

NVGate®

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OROS
TECHNICAL
SPECIFICATIONS

Software Platform for OROS 3-Series

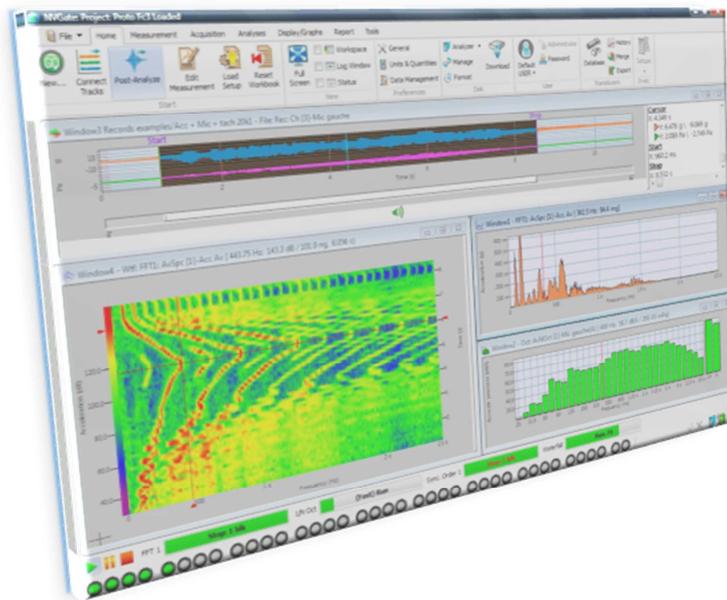


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General description

The following specifications concern NVGate® software for OR34, OR35, OR36, OR38 and Mobi-Pack® multi-analyzer instruments. These specifications apply for on-line analysis and post analysis with or without the instrument connected to the PC. The detailed features of analyzer hardware and metrological information are available in *OR3X multi-analyzer/recorder instruments specifications* documents.

Modules

NVGate® software is based on a general-purpose platform where optional analysis modules called plug-in analyzers are added.

The FFT plug-in features specific add-on for specialized analysis.

NVGate® Platform

NVGate® platform provides a comprehensive set of tools for noise and vibration acquisition, recording and analysis.

These functions are arranged in 4 parts:

- **Signal sources** that condition, provide and store time domain signals.
- **Shared resources** that apply simultaneously or independently on distributed signal to plug-in analyzers.
- **Operational tools** that increase measurement efficiency and reliability.
- **General-purpose analysis** for monitoring and result tracking.

Signal sources	Front-end	Controls dynamic inputs, generators, external synchronization/tach. input and parametric (DC) inputs.
	Recorder	Record and store time domain signal on analyzer or PC hard disc. Records dynamic, parametric (DC) and ext. synch/tach inputs with multiple frequencies.
	Player	Visualize, listen, playback on output or generate signals for post-analysis purpose. Based on recorded or imported time domain signal file.
Shared resources	Filters	High/low pass, Band/Stop pass, single and double integrator, differentiator, A and C acoustic laws
	Events	Edge detection, DC levels, Delta DC levels, RPM, Delta RPM, Manual, Time period, combinations.
	Weighting windows	Programmable Force and response, Hanning, Hamming, Kaiser Bessel, flat-top, uniform.
	Tachometers	Compute RPM from ext. sync, DC and input pulses. Fractional, simulated and combined tach.
Operational tools	Transducers management	Automatic calibration, database management, calibration history, automatic setup of inputs, TEDS management.
	Masks	Mask editor for spectra, profiles, 1/n octave, order spectra
	Report	On-line report editor, automated report generation, word files.
	Automation tools	Macros, sequence from Excel® sheet, alarms based on mask comparison, customizable control panel, restricted user profiles, remote controller interface.
General purpose analysis	Monitor	4 channels FFT analyzer with input hot swap. Statistical extraction (RMS, Max, Min, Kurtosis) from time domain with programmable band-pass filter.
	Waterfall	Synchronized stack for 2D (spectra) and scalar (order, overall). 3D, color map and profiles displays. Extraction capabilities.

NVGate® Plug-ins analyzers

In addition to the standard functions featured in the software platform, NVGate® can receive additional plug-in analyzers that offer flexible configuration of independent analysis modes.

NVGate® features the following Plug-ins analyzers:

FFT	Fast Fourier Transform - Time to Frequency conversion with multiple average domains, combinable trigger, zooms and cross functions.	General-purpose frequency analysis, machinery signature, modal analysis acquisition (hammer or shaker), machinery diagnostic.
FFT Add-ons		
CBT	Constant Band Tracking - Order extraction at constant bandwidth	Gears mesh analysis, gearboxes noise and vibration tracking.
FFTDiag	Cepstrum, Auto and cross correlation, DC, Min/Max, Pk, pk/pk and crest factor .	Set of functions dedicated to the diagnostics of industrial rotating machineries.
TDA	Time Domain Analysis -Time view (oscilloscope). True statistical extraction, averaging.	Machinery diagnostic, long term acquisition monitoring, critical acquisition control, large structure damping control, shocks determination, machinery health control, trend analysis.
SOA	Synchronous Order Analysis - Time to Order re-sampling with angle or order averaging, acoustic weightings, multiple tach management.	Rotating machinery balancing. In vehicle order to noise correlation R&D. Pump, compressors, turbines and speed reducer/multiplier test.
OCT	1/n Octave Constant Percentage Band filters - 1/n octave detectors set with multiple averaging modes.	General-purpose industrial noise analysis. Vehicle acoustics R&D. Noise test.
OVA	Overall Acoustics Detectors - 3 detectors + 1 peak detection per channel with parallel averaging and acoustic weightings.	Industrial acoustic, sound power measurements. Machinery with cycles, R&D and test.

NVGate® Options

Beside the plug-ins analyzers and their add-on, the 3-Series analyzers software features options:

IVC	Instantaneous angular velocity converter	Torsionnal and acyclic measurements from multiples/rev tachometer/encoder with Ext. Synch inputs
CTE	Combined Tachometer editor	Tachometer math editor – 2 inputs, 1 output
VIN	Virtual inputs	Real-time math combination of dynamic inputs
VDC	Virtual DC	Real-time math combination of parametric inputs

PC requirements

Minimum	Pentium 4/ 2 GHz / 2561 MB RAM with Windows XP or 5121 MB with Windows Vista/ Graphics video with at least 32 MB dedicated (not shared) memory / 100 MB free on HD + storage for measurements and signals, CD ROM drive, 1024 x 768 display (XGA), DirectX 8.0	
Recommended (for laptop)	Intel Core 2 Duo / 2 GHz / 1 GB of RAM with XP/7, 2 GB of RAM with Vista / Graphics video with 256 MB dedicated (not shared) memory / 100 MB free on HD + storage for measurements and signals, CD or DVD ROM drive, 1400 x 1024 display (SXGA+), DirectX 10	
Recommended (for desktop)	Intel Core 2 Duo / 2.6 GHz or AMD Athlon 64 X2 Dual-Core 6000+ / 3 GB of RAM / Graphics video with 512 MB dedicated (not shared) memory / 100 MB free on HD + storage for measurements and signals, CD or DVD ROM drive, 1600 x 1200 display (UXGA), DirectX 10	
Connection	Type: Ethernet 100base TX , 100 Mbit/s - Connector: RJ45 For removable disk: USB 2.0 - At least one USB port for dongle key.	
Operating systems	Windows XP Pro Service Pack 3 (recommended), Windows Vista Business Service Pack 2, Windows 7	

1) Waterfall depth depends on available memory. Minimum configuration does not allow waterfall storage.

