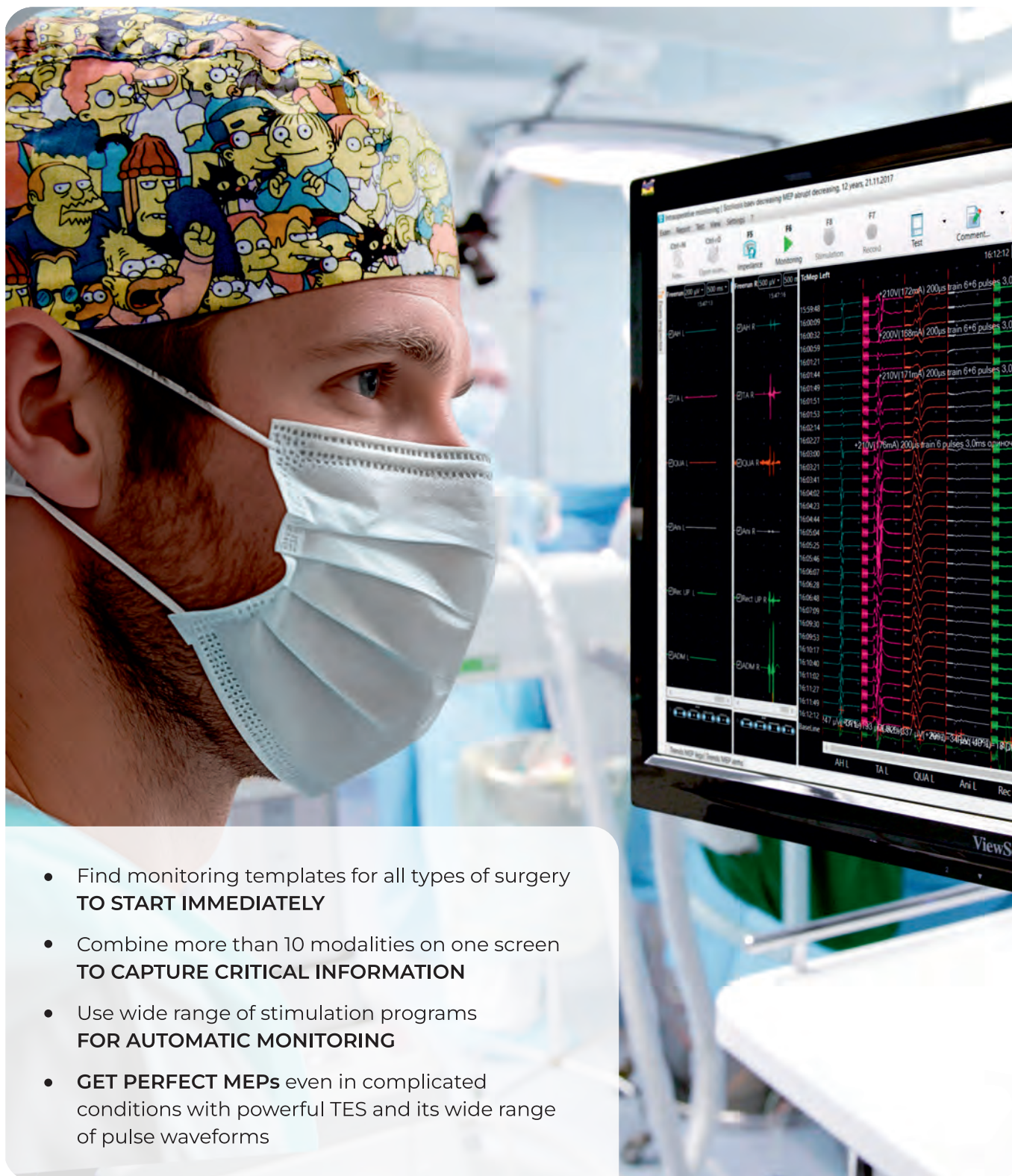




NEURO-IOM

Multimodal System for Intraoperative Neurophysiological Monitoring



The image shows a surgeon in profile, wearing a white surgical mask and a colorful cartoon-patterned surgical cap. He is looking at a computer monitor that displays a complex software interface for neurophysiological monitoring. The interface includes multiple channels of data, such as 'AH L', 'IA L', 'QUA L', and 'Ana L', with corresponding waveforms and numerical values. The background is a blurred operating room environment.

