User Guide

FLS-2600B

Tunable Laser Source

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Telecom Test and Measurement

EXFO

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Units of Measurement

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

Version number: 3.0.0

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Certification Information

FCC Information

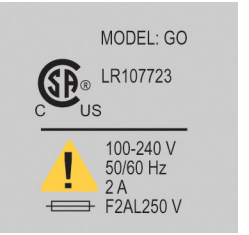
Electronic test equipment is exempt from Part 15 compliance (FCC) in the United States. However, compliance verification tests are systematically performed on most EXFO equipment.

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.

CSA Information

This unit is certified by the CSA (certificate number 162451) and was evaluated according to applicable CSA standards (as confirmed by cCSAus mark) as well as applicable IEC standards for use in Canada, the United States, and other countries.



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.

EXFO CE **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:	**EXFO Inc.**	**EXFO Europe**
Manufacturer's Address:	400 Godin Avenue Quebec, Quebec Canada, G1M 2K2 (418) 683-0211	Omega Enterprise Park Electron Way, Chandlers Ford, Hampshire, SO53 4SE, UNITED KINGDOM
Equipment Type/Environment:	Test & Measurement / Industrial	
Trade Name/Model No.:	Tunable Laser Source / FLS-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.

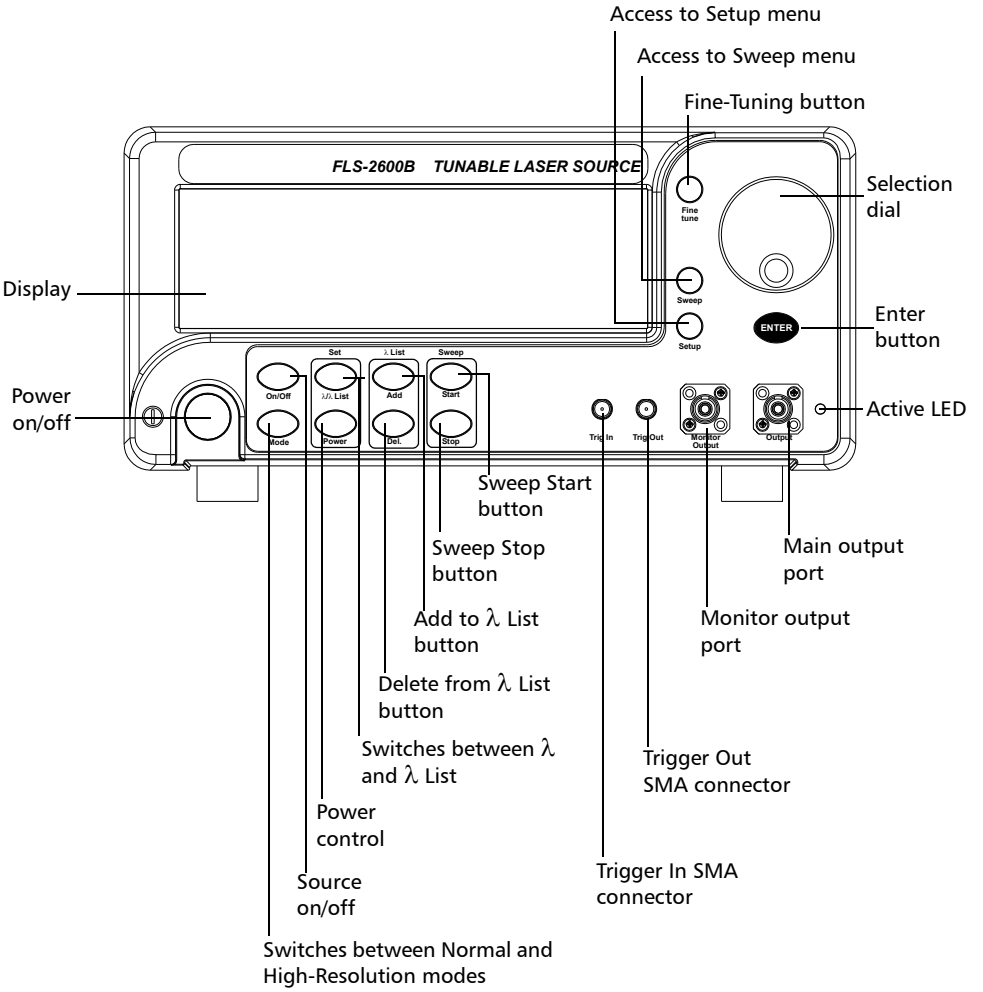
Manufacturer
Signature:

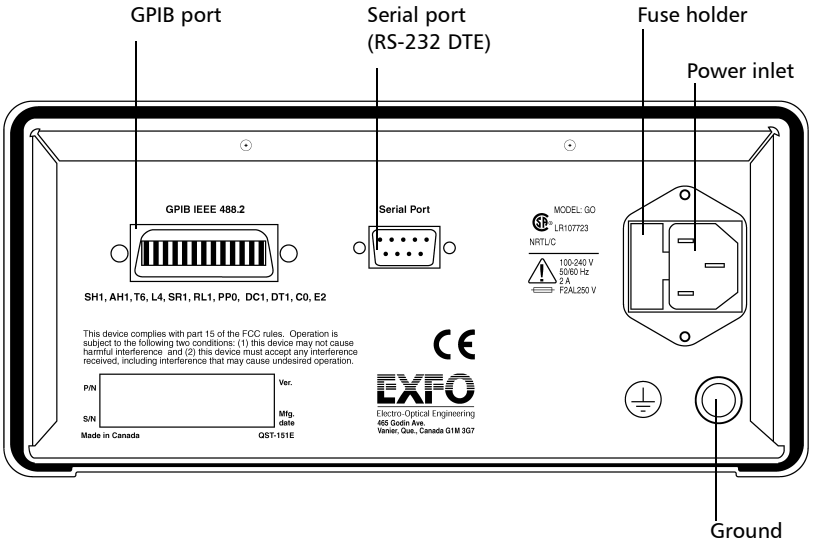
Full Name: Stephen Bull, E. Eng
Position: Vice-President Research and Development
Address: 400 Godin Avenue, Quebec (Quebec), Canada, G1M 2K2
Date: February 03, 2009

1 Introducing the FLS-2600B Tunable Laser Source

General Information

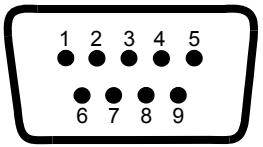
The FLS-2600B Tunable Laser Source addresses the testing requirements for dense WDM component testing in the C- and L-bands.




GPIB port
Serial port
(RS-232 DTE)
Fuse holder
Power inlet
GPIB IEEE 488.2
Serial Port
MODEL: GO
LR107723
NRTL/C
100-240 V
50/60 Hz
2 A
F2AL250 V
SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0, E2
This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.
P/N
Ver.
S/N
Mfg. date
Made in Canada
QST-151E
EXFO
Electro-Optical Engineering
465 Godin Ave.
Vanier, Que., Canada G1M 3G7
Ground

RS-232 Connector Pinout

The RS-232 connector (serial port) at the back of the FLS-2600B uses a DTE pinout configuration.



Pin	Description	Direction
2	Receive (Rc)	Input
3	Transmit (Tx)	Output
5	Signal ground (Gnd)	—

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 FLS-2600B Tunable Laser Source supports local control (via its front panel) and remote control (through GPIB or RS-232 using SCPI commands or the provided LabVIEW drivers).

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

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

Laser 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.*

Electrical Safety Information

The following safety precautions must be observed while operating and servicing the unit. Failure to comply with these precautions or with specific indications elsewhere in this manual violates safety standards of intended use of the unit. EXFO assumes no liability for the user's failure to comply with these requirements.

- This unit is intended for indoor use only.
- Only fuses with the required rated current and specified type (IEC, 250 V, 2 A, fast blow, 0.197 in x 0.787 in/5 mm x 20 mm) may be used for replacement. Do not use repaired fuses or short-circuited fuse holders.
- The power cable of the FLS-2600B Tunable Laser Source is the most effective method to turn off the unit if a problem should occur.
- Capacitors inside the unit may be charged, even if the unit has been disconnected from its electrical supply.
- Before turning on the unit, all grounding terminals, extensions cords, and devices connected to it should also be connected to a protective ground via a ground socket. Any interruption of the protective grounding is a potential shock hazard and may cause personal injury.
- Whenever the ground protection is impaired, the unit is not to be used, and must be secured against any accidental or unintended operation.
- Unit covers cannot be removed during operation.
- Any adjustments, maintenance, and repair of opened units under voltage should be avoided and carried out only by skilled personnel aware of the hazards involved. Do not attempt internal service or adjustment unless a person qualified to perform first aid is present. Do not replace any components while power cable is connected.

- The unit must be positioned so as not to block the ventilation holes located on each side of the unit and to allow easy disconnection of the power cord if any problem should occur.
- Operation of any electrical instrument around flammable gases or fumes constitutes a major safety hazard.

Power Cable

This unit uses a three-wire power cable, which complies with international safety standards. This cable serves as a ground when connected to an appropriate AC power receptacle. The type of power cable supplied with each unit is determined according to the country of destination.

Only qualified electricians should connect a new plug if needed. The color coding used in the electrical cable depends on the cable. New plugs should meet the local safety requirements and include the following features:

- adequate load-carrying capacity
- ground connection
- cable clamp

WARNING

To avoid electrical shock, do not operate the unit if there are signs of damage to any part of the outer surface (covers, panels, etc.).

To avoid serious injury, you must observe the following precautions before turning on the unit.

- **If the unit is to be powered via an auto-transformer for voltage reduction, the common terminal must be connected to the grounded power-source pole.**
- **Insert the plug into a power outlet with a protective ground contact. Do not use an extension cord without a protective conductor.**
- **Before turning on the unit, you must connect the protective ground terminal of the unit to a protective conductor using the unit power cord.**
- **Do not tamper with the protective ground terminal.**

Equipment Ratings	
Relative humidity	0 % to 80 % non-condensing[a]
Maximum operation altitude	2000 m (6150 ft)
Pollution degree	2
Overvoltage category	II
Power supply rating[b]	100 V to 240 V (50 Hz/60 Hz)
	maximum 2 A

a. Measured in 0 °C to 31 °C (32 °F to 87.8 °F) range decreasing linearly to 50 % at 40 °C (104 °F).
b. Not exceeding ± 10 % of the nominal voltage.

3 Getting Started with Your Tunable Laser Source

Turning on the Unit

Before turning on the FLS-2600B, please read the *Safety Information* on page 7.

To turn the unit on and off, use the red button in the lower left-hand corner of the front panel. The source is not active upon startup. To activate it, see *Activating/Deactivating Light Emission* on page 42.

Upon startup, the unit beeps twice, performs a self-test, and then enters the main menu with the same settings that were active when it was shut down. When the unit is turned off, the following items remain in a storage device called non-volatile memory:

- current power setting
- current wavelength setting
- current mode (normal/high resolution)
- current display mode (wavelength/power)
- current **Setup** menu settings
- shortlisted wavelengths (up to 100)
- sweep parameters
- saved sweep configurations (up to five)

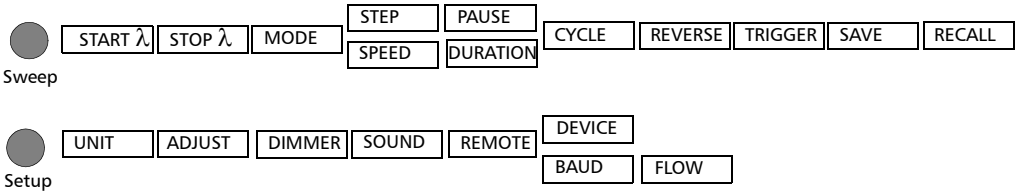
Note: *The power cord is the most effective disconnecting device. To ensure that the unit is completely turned off, disconnect the power cord.*

Some internal mechanisms can sometimes take several seconds to adjust, depending on the operation.

The front panel control provides access to the following options:

- source activation/deactivation
- Normal or High-Resolution mode
- wavelength editing
- shortlisted wavelengths
- power editing
- shortlisted wavelength addition or deletion
- start and stop sweep

The blue buttons to the right of the display give access to single-level menus: **Sweep** and **Setup**. Unless a sweep is under way, these menus can always be accessed, even while the source is active. The following diagram shows these two menus and their items.



To move between the menu items, turn the selection dial. To exit a menu, press the button that gave access to it (Sweep or Setup). The FLS-2600B will return to its previous state.

Note: *The unit will beep whenever the FLS-2600B does not allow an operation.*

Positioning Your Unit Using the Support Stands

To change the orientation of your unit, you can use the support stands located on the bottom front part of the casing. Simply pull them down until they lock into place.

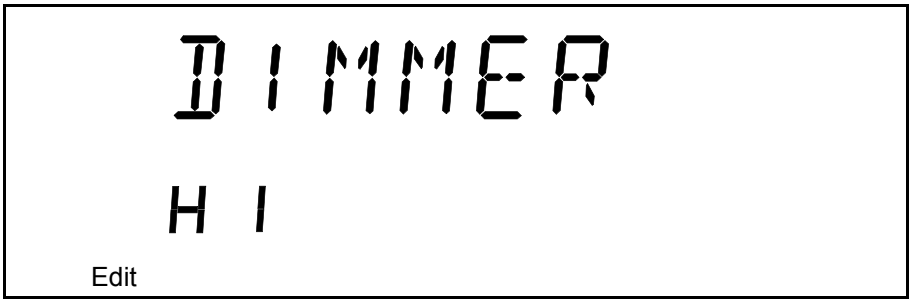
4 Setting Standard Parameters

Setting the Display Intensity

You might want to set the display intensity of your unit, or turn the display off.

To change the display intensity:

1. Press **Setup**.
2. Turn the selection dial clockwise until **DIMMER** is displayed. The current dimmer status appears.



3. Press **ENTER**. The **Edit** marker starts blinking in the lower part of the display.
4. Turn the selection dial until you see the desired display intensity (**LO**, **HI**, **OFF**, *or* **Auto. OFF**), then press **ENTER**.

Setting the dimmer to **OFF** turns off the display. Press any key to turn the display back on.

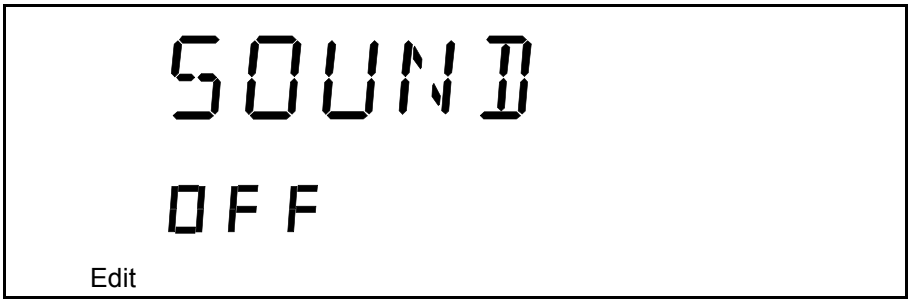
Setting the dimmer to **Auto. OFF** also turns off the display. Press any key to turn the display back on. However, after five seconds, the display will automatically turn off again.

5. To exit the **Setup** menu, press **Setup**.

Turning the Sound On or Off

To turn the sound on your unit on or off:

1. Press **Setup**.
2. Turn the selection dial clockwise until **SOUND** is displayed. The current sound status appears.



3. Press **ENTER**. The **Edit** marker starts blinking in the lower part of the display.
4. Turn the selection dial until you reach the state you want (on or off), then press **ENTER**.

