



simplifying **Neurosurgery**

Stereotactic & Functional Neurosurgery

Global leaders for innovative and dependable
microelectrode recording systems

Research Applications

Advance neuroscience research without
sacrificing clinical efficiency

Medical Consumables

NeuroProbe, cannulae, & electrode input cables
for any MER system

Technical Support

On-site and remote case support, training,
maintenance and more

A letter from the President



Imad Younis
President

Since our inception in 1993, Alpha Omega has played an important role in fostering innovation and development in two main areas - neuroscience research and functional neurosurgery. Over the last two decades, we have pioneered leading edge technology in both fields and humbly received international recognition from numerous global experts. In 2013, we introduced the latest innovation in neuroscience technology and the new gold-standard in MER: The Neuro Omega. Alongside this novel MER solution are many more updates to our current neurosurgery suite designed to fit your needs and exceed your expectations, day after day, with the utmost precision and reliability in the operating room.

One of the most important aspects of Alpha Omega's success is based on the unique and personal relationships we have maintained with our customers. In today's fast-paced world of evolving technology, smart decisions are critical for innovation to bring results of improved patient outcomes. We are here to serve you, and are glad to welcome you into the Alpha Omega family of satisfied customers!

Mission & Values

Improve the quality of patient care in the areas of neurology and neurosurgery, by developing superior technological solutions

Provide state-of-the-art tools for those who work to reveal the mystery of the brain and find cures for neurological disorders.

Relentlessly endeavor for the highest standards of reliability and quality in our products

Be identified as a company of dedication, honesty, integrity, and outstanding customer support

Don't take it from us...
here's what some of our customers have to say



Alpha Omega is the world's best company for producing technologically sophisticated, versatile, and highly usable physiological recording equipment. The devices are highly robust and functional. In the clinical setting, this translates into excellent and reliable recordings which result in optimal localization and maximum benefit for the patient. In the research setting the same qualities allow the scientist to focus on the experiments and the resulting data and not on trouble-shooting the system. The company is instantly responsive and willing to modify their products to suit the needs of each individual user. They are without question the best in the field.

Emad Eskandar, MD Boston MA.



I have used Alpha Omega equipment for 7 years, after having used equipment from a number of other vendors in the past. I have found the Alpha Omega equipment to be the most reliable, with by far the best noise reduction hardware and software available, as well as easy-to-use and powerful data analysis tools. Furthermore, the company's support staff is without peer.

Alon Y. Mogilner, MD, PhD, NYU Langone Medical Center



Over the years, I have had experience with all of the major microelectrode recording systems, and have found Alpha Omega to be superior in terms of clinical and research applications. The support staff is extremely responsive to questions and helpful in troubleshooting any problems that arise. In fact, the cadre of support people employed by Alpha Omega are some of the most hardworking, intelligent, and insightful in the field, and a credit to the company that they serve. The nimbleness of the company in responding to end-user requests for design improvements in everything from electrodes to software, is admirable.

Aviva Abosch, M.D., Ph.D., University of Colorado

Why MER?

Microelectrode Recording (MER) remains the gold standard for optimal localization of DBS targets

Assessment of electrophysiological activity confirms the structural location

Real-time feedback to account for inaccuracies during planning stage

Critical research tool for exploration of DBS targets

"Ultimate spatial localization of the DBS electrode should be based on the electrophysiological properties of the tissue, ie, the underlying neuronal activity, rather than the anatomically defined location."

Abosch, Aviva, et al. "An assessment of current brain targets for deep brain stimulation surgery with susceptibility-weighted imaging at 7 tesla." Neurosurgery 67.6 (2010): 1745.

"Functional imaging and neuroelectrophysiological data will be essential to the development of targets, trials, and unbiased assessment of clinical response."

Lyons, Mark K. "Deep brain stimulation: current and future clinical applications." Mayo Clinic Proceedings. Vol. 86. No. 7. Elsevier, 2011.

"Factors that call for physiological mapping to refine electrode location following initial anatomical targeting include imaging inaccuracy or distortion (particularly MRI); the need to refine target selection related in part to incomplete understanding of the relationship of anatomy, physiology, and clinical outcome; inaccuracy of frame- or frameless-guided navigation; and/or brain shift due to positioning, loss of cerebrospinal fluid, pressure shifts, and/or pneumocephalus"

Gross, Robert E., et al. "Electrophysiological mapping for the implantation of deep brain stimulators for Parkinson's disease and tremor." Movement disorders 21.S14 (2006): S259-S283.

"...a relatively inaccurate anatomical placement can be refined (and presumably improved) based on intraoperative physiological or neurological data."

