

# Noise & Vibration

Test and Measurement Solutions

Instruments

Software

Services



# Made for your Demanding World

**R&D**



**Acceptance**



**Diagnostics**



**Distributed Acquisition**



**Remote Monitoring**



**Test Bench**



**Team's Office**



## Large Channel Count Systems



## On-Board



## On-Site Services



## Energy & Process

- > Power Generation
- > Oil & Gas
- > Chemical
- > Petrochemical



## Marine

- > Shipbuilding
- > Propulsion



## Aerospace

- > Aero Engine
- > Aircraft, Helicopter
- > Components
- > Defense Systems, Satellite



## Automotive

- > Cars
- > Heavy Vehicles
- > Railways
- > Components Suppliers



## Manufacturing & Automation

- > Machine Tools
- > Micro-Electronic Machines
- > Components Suppliers
- > Robots & Conveyors

# OROS Solutions Enhance your B

OROS designs and manufactures portable, rugged and real-time Noise and Vibration Analyzers with efficient software solutions for all your tests and measurements.

## INSTRUMENTS

### Flexible Connection

- > Mobile Analyzer
- > Distributed Configuration
- > Remote Access
- > Large Channel Count Systems
- > Wi-Fi

### Multiperations

- > PC Free Recorder
- > Online & Post Analysis
- > Multianalysis
- > Handling Any Transducers

### 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

### Anywhere Close to You



#### Training

- > Initial
- > Advanced
- > Webinar



#### Coaching

- > Software customization
- > Assistance in your measurement

#### Testing

- > Expertise in diagnostics
- > Troubleshooting
- > Tools for automation



#### A Dedicated Team

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



#### Maintenance and Contracts

- > Premium contracts
- > Software updates
- > Hardware upgrades
- > Calibration

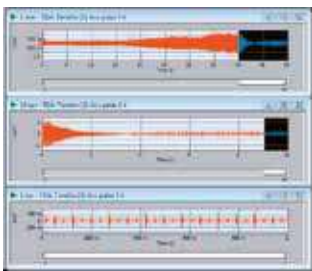
# Efficiency

## SOFTWARE

R&D, Acceptance, Diagnostics



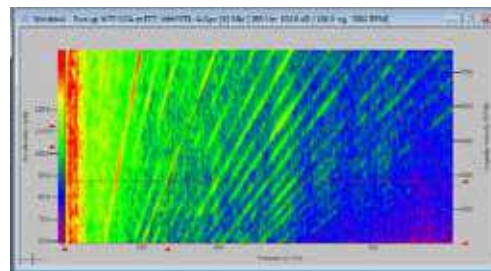
### Noise & Vibration Software Platform



- > Recording
- > FFT
- > Time Domain Analysis
- > Monitoring



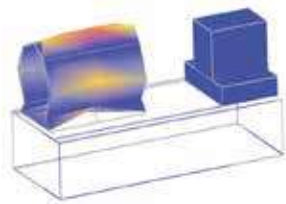
### Rotating Analysis



- > Synchronous Order Tracking
- > Turbomachinery Vibration
- > Reciprocating Machines Diagnostics
- > Torsion & Twist
- > Balancing



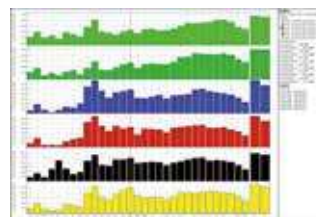
### Structural Dynamics



- > Operating Deflection Shape
- > Modal Analysis
- > FRF & Cross-Spectrum Acquisition
- > Advanced Swept Sine



### Acoustics Analysis



- > 1/n Octave Analysis
- > Overall Acoustics: Levels & Profiles
- > Sound Power
- > Sound Intensity
- > Sound Mapping and Source Localization
- > Sound Quality

# Teamwork Instruments

## Same platform, same technology, same software

Based on a range of modular instruments, from 2 to 32 channels, the Teamwork technology enables to cascade or distribute the analyzers to measure up to 1000 channels. Instruments, conditioners and software licenses are exchangeable and flexible. Data are also easy to share thanks to the native technology. They allow different configurations: mobile analyzer, distributed configuration, remote access and large channel count systems.

### OR34

The compact analyzer  
(2 or 4 inputs)

OR34 is the smallest instrument in this series. Its size sacrifices nothing to efficiency. This 4 channel analyzer brings all the best from the 3-Series technology in a **professional, rugged and powerful unit.**

### OR35

The modular analyzer  
(6 to 10 inputs)

OR35 is the most **flexible and modular** 10 channels multi-analyzer available. Ideal for mixing laboratory, on-board and field measurement, this analyzer features **long autonomy, portability, ruggedness and continuous accuracy.**

The unique 8+2 channel-count **combines high-speed tach and standard inputs** offering larger applications coverage than regular 8 channels units.

### OR36

The recorder/  
multianalyzer  
(4 to 16 inputs)

OR36, Mobi-Pack and OR38 open the way for unrivaled measurements. They are able to acquire and analyze large amount of noise and vibration data. Thanks to their computing power and their built-in Mobi-Disk, OR36, Mobi-Pack and OR38 offer the capability of an advanced laboratory instrument.

### MOBI-PACK

The reinforced  
recorder/multianalyzer  
(4 to 16 inputs)



- Hand size (A5 foot print)
- Light 1.4 kgs (3 lbs)
- Uninterruptible power supply
- 2 trigger/tachometer inputs
- 1 generator output
- 1 computation DSP

- Easy to carry 3 kgs (6.6 lbs)
- 6 to 10 universal inputs
- 1 or 2 computation DSPs
- 2 trigger/tachometer inputs
- 2 generator outputs
- 64 GB internal SSD

- Portable (5 kgs/11 lbs/ A4+)
- 4 to 16 universal inputs
- 1 to 4 computation DSPs
- 2 to 6 trigger/tachometer inputs
- 2 to 6 generator outputs
- 128 GB Mobi-Disk

- All-in-one package
- Integrated PC power supply
- Suitable for touch-screen tablet PC
- 128 GB Mobi-Disk

## OR38

The recorder/multianalyzer  
(8 to 32 inputs)

Measurement possibilities. These 4 to 32 channel instruments  
provide data without compromise with a comfortable  
Pack and OR38 face any measurement situation.  
It is in a **modular, rugged and portable package.**



- Portable (8 kgs/18 lbs)
- 8 to 32 universal inputs
- 1 to 8 computation DSPs
- 2 to 6 trigger/tachometer inputs
- 2 to 6 generator outputs
- 128 GB Mobi-Disk

16-32

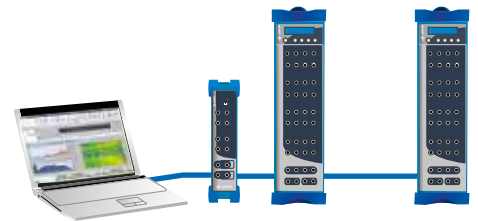
1000+

Channel-count

## MOBILE ANALYZER



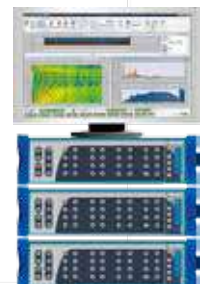
## DISTRIBUTED CONFIGURATION



## REMOTE ACCESS



## LARGE CHANNEL COUNT SYSTEMS



# Teamwork Instruments

Same platform, same technology, same software

## Cascade



OROS analyzers allow distributed and/or large channel acquisition by using instruments together. Multiple systems are controlled from a single PC running NVGate software which takes advantage of on-board DSP processing and storage ability.

