User Guide

IQS-1600

High Speed Power Meter for IQS Platforms

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Telecom Test and Measurement

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Units of Measurement

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

Version number: 2.0.2

Contents

Certification Information

F.C.C. Information

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

CE Information

Electronic test equipment is subject to the EMC Directive in the European Union. The EN61326 standard prescribes both emission and immunity requirements for laboratory, measurement, and control equipment. This unit has undergone extensive testing according to the European Union Directive and Standards.

IMPORTANT

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

EXFO CE

DECLARATION OF CONFORMITY

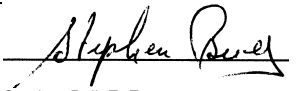
Application of Council Directive(s):	73/23/EEC - The Low Voltage Directive 89/336/EEC - The EMC Directive And their amendments
Manufacturer's Name:	EXFO Electro-Optical Engineering Inc.
Manufacturer's Address:	400 Godin Avenue Quebec, Quebec Canada G1M 2K2 (418) 683-0211
Equipment Type/Environment:	Test & Measurement / Industrial
Trade Name/Model No.:	IQS-1600 High-Speed Power Meter

Standard(s) to which Conformity is Declared:

EN 61010-1:2001	**Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements.**
EN 55022: 1998 +A2: 2003	**Limits and Methods of Measurement of Radio Disturbance Characteristics of Information Technology Equipment.**
EN 61326:1997 +A1:1998 +A2:2001 + A3:2003	**Electrical Equipment for Measurement, Control and Laboratory Use - EMC Requirements**

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

Manufacturer

Signature: 

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Position:	Vice-President Research and Development
Address:	400 Godin Avenue, Quebec (Quebec), Canada, G1M 2K2
Date:	January 7, 2002

1 Introducing the IQS-1600 High Speed Power Meter

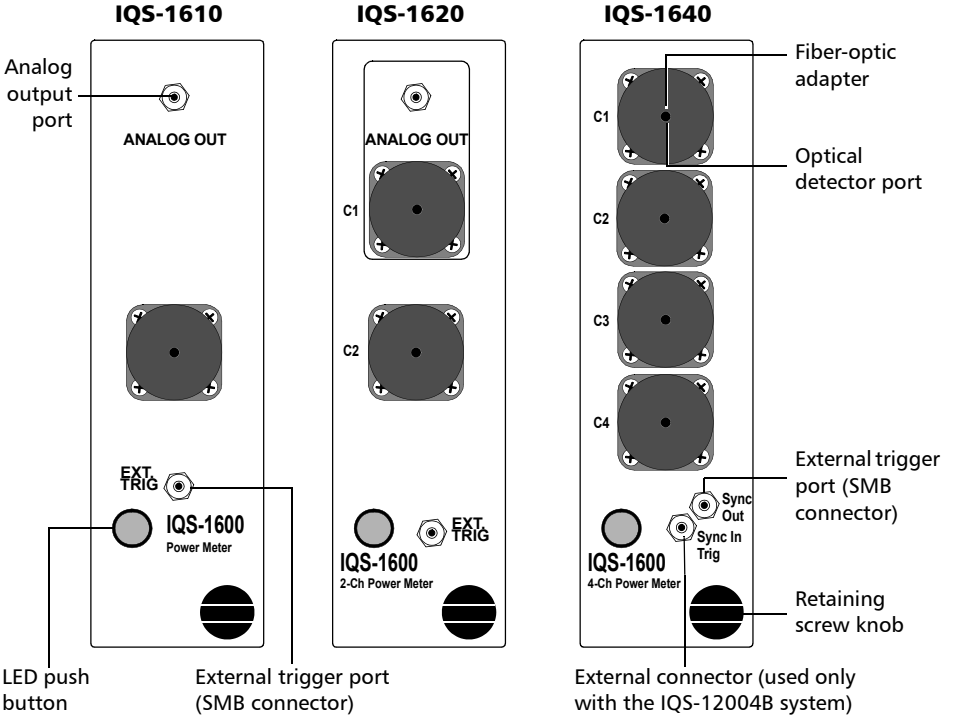
Designed for the IQS platforms, the IQS-1600 High Speed Power Meter is a module available in three different models. It is used with the OHS-1700 Optical Head.

Main Features

The IQS-1600 High Speed Power Meter is offered in different configurations:

- Standard option—IQS-1600 Series
- Low-PDL option—IQS-1600-PL Series
- Wide-Area Detector (3 mm) option—IQS-1600W Series

All configurations come in the single-, dual- or quadruple-connector models.



It features a high sampling rate and fast stabilization, and comes in one-, two- or four-channel options (each detector is independent). It also provides you with power level and TTL voltage synchronization triggers. The synchronization triggers will operate simultaneously on dual- and quadruple-channel models.

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

The IQS-1600 High Speed 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.

Moreover, a special model was designed for the IQS-12004B DWDM Passive Component Test System The IQS-1643T-PL-SN presents specifications that are very close to the IQS-1643-PL-SN standalone module.

Every customer purchasing the IQS-12004B system for applications covering both the C- and L-bands will receive an IQS-1643T-PL-SN. Even though the power meter has been modified to work in the IQS-12004B system, it can still be used as a standalone unit using an IQS-500 Intelligent Test System.

Both the facia of the module and the title bar in the software reflect whether you are using an IQS-1643T-PL-SN or a standard IQS-1643-PL-SN.

Note: *The instrument is only guaranteed within the IQS-12004B operating temperature range of 23 ^{O}C ±3 ^{O}C. Any other functionality or specification, particularly those concerning the accuracy and linearity of the instrument, will not be affected by the design change to the IQS-1600T-PL-SN.*

Typical Applications

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

- Insertion loss of passive components in the production environment
- Component and system monitoring
- Source stability characterization
- Absolute power measurements
- Manual or automated splice loss measurement
- Characterization of MUX/DEMUX, used in conjuction with a tunable laser source, or within the IQS-12004B DWDM Passive Component Test System
- Optical switch characterization (switching time, insertion loss)
- Measurement on bare or unconnectorized fibers

Conventions

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

WARNING

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

CAUTION

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

CAUTION

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

IMPORTANT

Refers to information about this product you should not overlook.

2 Safety Information

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

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

3 Getting Started with Your High Speed 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.

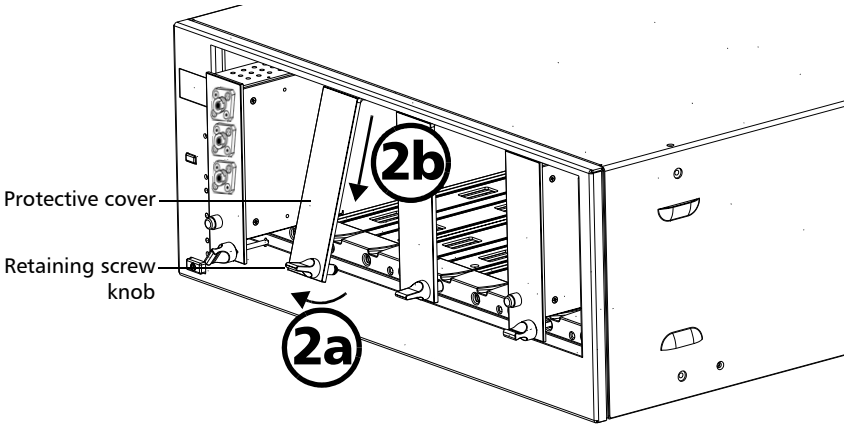
To insert a module into the controller or expansion unit:

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

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

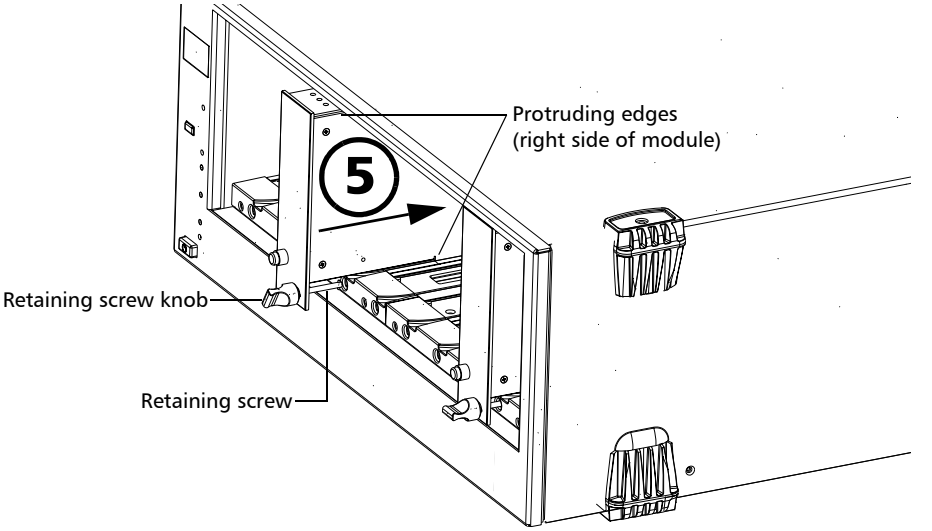
2a. Pull the retaining screw knob firmly towards you and release the bottom of the cover.

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



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

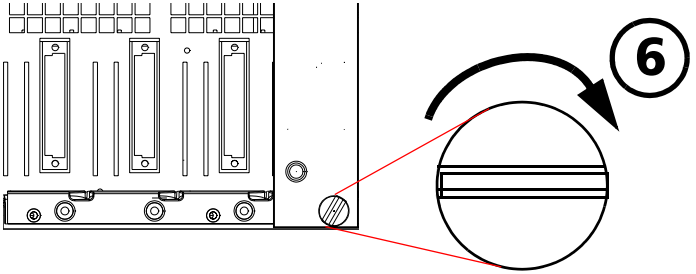
4. Insert the protruding edges of the module into the grooves of the unit's module slot.



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

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

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



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

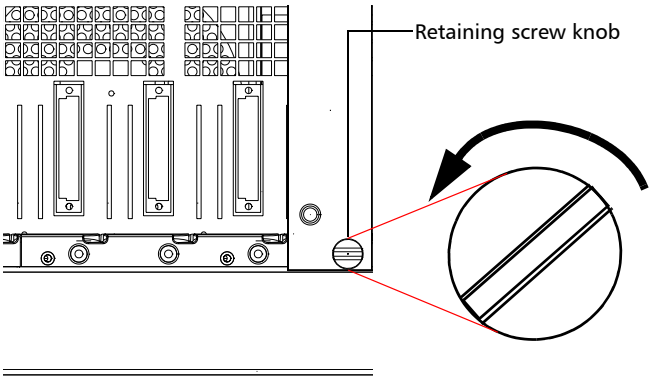
When you turn on the controller unit, the startup sequence will automatically detect your module.

Note: *You can insert IQ modules into your controller or expansion unit; the IQS Manager software will recognize them. However, the IQS-1600 locking mechanism (retaining screw) will not work for IQ modules.*

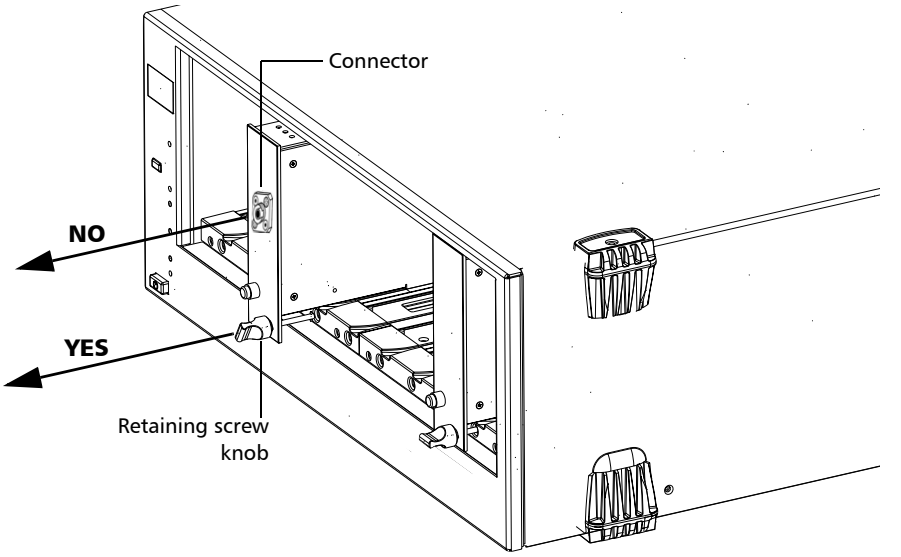
To remove a module from your controller or expansion unit:

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

The module will slowly be released from the slot.



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



CAUTION

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

3. Cover empty slots with the supplied protective covers.

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

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

CAUTION

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

Starting the High Speed Power Meter Application

Your IQS-1600 High Speed 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.

2. Click **Start Application**.

   OR

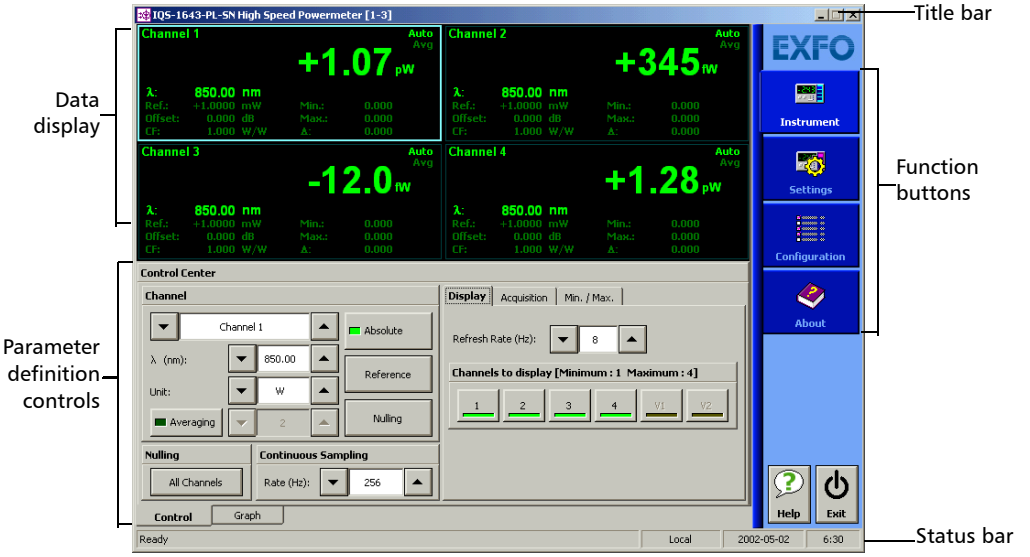
   Press the green LED push button on the front of the corresponding module.

   You can also double-click its row.

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

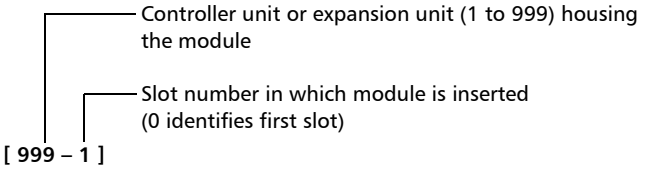
Note: *To start the corresponding monitor window at the same time, click* ***Start App. & Monitor****. The window opens on the* ***Monitors*** *function tab.*

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


IQS-1643-PL-SN High Speed Powermeter [1-3]
Channel 1
+1.07 pW
Channel 2
+345 fW
Channel 3
-12.0 fW
Channel 4
+1.28 pW
Control Center
Channel
Display
Acquisition
Min. / Max.
Absolute
Reference
Nulling
Refresh Rate (Hz):
Channels to display [Minimum : 1 Maximum : 4]
Continuous Sampling
All Channels
Rate (Hz):
Control
Graph
Instrument
Settings
Configuration
About
Help
Exit
Ready
Local
2002-05-02
6:30
Title bar
Data display
Function buttons
Parameter definition controls
Status bar

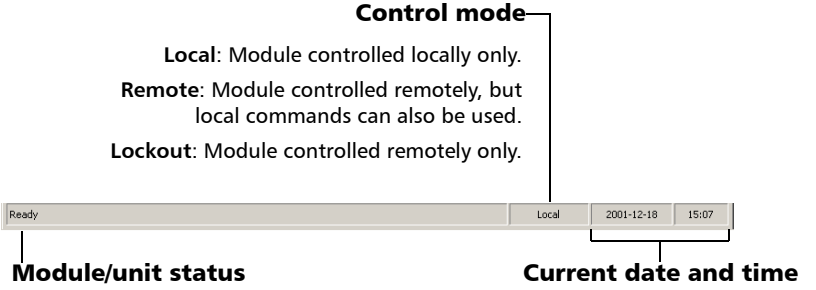
Title Bar

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



Status Bar

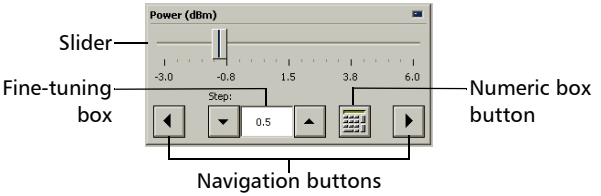
The status bar, located at the bottom of the main window, identifies the operational status of the IQS-1600 High Speed Power Meter.



