IQS-1700
High Performance Power Meter and Optical Head for IQS-600

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Telecom Test and Measurement

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Trademarks

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

Units of Measurement

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

Patents

The IQS-1700 power meter and optical heads are protected under one or more of US patent nos.: 6,437,861, 6,621,067 and 7,167,655.

Version number: 4.0.0

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Certification Information

North America Regulatory Statement

This unit was certified by an agency approved in both Canada and the United States of America. It has been evaluated according to applicable North American approved standards for product safety for use in Canada and the United States.

Electronic test and measurement equipment is exempt from FCC part 15, subpart B compliance in the United States of America and from ICES-003 compliance in Canada. However, EXFO Inc. makes reasonable efforts to ensure compliance to the applicable standards.

The limits set by these standards are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the user guide, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

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.

European Community Declaration of Conformity

An electronic version of the declaration of conformity for your product is available on our website at **www.exfo.com**. Refer to the product's page on the Web site for details.

1 Introducing the IQS-1700 High Performance Power Meter

Designed for the IQS-600 Integrated Qualification System, the IQS-1700 High Performance Power Meter is a module available in different models. It is used with the OHS-1700 Optical Head.

Main Features

The IQS-1700 High Performance Power Meter is offered with the followingone-, two-, or four-channel models.

The OHS-1700 Optical Head is offered in Ultra-High Power option (up to 37 dBm).

Models With Standard Optical Detector Ports

IQS-1710X   **IQS-1720X**   **IQS-1740X**

Models With Optical Head Connectors

IQS-1710   IQS-1720   IQS-1740
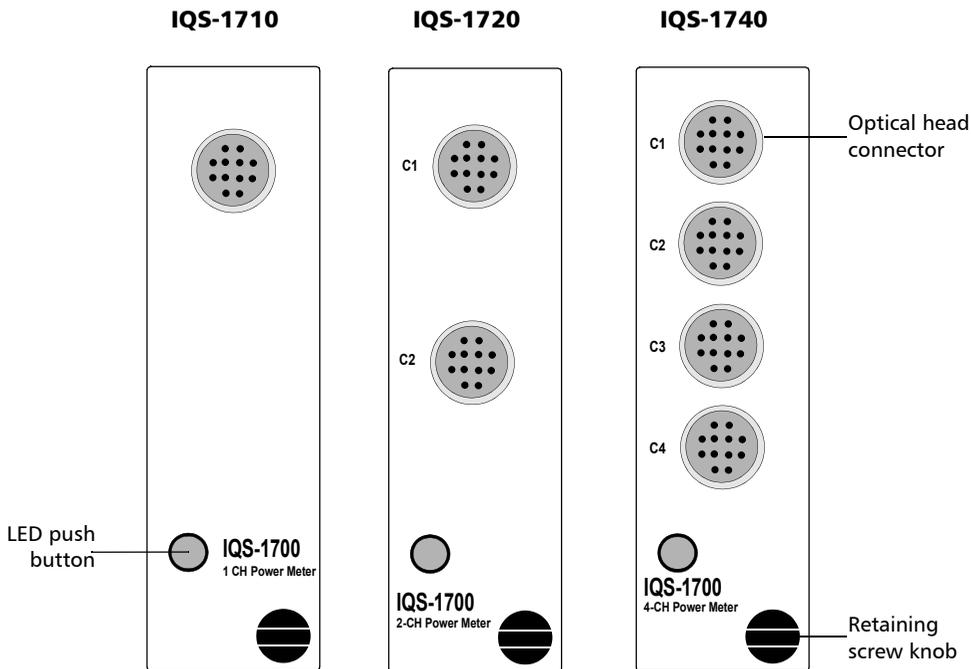
It features a high sampling rate and fast stabilization, and comes in one-, two- or four-channel options (each detector is independent).

The OHS-1700 Optical Head allows you to handle power signals in a safe and efficient way. You can connect up to four optical heads to a module, depending on the model you have acquired. The optical head functions with connectorized and non-connectorized fiber.

Connector port

Integrating cavity and heat dissipator

Tripod screw hole (Metric system on the left and Imperial system on the right)

EXFO
OHS-1700

Connector port to module

The graphical display mode shows all channels on a real-time graph, which you can analyze afterwards.

The IQS-1700 High Performance Power Meter supports local control (via the IQS Manager software) and remote control (through GPIB, RS-232, or Ethernet TCP/IP using SCPI commands or the provided LabVIEW drivers). For more information, refer to the *IQS platform* user guide.

Typical Applications

Your power meter is suitable for numerous applications, including the following:

➤ Transceiver testing

➤ Amplifier characterization

➤ PDL measurements

➤ Network monitoring

➤ Passive component characterization

Conventions

Before using the product described in this guide, 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*

Your power meter does not contain laser components in itself. However, you will be using it with light sources.

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

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

IMPORTANT

When you see the following symbol on your unit ⚠, make sure that you refer to the instructions provided in your user documentation. Ensure that you understand and meet the required conditions before using your product.

IMPORTANT

Other safety instructions relevant for your product are located throughout this documentation, depending on the action to perform. Make sure to read them carefully when they apply to your situation.

Note: *Refer to the platform's user guide for additional test equipment safety information and ratings.*

3 *Getting Started with Your High Performance Power Meter*

This chapter contains information on how to insert and remove test modules. You will also find how to connect your optical head to your power meter and how to start and exit the application.

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.

CAUTION

To avoid damaging your unit, use it only with modules approved by EXFO.

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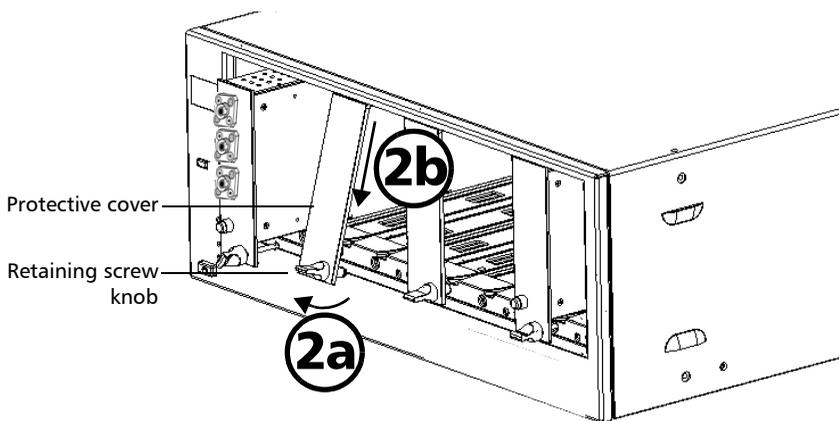
3. Position the module so that its front panel is facing you and the top and bottom protruding edges are to your right.

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

Protruding edges
(right side of module)

Retaining screw knob
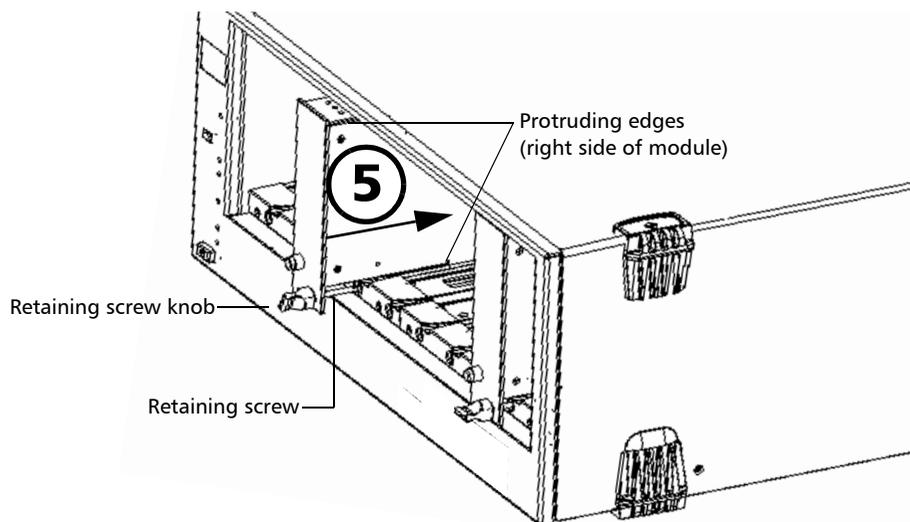
Retaining screw

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-1700 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.

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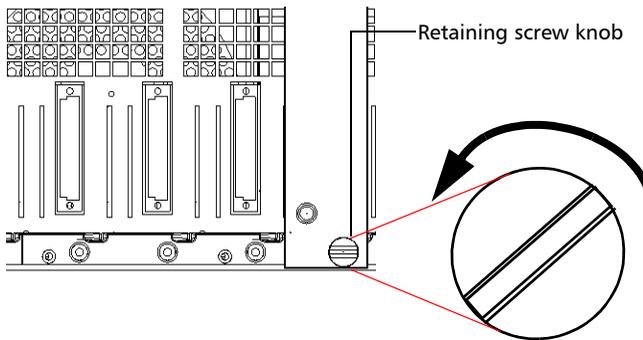
2. Place your fingers underneath the module or hold it by the retaining screw knob *(NOT by the connector)* and pull it out.

Connector

NO

YES

Retaining screw
knob
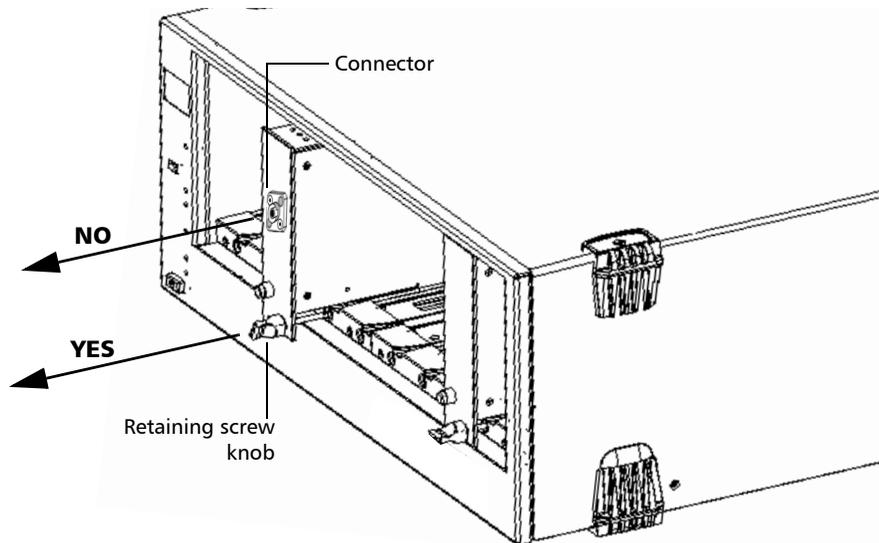
CAUTION

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.

Connecting the Optical Head to the Power Meter

To connect the optical head to the optical head interface, use the provided cable. Ensure that the connector key is aligned with the port's corresponding notch; once the key and pins are properly aligned, the connection should be made easily.

CAUTION

Do not force the connector into the port if the pins do not seem to be correctly aligned with the corresponding holes. Forcing the connector could permanently damage the pins.

Once you have connected the optical head to the interface and started the application (as explained in *Starting the High Performance Power Meter Application* on page 15), you should see the channel or channels (on a multiple-channel power meter) in the data display.

If the optical head is not connected to its channel, you will notice that the display is different and you cannot perform measurements on this channel until you have connected the head properly.

Head not connected   Head properly connected

Securing the Optical Head onto Your Work Surface

Your OHS-1700 Optical Head can be used with a tripod. A metric-based screw hole is located on the left side of the head and bears the inscription "M6 X 1" and an imperial-based screw hole is located on the right side and bears the inscription "1/4-20".
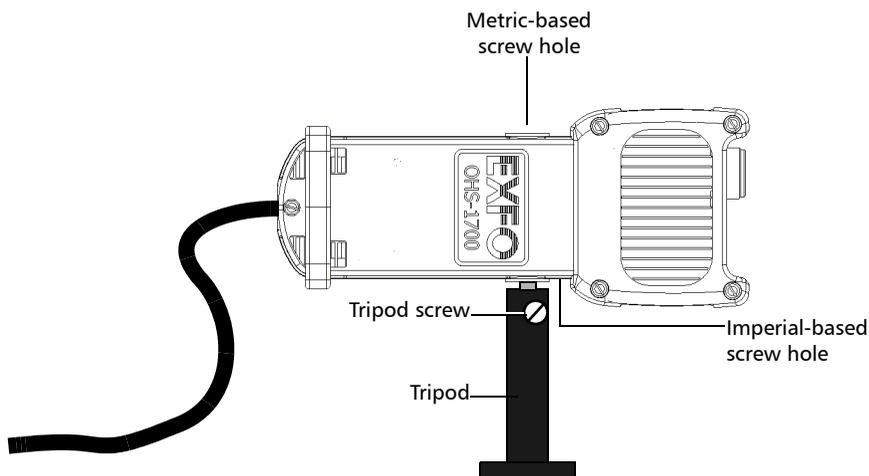
Once you have installed the head onto the tripod, tighten the tripod screw to prevent it from turning; which would compromise your test results.

Starting the High Performance Power Meter Application

Your IQS-1700 High Performance Power Meter module can be configured and controlled from its dedicated IQS Manager application.

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

To start the application:

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

It will turn white to indicate that it is highlighted.

Highlighted module
(white background)
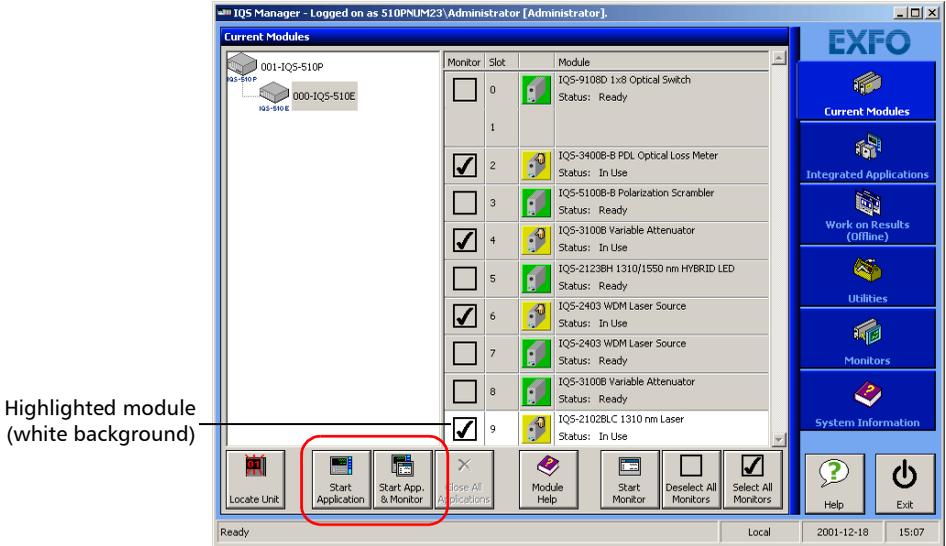
2. Click **Start Application**.

OR

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

You can also double-click its row.

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

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

The main window (shown below) contains all the commands required to control the High Performance Power Meter:

Note: *When using a multichannel power meter with different optical heads, the settings (such as the wavelength list) used by the application are those detected on the highest channel number. For example, if you use a Low-PDL head on channel 2 and a high-power head on channel 3, the high-power head settings will take precedence. If you move the head from channel 3 to channel 1, the Low-PDL head will be used for settings instead.*

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:

Controller unit or expansion unit (1 to 999) housing the module

Slot number in which module is inserted (0 identifies first slot)

[999 – 1]
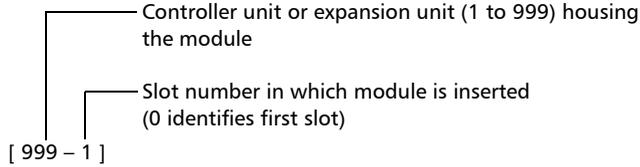
Status Bar

The status bar, located at the bottom of the main window, identifies the operational status of the IQS-1700 High Performance Power Meter.

Control mode

Local: Module controlled locally only.

Remote: Module controlled remotely, but local commands can also be used.

Lockout: Module controlled remotely only.

| Ready | | Local | 2001-12-18 | 15:07 |

Module/unit status

Current date and time
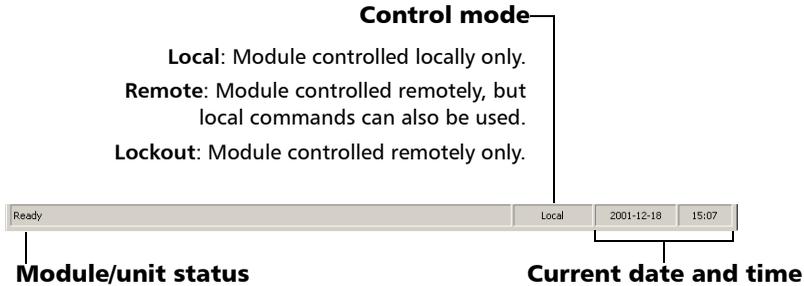
For more information about automating or remotely controlling the IQS-1700 High Performance Power Meter, refer to your platform user guide.

Entering Values Using Sliders and Numeric Boxes

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

- Slider
- Fine-tuning box
- Numeric box button
- Navigation buttons
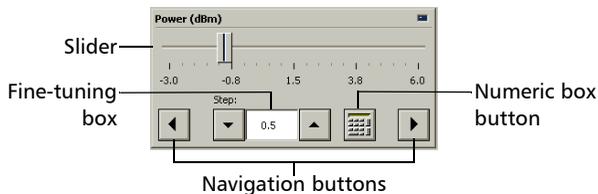
➤ Slider: Drag it to the desired value on the scale below.

➤ 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 power value.

To enter a value using the numeric box:

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

- Parameter identification
- Entry display
- Clear button
- Toggle button
- Backspace button (to correct a value)
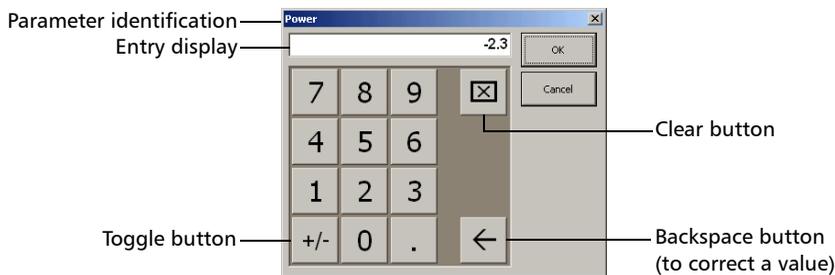
2. Enter the value.

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

Exiting the Application

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

To close the application from the main window:

Click ❌ in the top right corner of the main window.

OR

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

To close all currently running applications:

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

4 Setting Up Your High Performance Power Meter

You can set the following parameters on your IQS-1700:

➤ Channel display

➤ Wavelength selection and management

➤ Measurement unit selection

➤ Display resolution

➤ Refresh rate

➤ Measurement range

➤ Saving and recalling configuration

Setting Channel Display

The channel display allows you to select which channels you want to view when using a multichannel power meter. You can display up to four optical channels using a four-channel power meter.

To set the channel display :

1. From the **Instrument** function tab, click the **Display** tab to view the available channels.
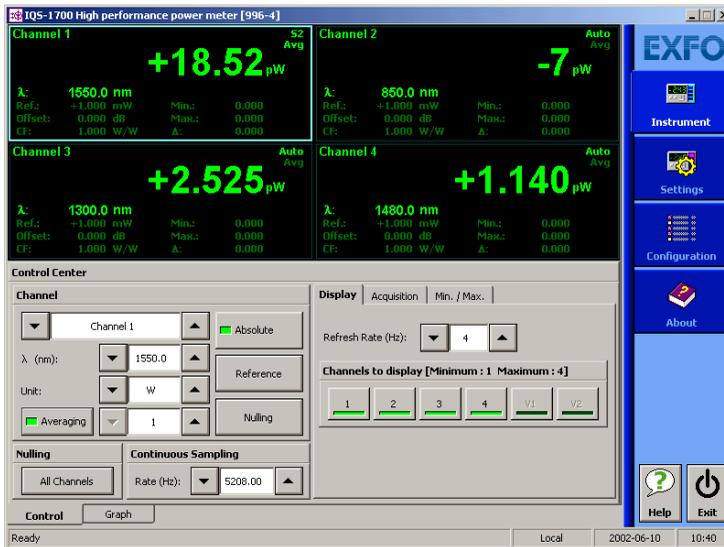
2. Select the desired channel.

