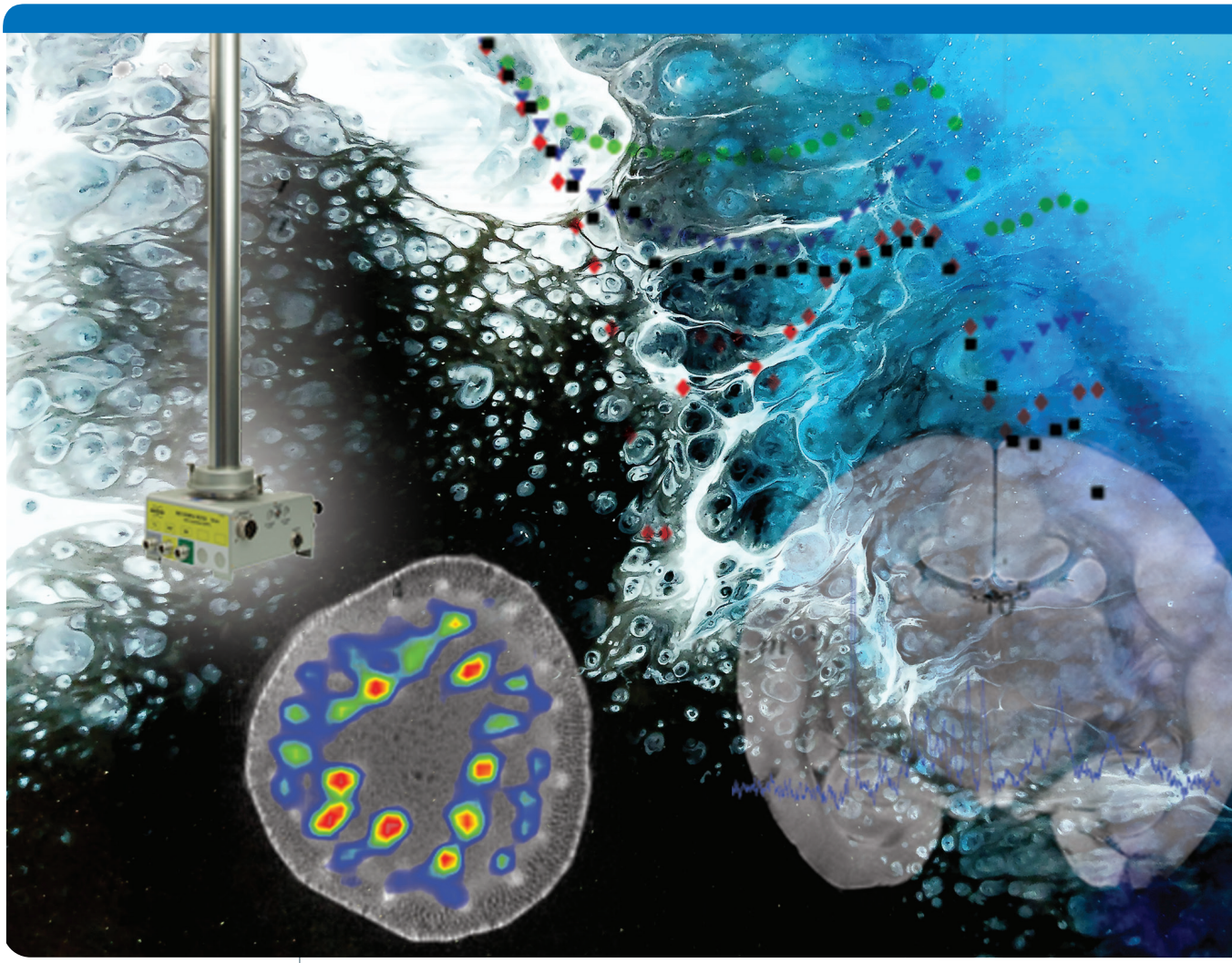
BRUKER



NMR Microscopy and Diffusion

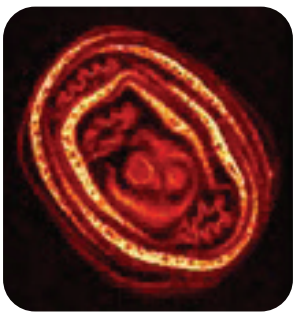
- Hardware and Software Solutions for MRI and Dynamics Applications

Preclinical Imaging

Innovation with Integrity

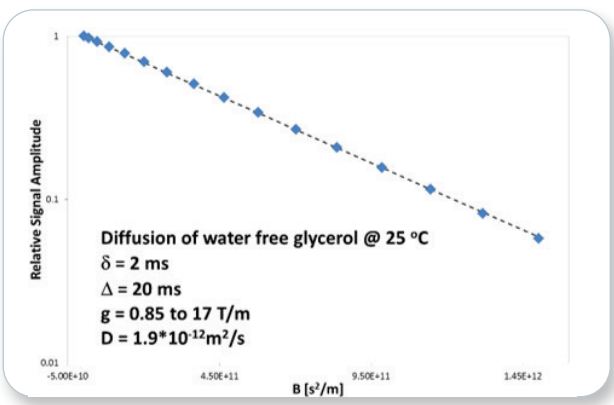
Magnetic resonance imaging at the forefront of technology, delivering stunning resolution

Magnetic Resonance (MR) Microscopy and MR Diffusion are techniques ubiquitous in various fields of research such as physics, chemistry and biology as well as the fields of petroleum industry, biomedicine or food technology. They can provide insights of the salient physical properties of the underlying system of interest in a non-destructive fashion and visualize them as multidimensional images.