For more information about automating or remotely controlling the IQS-1600 High Speed Power Meter, refer to your platform user guide.

Entering Values Using Sliders and Numeric Boxes

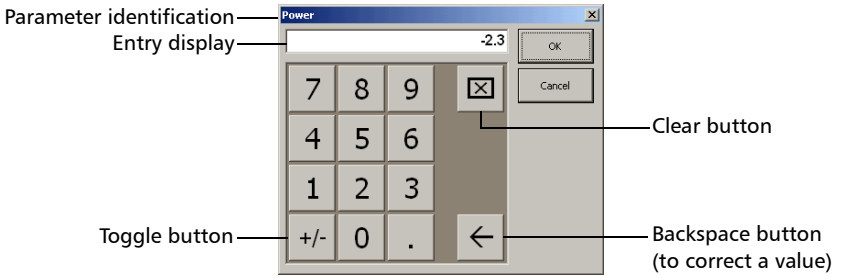
Many parameters in IQS Manager and module applications can be set using the following tools.



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

To enter a value using the numeric box:

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



2. Enter the value.

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

Exiting the Application

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

To close the application from the main window:

Click  in the top right corner of the main window.

OR

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

To close all currently running applications:

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

4 Setting Up Your High Speed Power Meter

You can set the following paameters on your IQS-1600:

- Chanel display
- Wavelength selection and management
- Measurement unit selection
- Display resolution
- Refresh rate
- Measurement range
- Saving and recalling configuration

Setting Channel Display(IQS-1620, IQS-1640)

The channel display allows you to select which channels you want to view when using a multichannel power meter. You can display up to three optical channels using a dual-channel power meter (the two normal channels, plus the virtual channel) and up to four optical channels using a four-channel power meter. These channels may include one or two virtual channels respectively.

To set the channel displayon IQS-1620 or IQS-1640 models:

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 (IQS-1620, IQS-1640)

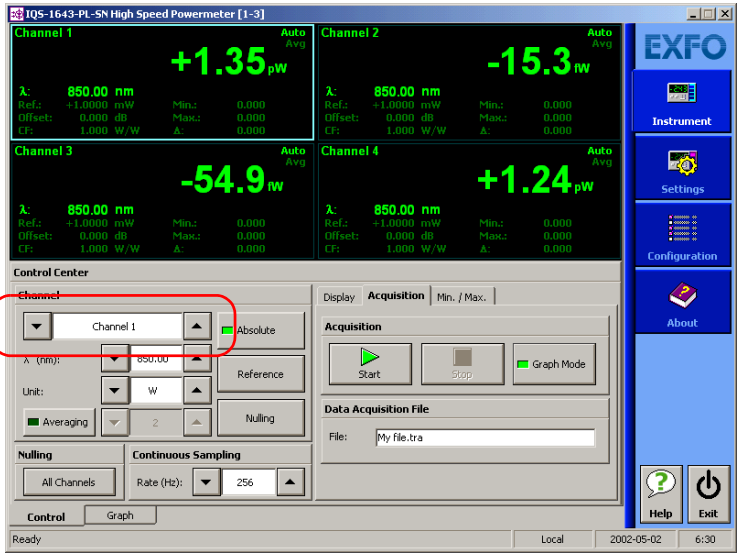
The IQS-1620 and IQS-1640 have two and four independent optical channels respectively.

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.

Selecting a Virtual Channel (IQS-1620, IQS-1640)

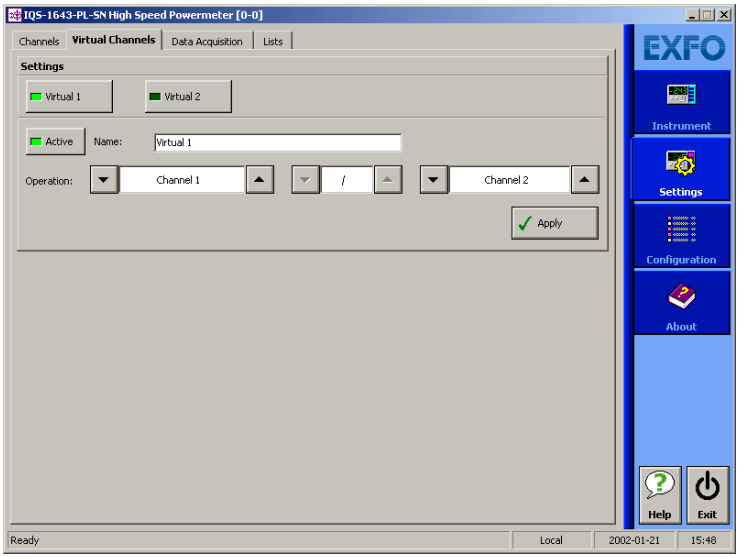
In addition to the optical channels, your application offers one virtual channel for the dual-channel power meter and two virtual channels for the quadruple-channel power meter.

A virtual channel is a combination (sum or difference when using dB or dBm as units, product or ratio when using watts or watts/watts as units—see the table on page 24) of the measured power from any two optical channels. This feature provides an extremely flexible comparative measurement display. A virtual channel is used and controlled in the same way as an optical channel.

The virtual channel is an excellent tool for comparing two optical channels. For example, if two devices (connected to channels 1 and 2) are supposed to have identical power levels, displaying a virtual channel (defined as channel 1 minus channel 2) provides quick monitoring of both devices and indicates any power fluctuations. You may also want to reference the drift of a source in real time by cancelling it out in a virtual channel.

To define a virtual channel:

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



2. Click on the desired virtual channel (when using a dual-channel power meter, only virtual channel 1 is available).

Note: *If you change settings, such as the units or trigger options, in the* ***Channels*** *tab, your virtual channel(s) may be deactivated. Ensure your settings are defined before selecting one or more virtual channels.*

3. Click on **Active** to use the channel, then enter a name for it if desired.
4. In the first box of the **Operation** area, select the first optical channel using the arrow buttons.
5. In the second box, select the virtual channel operator (+, –, *, or /).
6. In the third box, select the second channel in the same way.
7. Click on **Apply** to set the virtual channel.

Since operations between channels cannot be made with any type of measurement unit, the second channel and the operator can be selected according to the unit of the first channel as described in the following table.

First Channel Unit	Second Channel Unit	Virtual Channel Unit and Allowed Operators
dBm	dBm	dB (operator –)
dBm	dB	dBm (operators + and –)
dB	dBm	dBm (operator +)
dB	dB	dB (operators + and –)
W	W	W/W (operator /)
W	W/W	W (operators * and /)
W/W	W	W (operator *)
W/W	W/W	W/W (operators * and /)

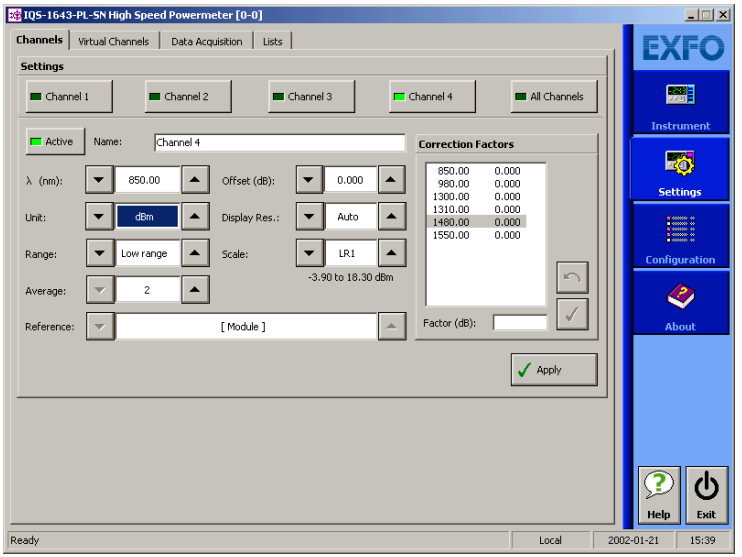
Note: *Since a virtual channel consists of a mathematical operation using two optical channels, the only parameter that can be set for a virtual channel is its name.*

Naming Channels

A user-selected name can be given to each power meter channel, including virtual channels. 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.

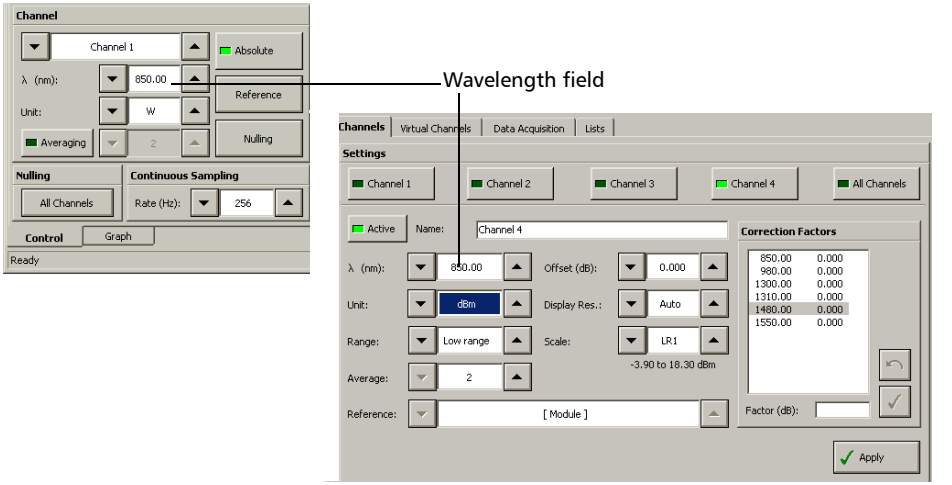
Selecting the Wavelength

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 27.

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.

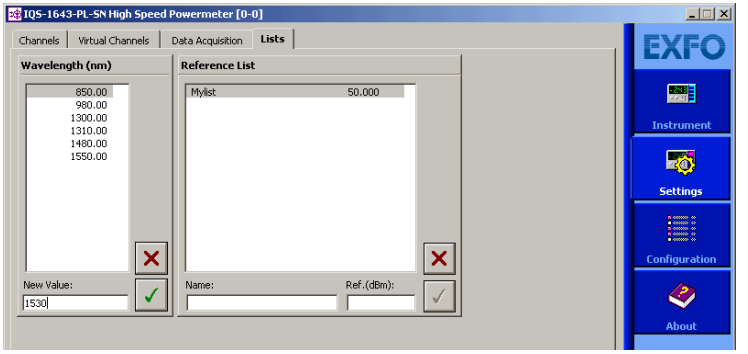
Note: *You can also use the **All Channels** button to modify all channels identically. Values previously set will turn red to indicate that the new setting differs.*

Managing Wavelength Lists

The wavelengths you want to use with your IQS-1600 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.



   In the **New Value** list, enter the wavelength value to be added.You can enter a value with a 0.01 nm resolution.

2. 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

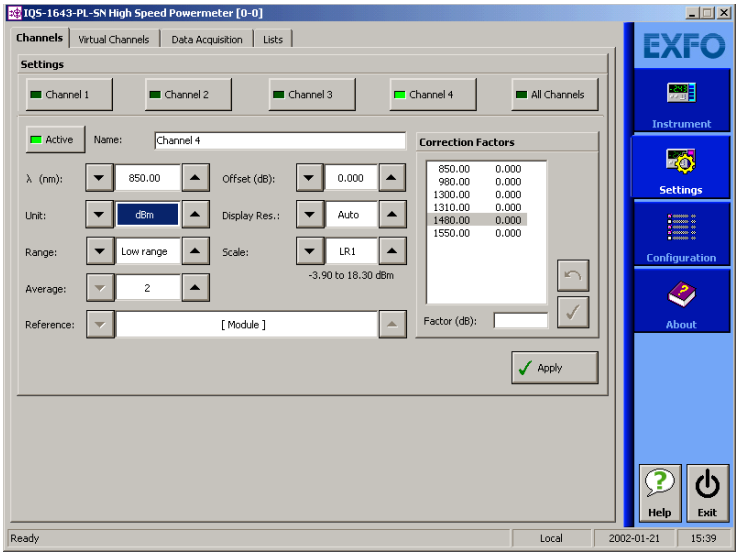
Depending on the required resolution and operating power level, 0, 1, 2, 3, or 4 digits can be displayed after the decimal point. When the auto setting is selected, the display resolution is determined by the power level being measured.

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 32).*

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.

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.*

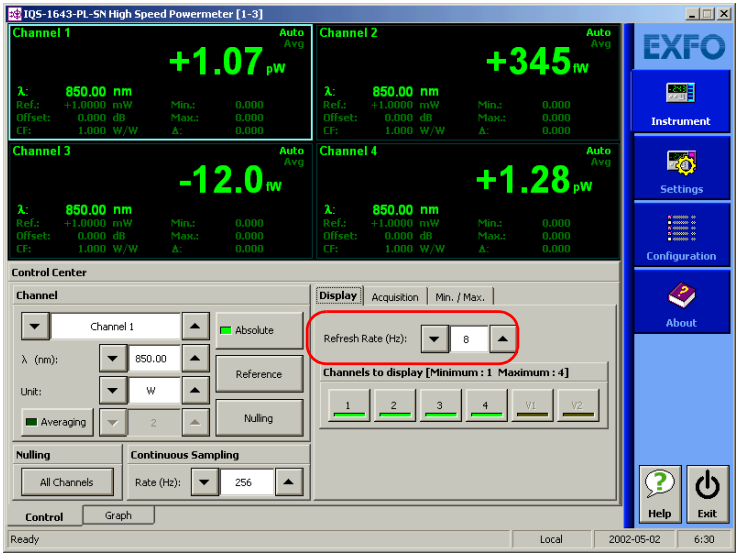
Note: *When W or W/W is selected, the display resolution changes to* Auto *(the appropriate W unit will be used according to the power of the signal detected). It is then impossible to access the display resolution list.*

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.

The measuring range should be locked when the analog output is used—see*Using the External Trigger and Analog Outputs* on page 81—in order to avoid variations in voltage outputs due to an automatic switch of gain scales. It is also necessary to use a manual range to achieve high-rate acquisitions (see *Performing Acquisitions* on page 55).

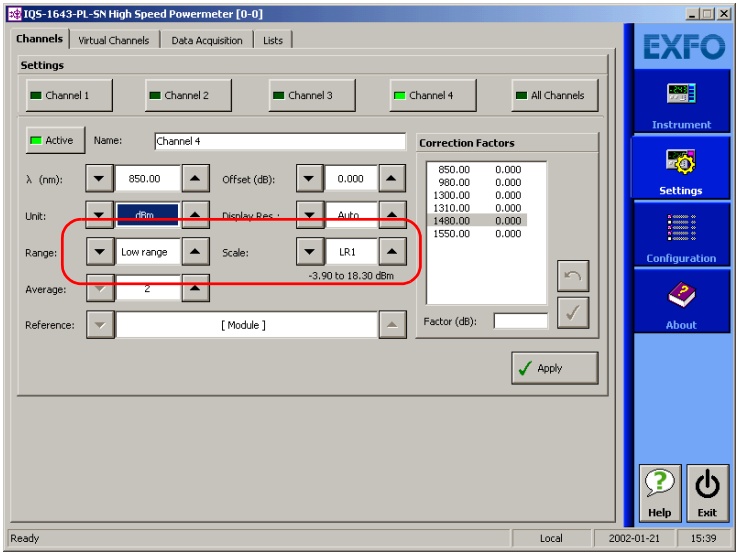
Two manual ranges are available:

The Low range (LR1 to LR6) provides a lower dynamic range (typically 35 dB) per scale with better signal-to-noise ratio and resolution. The High range (HR1 to HR4) provides a higher dynamic range (typically 42 dB) per scale with a lower signal-to-noise ratio.

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 a* Continuous *acquisition when the input signal has unstable or modulated variations. This prevents* ! ! ! ! ! ! ! *from appearing on the display when changing gain cales often.*

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

The table on the following page displays the permitted scales when the currently selected measurement unit is dB or dBm. The power values displayed are typical at 1550 nm.

Permitted Scales	
Low Range (LR)	**High Range (HR)**
–3.90 to 18.30 dBm (LR1)[a]	–29.60 to 18.30 dBm (HR1)[a]
–12.50 to 9.90 dBm (LR2)[a]	–38.20 to 9.90 dBm (HR2)[a]
–32.49 to –10.09 dBm (LR3)	–58.29 to –10.09 dBm (HR3)
–52.27 to –29.87 dBm (LR4)	–78.00 to –29.87 dBm (HR4)
–72.01 to –49.61 dBm (LR5) (–64.60 to –44.04 dBm for 16XXW models)	—
–90.00 to –69.61 dBm (LR6) (–75.00 to –64.10 dBm for 16XXW models)	—

a. InGaAs detector has a +9 dBm saturation limit for a 1 mm detector, and +8 dBm saturation limit for a 3 mm detector.