The data display immediately reflects your selection and the selected channel indicator will turn light green.

Selecting a Channel (Multi-Channel Models)

The optical channels on multi-channel models are independent.

To select an optical channel:

From the **Instrument** function tab, go to **Channel** and use the arrow buttons next to the channel number to change it.

OR

Click the appropriate data display zone.
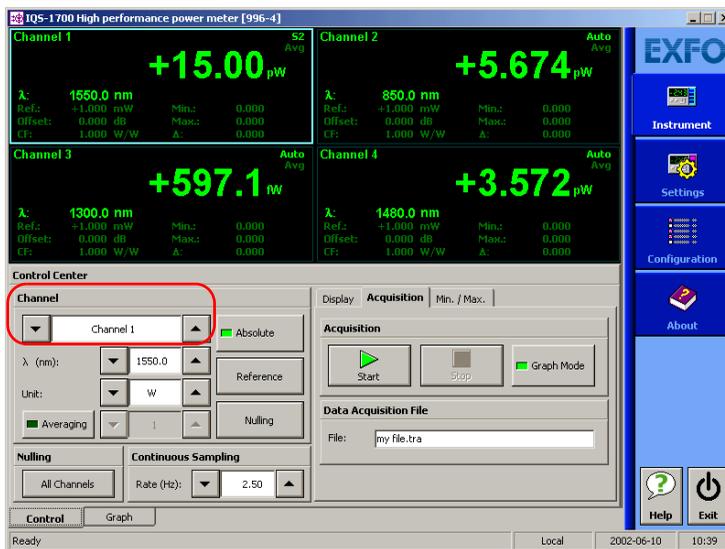
A colored frame will indicate your selection.

Naming Channels

A user-selected name can be given to each power meter channel. The channel name appears in the main window. Naming individual channels is particularly useful when you need to display more than one power channel at the same time, especially in Monitor Window mode with several optical power meters displayed simultaneously. The name should be as self-explanatory as possible (for example, Power-Fiber 3).

To enter a channel name:

1. Click the **Settings** function tab.
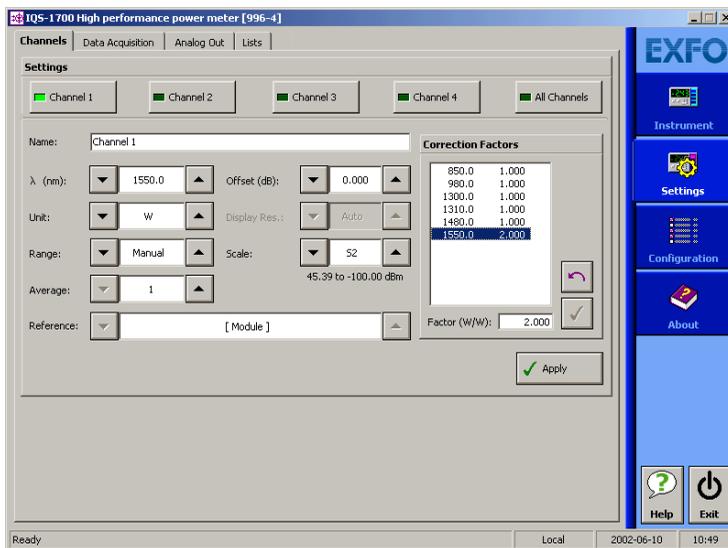
2. From the **Channels** tab, select the channel to name by clicking the corresponding button.

3. Type in a self-explanatory name in the **Name** box.

4. Click **Apply** to confirm your new setting.

Selecting the Wavelength

When taking accurate measurements, your power meter must be set to the correct wavelength to compensate for the photodetector responsivity at the incident wavelength. Ideally, the power meter's wavelength should be set as close as possible to that of the optical source being used.

The wavelength must be selected from the wavelength list. To set the wavelength list, see *Managing Wavelength Lists* on page 26.

To select the wavelength (either from the Instrument or Settings function tab):

1. Select the channel for which you want to set the wavelength (if you have a multiple-channel power meter).

2. Select the wavelength using the arrow buttons next to the λ list.
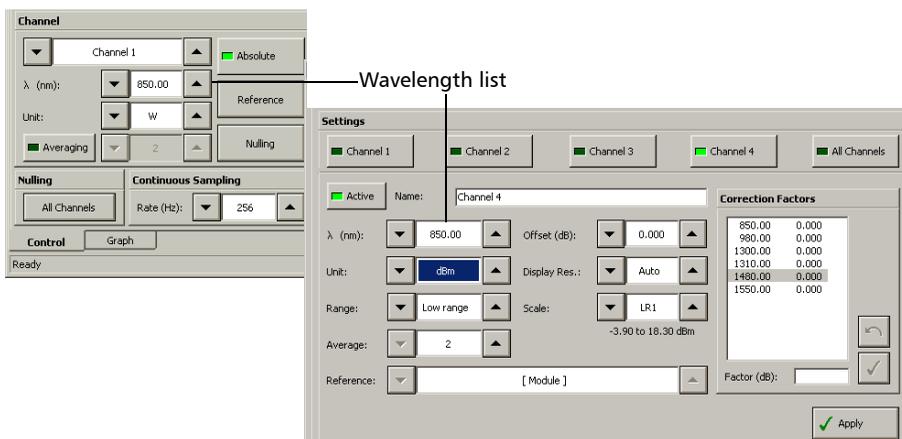
3. If you are in the **Channels** tab of the **Settings** function tab, click **Apply** to confirm your new setting.

Note: *You can also use the **All Channels** button to modify all channels identically. Values previously set will turn red to indicate that the new setting differs.*

Managing Wavelength Lists

The wavelengths you want to use with your IQS-1700 and OHS-1700 must be entered in the **Wavelength** list. Please refer to the Certificate of Compliance supplied with your power meter for information on the wavelength range.

To add a wavelength to the list:

1. From the **Settings** function tab, select the **Lists** tab.
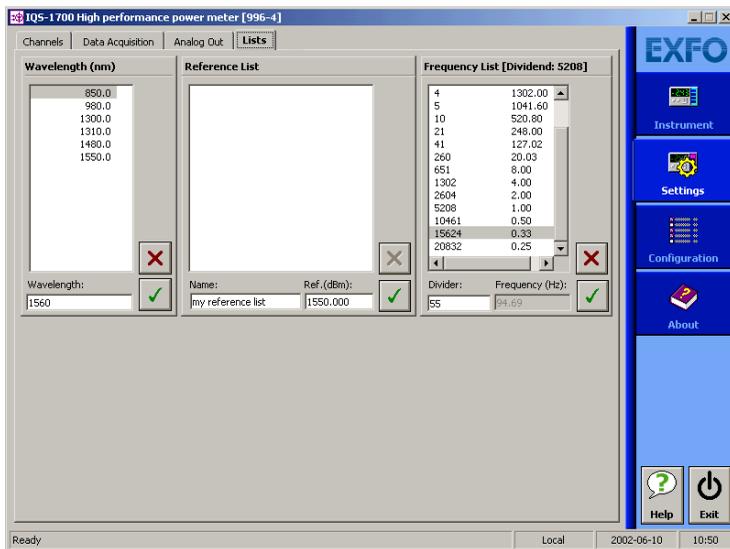
2. In the **Wavelength** list, enter the wavelength value to be added.

You can enter a value with a 0.01 nm resolution.

3. Click ✓ to confirm the new wavelength.

Note: *A warning message is displayed if the new wavelength is not within the power meter's wavelength range.*

To delete a wavelength from the list:

1. From the **Settings** function tab, click the **List** tab.

2. From, the **Wavelength** list, select the wavelength to be deleted.

3. Click ☒ to confirm the operation.

Note: *It is not possible to delete a wavelength that is currently being used.*

Selecting the Measurement Unit

Power measurements can be displayed in dB, dBm, W, or W/W (the latter indicating the ratio between the power received and the reference for the current wavelength and channel). When W or W/W is selected, the software automatically selects W units (pW, nW, μW, mW), depending on the measured power and sensitivity of the detector.

When a relative unit is selected (dB or W/W), the most recent reference value used will become the current reference value.

To select the measurement unit (either from the Instrument or Settings function tab):

1. Select the channel for which you want to set the measurement unit (if you have a multiple-channel power meter).

2. Use the arrow buttons next to the **Unit** list to change the value.

3. click **Apply** to confirm your new setting.

Note: *You can also use the **All Channels** button to modify all channels identically. If other values were set before, but are different from those you are setting, any value you change will turn red to indicate that it is different.*

Setting the Display Resolution

Depending on the required resolution and operating power level, 0, 1, 2, 3, or 4 digits can be displayed after the decimal point. When the auto setting is selected, the display resolution is determined by the power level being measured.

Note: *The Auto marker in the data display does not refer to the automatic display resolution but to the measurement range (see* Setting the Measurement Range *on page 31).*

To select the display resolution of a power measurement expressed in dB or dBm:

1. Click the **Settings** function tab, then click the **Channels** tab.

If necessary, select the channel for which you want to set the display resolution.
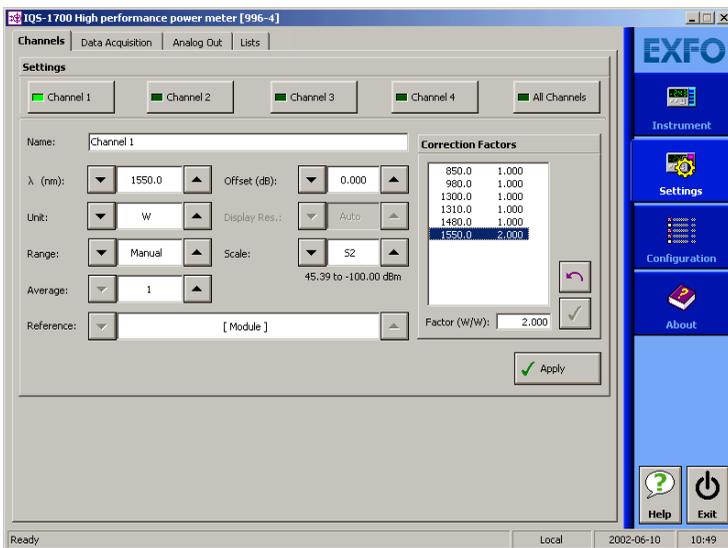
2. Use the arrow buttons to select the value in the **Display Res.** list.

If you have previously selected watts as units, the **Display Res.** list will be grayed out (as illustrated above).

3. Click **Apply** to confirm your new setting.

Note: *You can also use the **All Channels** button to modify all channels at once. If other values were set previously, but are different from those you are currently setting, any value you change will turn red to indicate that it is different.*

Note: *When W or W/W is selected, the display resolution changes to Auto (the appropriate W unit will be used according to the power of the signal detected). It is then impossible to access the display resolution list.*

Setting the Refresh Rate

This function allows you to define the refresh rate of the power readings on the display. The refresh rate is the number of times per second that a new power measurement will be displayed on the screen. The refresh rate applies to all channels when using a multichannel power meter.

To set the refresh rate:

1. From the **Instrument** tab, select the **Display** tab.
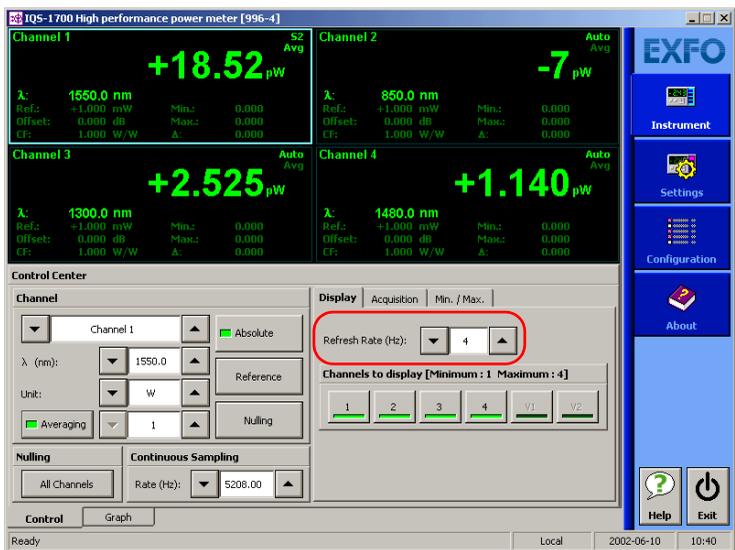
2. Use the arrow buttons to select the refresh rate you want to use.

Note: *The refresh rate can be faster or slower than the sampling rate; however, only a refresh rate slower than the sampling rate will have an effect.*

Setting the Measurement Range

The measurement range and gain scale applied to the power detector can be manually selected to prevent the automatic scale adjustment performed by the instrument. A manual adjustment of the dynamic gain scale will lock the measurement range to a specific level.

It is necessary to use a manual range to achieve high-rate acquisitions (see *Performing Acquisitions* on page 57).

Each channel is adjusted independently in the case of a multichannel power meter.

To set the measurement range:

1. Click the **Settings** function tab, then select the **Channels** tab.

2. If necessary, select the channel for which you want to set the range.

3. Use the arrow buttons next to the **Range** list to select the range you want to use.
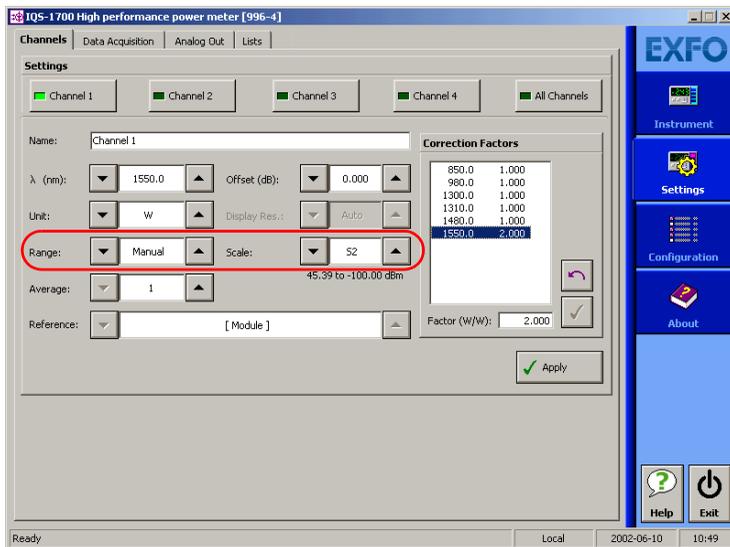
Note: Select **Manual** range for an acquisition when the input signal has unstable or modulated variations. This prevents ! ! ! ! ! ! ! from appearing on the display when changing gain scales often.

4. Use the arrow buttons next to the **Scale** list and highlight the scale you wish to use.

5. Click **Apply** to confirm your new setting.

Note: *You can also use the **All Channels** button to modify all channels identically. If other values were set previously, but are different from those you are currently setting, any value you change will turn red to indicate that it is different.*

Saving and Recalling Configurations

Once you have set the IQS-1700 High Performance Power Meter 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.
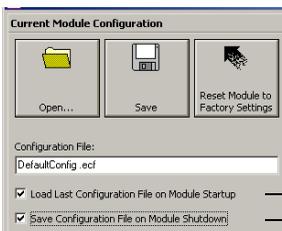
To always use the last saved parameters when starting.

To save parameters being used just before shutting down, *overwriting the previous file*.

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.

Note: *Reverting to factory settings will not change the name given to the channels. It will not change the user reference or correction factor lists either.*

5 Preparing Your High Performance Power Meter for a Test

The OHS-1700 Optical Head can be used with connectorized or nonconnectorized fiber (using the FOA-3000 and BFA-3000 Bare Fiber Adaptor). Each head has its own port, onto which you can connect a fiber.

Ensure you use the appropriate adaptors such as the FOA-3000 or the BFA-3000 to combine your power meter to the optical head. You also have to clean optical fibers properly before connecting them to your unit.

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.*

EXFO uses good quality connectors in compliance with EIA-455-21A standards.

To keep connectors clean and in good condition, EXFO strongly recommends inspecting them with a fiber inspection probe before connecting them. Failure to do so will result in permanent damage to the connectors and degradation in measurements.

Nulling Offsets

Temperature and humidity variations affect the performance of electronic circuits and optical detectors, which can offset measurement results. To compensate for this offset, the unit is equipped with an offset nulling function.

Your unit is designed not to require offset nulling under normal operation, but you should perform it whenever environmental conditions change significantly or when measuring very low power values.

Note: *The manual nulling offset is valid for the* current *test session only; it no longer applies when you turn off your power meter.*

IMPORTANT

Light must not reach the detector when performing an offset nulling operation. Always use a protective screw cap. Do not use a soft rubber cover

To perform an offset nulling on one channel:

1. Install the protective cap over the detector port.

2. If necessary, select the desired channel (on a multichannel high-speed power meter).

To set the channel, see *Selecting a Channel (Multi-Channel Models)* on page 23.

Offset nulling values are applied to the channel until a new nulling is performed.

3. Under **Channel**, click the **Nulling** button. A message prompts you to ensure that the detector cap is properly installed.
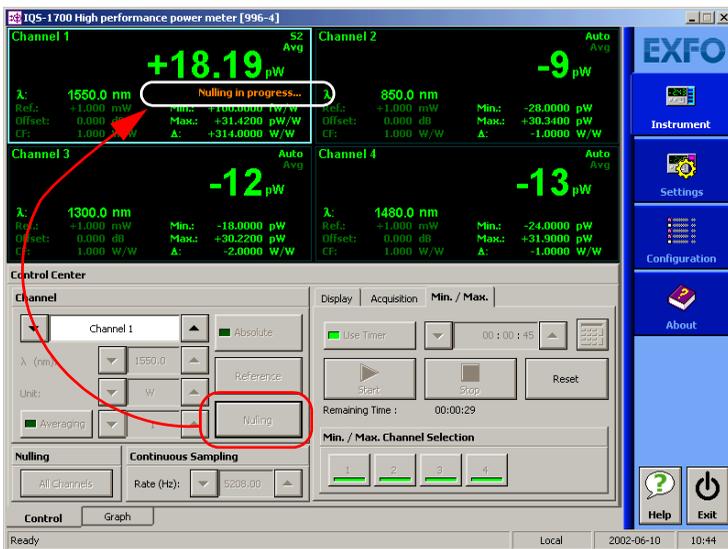
4. Select **OK** to perform the offset nulling, or **Cancel** to exit.

A red message appears beneath the power value of the channel for which you are performing a nulling.

If you are using a multichannel power meter, you will notice that the other channels will stop reading power while nulling is in progress.

