode:* The response data syntax for <SweepMode> is defined as a <CHARACTER RESPONSE DATA> element. The <SweepMode> response is the current selected sweep mode: CONTINUOUS, the sweep is in Continuous mode. STEPped, the sweep is in Step-by-Step mode.
Example(s)	SOUR:WAV:SWE:MODE CONT SOUR:WAV:SWE:MODE? returns CONTINUOUS (The sweep mode is in Continuous mode.)
See Also	SOURce[1..n]:WAVelength:SWEep:MODE

:SOURce[1..n]:WAVelength:SWEep:CYCLe

Description	This command specifies the number of cycles you want the sweep program to perform. At *RST, the sweep cycle is set to 1.
Syntax	:SOURce[1..n]:WAVelength:SWEep:CYCLe<wsp><Cycle>|MAXimum|MINimum|DEFault
Parameter(s)	*Cycle:* The program data syntax for <Cycle> is defined as a <numeric_value> element. The <Cycle> special forms MINimum, MAXimum and DEFault are accepted on input. MINimum allows to set the instrument to the smallest supported value. MAXimum allows to set the instrument to the greatest supported value. DEFault allows the instrument to select a value for the <Cycle> parameter. The <Cycle> parameter is the new number of cycles for the sweep program.

:SOURce[1..n]:WAVelength:SWEep:CYCLe

Example(s)	SOUR:WAV:SWE:REP NCON SOUR:WAV:SWE:CYCL 32
Notes	This function cannot be performed while the module is sweeping. To specify whether or not you want the sweep program to loop continuously, use the SOURce[1..n]:WAVelength:SWEep:REPeat command.
See Also	SOURce[1..n]:WAVelength:SWEep:REPeat SOURce[1..n]:WAVelength:SWEep:REPeat? SOURce[1..n]:WAVelength:SWEep:CYCLe?

:SOURce[1..n]:WAVelength:SWEep:CYCLe?

Description	This query returns the number of repetitions set for the sweep program. At *RST, the sweep cycle is set to 1.
Syntax	:SOURce[1..n]:WAVelength:SWEep:CYCLe?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Cycle>

:SOURce[1..n]:WAVelength:SWEep:CYCLe?

Response(s)	*Cycle:* The response data syntax for <Cycle> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <Cycle> response is the current number of repetitions set for the sweep program.
Example(s)	SOUR:WAV:SWE:REP NCON SOUR:WAV:SWE:CYCL 32 SOUR:WAV:SWEP:CYCL? returns 32 cycles
See Also	SOURce[1..n]:WAVelength:SWEep:CYCLe

:SOURce[1..n]:WAVelength:SWEep:DIRection

Description	This command controls the direction of the sweep. If ONEWay is selected, the sweep is carried out from STARt to STOP. If TWOWay is selected, the sweep is carried out from STARt to STOP and from STOP to STARt. At *RST, the value of this function is TWOWay.
Syntax	:SOURce[1..n]:WAVelength:SWEep:DIRection<wsp>ONEWay|TWOWay
Parameter(s)	*Directional Way:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: ONEWay|TWOWay. The parameter is indicating whether or not the sweep will be performed in both directions: ONEWay, the sweep is performed in one direction, from start to stop. TWOWay, the sweep is performed in two directions, from start to stop to start.
Example(s)	SOUR:WAV:SWE:DIR BOTH
Notes	This function cannot be performed while the module is sweeping.
See Also	SOURce[1..n]:WAVelength:SWEep:DIRection?

:SOURce[1..n]:WAVelength:SWEep:DIRection?

Description	This query returns the direction of the sweep. If ONEWay is returned, the sweep is carried out from STARt to STOP. If TWOWay is returned, the sweep is carried out from STARt to STOP and from STOP to STARt. At *RST, the value of this function is TWOWay.
Syntax	:SOURce[1..n]:WAVelength:SWEep:DIRection?
Parameter(s)	None
Response Syntax	<Directionalway>
Response(s)	*Directionalway:* The response data syntax for <Directionalway> is defined as a <CHARACTER RESPONSE DATA> element. The <DirectionalWay> response is the current state of the sweep direction function:

:SOURce[1..n]:WAVelength:SWEep:DIRection?	
	ONEWAY, the sweep is performed in one direction, from start to stop. TWOWAY, the sweep is performed in two directions, from start to stop to start.
Example(s)	SOUR:WAV:SWE:DIR TWOW SOUR:WAV:SWE:DIR? returns TWOWAY (the sweep is performed in two directions, from start to stop to start)
See Also	SOURce[1..n]:WAVelength:SWEep:DIRection

:SOURce[1..n]:WAVelength:SWEep:REPeat

Description	This command is used to select the sweep looping mode. The module can perform the sweep continuously or execute the sweep according to the number of cycles specified. At *RST, the repeat mode depends on the number of cycles.
Syntax	:SOURce[1..n]:WAVelength:SWEep:REPeat<wsp>CONTinuous|NCONtinuous
Parameter(s)	*Repeat:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: CONTinuous|NCONtinuous. The parameter is indicating whether or not the sweep will be continuous: CONTinuous, the sweep is continuous. NCONtinuous, the sweep will be executed according to the number of cycles specified.
Example(s)	SOUR:WAV:SWE:REP CONT
Notes	This function cannot be performed while the module is sweeping.
See Also	SOURce[1..n]:WAVelength:SWEep:REPeat? SOURce[1..n]:WAVelength:SWEep:CYCLe

:SOURce[1..n]:WAVelength:SWEep:REPeat?

Description	This query returns the sweep looping mode. The module can perform the sweep continuously or execute the sweep according to the number of cycles specified. At *RST, the repeat mode depends on the number of cycles.
Syntax	:SOURce[1..n]:WAVelength:SWEep:REPeat?
Parameter(s)	None
Response Syntax	<Repeat>
Response(s)	*Repeat:* The response data syntax for <Repeat> is defined as a <CHARACTER RESPONSE DATA> element. The <Repeat> response is the current state of the sweeps repeat function: CONTinuous, the sweep is performed continuously. NCONtinuous, the sweep is performed according to the number of times specified by the sweep cycle value.
Example(s)	SOUR:WAV:SWE:REP CONT SOUR:WAV:SWE:REP? returns CONTINUOUS
See Also	SOURce[1..n]:WAVelength:SWEep:REPeat SOURce[1..n]:WAVelength:SWEep:CYCLe

:SOURce[1..n]:WAVelength:SWEep:STARt

Description

This command allows you to specify a start wavelength for the sweep.

At *RST, the start wavelength is 1520 nm.

Syntax

:SOURce[1..n]:WAVelength:SWEep:STARt<wsp><StartWavelength[<wsp>M|HZ]>|MAXimum|MINimum|DEFault

Parameter(s)

StartWavelength:

The program data syntax for <StartWavelength> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> elements are: M|HZ. The <StartWavelength> special forms MINimum, MAXimum and DEFault are accepted on input.

MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.

:SOURce[1..n]:WAVelength:SWEep:STARt

	DEFault allows the instrument to select a value for the <StartWavelength> parameter. The <StartWavelength> parameter is the desired start spectrum value for the sweep. If you do not specify a unit, the device will use the current spectral units (meter or Hz). To select the current spectral units, use the UNIT[1..n]:SPECtrum command.
Example(s)	SOUR:WAV:SWE:STAR 0.00000155 (if current unit is meters) SOUR:WAV:SWE:STAR 1521.157NM SOUR:WAV:SWE:STAR 192.000 THZ
Notes	This command cannot be performed during a sweep.
See Also	SOURce[1..n]:WAVelength:SWEep:STARt? SOURce[1..n]:WAVelength:SWEep:STOP? UNIT[1..n]:SPECtrum

:SOURce[1..n]:WAVelength:SWEep:STARt?

Description

This query returns the current sweep start wavelength setting.

At *RST, the start wavelength is 1520 nm.

Syntax

:SOURce[1..n]:WAVelength:SWEep:STARt?[<wsp>MAXimum|MINimum|DEFault]

Parameter(s)

Parameter 1:

The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault.

MINimum is used to retrieve the instrument's smallest supported value.
MAXimum is used to retrieve the instrument's greatest supported value.
DEFault is used to retrieve the instrument's default value.

Response Syntax

<StartWavelength>

:SOURce[1..n]:WAVelength:SWEep:STARt?

Response(s)

StartWavelength:

The response data syntax for <StartWavelength> is defined as a <NR3 NUMERIC RESPONSE DATA> element.

