Waygate Technologies
a Baker Hughes business

High performance X-ray inspection solution

with non-destructive planarCT board inspection

Microme|x neo 160
Microme|x neo 180
Nanome|x neo 180

phoenix Micromelx neo and Nanomelx neo

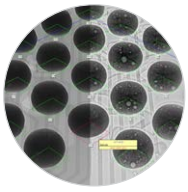
High resolution 160/180 kV micro- / nanofocus X-ray inspection systems with 3D CT option

The phoenix Micromelx neo and Nanomelx neo series combines high-resolution 2D X-ray technology and 3D CT in one system. Innovative and unique features and an extreme high positioning accuracy make both systems the effective and reliable solution for a wide spectrum of 2D and 3D offline inspection tasks: R&D, failure analysis, process and quality control.

The Phoenix|x-ray X|act technology offers easy to program CAD based µAXI ensuring automated inspection in the micrometer range. Another unique benefit is Waygate Technologies highly dynamic DXR flat panel detector with active cooling. Offering up to 30 frames per second, it provides outstanding brilliant live imaging and fast data acquisition for 3D CT.

Unique features

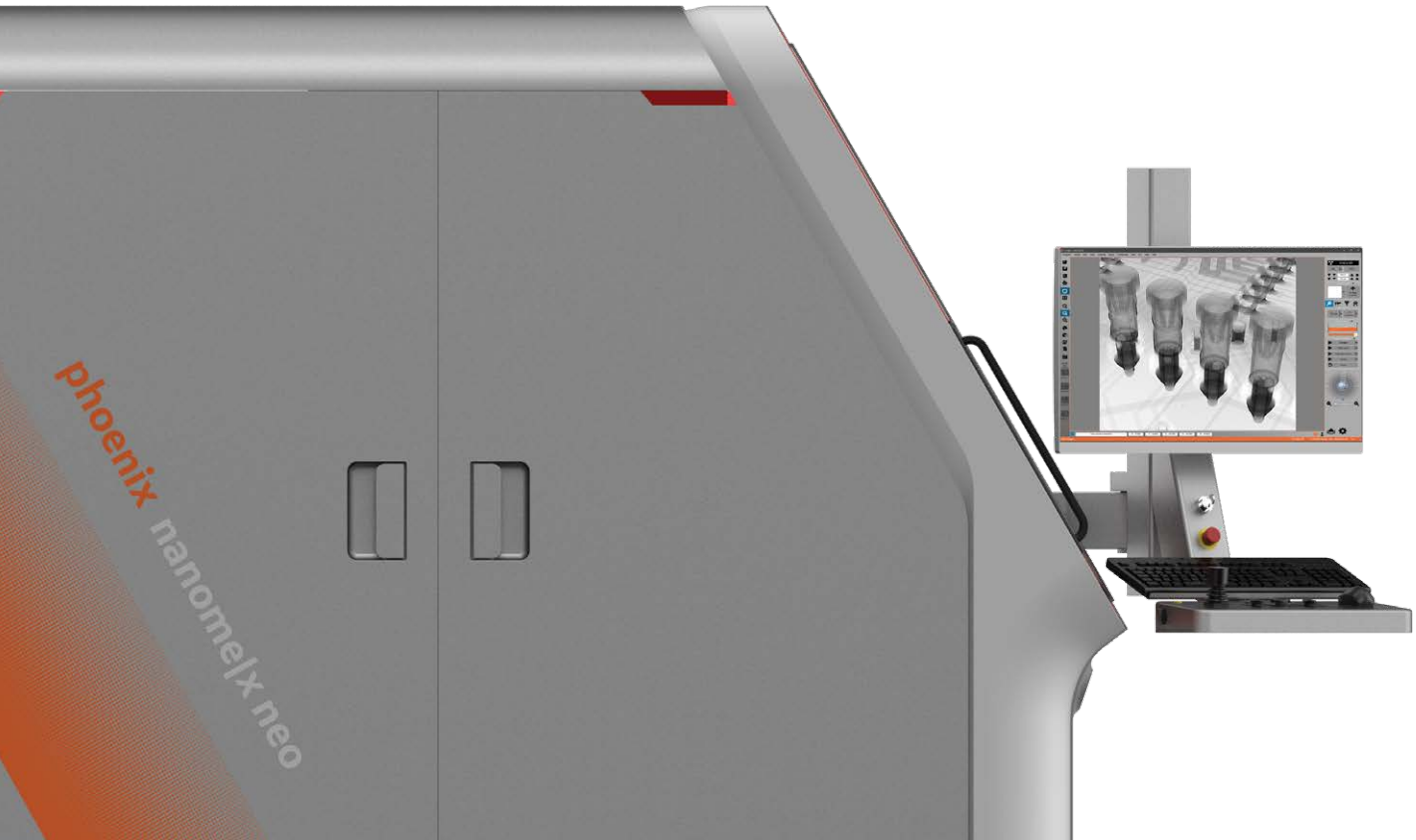
- Superior pixel resolution (85/100µm) new detectors more competent to semiconductors and tiny electronics components inspection
- Ease of use: inspection report to be automatically generated after inspection
- X|act package for CAD based µAXI programming and automatic inspection
- Diamond|window for up to 2 times faster data acquisition at the same high image quality level
- Optionally 3D computed tomography scans within 10 seconds
- Shadow|target to prevent sensitive devices from radiation damage by reducing unnecessary dose
- Optical or X-ray navigation map for overview of large size samples and fast positioning



