User Guide

IQS-2100

Light Source for IQS Platforms

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Telecom Test and Measurement

EXFO
EXPERTISE REACHING OUT

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Units of Measurement

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

Version number 2.0.0

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Certification Information

F.C.C. 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 EN61326 standard prescribes both emission and immunity requirements for laboratory, measurement, and control equipment. This unit has undergone extensive testing according to the European Union Directive and Standards.

IMPORTANT

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

EXFO CE DECLARATION OF CONFORMITY

Application of Council Directive(s):	73/23/EEC - The Low Voltage Directive 89/336/EEC - The EMC Directive And their amendments
Manufacturer's Name:	EXFO Electro-Optical Engineering Inc.
Manufacturer's Address:	400 Godin Avenue Quebec, Quebec Canada, G1M 2K2 (418) 683-0211
Equipment Type/Environment:	Test & Measurement / Industrial
Trade Name/Model No.:	IQS-2100 Light Source

Standard(s) to which Conformity is Declared:

EN 61010-1:2001	**Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements.**
EN 60825-1:1994 +A11:1996 +A2: 2001 +A1: 2002	**Safety of laser products – Part 1: Equipment classifications, requirements, and user's guide**
EN 61326:1997 +A1: 1998 +A2: 2001	**Electrical Equipment for Measurement, Control and Laboratory Use - EMC Requirements**
EN 55022: 1998 +A1: 2000	**Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment.**

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

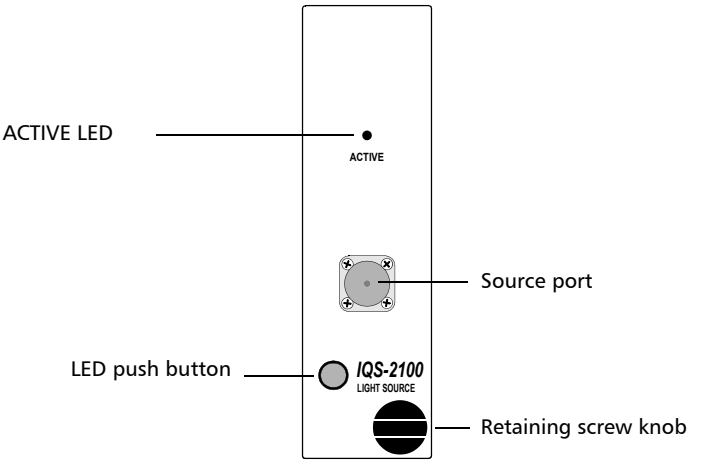
Manufacturer
Signature:

Full Name: Stephen Bull, E. Eng
Position: Vice-President Research and Development
Address: 400 Godin Avenue, Quebec (Quebec), Canada, G1M 2K2
Date: January 7, 2002

1 Introducing the IQS-2100 Light Source

Main Features

The IQS-2100 Light Source is designed for scientific and industrial applications using the IQS Platforms. The IQS-2100 Light Source includes a choice of multimode LEDs and temperature-stabilized single-mode Fabry-Perots laser emitters, in single- and dual-wavelength configurations, for both singlemode and multimode test applications.



The IQS-2100 Light Source is designed for optimal stability. Steady drive circuitry maximizes optical output power and maintains excellent stability, while precision optical components ensure efficient, low-loss, narrow-beam output coupling. Laser sources are stabilized by thermoelectric Peltier coolers that regulate submount internal temperature.

A single-operation display screen lets you activate sources and select signal wavelength, power, and modulation characteristics. The emitter's central wavelength is also displayed. For easy repeat access, the software stores multiple power level and modulation configurations. Its Windows-based software allows the IQS-2100 Light Source to integrate easily into any test system.

The IQS-2100 Light Source supports local control (via the IQS Manager software) and remote control (through GPIB, RS-232, or Ethernet TCP/IP using SCPI commands or the provided LabVIEW drivers). For more information, refer to the *IQS platform* user guide.

Available Models

The IQS-2100 Light Source offers different models, which are distinguished by characteristics such as the type of LED or laser used:

- Fabry-Perot laser
- Surface-Emitting LED

Typical Applications

This light source is suitable for quality control, calibration, acceptance testing, and loss and return loss testing in laboratory and manufacturing environments.

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

WARNING

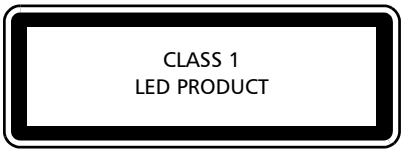
Do not install or terminate fibers while a light source is active. Never look directly into a live fiber and ensure that your eyes are protected at all times.

WARNING

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

Your instrument is a Class 1 laser or LED product in compliance with standards IEC 60825-1 Amendment 2: 2001 and 21 CFR 1040.10. Laser radiation may be encountered at the output port.

The following labels indicate that a product contains a Class 1 source:



Note: *Labels shown for information purposes only. They are not affixed to your product.*

3 Getting Started with Your Light Source

Inserting and Removing Test Modules

CAUTION

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

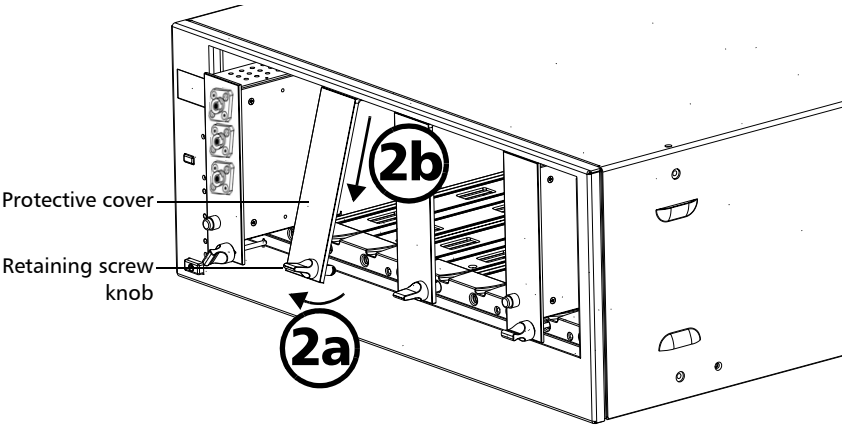
To insert a module into the controller or expansion unit:

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

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

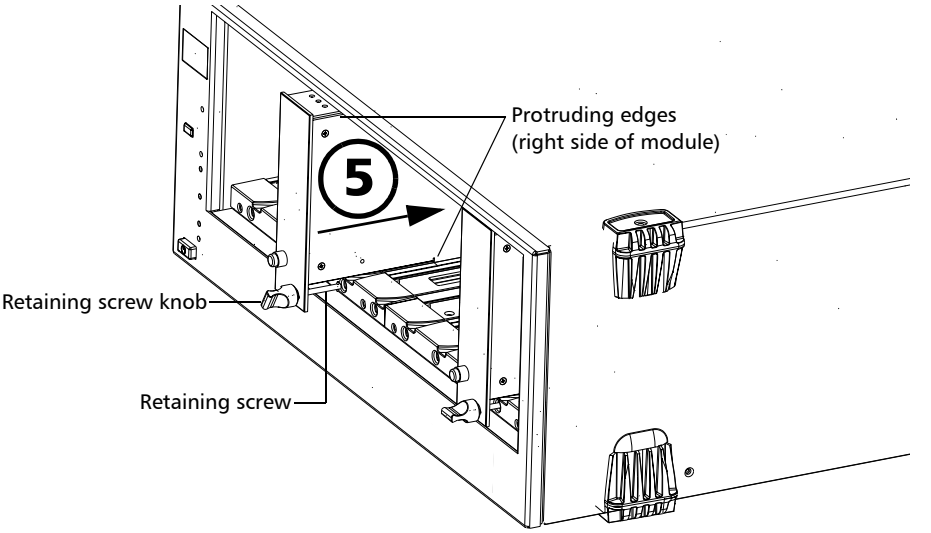
2a. Pull the retaining screw knob firmly towards you and release the bottom of the cover.

