




**Brüel & Kjær Vibro**



# VIBROTEST 60

The 3-in-1 solution for the vibration expert



Mega capacity in  
a mini package

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# Predictive Machine Maintenance Holds the Aces!

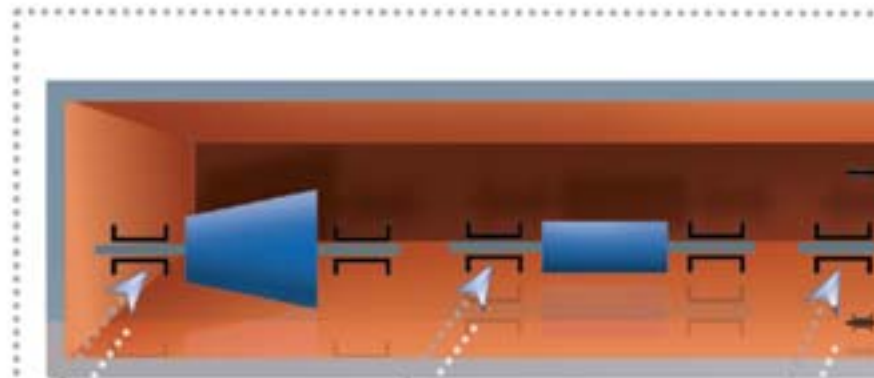
Years of experience and countless applications have clearly demonstrated the advantages of predictive machine maintenance.

- Higher levels of machine availability
- Prevention of unscheduled production stoppages
- Limitation of machine damage by early fault diagnosis
- Lengthening of intervals between inspections, and
- Timely planning of optimally scheduled repair action

are the bases for the cost-effective significance of this strategy for an entire company.

The prerequisite for this is continuous knowledge of the “current” machine condition during operation. Mechanical vibrations, bearing condition values, speeds and process values are authoritative indicators with which the machine condition can be assessed and faults diagnosed.

Which characteristic parameters should be acquired and how often, depends not only on the complexity and absolute value of the machines, but also on the criticality of the machines for the production process.

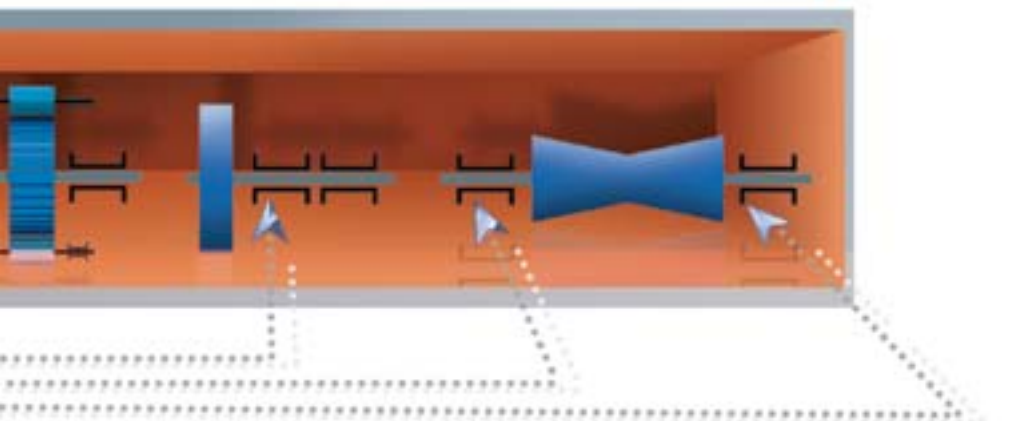


ONLINE

In practice two methods of data acquisition can be implemented:

- On-line acquisition of data showing the machines' condition with permanently-installed measurement, monitoring and diagnosis systems, and
- Off-line acquisition of the same important data with portable data-collectors and analysing instruments.

Brüel & Kjær Vibro offers the most modern solution for both methods.



OFFLINE

The unique feature!

All hardware and software components can be combined

This provides the power for the data acquisition and evaluation to be done selectively in an "off-line", an "on-line", or a "mixed" operation.

This is achieved through a modular design for the PC software concept and a common database for all measured data.

**VIBROTEST 60,**  
the 3-in-1 solution.

- Vibration Analyser
  - Data-collector and
  - Field Balancer
- in one represents THE "off-line" standard in

"Integrated systems for condition-oriented maintenance"

from Brüel & Kjær Vibro.

