

물 품 규 격 서

- ☐ 입찰공고번호 : (학)일송학원 관리국 제2025-165호
- ☐ 입찰건명 : 재활의학과(근전도실) EMG/EP System 구매
- ☐ 수요기관 : 한림대학교 동탄성심병원
- ☐ 납품장소 : 수요기관 희망장소 입고도
- ☐ 물품내역 등

연번	품명(영문, 국문)	규격 및 사양	총 구매예정 수량 (Q'TY)	1회 최대 발주 수량	Warranty 기간	단위 (Unit)
1	EMG/EP System (근전도/유발전위검사기)	하단 참조	1	1	검수(합격)일로부터 3년 종료월 말일까지	SET

☐ 공통사항

- 장비의 설치와 작동 및 교육은 무상으로 제공한다.
- 수요기관 담당자 입회하에 계약상대자는 제품의 설치 테스트 및 시험작동을 실시하여야 한다.
- 무상 하자담보 책임기간은 물품 검수(합격)일로부터 3년 종료월 말일 까지를 기본 원칙으로 하며 계약상대자의 추가 제안에 따라 3년을 초과하여 설정할 수 있다.
- 무상 하자담보 책임기간 중 수요기관의 사정으로 인하여 부서 및 장비의 위치가 불가피하게 이동을 필요로 할 경우 설명 및 설치가 무상으로 이루어진다.
- 무상 하자담보 책임기간 중 중 공급된 장비의 부속품이 단종된 경우 수요기관이 인정하는 동등 이상의 장비로 무상 교체가 이루어져야 한다.
- 계약상대자는 어떠한 상황에서도 애프터서비스를 위하여 전문서비스 인력을 제공하여야 하며 애프터서비스를 위하여 교체 부품을 보관하여야 한다.
- 계약상대자는 장비 납품 시 납품일을 기준하여 제품 제조년월이 6개월 이내인 장비를 납품하고 납품장비에 해당 제조년월이 명시되어야 한다.

<규격 · 사양 A>

A. Features

1. The flexible amplifier configuration ranging from 2 channels up to 5 channels.
2. The amplifier supports 22 input connectors available on the amplifier.
3. Two trigger inputs and trigger outputs paired with a very flexible triggering.
4. External analysis systems can be connected to the live continuous data using either digital data or analog outputs.
5. Report ; On-Line Report, highly customizable for numerical results, waveforms, left/right side comparisons, highlighted results if outside the reference range.
6. Producer ; Capture images as well as videos of the acquisition screen and can be exported and placed into training material, presentations, or procedure documentation.
7. Test configuration wizard ; Easily creates and changes test protocols.
8. Electrical stimulator probes ; Optimized to reach all test sites, Interchangeable probe heads and control buttons on probe for start/stop stimulus, change stimulus intensity, duration, and polarity, move to next site.

B. Specifications

1. General Specification ;

- 1) Power source ; 220 - 240V, 50/ 60Hz

2. Computer ; (or better)

- 1) Processor ; Intel i5
- 2) Hard Drive : 500 GB
- 3) RAM ; 4 GB
- 4) Display Resolution ; Minimum of 1024 X 768 pixels

3. Base Unit

- 1) Integrated Stimulators ; Two electrical stimulators, one auditory stimulator and one visual LED stimulator are integrated in the base unit.
- 2) Audio Speaker ; Built-in audio speaker available for output of both live signals as well as playback of recorded data
- 3) Computer Interface ; USB (2.0) connection to the computer. also contains an USB hub.
- 4) Trigger Input/Output ; Two trigger inputs and two trigger outputs for connection to external devices.
- 5) Integration with external acquisition system ; All five channels are available to external acquisition equipment for on-line analysis through the Analog Out connector.