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



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

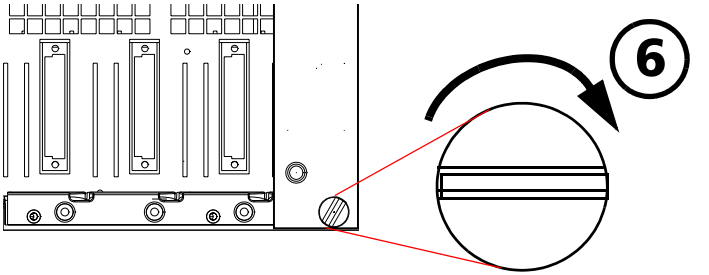
4. Insert the protruding edges of the module into the grooves of the unit's module slot.



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

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

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



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

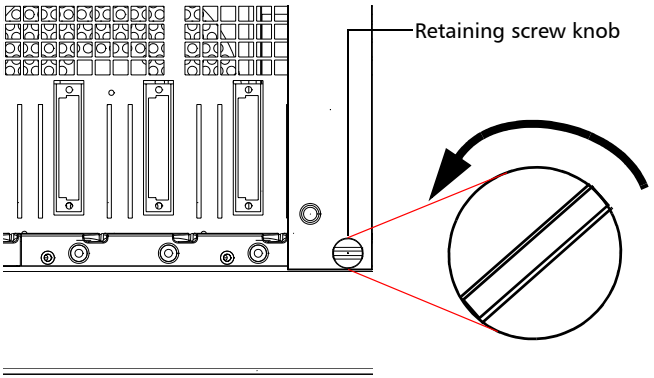
When you turn on the controller unit, the startup sequence will automatically detect your module.

Note: *You can insert IQ modules into your controller or expansion unit; the IQS Manager software will recognize them. However, the IQS-2100 locking mechanism (retaining screw) will not work for IQ modules.*

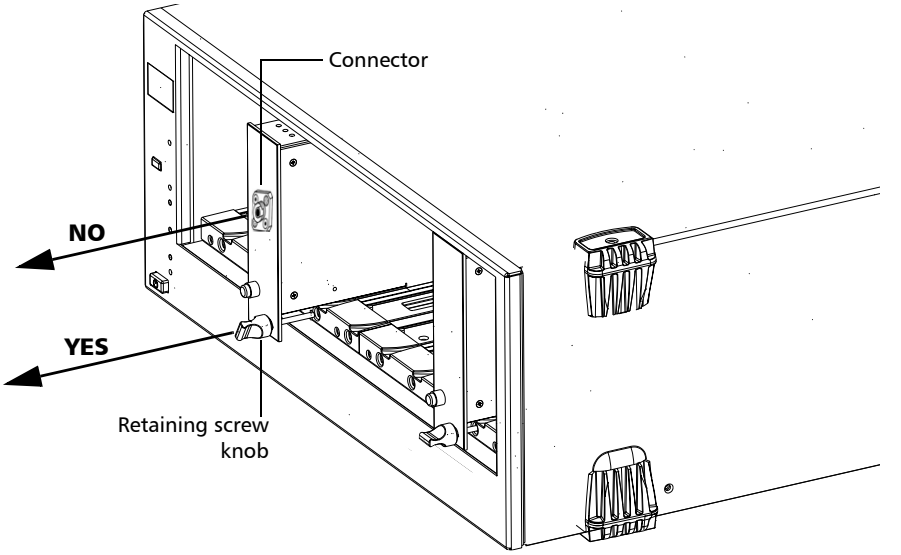
To remove a module from your controller or expansion unit:

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

The module will slowly be released from the slot.



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



CAUTION

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

3. Cover empty slots with the supplied protective covers.

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

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

CAUTION

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

Starting the Light Source Application

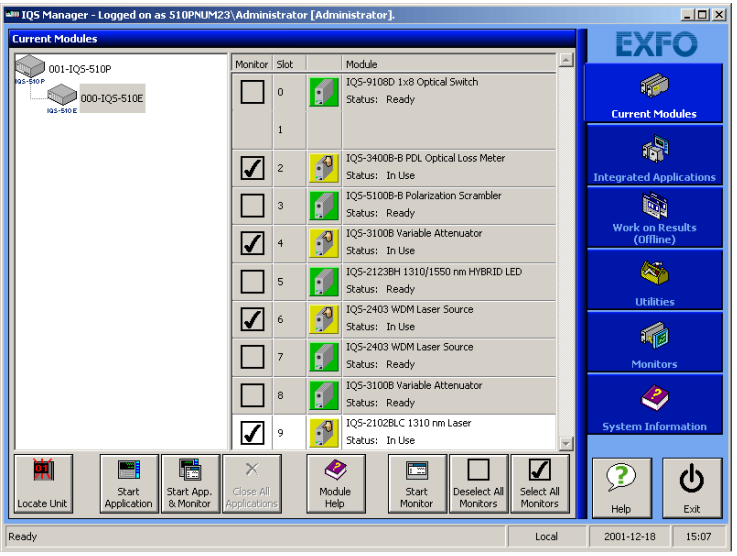
Your IQS-2100 Light Source module can be configured and controlled from its dedicated IQS Manager application.

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

To start the application:

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

   It will turn white to indicate that it is highlighted.



2. Click **Start Application**.

   OR

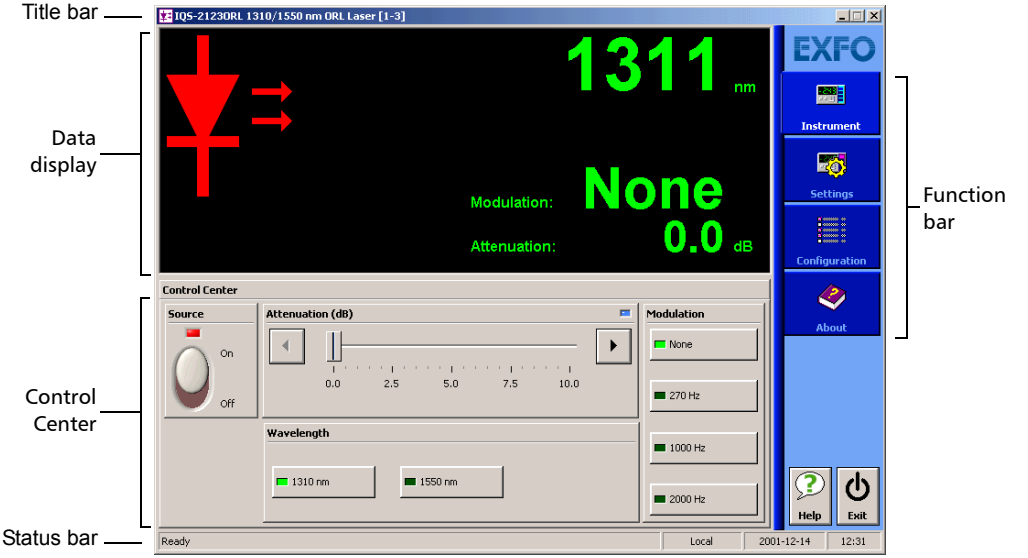
   Press the green LED push button on the front of the corresponding module.

   You can also double-click its row.

