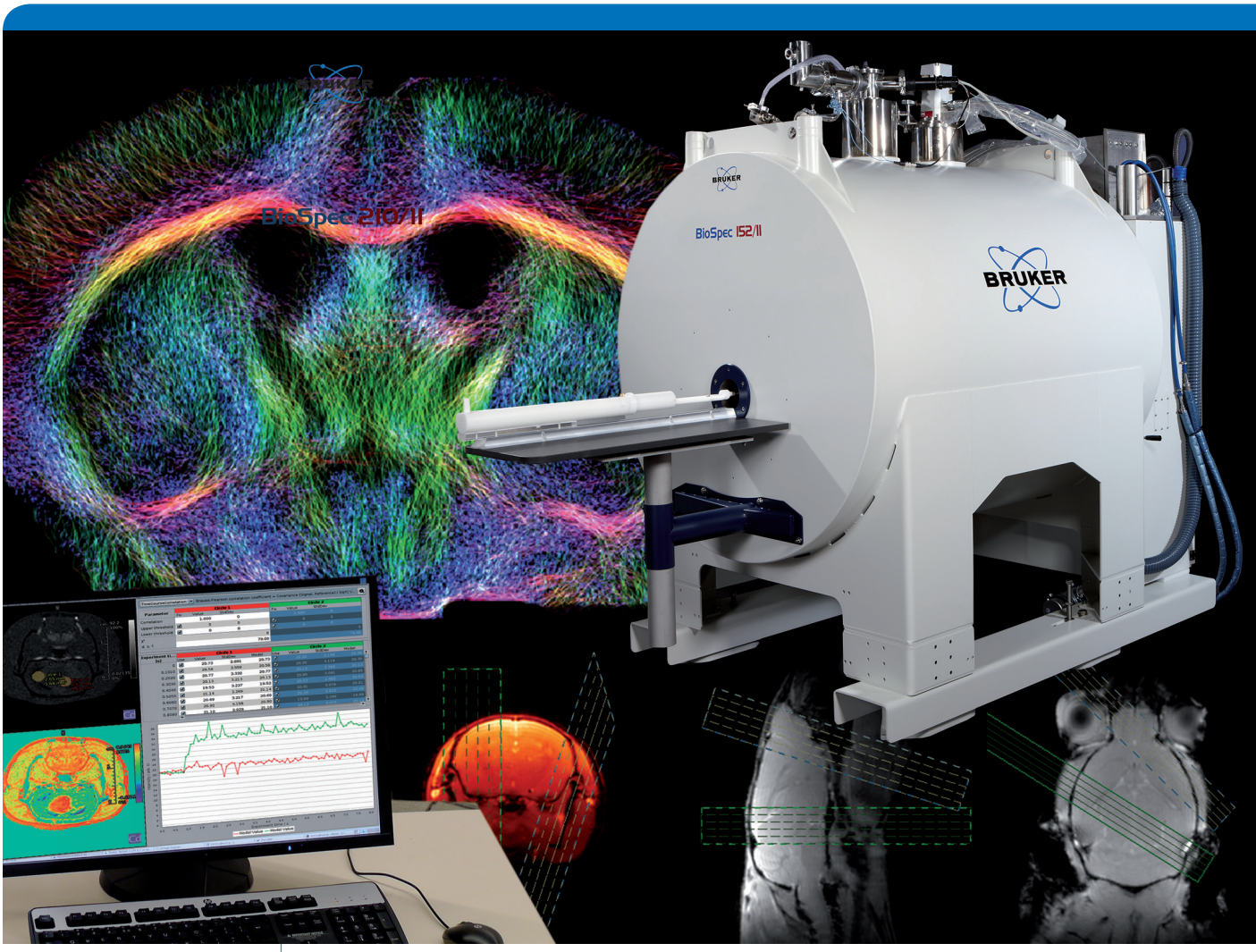


BioSpec®

- High Field MRI/MRS Research

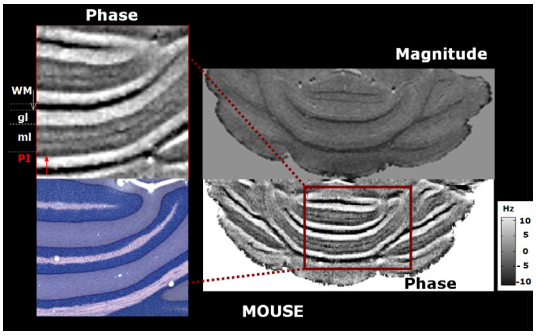
Innovation with Integrity

MRI/MRS

Unlimited Research Possibilities

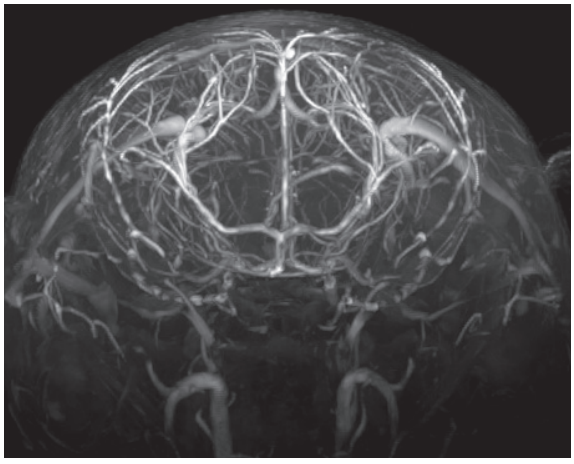
With the power to conduct limitless imaging applications, BioSpec® opens up a whole new world of applications. Customers across the world undertake daily investigations into:

- **Angiography** - flow contrast and flow analysis of the velocity of each voxel for glioblastoma and aneurysm studies
- **Cardiology** - investigation of cardiac strain, ejection fraction, and septum defects, using triggered sequences or Bruker's patented IntraGate for navigator based retrospective gating
- **Diffusion** - visualization of disturbed pathology, such as in multiple sclerosis, epilepsy, and stroke tumors
- **fMRI** - insight into the brain's function
- **Molecular MRI** - imaging at the cellular level
- **Perfusion** - with and without CA for tumor- detection, -neoangio-genesis, and -vascularization, and disruption of the blood brain barrier
