

Magnetic Resonance Imaging

Nuclear Molecular Imaging



Imaging Innovations bringing real benefit to researchers



Preclinical and Clinical

Innovation is in our genes



THE QUEEN'S AWARDS FOR ENTERPRISE: INNOVATION With over 33 years of experience, MR SOLUTIONS has continued to develop new and exciting technical innovations for the clinical and preclinical markets. MR SOLUTIONS' technology has become a game changer over traditional preclinical devices, with the introduction of cryogen-free MR up to 9.4T and advanced simultaneous PET/MR technology.

In recognition of MR SOLUTIONS innovation and worldwide commercial success, MR SOLUTIONS achievements have been recognised many times. MR SOLUTIONS has received two prestigious Queen's Awards Enterprise. Two for Innovation in 2016 and 2019 and one for International Trade in 2017.

The winner's reception was hosted by Her Majesty the Queen and His Royal Highness the Duke of Edinburgh.

The Queen's Award is the most prestigious business award in the UK. It is presented to a select group of businesses having been recognised for outstanding business achievement.

MR SOLUTIONS has also received a prestigious R&D 100 Award, one of the highest honours in the research and development sector, often referred to as the "Oscars of Invention". In addition, the Innovation Award at "the Made in the South East Awards" and the SME business award further recognised MR SOLUTIONS achievements.







Contents

Innovation is in our genes	Pa
Table of contents	Pa
Headquarters and about MR SOLUTIONS	Pa
MRS Magnetics - Manufacturing	Pa
EVO2+ Spectrometer	Pa
Clinical OEM scanner	Pa
Preclinical MR	Pa
The Cryogen-free revolution by MR SOLUTIONS	Pa
Installation and use: Stress free	Pa
Powerscan and Flexiscan MR	Pa
Coils	Pa
Rampable	Pa
Rotating magnet	Pa
9.4T and 7.0T specifications	Pa
4.7T and 3.0T specifications	Pa
MRI Upgrades	Pa
C2P: Clinical to Preclinical conversion kit	Pa
Gradients Upgrade	Pa
Preclinical PET-SPECT-CT	Pa
Multi-modality Imaging	Pa
PET specifications	Pa
Simultaneous PET/MR imaging: MRS*PET INSERT	Pa
Sequential PET/MR imaging: MRS*PET CLIP-ON	Pa
Sequential PET/CT Imaging ; MRS*PET CLIP-ON	Pa
MRS*PET/CT Benchtop & MRS*SPECT/CT Benchtop	Pa
MRS*PET/CT 80 and 120 large bore system	Pa
MRS*PET/CT 220 Extra large bore system	Pa
SPECT/MR & SPECT-CT	Pa
MR*CT for Preclinical Imaging	Pa
Animal handling and Software	Pa
Animal beds and monitoring	Pa
Preclinical Scan: Multi-modality software interface	Pa
Powerscan: Pulse sequence programming software	Pa

ge 2 ge 3 ge 4 ge 5 ge 6 ge 7 ge 8 ge 9 ge 10 ge 11 ge 11 ge 11 ge 11 ge 12 ge 13 ge 14 ge 14 ge 15 ge 16 ge 17 ge 18 ge 19 ge 20 ge 21 ge 22 ge 24 ge 25 ge 26 ge 27 ge 28 ge 29 ge 30 ge 31

HEADQUARTERS

Guildford, England, UK



Administration Sales Service Application Marketing Research Development Manufacturing Shipment

Distributors

MR SOLUTIONS has carefully selected qualified partners in most of the countries around the world.

Please contact us to know your point of contact

MR SOLUTIONS has its headquarters in the United Kingdom with offices in the United States of America and gualified distributors in Asia.

About MR SOLUTIONS:

In 1985 Dr David Taylor founded SMIS Ltd., a manufacturer of research MRI systems and spectrometers. In 1999, David founded MR Research Systems Ltd., leveraging the technology developed by SMIS. Shortly afterwards he also co-founded Hallmarq Veterinary Imaging Ltd, a dedicated equine MRI systems supplier.

In 2004, following the exponential growth of both companies, MR Research systems and Hallmarq Veterinary Imaging restructured to target specific markets, and therefore MR SOLUTIONS was created to serve non-veterinary markets.

Subsequently MR SOLUTIONS completely re-engineered its market leading MRI spectrometer and launched a range of revolutionary preclinical MRI systems based on innovative cryogen free superconducting magnet technology.

The success of this product was immediate, and MR SOLUTIONS is now the worldwide leader in high field cryogen-free MRI. As only an MR company could understand MR based multimodality integration, MR SOLUTIONS was able to quickly launch its PET INSERT compatible with high field MR. Within a few months MR SOLUTIONS became market leader in this product segment too.

MR SOLUTIONS is a privately-owned company, not on any stock market. Profits are reinvested into long term product and business development without having to compromise to meet short term market share price expectations.





2 Offices in USA, Orlando and Boston Covering North America

Application support across Europe with staff locally based

Research, Development, Manufacturing, Production by **MR** SOLUTIONS



MRS Magnetics

MRS Magnetics an MR SOLUTIONS' Company

From manufacturing to the sale and installation, MR SOLUTIONS carries out all the stages:

MR SOLUTIONS strength is in its ability to control all the steps from product development to manufacturing and delivery of its products. This enables the best product integration and therefore gives the best commercial products on the market.

MR SOLUTIONS manufactures its own nuclear imaging devices such as PET, SPECT and CT, and through its wholly owned company MRS Magnetics, manufactures its own magnets and gradients.

MR SOLUTIONS has set up a large production facility enabling it to manufacture not only preclinical systems but also clinical systems.







MRS Magnetics

EVO2+ SPECTROMETER

Clinical & Research

Future Proof MRI Spectrometers

The perfect tool for OEM's and MR research:

MR SOLUTIONS is recognised as the leading supplier of MRI spectrometers for OEM's and end users, with over 2000 operational MRI spectrometers installed across the world.

