

NEURO-MSX

magnetic stimulator



- ✓ Treatment of psychiatric and neurological disorders
- ✓ Transcranial and peripheral magnetic stimulation
- ✓ Advanced liquid cooling technology
- ✓ Multifunctional color display
- ✓ New-generation ergonomic coils
- ✓ Intuitive interface and easy control

**Stimulation
frequency –
up to 150 Hz**

OVER 25 YEARS IN PRODUCTION OF MAGNETIC STIMULATORS

1996

Neurosoft launched its first magnetic stimulator to the market just 10 years after TMS technology first appeared in scientific literature*.



* Barker AT. Non-invasive magnetic stimulation of the human motor cortex. Lancet 1985.



REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION (rTMS)

TMS is non-invasive cortex stimulation by short magnetic pulses. The alternating magnetic field of TMS machine easily penetrates through clothes, skin, scalp, meninges, and bones. It rapidly reaches the electroconductive tissues of central and peripheral nervous systems. Such field generates the alternating electric field. It, in turn, evokes the electrical current which is sufficient to activate the neurons as during the electrical stimulation. Such impact allows performing a wide range of diagnostic and therapeutic procedures.

When the magnetic stimulation is performed repetitively for some time, the long-lasting changes in cortical activity can be achieved (for example, excitation with high-frequency stimulation or inhibition with low-frequency stimulation).

Unlike electrical stimulation, rTMS is absolutely painless and does not require any special preparation. At that, the therapeutic rTMS session can last from 40 sec to 37 min depending on the used treatment protocol.

rTMS Application**:

- **Psychiatry:** depression, post-traumatic stress disorder, schizophrenia, obsessive-compulsive disorder, addiction, anxiety disorders.
- **Neurology:** motor stroke rehabilitation, spasticity, pain, migraine, Parkinson's disease, tinnitus, dystonia, essential tremor, Tourette's syndrome, amyotrophic lateral sclerosis, multiple sclerosis, epilepsy, Alzheimer's disease.
- **Pediatrics:** autism spectrum disorders, functional neurological disorders, Tourette's syndrome, attention deficit hyperactivity disorder, mental retardation (including speech delay), depression.

REPETITIVE PERIPHERAL MAGNETIC STIMULATION (rPMS)

If compared to rTMS, the magnetic field during rPMS impacts spinal roots, nerves, or muscles but not the brain.

rPMS is applied for treatment of pain, spasticity and movement disorders, muscle dystrophy, facial and trigeminal neuropathy, chronic pelvic pain syndrome. This technique has also proved effective in urology, proctology, gynecology as well as for post-exercise muscle recovery and physical exercise.

** Some of listed applications are investigational only

HIGH-PO

1 HIGH STIMULATION FREQUENCY

The main unit of Neuro-MSX magnetic stimulator allows performing stimulation at up to 150 Hz frequency while peak induction is ensured at the frequency of 13-15 Hz.