The <StartWavelength> response indicates the sweep start wavelength. This value is returned in meters or in Hz, depending on the selected unit. To select the unit, use the UNIT[1..n]:SPECtrum command.

Example(s)

UNIT:SPEC M
SOUR:WAV:SWE:STAR 192.000 THZ
SOUR:WAV:SWE:STAR? returns 1.561419E-006

See Also

SOURce[1..n]:WAVelength:SWEep:STARt
SOURce[1..n]:WAVelength:SWEep:STOP
UNIT[1..n]:SPECtrum

:SOURce[1..n]:WAVelength:SWEep:STOP

Description

This command allows you to specify a sweep stop wavelength setting.

At *RST, the stop wavelength is 1570 nm.

Syntax

:SOURce[1..n]:WAVelength:SWEep:STOP<wsp><StopWavelength[<wsp>M|HZ]>|MAXimum|MINimum|DEFault

Parameter(s)

StopWavelength:

The program data syntax for <StopWavelength> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> elements are: M|HZ. The <StopWavelength> special forms MINimum, MAXimum and DEFault are accepted on input.

MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.

DEFault allows the instrument to select a value for the <StopWavelength> parameter.

The <StopWavelength> parameter is the desired stop spectrum value for the sweep. If you do not specify a unit, the device will use the current spectral units (meter or Hz). To select the current spectral units, use the UNIT[1..n]:SPECtrum command.

:SOURce[1..n]:WAVelength:SWEep:STOP

Example(s)	SOUR:WAV:SWE:STOP 0.00000155 (if current unit is meter) SOUR:WAV:SWE:STOP 1521.157NM SOUR:WAV:SWE:STOP 192.000 THZ
Notes	This function cannot be performed while the module is sweeping.
See Also	SOURce[1..n]:WAVelength:SWEep:STOP? SOURce[1..n]:WAVelength:SWEep:STARt? UNIT[1..n]:SPECtrum

:SOURce[1..n]:WAVelength:SWEep:STOP?

Description	This query returns the current sweep stop wavelength setting. At *RST, the stop wavelength is 1570 nm.
Syntax	:SOURce[1..n]:WAVelength:SWEep:STOP?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<StopWavelength>

:SOURce[1..n]:WAVelength:SWEep:STOP?

Response(s)

StopWavelength:

The response data syntax for <StopWavelength> is defined as a <NR3 NUMERIC RESPONSE DATA> element.

The <StopWavelength> response indicates the sweep stop wavelength. This value is returned in meters or in Hz, depending on the selected unit. To select the unit, use the UNIT[1..n]:SPECtrum command.

Example(s)

```
UNIT:SPEC M
SOUR:WAV:SWE:STOP 192.000 THZ
SOUR:WAV:SWE:STOP? returns 1.561419E-006
```

See Also

SOURce[1..n]:WAVelength:SWEep:STOP
SOURce[1..n]:WAVelength:SWEep:STARt
UNIT[1..n]:SPECtrum

:SOURce[1..n]:WAVelength:SWEep:SPEed

Description	This command allows you to select the sweep speed for continuous mode. At *RST, the sweep speed is 15 nm/s.
Syntax	:SOURce[1..n]:WAVelength:SWEep:SPEed<wsp><Speed>|MAXimum|MINimum|DEFault
Parameter(s)	*Speed:* The program data syntax for <Speed> is defined as a <numeric_value> element. The <Speed> special forms MINimum, MAXimum and DEFault are accepted on input. MINimum allows to set the instrument to the smallest supported value. MAXimum allows to set the instrument to the greatest supported value. DEFault allows the instrument to select a value for the <Speed> parameter. This parameter sets the optical spectrum displacement sweep speed in meters/s.
Example(s)	SOUR:WAV:SWE:SPE 35.455E-9 (in meters/s)
Notes	This function cannot be performed while the module is sweeping.
See Also	SOURce[1..n]:WAVelength:SWEep:SPEed?

:SOURce[1..n]:WAVelength:SWEep:SPEed?

Description	This query returns the sweep speed for Continuous mode. At *RST, the sweep speed is 15 nm/s.
Syntax	:SOURce[1..n]:WAVelength:SWEep:SPEed?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Speed>

:SOURce[1..n]:WAVelength:SWEep:SPEed?

