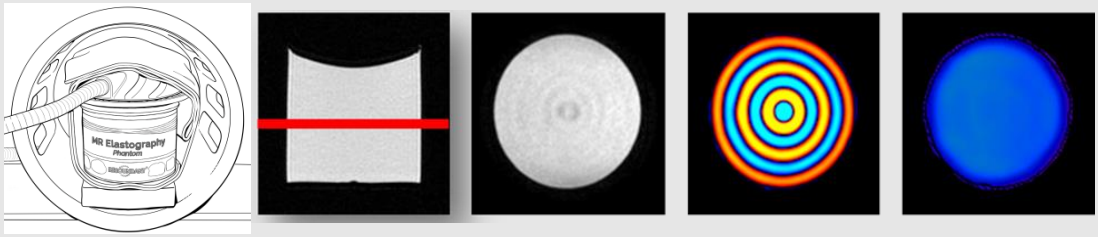
MR Elastography Phantom

Scanning Parameter Recommendations

- To set-up the phantom for scanning, refer to the illustrations in the MRE PHANTOM USER GUIDE included with each MRE Phantom.

- Use the following recommended MRE Phantom imaging parameters that are specific to your Siemens MR scanner.

Siemens - 2D MRE Phantom Parameter Recommendations					
Scanners and Sequences (Note 1)	**Scanner**	**MAGNETOM**	**MAGNETOM**	**MAGNETOM**	**MAGNETOM**
	Field Strength	1.5T	1.5T	3T	3T
	Compatible Software versions	Tim3G ≥VB11 Tim4G ≥VD13 NX ≥XA10	Tim4G ≥VE11E NX ≥XA10	Tim3G ≥VB11 Tim4G ≥VD13 NX ≥XA10	Tim4G ≥VE11E NX ≥XA10
	Pulse sequence	greMRE	epseMRE	greMRE	epseMRE
	Mode	2D	2D	2D	2D
Setup	Phantom Setup	See MRE PHANTOM USER GUIDE included with phantom kit.			
	Coil (Note 2)	Head or Torso/Spine			
Slice Positioning	Place one coronal slice at the center of the height of the phantom. 				
Information Input (Pretent Patient)	Position	head-first, supine	head-first, supine	head-first, supine	head-first, supine
	Weight	150 Lbs (68 kg)	150 Lbs (68 kg)	150 Lbs (68 kg)	150 Lbs (68 kg)
	Height	5 ft (1.5 m)	5 ft (1.5 m)	5 ft (1.5 m)	5 ft (1.5 m)
Imaging Parameters	Imaging Plane	Coronal	Coronal	Coronal	Coronal
	Number of slices	4	4	4	4
	Slice thickness (mm)/dist. Factor	10 mm / 0%	8 mm / 25% (2 mm)	10 mm / 0% (0)	8 mm / 25% (2 mm)
	FOV (mm) / Phase FOV (%) (note 3)	420 mm/100%	420 mm/100%	420 mm/100%	420 mm/100%