Signal sources

NVGate®/OROS 3-Series multi-analyzers platform can process signal coming from different sources. These sources are detailed in this section as modules.

Front-end

The front-end module gathers the different input and output settings available in the instrument unit. In addition, the front-end module generates virtual signals (synthesized) when running the office mode (no unit connected to the PC) which is useful for set-up.

Front-end settings

Dynamic inputs	Sampling clock	102.4 kS/s to 3,200 S/s or 65.536 kS/s to 2,048 S/s
	LEMO ¹ polarization	200 V on/off per block of 8 dynamic input
	Coupling ^{2,3}	AC (0.35 Hz) - DC - ICP - ICP + TEDS - AC float - DC float - Grounded
	Node information ²	Label - component - node - direction ($\pm X, Y, Z$) - type (translation, rotation)
	Physical quantity ^{2,3}	Any physical quantity can independently be associated to inputs.
	Sensitivity ^{2,3}	User defined in V/unit .
	Range ²	Pk to pk expressed in the associated unit, (taking in account sensitivity) - linear or dB
	External conditioner compensation ²	Gain - polarity - offset .
	Filter ²	Any NVGate filter can independently be applied to each dynamic input (See Filters §)
Auto-range	Enable/disable auto-ranging independently on any input	
Ext. sync inputs	Sampling	over-sampled 64 time the dynamic inputs sampling
	Coupling ²	AC (0.35 Hz) - DC
	Information ²	Label
	Physical quantity ^{2,3}	Any physical quantity can be associated to inputs.
	Sensitivity ^{2,4}	User defined in V/unit .
	Range ²	Pk to pk expressed in the associated unit, (taking in account sensitivity) - linear or dB
	External conditioner compensation ²	Gain , offset .
	Edge detection	Threshold (in associated unit) - Edge (rise, fall) - Hysteresis - hold off (sec)
	Pre-divider	Hardware - 1 to 1024 pulses – accept up to 375 kpulses/sec
	Post-multiplier	1 to 50 pulses/pulse - Generate higher frequencies on low rate triggers. (ex. GPS)
	Tachometer mode	Pulse per rev (0 to 1024) - average (n rev) - min (detect stopped shaft) and max RPM speed - hold off (in % of revolution) - rotation (clockwise/counterclockwise)
Torsional mode ¹ : Instantaneous angular velocity converter	Pulse per rev (1 to 1024) - min (detect stopped shaft) and max RPM speed - sliding average (1 to 20 samples) - Missing pulse number (0 to 3), Missing pulses detection (delay of 0 to $\pm 20\%$ of previous pulses duration) - Filters (dt, dt ² , 1/dt)	
Outputs	Sampling	Same as dynamic inputs
	Generated signals ²	Any outputs signals , see §outputs - play-back of signal file tracks - DC levels - Inputs playback (Delay > 256 samples)
	Filters ²	Any NVGate filter can independently be applied to each dynamic output (See Filters §)

¹ Optional features

² Independent for each input

³ Linked with the transducer database

Front-end (continued)

Outputs	Impedance ²	50 Ω, 600 Ω (only OR36 and OR38) or grounded
	Gain ²	-100 dB to + 120 dB
	Synchronization ²	Free run or linked to acquisitions runs
	Level and phase transition ²	No (Steps) - controlled (ramp) - user selectable ramp time
	Clipping ²	User selectable - protects shaker and amplifier .
	Events (can trig analysis or record) ²	Outputs stabilized - new step reached - start & stop sweep
	Controls	Emergency stop - mute/un-mute all
Parametric¹ (DC) inputs	Sampling	12.5 S/s (50 Hz rejection) - 15 S/s (60 Hz rejection)
	Information ²	Label
	Physical quantity ^{2,3}	Any physical quantity can be associated to inputs.
	Sensitivity ^{2,4}	User defined in V/unit.
	Range ²	Pk to pk expressed in the associated unit (taking in account sensitivity) - linear or dB
	External conditioner compensation ²	Gain (-120 dB to +20 dB) - polarity - offset (< range).
	Auto-range	Enable/disable auto-ranging independently on any input
Auto-ranging	Type	Normal - on Peak detection
	Margin	Select the first highest range with 0 dB - 3 dB or 20 dB margin
	Duration (apply for normal auto-range)	0 to 10 sec.
	Peak detection	User select input were to detect peak, auto-range applies on all enabled input at each peak detection.
	Peak parameters settings	1 to 10 peaks - sensitivity (low, normal, high) - rise, fall or any edge .
Checking	ICP ⁵	Test and report (Open, shortcut, ok) all enabled inputs.
	TEDS	Transducers automatic recognition - Complies with IEEE 1451.4 2004 Rev. 1.0

Front-end results & connections

The following results are available for monitoring and connection to analysis mode (plug-in analyzers)

Dynamic inputs	Monitoring ²	Time domain instantaneous signal - Size 256 samples
	Status led ^{2,4} (docking tool bar)	Overloaded = red - overload occurred since last start = red with yellow center - ok = green - under load (20 dB below range) = green with yellow center
	Connection ²	To any: plug-in analyzer channel, monitor channel, recorder track, edge event detector and tachometer
Ext. Sync inputs	Monitoring ²	Time domain instantaneous status (1 = threshold crossed, 0 = no event) - Size 256 samples .
	Connection ²	To any: start or stop averaging of plug-in analyzers, recorder start or stop recording, waterfall start or stop acquisition, new block trigger for FFT and SOA and new slice for waterfall acquisition.
Parametric¹ (DC) inputs	Monitoring	Profiles versus time (160 ms to 163 sec user selectable), and digital/analog view meter .
	Connection ²	To any: recorder track, waterfall reference (Z/X axis) and profiles, level and delta level detectors .

¹ Optional features
² Independent for each input or output
³ Comes automatically from transducer database
⁴ Available in the remote controller display
⁵ Not supported on OR34 & OR35

Recorder / Player

OROS 3-Series/NVGate instruments feature a recorder and a player module that allows users to:

- Record time domain signal, trigger and parametric input.
- Export or import time domain files.
- Playback time domain files on analyzers outputs during analysis
- Listen recorded tracks on the PC speakers.
- Post-analyze time domain files in the available plugs-in.

Recorder

The recorder module memorizes time domain signal into files located on 3-Series analyzer HD, Mobi-Disc™ or PC HD. This is available on 2 different modes:

- **On-line record**, the chosen inputs (Dynamic, ext. sync, parametric) are recorded at selected sampling frequency during acquisition. Real-time analysis is available simultaneously.
- **Time and tracks split**, the chosen recorded tracks (from signal file) are played back in the recorder using the post-analysis mode. The sampling frequency, duration, and/or track arrangement can be changed.