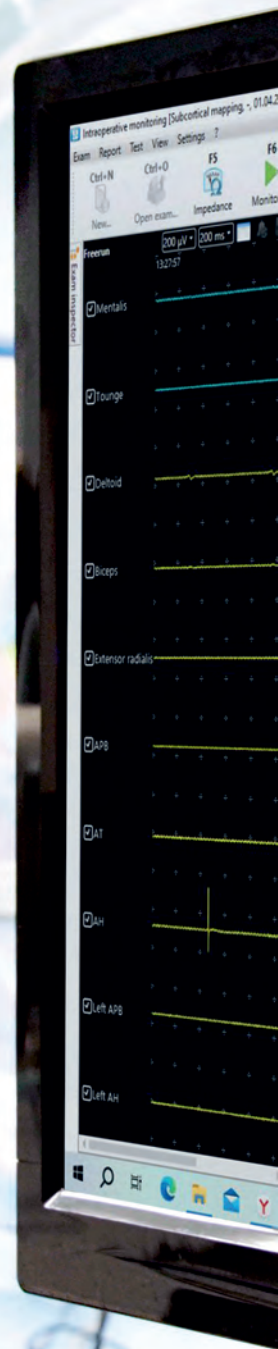
- Find monitoring templates for all types of surgery
TO START IMMEDIATELY
- Combine more than 10 modalities on one screen
TO CAPTURE CRITICAL INFORMATION
- Use wide range of stimulation programs
FOR AUTOMATIC MONITORING
- **GET PERFECT MEPS** even in complicated conditions with powerful TES and its wide range of pulse waveforms

INTERNATIONAL EXPERIENCE

Neuro-IOM is a cutting edge modular platform solution that combines the years of knowledge and experience obtained in clinical and research environments. Due to flexible configuration options, the system can meet the most exacting demands of both surgeon and advanced neuromonitoring specialist.

The high-performance system ensures the full flexibility to the user. The predefined configurations are intended for almost all types of surgery procedures and ensure the simple workflow thanks to an intuitive user interface. Any parameter can be changed on-the-fly during the recording and easily interpreted. The time-synchronized video and audio data contribute to obtaining the reliable and accurate results.

We continue mastering the most recent technologies, implementing robust hardware and software tools to stand on the forefront of IOM devices.





COMPREHENSIVE SOLUTION FOR OPERATING ROOM

Neuro-IOM is our recent development for intraoperative neurophysiological monitoring. The system ensures full-featured performance due to the high-quality and low-noise signal acquisition, configurable display options and auditory and visual feedback. The modern design with color-coded amplifier outputs and pods allows a specialist to speed up the startup procedure.