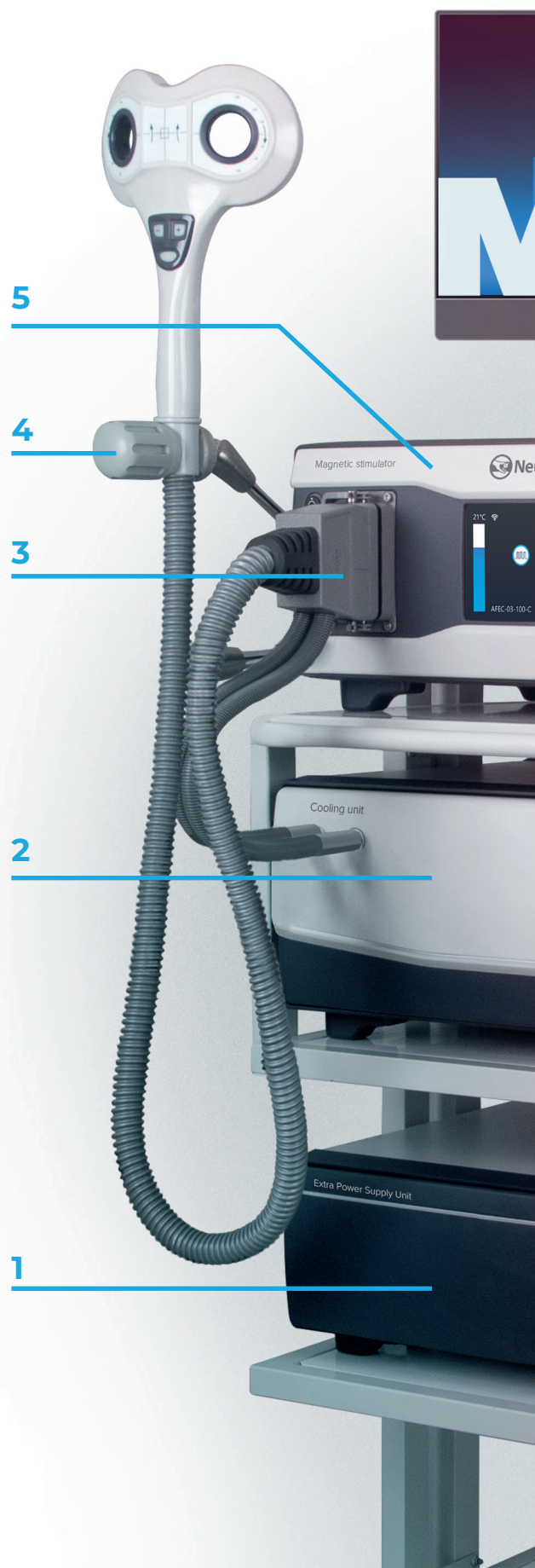
Extra power supply unit allows increasing stimulation frequency, up to 25-30 Hz, at which peak induction is reached, and the system assures 60% intensity at 50 Hz frequency. This is clinically important because when using our stimulators motor threshold in most patients is 45% MSO and lower. It means that these patients can be stimulated with up to 50 Hz frequency and with TBS protocols without any stimulus decay.

2 INNOVATIVE LIQUID COOLING SYSTEM

The cooling system allows avoiding coil overheating during long-term rTMS sessions. The advanced method of active coil component cooling is implemented in Neurosoft magnetic stimulators.

The cooling liquid does not fill the whole coil, it runs inside the winding and therefore neutralizes the heat on the very site where heating appears.

Besides, the less liquid is inside the coil, the easier and more comfortable it is to use.



POWERED



3 RELIABLE COIL CONNECTOR

The special industrial connector made of high-strength materials ensures safe coil attachment to the main unit and longstanding functioning without pin burning which is common for other connectors.

4 FLEXIBLE ARM FOR COIL POSITIONING

During the whole treatment session, it is very important to keep the coil in one and the same position relative to the patient's head. Any coil motion can impact negatively the therapy efficiency. To ensure reliable and accurate coil placement above the target area, we designed the special flexible arm for coil positioning. With such arm it is easy and fast to fix the coil.

5 INTUITIVE CONTROL

The main unit controls the whole system. The big color screen showing the stimulator parameters, buttons, and knobs are located on the front panel.

The stimulator can be controlled by the Windows-based computer with installed Neuro-MS.NET software. Computer interfaces with the main unit via single USB port.

On top of all that, Neuro-MSX has Wi-Fi interface and can be controlled through browser window of any gadget: iOS or Android phone, tablet, etc.

INTUITIVE CONTROLS

DISPLAY

The multifunctional display of the main unit shows stimulation parameters, state of the coil, and the unit itself.

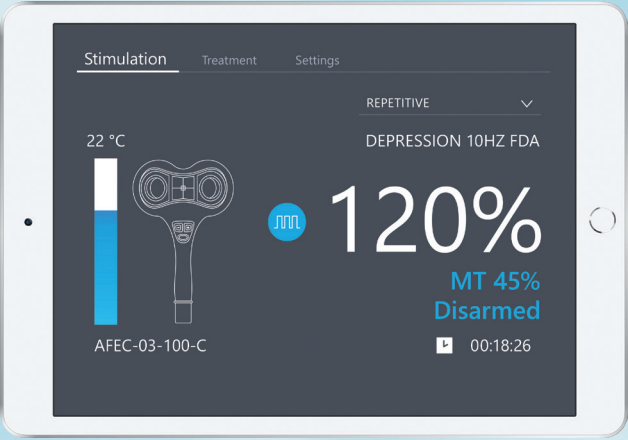
“TRIGGER” BUTTON

When the stimulator is in “Armed” state, pressing the “Trigger” button starts single pulse or repetitive stimulation depending on the current operating mode.



“STIMULATION PARAMETERS” KNOB

Press — to select the parameter, rotate — to adjust it. Moreover, this knob allows editing existing stimulation protocols and selecting those pre-defined as well as switching between the screens during stimulation.