# VIBROTEST 60- A Modular Concept with Many Facets

## The concept

The modular concept of VIBROTEST 60 allows individual combinations of measurement functions and thus opens up many applications. Any time you are able to complement expanded functional modules and upgrade with future improvement and development of measurement functions without difficulties. VIBROTEST 60 is the ideal instrument for “single-task” or “first-time” users who have future expanded needs for the instrument in mind. At the same time VIBROTEST 60, with its multiple functions, provides the “diagnostics expert” with a solution for universal applications.

All this together in an extremely small compact and lightweight instrument operated with only one hand!

## The unique advantages of VIBROTEST 60:

- For the first time an **FFT-analyzer, data-collector and field balancer** in one handy instrument
- **Easy to understand operator dialogue** in a number of languages; English, German, French, Italian, Dutch, Czech, Hungarian, Polish, Spanish, Portuguese
- **Genuine 2-channel instrument** with additional speed measurement channel
- **Compact, lightweight** (approx. 900g / 2 lb)

## • New level of quality in data-collector technology through

- Extreme speed of measurement and simultaneous processing of up to 5 measurements
- Multiple Routes and random processing of points in the Route
- Random switching between analyser and data-collector modes
- **State of the art, high-tech digital signal processor (DSP)**
- **Long instrument life** through modular, expandable measurement functions for future developments
- **High measurement accuracy and dynamic resolution** with 16 Bit ADC
- **Excellent FFT-spectrum resolution** with 12,800 lines

- Standard acceleration, velocity and displacement sensors can be used
- **Brilliant, high-contrast graphic display** with backlight
- **Unlimited storage capacity** and high security for measured data with PC-cards (Compact Flash / PCMCIA)
- **Exceptionally attractive price: performance ratio**



## PC-Software Packages

### xms VIBRO-REPORT

- Modular PC software packages with a tailor-made range of performance features for data display, fault diagnosis and database archiving, and extensive data-collector functions for predictive machine maintenance

**Note:** Measured off-line data from previous software packages like VIBROEXPERT CM-400 can still be utilised.

## Overview of all Modules

### The function modules of VIBROTEST 60

#### Module 1.1: Basic Module Overall values for Machine Evaluation

- Absolute bearing vibrations
- Relative shaft vibrations
- Bearing Condition Unit (BCU)
- Bandpass measurements
- Process values
- Speed measurement
- Manual entry

#### Module 1.2: Extension Module

- Overall Vibration vs. Speed
- Overall Vibration vs. Time

#### Module 2.1: Basic Module for Machine Diagnosis

- FFT-spectrum for analysis of machine faults and damage

#### Module 2.2: Extension Module for Machine Diagnosis

- Envelope analysis BCS/SED-spectrum for extended identification of bearing damage
- Cepstrum for selective gear analysis

#### Module 3: Tracking Analysis

- Narrow-band measurement of rotor-synchronous vibrations
- Amplitude / Phase vs. Speed
- Amplitude / Phase vs. Time

#### Module 5: Dual-channel Function

- Extension for simultaneous acquisition and evaluation of all measurements for condition-oriented machine maintenance

#### Module 6: Data-collector

- For systematic acquisition and evaluation of all measurements types for predictive machine maintenance

#### Module 7: BALANCING EXPERT Field Balancing (Dual-channel)

- For field balancing of rotors in one and two correction planes

#### Module 8: CPB-spectrum

- For efficient fault detection through formation of multiband-pass filters in the frequency range of measurement.



# Accurately Identifying Machine Condition and Faults

## Module 1: Comprehensive Evaluation of Machine Condition

### The task

The machine condition can be quickly and simply evaluated with the help of overall measurements such as vibration, displacement, and process values. To do this the relevant parameters are measured, compared with limit values and, usually, the trend of the measurements are monitored over some time period.

From the results a decision can be made whether the machine can continue to operate, detailed diagnostic measurements are necessary or repair action must be initiated.

### VIBROTEST 60 offers the solution:

With the measuring functions

#### Module 1.1:

- Absolute bearing vibrations
  - Relative shaft vibrations
  - Bearing Condition Unit (BCU)
  - Bandpass measurements
  - Process values
  - Speed measurement
- and the possibility of
- Manual entry

all relevant indicators for comprehensive machine evaluation are available.



VIBROTEST 60 is perfected with the measurement functions of

#### Module 1.2:

- Overall Vibration vs. Speed
- Overall Vibration vs. Time

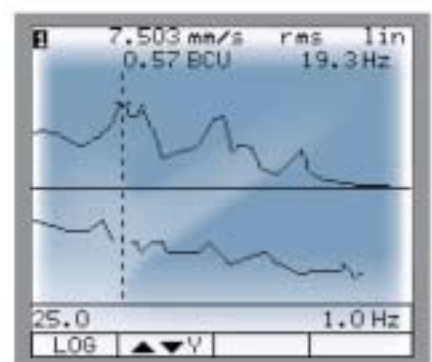
opening up for you the possibility to observe the behaviour of a machine over a longer time period or an almost freely-definable speed range. This is often required for example in the case of acceptance tests.