To exit the **Setup** menu, press **Setup**.

Switching between Normal and High-Resolution (HR) Modes

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:

Press the mode control button on the front panel.

Adjusting Decimals Using the Fine-Tune Feature

You can select values for your testing needs in two different ways: **Fine-tune** and **Coarse**. If you press the **Fine-tune** button on the front panel, **Fine-tune** appears on the display and you will be able to set the decimals. If **Fine-tune** does not appear on the display, you are in **Coarse** mode and can only adjust the numbers before the decimal point with the selection dial.

Note: *The* **Fine-tune** *feature applies to every numerical edition function with a decimal point except in the* **Adjust** *submenu of the* **Setup** *menu.*
See Adjusting Your Unit According to Wavelength *on page 54 for more information.*

Selecting the Display Unit

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

To select the display unit:

1. Press **Setup**.
2. The menu displays **UNIT** right away. Press **ENTER** to edit the units.
3. Turn the selection dial clockwise or counterclockwise to select the desired unit (nm or THz).
4. Press **ENTER** to validate your choice and **Setup** to exit the **Setup** menu.

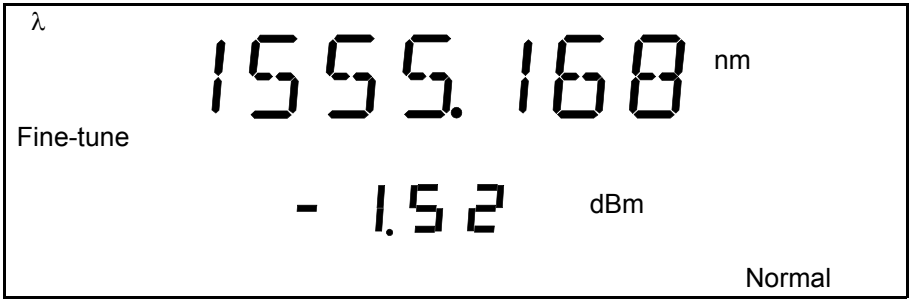
The selection affects all relevant wavelength settings, including those in the **Sweep**.

Selecting a Wavelength

There are several ways to select a wavelength for testing.

Entering a Wavelength Directly

To select a wavelength, make sure you are in **Wavelength Edition** mode. To select the **Wavelength Edition** mode, press the λ/λ ***List*** button on the front panel, so that λ appears on the upper left-hand corner of the display.



To select a specific wavelength, turn the selection dial clockwise or counterclockwise until you reach the desired wavelength. The module will then set the wavelength according to your selection.

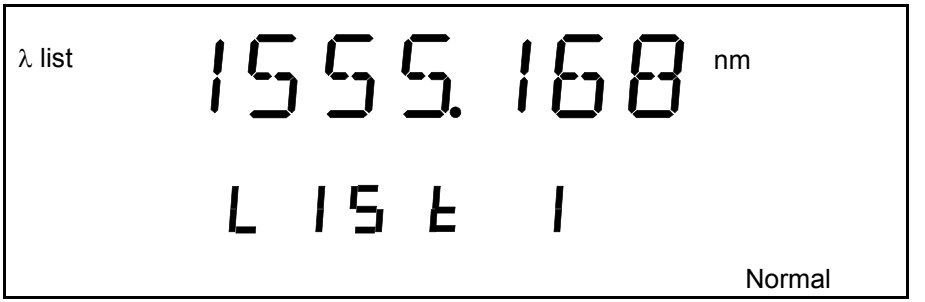
If the set power cannot be maintained at the selected wavelength (especially at extreme wavelengths), the displayed power value will flash, a message appears in the status bar, and the power is no longer in constant power mode. The output power stability and level will be the natural laser emission.

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. Ensure that you are in **Wavelength List Edition** mode. To select this mode, press the *λ*/*λ **List*** button on the front panel so that *λ **List*** appears on the upper left-hand corner of the display.



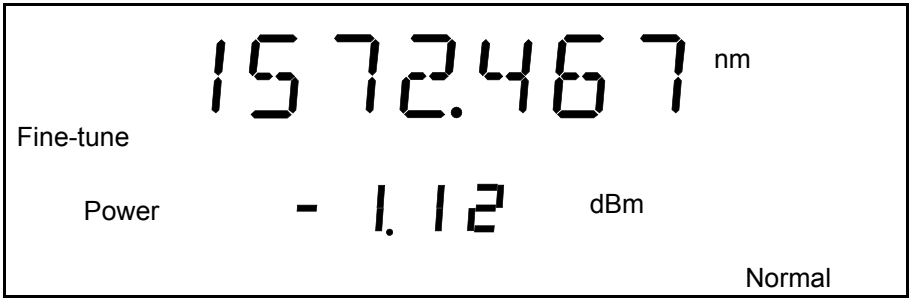
2. Turn the selection dial clockwise or counterclockwise until you reach the desired listed wavelength.

The list number corresponding to your wavelength selection will appear for a few seconds, then the current power setting will reappear.

To add a wavelength to the list, see *Adding Items to Lists* on page 22.

Setting the Power

To set the output power, you must be in **Power Edition** mode. To select the **Power Edition** mode, press the **Power** button on the front panel, so that **Power** appears in the left part of the display.



To select a specific power value, turn the selection dial clockwise or counterclockwise until you reach the desired power value. The source will then send the command to set the power according to your selection.

Note: *If the set power cannot be maintained at the selected wavelength (especially at extreme wavelengths), the displayed power value will flash and you will no longer be 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 wavelengths at an interval where the displayed power can be reached or select a lower power for your wavelength. For more information on how to set a specific wavelength, see* Entering a Wavelength Directly *on page 19.*

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

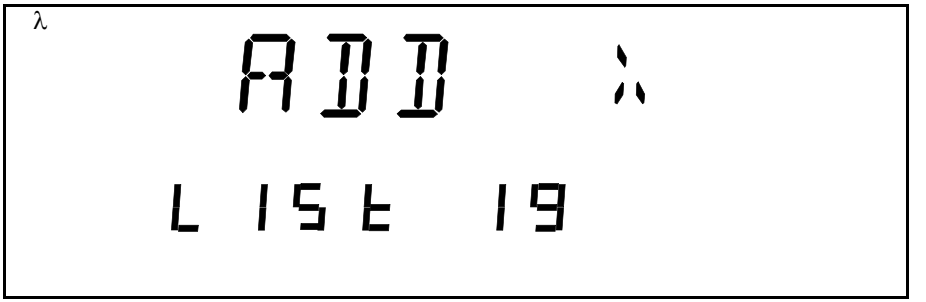
To change the **Automatic Level Control** status, press on the **Power/Pmax.** button. If you see **Power** on the left side of the display, you are in *Normal Power* mode. If you see **Max. Power** on the right side of the display, you are in *Max. Power* mode. Once you have selected **Max. Power**, the unit reverts to λ or λ **List** mode, according to the one you used last.

Adding Items to Lists

You can add items to the current list of wavelengths.

To add items:

1. Make sure you are in **Wavelength Edition** mode (**λ mode**). To select the **Wavelength Edition** mode, see *Selecting a Wavelength* on page 19.
2. Turn the selection dial clockwise or counterclockwise until you reach the desired wavelength.
3. Press the **Add** button on the front panel.



To indicate that the new wavelength was saved, a number between 1 and 100, stating the wavelength's rank in the list, as well as the **ADD** λ mention, will appear. If the list is full, the display will indicate **FULL**, and you will hear a beep. You will need to delete some wavelengths before adding more to the list.

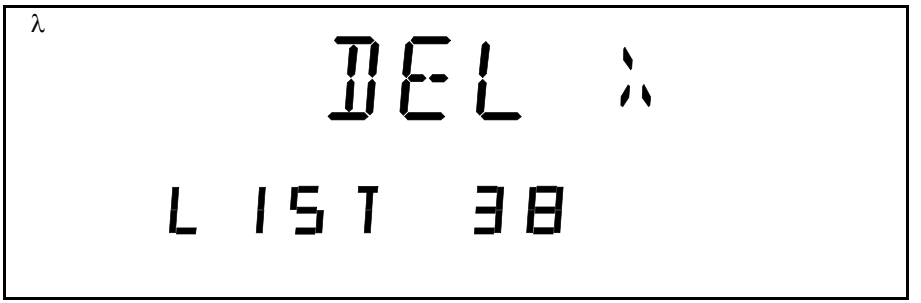
The new wavelength is always added to the end of the list, regardless of its value, using the next available list number. This means that your entries will not be in ascending or descending numerical order if not entered as such. To create an ascending list of wavelengths, enter your values beginning with the lowest and finishing with the highest. To create a descending list of wavelengths, simply enter your values from highest to lowest.

Deleting Items from Lists

You can delete items from the current list of wavelengths.

To delete items:

1. Make sure you are in **Wavelength List Edition** mode (λ ***List*** **mode**). To select the **Wavelength List Edition** mode, see *Retrieving a Wavelength from a Stored List* on page 20.
2. Turn the selection dial clockwise or counterclockwise until you reach the desired listed wavelength.
3. Press the ***Del*** button on the front panel.



To indicate that the wavelength was deleted, a number between 1 and 100, stating the wavelength's rank in the list, as well as the ***DEL*** λ mention will appear. If the list is empty, the display will indicate **EMPTY**, and you will hear a beep.

Note: *Deleting a wavelength will shift the ranking of the other entries. For example, if you delete entry number 3 in a list of five items, number 4 will become 3 and number 5 will become 4.*

Using the Monitor Output

The monitor output of the FLS-2600B, located on the front of the unit, is mainly used to monitor the wavelength of the emitted signal with a wavelength meter. The power available through the monitor corresponds to approximately 10 % of the total power output, even though neither this fraction nor the power stability emitted are guaranteed.

IMPORTANT

You *cannot* deactivate the monitor output.

Saving and Recalling Configurations

Once you have set the FLS-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.

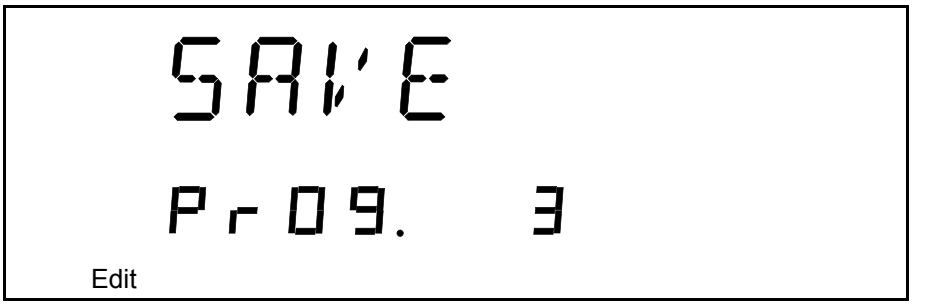
Note: *You can save or recall up to five configurations.*

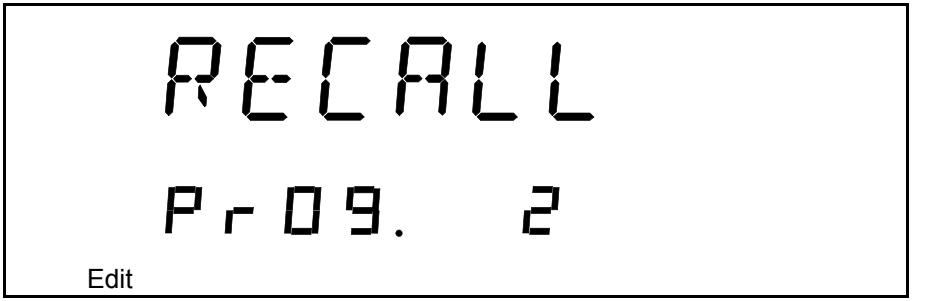
Saved parameters are

- Start wavelength of the sweep
- End wavelength of the sweep
- Number of sweeps (1-99 or loop)
- Sweep speed (Continuous mode)
- Sweep duration (Continuous mode)
- Step size (Step-by-Step mode)
- Pause length (Step-by-Step mode)
- Reverse status (ON/OFF)
- Trigger status (ON/OFF)

To save or recall a sweep configuration:

1. Press **Sweep**.
2. Turn the selection dial clockwise until **SAVE or RECALL** is displayed, depending on the action you want to perform.
3. Press **ENTER**. The **Edit** marker starts blinking in the lower left-hand corner of the display.
4. Turn the selection dial clockwise or counterclockwise to select the desired number where you want to save your configuration.





5. Press **ENTER** to validate your choice, and **Sweep** to exit the **Sweep** menu.

Reverting to Factory Settings

Turning on the unit and pressing **ENTER** at the same time until it beeps three times will reset the unit to the following default values:

Parameters	Reset Value or State
Edit mode (λ/λ list)|(Power)	λ
Source mode (Normal|HR)	Normal
Lambda unit (nm|THz)	nm
Fine-tune (Active|Inactive)	Active
Lambda	1550.000 nm
Power	0.0 dBm
Lambda list	Empty
Lambda list index (0-100)	1
Sweep program (1-5)	1
Dimmer status (Hi, Low, Off, Auto. Off)	Hi
Key sound (On|Off)	Off
Sweep range	1540.000 nm to 1560.000 nm
Sweep mode	Continuous
Speed	10.000 nm/s
Step	10.000 nm
Pause	1000 ms (1 second)
Cycles (1-99 or Loop)	Loop
Reverse (Active|Inactive)	Inactive
Trigger (Active|Inactive)	Inactive
GPIB Address[a]	12
RS-232/GPIB[a]	GPIB

a. This setting will only change with a local reset.

5 Setting Sweep Parameters

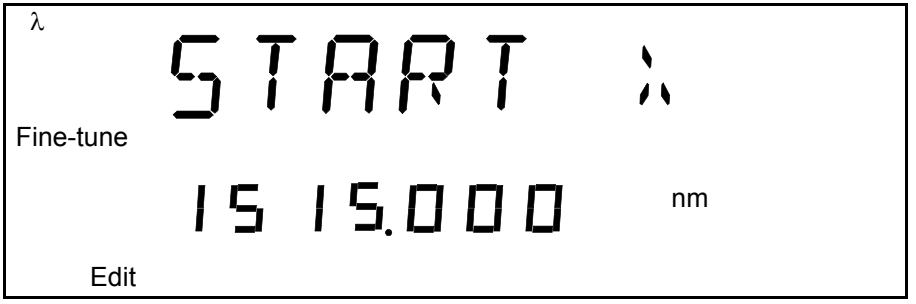
Your tunable laser source allows you to perform automatic wavelength scans according to user-defined parameters. You can perform a continuous sweep (the source will make one or several continuous passes), or you can perform a step-by-step sweep (the signal wavelength changes according to preset increments 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. Press **Sweep**. You will be in the **START** λ menu.



2. Press **ENTER**. The **Edit** marker starts blinking in the lower part of the display.

3. Turn the selection dial clockwise or counterclockwise until the desired wavelength is displayed.

4. Press **ENTER**. You can select a wavelength at a resolution of 0.001 nm.

5. To exit the **Sweep** menu, press **Sweep**.

OR

Turn the dial clockwise or counterclockwise until **EXIT** is displayed, then press **ENTER**.

To set the end wavelength, repeat the process, but after pressing on **Sweep**, turn the selection dial clockwise until **STOP** λ is displayed.