WI-FI

Neuro-MSX is the first in industry TMS system with Wi-Fi interface and can be wirelessly controlled using standard browser app of any gadget: iOS or Android phone, tablet, etc. The web interface allows the following:

- editing treatment protocol parameters;
- selecting stimulation mode;
- monitoring stimulation status (stimulation progress, intensity, parameters, coil temperature).

Treatment

Stroke 1 Hz	Mode	Train
Depression 37 min	MT % output	125%
Depression 19 min	Freq in Train	10.0 Hz
Neuropathic pain	Pulses in Train	40
Depression TBS	Pause	26 s
	Train in Session	75

00:20:00

3000

PRE-DEFINED TREATMENT PROTOCOLS

Neuro-MSX can store 5 pre-defined treatment protocols in built-in memory. Protocols can be edited when necessary using the controls on the front panel or via Wi-Fi.

Treatment

SWEEP

00:20:00

700

Mode	Ramp
MT % output	100%
Freq Lower	1.0 Hz
Freq Upper	30.0 Hz
Sweep Up	3.0 s
Plato duration	2 s
Sweep Down	3.0 s
Pause	2.0 s
Trains in Session	10

Back

Sweep mode. Repetitive stimulation by trains with rising and falling frequency.

NEW STIMULATION POSSIBILITIES

Newly implemented stimulation patterns with rising and falling frequency or ramp up and down amplitude can be used during therapeutic rPMS to reduce muscle habituation (or decrease adaptation) to the stimulation.

Treatment

RAMP

00:20:00

10000

Mode	Ramp
MT % output	100%
Freq in Train	10.0 Hz
Ramp up	10.0 s
Plato duration	10 s
Ramp down	10.0 s
Pause	10.0 s
Train in Session	100

Back

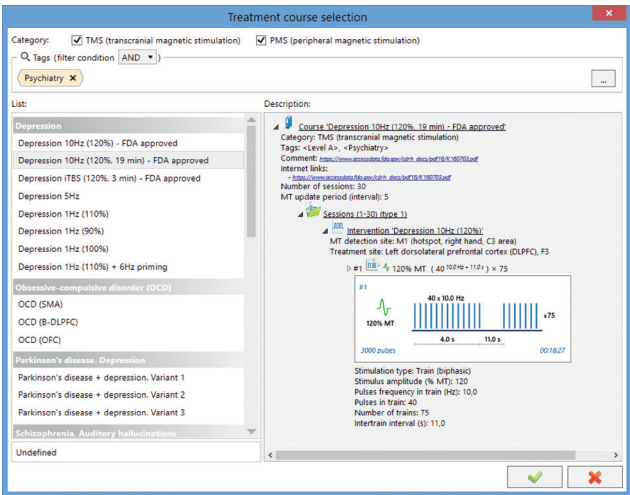
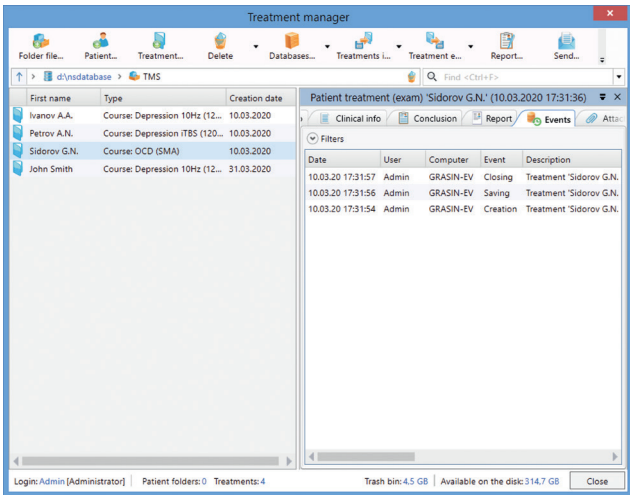
Ramp mode. Repetitive stimulation by trains with ramp up and down amplitude.

NEURO-MS.NET

The stimulator can be controlled by the Windows-based computer with installed Neuro-MS.NET software. Computer interfaces with the main unit via a single USB port.

Neuro-MS.NET software comprises the patient database, treatment protocol library and editor, and controller of TMS machine.

The software guides the user through regular routine workflow such as creating a new patient record, selecting the pre-defined protocol from the library, generating or editing new treatment protocol, running and completing stimulation session, displaying the detailed history of each treatment on the screen, and printing treatment report.

