VibroMatrix® softwarepackage included

i592 Solid base plate

InnoBeamer LX2

Sensor cable i107-5

foot tips (blunt an pointed)

Triaxial mounting cube i553

Sensor KB12VD

The equipment shown depends on the respective VMSet 25

VMSet-25

The VibroMatrix kit for microvibrations contains all components needed for displaying and recording the slightest vibrations.

- The high-quality 24-bit digitization of the vibration signal in HD quality is taken by the data converter InnoBeamer LX2.

- The software instruments InnoPlotter Pro and InnoAnalyzer Pro are included for evaluation. They can be adapted to the most diverse parameters of the manufacturers because of their wide setting options and perform long-term-monitoring in time and frequency area.

- By means of limit value curves the instruments can automatically produce graphics of exceedances in order to ensure an unobserved measurement.

- Parallel to measurement / monitoring, a raw data logging can be switched on, additionally. This logged the sensor signals in an untreated condition and with full information content to the hard disk.

- Using the included InnoMaster Replay, these datas can be imported in the instruments. The full information content of the raw signal allows it to configure the instruments completely other than during the measurement time. Nevertheless, the results are exactly the way displayed as if this configuration has existed already at the measurement time.

| Equipment	VMSet-25-01	VMSet-25-02..6
	1 Measuring channel	**2..6 Measuring channels**
Hardware		
Sensor for Vibration Measurement	**Piezoelectric accelerometer** - Sensitivity: 10000 mV/g, linear frequency range: 0.08 .. 260 Hz - Operating temperature: -20 .. 80 °C - Accessories: i107-5 sensor cable 5m	
	1 x	**2..6 x**
Miscellaneous accessories	**1 x** i592 Tripod plate with screwable feet (**2 x** with VMSet-25-4..6)	
USB box for Digitization	**InnoBeamer LX2** - Inputs: 2x analog for vibration sensor(s), 1x digital for photoelectric reflex switch - Signal frequency: 0.1 .. 3200 Hz - Supply current: < 500 mA with supply of all sensors - no mains adapter required - Operating temperature: -20 .. 50 °C, weight: 350 gr., Accessories: Synchronisation cable and 1m USB cable	
	1 x	**1/2/2/3/3 x**
Software licenses		
Global Option Free Replay	✓	✓
Amount	**1 x**	**per Channel**
InnoPlotter Pro	✓	✓
InnoAnalyzer Pro	✓	✓
InnoAnalyzer Octave Pro	✓	✓

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Global Options - InnoMaster Replay

IDS2ASC and IDS2BIN - Export functions

If you want to analyze the raw data with your own software, we recommend to use the option IDS2ASC or IDS2BIN. The original InnomicDataStream (IDS) format for the InnoMaster Replay not only contains the raw data, but also many other pieces of information, for instance the wall clock time valid during the measurement, your notes etc. By means of the option IDS2ASC, the InnoMaster Replay extracts the pure measurement data and saves it in ASCII text format. Now the data can be indicated with an arbitrary text editor or it can be further processed with your own software. In contrast, the option IDS2BIN exports the measurement data in binary format, which allows more compact files than in text format.
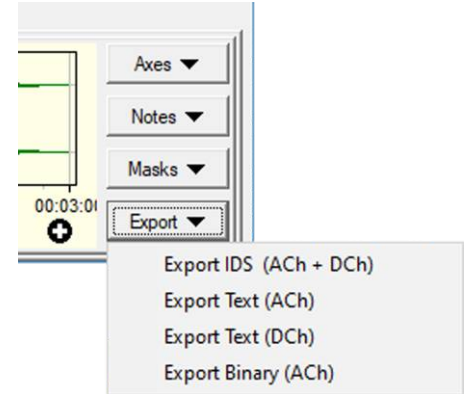
FRep - Free Replay

The complete off-line analysis of the InnoMaster Replay is available for you without extra charge if the same InnoBeamers are connected to the PC at both times, during measurement and off-line analysis. By means of Free Replay, that is not necessary. You can send the files with the raw data, the recipient downloads the free VibroMatrix software and can analyse the raw data. That is how you achieve an excellent team work between the field measurement staff and analysis team in your home company.

