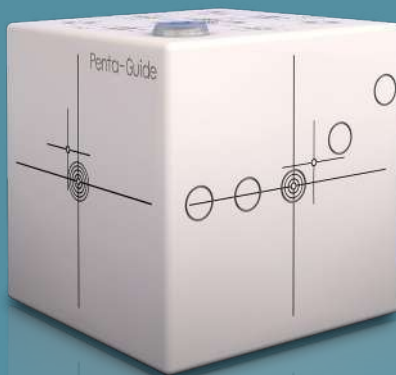
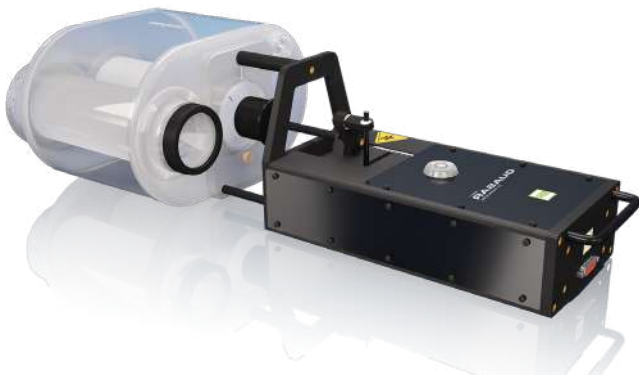


MODUS QA

PRODUCT CATALOG 2020

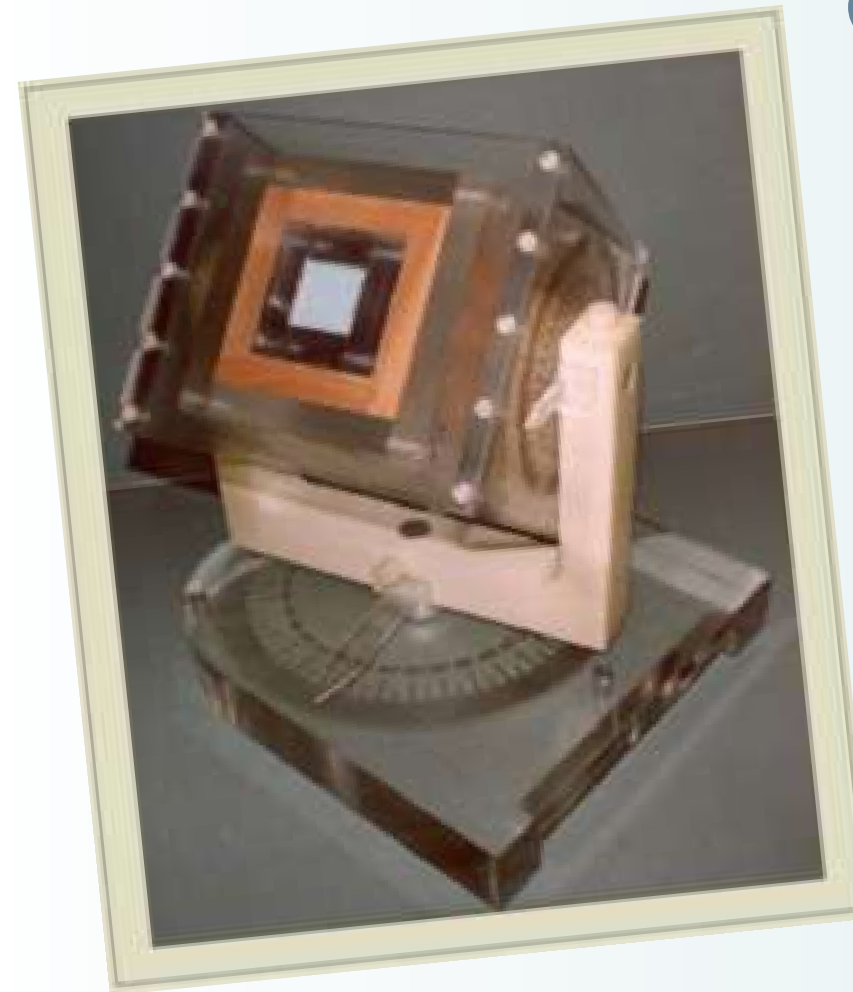




Our Story

A TEAM YOU CAN COUNT ON

For 20 years, Modus QA has been at the forefront of quality assurance in the field of advanced radiotherapy and medical imaging. We have earned the trust of the world's leading medical physicists by creating phantoms and software that help fulfill their responsibilities with the utmost confidence. As treatment and imaging options evolve, we continue to innovate – enabling accuracy when it matters most. Our team's combined knowledge and passion delivers critical QA tools and software needed to ensure the best care and the best outcomes.