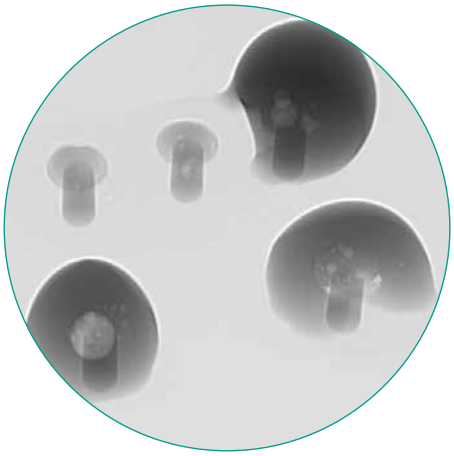
Open BGA ball with live CAD data overlay and FLASH!™ image optimization

3D Computed Tomography of an USB flash drive

Advanced PlanarCT evaluation (left) without overlaying features in the X-ray image



Waygate Technologies Brilliant DXR-HD detector fleet



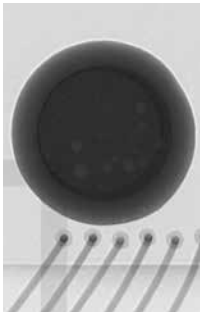
FLASH!™ filtered voids in an open µBGA ball: 1,970x geometric zoom for extreme high magnification

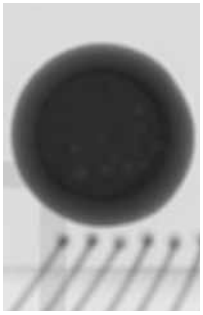
Newest large-size DXR S100 Pro detector in combination with superior pixel resolution defines industry-leading imaging technology:

- Provides superior 100 um pixel resolution and frame rates up to 30 frames per second which combines outstanding detectability with high efficiency
- 300 mm x 250 mm large active area significantly expands the vision and redefines inspection efficiency

Exclusive high dynamic DXR250RT detector with enhanced scintillator technology introduces a new industry standard for efficient live inspection:

- Full frame rate of 30 frames per second at 1000 x 1000 pixels offers low noise coupled with brilliant image quality ensuring fast and detailed live inspection
- Active temperature stabilization for precise and reliable inspection results
- Extremely fast data acquisition in 3D CT mode
- Best detail detectability 0.5 µm/0.2 µm for high performance failure analysis





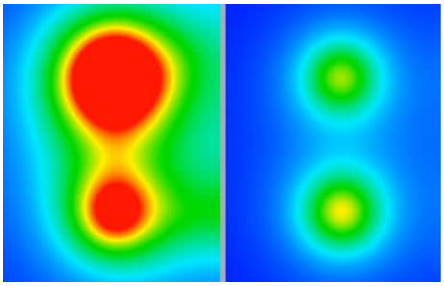
Diamond|window (same X-ray tube parameter: 130 kV, 11.4 W)

beryllium window

High output with high-resolution: Diamond|window

Compared to conventional beryllium targets, the Diamond|window allows higher power at a smaller focal spot. This ensures high-resolution even at a high output.

