



Association VAST - winner of the Main All-Russia public award "Russian National Olympics" as an "Outstanding Small or Medium Business Enterprise"



# Vibration Analyzer Data Collector **DC-21**



# DC-21

## Dual channel vibration analyzer and data collector for condition monitoring, diagnostics and balancing



### NEW GENERATION VAST AND VIBROTEK INSTRUMENTS

The DC-21 is our new hardware platform for dual channel analyzers.

The DC-21 uses a 24 bit delta-sigma analog to digital converter.

The dimensions and weight of the analyzer have been decreased by almost two times compared to the previous model, the DC-12M. The DC-21 has a light aluminium alloy casing and has improved environmental protection; it is dust and splash proof. The DC-21 is equipped with with an easily replaceable battery.

The DC-21 is easily expandable in functionality by simple firmware upgrades.



### ACCELEROMETERS AND SENSORS

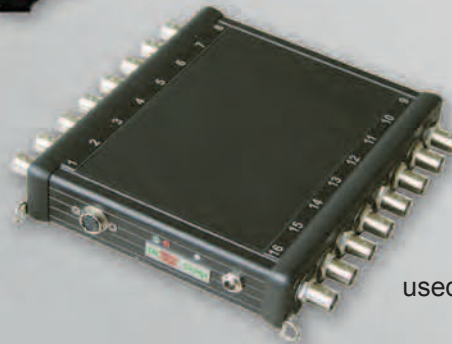
The DC-21 works with a variety of sensors such as ICP, charge, etc. accelerometers, clamp-on current, etc. plus many other sensors including clamp-on current.

Accelerometers have different designs and can be mounted permanently or or using a temporary magnet



### PHASE REFERENCE TACHOMETER

The DC-21 can be equipped with several types of tacho probes for rotation speed and phase measurements. Shown above are a photo probe and a eddy current probe. The tachos can be mounted permanently or temporarily with a special holder.



### MULTIPLEXER

A 16 channel multiplexer with internal battery that supplies constant power to all accelerometers can be used for amplitude/phase-RPM measurements for run-up/coast-down measurements.

When equipped with multiplexers, the DC-21 can work as part of an on-line system for monitoring and test stand applications.



### BATTERY

The DC-21 has a quick replacement, field replaceable battery. The battery can be charged in the instrument or externally.



### HEADPHONES

The DC-12M has an sensor audio output which can be used with headphones, This is an old and simple way to estimate machinery condition and search for noise sources.



# The DC-21 meets all requirements for condition monitoring, diagnostics and balancing applications



The DC-21<sup>®</sup> is a fully digital dual channel spectrum analyzer and data collector. It is used for:

## Condition monitoring and diagnostics:

- time wave form (oscilloscope mode)
- vibration levels in different frequency bands according to ISO standard.
- RMS, true peak, peak-peak
- peak factor
- autospectra
- envelope spectra selected by multiple band pass filters
- rotation speed
- amplitude and phase of rotation speed and its harmonics
- recording of long duration time domain signal limited by with memory capacity

## Rotor balancing

- 1, 2 or 3-plane balancing
- up to 8 measurement points
- balancing using influence coefficients without trial runs (trim balancing)
- utilities for trial weights estimation, summing, and splitting weights
- automatic report generation and printout

