

## 7. Vibration Meter


The Vibration Option turns the XL2 Audio and Acoustic Analyzer into a professional vibration meter with broadband measurements and spectral analysis in 1/3 or octave resolution. The XL2 Vibration Meter determines vibration acceleration, velocity and deflection with standard-compliant weighting filters in the frequency range from 0.8 Hz to 2.5 kHz. Detailed recording of measurement data and audio files allow for comprehensive evaluation and reporting. In addition, the XL2 Vibration Meter comes standard with an FFT analysis and an oscilloscope function. Selectable FFT frequency ranges from 1 Hz to 1.69 kHz allow a detailed examination of the measured vibrations.

The Spectral Limits Option adds functions to the Vibration Meter including a zoom FFT up to 20 kHz and a 1/12 octave band analysis from 0.73 Hz to 1.36 kHz. Also, it adds the ability to record reference spectra and set tolerances for pass / fail quality control measurements. The Remote Measurement Option allows the real-time acquisition of measurement data directly into a computer application via the USB interface. A documented command set is available.

### VibMeter / Spectrum

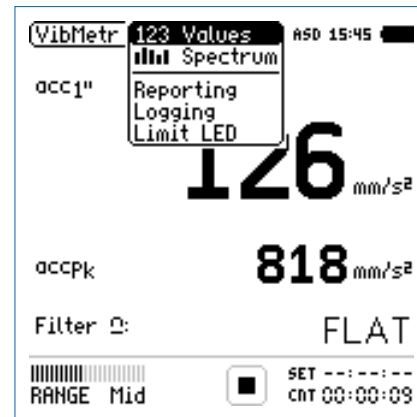
The vibration meter offers different pages:

#### Page Selection using the Page Button

- Press page  to toggle between the **123 VibMeter** page and the **CPB** page.

#### Page Selection using the Rotary Wheel

- Select the page **123 VibMeter** with the rotary wheel .
- Confirm with enter .



Page Selection

## 123 Values: Vibration Meter

Displays the selected broadband vibration level results. You can change the font size of the result. Depending on the font size chosen, the XL2 shows 2 up to 4 results simultaneously. The display of the actual or maximum level can be selected with the applicable frequency weighting. The peak levels PK or P-P are real peak levels.

## Spectrum: Constant Percentage Bandwidth CPB

Displays the 1/3 or 1/1 octave spectrum of the selected RMS, peak or peak-peak vibration level. Additionally, the wide band result B is shown graphically by a bar.

## Reporting: Report Setting

Here you set which vibration levels shall be stored in a .txt file after the completed measurement. Choose between:

**ALL** Stores all vibration levels.

**Selected** Stores up to 10 different individually-defined vibration levels.

For details refer to the chapter Reporting.


## Logging: Setup of Data Logging

The XL2 features a powerful vibration level meter data logger, which allows you to record all required vibration level values during the measurement. In the logging page you set which vibration levels shall be logged over time. For details refer to the chapter Logging. Choose between:

**ALL** Logs all vibration levels.

**Selected** Logs up to 10 different individually-defined vibration levels.

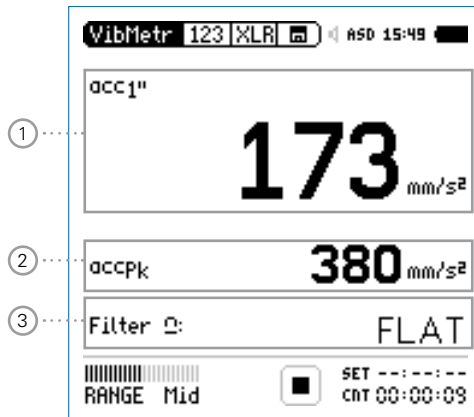
## Limit LED: Limit Setting

Here you set the function of the limit LED , thereby highlighting any vibration level that exceeds the pre-set limits in orange or red color. Further, external peripherals are controlled by the optional Serial I/O Interface based on the vibration level, such as displaying vibration levels on a large external red-orange-green lamp. For details refer to the chapter Limits.