- > **One software interface** for 1 to n hardware together
- > **Local processing and storage** increase with additional units
- > **Distributed channels along all units**  
(Tachs, Ref. channels, Events)
- > Daisy chain **up to 100 m** between units, **1000+ channels**, switchless
- > **Cross phase** between units <  $\pm 0.2^\circ$  @51.2 kS/s

## PC Free recorder



D-rec, direct recording, offers a unique technology for **stand-alone digital data recording measurements**. It is the best way to replace old DAT recorders. The unique

front-panel with its bright LCD and accessible buttons offers freedom of direct setup, **without a PC or a tablet**. It is easy to select inputs, modify front-end settings (coupling, range, etc...) or change the bandwidths. Up to 12 user-defined recording configurations can be saved in the instrument. They can be loaded either from the control panel or automatically (routed acquisition).

- > **100% PC or tablet free:** secured data recording, bright LCD and large buttons, compatible with CAN, Xpod, universal inputs
- > **Removable storage disks (SSD):** more flexible, rugged and much faster!

## Mobi-Disk



The Mobi-Disk is the local storage device for OR36, OR38 and Mobi-Pack. This removable device enables each engineer to keep its own raw data.

Connected to the PC through the USB port it allows fast and easy post-processing or back-up.

- > 128 to 512 Gb **shock proof** SSD
- > Dual port (**USB 3.0** & analyzer slot)
- > High throughput (32 ch x 102.4 kS/s)

## Remote

With a **1 Gb/s** Ethernet connection, OROS analyzers can be controlled through local network or internet. Thanks to the local processing and storage, the data bandwidth remains low, supporting wireless and low speed connection.

- > **Internet and LAN remote** analysis
- > Remote **post-processing from local storage**
- > Wi-Fi



## All-In-One

## Auxiliary Channels

In addition to universal inputs, OROS instruments extend input/output capabilities with auxiliary channels. As a standard, teamwork instruments offer 2 high-speed digitizers and 2 multipurpose outputs:

- > 2 to 6, **6.4 MHz sampling trigger:**
  - **Edge** detection
  - **Tachometer**/keyphasor
  - **Torsional** measurement
  - **Angular Sampling**





## Smart Front-End

OROS 3-Series analyzers are designed to handle numerous transducer types with no hassle. Inputs are compatible with:

- > **ICP® accelerometer, force sensor & , microphone and pressure** (2 or 4 mA)
- > **Proximity probe & keyphasor** with  $\pm 40$  V range
- > **Temperature, Torque, Power...** parameters with universal dynamic + parametric inputs



## Plug and Play Signal Conditioning

The Xpod modules add signal conditioning to the OR35, OR36 and OR38 in a smart and field operation driven design. These 8 channels' conditioners can be added, removed and exchanged between the analyzers in a few seconds. Moreover, the lateral side clipping, leaves the BNC input connectors free to be used as classical ICP®/AC/DC/Float inputs

- > **Exchangeable** between any OR35, OR36 and OR38
- > **5 sec** docking time
- > BNC connectors still available

### XPods line: bridge & temperature conditioners

**Wheatstone bridge conditioner** handles any bridge-based transducers (strain, pressure, load, torque, force...).



- > **Full, 1/2 and 1/4** bridge
- > **Automatic bridge balance** (incl. in D-rec)
- > **120  $\Omega$  / 350  $\Omega$  built-in resistors**
- > Continuous 0 to 10 V excitation voltage



**Temperature conditioner** handles thermocouples and RTD transducers.

- > **PT100, PT1000 and J, K, N, E, T, thermocouples**
- > Integrated **linearization**
- > Automatic **cold junction compensation**
- > Standard flat pin **connectors**

## CAN Bus



Allows acquiring live parametric data from a car or machine's CAN bus.

- > **CAN2.0A & CAN2.0B**
- > 125 kb/s to 1 Mb/s
- > Rugged Hi-z probe

- > 2 to 6 **Synchronized generators**
  - High resolution **swept sine**
  - **Multi-sine, White/Pink Noise, Chirp**
  - Signal **playback**
  - **All filtered** (HP, LP, BP,  $\Sigma$ /dt)
- > 2 to 4 **parametric DC inputs**
  - 10 S/s
  - > 1 mV repeatability

# No compromise : Performance

## Portable, Rugged...

Designed to be the best for field operations, the OROS 3-Series instruments offer the capabilities of advanced laboratory instruments in a rugged and portable package that takes any measurement situation in its stride.

### Specifications for Field Operations

Being portable is more than just a carrying case!

- > All inputs protected up to  $\pm 60$  V
- > Internal battery
- > Aircraft cabin compatible carrying case
- > Double shielded chassis
- > Foolproof cooling inlets
- > Secured power supply connector
- > Switchless cascable units
- > Bright LCD panel
- > Large and touchable operating buttons
- > Environment proof (Vibe, shock and temp)
- > BNC connectors
- > Ethernet (up to 100 m away)
- > Power supply: AC (100 to 240 V) / 50-60 Hz / DC (10 to 28 V)
- > Grounded or floating couplings



# & Reliability in the Field

## and Accurate

Focusing on measurement quality and efficiency, OROS design takes care of every part of the hardware, preventing interferences from internal and external perturbations. It results in an instrument that provides, exact and perfectly reproducible results.

### The Need for Real-Time

Every part of the signal may contain important signatures hidden by non real-time analyses. Live synchronous order, 1/n octave and filtering are **not possible without gap free analysis** capability. Real-time analysis helps getting actual data on-line.

Thanks to this DPS-based architecture, OROS 3-Series analyzers provide the same measurement and analysis performance **whatever the number of channels or bandwidths**.

The same process applies with distributed units or large channel count. The local processing capability and data storage come natively with the additional inputs. This modular architecture guarantees valuable live results for all your applications, even the most demanding ones.



### The Right Result at the Right Time

In regular PC-based test and analysis systems, the **un-deterministic behavior of the operating** systems may rapidly lead to loss of samples (not real-time) while the acquisition and analyses duty increases. Your test data integrity is not guaranteed.

OROS DSP-based architecture is designed to offer safe and powerful processing capabilities that allow getting the right data with certainty. With DSPs the amount of analyses **is known before starting the acquisition**.

OROS 3-Series analyzers run the real-time analysis **exclusively with their DSP bank**:

- > Scalable (1 to 8) **computation DSPs** for analyses (FFT, SOA, 1/n OCT...) on each systems
- > Distributed or large channel count with **hundreds of processors running** your data in parallel
- > **ForceDSP** that offers up to 10 time more horse power for demanding applications
- > A **dedicated processor** handling trigger, monitoring, generators and tachometers
- > A **disk manager** devoted to the true parallel raw data recording

### The Best of Electronics for Metrology

The analyzer inputs must accurately read the transducer input signals. They must be properly designed.