4. Operating system software ;

Microsoft® Windows® 7 32-bit (also Windows XP® (SP3) compatible) or Windows 10

5. Waveform Acquisition and Display ;

- 1) Delay range : -3,000 to +500 ms
- 2) Sweep speed ; 5 ms - 50 sec

6. Data Storage Analysis ;

- 1) Free run EMG data and sound can be recorded for up to 960 seconds.
- 2) Stored data can be reanalyzed, digitally filtered, smoothed, inversed, summed, replayed, displayed as trends, in plots, frequency analysis, etc.
- 3) The data are stored in WAV format to export to other research or analysis programs.

7. Averager Capabilities ;

- 1) Averaging techniques ; mean, exponential, median, rectified, and weighted mean.
- 2) Artifact Reject function ; Automatically exclude artifacts that exceed a user definable amplitude threshold but it is also possible to manually include or exclude data on a trace per trace basis.
- 3) Averager display sensitivity ; 10 nV/division to 100 mV/division.

8. Amplifiers ;

- 1) Amplifier Types ; 5 channel amplifier can be configured from 2 to 5 simultaneously.
- 2) Analog to Digital Converter ; 24bit ADC with 48KHz sampling rate per channel
- 3) Stimulus Artifact Suppression ; The amplifiers contain stimuli artifact rejection hardware, preventing the stimuli artifact from saturating the amplifier for a quicker baseline recovery.
- 4) Electrode Impedance ; Impedance at 20Hz with a range from 500 Ω to 450 k Ω .
- 5) Calibration ; rectangular calibration pulse selectable between 2 to 20,000 uV.
- 6) Sensitivity ; 1uV/division to 10mV/division
- 7) Filters ; (1) Low Frequency ; 0.05Hz to 5KHz
(2) High Frequency ; 30Hz to 20KHz
- 8) Notch Filter ; 50Hz, 60Hz, or off
- 9) Common Mode Input Impedance (CMII) ; more than 1000 Mohm
- 10) Common Mode Rejection Ratio (CMRR) ; more than 115 dB
- 11) Noise ; less than 0.6uV RMS
- 12) Safety Isolation ; Type BF.

9. Electrical Stimulator ;

- 1) Electrical stimulators ; Two independent electrical stimulators
- 2) Stimulus output ; constant-voltage and constant-current mode, selectable.
- 3) Stimulus Intensity ; 0 – 400V / 0 – 100 mA, selectable
- 4) Stimulus Duration ; 0.02 – 1 ms.
- 5) Stimulus Modes ; monophasic or biphasic stimulation using single, Refractory, Collision, Double or Train
- 6) Stimulus Rate ; 0.06 – 200 Hz.

10. Auditory Stimulator ;

- 1) Stimulus Type ; Click, tone pip or tone burst
- 2) Stimulus Intensity ; 0 to 139 dB pSPL or -31 to 109 dBSPL nHL,
- 3) Stimulus Increments ; 1 to 30dB steps (selectable)
- 4) Stimulus Polarity ; Condensation, rarefaction, or alternating

- 5) Click duration ; 0.05 to 1.0 ms.
- 6) Tone stimuli type ; Pip or Burst
- 7) Tone Frequencies ; 125Hz to 8KHz
- 8) Tone Pip Total Cycles ; 2 to 20 cycles
- 9) Tone Burst Ramp Cycles ; 1 to 10 cycles
- 10) Tone Burst Plateau ; 1 to 400 cycles
- 11) Tone Envelope ; Linear, Gaussian, Hanning and Blackman
- 12) Noise ; Broadband, -15 to 125dB SPL or -1 to 103dB nHL
- 13) Transducers ; 300 Ω TDH-39 Headphones, TIP 300 Insert Phones.

11. Visual Stimulator ;

- 1) Pattern type ; checks, bars, or gratings
- 2) Pattern ; full-field or partial-field (hemi, quadrants, eighths, and sixteenths)
- 3) Fixation Target ; target size, position, color, and choose between a static or a pulsating target.