GREATER ACCURACY, GREATER CONFIDENCE

Our quality assurance tools are built to the highest standards to achieve greatest accuracy. Trusted by medical physicists since 2000 and with more than 5,000 QUASAR™ phantoms used in leading treatment centers across the world, we help medical physicists and our partners fulfill their responsibilities with the utmost confidence.

Pictured: First QUASAR™ Phantom

Why Modus

FOR MEDICAL PHYSICISTS

Designed by Medical Physicists, our products are built with a deep understanding of your clinical needs. This results in QA equipment that is built to improve workflow every time.

FOR OEMS

Collaborative development approach with physicists and OEM partners results in products created and manufactured to the highest standards for QA solutions. Our focus on comprehensive after-sale service and support also means we're delivering confidence to you and your customers, every step of the way.

Modus QA celebrates our 20th year in 2020. Our numbers and influence in the field of advanced radiotherapy and medical imaging reflect 2 decades of growth:

20
YEARS OF QA
EXPERIENCE

5K
QUASAR™
PHANTOMS
IN USE

3K+
TREATMENT CENTERS
USING QUASAR™
PHANTOMS

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MR Guided Radiation Therapy and Geometric Distortion

Collaborating with the world's leaders in MR technology, Modus QA is well-positioned to provide you with the best MR solutions available today.

Pictured: QUASAR™ MRID^{3D} used with Elekta Unity

GRID^{3D}

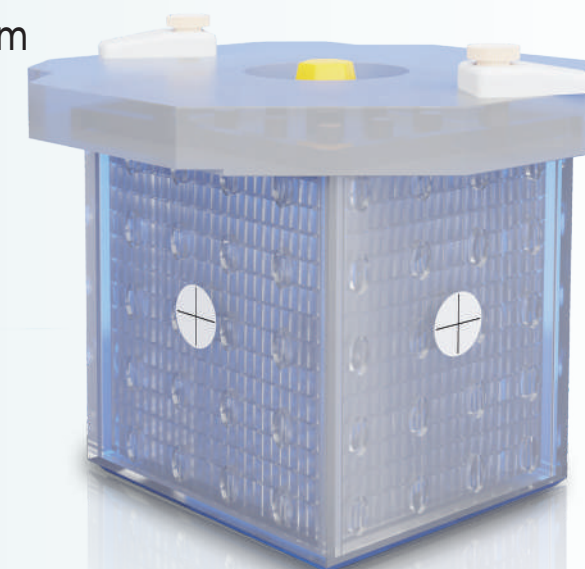
QUASAR™ GRID^{3D} Image Distortion Analysis System
100-1017



The QUASAR™ GRID^{3D} Image Distortion Analysis System is designed to evaluate MR and CT imaging data on Leksell Gamma Knife® platforms, including PERFEXION™ and ICON™

COMPATIBLE MACHINE(S): SRS Systems, MR-LINAC, MR-SIM

APPLICATION(S): MR Guided Radiation Therapy, Geometric Distortion



Phantom Highlights

- ▶ Dense 1 cm³ grid, manufactured to 0.1mm tolerance, analyzes 2002 signal-producing control points.
- ▶ Designed for simple insertion and positioning within the Leksell G-Frame®.
- ▶ Automated image analysis with an advanced user interface provides efficient image distortion analysis.

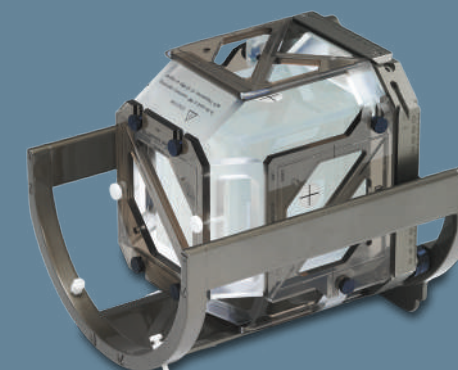
Software Highlights

- ▶ Advanced, automated control point detection algorithm.
- ▶ Evaluate distortion values and detection uncertainty for each control point.
- ▶ Evaluate results directly within the GammaPlan™ reference space for increased confidence.
- ▶ Increased support for frameless distortion analysis.

Simplified Workflow

"What I like about the QUASAR™ GRID^{3D} system is the simplicity of its design and operation. In a matter of minutes I can obtain a full 3D distribution of geometric distortion. Fine-tuning an MR sequence is now an efficient undertaking, as opposed to a nearly endless chore of phantom preparation and image analysis."