- > **High dynamic range:** 24 bits  $\Sigma\Delta$  / 140 dB
- > **Wide voltage range:**  $\pm 100$  mV to  $\pm 40$  V
- > **Precise phase matching:**  $< \pm 0.02^\circ$  @ 20 kHz
- > **Multiple frequencies:** 2 sampling clocks 102.4 kS/s and 65.536 kS/s with sub-multiples
- > **Accurate:**  $< \pm 0.02$  dB amplitude match
- > **Stable:**  $< \pm 0.1$  mV offset drift



# Noise And Vibration Software Platform

## NVGate, the Teamwork Instruments Interface

NVGate, the software platform is the cornerstone for all measurement tasks. It hosts the suite of OROS software modules.

Whatever the application and software module, it allows you working in a coherent and continuous environment.

### Standard Modules

#### Save Your Signal

The **Recorder** captures raw, time-domain data during your acquisition and analysis process. Designed for reliability and fidelity, saved signals may be used for post-processing, export or as an archive.

#### Extract Any Spectral Signature

The **FFT** software module provides all the necessary functions for spectral analyses. From spectra to FRFs with advanced averaging methods and various resolutions and bandwidths, it provides standard and advanced frequency analysis tools.

#### Control Your Acquisitions

The **Monitor** software module brings 4 additional analysis channels (time and spectral domain) free running on a dedicated DSP. Similarly the TDA (Time Domain Analysis) software module delivers crystal-clear time views, as well as statistics (RMS, DC, PK-Pk) of the acquired signal.

#### Track Your Results Along Any Parameter

The **Waterfall** stacks your spectra, levels, orders and trigger blocks providing flexible 3D waterfall and powerful profiles. Color-spectrogram, Bode plots, order tracking trend plots, all that Vs time, RPM, Power or Torque.

### Intuitive Tools

#### Analyze and Compare Your Measurements and Analyses

- > Various **markers & cursors** (linked between graphs & windows)
- > **Math** between channels on time, angular, spectral and order domain
- > **Overlay** reference results with live measurements
- > Mask editor and alarms

#### Create Your Own Interface

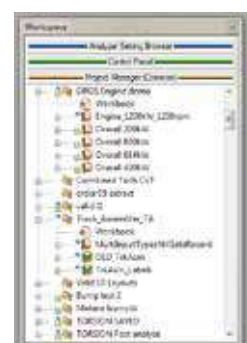
- > Drag, drop and rename any settings in the **control panel**
- > **Macros** and **Excel based sequences** allows automating recurrent tasks

#### Manage Your Tests: Dataset Management

- > **Models'** database provides repeatable predefined setups
- > **Projects manager** saves your **data**, corresponding **setup** and qualified **meta-data**
- > Calibration management
- > Filters, properties, data mining, meta-data and exchange features embedded in the existing project management

#### Broadcast Your Results

- > **Instant reports** to Word/Excel
- > Automated **company-defined reports** for personalized communication
- > Multiple **import/export formats**

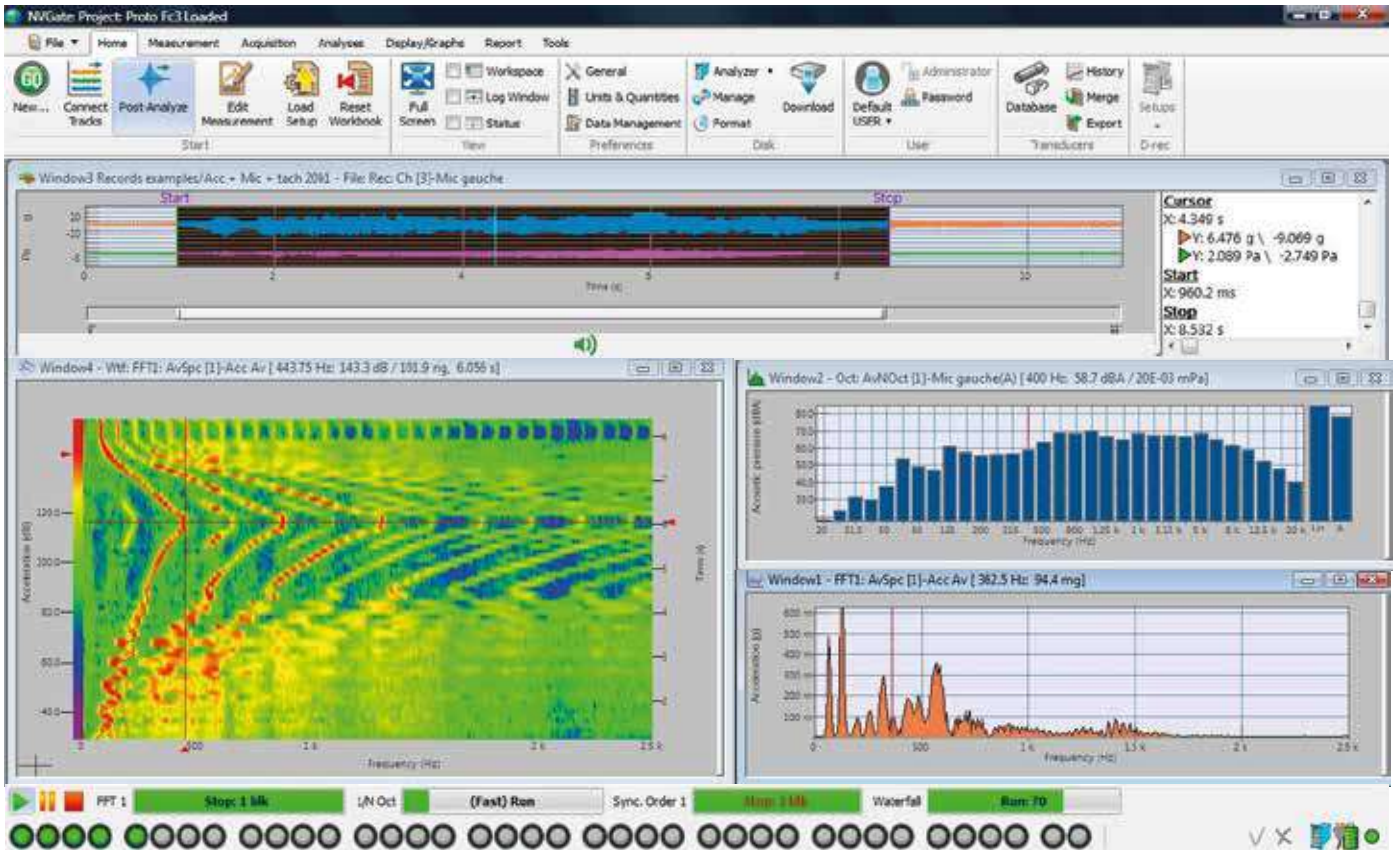


## Multidomain Analysis

- Multiple bandwidth and sampling
- **True multianalysis:** time, order, spectra, recording
- Gap free analysis : 100% real-time

## Flexible Software Licensing

- Additional **post-processing/report license** included
- 1 to n Analyzer = distributed software modules
- **Company level** licensing



Vision Interface

## Open and Customizable Platform

- Database: results 'access toolkits
- Automation: sequencer, macros, control panel
- 3<sup>rd</sup> party software: import/export, NVDrive, MATLAB® toolkits
  - > Import/Export in .uff, .txt, .mat, .wav, .sdf, .atfx
  - > Compatibility: FAMOS, ME'scope, GlyphWorks, DynaWorks®, DynamX®

## Software Suite

- Integrated in the same platform with **modern ribbons**
- **Acoustics, Rotating** and **Structural Dynamics**



# Rotating Analysis

## From Acceptance Tests to Diagnostics

Whatever the machine type: a high speed turbine, a compressor, a 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 (6 maximum)
- > High sampling rate of 6.4 MHz (< 152 ns resolution) to allow an accurate phase measurement

#### Angular Sampling

For crankshaft, timing and valve analysis on engines.