- Up to 2 times faster CT data acquisition at the same high image quality level
- High output with high-resolution
- Non-toxic target
- Improved focal spot position stability within long term measurements
- Increased target lifetime due to less degradation with higher power density

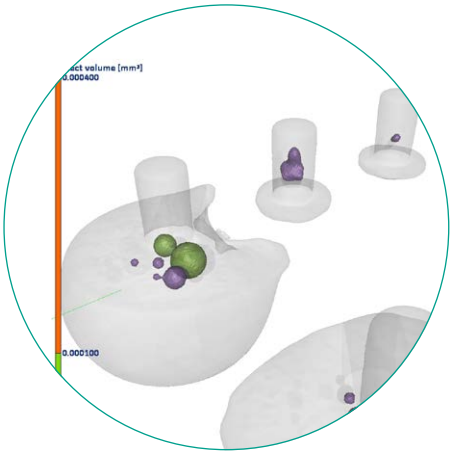


In the Dose|manager tool, rainbow coloring is visualizing the projected X-ray dose in real time. Left image: Dose Map without Shadow|target. Right image: Dose Map with Shadow|target.

Smart dose management

Waygate Technologies´ proprietary Shadow|target inside the X-ray tube enables a reduction of unnecessary radiation dose of up to 60% compared to conventional x-ray tubes during a typical inspection. Combined in a low-dose bundle together with the brand new Dose|manager tool, it enables real-time dose monitoring and controlling. This solution protects radiation sensitive inspected components from aging to worst case damage.

- The Shadow|target is linked with the Dose|manager tool
- Shadow|target prevents frequent generator start & stop to reduce unwanted radiation
- Fast and stable X-ray recovering. No delay of energy running up
- Dose measurement: Realtime visualization of projected dose through “heat map”
- Cumulated dose counting per inspection



nanoCT® of TSVs in an electronic package. The voids in the copper filling are clearly visible.

High-resolution 3D computed tomography

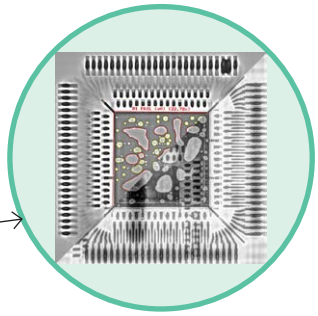
For advanced inspection and 3D analysis of smaller samples, Phoenix|x-ray's proprietary 3D CT technology is optionally available.

- 180 kV high power X-ray technology, fast image acquisition with DXR detector and Diamond|window combined with Phoenix|x-ray's fast reconstruction software deliver high quality inspection results
- Maximum voxel resolution down to 2 microns; the nanoCT® capability of the Nanome|x allows even a higher image sharpness

