USER MANUAL

PC-Gentec-EO | Universal PC Application Sotfware

gentec-e·o
PARTNERS for ACCURACY

WARRANTY

All Gentec-EO devices carry a one-year warranty (from date of shipment) against material and/or workmanship defects, when used under normal operating conditions. The warranty does not cover damages related to battery leakage or misuse.

Gentec-EO Inc. will repair or replace, at Gentec-EO Inc.'s option, any device that proves to be defective during the warranty period, except in the case of product misuse.

Any attempt by an unauthorized person to alter or repair the product voids the warranty.

The manufacturer is not liable for consequential damages of any kind.

Contacting Gentec Electro-Optics Inc.
To help us answer your calls more efficiently please have the model number of the detector you are using ready before calling Customer Support.

Gentec Electro-Optics, Inc.
445, St-Jean-Baptiste, Suite 160
Québec, QC
Canada, G2E 5N7

Tel: (418) 651-8003
Fax: (418) 651-1174
E-mail: service@gentec-eo.com
Website: gentec-eo.com

CLAIMS

To obtain warranty service, contact your nearest Gentec-EO agent or send the product, with a description of the problem, and prepaid transportation and insurance, to the nearest Gentec-EO agent. Gentec-EO Inc. assumes no risk for damage during transit. Gentec-EO Inc. will, at its option, repair or replace the defective product free of charge or refund your purchase price. However, if Gentec-EO Inc. determines that the failure is caused by misuse, alterations, accident or abnormal conditions of operation or handling, it would therefore not be covered by the warranty.

SAFETY INFORMATION

Do not use a Gentec-EO device if the monitor or the detector looks damaged, or if you suspect that the device is not operating properly.

Appropriate installation must be done for water-cooled and fan-cooled detectors. Refer to the specific instructions for more information. Wait a few minutes before handling the detectors after power is applied. Surfaces of the detectors get very hot and there is a risk of injury if they are not allowed to cool down.

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instructions, it may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, try to correct the interference by taking one or more of the following steps:

• Reorient or relocate the receiving antenna.
• Increase the distance between the equipment and receiver.
• Connect the equipment to an outlet that is on a different circuit than the receiver.
• Consult the dealer or an experienced radio/TV technician for help.

Caution: Changes or modifications not expressly approved in writing by Gentec-EO Inc. may void the user's authority to operate this equipment.

SYMBOLS

The following international symbols are used in this manual:

Refer to the manual for specific Warning or Caution information to avoid any damage to the product.

DC, Direct Current

TABLE OF CONTENTS

1. PC-Gentec-EO

1.1. INTRODUCTION

The PC-Gentec-EO software is a simple and intuitive PC interface that allows you to control and display the readings from various Gentec-EO devices. The PC-Gentec-EO software supports the P-LINK, the HP, the INTEGRA, the U-LINK, and the MAESTRO. Previous PC-MAESTRO users will find it easy to navigate since the PC-Gentec-EO interface is very similar.

1.2. SPECIFICATIONS

The following specifications are based on a one-year calibration cycle, an operating temperature of 18 to 28ºC (64 to 82ºF) and a relative humidity not exceeding 80%. Monitors must be stored in an environment between -20ºC to 60ºC (-4 to 140ºF) and a relative humidity not exceeding 90%.

	General Specifications
Compatible Devices	MAESTRO U-LINK P-LINK INTEGRA HP

Serial Communication:
    MAESTRO
    P-LINK
    U-LINK
    INTEGRA
    HP
	USB 2.0, RS-232, Ethernet
	USB 2.0, RS-232
	USB 2.0, RS-232
	USB 2.0, RS-232
	USB 2.0

Transfer Rate for Energy Measurements	MAESTRO: 500 Hz[1] (no missing points) INTEGRA: 5,200 Hz[2] (no missing points) U-LINK: 10,000 Hz[2] (no missing points)

Accuracy for Frequency Measurements:
    MAESTRO
    U-LINK
    INTEGRA
	See monitor user manual for specifications.

Displays	Real Time, Scope, Needle, Averaging, Histogram, Statistics
Correction Factors	1 multiplier and 1 offset (7 digits floating point)
Statistics	Current Value, Average Value, Maximum Value, Minimum Value, RMS Stability, PTP Stability, Repetition Rate, Average Power, STD Deviation
Data Storage	*.acq file for acquisition and statistics *.geo file for saved settings
Software Trigger Level	0.1% to 99.9%, 0.1% resolution
Internet Upgrades	https://www.gentec-eo.com/resources/download-center
File Size	4.39 MB
Average RAM Allocation	9 to 23 MB
Recommended PC Requirements	Dual Core Processor 3 Gb of RAM
Operating System Compatibility	Windows 11, Windows 10, Windows 8

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[1] For higher repetition rates, you need to use the internal data acquisition function on the MAESTRO. In a full-size statistics window, with no scope display and no serial communication, the repetition rate will be higher.
[2] Computer-dependent. If capturing data or performing statistics at high rep-rates, the use of a modern computer, one produced in the last 7 years, is recommended.

2.   Quick Start Procedure

1. Install the **PC-Gentec-EO software** on a PC.

2. Install the detector on an optical stand.

3. Connect the device to the PC with the appropriate USB cable.

4. If you are using a MAESTRO, verify that it is not in "SOLO2 Serial Compatibility or Binary Mode Measurement" and that it is configured to use the USB port. (In the MAESTRO monitor, go to "Home" ▸ "Set Device" ▸ "Serial Commands")

5. Start the PC-Gentec-EO software and power up your monitor (if applicable).

6. Choose the appropriate display for your measurement:

    a.   Real time with bar graph   d.   Averaging

    b.   Scope   e.   Histogram

    c.   Needle   f.   Statistics

7. Press the **Connect** button located in the top left corner of the main menu and change the measurement and display options in the appropriate tabs.

8. Remove the protective cover on the detector and start the laser.

9. Put the detector in the laser beam path. Leave it there for a few minutes or until the detector's temperature has stabilized. The entire laser beam must be within the aperture of the sensor. Do not exceed maximum specified densities, energies or powers. For the most accurate measurements, spread the beam across 60% to 80% of the sensor area.

    **Warning: Power Detectors can be used with both CW and pulsed lasers.
    Energy Detectors can only be used with pulsed lasers.**

Next Page

10. Adjust the **Zero**:

Even when there is no incident power, the measured value may not be 0. For power measurements, this is because the detector is not thermally stabilized OR there was a heat source in the field of view of the detector when you connected the PC-Gentec-EO software. For Photo Detectors, zeroing will remove the offset on the detector.

▶ **Power and Energy Detectors**: Block all laser radiation on the detector. To reset the zero, wait until the reading has stabilized and click **Set Zero** in the Main menu.

▶ **Photo Detectors:** Block all laser radiation on the detector. Click **Set Zero** in the Main menu. In some software versions, a message will appear requesting you to put the black cover over your photo detector. Press the **OK** button after you have done so. The software passes through all the ranges to determine the zero for each range.

11. All done! You are now ready to make measurements.

See Notes

Notes:

a.   Refer to specific Power Detector documentation for complete installation and operating instructions.
b.   Power Detectors are thermal sensors and are thus sensitive to temperature variations.
c.   For high-precision measurements, it is recommended to:
      i.   Allow the Power Detector to thermally stabilize before zeroing the software.
      ii.   Touch only the stand when handling the Power Detector. Do not touch the detector itself. This is especially true for highly sensitive detectors.
      iii. Do not adjust the zero for Energy Detectors, such as the QE series.
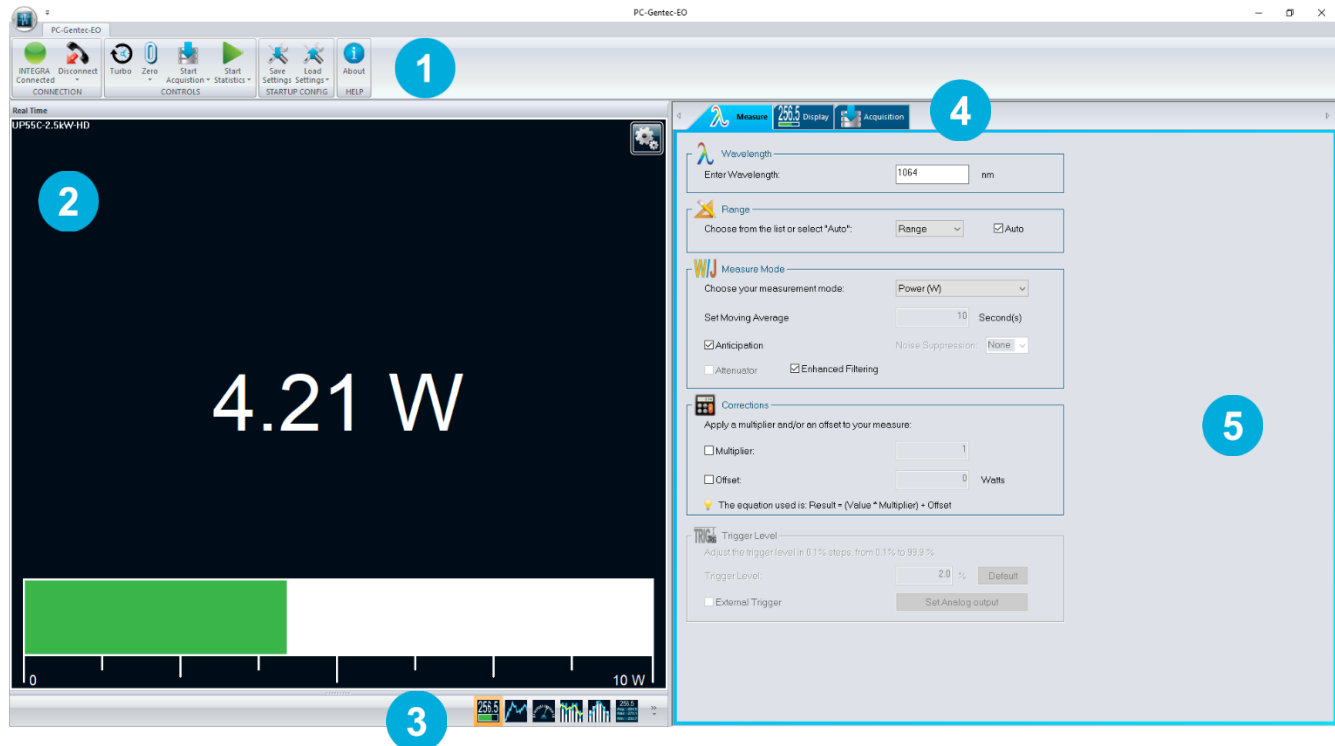   iv.   Avoid forced airflow or drafts around the detector.