Recorder settings

Bandwidths	Dynamics inputs	2 groups of user selectable sampling frequency - From 102.4 kS/s to 2.048 S/s (40 kHz to 800 mHz) - available simultaneously
	Ext. sync inputs	Automatic selection at Front-end sampling frequency - Resolution is 64 time Front-end sampling frequency
	Parametric (DC) inputs	12.5 S/s (50 Hz rejection) - 15 S/s (60 Hz rejection)
Tracks	Number	14 tracks⁵ (8 + 6 ext. sync) or 38 tracks⁶ (32 + 6 ext. Sync)
	Saved settings / track	Label - Coupling - External gain - Input range - Sampling frequency and signal bandwidth - Component - Node number - Direction - Type - Associated transducer - Unit - Sensitivity and Offset compensation.
Modes	Start to time	Start recording on run or any activated event - Stop recording when duration ends - Duration 10 ms to available space on target HDD.
	Start to stop	Start recording on run or any activated event - Stop recording on stop on any activated event - Start and stop event can be the same - Duration 10 ms to available space on target HDD (PC or OR3x).
	Time to stop	Memorize the earliest x seconds - Stop = stop or any activated event - Duration 10 ms to 2 GSamples (limited by the HD available space)
Triggering	Start recording (new record)	Any NVGate® event plus manual and free run
	Stop recording (end current record)	Any NVGate® event plus manual and free run
	Start delay	Positive = unlimited - negative = 128 kSamples
	Stop delay	Positive = unlimited - negative = 0
Markers	Saved in the record files	Added by tool bar or shortcut - comment fields editable during record or at end of acquisition
Signal file	Record on PC HDD	Up to 10 dynamic inputs – Up to 4 parametric inputs - max total bandwidth 512 kS/s - (2 MB/s)
	Record on Analyzer HDD	Up to 40 channels (32 inputs + 6 ext. sync or DC) - max bandwidth 1.8 MS/s (7.2 MB/s)
	Format	Normal: 32 bits/sample - Compressed 16 bits/sample

⁵ For OR34, OR35 and Office-8 licenses.

⁶ For OR36, OR38 and Office licenses.

Management	Download	Discard Analyzer HDD on PC HDD - Batch download available - Rate 4 MB/s
	Upload	Load PC HDD records on the analyzer HDD - Rate 1.4 MB/s
	Location	All records accessible from the project manager tree
	Hard drive management	Format HDD - Selective delete - Sorting tools

Mobi-Disk™

OR36 and OR38 multi analyzers/recorders feature a removable hard drive with 2 ports:

- Parallel High speed port for direct data throughput to the Mobi-Disk™.
- USB 2.0 port for post processing and data management without the instrument.

Connection	1 to 8 Mobi-Disc™	Up to 8 Mobi-disc connected - Active Mobi-Disc: 1 (user selectable) - hot swap
Transfer	Based on the USB 2.0 link	Download 9 MB/s

Recorder monitoring

The following displays are available during real-time or post-analysis.

RMS	Overall RMS / input	Digital or analog view-meter
Signal	Real-time	Compressed view of entire recorded signals - Automatic update of time axis.

Player

The player module plays the recorded signal files. This is achieved following 2 different ways:

- **Post analysis**, the player tracks take place of the corresponding inputs (Dynamics, Ext. Sync and parametric) to be processed by the plug-in analyzers, recorder, trigger and tachometer
- **Playbacks**, the recorded dynamic input are generated on the instrument outputs simultaneously with standard analysis of the inputs.

Player settings

Played section	File selection	NVGate® recorded files - Imported files - located on instrument HDD, Mobi-Dsic™ or on PC HDD.
	Record selection	Record number selection (for multi record files)
	Section definition	User selectable Start and stop offsets (in sec.) - available in the file overview window (marker and slider)
	Duration	Play backed duration (User information)
	Repeat	On/off - repeat continuously the selection (available only for playback on analyzer output)
Mode	File swap	Swap loaded files with same tracks number - applies identical post-analysis setup to multiple files.
	Playback	Continuous or step by step (5 ms to 360,000 s)
	Bandwidth	All tracks at lowest frequency (compatible with all plugs-in) or initial record frequencies (no track mix in plugs-in)
Tracks	Number	38 tracks (32 + 6 ext. Sync) for all licenses.
	Type	Dynamic input record (2 sampling frequencies), parametric (DC) input record and ext. sync record.
	Fixed setting (information) / track	Label, Coupling, external gain, input range, sampling frequency and signal bandwidth
	Modifiable measurement point information settings (apply for post analysis or re-recording) / track	Component - node number - direction - type
	Modifiable settings (apply for post analysis or re-recording) / track	Associated transducer - unit - sensitivity - offset compensation
Listening	File location	Analyzer HD - Mobi-Disc™ connected with USB or inside the analyzer - PC HD
	Playback	One track - from cursor position - repeat displayed signal
Markers	Display	Recorded markers are available in the file overview
	Use	Set the start and stop playback offset (user selectable)

Player connections

The following table describes the available connections to the analysis modes (plug-in analyzers and recorder) during post-analysis operation:

Dynamic inputs Tracks	Preview (multiple file simultaneously)	Entire file fast overview (pre-compressed at recording time) - Track contents preview, independently (multi-graph display)
	Monitoring (loaded file only)	Zoom on selected play-back section
	Connection ⁷ (loaded file only)	To any: plug-in analyzer channel, monitor channel, recorder track, edge event detector and tachometer
Ext. sync Tracks	Preview (multiple file simultaneously)	Entire file fast overview (pre-compressed at recording time) - Track contents preview, independently (multi-graph display)
	Monitoring (loaded file only)	Zoom on selected play-back section
	Connection ² (loaded file only)	To any: start or stop averaging of plug-in analyzers, recorder start or stop recording, waterfall start or stop acquisition, new block trigger for FFT and SOA and new slice for waterfall acquisition.
Recorded parametric¹ (DC) inputs	Preview (multiple file simultaneously)	Entire file fast overview - Track contents preview
	Monitoring (loaded file only)	Profiles versus time and digital or analog view meter.
	Connection ² (loaded file only)	To any: recorder track, waterfall reference (Z/X axis) and profiles, level and delta level events.

⁷ Independently on each track.

Plug-ins analyzers

The following plug-in analyzers are available as options of NVGate® software platform.

Time Domain Analysis - TDA

The TDA plug-in analyzer provides time domain based analyses and visualizations. This plug-in analyzer computes statistical extractions and data compression of long duration oscilloscope views. All results are real time and operations are possible on-line or in post processing. The TDA plug-ins can operate free run or synchronized with the other plug-in analyzers.

