

NOTE: All systems Should be Considered as Investigational Use Only in the Context of the NIH BRAIN Initiative, and Protocol Support is Subject to Medtronic Clinical Research Board Approval

RestoreSensor

The Medtronic Implantable System, RestoreSensor, is a commercially-available INS with an embedded accelerometer capable of adjusting stimulation in response to changes in position. The product includes stimulation capabilities, the use of the 8840 Clinician Programmer and software and Patient Programmers, and is compatible with Activa PC leads and extensions. For situations in which posture responsive stimulation is desired, the embedded algorithm used to determine patient position may be employed.

Accelerometer capability is included in the RestoreSensor INS. Sensing is controlled and its data managed with a user-intuitive Research Programmer. The Research Programmer will not adjust or control therapy. Likewise, the 8840 Clinician Programmer and the Patient Programmer will not adjust or control sensing. Sensing performance is summarized as follows:

Inertial	Sensor
Operating Power (3-axis Measurement)	2 μ W
Inertial Algorithm Power Dissipation	25 μ W
Sensitivity	125mV/g (.0lg/LSB)
Dynamic Range	+/-Sg (Falls, footsteps, high impact activity)
Noise (X,Y axis)	3.5 mgRMs(0.1-IOHz)
Noise (Z axis)	5 mgRMS (0.1-IOHz)
Nonlinearity	<1%
Shock Survival	>10,000g
Telemetry	
Physical Layer	Established 75kHz (ISM)
Data Capacity	4 DOF/preprocessed
Training Mode	2 DOF/ raw high data rate
Stimulation Capability	
Stimulation Channels	16 for bilateral (8/lead) (bipolar)
Stimulation Parametrics	Predicate Approved (RestoreSensor)
Embedded Algorithm Characteristics	
Algorithm Power	5 μ W/channel (typical)
Algorithm Type (Embedded)	Support Vector Machine (Linear kernel, 4DOF)
Algorithm Uoerade Capability	In-vivo through telemetry and embedded bootloader

Characteristics of the posture response capability are available in the paper: Denison T., Litt B. 2014 *Neuromodulation* 2014, included as Appendix B.