**VIDEO FROM UP
TO THREE CAMERAS
OR A MICROSCOPE**



**EASY-TO-USE
STIMULATOR
AND ACQUISITION
PODS WITH
5 M CABLES**



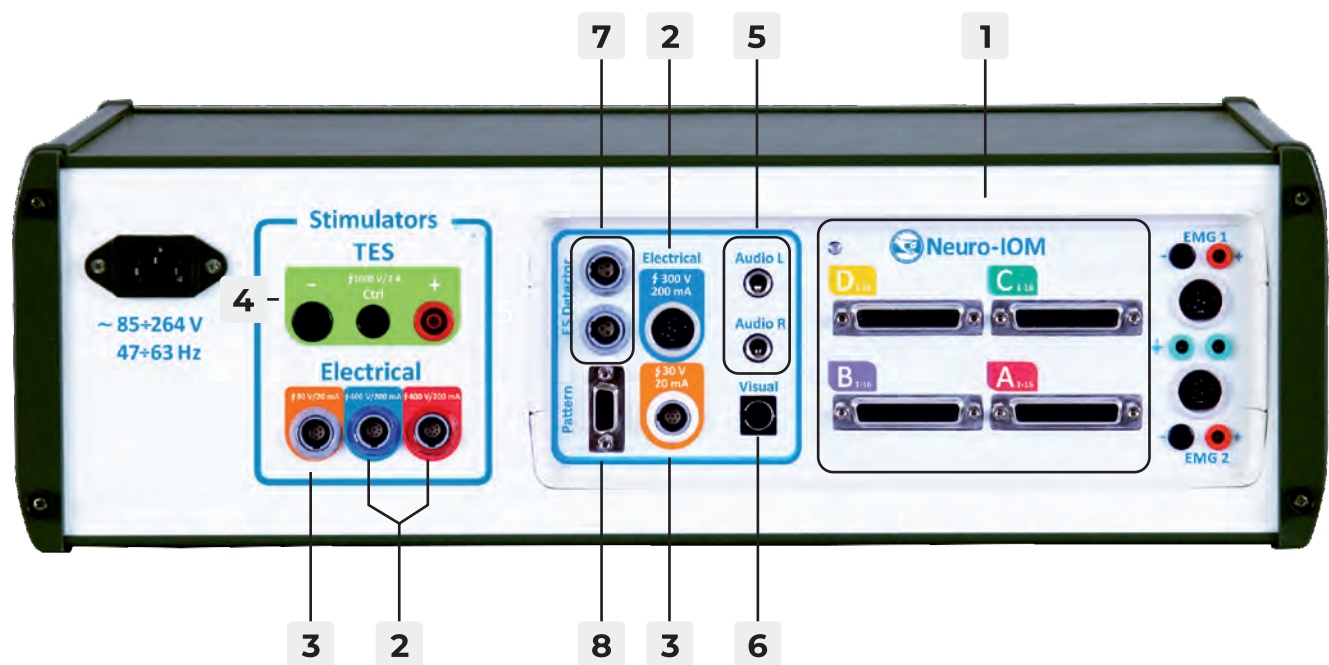
**64 AMPLIFIER
INPUTS (32 BIPOLAR
CHANNELS)**



**SMOOTH-RUNNING
TROLLEY TO MOVE
THE SYSTEM EASILY**

SYSTEM ARCHITECTURE

Neuro-IOM system consists of an electronic unit with built-in amplifiers and stimulators, several pods with 5-meter extension cables, a PC, a set of special electrodes and dedicated software.



Main Specifications

- | | | | |
|---|--|---|------------------------------|
| 1 | up to 64 amplifier inputs (32 bipolar channels) | 5 | auditory stimulator channels |
| 2 | up to 16 electrical stimulator channels | 6 | visual stimulator channels |
| 3 | up to 3 low current stimulator channels | 7 | up to 4 ES detector channels |
| 4 | up to 4 transcranial electrical stimulator channels (can be switched to different outputs) | 8 | pattern-stimulator channel |

Motor evoked potentials (MEP) are used to control the motor pathways, somatosensory evoked potentials (SSEP) are to control the sensory pathways, electroencephalogram (EEG) is to assess the depth of anaesthesia, brain ischemia, epileptiform abnormalities, and direct nerve stimulation is to monitor peripheral nerve integrity. Besides, many other modalities (free-run EMG, AEP, VEP, etc.) can be recorded.



IOM MODALITIES

Neuro-IOM system is delivered with the preset templates ensuring the following modalities: free-run EMG, direct nerve stimulation including pedicle screw test, SSEP, MEP, EEG, AEP, VEP, ECoG, direct cortical stimulation, train-of-four (TOF) stimulation.

PRACTICAL APPLICATION OF MODALITIES:

- Motor evoked potentials to evaluate the integrity of motor pathways.
- Somatosensory evoked potentials to evaluate the integrity of sensory pathways and detect brain and spinal cord ischemia.
- EEG to record and analyze brain activity (functional state of the brain).
- Direct nerve stimulation to control the functional integrity of peripheral nerves.