12. LED Goggles

- 1) Flash rate ; 0.1 – 100 per second (Hz)
- 2) Duration ; 2 – 500ms.

C. Consist of (per 1Set)

1. Base system ;	1 Set
1) Windows 10 operation	
2) Intel processor	
3) 8Gbyte internal RAM	
4) 1Tbyte HDD	
5) 24“ LCD Monitor	
6) Laserjet Printer	
7) Base Unit	
8) Control Panel	
9) Master software	
10) Isolated Power Supply	
2. Patient Administrator Software (built-in)	1 ea
3. Cart & Monitor Arm	1 ea
4. 5 ch. amplifier with arm	1 ea
5. Electrical stimulator 2port (built-in)	1 ea
6. Electrical Stimulator Probe	1 ea
7. Auditory stimulator (built-in)	1 ea
8. Auditory headphones	1 ea
9. Visual stimulator with LED goggle stimulator	1 ea
10. Footswitch	1 ea

11. NCS software (built-in)	1 ea
12. RNS and Inching study software(built-in)	1 ea
13. Reference value software (built-in)	1 ea
14. Integrated EMG examination software (built-in)	1 ea
15. Autonomic study software(built-in)	1 ea
16. Single MUP analysis & liveplay software(built-in)	1 ea
17. SEP software (built-in)	1 ea
18. AEP software (built-in)	1 ea
19. VEP software (built-in)	1 ea
20. VEMP software(built-in)	1 ea
21. Viking producer software(built in)	1 ea
22. Online report generation software(built in)	1 ea
23. Nerve stimulation for Hypodermic(built-in)	1 ea
24. Standard accessories	
1) Disp. Surface electrode(60ea/box)	2 box
2) Disp. Ground electrode(24ea/box)	2 box
3) Disp. Monopolar needle 25mm(48ea/box)	1 box
4) Disp. Monopolar needle 37mm(48ea/box)	2 box
5) Ring electrode	1 ea
6) Bar electrode	1 ea
7) EP electrode (10ea/pkg)	1 pk
8) Tape measure	1 ea
9) Skin prep paste	3 ea
10) Electrode Gel	3 ea
25. Operating & Service manual	1 ea

D. Remarks

- Warranty: 검수(합격)일로부터 3년 종료될 말일까지

〈규격 · 사양 B〉

A. Features

1. This System is offered in either a 2, 4, 6, or 12 channel configuration.
2. Each amplifier features fast artifact recovery and very low noise. Analog-to-digital conversion is done inside the amplifier, eliminating the amplifier cable as a potential noise source. Each amplifier has superb RF immunity and excellent signal quality.
3. Temperature measurement, impedance, on/off switch and calibration signals are built in.
4. The 12-channel amplifier has four non-switched and eight switched channels. The eight switched channels can use any of the 20 inputs available in the modified head pattern on the amplifier or optional remote input box. All 12 channels can be used simultaneously for data acquisition the 6-channel configuration, with the maximum number of channels limited by software.
5. A unique electrode continuity check (Electrode Check) is built into each amplifier, so you can easily confirm if one of your electrode leads is good or bad.
6. The StimTroller Plus reduces test time by providing commonly used functions on the remote handheld stimulator. Three programmable buttons allow customization to suit your technique.
7. A plug-and-play USB communication interface to the System base unit provides compatibility and upgrade ability in a rapidly changing PC environment.
8. Standard EMG protocol includes both Live and Capture data acquisition modes with easily accessible muscle scoring table and audio equalizer controls, allowing you to fine tune the audio signal to our listening preference. Up to 10 minute Live EMG Buffer with unlimited storage and playback. Full-screen or raster displays. Manual MUP tool and single Motor Unit Analysis for quick documentation of interesting motor unit potentials.
9. Spontaneous or Stimulated Single Fiber Analysis using either real-time peak latency detection or voltage crossing. Records up to 100 consecutive discharges and displays #blocks, MCD, IPI, and frequency. Review and editing can be done real-time or offline. A Fiber Density calculator is included.
10. Interference Pattern Analysis: Quantifies the electromyographic interference pattern and displays the results on color-coded plots.
11. Multi-MUP Analysis: Includes flexible editing features and summary display of all acquired MUPs. Can be performed real-time or offline.
12. Automatic cursor placement and Left vs. Right comparisons in NCV, F, H, and Evoked Potential test protocols. Live Monitor window facilitates identification of artifacts or poor electrode connections. On-line comparison to reference data and identification of abnormal values. Unlimited number of traces displayed per test protocol.
13. Unique Tab Data Summary View provides quick and convenient review on all acquired traces and tabular results.
14. Repetitive Nerve Stimulation by manual or automatic delivery of programmable stimulus trains.
15. AnatomyVIEW feature displays the EMG muscle scoring and NCV results on a 3D color-coded anatomical model. This graphic can be included in reports.

