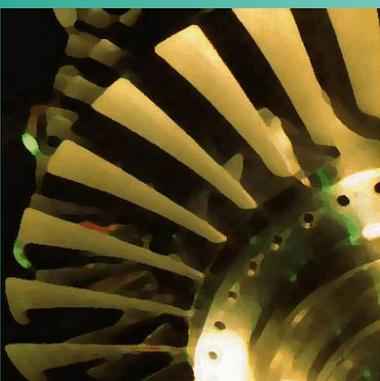
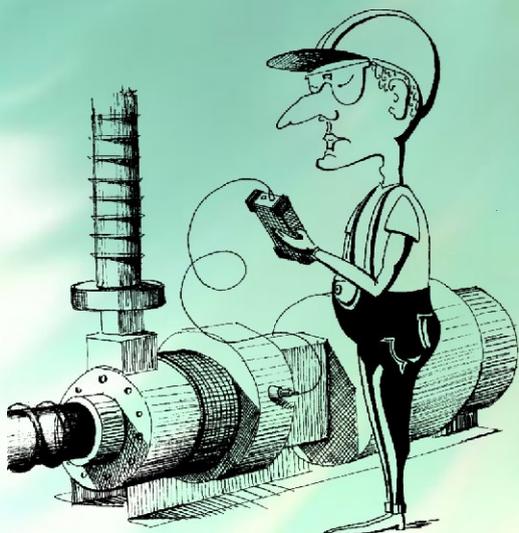


VIBRATION MEASUREMENTS AND ANALYSIS  
MACHINERY DIAGNOSTICS  
BALANCING AND DATA COLLECTION



# DIAMOND 401B - instrument for the measurement and analysis of vibrations, balancing and data collection

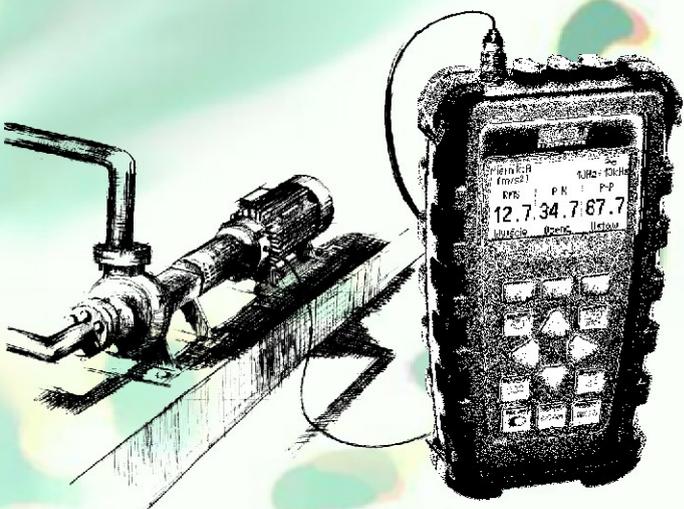


## Why it is important to monitor the vibrations of machinery?

Among the major factors in the successful and profitable operation of a manufacturing plant are the reliability, safety and the durability of its installations. Unforeseen breakdowns result in major production losses and high repair costs. It is essential to identify as soon as possible the changes in the dynamic condition of machinery, its degree of wear, and type and seriousness of damage. Based on this information it will be possible to undertake the appropriate actions in order to prevent catastrophic machine failure. The maintenance of installations based on thorough understanding of their condition is the cheapest method to keep them in a good shape. Vibration measurements are the most efficient tools that allow you to evaluate the state of machinery, to identify those elements which require repair, and to schedule repair work. DIAMOND 401B, together with MBJLab software, is a complete, yet unusually affordable solution for a periodic condition monitoring and predictive maintenance of machinery.

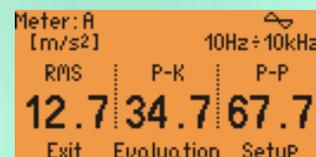
## DIAMOND 401A

DIAMOND 401B is a modern, one- or two-channel, measurement instrument designed for a thorough vibration diagnostics of machinery and rotating equipment. It is easy and intuitive to use, equally convenient for beginners and experienced users. DIAMOND 401B has wide measurement and diagnostic capabilities including vibration analysis according to ISO 10816 standard, FFT spectrum, phase measurement, bearing condition evaluation, temperature measurement, tachymetry, one or two plane balancing, cavitation measurement. Together with MBJLab software it allows the collection of machinery condition data according to a predefined measurement route, the analysis of the collected information, and the archiving of results. DIAMOND 401B exists in four versions, allowing the customer to choose the most suitable for his requirements.



## ✓ Vibration measurements

The vibrometer is one of the basic functions of the instrument allowing the user to do all the necessary vibration measurements. Periodical collection of measurement results and analysis of underlying trends allows him to evaluate the current state of his installation, to detect potential problems and to optimize the scheduling of inspections and repairs. The results can be instantly compared against ISO 10816 standards giving the user immediate indication about the condition of a machine.



