

Product data

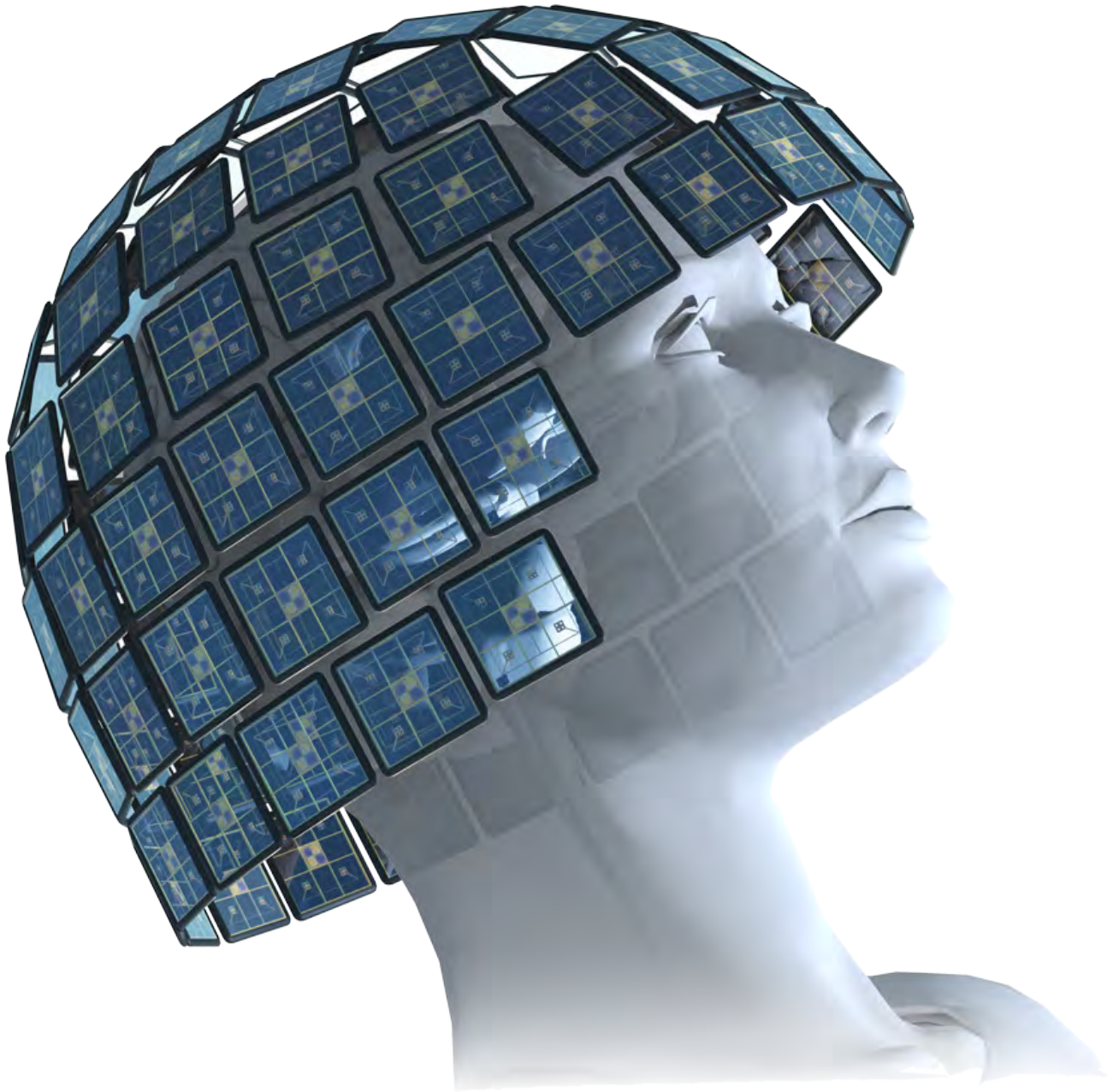


TRIUX™ *neo*

TRIUX™ neo

TRIUX™ neo (art. no. NM26000N) is a comprehensive bioelectromagnetic measurement system for functional brain studies:

- 306-channel neuromagnetometer, which optimally combines both planar gradiometers as well as magnetometers
- Ultra-resilient ARMOR™ sensor technology with instant recovery from magnetic interference
- Enhanced, low-noise ARMOR™ electronics with improved frequency response
- Uniquely effective interference elimination technologies with unparalleled robustness even in the presence of intense, nearby sources of interference
- Utmost flexibility in tailoring the system for the particular clinical and/or research needs thanks to a wide range of options
- Ground-breaking zero helium boil-off technology



Technical specifications

Sensor array

State-of-the-art ARMOR™ sensor array featuring densest spatial sampling and lowest intrinsic noise in the industry. For the first time, the SQUID sensor recovers instantly from even the harshest of magnetic fields, does not trap flux, and offers a remarkable improvement of signal quality. The ARMOR™ sensor requires virtually no tuning.

- Whole-head sensor array with realistic helmet shape
- 1,220 cm² sensor coverage
- 102 high-precision triple-sensor elements
- 204 planar gradiometers
- 102 magnetometers
- 35 mm average distance between each sensor element
- 20 mm effective channel separation
- 17.0 mm base length (planar gradiometers)
- <0.1 % geometrical imbalance
- ±20 nT dynamic range
- 18 mm average distance between pick-up coils and room temperature surface
- Typical intrinsic system noise levels:

Sensor type	White noise
Gradiometer	2.8 fT/cm/√Hz
Magnetometer	3.0 fT/√Hz

- <0.1 % residual crosstalk between sensors (corrected)

Data acquisition

Low-noise ARMOR™ electronics capture even the highest-frequency brain signals without compromising signal quality:

- Up to 474 simultaneously sampled channels
- 306 MEG channels
- Up to 128 EEG channels
- 12 bipolar analog input channels for physiological signals
- 12 auxiliary analog input channels (±10 V)
- 16 trigger (TTL) channels
- 1–5 kHz sampling rate, configurable by the user
- 24-bit output
- 2.0 fT/cm least significant bit (gradiometer channels)

- 2.5 fT least significant bit (magnetometer channels)
- MEG high-pass filter cutoff frequencies: DC–10 Hz
- EEG high-pass filter cutoff frequencies: DC, 0.03, 0.1, and 10 Hz

Internal active shielding

The internal active shielding system provides additional protection against ambient magnetic fields without additional weight or size by using the regular sensor array as a zero indicator and compensation coils placed inside the magnetically shielded room to deliver a cancellation field for attenuating the interference.

- Attenuations:

Frequency	Attenuation
0.01 Hz	20 dB
0.1 Hz	20 dB
1 Hz	20 dB
10 Hz	10 dB
100 Hz	6 dB

Interference elimination

Proprietary, uniquely effective interference elimination provided by MaxFilter™ and signal space projection technologies allow suppression of spatial and spatiotemporal interferences:

- Online signal space projection (SSP) for adaptive elimination of external interferences with up to 40 dB attenuation
- MaxFilter™ technology for offline spatial suppression of interferences with up to 40 dB attenuation for frequencies up to 100 Hz
- MaxFilter™ technology for offline spatiotemporal elimination of even intense artifacts from distant and nearby sources with up to 130 dB attenuation
- Automatic offline detection and exclusion of defective channels

Gantry

Motorized gantry with integrated connectors for auxiliary electrodes and stimuli:

- Reclined measurement position (60° recline)
- Upright measurement position (68° recline)
- Supine measurement position (0°)
- Dedicated helium recycling position

- Button-operated electric lifting motor
- Safety locking latch
- Integrated connectors for EEG and auxiliary channels
- Automatic detection of gantry position
- Weight (empty): 450 kg (992 lb)
- Dimensions (upright): 950 x 1,660 x 2,220 mm (37.4 x 65.4 x 87.4 in)
- Dimensions (supine): 950 x 1,340 x 1,990 mm (37.4 x 52.8 x 78.3 in)

Cryogenics and helium recycling

Cryogenics featuring zero helium boil-off technology and fastest stabilization after change of measurement position:

- 78-liter (20.6 gal) liquid helium dewar
- <50 l/year (<13.2 gal/year) helium loss rate (excluding loss during possible maintenance breaks)
- 365-day refill interval (excluding possible maintenance breaks)
- Minimum 35 hours/week available measurement time
- <48-hour warm up-cool down cycle
- Safety exhaust line to an outdoor vent
- Automatic scheduling and monitoring of helium recycling and cryogenic system
- Liquid helium transfer siphon
- Liquid helium gauge for storage dewars
- Helium transfer accessories

See NM25211B for more details.

