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High-Speed Power Meter

PM-1600

MAN-156-I .2ACE



Instruction Manual

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High-Speed Power Meter

PM-1600



If the equipment described herein bears the CE symbol, the said equipment complies with the applicable European Union Directive and Standards mentioned in the Declaration of Conformity.

Instruction Manual

P/N: MAN-156-I .2ACE
November 2001

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Certification Information

F.C.C. Information

Electronic test equipment is exempt from Part 15 compliance (FCC) in the United States, but EXFO makes reasonable efforts to ensure this compliance.

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 been tested and found to comply with the limits for a Class A digital device. Please refer to the Declaration of Conformity.

CSA Information to User

This unit received CSA certification under the model name “GO”. The CSA Certificate Number is 162451. The “C-US” indicator adjacent to the CSA Mark signifies that the product has been evaluated to the applicable ANSI/UL and CSA Standards, for use in the U.S. and Canada.

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Independent Laboratory Testing

This unit has undergone extensive testing according to the European Union Directive and Standards. All pre-qualification tests were performed internally, at EXFO, while all final tests were performed externally, at an independent, accredited laboratory. This guarantees the unerring objectivity and authoritative compliance of all test results.

➤ 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.

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High-Speed Power Meter vii

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1 Introducing the PM-1600 High-Speed Power Meter

The PM-1600 High-Speed Power meter provides all the performance you need to increase your testing efficiency. With its high sampling rate and fast stabilization time, the PM-1600 is ideal for system monitoring and high-density WDM component characterization and assembly.

The PM-1600 is available with one or two detectors. Each power channel (detector) is independently controlled (except for the acquisition frequency) and can achieve a sampling rate of up to 4096 Hz.

Power transitions of up to 95 dB will stabilize within 15 ms. Faster stabilization time will be achieved with reduced dynamic range. Stabilization within 1 ms is possible when the gain of the detector amplification stage is manually locked on a specific scale (“Manual Range”).

Power measurement acquisitions can be electrically synchronized with the external trigger input or optically synchronized by programming a power level threshold.

In addition to the standard, 1 mm InGaAs detector, the PM-1600 power meter series offers a new detector option, the PM-1600W wide-area detector. This power meter, equipped with a 3 mm diameter InGaAs detector, offers excellent repeatability for in-process testing of components before they are connectorized. Also, this large detector option improves the stabilization time of the module over the complete dynamic range.

Particularly user-friendly with its state-of-the-art technology display, the PM-1600 features absolute power (in watts or dBm) and relative power (dB or W/W) measurements, manual data storage, and programmed data acquisition. The PM-1600 is particularly suited for the most demanding laboratory, qualification, and manufacturing applications. It can be remotely controlled through a GPIB or RS-232 interface.

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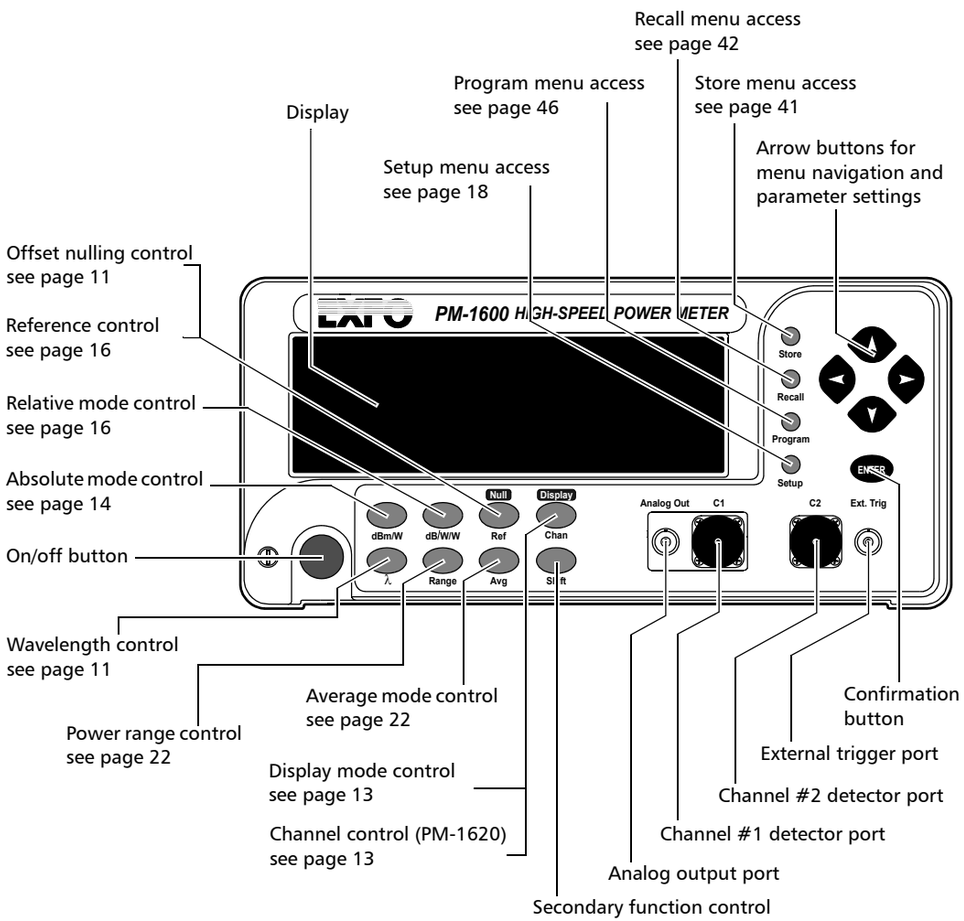
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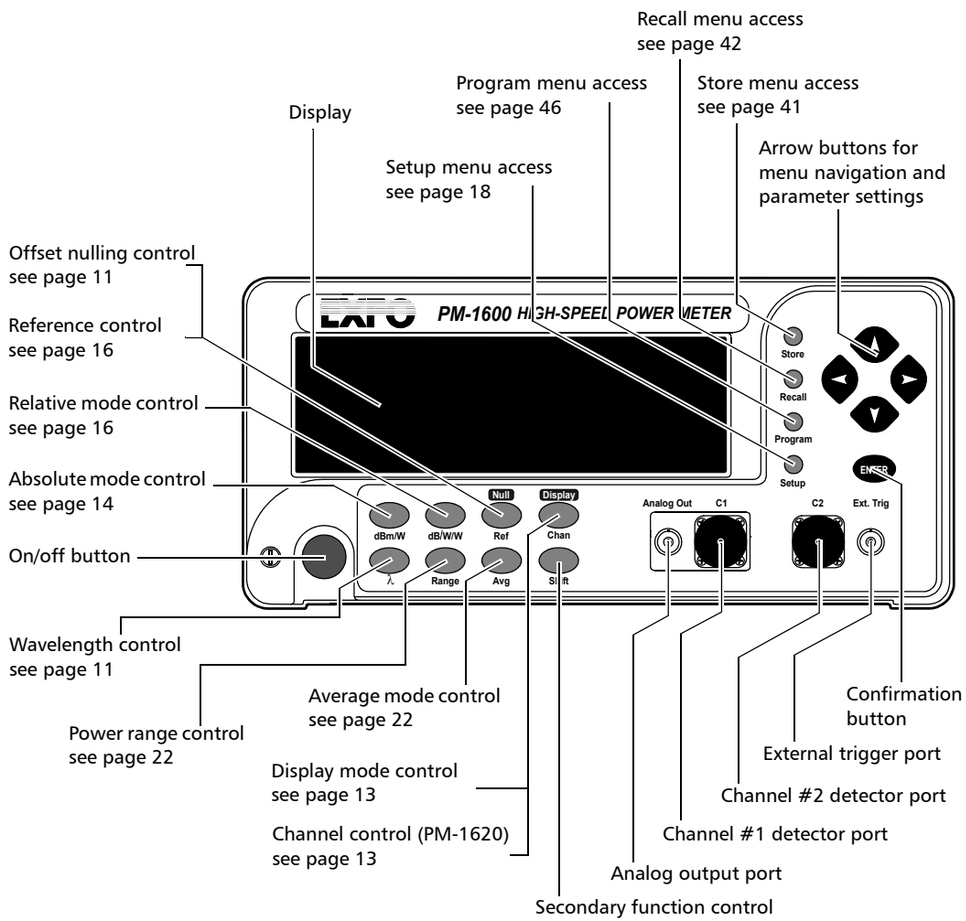
Front Panel



Note: *Your PM-1600 may slightly differ from the above illustration.*

Introducing the PM-1600 High-Speed Power Meter
Front Panel

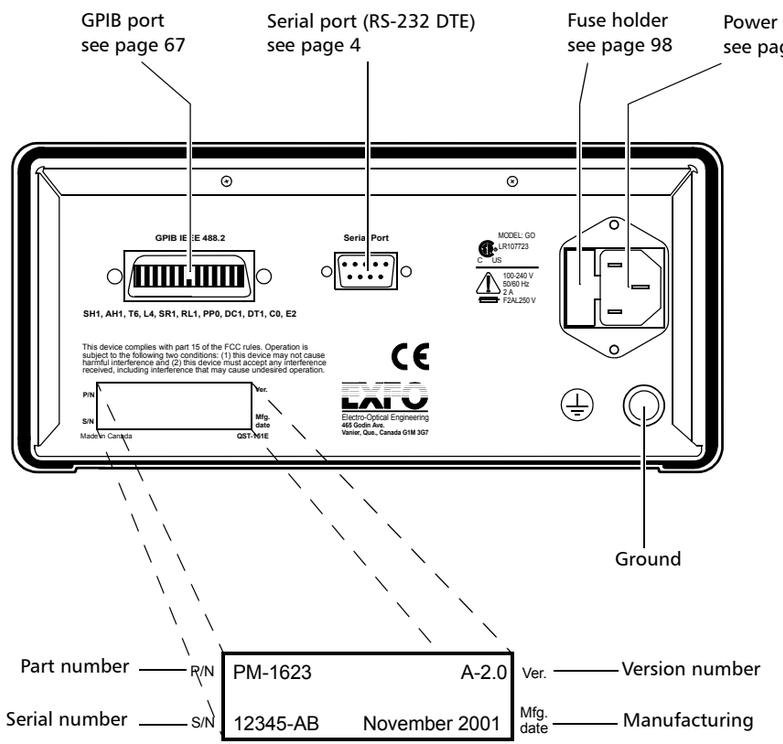
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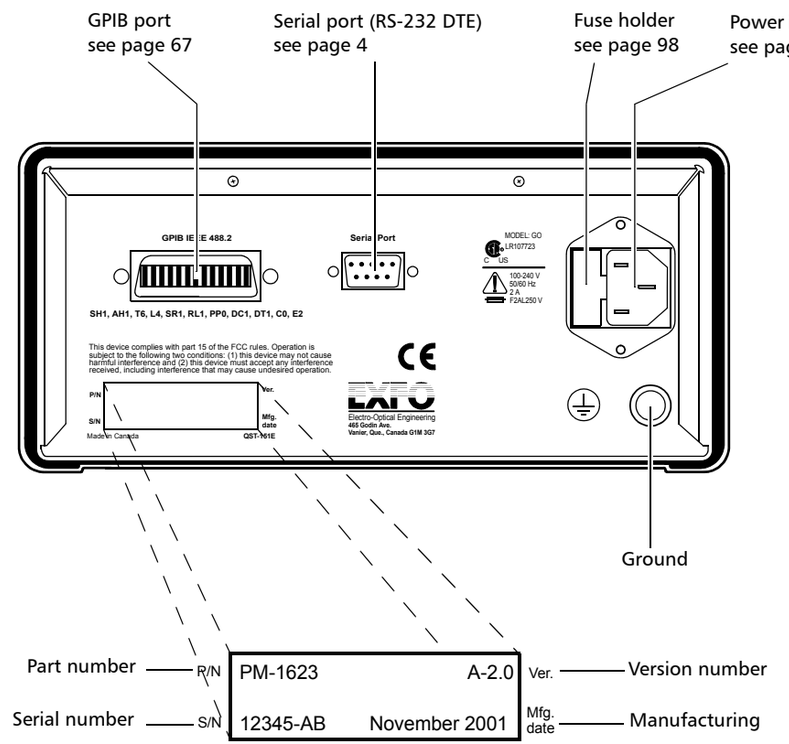
Back Panel



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Introducing the PM-1600 High-Speed Power Meter
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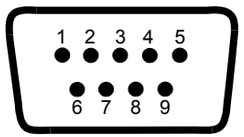


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RS-232 Connector Pinout

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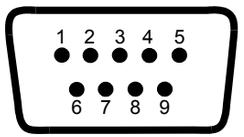


Pin	Description	Direction
2	Receive (Rx)	Input
3	Transmit (Tx)	Output
5	Signal ground (Gnd)	—

Introducing the PM-1600 High-Speed Power Meter
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2 Safety Information

Safety Conventions

You should understand the following conventions before using the product described in this manual:

WARNING

Refers to a potential *personal* hazard. It requires a procedure which, if not correctly followed, may result in bodily harm or injury. Do not proceed beyond a **WARNING** unless you understand and meet the required conditions.

CAUTION

Refers to a potential *product* hazard. It requires a procedure which, if not correctly followed, may result in component damage. Do not proceed beyond a **CAUTION** unless you understand and meet the required conditions.

IMPORTANT

Refers to any information regarding the operation of the product which you should not overlook.

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General Safety Information

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

- This unit is intended for indoor use only.
- Unit covers cannot be removed during operation.
- The unit must be positioned in a way not to block the ventilation holes located on each side of the unit.
- Installation of replacement parts or modification of the unit should be carried out by authorized personnel only.

Laser Safety Information

WARNING

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

WARNING

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

Safety Information
General Safety Information

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Electrical Safety Information

- Before powering on the unit, all grounding terminals, extension cords, and devices connected to it should be connected to a protective ground via a ground socket. Any interruption of the protective grounding is a potential shock hazard and may cause personal injury.
- Whenever the ground protection is impaired, the unit is not to be used and must be secured against any accidental or unintended operation.
- Only fuses with the required rated current and specified type (IEC, 250 V, 2 A, fast blow,5 mm x 20 mm (0.197 in x 0.787 in)) may be used for replacement. Do not use repaired fuses or short-circuited fuse holders.
- Any adjustments, maintenance, and repair of opened units under voltage should be avoided and carried out only by skilled personnel aware of the hazards involved. Do not attempt internal service or adjustment unless another person qualified in first aid is present. Do not replace any components while power cable is connected.
- Operation of any electrical instrument around flammable gases or fumes constitutes a major safety hazard.
- Capacitors inside the unit may be charged even if the unit has been disconnected from its electrical supply.

AC Requirements

The PM-1600 can operate from any single-phase AC power source between 100 V and 240 V (50 Hz/60 Hz). The maximum input current is 2 A.

Safety Information
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Power Cable

The PM-1600's power cable is its disconnecting device.

The PM-1600 uses an international safety standard three-wire power cable. This cable serves as a ground when connected to an appropriate AC power receptacle. The type of power cable supplied with each unit is determined according to the country of destination.

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

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

WARNING

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

To avoid serious injury, the following precautions must be observed before powering on the unit.

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

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3 Getting Started with Your High-Speed Power Meter

Turning the PM-1600 On and Off

IMPORTANT

Before turning the PM-1600 on, please read the *Safety Information* on page 5.

To turn the unit on or off, use the red button in the lower left corner of the front panel.

When you turn on the unit, it beeps twice and performs a self-test, while displaying startup information as well as the software version number. Before taking any measurements, it is recommended that you null the detector offsets (see *Nulling Electrical Offsets* on page 11).

When the unit is turned off, the following items remain in non-volatile memory:

- manually stored data
- reference values
- remote-control settings
- shortlisted wavelengths
- customized settings
- saved configurations (up to three setup configurations and up to three program configurations)

Note: *To ensure the power is completely turned off, disconnect the power cord.*

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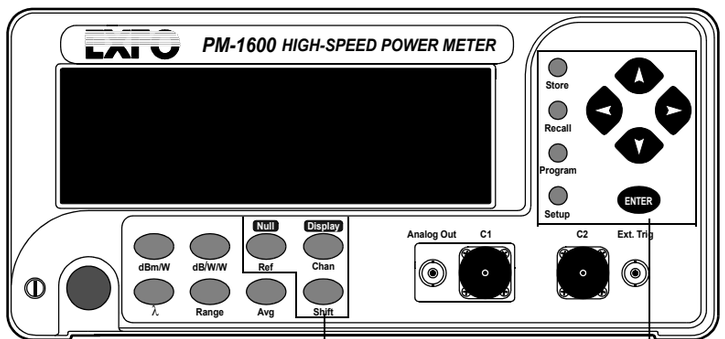
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Selecting a Menu or a Menu Option

The PM-1600 is equipped with a new type of multifunctional, graphical liquid crystal display (LCD) with increased brightness, readability, and resolution that significantly improves both menu navigation and power meter operation versatility.

For basic PM-1600 operation, simply press the control buttons at the bottom of the display.



To access a secondary function, press *Shift* (*SH* marker appears in the lower right corner of the display), then press the desired control button.

To select a menu, press the matching menu button. For more information, see *Storing and Recalling Power Measurements* on page 41 and *Customizing the PM-1600 Display* on page 85.

To select a menu option, use the up/down or left/right arrow keys until the desired option is highlighted, then confirm by pressing *ENTER*.

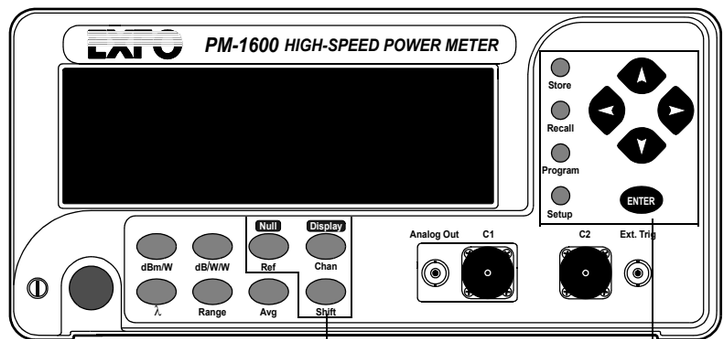
To exit a menu, use the up/down or left/right arrow keys until **Exit** is highlighted, then press *ENTER*. You can also press the button that gave access to the menu.

Getting Started with Your High-Speed Power Meter
Selecting a Menu or a Menu Option

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Note: *The PM-1600 will beep whenever the unit does not allow an operation.*

Note: *In this manual, the single-channel power meter is referred to as the PM-1610 and the dual-channel power meter as the PM-1620.*

Nulling Electrical Offsets

The *Offset Nulling* function provides a zero power measurement, thus eliminating the effects of electronic dark current. For best results and accuracy, ensure that offsets are nulled before each test session, each time the unit is turned on, or whenever environmental conditions change while the power meter is operating (temperature and humidity variations affect the performance of optical detectors).

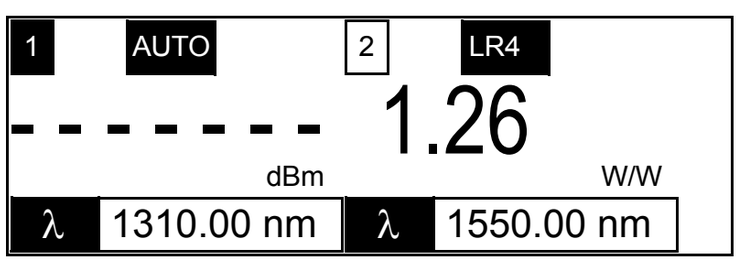
IMPORTANT

Light must not reach the detector when nulling offsets.

When the PM-1600 is turned on after a cold start, allow the unit to warm up for about 20 minutes (30 minutes for PM-1600W) until the electronics stabilize and can meet announced optical specifications.

To perform a nulling,

1. Place the protective cap over the detector port on which a nulling has to be performed.



Getting Started with Your High-Speed Power Meter
Nulling Electrical Offsets

Note: *The PM-1600 will beep whenever the unit does not allow an operation.*

Note: *In this manual, the single-channel power meter is referred to as the PM-1610 and the dual-channel power meter as the PM-1620.*

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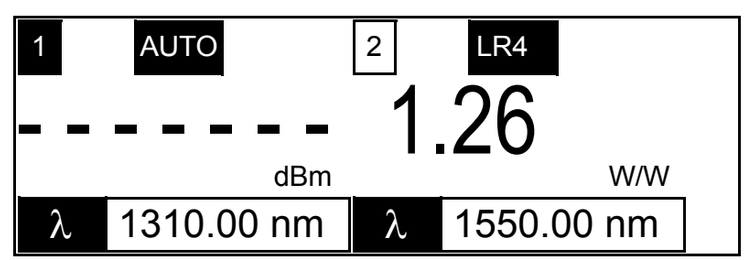
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When the PM-1600 is turned on after a cold start, allow the unit to warm up for about 20 minutes (30 minutes for PM-1600W) until the electronics stabilize and can meet announced optical specifications.

To perform a nulling,

1. Place the protective cap over the detector port on which a nulling has to be performed.



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2. If necessary, select the desired channel (in the case of a PM-1620) by pressing *Chan*. In the above figure, channel #1 is currently selected.
3. Press *Shift*, then *Null*. The offset nulling process takes approximately 10 seconds. Once done, the unit returns to the previously active operation state.

Note: *If you are trying to perform an offset nulling with a protective cap improperly tightened on the detector port, the message* Light detected *will be briefly displayed. If so, ensure the protective cap is properly tightened and restart the offset nulling.*

Note: *Offset nulling constants are retained until a new offset nulling is performed.*

Getting Started with Your High-Speed Power Meter
Nulling Electrical Offsets

2. If necessary, select the desired channel (in the case of a PM-1620) by pressing *Chan*. In the above figure, channel #1 is currently selected.
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Note: *Offset nulling constants are retained until a new offset nulling is performed.*

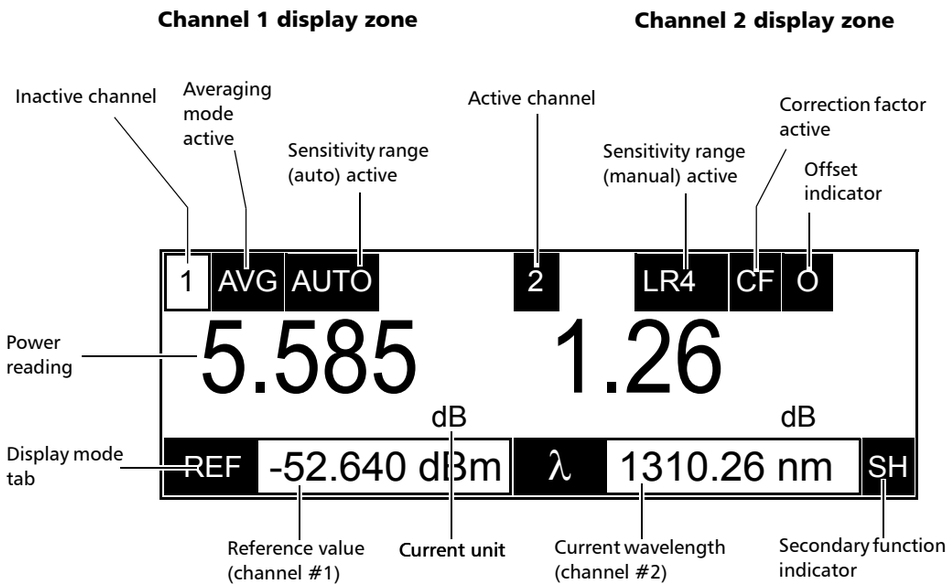
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4 Acquiring Power Measurements

Setting a Display Mode

A typical display in power measurement mode might look as follows.



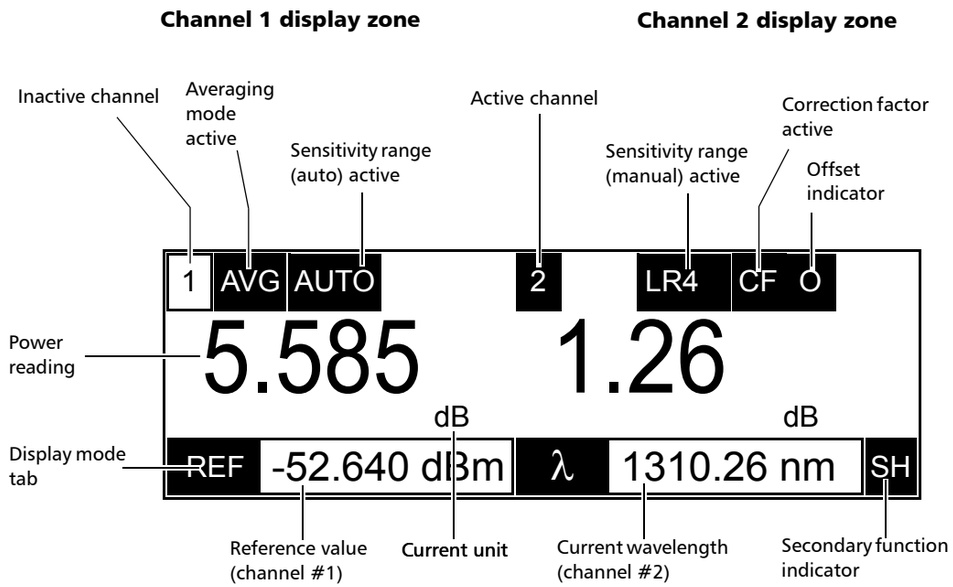
To set the display mode, i.e., the data type at the bottom of the display,

1. If necessary, select the desired channel (PM-1620) by pressing *Chan*. The current wavelength is displayed for the active channel. In the above figure, channel #2 is currently selected.
2. Press *Shift*, then *Display*. The current reference value is displayed for the active channel (in dBm or W units, depending on the currently selected measurement unit).

4 Acquiring Power Measurements

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A typical display in power measurement mode might look as follows.



To set the display mode, i.e., the data type at the bottom of the display,

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2. Press *Shift*, then *Display*. The current reference value is displayed for the active channel (in dBm or W units, depending on the currently selected measurement unit).

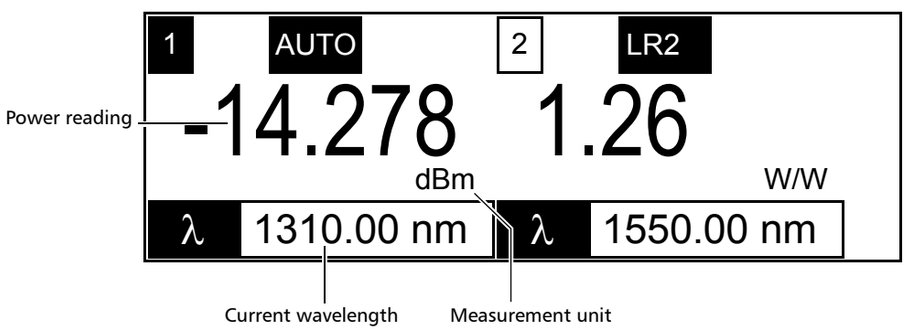
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3. Press *Shift* a second time, then *Display*. The current correction factor (**CF**) is displayed for the active channel (in dB or W/W units, depending on the currently selected measurement unit).
4. Press *Shift* again, then *Display*. The Offset value (**O**) appears for the active channel (in dB or W/W units, depending on the currently selected measurement unit).

Note: *On a PM-1610 single-channel power meter, two different data types simultaneously appear at the bottom of the display. To select the desired display mode, just press* Display.

Measuring Absolute Power

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



To display absolute power,

1. If necessary, select the desired channel (PM-1620). In the above figure, channel #1 is currently selected.

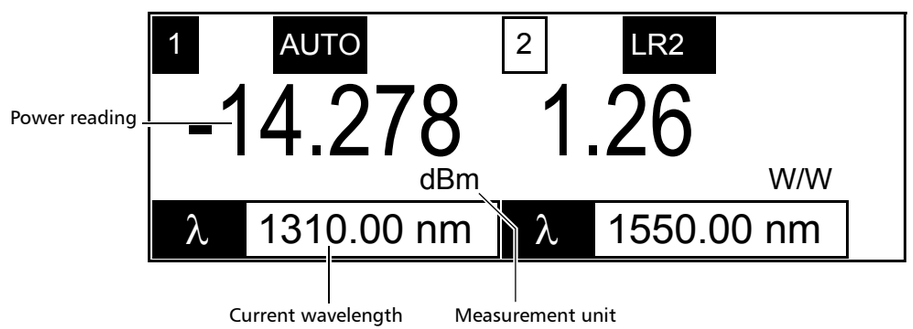
Acquiring Power Measurements
Measuring Absolute Power

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2. If necessary, press λ to select the appropriate wavelength from the shortlist (see the section on viewing wavelength list on page 25).

Note: *The wavelength may take some time to change on the display due to a low refresh rate. To set the refresh rate, see* Setting Refresh Rate *on page 34.*

3. Press *dBm/W* to display the absolute power of the signal received at the detector port. The *dBm/W* button is also used to toggle between dBm and W measurement units.

An absolute power measurement in negative W units indicates that electrical offsets were improperly nulled. If so, repeat the offset nulling (see *Nulling Electrical Offsets* on page 11).

Note: *When - - - - - - - is displayed, the power level detected is below the lower limit of the selected measurement range. When + + + + + + + is displayed, the power level detected is above the upper limit of the selected measurement range. See* Setting Measurement Range *on page 22. When ! ! ! ! ! ! ! is displayed, the displayed data is in transition (range was changed in power measurement mode, with* Autorange *selected). When * * * * * * * is displayed, a programmed acquisition is running with a high sampling rate.*

Acquiring Power Measurements
Measuring Absolute Power

2. If necessary, press λ to select the appropriate wavelength from the shortlist (see the section on viewing wavelength list on page 25).

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High-Speed Power Meter 15

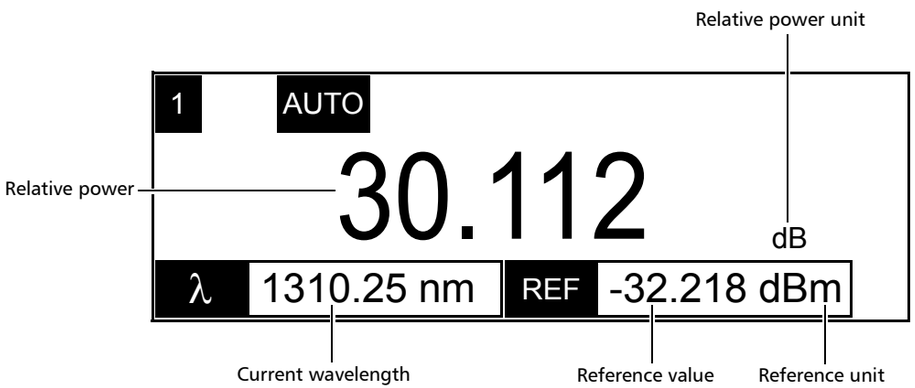
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Measuring Relative Power

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

Relative power is displayed in dB when the reference value is measured in dBm. If this is the case, the value will either be positive or negative since 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 units. The relative power will then represent the *deviation ratio* from the reference.



