

# Starstim<sup>®</sup> technical specifications

HARDWARE	Starstim 32	Starstim 20	Starstim 8	Starstim tES
Number of channels	32 Channels	20 Channels	8 Channels	8 Channels
Communication	Wi-Fi IEEE 802.11 g or USB			
Rechargeable system using Li-Ion battery	✓	✓	✓	✓
Device dimensions	163 mm x 79 mm x 70 mm		89.1 mm x 61.1 mm x 23.8 mm	
Device weight	226 g		86 g	
Operating time (WiFi communication)	4.0 hours (combined tES-EEG)	4.0 hours (combined tES-EEG)	4.5 hours (combined tES-EEG)	4.5 hours (8-channel tDCS)
Operating time (USB communication)	5.5 hours (combined tES-EEG)	5.5 hours (combined tES-EEG)	8.0 hours (combined tES-EEG)	8.0 hours (8-channel tDCS)

## HARDWARE: tES SPECIFICATIONS

Sampling rate	1000 S/s			
Frequency range	0 to 250 Hz (tACS) and 0 to 500 Hz (tRNS)			
Configurable bandpass filter for tRNS	✓	✓	✓	✓
Available stimulation techniques	tDCS, tACS, tRNS, custom waveforms, temporal interference			
Parameterizable sham protocols	✓	✓	✓	✓
Maximum current per channel	± 2mA			
Max total injected current (by all electrodes, any time)	4mA			
Current accuracy	1%		10 %	
Current resolution	1 µA			
Current configurable independently for each channel	✓	✓	✓	✓
Configurable Ramp-up and Ramp-down times	✓	✓	✓	✓
Impedance pre-check and continuous monitoring	✓	✓	✓	✓
Abort functionality	Abort button, auto-abort on disconnection / high impedances			
Voltage	± 15 V per electrode (30 V potential difference)			

## HARDWARE: EEG SPECIFICATIONS

Bandwidth	0 to 125 Hz (DC coupled)			—
Sampling rate	500 S/s			—
Dynamic range	24 bits – 0,05 microvolt (µV)			—
Measurement Noise	< 1 µV RMS			—
Input impedance	> 1 GΩ			—
CMRR	-115 dB			—
MicroSD card for offline recording	✓	✓	✓	—

## HARDWARE: ACCELEROMETER SPECIFICATIONS

Axes number	3			—
Sampling rate	100 S/s			—

## SOFTWARE

Custom bipolar, high-definition, 4x1 or multi-channel montage design	✓	✓	✓	✓
Optimized Stimweaver montages import	✓	✓	✓	✓
Advanced Visualization of tES Field Distribution	✓	✓	✓	✓
Double-blind study mode	✓	✓	✓	✓
Multi-step tES-EEG protocols	✓	✓	✓	—
Custom EEG-driven closed-loop tES	✓	✓	✓	—

## SOFTWARE: EEG SPECIFICATIONS

File output	Proprietary NEDF or EDF+ & ASCII file formats			—
Real-time EEG monitoring	✓	✓	✓	—
Scalp and cortical mapping of brain activity	✓	✓	—	—
Spectrum, spectrogram and band power plots	✓	✓	✓	—
Raw data streaming output	Lab Streaming Layer (LSL) outlets or TCP/IP port			—
EEG markers sources	Lab Streaming Layer (LSL) inlets, TCP/IP, keyboard, TTL triggers			—
Timestamp synchronization for precise hyperscanning	✓	✓	✓	—
Compatible with Windows 7/8/10/11 and macOS (≥ High Sierra)	✓	✓	✓	—
3rd party EEG software compatibility	OpenVibe, BCI2000, NeuroGuide, E-Prime (via Lab Streaming Layer)			—
Offline EEG analysis	MatLab (EEGLAB Plugin), Python (NEPy library)			—

## HEADSET

Available headcaps	6 sizes: 42/46/49/54/57/60cm			
Custom montages	Headcaps available with 39 or 64 of 10-10 EEG system positions			

# Starstim<sup>®</sup> product content

Starstim 32	Starstim 20	Starstim 8	Starstim tES
1 x Starstim 32 NECBOX	1 x Starstim 20 NECBOX	1 x Starstim 8 NECBOX	1 x Starstim tES NECBOX
1 x Neoprene headcap size M	1 x Neoprene headcap size M	1 x Neoprene headcap size M	1 x Neoprene headcap size M
4 x NG Pistim (bag of 8)	3 x NG Pistim (bag of 8)	1 x NG Pistim (bag of 8)	1 x NG Pistim (bag of 8)
1 x Sponstim 25 (bag of 4)	1 x Sponstim 25 (bag of 4)	1 x Sponstim 25 (bag of 4)	1 x Sponstim 25 (bag of 4)
1 x Sponstim 8 (bag of 8)	1 x Sponstim 8 (bag of 8)	1 x Sponstim 8 (bag of 8)	1 x Sponstim 8 (bag of 8)
1 x Earclip	1 x Earclip	1 x Earclip	1 x Earclip
1 x Kendall™ H124SG Electrodes (bag of 50)	1 x Kendall™ H124SG Electrodes (bag of 50)	1 x Kendall™ H124SG Electrodes (bag of 50)	1 x Kendall™ H124SG Electrodes (bag of 50)
1 x Set of cables Starstim 32	1 x Set of cables Starstim 20	1 x 10 Electrode cable	1 x 10 Electrode cable
1 x Saline solution 100 ml	1 x Saline solution 100 ml	1 x Saline solution 100 ml	1 x Saline solution 100 ml
1 x Signagel® Electrode Gel (250g)	1 x Signagel® Electrode Gel (250g)	1 x Signagel® Electrode Gel (250g)	1 x Signagel® Electrode Gel (250g)
1 x Curved Syringe	1 x Curved Syringe	1 x Curved Syringe	1 x Curved Syringe
1 x USB Stick with manuals & Software	1 x USB Stick with manuals & Software	1 x USB Stick with manuals & Software	1 x USB Stick with manuals & Software
1 x USB wifi dongle	1 x USB wifi dongle	1 x USB wifi dongle	1 x USB wifi dongle
1 x Testboard head & Cables	1 x Testboard head & Cables	1 x Testboard head & Cable	1 x Testboard head & Cable
1 x USB Isolator & Extension cable	1 x USB Isolator & Extension cable	1 x USB Isolator & Extension cable	1 x USB Isolator & Extension cable
1 x Wifi devices power adapter	1 x Wifi devices power adapter	1 x Wifi devices power adapter	1 x Wifi devices power adapter
4 x NG Geltrode (bag of 8)	3 x NG Geltrode (bag of 8)	1 x NG Geltrode (bag of 8)	-