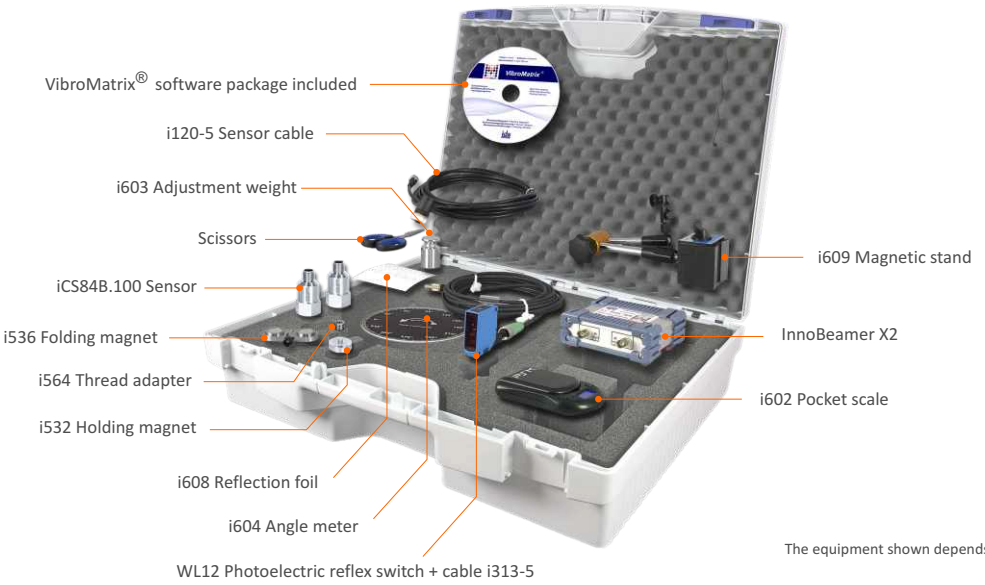

The equipment shown depends on the respective VMSet 02 to 05

VMSet-02 to 05 come in a handy case and provide you with everything you need for the diagnosis of vibration problems and their elimination. The VMSets are applied on e.g. fans, pumps, electric motors / generators and components like roller bearings and gearboxes.

With these kits you answer, amongst others:

Which are rotational speed and vibration level in a selected frequency range, vibration level at rotational speed or ist multiples?

How is the allocation of the vibration levels in the complete frequency range, at which rotation speeds is the machine getting resonant, how high are the vibration levels then?

What are the natural frequencies?

Are the measurement points vibrating synchronously or oppositely?

How high is the unbalance and how can it be balanced?

Thanks to the high flexibility of the VibroMatrix-System, you are prepared for the measurement of vibration parameters acc. to different standards.

The system works on a PC or notebook and is suitable for both, mobile field work and stationary applications, e.g. in research and development or quality control. Extra mains adapters are not required, VibroMatrix is supplied by the USB data cable.

High-quality piezoelectric accelerometers provide precise measurement signals. A photoelectric reflex switch permits, amongst others, the synchronization of measurements with the rotation speed.

The instruments are combined on the screen acc. to your needs. A suitable configuration can be saved and loaded again within seconds when required.

You export measurement data and graphics fast as lightning into files or your word processing. Thus you have compiled a conclusive documentation quickly.

Simultaneously with real-time measurement, you can record the raw data stream. If you need more details of your measurement later or want to present interesting processes to your colleagues in the office, you can replay the data like a live measurement. The configuration of the software instruments can even be different from the one during the original measurement.

More channels? No Problem, several measurement kits can be combined to a multichannel systems.

6 and 8 channel system in waterproof and rugged trolley. Dimensions are allowed as hand baggage on airplanes.

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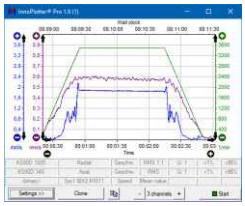
Equipment

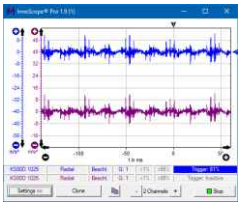
	VMSet-02	VMSet-03	VMSet-04	VMSet-05
	Natural frequency diagnostics	Machine diagnostics Basic	Machine diagnostics Plus	Machine diagnostics machining centers
Hardware				
Sensor for vibration measurement	**Piezoelectric accelerometer, shear design** - Sensitivity: 100 mV/g, linear frequency range: 0.2 .. 20000 Hz, TEDS - Operating temperature: -40 .. 120 °C - Protection grade: IP68 / Insulated case avoiding ground loop problems - Accessories: i532 holding magnet, i536 magnet for curved surfaces, i564 thread adapter, 120-5 Sensor cable 5m			
Sensor for Reference Position		**1 x WL12 opto-electronic sensor** - Scanning Range: Maximum 7m, response time: < 330 µs - Accessories: i609 Stand with magnetic base, i313-5 cable 5m length, i608 reflection foil		**1x KTM contast scanner** - Scanning range: 11-14mm, response time: < 50 µs - Accessories: i609 Stand i321-5 Cable
Additional accessories			i604 angle meter, i602 precision scale, i603 test weight	
USB Box for Digitization	**InnoBeamer X2** - Inputs: 2x analog for vibration sensor(s), 1x digital for speed switch - Signal frequency: 0.1 .. 40000 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			
Softwarelizenzen				
Free Replay	✓	✓	✓	✓
InnoScope Pro	✓	✓	✓	✓
InnoAnalyzer Pro	✓	✓	✓	✓
InnoAnalyzer Speed Pro		✓	✓	✓
InnoMeter Pro		✓	✓	✓
InnoPlotter Pro		✓	✓	✓
InnoBalancer Pro			✓	✓

This rich software equipment allows an extensive analysis of the vibrational behavior of your machines/plants. Without further ado, it is possible to the take down or extend equipment purposefully. We are at your disposal for advice.

