Ready for an automated production environment, with autoloading and robotic integration capabilities available

POWERFUL AND AUTOMATION-READY
VOXLS 30 SERIES
Nikon has changed the world of enterprise inspection with the launch of the new VOXLS 30 Series, CT systems optimized for automated industrial quality control and designed to help customers achieve zero-defect manufacturing.

At the core of the VOXLS 30 Series system is an expertly designed, metrology-grade manipulator set on a vibration-damping and thermally stable granite base. This rock-solid foundation enables exact and repeatable part positioning within the system’s expansive scanning envelope which is greater than 600 mm (Ø) x 1,000 mm (H), with a system capacity of 1,000 mm (Ø) x 1,300 mm (H). This empowers the VOXLS 30 Series to generate stunning image clarity.

Thanks to unrivalled visibility, users gain immediate confidence in handling critical components. A glass door provides a clear view inside the system, and this enables operators to position parts on the manipulation stage easily. Integrated high-definition cameras add more perspectives and monitoring options to optimize every scan.

Equally at home on the smart factory floor as they are in a research laboratory, the VOXLS 30 Series offers robotic integration and the Nikon Automation OPC UA Interface, which enables closed-loop quality control to allow manufacturing to be adapted in real-time.

With configurations designed to meet diverse energy and resolution requirements, the VOXLS 30 Series helps manufacturers work towards smarter, faster, zero-defect production and R&D discovery.
High-speed automated inspection with exceptional visibility

**AUTOMATION-READY**
The VOXLS 30 Series systems are just as at home on the factory floor as in the research lab. The motorized radiation safety doors have been engineered to open or close within just five seconds. When integrated with a robotic loader and the Nikon Automation OPC UA Interface, these systems are automation-ready for closed-loop inspection at high speed in a Quality 4.0 production line environment.

**EXCEPTIONAL VISIBILITY**
All VOXLS 30 Series systems come with a 1.3-meter tall glass outer door with manipulator interlock, which gives the operator unrivalled visibility into the enclosure for precise and confident positioning of the scan object. This removes the need for light curtains and minimizes the risk of sample collision with the X-ray sources and detectors. Two internal video cameras continue to provide an excellent view even with the inner radiation safety doors shut and X-rays on.

**ERGONOMIC DESIGN**
As standard, each VOXLS 30 Series system comes with a 1.5 m ergo desk with motorized height adjustment, enabling optimal positioning for all operators, ensuring they can work comfortably whether seated or standing. In addition, the integrated cabinet touch screen allows effortless operation of the radiation safety doors and quick access to system status information.

**LARGE SAMPLE CAPACITY**
Accommodates samples up to 1,000 mm (Ø) × 1,300 mm (H)

**GLASS OUTER DOOR**
Full system interior visibility

**SINGLE-PIECE CABINET**
Easy to install and relocate

**LARGE ERGO DESK**
Comfort for all operators

**INTEGRATED TOUCH SCREEN**
Door control and system status at your fingertips

**FROSTED GLASS WARNING LIGHTS**
‘Floating’ text with increased legibility for safety
Granite-based manipulator provides superior mechanical stability

**METROLOGY-GRADE MANIPULATOR**
At the core of VOXLS 30 Series systems is a metrology-grade, granite-based manipulator coupled with rigid steel towers, high-precision motors and linear encoders. The resulting construction provides superior mechanical and thermal stability, resulting in more accurate manipulator positioning and, therefore, the generation of highly precise, repeatable measurement data throughout the entire scan volume.

**LARGE SCANNING VOLUME**
The VOXLS 30 Series cabinets can accommodate items up to 1,000 mm in diameter by 1,300 mm tall. Thanks to synchronous vertical travel of the X-ray source and detector, combined with a 2-position horizontal panel shift, these systems provide impressive maximum scanning volumes of more than 600 mm diameter by more than 1,000 mm high. The VOXLS 30 C 225 model boasts an industry-leading scan volume within its size class at 620 mm diameter by 1,025 mm tall.

