# Mezzo Precision Microphone

## with Mezzo Noise Analyzer Module

User Guide – v1.1

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Soft dB

WWW.SOFTDB.COM

# Contents

# 1 Introduction

Congratulations on your purchase of the Mezzo Precision Microphone. This instrument provides an innovative and cost effective solution for professional grade acoustical measurement. More than just a DAQ, the DSP embedded in each Mezzo Precision Microphone ensures real-time signal processing. Moreover, the Mezzo uses a proprietary driver ensuring signal integrity.

Designed to be used with a tablet PC or any other Windows based PC, the Mezzo Precision Microphone takes profit of the versatility and flexibility provided by computers. This approach also allows offering the Mezzo Precision Microphone along with a measurement module from the Mezzo Software Suite at a very competitive price. Used along with the Mezzo Noise Analyzer measurement module, the Mezzo Precision Microphone complies with IEC 61672 (2013) Class 1 standard.

The Mezzo Precision Microphone is compatible with the following modules of the Mezzo Software Suite:

- **Noise Analyzer**: SLM, RTA, FFT & advanced post analysis.
- **Noise Monitor**: SLM, RTA, FFT & advanced monitoring functionalities.
- **Building Acoustics**: room noise, reverberation time, airborne sound insulation, impact sound level & more.
- **Waveform Recorder**: signal recording & advanced post-processing tools.

The current user's manual describes the Mezzo Precision Microphone hardware and its use through the Mezzo Noise Analyzer module.

# 2 Hardware Description

The full measurement system mainly consists of a host computer that is connected to the Mezzo Precision Microphone through USB cable. The computer is the responsibility of the owner since Soft dB does not sell it. Section 2.1 describes the requirements that should give guidelines in its selection.

## 2.1 Computer Requirements

Computer Requirements

| Item | Minimum Requirements |
|---|---|
| Operating System | Windows XP SP3, Vista, 7, 8 or 10 |
| CPU | Dual-Core at1.2 GHz[1] |
| Memory | 2 GB RAM |
| Hard drive | 300 MB free hard disk space |
| Port | USB 2.0 |
| Display resolution | 800 x 600 |

## 2.2 Mezzo Precision Microphone Specifications

Mezzo Precision Microphone Specifications

| Item | Specifications |
|---|---|
| Microphone | BSWA MPA221 (Class 1)[2] or BSWA MPA225 (Class 2)[3] |
| Connector | SMB |
| Peak Maximum Level[4] | Low Range: 112 $dB_{pk}$ High Range: 126 $dB_{pk}$ |
| Noise Level[5] | Low Range: 22 dBA, 20 dBC, 25 dBZ High Range: 32 dBA, 30 dBC, 35 dBZ |
| Under-Range Limit Level[6] | Low Range: 32 dBA, 30 dBC, 35 dBZ High Range: 39 dBA, 37 dBC, 42 dBZ |
| Input Range | Low Range: 0.42 $V_{pk}$ High Range: 2.1 $V_{pk}$ |
| Maximum Sampling Rate | 48 kHz |
| Signal Conditioning | IEPE |
| Communication | USB 2.0 (Mini B connector) |
| Dimensions | 230 x 32 x 23 mm |
| Power Supply | USB Powered (Max 0.35W) |

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[1] If using the 1/24 octave spectrum, the CPU requirement is Dual-Core at 2.4 GHz.

[2] ½" MP201 Mic with MA221 Preamp – 50 mV/Pa, IEC 61672 (2002) Class 1, SMB Connector.

[3] ½" MP215 Mic with MA221 Preamp – 40 mV/Pa, IEC 61672 (2002) Class 2, SMB Connector.

[4,5,6] Evaluated according to IEC 61672 (2013) Class 1, using 50m V/Pa sensitivity.

## 2.3    Accessories

### Included Accessories

| Component | Description |
|---|---|
| Mezzo Unit | The Mezzo Precision Microphone without the actual microphone.<br>Dimension (with microphone): 228x31x22mm (9x1.22x0.86") |
| ICP Microphone | BSWA MPA221: ½" MP201 Mic with MA221 Preamp – 50 mV/Pa, IEC 61672 (2002) Class 1<br>or<br>BSWA MPA225: ½" MP215 Mic with MA221 Preamp – 40 mV/Pa, IEC 61672 (2002) Class 2 |
| USB Cable | 1 m USB 2.0 cable with Mini B connector |
| Windscreen | 50 mm  diameter windscreen |
| Case | Plastic transport case Dimension: 268x240x57mm (10.5x9.5x2.25") |

### Optional Accessories

| Component | Description |
|---|---|
| Extension Adapter | Plugs a wire into the Mezzo unit in order to deport the microphone. Coming soon… |