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

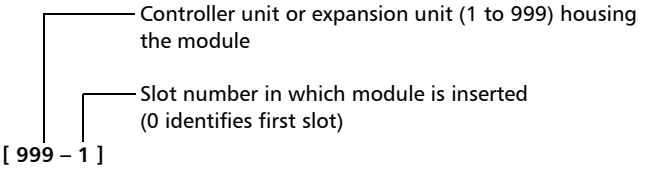
Note: *To start the corresponding monitor window at the same time, click* ***Start App. & Monitor****. The window opens on the* ***Monitors*** *function tab.*

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



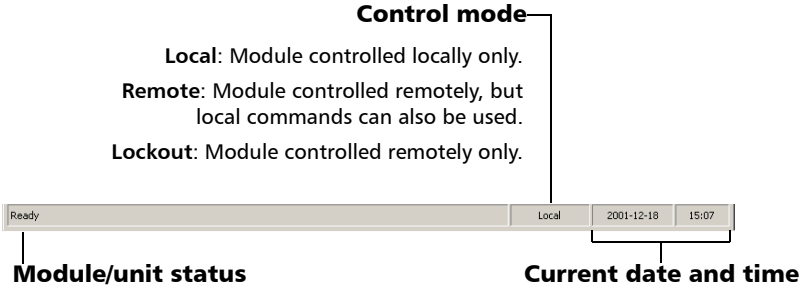
Title Bar

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



Status Bar

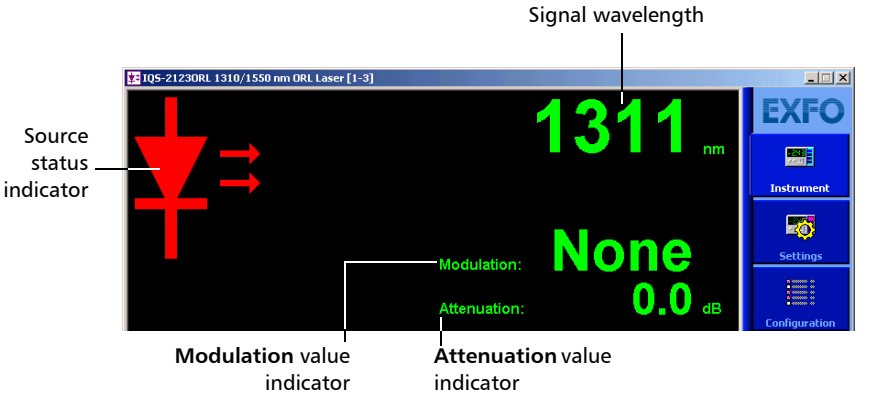
The status bar, located at the bottom of the main window, identifies the operational status of the IQS-2100 Light Source.



For more information about automating or remotely controlling the IQS-2100 Light Source, refer to your platform user guide.

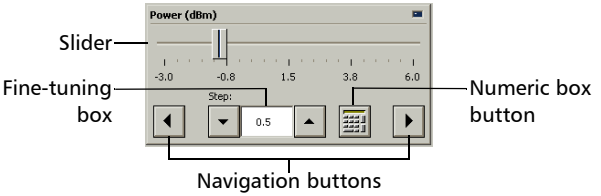
Data Display

In addition to the **Control Center**, the main window also contains the data display, where the source status indicator, as well as values for wavelength, modulation, and attenuation controls are shown (see figure below).



Entering Values Using Sliders and Numeric Boxes

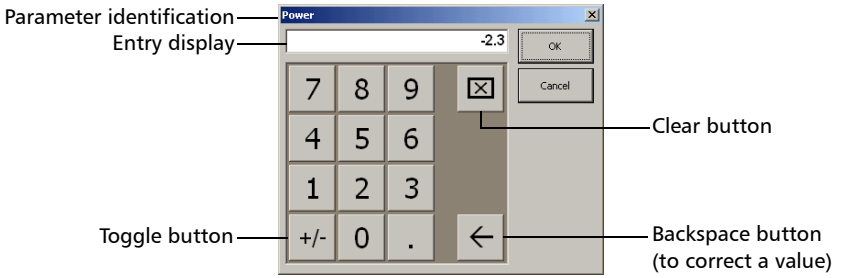
Many parameters in IQS Manager and module applications can be set using the following tools.



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

To enter a value using the numeric box:

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



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

Exiting the Application

Closing any application that is not currently being used is a good way to free system memory.

To close the application from the main window:

Click  in the top right corner of the main window.

OR

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

To close all currently running applications:

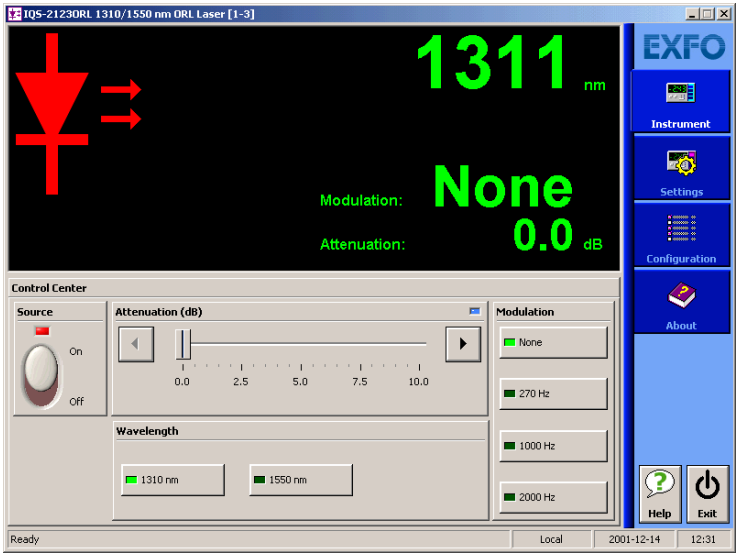
From IQS Manager, click **Close All Applications**.

4 Setting Up Your Light Source

Light source features are controlled with the Windows-compatible IQS Manager software. Please refer to the IQS Platforms user guides for information regarding the IQS-500/600 Controller Units and IQS Manager software conventions.

The source is controlled and operated from within the **Control Center**. Depending on your source model, some or all of the following operations are available:

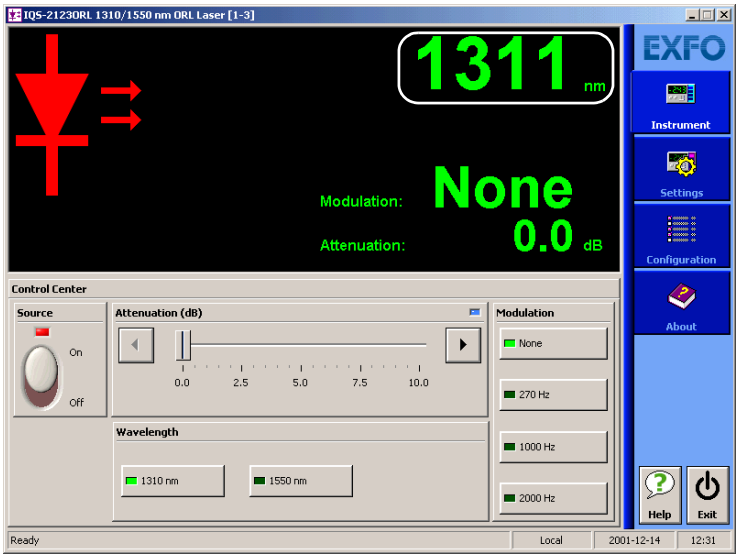
- selecting wavelength (for dual-wavelength modules only)
- setting attenuation
- selecting modulation
- saving and recalling a configuration