**MOTORIZED MOVEABLE FID**
In traditional X-ray CT systems, the Focus to Imager Distance (FID) is either fixed or manually adjustable. However, the VOXLS 30 Series have motorized moveable FID, allowing the operator to effortlessly change the distance between the X-ray source and detector with sub-millimetre precision. Reducing the FID provides dramatically greater X-ray photon flux, significantly faster scan times and increased signal-to-noise ratio for enhanced image quality.
Microfocus X-ray sources enable high-resolution and rapid scanning

Nikon Metrology X-ray sources are at the heart of our technology and have been designed and manufactured in-house at our UK factory since 1987. All our sources are of microfocus open-tube design, which provides micron-level resolution, exceptional image quality, and a low cost of ownership.

180 kV TRANSMISSION TARGET
- Our highest resolution source, enabling sub-micron feature recognition
- Liquid cooled to provide up to 180 kV energy and 20 W continuous power
- Perfect for high-resolution CT of small objects

Typical applications include biological tissues, low-density composites and foams, electronic connectors and PCBs.

225 kV REFLECTION TARGET
- Spot size down to 3 µm for ultra-high-resolution applications
- Liquid cooled to provide up to 225 kV energy and 225 W continuous power
- Ideal for high-resolution CT across a broad sample range

Typical applications include light metal castings, plastic ALM components, drug delivery devices and pharmaceuticals.

225 kV MULTI-METAL REFLECTION TARGET
- Unique to the market, with four target metals to choose from (W, Cu, Al and Mo)
- Effortless target metal changeover without the need to break vacuum
- Optimize the X-ray spectra required for challenging low kV scanning

Typical applications include low-density polymers, thin plastic films, low-contrast materials research and small natural specimens.

225 kV ROTATING TARGET 2.0
- The second generation of Nikon’s unique 225 kV rotating reflection target provides double the service interval of its predecessor. Spinning the target at high speed combined with advanced liquid cooling enables continuous operation even at 450 W full power, three times greater power density than conventional reflection targets, and significantly higher X-ray photon flux. All these factors add up to dramatically faster scan times and better signal-to-noise ratio without loss of resolution.
- Typical applications include LiB pouch, cylindrical and prismatic cells, light metal ALM components and aerospace wax turbine blades.

450 kV ROTATING TARGET
- Nikon’s unique 450 kV rotating reflection target builds on the world’s first 450 kV microfocus X-ray source, also designed by Nikon. Unlike traditional minifocus sources, the target’s innovative cooling system provides continuous operation across the full power range up to 450 W and 5-10x higher resolution. Additional benefits include 3x greater power density and flux than Nikon’s standard 450 kV source to radically accelerate acquisition while providing superior image quality.
- Typical applications include LiB modules and packs, large or dense ALM components and aerospace Inconel turbine blades.

320 kV REFLECTION TARGET
- Higher penetrative power whilst maintaining high resolution
- Liquid cooled to provide up to 320 kV energy and 320 W continuous power
- Rapidly interchangeable with all our 225 kV targets and 180 kV transmission

Typical applications include small-to-medium-sized metal castings, medium-density automotive components and rock cores.

450 kV REFLECTION TARGET
- High energy microfocus source combined with a low cost of ownership
- Liquid cooled to provide up to 450 kV energy and 450 W power
- Critical for high-resolution CT of higher-density components

Typical applications include medium-to-large-sized metal castings, high-density automotive parts and rocket engine components.
Advanced scanning technologies improve resolution, scan volume, and speed

**X.Tend Helical CT**
Tall objects can be scanned in a single acquisition process, eliminating artefacts introduced by the cone beam and multi-scan stitching. This also provides the benefit of scanning objects at higher magnification, resulting in significantly higher resolution.

- Petrol-Powered Chainsaw [scanned with X.Tend Helical CT]

**Offset.CT**
Objects wider than the detector itself can be captured in a single scan. This also allows smaller wide objects to be scanned at considerably higher magnification, providing enhanced detail.

- Heated Car Steering Wheel [scanned with Offset.CT]

**Panel Shift**
Thanks to horizontal detector movement, objects much wider than the field of view can be imaged and reconstructed as an automatically combined single CT volume. Additionally, small-to-medium-sized objects can be magnified over a wider area, resulting in increased resolution.