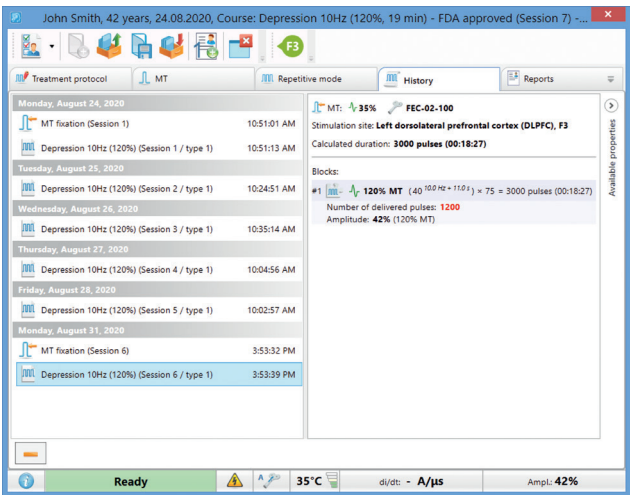
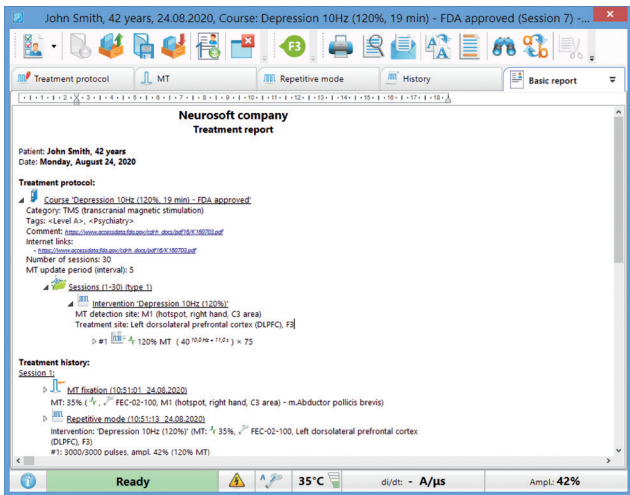


PATIENT DATABASE

The patient database contains the list of all patients and history of all treatments.

PRE-DEFINED PROTOCOLS

The software offers a large number of pre-defined treatment/rehabilitation protocols. The user can always create new protocols or edit any parameter of existing ones.

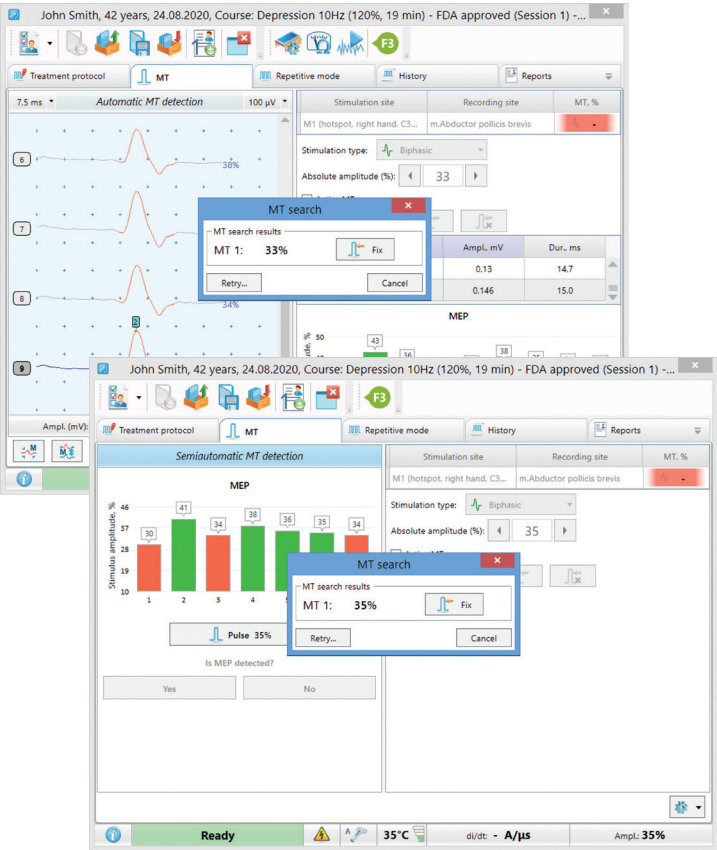


REPORT

Upon the treatment session completion, the software automatically generates printable treatment report which includes patient demographics, treatment parameter description and all treatment session history.