- **Spectroscopy** – quantification of metabolic disorders and long term changes in metabolic processes



Cortical Layers of Mouse Cerebellum *in vivo*

MRI CyroProbe™ at 7 Tesla, Magnitude and phase images depict cortical layers of mouse cerebellum – ml (molecular layer), gl (granular layer), WM (white matter), PI (Purkinje cells)
Acquisition details: SWI FLASH, resolution (30 × 30 × 200) µm³, scan time: 12 min 50 s.
Courtesy: N. Baxan, D. von Elverfeldt, University Medical Center Freiburg, Freiburg, Germany

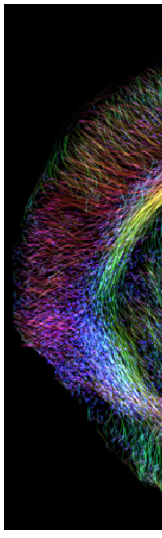


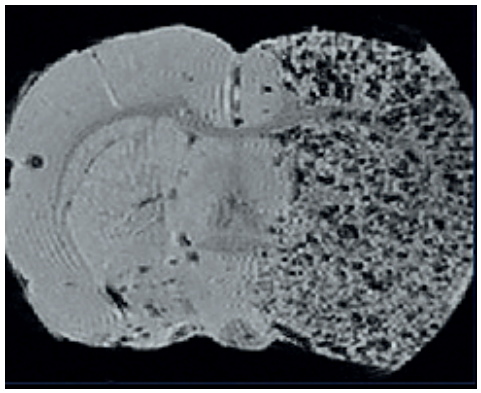
Angiography

Time-Of-Flight angiography with no contrast agent at high spatial resolution, showing the excellent contrast that enables the identification of fine vascular structures.
Acquisition details: Mouse brain *in vivo*: MRI CryoProbe™ at 9.4 Tesla, GEFC, TR: 30 ms, TE: 5.9 ms, resolution: (59 × 59 × 59) µm³
Courtesy: H. Waiczies, Berlin Ultra-High Field Facility (BUFF), MDC, Berlin, Germany