3.   User Interface

Fig. 3-1 PC-Gentec-EO software User Interface

① Main Controls
All the main functions of the PC-Gentec-EO software are controlled using this tab ribbon. The functions are separated by categories: Connection, Controls, Startup Config and Help

② Display Panel
This section of the software displays the value in the user's selected display mode. Only one display at a time is allowed.

③ Change Display
At any time, it is possible to change the type of display by selecting the desired graphic.

④ Setup Panel - Selector Tabs
Choose the desired set of controls using the setup panel tabs.

⑤ Setup Panel – Controls
This section contains the different options that allow to control the display, measurement and acquisition parameters.
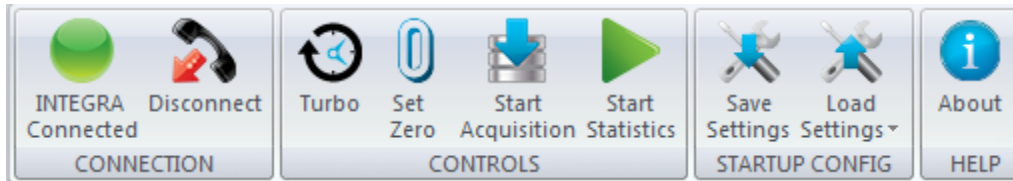
3.1. THE MAIN MENU

Fig. 3-2 Main Controls

You can minimize the main menu by right clicking on it and choosing **Minimize the ribbon**. This will maximize the Display panel.

Fig. 3-3 PC-Gentec-EO software with and without the Main Menu

3.1.1. Connection

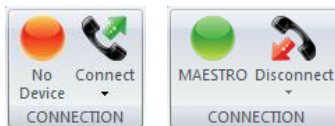**Automatic Connect/Disconnect button**

Fig. 3-4 CONNECTION menu

This button is used to automatically connect or disconnect a Gentec-EO device from the PC. By clicking on the main button there is no need to make a port selection, *the PC-Gentec-EO software will automatically find a connected Gentec-EO device or any available ports on the PC and will connect to it.*
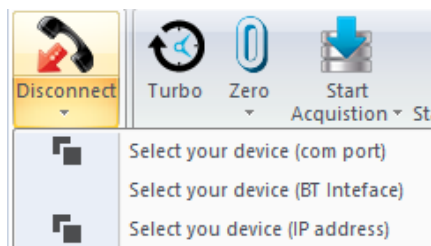

Fig. 3-5 Selecting your device

If however you have multiple Gentec-EO devices and you wish to select a specific communication port, you can do so by clicking the lower portion of the Connect button. Click on **Select your device (com port)** and a window will prompt you to select the desired port. If the Gentec-EO device was connected after the window appeared, just click on the **Refresh** button to find all new available ports.
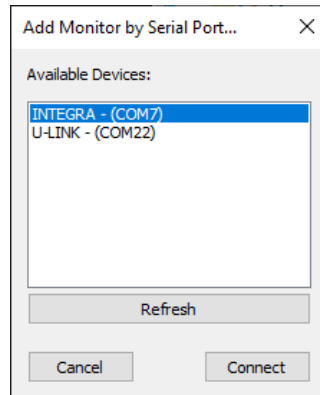

Fig. 3-6 Connecting a monitor via USB

 Warning

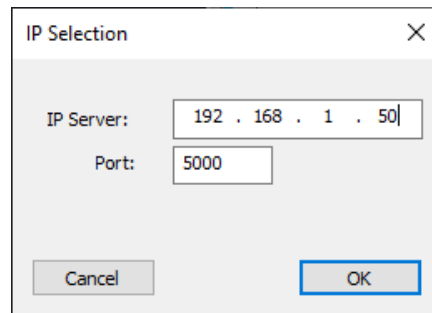| If a USB Bluetooth adapter is present on a PC, it is possible that the connection will take longer. Some USB Bluetooth adapters use the same virtual port as the PC-Gentec-EO software, but the delay for verifying the connection to the Bluetooth port is longer than the traditional serial port. |
| --- |

Fig. 3-7 Connecting a monitor via Ethernet

It is also possible to connect your MAESTRO device via Ethernet. Connect your MAESTRO to your Ethernet network. Go to HOME/SET DEVICE/ETHERNET CONFIG and note the IP address of the MAESTRO and port number. In the PC-Gentec-EO software, click on **Select your device (IP address)** and enter the IP address information.

3.1.2.   Controls

Fig. 3-8 CONTROLS menu

3.1.2.1.   Turbo Mode

The **Turbo Mode** is used by Energy Detectors to transfer data from the device. It switches the monitor in binary mode to accelerate the data transfer from the USB port. Turning off the **Turbo Mode** will put the device in ASCII mode. For optimal use, the **Turbo Mode** should always be on.

3.1.2.2.   Set Zero

This button adjusts the zero on the detector. It resets the zero reading level. It does this by subtracting the power reading on the display as soon as the **Set Zero** button is pressed. Subsequent measurements will be relative to this zero power level. The main purpose of this option is to remove reading offset caused by thermal noise in the environment. Thermal noise is caused by a detector that has not been thermally stabilized OR there was a heat source in the field of view of the detector when the PC-Gentec-EO software was connected (for example, the hand or body of the user). Use this function once your power meter has achieved thermal equilibrium to ensure accurate measurements.

For instructions on the correct way to make a zero offset, refer to step 10 in the Quick Start Procedure.

In Energy mode zeroing clears the current value.

3.1.2.3.   Start/Stop Acquisition

This button starts and stops the acquisition to a logging file. The different options for the acquisition can be made in the *Set Acquisition* tab. The Gentec-EO device must be connected to start the acquisition.

Tips

To save statistics at the end of the acquisition file, select **Save Statistics** in the **Acquisition** menu.
Changing the duration settings of the acquisition will automatically change the duration settings of the statistics as both are linked.
The data is saved to an ACQ file, which can be opened in your favorite data analysis software, like Excel.
A new acquisition will not concatenate the new data with the old one, it will erase old data and save only the new one. You must use a new filename if you want to keep both old and new data.

Set your Acquisition Parameters in Power Mode

In Power Mode, you can use the **Acquisition** menu to choose the **Sample Rate** and **Duration** of an acquisition. The sample rate is defined as a specific number of measurements in a fixed interval (for example: 3 measurements/minute or 100 measurements/hour). The total duration can also be set in seconds, minutes, hours or days. The **File Name** for data logging, the file location and the option to add a **Time Stamp** to each value can also be set using this menu.

Fig. 3-9 Settings for the ACQUISITION Menu in Power Mode

Set your Acquisition Parameters in Energy Mode

In Energy Mode, you can use the **Acquisition** menu to choose the **Sample Rate** and **Duration** of an acquisition. The sample rate is defined to measure 1 pulse every X pulses (for example: 1 measurement every 10 pulses). The total duration is also set in a specified number of pulses. The **File Name** for data logging, the file location and the option to add a **Time Stamp** to each value can also be set using this menu.
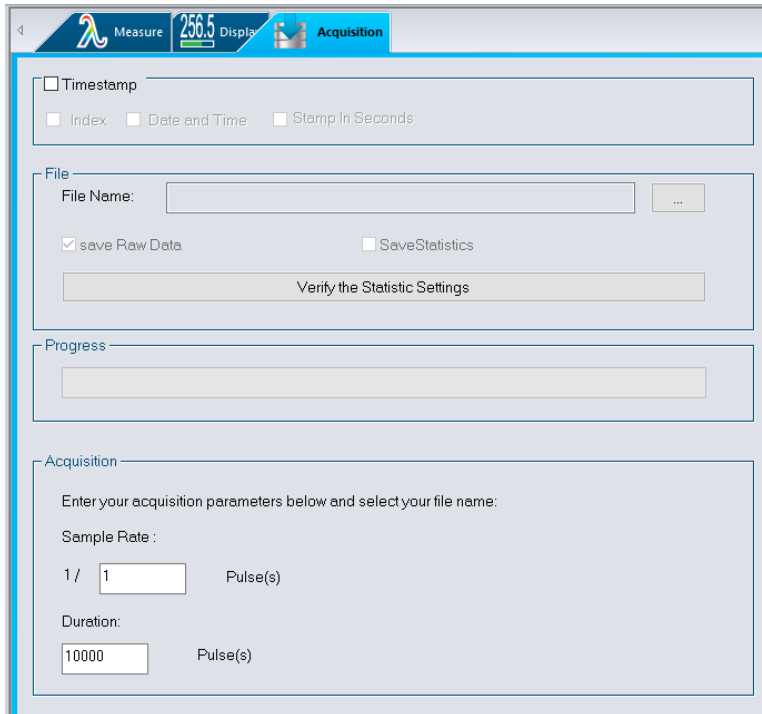
Fig. 3-10 Settings for the ACQUISITION Menu in Energy Mode

 Warnings

The number of pulses acquired is the number of pulses that the PC-Gentec-EO software received via the USB port. Depending on the device, this can be different from the number of pulses read by the monitor. Please refer to the Specifications.