## Overview

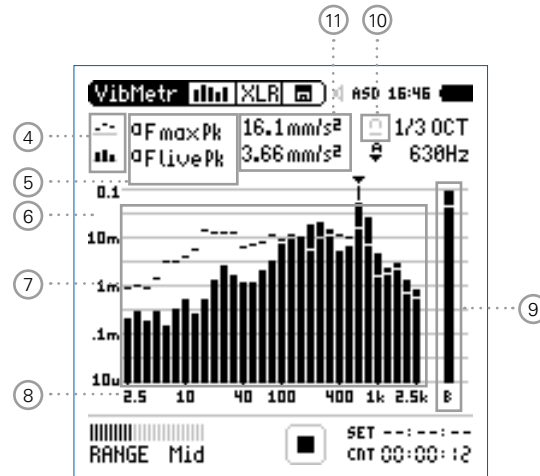
### Numeric Result Page

The numeric result page **123 Values** displays the selected broadband vibration level results. You can change the font size of the result. Depending on the font size chosen, the XL2 shows 2 up to 4 results simultaneously. The display of the actual or maximum level can be selected with the applicable frequency weighting.



### Constant Percentage Bandwidth Analyzer Page





The real-time analyzer page **Spectrum** measures and displays the 1/3 or 1/1 octave spectrum in the selected frequency range including the wideband result.





## ① Vibration Level Result 1

All vibration levels are measured and logged simultaneously. You select which vibration levels should be displayed.

### Change Parameter

- Turn the rotary wheel  to select the parameter **Lxx**.
- Press enter  to open the selection menu and choose the wideband vibration level to be displayed.
- Turn the rotary wheel  to select the required test result parameters and confirm with enter .

### Change Font Size

- Turn the rotary wheel  to select the actual test result.
- Press enter  1x, 2x or 3x to set the font size to small, medium or large.

The XL2 shows 2 vibration levels on the display if a large font is chosen, otherwise it shows 4 vibration levels.

## ② Vibration Level Result 2

Follow the setting instructions for vibration level result 1.


## ③ Filter

Select one of the following frequency filters:

<b>FLAT</b>	no filter applied
<b>1-80Hz</b>	Filter 1 - 80 Hz with decay rate of 12 dB / octave in accordance with DIN 45669-1
<b>1-315Hz</b>	Filter 1 - 315 Hz with decay rate of 12 dB / octave in accordance with DIN 45669-1
<b>10-1000Hz</b>	Filter 10 - 1000 Hz with decay rate of 18 dB / octave in accordance with ISO 2954

## ④ Result Symbols / Capture

This field offers two functions:

- Symbols for measurement results 






Upper parameter displayed as line.




Lower parameter displayed as bargraph.

- Capture

One of the displayed frequency band readings may be captured. Any measurement data can then be compared with this captured reference live on the XL2 Analyzer.

- Select the parameter to be captured.
- Confirm with enter , to capture the reading.
- Select the upper parameter  and choose **Capt.**
- Confirm with enter .

 The lower reading can be compared with the previously-captured reference data.

## 5 Level Type

Select in the **System Settings**:

- metric or imperial units
- RMS, peak or peak-peak level








Upper parameter displayed as line.



Lower parameter displayed as bargraph.

## 6 Y-Scale setting

- Select the Y-Axis with the rotary wheel  and confirm with enter .
- Select the zoom factor between **20, 10, 5, 2.5 dB/div** and confirm with enter .
- Scroll up and down with the rotary wheel  to select the Y-axis range.
- Confirm with enter .

## 7 Measurement Result

Real-time analyzer results in 1/1 octave or 1/3 octave band resolution.