Free Replay means: Arbitrarily many persons at arbitrary locations at arbitrary times can replay and analyse the recorded raw data with the InnoMaster Replay.
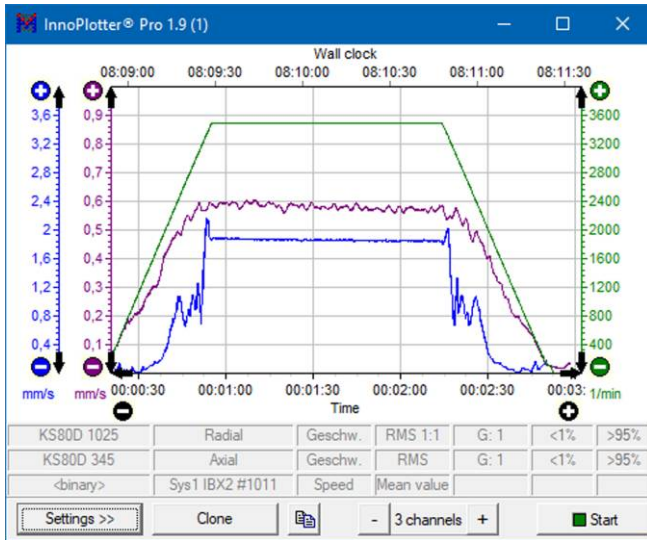
Without the need to invest a single cent for measurement equipment. Thus, you mulitply the advantages of VibroMatrix.

For analysis, the instruments which were licensed during data recording are available.

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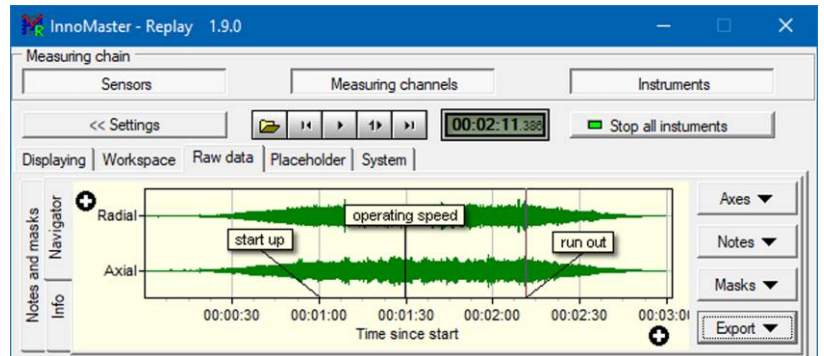
Software Module - InnoPlotter Pro® 1.9
Digital Strip Chart Recorder

Simultaneous display up to 4 graphs, different measurands

Numerous settings for signal conditioning

Warning/alarm limit for monitoring characteristics

Application

Vibrations are caused by rotating parts or impulse-like loads, e.g. by a vibratory pile driver in the constructionfield. In numerous vibration standards significant vibration characteristics and limit values are defined for a reliable evaluation of the vibration situation.

The InnoPlotters measure these vibration characteristics, display their trend graphically and monitor them when required. Thus, they are especially convenient for longer test sequences. Weak spots in the continuous operation become obvious, the success of counter measures is proven and the compliance with limits is controlled.

2 cursors, display of cursor data and

Data export by mouse click or automated

Annunciation of measured data and events

Properties

The InnoPlotter is a universal digital strip chart recorder for up to four characteristics. It features a memory for 24 hours continuous recording and various display modes. 2 time axes are available for the absolute time and the elapsed time since the start of measuring.

The Pro version is able not only to integrate vibration acceleration to vibration velocity and displacement, but also to measure rotation speed and user measurands.