InnoMeter Pro
Parameters at a glance

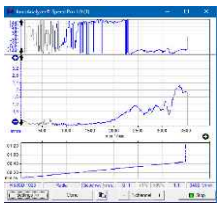


InnoPlotter Pro
Monitor parameters in time

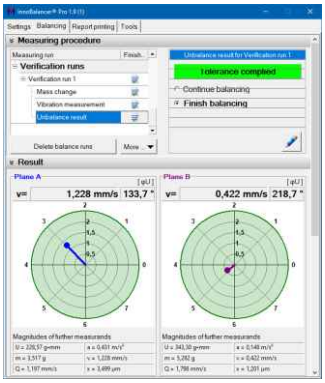


InnoScope Pro
Display vibrations in time domain

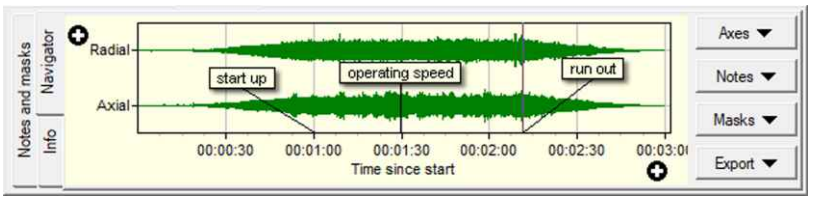
InnoAnalyzer Pro
There are vibrations at which frequencies?



InnoAnalyzer Speed Pro
Resonances occur at which rotation speeds?



InnoBalancer Pro
Precise elimination of unbalances



InnoMaster Replay
Always inclusive: Recording raw data during the measurement. Replay live data with the InnoMaster Replay.
By means of **FreeReplay** option, third parties can download VibroMatrix without costs and then analyse the raw data transmitted by you.

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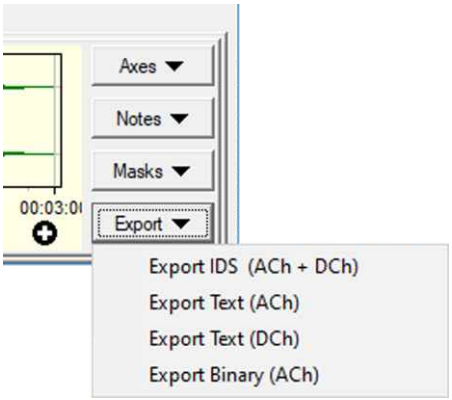
Global Options - InnoMaster Replay

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.



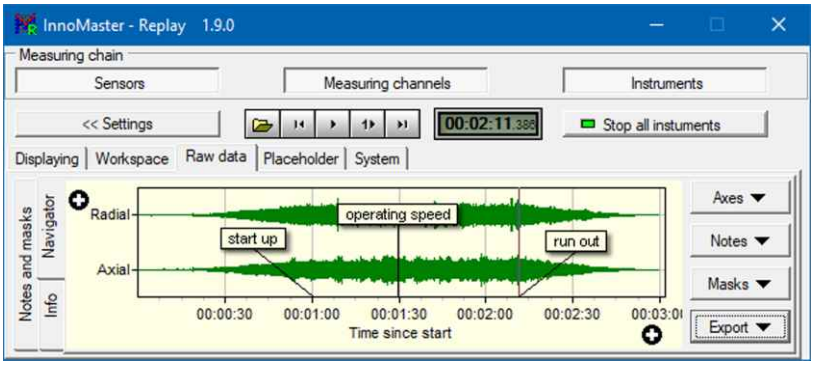
FRep - Free Replay

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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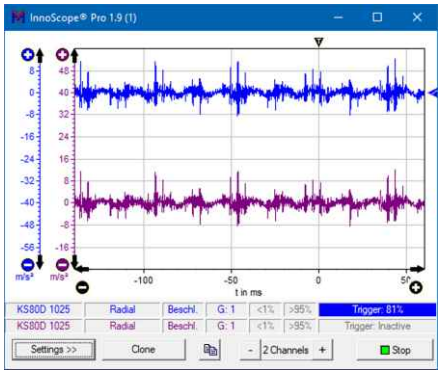
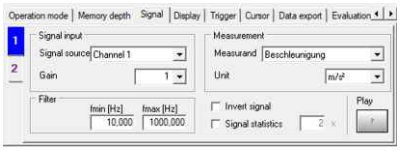
Software Module - InnoScope Pro® 1.9

