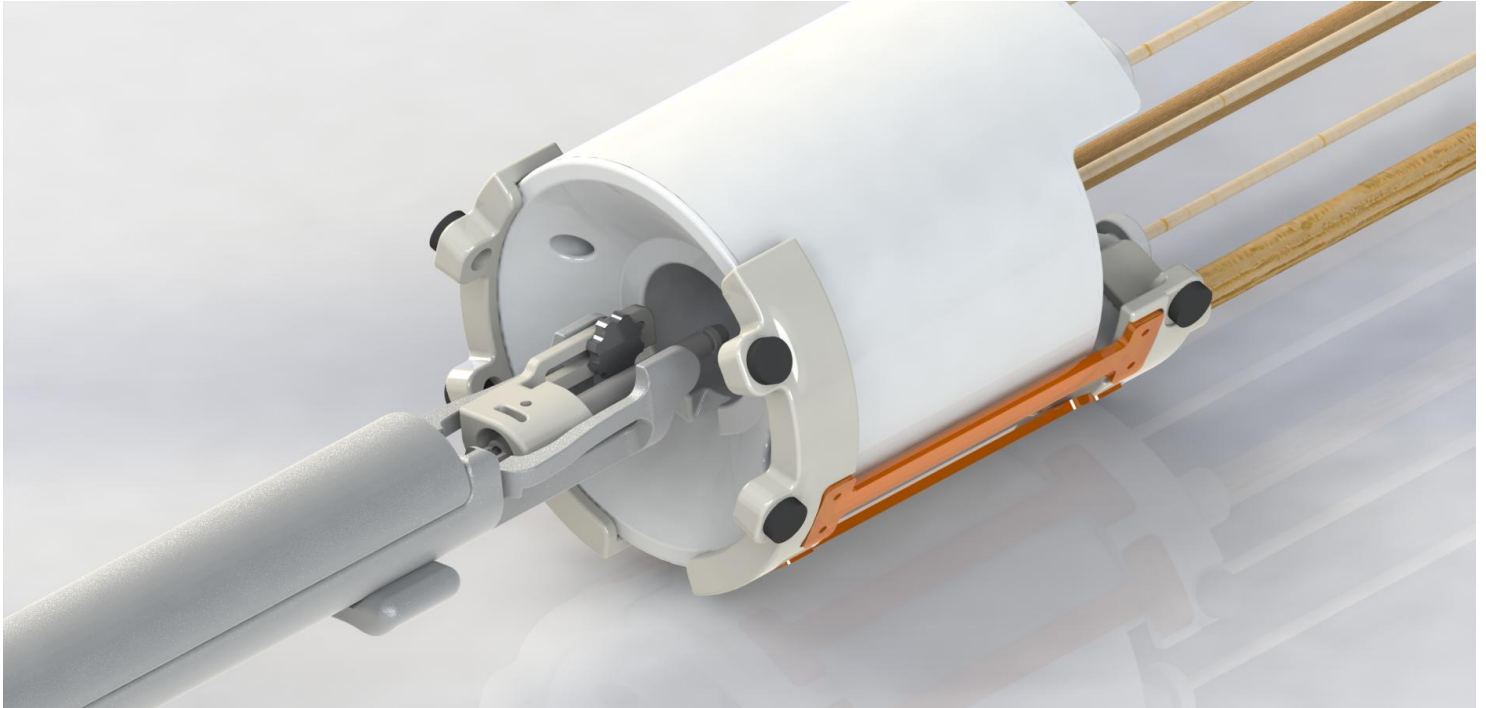




Animal Imaging Research, LLC

Quadrature Transmit/Receive Coil System for Awake or Anesthetized Mouse Imaging



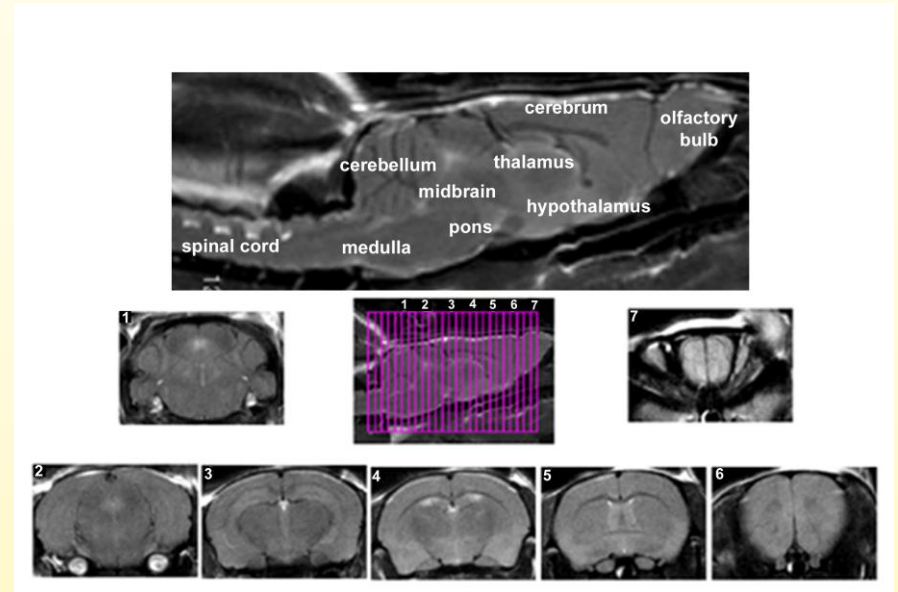
- Quadrature transmit/receive volume coil with exceptional SNR – no signal drop off
- B_1 field homogeneity over the entire brain
- Ergonomic design – animal set-up in seconds with easy tuning and matching
- Awake or anesthetized - temperature regulation for all conditions.
- Accommodates small rodent from 10-60 gm - ideal for transgenic mice, voles and post-natal rats.



Technology at work for you

COMPLETE BRAIN COVERAGE FOR OPTIMAL SMALL RODENT IMAGING

The images below provide a sagittal view of a mouse brain. Note the linearity along the Z-axis. The axial images from a 22-slice RARE sequence (.6 mm thickness) demonstrate complete brain coverage from the olfactory bulbs to the brainstem.

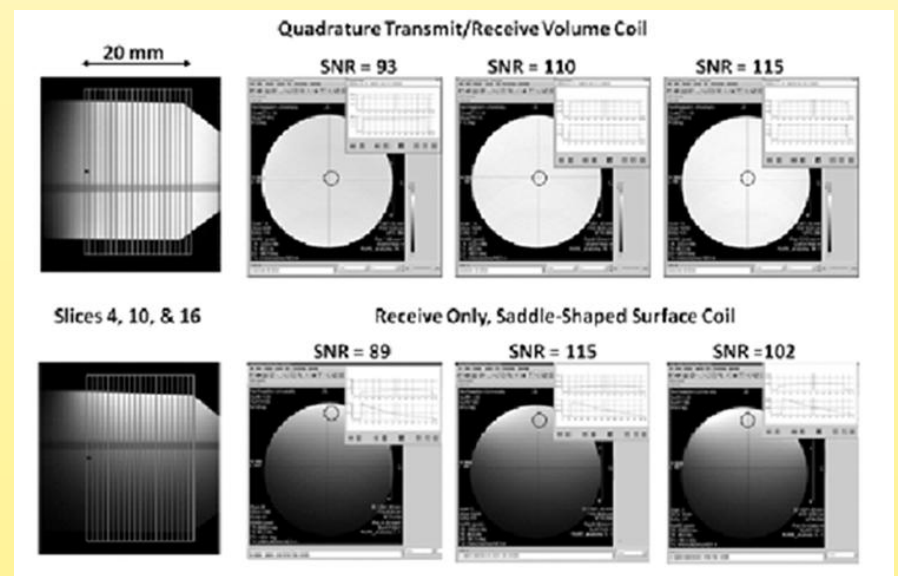


Set-Up in Seconds!

- With the coil stationary in the magnet, the body tube/head holder shown above can be withdrawn and replaced with another. No need to retune or rematch.
- Customers have reported running 8-10 mice less than an hour of imaging time.
- Can be for developmental studies to image post-natal rats.
- Compatible with the Bruker and easily interfaced with similar systems from Agilent and other MR equipment providers including clinical scanners
- Scalable from 1.5 to 11.7 Tesla with 89 – 120 mm ID gradient coils
- Awake or anesthetized – temperature regulation for all conditions.
- No head post, ear bars or skull pins, just a simple head cushion to minimize stress and discomfort.

OPTIMAL HOMOGENEITY IN THE X & Y PLANES WITHOUT LOSS OF SIGNAL

The excellent SNR performance and field homogeneity along the X and Y axes of the AIR coil system compared to a leading surface coil is seen in the images and data below. Over the entire FOV, the AIR coil system delivers a similar SNR to the maximum surface coil SNR (see circles). The phantom is a 50cc Falcon tube filled with CuSO_4 solution.