## Analysis for machine commissioning

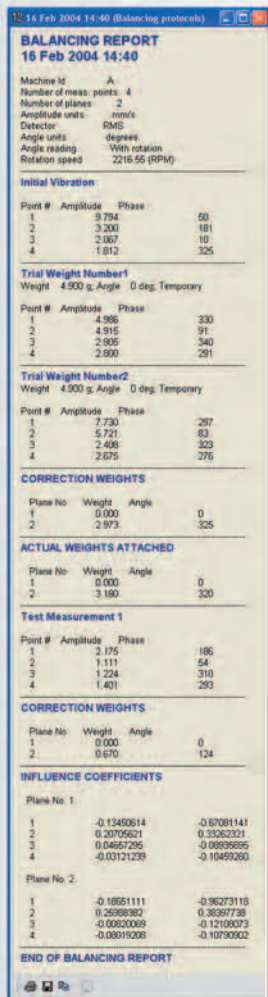
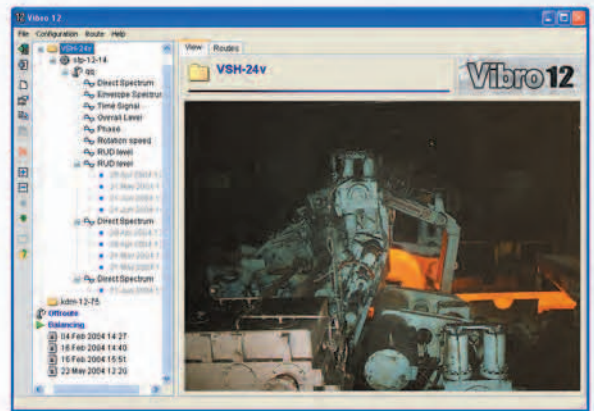
- RPM/amplitude/phase characteristics during machine run-up/coast down (up to 16 channels simultaneously)
- modal analysis, resonance analysis, logarithmic coefficient of damping for certain frequencies
- shaft alignment shims calculations from the results of measurement with probes or dial-type indicators

Vibro12 is application software included in the DC-21 package. It supports all features of the DC-21 and provides database and analysis tools

# Vibro12

## USES

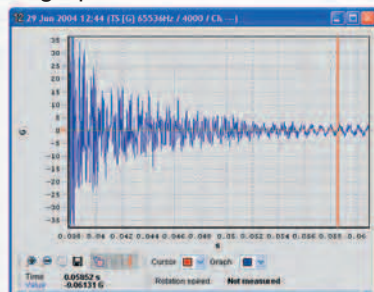
Vibro12 is designed for the DC-21 database support with hierarchy tree, configuration of machines, measurement points, routes and provides a standard means of data analysis. All data collected with the DC-21 can be unloaded to Vibro12, including balancing and other application protocols. A user friendly interface allows picture or drawing attachment for each machine.



## DATA ANALYSIS

A complete balancing report, automatically generated in the DC-21, and unloaded to the Vibro12 is shown on the left. You can see all the steps of balancing procedure. Influence coefficients can be used for future trim balancing.

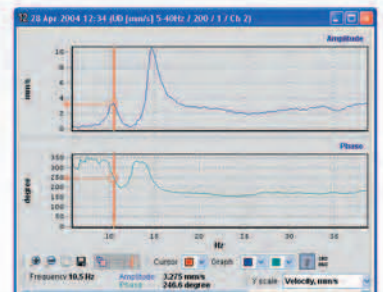
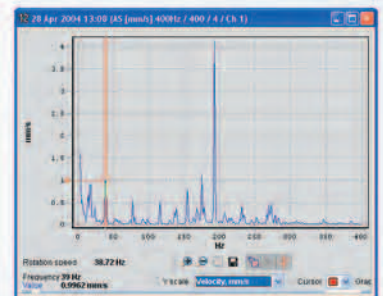
All data can be exported in text or graphic format



An autospectrum analysis window is presented on the right. Any amplitude units can be chosen for display. If the rotation speed was measured, Vibro12 displays it with the measured data.

A shock response for modal analysis is displayed on the left. Vibro12 or DC-21 calculate spectra and damping decrement from time domain data.

On the left is an example of run-up amplitude and phase dependency vs. RPM.



