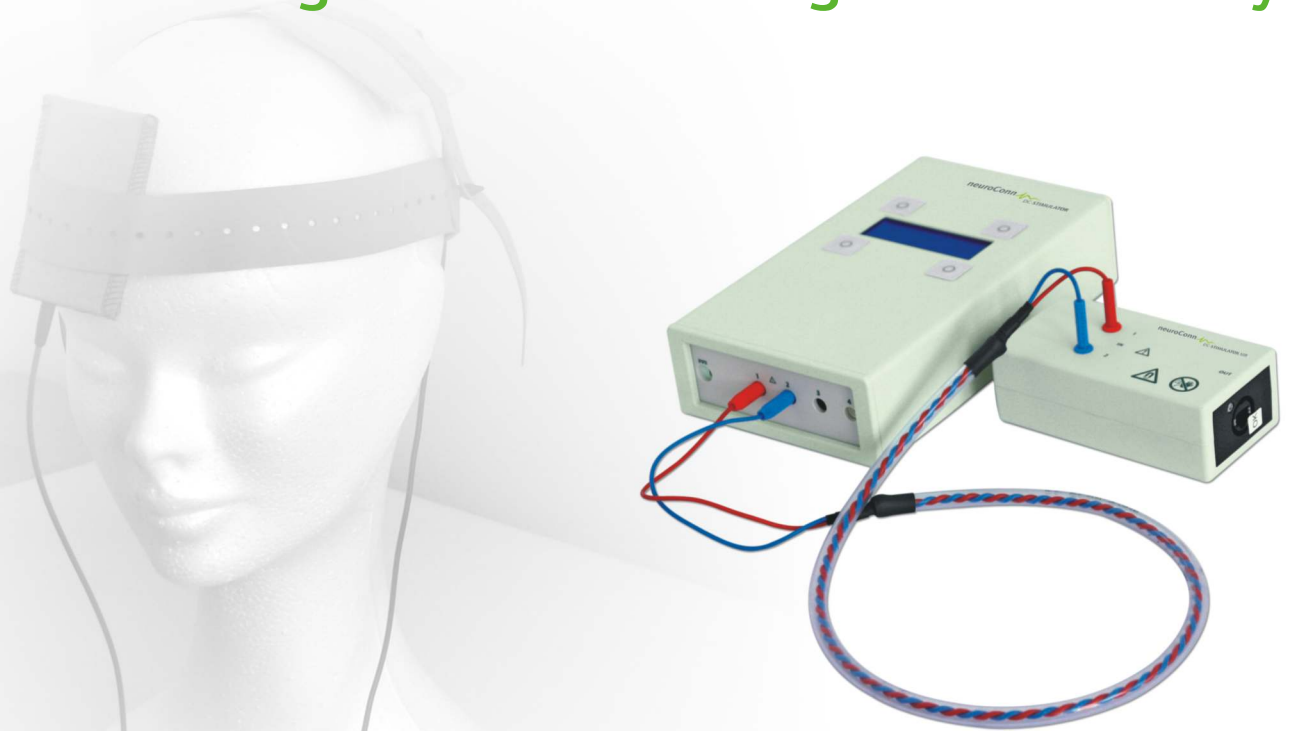


# Measuring and Modulating Brain Activity



## neuroConn DC-STIMULATOR MR

### Programmable direct and alternating current stimulator

Transcranial stimulation using weak electric currents (direct, alternating and random noise currents) over a period of several minutes changes the electrical charge in the nerve cell membranes and has a direct influence on neurotransmitter channels. This serves to strengthen or diminish the excitability of the brain cells. Scientific and clinical studies conducted in recent years have shown transcranial direct current stimulation (tDCS) to be a recognized method of therapy for various disorders of the brain that is applied as a therapeutic component in clinical practice. Alternating current and random noise current stimulation (tACS, tRNS) are currently in the research and validation phases. Transcranial electrical stimulation (tDCS, tACS and tRNS) can also be performed during functional magnetic resonance imaging to localize the exact position of cortical activation.

#### Areas of Application/Treatments

Stroke		Improved motor skills, increased memory performance
Migraine		Reduction in the tendency and frequency of migraine attacks
Epilepsy		Reduction and total suppression of attacks, potential lowering of medication dosage
Tinnitus		Reduction in the loudness of and exposure to tinnitus
Miscellaneous		Depression, chronic headache, dementia, multiple sclerosis, spasticity and Parkinson disease

Moving thought



### DC-STIMULATOR MR Features

- Microprocessor-controlled constant current source
- 1 channel, unipolar (DC) and bipolar (AC) stimulation possible
- Use during fMRI, no interference of the fMRI images during EPI sequence
- High safety standard through multistage monitoring of the current path
- Stimulation mode: single (continuous stimulation, adjustable, fade in and fade out)
- Stimulation mode: pulse (cyclic turning on/off of stimulation, adjustable pulse width and interval)
- Stimulation mode: sinus (bipolar sinus wave, offset, frequency, phase and oscillation period adjustable)
- Stimulation mode: noise, noise LF, noise HF (normally distributed broadband, low- and high-frequency noise, offset and duration adjustable)
- Study mode for "blind" operation of real and pseudo stimulation, encoded from a code list of 200 codes, independently adjustable settings (which can be saved in order to avoid accidental modification the study parameters)\*
- Patient mode: simple (for secure and controlled use at home by the patient without the possibility of parameters being modified)\*
- External trigger input\*, trigger output\*