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.*

Selecting the Sweep Mode

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

To set the sweep mode you want to use:

1. Press **Sweep**.
2. Turn the selection dial clockwise until **MODE** is displayed.
3. Press **ENTER**. The *Edit* marker starts blinking in the bottom left-hand corner of the display.
4. Turn the selection dial clockwise or counterclockwise until the desired mode is displayed: Continuous (**Cont.**) or Step-by-Step (**Step**).

5. Press **ENTER** to confirm your choice, and then **Sweep** to exit the **Sweep** menu.

The sweeps will now be performed according to the mode you have selected.

Setting the Sweep Step

You can set the size of the step (in nm or THz) for your step-by-step sweep.

Your tunable laser source unit was designed to give a constant step value using nm as units. When steps are given in THz, the selected step value represents the average value of the steps during the sweep, since an interval in nm does not always have the save equivalent value in THz according to the wavelength bandwidth you have selected.

To set the step:

1. Make sure you have selected the step-by-step sweeping mode (as seen in *Selecting the Sweep Mode* on page 30).
2. Press **Sweep**.
3. Turn the selection dial clockwise until **STEP** is displayed.
4. Press **ENTER**. The **Edit** marker starts blinking in the lower part of the display.
5. Turn the selection dial clockwise or counterclockwise to select the desired size for the step.

6. Press **ENTER** to validate your choice, and **Sweep** to exit the menu.

   OR

   Turn the dial clockwise or counterclockwise until **EXIT** is displayed, then press **ENTER**.

Note: *If the sweep wavelength range is not a multiple of the step value selected, the stop wavelength will be truncated to the nearest possible value, thus reducing the range.*

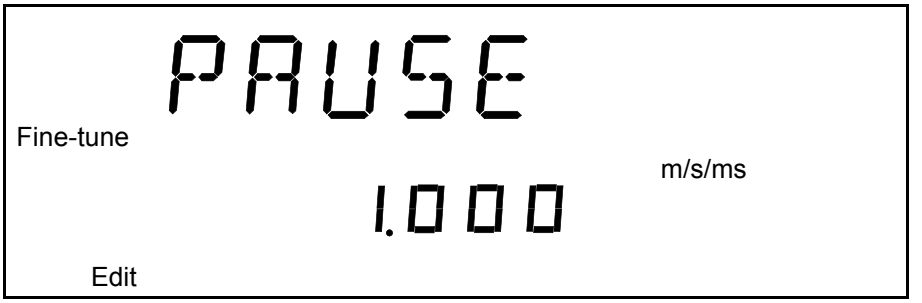
Setting the Pauses

You can set a time interval or pauses between steps. First, make sure you have selected the Step-by-Step sweep mode. For more information, see *Selecting the Sweep Mode* on page 30.

To set the length of the pauses between the steps:

1. Press **Sweep**.
2. Turn the selection dial clockwise until **PAUSE** is displayed.
3. Press **ENTER**. The **Edit** marker starts blinking in bottom left-hand corner of the display.

4. Turn the selection dial clockwise or counterclockwise to select the desired length of time for the pause. The pause range goes from 0.050 to 60.000 seconds.



5. Press **ENTER** to validate your choice, and **Sweep** to exit the **Sweep** menu.

Setting the Sweep Speed

You can change the sweep speed when you are in *Continuous* mode. For more information on setting the mode to *Continuous*, see *Selecting the Sweep Mode* on page 30.

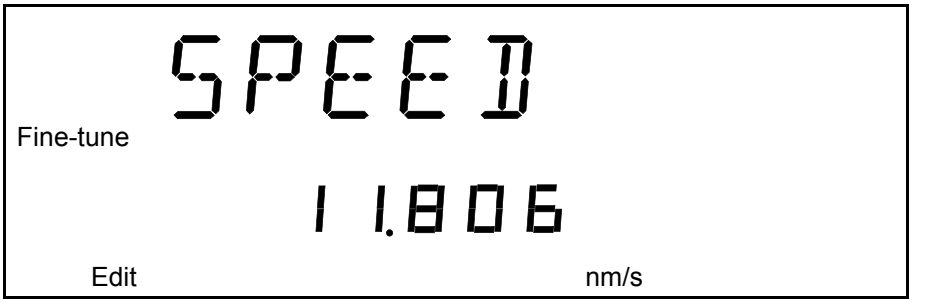
To change the speed:

1. Press **Sweep**.

2. Turn the selection dial clockwise until **SPEED** is displayed.

3. Press **ENTER**. The **Edit** marker starts blinking in the bottom left-hand corner of the display.

4. Turn the selection dial clockwise or counterclockwise to select the desired speed of the sweep.



5. Press **ENTER** to validate your choice, and **Sweep** to exit the **Sweep** menu.

Note: *Setting the speed will automatically determine the duration of one pass according to the selected range.*

Your FLS-2600B unit was designed to give a constant speed value using nm as units. When the speed is given in a THz environment, the selected speed value represents the average value during the sweep, since an interval in nm does not always have the same equivalent value in THz according to the wavelength bandwidth you have selected.

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

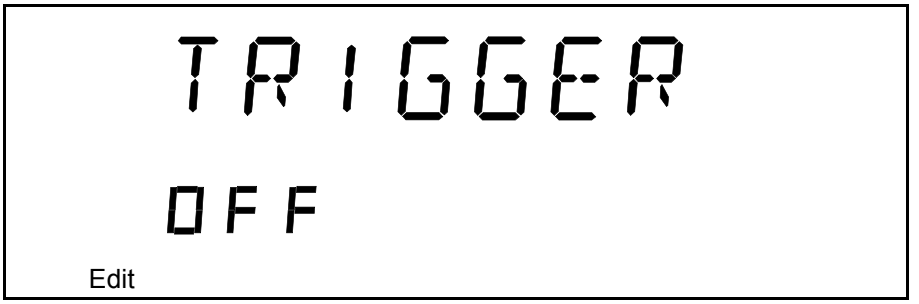
To add or delete steps from the lists, see *Adding Items to Lists* on page 22 and *Deleting Items from Lists* on page 23.

Selecting the Incoming Trigger Option

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

To switch the incoming trigger option on or off:

1. Press **Sweep**.
2. Turn the selection dial clockwise until **TRIGGER** is displayed.
3. Press **ENTER**. The **Edit** marker starts blinking in the lower part of the display.
4. Turn the selection dial clockwise or counterclockwise to turn the Trigger option on or off.



5. Press **ENTER** to validate your choice and **Sweep** to exit the **Sweep** menu.

For more information about the trigger option on your tunable laser source, see *Trigger Option Theory* on page 69.

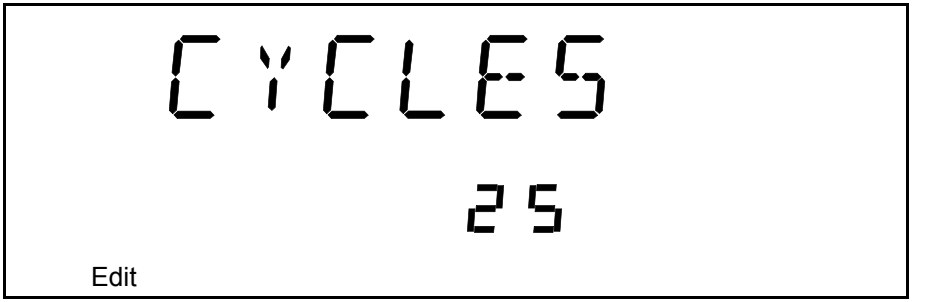
Setting the Cycle Options

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. Press **Sweep**.
2. Turn the selection dial clockwise until **CYCLES** is displayed.
3. Press **ENTER**. The **Edit** marker starts blinking in the bottom left-hand corner of the display.
4. Turn the selection dial clockwise or counterclockwise to select the desired number of sweep cycles. You can select a number from 1 to 99. You can also select Continuous cycling by turning the selection dial counterclockwise until you pass 1. The display will then indicate **Loop**.



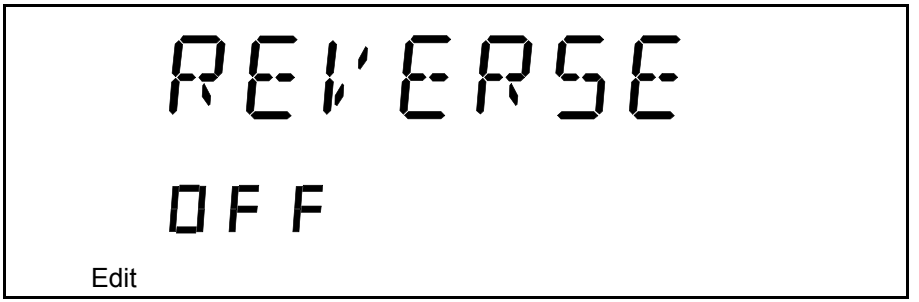
5. Press **ENTER** to validate your choice, and **Sweep** to exit the **Sweep** menu.

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. This is set through the **Reverse** feature of your FLS-2600B.

To set the direction of the sweep:

1. Press **Sweep**.
2. Turn the selection dial clockwise until **REVERSE** is displayed.
3. Press **ENTER**. The **Edit** marker starts blinking in the bottom left-hand corner of the display.
4. Turn the selection dial clockwise or counterclockwise to turn the Reverse option on or off.



5. Press **ENTER** to validate your choice, and **Sweep** to exit the **Sweep** menu.

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.

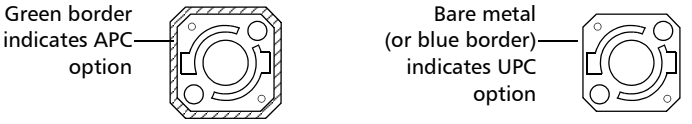
4. Push the connector in so that the fiber-optic cable is firmly in place, thus ensuring adequate contact.

   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.*

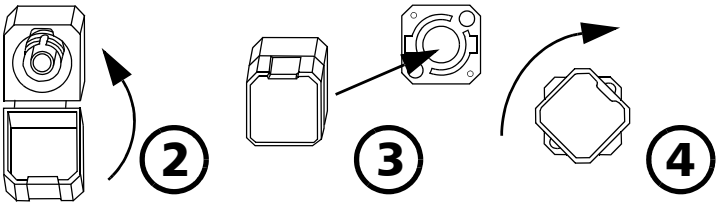
Installing the EXFO Universal Interface (EUI)

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 7.

If the source has been exposed to extreme conditions or if you feel that a calibration would help you achieve better results, you can perform an offset calibration as described in *Adjusting Your Unit According to Wavelength* on page 54.

To activate or deactivate the light emission:

1. Press the **On/Off** button. The **Source init.** marker appears on the display.
2. The **Active** LED lights up on the module front panel to indicate that the source is active at the wavelength, output power, and mode currently selected.
3. To deactivate the source, press **On/Off** again.

IMPORTANT

The Active LED usually lights up immediately, but the laser power is ramped to its maximum in about five seconds. If an error occured with the power prior to the source initialization, the active LED can take up to three seconds to light up.

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, press the **Start** button on the front panel. The system will perform the sweep according to the settings you have entered.

To stop the sweep before it is completed, press the **Stop** button on the front panel.

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

7 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

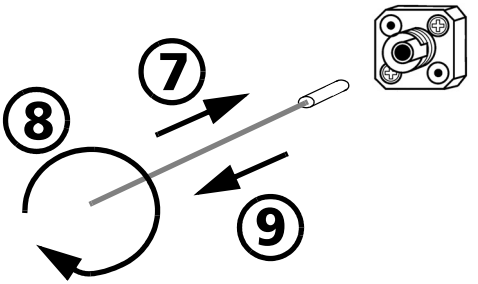
Isopropyl alcohol takes approximately ten seconds to evaporate. Since isopropyl alcohol is not absolutely pure, evaporation will leave microscopic residue. Make sure you dry the surfaces before evaporation occurs.

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

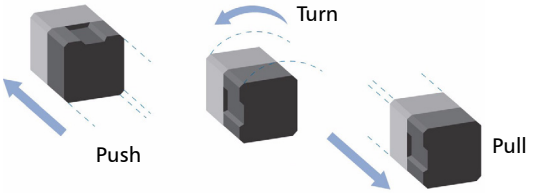
Regular cleaning of EUI connectors will help maintain optimum performance. There is no need to disassemble the unit.

IMPORTANT

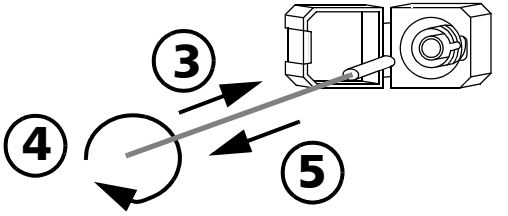
If any damage occurs to internal connectors, the module casing will have to be opened and a new calibration will be required.

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 fiber 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).

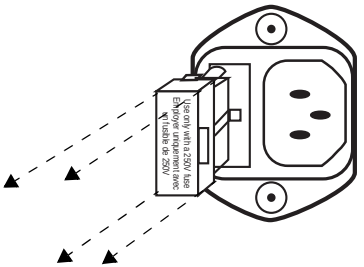
8. Throw out cleaning tips and wiping cloths after one use.

Replacing the Fuse

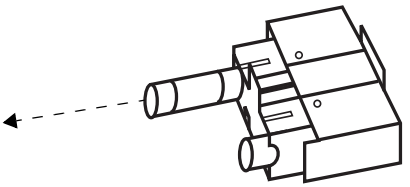
The FLS-2600B contains two fuses of type IEC, 250 V, 2 A, fast blow 0.197 in x 0.787 in/5 mm x 20 mm. The fuse holder is located at the back of the FLS-2600B, just beside the power inlet.

To replace the fuses:

1. Unplug the power cord from the FLS-2600B.
2. Pull the fuse holder out of the FLS-2600B.



3. Check and replace the fuses if necessary.



4. Make sure the fuses are placed firmly in the holder prior to its reinsertion.
5. Firmly push the holder into place.

Software Upgrades

To upgrade the FLS-2600B embedded software using a diskette, you must connect your FLS-2600B to a computer through a null modem cable.

Note: *Software upgrades may be performed in DOS, Windows 3.1, Windows 95, Windows 98 or Windows 2000. If problems occur, please contact EXFO.*

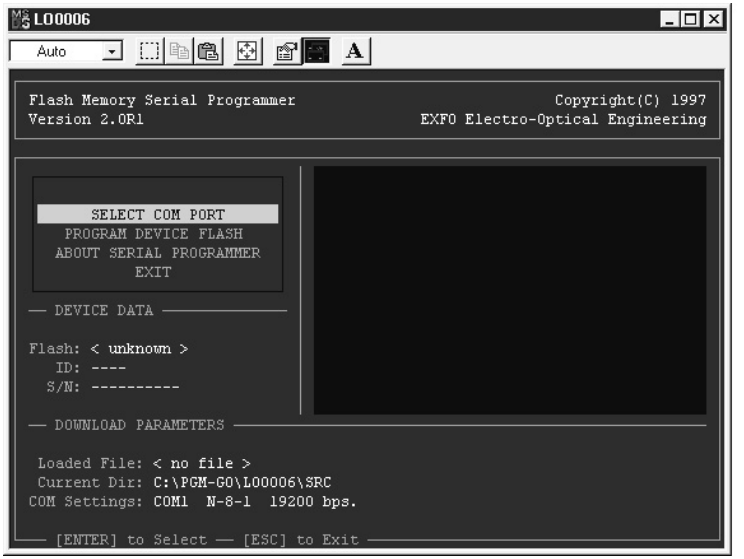
IMPORTANT

When using a notebook computer to upgrade the FLS-2600B software, you should perform the upgrade in a DOS environment.