Starr, Philip A., et al. "Subthalamic nucleus deep brain stimulator placement using high-field interventional magnetic resonance imaging and a skull-mounted aiming device: technique and application accuracy." Journal of neurosurgery 112.3 (2010): 479.

"Despite improvements in anatomic imaging of the basal ganglia, microelectrode recording is still an invaluable tool in locating appropriate targets for neurosurgical intervention."

Lozano, Andres M., et al. "Basal ganglia physiology and deep brain stimulation." Movement Disorders 25.S1 (2010): S71-S75.

"We therefore suggest that optimization of DBS outcome in patients with Parkinson's disease could be achieved by intraoperative analysis of STN beta oscillations by microelectrode (as in this study) or macroelectrode (Chenet al., 2006) recording."

Zaidel, Adam, et al. "Subthalamic span of oscillations predicts deep brain stimulation efficacy for patients with Parkinson's disease." Brain 133.7 (2010): 2007-2021.

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NeuroSmart

Smart Portable MER system with advanced target localization capabilities

- | Superior Performance
- | Automatic Navigation
- | Online Data Replay
- | Lead Confirmation Tools
- | Integrated Research Capabilities



Alpha Omega has been at the forefront of MER technology for advanced localization of surgical targets in Deep Brain Stimulation (DBS) implantation for 25 years. NeuroSmart brings automatic navigation and advanced connectivity tools in a portable, accessible and affordable package to fit your surgical and research needs. The modern and futuristic appearance of the NeuroSmart was designed with robustness in mind. With the built-in FDA& CE approved HaGuide, the NeuroSmart allows the user to automatically locate the implantation target with enhanced confidence.

With the MATLAB data access, NeuroSmart is ideal for DBS centers interested in simple research capabilities.

Key Qualities

- > **5 Spike (SPK) and 5 Local Field Potential (LFP) channels**
- > Advanced capabilities for enhanced target localization based on **HaGuide automatic navigation**
- > Newly designed user interface and remote control for **enhanced user experience**
- > Conformance to highest Production and Quality Control standards for **superior Design and Robust performance**
- > **Online Data Replay** offers quick review of the entire trajectory data both during and after the procedure
- > **Analog & Digital Input and Outputs** package allows syncing with third-party systems
- > **Data streaming through MATLAB and C++** enables online data access and processing during surgery
- > **Connectivity to DBS lead** with integrated LFP acquisition and stimulation tools to support Lead Confirmation
- > **Stimulation pedal** for hands-free kinesthetic testing

Newly Designed Remote Control

The NeuroSmart is equipped with newly designed remote control for enhanced user experience and procedural interactions.

- > **Ergonomic design** for ease of use in the OR
- > **Smart Button** for automatic navigation including automatic adjustment of movement step size
- > **Volume, Impedance and Data Save control buttons**
- > **Speed adjustable** dial for convenient Drive control
- > **Built-in LCD screen with channel control Stimulation ON/OFF and Amplitude control buttons**



User interface

1 Flexible Workspace Builder

Up to 5 channels for spikes (SPK) and up to 5 channels for Local Field Potentials (LFP). Number of channels decided by the user per procedure

2 Wide stimulation range for micro and macro threshold stimulation tests

3 Switch from recording to stimulation with the push of a button

4 Gradual increase and decrease of stimulation current during stimulation for added safety

5 Current monitor system ensures accurate delivery of stimulation current

6 Clear on-screen trajectory view, automatically builds electrophysiological map as the electrode advances in the brain

7 Electrode depth and distance from target are both clearly displayed on screen, with easy reference to macro and micro tip locations

8 Built-in HaGuide automatic navigation assistant with stimulation recommendation capability

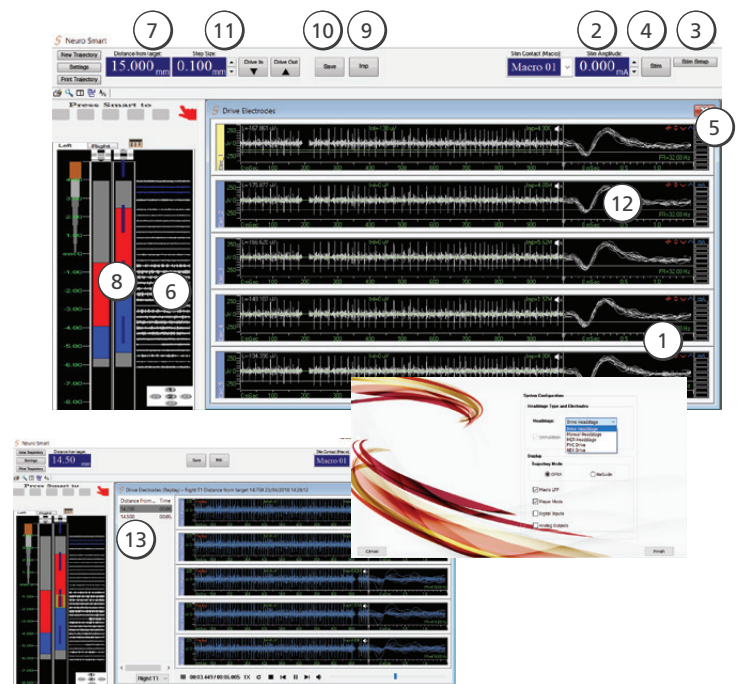
9 Measure the impedance of all micro contacts simultaneously to ensure recording integrity