TDA Settings

Bandwidths	Oscillator 1	800 mHz to 40 kHz (sampling oscillator 102.4 kS/s to 2,048 S/s)
	Oscillator 2	512 mHz to 25.6 kHz (sampling oscillator 65.536 kS/s to 3,277 S/s)
Time views	Depth	7200/ABW⁸ sec to 100 000 sec (27 hours) - Independent on each channel
	Time base (resolution)	Depth/2048- Independent on each channel
Time span for extraction (averaging)	Type	Continuous sliding with refresh each 256 samples (Exponential) - One shot (Linear) - Repeated shot (Repeated linear)
	Duration	1/ABW to 2 10⁶/ABW (ex: 50 ms to 1000 sec @ 2 kHz)
Channels	OR36 & OR38 analyzers	32 channels per plug-in for on line and post-analysis
	OR34 & OR35 analyzers	8 channels per plug-in for on line and post-analysis
Filters	On each channel	Any NVGate filter can independently be applied to each dynamic input (See Filters §)
Triggering	Start analysis	Any NVGate® event plus manual and free run
	End analysis	Any NVGate® event plus manual and free run
	Repeat analysis	On new start or end of averaging
	Trigger delay	Positive = unlimited - negative = 32k Samples

TDA Results

The following results are available for real time or post-analysis display, report and saving.

Time Views	Overview	Signal envelope: Min/Max line for each time step -
	Statistical values	DC - RMS - Min- Max - Peak - Peak to Peak - Crest factor - Skewness - Kurtosys - computed on a user defined area of the time view
Extractions	Statistical values	DC - RMS - Min- Max - Peak - Peak to Peak - Crest factor - Kurtosys - computed on the Time span – All values available for Viewmeter and/or Waterfall profiles

⁸ ABW: the plug-in Analysis Bandwidth.

Fast Fourier Transform analysis - FFT

The FFT plug-in analyzer features multiple vibrations results depending on applied setting. This type of plug-in analyzers computes real-time (on-line or post-processing) Fast Fourier Transform algorithms with multiple averaging domain and trigger capabilities. Up to 4 FFT plug-ins can operate at the same time.

FFT Settings

Bandwidths	Oscillator 1	800 mHz to 40 kHz (sampling oscillator 102.4 kS/s to 2,048 S/s)
	Oscillator 2	512 mHz to 25.6 kHz (sampling oscillator 65.536 kS/s to 3,277 S/s)
Resolution	Lines	101, 201, 401, 801, 1601, 3201 and 6401 lines
	Frequency resolution	80 µHz (512 mHz/6401 lines) to 400 Hz (40 kHz/101 lines)
Averaging	Domain	Spectral (power) - time (with phase) - FDSA (Synchronized with one frequency)
	Type	Exponential - linear - repeated linear - referenced peak hold (eq. to tracking filter locked on reference channel frequency) - peak hold
	Size	Duration or number of blocks , unlimited size
	Overlap	0% to 99.9% depending on block size - retrigger
Channels	OR36 & OR38 analyzers	32 channels per plug-in for on line and post-analysis
	OR34 & OR35 analyzers	8 channels per plug-in for on line and post-analysis
Weighting	General	Uniform - Hanning - Hamming - Kaiser Bessel
	Modal acquisition	User defined Force (rect.) and Response (Rect. + exp)
	Assignment	Independently on any channels
Filters	On each channel	Any NVGate filter can independently be applied to each dynamic input (See Filters §)
Cross functions	Reference selection	Full or partial matrix available (all channels can be references)
Zoom	Magnification factor	2 to 128 by step power of 2
	Min., max and center frequencies	Graphically selectable on wide band spectrum
Triggering	Start averaging	Any NVGate® event plus manual and free run
	End averaging	Any NVGate® event plus manual and free run
	New block	Any NVGate® event plus manual and free run
	Repeat averaging	On new start or end of averaging
	Trigger delay	Positive = unlimited - negative = 32k Samples
Blocks rejection Overall	Automatic	Reject overloaded blocks
	Manual	Accept or Reject after preview of averaged results (FRF, Coherence)
	Normal	Accept all blocks
Overall	Detector	Quadratic sum of spectra lines taking in account weighting window equivalent noise bandwidth
	Lower and upper frequencies	Selectable into the current FFT bandwidth

FFT Results

The following results are available for real time or post-analysis display, report and saving.

Time averaging	Time domain	Filtered signal - Triggered block - Averaged Triggered block - Weighted Block - Lissajoux of triggered blocks
	Spectra	Complex spectra
	Cross-functions	Instantaneous cross-spectra - averaged cross-spectra - FRF H1 - FRF H2 - Coherence
	Overall	Overall RMS value in specified band - Overall RMS profile in specified band.
Spectral averaging	Time domain	Filtered signal - Triggered block - Weighted Block - Lissajoux of triggered blocks
	Spectra	Instantaneous complex spectra - averaged power spectra
	Zoomed spectra	Zoomed instantaneous complex spectra - zoomed averaged power spectra
	Cross-functions	Instantaneous cross-spectra - averaged cross-spectra - FRF H1 - FRF H2 - Coherence
	Zoomed cross-function	Instantaneous zoomed cross-spectra - averaged zoomed cross-spectra - zoomed FRF H1 - zoomed FRF H2 - zoomed Coherence
	Overall	Overall RMS value in specified band - Overall RMS profile in specified band.
Synchronous averaging on one frequency (FDSA)	Time domain	Filtered signal - Triggered block - Averaged Triggered block - Weighted Block - Lissajoux of triggered blocks
	Spectra	Instantaneous complex spectra - time domain averaged power spectra
	Overall	Overall RMS value in specified band - Overall RMS profile in specified band.

Constant Band Order Tracking Add-on (CBT)

Constant band order tracking is an optional add-on to the FFT plug-in analyzers. This add-on computes spectrum lines power related to RPM speed. This option adds settings and results to the FFT Plug-ins. Up to 4 constant Band tracking can operate on 4 different tachometers at the same time.

CBT Settings

Tracked Order	Number	8 per channels
	Max	0.001 to 800
	Constant bandwidth	User selectable per channel - minimum depend on weighting windows
Computation	Associated tachometer	Any front end, recorded or virtual tachometer
	Peak tracking	On/Off center bandwidth on nearest peak
	Order amplitude	Weighting windows eq. noise bandwidth correction

CBT Results

The following results are available for real time or post-analysis display, report and saving.

Scalar	Tracked order	Digital (magnitude and phase) or analog view-meter
	Cross phase tracking	Order phases are relative to the same order from a ref. channel
	Overall	Digital or analog view-meter
Monitoring⁹	Continuous profiles of tracked order	Profiles vs. time - profiles vs. RPM - max depth 2048 pts - user selectable delta time - user selectable delta RPM
Profiles	One shot acquisition	Tracked order (complex), cross phase orders and overall level can be collected by the <i>waterfall</i> profiles.
	References	Time, RPM and DC levels

⁹ These result cannot be saved

Diagnostic Add-on (FFTDiag)

FFT Diagnostic is an optional add-on to the FFT plug-in analyzers. This add-on computes a set of useful analysis for machinery diagnostic. This option adds settings and results to the FFT Plug-ins. Up to 4 FFTDiag can operate on 4 different FFT plug-in at the same time.

