



motion
INFORMATICS

Stimel-03: Technical Specifications



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Stimel-03 – Neuromuscular Stimulation with Integrated Biofeedback for Rehabilitation

Intended Use:

- Relaxation of muscle spasms.
- Prevention or retardation of disuse atrophy.
- Increasing local blood circulation.
- Stroke Rehabilitation by muscle re-education.
- Maintaining or increasing range of motion.
- Immediate post-surgical stimulation of calf muscles to prevent venous thrombosis.

Application Settings:

- Utilized in hospital departments: geriatrics, rehabilitation, neurology, traumatology, and physiotherapy.
- Employed by health practitioners in private clinics: physiotherapist, orthopedics, sports rehabilitation facilities, Occupational Therapists, Chiropractors, Neurologists, and others.
- Operated by the patient at their home environment (prescription use).

Benefits of the Stimel-03:

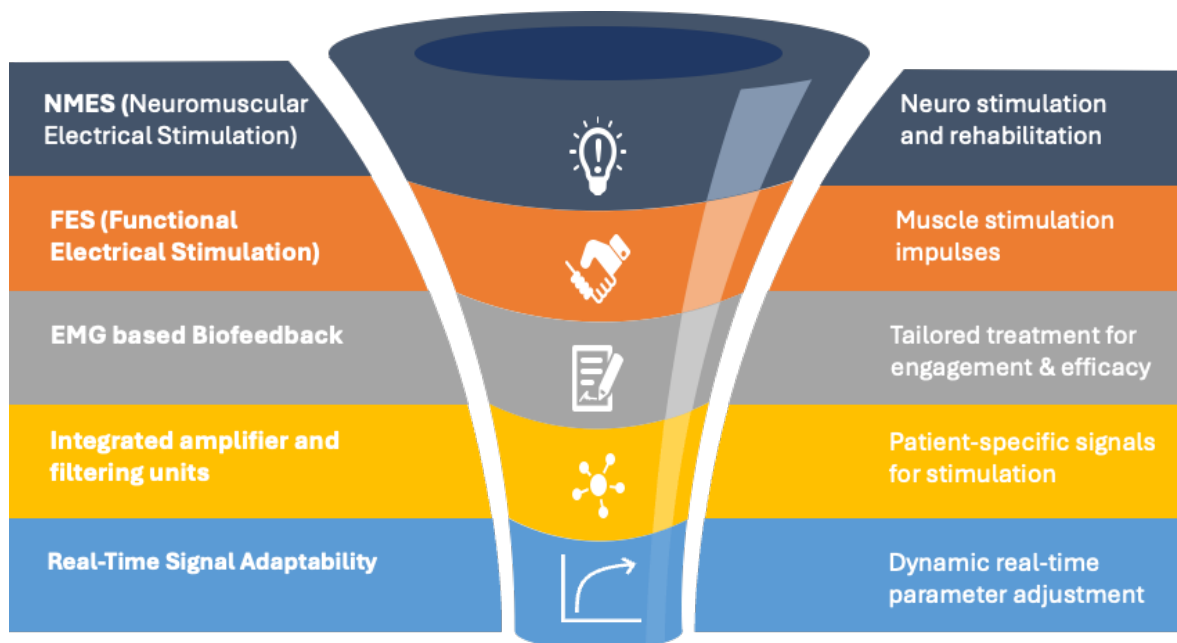
- Traditional post-CVA rehabilitation methods involve electrostimulation where the patient is passive. The Stimel-03 **actively involves** the patient in the therapy process.
- It leverages the patient's voluntary movement intentions, allowing them to see their electromyography (EMG) signal levels on a display and strive to reach therapist-set targets. This engagement significantly boosts treatment efficacy.
- Simplifies treatment by using the same pair of electrodes for both EMG signal measurement and stimulation, targeting the same muscle group.
- Unlike conventional devices that use absolute units (milliamperes) for stimulation signal amplitude, the Stimel-03 uses **threshold units** derived from the patient-specific thresholds, providing personalized muscle contraction control for increased rehabilitation treatment efficacy.

Performance Features:

- The Stimel-03 harnesses the patient's voluntary efforts, displaying biopotential levels for matching with a pre-set stimulator trigger level, followed by a series of modulated bipolar stimulation currents.
- Generates modulated bipolar currents in two modes: simultaneous or alternating.
- Uses the same electrodes for EMG signal measurement and stimulation pulse delivery.

