3D Guidance®

Tracking Technology for Your Most Realistic Training or Simulation System

NDI


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Electromagnetic Tracking Technology for Your Image-Guided Training or Simulation System

As part of the 3D Guidance® product suite, the driveBAY™ and trakSTAR™ electromagnetic (EM) tracking systems deliver exceptional performance and value. They provide highly accurate, unobstructed 6DOF (six-degrees-of-freedom) tracking of reusable sensors embedded into surgical tools, probes, and needles. Both systems can simultaneously track up to four EM tools and support interchangeable sensor sizes.

System Features

- **Dynamic 6DOF tracking of sensor position and orientation**
- **No line of sight needed between sensors and transmitter**
- **Miniaturized reusable passive sensors as small as 0.56 mm-diameter**
- **High metal immunity with no distortion from nonmagnetic materials**
- **Two transmitter designs to support optimally sized tracking volumes**

Customer Integrations

Ready-to-use configuration supports easy and cost-effective integration into simulators and trainers. The tracking volume, measurement rate, sensors and software interface can also be adapted to your unique system requirements.

Biopsy Needle Guidance

Localize and track the 3D position and trajectory of the tip of the biopsy needle during a training procedure by integrating our reusable needle with an embedded sensor, then attaching another sensor to an ultrasound probe.

Oncology

Guide therapeutic probes as part of laparoscopic navigation training and dynamically track needle tips for precise targeting and delivery of radiotherapy.

Laparoscopic Surgery

Track the approach, angle, and movement of laparoscopic instruments within virtual and/or lifelike organs for training in various surgical techniques across various medical procedures.

GI Endoscopy and Bronchoscopy

Localize and guide rigid and flexible scopes through virtual bronchial airways, intestinal loops, and other anatomical tracts to develop user hand-eye coordination and scope maneuvering skills.

Arthroscopic Surgery

Visualize the position and orientation of probes, graspers, punches, and shavers within a virtual joint for training of precise tool placement and development of visual-spatial dexterity.

Lumbar Puncture and Epidural

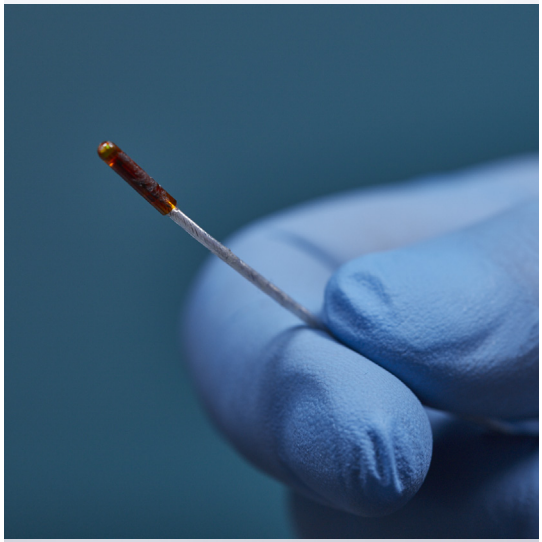
Track the position and trajectory of the needle inside the phantom to replicate safe epidural needle injection and catheter placement as well as lumbar puncture and cerebrospinal fluid collection.

System Components

The 3D Guidance® product suite utilizes three main components consisting of the electronics unit, sensors, and transmitter. Together they allow for the most subtle of tool movements to be instantly tracked and visualized within the simulation or training interface.

Electronics Unit:

A preamplifier embedded inside the electronics unit amplifies and digitizes the signal (current) relayed from the sensor coil. The electronics unit calculates the sensor position and orientation data and communicates this data to the host computer.



Sensor:

The sensor consists of a small coil in which a small signal is induced when the sensor enters the EM field.

Transmitter:

The transmitter emits a low-intensity, time-varying EM field that establishes the measurement volume in combination with the sensor. Low latency and fast update rates allow sensor position and orientation data to integrate instantly and seamlessly within medical imaging software.

Electronics Unit

The 3D Guidance system is available in driveBAY or trakSTAR configurations. Both share the same accuracy, reliability, and versatility. The trakSTAR is a desktop unit that connects directly into a main power source, while the smaller driveBAY fits inside the drive bay of a computer or imaging cart. The ready-to-use configuration supports easy and cost-effective integration into OEM medical imaging systems. Both provide the same accurate, unobstructed tracking of reusable (non-disposable) 6DOF sensors: up to four sensors can be tracked at once.

