VIBstudio

Your Machinery Guardian

EC GRUPA
EC SYSTEMS

› EC Systems

EC Systems is an expert in design and implementation of industrial systems for monitoring, diagnostics, testing and control. For over 15 years our products have been monitoring various critical machinery, ranging from wind turbines and printing machines, through exhaust gas ventilators in power plants and dewatering pumps in underground mines, up to natural gas reciprocating compressors and synthesis gas compressors in chemical factories.

› Condition monitoring

Condition monitoring is a profitable investment. Find out why:

- **23%** of entrepreneurs confirm, that they suffer losses due to machine failures
- **90%** of entrepreneurs, who use condition monitoring confirm, that they have reduced their downtime at least by half
- **14%** of entrepreneurs estimate, that thanks to condition monitoring they have avoided critical failure

› VIBstudio

VIBstudio is an intelligent platform for online condition monitoring, failure protection and vibration-based diagnostics of machinery.

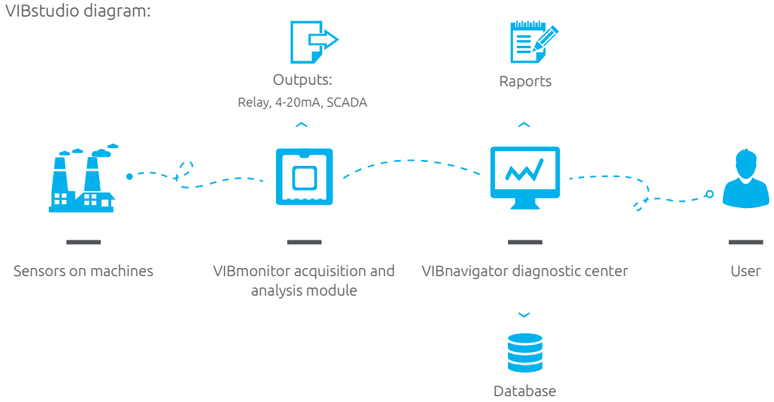
The platform allows to:

- reduce the number of failures and downtime by up to **70%**,
- decrease the maintenance costs by up to **20%**,
- increase lifetime of monitored machines by up to **30%**.

VIBstudio is comprised of VIBmonitor modules and VIBnavigator software.

Wide range of configurations allows to adjust the system to the functional needs and financial capabilities of the customer. Moreover, the ease of future expansion makes it possible to spread out the investment in time. This provides a unique business benefit allowing to start from an inexpensive base version of the system for monitoring of a single machine, and further gradual expansion into an advanced platform for remote diagnostics of the entire enterprise.

VIBstudio diagram:



› **VIBstudio** versions

› For compressors

› For wind turbines

› Basic
(pumps, gears, ventilators, drives)

› **VIBstudio** key features

Affordable monitoring, safety and diagnostics

Modular architecture and easy expansion

Reduction of false alarms

Automatic failure diagnostics

Real-time processing

Advanced diagnostic algorithms

Access from any place in the world

Access to historical data

Compatibility with systems from other manufacturers

› VIBmonitor

VIBmonitor is a modular, multichannel and autonomous system operating close to the monitored machine. The system monitors and protects operating machines through conditioning, high quality acquisition of signals and process parameters, all well as their continuous analysis. Due to True Data Validator™, the real-time data validation technology, as well as automated machine operational states detection and advanced diagnostic analyses, the system effectively detects anomalies in an early development phase, and significantly reduces the number of false alarms.

Expansion of the system is possible through adding or exchanging hardware feature cards. The base version of the system is named VIBmonitor EL, and is comprised of: processing card, server card and measurement card.

› VIBmonitor EL specification (base version*)

Inputs	**4 measurement inputs (expandable up to 20)** › Input type: IEPE (ICP) › Resolution 24bit › Synchronized sampling 25/50/100kHz › Spectrum resolution 0,002Hz › Parallel processing › 1 phase marker
Outputs	**Modbus TCP** (expandable by OPC, 4-20mA, relays)
Estimates available for each channel	**Wideband** › RMS › VRMS › PP › Crest › Kurtosis › Narrowband (up to 20 per channel)
Casing	**IP code: IP65** **Prepared for optional LCD panel**
Power supply and environmental conditions	**Power supply: 24V DC 25W** **Operational temperature: from -40oC to +85oC** **Vibration resistance: group 1B** **Optional ATEX compliance**

* Information about expansion options are described on the following page

True Data Validator™

› VIBmonitor key features

01 › Continuous real-time data processing

02 › Built-in diagnostic analyses

03 › Parallel data processing for each signal

04 › Reduction of false alarms

05 › Modular structure based on functional cards

06 › Historical data recording

07 › 24bit measurement resolution, sampling up to 100kHz

08 › Integration with SCADA systems

09 › Relay outputs for protection

10 › Access from any place in the world (Ethernet)

› **Available** feature cards and expansions

› Processing card [1]

