Instrument Specifications

OROS
TECHNICAL SPECIFICATIONS

OR34/35
2 to 8 Channels Multi-Analyzers

SmartRouter
Controller Unit

Table of Content

General description

The following specifications concern OR34 & OR35 multi-analyzers and the SmartRouter controller. OR34 and OR35 instruments consist of an OR3x hardware containing optional inputs and processing modules, a PC with an Ethernet interface, and NVGate® software with optional plug-in analyzers.

Modules

The following tables detail the complete capacity of OR34, OR35 & SmartRouter hardware. Optional or standard modules may fill the described slots.

OR34

Front-end	Dynamic analog inputs	2 slots of 2 inputs (BNC)
	Dynamic analog outputs	1 output (BNC)
	Externals sync	2 trigger/tachometer inputs (BNC)
Processors	Trigger / tachometer / monitoring	1 DSP
	PC communication / recording	1 DSP
	Computation power	1 DSP
Miscellaneous	Remote control	1 with RS232 cable connection (RJ11)

OR35

Front-end slots	Dynamic analog inputs	4 slots of 2 inputs (BNC or BNC+LEMO)
	Dynamic analog outputs	2 outputs (BNC)
	Externals sync	2 trigger/tachometer inputs (BNC)
	Auxiliary	1 slot of 4 parametric (DC) inputs
Processors	Trigger / tachometer / monitoring	1 DSP
	PC communication / recording	1 DSP
	Computation power	2 slots of 1 DSP
Miscellaneous	Remote control (on/off/reset)	1 with RS232 cable connection (RJ11)

SmartRouter

I/O ports	Ethernet (analyzer connection)	100 Mb/s - RJ45 - CAT 5
	Ethernet (LAN/WAN connection)	1 Gb/s- RJ45 - CAT 5
	Digital I/O	8 in/out
	USB ports	4 external / 1 internal
Controller	CPU	Intel Celeron/M - 1 GHz – FSB 400 MHz
	RAM	480 MB
	Hard drive	50 GB
Miscellaneous	Analyzer remote (on/off/reset)	RS232 cable connection (RJ11)

PC requirement

Minimum	Pentium 4/ 2 GHz / 256[1] MB RAM with Windows XP or 512[1] 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, **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 **parallel port** or one **USB port** for dongle key.
Operating systems	Windows **XP Pro** Service Pack 3 (recommended), Windows **Vista Business** Service Pack 2

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

Case

Mechanicals

OR34

Weight	**1.4 kg** (3 lb)	
Dimensions	Case (w.h.d)	**45 mm x 205 mm x 154 mm** (1.8 in x 8.1 in x 8.8 in)
	Overall (w.h.d)	**54 mm x 215 mm x 163 mm** (2.1 in x 8.4 in. x 6.4 in)

OR35/SmartRouter

Weight	**2.8 kg** (6.2 lb)	
Dimensions	Case (w.h.d)	**56 mm x 246 mm x 222 mm** (2.2 in x 9.7 in x 8.8 in)
	Overall (w.h.d)	**67 mm x 254 mm x 232 mm** (2.6 in x 10 in. x 9.15 in)

Power supply

OR34

Power	**< 15 VA**	
External AC Power supply	Voltage	**100 to 240 VAC**
	Frequency	**47 to 63 Hz**
DC	Range	**10 V to 28 V**
	Overload protection	**31 V** (over this voltage DC poles are short-circuited)
UPS (Uninterrupt-ible Power Supply)	Type	**Internal NiMh battery** (No memory effect)
	Protection against power supply loss or failure	**15 min.**

OR35

Power	**< 20 VA**	
External AC Power supply	Voltage	**100 to 240 VAC**
	Frequency	**47 to 63 Hz**
DC	Range	**10 V to 28 V**
	Overload protection	**31 V** (over this voltage DC poles are short-circuited)
Battery	Type	**NiMh** (no memory effect)
	Autonomy	**2 h** (typical)
	Charge time	**3 h** (typical)
	Charge conditions	DC power supply > 18 V

SmartRouter

Power	**< 20 VA**	
External AC Power supply	Voltage	**100 to 240 VAC**
	Frequency	**47 to 63 Hz**
DC	Range	**10 V to 28 V**
	Overload protection	**31 V** (over this voltage DC poles are short-circuited)
Battery	Type	**NiMh** (no memory effect)
	Autonomy	**2 h** (typical)
	Charge time	**3 h** (typical)
	Charge conditions	DC power supply > 18 V