Electronics Unit Performance

	trakSTAR™	driveBAY™
Accuracy - 6DOF Sensor		
Position	1.40 mm RMS	1.40 mm RMS
Orientation	0.50° RMS	0.50° RMS
Performance		
Number of Sensors	Four (4) 6DOF per unit (up to 32 sensors)	Four (4) 6DOF per unit (up to 8 sensors)
Measurement Rate	80 Hz default, user-configurable from 20-255 Hz	80 Hz default, user-configurable from 20-255 Hz
Dimensions & Weight		
Dimensions	290 mm x 184 mm x 64 mm	180 mm x 147 mm x 41 mm (Fits a 5.25-inch PC drive bay)
Weight	1.31 kg	0.84 kg
Power & Interface		
Power	100-240 VAC, 50/60 Hz	Molex Power Connector; +12 V: 1.6 A nominal, 2.9 A maximum; +5V: 600 mA nominal
Interface	USB, RS-232	USB

Transmitter

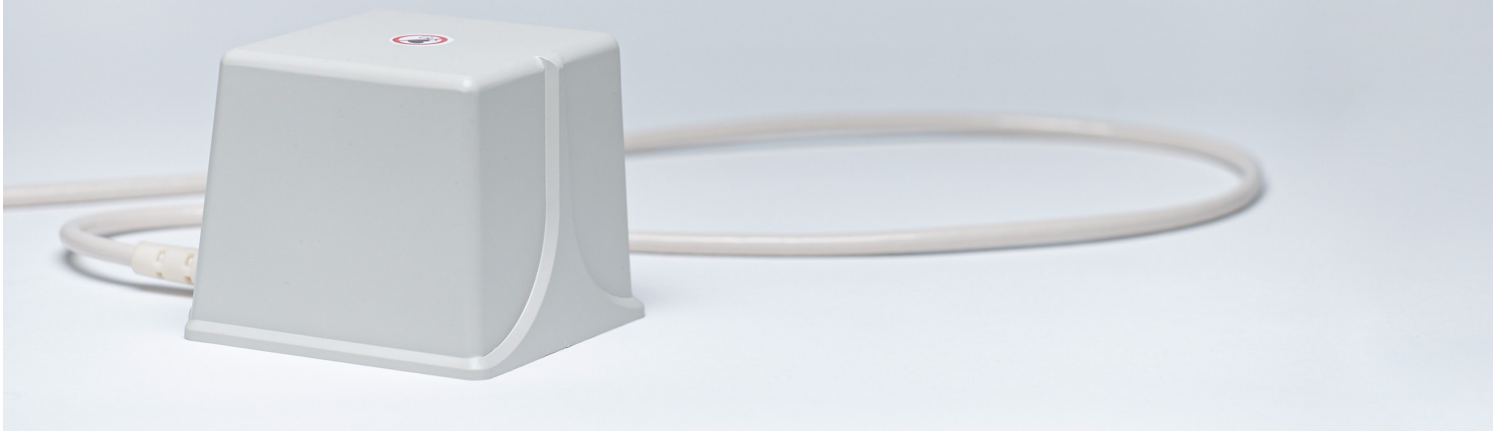
Each system works in conjunction with a Mid-Range Transmitter (MRT) or Short-Range Transmitter (SRT). They provide accurate and precise 3D localization and guidance of needles, probes, and surgical tools.

Mid-Range Transmitter

- Offers a flexible setup that can be integrated into most applications where the tracking volume needs to cover a larger region
- General-purpose transmitter (field generator) used in a wide range of OEM system navigation applications in interventional imaging, such as ultrasound probe tracking, ultrasound-guided needle biopsy, and robotic surgery

Mid-Range Transmitter Performance

Accuracy - 6DOF Sensor	
Position	1.40 mm RMS
Orientation	0.50° RMS
Performance	
Translation Range	± 76 cm in any direction
Angular Range	All attitude: ±180 deg azimuth and roll, ±90 deg elevation
Frequency	up to 765 updates/second
Measurement Rate	80 Hz default; configurable from 20–255 Hz
Maximum Tracking Distance (with model 800 sensor, on positive x-axis)	660 mm - Normal Mode 1800 mm - Expanded Volume Mode* *reduced specifications with optimized system settings
Hardware	
Dimensions	96 x 96 x 96mm
Weight	2.3 kg
Mounting Options	two mounting holes supporting M8 threaded screws