FFTDiag Settings

Envelop demodulation	Activation	Enable/disable on all channels - requires zoom activation
	Averaging	Spectral domain - FDSA
	Bandwidth	½ of zoom span - ¼ of FFT bandwidth
Correlation	Activation	Enable/disable on all channels - All other FFT results are affected
	Weighting window	Uniform - Left zero padding - Centred zero padding

FFTDiag Results

The following results are available for real time or post-analysis display, report and saving.

Scalar	Min/Max	Minimum and maximum amplitude per trigger block
	Peak detectors	Peak level - Peak to Peak level - Crest Factor - per trigger block
Others	Cepstrum	Cepstrum - Zoomed cepstrum
	Correlation	Auto-correlation block - Cross correlation block
	Shaft view	Time domain signal on first rotation – angular representation

Synchronous Order Analysis (SOA)

The SOA plug-in analyzer features several results depending on applied settings. Up to 2 SOA plug-ins can operate in parallel.

SOA Settings

Bandwidths	Order span	6.25 to 400
	Frequency bandwidth	Up to 40 kHz
	RPM span	Up to 192 000 RPM – Ratio of 64 between Min & Max RPM
Resolution	Lines	101 - 201 - 401 - 801
	Order resolution	1 - ½ - ¼ - 1/8 - 1/16 - 1/32
Averaging	Domain	Spectral (power) - revolution (re-sampled blocs)
	Type	Exponential - linear - repeated linear - peak hold
	Size	Number of blocks , unlimited size
	Overlap	0 to 31 revolution depending on resolution – 0 to 359° into revolution – Retrigger on multi-pulse/rev
Tachometer	Computation base	Any NVGate® tachometer (ext. sync, regular input, DC input, simulated, Fractional, and combined tach.)
	Phase reference	Tachometer pulse edge or pulse center requires to analyze the tachometer input
	0° Phase reference	Cosine or sine
RPM	Max speed variation	1 to 99% per analyzed block - blocks with higher variation are rejected. No control (set @ 100%)
	RPM range	User selectable max & min RPM , under and over speed blocks are rejected
Tracked order	Number	Up to 8 per channels
	Min-Max	1/32 to 400
	Cross phase tracking	Order phases are relative to the same order from a ref. channel
Channels	OR36 & OR38 analyzers	32 channels per plug-in for on line and post-analysis
	OR34 & OR35 analyzers	8 channels per plug-in for on line and post-analysis

SOA Settings (continued)

Weighting	Windows selection	Uniform - Hanning - Hamming - Kaiser Bessel Applied independently on any channels
Filters	On each channel	Any NVGate filter can independently be applied to each dynamic input (See Filters §)
Triggering	Start averaging	Any NVGate® event plus manual and free run
	End averaging	Any NVGate® event plus manual and free run
	New block	Any NVGate® event plus manual and free run
	Repeat averaging	On new start or end of averaging
	Trigger delay	Positive = unlimited - negative = 1/order res revolution
	Trigger block phase shift	+/- 720° - independent for each channel (with FFTDiag)
Overall	Detector	Quadratic sum of order spectra lines taking in account weighting window equivalent noise bandwidth
	Lower and upper orders	Selectable into order span - from 0,03125 to 400

SOA Results

The following results are available for real time or post-analysis display, report and saving.

Revolution averaging	Time domain	Filtered signal
	Angle domain (Revolution)	Triggered block - Averaged Triggered block - Weighted block - Shaft view (with FFTDiag)
	Order spectra	Complex spectra
	Tracked orders	Digital (magnitude & phase) view-meter - Analog view -meter
	Overall	Overall RMS value in specified order band (digital or analog view-meter)
Spectral (order) averaging	Time domain	Filtered signal
	Angle domain (Revolution)	Triggered block - Weighted Block - Shaft view (with FFTDiag)
	Order spectra	Instantaneous complex order spectra - averaged power order spectra
	Tracked orders	Digital (module and phase) and/or Analog view-meter.
	Overall	Overall RMS value in specified order band (digital or analog view-meter)

1/n octave constant percentage band filter analysis - OCT

The OCT plug-in analyzer features multiple acoustic results depending on applied setting. This plug-in analyzer computes real-time signal (on-line or post-processing analysis) based on digital filters (CPB) and detectors.

OCT Settings

Bandwidths	Sampling oscillator 1 (102.4 kS/s to 2,048 S/s)	Center of highest 1/3rd band = 40 kHz Center of lowest 1/3rd band = 100 mHz
	Sampling oscillator 2 (65.536 kS/s to 3,277 S/s)	Center of highest 1/3rd band = 25 kHz Center of lowest 1/3rd band = 100 mHz
	Frequency span	Highest Band / lowest band < 2000 (ex. 10Hz - 20kHz)
Resolution	1/n Octave	1, 1/3rd, 1/12th, 1/24th
Averaging	Basic	Linear & repeated linear (20 ms to 60,000 s) exponential (20 ms to 60s)
	Acoustics	Short LEQ 1 s, Short LEQ 1/8 s, Fast, Slow, Impulse
	Constant Bandwidth * Time	B*T = 0.2dB, 0.5 dB, 1 dB, 2 dB
Standards	Detectors	Complies with IEC 651, IEC 804, IEC 61-672 class 1
	CPB filters	Complies with IEC 1260 class 1

OCT Settings (continued)

Channels	OR36 & OR38 analyzers	32 channels for on line and post-analysis
	OR34 & OR35 analyzers	8 channels for on line and post-analysis
Triggering	Start averaging	Any NVGate® event plus manual and free run
	End averaging	Any NVGate® event plus manual and free run
	Repeat averaging	On new start or end of averaging
Overall	Detectors	2 parallel overall detectors linear and weighted (time domain)
	Weighting	A, C, or Z (none) applicable in 10 kHz - 40 kHz bandwidth

OCT Results

The following results are available for real time or post-analysis display, report and saving.

Spectra	1/n Octave spectra	Instantaneous spectra, averaged spectra
	Holden spectra	Minimum & maximum spectra
Overall	Linear	Digital & analog view meter of time domain overall detector, exact bandwidth is informed
	Weighted	Digital & analog view meter of A or C weighted overall levels computed in time domain, exact bandwidth is informed

Overall acoustics sound level meter - OVA

The OVA plug-in analyzer features class sound pressure level measurement according to IEC 61-672 standard. This plug-in analyzer computes real-time signal (on-line or post-processing analysis) based on digital filters and detectors.

OVA Settings

Type	Standard	IEC 61-672-1 - IEC 651 - IEC 804
	Class	1
	Bandwidths	10 Hz to 40 kHz - Adjustable
Channels	OR36 & OR38 analyzers	32 channels for on line and post-analysis
	OR34 & OR35 analyzers	8 channels for on line and post-analysis
Averaging	Linear	User selectable duration - repeat mode
	Short leq	1/8 s - 1 s - User selectable duration
Triggering	Start averaging	Any NVGate® event plus manual and free run
	End averaging	Any NVGate® event plus manual and free run
	Repeat averaging	On new start or end of averaging
Detectors	Peak	1 peak detector/Ch. - A, C or Z (none) weighting - Independent for each channel
	Weighting	3 overall detectors/Ch. - A, C or Z (none) weighting - Fast, Slow, Impulse and linear time weighting - Independent for each channel

OVA Results

The following results are available for real time or post-analysis display, report and saving. The following levels can be tracked in profiles up to 100 000 pt each.