In the example on the previous page, the measured power is 30.112 dB higher than the reference value of –32.218 dBm. The absolute power is –2.106 dBm.

To display relative power,

1. If necessary, select the desired channel (PM-1620).
2. If necessary, press λ to select the appropriate wavelength from the shortlist (see the section on viewing wavelength list on page 25).

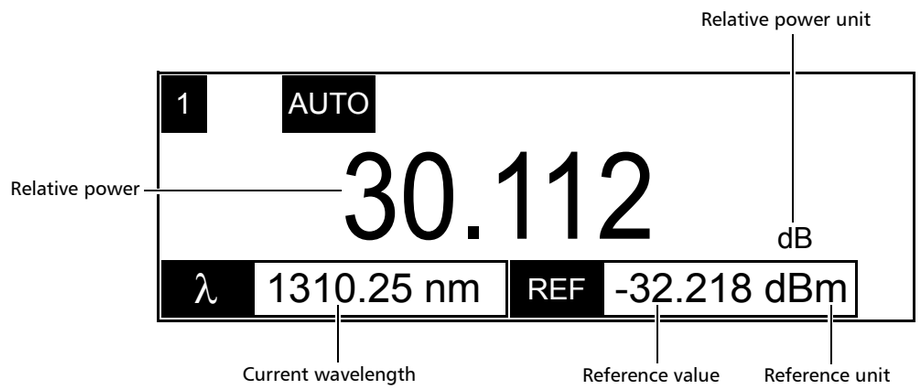
Acquiring Power Measurements
Measuring Relative Power

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3. Press *dB/W/W* until the display switches to relative mode in dB (where the value displayed is equal to the absolute power minus the previously stored reference power) or in W/W (where the value displayed is the deviation ratio from the reference). Pressing *dB/W/W* again switches between dB and W/W measurement units for the relative power and reference value.

When you access relative mode, the PM-1600 displays the last reference value entered at the current wavelength (to view the reference value, set the appropriate channel to reference display mode).

However, to display meaningful relative power readings, it is important to have an appropriate reference value, using appropriate adapters and test jumpers, and connecting the optical circuit being referenced to a detector port.

Note: *If you set a reference while a correction factor (CF) is active, the reference measurement will take the correction factor into account.*

To set a reference value, two choices are available.

Entering the Current Power as the Reference Value

To enter the current power,

1. If necessary, select the desired channel (PM-1620).
2. If necessary, press λ to select the appropriate wavelength.
3. Press *dBm/W* to select the desired measurement unit.
4. Press *Ref to use the* current power value as the new reference.

Note: *Pressing* Ref *switches the display to relative mode.*

Acquiring Power Measurements
Measuring Relative Power

3. Press *dB/W/W* until the display switches to relative mode in dB (where the value displayed is equal to the absolute power minus the previously stored reference power) or in W/W (where the value displayed is the deviation ratio from the reference). Pressing *dB/W/W* again switches between dB and W/W measurement units for the relative power and reference value.

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Entering a Specific Reference Value

To enter a specific value,

1. If necessary, press λ to select the appropriate wavelength.
2. Press *dBm/W* to select the desired measurement unit.
3. Press *Setup* to access the *Setup* menu.

System Setup
Wavelength List & Corr. Factor
Channel 1 Setup
Channel 2 Setup
Exit

4. Use the up/down arrow keys to select **Channel 1 Setup** or **Channel 2 Setup**, then press *ENTER*. The current channel settings are displayed.
5. Use the up/down arrow keys to select **Reference**.

Resolution	4 ▶ 3.0103 dB	
Averaging	002 (Active)	
Reference	–68.975 dBm	Reset
Offset	100.000 dB	Reset
Exit Channel 1 Setup		

5a. To clear the current reference, use the left/right arrow keys to select **Reset**, then confirm by pressing *ENTER*.

Acquiring Power Measurements
Measuring Relative Power

Entering a Specific Reference Value

To enter a specific value,

1. If necessary, press λ to select the appropriate wavelength.
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5b. To modify the current reference, press *ENTER* to select the reference edit box, then use the left/right arrow keys to select the desired sign and digit, and the up/down arrow keys to increase or decrease the flashing value. Confirm by pressing *ENTER*. You can enter a reference value from –90.000 dBm to +90.000 dBm or from +001.0000 pW to +999.9999 kW.

Note: *You can toggle between dBm and W units while in the* Channel Setup *menu by pressing* dBm/W.

6. Exit the *Channel Setup* menu and then the *Setup* menu.

Measuring Corrected Power

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

When expressed in dB, the correction factor, which can be positive or negative, is applied to the measured power. When expressed in W/W, the correction factor is a deviation from the measured power. This feature provides additional flexibility and can be useful when compensating for known inaccuracies (power gains or losses) at specific wavelengths.

To use the corrected power display, see *Setting a Correction Factor* on page 30. When a correction factor is active, i.e., different from 0.000 dB or 1.0000 W/W, the *CF* marker appears at the top of the display for the matching channel.

Note: *Special care must be taken when setting a correction factor as it emulates a new calibration (the PM-1600's calibration is not affected and will be restored by setting the CF back to a null value).*

Acquiring Power Measurements
Measuring Corrected Power

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Setting an Offset Value

You can use the Offset function to take into account, in the power displayed, of 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 on a specific channel.

To enter an offset value,

1. If necessary, press λ to select the appropriate wavelength.
2. Press *dBm/W* to select the desired measurement unit.
3. Press *Setup* to access the *Setup* menu.

System Setup
Wavelength List & Corr. Factor
Channel 1 Setup
Channel 2 Setup
Exit

4. Use the up/down arrow keys to select **Channel 1 Setup** or **Channel 2 Setup**, then press *ENTER*. The current channel settings are displayed.

Acquiring Power Measurements
Measuring Corrected Power

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Wavelength List & Corr. Factor
Channel 1 Setup
Channel 2 Setup
Exit

4. Use the up/down arrow keys to select **Channel 1 Setup** or **Channel 2 Setup**, then press *ENTER*. The current channel settings are displayed.

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5. Use the up/down arrow keys to select **Offset**.

Resolution	4 ▶ 3.0103 dB	
Averaging	002 (Active)	
Reference	–68.975 dBm	Reset
Offset	–100.000 dB	Reset
Exit Channel 1 Setup		

5a. To clear the current offset, use the left/right arrow keys to select **Reset**, then confirm by pressing *ENTER*.

5b. To modify the current offset, press ENTER to select the offset edit box, then use the left/right arrow keys to select the desired sign and digit, and the up/down arrow keys to increase or decrease the flashing value. Confirm by pressing ENTER. You can enter an offset value from –90.000 dBm to +90.000 dBm or from +001.0000 pW to +999.9999 kW.

Note: *The Offset value will be displayed in dB or W/W units, depending on the currently selected measurement unit.*

Note: *You can toggle between dBm and W units while in the* Channel Setup *menu by pressing* dBm/W.

6. Exit the *Channel Setup* menu and then the *Setup* menu.

Acquiring Power Measurements
Measuring Corrected Power

5. Use the up/down arrow keys to select **Offset**.

Resolution	4 ▶ 3.0103 dB	
Averaging	002 (Active)	
Reference	–68.975 dBm	Reset
Offset	–100.000 dB	Reset
Exit Channel 1 Setup		

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High-Speed Power Meter 21

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Displaying Averaged Measurement

To display averaged power measurement,

1. If necessary, select the desired channel (PM-1620).
2. Press *Avg*.

When averaging is enabled, the *AVG* marker appears at the top of the display for the matching channel. The most recent measurement samples, of which the number is set in the **System Setup** menu (see *Choosing a Number of Measurements for Averaging* on page 36), are then used to compute an unweighted average.

Setting Measurement Range

The measurement range (or gain scale) applied to the power measurement 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 measurement range should be locked when the analog output (see *Using the Analog Output* on page 65) is used to avoid variations in voltage output due to scale changes. It is also necessary to use a manual range to achieve high-rate, programmed acquisitions (see *Programming Data Acquisitions* on page 45).

Two types of manual ranges are available:

- The *Low* range provides a lower dynamic range (typically 22 dB) per scale with better signal-to-noise ratio and resolution.
- The *High* range provides a higher dynamic range (typically 42 dB) per scale with an inferior signal-to-noise ratio. In the PM-1620 model, each channel is adjusted independently.

Acquiring Power Measurements
Displaying Averaged Measurement

Displaying Averaged Measurement

To display averaged power measurement,

1. If necessary, select the desired channel (PM-1620).
2. Press *Avg*.

When averaging is enabled, the *AVG* marker appears at the top of the display for the matching channel. The most recent measurement samples, of which the number is set in the **System Setup** menu (see *Choosing a Number of Measurements for Averaging* on page 36), are then used to compute an unweighted average.

Setting Measurement Range

The measurement range (or gain scale) applied to the power measurement 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.

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Two types of manual ranges are available:

- The *Low* range provides a lower dynamic range (typically 22 dB) per scale with better signal-to-noise ratio and resolution.
- The *High* range provides a higher dynamic range (typically 42 dB) per scale with an inferior signal-to-noise ratio. In the PM-1620 model, each channel is adjusted independently.

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To set the measurement range,

1. If necessary, select the desired channel (PM-1620).
2. Press *Range* until the required measurement range marker is shown at the top of the display for the matching channel. The table shown below displays the permitted manual ranges when the currently selected measurement unit is dB or dBm. The power range values displayed are typical at 1310 nm.

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)	—
–90.00 to –69.61 dBm (LR6)	—

a. InGaAs detector has a +9 dBm saturation limit.

Note: *Select a manual range in power measurement mode when the input signal has unstable or modulated variations. This prevents ! ! ! ! ! ! ! from being displayed upon constantly changing gain scales.*

Acquiring Power Measurements
Setting Measurement Range

To set the measurement range,

1. If necessary, select the desired channel (PM-1620).
2. Press *Range* until the required measurement range marker is shown at the top of the display for the matching channel. The table shown below displays the permitted manual ranges when the currently selected measurement unit is dB or dBm. The power range values displayed are typical at 1310 nm.

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)	—
–90.00 to –69.61 dBm (LR6)	—

a. InGaAs detector has a +9 dBm saturation limit.

Note: *Select a manual range in power measurement mode when the input signal has unstable or modulated variations. This prevents ! ! ! ! ! ! ! from being displayed upon constantly changing gain scales.*

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Viewing Statistics

Although it is not possible to retrieve acquisition results from the PM-1600 except when using remote control, this function provides you with statistical information on the last acquisition performed.

To view statistics,

1. Press *Program* to access the *Program* menu.
2. Use the up/down or left/right arrow keys to select **Statistics**.
3. Confirm by pressing *ENTER*. The last statistics available are displayed.

Min.	–37.2360 dBm	99.445 n W /W
Max.	–6.3334 dBm	189.98 n W /W
Mean	–9.290 dBm	136.50 n W /W
Stdev.	–10.649 dB	27.380 n W /W
Reject	10.00 %	0.00 %
Exit		

Note: Reject *indicates the percentage of values rejected during measurements. When* ! ! ! ! ! ! ! *is displayed, the displayed data is in transition. When* - - - - - - - *is displayed, the power level detected is below the lower limit of the selected measurement range. When* + + + + + + + *is displayed, the power level detected is above the upper limit of the selected measurement range.*

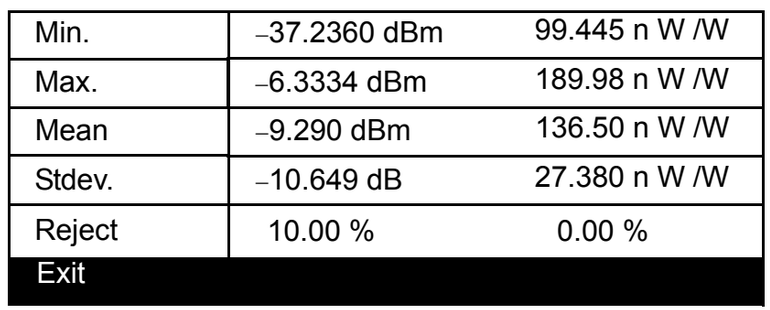
Acquiring Power Measurements
Viewing Statistics

Viewing Statistics

Although it is not possible to retrieve acquisition results from the PM-1600 except when using remote control, this function provides you with statistical information on the last acquisition performed.

To view statistics,

1. Press *Program* to access the *Program* menu.
2. Use the up/down or left/right arrow keys to select **Statistics**.
3. Confirm by pressing *ENTER*. The last statistics available are displayed.



Note: Reject *indicates the percentage of values rejected during measurements. When* ! ! ! ! ! ! ! *is displayed, the displayed data is in transition. When* - - - - - - - *is displayed, the power level detected is below the lower limit of the selected measurement range. When* + + + + + + + *is displayed, the power level detected is above the upper limit of the selected measurement range.*

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Managing the Wavelength List

To view the list,

1. Press *Setup* to access the *Setup* menu.

System Setup
Wavelength List & Corr. Factor
Channel 1 Setup
Channel 2 Setup
Exit

2. Use the up/down arrow keys to select **Wavelength List & Corr. Factor**, then press *ENTER*. The number of wavelengths in the list is displayed. If the maximum number of wavelengths (32) in the list is reached, *full* is displayed. If the list is empty, *empty* is displayed. A ✓ mark is displayed next to the active wavelength to indicate that it is on the wavelength list.

View λ List (31 λ)		Sort λ	Del All
λ	1537.98 nm √	Add λ	Del λ
CF Ch1	1.0000 W/W	Clear CF	
CF Ch2	+0.000 dB	Clear CF	
Exit			

Active wavelength

Acquiring Power Measurements
Managing the Wavelength List

Managing the Wavelength List

To view the list,

1. Press *Setup* to access the *Setup* menu.

System Setup
Wavelength List & Corr. Factor
Channel 1 Setup
Channel 2 Setup
Exit

2. Use the up/down arrow keys to select **Wavelength List & Corr. Factor**, then press *ENTER*. The number of wavelengths in the list is displayed. If the maximum number of wavelengths (32) in the list is reached, *full* is displayed. If the list is empty, *empty* is displayed. A ✓ mark is displayed next to the active wavelength to indicate that it is on the wavelength list.

View λ List (31 λ)		Sort λ	Del All
λ	1537.98 nm √	Add λ	Del λ
CF Ch1	1.0000 W/W	Clear CF	
CF Ch2	+0.000 dB	Clear CF	
Exit			

Active wavelength

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3. Press *ENTER*. The wavelength list is displayed with the correction factor (CF) set for each wavelength on the list (for both channels in a PM-1620).

Note: *By default, the six most commonly used wavelengths (850 nm, 980 nm, 1310 nm, 1480 nm, 1550 nm, and 1625 nm)are saved in the wavelength shortlist.*

λ #	λ (nm)	CF Ch1 (W/W)	CF Ch2 (dB)
1►	850.00	+1.0020	+0.000
2►	980.00	+1.0000	-0.100
3►	1310.00	+1.0000	+0.000
4►	1480.00	+1.0000	+0.000
5►	1550.00	+1.0000	+0.000
6►	1550.25	+1.0000	+0.000

Note: *The correction factor is displayed in W/W or dB depending on the currently selected measurement unit.*

4. Use the up/down arrow keys to scroll through the wavelength list.

5. To exit the wavelength list, press *ENTER*.

Note: *A wavelength list can be set for each different setup configuration (up to three setup configurations are possible). To save or recall a setup configuration, see* Saving a Setup Configuration *on page 37, or* Recalling a Setup Configuration *on page 38.*

Acquiring Power Measurements
Managing the Wavelength List

3. Press *ENTER*. The wavelength list is displayed with the correction factor (CF) set for each wavelength on the list (for both channels in a PM-1620).

Note: *By default, the six most commonly used wavelengths (850 nm, 980 nm, 1310 nm, 1480 nm, 1550 nm, and 1625 nm)are saved in the wavelength shortlist.*

λ #	λ (nm)	CF Ch1 (W/W)	CF Ch2 (dB)
1►	850.00	+1.0020	+0.000
2►	980.00	+1.0000	-0.100
3►	1310.00	+1.0000	+0.000
4►	1480.00	+1.0000	+0.000
5►	1550.00	+1.0000	+0.000
6►	1550.25	+1.0000	+0.000

Note: *The correction factor is displayed in W/W or dB depending on the currently selected measurement unit.*

4. Use the up/down arrow keys to scroll through the wavelength list.

5. To exit the wavelength list, press *ENTER*.

Note: *A wavelength list can be set for each different setup configuration (up to three setup configurations are possible). To save or recall a setup configuration, see* Saving a Setup Configuration *on page 37, or* Recalling a Setup Configuration *on page 38.*

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To sort the list by wavelengths,

1. Press *Setup* to access the *Setup* menu.
2. Use the up/down arrow keys to select **Wavelength List & Corr. Factor**.
3. Press *ENTER*.
4. Use the left/right arrow keys to select **Sort** λ.
5. Confirm by pressing *ENTER*. The wavelengths are sorted in ascending order.

Note: *If the list of wavelengths is full, delete a wavelength before adding a new one. See section on deleting a wavelength on page 29.*

To add a wavelength to the list,

1. Press *Setup* to access the *Setup* menu.
2. Use the up/down arrow keys to select **Wavelength List & Corr. Factor**.
3. Press *ENTER*.
4. Use the up/down arrow keys to select λ.
5. With λ highlighted, use the left/right arrow keys to select **Add** λ, then confirm by pressing *ENTER*. The current wavelength is displayed in the wavelength edit box.
6. Use the left/right arrow keys to select the flashing digit of the wavelength and the up/down keys to increase or decrease the flashing digit. You can enter a value with a 0.01 nm resolution.
7. Confirm the new wavelength by pressing *ENTER*.

Note: *Adding a wavelength to the list will not affect the current wavelength in measurement mode.*

Acquiring Power Measurements
Managing the Wavelength List

To sort the list by wavelengths,

1. Press *Setup* to access the *Setup* menu.
2. Use the up/down arrow keys to select **Wavelength List & Corr. Factor**.
3. Press *ENTER*.
4. Use the left/right arrow keys to select **Sort** λ.
5. Confirm by pressing *ENTER*. The wavelengths are sorted in ascending order.

Note: *If the list of wavelengths is full, delete a wavelength before adding a new one. See section on deleting a wavelength on page 29.*

To add a wavelength to the list,

1. Press *Setup* to access the *Setup* menu.
2. Use the up/down arrow keys to select **Wavelength List & Corr. Factor**.
3. Press *ENTER*.
4. Use the up/down arrow keys to select λ.
5. With λ highlighted, use the left/right arrow keys to select **Add** λ, then confirm by pressing *ENTER*. The current wavelength is displayed in the wavelength edit box.
6. Use the left/right arrow keys to select the flashing digit of the wavelength and the up/down keys to increase or decrease the flashing digit. You can enter a value with a 0.01 nm resolution.
7. Confirm the new wavelength by pressing *ENTER*.

Note: *Adding a wavelength to the list will not affect the current wavelength in measurement mode.*

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To modify a wavelength,

1. Follow steps 1 to 4 in section on viewing the wavelength list on page 25. Select the wavelength to be modified by pressing *ENTER*.
2. Use the up/down arrow keys to select λ.
3. Press *ENTER*.
4. Use the left/right arrow keys to select the flashing digit of the wavelength and the up/down keys to increase or decrease the flashing digit. You can enter a value with a 0.01 nm resolution.

Note: *The ✓ mark in the wavelength edit box indicates that the wavelength is on the wavelength list. This mark may disappear as you modify the value in the wavelength edit box.*

5. Confirm by pressing *ENTER*.

Acquiring Power Measurements
Managing the Wavelength List

To modify a wavelength,

1. Follow steps 1 to 4 in section on viewing the wavelength list on page 25. Select the wavelength to be modified by pressing *ENTER*.
2. Use the up/down arrow keys to select λ.
3. Press *ENTER*.
4. Use the left/right arrow keys to select the flashing digit of the wavelength and the up/down keys to increase or decrease the flashing digit. You can enter a value with a 0.01 nm resolution.

Note: *The ✓ mark in the wavelength edit box indicates that the wavelength is on the wavelength list. This mark may disappear as you modify the value in the wavelength edit box.*

5. Confirm by pressing *ENTER*.

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To delete a specific wavelength from the list,

1. Follow steps 1 to 4 in section on viewing the wavelength list on page 25. Select the wavelength to be deleted by pressing *ENTER*.

Note: *You can also select the wavelength while in the* **Wavelength List & Corr. Factor** *menu by pressing* λ.

2. With the wavelength to be deleted displayed in the wavelength edit box, use the up/down arrow keys to select λ.
3. Use the left/right arrow keys to select **Del** λ.
4. Confirm the wavelength deletion by pressing *ENTER*.

To remove all the wavelengths from the list,

1. Press *Setup* to access the *Setup* menu.
2. Use the up/down arrow keys to select **Wavelength List & Corr. Factor**.
3. Press *ENTER*.
4. Use the left/right arrow keys to select **Del All**.
5. Confirm the wavelength list deletion by pressing *ENTER*.

Acquiring Power Measurements
Managing the Wavelength List

To delete a specific wavelength from the list,

1. Follow steps 1 to 4 in section on viewing the wavelength list on page 25. Select the wavelength to be deleted by pressing *ENTER*.

Note: *You can also select the wavelength while in the* **Wavelength List & Corr. Factor** *menu by pressing* λ.

2. With the wavelength to be deleted displayed in the wavelength edit box, use the up/down arrow keys to select λ.
3. Use the left/right arrow keys to select **Del** λ.
4. Confirm the wavelength deletion by pressing *ENTER*.

To remove all the wavelengths from the list,

1. Press *Setup* to access the *Setup* menu.
2. Use the up/down arrow keys to select **Wavelength List & Corr. Factor**.
3. Press *ENTER*.
4. Use the left/right arrow keys to select **Del All**.
5. Confirm the wavelength list deletion by pressing *ENTER*.

High-Speed Power Meter 29

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Setting a Correction Factor

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

When a dB correction factor other than +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 other than 1.0000 is defined, the displayed power is equal to the actual power times the value of the correction factor. With an active correction factor, the *CF* marker appears at the top of the display for the matching channel.

Note: *Setting a correction factor emulates a new calibration (the PM-1600's calibration is not affected and will be restored by setting back the CF to a null value).*

When expressed in dB, the correction factor 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 correction factor expressed in W/W will always be a positive value.

To select a correction factor,

1. Press λ to select the appropriate wavelength, then *Setup* to access the *Setup* menu, then use the up/down arrow keys to select **Wavelength List & Corr. Factor**, and press *ENTER*.

   Or

   Follow steps 1 to 4 in section on viewing the wavelength list on page 25. Select the wavelength by pressing *ENTER*.

Note: *You can also select the wavelength while in the* **Wavelength List & Corr. Factor** *menu by pressing* λ.

2. Use the up/down arrow keys to select **CF Ch 1** or **CF Ch 2** (PM-1620). The current correction factor for the matching wavelength is displayed in dB or W/W, depending on the currently selected measurement unit.

Acquiring Power Measurements
Setting a Correction Factor

Setting a Correction Factor

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

When a dB correction factor other than +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 other than 1.0000 is defined, the displayed power is equal to the actual power times the value of the correction factor. With an active correction factor, the *CF* marker appears at the top of the display for the matching channel.

Note: *Setting a correction factor emulates a new calibration (the PM-1600's calibration is not affected and will be restored by setting back the CF to a null value).*

When expressed in dB, the correction factor 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 correction factor expressed in W/W will always be a positive value.

To select a correction factor,

1. Press λ to select the appropriate wavelength, then *Setup* to access the *Setup* menu, then use the up/down arrow keys to select **Wavelength List & Corr. Factor**, and press *ENTER*.

   Or

   Follow steps 1 to 4 in section on viewing the wavelength list on page 25. Select the wavelength by pressing *ENTER*.

Note: *You can also select the wavelength while in the* **Wavelength List & Corr. Factor** *menu by pressing* λ.

2. Use the up/down arrow keys to select **CF Ch 1** or **CF Ch 2** (PM-1620). The current correction factor for the matching wavelength is displayed in dB or W/W, depending on the currently selected measurement unit.

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Note: *You can toggle between dB and W/W units while in the* **Wavelength List & Corr. Factor** *menu by pressing* dB/W/W.

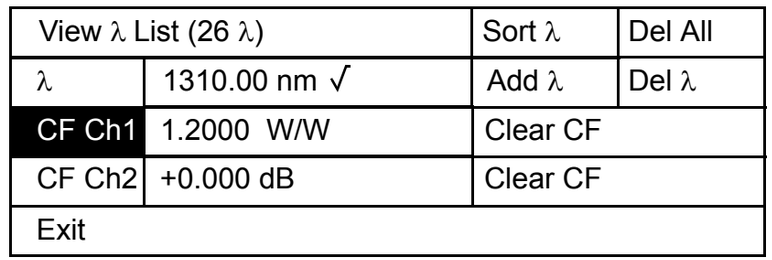
View λ List (26 λ)		Sort λ	Del All
λ	1310.00 nm √	Add λ	Del λ
CF Ch1	1.2000 W/W	Clear CF	
CF Ch2	+0.000 dB	Clear CF	
Exit			

3. Press *ENTER*.
4. Use the left/right arrow keys to select the flashing digit of the correction factor and the up/down keys to increase or decrease the flashing digit. You can enter a value from –5.999 dB to +6.000 dB or from 0.2512 W/W to 3.9811 W/W.
5. Confirm the correction factor by pressing *ENTER*. The newly defined correction factor will be automatically applied when you return to measurement mode, with the *CF* marker at the top of the display for the matching channel.

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

Acquiring Power Measurements
Setting a Correction Factor

Note: *You can toggle between dB and W/W units while in the* **Wavelength List & Corr. Factor** *menu by pressing* dB/W/W.



3. Press *ENTER*.
4. Use the left/right arrow keys to select the flashing digit of the correction factor and the up/down keys to increase or decrease the flashing digit. You can enter a value from –5.999 dB to +6.000 dB or from 0.2512 W/W to 3.9811 W/W.
5. Confirm the correction factor by pressing *ENTER*. The newly defined correction factor will be automatically applied when you return to measurement mode, with the *CF* marker at the top of the display for the matching channel.

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

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To delete a correction factor,

1. Press λ to select the appropriate wavelength, then *Setup* to access the *Setup* menu, then use the up/down arrow keys to select **Wavelength List & Corr. Factor**, and press *ENTER*.

   Or

   Follow steps 1 to 4 in section on viewing the wavelength list on page 25. Select the wavelength by pressing *ENTER*.

Note: *You can also select the wavelength while in the* **Wavelength List & Corr. Factor** *menu by pressing* λ.

2. Use the up/down arrow keys to select **CF Ch 1** or **CF Ch 2** (PM-1620). The current correction factor for the matching wavelength is displayed in dB or W/W, depending on the currently selected measurement unit.

Note: *You can toggle between dB and W/W units while in the* **Wavelength List & Corr. Factor** *menu by pressing* dB/W/W.

3. Use the left/right arrow keys to select **Clear CF**.
4. Confirm the deletion by pressing *ENTER*. The correction factor is immediately reset to +0.000 dB or 1.0000 W/W and, therefore, deactivated.

Setting 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 *AUTO* is selected, the display resolution is determined by the power level being measured.

Note: *The* AUTO *marker on the display in measurement mode does not refer to the automatic display resolution but to the measuring range (see* Setting Measurement Range *on page 22).*

Acquiring Power Measurements
Setting Display Resolution

To delete a correction factor,

1. Press λ to select the appropriate wavelength, then *Setup* to access the *Setup* menu, then use the up/down arrow keys to select **Wavelength List & Corr. Factor**, and press *ENTER*.

   Or

   Follow steps 1 to 4 in section on viewing the wavelength list on page 25. Select the wavelength by pressing *ENTER*.

Note: *You can also select the wavelength while in the* **Wavelength List & Corr. Factor** *menu by pressing* λ.

2. Use the up/down arrow keys to select **CF Ch 1** or **CF Ch 2** (PM-1620). The current correction factor for the matching wavelength is displayed in dB or W/W, depending on the currently selected measurement unit.

Note: *You can toggle between dB and W/W units while in the* **Wavelength List & Corr. Factor** *menu by pressing* dB/W/W.

3. Use the left/right arrow keys to select **Clear CF**.
4. Confirm the deletion by pressing *ENTER*. The correction factor is immediately reset to +0.000 dB or 1.0000 W/W and, therefore, deactivated.

Setting Display Resolution

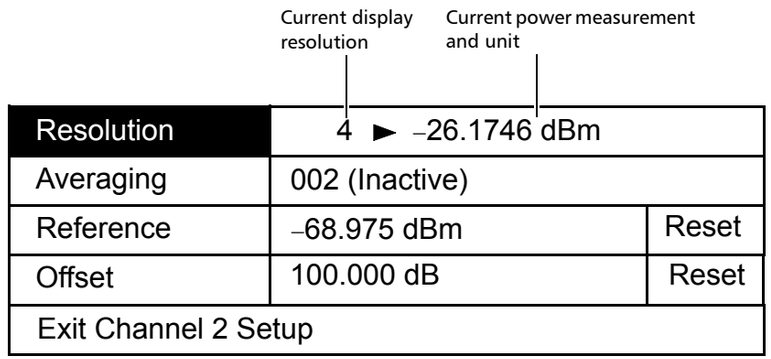
Depending on the required resolution and operating power level 0, 1, 2, 3, or 4 digits can be displayed after the decimal point. When *AUTO* is selected, the display resolution is determined by the power level being measured.

Note: *The* AUTO *marker on the display in measurement mode does not refer to the automatic display resolution but to the measuring range (see* Setting Measurement Range *on page 22).*

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To set the display resolution of a power measurement expressed in dB or dBm,

1. Press *Setup* to access the *Setup* menu.
2. Use the up/down arrow keys to select **Channel 1 Setup** or **Channel 2 Setup** (PM-1620), then press *ENTER*. The current resolution is displayed with the current power measurement in real time.



3. Press *ENTER* to access the display resolution edit box.
4. Use the up/down arrow keys to change the display resolution. The power measurement is immediately affected as can be seen in the display resolution edit box.
5. Press *ENTER* to confirm the new display resolution.

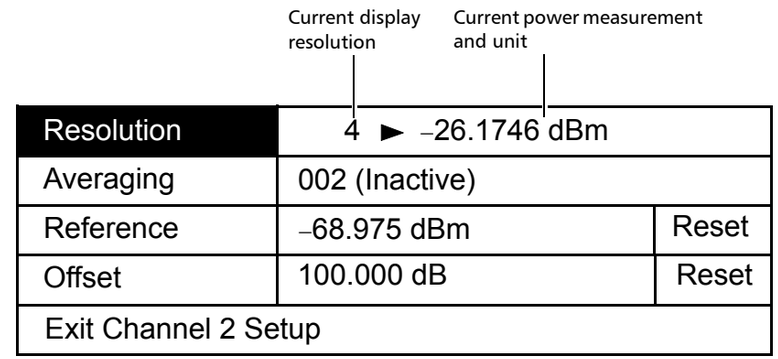
Note: *You can toggle between dBm and W units while in the* Channel Setup *menu by pressing* dBm/W.