### The advantages:

- All measurements can be acquired in a measurement list, stored and extended at any time with the "Listing function".
- The Report memory allows an almost unlimited storage capacity with the use of PC-cards. For transfer of data the PC-card is simply inserted in the PC and "read". This means the VIBROTEST 60 itself is always available during this time for your measurement tasks.



- Observation time period of more than 24 hours through a maximum number of data sets (up to 6,400) when recording vs. time.
- The extraordinarily flexible instrument configuration allows different setups of the high- and low-pass filters for broad-band measurement. This guarantees optimum adaptation to the individual measurement task.
- Simultaneous processing of vibration and bearing condition values
- Averaging function for noise influence and beat-effect reduction.



# Analysing Measured Data and Diagnosing Machine Faults

## Module 2: Machine Diagnosis by FFT-analysis

### The task

If unacceptably high overall vibrations or bearing condition units are found in the course of the machine evaluation, the causes must be identified so progressive and specific action can be taken. A frequency analysis (FFT) and envelope analysis, in BCS mode (Bearcon Signature) or in SED mode (Selective Envelope Detection), provides the answer so the increased vibrations can be traced to unbalance, misalignment, a bearing or gear fault or some other source. In those cases where functions already mentioned are not completely authoritative for selective analysis of gear damage, a Cepstrum function delivers additional invaluable information.

### VIBROTEST 60 offers the solution:

With the diagnosis methods of

#### Module 2.1:

- FFT-spectrum

and

the extended method of an envelope analysis using

#### Module 2.2:

- Bearcon Signature
- Selective Envelope Detection and a
- Cepstrum function

the causes of faults and damage can be reliably diagnosed.

#### The advantages:

- All important averaging functions, like "time-domain", "frequency-domain", "peak-hold" are available
- Relevant windowing functions Flat-top, Hanning, Uniform
- Efficient envelope analysis "BCS/SED-spectra" for diagnosis of bearing damage
- High dynamic resolution and accuracy through 16-Bit ADC and 12,800 line FFT
- Excellent graphic displays and resolution through a Zoom function in X- and Y-axes and a linear/logarithmic switch-over function in the Y-axis.

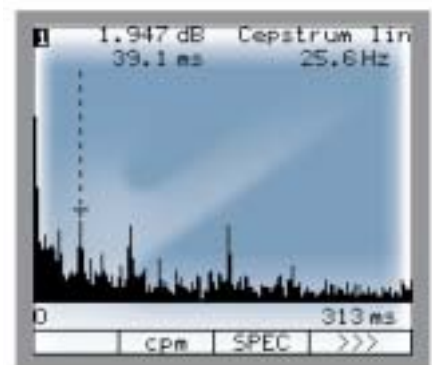
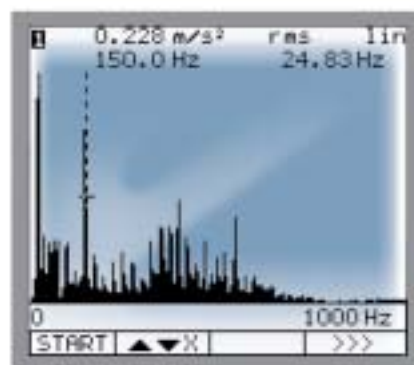
## Module 3: Tracking Analysis

### The task

Many faults and types of damage in machines lead to mechanical vibrations with a frequency directly related to the rotational speed of the rotor. Of special interest are e.g. unbalance, alignment errors, blade-pass frequencies, gear-mesh frequencies in gearboxes, that occur as rotor-synchronous vibrations or harmonics (orders) of the rotor's rotational frequency.

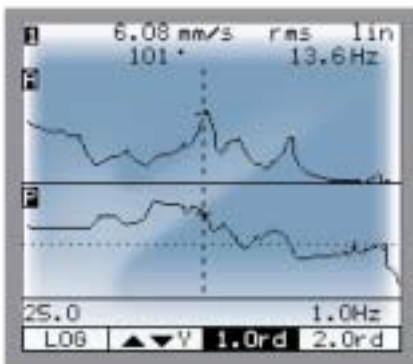
### VIBROTEST 60 offers the solution:

The tracking analysis allows an extremely fast and selective narrow-band measurement of rotor-synchronous vibrations. Thus the most important vibration signals from the machine can be analysed specifically during stationary operation or run-up / coast-down or over a longer time period due to thermomechanical events of the machine. At the same time the vibration behaviour the machine exhibits over the entire speed range provides important information about the resonance behaviour of the machine.