Note: *You can have a high acquisition rate only if a manual range is set on all channels.*

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.*

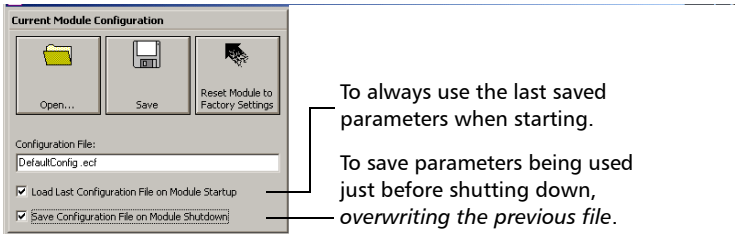
Saving and Recalling Configurations

Once you have set the IQS-1600 High Speed 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.



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 Speed Power Meter for a Test

Cleaning and Connecting Optical Fibers

IMPORTANT

To ensure maximum power and to avoid erroneous readings:

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

To connect the fiber-optic cable to the port:

1. Clean the fiber ends as follows:

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

1b. Use compressed air to dry completely.

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

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

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

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

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

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

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.

Your IQS-1600 High Speed Power Meter automatically performs nulling of the offset each time you turn it on.

However, you might need to perform a manual nulling of the offset when environmental conditions change significantly or when you are measuring very low power.

Note: *The manual nulling offset is valid for the* current *test session only; it no longer applies when you turn off your power meter. The next time you turn it on, the automatic offset nulling is performed again. You will achieve better results if you perform the manual offset nulling at a temperature around 23 °C after a running period of 45 minutes.*

IMPORTANT

When the application is launched after a cold start, allow the power meter to warm up for about 20 minutes (30 minutes for IQS-1600W modules) until the electronics stabilize before nulling offsets.

IMPORTANT

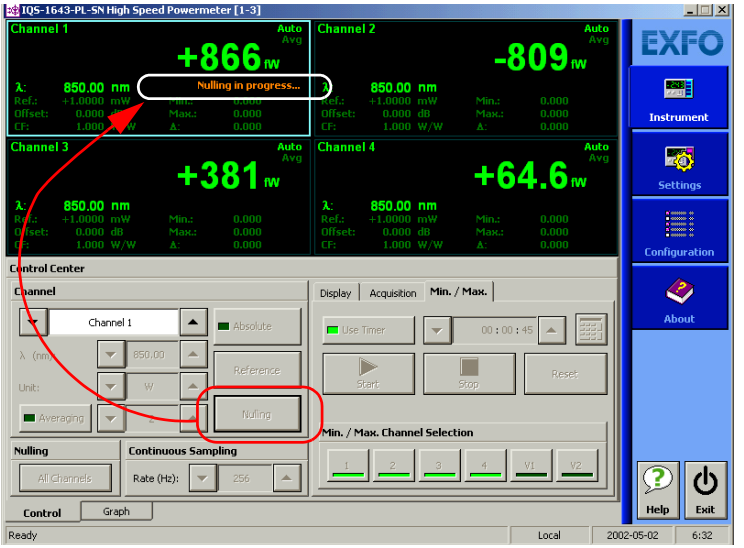
Light must not reach the detector when performing an offset nulling operation. Always use a protective screw cap. Do not use a soft rubber cover

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 (IQS-1620, IQS-1640)* on page 21.

   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.

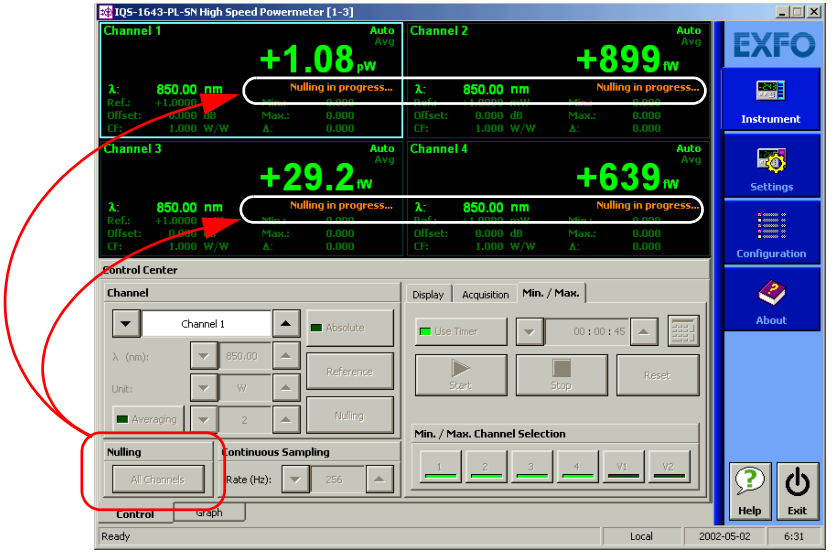
   If you are using a multichannel power meter, you will notice that the other channels will stop reading power while nulling is in progress.

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

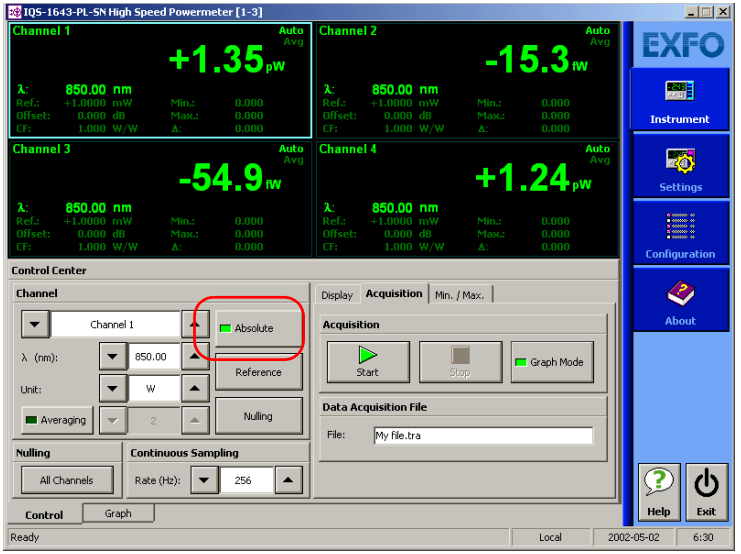
Power measurements can be displayed in two ways:

- 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.
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.

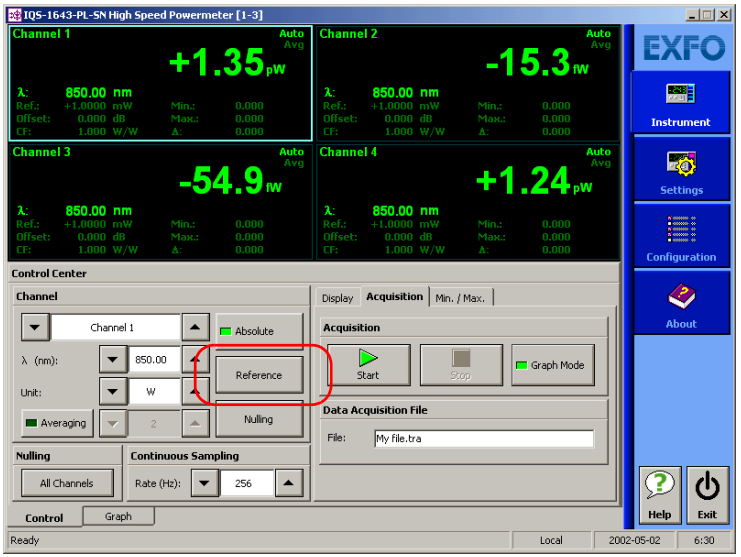
An absolute power measurement in negative W units indicates that the nulling of the offset was improperly done. If this happens, repeat the offset nulling operation (see *Nulling Offsets* on page 38).

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).



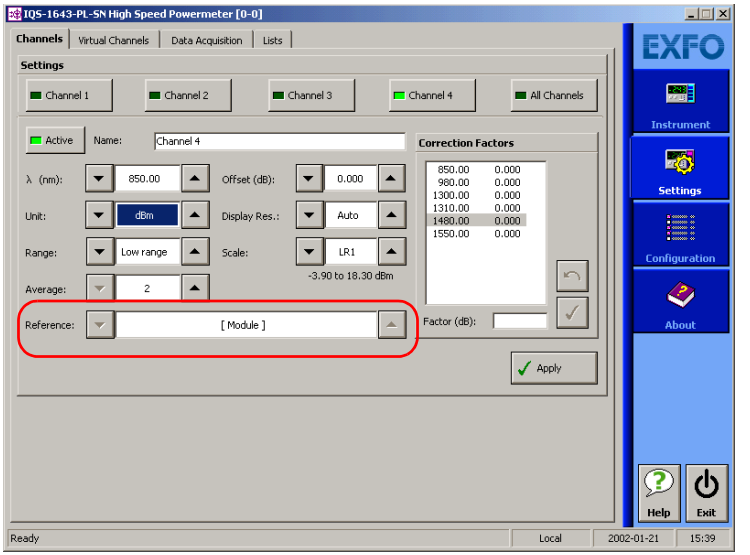
To display significant relative power values, it is important to have an appropriate reference value, which you activate by clicking the **Reference** button in the **Instrument** function tab.You can either apply the current module power as a reference or edit a value to be used as the reference.

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.

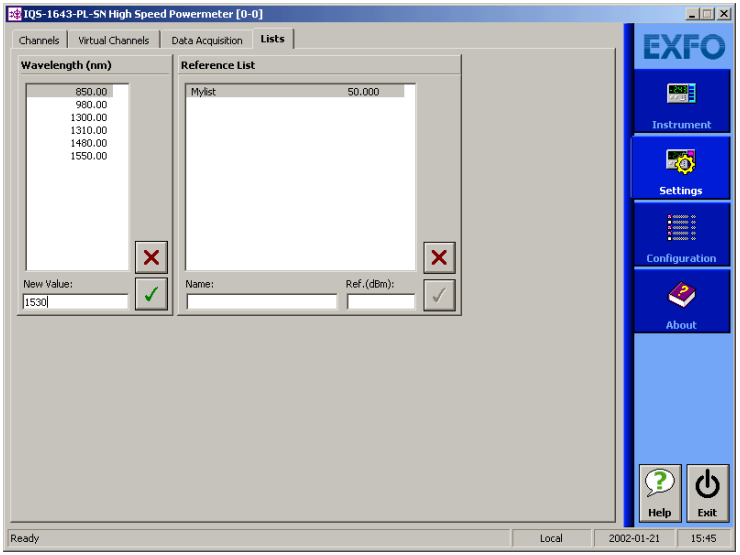
4. From the **Instrument** function tab, click the **Reference** button to use your new reference value.

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.

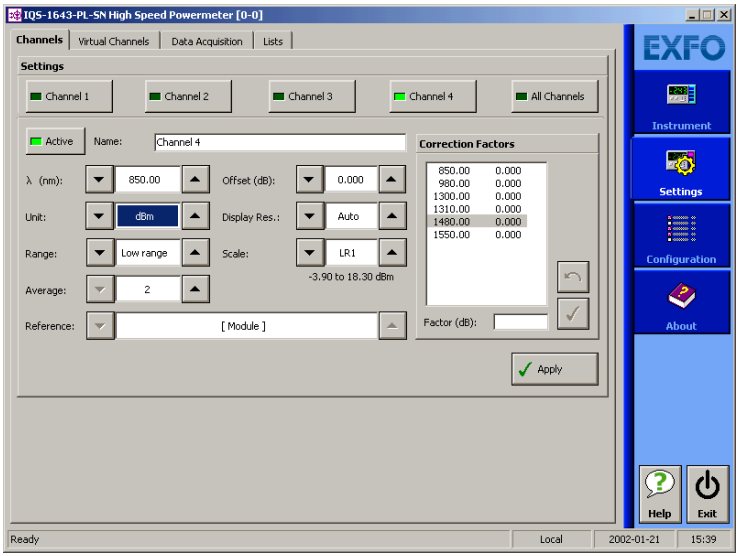
Note: *With an active correction factor, the CF marker appears in the data display for the matching channel.*

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.*

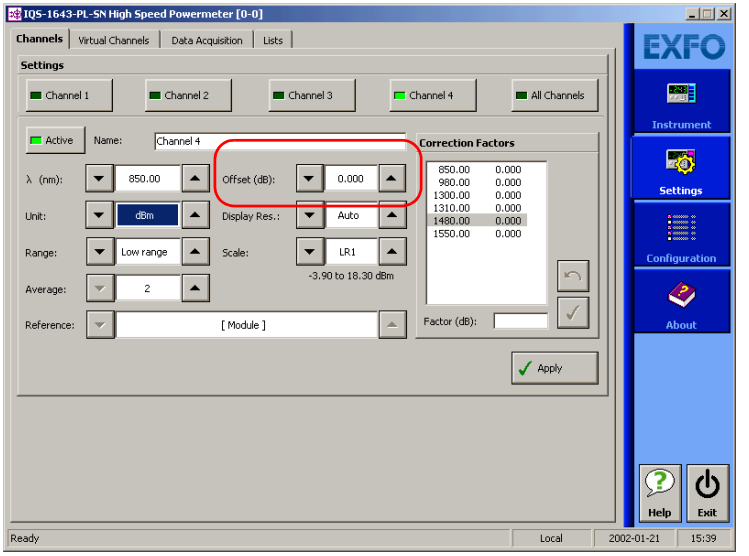
To remove the offset from a wavelength, select the wavelength, then click ↶.

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 enabledIQS-1600 High Speed 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.

If $n < M$, then

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

If $n \geq M$, then

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

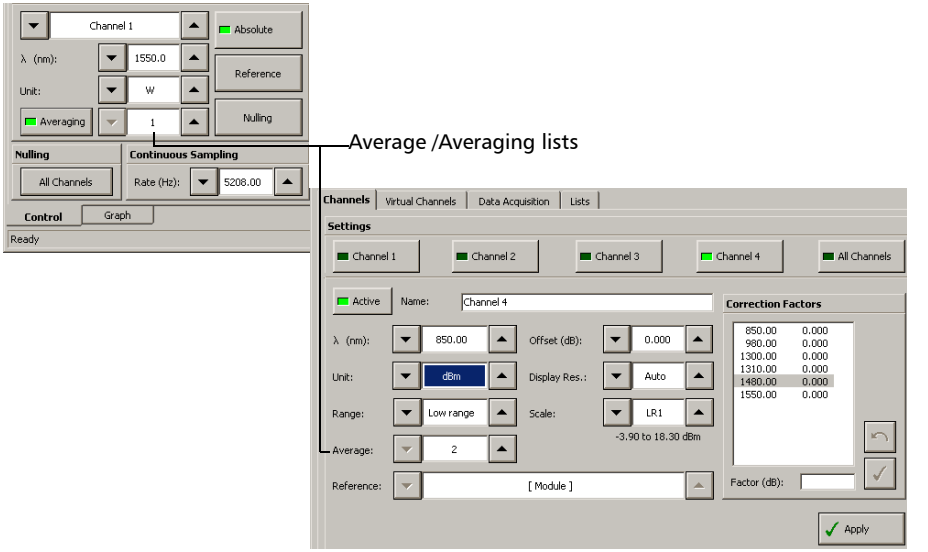
Where

- *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.



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.

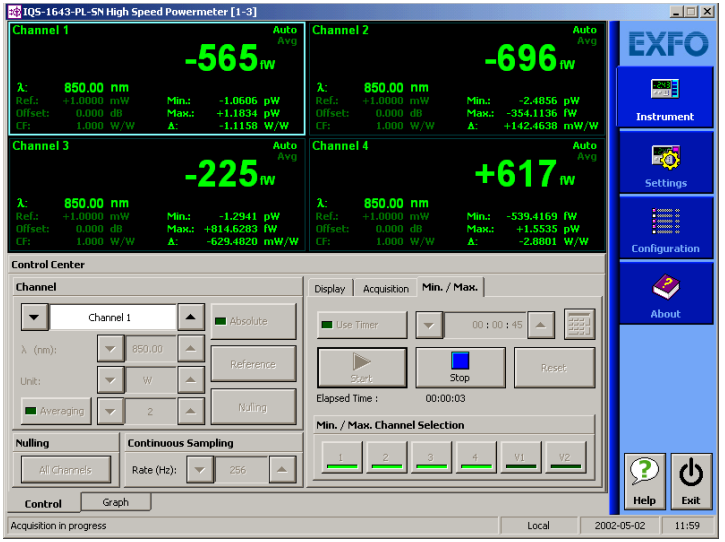
7 Recording Power Signal Variations

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 28). 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 56).

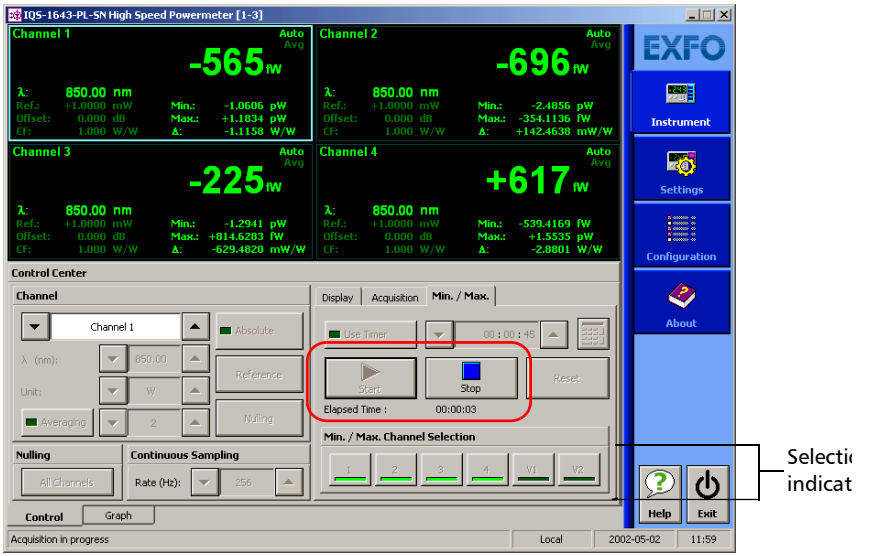


2. Select the channel for which you want to see the power variation data on-screen by clicking the corresponding buttons in the **Min./Max.** tab.

