

neuro | mate® Frameless Gen II stereotactic robot

neuromate® is specially designed and developed for stereotactic applications in neurosurgery. It assists the surgeon in the operating tasks by providing stable, accurate, and repeatable mechanical guidance for surgical instruments.

neuromate® automatically and accurately ensures the correct stereotactic angular and spatial positioning of surgical instruments, thereby reducing potential human errors.



neuromate® is driven by an image-based surgical planning station, with interactive 3D displays providing visualization of anatomical structures and brain targets. The planning software can process 3D imaging datasets from Computed Tomography (CT) and Magnetic Resonance Imaging (MRI), and 2D images from X-rays.

Once the planning phase is complete, the *neuromate*® registers the patient using a stereotactic frame or using the frameless system. The robot arm moves with high precision and safety along the planned trajectory under the surgeon's supervision via a remote control.

The *neuromate*® provides a particularly stable platform for an instrument holder or tool guide. The robot arm does not come in direct contact with the patient's head. The navigation station displays the tool position on anatomical images in real time throughout the procedure.

NOTE: The *neuromate*® robot is a CE marked device and is cleared for sale in the USA.

Key safety features

- Activated by safety trigger
- Collision avoidance through defined safety volumes
- Non-backdrivable joints prevent any motion in the event of power failure, ensuring total stability
- Dual encoder feedback for continuous fail-safe accuracy validation
- Stable rigid attachment with custom adaptor for frame or head holder
- Main power ON/OFF switch, safety key-based remote control

Specification

Lifetime	10 years with regular maintenance schedule	
Standard dimensions (L x W x H)	125 cm x 70 cm x 125 cm Height and length are customisable to installation site requirements	
Dimension of arm end	9 cm x 8 cm	
Weight	180 kg (arm weight: 30 kg); floor pressure: 0.64 N/mm ²	
Number of links	4 + 1 interchangeable tool holder	
Number of joints	5	
Degrees of freedom	5 rotational + 1 linear	
Instrument payload	5 kg (1 kg for maximal accuracy)	
Mechanical resistance	Resistant to forces up to 70 kg	
Electrical insulation	Type BF, patient isolated	
Speed	Linear	max. 100 mm/s
	Angular	max. 0.075 rad/s for each joint
Joint rotation angles	±160°, ±160°, ±90°, ±160°, ±90°	
Arm accessible volume	Half-sphere of 1 m radius	
Arm working volume	Horizontal cylinder centred 81 cm away from first robot axis, with diameter 18 cm and length 20 cm <i>(Customisable safety features may render some trajectories not executable)</i>	
Arm positions	Up to 4 selectable arm configurations to reach a target position and angle	
Manual actuation	Possible with mechanical wrench (in case of emergency)	
Cleaning	Isopropyl alcohol on a damp nonwoven cloth, or similar disinfectant product	
Mobility	3 wheels, mechanical raising system for secure immobilization	
Sterility	Disposable sterile drapes available for the robot arm and remote control	
Transportation and storage conditions	Temperature	-40 °C to +70 °C
	Relative humidity	10% to 95%, non-condensing
	Pressure	500 hPa to 1600 hPa
Operating conditions	Temperature	+15 °C to +25 °C
	Relative humidity	10% to 75%, non-condensing
	Pressure	700 hPa to 1060 hPa
Power supply	115 V or 230 V, 50 Hz–60 Hz, 400 W (2 plugs)	

Planning and navigation station

Software	IVS VoXim®/neuromate™
Computer	Microsoft® Windows PC
Communication with the robot	RS-232 serial link
Data transfer	DICOM 3.0

Regulatory compliance

Robot	IEC 60601-1:2005 + AC1:2006 + AC2:2007. Medical electrical equipment – Part 1: General requirements for safety
	IEC 60601-1-2: 2007. Medical electrical equipment – Part 1-2: General requirements for safety – Collateral standard: electromagnetic compatibility – Requirements and tests
	IEC 60601-1-4: 2000 Consol. Ed. 1.1. Medical electrical equipment – Part 1-4: General requirements for safety – Collateral standard: Programmable electrical medical systems
	IEC 62304: 2006 Medical device software - Software life cycle processes
	IEC 62366: 2007 Medical devices – Application of usability engineering to medical devices
	ISO 14971: 2007 Application of risk management to medical devices

* In the USA, neuromate® is known as neuromate® Frameless Gen II stereotactic robot.

For worldwide contact details, please visit our main web site at www.renishaw.com/contact