The advantages:

- Simultaneous acquisition of the amplitude and phase of two orders of vibration in both measuring channels
- Extremely sharp tracking-filter with bandwidths from 2 Hz to 0,01 Hz
- Maximum number of measured values (up to 6,400) when recording run-up or coast-down curves
- Numerical and graphical live-display of amplitude and phase measurements
- Storage of all measurements on the inserted PC-card



## Module 8: Efficient and reliable machine fault detection with CPB-spectrum

The task

Traditionally spectral analysis (FFT) has been used for fault detection and signal analysis, with fault diagnosis as the primary objective. Experience shows however that a manual interpretation of an FFT-spectrum is very time-consuming. Considering that almost 90% of all machines operate without problems, this time-expense fortunately does not often occur. An alternative to this is a CPB-analysis (Constant Percentage Bandwidth). The CPB-analysis guarantees maximum spectral analysis efficiency in broad-band fault detection.

VIBROTEST 60 offers the solution:

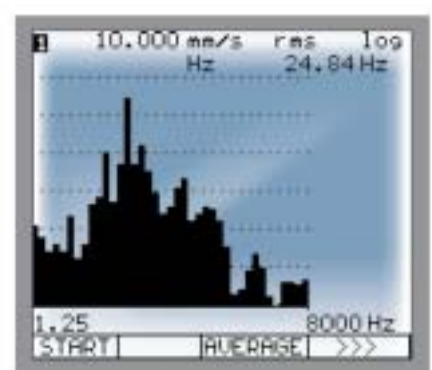
With the measuring function

- CPB-spectrum

on-going damage can be identified at an earlier stage at the spectrum level than at the Overall vibration level with the help of CPB-spectra comparisons.

The advantages:

- Automatic early fault detection through high reproducibility of the measurement. Limit values can be set closer to reference values under "normal" operating conditions
- Simple switch-over of bandwidth between 70%, 23% and 6% allows easy adaptation to the desired resolution quality
- Easy interpretation of the measurement results through limited number of frequency components (bands)
- As a consequence of data reduction from this method shorter access times in the software are guaranteed.
- High effective measurement function for the data-collector



# Complete Data Acquisition and Selective Evaluation

## Module 6: Data-collector

For systematic condition-oriented machine maintenance.

### Measurement functions in Data-collector operation

- All the measurement functions of Modules 1.1, 2.1, 2.2 and 8 are possible, i.e. all Overall vibrations, spectra, envelope analysis, Cepstrum and CPB-spectrum
- Measurement channels:  
1 channel plus speed measurement

### Special advantages of the VIBROTEST 60 data-collector

#### Simultaneous processing of up to 5 measurements:

- 1 Overall vibration value
- 1 Bearing Condition value or 1 bandpass value
- 1 FFT-spectrum or 1 CPB-spectrum
- 1 Bearcon Signature or 1 Selective Envelope Detection
- 1 Speed measurement

is done with one measurement.

- **Multiple Routes**, i.e. up to 5 Routes, each with 1,000 measurement points can be processed.

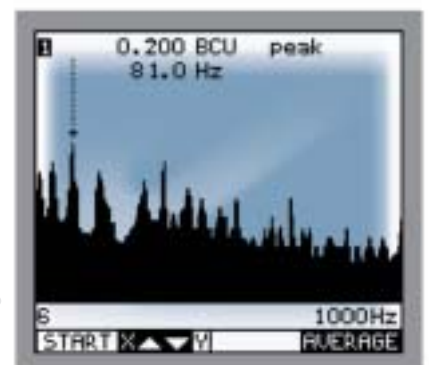
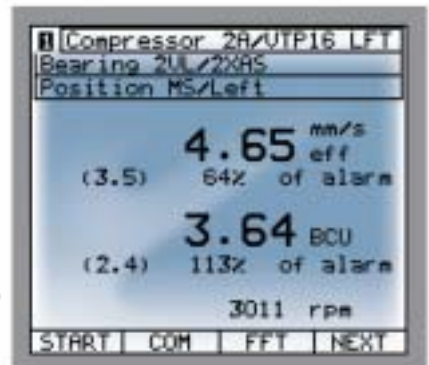
- **Random jumping** within a Route or between Routes is possible
- **Random switching** between analyser and data-collector function at any time offers maximum possible flexibility
- **Maximum information on site**; with overall measurements, the current value, previous value and the relationship with the alarm value (in %) are always displayed.