# 3 Mezzo Noise Analyzer Measurement Module

The Mezzo Noise Analyzer measurement module is part of the Mezzo Software Suite and is included with the Mezzo Precision Microphone. It offers a professional sound level meter with a real-time spectrum analyzer and advanced post analysis functionalities.
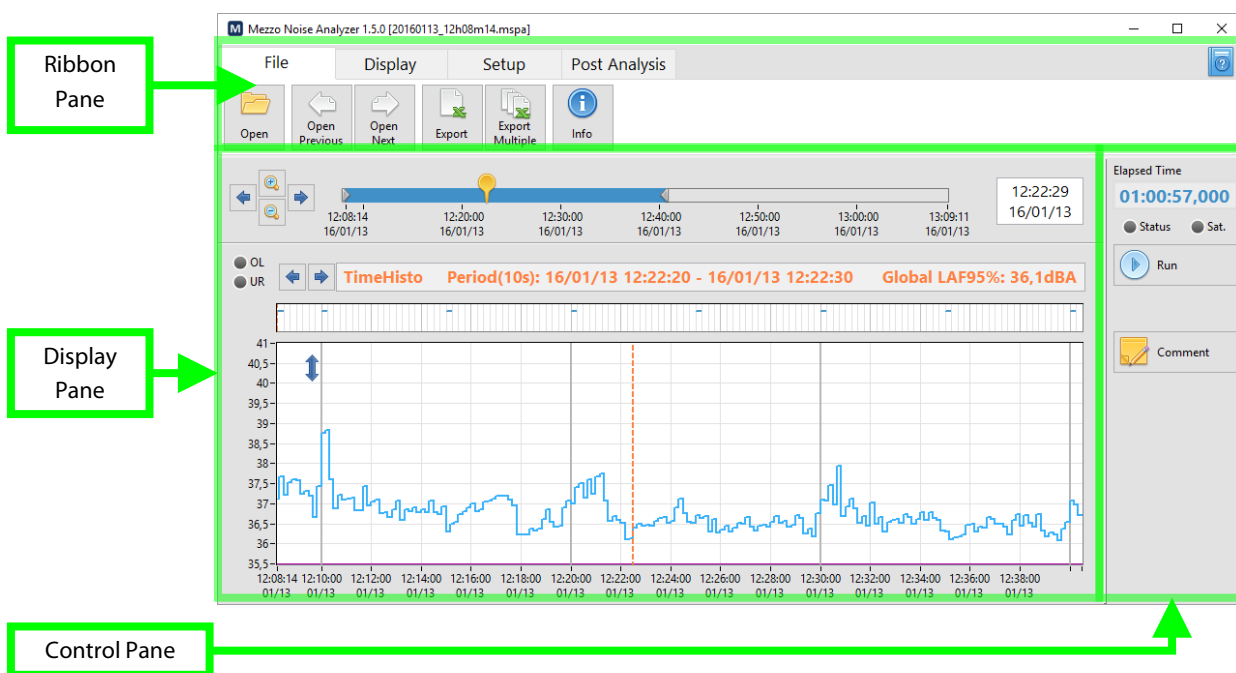


Main interface of the Noise Analyzer Module

## General Module Specifications

| Parameter | Value |
|---|---|
| Available Data | Time weighting: Slow, Fast or Impulse. <br> Frequency weighting: A, C and Z. <br> Global levels, octave spectrum (1/1, 1/3, 1/24) and FFT spectrum. <br> Live data: SPL, Peak, live Leq. <br> Periodic Average and Overall Average data: SPL Stats (Lmin, Lmax and selected LN%), Peak max, Leq. Taktmax. |
| Bandwidth | 1/1 octave: 16 Hz to 16 kHz <br> 1/3 octave: 12.5 Hz to 20 kHz <br> 1/24 octave: 11.4 Hz to 22.1 kHz <br> FFT: 0 to 22 kHz |
| Audio Events | Periodically and on trigger. Wave or MP3 format. |
| Data save | Levels data and audio events are added to the measurement file as they become available during the measurement. <br><br> Three save modes are available: <br> • Single Period: Save the overall average data at the end of the measurement. It is simple and creates small files but it does not allow any post analysis (post periods and masks). |

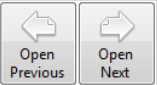| | |
|---|---|
| | • Multiple Periods: saves the raw periodic average data at each period end. The time resolution in post analysis directly depends of the selected Average Duration and it produces files with reasonable sizes.<br>• Instant Data: saves the raw instant data (live) at the instant rate. It allows the best time resolution in post analysis but the files are heavier. |
| Display | All measured data (both live and overall) can be displayed during the acquisition.<br>In post analysis, the available data depends on the record mode.<br>The main panel is scalable (smaller is 660 x 430 pixel) |
| Post Analysis | Available on files that used the Multiple Periods or Instant Data as record mode.<br>Evaluation of the average level on post intervals from the raw data (either instant data or periodic average).<br>The bounds of the post intervals can be set manually or automatically.<br>Masks can also be applied to filter unwanted events.<br>Possibility to use several scenarios of different intervals and masks. |
| Miscellaneous | Export the overall data to Excel.<br>Automatically reconnect and restart a measurement if an error occurs. |

## 3.1     Ribbon Pane

### 3.1.1     File Menu



File Menu

File Menu

| Icon | Description |
|---|---|
| Open | The Open button prompts the user to open data files (.mspa). Several files can be loaded all at once given that they are part of the same measurement. |
| Open Previous / Open Next | These two buttons open the previous/next data file in the Record Directory. |
| Export | This button exports the loaded data into a tab delimited file (.txt). The Export interface sets the data to be exported. The exported file can be easily opened with any spreadsheet application such as Microsoft Excel. |
| Export Multiple | This button prompts the user to select several files to be exported in a batch process. The same Export interface also sets the data to be exported according to the setup of the first selected file. Each source file is exported into its own export file. |
| Info | This button opens the File Info interface (figure below).<br>It contains the information on the measurement over several tabs:<br>• General information (including Comment)<br>• Input setup<br>• Data setup<br>• Audio setup<br>• Record Setup |

They are all indicators except for the comment, which can be modified either while measuring or once the measurement is completed.

