

ORBIGate

The Turbomachinery Vibration Software

Introduction

ORBIGate is the **dedicated software module** for **industrial rotating machinery vibration** during **diagnostics as well as acceptance works**. Easy to use, it provides all the tools to bring the **highest level of set-up simplicity and efficiency** to the user.

Featuring simultaneous portable acquisition on up to 32 dynamic channels, an entire machine train can be tested during transients or steady states. The system acquires and analyzes shaft and casing vibration. Typical graphics are **orbits, shaft centerline, spectra, Bode and polar diagrams, trends, waterfall, overall peak to peak, 1X** (amplitude and phase). In a typical situation the OROS instrument is connected to the outputs of the monitoring system as shown in Fig1.

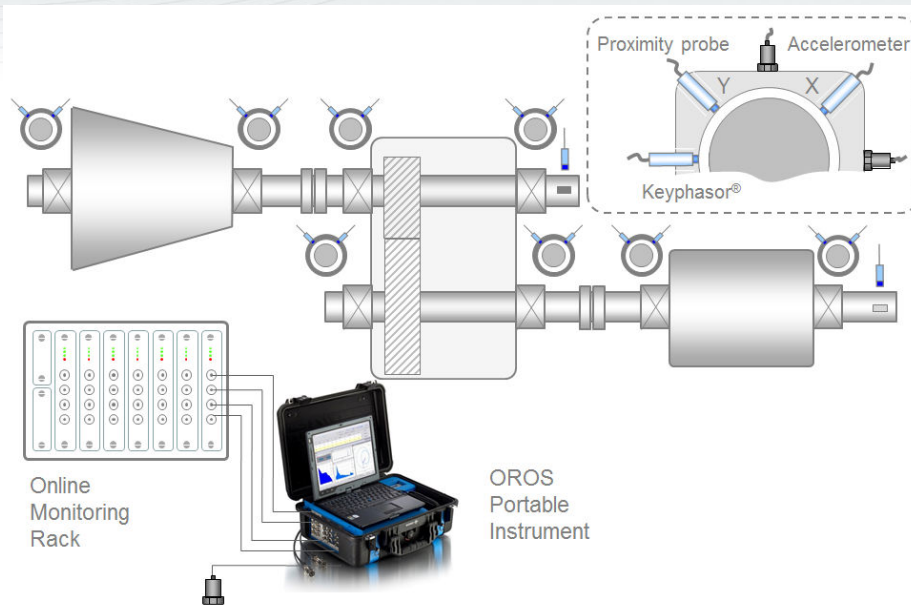


Fig1: Application example: a full machine train set-up

Industries

- > Power Generation
- > Oil and Gas
- > Chemical
- > Petrochemical
- > Marine

Machines

- > Turbines (gas, steam, hydro)
- > Motors
- > Gear boxes
- > Pumps
- > Compressors
- > Generators
- > Cogeneration machine trains
- > Compression groups
- > Power generation groups
- > Turbochargers

Applications

- > From acceptance to diagnostics
- > **Manufacturers workshops & test cells**
 - o Acceptance tests
 - o Overhaul
 - o String tests
- > **Field testing:** power and chemical plants, offshore
 - o Commissioning
 - o Predictive maintenance
 - o Diagnostics and troubleshooting
- > Relative shaft vibration (journal bearings), absolute casing vibration, run-up, steady state and shut down signatures
- > Multiplane Balancing (1X acquisition)



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Main features

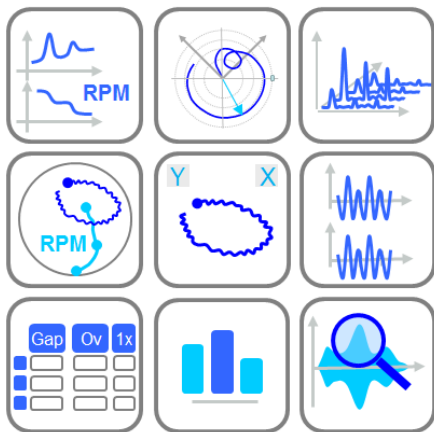


Fig1: The most common rotating machinery displays

Rotating machinery diagnostics tools

For analyzing rotating machinery vibration, ORBIGate features, among others, the following graphics and displays:

- > Scalar Table: Gap, Overall, vector data (nX orders amplitude and phase), SUB1X, SMax
- > Orbits (overall and nX), time blocks
- > Shaft centerline and full shaft motion
- > Frequency and order spectrum, waterfall
- > Full Spectrum
- > Trends, Bode and polar plots
- > Raw signal and zoomed signal

Machine	Part label	Clearance	Direction	Orientation	Point label	Input
GasTurbine	GasTurbine.P1	<input checked="" type="radio"/>	CW	45° L Y	GasTurbine.P1.Y	1
				45° R X	GasTurbine.P1.X	2
	GasTurbine.P2	<input checked="" type="radio"/>	CW	45° L Y	GasTurbine.P2.Y	3
				45° R X	GasTurbine.P2.X	4
HS-GB	HS-GB.P1	<input checked="" type="radio"/>	CW	90° R X	GasTurbine.M2	5
				45° L Y	HS-GB.P1.Y	7
	HS-GB.P2	<input checked="" type="radio"/>	CW	45° R X	HS-GB.P1.X	8
				45° L Y	HS-GB.P2.Y	9
LS-GB	HS-GB.P1	<input checked="" type="radio"/>	CW	45° R X	HS-GB.P2.X	10
				90° R X	HS-GB.M2	11
	LS-GB.P1	<input checked="" type="radio"/>	CW	45° L Y	LS-GB.P1.Y	13
				45° R X	LS-GB.P1.X	14
Compressor	LS-GB.P2	<input checked="" type="radio"/>	CW	45° L Y	LS-GB.P2.Y	15
				45° R X	LS-GB.P2.X	16
	Compressor.P1	<input checked="" type="radio"/>	CW	45° L Y	Compressor.P1.Y	17
				45° R X	Compressor.P1.X	18
	Compressor.P2	<input checked="" type="radio"/>	CW	45° L Y	Compressor.P2.Y	19
				45° R X	Compressor.P2.X	20

Fig 2: Configuration of a large machine train

User friendly set-up: designed by users for users

Efficiency is the key word in the field. For that reason set-up in ORBIGate has been dedicated to all turbomachinery users: **no need to be an expert!** ORBIGate is the fruit of OROS collaboration with experienced field users: it is designed by users for users. The sequencing of the configuration has been developed to be fully natural for such measurements.

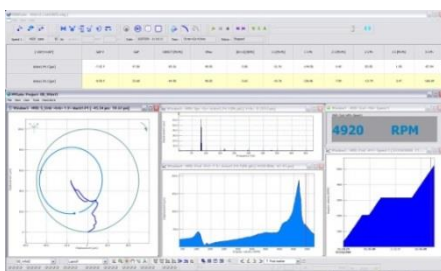


Fig3: The main software interface showing a run-up test

Monitor, investigate, report

A complete and simple interface is provided to set-up and display the graphics required for the application.

Several type of graphics can be mixed freely in the same layout. The master navigation cursor allows the user to navigate through the pile of recorded data. When doing that, all cursors are synchronized in order to display the data at the chosen instant (RPM, absolute date or relative date).

A flexible and evolutive instrument platform & services

ORBIGate runs on all OROS analyzers providing a flexible choice of the hardware platform size: **portable, rugged and evolutive instruments from 2 to 32 channels**. OROS applications range from rotating analysis, basic to advanced, structural through acoustics. Allow yourself to extend the range of your applications!



Fig4: The OROS instruments' range



Fig5: BNC/BNC connection to the monitoring rack or direct to sensors

Flexible and rugged in the field

- > Featuring up to +/- 40 V inputs, **portable and rugged**, OROS instruments are comfortable traveling to the field.
- > They are also typically used from the control room when connected via BNC cables to on-line monitoring rack.
- > They can also be used close to the machine connected to the sensors. In particular, they feature the ICP® technology allowing to connect directly to accelerometers.

