BRUKER

SKYSCAN 1276 CMOS EDITION

● High Resolution *In Vivo* X-Ray Microtomograph

Innovation with Integrity

Microtomography

SKYSCAN 1276 CMOS EDITION
## High-Resolution, Fast, *In Vivo* Desktop X-Ray Microtomograph

X-ray micro-computed tomography (μCT) is one of the most advanced methods for getting 3D insights into samples of any material, any shape, and any size with little to no sample preparation, including small laboratory animals. Bruker, a pioneer of microCT, has made this technology easier and more accessible for everyone by offering unparalleled *in vivo* 3D X-ray microtomography, all in a desktop format SKYSCAN 1276 CMOS high-resolution *in vivo* microCT. A single scan is all you need to reveal the complete internal 3D structure of your animal or sample non-destructively.

Counting on several hundreds of microCT installations worldwide, the SKYSCAN 1276 CMOS builds on this trusted platform and incorporates the latest X-ray technologies to bring microCT to the next level.
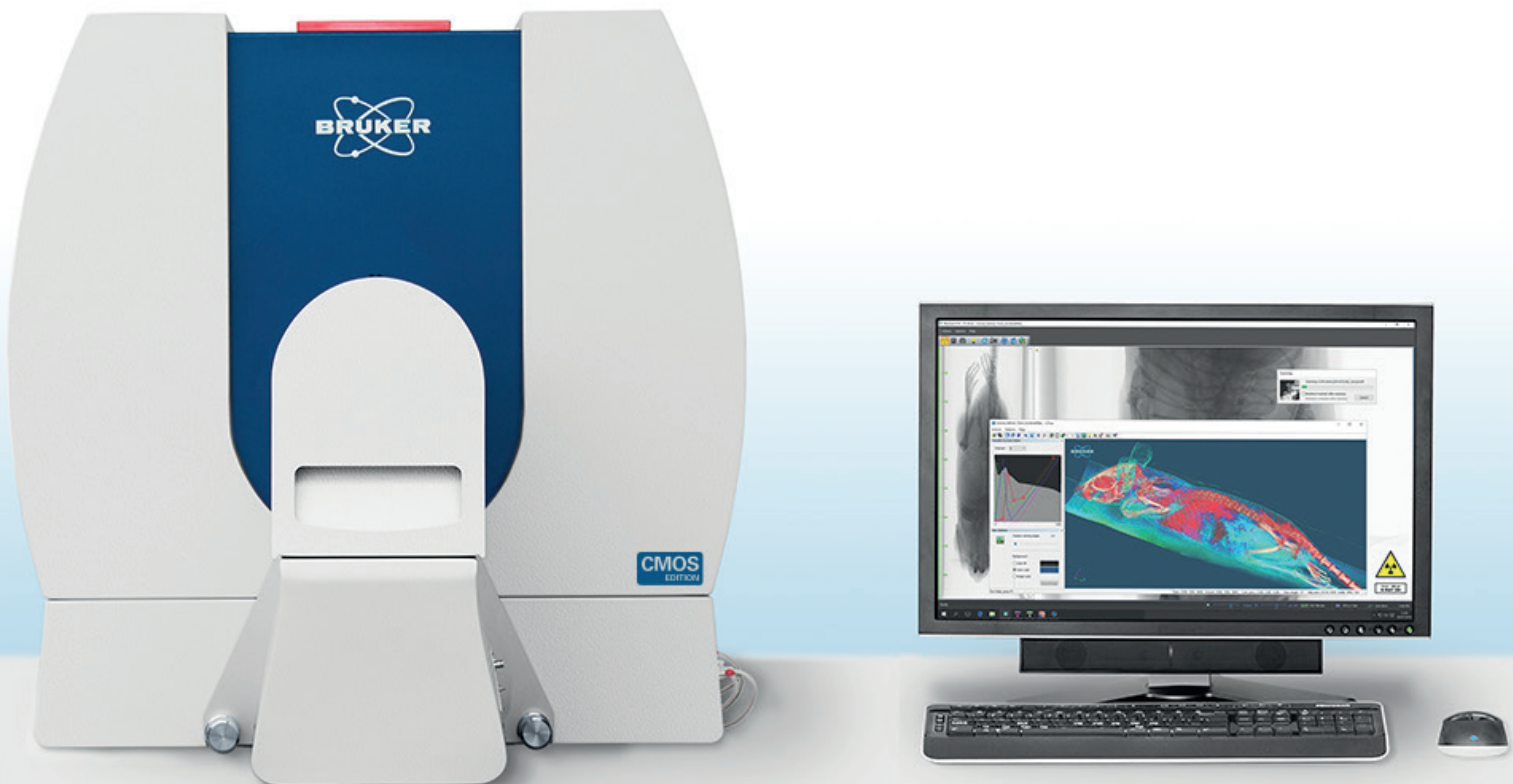
Mineralized tissue analysis