For the MAESTRO, the repetition rate is limited to 500 Hz. The MAESTRO will perform a subsampling at higher repetition rates. If you need to make an acquisition u*sing all the points measured by the MAESTRO*, *please use the MAESTRO monitor and store the file on a USB key.*

3.1.2.4. *Start/Stop Statistics*

This button starts and stops the calculation of statistics. The different options for the statistics calculations can be made in the **Set Display** menu of the **Statistics** display. Changing the **Duration** settings of the statistics will automatically change the duration settings of the acquisition as both are linked. Statistics can also be saved to a file, as long as a **File Name** has been provided.

To save only the statistics to a file, select **Save Statistics** in the **Acquisition** menu and start only the statistics, not the acquisition. To save statistics at the end of the acquisition file, select **Save Statistics** in the **Acquisition** menu and start the acquisition. Starting the acquisition when the **Save Statistics** option is selected will also start the statistics. The statistics and acquisition routines produce an ACQ file which can be opened in your favorite data analysis software, like Excel.

3.1.3. Startup Config

Fig. 3-11 STARTUP CONFIG Menu

Save Settings: Save the current display and graphic settings in a GEO file

Load Settings: Load a GEO file with previously saved settings.

All modifications to the PC-Gentec-EO software options (Set Measure options, Set Display options of each graphic and Set Acquisition options) can be saved to a GEO file.

1. Make all the necessary modifications to the settings of the PC-Gentec-EO software.
2. Press the **Save Settings** button and save your settings to a file.
3. When next you open the PC-Gentec-EO software, press the **Load Settings** button and choose your settings file.

Tips

To go back to the original settings, press the **Default Settings** button.
For previous PC-MAESTRO users, the settings saved in a MAESTRO file will be compatible

3.1.4. Help

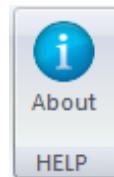
Fig. 3-12 HELP Menu

3.1.4.1. About

To learn more about the PC-Gentec-EO software, the connected Gentec-EO device, and the detector that is connected to your monitor, press the **About** Button.

This menu also allows you to verify if your version of PC-Gentec-EO software is up to date.

Warning

An internet connection is needed to verify if an update is available.

Tip

> You can also obtain the latest PC-Gentec-EO software version on our website at www.gentec-eo.com/downloads

3.2. THE DISPLAYS

The PC-Gentec-EO software offers 6 graphical displays to view and analyze your measurements. Every display shows the real time value of the signal on top of the graphic, except the Real Time graph which displays the real time value in large digits in the center of the panel.

Real Time: A real time display of the signal value shown in the center of the graph panel with the corresponding bar graph below.

Scope: A real time display of the signal value presented in a scope mode.

Needle: A real time display of the signal value presented by a needle.

Averaging: A scope-like display which presents the minimum, maximum, and average values of the last 50 values for a given period.

Histogram: A real time graph that displays the power or energy distribution of the last desired number of samples in the desired number of bars. Ex: A distribution, in real time, of the last 1000 samples in 50 different bars.

Statistics: Shows different measured and calculated information about the signal for a specified duration and sample rate.

For all displays, you can access the specific display options by clicking the Settings button on the top right of the graph panel. This operation will open the corresponding options panel for the current display, located on the right-hand side of the software.
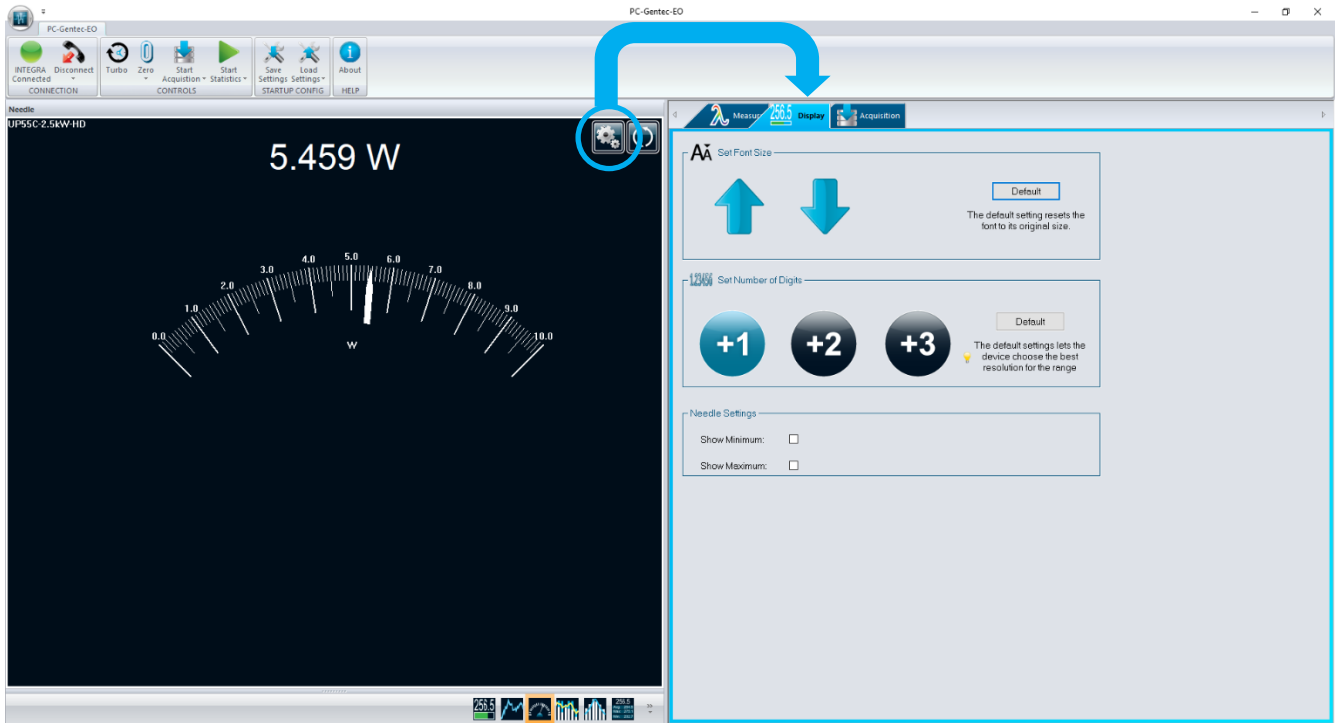
Fig. 3-13 Graphical Display with Settings Menu

3.2.1.   Real Time

A large, simple, real time value with a bar graph that allows you to see what is going on in real time. The large digits make it perfect to read from a distance. For HP series, information about water flow and water temperature appear below the power measurement. Warnings will appear in red.
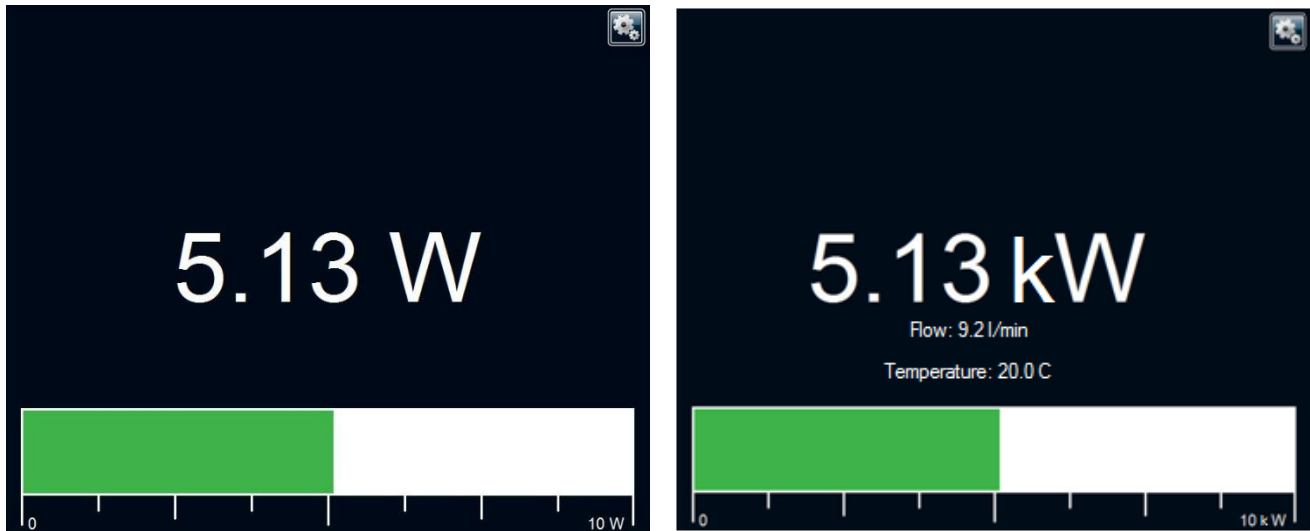

Fig. 3-14 REAL TIME Display with Bar Graph

By resizing the window, you can also hide the bar graph. When the window becomes too small to show the bar graph, the software will automatically hide it and keep only the real time value, like shown below.

