



# USER MANUAL

MIRADOR | PC Software for MIRO ALTITUDE

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# 1. MIRADOR

## 1.1 INTRODUCTION

The MIRADOR software is a dedicated and intuitive PC interface designed to control and display readings from the Gentec-EO MIRO ALTITUDE. As it is tailored specifically for this device, MIRADOR provides a streamlined experience with an interface optimized for clear operation and reliable performance.

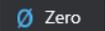
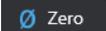


This user manual corresponds to MIRADOR software version 1.02.00 and higher.  
Software updates are provided on the Gentec-EO website:  
<https://www.gentec-eo.com/resources/download-center>

## 1.2 SPECIFICATIONS

Description	General specifications
Compatible devices	MIRO ALTITUDE
Serial communication	USB 2.0
Maximum data transfer rate	Power measurements: 15 Hz Energy measurements: 10,000 Hz
Displays	Scope and statistics
Correction factors	One multiplier (from 0.0002 to 5,000) and one offset (from -10,000 to 10,000)
Statistics	Current value, maximum, minimum, average, standard deviation, RMS stability, PTP stability Energy measurements additional statistics: number of pulses, repetition rate, average power
Data storage	.csv or .xlsx file for data recording and statistics
Software trigger level	0.1 % to 99 %, 0.1 % resolution
Internet updates	<a href="https://www.gentec-eo.com/resources/download-center">https://www.gentec-eo.com/resources/download-center</a>
Installed size	Less than 300 MB
Average RAM allocation	Minimum: 150 MB (with power meter connected to MIRO ALTITUDE) Maximum: 250 MB (with energy meter connected to MIRO ALTITUDE, software trigger level set to 0.1 %, during a data logging session)
Display resolution and scaling support	From 1280 × 768 up to 4096 × 2160, following the recommended Windows scaling settings.
Minimum PC requirements	Processor: Intel Core i3 or equivalent Memory: 4 GB RAM Storage: 500 MB free hard disk space Graphics: Integrated, DirectX 11 compatible or higher Operating system: Windows 10 64-bit or later

## 2. QUICK START PROCEDURE

1. Install the MIRADOR software on a PC.
2. Install your detector on an optical stand.
3. Connect the detector to your monitor.
4. Start the MIRADOR software and power up your monitor.
5. In MIRADOR, press the **Connect detector**  button in the center of the **Channel manager**  tab.
6. Place the detector in the laser beam path. Remove the protective cover from the detector and start the laser. The entire laser beam must be within the aperture of the sensor. Do not exceed maximum specified densities, energy or powers. For more details and best measurement practices, consult the user manual for your detector.
7. Let the temperature of the detector stabilize.
8. Adjust the **Zero** : Even when no incident power is present, the measured value may not be zero. For power measurements, this can occur if the detector is not thermally stabilized or if a heat source was within the detector's field of view when MIRADOR was connected to the MIRO ALTITUDE. For photodetectors, performing a zeroing procedure will remove the detector offset.
  - Block all laser radiation on the detector. To reset the zero, wait until the reading has stabilized and click the **Zero**  button on the top right of the **Display**  tab.
9. All done! You are now ready to make measurements.

### 3. USER INTERFACE



MIRADOR software user interface

#### 1. Main controls

The main functions of the MIRADOR software are in the top bar. This section contains two tabs and two control buttons:

Icon	Name	Nature	Functions
	Display	Tab	Provides a view of the main data display.
	Channel manager		Allows the user to manage connected detectors and view detailed information.
	Data recording manager	Button	Allows the user to access the data logging settings.
	Settings		Provides access to general MIRADOR parameters, including the number of digits to display, software updates, and customer support.

#### 2. Measurement settings panel

Located on the left side of the window, this panel contains all the settings and controls for the selected channel. This panel allows the user to adjust various parameters, including wavelength, range, measurement mode, moving average, anticipation, correction (multiplier and offset).