– Ian Paddick, Consultant Physicist, Medical Physics Limited



MRID^{3D}

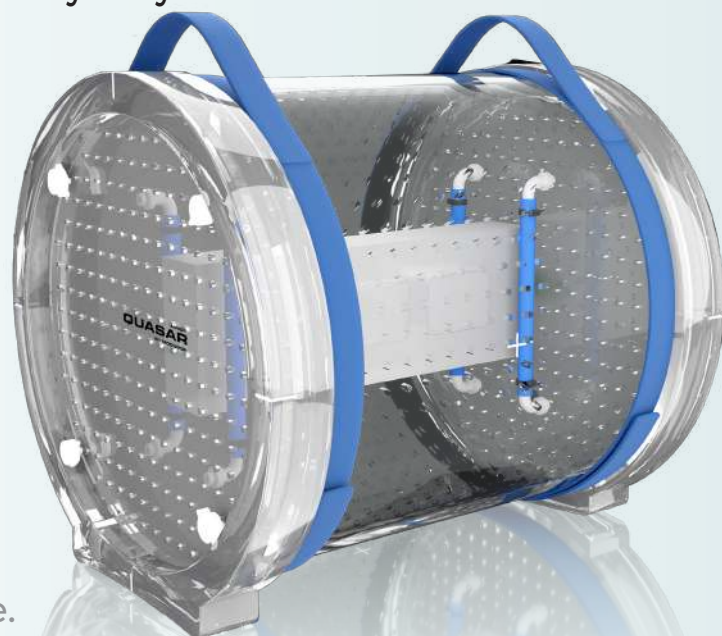
QUASAR™ MRID^{3D} Geometric Distortion Analysis System
100-1018



QUASAR™ MRID^{3D} is a lighter, larger and more efficient way to quantify MRI geometric distortion in 3D. This industry-leading distortion analysis system provides sub-millimeter accuracy and is trusted globally by medical physicists for third party MR-SIM and MR-LINAC commissioning and quality assurance.

COMPATIBLE MACHINE(S): SRS Systems, MR-LINAC, MR-SIM
APPLICATION(S): MR Guided Radiation Therapy, Geomateric Distortion

US Pat. 9,857,443
10,082,550

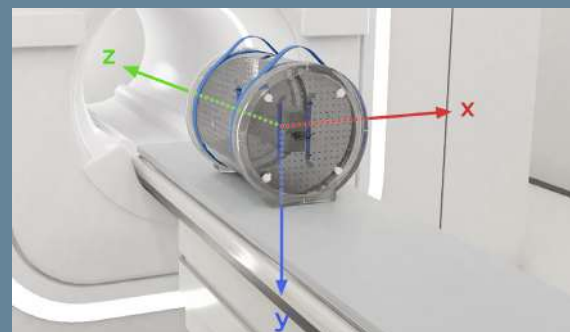


Phantom Highlights

- **Workflow Efficiency:** Quick setup, scanning and analysis of geometric distortion measurements. Auto-detection and auto-registration features support quick and accurate data analysis.
- **Geometric Accuracy/Stability:** NEMA/ITA MS-12 and IEC 62464-1 standard- setting design ensures geometric integrity over the lifetime of the phantom creating a superior geometric distortion solution.
- **Spherical Harmonic Analysis Detection Method:** Quantifies MR Geometric Distortion by adaptation of algorithms used in B0 shimming and gradient coil design. Allows for a highly accurate, precise and significantly lighter geometric distortion phantom.
- **Automatic Phantom Registration:** Accuracy is further improved by the automatic detection of alignment features: correct laser alignment or positioning error.
- **Large FOV Without the Weight:** At 21 kg, the pre-filled 37cm x 32cm imaging FOV contains 1496 5mm fiducials designed to evaluate 11,253 data points.

Accuracy and Precision

The standard-setting MRID^{3D} phantom provides superior geometric distortion analysis in an easy-to-use and efficient package. From the precision CNC machined fiducials, superior contrast media and the temperature/pressure compensation system, the MRID^{3D} phantom is designed to achieve true sub-millimeter accuracy for years to come.



The Best Way to QUANTIFY MRI GEOMETRIC DISTORTION IN 3D

The world's experts in MRgRT are also our partners. MR OEMS rely on the MRID^{3D} for the commissioning and continuous QA of MRgRT systems. Evaluate distortion on all systems ranging from 0.35T – 3T.

pictured: QUASAR™ MRID^{3D} used with Elekta Unity

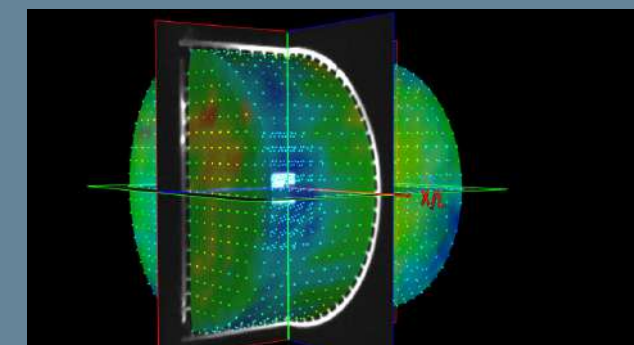
Software Highlights

- **Efficient and Secure:** Fast data transfer using a built in DICOM receiver on a locally stored software platform.
- **Unlimited Scan License:** Test freely without concerns of a time-limited license or depleting a quota of eligible scans. MRID^{3D} is provided with an unlimited scan license on 1 system with no expiry. Additional system licenses available.
- **Real-time Visualization Tools:** Interactive 3D DVF Viewer with ROI selector enables users to update displayed data in real-time.
- **Trending Analysis:** Monitor your MR hardware using periodic scans to evaluate DVF changes over time.
- **B0 and GL Differentiation:** Evaluate system distortion with the ability to automatically separate B0 and GNL distortions. Valuable for a deeper understanding of your system distortion as well as advanced imaging techniques such as DWI.