10 Save data for post-case analysis in MATLAB or other formats

11 Pre-set Step Size option to maximize precision of the microdrive and improve safety and control

12 Adjustable threshold for spike detection

13 Online Data Replay off all the recordings from the procedure



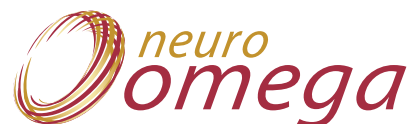
Stimulation Pedal

For hands-free stimulation

The pedal is fully-integrated with a simple USB plug-and-play interface and enables delivering electrical stimulation from within the sterile field.

The Stimulation Pedal allows for uninterrupted kinesthetic testing while applying electrical stimulation. The pedal is designed to be waterproof as well as compliant with EMC and electrical safety standards.





Neuro Omega

The new gold-standard in MER and the latest innovation in neuroscience technology

- | User-friendly built-in EEG montages
- | Integrated research platform
- | Closed loop and 3D stimulation possibilities
- | Expandable channel count

The Neuro Omega is the latest technological breakthrough in MER. Innovative software and hardware implemented in the Neuro Omega make this all-encompassing system ideal for both clinical MER applications and advanced research needs. MER users gain total experimental control while benefiting from Alpha Omega's highest performance, quality and clinical efficacy.

Key Qualities

- > Expandable up to 122 channels
- > Online data streaming to MATLAB and C++
- > Closed loop stimulation control through data streaming or direct-to-processor scripting
- > Unparalleled stimulation capabilities including conditional stimulation, programmable stimulation, and arbitrary wave definition
- > Multi-source, multi-polar stimulation allows for 3D stimulation control
- > Single cable exiting the sterile field for electrode positioning, recording and stimulation
- > Online statistics including evoked potentials
- > Unique dual screen display and customizable workspace
- > Integrated analog and digital inputs and outputs



NeuroOmega Stimulation Foot Pedal

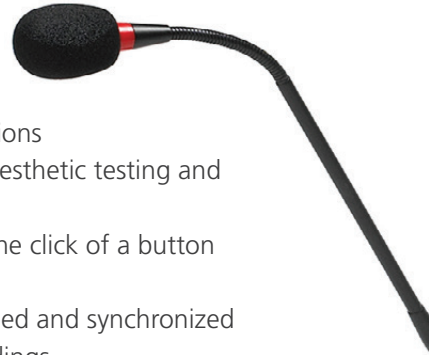
- > A **hands-free solution** for uninterrupted kinesthetic testing while simultaneously controlling the application of stimulation currents
- > Also enables delivering electrical stimulation
- > **from within the Sterile field**
- > A **fully-integrated and simple USB plug-and-play interface** seamlessly connects to NeuroOmega for independent control via software and handheld remote
- > **Waterproof** as well as **compliant with EMC** and electrical **safety standards**

NeuroMic

The NeuroMic is a microphone fully-integrated with our data acquisition systems via a simple USB plug-and-play interface. This enables seamless voice recording fully time-synchronized with electrophysiological recordings, annotations of event like patient feedback and side effects for both clinical and research applications. The data recoded using NeuroMic can also be easily imported into MATLAB for analysis along with electrophysiological recordings.