Speed 1 :	GAP V	Gy [µm-Pk]	XZ [µm-Pk]	SX Pk
3557 RPM	-7.12 V	82.40	24.42	98.75
39 Hz	-8.51 V	27.04	54.28	245.75

Fig6: Table and master cursor

One table for monitoring your indicators, one cursor for all your graphics

- > When monitoring a test, one wants to have all the critical values directly: Overall, GAP, 1X amplitude and phase. All those main indicators are in the **main configurable table**.
- > Investigate your tests using the **master cursor**: want to know about the shape of the orbit and the spectrum at the critical speed? Just position the cursor at the maximum of amplitude and check!

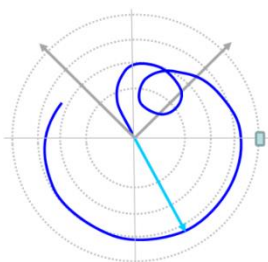


Fig7: The dedicated polar diagram

Overall and 1X: Bode and Polar. Balance or not?

- > **1X amplitude and phase** is provided directly from the Synchronous Order Analysis.
- > In the **Bode**, 1X is compared to Overall to check the occurrence of other harmonic components that may reveal other problems than simply an unbalance.
- > **Polar** diagrams are displayed with all usual conventions: phase lag, shaft rotation direction, probe orientations, keyphasor position display. 1X results can also be exported into txt or xls files for further processing such as in the Multiplane balancing module.

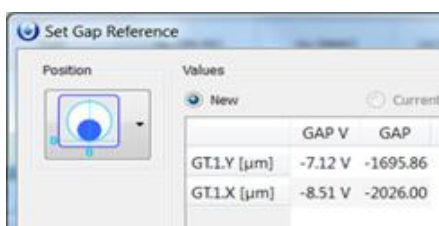


Fig8: Setting-up a gap reference

Gap voltage

- > The Gap voltage is required to be measured in many situations: at stand still, during the jack oil stage, at the beginning and during the start up: it gives the shaft centerline position.
- > **Reference voltage** should be determined in order to position the shaft position graphic relatively to the clearance circle. This can be done in several ways. For horizontal machines, the rotor is assumed to be laying on the bottom part of the bearing. For vertical machines (hydro turbines or vertical pumps), the assumption of having the rotor at the center can be taken.



Fig9: Looking at the Full Shaft Motion display along the rotor at 3 bearings

Full shaft motion: Shaft centerline and orbit

- > The full shaft motion graph displays on the same plot and for each bearing, **the shaft centerline, the orbits and the clearance circle**. In figure 9, the orbit is displayed with its gap voltage component. This graph displays the full shaft motion for each bearing and provides a descriptive picture of the global rotor path within the bearing clearance.

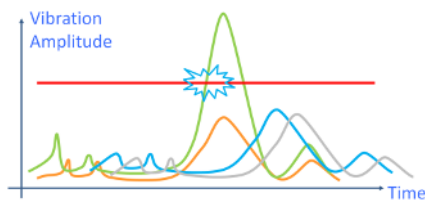


Fig10: Multi-channel alarm conditions and actions



Fig11: Run Out steps: Slow roll selection, raw data, corrected data

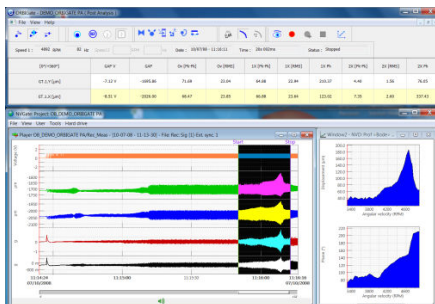


Fig12: Post Analysis

Run up plot session		Plot No: _____
Project Ref: X567-OverHaul		DefaultProject
Measurement Ref: RUNUP 4		[2014-02-21 16:10 Compressor Train6
		From: 21/02/2014 - 16:26
Bode plot group		
Compressor		
	Compressor.P1.Y	45° L
	Compressor	CW
From	21/02/2014 - 16:26:09	To 21/02/2014 - 16:2
1800 _____		

Fig 13: Rotating machinery dedicated reports

Full spectrum

The Full Spectrum features the **forward and reverse** components of the orbit: comparing them at each harmonics and subharmonics will allow the analyst distinguishing phenomena such as **rub or fluid induced instabilities** (oil whirl/whip) from one to another.

