

Instrument Specifications

O4

4 Channels USB Compact Analyzer



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General description

The following specifications concern the O4 USB compact analyzer. O4 consists of a 4 channels instrument controlled by a PC running the NVGate software for real-time analysis.

Modules

The following tables detail the complete capacity of O4 hardware. Optional or standard modules may fill the described slots.

Front-end	Dynamic analog inputs	4 inputs (BNC)
	Dynamic analog outputs	1 output (mini Lemo), delivered with mini-Lemo to BNC adaptor
	External syncs.	2 trigger/tachometer inputs (BNC)

Case

Mechanicals

Weight	534 g (1.17 lb)	
Dimensions	Overall (L.W.H.)	185 mm x 110 mm x 35 mm (7.3 in x 4.3 in. x 1.4 in)

Power supply

Power	< 8 W	
From PC	Port format	Port 1, USB-3
	USB-PD 3.0 technology compliant	5 V
From main	Voltage	Port 2, AC to USB-PD 3.0 tech compliant
	Power	< 8 W
USB Port	USB-C x 2	Port 1 for data and supply, Port 2 for supply only

PC requirements

Minimum	1 GB ¹ of RAM / 250 MB free on HD + storage for measurements and signals / 1024 x 768 display	
Recommended	Quad core processor (e.g.: Intel Core i5) / 6 GB of RAM / GPU / 1920 x 1080 display / 1 GB free on SSD + storage for signals	
Connections	USB 3.0 for data & Power > 7 watts	
Operating systems	Windows 10 / Windows 11 / MS Office: 32 bits only	

Environmental / Compliance with standards

CE	Indicates compliance with:	EMC Directive 2014/30/EU
EMC	IEC 61326-1:2013	Electrical equipment for measurement, control and laboratory use - EMC requirements
Materials	ROHS	2011/65/EU
	WEEE	2012/19/EU
Humidity	Max 93 % RH at 40°C non-condensing	

¹) Waterfall depth depends on available memory.

Temperature	Operating	0 °C to 40 °C (32 °F to 104 °F)
	Storage	-20 °C to 65 °C (-4 °F to 149 °F)
	Absolute maximum rating	-35 °C to 70 °C (-31 °F to 158 °F)
Shocks & bump	Operating	40 g (6 ms, ½ sine, 3 chocks, all axes, IEC 60068-2-27)
		60 g (3 ms, ½ sine, 3 chocks, all axes, IEC 60068-2-27)
	Storage	40 g (6 ms, ½ sine, 1k shocks, IEC 60068-2-29) 60 g (11 ms sawtooth, 3 shocks 3 axes MIL-STD-810F 516.5)
Vibrations	Operating	2.5 g (sine, 15-500 Hz, all axes, IEC 60068-2-6)
		5 mm (sine, 5-15 Hz, all axes, IEC 60068-2-6)
		7.7 grms (random, 20-2k Hz, 30 min, MIL-STD-810F 514.5)
Altitude	Operating, non-tested above	≤ 2000 m (6562 feet)
Enclosure		IP 40

