OROS

MEASURING NOISE & VIBRATION

NOISE & VIBRATION

Testing & Analysis Solutions

www.oros.com

OROS Leadership through Innovation

About Us

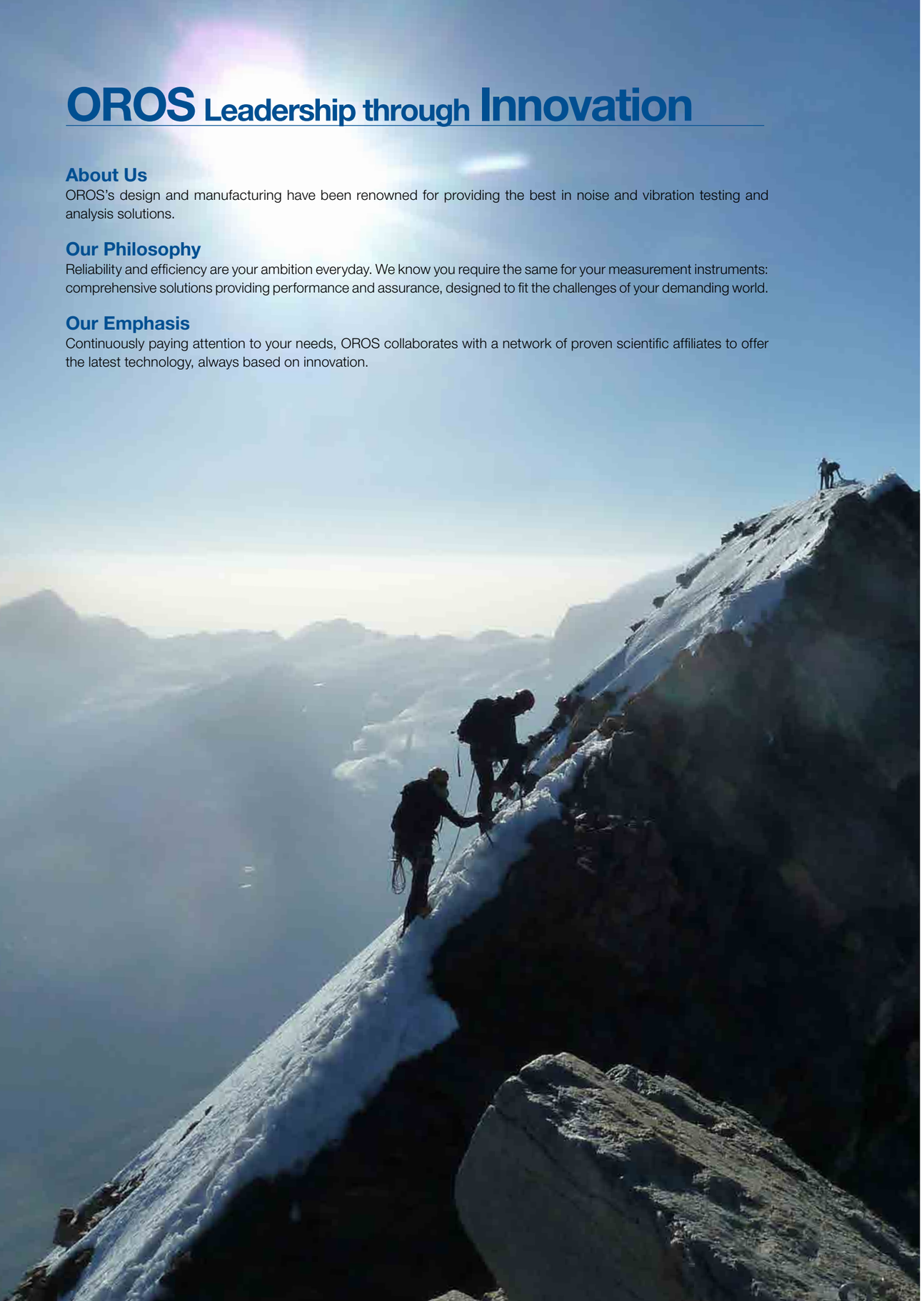
OROS's design and manufacturing have been renowned for providing the best in noise and vibration testing and analysis solutions.

Our Philosophy

Reliability and efficiency are your ambition everyday. We know you require the same for your measurement instruments: comprehensive solutions providing performance and assurance, designed to fit the challenges of your demanding world.

Our Emphasis

Continuously paying attention to your needs, OROS collaborates with a network of proven scientific affiliates to offer the latest technology, always based on innovation.



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Made for your Demanding World

Energy & Process
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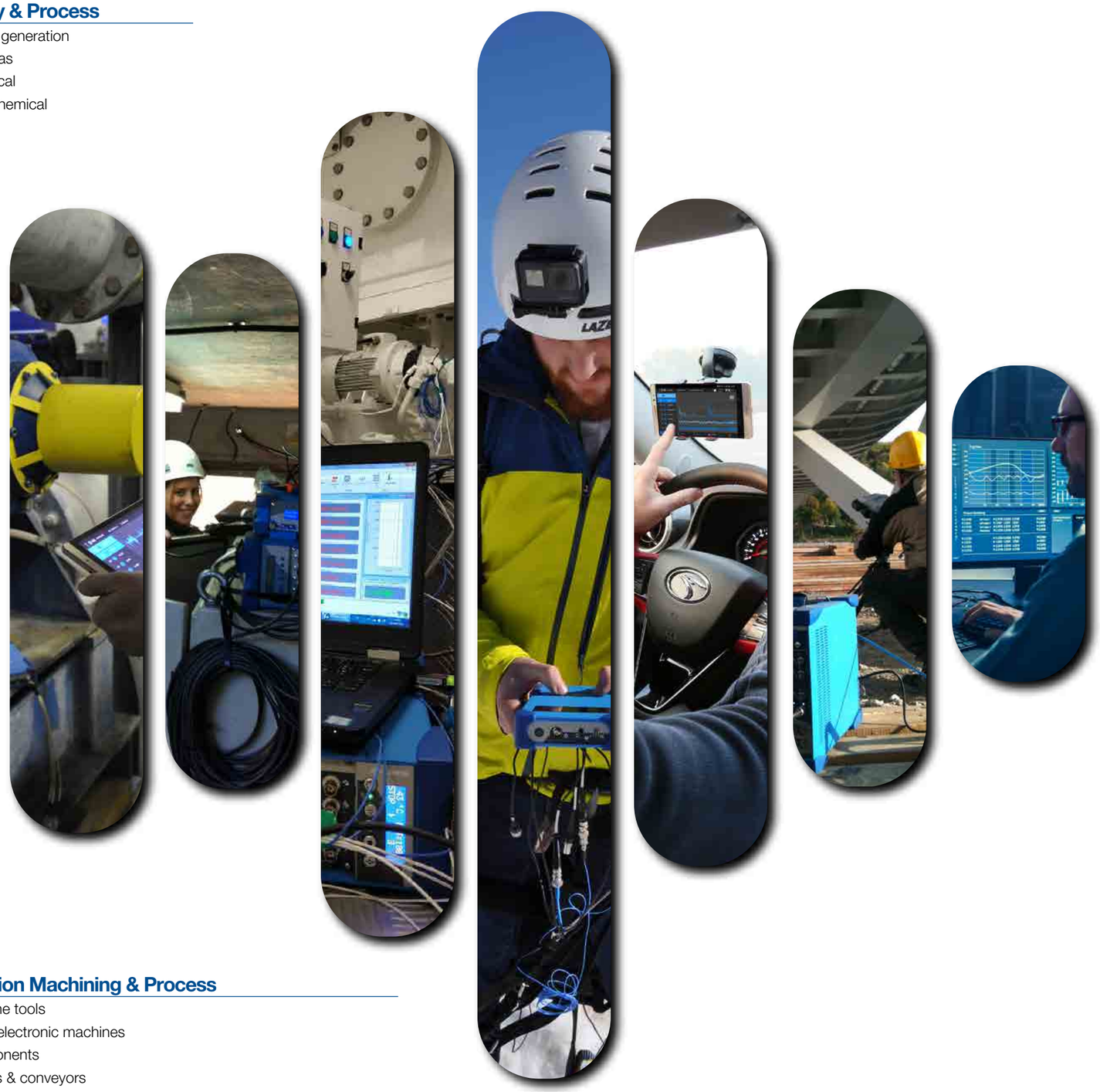
> Aircraft, helicopters
> Subsystems
> Defense systems, satellites

Automotive
> EV/HV
> Cars
> Heavy vehicles
> Railways
> Components

Marine
> Shipbuilding
> Propulsion
> Defense



Precision Machining & Process
> Machine tools
> Micro-electronic machines
> Components
> Robots & conveyors

R&D
> Prototype validation
> In-vehicle tests
> Simulation models updating and correlation

Acceptance
> Test benches
> Field commissioning

Diagnostics
> Troubleshooting
> Root cause determination

Application Based

Instruments, software and services to meet your needs and expectations in noise and vibration analysis for test bench, in the field or in the laboratory.