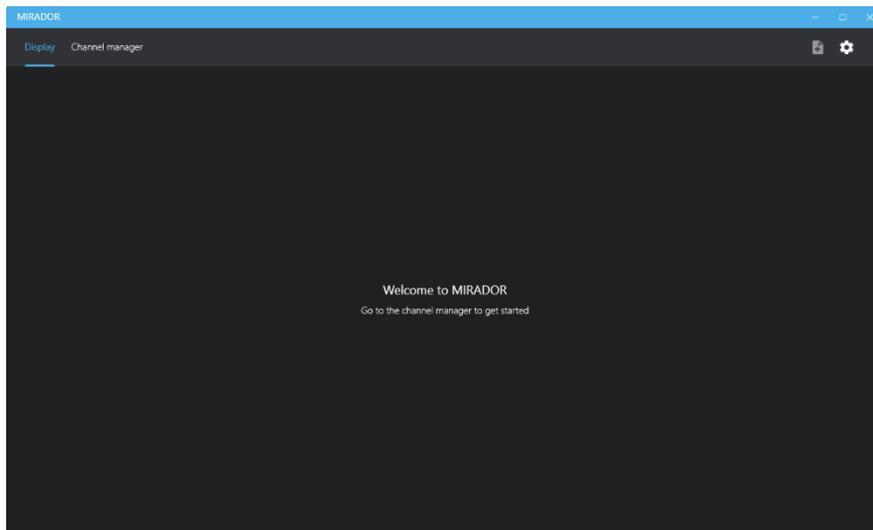
#### 3. Display panel

The Display Panel is the main section of the software, where measurement data is visualized in real time. It features a graph that plots the measurement over time, along with the current value, which is displayed with up to five significant numbers after the decimal point. The panel also includes controls like the Zero and Clear buttons.

## 1.3 MAIN CONTROLS

### 1.3.1 Display

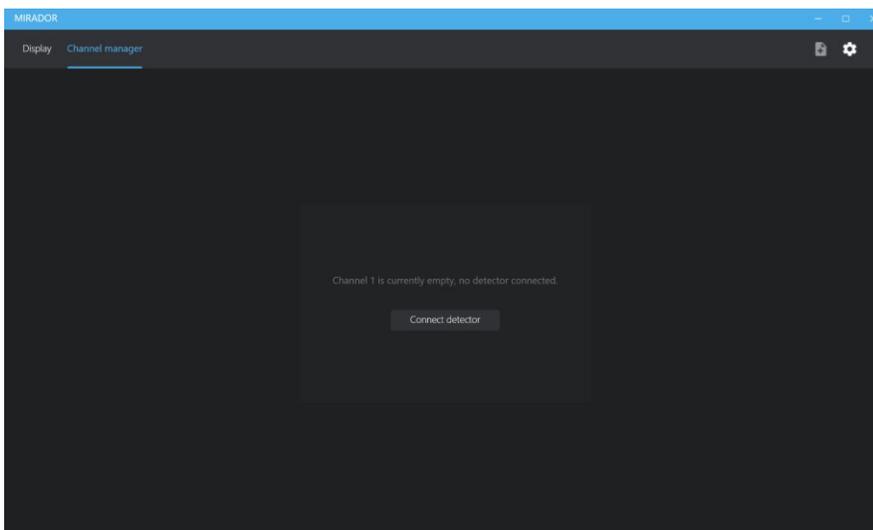
The **Display** tab is the main landing page that appears when you launch the application. This is the central hub for visualizing all your measurement data. When a detector is properly connected, the panel will populate with real-time graphs and numerical readouts. If no detector is connected, the screen remains clear, showing a **Welcome to MIRADOR** message and a prompt to use the **Channel manager** to begin.



Display tab with no detector connected

### 1.3.2 Channel manager

The **Channel manager** serves as the central hub for managing all your detectors. This is where you connect devices and view their details. When no detector is connected to the software, the screen will inform you that **Channel 1 is currently empty, no detector connected** and provide a **Connect detector** button to guide you through the setup process.



Channel manager with no detector connected

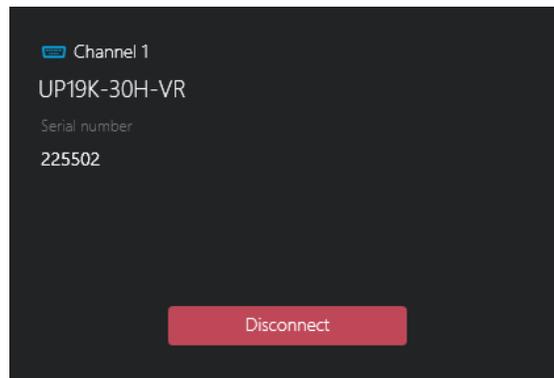
### 1.3.2.1 Connection



To successfully connect a detector, first confirm that the device is physically plugged into the monitor. For detectors that require it, make sure the connector is also properly locked. Once these steps are complete, you may click «**Connect Detector**».