- > Record physician voice annotations
 - > Record patient voice during kinesthetic testing and speech-related research
 - > Start and stop recording with the click of a button
 - > USB Plug and play solution
 - > Voice recordings are timestamped and synchronized with electrophysiological recordings
- Recordings are saved in a simple WAV audio format

**Alpha Omega Sonus microphonic-free electrodes recommended for speech artifact suppression in electrophysiological recordings*



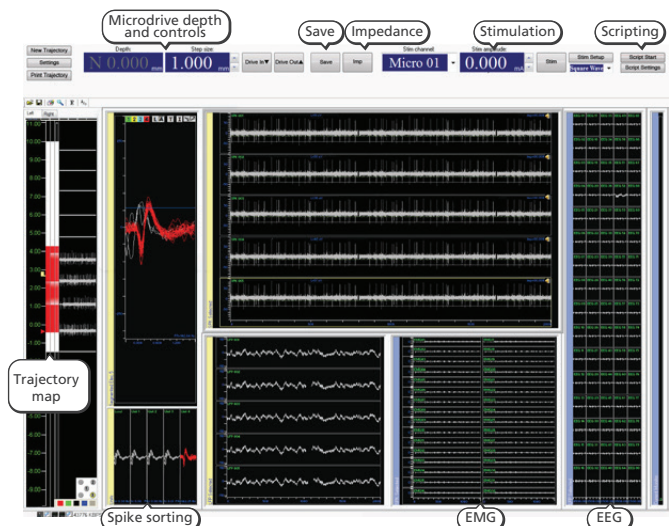
Headbox Module

- > Up to 7 additional modules
- 16 channels per module with referential and differential recording for EEG, EMG, & ECoG
- > Portable and compact
- > Advanced multi-source stimulation capabilities for peripheral nerve and ECoG
- > Medical grade, industry standard touch proof connectors



User interface

- > **Trajectory view** with pattern recognition for increased neural activity
- > **10 channels built into the microdrive** for recording and stimulation with micro and macro spike and LFP recordings
- > **Configurable with up to 122 channels** integrated all in one system:
 - ▶ Micro and Macro electrodes ▶ LFP ▶ EEG ▶ EMG ▶ ECoG
- > One click **impedance check** for all channels and electrode types
- > **Flexible stimulation** current ranges for microelectrode test stimulations, peripheral nerve stimulation and other stimulation research requirements
- > Complete **stimulation control** on the basic stimulation parameters and the ability to create unique waveforms
- > **Save data** for post-case analysis in MATLAB or other formats
- > **User-defined Events** allow for easy marking and commenting onto data file



NeuroNav

Compact MER solution for simplicity in the OR

- | Streamlined setup
- | Compact
- | Cost-effective

The NeuroNav is a compact, field-proven MER system, used clinically in the localization of surgical targets for the implantation of Deep Brain Stimulation (DBS) electrodes or ablation of target structures, in the treatment of neurological and psychiatric diseases. The NeuroNav allows for safe and accurate introduction of electrodes into the brain, while recording neural activity, stimulating neural tissue, and guiding the user to the optimal target. This system is ideal for all DBS centers and community hospitals interested in flexible usability, affordability, and compact size.

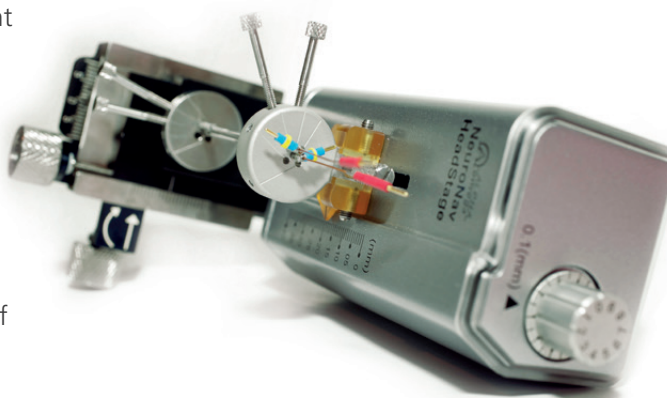
Key Qualities

- > Quick set-up with user friendly interface & seamless operation capabilities
- > Handheld remote allows completely independent operation from within sterile field
- > Straightforward software interface specifically designed to streamline the MER procedure
- > Single cable exits sterile field for electrode positioning, recording and stimulation, which minimizes risk of contamination
- > Minimize impact of MER on O.R. time
- > Optimal signal clarity due to direct connection of electrodes to system amplifiers
- > Available for rental or fee-per-use



NeuroNav Headstage

- > Pre-assembled microdrive for quick and easy setup in the sterile field
- > Built in capability for recording and stimulation
- > Lightweight, low impact on frameless or frame based procedure
- > XY stage and 5-hole bungen allows trajectory adjustments without frame manipulation
- > Direct implantation of DBS electrode without backing up drive or removing cannulae
- > Fully compatible with all stereotactic frames
- > Precision movement with an electronic drive
- > Automatic or manual microdrive capabilities



User interface

1 Multi-channel recording capabilities.

A total of up to 10 recording channels: up to 5 for spike activity measured from electrode micro contact and up to 5 for local field potentials (LFP) measured at the macro contact