Note: *You do not need to turn on the IQS-2100 Light Source or connect it to a DUT to set it up. To turn on the source, see* Operating Your Light Source *on page 25.*

Selecting a Wavelength

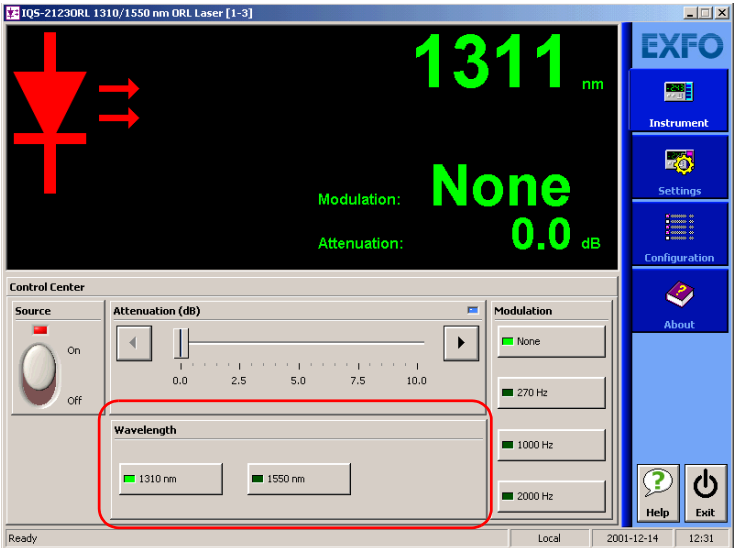
If you are using a dual-wavelength module, you can select a wavelength to perform your tests. When the source is activated, the wavelength appears in the top right corner.



To select the desired wavelength:

Click the appropriate button in the **Wavelength** panel. A green light identifies the selected wavelength.

To indicate a successful wavelength selection, the message **Stabilization in progress...** appears on the data display (only if the source is an active laser).



You can also select a wavelength from the QuickTools utility. For details, see *Monitoring Light Source Modules* on page 29.

Note: *The wavelengths specified in the **Wavelength** panel are the measured wavelengths of the optical sources (to the nearest 1 nm for FP lasers, and to the nearest 10 nm for LED sources).*

Setting the Attenuation

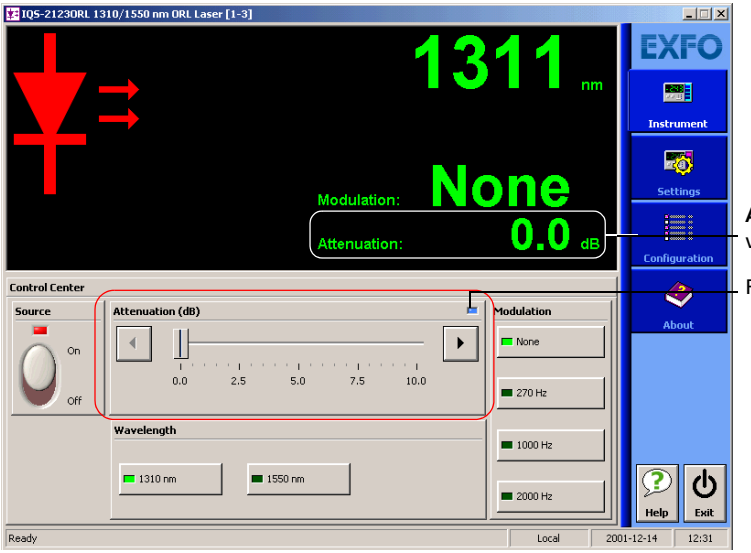
You can modify the power of the IQS-2100 Light Source output by attenuating the emitted signal.

With some IQS-2100 Light Source models, the **Attenuation** control is grayed out during the stabilization period, which occurs after you have selected a wavelength if the source is activated.

To set the source attenuation:

1. Select the **Instrument** function tab.
2. Adjust the attenuation of the laser signal emitted by the source from the **Attenuation (dB)** panel. For details, see *Entering Values Using Sliders and Numeric Boxes* on page 15.

The attenuation value increases or decreases by increments of 0.1 dB.



The attenuation value in the data display will then indicate the increased or decreased attenuation.

As you change the attenuation value, you will notice that the numbers change from green to orange. After you release the attenuation controls, they revert to their original green color to indicate that the change has been applied to the source (when it is active). The focus indicator rectangle on the control turns blue when setting the attenuation value.

The attenuation value indicator on the data display (see preceding figure) indicates the level of attenuation in dB, selected using the attenuation controls.

You can also set attenuation from the QuickTools utility. For details, see *Monitoring Light Source Modules* on page 29.

Note: *To obtain maximum output power, attenuation should be set to* 0.0 dB *and modulation should be set to* None.

Selecting a Modulation Frequency

You can modulate the laser output of the IQS-2100 Light Source to simulate data transfer. A number of modulation frequencies are available.

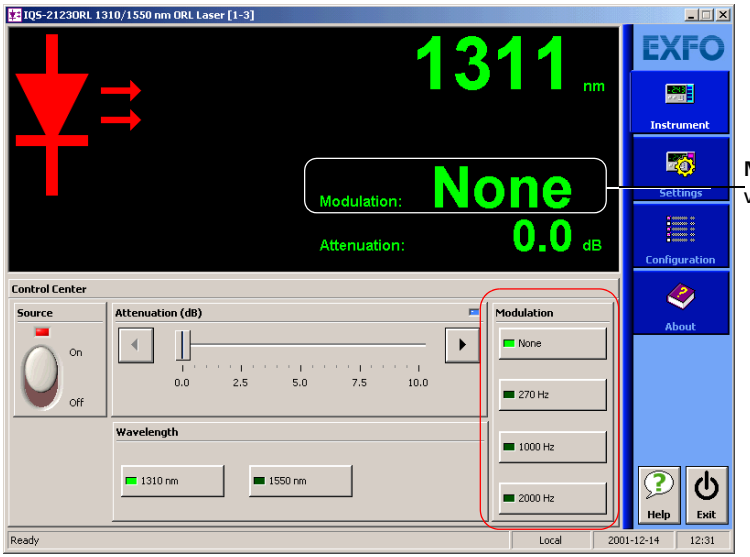
To select a modulation frequency:

1. Select a modulation frequency by choosing a value in the **Modulation** panel, as shown in the following figure.

   A green light identifies the selected modulation frequency.

   To indicate a successful selection, **Stabilization in progress** appears in the data display (only if the source is an active laser).

The **Modulation** value indicator in the data display indicates the source modulation frequency selected.



2. You can also select a modulation frequency from the QuickTools utility. For details, see *Monitoring Light Source Modules* on page 29.

Note: *The internal modulation is full on/off modulation at a 50 % duty cycle.*

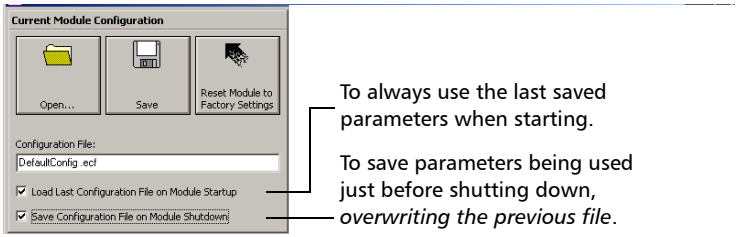
Saving and Recalling Configurations

Once you have set the IQS-2100 Light Source parameters, you can save your custom configuration and recall it at any time. You can also recall the factory-defined settings.