- Practically unlimited memory through the quick-change PC-cards. VIBROTEST 60 supports PC-cards up to storage capacities of 128 MB. The standard delivered PC-card offers storage space for 5,000 Points (5 Routes each with 1,000 Points), each with typically 1 broad-band measurement and 1 x 400-line spectrum.

- Time-saving and top data security. A direct load and unload between the instrument and PC is no longer necessary. Data transfer takes place between PC-card and PC and the instrument never needs to be connected to the PC interface.



# Field Balancing with BALANCING EXPERT

## Module 7: BALANCING EXPERT Field Balancing at a new level

### The task

Unbalance is the most common cause of excessive vibrations and thus damage to bearings, foundations and the rotor itself.

Field balancing offers a number of important cost- and time-saving advantages:

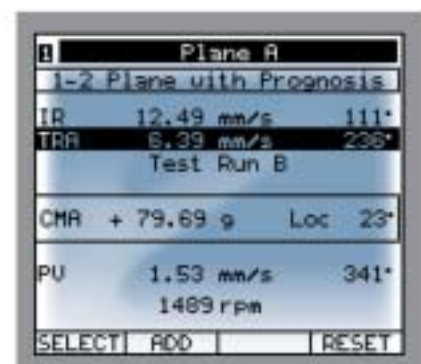
- No dismantling and transporting of the rotor
- The constructional features of the machine and the effects of the mounting conditions are automatically compensated
- Rotors of almost any weight and size can be balanced

VIBROTEST 60 offers with the dual-channel Module 7 BALANCING EXPERT the following Field Balancing functions:

- 1-plane balancing
- 2-plane balancing
- 1 – 2-plane balancing with Prognosis

The unbalance vibrations are measured at both planes simultaneously. \* After the first test run the correction weight for 1-plane correction is calculated as well as the anticipated residual vibrations for both measuring planes. This allows many 2-plane machines to be balanced to within the required tolerance by correcting at only one plane.

\* Module 5 (dual-channel) is not required.



## Special benefits of the BALANCING EXPERT

BALANCING EXPERT is the first to offer balancing in the shortest possible time with a minimum number of balancing runs

due to

- optimisation of the residual vibrations at both bearings already after correction in one plane with "1 – 2-plane balancing with prognosis"
- Selectable compensation mode for non-linear machine behaviour, e.g. due to machine mounting
- Elimination of interference, e.g. vibrations originating from neighbouring machine
- Storage of all relevant measurement data. Repetition of measuring runs is unnecessary

In addition VIBROTEST 60 offers up-to-date, field-tested features, such as

- User-friendly, dialogue-assisted operation
- Integrated balancing computer offers a choice of mass correction in polar, component or unit-mass form
- Extremely selective tracking filters of 0,3 Hz to 0,01 Hz
- Simplified procedure in case of repeat balancing
- Automatic error-messaging in case of unacceptable speed variations or unsuitable test weights
- Generation of a balancing report with VIBRO-REPORT

## Module 5: Dual-channel function

### The task

In some cases for the evaluation of machine condition, simultaneous measurements from two points on the machine must be considered, i.e. a simultaneous acquisition through two channels of the instrument is required for comprehensive diagnosis of the machine. At times it is also an advantage to save time. This Dual-channel functions allows two-channel operation of the instrument for all its released measurement functions with the exception of Module 6 – Data-collector and Module 7 – Balancing Expert. Module 6 provides a single-channel operation only and in Module 7 the dual-channel function is already built-in.

VIBROTEST 60 offers the solution:

With the features

- **Separate setups** for channels 1 and 2
- **Simple copying** of the setup from channel 1 to channel 2
- **Simultaneous measurement acquisition** at channel 1 and 2
- **Simultaneous storage** of measurements from channel 1 and 2 onto the PC-card

all the necessary functions for effective operation in two channels are available.

# Working in a System: PC-software for VIBROTEST 60

Two powerful PC-software packages operating under Windows\* are available for VIBROTEST 60:

## 1. xms extended Monitoring Software

xms is the professional software for optimum implementation of the concept "condition-oriented machine maintenance" and provides perfect support through an intelligent database for systematic use of the entire machine data.

