



Grael HD EEG



Grael Jackbox

# grael<sup>®</sup>4K HD EEG

## High-Definition EEG

A DC-coupled, digital amplifier system with a high input range and 24-bit resolution providing amplification and digitization of electroencephalographic physiologic signals from surface, cortical and depth electrodes. The amplifier provides 40 channels (32 isolated high-frequency referential channels, 8 bipolar channels), an integrated pulse-oximeter and event button input. The unit has a POE 100BASE-TX network connection for both power and communication.

# Technical specifications

|                         |  |
|-------------------------|--|
| <b>INPUTS</b>           | 32, DC-coupled, fully isolated, referential (monopolar);<br>8 user-defined, DC-coupled, fully isolated, bipolar inputs |
| <b>INPUT IMPEDANCE</b>  | >100 M $\Omega$ 1-32;<br>>20 M $\Omega$ 33-40  |
| <b>BIAS CURRENT</b>     | typically 1nA  |
| <b>INPUT NOISE</b>      | < 2 $\mu$ Vpp typical (referential ch)   |
| <b>INPUT RANGE</b>      | 300mVpp, 600mVpp, 1200mVpp, 3000mVpp<br>user selectable  |
| <b>CMRR</b>             | > 100dB  |
| <b>CROSSTALK</b>        | <- 60dB to adjacent channels FSR   |
| <b>HIGH PASS FILTER</b> | DC coupled on all channels   |
| <b>LOW PASS FILTER</b>  | (3dB):<br>71 Hz at 256 s/s<br>143 Hz at 512 s/s<br>284 Hz at 1024 s/s<br>580 Hz at 2048 s/s<br>1150 Hz at 4096 s/s     |
| <b>NOTCH FILTER</b>     | Software based display filtering of 50Hz, 60Hz, or off   |

## ISOLATION SPECIFICATIONS

Complies with IEC 60601-1 CF patient Inputs

## ANALOGUE TO DIGITAL CONVERTER

24 bit resolution

## SAMPLE AND DATA RATES CHANNELS 1 TO 40

Data sampled at 16384 samples per second and decimated to data rates shown below. Actual data rate sent is determined by controlling PC software application.

**Output data rate** 4096, 2048, 1024, 512 or 256 samples per second

## COMMUNICATION INTERFACE

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

## OXIMETER

**SPO<sub>2</sub> range** 25 to 100%

**Heart rate range** 35 to 300 pulses per minute

**SPO<sub>2</sub> accuracy** 70 – 100%  $\pm$ 2.5 digits within 1 standard deviation

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

**Sample rate (SPO<sub>2</sub>, 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

## EVENT BUTTON CHANNEL x 1

## DIMENSIONS

| Grael EEG System Component | Size L x W x H                                    | Weight                   |
|----------------------------|---|--------------------------|
| <b>Amplifier</b>           | 240mm x 144mm x 50mm<br>9.45in x 5.66in x 1.97in  | 700 grams<br>24.7 ounces |
| <b>Jackbox</b>             | 200mm x 83.1mm x 49mm<br>7.87in x 3.27in x 1.92in | 250 grams<br>8.81 ounces |

## ENVIRONMENTAL REQUIREMENTS

**Temperature** Ambient operating temperature range:  
0°C - 40°C (32°F - 104°F)

Storage temperature range:  
-10°C - 50°C (-4°F - 122°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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