#### ➤ **Single valid detector found**

The software is designed for a seamless connection process. If it detects only one valid detector, it will automatically connect to it and take you directly to the **Display** tab, where you can immediately see the live data. The **Channel manager** will then update to show the details of the connected detector and its channel.

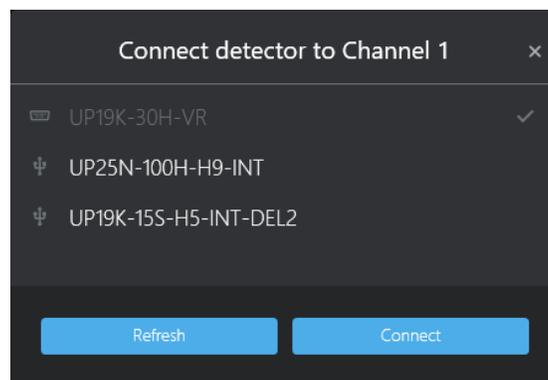


Connected detector information shown in the channel manager tab

#### ➤ **Multiple valid detectors found**

When multiple detectors are detected, the application will present you with a list to choose from. Each entry in the list includes the detector's name and an icon that clearly identifies its model, such as DB15 or Integra USB. The detector that is currently selected is highlighted with a checkmark.

If a detector is connected to the device at that time and it does not appear on the list, click on **Refresh** button so that MIRADOR can look for it. To switch to and connect another detector, simply click on its name in the list and then press the **Connect** button.



List of detectors for connection

### 1.3.2.2 Disconnecting your Gentec-EO device

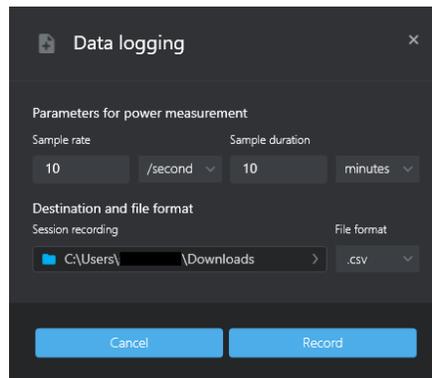
To end the connection with the detector, navigate to the **Channel manager** and click **Disconnect**, as shown above.

### 1.3.3 Data recording manager

The data recording manager provides the user with control over the data recording parameters. You can begin a new recording session by clicking the **Record**  button. The MIRADOR saves all recordings on the computer's storage, offering ample capacity for extensive data logging.

#### 1.3.3.1 Set your data recording parameters in power mode

Upon clicking the **Record**  button with a power detector connected, the application will display the following window, allowing you to configure your recording settings.



Data logging parameters for power measurement

- The **Sample rate** is fully customizable, allowing you to select any value from one (1) point per day all the way up to fifteen (15) points per second.
- The **Sample duration** can be set for a time ranging from a minimum of 1 second to a maximum of 48 hours.
- **Destination:** Specifies the directory where the recorded file will be saved. The user can select any folder accessible through Windows File Explorer, including removable devices such as USB drives or external hard drives. This preference is saved automatically and remains the default for subsequent sessions, even after restarting the software or Windows.
- **File format:** Allows the user to choose between .csv and .xlsx formats. The .csv format is recommended for third-party data processing, while the .xlsx format is optimized for visualization and analysis in Microsoft Excel.

At the bottom of the window, the user can either **Cancel** the operation or start the recording by clicking **Record**.

#### 1.3.3.2 Data recording in power mode

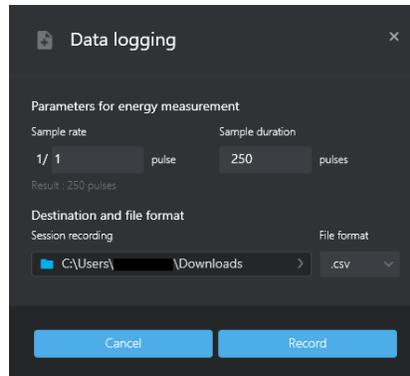
When a data recording session is active, a new item will appear in the center of the **Main Controls** section. This item features a timer that indicates the session's remaining duration and a progress bar showing the percentage of completion. The user can click the **Stop** button at any time to terminate the recording before the predefined duration is complete.