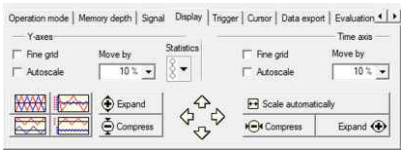
Digital Oscilloscope



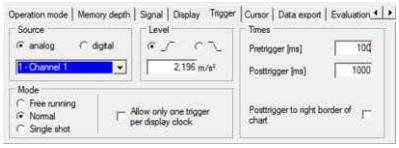
Simultaneous display of up to 4 graphs, optional: statistics



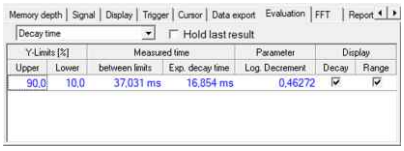
Numerous settings for signal conditioning



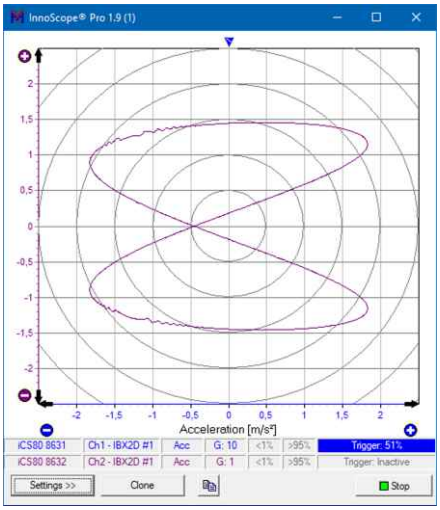
Arrange, zoom, compress graphs acc. to your demands

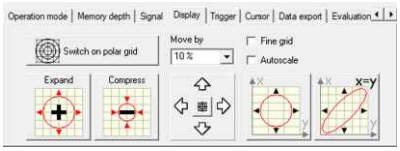


Analog and external digital trigger source

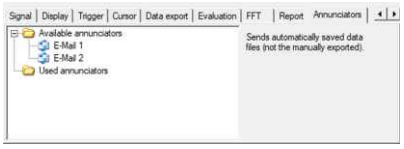


Automated signal evaluations (Pro version)





Orbital mode: display movements of the measurement object in the plane



Annunciation of measured data and events

Application

The InnoScopes allow the signals' shape analysis of fast vibration and shock processes in time domain. These processes can be displayed in detail, measured and exported for documentation or post-processing.

Thus, e.g. construction parts which are exposed to impulse-like loads can be optimized. Automated evaluations determine e.g. the HIC (Head Injury Criterion) directly after the measurement, but also parameters of decay processes. Working together with the InnoAnalyzer, natural frequencies can be determined.

Likewise, the InnoScopes reliably display sporadically or periodically occuring events. The orbital mode displays movement of the object in the plane (e.g. shaft vibrations).

Properties

The InnoScopes are universal digital oscilloscopes.

Up to 4 measurement graphs can be displayed in one InnoScope simultaneously. They can represent both, signals of different sensors but also different measurands from one sensor signal, since the InnoScope Pro masters time integration and double integration.

The InnoScopes have a high memory depth of up to 10 million measured values per channel. They record up to 1000 seconds to display low-frequency processes, e.g. building vibrations.

The new statistical techniques can be used for smoothing the displayed processes, but also to detect the signal range.

For evaluation, 2 cursors are available. Time and measured values as will as differences at the cursor position are presented numerically.

The export of data as graphic or text provides additional fields of application. Furthermore, the recorded signals can be played back acoustically or be saved as wave file. The InnoScope can even carry out this export automated when triggering and then send this file via e-mail by means of the annunciator function.

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Technical Data — Software Module - InnoScope®

	InnoScope Pro®	InnoScope®
Signal processing		
Filter	Freely adjustable 0.1..40 000 Hz **	
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 | 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	
Trigger		
Modes	Free running, normal, single shot	
Source	Analog or digital channel, each with rising / falling edge	
Level	Freely adjustable ±10000	
Pretrigger /Posttrigger	0 .. 1000 ms / 0.001 .. 1000 s	0 .. 1000 ms / 0.001 .. 100 s
Graphical Presentation		
Number of Graphs in the Chart	1 .. 4	
Number of Graphs for Statistics	1 .. 100	-
Statistical Presentation Modes	Minimum / maximum / mean value Current, min, max / mean, min, max	
Interval Y-axis / X-axis (time)	0.01 .. 10000 / 1 ms .. 101 s	0.01 .. 10000 / 1 ms .. 11 s
Time Resolution / Memory Depth	Up to 0.01 ms *** / up to 10.1 Millionen Werte	Up to 0.01 ms *** / up to 1.1 Millionen Werte
Cursors	2 lines, freely adjustable by mouse or button, display of cursor values and difference	
Refresh	1.. 16 times per second *	
Status Indicators	Sensor, measuring channel, measurand, gain, underload, overload, trigger status	
Date Export		
Control	Manual and automatic after trigger	
Formats	Bitmap, PNG, Enhanced Meta File (EMF), text, wave	
Destinations	Clipboard or file	
Event Annunciators		
E-Mail	Trigger initiates transfer of exported measurement data	
Miscellaneous		
Integrated Evaluations	Decay time, log. decrement, Head Injury Criterion (HIC) and phase position (orbital mode)	-
Coupling	With InnoAnalyzer and InnoAnalyzer Pro	
Available in a Kit	VMSet-02;-03;-04;-05	-
General Functions	Measurement data is held after switching off, module is cloneable	