Response(s)	*Speed:* The response data syntax for <Speed> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Speed> response indicates the current optical wavelength displacement speed in meters/s.
Example(s)	SOUR:WAV:SWE:SPE 35.455E-9 SOUR:WAV:SWE:SPE? returns 3.545500E-008
See Also	SOURce[1..n]:WAVelength:SWEep:SPEed

:SOURce[1..n]:WAVelength:SWEep:STATe

Description	This function starts or stops the sweep program. The sweep program makes the optical wavelength sweep from a start wavelength to a stop wavelength, as specified in the sweep parameters. At *RST, the sweep state in off.
Syntax	:SOURce[1..n]:WAVelength:SWEep:STATe<wsp><State>
Parameter(s)	*State:* The program data syntax for <State> is defined as a <Boolean Program Data> element. The <State> special forms ON and OFF are accepted on input for increased readability. ON corresponds to 1 and OFF corresponds to 0. The <State> parameter is a value representing the state of the sweep program.

:SOURce[1..n]:WAVelength:SWEep:STATe

Example(s)

```
UNIT:SPEC M
SOUR:WAV:SWE:REP CONT
SOUR:WAV:SWE:STAR 0.000001550
SOUR:WAV:SWE:STOP 0.00000160045
SOUR:WAV:SWE:SPE 12.65e-9
SOUR:WAV:SWE:MODE CONTINUOUS
SOUR:WAV:SWE:DIR  BOTH
TRIG:SEQ:INP DISABLED
SOUR:WAV:SWE:STAT ON
```

See Also

SOURce[1..n]:WAVelength:SWEep:STATe?
SOURce[1..n]:WAVelength:SWEep:MODE?
SOURce[1..n]:WAVelength:SWEep:CYCLe?
SOURce[1..n]:WAVelength:SWEep:DIRection?
SOURce[1..n]:WAVelength:SWEep:REPeat?

SOURce[1..n]:WAVelength:SWEep:STARt?
SOURce[1..n]:WAVelength:SWEep:STOP?
SOURce[1..n]:WAVelength:SWEep:SPEed?
SOURce[1..n]:WAVelength:SWEep:TIME?
SOURce[1..n]:WAVelength:SWEep:STEP[:WIDTh]?
SOURce[1..n]:WAVelength:SWEep:DWELl?

:SOURce[1..n]:WAVelength:SWEep:STATe?

Description	This query returns a value indicating the sweep program state. At *RST, the sweep state is off.
Syntax	:SOURce[1..n]:WAVelength:SWEep:STATe?
Parameter(s)	None
Response Syntax	<State>
Response(s)	*State:* The response data syntax for <State> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <State> response indicates the current sweep state. 1, the sweep is running 0, the sweep has stopped.
Example(s)	SOUR:WAV:SWE:STAT?
See Also	SOURce[1..n]:WAVelength:SWEep:STATe

:SOURce[1..n]:WAVelength:SWEep:TIME?

Description	This query returns the continuous sweep duration. This duration represents the time required to reach the stop point from start point at a specified speed. At *RST, the value is a function of the start point, the stop point and the sweep speed.
Syntax	:SOURce[1..n]:WAVelength:SWEep:TIME?
Parameter(s)	None
Response Syntax	<ExecutionTime>
Response(s)	*ExecutionTime:* The response data syntax for <ExecutionTime> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <ExecutionTime> response is a value representing the duration currently set for the continuous sweep in second.
Example(s)	SOUR:WAV:SWE:START 1550.000nm SOUR:WAV:SWE:STOP 1555.000nm SOUR:WAV:SWE:SPE 5.0nm SOUR:WAV:SWE:TIME? returns 1.000000E+000
See Also	SOURce[1..n]:WAVelength:SWEep:SPEed? SOURce[1..n]:WAVelength:SWEep:STARt SOURce[1..n]:WAVelength:SWEep:STOP

:SOURce[1..n]:WAVelength:SWEep:STEP[:WIDTh]

Description

This command allows you to specify the wavelength step for the step-by-step sweep.

At *RST, this value is device-dependent.