- High resolution *in vivo* imaging of bone and teeth
- True spatial resolution down to 6µm for visualizing the finest bone structures
- Measure trabecular and cortical bone parameters
- Analyze dynamic processes and skeletal disorders
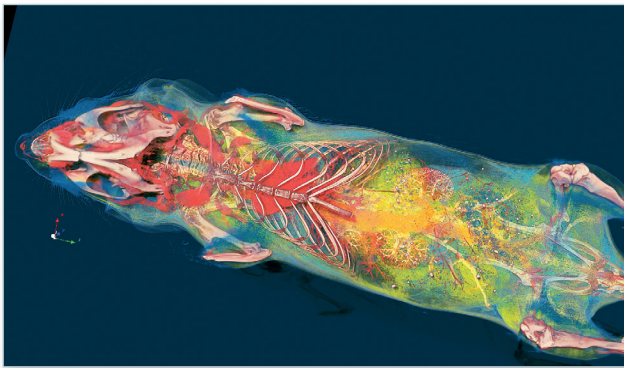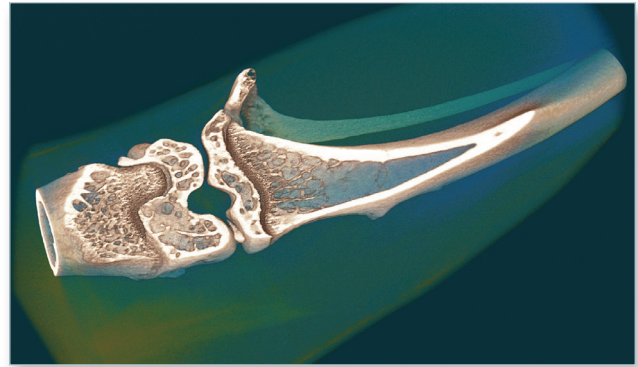
Total body imaging

- Body composition analysis for mice and rats
- Contrast enhanced imaging of vascularisation, liver, spleen, etc
- Tumor detection in various organs
- 2D kinetic study of bladder and kidney dynamics

Lung and Cardiac dynamic imaging

- Prospective, retrospective and image based gating capabilities
- Measure dynamic processes such as heart ejection fraction and respiratory volume
- Lung tumour detection and analysis
- Synchronized scans in only 2 minutes
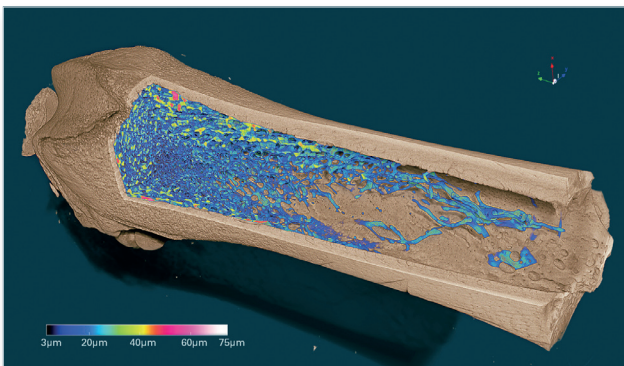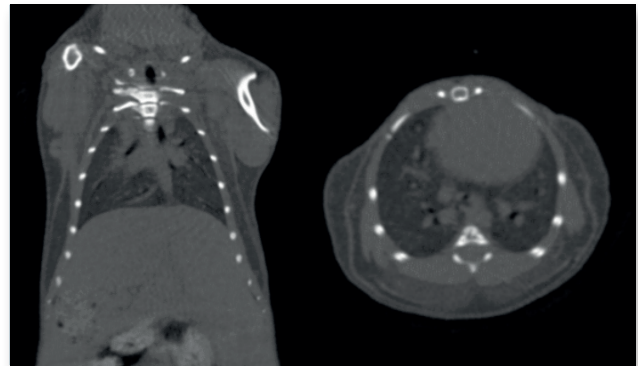
Ex vivo sample analysis