SPL	Time weighted	Instant - max hold - min Hold
	Averaged	Short leq - leq
	Peak	Peak - Time weighted - max hold min hold

Options

Instantaneous angular Velocity Converter (IVC)

The IVC option converts frequency to voltage from the External synch inputs. It covers torsional and acyclism measurements. The converted signals are made available as standard inputs (or player tracks). This option operates real-time computation and operations are possible on-line or in post processing.

IVC Settings & specs

Rate	Pulse/rev	0.5 to 1024 - Up to 262 144 with pre-divider
	Pulse/rev Frequency	> 40 kpulse/sec max
	Pre-divider	1 to 255 - hardware decimation (pulse are not measured)
	Pre-divider frequency	375 kpulse/sec max.
Missing pulses	Number	0 to 3 consecutive pulses
	Hold off	2 consecutive pulses
	Generated signal	1st order interpolation
Tach. phase ref	No missing pulse	First random - continuous offset further
	missing pulse > 0	Last known edge before missing pulse
Resolution	Time	160 ns : 1/(SF x 64)
	Angular (with SOA)	350 µRad (20 mdegrees) @ 8000 RPM , up to order 10
Pre-processing	Smoothing	Sliding average - 1 to 32 samples
	Filtering	Any NVGate filter (See Filters §) incl. dt and 1/dt
Max Speed	Without pre-divider	Max RPM = $2.4 \text{ e6/Pulse per rev}$ - 12 000 RPM @ 200 pulse/rev
	With pre-divier	

IVC Results

The following results are available for real time or post-analysis.

Signals	Number	1 to 6 (depends on the number of available ext. synch)
	Use	Same as dynamic inputs or recorded dynamic inputs
	Magnitude	Torsional acceleration, velocity & angle – separated from angular magnitudes (RPM)
View	Type	Signal - filtered signal - 256 samples frame

Combined tachometer editor (CTE)

The CTE option combines 2 actual tachometers with math to generates a calculated angular velocity (new tachometer). It covers various unreachable rotating parts and more specially the CVT gear chain measurements. The combined tachometers are made available as standard tachometer. This option operates real-time computation and operations are possible on-line or post processing.

CTE Settings

Sources	Number	2
	Type	Any NVGate tachometer – excepted another CTE
Output	Type	New item in the active tachometers list
	Synchronization	0° phase shift with sources and analyzed signal
Editor	Type	Text
	Variables	Real values
	Operators	+, -, x, /, ^, = (affectation)
	Predefined	Rmp1, Rpm2 (sources speed), Pi, e
	Trigonometric functions	Sine, Cosine, Tangent - with Arc and Hyperbolic combination
	Logarithmic functions	Log2, Log10, Ln, Exp
Output characterization	Miscellaneous	Sqrt, Abs, Min, Max, Sum, Avg
	Rotation	Clock wise or counter clock wise
	Average	Sliding - 1 to 256 revolution
	Speed limits	Min: 0 RPM - max: 1 200 000 RPM
	Information	Label (text)

CTE Results

The following results are available for real time or post-analysis

Signals	Number	4
	Use	Same as on-line Tachometer or recorded tachometer
	Magnitude	Angular velocity (RPM)
View	Types	View meter - 1 to 100 s rolling profile

Virtual inputs (VIn)

The virtual input allows combining front end inputs with polynomial operations to generate a signal (new input). This option covers numerous applications such as vector strain calculation with rosette or dynamic twist measurement on machinery transmission. The virtual inputs are made available as standard dynamic input. This option operates real-time computation on raw or recorded signal.

VIn Settings

Output	Number	12 Operators
	Type	New item in the active inputs/tracks list
	Synchronization	0° phase shift with sources and analyzed signal
	Magnitude	Automatic or voltage if unresolved
Sources	Number	1 to 12 channels
	Type	Analyzer dynamic inputs or recorded dynamic inputs
Output adjustment	Type	(Input * Coeff + Offset) ^power - independent on each output
	Offset	Any real value from -1 e9 to 1 e9 - ex: -5.67
	Coefficient	Any real value from -1 e9 to 1 e9 - ex: 12
	Power	Any real value from -4 to 4 - ex: 0.5
Sources adjustment	Type	Filtering [(input * Coeff + Offset) ^ power] - independent for each source
	Offset	Any real value from -1 e9 to 1 e9 - ex: -5.67 e-5
	Coefficient	Any real value from -1 e9 to 1 e9 - ex: 1200
	Power	Any real value from -4 to 4 - ex: -2.4567
	Filtering	Any NVGate filter
Operators	Type	Product - Sum - independent on each operator

Virtual parameter (VDC)

The virtual parameter (VDC) allows combining front-end parametric inputs (DC) with math operations to generate a calculated parameter (new DC). This option covers numerous applications such as averaged temperature or non linear response transducers. The virtual parameters are made available as standard DC input. This option operates real-time computation on raw or recorded signal.

VDC Settings

Output	Number	12 Operators
	Type	New item in the DC inputs/track list
	Synchronization	0° phase shift with sources and analyzed signal
	Magnitude	User defined
Sources	Number	1 to 12 channels
	Type	Analyzer DC inputs or recorded DC inputs
Editor	Type	Text
	Variables	Real values
	Operators	+ , - , x , / , ^ , = (affectation)
	Predefined	Ch x (Channels signals), Pi , e
	Trigonometric functions	Sine , Cosine , Tangent - with Arc and Hyperbolic combination
	Logarithmic functions	Log2 , Log10 , Ln , Exp
Miscellaneous	Sqrt , Abs , Min , Max , Sum , Avg	
Output characterization	Limits	Min and max: +/- 1 E9 - In current unit
	Information	Label (text)

General purpose analysis

The following modules are available as standard features of NVGate® software platform; they feature additional analysis capabilities to regular plug-in analysis module.

Monitor

The monitor is an independent (dedicated processor) module that processes continuously FFT analysis on 4 channels at the maximum available bandwidth. The aim of this module is to monitor in both domains (time and spectral) 4 inputs and to compute basic indicators for monitoring and triggering purpose.

Monitor settings

Fixed setup	Bandwidth	ABW = Sampling freq / 2.56
	Resolution	401 lines
	Average domain	Spectral (power)
	Overlap	0%
	Average type	Exponential
	Weighting windows	Hanning
	Trigger	Free run
Channels	Number	4
	Swap	Between any active dynamic input - hot swap capable
Average	Duration	Instantaneous (20 ms) to unlimited
Overall analysis	Pass band filter	Butterworth order 2 to 10 - IIR type - Bypass function
	Upper & lower frequency	User defined - can be graphically modified
	Computed indicators	DC - Max - Min - RMS - Skew - Kurtosis - Into defined pass band - overall if bypass is on
	Average	User defined duration - independent from spectral averaging

Monitor results and connections

The following results are available for real time or post-analysis display, connection to other modules.