DTI Fibers

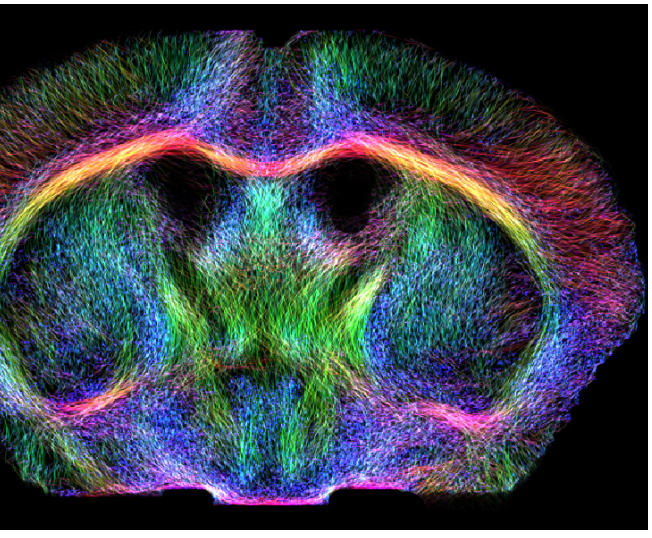
Brain connectivity studies in small animals are challenging but can be achieved using state-of-the-art MRI technologies for acquisition, such as the 7 T BioSpec® with MRI CryoProbe. High-resolution DTI MRI and fiber tracking of the living mouse brain delineate the organization of the fiber tracts.
Acquisition details: MRI CyroProbe™ at 7 Tesla, DTI-EPI, diffusion directions: 30, resolution: (12.5 × 15.5 × 50) µm³, scan time: 25 min.
Courtesy: L. A. Harsan, D. von Elverfeldt et al., University Medical Center Freiburg, Freiburg, Germany





Cellular Imaging

Mesenchymal stem cells were labeled and used as markers for stroke regions. They are readily visible in T_2- and T_{2*}-weighted images both *in vivo* and *ex vivo*. Full 3D brain coverage enables quantification and volume rendering.
Courtesy: P. Walczak, J. W. Bulte, et al. Johns Hopkins University School of Medicine, Baltimore, Maryland, USA



The Benefits You Want

Leading scientists worldwide are taking their research closer to the molecular and cellular level thanks to BioSpec®. Designed for the emerging market of preclinical imaging and molecular MRI, its innovative modular concept enables virtually any small animal MR imaging application in life science, biomedical, and preclinical research.
BioSpec® already brings proven performance, safety, convenience, and future-proof cost-effective operation to over 600 labs worldwide. With our new multimodal animal platforms and accessories and our latest generation ParaVision® software more users than ever can access a new level of research quicker than they think.

Key Benefits

- **Cost effective** - Helium zero boil off and Nitrogen-free for reduced maintenance costs and longer service intervals
- **Scalable** – upgradeable electronics, options, and accessories to keep your system at the cutting edge
- **Compatible** – multimodal animal handling solutions for use with all Bruker preclinical modalities
- **Intuitive** – with Bruker's gold standard preclinical imaging software, ParaVision®, users can start scanning immediately
- **Proven** – more than 30 methods with various contrast modules and hundreds of measurement protocols designed and tested on mice and rats to guarantee the highest image quality

Key Technologies

- **Field strengths** – 4.7 to 15.2 Tesla ultra-shielded superconducting magnets with reduced stray field
- **Bore sizes** – 11 to 40 cm for optimal working space
- **Gradient diameters** – 6, 9, 12, 20, 26 cm, with 6 and 12 cm gradients available as inserts (dual gradients)
- **Gradient strength** – up to 1000 mT/m for highest duty cycles
- **Shim sets** – Full 3rd order (6 cm) and 2nd order (9-26 cm) for best homogeneity