Lilac Bud: CryoProbe, 400 MHz, 2D Spin Echo (FOV 5 x 5 mm^2, resolution 19.5 x 19.5 x 0.3 μm^3)

The Bruker MR Microscopy and Diffusion systems establish leading standards in the fields of MR imaging and diffusion. The continuous evolution of such fields requires the hardware to be as flexible and powerful as possible to satisfy the demands of new methods and systems to be studied. Consequently, Bruker introduced the new imaging and diffusion accessories for the Avance Neo spectrometer electronics. Cutting edge development of new hardware and software interfaces between the components, which are now identical for all Bruker Avance Neo based systems, allow for a direct method exchange between preclinical imaging, MR microscopy and diffusion systems.

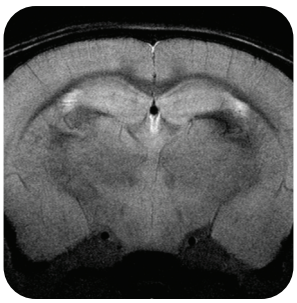


Diffusion of water free glycerol at 25 °C

The combination of the modular hardware components enables an extremely wide range of applications:

- MR Microscopy
- MR Diffusion
- MicroCoil
- CryoProbes for MR Microscopy
- Magic Angle Spinning (MAS) with strong triple axis gradients

The MR Microscopy and MR Diffusion accessories are fully compatible with liquid NMR and solid-state spectroscopy MR systems, enabling the expansion of your Magnetic Resonance research into the NMR domains you require, without the cost of ownership of dedicated systems. In addition, the MR Microscopy and MR Diffusion accessories make use of the powerful shim system, developed for high resolution spectroscopy, which allows for the best possible shim conditions.

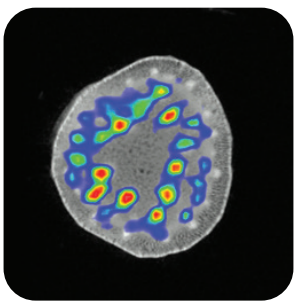


Anatomical Image of a mouse brain with in-plane resolution of (27 × 23) μm^2 and a slice thickness of 400 µm.

MR Microscopy

Magnetic Resonance Microscopy is a technology routinely utilized in MRI machines in hospitals, with a focus on imaging small samples in the range of **0.5 – 66 mm** with imaging resolutions down to **10 x 10 x 10 µm³ (1 picoliter)**. This resolution is achieved by combining Bruker's market leading magnetic resonance high field, vertical bore (standard to super-wide bore) systems with the state-of-the art imaging accessory.

Bruker Magnetic Resonance Microscopy systems provide optimal sample handling not limited to only ex-vivo specimens and non-organic samples but also small animals for in-vivo investigations. Bruker's state-of-the-art animal handling accessories for wide bore probes cover a broad range of functions namely anesthesia, physiological parameter control, temperature and flow control etc, that cover most experimental methodologies for in-vivo imaging.



Kangaroo paw (plant) stem: 1H reference image overlaid with a distribution of a $^{1}H^{13}C$ cross-polarization false color image, showing the absorption/distribution of labeled sugar. 400 MHz.

Courtesy of M. Wenzler and B.Schneider, Max Planck Institut für chemische Ökologie, Germany

Bruker offers a complete hardware and software accessory package for MR Microscopy which can be easily added to existing AVANCE spectrometers with standard bore (52 mm), wide bore (89 mm), or super wide bore (154 mm) magnets. This accessory provides researchers with unique, non-destructive MR capabilities for imaging and localized spectroscopy of small samples (0.5 - 66 mm) with resolutions down to 10 x 10 x 10 µm³.

Features

The MR Microscopy accessory is a user-friendly routine imaging package which contains both state-of-the art hardware and software which enables non-expert and expert user to take full control of their MR experiment - whether running routine imaging investigations or developing highly sophisticated imaging sequences.

MR Microscopy Accessory Package		
Hardware		Software
Imaging Rack ■ Safety controller ■ 3x Great60 gradient amplifiers	RF Probes / Gradients ■ Probe ■ rf coils ■ Animal support	■ ParaVision ■ Topspin

MR Microscopy Probes

MR microscopy probes are available for SB, WB, and SWB system. They feature exchangeable rf coils in various diameters for 1H and X-nucleus available as single or double tuned. The WB & SWB probes support animal handling.

Hardware

Bruker MR Microscopy hardware is flexible and powerful, whether performing routine measurements, creating new demanding methods or investigating new types of objects. Bruker GREAT60 gradient amplifier combines strong gradient pulses with up to 60 A and fast switching times with stability over a large bandwidth, low distortion, linearity and low noise.