* Centrally managed in the InnoMaster
** When using the InnoBeamer LX2: 0.1 .. 3200 Hz
*** When using the InnoBeamer LX2: 0.125 ms

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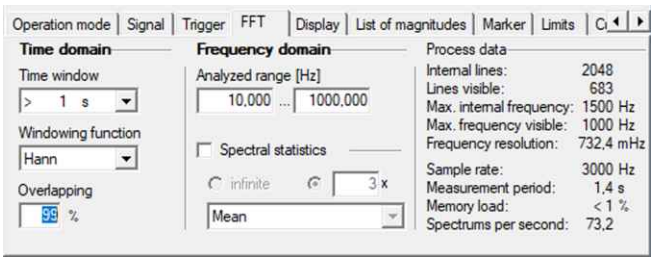
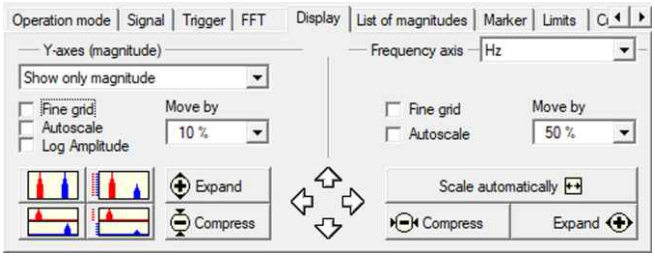
Software Module - InnoAnalyzer Pro® 1.9

FFT Vibration Analyzer

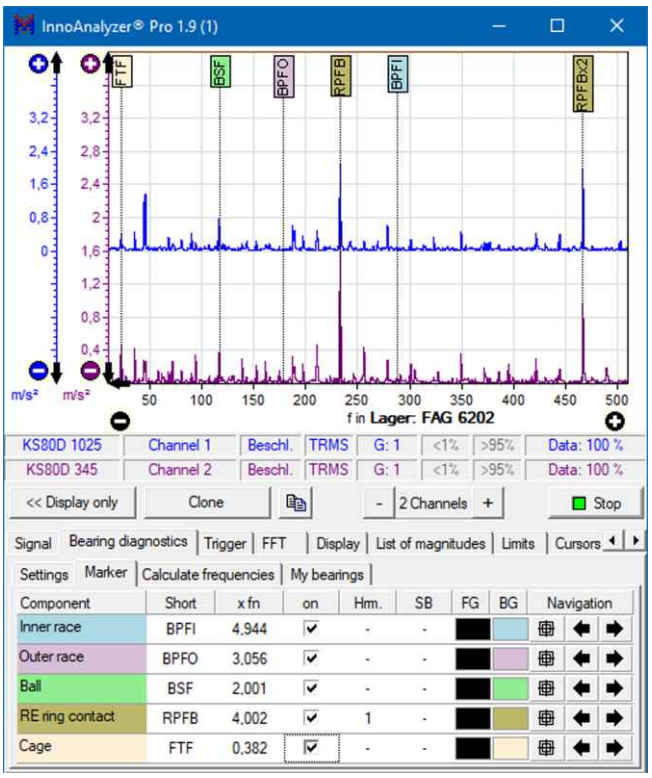
Simultaneous analysis of up to 4 signals, phase display switchable



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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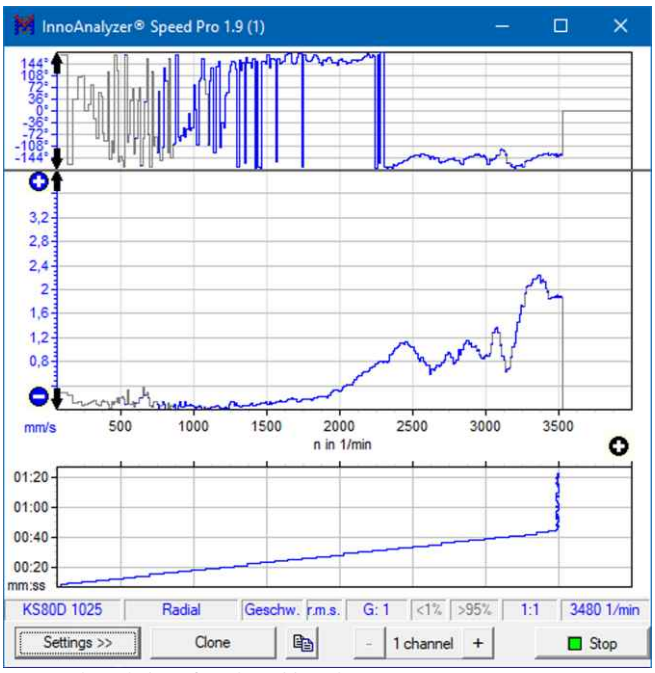
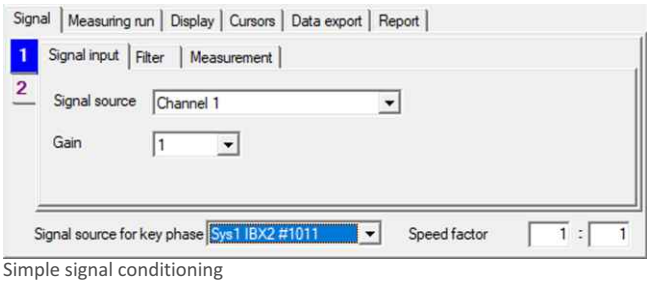
Software Module - InnoAnalyzer Speed Pro® 1.9