Note: *When W is selected, the display resolution changes to* AUTO *(different W units will be used according to the power of the signal detected). It is then impossible to access the display resolution edit box.*

Acquiring Power Measurements
*Setting Display Resolution

To set the display resolution of a power measurement expressed in dB or dBm,

1. Press *Setup* to access the *Setup* menu.
2. Use the up/down arrow keys to select **Channel 1 Setup** or **Channel 2 Setup** (PM-1620), then press *ENTER*. The current resolution is displayed with the current power measurement in real time.



3. Press *ENTER* to access the display resolution edit box.
4. Use the up/down arrow keys to change the display resolution. The power measurement is immediately affected as can be seen in the display resolution edit box.
5. Press *ENTER* to confirm the new display resolution.

Note: *You can toggle between dBm and W units while in the* Channel Setup *menu by pressing* dBm/W.

Note: *When W is selected, the display resolution changes to* AUTO *(different W units will be used according to the power of the signal detected). It is then impossible to access the display resolution edit box.*

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Setting Refresh Rate

This function allows you to define the refresh rate of the power readings in power measurement mode (for both channels in a PM-1620 dual-channel power meter).

To set the refresh rate,

1. Press *Setup* to access the *Setup* menu.
2. Press *ENTER* to access the **System Setup** menu.
3. Use the up/down arrow keys to select **Refresh Rate**. The current refresh rate is displayed.

Sampling Rte	256Hz	RS232 / GPIB	GPIB
Refresh Rate	16Hz	GPIB Addr.	15
Backlight	ON	Save	# 3
Contrast	▼ ◐ ▲	Recall	# 3
Video Mode	STD	Exit	

4. Press *ENTER* to access the refresh rate edit box.
5. Use the up/down arrow keys to set the refresh rate between 1/2 Hz, 1 Hz, 2 Hz, 4 Hz, 8 Hz, and 16 Hz.
6. Press *ENTER* to confirm the new refresh rate.

Acquiring Power Measurements
Setting Refresh Rate

Setting Refresh Rate

This function allows you to define the refresh rate of the power readings in power measurement mode (for both channels in a PM-1620 dual-channel power meter).

To set the refresh rate,

1. Press *Setup* to access the *Setup* menu.
2. Press *ENTER* to access the **System Setup** menu.
3. Use the up/down arrow keys to select **Refresh Rate**. The current refresh rate is displayed.

Sampling Rte	256Hz	RS232 / GPIB	GPIB
Refresh Rate	16Hz	GPIB Addr.	15
Backlight	ON	Save	# 3
Contrast	▼ ◐ ▲	Recall	# 3
Video Mode	STD	Exit	

4. Press *ENTER* to access the refresh rate edit box.
5. Use the up/down arrow keys to set the refresh rate between 1/2 Hz, 1 Hz, 2 Hz, 4 Hz, 8 Hz, and 16 Hz.
6. Press *ENTER* to confirm the new refresh rate.

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Setting Sampling Rate

This function allows you to define the number of power readings per second in power measurement mode (for both channels in a PM-1620 dual-channel power meter) with a maximum of 256 per second.

In power measurement mode, power measurements are constantly updated on the measurement display. Samples can also be retrieved with the GPIB or RS-232 interface (refer to the *IQ-200 GPIB and Application Development Guide*).

According to your specific requirements and the power level, you will select a sampling rate that will optimize instrument flexibility and measurement stability as well as determine the quantity of data generated during data acquisition.

Note: *Use a lower sampling rate with averaging active (see* Displaying Averaged Measurement *on page 22) for greater repeatability when measuring very low power.*

To set the sampling rate,

1. Press *Setup* to access the *Setup* menu.
2. Press *ENTER* to access the **System Setup** menu. The current sampling rate is displayed.
3. Press *ENTER* to access the sampling rate edit box.
4. Use the up/down arrow keys to select the rate from the 11 values listed. Values vary from 1/4 Hz to 256 Hz.
5. Press *ENTER* to confirm the new sampling rate. If using a PM-1620 dual-channel power meter, the sampling rate applies to both channels.

Note: *The sampling rate defined in the* Setup *menu is independent of the sampling rate defined in the* Program *menu.*

Acquiring Power Measurements
Setting Sampling Rate

Setting Sampling Rate

This function allows you to define the number of power readings per second in power measurement mode (for both channels in a PM-1620 dual-channel power meter) with a maximum of 256 per second.

In power measurement mode, power measurements are constantly updated on the measurement display. Samples can also be retrieved with the GPIB or RS-232 interface (refer to the *IQ-200 GPIB and Application Development Guide*).

According to your specific requirements and the power level, you will select a sampling rate that will optimize instrument flexibility and measurement stability as well as determine the quantity of data generated during data acquisition.

Note: *Use a lower sampling rate with averaging active (see* Displaying Averaged Measurement *on page 22) for greater repeatability when measuring very low power.*

To set the sampling rate,

1. Press *Setup* to access the *Setup* menu.
2. Press *ENTER* to access the **System Setup** menu. The current sampling rate is displayed.
3. Press *ENTER* to access the sampling rate edit box.
4. Use the up/down arrow keys to select the rate from the 11 values listed. Values vary from 1/4 Hz to 256 Hz.
5. Press *ENTER* to confirm the new sampling rate. If using a PM-1620 dual-channel power meter, the sampling rate applies to both channels.

Note: *The sampling rate defined in the* Setup *menu is independent of the sampling rate defined in the* Program *menu.*

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Choosing a Number of Measurements for Averaging

Power measurements can be averaged over a programmable number of samples by pressing *Avg* in power measurement mode. Measurements will continue to be displayed at the specified sampling and refresh rates (see *Setting Sampling Rate* on page 35 and *Setting Refresh Rate* on page 34), but the average will include the specified number of power samples.

To set the number of measurements for averaging,

1. Press *Setup* to access the *Setup* menu.
2. Use the up/down arrow keys to select **Channel 1 Setup** or **Channel 2 Setup** (PM-1620), then press *ENTER*.
3. Use the up/down arrow keys to select **Averaging**. The current averaging number is displayed with the averaging status (*Active* or *Inactive*).
4. Press *ENTER* to access the averaging number edit box.
5. Use the left/right arrow keys to select the flashing digit of the averaging number and the up/down keys to increase or decrease the flashing digit. You can enter a value from 002 to 999.
6. Press *ENTER* to confirm the new number of measurements for averaging.

Note: *You can activate or deactivate the averaging function while in the* Channel Setup *menu by pressing* Avg.

Acquiring Power Measurements
Choosing a Number of Measurements for Averaging

Choosing a Number of Measurements for Averaging

Power measurements can be averaged over a programmable number of samples by pressing *Avg* in power measurement mode. Measurements will continue to be displayed at the specified sampling and refresh rates (see *Setting Sampling Rate* on page 35 and *Setting Refresh Rate* on page 34), but the average will include the specified number of power samples.

To set the number of measurements for averaging,

1. Press *Setup* to access the *Setup* menu.
2. Use the up/down arrow keys to select **Channel 1 Setup** or **Channel 2 Setup** (PM-1620), then press *ENTER*.
3. Use the up/down arrow keys to select **Averaging**. The current averaging number is displayed with the averaging status (*Active* or *Inactive*).
4. Press *ENTER* to access the averaging number edit box.
5. Use the left/right arrow keys to select the flashing digit of the averaging number and the up/down keys to increase or decrease the flashing digit. You can enter a value from 002 to 999.
6. Press *ENTER* to confirm the new number of measurements for averaging.

Note: *You can activate or deactivate the averaging function while in the* Channel Setup *menu by pressing* Avg.

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Saving a Setup Configuration

Once the PM-1600 has been customized for a specific application or user, it is possible to save the configuration of the parameters that have been set in the *Setup* menu, with the exception of the contrast setting. Up to three setup configurations can be saved and recalled. The following parameters are saved:

- channel parameters (measurement unit, display resolution, averaging status and number, measuring range, reference value, active wavelength, correction factor, and display mode)
- system parameters (sampling rate, refresh rate, backlight, video mode, RS-232/GPIB address, wavelength shortlist, active channel, and active program)

To save a setup configuration,

1. Press *Setup* to access the *Setup* menu.
2. Press *ENTER* to access the *System Setup* menu.
3. Use the up/down or left/right arrow keys to select *Save*. The current setup configuration number is displayed.

Note: (Mod.) *indicates that a recalled setup configuration has been modified.*

4. Press *ENTER* to access the setup configuration number edit box.
5. Use the up/down arrow keys to set a setup configuration number from 1 to 3.
6. Confirm the new setup configuration by pressing *ENTER*. It takes a few seconds to save a setup configuration.

Acquiring Power Measurements
Saving a Setup Configuration

Saving a Setup Configuration

Once the PM-1600 has been customized for a specific application or user, it is possible to save the configuration of the parameters that have been set in the *Setup* menu, with the exception of the contrast setting. Up to three setup configurations can be saved and recalled. The following parameters are saved:

- channel parameters (measurement unit, display resolution, averaging status and number, measuring range, reference value, active wavelength, correction factor, and display mode)
- system parameters (sampling rate, refresh rate, backlight, video mode, RS-232/GPIB address, wavelength shortlist, active channel, and active program)

To save a setup configuration,

1. Press *Setup* to access the *Setup* menu.
2. Press *ENTER* to access the *System Setup* menu.
3. Use the up/down or left/right arrow keys to select *Save*. The current setup configuration number is displayed.

Note: (Mod.) *indicates that a recalled setup configuration has been modified.*

4. Press *ENTER* to access the setup configuration number edit box.
5. Use the up/down arrow keys to set a setup configuration number from 1 to 3.
6. Confirm the new setup configuration by pressing *ENTER*. It takes a few seconds to save a setup configuration.

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Recalling a Setup Configuration

Once you have saved a setup configuration, you can recall it at any time.

To recall a configuration,

1. Press *Setup* to access the *Setup* menu.
2. Press *ENTER* to access the *System Setup* menu.
3. Use the up/down or left/right arrow keys to select *Recall*. The current setup configuration number is displayed.
4. Press *ENTER* to access the setup configuration number edit box.
5. Use the up/down arrow keys to select the required configuration number.
6. Confirm by pressing *ENTER*. It takes a few seconds to recall a setup configuration.

Acquiring Power Measurements
Recalling a Setup Configuration

Recalling a Setup Configuration

Once you have saved a setup configuration, you can recall it at any time.

To recall a configuration,

1. Press *Setup* to access the *Setup* menu.
2. Press *ENTER* to access the *System Setup* menu.
3. Use the up/down or left/right arrow keys to select *Recall*. The current setup configuration number is displayed.
4. Press *ENTER* to access the setup configuration number edit box.
5. Use the up/down arrow keys to select the required configuration number.
6. Confirm by pressing *ENTER*. It takes a few seconds to recall a setup configuration.

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Resetting the PM-1600

When turning on the unit, press *ENTER* until the unit beeps repeatedly. All the user-defined parameters are reset to their default values. These are displayed in the following tables.

Channel Parameters	
Measurement unit	W
Display resolution	AUTO
Averaging	Active
Number of measurements used for averaging	2
Measuring range	Autorange
Reference	Null
Offset	Null
Wavelength	850 nm
Correction factor	OFF
Display mode	Reference

Acquiring Power Measurements
Resetting the PM-1600

Resetting the PM-1600

When turning on the unit, press *ENTER* until the unit beeps repeatedly. All the user-defined parameters are reset to their default values. These are displayed in the following tables.

Channel Parameters	
Measurement unit	W
Display resolution	AUTO
Averaging	Active
Number of measurements used for averaging	2
Measuring range	Autorange
Reference	Null
Offset	Null
Wavelength	850 nm
Correction factor	OFF
Display mode	Reference

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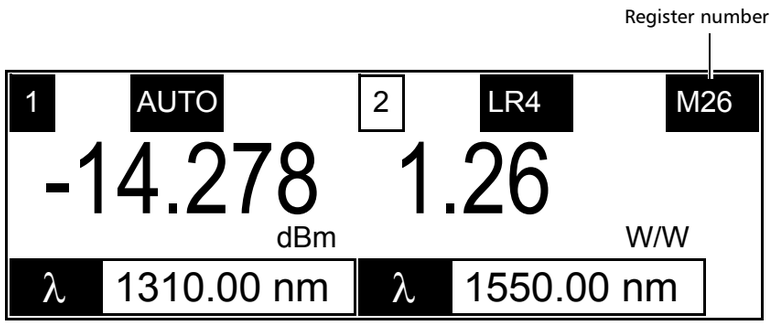
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5 Storing and Recalling Power Measurements

Storing Power Measurements Manually

The PM-1600 has 100 memory registers to manually store absolute or relative power measurements (for both channels in a PM-1620).

To store a measurement manually, select the desired measurement and then press *Store*. The register number is briefly displayed.



Note: *The register number automatically increases each time you store a measurement.*

When the maximum number of 100 power measurements is reached, it is no longer possible to store new power measurements. *Full* is then displayed.

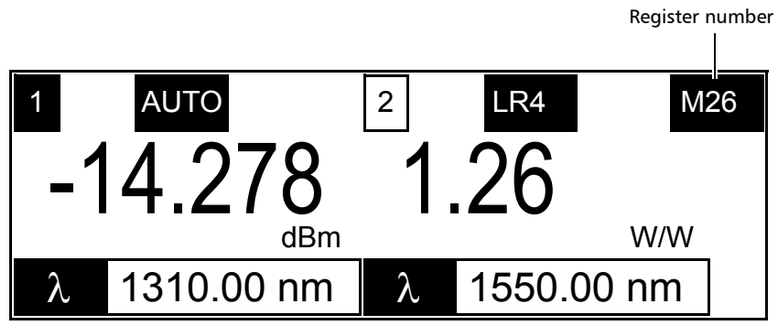
Note: *You may observe a difference between the power measurement displayed and the power measurement stored, especially if the sampling rate is significantly higher than the refresh rate.*

5 Storing and Recalling Power Measurements

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Note: *You may observe a difference between the power measurement displayed and the power measurement stored, especially if the sampling rate is significantly higher than the refresh rate.*

High-Speed Power Meter 41

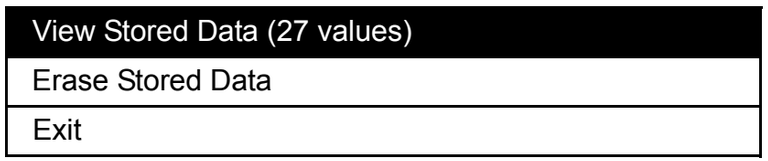
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Recalling Manually Stored Power Measurements

The power measurements that you stored manually (see *Storing Power Measurements Manually* on page 41) can be recalled one register at a time.

To retrieve a manually stored power measurement,

1. Press *Recall*. The display either indicates the number of stored power measurements or a message stating whether the memory is empty or full.



2. Press *ENTER*. A stored power measurement is displayed with the matching register number.
3. Use the up/down arrow keys to select the required register.

Note: *You can keep the up/down arrow keys pressed to quickly scan the power measurements in adjacent registers. To speed up the scan, use the left/right arrow keys.*

4. To exit the *Recall* menu, press *Recall*, or select **Exit** then press *Enter*.

When recalling a stored power measurement, it is possible to change the display mode (on both channels when using a PM-1620) and the measurement unit.

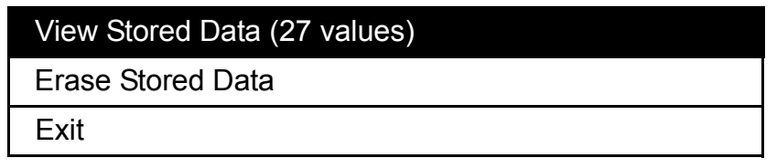
Storing and Recalling Power Measurements
Recalling Manually Stored Power Measurements

Recalling Manually Stored Power Measurements

The power measurements that you stored manually (see *Storing Power Measurements Manually* on page 41) can be recalled one register at a time.

To retrieve a manually stored power measurement,

1. Press *Recall*. The display either indicates the number of stored power measurements or a message stating whether the memory is empty or full.



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Note: *You can keep the up/down arrow keys pressed to quickly scan the power measurements in adjacent registers. To speed up the scan, use the left/right arrow keys.*

4. To exit the *Recall* menu, press *Recall*, or select **Exit** then press *Enter*.

When recalling a stored power measurement, it is possible to change the display mode (on both channels when using a PM-1620) and the measurement unit.

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Erasing Manually Stored Power Measurements

The manually stored power measurements (up to 100) can be erased as a batch.

To erase a stored power measurement,

1. Press *Recall*.
2. Use the up/down arrow keys to select **Erase Stored Data**.

IMPORTANT

After you press *ENTER*, all the manually stored power measurements in the 100 registers will be deleted without any other warning.

3. Press *ENTER* to confirm the deletion. It takes a few seconds to erase all stored power measurements.
4. To exit the *Recall* menu, press *Recall*, or select **Exit** then press *Enter*.

Storing and Recalling Power Measurements
Erasing Manually Stored Power Measurements

Erasing Manually Stored Power Measurements

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1. Press *Recall*.
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IMPORTANT

After you press *ENTER*, all the manually stored power measurements in the 100 registers will be deleted without any other warning.

3. Press *ENTER* to confirm the deletion. It takes a few seconds to erase all stored power measurements.
4. To exit the *Recall* menu, press *Recall*, or select **Exit** then press *Enter*.

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6 Programming Acquisitions

Programming Data Acquisitions

In addition to measurement mode (where power measurements are constantly updated on the display) and to manually stored power measurements, the PM-1600 allows either timed or triggered programmed acquisitions. Here, absolute or relative power measurements are acquired for a fixed number of samples, thus for a fixed duration at a specific sampling rate and stored in the PM-1600's RAM.

With programmed acquisitions, it is possible to use the same sampling rates as the ones defined in the *Setup* menu (i.e., from 1/4 Hz to 256 Hz), as well as higher sampling rates (from 512 Hz to 4096 Hz). Both types of available sampling rates are displayed in the following table.

Programmed Acquisition Sampling Rate		Maximum Number of Points	
		PM-1610	PM-1620
Low[a]	1/4 Hz, 1/2 Hz, 1 Hz, 2 Hz, 4 Hz, 8 Hz, 16 Hz, 32 Hz, 64 Hz, 128 Hz, and 256 Hz	4096	2048 (per channel)
High	512 Hz, 1024 Hz, 2048 Hz, and 4096 Hz	8192	4096 (per channel)

a. Low acquisition rates are also available in power measurement mode.

A manual range (see *Setting Measurement Range* on page 22) must be set, on both channels when using a PM-1620, to perform a programmed acquisition.

The sampling rate defined in the *Program* menu is independent of the sampling rate defined in the *Setup* menu.

The two types of programmed acquisitions (timed acquisition and triggered acquisition) are described hereafter.

6 Programming Acquisitions

Programming Data Acquisitions

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		PM-1610	PM-1620
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High	512 Hz, 1024 Hz, 2048 Hz, and 4096 Hz	8192	4096 (per channel)

a. Low acquisition rates are also available in power measurement mode.

A manual range (see *Setting Measurement Range* on page 22) must be set, on both channels when using a PM-1620, to perform a programmed acquisition.

The sampling rate defined in the *Program* menu is independent of the sampling rate defined in the *Setup* menu.

The two types of programmed acquisitions (timed acquisition and triggered acquisition) are described hereafter.

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Programming Timed Acquisitions

A timed acquisition is enabled as soon as **Start Program** is pressed and continues for the time specified in the duration edit box or until the specified number of points has been acquired. If a delay was set in the delay edit box, the acquisition will start once the countdown has expired. If no delay was set, the acquisition will start immediately after **Start Program** is pressed.

To program a timed acquisition,

1. Set the power measurement parameters as required (see *Customizing the PM-1600 Display* on page 85).

2. Press *Program* to access the *Program* menu. The default program parameters are displayed. **Trigger Inactive** must be displayed.

Trigger Inactive		Statistics	
Delay	00h00m00s	Save	# 1
Duration	00h00m00s	Recall	# 1
Sampling	1Hz	Start Program	
Points	0000/Ch.	Exit	

Note: *If you do not want the acquisition to be delayed, skip step 3.*

3. To delay the acquisition,

3a. Use the up/down or left/right arrow keys to select **Delay**.

3b. Press *ENTER* to access the delay edit box.

3c. Use the left/right arrow keys to select the flashing digit of the delay and the up/down keys to increase or decrease the flashing digit. You can enter a delay from 00h00m01s to 99h59m59s.

3d. Confirm the delay by pressing *ENTER*.

Programming Acquisitions
Programming Timed Acquisitions

Programming Timed Acquisitions

A timed acquisition is enabled as soon as **Start Program** is pressed and continues for the time specified in the duration edit box or until the specified number of points has been acquired. If a delay was set in the delay edit box, the acquisition will start once the countdown has expired. If no delay was set, the acquisition will start immediately after **Start Program** is pressed.

To program a timed acquisition,

1. Set the power measurement parameters as required (see *Customizing the PM-1600 Display* on page 85).

2. Press *Program* to access the *Program* menu. The default program parameters are displayed. **Trigger Inactive** must be displayed.

Trigger Inactive		Statistics	
Delay	00h00m00s	Save	# 1
Duration	00h00m00s	Recall	# 1
Sampling	1Hz	Start Program	
Points	0000/Ch.	Exit	

Note: *If you do not want the acquisition to be delayed, skip step 3.*

3. To delay the acquisition,

3a. Use the up/down or left/right arrow keys to select **Delay**.

3b. Press *ENTER* to access the delay edit box.

3c. Use the left/right arrow keys to select the flashing digit of the delay and the up/down keys to increase or decrease the flashing digit. You can enter a delay from 00h00m01s to 99h59m59s.

3d. Confirm the delay by pressing *ENTER*.

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4. Use the up/down or left/right arrow keys to select the sampling rate as per table on page 45, and confirm by pressing *ENTER*.

If you want to set the number of points for the acquisition instead of the duration, skip step 5.

5. Set the duration of the acquisition:

5a. Use the up/down or left/right arrow keys to select **Duration**.

5b. Press *ENTER* to access the duration edit box.

5c. Use the left/right arrow keys to select the flashing digit of the duration and the up/down keys to increase or decrease the flashing digit. You can enter a duration from 00h00m01s to 99h59m59s (the maximum duration allowed depends on the sampling rate and on the maximum number of points. See table on page 45). As you change the duration, the number of points is automatically set as a function of the sampling rate.

5d. Confirm the duration by pressing *ENTER*.

6. Set the number of points for the acquisition:

6a. Use the up/down or left/right arrow keys to select *Points*.

6b. Press *ENTER* to access the points edit box.

6c. Use the left/right arrow keys to select the desired digit and the up/down arrows to increase or decrease the flashing value. Then confirm by pressing *ENTER*. See table on page 45 for the maximum number of points that can be set. As you change the number of points, the duration is automatically set as a function of the sampling rate.

Programming Acquisitions
Programming Timed Acquisitions

4. Use the up/down or left/right arrow keys to select the sampling rate as per table on page 45, and confirm by pressing *ENTER*.

If you want to set the number of points for the acquisition instead of the duration, skip step 5.

5. Set the duration of the acquisition:

5a. Use the up/down or left/right arrow keys to select **Duration**.

5b. Press *ENTER* to access the duration edit box.

5c. Use the left/right arrow keys to select the flashing digit of the duration and the up/down keys to increase or decrease the flashing digit. You can enter a duration from 00h00m01s to 99h59m59s (the maximum duration allowed depends on the sampling rate and on the maximum number of points. See table on page 45). As you change the duration, the number of points is automatically set as a function of the sampling rate.

5d. Confirm the duration by pressing *ENTER*.

6. Set the number of points for the acquisition:

6a. Use the up/down or left/right arrow keys to select *Points*.

6b. Press *ENTER* to access the points edit box.

6c. Use the left/right arrow keys to select the desired digit and the up/down arrows to increase or decrease the flashing value. Then confirm by pressing *ENTER*. See table on page 45 for the maximum number of points that can be set. As you change the number of points, the duration is automatically set as a function of the sampling rate.

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7. Press **Start Program** to enable the acquisition. Once the acquisition is enabled, you can disable it by selecting **Stop Program** and pressing *ENTER*.

Note: *Once you have enabled the acquisition, you can see how much time is left in the delay (before the acquisition actually starts) and how much time is left in the acquisition from within the* Program *menu.*

8. You can exit the *Program* menu and return to measurement mode either by pressing *Program,* or by selecting **Exit** then pressing *ENTER*. In measurement mode, **PG** is shown in the upper right corner of the display. Although you can revert to the *Program* menu, no action is possible in measurement mode until the acquisition has been completed.

When the acquisition is completed, the **PG** marker disappears. Data processing is performed, which takes a few seconds, then the PM-1600 returns to measurement mode.

Programming Acquisitions
Programming Timed Acquisitions

7. Press **Start Program** to enable the acquisition. Once the acquisition is enabled, you can disable it by selecting **Stop Program** and pressing *ENTER*.

Note: *Once you have enabled the acquisition, you can see how much time is left in the delay (before the acquisition actually starts) and how much time is left in the acquisition from within the* Program *menu.*

8. You can exit the *Program* menu and return to measurement mode either by pressing *Program,* or by selecting **Exit** then pressing *ENTER*. In measurement mode, **PG** is shown in the upper right corner of the display. Although you can revert to the *Program* menu, no action is possible in measurement mode until the acquisition has been completed.

When the acquisition is completed, the **PG** marker disappears. Data processing is performed, which takes a few seconds, then the PM-1600 returns to measurement mode.

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Programming Triggered Acquisitions

Conditional data acquisition can be performed by using a triggered acquisition, where data recording begins when a specified condition is met and continues until the specified number of points has been acquired or for the time specified in the duration edit box. If a delay was set in the delay edit box, the acquisition will not start until

- the countdown has expired, and **then**
- the specified condition is met.

Different trigger conditions are available. These conditions are explained in the following table.

Trigger	Description
Power > *Level* or *Power* < *Level* (channel #1 or channel #2)	Acquisition will start when the measured power is greater or smaller than the specified power level (in dBm or W units).
Falling Edge or *Rising Edge* (external trigger)	Acquisition will be triggered by an external signal on the external trigger port of the power meter, whether on negative or positive TTL transitions. See also *Using the External Trigger* on page 63.

Note: *The trigger defines the condition for starting data acquisition. Once underway, the acquisition will continue until the specified number of points has been acquired or for the specified duration, regardless of the measured power.*

Programming Acquisitions
Programming Triggered Acquisitions

Programming Triggered Acquisitions

Conditional data acquisition can be performed by using a triggered acquisition, where data recording begins when a specified condition is met and continues until the specified number of points has been acquired or for the time specified in the duration edit box. If a delay was set in the delay edit box, the acquisition will not start until

- the countdown has expired, and **then**
- the specified condition is met.

Different trigger conditions are available. These conditions are explained in the following table.

Trigger	Description
Power > *Level* or *Power* < *Level* (channel #1 or channel #2)	Acquisition will start when the measured power is greater or smaller than the specified power level (in dBm or W units).
Falling Edge or *Rising Edge* (external trigger)	Acquisition will be triggered by an external signal on the external trigger port of the power meter, whether on negative or positive TTL transitions. See also *Using the External Trigger* on page 63.

Note: *The trigger defines the condition for starting data acquisition. Once underway, the acquisition will continue until the specified number of points has been acquired or for the specified duration, regardless of the measured power.*

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To program a triggered acquisition,

1. Set the power measurement parameters as required (see *Customizing the PM-1600 Display* on page 85).
2. Press *Program* to access the *Program* menu.
3. You can set a delay as explained on page 46.
4. Use the up/down or left/right arrow keys to select the sampling rate (as per table on page 49), and confirm by pressing *ENTER*.
5. To set the trigger, press *ENTER* to access the trigger menu.

5a. To activate the trigger,

- ➤ Press *ENTER* to access the trigger status edit box.
- ➤ Use the up/down arrow keys to activate the trigger, then confirm by pressing *ENTER*. The default trigger parameters are displayed.

Status	Active	Trig.	Rising Edge
Source	Ext. Trig	Level	N.A.
Exit			

- ➤ Use the up/down or left/right arrow keys to select **Trig**.

5b. To set the trigger source,

- ➤ Use the up/down or left/right arrow keys to select **Source**.
- ➤ Press *ENTER* to access the source edit box.
- ➤ Use the up/down arrow keys to define whether the acquisition will be externally triggered or started when channel #1 or #2 (PM-1620) receives a signal. The power level of this signal will be set in step 5d.

Note: *An externally triggered acquisition is only possible using a high sampling rate.*

Programming Acquisitions
Programming Triggered Acquisitions

To program a triggered acquisition,

1. Set the power measurement parameters as required (see *Customizing the PM-1600 Display* on page 85).
2. Press *Program* to access the *Program* menu.
3. You can set a delay as explained on page 46.
4. Use the up/down or left/right arrow keys to select the sampling rate (as per table on page 49), and confirm by pressing *ENTER*.
5. To set the trigger, press *ENTER* to access the trigger menu.

5a. To activate the trigger,

- ➤ Press *ENTER* to access the trigger status edit box.
- ➤ Use the up/down arrow keys to activate the trigger, then confirm by pressing *ENTER*. The default trigger parameters are displayed.

Status	Active	Trig.	Rising Edge
Source	Ext. Trig	Level	N.A.
Exit			

- ➤ Use the up/down or left/right arrow keys to select **Trig**.

5b. To set the trigger source,

- ➤ Use the up/down or left/right arrow keys to select **Source**.
- ➤ Press *ENTER* to access the source edit box.
- ➤ Use the up/down arrow keys to define whether the acquisition will be externally triggered or started when channel #1 or #2 (PM-1620) receives a signal. The power level of this signal will be set in step 5d.

Note: *An externally triggered acquisition is only possible using a high sampling rate.*

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5c. To set the trigger type,

➤ Press *ENTER* to access the trigger edit box, i.e., to define whether the acquisition will be triggered by an external signal on positive (rising edge) or on negative (falling edge) TTL voltage transitions using the external trigger or be started when the measured power on channel #1 or #2 is greater or smaller than the specified power level.

➤ Use the up/down arrow keys to select **Rising Edge** or **Falling Edge**, then confirm by pressing *ENTER*.

5d. To set the trigger level,

➤ If you selected *Chann. 1* or *Chann. 2,* use the up/down or left/right arrow keys to select **Level**.

➤ Press *ENTER* to access the trigger level edit box.

➤ Use the left/right arrow keys to select the desired sign and digit and the up/down arrows to increase or decrease the flashing value. Then confirm by pressing *ENTER*. You can enter a trigger level from –90.000 dBm to +90.000 dBm or from +001.0000 pW to +999.9999 kW. The trigger level must be set in absolute power measurement mode (see *Measuring Absolute Power* on page 14) and must be within the range of the active channel (see *Setting Measurement Range* on page 22).