Fig. 3-15 REAL TIME Display without Bar Graph

Settings

In the **Real Time** display, you can change the number of digits that are displayed. The **Default** button lets the device choose the best resolution for the range. The "+1", "+2" and "+3" buttons let you add one, two, or three digits to the resolution.
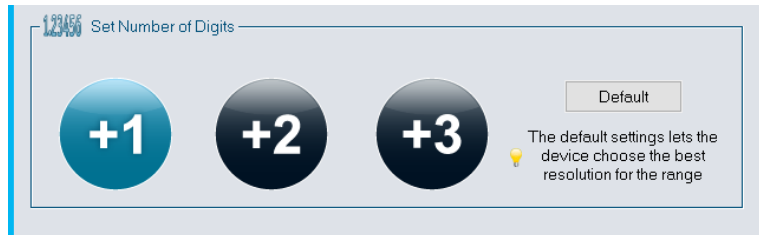
Fig. 3-16 Settings for the REAL TIME Display

You can also change the font size display using the **Set Font Size** control. This control changes the font size in the Real Time display using the up and down arrows. The **Default** button lets the default font size for display.

Fig. 3- 17 Set Font Size for the REAL TIME Display

3.2.2.   Scope

See the evolution in real time of your signal, like you would see on an oscilloscope. This mode can also show the minimum, maximum and average values of your signal over a determined period of time.
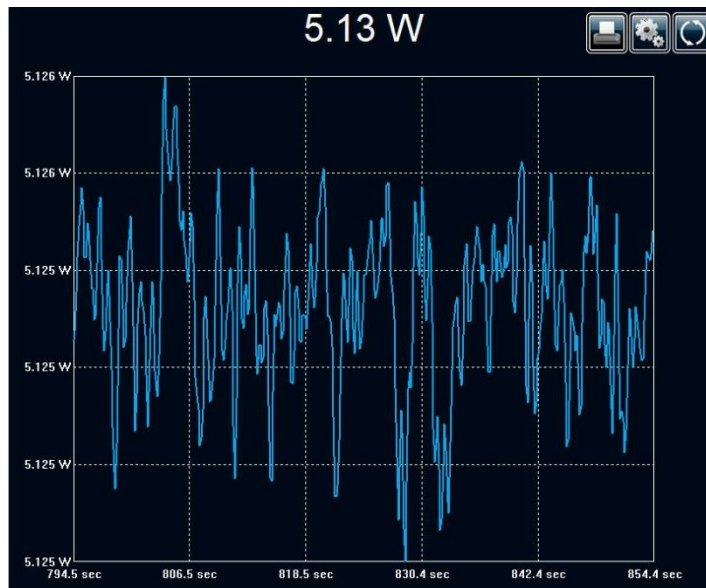
Fig. 3-18 SCOPE Display

It is possible to have live on-screen statistics with this graphical mode. Simply go in the **Set Display** menu using the **Settings** ⚙️ button and click **Display Stats**. To restart the graph, use the **Refresh** 🔄 button directly in the display panel.
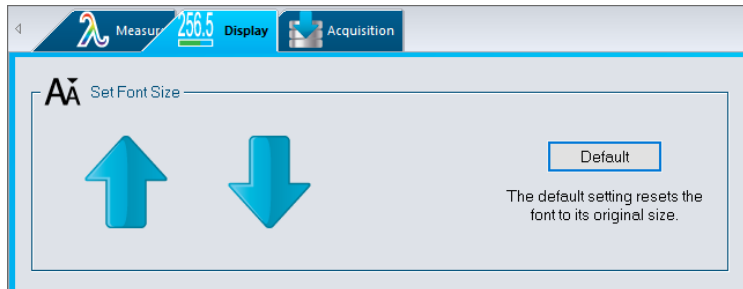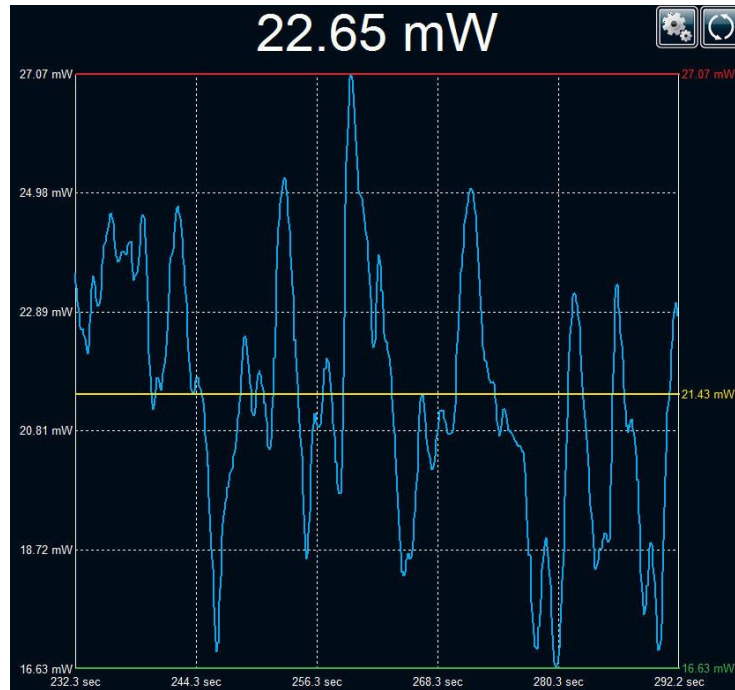

Fig. 3-19 SCOPE Display with Statistics

<u>**Settings**</u>

In the Scope display, you can:

- ▸ Change the number of digits (+1, +2 or +3)
- ▸ Adjust the period of the graph (in seconds)
- ▸ Change the values of the Y axis (either user-set or Same as Range)
- ▸ Show/Hide statistics
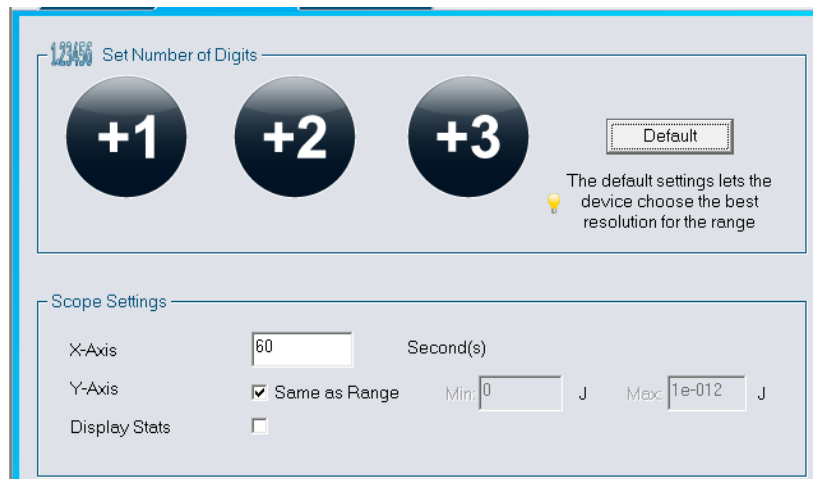
Fig. 3-20 Settings for the SCOPE Display

3.2.3.   Needle

This is a simple and intuitive way to see your current signal value. It is the ideal tool for laser tuning.
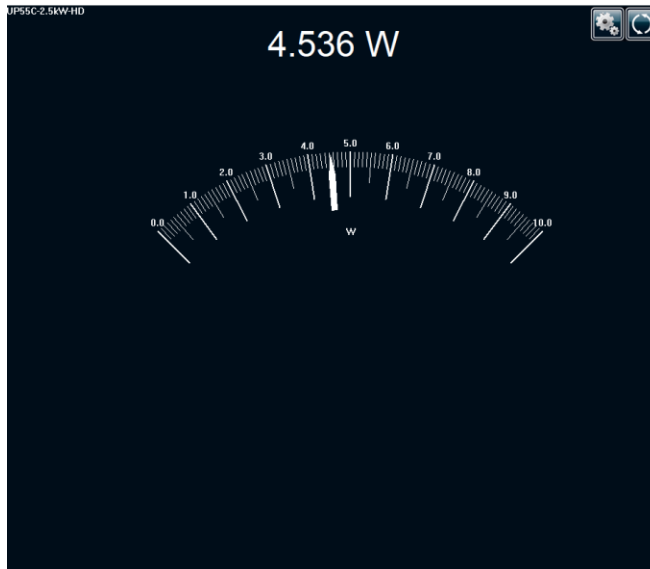
Fig. 3-21 NEEDLE Display

It is possible to add green and red needles indicating the minimum and maximum values in this graphical mode. Simply go in the **Set Display** menu using the **Settings** ![settings] button and click **Show Minimum** and/or **Show Maximum**. To refresh the Min/Max needles, use the **Refresh** ![refresh] button directly in the display panel.