To perform an offset nulling on all channels (two- and four-channel power meters):

1. Install the protective caps over all of the detector ports.

2. Under **Nulling**, click the **All Channels** button.

   Offset nulling values are applied to the channel until a new nulling is performed. A message prompts you to ensure that the detector caps are properly installed.
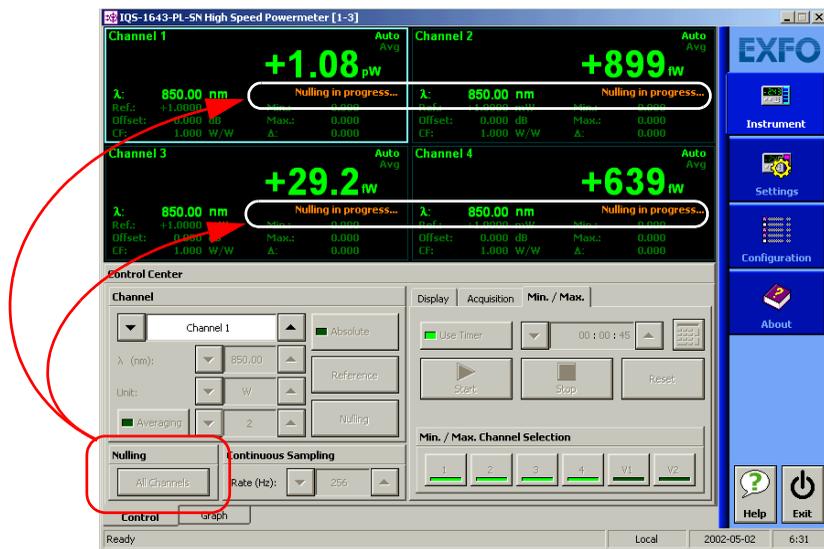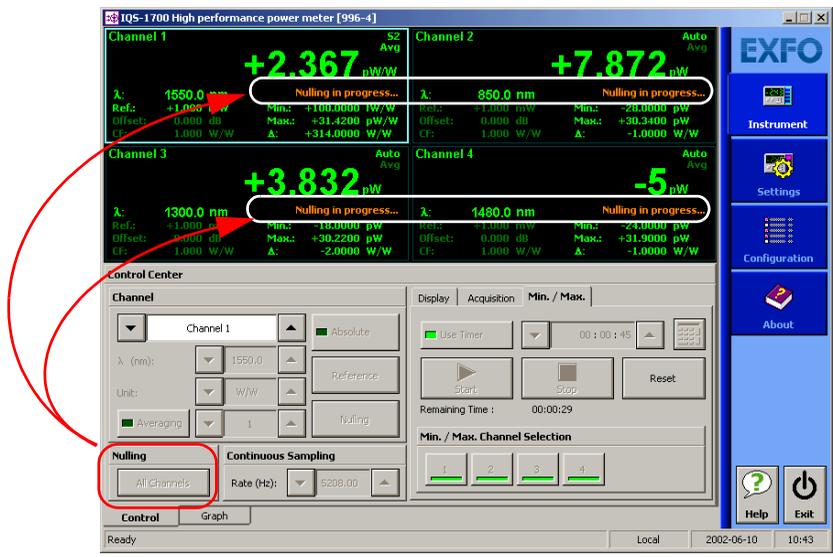
3. Click **OK** to perform the offset nulling, or **Cancel** to exit.

    A red message appears beneath the power value of the channel for which you are performing a nulling.

6 *Measuring Power*

Power measurements can be displayed in two ways:

➤ absolute

➤ relative

It is also possible to use a correction factor at specific wavelengths and to add an offset value to your power measurement.

Displaying Absolute Power

When in absolute power, measured values are displayed in either dBm or W units (pW, nW, µW, mW...) and the displayed value represents the absolute optical power reaching the detector within specified uncertainty.
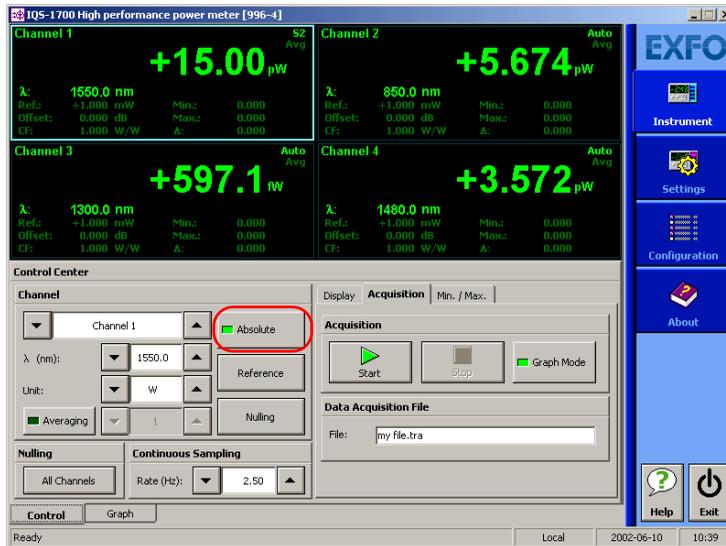
To display absolute power:

1. Select the **Instrument** function tab or the **Channels** tab of the **Settings** function tab (you can use either).

2. Select the channel for which you want to set the offset if you are using a multichannel power meter.

Note: *Step 3 is not mandatory, but will help you achieve more precise results.*

3. Select the appropriate wavelength by using the arrow buttons next to the corresponding list.

4. Select the appropriate unit by using the arrow buttons next to the corresponding list (W or dBm).

5. If you are in the **Settings** function tab, click **Apply** to confirm your new setting.

6. Return to the **Instrument** function tab and click **Absolute** to activate the mode.

An absolute power measurement in negative W units indicates that the nulling of the offset was improperly done. If this happens, repeat the offset nulling operation (see *Nulling Offsets* on page 39).

Measuring Relative Power

Power measurements can be displayed as a deviation from an absolute reference value. The relative power is particularly useful when performing loss measurements.

Relative power is displayed in dB when the reference value is measured in dBm. In this case, the value will be either positive or negative, as the actual measured power is higher or lower than the reference power.

If the reference value is in W, the relative power will be displayed in W/W. In this case, the relative power is the deviation ratio from the reference and will always be a positive value (unless operation was improperly done).
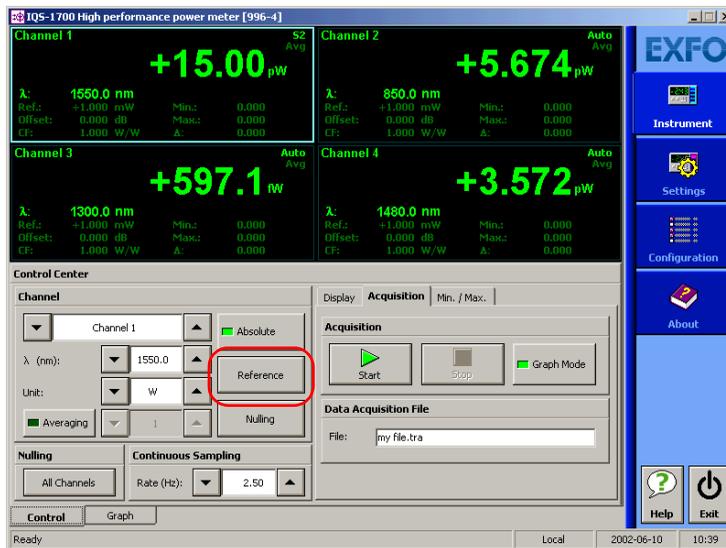
To display significant relative power values, it is important to have an appropriate reference value, which you activate by clicking the **Reference** button in the **Instrument** function tab. You can either apply the current module power as a reference or edit a value to be used as the reference.

Selecting the Reference Value

The reference value influences your measurements once selected and activated. Whether you select the current module's power or a set value from the list, this becomes the basis for your future acquisitions.

To select the reference value:

1. From the **Settings** function tab, select the **Channels** tab.
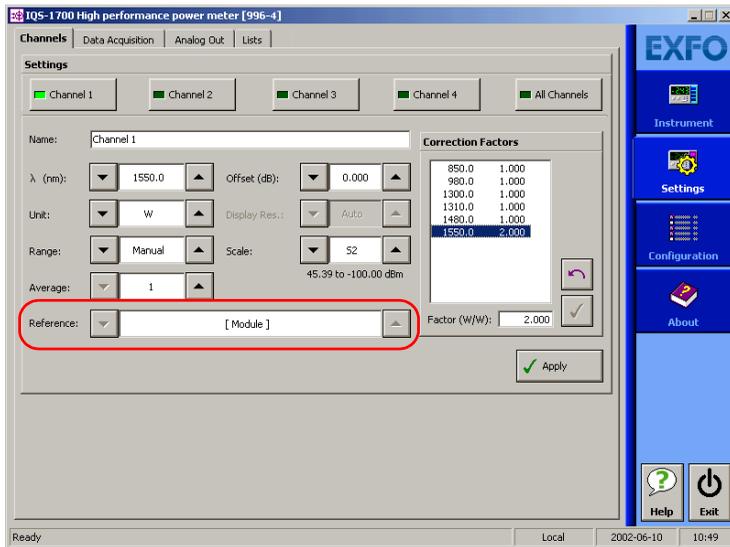
2. Use the arrow buttons next to **Reference** to select either the current module's power or a value from the list, which you can then edit as explained in the following section.

3. Click **Apply** to confirm your new setting.

4. From the **Instrument** function tab, click the **Reference** button to use your new reference value.

Editing the Reference List

The **Reference** list can be changed to adapt to your testing requirements.

To add a reference to the list:

1. From the **Settings** function tab, select the **Lists** tab.
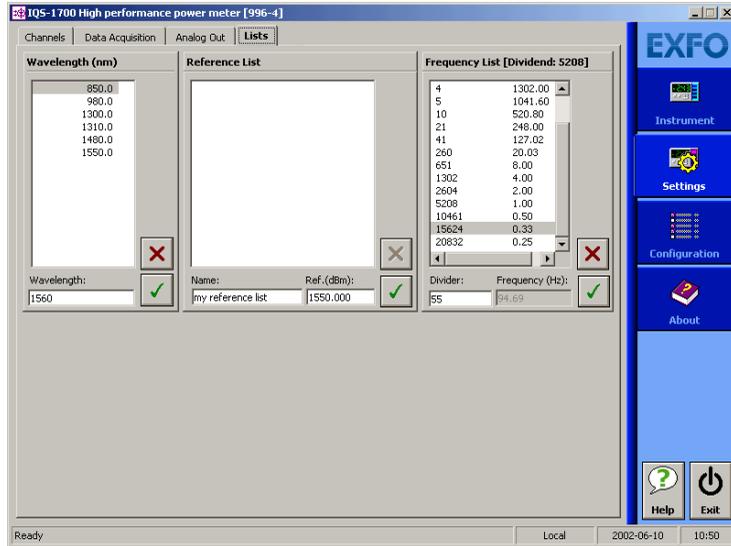
2. Under **Reference List**, enter the name of the new reference value in the **Name** box.

3. In the **Ref (dBm)** box, enter a reference between –100.000 dBm and 100.000 dBm.

4. Click ✓ to enter the value.

Note: *Although the wavelength list applies to all channels, the selected reference applies to the wavelength and channel at which it was set.*

To delete a user reference from the list:

1. From the **Settings** function tab, select the **Lists** tab.

2. Select the value to remove by clicking it once.

3. Click ✖ to remove the value.

Measuring Corrected Power

Applying a correction factor to the measured power is useful when compensating for known inaccuracies (power gains or losses) at specific wavelengths.

A correction factor (CF) can be applied to any measurement that is displayed in either dB, dBm, W, or W/W.

When a dB correction factor different from 0.000 is defined, the displayed power is equal to the actual power plus the value of the correction factor. When a W/W correction factor different from 1.000 is defined, the displayed power is equal to the actual power times the value of the correction factor.

Note: *With an active correction factor, the CF marker appears in the data display for the matching channel.*

Note: *Special care must be taken when setting a CF as it emulates a new calibration (the module calibration is not affected and will be restored by setting back the CF to a null value).*

When expressed in dB, the CF can be a positive or negative value. When the currently selected measurement unit is W, the correction factor is expressed in W/W, indicating a multiplication factor for the current wavelength and channel. The CF expressed in W/W will always be a positive value.

To set a correction factor:

1. From the **Settings** function tab, select the **Channels** tab.
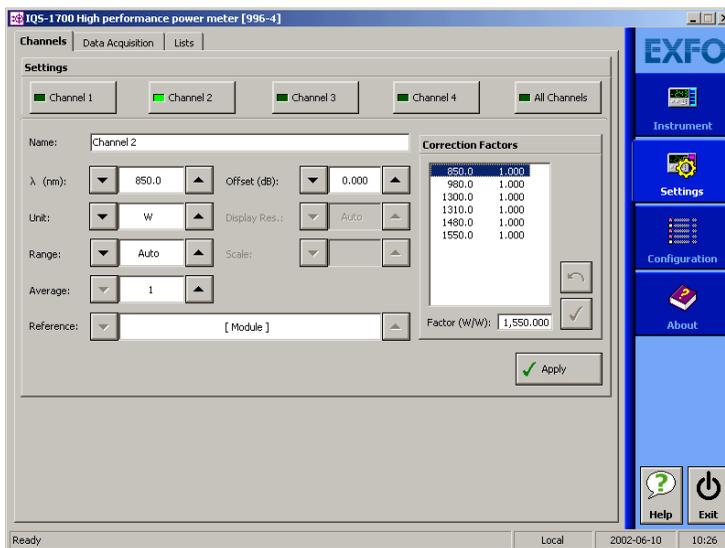
2. Select the channel for which you want to set the CF (in the case of a two- or four-channel power meter).

3. Select the wavelength to which the CF will be applied by using the up and down arrow buttons next to the list or by clicking it once in the **Correction Factors** list.

4. In the **Factor (unit)** box, enter a CF between –10.000 dB and 10.000 dB, or between 0.100 W/W and 10.000 W/W, then click ✓.

Note: *Although the wavelength list applies to all channels, the CF applies to the wavelength and channel at which it was set.*

To remove the offset from a wavelength, select the wavelength, then click ↺.

Using the Offset Function

The offset function is used when you want to take into account, in the power displayed, a known gain or loss in the link that is not already included in the signal reaching the detector. Contrary to the correction factor, which applies to a specific wavelength, the offset value applies to any wavelength when it is enabled in a specific channel.

To enter an offset value:

1. From the **Settings** function tab, select the **Channels** tab.
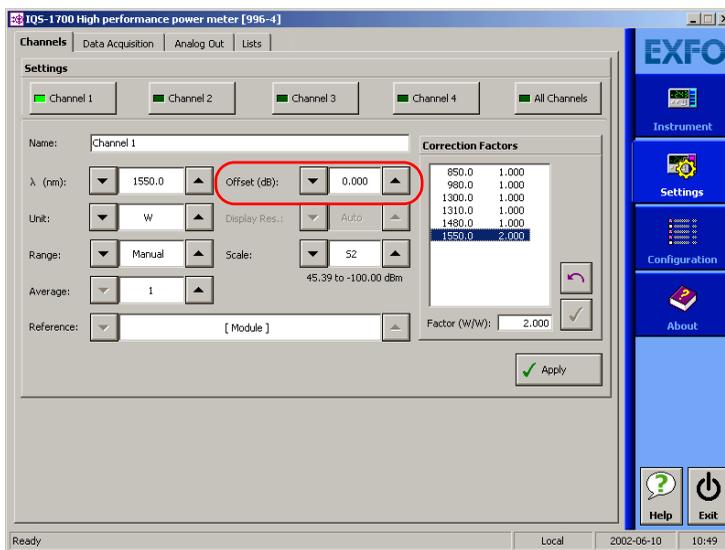
2. Select the channel for which you want to set the offset if you are using a multichannel power meter.

3. From the **Offset** list, use the arrow buttons to adjust the value.

4. Click **Apply** to confirm your new setting.

Averaging Measurements

When the averaging function is enabled on the IQS-1700 High Performance Power Meter, the most recent measurement samples, for which you can set the number, are used to compute an unweighted average. This average is displayed as the measured value. The **AVG** marker will also be displayed to the right of the value for the matching channel, indicating that averaging is enabled.

Averaging can be done on a minimum of 2 and a maximum of 1000 points (you can enter 1 as a value, but the averaging will be performed only on that value and will be rather useless). The calculation uses watt as unit, but the result will be converted into the unit you have selected for your acquisition (W, W/W, dBm or dB) afterwards.

The formulas used to calculate measurement averaging depend on the number of the current acquisition.

If $n \geq M$, then

$$y[n] \ = \ \frac{1}{M} \cdot x[n] + \left(1 - \frac{1}{M}\right) \cdot y[n-1]$$

Where

➤ *n* is the number of the current acquisition

➤ *M* is the number of points to average (value you set)

➤ *x[n]* is the current sample in watts

➤ *y[n]* is the result of the present average in watts

➤ *y[n-1]* is the value before the average in watts

Note: *When measurement conditions change, the number of the acquisition is reset to zero in order to start a new averaging measurement with the new settings.*

To select the number of samples for averaging, whether you are in the **Instrument** function tab or the **Channels** tab of the **Settings** function tab, use the arrow buttons to change the value in the **Average** (in the **Settings** function tab) or **Averaging** (in the **Instrument** function tab) lists.

If you are setting the average value in the **Instrument** function tab, you must first press the **Averaging** button to activate the list.

Average /Averaging lists
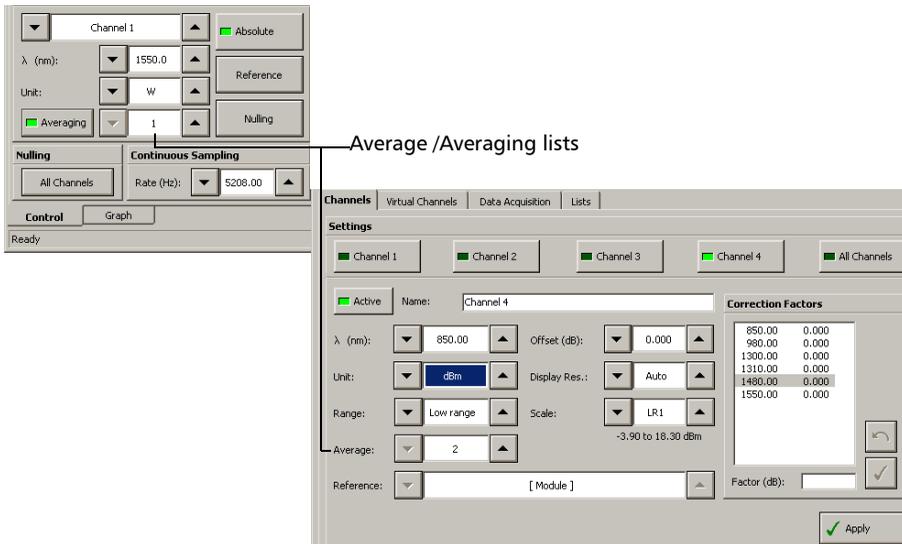
To toggle between averaged and unaveraged power measurement:

1. If necessary, select the desired channel from the **Instrument** function tab.

2. Click the **Averaging** button to activate or deactivate it.

7 Recording Power Signal Variations

The Min./Max. function allows you to record the extremes of a varying power signal when performing a continuous acquisition. For example, it could be used to determine the stability of a light source over time or to measure the polarization-dependent loss (PDL) of a passive component when combined with a polarization state controller.

The function is started manually and can be stopped manually or automatically using the timer function. Minimum (Min.) and maximum (Max.) values can be recorded and displayed in any measurement unit (dB, dBm, W, or W/W; see *Selecting the Measurement Unit* on page 27). In logarithmic scales (dB and dBm), the difference between the maximum and minimum values is expressed as Max.–Min. In linear scales (W and W/W), the difference is expressed as a ratio (Min./Max.).

To use the Min./Max. function:

1. Select the **Continuous** acquisition rate (see *Selecting the Sampling Type* on page 58).

2. Select the channel for which you want to see the power variation data on-screen by clicking the corresponding buttons in the **Min./Max.** tab.

3. If you want to specify the duration of power measurements, click the **Use Timer** button, then enter a span using the arrow buttons on each side of the list. If you are using the numeric box to enter a time value, you must enter it in seconds (for example, 120 seconds for 2 minutes).
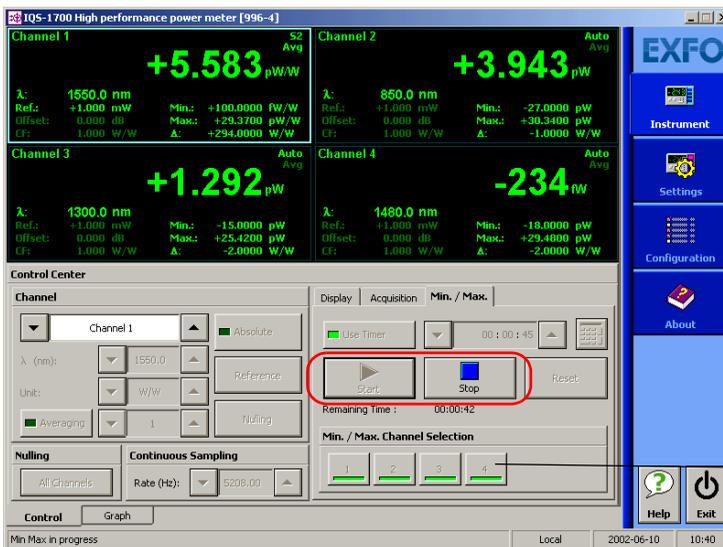
4. Click **Start** to start power measurements.

These can be stopped at any time by clicking **Stop**. If the timer is set, power measurements will stop automatically after the specified duration.

Note: *The remaining duration is indicated under the **Start** and **Stop** button.*

The **Reset** button will reinitialize the **Min./Max.** acquisition results in the data display.