Note: *You can toggle between dBm and W units from within the trigger menu by pressing* dBm/W.

➤ Confirm the trigger power level by pressing *ENTER*, then exit the trigger menu.

Programming Acquisitions
Programming Triggered Acquisitions

5c. To set the trigger type,

➤ Press *ENTER* to access the trigger edit box, i.e., to define whether the acquisition will be triggered by an external signal on positive (rising edge) or on negative (falling edge) TTL voltage transitions using the external trigger or be started when the measured power on channel #1 or #2 is greater or smaller than the specified power level.

➤ Use the up/down arrow keys to select **Rising Edge** or **Falling Edge**, then confirm by pressing *ENTER*.

5d. To set the trigger level,

➤ If you selected *Chann. 1* or *Chann. 2,* use the up/down or left/right arrow keys to select **Level**.

➤ Press *ENTER* to access the trigger level edit box.

➤ Use the left/right arrow keys to select the desired sign and digit and the up/down arrows to increase or decrease the flashing value. Then confirm by pressing *ENTER*. You can enter a trigger level from –90.000 dBm to +90.000 dBm or from +001.0000 pW to +999.9999 kW. The trigger level must be set in absolute power measurement mode (see *Measuring Absolute Power* on page 14) and must be within the range of the active channel (see *Setting Measurement Range* on page 22).

Note: *You can toggle between dBm and W units from within the trigger menu by pressing* dBm/W.

➤ Confirm the trigger power level by pressing *ENTER*, then exit the trigger menu.

High-Speed Power Meter 51

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If you want to set the duration of the acquisition instead of the number of points, skip step 6.

6. To set the number of points for the acquisition,

6a. Use the up/down or left/right arrow keys to select **Points**.

6b. Press *ENTER* to access the points edit box.

6c. Use the left/right arrow keys to select the desired digit and the up/down arrows to increase or decrease the flashing value. Then confirm by pressing *ENTER*. See table on page 45 for the maximum number of points that can be set. As you change the number of points, the duration is automatically set as a function of the sampling rate.

7. To set the duration of the acquisition,

7a. Use the up/down or left/right arrow keys to select **Duration**.

7b. Press *ENTER* to access the duration edit box.

7c. Use the left/right arrow keys to select the flashing digit of the duration and the up/down keys to increase or decrease the flashing digit. You can enter a duration from 00h00m01s to 99h59m59s. As you change the duration, the number of points is automatically set as a function of the sampling rate.

7d. Confirm the duration by pressing *ENTER*.

8. Enable the acquisition as explained in *Programming Timed Acquisitions* on page 46. The **TG** marker will be displayed when the trigger is activated.

Note: *It is not possible to set the duration when programming a high-rate, triggered acquisition.*

IMPORTANT

Starting an acquisition erases all acquisition data in memory.

Programming Acquisitions
Programming Triggered Acquisitions

If you want to set the duration of the acquisition instead of the number of points, skip step 6.

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6a. Use the up/down or left/right arrow keys to select **Points**.

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7. To set the duration of the acquisition,

7a. Use the up/down or left/right arrow keys to select **Duration**.

7b. Press *ENTER* to access the duration edit box.

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Saving a Program Configuration

Once you have defined the parameters for a data acquisition, whether using timed or triggered mode, it is possible to save the configuration of the program. Up to three program configurations can be saved and recalled. The following parameters are saved:

- trigger status and conditions (source, type, and level)
- delay
- duration
- sampling rate
- number of points

To save a program configuration,

1. Before enabling the acquisition by pressing **Start Program** (as explained in *Programming Timed Acquisitions* on page 46, or in *Programming Triggered Acquisitions* on page 49), use the up/down or left/right arrow keys to select **Save**. The current program configuration number is displayed.

Note: (Mod.) *following* Save *indicates that a recalled program configuration has been modified.*

2. Press *ENTER* to access the program configuration edit box.
3. Use the up/down arrow keys to set a program configuration number from 1 to 3.
4. Confirm the new program configuration by pressing *ENTER*. It takes a few seconds to save a program configuration.

Programming Acquisitions
Saving a Program Configuration

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High-Speed Power Meter 53

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Recalling a Program Configuration

Once you have saved a program configuration, you can recall it at any time.

To recall a configuration,

1. Set the power measurement parameters as required (see *Customizing the PM-1600 Display* on page 85).
2. Press *Program* to access the *Program* menu.
3. Use the up/down or left/right arrow keys to select **Recall**. The current program configuration number is displayed.
4. Press *ENTER* to access the program configuration edit box.
5. Use the up/down arrow keys to select the required configuration number.
6. Confirm by pressing *ENTER*.

Programming Acquisitions
Recalling a Program Configuration

Recalling a Program Configuration

Once you have saved a program configuration, you can recall it at any time.

To recall a configuration,

1. Set the power measurement parameters as required (see *Customizing the PM-1600 Display* on page 85).
2. Press *Program* to access the *Program* menu.
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4. Press *ENTER* to access the program configuration edit box.
5. Use the up/down arrow keys to select the required configuration number.
6. Confirm by pressing *ENTER*.

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7 Performing Typical Tests with Your PM-1600

To make accurate, meaningful, 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. To perform a null measurement, see *Nulling Electrical Offsets* on page 11.
- The optical source should be stable.
- Appropriate test jumpers, connectors, and adapters must be used.
- Once a reference has been taken, ensure that the setup remains stable. To take a reference, see *Measuring Relative Power* on page 16.
- Since optical losses vary according to the launch, receive conditions, and fiber type, controlling these conditions with mode filters and strippers is essential.

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High-Speed Power Meter 55

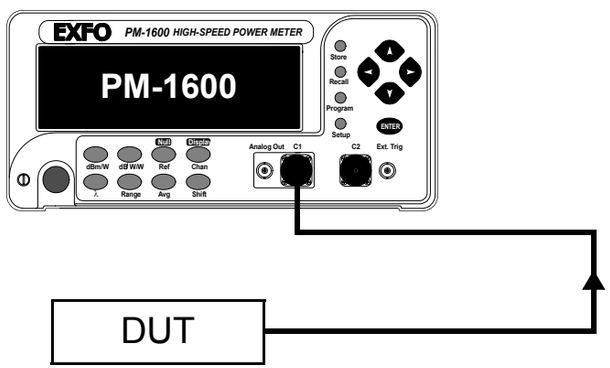
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Performing Absolute Power Measurements

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

To perform an absolute optical power measurement,

1. Perform an offset nulling.
2. Using an appropriate test jumper and connector adapter, connect the DUT to the detector port.



3. Adjust the power meter to the correct wavelength, +0.000 dB or 1.0000 W/W correction factor, and set the display unit to dBm or W.
4. The absolute optical power can now be monitored and recorded.

Note: *Using a PM-1620, absolute power can be simultaneously measured for each independent channel. Simply apply each step of the above procedure to all used channels.*

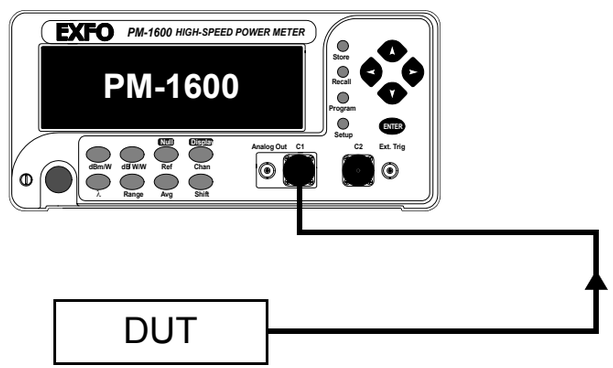
Performing Typical Tests with Your PM-1600
Performing Absolute Power Measurements

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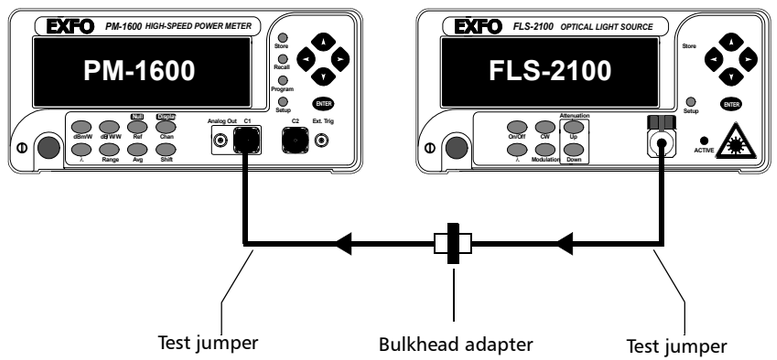
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Measuring Insertion Loss

To ensure accurate measures for the insertion loss of a fiber-optic component, use a light source (FLS-2100) and a PM-1600 Power Meter.

To measure insertion loss,

1. Using two appropriate test jumpers and a bulkhead adapter, connect the source to the power meter as shown below. This setup will be used to record a reference value.



2. Adjust the source and power meter to the appropriate wavelength.
3. Activate the source and select a suitable power output.

IMPORTANT

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

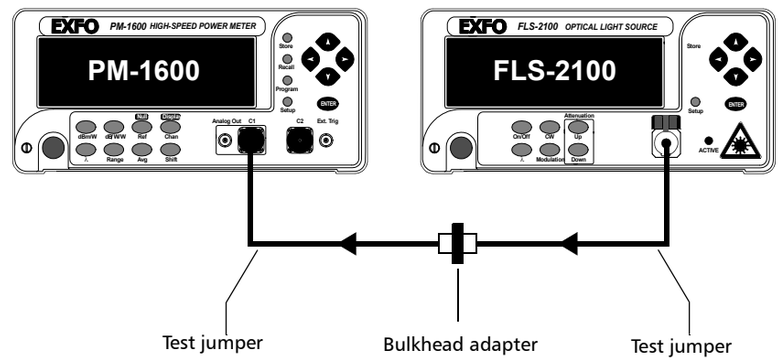
Performing Typical Tests with Your PM-1600
Measuring Insertion Loss

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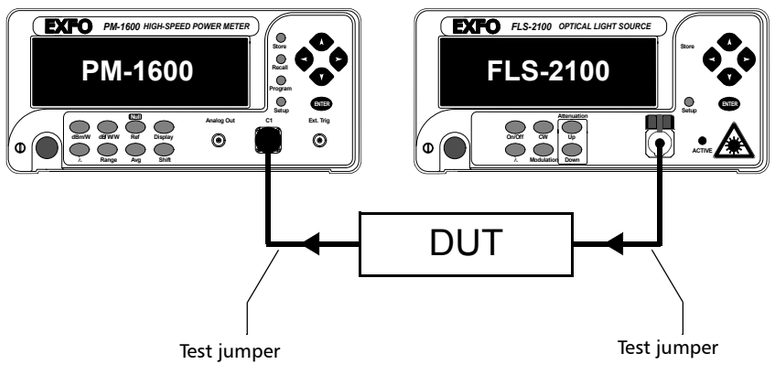
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4. On the PM-1600 Power Meter, set the measurement units to dB or dBm and press *Ref*. The reference value has now been taken and the display should read 0.000 dB.

5. Replace the bulkhead adapter with the DUT as shown in the following figure.



6. The insertion loss of the DUT is the relative measurement as displayed by the PM-1600. For best results, ensure that the setup remains stable.

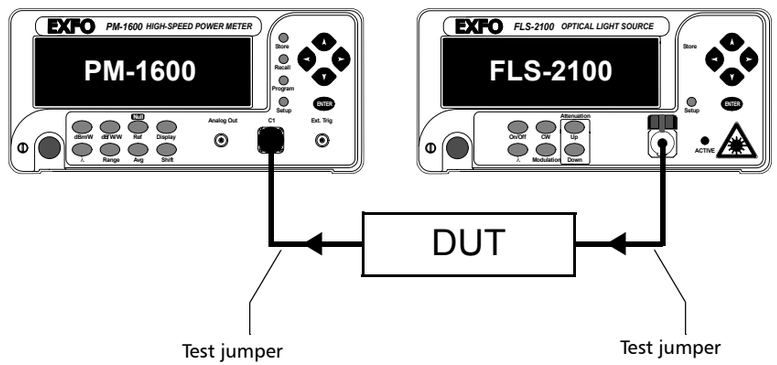
Testing Instrument Linearity

As stated in *Measuring Insertion Loss* on page 57, 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 out of a DUT. To accurately measure delta power, instrument linearity is very important. The PM-1600 High-Speed Power Meter is specified to be very linear, down to –55 dBm. Not only is the PM-1600 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.

Performing Typical Tests with Your PM-1600
Testing Instrument Linearity

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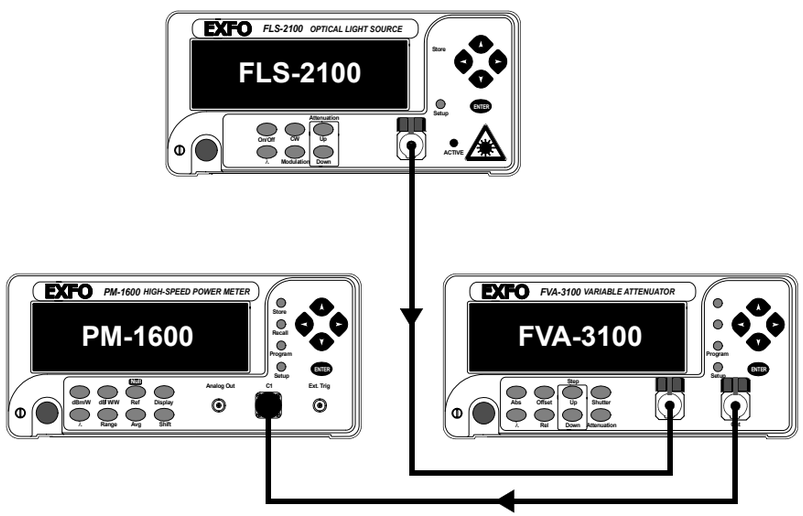
When verifying instrument linearity, a linear variable attenuator (e.g., FVA-3100) is also required. Before verifying the linearity of an optical detector, you must confirm the linearity of the attenuator being used.

Confirming the Linearity of the Attenuator Being Used

Before getting started, you need a stable source (FLS-2100), a variable attenuator, a PM-1600, two test jumpers, and appropriate connector adapters.

To confirm the linearity of the attenuator being used,

1. Connect the instruments as shown below.



2. With all instruments set to the same wavelength and the attenuator set to minimum attenuation, take a PM-1600 reference measurement and switch to relative display. Also, switch the attenuator to relative display mode.

Performing Typical Tests with Your PM-1600
Testing Instrument Linearity

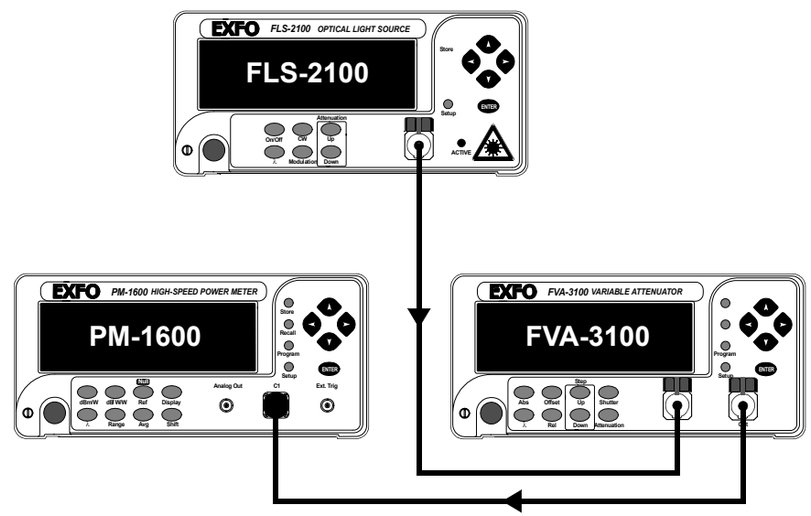
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3. At this time, both the attenuator and power meter will display 0.000 dB. Increase the attenuation using constant step sizes while recording the values from both displays (attenuator and power meter) at each step. Continue until the power meter indicates around –55 dB. The recorded values at each step should follow within permitted tolerances. If the values do not follow, there is a problem with the equipment setup or with one of the instruments. Before proceeding any further, the problem must be solved.

Testing the Linearity of an Optical Detector

Once the test configuration and instruments are properly set up (see *Confirming the Linearity of the Attenuator Being Used* on page 59), you can start testing for component linearity.

To test the linearity of the detector,

1. Disconnect the PM-1600 from the circuit as shown in the figure on page 59 and replace it with the detector being tested.
2. Reset the attenuator to minimum attenuation.
3. Increase the attenuation on the attenuator with constant step sizes, while recording the output read by the detector at each step.
4. When completed, the data can be analyzed to determine the linearity of the detector.

Characterizing an Optical Switch

The high sampling rate, fast stabilization, and trigger capability of the PM-1600 can be used simultaneously to easily characterize optical switches.

The figure displayed in *Testing Repeatability* section on page 61 displays a simple test station for a 1 x 2 optical switch. A light source is connected to the optical switch common terminal. Each optical output of the switch is connected to a detector of a PM-1600 Dual-Channel Power Meter. This test setup can be used to test both the repeatability and the settling time of the

Performing Typical Tests with Your PM-1600
Characterizing an Optical Switch

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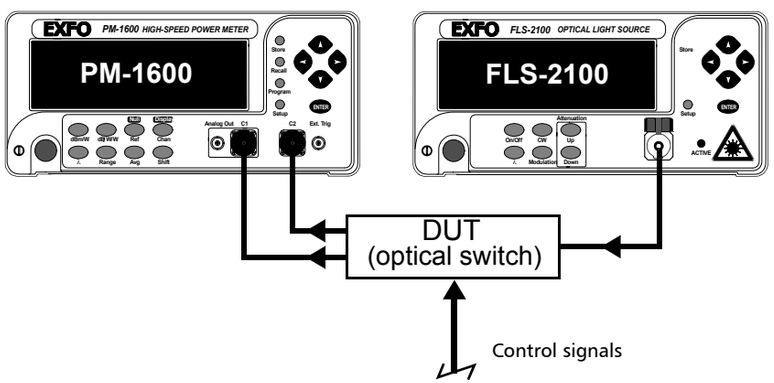
optical switch. For the latter test, the electrical signal that is used to command the switch is also connected to the external trigger input of the PM-1600.

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. Repetitive transitions of the switch must then be performed and the total deviation from the reference points will be considered as switch repeatability.

To test repeatability,

1. Connect the instruments as shown below.



2. Set the power meter channels to the same wavelength as the source.
3. Set the power meter channels to Autorange mode.
4. Set the switch to the first position and take a reference measurement on the power meter, selecting the active channel (the channel in which the switch has a minimum insertion loss).
5. Set the switch to the second position and take a reference measurement on the power meter, selecting the active channel.

Performing Typical Tests with Your PM-1600
Characterizing an Optical Switch

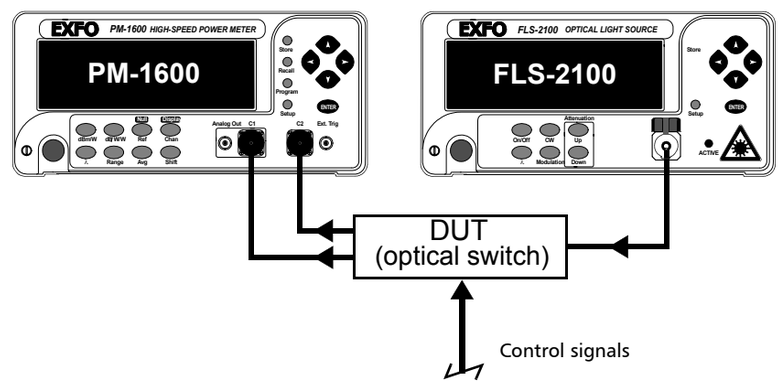
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5. Set the switch to the second position and take a reference measurement on the power meter, selecting the active channel.

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6. 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.

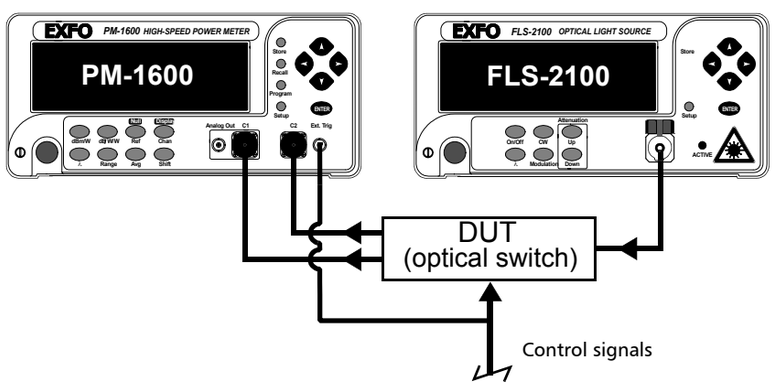
7. For each channel, the total switch deviation will be the highest positive deviation minus the highest negative deviation relative to the original reference (taken at step 4). The repeatability of the switch insertion loss may be expressed as ± (total deviation in dB)/2.

Testing the Settling Time

The triggering and fast stabilization of the PM-1600 can be used to capture fast power transitions. A good example of this is the optical switch settling time measurement. When an electrical control signal for the switch is available, a settling time including the electronics response time can be measured. This is done by controlling the PM-1600 remotely to easily retrieve the acquisition data (see *Controlling the PM-1600 Automatically or Remotely* on page 67).

To measure the settling time,

1. Connect the instruments as shown below.



2. Set the power meter channel to the same wavelength as the source.

Performing Typical Tests with Your PM-1600
Characterizing an Optical Switch

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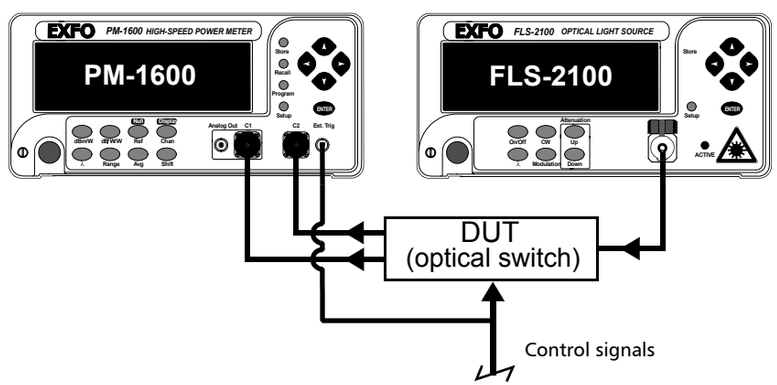
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3. Set the power meter channels to the proper manual range, making sure that no saturation occurs on the active channel.
4. Select the highest *Single* sampling rate (4096 samples per second).
5. Set the acquisition to be externally triggered.
6. Set the optical switch to initial position.
7. Start the acquisition.
8. Activate the electrical control signal, which acts as a trigger for the PM-1600. The *PG* marker, in measurement mode, will be displayed until the switch transition is totally acquired.
9. Retrieve the data by remote control and determine the switch time from the initial channel to the target channel.
10. Repeat steps 6 to 9 for each transition to be characterized.

This chapter describes how to use the external trigger and analog output of the PM-1600 High-Speed Power Meter.

Both the external trigger and analog output are easily accessible from the front panel of the power meter and use standard BNC connectors.

Using the External Trigger

The external trigger is used to synchronize or stimulate the acquisition of power measurements with an electrical signal (TTL level). Acquisitions at up to 4096 Hz can be performed. The use of an external trigger requires a programmed acquisition and selection of a manual power range.

Performing Typical Tests with Your PM-1600
Using the External Trigger

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9. Retrieve the data by remote control and determine the switch time from the initial channel to the target channel.
10. Repeat steps 6 to 9 for each transition to be characterized.

This chapter describes how to use the external trigger and analog output of the PM-1600 High-Speed Power Meter.

Both the external trigger and analog output are easily accessible from the front panel of the power meter and use standard BNC connectors.

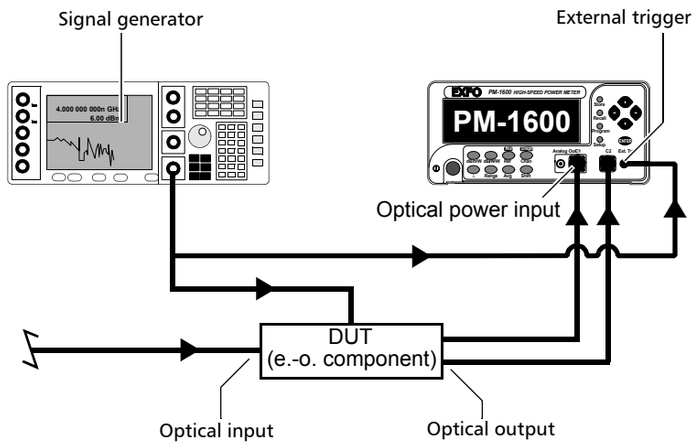
Using the External Trigger

The external trigger is used to synchronize or stimulate the acquisition of power measurements with an electrical signal (TTL level). Acquisitions at up to 4096 Hz can be performed. The use of an external trigger requires a programmed acquisition and selection of a manual power range.

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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 PM-1600 if it does not exceed TTL levels. The illustration below displays a typical signal generator connection setup.



External Trigger and Data Acquisition

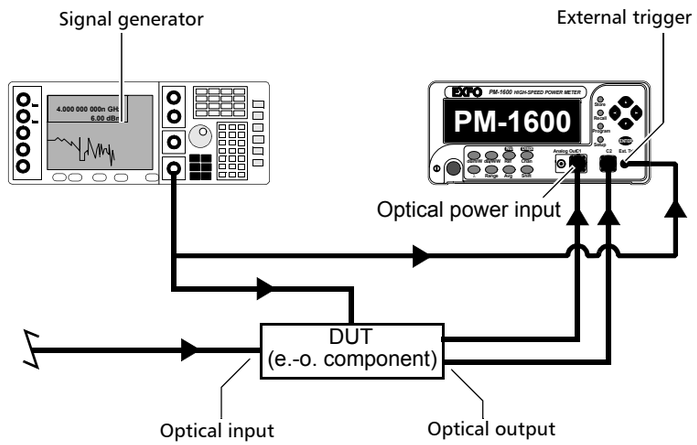
To prepare an externally triggered acquisition,

1. Make sure a sampling rate from 512 Hz to 4096 Hz and a manual power range are selected.
2. Follow the instructions in *Programming Triggered Acquisitions* on page 49.
3. When you enable the externally triggered acquisition with **Start Program,** the acquisition will wait for the voltage transition to occur before storing the data in memory. If a delay was set, the acquisition will first wait until the countdown has expired and then until the trigger condition is met.

Performing Typical Tests with Your PM-1600
Using the External Trigger

Connecting a TTL Source to the External Trigger

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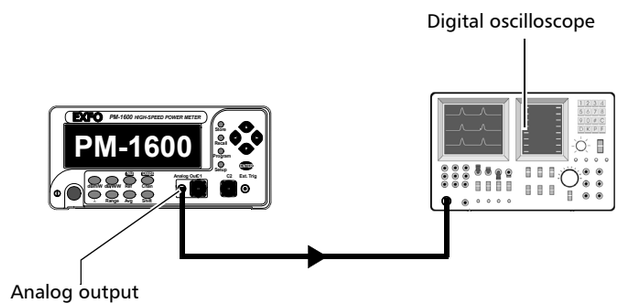
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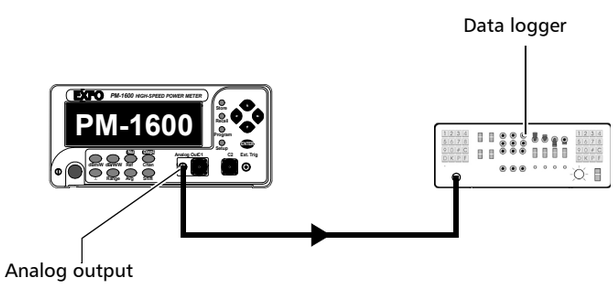
Using the Analog Output

The analog output provides an electrical signal proportional to the optical power input on the detector. On a dual-channel high-speed power meter, this is only available for channel #1.

The analog output signal is the redirection of the signal after the first amplification stage. Do not use the analog output while in Autorange mode (see *Setting Measurement Range* on page 22) because the gain scales of the first amplification stage are constantly changed to optimize signal-to-noise ratio.

The following two figures illustrate typical use of the analog output.





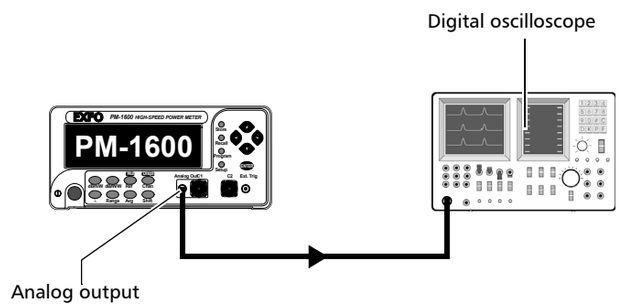
Performing Typical Tests with Your PM-1600
Using the Analog Output

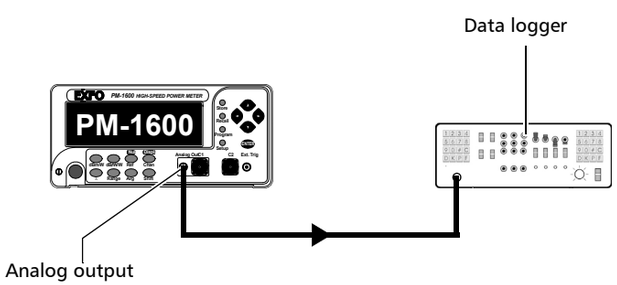
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The user interface can be used to determine the operating power levels and to optimize the analog output range. Choose the optimum power range for your application. The following table provides the voltage vs. power information for each available manual 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[c]
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 PM-16XXW models
LR6	2.15 V ±25%[b] at -69.61 dBm or at 64.10 dBm for PM-16XXW models

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

Performing Typical Tests with Your PM-1600
Using the Analog Output

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LR6	2.15 V ±25%[b] at -69.61 dBm or at 64.10 dBm for PM-16XXW models

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8 Controlling the PM-1600 Automatically or Remotely

The PM-1600 can be remotely controlled by either

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

The commands used in the two protocols are almost the same and are described in the following pages. When the PM-1600 is being remotely controlled, the *RM* marker appears to the right of the display.

Note: *If you have already designed a GPIB program to control a high-speed power meter from EXFO's IQ Series (IQ-1600), you can reuse certain sections for the PM-1600.*

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Setting Up the PM-1600 for Remote Control

To remotely control the PM-1600, you need to set a GPIB address or activate the RS-232 port.

1. Press *Setup* to access the *Setup* menu.
2. Press *ENTER* to access the *System Setup* menu.
3. Use the up/down or left/right arrow keys, select **RS232 / GPIB**. The current setting is displayed.