Fig. 3-22 NEEDLE Display with Minimum and Maximum Values

Settings

In the Needle display, you can change the number of digits and to show/hide the minimum and maximum values on the graph.
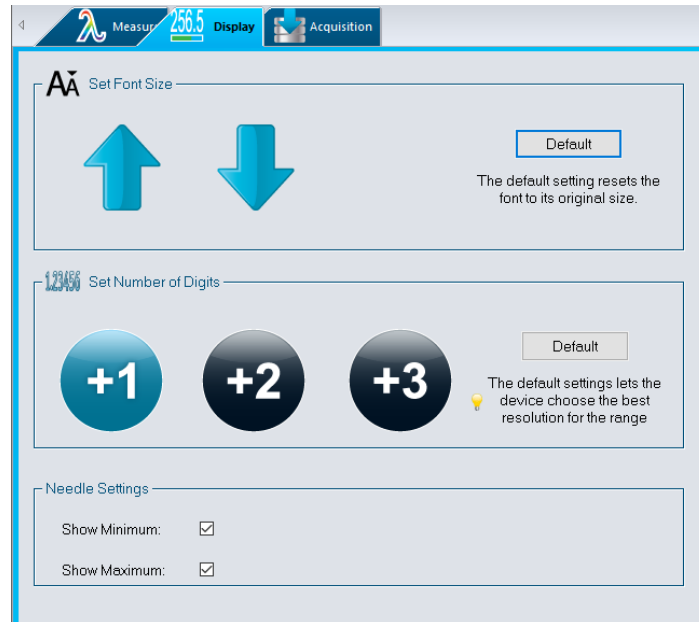
Fig. 3-23 Settings for the NEEDLE Display

3.2.4.   Averaging

The Averaging display is the perfect tool for checking laser stability over time. The averaging display is a bar graph that presents the statistics of a set of measurements as a function of time. The PC-Gentec-EO software measures a series of data during a user-defined period of time. Each bar represents the maximum (in blue), average (in yellow), and minimum (in white) values of the measured data. The top of the white bar represents the minimum value while the top of the blue bar represents the maximum value. The yellow line represents the average value for each set of bars. This allows you to quickly evaluate the trends of the average, maximum, and minimum values over time.
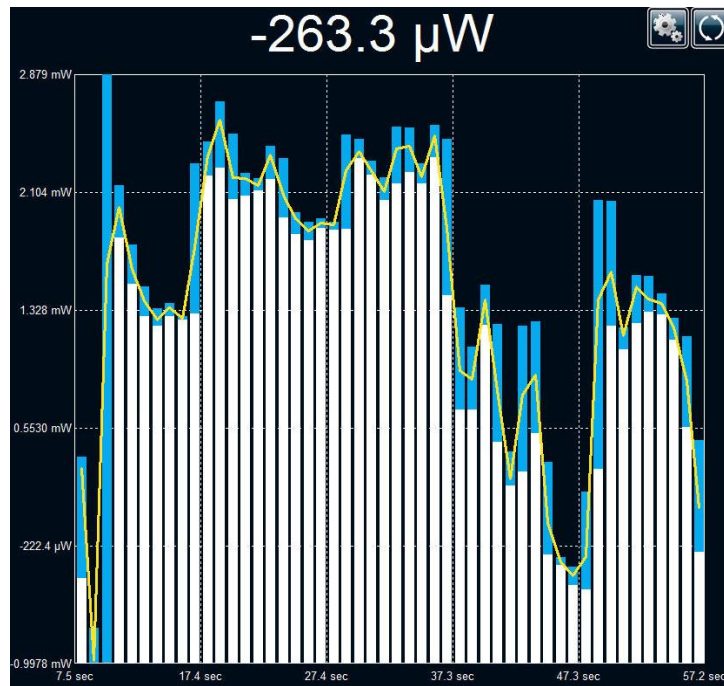
Fig. 3-24 AVERAGING Display

For Power Detectors

In the **Averaging** display, a Power measurement is the average value defined in the settings. For optimum averaging, when measuring the average power of a pulsed laser, it is preferable to use a sample period that is a multiple of your laser repetition rate. For instance, if you are running at 1 Hz, use an averaging period of 1, 2, 3 etc… seconds. If it is at 1.5 Hz, use 3, 6, 9 etc… seconds, as the sample period. Take note that if one data point is out of the current range, the resulting period average will be OUT. You should set the range higher than your maximum unfiltered measurement to avoid this situation.

For Energy Detectors and Power Detectors in Energy Mode

In the **Averaging** display mode, an Energy measurement is the average value defined in the averaging settings.

<u>Settings</u>

The settings panel for the Averaging display allows you to control the number of digits and to change the averaging period (the period of one bar on the graph). Whatever the period entered, the total number of bars (once the screen is filled) is 50. To refresh the screen and accumulate new data, use the Refresh 🔄 button directly in the display panel.
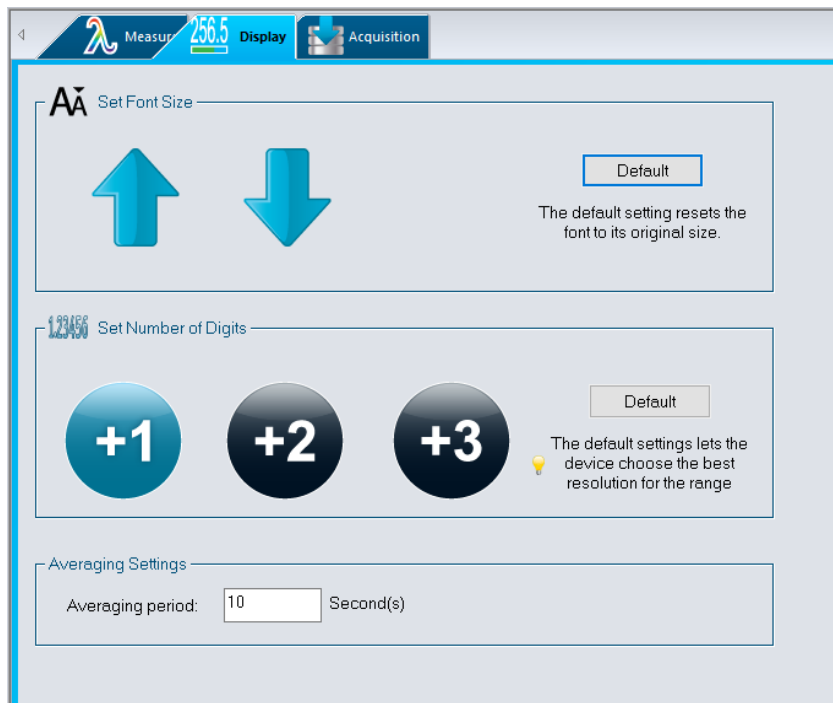
Fig. 3-25 Settings for the AVERAGING Display

3.2.5.   Histogram

This is a simple way to see in real time the power or energy distribution of a signal.
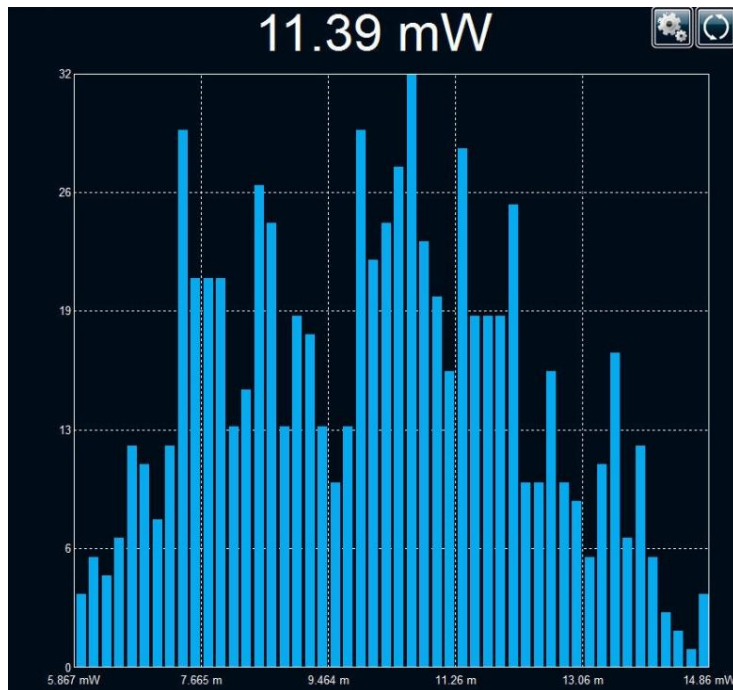
Fig. 3-26 Histogram Display

Settings

The settings panel for the Histogram display allows you to control the number of digits and the number of bars and period of the graphic:

 Warning

> The number of samples is not related to the repetition rate of the signal, it is the number of samples that the Gentec-EO device sends through the serial port.
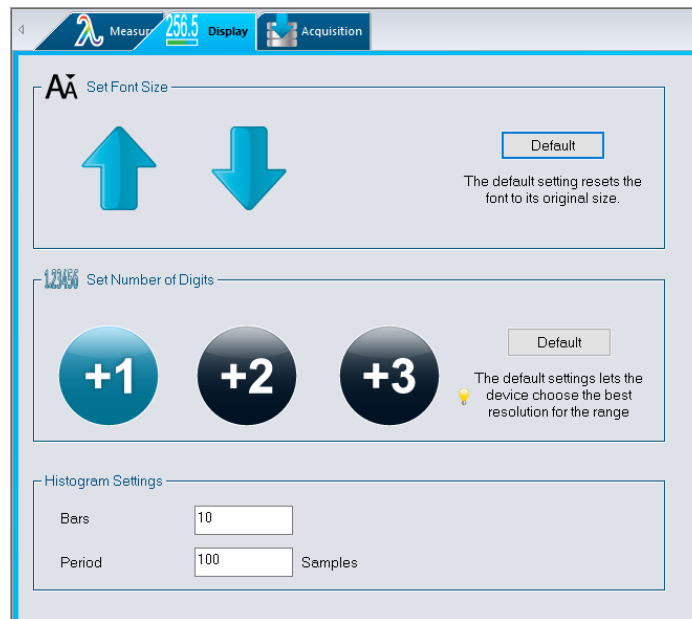
Fig. 3-27 Settings for the HISTOGRAM Display

3.2.6.   Statistics

Statistics in the PC-Gentec-EO software are calculated from the values that come from the serial port of the Gentec-EO device.

 Warning

> Statistics in PC-Gentec-EO software are calculated from all the entry points coming from the serial port of the Gentec-EO device. Depending on the device, this can be different from the number of points received by the monitor. Please refer to the Specifications.

Tip

MAESTRO users who want to accumulate statistics from all acquired points at rates greater than 500 Hz must use the MAESTRO's internal statistics mode and store them to a USB key.

The statistics available depend on the type of detector that is plugged, as can be seen in the pictures below.
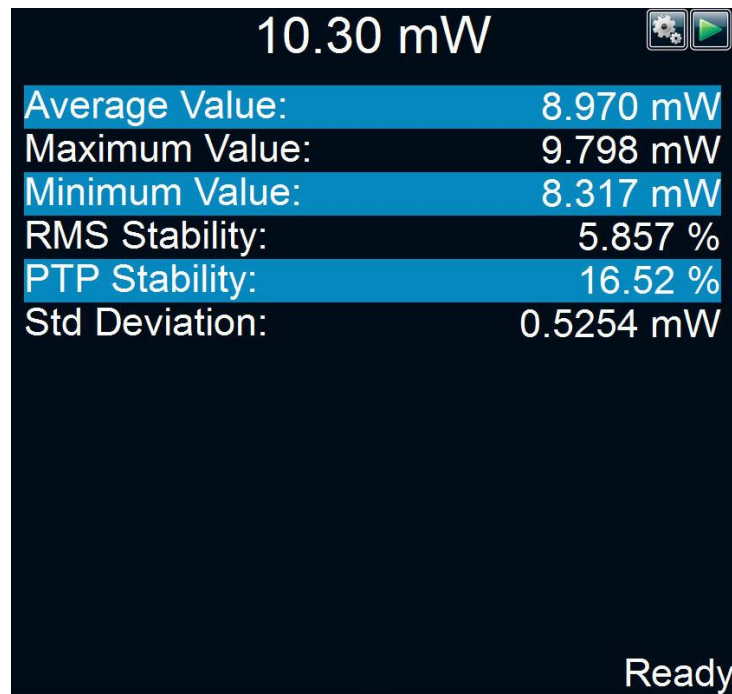
Fig. 3-28 STATISTICS Display in Power Mode
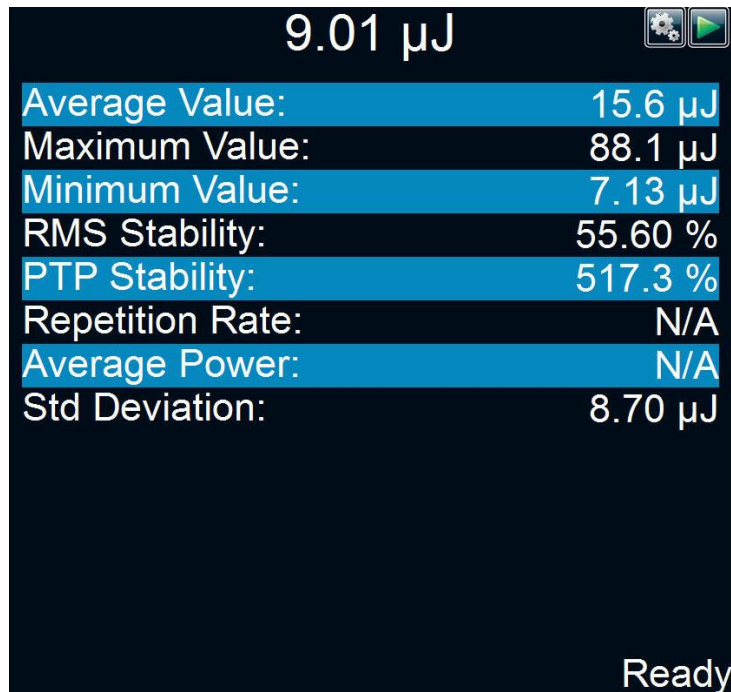
Fig. 3-29 STATISTICS Display in Energy Mode

<u>**Settings**</u>

The settings panel for the statistics display allows you to control the period and the sample rate for the calculations. In power mode, the duration is set in days, hours, minutes and/or seconds.
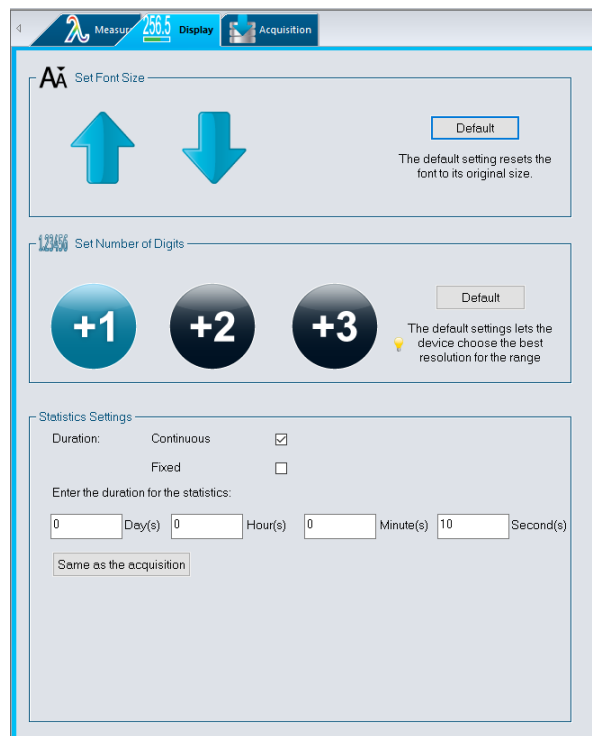
Fig. 3-30 Settings for the STATISTICS Display Power Mode

In energy mode, the duration is set in number of pulses.
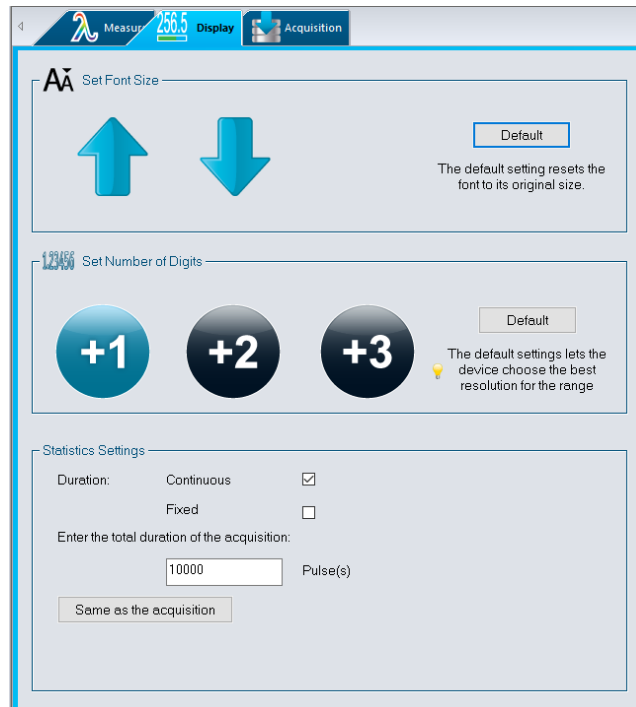
Fig. 3-31 Settings for the STATISTICS Display Energy Mode

<u>Continuous vs Fixed Statistics</u>

In both statistics modes, the calculations start and reset with the **Start Statistics** button in the **CONTROLS** menu. You can also use the **Play** ▶ button at the top right corner of the statistics display.

In the **Fixed** mode, the statistics will stop automatically after the duration period. With the **Continuous** mode, the statistics, after the duration period has ended, will automatically reset and start again with the same duration period. This will continue until the **Stop** ■ button is pressed.