Optional monitoring of characteristics is offered as well. The following settings are available for signal conditioning:

• Free filter adjustment 0.1 .. 40000 Hz
• SI and imperial units for each measurand
• 25 characteristics

2 cursors allow the exact measurement of the data. Measurement graphs can be moved and spread manually or be arranged automatically. Time bar can be moved depending on the progress of the measurement.

The export of data into other applications as graphic or text is possible without any problems. Saving measured data can be carried out manually or triggered. By means of annunciator function, the InnoPlotter can forward measured data or events automatically, e.g. by e-mail.

Technical Data   Software Module - InnoPlotter®

	InnoPlotter Pro®	InnoPlotter®
Signal Processing		
Filter	Freely adjustable 0.1..40 000 Hz **	
Time Window	Freely adjustable 0.1..10 s	
Measurands	Alternating measurands: Vibration acceleration, velocity, displacement; force, pressure, sound pressure, voltage, user-defined measurands	
	Speed, phase angle, noise weighted	-
Integrated Measurands	Acceleration → velocity and displacement	-
Units	m/s², mm/s², µm/s², nm/s², pm/s², g, mg, µg, km/s², kg | m/s, mm/s, µm/s, nm/s, pm/s, in/s, mil/s, µin/s | m, mm, µm, nm, pm, ft, in, mil, µin | kN, N, mN, µN, nN, lb, oz | bar, mbar, MPa, kPa, hPa, Pa, mPa, µPa, nPa, psi | V, mV, µV, nV, pV | A, mA, µA, nA, pA	
	1/min, 1/s, Hz, 1/h | Hz, kHz | % | °	-
Characteristics	**Overall values:** Instantaneous value, peak value absolute / positive / negative, peak-topeak value, true r.m.s. value, main frequency, mono harmony, crest factor	**Overall values:** Instantaneous value, peak value absolute / positive / negative, peak-to-peak value, true r.m.s. value
	Order values: Peak value, r.m.s. value, phase angle	-
	Speed values: Mean value, instantaneous value	-
	Acoustic values: Noise level with A- and Cweigthed frequency (peak / fast / slow time weighted, equivalent continous noise); noise level unweighted (fast / slow time weighted); daily noise exposure level	-
Monitoring	Free alarm limit, warning limit 0..100% of alarm limit	-
Statistics	Mean value, minimum, maximum	-
Graphical Presentation		
Number of Measurement / Limit Graphs	1 .. 4 per window / 0 .. 8 per window	
Interval Y-axis / t-axis	0.01 .. 10000 / 6 s .. 24 h	
Digital Channel	Display of the variation in time of the trigger status (switchable, one measuring channel)	
Cursors	2 lines, freely adjustable by mouse or button, display of cursor values and difference	
Refresh	1 / 8 / 16 times per second *	
Status Indicators	Sensor, measuring channel, measurand, characteristic, gain, underload, overload	
Data Export		
Control	Manually, time-triggered, level-triggered	Manually, time-triggered
Formats/ Destinations	Bitmap, PNG, Enhanced Meta File (EMF), text, Clipboard or file	
Event Annunciators		
Display	Single channel: Currently measured value Single channel: Current alarm state Instrument: Current alarm state	Single channel: Currently measured value
Radio Switch	Single channel: Current alarm state Instrument: Current alarm state	-
Digital Output	Single channel: Current alarm state Instrument: Current alarm state	-
E-Mail	Time-triggered transfer of measurement data Level-triggered transfer of measurement data	Time-triggered transfer of measurement data
Miscellaneous		
Available in a Kit	VMSet-25-1..6	-
General Functions	Measurement data is held after switching off, module is cloneable	