2 Wide stimulation range for micro and macro threshold stimulation tests

3 Switch from recording to stimulation with the push of a button

4 Gradual increase and decrease of stimulation current during stimulation for added safety

5 Current feedback system ensures accurate delivery of stimulation current

6 Clear on-screen trajectory view, automatically builds electrophysiological map as the electrode advances in the brain

7 Electrode depth and distance from target are both clearly displayed on screen, with easy reference to macro and micro tip locations

8 Proprietary On-line Pattern Recognition Algorithm for optimal localization of increased neural activity

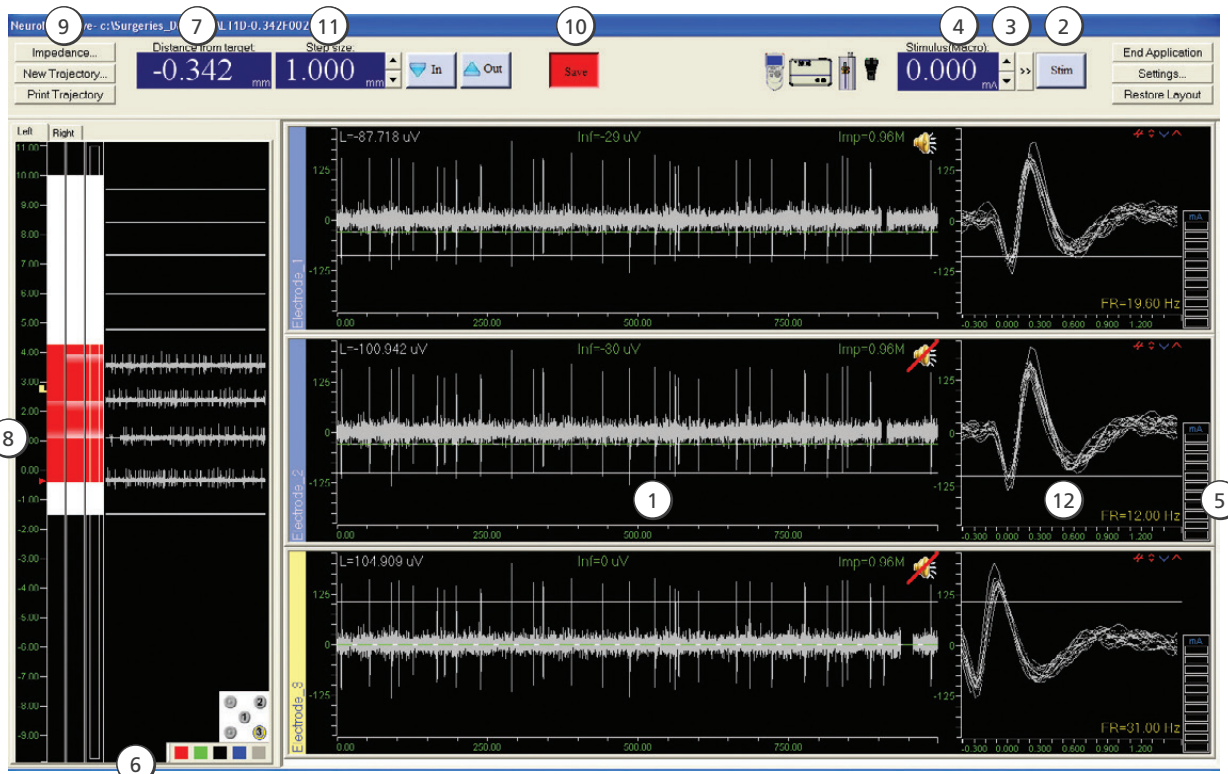
9 Measure the impedance of all micro contacts simultaneously to ensure recording integrity