Environmental / Compliance with standards

1	Indicates compliance with EMC Directive **89/336/EEC** and Low Voltage Directive **73/23/EEC**	
Safety	**EN 61010-1 June 2001**	Safety requirements for electrical equipment for measurement, control and laboratory use.
	Over-voltage Category	**II** (Local level mains, appliance, and portable equipment)
	Pollution Degree	**2:** Do not operate in environments where pollutants may be present.
EMC Emission	**EN 50081-1**	Generic emission standard: Residential, commercial and light industry.
	EN 50081-2	Generic emission standard: Industrial environment.
	IEC 61326-A: 2002	Electrical equipment for measurement control and laboratory use EMC requirements. Industrial locations
	CISPR 22	Radio disturbance characteristics of information technology equipment. Class B limits.
	FCC Rules	Complies with the limits for a Class B digital device.
EMC Immunity	**EN 50082-1**	Generic immunity standard: Residential, commercial and light industry.
	IEC 61326-1	Electrical equipment for measurement control and laboratory use EMC requirements.
	EN 50082-2	Generic immunity standard: Industrial environment.
	Linear input response range on interference	Max slew rate on input: **5 V/ µs**
Temperature	OR34 Operating	**0°C to 50°C** (32°F to 122°F)
	OR35 Operating	**0°C to 50°C** (32°F to 122°F)
	Storage	**-20°C to 65°C** (-4°F to 149°F)
	Absolute maximum rating[ii]	**-35°C to 70°C** (-31°F to 158°F)
Humidity	Max	**93 %** RH at **40°C** non condensing
Shock	Complies with **IEC 68-2-27**	
	Operating	**98.1 m/s²** (11 ms, ½ sine) and **686 m/s²** (3 ms, ½ sine)
	Storage	**196 m/s² (**11 ms, ½ sine) and **981 m/s²** (3 ms, ½ sine)
	Absolute maximum rating[ii]	**981 m/s²** (3 ms, ½ sine)
Vibration	Complies with **IEC 68-2-6**	
	Operating	**19.6 m/s², 5-500 Hz, 5mm**
	Storage	**24.5 m/s², 5-500 Hz, 5mm**
	Absolute maximum rating[ii]	**29.4 m/s², 5-500 Hz, 5mm**
Bump	Complies with **IEC 68-2-29**	
	Storage	**1000 bumps** in each direction (6) at **392 m/s², 6 ms**
Enclosure	Type	**IP 40**

Radio frequencies sensibility

	Input measured with 50 Ω terminator
Radiated RF: 80-1000 MHz, 80% AM 1 kHz, 10 V/m	< 20 µV
Conducted RF: 0.15-80 MHz, 80% AM 1 kHz, 10 V	< 100 µV
Magnetic field: 30 A/m, 50 Hz	< 2 µV