#### Integrated Frequency to Voltage Converter

Into the analyzer's software using the external synch channels 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 shafts 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

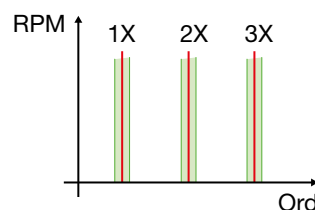
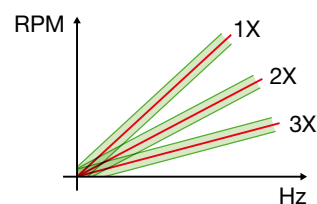
#### Constant Band Tracking (CBT)

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

#### Synchronous Order Analysis (SOA)

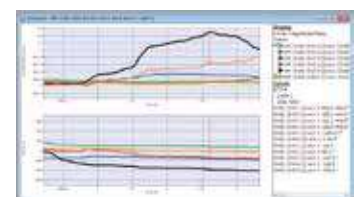
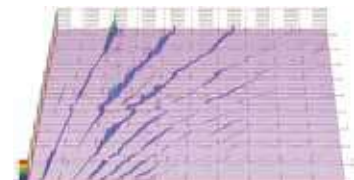
Provides stable and repeatable measurements for any speed-varying machinery. Using proven **real-time angular resampling algorithms**, SOA extracts amplitude and phase of orders; even from fast transients.

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



### Waterfall & Profiles

Results are sorted based on a choice of references for the Z Axis (RPM, time and levels) and represented in 3D or profile views (Bode plots, cross-phase tracking, ...)

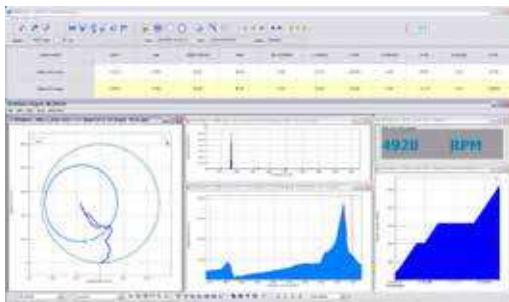




## Turbomachinery Vibration : ORBIGate

ORBIGate, the turbomachinery software, gathers all functions required for turbomachinery vibration 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



## Reciprocating Machines Diagnostics : EngineDiag

Integrate the **machine mechanical properties and kinematics** (number of cylinders, machine cycles, timing diagram) into NVGate, the Noise and Vibration software platform. The **Advisor** offers an easy software configuration and results displays based on the machine characteristics and instrumentation.

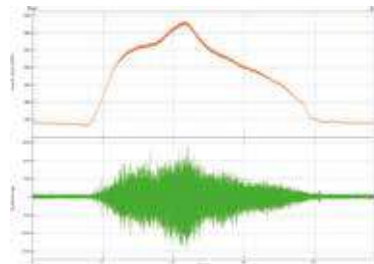
- > Synchronous time signals with cycles overview
- > Overall level on the machine cycles and kinematic phases
- > Results comparison and trend
- > Angle-Frequency representation based on Wigner-Ville algorithm
- > Cylinder phase alignment



## 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:

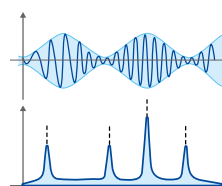
- > Rigid or flexible rotor
- > 1 or 2 sensors per plane
- > Synchronous Order Analysis based
- > Trial mass method
- > Balancing prognosis, Trim



## 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 Analysis

## From Acquisition to the Result

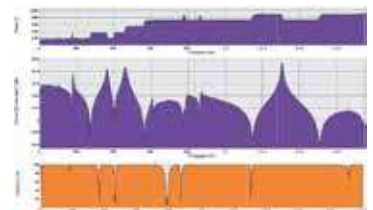
Structural dynamics is a powerful tool for understanding the behavior of industrial machinery and their supporting structures. It is used in maintenance, prototype validation and mechanical design as well as field applications. Good structural dynamics starts with good data. For that reason, all the tools for efficient and accurate acquisition have been integrated into our structural solutions.



### Measurement Acquisition With NVGate

With its dedicated structural mode, the **FFT software module** offers a comprehensive tool set for FRF acquisition. Whatever the method used, impact hammer or shaker excitation, FRFs are confidently acquired.

- > Check the validity of the acquisition thanks to different displays and their **preview**:
  - **Frequency Response Function**
  - **Coherence**
  - Trigger blocks
  - Averaged results
- > Adjust the settings using an appropriate **weighted window** if necessary: uniform, force/response, hanning
- > **Accept /reject** the impact hammer measurement after coherence checking
- > Hammer **impact auto-range**
- > Define the measurement sets in Excel and use the node path sequencer to track all measurement points
- > Export the FRF in **Universal File Format, MATLAB®** and **ASAM** format



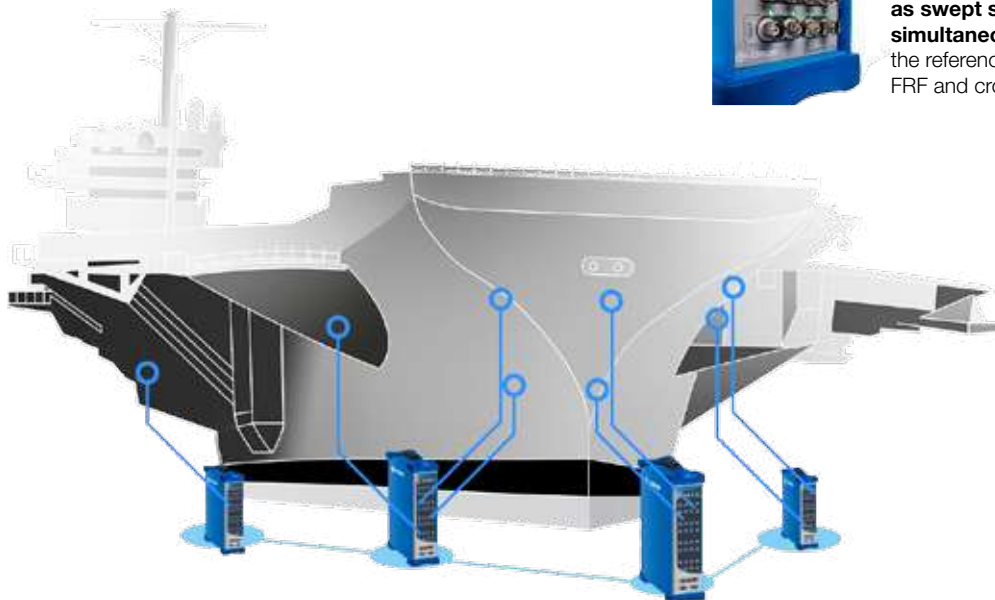
### Distributed & Large Channel Count Systems

Large structures require a high number of input channels. **Multiple OROS analyzers can be cascaded to increase the total channel count.** This solution offers the same acquisition, recording and analysis capabilities as 3-Series analyzers on wider scale applications.