FFT analyzer	Trigger bloc	1024 samples - time domain analyzed bloc
	Spectra	Instantaneous complex spectra - averaged power spectra
Overall detectors	Display (digital or analog view-meter)	DC - Max - Min - RMS - Skew - Kurtosis
	Connection	To level and delta level event detector - to waterfall profiles

Waterfall

The waterfall module operates as a stack for plug-in analyzers results. Waterfall module features advanced graphics for 3D and profiles, including extraction tools. It can synchronize results coming from multiple plug-in analyzers and sources in one result.

Waterfall settings

Mode	Continuous	Circular buffer of results
	One shot	Fill stack and stop waterfall acquisition
Triggering	Start acquisition	Any NVGate® event plus manual and free run
	Stop acquisition	Any NVGate® event plus manual and free run
	New slice (point or spectra)	Any NVGate® event - manual - free run - availability of connected results - periodic

Waterfall settings (continued)

Size	Number of result per acquisition	Up to 95 results + Time
	Depth	2 to 100,000 slices or points - depend on PC available memory and requested result - automatically adjusted before acquisition
	Depth for stand-alone acquisition	Up to 3 MSamples per computation DSP
Channels	Type scalar (the following results are connectable to waterfall channels)	Overall levels (lin and weighted) from OvA and 1/n OCT - Monitor indicators (DC, Max, Min, RMS, Kurtosis) - Orders (from CBT and SOA) - Complex orders (magnitude & phase) - Overall levels in selected BW from FFT & SOA (order or frequency) - TDA scalar: DC, Min/max, RMS, Kurtosis, peak, peak-peak, crest factor
	Type 2D - FFT (the following results are connectable to waterfall channels)	Triggered block - Averaged Triggered block - Weighted Block - Complex spectra - Power spectra - Cross-spectra - FRF H1 - FRF H2 - Coherence - Zoomed complex spectra - zoomed power spectra
	Type 2D - OCT (the following results are connectable to waterfall channels)	Instantaneous spectra - averaged spectra - max & min hold spectra
	Type 2D - SOA (the following results are connectable to waterfall channels)	Triggered block - Averaged Triggered block - Weighted block - Complex order spectra - Power order spectra

Waterfall results

The following results are available for real time or post-analysis display, report and saving. All stacked result can be saved.

3D	Display	1 pane (3D) - 2 panes (3D + YZ view or 3D + XY view) , 3 panes (3D + YZ + XY + Extraction view) windows - automatic or user selectable pane arrangement - Real or imaginary part and module or phase for complex results
	Z axis (X axis for extraction and YZ view)	Any reference - time - independent for any window - swap reference at any time
	Saving selection	Entire 3D data and / or any active section (YZ, XY or Extraction)
Profiles	Display	Profile of any scalar - Real or imaginary part and module or phase for complex results
	X axis	Any reference - Time – Slice - independent for any window - swap reference at any time

Waterfall Tools

The following results are available for real time or post-analysis display, report and saving.

Sections	YZ Sections (Profiles vs. Ref)	Any order/frequency - Power - Peak - on selected bandwidth
	XY Sections (Spectra)	Any position in the current ref. - Min - Max - Average - on selected range or all slices
	Order/Frequency extraction (profiles vs. Ref.)	Any order/frequency extraction - user selectable tach. - Power - Peak - on selectable bandwidth - Max order
	Number of sections	Unlimited - available on result or real-time waterfalls
Linked cursors	General	Single or dual cursor in each view - linked with other graphs
	Linked by value	Linked cursors track the same X value in different windows.
	Linked by reference	Linked cursors track the same acquisition slice in different waterfall windows with different X or Z-axis .

References are: Time - Slice number - DC channels (expressed in physical quantity) - TDA scalars - Monitor levels- any Tachometer

Shared resources

The following resources are available for each plug-in analyzer (when it is compatible). For example once a trigger is activated it can be applied to FFTx and SOA: Then modifying the trigger setting in the resources will apply on all corresponding plug-in.

Triggering:

Each plug in analyzer (and recorder) can be started, stopped or triggered (new block) with events defined in the Event module.

Event settings

Edge detector	Source	Any dynamic input - Any recorded dynamic input
	Label	String for event identification (Ex. "Impact" for a hammer impact detection)
	Threshold	Between min and max range - use source unit (ex. g for an accelerometer)
	Pre-filtering	A law - C law - any NVGate filter
	Slope	Rise - fall
	Hold off	0 to 36000 s
	Hystersis	Into source input range - use source unit (ex. g for an accelerometer)
	Number	2 edge detectors
RPM speed detector	Source	Any tachometer - computed from dynamic input or ext.sync - any recorded pulses (through tachometer)
	Label	String for event identification (Ex. "start speed" for a run up initial triggering)
	Threshold	Detection into source tachometer RPM range
	Slope	Run up - Run down
	Hysteresis	0 to source max RPM
	Interpolation	On interpolate event occurrence into revolution - Off event occur at revolution ends (new pulse)
	Number	2 to 6 RPM speed detector
Delta RPM speed detector	Source	Any tachometer - computed from dynamic input or ext.sync - any recorded pulses (through tachometer)
	Label	String for event identification (Ex. "Each 100 RPM" for a run up triggering)
	Lower velocity	Minimum RPM speed - Events occurs only for higher source speed
	Higher velocity	Maximum RPM speed - Events occurs only for lower source speed
	Delta velocity	Define velocity step - event occur each time source speed increase or decrease by delta velocity
	Slope	Run up - run down - first , first slope is automatically selected - any , event occur on any slope
	Interpolation	On , interpolate event occurrence into revolution - Off , event occur at revolution end (new pulse)
	Number	2 to 6 delta RPM speed detector
Level detector	Source	Any parametric (DC) input - Monitor scalar - Filtered monitor scalar (Band Pass)
	Label	String for event identification (Ex. "temp A" for a recording trigger)
	Type	Monitor scalar - DC - RMS - Max - Min - Kurtosis
	Status	Above / below - Detection level - available in lin or dB
	Number	1 to 4 level detectors

Event settings (continued)

Periodic event	Label	String for event identification (Ex. "Hourly" for 1 hour time interval)
	Time interval	2 ms to 11 days - Synchronized with analyzer.
	Number	2 periodic events
Combination	Sources	Any event - 2 different sources defined as A and B
	Label	String for event identification (Ex. "Time/RPM variation" for a mix between periodic and delta RPM)
	Combination	A OR B - A AFTER B - A AND B (occur in the same bloc)
	Number	2 event combination
Plug-in synchronization	FFTx result available	Occurs at each new spectra availability - Occurs at end of linear averaging (repeat and linear) - One event per active FFT plug in (FFT1 to FFT4)
	OCT result available	Occurs at each new 1/n spectra availability - Occur at end of linear averaging (leq, short leq, linear repeat)
	SOAx result available	Occurs at each new spectra availability - Occurs at end of linear averaging (repeat and linear) - One event per active SOA plug in (up to 2)
	TDA result available	Occurs at each new level set (RMS, DC, etc) availability - Occur at end of linear averaging (repeat and linear)
	OVA result available	Occurs at each new set of overall level (short LEQ) availability - Occur at end of short averaging (repeat and linear)
Generators Synchronization	Event synchronized with blocks of :	Multi-sine - random noise - chirps
	Swept sine generator event:	Swept sine stabilized (output amplitude established) - step sine stabilized (occur x sec after step frequency is reached) - pure tone stabilized (output amplitude established)

Output signals:

NVGate® proposes a set of generator signals.

