Natus® UltraPro S100

Technical Specifications

System Overview

The Natus UltraPro S100 System with Natus Elite software powered by Viking or Synergy is intended for the acquisition, display, analysis, reporting and management of electrophysiological information from the human nervous and muscular system during routine clinical electromyography (EMG), nerve conduction studies (NCS) and evoked potential (EP) testing.

General Description

The UltraPro S100 system utilizes a base unit with a built-in control panel, an amplifier, a laptop computer and system software. The base unit contains integrated speakers, the electrical stimulator probe and connections for optional peripheral devices.

The UltraPro S100 Base Unit

Control Panel

Ergonomically designed control panel optimizes operation, reduces learning time and maximizes patient interaction.

Integrated Stimulator

The electrical stimulator is integrated in the base unit.

Dual Audio Speakers

Built-in speakers provide output of live signals.

Computer Interface

The base unit is connected through a single USB (2.0) connection to the computer.

Trigger Input/Output

The base unit has one trigger input and one trigger output for connection to external devices.

Digital Signal Processing

A powerful built-in Digital Signal Processor (DSP) provides advanced signal processing functionality such as signal filtering and sound optimization.

Computer

The UltraPro S100 operates on a laptop computer. Please contact your Natus representative for the latest computer specifications that are shipped with the system.

Recommended Specifications

Intel® i5 gen3 or greater, RAM-4GB or greater, SATA 7400 or SSD or SSD/Hybrid, Wide Aspect Display 1600x900 or greater, running Microsoft® Windows® 10 64-bit (for Bitlocker encryption).

Amplifiers

Amplifier

3- and 4-channel amplifiers, each channel includes its own 1.5 mm touch-proof DIN connector.

4-channel amplifier includes software controlled interconnection of the reference inputs, and convenient controls for impedance measurements and speaker.

Input Impedance, Balanced ..... >200 MΩ
Input Impedance, Common Mode ..... >1,000 MΩ/25 pF
Noise Level ..... typical (RMS) 0.4 µV (2 Hz – 10 kHz) shorted Input
Isolation Mode Rejection ..... >160 dB
Common Mode Rejection Ratio ..... ≥124 dB

Analog to Digital Converter

Amplifier utilizes a 24-bit Analog to Digital Converter (ADC) with 48 kHz sampling rate per channel.

Disconnect/Reconnect

Restoring the connection to the amplifier will automatically bring the system back to running condition without any need for additional user intervention.

Electrode Impedance Measurement

The amplifier has built-in impedance measurement capability measuring the impedance at 220 Hz with a range from 1 kΩ to 1,000 kΩ.

Sensitivity

Hardware gain can be adjusted from 10 nV/division to 100 mV/division (21 steps).

Filters

High Frequency ..... 30 Hz – 20 kHz (14 steps)
Low Frequency ..... 0.2 Hz – 5 kHz (19 Steps)
ADC Resolution 24-bit
Sampling Rate ..... 48 kHz per amplifier

Acquisition

Sweep speed ..... 0.1 ms/div – 5 s/div (24 steps)

Electrical Stimulator Probes

Two electrical stimulator probes are available: the Advanced Stimulus Probe and the RS10 Comfort Probe. The electrical stimulator probes are small and lightweight, and are designed for maximum comfort. Ergonomically designed handles allow for a comfortable grip even when examining difficult to reach sites. The probe head tips are rounded to optimize contact while minimizing discomfort.

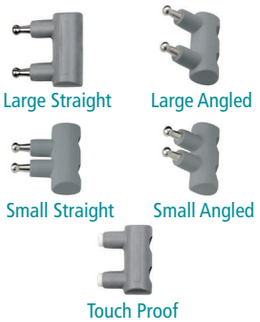
Advanced Stimulus Probe

The Advanced Stimulus Probe provides multiple controls and programmable buttons for fast and convenient patient-side operation. Controls include stimulus intensity, stimulus activation, single/recurrent stimulation, reverse anode and cathode, next site and next test. Three convenient quick-connect probe heads are available including an adult straight and angled probe head and a pediatric angled probe head. The probe head may be removed for access to touchproof connectors for use with supplies such as ring or bar electrodes.

Adult Straight Adult Angled Pediatric Angled

RS10 Comfort Probe

The RS10 Comfort Probe heads are available in five sizes: two large probe heads and two small probe heads both in a straight and angled version. A probe head with touchproof connectors may be used with external electrodes. The probe cable is partially coiled to allow for an extended reach.



Large Straight Large Angled
Small Straight Small Angled
Touch Proof

RS 10 Comfort Probe

Stimulus Intensity

Stimulus output is constant-current mode delivering, 0 – 100 mA stimulus into a 4 kΩ load. The stimulus intensity is continuously adjustable with a user definable maximum level. The stimulus intensity can be adjusted with a resolution of 0.02 to 0.4 mA. The stimulus intensity can be adjusted either from the control panel or directly from the stimulator probe (if applicable). The stimulus intensity is stored for each trace.