   In the case of dual-channel power meters, you can select up to three channels (the two normal channels, plus the virtual channel) and in the case of the four-channel power meter, you can select up to six channels, including the virtual channels.

Note: *For four-channel power meters, since the display allows only four channels to be viewed at once, you will have to modify your display, either during or after your acquisition in order to view the remaining two channels.*

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.

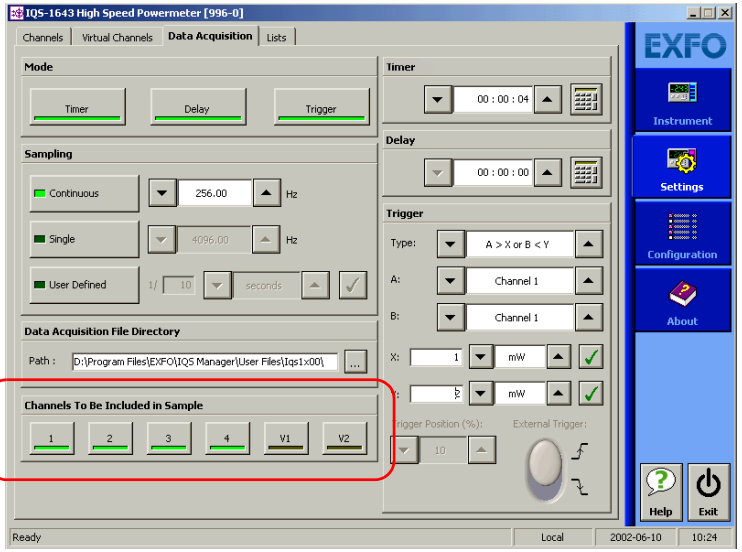
Selecting **Autorange** for this channel will prevent these symbols from appearing.

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**.



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.

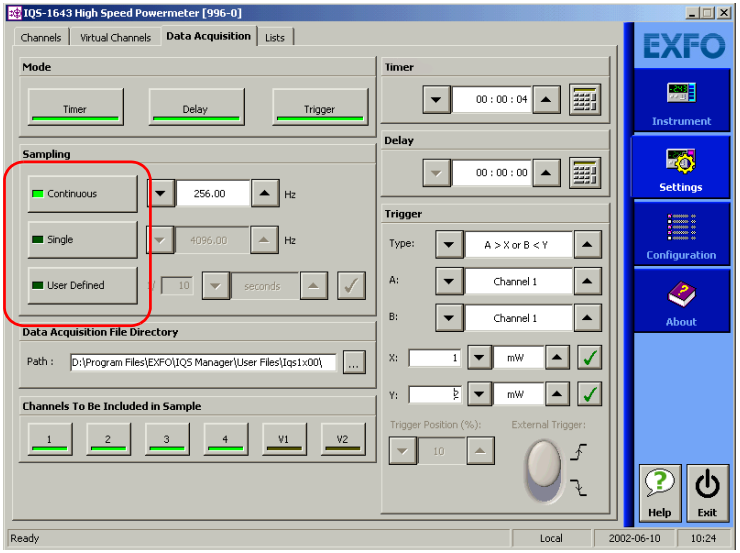
Selecting the Sampling Type

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.

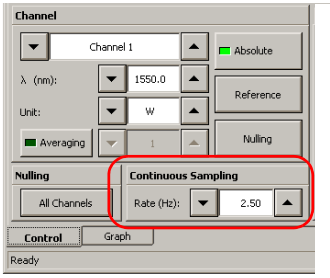


2. Select the sampling type by clicking the corresponding button.

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

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

Note: *If a* Single *acquisition rate is selected while one or more channels have been set to autoranging power measurement (see* Setting the Measurement Range *on page 32), the file acquisition will not start and a warning message will prompt you to set a manual power measurement range for the channels concerned.*

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 49) for greater repeatability when measuring very low power.*

Selecting the Acquisition Mode

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

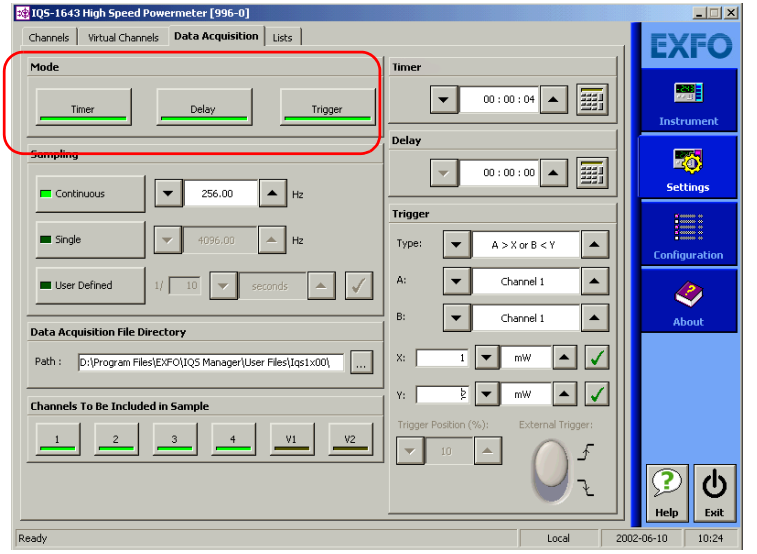
- **Timer**: the acquisition will last for the length of time you have previously set.
- **Trigger**: the power meter will wait for an incoming trigger signal before starting its next acquisition.
- **Delay**: the power meter will wait for a set length of time between acquisitions.

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.

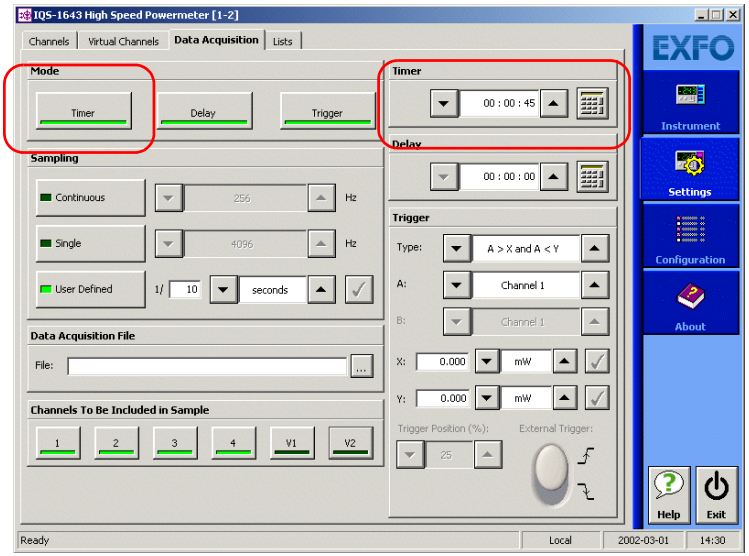
Setting Up Timed Acquisition Duration

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).



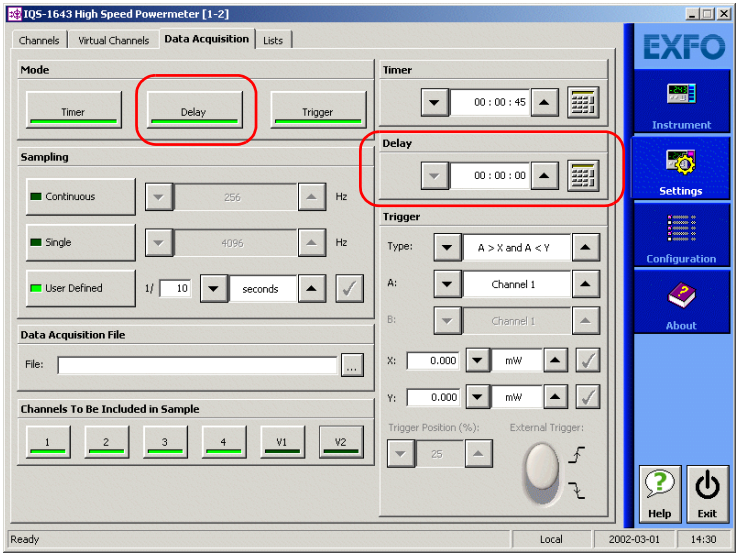
The acquisition length displayed for a single acquisition includes the time set in the **Settings** tab for the acquisition, plus the time needed to transfer data according to the sampling rate selected. During the acquisition, you will notice the message **Acquisition in progress**, then **Data transfer 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

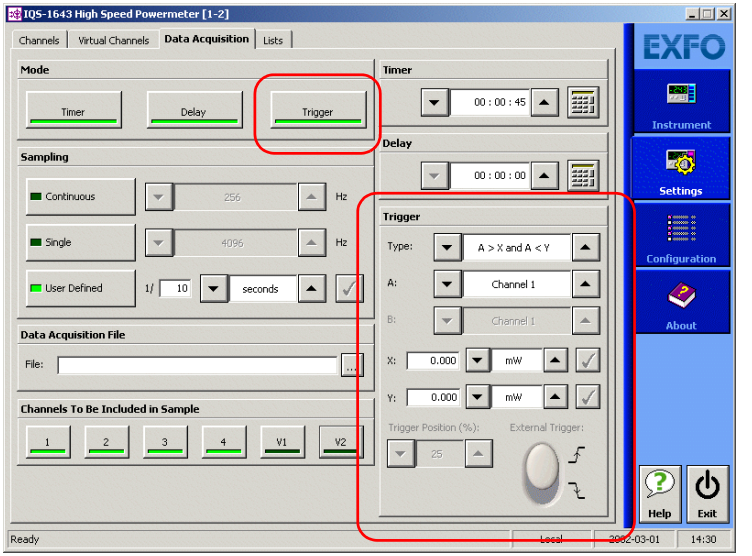
Conditional data acquisition can be performed using a triggered acquisition, meaning that data recording begins when a specified condition is met. Different trigger conditions are available, which are explained in the following table, where **A** and/or **B** represent the channel on which the condition 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.
External trigger	Acquisition in single rate will be triggered by an external signal, whether on positive or negative TTL voltage transitions (See*External Trigger* on page 82 for additional information on this feature).

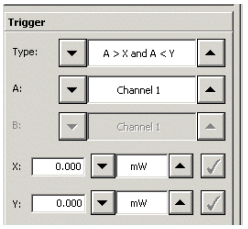
Note: *The trigger defines the condition for starting data acquisition. Once begun, acquisitions will continue for the specified duration, regardless of the measured power.*

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** It is possible to select a virtual channel in the case of a multichannel power meter.



Note: *The **X** and **Y** values are displayed in the currently selected unit.*

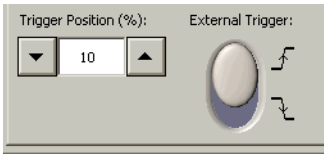
3. Enter the appropriate **X** or **Y** values in the corresponding lists.

4. Click ✓ to confirm your setting.

If you select a **Single** acquisition rate, the **External Trigger** switch and **Trigger Position (%)** options become available.

The **External Trigger** switch allows you to select whether the acquisition will be externally triggered on positive or negative TTL voltage transitions. Choose ⎍ to select positive (from 0 to 5 V) transitions, or ⎎ to select negative (from –5 to 0 V) transitions.

The **Trigger Position (%)** list allows you to set the number of points that will be acquired on the file before the trigger position is met by using the up and down arrow buttons on each side of the list.



For more information about the external trigger function, see*External Trigger* on page 82.

Once you have launched your acquisition, you will notice a message indicating that the power meter is waiting for the trigger. This message will remain until the trigger condition is met.

Starting the Acquisition

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

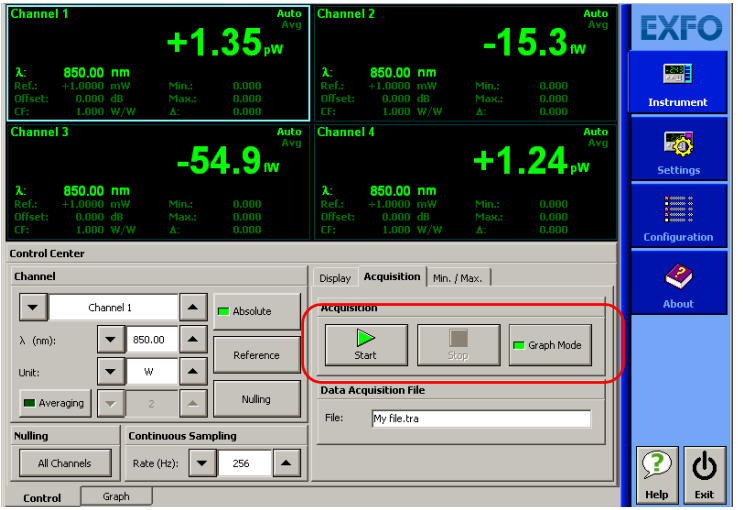
To start an acquisition:

1. Select the **Instrument** function tab.
2. From the **Acquisition** tab, press **Start**.

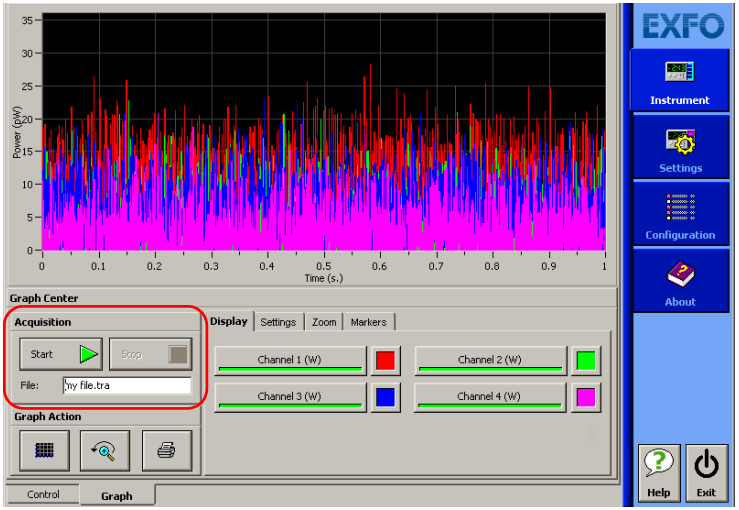
Data acquisition can be terminated at any time by clicking **Stop**. The accumulated data is available in the data file.

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 73).

Note: *You cannot activate **Graph** mode after the acquisition has already been start**ed**.*



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

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.

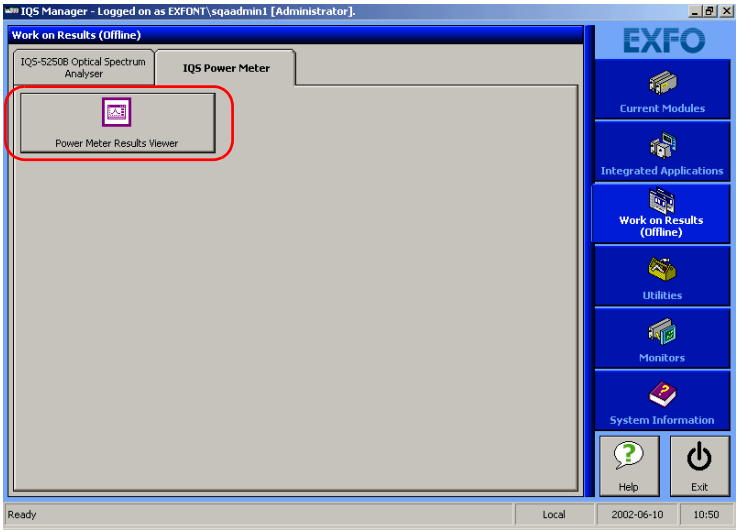
To enter a name for your acquisition, type it in the **File** box of **Data Acquisition File**. The default extension is *.tra*.

