

## Technical Specifications

### General Specifications

#### Isolated Power Supply

110/115 or 230 VAC  $\pm$  10% input, 50 - 60 Hz

595 VA primary; 500 VA secondary

Output voltage = input voltage

#### Dimensions

Unibody cart approx. .... 119 H x 53 W x 76 D cm (47" x 21" x 30")

Weight..... Unibody cart approx. 68kg (150 lbs.) (depending on model of printer)

#### Operating Environment (in use)

Temperature.....15.6 to 32.2° C, (60 to 90° F)

Relative humidity.....20-80%, non-condensing

Altitude..... 0-3km, (0-10,000 ft)

#### Non-Operating Environment (in storage)

Temperature.....17.7 to 55° C, (0 to 132° F)

Relative humidity ..... 10-90%, non-condensing

Altitude..... 0-12km, (0-40,000 ft)

### Computer

The Nicolet Clinical EEG system operates with a desktop computer. Please contact your Natus representative for the latest computer specifications.

### Printout

HP DeskJet printer (black, white, and color)

### Network

10/100/1000 Mb Ethernet (standard)

HL7 compatible through NicVue Connect interface

### EEG software (with v32/v44 Amplifier)

#### EEG Display

Sec/Page..... 2, 5, 10, 20, 30, 60, 120, 240, 300, 600, 1200

mm/Sec.....6, 8, 10, 15, 30, 60, 120, 240

Sensitivity..... 10, 20, 30, 50, 70, 100, 150, 200, 300, 500, 700, 1000, 2000, 5000  $\mu$ V/cm  
1, 2, 3, 5, 7, 10, 15, 20, 30, 50, 70, 100, 200, 500  $\mu$ V/mm

#### High Filters

Off, 10, 15, 25, 30, 35, 40, 50, 60, 70, 100, 150, 200, 300, 500, 1000, 1500 Hz

#### Low Filters

Off, 0.053, 0.16, 0.3, 0.5, 1, 1.6, 2, 3, 5 Hz

0.2, 0.33, 0.5, 0.625, 1, 2, 3.3, 6.2, 18.9 seconds

Notch Filter .....Off, 50/60 Hz



### v32 Amplifier

Analog/Digital Converter ..... 16 bits

ADC Resolution Voltage ..... = 0.153  $\mu$ V

DC Offset Tolerance.....  $\pm$  340 mV

Channels (Inputs) .... 32 EEG, configurable as bipolar AC (24-32), 1 configurable as DC (32)

Maximum Input Range .....  $\pm$  5 mV

Bandwidth ..... 0.053 - 500 Hz

Noise..... < 1.5 $\mu$ V pk-pk @ 0.1 - 100 Hz

Input Impedance ..... > 100 M $\Omega$  (common mode)

CMRR at Patient Inputs.....> 115 dB @ 50 – 60 Hz, with active patient ground connected

Channel Crosstalk ..... < -40 dB

Amplifier Sample Rate (under software control) ..... 125, 250, 500, 1000, 2000

Calibration ..... Square wave, 1, 5, 10, 20 sec period, 10, 50, 100, 1000  $\mu$ V amplitude

Input Bias Current..... < 5 nA

Anti-Aliasing Filter Cut Off Frequency ..... 500 Hz

Differential Input Impedance ..... 40 M $\Omega$

Interface to Amplifier ..... Ethernet

Built-in Impedance and Display

Headbox..... Optional; no impedance display

#### Additional Ports

- Isolated SpO<sub>2</sub> with X-Pod
- Photoc output
- Isolated patient event button

