NEWSLETTER

Dear Reader,

This special edition of our newsletter informs you about the new generation of our transcranial stimulator DC-STIMULATOR PLUS. We have improved the device for the use in both therapy and research and introduce to you the new opportunities the stimulator offers you, e. g. for the optimized therapeutic progress or when being used in combination with EEG or fMRI.

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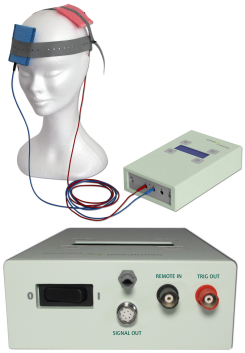
The new DC-STIMULATOR PLUS - For therapy and research



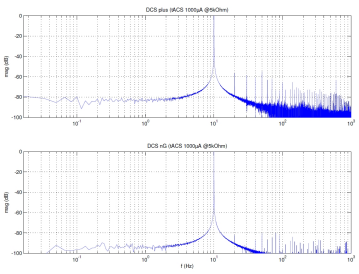
The DC-STIMULATOR PLUS is a CE-certified medical device for conducting non-invasive transcranial direct (tDCS) and alternating current stimulation (tACS/tRNS) on people.

tDCS is applied in research in order to influence the cerebral excitability. The stimulation is used to treat strokes, epilepsy, migraine, tinnitus, depression, chronic headache, and other indications.

tACS and tRNS are new methods of the non-invasive electrical brain stimulation and are used in the research of the neurobiology of learning and behavior. The modulation of cortical oscillations via tACS or tRNS permits conclusions about the cerebral plasticity.

Highly improved quality of current signal

The new generation of our DC-**STIMULATOR** PLUS provides a current signal of a much higher quality. The resolution of the current signal was increased from 12 to 16 bit. At the same time the sample rate was doubled. The basic noise as well as the disturbances in the current signal could be reduced significantly. This is not relevant for the electrical stimulation but it is of essential importance for the simultaneous registration of EEG signals or of fMRI images.



The figure illustrates the exemplary recording of a 10 Hz sinus stimulation at 1000 µA. With the new generation (lower curve) the noise is reduced by approx. 10 dB compared to the previous version (upper curve).

Highest patient safety

By continuously monitoring the electrode impedance the stimulator detects insufficient contact with the skin and automatically terminates stimulation. This is a reliable method of excluding any injury to the patient.

The plausibility check of every entry avoids faulty insertions and acoustic and optical warning signals indicate problems during stimulation.

Tamper-proof therapy schedule*

The new DC-STIMULATOR PLUS allows the physician to program a therapy-specific treatment schedule. The physician sets the intensity of the current, the stimulation mode, the time of the initial stimulation, the duration of each session and the interval between the stimulations.

When the mode is active the therapist can only start the very stimulation at the predefined time, but cannot make any changes to the settings. Thus, it is impossible to deviate from the therapy schedule and the danger of faulty insertions is minimized.

The internal log file records all activities for supervision and analysis.

Double-blind studies with individual stimulation settings*

The DC-**STIMULATOR** PLUS is perfectly suitable for use in double-blind studies. The so-called study-mode encodes normal and sham stimulation via 5-digit codes which only the research coordinator can assign.

The parameters can be set individually and the device can save up to four different stimulation settings for complex study conditions. While the study mode is enabled only the research coordinator can alter the settings. A small input current at the beginning of the sham stimulation gives the patient the impression of a real stimulation, making sure that the study remains blind.

Artefact-free fMRI images*

The DC-**STIMULATOR** PLUS is ideal for the use in fMRI scanners since a hardware extension of special filters and cables eliminates noise caused by the stimulation effectively.

With the new generation of the stimulator artefact-free fMRI images can be obtained even during EPI sequences of a 128 x 128 matrix. The module has been tested for 1.5 and 3 Tesla scanners.

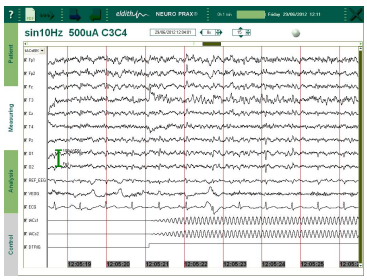
Our devices are the only fMRI-compatible DC-stimulators worldwide that are CE-certified.

