Experience | Solutions

PMManager

PMManager User Guide

For Newport Laser Measurement Devices

NEWPORT CORPORATION

www.newport.com

Table of Contents

About this Guide

This guide describes how to operate the Newport **PMManager** application with any of the following Newport measuring devices:

- 843-R-USB
- 1919-R
- 841-PE-USB

How the Document is Organized

This guide describes installation and operation in the following order:

- Installing the **PMManager** Software
- Connecting the Measuring Device
- Using the **PMManager** Application
- Safety and Compliance in Appendix A

Definition of Terms

The Newport devices listed above are referred to in this guide as the **device** or the **instrument**. The connection between the smart sensor detector, referred to as a **sensor**, and the **PMManager** application running on your PC, is referred to as a **channel**. Using the **PMManager** system, you can view each channel's laser power and energy information.

Chapter 1 – PMManager and Devices

This chapter includes the following topics:

PMManager Features

PMManager turns a PC into a laser power/energy multi-channel analysis workstation.

The **PMManager** software features include:

- Extensive graphic display of data:
  - Line Plot, Histogram, Pulse Chart, Simulated Analog Needle, Position, and Stability Graph
  - Multiple data sets on separate graphs on the same screen
- Advanced measurement processing
  - Power/energy density, scale factor, normalize against a reference
  - Multi-channel comparisons
  - User defined mathematical equations: channels A/B, etc.
- Connect additional devices during active measurements
- Data logging for future review
  - Displayed graphically or saved in text format
  - Exported to an Excel spreadsheet.
- Printing of graphs and data.
- Interfaces and supports data logging with Newport's devices.

Package Contents

Each measuring device you purchase from **Newport** comes with a PMManager installation CD and other items, depending on the device. When you receive a device package, inspect the equipment container before unpacking. Evidence of damage should be noted and reported immediately. Unpack and check the contents against the relevant list below.

The **1919-R** package consists of the following items:

- 1919-R device
- USB cable
- Installation CD-ROM
- 12v power supply

The **841-PE-USB** package consists of the following items:

- 841-PE-USB device
- USB cable
- Installation CD-ROM

The **843-R-USB** package consists of the following:

- 843-R-USB device
- USB cable
- Installation CD-ROM
- 12v power supply

System Requirements

To run the **PMManager** software, you need a computer system that meets the requirements listed in *Table 1-1*.

Table 1-1 System Requirements

Item	Requirements
CPU	Intel(R) Core(TM) i7-2600 CPU @3.40 GHz 3.40 GHz.
System Ram	4GBytes.
Hard Disk	200MBytes (more for storing very large log files).
Operating System	Windows XP / 7 / 8 / 10 32 & 64 bit
USB Ports	USB 1.1 ("Full Speed") or USB 2.0 ("High Speed").
PC Accessories	• CD-ROM drive • Microsoft mouse (or equivalent) • VGA display with 1024X768 resolution (17” recommended)

Installing PMManager

To install the software:

1. Insert the CD into the CD-ROM drive.
2. If the CD software does not start automatically, open the CD-ROM drive, locate the **index.htm** file and double-click that file.

   The main CD menu appears.
3. Click **Install PMManager Application**.

   The *InstallShield™ Wizard* dialog box appears. The *InstallShield™ Wizard* guides you through the installation process.

   When the installation is finished,  appears on the desktop.

Chapter 2 – Connecting Devices

After completing the software installation, follow the instructions in the relevant section below to connect the device to your PC.

When you start **PMManager**, it will recognize the connected device(s) and respond depending on how options in the Preferences dialog box are set (see *Preferences Option*). You may find that you want to manually select which device or devices connect to **PMManager**.

If after following the steps for your device, PMManager does not recognize the device, refer to the troubleshooting section in *Chapter 12 – Preferences and other* Features.

Connecting the 843-R-USB device

After completing the software installation, you are ready to connect the **843-R-USB** device.

To connect the 843-R-USB:

1. Connect the sensor to the sensor head input on the device.

Figure 2-1 843-R-USB, Front View

2. Connect the USB cable to the device and to the USB port of your PC.

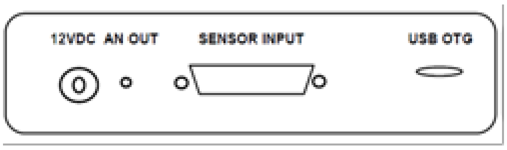


Figure 2-2 Diagram of Sensor and USB connector panel of 843-R-USB

3. Start the **PMManager** application by clicking the **PMManager** icon, .

   The device is connected and ready for use.

☞**Note:** *If this is the first time you are connecting the 843-R-USB device to your PC, make sure that Windows is running in Administrator mode.*

Connecting the 1919-R device

After completing the software installation, you are ready to connect the 1919-R device.

To connect the 1919-R:

1. Connect the sensor to the sensor head input on the device.

Figure 2-3 1919-R, Front View

2. Connect the USB cable to the device and to the USB port of your PC.

*Figure 2-4 Diagram of Sensor and USB connector panel of **1919-R***

3. Start the PMManager application by clicking the PMManager icon, .

   The device is connected and ready for use.

☞***Note**: If this is the first time you are connecting the 1919-R device to your PC, make sure that Windows is running in Administrator mode.*

Connecting the 841-PE-USB device

After completing the software installation, you are ready to connect the 841-PE-USB device.

☞**Note:** *If this is the first time you are connecting the 841-PE-USB device to your PC, Make sure that Windows is running in Administrator mode.*

To connect the 841-PE-USB:

1. Connect the sensor to the sensor head input on the device.

Figure 2-5 841-PE-USB, Head Input View

2. Connect the USB cable to the device and to the USB port of your PC>

   On the **841-PE**, the LINK LED flickers momentarily, indicating USB enumeration of the device.

Figure 2-6 841-PE. LED indicator side

3. Start the **PMManager** application by clicking the **PMManager** icon,

   The device is connected and ready for use.

Chapter 3 – Getting Started

The **PMManager** application is used with the 843-R-USB, 1919-R, and 841-PE-USB devices.. This application supports the use of multiple sensors; each connection between the sensor, the device, and the application is referred to as a channel. When one or more channels are present, they may be displayed in separate graphs or combined on the same graph.

This chapter discusses the following topics:

- Starting and Ending a PMManager Application Session
- The PMManager Window
- Resizing the PMManager Window

Starting and Ending a PMManager Application Session

To start a PMManager session:

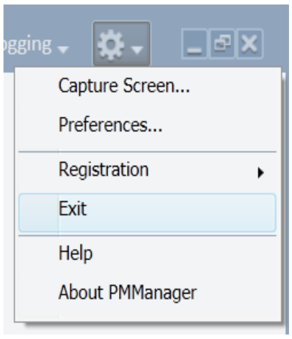
➢ From the desktop, double-click . The PMManager application opens.

On startup, **PMManager** searches for devices. If only one is found, **PMManager** automatically opens in full screen mode (see *Figure 3-2*) and begins operation. If more than one device is found, or there is more than one sensor on a single device, refer to *Chapter 8 – Working with Multiple Channels*.

☞***Note:*** *The keypad of the 843-R-USB and the 1919-R is disabled during a communication session with the **PMManager** application. The key pad does not respond to any key press until released from the **PMManager** communication session.*

To end a PMManager session:

➢ Click Exit from the **Options Menu** or click the X in the corner of title bar of the window to close PMManager.



☞***Note:*** *See Preferences for options when exiting the program.*

Selecting a Sensor

PMManager lets you work with multiple channels from one device or various devices at the same time. The devices may be connected to many types of sensors including thermopile and photodiode or a combination of different sensor types. In addition to being able to connect the application to numerous channels at once, you can specify which of the connected channels you wish to view. For more information on multiple sensors, refer to *Chapter 8 – Working with Multiple Channels*.

To select a device

1. Click Select Device(s) in the title bar of the window.

A separate window opens to select device(s) that are currently connected.

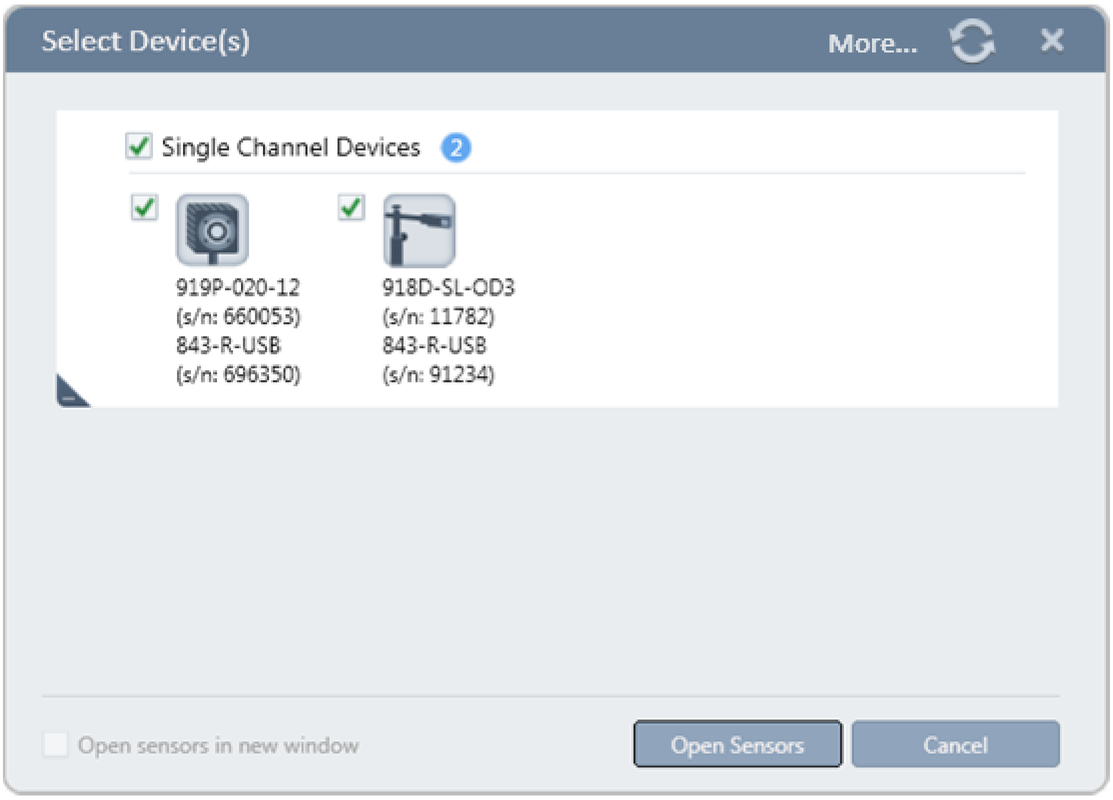


Figure 3-1 Selecting an available device

Each connected device is displayed as an icon with its name, type, and s/n.

2. Select the adjacent checkbox for each device.
3. Click the **Open Sensors** button indicated in the figure.

The PMManager Window

The following figure shows the **PMManager** Window:

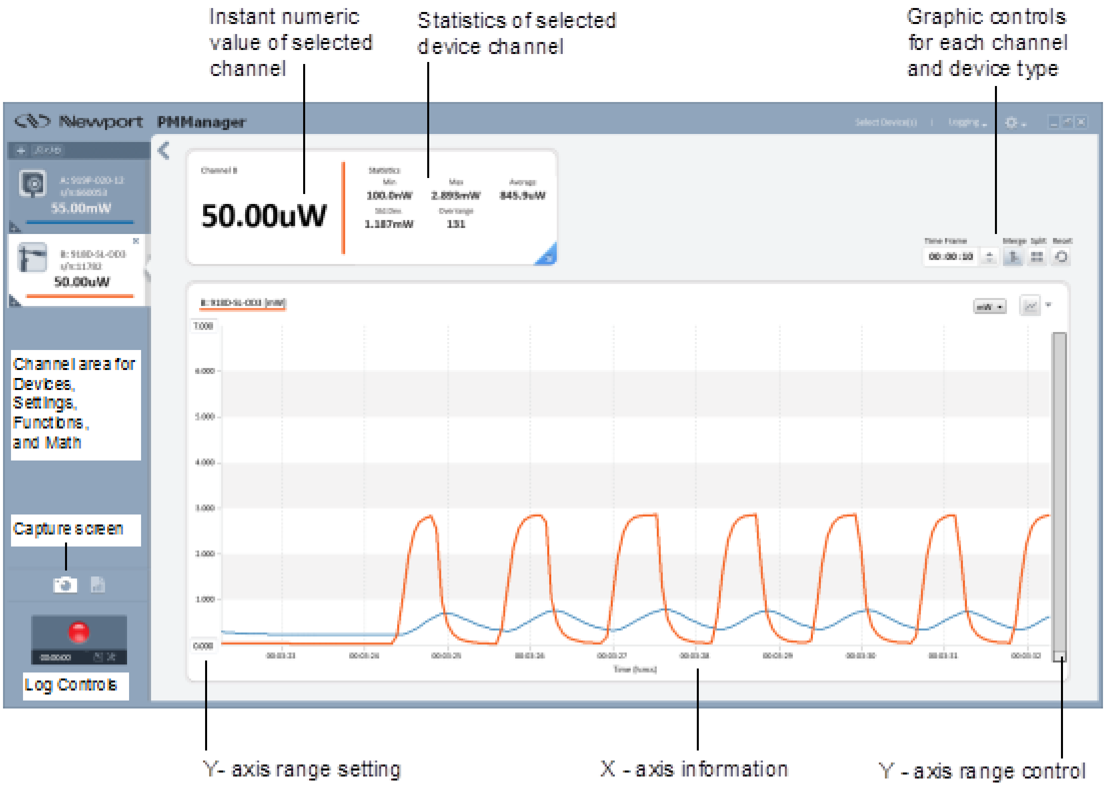


Figure 3-2 PMManager Application Window, with two channels

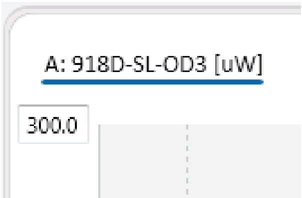
The **PMManager** window contains the following areas for all sensors:

- The Channel Area
- The Numeric Display Area
- The Graph Configuration Area
- The Statistics Area
- The Logging Area
- The Title Bar Controls

The specific items displayed in these areas depend on which channel is active – Math or sensor (Thermopile or Photodiode).

☞ ***Note:** See Chapter 4 – Features of the PMManager Window for details and examples.*

The Channel Area



The Channel Area contains a channel for each connected sensor and any Math channel that was started by the user. Each channel is given its own colored line to identify it, both in Channel area and the display area. When a channel is selected for the Y-axis values, its label appears in the upper corner of the display area.

The **Settings** for each sensor channel are inputted from the connected sensor. Every time you change a setting value, the setting is remembered for the next time the sensor is connected.

The **Functions** options can be set for each connected sensor.

Changes in **Settings, Functions,** and **Math** are applied immediately and the results are shown in the display area. Making changes usually requires adjusting values in Graph configuration area.

For information on configuring measurement settings for the various types of sensors, refer to *Chapter 4 – Features of the PMManager Window*.

Channel Controls

When a sensor is connected, only the current reading and properties of the device and sensor are shown in the Channel area (*Figure 3-3)*. Its **Settings**, **Math**, and **Function** dialogs are closed. Options for the later are shown in *Figure 3-4*.

Buttons are available to disconnect the device and to connect other devices.

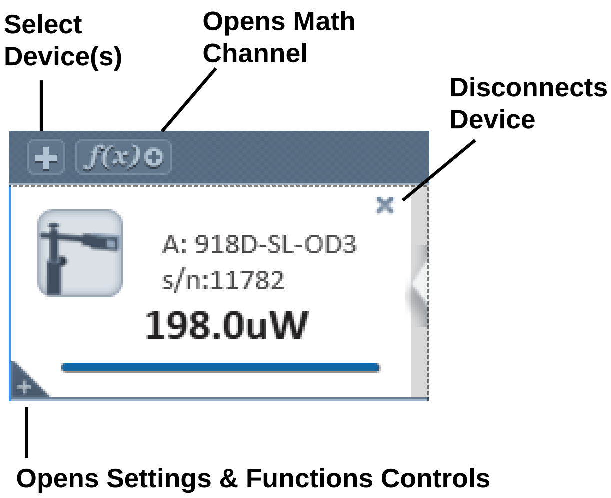


Figure 3-3 Channel display with all controls closed

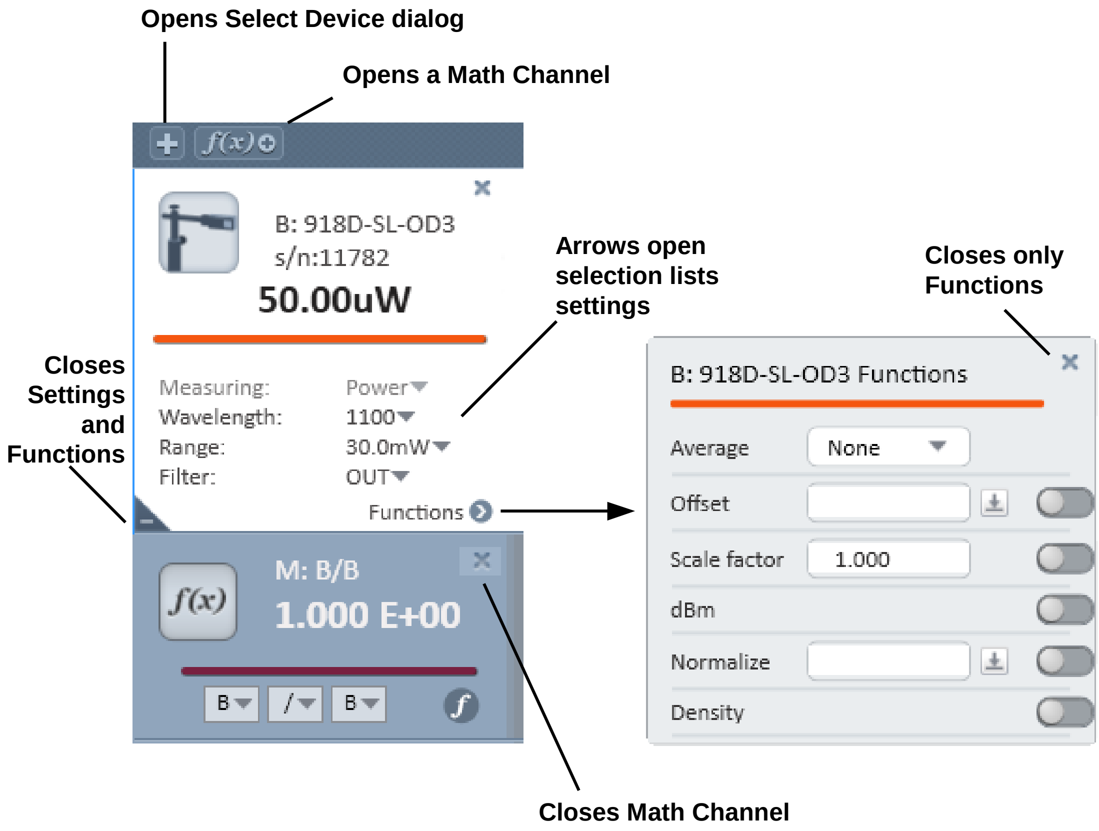


Figure 3-4 Device channel with Statistics, Math, and Functions opened

The Display Area

The Display Area shows the measurement readings in graph form, which you can modify with the options in the The Graph Configuration Area.

For information on configuring the display, refer to Chapter 4 – Features of the PMManager Window

☞**Note:** *To clear (reset) the display area that has focus , click in the Graphics control area for that device.*

The Numeric Display Area

The Numeric Display Area shows the numeric value of the selected channel (sensor or math) and the Statistics (see page 19).

The colored vertical line separating the measurement value and the statistics identifies the sensor in the display area.

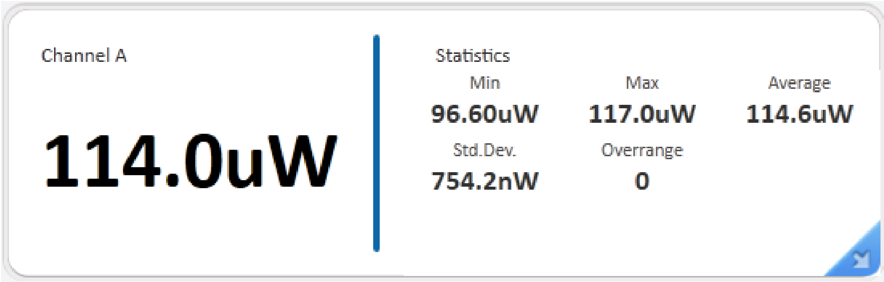


Figure 3-5 Numerical display example

The Graph Configuration Area

The Graph Configuration Area is used to configure graph display settings.

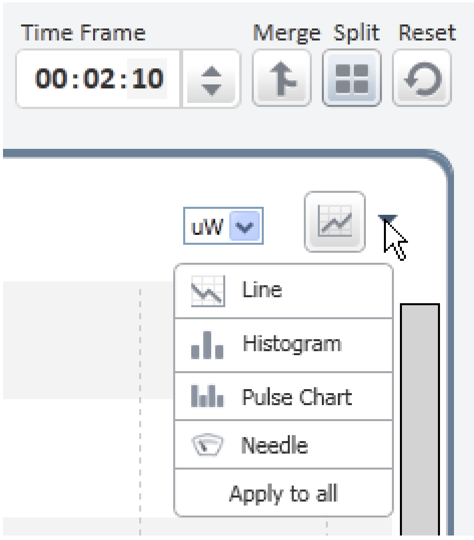
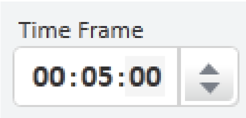
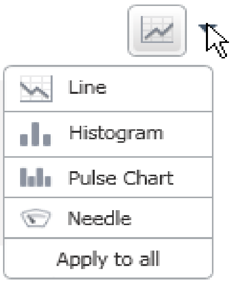


Figure 3-6 Graph Configuration Area

Table 3-1 Graphics Configuration area

Control	Description
Time Frame 	Value selected determines time period for the X-axis. Time is divided into three sections HH:MM:SS. To change a section value, click in the section (numbers shown with grey background), and click the up/down arrow to the desired value.
Power and Energy Graphs 	Click the down arrow to open the list of graphs. • The **Line** graph plots the values by connecting a line between points. The Y-axis is the value and the X-axis the time. • The **Histogram** presents a statistical analysis of all the measurements. • The **Pulse Chart** graph displays readings as bars with lengths proportional to the measurement. • The **Needle** graph displays value(s) as an analog meter. Option to include previous displays as a gray persistence. • **Apply to all** uses the graph mode of the selected channel and applies that mode to the other channels.
	• Merge to display multiple channels on the same graph. • Split to display multiple channels in separate graphs. If the Graph mode is Needle, Merge is not available.
Y-axis	A y-axis range is set from the Range control in the Device Channel. For the graph modes Line and Pulse, different values can be manually entered. Measurements that are outside the immediate display area can be moved into view by the y-slide control. See *Figure 4-3* for an example.
X-axis	The x-axis measurement is determined by the Graph Mode. The measurement can be time (Line), power/energy (Histogram and Needle), pulses (Pulse Chart).

For more information on configuring graph display settings, refer to *Chapter 4 – Features of the PMManager Window*.

The Statistics Area

The Statistics Area displays statistics for the current parameters in the selected Changes made to the Math and Function settings are updated in the statistics.

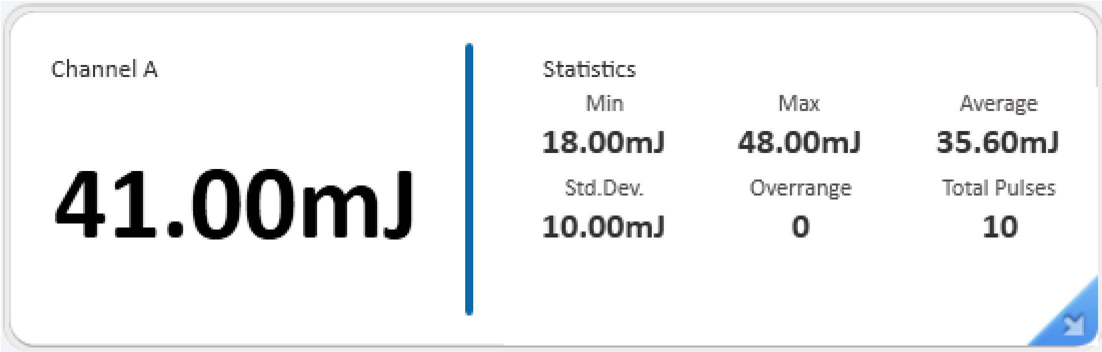


Figure 3-7 Statistics Area example

Table 3-2 The Statistics Area

Statistic	Description
Min	Displays the minimum measurement taken.
Max	Displays the maximum measurement taken.
Average	Displays the average measurement taken.
Std. Dev.	Displays the standard deviation.
Overrange	Displays the number of readings measured that were over the maximum value for the chosen range. When a reading is over the maximum value for the chosen range, **OVER** is displayed in the Numeric Display Area.
Total Pulses Thermopile sensors in Energy Mode	Displays the total number of measurements taken.

The Logging Area

The logging controls are found at the bottom of Channel Area (see *Figure 3-2*).

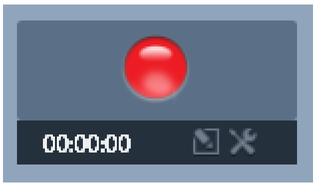


Figure 3-8 Logging controls

The Logging Area is used to configure log file settings and to start and stop the log. For information on working with log files, refer to *Chapter 10 – Working with Log Files*.

The Title Bar Controls

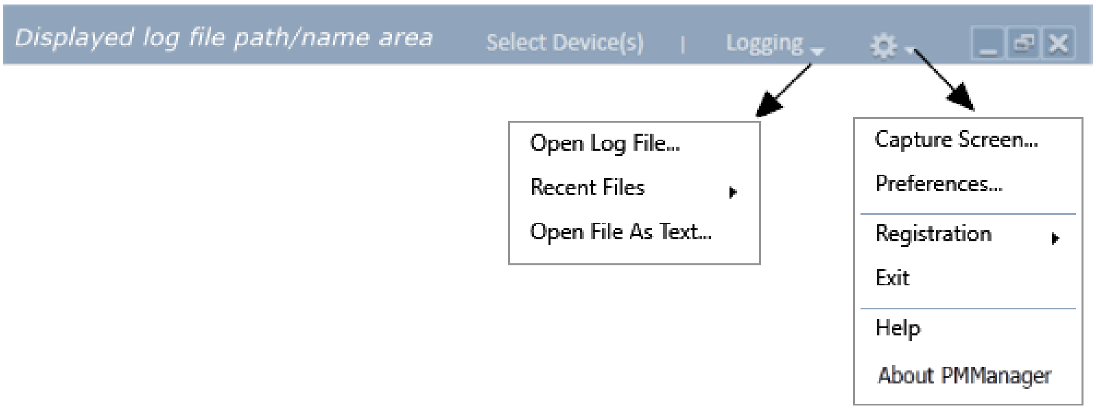


Figure 3-9 Title Bar commands and options

Table 3-3 Title Bar Controls description

Control	Description
Displayed log file path/name area	This area is used by the logging command to display the opened selected log file, whether as a PMManager window or as a Notepad text file.
Select Device(s)	Command to select and connect devices (see *Selecting a Sensor*)
Logging	Drop down list to select Logging options (see *Chapter 10 – Working with Log Files*).
	**Options Menu** – features and preferences (*Chapter 12 – Preferences and other* Features). Some of the Advanced Functions are dependent on the device and/or sensor.
	Standard Windows control box options. See also *Multiple Sessions*.

Resizing the PMManager Window Areas

PMManager is meant to run in full screen mode. Although, you can resize the entire window by using the controls in the upper right corner, doing so may hide options in the graph configuration area.

There are individual controls to hide/show or expand/contract certain areas.

- Display area

  This area can be expanded to fill the entire screen by clicking the button of the display area. To contract to the default size, click the button in the expanded view. These actions hide and show the left control panel.