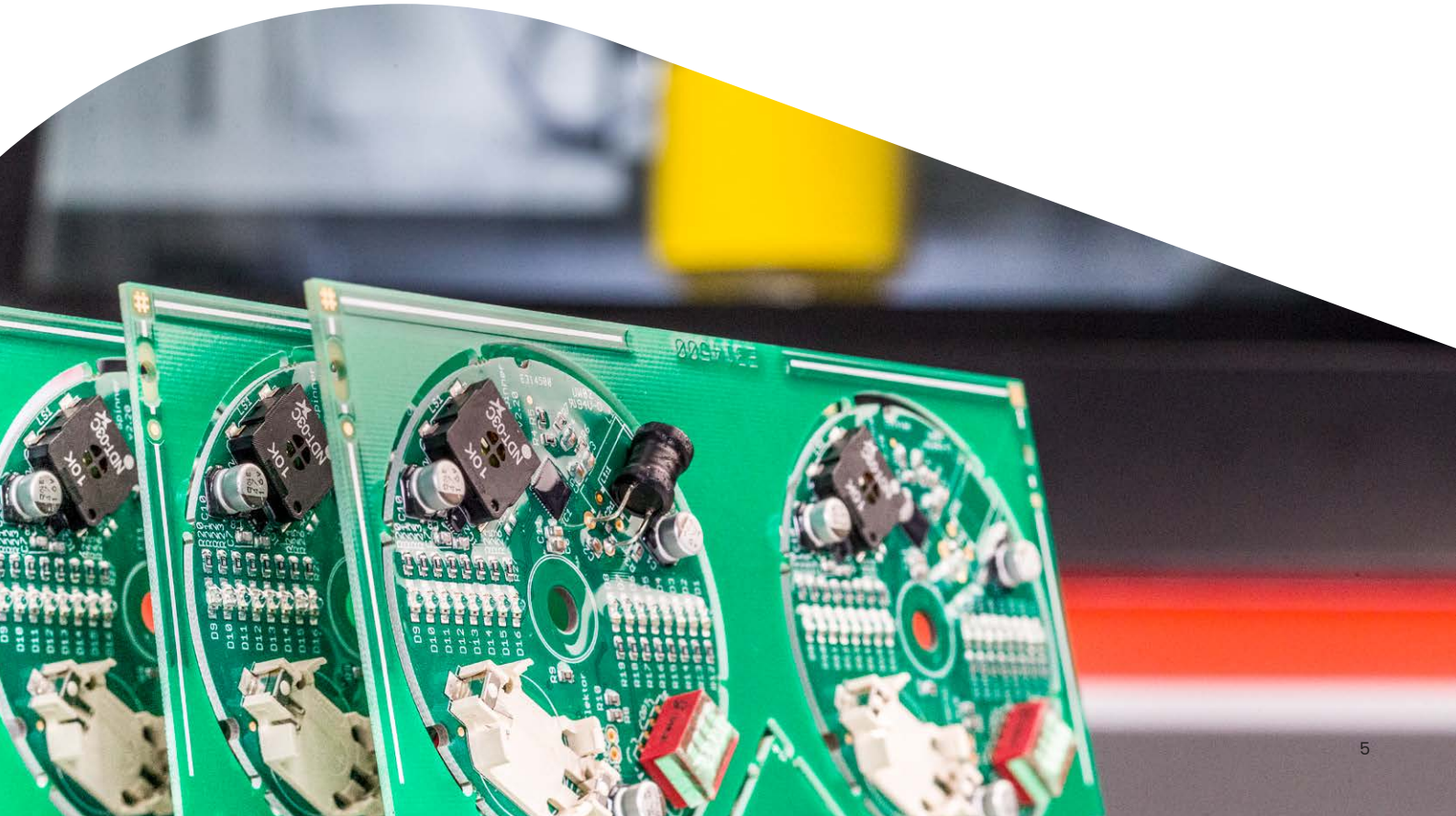
Virtual board slicing with PlanarCT

- Easy 2D slice or 3D volume evaluation of large complex boards
- No board cutting, no overlaying structures as in X-ray images

PlanarCT slice or multislice views allow exact inspection results of a single plane or a whole package



Advanced PlanarCT evaluation without overlaying features in the X-ray image



X|act – CAD based inspection:

high resolution µAXI for extremely high defect coverage

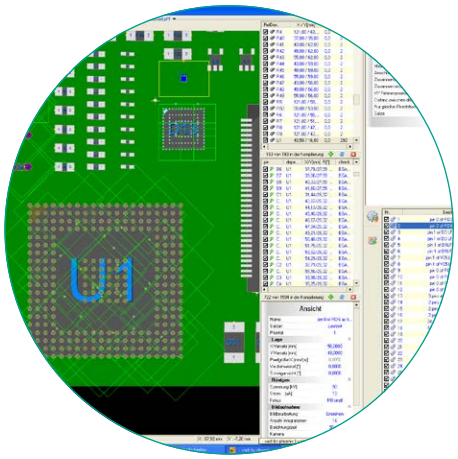
As a solution for µAXI with extremely high defect coverage, Phoenix|x-ray provides its high precision systems Microme|x neo and Nanome|x neo including the unique X|act software package for fast and easy offline CAD programming.

Its intuitive new GUI with improved outstanding precision and repeatability, small views with resolutions of only a few micrometers, 360° rotation and oblique viewing up to 70° ensures meeting highest quality standards – even for inspection of components with a pitch of just 100 microns.

Besides automated inspection, X|act ensures an easy pad identification by its live CAD data overlay function even in manual inspection while FLASH!™ image optimization ensures high defect coverage.