Very many of our MRI spectrometers run clinical systems whilst the rest have been specified and bought for scientific research needs.

MR SOLUTIONS MRI spectrometers can be used for both preclinical and clinical MR imaging system control and operation.

- 2 TX to 16 TX
- 4 RX to 32 RX, extension to 64 RX and 128 RX
- Optional fibre optic RX communication
- Expanded pulse program and waveform memory
- TX direct digital synthesis to 500 MHz
- Pulse sequence floating point support •
- Pulse sequence maths library support
- RX Real time, on board, configurable signal processor





Sequence Library

Includes:

- 2D, 3D GRE and SE
- 2D, 3D FSE
- Steady state GRE
- Inversion recovery
- Pre saturation and MTC imaging
- Multi angle oblique imaging
- FPI

SPECTROMETER EVO 24

- Multiple echoes
- Diffusion weighted imaging
- Diffusion tensor imaging
- 2D, 3D angiography

Software

- 'Powerscan' research and development environment
- Full control of the system
- Flexible pulse programming environment with user defined graphical wave shape generation
- Interactive setup mode for sequence parameter optimisation including real time display of images and/or spectra and time data
- Scripting of own set of modes of acquisition
- Customisable reconstruction processing
- 'Clinical Scan' user interface Optional

Hardware

- 4 RX minimum, expandable up to 32 **BX** in 6U enclosure
 - 1TX minimum expandable up to 16 TX
- Extensions available to 64 RX and 128 RX
- Digital pre-emphasis and B0 compensation including cross terms
- 16 bit, 500 mega samples/sec ADC
- 2 Mbytes of pulse program memory
- 1 Gbyte of waveform memory
- **Operation under Windows 10**



Clinical Scanners for OEMs



Providing Solutions for Clinical OEMs

MR SOLUTIONS clinical division:

MR SOLUTIONS developed some of the first 3.0T and 4.7T clinical research systems.

Based on its 30 years+ clinical MR experience and its proven success in developing high field PET / MR systems. MR SOLUTIONS can supply partial or complete clinical systems as an OEM sub-contractor.

MR SOLUTIONS has already developed a large bore PET INSERT available to clinical MR manufacturers for clinical research purposes.

The new MR SOLUTIONS' facility for manufacturing and production, MRS Magnetics (see page 5) has been scaled up to handle clinical projects.



THE CRYOGEN-FREE REVOLUTI

by MR SOLUTIONS



MRS*DRYMAG Superconducting and Rampable magnets from 0.1T to 9.4T:

MR SOLUTIONS has pioneered cryogen free superconducting technology and is now clearly established as the market leader.

Our technology doesn't require liquid helium or liquid nitrogen for cooling, hence the term dry magnets. Due to this revolutionary technology, options that were impossible on conventional wet magnets, such as changing the magnetic field strength without penalty in just a couple of hours, become possible. This is a great utility for researchers interested in translational imaging, contrast agent development, or ex-vivo studies.

All our MRS*DRYMAG systems are compatible with our nuclear modules, PET & SPECT for simultaneous and sequential acquisition and can be upgraded at any time.

The MR SOLUTIONS' technology also has a huge advantage in providing systems that are very light and compact (350kg/1m40 high for a 3T for example), and do not require specific room requirements such as quench pipes or a liquid helium reservoir.



CRYOGEN-FREE



Installation & use : Stress free

Don't stress about installation and operational cost!

The site preparation for the installation of a traditional big wet magnet cooled with liquid helium requires a huge investment from the institute. Cryogen-free dry magnets from MR SOLUTIONS need very little infrastructure on site.

MRS*DRYMAG systems are extremely light and compact. There are no requirements for ceiling height beyond standard room construction, no need for quench pipes, or reservoirs of liquid helium or liquid nitrogen. There is also no need for a Faraday cage as they are self-shielded. MR SOLUTIONS' MRI systems can be installed almost anywhere in rooms as small as 8m2.



FLEXISCAN POWERSCAN

MR models for all requirements

FLEXISCAN & POWERSCAN

At MR SOLUTIONS, we understand that researchers have unique needs. Some researchers solely require high-end MR functionality, whilst others are more interested in multi-modality imaging. Flexiscan systems don't require specialist knowledge and can be operated by simply selecting predefined protocols. Powerscan systems allow pulse sequence programming, a wider variety of radio frequency coils, stronger gradients, and more transmitters and receivers. They also have a rampable magnetic field available as an option.

At MR SOLUTIONS, we are conscious that your research focus may change over time and therefore we have made it possible to upgrade on-site Flexiscan systems to the Powerscan standard.

Rampable

All Powerscan models have, as an option, a rampable field feature. They can ramp down from 9.4T to 3T for translational imaging, to 1T for contrast agent development, to 0.5T for ex-vivo studies or any other field strength.

The system moves from one field to the other in a couple of hours. Up to 3 strengths are selectable on a system and are predefined by the customer.



COILS

Flexiscan and Powerscan: Transmit/receive bird cages coils Whole body, cardiac, and brain Surface coils From mouse to large animals

Powerscan models : Phased array coils Multi nuclear coils: e.g. 23Na, 150,19F, 31P, 13C Specific customised coils



FLEXISCAN POWERSCAN

Rotating Magnet for Flexiscan and Powerscan

The compact size of MR SOLUTIONS magnet and the cryogenfree technology permits rotation of the magnet, expanding possible applications to examples such as fluid flow in porous media and agronomic research on plants.