The results of the **Min./Max.** function are continuously updated in the matching lists. When a logarithmic scale is used, the **Max.**–**Min.** calculation is made to continuously provides the difference between the two extremes. In a linear scale, the **Min./Max.** ratio is computed to provide valuable information.

➤ If the power reaches the saturation level, + + + + + + + will be recorded as the Max. value. The Max.-Min. or Min./Max. calculation will also be + + + + + + +.

➤ If the detected power decreases below the lowest measurable power, the Min. value will be – – – – – – – and both Max.-Min. or Min./Max. will display – – – – – – –.

➤ If a Min./Max. calculation is made with a null Min. value, ! ! ! ! ! ! ! will be displayed.

➤ If a channel is shown in the data display but is not part of the selected channels for a Min./Max. acquisition, * * * * * * * will be displayed to indicate that no power reading is being performed at that time.

Selecting **Autorange** for this channel will prevent these symbols from appearing.

8 Performing Acquisitions

You can perform your acquisition on one or several channels at the same time (in the case of multichannel power meters).

To select which channel will be affected by your acquisition:

1. From the **Settings** function tab, select the **Data Acquisition** tab.

2. Press on the corresponding button in the **Channels To Be Included in Sample**.
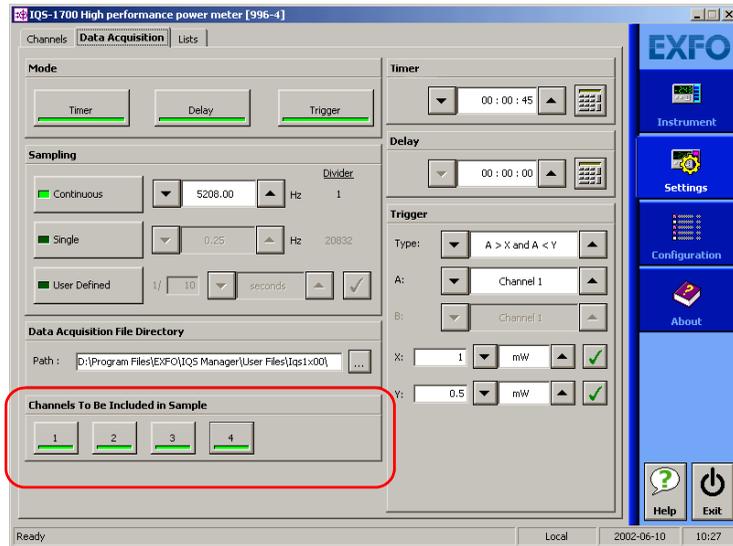
You can set a location where the acquisitions will be stored when you do your tests.

To select a path for storing your acquisitions:

1. From the **Settings** function tab, select the **Data Acquisition** tab.

2. Use ... to select the folder to save your file.

Selecting the Sampling Type

You can perform different types of samplings with your power meter:

➤ **Continuous** sampling signifies that power measurements are constantly updated on the measurement display for an unlimited time period. You can select a rate that will optimize instrument flexibility and measurement stability as well as determine the quantity of data generated during data acquisition.

➤ **Single** sampling signifies that power measurements will be taken once, at the rate you have selected. This type of acquisition is particularly useful when using a high acquisition rate, since the higher the rate, the more data is transmitted. It will be easier for your power meter module to manage one huge input of points as opposed to several at the same time (it will stop analyzing if overwhelmed by data).

➤ **User Defined** sampling signifies that you can enter the rate and the time units you wish to use. The value you enter in the **1/** list is the number of time units the acquisition process will use. For example, if you enter a value of 10, and select seconds as the unit, an acquisition will be performed once every ten seconds; if you enter a value of 1 and select seconds as the unit, an acquisition will occur every second, etc.

To select a sampling type:

1. From the **Settings** function tab, select the **Data Acquisition** tab.
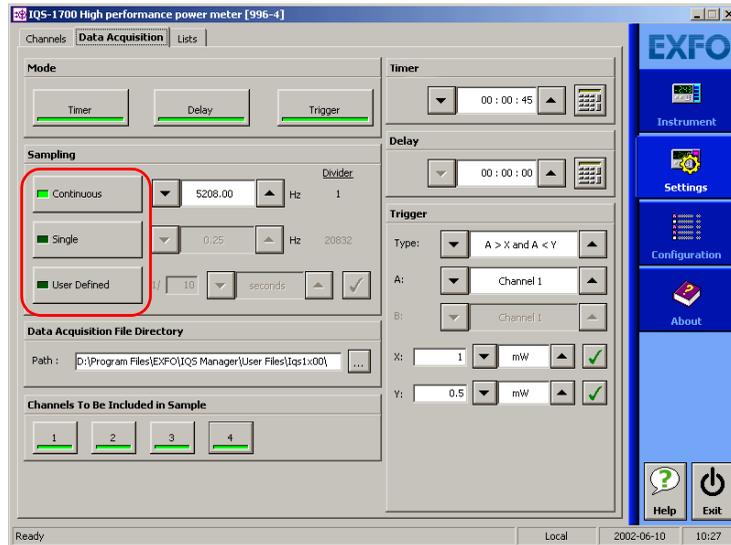
2. Select the sampling type by clicking the corresponding button.

If you select **Continuous**, select the rate to use with the arrow buttons.

This rate is a divider of the maximum rate (5208 Hz). For example, 5208 Hz has a divider of 1, 2604 has a divider of 2 and so forth. To add or remove dividers from the list of available values, see *Editing the Frequency Divider List* on page 61.

The acquisition rate applies to all channels when using a multichannel power meter.

You can also change the continuous sampling rate in the **Instrument** function tab in the same manner.
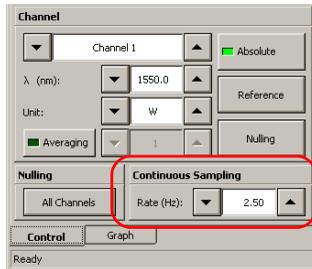
If you select **Single**, select the rate to use with the arrow buttons.

This rate is a divider of the maximum rate (5208 Hz). For example, 5208 Hz has a divider of 1, 2604 has a divider of 2 and so forth. To add or remove dividers from the list of available values, see *Editing the Frequency Divider List* on page 61. The acquisition rate applies to all channels when using a multichannel power meter.

If you select **User Defined**, select the rate by entering a value in the **1/** list, then select a time unit using the arrow buttons. Remember to click ✓ to confirm your settings.

Note: *Use a lower sampling rate with averaging set to active (see* Averaging Measurements *on page 51) for greater repeatability when measuring very low power.*

Editing the Frequency Divider List

To select the frequency at which your continuous or single acquisition will be performed, use a value which is a divider of the full frequency value, 5208 Hz. The values available to you are listed located in the **List** tab of the **Settings** function tab.
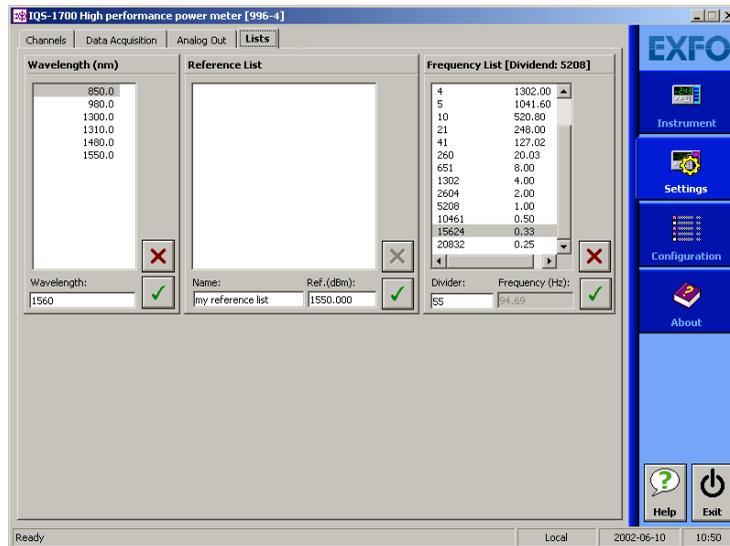
To enter a new divider, simply type it in the **Divider** box. The **Frequency (Hz)** box will be automatically updated with the proper value. To confirm your new value, click [✓].

To remove a divider from the list, select it by clicking it once, then click [✗].

Selecting the Acquisition Mode

You can use three data acquisition modes, regardless of the type of acquisition you are performing.

➤ **Timer**: the acquisition will last for the length of time you have previously set.

➤ **Trigger**: the power meter will wait for an incoming trigger signal before starting its next acquisition.

➤ **Delay**: the power meter will wait for a set length of time between acquisitions.

Note: *You can use one, several or all modes at the same time. If you use both the trigger and delay modes simultaneously, the power meter will first wait for the set delay time to elapse, then wait again for the incoming trigger signal. If you add the timer mode, the acquisitions will be performed during a set length of time, using both the trigger and delay modes.*

In each case, measurements are taken at the selected sampling rate and saved to a user-specified data file. The size of the data files created during acquisition is proportional to the sampling rate and duration of the acquisition. Higher sampling rates and longer durations generate larger quantities of data.

To select the acquisition mode:

1. From the **Settings** function tab, select the **Data Acquisition** tab.
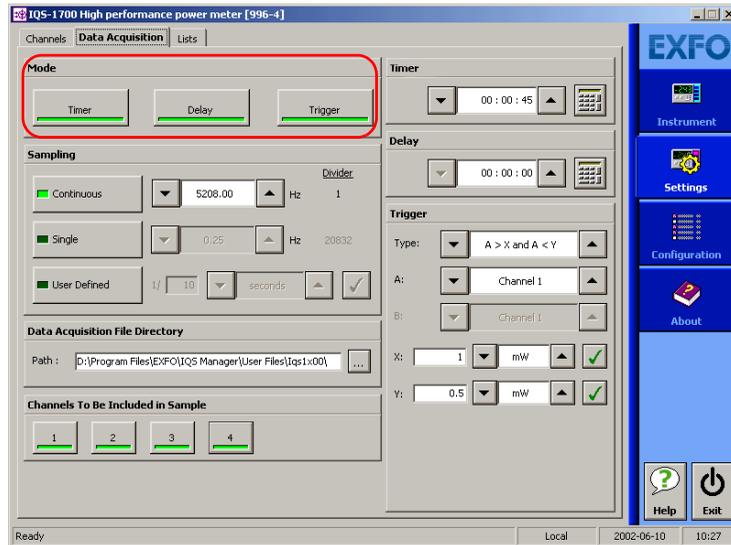
2. From **Mode**, select the desired mode or combination of modes.

Setting Up Timed Acquisition Duration

A timed acquisition starts when you start the process, and continues for the time you have previously specified.

To set the duration for your acquisition:

Click inside the **Timer** edit box of the **Data Acquisition** tab and enter the value (or use the arrow buttons next to the list to adjust it).

If you are using the numeric box, enter the value in seconds (for example, 120 seconds if you want to enter two minutes).
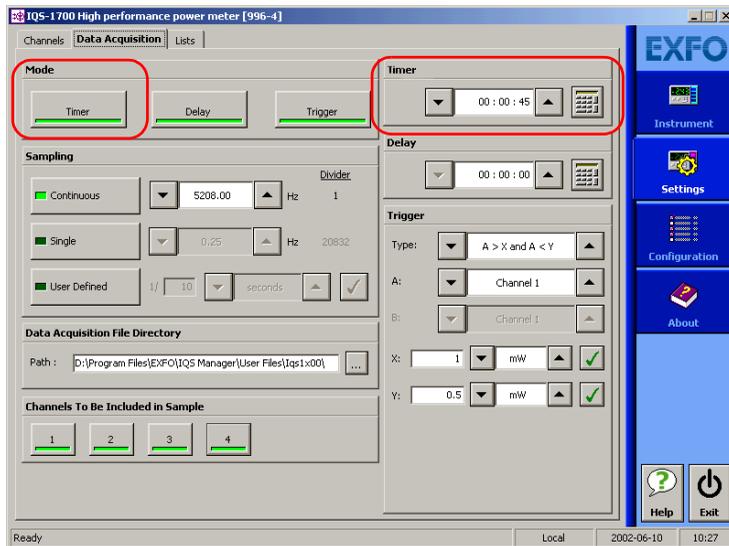
The acquisition length displayed for a single acquisition includes the time set in the **Settings** tab for the acquisition, plus the time needed to transfer data according to the sampling rate selected. During the acquisition, you will notice the message **Acquisition in progress**, then **Data transfer in progress** in the **Instrument** function tab. If you click **Stop** before the data transfer is complete, you will lose your acquisition data.

Setting Up Delayed Acquisition Delay

Delayed acquisition starts at a specified time after you start the process, and continues for the time you have previously specified if you have selected a combination of Timed and Delayed acquisition types.

To set a delay for your acquisition:

1. From the **Data Acquisition** tab, locate **Delay**.
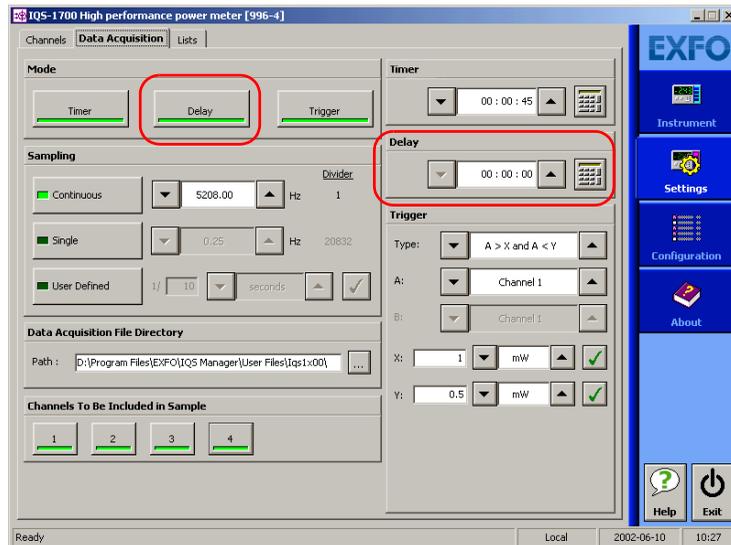
2. Click inside the corresponding edit box and enter the value using the numeric box, or use the arrow buttons to adjust the value.

If you are using the numeric box, enter the value in seconds (for example, 120 seconds if you want to enter two minutes).

Setting Trigger Acquisition Parameters

Conditional data acquisition can be performed using a triggered acquisition, meaning that data recording begins when a specified condition is met. Different trigger conditions are available, which are explained in the following table, where A and/or B represent the channel on which the condition is to be met, and x and/or y represent the desired power level threshold.

Trigger	Description
A > x	Acquisition will start when measured power is greater than the specified x value.
A < x	Acquisition will start when measured power is lower than the specified x value.
A > x AND A < y	Acquisition will start when measured power in channel A is inside the interval set by the values x and y.
A or B < x	Acquisition will start when power in either channel A or channel B is lower than the specified x value.
x < A or B < y (multichannel power meters only)	Acquisition will start when measured power in channel A goes over a specified value (A > x). OR Acquisition will start when measured power in channel B falls under a specified value (B < y).
A < B (multichannel power meters only)	Acquisition will start when measured power of channel A is lower than measured power of channel B.

Note: *The trigger defines the condition for starting data acquisition. Once begun, acquisitions will continue for the specified duration, regardless of the measured power.*

To set up the power level trigger condition:

1. From **Trigger** of the **Data Acquisition** tab, use the arrow buttons next to the **Type** list to select the desired condition.
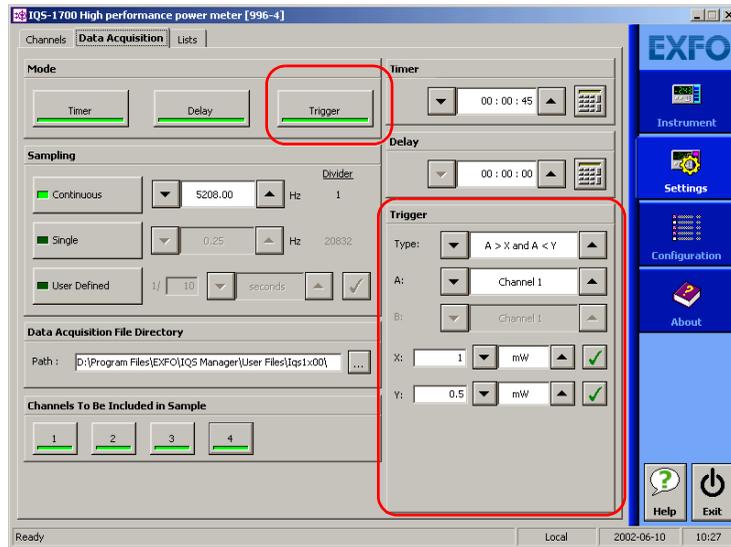
2. Select a channel (if applicable) to be taken as **A** and **B**
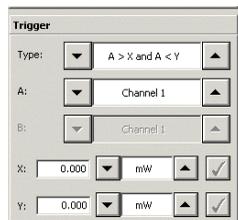
Note: *The X and Y values are displayed in the currently selected unit.*

3. Enter the appropriate X or Y values in the corresponding lists.

4. Click ✓ to confirm your setting.

Starting the Acquisition

Once you have set your parameters, you can start the acquisition.

To start an acquisition:

1. Select the **Instrument** function tab.

2. From the **Acquisition** tab, press **Start**.

Data acquisition can be terminated at any time by clicking **Stop**. The accumulated data is available in the data file.

If you want to start a graph acquisition at the same time, you must enable the **Graph** function in the same tab (for more information on the graph acquisition and visualization mode, see *Performing and Analyzing Graph Acquisitions* on page 75).

Note: *You cannot activate **Graph** mode after the acquisition has already been started.*
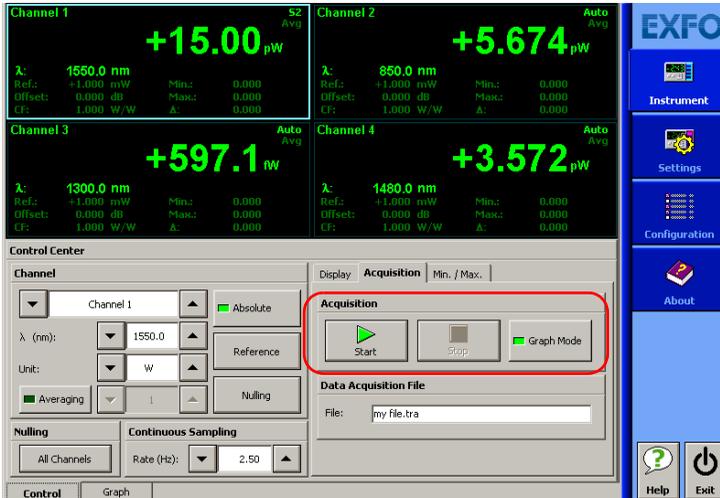
You can also start the acquisition in the **Graph** tab by clicking the **Start** button the same way you would in the **Control** tab.

![IMPORTANT symbol]

IMPORTANT

If you change units on one or more channels using Relative or Absolute mode and that you had enabled Graph mode, the Graph and Start buttons might automatically disable themselves if the resulting changes are not compatible with the base unit used in the graph.

To enter a name for your acquisition, type it in the **File** box of **Data Acquisition File**. The default extension is *.tra*.

Consulting Acquired Data

Once you have acquired data, it is possible to view the results in IQS Manager.

To view data previously acquired:

1. In IQS Manager, select the **Work on Results (Offline)** function tab.

2. Click the tab, then click the button corresponding to the application for which you want to see information.
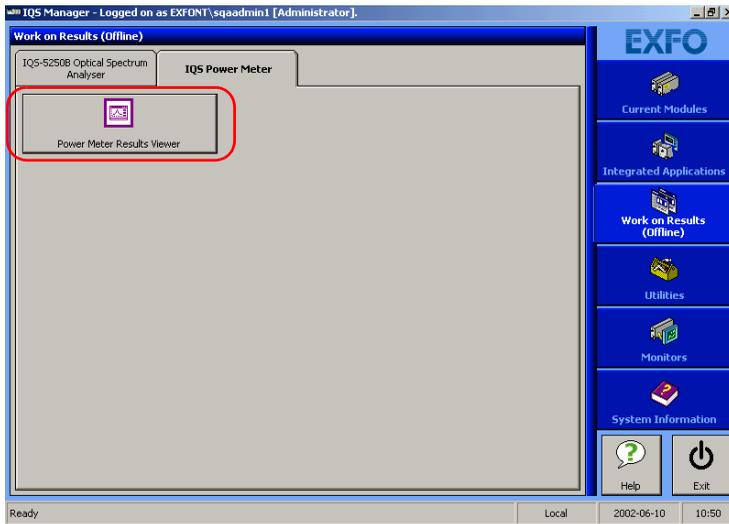
3. In the viewer, retrieve the corresponding file using the [...] button.