Channel Hardware Gain.....410

Deblock.....Yes

#### Auxiliary Inputs

1 Hi-level, non-isolated input for connection of external devices (e.g. CO2 monitors, etc.)

Analog/Digital Converter ..... 16 bits

Maximum Input Range .....  $\pm$  2.5V

ADC Resolution.....76.3  $\mu$ V

Bandwidth ..... DC – 500 Hz

## v44 Amplifier

### System Configurations

Sleep, EEG, ICU monitoring and LTM

OR and non-OR applications

Cart mount and wall mount options

Analog/Digital Converter .....	16 bits
ADC Resolution Voltage .....	= 0.153 $\mu$ V
DC Offset Tolerance .....	$\pm$ 900 mV
Channels (AC Inputs) .....	32 EEG, (9 configurable as bipolar (24-32) AC) 12 non-isolated DC inputs ( $\pm$ 5 V, BW = 100 Hz)
Maximum Input Range .....	$\pm$ 5 mV
Bandwidth .....	0.053 - 500 Hz
Noise .....	< 1.5 $\mu$ V p-p @ 0.1 - 100 Hz (except channels 31, 32 and OR channels < 2 $\mu$ V p-p @ 0.1 - 100 Hz)
Input Impedance .....	> 100 M $\Omega$ (common mode)
CMRR at Patient Inputs .....	> 115 dB @ 50 – 60 Hz, with active patient ground connected (except channels 31, 32 and OR channels > 100 dB @ 50-60 Hz with RLD)
Channel Crosstalk .....	< -40 dB
Amplifier Sample Rate (under software control) .....	125, 250, 500, 1000, 2000
Calibration .....	Square wave, 1, 5, 10, 20 sec period, 10, 50, 100, 1000 $\mu$ V amplitude
Input Bias Current .....	< 5 nA
Anti-Aliasing Filter Cut Off Frequency .....	500 Hz
Differential Input Impedance .....	40 M $\Omega$
Interface to Amplifier .....	Ethernet
Channel Hardware Gain .....	410
Deblock .....	Yes

### Integrated SpO<sub>2</sub>

#### Channels (DC Inputs): 12 non-isolated

- Analog/Digital converter: 16 bits
- Maximum input range:  $\pm$  5V
- ADC resolution: 153  $\mu$ V
- Bandwidth: DC – 100 Hz

### Additional Ports

- Panasonic camera control port on amplifier
- Isolated SpO<sub>2</sub>
- Isolated patient event button
- Photoc output

### Headboxes

v44 requires one of the following:

- Clinical headbox with built in impedance and display
- Clinical headbox with head cap adapter and built in impedance and display
- OR headbox

## Interfaces with the Nicolet Ambulatory Module.

See Nicolet Ambulatory EEG Specifications Sheet #169-435300.

## Quality Standards

Manufactured, designed, developed and marketed under ISO 13485 certified quality system

## Compliance/Regulatory Standards

Designed, tested, manufactured and certified to meet the following domestic (USA), Canadian, European and International Standards:

UL 60601-1 Medical Electrical Safety Standard (USA)

CAN/CSA-C22.2 no. 601.1-M90 Medical Electrical Safety Standard (Canada)

EN/IEC 60601-1 Medical Electrical Safety of Medical Equipment (International and Europe)

IEC 60601-2-26 Particular Safety of electroencephalographs equipment

IEC 60601-2-40 Particular Safety of electromyography and evoked response equipment

EN 60601-1-2 Collateral safety standard for EMC

### European Community (CE Mark)

Medical Device Directive (MDD) product certified to comply to EC Directive 93/42/EEC

Patient Isolation ..... BF



### Natus Neurology Incorporated

3150 Pleasant View Road

Middleton, WI 53562 USA

Tel: 1-800-356-0007

1-608-829-8500

Fax: 1-608-829-8709

www.natus.com

Specifications subject to change without notice.

©2016 Natus Medical Incorporated. All Rights Reserved. All product names appearing on this document are trademarks or registered trademarks owned, licensed to, promoted or distributed by Natus Medical Incorporated, its subsidiaries or affiliates.



## A common software platform for EEG, Sleep and research studies

### What's new in NeuroWorks

- Advanced Trending
- Physiological Monitoring Integration
- Support for new LTM data management
- Improved display of annotations and navigation to regions of interest across a set of studies
- Windows® 10 compatibility
- Support for Quantum on-board memory and Nicolet Cortical Stimulator integrations
- Support for new cutting-edge Brain Monitor
- Frequency Analysis Tool
- Addition of Full HD (1080p) video

The Natus NeuroWorks platform simplifies the process of collecting, monitoring and managing data for routine EEG testing, long-term monitoring (LTM), ICU monitoring, ambulatory and Sleep studies. NeuroWorks systems are scalable to meet the needs of private practice clinics, hospitals and large teaching facilities.