NEURO-TES
ELECTRONIC SWITCH



DISPOSABLE SUBDERMAL
CORKSCREW NEEDLE
ELECTRODE

AUDITORY STIMULATOR

VISUAL STIMULATOR

NEURO-IOM
ACQUISITION POD (A)



SUBDERMAL NEEDLE
ELECTRODE

ELECTRICAL STIMULATOR POD
(FOR 1-4 CHANNELS)



DISPOSABLE
ADHESIVE ELECTRODE
OR MONOPOLAR
NEEDLE ELECTRODE

LOW CURRENT STIMULATOR POD



ADJUSTABLE PROBE
FOR DIRECT NERVE
STIMULATION

NEURO-IOM ACQUISITION POD (B)



MONOPOLAR NEEDLE
ELECTRODE

ELECTRICAL STIMULATOR POD
(FOR 5-8 CHANNELS)



MONOPOLAR
NEEDLE ELECTRODE
OR DISPOSABLE
ADHESIVE ELECTRODE



MULTIMODAL INTRAOPERATIVE NEUROPHYSIOLOGICAL MONITORING

TRANSCRANIAL ELECTRICAL STIMULATOR

For stimulation of motor cortex in order to elicit MEPs in peripheral muscles. MEPs allow a specialist to monitor the integrity of motor pathways.

LOW CURRENT STIMULATOR

For direct cortical stimulation, direct nerve stimulation and pedicle screw test. During direct nerve stimulation, a surgeon can apply electric current to the nerves in the operative area of risk using a special probe. At that, low current is delivered to the probe. The recording electrodes connected to the amplifier are placed on the muscles innervated by the nerves located in the operative area. As soon as the surgeon stimulates the nerve with the probe, the system will record the obtained muscle response. Thus, the specialist will get a direct positive feedback concerning the nerve location. During direct cortical stimulation MEPs are elicited when the surgeon stimulates open cortex directly which allows mapping the eloquent brain areas.



TES ELECTRONIC SWITCH

During the monitoring it is often required to change stimulation site, for example, stimulate left or right side, arm or leg area. For this purpose, a special electronic switch is supplied. It has 4 pairs of outputs to attach the stimulating electrodes. A pair of outputs to deliver a stimulus can be chosen in Neuro-IOM.NET software. The corkscrew electrodes are commonly used for the transcranial electrical stimulation.

LOW CURRENT STIMULATOR POD

The pod with 5-meter cable is intended to attach different electrodes for direct nerve stimulation. The wide range of probes can be used: bipolar, monopolar, concentric, hook, etc.

IOM APPLICATIONS

Spine surgery:

- cervical/thoracic/lumbosacral decompression surgery
- pedicle screw positioning
- intradural extramedullary (IDEM) spinal tumors
- scoliosis surgery
- tethered spinal cord syndrome
- dorsal rhizotomy



8-CHANNEL ELECTRICAL STIMULATOR

This device allows stimulating up to 8 peripheral nerves simultaneously or in any sequence to elicit SSEPs. Using an amplifier, it is possible to record SSEPs obtained from various sites of peripheral nervous system along the efferent pathways. SSEPs are sensitive to peripheral nerve events, spinal cord pathway injuries and also to regional blood flow changes (spinal cord and brain ischemia).



AMPLIFIER

The system is equipped with a reliable low-noise universal neurophysiological amplifier, allowing high-quality acquisition. The system can be supplied with 16-, 32- or 64-bipolar channel amplifier upon customer's request (16-, 32- and 64-channel amplifiers have 32, 64 and 128 inputs correspondingly).



ELECTRICAL STIMULATOR PODS

The system is equipped with 2 electrical stimulator pods (for channels 1-4 and 5-8). Each pod has 4 pairs of outputs to attach the stimulating electrodes. The outputs can function simultaneously. The electrodes placed at upper extremities are connected to one pod, and at lower extremities – to another one.

ACQUISITION PODS

The system is equipped with several pods with 5-meter shielded cables to attach the recording electrodes. The electrodes are usually placed according to the selected test. The signal acquisition at IOM is mostly done with the subdermal needle or corkscrew electrodes.