Speed and Automation

T1W analysis is completed in under 10 minutes, including setup, scan and data transfer. A full 3D DVF is obtained using 1 single acquisition, saving physicists valuable scan time.

Through intensive design and engineering, the MRID^{3D} phantom provides quick and accurate analysis of 11,253 data points over a large 37cm x 32cm F.O.V.



MRI^{4D}

QUASAR™ MRI^{4D} Motion Phantom 100-1022



Quasar™ MRI^{4D} is the world's first MR-safe programmable motion phantom. The MRI^{4D} enables you to develop, test and validate advanced 4D treatment delivery protocols on MR-sim and MR-Linacs.

US Pat. 10,090,781

COMPATIBLE MACHINE(S): LINAC, Ring-Gantry System, SRS Systems, MR-LINAC, MR-SIM, SGRT

APPLICATION(S): Motion Management, MR Guided Radiation Therapy, Machine Targeting

Phantom Highlights

- ▶ **System Compatibility:** Utility within MR, CT and PET-based systems. MRI^{4D} can perform motion QA across all platforms, providing a comprehensive end-to-end validation of treatment protocols.
- ▶ **Workflow Efficiency:** Integrated phantom design and easy-to-use motion software saves time and increases operational efficiency by reducing or eliminating the need for complex assembly before operation.
- ▶ **Testing Versatility:** Fillable components allow customization of contrast media, enabling improved visualization of desired structures.
- ▶ **Latency Tools:** Provides analog input and output connectivity for real-time latency statistics without an external oscilloscope. Users can select beam on/off triggering points within the software to quantify the treatment system's total latency values.
- ▶ **Ultra-Low Latency Motion:** Features an ultra-low latency controller (500µs), which does not contribute significant phantom latency to the motion management system analysis.
- ▶ **Complex Motion:** Programmable 3D target motion provides in-depth QA of MRgRT gating and tracking systems. Users have the choice to set the complexity of motion with our intuitive Software.

The World's Experts in MRgRT are also our partners

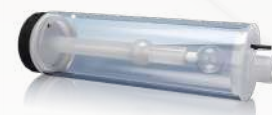
We are proud to be part of the ViewRay partner program and the STARLIT Elekta / Philips consortium (System Technologies for Adaptive Real-time MR image-guided therapies) to provide necessary capabilities related to 4D MRgRT quality assurance and dosimetry.



MR SAFE 4D Motion QA for Adaptive MRgRT

The programmable QUASAR™ MRI^{4D} Motion Phantom is designed to move liquid or gel filled cylindrical inserts within a contrast media filled body shaped oval at varying speeds and amplitudes. **Optional ion chamber holders, film cassettes and interchangeable targets provide end-to-end testing flexibility.**

pictured: QUASAR™ MRI^{4D} used with Elekta Unity



Center ICH
Center Ion Chamber Holder
installed in Hollow Insert



Offset ICH
Offset Ion Chamber Holder
installed in Hollow Insert



Film Cassette Insert
Insert accommodates
one layer of EBT3 film



Spherical Targets
Additional Spherical Targets

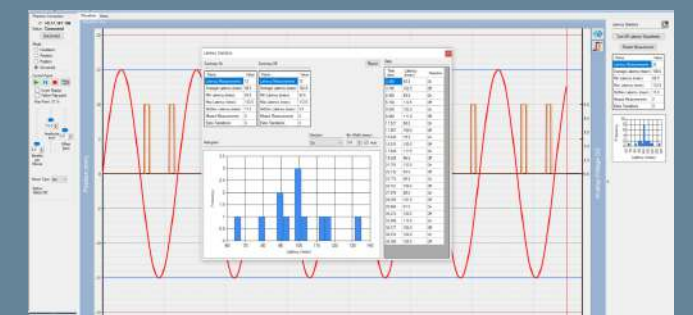
Software Highlights

- ▶ **Complex Motion Control Options:** Our Respiratory Motion QA Software offers multiple operation modes to increase utility. From adjustable sinusoidal motion and simple test patterns to accurate playback of complex 3D waveforms.
- ▶ **Customizable Waveforms:** Enables import of acquired waveforms from a number of respiratory gating and motion tracking systems. Waveforms are customizable, improving the user experience when modifying waveform patterns to achieve the desired testing protocol.
- ▶ **Latency Data Reporting:** Using the detailed latency reporting capabilities, physicists can improve the accuracy and confidence of their MRgRT delivery.