MRS*DRYMAG Specifications

Dry Magnet Cryogen-free



Main Specifications					
Model reference	MRS*DRYMAG 9417	MRS*DRYMAG 9426			
Bore size	17 cm	26 cm			
	Multimodality imaging compatible	with			
MRS*PET INSERT	Yes, for Simult	aneous PET/MR			
MRS*PET CLIP-ON	Yes, for Sequ	ential PET/MR			
MRS*SPECT CLIP-ON	Yes, for Sequer	ntial SPECT/MRI			
Dry magnet, gradient and spectrometer specifications					
Animal type	Whole body mice, rats & Marmosets	Whole body mice, rats, marmo- sets, 3kg animals			
Clear bore size (mm)	170	259			
FOV (mm)	70 mm x 100 mm axially	135 mm DSV			
Homogeneity	over 35 mm DSV +/- 0.05ppm	±1 ppm over 98 mm DSV			
5 gauss line	105 cm rad. x120 cm axially	140 cm radially x 170cm axially			
Magnet stability	<0.05 ppm/hour (intrinsically stable)				
Magnet type	Superconducting				
Magnet Technology / Cooling	Dry Magnet technology MRS*DRYMAG, Cryogen free (no liquid helium and no nitrogen)				
Variable fields / Rampable	Yes, for Powerscan version: up to 3 additional stengths				
Integral RF shield	Yes, self	shielded			
Rotating magnet stand	Yes, option for both Flexiso	can and Powerscan versions			
Diameter	158 mm OD, 100 mm ID	244 mm OD, 161 mm ID			
Linearity	L: +/- 5% over 75 mm DSV	L: +/- 5% over 90 mm DSV			
Gradient strength	600 mT/m all directions	420 mT/m all directions			
Gradient upgrade	1000 mT/m for Powerscan	600 mT/m for Powerscan			
Gradient insert	Yes, option for Powersca	n version up to 1750mT/m			
EVO Spectrometer	2 Transmitter	s - 4 receivers			
Channels upgrade	Yes for Powerscan ver	rsion, up to 8 TX, 32 RX			
	Coils				
Volume, surface	Yes	Yes			
Phased array, multinuclear	Yes for Powe	erscan version			
C	imensions and weight with anima	l table			
DRYMAG Dimensions	1450 (h) x 800 (w) x 1024 (l)	1540 (h) x 980 (w) x 1310 (l)			

700 kg

<1000kg

Dry Magnet Cryogen-free

No Liquid Helium - No Nitrogen

Main Specifications					
Model reference	MRS*DRYMAG 7017	MRS*DRYMAG 7024			
Bore size	17 cm	24 cm			
	Multimodality imaging compatible	with			
MRS*PET INSERT	Yes, for Simulta	aneous PET/MR			
MRS*PET CLIP-ON	Yes, for Seque	ential PET/MR			
MRS*SPECT CLIP-ON	Yes, for Sequer	tial SPECT/MRI			
Dry mag	net , gradient and spectrometer s	pecifications			
Animal type	Whole body mice, rats & Marmosets	Whole body mice, rats, mar- mosets, 3kg animals			
Clear bore size (mm)	170	240			
FOV (mm)	70 mm x 100 mm axially	135 mm DSV			
Homogeneity	over 35 mm DSV +/- 0.05ppm	±1 ppm over 98 mm DSV			
5 gauss line	85 cm radially x 155 cm axially	120 cm radially x 150cm axially			
Magnet stability	<0.05 ppm/hour (intrinsically stable)				
Magnet type	Superconducting				
Magnet Technology / Cooling	Dry Magnet technology MRS*DRYMAG, Cryogen free (no liquid helium and no nitrogen)				
Variable fields / Rampable	Yes, for Powerscan version: up to 3 additional stengths				
Integral RF shield	Yes, self shielded				
Rotating magnet stand	Yes, option for both Flexisc	an and Powerscan versions			
Diameter	158 mm OD, 100 mm ID	227 mm OD, 160 mm ID			
Linearity	L: +/- 5% over 75 mm DSV	L: +/- 5% over 90 mm DSV			
Gradient strength	600 mT/m all directions	420 mT/m all directions			
Gradient upgrade	1000 mT/m for Powerscan	600 mT/m for Powerscan			
Gradient insert	Yes, option for Powerscar	n version up to 1750mT/m			
EVO Spectrometer	2 Transmitters	s - 4 receivers			
Channels upgrade	Yes for Powerscan ver	sion, up to 8 TX, 32 RX			
	Coils				
Volume, surface	Yes	Yes			
Phased array, multinuclear	Yes for Powe	rscan version			
C	imensions and weight with anima	Itable			
DRYMAG Dimensions (mm)	1450 (h) x 800 (w) x 1024 (l)	1500 (h) x 980 (w) x 1310 (l)			
Total Weight	~500 kg	<600 kg			

PRECLINICAL MR

Total Weight



Flexiscan and Powerscan models



No Liquid Helium - No Nitrogen



No Liquid Helium - No Nitrogen

	Main Specifications		
Model reference	MRS*DRYMAG 4717	MRS*DRYMAG 4724	Model ret
Bore size	17 cm	24 cm	Bore size
	Multimodality imaging compatible	with	
MRS*PET INSERT	Yes, for Simulta	aneous PET/MR	MRS*PET
MRS*PET CLIP-ON	Yes, for Sequ	ential PET/MR	MRS*PET
MRS*SPECT CLIP-ON	Yes, for Sequer	ntial SPECT/MRI	MRS*SPI
Dry mag	gnet , gradient and spectrometer s	pecifications	
Animal type	Whole body mice, rats & Marmosets	Whole body mice, rats, mar- mosets, 3kg animals	Animal ty
Clear bore size (mm)	170	240	Clear bor
FOV (mm)	70 mm x 100 mm axially	135 mm DSV	FOV (mm
Homogeneity	over 35mm DSV +/- 0.05ppm	±1 ppm over 98 mm DSV	Homoger
5 gauss line	75 cm radially x 90 cm axially	110 cm radially x 140cm axially	5 gauss I
Magnet stability	<0.05ppm/hour (i	Magnet s	
Magnet type	Superco	Magnet t	
Magnet Technology / Cooling	Dry Magnet technology MRS*D helium and	Magnet T Cooling	
Variable fields / Rampable	Yes, for Powerscan version	Variable f	
Integral RF shield	Yes, self	Integral F	
Rotating magnet stand	Yes, option for both Flexisc	Rotating	
Diameter	158 mm OD, 100 mm ID	227 mm OD, 160 mm ID	Diameter
Linearity	L: +/- 5% over 75 mm DSV	L: +/- 5% over 90 mm DSV	Linearity
Gradient strength	600 mT/m all directions	420 mT/m all directions	Gradient
Gradient upgrade	1000 mT/m for Powerscan	600 mT/m for Powerscan	Gradient
Gradient insert	Yes, option for Powersca	n version up to 1750mT/m	Gradient
EVO Spectrometer	2 Transmitter	s - 4 receivers	EVO Spe
Channels upgrade	Yes for Powerscan ver	sion, up to 8 TX, 32 RX	Channels
	Coils		
Volume, surface	Yes	Yes	Volume, s
Phased array, multinuclear	Yes for Powe	erscan version	Phased a
C	Dimensions and weight with anima	I table	
DRYMAG Dimensions (mm)	1450 (h) x 800 (w) x 1024 (l)	1500 (h) x 980 (w) x 1310 (l)	DRYN
Total Weight	<500 kg	<600 kg	Tota