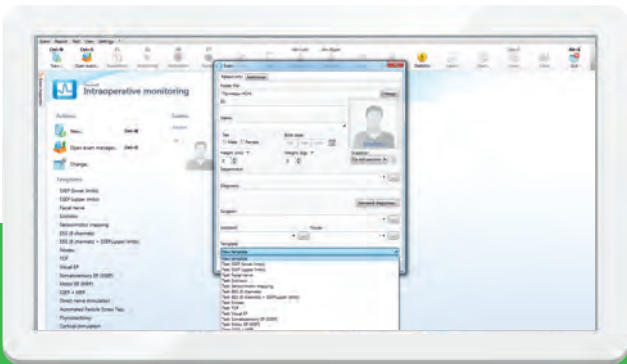
Vascular surgery:

- aorta surgery
- blood vessel replacement
- endarterectomy
- heart surgery

Brain surgery. Intraoperative brain and cranial nerve monitoring. Mapping of functional areas of the cerebral cortex and brainstem:

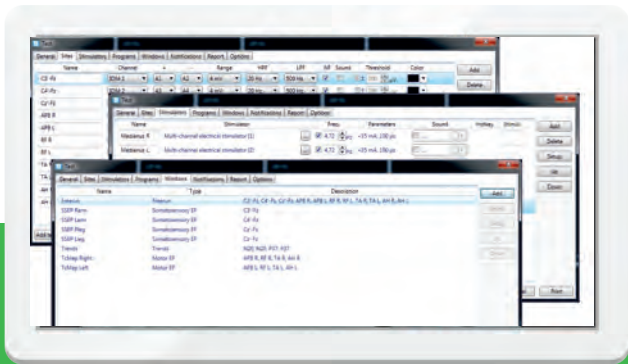
- brain tumors (and other abnormalities in motor, sensory, auditory, visual cortical areas and their pathways)
- facial nerve monitoring
- epilepsy surgery
- recurrent laryngeal nerve monitoring during neck and thyroid surgery
- movement disorder surgery
- chiasmo-sellar area (CSAB) monitoring
- aneurysm clipping