Data logging in progress for power measurement

### 1.3.3.3 Set your data recording parameters in energy mode

When an energy detector is connected, clicking the **Record**  button will open the following window, allowing you to configure your recording settings.



Data logging parameters for energy measurement

- **Sample rate:** Fully customizable, from 1/9,999 pulse up to 1/1 pulse. This determines how frequently pulses are sampled during the data logging process.
- **Sample duration:** Defines the total number of pulses to be recorded, from a minimum of 1 pulse up to 999,999 pulses.
- **Destination:** Specifies the directory where the recorded file will be saved. The user can select any folder accessible through Windows File Explorer, including removable devices such as USB drives or external hard drives. This preference is saved automatically and remains the default for subsequent sessions, even after restarting the software or Windows.
- **File format:** Allows the user to choose between .csv and .xlsx formats. The .csv format is recommended for third-party data processing, while the .xlsx format is optimized for visualization and analysis in Microsoft Excel.

At the bottom of the window, the user can either **Cancel** the operation or start the recording by clicking **Record**.

### 1.3.3.4 Data recording in energy mode

When a data logging session is active in energy mode, a status bar appears in the center of the Main Controls section. This bar displays the number of pulses remaining in the session as well as a progress indicator. The user can click the Stop button at any time to end the recording before the predefined number of pulses is reached.



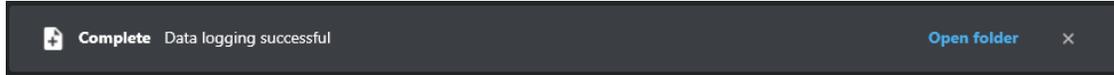
Data logging in progress for energy measurement

### 1.3.3.5 Data recording end notification

Upon the automatic or manual termination of a recording session, a notification appears at the top of the Display Panel. This notification provides a status message along with a direct link to the folder where the file was saved. The status messages are:

- **Complete:** The recording has successfully finished.

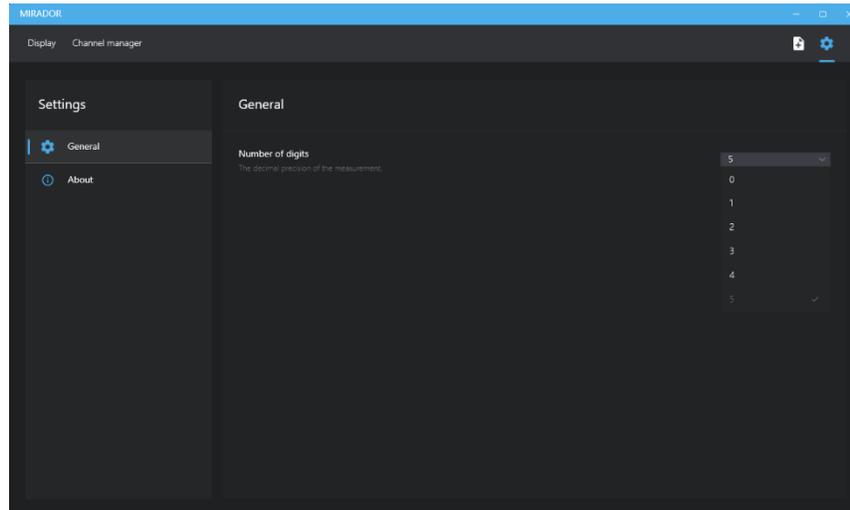
- **Stopped:** The user manually ended the data logging before its scheduled completion.
- **Error:** The data logging process encountered an issue. This status indicates that an issue prevented the recording session from being completed successfully. For example, a disconnection of the detector or monitor during the data logging will result in an error. When this occurs, only a partial data file is saved.