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

To save a configuration:

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



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

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

3. Click **Save**.

To recall a configuration:

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

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

To revert to factory settings:

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

IMPORTANT

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

IMPORTANT

The operation may take a few seconds to complete.

5 Operating Your Light Source

Once you have set your source parameters, you are ready to use the source in a test setup.

To operate the source, you must perform the following steps:

- Connect the source to other test components.
- Activate or deactivate the source.

Cleaning and Connecting Optical Fibers

IMPORTANT

To ensure maximum power and to avoid erroneous readings:

- **Always clean fiber ends 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. Clean the fiber ends as follows:

   1a. Gently wipe the fiber end with a lint-free swab dipped in isopropyl alcohol.

   1b. Use compressed air to dry completely.

   1c. Visually inspect the fiber end to ensure its cleanliness.

2. 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.

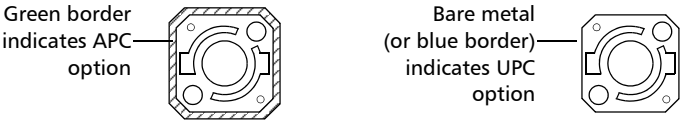
3. Push the connector in so that the fiber-optic cable is firmly in place, thus ensuring adequate contact.

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.*

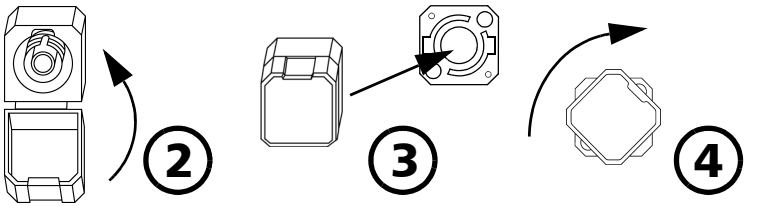
Installing the EXFO Universal Interface (EUI)

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 EU connector adapter so the dust cap opens downwards.



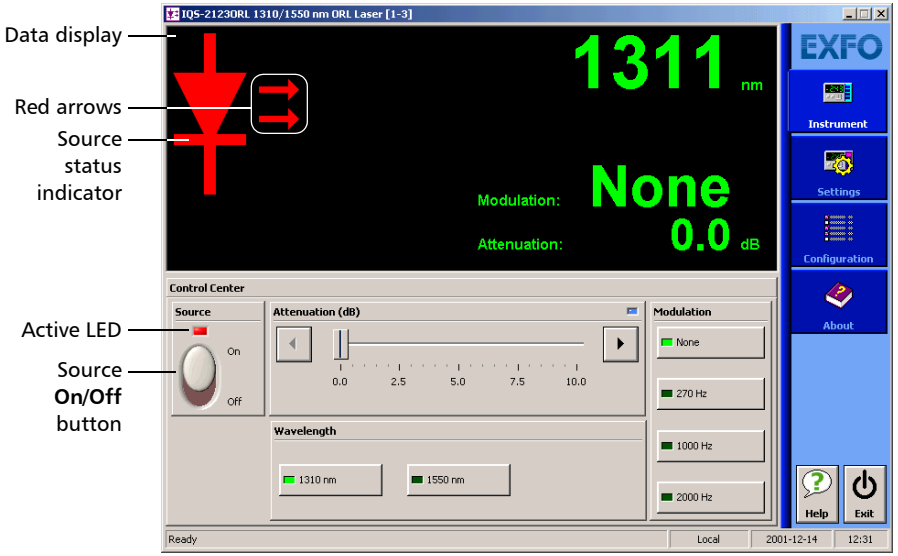
2. Close the dust cap in order to hold the connector adapter more firmly.

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 or Deactivating Light Emission

Before activating the source, read carefully *Safety Information* on page 5. Upon source activation, the set parameter values are used. Therefore, make sure the source setup is correct before activation.



To activate or deactivate light emission:

➤ Select **ON** to activate the light emission. The ACTIVE LED on the module's front panel lights up, indicating that the source is active.

The data display lights up and two red arrows appear beside the status indicator on the data display, indicating that the source is on (see preceding figure).

➤ Select **OFF** to deactivate the light emission. The ACTIVE LED on the module's front panel turns off, indicating that the source is off.

The status indicator on the data display is dimmed and the two red arrows disappear from the data display indicating that the source has been deactivated.

Note: *You should let the source warm up for 30 minutes to obtain optimum wavelength stability.*

You can also activate or deactivate the light source from the QuickTools utility. For more information, see *Monitoring Light Source Modules* on page 29.

Viewing Results

You cannot view results directly using the IQS-2100 Light Source software. To view results, you must use modules and systems which perform tests. For more information, refer to test modules or system user guides, or call EXFO.

6 Monitoring Light Source Modules

When using your IQS-2100 Light Source module, either alone or with other modules in a test setup, you can view module data and status using its monitor window in IQS Manager.

Using Monitor Windows

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

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

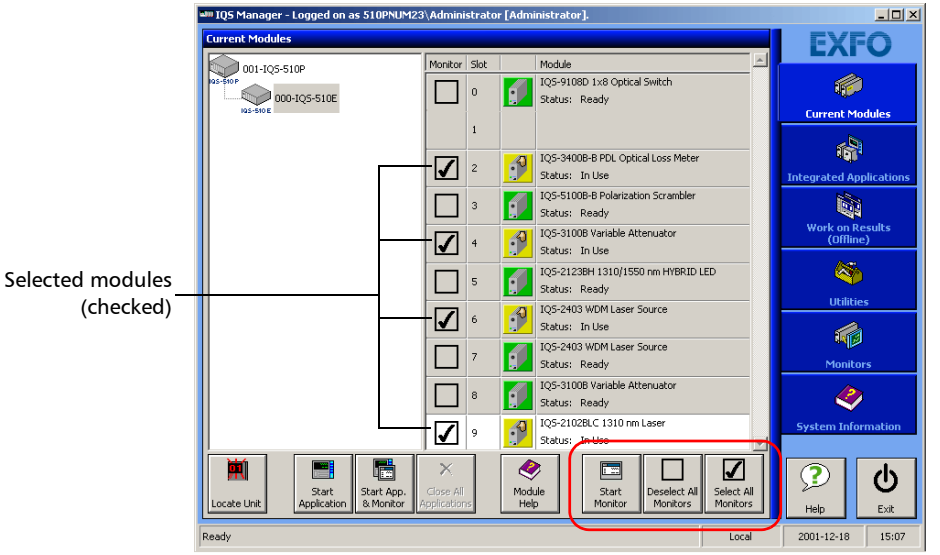
- opening the module application to access all the functions

  OR

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

To select modules and display their monitor windows:

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



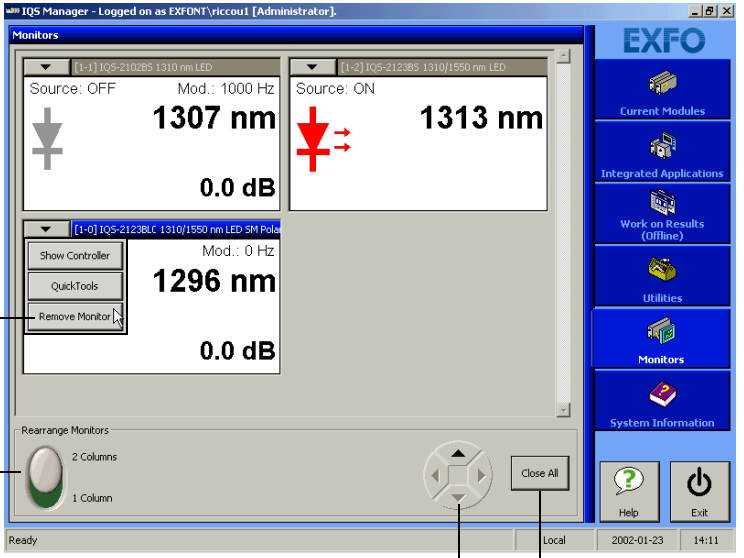
2. In the **Monitor** column, select the box next to each module you want to monitor.

