skope

DATA SHEET: **Dynamic Field Camera™**

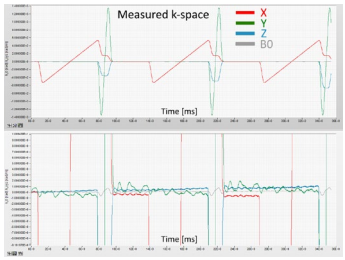
MR Methods Development | Ultra-High-Field Imaging

THE OSCILLOSCOPE FOR MRI

Your Partner in Scientific MR Imaging

Faster R&D and optimized use of MR hardware

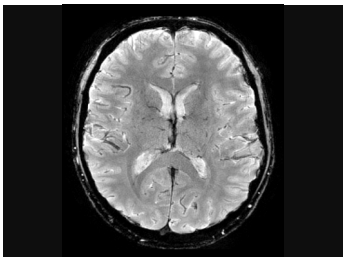
- Speed up sequence development
- Enable novel image reconstruction using actual k-space trajectories
- Characterize and leverage gradient and shim systems



Top: k-space measurements from a balanced SSFP acquisition, for X, Y and Z, and the B0 term. Bottom: Zoomed version shows potential violation of balanced behaviour due to oscillations and eddy currents.

Speed up sequence development

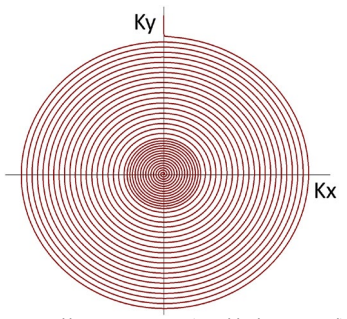
The development of novel MR sequences is commonly impeded by unwanted gradient behavior or programming errors, which are cumbersome to investigate. With the Dynamic Field Camera, it is possible to measure the actual gradient evolution and instantly visualize all measured sequence gradients. This visualization of gradient dynamics expedites the debugging process without the need for implementing additional pulse sequences, dramatically reducing the time to successfully implement new MR methods.



Multishot spiral image. Knowledge of actual image encoding can significantly reduce blurring effects for spiral imaging.

Enable novel image reconstruction using actual k-space trajectories

Gradient encoding is the principal image encoding mechanism in MRI. Deviations from ideal gradient fidelity often limit the achievable image quality, in particular when using demanding image reconstruction methods. The Dynamic Field Camera allows for the direct measurement of the encoded k-space trajectory. By incorporating the measured trajectory into image reconstruction, image quality and robustness can be improved, enabling new applications for MR imaging.



Measured k-space trajectory (variable density spiral)

Characterize and leverage your gradient and shim systems

Incomplete or inaccurate gradient system calibration (i.e. pre-emphasis) can lead to artifacts in images that can limit their usefulness in research. The Dynamic Field Camera allows for direct, fast, and accurate characterization of gradient and shim systems, such as frequency responses and higher order field dynamics. This will assist in leveraging the highest performance your MR system has to offer.

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Physical dimensions

Housing (w x d x h)	75 cm x 28 cm x 31 cm
Cable diameter	3 cm
Coaxial cables	custom fit, < 20 m

NMR field probes

Coherence lifetime	> 100 ms
Minimum repetition time	110 ms
SNR·√BW	> 80'000
Achievable k_{max}	±7'800 rad/m

Field measurement

Data types	Unit	Temporal resolution
Gradients	[mT/m]	1 µs
B0	[mT]	1 µs
k-space values	[rad/m] and k0 [rad]	1 µs
k-higher order	up to 3rd spatial order	1 µs
Bfit, Gfit	fitted field value for each interleave/dynamic	

Camera Acquisition System

The field sensor signals of the Dynamic Field Camera are acquired by the 16-channel Skope Camera Acquisition System and automatically processed to provide the actual magnetic field dynamics.

skope-fx, field explorer software

The skope-fx software controls the acquisition and processing of the field data, and allows for a fast and easy visualization.

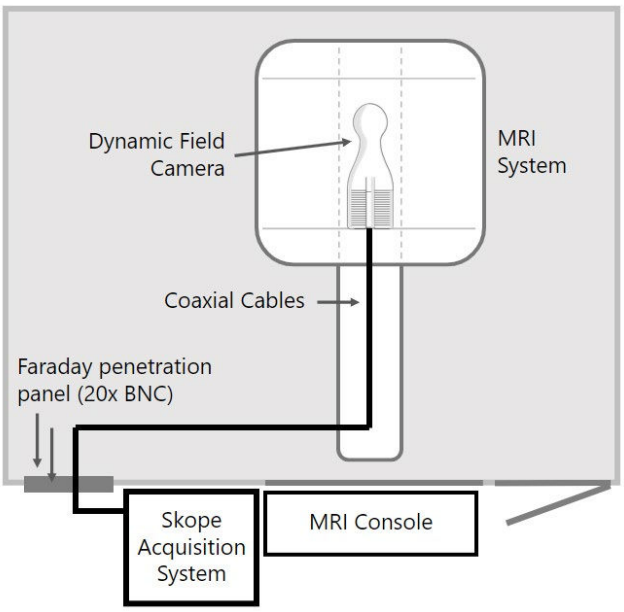
- Compare changes of k-space trajectory
- Analyze time series
- Parametric view (kx vs. ky , kx vs. kz or ky vs. kz)
- Spectral view
- Logarithmic plot
- Detrend data
- Filter data

Table Positioning Unit for the Dynamic Field Camera

The Table Positioning Unit allows for a rigid mounting of the Dynamic Field Camera on the patient bed and enables the height- and orientation-adjusting of the Dynamic Field Camera.

1) Field Camera Unit
2) Field Camera Electronics
3) Table Positioning Unit

Site Overview



Example configuration of Skope Acquisition System in MRI operator room. The Skope Acquisition System can be placed in either the MRI operator room or the scanner equipment room.

skope-fx Interface