Multichannel alarm conditions and actions

Alarms let the system **trigger actions on its own** based on defined conditions. Applications are multiple in the industry. The system can be defined to start a record in the middle of the night at a defined date or RPM condition. It can also be defined to increase the sampling of data on an unexpected increase of vibrations on one of the measured sensors due to a specific process change for example.

Run out compensation

Run out compensation can be processed based on a slow roll measurement. **Slow roll vector** position is selected either during or after the test at a chosen time and speed. A run out correction order spectrum is derived from the selected measurement point. The correction is a vector compensation (amplitude and phase) and is applied to the test data.

Record & playback: comfort, flexibility, security

- > The signal can be recorded continuously **with or without PC** (DREC): on the **removable Mobi-Disk** of the instrument or on the PC. The sampling frequency is selectable up to 102.4 kHz.
- > Signals are played back and data can be monitored and saved **as if being on-site**: allowing analysis set-ups to be modified even after being back to the office. It can be achieved based on the office software license even when the instrument is used on the field by another user.

Data management: sort & investigate

When preparing a report and investigating data it is key to be able to **find easily** the measurement files. For that reason the measurement management tool enable the user to sort and classify by properties such as measurement date, comments, plant, machine train etc ...

Export, manual and batch reporting

- > Run-up, steady-state or shut down plotting sessions can be selected thanks to the **range selection tool**. Templates and legends are fully adapted to typical rotating machinery reports and can be modified. **Copy/paste** or instant reporting can be used for any fast and manual reports.
- > For large and standard reports, the **full batch reporting** feature is preferably used. Results can be exported to text or Microsoft Excel files.

Easy configuration: designed by users for users

Software configuration is achieved through 7 main steps guided through a wizard: no risk to forget any settings. Each of the configuration steps may be accessed individually through toolbar icons or sequentially through a dedicated wizard in the following sequence:

Machine Train

Machine trains can be directly driven or indirectly driven (gear box based). A machine train using a **gear box** requires the analysis system to process order tracking on **2 shaft rotating speeds simultaneously**.

Bearings and Sensors

The machine configuration, including gap reference voltages, and bearing clearance values can be reloaded from the **machine library**. Bearing clearance and sensors angular positions can be configured.

Instrument inputs

Sensors, selected from the **sensor database**, cover all vibration sensors ranging from proximity probes to accelerometers (**ICP® Power**). The AC/DC/Float selection allows choosing the appropriate coupling.

Rotating Speeds

The rotating speeds can be captured based on proximity probes or optical sensors, on manual values, on computed keyphasor® based on a gear ratio (gear box situation) or on any combination of these inputs.

Analysis

> Analysis is configured on an interactive display featuring an overview of the frequency and order settings. Default orders are 1X, 2X, 3X. Additional orders can be setup including sub harmonics (0.5X) as shown on figure 14.

- > Data are saved at a configurable sampling rate: Delta time, Delta RPM, or a combination of both. Analysis is based on:
 - > **Synchronous Order Analysis (SOA)**: a resampling technique based on a keyphasor® signal.
 - > **ASync analysis** (FFT analysis): allows one to monitor vibration even when no keyphasor® is installed or machine is stopped.
 - > **Continuous signal recording** may be triggered independently from the standard measurement data recording (provides a back up of the critical test periods) even during several hours of tests.

Alarms

Alarms are configured using a flexible interface activating them or not. Alarms are made of a condition and an action. Whenever one of the conditions are fulfilled (or all conditions are fulfilled), the actions may be triggered (start record, pause etc...).

Displays

A number of layouts containing graphic windows can be easily created and saved in the project as well. The user can browse freely from one layout to another increasing the display capacity of the screen.