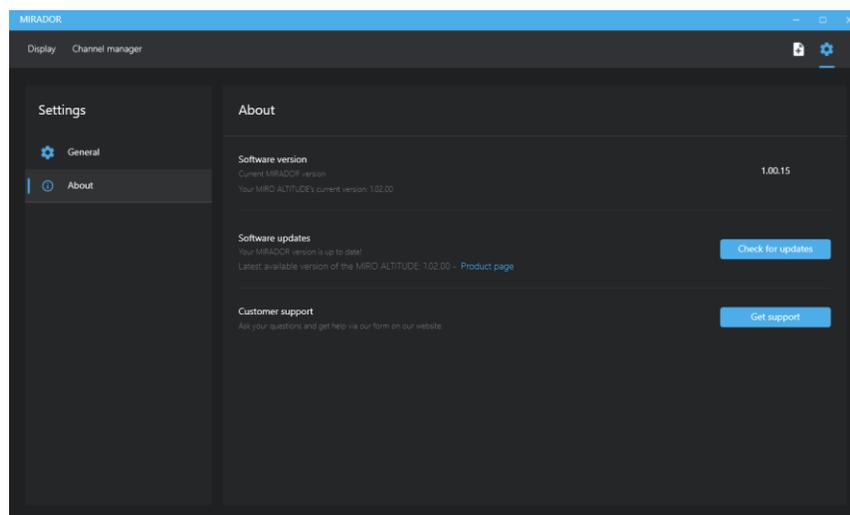
Data recording end notification

### 1.3.4 Settings

The **Settings**  menu in MIRADOR allows the user to customize and access key software options. The user can adjust the number of digits displayed in the measurements, check the software revision, and manage software updates. The **Settings** menu also provides direct access to customer support resources. The following images shows the **Settings** menu.



General tab of the settings menu



About tab of the settings menu

#### 1.3.4.1 Number of digits

This setting allows the user to define the number of digits displayed after the decimal point in measurement values. As shown in the screenshot above, the user can select a value from 0 to 5 digits from the drop-down list. The selection is applied automatically to the data displayed in the **Display** tab.

#### 1.3.4.2 Software version

As shown above, the **About** page in MIRADOR displays the software version currently installed in the **Software version** section. When a valid monitor is connected to MIRADOR, this section also includes an additional line indicating the software version running on the device.

#### 1.3.4.3 Software updates

As shown above, this section includes a button that allows the user to check whether the installed version of MIRADOR is up to date.



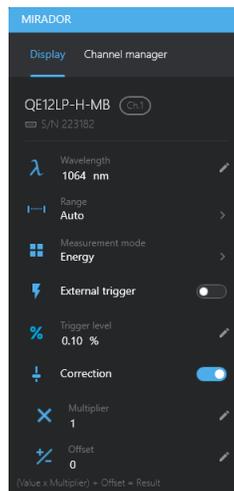
An active internet connection is required to verify if a software update is available.  
You can also obtain the latest MIRADOR software version on our website at:  
<https://www.gentec-eo.com/resources/download-center>

#### 1.3.4.4 Get support

As shown above, the **Get support** button allows the user to directly contact Gentec-EO customer support for assistance or to submit a request for a Return Material Authorization (RMA).

## 1.4 MEASUREMENT SETTINGS PANEL

Located on the left side of the MIRADOR software within the **Display** tab, this panel provides all settings and controls for the selected channel. It allows the user to adjust parameters such as wavelength, range, measurement mode, moving average, anticipation, and correction (multiplier and offset). The options in this panel define the measurement settings and can be configured by the user. Note that some settings are available only for specific detector types.



Measurement settings panel

### 1.4.1 Detector and channel information

As shown above, at the top of the **Measurement Settings panel**, the first section displays the connected detector's name, its serial number, the ID of the channel in use, and an icon indicating the type of connection (DB5 or Integra USB).

### 1.4.2 Measurement settings

#### 1.4.2.1 Wavelength

The **Wavelength** field is an editable numeric input that can be set according to the connected detector and laser in use. It applies a correction factor to compensate for variations in the detector's absorption at different wavelengths. Pre-programmed correction factors are automatically loaded from the detector's EEPROM, and the calibration wavelength is selected by default when a new detector is connected. Only values within the detector's valid range can be entered; invalid entries trigger an error message and the field resets to the default calibration wavelength.

The user can edit the value by clicking anywhere in the highlighted area when the mouse is over this section. The unit of measurement is nanometres (nm), with accepted values depending on the connected detector.



Wavelength setting



#### The Personal Wavelength Correction™ 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 for wattmeters.

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 MIRADOR to get the most precise laser measurements on the market.

