Measuring and Modulating Brain Activity

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DC-**STIMULATOR** PLUS

Programmable direct and alternating current stimulator

The DC-**Stimulator** PLUS is a stimulator for use in scientific research that provides a stimulation with weak currents, either direct or alternating, (transcranial Electrical Stimulation tES), within non-invasive Interventional Neurophysiology. The electrical charge and current density applied through a constant current source are far below the threshold for releasing a stimulus. Depending on the duration, the used current, the current density, and the frequency the stimulation has a modular effect on existing neuronal elements by either activating or inhibiting cortical activity.

Advantages of the DC-**STIMULATOR** PLUS:

- Highest patient safety standards due to multistage monitoring of the current path, automatic termination of the stimulation, as well as continuous monitoring of the electrode impedance
- Intuitive menu navigation via display and four buttons
- Individual setting and saving of the stimulation parameters
- Programmable treatment schedule with limited menu access*
- Study mode for double-blind active and sham stimulation*
- Signal output for online-correction of the EEG signal during tDCS or tACS/tRNS*
- Extension for use of the DC-**STIMULATOR** PLUS in fMRI scanners*

* optional

Moving thought

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CE

neuroConn DC-STIMULATOR PLUS

DC-STIMULATOR PLUS Features

- 1 channel transcranial stimulator for unipolar (DC) and bipolar (AC) stimulation
- Four different stimulation settings definable
- Active and sham stimulation
- Stimulation modes:
  - „tDCS" stimulation mode: continuous stimulation, adjustable current of 0 up to ± 4,500 µA[1], duration 15–1,800 s, increment 15 s, duration of fade-in / fade-out 1–120 s, increment 1 s
  - „Pulse" stimulation mode: cyclic turning on/off of stimulation, duration of complete pulse cycle/interstimulus interval (ISI) 300–2,000 ms, increment 100 ms, number of pulse cycles 1–500
  - „Sinus" stimulation mode: bipolar sinus waves, adjustable current of 0 up to 3,000 μA_{ss} in 25 µA increments, offset 0–±1,000 µA, increment 10 µA, frequencies of 0–250 Hz, increment 0.01 Hz, adjustable phase 0–360° in 5° steps, duration 0–480 min
  - „Noise" stimulation mode: normally distributed broadband low and high frequency noise, adjustable current of 0 up to 1,500 μA_{ss}, offset 0–±1,000 µA, duration 0–1,800 s in 5 s increments, fade-in / fade out period of 0–120 s
- Internal 16bit D/A conversion
- Internal time resolution < 1 ms (sample rate 2,048 sps)
- Current supply via built-in rechargeable batteries
- Continuous operation time approx. 5 h
- Max. 1 % relative direct current fault tolerance in all options

[1] depending on load impedance and features

Optional features:

Schedule mode to set up a treatment schedule for your patient
For the safe and controlled operation of the device in the absence of medical staff. The therapist sets up the parameters of the stimulation and a schedule. The patient can only start the stimulation and only at the predefined time. The patient cannot make any changes to the settings. An internal logfile records all actions for later analysis.

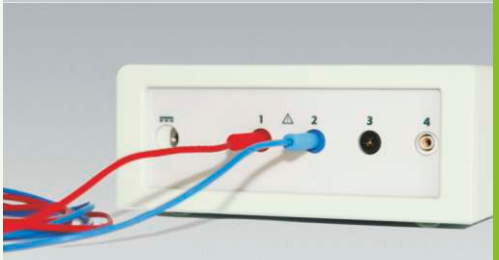
Study mode for double-blind studies
The study mode encodes sham and active stimulation using one out of 200 5-digit codes. There are four settings available to meet even complex study conditions. The parameters can be set individually. As long as the study mode is enabled, only the study manager can change the parameters.

fMRI Add-on
The DC-**STIMULATOR** PLUS can be extended with filter boxes and cables for operation within an fMRI scanner. This optional module allows artifact-free MRI images even during EPI sequences. The module has been tested for 1.5 and 3 Tesla scanners.

Signal Out for EEG-measurement during tACS / tRNS
Signal Out allows you to track, analyze and process the voltage waveform the DC-**STIMULATOR** PLUS sends out to external devices (e. g. Oscilloscope, measuring amplifier, PC). In combination with our EEG-system NEURO **PRAX**® you can measure online-corrected EEG signals even during tACS/tRNS. This is unique worldwide.

Further options:
- Operation via externally controlled voltage source (option Remote)
- Trigger module to safely connect external trigger
- Phase-synchronous trigger output when sinus stimulation is used

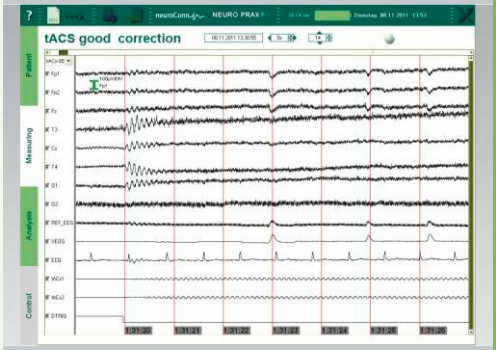
example of use



1 Anode | 2 Cathode | 3 and 4 Trigger in

front panel

back side with all optional connections



option Signal Out: Online-corrected EEG signals during tACS

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We reserve the right to make changes and improvements in line with technical developments.

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Made in Germany

Publicly funded multi-center studies into neurofeedback and non-invasive brain stimulation are equipped with **neuroConn** technology. We are also a member of the "National Bernstein Network for Computational Neuroscience".

bcol transcranial stimulation