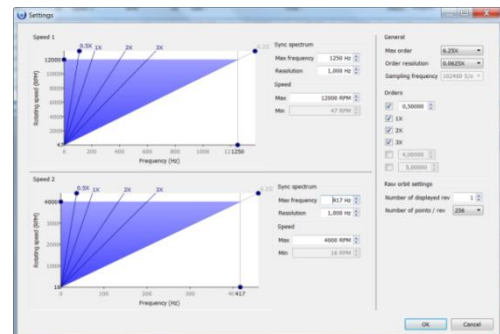


Fig 14: A 2 shafts machine train configuration

A Powerful and Flexible Range for Your Needs

The ORBIGate solution belongs to the comprehensive OROS software suite that covers a wide range of applications:



Signal Processing and Data Acquisition

FFT, Recording, Time Domain Analysis, Monitoring



Structural Dynamics

Operating Deflection Shape, Modal Analysis, Bump Test, FRF & Cross-Spectrum



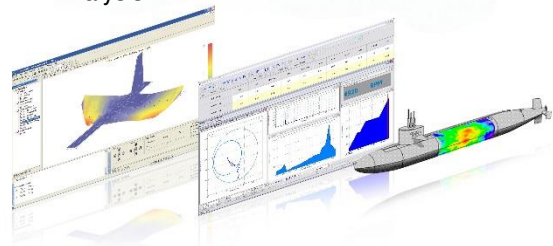
Rotating

Synchronous Order Tracking, Torsion, Twist and angular resampling, Rotordynamics, Turbomachinery Vibration, Reciprocating Machines Diagnostics, Single, Dual and Multiplane Vibration Balancing



Acoustics

1/n Octave Analysis, Sound Level Meter, Sound Power, Sound Intensity, Sound Mapping & Source Localization, Sound Quality/Psychoacoustics, Near-field Acoustic Holography (Air or Underwater), Transfer Path Analysis



The ORBIGate solution can analyze results from all OROS Teamwork instruments, providing flexibility in the choice of hardware platform size. The Teamwork technology enables the analyzers to be cascaded or distributed in order to measure up to 1000 channels. Instruments, conditioners and software licenses are exchangeable and flexible. Results are also easy to share thanks to the native Dataset Management technology. Based on the same platform, same technology and same software, OROS instruments are portable, rugged and real-time.

On-Site Measurements & Applied Trainings

Experts from OROS may come on-site for applied trainings. They will help you using your OROS system. They can provide assistance in your measurement. They are also able to recommend optimization in your measurement process depending on your application and field constraints.

Applied training: Introduction on Turbomachinery Vibration with ORBIGate

Objective

What are the main characteristics and behavior of Turbomachinery? Understand the main phenomena from a theoretical to a practical point of view. What could be the main issues and how to measure and identify them?

For diagnostics, for validation or for acceptance tests, our dedicated solution ORBIGate will let you get all the measurements for Turbomachinery.

Program

- > Roller and journal bearing behavior
- > Gap, orbit, polar, full spectrum
- > Major faults and typical measurement results
- > Analysis on a real fluid film bearing machine (demo kit or real machine of your choice): ORBIGate setup
- > Measurement with ORBIGate
- > Data and result management
- > Report generation

Who Should Attend

Technician or engineer dealing with turbomachinery for acceptance tests or vibration measurement diagnostics

Duration 2 days

On-site measurement

- > Assistance in your measurement
- > Expertise in diagnostics


















Specifications



Displays

General

Features	Description
Multitrace and multigraph	Plots can be multitrace (several bearing in the same plot, or several nX in the same plot), or multigraph (several graph in the same window).
Windows management	1 to 16 layouts – 1 to 32 windows/layout/linked cursors between windows
Trace management	Multitrace-Multigraph-Magnitude gathering
Zoom and translation	Mouse driven X, Y or Z translation – Area/axis zoom, Adjustable X, Y, Z scale.
Scale	Auto scale (continuous auto scale up), adjustable fixed scales by physical units
Markers / Cursors	Dual cursors with Dx/Dy – peaks and max automatic detection (interpolated) – adjustable labels, sideband, harmonic, power band.