Head phantom

Precision-engineered head phantom with both current and magnetic dipoles for verification of localization accuracy:

- 32 current dipoles
- 4 magnetic dipoles
- 89 mm (3.5 in) radius
- Guaranteed localization accuracy (aggregate): ≤ 5.0 mm (≤ 0.2 in)
- Typical localization accuracy (aggregate): ≤ 2.0 mm (≤ 0.08 in) for current dipoles

Co-registration

Landmark-based co-registration of patient's anatomy with magnetic resonance images:

- Co-registration using anatomical landmarks
- Digitization of additional surface points for visual verification

Acquisition workstation

Powerful workstation for data acquisition and post-processing of measurements:

- High-end graphical workstation
- Linux operating system
- Wide-screen monitor
- Real-time visualization of raw data for user-selected channels
- Recording of raw data
- Programmable stimulation sequences and timing
- Online averaging of 1–32 categories
- Automatic rejection of signal epochs containing artifacts
- Visualization of online averages
- Noise level monitoring
- Automatic and manual noise optimization
- Loadable acquisition presets
- Post-acquisition interference elimination

Operating environment

Required operating environment within the magnetically shielded room:

- Air temperature: 20–28 °C (68–82 °F)
- Minimum air flow: 30 l/s (8 gal/s)
- Relative humidity: 40–70 %

Required operating environment within the equipment and operator area:

- Air temperature: 20–24 °C (68–75 °F)
- Relative humidity: 40–70 % (non-condensing)

Power

Requires both single-phase and three-phase power:

- Single-phase input voltage: 100, 115, 200, 220, 230, or 240 V (47–63 Hz)
- Three-phase input voltage: 200 V (50/60 Hz), 380–415 V (50 Hz), or 480 V (60 Hz)
- Single-phase power consumption: 4,200 W (average)
- Three-phase power consumption: 4,700 W (average)

Built-to-order options

32-channel EEG

Art. no. NM25983N

Integrated EEG subsystem with 32 channels:

- 32 unipolar EEG channels
- $<0.4 \mu\text{Vrms}$ (0.5–100 Hz) noise at 10 k Ω impedance
- 100 M Ω input impedance at DC
- Software-controllable gain for individual channels (640, 2,000, or 20,000)
- 100 dB common-mode rejection ratio (with active ground)
- Fixed analog high-pass filters: 0 Hz (DC), 0.03 Hz, 0.1 Hz, and 10 Hz

64-channel EEG

Art. no. NM25984N

Integrated EEG subsystem with 64 channels:

- 64 unipolar EEG channels
- $<0.4 \mu\text{Vrms}$ (0.5–100 Hz) noise at 10 k Ω impedance
- 100 M Ω input impedance at DC
- Software-controllable gain for individual channels (640, 2,000, or 20,000)
- 100 dB common-mode rejection ratio (with active ground)
- Fixed analog high-pass filters: 0 Hz (DC), 0.03 Hz, 0.1 Hz, and 10 Hz

128-channel EEG

Art. no. NM25985N

Integrated EEG subsystem with 128 channels:

- 128 unipolar EEG channels
- $<0.4 \mu\text{Vrms}$ (0.5–100 Hz) noise at 10 k Ω impedance
- 100 M Ω input impedance at DC
- Software-controllable gain for individual channels (640, 2,000, or 20,000)
- 100 dB common-mode rejection ratio (with active ground)
- Fixed analog high-pass filters: 0 Hz (DC), 0.03 Hz, 0.1 Hz, and 10 Hz





Patient positioning

Patient couch

Art. no. NM25906N

Roll-away patient couch on wheels:

- Moveable upper bed
- Transparent, removable side guards
- Safety belt
- Detachable head support
- Weight: 75 kg (165 lb)
- Dimensions: 2,220 x 740 x 760 mm (87.4 x 29.1 x 29.9 in)
- Maximum load: 135 kg (298 lb)