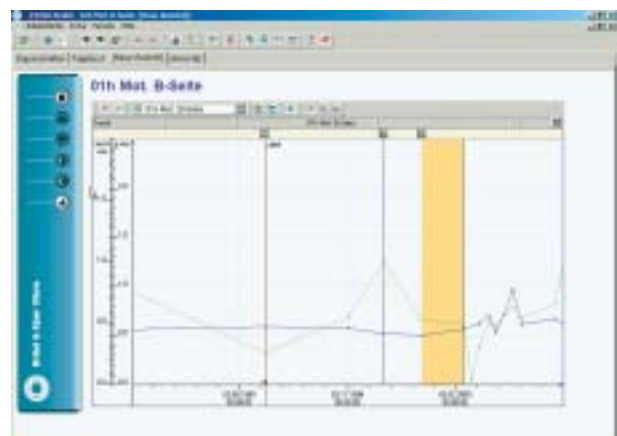
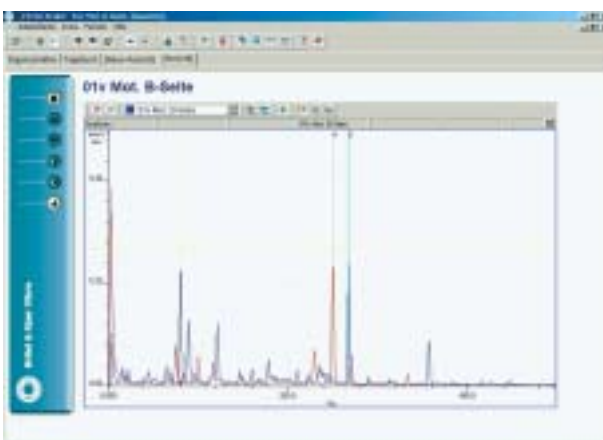
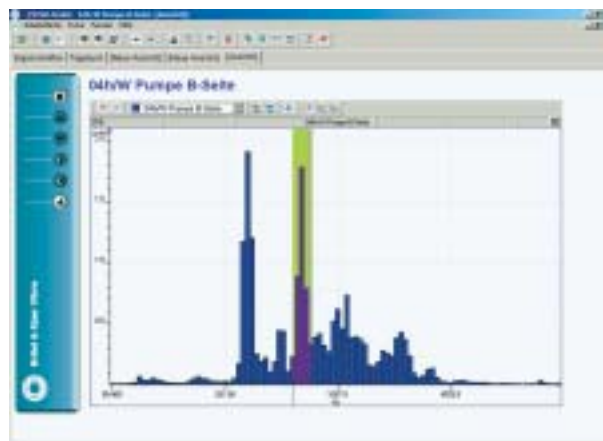
The modular construction of XMS offers all the options to structure the full extent of its functions completely according to your individual requirements. In addition to the Basic Module, whether the VIBROTEST 60 is used in the analyser or the data-collector mode, two Interface Modules are available. XMS is complemented and perfected by various Analysis and Diagnosis Modules.

You can find out more about the merits of the software and other important information from the **xms product brochure**.

Furthermore, in a combined "Technical Specification" especially prepared for the purpose, a summary of the extent of the functions of each software Module is compiled in a compressed overview.

**xms**, the software that impresses even the professionals.

\* xms: NT 4,0 SP6 / 2000 / XP  
VIBRO-REPORT: NT 4,0 SP6 / 2000 / XP



## 2. VIBRO-REPORT

VIBRO-REPORT allows all measurements to be displayed, in graphic diagram form or as a measurement list, and printed out for documentation purposes.

An overview of the most important features of the VIBRO-REPORT:

- For use in a **pure off-line operation**, i.e. only for individual measurements in the Analyser mode of the instrument (Routes cannot be processed and no database is available for archiving).
- For **fast data transfer** between instrument and PC via the PC-card

- **Graphic display** of the measurements, including cursor and Zoom functions
- **Zoom-preview** for **better orientation** in the graphics routine
- For **reporting** on the Field Balancing procedure
- For **specific entry of headers and footers** for descriptions in pre-formatted report documentation
- **Fast printout** of measurements and diagrams, including documentation of the instrument setup
- **Export of measured data** for further processing in Windows programs

VIBRO-REPORT is the technician's low-cost software package for fast and clear documentation of measurements.



# Technical Data

## 1. Measurement processing

- **Measurement channels**  
(Basic instrument plus Module 5)
  - Real Dual-channel with 4 internal measurement paths for parallel acquisition of machine vibrations and bearing condition at each channel
  - Plus speed channel
- **A/D converter**
  - AD converter 16 Bit (96dB) dynamic 1 Hz – 20 kHz usable frequency range
  - 1 AD converter for BCU 10 Bit (60dB) dynamic 0 – 48 kHz frequency range
- **Vibration measurement types**
  - Vibration acceleration
  - Vibration velocity
  - Vibration displacement
- **Signal detection types:**
  - RMS value
  - Peak value (true & calculated)
  - Peak-peak value (true & calculated)
  - Bearing Condition Unit (BCU)
- **Units:**
  - g, m/s<sup>2</sup>, mm/s, inch/s,  $\mu$ m, mils, BCU, eu
- **Broad-band Overall values**
  - High-pass:  
1 Hz to 10 kHz (selectable in 1/3 octave steps)
  - Low-pass:  
10 Hz to 20 kHz (selectable in 1/3 octave steps)
- **Bandpass measurements**
  - High-pass:  
630 Hz to 16 kHz (selectable in 1/3 octave steps)
  - Low-pass:  
800 Hz to 20 kHz (selectable in 1/3 octave steps)
- **Bearing Condition Unit (BCU)**
  - 13 kHz – 48 kHz