Display types

Features	Description
 Scalar table grid	Configurable grid view of scalars (Sync & ASync).
 Scalar Vu-Meter	Scalar values (Sync or ASync) displayed in a Vu-Meter or as digital values. Color change on Alarm level reached.
 Rotating Speed Vu-Meter	Rotating speed displayed as a digital value or as a vu-meter. Color change on Alarm level reached.
 Speed Profile vs Time	Rotating speed displayed as a function of Time. The time scale can be relative or absolute based on the chosen preference.
 Full Shaft Motion: Shaft Centerline + Orbit	Shaft Centerline (GAP based), Clearance Circle and possibility to add the Orbits on the same plot. RPM and Time tags. Guided reference voltage determination.
 Orbit	Overall orbit over the defined order range, configurable number of revolutions, 256 or 512 points per rev.
 nX Orbit	Synthesized out of the Sync analysis: 1X, 2X, 3X (default) + 3 additional custom orders.
 Signal vs Rotations	Signal displayed vs rotations. Configurable number of revs
 Profile vs RPM / Time	Amplitude of Scalar values (Sync & ASync) vs Time (absolute or relative) or RPM.
 Bode Plot vs RPM / Time	nX Vectors (amplitude and phase) displayed as a function of RPM or Time (absolute or relative). 1X + Overall display.
 Polar Plot	nX Vectors (amplitude and phase) displayed with Time/RPM labels in a Polar diagram. Oriented referenced to sensor positions, keyphazor position and shaft rotation.
 Half Spectrum	Amplitudes vs order (or freq) with selectable max order (or max frequency) and selectable resolution. Dedicated markers (free, harmonics, side band etc...)
 Full Spectrum	Forward and/or Reverse spectra (vs orders) displayed in a multigraph or a multitrace for easy comparison.
 3D Spectrum	Spectrum displayed in a 3D diagram or color spectrogram ordered by RPM or Time during navigation (Waterfall). 3D diagram ordered by index for monitoring purposes in acquisition and post analysis (Cascade).
 Recorded Signal	Full raw recorded signal to be post-processed in the Post Analysis mode.

	Input Signal/Zoomed signal	In acquisition: Acquisition input signal In post analysis: Recorded signal zoomed between the Start and Stop cursors.
	Shaft View	Signal over one rotation displayed around a circle.

The following display types are not available during navigation: Input signal/Zoomed signal, the recorded signal, the shaft view.

Data Management

Features	Description
Projects	Save and load settings (machine configuration, instrument set-up, analysis and display configuration)
Machine train library	Machine train database containing machine setup (labels, sensors) and machine properties (reference voltage). Sort and search by machine properties (site, company, date)
Measurement file	File allowing saving and displaying data results and graphics: in real-time during acquisition or in office mode after the test.
Signal file	Raw continuous time waveform with a selectable sampling frequency. Provides backup and allow replaying the recorded signal (post analysis mode), as if it was live on the machine.
Report library	Report library, sort and search by template properties (report type, description)

Machine Train Configuration

Features	Description
Machine type	1 or 2 rotating shafts (1 or 2 shaft speeds)
Machine train library	Reload an existing machine (configuration and properties) including database keyword search
Machine information	Company, Site, Machine train name
Shaft direction	Clockwise (CW) or Counterclockwise (CCW)

Bearings and Sensors Configuration

Features	Description
Angle between probes	90°
Position	Selectable by steps of 1°
Bearing Clearance	Manual setting
Labels	Configurable probe and bearing labels
Inputs connection	Configurable

Input configuration

Features	Description
Vibration quantities	Displacement (microns, mils), velocity (mm/s, ips), acceleration (m/s ² ,g)
Other physical quantities	Frequency (Hz, Cpm), Voltage (V), machine power (W), acoustic pressure (Pa), torque (N/m), temperature (°C, °F, °K)
Sensor library	Proximity probes, velocity probes, accelerometer(ICP® or standard), voltage, DC,
Conditioning	Up to ±40 V on OR38, OR36 and Mobi Pack (Up to ±10 V on OR34 and OR35), autorange
Accuracy	Phase ±0.02° - amplitude ±0.02 dB – Dynamic > 120 dB
Input filter	Single or double times integration filters with HP filter
Coupling	DC, AC, ICP®, AC floating, DC floating, TEDS