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

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

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

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



Remove Monitor button

Rearrange Monitors button (1 or 2 columns)

Monitor window arrow buttons

Close All button

Using QuickTools

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

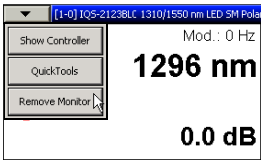
Note: *You can only access QuickTools if the module's monitor window is selected from the* ***Monitors*** *function tab and is currently active.*

To start QuickTools:

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

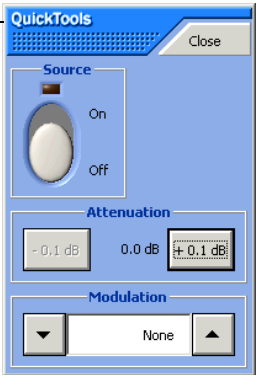
   The corresponding monitor window flashes when QuickTools is activated.

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

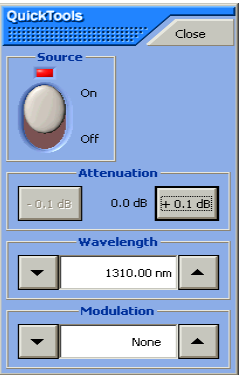


For the IQS-2100 Light Source, one of the two QuickTools utility versions will be displayed, depending on the selected module, as shown in the following figure.

Single-wavelength source QuickTools utility



Dual-wavelength source QuickTools utility



To control a specific source with QuickTools:

Make sure that the IQS-2100 Light Source monitor window is selected (its title bar should be displayed in the same color as the sidebar buttons).

➤ Turn the source on (for more information, see *Activating or Deactivating Light Emission* on page 27).

➤ From the **Attenuation** section, click the **-0.1 dB** and **+0.1 dB** buttons to increase or lower the attenuation by increments of 0.1 dB. The current Attenuation value is displayed between the button (for details, see *Setting the Attenuation* on page 20).

Note: *To obtain maximum output power, the attenuation should be set to 0.0 dB and modulation should be set to None.*

➤ From the **Wavelength** section, you can select a wavelength by clicking the selection arrows on both sides of the list (for details, see *Selecting a Wavelength* on page 18).

Note: *For single-source IQS-2100 modules, the **Wavelength** panel is not displayed.*

➤ From the **Modulation** section, select a modulation frequency by clicking the selection arrows on both sides of the list (for details, see *Selecting a Modulation Frequency* on page 22).

To close QuickTools:

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

OR

➤ Click outside the QuickTools window.

To close a monitor window:

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

OR

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

7 Maintenance

To help ensure long, trouble-free operation:

- Always clean fiber-optic connectors before using them.
- 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 and let the unit dry completely.

WARNING

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

Cleaning Fixed Connectors

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

To clean fixed connectors:

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

IMPORTANT

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

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

IMPORTANT

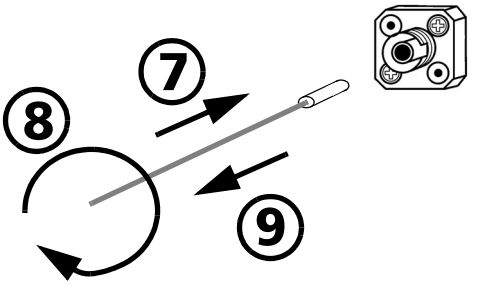
Isopropyl alcohol takes approximately ten seconds to evaporate. Since isopropyl alcohol is not absolutely pure, evaporation will leave microscopic residue. Make sure you dry the surfaces before evaporation occurs.

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

IMPORTANT

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

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



8. Gently turn the cleaning tip one full turn.

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

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

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

11. Throw out the cleaning tips after one use.

Cleaning EUI Connectors

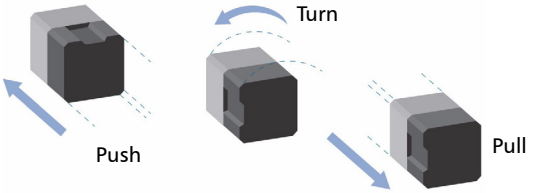
Regular cleaning of EUI connectors will help maintain optimum performance. There is no need to disassemble the unit.

IMPORTANT

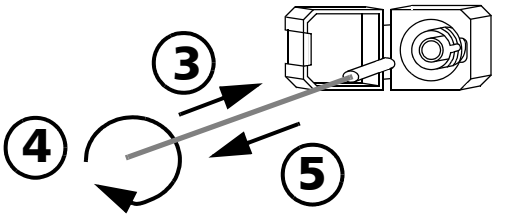
If any damage occurs to internal connectors, the module casing will have to be opened and a new calibration will be required.

To clean EUI connectors:

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



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



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

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

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

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

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

IMPORTANT

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

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

   6b. Gently wipe the connector and ferrule.

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

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

WARNING

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

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

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

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)

Recycle or dispose of your product (including electric and electronic accessories) properly, in accordance with local regulations. Do not dispose of it in ordinary garbage receptacles.

This equipment was sold after August 13, 2005 (as identified by the black rectangle).

- Unless otherwise noted in a separate agreement between EXFO and a customer, distributor or commercial partner, EXFO will cover costs related to the collection, treatment, recovery and disposal of end-of-lifecycle waste generated by electronic equipment introduced after August 13, 2005 to an European Union member state with legislation regarding Directive 2002/96/EC.
- Except for reasons of safety or environmental benefit, equipment manufactured by EXFO, under its brand name, is generally designed to facilitate dismantling and reclamation.

For complete recycling/disposal procedures and contact information, visit the EXFO Web site at www.exfo.com/recycle.

8 Troubleshooting

Solving Common Problems

The following is a list of common problems along with their possible causes and some recommended actions to solve them.

Note: *In all cases, if problem persists after performing the recommended actions, contact EXFO.*

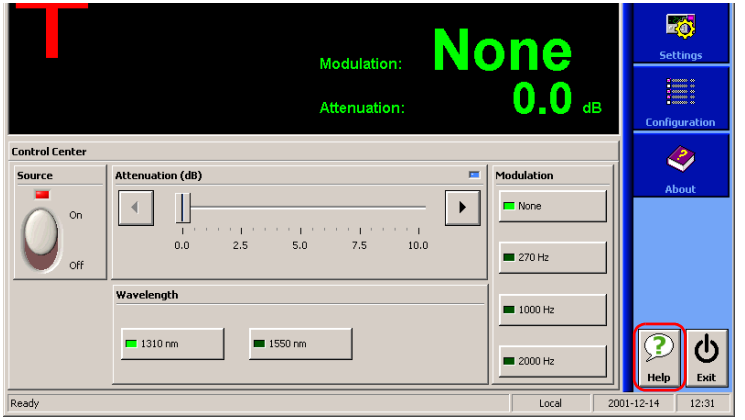
Problem	Possible Cause	Recommended Action
LED push button does not light up.	Power not on.	Check AC power cord and turn on the IQS-500/600 Controller or Expansion Unit
	Module is not properly inserted.	Turn off the IQS-500/600 Controller or Expansion Unit, then remove and reinstall the module.
	Computer is locked up.	Reboot the IQS-500/600 Controller Unit.
	LED is burnt.	Call EXFO.
Pushing the LED push button does not open the module main window.	Computer is locked up.	Reboot the IQS-500/600 Controller Unit.
Impossible to open a window.	Too many windows are open at the same time.	Close unused windows, then try to open the needed window again.