Patient chair

Art. no. NM25910N

Roll-away patient chair on wheels:

- Adjustable height
- 2 removable table plates, non-slip table top (separate washable silicon mat)
- Weight: 80 kg (176 lb)
- Dimensions: 1,988 (with handle) x 650 x 784 mm (78.3 x 25.6 x 30.9 in)
- Maximum load: 135 kg (298 lb)

Chair fine-adjustment system*

Art. no. NM25912N

System for fine-adjusting horizontal position and back-rest recline of the patient chair:

- Non-magnetic operating console attached to the gantry
 - Operating levers for smooth and consistent adjustments
 - Horizontal movement system on the floor
 - Console dimensions: 346 x 208 x 653 mm (13.6 x 8.2 x 25.7 in)
 - Requires the patient chair (NM25910N)
- * Patents pending

Pediatric comfort set

Art. no. NM25744N

Non-magnetic chair cushioning for pediatric patients and research participants:

- Set of cushions: 2 seats, 2 pairs of armrests, and 2 saddle pieces
- Adjustable footrests
- Requires the patient chair (NM25910N)



Accessories

High-fidelity visual stimulator

Art. no. NM24034N

High-fidelity video projection system:

- Native 16:9 three-panel DLP video projector
- Symmetric black-to-white and white-to-black transition time
- 26 ms delay from trigger presentation
- <1 ms jitter (frame-to-frame) at 60 Hz refresh rate
- 1,400 x 1,050 pixel native resolution
- 16-bit color depth
- 24–120 Hz refresh rate
- 112 cm (44 in diagonal) standalone back-projection screen on wheels

Auditory stimulator

Art. no. NM24035N

Stereophonic auditory stimulus delivery system:

- Non-magnetic tubal-insert earphone set
- Independent delivery of auditory stimuli to each ear
- >80 dB sound pressure level (SPL)
- >60 dB channel separation
- <1 ms jitter between trigger and stimulus onset
- 50 disposable foam ear tips

Somatosensory stimulator

Art. no. NM21709N

Somatosensory stimulus delivery system:

- One electric somatosensory stimulator with controllable amplitude
- 0–99.9 mA output current
- 50, 100, 200, 500, 1,000, or 2,000 ms pulse duration
- Triggered via the acquisition workstation or from within the stimulus presentation workstation

Response device

Art. no. NM20999N

Non-magnetic, single-finger optical response pad:

- Finger-press mode
- Finger-lift mode
- Trigger output
- <1 ms delay between response and recorded event

Video monitoring system

Art. no. NM21712N

CCTV video monitoring system:

- CCTV video camera
- Monitor
- Mouse
- Cabling

Bidirectional intercom system

Art. no. NM21632N

Bidirectional intercom system for two-way communication between the patient, operator, and nurse:

- Intercom system with half-duplex and simplex modes
- Microphone
- Cabling

Acquisition system UPS

Art. no. NM24062N

Uninterruptible power supply unit for maintaining the data acquisition system operational during power outage or voltage fluctuation:

- 3,000 VA uninterruptible power supply for the data acquisition electronics
- Cabling

Workstation UPS

Art. no. NM24063N

Uninterruptible power supply unit for maintaining a workstation operational during power outage or voltage fluctuation:

- 1,000 VA uninterruptible power supply for a single workstation and peripherals
- Cabling

Consumables

Head position coils

- Head position coil set with five coils in a ready-to-use assembly (art. no. NM23880N)

32-channel EEG caps

- Small (size 46–52 cm) 32-channel EEG cap (art. no. NM23905N)
- Medium (size 52–58 cm) 32-channel EEG cap (art. no. NM23906N)
- Large (size 58–64 cm) 32-channel EEG cap (art. no. NM23907N)

64-channel EEG caps

- Small (size 46–52 cm) 64-channel EEG cap (art. no. NM23890N)
- Medium (size 52–58 cm) 64-channel EEG cap (art. no. NM23891N)
- Large (size 58–64 cm) 64-channel EEG cap (art. no. NM23892N)

128-channel EEG caps

- Medium (size 52–58 cm) 128-channel EEG cap (art. no. NM23895N)
- Large (size 58–64 cm) 128-channel EEG cap (art. no. NM23896N)

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