Noise

> Sound power
> Source localization
> Psychoacoustic & sound design
> Building acoustics

Rotating

> Jet engine testing
> In-flight testing
> Rotordynamics & balancing
> Factory acceptance testing
> MRO - Maintenance Repair Overhaul
> On-site commissioning / Troubleshooting diagnostics

Structural Dynamics

> Bump test
> ODS - Operating Deflection Shape
> Modal analysis
> Building vibration

NVH

> In-vehicle testing
> Prototype validation
> EV/HV
> Powertrain testing
> Cabin noise & acoustic comfort
> TPA - Transfer Path Analysis

Quality & Process Control

> Microelectronics production equipment
> End of line production testing
> Machine tool fine tuning

OROS Solutions Improve your Efficiency

OROS designs and manufactures portable, rugged and real-time noise and vibration analyzers with efficient software solutions for all your tests and measurements.

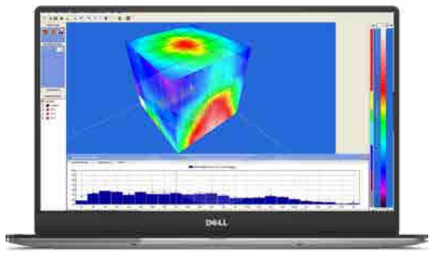
Software - From R&D to diagnostics

Rotating

> Order tracking
> Torsion & twist
> Rotordynamics
> Turbomachinery vibration
> Single, dual and multiplane balancing
> Monitoring

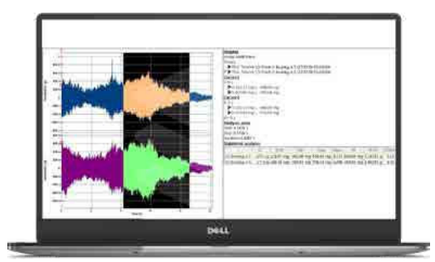
Acoustics

> 1/n octave
> Multichannel sound level meter
> Sound power
> Sound intensity
> Sound mapping & source localization
> Sound quality: psychoacoustics & sound design
> TPA - Transfer Path Analysis
> EV/HV NVH



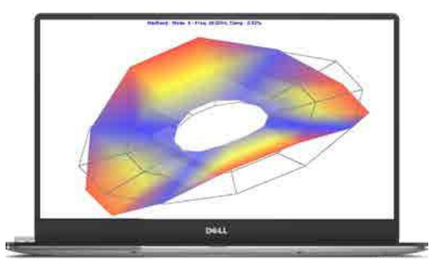
Data Acquisition & Signal Processing

> Recording
> TDA - Time Domain Analysis
> FFT - Narrow Band Spectral Analysis



Structural Dynamics

> Bump test
> FRF & cross-spectrum
> ODS - Operating Deflection Shape
> Modal analysis



Instruments - From 2 to 32 channels, cascadable up to 1000+

Flexible Connection

> Mobile analyzer
> Wi-Fi
> Remote access
> Distributed configuration
> Large channel count systems

Multioperations

> PC free recording
> Real-time & post-analysis
> Multi-analysis
> Handles any transducer

Made for the Field

> Portable
> Rugged
> Real-time
> Multichannel

Accurate

> DSP-based
> 24 Bit – 40 kHz – 140 dB
> ± 40 V input range
> ±0.02 dB / ±0.02°

Services - Everywhere close to you

Training

> Initial
> Advanced
> Webinar

Coaching

> Software customization
> Measurement and analysis

Testing

> Diagnostics expertise
> Troubleshooting
> Tools for automation

A Dedicated Team

> Dynamic and responsive Services department
> Worldwide hotline
> Global Accredited Maintenance Centers (worldwide coverage)
> Rentals
> Ready-to-go systems at any time

Maintenance and Contracts

> Premium contracts
> Software updates
> Hardware upgrades
> Calibration

Teamwork Instruments

For Teams & Fleets

Flexibility: Handles any transducer • Dual licenses system • Synchronous multi-tasking (live and post)
Multi-environments: Robust design • Standalone & remote monitoring modes • Easy integration for test benches
DataCare: Embedded dedicated processing (DSPs) • High-end metrology in all locations • Retrievable SSD hard-drives

Connections for any Situation

OR35, OR36 & OR38 Instruments

From 2 to 32 channels per chassis, and with daisy chain distribution the OR35, OR36 and OR38 instruments' range perfectly suits your measurement requirements with its high level of versatility and performance. Designed to be shared, these instruments provide exactly the same performance and capacities per channel no matter the model.

Full Combination Options

- Switchless daisy chain distribution
- Best in class cross channel phase 0.2 ° @20 kHz
- Local processing and storage: extend the system power as channel number grows
- Auxiliary tach/triggers and generators on all chassis's

Made for Everyday Efficiency

- Exchangeable XPod strain & temperature conditioners
- PC free, direct standalone recording
- USB ports for recording or charging/ powering of accessories
- Wi-Fi connectivity

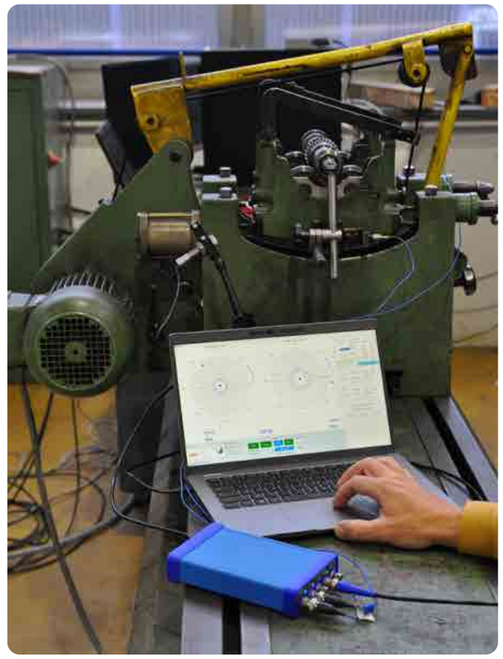
Powerful Instruments

- Fixed / removeable embedded SSD 16 to 512 GB
- Dynamic or parametric (DC, 10 S/s) universal inputs
- Scalable Force DSPs up to 8/chassis
- 2 to 3 hours autonomy on internal batteries
- Wi-Fi, Gb Ethernet, secure internet connections (SSH)

O4 – 4 channels USB Compact Analyzer

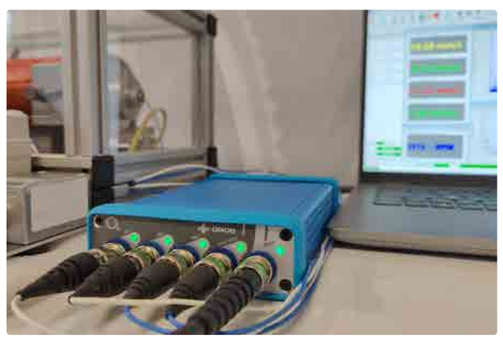
Focused on portability, accuracy, and ease of use, O4 packs includes the latest USB compact analyzer, selected powerful software modules, and ready-to-use models carefully prepared with OROS know-how accumulated over 40 years.

- Plug & Play: data & power by PC via 1 USB cable
- Ultra portable: 185x110x35 mm, 534 g
- High-end metrology
  - Accuracy: phase ±0.02°, amplitude ±0.02 dB
  - 4 inputs, ±40 V, 24 bits, AC/DC/IEPE/TEDS/ FLOAT
  - 2 high speed Ext synch (trig/tach), oversampled 32.8 MHz, ±40 V
  - 1 output



O4 Rotating pack

- Rotor balancing
- FAT & commisioning
- Test bench integration
- End-of-line production test



O4 FFT pack

- Machine tool tuning
- Modal/ODS
- Blades sorting
- Mobility check

Teamwork Technology

DataCare, Focus on the Best of your Signals

OROS Teamwork instruments include common «edge technologies» with an ability to process and store data faster, providing more efficient real-time results. Designed to accurately capture the right data at the right time, this powerful architecture combines many advanced capabilities.

Handle any Transducer

Front-end designed to handle any type of transducer with no hassle

- Accelerometer, microphone, force & pressure with ICP & TEDS
- Torque, power, etc.... including parametric DC mode (part of universal inputs)
- Prox. probe & keyphasor with ±40 V

Temperature XPod

- RTD: PT100, PT1000
- J, K, T, N, E, T thermocouples
- Integrated linearization
- Automatic cold junction compensation

Wheatstone Bridge XPod

- Full, ½ and ¼ bridge
- Automatic bridge balance
- 120/350 Ω built-in resistors 0.5%
- Continuous 0 to 10 V excitation compensation

High-Performance Triggers

Teamwork instruments feature high speed digitizers for acquisition on triggers & tachometers. From 2 to 6 external sync inputs per chassis.