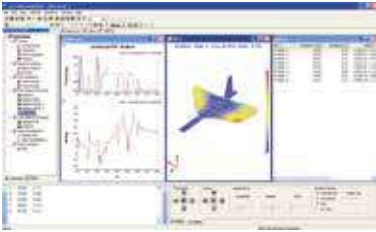
### Generators



For exciting a large structure, up to 6 shakers can receive signals from the generator outputs of the analyzer. In order to fit the wide range of potential cases, **a large series of excitation signals such as swept sine, chirp, random, can be simultaneously generated.** Any input can be set as the reference which generates a multiple reference FRF and cross spectrum matrix.



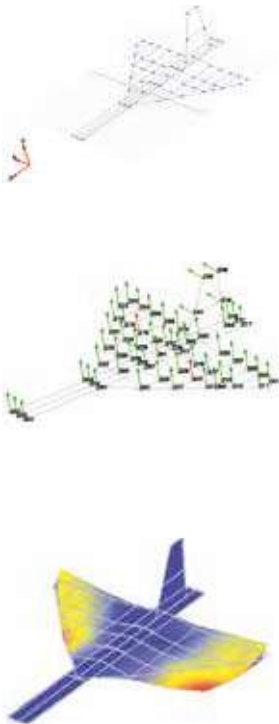




## Modal

Now an affordable modal software providing a comprehensive package for modal experts as well as novice engineers.

Modal, the Structural Dynamics Module, is an application-oriented software solution utilizing the most powerful analysis techniques with user friendly and intuitive interfaces and automatic procedures.



### 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 and .iges

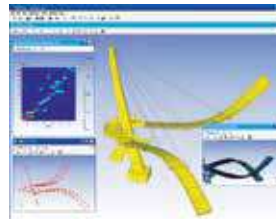
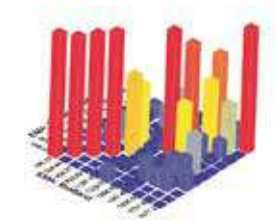
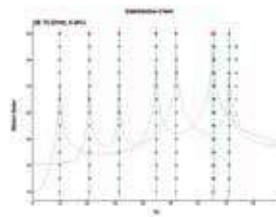
#### Direct Acquisition & Signal Processing

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

#### ODS

In **time** and **frequency** domain



#### EMA

**SIMO & MIMO** identification methods

#### OMA

Narrow Band and Broadband identification for responses only measurement

Focus on **Broadband method** to identify all the modes in a broad frequency band in one time with a high accuracy

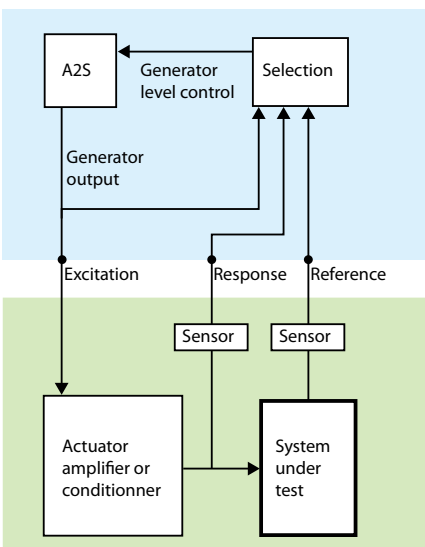
#### Validation

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

#### Correlation and Model Updating

with FEMtools from DDS

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



## Advanced Swept Sine (A2S)

Frequency Response determination is commonly used in various industries for:

- > **Servo Control:** steppers, machine tools, guiding systems
- > **Structural Dynamics:** accurate FRF for modal acquisition with excellent mode separation and non linear structure
- > **Acoustics:** absorption materials, audio systems
- > **Electronics:** filters, amplifiers
- > **Accelerometers calibration**

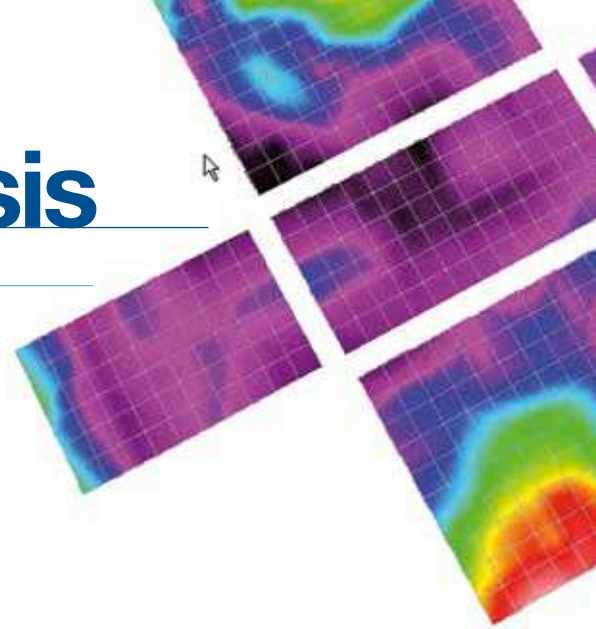
A2S provides the most adapted answer to these requests. Compared to the standard functions included in a FFT analyzer, A2S dramatically surpasses the capabilities of a random or swept sine excitation coupled with a peak hold FFT, offering:

- > Up to 80,000 points
- > **Fine control of excitation level:** control on excitation output or reference or response input with a constant or frequency dependant level
- > Boosted mode: **dramatically reduces the measurement time with the same accuracy**

# Acoustics Analysis

## From Octave to Sound Power

OROS 3-Series portable analyzers provide accurate and comprehensive results from noise phenomena. Acoustic analysis can be performed simultaneously with other signal processing such as FFT, recorder, or order tracking.

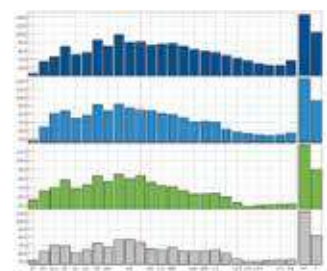


### 1/n Octave Analysis

Acoustic signature and investigation require the use of appropriate analysis methods. The 1/n Octave plug-in computes levels using constant percentage band filters.

It complies with the IEC 61260 standard. Noise signals can be analyzed real-time by the system up to 40 kHz, making it a highly flexible acoustic analyzer.