- 580 mm wide R-15 Car Tyre [scanned with Panel Shift]

**Half.Turn CT**
This is designed for high throughput environments where fast cycle times are most important. This productivity gain is achieved by acquiring and reconstructing approximately half the data of conventional circular CT without loss of resolution or image quality.

- Lithium-Ion Battery Pouch Cell [scanned with Half.Turn CT]

**Pixel Split CT**
Applications that require much greater resolution than typically possible benefit from a quadrupling of the pixel count. This is achieved by horizontal and vertical detector movement at the sub-pixel scale and the acquisition, combination and reconstruction of four automated circular CT scans.

- Female UK Dung Beetle (Geotrupes spiniger) [scanned with Pixel Split CT]

**Tilted CT**
Maximizes the geometric magnification and, therefore, the resolution of planar or high aspect ratio objects with a small region of interest. This is made possible by tilting the component’s axis of rotation, which also yields superior image quality in areas previously masked by more dense material.

- Cylindrical Aluminium Extrusion [scanned with Tilted CT]
Enabling automated inspection, calibration, and evaluation

**Local Calibration**

Allows fast, automated calibration of voxel size at any CT scan position, rather than the user having to perform the function manually. This leads to a radical improvement in measurement accuracy for metrology applications. As the CT scan position is calibrated with reference to a known artefact, measurements can be made with high confidence.

**Dual.Material CT**

An innovative reconstruction technique for high throughput production environments that reduces streak and beam hardening artefacts caused by metal and other dense parts in dual-material samples. Discrimination between materials is greatly improved, resulting in clearer visualisation and facilitating automatic inspection. Dual.Material CT eliminates the need for long scan times and manual postprocessing routines.

**ASTM E2737 Detector Evaluation Kit**

The condition of flat panel detectors has a considerable influence on the efficiency and accuracy with which features are detected and measured, so evaluating and tracking their performance over time is crucial. Nikon’s unique hardware and software evaluation kit enables detailed trend analysis and performance tracking in accordance with ASTM E2737 and produces clear graphical visualisation of results, all within a fully automated process.

**LiB.Overhang Analysis**

Automatic high-speed analysis of anode overhang in Lithium-ion batteries. Cutting-edge Deep Learning AI precisely and reliably analyses the fastest CT scans, exporting repeatable results in a machine-readable format. LiB.Overhang Analysis enables closed-loop process control, resulting in improved product quality and significantly reduced scrap.
BATCH CT
As standard, Nikon Metrology’s Inspect-X control software allows operators to save scan profiles to be recalled later. These profiles define all acquisition, reconstruction and analysis parameters, ensuring repeatability of the complete inspection process. The easy-to-use interface eliminates the requirement for advanced programming skills and manual parameter selection, freeing up the operator to carry out other tasks.

ROBOTIC LOADING
In-line CT enables fully autonomous inspection in production environments where critical complex parts require rapid process control. By integrating CT systems with robotics and conveyors, parts can be loaded and scanned automatically for rapid detection of variations. This inspection data is fed back in real-time to optimize processes, enabling tightly controlled and continuously improved production quality. With robotic automation and real-time feedback, in-line CT solutions allow production to run lights-out with rapid adaptation for zero defects.

NIKON AUTOMATION OPC UA INTERFACE
Nikon CT systems now feature an industry-standard OPC UA interface, enabling easier integration with automation equipment than the previous proprietary IPC interface. With OPC UA, integrators can rapidly connect Nikon CT data to optimize production per the Quality 4.0 goal of zero defects via real-time process control. This simplifies installing Nikon systems in smart factories, saving time and costs. The open OPC UA protocol provides a common language for secure communication between machines, aligning with the Industry 4.0 trend of production networking for maximum efficiency, quality, and flexibility.