Main Specifications							
Model reference	MRS*DRYMAG 017	MRS*DRYMAG 3024	MRS*DRYMAG 3042				
Bore size	17 cm	24 cm	42 cm				
Multimodality imaging compatible with							
MRS*PET INSERT	Ye	s, for Simultaneous PET/N	IR				
MRS*PET CLIP-ON	٢	es, for Sequential PET/MF	1				
MRS*SPECT CLIP-ON	Yes, for Sequen	tial SPECT/MRI	N/A				
Dry magnet , gradient and spectrometer specifications							
Animal type	Whole body mice, rats & Marmosets	Whole body mice, rats, ≤ 3kg animals	≤ 6 kg animals				
Clear bore size (mm)	170	240	420				
FOV (mm)	70 x 100 axially	135 mm DSV	180 mm DSV				
Homogeneity DSV	35 mm +/- 0.05ppm	98 mm ±1 ppm	220 mm ±2 ppm				
5 gauss line (cm)	65 cm x 80 cm axially	110cm x 140cm axially	160cm x 210cm axially				
Magnet stability	<0.05ppm/hour (intrinsically stable)						
Magnet type	Superconducting						
Magnet Technology / Cooling	Dry Magnet technology MRS*DRYMAG, Cryogen free (no liquid helium and no nitrogen)						
Variable fields	Yes, for Powerscan: up to 3 additional stengths N/A						
Integral RF shield	Yes, self shielded						
Rotating stand	Yes, option for Flexiscan and Powerscan versions N/A						
Diameter (mm)	158 OD, 100 mm ID	227 OD, 160 mm ID	395 OD, 190 mm ID				
Linearity over DSV	+/- 5% (75 mm DSV)	+/- 5% (90 mm DSV)	+/- 5% (180 mm DSV)				
Gradient strength	600 mT/m all directions	420 mT/m all directions	266 mT/m all directions				
Gradient upgrade	1000 mT/m Powerscan	600 mT/m Powerscan	N/A				
Gradient insert	Yes, Powerscan vers	ion up to 1750 mT/m	Yes, Option				
EVO Spectrometer		2 Transmitters - 4 receivers					
Channels upgrade	Yes for Po	owerscan version, up to 8	FX, 32 RX				
	Co	pils					
Volume, surface		Yes					
Phased array, nuclear		Yes for Powerscan version					
	Dimensions and wei	ght with animal table					
DRYMAG (mm)	1425 x880 x750	1450 x843 x 977	1450 x1200 x				
Total Weight	<350 kg	<600 kg	<1300 kg				

MR SOLUTIONS /// 13

MRI Upgrades



Bring your MRI back to life

PTW 2X0,35(2),

Do you have an orphaned preclinical MRI system? Do you need the most advanced MR console? Does your former supplier charge too much for an upgrade or service?

MR SOLUTIONS can refurbish and enhance all or part of the following:

- Cryogenic magnets from Agilent™, Varian™ and Bruker™
- Multi TX and multi RX spectrometers
- Gradient and Shim amplifiers
- RF coils and RF Amplifiers
- RF and gradient amplifiers
- Gradient/shim coils
- Advanced electronics and hardware interface

MR SOLUTIONS provides:

- The most advanced MR console: Preclinical Scan
- Powerscan software for pulse sequence programming
- Ready to use sequences, methods and protocols
- Assistance to transfer sequences from the old console to MR SOLUTIONS' console
- A broad range of RF coils
- On-site and online application assistance

MR SOLUTIONS service and technical support:

- Magnet service
- Maintenance of the refrigerator and helium compressor
- Maintenance of all electronic components

FLEXIBLE Switch at any time from the old to the

new MR SOLUTIONS console



An Investment for your next MRI

Some of the upgrade components can be re-used on MR SOLUTIONS cryogen-free magnets up to 9.4T for small animal imaging

Clinical To Preclinical Conversion kit: small animal imaging with clinical MRI



C2P is a conversion kit, that enables small animal imaging using only the magnetic field of a clinical MRI system. There is no dependency on the clinical systems' hardware and software.

C2P kit Includes:

- Operator workstation
- Preclinical Scan Software
- Extensive Sequences library
- Electronics rack
- Gradient coil
- **RF** Coils
- Animal Handling



AR UPGRADES



Gradient Upgrades

Pre-clinical MRI systems from all vendors can be upgraded with MRS Magnetics gradients

MRS Magnetics[™], an MR SOLUTIONS' company, manufactures gradient coils that are fully compatible replacements for Bruker[™], Magnex[™], Varian[™], Agilent[™] or RRI[™] gradient coils. It is possible to change the temperature sensor type and interface configuration to match the gradient being replaced.

Smaller high strength gradient coils such as the G19060 can be supplied as an additional removable INSERT, to be mounted inside a larger gradient coil for experiments demanding higher gradient strength.