➤ To view the details pertaining to the channels used for the acquisition, select the **General** tab.

➤ To view your acquisition data, select the **Data** tab.

Time (s.)	Channel 1 (W)	Channel 2 (W)	Channel 3 (W)	Channel 4 (W)
0.000	1.12643E-11	-3.582231E-12	7.860811E-12	-6.569727E-13
0.000	1.12643E-11	-3.582231E-12	7.860811E-12	-6.569727E-13
0.000	1.166632E-11	1.716611E-11	3.567598E-12	1.291291E-12
0.001	1.166632E-11	1.716611E-11	3.567598E-12	1.291291E-12
0.001	1.190147E-11	-9.294232E-12	3.212351E-12	1.902955E-12
0.001	1.190147E-11	-9.294232E-12	3.212351E-12	1.902955E-12
0.001	6.925455E-12	-5.283037E-12	5.487451E-12	-4.598808E-12
0.001	6.925455E-12	-5.283037E-12	5.487451E-12	-4.598808E-12
0.002	1.244003E-11	1.018226E-11	8.31432E-12	2.288077E-12
0.002	1.244003E-11	1.018226E-11	8.31432E-12	2.288077E-12
0.002	8.343922E-12	2.046988E-12	4.512408E-12	-2.235217E-12
0.002	8.343922E-12	2.046988E-12	4.512408E-12	-2.235217E-12
0.002	1.487494E-11	-1.459985E-12	3.832146E-12	1.316211E-11
0.002	1.487494E-11	-1.459985E-12	3.832146E-12	1.316211E-11
0.003	1.394194E-11	2.950072E-12	6.598546E-12	1.106281E-11
0.003	1.394194E-11	2.950072E-12	6.598546E-12	1.106281E-11
0.003	9.314851E-12	-2.852238E-12	1.776241E-12	-7.090773E-12
0.003	9.314851E-12	-2.852238E-12	1.776241E-12	-7.090773E-12
0.003	3.003812E-12	1.776064E-12	6.341558E-12	1.789684E-12
0.004	3.003812E-12	1.776064E-12	6.341558E-12	1.789684E-12
0.004	7.395749E-12	2.069565E-12	9.395181E-12	7.475895E-12
0.004	7.395749E-12	2.069565E-12	9.395181E-12	7.475895E-12
0.004	1.438947E-11	2.174925E-12	9.123076E-12	-7.777954E-13
0.004	1.438947E-11	2.174925E-12	9.123076E-12	-7.777954E-13
0.005	3.398251E-12	3.552127E-12	6.689248E-12	6.682997E-12
0.005	3.398251E-12	3.552127E-12	6.689248E-12	6.682997E-12
0.005	6.068306E-12	6.577456E-12	6.008986E-12	4.387368E-12
0.005	6.068306E-12	6.577456E-12	6.008986E-12	4.387368E-12
0.005	1.357784E-12	-8.594342E-12	8.382346E-12	9.152307E-12
0.006	1.357784E-12	-8.594342E-12	8.382346E-12	9.152307E-12
0.006	6.750991E-12	5.659321E-12	-4.519967E-12	6.992604E-12
0.006	6.750991E-12	5.659321E-12	-4.519967E-12	6.992604E-12

Power Meter Results Viewer

Data Acquisition File: D:\Program Files\EXFO\IQS Manager\User Files\Iqs1X00\my file.tra

Export...

General | Data | Graph

Exit

➤ To view the graph corresponding to your acquisition data, select the **Graph** tab.
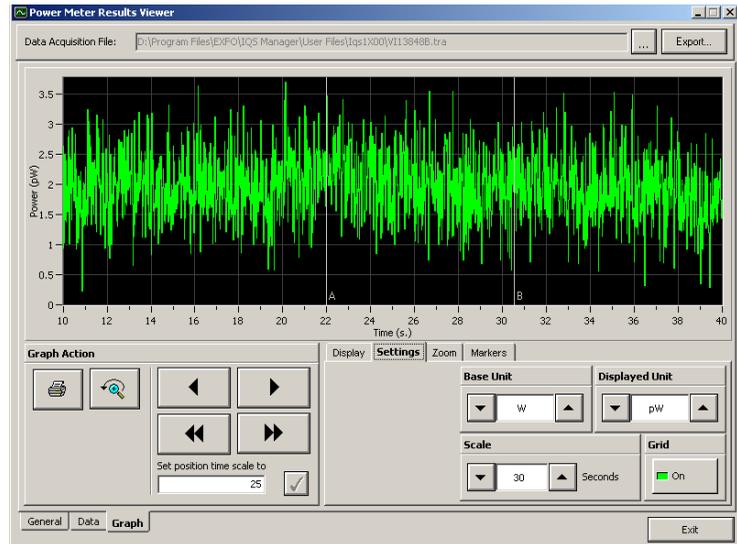
To move along the time scale, use the arrow buttons.

The single arrow buttons will move by increments or decrements representing 10 % of the current trace scale value.

The double arrow buttons will move by increments or decrements of the current screen display (for example, the 10 to 40 seconds display would become 40 to 70 seconds in the figure above).

To center on a specific value, type it in the **Set position time scale to** box.

The other buttons and tabs are identical to those found in your power meter application's **Graph** tab. See *Performing and Analyzing Graph Acquisitions* on page 75 for details.

If you want to save your acquisition file as a text file, use the **Export** button located on the upper right-hand corner of the window. Save the file as you would any other text file, then confirm your choice. You can now view your data in any word processing program.

Note: *If your acquisition file is too large for the viewer, you will be notified by a pop-up message. Only the first part of your acquisition file will be displayed in the viewer; to see complete results, you must export the file and view it in a word processing program.*

To exit the window and return to IQS Manager, click **Exit**.

9 *Performing and Analyzing Graph Acquisitions*

The Graph mode of your power meter allows you to view your acquisition as it is performed, and analyze it once it has been completed.

Setting Up Graph Parameters

Before acquiring data, you should set the parameters that will help you achieve a better viewing afterwards.

To select which channels will be displayed:

Click the corresponding button when you are in the **Display** tab of the **Graph Center**.
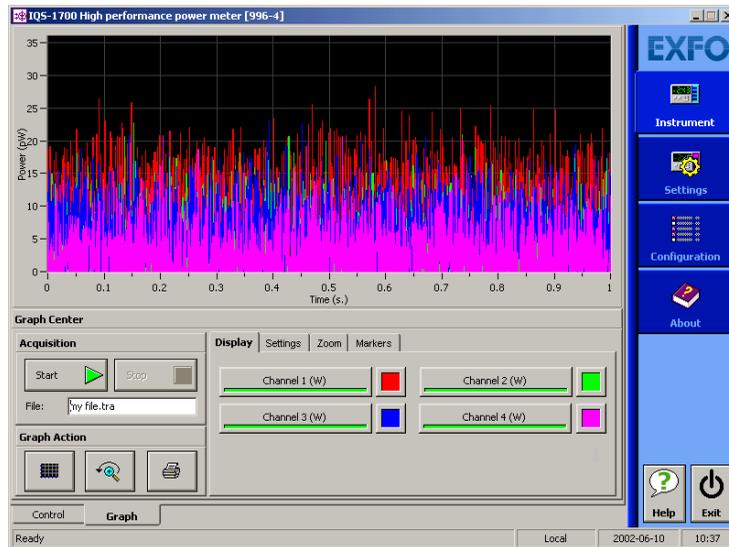
Once you have acquired a trace, you can also show or hide the channels by clicking the corresponding buttons.

Note: *You can only hide or display channels actually used for this acquisition. Moreover, only channels in the type of unit selected for the acquisition (absolute or relative) will be displayed. For example, if your graph was set to dBm units before the acquisition, you will see the graphs for channels using W or dBm as the unit. If your graph was set to W/W units, you will see the graph for channels using dB or W/W as the unit.*

To select which type of display to use during the acquisition:

Go to the **Settings** tab of the **Graph Center** and click the button corresponding to your choice:
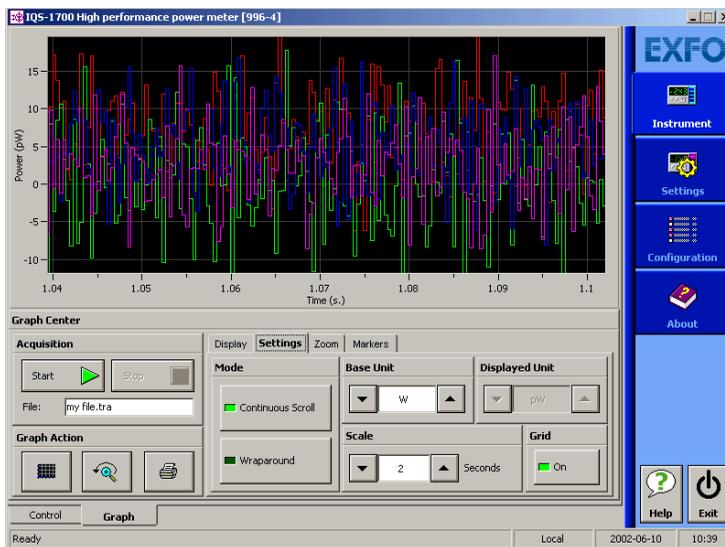
➤ **Continuous Scroll**: The display will scroll along to the right as the acquisition progresses.

➤ **Wraparound**: Once the acquisition has reached the end of the screen to the right, it will begin on the left again and cover the previous trace.

To change the base unit of the acquisition (dBm or watts):

Use the arrow buttons in the **Settings** tab to toggle between them.

If you set the base unit before performing an acquisition, you will have the choice between W, dBm, dB, and W/W. If you change the unit while an acquisition is in progress, you will only have the choice between absolute units (dBm or W) or relative units (dB or W/W), depending on your base unit at the start of the acquisition.

If you have selected either W or W/W as the base unit, the **Displayed Unit** list becomes available, and you can change it during the acquisition using the arrow buttons, depending on the sub-unit that suits the current situation. For example, if at the beginning of the acquisition, no light goes through, the display will be in pW. When light goes through, you might want to switch to μW or nW to get a more appropriate reading.

To change the displayed time scale:

Use the arrow buttons in the **Settings** tab to increase or decrease the value. The display will change accordingly.

IMPORTANT

If you change the base unit after acquiring data, you will lose the graph you have obtained, as well as the data acquired. Ensure you set your values before acquiring data.

IMPORTANT

If you change the base unit, the channels in the Display tab will automatically change when you switch from a relative unit to an absolute unit or vice versa.

To show or hide the grid in the background of the graph display:

Click the corresponding button in the **Settings** tab.

Printing Graph Results

Once you have acquired data and displayed a graph, it is possible to print out this information.

To print your graph results:

Click [🖨] in the **Graph Center**.
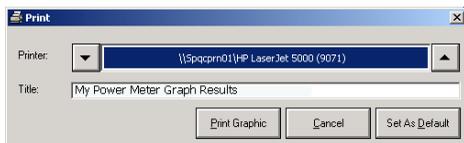
Use the arrow buttons to select the printer to use. You can enter a title for your document in the corresponding box. The **Print Graphic** button will start the printout, the **Cancel** button will bring you back you to the **Graph** tab, and the **Set As Default** button will keep the selected printer for future printouts.

The button will be disabled if no graph is displayed.

Clearing Graph Display

The graph display will automatically clear itself when you start a new acquisition. However, you can also clear the graph display manually.

To clear the graph display:

Click [▦] in the **Graph Center**.

Note: *Changing items such as the units or display options will also clear the graph display. Ensure that you have set your parameters beforehand.*

Using the Zoom Function

Once you have performed an acquisition, you can use various zooming tools to help you analyze it.

To access and use the zoom tools:

Click the **Zoom Control** tab of the **Graph Center**.
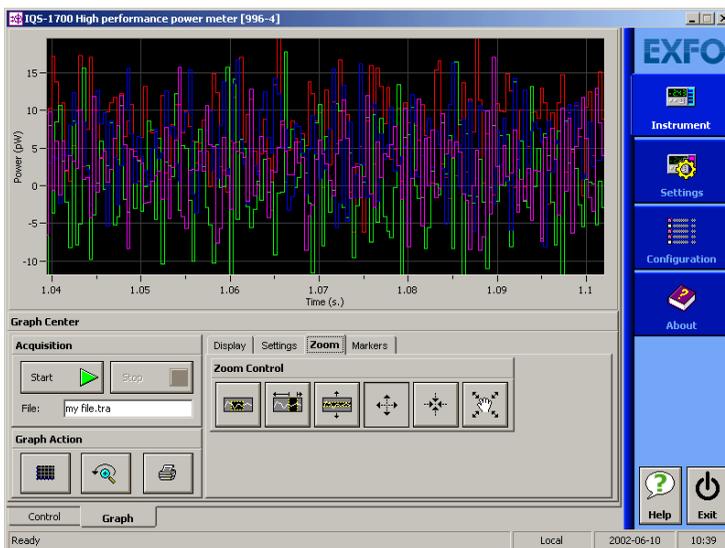
➤ ▨ allows you to enlarge a precise portion of the trace by dragging a zone over it. Simply drag the cursor to cover the area you wish to see and release the mouse button to enlarge the area.

➤ ▨ allows you to enlarge a precise portion of the trace horizontally, meaning that the time scale will enlarge and the power scale will remain the same.

➤ ▨ allows you to enlarge a precise portion of the trace vertically, meaning that the power scale will enlarge and the time scale will remain the same.

➤ ⊕ allows you to enlarge the trace display at the precise location where you click. Click the area repeatedly until you reach the desired zoom factor.

➤ ⊹ allows you to reduce the trace display at the precise location where you click. Click the area repeatedly until you reach the desired zoom factor.

➤ ✋ allows you to move around the trace to view areas not currently displayed. You can pan upwards and downwards, as well as to the left and right.

Note: *You can only pan to the right and left if the time scale length is larger than the portion displayed on the screen.*

To revert to the original trace size, click 🔍 in the **Graph Center.**

Displaying and Moving Markers

Once you have acquired a trace, you can use markers to take precise measurements.

To enable the markers:

1. Select the channel you want to use from the **Channel** pull-down list in the **Markers** tab.
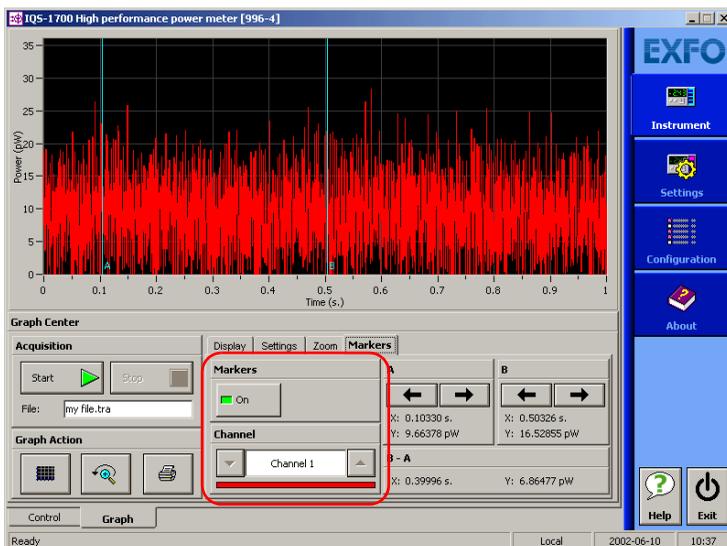
2. Click the **On** button.

The two markers, **A** and **B**, will appear on the display.

You can move the markers to the desired position by clicking them and dragging them to the left or right; or you can use the arrow buttons next to each marker to move them. The markers will move automatically to the next available point when you move them either by dragging or with the arrow buttons.

Note: *If you have enabled the markers and you move to another tab (than the* ***Zoom*** *tab), the markers will still be visible, but you cannot move them. You must return to the* ***Markers*** *tab to do so.*

You will notice that the difference between the markers (B – A) is automatically refreshed on the lower part of the tab as you move the markers.

10 *Monitoring Power Meter Modules*

When using your IQS-1700 High Performance Power Meter 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.

Selected modules (checked)

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.*

Close 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, select the monitor window of the module you wish to control.

2. Using the arrow button in the upper left corner, select **QuickTools**.

   The corresponding monitor window flashes when QuickTools is activated.

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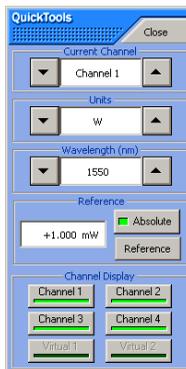
To close QuickTools:

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

OR

Click outside the QuickTools window.

To close a monitor window:

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

OR

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

11 *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

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

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.*

WARNING

Looking into the optical connector while the light source is active WILL result in permanent eye damage. EXFO strongly recommends to TURN OFF the unit before proceeding with the cleaning procedure.

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).
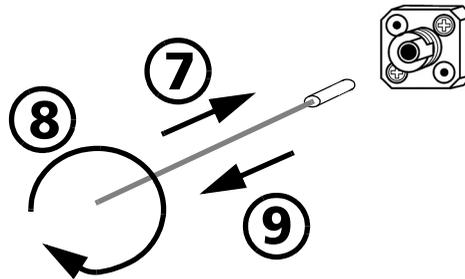
8. Gently turn the cleaning tip one full turn.

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 Detector Ports

Regular cleaning of detectors will help maintain measurement accuracy.

> **❗IMPORTANT**
>
> **Always cover detectors with protective caps when unit is not in use.**

To clean detector ports:

1. Remove the protective cap and adapter (FOA) from the detector.

2. If the detector is dusty, blow dry with compressed air.

3. Being careful not to touch the soft end of the swab, moisten a cleaning tip with *only one drop* of isopropyl alcohol.

> **❗IMPORTANT**
>
> **Alcohol may leave traces if used abundantly. Do not use bottles that distribute too much alcohol at a time.**

4. While applying light pressure (to avoid breaking the detector window), gently rotate the cleaning tip on the detector window.

5. Repeat step 4 with a dry cleaning tip or blow dry with compressed air.

6. Discard the cleaning tips after one use.

Recalibrating the Unit

EXFO manufacturing and service center calibrations are based on the ISO/IEC 17025 standard (*General Requirements for the Competence of Testing and Calibration Laboratories*). This standard states that calibration documents must not contain a calibration interval and that the user is responsible for determining the re-calibration date according to the actual use of the instrument.

The 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, as well as the specific requirements for your application. All of these elements must be taken into consideration when determining the appropriate calibration interval of this particular EXFO unit.

Under normal use, the recommended interval for your IQS-1700 High Performance Power Meter is: one year.

For newly delivered units, EXFO has determined that the storage of this product for up to six months between calibration and shipment does not affect its performance (EXFO Policy PL-03).

To help you with calibration follow-up, EXFO provides a special calibration label that complies with the ISO/IEC 17025 standard and indicates the unit calibration date and provides space to indicate the due date. Unless you have already established a specific calibration interval based on your own empirical data and requirements, EXFO would recommend that the next calibration date be established according to the following equation:

Next calibration date = Date of first usage (if less than six months after the calibration date) + Recommended calibration period (one year)

To ensure that your unit conforms to the published specifications, calibration may be carried out at an EXFO service center or, depending on the product, at one of EXFO's certified service centers. Calibrations at EXFO are performed using standards traceable to national metrology institutes.

Note: *You may have purchased a FlexCare plan that covers calibrations. See the Service and Repairs section of this user documentation for more information on how to contact the service centers and to see if your plan qualifies.*

Recycling and Disposal (Applies to European Union Only)

For complete recycling/disposal information as per European Directive WEEE 2012/19/UE, visit the EXFO Web site at www.exfo.com/recycle.