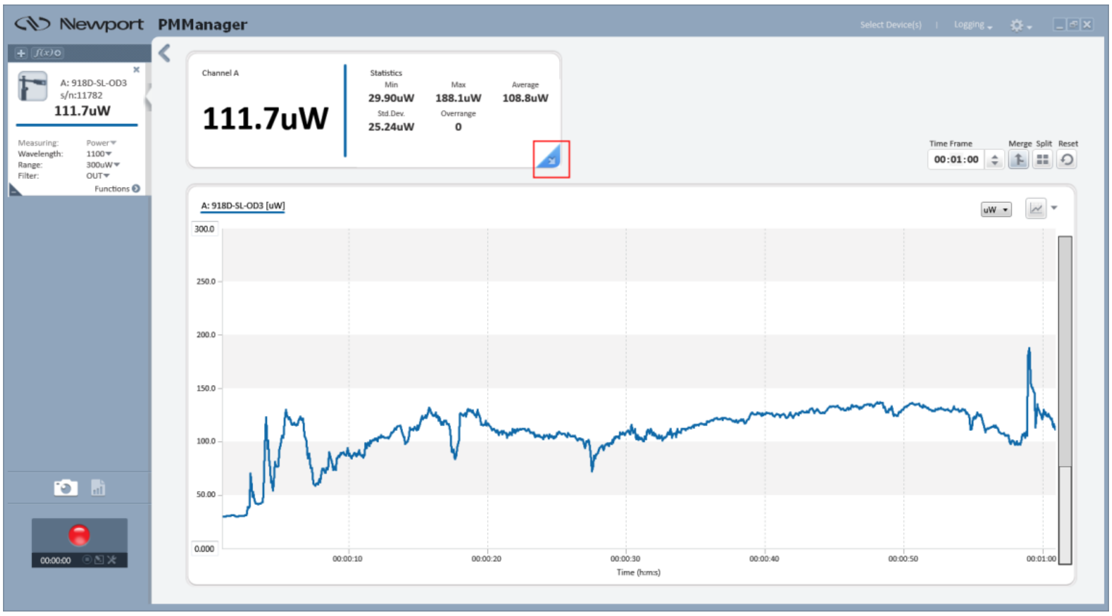


Figure 3-10 Expanded view of the data area

- Numerical Measurement and Statistics

  This area can be expanded to fill the entire display area or expanded to fill the entire screen.

  - To fill the display area, click the button in the lower corner of the Numerical area. While in this expanded mode, you can hid the Statistics area so that only the Measurement area is shown. To do this, click the "X" at the end of the horizontal line below the measurement value . To leave this view, click the button.
  - To return to the default size, click the button in the lower corner of the Numerical area.
  - To fill the entire screen area with the expanded view of the Numerical area, click the button of the display area. Click the appropriate button(s) to return to default size.

- To flip the color of the Measurement Area at any viewing option, click the  button in the lower left corner.

These options are shown in the following pictures.

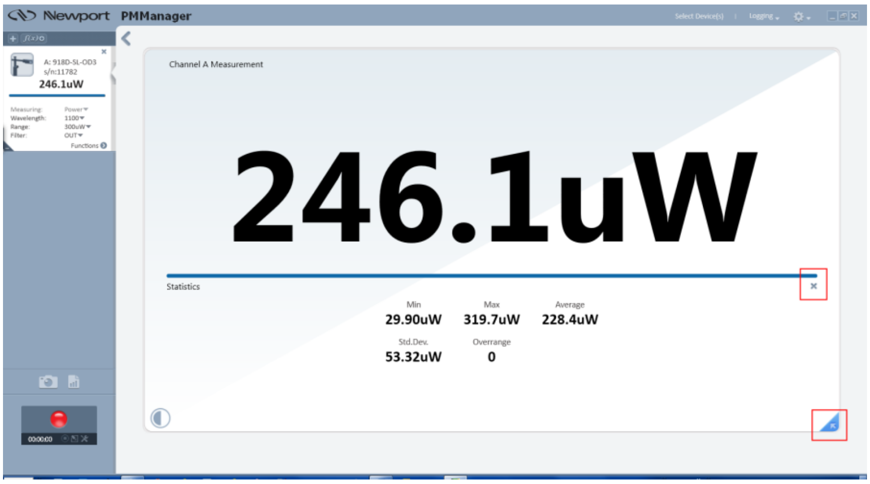


Figure 3-11 Expanded Numerical Area with Channel Area

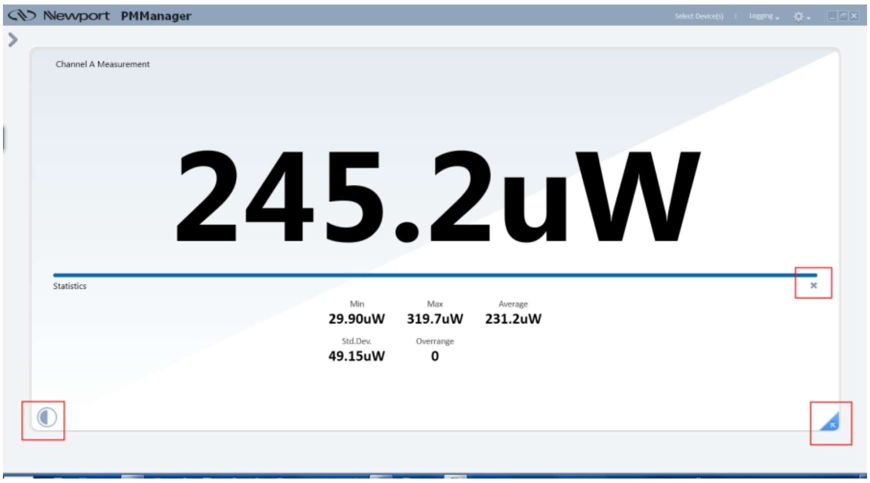


Figure 3-12 Expanded Numerical Area only

Figure 3-13 Expanded Measurement Area in flipped background

Chapter 4 – Features of the PMManager Window

PMManager offers a range of options to view, analyze, and plot sensor outputs.

You can analyze sensors individually, perform mathematical operations on their output, and then have outputs and/or results displayed individually or merged on a single graph with other sensors.

Each sensor output is assigned to its own Channel (settings and functions) where the available settings are read from the sensor.

This chapter describes:

- Channel
- Settings
- Functions
- Graphic Setup

Math channels have their primary usage when more than one channel is present. Refer to *Chapter 8 – Working with Multiple Channels*.

Channel

A channel is opened for each sensor that is connected to **PMManager**. There are two sets of configuration fields for each channel: Settings and Functions. Each channel is assigned a letter character to identify the channel for graphic configurations and displays. The title or banner of the channel displays the sensor and the current value. Holding the mouse indicator over the banner displays full details of the sensor including sensor and devices serial numbers. (Refer to *Figure 3-3* and *Figure 3-4*.)

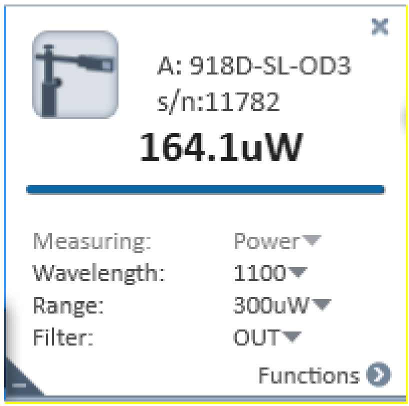
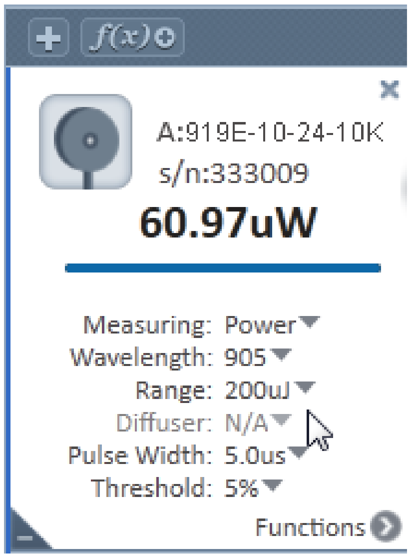
The Channel Measurement frame displays the current value measured by the sensor, adjusted by enabled (if any) Function parameters.

Settings

As the following examples show, the options for Settings are dependent on the sensor.

The Save button, which is common for all sensors, is enabled every time you select a different value from one of the Settings parameters. Clicking the button sets the current parameters values as the default the next time the sensor is connect to **PMManager**.

Drop down list boxes are adjacent to sensor parameters so that you can select which value to use.

Sensor	Settings
Thermopile The Measuring parameter is set at Power; the other option is Energy. Refer to <u>*Chapter 5 – Measuring with the Thermopile Sensor*</u>.	
Photodiode The Measuring parameter is fixed at Power as this is the only option for a photodiode sensor. Refer to <u>*Chapter 6 – Measuring with the Photodiode Sensor*</u>.	
Pyroelectric The Measuring parameter has two options, Power and Energy <u>*Chapter 7 – Measuring with the Pyroelectric and PD Energy Sensors*</u>.	

Functions

Each sensor channel comes with a Functions section. The parameters are the same for each sensor, but their values are related to the sensor and the current readings of the Settings.

Functions apply to power and energy readings. .

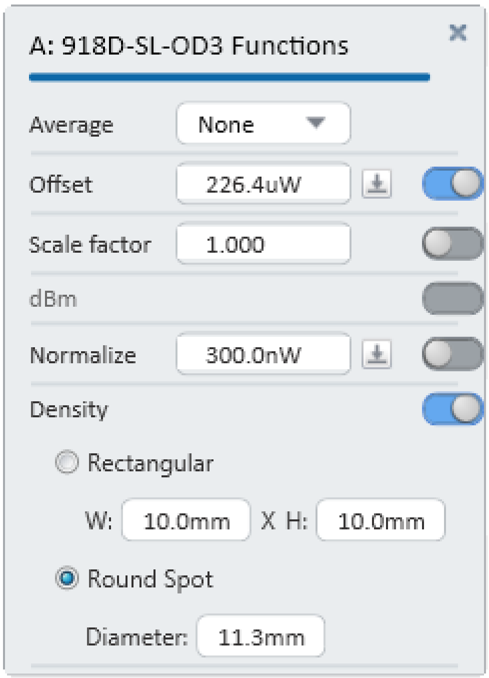
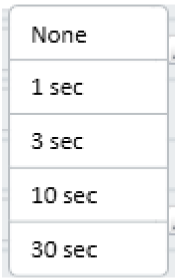


Figure 4-1 Functions with current sensor values

Average

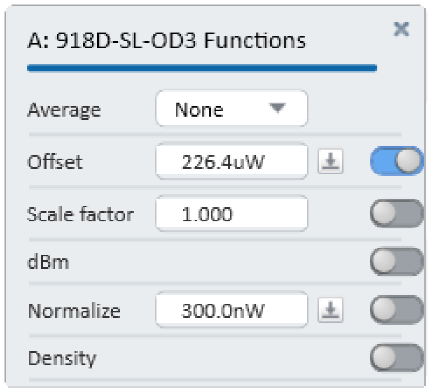


The Average function offers several choices as to the time interval over which sensor readouts are averaged.

When you set the channel to average mode, PMManager displays the average of the readings spanning from the last time average mode was activated, to the present. Once the time period of the average is reached, the average becomes a running average, spanning the average period backwards in time. For example, if the average period is 30 seconds, at 15 seconds, the average is over 15 seconds; at 30 seconds, the average is over 30 seconds; at 5 minutes, it is over the period from 4 minutes and 30 seconds to 5 minutes (30 seconds back from the present).

Figure 4-2 Averaging over a 30-sec interval

Offset



The Offset function lets you select a "current" value as an offset value.

1. Open the Function dialog.

   If this is the first use of Offset, the value is blank (grey).

2. To use the current measurement value, click the adjacent .

   That value becomes the Offset value and the adjacent slide switch is engaged.

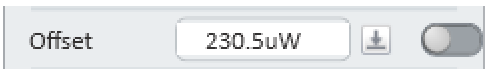
   

   Every time you click the adjacent button, the current value becomes the offset value and shows in the adjacent field. The offset value remains until another value is selected.

   The difference between the "current" value and the Offset is displayed in the measurement frame.

   If you click the button while the offset is in effect, the new offset value is the "current" value, not the displaced difference.

3. To remove the Offset value, but keep current value, click the slide .

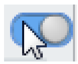
Scale Factor

The Scale Factor function multiplies the "current" value with the positive or negative value you enter in the adjacent field once you select the check box.

1. Open the Function dialog.

If this is the first use of Offset, the value is 1.000 (grey).

2. Click in adjacent slide to open the value field.

3. Enter the scale factor.
4. Double click the  to set and use the factor.
5. To remove the scale value, but keep current value, click the slide .

This option is especially useful in measurement configurations that have a beam splitter in front of the sensor. By multiplying by the correct scale factor (usually about 20), the user will see the actual laser power/energy measurement and not just what hits the sensor

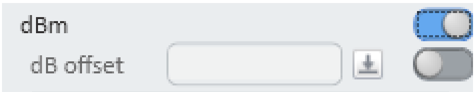
dBm and dB Offset

The dBm function offers displaying current values as dBm values and with a dB Offset.

1. Open the Function dialog.
2. Verify that the [Normalize](#) function off.
3. Click in the slide area

   The options for dBm open.

   The measurements values are displayed as dBm.

4. To include dBm offset, click the adjacent

   This offset parameter functions like the Offset one. Every time you click the adjacent button, the current value becomes the offset value. The difference between the "current" dBm value and the dB Offset value is displayed in the Channel Measurement frame.

5. To remove dBm (and offset, keeping current value), click in slide area.

Normalize

The Normalize function uses the selected "current" value and divides all subsequent values by the selected value and displays the result in Channel Measurement frame.

1. Open the Function dialog.
2. Verify that dBm function is off.
3. To begin normalization, click the adjacent button.

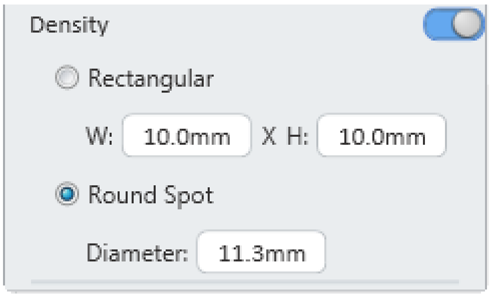
   The current value becomes the normalizing value and is displayed in the text field.

   You can also enter the normalization value manually.

4. To remove normalization, keeping current value, click in slide area.

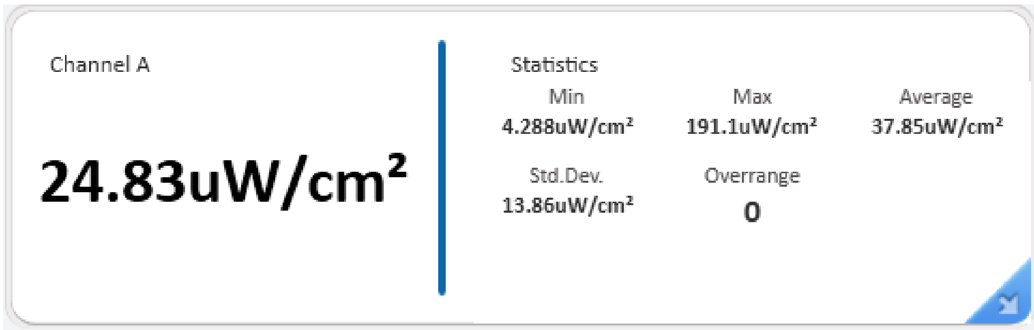
Density

The Density function displays the sensor output as a per cm^2 value. The option lets you choose a Round Spot or a Rectangular Spot diameter from the adjacent list box.



1. Open the Functions dialog.
2. Verify that the dBm option is off.
3. For a Round Spot, select its radio button.
   a. Manually enter the diameter in the adjacent field
4. For a Rectangular Spot, select its radio button.
   a. Manually enter values for W and H in their respective fields.

With either of the selections, the Graph plot power density, and the displayed measurement Statistics is updated to reflect the selection.



Graphic Setup

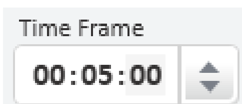
This section describes the Graphic Setup using one channel as an example. Graph selection starts by clicking the adjacent list arrow to a list to select the graph type. The icon picture updates to show your selection.

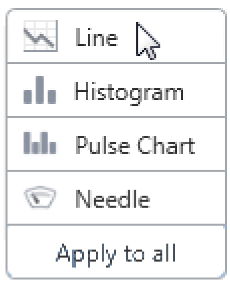
Multi-channel displaying would follow the same use of the controls, only then you can show the channels on separate graphs or merged into one. When merged, the Channel you click defines the axis definitions.

Line Graph

To configure a Line graph:

1. In the Graph option list, select Line.
2. In the Time Period section, select the time period to represent the width of the X-axis.



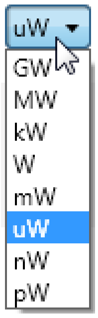


Since the X-axis always has 10 major divisions, then in this case, each one is 1-second. After 10 seconds has elapsed, the X-axis will begin sliding to right and after each second another division is added to the right and one division is removed on the left.

3. Observe the value in the Channel A Measurement frame as well as the Min and Max shown in the Statistics frame.

   This information will guide you in selecting Y-axis limits.

4. Open the list box to select the units for the Y-axis.



5. Select a unit based on the information gathered from the previous steps.

   With the slide controls in this position, the values are 0 to 1,000 of the unit that you selected.

   ☞**Note:** *When options from Functions are used, the unit selection will change accordingly. Refer to Y-axis with Functions for details.*

6. Adjust the slide controls to give you the definition that you wish to see in the display.

Figure 4-3 Line graph of a photodiode sensor

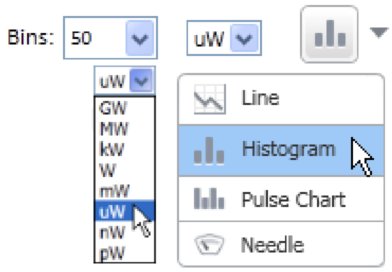
Y-axis with Functions

Function	Y axis unit
dBm	dBm
Normalize	No units displayed
Density	W/cm² or J/ cm²
Offset and Scale Factor	Selecting one of these functions does not change the units of the Y-axis scale but may require adjusting the limits.

Histogram Graph

To configure a histogram:

1. In the Graphic option list, select Histogram. (*Figure 4-4*)



2. Observe the value in the Channel A Measurement frame as well as the Min and Max shown in the Statistics frame.

   This information will guide you in selecting X-axis limits.

3. Open the list box to select the units for the X-axis.
4. Experiment with the controls in Histogram Settings so the data is displayed in an appropriate way.

   ☞***Note:*** *When options from Functions are used, the unit selection will change accordingly. Refer to Y-axis with Functions for details.*

   ☞*Note:* *Measurements that are out of the selected X-Axis limits can be displayed by the slide below the X-axis.*

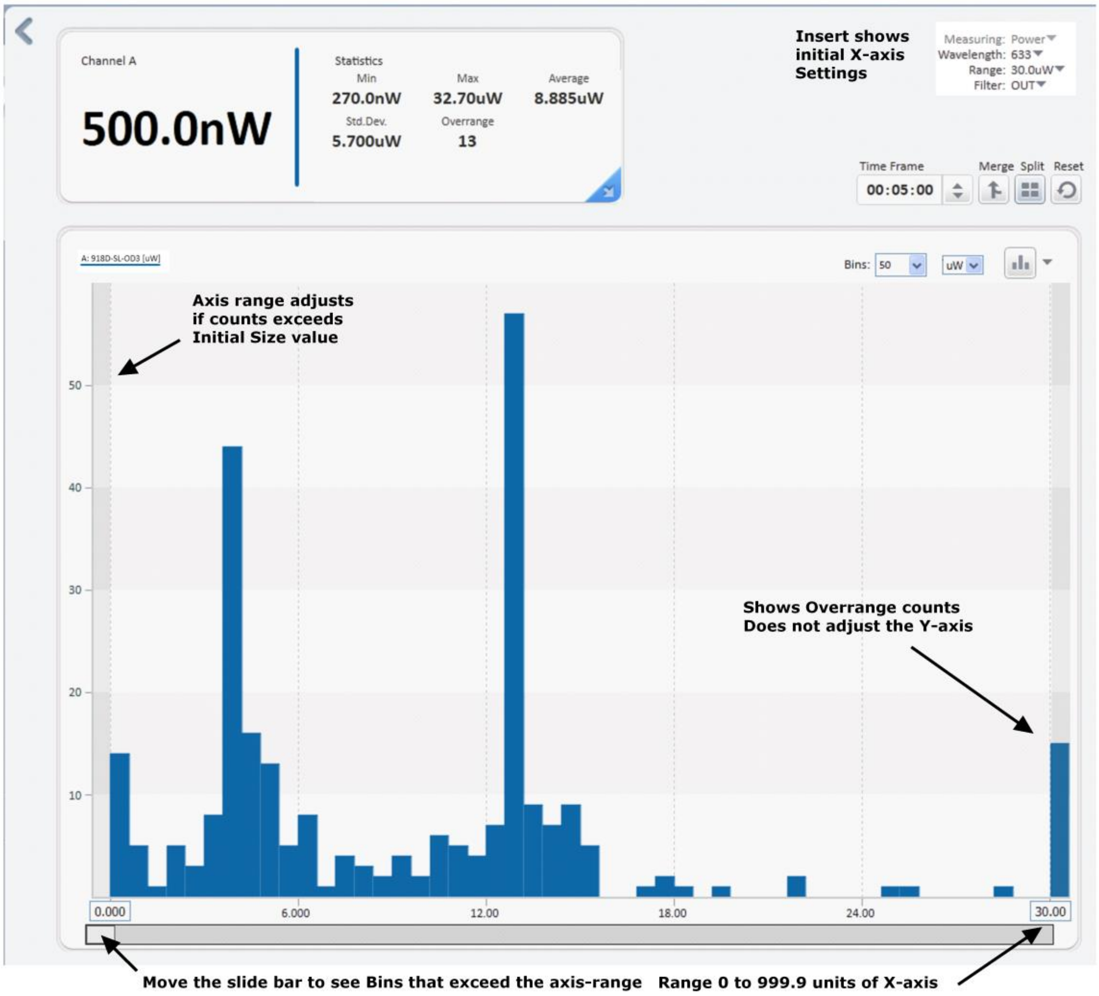


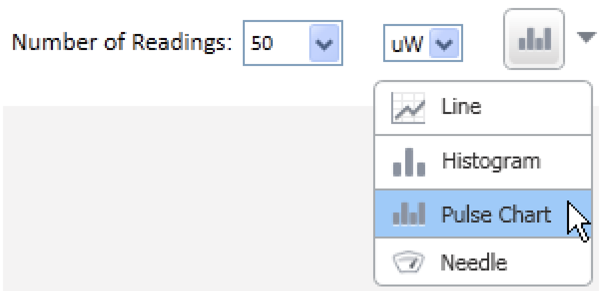
Figure 4-4 Example of a Histogram plot

Pulse Chart

To configure a Pulse Chart:

1. In the Graph option list, select Pulse Chart.
2. Observe the value in the Channel A Measurement area as well as the Min and Max shown in the Statistics area.

   This information will guide you in selecting Y-axis limits.
3. Open the list box to select the units for the Y-axis.



In this example, the Y-axis was modified to display 5.000µW at the top because the measurement values were less. Initially, the value 30.000 was changed and after clicking in the bottom field (0.0), the chart show was displayed.

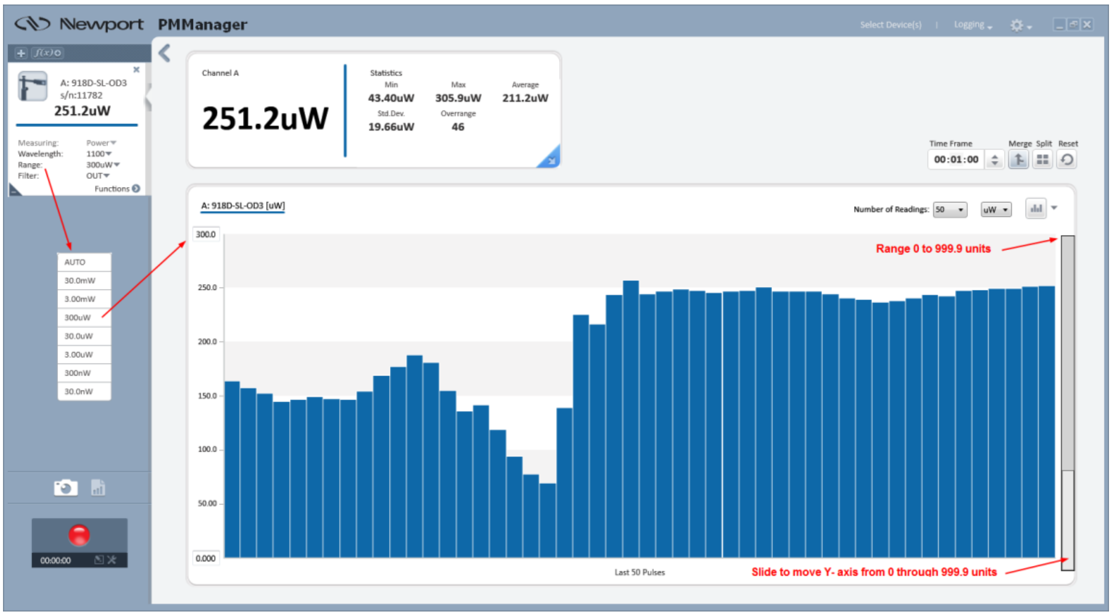


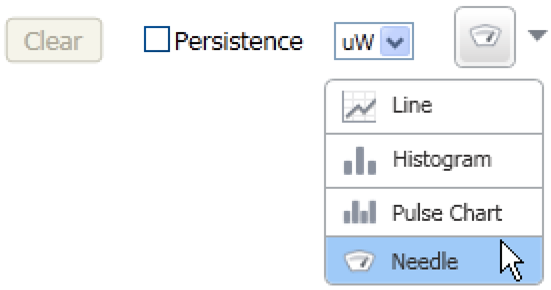
Figure 4-5 Example of Pulse Chart

Needle Graph

A needle graph simulates an analog display, similar to the style of an analog voltmeter.

To configure a Needle Graph:

1. In the Graph option list, select Needle.



2. Observe the value in the Channel A Measurement area as well as the Min and Max shown in the Statistics area.

   This information will guide you in selecting X-axis limits.

3. Follow the steps for a Line Graph as the requirements for these two graphs are similar.

Needle modes

The Needle graph has two modes:

- Persistence

  In this mode, previous measurements remain and are displayed in gray. Also, the Min and Max values are displayed.

  Clicking the Clear button clears the display of previous measurements, including Min and Max.

  De-selecting Persistence check box converts to Non-Persistence display.

- Non-Persistence

  In this mode, only the current measurement is displayed.

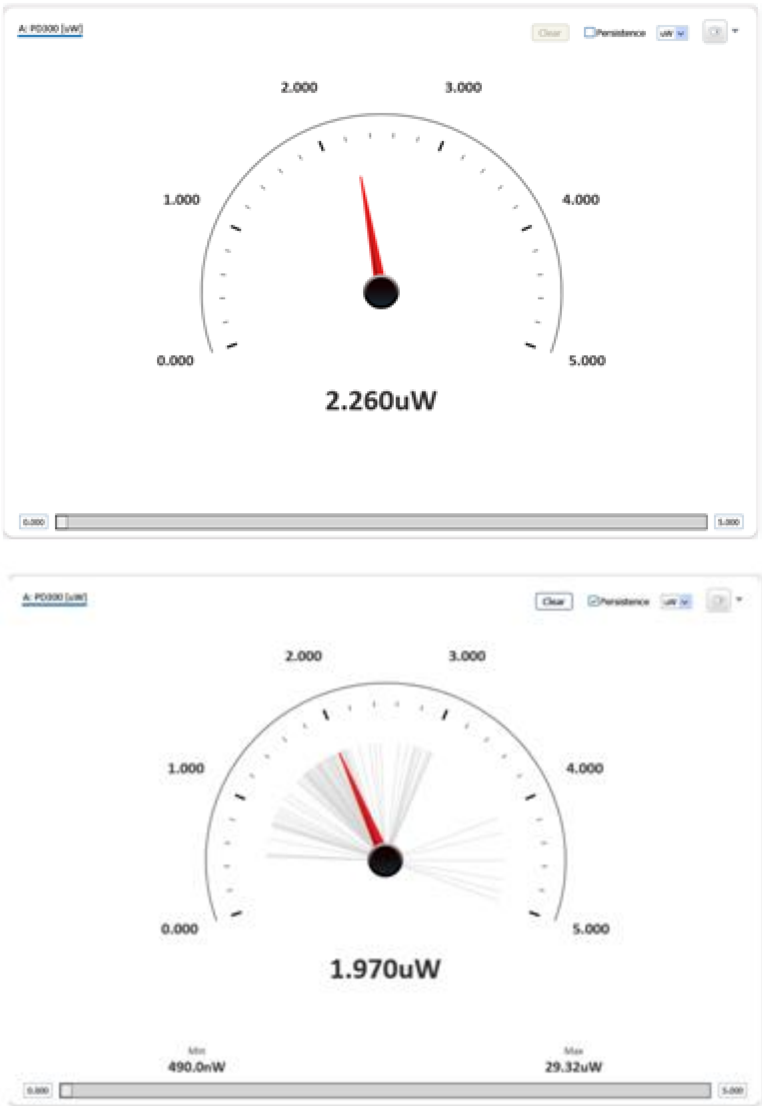


Figure 4-6 Needle graph, persistent and non-persistent, respectively

Position

When a sensor is in Track w/Power measurement mode, the graphic display can either be **Position** or *Stability*. In the Position graph, **PMManager** displays the position of the laser beam on a coordinate graph as well as numerically. It also displays size as a circle drawn to scale on the graph and numerically. If size cannot be measured, then position data only will be shown.