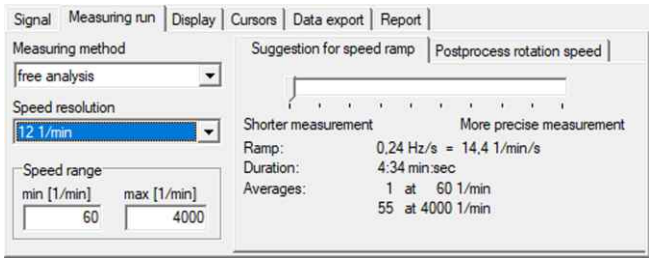
Run-up/Coast-down Tracking Analyzers



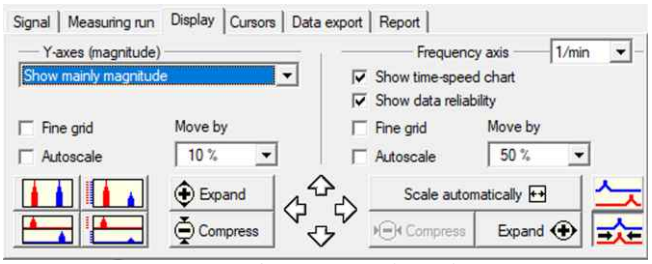
Magnitude and phase for adjustable orders



Simple signal conditioning



Settings for the measuring run, speed ramp



Arrange, zoom, compress graphs acc. to your demands or move them in direction of the frequency axis and display all orders stacked

Application

Rotating parts in drives, gears, pumps, fans and many other technical products cause perturbing vibrations. Different rotation speeds cause different vibrations since the measurement objects develop or do not develop resonant behaviour at certain rotation speeds.

These differences become obviously in run-up or coastdownmeasurements. A rotor changes its rotation speed when run up or coast down and excites the whole system at different frequencies.

The InnoAnalyzers Speed measure the vibration level and phase angle at the rotation speed or a multiple and graphically display them at the respective rotation speed. This way, for instance resonant rotation speed levels are detected.
The progression of the rotation speed is displayed graphically as well.

For rotation speed detection, different photoelectric reflex switches and contrast scanners are directly supplied by the InnoBeamer and their signal is read. Optionally, an existing rotation speed signal can be fed as pulse/ revolution or reference can be taken towards a transformed rotation speed.

Properties

The InnoAnalyzers Speed masters order-tracked filtering and band-pass filtering. Thus it can display magnitude and phase of (pre-filtered) orders but also wide-band overall values in dependance on the rotational speed.
Speed range and frequency resolution can be adjusted. Using these parameters, the InnoAnalyzer Speed calculates optimum settings for the speed change rate, which you can enter for instance into a frequency converter.

Magnitude and phase of arbitrary orders can be displayed at their actual frequency or they can be displayed frequency-transformed and stacked in relation to order 1.

The clone function makes it possible to operate several InnoAnalyzers at the same time.

The export of the measurement graph as graphic or pairs of numbers in text format into other applications provides additional fields of application.

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Technical Data — Software Module - InnoAnalyzer Speed®

	InnoAnalyzer Speed Pro®	InnoAnalyzer Speed®
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 of Order Analysis	Peak value, Peak-to-peak value, r.m.s. value, phase	
Characteristics of Wide-Band Analysis	Instantaneous value, peak value absolute / positive / negative, peak-to-peak value, true r.m.s. value	
Orders in Order Analysis	Freely adjustable ratio m : n (m, n: 1 ..1 000)	
Frequency Range in Wide-Band Analysis	Freely adjustable range 0.1 .. 40 000 Hz **	
Measurands and Units X-Axis	Frequency (Hz) / Rotational speed (rpm)	
Frequency Resolution	0.05 / 0.1 / 0.2 / 0.5 / 1 / 2 / 5 / 10 / 20 Hz (3, 6, 12, 30, 60, 120, 300, 600, 1200 rpm)	
Graphical Presentation		
Number of Graphs	1 .. 4 for magnitude, 1..4 for phase, 1 time-speed chart	
Refresh	1 .. 16 times per second *	
Interval Y-Achse	Magnitude: 0.1 .. 10000 / Phase: 0..360°, -180 .. +180°, -3600 .. 3600 ° / Zeit: 1 min .. 24 hours	
Interval X-Achse	0.2 .. 40 000 Hz / 2 .. 2 400 000 min-1 **	
Cursors	2 lines, freely adjustable by mouse or button, display of cursor values and difference	
Measuring Methods	Switchable without restart: Run-up/Coast down (rising/falling rotation speeds with average only), Run-up/coast-down monotonous(rising/falling rotation speed without average only), free analysis (all rotation speeds with average)	
Frequency Shift	All orders can be transformed to order 1 for a better comparison	
Statistics	Visualization of number of averages for each speed interval by means of line thickness and color	
Status Indicators	Sensor, measuring channel, measurand, characteristic, gain, underload, overload	
Data Export		
Control	Manually or time-triggered	
Formats	Bitmap, PNG, Enhanced Meta File (EMF), text	
Destinations	Clipboard or file	
Miscellaneous		
Measuring Run	Optimum speed change rate is calculated and indicated	
Available in a Kit	VMSet-03;-04;-05	-
General Functions	Measurement data is held after switching off, module is cloneable	

