Introduction

OROS Balancing Solutions are software modules for balancing rigid and flexible rotors. These modules are well-suited for shop balancing or in-situ field balancing. They are designed to run on OROS analyzers.

2 modules are available:

Single/Dual plane software module
It is particularly suited for shop or field balancing of rotors operating in their rigid body region (well below their first critical speed).

Multiplane software module
It is designed to balance rotors above the first critical speed: meaning in the region where the rotor deforms and reaches its first bending mode.
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Main features

Flexible acquisition

> Acquisition from a wide choice of hardware platforms (sizes and weights) thanks to the OROS 3-Series instruments’ range’s flexibility.

> Accepts signals from accelerometers, velocimeters or proximity probes.

> Up to 32 sensors depending on the instrument platform.

Accurate balancing

> Source data for the balancing operation (1X amplitude and phase) provided in real time by the powerful OROS Synchronous Order Analysis plug-in analysis engine reputed for its high precision.

> Oversampled tach input at 6.4 MHz to provide the best phase accuracy.

> High quality digital signal provided by the state of the art electronics of the OROS instruments.

Designed for efficiency

> Correction planes and measurement planes managed independently and flexibly,

> Flexible weight map configuration with correction mass split or by step of 1°,

> Add or remove weight by drilling,

> Keep or remove test mass,

> Prognostics of residual vibration (“what if” feature),

> Trim balancing,

> Report generation,

> Available in English, German, and French languages.
Single/Dual plane balancing (ORNVS-BAL)

> 1 or 2 balancing planes
> Rigid rotors
> 1 to 4 sensors (1 or 2 per bearing)
> Real time acquisition and 1X polar diagram (amplitude and phase).
> Steady state speed acquisition
> Acceptance of residual unbalance according to ISO 1940 / Balancing quality selection
> Size and weight: optimum size with OR34. Runs on 3-Series instruments’ platform
> Trim Balancing
> Report generation
> Designed for non-experts

Easy to set-up, fast to learn

Being guided by the wizard, the user can perform a balancing operation in a few clicks and without any special knowledge about balancing theory: **Training time is reduced**.

It is designed for shop or field balancing. Steps to the balancing report are optimized and guided. **Testing and correction time are minimized**.

Thanks to the dedicated interface, the **risk for errors is limited**.

Practical and applied tools for user ease and efficiency

Based on the acceptance circle the **residual unbalance is compared to the acceptable level required by ISO 1940** (based on rotor weight, balancing quality grade and operating speed should be provided).

Using the unique **prognostics feature**, and providing the actual correction mass implemented, the residual unbalance can be easily estimated and compared to the acceptable level.

The history of **one rotor can be saved in the project and trim balancing** allows further balancing with no requirement for carrying additional trial tests.

The report feature lets the user print a balancing report and keep track of the modifications made.
Multiplane Balancing (ORNVS-BAL-MP)

A simple solution for a complex problem

Multiplane balancing is a delicate operation that requires a high level of expertise from the user. The rotor is operated above its first critical speed and will be deformed. The purpose of OROS’ multiplane balancing module is to bring a simple and dedicated tool to the fingertips of the user to solve this complex problem.

Transient 1X data acquisition

Based on the OROS multichannel instruments the 1X data are collected real-time during transients (run-up, coast-down) or steady-state phase at the different steps of the balancing operation (initial, trial, trim). At that stage, the data are displayed as Bode or Polar diagrams. Data can also be entered via other collecting sources including manual input.

Correction weights calculation

The data are then processed offline in the software after selection of the speeds for which unbalance should be reduced.

Residual unbalance prognostics

The residual unbalance after implementation of the correction masses can be calculated for the different speeds of the transient.
Accessories

OROS Tachometer solution

The RPM and Phase sensor (TAC-O01) is particularly suited for 1 Pulse/rev signals. It is recommended for applications such as Keyphasor® applications, phase reference, balancing and RPM measurements. ORAC-TAC-O01 is a versatile optical tachometer probe. The probe detects rotation pulses using a reflective tape placed on the studied shaft. OROS 3-Series analyzers or external 100-240V AC can power it. Based on the captured pulse signal, the OROS analyzer achieves the RPM computation or any other type of analysis such as Order tracking or FFT analysis.

Specifications

The following specifications concern OR36, Mobi-Pack & OR38 multi-analyzers/recorders. These systems consist of OROS 3-Series hardware containing optional inputs and processing modules, a PC with an Ethernet interface, and NVGate® software with optional plug-in analyzers.