The numeric display and statistics are of the power measurement. Functions that are set will affect the power and statistics measurement. They have no effect on the position and size measurements.

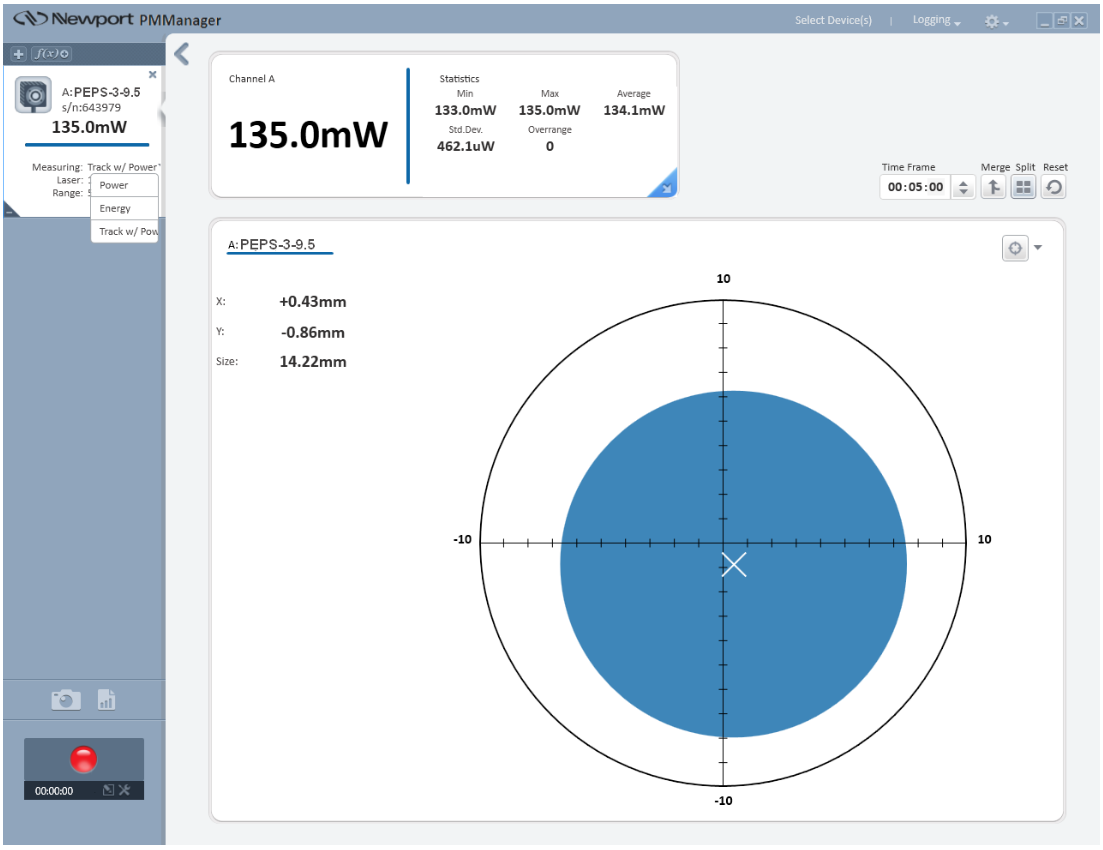


Figure 4-7 Position and size display

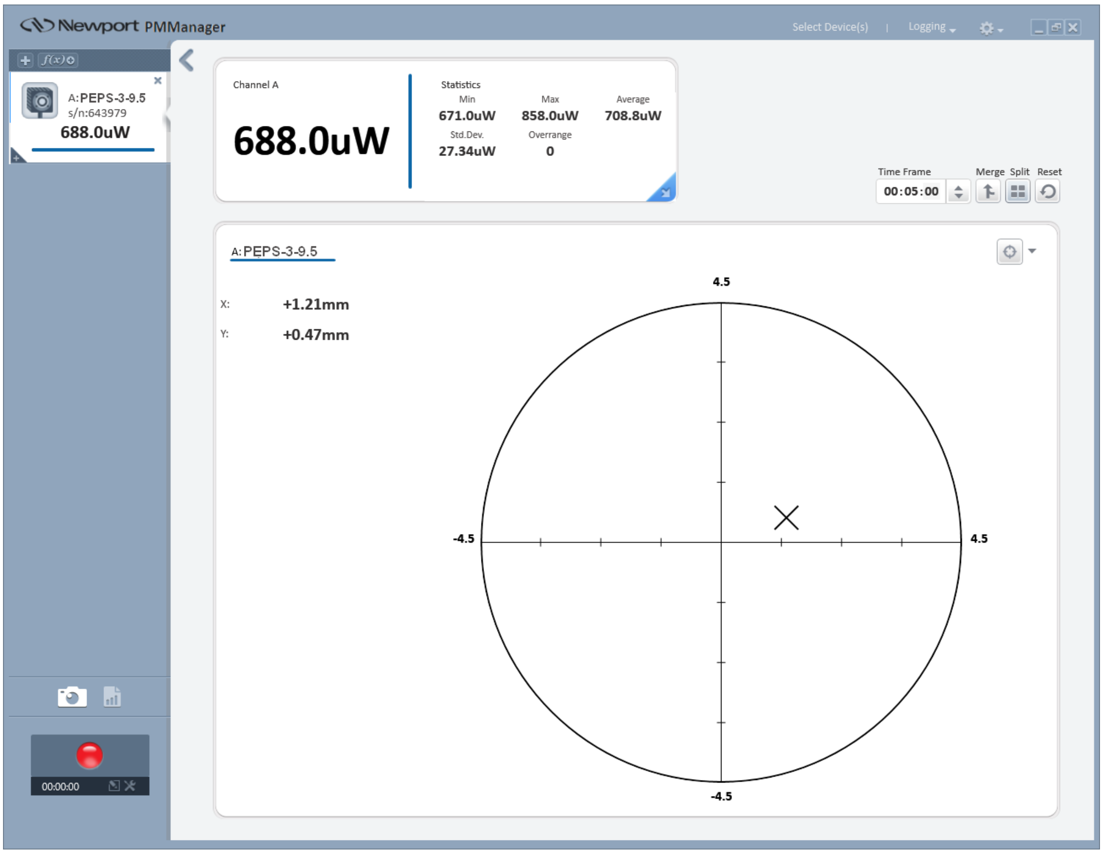


Figure 4-8 Position when size cannot be measured

Stability

When a sensor is in Track w/Power measurement mode, the graphic display can either be **Stability** or *Position*. The Stability graph tracks the pointing stability of the laser beam over time.

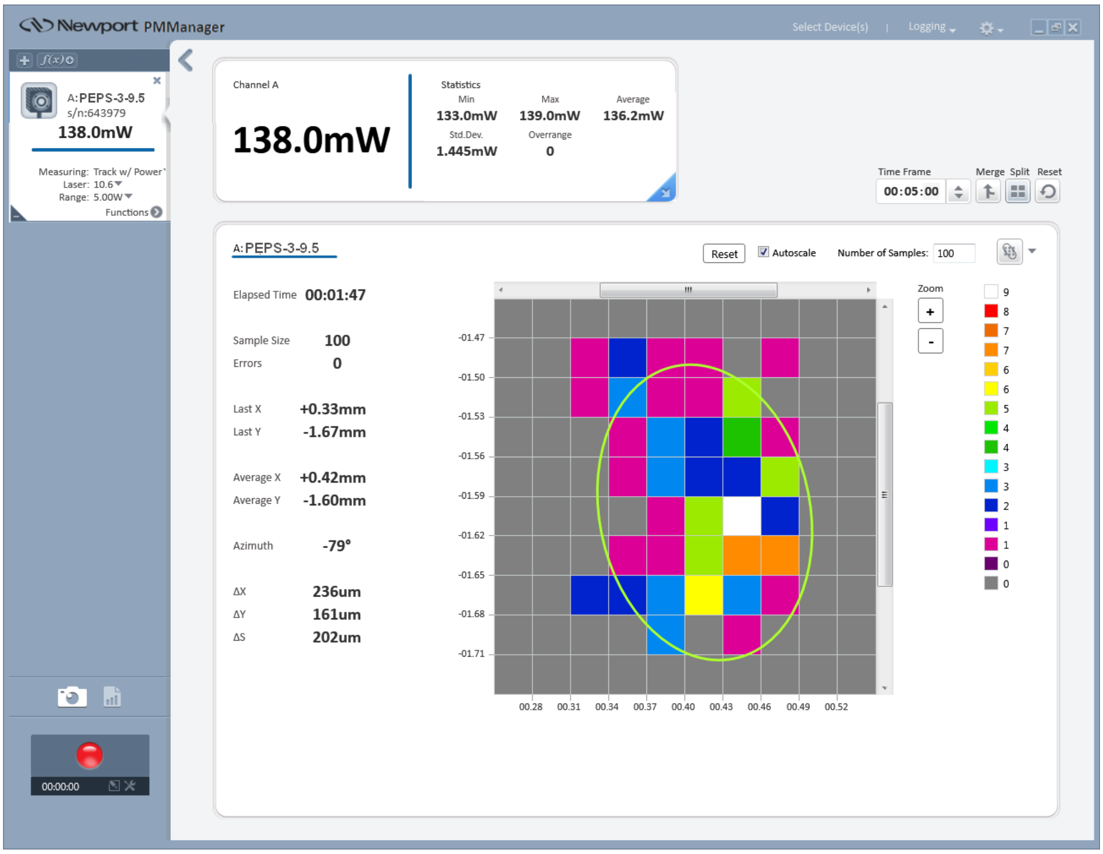


Figure 4-9 Stability mode example

Configuring a Stability graph

1. Select **Stability**
2. Set the number of samples to collect

   Enter a number from 1 to a million. This is the number of beam center locations that will be counted. When the sample count reaches this value, old readings are removed from the sample set as new readings are added to keep the sample count constant. You can follow the count in the *Data area*.

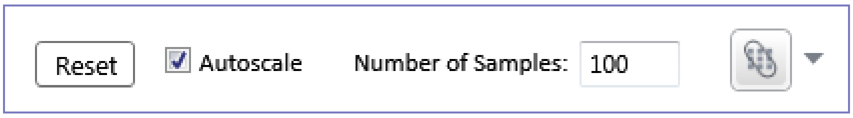


Figure 4-10 Graph setup for Stability

Graphic area

The default size for the area is the position tracking area available on the PEPS sensor being used, with zero in the center. The measuring dimensions can be altered by using one of the *Zooming* options.

Each axis is divided into 10 units creating 100 cells in which the counting is made for the beam center position. In the example of *Figure 4-9*, each cell is 0.05mm by 0.05mm.

Each cell is given a color that represents the number of readings for that cell, see *Legend*. As the stability measurement proceeds, the cells change colors.

Autoscale

Selecting this option in Graph Setup scales the X- and Y-axes so that the display occupies the maximum area of the graph.

If you then de-select the option, these axis settings remain. One of the *Zooming* options must be used to change the display.

Legend

The legend is a series of vertical, colored squares where each square's number is the number of counts for that x-y cell in the graph. The value zero, which means no hits in that cell, is the background color of the display. The cell with the greatest number of counts is made white. The values of the squares in between are given values divided between zero and the highest values.

As the stability measurement proceeds, you will see the values of the legend's squares change.

Data area

Laboratory System. An X, Y coordinate system defined in the space of the laser sensor. The zero point is the sensor center, X is horizontal and Y is vertical.

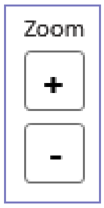
Beam Axis System. An X, Y coordinate system where the X direction is the direction of the maximum amplitude of movement of the laser beam, and the Y direction is perpendicular to the X direction. The zero point is the average position. This coordinate system moves relative to the Laboratory System as the laser beam moves.

Elapsed Time	Shows duration of the counting. Counting begins when the Graph option Stability is selected or when the Reset button is clicked.
Sample Size	Indicates how many samples have been measured. This value increases until the entered value for the number of samples is reached; after which old samples are discarded from the sample set to keep the value constant.
Errors	When value is greater than zero indicates number of times a count could not be made. The usual reason is that the beam center when outside the sensor's field of view.
Last X and Y	The position of the beam center for the last reading, in the Laboratory System.
Average X and Y	Shows the average X and Y positions for the readings in the sample set, in the Laboratory System.
Azimuth	The rotation angle of the X axis of the Beam Axis System relative to the X axis of the Laboratory System.
Δ X, Y, and S	The position stability, calculated as 4σ in the X, Y and S directions respectively in the Beam Axis System, where σ is the standard deviation. S represents a general radial direction.

Zooming

Zooming the displayed stability graph is available during measurements as well when viewing a recorded log file. Zooming is accomplished by keyboard, the left mouse button, and by the mouse wheel. As zooming is increased or decreased, the X- and Y-axes will adjust. Moreover, cell colors and legend values will change. You can use the scroll bars of the graph to center the new zoom field.

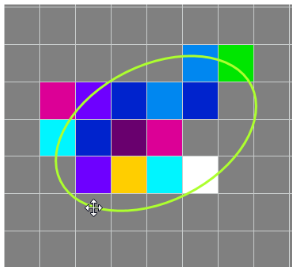
- ***Keyboard***

  Clicking the Plus and Minus keys on the main keyboard section or on the Number keypad will zoom in and zoom out the display.

  The arrow keys can be used to scroll the display.

- ***Left mouse button***

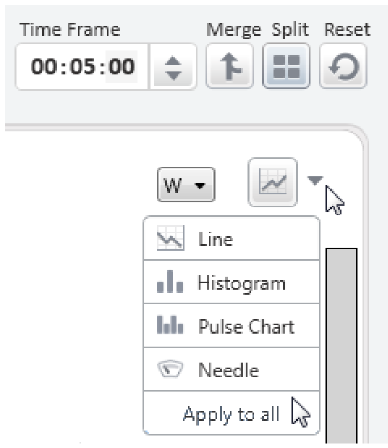
  This button can zoom the display by clicking the appropriate button on the Zoom control.

  The left mouse will drag the display by holding down the button and moving in the desired direction. The mouse indicator changes to a 4-point motion indicator icon.

- ***Mouse whee*l**

  Rolling the mouse wheel away from you zooms in, and towards you zooms out. The display may be scrolled in any direction by pressing the mouse wheel (or middle mouse button) and dragging.

Apply to All



This option sets all displays to the same Graph mode as the display that is selected. Apply to All does not affect displays which cannot be changed to the selected graph.

Chapter 5 – Measuring with the Thermopile Sensor

This chapter provides an overview of thermopile sensors and instructions for taking measurements with the thermopile sensor. Topics include:

Overview of Thermopile Sensors

Newport thermopile sensors measure both power and single shot energy. When a radiant heat source, such as a laser, is directed at the absorber sensor aperture, a temperature gradient is created across the thermopile of the enclosed detector disc. This generates a voltage proportional to the incident power.

The instrument amplifies this signal and indicates the power level received by the sensor. At the same time, the signal-processing software enables the instrument to respond faster than the thermal rise time of the detector disc, reducing the response time of instrument. The energy of a single pulse is measured by digitally integrating the pulse power over time.

Measurement Settings Configuration

If you are planning to repeat similar measurements, you can configure the settings for each individual sensor, and save them to the instrument. The saved settings become the default configuration for that channel, and are displayed every time the channel is opened.

The following sections describe how to select the measurement mode, how to configure measurement settings for thermopile sensors and how to save them as the default configuration for that channel. The measurement setting fields differ for power and energy modes.

Selecting the Measurement Mode

To select the measurement mode:

➢ Select Power or Energy from the Measuring drop down list in the Settings Area. The Thermopile screen fields displayed depend on the mode selected.

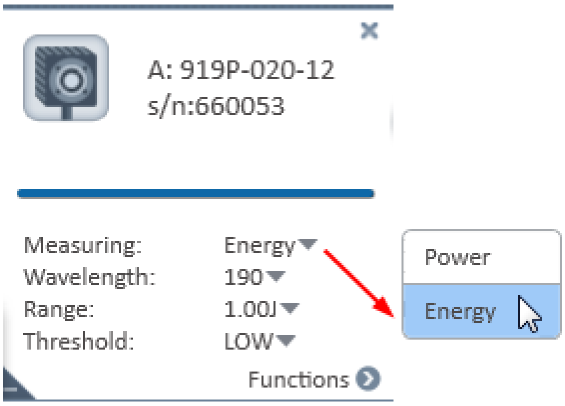


Figure 5-1 Mode Drop Down List

Configuring Measurement Settings in Power Mode

This section explains how to select the laser wavelength and configure the range and an average reading in power mode.

Selecting the Laser Wavelength

Thermopile sensors have different absorption at different wavelengths. To compensate for these differences, each sensor has been calibrated by a laser at several wavelengths. By choosing the correct laser wavelength, the correction factor for that wavelength is automatically introduced.

To select the laser wavelength:

➢ Select the laser wavelength from the Laser drop down list in the Measurement Parameters Area.

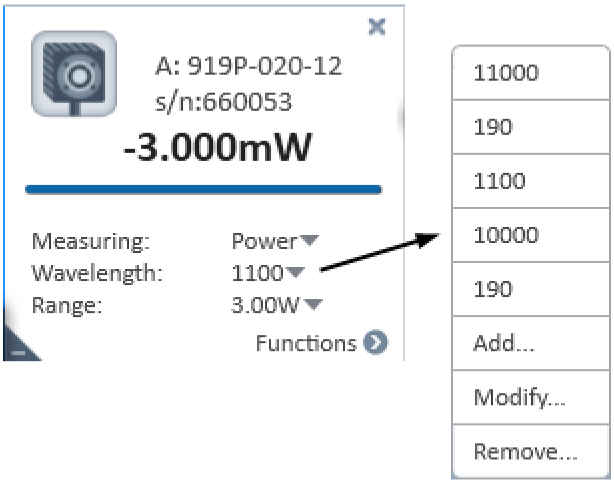


Figure 5-2 Laser Drop Down List

For the 919P family of sensors, the absorption of the detector coating varies somewhat according to wavelength. The correction curve for the absorber is stored in the sensor EEROM. This correction curve ensures that the power reading is correct at all laser wavelengths.

To configure laser wavelengths, refer to Configuring Laser Wavelengths in Chapter 6 – Measuring with the Photodiode Sensor.

Selecting the Range

Thermopile sensors cover a wide range of powers, from microwatts to 1000s of watts, depending on the type of sensor in use. In order to provide accuracy at each end of the range, the electronics of the device must be configured to work in a range that is most suited to your needs.

To configure the range when you know the approximate range of the expected readings:

➢ Select the range from the Range drop down list in the Settings Area. The instrument will configure itself according to the selected range.

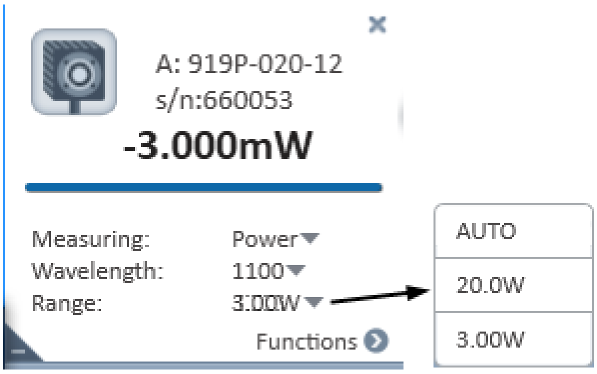


Figure 5-3 Range Drop Down List

To configure the range when the range of the expected readings is not known, or if highly varying readings are expected:

➢ Select AUTO from the Range drop down list in the Measurement Parameters Area. The instrument will configure itself according to the selected range.

☞ ***Note:*** *AUTO instructs the instrument to configure itself in the lowest range possible that is higher than the latest readings. If the readings exceed 100% of the present range, the instrument reconfigures itself for the next higher range. If the readings fall below 9% of the present range, the instrument reconfigures itself for the next lower range after a short delay. The delay prevents an infinite range-changing loop when readings are close to the end of the scale.*

Averaging the Measurements

The thermopile sensor is measured 15 times a second. **PMManager** automatically refines your readings and applies a moving average. For details, refer to *Average*.

Configuring Measurement Settings in Energy Mode

Laser wavelength and range are configured exactly as in power mode. This section describes the **READY** sign as well as the Energy Threshold setting, which are only available in energy mode.

Using the Ready Sign

When the instrument is ready to measure a new pulse, **Ready** will appear in the Numeric Display Area and flash on and off. The next pulse will automatically clear the screen, and the new value will be displayed. If you fire another pulse before **READY** appears, the reading may be inaccurate or may not be displayed.

Configuring the Energy Threshold

If the instrument is used in a noisy environment, or where high levels of background thermal radiation are present, the instrument may trigger spuriously on the noise or background radiation. It would then fail to measure the intended pulse. Since some degree of noise or background radiation is inevitable, the instrument is designed not to respond to pulses below a preset minimum level.

The minimum energy threshold is typically set to 0.3% of the full scale of the selected range. If this level is too sensitive for your particular environment, you can alter it. Do not, however, raise the threshold higher than necessary, as this will cause degradation in the accuracy of energy measurements of pulses below about 4 times the threshold level.

To configure the energy threshold:

- Select the energy threshold setting from the following options on the Threshold drop down list in the Measurement Parameters Area:
  - **LOW** – Use this setting if you are measuring small energies and the unit does not trigger.
  - **MED** – This is the default factory setting.
  - **HIGH** – Use this setting if the unit triggers when there is noise.

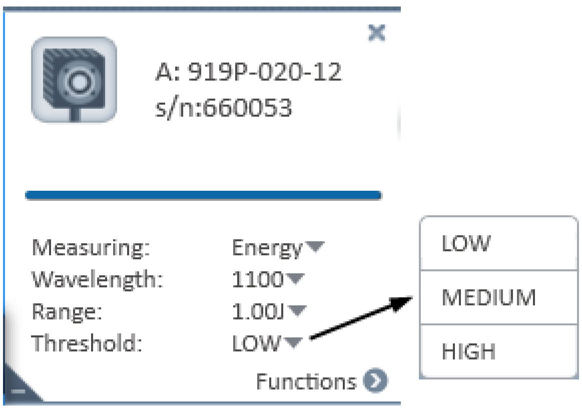


Figure 5-4 Energy Threshold Drop Down List

Optimizing the Readings

PMManager can be optimized to achieve the most accurate and efficient results. This section describes the most commonly used optimizations: offset, zeroing the instrument, and setting line frequency.

Applying an Offset

When there is thermal background in the environment, thermopile sensors may show a non-zero power reading, even when there is no laser. For example, the display reads 0.1 Watts when the laser is blocked, and reads 20.5 Watts when laser power is applied. In this case, the true power is 20.5 - 0.1 = 20.4 Watts. To subtract the background, apply an offset while the laser is blocked. The display will now read zero, and the 0.1 Watt background will be subtracted from all subsequent readings. The laser power reading will be 20.4 Watts.

☞***Note:*** *Refer* *to Chapter 4 – Features of the PMManager Window* *for details.*

☞***Note:*** *If you suspect that the instrument has a permanent zero offset, disconnect the sensor while the sensor is in power measurement mode. If PMManager still shows a similar reading even when the sensor is not connected, zero the instrument. For information on zeroing the instrument, refer to* *Zeroing the Instrument*.

Zeroing the Instrument

In Newport devices, all adjustments, including zeroing internal circuits, are performed from the software. This ensures simple and accurate realignment. For best performance, it is recommended to zero the instrument frequently.

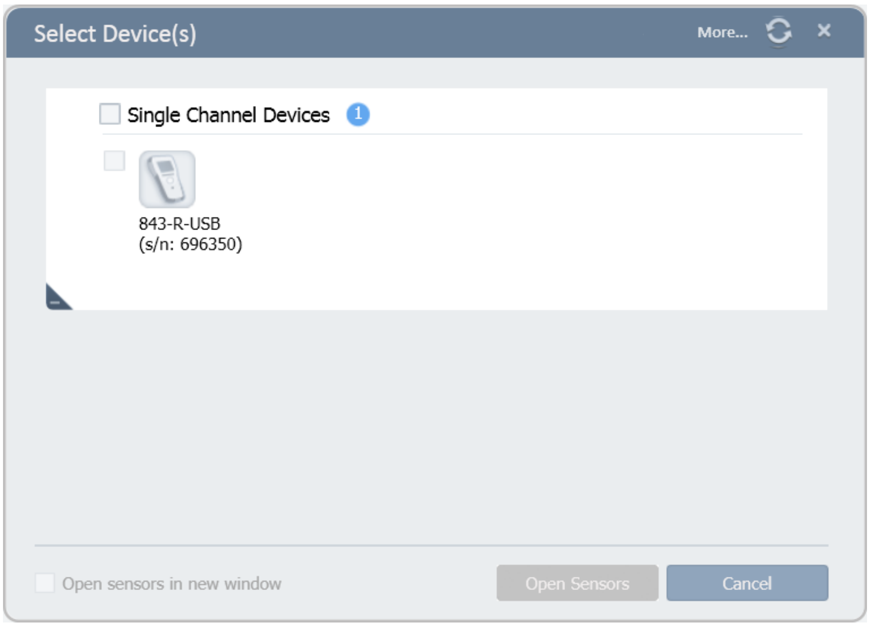
For the 843-R-USB device:

With thermopile sensors, it is necessary to zero the instrument with no sensor attached, and then repeat with the sensor attached.

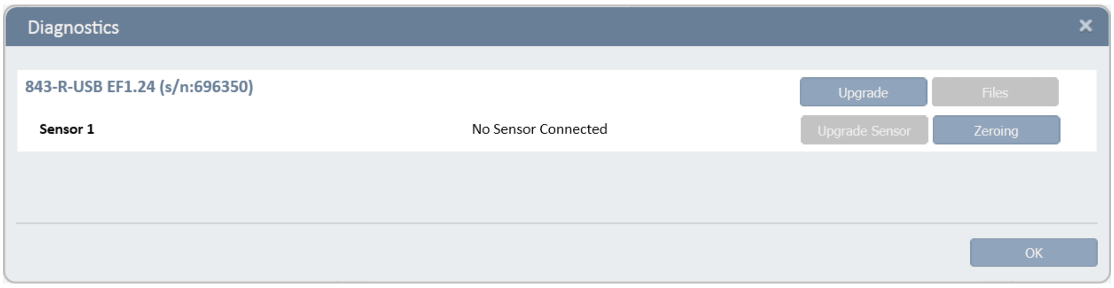
With photodiode sensors it is only necessary to zero with the sensor attached.

To zero the device with NO sensor attached:

1. Start up the instrument with no sensor attached: unplug the USB cable, disconnect the sensor, and replace the USB cable.
2. Check that the instrument is not in an electrically noisy environment and is undisturbed.
3. Open the **Select Device(s)** window and click **Diagnostics**.



The **Diagnostics** window opens.



4. Press **Zeroing**.

   The **Zeroing Instrument** dialog box appears.

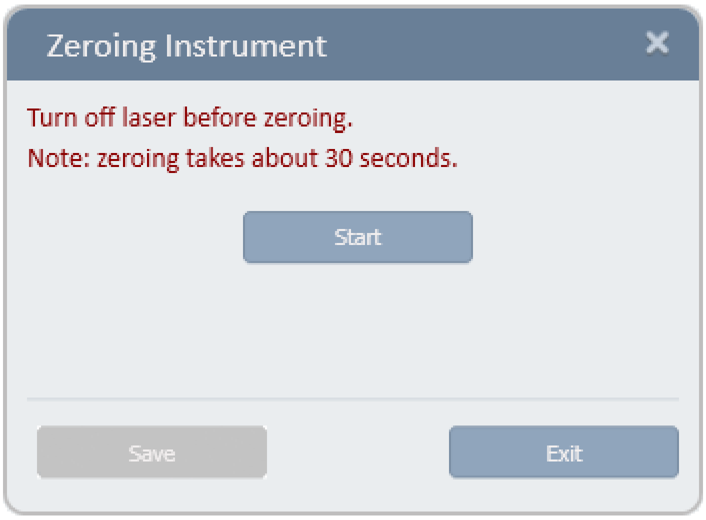
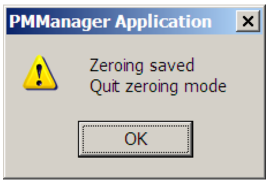


Figure 5-5 Zeroing Instrument Dialog Box

5. Press **Start**. The zeroing begins.

6. Once zeroing is complete, the dialog screen updates with a message that the Zeroing completed or Zeroing failed.
7. Press **Save** to save the zeroing and close the dialog screen.
8. Click Ok when the message window opens.