Tips

If the **Save Statistics** option is selected in the **Acquisition** menu, the **Continuous** mode cannot be used. Since the statistics are entered into a file *at the end of the duration period*, you must use the a **Fixed** duration.
The file used for the statistics is the same as the one used for the acquisition. Therefore, if the filename of the statistics is changed, the acquisition filename will be changed automatically.
To store only the statistics in a file, select the **Save Statistics** option and start the statistics. To add statistics at the end of an acquisition file, select the *Save Statistics* option and start the acquisition. The statistics will automatically start at the same time and will be entered in the file at the end of the acquisition.

Parameter	Power	Energy	Definition
Current Value	✔	✔	The value that is currently measured
Average Value	✔	✔	The average of all the values measured since the beginning of the sample period, E_{avg} or P_{avg}
Maximum Value	✔	✔	The highest value measured since the beginning of the sample period, E_{max} or P_{max}
Minimum Value	✔	✔	The lowest value measured since the beginning of the sample period, E_{min} or P_{min}
RMS Stability	✔	✔	The Root Mean Square (RMS) stability represents the standard deviation as a percentage of the average: $$RMS=\frac{STD}{E_{avg}}\times100 , \quad RMS=\frac{STD}{P_{avg}}\times100$$
PTP Stability	✔	✔	The Peak-to-Peak (PTP) Stability shows the spread between the highest and lowest points in the sample in percentage: $$PTP = \frac{E_{max} - E_{min}}{E_{avg}} \times 100 , \quad PTP = \frac{P_{max} - P_{min}}{P_{avg}} \times 100$$
Repetition Rate		✔	The frequency of the pulsed laser, PRR
Average Power		✔	The average power calculated from the pulsed energies and repetition rate: $$P_{avg}=E_{avg}\times PRR$$
STD Deviation	✔	✔	A measure of the spread of the data around the average: $$STD=\sqrt{\frac{\sum_{i=1}^{n}(E_i-E_{avg})^2}{n-1}} , \quad STD=\sqrt{\frac{\sum_{i=1}^{n}(P_i-P_{avg})^2}{n-1}}$$

4.   Operating Instructions

4.1.   CONNECTING YOUR GENTEC-EO DEVICE

When there is only one Gentec-EO detector:

1. Connect your Gentec-EO device to the PC using a USB cable
2. Install the PC-Gentec-EO software on the PC
3. If necessary, power up the Gentec-EO device
4. Start the PC-Gentec-EO software

5. Click the **Connect**   button in the Main Menu. The software will scan each port on your computer and connect to the first port connected to a Gentec-EO device that is detected.

When there are more than one Gentec-EO detector:

1. Connect your Gentec-EO devices to the PC using USB cables
2. Install the PC-Gentec-EO software on the PC
3. If necessary, power up the Gentec-EO devices
4. Start the PC-Gentec-EO software

5. Click the D**own Arrow under the Connect**   button in the Main Menu and then click **Select your device**.
6. The screen below will appear:

7. The software will scan each port on your computer and display all the ports connected to a Gentec-EO device. Simply choose the device you want to connect and click the **Connect** button.

4.2.   DISCONNECTING YOUR GENTEC-EO DEVICE

Click the **Disconnect**   button in the Main Menu.

4.3.   MODIFYING THE MEASUREMENT SETTINGS
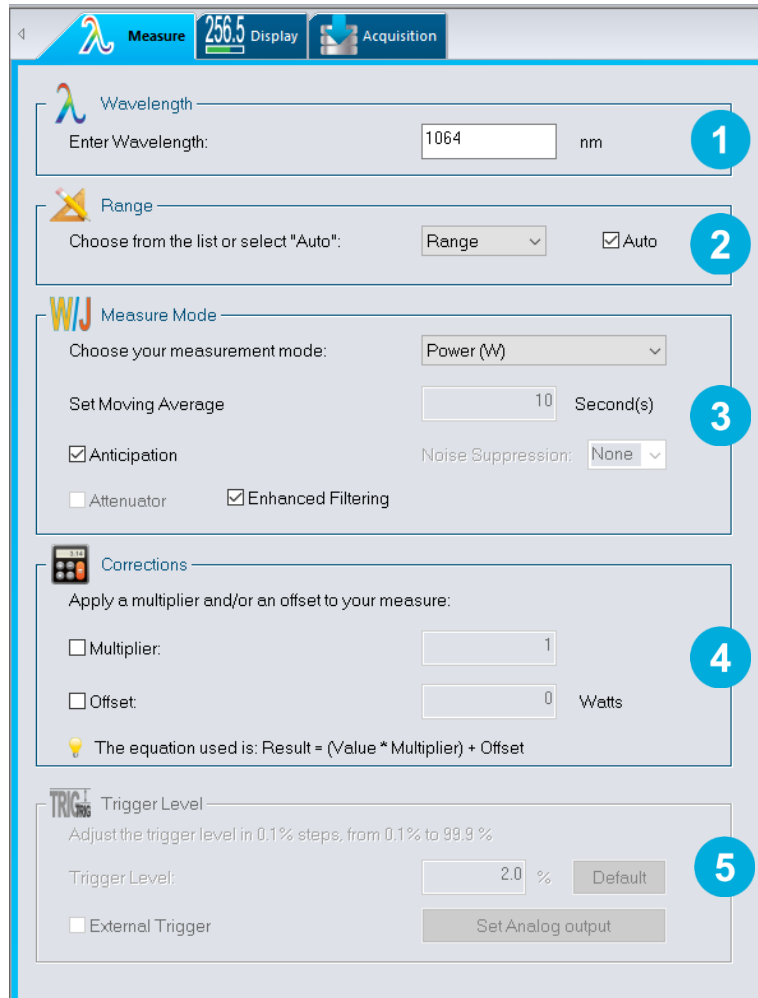
Fig. 4- 1 The MEASURE Menu

Wavelength
Enter the desired wavelength in nm.

Range
Use the dropdown menu to select the desired range. The chosen value will be the maximum that the PC-Gentec-EO software will measure before displaying **OUT**. By default, the Gentec-EO device is in **Auto** mode.

Measure Mode
Use the dropdown menu to set the measurement mode (Power, Single Shot Energy, Moving Average, etc.). Please note that it can take up to 3 seconds for the software to switch between measurement modes. **Anticipation**, **Attenuator** and **Enhanced Filtering** options are controlled in this menu.

Corrections
Use these settings to set a **Multiplier** and/or **Offset** to your measurement. The equation used is : Result = (Value*Multiplier)+Offset

Trigger Level
Adjust the trigger level in 0.1% steps, from 0.1% to 99.9%. Trigger level is not available in power mode. External trigger option is not available in power mode and with Integra. Default value is 2%.

4.3.1. Wavelength

The **Wavelength** menu is used to select the proper wavelength at which the detector is used. It applies a correction factor to compensate for the variation in absorptivity at different wavelengths. Pre-programmed wavelength correction factors specific to each detector are available and automatically loaded from the EEPROM of the detector (for detectors of version 5 and higher). When a new detector is plugged in, the calibration wavelength is the default selection.

The PC-Gentec-EO software automatically recognizes the latest energy and Power Detector for accurate auto-calibration. More importantly, it takes advantage of our *Personal Wavelength Correction*™ certificate.

The PC-Gentec-EO software only allows you to choose values that fall within the detector's range. If you enter an invalid value, a menu pops up to signal the error and the PC-Gentec-EO software automatically selects the default value, which is the wavelength used for calibration at Gentec-EO during manufacturing or subsequent service.

Tip

The *Personal Wavelength Correction^(TM)* Certificate

To fill the gaps between the NIST references, Gentec-EO offers you the only NIST traceable calibration in nm steps, from 250 nm to 2.5 μm. We achieve this using our proprietary setup that is based on a NIST traceable spectrophotometer. This way, instead of supplying you with typical values, we offer you a NIST traceable calibration. What you get is an overall accuracy that is not more than ±1% away from the original calibration accuracy, in the spectrum of 300 to 2200 nm.

Each Gentec-EO detector comes with a Personal Wavelength Correction Certificate. The correction factors are based on measurements that were made with YOUR detector. They are not based on the general curve of the absorbing material or the general response of equivalent products. This means you get the best wavelength correction tool available on the market. This data is stored in the Smart Interface of your Gentec-EO detector, you just have to select the wavelength in your monitor (or software) to get the most precise laser measurements on the market.

4.3.2. Range

The **Range** menu is used to select the signal level read by a detector. When a new detector is plugged in, the **Auto** mode is the default option. In this mode, the PC-Gentec-EO software automatically selects the best range for the value being measured. You can also choose a fixed range. The PC-Gentec-EO software only shows range values that fall within the detector's range. You can only choose from these available ranges.

When in a manually selected range, you should always use the next higher range to the measured value, for maximum precision. For example, when measuring around 200 mW, choose the 300 mW range.

Special care must be taken in the case of widely varying pulse energies to ensure that every pulse is detected. Contrary to power measurements, where the **Auto** mode continuously adjusts the range to the measured value, in energy mode, the Auto range selects the range based on the energy of the previous pulse. A pulse with energy less than 2% of the current range will not be detected. Always set the range to the best one available. To be sure to measure lower energies, set the range manually to the lowest level or use the **Auto** range so the PC-Gentec-EO software automatically chooses the best range. In this case, the pulses that saturated the range while the **Auto** range was searching for the best range will be invalid.