16. Evoked Potentials include somatosensory, auditory, and visual modalities with display and storage of unlimited number of waveforms. Auto-cursors for marking important waveform features with automatic side-to-side comparison and highlighting of abnormal values. Normal or Odd/Even averaging modes. Adjustable artifact rejection and support for third-party stimulators via Trigger In/Out.
17. Report Generator utilizes Microsoft Word and includes customizable modules for entry of patient history, physical exam, impressions, and more, without having to type at the keyboard.
18. Autonomic Studies include RR interval and Sympathetic Skin Response.
19. Advanced Studies include Macro EMG, MUNE (motor unit number estimation) and multiple stimulus configurations utilizing the two independent electrical stimulators with adjustable train lengths and delays.
20. CadLink™ Database organizes, manages and secures your patient files and customized user settings. CadLink supports multiple users; each with their own test settings and report templates.
21. Networking : Add the CadLink Central Server module and you can seamlessly network multiple Systems and Reader stations. Patient records are available from any acquisition or review station on the network. Complete the exam and then finish the report later in the comfort of your office. The receptionist can also be included on the network so that patient information can be input at check-in or final edits can be made to reports. Change a test setting or report template on one System and it is automatically available to all systems on the network.

B. Specification

1. 4Channel Amplifier

- 1) A/D Conversion: 16 bit, 100 kHz per channel
- 2) 25 kHz per channel
- 3) Connection types
Non-Switched Channels: 1.5 mm, touchproof or 5-pin DIN.
Switched Channels: 1.5 mm, touchproof.
- 4) Common Mode impedance: >1000 Mohm.
- 5) Noise: <0.6 μ V rms.
- 6) CMRR at 50 or 60 Hz: Non-switched channels: >115 dB. Switched channels: >90 dB.
- 7) Sensitivity: 2, 5, 10, 20, 50, 100, 200, 500 μ V/div; 1, 2, 5, 10 mV/Div.
(Additional sensitivity values of 0.05, 0.1, 0.2, 0.5, 1.0 μ V/Div in NCV protocol).
- 8) Sweep speeds: 0.1 to 1000 ms/Div in 23 steps.
- 9) Highcut filters: 2-pole (12 dB/octave). Selectable at 30, 50, 100, 200, 300, 500 Hz; 1, 1.5, 2, 3, 5, 10, 15 kHz.
- 10) Lowcut filters: 1-pole (6 dB/octave). Selectable at 0.3, 1, 2, 5, 10, 20, 30, 100, 150, 500 Hz.
(Additional 1 and 2 kHz filter values in EMG and SFEMG protocols).
- 11) Notch filter: 50 or 60 Hz, plus 3 programmable notch filters.
- 12) Temperature probe input: 21° to 40° C \pm 0.5° C.
- 13) Impedance Measurement: Active, Reference, and Ground inputs. 20 Hz signal, 100 to 100k Ohm.