- 6.4 MHz oversampled trigger/tach
- Eliminates ripple & jitter errors
- Tach, torsion, twist and angular sampling
- Sub-sample trigger adjustment

Access Anywhere

The Teamwork instruments feature advanced connectivity that includes:

- High speed 1 Gb/s Ethernet with integrated switch
- SSH tunnel for secure remote connection
- 100 Mb/s PTP IEEE 1588.2 clock synchronization with integrated switch
- USB 3.0 ports for data streaming
- Wi-Fi 2.4 & 5 GHz

Fluid real-time results at all times with edge computing and storage.

State of the Art Features

- Double aluminum casing
- Connector protections
- Dedicated transport bag
- DC 10-32 V and AC mains
- Control screen & keyboard
- Rubber corner protection
- ±40 V, 24 bits, 140 dB dynamic
- ±0.02 °/ ±0.01 dB channel match
- 40 kHz BW, 102.4 & 65.536 kS/s
- AC, DC, IEPE, Float & TEDS
- Instrument locked shared licenses
- On-board battery
- Retrievable solid-state disks

Gap-Free Multi-Analysis

When using OROS instruments for real-time analysis a gap-free analysis is guaranteed: all single samples are captured and processed thanks to the DSP based technology. This is very important as critical information may be stay hidden in the signal when using a non gap-free system.

The DSP based architecture of OROS systems ensures full real-time analysis avoiding any gap in the sample stream.

- Scalable DSP
- From 2 to 8 channels per DSP
- Multi-task analyses
- 100% deterministic

Flexible Recording

The edge technology permits secure, high speed real-time multi-tasking of your data without compromising efficiency.

Recording raw data can be monitored with computed results (profiles, color maps, spectra, levels). Such results are used as graphical test signatures.

Real-time analysis can be re-analyzed anytime with the raw data recording backup.

Designed for the Field

Teamwork instruments extend the need for laboratory accuracy to the field.

- ½ day batterie life
- MIL-STD-810-F
- Robust aluminum casing
- -20°C to 50°C
- Portable

Versatile Generators

All analyzers have high-performance outputs driven by a flexible multi-signal generator module.

- Controls experimental shakers
- 1 to 6/chassis, cascadable
- Fully synchronized
- High resolution down to 25 µHz
- Pure / Multi / Swept sine, white/pink noise, chirp, burst, file playback
- Uncorrelated noises



Data Acquisition & Signal Processing

NVGate, the Teamwork Software Platform

NVGate is the OROS software platform. It manages instruments' setup and signal analysis in both real-time and post-processing. NVGate gathers the basis of noise & vibration measurements backbone with front-end setup, signal processing, calibrations, transducers' database, live results graphs, reports and measurement automation tools.

From Acquisition to Reporting, a Platform for your Performance

The OROS software feature natively embedded technologies that enhance your efficiency, security and quality.

Usage Driven Workflow

Based on OROS experience of user's feedback, the ergonomics are optimized for a reduced number of clicks.

- Toolbox flexibility
- Ribbon access for setups, displays and actions
- Reload saved and shared setups
- Advanced display tools: live linked cursors, maths operators, D&D based comparison

Automation for Optimized Efficiency

For test benches and production lines, automated process is key for an optimized efficiency.

- Non specialist's usage: start and run
- Dedicated control panels
- Mask editors and alarms
- Macros and sequences for automated data acquisition, data storage and reporting
- Template based Word/Excel automatic reports


Simultaneous multianalyses

The platform features the following analyses in real-time and post-processing:

- Signal recording
- TDA - Time Domain Analysis
- Single and multiple FFTs
- 1/n octave and sound level overalls
- Order tracking

Data Management Designed for Teams

Teamwork require to easily browse, filter & sort large datasets and setups:

- Measurements measurements by contextual properties and attachments
- Team shared data and setups
- Use any PC or network directory: database free
- A platform data management for the software suite
- Multiple data formats imports and exports

Multi-Purpose Analysis for your Daily Use

Just Store It - Recorder

The time signal is recorded to be post-analyzed later on

- Parallel results monitoring for optimized efficiency, comfort and security
- Gap-free parallel sampling rates: slow @10 S/s, fast (selectable up to 102.4 kS/s), oversampled @6,4 MHz for tachs
- Pre-event recording

A Glance at It - Time Domain Analysis

A first step into analysis allowing:

- Looking at signals from seconds to hours
- Displaying typical scalar values (True DC, Min , Max, RMS, 0-Pk, Pk-Pk, Crest factor, Kurtosis) as view meters and profiles
- Triggering other analysis/recording

Get into It - FFT

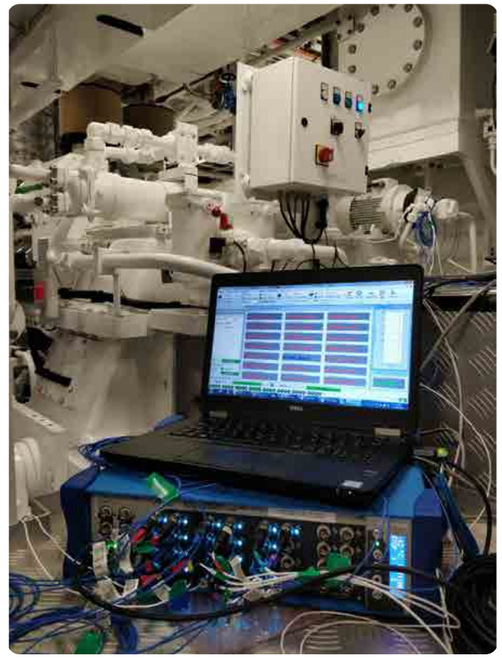
The FFT module is the swiss-knife of noise and vibration analysis providing narrow band analysis. It is used for most applications including structural dynamics, acoustics, and rotating analysis. It offers from basic to advanced analysis results:

- Spectra up to 40 kHz with 25601 lines
- Frequency, time and synchronous time averaging
- Lissajous, shaft view, envelope demodulation
- All units: RMS, Peak, pk-pk, PSD, ESD, RMS PSD
- Single/double integration & differentiation filters

Track its Evolutions - Waterfall

Results can be stored in a pile referenced as a function of time, RPM or other parametric data (temperature, torque etc…).

- 3D, colormap, profiles, Bode displays
- Band level, order and max order extraction sections
- Multigraph linked cursors for comparison analysis






Rotating

From Acceptance Tests to Diagnostics

Whatever the machine type: high speed turbine, compressor, transmission or a slow speed engine, OROS analyzers provide all the tools for rotating analysis from R&D, acceptance tests to diagnostics.

Rotating Speed Measurements

OROS 3-Series analyzers feature flexible and accurate shaft speed measurement tools. **Tachometer signals are over-sampled** to ensure accurate rotating speed and phase. Signals can be adjusted for better pulse detection using filters, holdoff and hysteresis.

External Trigger Channels

- 2 tachometer inputs are standard (up to 6/chassis)
- High sampling rate of 6.4 MHz (<152ns resolution) to allow an accurate phase measurement

Angular Sampling

For crankshaft, timing and valve analysis on engines.

Integrated Frequency to Voltage Converter

This function allows using the external synch channels directly as inputs for **torsional & twist** measurement.

Output Shaft Rotating Speed Computation

Based on 1 or 2 tachometers and the gear ratio. Provides phase and RPM from any shaft on the kinematics including CVT belts.

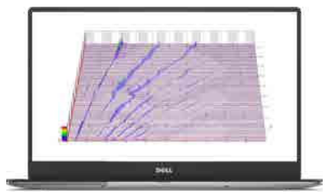
Order Tracking Analysis

Order Based Diagnostics: ORDiag

- **Rotation synchronous levels** (RMS, Min/Max, Pk-Pk, Crest factor)
- Angular correlation
- Roders, ORFs

Constant Band Tracking (CBT)

Helps the user acquire gearboxes' modulated and often buried noise and vibration orders.



Synchronous Order Analysis (SOA)

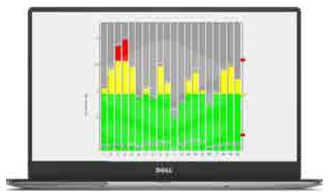
Provides stable and repeatable measurements for any speed-varying machinery. Using proven **real-time angular resampling algorithms**, SOA extracts amplitude and phase of orders; even from fast transients.

- Up to 40 kHz real-time analysis
- Order or angular domain averaging
- Max order contribution search
- Simultaneous order analysis on 2 shafts

Monitoring

Use as a standalone monitoring system with ability to trigger actions based on defined alarm conditions. The system operates autonomously and can be accessed remotely for further diagnostics.