Consulting Acquired Data

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

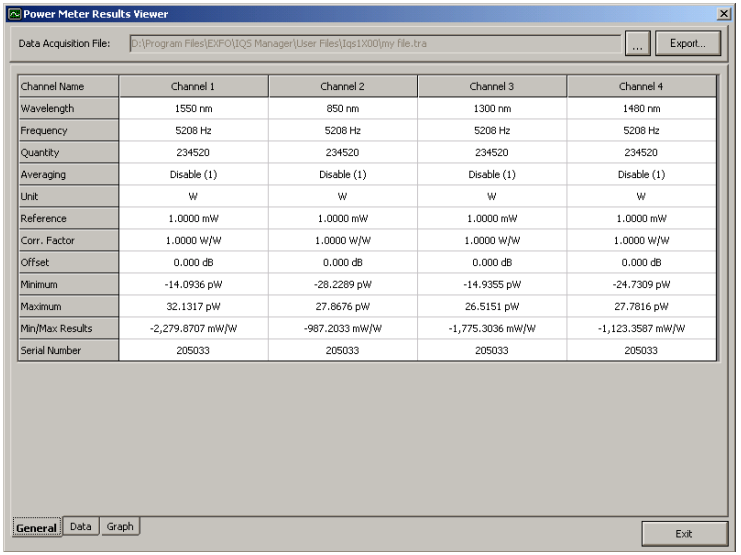
To view data previously acquired:

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.

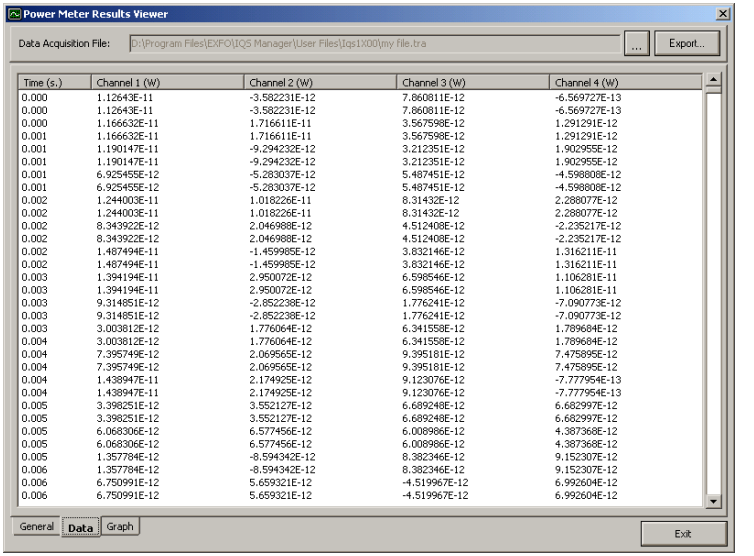


3. In the viewer, retrieve the corresponding file using the ... button.

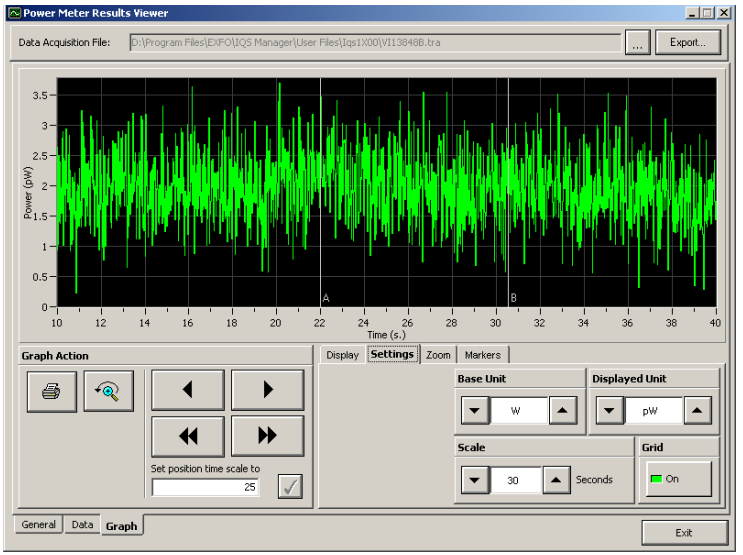
➤ To view the details pertaining to the channels used for the acquisition, select the **General** tab.



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



➤ 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 73 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

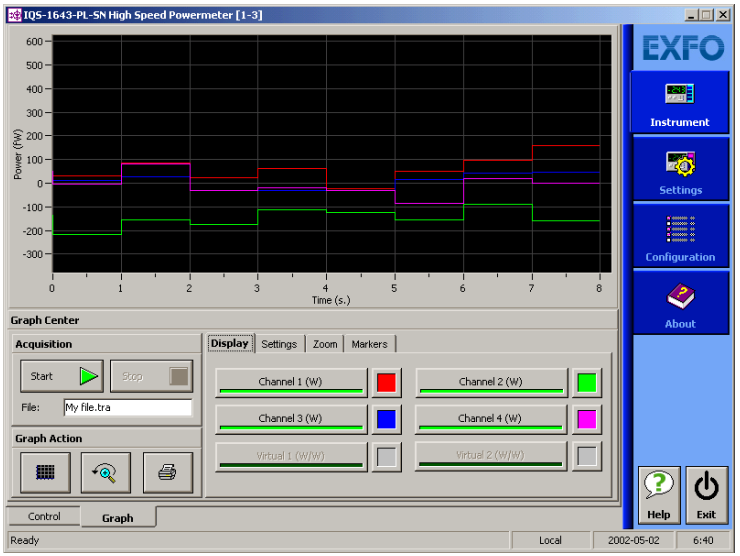
The Graph mode of your power meter allows you to view your acquisition as it is performed, and analyze it once it has been completed.

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**.

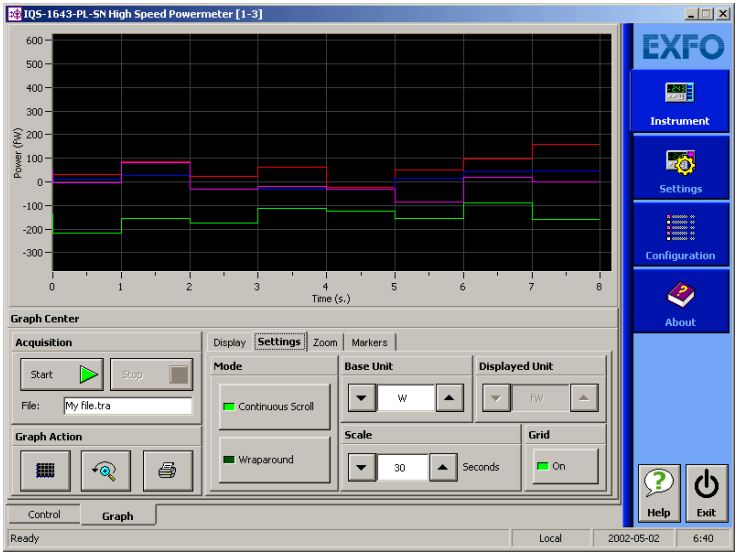


Once you have acquired a trace, you can also show or hide the channels by clicking the corresponding buttons.

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:

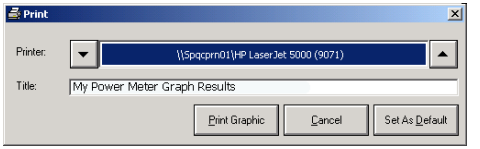
Click the corresponding button in the **Settings** tab.

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.

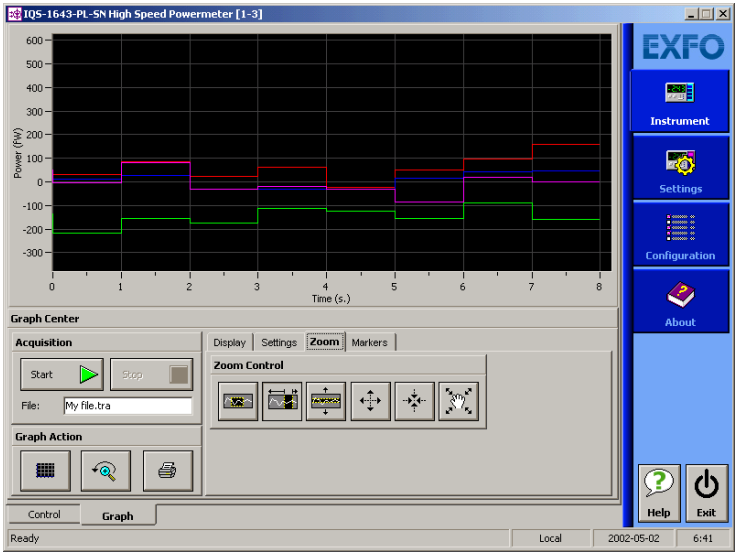
Note: *Changing items such as the units or display options will also clear the graph display. Ensure that you have set your parameters beforehand.*

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.*

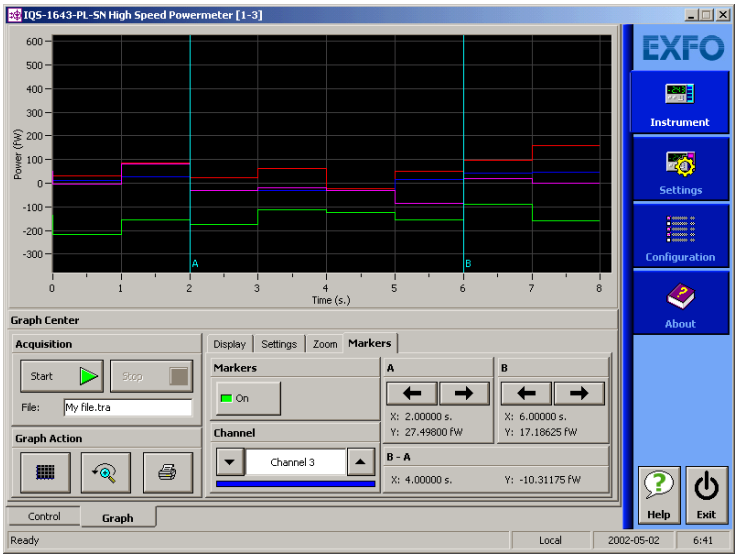
To revert to the original trace size, click  in the **Graph Center.**

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.

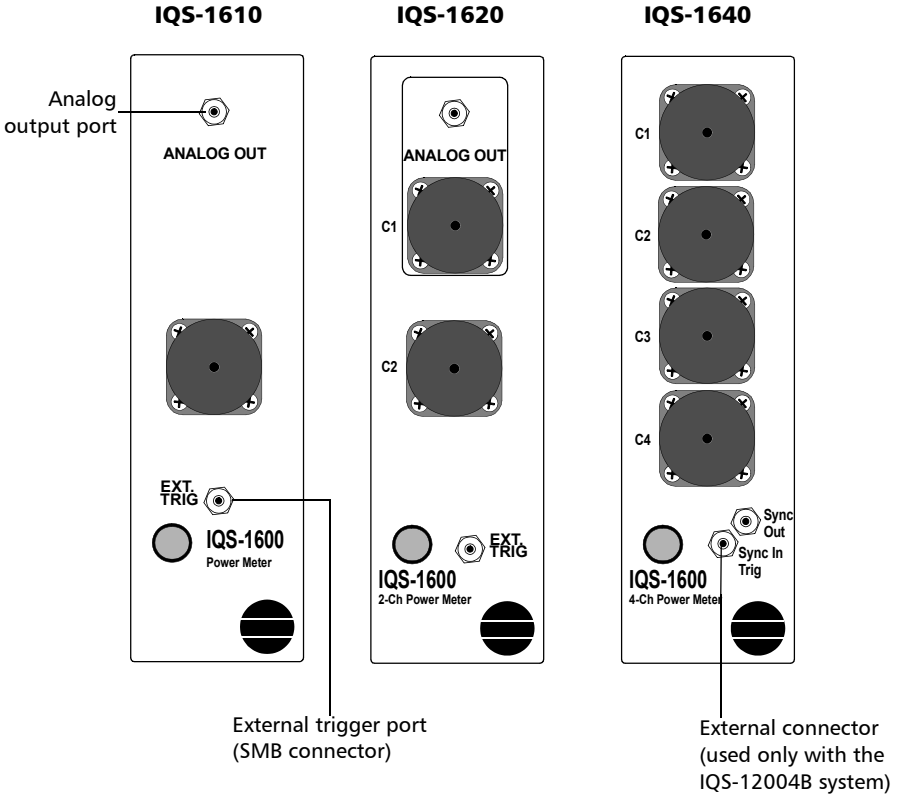
You can move the markers to the desired position by clicking them and dragging them to the left or right; or you can use the arrow buttons next to each marker to move them. The markers will move automatically to the next available point when you move them either by dragging or with the arrow buttons.

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 Using the External Trigger and Analog Outputs

Both the external trigger and analog output (SMB connectors) are accessible from the front panel of your power meter module.



External Trigger

The external trigger is used to synchronize or stimulate the acquisition of power measurements with an electrical signal (TTL level). Single acquisitions of up to 4096 Hz can be performed. The external trigger can only be used with a Single acquisition rate. The external trigger can be used to start a file acquisition.

Note: *Since externally triggered acquisitions may only be performed using a high acquisition rate, a manual power range must be set for all channels.*

To prepare an externally triggered file acquisition:

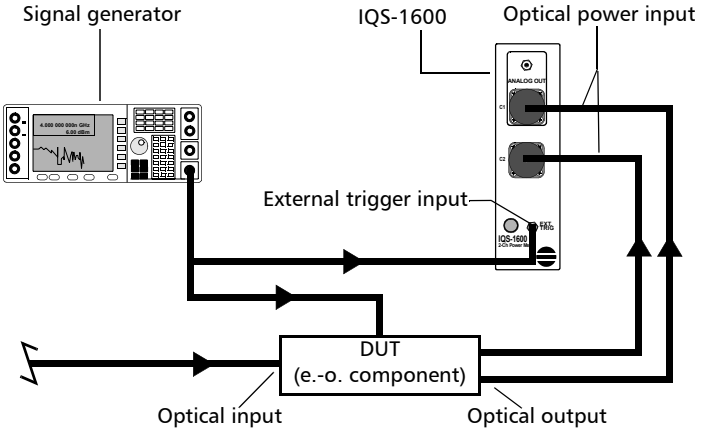
1. You must select the **Single** acquisition rate (see *Performing Acquisitions* on page 55).
2. In the **Settings** function tab, select **Data Acquisition**.
3. Click on **Trigger** to select it.
4. Determine whether the acquisition will be externally triggered on either positive or negative TTL voltage transitions by selecting  or  , respectively by using the **External Trigger** switch.

At the fastest sampling rate (4096 Hz) during a single acquisition, the instrument can store at least four seconds worth of data per channel (depending on the number of channels per instrument). The trigger will be set at instant 0. You may want to see the data acquired before the trigger occurred. You can enter the desired percentage of data before the trigger position from the **Trigger position (%)** box.

When you enable the externally triggered acquisition with **Start,** the acquisition will wait for the voltage transition to occur before storing the data on file.

Connecting a TTL Source to the External Trigger

A synchronizing signal from a signal generator or from a control circuit may be connected to the external trigger input of the your high-speed power meter module if it does not exceed TTL levels. The illustration below shows a typical connection setup for a signal generator.

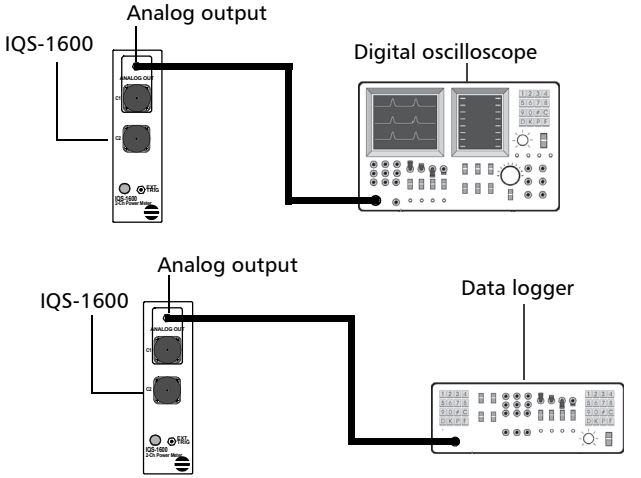


Analog Output (IQS-1610, IQS-1620)

The analog output provides an electrical signal proportional to the optical power input on the detector (which is the measured value shown in the display of the **Instrument** function tab). It is available for channel 1 of both single- and dual-channel models.

The analog output signal is the redirection of the signal after the first amplification stage. Do not use the analog output in **Autorange** mode (see *Setting the Measurement Range* on page 32) because the gain scales of the first amplification stage are constantly changed to optimize signal-to-noise ratio.

The following is an illustration of typical uses of the analog output.



The user interface can be used to determine the operating power levels and to optimize the analog output range. Choose the optimum power range for your application. The table below provides the voltage vs. power information for each available manual range.