*   Centrally managed in the InnoMaster
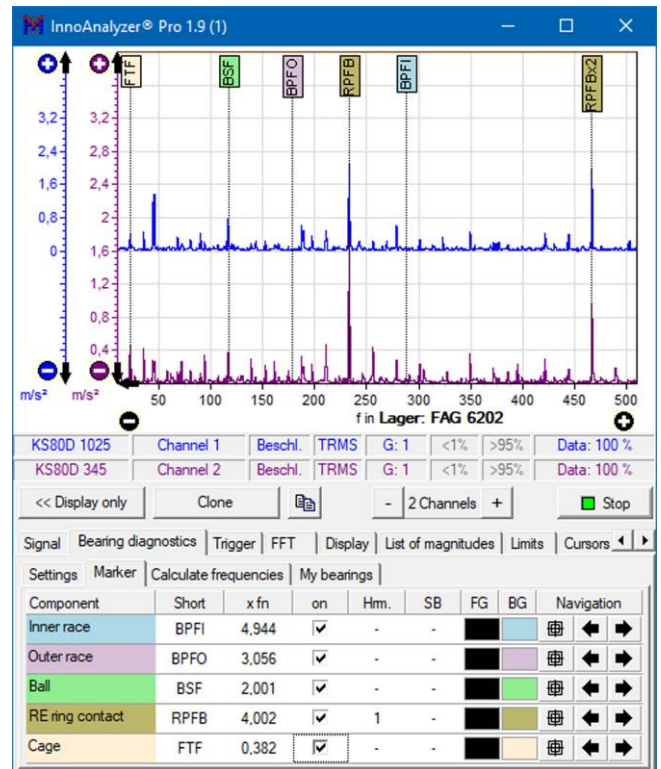**   0.1 .. 3200 Hz using the InnoBeamer LX2

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Software Module - InnoAnalyzer Pro® 1.9
FFT Vibration Analyzer

Simultaneous analysis of up to 4 signals, phase display switchable

Manual mode for purposeful FFT configuration
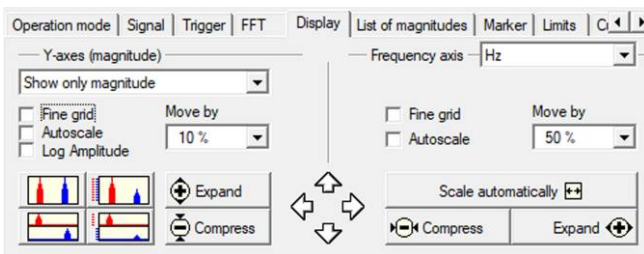
Arrange, zoom, compress graphs acc. to your demands

Special modes, e.g. bearing diagnosis by envelope analysis

Application

For the frequency analysis of vibrations, the InnoAnalyzers are applied. Rotating parts in drives, gears, pumps, fans and many other technical products cause vibrations.

Often, different frequency components generate a vibration mix. InnoAnalyzers decompose this mix into ist different frequency components by fast Fourier-transformation. So you can detect the parts which are primarily responsible for the vibrations. As a result, mechanical malfunctions are precisely and quickly tracked down in development, quality control or service. The success of measures to reduce vibrations is proven measurably.

Properties

The InnoAnalyzers are universal vibration analyzers for vibration acceleration respectively also vibration velocity and displacement (Pro version).

The instruments cover the whole field of frequency analysis from an automatic mode to special modes like PSD, bearing diagnosis by envelope analysis, acoustics measurements or determination of frequency response.

The high number of lines of more than 500 000 FFT lines allows a frequency resolution of up to 1 mHz. Switching the frequency axis from Hz to 1/min simplifies the allocation to rotating parts. In addition, frequencies can be displayed as multiple of rotation speed (order analysis).

Amplitudes are detected and listed up automatically, values are also displayed in the chart when required.

Additionally, two differently colored cursors with value display support you during the analysis. The export of the graphs into other applications as graphic or as pairs of values in text format is easily possible.