Software

ParaVision® is a sophisticated software package for the acquisition of multidimensional MR data, as well as data reconstruction, visualization, and analysis. This software package is supplemented by several extension packages which offer additional experimental techniques or post-processing algorithms. In MR Microscopy we offer the full set of ParaVision features, all routinely used imaging sequences are available in the software as well as development and processing features for new methodologies. https://www.bruker.com/products/mr/preclinical-mri/paravision-360.html

ParaVision is based on the TopSpin® software package, making all TopSpin experiments available. **TopSpin®** sets the industry standard for NMR data analysis and the acquisition and processing of NMR spectra. The latest release of TopSpin® software, 4.0, features a new, user-friendly GUI which provides easy access to vast experiment libraries including standard Bruker pulse sequences and user generated experiment libraries for both industrial and academic users. https://www.bruker.com/products/mr/nmr/software/topspin.html

MR Microscopy Probes

Micro2.5 - MicWB40

The Micro2.5 is Bruker's most versatile MR Microscopy probe. In combination with the MicWB40 rf probe system it offeres an optimized sample size / resolution ratio. Combined with it's exchangable rf coils (2.5-30 mm) it can be adapted to perfeclty match your application.

The Micro2.5 / MicWB40 probe is the perfect tool for imaging of a wide range of small objects. The MicWB40 rf probe is equipped with exchangeable coils supporting sample diameters from 1 to 30 mm. If required it can be equipped with the animal monitoring system to supervise physiological parameters of the animals (ECG, respiration, body temperature) and provide connections and masks for breathing gas anesthesia. Different type of animal beds and positioning systems are supported for the individual coil types. An optional VT set allows to control the temperature of the sample between -20°C and +60°C.

It is combined with Bruker's Micro2.5 WB gradient system, which is the MR Microscopy gradient workhorse. Its gradient strength is perfect for most applications. The Micro2.5 remains in the magnet while the MicWB40 is removed from the magnet to insert the sample.

Applications

The MicWB40 probe is Brukers most versatile probe supporting large space (30 mm) for samples but also a high gradient strength for high resolution. It's the Bruker MR Microscopy workhorse for all kind of samples from materials to in-vivo.

Features

- Gradient strength of up to 1.5 T/m per axis, water cooled
- Animal support (Triggering Unit, Anesthesia)
- Exchangeable Rf coils, named 'MicWB40' series
  - 2.5 mm Solenoid
  - 5-30 mm Single Tuned Coils, in part circular polarized
  - 5-25 (30) mm Double Tuned Coils
  - Surface Coils
- Optional Variable Temperature Control (compatible to BSVT, BCU,…)

Accessories

- 2.5 mm solenoid coil. Due to the B1 direction, the samples must be placed horizontally.
- 5 – 30 mm volume coil (in 5 mm steps). The sample needs to be placed manually into the rf coil. Single tuned coils up to 15 mm are linear coils, while 20-30 mm coils are circular polarized coils (needs quad combiner or two receive/transmit channels in the console). Double tuned coils (5-30 mm) are always linear. Comes with sample holder in corresponding diameter.
- Surface coils (10, 15, 20 mm) can be tuned to a single frequency where the object needs to be placed directly on the coil and is typical used for in-vivo experiments. The animal handing is included with the coil.
- Animal Handling Accessory
- Animal Monitoring Unit

MR Microscopy Probes

Specifications MicWB40	
Bore	WB / SWB
1H frequency range	300 – 800 MHz
rf channels	Two independent
Requirements	MR Microscopy Accessory
Gradient	Micro2.5
Directions	xyz
Gradient strength per direction	1.5 T/m
ID/OD	40/72 mm
Rise Time (5-95%), 0-60A,120V	< 100 µs
Cooling	Water
Maximum current tested	60 A
Removable	Yes
Exchangable rf coils	
Detection	single tuned, double tuned, or quadrature
Typical Nuclei	^{1}H, ^{2}H, ^{13}C, ^{31}P, ^{7}Li, ^{19}F, …
Standard sample temperature range	-20 – 60°C
Sample diameter	2.5 – 30 mm

MR Microscopy Probes

Micro2.5 - Cryoprobe

Bruker's CyroProbe expertise into the field MR microscopy is leading to new, exciting opportunities. MR Microscopy techniques for small samples with dedicated diameters 5 and 10 mm benefit from CryoProbe technology and a factor of up to 4 improvement in sensitivity on non-polar samples. The superb image quality, top-of-the-line spatial resolution and/or largely reduced scan times. The MR Microscopy CryoProbe technology is based on the HR CryoProbe ensuring full compatibility to the Automatic Tuning Module (ATM) and the Cryoplatform unit.

The single or double frequency MR Microscopy CryoProbe offers variable temperature operation over the range from 0 to 80 °C and is mounted in the Micro2.5 gradient system, which is the MR Microscopy gradient workhorse. Its gradient strength is perfect for most applications. The Micro2.5 remains in the magnet while the MicWB40 is removed from the magnet to insert the sample. It is available for WB and SWB systems.

The MR Microscopy CryoProbe is a very dedicated and customized device. Please contact the MR Microscopy Product Management for details.

Applications

The MR Microscopy CryoPorbe is the perfect solution for demanding investigations of plants, small animals, porous and inhomogeneous objects where S/N ratio may be an issue.