12 *Troubleshooting*

Solving Common Problems

Problem	Probable Cause	Recommended Action
LED push button does not illuminate.	Power is not on.	Check AC power cord and turn on the Intelligent Test System units.
	Module is not properly inserted.	Turn off the Intelligent Test System units, then remove and reinsert the module.
	Unit has locked up.	Reboot the Intelligent Test System.
	LED is burnt out.	Call EXFO.
Pressing LED push button does not open the module application's main window.	Computer has locked up.	Reboot the Intelligent Test System.
Power meter does not respond to new commands.	IQS Intelligent Test System still processing remaining commands. «Processing» is displayed in the status bar.	New commands will be executed after completion of current processing.
$-------$ is displayed as power value.	Power level is below the minimum detectable power.	Select an appropriate manual measurement range (lower range) or Autorange.
$++++++$ is displayed as power value.	Power level is above the maximum detectable power (saturation).	Select an appropriate manual measurement range (higher range).
		Turn the source off.

Problem	Probable Cause	Recommended Action
* * * * * * * is displayed as power value.	➤ Channel not active. ➤ Channel not selected for Min. / Max. acquisition.	➤ Click the **Active** button for the appropriate channel in the **Channel** tab of the **Settings** function tab. ➤ Select the appropriate channel in **Min./Max. Channel Selection** of the **Instrument** function tab.
! ! ! ! ! ! ! is displayed as power value.	The signal is unstable or has a modulated input.	Select an appropriate manual measurement range if **Autorange** mode is selected.
Questionable readings displayed.	The detector or optical connectors are dirty.	Clean the detector and all optical connections.
	The wavelength selection is improper.	Switch to the correct wavelength on all instruments being used.
	The offset nulling is incorrect.	Perform an offset nulling with protective cap installed.
	The optical source is unstable.	Wait for source to stabilize (at least 60 minutes).
	The correction factor is incorrect.	Reset the correction factor to 0.000 dB or 1.000 W/W.

Viewing Online Documentation

An online version of the IQS-1700 High Performance Power Meter 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).

Technical Support Group

400 Godin Avenue	1 866 683-0155 (USA and Canada)
Quebec (Quebec) G1M 2K2	Tel.: 1 418 683-5498
CANADA	Fax: 1 418 683-9224
	support@exfo.com

For detailed information about technical support, and for a list of other worldwide locations, visit the EXFO Web site at www.exfo.com.

If you have comments or suggestions about this user documentation, you can send them to customer.feedback.manual@exfo.com.

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

You may also be requested to provide software and module version numbers.This information, as well as technical support contact information, can be found in the **About** function tab.
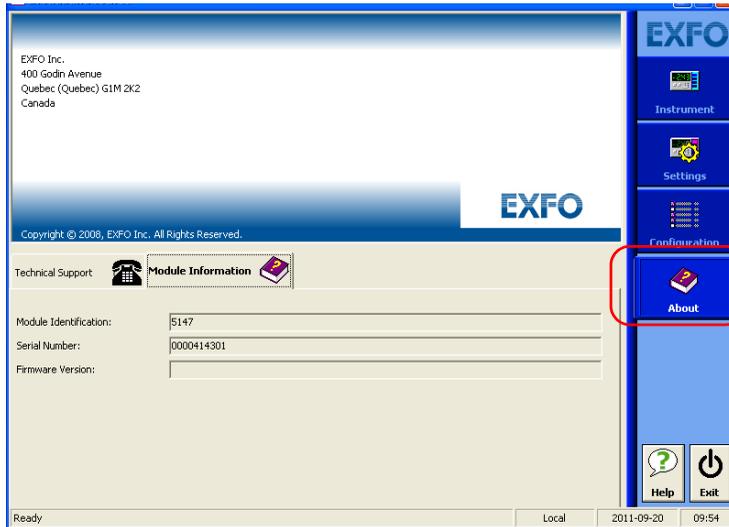
➤ Select the **Technical Support** tab to view phone numbers and active Internet links to EXFO's Technical Support Group. Use these links to send an information request by e-mail or to access EXFO's web site.

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

Transportation

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

➤ Pack the unit in its original packing material when shipping.

➤ Avoid high humidity or large temperature fluctuations.

➤ Keep the unit out of direct sunlight.

➤ Avoid unnecessary shocks and vibrations.

13 *Warranty*

General Information

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

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

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

Liability

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

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

Exclusions

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

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

Certification

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

Service and Repairs

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

To send any equipment for service or repair:

1. Call one of EXFO's authorized service centers (see *EXFO Service Centers Worldwide* on page 104). 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 104).

EXFO Service Centers Worldwide

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

EXFO Headquarters Service Center

400 Godin Avenue	1 866 683-0155 (USA and Canada)
Quebec (Quebec) G1M 2K2	Tel.: 1 418 683-5498
CANADA	Fax: 1 418 683-9224
	support@exfo.com

EXFO Europe Service Center

Winchester House, School Lane	Tel.: +44 2380 246800
Chandlers Ford, Hampshire S053 4DG	Fax: +44 2380 246801
ENGLAND	support.europe@exfo.com

EXFO Telecom Equipment (Shenzhen) Ltd.

3rd Floor, Building 10,	Tel: +86 (755) 2955 3100
Yu Sheng Industrial Park (Gu Shu	Fax: +86 (755) 2955 3101
Crossing), No. 467,	support.asia@exfo.com
National Highway 107,	
Xixiang, Bao An District,	
Shenzhen, China, 518126	

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 [a] (IQS/OHS-1700 SERIES) Optical heads must be operated with the IQS-1710/1720/1740 High-Performance Interface Module.

Model	IQS-1712X/1722X/1742X	IQS-1713/1723/1743	OHS-1713-UH
Number of detectors	1/2/4	1/2/4	1
Detector type	GeX	InGaAs	InGaAs and integrating cavity
Detector size	2 mm detector	1 mm detector	9 mm input aperture
Wavelength range (nm)	800 to 1660	800 to 1700	930 to 1660
Power range (dBm) [b, h]	25 to −50	8 to −87	37 to −55
Uncertainty	±(5 % + 10 nW) [e, h]	±(5 % + 2 pW) [f, h]	±(4 % + 3 nW) [g, h]
Polarization-dependent responsivity (dB) [c]	N/A	N/A	(0 dBm to −50 dBm) ±0.008 typ.
Linearity [d]	±0.015 dB (10 dBm to −30 dBm)	±0.015 dB (5 dBm to −55 dBm)	±0.11 dB (35 dBm to 30 dBm) ±0.05 dB (30 dBm to 5 dBm) ±0.015 dB (5 dBm to −22 dBm)
Power resolution (dB) [h]	0.001 (25 dBm to −20 dBm)	0.001 (8 dBm to −50 dBm)	0.001 (37 dBm to −25 dBm)
Wavelength resolution (nm)	0.01	0.01	0.01
Stabilization time (ms)	0.3	0.3	0.3
Sampling rate (sample/s/channel)	up to 5208	up to 5208	up to 5208
Fiber type (µm)	5/125 to 62.5/125 NA ≤ 0.3	5/125 to 62.5/125 NA ≤ 0.3	5/125 to 62.5/125 NA ≤ 0.4 (with BFA-3000)

GENERAL SPECIFICATIONS

	IQS-1710/1720/1740 IQS-1713/1723/1743 IQS-1712X/1722X/1742X	OHS-1713-UH
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)	42 mm x 79 mm x 190 mm ($1^5/_8$ in x $3^1/_8$ in x $7^1/_2$ in)
Weight	0.64 kg (1.4 lb)	0.5 kg (1.1 lb)
Temperature Operating [i] Storage	0 °C to 40 °C (32 °F to 104 °F) −40 °C to 70 °C (−40 °F to 158 °F)	0 °C to 40 °C (32 °F to 104 °F) −40 °C to 70 °C (−40 °F to 158 °F)
Number of ports	1/2/4	1
Relative humidity [i]	0 % to 80 % non-condensing	0 % to 80 % non-condensing
Remote control	With IQS-600: GPIB (IEEE-488.1, IEEE-488.2), Ethernet and RS-232.	
Instrument drivers	LabVIEW™, SCPI commands and COM/DCOM library drivers.	
Standard accessories	User guide, one fiber-optic adapter per channel, Certificate of Compliance and Certificate of Calibration.	

Notes

a. At 1550 nm (unless otherwise specified), with an FC angled connector and a warmup time of 20 minutes, followed by an offset nulling.

b. From 18 °C to 28 °C.

c. At 23 °C ± 3 °C, constant wavelength (1550 nm), constant power and with an FC non-angled connector.

d. At constant temperature in the 0 °C to 40 °C range; nulling required.

e. At 23 °C ± 1 °C with an FOA-322 and an FC non-angled connector, between 1000 nm and 1650 nm. Add 1 % to uncertainty below 1000 nm, and 3 % over 1650 nm.

f. At 23 °C ± 1 °C with an FOA-322 and an FC non-angled connector, between 1000 nm and 1640 nm. Add 1 % to uncertainty below 1000 nm, and 6 % over 1640 nm.

g. At 23 °C ± 1 °C with an FOA-322 and an FC angled connector, between 1290 nm and 1340 nm, and between 1420 nm and 1640 nm. Add 2 % to uncertainty below 1000 nm, 1 % between 1370 nm and 1420 nm, and 5 % over 1640 nm. All uncertainties valid on the day of calibration. Wavelength must not be equal to any water absorption line.

h. Averaging time of 1 s.

i. For optical power of > 35 dBm, maximum operating temperature is 30 °C. With the FOA-396, maximum operating temperature is 25 °C.

j. From 0 °C to 40 °C.

B SCPI Command Reference

This appendix presents detailed information on the commands and queries supplied with your IQS-1700 High Performance Power Meter.

IMPORTANT

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

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

LINStrument<LogicalInstrumentPos>:

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

IQS controller or expansion unit
identification number (for example, 001)

XXXY

Instrument slot number (0 to 9)

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

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Product-Specific Commands—Description

	:ABORt[1..n]
Description	This command is used to stop the acquisition currently in progress. On *RST, the equivalent of an ABORt command is performed on any acquisition in progress.
Syntax	:ABORt[1..n]
Parameter(s)	None
Example(s)	INIT:AUTO 1, CONT ABOR
See Also	INITiate:AUTO INITiate:AUTO? INITiate:EXTRema INITiate:EXTRema? MMEMory:ACQuisition MMEMory:ACQuisition?

:FETCh[1..n][:SCALar]:POWer:DC?

Description	This query returns the stored value on the specified channel. To fetch a specific channel, enter the channel number as a suffix of the FETC keyword. The maximum channel is device-dependent. Channel 1 is always used by default.
Syntax	:FETCh[1..n][:SCALar]:POWer:DC?
Parameter(s)	None
Response Syntax	<PowerMeasurement>
Response(s)	*PowerMeasurement:* The response data syntax for <PowerMeasurement> is defined as a <NR3 NUMERIC RESPONSE DATA> element. It is the stored value on the specified channel.
Example(s)	READ:POW:DC? FETC1:POW:DC?
See Also	MEASure:SCALar:POWer:MAX? MEASure:SCALar:POWer:MIN? READ:SCALar:POWer:DC?

:FORMat[1..n][:DATA]

Description	This command changes the resolution of the power value when dB or dBm is selected for the specified channel.
Syntax	:FORMat[1..n][:DATA]<wsp><FormatData>
Parameter(s)	*FormatData:*
	The program data syntax for <FormatData> is defined as a <DECIMAL NUMERIC PROGRAM DATA> element.
	Changes the data format
Example(s)	FORM:DATA 3
See Also	FORMat[:DATA]?

:FORMat[1..n][:DATA]?

Description	This query returns the resolution of the power value when dB or dBm is selected for the specified channel.
Syntax	:FORMat[1..n][:DATA]?
Parameter(s)	None
Response Syntax	<FormatData>
Response(s)	*FormatData:*
	The response data syntax for <FormatData> is defined as a <NR3 NUMERIC RESPONSE DATA> element.
	This query returns the data format.
Example(s)	FORM:DATA?
See Also	FORMat[:DATA]

:INITiate[1..n]:AUTO

Description	This command starts or stops an acquisition using the number of points set with the TRAC:POIN command, and the sampling rate set with the SENS:FREQ[:CONT] or SENS:FREQ:NCON commands.
	At *RST, all acquisitions are stopped.
Syntax	:INITiate[1..n]:AUTO<wsp><StartStop>,CONT|NCONt
Parameter(s)	➤ *StartStop:*

The program data syntax for <StartStop> is defined as a <Boolean Program Data> element. The <StartStop> special forms ON and OFF are accepted on input for increased readability. ON corresponds to 1 and OFF corresponds to 0.

This parameter changes the state of an acquisition:
0 or OFF - Stops the acquisition.
1 or ON - Starts the acquisition.

➤ *AcqType:*

The program data syntax for the second parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: CONT\|NCONt.

:INITiate[1..n]:AUTO

This parameter allows to set the acquisition
mode:
CONT set Continuous acquisition.
NCON set Single acquisition.

Example(s)   TRAC:POIN TRC1, 5
INIT:AUTO 1, CONT
INIT:AUTO 0, CONT
or
INIT:AUTO 1, NCON

See Also   ABORt
INITiate:AUTO?
INITiate:EXTRema
MMEMory:ACQuisition
TRACe:POINt

:INITiate[1..n]:AUTO?

Description	This query returns a value indicating whether a programmed (or "Autostop") acquisition is in progress.
Syntax	:INITiate[1..n]:AUTO?
Parameter(s)	None
Response Syntax	<AcqOnOff>
Response(s)	*AcqOnOff:*
	The response data syntax for <AcqOnOff> is defined as a <NR1 NUMERIC RESPONSE DATA> element.
	This query returns the current <AcqOnOff> acquisition state: 0 - Autostop acquisition is stopped. 1 - Autostop acquisition is running.
Example(s)	INIT:AUTO?
See Also	ABORt INITiate:AUTO INITiate:EXTRema INITiate:EXTRema? MMEMory:ACQuisition MMEMory:ACQuisition? TRACe:POINt

:INITiate[1..n]:EXTRema

Description	This command starts or stops the Min./Max. power measurements in Continuous acquisition mode for all channels.
	At *RST, all acquisitions are stopped (the value is set to OFF).
Syntax	:INITiate[1..n]:EXTRema<wsp><Extrema>
Parameter(s)	*Extrema:*
	The program data syntax for <Extrema> is defined as a <Boolean Program Data> element. The <Extrema> special forms ON and OFF are accepted on input for increased readability. ON corresponds to 1 and OFF corresponds to 0.
	This parameter allows to change the Min./Max. measurement status: 0 - Stops the Min./Max. measurements. 1 - Starts the Min./Max. measurements.
Example(s)	INIT:EXTR ON
See Also	ABORt INITiate:AUTO INITiate:AUTO? INITiate:EXTRema? MMEMory:ACQuisition MMEMory:ACQuisition? TRACe:POINt

:INITiate[1..n]:EXTRema?

Description	This query returns a value indicating whether Min./Max. power measurements are in progress in Continuous acquisition mode.
Syntax	:INITiate[1..n]:EXTRema?
Parameter(s)	None
Response Syntax	<ExtremaOnOFF>
Response(s)	*ExtremaOnOFF:*
	The response data syntax for <ExtremaOnOFF> is defined as a <NR1 NUMERIC RESPONSE DATA> element.
	This query returns the current Min./Max. measurements status: 0 - Min./Max. measurements have stopped. 1 - Min./Max. measurements are in progress.
Example(s)	INIT:EXTR?
See Also	ABORt INITiate:AUTO INITiate:AUTO? INITiate:EXTRema MMEMory:ACQuisition MMEMory:ACQuisition? TRACe:POINt

:MEASure[1..n][:SCALar]:POWer: MAXimum?

Description	This query returns the maximum power measurement value recorded for a channel in Continuous acquisition mode.
Syntax	:MEASure[1..n][:SCALar]:POWer:MAXimum?
Parameter(s)	None
Response Syntax	<MaxPower>
Response(s)	*MaxPower:* The response data syntax for <MaxPower> is defined as a <NR3 NUMERIC RESPONSE DATA> element. This query returns the power measurement maximum for a channel in the currently selected unit. The number of digits after the decimal depends on the selected resolution. To change the resolution of the displayed power value in dB or dBm, use the FORM[:DATA] command. To know the current measurement unit, use the UNIT:POWer? query.
Example(s)	INIT:EXTR ON MEAS:POW:MAX?
See Also	INITiate:EXTRema MEASure:SCALare:POWer:MIN?

:MEASure[1..n][:SCALar]:POWer: MINimum?

Description	This query returns the minimum power measurement value recorded for a channel in Continuous acquisition mode.
Syntax	:MEASure[1..n][:SCALar]:POWer:MINimum?
Parameter(s)	None
Response Syntax	<MinPower>
Response(s)	*MinPower:*
	The response data syntax for <MinPower> is defined as a <NR3 NUMERIC RESPONSE DATA> element.
	This query returns the power measurement minimum in the currently selected unit. The number of digits after the decimal depends on the selected resolution. To change the resolution of the displayed power value in dB or dBm, use the FORM[:DATA] command. To know the current measurement unit, use the UNIT:POWer? query.
Example(s)	INIT:EXTR ON MEAS:POW:MIN?
See Also	INITiate:EXTRema MEASure:SCALare:POWer:MAX?

:MMEMory[1..n]:ACQuisition

Description	This command initiates a data acquisition. Acquires data at the selected sampling rate. The acquisition will be saved to the system hard disk in the file : <filename to specified> The acquisition will continue for the duration specified in the MMEM:ACQ:DUR command.
Syntax	:MMEMory[1..n]:ACQuisition<wsp><StartStop> ,CONT|NCONt
Parameter(s)	➤ *StartStop:* The program data syntax for <StartStop> is defined as a <Boolean Program Data> element. The <StartStop> special forms ON and OFF are accepted on input for increased readability. ON corresponds to 1 and OFF corresponds to 0. This parameter allows to change the state of an acquisition: 0 or OFF - Stops the acquisition. 1 or ON - Starts the acquisition. ➤ *AcqType:* The program data syntax for the second parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: CONT|NCONt.

:MMEMory[1..n]:ACQuisition

The acquisition state can be modified with:
CONT -sets the Continuous acquisition rate.
NCON -sets the Single acquisition rate.

Example(s)

MMEM:ACQ 1, CONT
MMEM:ACQ?
MMEM:ACQ 0, CONT
or
MMEM:ACQ 1, NCON
MMEM:ACQ 0, NCON

See Also

MMEMory:ACQuisition?
MMEMory:ACQuisition:DURation
MMEMory:ACQuisition:DURation?
ABORt
INITiate:AUTO?
INITiate:EXTRema

:MMEMory[1..n]:ACQuisition?

Description	This query returns the acquisition flag.
	0 - No memory acquisition running.
	1 - Memory acquisition running.
Syntax	:MMEMory[1..n]:ACQuisition?
Parameter(s)	None
Response Syntax	<AcqOnOff>
Response(s)	*AcqOnOff:*
	The response data syntax for <AcqOnOff> is defined as a <NR1 NUMERIC RESPONSE DATA> element.
	This query returns the current memory acquisition state:
	0 - Memory acquisition is off.
	1 - Memory acquisition is on.
Example(s)	MMEM:ACQ 1, CONT
	MMEM:ACQ?
	MMEM:ACQ 0, CONT
	MMEM:ACQ?
See Also	MMEMory:ACQuisition
	MMEMory:ACQuisition:DURation
	MMEMory:ACQuisition:DURation?
	ABORt
	INITiate:AUTO?
	INITiate:EXTRema

:MMEMory[1..n]:ACQuisition:DURation

Description	This command is used to set the duration of an acquisition.
Syntax	:MMEMory[1..n]:ACQuisition:DURation<wsp><TimeHour>,<TimeMinute>,<TimeSecond>
Parameter(s)	➤ *TimeHour:* The program data syntax for <TimeHour> is defined as a <DECIMAL NUMERIC PROGRAM DATA> element. Used to set the duration of acquisition in hours. ➤ *TimeMinute:* The program data syntax for <TimeMinute> is defined as a <DECIMAL NUMERIC PROGRAM DATA> element. Used to set the duration of acquisition in minutes. ➤ *TimeSecond:* The program data syntax for <TimeSecond> is defined as a <DECIMAL NUMERIC PROGRAM DATA> element. Used to set the duration of acquisition in seconds.
Example(s)	MMEM:ACQ:DUR 1,1,1
See Also	MMEMory:ACQuisition:DURation? MMEMory:ACQuisition MMEMory:ACQuisition:DURation:MMAXimum INITiate:AUTO INITiate:EXTRema

:MMEMory[1..n]:ACQuisition: DURation?