Frequency analyses can be carried out continuously as well as - e.g. for bump tests - in response to a triggered time signal. In this case, the InnoAnalyzer is working together with the InnoScope. During unattended operation, analyses can be saved periodically or limit dependent or be sent via e-mail.

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Technical Data   Software Module - InnoAnalyzer®

|	InnoAnalyzer Pro®	InnoAnalyzer®
Signal Processing		
Measurands	Alternating measurands: Vibration acceleration, velocity, displacement; force, pressure, sound pressure, voltage, user-defined measurands	
Integrated Measurands	Acceleration → Velocity and displacement	-
Units	m/s², mm/s², µm/s², nm/s², pm/s², g, mg, µg, km/s², kg, dB | m/s, mm/s, µm/s, nm/s, pm/s, in/s, mil/s, µin/s, dB | m, mm, µm, nm, pm, ft, in, mil, µin , dB | kN, N, mN, µN, nN, lb, oz | bar, mbar, MPa, kPa, hPa, Pa, mPa, µPa, nPa, psi | V, mV, µV, nV, pV | A, mA, µA, nA, pA	
Characteristics	Peak value, Peak-to-peak value, r.m.s. value, phase	
Measurands and Units X-Axis	Frequency (Hz) / Rotation speed (rpm) / Rotation speed order	
Frequency Range	Freely adjustable 0 .. 40 000 Hz **	
Frequency Resolution, Overlapping	< 1 mHz, 0 .. 99%	
Windowing	Rechteck, Bartlett, Blackman, Hamming, Hann, Flattop	
FFT Modes	Automatic, manual, bearing diagnosis, PSD, Frequency response function, Acoustics	Automatic, manual
Time Data Feeding	Continuous / triggered in time domain	
FFT Statistics	Mean, quadratic mean, maximum	
Statistics Time Frame	Infinite / adjustable number of spectra (up to 1000)	
Number of Lines	2 .. 524,288	
Graphical Presentation		
Number of Graphs	1 .. 4 for magnitude and 1..4 for phase per window	
Refresh	1 .. 16 times per second *	
Interval Y-Achse	Magnitude: 0.1 .. 10000 (logarithmic as well) / Phase: 0..360°, -180° .. +180°	
Interval X-Achse	1 .. 40 000 Hz / 600 .. 2 400 000 min-1 **	
List of Magnitudes	1..20 magnitudes (search sensitivity adjustable), sorting acc. to magnitude or frequency	
Cursors	2 lines, freely adjustable by mouse or button, display of cursor values and difference	
Markers (Bearing diagnosis)	Inner race, outer race, kaefig, ball, WK ring contact, side bands, harmonics (integrated database of > 20000 bearings)	-
Marker Control	Adjustable frequency / Rotation speed signal	-
Limit Graph	Graphically free adjustable with 100 points	-
Status Indicators	Sensor, measuring channel, measurand, characteristic, gain, underload, overload, level	
Data Export		
Control	Manually time- or level-triggered	
Formats	Bitmap, PNG, Enhanced Meta File (EMF), text	
Destinations	Clipboard or file	
Event Annunciators		
E-Mail	Trigger initiates tranfer of exported measurement data	
Miscellaneous		
Available in a Kit	VMSet-02;-03;-04;-05, VMSet-25	-
General Functions	Measurement data is held after switching off, module is cloneable	

*   Centrally managed in the InnoMaster
**   when using a InnoBeamer LX2: Upper frequency limit 3200 Hz = 192 000 rpm

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Software Module - InnoAnalyzer Octave Pro® 1.9