Manual Range	Power vs. Voltage[a]
LR1, HR1	2.15 V ± 25 %[b] at 18.30 dBm[c]
LR2, HR2	2.15 V ± 25 %[b] at 9.90 dBm
LR3, HR3	2.15 V ± 25 %[b] at –10.09 dBm
LR4, HR4	2.15 V ± 25 %[b] at –29.87 dBm
LR5	2.15 V ± 25 %[b] at –49.61 dBm or at 44.94 dBm for IQS-16XXW models
LR6	2.15 V ± 25 %[b] at –69.61 dBm or at 64.10 dBm for IQS-16XXW models

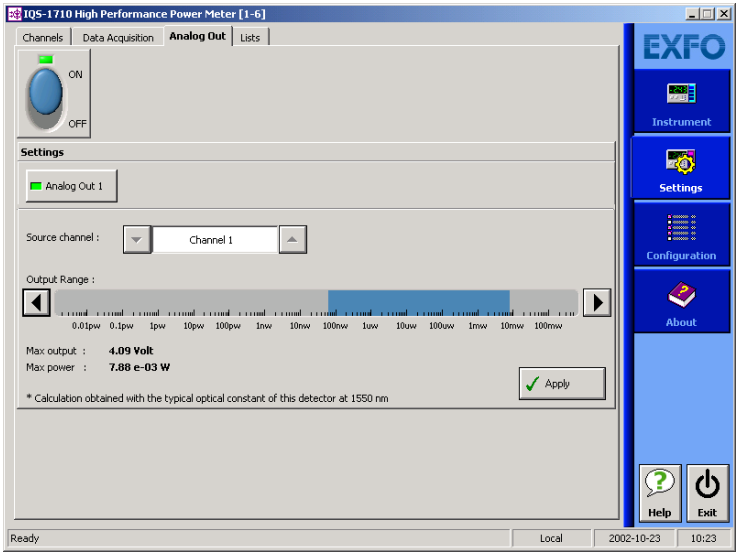
a. At 1310 nm.
b. Large uncertainty is due to detector responsivity at 1310 nm.
c. Not guaranteed due to detector saturation.

When using your high-speed power meter with rising optical power, saturation of the scale converter will be reached when **+++++++** is displayed. At that moment, the voltage in the analog output will be 2.15 V. Even with **+++++++** displayed, the optical power can still be increased further and the analog output will continue to increase proportionately. The voltage reading on the oscilloscope is then 3.95 V for HR1 to HR4 and LR1 to LR4, and 4.4 V for LR5 and LR6.

To set the analog output properties:

1. From the main window, click **Settings**.

2. Select the **Analog Out** tab.



3. Select an analog output in **Settings** (Analog Out 1 for a one- or four-channel power meter, or Analog Out 1 or 2 for a two-channel power meter) by clicking the corresponding button.

4. In the case of a multichannel power meter, select the source channel you want to associate with the analog output by clicking the up or down arrow buttons.

5. Set the range for the analog output by using the arrow buttons. The 0-4.09 Volt output range (the dark section) will move accordingly along the available power range.

Note: *As you move the range, the **Max power** value is automatically updated.*

6. Once your settings are set, click **Apply** to enter them and use them for your future acquisitions.

7. Before leaving the **Settings** function tab, activate the analog output mode by moving the switch to the **ON** position.

11 Monitoring Power Meter Modules

When using your IQS-1600 High Speed 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:

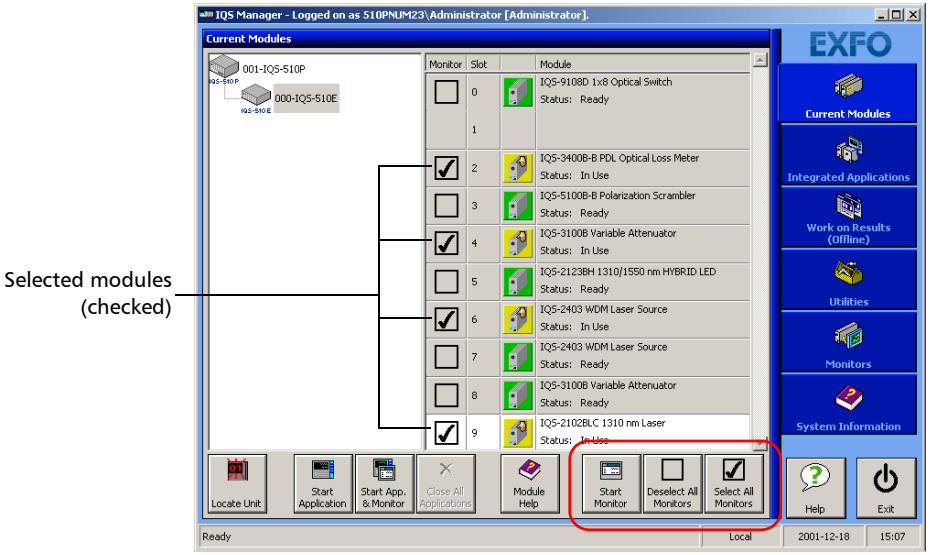
- opening the module application to access all the functions

  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.



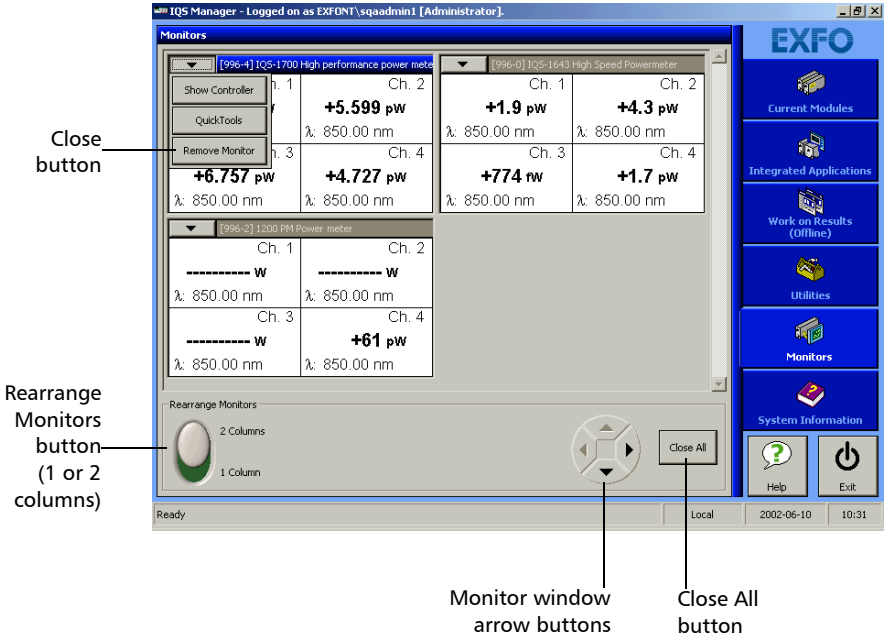
2. In the **Monitor** column, select the box next to each module you want to monitor.

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.*



Using QuickTools

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

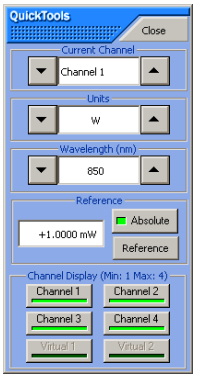
Note: *You can only access QuickTools if the module's monitor window is selected from the* ***Monitors*** *function tab and is currently active.*

To start QuickTools:

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

   The corresponding monitor window flashes when QuickTools is activated.

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



To close QuickTools:

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

OR

➤ Click outside the QuickTools window.

To close a monitor window:

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

OR

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

12 Typical Applications

For accurate, significant, and repeatable power measurements, it is *important* to consider the following points:

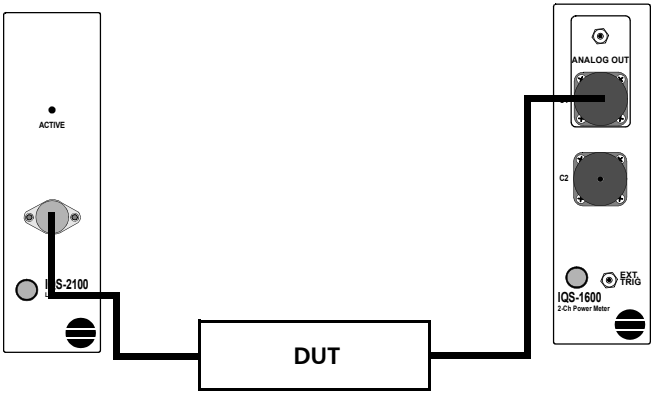
- Connectors, fiber ends, ports, and detectors should be clean at all times.
- A null measurement should be performed prior to each user session or whenever there is a significant change in ambient temperature or environmental conditions. To perform a null measurement, see *Nulling Offsets* on page 38.
- The optical source should be stable.
- Appropriate test jumpers, connectors, and adapters must be used.
- Once a reference has been taken, make sure that the setup remains stable. To take a reference, see *Measuring Relative Power* on page 43.
- Since optical losses vary according to the launch and receive conditions and fiber type, controlling these conditions with mode filters and strippers is essential.

Performing Absolute Power Measurements

Absolute power measurements are necessary when performing system or component monitoring, quality control, system or component acceptance, and troubleshooting.

To carry out absolute power measurements:

1. Perform an offset nulling as explained in *Nulling Offsets* on page 38.
2. Make sure that the source is off, then, using an appropriate test jumper and connector adapter, connect the DUT to the detector port.



3. Adjust the power meter to the correct wavelength and set the display unit to dBm or W.
4. Switch on the source and allow it to stabilize (the recommended time is 60 minutes).
5. The absolute optical power can now be monitored and recorded.

Note: *With a multichannel high-speed power meter, absolute power can be simultaneously measured for each independent channel. Simply apply each step of the above procedure to all channels being used.*

Note: *The high-speed power meter virtual channel (IQS-1620 or IQS-1640) is an excellent tool for comparing two optical channels. For example, if two devices (connected to channels 1 and 2) are supposed to have identical power levels, displaying a virtual channel (defined as channel 1 minus channel 2) provides easy monitoring of both devices and will quickly highlight any power fluctuations.*

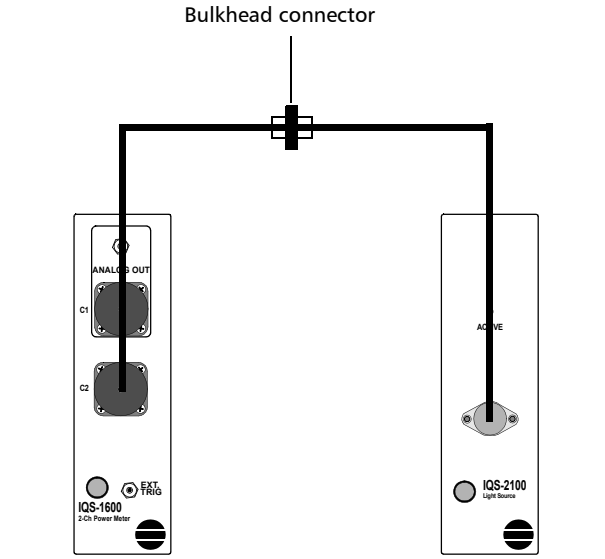
Note: *You can perform precise and repeatable power measurements of unconnectorized DUTs by combining a high-speed wide area detector power meter (IQS-1600W) and a bare fiber adapter.*

Measuring Insertion Loss

To accurately measure the insertion loss of a fiber-optic component, use a light source (such as EXFO's IQS-2100 Light Source) and your high-speed power meter.

To measure the insertion loss:

1. Perform an offset nulling of the detector(s) if needed.
2. Make sure that the source is turned off.
3. Connect the source to the power meter using two appropriate test jumpers and a bulkhead connector as shown below. This setup will be used to record a reference value.



IQS-1600 Power Meter IQS-2100 Light Source

4. Adjust the source and power meter to the appropriate wavelength.
5. Activate the source and select a suitable power output.

IMPORTANT

The absolute power output value is not particularly important when measuring insertion loss. It is very important, however, that the power level used for taking the reference measurement is identical to the power level used during the insertion loss measurement.

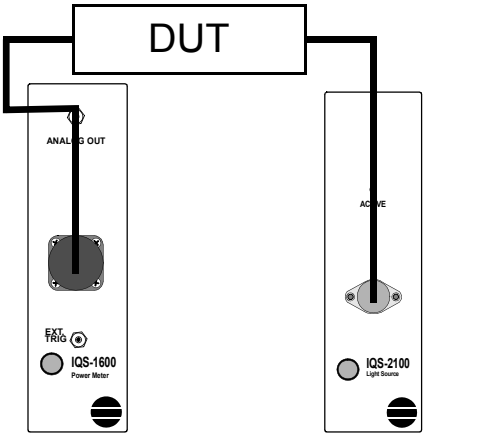
6. In the IQS-1600 Power Meter application (Normal mode), set the measurement units. The reference value has now been taken and the display should read “0.000 dB” or “1 W/W”.

7. Switch off the source.

8. Replace the bulkhead connector with the DUT as shown in the figure on the previous page.

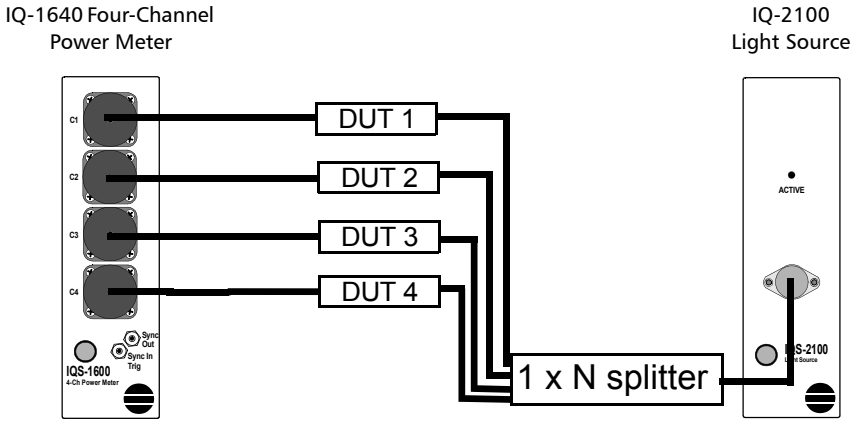
9. Switch on the source and allow it to stabilize (the recommended time is 60 minutes).

10. The insertion loss of the DUT is the relative measurement as displayed by the high-speed power meter software. For best results, ensure that the setup remains stable.



IQS-1600 Power Meter IQS-2100 Light Source

With an IQS-1640 Four-Channel Power Meter, the previous procedure could be used to perform four simultaneous insertion loss measurements as shown in the figure below.



Testing Instrument Linearity

As stated in *Measuring Insertion Loss* on page 96, absolute power levels are not particularly significant when measuring the insertion loss of a fiber-optic component.

In calculating insertion loss, we are essentially measuring the difference between the power in and the power out of a DUT. To accurately measure that difference, instrument linearity is very important.

Your high-speed power meter is specified as being very linear. Not only is it ideal for measuring insertion loss, it is also suitable as a reference instrument for determining the linearity of other fiber-optic components such as attenuators, other power meters, and optical detectors.

When verifying instrument linearity, a linear variable attenuator (such as EXFO's IQS-3100 Variable Attenuator) is also required. Before verifying the linearity of an optical detector, you must confirm the linearity of the attenuator being used.

To confirm the linearity of the attenuator being used, you need a stable source (IQS-2100), a variable attenuator, your high-speed power meter, two test jumpers, and appropriate connector adapters.

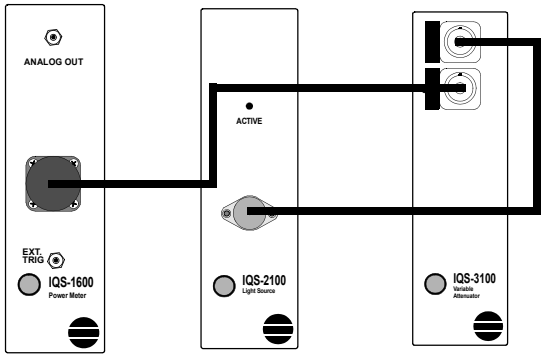
Once you are confident with both the test setup and instruments being used, you can start testing for component linearity.

To confirm the linearity of the attenuator:

1. Perform an offset nulling if needed.

2. Make sure that the source is switched off.

3. Connect the instruments as shown below.



IQS-1600 Power Meter | IQS-2100 Light Source | IQS-3100 Variable Attenuator

4. Switch on the source and allow it to stabilize (the recommended time is 60 minutes).

5. With all instruments set to the same wavelength and the attenuator set to minimum attenuation, take an IQS-1600 reference measurement and switch to relative display. Next, switch the attenuator to **Relative** display mode.

6. At this time, both the attenuator and power meter will display “0.0 dB”. Increase the attenuation using constant step sizes, while recording the values from both displays (attenuator and power meter) at each step. Continue until the power meter indicates around –55 dB. The recorded values at each step should follow within allowable tolerances of both instruments. If the values do not correspond, this indicates a problem with the equipment setup or with one of the instruments. Before proceeding any further, the problem must be isolated.

To test the linearity of an optical detector:

1. Switch off the source.
2. Disconnect the high-speed power meter from the circuit shown in the previous page and replace it with the detector being tested.
3. Reset the attenuator to minimum attenuation.
4. Switch on the source and allow it to stabilize (the recommended time is 20 minutes).
5. Increase the attenuation on the attenuator with constant step sizes, while recording the output read by the detector at each step.
6. When completed, the data can be analyzed to determine the detector’s linearity.

Characterizing an Optical Switch

The high sampling rate, fast stabilization and trigger capability of your high-speed power meter can be combined to easily characterize optical switches.