Integrated system for measurement data processing

- Continuous monitoring of measurement data stream
- Configurable analysis module
- Recording of trends
- Remote access to VIBmonitor system

› Server card [2]

Supervision over measurement process and synchronization of system cards

- Handles up to 6 measurement cards
- Ethernet communication interface

› Measurement card [3]

4 measurement inputs (expandable up to 20)

- Input type: IEPE (ICP)
- Resolution: 24bit
- Synchronic sampling: 25/50/100kHz
- Spectrum resolution: down to 0,002Hz
- Parallel processing
- **1 phase marker**

› Process variables card [4]

4 analog inputs:

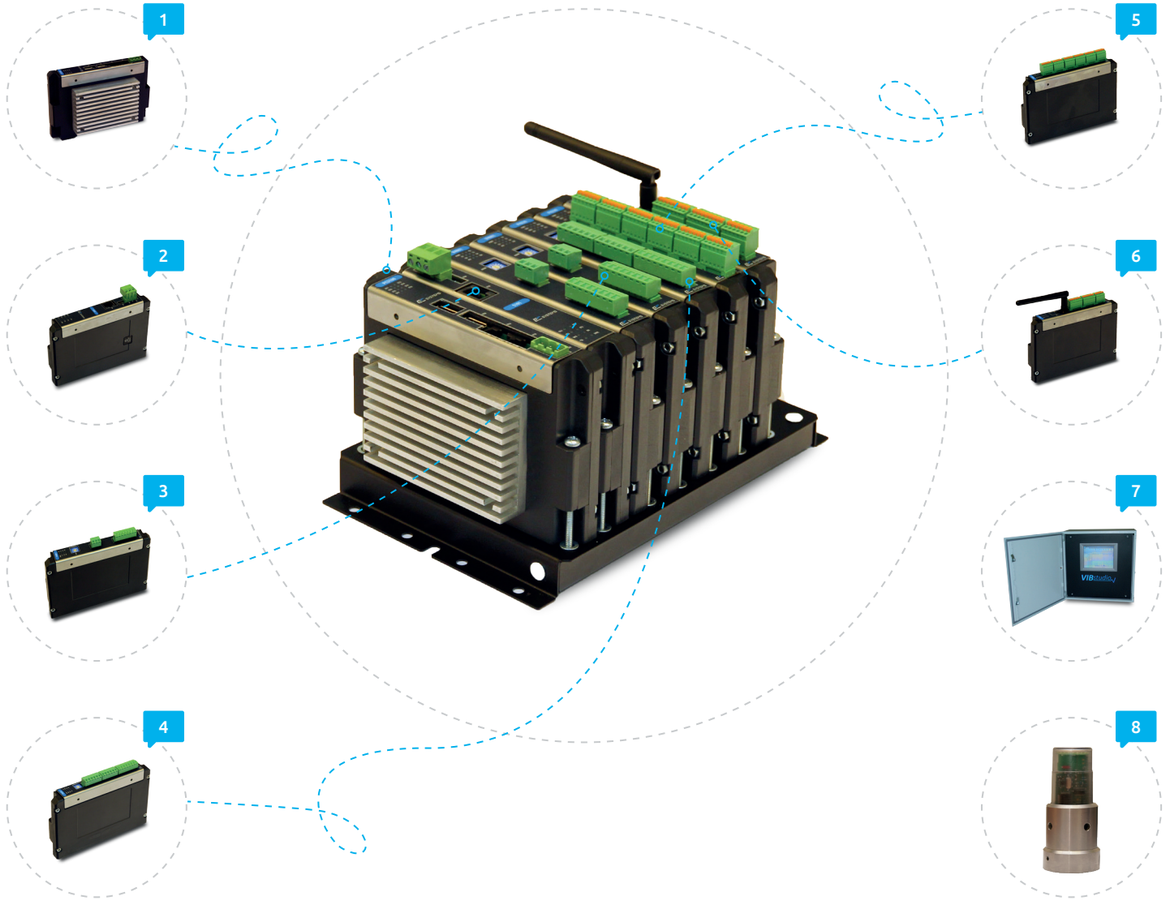
- Standard: 0-10V or 4-20mA
- Resolution: 16bit
- Sampling frequency: 1kHz
- Parallel processing

2 digital inputs:

- 24VDC OC

3 relay outputs

- Contacts load: 24VDC 100mA NO/NC



› ANDout card [5]

4 analog outputs: 4-20mA

8 digital outputs:

- Contacts load 24VDC 100mA NO/NC

› GSM card [6]

Remote access to the system using GSM technology. Sending messages on email/cell phone/Android app

› LCD panel [7]

Visualization of estimate: RMS, PP, Kurtosis, VRMS, Envelope RMS

Visualization of settings and exceeded thresholds

Possibility to configure:

- Threshold levels (warning, alarm)
- Relay outputs states

› VIBair [8]

Wireless vibration sensor:

- 1(2) Measurement directions
- Band: 10kHz
- Implemented analyses: 12 wide and narrowband analyse
- Temperature measurement from od -45oC to 85oC

The set includes communication module for connection with the sensors and their integration with the VIBmonitor system.