To zero the instrument with a sensor attached:

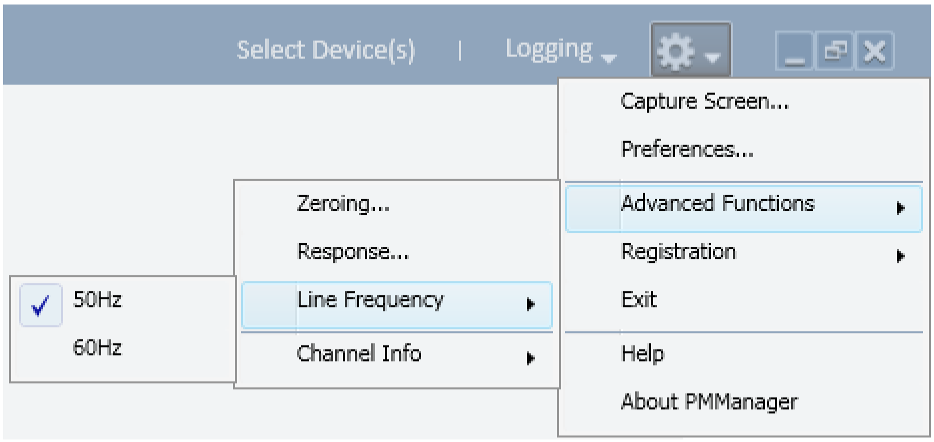
1. Start up the instrument with a sensor attached.
2. From the sensor control screen, click the right mouse button and select **Zeroing** from the pop-up menu, OR open the Functions menu and select **Zeroing.** The **Zeroing Instrument** dialog box appears (*Figure 5-5*).
3. Press **Start**. The zeroing begins.
4. Once zeroing is complete, press **Save** to save the zeroing.

Setting Line Frequency

You can use the line frequency feature to remove interference caused by AC electricity in the room. The 843-R-USB is factory set for 50Hz. If your country uses 60Hz, you must reset the line frequency.

To set line frequency:

1. Select Line Frequency from the **Title** bar option list.



2. From the expanded menu, check one of the following options:
   - 50Hz – If you are in Europe.
   - 60Hz – If you are in the United States or Japan.

   The line frequency is set.

Calibration Factors

PMManager allows you to adjust power calibration factors, configure the response factor and adjust energy calibration factors.

Warning: *Adjusting the calibration factor makes a permanent change in the sensor. It is strongly recommended that before making any change to the factor, the original factory setting is recorded separately. This will make it easier to restore the value to its original setting later if needed.*

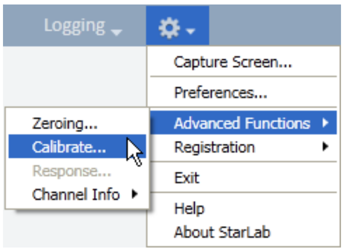
Adjusting Power Calibration Factors

The absorption of the various **Newport** thermal absorbers can vary from disc to disc. Therefore, all **Newport** absorbers are individually calibrated against NIST traceable standards. **Newport** sensors are individually laser-calibrated at several wavelengths, against a NIST calibrated standard meter. For more information on **Newport** sensor calibration and traceability, refer to *Appendix A – Device Technical and System Performance Specifications*.

PMManager offers two types of calibration:

- **Overall Calibration** – Changes the calibration at all wavelengths at once.
- **Laser Specific Calibration** – Changes the calibration at one specific laser wavelength.

To adjust the power calibration factor:



1. Verify that Measuring is set for Power.
2. Select **Calibrate** from the **Options Menu** list.

   The **Adjust Calibration Factors** dialog opens

   The **Original** area displays the original **Measurement**, **Overall Sensitivity** and **Laser Factor** fields. The **Current wavelength** is displayed beneath the **Original** area.

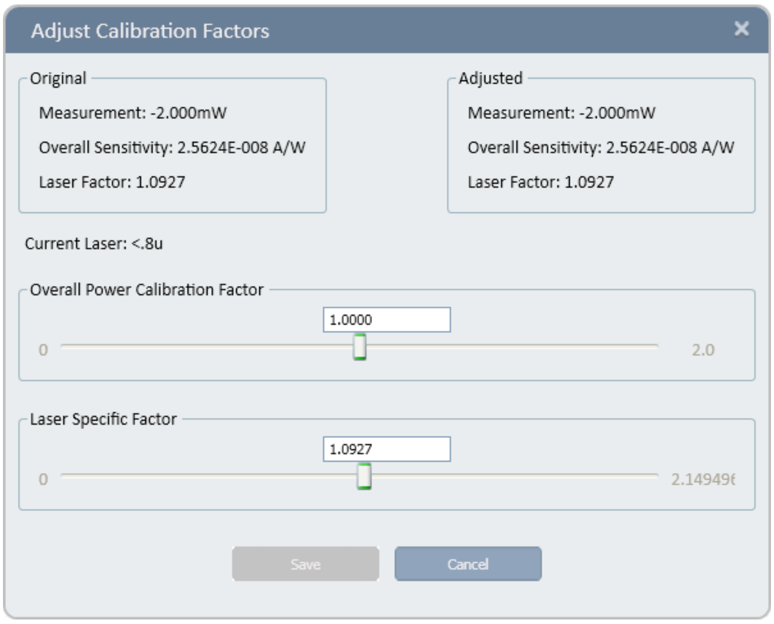


Figure 5-6 Adjust Calibration Factors Dialog Box

3. Use the **Overall Power Calibration Factor** scroll bar to attain an accurate reading in the **Overall Sensitivity** field in the **Adjusted** area.

   OR

   Enter the desired factor into the text box above the scroll bar.

☞***Note:*** *Adjusting the overall power calibration factor effects both the Measurement and the Overall Sensitivity values.*

4. Use the **Laser Specific Factor** scroll bar to attain an accurate reading in the **Overall Sensitivity** and **Laser Factor fields** in the **Adjusted** area.

   OR

   Enter the desired factor into the text box above the scroll bar.

☞***Note:*** *Adjusting the Laser Specific Factor effects both the Measurement and the Laser Factor values.*

5. Click **Save** to save the adjustment for the active channel.

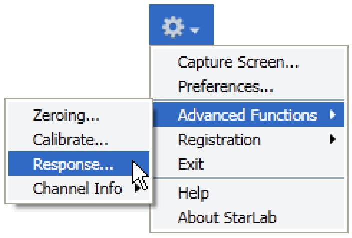
Configuring the Response Factor

The response factor feature finds the optimum response time to enable an accurate reading as quickly as possible, while minimizing the risk of overshoot, (the erroneous reporting of readings above 100% of the full scale). Response factor adjustment is only possible when the sensor is in power mode.

To set the response factor:

1. Click the option from the Options list of the Title bar.

   The **Adjust Response Time Factor** dialog screen opens.



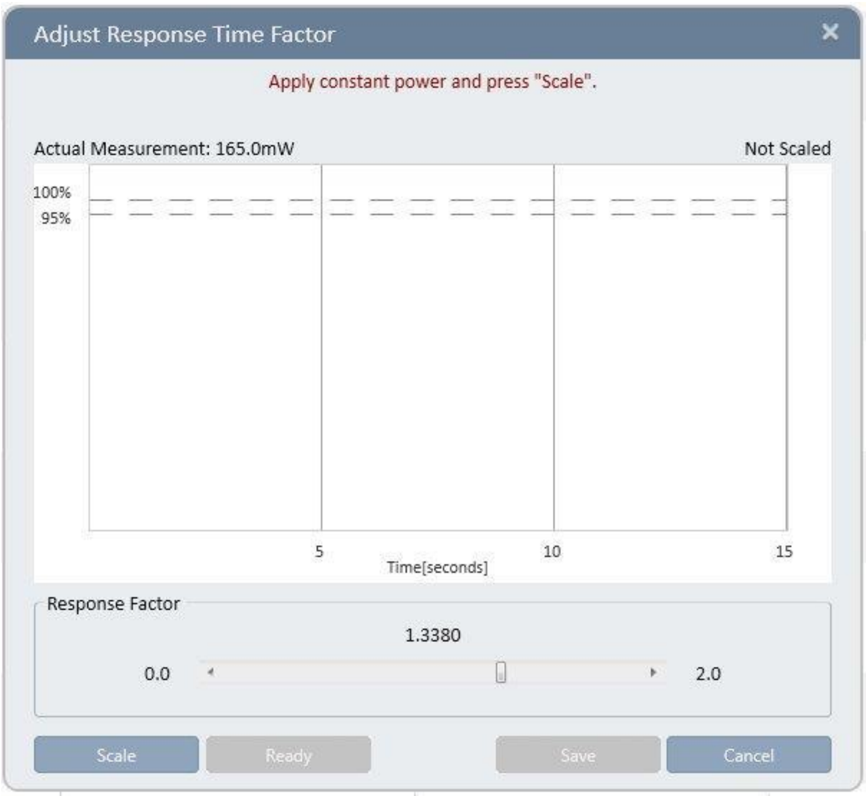
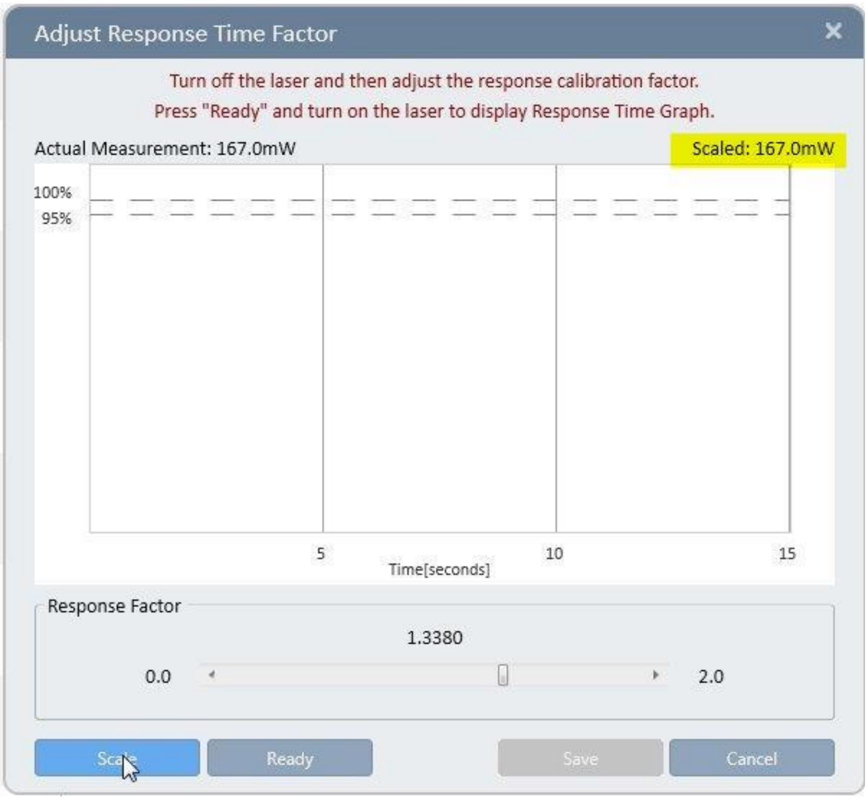


Figure 5-7 Response Factor Dialog Box

2. Apply constant power and press **Scale**.

   When the scaling is complete, the scaled value is displayed on the right side.



3. Use the scroll bar to adjust the response factor in the **Response Factor** area.
4. Apply constant power to the thermopile sensor until the graph stabilizes.
5. Click **Scale**.
6. Block the laser for several moments to allow the sensor to cool down.
7. Adjust the response factor as follows:
   - To reduce overshoot at the risk of possibly slowing down the response of the sensor, lower the response factor.
   - To speed up the response of the sensor at the risk of possible overshoot, raise the response factor.
8. Click **Ready**.
9. Unblock the thermopile sensor.
10. Take a second reading.
11. Repeat steps 5 through 9 until response is optimized.

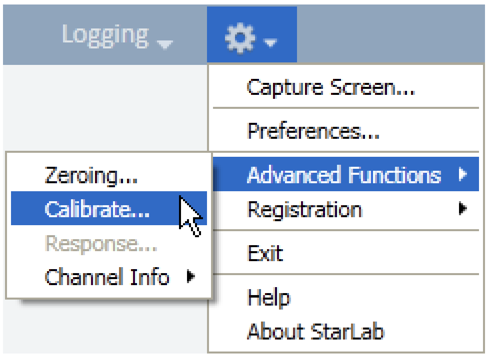
Figure 5-8 Response graph after adjustment

Adjusting Energy Calibration Factors

Both power and energy readings are equally affected by changes in the absorption and/or sensitivity of the thermal disc. Therefore, changing power calibration changes energy calibration proportionately. In addition, adjusting the response time of the sensor can also affect energy calibration. For this reason, provisions are made to adjust energy calibration without affecting power calibration.

To adjust the energy calibration factor:

1. Select **Calibrate** from the pull-down list for options.



The Adjust Calibration Factor dialog opens,

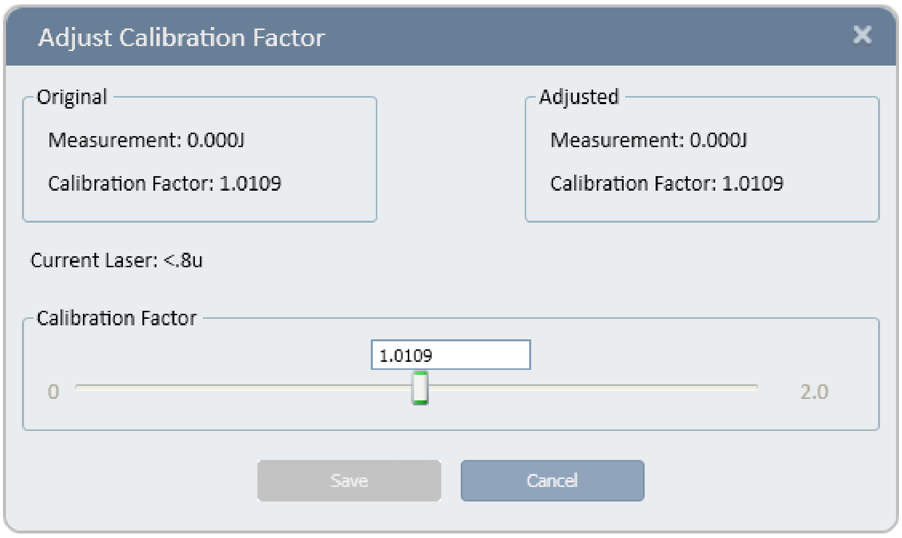


Figure 5-9 Adjust Calibration Factor Dialog Box

2. The **Original** area displays the original **Measurement** and **Calibration Factor**. The **Current wavelength** is displayed beneath the **Original** area.
3. Use the scroll bar to adjust the **Energy Calibration Factor** to attain an accurate reading in the **Calibration Factor** field in the **Adjusted** area.
4. Click **Save** to save the adjustment for the active channel.

PEPS Sensors

Overview of PEPS Sensors

PEPS sensors are a line of thermopile sensors that can measure beam position and beam size while measuring power. This is accomplished by adding quadrant detectors to the classical thermopile disc, as well as a patented beam size detector in the center.

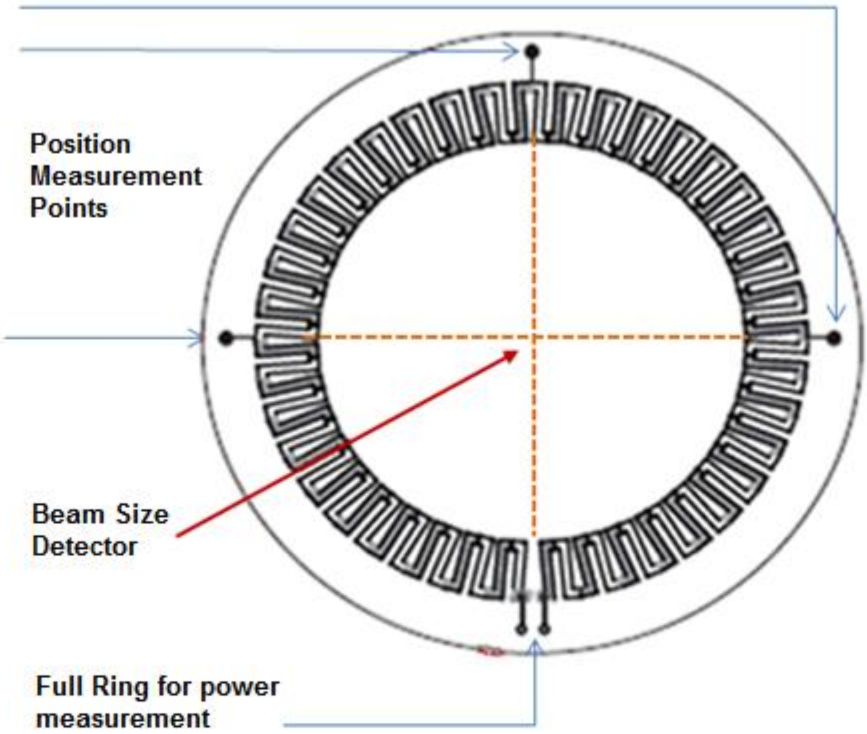
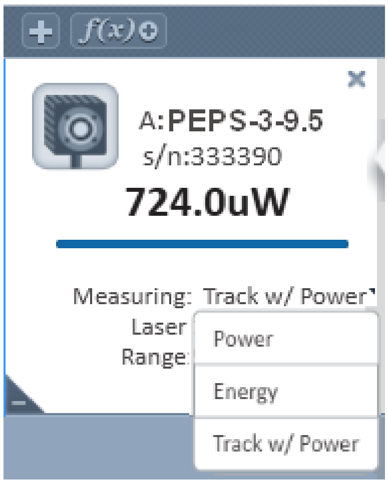


Figure 5-10 PEPS Sensor schematic

☞ ***Note:*** *Beam size is calibrated only for Gaussian beams. For other beams it will give relative size information and will indicate if the beam is changing size.*

Configuring Measurements in Track w/Power



➢ To measure with track w/power:

Select 'Track w/Power' in the Settings section from the Measuring drop-down list.

The graph types available in Track w/Power measurement mode are Position and Stability. For more details, refer to ***Position*** and ***Stability*** in *Chapter 4 – Features of the PMManager Window.*

- Functions apply to power measurements only, not to the position and size measurements. See *Functions* in *Chapter 4 – Features of the PMManager Window*.
- Data Logging includes position and size readings as well as power measurements; see *Chapter 10 – Working with Log Files*.
- Math channel functionality only applies to power; see *Chapter 9 – Working with Math Channels*.

Additional Graphical Display Options

☞***Note:*** *Refer to Chapter 4 – Features of the PMManager Window for details.*

Chapter 6 – Measuring with the Photodiode Sensor

This chapter overviews photodiode sensors and instructs how to take measurements with these sensors. This chapter discusses the following topics:

Overview of Photodiode Sensors

When a photon source, such as a laser, is directed at a photodiode sensor, a current is created proportional to the light intensity and dependent on the wavelength.

Newport photodiode sensors significantly reduce background noise because they have a unique dual detector sensor containing two identical detectors, connected back to back. When a uniform signal, such as background room light, falls on the detector sensor, the signal from the two detectors cancels. Conversely, when a laser beam falls on the sensor, it illuminates the first detector only and is detected. This is how the sensor subtracts most of the background while still detecting the desired signal. In general, 98% of the background signal is eliminated. This means that the detector can be used in ordinary laboratory lighting conditions.

The instrument amplifies this signal and indicates the power level received by the sensor. Due to the superior circuitry of the Newport instruments, the noise level is very low, and Newport photodiode sensors have a large dynamic range, from pico Watts to Watts.

Since many low power lasers have powers ranging from 5 to 30mW, and most photodiode detectors saturate at about 2mW, Newport photodiode sensors have a built in filter to allow the sensor to measure up to 30mW or more without saturation. When the additional filter is applied, the maximum power can range from 300mW to 3W. Photodiode sensors saturate when the output current exceeds 1.3mA so the exact maximum power depends on the sensitivity of the detector at the wavelength used. For a more detailed description of the principles of operation of Newport photodiode sensors, refer to the Newport Optronics catalog, available for download from http://www.Newport.com.

Configuring Measurement Settings

If you are planning to repeat similar measurements, you can configure the settings for each individual sensor, and save them to the instrument. The saved settings become the default configuration for that channel, and are displayed every time the channel is opened.

The following sections describe how to configure measurement settings for photodiode sensors and how to save them as the default configuration for that channel.

Configuration settings include: configuring laser wavelengths, range, average readings, and inserting/removing the filter.

Configuring Laser Wavelengths

Photodiode sensors have a different sensitivity at different wavelengths. Moreover, the filters used in the sensor have a different transmission at different wavelengths. When you choose the correct laser wavelength, the correction factor for that wavelength is automatically introduced.

You can select which laser wavelength to work with from an editable drop down list. You can configure a maximum of six wavelengths to appear in the drop down list, to simplify changing from one laser wavelength to another. Laser wavelengths can also be modified or removed.

To select the laser wavelength:

➢ Select the laser wavelength from the Wavelength drop down list in the Measurement Parameters Area.

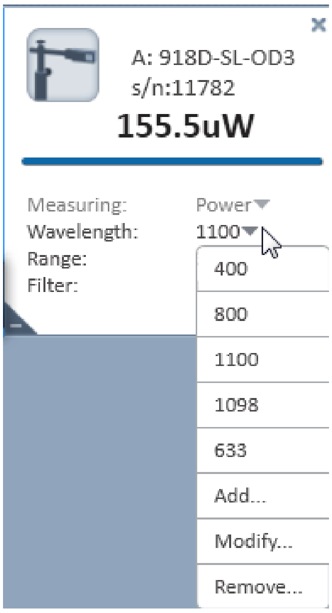


Figure 6-1 Wavelength Drop Down List

To add a laser wavelength:

1. Select **Add** from the **Wavelength** drop down list in the Measurement Parameters Area. The **Set Favorite Wavelength** dialog box appears.

☞***Note:*** *Add is only available if less than 6 wavelengths are listed in the Wavelength drop down list.*

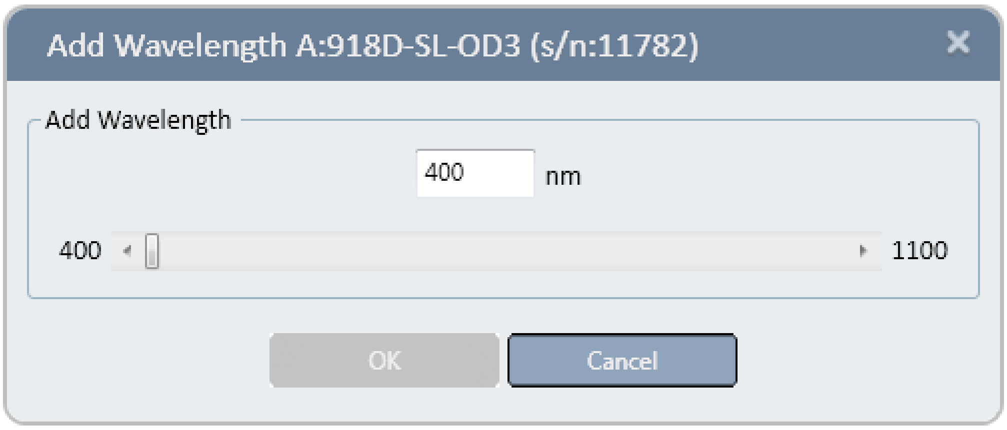


Figure 6-2 Set Wavelength Dialog Box

2. Enter the wavelength in the text box in the **Set Wavelength** area.

   OR

   Use the scroll bar or arrows to configure the new wavelength.

3. Click **OK** to save the new wavelength and close the dialog box. The new wavelength appears in the **Wavelength** drop down list.

To modify laser wavelengths:

1. Select **Modify** from the **Wavelength** drop down list in the Measurement Parameters Area.

   The **Modify Favorite Wavelength** dialog box appears, displaying the laser wavelength you wish to modify in the text box in the **Modify Wavelength** area.

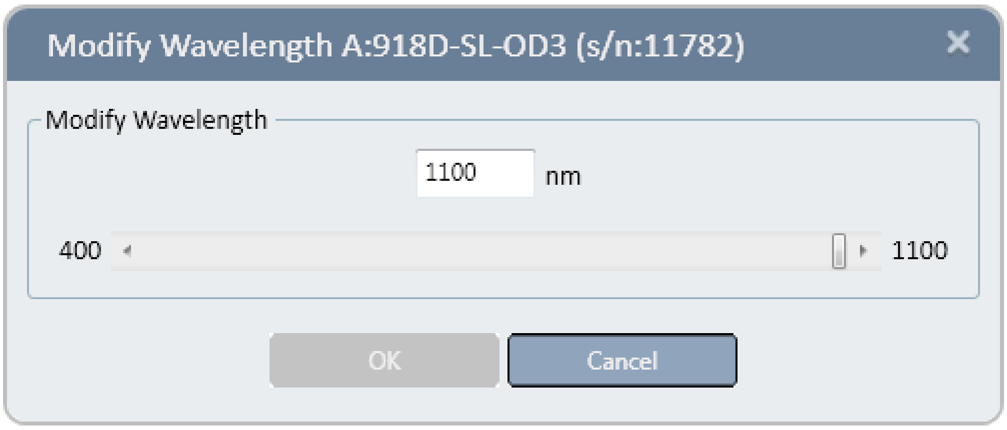


Figure 6-3 Modify Wavelength Dialog Box

2. Select the wavelength in the text box in the **Modify Wavelength** area and enter the desired wavelength.

   OR

   Use the scroll bar or the arrows to modify the wavelength.

3. Click **OK** to save the modification and close the dialog box. The modified wavelength appears in the **Wavelength** drop down list.

To remove laser wavelengths:

1. Select **Remove** from the **Wavelength** drop down list in the Measurement Parameters Area. The **Remove Favorite Wavelength** dialog box appears, displaying the wavelengths listed in the **Laser Wavelength** drop down list.

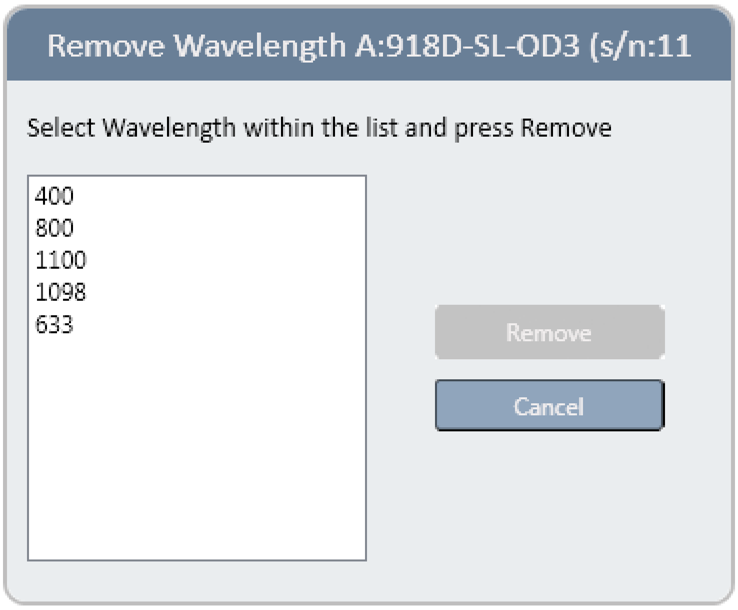


Figure 6-4 Remove Favorite Wavelength Dialog Box

☞***Note:*** *Remove is only available if more than 1 wavelength is listed in the Wavelength drop down list.*

2. Select the wavelength you wish to remove. You can only remove one wavelength at a time.
3. Click **Remove** to remove the selected wavelength and close the dialog box. The removed wavelength no longer appears on the **Wavelength** drop down list.

Filter Settings

Most photodiode sensors are equipped with an optional filter that allows them to measure up to 300mW or more without saturating the detector. The exact maximum power is reached when the reading reaches full scale, or when the output current from the sensor reaches 1.3mA, whichever comes first. You can work with or without the filter, depending on which powers you wish to measure.

To configure the instrument to measure when the filter is inserted:

- Select In from the Filter drop down list in the Measurement Parameters Area.