- *Ex vivo* scan capabilities with resolutions down to 2.8µm pixel size
- Included sample holders for *ex vivo* sample analysis
- Batch scan option for automated scanning of multiple samples

SKYSCAN 1276 CMOS EDITION –
State-of-Art Desktop *in Vivo* MicroCT

SKYSCAN 1276 CMOS Edition builds on the trusted SKYSCAN 1276 platform and integrates the latest X-ray technologies.

Its state-of-art 16 megapixel sCMOS X-ray detector provides high-contrast images with superior resolution. The extended detector field of view and enhanced sensitivity for X-rays result in up to twice shorter scan times. The extraordinary native resolution of up to 7,800 x 7,800 pixels per slice allows zooming into any part of the 3D volume without rescanning the sample. The new **Clean Image™** scan mode significantly reduces typical CT artefacts right from the start, thus providing great quality images without cumbersome posteriori corrections.

This top performance is paired with low cost of ownership. Our desktop SKYSCAN 1276 CMOS Edition can be placed on any laboratory desk and consequently does not occupy a lot of expensive lab space. A standard domestic power plug is all you need to start running the instrument, no water chiller or additional compressor. There are also no further hidden costs as the industry-grade sealed X-ray source is maintenance-free.

Plug'n Analyze

No Water Supply

Single-phase Power

Small Footprint
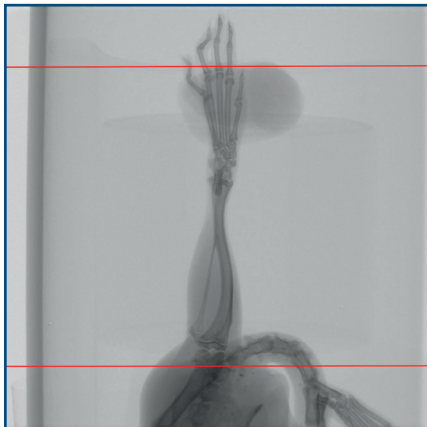
Projection image of a mouse hindlimb. The complete hindlimb fits in the field of view of the CMOS detector (blue), whereas the smaller field of view of the CCD detector (red) would require an oversize scan.
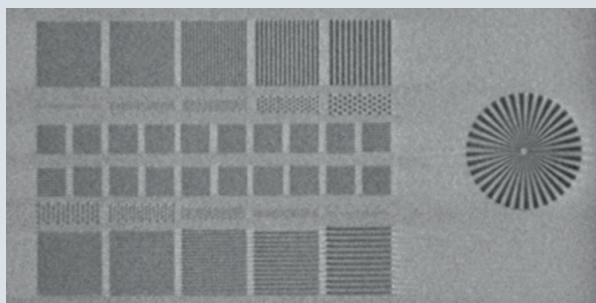
Several factors affect the true 3D spatial resolution: the focal spot size of the X-ray source, the acquisition geometry, the overall system stability, the mechanical accuracy of the rotation axis, as well as the reconstruction algorithms. The 3D spatial resolution is determined with special phantom structures after reconstruction. The SKYSCAN 1276 CMOS easily resolves better than 6 μm in both directions.