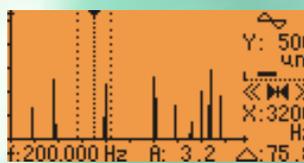
## ✓ Bearings verification

Periodical analysis of signals generated by bearings allows the estimation of its condition without dismantling the machine. The condition of a bearing is estimated based on the analysis of shock pulses, envelope and kurtosis.



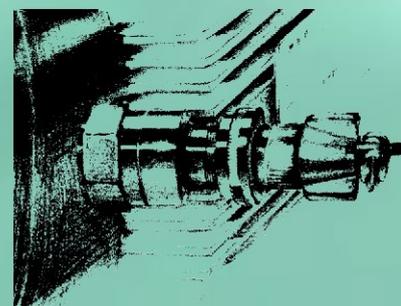
## ✓ Spectral analysis

This powerful tool allows the user to localize the source of vibrations and therefore to identify the cause of a problem, like unbalance, misalignment, plays, defective bearing or gear.



## ✓ Temperature measurement

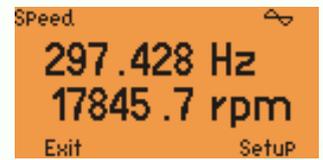
Together with vibrations, the temperature is another important source of diagnostic information. Rise of temperature in a bearing may indicate its damage or insufficient lubrication.





## Rotational speed

The method for non-contact RPM measurement is very straightforward. The laser sensor is easy to mount and it allows precise measurements to be obtained even from relatively long distances.



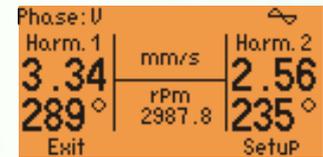
## Cavitation

This noxious phenomenon generates very strong vibrations in liquids and it is most often encountered in pipe installations. In order to protect the endangered elements against the "cavitation erosion" it is important to detect the cavitation early enough.



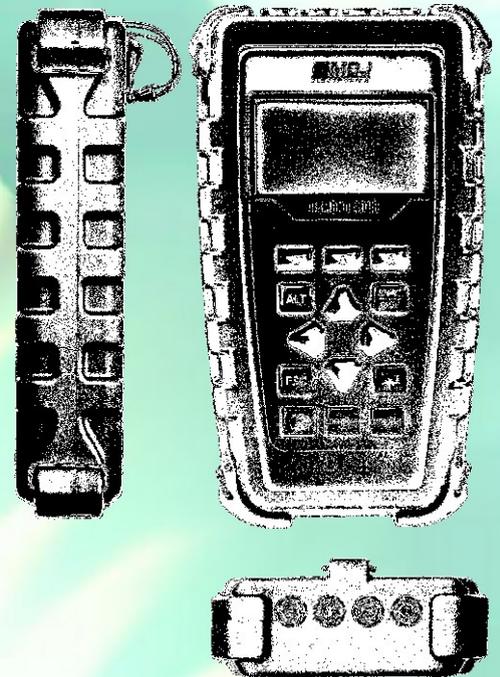
## Phase measurements

It is a very useful measurement function since it helps in identifying some of the important defects like misaligned or deflected rotor. It is also used in diagnostic of turbines.



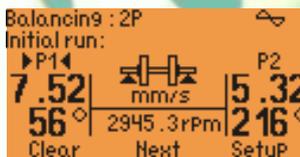
## Data collection

The measurements results can be stored in the database together with time and date of their occurrence. Easy servicing makes possible efficient collection of data from all locations along the measurement route.



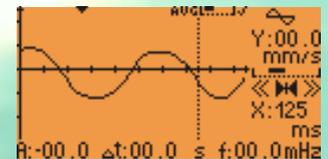
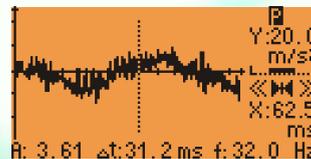
## Balancing

The unbalance of rotating parts is the most commonly encountered reason for the deterioration of a machine's condition. DIAMOND 401B can help since it has the one- or two-plane field balancing capability. It is possible to balance the rotors in place, without the need to disassemble and transport the machine. The available algorithms will calculate the weights and the positions of the correction masses and indicate when the required balancing quality has been reached. Step-by-step operator guidance renders the balancing procedure easy.



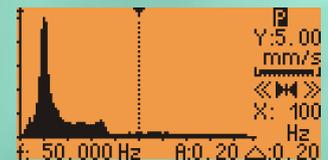
## Oscilloscope

The oscilloscope function allows to record of the vibration waveform. This is useful function to observe a lubrication status for rolling bearings. Sometimes it can be applied to analyze and diagnose low-speed machines.



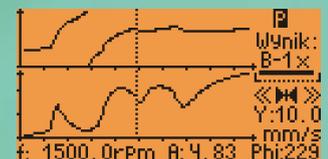
## Impact test (natural frequency analysis)

The cause of elevated vibration levels is not always connected with a machine itself but sometimes also with a foundation or a structure where the machine is installed on. Analysis of natural frequencies is taken from modified vibration spectrum analysis. It is a tool designed for convenient and easy analysis of structure vibration to find resonant frequencies.