- Adjustable pulse frequency (30-80 Hz) and amplitude (0.1-75 mA), ensuring pain-free, efficient muscle activation.
- Pulse series duration varies from 1 to 10 seconds, with adjustable pulse-to-pause ratios (1:1 to 1:5).
- Offers three operational modes: Automatic, Manual, and Biofeedback.
- In Biofeedback mode, the patient's voluntary EMG signal, upon reaching a set level, triggers a stimulation pulse series.
- Features a LED bar display for visual feedback, enhancing treatment effectiveness.
- Equipped with an LCD for parameter settings, self-testing functionality, and automatic emergency shutdown for faults.
- Powered by an internal Nickel Metal rechargeable battery.
- Compact dimensions: 220x245x100 mm.

Explanation of the BioRhythmIQ Technology



The Stimel-03 device, powered by BioRhythmIQ™ technology, introduces three layers of personalization to enhance therapeutic precision and clinical efficacy.

- The first layer leverages **EMG-based biofeedback**, using real-time muscle activity to guide the timing and delivery of electrical stimulation. By incorporating customized threshold values, this layer tailors stimulation onset to the patient's neuromuscular profile, optimizing motor unit recruitment while minimizing fatigue and discomfort, thereby improving patient engagement and adherence.
- The second layer of personalization integrates **patient-specific EMG signal characteristics** into the stimulation protocol, mimicking the brain's recognition of natural muscle activation patterns. By replicating this neurophysiological process,

the therapy aligns with the patient's intrinsic neuromuscular responses, promoting more effective motor relearning and rehabilitation.

- The third is **real-time signal adaptability**, which continuously adjusts stimulation parameters based on EMG readings during the session. This ensures the treatment dynamically reflects the patient's clinical status and movement attempts in real time.

Together, these three layers of personalization create an individualized therapy framework that incorporates patient-specific data to optimize neuromuscular re-education, enhance therapeutic engagement, and prevent over- or under-stimulation. This approach represents a significant advancement in neuromuscular rehabilitation, offering clinicians a sophisticated tool for delivering highly tailored and effective treatments.

USPs of the Stimel-03

- Provides unparalleled treatment for stroke patients, from severe immobility to minor impairments.
- Employs “Personalized Medicine” by replicating the patient's unique brain-to-limb signal for treatment.
- Ensures a pain-free rehabilitation experience, setting it apart from other devices on the market.
- Differentiates itself by being the exclusive device that incorporates the use of biofeedback.

Stimel-03 – Product Facts

Attribute	Details
FDA 520K	K 130424
Patents	US7221980B2
Regulation Number	21 CFR 890.5850
Regulatory Class	Class II
Product Code	IPF
Dimensions	78.7 x 70.8 x 31.5 inches
Accessories	User cable, Charger
Warranty	12 months from date of purchase (device)
Channels	Dual-channel stimulation
Technology	BioRhythmiQ Technology
Stimulation Modes	Biofeedback and Electrical Stimulation (NMES & FES)
Intensity Levels	0-2 mJ per pulse @ 500Ω

Stimel-03 – Technical Specifications

Attribute	Value
Input Voltage	100-240VAC
Frequency pass band	10 - 415 Hz
Notch filter type	Switched capacitors
Notch filter frequency	50/60 Hz
Input Current	330 mA (in battery charge mode from charger)
Pulse Waveform	Balanced biphasic (pulse is hardware balanced, no DC component)
Pulse Frequency	14-44Hz ±10%
Intensity	0-2 mJ per pulse @ 500Ω
Maximum Output Voltage (±15%)	68V @ 500Ω / 90V @ 2kΩ / 100V @ 10kΩ

Maximum Output Current ($\pm 15\%$)	137mA @ 500 Ω / 45mA @ 2k Ω / 10mA @ 10k Ω
Positive/Negative Pulse Duration	60/120/300 μ s $\pm 20\%$
Max Load	Output Short Circuit, Duration Indefinite
Typical Load	Body resistance: 300-1,500 Ω
Minimum Load	5,000 Ω
On Time	1-10 seconds
Off Time	1-50 seconds
Ramp Up/Down	0.5 – 5 seconds
Total Time (Timer Range)	5-35 minutes
Full scale sensitivity	70 μ V
Division Value	0.27 μ V
Maximum Power Density	0.38 W/cm ²
Maximum Current Density	5.6 mA/cm ² @ 500 Ω
Net Charge (per pulse)	+/- 39 μ C @ 500 Ω
Maximum Phase Charge	39 μ C @ 500 Ω
Dimensions	Length: 203mm, Width: 178mm, Depth: 76mm
Power Source	12V Rechargeable Ni-MH battery (12V, 2200mAh)
Shape	Symmetrical Rectangular Biphasic with zero DC current
Weight	1,360 g with batteries