Accessories

- Automatic Tuning Module (ATM)
- Cryoplatform- https://www.bruker.com/products/mr/nmr/probes/cryoprobes/cryoplatform.html

Specifications - CryoProbe	
Bore	WB / SWB
^{1}H frequency range	300 – 700 MHz
rf channels	^{1}H
Requirements	MR Microscopy Accessory CryoPlatform
Gradient	Micro 2.5
Directions	xyz
Gradient strength per direction	1.5 T/m
ID/OD	40/72 mm
Rise Time (5-95%), 0-60A,120V	< 100 µs
Cooling	Water
Maximum current tested	60 A
Removable	Yes
Standard sample temperature range	0 – 80°C
Sample diameter	5 and 10 mm

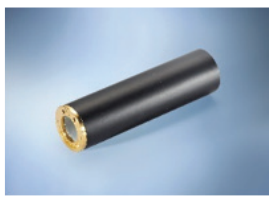
MR Microscopy Probes

Micro2.5 – Magic Angle Spinning (MAS)

Combining Magic Angle Spinning (MAS) technology with the MR Microscopy gradient technology enables to acquire images and localized spectra of semi-solid objects due to the combination of reduced signal linewidth with a high and very linear gradient field. Rotors with a 3.2 or 4 mm diameter are offered, further on request. Besides imaging applications very slow diffusion processes can be investigated applying the strong gradient fields.

It is combined with Bruker's Micro2.5 WB gradient system, which is the MR Microscopy gradient workhorse. Its gradient strength is perfect for most applications. The Micro2.5 remains in the magnet while the MicWB40 is removed from the magnet to insert the sample. Utilizing the Micro2.5 gradient the maximum gradient strength of 2.5 T/m along the magic angle is reached if the x, y, z gradients are switched simultaneously.

The MR Microscopy MAS Probe is a very dedicated and customized device. Please contact the MR Microscopy Product Management before placing an order.



Applications

The MR Microcopy Micro2.5 Magic Angle Spinning probe offers unique capabilties for imaging and diffusion experiments of semi-solid objects.

Accessories

- MAS-3 Unit

Specifications - MAS	
Bore	WB / SWB
^{1}H frequency range	300 – 800 MHz
rf channels	Two independent
Requirements	Microscopy Accessory
Gradient	Micro 2.5
Directions	xyz
Gradient strength per direction	1.5 T/m
ID/OD	40/72 mm
Rise Time (5-95%), 0-60A,120V	< 100 µs
Cooling	Water
Maximum current tested	60 A
Removable	Yes

MR Microscopy Probes

Micro5

The Micro5 probe supports Bruker's most powerful 3 T/m imaging gradient, delivering stunning magnetic resonance microscopy images with resolutions < 10 x 10 x 10 μm^3 samples in a Bruker standard bore magnet. But the probe can also be used in wide bore and super wide bore systems. Combined with it's versatile exchangeable rf coils it can be adapted to perfectly match your application, supporting sample diameters from 0.5 - 10 mm.

The Micro5 probe can also be used as a 3-axis diffusion probe or combined to increase the gradient strength in one direction. It is particularly useful to investigate anisotropic diffusion.

Applications

The Micro5 probe is typically used to study mineral or geologic samples, polymers, tablet dissolution kinetics, plants and seeds, bone or tissue biopsy samples, and small insects.

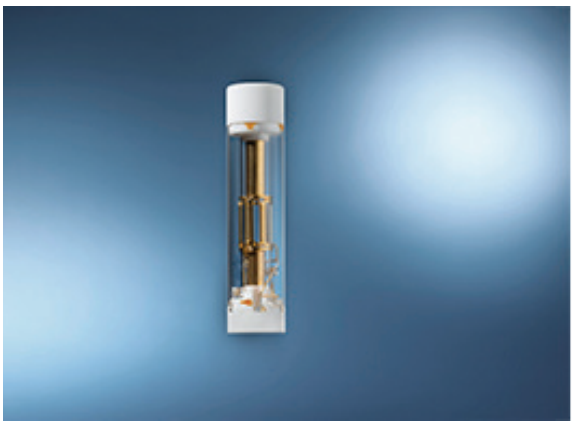
Features

- Standard Bore Probe, also compatible to WB and SWB magnets
- Gradient strength of up to 3 T/m, water cooled
- Exchangeable rf coils
- Micro5 rf coils (compatible to Diff50 except 10 mm coils)
  - 2 and 4mm Solenoid
  - 5-10 mm Volume Coils
    (Sample transfer via SB-BST)
- 500 µm MicroCoils
- Double channel 5-8 mm coils and single channel 5-10 mm coils
- Variable Temperature Control (compatible to BSVT, BCU,…)
- Compatible to SB or WB Shim System
- Compatible to TopShim
- Probe body compatible to Diff50 MR Diffusion Probe

Accessories

Rf coils are exchangeable, the gradient coil must be unmounted first to allow the change of the rf coil.