ORNVS-BAL-ST and ORNVS-BAL-FL

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Procedure</td>
<td>1 or 2 plane balancing for rigid rotors, trial weight method at steady state (not necessarily operating speed), trim balance</td>
</tr>
<tr>
<td>Analysis</td>
<td>1X amplitude and phase determination: based on Synchronous Order Analysis (SOA)</td>
</tr>
<tr>
<td>Inputs</td>
<td>1 or 2 sensors per plane. Proximity probes, velocimeters, accelerometers. Coupling: AC, DC, AC Float, DC Float, ICP®</td>
</tr>
<tr>
<td>Residual unbalance</td>
<td>Adding/retrieving weight, split correction weights on defined positions</td>
</tr>
<tr>
<td>Residual unbalance</td>
<td>ISO 1940-1 admissible residual unbalance determination at operating speed</td>
</tr>
<tr>
<td>Displays</td>
<td>Real-time polar diagram, correction display &amp; correction chart</td>
</tr>
<tr>
<td>Report</td>
<td>Overview balancing report</td>
</tr>
</tbody>
</table>

ORNVS-BAL-MP

<table>
<thead>
<tr>
<th>Features</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machines</td>
<td>Up to 14 balancing planes</td>
</tr>
<tr>
<td>Data</td>
<td>Based on 1X data (Amplitude &amp; Phase): Run-up, steady-state or shut-down</td>
</tr>
<tr>
<td>Data source</td>
<td>TXT (csv) file import: Easily exported from OROS ORBiGate or other sources including manual input</td>
</tr>
<tr>
<td>Calculations</td>
<td>Carried out in office mode with multiple speed selections</td>
</tr>
<tr>
<td>Displays</td>
<td>Rotating speed profile (RPM vs. time), 1X, Amplitude, Phase, Polar</td>
</tr>
<tr>
<td>Correction</td>
<td>Adding/retrieving weight, split correction weights on defined positions</td>
</tr>
<tr>
<td>Features</td>
<td>Residual unbalance prognostic as a function of RPM</td>
</tr>
<tr>
<td>Report</td>
<td>Overview balancing report</td>
</tr>
</tbody>
</table>
Instrument inputs

<table>
<thead>
<tr>
<th>Features</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical quantities</td>
<td>Displacement, velocity, acceleration</td>
</tr>
<tr>
<td>Sensor library</td>
<td>Proximity probes, velocity probes, accelerometer(ICP® or standard)</td>
</tr>
<tr>
<td>Conditioning</td>
<td>Up to ±40 V on OR38, OR36 and Mobi Pack (Up to ±10 V on OR34 and OR35), auto range</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Amplitude ±0.02 dB – Dynamic &gt; 120 dB</td>
</tr>
<tr>
<td>Input filter</td>
<td>Single or double integration filters with high-pass</td>
</tr>
<tr>
<td>Coupling</td>
<td>DC, AC, ICP®, AC floating, DC floating, TEDS</td>
</tr>
<tr>
<td>External sync</td>
<td>64 x oversampled – resolution &lt; 160 ns (0.06° @ 1 kHz) ±40 V (±10 V on OR34, OR35)</td>
</tr>
</tbody>
</table>

Keyphasors® is a registered trademark of GE Energy/Bently Nevada. ICP® is a registered trademark of PCB Piezotronics. Windows XP, Vista and 7, Word and Excel are trademarks of Microsoft Corp. NVGate® and ORBiGate® are trademarks of OROS SA.

Ordering Information

The dual plane solution can be ordered based on one instrument (standard license) or any instrument of your float (floating license). The multiplane software module operates in office mode and therefore works independently of the analyzer license.

Typical instrument package configurations

<table>
<thead>
<tr>
<th>Reference</th>
<th>Description</th>
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<tbody>
<tr>
<td>ORNVS-BAL-2</td>
<td>Balancing on OR34, 2 channels</td>
</tr>
<tr>
<td>ORNVS-BAL-4</td>
<td>Balancing on OR34, 4 channels</td>
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</table>

Software modules

<table>
<thead>
<tr>
<th>Features</th>
<th>Description</th>
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<tbody>
<tr>
<td>ORNVS-BAL-ST</td>
<td>1/2 planes balancing module – Licensed on one analyzer hardware</td>
</tr>
<tr>
<td>ORNVS-BAL-FL</td>
<td>1/2 planes balancing module – USB dongle based floating licence for one or several analyzers</td>
</tr>
<tr>
<td>ORNVS-BAL-MP</td>
<td>Multiplane balancing module (USB dongle based)</td>
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Accessories

<table>
<thead>
<tr>
<th>Features</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ORAC-TACM-O01</td>
<td>OROS Optical tachometer kit powered by 3-Series analyzer or 100-240V AC + 3m (10ft) cable* + Magnetic base</td>
</tr>
<tr>
<td>ORAC-TACC-O01</td>
<td>OROS Optical tachometer kit powered by 3-Series analyzer or 100-240V AC + 3m (10ft) cable* + base clamp</td>
</tr>
</tbody>
</table>

*Extension cables are available on demand.
OROS, Leadership through Innovation

About Us
Now approaching 30-years in business, OROS’ designs and manufacturing have been renowned for providing the best in noise and vibration analyzers as well as in specific application solutions.

Our Philosophy
Reliability and efficiency are our 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 of the technology, always based on innovation.

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

Want to know more?
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