## DC-21 specifications

<b>Input</b>	
Number of channels	2 analog channels 1 synchronization channel
Input types	linear voltage (two ch.) ICP® or charge accelerometer (two ch.) phase reference tachometer (TTL)
Sensor types	accelerometer, current clamps, microphone, tachometer probe
Integration	analog (one stage) digital (one or two stages) phase reference tachometer (TTL)
Frequency range	0.1 - 25600 Hz
Frequency response (+/-0.5dB)	0.5 - 25600 Hz
Linear input signal range	± 3 V
Phase difference between channels	from 2..300 Hz less than 1 degree from 301..1000Hz 5 degrees or less
Cross channel interference	- 100 dB or better
Gain	auto, 0-54 dB in 6 dB steps
<b>Vibration parameters</b>	
Measured magnitudes	displacement, velocity, acceleration, peak-factor
Detector	RMS, true peak, peak-peak
Frequency bands for vibration measurement	2..1000, 10..1000, 10..2000 Hz
ISO standard:	2..200, 3..300, 5..500, 10..5000,
additional:	500..2500, 625..1250, 1200..2500, 2500..5000, 5000..10000, 10000..25000, 17000..25000 Hz
Vibration range	
acceleration (on 160 Hz)	from 0.05 up to 1000 m/s <sup>2</sup>
velocity (on 80 Hz)	from 0.1 up to 100 mm/s
displacement (on 40 Hz)	from 1 up to 1000 um
<b>FFT spectra</b>	
Frequency span	25, 50, 100, 200, 400, 800, 1600, 3200, 6400, 12800, 25600 Hz
Frequency resolution	400, 800, 1600 lines
Dynamic range	90 dB or better
Number of linear averages	1-256
Weighting function	Hanning
Scale type	Linear or Logarithmic
Envelope detector with passband filters	
1/3 octave:	800, 1000, 1250, 1600, 2000, 2500, 3200, 4000, 5000, 6400, 8000, 10000, 12800, 16000, 20000 Hz
1/1 octave:	50, 100, 200, 400, 800, 1600, 3200, 6400, 8000, 12800, 16000 Hz
<b>Amplitude and phase measurements for balancing</b>	
Rotation speed range	0.5-1700 Hz (30-102000 RPM)
RPM error	± 1%
Phase error	± 5 degrees
Amplitude error	± 1 dB
Automatic control	phase reference tachometer signal parameters, reliability of measurements
Amplitude measurement units	G, m/s <sup>2</sup> , mm/s, um, in/s, mil (RMS, Peak, or Peak to Peak)
Internal power supply for phase reference tachometer	5 V DC, 15 mA
<b>RPM-amplitude-frequency measurements for run-up/coast-down</b>	
Rotation speed range	0.5-1700 Hz (30-102000 RPM)
Frequency range	from 0.5 Hz up to 10xRPM
RPM resolution	up to 200 lines on two harmonics
Measurements are done on	1-6th harmonics of rotation speed
<b>General</b>	
Operation temperature	-20 / +50C (5 / +120 F)
Weight	0.9 kg
Dimensions	109(W) x 208(L) x 35(H) mm
Operation time on batteries	10 hours with reserve battery
Battery full charge time	2 hours
Data storage capacity	800 spectra

## DC-21 standard accessories

The following accessories are included in the DC-21 kit



DC-21 in nylon case, accelerometers with magnet and cables, tachometer probe with cables and holder mount with magnet, charger, communication cable, headphones. The DC-21 kit is supplied in a nylon bag. Vibro12 application software is included in the kit.

## DC-21 auxiliary accessories



Different types of optional accessories are available - switchboxes for on-line, test stand, balancing, etc. applications; different types of sensors including current clamps, eddy current tachometers, accelerometers; cables, batteries, chargers, headphones, etc..

## DC-21 firmware options

- BALANCING** Balancing firmware. 1-3 balancing planes, 8 measurement points, including trimbalancing, influence coefficient balancing, splitting and summing weights, etc.
- SHOCK** Modal analysis firmware. Analysis of resonant frequencies and damping coefficients by shock excitation of the structure
- RUN-UP/COAST-DOWN** Amplitude-phase-RPM measurement during machine run-up or coast-down. Up to 16 channels simultaneously. Analyses critical speeds, resonances. Data can be used for the initial balancing of the machine.
- ALIGN** Shaft alignment utility. Calculates correction actions from the alignment measurements using probes or dial indicators (not included in the standard kit).
- RECORDER** Application for recording of long time domain signals for future analysis and processing on computer. The amount of saved signal is limited by amount of free memory only.

## DC-21 software options

- VBal\_PRO** 16 balancing planes, 64 measurement points, 8 operation modes. Balancing by moving of existing weight sets, etc.
- DREAM** Software for condition monitoring, automatic diagnostics, long term condition prediction for all types of rotating equipment - bearings, gearboxes, transmissions, pumps, electric machines, etc., Automatic setup and monitoring by ISO 10816 and other standards.



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