



MRI Compatible Multimodality Motion Stage for Diagnostic Imaging & Radiation Therapy

The programmable MR-1A-XRV is a fully Magnetic Resonance Imaging (MRI) compatible linear motion stage for use inside the bore of an MRI scanner. The stage is made of precisely machined MRI-compatible materials and replicates, in real time, user defined dynamic and periodic motion profiles.

Product Description

The programmable MR-1A-XRV features user-defined and dynamic trajectory-following capabilities as well as accurate positioning control of the stage. The user-defined trajectories can be created in a spreadsheet template on any computer then loaded on the control system through a micro SD card. Data communication and positioning control is also achieved through a USB port. The stage and motor are controlled via a control unit that is positioned outside the scanner room. An LCD on the control unit provides the user with real-time updates of the exact position of the stage and mode of operation.

Versatility beyond 1 axis ...

Simultaneous superior-inferior (SI) & left-right (LR) linear motion can be achieved by rotating the stage to varying known degrees, similarly simultaneous superior-inferior (SI) & anterior-posterior (AP) linear motion can be achieved if the device is secured to angular wedges of varying and known degrees. The MR-1A-XRV motion stage offers a sinusoidal implementation. A second default motion can be added.

Designed and developed for use in an MRI environment, the MR-1A-XRV is compatible with other imaging modalities such as; CT, PET, SPECT, and Ultrasound.

**Custom modifications can be made upon request.*

Applications

This programmable linear motion stage can be used for a wide range of applications in imaging, validation, and development studies:

- Evaluation of systems designed for MRI guided treatment
- Radiation therapy related research, motion assessment & validation
- Evaluation of motion correction algorithms
- Comparison, co-registration & validation of MRI, PET, SPECT & CT motion correction algorithms
- MRI guided robotics applications
- Evaluation of MRI guided HIFU treatment

System Specifications

Motion Stage

- Accuracy in reaching a fixed position: 0.1 mm
- Maximum NRMSE for dynamic motion with frequency < 1 Hz: 6.0%
- Max speed: > 30 mm/sec
- Max force: -> 15 N
- Max phantom weight: 2 kg
- Dimensions: 90 mm W X 80 mm H (100 mm with phantom adapter) X 260 mm L
- Carriage: 90 mm W X 65 mm L
- Range of motion: 50 mm (2.0")

Control System

- Communication USB
- Memory: Micro SD card
- Input Voltage: 12 Volts DC
- Input Supply Current: 3 Amperes

Modes of Operation

- Manual position control using step and direction keys
- Position control through computer by sending commands through USB port
- Execute sinusoidal trajectory with options of varying motion amplitude or frequency using keys
- Execute user defined dynamic and periodic trajectories with options of varying motion amplitude or frequency in real-time using specific interface keys

Additional Specifications

- Maximum scanner field strength: 3 T
- Memory: >32 MB for storing trajectories
- Temporal resolution: > 1 KHz
- LCD position Display: Yes
- Safety limit switch: Yes

Accessories

- Two cables with two DB9 connectors for connecting to the scanner room's penetration panel (length – up to 20 m)
- Cables from penetration panel to control unit
- Penetration panel adaptor plates upon request
- Micro SD card
- Power supply adapter
- Horizontal actuator arm with vertical plate for push/pull or deformation motion applications



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Patent Pending

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