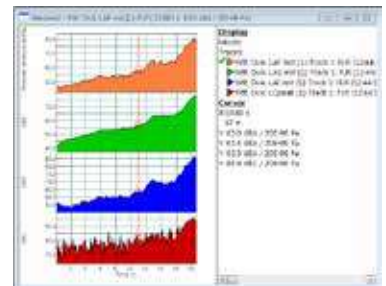
- > **1, 1/3<sup>rd</sup>, 1/12<sup>th</sup>, 1/24<sup>th</sup> octave**
- > Mask, Min/Max live overlay
- > Dedicated DSP processing
- > Complies with **IEC 61260 and IEC 60804**
- > A,C weighting filters and other common ISO standards
- > Fast, slow, impulse time filtering
- > Leq, Short Leq, User Leq,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



### Overall Acoustics: Levels & Profiles

The OVA plug-in, a multichannel sound level meter, extends the analyzers 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 3<sup>rd</sup> order 10 Hz high pass
- > Long duration profile memory (100,000 points/channel)

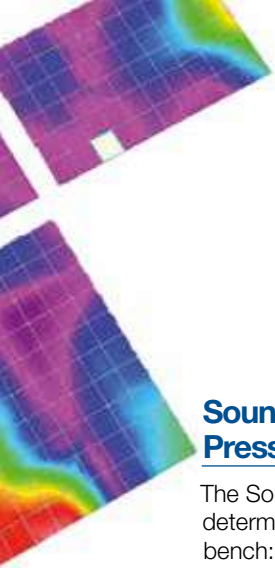


### Sound Quality: Psychoacoustics & Sound Design

The Sound Quality software module is the ideal tool for psychoacoustic metrics determination and filtered playback.

- > Accurate and standardized psychoacoustic metrics determination
- > Loudness according to Zwicker ISO 532B, sharpness
- > Tonality indicators: tone to noise, prominence ratio
- > Modulated sound metrics: fluctuation strength, roughness
- > Articulation index
- > Sound filtering and sound design capabilities
- > Interactive filtering: frequency & order based
- > Playlist management for fast & easy comparison
- > Embedded platform data management: direct compatibility with the OROS range



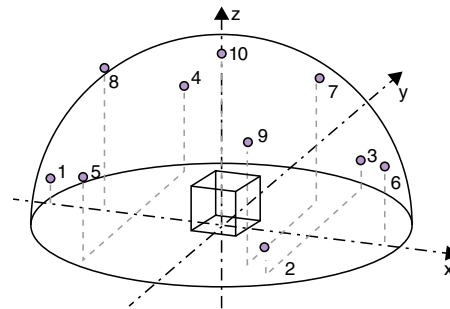


## Sound Power Determination with Sound Pressure Level Measurement

The Sound Power software provides sound power determination in free field environments. It is ideal for test bench: indoor (laboratory anechoic environments) or outdoor.



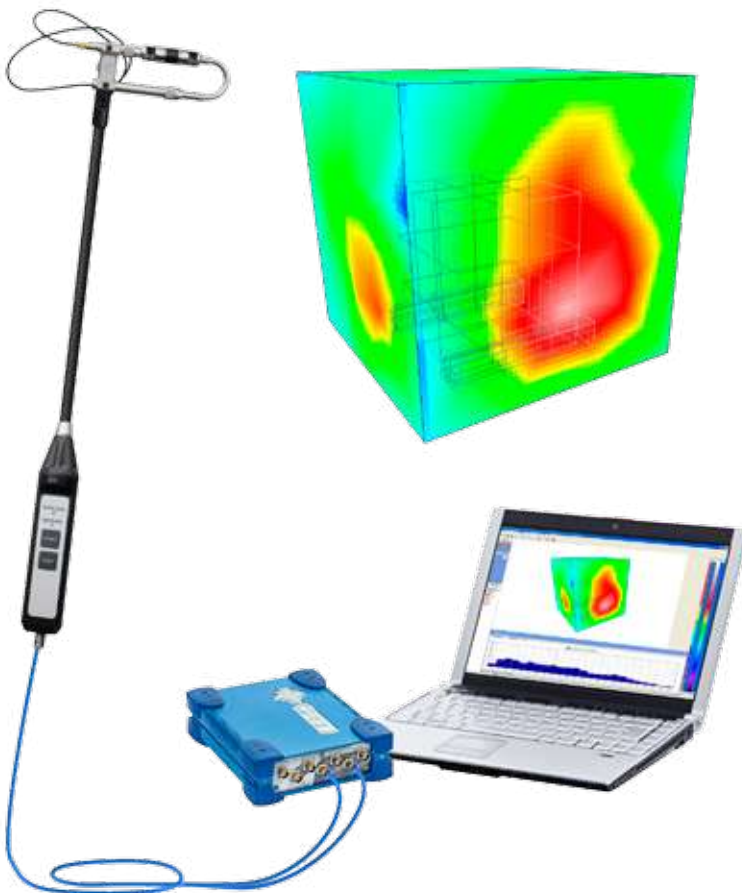
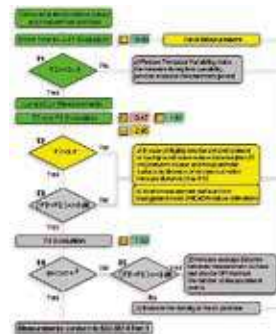
- > Fulfills main international standards for **free field environments: ISO 374x**
- > Dedicated interface for easy and repeatable operation
- > All microphone positions measured at once
- > Overall and Spectra real-time display
- > Type-1 precision results in dBA
- > Direct Sound Power determination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



## Sound Power Determination with Sound Intensity Measurement

The Sound Intensity software provides Sound Power determination 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
- > Provide guidance for complying with **ISO 9614-1&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

- > **2D & 3D sound intensity mapping**
- > Levels and spectra selectable by segment
- > Narrow band, octave, and 1/3 octave
- > Guided acquisition procedure
- > Multiple measurement surfaces creation
- > Multifrequency views
- > Probe remote control management
- > Picture overlay

# Services

## Training, Coaching, Testing

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

**Our services philosophy: OROS customers should not have to wait for an answer. Our expertise is at their disposal - anywhere, anytime.**



### Training

Experts from OROS offer **theoretical and applied training sessions on noise and vibration**. Our trainings are defined with you according to your needs: content is either initial or advanced depending on your level and skills. Our objective is to be beside you all along the use of your system to **maximize your profitability and efficiency**. We come **on-site for applied trainings**. We will help you using your OROS equipment. We also propose **remote internet training sessions** delivered from OROS offices.

### Training, Coaching, Testing

Our full trainings catalog is available on our website, in the Services section.



### Customization

To go beyond the regular uses, we are able to answer **specific requirements and adapt to your specifications**. We **customize, either the instrument or the software**. We imagine and find the best solution with you.

### Automation Tools

Large panel of tools for automation that make your test go faster. Macros and sequences are very powerful tools to create automatic procedures.

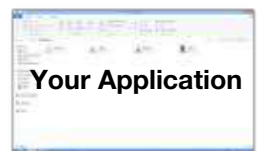
### Integration

NVDrive allows you to implement your own solution. From a simple add-on to complete test benches, build your program that drives and gets results from OROS 3-Series analyzers. Whatever your need of customization, OROS experts provide the right solution: simple support to your development team or full project management.

### NVDrive,

**the language to drive NVGate from an external application**

- > Full remote-control of NVGate
- > TCP/IP remote programming interface



↑ NVDrive ↓



### Renting

Based on a range of modular instruments, from 6 to 32 channels, the OROS Teamwork technology enables to cascade or distribute the analyzers to measure up to 1000 channels. Instruments, conditioners and software licenses are exchangeable and flexible.

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 power of your instruments.