› VIBnavigator

VIBnavigator is the user interface of the VIBstudio platform based on I3 Technology™. It is primarily used for event monitoring, data viewing, configuration and administration of the system. On one hand the interactive and easy to use browser ensures intuitive handling for the operator. On the other it offers to the maintenance and diagnostic teams a wide functionality for processing and analysis of signals. High degree of configurability and automation of operations make it very easy to verify the causes of an alarm.

VIBnavigator is available in two versions:

- **Standard Edition (SE)** – - for small installations, allows to verify the causes of warnings and alarms,
- **Enterprise Edition (EE)** – diagnostic center, allows direct access to live and historical data from any number of machines.

Both versions offer the same set of diagnostic tools.

› VIBnavigator system version

	SE	EE
Set of diagnostic tools and plots	✓	✓
Live data viewing	✓	✓
Import of measurement data from files	✓	✓
Event manager	✓	✓
Dedicated database for measurement data (reading, writing, analysis)		✓
Automated data replication from VIBmonitor		✓
Indication of current condition		✓
Managing measurement data sets (import/export/...)		✓
Managing data access rights of the users		✓
Managing events from the phone (Android application)		✓

I³ Technology™

› VIBnavigator is:

Clear and modern interface

Access to live and historical data

One click diagnostics (I³ Technology™)

Management of warnings and alarms

Graphical editor of kinematics

› VIBnavigator unique features:

01 › Displaying data from time periods of an unlimited length
02 › Automated thresholds configuration (ATC™)
03 › Displaying time signals and trends on the same plot
04 › Viewing of continuous time signal
05 › Displaying characteristic frequency bands on spectrum plots
06 › Rejection of data not matching validation criteria
07 › Filtration of data according to machine operational states
08 › Spectrum calculation from selected fragments of signals
09 › Comments on data and configuration

› VIBcare

› Remote diagnostics service

VIBcare is a service delivered 24/7 by EC Systems engineers, supporting customer's maintenance team. Thanks to the use of the VIBstudio platform, VIBcare allows for remote, online analysis and assessment of machines' technical condition. Based on monitored parameters, VIBcare enables for an immediate notification of machines' users about occurrence of symptoms suggesting emerging threats for their operation, as well as possible failures related to wear or damage of individual elements.

As a part of the package, client receives event related and periodical reports about each monitored machine, which describe its current condition. The reports contain relevant guidelines regarding further machine's operation and a list of elements, which should be under special supervision in the following period.

EC Systems
Diagnostic Team

Immediate information about developing failure

Periodical reports for each monitored machine

Guidelines regarding further machine's operation

› **Implementation** of the system

Project:

Implementation of the VIBstudio system for condition monitoring and diagnostics of natural gas compressor station at Baltic Beta offshore platform

In November 2007, EC Systems implemented and commissioned a diagnostic system on the Baltic Beta offshore platform. Currently VIBStudo is used for online condition monitoring of bearings, valves, driveshaft, and other mechanical elements of a four-stage Dresser-Rand reciprocating compressor, with is the "heart" of the natural gas compressor station.

The cooperation between the companies proceeds without interruptions, and the monitoring conducted by the EC Systems diagnostic engineers is reliable and professional. We are satisfied with the quality of EC Systems service, and we recommend the company as a solid and professional partner.

Zbigniew Olejniczak
Deputy Managing Director, Head of the Maritime Team
› Energobaltic Sp. z o.o.

› fot. ©Grupa Lotos SA

› **Case** study

In 2008 the condition monitoring system alarmed about elevated vibration level on the compressor and the motor. Data review indicated high level of wide band analyses suggesting failure of mechanical components generating vibration in the range first three revolutionary frequencies of the driveshaft. According to recommendations of the EC Systems diagnostic engineers, in cooperation with the Baltic Beta platform crew, the compressor was inspected from the outside and the control measurements were made on the housing and cylinders using a hand-held meter. Subsequently, due to the absence of visible failures, the gas extraction was halted and the inspection covers were open. The shaft was cracked.

The shaft cracked in a way, that the broken parts got clinched together again and the gas compression process was not stopped. Based on the alarm report, and in cooperation with the platform's crew, a decision was made to temporarily shut the compressor down, and to replace the shaft. Without the VIBstudio vibration monitoring system, and without a good cooperation with the platform's crew, the abnormality in the machine's operation would not have been detected. Such situation could have caused significant or complete damage of the machine, very expensive repair or even necessity to replace the machine (housing value of approx. 500 000 USD) in open sea conditions.

Our diagnostic solutoins are used, among others, by:

SIEMENS · pesa · FAMUR · ORLEN · ABB · grupa azoty · EDF · TI Automotive

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