Short-Range Transmitter

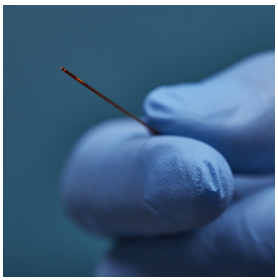
- Provides a smaller measurement volume for localized tracking in confined, difficult-to-access regions
- Small, lightweight design allows for mounting directly on OEM third-party mobile imaging equipment or into OEM system surgical simulation phantoms

Short-Range Transmitter Performance

Accuracy - 6DOF Sensor	
Position	1.40 mm RMS
Orientation	0.50° RMS
Performance	
Translation Range	± 45 cm in any direction
Angular Range	All attitude: ±180 deg azimuth and roll, ±90 deg elevation
Frequency	up to 600 updates/second
Measurement Rate	80 Hz default; configurable from 20–255 Hz
Maximum Tracking Distance (with model 800 sensor, on positive x-axis)	410 mm
Hardware	
Dimensions	64 x 46 x 52 mm
Weight	0.29 kg
Mounting Options	four mounting holes supporting M4 threaded screws

Sensors

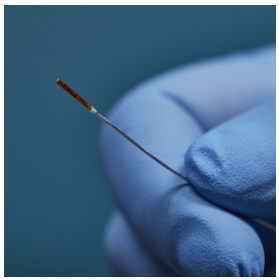
The 6DOF sensors come in a variety of sizes, including the general-purpose reference sensor that consists of an 8 mm-square cross section down to a 0.56 mm-diameter cylindrical sensor for use in the smallest tools.



Model 55

6DOF Sensor

- Sensor OD = 0.56 mm Max
- Cable OD = 3.8 mm
- Sensor Length = 300 mm
- Cable length = 2.2 m



Model 90

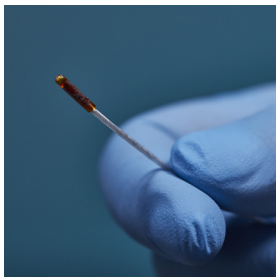
6DOF Sensor

- Sensor OD = 0.9 mm
- Cable OD = 0.6 mm
- Sensor Length = 7.25 mm
- Cable length = 3.3 m

Model 130

6DOF Sensor

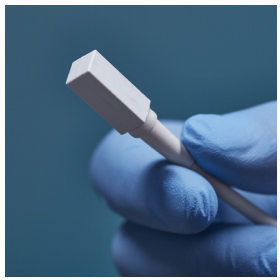
- Sensor OD = 1.5 mm
- Cable OD = 1.2 mm
- Sensor Length = 7.7 mm
- Cable length = 3.3 m