Syntax

:SOURce[1..n]:WAVelength:SWEep:STEP[:WIDTh]<wsp><StepWidth[<wsp>M|HZ]>|MAXimum|MINimum|DEFault

Parameter(s)

StepWidth:

The program data syntax for <StepWidth> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> elements are: M|HZ. The <StepWidth> special forms MINimum, MAXimum and DEFault are accepted on input.

MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.

DEFault allows the instrument to select a value for the <StepWidth> parameter.

The <StepWidth> parameter is the new step width, in meters, for the sweep program in Step-by-Step mode.

:SOURce[1..n]:WAVelength:SWEep:STEP[:WIDTh]

Example(s)	SOUR:WAV:SWE:STEP 0.00000001 SOUR:WAV:SWE:STEP 1.6NM
Notes	This function cannot be performed while the module is sweeping.
See Also	SOURce[1..n]:WAVelength:SWEep:STEP[:WIDTh]? SOURce[1..n]:WAVelength:SWEep:MODE

:SOURce[1..n]:WAVelength:SWEep:STEP[:WIDTh]?

Description	This query returns the current step width for Step-by-Step sweep mode. At *RST, this value is device-dependent.
Syntax	:SOURce[1..n]:WAVelength:SWEep:STEP[:WIDTh]?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<StepWidth>

:SOURce[1..n]:WAVelength:SWEep:STEP[:WIDTh]?

Response(s)	*StepWidth:* The response data syntax for <StepWidth> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <StepWidth> response indicates the step width for the sweep program in meters.
Example(s)	SOUR:WAV:SWE:STEP 10 nm SOUR:WAV:SWE:STEP? returns 1.000000E-008 (in meters)
See Also	SOURce[1..n]:WAVelength:SWEep:STEP[:WIDTh]

:SOURce[1..n]:WAVelength:SWEep:DWELl

Description

This command allows you to set the time interval between each step of the Step-by-Step sweep mode.

At *RST, the time interval between each step is 2 seconds.

Syntax

:SOURce[1..n]:WAVelength:SWEep:DWELl<wsp><DwellTime[<wsp>S]>|MAXimum|MINimum|DEFault

Parameter(s)

DwellTime:

The program data syntax for <DwellTime> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is S. The <DwellTime> special forms MINimum, MAXimum and DEFault are accepted on input.

MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.

DEFault allows the instrument to select a value for the <DwellTime> parameter.

This parameter is the duration of the pause between the steps in seconds.

:SOURce[1..n]:WAVelength:SWEep:DWELl

Example(s)	SOUR:WAV:SWE:DWEL 550MS
Notes	This function cannot be performed while the module is sweeping.
See Also	SOURce[1..n]:WAVelength:SWEep:DWELl?

:SOURce[1..n]:WAVelength:SWEep:DWELl?

Description	This query returns the time interval between each step of the Step-by-Step sweep mode. At *RST, the time interval between each step is 2 seconds.
Syntax	:SOURce[1..n]:WAVelength:SWEep:DWELl?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<DwellTime>

:SOURce[1..n]:WAVelength:SWEep:DWELl?

Response(s)	*DwellTime:* The response data syntax for <DwellTime> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <DwellTime> response is the current time spent between each step in seconds.
Example(s)	SOUR:WAV:SWE:DWEL 550MS SOUR:WAV:SWE:DWEL? returns 5.500000E-001
See Also	SOURce[1..n]:WAVelength:SWEep:DWELl

:TRIGger[1..n][:SEQuence]:INPut

Description	This command allows you to set the operating mode of the input trigger. The sweep can be started with a trigger pulse at each end of a scan in Continuous mode. In Step-by-Step mode, each step can be started with a trigger pulse. At *RST, the trigger is disabled.
Syntax	:TRIGger[1..n][:SEQuence]:INPut<wsp>DISabled|SSWeep
Parameter(s)	*TriggerMode:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: DISabled|SSWeep. This parameter corrresponds to the the desired state for the input trigger. DISabled, trigger operation is disabled. SSWeep, trigger operation is enabled.
Example(s)	TRIG:SEQ:INP SSW
Notes	This function cannot be performed while the module is sweeping.
See Also	TRIGger[1..n][:SEQuence]:INPut? SOURce[1..n]:WAVelength:SWEep:MODE SOURce[1..n]:WAVelength:SWEep:STATe

:TRIGger[1..n][:SEQuence]:INPut?