Front-end

Dynamic inputs

Sampling	Frequencies (Additional decimators allow analysis bandwidth down to 0.8 Hz)	**102.4 kHz, 65.536 kHz, 51.2 kHz, 37.768 kHz, 25.6 kHz, 16.384 kHz, 12.8 kHz, 8.192 kHz, 6.4 kHz, 5.12 kHz, 4.096 kHz, 3.2 kHz, 2.048 kHz**
	Converters	One **24 bit sigma-delta ADC** for each input
	Frequency relative precision	0.5 10^{-4} (typical 1 10 $^{-5}$)
	Synchronization	All inputs synchronized on the same sampling clock
Anti-aliasing filter	Type	Over-sampled digital filters
	Slope	**> 400 dB/octave**
	Pass band ripple	**< 0.003 dB**
	Rejection of parasites bands	**> 110 dB** (@ frequency > 0.57 x FS)
	Effective bandwidth	**0.43 x FS** (ex: 23.2 kHz @ 51.2 kS/s)
Range (peak)	With amplifier (included)	**±17.5 mV, ±31.6 mV, ±60 mV, ±100 mV, ±175 mV, ±316 mV, ±600 mV, ±1 V, ±1.75 V, ±3.16 V, ±6 V**
	Direct	**±10 V**
Absolute accuracy	Resolution	**24 bits** (144 dB)
	All input ranges at 1 kHz	**±0.05 dB** (typical ±0.015 dB)
	Temperature variability	**< 0.1 dB / 10°C**
DC offset	For ranges from **±1** V to **±10** V	**< ±0.15 %** of full scale
	For ranges below **±1** V	**< ±1 mV**
Frequency flatness and phase response	Includes channel to channel match with different gains	
	10 V range, 0 to 20 kHz	**±0.02 dB / ±0.02 °**
	10 V range, 20 to 40 kHz	**±0.05 dB / ±0.05 °**
	175 mV to 6 V ranges, 0 to 20 kHz	**±0.02 dB / ±0.1 °**
	175 mV to 6 V ranges, 20 to 40 kHz	**±0.10 dB / ±0.5 °**
	17.5 mV to 100mV ranges, 0 to 10 kHz	**±0.05 dB / ±0.3 °**
	17.5 mV to 100mV ranges, 10 to 20 kHz	**±0.1 dB / ±1 °**
	17.5 mV to 100mV ranges, 20 to 40 kHz	**±0.4 dB / ±3 °**
Cross-talk	Between N (N is odd) and N+1 inputs:	
	@ 1 kHz: **< -112 dB,** @ 20 kHz: **< -86 dB,** @ 40 kHz: **< -80 dB**	
	Between any inputs excluding: N (N is odd) and N+1 inputs:	
	@ 1 kHz: **< -122 dB,** @ 20 kHz: **< -96 dB,** @ 40 kHz: **< -90 dB**	
Signal to noise ratio	With 50 Ω terminators:	
	10 V range, 40 kHz bandwidth: **> 100 dB**, spurious lines **< -115 dB** of full scale	
	10 V range, 20 kHz bandwidth: **> 104 dB**, spurious lines **< -125 dB** of full scale	
Input noise	With 50 Ω terminators	
	Thermal input noise	**20 nV/√Hz**
	17.5 mV range	20 kHz BW **< 3 µV rms**, 40 kHz BW: **< 4.2 µV rms**
	100 mV range	20 kHz BW **< 3 µV rms**, 40 kHz BW: **< 4.2 µV rms**
	1 V range	20 kHz BW **< 5.4 µV rms**, 40 kHz BW: **< 8.5 µV rms**
	10V range	20 kHz BW **< 44 µVrms**, 40 kHz BW: **< 70 µV rms**
Impedance		**1 MΩ ±1%, < 100 pF**
Coupling	**AC**	Cut-off frequency 0.35 Hz ±10% (analog filter)
	DC	
	ICP	**4 mA** power supply with AC coupling
	ICP + TEDS	ICP with reverse current for TEDS reading
	AC and DC float	Independent ground references for each input within the current input range
	GND	Shortcuts input poles to the ground
Protection	On any inputs[ii]	**±60 V** peak without damage
TEDS	Standards	**IEEE 1451.4 2001** revision **1**
	Templates	Accelerometer/Force meter (**25**) Microphones (**27**, **28** and **29**)
Dynamic	Spectral domain	**> 120 dB** (typical >130 dB)

Dynamic outputs

Sampling	Converters	One **24 bits DAC** for each output
	Synchronization	Same sampling clock as the dynamic inputs
Range	Direct	**±10 V peak**
	With attenuator (included)	**±1 V peak**
	Clipping	**User selectable** in the output range
	Digital gain	**From 10^{-5}** to **10^{3}**
Absolute accuracy	Resolution	**24 bits** (144 dB)
	All output ranges at 1 kHz	**±0.05 dB**
	Temperature drift	**< 0.1 dB / 10°C**
Frequency response	Variation relative to 0 dB at 1 kHz	
	All ranges, at 10 kHz	**±0.05 dB**
	All ranges, at 20 kHz	**±0.15 dB**
	All ranges, at 40 kHz	**±0.8 dB**
Noise floor level	10 V range, 20 kHz bandwidth	**-110 dB** of full scale, spurious lines **< -125 dB** of full scale
	10 V range, 40 kHz bandwidth	**-105 dB** of full scale, spurious lines **< -125 dB** of full scale
	1 V range, 20 kHz bandwidth	**-99 dB** of full scale, spurious lines **< -110 dB** of full scale
	1 V range, 40 kHz bandwidth	**-94 dB** of full scale, spurious lines **< -110 dB** of full scale
Impedance	Impedance	**50** Ω
Current	Max	**±10 mA**
Protection	Sum of injected + generated voltages	**±15 V peak,** On any output[ii] Permanent short circuit supported
Total harmonic distortion	THD @ 1 kHz	**< 0.002%** or **-94 dB** at 20 kHz BW
	THD @ 5 kHz	**< 0.005%** or **-86 dB** at 20 kHz BW
Cross-talk	Output 0 dBV to 50 Ω terminated input	**Lower than measurable noise**