10 Save data for post-case analysis in MATLAB or other formats

11 Pre-set Step Size option to maximize precision of the microdrive and improve safety and control

12 Adjustable threshold for spike detection

13 User-friendly, handheld remote control allows control of all system functions from outside or inside the sterile zone

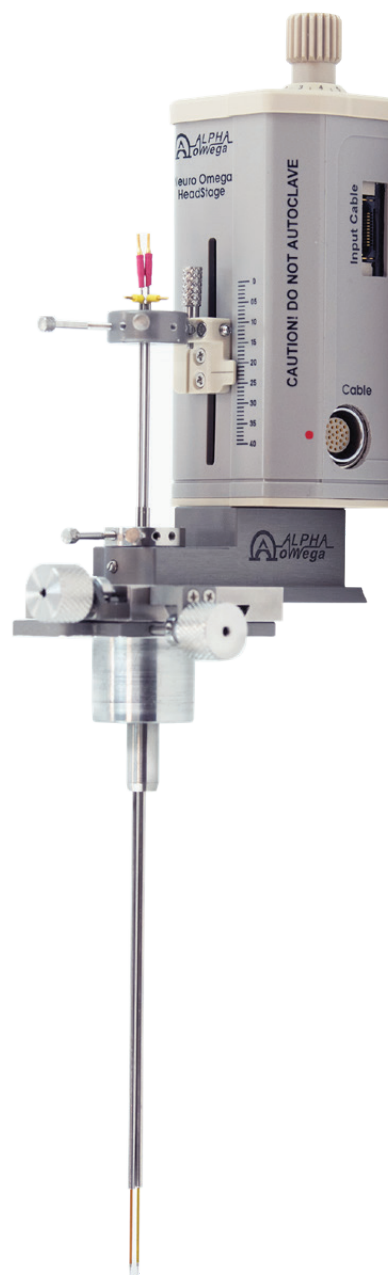


NeuroFortis

Automatic, motorized, washable drive.
Compatible with all Alpha Omega systems

Alpha Omega utilized its 25 years of experience in designing and building OR equipment and reflected this vast experience in the new NeuroFortis Drive Headstage design and manufacturing.
Among the advancements of this new HeadStage:

- > Operated by **remote control** or manually
- > **High-quality material**, durable design and production control for maximum durability in aggressive OR environment
- > Electronic or Manual Compatible with hand or **machine cleaning**
- > **Stands in Robert Koch Institute recommendations** for cleaning and sterilization of medical devices
- > **Pre-assembled with Built-in recording and stimulation capability**
- > New ergonomic knob design for user-friendly and **accurate** manual driving
- > XY stage and 5-hole begun allows **trajectory adjustments** without frame manipulation
- > **Direct implantation** of DBS electrode without backing up drive or removing cannulas
- > **High amplifier input** range allows non-stimulating channels to record throughout stimulation
- > **Lightweight**, low impact on frameless or frame based procedure
- > **Fully compatible with all stereotactic frames**
- > **Precision movement** with an electronic drive



Also Available



Autoclavable,
washable,
manual drive
headstage with
built in digitizer
and amplifier



Autoclavable,
washable,
manual drive

HaGuide

Simple Procedure

HaGuide is the only FDA approved software that can drive through the trajectory in predefined steps to automatically detect STN boundaries as well as the separation between the dorsolateral oscillatory (DLOR) and ventromedial nonoscillatory regions (VMNR)."

Accuracy

HaGuide demonstrates a submillimetric match between surgeon/neurophysiologist and HaGuide for entry and exit of the STN as well as optimal DBS implant depth recommendation based on hundreds of trajectories of leading Neurosurgery centers in USA, Europe and Asia.

Efficiency & Time Saving

Usage with leading Implanters has demonstrated Efficiency and Saving time. HaGuide allows performing MER session within up to 10 minutes.

Alpha Omega together with **Prof. Bergman, Prof. Israel** and their colleagues developed **HaGuide**, a real time software solution designed to provide power spectral density (PSD) graphs

Peer reviewed abstracts

"After thirty years of experience with microelectrode recording in different settings, I decided to test HaGuide in some surgeries: HaGuide is the ultimate advising tool for interpreting microelectrode."

- **José Luis Relova**, MD, PhD, Santiago Clinic Hospital

ASSFN 2016 abstract

"A semi-automated software for estimating subthalamic nucleus boundaries and assisting optimal target selection for deep brain stimulation implantation surgery"