PROVEN TECHNOLOGY

AIR's engineering team works with a complete set of proprietary, high-performance coil analysis and design tools. This enables AIR to design, simulate, and optimize its products on standard computer platforms using available, proven technology.

OPTIMIZED DESIGN FOR CUSTOM PROJECTS

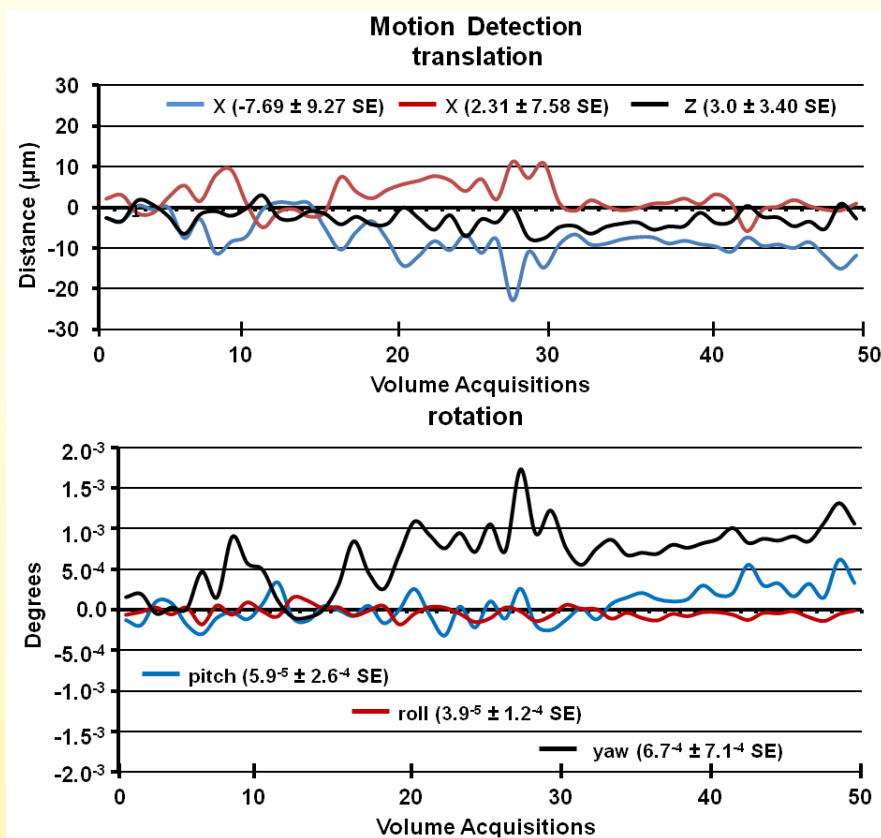
The common denominator underlying AIR's imaging systems is our software design portfolio that integrates electronics with mechanics. We utilize 3-D and prototype coil modeling, magnetic field mapping, and advanced MR gradient and RF coil simulation tools for both our standard and custom coils. As system performance is highly dependent on coil size, filling factor and immobilization of the animal for awake imaging, AIR harmoniously integrates coil design into mechanical restraining system to optimize performance and minimize conflicts between design requirements. We have extensive experience designing small bore imaging systems for mice, voles, rats, rabbits and small and large non-human primates.

QUALITY CONSTRUCTION

Component and sub-assembly manufacturing is either outsourced to highly capable companies in close proximity to AIR or performed in-house. Materials used in MRI components often have unique properties; AIR utilizes its own CNC machining equipment and lathes where final processing is performed. All assembly and calibration testing takes place in a controlled production area at the AIR's location.

Awake fMRI with minimal motion artifact

Shown below are data stability as estimated by a 3D rigid body model with six degrees of freedom for translational and rotational movement. Data was collected from 29 awake mice imaged for five minutes during which they were exposed to a 5% CO2 challenge as a stimulus for a surrogate BOLD response. The average motion is less than 20 microns!



Coil Performance

The report below is a standard Bruker report, generated from its internal analysis software – showing coil performance using the Bruker phantom with the AIR 36 mm mouse quadrature T/R coil. Note the Total-Image SNR/mm³ in the column at the bottom right (in red).