☞**Note:** *For sensors with built-in filter state detection, the Filter drop-down will display the presently active setting only.*

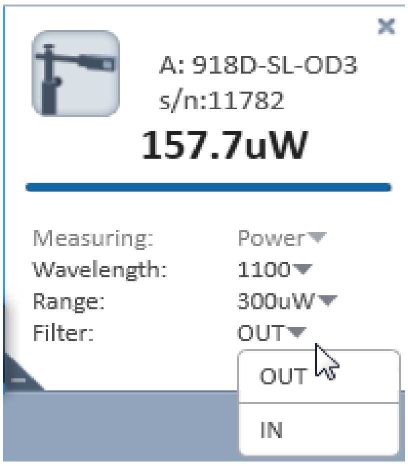


Figure 6-5 Filter Drop Down List

To configure the instrument to measure when the filter is removed:

➢ Select Out from the Filter drop down list in the Measurement Parameters Area.

☞***Note:*** *Make sure to physically insert or remove the filter, according to the filter setting selected. Failure to do so will result in erroneous readings.*

☞**Note:** *For sensors with built-in filter state detection, the Filter drop-down will display the presently active setting only.*

Selecting the Range

Photodiode sensors cover a wide range of powers, depending on the type of sensor in use. In order to provide accuracy at each end of the range, the electronics of the device must be configured to work in a range that is most suited to your needs.

To configure the range when you know the approximate range of the expected readings:

➢ Select the range from the Range drop down list in the Settings Area. The instrument will configure itself according to the selected range.

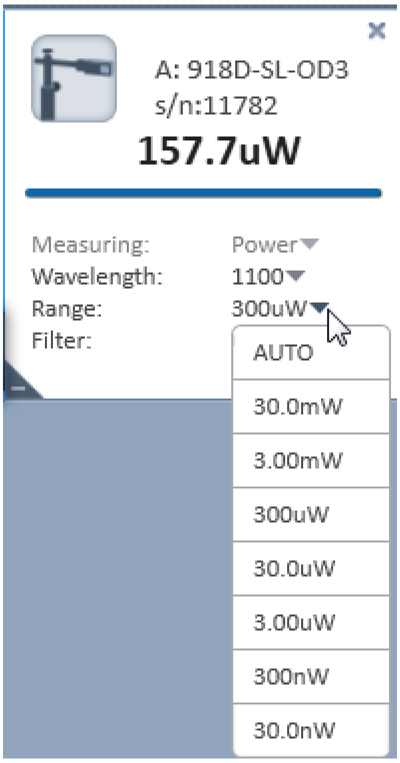


Figure 6-6 Range Drop Down List

To configure the range when the range of the expected readings is not known, or if highly varying readings are expected:

- Select AUTO from the Range drop down list in the Measurement Parameters Area. The instrument will configure itself according to the selected range.

☞***Note:*** *AUTO instructs the instrument to configure itself in the lowest range possible that is higher than the latest readings. If the readings exceed 100% of the present range, the instrument reconfigures itself for the next higher range. If the readings fall below 9% of the present range, the instrument reconfigures itself for the next lower range after a short delay. The delay prevents an infinite range-changing loop when readings are close to the end of the scale.*

Averaging the Measurements

To configure an average reading for a photodiode sensor, refer to *Average*.

Optimizing the Readings

PMManager can be optimized to achieve the most accurate and efficient results. This section describes the optimization settings available for the photodiode sensor: applying an offset, zeroing the instrument, and setting line frequency.

Applying an Offset

Newport’s unique dual-detector sensors detect and subtract 98% of background light. The residual background signal can be removed using the Offset feature.

For example, the display reads 0.1 µW when the laser is blocked, and reads 20.5 µW when laser power is applied. In this case, the true power is 20.5 - 0.1 = 20.4 µW. To subtract the background, apply an offset while the laser is blocked. The display will now read zero, and the 0.1 µW background will be subtracted from all subsequent readings. The laser power reading will be 20.4 µW.

To apply an offset:

- Refer to Offset.

☞ ***Note:*** *If you suspect that the instrument has a permanent zero offset, disconnect the sensor while the sensor is in power measurement mode. If the instrument still shows a similar reading even when the sensor is not connected, zero the instrument. For information on zeroing the instrument, refer to Zeroing the Instrument in Chapter 5 – Measuring with the Thermopile Sensor.*

Zeroing the Instrument

To zero the instrument for a photodiode sensor, refer to *Zeroing the Instrument* in *Chapter 5 – Measuring with the Thermopile Sensor*.

☞ ***Note:*** *When zeroing the instrument for photodiode sensors, it is unnecessary to disconnect the sensor. Turn the laser off instead, and cover the sensor.*

Setting Line Frequency

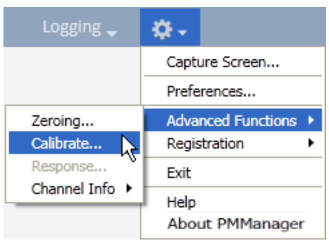
To set the line frequency for a photodiode sensor, refer to *Setting Line Frequency* in *Chapter 5 – Measuring with the Thermopile Sensor*.

Adjusting Calibration Factors

⚠ ***Warning****: Adjusting the calibration factor makes a permanent change in the sensor. It is strongly recommended that before making any change to the factor, the original factory setting is recorded separately. This will make it easier to restore the value to its original setting later if needed*

Photodiode detectors are inherently very linear but do vary broadly in sensitivity from wavelength to wavelength. In addition, **Newport** Photodiode sensors are equipped with a removable filter to enable measurement of higher powers without detector saturation. The transmission of these filters depends on wavelength. Sensors has a built in calibration adjustment for wavelength. The user cannot recalibrate the whole calibration curve, but can adjust the overall calibration, which in turn adjusts all wavelengths proportionately.

To adjust the power calibration factor:



1. Select **Calibrate** from the **Options** list.

   The Adjust Calibration Faction dialog box opens.

   The **Original** area displays the original **Measurement** and **Calibration Factor**. The **Current wavelength** is displayed beneath the **Original** area.

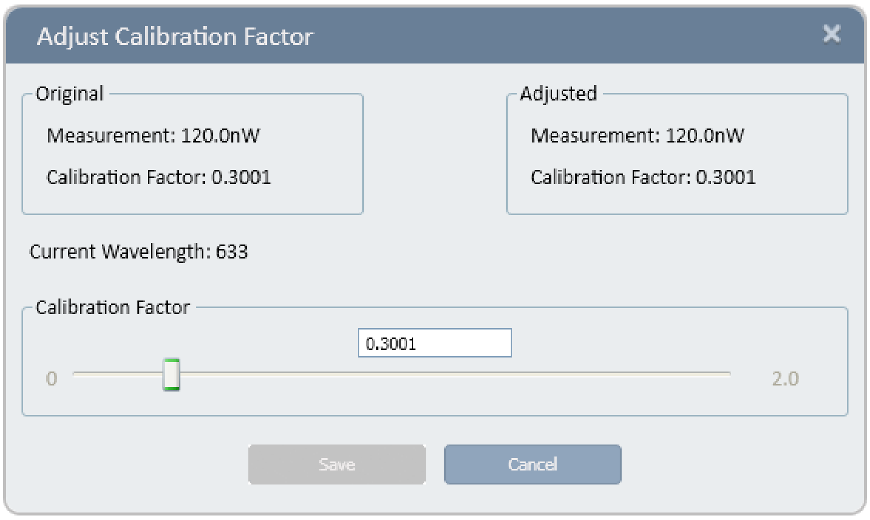


Figure 6-7 Adjust Calibration Factor Dialog Box

2. Use the **Calibration Factor** scroll bar to attain an accurate reading in the **Calibration Factor** field in the **Adjusted** area.

   OR

   Enter the desired factor into the text box above the scroll bar.

☞***Note:*** *Adjusting the Calibration Factor changes the calibration of all wavelengths by the same factor.*

3. Click **Save** to save the adjustment for the active channel.

Additional Graphical Display Options

Refer to *Chapter 4 – Features of the PMManager Window*.

Chapter 7 – Measuring with the Pyroelectric and PD Energy Sensors

This chapter provides an overview of pyroelectric and PD energy sensors and instructions for taking measurements with these sensors. Topics include:

Overview of Pyroelectric and PD Energy Sensors

Newport pyroelectric sensors measure both frequency and energy of pulsed lasers. When a pulsed heat source, such as a laser, is directed at the detector, a temperature gradient is created across the pyroelectric crystal mounted in the sensor. This produces an electric charge, which is proportional to the energy absorbed. The detector sensor has sophisticated circuitry unique to **Newport** (patented) that determines the baseline before the pulse is received, measures the voltage after a pre-determined interval, amplifies it, and holds it for a pre-determined time.

Due to this innovative circuitry, **Newport** pyroelectric sensors can measure very long pulses as well as short ones; low energies as well as high energies. They can also measure at higher repetition rates than ever before possible.

The device to which the sensor is connected converts this signal to a digital value and indicates the energy received by the sensor, as well as the frequency at which the laser is pulsing. Using the energy and frequency information, the **PMManager** application is also able to display average power.

Newport PD energy sensors differ from pyroelectric sensors in that their detector is a photodiode instead of a pyroelectric crystal. They use a similar circuit to the pyroelectric sensors and offer similar functionality. Therefore, throughout this guide, they are included in the generic term "pyroelectric" when referring to software and control functions, even when this is not stated explicitly.

Warning: *Before using the sensor for frequency or energy measurements, make sure that your laser power, energy, and energy density do not exceed the sensor ratings listed in the specifications table for the specific sensor. Otherwise, you may damage the absorber. Refer to the* ***Newport*** *Laser Power/Energy Measurement, at www.**Newport**.com, for full details on each sensor.*

A test slide is provided with each pyroelectric sensor, which contains the same coating as the pyroelectric detector. (You can obtain additional slides from your supplier.) Use this slide to test the damage threshold of your laser pulses. If the laser pulses damage the slide, either enlarge the beam or lower the laser energy until no damage is detected.

To measure pyroelectric energies properly, it is important that the sensor is not grounded to the optical bench. Make sure that the sensor is isolated electrically from the ground. Each pyroelectric sensor is supplied with an insulating mounting post for this purpose.

Configuring Measurement Settings

If you are planning to repeat similar measurements, you can configure the settings for each individual sensor, and save them to the instrument. The saved settings become the default configuration for that channel, and are displayed every time the channel is opened.

The following sections describe how to select the measurement mode, how to configure measurement settings for pyroelectric sensors and how to save them as the default configuration for that channel. The measurement setting fields differ for frequency and energy modes. Measurement settings include: laser wavelength, power range, diffuser, pulse width, and average reading. In addition to these measurement settings, the Pulsar device includes an external trigger.

Selecting the Measurement Mode

To select the measurement mode:

➢ Select Power or Energy from the Mode drop down list in the Measurement Parameters Area. The pyroelectric screen fields displayed depend on the mode selected.

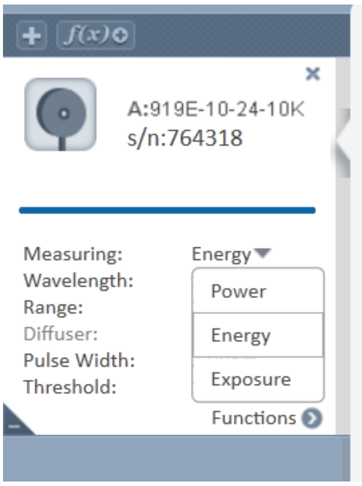


Figure 7-1 Mode Drop Down List

Configuring Laser Wavelengths

Metallic and PD Energy Sensors

For metallic and PD energy sensors, the absorption of the detector coating varies somewhat according to wavelength. The correction curve for the absorber is stored in the sensor EEROM. This correction curve ensures that the power reading is correct at all laser wavelengths.

To configure laser wavelengths, refer to *Configuring Laser Wavelengths* in *Chapter 6 – Measuring with the Photodiode Sensor*.

Broadband (BB) Sensors

Broadband (BB) sensors have less variation according to wavelength. For broadband sensors, fixed wavelength ranges are provided, similar to thermopile sensors.

To configure laser wavelengths, refer to *Selecting the Laser Wavelength* in *Chapter 5 – Measuring with the Thermopile Sensor*.

Selecting the Range

Pyroelectric sensors cover a wide range of energies (from tens of nanojoules to tens of joules) depending on the type of sensor in use. In order to provide accuracy throughout the range, the electronics of the sensor must be configured to the range you are working in.

To configure the range when you know the approximate range of the expected readings:

➢ Select the range from the Range drop down list in the Measurement Parameters Area. The instrument will configure itself according to the selected range.

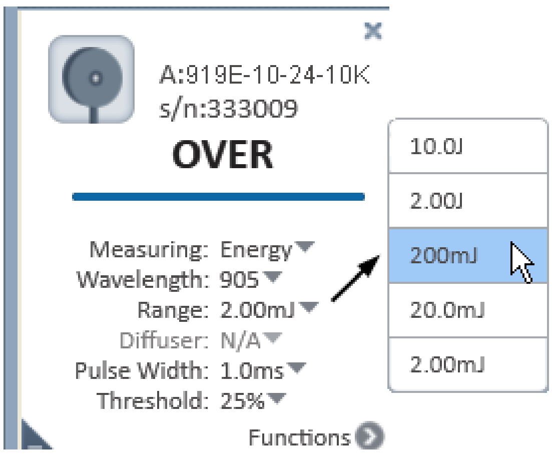


Figure 7-2 Range Drop Down List

Warning: *While measuring pulsing lasers, an erroneous energy reading will result if the energy range is not set up correctly.*

Using a Diffuser

You can add a diffuser to some pyroelectric sensors. A diffuser enables the energy ranges to reach very high levels. When using a sensor that can have a diffuser, configure the diffuser setting in the Measurement Parameters Area.

To select whether a diffuser is in use:

➢ Select whether a diffuser is in use (In) or not in use (Out) from the Diffuser drop down list in the Measurement Parameters Area.

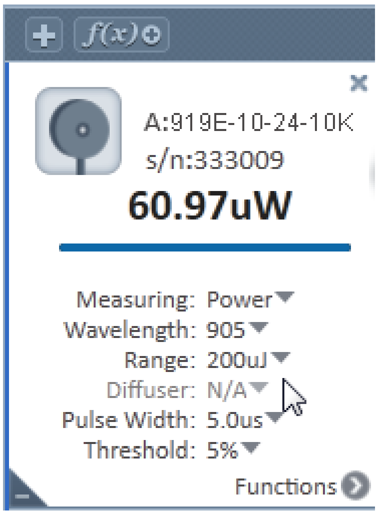


Figure 7-3 Diffuser Drop Down List

When you change this setting, a dialog box appears reminding you to either insert or remove the diffuser.

☞**Note:** *For sensors that are not equipped with a diffuser, this setting is disabled, and the sensors are configured to measure in Diffuser Out mode.*

Selecting the Pulse Width

Some pyroelectric sensors can be configured to measure long as well as short pulses. To accomplish this, the user must configure the sensor for long laser pulses or short pulses.

☞**Note:** *If the pulse length is incorrectly set to the short setting for pulses longer than that value, the reading will be erroneously low. If it is set to the longer setting for short pulses, the reading will be correct, but noisier.*

To select a pulse width:

➢ Select the pulse width from the Pulse Width drop down list in the Measurement Parameters Area.

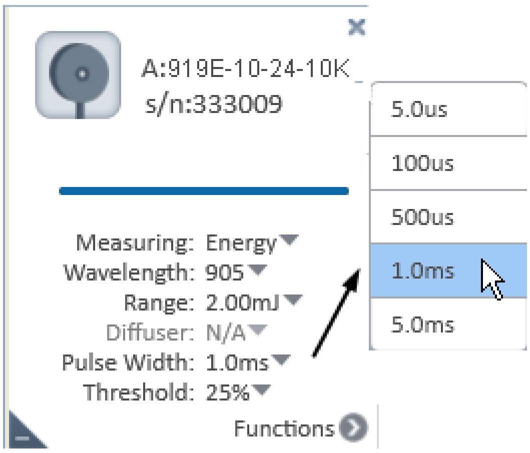


Figure 7-4 Pulse Width Drop Down List

☞***Note:*** *For sensors with only one pulse width setting, the Pulse Width Drop Down list is unavailable and the sensor is configured to measure in its correct mode.*

Averaging the Measurements

The **PMManager** application automatically refines your readings and applies a moving average. For pyroelectric sensors, the **PMManager** application averages the number display, not the graph display.

☞***Note:*** *For details, refer to Average.*

Setting the Threshold

In order to screen out false triggers the user can set a minimum threshold. Threshold is a percentage of the full scale of the presently selected range. Pulses above the threshold are understood to be true readings that should be recorded. Anything below the threshold is assumed to be noise and is filtered out from the recorded set of measurements.

Optimizing the Readings

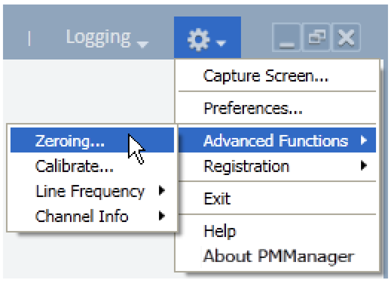
The **PMManager** application can be optimized to achieve the most accurate and efficient results. This section describes the most commonly used optimization of zeroing the instrument with the sensor connected.

Zeroing the Instrument

Unlike thermopile and photodiode sensors, pyroelectric readings are slightly dependent on the instrument. Therefore, for the most accurate pyroelectric energy measurements, it is necessary to zero the sensor against the instrument with which it is being used. After this is done, the sensor is *conditioned* to work with that specific instrument. It is not necessary to repeat this procedure unless the sensor will be used with a different instrument, or with a Laserstar. If this procedure is not performed, errors of up to approximately 2% may occur.

☞***Note:*** *For pyroelectric, it is necessary to leave the sensor connected when zeroing the instrument.*

To zero the instrument:



1. Turn off the laser.
2. Check that the instrument is not in an electrically noisy environment and is undisturbed.
3. Select **Zeroing** from the pull-down list for **Advance Functions**.

   The **Zeroing Instrument** dialog opens

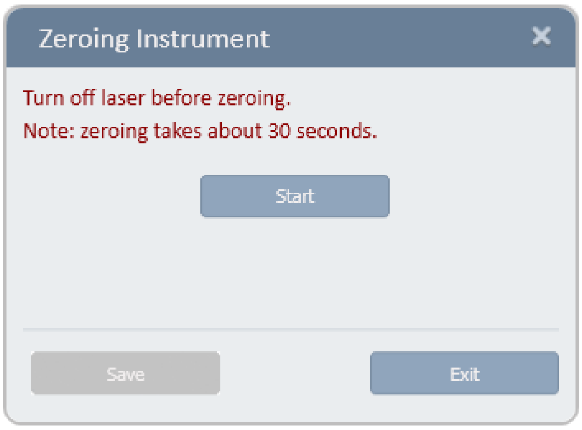


Figure 7-5 Zeroing Instrument Dialog Box

4. Press **Start**. The zeroing begins.
5. Once zeroing is complete, press Save to save the zeroing.
6. A message window opens to confirm, click OK.

Measuring the Total Energy Exposure

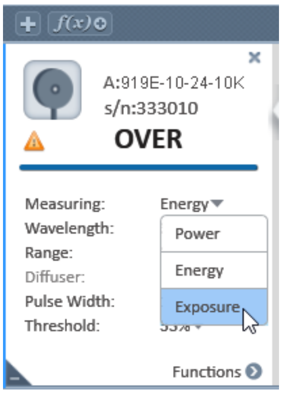
For pyroelectric sensors, the **PMManager** application has the ability to sum the total energy of a number of pulses over a given time period or number of pulses. This returns the total energy exposure over the selected period. For example, if the laser is pulsing at 30 times per second, at 1mJ per pulse, and you measure the exposure over 20 seconds, then the total exposure is 30 x 1 x 20 = 600mJ.

☞***Note:*** *The maximum exposure measurement time is one hour.*

☞***Note: PMManager*** *does support exposure with the 1919-R and the 841-PE-USB, but does not support exposure with the 843-R.*

To measure the total exposure:

1. Select Exposure from the Measuring list.



The **Exposure Screen** opens (Refer to *Figure 7-6*)

The screen displays the default time required for the exposure.

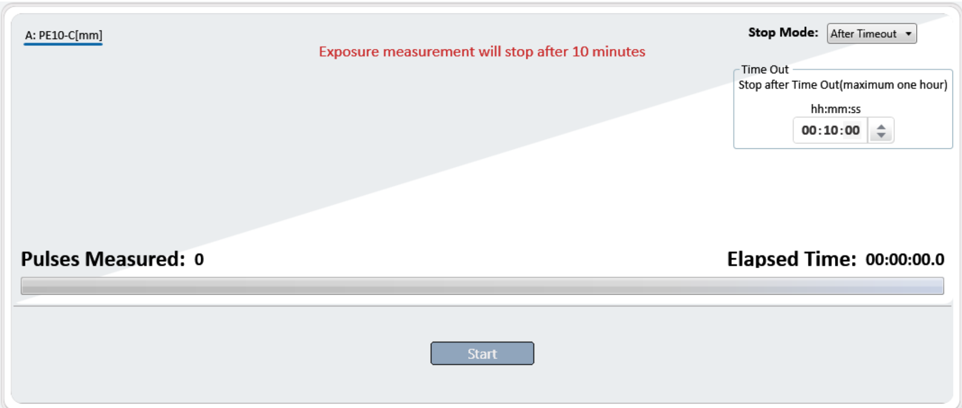
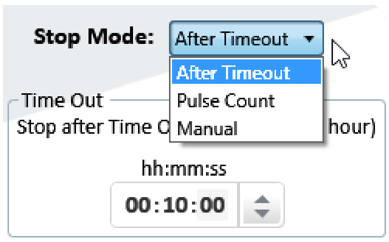


Figure 7-6 Opening screen for the Exposure measurement

2. Select the desired Stop Mode from the drop list.
3. Click the Start button to begin the measurement.
4. Select the Time Out required for the Stop Mode.
5. Click the Stop button to discontinue Exposure measurement.
   - Refer to *Figure 7-7*, page 70.
   - Total number of Pulses Measured are displayed.
   - Elapsed Time is displayed.



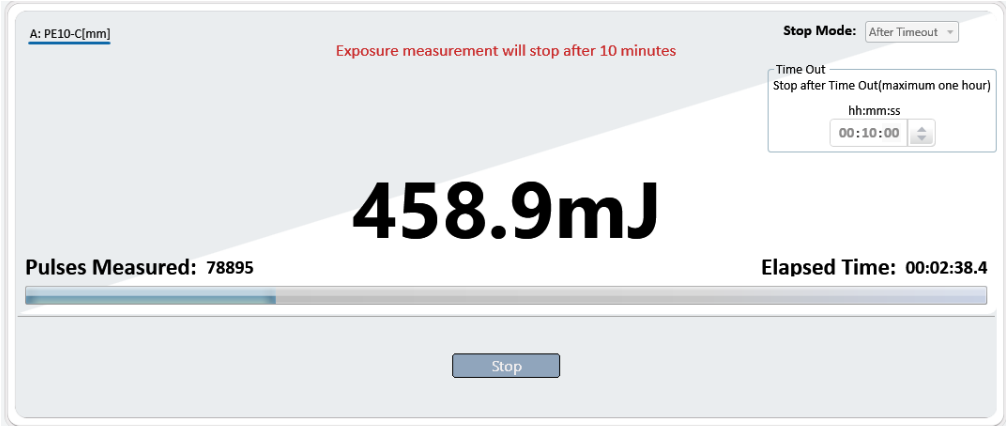


Figure 7-7 Exposure measurement in progress.

Adjusting Calibration Factors

***Warning:** Adjusting the calibration factor makes a permanent change in the sensor. It is strongly recommended that before making any change to the factor, the original factory setting is recorded separately. This will make it easier to restore the value to its original setting later if needed.*

The sensitivity of the various **Newport** pyroelectric sensors varies from one to another, as well as with wavelengths. Therefore, **Newport** pyroelectric detectors are individually calibrated against NIST traceable standards. In addition, the calibration is corrected in the devices for different wavelengths. For more information on calibration, refer to *Appendix A – Device Technical and System Performance Specifications*.

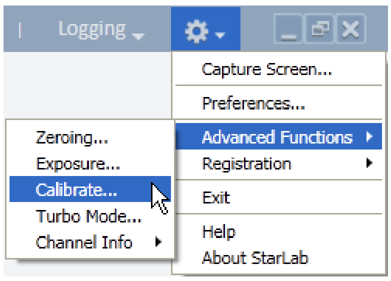
***Note:** For metallic sensors, when the calibration is changed at one laser wavelength, the overall calibration of all other wavelengths changes proportionately. For broadband sensors, there is an option to adjust the calibration factor for all wavelengths or only for a selected wavelength.*

To adjust the energy calibration factor:

1. Select Calibrate from the Options list.

   The **Adjust Calibration Factor** dialog box appears.

   The calibration screen depends whether the Metallic or Broadboad sensor is selected.



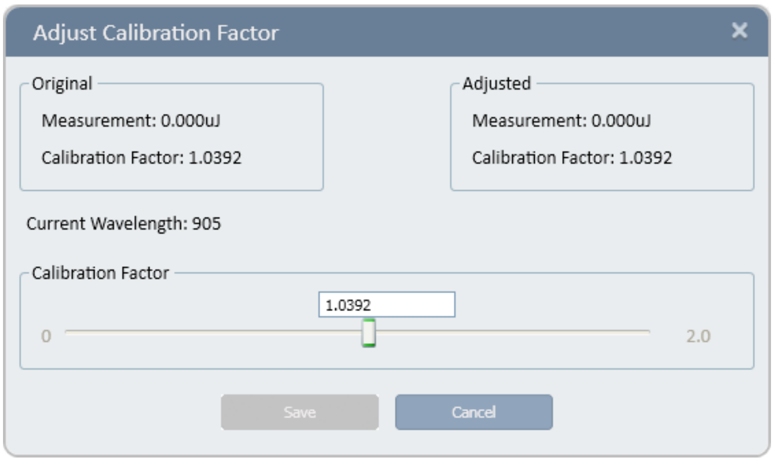


Figure 7-8 Adjust Calibration Factor Dialog Box – Metallic Sensor

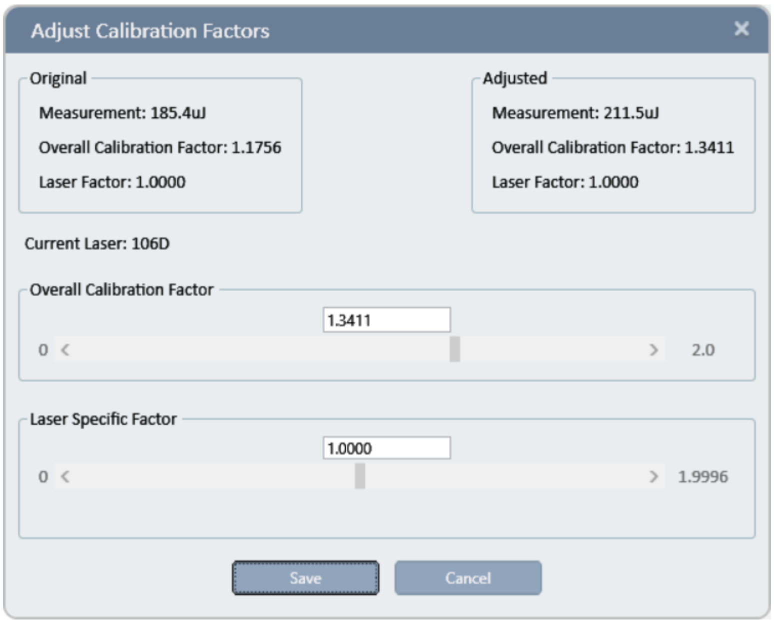


Figure 7-9 Adjust Calibration Factor Dialog Box – Broadband Sensor

The **Original** area displays the original **Measurement** and **Calibration Factor**. The **Current wavelength** is displayed beneath the **Original** area.

2. Use the **Calibration Factor** scroll bar to attain an accurate reading in the **Calibration Factor** field in the **Adjusted** area.

   OR

   Enter the desired factor into the text box above the scroll bar.

3. Click **Save** to save the adjustment for the active channel.

Additional Graphical Display Options

Refer to *Chapter 4 – Features of the PMManager Window*.

Chapter 8 – Working with Multiple Channels

This chapter provides instructions for working with multiple sensors and channels from various connected devices. Topics include:

- Connecting More than One Sensor
- Selecting Sensors
- Examples of 2 Channel Displays
- Viewing the List of Active Sensors

Connecting More than One Sensor

It is possible to attach more than one Newport sensor to a PC. **PMManager** creates a Channel for each sensor/meter that is selected.