* Centrally managed in the InnoMaster
** when using a InnoBeamer LX2: Maximum frequency 3200 Hz, maximum rotation speed 192 000 rpm

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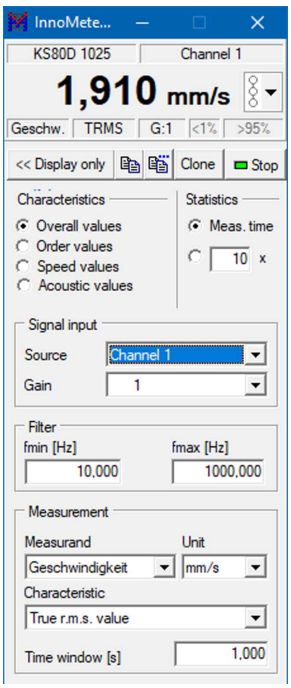
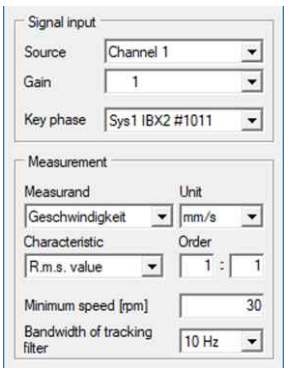
Software Module - InnoMeter Pro® 1.9

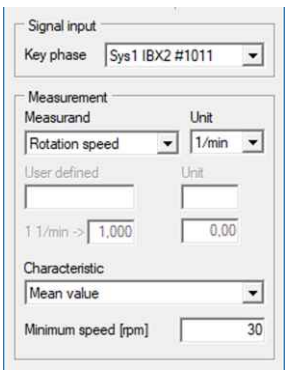
Vibration Meter with Numerical Display



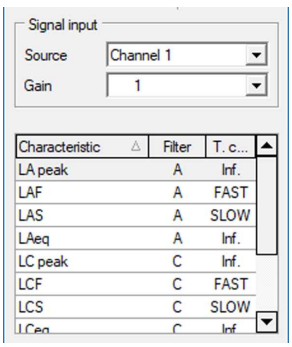
Overall values



Order values



Speed values



Acoustic values

Application

When vibrations have to be measured as significant characteristics, InnoMeters are applied.

Rotating parts in drives, gears, pumps, fans and many other technical products cause vibrations. Recurring impacts like construction operations or vehicular traffic cause perturbing vibrations as well.

Numerous standards, e.g. DIN/ISO 20816 or the machinery directive, define significant vibration characteristics for a reliable evaluation of vibration and sound.

The InnoMeters measure these characteristics precisely and thus allow a reliable assessment of the vibration state.

The InnoMeters are applied in the complete product cycle – development, manufacturing, final inspection. Weak spots are discovered, the success of counter measures is proven and the compliance with limits is controlled.

Properties

The InnoMeters are universal measuring instruments for characteristics of vibration, sound and further mechanical and electrical measurands. They can be adapted tocharacteristics from numerous standards and directives.

For instance, the InnoMeter Pro features:

- Measurands: acceleration, velocity, displacement, rotation speed, user-defined measurands
- SI and imperial units for each measurand
- Free filter adjustment 0.1 .. 40000 Hz
- 25 characteristics

Additional to overall values, the InnoMeter Pro offers order values for the measurement on rotating machines:

Magnitude and phase angle can be displayed for adjustable orders. Fractional orders, e.g. from gear ratios, can be entered as well. The InnoMeter Pro can also display the rotation speed, which can be converted into other units as well, for instance to display length' speeds.

Sound measurements acc. to the machinery directive are, among others, supported in the InnoMeter Pro by means of the characteristics LEX,8h and LC,peak.

Status information concerning the measurement quality, like over- or underload, is always indicated.

The clone function makes it possible to operate several InnoMeters at the same time, for example to measure several characteristics simultaneously.

The measured values can be copied into other programs for documentation.

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Technical Data — Software Module - InnoMeter®

	InnoMeter Pro®	InnoMeter®
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, 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	
	1/min, 1/s, Hz, 1/h (Rotation speed), Hz, kHz (Main frequency) % (mono harmony), ° (Phase angle)	-
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	-
Graphical presentation		
Display	5 digits 0.001 .. 99999	
Refresh	1.. 4 times per second *	
Status indicators	Sensor, measuring channel, measurand, characteristic, gain, underload, overload	
Miscellaneous		
Available in a Kit	VMSet-03;-04;-05	-
General Funtions	Measured value is held after switching off, module is cloneable, measured values can be copied to clipboard	

