skope

DATA SHEET: **Clip-on Camera *„Cranberry“* Edition**

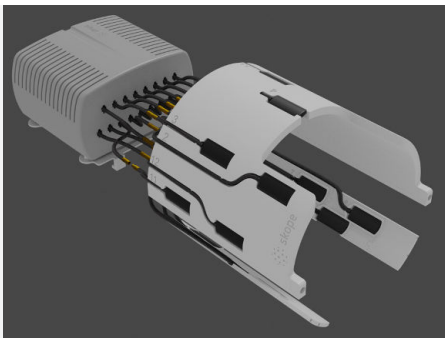
Diffusion Imaging | **fMRI** | **Ultra-High-Field Imaging**

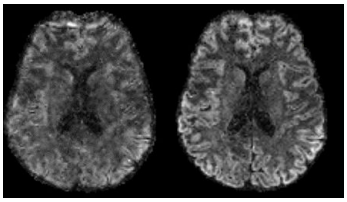
EXTEND YOUR 7T SIEMENS NEUROIMAGING RESEARCH

Your Partner in Scientific MR Imaging

7T Neuroscience imaging - optimized

- Achieve robust workflows and neuroimaging performance for scientific 7T MR imaging
- Slide in/out probe positioning kit sized for the Nova Medical Head Coil 1TX / 32RX
- Explore novel MR Methods development at an accelerated pace





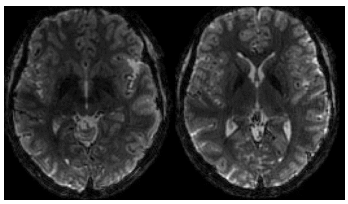
Spherical b-tensor diffusion weighted imaging at 7T acquired with spiral readout. *(Left)* image reconstructed with delta B0 map and nominal trajectory, *(right)* image reconstructed with measured trajectory and delta B0 map. Image parameters 1.4 mm isotropic, TE=78 ms, b=2000. Images from 2

Achieve reproducible workflows and neuroimaging performance for scientific 7T MR imaging

The increased challenges of 7T imaging means greater variance in imaging. Methods which should benefit from 7T, such as spiral imaging[1] or b-tensor diffusion weighted imaging[2] are difficult to acquire reproducibly due to perturbations of the encoding trajectories induced by scanner and subject sources. The Clip-on Camera *„Cranberry“* Edition provides a solution to measure these perturbations, allowing researchers to develop mitigation strategies and to deploy robust, reproducible workflows.

Slide in/out probe positioning kit sized for the Nova Medical Head Coil 1TX / 32RX

The slide in/out hardware integration kit positions field probes into the same pre-optimized locations at every scan session. Probes then connect to the front end fixture using fast connect sockets. Probe locations are characterized to provide optimal k-coefficient calculation with minimum phase noise amplification. Probe calibration is simple using the local eddy current calibration tool that is part of skope™-fm. Knowing that probes are reliably placed for every scan allows your focus to remain on your research questions, not on experimental setup.



Courtesy: IBT, ETH Zurich and University of Zurich, Switzerland

Explore novel MR Methods development at an accelerated pace

New MR sequences and image reconstruction techniques are being developed to meet the needs of neuroscience and clinical researchers. The Clip-on Camera *„Cranberry“* Edition integrates closely with your existing 7T system, allowing you to accelerate the development of novel MR sequences and acquisition methods. The information provided by using the Cranberry allows you to quickly test and debug novel trajectories and acceleration methods. Once your method is ready for *in vivo* scanning, continue using the *„Cranberry“* to create consistent, well characterized data for neuroscience and clinical research.

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NMR field probes

Coherence lifetime at 7T and a main field inhomogeneity < 0.1mT/m	50 ms (typical)
Minimum repetition time (depending on NMR field probe T2 value)	3 x coherence lifetime (typical)
SNR·√BW (the sensitivity at FID start)	65’000
Achievable k_{max}	±7800 rad/m

Probes come fitted with traps to minimize phase noise amplification.

Physical Dimensions (in-bore electronics box)

Housing (w x d x h)	24 cm × 20 cm × 13 cm
Cable diameter	3 cm
Cable length	1 m to 10 m

Physical Dimensions (single probe)

Housing (w x d x h)	24 mm × 60 mm × 9 mm
Cable diameter	6 mm
Cable length	15 cm to 30 cm

Dynamic field measurement

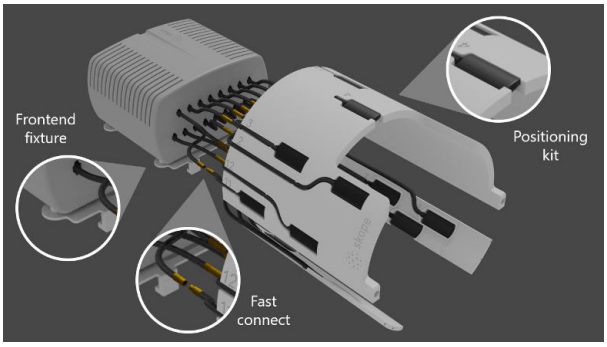
Data types	Unit	Temporal resolution
Gradients	[mT/m]	1 µs
B0	[mT]	1 µs
k-space values	[rad/m] and k0 [rad]	1 µs
k-higher order	up to 3rd spatial order	1 µs
Bfit, Gfit	fitted field value for each interleave/dynamic	

Camera Acquisition System

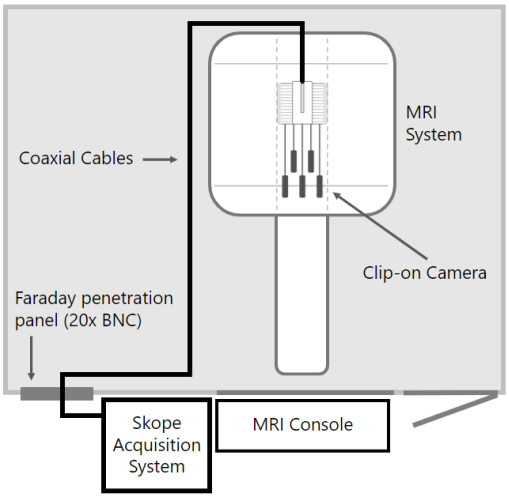
The field sensor signals of the Clip-on Camera are acquired by the 16-channel Skope Camera Acquisition System and automatically processed to provide the actual magnetic field dynamics.

1. Kasper, Lars, Maria Engel, Jakob Heinzle, Matthias Mueller-Schrader, Nadine N. Graedel, Jonas Reber, Thomas Schmid, et al. “Advances in Spiral FMRI: A High-Resolution Study with Single-Shot Acquisition.” NeuroImage, November 17, 2021, 118738. https://doi.org/10.1016/j.neuroimage.2021.118738.
2. Feizollah and Tardif, ISMRM 2021 proceedings, poster 1791, “Toward High-resolution Mapping of Microscopic Anisotropy in the Cortex Using b-tensor Diffusion Imaging with a Spiral Readout at 7 Tesla”

Cranberry Hardware Components



Site Overview



Integration into MRI setup