Front-end

Dynamic inputs

Sampling	Sampling frequencies (Additional decimators allow analysis bandwidth down to 0.8 Hz)	256 kHz, 204.8 kHz, 131.072 kHz, 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	$0.5 \cdot 10^{-4}$ (typical $1 \cdot 10^{-5}$)
	Synchronization	All inputs synchronized on the same sampling clock
Anti-aliasing filter	Type	Over-sampled digital filters
	Slope	> 400 dB/octave
	Pass band ripple	< ± 0.005 dB
	Rejection of parasites bands	> 100 dB (@ frequency > 0.57 x FS)
	Effective bandwidth	0.45 x FS (ex: 23.4 kHz @ 51.2 kS/s)
Range (peak)	With amplifier (included)	±100 mV, ±300 mV, ±1 V
	Direct	±10 V
	With attenuator (included)	±40 V
Absolute accuracy	Resolution	24 bits (144 dB)
	All input ranges at 1 kHz	±0.05 dB (typical ±0.015 dB)
	Temperature variability	< 0.002 dB / 10 °C
DC offset	±100 mV, ±300 mV and ±1V ranges	< ± 100 µV
	±10 V range	< ± 1 mV
	±40 V range	< ± 2 mV
Frequency flatness and phase response²	±10 V range, DC to 20 kHz	< ±0.02 dB / < ±0.02 °
	±10 V range, 20 kHz to 40 kHz	< ±0.05 dB / < ±0.05 °
	±10 V range, 40 kHz to 100 kHz	< ±0.05 dB / < ±0.08 °
	±0.3 V, ±1 V ranges, DC - 20 kHz	< ±0.02 dB / < ±0.1 °
	±0.3 V, ±1 V ranges, 20 kHz - 100 kHz	< ±0.05 dB / < ±0.2 °
	±0.1 V range, DC to 20 kHz	< ±0.02 dB / < ±0.4 °
	±0.1 V range, 20 kHz to 40 kHz	< ±0.1 dB / < ±0.6 °
	±0.1 V range, 40 kHz to 100 kHz	< ±0.15 dB / < ±0.8 °
	±40 V range, DC - 20 kHz	< ±0.1 dB / < ±0.4 °
	±40 V range, 20 kHz - 40 kHz	< ±0.1 dB / < ±0.6 °
±40 V range, 40 kHz - 100 kHz	< ±0.15 dB / < ±0.8 °	
Cross-talk	<i>Between N (N is odd) and N+1 inputs:</i>	
	@ 1 kHz: < -120 dB, @ 20 kHz: < -96 dB, @ 40 kHz: < -90 dB	
	<i>Between any inputs excluding: N (N is odd) and N+1 inputs:</i>	
@ 1 kHz: < -140 dB, @ 20 kHz: < -114 dB, @ 40 kHz: < -108 dB		

²) Includes channel to channel match with different ranges

Signal to noise ratio	<i>With 50 Ω terminators:</i>	
	±10 V range, 100 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	<i>With 50 Ω terminators:</i>	
	±100 mV range	20 kHz BW < 3.5 μV rms, 80 kHz BW < 5 μV rms, 100 kHz BW < 6 μV rms
Impedance		1 MΩ ±1 %, < 100 pF
Protection	Overvoltage	±60 V peak without damage - On any input [†]
Dynamic	Spectral domain	> 140 dB ³
Coupling	AC	Cut-off frequency 1.13 Hz ±10% (analog filter)
	DC	
	ICP	2 mA or 4 mA power supply with AC coupling (±10%)
	ICP + TEDS	ICP + reverse current on TEDS reading operations
	GND	Shortcut to ground - Automatic current limitation to 50 mA
Floating	Coupling	AC or DC / All ranges / Overall voltage < ±40 V
TEDS	Standards	IEEE 1451.4 2001 revision 1
	Supported templates	Accelerometer/Force meter (25) Microphones (27, 28 and 29)

Dynamic outputs

Sampling	Converters	One 24 bit 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 variability	< 0.1 dB / 10 °C
Frequency response	<i>Variation relative to 0 dB @ 1kHz</i>	
	All ranges, at 10 kHz	< ±0.05 dB
	All ranges, at 20 kHz	< ±0.15 dB
	All ranges, at 40 kHz	< ±0.8 dB
	All ranges, at 80 kHz	< ±2 dB
	All ranges, at 100 kHz	< ±3 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, 100 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
	1 V range, 100 kHz bandwidth	-90 dB of full scale, spurious lines < -107 dB of full scale
Impedance	User selectable	50 Ω or Grounded
Current	Max	±10 mA
Protection	Sum of injected + generated voltages	±15 V peak, On any output [†] Permanent short circuit supported
Total harmonic distortion	THD @ 1 kHz	< 0.002% or -94dB at 20 kHz BW
	THD @ 5 kHz	< 0.005% or -86dB at 20 kHz BW
Cross-talk	Output 0 dBV to 50 Ω terminated input	Lower than measurable noise

