

Neuro-MS/D

Transcranial
Magnetic Stimulator

1 DIAGNOSTICS

of corticospinal pathways
pathology

2 REHABILITATION

of motor disorders
after the stroke

3 TREATMENT

of depression and
Parkinson's disease

STIMULATION

with up to 100 HZ frequency,
peak magnetic field up
to 4T and active
coil cooling



20 YEARS IN TMS FIELD

Neurosoft Company is a world leader in development and manufacture of transcranial magnetic stimulators (TMS systems). Our first stimulator was created in 1996. Nowadays, in almost 20 years of continuous development, we produce extensive line of TMS devices. Neuro-MS/D is the magnetic stimulator of fourth generation. Thousands of Neurosoft TMS machines operate in scientific laboratories, neurological and psychiatric clinics all over the world and TMS technique becomes a routine practice of neurologists and psychiatrists.



WHAT IS TMS?

The alternating magnetic field easily penetrates through skin, cranium bones, soft tissues and reaches the cortex. This field has extremely high intensity. If the coil is positioned over the motor cortex and the stimulus is delivered, the intensity of induced field is enough to activate big groups of motor neurons that results in a visible muscle twitch.

Such impact is inaccessible for other types of stimulation and allows performing a wide range of diagnostic and therapeutic procedures.

If the recording electrodes placed on the peripheral muscle are plugged in the EMG machine, and the muscle representation in the motor cortex is stimulated with the coil, the motor evoked potential (MEP) can be recorded. The study of the obtained waveform, its amplitude and latency allow estimating the state of the motor pathway starting from the cortex.

The repetitive transcranial magnetic stimulation performed for a long time (about 10-30 minutes) can modulate the cortex excitability.

For example, the excitability can be increased with high-frequency stimulation or decreased with low-frequency stimulation. The magnetic stimulation has proven therapeutic effect at different psychiatric and neurological disorders.

TMS APPLICATIONS

- **PSYCHIATRY:** treatment of depressions, schizophrenia, obsessive-compulsive disorders, manias and other disorders.
- **NEUROLOGY:** diagnostics of motor pathway disorders, treatment of tinnitus, consequences of stroke, spasticity, pain syndrome, migraine, Parkinson's disease
- **RESEARCH:** study of brain functions and motor pathways.

PEAK MAGNETIC FIELD

Peak magnetic field of Neuro-MS/D reaches 4T. This is one of the highest values in the industry. Patients suffering from brain disorders may sometimes have decreased motor cortex excitability. To ensure the desired stimulation effect in such patients, it is required to perform high-intensity stimulation.

SOFTWARE

The stimulator can operate in stand-alone mode when all the parameters are adjusted using the stimulator controls located on the front panel or under Neuro-MS.NET software control. Neuro-MS.NET software allows keeping patient database, detecting motor thresholds, managing the treatment courses and stimulation sessions. The software is equipped with the preset protocols for treatment of neurological and psychiatric diseases. There is no need to search the stimulation parameters for treatment of depression, Parkinson's disease or other disorders in books, articles or manuals, you just select the protocol from the list and start the treatment.

ACTIVE COIL COOLING

One of the problems related to therapeutic magnetic stimulator use is quick overheating of coils during the stimulation. We designed special cooling unit and cooled coils to cope with this problem. The cooling unit allows increasing the running time without overheating up to 10 000 pulses iteratively. In practice it means that the device can operate for hours without overheating.

STIMULATION WITH UP TO 20 HZ FREQUENCY

To achieve the therapeutic effect, it is required to perform stimulation with specified frequency. The researches all over the world create and test continuously new therapeutic TMS protocols. Often it assumes that the high-frequency stimulation is required. Neuro-MS/D performs stimulation at up to 100 Hz frequency (up to 25 Hz with maximum intensity). All these allow using most advanced and modern treatment protocols.

STIMULATOR COMPONENTS

MAIN UNIT

Main unit controls all other units and can be used as a stand-alone machine (if equipped with the coils). The front panel contains digital indicators displaying all parameters of stimulator and controls used to adjust parameters. To attach the stimulator to PC, main unit has USB socket.

COOLING UNIT

The cooling unit is a significant part of therapeutic magnetic stimulator. There is a tank with cooling agent inside it, high-tech compressor-free cooler and the pump running continuously the cooling agent via the coil. The liquid cooling system is much more efficient and less noisy in comparison with the air one.

EXTRA POWER SUPPLY UNIT

The main unit of the magnetic stimulator is designed to operate with up to 30 Hz frequency. However, the main unit alone can deliver maximum intensity only at 5-7Hz frequency. The extra power supply unit makes it possible to increase the maximum frequency up to 100 Hz and obtain the maximum intensity at 20-25 Hz frequency depending on coil type.



NEURO-MEP-MICRO DEVICE

Is a two-channel EMG machine. When connected to the computer, it can be used to record the motor evoked potentials obtained at stimulation of the motor cortex and peripheral nervous system.

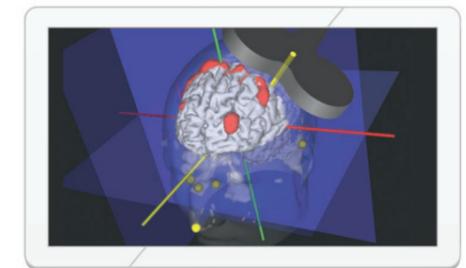


FLEXIBLE ARM FOR COIL POSITIONING

During the stimulation it is very important to keep the coil in one and the same position relative to patient's head. Only in this case one can be sure that the stimulus is delivered in the targeted brain area. Moreover, the location of cortex depends on individual anatomic features. Thus, at the beginning of the procedure the clinician must be free to move the coil relative to patient's head to detect the stimulation area and then instantly fix the coil securely at any position. To ensure such fixation, Neuro-MS/D can be supplied with special flexible arm for coil positioning.