Gradients, Coils, and Electronics

The World's Leading Hardware

Gradients

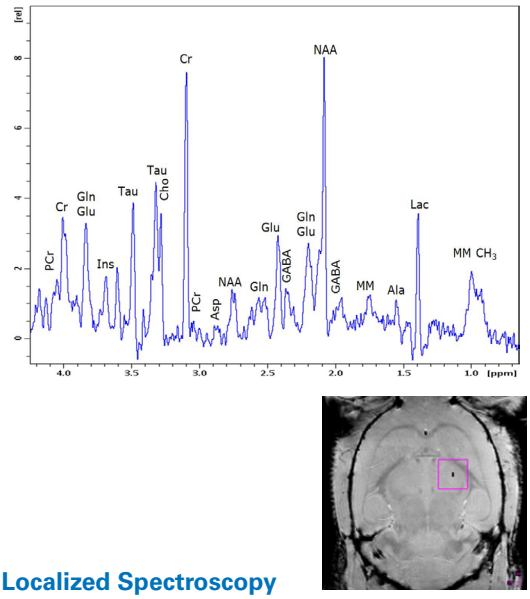
The high performance BGA-S HP gradient series delivers unsurpassed slew rates, up to 9000 T/m/s, and gradient strengths up to 1000 mT/m. Integrated shim coils enable optimal field homogeneity even at the highest magnetic fields. The dedicated cooling design results in unique duty cycle specifications for high end fMRI applications. Gradients can be used as inserts and thanks to automatic hardware recognition they are easily exchangeable.

RF-coils

RF-coils are the interface to the sample and have a major impact on quality, acquisition time, and workflow. Bruker delivers application-optimized RF-coils for head, brain, cardio, abdomen, spine, and arterial spin labeling, as well as RF-coils for non-proton applications for mice and rats. The closed-loop helium-cooled MRI CryoProbe™ series RF-coils are available for mice and rats and offer uncompromised performance for highest signal-to-noise requirements.

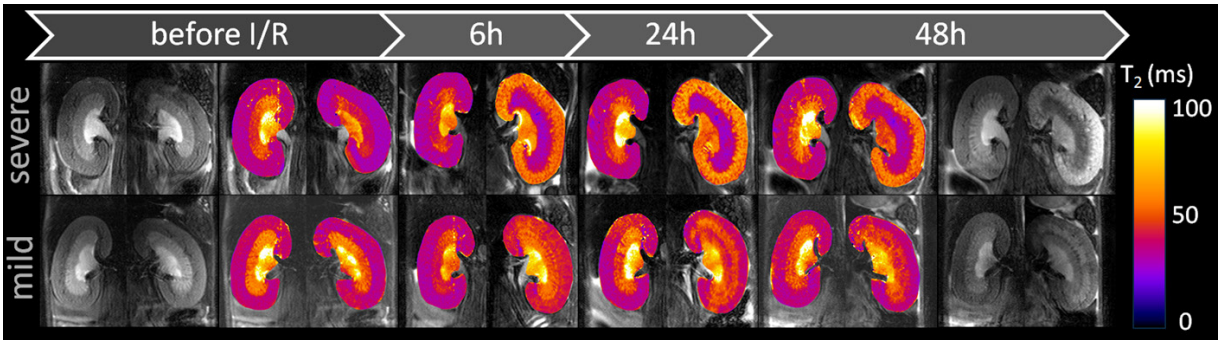
AVANCE™ Electronics

The AVANCE system architecture delivers an unprecedented level of digital control for high quality and high speed MR imaging and spectroscopy applications, while offering great flexibility and highly scalable transmitter and receiver channel architecture.
MRI scanner operation has never been easier, with single push-button scanner operation and complete hardware detection for RF-coils, gradients, shims, and signal routing.