Animal Handling

The SKYSCAN 1276 CMOS system is supplied with different-sized, easily exchangeable multimodal animal cassettes that can be used in multiple Bruker *in vivo* imaging instruments to collect multimodal information. The cassettes are equipped with a face mask and tubing for gas anaesthesia as well ECG electrodes and a temperature sensor. All tubes and contacts are combined in a single connector, which can be connected or disconnected by a simple turn of a slider. Leakage of anaesthetic gas is prevented by valves that close when the animal cassette is disconnected from the animal transport system.

The instrument can be easily and intuitively controlled from the workstation as well as from the integrated touchscreen, which can be operated even by gloved hands.
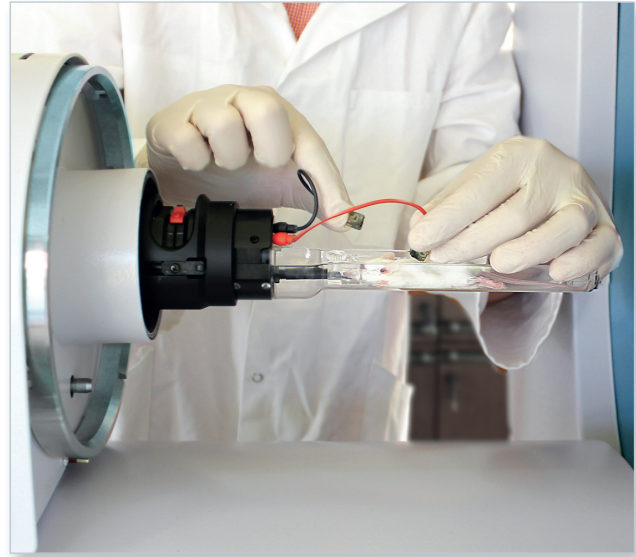
Physiological Monitoring

The physiological monitoring system is fully integrated and includes video monitoring of the animal with real-time movement detection through a 5PM visual camera, ECG and breathing detection, and temperature stabilization. Besides monitoring of the animal, the physiological monitoring creates reference time-marks for time-resolved reconstruction of heart and lung dynamics.

Additionally, the SKYSCAN 1276 CMOS EDITION control software includes a real-time on-screen dose meter. It indicates an estimation of the dose absorbed by the animal body during scanning. Dose information is always documented in the scan log-file together with all scan and reconstruction settings.
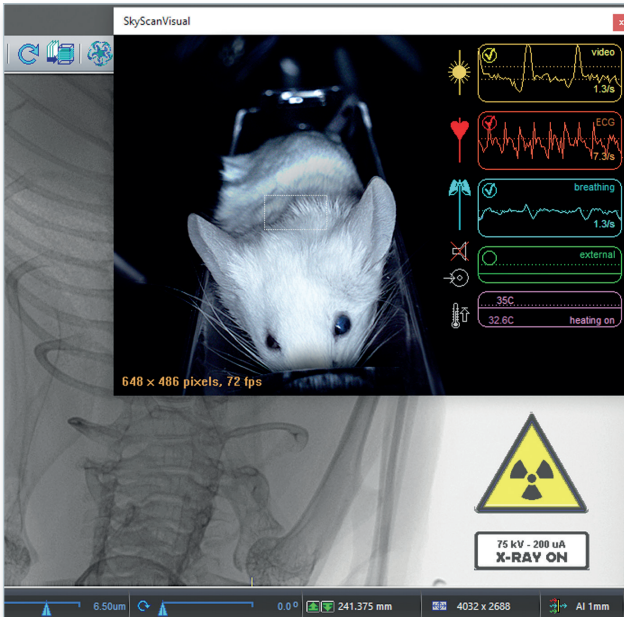
Low Dose Imaging

The SKYSCAN 1276 CMOS EDITION uses an X-ray source with adjustable power and applied voltage in the range of 40-100kV. In combination with a motorized six-position filter changer it provides optimal scanning protocols for *in vivo* studies taking into account size of the animal and dose requirements. A patented "low-dose" filter creates variable filtering conditions across the scanning area and reduces the X-ray dose 2-3 times without compromising image quality of the reconstructed results.