Stimulus Duration

The stimulus duration can be adjusted within 0.05 – 1 ms.

Stimulus Modes

The stimulus can be set to either monophasic or biphasic stimulation using Single, Double (Pair), or Train.

Stimulus Rate

The stimulus rate can be set to non-recurrent or recurrent stimulation. The stimulus rate can be varied between 0.2 – 200 stimuli per second (Hz).

Safety Isolation ..... The electrical stimulator outputs are Type BF
Maximum mean power ..... 0.5 W

Auditory Stimulator (Optional)

Auditory stimulator options and functionality may vary between different test types.

Stimulus Type

The stimulus type can be selected between Click, Tone Pip and Tone Burst.

Stimulus Intensity

The stimulus intensity range is 0 to 139 dB pSPL (132 dB peSPL) +/- 1 dB, depending on stimulus type, stimulus frequency and transducer type. The maximum masking noise level is 99 dB pSPL.
The stimulus increment steps can be selected in 1 dB increments.
Stimulus intensity can also be set relative to the examined patient's hearing threshold.

Stimulus Polarity

The stimulus polarity can be set to: Condensation, Rarefaction, or Alternating.

Stimulus Rate

The stimulus rate can be set between: 0.2 – 200 stimuli per second (Hz). The stimulus rate may vary depending on the stimulation type, duration and actual transducer used due to calibration settings.

Click Stimuli

The Click duration can be set to 0.05 or 0.1 ms.

Tone Stimuli

The tone stimuli type can be set to either Pip or Burst. The tone frequency can be set to 125, 250, 500, 750, 1K, 1.5K, 2K, 3K, 4K, 6K, 8K (Hz). The tone envelope can be set to Linear, Gaussian, Hanning, or Blackman.
Pip 1 to 999 cycles up to 1 s duration, in steps of 1 cycle (maximum value depends on frequency)

Bursts Plateau ..... 4 – 2,000 ms in steps of 1 ms
Bursts Rise/Fall ..... 0 – 100 ms in steps of 1 ms
Masking Types ..... White Noise, HP Noise, Notched Noise
Masking Intensity ..... +10 dB to -50 dB relative to stimulus
Presentation ..... Binaural, Ipsilateral, Contralateral

Transducers

Following transducers can be used: DDR45 Headphones (non-shielded), Tubal Insert Phones (TIPs).

Visual Stimulator (Optional)

Pattern Types

Checkerboard, Horizontal Gratings (Bars), or Vertical Gratings (Bars)

Pattern Sizes

8 x 8, 16 x 16, 32 x 32, 64 x 64, 128 x 128

Pattern Field Screen Format

Full, Left Half, Right Half, Right Upper Quadrant, Right Lower Quadrant, Left Upper Quadrant, Left Lower Quadrant

Stimulus Types

Onset/Offset, Reversal

Fixation Target Options

Off (None), + (Option 1), X (Option 2), >< (Option 3), or [ ] (Option 4)

LED Goggles (Optional)

LED goggles are connected with a single 15' (4.6 m) cable to the dedicated LED goggle connector located on the UltraPro S100 base unit.

LED Stimulus

The goggles consist of high efficiency red LEDs (635 nm) in 4 x 4 array in each eyepiece. The flash rate can be set between 0.2 – 200 Hz with a duration of 1 ms.

Software

Operating System

The UltraPro S100 ships with Microsoft Windows 10 64-bit (BitLocker encryption compatible).

Workflow Efficiencies

UltraPro S100 optimizes test workflow with preset protocols using recognized standards, automatic data store, single button switch side and auto compare operation, and automated markers. Data analysis and reporting efficiencies are achieved with AANEM or customized reference values with highlighted user-defined results, unlimited report configurations, fast-select comments, and selectable diagnostic summaries. Patient data management is optimized with customized filters for appointments, visit status, physician, technologist, review requirements, and quick hide of patient lists for patient confidentiality. Improved screen readability is provided with automated font sizing when adjusting window sizing/position and large font size options for all tool bars and screen text.

EMG Capabilities

Natus continues its EMG leadership providing*:

- Single and Multi-channel EMG
- Quantitative analysis inclusive of Single MUP, Multi-MUP, Turns & Amplitude, Expert's Quantitative Interference Pattern
- Single Fiber Volitional & Stimulation EMG with peak and level-based analysis
- Macro EMG & Fiber Density
- Tremor Analysis
- Dual timebase for viewing EMG waveforms

EMG features also include operations critical to the physician including continuous live data presented in oscilloscope mode, 48 kHz sampling rate for routine EMG LivePlay data for up to 960 seconds, and convenient speaker control and mute functions.