Sampling	256Hz	RS232 / GPIB	GPIB
Refresh Rate	16Hz	GPIB Addr.	15
Backlight	ON	Save	# 3
Contrast	▼ ◐ ▲	Recall	# 3
Video Mode	STD	Exit	

4. Press *ENTER*, then use the up/arrow keys to toggle between *GPIB* and *RS232*.
5. Press *ENTER* to confirm.
6. If you selected *RS232*, the **GPIB Addr**. menu option is deactivated (*N.A.* is displayed). If you selected *GPIB* and you are not satisfied with the currently selected GPIB address, press *ENTER*, use the up/arrow keys to select the required address (between 1 and 30), and then confirm by pressing *ENTER*.

Note: *If GPIB is currently selected and you want to specify a GPIB address, you can skip steps 4 and 5 above.*

Controlling the PM-1600 Automatically or Remotely
Setting Up the PM-1600 for Remote Control

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Communication Parameters

For GPIB Communication	
Terminate Read on EOS[a]	Yes
Set EOI[b] with EOS on Writes	Yes
Type of compare on EOS	8-bits
EOS byte	0Ah
Send EOI at end of Writes	Yes
GPIB primary address	See page 68
GPIB secondary address	None

a. "End of String"
b. "End or Identify"

For RS-232 Communication	
EOS bytes	0Ah
Baud rate	9600 bps
Parity	None
Data bits	8 bits
Stop bits	1 bit
Flow control	None
Activation	See page 68

Controlling the PM-1600 Automatically or Remotely
Communication Parameters

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Standard Status Data Structure

The figures below illustrate the four common Status and Enable registers as defined by IEEE 488.2. These diagrams are a useful aid in understanding the general commands and how a service request (SRQ) is generated. The four registers are

- Standard Event Status Register (ESR)
- Standard Event Status Enable Register (ESE)
- Status Byte Register (STB)
- Service Request Enable Register (SRE)

Bit	ESR	ESE	STB	SRE
0	Operation Complete	Operation Complete	Source Status	Source Status
1	Request Control	Request Control	N/A	N/A
2	Query Error	Query Error	Error Bit	Error Summary Bit
3	Device Dependent Error	Device Dependent Error	Questionable Status	Questionable Status
4	Execution Error	Execution Error	Message Available	Event Status Summary Bit
5	Command Error	Command Error	Event Status Summary Bit	Message Available
6	User Request	User Request	Master Summary Status	Request Service/ Master Summary Status
7	Power On	Power On	Operation Status	Operation Status

Controlling the PM-1600 Automatically or Remotely
Standard Status Data Structure

Standard Status Data Structure

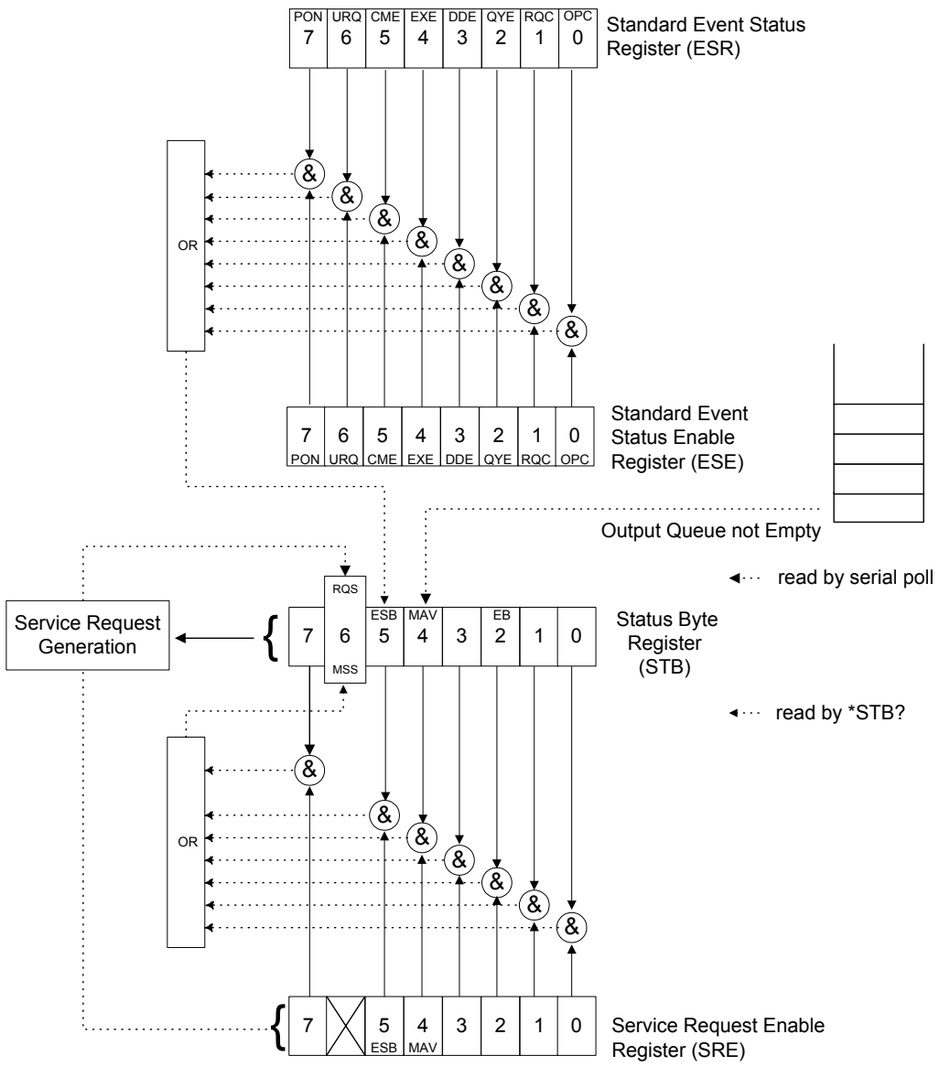
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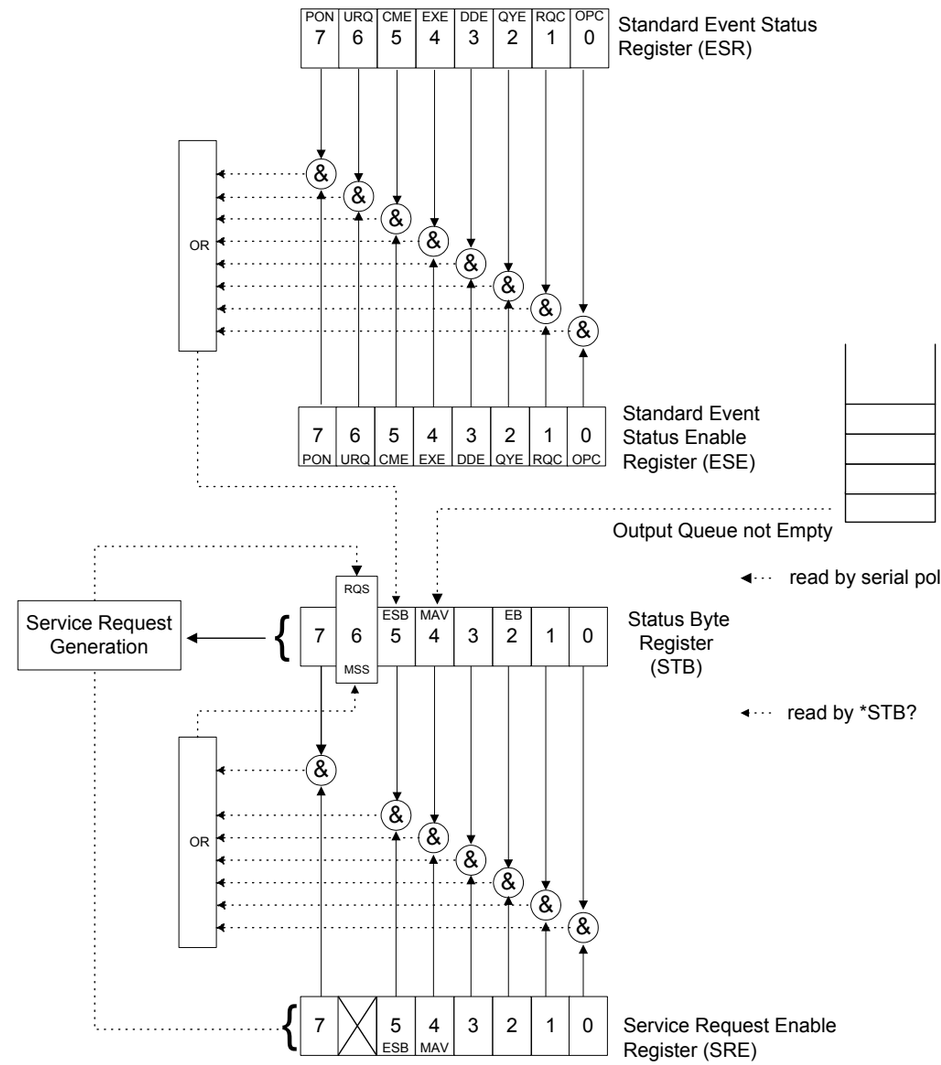
Bit	ESR	ESE	STB	SRE
0	Operation Complete	Operation Complete	Source Status	Source Status
1	Request Control	Request Control	N/A	N/A
2	Query Error	Query Error	Error Bit	Error Summary Bit
3	Device Dependent Error	Device Dependent Error	Questionable Status	Questionable Status
4	Execution Error	Execution Error	Message Available	Event Status Summary Bit
5	Command Error	Command Error	Event Status Summary Bit	Message Available
6	User Request	User Request	Master Summary Status	Request Service/ Master Summary Status
7	Power On	Power On	Operation Status	Operation Status

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Controlling the PM-1600 Automatically or Remotely
Standard Status Data Structure



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An SRQ is forced when a bit is set in the STB. At the same time the corresponding SRE bit is set. When the SRQ is generated, the RQS bit is set to 1, and remains set until read by a serial poll. Once the RQS is read, it returns to 0.

Command Structure

The GPIB and RS-232 commands follow the guidelines determined by the Standard Commands for Programmable Instruments (SCPI) consortium. For example, the command syntax

FORM:READ[:DATA]<space><digit>

is used to change the measurement display resolution (i.e., the number of digits after the decimal point) on the PM-1600.

In this particular example,

- FORM identifies that the command is part of the SCPI FORMat subset of commands
- READ and DATA are keywords that define the function of the command
- [ ] indicates that a keyword or parameter is optional
- <space> is included to indicate that a space is required
- <digit> is the command parameter

Keywords must be separated by a colon. A typical command would be

FORM:READ:DATA 1

This command instructs the PM-1600 to display a power measurement with 1 digit after the decimal point.

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

Controlling the PM-1600 Automatically or Remotely
Command Structure

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General Commands—Quick Reference

The PM-1600 recognizes the main commands identified in IEEE 488.2. These commands, as well as some optional general commands, the programming state commands, and some status queries, are summarized in the table below. For full explanation, see *General Commands* on page 113.

Command	Function
*CLS	Clear status command
*ESE	Standard event status enable command
*ESE?	Standard event status enable query
*ESR?	Standard event status register query
*IDN?	Identification query
*LOK	Set Remote Lockout programming state
*OPC	Operation complete command
*OPC?	Operation complete query

Controlling the PM-1600 Automatically or Remotely
General Commands—Quick Reference

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Command	Function
*CLS	Clear status command
*ESE	Standard event status enable command
*ESE?	Standard event status enable query
*ESR?	Standard event status register query
*IDN?	Identification query
*LOK	Set Remote Lockout programming state
*OPC	Operation complete command
*OPC?	Operation complete query

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Command	Function
*REM[a]	Set Remote programming state
*RST	Reset command
*SRE	Service request enable command
*SRE?	Service request enable query
*STB?	Read status byte query
SYST:ERR?	Error status query
SYST:VERS?	Identification status query
*TRG	(Not supported)
*TST?	Self-test query
*WAI	(Not supported)

a. This command can only be used with RS-232 communication.

Controlling the PM-1600 Automatically or Remotely
General Commands—Quick Reference

Command	Function
*REM[a]	Set Remote programming state
*RST	Reset command
*SRE	Service request enable command
*SRE?	Service request enable query
*STB?	Read status byte query
SYST:ERR?	Error status query
SYST:VERS?	Identification status query
*TRG	(Not supported)
*TST?	Self-test query
*WAI	(Not supported)

a. This command can only be used with RS-232 communication.

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Specific Commands—Quick Reference

The following table contains a summary of the PM-1600 specific commands. If you need more information about these specific commands, see *Specific Commands* on page 120.

Command					Parameter/ Response	Description
ABOR					—	Stops measurements
FETC	[SCAL]	POW	DC?		(+999.9999E±99) for W and W/W units (±999.9999) for dBm and dB units	Gets stored value
FORM	READ	[DATA]		[a]	<0|1|2|3|4|5>	Sets display resolution
INIT	AUTO			[a]	<0|1>,<CONT|NCON>	Starts/stops programmed acquisition
	AUTO?				(0|1)	Checks if programmed acquisition is in progress
	CONT				<0|1>	Starts/stops measurements
	CONT?				(0|1)	Checks if measurements are in progress

Controlling the PM-1600 Automatically or Remotely
Specific Commands—Quick Reference

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The following table contains a summary of the PM-1600 specific commands. If you need more information about these specific commands, see *Specific Commands* on page 120.

Command					Parameter/ Response	Description
ABOR					—	Stops measurements
FETC	[SCAL]	POW	DC?		(+999.9999E±99) for W and W/W units (±999.9999) for dBm and dB units	Gets stored value
FORM	READ	[DATA]		[a]	<0|1|2|3|4|5>	Sets display resolution
INIT	AUTO			[a]	<0|1>,<CONT|NCON>	Starts/stops programmed acquisition
	AUTO?				(0|1)	Checks if programmed acquisition is in progress
	CONT				<0|1>	Starts/stops measurements
	CONT?				(0|1)	Checks if measurements are in progress

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Command					Parameter/ Response	Description
	[IMM]				—	Stores single measurement
INST	NSEL			[a]	<channel#>	Sets channel number
	NSEL?				(channel#)	Gets channel number
READ	[SCAL]	POW	DC?		(+999.9999E±99) for W and W/W units (±999.9999) for dBm and dB units	Stores and gets value
	ALL	POW	DC?		(+999.9999E±99) for W and W/W units (±999.9999) for dBm and dB units	Returns the power of both channels in their respective current unit
SENS	AVER	COUN		[a]	<999>	Sets number for data averaging
		COUN?			(999)	Gets number for data averaging
		[STAT]		[a]	<0|1>	Sets data averaging
		STAT?			(0|1)	Checks if data averaging is active
	CORR	COLL	ZERO	[a]		Performs null measurement
		FACT	[MAGN]	[a]	[<–10.0 to +10.0 dB>] [<0.1 to 10 W/W>]	Sets correction factor for specific wavelength

Controlling the PM-1600 Automatically or Remotely
Specific Commands—Quick Reference

Command					Parameter/ Response	Description
	[IMM]				—	Stores single measurement
INST	NSEL			[a]	<channel#>	Sets channel number
	NSEL?				(channel#)	Gets channel number
READ	[SCAL]	POW	DC?		(+999.9999E±99) for W and W/W units (±999.9999) for dBm and dB units	Stores and gets value
	ALL	POW	DC?		(+999.9999E±99) for W and W/W units (±999.9999) for dBm and dB units	Returns the power of both channels in their respective current unit
SENS	AVER	COUN		[a]	<999>	Sets number for data averaging
		COUN?			(999)	Gets number for data averaging
		[STAT]		[a]	<0|1>	Sets data averaging
		STAT?			(0|1)	Checks if data averaging is active
	CORR	COLL	ZERO	[a]		Performs null measurement
		FACT	[MAGN]	[a]	[<–10.0 to +10.0 dB>] [<0.1 to 10 W/W>]	Sets correction factor for specific wavelength

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Command					Parameter/ Response	Description
		FACT?			99.999 [dB] or [W/W]	Gets the correction factor for specific wavelength
		OFFS	[MAGN]	[a]	<–5.999 to +6.000> [DB] <0.2512 to 3.9811> [W/W]	Sets correction factor
		OFFS	MAGN?	[a]	(+9.9999E±99) for W and W/W units (±9.9999) for dBm and dB units	Returns correction factor
SENS	FREQ	[CONT]		[a]	<value> [HZ]	Sets low acquisition rate
		CONT?			(999.999)	Gets low acquisition rate
		CONT	CATA?		(999.999;999.999;...)	Lists low acquisition rates
		NCON		[a]	<value> [HZ]	Sets programmed acquisition rate
		NCON?			(9999.999)	Gets programmed acquisition rate
		NCON	CATA?		(9999.999; 9999.999...)	Lists programmed acquisition rates
	OFFS	[MAGN]		[a]	(999.999) [dB]	Sets offset for current or selected channel
		OFFS?		[a]	(999.999) [dB]	Gets offset for current or selected channel

Controlling the PM-1600 Automatically or Remotely
*Specific Commands—Quick Reference**

Command					Parameter/ Response	Description
		FACT?			99.999 [dB] or [W/W]	Gets the correction factor for specific wavelength
		OFFS	[MAGN]	[a]	<–5.999 to +6.000> [DB] <0.2512 to 3.9811> [W/W]	Sets correction factor
		OFFS	MAGN?	[a]	(+9.9999E±99) for W and W/W units (±9.9999) for dBm and dB units	Returns correction factor
SENS	FREQ	[CONT]		[a]	<value> [HZ]	Sets low acquisition rate
		CONT?			(999.999)	Gets low acquisition rate
		CONT	CATA?		(999.999;999.999;...)	Lists low acquisition rates
		NCON		[a]	<value> [HZ]	Sets programmed acquisition rate
		NCON?			(9999.999)	Gets programmed acquisition rate
		NCON	CATA?		(9999.999; 9999.999...)	Lists programmed acquisition rates
	OFFS	[MAGN]		[a]	(999.999) [dB]	Sets offset for current or selected channel
		OFFS?		[a]	(999.999) [dB]	Gets offset for current or selected channel

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Command					Parameter/ Response	Description
	POW	RANG?			(±99.99) [dBm] (+999.9999E+99)[W]	Gets range
		RANG	AUTO	a	<0|1>	Sets Autorange
			AUTO?		(0|1)	Checks if Autorange is active
			HIGH	a	<1|2|3|4>	Sets manual high range
			LIST?		(±99.99) [dBm] (+999.9999E+99)[W]	Lists ranges
			LOW	a	<1|2|3|4|5|6>	Sets manual low range
		REF		a	±999.9999 [dBm] +999.9999E±99[W]	Sets user reference
		REF?			±999.9999 [dBm] +999.9999E±99[W]	Gets reference
		REF	DISP	a	—	Sets new reference
SENS	POW	REF	STAT	a	<0|1>	Sets absolute or relative mode
		REF	STAT?		(0|1)	Gets absolute or relative mode
		UNIT		a	<DBM|W|0|1>	Sets power unit
		UNIT?			(0|1)	Gets power unit
		WAVE		a	<value> [NM]	Sets wavelength
		WAVE?			(9999.99) [NM]	Gets wavelength

Controlling the PM-1600 Automatically or Remotely
Specific Commands—Quick Reference

Command					Parameter/ Response	Description
	POW	RANG?			(±99.99) [dBm] (+999.9999E+99)[W]	Gets range
		RANG	AUTO	a	<0|1>	Sets Autorange
			AUTO?		(0|1)	Checks if Autorange is active
			HIGH	a	<1|2|3|4>	Sets manual high range
			LIST?		(±99.99) [dBm] (+999.9999E+99)[W]	Lists ranges
			LOW	a	<1|2|3|4|5|6>	Sets manual low range
		REF		a	±999.9999 [dBm] +999.9999E±99[W]	Sets user reference
		REF?			±999.9999 [dBm] +999.9999E±99[W]	Gets reference
		REF	DISP	a	—	Sets new reference
SENS	POW	REF	STAT	a	<0|1>	Sets absolute or relative mode
		REF	STAT?		(0|1)	Gets absolute or relative mode
		UNIT		a	<DBM|W|0|1>	Sets power unit
		UNIT?			(0|1)	Gets power unit
		WAVE		a	<value> [NM]	Sets wavelength
		WAVE?			(9999.99) [NM]	Gets wavelength

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Command					Parameter/ Response	Description
TRAC	DATA?				(+999.9999E±99; +999.9999E±99;...) [W] or (±999.9999; ±999.9999;...) [dB or dBm]	Gets measurements
	POIN			a	<9999>	Sets number of points
	POIN?				(9999)	Gets number of points
TRIG	SEQ	LEV		a	<+999.9999E±99> [W] or <±999.9999> [dBm]	Sets trigger level
		LEV?			(+999.9999E±99) [W] or <±999.9999> [dBm]	Gets trigger level
		SLOP		a	<POSITIVE| NEGATIVE>	Sets trigger edge

Controlling the PM-1600 Automatically or Remotely
Specific Commands—Quick Reference

Command					Parameter/ Response	Description
TRAC	DATA?				(+999.9999E±99; +999.9999E±99;...) [W] or (±999.9999; ±999.9999;...) [dB or dBm]	Gets measurements
	POIN			a	<9999>	Sets number of points
	POIN?				(9999)	Gets number of points
TRIG	SEQ	LEV		a	<+999.9999E±99> [W] or <±999.9999> [dBm]	Sets trigger level
		LEV?			(+999.9999E±99) [W] or <±999.9999> [dBm]	Gets trigger level
		SLOP		a	<POSITIVE| NEGATIVE>	Sets trigger edge

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Command					Parameter/ Response	Description
TRIG	SEQ	SLOP?			(POSITIVE|NEGATIVE)	Gets trigger edge
		SOUR		[a]	<EXTERNAL|INTERNAL1|2>	Sets trigger source
		SOUR?			(EXTERNAL|INTERNAL1|2)	Gets trigger source
		STAT			<0|1>	Activates/deactivates trigger
		STAT?			(0|1)	Checks if trigger is active
UNIT	POW				<0|1|2|3|DB|DBM|W|W/W>	Sets display unit

a. These commands are not executed if a data acquisition is in progress. The "Acquisition already running" message will be returned.

Controlling the PM-1600 Automatically or Remotely
Specific Commands—Quick Reference

Command					Parameter/ Response	Description
TRIG	SEQ	SLOP?			(POSITIVE|NEGATIVE)	Gets trigger edge
		SOUR		[a]	<EXTERNAL|INTERNAL1|2>	Sets trigger source
		SOUR?			(EXTERNAL|INTERNAL1|2)	Gets trigger source
		STAT			<0|1>	Activates/deactivates trigger
		STAT?			(0|1)	Checks if trigger is active
UNIT	POW				<0|1|2|3|DB|DBM|W|W/W>	Sets display unit

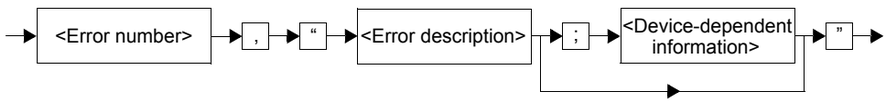
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Error Messages

System and device-specific errors are managed by the PM-1600. The generic format for error messages is illustrated in the following figure.



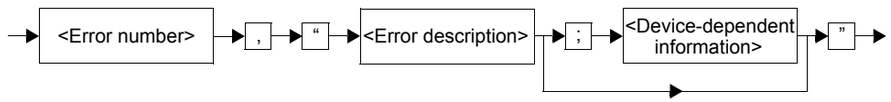
As shown in the figure above, the message contains three parts: the error number, the error description, and device-dependent information. All error messages are stacked in a FIFO buffer. When there is at least one message in the buffer, bit 2 of the Status Byte Register is set to 1. Use the SYST:ERR? query to read the most recent message. The error message buffer is initialized when starting up the PM-1600, when executing the *CLS command, or when reading the last message stored in the buffer.

- Error messages ending with a negative number are SCPI-based errors.
- Error messages ending with a positive number are specific to the PM-1600.

Controlling the PM-1600 Automatically or Remotely
Error Messages

Error Messages

System and device-specific errors are managed by the PM-1600. The generic format for error messages is illustrated in the following figure.



As shown in the figure above, the message contains three parts: the error number, the error description, and device-dependent information. All error messages are stacked in a FIFO buffer. When there is at least one message in the buffer, bit 2 of the Status Byte Register is set to 1. Use the SYST:ERR? query to read the most recent message. The error message buffer is initialized when starting up the PM-1600, when executing the *CLS command, or when reading the last message stored in the buffer.

- Error messages ending with a negative number are SCPI-based errors.
- Error messages ending with a positive number are specific to the PM-1600.

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SCPI Management Errors (System Errors)

Error Number	Description	Probable Cause
–100	“Command error”	An error occurred while validating a command.
–101	“Undefined header”	Unknown command.
–102	“Missing parameter”	A required data parameter was not detected.
–103	“Parameter not allowed”	Too many parameters were detected for the specified command.
–104	“Data type error”	A data parameter is not the expected data type.
–200	“Execution error”	An error occurred while executing the command.
–300	“Device dependent error”	A command has taken longer than expected to complete execution.
–400	“Query error”	Attempt to read an empty buffer or buffer data has been lost.
–500	“System error”	System is out of memory.

Controlling the PM-1600 Automatically or Remotely
SCPI Management Errors (System Errors)

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–400	“Query error”	Attempt to read an empty buffer or buffer data has been lost.
–500	“System error”	System is out of memory.

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PM-1600 Error Messages

Error Number	Description	Probable Cause
1602	“Invalid channel”	The specified channel number is invalid.
1603	“Light on detector”	A nulling command has been attempted with light reaching the detector.
1604	“Invalid parameter”	The high-speed power meter has received a data parameter that it was not expecting.
1605	“Parameter out of range”	The high-speed power meter has received a data parameter outside the valid range.
1606	“Acquisition already running”	A command was sent while an acquisition was in progress.
1607	“Acquisition not running”	A command to stop an acquisition was sent with no acquisition in progress.
1612	“Invalid unit”	The specified unit is not valid.
1615	“Invalid sampling rate”	The selected sampling rate is not compatible with the current acquisition mode (continuous or single).
1616	“Module timeout on nulling”	The nulling process could not be performed.
1617	“Automatic range cannot be used for programmed acquisition”	A manual range must be selected for a programmed acquisition.
1618	“Command not processed: internal error”	An internal error caused the command to fail.
1619	“Segment not allowed”	No data in the segment.
1620	“No data logged”	No data was logged.

Controlling the PM-1600 Automatically or Remotely
PM-1600 Error Messages

PM-1600 Error Messages

Error Number	Description	Probable Cause
1602	“Invalid channel”	The specified channel number is invalid.
1603	“Light on detector”	A nulling command has been attempted with light reaching the detector.
1604	“Invalid parameter”	The high-speed power meter has received a data parameter that it was not expecting.
1605	“Parameter out of range”	The high-speed power meter has received a data parameter outside the valid range.
1606	“Acquisition already running”	A command was sent while an acquisition was in progress.
1607	“Acquisition not running”	A command to stop an acquisition was sent with no acquisition in progress.
1612	“Invalid unit”	The specified unit is not valid.
1615	“Invalid sampling rate”	The selected sampling rate is not compatible with the current acquisition mode (continuous or single).
1616	“Module timeout on nulling”	The nulling process could not be performed.
1617	“Automatic range cannot be used for programmed acquisition”	A manual range must be selected for a programmed acquisition.
1618	“Command not processed: internal error”	An internal error caused the command to fail.
1619	“Segment not allowed”	No data in the segment.
1620	“No data logged”	No data was logged.

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9 Customizing the PM-1600 Display

Setting Backlight

In certain circumstances, you might want to deactivate the backlight that illuminates the display.

To deactivate the backlight,

1. Press *Setup* to access the *Setup* menu.
2. Press *ENTER* to access the **System Setup** menu.
3. Use the up/down or left/right arrow keys to select **Backlight**.
4. Press *ENTER* to access the backlight edit box.
5. Use the up/down arrow keys until the backlight value changes to OFF.

Note: *To reactivate the backlight, follow steps 1 to 5, except that the backlight value has to be set to ON.*

Note: *You can deactivate the backlight while in the power measurement mode by pressing* Shift*, then the left arrow key. To subsequently reactivate the backlight, press* Shift*, then the right arrow key.*

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Setting Display Contrast

To set the contrast,

1. Press *Setup* to access the *Setup* menu.
2. Press *ENTER* to access the **System Setup** menu.
3. Use the up/down or left/right arrow keys to select **Contrast**.
4. Press *ENTER* to access the contrast edit box.
5. Use the up/down arrow keys to adjust the contrast as required.
6. Confirm the contrast adjustment by pressing *ENTER*.

Note: *You can adjust the display contrast from within the power measurement mode by pressing* Shift*, then the up/down arrow keys. To confirm the contrast adjustment, press* Shift *again.*

Choosing Video Mode

To set the video mode,

1. Press *Setup* to access the *Setup* menu.
2. Press *ENTER* to access the **System Setup** menu.
3. Use the up/down or left/right arrow keys to select **Video Mode**.
4. Press *ENTER* to access the video mode edit box.
5. Use the up/down arrow keys to set the required video mode.

Customizing the PM-1600 Display
Setting Display Contrast

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1. Press *Setup* to access the *Setup* menu.
2. Press *ENTER* to access the **System Setup** menu.
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Choosing Video Mode

To set the video mode,

1. Press *Setup* to access the *Setup* menu.
2. Press *ENTER* to access the **System Setup** menu.
3. Use the up/down or left/right arrow keys to select **Video Mode**.
4. Press *ENTER* to access the video mode edit box.
5. Use the up/down arrow keys to set the required video mode.

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Sampling	256Hz	RS232/GPIB	GPIB
Refresh Rate	16Hz	GPIB Addr.	15
Backlight	ON	Save	# 3
Contrast	▼ ◐ ▲	Recall	# 3
Video Mode	STD	Exit	

Sampling	256Hz	RS232/GPIB	GPIB
Refresh Rate	16Hz	GPIB Addr.	15
Backlight	ON	Save	# 3
Contrast	▼ ◐ ▲	Recall	# 3
Video Mode	INV	Exit	

6. Press *ENTER* to confirm the video mode.

Customizing the PM-1600 Display
Choosing Video Mode

Sampling	256Hz	RS232/GPIB	GPIB
Refresh Rate	16Hz	GPIB Addr.	15
Backlight	ON	Save	# 3
Contrast	▼ ◐ ▲	Recall	# 3
Video Mode	STD	Exit	

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Refresh Rate	16Hz	GPIB Addr.	15
Backlight	ON	Save	# 3
Contrast	▼ ◐ ▲	Recall	# 3
Video Mode	INV	Exit	

6. Press *ENTER* to confirm the video mode.

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System Parameters	
Refresh rate	4 Hz
Sampling rate	4 Hz
Backlight	ON
Video mode	Standard
RS-232/GPIB address	12
Active channel	#1
Active program	#1
Shortlisted wavelengths	Six wavelengths (see note on page 26) with CF OFF

Program Parameters	
Delay	00h00m00s
Duration	00h00m01s
Trigger	Inactive
Sampling rate	1 Hz
Number of points	0001/Ch.

