



OR36/38

4 to 32 Channel
Multi-analyzers / Recorders

Instrument Specifications

► GENERAL DESCRIPTION

The following specifications concern OR36 & OR38 multi-analyzers/recorders. These systems consists in 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 OR36 & OR38 hardware system. Optional or standard modules may fill the described slots.

OR36

Font end slots	Dynamic analog inputs:	4 slots of 4 inputs (BNC or LEMO)
	Dynamic analog outputs:	1 slot of 2 outputs (BNC)
	Externals sync:	1 slot of 2 trigger/tachometer inputs (BNC)
	Auxiliary:	2 slots of 2 input/output for optional outputs, Ext. sync or DC (parametric) inputs (BNC)
Auxiliary slots	1 slot for: TEDSi, LEMO polarization, CAN bus interfacei, digital I/Oi)	
Processor slots	PC interface:	1 slot of 1 DSP (Ethernet)
	Disc management:	1 slot of 1 DSP
	Trigger / tachometer / monitoring:	1 slot of 1 DSP
	Processing power:	4 slots of 1 DSP
Miscellaneous	Internal Hard drive:	1 disc of 40 Gbytes
	Remote control:	1 RS232 cable connection (DB9)

OR38

Font end slots	Dynamic analog inputs:	4 slots of 8 inputs (BNC or LEMO)
	Dynamic analog outputs:	1 slot of 2 outputs (BNC)
	Externals sync:	1 slot of 2 trigger/tachometer inputs (BNC)
	Auxiliary:	2 slots of 2 input/output for optional outputs or Ext. sync or DC (parametric) inputs (BNC)
Auxiliary slots	1 slot for: TEDSi, LEMO power supply, CAN bus interfacei, digital I/Oi)	
Processor slots	PC interface:	1 slot of 1 DSP (Ethernet)
	Disc management:	1 slot of 1 DSP
	Trigger / tachometer / monitoring:	1 slot of 1 DSP
	Processing power:	8 slots of 1 DSP
Miscellaneous	Internal Hard drive:	1 disc of 40 Gbytes
	Remote control:	1 RS232 cable connection (DB9)

• Basic hardware configuration

Hardware unit contains at least the following modules. All the other modules are optional.

OR36

Font end	4 analog inputs, 2 analog outputs, 2 trigger/tachometer inputs
Processors	1 Ethernet DSP module for PC interface.
	1 disc DSP module for disc management.
	1 master DSP module for Trigger / tachometer / monitoring.
	1 computation DSP module for recorder operation.
Miscellaneous	1 disc of 40 Gbytes

OR38

Font end	8 analog inputs, 2 analog outputs, 2 trigger/tachometer inputs
Processors	1 Ethernet DSP module for PC interface.
	1 disc DSP module for disc management.
	1 master DSP module for Trigger / tachometer / monitoring.
	1 computation DSP module for recorder operation.
Miscellaneous	1 disc of 40 Gbytes

- **PC requirement**

Minimum	Pentium III / 700MHz / 64 Mbytes of RAM / 8 Mbytes video card with 3D video processor / 50 Mbytes free on HD, CD ROM drive, 1024 x 768 display (XGA), directX 3.0
Recommended (For laptop)	Pentium IV / 1.7 GHz / 256 Mbytes of RAM / 32 Mbytes video card with 3D video processor / 100 Mbytes free on HD, CD ROM drive, 1280 x 1024 display (SXGA), directX 8.0
Recommended (For desktop)	Pentium IV / 2.2 GHz / 512 Mbytes of RAM / 64 Mbytes video card with 3D video processor / 100 Mbytes free on HD, CD ROM drive, 1600 x 1200 display (UXGA), directX 8.0
Connection	Type: Ethernet 100base TX , 100Mbps/s Connector: RJ45
Operating system	Windows 2000 Service pack 4 (recommended), Windows 98 SE , Windows XP Pro

► **CASE**

- **Mechanicals**

OR36

Weight	5.2 kg (11.5 lbs)
Dimensions	Case (w.h.d): 102 mm x 260 mm x 311 mm (4.16 in x 10.27 in x 12.24 in)
	Overall: (w.h.d) 114 mm x 280 mm x 350 mm (4.48 in x 11.03 in x 13.78 in)