NEURO-IOM.NET SOFTWARE



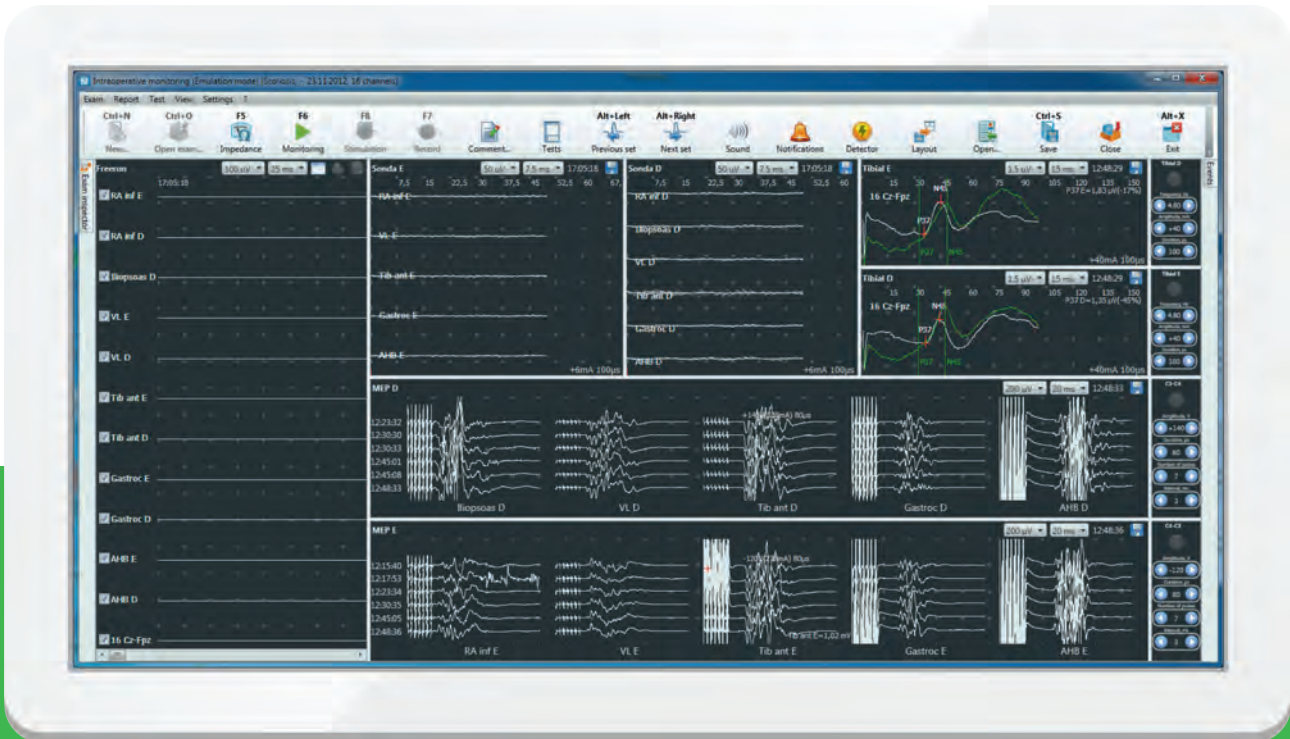
MONITORING START

To begin the monitoring, just enter the patient's data and choose one of the test templates. The system provides a set of default templates for various types of surgeries.



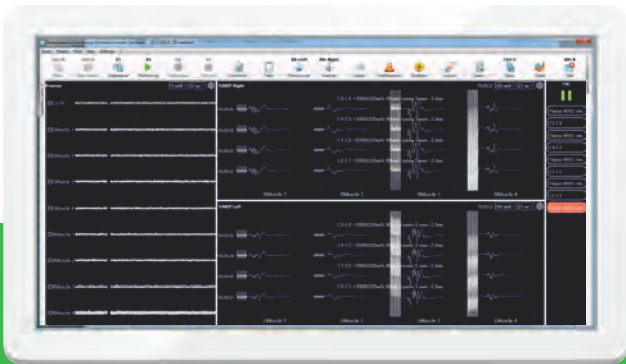
TEST TEMPLATE EDITOR

You can create your own test templates or edit existing ones by selecting stimulation and recording sites and also adjusting the stimulation parameters for the current clinical case.



TEST WINDOW LAYOUTS

The possibility to create various layouts of test windows and quick switching between them allows accommodating a huge amount of information obtained during multimodal monitoring.



STIMULATION PROGRAMS

A wide range of preset stimulation programs can be used to automate monitoring during various operations. You can also select the stimulation parameters to create your own programs.



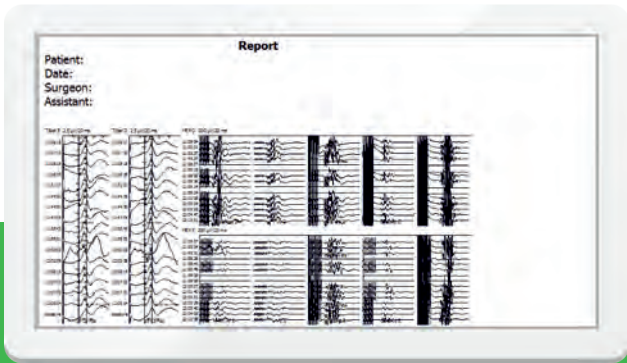
VIDEO RECORDING DURING SURGERY

The video from up to three video cameras can be displayed on the screen. The video is recorded and synchronized with other data.



THE TRENDS WINDOW

It is possible to view the graphs showing the dynamics during surgery displayed as trends.



MONITORING REPORT

The software allows generating the monitoring report automatically in RTF or MS Word format. The report includes traces and text comments. It can be edited using the built-in editor or MS Word and printed on an office PC printer.

NEURO-IOM VERSIONS

NEURO-IOM	32/B	32/S	16/S	Solo
				
IOM amplifier inputs (bipolar channels)	64 (32)	64 (32)	32 (16)	16 (8)
Electrical stimulator channel	12	4-12*	4-12*	4
Low current stimulator channel	2	1	1	1
Transcranial electrical stimulator channel	4	+ **	+ **	—
Auditory stimulator channel	2	2	2	—
Visual stimulator channel	2	2	2	—
ES detector channel	2	2	2	1
Pattern-stimulator channel	1	1	1	—



* If multichannel electrical stimulator is used



** If Neuro-TES transcranial electrical stimulator is used

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