Octave band analyzer
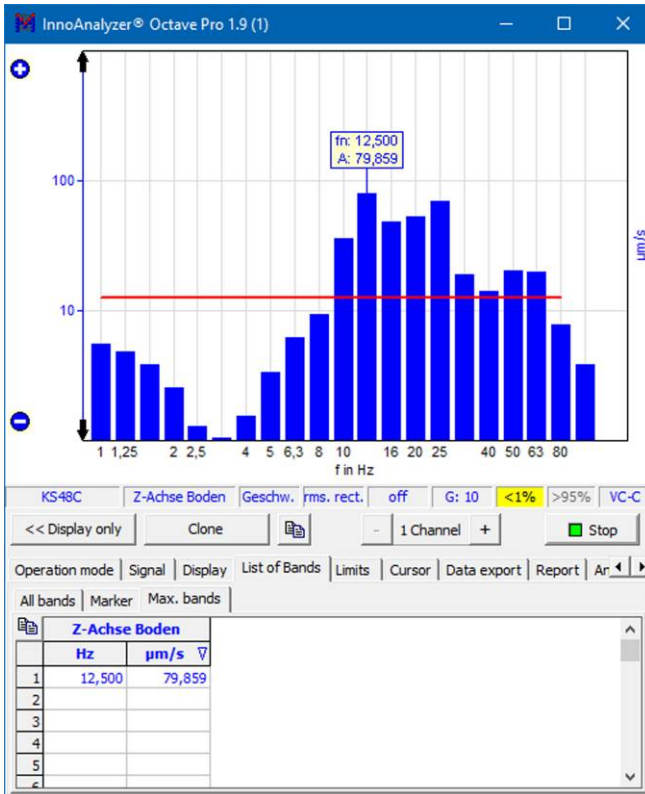
Limits can be selected (e.g. VC-lines) or individually be set up.
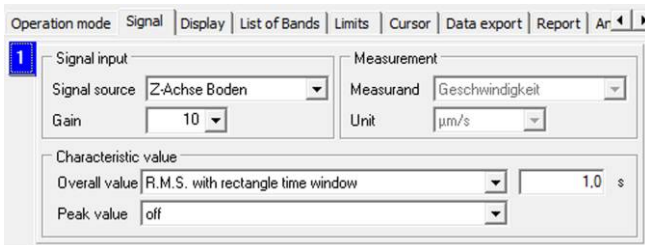

The measured variables are already preset in accordance wwith VDI 3038 Part 2. Average values and peak values are also possible.

Application

For the monitoring of highly sensitive devices, such as electron microscopes or lithography systems, an analysis of the 1/3 octave bands (thirds) has proven its value. This analysis is used especially in the semiconductor industry.
Limit value curves (Vibration Criteria, VC lines) are defined for various usage criteria. Further nano lines have been agreed, especially for applications in nano technology.

The InnoAnalyzer Octave instruments are specially designed for **monitoring VC and nano lines**.

Octave band analyses are also used for acoustic measurements. Thus, the (weighted) levels of the individual bands on a large frequency range can be recorded at a glance.
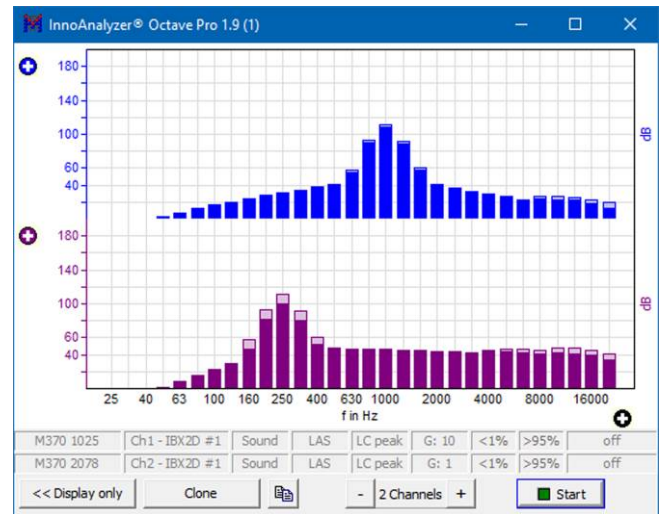
Acoustic mode with switchable peak value display.
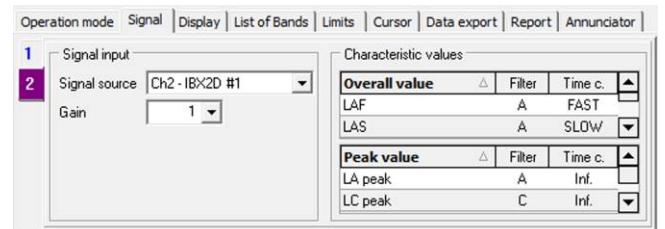
A frequency weighting (effective value and peak value) for acoustic measurements can be selected.