Efficient CAD programming

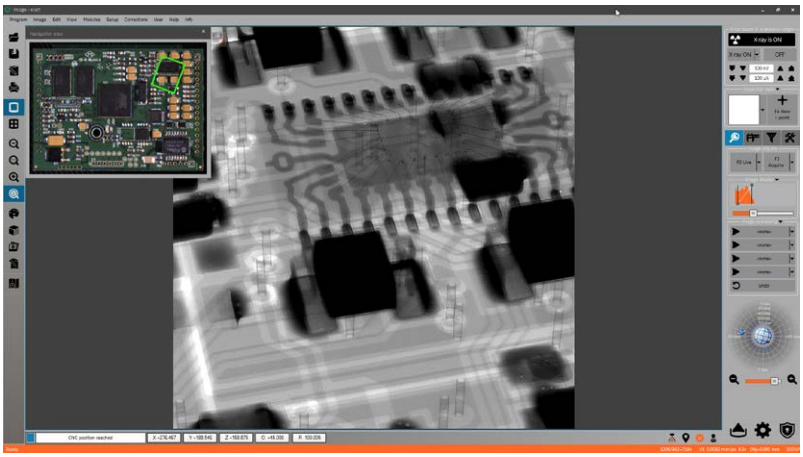
X|act provides not only a minimal setup time compared with conventional view based AXI – once programmed, the inspection program is portable to all X|act compatible systems.



- Easy pad-based offline programming
- Specific inspection strategies for different pad types
- Fully automated inspection program generation
- Extremely high positioning accuracy even at oblique viewing and rotation
- Easy pad identification in manual X-ray inspection
- High reproducibility on large PCBs

Fast and easy programming: just assign the inspection strategies and let X|act generate the automated inspection program

Navigation map – Clear overview and fast positioning



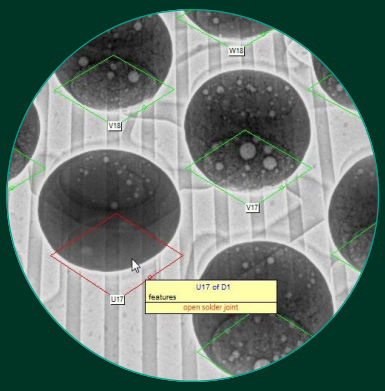
Easy sample map orientation

- Optical camera image or X-ray overview image for whole sample as navigation map
- Fast manipulation by clicking on the map
- Inspection program can be set up based on the optical navigation map
- Position on the map can be saved into inspection report generated by X|act

Your advantages

Phoenix Microme|x and Nanome|x neo

- Brilliant live inspection images due to high dynamic Waygate DXR digital detector array
- Unique high power 180 kV / 20 W micro- or nanofocus tube for even high absorbing electronic samples
- Minimized setup time due to highly efficient automated CAD programming
- Live overlay of CAD and inspection results even in rotated oblique inspection views
- Extremely high defect coverage and repeatability
- Best detail detectability 0.5 µm or even 0.2 µm with nanofocus
- Optional FLASH!™ image optimization technology
- Large 27" monitor for better defect identification
- Optional advanced failure analysis with high resolution 3D micro- or nanoCT® or large board PlanarCT
- Optional 3D CT scans up to 10 seconds
- Complete and industry leading dose control technology to protect radiation sensitive devices
- Optical or X-ray image based navigation map to make multi-points inspection easier and faster
- OPC-UA interface to export process and machine data for statistical analysis, improved efficiency and minimized downtime



X|act provides **live CAD overlay** and inspection results in the X-ray live image – at **any time**, at **any viewing angle**.

Waygate Technologies exclusive **FLASH!**™ technology option enables **faster, more reliable** failure detection.