Localized Spectroscopy

STEAM spectrum of the mouse brain acquired using the MRI CryoProbe™ at 15.2 Tesla.
Acquisition details: STEAM, voxel size: (2 x 2 x 2) mm³, TR: 8 s, 128 averages, resolution enhancement with shifted Gauss filtering, TE: 1.1 ms, shift: 7%, broadening: 7 Hz



Ischemia and Reperfusion

Ischemia was induced in mouse kidneys. Ischemia was induced severely (30 min., top) or mildly (17.5 min., bottom). Recovery can be seen after 48 hours in T_2-weighted images & T_2-maps in case of mild ischemia.
Acquisition details: 9.4 Tesla, MSME, TE: 10 - 70 ms, resolution: (124 × 124 × 650) µm³
Courtesy: T. Niendorf, Berlin Ultra-High Field Facility (BUFF), MDC, Berlin, Germany

MRI CryoProbe™

A Quantum Leap in Neuro Imaging

Unique Technology for Outstanding Results

Based on very low temperature, helium-cooled, closed-cycle RF coils and preamplifiers, the unique MRI CryoProbe delivers a significant increase in SNR over equivalent room-temperature RF-coils in routine *in vivo* MRI applications. Animal handling and supervision of the MRI CryoProbe is very similar to standard room temperature RF-coils. MRI CryoProbe cooling can be accomplished outside the magnet ensuring optimum usage of scanner time.

MRI CryoProbes provide tremendous benefits compared to standard room-temperature RF-coils:

- Increased signal-to-noise ratio of up to factor 5
- Higher resolution *in vivo* down to 20 µm
- Shorter measurements times directly enable lower costs per sample and higher productivity
- Access to new applications not possible with room temperature RF-coils (high resolution, fMRI)
- Shorter durations of anesthesia

^{1}H four channel phased array receive-only MRI CryoProbe for rat brain applications	The latest innovation for leading image quality in rat brain imaging with an enormous signal-to-noise gain of up to 2.4 *in vivo*.	Available as a commercial product for 9.4 T
^{1}H four channel phased array receive-only MRI CryoProbe for mouse applications	Thanks to the remarkable signal-to-noise gain, a dramatic scan time reduction is possible while keeping the resolution very high. In comparison with a room temperature coil, a four channel phased array coil typically provides a signal-to-noise-gain of 2.5 *in vivo*.	The four channel phased array coils are available at 7 T, 9.4 T, and 11.7 T.
^{1}H Quadrature transmit/receive MRI CryoProbe for mouse applications	The quadrature transmit/receive MRI CryoProbe provides an immense signal-to-noise gain of 2.5 to 3.0 *in vivo*. This MRI CryoProbe is also available in a smaller diameter version for 6 cm gradients.	Available as a commercial product for 4.7 T, 7 T, 9.4 T, 11.7 T, and 15.2 T and for 9.4 T and 11.7 T for use with the 6 cm gradient
X-nuclei MRI CryoProbe with combined ^{1}H room temperature RF-coil for mouse applications	Gains in signal-to-noise benefit from lower NMR frequencies: The lower the frequencies of the nuclei, the higher the SNR gain. Therefore signal-to-noise gains of a factor of 5 are possible in ^{13}C measurements.	Available for ^{13}C as a commercial product at 7 T and 9.4 T, other frequencies and nuclei upon request.

ParaVision®

Software for Performance, Flexibility, and Routine Optimization

Enhanced Productivity

A redefined and intuitive workflow introduces optimized, application-oriented and *in vivo* validated experimental protocols, an interactive 3D scan planning viewport, advanced image analysis tools, and automatic reporting. The scan queue enables the use of scan programs with automatic copy references in order to minimize user interaction. Thanks to its DICOM-based data exchange module, ParaVision seamlessly integrates with data from multimodal imaging studies employed in many preclinical research labs.