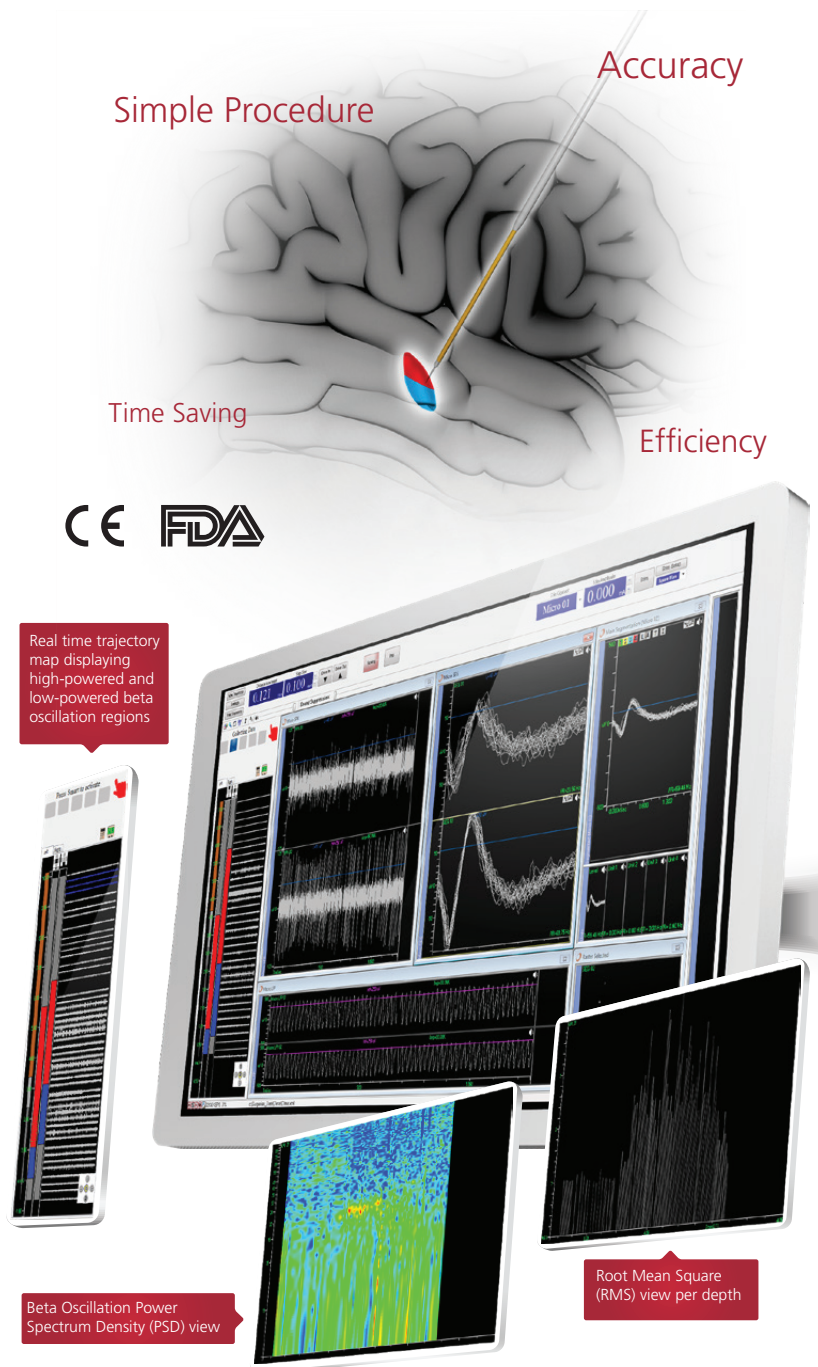
Conclusion: These data demonstrate that the software can reliably and accurately estimate entry into and exit from STN, and select the optimal track for DBS implantation.

Simple Procedure

Accuracy

Time Saving

Efficiency



WSSFN 2017 abstract

"Automated navigation system for detection of the subthalamic nucleus reduces deep brain stimulation surgery time"

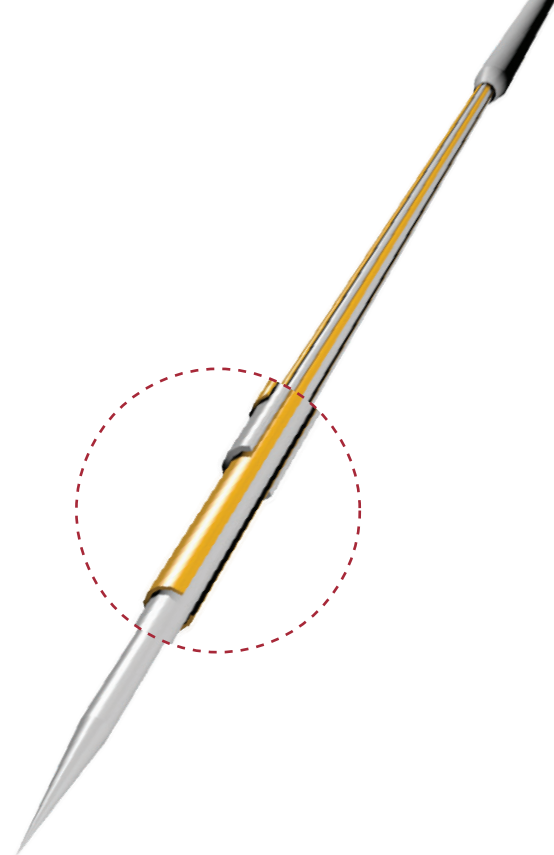
Conclusion: Automatic navigation (AN) is safe and has a high level of reliability. Results of an MER track can easily be displayed in an inbuilt, user friendly & graphical form..