This product manufactured under license from CIRS, Inc., Norfolk, Virginia, USA, Pat. 7,151,253.

Ready for the Future

The MRI^{4D} includes advanced latency measurement capabilities without need of an external oscilloscope. A new generation of MR-guided radiotherapy systems requires detailed reporting of their system latency. The MRI^{4D} is equipped for current and future testing capabilities needed for gating and tracking techniques.



Motion QA

Modus QA specializes in motion quality assurance devices that enhance the management of patient and tumor motion in clinical practice. These systems allow you to verify treatment planning procedures and provide the best care for your patients.

Pictured: Modus QUASAR™ Respiratory Motion Phantom (pRESP) used with Elekta Versa HD

Platform

QUASAR™ Respiratory Motion Platform
100-1010



The QUASAR™ Respiratory Motion Platform is designed to move your existing phantoms with programmable respiratory and sinusoidal motion profiles for patient-specific QA.

COMPATIBLE MACHINE(S): LINAC, Ring-Gantry System, SGRT

APPLICATION(S): Motion Management, Machine Targeting



Motion QA

Phantom Highlights

- ▶ **Versatility:** Accommodates any phantoms weighing up to 20 kg on a 35 x 35 cm platform.
- ▶ **Motion Control Options:** Easy operation with local, manual control at the motor, or advanced, software-programmable control. Apply lateral hysteresis for phase separation to existing phantoms for various testing abilities.
- ▶ **Motion Precision:** Highly responsive motor repositions translation stage every 10 ms providing real breathing replication. Waveforms from 0-60 BPM are replicated, testing a large range of clinical protocols.

Software Highlights

- ▶ **Complex Motion Control:** Playback captured or created waveforms to increase motion complexity. Software predicts the capability of playback based on the weight load and range of motion chosen.
- ▶ **Customizable Waveforms:** Easily edit and save provided or captured waveforms to achieve the desired motion pattern.
- ▶ **DIBH Mode:** Initiate a Deep Inspiration Breath Hold on demand for increased efficiency during testing.

Integrate Motion QA with Leaders in SGRT

Vertical chest-wall platform is compatible with SGRT systems: Vision RT, C-RAD, Brainlab, and Varian Identify. Import patient-specific waveforms from various motion capture sources. Compatible with: .VXP, .CSV, .TXT, .DCM, .LOG, .DAF, .IMA file formats.



pRESP

QUASAR™ Respiratory Motion Phantom (pRESP)
100-1011



The QUASAR™ Respiratory Motion Phantom (pRESP) is a programmable breathing and tumor motion simulator for end-to-end quality assurance on motion-guided radiation therapy systems including CT, LINAC, and PET.



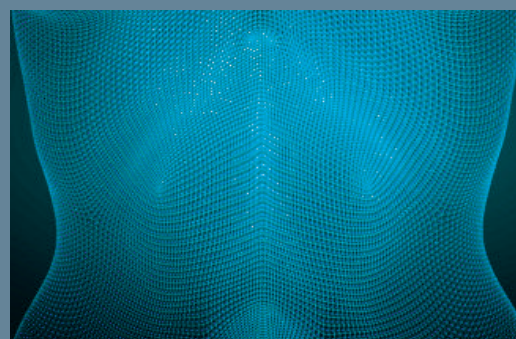
COMPATIBLE MACHINE(S): LINAC, Ring-Gantry System, SGRT
APPLICATION(S): Motion Management, Machine Targeting

Phantom Highlights

- **Simplicity:** Easy to operate motion phantom with advanced tools for intuitive motion management QA.
- **Versatility:** Comprehensive collection of interchangeable inserts provides end-to-end testing on multiple treatment and imaging platforms. Additional functionality for SGRT systems – capture motion waveforms and confirm the chest wall and tumor motion effects on treatment delivery.
- **Motion Control Options:** Local, manual control at the motor or advanced, programmable control with included software. Add increased 3D motion capabilities with the optional 3D Rotation stage (500-3330).
- **Motion Precision:** A highly responsive motor repositions the translation stage every 10 ms (100x per second) providing real-life breathing replication. Waveforms from 0-60 BPM are replicated with ease, testing a large range of clinical protocols.

Integrate Your Motion QA with Leaders in SGRT

Features a vertical chest-wall platform that is compatible with SGRT systems, such as: Vision RT, C-RAD, Brainlab, and Varian Identify. Import patient-specific waveforms from various motion capture sources. Compatible with: .VXP, .CSV, .TXT, .DCM, .LOG, .DAF, .IMA file formats.