In the bottom left of the panel, the record rate and the remaining record duration are estimated.



File Info Interface

## 3.1.2    Display Menu
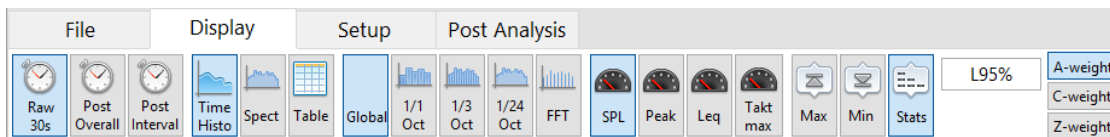


Display Menu

### Display Menu

| Icon | Description |
|---|---|
| While measuring :<br>Live Instant, Period 30s, Overall<br>Post Analysis :<br>Raw Instant, Raw 30s, Post Overall, Post Interval | The Live mode displays the current level during the measurement (Live SPL, Leq or Peak).<br>The Overall mode displays the overall level (SPL Max, Min and LN%, Leq or Peak Max).<br>While acquiring the display can be toggled between Live and Overall mode.<br>Only Overall is available when displaying data from a previous measurement. |
| SPL, Peak, Leq, Takt max | Toggles between the SPL, Peak, Leq or Taktmax data.<br>If the Data Setup is set to FFT, only the Leq button is available. |
| Max, Min, Stats | Toggles between the SPL Max, Min or Stat data. These controls are only available when displaying the SPL data type in Average mode (periodic or overall). |

| | |
|---|---|
| L95% | Sets the statistic to be displayed when the Overall SPL Stats data are selected. |
| A-weight<br>C-weight<br>Z-weight | Selects the applied frequency weighting: A, C or Z (no weighting). The A-weighting is the most common. The three weightings are evaluated in parallel in the time domain except for the spectrums, for which the dBA and dBC are obtained by applying the frequency weighting on dBZ spectrum. |
| ← 1kHz → | Sets the frequency of the selected spectrum (octave or FFT) to be display in the time history graph. For an octave spectrum, the left/right arrows can be used to shift to the next band. |

## 3.1.3 Setup Menu
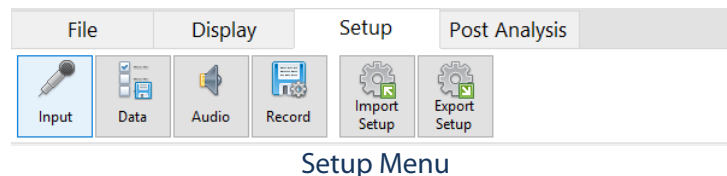
Setup Menu

Setup Menu

| Icon | Description |
|---|---|
| Input | The Input button calls the Input Setup interface.<br>It mainly sets the sensitivity and range of the sensor. |
| Data | The Data button calls the Data Setup interface.<br>It mainly sets the data to be evaluated and recorded. |
| Audio | The Audio button calls the Audio Setup interface.<br>It mainly sets when to record audio events. |
| Record | The Record button calls the Record Setup interface.<br>It mainly sets the record destination and the file management. |
| Import Setup | The Import Setup button prompts the user to load a measurement setup from a file. The source file can be previously exported configuration (.cfg) or measurement file (.mspa). |
| Export Setup | The Export Setup button prompts the user to save the current measurement setup into a file (.cfg). |

Input Setup



Input Setup interface

The left part of the Input Setup interface is related to the Mezzo Analyzer (without the sensor) and the right part is related to the microphone.

### Input Setup Interface – Mezzo Analyzer Parameters

| Control / Indicator | Description |
|---|---|
| Model Precision Microphone | Model of the detected hardware. |
| SN M15061103-02 | Serial Number of the detected hardware. |
| Channel Input 1 | Selects the input channel to be measured if several channels are available on the detected hardware. The Mezzo Precision Microphone is single channel. |
| Range Low / Low High | Selects the Low or High input range be used during the measurement. |
| Peak Overload 111,5dB / Under Range 32,0dBA / Noise 22,0dBA | The indicators show the amplitude range of operation. Those values change according to the sensitivity and the selected gain. |