- 1 mm MicroCoil (coil diameter 1mm, max. sample size 500µm). To replace the sample the probe must be removed from the magnet as with the solenoid coils, unless e.g. a Flow Cell is used. Different Type of sample containers are supported
- 2-4 mm Solenoid coil. The samples must be placed horizontally in this type of rf coils. This requires to remove the probe from the magnet, remove the gradient coil and place to sample.
- 5 or 10mm single tuned saddle coil or a 5 or 8 mm double tuned coil. In this case the sample can be changed using the Bruker BST sample transfer system, the probe remains inside the magnet.



Specifications - Micro5	
Bore	SB / WB / SWB
1H frequency range	300 – 950 MHz
rf channels	Two independent
Requirements	MR Microscopy Accessory
Gradient	Micro5
Directions	xyz
Gradient strength per direction	3 T/m
ID/OD	19/40 mm
Rise Time (5-95%), 0-60A,120V	< 80 µs
Cooling	Water
Maximum current tested	60 A
Removable	Yes
Exchangable rf coil	
Detection	single tuned, double tuned
Typical Nuclei	^{1}H, ^{2}H , ^{13}C, ^{31}P, ^{7}Li, ^{19}F, …
Standard sample temperature range (5 mm)	-40°C.. +80°C
Sample diameter	0.5 – 10 mm

MR Microscopy Probes

Mini0.75 – MiniWB57R

The MiniWB57R rf probe offers the maximum available sample space in a WB magnet - a perfect compromise between space and gradient strength. Its main application field is in-vivo studies of rodents, such as, large mice or small rats. Combined with it's exchangable rf coils it can be adapted to perfeclty match your application.

If required it can be equipped with the animal monitoring system to supervise physiological parameters of the animals (ECG, respiration, body temperature) and provide connections and masks for breathing gas anesthesia. Different type of animal beds and positioning systems are supported for the individual coil types.

Accessories

- Animal Handling Accessory
- Animal Monitoring Unit

Applications

- Wide Bore Probe, also compatible to WB and SWB magnets
- Gradient strength of up to 470 mT/m, water cooled
- Animal support (Triggering Unit, Anesthesia, Mouse Bed)
- Range of exchangeable rf coils.
- Open access
- 35 or 40mm birdcage coil. The sample is manually placed inside the rf coil from the top or inserted using the animal/object handling system from the bottom of the probe.
- Special animal/object support is optionally available for volume and surfacecoils.
- Single or double tuned surface coils in fixed housings, typically used in in-vivo investigations. For this coil configuration, the in-vivo support option is mandatory.

Specifications MiniWB57R / Mini0.75	
Bore	WB / SWB
^{1}H frequency range	300 – 800 MHz
rf channels	Two independent
Requirements	Microscopy Accessory
Gradient	Mini0.75
Directions	xyz
Gradient strength per direction	475 mT/m
ID/OD	57/72 mm
Rise Time (5-95%), 0-60A,120V	< 120 µs
Cooling	Water
Maximum current tested	60 A
Removable	Yes
Exchangable rf coils	
Detection	single tuned, double tuned, or quadrature
Typical Nuclei	^{1}H, ^{2}H, ^{13}C, ^{31}P, ^{7}Li, ^{19}F,…
Standard sample temperature range	5 – 40°C
Sample diameter	20-40 mm

MR Microscopy Probes

SWB Probes – MiniSWB90

Bruker's vertical super wide bore (SWB) magnets provide space for samples up to a diameter of 66 mm. Therefore it is Bruker's largest vertical magnet system with a room temperature bore diameter of 154 mm. The MiniSWB90 super wide bore RF probe is optimized for material research and the investigation of process parameters. The system is equipped with a combined SWB gradient/shim system. An additional WB shim system can be mounted optionally in the SWB gradient/shim system. All SB and WB gradients, shims and MR microscopy, MR diffusion, solid state and are compatible, making it suitable for every purpose. The SWB driver hardware is required to drive the amplifier rack from a standard spectrometer delivering up to 200 A and creating a maximum gradient strength of 785 mT/m. The SWB system is available in a 300 or 500 MHz configuration.

Features

- Super Wide Bore Probe
- Gradient strength of up to 785 mT/m, water cooled
- Compatible to high resolution and solid state applications
- Small footprint
- Available probe:
  - 66 mm ID 1H Quadrature Probe
  - 40 mm ID 1H Quadrature Probe
  - 66 mm ID 1H/13C and 1H/19F Probes
  - 40 mm ID 1H/13C and 1H/19F Probes
- All other probes on request
- Optional Variable Temperature Control (compatible to BSVT, BCU)