Viewing Online Documentation

An online version of the IQS-2100 Light Source user guide is available at all times from the application.

To access the online user guide:

Click **Help** in the function bar.



Contacting the Technical Support Group

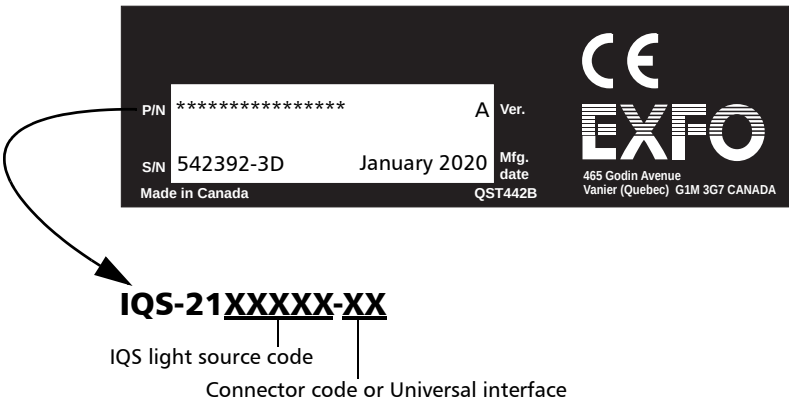
To obtain after-sales service or technical support for this product, contact EXFO at one of the following numbers. The Technical Support Group is available to take your calls from Monday to Friday, 8:00 a.m. to 7:00 p.m. (Eastern Time in North America).

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

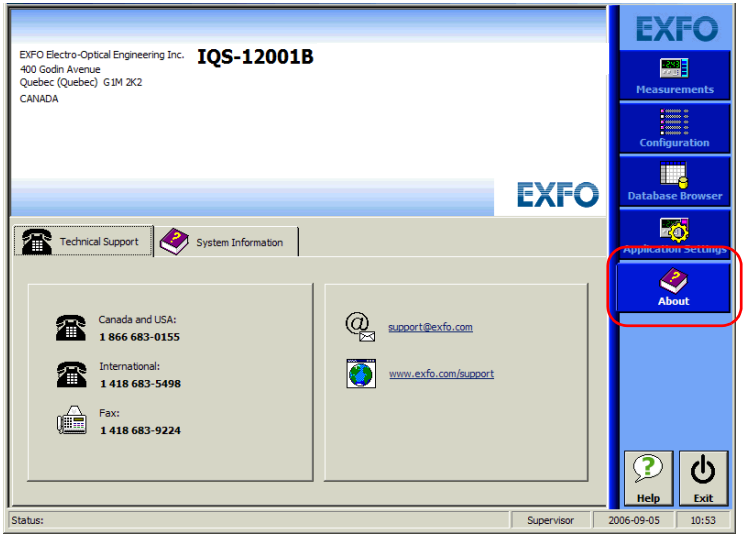
Technical Support Group
400 Godin Avenue
Quebec (Quebec) G1M 2K2
CANADA

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

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



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



- Select the **Technical Support** tab to view phone numbers and active Internet links to EXFO's Technical Support Group. Use these links to send an information request by email or to access EXFO's web site.
- Select the **Module Information** tab to view the module identification, serial number and firmware version.

Transportation

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

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

9 Warranty

General Information

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

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

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

Liability

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

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

Exclusions

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

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

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 52). 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 RMAnumber.*

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 52).

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
Fax: +44 2380 246801
europe.service@exfo.com

EXFO China Service Center/
Beijing OSIC
Beijing New Century Hotel
Office Tower, Room 1754-1755
No. 6 Southern Capital Gym Road
Beijing 100044
P. R. CHINA

Tel.: +86 (10) 6849 2738
Fax: +86 (10) 6849 2662
beijing.service@exfo.com

A Technical Specifications

IMPORTANT

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

SPECIFICATIONS

TEC Fabry-Perot Laser Specifications [a]

Model	02BLC	03BLC	04BLC	23BLC	34BLC
Wavelength [b] (nm)	1310 +20/–30	1550 ± 20	1625 ± 15	1310 +20/–30	1550 ± 20
				1550 ± 20	1625 ± 15
Spectral width (rms) [c] (nm)	2	5	10	2/5	5/10
Output power (dBm)	≥ 0	≥ 0	≥ –4	≥ –1	≥ –4
Stability [d] (dB) (D/2)					
15 min	± 0.003	± 0.003	± 0.01	± 0.005	± 0.01
8 h	± 0.03	± 0.03	± 0.05	± 0.05	± 0.05
Temperature sensitivity [e] (dB)	± 0.25	± 0.25	± 0.25	± 0.25	± 0.25
Modulation		270 Hz, 1 kHz, 2 kHz (50 % duty cycle)			

Model	02ORL	03ORL	04ORL	23ORL	34ORL
Wavelength [b] (nm)	1310 +20/–30	1550 ± 20	1625 ± 15	1310 +20/–30	1550 ± 20
				1550 ± 20	1625 ± 15
Spectral width (rms) [c] (nm)	2	5	10	2/5	5/10
Output power (dBm)	≥ –2	≥ –2	≥ –6	≥ –3	≥ –6
Stability [d] (dB) (D/2)					
15 min	± 0.01	± 0.01	± 0.01	± 0.01	± 0.01
8 h	± 0.03	± 0.03	± 0.03	± 0.05	± 0.03
Temperature sensitivity [e] (dB)	± 0.25	± 0.25	± 0.25	± 0.25	± 0.25

SURFACE-EMITTING LED SPECIFICATIONS [a]

Model	01C/D	02C/D	12C	12D
Wavelength [b] (nm)	850 ± 25	1300 +45/–60	850 ± 25	850 ± 25
			1300 +45/–60	1300 +45/–60
Spectral width (FWHM) [f, g] (nm)	50	145	50/145	50/145
Output power (dBm)	≥ –17/≥ –14	≥ –21/≥ –17	≥ –18/–22	≥ –15/–18
Stability [d] (dB) (D/2)				
15 min	± 0.003	± 0.003	± 0.005	± 0.005
8 h	± 0.03	± 0.03	± 0.05	± 0.05
Temperature sensitivity [e] (dB)	± 0.4	± 0.4	± 0.4	± 0.4
Modulation		270 Hz, 1 kHz, 2 kHz (50 % duty cycle)		

IQS-2100 GENERAL SPECIFICATIONS

Size (H x W x D)	125 mm x 36 mm x 282 mm	(4 15/16 in x 1 7/16 in x 11 1/8 in)
Weight	0.5 kg	(1.1 lb)
Temperature		
Operating	0 °C to 40 °C	(32 °F to 104 °F)
Storage	–35 °C to 70 °C	(–31 °F to 158 °F)
Relative humidity	0 % to 95 % non-condensing	

B SCPI Command Reference

This appendix presents detailed information on the commands and queries supplied with your IQS-2100 Light Source.