Compatibility Matrix						
MRS Magnetics™	Bruker™	Agilent™ / Varian™ / Magnex™	RRI™			
G19060	B-GA 6S	SGRAD115/60/S SGRAD115/60/HD/S	BFG 113/60-S			
G152090	B-GA 9S B-GA 9S HP	SGRAD155/90/HD/S				
G157100		SGRAD155/100/S SGRAD155/100/HD/S	BFG 155/100 S			
G198116	B-GA 12S B-GA 12S2 B-GA 12S HP		BFG 200/115-S			
G205120		SGRAD205/120/S SGRAD205/120/HD/S				
G302200	B-GA 20S B-GA 20S HP					
G307210		SGRAD305/210/S SGRAD205/210/HD/S	BFG 305/210 S			



Happy Users:

«MRS Magnetics provided a new gradient coil for our Agilent™ MRI system with a custom interface to fit our magnet. The MRS Magnetics' team is lovely, professional, highly knowledgeable, and very friendly.

They provided a well-engineered and very highquality product that has substantially improved our capabilities. The coil's performance is excellent and the price was extremely competitive.

The system is quite literally an order of magnitude better in every respect, and functions perfectly. The duty cycle, GMax and SMax are much better than our previous gradient set, while the new set uses less power (and therefore requires less cooling).

The new gradient set has allowed us to completely remove what was otherwise a substantial hardware limitation with our system»

Prof. Damian Tyler, Associate Professor Department of Physiology, Anatomy & Genetics

MR SOLUTIONS /// 15



16 /// MR SOLUTIONS

EXTENDED MULTIMODALITY IMAGING



The most efficient Plug and Play design for multimodality imaging:

MR SOLUTIONS has developed a unique plug and play concept for multimodality imaging. The same PET and SPECT imaging systems can be mounted directly on MRI and CT systems to provide all of the possible combinations: PET/CT, PET/MR, SPECT/CT and SPECT/MR. It only takes moments to clip a PET or SPECT module on to either a CT or MRI system and be ready for multimodality imaging.

Compact and light

The PET and SPECT modules are extremely compact and weight only a few kilos. All the electronics are built into the rings and therefore only power and data cable connections are required to have them ready to run. If the CT and the MR systems are not in the same room, or if stand-alone operation is required, this is no problem.

Optimising the workflow and investment

This modular approach offers significant advantages in efficiency and workflow, and most importantly reduces considerably the investment for the research institute.

PET and SPECT are compatible with all MR models up to 9.4T and all CT models

Any MR and CT from MR SOLUTIONS can be upgraded at any time with PET or SPECT.

Motorised Bed for all multimodality configuration

A high precision Motorised bed is included for multimodality imaging configuration, whether sequential or simultaneous.

ARI PET SPECT CT

One component of each imaging modality

Dual modality imaging configurations without duplicating imaging components





NULTIMODALITY

SIMULTANEOUS & SEQUENTIAL IMAGING

MR SOLUTIONS /// 17

Specifications

SEQUENTIAL IMAGING PET/MR - PET/CT

PET CLIP-ON 80 series

Mice & Rats







The PET CLIP-ON and PET INSERT for small animal imaging are based on the latest silicon photomultiplier (SiPM) technology. The detector assembly (crystal/SiPM) allows true DOI (depth of interaction) with two pixelated layers of scintillator crystal with different matrices.

This enables the MR SOLUTIONS PET module to achieve a resolution below 0.8mm. Both PET models, CLIP-ON and INSERT are fully compatible with all MRI systems from MR SOLUTIONS up to 9.4T and all CT models.

All the PET systems from MR SOLUTIONS are built up with true depth of interaction hardware allowing a uniform high resolution across the entire field of view. All systems have dual-layer LYSO matrix with 1/2 pixel offset between the top and bottom layers.



18 /// MR SOLUTIONS

SIMULTANEOUS IMAGING PET/MR ≤9.4T PET INSERT 80 Series

1990 C	



& Rats

System type	MRS*PET CLIP-ON MRS*PET INS			T INSERT	
Reference	PET-CO 80	PET-CO 120	PET-I 40	PET-I 80	
Multin	nodality compati	bility with:			
MR 24cm bore	Yes	Yes	Yes	Yes	
MR 17cm bore	Yes	Yes	Yes	No	
СТ	Yes	Yes	Yes	Yes	
	System data				
Clear bore size (mm)	112	160	60	112	
Transaxial. FOV (mm)	80	120	40	80	
Axial FOV (mm)	50.20 (one ring), 102.48 (two rings), 151,2 (three rings)				
Extended aFOV	300 mm with Motorised bed				
Crystals thickness	Double Layers of LYSO: LYSO/LYSO: 10mm				
PMT	Silicon PM				
Depth of Interaction (DOI)	Yes-	true DOI from ha	ardware configura	ation	
Spatial Resolution with 3D OSEM (mm)	0.7	0.7	0.7	0.7	
Sensitivity	up t	o 12% depending	g of the configura	ition	
Timing Resolution		1 nano	second		
Average Energy Resolution		15	%		
Software					
Preclinical Scan Console	Yes acquisition, post process- ing, all modalities under one interface interface interface			, post process- ties under one face	
* Additional technical specifications available on request.					

PET INSERT 40 Series

PRECLINICAL PET

SIMULTANEOUS PET/MR

PET INSERT for 9.4T 7.0T 4.7T 3.0T



PET INSERT for CRYOGEN-FREE MR from MR SOLUTIONS

The PET INSERT is designed for simultaneous imaging in combination with MR SOLUTIONS cryogen-free MRI up to 9.4T. Two models of the PET-INSERT are available. The MRS*PET-I 80 series for large bore MRI systems allows simultaneous whole body imaging of mice and rats whilst the MRS*PET-I 40 series for smaller bore MRI systems enables simultaneous whole body imaging of mice and simultaneous brain imaging of rats.

The PET INSERT can be removed on the Powerscan MRI models to give access to the full bore size of the MR. Each PET INSERT can be operated as a stand-alone device and/or alternatively linked to a Powerscan CT for sequential imaging.