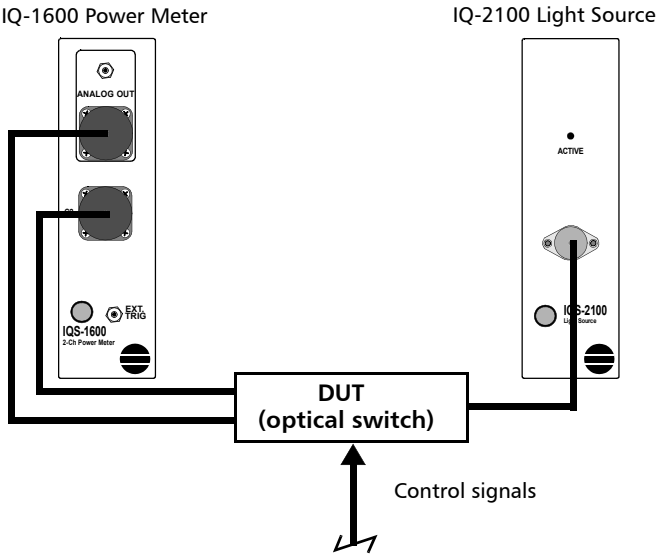
The figure on the following page displays a simple test station for a 1 x 2 optical switch. A light source is connected to the common terminal of the optical switch. Each optical output of the switch is connected to a dual-channel power meter detector. This setup can be used to test both the repeatability and the settling time of the optical switch. For the latter test (in **Single** acquisition mode), the electrical signal used to command the switch is also connected to the external trigger input of the power meter.

Testing Repeatability

The procedure to test the repeatability of an optical switch is relatively simple. First, a reference measurement must be taken on each channel. Next, repetitive transitions of the switch must be performed. The switch repeatability will be the total deviation from the reference points.

To test the repeatability:

1. Perform an offset nulling if needed.
2. Make sure that the switch is off.
3. Connect the instruments as shown below.



4. Set the power meter channels to the same wavelength as the source.
5. Set the power meter channels to **Autorange** mode.
6. Switch the source on and allow it to stabilize (the recommended time is 60 minutes).

7. Set the switch to the first position and take a reference measurement on the channel receiving the signal.

8. Set the switch to the second position and take a reference measurement on the second channel, now receiving the signal.

9. Change the switch position from one channel to the other. For each channel, take note of the relative power measurement when the channel is active.

10. Repeat step 9 as many times as required.

11. For each channel, the total deviation will be the highest positive deviation minus the highest negative deviation relative to the original reference (taken at step 4). The repeatability of the switch insertion loss may be expressed as ± (total deviation in dB)/2.

13 Maintenance

To help ensure long, trouble-free operation:

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

WARNING

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

Cleaning Fixed Connectors

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

To clean fixed connectors:

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

IMPORTANT

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

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

IMPORTANT

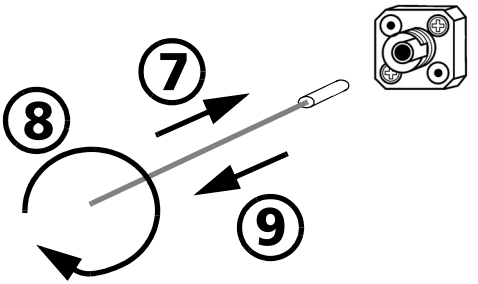
Isopropyl alcohol takes approximately ten seconds to evaporate. Since isopropyl alcohol is not absolutely pure, evaporation will leave microscopic residue. Make sure you dry the surfaces before evaporation occurs.

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

IMPORTANT

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

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



8. Gently turn the cleaning tip one full turn.

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

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

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

11. Throw out the cleaning tips after one use.

Cleaning 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.

Cleaning the Analog Output and External Trigger Ports

To ensure better performance and higher accuracy, gently wipe the inside of the analog output and external trigger ports with a ling-free swab dipped in isopropyl alcohol.

To dry the port after cleaning it, use either compressed air or a dry lint-free swab.

Recalibrating the Unit

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

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

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

Recycling and Disposal (Applies to European Union Only)

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

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

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

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

14 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.

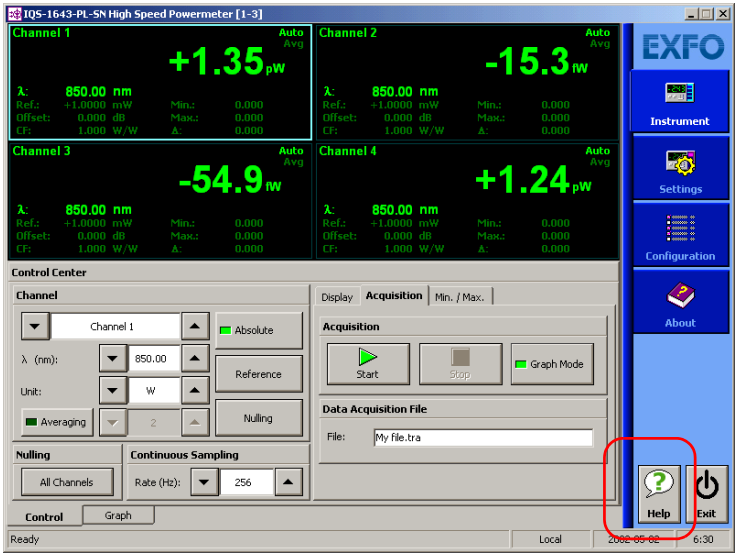
Problem	Probable Cause	Recommended Action
* * * * * * * is displayed as power value.	➤ Channel not active. ➤ Channel not selected for Min. / Max. acquisition.	➤ Click the **Active** button for the appropriate channel in the **Channel** tab of the **Settings** function tab. ➤ Select the appropriate channel 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-1600 High Speed Power Meter user guide is conveniently available at all times from the application.

To access the online user guide:

Click **Help** in the function bar.



Finding Information on the EXFO Web Site

The EXFO Web site provides answers to frequently asked questions (FAQs) regarding the use of your IQS-1600 High Speed Power Meter.

To access FAQs:

1. Type http://www.exfo.com in your Internet browser.
2. Click the **Support** tab.
3. Click **FAQs** and follow the on-screen instructions. You will be given a list of questions pertaining to your subject.

The EXFO Web site also provides the product's most recent technical specifications.

Contacting the Technical Support Group

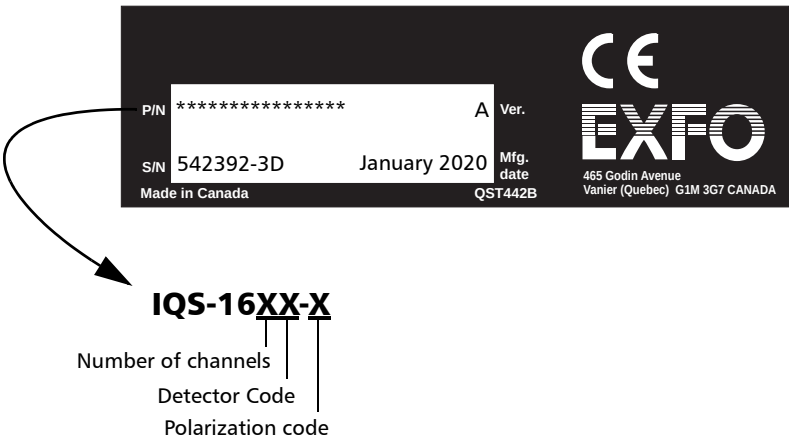
To obtain after-sales service or technical support for this product, contact EXFO at one of the following numbers. The Technical Support Group is available to take your calls from Monday to Friday, 8:00 a.m. to 7:00 p.m. (Eastern Time in North America).

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

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

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

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



Transportation

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

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

15 Warranty

General Information

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

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

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

Liability

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

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

Exclusions

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

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

Certification

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

Service and Repairs

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

To send any equipment for service or repair:

1. Call one of EXFO's authorized service centers (see *EXFO Service Centers Worldwide* on page 118). Support personnel will determine if the equipment requires service, repair, or calibration.
2. If equipment must be returned to EXFO or an authorized service center, support personnel will issue a Return Merchandise Authorization (RMA) number and provide an address for return.
3. If possible, back up your data before sending the unit for repair.
4. Pack the equipment in its original shipping material. Be sure to include a statement or report fully detailing the defect and the conditions under which it was observed.
5. Return the equipment, prepaid, to the address given to you by support personnel. Be sure to write the RMA number on the shipping slip. *EXFO will refuse and return any package that does not bear an RMAnumber.*

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

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

Routine recalibration is not included in any of the warranty plans. Since calibrations/verifications are not covered by the basic or extended warranties, you may elect to purchase FlexCare Calibration/Verification Packages for a definite period of time. Contact an authorized service center (see *EXFO Service Centers Worldwide* on page 118).

EXFO Service Centers Worldwide

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

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

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

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

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

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

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

A Technical Specifications

IMPORTANT

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

SPECIFICATIONS [a] (IQS-1600 Series)

Model	IQS-1613/1623/1643	IQS-1613-PL/1623-PL/1643-PL	IQS-1613W/1623W/1643W
Number of detectors	1/2/4	1/2/4	1/2/4
Detector type	InGaAs	InGaAs	InGaAs
Detector size (mm)	1	1	3
Wavelength range (nm)	800 to 1700	800 to 1700	800 to 1700
Power range [b, i] (dBm)	9 to –85	9 to –85	8 to –75
Uncertainty [c] (%)	±5 (0 dBm to –55 dBm)	±5 (0 dBm to –55 dBm)	±5 (0 dBm to –50 dBm)
Polarization dependent responsivity [d] (dB)	N/A	±0.005	N/A
Linearity [e] (dB)	±0.015 (0 dBm to –55 dBm)	±0.015 (0 dBm to –55 dBm)	±0.015 (0 dBm to –50 dBm)
Power resolution (dB)	0.001 (9 dBm to –40 dBm)	0.001 (9 dBm to –40 dBm)	0.001 (8 dBm to –40 dBm)
Wavelength resolution (nm)	0.01	0.01	0.01
Stabilization time (ms)			
automatic range	< 12 (9 dBm to –85 dBm)	< 12 (9 dBm to –85 dBm)	< 6 (8 dBm to –75 dBm)
automatic range	< 3 (9 dBm to –50 dBm)	< 3 (9 dBm to –50 dBm)	< 3 (8 dBm to –49 dBm)
fixed range (ranges 1 to 4)	< 1	< 1	< 1
Sampling rate (sample/s/channel)			
fast acquisition mode	up to 4096	up to 4096	up to 4096
continuous measurement mode	up to 256	up to 256	up to 256
Fiber type (µm)	5/125 to 62.5/125	5/125 to 62.5/125	5/125 to 62.5/125

GENERAL SPECIFICATIONS

	IQS-1613/1623/1643	IQS-1613W/1623W/1643W	IQS-1710/1720 and IQS-1712X/1722X	OHS-1713W-PL	OHS-1713-UH
External trigger input voltage (V)	0 to 5 (TTL)	0 to 5 (TTL)	N/A	N/A	N/A
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)	125 mm x 36 mm x 282 mm (4 15/16 in x 1 7/16 in x 11 1/8 in)	125 mm x 36 mm x 282 mm (4 15/16 in x 1 7/16 in x 11 1/8 in)	43 mm x 66 mm x 151 mm (1 11/16 in x 2 5/8 in x 5 15/16 in)	42 mm x 79 mm x 190 mm (1 5/8 in x 3 1/8 in x 7 1/2 in)
Weight	0.7 kg (1.5 lb)	0.7 kg (1.5 lb)	0.58 kg (1.3 lb)	0.32 kg (0.7 lb)	0.45 kg (1.0 lb)
Temperature					
Operating [a]	0 °C to 40 °C (32 °F to 104 °F)	0 °C to 40 °C (32 °F to 104 °F)	0 °C to 40 °C (32 °F to 104 °F)	0 °C to 40 °C (32 °F to 104 °F)	0 °C to 40 °C (32 °F to 104 °F)
Storage	–35 °C to 70 °C (–31 °F to 158 °F)	–35 °C to 70 °C (–31 °F to 158 °F)	–40 °C to 70 °C (–40 °F to 158 °F)	–40 °C to 70 °C (–40 °F to 158 °F)	–40 °C to 70 °C (–40 °F to 158 °F)
Analog output					
Bandwidth (Hz)	700 k; 700 k; 30 k; 30 k 150; 150; (typical) [b]	50 k, 7.5 k, 5 k 7 k, 1 k, 1 k (typical) [b]	2500 (typical)	N/A	N/A
Output voltage (V)	0 to 2.15 (typical)	0 to 2.15 (typical)	0 to 4 (typical)	N/A	N/A
Output impedance (Ω)	640	640	100 to 150	N/A	N/A
Number of ports	1/1/0	1/1/0	1/2/1	N/A	N/A
Relative humidity [c]	0 % to 80 % non-condensing	0 % to 80 % non-condensing	0 % to 80 % non-condensing	0 % to 80 % non-condensing	0 % to 80 % non-condensing

B SCPI Command Reference

This appendix presents detailed information on the commands and queries supplied with your IQS-1600 High Speed Power Meter.

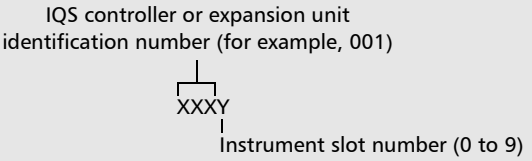
IMPORTANT

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 (except for IEEE 488.2 and platform commands):

LINStrument<LogicalInstrumentPos>:

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



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

Quick Reference Command Tree

Command						Parameter(s)	P.
ABORt[1..n]							126
FETCh[1..n]	[SCALar]	POWer	DC?				127
FORMat[1..n]	[DATA]					<FormatData>	128
	[DATA]?						129
INITiate[1..n]	[IMMediate]						130
	AUTO					<StartStop>,CONT|NCONt	131
	AUTO?						133
	CONTinuous					<ContinuousAcquisition>	134
	CONTinuous?						135
	EXTRema					<Extrema>	136
	EXTRema?						137
MEASure[1..n]	[SCALar]	POWer	MAXimum?				138
			MINimum?				139
MMEMory[1..n]	ACQuisition					<StartStop>,CONT|NCONt	140
	ACQuisition?						142
	ACQuisition	DURation				<TimeHour>,<TimeMinute>,<TimeSecond>	143
		DURation?					145
		DURation	MMAXimum			<TimeSecond>	146
			MMAXimum?				147
			MMAXimum	STATe		<StateDurMinMax>	148
				STATe?			149

Command						Parameter(s)	P.
	FNAMe					<FileName>	150
	FNAMe?						151
READ[1..n]	[SCALar]	POWer	DC?				152
SENSe[1..n]	AVERage	[STATe]				<AverageState>	154
		[STATe]?					155
		COUNt				<AverageCount>|MAXimum|MINimum|DEFault	156
		COUNt?				[MINimum|MAXimum|DEFault]	157
	CORRection	COLLect	ZERO				159
				ALL			160
				ASYNchronous			161
					ALL		162
		FACTor	[MAGNitude]			<CorrectionFactor[<wsp>W/W|DB]>|MAXimum|MINimum|DEFault	163
			[MAGNitude]?			[MINimum|MAXimum|DEFault]	165
		OFFSet	[MAGNitude]			<CorrectionOffset[<wsp>W/W|DB]>|MAXimum|MINimum|DEFault	167
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Product-Specific Commands—Description

:ABORt[1..n]	
Description	This command is used to stop the acquisition currently in progress.
Syntax	:ABORt[1..n]
Parameter(s)	None
Example(s)	INIT:CONT ON ABOR
See Also	INITiate:AUTO INITiate:AUTO? INITiate:CONTinuous INITiate:CONTinuous? INITiate:EXTRema INITiate:EXTRema? INITiate:IMMediate 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)	INIT:IMM 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][:IMMediate]

Description	This command stores one value in the buffer for all channels.
Syntax	:INITiate[1..n][:IMMediate]
Parameter(s)	None
Example(s)	INIT:IMM FETC1:POW:DC? or INIT FETC1:POW:DC?
See Also	FETCh[:SCAL]:POWer:DC? READ[:SCAL]:POWer:DC? ABORt INITiate:AUTO INITiate:CONTinuous INITiate:EXTRema MMEMory:ACQuisition

: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. To start an acquisition in non-continuous mode, no channel must be set to auto scale.