## Run-up, coast-down analysis

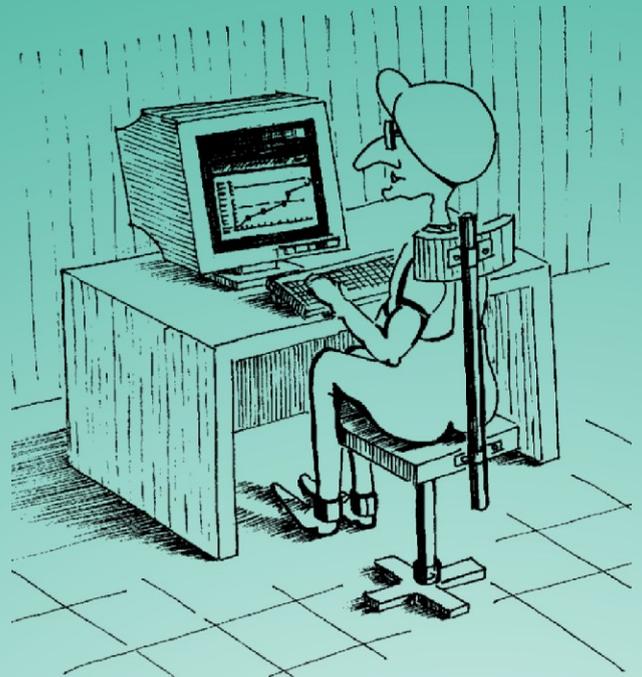
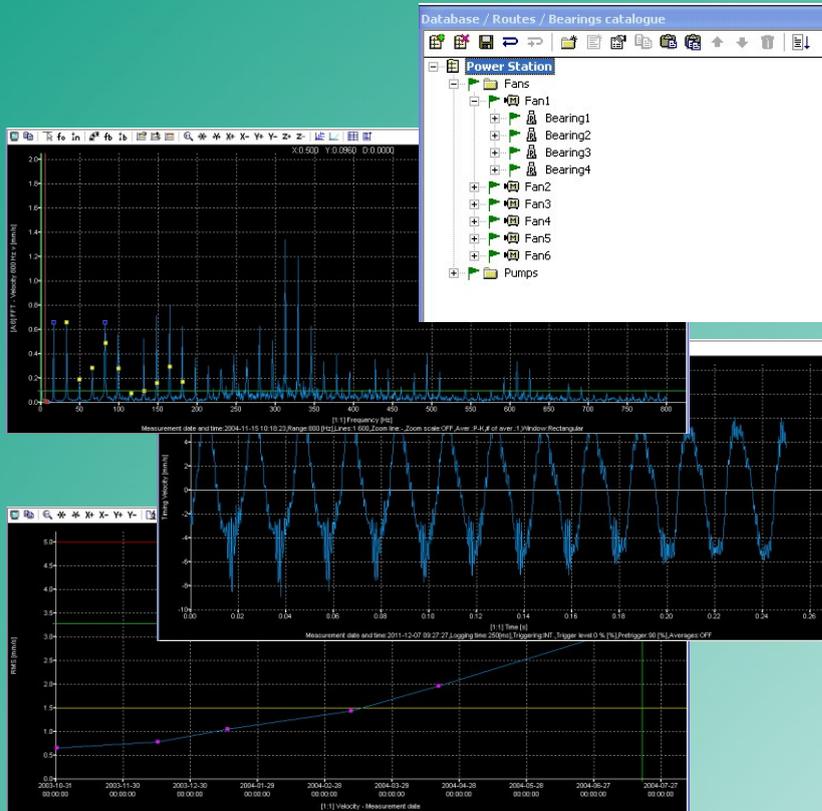
Each rotor machine has its own resonance frequencies. Recording of run-ups and coast-downs helps to check rotational speeds at which these resonances appear. With this function you can determine the proper rotational speed range of the machine to avoid serious problems with resonances.



# MBJLab software

MBJLab software is designed to work in conjunction with DIAMOND 401B. When the measurements are done on regular basis then a huge amount of data is being collected. MBJLab helps to keep this data in an organized way and to analyze the measurement results in order to detect the alarm conditions or to visualize the trends. The most important functions of the program are:

- ✓ Establishment of the database
- ✓ Designing the measurement routes
- ✓ communication with the instrument
- ✓ Data ordering
- ✓ Graphical review of the results
- ✓ Signalling the warnings and alarms
- ✓ Rapport generation



## Instrument versions

Version	S	D	X
Vibrations measurement	X	X	X
Machine condition evaluation	X	X	X
Bearing verification	X	X	X
FFT analysis	X	X	X
Data collector	X	X	X
Rotational speed measurement		X	X
Phase measurement		X	X
Balancing		X	X
Oscilloscope			X
Impact test			X
Run-up, coat-down analysis			X
Temperature measurement	O	O	O

X - standard, O - additional option

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