AUTOLOADER
With Nikon’s Autoloader, placing a rack containing a series of sample holders into the system is the only manual operation needed. Part loading and identification, program selection, data acquisition, analysis and reporting are entirely automated.
Quality 4.0 CT inspection drives zero-defect production in smart factories

The goal of Industry 4.0 is greater manufacturing competitiveness through lower costs, faster adaptation, and shortened time-to-market. This requires a shift in quality control from simply qualifying good or bad products to proactively controlling processes for zero defects via real-time data. Called Quality 4.0, this new paradigm demands frequent, detailed inspection as close to real-time as possible. With automated analysis of internal and external part features in a single fast process, computed tomography is ideally suited to provide the rapid feedback essential for Quality 4.0 and optimizing smart factory production.

100% PART INSPECTION

The in-line CT inspection system enables fully automated quality control for critical complex parts in Industry 4.0 production environments. Robots identify, load, and position parts for scanning according to database recipes, while conveyors transport them just in time.

Automated doors and acquisition eliminate user input, allowing complete CT analysis and sentencing in under a minute. Parallel scanning and analysis can further optimize the process for long Takt times. With tight integration to handle each step from loading to results, in-line CT provides the rapid feedback essential for zero-defect manufacturing of sophisticated components.

AUTOMATION BENEFITS

- Increase productivity
- Reduce costs
- Improve quality
- Closed-loop manufacturing
- Centralized data
- Deskill complex tasks
Nikon VOXLS 30 C 225

Largest 225 kV scan volume in its class

The VOXLS 30 C 225 is a feature-packed, premium X-ray CT system designed for small-to-medium-sized samples of low to medium-density materials.

The system suits demanding environments requiring high scan throughput, especially when configured with Nikon’s 225 kV Rotating Target 2.0 source.

Optional Auto.Filament Control can double the filament lifetime, decreasing system downtime for maintenance and increasing productivity.

Pair the system with one of Nikon’s Automation solutions, and you have an ultimate quality control tool for reliable inspection on the production floor.

**VOXLS 30 C 225 HIGHLIGHTS**

- Max Part Size: 1,000 mm (Ø) × 1,300 mm (H)
- Max Scan Volume: 620 mm (Ø) × 1,025 mm (H)
- Max Sample Mass: 50 kg central load
- Auto.Filament Control available

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**225 kV applications**

- **Aerospace**
  - Wax turbine blades

- **Electric Vehicles**
  - Lithium-ion battery pouch, cylindrical and prismatic cells

- **Additive Layer Manufacturing**
  - Small-to-medium plastic, low-density metal components

- **Small Castings**
  - Light metals (magnesium and aluminium)

- **Natural Sciences**
  - Biological tissues, bones, animals, plants and insects

- **Medical Devices and Pharmaceuticals**
  - Inhalers, injectors, tablets, powder sachets
Nikon VOXLS 30 C 320
One X-ray source, limitless applications

The VOXLS 30 C 320 is available with up to five target modules within a single source configuration for those demanding the most versatility possible in a single-tube X-ray system.

These empower researchers and engineers to advance their non-destructive testing capabilities and help make new discoveries, validate designs, and accelerate innovation.

AVAILABLE TARGET MODULES
- 180 kV Transmission: Ultra-high resolution with sub-micron feature recognition
- 225 kV Reflection: Outstanding imaging quality and resolution across a broad sample range
- 225 kV Rotating Target 2.0: 3x higher power density over the Reflection target for significantly faster scan times
- 320 kV Reflection: Increased power for dense samples at high resolution
- 225 kV Multi-Metal Reflection Target: Unrivaled flexibility for complex applications

VOXLS 30 C 320 HIGHLIGHTS
- Max Part Size: 1,000 mm (Ø) × 1,300 mm (H)
- Max Scan Volume: 610 mm (Ø) × 1,050 mm (H)
- Max Sample Mass: 100 kg central load
- Penta Source available

320 kV applications

Aerospace
Wax and titanium turbine blades

Electric Vehicles
Lithium-ion battery cells and modules

Automotive and Motorsports
Carbon fibre brake discs, bodywork, sub-assemblies

Small-to-Mid-Sized Castings
Magnesium, aluminium and titanium

Additive Layer Manufacturing
Medium-sized plastic or low-density metal components

Materials Research
Composites and midrange-density metals
Nikon VOXLS 30 C 450
Unmatched resolution on high-density samples

The VOXLS 30 C 450 is a uniquely positioned system, ideal for inspecting small-to-mid-sized, higher-density components in a space-efficient footprint. The single source, dual detector-capable system offers a full range of Nikon’s scan enhancement acquisition modes, traditionally only found on larger systems.