### Input Setup interface – Microphone

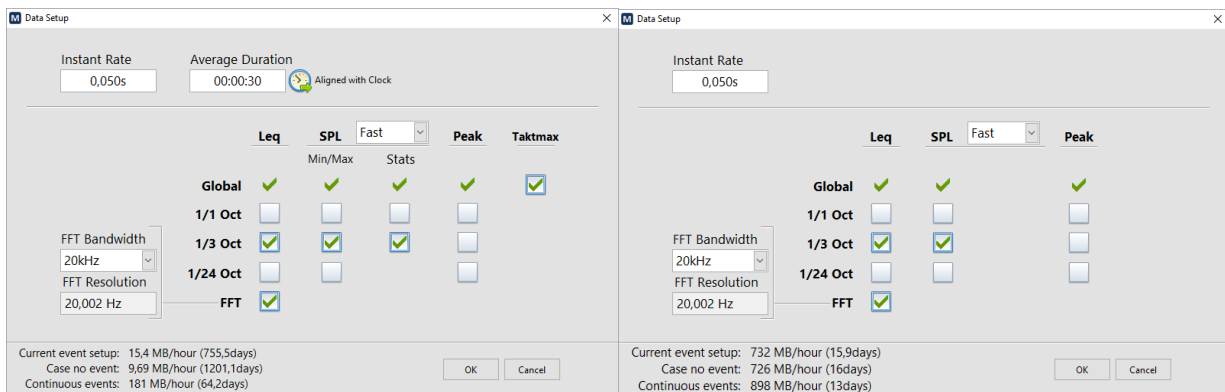| Control / Indicator | Description |
|---|---|
| Manufacturer BSWA / Model MP215-MA221 / Serial Number 503776-500064 | The Manufacturer, Model and Serial Number of the microphone |
| Sensitivity 50,00mV/Pa / Calib. Date 2015/12/01 10:53 / Calibrate | Sets the Sensitivity of the microphone. To set the sensitivity, a level calibration is usually done using the Microphone Calibration interface. It can also be set by manually overwriting the Sensitivity field. |
| Load From Mezzo | Loads the microphone information from the Mezzo memory (factory defined) |

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*Microphone Calibration Interface*

The microphone can be calibrated using the Microphone Calibration interface and a sound pressure calibrator.
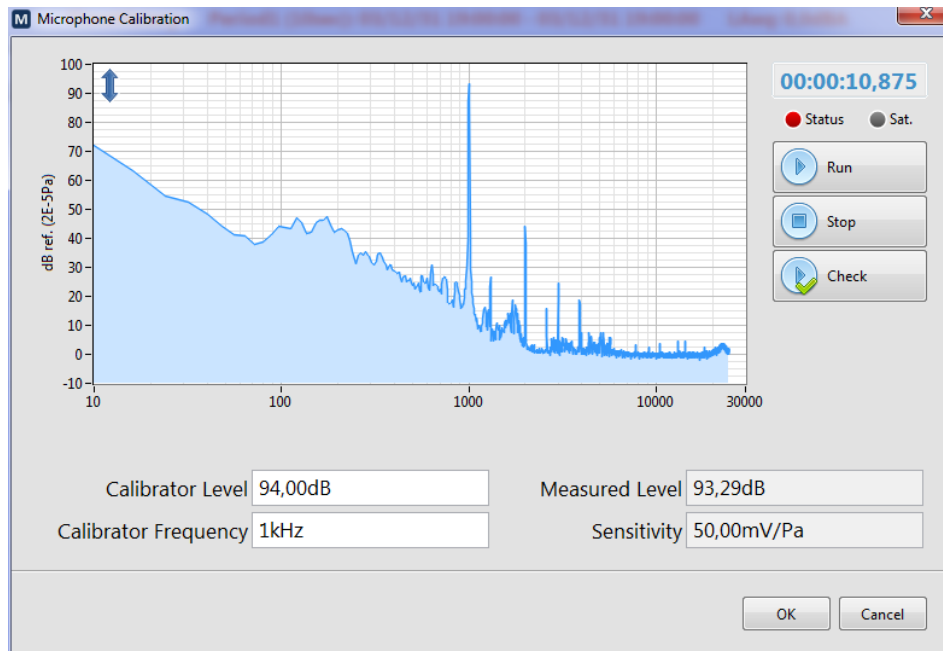


Microphone Calibration interface

1) Adjust the Calibrator Level and Calibrator Frequency according the sound calibrator used. Most calibrators generate 94 dB at 1 kHz.
2) Install the sound calibrator on the microphone and start the calibration signal.
3) Press Run to start the calibration measurement.
4) Wait a few seconds until the measured level stabilizes. 10 seconds should be enough.
5) Press Stop. The sensitivity is updated according to the calibration measurement.
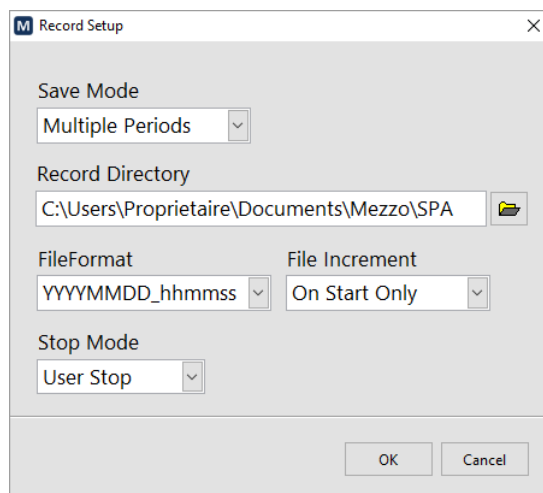6) If the new Sensitivity value is acceptable, press OK

## Data Setup



Data Setup interface

The Data Setup varies slightly according to the Record Mode used in the Record Setup.