**Software:** try other OROS software modules according to your applications or rent any additional function temporarily.



### They trust Oros

> "We need to expand our capabilities up to 100 channels about once a year. The analyzer's rental program is very convenient for us. Moreover with onsite assistance from OROS experts we can quickly setup and secure our measurements."

Harry DUSSELMAN, 45  
NVH Engineer,  
Passenger Car Business Unit.



## Coaching

### Assistance in your measurements

When resources are not available (lack of resources, of skills, of systems), we propose assistance in measurement going on-site. We may manage the entire process of your tests and measurements up to reports. We optimize your measurement process depending on your application and field requirements. We may also integrate your team and deliver knowledge to them.

### Expertise in diagnostics

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



## Premium Contracts

1, 2 or 4 years renewable contracts  
(in addition to the 1 year included warranty)

- > Satisfied or exchanged\*
- > Hotline (Help-desk support)
- > Full coverage of your analyzer and its options
- > Guaranteed turn around time (4 days) for hardware repairs and calibration
- > Loan of a replacement instrument (same range or higher) in case of delay overdue
- > Access to your personal myOROS section to download software updates
- > Calibration reminders
- > Priority processing in maintenance center facilities

- > Privileged access to extended services at a preferential rate: urgent loan within 1 day,...

### Additional Services

- > Software Updates: Additional modules, Latest version releases, Additional licenses
- > Hardware Upgrades: Channels, DSPs, Accessories
- > Calibration: NFX07-011 compliant
- > Diagnosis and Repair



\* during the first 3 months

## The OROS Services 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 a worldwide coverage (China, Europe, India, Japan, Saudi Arabia, South Korea, USA), OROS is in close proximity to its customers, reducing maintenance downtime. Technicians are certified on a regular basis by OROS specialists, enabling them to repair, calibrate and upgrade all OROS systems.

## They trust Oros

> *"With all new software release available and a reduce turnaround time for hardware maintenance and calibration, the OROS Serenity contract is all what we expect. We optimize the availability and the functions of our system."*



Michio ASANO, 36  
Vibration, Environmental & Measurement Manager,  
Delivery Division.

# General Specifications

## Instruments

Front end	OR34	OR35	OR36	Mobi-Pack™	OR38
Dynamic inputs	2/4	2	-	-	-
Universal inputs (DYN/DC)	-	4/8	4/8/12/16	4/8/12/16	8/16/24/32
Connectors	BNC	BNC	BNC	BNC	BNC
Type	Dynamic	Dynamic	Universal	Universal	Universal
Ext. Sync (Triggers/Tach)	2	2	2 (+4*)	2 (+4*)	2 (+4*)
Outputs	1	2	2 (+4*)	2 (+4*)	2 (+4*)
Auxiliary DC channels*	-	-	2/4	2/4	2/4

### Inputs

Sampling	2 kS/s to 65.536 kS/s or 102.4 kS/s - 24 bits sigma delta ADC				
Accuracy	Phase $\pm 0.02^\circ$ - amplitude $\pm 0.02$ dB - Dynamic > 140 dB				
Conditioning	AC/DC/ICP®/TEDS/Float -   AC/DC/ICP®/TEDS/Float - $\pm 100$ mV to $\pm 40$ V $\pm 17$ mV to $\pm 10$ 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 - $\pm 10$ V range - 24 bits DACs - THD < 0.002%				
Ext. synchron (Trigger / Tach)	64 x over sampled - Resolution < 160 ns (0.06° @ 1 kHz) - $\pm 40$ V range ( $\pm 10$ V on OR34)				
DC channels*	Sampling 10 Hz - 50 Hz/60 Hz rejection - reproducibility < 1 mV				

### System

Hard disk	-	64 GB Internal SSD	128 GB removable SSD - USB 3.0	128 GB removable SSD - USB 3.0	128 GB removable SSD - USB 3.0
Processors (DSP)	1	1 or 2* - Force	1 to 4* - Force	1 to 4* - Force	1 to 8* - Force
Autonomy	15 min	3 h	2 h	2 h	2 h
Power supply	AC (100 V to 240 V) / DC (10 V to 28 V), Mobi-Pack is AC only				
PC link	100 Mb/s Ethernet				
	1 Gb/s Ethernet - LAN / WAN / Wi-Fi				
Weight	1.4 kg/3 lbs	3 kg/6.6 lbs	5.2 kg/11.5 lbs	10 kg/22 lbs with power supply	8.2 kg / 18 lbs
Dimensions (w.h.d) mm	163 x 54 x 215	308 x 58 x 245	114 x 280 x 350	470 x 180 x 360	114 x 410 x 350
Dimensions (w.h.d) inches	6.4" x 2.1" x 8.4"	12.1" x 2.3" x 9.6"	4.5" x 11" x 13.8"	18.5" x 7" x 14"	4.5" x 16" x 13.8"

### Large Channel Count Systems

Channels	Max channels: 1000+ - Matching; Phase: $0.2^\circ$ @ 20 kHz, Amp: < $\pm 0.1$ dB				
Connections	1 Gb/s Ethernet network (analysis/monitoring)				
Operations	Up to 40 kHz analyses and recording - local disk storage				
Software	Supervisor NETGate or NVGate				

### Distributed systems

Size	2 to 30+ units				
Accuracy	Between units: $\pm 0.2^\circ$ @ 20 kHz - $\pm 0.02$ dB				
Network	Daisy chain - 1 Gbs/S Ethernet - Switchless - 100 m/ branch				
Synchronization	IEEE 1588.2 PTP				
Software	Native Software platform NVGate				

\*optional features

## 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	24 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 $\Omega$ , 350 $\Omega$ built in completion resistors
Inputs	8 dynamics (40 kHz) inputs - $\pm 1$ V and $\pm 100$ mV range, DC/AC coupling
Excitation	continuous 0 to 10 V - 30 mA (0 to 4 V) / 12 mA (4 to 10 V) - Automatic balances

### 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, EU <sup>2</sup> , 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

Setups	Load, save and recall workbook with: instrument setup, analysis setup, layouts, control panel, report setup - Generates models
Measurements	Save selected results and raw data automatically - Direct recall of measurement setup - Recall, edit and save measurement views
Projects	Project manager tree - filters (date, keyword, owner) - allows direct access to saved results - manage multiple project databases - import setups and measurement from files

### Real-time analysis

Performances per DSP	OR34 and OR35	MP, OR36 and OR38
Gap free recording	8 ch 40 kHz compressed format	8 channels 40 kHz
Real-time FFT	8 ch 20 kHz 401 lines or 6 ch 40 kHz 401 lines	8 ch 40 kHz 3201 lines or 8 ch 25.6 k kHz 25601 lines
Synchronous order	4 ch 12000 RPM 1/8th order max order 100	8 ch 12000 RPM 1/4th order max order 100
1/nth Octave	4 ch 25.6 kHz 1/3rd Octave	8 ch 25.6 kHz 1/3rd Octave
Time domain analysis	4 ch 20 kHz	8 ch 25.6 kHz or 4 ch 40 kHz
Sound level meter	8 ch 25.6 kHz – 3 detectors + peak/ch	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 fractional tach - 4 DC tachometers
Settings	Adjustable Signal filtering - pre-divider 2 to 1024 - averaging - pulse/rev
Frequency to voltage converter (option)	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 (option)	RPM computation from 2 tachs - Editor with +, -, *, /, log, exp, power, sqrt and trigonometrical operators - Ideal for Continuously Variable Transmission
Angular sampling	2 to 2048 pulse/rev - Decorrelated analysis resolution

#### Triggers

Edge	From input or ext. synchron - Adjustable threshold, Slope, Hold off, Hysteresis, 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 - adjustable 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/n <sup>th</sup> 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

## Modules (software options)

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)

### Standard plug-ins

#### Recorder

Bandwidths	4 independent bandwidths/record - 0.8 Hz to 40 kHz - Records DC channels at low rate - Records ext. synchron 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

### Optional plug-ins

The following plug-ins are optional. They can be ordered in addition to the chosen analyzer pack.