Unique worldwide: Artefact-free online EEG-recording during tACS and tRNS*

The recording of an artefact-free EEG during simultaneous tACS or tRNS is a unique feature worldwide. So far EEG systems with a sufficient resolution and a high inut resistance have only been able to record an EEG during tDCS.

*These features are options.

In order to correct a tACS-EEG a signal output provides a galvanically isolated reference signal for external devices. A special cable transfers the signal from the stimulator to an external device, e. g. the amplifier of our EEG-system NEURO PRAX®.



The innovative ONLINE Correction software within the NEURO PRAX® system uses the reference signal to remove the artefacts induced by the stimulation from all EEG channels in real time.

The first successful presentations of tACS-EEG have already been held at the Universities of Goettinge and, Hamburg (Germany), London (UK) and Zurich (Switzerland).

Further options are introduced in the current product leaflet off the DC-STIMULATOR PLUS.

Latest news on transcranial stimulation:

tACS-EEG of growing interest in research

The combined application of transcranial electrical stimulation (tES) and EEG-recording (e. g. tACS-EEG) is expected to provide detailed knowledge about the actual influence of the stimulation on the modulation and modification of the cortical activity (Miniussi C., et al., 2012). Scientists hope that these new methods provide new insights into the effect of tES on the neuronal networks.

A first research project in this field was conducted by the University of Goettingen, Germany. The study examined the effect of a stimulation with synchronized and with desynchronized alternating current on the visual perception (Polanía R., et al., 2012). The subsequent EEG showed that the stimulation with transcranial alternating current artificially induced coupling or decoupling of behaviorally relevant brain rhythms between segregated cortical regions and thus influences cognitive performance.

Experiments performed by scientists from Oldenburg (Germany) showed that an oscillating stimulation is able to influence perception thresholds, but also the α-EEG (Neuling T., et al. 2012).

Latest research with DC-STIMULATOR presented at CNS 2012

tDCS was once more one of the big topics at this year's annual meeting of the Cognitive Neuroscience Society (CNS) in Chicago, USA. There the method was explained to be a „painless, inexpensive, and apparently safe method for cognitive improvement with potential long term efficacy“ (CNS press).

One of the studies presented at the conference had been conducted at the University College London. It examined the application of tDCS to improve a patient's speech after an aphasic stroke (Holland R., et al, 2011). The study combined an fMRI picture-naming task with tDCS in order to examine the effect of tDCS in the areas of the brain involved in speech production. The results show that tDCS speeds up word-finding in healthy persons as well as in stroke patients and helps to identify the part of the brain that should be stimulated. The first fMRI images showing the influence of tDCS on the speech center were shown.

Oxford University found in a series of studies, that tDCS can help improve numerical competence. The positive effects were still presents six months after treatment (Cohen Kadosh R., et al., 2011). Another result was, that individuals with dyscalculia respond to the stimulation of other brain areas than those without the indication. This finding suggests that there is some form of brain reorganization in patients with dyscalculia.

Further studies are planned that will examine the enhancement of learning and cognition in children with typical and atypical development. The big ethical issues arising from these approaches are currently being discussed in the learned press (Cohen Kadosh R., et al., 2012).

A study by Vera Moliadze, who has been working at Frankfurt University (Germany) since April 2012, found that our brain reacts differently to the applied current intensities (Moliadze V. et al., 2012).

Thanks to our partners from Rogue Resolutions and Rogue Research who presented our products to the audience during the CNS exhibition.

neuroConn – upcoming exhibitions 2012

October 10-13, 2012: REHACARE, Duesseldorf, Germany [read more]

October 10-13, 2012: 8th World Stroke Congress, Brasilia, Brazil [read more]

October 13-17, 2012: SfN, 42nd annual meeting of the Society for Neuroscience, New Orleans, USA [read more]

November 2-3, 2012: 1st Asian ADHD Congress, Seoul, Korea [read more]

November 21-24, 2012: DGPPN 2012, German Association for Psychiatry and Psychotherapy, Berlin, German [read more]

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