Proceed with the software upgrade only if the version indicated on the diskette is *greater* than the software version currently installed in your unit. To check the software version currently installed on your unit, see the information displayed at startup.

To perform a software upgrade:

1. Turn off the FLS-2600B.
2. If it is not already done, turn on the computer.
3. On the hard disk of your computer, create a directory named "*Test*" (*C:|Test*).
4. Insert the upgrade diskette into the computer's floppy disk drive and copy the **.hex* file into the new directory (if necessary, unzip the file).
5. Connect one end of a null modem cable to the FLS-2600B RS-232 serial port and the other end to an unused communication port on your computer (ex. COM2).
6. If the software upgrade is performed in Windows 98, you have to restart your computer in DOS mode before starting the upgrade program. Otherwise, simply exit to DOS.
   - From *C:\Test* directory, type LO0006.exe /c:2 /F:C:\Test*.hex, which can be decoded as follows:
     2 represents the serial port number. In this case, it means *COM2*.
   - There is a space between *LO0006*.exe and /.
   - There is a space between *c:2* and */F*.
   - * represents the name of the file. Do not type **.hex*, but rather the actual name of the file you copied to your hard disk.
7. Press *Enter*.



8. When the *Waiting for device handshake* message appears, turn on the FLS-2600B. The FLS-2600B screen will remain off; the unit will beep once and the update program will start automatically. A progress bar on the computer screen will indicate the status of the software upgrade.

9. Once the software upgrade is complete, the *Reboot device for self-test* message will appear. If the software upgrade was performed in Windows 2000, the following error message will be displayed: *LO0006 NTVDM has encountered a System Error. The parameter is incorrect. Select "Close" to terminate the application.* Click **Close** to hide the dialog box.

10. You must turn the FLS-2600B off, and then on again, to use the upgraded software. During self-test execution, the FLS-2600B should display the new software version number.

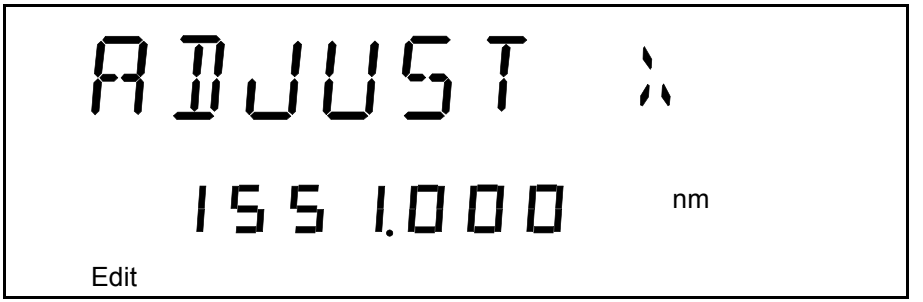
Adjusting Your Unit According to Wavelength

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. Press **Setup**.
3. Turn the selection dial until **ADJUST** λ is displayed. The default pre-selected wavelength appears.



4. Press **ENTER**. The **Edit** marker starts blinking in the lower part of the display.
5. Connect your FLS-2600B to a calibrated wavelength meter.
6. Turn the selection dial until you reach the wavelength value read on the wavelength meter, then press **ENTER** to validate it.

Note: *The* **Fine-tune** *feature is not available in this submenu.*

7. To exit the **Setup** menu, press **Setup**.

Note: *The difference between the pre-selected wavelength and the measured wavelength cannot be greater than ± 0.200 nm or ± 0.0250 THz.*

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.

8 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.

Contacting the Technical Support Group

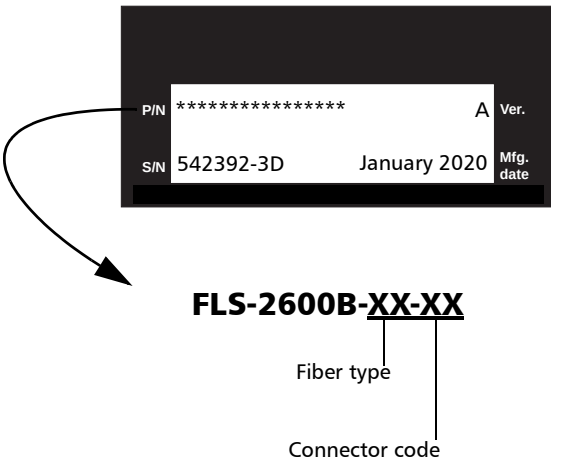
To obtain after-sales service or technical support for this product, contact EXFO at one of the following numbers. The Technical Support Group is available to take your calls from Monday to Friday, 8:00 a.m. to 7:00 p.m. (Eastern Time in North America).

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.



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.

9 Warranty

General Information

EXFO Inc. (EXFO) warrants this equipment against defects in material and workmanship for a period oftwo 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.

IMPORTANT

The warranty can become null and void if:

- **unit has been tampered with, repaired, or worked upon by unauthorized individuals or non-EXFO personnel.**
- **warranty sticker has been removed.**
- **case screws, other than those specified in this guide, have been removed.**
- **case has been opened, other than as explained in this guide.**
- **unit serial number has been altered, erased, or removed.**
- **unit has been misused, neglected, or damaged by accident.**

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.

IMPORTANT

EXFO will charge a fee for replacing optical connectors that were damaged due to misuse or bad cleaning.

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 65). 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 65).

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
quebec.service@exfo.com

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

Tel.: +44 2380 246810
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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

B Trigger Option Theory

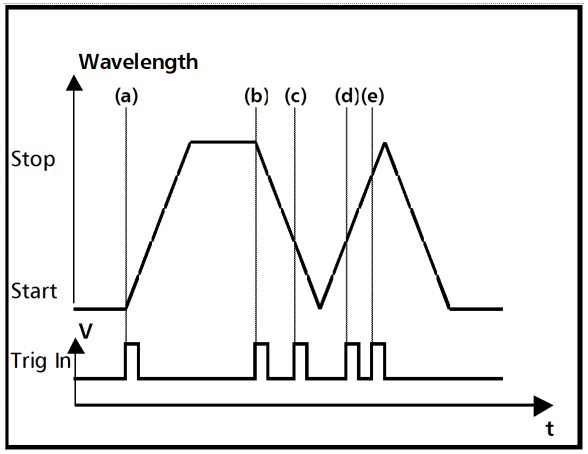
Your Tunable Laser Source features Trigger In and Out connectors. When the trigger option is set to On, the Trigger In will wait for signals. The Trigger Out is always active and emits a signal for each one-way pass (*Continuous* mode) or step (*Stepped* mode) the system performs during the sweep.

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

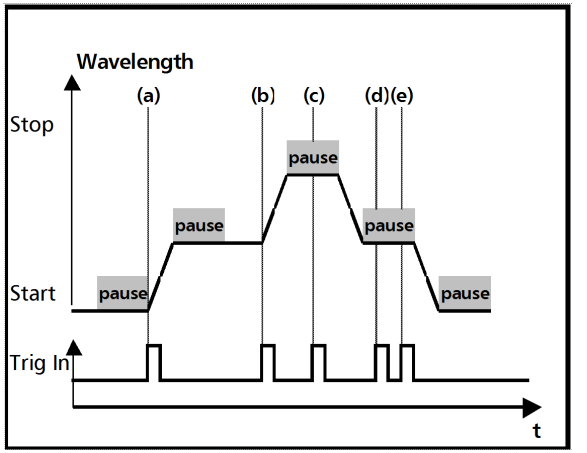
(d) trig received during the third sweep kept in memory and will trigger the fourth sweep

(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

C Remote Control

Your Tunable Laser Source can be remotely controlled by either the

- GPIB interface (through a GPIB cable connected to the GPIB port), or
- RS-232 interface (through a serial cable connected to the serial port).

The commands used in both protocols are the same and described in the following pages. When the FLS-2600B is being remotely controlled by GPIB, *Remote* appears in the upper right-hand corner of the display.

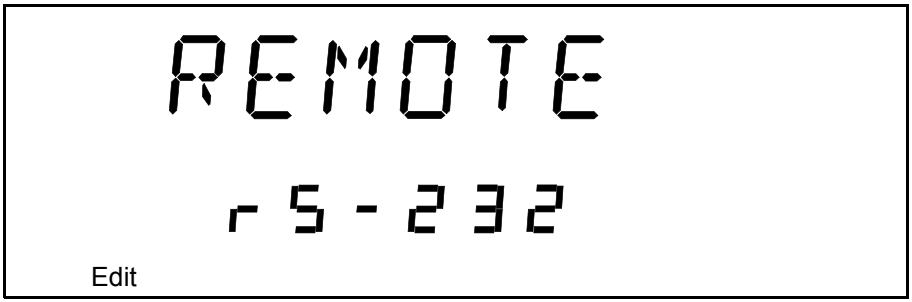
Note: *If you have already designed a GPIB program to control a Tunable Laser Source from EXFO's IQS Series (IQS-2600B), you can reuse sections for the FLS-2600B.*

Setting the FLS-2600B for Remote Control

To remotely control the FLS-2600B, you need to set a GPIB address or activate the RS-232 port.

To set the remote control mode:

1. Press **Setup**.
2. Turn the selection dial clockwise until **REMOTE** is displayed. The current setting appears.



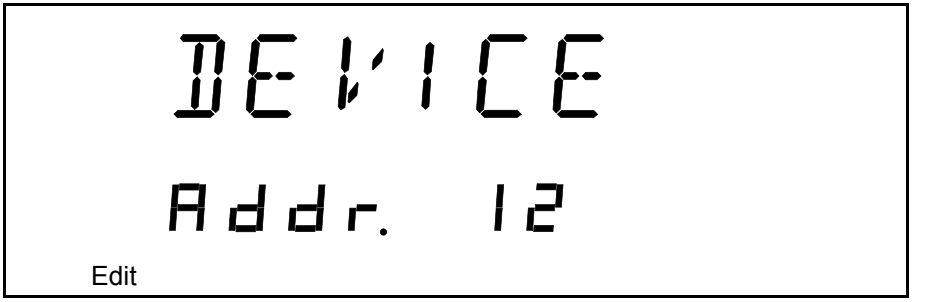
3. Press **ENTER**. The **Edit** marker starts blinking in the lower part of the display.
4. Turn the selection dial to enter the setting you wish to work with—GPIB or RS-232.
5. Press **ENTER**.
6. To exit the **Setup** menu, press **Setup**.

Setting the GPIB Primary Address

To set the GPIB primary address, you must be in GPIB mode. To select the GPIB mode, see *Setting the FLS-2600B for Remote Control* on page 71.

To set the GPIB primary address:

1. Press **Setup**.
2. Turn the selection dial clockwise until **DEVICE** is displayed. The current address appears.



3. Press **ENTER**. The **Edit** marker starts blinking in the lower part of the display.
4. Turn the selection dial to enter the address you wish to work with. You can select a number between 1 and 30.
5. Press **ENTER**.

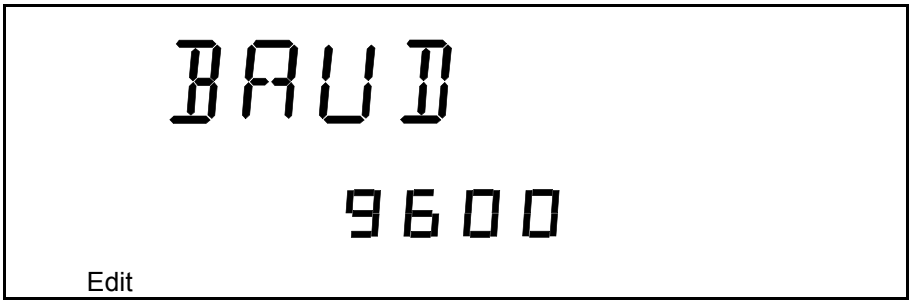
To exit the **Setup** menu, press **Setup**.

Changing the Baud Rate for RS-232

To change the baud rate for RS-232 transfer, you must be in RS-232 mode. To select RS-232 mode, see *Setting the FLS-2600B for Remote Control* on page 71.

To change the baud rate:

1. Press **Setup**.
2. Turn the selection dial clockwise until **BAUD** is displayed. The current setting appears.



3. Press **ENTER**. The **Edit** marker starts blinking in the lower part of the display.
4. Turn the selection dial to enter the rate you wish to work with.
5. Press **ENTER**.
6. To exit the **Setup** menu, press **Setup**.

Changing the Flow Control for RS-232

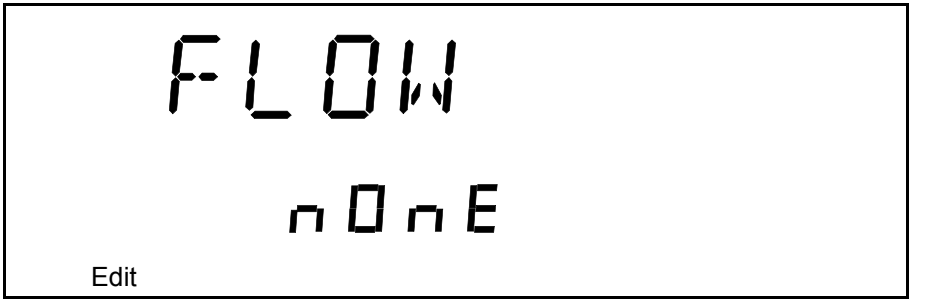
Handshake controls are software mechanisms controlling data flow along a serial line. The most common requirement is for flow control to match the data transmission rate to a rate the device can process.

The computer and the terminal (in this case, the FLS-2600B) stop each other transmitting by sending a control character (xoff), and cause transmission to restart by sending another control character (xon). This is known as a software handshake.

To change the handshake flow control for RS-232 transfer, you must be in RS-232 mode. To select the RS-232 mode, see *Setting the FLS-2600B for Remote Control* on page 71.

To change the flow control:

1. Press **Setup**.
2. Turn the selection dial clockwise until **FLOW** is displayed. The current setting appears.



3. Press **ENTER**. The **Edit** marker starts blinking in the lower part of the display.
4. Turn the selection dial to choose the desired setting for the flow: **Soft. (xon/xoff)** or **None**.
5. Press **ENTER**.
6. To exit the **Setup** menu, press **Setup**.

Communication Parameters

Note: *EOS means* "End of String". *EOI means* "End or Identify".