HISTORY

The treatment history keeps the data obtained during MT determination (including traces), data on performed treatment sessions, time when session started, the actual number of stimuli delivered during each session, and a lot of other data.



MT DETERMINATION AND BRAIN MAPPING TOOLS

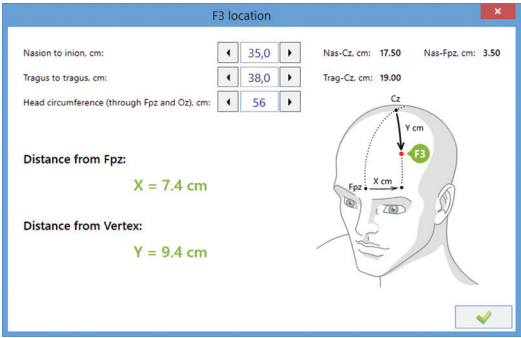
Motor threshold (MT) is the way to determine the “dosage” of rTMS treatment. It is an important measure for most rTMS protocols. The accuracy of MT measurement is the key to achieve the effectiveness and safety of the treatment. Together with treatment location mapping, MT determination must be performed quickly but accurately. Neuro-MS.NET software offers a battery of tools both for MT determination and for brain mapping: automatic MT determination using EMG amplifier, semiautomatic MT determination using STEP algorithms, F3 locator, and visual help.

Automatic MT Determination

Motor threshold can be determined automatically using a compatible EMG amplifier. In this mode, the software automatically delivers the series of pulses with random intervals. Specially designed sophisticated algorithm gradually increases or decreases pulse intensity depending on the amplitude of a particular EMG response. In just a few steps the algorithm finds the threshold value automatically.

Semiautomatic MT Determination

In semiautomatic mode, the software also delivers a series of pulses, automatically increases and decreases stimulus intensity depending on the response whereas the user observes muscle twitch visually and clicks “Yes” or “No” in the software respectively the response. MT is usually found in just 6-8 steps/stimuli. This approach streamlines MT determination and ensures high accuracy and speed.



F3 Locator***

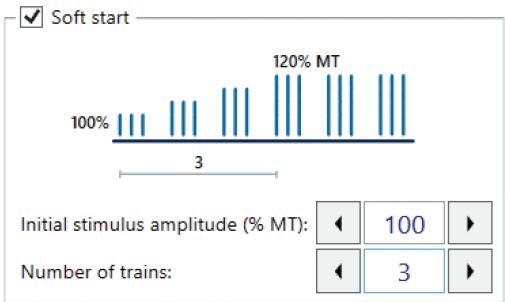
Once MT is determined, it is important to position the coil correctly over the stimulated area. The conventional protocol for depression treatment implies stimulation of the left dorsolateral prefrontal cortex (DLPFC), which corresponds to the F3 point in the 10-20 system.

Manual location of F3 requires lots of measurements and calculations. Our software has an implemented algorithm for F3 location using just 3 measurements:

- tragus-to-tractus distance,
- nasion-to-inion distance,
- head circumference.

Just enter the measurements and the software shall calculate precisely the target point.

For more precise brain mapping Neuro-MSX can be upgraded with MRI guided neuronavigation system.



“SOFT START” MODE

Some treatment protocols assure performing stimulation at 110% or 120% MT. Such intensity can induce involuntary head movements in patients unfamiliar with this technique. To avoid such response and prepare a patient to the procedure, you can use the “Soft Start” mode implemented in the software. It allows you to start stimulation at a low intensity and gradually increase it automatically up to the required value.

*** Validated F3 locator. Gabitova M, et al. Simplified method of left DLPFC locating for depression treatment with TMS. Brain Stimulation: Basic, Translational, and Clinical Research in Neuromodulation 12.2 (2019): 417-418.