Selecting Sensors

The **PMManager** application allows you to work with multiple channels from multiple devices at the same time. The devices may be connected to many types of sensors including thermopile, photodiode, pyroelectric or a combination of different sensor types. In addition to being able to connect the application to numerous channels at once, you can specify which of the connected channels you wish to view.

To select sensors:

1. If the application is not yet open, from the desktop, double-click . The **PMManager** interface opens, and the **Select Device(s)** dialog box appears.

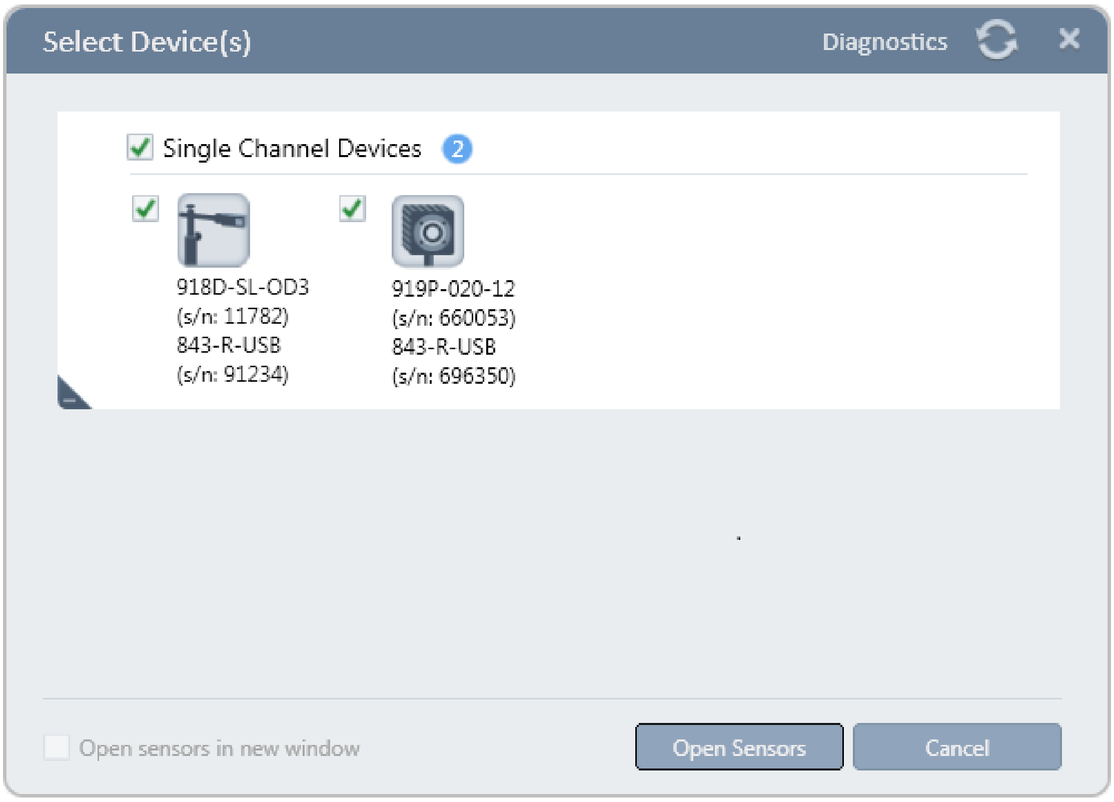


Figure 8-1 Select Device(s) Dialog Box

2. Select which sensor with which you wish to work; or, if all the devices are single senor ones, then selecting the check box above the devices, selects all of them (top group in *Figure 8-1*).

Table 8-1 Select Device(s) options

Option	Explanation
 Label shows the device type/name that is connected. The number of devices show in the blue circle.	When more than one device is selected, each device gets a channel, but they appear together in one graphic window. This is the recommended way to display more than one device. Each device gets a separate graphic window.
	Opens the Diagnostic Screen to select a device for the diagnostic routine. Shows all devices, no need to pre-select devices.
	**PMManager** re-scans ports to find connected devices.
	Check to have two PMManager sessions. Refer to *Multiple Sessions*.
	Closes the **Select Device(s)** Dialog Box without selecting any device.

Examples of 2 Channel Displays

☞***Note: For detailed information on the Settings and Functions features of a Channel, refer to Chapter 4 – Features of the PMManager Window.***

Merge/Split

Split

By default when starting PMManager with multiple channels, the channels are displayed (split) as Line graphs in the Display Area *Figure 8-2*.

The Split feature is available individually in all graph modes. Each graph mode has its own Y settings, but share the same X setting with the other display.

A channel is selected for focus by clicking its colored horizontal line in its **Channel Control** window.

Above the opened device Channels is a button to create a Math Channel for a selected Device Channel See *Chapter 9 – Working with Math Channels.*

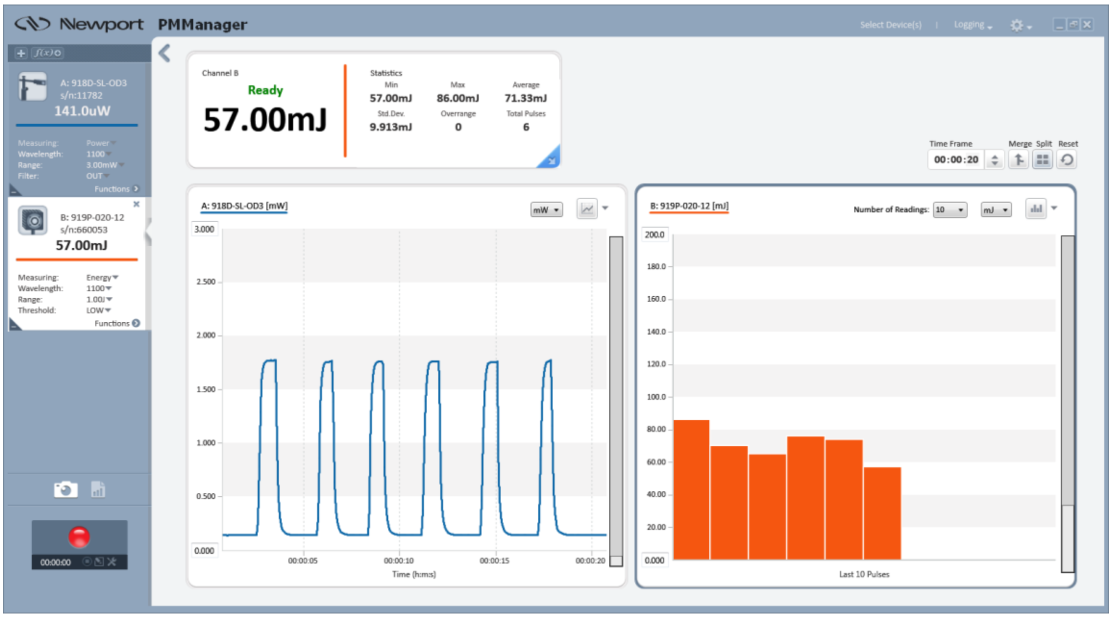


Figure 8-2 2-Channel Together/Split

Merge

A merged display is obtained by clicking its icon. The X axis is the same for both channels. The Y axis setting is determined by the setting of the focused channel when the icon is clicked. The color designation for each channel is not affected.

A Merged display is automatically switched to Split if one of the channels is set to the Needle graph. In which case, both channels are displayed in the Needle mode.

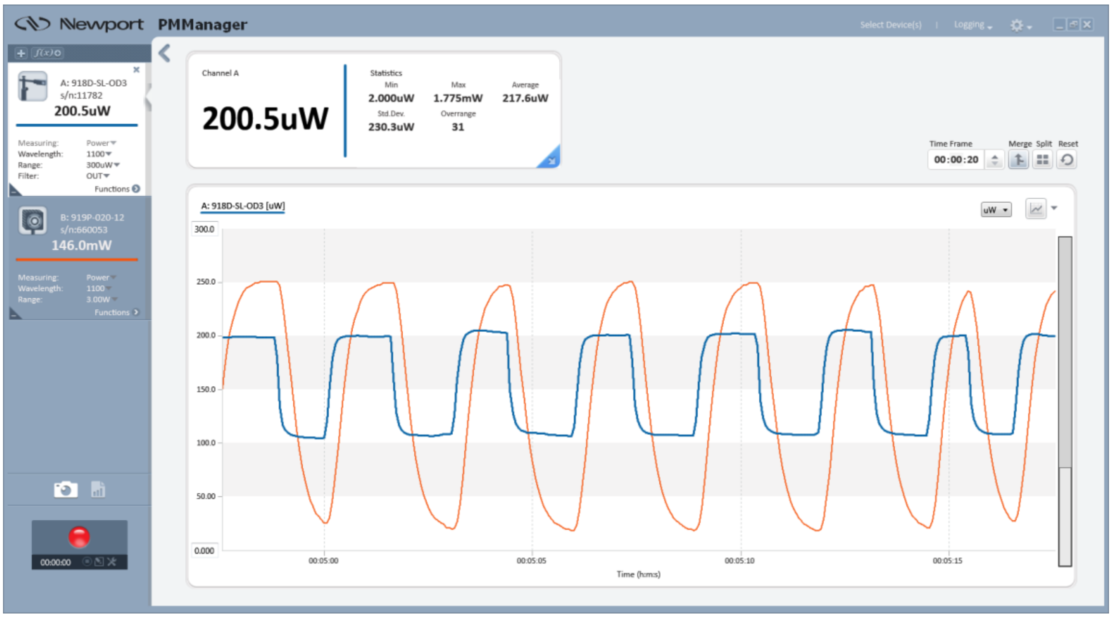


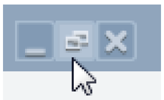
Figure 8-3 Two channel Merged measurement display

Multiple Sessions

Multiple Sessions refers to having each device appearing in its own "instance" of PMManager. This feature is not the standard understanding of two instances of the same program running independently even though there are two tabs displayed in the Task bar.

To have multiple sessions

1. Connect two devices to the computer.
2. Start a session of **PMManager** with one device selected.

   Normally, when a session opens, it is maximized to fill the monitor screen.
3. Click in the upper right corner the Windows control  to reduce the display so it does not fill the monitor screen.
4. Click **Select Device(s)** and select the other device (highlighted), *Figure 8-4*.
5. Click the option **Open sensors in new window** (highlighted).

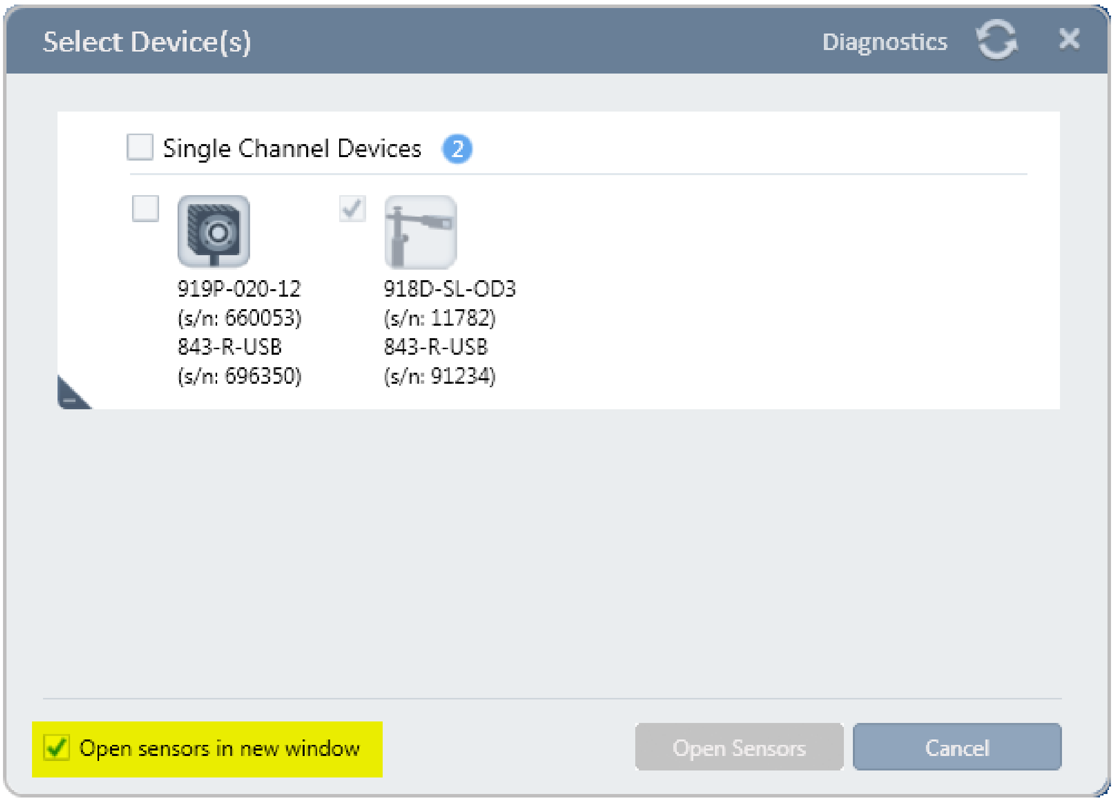


Figure 8-4 Creating multiple sessions

6. Click Open Sensors.
7. In the new window that opens, click in the upper right corner the Windows control  to reduce the display so it does not fill the monitor screen.
8. Manipulate the screens so they display separately

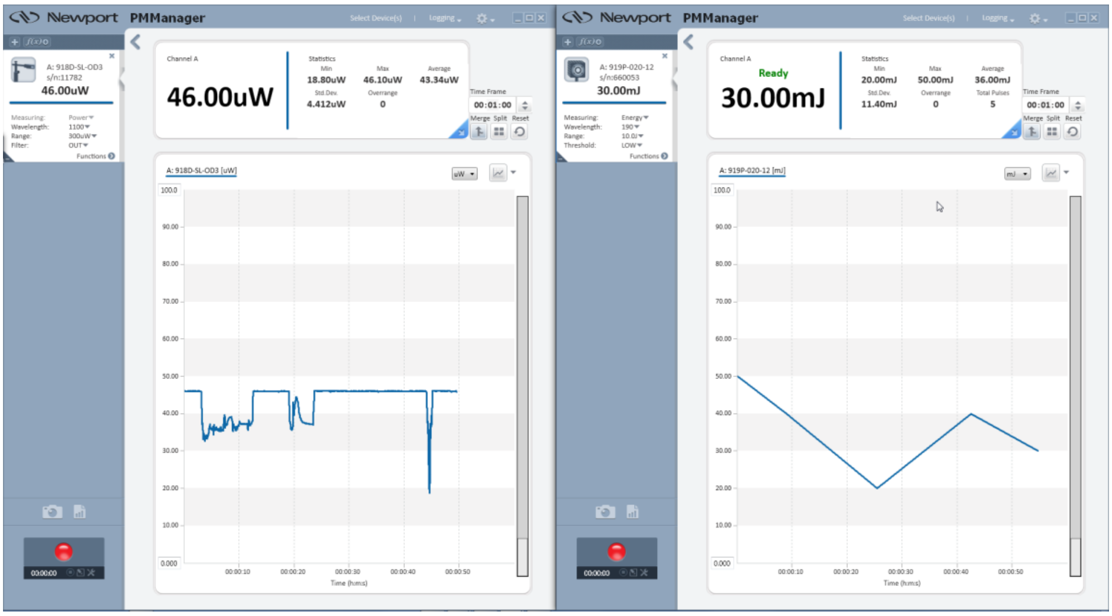


Figure 8-5 Multiple measurement sessions

This display method may have a purpose when certain time-related analyses are required because each X-axis can have its own definition. Each channel is given the same default color.

However, the method does not allow performing Math Channel operations between two channels. Only operations on the same channel are available. See *Chapter 9 – Working with Math Channels*. Moreover, the option, **Capture Screen** outputs only the selected channel, not both of them,

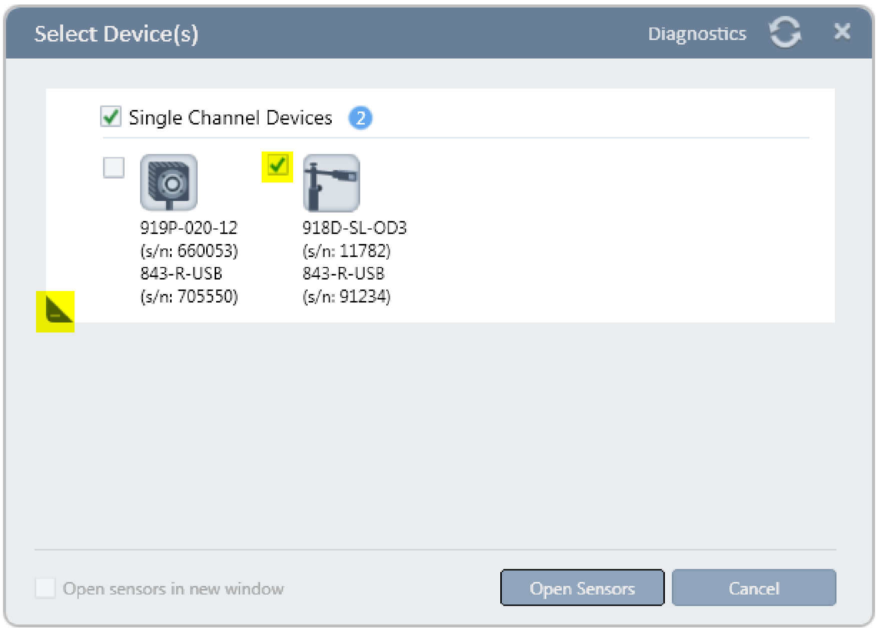
Viewing the List of Active Sensors

You can view a list of all the currently active sensors.

To view the list of active sensors:

- Click **Select Device(s)** from the menu bar.

  The checked sensor is the active sensor.



- Click the highlighted icon in the corner to minimize the list when you have multiple devices connected.

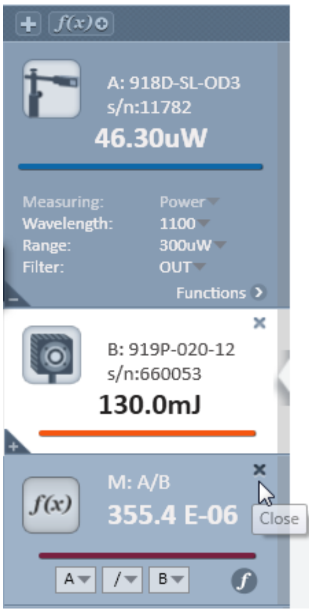
Chapter 9 – Working with Math Channels

Math Channels provide a means to perform built-in mathematical operations and user-defined functions involving any number of device channels. This chapter includes:

- Opening a Math Channel
- Adjusting Default Operations
- Creating a User Defined Formula

☞ ***Note:*** *Math channel functionality does not apply to position and size. If a sensor in the Track w/Power mode is selected, Math channel functionality will be applied to the power readings.*

Opening a Math Channel



The Add Math Channel button opens a Math Channel. In this example, a Math Channel is added to the Channel Area below the 2nd device channel.

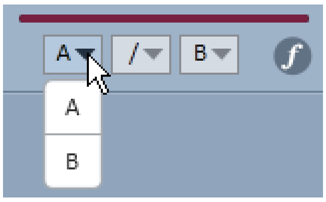
Each Math Channel that is opened during a **PMManager** session is given the next available letter (starting from the letter "M") and is assigned a color. Multiple Math Channels can be opened on the same device channel.

A Math Channel is closed by clicking the “X” that is exposed when hovering the mouse over the area.

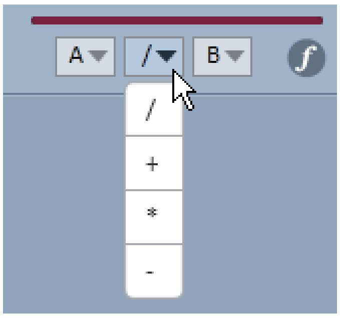
Adjusting Default Operations

The default operation is A/B when a Math Channel is created. This can be adjusted by selecting other device channels and mathematical operators.

Use the drop down list to select another device channel.



Use the drop down list to select another mathematical operator.



Creating a User Defined Formula

In addition to the built-in operations, a Math Channel can perform user created operations.

To create a user defined formula:

1. Open a Math Channel.

   Designated as "M" Math Channel

2. Click the icon.

   By default, the formula field opens as A/B

3. Enter the function.

   Click in the field to edit.

   In this example, (B*A)/A^2 is entered.

   Use "^" for power. Sin() and other functions can be used as well. If there is a mistake in the formula, the cursor moves to the location of the error, enabling you to correct it.

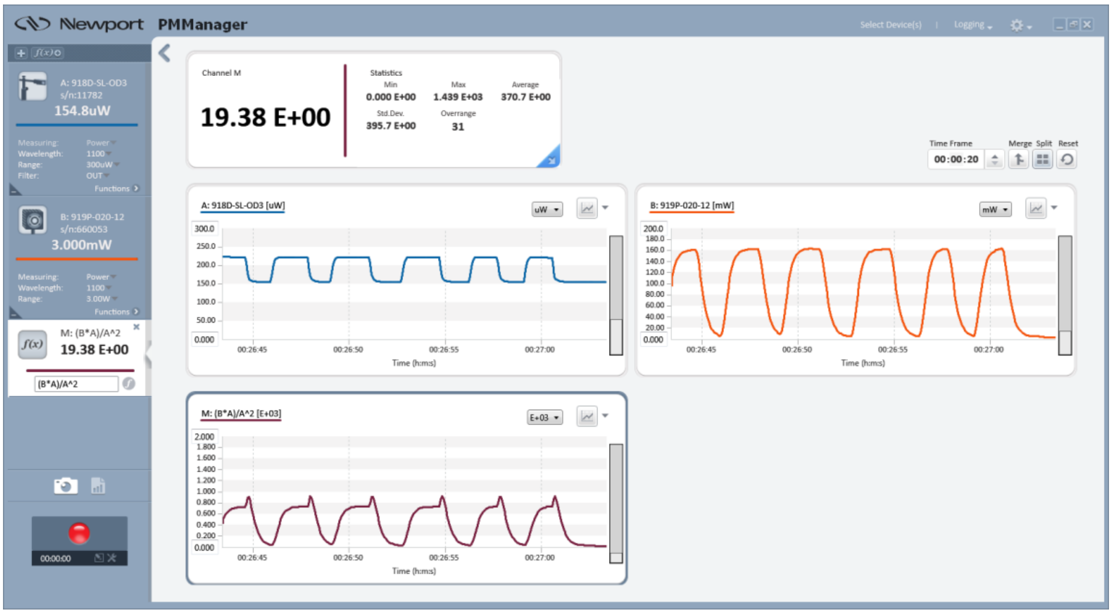


Figure 9-1 Math Channel function with two channels

To view the math result in the Statistics area, click the colored line of the Channel "M" in the Channel Area.

The following example displays the built-in function, A/B, merged with the channels shown above. The vertical axis control was used to bring the plots in view.

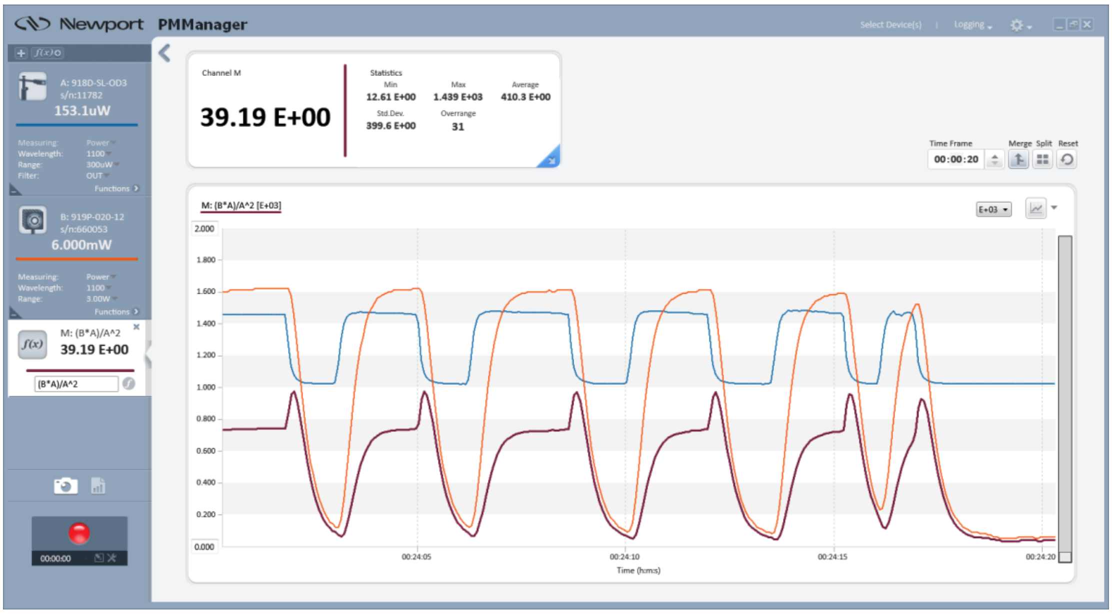
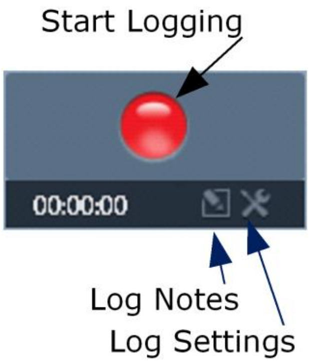


Figure 9-2 2-Math and 2-Device Channels (default formula)

Chapter 10 – Working with Log Files

This chapter provides instructions for working with log files for Newport devices. Topics include:



- Default Location and Name for Log Files
- Configuring Log File Settings
- Starting and Stopping the Log
- Adding Notes to a Log File
- Choosing the Log File Format

Accessing the logging commands is available from the Logging drop-down list of the Title bar or by clicking the appropriate icon of the **Log Group** in the Channel area.

Note: *To see the contents of a log file, see Chapter 11 – Viewing Log Files*

Default Location and Name for Log Files

By default, Windows XP saves log files in the application software installation directory; and, Win 7, 8, and Win 10 save log files in Documents**PMManager** (full path – C:\Users\<user>\Documents\ **PMManager**). If the user changes the default file location, the system retains the new default location even after reinstallation of a new version of the software.

If desired, you would change the new file location the first time you create a new log file. The name of the log file can be one generated by **PMManager**, or one that you give it.

1. Click  in the **Log Group**.

   The **Log Settings** dialog box appears.

2. Click the Browse button that opens a form to the existing path location.
3. Select a new name if desired and save the file in the existing location or navigate to a different one.
4. Continue with procedures in the following topics.

Configuring Log File Settings

This section explains how to configure log file settings. You can log just one screen of data or you can specify the duration of the log or the number of measurements to be taken.

Logging One Screen of Data Only

To log one screen of data:

1. Click in the **Log Group**.

   The **Log Settings** dialog box appears.

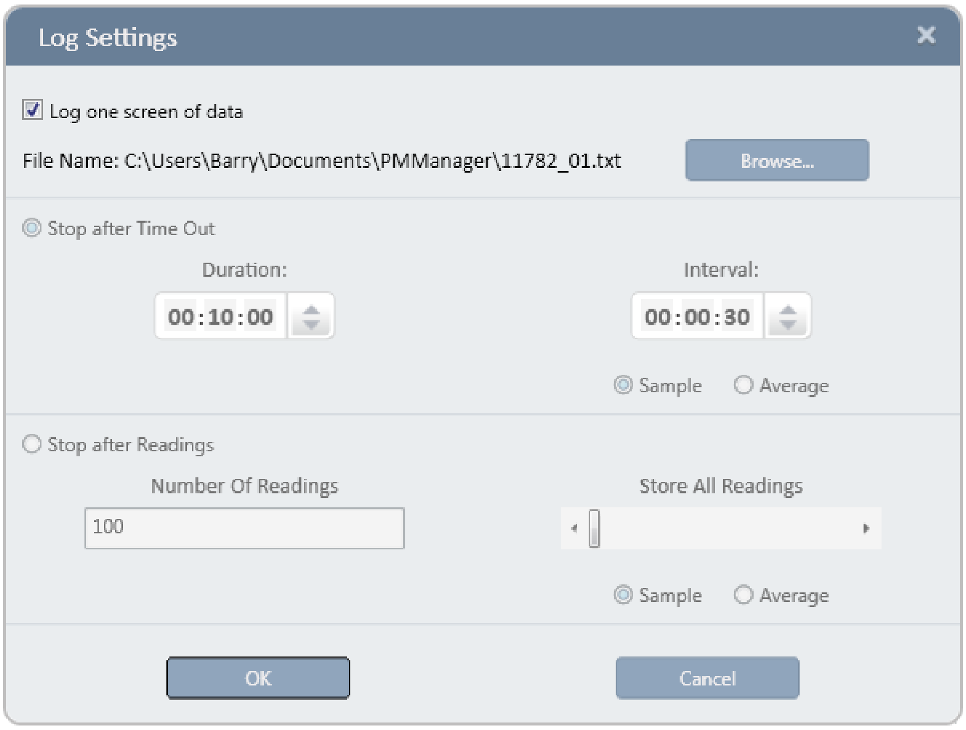


Figure 10-1 Log Settings Dialog Box – Log One Screen of Data

2. Select the **Log one screen of data** check box.
3. Click **Browse** and select a file location to save the log data. The log data will be saved to the default file, as displayed in the **File Name** area.