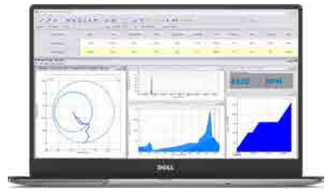
- From basic to advanced triggering conditions
- Pre-trigger time domain signal recording
- Advanced and flexible actions on alarms (emails, external applications, macro)



Turbomachinery Vibration : ORBIGate

ORBIGate, the turbomachinery software, gathers all functions required for turbomachinery rotordynamics analysis into one simple to use dedicated user interface.

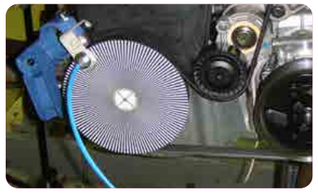
- **Tabular list: gap voltage, overall,** orders amplitude and phase (0.5X, **1X,** nX), Sub1X, SMax
- **Orbits** (Overall and nX filtered)
- **Full shaft motion:** Shaft centerline + clearance circle + orbits
- **Bode, polar and trend** plots
- **Full and half spectrum**, cascade and waterfall
- Gap voltage reference
- **Slow roll vector** reference for **run-out** correction
- Real-time acquisition, post analysis (based on raw signal recording) and data navigation



Torsion & Twist

The Instantaneous angular Velocity Converter (IVC) provides instantaneous angular velocity signal to be analyzed.

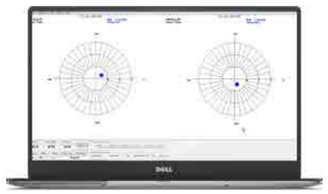
- **Integrated frequency to voltage converter**
- **Cross phase tracking:** the order cross-phase relatively to a reference channel for torsional resonances at specific orders identification.
- **Virtual inputs** compute the static and dynamic twist from 2 tachometers' signals.



Single, Dual & Multiplane Balancing

Assists the user during the test and the correction process:

- Rigid or flexible rotor
- 1 or 2 sensors per plane
- Synchronous Order Analysis based
- Trial mass method
- Balancing prognosis, Trim



Spectral Based Diagnostics: FFTDiag

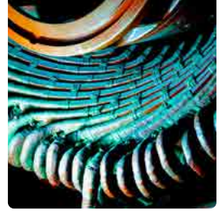
A complete toolset dedicated to machinery diagnostics: rotating machine trains, transmissions, gears and roller bearings.

- ShaftView
- Kinematics' markers
- Levels & profiles
- Cepstrum
- Envelope demodulation

Structural Dynamics

From Acquisition to Modal Analysis

Structural dynamics aims at understanding the mechanical behavior of vehicles, components and industrial machinery. The success of such analysis starts with an efficient and high quality data acquisition in the field: the key main features required for achieving this have been built into our solutions.



Structural Data Acquisition

With its dedicated structural mode, the FFT software module offers a comprehensive tool set for FRF and cross-spectra acquisition. Whether impact hammer, shaker excitation, or natural excitation is used, structural data can be acquired with confidence.

> Use the appropriate results and display: **Frequency Response Function (FRF)**, cross-spectra, force spectrum, coherence, trigger blocks.

> Any input can be set as the reference which generates a multiple reference FRF and cross spectrum matrix.

> Manage small to large amounts of structural data by **cascading instruments**.

> Define the measurement sets in Excel and use our node path sequencer to track all measurement points.

> **Hammer** impact auto-range.

> Use the appropriate weighting window (uniform, force/response).

> **Excitation validity check** based on results preview: FRF, Force spectrum, Coherence, Trigger blocks.

> Accept/reject impact hammer measurement after checking coherence.

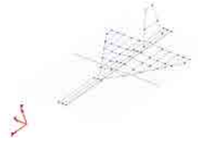
> Connect up to **6 shakers** for open-loop excitation with our outut generators.

> **Excitation signals** such as swept sine, chirp, random, can be generated simultaneously.

> Export the FRF in Universal File Format (**UFF**), MATLAB® and ASAM format.

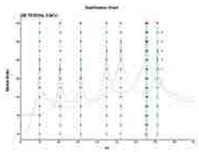
Modal

OROS proposes a comprehensive and powerful modal package adapted to all user levels from novices to modal experts. It features Operating Deflection Shape (ODS), Experimental Modal Analysis (EMA) as well as OMA (Operational Modal Analysis) using powerful state of the art algorithm making analysis of complex structures accessible without expertise.



Geometry Building

Interactive interface to create, modify and assemble standard elements or complex structures with global and local coordinate systems. **Import data from external software** in Universal File Format (UFF) and .iges.



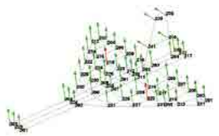
EMA

SIMO (Single Input Multiple Output) & MIMO (Multiple Input Multiple Output)
Single/multi-input and multi-output idenitifcation.

OMA

Narrow Band and Broadband Identification for responses only.

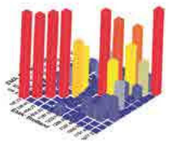
Focus on the Broadband method to identify all modes in a broad frequency band with high accuracy in a single measurement.



Direct Acquisition & Signal Processing

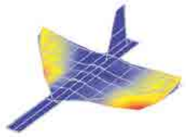
Dedicated interface for modal acquisition **with impact hammer, shakers** or under **operational conditions** to obtain:

> FRF H1, FRF H2 for EMA.
> Power spectral density, half power spectral density for OMA.



Validation

Use **MAC & COMAC to compare modal** parameters from different methods. Compatible with external experimental and simulation results.



ODS

Look at structure deflection based on natural excitation in time and frequency domain.

Correlation and Model Updating

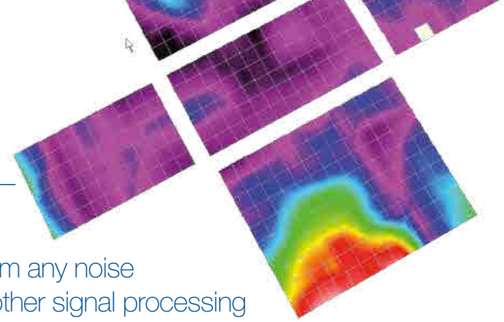
with FEM tools from DDS

> Structural static and dynamic simulation
> Pre-test and correlation
> Model updating and optimization

Acoustics Analysis

From Benchmarking to Troubleshooting

Teamwork instruments provide accurate and comprehensive results from any noise phenomena. Acoustic analysis can be performed simultaneously with other signal processing such as FFT, recorder, or order tracking.



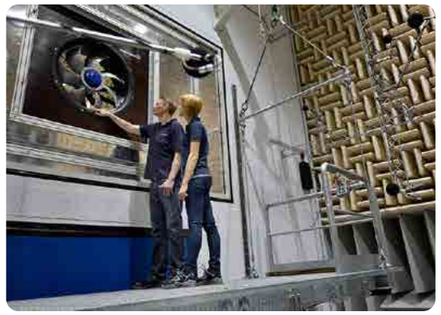
Sound Power

In multiple situations, the sound emitted from objects need to be quantified: sound power is the ideal quantity for this. Depending on the test environment the best method to apply may vary. If it is a field test, Sound Intensity based techniques will be typically applied. If it is a repetitive test based on a test bench, the sound pressure based technique (Sound Power) is the ideal one.

Sound Pressure Based

The Sound Power software provides sound power determination based on the sound pressure levels measured by microphones around the test object. It is ideal for a test bench: indoor (laboratory anechoic environments) or outdoor environment.

- Fulfills main international standards for **free field environments: ISO 374x**
- Dedicated interface for easy and repeatable operation
- All microphone positions measured at once
- Overall and Spectra real-time display
- Type-1 precision results in dBA
- Direct Sound Power determination
- Automatic standard validity check
- Background and environmental corrections
- Repeatability and directivity checks
- Test reporting with Excel



Octave Analysis

- **1, 1/3rd, 1/12th, 1/24th octave**
- Complies with IEC 61260 and IEC 60804
- A, C weighting filters and other common ISO standards
- **Fast, slow, impulse** time filtering
- Leq, Short Leq, User Leq, Constant BT
- Mask, Min/Max live overlay
- 1/n octave **waterfall** with profile extraction by band
- Dedicated DSP processing
- Up to 40 kHz

Sound Intensity

Sound Intensity software module is a flexible experimental technique that allows to obtain a large number of information on the sound pattern emitted from a source such as sound power or noise source localization.

Sound Intensity Based

The Sound intensity software provides sound power determination based on the sound intensity measured by an intensity probe following the point-by-point testing (ISO9614-1) or the scanning procedure (ISO9614-2). It is ideal for tests in the field.