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

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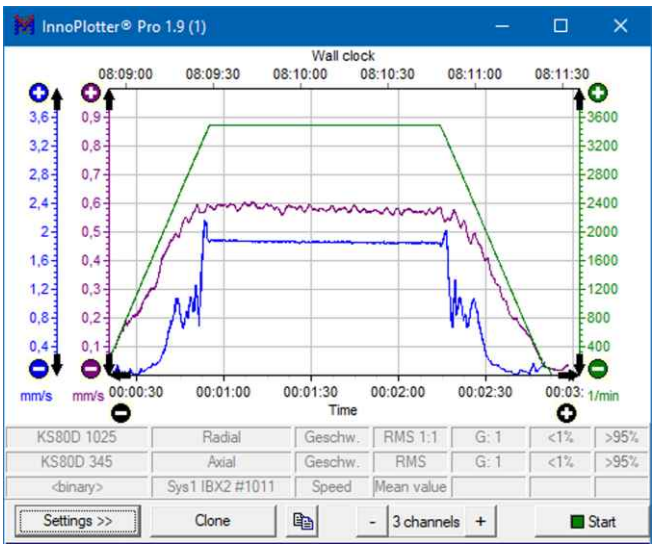
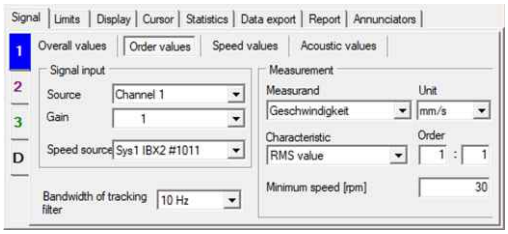
Software Module - InnoPlotter Pro® 1.9

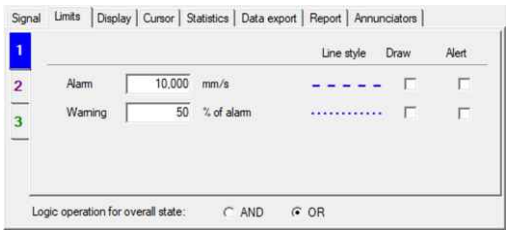
Digital Strip Chart Recorder



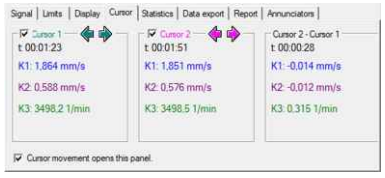
Simultaneous display up to 4 graphs, different measurands



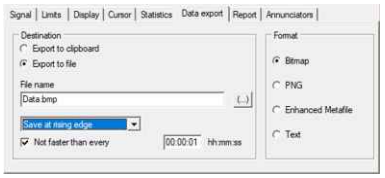
Numerous settings for signal conditioning



Warning/alarm limit for monitoring characteristics



2 cursors, display of cursor data and



Data export by mouse click or automated

Annunciation of measured data and events

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.

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.

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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-03;-04;-05	-
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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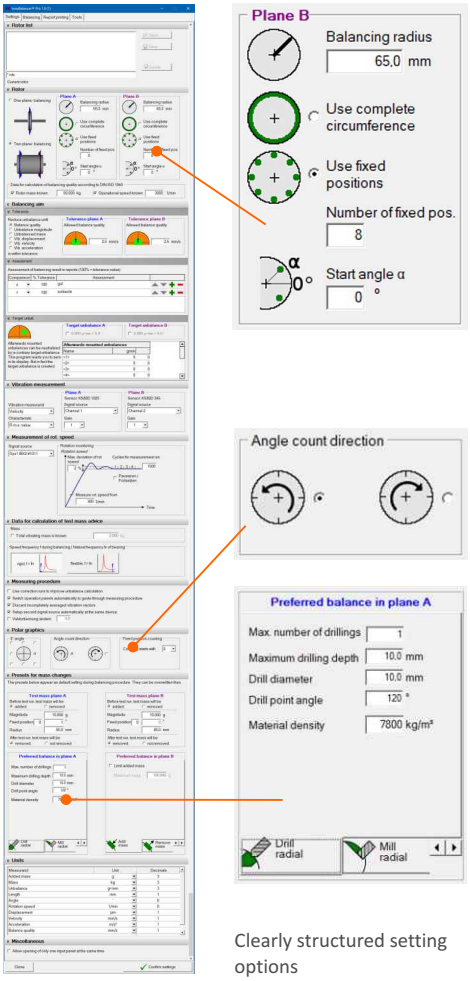
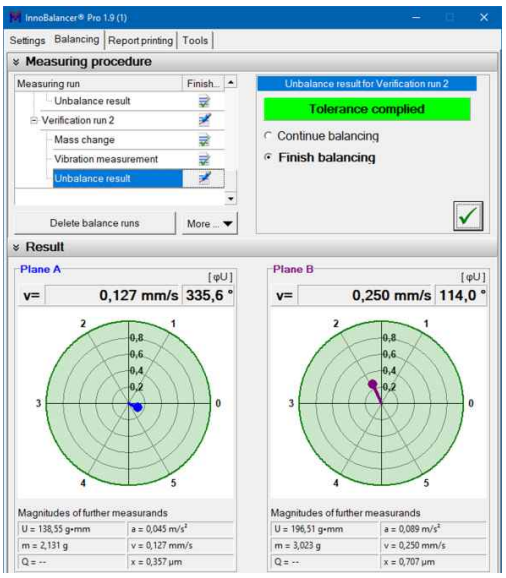
Software Module - InnoBalancer Pro® 1.9