Properties

Measurement quantities, units and limit value curves (VCA .. VC-G, Nano-D, Nano-E, Nano-EF) are already preset for measurements of VC and nano lines according to VDI 2038 Part 2. In addition to the displayed effective values, peak values can also be displayed.

For acoustic measurements, frequency weightings for effective and peak values as well as limit value curves can be freely selected.

Band amplitudes are automatically found and listed, the values can also be displayed directly in the chart if required. In addition, two cursors with measured value display provide support during analysis. It is easy to transfer the measurement curve as a graphic or as pairs of values in text format to other applications.

During unattended operation, analyses can be saved periodically or limit dependent or be sent via e-mail.

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Technical Data   Software Module - InnoAnalyzer Octave Pro®

	InnoAnalyzer Octave Pro®	
Signal Processing		
Measurands	Alternating measurands: Vibration acceleration, velocity, displacement; sound pressure	
Integrated Measurands	Acceleration → velocity → displacement	
Units	m/s², mm/s², µm/s², nm/s², pm/s², g, mg, µg, km/s², kg, dB | m/s, mm/s, µm/s, nm/s, pm/s, in/s, mil/s, µin/s, dB | m, mm, µm, nm, pm, ft, in, mil, µin , dB | bar, mbar, MPa, kPa, hPa, Pa, mPa, µPa, nPa, psi |, Schall bewertet	
Characteristics	RMS value (rectangular, exponential time window) ; peak (rectangular, exponential time window, interval peak) ; Sound level with A and C frequency weighting (peak, fast, slow time weighted, equivalent continuous sound, daily noise exposure level); Sound Level Unweighted (Fast, Slow Time Weighted)	
Measurands and Units XAxis	Frequency (Hz) (octaves, 1/3 octaves (thirds), 1/6 octaves)	
Frequency Range	preset for VC and nano lines (1 .. 100 Hz) as well as for acoustics (20 .. 20 000 Hz) *, free mode 1 Hz .. 40 000Hz *	
Operating modes	free settings, ISO, VC, Nanon lines, acoustics	
Graphical Presentation		
Number of Graphs	1 .. 4 per Window	
Refresh	1 / 8 / 16 times per second *	
Interval Y-Axis	Amplitude: 0.1 .. 10000 (logarithmic as well)	
Interval X-Axis	1 .. 40 000 Hz *	
List of amplitudes	1..45 bands (all or adjustable search sensitivity), sorting by amplitudes or mid-band frequency	
Cursors	2 lines, freely adjustable by mouse or button, display of cursor values and difference	
Limit Graph	Graphically free adjustable with 100 points (free settings + acoustic mode9, VC-A .. VC-G, Nano-D, Nano-E, Nano-EF	
Status Indicators	Sensor, measuring channel, measurand, characteristic, gain, underload, overload, level	
Data Export		
Control	Manually, time- or level-triggered	
Formats	Bitmap, PNG, Enhanced Meta File (EMF), text	
Destinations	Clipboard or file	
Event Annunciators		
E-Mail	Trigger initiates tranfer of exported measurement data	
Miscellaneous		
Available in a Kit	VMSet-25-1..6	-
General Functions	Measurement data is held after switching off, module is cloneable	

*   Only when using an InnoBeamer type X2

**   Centrally managed in the InnoMaster

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