- **FFT/BCS-spectrum**
  - Frequency ranges
    - High-pass 1/2/5/10 Hz
    - Low-pass 20/50/100/200/500 Hz
  - 1/2/5/10/20 kHz
- **FFT/BCS/SED No. of lines**
  - 100/200/400/800/1,600/3,200/6,400/12,800
- **FFT/BCS/SED Averaging**
  - RMS, linear, exponential, peak-hold
- **FFT/BCS/SED Windowing functions:**
  - Uniform, Hanning, Flat-top
- **Process values inputs**
  - +/- 30 V, 0/4 - 20 mA
- **Speed:**
  - Speed range  
30 – 600,000 rpm
  - Speed / Ref. Ratio (S/R)  
xxx / yyy  
 $0.01 \leq S/R \leq 99$
- **Measurement accuracy**
  - Vibration measurement typically +/- 2% of measured value
  - Speed measurement typically +/- 0.01% of measured value
  - Phase angle typ. +/- 1°
  - Process values  
+/- 0.3 V, +/- 0.5 mA
- **Tracking / Field Balancing**
  - Frequency range 1 Hz – 10 kHz
  - Automatic selection of bandwidth:  
Tracking 2 – 0.01 Hz  
Balancing 0.3 – 0.01 Hz
  - Orders in tracking mode:  
1<sup>st</sup> order plus selectable additional order 2 – 99
- **CPB-spectrum**
  - Bandwidth:  
Steps 70% / 23% / 6% (selectable)
  - High-pass:  
1, 1/2, 2/4, 5/9/18/35 Hz (selectable)
  - Low-pass:  
1, 1/2, 2/4, 5/9/18 kHz (selectable)
  - Averaging time:  
3 – 999 seconds

## 2. Connections for sensors

- **Inputs:**
  - 2 connectors for measurement sensors
  - 1 connector for speed/ ref. sensor, each via 6-pole sockets
- **Sensor types**
  - a/v/s to max. 36 Vpp
  - Process values +/-30 V
  - 0/4 - 20 mA
  - Reference sensor P-84/P-95
- **Sensor power supply**
  - 2-4 mA/24 V current source
  - +5 V/20 mA
  - +24 V (only reference channel)

## 3. Hardware

- **Display**
  - Backlit LCD with high brilliance
  - 160 x 140 pixel
- **Slot for PC-card (PCMCIA)**
  - Compact Flash (CF) with adapter
- **Battery operation**
  - Period typically 2 x 3 h (2 quick-change batteries supplied, simultaneous charging)
- **Main power operation**
  - With power charger unit 84 – 265 VAC, 48 – 400 Hz
- **Operating temp. range**
  - Display 0 - +50°C
  - Instrument -10 - +60°C
- **Dimensions**
  - Approx. 255 x 90 x 50 mm
- **Instrument weight**
  - Approx. 900 g incl. battery

# Extent of Delivery and Ordering Information

## VIBROTEST 60

Single channel basic instrument with Speed Channel and Module 1 "Overall measurements"

Consisting of:

- 1 Measuring instrument type VIBROTEST 60, with selectable operator dialog in German, English, French, Dutch, Italian, Spanish, Portuguese, Hungarian, Czech and Polish languages
- 1 Power and charger unit, type AC-601, for power operation and simultaneous charging of 2 batteries
- 2 Batteries, type AC-602
- 1 PC-Card, type AC-603/16 as storage media for measured data 16 MByte (approx. 15,000 overall values)
  - extension with larger PC-Cards possible
- 1 Acceleration sensor, type AS-065 with connecting cable, 5 m (16,4 ft) long type AC-437
  - mounting magnet type AC-172
  - probe tip AC-272,
  - threaded stud AC-350
- 1 Short-form operators manual in the language of the instrument dialog (please order the required language)
- 1 Set technical documentation in German, English or French (please order the required language)
- 1 Case, type AC-605, for transporting the instrument and accessories
- Measurement functions:
  - 1 Module Overall measurements
  - Vibration values
  - Bearing Condition Units
  - Process values
  - Speed
  - Manual entry of values (Reference sensor Option 606 not included)