Keeping track of the X-ray dose administered to the animal is made easy with the on-screen integrated dose meter displaying the accumulated dose or dose rate in real-time.
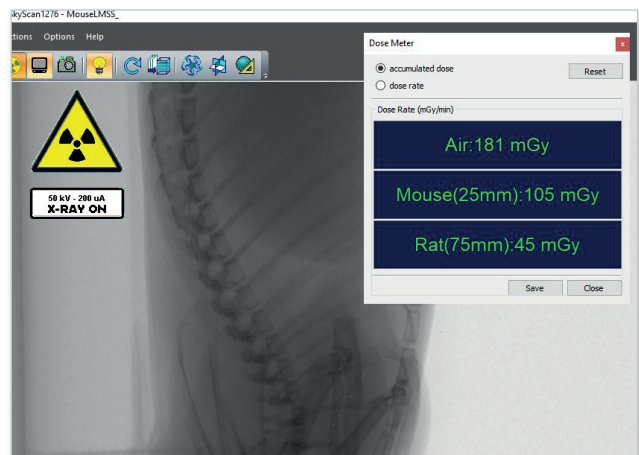
Always included –
Our 3D.SUITE Software

Intuitive, simple, yet powerful – the 3D.SUITE software that comes with every SKYSCAN 1276 CMOS EDITION is designed to inspire finding out what's inside. With the help of Genius Mode, even a novice user can intuitively start scanning right away. It helps optimize the scan conditions by choosing the appropriate filter and X-ray energy to achieve optimal image contrast, and by selecting the optimum exposure time and rotation step for efficient scanning. The SKYSCAN 1276 CMOS EDITION is supplied with a GLP module, which allows administration of user rights in 3 levels and implementation of the necessary data protection according to GLP requirements.

Our NRECON reconstruction software readily transforms the 2D projection images into 3D volumes thanks to the included GPU acceleration. The GPU accelerated 3D reconstruction is several times faster than conventional reconstruction engines operating on a single PC.

3D.SUITE also includes all advanced software capabilities needed for 3D inspection, visualization, and analysis. This means you are perfectly set up for starting with 3D X-ray microtomography.

