



grael 4K psg:eeeg

High-Definition PSG:EEG

Over 20 years of experience in designing PSG and EEG amplifiers, including the highly successful E-Series, has culminated in **Grael HD**. This is our most technologically advanced amplifier yet, and the world's first High-Definition PSG amplifier, *now in 4K*.

Technical specifications



DIMENSIONS

Grael System Component	Size L x W x H	Weight
Amplifier	240mm x 144mm x 50mm 9.45in x 5.66in x 1.97in	700 grams 24.7 ounces

NETWORK

POE (power over Ethernet)

NETWORK CONNECTION

Drop in cradle for quick disconnect

ANALOGUE TO DIGITAL CONVERTER

24 bit resolution

DATA SAVE RATE

256, 512, 1024, 2048, 4096 sps

SAMPLE RATE

16384 sps

CHANNEL SKEW

Negligible (ADC per channel)

PATIENT CONNECTIONS

CF as per IEC60601-1

SAFETY

IEC60601-1, IEC60601-2-26

EMC

IEC60601-1-2

COMMUNICATION INTERFACE

Network Type 802.3/802.3u twisted pair
Ethernet with auto
MDIX; RJ45 connector

32 REFERENTIAL CHANNELS

Range $\pm 150, \pm 300, \pm 600, \pm 1500\text{mV}$ (resolution $< 50\text{nV}$)
Frequency response DC to 1150 Hz (user adjustable)
Input impedance $> 100\text{M}$
CMRR $> 100\text{dB}$
Noise (0.1 to 70Hz) $2\mu\text{Vpp}$ typical

16 DIFFERENTIAL CHANNELS

Range $\pm 150, \pm 300, \pm 600, \pm 1500\text{mV}$ (resolution $< 50\text{nV}$)
Frequency response DC to 1150 Hz (user adjustable)
Input impedance $> 20\text{M}$
CMRR $> 100\text{dB}$
Noise (0.1 to 70Hz) $2\mu\text{Vpp}$ typical

RESPIRATORY

IMPEDANCE PLETHYSMOGRAPHY

Channel Derived from ECG electrodes
Frequency response DC to 6 Hz

2 RESPIRATORY INDUCTIVE PLETHYSMOGRAPHY CHANNELS

Sensor Inductive band
Frequency response DC to 64 Hz

PRESSURE

Range $\pm 100\text{cmH}_2\text{O}$
Frequency response DC to 1150 Hz (user adjustable)
Accuracy $\pm 1\text{cmH}_2\text{O}$ at 25°C

AIRFLOW

Differential input 2 male luer
Range $\pm 12\text{cmH}_2\text{O}$
Frequency response DC to 1150 Hz (user adjustable)
Accuracy $\pm 0.6\text{cmH}_2\text{O}$ at 25°C

POSITION

Sensor Tri-axial accelerometer
Positions Supine, prone, left, right, upright

MICROPHONE

Sensor Electret
Frequency response 5 to 1150 Hz (user adjustable)

LIGHT

Sensor Integrated

OXIMETER

SPO₂ range 25 to 100%
Heart rate range 18 to 300 pulses per minute
SPO₂ accuracy 70 – 100% ± 2.5 digits within 1 standard deviation

Heart rate accuracy $\pm 1\%$ ± 1 digit

Sample rate

(SPO₂, HR, status) 1 sample per second, up sampled to match the other channels

Sample rate

(plethysmograph) 256 samples per second, up sampled to match the other channels

ENVIRONMENTAL REQUIREMENTS

Temperature Ambient operating temperature range: $0^\circ\text{C} - 40^\circ\text{C}$ ($32^\circ\text{F} - 104^\circ\text{F}$)
Storage temperature range: $-10^\circ\text{C} - 50^\circ\text{C}$ ($-4^\circ\text{F} - 122^\circ\text{F}$)

Humidity

20% - 90%-relative humidity

(non-condensing)

Altitude

Less than 3,000m

ELECTRICAL SPECIFICATIONS

Power Supply All power provided by the network connection using Power Over Ethernet (either mid-span injector or POE Switch, per IEEE 802.3af standard)

Operating voltage 48 volts

Power consumption < 10 watts

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