Customizing the PM-1600 Display
Choosing Video Mode

System Parameters	
Refresh rate	4 Hz
Sampling rate	4 Hz
Backlight	ON
Video mode	Standard
RS-232/GPIB address	12
Active channel	#1
Active program	#1
Shortlisted wavelengths	Six wavelengths (see note on page 26) with CF OFF

Program Parameters	
Delay	00h00m00s
Duration	00h00m01s
Trigger	Inactive
Sampling rate	1 Hz
Number of points	0001/Ch.

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10 Maintenance

To help ensure long, trouble-free operation,

- Keep the unit free of dust.
- Clean the unit casing with a tissue that has been 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.
- If any liquids are spilled on or into the unit, turn off the power immediately and let the unit dry completely.
- Avoid unnecessary shocks and vibrations.

WARNING

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Cleaning the Front Panel

Clean the front panel of the module regularly to avoid build-up of dust, dirt, and other foreign substances.

To clean the front panel,

1. Gently wipe the front panel with a cloth that has been dampened with soapy water.
2. Rinse the front panel with a cloth that has been dampened with water.
3. Dry with a clean wiping cloth.

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IMPORTANT

To help keep the various connectors and adapters clean, EXFO recommends that you install protective caps when the unit is not in use. You should also clean the fiber ends before every connection.

Cleaning Fixed Connectors

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

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.

Maintenance
Cleaning Fixed Connectors

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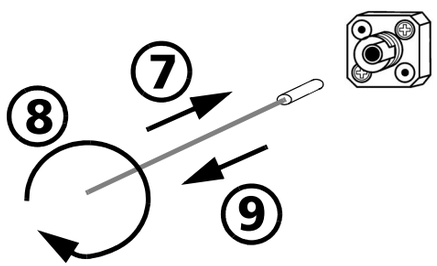
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6. Moisten a cleaning tip (2.5 mm tip) provided by EXFO with *only one drop* of isopropyl alcohol.

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

Note: *Make sure that you do not 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.

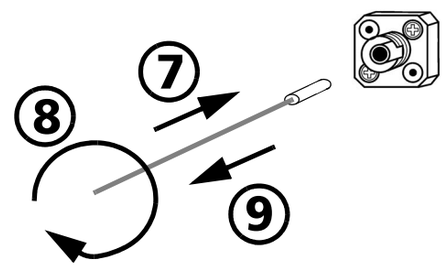
Maintenance
Cleaning Fixed Connectors

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Cleaning Connectors Equipped with EUI/EUA Adapters

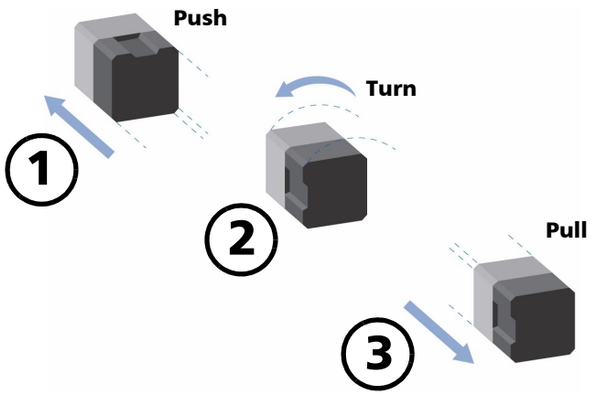
Regular cleaning of connectors equipped with EUI/EUA adapters will help maintain optimum performance. There is no need to disassemble the unit.

IMPORTANT

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

To clean connectors,

1. Remove the EUI/EUA adapter from the module to expose the optical connector baseplate and ferrule.



2. Use a lint-free wiping cloth and deposit *only one drop* of isopropyl alcohol on it.

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.

Maintenance
Cleaning Connectors Equipped with EUI/EUA Adapters

Cleaning Connectors Equipped with EUI/EUA Adapters

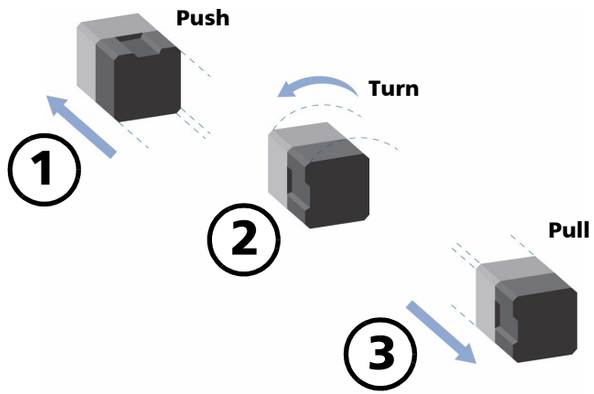
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2. Use a lint-free wiping cloth and deposit *only one drop* of isopropyl alcohol on it.

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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.

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3. Gently wipe the connector and ferrule.

IMPORTANT

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

4. With a dry lint-free wiping cloth, gently wipe the same surfaces in order to be sure that the connector and ferrule are perfectly dry.
5. Throw out the wiping cloths after one use.
6. After having cleaned the connectors and having made sure that the unit is not active, verify the surface of the connector with a small, portable fiber-optic microscope.

Maintenance
Cleaning Connectors Equipped with EUI/EUA Adapters

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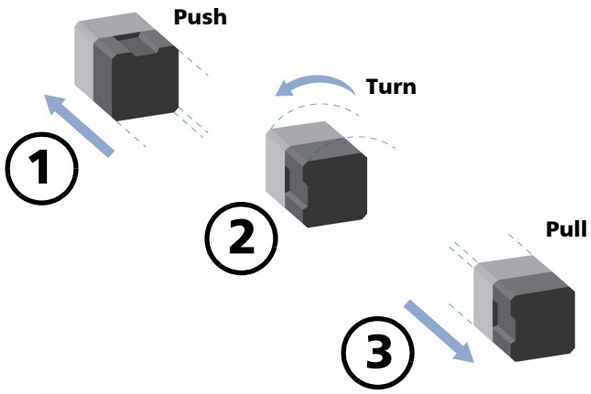
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Cleaning EUI/EUA Adapters

To clean EUI/EUA adapters,

1. Remove the EUI/EUA adapter from the module connector.



2. Moisten a cleaning tip (2.5 mm tip) provided by EXFO with *only one drop* of isopropyl alcohol.

IMPORTANT

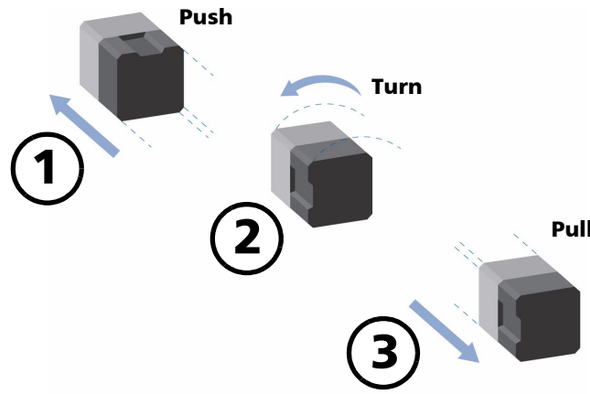
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Maintenance
Cleaning EUI/EUA Adapters

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1. Remove the EUI/EUA adapter from the module connector.



2. Moisten a cleaning tip (2.5 mm tip) provided by EXFO with *only one drop* of isopropyl alcohol.

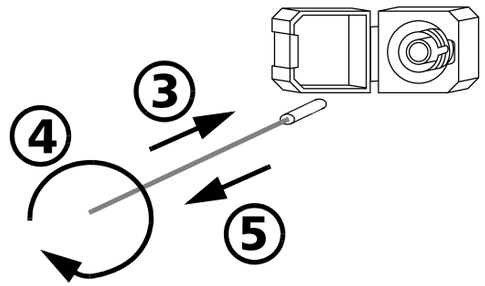
IMPORTANT

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.

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3. Slowly insert the cleaning tip into the adapter until it comes out on the other side (a slow clockwise rotating movement may help).



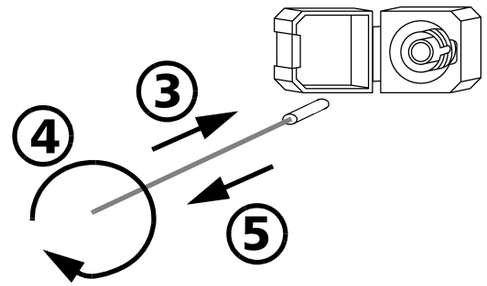
4. Gently turn the cleaning tip one full turn.
5. Continue to turn as you withdraw the cleaning tip.
6. Perform steps 3 to 5 again, but this time with a dry cleaning tip (2.5 mm tip provided by EXFO).

Note: *Make sure that you do not touch the soft end of the cleaning tip, and verify the cleanliness of the cotton tip.*

7. Throw out the cleaning tips after one use.

Maintenance
Cleaning EUI/EUA Adapters

3. Slowly insert the cleaning tip into the adapter until it comes out on the other side (a slow clockwise rotating movement may help).



4. Gently turn the cleaning tip one full turn.
5. Continue to turn as you withdraw the cleaning tip.
6. Perform steps 3 to 5 again, but this time with a dry cleaning tip (2.5 mm tip provided by EXFO).

Note: *Make sure that you do not touch the soft end of the cleaning tip, and verify the cleanliness of the cotton tip.*

7. Throw out the cleaning tips after one use.

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Cleaning Detector Ports

IMPORTANT

To help keep the detectors and adapters clean, EXFO recommends that you install protective caps when the unit is not in use. You should also clean the fiber ends before every connection.

Regular cleaning of connectors will help maintain optimum performance.

To clean detector ports,

1. Remove the detector protective cap and the connector adapter (FOA).
2. If the detector is dusty, remove dirt with compressed air.
3. Take a cleaning tip from the package (supplied with EXFO's power meters) being careful not to touch the soft end of the swab.

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.

4. Moisten the cleaning tip with *only one drop* of isopropyl alcohol.

Maintenance
Cleaning Detector Ports

Cleaning Detector Ports

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4. Moisten the cleaning tip with *only one drop* of isopropyl alcohol.

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CAUTION

To avoid breaking the detector window during cleaning, be careful not to apply too much pressure on it.

5. While applying light pressure, gently rotate the cleaning tip on the detector window.
6. Repeat step 5, but this time with a dry cleaning tip or blow dry with compressed air.
7. 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 lint-free swab dipped in isopropyl alcohol, then dry using clean compressed air or with a dry lint-free swab.

Maintenance
Cleaning the Analog Output and External Trigger Ports

CAUTION

To avoid breaking the detector window during cleaning, be careful not to apply too much pressure on it.

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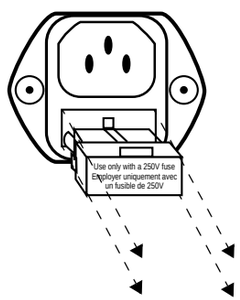
Replacing the Fuse

The PM-1600 contains two fuses of type IEC, 250 V, 2 A, fast blow 0.197" x 0.787"/5 mm x 20 mm. The fuse holder is located at the back of the PM-1600, just beside the power inlet.

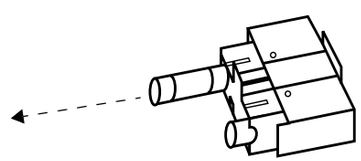
This symbol, found at the back of the PM-1600, indicates that the user should refer to the instruction manual for fuse replacement and power rating.

To replace the fuse,

1. Unplug the power cord from the PM-1600.
2. Pull the fuse holder out of the PM-1600.



3. Verify and replace the fuses if necessary.



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

Maintenance
Replacing the Fuse

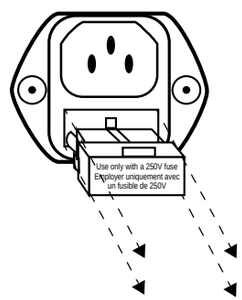
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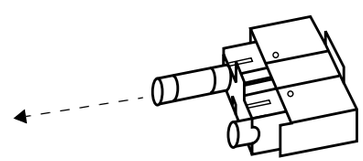
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Recalibrating the Unit

If a calibration due date is not indicated on the calibration label, this means that the calibration certificate for your instrument has been modified to follow the ISO/IEC 17025 standard.

EXFO recommends that an annual calibration be performed on your instrument to ensure that it remains within the published specifications. However, as prescribed by the ISO/IEC 17025 standard, this date can only be set by you.

You should indicate the calibration due date in the space provided on the calibration label.

Software Upgrade

To upgrade the PM-1600 embedded software using a diskette, you must connect your PM-1600 to a computer through a null modem cable.

Note: *The software upgrade may be performed in DOS, Windows 3.1, or Windows 95. If problems occur, please contact EXFO.*

IMPORTANT

When using a notebook computer to upgrade the PM-1600 software, you should perform the upgrade in a DOS environment.

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

Maintenance
Recalibrating the Unit

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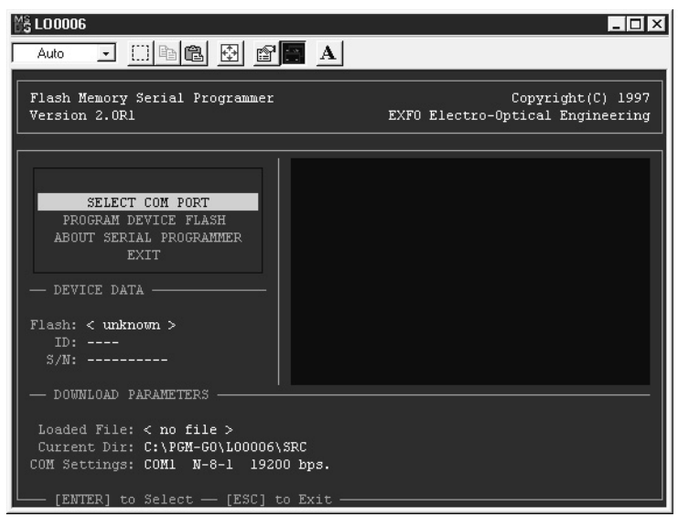
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To perform a software upgrade,

1. Turn off the PM-1600.
2. Connect one end of a null modem cable to the PM-1600 RS-232 serial port and the other end to an unused communication port on your computer (ex. COM2).
3. Insert the upgrade diskette into the computer diskette drive.
4. Create a new directory on the computer hard drive, then copy the contents of the diskette into the new directory.
5. Execute the “lo0006.exe” file to start the software upgrade.

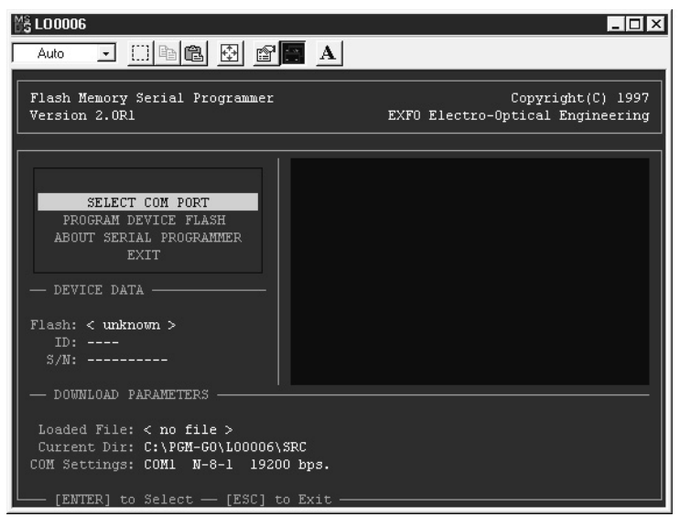


6. Highlight the “SELECT COM PORT” command, then press *Enter*.
7. Select the COM port to which the null modem cable is connected on your computer, then press *Enter*.
8. Highlight the “PROGRAM DEVICE FLASH” command, then press *Enter*.

Maintenance
Software Upgrade

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9. Once you see the “Waiting for device handshake” message, turn on the PM-1600. The PM-1600 screen will remain off; the unit will beep once and programming will start automatically. A progress bar on the computer screen will indicate the status of the software upgrade.
10. Once the software upgrade is complete, the “Reboot device for self-test” message will appear.
11. Turn the PM-1600 off and then on again to use the upgraded software. During self-test execution, the PM-1600 should display the new software version number.

Maintenance
Software Upgrade

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High-Speed Power Meter 101

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Problem	Probable Cause	Recommended Action
- - - - - - - displayed as power value.	Power level is below the minimum detectable power.	Select Autorange if a manual range is selected, or choose a lower manual range.
+++++++ displayed as power value.	Power level is above the maximum detectable power (saturation).	Select Autorange if a manual range is selected, or choose a higher manual range.
		Turn the source off.
!!!!!!! displayed as power value.	Unstable or modulated input signal.	Select a manual range.
Questionable readings displayed.	Dirty detector or optical connectors.	Clean the detector and all optical connections.
	Improper wavelength selected.	Switch to the correct wavelength on all instruments being used.
	Incorrect offset nulling.	Perform an offset nulling with protective cap installed.
	Unstable optical source.	Wait for source to stabilize.
	Wrong correction factor.	Reset the correction factor to +0.000 dB or 1.0000 W/W

11 Troubleshooting

Problem	Probable Cause	Recommended Action
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	Unstable optical source.	Wait for source to stabilize.
	Wrong correction factor.	Reset the correction factor to +0.000 dB or 1.0000 W/W

High-Speed Power Meter 103

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Finding Information on the EXFO Web Site

The EXFO Web site provides answers to frequently asked questions (FAQs) regarding the use of your product.

To access FAQs,

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

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Troubleshooting
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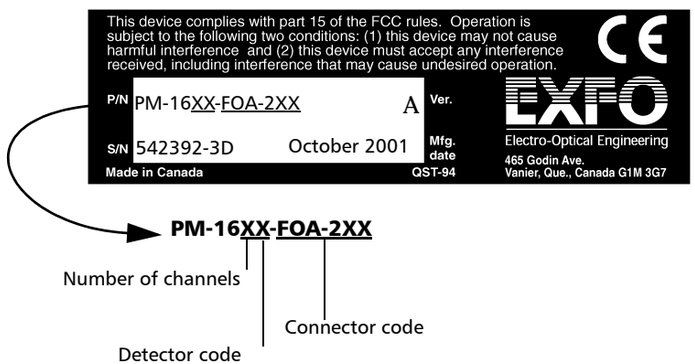
Contacting the Technical Support Group

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, 7:30 a.m. to 8:00 p.m. (Eastern Time in North America).

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

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

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



Troubleshooting
Contacting the Technical Support Group

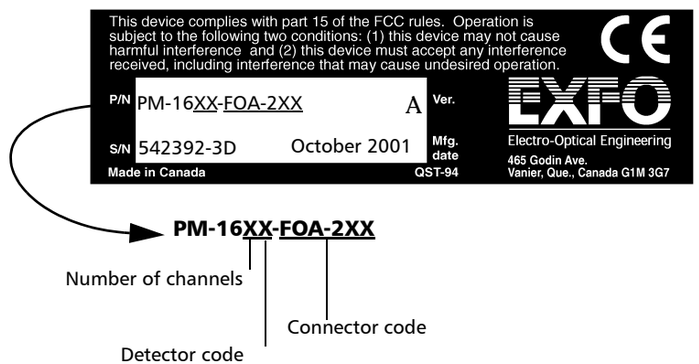
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Transportation

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 the original packing material when shipping.
- Avoid high humidity or large temperature fluctuations.
- Keep the unit out of direct sunlight.
- Avoid unnecessary shock and vibration.

Troubleshooting
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12 Warranty

General Information

EXFO Electro-Optical Engineering Inc. (EXFO) warrants this equipment against defects in material and workmanship for a period of one year 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 recalibrate the product free of charge should the equipment need to be repaired or if the original calibration is erroneous.

IMPORTANT

The warranty can become null and void if

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

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

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Liability

EXFO shall not be liable for damages resulting from the use of the purchased product, nor shall be responsible for any failure in the performance of other items to which the purchased product is connected or the operation of any system of which the purchased 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, and batteries used with EXFO products are not covered by this warranty.

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

Warranty
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Service and Repairs

EXFO commits to providing product service and repair for five years after 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 110). Support personnel will determine if the equipment requires service, repair, or calibration.
2. If the equipment must be returned to EXFO or an authorized service center, support personnel will issue a Return Merchandise Authorization (RMA) number and an address for return.

IMPORTANT

Never send any unit or accessory back to EXFO without a Return Merchandise Authorization (RMA) number.

3. If the unit has an internal storage device, do a backup of your data before sending the unit for repairs.
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 by the support personnel. Be sure to write the RMA number on the shipping slip. EXFO will refuse and return any package that does not bear an RMA number.

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

After repair, the equipment will be returned with a repair report. If the equipment is not under warranty, the customer will be invoiced for the cost appearing on this report. Return-to-customer shipping costs will be paid by EXFO for equipment under warranty. Shipping insurance is at the customer's expense.

Warranty
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EXFO Service Centers Worldwide

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

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

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

EXFO Europe Service Center
Le Dynasteur
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92366 Meudon la Forêt Cedex
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Fax: +33.1.40.83.04.42
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P.R. CHINA

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151 Chin Swee Road
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asiapacific.service@exfo.com

Burleigh Instruments Service Center
7647 Main Street Fishers
Victor, NY 14564
USA

Tel.: (716) 924-9355
Fax: (716) 924-9072
service@burleigh.com

Warranty
EXFO Service Centers Worldwide

EXFO Service Centers Worldwide

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CANADA

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EXFO Europe Service Center
Le Dynasteur
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92366 Meudon la Forêt Cedex
FRANCE

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Fax: +33.1.40.83.04.42
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Office Tower
No. 6 Southern Capital Gym Road
Beijing 100044
P.R. CHINA

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110 PM-1600

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A Technical Specifications

IMPORTANT

The technical specifications for this product 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[1]

Model		PM-1613/1623	PM-1613W/1623W
Number of detectors		1/2	1/2
Detector type		InGaAs	InGaAs
Detector size (mm)		1	3
Wavelength range (nm)		800 to 1700	800 to 1700
Power range[2] (dBm)		9 to –80	8 to –70
Uncertainty[3] (%)		± 5 (0 to –55 dBm)	± 5 (0 to –50 dBm)
Linearity[4] (dB)		± 0.015 (0 to –55 dBm)	± 0.015 (0 to –50 dBm)
Noise (peak-to-peak)[5] (pW)		3	20
Power resolution (dB)		0.001 (9 to –40 dBm)	0.001 (8 to –40 dBm)
Wavelength resolution (nm)		0.01	0.01
Stabilization time (ms)			
automatic range		12 (9 to –85 dBm)	6 (8 to –75 dBm)
automatic range		3 (9 to –49 dBm)	3 (8 to –49 dBm)
fixed range (1 to 4)		1	1
Sampling rate (sample/s/channel)			
fast acquisition mode		up to 4096	up to 4096
continuous measurement mode		up to 256	up to 256
Fiber type (µm)		5/125 to 62.5/125	5/125 to 62.5/125
Analog output	bandwidth[6] (Hz) (ranges 1 to 6)	700 k; 700 k; 30 k; 30 k; 150; 150; typical	50 k; 7.5 k; 5 k; 7 k; 1 k; 1 k; typical
	output voltage (V)	between 0 and 2.15, typical	between 0 and 2.15, typical
	output impedance (Ω)	640	640

General Specifications

External trigger	input voltage (V)	0 to 5 (TTL)	
Size (H x W x D)		11.7 cm x 22.2 cm x 33.3 cm	(4 5/8 in x 8 3/4 in x 13 1/8 in)
Weight		2.8 kg	(6.2 lb)
Temperature	operating	0 °C to 40 °C	(32 °F to 104 °F)
	storage	–35 °C to 70 °C	(–31 °F to 158 °F)
Relative humidity[7]		0 to 80 % non-condensing	

Notes

1. All specifications are measured at 1310 nm (unless otherwise specified) with an FC/non-angled connector and a warmup time of 20 minutes (30 minutes for PM-16X3W), followed by an offset nulling.
2. From 18 °C to 32 °C
3. Measured at 23 °C ± 1 °C with FOA-222 between 1000 and 1640 nm. Add 1 % to uncertainty below 1000 nm and 6 % over 1640 nm. All uncertainties are valid on the day of calibration.
4. Averaged measurement at constant temperature in 0 to 40 °C range.
5. Averaging time 0.25 s, observation time 50 s at 23 °C ± 1 °C, from 1200 nm to 1640 nm.
6. Bandwidth corresponds to each electrical scale from the lowest to the highest gain.
7. Measured in 0 °C to 40 °C range.

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Specifications[1]

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Detector type		InGaAs	InGaAs
Detector size (mm)		1	3
Wavelength range (nm)		800 to 1700	800 to 1700
Power range[2] (dBm)		9 to –80	8 to –70
Uncertainty[3] (%)		± 5 (0 to –55 dBm)	± 5 (0 to –50 dBm)
Linearity[4] (dB)		± 0.015 (0 to –55 dBm)	± 0.015 (0 to –50 dBm)
Noise (peak-to-peak)[5] (pW)		3	20
Power resolution (dB)		0.001 (9 to –40 dBm)	0.001 (8 to –40 dBm)
Wavelength resolution (nm)		0.01	0.01
Stabilization time (ms)			
automatic range		12 (9 to –85 dBm)	6 (8 to –75 dBm)
automatic range		3 (9 to –49 dBm)	3 (8 to –49 dBm)
fixed range (1 to 4)		1	1
Sampling rate (sample/s/channel)			
fast acquisition mode		up to 4096	up to 4096
continuous measurement mode		up to 256	up to 256
Fiber type (µm)		5/125 to 62.5/125	5/125 to 62.5/125
Analog output	bandwidth[6] (Hz) (ranges 1 to 6)	700 k; 700 k; 30 k; 30 k; 150; 150; typical	50 k; 7.5 k; 5 k; 7 k; 1 k; 1 k; typical
	output voltage (V)	between 0 and 2.15, typical	between 0 and 2.15, typical
	output impedance (Ω)	640	640

General Specifications

External trigger	input voltage (V)	0 to 5 (TTL)	
Size (H x W x D)		11.7 cm x 22.2 cm x 33.3 cm	(4 5/8 in x 8 3/4 in x 13 1/8 in)
Weight		2.8 kg	(6.2 lb)
Temperature	operating	0 °C to 40 °C	(32 °F to 104 °F)
	storage	–35 °C to 70 °C	(–31 °F to 158 °F)
Relative humidity[7]		0 to 80 % non-condensing	

Notes

1. All specifications are measured at 1310 nm (unless otherwise specified) with an FC/non-angled connector and a warmup time of 20 minutes (30 minutes for PM-16X3W), followed by an offset nulling.
2. From 18 °C to 32 °C
3. Measured at 23 °C ± 1 °C with FOA-222 between 1000 and 1640 nm. Add 1 % to uncertainty below 1000 nm and 6 % over 1640 nm. All uncertainties are valid on the day of calibration.
4. Averaged measurement at constant temperature in 0 to 40 °C range.
5. Averaging time 0.25 s, observation time 50 s at 23 °C ± 1 °C, from 1200 nm to 1640 nm.
6. Bandwidth corresponds to each electrical scale from the lowest to the highest gain.
7. Measured in 0 °C to 40 °C range.

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Electrical and Environmental Specifications	
Operating temperature	0 °C to 40 °C (32 °F to 104 °F)
Relative humidity	0 % to 80 % non-condensing.[a]
Maximum operation altitude	2000 m (6150 ft)
Pollution degree	2
Installation category	II
Power supply rating[b]	100 V to 240 V (50 Hz/60 Hz)
	maximum 2 A

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

Note: *The PM-1600 is intended for indoor use only.*

Technical Specifications

Electrical and Environmental Specifications	
Operating temperature	0 °C to 40 °C (32 °F to 104 °F)
Relative humidity	0 % to 80 % non-condensing.[a]
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Power supply rating[b]	100 V to 240 V (50 Hz/60 Hz)
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Note: *The PM-1600 is intended for indoor use only.*

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B Remote Control (SCPI) Commands

General Commands

The PM-1600 recognizes the main commands identified in IEEE 488.2. These commands, as well as some optional general commands, the programming state commands, and some status queries, are fully explained on the following pages.

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

*ESE	
Description	This command is used to set bits in the Standard Event Status Enable Register (ESE) to a new value (initial value is 255). The contents of the ESE register are logically ANDed with the ESR register. A non zero result will set the Event Summary Bit (ESB) of the Status Byte Register (STB). This command is useful for selecting which events may generate an SRQ.
Syntax	*ESE<space><value>
Parameter	The <value> parameter must be between 0 and 255.

B Remote Control (SCPI) Commands

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The PM-1600 recognizes the main commands identified in IEEE 488.2. These commands, as well as some optional general commands, the programming state commands, and some status queries, are fully explained on the following pages.

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Syntax *CLS

*ESE

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

Syntax *ESE<space><value>

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

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*ESE?

Description	This query reads the contents of the Standard Event Status Enable Register (ESE).
Syntax	*ESE?
Response	A binary integer between 0 and 255.

*ESR?

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

*IDN?

Description	This query reads the IQ system identification string.
Syntax	*IDN?
Response	“EXFO E.-O. Eng PM-1600 Vxx.xx”, where xx.xx is the current product version.

Remote Control (SCPI) Commands
General Commands

*ESE?

Description	This query reads the contents of the Standard Event Status Enable Register (ESE).
Syntax	*ESE?
Response	A binary integer between 0 and 255.

*ESR?

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

*IDN?

Description	This query reads the IQ system identification string.
Syntax	*IDN?
Response	“EXFO E.-O. Eng PM-1600 Vxx.xx”, where xx.xx is the current product version.

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*LOK

Description This command is used to set the Remote Lockout programming state, i.e., to lock and unlock the PM-1600 keypad. Once the PM-1600 keypad is locked, no external input can interfere with the GPIB communication. The only way to unlock the keypad is to use the *LOK command again or turn off the unit.

Syntax *LOK<space><data>

Parameters The <data> parameter can be “1” to set the Remote programming state to Remote Lockout or “0” to set the Remote programming state to Remote.

*OPC

Description This command will cause the PM-1600 to generate the “Operation complete” message in the Standard Event Status Register (ESR) when all pending selected PM-1600 operations have been completed.

Syntax *OPC

Example *OPC;*IDN?

*OPC?

Description This query puts an ASCII 1 in the output queue when the content of the input queue has been processed. This query is useful to prevent another command from being processed until the current command is complete.

Syntax *OPC?

Response “1”

Remote Control (SCPI) Commands
General Commands

*LOK

Description This command is used to set the Remote Lockout programming state, i.e., to lock and unlock the PM-1600 keypad. Once the PM-1600 keypad is locked, no external input can interfere with the GPIB communication. The only way to unlock the keypad is to use the *LOK command again or turn off the unit.

Syntax *LOK<space><data>

Parameters The <data> parameter can be “1” to set the Remote programming state to Remote Lockout or “0” to set the Remote programming state to Remote.