Phantom Inserts



Cedar Lung Tumor Inserts
2D Dose Distribution in and around a Tumour within Lung Density Material (for Gafchromic film)



Cedar Solid Tumour Inserts
Imaging and Chamber Dosimetry with or without a Tumour within Lung Density Material



Acrylic Insert
Ion Chamber Measurements in Neutral Density Material



Hollow Insert with Screw Cap
Fill with liquid or gel for user-specific tasks



PET CT Imaging Insert
Acquisition, Reconstruction, Display and Registration 30 mm Sphere



4D CT Imaging Insert
Verify the geometry and density in each phase of a 4D CT image

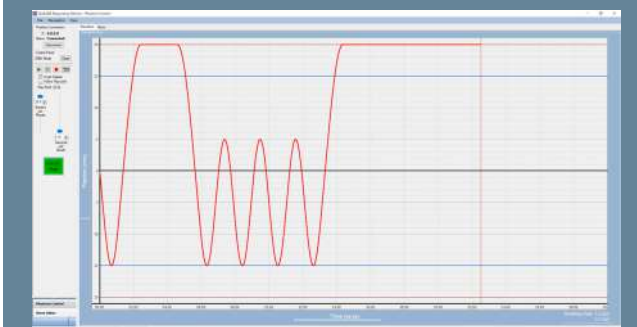
Software Highlights

- **Complex Motion Control:** Playback captured or created waveforms to increase motion complexity. Software predicts the capability of playback based on the weight load and range of motion chosen.
- **Customizable Waveforms:** Easily edit and save provided or imported waveforms to achieve the desired motion pattern using a wide range of functions:
 - Adjust the amplitude and frequency
 - Stretch or compress the timeline
 - Filter out high frequency noise, low frequency drift and cardiac signals
- **Utility:** Software license allows for unlimited usage and installation on unlimited computers. Software architecture enables remote access over a network or direct connection to a PC.

This product manufactured under license from CIRS, Inc., Norfolk, Virginia, USA, Pat. 7151253.

Deep Inspiration Breath Hold Mode

pRESP software incorporates a **Deep Inspiration Breath Hold Function** that automatically initiates a simulated breath hold of the phantom. This feature promotes workload efficiency by initiating a breath hold on demand and testing your system's treatment delivery accuracy.



Machine Targeting

Our collection of beam geometry phantoms is used globally to validate the accuracy of countless treatment targeting systems. Modus QA devices support accurate therapy delivery systems, strengthening the foundation for improved outcomes in today's radiation therapy clinics

QUASAR™ PentaGuide used with Elekta Versa HD

MP Body

QUASAR™ Multi-Purpose Body Phantom
100-1004



The QUASAR™ Multi-Purpose Body Phantom is a flexible tool, designed to perform both dosimetric and non-dosimetric tests on radiotherapy systems. It incorporates a wide variety of test objects in a solid acrylic housing.

COMPATIBLE MACHINE(S): LINAC, Ring-Gantry System

APPLICATION(S): Motion Management, Machine Targeting



Phantom Highlights

- **Comprehensive Testing:** Designed to fulfill treatment planning and delivery testing requirements as prescribed by the following guidelines: AAPM TG 53/66, IAEA TRS-430, TECDOC-1540/1583/1588, IEC 62083.
- **Flexibility:** Designed for simple interchangeability of inserts which enables measurements in various locations of the phantom. Validate a broad range of applications including TPS accuracy and end-to-end testing of SBRT delivery.
- **Compatibility:** Perform cross-system verification on all x-ray-based systems designed to deliver IMRT, IGRT, VMAT, SRS and Tomotherapy.



Ready for Motion

Easily converts to an IGRT motion phantom with the addition of the Quasar™ Respiratory Motion Assembly. Add motion capabilities with the addition of a QUASAR™ Respiratory Motion Platform (see page 13 for Motion Platform details).