Description	This query returns the duration of the acquisition.
Syntax	:MMEMory[1..n]:ACQuisition:DURation?
Parameter(s)	None
Response Syntax	<AcqTime>
Response(s)	*AcqTime:*
	The response data syntax for <AcqTime> is defined as a <DEFINITE LENGTH ARBITRARY BLOCK RESPONSE DATA> element.
	This query returns the duration for the acquisition in hour, minute, second format.
Example(s)	MMEM:ACQ:DUR?
See Also	MMEMory:ACQuisition:DURation
	MMEMory:ACQuisition
	MMEMory:ACQuisition:DURation:MMAXimum
	INITiate:AUTO
	INITiate:EXTRema

:MMEMory[1..n]:ACQuisition:DURation: MMAXimum

Description	This command is used to set the duration of the Min. Max. acquisition.
Syntax	:MMEMory[1..n]:ACQuisition:DURation:MMAXim um<wsp><TimeSecond>
Parameter(s)	*TimeSecond:* The program data syntax for <TimeSecond> is defined as a <DECIMAL NUMERIC PROGRAM DATA> element. Changes the Min. Max. acquisition duration in seconds.
Example(s)	MMEM:ACQ:DUR:MMAX 120
See Also	MMEMory:ACQuisition:DURation:MMAXimum? MMEMory:ACQuisition:DURation:MMAXimum:ST ATe MMEMory:ACQuisition:DURation MMEMory:ACQuisition INITiate:AUTO INITiate:EXTRema

:MMEMory[1..n]:ACQuisition:DURation: MMAXimum?

Description	This query returns the duration of the Min. Max. acquisition.
Syntax	:MMEMory[1..n]:ACQuisition:DURation:MMAXimum?
Parameter(s)	None
Response Syntax	<AcqMinMaxTime>
Response(s)	*AcqMinMaxTime:*
	The response data syntax for <AcqMinMaxTime> is defined as a <NR1 NUMERIC RESPONSE DATA> element.
	This query returns the Min. Max. acquisition duration in seconds.
Example(s)	MMEM:ACQ:DUR:MMAX?
See Also	MMEMory:ACQuisition:DURation:MMAXimum
	MMEMory:ACQuisition:DURation:MMAXimum:STATe
	MMEMory:ACQuisition:DURation
	MMEMory:ACQuisition
	INITiate:AUTO
	INITiate:CONTinuous
	INITiate:EXTRema

:MMEMory[1..n]:ACQuisition:DURation: MMAXimum:STATe

Description	This command is used to set the timer state of the Min. Max. acquisition.
Syntax	:MMEMory[1..n]:ACQuisition:DURation:MMAXim um:STATe<wsp><StateDurMinMax>
Parameter(s)	*StateDurMinMax:* The program data syntax for <StateDurMinMax> is defined as a <Boolean Program Data> element. The <StateDurMinMax> special forms ON and OFF are accepted on input for increased readability. ON corresponds to 1 and OFF corresponds to 0. Changes the timer state for the Min. Max. acquisition. 0 -Timer for the Min. Max. acquisition is disabled. 1 -Timer for the Min. Max. acquisition is enabled.
Example(s)	MMEM:ACQ:DUR:MMAX:STAT ON
See Also	MMEMory:ACQuisition:DURation:MMAXimum MMEMory:ACQuisition:DURation:MMAXimum:ST ATe? MMEMory:ACQuisition:DURation MMEMory:ACQuisition INITiate:AUTO INITiate:EXTRema

:MMEMory[1..n]:ACQuisition:DURation: MMAXimum:STATe?

Description	This query returns the timer state of acquisition, namely if the duration function of acquisition Min. Max. is active or not.
Syntax	:MMEMory[1..n]:ACQuisition:DURation:MMAXimum:STATe?
Parameter(s)	None
Response Syntax	<AcqMinMaxState>
Response(s)	*AcqMinMaxState:*
	The response data syntax for <AcqMinMaxState> is defined as a <NR1 NUMERIC RESPONSE DATA> element.
	This query returns the timer state of Min. Max. acquisition.
	0 -Timer is disabled
	1 -Timer is enabled
Example(s)	MMEM:ACQ:DUR:MMAX:STAT?
See Also	MMEMory:ACQuisition:DURation:MMAXimum
	MMEMory:ACQuisition:DURation:MMAXimum:STATe
	MMEMory:ACQuisition:DURation
	MMEMory:ACQuisition
	INITiate:AUTO
	INITiate:EXTRema

:MMEMory[1..n]:FNAMe

Description	This command is used to set the acquisition file's name and storage location.
Syntax	:MMEMory[1..n]:FNAMe<wsp><FileName>
Parameter(s)	*FileName:*
	The program data syntax for <FileName> is defined as a <STRING PROGRAM DATA> element.
	Changes the file name and storage location. Example: PmACQ.tra or D:IQS ManagerUser FilesIqs1x00PmACQ.tra
Example(s)	MMEM:FNAM PmACQ.tra
See Also	MMEMory:FNAMe?

:MMEMory[1..n]:FNAMe?

Description	This query returns the acquisition file's name and storage location.
Syntax	:MMEMory[1..n]:FNAMe?
Parameter(s)	None
Response Syntax	<FileName>
Response(s)	*FileName:*
	The response data syntax for <FileName> is defined as a <STRING RESPONSE DATA> element.
	This query returns the files name and storage location.
	Response format: D:IQS ManagerUser FilesIqs1x00PmACQ.tra
Example(s)	MMEM:FNAM?
See Also	MMEMory:NAMe

:READ[1..n][:SCALar]:POWer:DC?

Description	With this query, a measurement value is stored and returned. To read a specific channel, enter the channel number as a suffix of the READ keyword. The maximum channel is device-dependent. Channel 1 is always used by default.
Syntax	:READ[1..n][:SCALar]:POWer:DC?
Parameter(s)	None
Response Syntax	<PowerMeasurement>
Response(s)	*PowerMeasurement:*
	The response data syntax for <PowerMeasurement> is defined as a <NR3 NUMERIC RESPONSE DATA> element.
	This query returns the current power. If the returned value is:
	9221120237577961472, power is under range 9221120238114832384, power is over range 9221120238651703296, power is invalid 9221120239188574208, channel is inactive

:READ[1..n][:SCALar]:POWer:DC?

Example(s)	READ:SCAL:POW:DC? Returns -1.254000E+001 READ:SCAL:POW:DC? Returns 9221120237577961472 (UNDERRANGE) READ:SCAL:POW:DC? Returns 9221120238114832384 (OVERRANGE) READ:SCAL:POW:DC? Returns 9221120238651703296 (INVALID) READ:SCAL:POW:DC? Returns 9221120239188574208 (INACTIVE)
See Also	FETCh:SCALar:POWer:DC? MEASure:SCALar:POWer:MAX? MEASure:SCALar:POWer:MIN?

:SENSe[1..n]:AVERage[:STATe]

Description	This command turns the averaging ON or OFF
	On *RST, this value is set to OFF.
Syntax	:SENSe[1..n]:AVERage[:STATe]<wsp><Average State>
Parameter(s)	*AverageState:*
	The program data syntax for <AverageState> is defined as a <Boolean Program Data> element. The <AverageState> special forms ON and OFF are accepted on input for increased readability. ON corresponds to 1 and OFF corresponds to 0.
	State of averaging: 0 or OFF -Disables Averaging 1 or ON -Enables Averaging
Example(s)	SENS:AVER:STAT ON
See Also	SENSe:AVERage:STATe? SENSe:AVERage:COUNt SENSe:AVERage:COUNt?

:SENSe[1..n]:AVERage[:STATe]?

Description	This query returns the current averaging state.
Syntax	:SENSe[1..n]:AVERage[:STATe]?
Parameter(s)	None
Response Syntax	<AverageState>
Response(s)	*AverageState:*
	The response data syntax for <AverageState> is defined as a <NR1 NUMERIC RESPONSE DATA> element.
	State of averaging. 0 -Averaging is disabled 1 -Averaging is enabled
Example(s)	SENS:AVER:STAT?
See Also	SENSe:AVERage:STATe SENSe:AVERage:COUNt SENSe:AVERage:COUNt?

:SENSe[1..n]:AVERage:COUNt

Description	Sets the number of measurements used to calculate the final measurement's average on the specified channel.
	At *RST, this value is 2.
Syntax	:SENSe[1..n]:AVERage:COUNt<wsp><AverageCount>|MAXimum|MINimum|DEFault
Parameter(s)	*AverageCount:*
	The program data syntax for <AverageCount> is defined as a <numeric_value> element. The <AverageCount> 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 <AverageCount> parameter.
	The <numeric_value> represents the number of measures to average for the final measures. MIN, MAX and DEF can also be used as parameters.
Example(s)	SENS:AVER:COUN 12
See Also	SENSe:AVERage:COUNt? SENSe:AVERage:STATe SENSe:AVERage:STATe?

:SENSe[1..n]:AVERage:COUNt?

Description	This query returns the number of measurements used to perform an averaged measurement on the specified channel.
Syntax	:SENSe[1..n]:AVERage:COUNt?[<wsp>MINimum|MAXimum|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: MINimum|MAXimum|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	<AverageCount>

:SENSe[1..n]:AVERage:COUNt?

Response(s)	*AverageCount:*
	The response data syntax for <AverageCount> is defined as a <NR1 NUMERIC RESPONSE DATA> element.
	This query returns the number of measurements used to perform an averaged measurement.
Example(s)	SENS:AVER:COUN?
See Also	SENSe:AVERage:COUNt
	SENSe:AVERage:[STATe]
	SENSe:AVERage:[STATe]?

:SENSe[1..n]:CORRection:COLLect: ZERO

Description	This command performs an offset nulling on the specified channel.
Syntax	:SENSe[1..n]:CORRection:COLLect:ZERO
Parameter(s)	None
Example(s)	SENS1:CORR:COLL:ZERO
Notes	This command is not executed if a data acquisition is in progress. In that case, the "acquisition in progress" message will be returned. This command will take at least 30 seconds to complete.
See Also	SENSe:CORRection:COLLect:ZERO:ALL ABORt

:SENSe[1..n]:CORRection:COLLect: ZERO:ALL

Description	This command performs an offset nulling measurement on all channels.
Syntax	:SENSe[1..n]:CORRection:COLLect:ZERO:ALL
Parameter(s)	None
Example(s)	SENS:CORR:COLL:ZERO:ALL
Notes	This command is not executed if a data acquisition is in progress. In that case, the "acquisition in progress" message will be returned. This command will take at least 30 seconds to complete.
See Also	SENSe:CORRection:COLLect:ZERO ABORt

:SENSe[1..n]:CORRection:FACTor [:MAGNitude]

Description

This command sets a correction factor. The units are w/w by dÈfault.

Syntax

:SENSe[1..n]:CORRection:FACTor[:MAGNitude]< wsp><CorrectionFactor[<wsp>W/W|DB]>|M AXimum|MINimum|DEFault

Parameter(s)

CorrectionFactor:

The program data syntax for <CorrectionFactor> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> elements are: W/W|DB. The <CorrectionFactor> 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 <CorrectionFactor> parameter.

The <numeric _value> parameter is a correction factor using W/W as units. If an invalid parameter is entered, the Parameter out of range message will be returned.

:SENSe[1..n]:CORRection:FACTor [:MAGNitude]

Example(s)	SENS:CORR:FACT:MAGN 2
Notes	The correction factor expressed in W/W indicates the ratio between the power received (in W) and the reference (in W) for the current wavelength and channel.
See Also	SENSe:CORRection:FACTor:[MAGNitude]? SENSe:CORRection:OFFSet:[MAGNitude] SENSe:CORRection:OFFSet:[MAGNitude]?

:SENSe[1..n]:CORRection:FACTor [:MAGNitude]?

Description	This query returns the correction factor. The value is in W/W units.
Syntax	:SENSe[1..n]:CORRection:FACTor[:MAGNitude]?[<wsp>MINimum|MAXimum|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: MINimum|MAXimum|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	<CorrectionFactor>

:SENSe[1..n]:CORRection:FACTor [:MAGNitude]?

Response(s)	*CorrectionFactor:*
	The response data syntax for <CorrectionFactor> is defined as a <NR3 NUMERIC RESPONSE DATA> element.
	The correction factor for the current wavelength and channel is expressed in W/W. If a token is used, it will return the maximum, minimum or default value as specified.
Example(s)	SENS:CORR:FACT:MAGN?
See Also	SENSe:CORRection:FACTor:[MAGNitude]
	SENSe:CORRection:OFFSet:[MAGNitude]
	SENSe:CORRection:OFFSet:[MAGNitude]?

:SENSe[1..n]:CORRection:OFFSet [:MAGNitude]

Description	This command sets an offset value. The units are w/w by dÈfault. If no channel was specified, the default channel used is 1.
Syntax	:SENSe[1..n]:CORRection:OFFSet[:MAGNitude] <wsp><CorrectionOffset[<wsp>W/W|DB]>| MAXimum|MINimum|DEFault
Parameter(s)	*CorrectionOffset:* The program data syntax for <CorrectionOffset> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> elements are: W/W|DB. The <CorrectionOffset> 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.

:SENSe[1..n]:CORRection:OFFSet [:MAGNitude]

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

Sets the offset for the specified channel.

Example(s)	SENS:CORR:OFFS:MAGN 2.0
See Also	SENSe:CORRection:OFFSet:[MAGNitude]?
	SENSe:CORRection:FACTort:[MAGNitude]
	SENSe:CORRection:FACTor:[MAGNitude]?

:SENSe[1..n]:CORRection:OFFSet [:MAGNitude]?

Description	This query returns the offset value in W/W. If no channel was specified, the default channel used is 1.
Syntax	:SENSe[1..n]:CORRection:OFFSet[:MAGNitude]?[<wsp>MINimum|MAXimum|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: MINimum|MAXimum|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	<CorrectionOffset>

:SENSe[1..n]:CORRection:OFFSet [:MAGNitude]?

Response(s)	*CorrectionOffset:*
	The response data syntax for <CorrectionOffset> is defined as a <NR3 NUMERIC RESPONSE DATA> element.
	This query returns the offset for the specified channel
Example(s)	SENS:CORR:OFFS:MAGN?
See Also	SENSe:CORRection:OFFSet:[MAGNitude]
	SENSe:CORRection:FACTor:[MAGNitude]
	SENSe:CORRection:FACTor:[MAGNitude]?

:SENSe[1..n]:FREQuency:CONTinuous

Description	This command sets the continuous acquisition rate in Hz.
Syntax	:SENSe[1..n]:FREQuency:CONTinuous<wsp><ContinuousRate[<wsp>HZ]>
Parameter(s)	*ContinuousRate:* The program data syntax for <ContinuousRate> 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 <numeric_value> parameter is the Continuous acquisition rate.
Example(s)	SENS:FREQ:CONT 256
Notes	This command is not executed if a data acquisition is in progress. In that case, the "acquisition in progress" message will be returned.
See Also	SENSe:FREQuency:CONTinuous? SENSe:FREQuency:CONTinuous:CATalog? SENSe:FREQuency:NCONtinuous SENSe:FREQuency:NCONtinuous? SENSe:FREQuency:NCONtinuous:CATalog?

:SENSe[1..n]:FREQuency:CONTinuous?

Description	This query returns the current continuous acquisition rate in Hz.
Syntax	:SENSe[1..n]:FREQuency:CONTinuous?
Parameter(s)	None
Response Syntax	<ContinuousRate>
Response(s)	*ContinuousRate:*
	The response data syntax for <ContinuousRate> is defined as a <NR2 NUMERIC RESPONSE DATA> element.
	This query returns the current continuous acquisition rate.
Example(s)	SENS:FREQ:CONT?
See Also	SENSe:FREQuency:CONTinuous SENSe:FREQuency:CONTinuous:CATalog? SENSe:FREQuency:NCONtinuous SENSe:FREQuency:NCONtinuous? SENSe:FREQuency:NCONtinuous:CATalog?

:SENSe[1..n]:FREQuency:CONTinuous: CATalog?

Description	This query returns the list of available continuous acquisition rates in Hz.
Syntax	:SENSe[1..n]:FREQuency:CONTinuous:CATalog?
Parameter(s)	None
Response Syntax	<ContinuousList>
Response(s)	*ContinuousList:*
	The response data syntax for <ContinuousList> is defined as a <DEFINITE LENGTH ARBITRARY BLOCK RESPONSE DATA> element.
	This query returns the list of available continuous acquisition rates.
Example(s)	SENS:FREQ:CONT:CAT?
See Also	SENSe:FREQuency:CONTinuous
	SENSe:FREQuency:CONTinuous?
	SENSe:FREQuency:NCONtinuous
	SENSe:FREQuency:NCONtinuous?
	SENSe:FREQuency:NCONtinuous:CATalog?

:SENSe[1..n]:FREQuency:NCONtinuous

Description	This command sets the single acquisition rate in Hz.
Syntax	:SENSe[1..n]:FREQuency:NCONtinuous<wsp><SingleRate[<wsp>HZ]>
Parameter(s)	*SingleRate:*
	The program data syntax for <SingleRate> 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 <numeric_value> parameter is the Single acquisition rate.
Example(s)	SENS:FREQ:NCON 512
Notes	This command is not executed if a data acquisition is in progress. In that case, the "acquisition in progress" message will be returned.
See Also	SENSe:FREQuency:CONTinuous SENSe:FREQuency:CONTinuous? SENSe:FREQuency:CONTinuous:CATalog? SENSe:FREQuency:NCONtinuous? SENSe:FREQuency:NCONtinuous:CATalog?

:SENSe[1..n]:FREQuency:NCONtinuous?

Description	This query returns the current single acquisition rate in Hz.
Syntax	:SENSe[1..n]:FREQuency:NCONtinuous?
Parameter(s)	None
Response Syntax	<SingleRate>
Response(s)	*SingleRate:* The response data syntax for <SingleRate> is defined as a <NR2 NUMERIC RESPONSE DATA> element. This query returns the current Single acquisition rate.
Example(s)	SENS:FREQ:NCON?
See Also	SENSe:FREQuency:CONTinuous SENSe:FREQuency:CONTinuous? SENSe:FREQuency:CONTinuous:CATalog? SENSe:FREQuency:NCONtinuous SENSe:FREQuency:NCONtinuous:CATalog?

:SENSe[1..n]:FREQuency:NCONtinuous: CATalog?

Description	This query returns the list of available single acquisition rates in Hz.
Syntax	:SENSe[1..n]:FREQuency:NCONtinuous:CATalog?
Parameter(s)	None
Response Syntax	<NonContinuousList>
Response(s)	*NonContinuousList:*
	The response data syntax for <NonContinuousList> is defined as a <DEFINITE LENGTH ARBITRARY BLOCK RESPONSE DATA> element.
	This query return the list of available single acquisition rates.
Example(s)	SENS:FREQ:NCON:CAT?
See Also	SENSe:FREQuency:CONTinuous
	SENSe:FREQuency:CONTinuous?
	SENSe:FREQuency:CONTinuous:CAT?
	SENSe:FREQuency:NCONtinuous
	SENSe:FREQuency:NCONtinuous?

:SENSe[1..n]:POWer[:DC]:RANGe:AUTO

Description	This command enables or disables the automatic power measurement range (Autorange) for the currently selected channel.
Syntax	:SENSe[1..n]:POWer[:DC]:RANGe:AUTO<wsp> <AutoRangeState>
Parameter(s)	*AutoRangeState:*
	The program data syntax for <AutoRangeState> is defined as a <Boolean Program Data> element. The <AutoRangeState> special forms ON and OFF are accepted on input for increased readability. ON corresponds to 1 and OFF corresponds to 0.
	Set the <AutoRangeState>, where: 0 or OFF -Disables the AutoRange 1 or ON -Enables the AutoRange
Example(s)	SENS:POW:RANG:AUTO 1
Notes	The Autorange function can be performed in Continuous acquisition mode only. When Autorange is deactivated, LR1 is activated by default.
See Also	SENSe:POWer:[DC]:RANGe:AUTO? SENSe:POWer:[DC]:RANGe SENSe:POWer:[DC]:RANGe:SCALe SENSe:POWer:[DC]:RANGe:SCALe? SENSe:POWer:[DC]:RANGe:SCALe:LIST?