The VOXLS 30 C 450 can be teamed with Nikon’s in-house CLDA (Curved Linear Diode Array), a high-sensitivity linear detector specifically designed for Nikon’s 450 kV microfocus source that is perfect for 2D CT and scatter correction.

VOXLS 30 C 450 HIGHLIGHTS

- Max Part Size: 1,000 mm (Ø) x 1,300 mm (H)
- Max Scan Volume: 610 mm (Ø) x 1,050 mm (H)
- Max Sample Mass: 100 kg central load
- Dual Detector Flexibility available

450 kV applications

Aerospace
Turbine blades and nozzle guide vanes

Electric Vehicles
Lithium-ion battery cells, modules and packs

Medium-to-Large Castings
Light-to-heavy metals

Space and Defense
Rocket engine components, sub and full assemblies

Additive Layer Manufacturing
Plastic or metal complex components

Materials Research
Composites and light-to-heavy metals/alloys
Nikon’s Versatile Large-Volume X-ray CT System Option: VOXLS 40 Series

The new VOXLS 30 Series supplies a solution for those who need to inspect small-to-mid-sized samples of low-to-high density. But what about those companies and organizations searching for more?

Meet the VOXLS 40 Series, Nikon’s versatile, large-envelope X-ray and CT systems, which offer a multitude of configuration options to manage the most exacting inspection requirements.

Larger than the VOXLS 30 Series, the VOXLS 40 Series can perform virtually limitless tasks within industry, inspection bureaux and academia thanks to its ability to inspect larger, denser items, internally and externally.

The VOXLS 40 Series can inspect objects in phenomenal detail in an expansive scanning envelope able to accommodate samples up to 1,275 mm swept diameter and 1,800 mm tall.

And just like the VOXLS 30 Series, the VOXLS 40 Series can be combined with an integrated robotic loader and the Nikon Automation OPC UA Interface to make it automation-ready for closed-loop, high-speed inspection in a Quality 4.0 production line environment.

Discover more about the VOXLS 40 Series today and learn how it can help deliver industry-leading large-volume inspection for any enterprise environment.

Learn more about the VOXLS 40 C 450:
FLEXIBILITY AND FUNCTIONALITY

The VOXLS 40 C 450 comes equipped with two Nikon high-power, microfocus X-ray sources (225 kV and 450 kV), providing exceptional flexibility for scanning various component sizes and material densities.

Both sources are equipped with Nikon’s unique rotating target technology, providing ultra-high resolution at industry-leading power to enable even the most minor defects inside an object to be identified quickly and easily.

The system also possesses dual detector functionality, with a choice of industry-leading, flat panel detectors (FPD) providing ultra-clear images for 3D Computed Tomography (CT) or 2D digital radiography, as well as Nikon’s unique Curved Linear Diode Array (CLDA) for 2D CT and scatter correction of high-density materials.

LARGE SCANNING VOLUME

Thanks to the synchronous vertical travel of the sources and detectors, combined with three-position horizontal panel shift, the VOXLS 40 C 450 boasts the largest scanning envelope of any single-piece cabinet system on the market today.