#### Intuitive clinical experience

- Multiple Spike & Event analyzer options
- Fully synchronized HD video
- Monitoring options for home ambulatory studies
- Scalable remote access with Citrix provisioning
- Powerful qEEG trending

#### Streamlined workflow

- Easy data searching with a variety of customizable parameters
- Automated settings synchronization across networked NeuroWorks stations
- Convenient import and export with EDF/EDF+
- Data sharing in multi-site environments

#### Time-saving administrator functions

- Ease of setup using IP streaming cameras and amplifiers
- Powerful enterprise level SQL database
- Automated discovery of amplifiers and cameras using DHCP

## NeuroWorks configures to your network and security needs

### Robust Security Features

- HIPAA requirements via dedicated XLSecurity layer
- Role-based security access to features and studies
- Automated power recovery
- Microsoft® BitLocker™ drive encryption support

### Advanced IT Capabilities

- Bi-directional HL7 integration with HIS/EMR
- Citrix® and VMWare® Ready partner – the most powerful infrastructure to facilitate collaboration



## A cutting-edge, single solution for EEG and Sleep Studies

### Advanced software for clinical excellence

- EEG/Sleep combo software package
- User customizable personal workspaces
- Software Development Kit for direct data access for research
- Data-Stream Wizard with two data streams for efficient clinical and research workflow\*

### Reliable and flexible hardware options

- Patient wearable compact and lightweight amplifiers
- Range of EEG amplifiers with 32- to 256- channels, plus differential and DC channel options
- Wireless amplifier options for long-term monitoring
- Range of sampling rates from 200 Hz to 16 kHz
- Perform EEG recordings in DC mode\*\*
- Advanced Digital Trigger Input (up to 256 trigger values)\*\*

## A family of amplifiers to meet your needs



**NEW!** Natus Quantum



EMU40EX



**NEW!** Natus Brain Monitor



Trex HD Monitoring



Nicolet® v32



Nicolet® v44



EEG32U



Trex HD

To learn more about Natus products contact your local distributor or sales representative.

US Customers Call: **1-800-356-0007**

International Customers Call: **+1-608-829-8500**

\*Only available with Quantum

\*\*Only available with Quantum and Natus Brain Monitor

## Making sense of the body's signals

©2023 Natus Medical Incorporated. All Rights Reserved. All product names appearing on this document are trademarks or registered trademarks owned, licensed to, promoted or distributed by Natus Medical Incorporated, its subsidiaries or affiliates. **013148 RevH1**

**natus**

Natus Medical Incorporated

[natus.com](http://natus.com)





High-quality EEG in a  
dependable system

# Natus® NeuroWorks® Routine EEG Solutions

## EEG solutions

A powerful solution, rich with dynamic features that provide the tools you need in any environment – EEG lab, operating room, emergency room, private practice clinic, outpatient or EEG service provider.

**Reliable performance** – Exceptional signal quality with high sample rates and HD video

**Setup flexibility** – True TCP/IP amplifiers and cameras with DHCP support plug and play anywhere on the network

**Enhanced patient mobility and comfort** – Small, lightweight patient-wearable amplifiers

**Security & HIPAA compliance** – XLSecurity role-based HIPAA compliance package with Active Directory integration and encryption

## Natus NeuroWorks software

Industry leading software with an extensive and flexible feature set for a variety of environments