*OPC

Description This command will cause the PM-1600 to generate the “Operation complete” message in the Standard Event Status Register (ESR) when all pending selected PM-1600 operations have been completed.

Syntax *OPC

Example *OPC;*IDN?

*OPC?

Description This query puts an ASCII 1 in the output queue when the content of the input queue has been processed. This query is useful to prevent another command from being processed until the current command is complete.

Syntax *OPC?

Response “1”

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*REM

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

*RST

Description This command empties the step response list. It is only seen when it is part of another multiple command. In the example below, by adding this command after *IDN?, you will not be able to access the answer. The *RST, in this instance, erases the identification string. In addition, this command performs the following operations:

1. Returns to initial state before command was sent and not necessarily to previous settings.
2. Forces the device to go into an Operation Complete Command Idle State (OCIS).
3. Forces the device to go into an Operation Complete Query Active State (OQAS).
4. Initialize sprevious responses unless there has been a program message terminator preceded by an *RST.

Syntax *RST

Example *IDN?;*RST<NL>

Remote Control (SCPI) Commands
*General Commands

*REM

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

*RST

Description This command empties the step response list. It is only seen when it is part of another multiple command. In the example below, by adding this command after *IDN?, you will not be able to access the answer. The *RST, in this instance, erases the identification string. In addition, this command performs the following operations:

1. Returns to initial state before command was sent and not necessarily to previous settings.
2. Forces the device to go into an Operation Complete Command Idle State (OCIS).
3. Forces the device to go into an Operation Complete Query Active State (OQAS).
4. Initialize sprevious responses unless there has been a program message terminator preceded by an *RST.

Syntax *RST

Example *IDN?;*RST<NL>

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*SRE

Description This command sets bits in the Service Request Enable Register (SRE; initial value is 255), and enables the corresponding bit in the Status Byte Register (STB). The command can be used to select which events can initiate a service request.

Syntax *SRE<space><value>

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

*SRE?

Description This query returns the contents of the Service Request Enable Register (SRE).

Syntax *SRE?

Response A binary integer between 0 and 255.

*STB?

Description This query returns the contents of the Status Byte Register (STB).

Syntax *STB?

Response A binary integer between 0 and 255.

Remote Control (SCPI) Commands
General Commands

*SRE

Description This command sets bits in the Service Request Enable Register (SRE; initial value is 255), and enables the corresponding bit in the Status Byte Register (STB). The command can be used to select which events can initiate a service request.

Syntax *SRE<space><value>

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

*SRE?

Description This query returns the contents of the Service Request Enable Register (SRE).

Syntax *SRE?

Response A binary integer between 0 and 255.

*STB?

Description This query returns the contents of the Status Byte Register (STB).

Syntax *STB?

Response A binary integer between 0 and 255.

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SYSTem:ERRor?

Description	This command returns the next error on the list. When an error is generated, an error number is sent to the error list. The error list is accessed with the SYST:ERR? query. If the list contains 20 errors and a new error occurs, the first error will be erased.
Syntax	SYST:ERR?
Response	See error list and descriptions in *Error Messages* on page 81.

SYSTem:VERSion?

Description	This query returns the current system software version.
Syntax	SYST:VERS?
Response	“EXFO E.O. Engineering PM-1600 Vxx.xx”, where xx.xx is the current product version.
Note	The *IDN? and SYST:VERS? queries are equivalent. They give the same result.

*TRG

Description	This command is not supported
Syntax	*TRG

Remote Control (SCPI) Commands
*General Commands

SYSTem:ERRor?

Description	This command returns the next error on the list. When an error is generated, an error number is sent to the error list. The error list is accessed with the SYST:ERR? query. If the list contains 20 errors and a new error occurs, the first error will be erased.
Syntax	SYST:ERR?
Response	See error list and descriptions in *Error Messages* on page 81.

SYSTem:VERSion?

Description	This query returns the current system software version.
Syntax	SYST:VERS?
Response	“EXFO E.O. Engineering PM-1600 Vxx.xx”, where xx.xx is the current product version.
Note	The *IDN? and SYST:VERS? queries are equivalent. They give the same result.

*TRG

Description	This command is not supported
Syntax	*TRG

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*TST?

Description	This query initiates an internal self-test and returns a binary value indicating the results of the test. If an error occurs, it is possible to return the error using the SYST:ERR? query.
Syntax	*TST?
Response	A binary value “0”- test is complete with no errors “1”- test is complete with errors

*WAI

Description	This command is not supported
Syntax	*WAI

Remote Control (SCPI) Commands
*General Commands

*TST?

Description	This query initiates an internal self-test and returns a binary value indicating the results of the test. If an error occurs, it is possible to return the error using the SYST:ERR? query.
Syntax	*TST?
Response	A binary value “0”- test is complete with no errors “1”- test is complete with errors

*WAI

Description	This command is not supported
Syntax	*WAI

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Specific Commands

There are some commands specific to the PM-1600. These commands are fully explained on the following pages.

ABORt

Description	This command stops any measurement in progress in continuous mode, on all channels when using a multichannel high-speed power meter.
Syntax	ABOR
Example	ABOR

FETCh[:SCALar]:POWer:DC?

Description	This query returns the stored value (for the selected channel when using a PM-1620).
Syntax	FETC[:SCAL]:POW:DC?
Response	A power measurement in the +999.9999E±99 format for W and W/W units and ±999.9999 for dBm and dB units in the currently selected unit. The number of digits after the decimal point depends on the selected resolution. To change the resolution of the displayed power value in dB or dBm, use the FORM:READ[:DATA] command. To know the current measurement unit, use the SENS:POW:UNIT? query.
Example	FETC:SCAL:POW:DC?
See also	INIT:CONT, INIT:CONT?, INIT[:IMM], and READ[:SCAL]:POW:DC?

Remote Control (SCPI) Commands
Specific Commands

Specific Commands

There are some commands specific to the PM-1600. These commands are fully explained on the following pages.

ABORt

Description	This command stops any measurement in progress in continuous mode, on all channels when using a multichannel high-speed power meter.
Syntax	ABOR
Example	ABOR

FETCh[:SCALar]:POWer:DC?

Description	This query returns the stored value (for the selected channel when using a PM-1620).
Syntax	FETC[:SCAL]:POW:DC?
Response	A power measurement in the +999.9999E±99 format for W and W/W units and ±999.9999 for dBm and dB units in the currently selected unit. The number of digits after the decimal point depends on the selected resolution. To change the resolution of the displayed power value in dB or dBm, use the FORM:READ[:DATA] command. To know the current measurement unit, use the SENS:POW:UNIT? query.
Example	FETC:SCAL:POW:DC?
See also	INIT:CONT, INIT:CONT?, INIT[:IMM], and READ[:SCAL]:POW:DC?

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FORMat:READings[:DATA]

Description	This command changes the resolution of the displayed power value when dB or dBm is selected (for the selected channel when using a PM-1620). If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.
Syntax	FORM:READ[:DATA]<space><digits>
Parameters	The <digits> parameter can be “0”- no digits after the decimal point “1”- one digit after the decimal point “2”- two digits after the decimal point “3”- three digits after the decimal point “4”- four digits after the decimal point “5”- auto-resolution, determined by the measured power level
Example	FORM:READ:DATA 3

Remote Control (SCPI) Commands
Specific Commands

FORMat:READings[:DATA]

Description	This command changes the resolution of the displayed power value when dB or dBm is selected (for the selected channel when using a PM-1620). If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.
Syntax	FORM:READ[:DATA]<space><digits>
Parameters	The <digits> parameter can be “0”- no digits after the decimal point “1”- one digit after the decimal point “2”- two digits after the decimal point “3”- three digits after the decimal point “4”- four digits after the decimal point “5”- auto-resolution, determined by the measured power level
Example	FORM:READ:DATA 3

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INITiate:AUTOstop

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 the SENS:FREQ:NCON commands. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.
Syntax	INIT:AUTO<space><boolean>,<CONT|NCON>
Parameters	The <boolean> value refers to “0”- stop acquisition “1”- start acquisition The <CONT|NCON> parameter refers to “CONT”- use a low sampling rate “NCON”- use a high sampling rate
Example	INIT:AUTO 1,CONT
See also	ABOR, INIT:AUTO?, INIT:CONT, INIT:CONT?, INIT[:IMM], and TRAC:POIN

INITiate:AUTOstop?

Description	This query returns the state of a programmed acquisition.
Syntax	INIT:AUTO?
Response	“0”- programmed acquisition is off “1”- programmed acquisition is on
Example	INIT:AUTO?
See also	ABOR, INIT:AUTO, INIT:CONT, INIT:CONT?, INIT[:IMM], and TRAC:POIN

Remote Control (SCPI) Commands
Specific Commands

INITiate:AUTOstop

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 the SENS:FREQ:NCON commands. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.
Syntax	INIT:AUTO<space><boolean>,<CONT|NCON>
Parameters	The <boolean> value refers to “0”- stop acquisition “1”- start acquisition The <CONT|NCON> parameter refers to “CONT”- use a low sampling rate “NCON”- use a high sampling rate
Example	INIT:AUTO 1,CONT
See also	ABOR, INIT:AUTO?, INIT:CONT, INIT:CONT?, INIT[:IMM], and TRAC:POIN

INITiate:AUTOstop?

Description	This query returns the state of a programmed acquisition.
Syntax	INIT:AUTO?
Response	“0”- programmed acquisition is off “1”- programmed acquisition is on
Example	INIT:AUTO?
See also	ABOR, INIT:AUTO, INIT:CONT, INIT:CONT?, INIT[:IMM], and TRAC:POIN

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INITiate:CONTinuous

Description This command starts or stops power measurements (for both channels when using a PM-1620) in power measurement mode.

Syntax INIT:CONT<space><boolean>

Parameters The <boolean> value refers to
"0"- stop measurements
"1"- start measurements

Example INIT:CONT 1

See also FETC[:SCAL]:POW:DC?, INIT:CONT?, INIT[:IMM], and READ[:SCAL]:POW:DC?

INITiate:CONTinuous?

Description This query returns a value indicating whether power measurements are in progress (for bothchannels when using a PM-1620) in power measurement mode.

Syntax INIT:CONT?

Response "0"- stopped
"1"- started

Example INIT:CONT?

See also FETC[:SCAL]:POW:DC?, INIT[:IMM], and READ[:SCAL]:POW:DC?

Remote Control (SCPI) Commands
Specific Commands

INITiate:CONTinuous

Description This command starts or stops power measurements (for both channels when using a PM-1620) in power measurement mode.

Syntax INIT:CONT<space><boolean>

Parameters The <boolean> value refers to
"0"- stop measurements
"1"- start measurements

Example INIT:CONT 1

See also FETC[:SCAL]:POW:DC?, INIT:CONT?, INIT[:IMM], and READ[:SCAL]:POW:DC?

INITiate:CONTinuous?

Description This query returns a value indicating whether power measurements are in progress (for bothchannels when using a PM-1620) in power measurement mode.

Syntax INIT:CONT?

Response "0"- stopped
"1"- started

Example INIT:CONT?

See also FETC[:SCAL]:POW:DC?, INIT[:IMM], and READ[:SCAL]:POW:DC?

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INITiate[:IMMediate]

Description	This command stores a power measurement value (for both channels when using a PM-1620).
Syntax	INIT[:IMM]
Example	INIT:IMM
See also	FETC[:SCAL]:POW:DC? and READ[:SCAL]:POW:DC?

INST:NSELect

Description	This command selects a power meter channel (when using a PM-1620). Until a new channel is selected, any subsequent commands will be directed to this channel. An error message appears if the command is sent to a PM-1610.
Syntax	INST:NSEL<space><numeric_value>
Parameters	The <numeric_value> parameter can be 1 or 2.
Example	INST:NSEL 2

INST:NSELect?

Description	This query returns the currently selected power meter channel (when using a PM-1620).
Syntax	INST:NSEL?
Response	A numeric value: 1 or 2.
Example	INST:NSEL?

Remote Control (SCPI) Commands
Specific Commands

INITiate[:IMMediate]

Description	This command stores a power measurement value (for both channels when using a PM-1620).
Syntax	INIT[:IMM]
Example	INIT:IMM
See also	FETC[:SCAL]:POW:DC? and READ[:SCAL]:POW:DC?

INST:NSELect

Description	This command selects a power meter channel (when using a PM-1620). Until a new channel is selected, any subsequent commands will be directed to this channel. An error message appears if the command is sent to a PM-1610.
Syntax	INST:NSEL<space><numeric_value>
Parameters	The <numeric_value> parameter can be 1 or 2.
Example	INST:NSEL 2

INST:NSELect?

Description	This query returns the currently selected power meter channel (when using a PM-1620).
Syntax	INST:NSEL?
Response	A numeric value: 1 or 2.
Example	INST:NSEL?

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READ:ALL:POWer:DC?

Description This command returns the power of both channels in their respective current unit.

Syntax READ:ALL:POW:DC?

Response Returns two values in the +999.9999E±99 format for W and W/W units and ±999.9999 for dBm and dB units. The number of digits after the decimal point depends on the selected resolution. To change the resolution of the displayed power value in dB or dBm, use the FORM:READ[:DATA] command.

Example READ:ALL:POW:DC?

See also READ[:SCAL]:POW:DC?, FETC[:SCAL]:POW:DC?, INIT:CONT?, INIT:CONT and INIT[:IMM]

READ[:SCALar]:POWer:DC?

Description This query performs an initiate and fetch (for the selected channel when using a PM-1620). A measurement value is stored and returned.

Syntax READ[:SCAL]:POW:DC?

Response A power mesurement in the +999.9999E±99 format for W and W/W units and ±999.9999 for dBm and dB units in the currently selected unit. The number of digits after the decimal point depends on the selected resolution. To change the resolution of the displayed power value in dB or dBm, use the FORM:READ[:DATA] command.

Example READ:SCAL:POW:DC?

See also FETC[:SCAL]:POW:DC?, INIT:AUTO, INIT:CONT, INIT:CONT?, and INIT[:IMM]

Remote Control (SCPI) Commands
Specific Commands

READ:ALL:POWer:DC?

Description This command returns the power of both channels in their respective current unit.

Syntax READ:ALL:POW:DC?

Response Returns two values in the +999.9999E±99 format for W and W/W units and ±999.9999 for dBm and dB units. The number of digits after the decimal point depends on the selected resolution. To change the resolution of the displayed power value in dB or dBm, use the FORM:READ[:DATA] command.

Example READ:ALL:POW:DC?

See also READ[:SCAL]:POW:DC?, FETC[:SCAL]:POW:DC?, INIT:CONT?, INIT:CONT and INIT[:IMM]

READ[:SCALar]:POWer:DC?

Description This query performs an initiate and fetch (for the selected channel when using a PM-1620). A measurement value is stored and returned.

Syntax READ[:SCAL]:POW:DC?

Response A power mesurement in the +999.9999E±99 format for W and W/W units and ±999.9999 for dBm and dB units in the currently selected unit. The number of digits after the decimal point depends on the selected resolution. To change the resolution of the displayed power value in dB or dBm, use the FORM:READ[:DATA] command.

Example READ:SCAL:POW:DC?

See also FETC[:SCAL]:POW:DC?, INIT:AUTO, INIT:CONT, INIT:CONT?, and INIT[:IMM]

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SENSe:AVERage:COUNt

Description	This command sets the number of power measurements that will be used to compute data averaging. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.
Syntax	SENS:AVER:COUN<space><digit>
Parameters	The <digit> parameter is the number of power measurements to be used to compute data averaging in the “999” format.
Example	SENS:AVER:COUN 12
See also	SENS:AVER:COUN?, SENS:AVER:STAT, and SENS:AVER:STAT?

SENSe:AVERage:COUNt?

Description	This query returns the number of power measurements used to compute data averaging.
Syntax	SENS:AVER:COUN?
Response	The number of power measurements used to compute data averaging in the “999” format.
Example	SENS:AVER:COUN?
See also	SENS:AVER:COUN, SENS:AVER:STAT, and SENS:AVER:STAT?

Remote Control (SCPI) Commands
Specific Commands

SENSe:AVERage:COUNt

Description	This command sets the number of power measurements that will be used to compute data averaging. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.
Syntax	SENS:AVER:COUN<space><digit>
Parameters	The <digit> parameter is the number of power measurements to be used to compute data averaging in the “999” format.
Example	SENS:AVER:COUN 12
See also	SENS:AVER:COUN?, SENS:AVER:STAT, and SENS:AVER:STAT?

SENSe:AVERage:COUNt?

Description	This query returns the number of power measurements used to compute data averaging.
Syntax	SENS:AVER:COUN?
Response	The number of power measurements used to compute data averaging in the “999” format.
Example	SENS:AVER:COUN?
See also	SENS:AVER:COUN, SENS:AVER:STAT, and SENS:AVER:STAT?

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SENSe:AVERage[:STATe]

Description This command activates or deactivates data averaging (for the selected channel when using a PM-1620). If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.

Syntax SENS:AVER[:STAT]<space><boolean>

Parameters The <boolean> parameter can be

“0”- disable averaging

“1”- enable averaging

Example SENS:AVER:STAT 1

SENSe:AVERage:STATe?

Description This query returns a value indicating whether data averaging is enabled or disabled (for the selected channel when using a PMD-1620).

Syntax SENS:AVER:STAT?

Response “0”- averaging is disabled

“1”- averaging is enabled

Example SENS:AVER:STAT?

Remote Control (SCPI) Commands
Specific Commands

SENSe:AVERage[:STATe]

Description This command activates or deactivates data averaging (for the selected channel when using a PM-1620). If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.

Syntax SENS:AVER[:STAT]<space><boolean>

Parameters The <boolean> parameter can be

“0”- disable averaging

“1”- enable averaging

Example SENS:AVER:STAT 1

SENSe:AVERage:STATe?

Description This query returns a value indicating whether data averaging is enabled or disabled (for the selected channel when using a PMD-1620).

Syntax SENS:AVER:STAT?

Response “0”- averaging is disabled

“1”- averaging is enabled

Example SENS:AVER:STAT?

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SENSe:CORRection:COLLect:ZERO

Description	This command performs an offset nulling measurement (on the currently selected channel when using a PM-1620). If light is detected, the “Light detected” error message is raised. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.
Syntax	SENS:CORR:COLL:ZERO
Example	SENS:CORR:COLL:ZERO

Remote Control (SCPI) Commands
Specific Commands

SENSe:CORRection:COLLect:ZERO

Description	This command performs an offset nulling measurement (on the currently selected channel when using a PM-1620). If light is detected, the “Light detected” error message is raised. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.
Syntax	SENS:CORR:COLL:ZERO
Example	SENS:CORR:COLL:ZERO

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SENSe:CORRection:OFFSet[:MAGNitude]

Description This command sets a correction factor (for the selected channel when using a PM-1620). The correction factor will be a positive or negative value when dB or dBm units are selected, or a positive value when W units are selected. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.

Syntax SENS:CORR:OFFS[:MAGN]
<space><numeric_value><space><unit>

Parameters The <numeric_value> parameter is a correction factor in dB or W/W units.

-5.999 ≤ numeric_value ≤ +6.000 (dB)

0.1 ≤ numeric_value ≤ 3.9811 (W/W)

The <unit> parameter can be in dB or W/W

If an invalid parameter is entered, the “Data type error” message appears.

Example SENS:CORR:OFFS:MAGN 2.105 DB

Note The correction factor, when expressed in W/W, indicates the ratio between the power received (in W) and the reference (in W) for the current wavelength and channel.

Remote Control (SCPI) Commands
Specific Commands

SENSe:CORRection:OFFSet[:MAGNitude]

Description This command sets a correction factor (for the selected channel when using a PM-1620). The correction factor will be a positive or negative value when dB or dBm units are selected, or a positive value when W units are selected. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.

Syntax SENS:CORR:OFFS[:MAGN]
<space><numeric_value><space><unit>

Parameters The <numeric_value> parameter is a correction factor in dB or W/W units.

-5.999 ≤ numeric_value ≤ +6.000 (dB)

0.1 ≤ numeric_value ≤ 3.9811 (W/W)

The <unit> parameter can be in dB or W/W

If an invalid parameter is entered, the “Data type error” message appears.

Example SENS:CORR:OFFS:MAGN 2.105 DB

Note The correction factor, when expressed in W/W, indicates the ratio between the power received (in W) and the reference (in W) for the current wavelength and channel.

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SENSe:CORRection:OFFSet:MAGNitude?

Description	This command returns the correction factor for the channel currently used in the unit.
Syntax	SENS:CORR:OFFS:MAGN?
Example	SENS:CORR:OFFS:MAGN?
Response	A power mesurement in the +9.9999E±99 format for W and W/W units and ±9.9999 for dBm and dB units in the currently selected unit.
See also	SENS:CORR:OFFS[:MAGN]

SENSe:FREQuency[:CONTinuous]

Description	This command sets the sampling rate in power measurement mode and in program mode, i.e., a low sampling rate. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.
Syntax	SENS:FREQ[:CONT]<space><numeric_value> [<space>HZ[
Parameters	The <numeric_value> parameter is the sampling rate in the “999.999” format: 0.25 Hz, 0.5 Hz, 1 Hz, 2 Hz, 4 Hz, 8 Hz, 16 Hz, 32 Hz, 64 Hz, 128 Hz, and 256 Hz. If an invalid parameter is entered, the “Data type error” message appears.
Example	SENS:FREQ[:CONT] 1
See also	SENS:FREQ:CONT?, SENS:FREQ:CONT:CATA?, SENS:FREQ:NCON, SENS:FREQ:NCON?, and SENS:FREQ:NCON:CATA?

Remote Control (SCPI) Commands
Specific Commands

SENSe:CORRection:OFFSet:MAGNitude?

Description	This command returns the correction factor for the channel currently used in the unit.
Syntax	SENS:CORR:OFFS:MAGN?
Example	SENS:CORR:OFFS:MAGN?
Response	A power mesurement in the +9.9999E±99 format for W and W/W units and ±9.9999 for dBm and dB units in the currently selected unit.
See also	SENS:CORR:OFFS[:MAGN]

SENSe:FREQuency[:CONTinuous]

Description	This command sets the sampling rate in power measurement mode and in program mode, i.e., a low sampling rate. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.
Syntax	SENS:FREQ[:CONT]<space><numeric_value> [<space>HZ[
Parameters	The <numeric_value> parameter is the sampling rate in the “999.999” format: 0.25 Hz, 0.5 Hz, 1 Hz, 2 Hz, 4 Hz, 8 Hz, 16 Hz, 32 Hz, 64 Hz, 128 Hz, and 256 Hz. If an invalid parameter is entered, the “Data type error” message appears.
Example	SENS:FREQ[:CONT] 1
See also	SENS:FREQ:CONT?, SENS:FREQ:CONT:CATA?, SENS:FREQ:NCON, SENS:FREQ:NCON?, and SENS:FREQ:NCON:CATA?

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SENSe:FREQuency:CONTinuous?

Description This query returns the current sampling rate in power measurement mode.

Syntax SENS:FREQ:CONT?

Response The current sampling rate in the “999.999” format.

Example SENS:FREQ:CONT?

See also SENS:FREQ[:CONT], SENS:FREQ:CONT:CATA?, SENS:FREQ:NCON, SENS:FREQ:NCON?, and SENS:FREQ:NCON:CATA?

SENSe:FREQuency:CONTinuous:CATAlog?

Description This query returns the list of available sampling rates in power measurement mode.

Syntax SENS:FREQ:CONT:CATA?

Response The list of available sampling rates in the “999.999;999.999;...” format.

Example SENS:FREQ:CONT:CATA?

See also SENS:FREQ[:CONT], SENS:FREQ:CONT?, SENS:FREQ:NCON, SENS:FREQ:NCON?, and SENS:FREQ:NCON:CATA?

Remote Control (SCPI) Commands
Specific Commands

SENSe:FREQuency:CONTinuous?

Description This query returns the current sampling rate in power measurement mode.

Syntax SENS:FREQ:CONT?

Response The current sampling rate in the “999.999” format.

Example SENS:FREQ:CONT?

See also SENS:FREQ[:CONT], SENS:FREQ:CONT:CATA?, SENS:FREQ:NCON, SENS:FREQ:NCON?, and SENS:FREQ:NCON:CATA?

SENSe:FREQuency:CONTinuous:CATAlog?

Description This query returns the list of available sampling rates in power measurement mode.

Syntax SENS:FREQ:CONT:CATA?

Response The list of available sampling rates in the “999.999;999.999;...” format.

Example SENS:FREQ:CONT:CATA?

See also SENS:FREQ[:CONT], SENS:FREQ:CONT?, SENS:FREQ:NCON, SENS:FREQ:NCON?, and SENS:FREQ:NCON:CATA?

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SENSe:FREQuency:NCONtinuous

Description This command sets the sampling rate in program mode, i.e., a high sampling rate. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.

Syntax SENS:FREQ:NCON<space><numeric_value>[<space>HZ]

Parameters The <numeric_value> parameter is the sampling rate in program mode in the “9999.999” format: 512/s, 1024/s, 2048/s, and 4096/s.

If an invalid parameter is entered, the “Data type error” message appears.

Example SENS:FREQ:NCON 512

See also SENS:FREQ[:CONT], SENS:FREQ:CONT?, SENS:FREQ:CONT:CATA?, SENS:FREQ:NCON?, and SENS:FREQ:NCON:CATA?

SENSe:FREQuency:NCONtinuous?

Description This query returns the current sampling rate in program mode.

Syntax SENS:FREQ:NCON?

Response The current sampling rate in program mode in the “9999.999” format.

Example SENS:FREQ:NCON?

See also SENS:FREQ[:CONT], SENS:FREQ:CONT?, SENS:FREQ:CONT:CATA?, SENS:FREQ:NCON, and SENS:FREQ:NCON:CATA?

Remote Control (SCPI) Commands
Specific Commands

SENSe:FREQuency:NCONtinuous

Description This command sets the sampling rate in program mode, i.e., a high sampling rate. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.

Syntax SENS:FREQ:NCON<space><numeric_value>[<space>HZ]

Parameters The <numeric_value> parameter is the sampling rate in program mode in the “9999.999” format: 512/s, 1024/s, 2048/s, and 4096/s.

If an invalid parameter is entered, the “Data type error” message appears.

Example SENS:FREQ:NCON 512

See also SENS:FREQ[:CONT], SENS:FREQ:CONT?, SENS:FREQ:CONT:CATA?, SENS:FREQ:NCON?, and SENS:FREQ:NCON:CATA?

SENSe:FREQuency:NCONtinuous?

Description This query returns the current sampling rate in program mode.

Syntax SENS:FREQ:NCON?

Response The current sampling rate in program mode in the “9999.999” format.

Example SENS:FREQ:NCON?

See also SENS:FREQ[:CONT], SENS:FREQ:CONT?, SENS:FREQ:CONT:CATA?, SENS:FREQ:NCON, and SENS:FREQ:NCON:CATA?

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SENSe:FREQuency:NCONtinuous:CATAlog?

Description This query returns the list of available sampling rates in program mode.

Syntax SENS:FREQ:NCON:CAT?

Response The list of available sampling rates in program mode in the “9999;999;...” format.

Example SENS:FREQ:NCON:CAT?

See also SENS:FREQ[:CONT], SENS:FREQ:CONT?, SENS:FREQ:CONT:CATA?, SENS:FREQ:NCON, and SENS:FREQ:NCON?

SENSe:POWer:RANGe?

Description This query returns the currently selected power measurement range (for the currently selected channel when using a PM-1620), expressed in dBm or W depending on the current unit.

Syntax SENS:POW:RANG?

Response The currently selected range (in dBm or W) in the “+99.99 to +99.99” (dBm) or “+999.9999E+99 to +999.9999E+99” (W) format,

“AUTO”- automatic range (Autorange)

“HR1..4”- high range

“LR1..6”- low range

Example SENS:POW:RANG?

See also SENS:POW:RANG:AUTO, SENS:POW:RANG:AUTO?, SENS:POW:RANG:HIGH, SENS:POW:RANG:LIST?, and SENS:POW:RANG:LOW

Remote Control (SCPI) Commands
Specific Commands

SENSe:FREQuency:NCONtinuous:CATAlog?

Description This query returns the list of available sampling rates in program mode.

Syntax SENS:FREQ:NCON:CAT?

Response The list of available sampling rates in program mode in the “9999;999;...” format.

Example SENS:FREQ:NCON:CAT?

See also SENS:FREQ[:CONT], SENS:FREQ:CONT?, SENS:FREQ:CONT:CATA?, SENS:FREQ:NCON, and SENS:FREQ:NCON?

SENSe:POWer:RANGe?

Description This query returns the currently selected power measurement range (for the currently selected channel when using a PM-1620), expressed in dBm or W depending on the current unit.

Syntax SENS:POW:RANG?

Response The currently selected range (in dBm or W) in the “+99.99 to +99.99” (dBm) or “+999.9999E+99 to +999.9999E+99” (W) format,

“AUTO”- automatic range (Autorange)

“HR1..4”- high range

“LR1..6”- low range

Example SENS:POW:RANG?

See also SENS:POW:RANG:AUTO, SENS:POW:RANG:AUTO?, SENS:POW:RANG:HIGH, SENS:POW:RANG:LIST?, and SENS:POW:RANG:LOW

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SENSe:POWer:RANGe:AUTO

Description	This command sets the power measurement range to automatic (Autorange), for the currently selected channel when using a PM-1620. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.
Syntax	SENS:POW:RANG:AUTO<space><boolean>
Parameters	The <boolean> parameter can be “0”- disable Autorange “1”- enable Autorange
Example	SENS:POW:RANG:AUTO 1
See also	SENS:POW:RANG?, SENS:POW:RANG:AUTO?, SENS:POW:RANG:HIGH, SENS:POW:RANG:LIST?, and SENS:POW:RANG:LOW
Note	The Autorange function can be performed in power measurement mode only.

Remote Control (SCPI) Commands
Specific Commands

SENSe:POWer:RANGe:AUTO

Description	This command sets the power measurement range to automatic (Autorange), for the currently selected channel when using a PM-1620. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.
Syntax	SENS:POW:RANG:AUTO<space><boolean>
Parameters	The <boolean> parameter can be “0”- disable Autorange “1”- enable Autorange
Example	SENS:POW:RANG:AUTO 1
See also	SENS:POW:RANG?, SENS:POW:RANG:AUTO?, SENS:POW:RANG:HIGH, SENS:POW:RANG:LIST?, and SENS:POW:RANG:LOW
Note	The Autorange function can be performed in power measurement mode only.

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SENSe:POWer:RANGe:AUTO?

Description This query returns a value indicating whether Autorange is enabled or disabled (for the currently selected channel when using a PM-1620).

Syntax SENS:POW:RANG:AUTO?

Response “0”- Autorange is disabled

“1”- Autorange is enabled

Example SENS:POW:RANG:AUTO?

See also SENS:POW:RANG?, SENS:POW:RANG:AUTO, SENS:POW:RANG:HIGH, SENS:POW:RANG:LIST?, and SENS:POW:RANG:LOW

Remote Control (SCPI) Commands
Specific Commands

SENSe:POWer:RANGe:AUTO?