- Real-time sound intensity spectrum
- Guided measurement procedure following **ISO9614-1 & 2**
- **Field criteria** and indicators calculation
- Automatic sound power report
- Calibration module for phase calibration and pressure-residual intensity index
- Probe remote control management

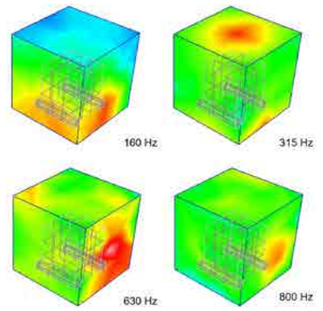
Sound Mapping and Source Localization

- Classical exploded 2D view & Advanced 3D graphics sound mapping
- Levels and spectra selectable by segment
- Narrow band, octave, and 1/3 octave
- Guided acquisition procedure
- Multiple measurement surfaces creation
- View the source behavior at several frequencies simultaneously
- Intensity probe remote control management
- Detect stationary noise sources

Overall Acoustics: Levels & Profiles

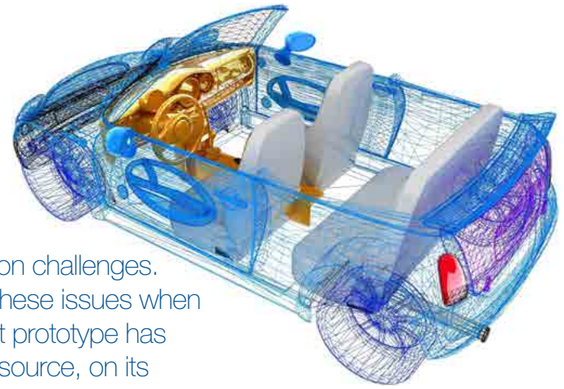
The OVA plug-in, a **multichannel sound level meter**, extends the analyzer's capabilities to a comprehensive acoustic measurement system.

- Complies with the latest standards such as **IEC 61672**
- Runs 3 RMS and a true peak detector/channel
- Time filtering and weighting
- User selectable 3rd order 10 Hz high pass
- Long duration profile memory (100,000 points/channel)



Acoustics Analysis

NVH

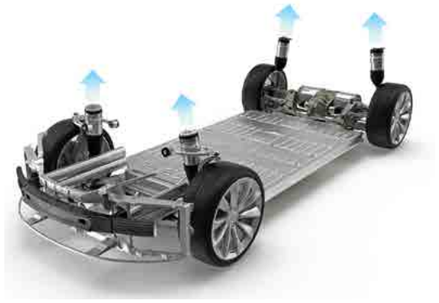


Trains, planes, cars, all means of transport are affected by noise and vibration challenges. Although the R&D departments of vehicle manufacturers deal directly with these issues when designing vehicles, it is often necessary to take further actions once the first prototype has been released. To reduce noise, actions can be implemented either at the source, on its transfer path, or at the level of final emission into the passengers' ears.

TPA: Transfer Path Analysis

In NVH, one of the key objectives is to characterize how noise and vibration reach a target, for example the ear of the driver. This is achieved experimentally by carrying Transfer Path Analysis (TPA). It allows ranking the main sources in growing order of contributions at the target. To fulfill the needs of this application, OROS proposes a unique TPA solution designed in cooperation with the ICR company.

- Full Transfer Path Analysis solution including analysis software, acquisition instruments and services
- Allows contributions determination and ranking along the path
- Range from a few to a large number of subsystems
- Intuitive dedicated interface looking at contributions evolutions vs operating conditions
- Frequency distribution of contributions: narrow-band, 1/3 octave spectra
- Intuitive data selection management and navigation
- Easy and flexible export of data for reporting



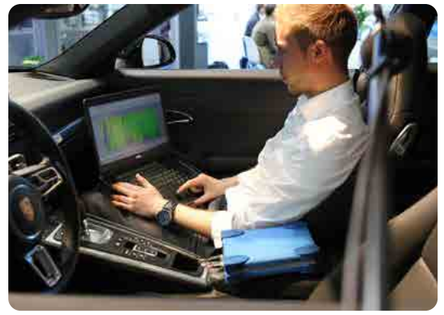
ATPA unique advantages

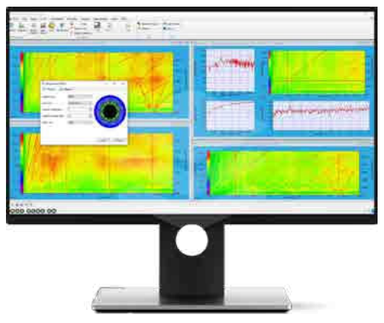
- No requirement to mechanically isolate the various sources, resulting in shorter testing time
- Allows contributions from panels, structural paths, and sources to be ranked
- Separates Air-borne contributions from Structure-borne contributions
- Coherent and Energetic analysis extending the analysis to high frequencies
- Synthesis calculation allowing for a full test validity check

Sound Quality: Psychoacoustics & Sound Design

The Sound Quality software module is the ideal tool for psychoacoustic metrics determination and intuitive sound design.

- Accurate and standardized psychoacoustic metrics determination: Loudness (DIN 45631/A1, ISO 532B, ISO 532-1, ISO 532-2), Sharpness, Fluctuation Strength, Roughness, Prominence Ratio, Tone-to-Noise Ratio, Articulation Index, and Speech Intelligibility Index
- Interactive sound filtering: Frequency-based and Order-based
- Auditory spectrogram: Time-frequency aurally related analysis, making aural sensation visible
- Intuitive sound design via innovative editing and resynthesis of auditory representations
- Comprehensive frequency analysis, including modulation analysis and wavelet analysis
- Order analysis and RPM-based display
- Playlist management for fast and easy comparison
- Distance spectrogram for visualizing differences between two sounds





EV/HV: Electric Motor Noise

Characterizing and mitigating noise from electric motors require to use the appropriate tools: the EVHV NVH module, developed in cooperation with the EOMYS company, is designed for that purpose.

Powertrain setup:

- Management of your EV/HV motor topologies (PMSM, SCIM...)
- Analysis of the main excitations (frequencies, wavenumbers)

Electric markers: spot the frequencies

- Spot instantly electromagnetic excitations (slotting frequencies, PWM, …) based on motor and converter characteristics
- Allows the separation of magnetic excitations from the structural response

Spatiogram: characterize the contributing electric forces patterns

- Represent the noise resulting of one spatial distribution of the electromagnetic forces for the whole range of rpms during a runup.
- Allow to determine how much a specific wavenumber (so one distribution of the forces) contributes to the emitted noise. It is calculated from the data captured on the surface of the stator.



Services

Everywhere Close to You

Responsiveness is the key to offering the highest level of services. OROS relies on a powerful network of subsidiaries, offices, resellers, maintenance centers and qualified partners. They are the first steps to your productivity.

Training

Experts from OROS offer **theoretical and applied training sessions on noise and vibration**. Our training programs are defined with you according to your needs: content can be either initial or advanced depending on your level and skill.

Our objective is to work side-by-side with you as you use of your system to **maximize your profitability and efficiency**. We offer **applied training programs at your facility**. We also offer **remote web-based training sessions** with one of our many expert instructors.

Coaching

Assistance with your Measurements

When resources are not available to you (lack of resources, skills, or systems), we offer assistance with your on-site measurements. We manage the entire process of your tests and measurements, up to and including final test reports. We help optimize your measurement process depending on your application and field requirements.

Expertise in Diagnostics

We even perform the measurement for you with on-site diagnostics or prototype characterization.

On-demand Services

We offer on-demand software and hardware upgrades and updates. At any time, calibration (NFX07-011) as well as diagnostics and repair can be provided.

Customization

When your needs go beyond typical use, we are able to answer the need for your **specific requirements and adapt to your specifications**. With our flexible platform, we are able to **customize either the instrument or software**. We tap into our years of experience and know-how to find the best solution for you.

Automation Tools

We offer a large panel of tools for automation that streamlines your testing. As an example, our macros and sequences are very powerful tools that create automated procedure.

Integration

NVDrive allows you to implement your own solution. From a simple add-on to complete test benches, build your program that drives and get results from Teamwork instruments through a TCP/IP interface.

Renting

Based on a range of modular instruments from 2 to 32 channels, the OROS line of Teamwork analyzer technology enables them to cascade or be distributed up to 1000 channels. Instruments, conditioners and software licenses are flexible and interchangeable.

The OROS Customer Care department is at your disposal to propose rentals of instruments and/or software modules to help you in your **fleet management**.

Hardware: increase capacity and performance of your instruments.

Software: try other OROS software modules according to your applications or rent any additional function on an as-needed basis.