**Leading-edge software that provides an intuitive clinical experience**

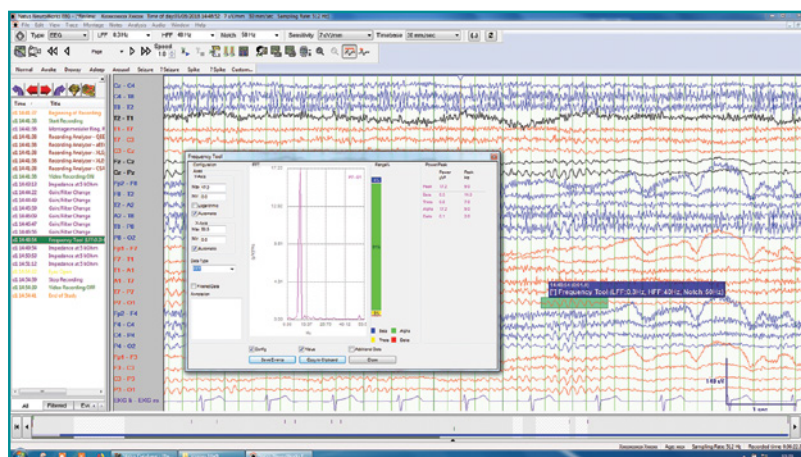
- Windows® 10 compatible
- Multiple spike and event analysis options, plus many additional Advanced Trending options
- Automated data recovery while operating the Bovie/Electrocautery in the Operating Room
- Fully synchronized, easy to set up, Full HD (1080p) TCP/IP PTZ network cameras
- Data sharing in multi-site environments

**Security and peace of mind for IT professionals and clinicians working together**

- XLSecurity Layer with role-based security package and drive encryption
- Searchable and powerful enterprise level SQL server distributed database
- Bi-directional HL7 integration with HIS/EMR

**Time-saving administrator functions**

- Easy setup using IP streaming cameras and amplifiers
- Automated discovery of amplifiers and cameras
- Automated settings synchronization across networked NeuroWorks stations



## Frequency Analysis Tool

- Drag the area of interest
- Quickly identify frequency, amplitude and power for selected data
- Display percent for each frequency range



## Natus cybersecurity program

Proactively addressing cybersecurity as an integral part of our design process

- Secure handling of confidential information generated or maintained by our hardware and software
- Continuous evaluation of our products against identified threats and vulnerabilities
- Monitoring of feedback channels to manage security events in the field

# Natus NeuroWorks EEG hardware

Durable, reliable, high-quality amplifiers for dependable data acquisition



EEG32U

Simple to use amplifier designed for routine EEG studies

- 32-channel amplifier
- Up to 1024 Hz sampling rate
- On-board impedance check
- 10-20 head stamp with impedance LEDs
- Only one standard USB cable from PC to amplifier for data and power transmission



Natus Brain Monitor\*

Versatile amplifier expandable for different testing options

- 64 referential, 16 DC channels
- 4 kHz sampling rate
- Integrated pulse oximeter
- Touchscreen display on base unit with real time interaction with ongoing studies
- Visual impedance checking and adding notes
- Perform bio-calibrations from the patient bedside

\*requires NeuroWorks 9.0 or higher



Natus LED Photostimulator

- Eliminates acoustic and electrical interference
- Customized photic sequences
- Easy to start or stop photic series

# Natus® NeuroWorks® Routine EEG Solutions

## Data security

Set up individual user or group access and permissions for the system and within the application. Assign separate lock-down rules for different computers on the same network. Access Audit Logs to review user activity on the system. Security is integrated with Microsoft® Active Directory and peace of mind is enhanced with system encryption.

## EEG Supplies solutions

### Convenient, complete, trusted

Natus supports the full spectrum of EEG care, providing a complete portfolio of EEG supplies for a seamless solution.

- Dedicated and knowledgeable customer support
- Streamlined order processing
- Convenient online ordering (US Customers only)

**Natus Medical Store – [natusmedicalstore.com](http://natusmedicalstore.com)**



## Service

At Natus, we strive for excellence in customer and technical service.

### Here's how we can help:

- Accessible and effective Technical Support
- Definitive technical documentation and knowledgeable installation teams
- Optional extended warranty and service coverage programs
- Comprehensive, flexible customer training courses

## Making sense of the body's signals

©2023 Natus Medical Incorporated. All Rights Reserved. All product names appearing on this document are trademarks or registered trademarks owned, licensed to, promoted or distributed by Natus Medical Incorporated, its subsidiaries or affiliates. 024991 Rev04



To learn more about Natus products contact your local distributor or sales representative.

US Customers Call:

**1-800-356-0007**

International Customers Call:

**+1-608-829-8500**

**natus®**

Natus Medical Incorporated

[natus.com](http://natus.com)