NCS Routine and Advanced Testing

UltraPro S100 provides 4800 points per trace saved in routine motor and sensory nerve conduction studies providing superior resolution for latency, velocity measurements. Implementation of the Signal Enhancer algorithm reduces stimulus artifact. Test options include Motor Nerve Conduction (MNC), Sensory Nerve Conduction (SNC), Combined Sensory Index, Combined Motor and Sensory Nerve Conduction, Inching Studies, Reference Help, F-Wave, H-Reflex, Blink Reflex, Repetitive Nerve Stimulation, Sympathetic Skin Response, and Heart Rate Variation. Advanced test options include Combined Motor and Sensory NCS, Conduction Velocity Distribution, Triple Stimulation and Central Conduction Time, Motor Unit Number Index: CMAP Scan and Multiple Point stimulation.

Software continued on next page

* Some features are not available in all markets

Evoked Potential Flexibility

Maximum flexibility for SEP, VEP and AEP testing. The Fsp Quality Measure provides an objective indicator of signal data quality and can be set to automatically stop once specified quality level is achieved. Multiple averaging techniques optimize the averaging results including mean, exponential, median, rectified, and weighted mean. Stored data can be reanalyzed, digitally filtered, smoothed, inverted, summed, and displayed as trends, in plots and frequency analysis.

Additional Software Features

Reference Help inclusive of pictures & values, Producer Software with creation of picture and video files, monitor trace, enhanced roll back/roll forward for multi-channel recordings, offline averaging, signal enhancer, control of artifact reject by channel, EMG quality meter, replicate and average, smooth, post-acquisition filtering, automatic stimulation at time intervals. Live Play Software for instant playback of EMG Signals, Long Trace Display for extended review and analysis.

Report Generation Options

- Generate On-line or Snapshot Reports using MS Word
- Reports update automatically with the unique On-line Reporting
- Document numerical data, reference values, waveforms, graphs, and comments
- Highlight normal and abnormal findings
- Use AutoText templates to insert predefined text
- Include images/results from other procedures e.g. ultrasound
- Exclude tests and change order of tests within the report
- Export report to a server/computer in DOCX or PDF format
- Use multi-screen snapshot and screen print options

Networking & HIS/EMR Integration

The UltraPro S100 uses an integrated database with user defined patient demographics and visit information, which can be set up as a stand-alone or networked system. The UltraPro S100 supports full networking functionality for multiple acquisition stations and reader/review stations, storing to a central server, including one button PDF (report for EMR sync) basic transfer to a server. The UltraPro S100 supports Active Directory for management of multiple user accounts. Network database is compatible with the following Microsoft servers:

Windows Server: 2012, 2016, 2019

Microsoft SQL Server: 2012, 2014, 2016, 2017, 2019

Networking software is available to manage multi-modality patient data and Hospital Information System (HIS/EMR) integration via an HL7 interface. The HL7 – HIS/EMR interface provides the ability to manage and finalize a Patient Visit in the local HIS/EMR using the UltraPro S100.

HL7 Gateway Support:

Windows Server: 2012, 2016

Microsoft SQL Server: 2014, 2016

Physical Dimensions

Main Unit (WxDxH) ..... 396 x 348 x 79 mm (15.6 x 13.7 x 3.1 in)

Weight Main Unit ..... 3.5 kg (7.72 lb)

UltraPro UB3 Cart Dimensions

Cart (WxDxH) ..... 53 x 81 x 81/96.5 to handle cm
(21 x 32 x 32/38 to handle in)

Base Weight ..... 38 kg (84 lb)

Patient Safety

Isolation between mains and patient-applied parts > 4 kV
Complies with IEC/EN 60601-1 type BF Specifications

Environmental Limits

Operating (in use)

Temperature ..... 59.0 to 91.4° F (15.0 to 33.0° C)

Relative Humidity ..... 20% – 80%, (non-condensing)

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

Storage/Transport

Temperature ..... 0 to 132° F (-17.7 to 55.5° C)

Relative Humidity ..... 20% – 90%, (non-condensing)

Altitude ..... 0 – 35000 ft (0 – 10668 m)

Atmospheric Pressure ..... 23 kPa – 101 kPa

Quality Standards

Manufactured, designed, developed and marketed under ISO 13485 Certified Quality System.

Safety Standards

Designed, tested, manufactured and certified to meet:

IEC 60601-1:2012 (Ed3.1) General Requirements for Basic Safety and Essential Performance

IEC 60601-2-40:2016 Particular Requirements for Safety of electromyographs and evoked response equipment

IEC 60601-1-2:2014 (Ed4) Collateral Standard: Electromagnetic disturbances (EMC)

Healthcare solutions with one thing in mind. You.

natus®

Natus Medical Incorporated

natus.com