Model 180

6DOF Sensor

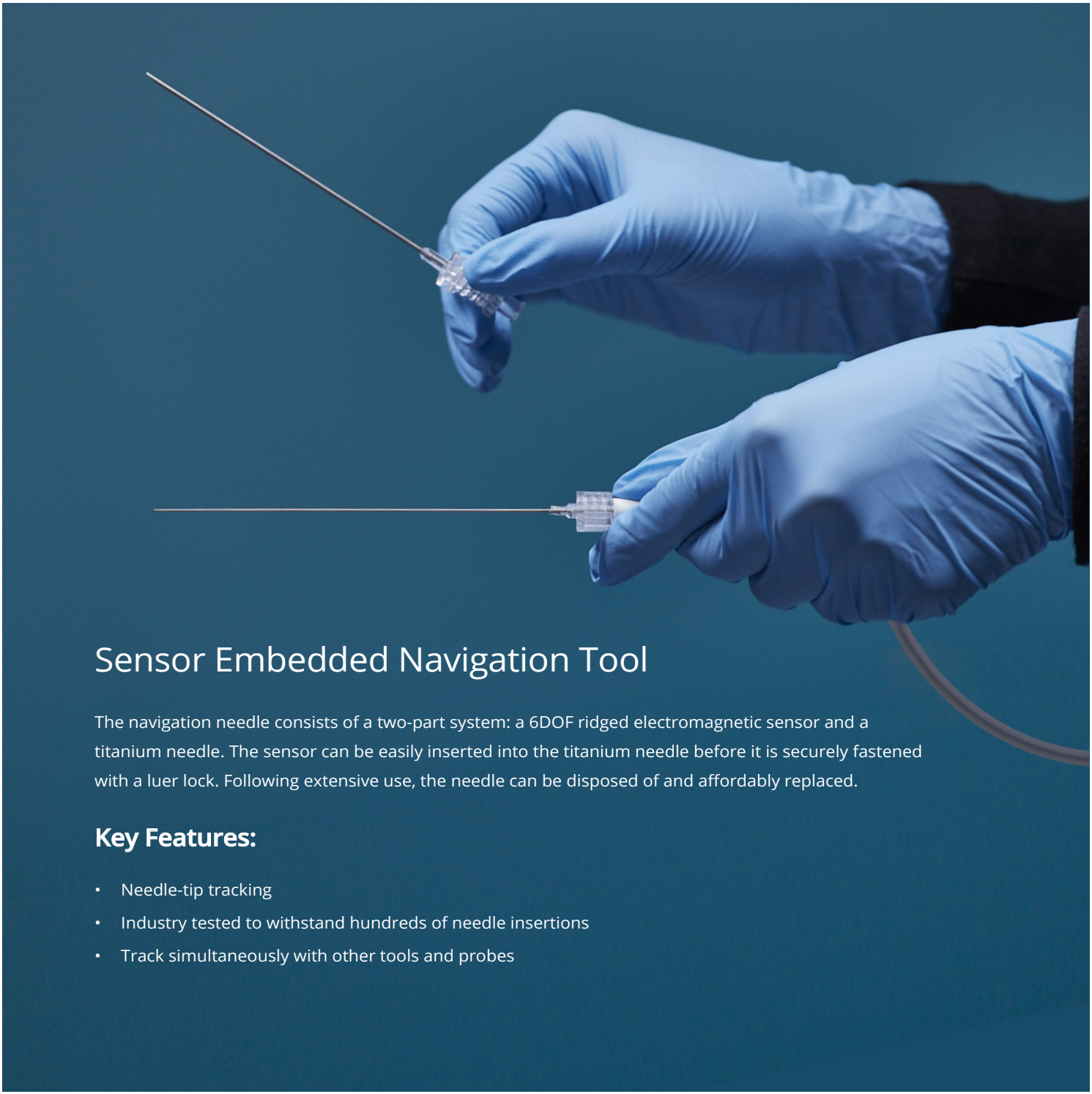
- Sensor OD = 2.0 mm
- Cable OD = 1.2 mm
- Sensor Length = 9.9 mm
- Cable length = 3.3 m



Model 800

6DOF Sensor

- Sensor OD = 7.9 mm
- Cable OD = 3.8 mm
- Sensor Length = 19.8 mm
- Cable length = 3.3 m



Sensor Embedded Navigation Tool

The navigation needle consists of a two-part system: a 6DOF ridged electromagnetic sensor and a titanium needle. The sensor can be easily inserted into the titanium needle before it is securely fastened with a luer lock. Following extensive use, the needle can be disposed of and affordably replaced.

Key Features:

- Needle-tip tracking
- Industry tested to withstand hundreds of needle insertions
- Track simultaneously with other tools and probes

Why Partner with NDI?

NDI is proud to be the industry pioneer and world's leading manufacturer of optical measurement and electromagnetic tracking technology solutions.

We've been a long-standing partner of the industry's top medical device OEMs, in some cases for more than twenty years. In fact, nearly 90% of all surgical navigation systems on the market incorporate our technologies. That trust in our solutions is something we work tirelessly to uphold.

Our solutions are designed with ease and speed of integration in mind, boasting flexible customization options to meet your most challenging tracking requirements.

Decades of technical expertise, lifetime technical support, dedicated account management, scalable manufacturing, and continuous product innovation make NDI the partner of choice to help bring your tracking applications—and industry breakthroughs—to market.

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