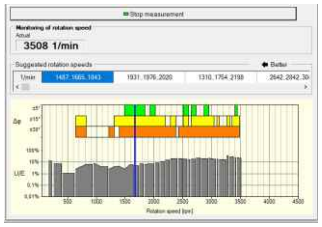
Field Balancing



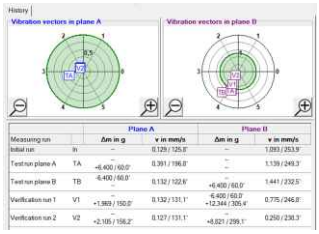
Clearly structured setting options



Purposefully reached balanced status



Analysis and display of optimum rotation speed for balancing



Overview of all measuring runs

Application

The InnoBalancers are designed for the reduction of vibrations.

Rotating parts in drives, gears, pumps, fans and many other technical products cause perturbing vibrations. These vibrations often have to be reduced in order to increase product quality and durability by smooth run.

The InnoBalancers allow a purposeful vibration reduction by balancing. Both discoidal and longish rotors can be balanced systematically and fast.

The InnoBalancers support field balancing. Ideally, the rotor is balanced directly in installed state. So you save the complex dismantling and the transport of the rotor to a balancing machine. Moreover, in many cases, an acceptable performance can only be achieved by balancing the installed rotor with all attached parts.

Properties

The InnoBalancers guide the user through the balancing process so that unbalance and caused vibrations are reduced purposefully.

You enter the most important rotor data in a clearly structured control panel. Afterwards you open the “balancing” control panel. It presents the balancing process with its different steps which you simply carry out. For rotors with alternating rotation speeds, the InnoBalancer Pro offers the analysis of optimum rotation speed for balancing so that you are prevented from balancing at resonant rotation speeds.

By means of the automatic recognition of rotation speed, the InnoBalancer reads the vibration vectors in a high quality and calculates the unbalance. The InnoBalancer Pro also offers suggestions for the test mass.

After unbalance calculation, the InnoBalancer offers clear suggestions for balancing. In case of not following these suggestions, consequences are already shown in chart even before the measurement is started.
Furthermore, the InnoBalancer Pro masters continuous improvement of influence coefficients and shows the single vectors of each revolution as well as the development of the vibration vectors for all measuring runs.

Measuring runs can be saved and reloaded. Thereby balancing can be interrupted and later be continued.

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Technical Data — Software Module - InnoBalancer®

	InnoBalancer Pro®	InnoBalancer®	InnoBalancer Light®
Balancing Methods and Calculations			
Planes	One- and Two-Plane Balancing for static and dynamic unbalance		
Fixed Positions	3..99 fixed positions, adjustable angle difference between 2 planes		-
Balancing Aims: Reduction of the following measurands to an adjustable tolerance	Unbalance magnitude Unbalanced mass Balance quality acc. to DIN ISO 21940 Vibration displacement, -velocity, -acceleration	Unbalance magnitude Unbalanced mass	
Test Masses	Suggestion for test mass Before run: Add / Remove Afterwards: Keep / Revert	Before run: Add / Remove Afterwards: Revert	Before run: Add Afterwards: Revert
balancing methods	Add mass Remove mass Drill radial Mill Balancing rings, nuts Radial setscrews Mass list	Add mass Remove mass	Add mass
Additional Calculations and Analyses	Optimum rot. speed for balancing Defined unbalance Vector monitoring Adding influence coefficients Combining masses	Vector monitoring (checks whether the vector positions are plausible)	
Signal Processing			
Vibration Measurands	Vibration velocity Vibration acceleration Vibration displacement	Vibration velocity	
Units	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 | t, kg, g, mg, µg, ng, lb, oz, dram | kgm, gm, gmm, mgmm, µgmm, ngmm, g in, lb in, dram in, oz in | °, rad | kHz, Hz, mHz, 1/s, 1/min, 1/h, rpm, cpm		
	m/s^2, mm/s^2, $µm/s^2$, nm/s^2, pm/s^2, g, mg, µg, km/s^2, kg, dB | kg/m^3, g/cm^3, kg/l, g/ml, lb/ft^3, oz/in^3, lb/in^3	-	
Rotation Speeds	6 .. 600 000 rpm *		
Rotation Speed Monitoring	Automatic recognition of run-up, monitoring of constant rotation speed incl. adjustable tolerance		
Graphical Presentation			
User Guide	Tree structure for measuring runs and division of each measuring run in balancing steps		
Optimum Rot.Speed for Balancing	Phase constancy and signal level	-	
Averaged Vibration Vectors	Numerical and in polar chart Optional display of single vectors Progress of all measuring runs	Numerical and in polar chart	
Display of Balancing Measures	Balancing suggestions and status of execution in polar chart and text / numerically Unbalance preview in polar chart and numerically in case of not following balancing suggestions		
Miscellaneous			
Rotor List	✓	-	
Save Measuring Runs	✓	-	
Available in a Kit	VMSet-01;-04;-05	VMSet-01	VMSet-01
General Functions	Measurement data is held after switching off, module is cloneable		

* Using InnoBeamer LX2: 6 .. 192 000 min^{-1}

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