Technical specifications and configurations

	Nanome|x neo 180	Microme|x neo 180	Microme|x neo 160
X-ray detector	Option 1: Waygate Technologies high dynamic 200 µm pixel resolution detector DXR250RT Option 2: Waygate Technologies large size 100 µm pixel resolution detector DXR S100 Pro		Option 1: Waygate Technologies Superior 85 µm pixel resolution detector DXR S85 Option 2: Superior 75 µm pixel resolution CMOS detector
Geometric magnification	DXR250RT: max. 1,970x; DXR S100 Pro: max. 2,185x		max. 1,970x
Total magnification 27" 2K monitor	DXR250RT: max. 36,800x; DXR S100 Pro: max. 40,700x		DXR S85: max. 84,800x; CMOS: max. 96,000x
Detail detectability	up to 0.2 µm	up to 0.5 µm	
X-ray tube type	Low maintenance open nanofocus tube with unlimited lifetime, transmission type, 170° cone angle, collimated	Low maintenance open microfocus tube with unlimited lifetime, transmission type, 170° cone angle, collimated	
Max. tube voltage/power on target	180 kV / 20 W	180 kV / 20 W	160 kV / 20 W
	Diamond|window for up to 3 times faster data acquisition at the same high image quality level		AL window, optional Diamond|window for up to for up to 3 times faster data acquisition at the same high image quality level
Filament	Tungsten hairpin, pre-adjusted in plug-in cartridges for fast and easy exchange		
Manipulator	high-precision vibration-free synchronized 5-axes manipulation		
Max. inspection area	460 mm x 360 mm (18" x 14"), 610 mm x 510 mm (24" x 20") without rotation table		
Max. sample size / weight	680 mm x 635 mm (27" x 25") / 10 kg (22 lbs.)		
ovhm – oblique view rotation	continuously adjustable view angle up to 70°, rotation 0° – 360°		
Control	Joystick or mouse control (manual mode) and CNC (automatic mode)		
Manipulation aids	Sample navigation map based on camera or X-ray overview image, click'n-move-to function, click'n-zoom-to function, automatic isocentric manipulator movement		
Positioning aid	laser crosshair		laser crosshair optional
Anti-Collision System	may be deactivated for maximum magnification (tube touching the sample)		
System dimensions (D x H x W)	2,160 mm x 1,958 mm x 1,590 mm (85" x 77" x 62.6"), (without control console) 2,772 mm x 1,958 mm x 1,770 mm (109" x 77" x 69.7"), (with control console)		
Min. transportation width:	1,770 mm (69.7") (with control console)		
Max. weight	appr. 3,250 kg / 7165 lbs		
Radiation safety	The radiation safety cabinet is a full protective installation without type approval according to the German StrSchG/ StrSchV and the US Performance Standard 21 CFR, Subchapter J. For operation, other official licenses may be necessary. Exposure rate < 1 µSv/h emission limit, measured at 10 cm distance from accessible surfaces.		
Dose Reduction	Dose|manager – combined with Shadow|target inside the X-ray tube, the low-dose bundle enables real-time dose monitoring and up to 60% dose reduction for radiation protection of sensitive inspection samples. Dose|manager is also available without Shadow|target		
Image processing software	Phoenix X|act: comprehensive CAD based X-ray inspection software comprising image enhancement functions, measuring functions and fast and easy automated CAD based programming for automatic inspection BGA|module (standard): Intuitive automatic view based BGA solder-joint evaluation incl. automatic wetting analysis VC|module (standard): Intuitive automatic view based voiding calculation software package incl. capability of multiple die attach voiding evaluation		
Software Configuration (Option)	X|act BGA check strategy: automated CAD based analysis of BGA solder joints X|act PTH check strategy: automated CAD based analysis of PTH solder joints QFP|module: automated QFP solder joint evaluation QFN|module: automated inspection of QFN / MLF solder joints PTH|module: automated pin-through-hole solder joint evaluation C4|module: view based evaluation of round solder joints with background structure, such as C4 bumps ML|module: view based registration of multilayer printed circuit boards Quality|review: visual interface for rework and failure indication FLASH!™: Waygate's exclusive image optimization technology		
Hardware Configuration (Option)	Tilt / rotate unit: tilt ± 45° and rotation n x 360° for samples up to 2 kg Manual bar code reader: for product identification		
PlanarCT (Option)	PlanarCT module: Non destructive 2D slice and 3D volume board evaluation incl. 3D|viewer software		
Computed Tomography (Option)	Volume acquisition / reconstruction software: phoenix datos|x Upgrade package for combined 2D / 3D (computed tomography) operation CT-unit: precision rotation axis Max. geom. magnification: 100 x (CT) Max. voxel resolution: down to 2 µm, resolution depending on the sample size. The nanoCT® function of the Nanome|x allows a higher image sharpness.		

For more detailed information or to request a demo, please visit our website or contact us.

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BHFF31343EN (04/2022)

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