³) 25601 lines / 30 sec. averaging

External sync

Sampling	Frequencies	128 times over-sampling of the current input sampling (up to 32.8 MHz)
	Converters	High speed voltage comparator and time counter
Range (peak)	Direct	± 300 mV, ± 1 V, ± 3 V, ± 10 V, ± 40 V
threshold	Amplitude precision	± 1 % of range
Setting	Hysteresis	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 $\pm 10\%$ (analog filter)
	DC	
Impedance		1 M Ω , < 100 pF
Protection	on any external sync ⁱ	± 60 V peak without damage

Notes

The above specifications describe all the guaranteed capacities and performances of the instrument and are applicable to an O4 hardware, powered through USB port, 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.

ⁱ Exceeding absolute maximum ratings damages the system and voids guarantee.

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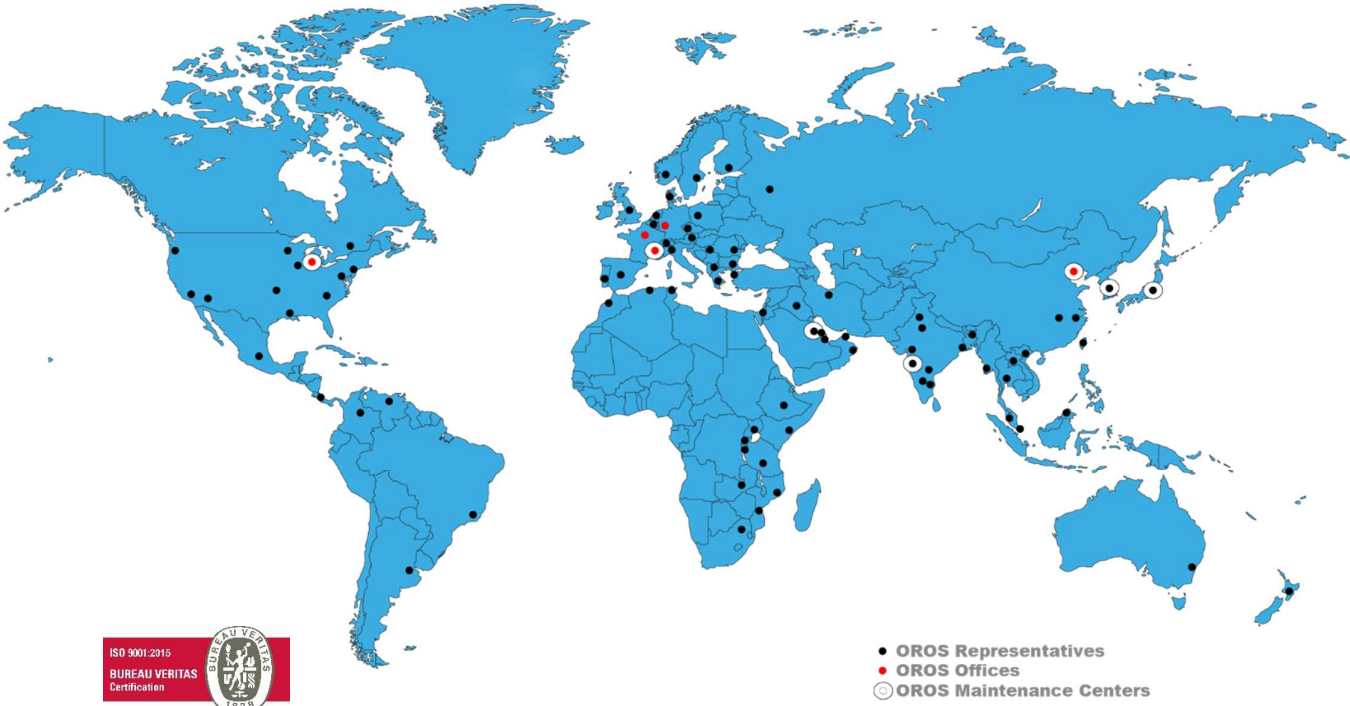
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