## Data Setup interface

| Control / Indicator | Description |
|---|---|
| **Average Duration** 00:00:30 Aligned with Clock | The Duration field indicates the period duration. The Align button allows aligning the periods with the clock. If set to False, the periods will be aligned with the starting time. |
| Instant Rate 0,050s | In Instant Data record mode, the Instant Rate directly impacts the file size of the measurement. Otherwise, it only set the reading rate of the SPL values used to evaluate the average data. The minimum and default value of 50 ms is appropriate to measure Fast (and Slow) SPL in respect of the CEI 61672 requirements. However, a higher instant rate can be useful when the host PC is struggling to run the software in real-time. |
| SPL Fast / Slow / Fast / Impulse | Selects the SPL time weighting that will be use during the measurement. |
| Global ✓ / 1/1 Oct / 1/3 Oct ✓ / 1/24 Oct / FFT ✓ | The check boxes let the user selects that data to be evaluated, displayable and recorded. Some data have a check without the box to show that the it cannot be disabled. |
| FFT Bandwidth 20kHz FFT Resolution 20,002 Hz | The FFT spectrum bandwidth is user defined: 20k, 10k, 5k, 3.33k, 2k or 1kHz. It corresponds to the frequency resolution: 20, 10, 5, 3.33, 2, and 1Hz. |

## Record Setup



Record Setup interface

### Record Setup interface

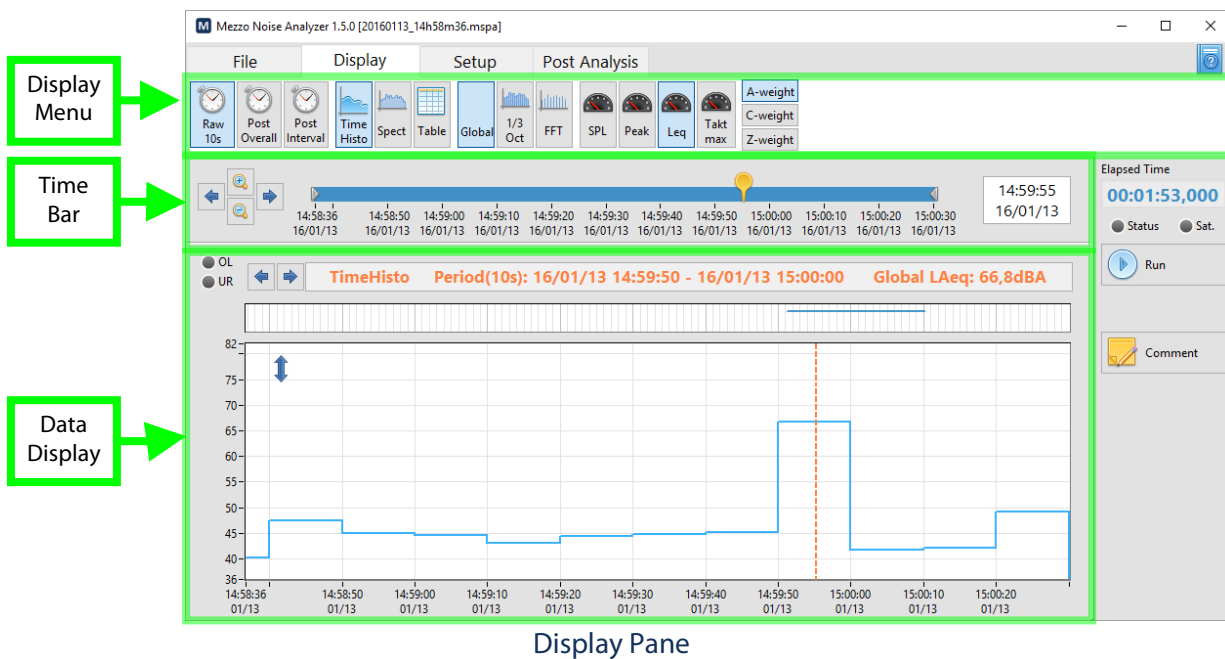| Control or Indicator | Description |
|---|---|
| Save Mode<br>Multiple Periods<br>Single Period<br>Multiple Periods<br>Instant Data | Selects the save mode:<br><br>• Single Period: only saves the measurement overall average at the end of the measurement<br>• Multiple Periods: saves several average periods (Average Duration) as each period ends.<br>• Instant Data: saves the instant data at each sample time (Instant Rate). |
| Record Directory<br>C:\My Documents\Mezzo\SPA | Select the directory where are the measurements are saved.<br>The default directory is *User Documents*\Mezzo\SPA. |
| FileFormat<br>YYYYMMDD_hhmmss | This list-box allows selecting the file name format. Choices are:<br><br>• YYYYMMDD_hhmmss<br>• MMDD_hhmmss<br>• DD_hhmmss |
| File Increment<br>On Start Only | This list-box allows selecting the automatic file increment behavior. Choices are:<br><br>• On Start Only (no periodic file increment)<br>• Every Hour<br>• Every Day<br>• Every Week<br>No matter how the File Increment is set, a file reaching the size of 1 gigabytes (1 GB) will also be incremented. Afterwards, several files of the same measurement can be opened all at once. |
| Stop Mode<br>User Stop | This list-box allows selecting the automatic stop mode. Choices are:<br><br>• User Stop (no automatic stop)<br>• Duration (stops after a specified duration)<br>• Stop time (stops at a specific moment) |