Description	This query returns the current state for the input trigger. At *RST, the trigger is disabled.
Syntax	:TRIGger[1..n][:SEQuence]:INPut?
Parameter(s)	None
Response Syntax	<TriggerMode>
Response(s)	*TriggerMode:* The response data syntax for <TriggerMode> is defined as a <CHARACTER RESPONSE DATA> element. The <TriggerMode> response indicates the current operating mode of the trigger. DISABLED, trigger is disabled. SSWEEP, trigger is enabled.
Example(s)	TRIG:SEQ:INP SSW TRIG:INP? returns SSWEEP (the trigger is enabled)
See Also	TRIGger[1..n][:SEQuence]:INPut SOURce[1..n]:WAVelength:SWEep:MODE

:UNIT[1..n]:SPECtrum

Description	This command allows you to set the spectrum units. At *RST, the spectrum unit is set to meters.
Syntax	:UNIT[1..n]:SPECtrum<wsp>M|HZ
Parameter(s)	*Unit:* The program data syntax for the first parameter is defined as a <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> elements are: M|HZ. The <Unit> parameter corresponds to the desired spectral unit.
Example(s)	UNIT:SPEC M
See Also	UNIT[1..n]:SPECtrum?

:UNIT[1..n]:SPECtrum?

Description	This query returns the current spectrum unit At *RST, the spectrum unit is set to meters.
Syntax	:UNIT[1..n]:SPECtrum?
Parameter(s)	None
Response Syntax	<SpectralUnit>
Response(s)	*SpectralUnit:* The response data syntax for <SpectralUnit> is defined as a <SUFFIX RESPONSE DATA> element. The <Unit> response is the currently selected spectral unit.
Example(s)	UNIT:SPEC M UNIT:SPEC? return M (meter)
See Also	UNIT[1..n]:SPECtrum

C Trigger Option Theory

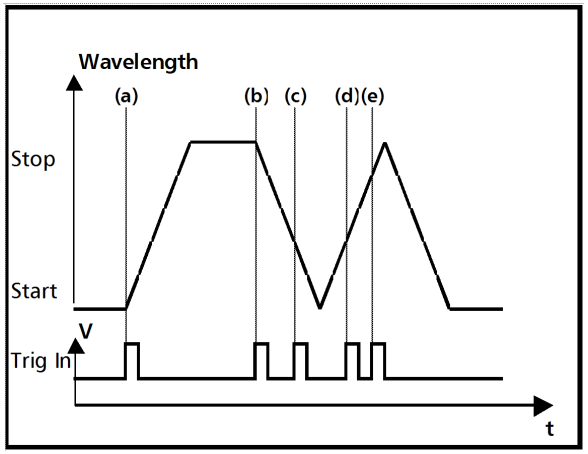
Your Tunable Laser Source features Trigger In and Out connectors. When the trigger option is set to On, the Trigger In will wait for signals. The Trigger Out is always active and emits a signal for each one-way pass (*Continuous* mode) or step (*Stepped* mode) the system performs during the sweep.

The synchronization feature uses a TTL, 5 V signal. It is achieved on the signal's rising edge. The pulse width of the Trigger In signal must be larger than 1 μs. The pulse width of the Trigger Out signal is 8 μs.

Trigger Option in Continuous Mode

The sweep will begin when the first synchronization signal is received at the In port. When a pass (one way) is completed, the system waits for another synchronization signal to move again.

If the synchronization signal arrives before the sweep is completed, it is kept in memory to be used on the next pass. The memory keeps only one synchronization signal on standby; if the system receives more than one signal before the sweep is completed, only the first one will be kept.



(a) sweep start

(b) second sweep trigger

(c) trig received during the second sweep; kept in memory and will trigger the third sweep

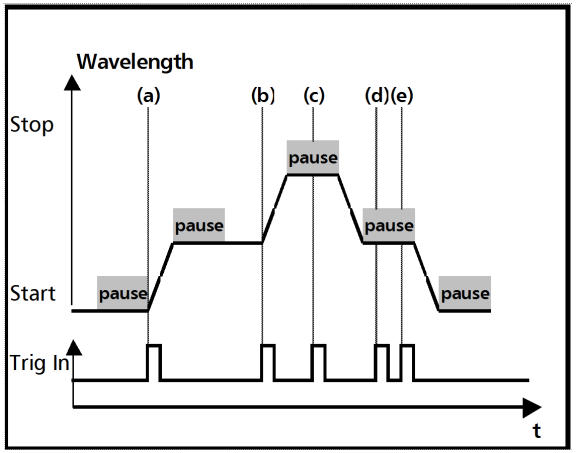
(d) trig received during the third sweep kept in memory and will trigger the fourth sweep