High Performance

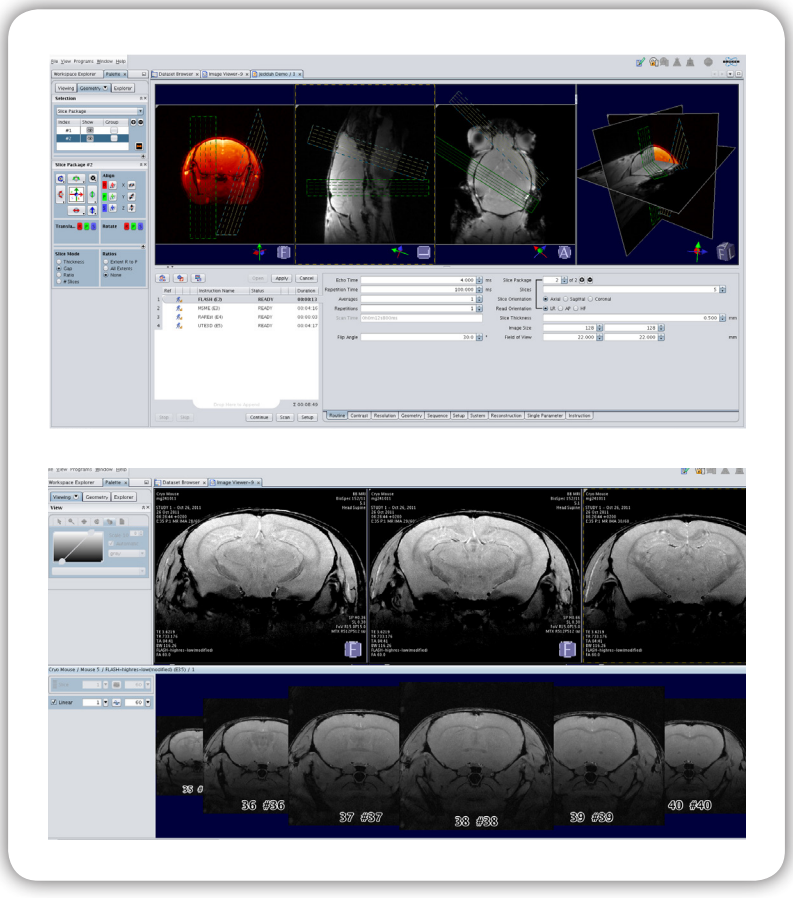
With true 64-bit architecture and parallel multi-core acquisition and reconstruction, ParaVision delivers high-resolution 3D images up to virtually unlimited size. It includes an extensive set of routine and advanced imaging sequences, offers seamless integration of parallel transmission techniques and navigator handling, and incorporates a unique, integrated field map-based shimming procedure.

Integrated real-time optimization features enable dynamic adjustment of parameters during scanning, provide integration of navigator scans, and provide on-the-fly pulse generation for optimum slice profiles.

Advanced users will welcome the fully integrated method development environment that enables them to redefine their own boundaries in imaging research.

Setting New Standards in Preclinical MRI

Delivering a quantum leap in ease of use, the redesigned ParaVision workflow is designed with preclinical imaging in mind, featuring a workflow optimized user interface and easy parameter handling. A guided imaging workflow produces consistent results and lowers the learning curve for biomedical researchers new to MRI. A context-sensitive view reduces complexity by visualizing only parameters relevant to the operations at hand, ensuring intuitive and focused operation.