## 8 X-Scale setting

Third-octave band resolution

2.5 Hz - 2.5 kHz frequency band levels including wide band result

0.8 Hz - 1.0 kHz frequency band levels including wide band result

0.8 Hz - 2.5 kHz frequency band levels

## Octave band resolution

4 Hz - 2.0 kHz      frequency band levels including wide band result

1 Hz - 0.5 kHz      frequency band levels including wide band result

1 Hz - 2.0 kHz      frequency band levels

- Select the X-Axis with the rotary wheel and confirm with enter .
- Toggle with the rotary wheel between the ranges.
- Confirm with enter .

## 9 **Broadband Results**

Displays broadband level B.

## 10 **Filter**

Select the preset frequency filter here, which is already used on the broadband page.

## 11 **Measurement Result**

Actual level result of the indicated frequency band. The cursor readout displays the center frequency and the level of the band pointed to by the arrow.

Select the measurement unit as follows:

Acceleration a

- m/s<sup>2</sup>
- g
- in/s<sup>2</sup>
- dB

Velocity v

- m/s
- in/s
- dB

Displacement d

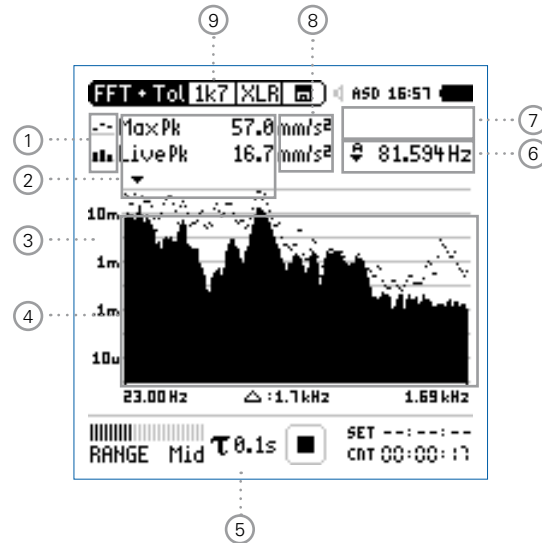
- m
- in
- dB

## FFT Analysis + Tolerance

The XL2 Vibration Meter includes a fast real-time FFT.

The following features are available upon installing the Spectral Limits Option in the XL2 Analyzer:

- High-resolution Zoom-FFT up to 0.4 Hz steps in the frequency range 1 Hz - 20 kHz
- Capture and tolerance function provided with Spectral Limits Option; thus the main menu function reads **FFT + Tol**.



## ① Result Symbols / Capture & Start Tolerance Mode

This field offers two functions:

- Symbols for measurement results ②



Upper result displayed as line.



Lower result displayed as bargraph.

- Capture & Start Tolerance Mode

The displayed readings may be captured as reference reading C1 to C8 for

- Comparing measurement results against captured traces with relative or absolute curve display.
- Creating tolerance masks based on captured reference curves for passed / failed measurements.

**Capture EQ**      Captures the upper parameter

**Capture Live**      Captures the lower parameter

## **Manage captures**

Allows to rename captures, clear recorded captures, save captures to the SD Card for export from the XL2 or load captures from the SD Card for import to the XL2.

## **Start tolerance mode**

Starts the tolerance mode for passed/failed measurements comparing the actual measurement results against a tolerance band.

## ② Measurement Result

Actual level result of the indicated frequency band. The cursor readout displays the center frequency and the level of the band indicated by the arrow.



Upper parameter displayed as line.








Lower parameter displayed as bargraph.

Select in the **System Settings**:

- metric or imperial units
- RMS, peak or peak-peak level



### ③ Y-Scale setting

- Select the Y-Axis with the rotary wheel  and confirm with enter .
- Select the zoom factor between **20, 10, 5, 2.5 dB/div** and confirm with enter .
- Scroll up and down with the rotary wheel  to select the Y-axis range.
- Confirm with enter .

### ④ Measurement Result

Displays the actual and averaged measurement results.