Accessories

- Optional SB and WB shim coils to use standard SB/WB probes in the SWB magnet

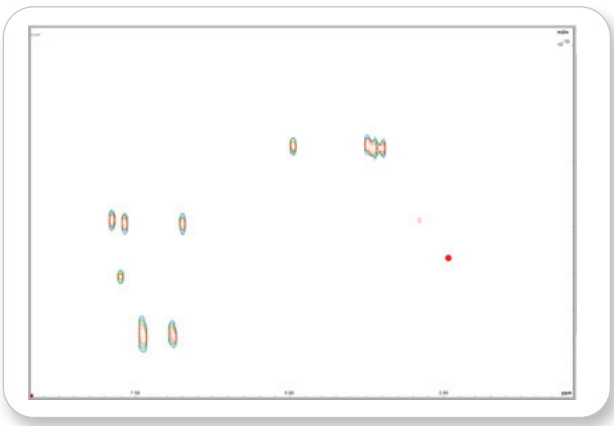
Specifications MiniSWB90 / Mini0.75	
Compatible with magnet system	SWB
Bore	SWB
^{1}H frequency range	300 or 500 MHz
rf channels	Two independent
Requirements	SWB Imaging Accessory
Gradient	BGA9
Directions	xyz
Gradient strength per direction	785 mT/m
ID/OD	66/92 mm
Rise Time (5-95%), 0-60A,120V	< 100 µs
Cooling	Water
Maximum current tested	200 A
Removable	Yes
Exchangable rf coils	
Detection	single tuned, double tuned, or quadrature
Typical Nuclei	^{1}H, ^{2}H, ^{19}F, ^{13}C, ^{31}P, ^{7}Li,,…
Standard sample temperature range	5 – 40°C
Sample diameter	40-66mm

MR Diffusion

MR Diffusion is a powerful and widespread method to investigate molecular motion, such as Brownian motion, and flow.

Dedicated diffusion probes are the ultimate tools to deliver increased resolution in DOSY and in q-space experiments. High gradient strength and fast switching times enable diffusion investigation of samples with diffusion coefficients as low as 5 x 10-15 m2/s, thus allowing the detection of various diffusion times over a wide range and investigation of X-Nuclei which requires a high gradient strength.

The MR Diffusion accessory and MR Microscopy accessory share the same hardware platform, allowing to drive the diffusion gradient coils with the imaging accessory's gradient amplifiers.



DOSY spectrum of a mixture of Na-Salicylat , Methylorange , Cyclodextrine in D_2O

Bruker offers a complete hardware and software accessory package for MR Diffusion which can be easily added to existing AVANCE spectrometers with standard bore (52 mm), wide bore (89 mm), or super wide bore (154 mm) magnets.
This accessory provides state of the art MR Diffusion capabilities, very strong gradients together with high resolution MR probe technology together allowing to extend the high-resolution spectroscopy seemlessly into the range of big, slow diffusion molecules. On the other hand it also allows investigating more exotic systems, e.g. porous media.

MR Microscopy Accessory Package		
Hardware		Software
Imaging Rack ■ Safety controller ■ 3x Great60 gradient amplifiers	RF Probes / Gradients ■ Probe ■ rf coils ■ Animal support	■ ParaVision ■ Topspin

Features

The MR Diffusion accessory is a user-friendly diffusion package which contains both state-of-the art hardware and software which enables non-expert and expert user to take full control of their MR experiment - whether running routine diffusion investigation or developing highly sophisticated diffusion sequences.

MR Microscopy Probes

MR Diffusion probes are available for SB, WB, and SWB system. The SB probe also fits into larger bore magnets and offer 1H-19F/XBB and lock in BBI or BBO configurations as well as automatic tuning and matching and a wide temperature range. The WB probe features exchangeable rf coils in various diameters for 1H and X-nucleus available as single or double tuned.

Hardware

Bruker MR Microscopy / MR Diffusion hardware is flexible and powerful, whether performing routine measurements, creating new demanding methods or investigating new types of objects. Bruker GREAT60 gradient amplifier combines strong gradient pulses with up to 60 A and fast switching times with stability over a large bandwidth, low distortion, linearity and low noise.

Software

TopSpin® sets the industry standard for NMR data analysis and the acquisition and processing of NMR spectra. The latest release of TopSpin® software, 4.0, features a new, user-friendly GUI which provides easy access to vast experiment libraries including standard Bruker pulse sequences and user generated experiment libraries for both industrial and academic users. https://www.bruker.com/products/mr/nmr/software/topspin.html

The **diff package** is a comprehensive software to simplify the set-up of diffusion experiments. To focus on physically relevant diffusion parameters, machine level settings are replaced by experiment level parameters. For example, rather than setting the gradient strength in percent, the gradient strength is given in physical units. The user can select between Gauss/cm, mT/m, T/m and Hz/cm (^{1}H). For experimentally relevant parameters, like the diffusion time, the **diff** program calculates all relevant delays building the diffusion time and provides a lower limit given by the unavoidable delays in the sequence.

The **diff** program covers the standard diffusion/DOSY experiments. It also offers a couple of "2D" methods, where "2D" stands for 2 non-FT or dynamic dimensions, for example like DDCOSY having 2 orthogonal diffusion dimensions, or DRCOSY having a diffusion and a relaxation dimension. The number of available methods will continue to grow in the future.
There are also some new setup experiments and pure T_1 and T_2 experiments. The diff program also prepares the data for analysis in Dynamics Center

Dynamics Center is an easy-to-use and integrated platform featuring general dynamics and protein dynamics. It offers intuitive, method-oriented workflows for the analysis of a wide range of experiments. https://www.bruker.com/products/mr/nmr/software/dynamics-center.html

The diffusion accessory is compatible with the **MNOVA** software suit.