## 3.2    Control Pane
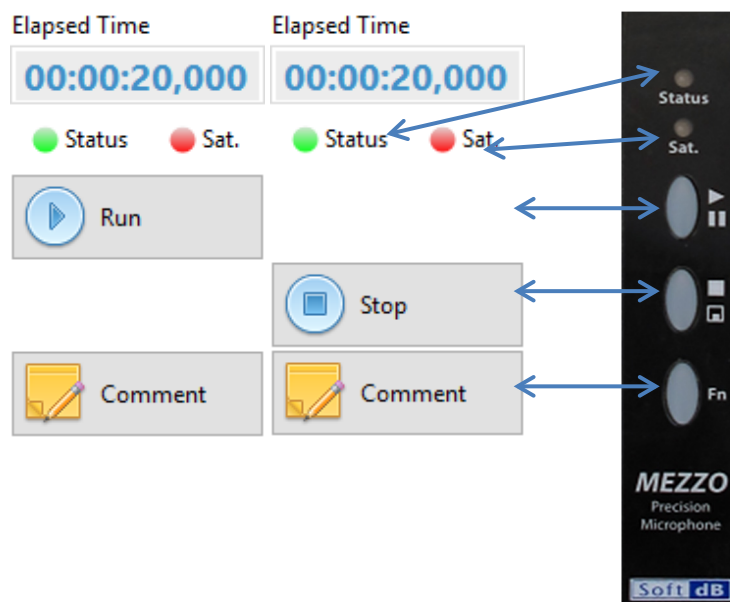


Control Pane

It should be noticed that most of the controls and indicators found in the Control Pane are duplicated on the Mezzo Presicion Microphone. Therefore, the Status, Sat, Run/Pause, Stop/Save and Fn (when applicable) have the save functionalities on the probe and in the software.
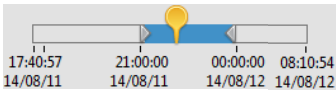
Controls & Indicators

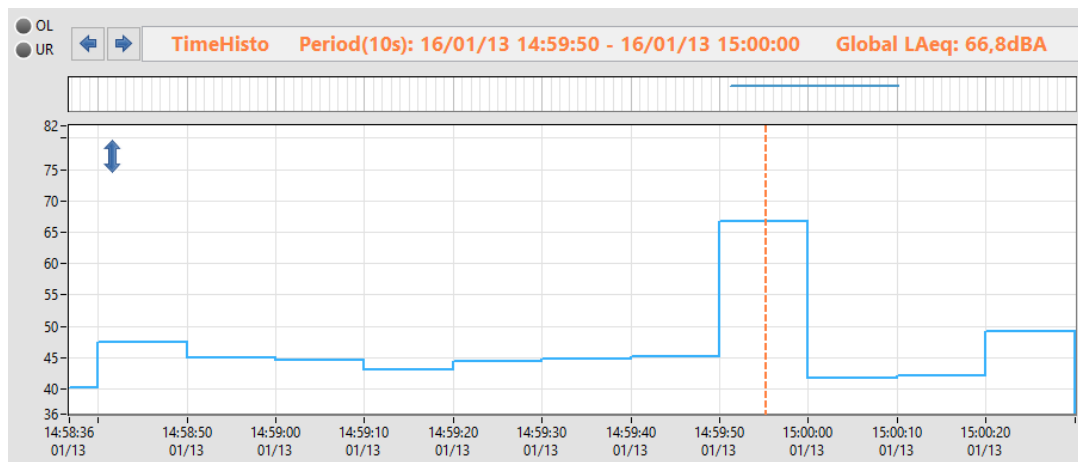| Control / Indicator | Description |
|---|---|
| 00:00:20,000 | The duration of the measurement in format HH:MM:SS. |
| Run / Pause | The Run/Pause button starts or pauses the measurement. The pause is only available when the Save Mode is set in Single Period. |
| Stop | The Stop button stops the measurement. |
| Comment | The Comment button directly accesses the comment for viewing or editing. The comment is also available in the General tab of the File Info (File → Info) |
| Status Status Status | The Status color indicates what is the acquisition state:<br>• Grey: acquisition off<br>• Yellow: acquisition paused<br>• Green: acquisition running |
| Sat. Sat. | The Sat color indicates if an overload occurred since the beginning of the measurement:<br>• Grey: no overload detected<br>• Red: overload detected |

## 3.3 Display Pane



**Display Pane**

## 3.3.1 Time Bar

Time Bar

| Control / Indicator | Description |
|---|---|
|  | This time slider gives time information about the measurement and the display data.<br><br>• The leftmost and rightmost values: measurement start and stop time respectively.<br><br>• The grey cursors that enclose the blue span: the time span on the Time History graph.<br><br>• The yellow cursor: the time cursor on the Time History graph and the time used to display a value on the Spectrum graph or Stats Table.<br><br>The cursor can be moved directly from the slider control. |
|  | The magnifier buttons zoom in and out the span of the Time History.<br>The arrow buttons shift left or right the span of the Time History. |
| 14:59:55<br>16/01/13 | This control displays the current value of the time cursor on the slider (also the cursor on the Time History graph). The exact time value should be set here. |

## 3.3.2 Data Display

The Data Display area can displayed either a time history graph, a spectrum graph (1/3 octave or FFT) and a table (SPL statistics or weather).