### ⑤ Time Weighting

Offers selectable time weighting of **0.1, 0.2, 0.5, 1.0** seconds as well **FAST** (125 ms) and **SLOW** (1 second).

Applications:




Short Time Weighting	High-resolution in time with minimum averaging
Long Time Weighting	Low resolution in time with longer averaging

### ⑥ Readout Frequency

You may select any frequency to read out individual levels. The selected frequency is indicated by the cursor arrow. Choose between the following settings:



The cursor follows automatically the highest level, e.g. tracing the dominant frequency of a rotating part.




- Select the frequency with the rotary wheel .
- Press enter .
- You may readout any individual frequency.
- Return to auto frequency with enter .



The cursor returns to the frequency with highest level bar.



The cursor readout may be set manually to any frequency. The readout remains at the selected frequency.

- Select the frequency with the rotary wheel .
- Press enter .
- Select the frequency of interest.
- Confirm with enter .



The cursor readout  displays the measurement results of the selected frequency band.

**7 Zoom Mode**

(optional, applicable with the Spectral Limits Option)

- Select the readout frequency **10** and press enter **↵**.
- The zoom mode is displayed above the flashing arrow.
- Select the zoom-in frequency with the rotary wheel **⦿**.
- Press limit **Ⓛ** and zoom the linear frequency scale in or out with the rotary wheel **⦿**.
- Release limit **Ⓛ** and scroll the linear frequency scale left or right with the rotary wheel **⦿**.

**8 Measurement Unit**

Select the measurement unit as follows:

Acceleration a	<ul style="list-style-type: none"><li>• m/s<sup>2</sup></li><li>• g</li><li>• in/s<sup>2</sup></li><li>• dBa</li></ul>
Velocity v	<ul style="list-style-type: none"><li>• m/s</li><li>• in/s</li><li>• dBv</li></ul>
Displacement d	<ul style="list-style-type: none"><li>• m</li><li>• in</li><li>• dBd</li></ul>

The Spectral Limits Option extends the function with captures and tolerances. All tolerances are specified as acceleration.

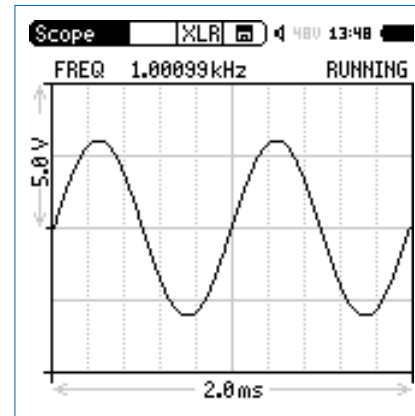
## 9 Page Selector X-Scale and Parameter Setting

- 1k7** Shows FFT result of the frequency band range.  
23 Hz - 1.687 kHz in a resolution of 11.72 Hz with 143 bins shown on the display.
- 400** Shows FFT result of the frequency band range.  
5 Hz - 421.02 Hz in a resolution of 2.92 Hz with 143 bins shown on the display.
- 100** Shows FFT result of the frequency band range.  
1 Hz - 105.00 Hz in a resolution of 0.73 Hz with 143 bins shown on the display.
- Usr** User Range  
(applicable with optional Extended Acoustic Pack or Spectral Limits Option)  
1 Hz - 20 kHz in zoom mode with a minimum resolution of 0.366 Hz and 143 bins displayed.
- Set** Selection for FFT Windowing:
- **Hann**: Default setting
  - **Dolph-Chebyshev**: for analyzing small signals (e.g. harmonics) close to a dominant signal.

The page button  switches these display modes.

## Oscilloscope

The scope function visualizes the waveform of the electrical input signal. It automatically triggers to the fundamental frequency and selects the scaling of the X-axis (time) and Y-axis (level) accordingly. The fundamental, or most dominant, frequency of the input signals is displayed above the scope screen.