For GPIB Communication	
Terminate Read on EOS	Yes
Set EOI with EOS on Writes	Yes
Type of compare on EOS	8 bits
EOS byte	0Ah
Sens EOI at end of Writes	Yes
GPIB primary address	See *Setting the FLS-2600B for Remote Control* on page 71
GPIB secondary address	None

For RS-232 Communication	
EOS bytes	0Ah
Baud rate	1200/2400/4800/9600/ 19200 bps
Parity	None
Data bits	8 bits
Stop bits	1 bit
Flow control	Software (xOn/xOff) or None
Activation	See *Setting the FLS-2600B for Remote Control* on page 71

Standard Status Data Structure

The figure on the next page illustrates the four common Status and Enable registers as defined by IEEE 488.2. This diagram is a useful aid in understanding the general commands and how a service request (SRQ) is generated. The four registers are described below:

➤ Standard Event Status Register (ESR)

Bits	Mnemonics	Bit Value
7	Power on	128
6	Not used	0
5	Command error	32
4	Execution error	16
3	Device-dependant error	8
2	Query error	4
1	Not used	0
0	Operation complete	1

➤ Standard Event Status Enable Register (ESE)

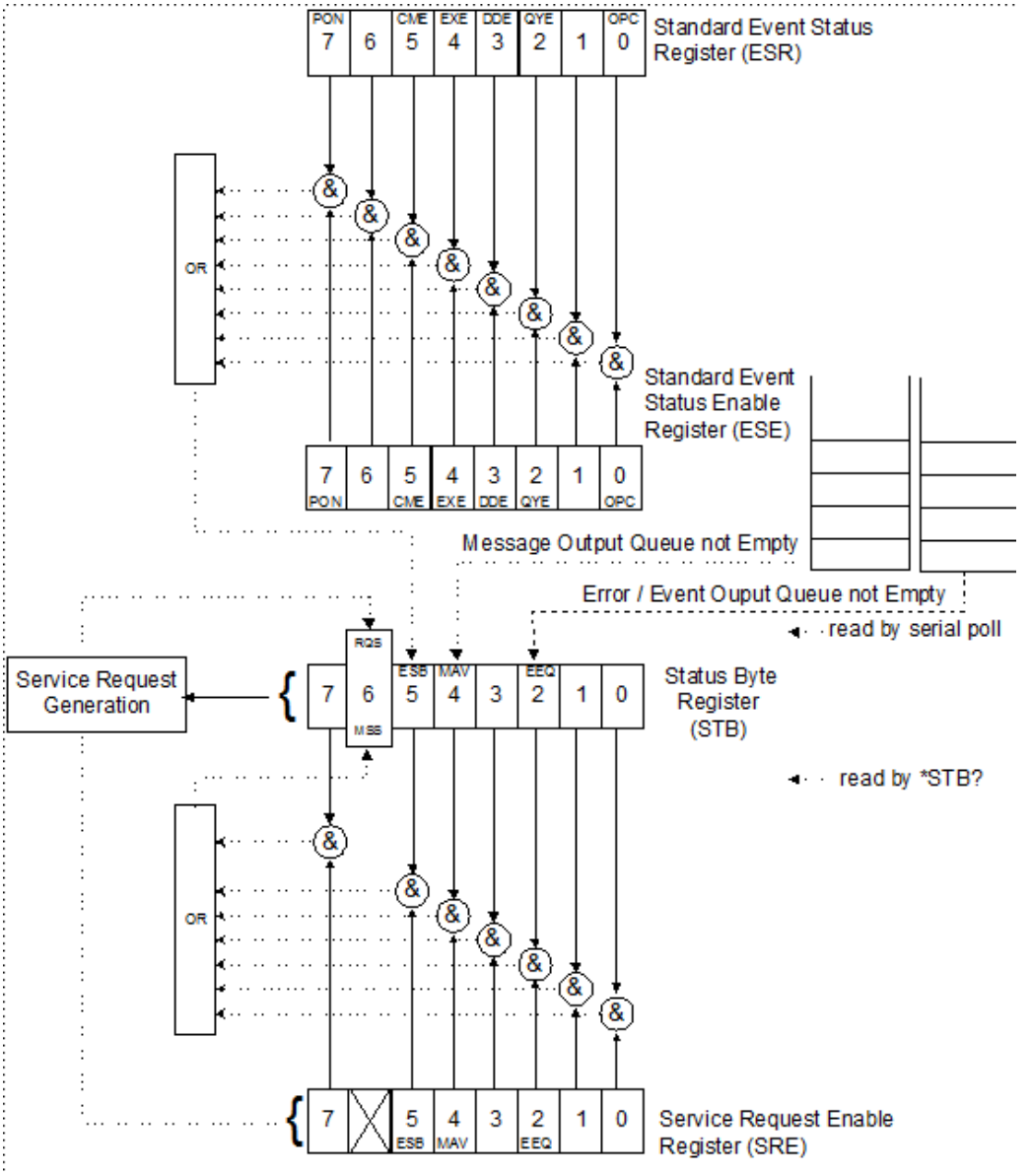
Bits	Mnemonics	Bit Value
7	Power on	128
6	Not used	0
5	Command error	32
4	Execution error	16
3	Device-dependent error	8
2	Query error	4
1	Not used	0
0	Operation complete	1

➤ Status Byte Register (STB)

Bits	Mnemonics	Bit Value
7	Not used	0
6	Request service/ Master summary status	64
5	Event summary bit	32
4	Message available	16
3	Not used	0
2	Error/Event queue	4
1	Not used	0
0	Not used	0

➤ Service Request Enable Register (SRE)

Bits	Mnemonics	Bit Value
7	Not used	0
6	Reserved	0
5	Event status byte	32
4	Message available	16
3	Not used	0
2	Error/Event queue	4
1	Not used	0
0	Not used	0


PON 7
6
CME 5
EXE 4
DDE 3
QYE 2
1
OPC 0
Standard Event Status Register (ESR)
OR
Standard Event Status Enable Register (ESE)
7 PON
6
5 CME
4 EXE
3 DDE
2 QYE
1
0 OPC
Message Output Queue not Empty
Error / Event Ouput Queue not Empty
read by serial poll
RQS
MSS
ESB
MAV
EEQ
Service Request Generation
Status Byte Register (STB)
read by *STB?
OR
Service Request Enable Register (SRE)

An SRQ is forced when a bit in the Status Byte register goes from 0 to 1 *and* the corresponding SRE Mask bit is set. If an SRQ is forced, the Recoverable Queueing Service (RQS) bit is set to 1 and remains as such until it is read by a serial poll, even if the reason or condition that caused the service request no longer exists. Similarly, if a serial poll reads the RQS, it is reset to 0, whether the condition that caused the service request still exists or not.

SCPI Commands

Command Structure

The GPIB commands follow the guidelines determined by the Standard Commands for Programmable Instruments (SCPI) consortium. For example, the following command syntax is used to activate or deactivate the source.

OUTP[:STAT]<wsp><boolean>

- OUTP and STAT are keywords defining the function of the command.
- [ ] indicates that a keyword or parameter is optional.
- <wsp> indicates that a space is required ("wsp" stands for "white space").
- <Boolean> indicates the command parameter.
- Keywords must be separated by a colon.

To enter commands or queries you must use either the full word for the command, or the three- or four-letter shortcut. Commands are not case-sensitive; however, spelling errors will cancel the command or query.

The command or query can be written using only shortcuts, only full words, or a combination of both.

Other command syntax elements can also be used:

- the comma, which is used to separate values in a command or query.
- the semi-colon, which is used to separate commands or queries, when you send more than one at a time.

Note: *It is recommended that you retrieve the response immediately after each query.*

General Commands

Your tunable laser source recognizes the main commands identified in IEEE 488.2.

Command	Function
*CLS	Clear status command
*ESE	Standard event status enable command
*ESE?	Standard event status enable query
*ESR?	Standard event status register query
*IDN?	Identification query
*LOK	Set Remote Lockout programming state (RS-232 only)
*LOK?	Remote Lockout programming state query (RS-232 only)
*OPC	Operation complete command
*OPC?	Operation complete query
*REM?	Set Remote programming state (RS-232 only)
*RST	Reset command
*SRE	Service request enable command
*SRE?	Service request enable query
*STB?	Read status byte query
*TST?	Self-test query

The commands are fully explained hereafter.

*CLS

Description This command sets the contents of the Standard Event Register (ESR), the Status Byte Register (STB), and the Error Queue (ERR) to zero. This command is commonly used to clear the status registers before enabling SRQ. Note that the output queue, Standard Event Status Enable Register (ESE), and Service Request Enable Register (SRE) are not affected.

Syntax *CLS

*ESE

Description This command is used to set bits in the Standard Event Status Enable Register (ESE) to a new value (default value is 255). The contents of the ESE register are logically ANDed with the ESR register. A non-zero result will set the Event Summary Bit (ESB) of the Status Byte Register (STB). This command is useful for selecting which events may generate an SRQ.

Syntax *ESE<wsp><value>

Parameter The <value> parameter must be an integer between 0 and 255.

*ESE?

Description This query reads the contents of the Standard Event Status Enable Register (ESE).

Syntax *ESE?

Response An integer between 0 and 255.

*ESR?

Description	This query reads the contents of the Standard Event Status Register (ESR) and clears it.
Syntax	*ESR?
Response	An integer between 0 and 255.

*IDN?

Description	This query reads the system identification string.
Syntax	*IDN?
Response	“EXFO E.-O. Eng. FLS-2600B vx.xx”xxxxxxxx xxxxxxx, where xxxxxxxx xxxxxxx is the serial number and vx.xx is the current product version.

*LOK

Description	This command is used to set the Remote Lockout programming state.
Syntax	*LOK<wsp><value>
Parameters	The <value> parameter is a boolean value indicating if the tunable laser source is “0” or “unlocked” “1” or “locked”
Note	This command can only be used when working with RS-232 communication.

*LOK?

Description	This query returns the Remote Lockout programming state.
Syntax	*LOK?
Response	A boolean value indicating if the tunable laser source is “0” unlocked “1” locked
Note	This command can only be used when working with RS-232 communication.

*OPC

Description	This command will cause the FLS-2600B to generate the operation complete message in the Standard Event Status Register (ESR) when all pending selected FLS-2600B operations have been completed.
Syntax	*OPC
Example	*OPC;*IDN?

*OPC?	
Description	This query puts an ASCII “1” in the output queue when the content of the input queue has been processed. This query is useful to prevent another command from processing until the current command is complete.
Syntax	*OPC?
Response	“1”

*REM	
Description	This command is used to set the Remote programming state.
Syntax	*REM<wsp><data>
Parameters	The <data> parameter can be “1” to set the Remote programming state to Remote or “0” to set the Remote progamming state to Local.
Note	This command can only be used with RS-232 communication.

*RST

Description The *RST command sets the instrument to reset settings (factory settings stored in ROM). Pending *OPC and *OPC? actions are canceled. The instrument becomes idle. The *RST command clears the Input and Error queues. The following settings remain unchanged:

- Instrument interface address
- Output queue
- Service Request Enable register (SRE)
- Standard Event Status Enable register (ESE)

Syntax *RST

Note For a complete list of default parameters, see *Saving and Recalling Configurations* on page 25.

This command uses electronic parts that have a limited life span (non-volatile memory). You must use this command with moderation.

*SRE

Description	This command sets bits in the Service Request Enable Register (SRE; initial value is 255), and enables the corresponding bit in the Status Byte Register (STB). The command can be used to select which events can initiate a service request.
Syntax	*SRE<wsp><value>
Parameter	The <value> parameter must be an integer between 0 and 255.

*SRE?

Description	This query returns the contents of the Service Request Enable Register (SRE).
Syntax	*SRE?
Response	An integer between 0 and 255.

*STB?

Description	This query returns the contents of the Status Byte Register (STB).
Syntax	*STB?
Response	An integer between 0 and 255.

*TST?

Description This query initiates an internal self-test and returns a binary value indicating the results of the test.

Syntax *TST?

Response An integer indicating the sum of all corresponding errors:

- 0: No errors
- 1: Interlock
- 2: Laser over-current
- 4: TEC failure
- 8: Flash not present
- 16: Flash time-out
- 32: EEprom not detected
- 64: EEprom check sum
- 128: Motor
- 256: Mechanic zero not found
- 512: Temperature
- 1024: FPGA
- 2048: Electronic power control
- 4096: Sweep
- 8192: Memory

Specific Commands

CALibration:WAVelength	
Description	This command introduces an offset into the FLS-2600B to correct a wavelength deviation as measured by a wavelength meter.
Syntax	CAL:WAV<wsp><wavelength>
Parameters	The <wavelength> parameter is a value indicating the wavelength in nm.
Example	CAL:WAV 1560.000
Note	This function cannot be performed if the application is performing a sweep. The difference between the wavelength and the measured wavelength cannot be greater then ± 0.200 nm or ± 0.0250 THz. EXFO recommends using 1560 nm as the wavelength parameter.

DISPlay:DIMMer

Description This command allows you to set the dimmer state on the source.

Syntax DISP:DIMM<wsp><state>

Response The <state> parameter is a single digit indicating the state of the dimmer:

- 0 or Off
- 1 or Lo
- 2 or Hi
- 3 or Auto off

You can also use the state name in your command.

See also DISP:DIMM 2

DISPlay:DIMMer?

Description This query returns a value indicating the dimmer state on the source.

Syntax DISP:DIMM?

Response A single digit indicating the state of the dimmer:

- 0 for Off
- 1 for Lo
- 2 for Hi
- 3 for Auto off

See also DISP:DIMM?

OUTPut:ASE?

Description This query returns a value indicating whether the ASE option is available on the tunable laser source.

Syntax OUTP:ASE?

Response A boolean value indicating whether the ASE option is available on the FLS-2600B Tunable Laser Source:

- 0: the ASE option is not available
- 1: the ASE option is available

Note The response will always be “not available”.

See also OUTP:MODE, OUTP:MODE?, OUTP:STAT and OUTP:STAT?

OUTPut:MODE

Description This command is used to set the source mode (tunable or ASE).

Syntax OUTP:MODE<wsp><mode>

Parameters The <mode> parameter is a boolean parameter representing the source mode:

- 0: Tunable
- 1: ASE

Note This command cannot be performed if the FLS-2600B is performing a sweep. It will return an error if ASE is selected because it is not available.

Example OUTP:MODE 0

See also OUTP:ASE?, OUTP:MODE?, OUTP:STAT and OUTP:STAT?

OUTPut:MODE?

Description	This query returns the current source mode (tunable or ASE).
Syntax	OUTP:MODE?
Response	A boolean value representing the current source mode: ➤ 0: tunable mode ➤ 1: ASE mode
Note	The response will always be “tunable mode”.
See also	OUTP:ASE?, OUTP:MODE, OUTP:STAT and OUTP:STAT?

OUTPut:STATe

Description	This command is used to activate or deactivate the source.
Syntax	OUTP:STAT<wsp><state>
Parameters	The <state> parameter is a boolean value representing the source state: ➤ 0: deactivates the source ➤ 1: activates the source
Example	OUTP:STAT 1
See also	OUTP:ASE?, OUTP:MODE, OUTP:MODE? and OUTP:STAT?

OUTPut:STATe?

Description	This query returns the current source state.
Syntax	OUTP:STAT?
Response	A boolean value representing the current source state: ➤ 0: the source is deactivated. ➤ 1: the source is activated.
See also	OUTP:STAT, OUTP:MODE, OUTP:MODE? and OUTP:ASE?

SOURce:MODE

Description	This command is used to toggle between the normal and high-resolution modes.
Syntax	SOUR:MODE<wsp><mode>
Parameters	The <mode> parameter is a boolean value representing the mode state: ➤ 0: Normal mode ➤ 1: High-Resolution mode
Example	SOUR:MODE 1
Note	This command cannot be processed if your tunable laser source is performing a sweep.
See also	SOUR:MODE?

SOURce:MODE?

Description This query returns the current source mode.

Syntax SOUR:MODE?

Response A boolean value representing the current mode state:

- 0: Normal mode
- 1: High-Resolution mode

See also SOUR:MODE

SOURce:POWer:ALC

Description This command activates the laser output Automatic Level Control (ALC). The source is either in ALC mode or Max. Power mode.