NEW GENERATION OF COOLED COILS



RC-03-125-C

RING COIL

- cortical and peripheral nerve stimulation (cervical, lumbosacral nerve roots, pudendal nerve)
- perfect for stimulation of deep-lying nerves



AFEC-03-100-C

ANGULATED-FIGURE-OF-EIGHT COIL

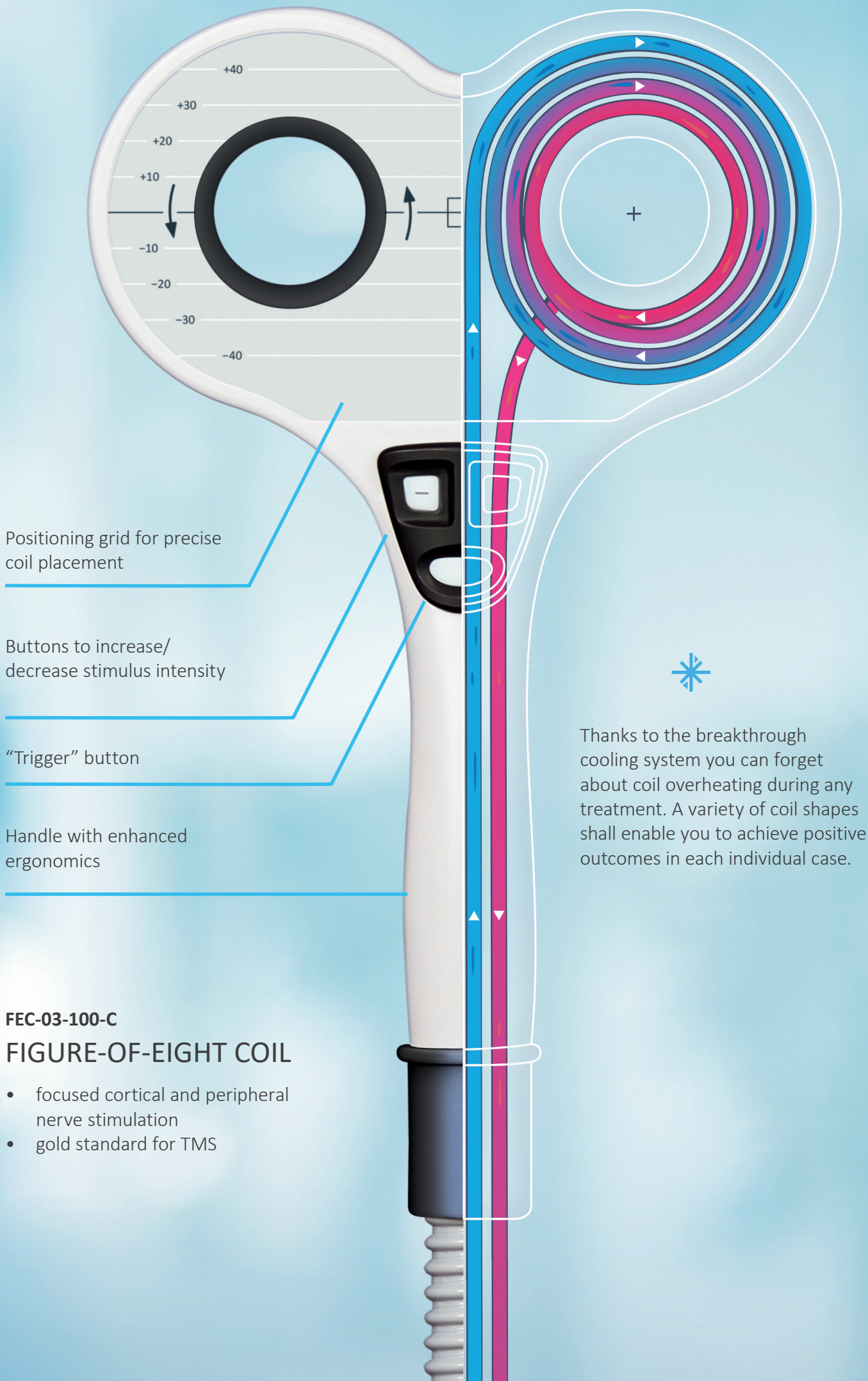
- deep cortical stimulation
- accurate focusing
- anatomic shape being congruent to head shape ensures closer fitting to the patient's head



DCC-03-125-C

DOUBLE CONE COIL

- deepest stimulation including cortex representations of lower limb and pelvic floor muscles, cerebellum and DMPFC



Positioning grid for precise coil placement

Buttons to increase/decrease stimulus intensity

"Trigger" button

Handle with enhanced ergonomics

FEC-03-100-C

FIGURE-OF-EIGHT COIL

- focused cortical and peripheral nerve stimulation
- gold standard for TMS

Thanks to the breakthrough cooling system you can forget about coil overheating during any treatment. A variety of coil shapes shall enable you to achieve positive outcomes in each individual case.



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