Description This query returns a value indicating whether Autorange is enabled or disabled (for the currently selected channel when using a PM-1620).

Syntax SENS:POW:RANG:AUTO?

Response “0”- Autorange is disabled

“1”- Autorange is enabled

Example SENS:POW:RANG:AUTO?

See also SENS:POW:RANG?, SENS:POW:RANG:AUTO, SENS:POW:RANG:HIGH, SENS:POW:RANG:LIST?, and SENS:POW:RANG:LOW

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SENSe:POWer:RANGe:HIGH

Description This command sets the power measurement range to manual high (for the currently selected channel when using a PM-1620). If this command is sent while an acquisition is in progress, the "Acquisition already running" error message will be raised.

Syntax SENS:POW:RANG:HIGH<space><numeric_value>

Parameters The <numeric_value> parameter can be 1, 2, 3, or 4 corresponding to manual HR1 to HR4.

Example SENS:POW:RANG:HIGH 2

See also SENS:POW:RANG?, SENS:POW:RANG:AUTO, SENS:POW:RANG:AUTO?, SENS:POW:RANG:LIST?, and SENS:POW:RANG:LOW

SENSe:POWer:RANGe:LIST?

Description This query returns the list of all available measurement ranges, expressed in dBm or W depending on the current unit.

Syntax SENS:POW:RANG:LIST?

Response The list of available measuring ranges (in dBm or W) in the "±99.99 to ±99.99" (dBm) or "+999.9999E±99 to +999.9999E±99" (W) format (LR1..6, HR1..4).

Example SENS3:POW:RANG:LIST?

See also SENS:POW:RANG?, SENS:POW:RANG:AUTO, SENS:POW:RANG:AUTO?, SENS:POW:RANG:HIGH, and SENS:POW:RANG:LOW

Remote Control (SCPI) Commands
Specific Commands

SENSe:POWer:RANGe:HIGH

Description This command sets the power measurement range to manual high (for the currently selected channel when using a PM-1620). If this command is sent while an acquisition is in progress, the "Acquisition already running" error message will be raised.

Syntax SENS:POW:RANG:HIGH<space><numeric_value>

Parameters The <numeric_value> parameter can be 1, 2, 3, or 4 corresponding to manual HR1 to HR4.

Example SENS:POW:RANG:HIGH 2

See also SENS:POW:RANG?, SENS:POW:RANG:AUTO, SENS:POW:RANG:AUTO?, SENS:POW:RANG:LIST?, and SENS:POW:RANG:LOW

SENSe:POWer:RANGe:LIST?

Description This query returns the list of all available measurement ranges, expressed in dBm or W depending on the current unit.

Syntax SENS:POW:RANG:LIST?

Response The list of available measuring ranges (in dBm or W) in the "±99.99 to ±99.99" (dBm) or "+999.9999E±99 to +999.9999E±99" (W) format (LR1..6, HR1..4).

Example SENS3:POW:RANG:LIST?

See also SENS:POW:RANG?, SENS:POW:RANG:AUTO, SENS:POW:RANG:AUTO?, SENS:POW:RANG:HIGH, and SENS:POW:RANG:LOW

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SENSe:POWer:RANGe:LOW

Description This command sets the power measurement range to manual low (for the currently selected channel when using a PM-1620). If this command is sent while an acquisition is in progress, the "Acquisition already running" error message will be raised.

Syntax SENS:POW:RANG:LOW<space><numeric_value>

Parameters The <numeric_value> parameter can be 1, 2, 3, 4, 5, or 6 corresponding to manual LR1 to LR6.

Example SENS:POW:RANG:LOW 4

See also SENS:POW:RANG?, SENS:POW:RANG:AUTO, SENS:POW:RANG:AUTO?, SENS:POW:RANG:HIGH, and SENS:POW:RANG:LIST?

SENSe:POWer:REFerence

Description This command sets a user-defined reference value (in dBm or W), for the selected channel when using a PM-1620. If this command is sent while an acquisition is in progress, the "Acquisition already running" error message will be raised.

Syntax SENS:POW:REF<space><numeric_value><space><DBM|W>

Parameters The <numeric_value> parameter is the user-defined reference value, in the "±99.999" (dBm) or "+999.9999E±99" (W) format.

The <DBM|W> parameter represents the unit:

"DBM"sets dBm

"W"sets W

Example SENS:POW:REF 11.23 dBm

Remote Control (SCPI) Commands
Specific Commands

SENSe:POWer:RANGe:LOW

Description This command sets the power measurement range to manual low (for the currently selected channel when using a PM-1620). If this command is sent while an acquisition is in progress, the "Acquisition already running" error message will be raised.

Syntax SENS:POW:RANG:LOW<space><numeric_value>

Parameters The <numeric_value> parameter can be 1, 2, 3, 4, 5, or 6 corresponding to manual LR1 to LR6.

Example SENS:POW:RANG:LOW 4

See also SENS:POW:RANG?, SENS:POW:RANG:AUTO, SENS:POW:RANG:AUTO?, SENS:POW:RANG:HIGH, and SENS:POW:RANG:LIST?

SENSe:POWer:REFerence

Description This command sets a user-defined reference value (in dBm or W), for the selected channel when using a PM-1620. If this command is sent while an acquisition is in progress, the "Acquisition already running" error message will be raised.

Syntax SENS:POW:REF<space><numeric_value><space><DBM|W>

Parameters The <numeric_value> parameter is the user-defined reference value, in the "±99.999" (dBm) or "+999.9999E±99" (W) format.

The <DBM|W> parameter represents the unit:

"DBM"sets dBm

"W"sets W

Example SENS:POW:REF 11.23 dBm

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SENSe:POWer:REFerence?

Description This query returns the reference power for the current wavelength (for the currently selected channel when using a PM-1620).

Syntax SENS:POW:REF?

Response Power mesurement in the “+999.9999E±99" format (for W unit) or in the “± 999.9999" format (for dBm unit) with a maximum of 128 data per segment or data packet.

Example SENS:POW:REF?
+49.4280E-06

SENSe:POWer:REFerence:DISPlay

Description This command performs a new reference measurement for the current wavelength and changes the display to read relative power (dB or W/W), for the selected channel when using a PM-1620. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.

Syntax SENS:POW:REF:DISP

Example SENS:POW:REF:DISP

Remote Control (SCPI) Commands
Specific Commands

SENSe:POWer:REFerence?

Description This query returns the reference power for the current wavelength (for the currently selected channel when using a PM-1620).

Syntax SENS:POW:REF?

Response Power mesurement in the “+999.9999E±99" format (for W unit) or in the “± 999.9999" format (for dBm unit) with a maximum of 128 data per segment or data packet.

Example SENS:POW:REF?
+49.4280E-06

SENSe:POWer:REFerence:DISPlay

Description This command performs a new reference measurement for the current wavelength and changes the display to read relative power (dB or W/W), for the selected channel when using a PM-1620. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.

Syntax SENS:POW:REF:DISP

Example SENS:POW:REF:DISP

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SENSe:POWer:REFerence:STATe

Description This command selects whether absolute (dBm or W) or relative (dB or W/W) power measurements are performed (for the selected channel when using a PM-1620). If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.

Syntax SENS:POW:REF:STAT<space><boolean>

Parameters The <boolean> value represents either dB and W, or dBm and W/W:

“0”- select absolute mode (dBm or W)

“1”- select relative mode (dB or W/W)

Example SENS:POW:REF:STAT 0

SENSe:POWer:REFerence:STATe?

Description This query returns a value indicating whether the high-speed power meter is displaying absolute (dBm or W) or relative (dB or W/W) power values (for the selected channel when using a PM-1620).

Syntax SENS:POW:REF:STAT?

Response “0”- absolute mode (dBm or W)

“1”- relative mode (dB or W/W)

Example SENS:POW:REF:STAT?

Remote Control (SCPI) Commands
Specific Commands

SENSe:POWer:REFerence:STATe

Description This command selects whether absolute (dBm or W) or relative (dB or W/W) power measurements are performed (for the selected channel when using a PM-1620). If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.

Syntax SENS:POW:REF:STAT<space><boolean>

Parameters The <boolean> value represents either dB and W, or dBm and W/W:

“0”- select absolute mode (dBm or W)

“1”- select relative mode (dB or W/W)

Example SENS:POW:REF:STAT 0

SENSe:POWer:REFerence:STATe?

Description This query returns a value indicating whether the high-speed power meter is displaying absolute (dBm or W) or relative (dB or W/W) power values (for the selected channel when using a PM-1620).

Syntax SENS:POW:REF:STAT?

Response “0”- absolute mode (dBm or W)

“1”- relative mode (dB or W/W)

Example SENS:POW:REF:STAT?

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SENSe:POWer:UNIT

Description	This command changes the absolute measurement display unit: dBm or W (for the selected channel when using a PM-1620). If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.
Syntax	SENS:POW:UNIT<space><value>
Parameters	The <value> parameter can be “DBM” or “0”-set power display to dBm “W” or “1”-set power display to W (pW, nW, μW, mW...)
Example	SENS:POW:UNIT DBM
See also	SENS:POW:UNIT? and UNIT:POW

SENSe:POWer:UNIT?

Description	This query returns the current absolute power measurement display unit (for the selected channel when using a PM-1620).
Syntax	SENS:POW:UNIT?
Response	“0”-current unit is dBm “1”-current unit is W (pW, nW, μW, mW...)
Example	SENS:POW:UNIT?
See also	SENS:POW:UNIT and UNIT:POW

Remote Control (SCPI) Commands
Specific Commands

SENSe:POWer:UNIT

Description	This command changes the absolute measurement display unit: dBm or W (for the selected channel when using a PM-1620). If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.
Syntax	SENS:POW:UNIT<space><value>
Parameters	The <value> parameter can be “DBM” or “0”-set power display to dBm “W” or “1”-set power display to W (pW, nW, μW, mW...)
Example	SENS:POW:UNIT DBM
See also	SENS:POW:UNIT? and UNIT:POW

SENSe:POWer:UNIT?

Description	This query returns the current absolute power measurement display unit (for the selected channel when using a PM-1620).
Syntax	SENS:POW:UNIT?
Response	“0”-current unit is dBm “1”-current unit is W (pW, nW, μW, mW...)
Example	SENS:POW:UNIT?
See also	SENS:POW:UNIT and UNIT:POW

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SENSe:POWer:WAVElength

Description This command selects a new operating wavelength (for the selected channel when using a PM-1620). If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.

Syntax SENS:POW:WAVE<space><numeric_value> [<space>NM]

Parameters The <numeric_value> parameter is an operating wavelength in nm. Any wavelength within the spectral range of the power meter optical detector at 0.01 nm resolution may be selected. See the power meter instruction manual for the exact spectral range of each detector type. An invalid parameter will raise a “Data type error” message.

Example SENS:POW:WAVE 1310.12

SENSe:POWer:WAVElength?

Description This query returns the currently selected wavelength (for the selected channel when using a PM-1620).

Syntax SENS:POW:WAVE?

Response The current wavelength in nanometers (nm) in the “9999.99” format.

Example SENS:POW:WAVE?

1310.12

Remote Control (SCPI) Commands
Specific Commands

SENSe:POWer:WAVElength

Description This command selects a new operating wavelength (for the selected channel when using a PM-1620). If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.

Syntax SENS:POW:WAVE<space><numeric_value> [<space>NM]

Parameters The <numeric_value> parameter is an operating wavelength in nm. Any wavelength within the spectral range of the power meter optical detector at 0.01 nm resolution may be selected. See the power meter instruction manual for the exact spectral range of each detector type. An invalid parameter will raise a “Data type error” message.

Example SENS:POW:WAVE 1310.12

SENSe:POWer:WAVElength?

Description This query returns the currently selected wavelength (for the selected channel when using a PM-1620).

Syntax SENS:POW:WAVE?

Response The current wavelength in nanometers (nm) in the “9999.99” format.

Example SENS:POW:WAVE?

1310.12

High-Speed Power Meter 141

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SENSitivity:CORRection:FACTor[:MAGNitude]

Description This command sets a correction factor (for the selected channel when using a multichannel high-speed power meter) for a specific wavelength. The correction factor will be a positive or negative value when dB or dBm units are selected, or a positive value when W or W/W units are selected.

Syntax SENS(0..26):CORR:FACT[:MAGN]<space><numeric_value><space><unit>

Parameters The <numeric_value> parameter is a correction factor with dB or W/W units.

-10.0 ≤ numeric_value ≤ 10 (dB)

0.1 ≤ numeric_value ≤ 10 (W/W)

The <unit> parameter can be DB or W/W.

If an invalid <numeric_value> parameter is entered, the “Parameter out of range” message appears.

If an invalid <unit> parameter is entered, the “Data type error” message appears.

Example SENS3:CORR:FACT:MAGN 8.00 DB

Note The W/W unit indicates the ratio between the power received (in W) and the reference (in W) for the current wavelength and channel.

Remote Control (SCPI) Commands
Specific Commands

SENSitivity:CORRection:FACTor[:MAGNitude]

Description This command sets a correction factor (for the selected channel when using a multichannel high-speed power meter) for a specific wavelength. The correction factor will be a positive or negative value when dB or dBm units are selected, or a positive value when W or W/W units are selected.

Syntax SENS(0..26):CORR:FACT[:MAGN]<space><numeric_value><space><unit>

Parameters The <numeric_value> parameter is a correction factor with dB or W/W units.

-10.0 ≤ numeric_value ≤ 10 (dB)

0.1 ≤ numeric_value ≤ 10 (W/W)

The <unit> parameter can be DB or W/W.

If an invalid <numeric_value> parameter is entered, the “Parameter out of range” message appears.

If an invalid <unit> parameter is entered, the “Data type error” message appears.

Example SENS3:CORR:FACT:MAGN 8.00 DB

Note The W/W unit indicates the ratio between the power received (in W) and the reference (in W) for the current wavelength and channel.

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SENSitivity:CORRection:FACTor?

Description	This query allows you to see the correction factor (for the selected channel when using a multichannel high-speed power meter) for a specific wavelength. The correction factor will be a positive or negative value when dB or dBm units are selected, or a positive value when W or W/W units are selected.
Syntax	SENS(0..26):CORR:FACT?
Response	The correction offset in 99.999 dB or W/W format, according to the units currently in use.
Example	SENS3:CORR:FACT?

Remote Control (SCPI) Commands
Specific Commands

SENSitivity:CORRection:FACTor?

Description	This query allows you to see the correction factor (for the selected channel when using a multichannel high-speed power meter) for a specific wavelength. The correction factor will be a positive or negative value when dB or dBm units are selected, or a positive value when W or W/W units are selected.
Syntax	SENS(0..26):CORR:FACT?
Response	The correction offset in 99.999 dB or W/W format, according to the units currently in use.
Example	SENS3:CORR:FACT?

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SENSitivity:OFFSet

Description This command sets an offset (for the selected channel, when using a multichannel power meter).

The offset will be a positive or negative value in dB. The offset value will be added to the current power measurement displayed, whatever the wavelength. Whatever the current unit in use, the offset is displayed in dB, but taken into account in the current unit.

Syntax SENS(0..26):OFFS<space><numeric_value> <space><dB>

Parameters The <numeric_value> parameter is a correction factor with dB or W/W units.

-100 ≤ numeric_value ≤ 100 (dB)

The <dB> parameter can be dB or W/W.

If an invalid <numeric_value> parameter is entered, the “Parameter out of range” message appears.

If an invalid <dB> parameter is entered, the “Data type error” message appears.

The format is 999.999.

Example SENS3:FACT:OFFS 22.105 DB

SENSitivity:OFFSet?

Description This query returns the offset on the selected channel.

Syntax SENS(0..26):OFFS?

Response The correction offset in 999.999 dB format, according to the units currently in use.

Example SENS3:OFFS?

Remote Control (SCPI) Commands
Specific Commands

SENSitivity:OFFSet

Description This command sets an offset (for the selected channel, when using a multichannel power meter).

The offset will be a positive or negative value in dB. The offset value will be added to the current power measurement displayed, whatever the wavelength. Whatever the current unit in use, the offset is displayed in dB, but taken into account in the current unit.

Syntax SENS(0..26):OFFS<space><numeric_value> <space><dB>

Parameters The <numeric_value> parameter is a correction factor with dB or W/W units.

-100 ≤ numeric_value ≤ 100 (dB)

The <dB> parameter can be dB or W/W.

If an invalid <numeric_value> parameter is entered, the “Parameter out of range” message appears.

If an invalid <dB> parameter is entered, the “Data type error” message appears.

The format is 999.999.

Example SENS3:FACT:OFFS 22.105 DB

SENSitivity:OFFSet?

Description This query returns the offset on the selected channel.

Syntax SENS(0..26):OFFS?

Response The correction offset in 999.999 dB format, according to the units currently in use.

Example SENS3:OFFS?

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TRACe:DATA?

Description This query indicates the data segment to be returned. Each segment contains between 1 and 128 data. If the segment requested by the user is not valid, no data is included in the segment and the “Segment not allowed” error message will be raised.

Syntax TRAC:DATA? #

Parameters The “#” parameter is the data segment to be returned in the “999” format.

Example For an acquisition containing 257 data, the user can expect to receive three segments (two segments with 128 data each and one segment with 1 data). To retrieve the data, the user must send the following commands:

TRAC:DATA? 0

TRAC:DATA? 1

TRAC:DATA? 2

Sending TRAC:DATA? 3 then will raise the “Segment not allowed” error message.

See also TRAC:POIN

Remote Control (SCPI) Commands
Specific Commands

TRACe:DATA?

Description This query indicates the data segment to be returned. Each segment contains between 1 and 128 data. If the segment requested by the user is not valid, no data is included in the segment and the “Segment not allowed” error message will be raised.

Syntax TRAC:DATA? #

Parameters The “#” parameter is the data segment to be returned in the “999” format.

Example For an acquisition containing 257 data, the user can expect to receive three segments (two segments with 128 data each and one segment with 1 data). To retrieve the data, the user must send the following commands:

TRAC:DATA? 0

TRAC:DATA? 1

TRAC:DATA? 2

Sending TRAC:DATA? 3 then will raise the “Segment not allowed” error message.

See also TRAC:POIN

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TRACe:POINts

Description	This command sets the number of points that will be used in the acquisition in the “9999” format. The maximum number of points depends on the number of channels available on the PM-1600 and on the selected sampling rate. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.
Syntax	TRAC:POIN<space><sample_nb>
Parameters	The <sample_nb> parameter is the number of points to be acquired using a programmed acquisition.
Example	TRAC:POIN 1200
See also	TRAC:DATA? and TRAC:POIN?

TRACe:POINts?

Description	This query returns the number of points that will be used in a programmed acquisition.
Syntax	TRAC:POIN?
Response	The number of points in the “9999” format.
Example	TRAC:POIN?
See also	TRAC:DATA?

Remote Control (SCPI) Commands
Specific Commands

TRACe:POINts

Description	This command sets the number of points that will be used in the acquisition in the “9999” format. The maximum number of points depends on the number of channels available on the PM-1600 and on the selected sampling rate. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.
Syntax	TRAC:POIN<space><sample_nb>
Parameters	The <sample_nb> parameter is the number of points to be acquired using a programmed acquisition.
Example	TRAC:POIN 1200
See also	TRAC:DATA? and TRAC:POIN?

TRACe:POINts?

Description	This query returns the number of points that will be used in a programmed acquisition.
Syntax	TRAC:POIN?
Response	The number of points in the “9999” format.
Example	TRAC:POIN?
See also	TRAC:DATA?

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TRIGger:SEQuence:LEVel

Description This command sets the power level of the trigger condition to be met to start an acquisition in dBm or W, depending on the currently selected unit. The trigger level must be set in absolute power measurement mode and must be within the range of the active channel. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.

Syntax TRIG:SEQ:LEV<space><numeric_value><space><unit>

Parameters The <numeric_value> is the trigger power level in the “±99.9999 dBm” format or in the “+001.0000 E-12 W” to “+999.9999 E+03 W” range.

The <unit> parameter represents the unit:

“DBM” dBm unit

“W” W unit

Example TRIG:SEQ:LEV 16.804 DBM

See also TRIG:SEQ:LEV?, TRIG:SEQ:SLOP, TRIG:SEQ:SLOP?, TRIG:SEQ:SOUR, TRIG:SEQ:SOUR?, TRIG:SEQ:STAT, and TRIG:SEQ:STAT?

Remote Control (SCPI) Commands
Specific Commands

TRIGger:SEQuence:LEVel

Description This command sets the power level of the trigger condition to be met to start an acquisition in dBm or W, depending on the currently selected unit. The trigger level must be set in absolute power measurement mode and must be within the range of the active channel. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.

Syntax TRIG:SEQ:LEV<space><numeric_value><space><unit>

Parameters The <numeric_value> is the trigger power level in the “±99.9999 dBm” format or in the “+001.0000 E-12 W” to “+999.9999 E+03 W” range.

The <unit> parameter represents the unit:

“DBM” dBm unit

“W” W unit

Example TRIG:SEQ:LEV 16.804 DBM

See also TRIG:SEQ:LEV?, TRIG:SEQ:SLOP, TRIG:SEQ:SLOP?, TRIG:SEQ:SOUR, TRIG:SEQ:SOUR?, TRIG:SEQ:STAT, and TRIG:SEQ:STAT?

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TRIGger:SEQuence:LEVel?

Description This query returns the power level of the trigger condition to be met to start an acquisition, in dBm or W depending on the currently selected unit.

Syntax TRIG:SEQ:LEV?

Response The trigger power level in the “-90.000” to “+90.000” (dBm) or “+999.9999E+99” (W) format depending on the currently selected unit.

Example TRIG:SEQ:LEV?

See also TRIG:SEQ:LEV, TRIG:SEQ:SLOP, TRIG:SEQ:SLOP?, TRIG:SEQ:SOUR, TRIG:SEQ:SOUR?, TRIG:SEQ:STAT, and TRIG:SEQ:STAT?

TRIGger:SEQuence:SLOPe

Description This command sets the edge status of the trigger condition, i.e., defines whether acquisitions will be triggered by positive or negative TTL voltage transitions. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.

Syntax TRIG:SEQ:SLOP:POS<space><data>

Parameters The <data> parameter defines the trigger condition status:

“NEGATIVE”-falling-edge trigger

“POSITIVE”-rising-edge trigger

Example TRIG:SEQ:SLOP POSITIVE

See also TRIG:SEQ:LEV, TRIG:SEQ:LEV?, TRIG:SEQ:SLOP, TRIG:SEQ:SLOP?, TRIG:SEQ:SOUR, TRIG:SEQ:SOUR?, TRIG:SEQ:STAT, and TRIG:SEQ:STAT?

Remote Control (SCPI) Commands
Specific Commands

TRIGger:SEQuence:LEVel?

Description This query returns the power level of the trigger condition to be met to start an acquisition, in dBm or W depending on the currently selected unit.

Syntax TRIG:SEQ:LEV?

Response The trigger power level in the “-90.000” to “+90.000” (dBm) or “+999.9999E+99” (W) format depending on the currently selected unit.

Example TRIG:SEQ:LEV?

See also TRIG:SEQ:LEV, TRIG:SEQ:SLOP, TRIG:SEQ:SLOP?, TRIG:SEQ:SOUR, TRIG:SEQ:SOUR?, TRIG:SEQ:STAT, and TRIG:SEQ:STAT?

TRIGger:SEQuence:SLOPe

Description This command sets the edge status of the trigger condition, i.e., defines whether acquisitions will be triggered by positive or negative TTL voltage transitions. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.

Syntax TRIG:SEQ:SLOP:POS<space><data>

Parameters The <data> parameter defines the trigger condition status:

“NEGATIVE”-falling-edge trigger

“POSITIVE”-rising-edge trigger

Example TRIG:SEQ:SLOP POSITIVE

See also TRIG:SEQ:LEV, TRIG:SEQ:LEV?, TRIG:SEQ:SLOP, TRIG:SEQ:SLOP?, TRIG:SEQ:SOUR, TRIG:SEQ:SOUR?, TRIG:SEQ:STAT, and TRIG:SEQ:STAT?

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TRIGger:SEQuence:SLOPe?

Description This query returns the rising or falling edge status of the trigger condition, i.e., whether positive or negative TTL voltage transitions will trigger the acquisition.

Syntax TRIG:SEQ:SLOP?

Response “POSITIVE”-rising-edge trigger

“NEGATIVE”-falling-edge trigger

Example TRIG:SEQ:SLOP?

See also TRIG:SEQ:LEV, TRIG:SEQ:LEV?, TRIG:SEQ:SLOP, TRIG:SEQ:SOUR, TRIG:SEQ:SOUR?, TRIG:SEQ:STAT, and TRIG:SEQ:STAT?

TRIGger:SEQuence:SOURce

Description This command sets the source of the trigger condition. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.

Syntax TRIG:SEQ:SOUR<space><data>

Parameters “EXTERNAL”-external trigger

“INTERNAL1”-channel 1

“INTERNAL2”-channel 2 (PM-1620)

Example TRIG:SEQ:SOUR EXTERNAL

See also TRIG:SEQ:LEV, TRIG:SEQ:LEV?, TRIG:SEQ:SLOP, TRIG:SEQ:SLOP?, TRIG:SEQ:SOUR, TRIG:SEQ:SOUR?, TRIG:SEQ:STAT, and TRIG:SEQ:STAT?

Remote Control (SCPI) Commands
Specific Commands

TRIGger:SEQuence:SLOPe?

Description This query returns the rising or falling edge status of the trigger condition, i.e., whether positive or negative TTL voltage transitions will trigger the acquisition.

Syntax TRIG:SEQ:SLOP?

Response “POSITIVE”-rising-edge trigger

“NEGATIVE”-falling-edge trigger

Example TRIG:SEQ:SLOP?

See also TRIG:SEQ:LEV, TRIG:SEQ:LEV?, TRIG:SEQ:SLOP, TRIG:SEQ:SOUR, TRIG:SEQ:SOUR?, TRIG:SEQ:STAT, and TRIG:SEQ:STAT?

TRIGger:SEQuence:SOURce

Description This command sets the source of the trigger condition. If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.

Syntax TRIG:SEQ:SOUR<space><data>

Parameters “EXTERNAL”-external trigger

“INTERNAL1”-channel 1

“INTERNAL2”-channel 2 (PM-1620)

Example TRIG:SEQ:SOUR EXTERNAL

See also TRIG:SEQ:LEV, TRIG:SEQ:LEV?, TRIG:SEQ:SLOP, TRIG:SEQ:SLOP?, TRIG:SEQ:SOUR, TRIG:SEQ:SOUR?, TRIG:SEQ:STAT, and TRIG:SEQ:STAT?

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TRIGger:SEQuence:SOURce?

Description	This query returns the source of the trigger condition.
Syntax	TRIG:SEQ:SOUR?
Response	“EXTERNAL”-external trigger “INTERNAL1”-channel 1 “INTERNAL2”-channel 2 (PM-1620)
Example	TRIG:SEQ:SOUR?
See also	TRIG:SEQ:LEV, TRIG:SEQ:LEV?, TRIG:SEQ:SLOP, TRIG:SEQ:SLOP?, TRIG:SEQ:SOUR, TRIG:SEQ:STAT, and TRIG:SEQ:STAT?

TRIGger:SEQuence:STATe

Description	This command sets the state of the trigger condition.
Syntax	TRIG:SEQ:STAT<space><boolean>
Parameters	The <boolean> parameter represents the status of the trigger condition: “0”-deactivate trigger condition “1”-activate trigger condition
Example	TRIG:SEQ:STAT 0
See also	TRIG:SEQ:LEV, TRIG:SEQ:LEV?, TRIG:SEQ:SLOP, TRIG:SEQ:SLOP?, TRIG:SEQ:SOUR, TRIG:SEQ:SOUR?, and TRIG:SEQ:STAT?

Remote Control (SCPI) Commands
Specific Commands

TRIGger:SEQuence:SOURce?

Description	This query returns the source of the trigger condition.
Syntax	TRIG:SEQ:SOUR?
Response	“EXTERNAL”-external trigger “INTERNAL1”-channel 1 “INTERNAL2”-channel 2 (PM-1620)
Example	TRIG:SEQ:SOUR?
See also	TRIG:SEQ:LEV, TRIG:SEQ:LEV?, TRIG:SEQ:SLOP, TRIG:SEQ:SLOP?, TRIG:SEQ:SOUR, TRIG:SEQ:STAT, and TRIG:SEQ:STAT?

TRIGger:SEQuence:STATe

Description	This command sets the state of the trigger condition.
Syntax	TRIG:SEQ:STAT<space><boolean>
Parameters	The <boolean> parameter represents the status of the trigger condition: “0”-deactivate trigger condition “1”-activate trigger condition
Example	TRIG:SEQ:STAT 0
See also	TRIG:SEQ:LEV, TRIG:SEQ:LEV?, TRIG:SEQ:SLOP, TRIG:SEQ:SLOP?, TRIG:SEQ:SOUR, TRIG:SEQ:SOUR?, and TRIG:SEQ:STAT?

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TRIGger:SEQuence:STATe?

Description	This query returns the status of the trigger condition.
Syntax	TRIG:SEQ:STAT?
Response	“0”-trigger inactive “1”-trigger active
Example	TRIG:SEQ:STAT?
See also	TRIG:SEQ:LEV, TRIG:SEQ:LEV?, TRIG:SEQ:SLOP, TRIG:SEQ:SLOP?, TRIG:SEQ:SOUR, TRIG:SEQ:SOUR?, and TRIG:SEQ:STAT

UNIT:POWer

Description	This command changes the measurement unit (for the selected channel when using a PM-1620). If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.
Syntax	UNIT:POW<space><value>
Parameters	The <value> parameter can be “DB” or “0”-set measurement unit to dB “DBM” or “1”-set measurement unit to dBm “W” or “2”-set measurement unit to W (pW, nW, μW, mW...) “W/W” or “3”-set measurement unit to W/W
Example	UNIT:POW DBM
See also	SENS:POW:UNIT, and SENS:POW:UNIT?

Remote Control (SCPI) Commands
Specific Commands

TRIGger:SEQuence:STATe?

Description	This query returns the status of the trigger condition.
Syntax	TRIG:SEQ:STAT?
Response	“0”-trigger inactive “1”-trigger active
Example	TRIG:SEQ:STAT?
See also	TRIG:SEQ:LEV, TRIG:SEQ:LEV?, TRIG:SEQ:SLOP, TRIG:SEQ:SLOP?, TRIG:SEQ:SOUR, TRIG:SEQ:SOUR?, and TRIG:SEQ:STAT

UNIT:POWer

Description	This command changes the measurement unit (for the selected channel when using a PM-1620). If this command is sent while an acquisition is in progress, the “Acquisition already running” error message will be raised.
Syntax	UNIT:POW<space><value>
Parameters	The <value> parameter can be “DB” or “0”-set measurement unit to dB “DBM” or “1”-set measurement unit to dBm “W” or “2”-set measurement unit to W (pW, nW, μW, mW...) “W/W” or “3”-set measurement unit to W/W
Example	UNIT:POW DBM
See also	SENS:POW:UNIT, and SENS:POW:UNIT?

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