## Module 1.2: Extension Module for Machine Evaluation

- 1 Module Overall measurements vs. speed  $f(n)$  and time  $f(t)$

## Module 2.1: Basic Module for Machine Diagnosis

- 1 Module Machine Diagnosis | FFT-analysis

## Module 2.2: Extension Module for Machine Diagnosis

- 1 Module Machine Diagnosis | BCS/SED envelope-analysis, Cepstrum-analysis

## Module 3: Tracking Analysis

- 1 Module tracking analysis (Reference sensor Option 606 is not included)

## Module 5: Dual-channel Function

- 1 Module Dual-channel function for acquisition of all measurement types for measurement modules "Overall measurements", "Machine Diagnosis", "Order tracking analysis" and «CPB-spectrum»

## Module 6: Data-collector

- 1 Module Data-collector Measurement functions:
  - "Overall values"
  - "Spectra/Cepstra"
  - "BCS/SED envelope-analysis"
  - "CPB-spectra", «Speed»
- 1 holster AC-604
- 1 Spiral cable AC-436

## Module 7: BALANCING EXPERT Dual-channel field balancing

- 1 Module Dual-channel Field Balancing for
  - 1-plane balancing
  - 2-plane balancing, and
  - 1-2-plane balancing with prognosis

Attention: Second vibration sensor and ref. sensor, with accessories, not included (see Options)

## Module 8: CPB-spectrum

- 1 Module CPB-spectrum

## PC Software Packages

### xms

- for professional condition-oriented machine maintenance

## VIBRO-REPORT

- for transfer of measured data to a PC, display and printout of measurements (no database, no Route management)

## Options

### Option 602/X

Additional acceleration sensor type AS 065 with accessories

Available order codes

#### Option 602/1

- with 1 connecting cable type AC-437, 5 m (16,4 ft) long

or

#### Option 602/2

- with 1 spiral cable AC-436

- Operating frequency range: -1...15,000 Hz

- Operating temperature range: -50...+121°C (-58...+250°F)

- Transmission factor: -100 mV/g

- Extent of delivery:
  - 1 Acceleration sensor type AS-065
  - 1 Mounting magnet, type AC-172
  - 1 Probe tip AC-272
  - 1 threaded stud AC-350

### Option 603

Vibration velocity sensor type VS 080 with accessories

- Operating frequency range: -1...2,000 Hz

- Operating temperature range: -40... +100°C (-40...+212°F)

- Transmission factor: -75 mV/mm/s

- Extent of delivery:
  - 1 Vibration velocity sensor type VS-080
  - 1 Connecting cable, type AC-435, 5 m long (16.4 ft)
  - 1 Mounting magnet, type AC-273
  - 1 Probe tip AC-171
  - 1 Threaded stud AC-350

### Option 606

Photo-electric reference sensor

#### Option 606-1

- 1 Reference sensor type P-95

#### Option 606-2

- 1 Connecting cable, type AC-185/5, 5 m long (16.4 ft)

#### Option 606-3

- 1 Magnetic stand, type AC-525

#### Option 606-4

- 1 Roll reflective tape, type AC-526, 5 m long (16.4 ft)

### Option 610

Extension cable for all sensor types

#### Option 610-1

- 1 cable, type AC-185/5, 5 m long (16.4 ft)

#### Option 610-2

- 1 cable type AC-185/20, 20 m long (65 ft)

### Option 611

Additional batteries

- 1 Exchangeable battery pack, type AC-602

### Option 612

Additional PC-Card for data storage

#### Option 612-2

- 1 PC-Card type AC-603/16, 16 Mbyte

### Option 615

Connecting cable for acceleration sensor AS-065

#### Option 615-1

- 1 cable type AC-437, 5 m long (16,4 ft)

#### Option 615-2

- 1 spiral cable type AC-436

## Order information and completion

- All instrument modules, software modules and Options can be combined as desired

- Future extensions (upgrades) are easily executed
  - by software unlocking of the desired instrument functions,
  - by delivery of the extension software,
  - by delivery of further hardware

As a rule all extensions can be carried out by the user.

Please provide the following information when ordering:

Initial orders:

- VIBROTEST 60
  - desired instrument modules
  - language for the short operators manual (one of the instrument dialog options)
  - language for the technical documentation (German, English or French)

- PC-Software
  - desired Software modules
  - language version for the documentation (English, German or French)

- Options
  - desired option number/s

Upgrades:

- Instrument and software:
  - desired modules
  - The instrument number and software fabrication number are required



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