Premium Contracts

1, 2 or 4 years renewable contracts to extend your warranty

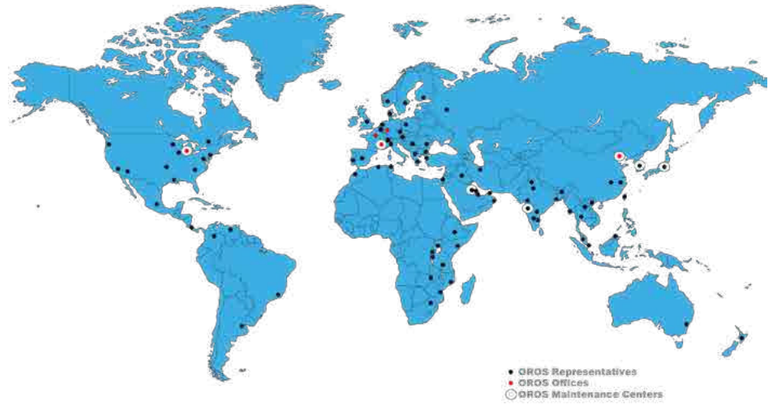
- 3 months *satisfied or exchanged* period
- Hotline (Help-desk support)
- Full coverage on your instrument (calibration and maintenance)
- Guaranteed turn around time (4 days) for hardware repairs and calibration
- Loaner units on longer time-frame repair or calibration
- Access to a personalized section on the myOROS website for software updates, tech-notes and other non-public downloads
- Calibration reminders
- Priority service at our maintenance center
- Privileged access to extended services at a preferential rate: urgent loan within 1 day,…

The OROS Service Department

Paying the greatest attention to our customers' satisfaction, OROS devotes a dedicated department, the Services Department, to ensure the best use of our technology. The dynamic and responsive team closely works with all the OROS experts: technical, R&D, manufacturing, marketing and sales.

Global Accredited Maintenance Centers

With worldwide coverage (China, Europe, India, Japan, Saudi Arabia, South Korea, USA), OROS is in close proximity to its customers, ensuring your instruments are up and running when you need it. Technicians are certified on a regular basis by OROS specialists, enabling them to repair, calibrate and upgrade all OROS systems.



General Specifications

Instruments

Front end	O4	OR35	OR36	OR38
Dynamic inputs	4	2/4/6/8/10	4/8/12/16	16/20/24/28/32
Universal inputs (DYN/DC)	-	4/8	4/8/12/16	16/20/24/28/32
Type	BNC	BNC/XPod	BNC/XPod	BNC/XPod
Ext. Sync (Triggers/Tach)	2	0/2	0/2/4/6	0/2/4/6
Outputs (Generators)	1	0/2	0/2/4/6	0/2/4/6
Auxiliary DC channels*	-	-	2/4	2/4

Inputs				
Sampling	204.8, 256 kS/s + **(1)**	**(1)** 2 kS/s to 65.536 kS/s or 102.4 kS/s - 24 bits sigma delta ADC		
Accuracy	Phase ±0.02° - amplitude ±0.02 dB - Dynamic > 140 dB			
Coupling	AC/DC/ICP®/TEDS/Float			
Range	±300 mV to ±40 V	±100 mV to ±40 V		
XPod slots	-	1	2	4
Filtering	High/Low Pass - Stop/Pass band – Integrator (simple/double) – Differentiator – A/C/Z			

Auxiliaries				
Outputs	-	DC to 40 kHz - ±10 V range - 24 bits DACs -THD < 0.002%		
Ext. sync (Trigger / Tach)	-	Resolution < 160 ns (0.06° @ 1 kHz) - ±40 V range (±10 V on OR34)		
DC channels	-	Sampling 10 S/s - 50 Hz/60 Hz rejection - reproducibility <1 mV		

System				
Hard disk	-	64 GB SSD fixed	128 GB removable SSD – USB 3.0	
Processors (DSP)	-	1/2 - Force	1 to 4 - Force	1 to 8 - Force
Autonomy	-	3 h	2 h	2 h
Power supply	USB-C power supply	AC (100 V to 240 V) / DC (10 V to 28 V), Mobi-Pack is AC only		
PC connection	USB-C	WiFi - 1 Gb/s		
Weight	534 g/1.17 lbs	3 kg/6.6 lbs	5.2 kg/11.5 lbs	8.2 kg / 18 lbs
Dimensions (mm)	185 x 110 x 35	310 x 58 x 245	114 x 280 x 325	114 x 400 x 325
Dimensions (in)	7.3 x 4.3 x 1.4	12.2 x 2.3 x 9.6	44.5 x 11 x 12.8	4.5 x 15.7 x 12.8

Large Channel Count Systems	
Channels	Max channels: 1000+ -
Connections	1 Gb/s Ethernet
Operations	Up to 40 kHz
Software	Supervisor NETGate

Distributed systems	
Size	2 to 16 units
Accuracy	Between units: ±0.2°
Network	Daisy chain - 1

Accessories

CAN bus interface (CAN)	
Type	CAN Bus Hi-Z probe and interface
Standards	CAN 2.0A & 2.0B – 125 kb/s to 500 Mb/s - J1939 compliant
Probe	Hi-Z Sub D 15 - 1.5 m and 5 m cables - Analyzer or Bus powered
Capacity	100 ch - 10 Hz refresh rate - synchronous with dynamic analyses

Strain gauges (S XPod)	
Type	Dynamic Wheatstone bridges conditioner extension module for OR36 and OR38
Bridge type	Full, Half, Quarter bridge - 120 Ω, 350 Ω built in completion resistors
Inputs	8 dynamics (40 kHz) inputs - ±1 V and ±100 mV range, DC/AC coupling
Excitation	Continuous 0 to 10 V - 30 mA (0 to 4 V) / 12 mA (4 to 10 V) - Automatic bridges balance

Temperature (T XPod)	
Type	Parametric thermocouples and RTDs conditioner extension module for OR36 and OR38
Thermocouple	J, K, T, N, E. Integrated cold compensation and linearization
RTDs	PT100 (0.5 to 4 mA), PT1000 (0,5 to 1 mA)
Range	-210°c to +1300°c, accuracy <0,5% of full range

Specifications not binding. OROS reserves its right to modify without notifications.

NVGate® (software base)

Graphics

Graphical features	
Windows management	1 to 16 Layouts - 1 to 32 windows/layout - 1 to 128 traces/window - automatic windows generation on channels activation - linked cursors between windows
Trace management	Multitrace - Multigraph - Magnitude gathering - Memorization - saved/on-line trace overlay
Zoom & translation	Mouse driven X, Y or Z translation - Area/axis zoom - Adjustable X, Y, Z scale
Scale management	Lin, log or dB Y scale - RMS, Pk, Pk-Pk, EU², PSD, ESD and RMS PSD unit - acoustics weightings
Markers/cursors	Dual cursors with Dx/Dy- peaks and max automatic detection (interpolated) - adjustable labels, sideband, harmonic, power band, period and kinematics markers

Displays type	
Time series	Triggered, weighted and filtered blocks - File overview / Zoom - X/Y (lissajous)
Narrow band	Magnitude - Phase- Bode - Imaginary & real part - Polar - 3D cascade
1/n Octave	1, 3, 12 and 24 band/octave - linear and weighted overall levels
Profiles	RPM - DC - kurtosis - Orders - power band - overall- Time, RPM or DC X axis
View meter	Digital - Magnitude/phase - Continuous with colored alarms
3D	Waterfall (narrow band/ 1/n Octave) - color spectrograms - sonogram - orthogonal or isometric views - XY, Yref, order/freq extraction views - sections management

Data management

Project manager	
Results indentification	User's define properties apply automatically to Projects (Context, campaign), Models (Setup, Workbook) and Measurement (Results + configuration)
Results search	Database free, the results are deposed (Share) at any network location with their properties embeded. Results recovery (Collate) with Excel like tables
Data fusion	Any data (Results, tranducers database, models, report templates, attached documents) are merged on the network and the seats

Real-time analysis

Performances per DSP	OR35, OR36 and OR38
Gap free recording	8 channels 40 kHz
Real-time FFT	8 ch 40 kHz 3201 lines or 8 ch 25.6 k kHz 25601 lines
Synchronous order	8 ch 12000 RPM 1/4th order max order 100
1/nth Octave	8 ch 25.6 kHz 1/3rd Octave
Time domain analysis	8 ch 25.6 kHz or 4 ch 40 kHz
Sound level meter	8 ch 40 kHz – 3 detectors + peak/ch

I/O functions

Tachs / keyphasor	
Sources	Pulses detection from ext. sync or inputs - virtual (compute gear ratio), DC level
Number	4 tachs from input - 2 to 6 ext. tach - 4 fractionnal tach - 4 DC tachometers
Settings	Adjustable Signal filtering - pre-divider 2 to 1024 - averaging - pulse/rev
Frequency to voltage converter	152 ns resolution - 1 to 4096 pulse/rev. - integrator and differentiator filter - smoother - 12 000 RPM max with 200 pulse/rev. - up to 6 inputs fractional missing teeth management
Math combined tachometer	RPM computation from 2 tachs - Editor with +,-,*, /, log, exp, power, sqrt and trigonometrical operators - Ideal for CVT belt speed measurement
Angular sampling	2 to 2048 pulse/rev - Decorrelated analysis resolution