## Time History Graph



Time History Graph

The Time History displays the selected data selected in the Display Menu. The time span of the graph is set from the Time Bar.

Time History Graph

| Control / Indicator | Description |
|---|---|
| **TimeHisto Period(10s):** 16/01/13 14:59:50 – 16/01/13 15:00:00 Global LAeq: 66,8dBA | This legend gives the main information on the data being displayed: <ul><li>The display type.</li><li>The period (instant or average).</li><li>The time span of the data.</li><li>The data name and the value of the cursor on the graph.</li></ul> |
| ← → | The arrow buttons shift left or right the cursor on the graph. |
| ○ OL ● OL ○ UR ● UR | If the OL indicator is red, it indicates that an overload occurred. During measurement, the overload stays red as soon as an overload is detected until a new average period starts. In post-process, the overload is red if an overload occurred during the displayed average data. <br> If the UR indicator is blue, it indicates that an under range occurred. During measurement, the under range stays blue only while the under range is detected. In post-process, the under range is blue if an under range occurred during the displayed average data. |
| | This event graph shows when events occurred. The cursor and time span match those on the main graph below. The audio records appear as blue lines. <br> In post process, clicking on an event opens the Event Viewer interface. |
| Y Axis Format — Maximum 70 — Minimum 30 — Auto-Scale Now — OK Cancel | This button opens the Y Axis Format interface from which the vertical scale of the graph can be modified. The Minimum and Maximum fields can be set manually or automatically using the Auto-Scale Now button. |

## Spectrum Graph
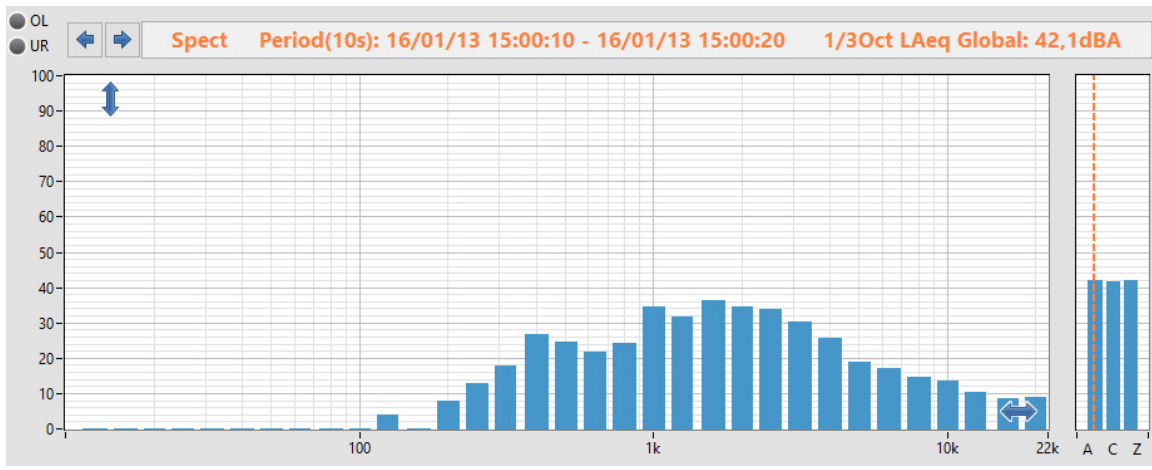


Octave Graph display (1/3 octave)