#### 1.4.2.2 Range

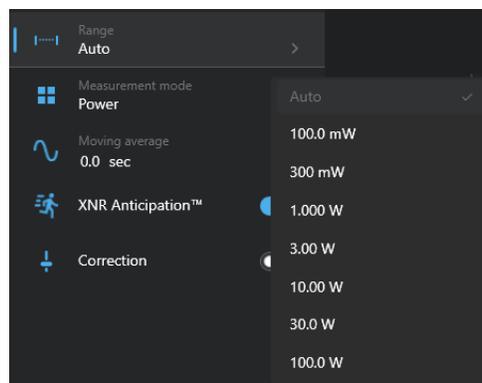
The **Range** menu, accessible as a dropdown list, is used to select the signal level read by a detector to obtain the best possible measurement. The values available in the list will correspond to the specific capabilities of the connected detector.

When a detector is initially connected, the **Auto** mode is the default option. In this mode, MIRADOR will automatically select the proper range for the value being measured. You can also manually select a fixed range from the available options in the dropdown list.

For maximum accuracy, when the reading is made in a manually selected range, you should always choose the next higher range than the value being measured. For example, if you are measuring a current range of around 200 mW, the 300 mW range would be ideal.

For energy measurements, special care must be taken in the case of widely varying pulse energies. 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. This means that a pulse with an energy less than 2 % of the current range will not be detected.

To be able to measure the lowest energies, manually set the range at the lowest level or use the Auto range so MIRADOR automatically chooses the best range. By doing this, MIRADOR will start in the lowest scale, then automatically select higher scales, as necessary. Afterwards, you can manually adjust to lower scales. While increasing scales, incoming pulses that exceed the current scale will be reported as out of scale and invalid until the automatic system selects the correct scale.



Range selection setting

#### 1.4.2.3 Measurement mode

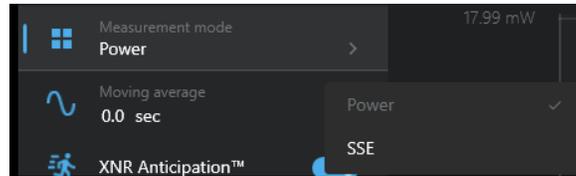
The **Measurement mode** depends on the type of detector connected. Available options are as follows:

- Power detectors (thermopiles and photodiodes):
  - Power (watts)
  - Single-shot energy (joules) – energy mode/calorimeter<sup>1</sup>
- Energy detectors (pyroelectric detectors and photodiodes):
  - Energy (joules)

<sup>1</sup> This mode allows measuring the energy of a laser pulse with a Gentec-EO thermal power detector. It provides access to the same options available for energy detectors, with the restriction that the delay between pulses must remain within the specifications of the power detector in use (refer to the corresponding user manual for details).

$$Delay = \frac{1}{Repetition Rate}$$

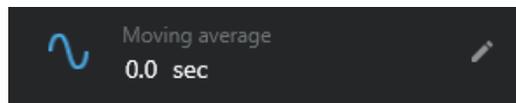
Power detectors are designed to handle high average power rather than high peak energy. Always ensure that the energy density stays below the maximum value specified in the detector's specifications. The energy mode is generally available for thermal power detectors with standard sensitivity. When specifically calibrated for energy mode, these detectors can achieve a  $\pm 3$  % uncertainty in pulse energy measurement. For details on pulse energy calibration, please contact your Gentec-EO distributor or the nearest Gentec-EO office.



Measurement mode setting

#### 1.4.2.4 Moving average

The **Moving average** function smooths the measurements over a user-defined averaging period. The range is from 0.0 s to 5.0 s, adjustable in 0.1 s steps. For example, setting the period to 5.0 s means that the displayed value will be the average of all samples taken during the last 5 seconds. This feature is not available for the INTEGRA family of detectors.



Moving average setting

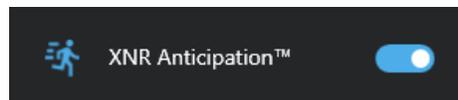


Note that the moving average in MIRADOR is separate from, and on top of, any moving average set in MIRO ALTITUDE.

#### 1.4.2.5 XNR Anticipation™

Activate the **XNR Anticipation™** feature to enable the power meter acceleration software, which provides a faster response of the detector. By applying advanced algorithms and the known physical properties of the detector, this function allows the connected monitor to deliver accurate power measurements significantly faster than the natural response time of a thermopile power detector. The anticipation can accelerate the response by up to a factor of ten.