- 14) Electrode Check Circuit: Built-in.
- 15) On/Off Button: Front panel.
- 16) Calibration Signals: 50, 100, 1000, and 10,000 μV square wave at 100 or 1000 Hz.
- 17) Safety Isolation: Type BF.

2. Base Unit

- 1) 16-bit ,analog-to-digital conversion.
- 2) 76.8-kHz sampling rate per channel (2-Channel Mode)
38.4-kHz sampling rate per channel (4-Channel Mode)
- 3) Field Upgradeable Firmware:
- 4) Yes. Trigger Input: 4 TTL compatible. Rising or falling edge.Trigger
- 5) Output: 4 TTL compatible, multiple pulse durations, positive or negative polarity.
- 6) Speakers: Built-in, dual 2" high power, front-facing, 4 ohm, 7 watt, with software equalizer.
- 7) Footswitch: USB, Single pedal.
- 8) USB to PC: Dedicated high-speed connection to PC (480Mb/sec).
- 9) USB Hub: 4-port hub for peripheral devices.
- 10) Electrical Stimulator: 1 standard, 2nd optional.
- 11) Auditory Stimulator: Optional.
- 12) Equipotential Ground: Connector on back panel.
- 13) Disconnect/Reconnect: Automatic recovery after connection is lost or power is restored.
- 14) Connections: Durable, color-coded connectors with protected pins

3. Averager

- 1) Number of averages per channel: 1 to 10,000. Modes: Normal or Odd/Even.
- 2) Artifact reject: Rejects signals from 30 - 95% of full scale. On or off for all channels.
- 3) Averager Sensitivity: 0.01 $\mu\text{V}/\text{Div}$ to 10 mV/Div in 42 steps

4. Electrical Stimulator

- 1) Number : 1 or 2.
- 2) Type : Hand-held, constant-current electrical stimulator with stimulus intensity dial, single, repetitive, store, polarity, and three user programmable buttons on handle.
Includes high flex-life cable.
- 3) Pulse duration: 50 to 1000 μs width, adjustable in 50- μs increments.
- 4) Pulse shape: Monophasic or Biphasic.
- 5) Pulse types: Single, Pair, Train, Dual, Dual Train, Triple.
- 6) Repetition rates: 0.1 to 200 pps depending on stimulus type and sweep speed.
- 7) Probes: 2 removable stainless steel, 2.5 or 1.5 cm center-to-center spacing.
- 8) Probe positions: Adjustable +45 to -90 degrees without removing probe tips.
- 9) Electrical range: 0 to 100 mA, 400 V maximum voltage.
- 10) Resolution: 0.03 mA.
- 11) Safety features: Over current fault detection, High impedance detection.
- 12) Isolation: Type BF.

5. Auditory Stimulator

- 1) Headphones : TDH-39, 10-ohm Available in acoustically shielded and nonshielded models
- 2) Ear inserts : TDH-39, 10ohm compatible transducers.
- 3) Presentation : left, right, both, or neither ear.
- 4) Intensity units : nHL/SPL.
- 5) Stimulus types : Click, Tone Burst and Tone Pips
- 6) Clicks : 100- μ s square wave clicks. Rarefaction, condensation, or alternating polarity.
- 7) Decibel range : -10 to 95dB nHL.
- 8) White noise masking : Contralateral masking from 0 to 80 dB below stimulus level.
- 9) Transducer: Sennheiser HDA 280 headphones (37-ohm), Insert earphones (10-ohm) and Bone transducer (10-ohm)
- 10) Presentation: Left, right, or bilateral.
- 11) Intensity units: nHL/SPL.
- 12) Intensity increments: 1, 2, 5, or 10 dB.
- 13) Stimulus types: Click, Tone Burst, Tone Pip 202, Tone Pip 212.
- 14) Stimulus polarity: Rarefaction, condensation, or alternating polarity.
- 15) Repetition rates: 0.1 to 90 pps depending on stimulus type and sweep speed.
- 16) Clicks: 50, 100, 200, 500 or 1000 μ s square wave.
- 17) Tone Frequencies: 250, 500, 750, 1k, 1.5k, 2k, 3k, 4k, 6k, 8k Hz.
- 18) Tone Burst: 4 to 100 ms rise/fall, 4 to 2000 ms plateau.
- 19) Tone Pip: 1 to 40 cycles rise/fall, 0 to 500 cycles plateau.
- 20) Tone Envelope: None, Linear, Gaussian, Hanning, Blackman.
- 21) Decibel range: -10 to 107 dB nHL (140 pSPL) depending on stimulus type, frequency and transducer.
- 22) White noise masking: Contralateral masking from 0 to 80 dB below stimulus level.