OR38

Weight	8.2 kg (18 lbs)
Dimensions	Case (w.h.d): 102 mm x 364 mm x 311 mm (4.16 in x 14.33 in x 12.24 in)
	Overall: (w.h.d) 114 mm x 410 mm x 350 mm (4.48 in x 16.14 in x 13.78 in)

- **Power supply**

OR36

Power	< 60 VA
External AC Power supply	Voltage: 100 to 240 VAC
	Frequency: 47 to 63 Hz
DC	Range: 10 V to 28 V
	Overload protection: 31V (over this voltage DC poles are short-circuited)
Battery	Type: NiMh (no memory effect)
	Autonomy: 30 min (1h for systems with 4ch. & 1 computation DSP)
	Charge time: 2h (typical)

OR38

Power	< 100 VA
Internal AC Power supply	Voltage: 85-132 VAC and 170-265 VAC (auto selectable)
	Frequency: 47 to 63 Hz
	Complies with EN61000-3-2 class D
DC	Range: 10 V to 28 V
	Overload protection: 31V (over this voltage DC poles are short-circuited)
Battery	Type: NiMh (no memory effect)
	Autonomy: 20 min (1h for systems with 8ch. & 2 computation DSPs)
	Charge time: 2h (typical)

- Environmental / Compliance with standard**

CE	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 Cat.:	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 61326-1:	Electrical equipment for measurement control and laboratory use EMC requirements.
	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.
Temperature	OR36 Operating:	0°C to 50°C (32 °F to 122°F)
	OR38 Operating:	0°C to 45°C (32 °F to 113°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	80 % RH at 40°C non condensing	
Shock	Complies with IEC 68-2-7	
	Operating:	10 g (11 ms, ½ sine) and 70 g (3 ms, ½ sine)
	Disc operation:	10 g (11 ms, ½ sine) and 70 g (3 ms, ½ sine)
	Storage:	20 g (11 ms, ½ sine) and 100 g (3 ms, ½ sine)
	Absolute maximum rating ⁱⁱ :	100 g (3 ms, ½ sine)
Vibration	Complies with IEC 68-2-6	
	Operating:	1 g, 5-500 Hz
	Disc operation:	0.5 g, 5-500 Hz
	Storage:	2.5 g, 5-500 Hz
	Absolute maximum rating ⁱⁱ :	3 g, 5-500 Hz
Enclosure	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:	> 400dB/octave
	Pass band ripple:	< 0.003 dB
	Rejection of parasites bands:	> 110dB (@ frequency > 0.57 x FS)
	Effective bandwidth:	0.43 x FS (ex: 23.2 kHz @ 51.2kS/s)
Range (peak)	With amplifier (included):	±17.5 mV, ±31.6 mV, ±60 mV, ±100 mV, ±175 mV, ±316 mV, ±600 mV, ±1V, ±1.75V, ±3.16V, ±6V
	Direct:	±10V
	With attenuator (included):	±20 V, ±40V
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
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	20V and 40 V ranges, 0 to 10 kHz:	± 0.1 dB / ±0.5°
	20V and 40 V ranges, 10 to 40 kHz:	± 0.2 dB / ±2 °
	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:	20nV/√Hz
	17.5 mV range:	20 kHz BW < 3 μVrms , 40 kHz BW: < 4.2 μVrms
	100 mV range:	20 kHz BW < 3 μVrms , 40 kHz BW: < 4.2 μVrms
	1 V range:	20 kHz BW < 5.4 μVrms , 40 kHz BW: < 8.5 μVrms
	10V range:	20 kHz BW < 44 μVrms , 40 kHz BW: < 70 μVrms
Impedance		1 MO ±1%, < 100 pF
Coupling	AC	Cut-off frequency 0.35 Hz ±10% (analog filter)
	DC	
	ICP	4 mA power supply with AC or DC coupling
	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 [†] :	± 60 Vpeak without damage
Dynamic	Spectral domain:	> 120 dB (typical > 130 dB)