(e) lost trig

Trigger Option in Stepped Mode

The sweep will begin when you press on **Start**. The system will position itself at the start wavelength and wait for a synchronization signal. Then, the system will wait for a synchronization signal to go to the next step in the sweep.

If the synchronization signal arrives before the sweep is completed, it is kept in memory to be used on the next step. The memory keeps only one synchronization signal in advance; if the system receives more than one synchronization signal before the step is completed, only the first signal will be kept.



(a) sweep start

(b) second sweep trigger

(c) trig received during the second sweep; kept in memory and will trigger the third sweep

(d) trig received during the third sweep kept in memory and will trigger the fourth sweep

(e) lost trig

Index

I

L

M

N

O

P

Q

R

S

T

U

W

NOTICE

通告

CHINESE REGULATION ON RESTRICTION OF HAZARDOUS SUBSTANCES
中国关于危害物质限制的规定

NAMES AND CONTENTS OF THE TOXIC OR HAZARDOUS SUBSTANCES OR ELEMENTS CONTAINED IN THIS EXFO PRODUCT
包含在本 **EXFO** 产品中的有毒有害物质或元素的名称和含量

O	Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006 表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。
X	Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。

Part Name 部件名称	Toxic or hazardous Substances and Elements 有毒有害物质和元素					
	Lead 铅 (Pb)	Mercury 汞 (Hg)	Cadmium 隔 (Cd)	Hexavalent Chromium 六价铬 (Cr VI)	Polybrominated biphenyls 多溴联苯 (PBB)	Polybrominated diphenyl ethers 多溴二苯醚 (PBDE)
Enclosure 外壳	O	O	O	O	O	O
Electronic and electrical sub-assembly 电子和电子组件	X	O	X	O	X	X
Optical sub-assembly[a] 光学组件 [a]	X	O	O	O	O	O
Mechanical sub-assembly[a] 机械组件 [a]	O	O	O	O	O	O

a. If applicable.
如果适用。

MARKING REQUIREMENTS
标注要求

Product 产品	Environmental protection use period (years) 环境保护使用期限 (年)	Logo 标志
This Exfo product 本 EXFO 产品	10	
Battery[a] 电池 [a]	5	

a. If applicable.
如果适用。

P/N: 1062026

www.EXFO.com · info@exfo.com

CORPORATE HEADQUARTERS	400 Godin Avenue	Quebec (Quebec) G1M 2K2 CANADA Tel.: 1 418 683-0211 · Fax: 1 418 683-2170
EXFO AMERICA	3701 Plano Parkway, Suite 160	Plano TX, 75075 USA Tel.: 1 972 907-1505 · Fax: 1 972 836-0164
EXFO EUROPE	Omega Enterprise Park, Electron Way	Chandlers Ford, Hampshire S053 4SE ENGLAND Tel.: +44 2380 246810 · Fax: +44 2380 246801
EXFO ASIA-PACIFIC	100 Beach Road, #22-01/03 Shaw Tower	SINGAPORE 189702 Tel.: +65 6333 8241 · Fax: +65 6333 8242
EXFO CHINA	Room 2711, Trade Center, No. 4028 Jintian Road, Futian District Beijing Global Trade Center, Tower C, Room 1207, 36 North Third Ring Road East, Dongcheng District	Shenzhen 518035 P. R. CHINA Tel.: +86 (755) 8203 2300 · Fax: +86 (755) 8203 2306 Beijing 100013 P. R. CHINA Tel.: +86 (10) 5825 7755 · Fax: +86 (10) 5825 7722
EXFO SERVICE ASSURANCE	270 Billerica Road	Chelmsford MA, 01824 USA Tel.: 1 978 367-5600 · Fax: 1 978 367-5700
TOLL-FREE	(USA and Canada)	1 800 663-3936

Printed in Canada (2011-11)

EXPERTISE REACHING OUT