6. Visual Stimulator

- 1) LCD Monitor : LCD monitor for black and white, pattern-reversal checkerboard stimulation. Features center fixation target, independent quadrant and half-field stimulation. Square sizes: 1, 2, 4, 8, 16, 32, 64 or 128 checks. Combination of System and monitor must meet requirements of EN60601-1-1.
- 2) Connection Type: SVGA, HDMI, DVI, or Display Port from Laptop or Desktop PC.
- 3) VEP Calibration Sensor: Included with VEP software (for automatic calibration of LCD video delay).
- 4) LED Goggles: Red flash, 5 ms duration. Left, right or bilateral presentation.

7. Mechanical

- 1) 12 Channel Amplifier: Dimensions: 2.0" H x 6.3" W x 9.0" L (5.1 x 15.9 x 22.9 cm). Weight: 2.1 lbs. (0.95 kg).
- 2) Base Unit (including keypad): Dimensions: 2.5" H x 15.0" W x 14.8" L (6.4 x 38.1 x 37.6 cm). Weight: 7.4 lbs. (3.4 kg), 14.5 lbs.(6.6 kg) with Laptop.

8. Electrical

- 1) 100-240 Vac, 50-60 Hz, 180 VA.

9. Isolation Transformer

Refer to Manufacturer document 309002-000 to determine if an isolation transformer is required.

C. Consist of(per 1Set)

1) EMG/EP Measuring System(Domestic)	1 Unit
- The very fast OS Windows 10	
- Intel Processor	
- Memory : 8GB or more	
- Hard Disk : 1Tb or More	
- Keyboard & Mouse	
2) LED Monitor 24" (Domestic)	1 ea
3) Base Unit	1 Unit
4) 4Channel EMG Amplifier	1 Unit
5) Constant Current StimTroller Plus	1 Unit
6) USB cable used to connect Base Unit to PC	1 ea
7) EMG/EP Software(Built-in)	1 ea
- Anatomy view software	
- ASCII Output Utility Software	
- EMG, NCV, F/H, RNS, Blink, and RR Interval	
- EMG to AVI Converter Software	
- EMG to WAV Converter Software	
- Interference Pattern Analysis (IPA) Software	
- Multi-Motor Unit analysis (MMUA) Software	
- Single-Motor Unit Analysis (SMUA) Software	
8) SEP (Somatosensory Evoked Potential) S/W(Built-in)	1 ea
9) AEP Software including EP board(Built-in)	1 ea
- VEMP Software including	
10) VEP Software(Pattern size of 30,'60,'90')	1 ea
11) Adult Headphones for BAEP	1 ea
12) LED Goggle for VEP	1 ea
13) 24" Monitor for VEP	1 ea
14) Foot switch	1 ea
15) Tabular Data & Report Generator(Built-in)	1 ea
16) Carrying Cart (Domestic)	1 ea
17) Operating & Service manual	1 ea
18) Standard Accessories	
- Surface electrode	1 box
- Disposable monopolar needles	1 box
- EP Gold Cup electrode's	1 pk
- CreamPaste	1 ea
- Nuprep gel(skin prep)	1 ea

D. Remarks

- Warranty : 검수(합격)일로부터 3년 종료월 말일까지