☞***Note:*** *For details of the default location for log files, see section* *[Default Location and Name for](#) Log Files.*

4. Click **OK** to save the log settings.

Configuring Log Duration

Here you set how data screens to log.

To configure the log duration:

1. Click in the **Log Group**.

   The **Log Settings** dialog box appears.

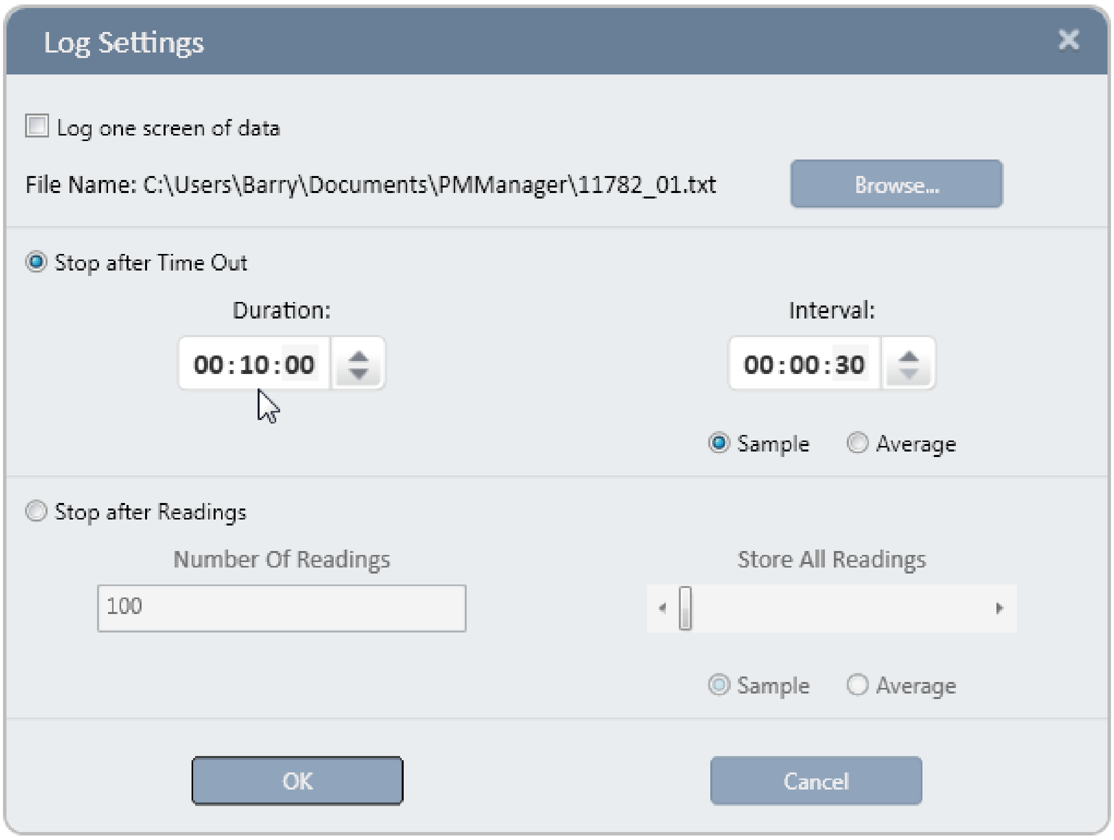


Figure 10-2 Log Settings Dialog Box – Stop after Time Out

2. Deselect **Log one screen of data**.
3. Select **Stop after Time Out**.
4. In the **Stop after Time Out** area, set the **Duration** value using the up/down arrows.

   When logging power readings, a time interval can be set for measurements configured to stop after time out. The interval determines how often a measurement will be taken and added to the log.
5. Select **Sample** to log one sample per interval.

   OR

   Select **Average** to log an average of all the readings in an interval.
6. Click **Browse** and select a file location to save the log data.

   OR

   The log data will be saved to the default file, as displayed in the **File Name** area.
7. Click **OK** to save the log settings.

Configuring the Number of Measurements

To configure the log to end after a specified number of pulses:

1. Click  in the **Log Group**.

   The **Log Settings** dialog box appears.

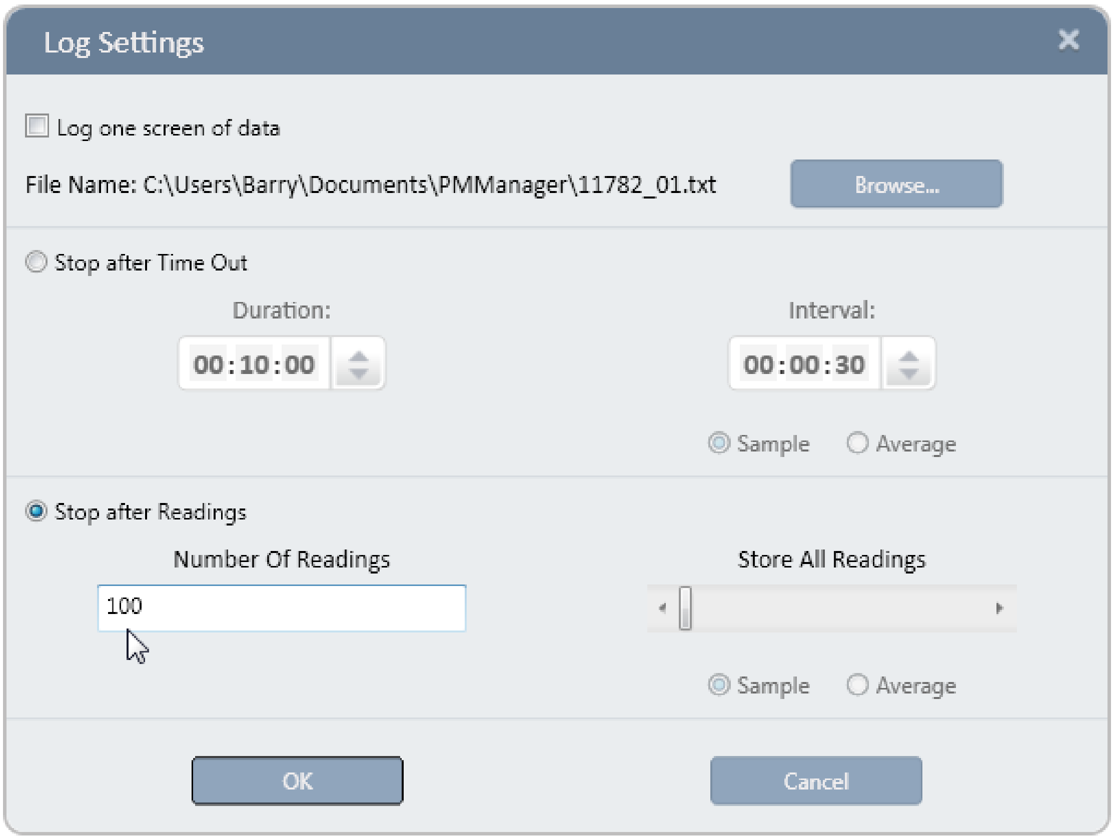


Figure 10-3 Log Settings Dialog Box – Stop after Measurements

2. Deselect **Log one screen of data**.
3. In the **Log Settings** dialog box select **Stop after Measurements**.
4. In the **Stop after Measurements** area, enter the number of pulses you want to measure in the **Number of Readings** field.
5. In the **Stop after Measurements** area, drag the scroll of **Store All Readings** bar to the right to set the value. As you move the scroll bar, the heading above the bar changes to **One out of #** pulses. You can choose one in 3, 10, 30, 100, 300, or 1000 pulses.

   OR

   Drag the scroll bar to the left. The sensoring above the bar changes to **Store all Readings**.
6. Select **Sample** to log one sample per interval.

   OR

   Select **Average** to log an average of all the readings in an interval.
7. Click **Browse** and select a file location to save the log data.

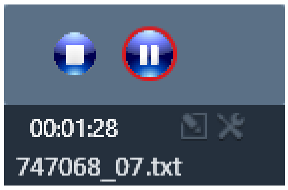
   Otherwise, the log data is be saved to the default file, as displayed in the File Name area.
8. Click **OK** to save the log settings.

Starting and Stopping the Log

This section explains how to start and stop saving data to a log file.

For these examples, the commands of **Log Control** in the Channel area are used.

Starting the Log

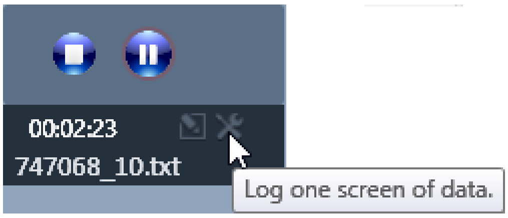


To start the log:

➢ Click the red button.

The red button is replace by a stop and a red-circled pause button.

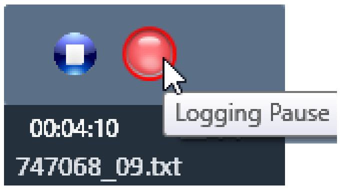
The **Log Control** changes to show the progress.



The time left before logging stops indicates the time remaining in the time range that was selected for the measurement. Hover the mouse over the button to display the logging type.

☞***Note:*** *No changes can be made to the settings in the Measurement Parameters or Graph Configuration Areas for the duration of the log process.*

Pausing the Log



To pause the logging

➢ Click the red-circled button, which is replaced by the red start button. Hover the mouse over the button indicates the paused mode.

To re-start the logging

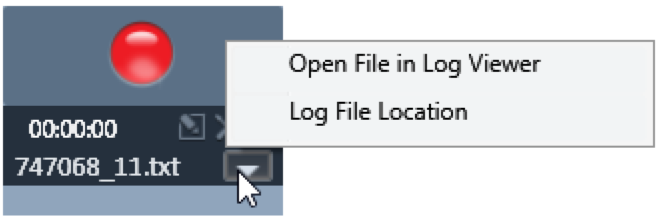
➢ Click the red button.

The red-circled button replaces the red button again.

Stopping the Log

To stop the log:

1. Either wait for the time to elapse or click the icon to the right of the time to stop the logging earlier.
2. You can use the drop-down arrow to select to **Open File in Log Viewer** or to open the file location where the log was stored.



While the file is displayed, you can add a note.

See Chapter 11 – Viewing Log Files.

Adding Notes to a Log File

This section describes how to add your own notes to a log file.

To add notes to a log file:

1. Open the file in Log View

   The **Note** dialog box opens over the display area.

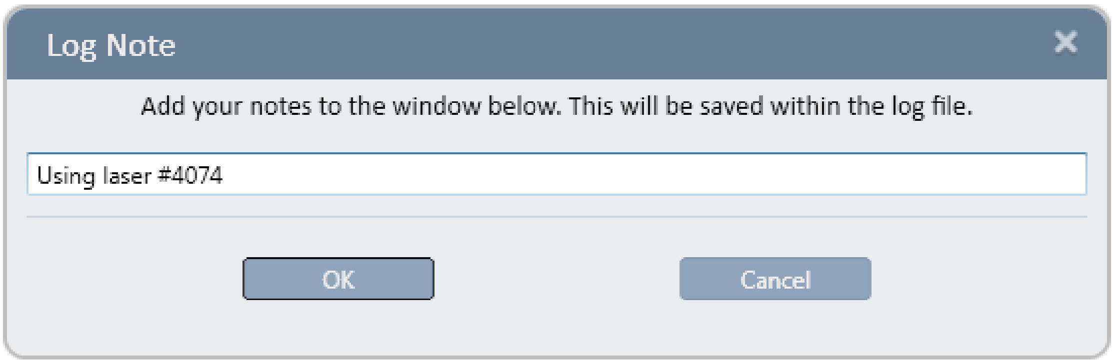


Figure 10-4 Note Dialog Box

2. Enter a note into the text box.
3. Click the OK button to add the note to the log file.

Choosing the Log File Format

Log files are stored by the **PMManager** application as tab-delimited text files. Two file formats are available in the software, “Standard” and “Excel Friendly”, which differ only in the way the timestamp is recorded in the file.

Standard Format Log Files

Standard Format is the default format. It is used in older versions of the USBI application, and is retained in newer versions of **PMManager** for backwards compatibility. In this format, the timestamp is recorded as hours, minutes, seconds, and fractions of a second. For example: 12:34:56.789 (for the 843-R-USB device using Thermopile and Photodiode sensors), where 12 is the hours, 34 is the minutes, 56 is the seconds, and 789 is the fraction of a second.

Excel Friendly Format Log Files

This format should be used when using Excel to process data stored in the log files. In this format, the timestamp is recorded in seconds and fractions of a second, in a manner more suited to Excel than the Standard format. For example: 45240.789 (for the 843-R-USB device using Thermopile and Photodiode sensors) where 45240 is the number of whole seconds (equaling 12 hours and 34 minutes), and 789 is the fraction of a second.

Selecting the Log File Format

1. Select **Preferences>Logging** from the **Options** menu.

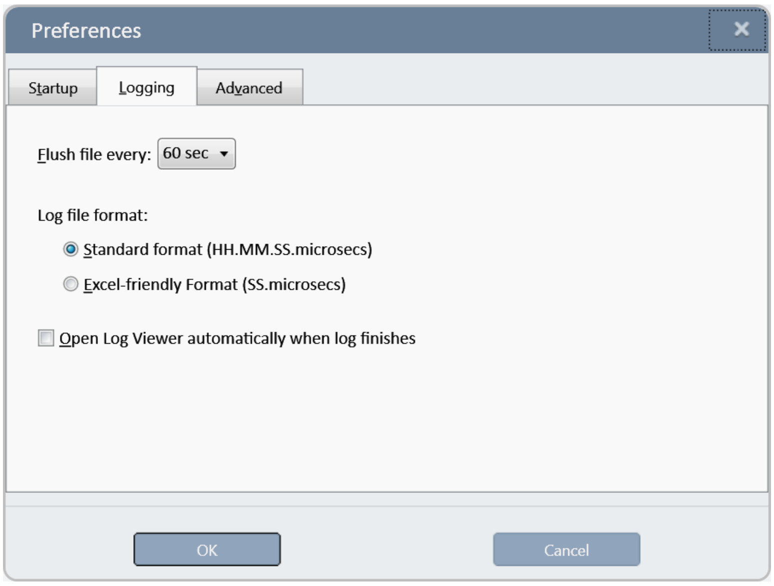


Figure 10-5 Preferences Dialog Box

2. Select the **Logging** tab.
3. In the Log file format area, select either **Standard Format** or **Excel Friendly Format**.

☞***Note:*** *With the 843-R-USB device, timestamps are stored in the log file with millisecond precision (three decimal places after the decimal point) - and have a resolution of approximately 1ms.*

Chapter 11 – Viewing Log Files

Log files may be viewed graphically in the **PMManager** application's Log Viewer, as text in NotePad, or as a spreadsheet in Excel. This chapter provides explanations and instructions for viewing log files. Topics include:

- Accessing the Log Viewer
- Understanding the Log Viewer Window
- Viewing Log Files in NotePad
- Opening Log Files in Excel

Accessing the Log Viewer

To open a log file in the PMManager application's Log Viewer:

1. Open the **File** menu and select **Open**. The **Open File** dialog box appears with the **PMManager** folder open.

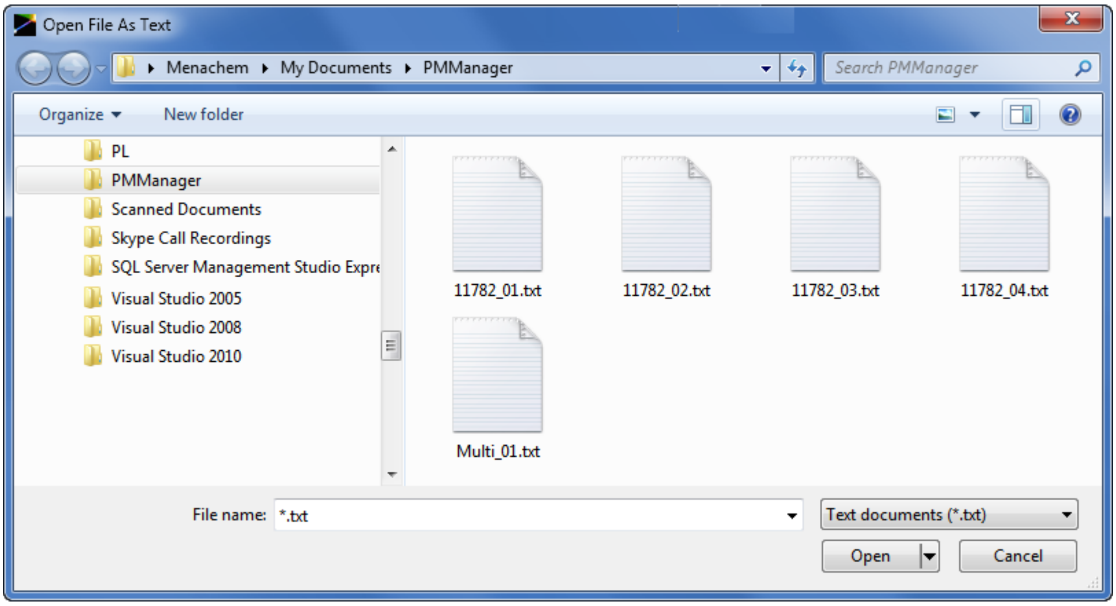


Figure 11-1 Open File Dialog Box

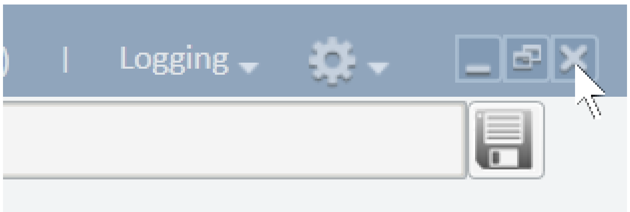
☞**Note:** *For details of the default location for log files, see section* *Default Location and Name for Log Files.*

2. Select the required file and click **Open**. The log file opens in the **PMManager** application's Log Viewer.

   In this example, a log file having a "Multi_" prefix is selected. That indicates multiple channels were logged. Numeric prefixes indicate a one-channel log file.

To close a Log Viewer file:

➢ Click the "X" in the upper right corner.



Understanding the Log Viewer Window

This section explains the Log Viewer window and the Log Viewer right mouse button functions. The basic layout and function of **PMManager** remains the same, with the exception that the Channels are disabled. The Settings and Function panels show the various values that were active when the log was made.

Figure 11-2 shows the Log Viewer window for multi-channel measurement. The yellow highlighted portions indicate that the note was added after the measurement and saved by clicking on the disk icon in the upper corner. A note can be added prior to the measurement as explained in *Adding Notes to a Log File*.

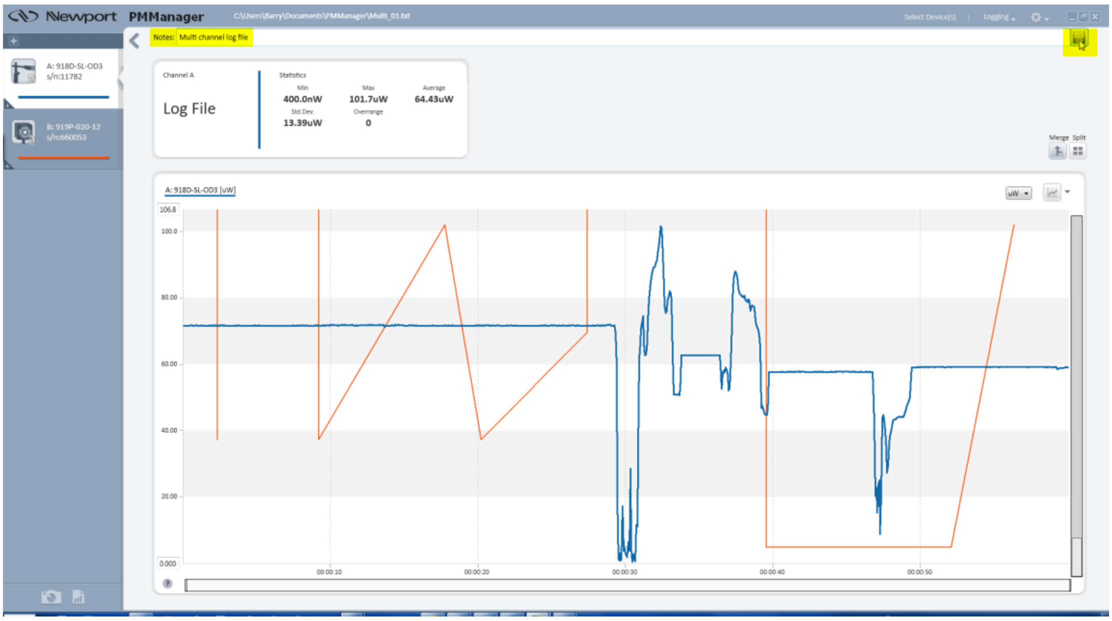
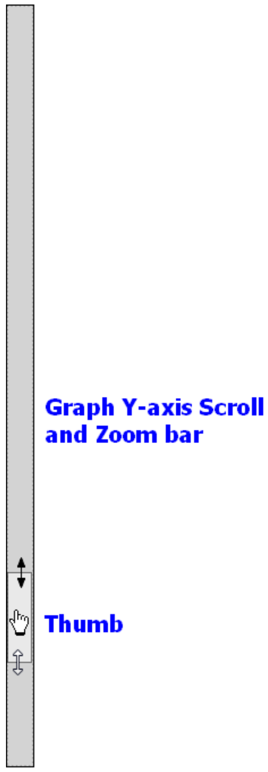


Figure 11-2 Log Viewer for Photodiode, Thermopile, Math Channels

Zooming In and Zooming Out

Changing the perspective or resolution of a displayed graph can be done by a combination of editing the limits of the Y-axis and/or manipulating the scroll bar **Thumb** (as explained below).

☞***Note:*** *Zooming features for displayed Graphs or log files for Track w/Power Stability measurements are discussed in Chapter 4 – Features of the PMManager Window.*



Method 1:

Method 1 is illustrated in *Figure 4-3* of the *Line Graph* setup procedure. The zooming is affected by editing the min and max values of the Y-axis and by pressing on, and sliding the **Thumb** (as indicated by the "hand" in the adjacent figure) to position the display within the new limits.

Method 2:

The top and bottom borders of **Thumb** are identified with double vertical arrows. Pressing on, and dragging a border affects the zoomings by changing the min and max Y-axis values.

- Y-max values by the black arrow: Dragging the border down, decreases the value. Dragging the border upwards, increases the value.
- Y-min values by the white arrow: Dragging the border down, decrease the value. Dragging the border upwards, increases the value.
- Position the new zoom display, if needed, with the "hand" use of the Thumb.

Reset the zoom:

Change the *Settings* in the Channel area or the range in the *Graph Configuration Area*.

Setting Logging Format Preferences

The default format of a logging file is set in the **Logging** tab of **Preferences**.

1. Open the **Options** menu and select **Preferences**.

   The **Preferences** dialog box appears.

2. Select the **Logging** tab.

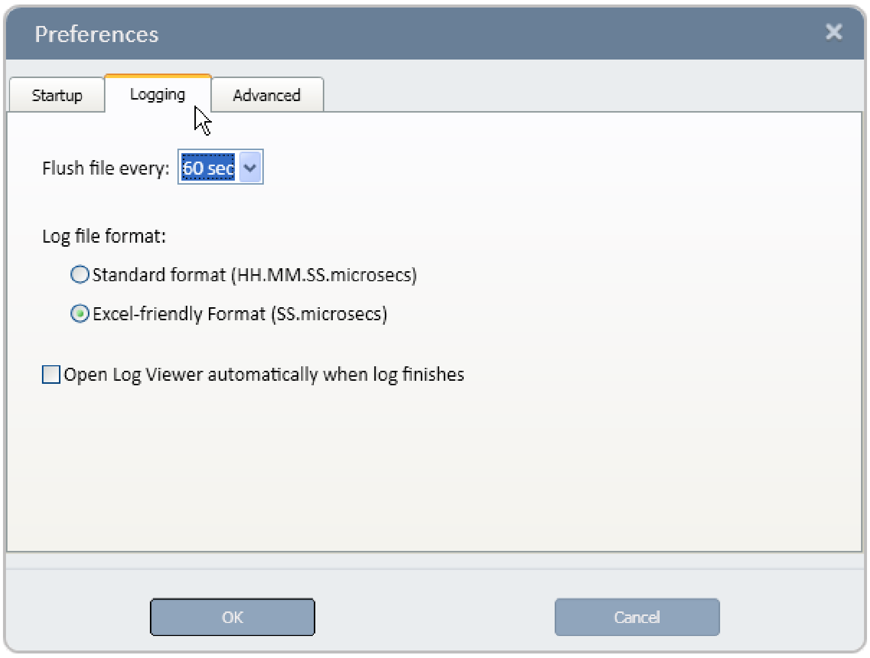


Figure 11-3 Preferences Dialog Box, Logging Tab

3. Select which format to use in the **Log file format** area.
4. If desired, select the option to open the log file automatically when the logging ends.
5. Click **OK** to save the setting.

Viewing Log Files in NotePad

This section explains how to view a log file in NotePad.

Opening a Log File in NotePad

To open a log file in NotePad:

1. Open the **File** menu and select **Open File As Text**.

   The **Open File** dialog box opens to select the file.

2. Navigate to the directory of the log files.

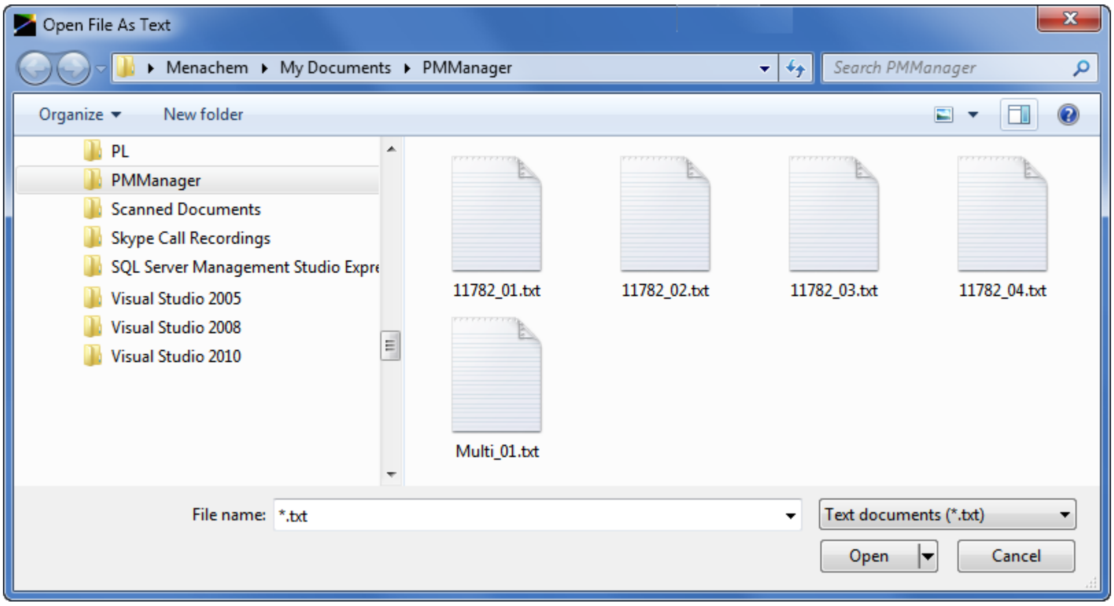


Figure 11-4 Open File Dialog Box

3. Select the required file and click **Open**.

   The log file opens in NotePad (see *Figure 11-5*,).