Options and Accessories

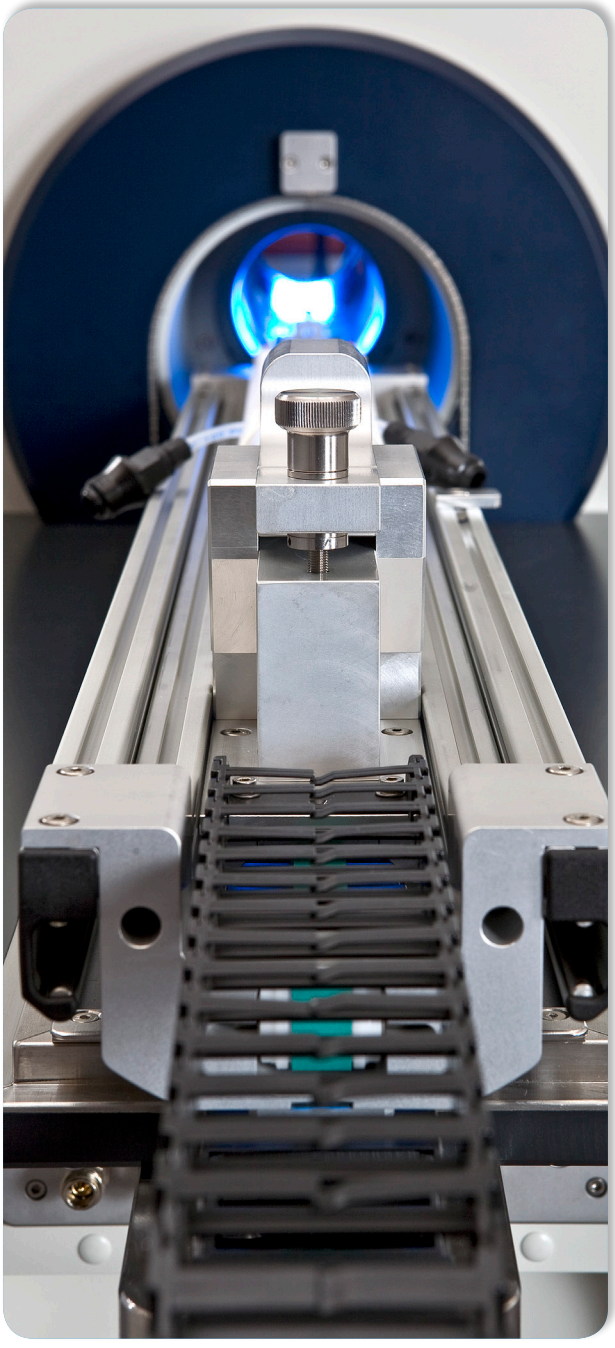
Keep Your System at the Cutting-Edge

Animal Cradles

Bruker's cradles accomodate mice and rats and enable a great variety of applications. They feature a bite bar for head fixation and have provisions for the use of fudicial markers, temperature stabilization, anesthesia implementation and exhaust, and monitoring of physiological signals (ECG, respiration, temperature), which can be used for triggering. The one-snap system of all control and monitoring lines allow the cradle to be quickly transferred from one imaging system to the next while keeping the animal's position stable and reproducible. Automatic cut-off of anesthesia when the cradle is not connected to the base assures user safety within the laboratory.

AutoPac

AutoPac, the automatic positioning system simplifies animal handling via laser positioning and electronic table driving. A touch pad allows positioning adjustment with an accuracy of 100 µm. Additionally, the AutoPac RF cover eliminates the necessity for a Faraday cage.



Service & Support

Bruker's commitment to providing the highest quality of service and support means maximum reliability, productivity, and performance from your MRI system. From the initial site evaluation, through system installation, and throughout the lifetime of your instrument, Bruker's service program is dedicated to providing personalized support.

Site Planning - Customized Services

Proper site planning for your MRI scanner is the first step in ensuring optimum system performance. Beyond the site-planning guide, Bruker's technical departments can provide space-planning and site preparation services tailored to your individual needs. Bruker's site-specific plans, based on your equipment specifications and local architectural drawings, can be used to develop bidding documentation and help estimate construction costs.

Responsive Technical and Software Support

Should you ever have questions or require assistance with your MRI system, Bruker's free service & support hotlines are your first point of call. Support center engineers and scientists will quickly and efficiently gather key information, suggest relevant diagnostics, and provide a swift solution. Worldwide support centers will liaise with your local service team, enabling on-site diagnosis, part replacement, repair, or preventative maintenance.

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