*For more information on Cryogen-free MR, please refer to pages 9 to 13 and for PET page 18

SEQUENTIAL PET/MR

PET CLIP-ON for 9.4T 7.0T 4.7T 3.0T

PET CLIP-ON for CRYOGEN-FREE MR from MR SOLUTIONS

The PET CLIP-ON is designed for sequential imaging in combination with MR SOLUTIONS cryogen-free MRI up to 9.4T. The PET CLIP-ON is mounted at the mouth of the bore of the MRI, allowing sequential acquisition of PET and MR imaging of rodents and larger animals up to 3kG. Two models of PET CLIP-ON are available. The MRS*PET-CO 80 series for whole body imaging of mice and rats and the MRS*PET-CO 120 series for whole body imaging of rodents up to large animals.

All models of PET CLIP-ON can be easily removed and operated as stand-alone devices, or equally easily mounted on a MR Solutions' CT for sequential PET/CT imaging



^{*}For more information on Cryogen-free MR, please refer to pages 9 to 13 and for PET page 18

SEQUENTIAL PET/CT



PET CLIP-ON for Powerscan and Flexiscan CT

PET CLIP-ON for Preclinical CT from MR SOLUTIONS

The PET CLIP-ON is designed for sequential imaging in combination with MR SOLUTIONS CT scanners: **MRS***CT. The PET CLIP-ON can be mounted on the MRS*CT system allowing sequential PET/CT imaging of rodents and larger animals up to 3KG. Two models of PET-CLIP-ON are available, the MRS*PET-CO 80 series for whole body imaging of mice and rats and the MRS*PET-CO 120 series for rodents up to large animals. Four models of MRS*CT are available with small and large bore up to 5kg animals and with high resolution functionalities. The PET CLIP-ON's can be removed on all MRS*CT models, Flexiscan and Powerscan and be operated as a stand-alone device and alternatively associated to a Flexiscan or Powerscan cryogen-free MR for sequential PET/MR imaging.



*For more information on CT, please refer to pages 27 and 18 for PET

Benchtop

MRS*PET/CT and MRS*SPECT/CT



The Most Advanced Benchtop Solution for Preclinical Imaging

MR Solutions enhances its Benchtop family. The new benchtop CT, PET and SPECT systems give a flexibility that has never been reached before in the industry. The compactness and the light weight of the scanners permits their installation on any bench and in any small or restricted environment.

The MRS*PET/CT and MRS*SPECT/CT Benchtops are in-line systems incorporating a motorised bed with a sub-millimeter precision, allowing the animal to be scanned automatically without any manual intervention from the operator. The benchtop design from MR Solutions provides perfect co-registration of the images between each modality, thus avoiding issues on other systems where the users have to move the animal manually from one modality to the other..

In addition, the Benchtop scanners have been designed in the way that users can detach easily the PET CLIP-ON or the SPECT CLIP-ON from the MRS*CT Benchtop and mount it on our Cryogen-free MR for PET/MR or SPECT/MR imaging. Alternatively, each modality can be used independently from each other as stand-alone device to maximise the workflow of the laboratory.

Benchtop PET 80 & 120			Benchtop SPECT			PECT Benchtop CT	
Reference	PET-CO 80	PET-CO 120	Reference	SPECT-CO M	SPECT-CO R	Reference	MRS*CT BT
Multimodality	compatibility wit	th:	Multimodality	compatibility wit	th:	Multimodality compatibility with:	
MR	Yes	Yes	MR	Yes	Yes	Stand alone CT operation	Yes
СТ	Yes	Yes	СТ	Yes	Yes	PET/CT and SPECT/CT	Yes
System data			Sys	tem data		Syste	m data
Clear bore size (mm)	112	160	Stationary Imaging	Yes	Yes	Power Output /Tube (W)	60W
Transaxial. FOV (mm)	80	120	Detectors / Pinholes	4 / 100	4 / 100	X-Ray Tube Voltage Range	4 - 60kVp
Axial FOV (mm)	50.20 (one ring	g), 102.48 (two	Detector Intrinsic reso-	<1mm	<1mm	X-Ray Tube Current Range	1 mA
	rings), 151,2	(three rings)				Detector Pixel Matrix	1944 x 1536
Extended aFOV	300 mm with Motorised bed		Resolution achievable with smalest pinhole	≤0.5mm	≤0.5mm	Variable Zoom	No
Crystals thickness	Double Layers of LYSO: LYSO/ LYSO: 10mm		Apertures for whole body mouse and rat head	Yes	Yes	Smallest isotropic voxel size	25µm
PMT	Silico	n PM	Apertures for whole	No	Yes	Spatial Resolution	50 µm
Depth of Interaction (DOI)	Yes- true DOI from hardware		body rat			Inner diameter (mm)	90
Spatial Besolution with 3D	0.7	0.7	Axial FOV (mm)	12mm	22mm	Transaxial FOV (mm)	80
OSEM (mm)	0.7	0.7	Extended aFOV	300 mm with I	Notorised bed	Axial EOV (mm) with	up to 180 mm
Sensitivity	up to 12% depending of the		Transaxial FOV (mm)	30mm	60mm	Motorised Bed	up to 180 mm
	config	uration	Sensitivity (cps/MBq)	3026	3191	Dual Energy CT	No
			Collimator material	non-ferromagnetic *For more information on CT, please refer to pages 2; 18 for PET page and 26 for SPFCT			CT, please refer to pages 27, or SPECT

22 /// MR SOLUTIONS

Preclinical Plug & Scan

PET/CT, SPECT/CT and CT



From PET/CT to PET/MR or from PET/CT to PET/MR, make your choice: Plug and Scan !

With MR Solutions technology there is no need to duplicate the modalities.

Only one PET scanner, one SPECT scanner one CT scanner and one MR system permits researchers to perform automatic sequential multimodality imaging of PET/MR, SPECT/MR, PET/CT, SPECT/CT, stand-alone PET, stand-alone SPECT and stand-alone CT.