4.3.3.   Measure Mode

Depending on the type of detector, you can choose different **Measure Modes**.

Energy Detectors:
▶   Energy in Joules

Power Detectors:
▶   Power in Watts (default)
    ▶   Single Shot Energy in Joules[3]: (Energy mode/calorimeter mode)
    ▶   Moving Average in Watts

Photo Detectors:
▶   Power in Watts (default)
    ▶   Moving Average in Watts
    ▶   Power in dBm (dBm = Log [power in Watts/0.001W])

The **Moving Average** algorithm is directly calculated in the PC-Gentec-EO software and will not activate the moving average setting on the monitor.

Deselect **Anticipation** to deactivate the power meter acceleration software that provides accelerated response. By using advanced algorithms and known properties of the detector, this software allows the PC-Gentec-EO software to provide a very accurate power measurement (a few seconds faster than the natural response of a Power Detector). It accelerates the natural response by a factor of 5 to 10. Turning off the anticipation will result in a slower response but will reduce the noise level and provide more stable measurements in a noisy environment.

Noise Suppression is only available for pyroelectric detectors (QE and UM) when combined with an INTEGRA Joulemeter or U-LINK. This function will greatly improve the accuracy of the lowest scale or in any scale when used in a noisy environment.

The INTEGRA or U-LINK will need to measure the number of pulses selected in the Noise Suppression selector before the algorithm will settle to the noise-reduced value, see **Fig. 4- 2** Noise Suppression selector. Once the readings have stabilized, any subsequent reading will be stable until the number of pulses selected is changed. The system will then stabilize to the noise-reduced value after the new number of pulses have been measured. Larger sample sizes will result in increased noise suppression. Noise suppression works best with the external trigger.

---

[3] This function allows you to measure the energy contained in a laser pulse with a Gentec-EO P**ower Detector**. This mode of operation gives access to the same options as an Energy Detector. The only restriction is that the time delay between pulses, $Delay = \left(\dfrac{1}{Rep.\ Rate} \right)$, must be compatible with the specifications of the detector.

(Please refer to the user manual for the specific power detector you are using.). You must select the range manually because the Auto range is deactivated when you select **Energy Mode**. Keep in mind that the power detectors are optimized to sustain high average power, not high peak energy. Always keep the energy density below the maximum energy density quoted in the manual for that specific detector. The energy mode is always available for power detectors with a typical sensitivity value. A precision of ±3% in the pulse energy measurement can be achieved if the power detector is specifically calibrated in energy mode. Please contact your local Gentec-EO distributor or nearest Gentec-EO office for more information on obtaining a pulse energy measurement calibration.
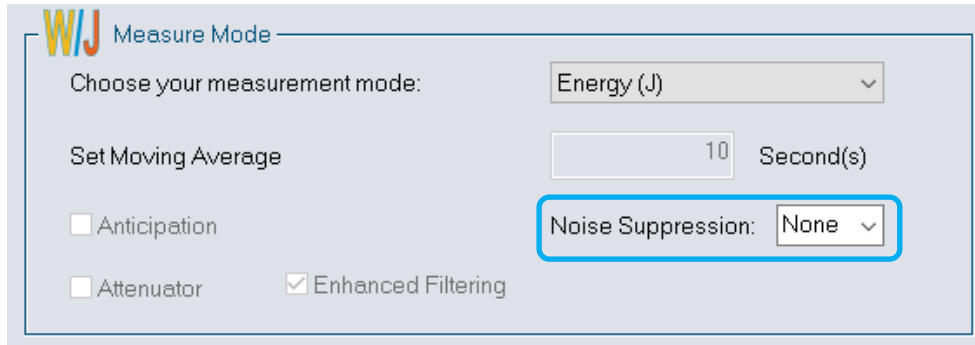
Fig. 4- 2 Noise Suppression selector

By default, the **Enhanced Filtration** is activated for Power Detectors. The Enhanced Filtration uses our noise reduction algorithm for an increased signal quality. By deactivating the Enhanced Filtration the response time of the detector will decrease (the measurements will be faster), but you will have a slightly higher noise level.

Version 7 Energy Detectors have been calibrated with and without the **Attenuator** at a chosen wavelength. When activating the **Attenuator**, only the wavelength at which it has been calibrated will be available in the wavelength menu. Similarly, Photo Detectors have been calibrated with and without the **Attenuator** at chosen wavelengths. When activating the **Attenuator,** the PC-Gentec-EO software will open the **Wavelength** menu because the available wavelengths with and without the attenuator are different.

4.3.4.   Corrections

The user can apply a **Multiplier** and/or **Offset** to the measurements. Correction factors are most useful when sampling a percentage of a powerful laser beam or correcting for absorption along an optical chain.

The default value for the multiplier is 1, and the default for the offset is 0. You can enter any multiplier value between 0.0002 and 5000 and any offset value between -10,000 and +10,000. To change the value of the correction factors, you first need to activate them by checking the appropriate box.

Example

<div style="border:1px solid">

Adjusting your measurements using correction factors

Let's say you are measuring a laser beam passing through the 99.9% back reflector of a laser (giving 1/1000th of the real value), choose **Multiplier** and enter 1000 in the dialog box. The PC-Gentec-EO software will display the laser power rather than the measured 0.1% sample.

</div>

Warning

<div style="border:1px solid">

It is essential to make sure that the actual measured value also complies with the power and energy limits of the detector.

</div>

The **Auto** range option is the default selection. You can select a specific range but it must always be based on the actual measured values and not on the corrected values. Of course, the displayed values and the display range selection are then calculated to take into account the correction factors.

Tip

The Statistics are computed for the corrected values only.

4.3.5.   Trigger Level

The **Trigger Level** only works if an Energy Detector is connected or if a Power Detector is used in **Single Shot Energy (SSE)** mode. This option allows you to change the **Trigger Level.** The default value is 2% of the full-range. This proves to be especially useful in noisy environments. Acceptable values range from 0.1% to 99.9% with 0.1% steps. Caution should be taken when choosing a trigger level lower than the 2% default value in a noisy environment.

The PC-Gentec-EO software will not detect pulses with a value under the trigger level. If the trigger level is high, be careful to select a range that is close to the measured value. To reset the default value to 2.0%, simply click the **Default** button.

Warning

If you select a high value trigger level, the PC-Gentec-EO may not be able to detect all the values of widely varying energy levels in **Auto** range mode. The **Auto** range function uses the energy level of the last pulse to set the range level. Therefore, it will not detect the next pulses if they are lower than the trigger level. As a result, the **Auto** range may become caught on a high range value. To avoid this problem, select a lower value for the trigger level, change the range manually, or reset the **Auto** range mode by reselecting **Auto** in the **Range** menu.

Erratic Triggering?

In electrically noisy environments, it is possible that the PC-Gentec-EO software will inadvertently trigger on the noise. If this is the case, increase the trigger level to 3% or higher if necessary.

It is always good practice to reduce electrical noise generation or shield the detector and monitor when measuring very low pulse energies.

You can also set the device to be triggered externally. Just click the **External Trigger** check box (not available on the Integra).

5. Troubleshooting

5.1. PC-GENTEC-EO SOFTWARE CANNOT FIND THE MONITOR

The following warning message is displayed: "*Please select a valid serial port*". Try the following steps until your connection is active.

- ▶ Make sure the USB drivers are installed.
- ▶ Verify all your connections. Verify that a Gentec-EO device is powered on and connected to the PC with a USB cable.
- ▶ For a MAESTRO monitor, go to "*Home*" menu ▶ "*Set Device*" ▶ "*Serial Commands*"
  - o Verify that the MAESTRO *is not* in Solo2 Serial Compatibility (ASCII Only) mode.
  - o Verify that the MAESTRO *is not* in Binary Mode Measurement (Energy Mode only) mode.
  - o Verify that USB (if a USB cable is used) or RS-232 (if a RS-232 cable is used) is selected
  - o Restart the MAESTRO.
- ▶ Unplug the Gentec-EO device.
- ▶ Restart the PC-Gentec-EO software.
- ▶ Restart your computer.
- ▶ If none of these steps have worked, contact Gentec-EO support at service@gentec-eo.com.

5.2. MOVING AVERAGE IS NOT WORKING WITH AN ENERGY DETECTOR

This is because this feature is not yet available for Energy Detectors.

5.3. MY SETTINGS WON'T LOAD

Settings can be saved exclusively for one type of detector. For example, you cannot use Power Detector settings with a Photo Detector.

We recommend following this procedure for each new detector type:

1. Connect your first detector (ex: a Photo Detector)
2. Customize the PC-Gentec-EO software to your needs
3. Save the settings to a file using the **Save Settings** button in the **CONTROLS** menu (ex: "Photodetector.geo")
4. Disconnect your first detector
5. Connect your second detector (ex: a Power Detector)
   Note: All the settings from the first detector are still active
6. Verify the options in the **Set Measure** Menu
7. Save the new settings to a file (ex: "Power.geo")

After that, you can plug any of your different detectors and load the corresponding settings without problem.

5.4. REPETITION RATE AND AVERAGE POWER ARE NOT ACCURATE IN THE STATISTICS MODE

Make sure that you activate the **Turbo** mode with an Integra or U-LINK and that you comply with the PC Recommended Requirements. The MAESTRO does not have a **Turbo** mode but it can go up to 500 Hz using the PC-Gentec-EO software.

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