Basic frequency = 300.331 MHz Gradient coil status = S116,
 RF coil diameter = 36 mm Measuring Method = MSME,
 Pulse length = 2000.0 usec Pulse shape = sinc3.exc
 Pulse attenuation = 23.5 dB PVM_RefAttCh1 = 32.2 dB

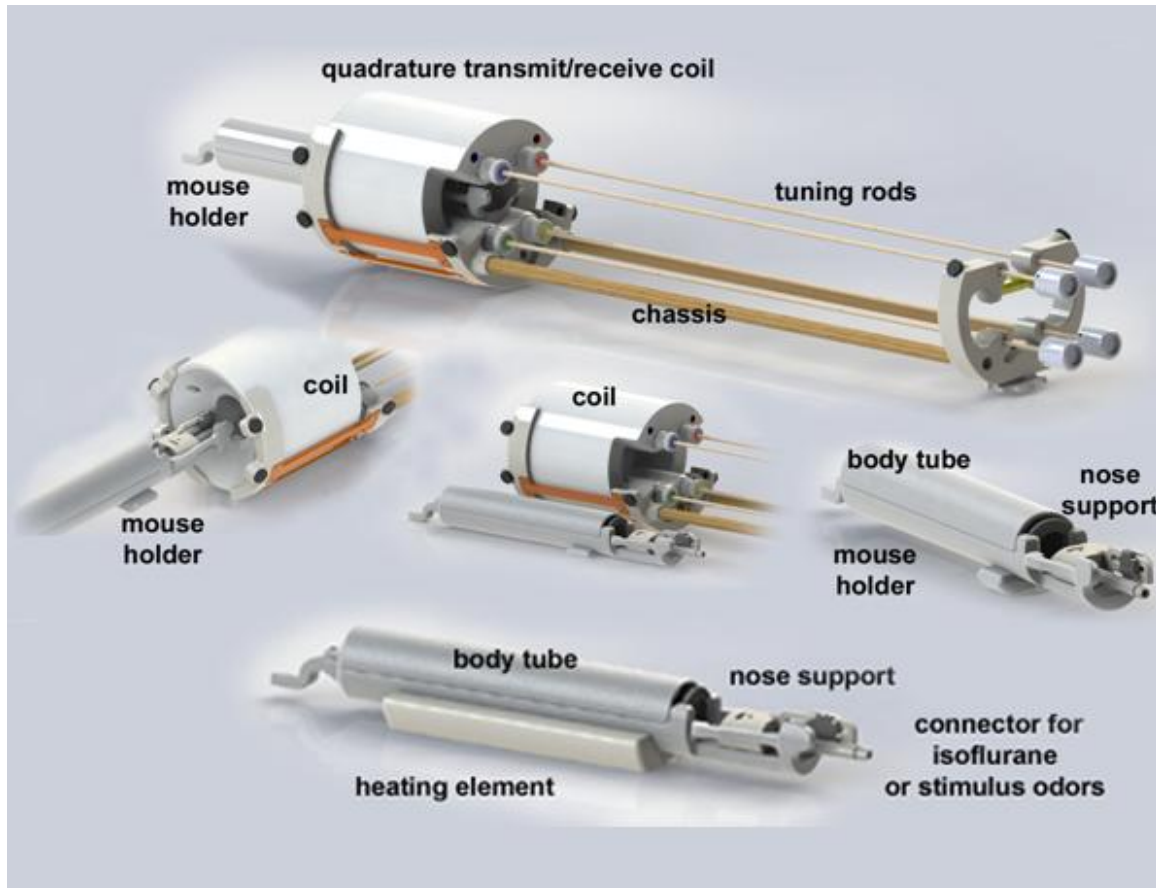
Pixel dimensions:
 read = 0.25 mm FOV_read = 64.0 mm dim_read = 256
 phase = 0.25 mm FOV_phase = 64.0 mm dim_phase = 256
 slice = 1.00 mm

sw_hz = 50000 acq time = 5.12 , NA = 1
 acq_factor = 1.00
 voxel_factor = 16.0

calc.	method	mean signal	noise sdev	snr	snr per mm ³
ROI	corners	25371	27	947	15155
ROI	strip	25371	28	920	14720
TOTAL	image	24615	25	976	15622

Compatible with Bruker and other MR systems

The Transmit/Receive Coil System has been designed with a compatible interface to the Bruker Animal Table and Slider System – as shown in the picture below. Similar interfaces can be constructed for Agilent and other MR equipment providers.



Animal Imaging Research LLC

To learn more about how awake animal imaging and AIR's coil systems can enhance your CNS research programs, contact us at:

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