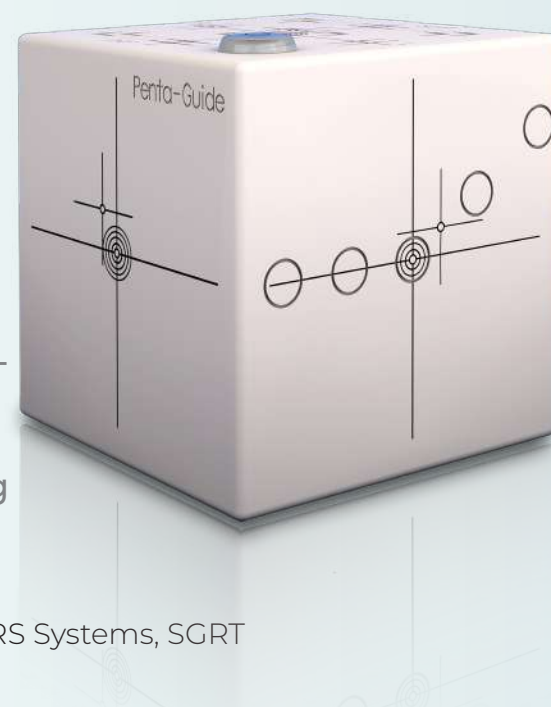
Penta-Guide

QUASAR™ Penta-Guide Phantom
100-1009



The QUASAR™ Penta-Guide Phantom is recognized globally as the preferred tool for commissioning and daily testing of Image-Guided Radiotherapy (IGRT) systems. This daily phantom ensures the accuracy of LINAC OBI guidance systems, including KV, MV, and X-ray Volumetric Imaging (XVI) using Cone Beam CT (CBCT).

COMPATIBLE MACHINE(S): LINAC, Ring-Gantry System, SRS Systems, SGRT
APPLICATION(S): Machine Targeting



Phantom Highlights

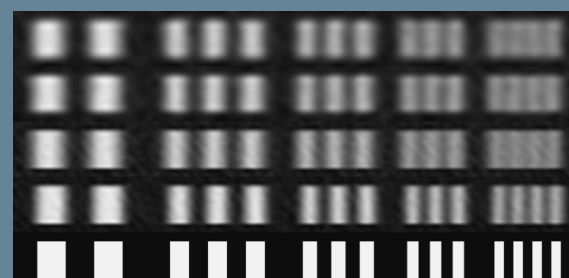
- ▶ **Intuitive Design:** Unique system of 5 low-density rings and hollow spheres enables intuitive quality assurance while eliminating high-density imaging artifacts.
- ▶ **Workflow Efficiency:** Use in routine QA/geometric accuracy tests. Confirm room laser and IGRT targeting alignment while capturing valuable CBCT image quality data.
- ▶ **Precision:** 0.25 mm accuracy. Perform multiple alignment tests with repeatability and confidence. Visual tolerance features provide intuitive pass/fail criteria.

Software Highlights

- ▶ **Alignment Consistency:** Use trending tools for early detection of alignment problems.
- ▶ **Daily QA Checklist:** Store and track daily QA procedures with sign-off authorization.
- ▶ **Reporting Feature:** Custom reports of daily QA procedures for improved communication within the physics group.
- ▶ **Visualization Tools:** 3D viewer for enhanced analysis of imported data.

CBCT Image Quality Trending

Use Penta-Guide's automated analysis software to evaluate image quality (IQ) metrics and monitor the performance of your LINAC OBI systems. Stats including spatial resolution (MTF), Hounsfield unit constancy and noise/contrast ratio reduce the need for additional IQ phantom scanning, saving valuable time.



Tilt Plate

QUASAR™ Penta-Guide Tilt Plate
500-3503



The QUASAR™ Penta-Guide Tilt Plate is an accessory to the QUASAR™ Penta-Guide Phantom to facilitate daily QA of linear accelerators equipped with 6 degree of freedom couches.

COMPATIBLE MACHINE(S): LINAC, Ring-Gantry System, SGRT
APPLICATION(S): Machine Targeting

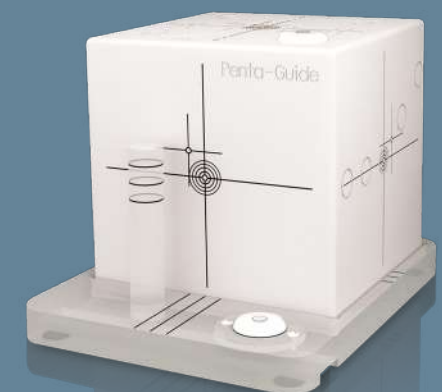


Phantom Highlights

- ▶ Tests rotation corrections, combined translation and rotation corrections on a 6DoF couch.
- ▶ Use the Tilt Plate and Penta-Guide as part of the daily QA of your SGRT system's alignment correction and isocenter correlation.
- ▶ Tilt angles are: 0.75°, 1.25°, and 1.0°.
- ▶ Turning the tilt plate in 90° increments varies the direction of the rotation corrections.
- ▶ Compatible with new and existing QUASAR™ Penta-Guide Phantoms.
- ▶ Features a precision cut out to accommodate most localization bars.

DAILY 6DoF

The Tilt Plate positions the Penta-Guide Phantom at known rotation angles and displacements relative to the isocenter. Users can **test rotation corrections and translations on a 6DoF couch**. Setup lines are provided at strategic locations to test the ability to correct alignment in different directions.