Imaging Parameters	Matrix (Base × Phase)	256 × 25% (64)	98 x 100% (128)	256 × 25% (64)	98 × 100% (128)
	TE (msec)	min (~20 with flow comp off)	min	min (~20 with flow comp off)	min
	TR (msec)	50	1000	50	1000
	Flip Angle (degree)	25	default (90)	20	default (90)
	Averages, EPI shots	1	1, 1shot	1	1, 1shot
	Bandwidth (Hz/Pixel)	260 Hz/pixel	2380 Hz/pixel	260 Hz/pixel	2380 Hz/pixel
	Phase enc.dir.	Right-Left	Right-Left	Right-Left	Right-Left
	Acceleration (Note 4)	GRAPPA	GRAPPA	GRAPPA	GRAPPA
	Acceleration factor (Note 4)	1	1	1	1
	Number of breath holds	NA	NA	NA	NA
	Shimming Volume	auto	auto	auto	auto
	Saturation Band	N/A	N/A	N/A	N/A
	Scan Time per slice	34 sec	11 sec	34 sec	11 sec
Driver Parameters (Generic) (Note 6)	Driver Power (%)	10 (Note 6)	10 (Note 6)	10 (Note 6)	10 (Note 6)
	Driver frequency (Hz)	60 (default)	60 (default)	60 (default)	60 (default)
	Driver cycles/ trigger (Duration)	3 (default)	3 (default)	3 (default)	3 (default)
Motion Encoding Gradients (Generic) (Note 5)	MEG frequency (Hz)	60 Hz (Hard Coded)	60 Hz (Hard Coded)	60 Hz (Hard Coded)	60 Hz (Hard Coded)
	MEG Amplitude	90%	(Hard coded)	90%	(Hard coded)
	Axis of MEG	Slice (Hard Coded)	Slice (Hard Coded)	Slice (Hard Coded)	Slice (Hard Coded)
	Number of phase	4 (Hard coded)	4 (Hard coded)	4 (Hard coded)	4 (Hard coded)
Specific Parameters (Note 1)	Sequence - Part 1 - Flow Comp	Yes	Yes	Yes	Yes
	Sequence - Special - MEG Amplitude (mT/m)	Not available	Not available	Not available	Not available
	Sequence - Special - MEG Frequency (Hz)	Not available	60.0	Not available	60.0
	Sequence - Special - MEG Waveform	Not available	1-2-1	Not available	1-2-1
	Sequence - Special - MEG Direction	Not available	Slice	Not available	Slice
	Resolution - Filter Image - Prescan Normalize	Yes	Yes	Yes	Yes
	Resolution - Distortion Correction	Yes	Yes	Yes	Yes

NOTES:

(1) Specific tab and parameters vary based on different software versions and MRE sequences; the generic MRE parameters for driver and motion encoding gradients are the guideline to those specific tab and parameters (MRE-related); overall, this recommendation is conservative so that it can be successfully performed at all software versions and scanners. Software versions prior to VE11C sp1 included a "body mask bug" that may erroneously discard some or all data, the parameters presented here are a work-around for this bug.

(2) Use of a multi-channel RX head coil is preferred. Alternatively, the Torso/Spine coils can be used.

(3) 20cm FOV is a minimum value for phantom studies, smaller FOVs may reduce SNR or confidence and should be avoided. Larger FOV may be used and may be beneficial for correlation to in vivo scans. FOV should be consistent for all phantom scans.

(4) GRAPPA (iPAT) acceleration factor R = 1 is recommended for QA scans. R > 1 can be used, particularly for correlation to in vivo sequences. Larger FOVs may be desirable to avoid aliasing artifacts.

(5) Performance may vary based on gradient hardware performance and maximum gradient amplitude. 20mT/m is a good value for 10% acoustic amplitude in phantom; 4mT/m is good for 50% acoustic amplitude.

(6) Siemens MRE does not natively set Active Driver parameters. Default acoustic amplitude is 50%. To change these values, a separate web connection to the Active Driver is required.

Questions - Questions regarding the Resoundant MRE Phantom Scanning Parameter Recommendations may be directed to:

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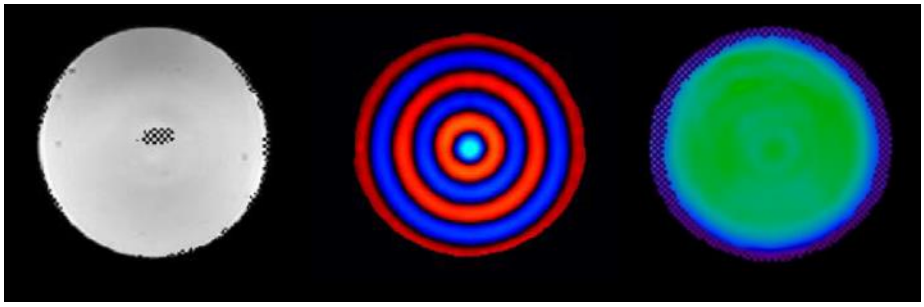
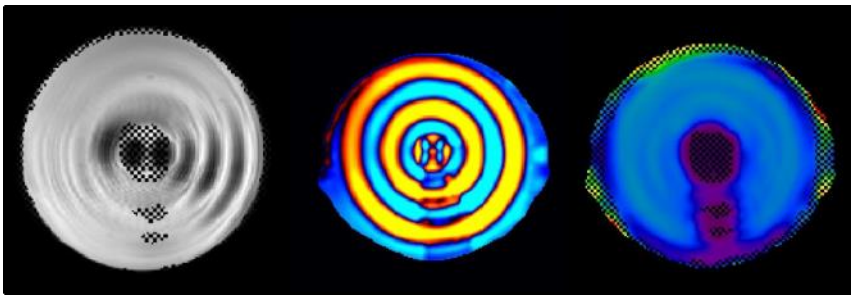
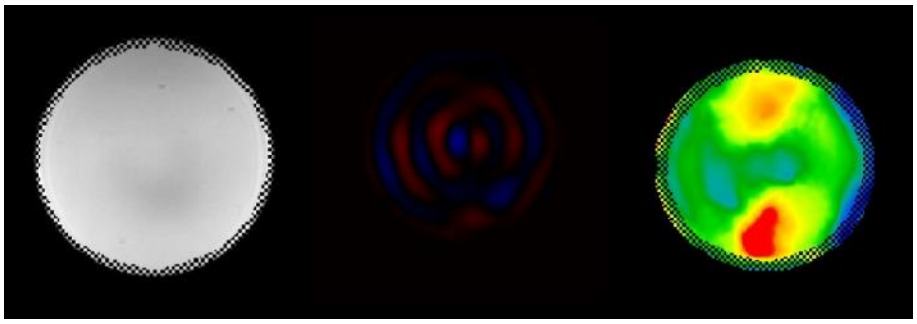
Phantom Scanning Results

The following table outlines the expected phantom scanning results, including sample images, visual descriptions, and troubleshooting tips.

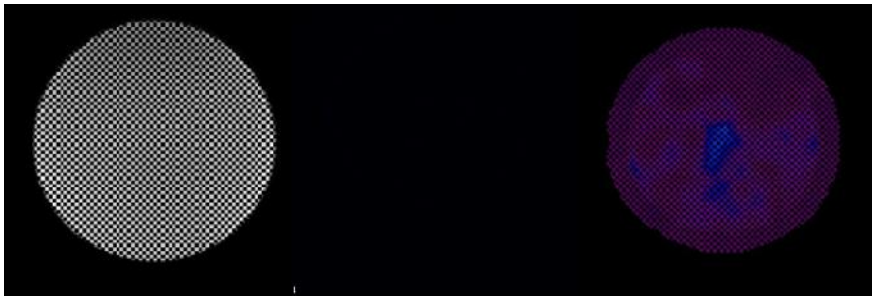
Normal Phantom Scan Results			
Magnitude, Wave, and Color Elastogram images			
Qualitative Description of Results	**Magnitude Image**	**Wave Image**	**Elastogram**
	• No "ripples" or motion present. • Circular, homogeneous appearance (may see slight distortion from EPI-based sequences)	• Red/blue waves • Concentric circles	• Large region of high confidence • May see confidence hatch out on edges or in the very center. This is acceptable

Amplitude Too High			
Magnitude, Wave, and Color Elastogram images			
Qualitative Description of Results	**Magnitude Image**	**Wave Image**	**Elastogram**
	• "Ripples" or motion present (phase dispersion).	• Wave images oversaturated	• Stiffness irregular
Troubleshooting Tips	Decrease amplitude to 5-10%.		

Amplitude Too Low

Magnitude, Wave, and Color Elastogram images			
Qualitative Description of Results	**Magnitude Image**	**Wave Image**	**Elastogram**
		• Wave images undersaturated/black	• Stiffness irregular
Troubleshooting Tips	Confirm proper phantom set-up: passive driver secured tightly to phantom with belt, tube connected between active and passive driver. May be due to leak in tubing or passive driver, or active driver failing.		

No Amplitude

Magnitude, Wave, and Color Elastogram images			
Qualitative Description of Results	**Magnitude Image**	**Wave Image**	**Elastogram**
		• No waves	• No regions of high confidence (completely hatched out)
Troubleshooting Tips	Confirm the active driver is on and amplitude set to 5-10%. Confirm tube between active and passive driver is connected. May be due to active or passive driver failure.		