External sync

Sampling	Frequencies	**64 time over-sampling** of the current input sampling (up to **6.4 MHz**)
	Converters	High speed voltage comparator and time counter
Range (peak)	Direct	**±300 mV**, **±1 V**, **±3 V**, **±10 V**
Resolution	Amplitude accuracy	**±1 %** of **range**
Setting	Hystersis	**1%** (of input range) to input range
	Hold off	**0 s** to **500 s**
	Slope	**Rise** or **fall**
	Hardwired pre-divider	From **1** to **255**
Time resolution		**> 160 ns** (0.06° at 1kHz and 1.2 ° at 20kHz)
Pulse rate	Max	**375k pulse/s**
Coupling	**AC**	Cut-off frequency 0.35 Hz ±10% (analog filter)
	DC	
Impedance		**1 MΩ**, < 100 pF
Protection	on any external sync[ii]	**±60 V peak** without damage

Optional parametric (DC) inputs

The following parametric inputs can be added to the OR35 hardware configuration 1 set of 4 parametric inputs with connector on the back plane.

These parametric inputs provide automatic calibration at each range modification including analyzer power-up.

Sampling	Frequencies	**12.5 samples/s** (50 Hz rejection) **15 samples/s** (60 Hz rejection) Independent from dynamic sampling clock
	Converters	One **16 bit sigma-delta ADC** for each input
Range (peak)	With amplifier (included)	**±150 mV, ±300 mV, ±625 mV, ±1.25 V, ±2.5 V, ±5 V**
	Direct	**±10 V**
Frequencies rejection	Selectable notch filters for	**50 Hz** (78 dB rejection) **60 Hz** (78 dB rejection)
Amplitude	Resolution	**16 bit**
	Linearity	**0.003 %** of input range peak
	Gain drift	**10 ppm** of input range peak/**°C** typ.
Offset	Offset	< ±**1 mV** (after auto calibration)
	Offset drift	**6 µV/°C** typ.
Impedance		**1 MΩ, 5 nF** typ.
Protection	On any input[ii]	**±60 V** peak
Input Noise	With 50 Ω terminators	
	Input noise	**< 1 mV** rms
	Max. deviation	**< 1 mV** peak

Satellite I/O

The following digital I/Os are included in the Satellite version of the SmartRouter with connector on the back plane.

Type	Inputs	**Open collector**
	Outputs	**Open collector**
Voltages	Standard	**±28 V**
	Absolute maximum rating	**±30 V**
Current	Peak	**< 500 mA**

Digital computation

The following table details the optional DSP modules that can be added to OR35 hardware to fit analysis mode calculation needs.

SPUs

SPU (Signal Processing Units): the following table gives the characteristics of each analysis mode and the associated SPU consumption. For multi-analysis purpose, add the corresponding SPUs of each mode used simultaneously and increase the sum by 10%. "Real-time" means that the analysis speed is faster than the input rate and does not miss any sample.

FFT	Real-time FFT analysis with;
	401 lines (for 801, 1601,3201, 6401 lines multiply requested SPU respectively by 1.25,1.5, 2, 3)
	20 kHz bandwidth (Requested SPU are proportional to bandwidth)
	0% overlap
	1 channel processing = **1 SPU**
1/n Octave	Real-time filter based 1/n octave analysis with:
	1/3rd octave resolution (for 1/12th and 1/24th octave multiply SPU respectively by 2 and 4)
	20 kHz bandwidth (Requested SPU are proportional to bandwidth)
	1 channel processing = **3 SPU**
Order analysis	Real-time order spectrum analysis (re-sampled time signal) with:
	Max order / order resolution = **800**
	Max RPM x Max order = **1 200 000** (requested SPU is proportional to max RPM)
	1 channel processing = **3 SPU**
Recorder	Gap free recording with:
	51.2 kHz sampling rate
	1 channel processing = **1 SPU**

Computation DSPs modules

Type	Sample size	**32 bit floating**
	Computation words	**32/40 bits**
	Memory	**4 MSamples**
Power	Computation capability	**12 SPU / DSP module**

Computation DSP module / OR34 & OR35 unit

Minimum	**1** Computation DSP module	**12 SPU**
OR34 Max.	**1** Computation DSP modules	**12 SPU**
OR35 Max.	**2** Computation DSP modules	**24 SPU**

Notes

The above specifications describe all the guaranteed capacities and performances of the instrument and are applicable to an OR34-4 or OR35-8 hardware, powered for more than 15 minutes, at a stabilized room temperature of 23°C ±5°C and calibrated since less than one year.

The adapted control software NVGate® is described separately.

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[i] Prepared for future use: the related specifications or options are in development.

[ii] Exceeding absolute maximum ratings damages the system and voids guarantee.

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.

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