MRS*PET/CT 80 - MRS*PET/CT 120

High resolution CT: up to 5µm High Resolution PET 0.8mm

> Up to160 mm bore size up to 150mm axial FOV Up to 3kg animals

> > 160

mm

MRS*PET/CT 80 & 120

MRS* PET/CT 80

MRS*PET/CT 80 is dedicated to rodents imaging and can achieve up to 5µm resolution with the MRS*CT. The **MRS***PET/CT 120 is a large bore system designed for animal imaging and veterinary use up to 3KG animals. The PET is based on the PET-CLIP-ON technology, built with the latest silicon photomultiplier (SiPM) technology. The detector assembly (crystal/SiPM) allows true DOI (depth of interaction) with two pixelated layers of scintillator crystal with different matrices. The PET has continuous detectors with therefore no gaps between «the rings».

Specifications

Reference	MRS*PET/CT 80	MRS*PET/CT 120	Reference	MRS*PET/CT 80	MRS*PET/CT 120
PE	۲ system data		CT system data		
Clear bore size (mm)	112	160	Power Output /Tube (W)	90W	90W
Transaxial. FOV (mm)	80	120	X-Ray Tube Voltage Range	40 - 90 kVp	40 - 90 kVp
Axial FOV (mm)	50.20 (one ring), 102.48 (two rings), 151,2 (three rings)		X-Ray Tube Current Range	0.5 mA	0.5 mA
Extended aFOV	300 mm with Motorised bed		Detector Pixel Matrix	1944 x 1536	3096 x 3100
Crystals thickness	Double Layers of LYSO: LYSO/LYSO: 10mm		Variable Zoom	Yes	Yes
РМТ	Silicon PM		Voxel size resolution	≤ 5 µm	≤ 10 µm
Depth of Interaction (DOI)	Yes- true DOI from hardware configuration		Spatial Resolution	≤ 15 µm	≤ 20 µm
Spatial Resolution with 3D OSEM (mm)	0.7	0.8	Low dose system / Shielded	Yes	Yes
Sensitivity	up to 12% depending of the configuration	up to 9% depending of the configuration	Prospective cardiac and respiratory gating	Yes, Option	Yes, Option
Timing Resolution	1 nanosecond	1 nanosecond	Inner diameter (mm)	120	145
Average Energy Resolution	19%	19%	Transaxial FOV (mm)	90	140

MRS*PET/CT 220 - Extra Large Bore

OLUTIONS

220 mm transaxial FOV310 mm bore size206 mm axial FOV

Up to 12kg animals

MRS*PET/CT 220

The large bore **MRS***PET/CT 220 is designed for animal imaging and veterinary use from rodents to animals up to 10KG+ (upon animal shape). The **MRS***PET/CT 220 has an inner bore size of 311 mm and provides an active transaxial field of view of 220mm. The system offers the latest technology with true Depth of Interaction (DOI). This enables resolutions of 1.2 mm across the whole field of view to be achieved.

The CT is based on the MRS*CT 220 using a large detector matrix size of 3096 x 3100 and X-ray tube voltage range from 40 - 90 kV.



MRS*PET-220

SPECT/MR & SPECT/CT

SPECT CLIP-ON for MR ≤9.4T and CT

Benchtop SPECT CLIP-ON for CT & MR

The SPECT CLIP-ON series is designed for sequential multimodality imaging in combination with MR SOLUTIONS CT and MRI up to 9.4T. It can also be operated as a stand-alone SPECT system. The module can image whole body mice and rats depending of the SPECT model selected. The SPECT is also available as an INSERT to acquire simultaneous SPECT/MR images.

The SPECT module is mechanically independent; hence it can be used as a stand-alone unit or coupled to either an MR SOLUTIONS MRI or CT system. This dramatically improves the workflow of the laboratory whilst reducing cost since only one SPECT module is required for SPECT/CT and SPECT/MR imaging.

SEQUENTIAL IMAGING SPECT/MR - SPECT/CT

SPECT CLIP-ON M series Mice and Rats head SPECT CLIP-ON R series Whole body Mice and Rats

System type	SPECT CLIP-ON SPECT INSER						
Reference	SPECT-CO-M	SPECT-CO-R SPECT-I-					
Multimodality compatibility with:							
MR 24cm bore	Yes	Yes	Yes				
MR 17cm bore	Yes	Yes	No				
СТ	Yes	Yes	No				
System data							
Stationary Imaging	Yes	Yes	Yes				
Detectors / Pinholes	4 / 100	4 / 100	4 / 100				
Detector Intrinsic resolution	<1mm	<1mm	<1mm				
Maximum resolution achievable with smallest pinhole	≤0.5mm	≤0.5mm	≤0.5mm				
Apertures for whole body mouse and rat head	Yes	Yes	Yes				
Apertures for whole body rat	No	Yes	No				
Axial FOV (mm)	12mm	22mm	12mm				
Extended aFOV	300	mm with Motorised	bed				
Transaxial FOV (mm)	30mm 60mm 30		30mm				
Sensitivity (cps/MBq)	3026 3191 302		3026				
Collimator material		Non-ferromagnetic					
Preclinical Scan Console	Yes acquisition, post processing, all modalities under one interface						
* Additional technical specifications available on request.							

SIMULTANEOUS IMAGING SPECT/MR ≤9.4T

SPECT INSERT M Series

Whole body Mice

Stationary Imaging MULTI-PINHOLE 100 PINHOLES 4 HEADS



The SPECT module implements the latest in multi-pinhole technology with up to 100 pinholes in total. The detectors are based on the SMT-type array, 6 mm pixels, 35 µm micro cells, 7.2 mm pitch with 3 mm Csl(Na) crystals and MLE positioning. Depending on the collimator, the system can achieve a resolution of < 0.5 mm

*For more information on Cryogen-free MR, please refer to pages 9 to 13 and for CT page 27.