#### 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	8 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 Add-on

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 Add-on

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

#### 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	8 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 ( $\pm 720^\circ$ ) 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	8 to 128 channels

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



### ORDiag Add-on

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	8 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	8 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	$(A \cdot IN + B)^N$ 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
Modal Indicator Function	Based on Singular Value Decomposition - available in ODS, EMA and OMA modules
Stability diagram	Automatic detection of structural modes
ODS	In time and frequency domain
EMA SIMO method	Based on Rational Fraction Polynomial formulation of transfer function
EMA MIMO 1 method	Based on Frequency Domain Poly-Reference algorithm (FDPR)
EMA/OMA broadband method	Based on Polyreference Least Squares Complex Frequency algorithm (p-LSCF)
Validation	Modal Assurance Criterion

### Advanced Swept Sine (A2S)

Frequency range	From 0,01Hz to 40kHz, in 1 to 8 spans
Frequency resolution	Continuous sweep up to 80 000 points
Control	Automatic control and limiting of generator output level at input or output of the system under test
Boosted mode	To speed up the measurement
Results	Frequency response, coherence, spectrum

### EngineDiag

Machine settings	Delivered power, nominal speed, configuration: Inline or Vee, the cycle : 2-stroke or 4 stroke, number of cylinders, firing order
Timing diagram	Kinematic events and phases
Instrumentation	Tables associating input, input label, connected transducer and sensitivity
Advisor	List of rules depending on the Engine Model to set up NVGate automatically or manually
Synchronous analysis results	Triggered block on one machine cycles with cycle overview , triggered block aligned on a same kinematic event, RMS values calculated on the machine cycle and on the different phases of the cycle
Angle-frequency analysis	Wigner-Ville colorspectrogram and extracted results : Energy spectrum & Instantaneous power

# General Specifications

## Applications Software Modules

### 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 indirect 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 ASCII and Microsoft Excel.

### 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 $\pm 0.02\text{dB}$ , $\pm 0.02^\circ$
Inputs	1 or 2 sensors per plane. Proximity probes, velocimeters, accelerometers. Coupling: AC, DC, AC Float, DC Float, ICP®. Up to $\pm 40\text{V}$
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

### Multiphase 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

Loudness	According to ISO 532B, scalar and scalar profiles
Sharpness	Scalar Profiles
Modulated sound metrics	Fluctuation strength (scalar profiles), Roughness (scalar profiles)
Tonality	Prominence Ratio (Scalar), Tone to Noise ratio (Scalar)
Articulation index	Scalar Profiles
Display	2D filtered color spectrogram versus frequency, time 2D RPM versus time profile Zoom & scaling (frequency, time, amplitude color scaling)
Filters	Graphical and numerical design of IIR filters: combination of up to 20 individual filters Frequency and order equalization, Low/High/Band pass, Band stop Display of transfer functions Magnitude, phase, group delay for individual filters and filters combinations

# Go Ahead...

## OROS Representatives

OROS relies on a worldwide network of authorized representatives. OROS products and services are marketed worldwide in more than 35 countries. Our representatives are carefully selected for their knowledge and expertise in noise and vibration analysis. They are regularly trained and updated on OROS products.



> Find your local reseller on [www.oros.com](http://www.oros.com)

● OROS Representatives ● OROS Subsidiaries and Offices ● OROS Maintenance Centers

## OROS Accredited Maintenance Centers

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

### China, Beijing

TS-Tech  
Tel. +86.10.823.66.086  
Email: [oros\\_support@ts-tech.com.cn](mailto:oros_support@ts-tech.com.cn)

### India, Mumbai

AMIL Limited  
Tel. +91.22.391.835.64/65/68  
Email: [rossupport@amil.com](mailto:rossupport@amil.com)

### South Korea, Seoul

MIRAE ENSYS  
Tel. +82.2.6409.2690  
Email: [support@mirae-ensys.com](mailto:support@mirae-ensys.com)

### Saudi Arabia, Dammam

RIGZONE Engineering  
- Barrak AL Fares  
Tel. +966.3.8305.773  
Email: [ceo@rigzonegroup.com](mailto:ceo@rigzonegroup.com)

### Europe

OROS  
Tel. +33.4.7690.5240  
Email: [customer.care@oros.com](mailto:customer.care@oros.com)

### Japan, Tokyo

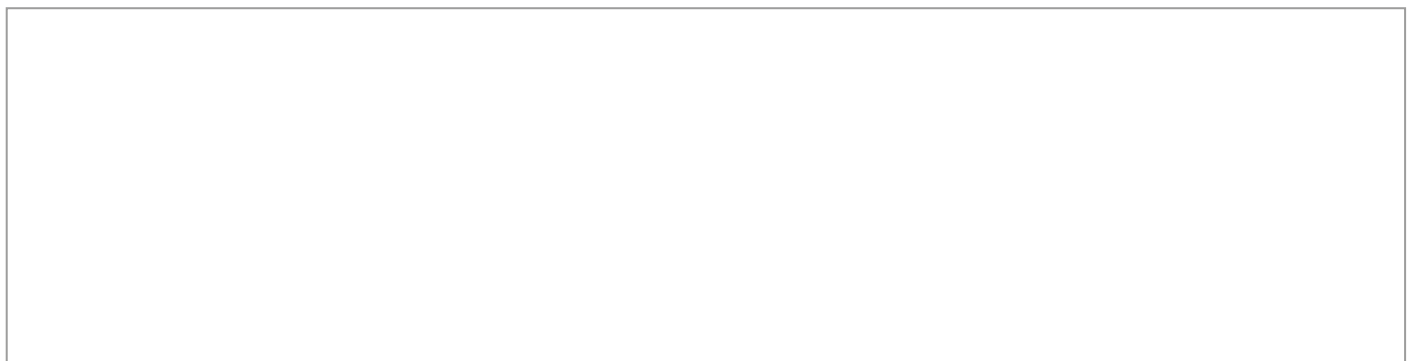
TOYO Corporation  
Tel. +81.3.3279.0771  
Email: [nvh@toyo.co.jp](mailto:nvh@toyo.co.jp)

### USA, Washington, DC

OROS Inc  
Tel. +1.703.478.3204  
Email: [support@orosinc.com](mailto:support@orosinc.com)

### Germany, Koblenz

OROS GmbH  
Tel. +49.261.133.96.50  
Email: [support@oros-deutschland.com](mailto:support@oros-deutschland.com)



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