Medical Consumables

Sonus

Neuroprobe Sonus features

- | Continue recording during drive movement
- | Eliminates drive noise
- | Recording while communicating with patient
- | Record and listen at full volume
- | Enhanced signal recording quality

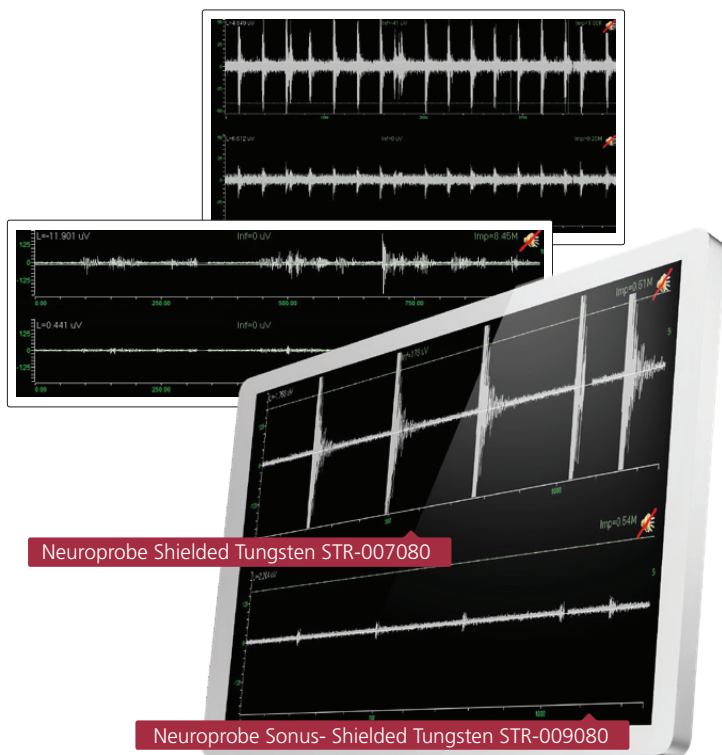


Alpha Omega delivers the highest standard in MER performance.

Our new Sonus Neuroprobes are uniquely designed to record high quality, clean signal

Proprietary technology incorporated in the **Neuroprobe** electrode family enables exceptional signal quality.

Signal Quality Testing



Prof. Hagai Bergman & Dr. Zvi Israel
on their Sonus experience:

“ Sonus has a unique signal quality facilitating faster, easier and clearer target identification. Using Sonus we were able to freely communicate with patients having no microphonic artifacts. In my experience Sonus electrodes streamlines our procedure and have become my new standard of choice. ”

Prof. Hagai Bergman MD,PHD

Gutmann Professor of Brain Research
The Hebrew University – Hadassah medical school
Jerusalem, Israel

Dr. Zvi Israel

Director, Center for Functional and Restorative
Surgery, Dept. of Neurosurgery. Jerusalem, Israel

Alpha Omega manufactures a large selection of electrodes, guide tubes, and electrode input cables of the highest quality and performance. The diverse selection can be further customized and is compatible with all drives and MER systems. Our consumables are now offered pre-sterilized to save time, cost, and hassle in the OR.

Key Qualities

- > Customizable specifications upon request
- > Compatible with any drive
- > Compatible with any MER system
- > Superior recording quality, impedance consistency
- > Variety of microelectrodes in different materials
- > Tapered or standard guide tubes

Pre-Sterile Option Benefits

- > Increase case efficiency by eliminating sterilization procedure
- > Avoid electrode tip damage during processing
- > Safer handling of the microelectrodes
- > Open only the electrodes needed for the operation
- > **Free samples upon request!**

NeuroProbes Sterile and non sterile disposables NeuroProbes for MER are intended to be used in neurosurgery for temporary stimulation of, or recording electrical signals of a small area in the brain "



Cannulas Sterile and non sterile disposables Cannulas for MER are intended for guiding the NeuroProbes in Neurosurgery for temporary stimulation of, or recording electrical signals of a small area in the brain "



Electrode Input Cable This cable connects the micro and macro contacts of the electrode to the NeuroNav or the Neuro Omega Headstage.



Application & Technical Support

Alpha Omega prides itself on the extraordinary level of service and personal attention we dedicate to each and every one of our clients to all products:

- | | |
|-------------------------------|----------------------------------|
| Remote & On-site Case Support | System Upgrades |
| Rentals and fee-per-use plans | Installation Packages |
| Service Contracts | In-Service Training for OR Staff |
| Performance Maintenance | Software Upgrades |
| System Refurbishment Plans | Warranty extension |



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