Understanding Log File Entries

Power or energy

```
;PC Software:PMManager Version 3.10 Build 8
! ******* Warning: Do not modify this file. Changes may prevent    ********
! ******* the PMManager Log reader from opening the file correctly. ********
;Logged:28/08/2014 at 15:36:43
;File Version:5
;Graph Mode:Split
;Notes:Standard Time Format

;Channel A:843-R-USB Photodiode 918D-SL-OD3 (s/n:11782)  EF1.24 (s/n:91234)

;Channel A:Details
;Name:918D-SL-OD3
;Graph Type:Line
;Graph Color:RGB(14,104,168)
;Units:W
;Settings:Measuring:Power
;Settings:Wavelength:1100
;Settings:Range:300uW
;Settings:Filter:OUT

;Channel A:Statistics
;Min:3.500uW
;Max:290.6uW
;Average:114.9uW
;Std.Dev.:69.99uW
;Overrange:0
;--------------------


;First Pulse Arrived : 28/08/2014 at 15:36:43.370000
   Timestamp               Channel A
     0:00:00.000           2.259e-004
     0:00:00.066           2.263e-004
     0:00:00.132           2.270e-004
     0:00:00.198           2.273e-004
     0:00:00.264           2.266e-004
     0:00:00.330           2.257e-004
```

Figure 11-5 Portion of a 2-channel log file in NotePad(Standard Format)

```
;PC Software:PMManager Version 3.10 Build 8
! ******* Warning: Do not modify this file. Changes may prevent    ********
! ******* the PMManager Log reader from opening the file correctly. ********
;Logged:28/08/2014 at 15:41:39
;File Version:5
;Graph Mode:Split
;Notes:Excel Friendly Time Format

;Channel A:843-R-USB Photodiode 918D-SL-OD3 (s/n:11782)  EF1.24 (s/n:91234)

;Channel A:Details
;Name:918D-SL-OD3
;Graph Type:Line
;Graph Color:RGB(14,104,168)
;Units:W
;Settings:Measuring:Power
;Settings:Wavelength:1100
;Settings:Range:300uW
;Settings:Filter:OUT

;Channel A:Statistics
;Min:10.40uW
;Max:209.3uW
;Average:125.6uW
;Std.Dev.:39.77uW
;Overrange:0
;--------------------


;First Pulse Arrived : 28/08/2014 at 15:41:39.826000
  Timestamp         Channel A
         0.000      8.220e-005
         0.067      8.170e-005
         0.134      8.150e-005
         0.200      8.160e-005
         0.267      8.120e-005
```

Figure 11-6 Portion of a 1-channel log file (Excel Friendly Format)

The first paragraph identifies the **PMManager**, graph mode, logging time, and any note that was added by the *Adding Notes to a Log File* option.

The next paragraphs contain the information that describes the devices, sensors, channel association, parameters per channel when the log measurement was made, followed by statistics for each channel.

The next section is the data that was measured. Using the First Pulse Arrived value, yellow highlighted, as a basis, the times in the first column are the incremental changes in the X-axis. After new readings on both channels have been logged, the math channel is evaluated.

Opening Log Files in Excel

This section explains how to open a log file using Excel, so that the log file can be processed as a spread sheet.

Opening a Log File Stored in the "Excel Friendly" Format

For more information on log file formats, see *Choosing the Log File Format*.

To open a log file stored in Excel Friendly format from the PMManager application:

1. Select either **Open** or **Open File As Text** from the **File** menu. The **Open File** dialog box appears.
2. Select the directory in which the log file is stored.
3. Click the filename of the required file.
4. Right-click the file icon in the upper window.
5. From the pop-up menu select **Open With** – **Microsoft Office Excel** (see *Figure 11-7*).

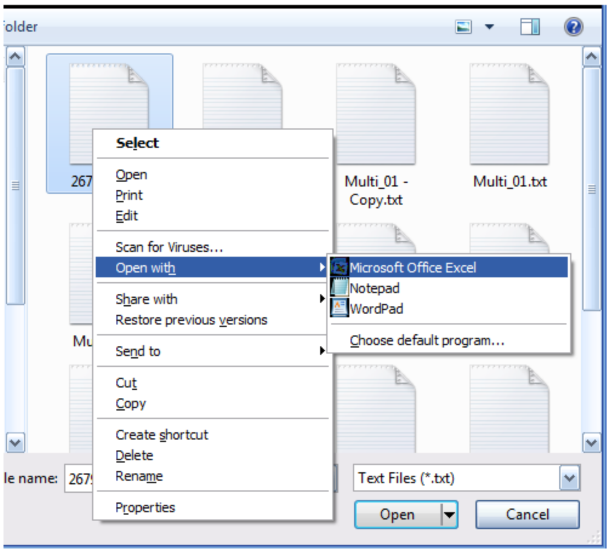


Figure 11-7 Open File Dialog Box

The log file opens.

To open a log file stored in Excel Friendly format outside the PMManager application:

1. Use the Windows Explorer to locate and select the log file.
2. Right-click on the file name, and select **Open With** from the pop-up menu, and select **Microsoft Excel** from the sub menu.

   The log file opens inside Excel as a spread sheet with two active columns: Energy in joules and Timestamp in seconds.

Opening a Log File Stored in Standard Format Using Excel

A log file stored in the Standard format can also be opened using Microsoft Excel, but it is more difficult than opening a log file stored in Excel Friendly format. For more details, refer to the Microsoft Excel Help section.

To open a log file stored in Standard format:

1. From the Windows taskbar, select **Start** – **All Programs** – **Microsoft Excel** to open Microsoft Excel from Windows. Microsoft Excel opens.
2. In Excel, from the menu select **File – Open**. The **File Open** dialog box appears.
3. In the Files of Type area, select **Text files**.
4. Navigate to the directory in which the log file is located (see section *Default Location and Name for* Log Files; by default, the **PMManager** application directory is under **\Program Files\Newport Optronics**). Select the log file icon and click **Open**. The Text Import Wizard appears.

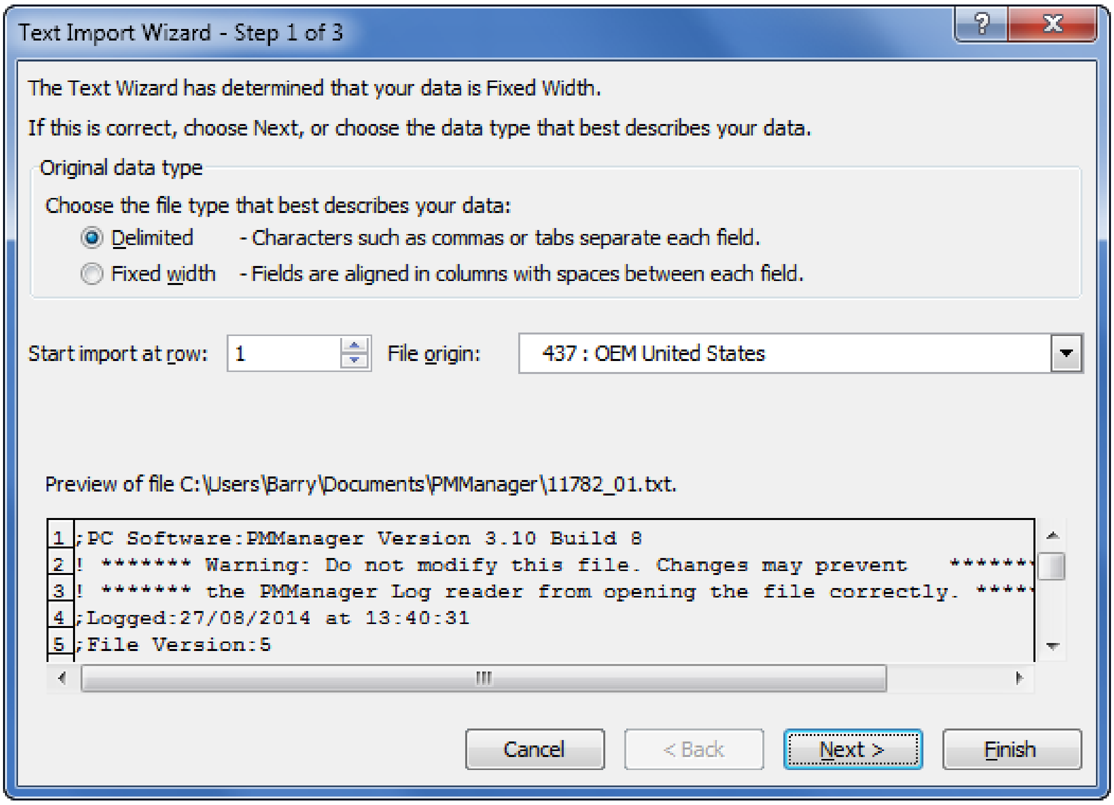


Figure 11-8 Text Import Wizard Step 1 of 3 Dialog Box

5. In the Original data type area, select **Delimited** (the default) and click **Next**. The second step of the Text Import Wizard appears.

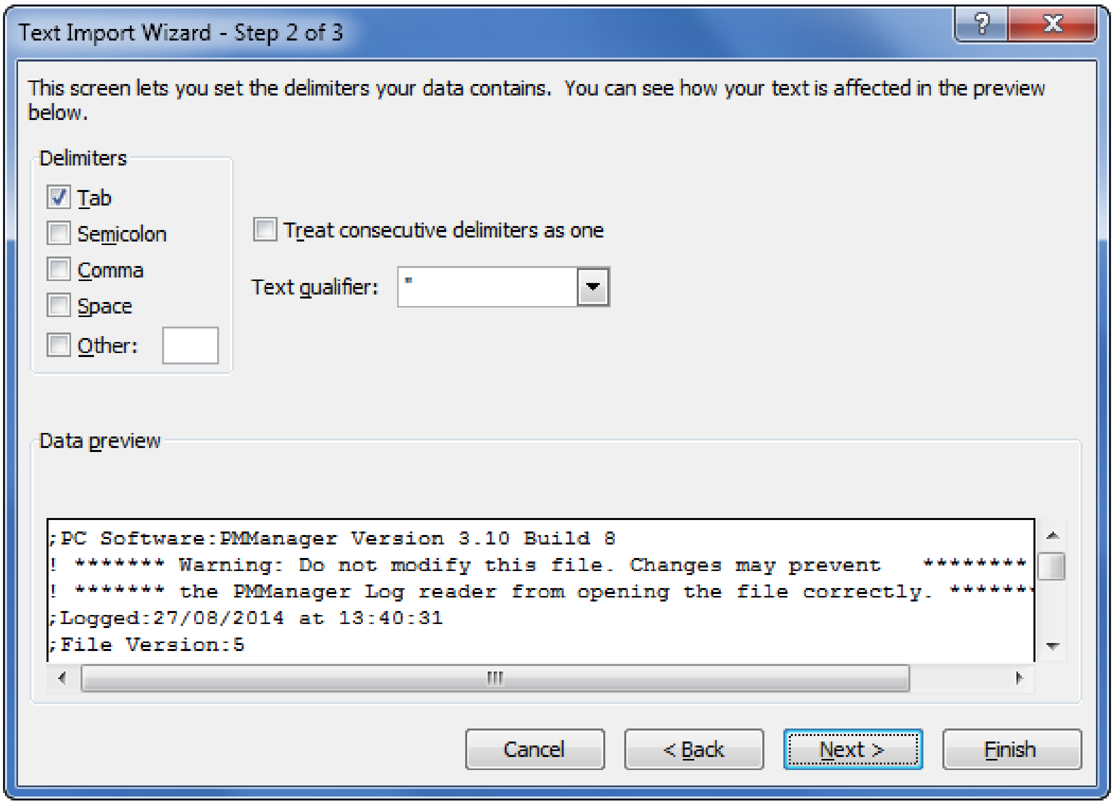


Figure 11-9 Text Import Wizard Step 2 of 3 Dialog Box

6. In the Delimiters area, check **Tab** (the default.)
7. Click **Finish**. The log file opens as a spread sheet (see *Figure 11-11*).

	A	B	C	D	E	F	G
1	;PC Software:PMManager Version 3.10 Build 8						
2	! ******* Warning: Do not modify this file. Changes may prevent *********						
3	! ******* the PMManager Log reader from opening the file correctly. *********						
4	;Logged:28/08/2014 at 15:36:43						
5	;File Version:5						
6	;Graph Mode:Split						
7	;Notes:Standard Time Format						
8							
9	;Channel A:843-R-USB Photodiode 918D-SL-OD3 (s/n:11782) EF1.24 (s/n:91234)						
10							
11	;Channel A:Details						
12	;Name:918D-SL-OD3						
13	;Graph Type:Line						
14	;Graph Color:RGB(14,104,168)						
15	;Units:W						
16	;Settings:Measuring:Power						
17	;Settings:Wavelength:1100						
18	;Settings:Range:300uW						
19	;Settings:Filter:OUT						
20							
21	;Channel A:Statistics						
22	;Min:3.500uW						
23	;Max:290.6uW						
24	;Average:114.9uW						
25	;Std.Dev.:69.99uW						
26	;Overrange:0						
27	;--------------------						
28							
29							
30	;First Pulse Arrived : 28/08/2014 at 15:36:43.370000						
31	Timestamp	Channel A					
32	0:00:00.000	2.26E-04					
33	0:00:00.066	2.26E-04					
34	0:00:00.132	2.27E-04					
35	0:00:00.198	2.27E-04					
36	0:00:00.264	2.27E-04					

Figure 11-10 Portion of a 1-channel log file in Excel using Standard Format

	A	B	C	D	E	F	G	H
1	;PC Software:PMManager Version 3.10 Build 8							
2	! ******* Warning: Do not modify this file. Changes may prevent ********							
3	! ******* the PMManager Log reader from opening the file correctly. ********							
4	;Logged:28/08/2014 at 15:41:39							
5	;File Version:5							
6	;Graph Mode:Split							
7	;Notes:Excel Friendly Time Format							
8								
9	;Channel A:843-R-USB Photodiode 918D-SL-OD3 (s/n:11782) EF1.24 (s/n:91234)							
10								
11	;Channel A:Details							
12	;Name:918D-SL-OD3							
13	;Graph Type:Line							
14	;Graph Color:RGB(14,104,168)							
15	;Units:W							
16	;Settings:Measuring:Power							
17	;Settings:Wavelength:1100							
18	;Settings:Range:300uW							
19	;Settings:Filter:OUT							
20								
21	;Channel A:Statistics							
22	;Min:10.40uW							
23	;Max:209.3uW							
24	;Average:125.6uW							
25	;Std.Dev.:39.77uW							
26	;Overrange:0							
27	;--------------------							
28								
29								
30	;First Pulse Arrived : 28/08/2014 at 15:41:39.826000							
31	Timestan	Channel A						
32	0	8.22E-05						
33	0.067	8.17E-05						
34	0.134	8.15E-05						
35	0.2	8.16E-05						

Figure 11-11 Portion of a 1-channel Excel Friendly Format log file

Chapter 12 – Preferences and other Features

Saving Sensor Settings

PMManager provides a range of sensor optimization options that can be adjusted to deliver the most accurate readings. Whenever you change the value of a parameter in the Settings area it is saved as the value for this parameter to be used the next time this sensor is connected.

For more information on configuring and optimizing measurement settings for the various sensor types, refer to *Chapter 5 – Measuring with the Thermopile Sensor*, *Chapter 6 – Measuring with the Photodiode Sensor*, and *Chapter 7 – Measuring with the Pyroelectric and PD Energy Sensors*.

Preferences Option

The Preferences option consists of the following four-tabbed pages:

- StartUp
- Logging
- Advanced

StartUp

The options of the StartUp tab (*Figure 12-1)* set startup parameters.

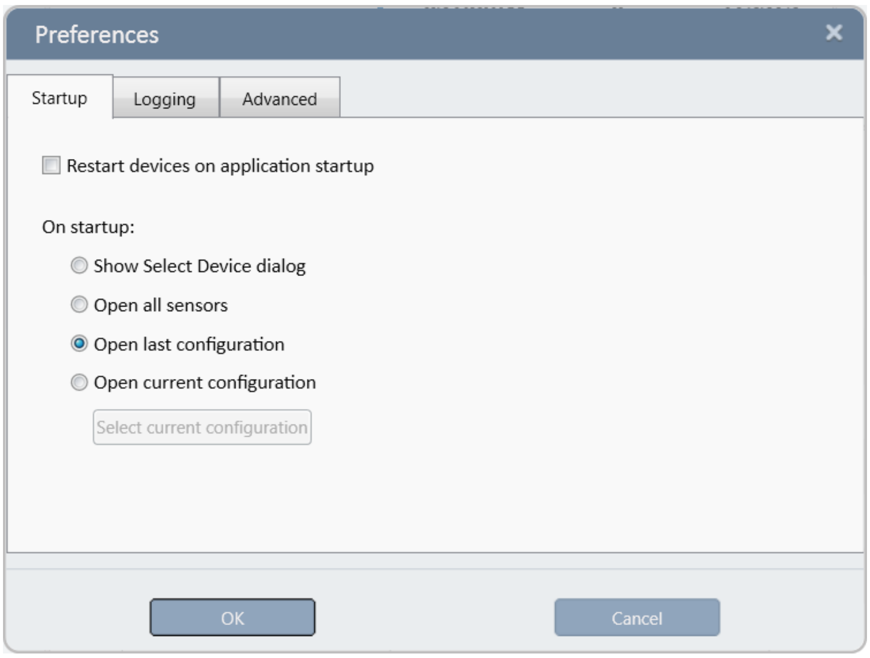


Figure 12-1 Preferences Dialog Box – StartUp

Option	Explanation
Restart devices on application startup	When **PMManager** begins, all connected devices are restarted
Show Select Device dialog	When selected, always show **Select Device(s)** window when **PMManager** starts.
Open all sensors	When selected, connects to all devices without showing **Select Device(s)** window.
Open last configuration	When selected, uses previous **PMManager** configuration settings.
Open current configuration	When selected, uses current configuration, even if it is not the last configuration.

Logging

This tab augments the logging command as described in the section *Setting Logging Format Preferences* of *Chapter 11 – Viewing Log Files*.

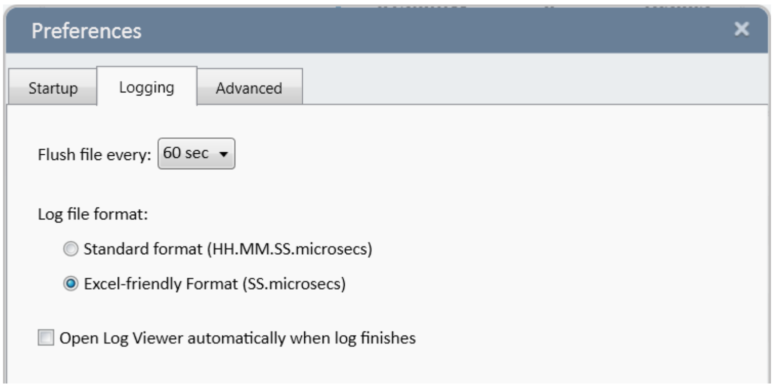


Figure 12-2 Preferences Dialog box – Logging

Flush file every	Set PMManager to zero log file every 60 (default), 10, and 3 seconds
Log file format	Set log format as either Excel-type (default) or standard
Open Log Viewer automatically when log finishes	Have Log View automatically open when log is finished.

Advanced

Sets how PMManager handles firmware downgrade and software graphics rendering.

Allow firmware downgrade	Allows loading a firmware version that is lower than the installed firmware in the device.
Use software graphics rendering	Should PMManager show any graphic anomalies, use of this option may help.

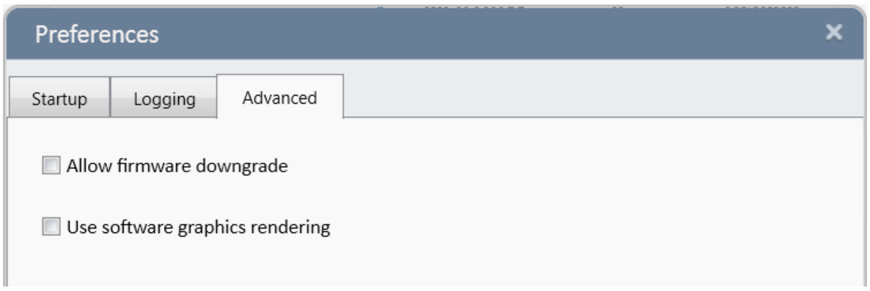


Figure 12-3 Preferences Dialog box – Advanced

Exporting Screen to File and Printer

You can export the entire **PMManager** window as picture file or to a printer . The entire screen is included, except the Function dialog.

This option works with active measurement sessions and when viewing a log file.

To export the screen as a PNG file:

1. In the lower part of the Channel area, click the  button.

   A dialog opens overlaying the screen that includes the captured screen and option buttons.

Figure 12-4 Captured screen showing options

2. To save to a PNG file, click Save to Image.

   A standard Save dialog opens that by default saves files in \User\My Documents\PMManager.

   - If desired, change file location.
   - Enter a name for the file.

3. Click **Save** to save the file
4. Enter the file name in the **File name** field.

To export screen to a printer:

1. In the lower part of the Channel area, click the  button.

   A dialog opens overlaying the screen that includes the captured screen and option buttons.

   This screen capture is of the log file that is displayed in *Figure 11-2.*

2. Click Print to print directly to the default printer.

   The **Default printer** is always selected.

3. To print to a different printer, de-select the option and click the print button.

   The standard Windows dialog opens to select a different printer.

☞ ***Note:*** *When opened, the Functions dialog is adjacent to the channel dialog. You can select the Functions dialog and move it anywhere on the* *screen. Note however, the dialog closes when you click anywhere else on the screen so that the dialog loses focus. Thus, regardless of its position, the Function dialog is not included by the Capture Screen option.*

Accessing the Help Module

PMManager application offers an easy-access Help module.

To access PMManager application's Help module:

- Click  on the toolbar.

  OR

  Open the **Help** menu and select **Help Topics**.

  OR

  Select **PMManager Online Help** from the **PMManager** program group of the Start menu of the Windows Desktop Toolbar.

  The **PMManager** Help module appears.

Appendix A – Device Technical and System Performance Specifications

The 841-PE-USB, 843-R-USB, and 1919-R meters support the following types of sensors

- 918D and 818 Photodiode sensors
- 919P Thermopile sensors includes PEPS sensors
- 919E Pyroelectric and Photodiode Energy sensors

841-PE-USB Specifications

Table A-1 841-PE-USB Technical and System Performance Specifications

Input Specifications Thermal, Photodiode	
Measurement range	Varies according to head in use.
Input Ranges	15nA - 1.5mA full scale in 16 ranges
A to D Sampling rate	15Hz
A to D Resolution	18 bits plus sign (0.0009% resolution)
Electrical accuracy	±0.25% ±20pA new; ±0.5% ±50pA after 1 year
Electrical input noise level	500nV or 1.5pA + 0.0015% of input range @3Hz.
Dynamic range	9 decades (1:10^^{9})
Input Specifications Pyroelectric Heads	
Measurement range	Varies according to head in use.
Input Range	0 - 6V full scale
A to D Sampling rate	10KHz
A to D resolution	12 bits no sign (0.025% resolution)
Electrical accuracy	±0.25% new; ±0.5% after 1 year
Electrical input noise	2mV
General Specifications	
Detector Compatibility	919P, PEPS, 918D, 818, 919E
Analog output	0-1 Volt with 0.3mV (0.03%) resolution. 100 ohms impedance
Analog output accuracy	±0.4% ±2mV
Number of channels	1 Channel
Dimensions (in millimeters)	68W x 117D x 32H
Mass	0.425kg
USB specifications	• Full speed • Bus powered • High power device • One interrupt IN endpoint

843-R-USB Specifications

Input Specifications Thermal, Photodiode	
Input Ranges	15nA - 1.5mA full scale in 16 ranges
A to D Sampling rate	15Hz
A to D resolution	18 bits plus sign
Electrical accuracy	±0.25% ± 20pA new; ±0.5% ±50pA after 1 year
Electrical input noise level	500nV or 1.5pA + 0.0015% of input range @3Hz.
Dynamic range	9 decades (1:10^9)
Input Specifications Pyroelectric Sensors	
Input Range	0 - 6V full scale
A to D Sampling rate	500 Hz
A to D resolution	12 bits no sign (0.025% resolution)
Electrical accuracy	±0.25% new; ±0.5% after 1 year
Electrical input noise	2mV
General Specifications	
Detector Compatibility	919P, PEPS, 918D, 818, 919E
PC Interface (optional)	USB
Analog output	1v full-scale; 0.03% resolution. 100 ohms impedance
Analog output accuracy	±0.2% (of reading) ±0.3% of full scale volts
Dimensions	114W x 41D x 212H
Mass	470g
Display	320x240 pixel TFT LCD; Active area 70x52mm approx
Display digit height	15mm
LCD lighting	LED’s. Operates from charger or battery. Lighting level can be adjusted between 3 levels using on/off button.
Bargraph segments	310
Battery	2x Li-Ion 3.7V, 5.2Amp-hour battery pack built in
Charger input	DC 12-16v, 1W Charge time approx. 5 hours Automatically stops charging when battery is full
Operation between charges	With low backlight: Thermal, Photodiode 19, Pyroelectric 16 With medium backlight: Thermal/Photodiode 17, Pyroelectric 15 With high backlight: Thermal/Photodiode 15, Pyroelectric 13

1919-R Specifications

Input Specifications Thermopile, Photodiode	
Input Ranges	15nA - 1.5mA full scale in 16 ranges
A to D Sampling rate	15Hz
A to D resolution	18 bits plus sign
Electrical accuracy	±0.25% ± 20pA new; ±0.5% ±50pA after 1 year
Electrical input noise level	500nV or 1.5pA + 0.0015% of input range @3Hz.
Dynamic range	9 decades (1:10^9)
Input Specifications Pyroelectric Sensors	
Input Range	0 - 6V full scale
A to D Sampling rate	5000 Hz
A to D resolution	12 bits no sign (0.025% resolution)
Electrical accuracy	±0.25% new; ±0.5% after 1 year
Electrical input noise	2mV
General Specifications	
Detector Compatibility	919P, PEPS, 918D, 818, 919E
PC Interface	USB; RS232 (max baud rate 115200)
Analog output	1v full-scale; 0.03% resolution. 100 ohms impedance
Analog output accuracy	±0.2% (of reading) ±0.3% of full scale volts
Dimensions	114W x 41D x 212H
Mass	470g
Display	320x240 pixel TFT LCD; Active area 70x52mm approx.
Display digit height	15mm
LCD lighting	LED's. Operates from charger or battery. Lighting level can be adjusted between 3 levels using on/off button.
Bargraph segments	310
Battery	2x Li-Ion 3.7V, 5.2Amp-hour battery pack built in
Charger input	DC 12-16v, 1W Charge time approx. 5 hours Automatically stops charging when battery is full
Operation between charges	With low backlight: Thermopile, Photodiode 19, Pyroelectric 16 With medium backlight: Thermopile/Photodiode 17, Pyroelectric 15 With high backlight: Thermopile/Photodiode 15, Pyroelectric 13 **Note:** Battery charge will be depleted faster if a USB Flash Drive is left plugged in the 1919-R meter.
Data Logging	
Log period	1 sec to 1000 hours
Max points stored onboard per file	Limited only by size of USB Flash Drive
Max points direct to PC file in real time	Unlimited
Max points stored onboard	Limited only by size of USB Flash Drive
Real Time Logging of Power	15Hz Onboard, USB, RS232
Real Time Logging of Energy	5000Hz Onboard, USB; 30Hz RS232

Appendix B – Safety and Compliance

CE Compliance

All Newport devices, as installed on a CE compliant PC, will comply with all pertinent CE requirements relating to safety, sensitivity to interference, EMC and emissions.

Appendix C – Warranty

Newport Corporation warrants that this product will be free from defects in material and workmanship and will comply with Newport's published specifications at the time of sale for a period of one year from date of shipment. If found to be defective during the warranty period, the product will either be repaired or replaced at Newport's option.

To exercise this warranty, write or call your local Newport office or representative, or contact Newport headquarters in Irvine, California. You will be given prompt assistance and return instructions. Send the product, freight prepaid, to the indicated service facility. Repairs will be made and the instrument returned freight prepaid. Repaired products are warranted for the remainder of the original warranty period or 90 days, whichever first occurs.

Limitation of Warranty

The above warranties do not apply to products which have been repaired or modified without Newport's written approval, or products subjected to unusual physical, thermal or electrical stress, improper installation, misuse, abuse, accident or negligence in use, storage, transportation or handling. This warranty also does not apply to fuses, batteries, or damage from battery leakage.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR USE. NEWPORT CORPORATION SHALL NOT BE LIABLE FOR ANY INDIRECT, SPECIAL, OR CONSEQUENTIAL DAMAGES RESULTING FROM THE PURCHASE OR USE OF ITS PRODUCTS.

Appendix D – Technical Support Contacts

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45340 Beaune la Rolande, FRANCE

Telephone: (33) 02 38 40 51 56

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Lot J3-8, Wuxi Export Processing Zone, New District, Jiangsu China 204028

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PMManager User Guide
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