3D.SUITE – A perfect match for SKYSCAN 1276 CMOS EDITION

NRECON

2D projection images are transformed into 3D volumes by the reconstruction software NRECON. Typical CT artefacts, such as beam hardening, ring artefacts and misalignment, are easily corrected. The SKYSCAN 1276 CMOS EDITION is supplied with GPU accelerated reconstruction providing results up to 10 times faster than traditional CPU-based reconstruction. GPU acceleration supports both conventional round CT and helical scanning.
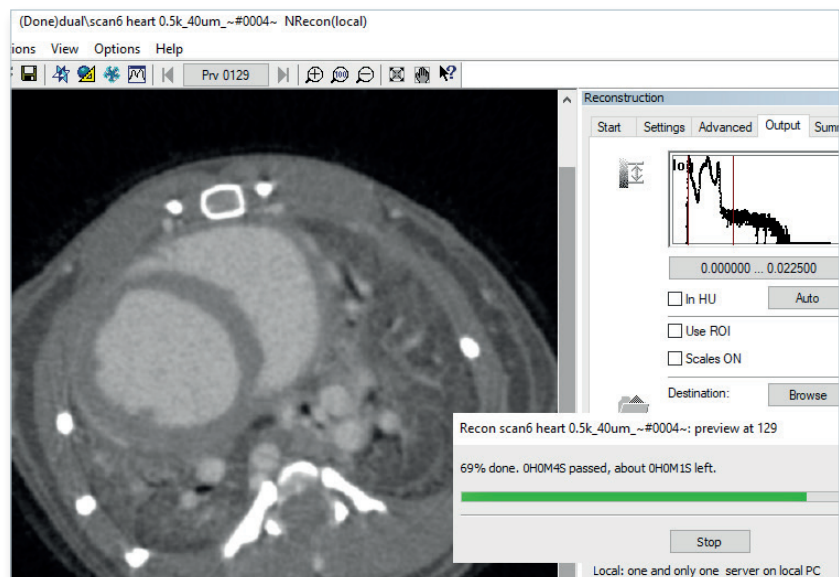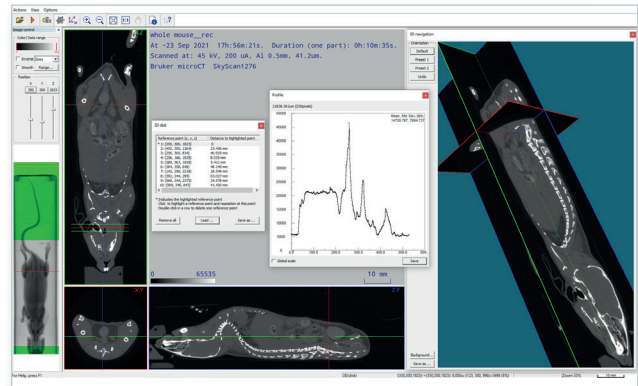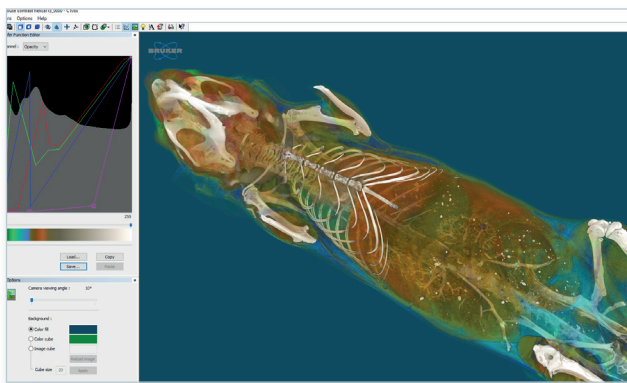
Reconstruction of a mouse thorax in NRECON

DATAVIEWER
Slice-by-slice inspection of 3D volumes and 2D/3D image registration

DATAVIEWER allows inspection of the reconstructed volume using orthogonal slices in any direction. Objects can be rotated, repositioned, and resliced using their new orientation for more convenient visualization and saving of more efficient subvolumes. The software includes intuitive tools for measurement of 3D distances. 2D and 3D image registration enables the exact alignment of multiple scans of the same sample, acquired at different times.

Orthogonal slices through a mouse body in DATAVIEWER

CTVOX
Realistic visualization by volume rendering

CTVOX is an easy-to-use volume rendering package that provides precise control of visualization parameters, ensuring a realistic representation of all types of samples. CTVOX offers intuitive manipulation of the point-of-view, virtual slicing through objects, and full control of light, shadow, and surface properties. Creating attractive cover images and impressive movies has never been so easy.

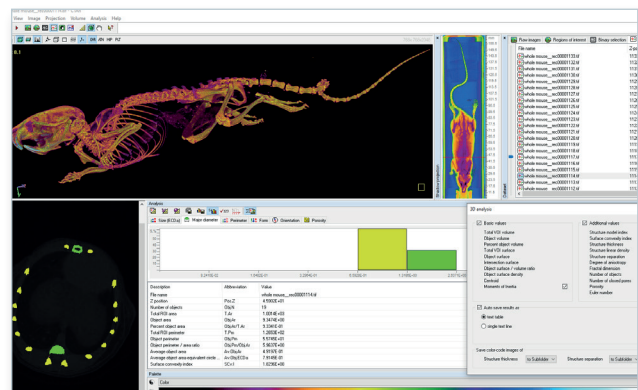**Volume rendered 3D model of a mouse body in CTVOX**