From Benchtop CT system to High resolution CT's

At MR SOLUTIONS, we understand that the needs of researchers can be different. Some scientists need very high-resolution CT and a large field of view for large animal scanning, whilst others require a cost-effective CT for multimodality imaging or for straightforward CT studies. MR SOLUTIONS has developed four models: From small bore for rodents imaging to large bore for 12KG animals imaging. Our PET CLIP-ON and SPECT CLIP-ON can be attached to either MRS*CT model for PET/CT and SPECT/CT operation.



SPECIFICATIONS:

System type	Preclinical CT					
Reference	MRS*CT BT Benchtop	MRS*CT 80	MRS*CT 140	MRS*CT 220		
Benchtop version	Yes	No	No	No		
Floor stand version	Yes	Yes	Yes	Yes		
Multimodality compatibility with:						
Stand alone CT operation	Yes	Yes	Yes	Yes		
PET/CT and SPECT/CT	Yes	Yes	Yes	Yes		
Attenuation correction	Yes	Yes	Yes	Yes		
	Sys	tem data				
Animal type	Whole body mouse & rats	Whole body mouse & rats	Whole body Rodents & large animals	Rodents, large animals and veterinary use		
Power Output /Tube (W)	60W	90W	90W	90W		
X-Ray Tube Voltage Range	4 - 60kVp	40 - 90 kVp	40 - 90 kVp	40 - 90 kVp		
X-Ray Tube Current Range	1 mA	0.5 mA	0.5 mA	0.5 mA		
Detector Pixel Matrix	1944 x 1536	1944 x 1536	3096 x 3100	3096 x 3100		
Variable Zoom	No	Yes	Yes	No		
Smallest isotropic voxel size	25µm	≤ 5µm	≤ 10µm	40 µm		
Spatial Resolution	50 µm	≤10 µm	≤20 µm	80 µm		
Low dose system / Shielded	Yes	Yes	Yes	Yes		
Fast scanning capability	Yes <5s	Yes <5s	Yes <10s	Yes <10s		
Prospective cardiac and respiratory gating	Yes, Option	Yes, Option	Yes, Option	Yes, Option		
Inner diameter (mm)	90	90	145	240		
Transaxial FOV (mm)	80	80	140	220		
Axial FOV (mm) with Motor- ised Bed	From ⁻	132,95 mm up to 30	00 mm (600mm for	CT-XL)		
Dual Energy CT	No	Yes, option	Yes, option	No		

The Powerscan CT model has advanced features such as variable zoom, large bore size, dual energy, large detector.

The system is suitable for in-vivo and ex-vivo applications

PRECLINICAL Animal handling Software

28 /// MR SOLUTIONS

ANIMAL HANDLING



Mice - Rats - large animals

Advanced Animal Handling for MR SOLUTIONS systems

The Imaging beds on MR SOLUTIONS imaging systems are designed to provide important support functions to the animal during the preparation stage and throughout the imaging process. The beds provide anaesthetic gas to the animal and thermo-regulation of the animal during the scan.

The animal beds are available in multiple sizes for whole body and mouse head imaging, whole body rat imaging, rat head imaging (MR) and large animals.

For high throughput imaging, a mouse and rat hotel is available allowing the imaging of 3 animals at the same time.

For each imaging modality, PET, SPECT, CT and MR the gating functionalities are available for cardiac and respiratory.





The most advanced multimodality imaging software

Preclinical Scan is the multimodality interface for preclinical imaging. Under one interface users have access to all MRI functionality such as adjusting MRI pulse sequences parameters, but also have access to the PET, SPECT and CT extended functionalities.

There is no need for our users to move from one console to another as they change imaging modality. Everything is covered within the Preclinical Scan software.

We have designed the graphical user interface in the way to be friendly and easy to set up, even for the new user. For the advanced user, real-time optimisation and advanced functionalities are available. Preclinical Scan software can be configured with different access of management depending of their role.



From Preclinical Scan software, researchers can select their modality of interest, it could be MR, PET, SPECT or CT and just run the scan.

MR SOLUTIONS develops and manufactures all the components of its preclinical systems including software. As all our team is under the same roof, we have been able to develop the most powerful platform for multimodality preclinical imaging under one common interface. We also take into consideration the valuable feedback of our users and we continue to implement new functionalities.

Auto-Shim, RX Gain, Calibration, Central Frequency etc... all the major parameters for the MRI are built in.

PACS, data export and advanced post-processing

Connect the Preclinical Scan console to the PACS server of the institute. MR SOLUTIONS provides compatibility with most well-known post-processing packages for preclinical imaging.



Preclinical Scan software integrates all the functionality to acquire and process simultaneous PET/MRI scans.

Subject, Scan, Image, MIP, Spectrum, Reports

Move from tab to tab - from acquisition to image processing. Export the data in the preferred format, including DICOM files.



Preclinical Scan Software



Pulse Sequence Programming

Powerscan allows the MRI physicist full access to all functions of the MRI system. Pulse sequences may be written and/ or modified and new reconstruction algorithms incorporated. Full source code to all pulse sequences is supplied.

All sequences developed by MRI physicists can be uploaded to Preclinical Scan Software once validated. MR SOLU-TIONS also provides assistance and services for development of new pulse sequences.

Powerscan Software main features

- Full control of the system
- Access to individual components such as reconstruction software
- Interface to user programs
- Flexible pulse programming environment with
 user defined graphical wave shape generation
- Interactive setup mode for sequence parameter optimisation including real-time display of images and/or spectra and time data
- Scripting of own set of modes of acquisition
- Customisable reconstruction processing
- DICOM export
- DICOM worklist
- User customisable text with international language display



PULSE SEQUENCES

MR SOLUTIONS has more than 30 years' experience in developing pulse sequences for clinical and preclinical applications. All our systems are provided with a large library of sequences ready to use. Contact MR SOLUTIONS for more information.





SPECTROSCOPY

Full spectroscopy functionality is available for all our preclinical MRI systems. A comprehensive set of sequences is included the spectroscopy package. Contact MR SOLUTIONS for more information.





Imaging INNOVATION

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