NEURO-MS.NET SOFTWARE

The Windows-based software intended to control the magnetic stimulator allows keeping the patient database, managing the treatment courses and the stimulation sessions, performing the stimulation using the predefined protocols and also creating and customizing the available stimulation protocols. The software is optimized for touchscreen interface.



NAVIGATION SYSTEM

Most clinicians, using the magnetic stimulators, apply anatomical landmarks to detect the stimulation area. Such stimulation, sometimes, is not enough accurate because of individual anatomical peculiarities of subjects. Recently there was developed a new technique that allows entering MRI data of a particular subject to computer before the stimulation session and perform MRI-guided stimulation using the 3D target markers on patient's brain rendering. Neuro-MS/D stimulators can be used together with navigation system.

STIMULATOR CONFIGURATIONS

1 DIAGNOSTIC

The diagnostic variant of magnetic stimulator is intended to study the state of cerebral, spinal and peripheral motor pathways. The maximum diagnostic capabilities can be shown if the device is used together with EMG machine. Neurosoft Company manufactures a wide range of such devices.



2 THERAPEUTIC

The therapeutic magnetic stimulator is a complete solution for basic therapeutic practice. The cooling unit included in therapeutic configuration allows performing treatments for a long time (including TMS with high frequency and intensity) without coil overheating.



3 ADVANCED THERAPEUTIC

The advanced therapeutic configuration is a solution for advanced practices. Due to the extra power supply unit it is possible to use high-frequency stimulation protocols of 20, 50 and even 100 Hz.



4 RESEARCH

The research magnetic stimulator combines all options of other configurations that allow performing studies in different fields, especially neurophysiology, psychiatry, epileptology. This configuration is supplied with EMG machine and also includes Neuro-MS monophasic magnetic stimulator to ensure paired stimulation.



TMS APPLICATION IN DIAGNOSTICS OF NEUROLOGICAL DISORDERS:

Multiple sclerosis (MS), amyotrophic lateral sclerosis (ALS), Parkinson's disease (PD), injury of corticospinal pathways of different genesis including vascular, tumorous, traumatic and at stroke; cervical myelopathy, dystonia, cerebellar ataxias, motor radiculopathy, phrenic nerve pathology.

DIAGNOSTIC TECHNIQUES

MEP amplitude; motor threshold (MT); central motor conduction time (CMCT); silence period (SP); intracortical (ICI) and interhemispheric (IHI) inhibition; intracortical (ICF) and interhemispheric (IHF) facilitation; triple stimulation test (TST); inhibition/facilitation of motor response at repetitive stimulation, paired associative stimulation (PAS).



MODULAR DESIGN

Neuro-MS/D can be customized for any needs. The different configurations ensure wide range of solutions for clinical and research needs including acquisition of motor evoked potentials (MEP), repetitive transcranial stimulation (rTMS), cortical mapping and brain research, TMS-fMRI studies, etc. For your convenience we offer four magnetic stimulator configurations.

COILS OF NEW GENERATION

The Neuro-MS/D magnetic stimulators can be supplied with different coils. All coils have ergonomic handle. The device readiness indicator and pulse delivery button are integrated into this handle. The coil is equipped with the reliable high-voltage connector used to plug the coil to the main unit. The wide range of cooled coils is also available. The cooled coils are equipped with quick connect couplings that allow fast coil attachment to the cooling unit excluding cooling agent leakage. No tools are required for coil replacement. Thus, even the cooled coil replacement takes a few seconds.

Besides the classical coils the double cone coil is designed. It is intended for deep brain stimulation.

Neurosoft Company can design the special coils upon customer's request.

	Active coil cooling	MEP acquisition	Paired stimulation and monophasic stimulation	Stimulation frequency at maximum intensity, Hz	Maximum stimulation frequency, Hz
Diagnostic	-	-	-	5	30
Therapeutic	+	-	-	5	30
Advanced therapeutic	+	-	-	25	100
Research	+	+	+	25	100

PEAK MAGNETIC FIELD AT 100% STIMULUS AMPLITUDE, T

IMAGE

NON-COOLED COILS

COOLED COILS

1,5 (3,2)*	1,3 (2,8)*	2.5 (5,2)*	1,2 (2,6)*	1,5 (3,2)*	1,4 (3)*
					
Small ring coil RC	Big ring coil RC-02-150	Small figure-of-eight coil SFEC-02-50	Figure-of-eight coil FEC-02-100	Angulated figure-of-eight coil AFEC-02-100	Double cone coil ACC-02-125
			Figure-of-eight coil (placebo) FEC-02-100-P	Angulated figure-of-eight coil (placebo) AFEC-02-100-P	
			Cooled figure-of-eight coil FEC-02-100-C	Cooled angulated figure-of-eight coil AFEC-02-100-C	Cooled double cone coil ACC-02-125-C
	Cooled big ring coil RC-02-150-C			Cooled angulated figure-of-eight coil (placebo) AFEC-02-100-C-P	

*If research configuration is used.



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