Tach Configuration

Features	Description
Tach mode	Measured (keyphasor), fractional (second gearbox shaft calculated), simulated (manual setting)
Tach channel	Ext trigger (2)
Edge detection	Adjustable threshold, Slope (fall/rise), Hold off, Hysteresis
External sync	64 x oversampled – resolution < 160 ns (0.06° @ 1 kHz) ±40 V (±10 V on OR34, OR35)
Tachometer Monitoring	Assistance set-up tool: Signal visualization, threshold set-up cursor, coupling, time duration

Analysis

Features	Description
Synchronous analysis	Synchronous Order Analysis (SOA) based: One SOA for single shaft machines, 2 SOA analyses for double shaft machine trains (see details below)
Asynchronous analysis	FFT based (see details below)
Recorder	Continuous raw signal recording, selectable sampling (see details below)
Trigger	Free Run, Delta time, Delta RPM, Delta RPM or Delta Time
Delta RPM	From any tach – adjustable start, stop, delta RPM and slope

Synchronous Order Analysis (SOA)

Features	Description
Scalar Results	GAP (DC), Ov & nX Vectors (Amp&Phase) (RMS, PP, 0P), SUB1X, Ov RO-, Smax. Cf chapter "Displays" for graphics
Results	Spectrum (nX & Hz), Time blocs, Orbit (Ov & nX), Full Spectrum. Cf "Displays" for graphics
Set-up interface	Interactive settings, overview presentation, displayed number of revolutions (up to 32), number of points per revolution : 256 or 512
Type	Time domain re-sampling and interpolation function of tachometer
Span / Resolution Max	Order max = 6.25X to 200X - 1 to 1/32 order resolution
Tracked orders (nX)	1 to 6 independent orders tracked per channels
Averaging	Angular or order domain: exponential
Multiple pulse/rev	1 to 1024
Window	Uniform
Capacity	1 or 2 SOA plug-ins with independent setups and tachometer. Independent from other analysis (FFT and Recorder)
Phase conventions	Lag conventions, Phase display (0/360°, -180°/180°, or n rotations)

ASynchronous Analysis (FFT)

Features	Description
Scalar Results	GAP (DC), Ov (0P, PP, RMS), Frequency lines, Crest factor, Min&Max level. Cf chapter "Displays" for graphics
Results	Spectrum (Hz). Cf chapter "Displays" for graphics
Bandwidths / Resolution	DC to 40 kHz - 101 to 6401 lines
Window	Hanning
Averaging	Exponential
Overlap	0 – 99.9%
Overall analysis	Low and High cut off frequency selection

Recorder

Features	Description
Results	Raw signal
Dynamic channels throughput	Selectable recording sampling frequency (Up to 102.4 Ks/s). Independent from the measurement analysis settings.
Ext sync throughput	Records ext. synch at over sampled resolution (6.4 MHz).
Mode	Multiple records on one file
Recording support	On Hard Disk, On PC
Post analysis player	Tracks update: Sensitivities, Units, Labels, Selectable playback speed

Alarms conditions & actions

Features	Description
Alarms	Active/Inactive, Labelled
Conditions	Above/Below values on scalar values levels (On any channels or selected channels), Rotating Speed, At Date and Time
And/Or	All fulfilled, At least one fulfilled
Actions	Start data monitoring, start data record, start signal recording, Stop, Pause data record, Pause signal recording, Change delta time.

Analysis tools

Type	Description
Gap reference voltage	Gap reference voltage determination for shaft centerline (0,0) initial position
Reference values edition	Manual, measured, or saved in the measurement
Reference shaft positions	Shaft at rest (bearing bottom), shaft at center
GAP Monitoring	Allows to monitor and capture gap values even when no tach is detected (machine at rest)
Run-out correction (slow roll compensation)	Order vectors correction (complex (amplitude and phase) correction for all nX orders)

Navigation

Type	Description
Measurement replay	Continuous replay, replay speed adjustment, by step forward/backward (icons or keys)
Cursors	Master cursor for linked displays or window cursors for localized graph work
Range selection	Start, stop selection. Reduce grid number function.
Reference values	RPM and 1X frequency for all shafts, Absolute and relative date.