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
SENS:POW:RANG:HIGH 1
SENS2:POW:RANG:HIGH 1
SENS3:POW:RANG:HIGH 1
SENS4:POW:RANG:HIGH 1
INIT:AUTO 1, NCON
```

See Also

ABORt
INITiate:AUTO?
INITiate:CONTinuous
INITiate:EXTRema
INITiate:IMMediate
MMEMory:ACQuisition
TRACe:POINt
SENSe:POWer:DC:RANGe:HIGH

: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:CONTinuous INITiate:CONTinuous? INITiate:EXTRema INITiate:EXTRema? MMEMory:ACQuisition MMEMory:ACQuisition? TRACe:POINt

:INITiate[1..n]:CONTinuous

Description	Sets continuous acquisition mode and starts or stops the acquisition.
Syntax	:INITiate[1..n]:CONTinuous<wsp><Continuous Acquisition>
Parameter(s)	*ContinuousAcquisition:* The program data syntax for <ContinuousAcquisition> is defined as a <Boolean Program Data> element. The <ContinuousAcquisition> 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 continuous acquisition status: 0 or OFF - Stops continuous acquisition. 1 or ON - Starts continuous acquisition.
Example(s)	INIT:CONT ON INIT:CONT OFF
See Also	ABORt INITiate:AUTO INITiate:AUTO? INITiate:CONTinuous? INITiate:EXTRema INITiate:EXTRema? MMEMory:ACQuisition MMEMory:ACQuisition? TRACe:POINt

:INITiate[1..n]:CONTinuous?

Description	This query returns a value indicating if a continuous acquisition is in progress.
Syntax	:INITiate[1..n]:CONTinuous?
Parameter(s)	None
Response Syntax	<ContinuousAcqState>
Response(s)	*ContinuousAcqState:* The response data syntax for <ContinuousAcqState> is defined as a <NR1 NUMERIC RESPONSE DATA> element. This parameter allows to set the state of continuous acquisition. 0 - Continuous acquisition is stopped. 1 - Continuous acquisition is running.
Example(s)	INIT:CONT?
See Also	ABORt INITiate:AUTO INITiate:AUTO? INITiate:CONTinuous 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.
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:CONTinuous INITiate:CONTinuous? 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:CONTinuous INITiate:CONTinuous? 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 SENS:POW[:DC]:UNIT? 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 SENS:POW[:DC]:UNIT? 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
SENS:POW:RANG:HIGH 1
SENS2:POW:RANG:HIGH 1
SENS3:POW:RANG:HIGH 1
SENS4:POW:RANG:HIGH 1
MMEM:ACQ 1, NCON
MMEM:ACQ 0, NCON

See Also

MMEMory:ACQuisition?
MMEMory:ACQuisition:DURation
MMEMory:ACQuisition:DURation?
ABORt
INITiate:AUTO?
INITiate:CONTinuous
INITiate:EXTRema
INITiate:IMMediate
SENSe:POWer:DC:RANGe:HIGH

: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:CONTinuous INITiate:EXTRema INITiate:IMMediate SENSe:POWer:DC:RANGe:HIGH

: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>

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

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:CONTinuous
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:CONTinuous 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:MMAXimum<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:STATe MMEMory:ACQuisition:DURation MMEMory:ACQuisition INITiate:AUTO INITiate:CONTinuous INITiate:EXTRema INITiate:IMMediate

: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:MMAXimum: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:STATe?
MMEMory:ACQuisition:DURation
MMEMory:ACQuisition
INITiate:AUTO
INITiate:CONTinuous
INITiate:EXTRema
INITiate:IMMediate

: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:CONTinuous 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	This query performs an "initiate and fetch" on the specified channel. 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

INITiate:IMMediate
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
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.
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 synchronous 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 SENSe:CORRection:COLLect:ZERO:ASYNchronous SENSe:CORRection:COLLect:ZERO:ASYNchronous:ALL

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

Description	This command performs an synchronous 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 SENSe:CORRection:COLLect:ZERO:ASYNchronous SENSe:CORRection:COLLect:ZERO:ASYNchronous:ALL

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

Description	This command performs an asynchronous offset nulling on the specified channel.
Syntax	:SENSe[1..n]:CORRection:COLLect:ZERO:ASYNchronous
Parameter(s)	None
Example(s)	SENS1:CORR:COLL:ZERO:ASYN
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 SENSe:CORRection:COLLect:ZERO:ALL SENSe:CORRection:COLLect:ZERO:ASYNchronous:ALL

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

Description	This command performs an asynchronous offset nulling measurement on all channels.
Syntax	:SENSe[1..n]:CORRection:COLLect:ZERO:ASYNchronous:ALL
Parameter(s)	None
Example(s)	SENS:CORR:COLL:ZERO:ASYN: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 SENSe:CORRection:COLLect:ZERO:ALL SENSe:CORRection:COLLect:ZERO:ASYNchronous

: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]>|MAXimum|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:HIGH SENSe:POWer:[DC]:RANGe:LOWer 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:HIGH SENSe:POWer:[DC]:RANGe:LOWer SENSe:POWer:[DC]:RANGe:SCALe? SENSe:POWer:[DC]:RANGe:SCALe:LIST?

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

Description	This command sets the power measurement range to manual high for the specified channel.
Syntax	:SENSe[1..n]:POWer[:DC]:RANGe:HIGH<wsp><HighRange>
Parameter(s)	*HighRange:* The program data syntax for <HighRange> is defined as a <DECIMAL NUMERIC PROGRAM DATA> element. The <numeric_value > parameter can be 1, 2, 3, or 4. It corresponds to manual HR1 to HR4.
Example(s)	SENS:POW:RANG:HIGH 3
See Also	SENSe:POWer:[DC]:RANGe:AUTO SENSe:POWer:[DC]:RANGe:AUTO? SENSe:POWer:[DC]:RANGe:LOWer SENSe:POWer:[DC]:RANGe:SCALe? SENSe:POWer:[DC]:RANGe:SCALe:LIST?

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

Description	This command sets the power measurement range to manual low for the currently specified channel.
Syntax	:SENSe[1..n]:POWer[:DC]:RANGe:LOWer<wsp><LowRange>
Parameter(s)	*LowRange:* The program data syntax for <LowRange> is defined as a <DECIMAL NUMERIC PROGRAM DATA> element. The <numeric_value > parameter can be 1, 2, 3, 4, 5 or 6. It corresponds to manual LR1 to LR6.
Example(s)	SENS:POW:RANG:LOW 4
See Also	SENSe:POWer:[DC]:RANGe:AUTO SENSe:POWer:[DC]:RANGe:AUTO? SENSe:POWer:[DC]:RANGe:HIGH SENSe:POWer:[DC]:RANGe:SCALe? 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?[<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	<Range>

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

Response(s)	*Range:* The response data syntax for <Range> is defined as a <CHARACTER RESPONSE DATA> element. Current power range, where: Auto -Automatic range HR1 to HR4 -High range LR1 to LR6 -Low range If a token is specified, the value will be MIN, MAX, or DEF.
Example(s)	SENS:POW:RANG:SCAL?
See Also	SENSe:POWer:[DC]:RANGe:AUTO SENSe:POWer:[DC]:RANGe:AUTO? SENSe:POWer:[DC]:RANGe:HIGH SENSe:POWer:[DC]:RANGe:LOWer 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: LR1, 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:HIGH SENSe:POWer:[DC]:RANGe:LOWer 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[:DC]:UNIT

Description	This command changes the absolute measurement display unit: dBm or W for the specified channel.
Syntax	:SENSe[1..n]:POWer[:DC]:UNIT<wsp>DBM|W
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: DBM|W. Power unit in dBm or Watt, where: DBM - sets the power display to dBm W | WATT - sets the power display to Watt (pW,nW,uW,Mw…)
Example(s)	SENS:POW:UNIT W
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]:UNIT? UNIT:POWer UNIT:POWer?

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

Description	This query returns the current absolute power measurement display unit for the specified channel.
Syntax	:SENSe[1..n]:POWer[:DC]:UNIT?
Parameter(s)	None
Response Syntax	<Unit>
Response(s)	*Unit:* The response data syntax for <Unit> is defined as a <CHARACTER RESPONSE DATA> element. Current power unit, either DBM or WATT.
Example(s)	SENS:POW:UNIT?
See Also	SENSe:POWer[:DC]:UNIT UNIT:POWer UNIT:POWer?

: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><Wavelength>|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 maximum number of points that can be acquired depends on the number of channels, since the physical memory is equally divided according to the number of channels.

On a 4-channel powermeter, the maximum is 16383 points.
On a 2-channel powermeter, the maximum is 32767 points.
On a 1-channel powermeter, the maximum is 65534 points.
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

:TRIGger[1..n]:POSition

Description

This command sets the position of the trigger. The percentage (in 5% steps from 5% to 50%) applies to Single acquisitions file mode (MMEM:ACQ 1,NCON) and to programmed acquisitions (INIT:AUTO 1,NCON).

For a file acquisition, it is the percentage of the total duration (e.g., 50% of 10 seconds equals 5 sec. before the trigger and 5 sec. after the trigger).
For a programmed acquisition, it is the percentage of the points (e.g., 25% of 1000 points equals 250 points before the trigger and 750 points after the trigger).

Syntax

:TRIGger[1..n]:POSition<wsp><TriggerPosition>

Parameter(s)

TriggerPosition:

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

The <numeric value> represents the trigger position and can be:
0 - 0%
5 - 5%
10 -10%
…

:TRIGger[1..n]:POSition	
	45 - 45% 50 - 50%
Example(s)	TRIG:POS 20
See Also	TRIGger:POSition? TRIGger:POSition:CATalog? TRIGger[:SEQuence]:LEVel TRIGger[:SEQuence]:STATe TRIGger[:SEQuence]:SOURce TRIGger[:SEQuence]:SLOPe

:TRIGger[1..n]:POSition?

Description	This query returns a value indicating the position of the trigger. This value determines the percentage of points that will be acquired in Single acquisition mode before the trigger is met.
Syntax	:TRIGger[1..n]:POSition?
Parameter(s)	None
Response Syntax	<TriggerPosition>
Response(s)	*TriggerPosition:* The response data syntax for <TriggerPosition> is defined as a <NR1 NUMERIC RESPONSE DATA> element. This query returns the percentage of points before the trigger.
Example(s)	TRIG:POS?
See Also	TRIGger:POSition TRIGger:POSition:CATalog? TRIGger[:SEQuence]:LEVel TRIGger[:SEQuence]:STATe TRIGger[:SEQuence]:SOURce TRIGger[:SEQuence]:SLOPe

:TRIGger[1..n]:POSition:CATalog?

Description	This query returns a list of available values for the trigger position. These values determine the percentage of points that will be acquired in Single acquisition mode before the trigger is met.
Syntax	:TRIGger[1..n]:POSition:CATalog?
Parameter(s)	None
Response Syntax	<TriggerList>
Response(s)	*TriggerList:* The response data syntax for <TriggerList> is defined as a <DEFINITE LENGTH ARBITRARY BLOCK RESPONSE DATA> element. The response corresponds to the list of available trigger positions.
Example(s)	TRIG:POS:CAT?
See Also	TRIGger[:SEQuence]:LEVel TRIGger:POSition TRIGger[:SEQuence]:STATe TRIGger[:SEQuence]:SOURce TRIGger[:SEQuence]:SLOPe

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

Description	This command sets the power level of the trigger condition to be met before starting an acquisition in W or W/W depending on the selected unit.
Syntax	:TRIGger[1..n][:SEQuence]:LEVel<wsp><TriggerPowerLevel>
Parameter(s)	*TriggerPowerLevel:* The program data syntax for <TriggerPowerLevel> is defined as a <DECIMAL NUMERIC PROGRAM DATA> element. Sets the power level of trigger.
Example(s)	TRIG:SEQ:LEV 1E-6
See Also	TRIGger[:SEQuence]:LEVel? TRIGger:POSition TRIGger:POSition:CATalog? TRIGger[:SEQuence]:STATe TRIGger[:SEQuence]:SOURce TRIGger[:SEQuence]:SLOPe

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

Description	This query returns the power level of the trigger condition to be met before starting an acquisition
Syntax	:TRIGger[1..n][:SEQuence]:LEVel?
Parameter(s)	None
Response Syntax	<TriggerPowerLevel>
Response(s)	*TriggerPowerLevel:* The response data syntax for <TriggerPowerLevel> is defined as a <NR3 NUMERIC RESPONSE DATA> element. This query returns the trigger power level in W or W/W depending on the selected unit.
Example(s)	TRIG:SEQ:LEV?
See Also	TRIGger[:SEQuence]:LEVel TRIGger:POSition TRIGger:POSition:CATalog? TRIGger[:SEQuence]:STATe TRIGger[:SEQuence]:SOURce TRIGger[:SEQuence]:SLOPe

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

Description	This command sets the edge status of the trigger condition. It defines whether acquisitions will be triggered on positive or negative transitions.
Syntax	:TRIGger[1..n][:SEQuence]:SLOPe<wsp>NEGative|POSitive
Parameter(s)	*Slope:* 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: NEGative|POSitive. This parameter sets the trigger edge. NEGative - represents a falling edge trigger. POSitive - represents a rising edge trigger.
Example(s)	TRIG:SEQ:SLOP POS
See Also	TRIGger{:SEQuence]:SLOPe? TRIGger[:SEQuence]:LEVel TRIGger:POSition TRIGger:POSition:CATalog? TRIGger[:SEQuence]:STATe TRIGger[:SEQuence]:SOURce

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

Description	This query returns the rising or falling edge status of the trigger condition. It defines whether positive or negative transitions will trigger the acquisition.
Syntax	:TRIGger[1..n][:SEQuence]:SLOPe?
Parameter(s)	None
Response Syntax	<Slope>
Response(s)	*Slope:* The response data syntax for <Slope> is defined as a <CHARACTER RESPONSE DATA> element. The edge used for trigger acquisition, where: 0 or NEGative -Falling edge trigger. 1 or POSitive -Rising edge trigger.
Example(s)	TRIG:SEQ:SLOP?
See Also	TRIGger{:SEQuence]:SLOPe TRIGger[:SEQuence]:LEVel TRIGger:POSition TRIGger:POSition:CATalog? TRIGger[:SEQuence]:STATe TRIGger[:SEQuence]:SOURce

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

Description

This command sets the trigger condition's source.

Syntax

:TRIGger[1..n][:SEQuence]:SOURce<wsp>EXTernal|INTernal1|INTernal2|INTernal3|INTernal4|INTernal5|INTernal6

Parameter(s)

Source:

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: EXTernal|INTernal1|INTernal2|INTernal3|INTernal4|INTernal5|INTernal6.

This parameter represents the trigger source.
EXTernal - external trigger
INTernal1 - channel 1
INTernal2 - channel 2 (IQS-1620 or IQS-1640)
INTernal3 -channel 3 (IQS-1640) or virtual channel 1(IQS-1620)

INTernal4 - channel 4 (IQS-1640)
INTernal5 - virtual channel 1(IQS-1640)
INTernal6 - virtual channel 2 (IQS-1640)

Example(s)

TRIG:SEQ:SOUR EXT

See Also

TRIGger[:SEQuence]:SOURce?
TRIGger[:SEQuence]:LEVel?
TRIGger:POSition
TRIGger:POSition:CATalog?
TRIGger[:SEQuence]:STATe
TRIGger[:SEQuence]:SLOPe

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

Description	This query returns the trigger condition's source.
Syntax	:TRIGger[1..n][:SEQuence]:SOURce?
Parameter(s)	None
Response Syntax	<TriggerSource>
Response(s)	*TriggerSource:* The response data syntax for <TriggerSource> is defined as a <CHARACTER RESPONSE DATA> element. The current trigger source, where: EXTernal - is the external trigger INTernal1 - is channel 1 INTernal2 - is channel 2 (IQS-1620 or IQS-1640) INTernal3 - is channel 3 (IQS-1640) or virtual channel 1(IQS-1620) INTernal4 - is channel 4 (IQS-1640) INTernal5 - is virtual channel 1 (IQS-1640) INTernal6 - is virtual channel 2 (IQS-1640)
Example(s)	TRIG:SEQ:SOUR?
See Also	TRIGger[:SEQuence]:SOURce TRIGger[:SEQuence]:LEVel? TRIGger:POSition TRIGger:POSition:CATalog? TRIGger[:SEQuence]:STATe TRIGger[:SEQuence]:SLOPe

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

Description	This command sets the state of the trigger condition.
Syntax	:TRIGger[1..n][:SEQuence]:STATe<wsp><TriggerState>
Parameter(s)	*TriggerState:* The program data syntax for <TriggerState> is defined as a <Boolean Program Data> element. The <TriggerState> special forms ON and OFF are accepted on input for increased readability. ON corresponds to 1 and OFF corresponds to 0. This parameter sets the trigger state. 0 - Trigger condition deactivated 1 - Trigger condition activated
Example(s)	TRIG:SEQ:STAT 0
See Also	TRIGger[:SEQuence]:STATe? TRIGger[:SEQuence]:LEVel TRIGger:POSition TRIGger:POSition:CATalog? TRIGger[:SEQuence]:SOURce TRIGger[:SEQuence]:SLOPe

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

Description	This query returns the status of the trigger condition.
Syntax	:TRIGger[1..n][:SEQuence]:STATe?
Parameter(s)	None
Response Syntax	<TriggerState>
Response(s)	*TriggerState:* The response data syntax for <TriggerState> is defined as a <NR1 NUMERIC RESPONSE DATA> element. Current trigger condition status, where: 0 - The trigger is inactive. 1 - The trigger is active.
Example(s)	TRIG:SEQ:STAT?
See Also	TRIGger[:SEQuence]:STATe TRIGger[:SEQuence]:LEVel TRIGger:POSition TRIGger:POSition:CATalog? TRIGger[:SEQuence]:SOURce TRIGger[:SEQuence]:SLOPe

: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? SENSe:POWer[:DC]:UNIT SENSe:POWer[:DC]:UNIT?

: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 SENSe:POWer[:DC]:UNIT SENSe:POWer[:DC]:UNIT?

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Printed in Canada (2008-03)

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