MR Diffusion Probes

Diff BB

The DiffBB is a broadband gradient probe with the Automatic Tuning Module (ATM) for NMR diffusion investigations of a wide range of diffusivities down to 110^{-14} m^2/s (T1 > 1s and T2 > 100 ms). The DiffBB provides a high-performance water cooled single axis gradient. Variable temperature measurements are possible in the range of -40°C to +150°C. Together with the ATM this allows a series of fully automatic variable temperature experiments. The broadband channel enables to observe a wide range of nuclei from ^{1}H down to ^{15}N.

Features

- Standard Bore Probe, also compatible to WB and SWB magnets
- Gradient strength of up to 17 T/m, water cooled
- Switching time < 300 µs
- ^{1}H-^{19}F / X-BroadBand (^{31}P-^{15}N)/ Lock Channel
- Automatic Tuning Module (ATM)
- Sample transfer via SB-BST
- Variable Temperature Control (compatible to BSVT, BCU,…)
- BBI or BBO configuration

Accessories

- Diff Software Application
- Dynamic Center for data processing
- Compatible with IconNMR and Bruker Sample changers for automation

Specifications DIFFBB	
Compatible with magnet system	SB / WB / SWB
^{1}H frequency range	300 - 800 MHz
rf channels	^{1}H, broadband, lock
Requirements	MR Diffusion / MR Microscopy accessory
ATMA	Yes
Gradient	BGA9
Directions	z
Gradient strength per direction	17 T/m
ID/OD	40/72 mm
Rise Time (5-95%), 0-60A,120V	< 300 µs
Cooling	Water
Maximum current tested	60 A
Removable	Yes
rf coil	BBO or BBI design, one coil tunable ^{1}H-^{19}F + ^{2}H lock, second coil BB tunable ^{31}P – ^{15}N
Standard sample temperature range	-40 – 150°C
Sample diameter	5 mm

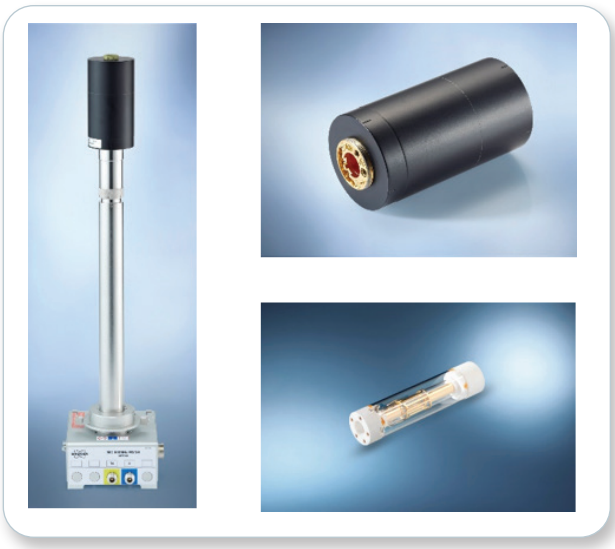
MR Diffusion

Diff50

The Diff50 high power MR Diffusion probe provides exchangeable single or double tuned frequency ref coils. The Diff50 offers the highest gradient strength available at Bruker for diffusion coefficient measurements down to 5 10^{-15} m^2/s (under specific conditions). The sample can be temperature controlled between -40°C and +80°C, probe body and coils (<= 8mm) are compatible with the Micro5 probe.

Often double tuned rf coils with ^2H on the outer coil are selected to allow for locked or TopShim applications. In this configuration, only one nucleus is available for the NMR experiments.

A special version of the Diff50, the Diff50L, has 2 rf coils for NMR investigations plus lock channel. In this configuration the rf coil is not exchangeable anymore, the frequency combination must be defined on initial order of the probe.



Accessories

- Diff Software Application
- Dynamic Center for data processing

Features

- Wide Bore Probe, also compatible to SWB magnets
- Gradient strength of up to 30 T/m, water cooled
- Exchangeable rf (compatible to micro5 except 10 mm coils)
- Rf coils
  - 5 and 10 mm single tuned coils
  - 5 and 8 mm double tuned coils
- Sample transfer via SB-BST
- Variable Temperature Control (compatible to BSVT, BCU,…)
- Compatible with WB shim system
- Special Diff50L version with two frequencies plus lock, but exchangeable rf coils

Specifications Diff50	
Bore	WB / SWB
1H frequency range	300 – 800 MHz
rf channels	Two independent
Requirements	Diffusion / Microscopy Accessory
Gradient	Diff50
Directions	z
Gradient strength per direction	30 T/m
ID/OD	19/57 mm
Rise Time (5-95%), 0-60A,120V	< 500 µs
Cooling	Water
Maximum current tested	60 A
Removable	Yes
Exchangable rf coils	
Detection	single tuned, double tuned
Typical Nuclei	^1H, ^2H, ^{13}C, ^{31}P, ^7Li, ^{19}F,…
Standard sample temperature range (5 mm)	-40°C.. +80°C
Sample diameter	5 – 10 mm

Diffusion Acquisition and Analysis using TopSpin, diff-5, and Dynamics Center 2.5