Output signals

The following output signals are available as standard and can be independently applied to the front-end outputs.

Sine	Type	Pure tone - Swept sine - Step sine
	Frequency	100 µHz to 40 kHz - smooth variation between step - resolution 10 µHz
	Frequency control	Start & stop frequencies - pause/release during sweep - adjustment during pause - step
	Cycle control	One shot - One cycle - continuous sweep between boundaries
	Amplitude control	Settling time 100 µs to 10 s - Stabilization time 0 s to 1000 s
	Sweep speed	Linear: 300 mHz/s to 20 kH/s - Log: 5 mOct/s to 330 Oct/s
	Step control	Synchronized with analysis end - free run
	Gain control	-15 dB to +60 dB - Independent for each output - Amplitude variation controlled by settling time (1 ms to 1000 s)
	Phase control	Offset $\pm 360^\circ$ - Independent for each output - phase variation controlled by phase speed (1.5°/s to 360°/s)
	Number	2 to 6 sine generated simultaneously - with independent phases and amplitudes - synchronized frequencies
Multi-sine	Frequency span	From 125 mHz to 40 kHz
	Amplitude	0 to 2.5 Vrms - Settling time 100 µs to 10 s
	Resolution	125 mHz to 400 Hz - 101 lines to 6401 lines
	Phase	Fixed (all sine have same phase) - Random
	Burst	0 to 100% - Step 1%
	Number	2 to 4 independents multi-sine

Output signals (continued)

Random noise	Frequency span	From 125 mHz to 40 kHz - independent lower and upper frequencies
	Amplitude	0 to 2.5 Vrms - Settling time 100 µs to 10 s
	Type	White - pink
	Burst	0 to 100% - Step 1% - Bloc duration: 2.5 ms to 100 s
	Number	2 to 6 independent and uncorrelated random noises
Chirp	Frequency span	From 3.125 Hz to 40 kHz - independent lower and upper frequencies
	Amplitude	0 to 7,07 Vrms - Settling time 100 µs to 10 s
	Size	256 - 512 - 1024 - 2048 - 4096 - 8192 - 16384
	Burst	0 to 100% - Step 1%
	Number	2 to 6 independents chirps

Filters:

The following filters apply on front-end inputs, plug-ins analyzers and output generators.

High pass	Type	Butterworth – IIR type
	Order	1 to 6
	Cutoff frequency	ABW¹⁰ to ABW/1024
Low pass	Type	Butterworth – IIR type
	Order	1 to 6
	Cutoff frequency	ABW to ABW /102.4
Stop/pass band	Type	Butterworth – IIR type
	Order	2 to 10
	Cutoff frequencies	ABW to 0.055 * ABW
	Bandwidth	ABW/2 to 0.0075 * ABW
Integrators	Type	HP, Single or double
	High pass frequency	ABW¹/10 000 or ABW¹/2 000
	Integration time	2 ms to 500 s
Differentiators	Type	Single
	Average	Sliding - 0 to 2 s
Weightings	Laws	A & C laws
	Bandwidths	10 kHz to 40 kHz
All	By-Pass	Apply/bypass without stabilisation time - independently on each filter
	Application	Same filters set for each plug-in
	Label	Each filter features a user define name

¹⁰ ABW : the analysis bandwidth, of the plug-in or front end where the filter is in use.

Notes

The above specifications describe all the guaranteed capacities and performances of the software installed in a PC running Windows XP Pro SP3 (recommended configuration). Functionalities may change depending on mode operation (connected to a 3-Series unit or office). Plug-in analyzers, options and channel number availability depend on purchased options.

The instruments hardware are described separately in the “Instruments specifications” data sheet for OR34 & OR35 and OR36 & OR38.

OROS reserves the right to modify the specifications without notification.

OROS, Leadership through Innovation

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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.

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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.

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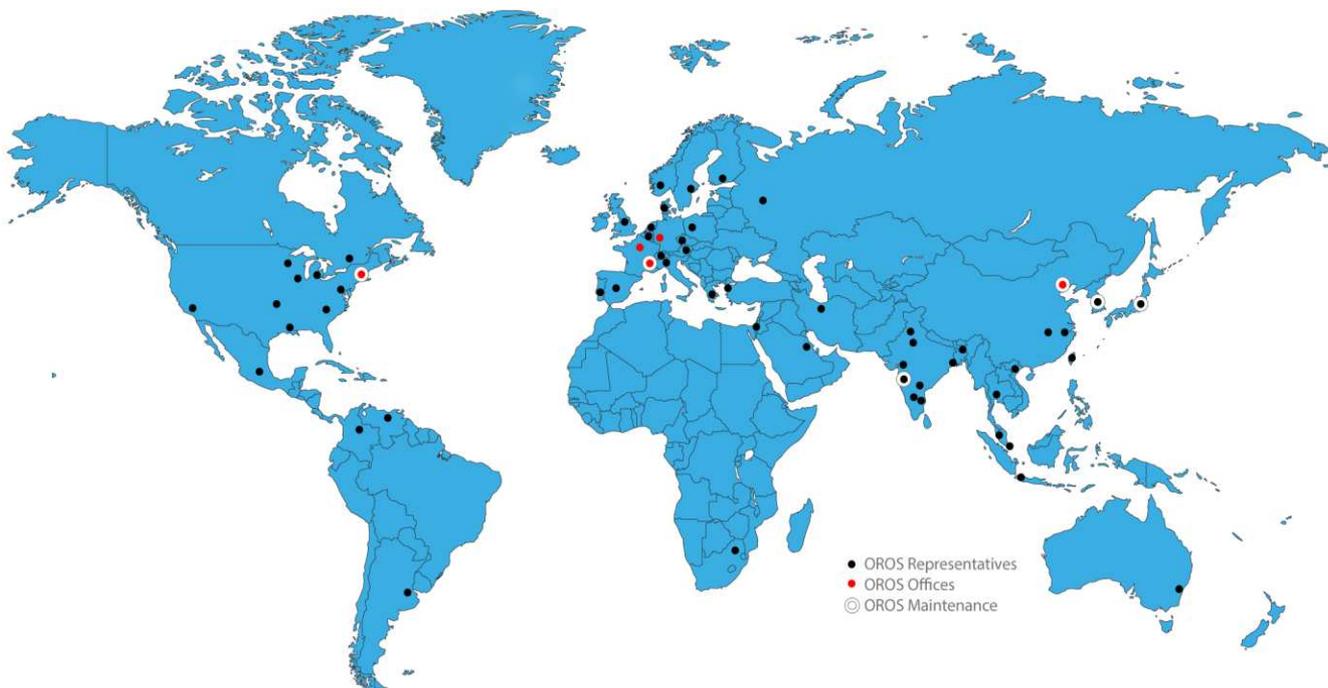
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