Triggers	
Edge	From input or ext. synch - Adjustable threshold, Slope, Hold off, Hystersis, pre and post-divider
Level & delta level	From input DC, RMS, Kurtosis pk, crest Factor or DC channel - Adjustable start, stop, delta levels and slope
RPM & delta RPM	From any tach - adjustable start, stop, delta RPM and slope - Interpolation
Miscellaneous	Manual - time period (2) - Combination (and, or, before) - generators steps, stabilization and burst - result availability from every plug-in

Generators	
Pure tone	2 independent fixed sine - 1 to 6 correlated fixed sine with sweep transition - amplitude and phase adjustable
Noises	4 uncorrelated random (white/pink) - 4 independent multisine - 2 chirp - Adjustable bandwidth, filtering, amplitude, phase, resolution and burst
Swept sine	1 to 6 simultaneous outputs - phase and amplitude offset - adjsutable sweep speed (lin/log), cycles, steps, frequency span and settling time
Play-back	File (recorded/imported) - Inputs - Simultaneous with real-time analysis

Compatibility

Automation	
Macros	Automate any NVGate® operation - Graphical editor - Records user operations - Algorithmic instructions - Interactive query management - Sub procedures - Debug/log window
Mask & Alarms	Mask editor for spectra (freq/order), profiles and 1/nth oct - Dual mask (min/max) - Mask crossing alarms - Link to macro
Sequencer	imports acquisition setup sequences from Excel® - Sequence navigator (replay, jump to, pause) - Sequence editor (control applied settings)
NVDrive®	TCP/IP language for control/command of NVGate® - Modifies setup - Collects data - injects result - Operates on-line and office modes - Operates locally or through LAN/WAN

Import / Export	
Signal import (time series)	OROS wav - Audio wav (with frequency conversion) - UFF (58) - Txt
Result import (others)	AE2 - TXT- Excel® (mask)
Export	UFF - TXT - SDF – Matlab® - Audio wav - OROS wav - ATFX (ASAM)
Report	MS Word® - Excel® - Copy/paste WMF - on-line data refresh

General Specifications

NVGate Software Modules

The following modules (plug-ins) run independently. They operate simultaneously on any inputs with separate bandwidths, averaging modes, triggering and filtering. (i.e. an input can be analyzed by the FFT plug-in in the 2 kHz bandwidth while it is integrated and orders are extracted from it by the SOA plug-in)

Base plug-ins

Recorder	
Bandwidths	4 independent bandwidths/record - 0.8 Hz to 40 kHz - Records DC channels at low rate - Records ext. synch at over sampled resolution - Compressed (16 bits) or native (32 bits) formats - Throughput max: 15 MB/s (38 ch. x 40 kHz)
Tracks	Up to 128 tracks - Files can be divided by tracks and/or duration
Modes	Start to time - Start to stop - Time to stop (up to 2 GSamples) - Records on PC or on local disc - Multiple records on one files

Player	
Modes	Playback on outputs - Post-analysis - Repeat mode
Tracks update	Sensibilities - Units - Labels - Adjustable duration and start offset

Monitor	
Sources	4 channels - Hot plug of any input (do not stop real-time analysis/recording) - Dedicated DSP
Fixed setup	401 lines - Hanning window - Spectral domain exponential averaging
Detectors	Adjustable band-pass filter with by-pass - Adjustable averaging duration - DC, RMS, Min, Max, Pk, Pk-Pk, Crest factor and Kurtosis detectors

Waterfall	
Stacks results from	Monitor (detectors) - FFT (power band, time, spectra, FRFs) - CBT and SOA (Orders, order spectra) - 1/n Oct (instantaneous, max & min hold,averaged CPB spectra) - OVA (Leq, short Leq) - TDA levels (DC, RMS, Min, Max, Pk, Pk-Pk, Crest factor, Kurtosis)
Acquisition modes	One shot or continuous scrolling - Synchronized on any event or result availability - 1 to 100 000 slices - On-line 3D & color map displays

Analysis plug-ins

Narrow band spectra (FFT)	
Bandwidths / Resolution	DC to 40 kHz - 101 to 25601 lines - Simultaneous FFT Zoom (x 128)
Averaging	Time (STA), Spectral or FDSA domains - Overlap (0 – 99.9%) - Linear, exponential, peak hold and ref peak hold modes
Weighting window	Hanning- Hamming - Kaiser Bessel - Uniform - User define - Force & Response
Filters	HP, LP - BP, BS - integrator (simple and double) - Differentiator A and C laws - Independent on any channels
Cross functions	Cross spectra - FRF H1 & H2 - Coherence - Zoomed results - Full matrix (32 x 32) of cross functions available simultaneously
Capacity	4 or 128 channels plug-ins - Up to 4 FFT plug-ins with independent setups
Others	Adjustable band power tracking

Constant band order tracking (CBT) FFT	
Tracked orders	1 to 8 independent orders tracked per channels - Adjustable frequency span
Tachometer	Any valid tachometer (ext. sync, inputs, virtual) - adjustable start, stop, delta RPM and slope - Interpolation
Capacity	Same as FFT
Others	Order extraction centered on nearest peak - cross phase tracking

FFT-Diag	
Levels	DC - Min/max - RMS - Peak - Peak to peak - Crest factor - Kurtosis - Time domain extraction
Correlation	Auto and cross correlation between any channels - instantaneous and averaged results - centered and left zero padding weighting windows
Demodulation	Envelope demodulation signal- Simultaneously with spectra, zoomed spectra and envelope spectra
Shaft-view	Unwrapped signal view along shaft profile - polar cursors - direct angle reading
Cepstrum	Frequency harmonics reducer, quefrencis and time axis
Kinematic markers	Excel or csv based - database provided

Synchronous order analysis (SOA)	
Type	Time domain re-sampling and interpolation function of tachometer
Span / Resolution	Max order 6.25 to 800 - 1 to 1/32 order resolution
Tracked orders	1 to 8 independent orders tracked per channels
Tachometer	Any valid tachometer (ext. sync, inputs, fractionnal), DC, Maths
Averaging	Angular or order domain - linear, exponential, peak hold and ref peak hold modes
Overlap	1 to 31 rev - in % of rev - phase correction to keyphasor reference
Multiple pulse/rev	1 to 1024 - spectrum at each new pulse - phase correction to keyphasor reference
Weighting windows	Hanning - Hamming - Kaiser Bessel - Uniform
Filters	HP, LP - BP, BS - Integrator (simple and double) - Differentiator - A and C laws - Independent on any channels
Capacity	4 or 128 channels plug-ins - 1 or 2 SOA plug-ins with independent setups and tachometer
Others	Adjustable band (order) power tracking - cross phase tracking - independent phase shift (± 720°) per channel - angular sampling

Time domain analysis (TDA)	
Type	Statistical extraction and view on time series
Levels	Real-time DC, RMS, min/max, kurtosis, peak, peak-to peak and crest factor view meters and profiles
Signal view	Time base and duration independent on each channels - 320 ms to 110 hrs - relative or absolute time
Bandwidths	Adjustable from DC to 40 kHz
Filtering	HP, LP, BP, BS, integrator (simple and double) - Differentiator - A and C laws - independent on any channels
Averaging	Exponential, linear, repeated linear, repeated on trigger
Capacity	4 to 128 channels

ORDiag	
Revolution synchronous levels	DC - Min/max - RMS - Peak - Peak to peak - Crest factor - On any channels
Order correlation	Auto and cross correlation between any channels - instantaneous and averaged results - centered and left zero padding weighting windows
Shaft-view	Unwrapped signal view along shaft profile - polar cursors - direct angle reading
Copstrum™	Order harmonics reducers - roders™ and angle axis
Cross functions	Cross-spectra - ORF (Order Response Function) - Order coherence

1/n Octave constant percentage band (OCT)	
Type	Filter based - complies IEC 1260 & IEC 804
Averaging	Short Leq - Fast - Slow - Impulse - Linear - repeated
Weighting	A - B - C - D - 1/A - 1(A*D) - A*D - Wx(ISO 2631) - Wx (BSI6841)
Capacity	4 to 128 channels plug-ins
Others	Overall levels (linear & time weighted)

Overall acoustics levels (OVA)	
Type	Integrated Sound level meter - complies IEC 60-672 - Delivers class 1 results
Bandwidths	10 Hz (adjustable filter) to 40 kHz
Detectors	1 peak / channel - 3 RMS time weighted detector / channel
Averaging / Weighting	Short Leq 1s and 1/8s - linear / A - C- Z (none) independent on any detector
Time filtering	Fast - Slow - Impulse independent on any detector
Capacity	4 to 128 channels plug-ins