:SENSe[1..n]:POWer[:DC]:RANGe:AUTO?

Description	This query returns a value indicating whether the automatic power measurement range (Autorange) is enabled or disabled for the specified channel.
Syntax	:SENSe[1..n]:POWer[:DC]:RANGe:AUTO?
Parameter(s)	None
Response Syntax	<Autorange>
Response(s)	*Autorange:*
	The response data syntax for <Autorange> is defined as a <NR1 NUMERIC RESPONSE DATA> element.
	The current <AutoRange> state, where: 0 - the autorange is disabled. 1 - the autorange is enabled.
Example(s)	SENS:POW:RANG:AUTO?
See Also	SENSe:POWer:[DC]:RANGe:AUTO SENSe:POWer:[DC]:RANGe SENSe:POWer:[DC]:RANGe:SCALe SENSe:POWer:[DC]:RANGe:SCALe? SENSe:POWer:[DC]:RANGe:SCALe:LIST?

:SENSe[1..n]:POWer[:DC]:RANGe:SCALe

Description	This command sets the measurement range.
Syntax	:SENSe[1..n]:POWer[:DC]:RANGe:SCALe<wsp> <Scale>
Parameter(s)	*Scale:*
	The program data syntax for <Scale> is defined as a <STRING PROGRAM DATA> element.
	Sets the scale for the specified channel Auto -Automatic range S1 -Scale 1 S2 - Scale 2
Example(s)	SENS:POW:RANG:SCAL "S1"
See Also	SENSe:POWer:[DC]:RANGe:SCALe? SENSe:POWer:[DC]:RANGe:AUTO SENSe:POWer:[DC]:RANGe:AUTO? SENSe:POWer:[DC]:RANGe:SCALe:LIST?

:SENSe[1..n]:POWer[:DC]:RANGe: SCALe?

Description	This query returns the currently selected measurement range.
Syntax	:SENSe[1..n]:POWer[:DC]:RANGe:SCALe?
Parameter(s)	None
Response Syntax	<Range>
Response(s)	*Range:* The response data syntax for <Range> is defined as a <STRING RESPONSE DATA> element. Current power range, where: Auto -Automatic range S1 -Scale 1 S2 - Scale 2
Example(s)	SENS:POW:RANG:SCAL?
See Also	SENSe:POWer:[DC]:RANGe:SCALe SENSe:POWer:[DC]:RANGe:AUTO SENSe:POWer:[DC]:RANGe:AUTO? SENSe:POWer:[DC]:RANGe:SCALe:LIST?

:SENSe[1..n]:POWer[:DC]:RANGe:SCALe: LIST?

Description	This query returns the list of supported scales.
Syntax	:SENSe[1..n]:POWer[:DC]:RANGe:SCALe:LIST?
Parameter(s)	None
Response Syntax	<RangePowerList>
Response(s)	*RangePowerList:* The response data syntax for <RangePowerList> is defined as a <DEFINITE LENGTH ARBITRARY BLOCK RESPONSE DATA> element. This query returns the list of power ranges supported. Each value is of NR2 type and is standardized at 1310nm. Format: S1, PowerMin, PowerMax, … Units: Watt
Example(s)	SENS:POW:RANG:SCAL:LIST?
See Also	SENSe:POWer:[DC]:RANGe:AUTO SENSe:POWer:[DC]:RANGe:AUTO? SENSe:POWer:[DC]:RANGe:SCALe SENSe:POWer:[DC]:RANGe:SCALe?

:SENSe[1..n]:POWer[:DC]:REFerence

Description	This command sets the reference power on the specified channel in watts.
Syntax	:SENSe[1..n]:POWer[:DC]:REFerence<wsp><Reference[<wsp>W|DBM]>|MAXimum|MINimum|DEFault
Parameter(s)	*Reference:*

The program data syntax for <Reference> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> elements are: W\|DBM. The <Reference> 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.

:SENSe[1..n]:POWer[:DC]:REFerence

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

Sets the reference for the specified channel. MIN, MAX and DEF can also be used as parameters.

Example(s) SENS:POW:REF 5

See Also SENSe:POWer:[DC]:REFerence?
SENSe:POWer:[DC]:REFerence:ALL
SENSe:POWer:[DC]:REFerence:DISPlay
SENSe:POWer:[DC]:REFerence:STATe
SENSe:POWer:[DC]:REFerence:STATe?

:SENSe[1..n]:POWer[:DC]:REFerence?

Description	This query returns the reference power in watts on specified channel.
Syntax	:SENSe[1..n]:POWer[:DC]:REFerence?[<wsp>MINimum|MAXimum|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: MINimum|MAXimum|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	<Reference>

:SENSe[1..n]:POWer[:DC]:REFerence?

Response(s)	*Reference:*
	The response data syntax for <Reference> is defined as a <NR3 NUMERIC RESPONSE DATA> element.
	This query returns the reference value for the specified channel.
Example(s)	SENS:POW:REF?
See Also	SENSe:POWer:[DC]:REFerence SENSe:POWer:[DC]:REFerence:ALL SENSe:POWer:[DC]:REFerence:DISPlay SENSe:POWer:[DC]:REFerence:STATe SENSe:POWer:[DC]:REFerence:STATe?

:SENSe[1..n]:POWer[:DC]:REFerence: ALL

Description	This command performs a new reference measurement and changes the display to show relative power (dB or W/W) for all channels.
Syntax	:SENSe[1..n]:POWer[:DC]:REFerence:ALL
Parameter(s)	None
Example(s)	SENS:POW:REF:ALL SENS:POW:REF? SENS2:POW:REF?
Notes	This command is not executed if a data acquisition is in progress. In that case, the "Acquisition in progress" message will be returned.
See Also	SENSe:POWer:[DC]:REFerence SENSe:POWer:[DC]:REFerence? SENSe:POWer:[DC]:REFerence:DISPlay SENSe:POWer:[DC]:REFerence:STATe SENSe:POWer:[DC]:REFerence:STATe?

:SENSe[1..n]:POWer[:DC]:REFerence: DISPlay

Description	This command performs a new reference measurement and changes the display to show relative power (dB or W/W) for the specified channel.
Syntax	:SENSe[1..n]:POWer[:DC]:REFerence:DISPlay
Parameter(s)	None
Example(s)	SENS:POW:REF:DISP SENS:POW:REF?
Notes	This command is not executed if a data acquisition is in progress. In that case, the "Acquisition in progress" message will be returned.
See Also	SENSe:POWer:[DC]:REFerence SENSe:POWer:[DC]:REFerence? SENSe:POWer:[DC]:REFerence:ALL SENSe:POWer:[DC]:REFerence:STATe SENSe:POWer:[DC]:REFerence:STATe?

:SENSe[1..n]:POWer[:DC]:REFerence: STATe

Description	This command selects whether absolute (dBm or W) or relative (dB or W/W) power measurements are performed.
Syntax	:SENSe[1..n]:POWer[:DC]:REFerence:STATe<wsp><ReferenceState>
Parameter(s)	*ReferenceState:*
	The program data syntax for <ReferenceState> is defined as a <Boolean Program Data> element. The <ReferenceState> special forms ON and OFF are accepted on input for increased readability. ON corresponds to 1 and OFF corresponds to 0.
	The <ReferenceState> parameter is a boolean value representing either dB and W, or dBm and W/W: 0 or OFF - selects absolute units (dBm or W). 1 or ON - selects relative units (dB or W/W).
Example(s)	SENS:POW:REF:STAT 1
Notes	This command is not executed if a data acquisition is in progress. In that case, the "Acquisition in progress" message will be returned.
See Also	SENSe:POWer:[DC]:REFerence SENSe:POWer:[DC]:REFerence? SENSe:POWer:[DC]:REFerence:ALL SENSe:POWer:[DC]:REFerence:DISPlay SENSe:POWer:[DC]:REFerence:STATe?

:SENSe[1..n]:POWer[:DC]:REFerence: STATe?

Description	This query returns a value indicating whether the power meter is displaying absolute (dBm or W) or relative (dB or W/W) power values for the specified channel.
Syntax	:SENSe[1..n]:POWer[:DC]:REFerence:STATe?
Parameter(s)	None
Response Syntax	<ReferenceState>
Response(s)	*ReferenceState:*
	The response data syntax for <ReferenceState> is defined as a <CHARACTER RESPONSE DATA> element.
	Current reference mode, where: 0 - is the absolute mode(dBm or W). 1 - is the relative mode (dB or W/W).
Example(s)	SENS:POW:REF:STAT?
See Also	SENSe:POWer:[DC]:REFerence SENSe:POWer:[DC]:REFerence? SENSe:POWer:[DC]:REFerence:ALL SENSe:POWer:[DC]:REFerence:DISPlay SENSe:POWer:[DC]:REFerence:STATe

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

Description	This command selects a new operating wavelength on the specified channel. If no channel was specified, the default value used is 1.
Syntax	:SENSe[1..n]:POWer:WAVelength<wsp><Wave length>|MAXimum|MINimum|DEFault
Parameter(s)	*Wavelength:* The program data syntax for <Wavelength> is defined as a <numeric_value> element. The <Wavelength> special forms MINimum, MAXimum and DEFault are accepted on input. MINimum allows to set the instrument to the smallest supported value. MAXimum allows to set the instrument to the greatest supported value. DEFault allows the instrument to select a value for the <Wavelength> parameter. The <wavelength> parameter is an operating wavelength using meter as units. Any wavelength within the spectral range of the instrument optical detector at a resolution of 0.01 nm may be selected.
Example(s)	SENS:POW:WAV 0.00000131002 or SENS:POW:WAV 1310.02 nm
Notes	See the instrument's user guide for the exact spectral range for each detector type.
See Also	SENSe:POWer:WAVelength?

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

Description	This query returns the currently selected wavelength on the specified channel. If no channel was specified, the default value used is 1.
Syntax	:SENSe[1..n]:POWer:WAVelength?[<wsp>MINimum|MAXimum|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: MINimum|MAXimum|DEFault.
	MINimum is used to retrieve the instrument's smallest supported value.
	MAXimum is used to retrieve the instrument's greatest supported value.
	DEFault is used to retrieve the instrument's default value.
Response Syntax	<Wavelength>
Response(s)	*Wavelength:*
	The response data syntax for <Wavelength> is defined as a <NR3 NUMERIC RESPONSE DATA> element.
	This query returns the current wavelength in meters for the specified channel.
Example(s)	SENS:POW:WAV?
See Also	SENSe:POWer:WAVelength

:SLINstrument:CATalog?

Description	This query returns a comma-separated list of <STRING RESPONSE DATA>, which contains the names of all channels of the module. If no channels are defined, a single null <STRING RESPONSE DATA> is returned.
	This is not affected by a *RST command.
Syntax	:SLINstrument:CATalog?
Parameter(s)	None
Response Syntax	<Catalog>
Response(s)	*Catalog:*
	The response data syntax for <Catalog> is defined as a <STRING RESPONSE DATA> element.
	The list of <STRING RESPONSE DATA> contains the names of all channels in the module.
Example(s)	SLIN:CAT?
See Also	SLINstrument:CATalog:FULL?

:SLINstrument:CATalog:FULL?

Description	This query returns a list of <STRING RESPONSE DATA> - <NR1 NUMERIC RESPONSE DATA> pairs. The <STRING RESPONSE DATA> contains the names of the channels. The immediately following <NR1 NUMERIC RESPONSE DATA> formatted number is the associated channel number. All response data elements are separated by commas. If no channels are defined, a null <STRING RESPONSE DATA> value, followed by a zero, is returned.
	This is not affected by a *RST command.
Syntax	:SLINstrument:CATalog:FULL?
Parameter(s)	None
Response Syntax	<Catalog>
Response(s)	*Catalog:*
	The response data syntax for <Catalog> is defined as a <STRING RESPONSE DATA> element.
	The list of <STRING RESPONSE DATA> contains the names of all channels in the module. The immediately following <NR1 NUMERIC RESPONSE DATA> formatted number is the associated channel number.
Example(s)	SLIN:CAT:FULL?
See Also	SLINstrument:CATalog?

:SNUMber?

Description	This query returns a value indicating the module's serial number.
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 modules serial number.
Example(s)	SNUM? Returns "123456-AB"

:STATus?

Description	This query returns a value indicating the status of the module (READY, BUSY, etc.).
Syntax	:STATus?
Parameter(s)	None
Response Syntax	<Status>
Response(s)	*Status:*
	The response data syntax for <Status> is defined as a <CHARACTER RESPONSE DATA> element.
	The <Status> response represents the module state, where:
	UNINITIALIZED, means the module is not initialized. INITINPROGRESS, means the module initialization is in progress, READY, means the module is ready, BUSY, means the module is busy, DISCONNECTED, means the module is disconnected,
	DEFECTIVE, means the module is defective and UNCONFIGURED, means the module is not configured.
Example(s)	STAT? Returns READY (Module is ready.)

:STATus:OPERation:BIT[1..n]: CONDition?

Description	This query returns the state of a specific bit. For the moment, only bit <8> was developed. This bit is used to return the state of the module. If the bit = 0, the module is ready. If the bit = 1, the module is busy.
Syntax	:STATus:OPERation:BIT[1..n]:CONDition?
Parameter(s)	None
Response Syntax	<StatusOperation>
Response(s)	*StatusOperation:* The response data syntax for <StatusOperation> is defined as a <NR3 NUMERIC RESPONSE DATA> element. This query returns the state of the module. If the response = 1, the module is busy, if the response = 0, the module is ready to receive commands.
Example(s)	STAT:OPER:BIT8:COND?
See Also	MMEMory:ACQuisition?

:TRACe[1..n][:DATA]?

Description	Returns all points in a trace.
Syntax	:TRACe[1..n][:DATA]?<wsp>TRC1|TRC2|TRC3|TRC4
Parameter(s)	*Trace:*

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: TRC1|TRC2|TRC3|TRC4.

This parameter is used to select the trace for which you want to see the points.
Each trace corresponds to a channel:
TRC1 - acquisition made on channel 1
TRC2 - acquisition made on the channel 2
TRC3 - acquisition made on the channel 3
TRC4 - acquisition made on the channel 4

Response Syntax	<TraceData>
Response(s)	*TraceData:*

The response data syntax for <TraceData> is defined as a <DEFINITE LENGTH ARBITRARY BLOCK RESPONSE DATA> element.

This query returns all power measurements for the specified trace.

:TRACe[1..n][:DATA]?

Each power value represents a point in the trace and is returned in the same unit used to perform the acquisition.
The number of values in a trace can be retrieved with the TRACe:POINt query.

Example(s)	TRAC:POIN TRC1, 10 INIT:AUTO 1, CONT TRAC? TRC1 TRAC? TRC2
Notes	A trace must be acquired prior to using this query. The suffix of TRACe[1..n] is not useful for this command.
See Also	TRACe:MAX? TRACe:MIN? TRACe:POINts TRACe:POINts?

:TRACe[1..n]:MAX?

Description	This query returns the maximum value for the specified trace.
Syntax	:TRACe[1..n]:MAX?<wsp>TRC1|TRC2|TRC3|TRC4
Parameter(s)	*Trace:*
	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: TRC1|TRC2|TRC3|TRC4.
	This parameter is used to select the trace to use. Each trace corresponds to a channel: TRC1 - acquisition made on channel 1 TRC2 - acquisition made on the channel 2 TRC3 - acquisition made on the channel 3 TRC4 - acquisition made on the channel 4
Response Syntax	<PointMax>
Response(s)	*PointMax:*
	The response data syntax for <PointMax> is defined as a <NR3 NUMERIC RESPONSE DATA> element.
	The response corresponds to the highest value in the specified trace. The maximum trace point is returned in the same unit used to perform the acquisition.

:TRACe[1..n]:MAX?

Example(s)	INIT:EXTR 1 INIT:EXTR 0 TRAC:MAX? TRC1
Notes	A trace must be acquired prior to using this query. The suffix of TRACe[1..n] is not useful for this command.
See Also	TRACe:[DATA]? INITiate:EXTRema TRACe:MIN? TRACe:POINts TRACe:POINts?

:TRACe[1..n]:MIN?

Description	This query returns minimum value in the trace.
Syntax	:TRACe[1..n]:MIN?<wsp>TRC1|TRC2|TRC3|TRC4
Parameter(s)	*Trace:*

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: TRC1\|TRC2\|TRC3\|TRC4.

This parameter allows to select the trace to use. Each trace corresponds to a channel:
TRC1 - acquisition made on channel 1
TRC2 - acquisition made on the channel 2
TRC3 - acquisition made on the channel 3
TRC4 - acquisition made on the channel 4

Response Syntax	<PointMin>
Response(s)	*PointMin:*

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

The response corresponds to the smallest value in the specified trace.
The minimum trace point is returned in the same unit used to perform the acquisition.

:TRACe[1..n]:MIN?

Example(s)	INIT:EXTR 1 INIT:EXTR 0 TRAC:MIN? TRC1
Notes	A trace must be acquired prior to using this query. The suffix of TRACe[1..n] is not useful for this command.
See Also	TRACe:[DATA]? INITiate:EXTRema TRACe:MAX? TRACe:POINts TRACe:POINts?

:TRACe[1..n]:POINts

Description	This command sets the number of points to store for all traces. The sufix [1..n], appearing after the keyword "TRACe", is not used.
Syntax	:TRACe[1..n]:POINts\<wsp>TRC1|TRC2|TRC3|TRC4[,\<NumberPoint>]
Parameter(s)	➤ *Trace:* 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: TRC1|TRC2|TRC3|TRC4.

:TRACe[1..n]:POINts

This parameter is used to select the trace to use.
Each trace corresponds to a channel:
TRC1 - acquisition made on channel 1
TRC2 - acquisition made on the channel 2
TRC3 - acquisition made on the channel 3
TRC4 - acquisition made on the channel 4

➤ *NumberPoint:*

The program data syntax for <NumberPoint> is defined as a <DECIMAL NUMERIC PROGRAM DATA> element.

<NumberPoint> sets the maximum number of points for subsequent acquisitions.
If no parameter is entered, the default value is used.

Example(s)	TRAC:POIN TRC1,5
See Also	TRACe:[DATA]?
	TRACe:MAX?
	TRACe:MIN?
	TRACe:POINts?

:TRACe[1..n]:POINts?

Description	This query returns the number of points in a specified trace. The sufix [1..n], appearing after the keyword "TRACe", is not used.
Syntax	:TRACe[1..n]:POINts?<wsp>TRC1|TRC2|TRC3|TRC4
Parameter(s)	*Trace:*
	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: TRC1|TRC2|TRC3|TRC4.
	This parameter allows to select the trace to use. Each trace corresponds to a channel: TRC1 - acquisition channel 1 TRC2 - acquisition for channel 2 TRC3 - acquisition for channel 3 TRC4 - acquisition for channel 4
Response Syntax	<PointsCount>
Response(s)	*PointsCount:*
	The response data syntax for <PointsCount> is defined as a <NR1 NUMERIC RESPONSE DATA> element.
	Number of points in the specified trace.

:TRACe[1..n]:POINts?

Example(s)	TRAC:POIN? TRC1
Notes	The suffix of TRACe[1..n] is not useful for this command.
See Also	TRACe:[DATA]? TRACe:MAX? TRACe:MIN? TRACe:POINts

:UNIT[1..n]:POWer

Description	The parameter corresponds to the power units for the specified channel.
Syntax	:UNIT[1..n]:POWer<wsp>DB|DBM|W|W/W|WATT|WATT/WATT
Parameter(s)	*Unit:* 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: DB|DBM|W|W/W|WATT|WATT/WATT. Set the power unit for the specified channel.
Example(s)	UNIT:POW DBM
Notes	This command is not executed if a data acquisition is in progress. In that case, the "Acquisition in progress" message will be returned.
See Also	UNIT:POWer?

:UNIT[1..n]:POWer?

Description	This query returns the current power unit for the specified channel.
Syntax	:UNIT[1..n]:POWer?
Parameter(s)	None
Response Syntax	<PowerUnit>
Response(s)	*PowerUnit:*
	The response data syntax for <PowerUnit> is defined as a <CHARACTER RESPONSE DATA> element.
	This response corresponds to the current power unit for the specified channel.
Example(s)	UNIT:POW?
See Also	UNIT:POWer

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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。

EXFO

EXPERTISE REACHING OUT

ISO 900 CE