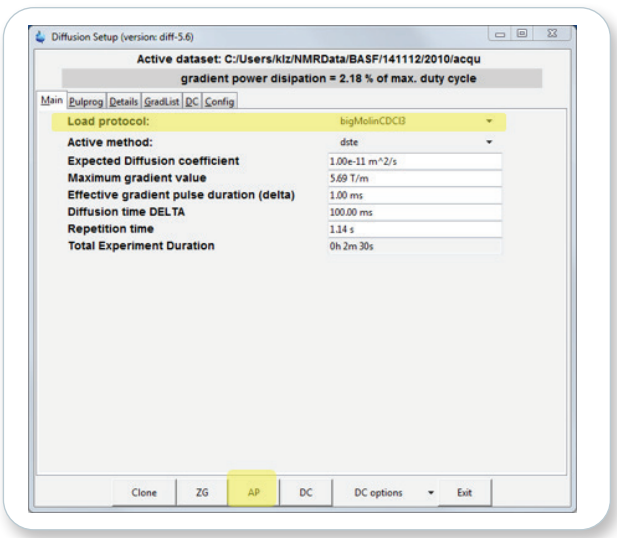
Comprehensive package for PFG Diffusion NMR

TopSpin is used to acquire the data and for basic processing. Dynamics Center does the analysis of the data. Diff-5 sets up the acquisition and controls automatic processing and analysis.

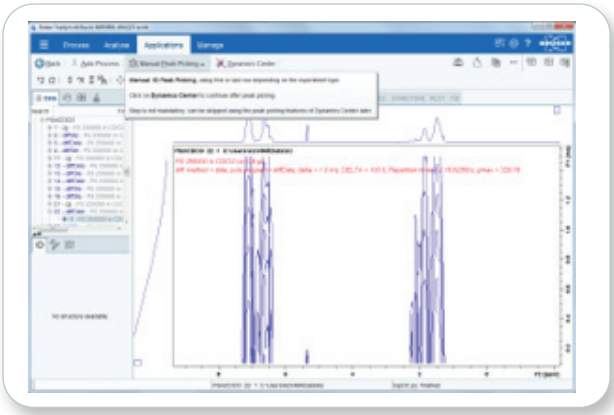
The usual workflow is as follows:
Setup and run a 1D onepulse experiment.

1. Clone the 1D, start diff and select a protocol.
2. Run the experiment
3. Press "Ap" in diff. The data will be automatically
4. Fourier transformed, phase and baseline corrected. Then the data are loaded automatically into Dynamics Center

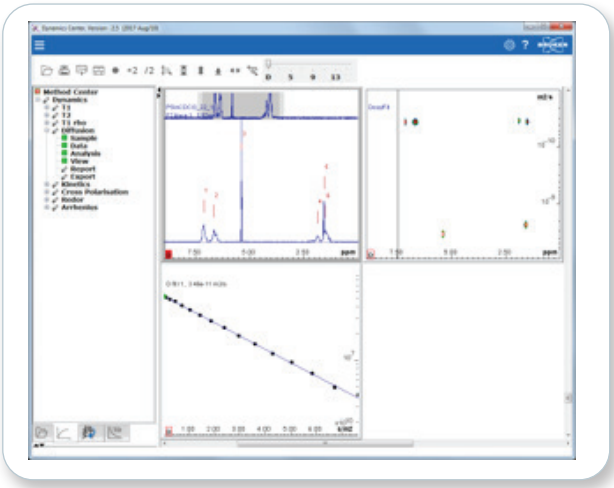
Step 4 can also be done in TopSpin as show below. Refinement of the analysis can then be performed in Dynamics Center.



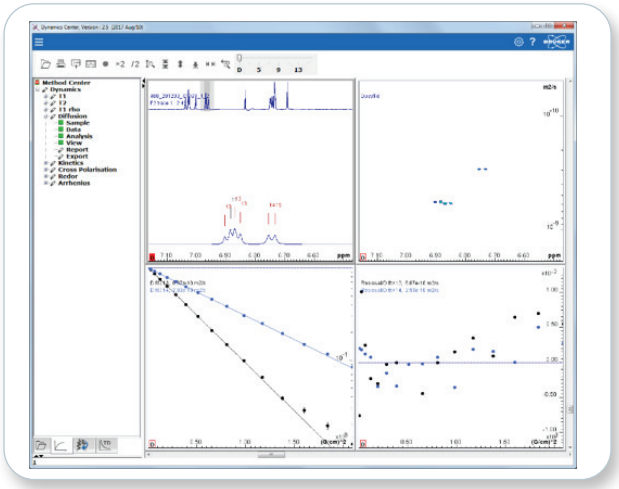
Acquisition parameter setup via pre-prepared Bruker and user protocols, fully automatic processing in TopSpin and analysis in Dynamics Center.



Processed data in Topspin: Interactive peak picking or integration prior to the transfer of the data to Dynamics Center is also possible



Automatically analyzed data in Dynamics Center: The analysis can be refined interactively in Dynamics Center. Different fit functions, a variety of display options, reports and export facilities are available in Dynamics Center.



Refined display in Dynamics Center: Two peaks are selected and the diffusion profiles and the residuals are shown in cumulative displays.

Summary

- Comprehensive acquisition, processing and analysis package
- Easy setup, automatic processing and analysis
- Full access for experts

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