Objects up to 800 mm in diameter, 1,415 mm in height and 275 kg in weight can be inspected in exceptional detail.
Specifications

Sources

<table>
<thead>
<tr>
<th>Nikon Microfocus X-ray Sources</th>
<th>Max. kV</th>
<th>Max. power</th>
<th>Focal spot size range</th>
<th>System</th>
</tr>
</thead>
<tbody>
<tr>
<td>180 kV Transmission Target</td>
<td>180 kV</td>
<td>20 W</td>
<td>1 µm up to 3 W</td>
<td>VOXLS 30 C 225 and VOXLS 30 C 320</td>
</tr>
<tr>
<td>225 kV Reflection Target</td>
<td>225 kV</td>
<td>225 W</td>
<td>3 µm up to 7 W</td>
<td>VOXLS 30 C 225 and VOXLS 30 C 320</td>
</tr>
<tr>
<td>225 kV Multi-Metal Target</td>
<td>225 kV</td>
<td>225 W</td>
<td>3 µm up to 7 W</td>
<td>VOXLS 30 C 225 and VOXLS 30 C 320</td>
</tr>
<tr>
<td>225 kV Rotating Target 2.0</td>
<td>225 kV</td>
<td>450 W</td>
<td>10 µm up to 30 W</td>
<td>VOXLS 30 C 225 and VOXLS 30 C 320</td>
</tr>
<tr>
<td>320 kV Reflection Target Module</td>
<td>320 kV</td>
<td>320 W</td>
<td>30 µm up to 30 W</td>
<td>VOXLS 30 C 320</td>
</tr>
<tr>
<td>450 kV Reflection Target</td>
<td>450 kV</td>
<td>450 W</td>
<td>80 µm up to 50 W</td>
<td>VOXLS 30 C 450</td>
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<tr>
<td>450 kV Rotating Reflection Target</td>
<td>450 kV</td>
<td>450 W</td>
<td>80 µm up to 100 W</td>
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Detectors

<table>
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<tr>
<th>16-bit Detectors</th>
<th>Field of View</th>
<th>Pixel Size</th>
<th>Max. frame rate</th>
<th>System</th>
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<tbody>
<tr>
<td>Varex XRD 1611</td>
<td>400 × 400 mm</td>
<td>100 µm</td>
<td>3.75 fps</td>
<td>VOXLS 30 C 225, VOXLS 30 C 320 and VOXLS 30 C 450</td>
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<tr>
<td>Varex XRD 1620</td>
<td>400 × 400 mm</td>
<td>200 µm</td>
<td>3.75 fps</td>
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<tr>
<td>Varex XRD 1621 EHS</td>
<td>400 × 400 mm</td>
<td>200 µm</td>
<td>15 fps</td>
<td>VOXLS 30 C 225, VOXLS 30 C 320 and VOXLS 30 C 450</td>
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<tr>
<td>Varex XRD 4343CT</td>
<td>430 × 430 mm</td>
<td>150 µm</td>
<td>15 fps</td>
<td>VOXLS 30 C 320 and VOXLS 30 C 450</td>
</tr>
<tr>
<td>Varex XRD 4343N</td>
<td>430 × 430 mm</td>
<td>150 µm</td>
<td>15 fps</td>
<td>VOXLS 30 C 320 and VOXLS 30 C 450</td>
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<tr>
<td>Nikon Metrology CLDA</td>
<td>0.4 × 850 mm</td>
<td>415 µm</td>
<td>50 fps</td>
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Manipulator

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<th>VOXLS 30 C 320</th>
<th>VOXLS 30 C 450</th>
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<tbody>
<tr>
<td># Axes</td>
<td>7</td>
<td>7</td>
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<tr>
<td>Max. Sample Envelope</td>
<td>620 (Ø) × 1,025 (H) mm</td>
<td>610 (Ø) × 1,050 (H) mm</td>
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<tr>
<td>Max. FID (nominal)</td>
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<td>1,261 mm</td>
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<td>FID Type</td>
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<td>Max. Sample Mass</td>
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<td>100 kg</td>
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Cabinet

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<th>VOXLS 30 C 320</th>
<th>VOXLS 30 C 450</th>
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<tr>
<td>Length</td>
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<td>3,217 mm</td>
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<tr>
<td>Width</td>
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<tr>
<td>Height</td>
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</tr>
<tr>
<td>Max. Mass</td>
<td>6,950 kg</td>
<td>10,350 kg</td>
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</table>

Note: All figures are intended for summary purposes and may vary based on exact system configuration. Contact your Nikon representative for detailed specifications of each configuration.