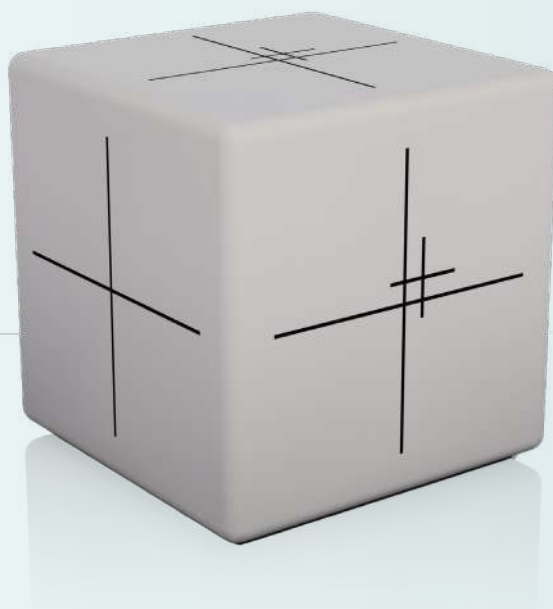
IsoCenter Cube

QUASAR™ IsoCenter Cube Phantom
100-1016



The QUASAR™ IsoCenter Cube is designed to implement a modified Winston-Lutz test for IGRT accuracy required for optimal treatment delivery. This system is also used for TG-142 quality assurance compliance for isocenter and laser alignment tests.

COMPATIBLE MACHINE(S): LINAC, Ring-Gantry System
APPLICATION(S): Machine Targeting

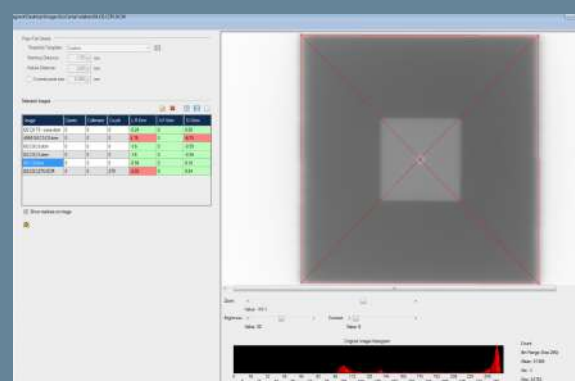


Phantom Highlights

- ▶ **Workflow Efficiency:** Quick, simple Winston Lutz test and isocenter alignment tests for IGRT systems.
- ▶ **Simple Design:** Seamless 5cm³ acrylic enclosure housing a 6mm radio-opaque tungsten sphere at the isocenter.
- ▶ **Image Match Verification:** Offset alignment marks enable quick couch adjustment QA.
- ▶ **TG142 Compliance:** Perform required IGRT isocenter QA with 0.1mm precision.

Accurate IGRT Setup in < 5 Minutes

Test end-to-end IGRT accuracy with **0.1 mm precision in less than 5 minutes**. Align the phantom at the offset position with room lasers and capture kV/MV exposures with EPID. Use the radio-opaque sphere at isocenter to apply couch translations and verify the alignment. Results used to determine targeting accuracy for SRS, SBRT, and IGRT treatments.



Software Highlights

- ▶ **Intuitive Analysis:** Import images for an automated report of directional errors vs selectable pass/fail criteria.
- ▶ **Exposure Evaluation:** Analyze EPID exposures with automated software including the verification of various beam shaping devices.

Winston-Lutz Wand

QUASAR™ Winston-Lutz Wand Phantom
500-5005



The QUASAR™ Winston-Lutz Wand Phantom Identifies the LINAC's true Isocenter. Precisely adjust all three axes using the XYZ micrometer assembly. Used in conjunction with the MV/KV Beam and portal imager, the QUASAR Winston-Lutz Wand is used to identify the true radiation isocenter of the linear accelerator with submillimeter accuracy.

COMPATIBLE MACHINE(S): LINAC, Ring-Gantry System, SRS Systems
APPLICATION(S): Machine Targeting



Phantom Highlights

- ▶ **Accuracy and Precision:** 7/16" (11.1125 mm) Steel BB embedded in acrylic wand with XYZ micrometer adjustment.
- ▶ **Alignment Confidence:** Achieve submilli meter agreement of radiological isocenter and room lasers.
- ▶ **Compatible Design:** Intuitive design enables MV and kV alignment for LINACs from all vendors.
- ▶ **Value:** Economical alternative to purchasing an additional SRS alignment package.

"The QUASAR™ Winston-Lutz Wand is the ideal tool to confirm a linear accelerator's true isocenter. It is quick and easy to set-up, and has micrometer adjustment for all three axes (x, y, and z planes). This facilitates the Alignment with the true isocenter and the sharp laser marks on the wand are clear and definitive."

- Peter A. Goyer, MS, DABR
Lewistown Hospital

XYZ Micrometer Assembly

All 3 axes of the QUASAR™ Winston-Lutz Wand **can be micro adjusted using built-in micrometers**. This allows placing the wand precisely at the radiological isocenter. From this position, users simply bring the lasers into alignment with the marks on the wand, thus tuning the lasers to the true radiation isocenter.





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