- **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:	10⁻⁵ to 10³
Absolute accuracy	Resolution:	24 bit (144 dB)
	All output ranges at 1 kHz:	± 0.05 dB
	Temperature variability:	< 0.1 dB / 10°C
Frequency response	Variation relative to 0dB at 1kHz	
	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	User selectable	50 Ω, 600 Ω or Grounded
Current	Max	± 10mA
Protection	Sum of injected + generated voltages	±15 V peak , On any outputs ⁱⁱ Permanent short circuit supported
Total harmonic distortion	THD @ 1 kHz:	< 0.002% or -94dB
	THD @ 5 kHz:	< 0.005% or -86dB
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, ±40 V
Resolution	Amplitude accuracy	±1% of range
Setting	Hysteresis:	1% (of input range) to input range
	Hold off:	0 sec to 500 sec
	Slope:	Rise or fall
	Pre-divider:	1 to 64
Time resolution		> 160 ns (0.06° at 1kHz and 1.2° at 20kHz)
Coupling	AC	Cut-off frequency 0.35 Hz ±10% (analog filter)
	DC	
Impedance		1 MO, < 100 pF
Protection	on any external syn [Ⓔ]	±60 V peak without damage

- **Optional parametric (DC) inputs**

The following parametric inputs can be added to the standard OR36 or OR38 hardware configuration as follows:

- On **auxiliary slot** by set of 2 inputs (max 4)
- On **OR36** as replacement of 4 dynamics inputs (max 12)
- On **OR38** as replacement of 8 dynamics inputs (max 24).

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

Sampling	Frequencies:	12,5 samples/seconds (50Hz rejection) 15 samples/seconds (60Hz 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, ±2.5V, ±5V
	Direct	±10V
Frequencies rejection	Selectable notch filters for:	50 Hz (78 dB rejection) 60 Hz (78 dB rejection)
Amplitude	Resolution:	16 bits
	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 MO, 5 nF typ.
Protection	On any inputs ⁱⁱ :	±60 V peak
Input Noise	With 50 Ω terminators:	
	Input noise	< 1 mVrms
	Max. deviation	< 1 mV peak

► DIGITAL COMPUTATION

The following table details the optional DSP modules that you can add to OR36 & OR38 hardware to fit your analysis mode calculation needs.

- **SPUs**

SPU (Signal Processing Units): the following table gives the characteristics of each analysis mode and the associated SPU consumption.

“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 requires 1 SPU
1/n Octave	Real-time filter based 1/n octave analysis with: 1/3rd octave (for 1/12 th and 1/24 th octave multiply requested SPU respectively by 2 and 4) 20 kHz bandwidth (Requested SPU are proportional to bandwidth) 1 channel processing requires 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 requires 3 SPU
Recorder	Gap free recording with: 51.2 kHz sampling rate 1 channel processing requires 0.75 SPU

- **Special DSPs modules**

The following DSPs are always integrated in OR36 & OR38 hardware.

Master DSP module	Monitor computations:	FFT 401 lines (max 4 Channels)
	Time domain detector:	DC, Max, Min, RMS, Kurtosis (on the monitor Channels)
	Events:	Threshold detections, combinations
Disc DSP module	File management	
	Time compression of raw data for file overview.	
	Sample compression:	32 or 16 bit (user selectable)
Ethernet DSP module	PC connection	
	Stand-alone operation management	

- **Computation DSPs modules**

The following computation DSP modules are optional.

Type	Sample size:	32 bit floating
	Computation words:	32/40 bit
	Memory:	4 MSample
Power	12 SPU / DSP module	
Input sharing	Inputs per DSP:	8 max

- **Computation DSP module / OR36 & OR38 unit**

Minimum	1 Computation DSP module:	12 SPU
OR36 Max.	4 Computation DSP modules:	48 SPU
OR38 Max.	8 Computation DSP modules:	96 SPU

► **NOTES**

The previous specifications describe all the guaranteed capacities and performances of the instrument and are applicable to an OR36-16 or OR38-32 hardware powered for more than 15 minutes at a stabilized room temperature of 25°C ± 5°C and calibrated since less than one year.

The adapted control software NVGate® is described separately.

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

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