Syntax SOUR:POW:ALC<wsp><state>

Parameters The <state> parameter is an expression indicating that the source is:

- 0 or OFF: Maximum Power mode (ALC off)
- 1 or ON: ALC mode

Example SOUR:POW:ALC 1

Note This command is for modules equipped with the PMF output only. It cannot be used while the source is performing a sweep.

See also SOUR:POW:ALC?

SOURce:POWer:ALC?

Description	This query returns the laser output power mode.
Syntax	SOUR:POW:ALC?
Response	The power mode expressed as: ➤ 0: Maximum power mode (ALC off) ➤ 1: ALC mode
Note	This query is for modules equipped with the PMF output only.
See also	SOUR:POW:ALC

SOURce:POWer:LIMit:HIGH?

Description	When in Automatic Level Control (ALC) mode, this query returns the maximum source output power.
Syntax	SOUR:POW:LIM:HIGH?
Response	The maximum source output power in ± 99.99 dBm format.
See also	SOUR:POW:LIM:LOW?, and SOUR:POW:LIM:STEP?

SOURce:POWer:LIMit:LOW?

Description	When in Automatic Level Control (ALC) mode, this query returns the minimum source output power (in dBm) that can be set with the SOUR:POW command.
Syntax	SOUR:POW:LIM:LOW?
Response	The minimum source output power in ± 99.99 dBm format.
See also	SOUR:POW:LIM:HIGH?, and SOUR:POW:LIM:STEP?

SOURce:POWer:LIMit:STEP?

Description	This query returns the minimum output power step (in dBm) that can be used when changing the source output power with the SOUR:POW command.
Syntax	SOUR:POW:LIM:STEP?
Response	The minimum output power step in ± 99.99 dBm format.
See also	SOUR:POW:LIM:HIGH?, and SOUR:POW:LIM:LOW?

SOURce:SWEep:MODE

Description	This command allows you to select the sweep mode.
Syntax	SOUR:SWE:MODE<wsp><mode>
Parameters	The <mode> parameter is a boolean value representing the mode state: ➤ 0: Continuous mode ➤ 1: Step-by-Step Mode
Example	SOUR:SWE:MODE 1
Note	This command cannot be performed during a sweep.
See also	SOUR:SWE:MODE?, SOUR:SWE:CENT, SOUR:SWE:COUN, SOUR;SWE:COUN?, SOUR:SWE:REP, SOUR:SWE:REP?, SOUR:SWE:REV and SOUR:SWE:REV?

SOURce:SWEep:MODE?

Description	This query returns the current sweep mode.
Syntax	SOUR:SWE:MODE?
Response	A boolean value representing the current sweep mode: ➤ 0: Continuous mode ➤ 1: Step-by-Step mode
See also	SOUR:SWE:MODE, SOUR:SWE:CENT, SOUR:SWE:COUN, SOUR;SWE:COUN?, SOUR:SWE:REP, SOUR:SWE:REP?, SOUR:SWE:REV and SOUR:SWE:REV?

SOURce:SWEep:CENTer?

Description	This query returns the central wavelength for the current sweep program in the current spectral units (nm or THz).
Syntax	SOUR:SWE:CENT?
Response	The central wavelength for the current sweep program in the current spectral units in the 9999.999 nm or 999.9999 THz format.
See also	SOUR:SWE:MODE, SOUR:SWE:MODE?, SOUR:SWE:COUN, SOUR;SWE:COUN?, SOUR:SWE:REP, SOUR:SWE:REP?, SOUR:SWE:REV and SOUR:SWE:REV?

SOURce:SWEep:COUNt

Description This command is used to specify how many times you want the sweep program to loop. To specify whether or not you want the sweep program to loop, use the SOUR:SWE:REP command.

Syntax SOUR:SWE:COUN<wsp><count>

Parameters The <count> parameter represents the new number of loops in 99 format. For continuous repetition, enter “0”.

Example SOUR:SWE:COUN 32

See also SOUR:SWE:MODE, SOUR:SWE:MODE?, SOUR:SWE:CENT, SOUR;SWE:COUN?, SOUR:SWE:REP, SOUR:SWE:REP?, SOUR:SWE:REV and SOUR:SWE:REV?

SOURce:SWEep:COUNt?

Description This query returns the number of repetitions set for the sweep program.

Syntax SOUR:SWE:COUN?

Response The number of repetitions set for the sweep program.

See also SOUR:SWE:MODE, SOUR:SWE:MODE?, SOUR:SWE:CENT?, SOUR;SWE:COUN, SOUR:SWE:REP, SOUR:SWE:REP?, SOUR:SWE:REV and SOUR:SWE:REV?

SOURce:SWEep:REPeat

Description This command is used to specify how many times you want the sweep program to repeat.

Syntax SOUR:SWE:REP<wsp><repeat>

Parameters The <repeat> parameter is a boolean parameter indicating whether or not the sweep program will be repeated:

- 1: the sweep program will be repeated continuously.
- 0: the sweep program will be repeated for the number of times set by the SOUR:SWE:COUN command.

Example SOUR:SWE:REP 1

Note You cannot use this command during a sweep.

See also SOUR:SWE:MODE, SOUR:SWE:MODE?, SOUR:SWE:CENT, SOUR:SWE:COUN, SOUR;SWE:COUN?, SOUR:SWE:REP?, SOUR:SWE:REV and SOUR:SWE:REV?

SOURce:SWEep:REPeat?

Description This query is used to check how the sweep repeat function is activated.

Syntax SOUR:SWE:REP?

Response A boolean value indicating the state of the sweep repeat function:

- 1: the sweep repeat function is continuous.
- 0: the sweep repeat function is set to the number entered with the SOUR:SWE:COUN command.

See also SOUR:SWE:MODE, SOUR:SWE:MODE?, SOUR:SWE:CENT, SOUR:SWE:COUN, SOUR;SWE:COUN?, SOUR:SWE:REP, SOUR:SWE:REV and SOUR:SWE:REV?

SOURce:SWEep:REVerse

Description This command is used to enable and disable the sweep reverse function. When this function is enabled, the sweep program is performed in both directions: ascending and descending.

Syntax SOUR:SWE:REV<wsp><sweep>

Parameters The <sweep> parameter is a boolean parameter indicating whether or not the sweep will be performede in both directions:

- 1: enable the sweep reverse function.
- 0: disable the sweep reverse function.

Example SOUR:SWE:REV 1

Note This command cannot be performed during a sweep.

See also SOUR:SWE:MODE, SOUR:SWE:MODE?, SOUR:SWE:CENT, SOUR:SWE:COUN, SOUR;SWE:COUN?, SOUR:SWE:REP, SOUR:SWE:REP? and SOUR:SWE:REV?

SOURce:SWEep:REVerse?

Description This query returns a value indicating whether the sweep reverse function is enabled.

Syntax SOUR:SWE:REV?

Response A boolean parameter representing the state of the sweep reverse function:

- 1: the sweep reverse function is enabled.
- 0 : the sweep reverse function is disabled.

See also SOUR:SWE:MODE, SOUR:SWE:MODE?, SOUR:SWE:CENT, SOUR:SWE:COUN, SOUR;SWE:COUN?, SOUR:SWE:REP, SOUR:SWE:REP? and SOUR:SWE:REV

SOURce:SWEep:STARt:WAVelength

Description	This command allows you to specify a start wavelength for the sweep.
Syntax	SOUR:SWE:STAR:WAV<wsp><wavelength>
Parameters	The <wavelength> parameter indicates the wavelength in 9999.999 nm or 999.9999 THz format.
Example	SOUR:SWE:STAR:WAV 1515.500
Note	This command cannot be performed during a sweep. If you do not specify a unit, the system will use the current spectral units (nm or THz). To specify the units you want to use, add NM or THZ after your query (e.g., SOUR:SWE:STAR:WAV<wsp>1550.000<wsp>NM).
See also	SOUR:SWE:START:WAV?, SOUR:SWE:STOP:WAV: and SOUR:SWE:STOP:WAV?

SOURce:SWEep:STARt:WAVelength?

Description	This query returns the start wavelength for the sweep.
Syntax	SOUR:SWE:STAR:WAV?
Response	Wavelength in 9999.999 nm or 999.9999 THz format.
Note	If you do not specify a unit, the system will return the value in the current spectral unit (nm or THz). To specify the units you want to use, add NM or THZ after your query (e.g., SOUR:SWE:STAR:WAV?<wsp>NM).
See also	SOUR:SWE:START:WAV, SOUR:SWE:STOP:WAV and SOUR:SWE:STOP:WAV?

SOURce:SWEep:STOP:WAVelength

Description	This command allows you to specify a stop wavelength for the sweep.
Syntax	SOUR:SWE:STOP:WAV<wsp><wavelength>
Parameters	The <wavelength> parameter indicates the wavelength in 9999.999 nm or 999.9999 THz format.
Example	SOUR:SWE:STOP:WAV 1610.000
Note	This command cannot be performed during a sweep. If you do not specify a unit, the system will use the current spectral unit (nm or THz). To specify the units you want to use add NM or THZ after your query (e.g., SOUR:SWE:STOP:WAV<wsp><wavelength><wsp>NM).
See also	SOUR:SWE:START:WAV, SOUR:SWE:START:WAV? and SOUR:SWE:STOP:WAV?

SOURce:SWEep:STOP:WAVelength?

Description	This query returns the stop wavelength for the sweep.
Syntax	SOUR:SWE:STOP:WAV?
Response	Wavelength in 9999.999 nm or 999.9999 THz format.
Note	If you do not specify a unit, the system will return the value in the current spectral units (nm or THz). To specify the units you want to use, add NM or THZ after your query (e.g., SOUR:SWE:STOP:WAV?<wsp>NM).
See also	SOUR:SWE:START:WAV, SOUR:SWE:START:WAV? and SOUR:SWE:STOP:WAV

SOURce:SWEep:SPAN?

Description	This query returns the wavelength range to be swept below and above the central wavelength.
Syntax	SOUR:SWE:SPAN?
Response	A value representing the wavelength range to be swept below and above the central wavelength in 9999.999 nm or 999.9999 THz format.
Note	If you do not specify a unit, the system will return the value in the current spectral units (nm or THz). To specify the units you want to use, add NM or THZ after your query (e.g., SOUR:SWE:SPAN?<wsp>NM).
Example	SOUR:SWE:SPAN?

SOURce:SWEep:SPEed

Description	This command allows you to select the sweep speed for the continuous mode.
Syntax	SOUR:SWE:SPE<wsp><speed>
Parameters	The <speed> parameter is set in the 99.999 nm/s or 9.9999 THz/s format.
Example	SOUR:SWE:SPE 35.455
Note	You cannot use this comment while the FLS-2600B is performing a sweep. If you do not specify a unit, the system will use the current spectral unit (nm/s or THz/s). To specify the units you want to use, add NM/S or THZ/S after your query (e.g., SOUR:SWE:SPE<wsp><speed><wsp>NM/S).
See also	SOUR:SWE:SPE?

SOURce:SWEep:SPEed?

Description	This query returns the sweep speed for the continuous mode.
Syntax	SOUR:SWE:SPE?
Response	Speed in 99.999 nm/s or 9.9999 THz/s format.
See also	SOUR:SWE:SPE
Note	If you do not specify a unit, the system will return the value in the current spectral unit (nm/s or THz/s). To specify the units you want to use, add NM or THZ after your query (e.g., SOUR:SWE:SPE?<wsp>THZ).

SOURce:SWEep:SPEed:LIMit:HIGH?

Description	This query returns the highest possible speed for the sweep.
Syntax	SOUR:SWE:SPE:LIM:HIGH?
Response	Speed in 99.999 nm/s or 9.9999 THz/s format.
See also	SOUR:SWE:SPE:LIM:LOW?
Note	If you do not specify a unit, the system will return the value in the current spectral unit (nm/s or THz/s). To specify the units you want to use, add NM or THZ after your query (e.g., SOUR:SWE:SPE:LIM:HIGH?<wsp>THZ).

SOURce:SWEep:SPEed:LIMit:LOW?

Description	This query returns the lowest possible speed for the sweep.
Syntax	SOUR:SWE:SPE:LIM:LOW?
Response	Speed in 99.999 nm/s or 9.9999 THz/s format.
See also	SOUR:SWE:SPE:LIM:HIGH?
Note	If you do not specify a unit, the system will return the value in the current spectral unit (nm/s or THz/s). To specify the units you want to use, add NM or THZ after your query (e.g., SOUR:SWE:SPE:LIM:LOW?<wsp>THZ).

SOURce:SWEep:STATe

Description	This function starts or stops the sweep program.
Syntax	SOUR:SWE:STAT<wsp><state>
Parameters	The <state> parameter is a boolean parameter representing the new state of the sweep program: ➤ 1: sweep program started ➤ 0: sweep program stopped
Example	SOUR:SWE:STAT 1
See also	SOUR:SWE:STAT?, SOUR:SWE:TIME? and SOUR:SWE:DUR?

SOURce:SWEep:STATe?

Description	This query returns a value indicating the state of the sweep program.
Syntax	SOUR:SWE:STAT?
Response	A boolean value representing the current state of the sweep program: ➤ 1: the sweep program is in progress ➤ 0: the sweep program is not in progress
See also	SOUR:SWE:STAT, SOUR:SWE:TIME? and SOUR:SWE:DUR?

SOURce:SWEep:DURation?

Description	This query returns the duration for a continuous sweep.
Syntax	SOUR:SWE:DUR?
Response	A value representing the duration currently set for the continuous sweep in 99:59:59:999 format.
See also	SOUR:SWE:STAT, SOUR:SWE:STAT?, SOUR:SWE:DUR and SOUR:SWE:TIME?

SOURce:SWEep:STEP

Description	This command allows you to specify the wavelength step for the step-by-step sweep.
Syntax	SOUR:SWE:STEP<wsp><state>
Parameters	Returns step in 9999.999 nm or 999.9999 THz format.
Example	SOUR:SWE:STEP 5.500
Note	You cannot use this command during a sweep. If you do not specify a unit, the system will use the current spectral unit (nm or THz). To specify the units you want to use, add NM or THZ after your query (e.g., SOUR:SWE:STEP<wsp><step><wsp>NM).
See also	SOUR:SWE:STEP:LIM:LOW?, SOUR:SWE:STEP:LIM:HIGH?, SOUR:SWE:STEP?, SOUR:SWE:PAUS and SOUR:SWE:PAUS?

SOURce:SWEep:STEP?

Description	This query returns the wavelength step for the sweep in step-by-step mode.
Syntax	SOUR:SWE:STEP?
Response	Wavelength in 9999.999 nm or 999.9999 THz format.
Note	If you do not specify a unit, the system will return the value in the current spectral unit (nm or THz). To specify the units you want to use, add NM or THZ after your query (e.g., SOUR:SWE:STEP?<wsp>THZ).
See also	SOUR:SWE:STEP, SOUR:SWE:STEP:LIM:LOW?, SOUR:SWE:STEP:LIM:HIGH?, SOUR:SWE:PAUS and SOUR:SWE:PAUS?

SOURce:SWEep:STEP:LIMit:HIGH?

Description This query returns the largest possible wavelength step in a step-by-step sweep.

Syntax SOUR:SWE:STEP:LIM:HIGH?

Response Maximal wavelength step in 9999.999 nm or 999.9999 THz format.