FFT Graph display

The spectrum graph displays the data selected in the Display Menu. The time of the data can be set by moving the yellow cursor in the Time Bar.
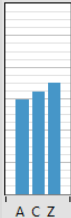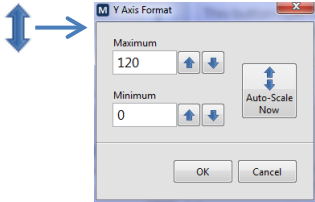
## Spectrum Graph
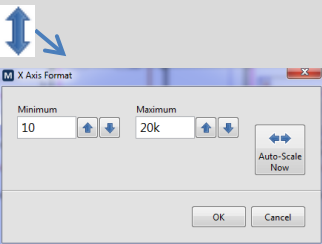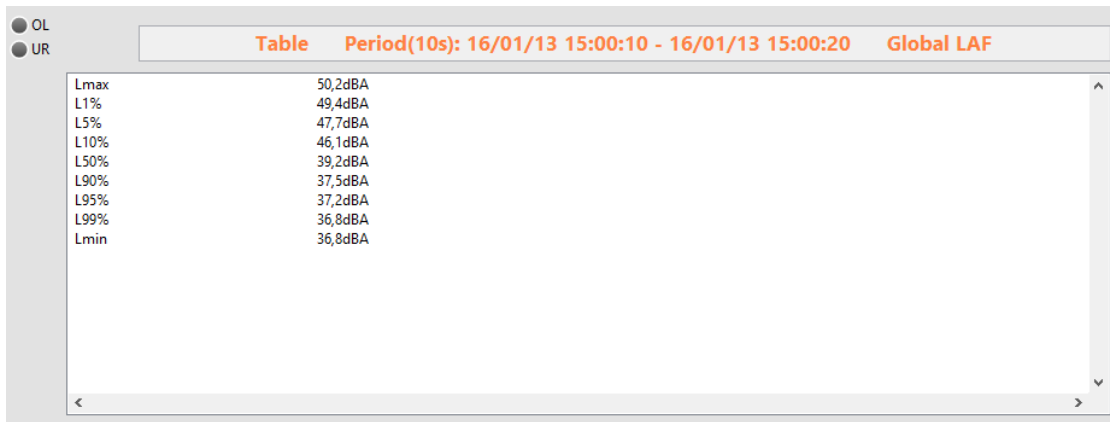
| Control / Indicator | Description |
|---|---|
| **Spect    Period(10s):** <br> **16/01/13 15:00:10 - 16/01/13 15:00:20** <br> **1/3Oct LAeq Global: 42,1dBA** | This legend gives the main information on the data being displayed: <br> • The display type. <br> • The period (instant or average)). <br> • The time span of the data. <br> • The data name and the value of the cursor on the graph. |
| ← → | The arrow buttons shift left or right the cursor on the spectrum and global graphs. |
| ⚫ OL  🔴 OL <br> ⚫ UR  🔵 UR | If the OL indicator is red, it indicates that an overload occurred. During measurement, the overload stays red as soon as an overload is detected until a new average period starts. In post-process, the overload is red if an overload occurred during the displayed average data. <br><br> If the UR indicator is blue, it indicates that an under range occurred. During measurement, the under range stays blue only while the under range is detected. In post-process, the under range is blue if an under range occurred during the displayed average data. |
|  | This small graph displays the global level of the requested data in the three frequency weightings (A, C and Z). This event graph shows when events occurred. The Level span matches the one on the main graph beside. |
|  | This button opens the Y Axis Format interface from which the vertical scale of the graph can be modified. The Minimum and Maximum fields can be set manually or automatically using the Auto-Scale Now button. |
|  | This button opens the X Axis Format interface from which the horizontal scale of the graph can be modified. The Minimum and Maximum fields can be set manually or automatically using the Auto-Scale Now button. |

Table Display



Table display – SPL Statistics

The Table display is usually used to display the SPL.

Table Graph

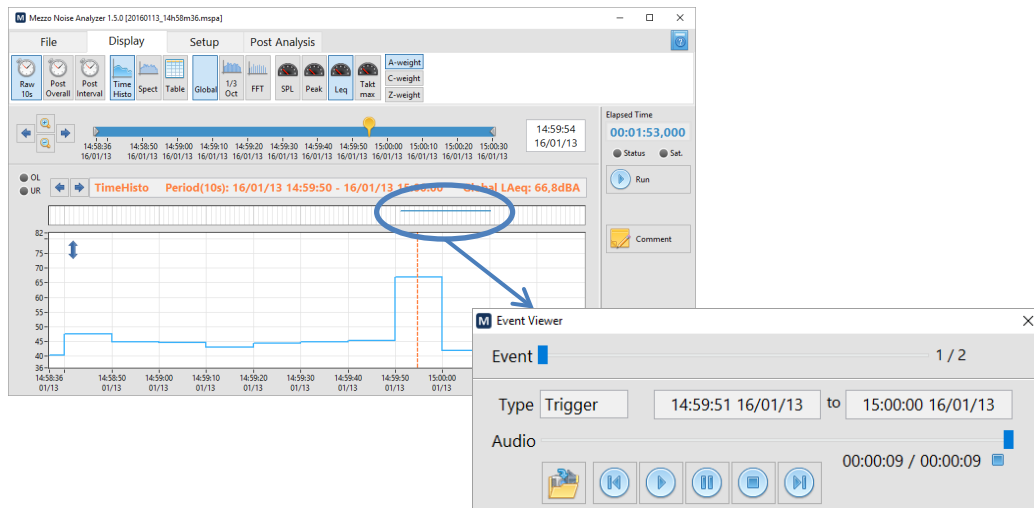| Control / Indicator | Description |
|---|---|
| **Table  Period(10s):**  16/01/13 15:00:10 - 16/01/13 15:00:20  **Global LAF** | This legend gives the main information on the data being displayed:<br>• The display type.<br>• The period (average period or overall)<br>• The time span of the data.<br>• The data name |
| OL  OL  UR  UR | If the OL indicator is red, it indicates that an overload occurred. During measurement, the overload stays red as soon as an overload is detected until a new average period starts. In post-process, the overload is red if an overload occurred during the displayed average data.<br><br>If the UR indicator is blue, it indicates that an under range occurred. During measurement, the under range stays blue only while the under range is detected. In post-process, the under range is blue if an under range occurred during the displayed average data. |

Event Viewer Interface



Event Viewer Interface

The Event Viewer allows listening to recorded events. To launch the Event viewer interface, click on the event history on top of the time history graph to view the selected event. The Event Viewer interface also allows to view the event type (trigger vs periodic), as well as its start and end time.

Also, the  button can be used to export the audio event into standard files.