### DC-STIMULATOR MR Specifications

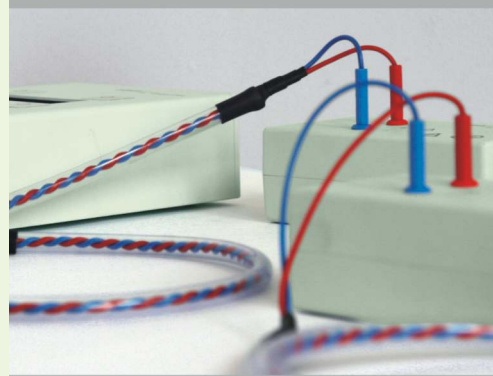
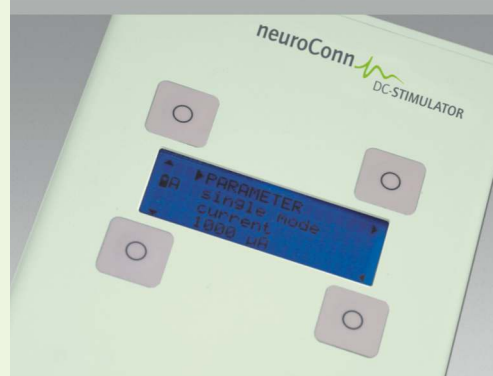
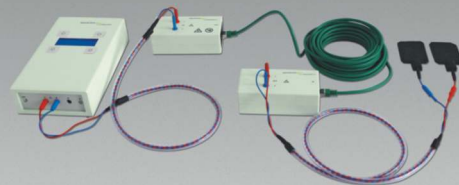
- Adjustable current (DC) up to 4,500  $\mu\text{A}$ \*\* in increments of 25  $\mu\text{A}$
  - Adjustable current (AC) up to 3,000  $\mu\text{A}$  (peak-to-peak)\*\*
  - Additional MRI protective resistor of approx. 5 kOhm in each electrode
  - Internal 12bit D/A conversion
  - Internal time resolution 1 ms (sample rate 1,280 sps)
  - "Single" stimulation mode: duration 15 -1,800 s\*\*, increment 15 s, duration of fade in / fade out 1-120 s, increment 1 s
  - "Pulse" stimulation mode: duration of complete pulse cycle/interstimulus interval (ISI) 300-2,000 ms, increment 100 ms, pulse width 200- (ISI-100), increment 100 s, number of pulse cycles 1-500
  - "Sinus" stimulation mode: adjustable current up to 3,000  $\mu\text{A}$  (p-p)\*\* in 25  $\mu\text{A}$  increments, offset of 0 to  $\pm 1,000 \mu\text{A}$ , increment 10  $\mu\text{A}$ , frequencies up to 250 Hz, increment 0.01 Hz, adjustable phase 0 to 360° in 5° steps, application time adjustable up to 30 min\*\*
  - "Noise", "noise LF", "noise HF" stimulation mode: adjustable current up to  $\pm 1,500 \mu\text{A}$  (p-p), offset of 0 up to  $\pm 1,000 \mu\text{A}$ , increment 50  $\mu\text{A}$ , duration 0-1,800 s\*\* in 5 s increments, current adjustable over period of 0-120 s to reach and leave oscillation level
  - Max. voltage limitation  $\pm 20 \text{ V}$
  - Power supply from built-in rechargeable batteries
  - Approx. 6 h stimulation time @ 1 mA, approx. 7 h for complete recharging
  - Alphanumeric display with backlight, membrane keypad with 4 keys
  - Contact-protected electrode connection in accordance with DIN 42802-2 ( $\varnothing 1.5 \text{ mm}$ )
  - Power consumption approx. 1.2 W (depends on display brightness and applied current)
  - Dimensions: 13.5 cm x 22.5 cm x 5.5 cm (W x D x H)
  - Weight (incl. batteries): 0.8 kg
- \* Optional  
\*\* Currents of more than 2,000  $\mu\text{A}$  and application times of more than 20 min are for research purposes only

### DC-STIMULATOR MR Option

- TRIGGER MODULE to connect external trigger safely
- Phase-synchronous trigger output when sinus stimulation used

### Particular Advantages of our Equipment

- We are the only supplier worldwide of CE-approved, fMRI-compatible transcranial DC stimulators (tDCS, tACS, tRNS).



**neuroConn GmbH**  
Grenzhammer 10  
98693 Ilmenau  
Germany

T +49 3677 68 979 0  
F +49 3677 68 979 15  
info@neuroConn.de  
www.neuroConn.de

neuroConn supplies equipment for publicly funded multi-center studies into neurofeedback and non-invasive brain stimulation and is also a member of the "National Bernstein Network for Computational Neuroscience".