Note If you do not specify a unit, the system will return the value in the current spectral unit (nm or THz). To specify the units you want to use, add NM or THZ after your query (e.g., SOUR:SWE:STEP:LIM:HIGH?<wsp>NM).

See also SOUR:SWE:STEP, SOUR:SWE:STEP:LIM:LOW?, SOUR:SWE:STEP?, SOUR:SWE:PAUS and SOUR:SWE:PAUS?

SOURce:SWEep:STEP:LIMit:LOW?

Description This query returns the smallest possible wavelength step in a step-by-step sweep.

Syntax SOUR:SWE:STEP:LIM:LOW?

Response Minimal wavelength step in 9999.999 nm or 999.9999 THz format.

Note If you do not specify a unit, the system will return the value in the current spectral unit (nm or THz). To specify the units you want to use, add NM or THZ after your query (e.g., SOUR:SWE:STEP:LIM:LOW?<wsp>NM).

See also SOUR:SWE:STEP, SOUR:SWE:STEP:LIM:HIGH?, SOUR:SWE:STEP?, SOUR:SWE:PAUS and SOUR:SWE:PAUS?

SOURce:SWEep:PAUSe

Description	This command allows you to set the minimal pause length between the steps for the step-by-step sweep.
Syntax	SOUR:SWE:PAUS<wsp><state>
Parameters	The <state> parameter is the time in the 59:999 ms format.
Example	SOUR:SWE:PAUS 30:500
Note	You cannot use this command during a sweep.
See also	SOUR:SWE:STEP, SOUR:SWE:STEP:LIM:LOW?, SOUR:SWE:STEP:LIM:HIGH?, SOUR:SWE:STEP?, SOUR:SWE:PAUS?, SOUR:SWE:PAUS:LIM:LOW?, SOUR:SWE:PAUS:LIM:HIGH?, SOUR:SWE:TRIG and SOUR:SWE:TRIG?

SOURce:SWEep:PAUSe?

Description	This query returns the minimal pause length between the steps for the step-by-step sweep.
Syntax	SOUR:SWE:PAUS?
Response	Time in 59:999 ms format.
See also	SOUR:SWE:STEP, SOUR:SWE:STEP:LIM:LOW?, SOUR:SWE:STEP:LIM:HIGH?, SOUR:SWE:STEP?, SOUR:SWE:PAUS, SOUR:SWE:PAUS:LIM:LOW?, SOUR:SWE:PAUS:LIM:HIGH?, SOUR:SWE:TRIG and SOUR:SWE:TRIG?

SOURce:SWEep:PAUSe:LIMit:HIGH?

Description This query returns the largest available pause for a step-by-step sweep.

Syntax SOUR:SWE:PAUS:LIM:HIGH?

Response Time in 59:999 ms format.

See also SOUR:SWE:STEP, SOUR:SWE:STEP:LIM:LOW?, SOUR:SWE:STEP:LIM:HIGH?, SOUR:SWE:STEP?, SOUR:SWE:PAUS, SOUR:SWE:PAUS?, SOUR:SWE:PAUS:LIM:LOW?, SOUR:SWE:TRIG and SOUR:SWE:TRIG?

SOURce:SWEep:PAUSe:LIMit:LOW?

Description This query returns the smallest available pause for a step-by-step sweep.

Syntax SOUR:SWE:PAUS:LIM:LOW?

Response Time in 59:999 ms format.

See also SOUR:SWE:STEP, SOUR:SWE:STEP:LIM:LOW?, SOUR:SWE:STEP:LIM:HIGH?, SOUR:SWE:STEP?, SOUR:SWE:PAUS, SOUR:SWE:PAUS?, SOUR:SWE:PAUS:LIM:HIGH?, SOUR:SWE:TRIG and SOUR:SWE:TRIG?

SOURce:SWEep:TRIGger

Description This command activates or deactivates the input trigger option.

Syntax SOUR:SWE:TRIG<wsp><trigger>

Parameters The <trigger> value is a boolean expression indicating the trigger state:

- 1: active
- 0: inactive

Example SOUR:SWE:TRIG 1

Note You cannot use this command during a sweep.

See also SOUR:SWE:STEP, SOUR:SWE:STEP:LIM:LOW?, SOUR:SWE:STEP:LIM:HIGH?, SOUR:SWE:STEP?, SOUR:SWE:PAUS, SOUR:SWE:PAUS?, SOUR:SWE:PAUS:LIM:LOW?, SOUR:SWE:PAUS:LIM:HIGH? and SOUR:SWE:TRIG?

SOURce:SWEep:TRIGger?

Description This query returns the state of the input trigger option.

Syntax SOUR:SWE:TRIG?

Response A boolean expression indicating the trigger state:

- 1: active
- 0: inactive

See also SOUR:SWE:STEP, SOUR:SWE:STEP:LIM:LOW?, SOUR:SWE:STEP:LIM:HIGH?, SOUR:SWE:STEP?, SOUR:SWE:PAUS, SOUR:SWE:PAUS?, SOUR:SWE:PAUS:LIM:LOW?, SOUR:SWE:PAUS:LIM:HIGH? and SOUR:SWE:TRIG

SOURce:WAVelength

Description	This command selects a new source wavelength.
Syntax	SOUR:WAV<wsp><wave>
Parameters	The <wave> parameter represents the new wavelength in the 9999.999 nm or 999.9999 THz format.
Note	This function cannot be performed while the source is performing a sweep. If you do not specify a unit, the system will return the value in the current spectral unit (nm or THz). To specify the units you want to use, add NM or THZ after your query (e.g., SOUR:WAV<wsp><wave><wsp>NM).
Example	SOUR:WAV 1550.000
See also	SOUR:WAV?, SOUR:WAV:LIM:HIGH?, SOUR:WAV:LIM:LOW?, SOUR:WAV:LIM:STEP?, UNIT:WAV, and UNIT:WAV?

SOURce:WAVelength?

Description	This query returns the current source wavelength.
Syntax	SOUR:WAV?
Response	A value representing the current wavelength in the 9999.999 nm or 999.9999 THz format.
Note	If you do not specify a unit, the system will return the value in the current spectral unit (nm or THz). To specify the units you want to use, add NM or THZ after your query (e.g., SOUR:WAV?<wsp>NM).
See also	SOUR:WAV, SOUR:WAV:LIM:HIGH?, SOUR:WAV:LIM:LOW?, SOUR:WAV:LIM:STEP?, UNIT:WAV, and UNIT:WAV?

SOURce:WAVelength:LIMit:HIGH?

Description	This query returns the maximum wavelength that can be set with the SOUR:WAV command.
Syntax	SOUR:WAV:LIM:HIGH?
Response	A value representing the maximum available wavelength in the 9999.999 nm or 999.9999 THz format.
Note	If you do not specify a unit, the system will return the value in the current spectral unit (nm or THz). To specify the units you want to use, add NM or THZ after your query (e.g., SOUR:WAV:LIM:HIGH?<wsp>NM).
See also	SOUR:WAV, SOUR:WAV?, SOUR:WAV:LIM:LOW?, SOUR:WAV:LIM:STEP?, UNIT:WAV, and UNIT:WAV?

SOURce:WAVelength:LIMit:LOW?

Description	This query returns the minimum wavelength that can be set with the SOUR:WAV command.
Syntax	SOUR:WAV:LIM:LOW?
Response	A value representing the minimum available wavelength in the 9999.999 nm or 999.9999 THz format.
Note	If you do not specify a unit, the system will return the value in the current spectral unit (nm or THz). To specify the units you want to use, add NM or THZ after your query (e.g., SOUR:WAV:LIM:LOW?<wsp>NM).
See also	SOUR:WAV, SOUR:WAV?, SOUR:WAV:LIM:HIGH?, SOUR:WAV:LIM:STEP?, UNIT:WAV, and UNIT:WAV?

SOURce:WAVelength:LIMit:STEP?

Description	This query returns the minimum wavelength step that can be used when changing the wavelength with the SOUR:WAV command.
Syntax	SOUR:WAV:LIM:STEP?
Response	A value representing the minimum wavelength step available in the 9999.999 nm or 999.9999 THz format.
Note	If you do not specify a unit, the system will return the value in the current spectral unit (nm or THz). To specify the units you want to use, add NM or THZ after your query (e.g., SOUR:WAV:LIM:STEP?<wsp>NM).
See also	SOUR:WAV:LENG, SOUR:WAV:LENG?, SOUR:WAV:LIM:HIGH?, SOUR:WAV:LIM:LOW?, UNIT:WAV, and UNIT:WAV?

SYSTem:ERRor?

Description	This command returns the next error in the list. When an error is generated, an error number is sent to the error list. The error list is accessed with the SYST:ERR? query.
Syntax	SYST:ERR?
Response	See error list and description in *SCPI Management Errors (System Errors)* on page 135.

SYSTem:VERSion?

Description	This query reads the FLS-2600B identification string.
Syntax	SYST:VERS?
Response	“EXFO E.-O. Eng. FLS-2600B vx.xx”xxxxxxxx xxxxxxx, where xxxxxxxx xxxxxxx is the serial number and vx.xx is the current product version.
Note	This query returns the same response as the *IDN? query.

UNIT:WAVelength

Description	This command changes the spectral measurement unit (nm or THz). This command cannot be used in Sweep mode.
Syntax	UNIT:WAV<wsp><unit>
Parameters	The <unit> parameter is a boolean parameter representing the new spectral measurement unit: ➤ 1 – THz ➤ 0 – nm
Note	This command cannot be performed if the FLS-2600B is performing a sweep.
Example	UNIT:WAV 1
See also	SOUR:WAV, SOUR:WAV?, SOUR:WAV:LIM:HIGH?, SOUR:WAV:LIM:LOW?, SOUR:WAV:LIM:STEP? and UNIT:WAV?

UNIT:WAVelength?

Description	This query returns the current spectral measurement units.
Syntax	UNIT:WAV?
Response	A boolean value representing the current spectral measurement unit: ➤ 1 – THz ➤ 0 – nm
See also	SOUR:WAV, SOUR:WAV?, SOUR:WAV:LIM:HIGH?, SOUR:WAV:LIM:LOW?, SOUR:WAV:LIM:STEP? and UNIT:WAV

Programming Commands

SOURce:SWEep:CONTinuous:PROGram	
Description	This function is used to set the parameters for a continuous sweep program. During a sweep program, the application sweeps continuously between the minimum (start) and maximum (stop) wavelengths.
Syntax	SOUR:SWE:CONT:PROG<wsp>[<start>],[<stop>], [<speed>],[<coun>],[<rev>],[<trig>]
Parameters	The <start> and <stop> parameters represent the start and stop wavelengths for the sweep. The current spectral measurement unit applies (nm or THz). The format must be 9999.999 nm or 999.9999 THz. The <speed> parameter is used to set the speed of the sweep. The format must be 99.999. The <coun> parameter is the number of passes. The format must be an integer from 1 to 100 or 0 for continuous. The <rev> parameter indicates whether the reverse option is on or off. The format must be 1|0. The <trig> parameter indicates whether the trigger option is on or off. The format must be 1|0.

SOURce:SWEep:CONTinuous:PROGram

Note

You cannot use this command while the FLS-2600B is performing a sweep.

You do not have to enter all values in the command, but you must enter the values in the same order as in the Syntax section. If you want to enter only some of the values, use a comma (,) to separate the values, including the ones you did not enter.

For each value including units, such as wavelengths or speed, you can specify a unit to use in the same way as the specific commands in the previous pages. If you do not specify the units, the system will use those that are currently set.

To specify the units, add <wsp><unit> at the end of the value you want to modify. The <unit> parameter will be a wavelength unit (nm or THz) or a speed unit (nm/s or THz/s).

Examples

A complete command:

SOUR:SWE:CONT:PROG 1550.50,1600.50,10.000,25,1,1

A command changing only the speed and reverse options:

SOUR:SWE:CONT:PROG ,,10.000,,0,

A command setting the start and stop wavelengths in THz, as well as the speed in THz/s, leaving the latter at its original settings:

SOUR:SWE:CONT:PROG 196.7 THZ,186.8 THZ,5.000 THZ/S

SOURce:SWEep:CONTinuous:PROGram?

Description

This function is used to set and/or view the parameters for a continuous sweep program, during which the application sweeps between the minimum (start) and maximum (stop) wavelengths.

If you only wish to view the parameters without programming them, simply enter the query without any data following it.

Syntax

SOUR:SWE:CONT:PROG?<wsp>[<start>],[<stop>], [<speed>],[<coun>],[<rev>],[<trig>]

SOUR:SWE:CONT:PROG?

Response

The <start> and <stop> parameters are the sweep start and stop wavelengths in 9999.999 nm or 999.9999 THz format.

The <speed> parameter is the sweep speed in 99.9999 format.

The <coun> parameter is the number of passes made. The format must be an integer from 1 to 100 or 0 (continuous).

The <rev> parameter indicates whether the reverse option is on or off. The format must be 1|0.

The <trig> parameter indicates whether the trigger option is on or off. The format must be 1|0.

SOURce:SWEep:CONTinuous:PROGram?

Note

You cannot use this query while theTunable Laser Source is performing a sweep.

You do not have to enter all values in the query, but you must enter the values in the same order as in the Syntax section. If you want to enter only some of the values, use a comma (,) to separate the values, including the ones you did not enter.

For each value including units, such as wavelengths or speed, you can specify a unit to use in the same way as the specific queries in the previous pages. If you do not specify the units, the system will use those that are currently set.

To specify the units, add <wsp><unit> at the end of the value you want to modify. The <unit> parameter will be a wavelength unit (nm or THz) or a speed unit (nm/s or THz/s).

Example

A complete query:
SOUR:SWE:CONT:PROG? 1550.50,1600.50,10.000,25,1,1
A query changing only the speed and reverse options:
SOUR:SWE:CONT:PROG? ,,10.000,,0,
A query setting the start and end wavelengths in THz, as well as the speed, leaving the latter at its original settings:
SOUR:SWE:CONT:PROG? 196.7 THZ,186.8 THZ,5.000 THZ/S

SOURce:SWEep:STEPped:PROGram

Description This function is used to set the parameters for a step-by-step sweep program, during which the application sweeps between two wavelengths, stopping at preset intervals.

Syntax SOUR:SWE:STEP:PROG<wsp>[<start>],[<stop>], [<pause>], [<step>],[<cycles>],[<rev>],[<trig>]

Parameters The <start> and <stop> parameters represent the start and stop wavelengths for the sweep. The current spectral measurement units apply (nm or THz). The format must be 9999.999 nm or 999.9999 THz.

The <pause> parameter is the pause length between the steps. The format must be 59:999.

The <step> parameter is the size of the step between the measurements. The format will be 9999.999 nm or 999.9999 THz.

The <cycles> parameter is the number of cycles to be performed during the sweep. The format will be 1-99 or 0 (continuous).

The <rev> parameter indicates whether the reverse option is on or off. The format must be 1/0.

The <trig> parameter indicates whether the trigger option is on or off. The format must be 1/0.

SOURce:SWEep:STEPped:PROGram

Note

You cannot use this command during a sweep.

You do not have to enter all values in the command, but you must enter the values in the same order as in the Syntax section. If you want to enter only some of the values, use a comma (,) to separate the values, including the ones you did not enter.

For each value including units, such as wavelengths or speed, you can specify a unit to use in the same way as the specific queries in the previous pages. If you do not specify the units, the system will use those that are currently set.

To specify the units, add <wsp><unit> at the end of the value you want to modify. The <unit> parameter will be a wavelength unit (nm or THz) or a speed unit (nm/s or THz/s).