Reporting

Type	Description
Template library	Default template library, Customizable templates
Report template	Microsoft Word® (2003, 2007, 2010) based
Batch reporting	Produce a report with a predefined format (no need to display graphics to be reported)
Instant reporting	Produce a report with windows displayed on the active layout
Manual reporting	Copy/paste WMF

Import/Export

Type	Export format
Signal import (raw time)	OROS wav – Audio wav (with frequency conversion) – UFF (58) – Txt
Export format	CSV, Excel, Export whole measurement (or selected range), Export current grid
Export options	Export per sensor or per result type

Preference and units

Type	Metric / Imperial
Displacement	microns, mils
Velocity	mm/s, inch/s
Acceleration	m/s ² , g
Other physical quantities	Volts, Watt, Pa (Microphones), Nm (Torque), °C, °F, °K (Temperature)

ORBIGate® is based on OROS 3-Series technology and benefits of NVGate® display possibilities. Keyphasors® is a registered trademark of GE Energy/Bently Nevada. ICP® is a registered trademark of PCB Piezotronics. Windows XP, Vista and 7, Word and Excel are trademarks of Microsoft Corp. NVGate® and ORBIGate® are trademarks of OROS SA.

Ordering Information

The ORBIGate Solution can be ordered as a full license, as well as an office license allowing post analysis, or a simple reader license.

Reference	Description	
ORNVS-ORBI-N-ACQ-I	Acquisition - Instrument locked license	Let the user acquire and visualize rotor dynamics data in real time on one instrument.
ORNVS-ORBI-N-PA-I	Post Analysis - Instrument locked license	Let the user determine and visualize rotor dynamics data in post-analysis based on a recorded signal.
ORNVS-ORBI-N-NAV-I	Navigation - Instrument locked license	Let the user navigate and display results from a measurement.
ORNVS-ORBI-N-I	All options- Instrument locked license	Let the user operate the full module (ACQ, PA, NAV) on one instrument.
ORNVS-ORBI-N-ACQ-FD	Acquisition - Floating dongle locked license	Let the user acquire and visualize rotor dynamics data in real time on multiple instruments.
ORNVS-ORBI-N-PA-D	Post Analysis - Dongle locked license	Let the user determine and visualize rotor dynamics data in post-analysis based on a recorded signal.
ORNVS-ORBI-N-NAV-D	Navigation - Floating dongle locked license	Let the user operate the full module (ACQ, PA, NAV) on one instrument.
ORNVS-ORBI-N-FD	All options - Floating dongle locked license	Let the user acquire and visualize rotor dynamics data in real time on multiple instruments.
ORSC-TR-TB	Turbomachinery introduction – Theoretical system behavior – Typical faults – Setup and training	Training
ORSC-PREST	On site assistance for measurement and coaching	Setup, measurement management, data handling and reporting

Examples of instrument configurations

Reference	Description	
OR35-RD-10	Rotor Dynamics Pack – 10 Ch OR35 based	Full options instrument pack
ORMP-RD-16	Rotor Dynamics Pack – 16 Ch Mobi Pack based	Full options instrument pack
OR38-RD-24	Rotor Dynamics Pack – 24 Ch OR38 based	Full options instrument pack
OR38-RD-32	Rotor Dynamics Pack – 32 Ch OR38 based	Full options instrument pack

OROS, Leadership through Innovation

About Us

Thanks to 30 years in business, OROS's designs and manufacturing capabilities are renowned for providing the best in noise and vibration testing systems, meeting the requirements and expectations of automotive, aerospace, marine energy & process, manufacturing and automation industries.

Our Philosophy

Reliability and efficiency are our constant ambition. We know you have the same requirements for your measurement instruments: comprehensive solutions providing guaranteed performance, designed to meet the challenges of your demanding environments.

Our Emphasis

Constantly in tune with your needs, OROS collaborates with a network of proven scientific affiliates to offer the latest in technology in this field, always based on innovation.

Global Presence

OROS products are marketed in more than 35 countries, through our authorized network of representatives, offices and accredited maintenance centers.

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