Direct recording (D-rec)	
Type	Stand-alone data recording option for the OR36, OR38 and Moby-Pack analyzers
Capacity	Same as analyzer ones (32 ch @ 40 kHz - multirecords - multisampling - all record modes)
Triggers	Periodic, level, edge detection, Ext. sync - pre/post-triggering
Setup	From NVGate or 100% PC free through LCD panel - 12 user define presets
LCD panel settings	Per input: coupling, range, add/remove - Sampling, record mode, bridge autozero
Data security	Power failure, disk extraction and failure proof - Automatic data recovery without PC - Time stamped records - Overload LED

Virtual inputs (VIN, VDC)	
Type	Real-time computation on time series from dynamic (VIN) and parametric (VDC) inputs
Typical operations	Time domain cross function, Vector components contribution, multitransducers power, torsional twist, trigger on averaged/ratio signal
Dynamic channels	$(A*IN+B)^N$ and filter on each channel – A, B, N positive, negative, decimal ex: $(2 * IN + 0.41)^{-1/2}$
Dynamic operators	Sum, Product, with general coefficient, offset and power - up to 12 ch per operator
Parametric operators	Equation editor: +, -, *, ÷, pwr, sqrt, exp, logs (n, 10,2), trigonometry (arc, hyp), abs

Applications Software Modules

Modal

Geometry	Geometry builder - import in UFF and IGES
Data import/export	UFF and Excel compatibility
Impact hammer acquisition	Sequencer - FRF H1/H2, coherence- force/response window - double impact rejection - manual accept/reject
Shakers acquisition	Multiexcitation - sine/random/chirp excitation - hanning window
Mode indentification tools	Complex Modal Indicator Function (CMIF), Stability diagram – manual or automatic modes selection
ODS	In time and frequency domain
EMA/OMA narrowband method	Based on the Complex Mode Indicator Function (CMIF)
EMA/OMA broadband method	Based on Polyreference Least Squares Complex Frequency algorithm (p-LSCF)
EMA MIMO1 method	Based on Frequency Domain Poly-Reference algorithm (FDPR)
EMA SIMO/MIMO2 method	Based on Rational Fraction Polynomial formulation of the transfer function
Validation	Modal Assurance Criterion (MAC), The Coordinate Modal Assurance Criterion (COMAC)

ORBIGate®

Multianalysis	Real-time analysis, based on Synchronous Order Analysis (SOA and FFT) + raw signal recording
Project & data	Project, machine train and measurement management interface - Sensors set by angular steps of 1°
Inputs	Proximity probes, velocity pick up, accelerometers - Coupling: AC, DC, AC Float, DC Float, ICP®. Up to +/- 40V
Tachs	Direct or undirect coupling (1 or 2 shafts per machine trains): simultaneous phase extraction Measured, virtual (gear ratio based determination) or simulated tach
Overview grid	GAP V, GAP, Overall, Amplitude & Phase vectors: 1X, 2X, 3X, customizable nX (from Subharmonic to 100) Sub1X, Smax
Displays	Full Shaft Motion (shaft centerline, clearance and orbit), shaft centerline, overall orbit (up to 512 points), nX filtered orbit, Bode & polar plot, trend (relative or absolute time x-axis), order and frequency spectrum, half and full spectra, waterfall & cascade, time domain signal, shaft view, rotating speed profile
Alarms	Trigger action on level above/below scalar values (on any channels), rotating speed, date and time
Sampling type	Delta time, Delta RPM, Delta RPM + Delta time, free run
Modes	Acquisition, post-analysis & navigation - on-line (connected to analyzer) or office (PC only) operation
GAP reference	Reference determination when shaft at bottom or at center
Run-out	Vector run-out correction (complex spectrum correction) at slow roll
Reporting	Report batch generation and printing with Microsoft Word or Excel: graphics & legends Data export to ASCI and Microsoft Excel.

General Specifications

Applications Software Modules

Monitoring

Platform integration	Linked to NVGate as an add-on module and benefits of all NVGate possibilities for condition levels availability, triggering and displays
Conditions	Defined amplitude threshold excess
Actions	Start analysis, recording, emails, external applications, macros
Autonomy	Fully autonomous, based on the Autonomy Kit (optional) allowing to restart automatically the instrument
NVGate plug-in	No compulsory plug-in. Recommended plug-in: ORNV-REC-I, ORNV-TDA-I, ORNV-FFT-I, ORNV-ORD-I

Single & Dual Balancing

Procedure	1 or 2 plane balancing for rigid rotor, trial weight method at steady state (not necessarily operating speed), trim balance
Analysis	1X amplitude and phase determination: based on Synchronous Order Analysis (SOA) Accuracy ± 0.02dB, ± 0.02°
Inputs	1 or 2 sensors per plane. Proximity probes, velocimeters, accelerometers. Coupling: AC, DC, AC Float, DC Float, ICP®. Up to ± 40V
Correction	Adding/retrieving weight, splitted correction weights on defined positions
Residual unbalance	ISO 1940-1 admissible residual unbalance determination at operating speed, residual unbalance prognostic
Displays	Real-time polar diagram, correction display & correction chart
Report	Overview balancing report

Multiplane Balancing

Machines	Up to 14 balancing planes
Data	Based on 1X data (Amplitude & Phase): Run-up, steady-state or shut-down
Calculations	Carried out in office mode with multiple speeds selection
Displays	Rotating speed profile (RPM vs time), 1X: Amplitude, Phase, Polar
Correction	Adding/retrieving weight, splitted correction weights on defined positions
Features	Residual unbalance prognostic as a function of RPM
Report	Overview balancing report

Sound Intensity

Sound Power	ISO 9614-1 point by point method, ISO 9614-2 scanning method, flowchart for criteria validation
Sequencing	Measurement sequence management - Sound intensity probe remote control (start, stop, pause, save) multispacer management
Calibration	Pressure and phase calibration and correction
Instrument standard	PRI (Pressure Residual Intensity) determination according to IEC 1043
Modes	Acquisition (connected to analyzer), office (PC Only)
Display	Real-time octave & 1/3 Octave, FFT narrow-band analysis (sound pressure & intensity)
Sound Mapping	Pressure & intensity mapping, 2D or 3D, Isolevel plots & picture overlay in 2D
Reporting	Sound power reporting

Sound Power

Method	Sound power determination based on sound pressure - Free field conditions
Overall level	dB and dBA overall level up to 20 kHz, complies with IEC 60-672 - Delivers class 1 results
Octave filters	1/3 oct up to 20 kHz, complies with IEC1260, 804
Standards	ISO 3743, ISO 3744, ISO 3745, ISO 704
Positions	Up to 24 simultaneous microphone positions
K1 Background correction	Background noise measurement, manual
K2 Reverberation correction	Reference source, RT60 based, approached method, manual
Tests	Standard conformity, repeatability test
Report	Automatic, customizable Excel report template

Sound Quality

Psychoacoustic metrics	Loudness (DIN 45631/A1, ISO 532B, ISO 532-1, ISO 532-2), Sharpness, Roughness, Fluctuation strength Tonality: Prominence ratio, Tone-to-noise ratio Intelligibility: Articulation index, Speech intelligibility index
Filters	Graphical and digital design of IIR filters: combination of up to 20 individual filters Frequency and order equalizer, Low/High/Band pass, Band stop Display of transfer functions: Magnitude, phase, group delay of an individual filter or the filter cascade
Auditory spectrogram	Time-frequency aurally related analysis, contour extraction, tracking of tonal components, editing and resynthesis of auditory representations
Sound analysis	SPL, 1/3 octave, FFT spectrogram, Wavelet analysis, Modulation analysis, Order analysis
Import/Export	Import: *.wav, *.snd, *.raw, *.oxf, *.hdf, *.dat, *.cmg Exportw: Data from curves and results table to MS Excel

Specifications not binding. OROS reserves its right to modify without notifications.

OROS and the Digigram Group

Headquartered in Grenoble, French Alps, with a worldwide reach, the Digigram group has built its expertise on the design and manufacture of professional audio solutions. OROS joined the group in 2024 adding its 40 years reputation, knowledge and experience in noise and vibration testing solutions.

Building on a joint vision and the value of our expertise from noise and vibration to critical audio, we are ready to address industrial market.

Our Focus

Our systems are specially designed to address the automotive, aerospace, marine energy & process, manufacturing and automation industries.

Our solutions range covers data acquisition, structural dynamics, acoustics and rotating applications.

Worldwide Coverage

Our Maintenance Centers provide close proximity to our customers. Technicians are certified on a regular basis by the OROS specialists.

Our representatives are carefully selected for their knowledge and expertise in noise and vibration analysis. They are regularly trained and updated on OROS products.

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