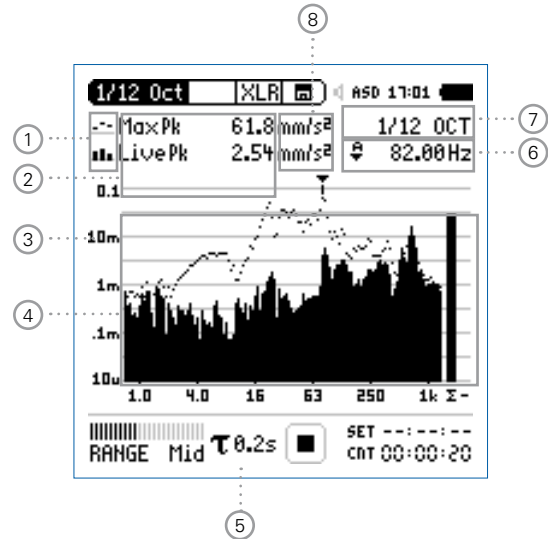
The scope scaling is fixed.

## 1/12 Octave + Tolerance (optional)

The Spectral Limits Option extends the function range of the XL2 with trace capturing, relative curve display and comprehensive tolerance handling for the **FFT** Analysis and the high-resolution **1/12 Oct + Tol** spectral analysis.

Features:

- Capturing of multiple readings into the internal memory
- Comparing measurement results against captures with relative or absolute curve display
- Comprehensive tolerance handling
- Creating tolerance masks based on captures for passed / failed measurements



## ① Result Symbols / Capture & Start Tolerance Mode

This field offers two functions:

- Symbols for measurement results ②



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The displayed readings may be captured as reference reading C1 to C8 for

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Allows to rename captures, clear recorded captures, save captures to the SD Card for export from the XL2 or load captures from the SD Card for import to the XL2.

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## ② Measurement Result

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Select in the **System Settings**:

- metric or imperial units
- RMS, peak or peak-peak level

### ③ Y-Scale setting

- Select the Y-Axis with the rotary wheel and confirm with enter .
- Select the zoom factor between **20, 10, 5, 2.5 dB/div** and confirm with enter .
- Scroll up and down with the rotary wheel to select the Y-axis range.
- Confirm with enter .

### ④ Measurement Result

Displays the actual and averaged measurement results.

### ⑤ Time Weighting

Offers selectable time weighting of **0.1, 0.2, 0.5, 1.0** seconds as well **FAST** (125 ms) and **SLOW** (1 second).

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- Select the frequency with the rotary wheel .
- Press enter .
- You may readout any individual frequency.
- Return to auto frequency with enter .



The cursor returns to the frequency with highest level bar.



The cursor readout may be set manually to any frequency. The readout remains at the selected frequency.






- Select the frequency with the rotary wheel .
- Press enter .
- Select the frequency of interest.
- Confirm with enter .



The cursor readout displays the measurement results of the selected frequency band.

### 7 Setting of Test Result Resolution

Set the spectral result display to 1/1, 1/3, 1/6 or 1/12 octave band resolution as follows:

- Turn the rotary wheel  to select the parameter .
- Press enter  to open the selection window.
- Turn the rotary wheel  to select **1/1 OCT**, **1/3 OCT**, **1/6 OCT** or **1/12 OCT**
- Press enter  to confirm.

### 8 Measurement Unit

Select the measurement unit as follows:

Acceleration a	<ul style="list-style-type: none"> <li>• m/s<sup>2</sup></li> <li>• g</li> <li>• in/s<sup>2</sup></li> <li>• dBa</li> </ul>
Velocity v	<ul style="list-style-type: none"> <li>• m/s</li> <li>• in/s</li> <li>• dBv</li> </ul>
Displacement d	<ul style="list-style-type: none"> <li>• m</li> <li>• in</li> <li>• dBd</li> </ul>

The Spectral Limits Option extends the function with captures and tolerances. All tolerances are specified as acceleration.