Example

A complete command:
SOUR:SWE:STEP:PROG 1570.00,1605.50,00:050,5.500,10,1,0
A command changing only the number of cycles and trigger options:
SOUR:SWE:STEP:PROG ,,,,5,,1
A command setting the start and end wavelengths in THz, as well as the pause time:
SOUR:SWE:CONT:PROG 196.7 THZ,186.8 THZ,00:100

SOURce:SWEep:STEPped:PROGram?

Description

This function is used to set and/or view the parameters for a step-by-step sweep program, during which the application sweeps between two wavelengths, stopping at preset intervals. This function also returns the validated parameters.

If you only wish to view the parameters without programming them, simply enter the query without any data following it.

Syntax

SOUR:SWE:STEP:PROG?<wsp>[<start>],[<stop>],[<pause>],[<step>],[<cycles>],[<rev>],[<trig>]

SOUR:SWE:STEP:PROG?

Parameters

The <start> and <stop> parameters represent the start and stop wavelengths for the sweep. The format must be 9999.999 nm or 999.9999 THz.

The <pause> parameter is the pause length between the steps. The format must be 59:999.

The <step> parameter is the size of the step between the measurements. The format will be 9999.999 nm or 999.9999 THz.

The <cycles> parameter is the number of cycles to be performed during the sweep. The format will be 1-99 or 0 (continuous).

The <rev> parameter indicates whether the reverse option is on or off. The format must be 1/0.

The <trig> parameter indicates whether the trigger option is on or off. The format must be 1/0.

SOURce:SWEep:STEPped:PROGram?

Note

You cannot use this query during a sweep.

You do not have to enter all values in the query, but you must enter the values in the same order as in the Syntax section. If you want to enter only some of the values, use a comma (,) to separate the values, including the ones you did not enter.

For each value including units, such as wavelengths or speed, you can specify a unit to use in the same way as the specific queries in the previous pages. If you do not specify the units, the system will use those that are currently set.

To specify the units, add <wsp><unit> at the end of the value you want to modify. The <unit> parameter will be a wavelength unit (nm or THz) or a speed unit (nm/s or THz/s).

Example

A complete query:
SOUR:SWE:STEP:PROG? 1570.00,1605,50,00:050,5.500,10,1,0
A query changing only the number of cycles and trigger options:
SOUR:SWE:STEP:PROG? ,,,,12,,0
A command setting the start and end wavelengths in THz, as well as the pause time:
SOUR:SWE:CONT:PROG? 196.7 THZ,186.8 THZ,00:200

Other Commands

SOURce:SWEep:SAVE

Description	This function is used to save the following sweep setup parameters: ➤ start wavelength, end wavelength, mode, speed, length, cycles, reverse, trigger for continuous sweep ➤ start wavelength, end wavelength, mode, step, pause, cycles, reverse, trigger for step-by-step sweepYou can save up to five configurations.
Syntax	SOUR:SWE:SAVE<wsp><number>
Parameters	The <number> parameter represents the number you want to use in the Save list. You can choose a number from 1 to 5.
Example	SOUR:SWE:SAVE 2
Note	You cannot use this command during a sweep.

SOURce:SWEep:RECAll

Description	This function is used to recall a sweep setup saved in your list.
Syntax	SOUR:SWE:RECA<wsp><number>
Parameters	The <number> parameter represents the number of the item you want to recall. You can choose a number from 1 to 5.
Example	SOUR:SWE:RECA 3
Note	You cannot use this command during a sweep.

SOURce:SWEep:RECAll?

Description	This function is used to recall from a setup in your list. It also returns the validated parameters.
Syntax	SOUR:SWE:RECA?<wsp><number>
Parameters	The <number> parameter represents the number of the item you want to recall. You can choose a number from 1 to 5.
Example	SOUR:SWE:RECA? 3
Note	You cannot use this command during a sweep.

Quick Reference Command Tree

Command					Parameter/ Response	Description
CAL	WAV				<9999.999>	Offset to correct wavelength deviation.
DISP	DIMM				<0~3>	Sets the display dimmer state.
	DIMM?				(0~3)	Displays dimmer state.
OUTP	ASE?				(0|1)	Asks if ASE source is available?
	MODE				<0|1>	Sets source mode (ASE or Tunable).
	MODE?				(0|1)	Returns source mode.
	STAT				<0|1>	Turns source on or off.
	STAT?				(1|0)	Asks if the source is active.
SOUR	MODE				<1|0>	Sets source mode (Normal or High Resolution).
	MODE?				(1|0)	Requests current source mode.

Command					Parameter/ Response	Description
SOUR	POW				<±99.99>	Sets source power.
	POW?				(±99.99)	Requests current source power.
		ALC			<0|1>	Enables the automatic power level.
		ALC?			(0|1)	Asks if automatic power level is enabled.
		LEV	IMM	AMP	<9.99 dBm> <9.999999 mW> <999.999999 μW>	Sets the output power.
				AMP?	(9.99 dBm) (9.999999 mW) (999.999999 μW)	Requests current output power.
		LIM	HIGH?		(±9.9)	Returns max. source power.
			LOW?		(±9.9)	Returns min. source power.
			STEP?		(±9.9)	Returns min. power step.
	SWE	MODE			<0|1>	Sets source sweep mode (continuous or step-by-step).

Command					Parameter/ Response	Description
SOUR	SWE	MODE?			(0|1)	Requests current source sweep mode.
	SWE	CENT?			(9999.999) [nm] (999.9999) [THz]	Requests central wavelength.
		COUN			<99>	Sets number of repetitions.
		COUN?			(99)	Requests number of repetitions.
		REP			<0|1>	Sets loop.
		REP?			(1|0)	Asks of loop active.
		REV			<0|1>	Sets reverse function.
		REV?			(1|0)	Asks if reverse function active.
		STAR	WAV		<9999.999> [nm] <999.9999> [THz]	Sets start wavelength.
		STAR	WAV?		(9999.999) [nm] (999.9999) [THz]	Requests current start wavelength.
		STOP	WAV		<9999.999> [nm] <999.9999> [THz]	Sets stop wavelength.
		STOP	WAV?		(9999.999) [nm] (999.9999) [THz]	Requests current stop wavelength.

Command					Parameter/ Response	Description
SOUR	SWE	SPAN?			(9999.999) [nm] (999.9999) [THz]	Returns wavelength span.
		SPE			<speed>	Sets sweep speed.
		SPE?			(99.999) [nm]	Requests current sweep speed.
		SPE	LIM	HIGH?	(99.999) [nm]	Requests maximum sweep speed.
		SPE	LIM	LOW?	(99.999) [nm]	Requests minimum sweep speed.
		STAT			<1|0>	Turns sweep on or off.
		STAT?			(1|0)	Asks if sweep active.
		DUR?			(99:59:59:999)	Requests total sweep duration.
		STEP			<9999.999> [nm]	Sets wavelength step.
		STEP?			(9999.999) [nm]	Requests wavelength step.
SOUR	SWE	STEP	LIM	HIGH?	(9999.999) [nm]	Requests maximum wavelength step.

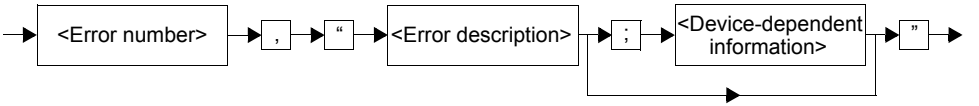
Command					Parameter/ Response	Description
			LIM	LOW?	(9999.999) [nm]	Requests minimum wavelength step.
		PAUS			<59,999> [s,ms]	Sets minimum length of pause.
		PAUS?			(59:999) [ms]	Requests minimum length of pause.
			LIM	HIGH?	(59:999) [ms]	Requests largest available pause.
			LIM	LOW?	(59:999) [ms]	Requests smallest available pause.
		TRIG			<1|0>	Sets Trigger In option.
		TRIG?			(1|0)	Asks if Trigger In option on?
	WAV				<9999.999> [nm] <999.9999> [THz]	Sets wavelength.
	WAV?				(9999.999) [nm] (999.9999) [THz]	Requests wavelength.
		LIM	HIGH?		(9999.999) [nm] (999.9999) [THz]	Requests max. wavelength.
SOUR	WAV	LIM	LOW?		(9999.999) [nm] (999.9999) [THz]	Requests min. wavelength.

Command					Parameter/ Response	Description
		LIM	STEP?		(9999.999) [nm] (999.9999) [THz]	Requests min. wavelength step.
SYST	ERR?				Error code	Asks for next error in list.
	VERS?				Current version	Requests identification string.
UNIT	WAV				<1|0>	Sets wavelength unit.
	WAV?				(1|0)	Requests wavelength unit.
SOUR	SWE	CONT	PROG		See command details	Programs settings for continuous sweep.
			PROG?		See query details	Programs and requests settings for continuous sweep.
		STEP	PROG		See command details	Programs settings for stepped sweep.
SOUR	SWE	STEP	PROG?		See query details	Programs and requests settings for stepped sweep.
		SAVE			<1~5>	Saves sweep configuration.

Command					Parameter/ Response	Description
SOUR	SWE	RECA			<1~5>	Recalls sweep configuration.
		RECA?			(1~5)	Asks which sweep configuration is recalled.

Error Messages

System- and device-specific errors are managed by the FLS-2600B. The generic format for error messages is illustrated below.



As shown in the figure above, the message contains three parts: the error number, the error description, and device-dependent information. All error messages are stacked in a FIFO buffer. When there is at least one message in the buffer, bit 2 of the Status Byte Register is set to 1. Use the command SYST:ERR? to read the most recent message. The error message buffer is initialized when starting the FLS-2600B, when executing the command *CLS, or by reading the last message stored in the buffer.

- Error messages ending in a negative number are SCPI-based errors.
- Error messages ending in a positive number are specific to the FLS-2600B.

SCPI Management Errors (System Errors)

Error Number	Description	Probable Cause
–100	Command error	The SCPI Manager does not recognize the command, probably due to invalid module address.
–104	Data-type error	A data parameter is not the expected data type.
–108	Parameter not allowed	Too many parameters were detected for the specified command.
–109	Missing parameter	A required parameter was not detected.
–113	Undefined header	The SCPI Manager does not recognize the command, probably due to incorrect grammar.
–130	Suffix error	An error occurred while parsing a suffix.
–131	Invalid suffix	The suffix does not follow the appropriate syntax or is inappropriate for this device.
–138	Suffix not allowed	A suffix was encountered after a numeric element that does not allow suffixes.
–200	Execution error	An error occurred while executing the command.
–222	Parameter out of range	The Tunable Laser Source has received a data parameter outside the valid range.

Error Number	Description	Probable Cause
–224	Illegal parameter value	The Tunable Laser Source has received an unexpected parameter.
–280	Program error	A program error occured.
–284	Program currently running	A command, not allowed by the application, was sent.
–300	Device-dependent error	The Tunable Laser Source did not respond to the command within the given time-out value.
–321	Out of memory	An internal operation needed more memory than was available.
–350	Queue overflow	This is a specific code entered into the queue in lieu of the code that caused the error. This code indicates that there is no room in the queue and an error occurred but was not recorded.
–365	Time-out error	The Tunable Laser Source did not respond to the command within the given time-out period.
–400	Query error	Attempt to read an empty buffer or buffer data has been lost.
–500	System error	System is out of memory.

FLS-2600B Error and Warning Messages

Error or warning Number	Description	Recommended Action
–11	Nulling was not performed correctly.	Restart your Tunable Laser Source.
–12	The Tunable Laser Source returns the wrong identification.	Contact EXFO.
–20	There was a communication error with the module.	Restart your Tunable Laser Source.
–25	There was a checksum error while reading the source's FIFO.	Restart your Tunable Laser Source.
–30	The command was not accepted and has been lost.	Verify if program resumed after having lost a command. Rerun the program.
–31	A setting sent to the tunable laser source is wrong.	Review command before sending it again.
–32	Command sent while tunable laser source is active.	Wait until Tunable Laser Source is done before sending a command.
–34	Too many commands sent at the same time.	Wait until the Tunable Laser Source is done before sending more commands.
–40	The FIFO in the Tunable Laser Source is not ready for reading.	Wait for the FIFO to be ready.
–60	A problem occurred with the current going to the laser.	Contact EXFO.

Error or warning Number	Description	Recommended Action
–61	A problem occurred with the thermo-electric cooler.	Contact EXFO.
–62	The Flash memory was not detected by the tunable laser source.	Contact EXFO.
–63	The Flash reading was not performed in the set delays.	Contact EXFO.
–64	The EEPROM was not detected.	Contact EXFO.
–65	A checksum error was detected by the Tunable Laser Source.	Contact EXFO.
–66	A problem occurred while the motor was moving.	Contact EXFO.
–67	The Tunable Laser Source index was lost.	Restart the Tunable Laser Source.
–68	The Tunable Laser Source is outside its temperature settings.	Ensure that the ambient temperature is within the Tunable Laser Source's range.
–69	An FPGA problem was detected.	Contact EXFO.
–71	An error occurred during a sweep.	Retry your sweep.
–72	An EEPROM error has been detected.	Contact EXFO.
–100	A command could not be added to the command pipe.	Avoid turning the selection dial while the Tunable Laser Source is performing a sweep.

Error or warning Number	Description	Recommended Action
–101	The command request was not performed in the set time amount.	Retry command or wait until there are no commands in the pipe.
–102	The command was not performed by the Tunable Laser Source due to a runtime error.	Contact EXFO.
–103	A command has triggered an invalid response from the Tunable Laser Source.	Retry the command.
–200	The Tunable Laser Source had difficulties while downloading or decomposing information.	Restart the Tunable Laser Source.
–1106	The sweep parameter not in the range expected by the SOUR:SWE:STAT SCPI command.	Modify your sweep parameters so that they are all within the acceptable range.
–32244	An overflow occurred while running a command.	Restart the Tunable Laser Source.
–32245	Not enough RAM to run the command.	Restart the Tunable Laser Source.
–32246	The Tunable Laser Source used a command not intended for it.	Restart the Tunable Laser Source.
–32300	Not enough space in the Heap.	Restart the Tunable Laser Source.
–32301	Not enough RAM to run the command.	Restart the Tunable Laser Source.

Error or warning Number	Description	Recommended Action
–32302	Not enough RAM to run the command.	Restart the Tunable Laser Source.
–32303	The Tunable Laser Source attempted to perform a division by zero.	Restart the Tunable Laser Source.
–32304	A table index is outside the boundaries set by the array.	Restart the Tunable Laser Source.
–32305	The Tunable Laser Source did not recognize the binary code.	Restart the Tunable Laser Source.

GPIB Troubleshooting

Problem	Probable Cause	Solution
Unable to communicate with the Tunable Laser Source (no response from *IDN? command).	Incorrect communication type selected.	Select the correct communication type: RS-232, GPIB, or DDE.
	Incorrect communication parameters.	Check the communication parameters: bus address, baud rate, flow control, etc., as required.
	Incorrect termination characters.	Synchronize termination characters between the GPIB controller and the SCPI Manager.
	Poor bus connection.	Ensure the functioning of the controller card and make sure that the bus cable is properly connected.
	Improper configuration.	Verify that the GPIB interface is properly configured.
Unstable communications.	Incorrect termination character.	Synchronize termination characters between the GPIB Controller and the SCPI Manager.

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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。

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