When anticipation is turned off, the response will be slower, but the noise level is reduced, resulting in more stable measurements in noisy environments. This feature is not currently available for the INTEGRA family of detectors.

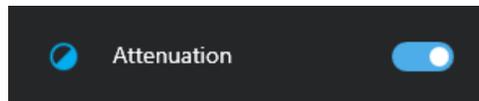


XNR Anticipation™ setting

#### 1.4.2.6 Attenuation

This setting is available for detectors calibrated by Gentec-EO with an attenuator (for example, QE series energy detectors with a QED attenuator or PH series power detectors). Toggle the attenuation setting to the correct mode so that the connected monitor applies the proper calibrated sensitivity.

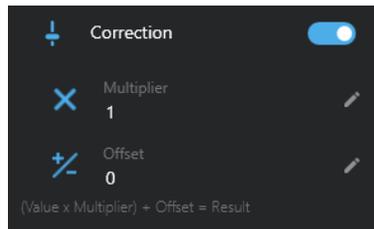
When attenuation is activated, only the wavelengths for which the detector has been calibrated with the attenuator can be entered in the wavelength field. If attenuation is turned on while a non-calibrated wavelength is in use, the wavelength field will automatically switch to the lowest calibrated wavelength.



XNR Attenuation setting

#### 1.4.2.7 Correction

This feature allows you to apply a custom correction multiplier and offset to the measurement. Correction factors are especially useful when measuring only a small fraction of a high-power laser beam or when compensating for absorption losses. The correction field displays the values currently applied to the measurement.



Correction setting

The default value for the multiplier is 1, and for the offset is 0. You can enter any multiplier value between 0.0002 and 5,000 and any offset value between -10,000 and +10,000. It is important to ensure that the actual measured value (before correction) always remains within the power and energy limits of the detector. When corrections are enabled, only the automatic range setting is available. Please note that statistics are calculated using the corrected values.



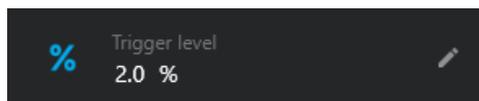
#### Example

If you are measuring a laser beam passing through a 99.9 % back reflector (measuring only 1/1,000 of the actual power), enter a multiplier of 1,000 in the correction field. The connected monitor will then display the full laser power instead of the measured 0.1 % sample.

#### 1.4.2.8 Trigger level

The **Trigger level** defines the threshold used to detect pulses. It is available when an Energy Detector is connected or when a Power Detector is used in Single Shot Energy (SSE) mode. The user can set any value between 0.1 % and 99 % of the full range, in 0.1 % steps.

The default value is 2 %, which generally offers reliable detection in most conditions. Lowering the trigger level below 2 % may help capture weaker pulses, but caution is required in noisy environments where false detections may occur. Conversely, if a higher trigger level is selected, make sure the measurement range is set close to the expected signal, since pulses below the threshold will not be detected.



Trigger level setting



If you select a high **Trigger level** value, MIRADOR may not detect all pulses when operating in **Auto range** mode. The **Auto range** function uses the energy level of the last detected pulse to set the range. If subsequent pulses are lower than the selected **Trigger level**, they will not be detected, and **Auto range** may remain locked on a higher range value. To avoid this issue, select a lower **Trigger level**, adjust the range manually, or reset **Auto range** by reselecting **Auto** in the **Range** menu.



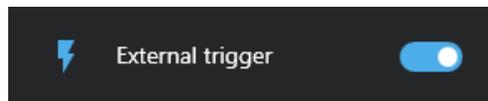
#### Erratic triggering

In electrically noisy environments, MIRADOR may inadvertently trigger on noise signals. If this occurs, increase the Trigger level to 3 % or higher as needed.

It is also good practice to minimize electrical noise at the source or to shield the detector and monitor when measuring very low pulse energies.

#### 1.4.2.9 External trigger

The user can set the device to be triggered externally by enabling the **External trigger** option (not available with the INTEGRA family of detectors). This allows synchronization of measurements with an external signal source. For detailed specifications and connection information, please refer to the user manual of the monitor in use.



External trigger setting

## 1.5 DISPLAY PANEL

MIRADOR provides a scope view display to visualize your measurements. This view shows the real-time value of the signal directly on the graph, allowing you to monitor changes as they occur.