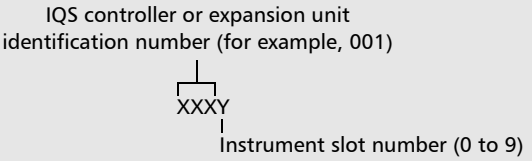
IMPORTANT

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

You must add the following mnemonic *at the beginning of any command or query* that you send to an instrument (except for IEEE 488.2 and platform commands):

LINStrument<LogicalInstrumentPos>:

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



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

Quick Reference Command Tree

Command						Parameter(s)	P.
SNUMber?							57
SOURce[1..n]	AM	INTernal	FREQuency			<ModulationFreq[<wsp>HZ]>	58
			FREQuency?				59
	POWer	ATTenuation				<Attenuation[<wsp>DB]>|MAXimum|MINimum|DEFault	60
		ATTenuation?				[MAXimum|MINimum|DEFault]	62
		STATe				<PowerState>	64
		STATe?					65
		WAVelength				UPPer|LOWer	66
		WAVelength?					67
		WAVelength	COUNt?				68
			LOWer?				69
			UPPer?				70
STATus?							71

Product-Specific Commands—Description

:SNUMber?	
Description	This query returns a value indicating the serial number of the module.
Syntax	:SNUMber?
Parameter(s)	None
Response Syntax	<SerialNumber>
Response(s)	*SerialNumber:* The response data syntax for <SerialNumber> is defined as a <STRING RESPONSE DATA> element. The <SerialNumber> response represents a string containing the serial number of the module.
Example(s)	SNUM? Returns "123456-AB"

:SOURce[1..n]:AM:INTernal:FREQuency

Description	This command selects the internal modulation frequency. The internal modulation is 50 % duty cycle at the selected frequency. *RST sets the modulation frequency to 0 Hz (CW).
Syntax	:SOURce[1..n]:AM:INTernal:FREQuency<wsp><ModulationFreq[<wsp>HZ]>
Parameter(s)	*ModulationFreq:* The program data syntax for <ModulationFreq> is defined as a <DECIMAL NUMERIC PROGRAM DATA> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is HZ. The <ModulationFreq> parameter is the new modulation frequency: 270, 1000, 2000, or 0 (CW).
Example(s)	SOUR:POW:STAT ON SOUR:AM:INT:FREQ 2000Hz
See Also	SOURce[1..n]:AM:INTernal:FREQuency?

:SOURce[1..n]:AM:INTernal:FREQuency?

Description	This query returns a value indicating the current internal modulation frequency. If the source is in CW mode, the function will return 0. *RST sets the modulation frequency to 0 Hz (CW).
Syntax	:SOURce[1..n]:AM:INTernal:FREQuency?
Parameter(s)	None
Response Syntax	<ModulationFrequency>
Response(s)	*ModulationFrequency:* The response data syntax for <ModulationFrequency> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <ModulationFrequency> response is the internal modulation frequency of the source, in Hz. If the source is in CW mode, the returned value is 0.
Example(s)	SOUR:POW:STAT ON SOUR:AM:INT:FREQ 270 SOUR:AM:INT:FREQ?
See Also	SOURce[1..n]:AM:INTernal:FREQuency

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

Description

This command changes the internal attenuation of the source. The source power is at its maximum when the attenuation is set to 0.0 dB.

*RST sets the attenuation to 0 dB.

Syntax

:SOURce[1..n]:POWer:ATTenuation<wsp><Attenuation[<wsp>DB]>|MAXimum|MINimum|DEFault

Parameter(s)

Attenuation:

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

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

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

The <Attenuation> parameter is the new power attenuation in dB. The power attenuation is always a positive value.

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

Example(s)	SOUR:POW:STAT ON SOUR:POW:ATT 2
Notes	Instrument must be in the Ready state to execute this command.
See Also	SOURce[1..n]:POWer:ATTenuation?

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

Description	This query returns a value corresponding to the internal power attenuation of the source. *RST sets the attenuation to 0 dB.
Syntax	:SOURce[1..n]:POWer:ATTenuation?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Attenuation>

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

Response(s)	*Attenuation:* The response data syntax for <Attenuation> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Attenuation> response is the power attenuation of the source, in dB.
Example(s)	SOUR:POW:STAT ON SOUR:POW:ATT 3 SOUR:POW:ATT?
See Also	SOURce[1..n]:POWer:ATTenuation

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

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

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

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

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

Description	This command selects a wavelength when using a dual-wavelength source instrument. *RST sets the selected wavelength to the LOW value.
Syntax	:SOURce[1..n]:POWer:WAVelength<wsp>UPPer|LOWer
Parameter(s)	*SelectedSources:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: UPPer|LOWer. UPPer, switches to the highest wavelength. LOWer, switches to the lowest wavelength.
Example(s)	SOUR:POW:WAV LOW Wait 3 seconds. SOUR:POW:STAT ON
Notes	Instrument must be in the Ready state to execute this command. This command can cause the instrument to enter the Stabilizing state.
See Also	SOURce[1..n]:POWer:WAVelength? SOURce[1..n]:POWer:WAVelength:LOWer? SOURce[1..n]:POWer:WAVelength:UPPer?

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

Description	This query returns a value indicating which wavelength is currently selected. *RST sets the selected wavelength to the LOW value.
Syntax	:SOURce[1..n]:POWer:WAVelength?
Parameter(s)	None
Response Syntax	<SelectedSources>
Response(s)	*SelectedSources:* The response data syntax for <SelectedSources> is defined as a <CHARACTER RESPONSE DATA> element. LOWer, the lower wavelength is activated. UPPer, the upper wavelength is activated.
Example(s)	SOUR:POW:WAV?
See Also	SOURce[1..n]:POWer:WAVelength SOURce[1..n]:POWer:WAVelength:LOWer? SOURce[1..n]:POWer:WAVelength:UPPer?

:SOURce[1..n]:POWer:WAVelength:COUNt?

Description	This query returns the number of available wavelengths on the instrument. *RST has no effect on this command.
Syntax	:SOURce[1..n]:POWer:WAVelength:COUNt?
Parameter(s)	None
Response Syntax	<NbWavelength>
Response(s)	*NbWavelength:* The response data syntax for <NbWavelength> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <NbWavelength> response is the number of wavelengths available on the instrument: 1, one wavelength available 2, two wavelengths available
Example(s)	SOUR:POW:WAV:COUN?

:SOURce[1..n]:POWer:WAVelength:LOWer?

Description	This query returns a value indicating the lower wavelength. *RST has no effect on this command.
Syntax	:SOURce[1..n]:POWer:WAVelength:LOWer?
Parameter(s)	None
Response Syntax	<LowerWavelength>
Response(s)	*LowerWavelength:* The response data syntax for <LowerWavelength> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <LowerWavelength> response is the lowest source wavelength value in meters.
Example(s)	SOUR:POW:WAV:LOW?
Notes	If you do not have a dual-wavelength instrument, use this function to determine the wavelength of your source.
See Also	SOURce[1..n]:POWer:WAVelength SOURce[1..n]:POWer:WAVelength? SOURce[1..n]:POWer:WAVelength:UPPer?

:SOURce[1..n]:POWer:WAVelength:UPPer?

Description	This query returns a value indicating the upper wavelength. *RST has no effect on this command.
Syntax	:SOURce[1..n]:POWer:WAVelength:UPPer?
Parameter(s)	None
Response Syntax	<UpperWavelength>
Response(s)	*UpperWavelength:* The response data syntax for <UpperWavelength> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <UpperWavelength> response is the highest source wavelength value in meters.
Example(s)	SOUR:POW:WAV:UPP?
Notes	Not available on single-source instruments.
See Also	SOURce[1..n]:POWer:WAVelength SOURce[1..n]:POWer:WAVelength? SOURce[1..n]:POWer:WAVelength:LOWer?

:STATus?

Description	This query returns a value indicating the status of the module (READY, BUSY, etc.).
Syntax	
Parameter(s)	None
Response Syntax	
Response(s)	*Status:*
Example(s)	STAT? Returns READY (Module is ready.)

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