CTAN
2D/3D image analysis & processing

Built over two decades based on direct feedback from scientists all over the world, CTAN is one of the most frequently used programs for quantitative image analysis. This package includes an extensive number of tools for region-of-interest selection, image segmentation and 3D measurements. Using the comprehensive library of embedded plugins or user-customized protocols, quantifying complex microstructures such as porosity, thickness, orientation, and many other properties is an easy task. Large sets of objects can simply be studied by automated batch analysis.
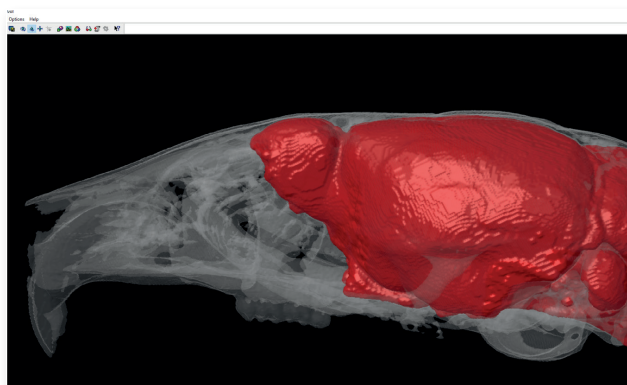

**Individual object analysis of mouse bone structures in CTAN**

CTVOL
Built-in surface rendering

Surface models can be visualized in CTVOL, a flexible 3D viewing environment. Volumes can be exported in STL format, to allow 3D printing of the acquired scan data or further use in CAD and modelling programs.

Surface rendering of a brain endocast using CTVOL

Technical Data

X-ray Source	40-100 kV, 20 W, <5 μm spot size at 4 W
X-ray Detector(s)	16 Megapixel sCMOS camera 4,096 x 4,096 pixels
Spatial Resolution	2.8 μm smallest pixel size, 6 μm details resolved with more than 10% contrast
Image Formats	Up to 7,800 x 7,800 x 2,500 pixels after a single scan
Scanning space	75 mm in diameter, up to 310 mm in length
Integrated Physiological monitoring	real-time motion detection (5 Mp color camera), ECG, breathing detection, temperature stabilization, all signals digitized in 16bit with up to 120 samples/sec
Radiation Safety	<1 μSv/h at any place of the instrument surface
System Dimensions	954W x 1190D x 940H mm, 360 kg

954mm

940mm

1190mm

1560mm

360 kg
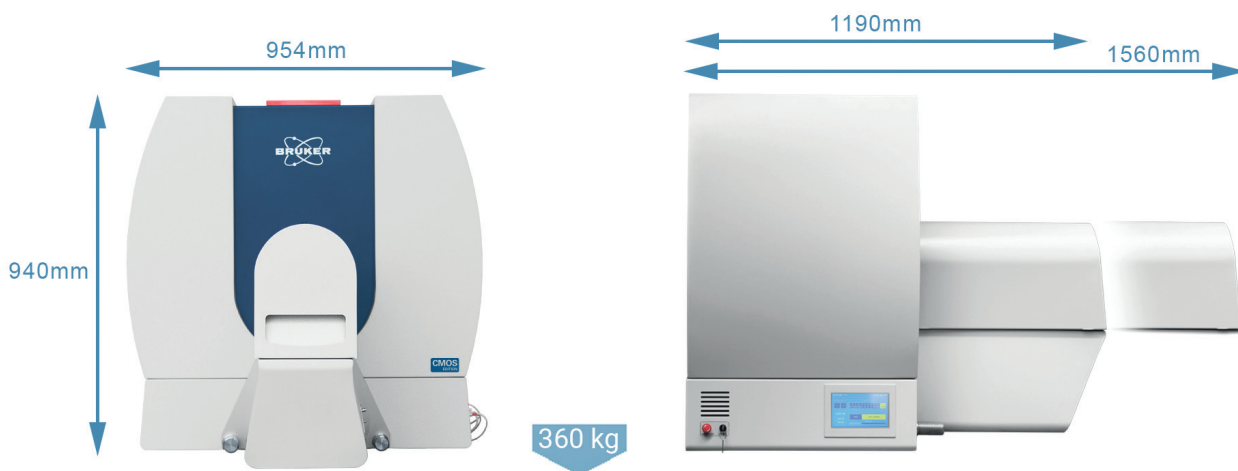
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SKYSCAN 1276 CMOS EDITION

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