### 1.5.1 Scope

The **Scope view**  provides a quick overview of the laser beam's stability and trend over time, like an oscilloscope. The x-axis represents 60 seconds. Once one minute of recording has passed, the graph scrolls automatically to display the most recent 60 seconds of data.

The user can zoom in and out of the scope using the mouse wheel, with five zoom levels available. In addition, the total average value of the signal (since the last **Clear**) is displayed on the scope.

### 1.5.2 Statistics

In addition to the **Scope view**, the **Statistics tab**  provides a complete analysis of the power or energy measurements. The statistics are updated in real time with each new measurement, giving the user an immediate overview of the signal's behavior and variation.

↗ Maximum	20.8558 mJ	√ RMS stability	144.647 %
↘ Minimum	0.42119 μJ	Σ PTP stability	393.440 %
⦿ Average	5.30078 mJ	📅 Repetition rate	41.2117 Hz
σ Std. deviation	7.66739 mJ	⦿ Average power	218.454 mW

### Statistics

The statistics that are calculated can be found in the following table:

Statistical parameters	Power	Energy	Definition
Average value	✓	✓	Average from the start of values in the sample, $E_{avg}$ or $P_{avg}$
Maximum value	✓	✓	Highest value in the sample period, $E_{max}$ or $P_{max}$
Minimum value	✓	✓	Lowest value in the sample period, $E_{min}$ or $P_{min}$
RMS stability	✓	✓	The root mean square stability represents the standard deviation as a percentage of the average $RMS = \frac{STD}{ E_{avg} } \times 100, RMS = \frac{STD}{ P_{avg} } \times 100$
PTP stability	✓	✓	Shows the spread between the highest and lowest point in the sample as a percentage $PTP = \left  \frac{E_{max} - E_{min}}{E_{avg}} \right  \times 100, PTP = \left  \frac{P_{max} - P_{min}}{P_{avg}} \right  \times 100$
Standard deviation	✓	✓	A measure of the spread of the data around the average $STD = \sqrt{\frac{\sum_{i=1}^n (E_i - E_{avg})^2}{n-1}}, STD = \sqrt{\frac{\sum_{i=1}^n (P_i - P_{avg})^2}{n-1}}$
Repetition rate		✓	Frequency of pulses coming from the laser, $PRR$
Average power		✓	Power calculated from the pulse energies and repetition rate $P_{avg} = E_{avg} \times PRR$

### 1.5.3 Clear

The **Clear**  button, located above the display panel in the top right corner, erases the **Scope View** chart and clears the statistics.

### 1.5.4 Zero

The **Zero**  button sets the current detector value to zero. All subsequent measurements will be taken relative to this new zero level. This feature is useful for removing offsets caused by environmental thermal

noise, which can occur if the detector has not yet reached thermal equilibrium or if a heat source (for example, the user's hand or body) was in the detector's field of view when MIRADOR was turned on.

The **Zero** function can also be used to perform relative measurements. For accurate results, use this function only after the power meter has reached thermal equilibrium. The user can refer to the detector's or the monitor's user manual to obtain detailed guidance on setting up the zero.

# LEADER IN LASER BEAM MEASUREMENT SINCE 1972



POWER & ENERGY METERS



BEAM PROFILING



THZ MEASUREMENT

## CANADA

445 St-Jean-Baptiste, Suite 160  
Quebec, QC, G2E 5N7  
CANADA

T (418) 651-8003  
F (418) 651-1174

[info@gentec-eo.com](mailto:info@gentec-eo.com)

## UNITED STATES

5825 Jean Road Center  
Lake Oswego, OR, 97035  
USA

T (503) 697-1870  
F (503) 697-0633

[info@gentec-eo.com](mailto:info@gentec-eo.com)

## JAPAN

Office No. 101, EXL111 building,  
Takinogawa, Kita-ku, Tokyo  
114-0023, JAPAN

T +81-3-5972-1290  
F +81-3-5972-1291

[info@gentec-eo.com](mailto:info@gentec-eo.com)

## CALIBRATION CENTERS

- 445 St-Jean-Baptiste, Suite 160  
Quebec, QC, G2E 5N7, CANADA
- Werner von Siemens Str. 15  
82140 Olching, GERMANY
- Office No. 101, EXL111 building,  
Takinogawa, Kita-ku, Tokyo  
114-0023, JAPAN