Always One Step Ahead

OCTAVIUS®

Turnkey Solutions for
2D Patient Plan Verification
As new complex treatment and delivery techniques evolve, which tend to increase potential error sources, the need to verify dose delivery quickly during the entire treatment period becomes crucial. Continuing where other QA devices leave off, OCTAVIUS® solutions perfectly answer these needs. With their modular design and trendsetting technologies, OCTAVIUS® systems cover the complete patient QA chain from patient plan verification to in vivo verification, providing you with the optimal solution for each treatment technique. Just as you expect from PTW.

Modular 2D QA Solutions

OCTAVIUS® I

Pre-Treatment Verification
Field-by-Field, Gantry 0°

OCTAVIUS® Phantom with Detector 1500, 1000 SRS or 729 and VeriSoft® Software

OCTAVIUS® II

Pre-Treatment Verification
Composite Plan, Rotating Gantry

OCTAVIUS® Phantom with Detector 1500 or 729, VeriSoft® Software

OCTAVIUS® III

Pre-Treatment Verification ...

OCTAVIUS® Phantom with Detector 1500 or 729, DAVID® Detector and VeriSoft® Software

... and In Vivo Verification

DAVID® Detector for in vivo IMRT dosimetry

Always One Step Ahead

OCTAVIUS® 2D Systems
Quick Overview
- Very quick set up – ready for measurement within a few minutes
- Outstanding flexibility – three detectors to choose from
- High detector density, best available field coverage – better error detection
- Optional 4D dosimetry and machine QA with FFF analysis
- Reliable Gold Standard ionization chambers as detectors
- Modular – upgradeable to any OCTAVIUS® system

OCTAVIUS® 729
Highlights
- Large field coverage – cubic detector design, uniform detector spacing (5 mm edge-to-edge)
- 729 vented ionization chambers (size 5 x 5 x 5 mm³) on 27 cm x 27 cm
- Full field coverage, increased sensitivity with four measurements using VeriSoft® Merge
- Gold Standard ionization chambers as detectors – no ageing, no degradation
- Extended dose rate range for FFF beams (up to 48 GY/min)

OCTAVIUS® Detectors: Largest field coverage – better detection of hot spots
With their high detector density and unique detector layout, OCTAVIUS® detectors offer the best field coverage of commercially available arrays, increasing the chance of detecting a hot spot or measuring dose at steep gradients.

OCTAVIUS® 1500
NEW
Highlights
- Highest detector density and largest field coverage of available arrays
- Resolution nearly doubled – 1405 vented ionization chambers (size 4.4 x 4.4 x 3 mm³) on 27 cm x 27 cm
- Unique checkerboard detector layout – no leaf undetected
- 100% field coverage with two measurements via simple couch shift
- Gold Standard ionization chambers as detectors – no ageing, no degradation
- Extended dose rate range for FFF beams (up to 48 GY/min)

OCTAVIUS® 1000 SRS
Highlights
- Smallest detector size (2.3 x 2.3 x 0.5 mm³) with highest spatial resolution (2.5 mm) – ideal for SRS/SBRT QA
- 977 liquid-filled ionization chambers on 10 cm x 10 cm
- Full field coverage on 5 cm x 5 cm
- Excellent sensitivity – measures single MUs
- 2.5 mm detector spacing in center area – suitable for high-definition MLC QA
- Optional accessory package for CyberKnife® patient QA
- Extended dose rate range for FFF beams (up to 36 GY/min)

OCTAVIUS® Detectors – which one is best for you?

Select the detector that is best for your application or budget, and get started.

Patient Plan Verification Software

VeriSoft® Dose comparison made simple.
Measure the dose with PTW OCTAVIUS® systems and verify it against the treatment planning system (TPS) quickly and efficiently using VeriSoft® patient plan verification software.

Standard and advanced tools for dose comparison and evaluation:
- Profile and dose distribution overlays
- Dose-difference distributions
- Results summary with “traffic light” indicator
- Gamma histograms

Feature-rich and easy-to-use, VeriSoft® provides you with a wide range of dose evaluation tools - from basic visual comparison to detailed quantitative evaluation.

Standard and advanced tools for dose comparison and evaluation:
- 2D/3D Gamma Index analysis
- Failed-point analysis
- Patient CT overlay
- Pre-defined reports for documentation

Dose comparison made simple.

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Dose comparison made simple.
OCTAVIUS® II

Pre-Treatment Plan Verification

Rotational dosimetry made simple

Including the complete functionality of the OCTAVIUS® I, OCTAVIUS® II adds a specially designed phantom along with a wide range of dedicated measurement tools to enable fast and precise verification of composite IMRT plans performed with a rotating gantry.

RapidArc®, VMAT, TomoTherapy®, IMRT, FFF

Quick overview

- Quick, easy set up within a few minutes
- Ready for measurement – no commissioning required
- Unique phantom geometry, perfectly adapted to rotational QA
- Suitable for all IMRT and IMAT treatment techniques
- Flexible – two detectors to choose from
- Versatile – multiple options for advanced QA measurements
- Modular – enhance or upgrade as and when needed

Which turnkey solution is best for you?

OCTAVIUS® II 1500 or 729

OCTAVIUS® II is available in two ready-to-use solutions which include everything you need for patient plan QA. Select the package with the detector that is best for your application or budget, and get started. Enhance or upgrade your OCTAVIUS® system as and when needed. With modular OCTAVIUS®, you stay flexible – now and in the future.

The OCTAVIUS® Phantom

Perfectly adapted to rotational dosimetry

- Superior directional response
- Measurements inside the clinically relevant volume

True 3D Gamma Index Analysis

- Fewer false-positive errors, better protection of OAR

Does it agree or not?

Quick and easy dose comparison and evaluation with powerful VeriSoft®

Highlights

- Quick setup on patient couch, ready for measurement within a few minutes
- Plan verification truly independent of LINAC or treatment planning system (TPS)
- Flexible phantom positioning for measurements in the clinically most relevant directions
- Superior directional detector response compared to cubic phantoms due to built-in semicircular air cavity and unique detector design
- Outstanding detector technology with best field coverage of available arrays – better error detection
- Measurements of isocenter dose (CAX) without additional measurement tools
- Wide range of optional tools for advanced QA measurements, including inserts for inhomogeneities, film and single ionization chambers or machine QA with FFF analysis
- A 3D Gamma Index analysis may reduce the number of failed points in regions of high dose gradient perpendicular to the measurement plane (Fig. 3 and 4) as it uses all three spatial dimensions for data comparison.

If this method is used in combination with the local dose chosen as reference value, the 3D Gamma Index analysis method will increase the chance of detecting relevant overdosage in organs at risk (OAR).
OCTAVIUS® III

Pre-Treatment Plan Verification ...

By integrating DAVID®, OCTAVIUS® III gives you a powerful, yet highly practical QA solution at hand to verify whether the planned dose is actually being delivered over the entire treatment period.

Highlights
- Clinically established QA solution for patient plan verification and in vivo verification of dose delivery and MLC accuracy during each patient treatment
- Pre-treatment QA based on independent measurements with OCTAVIUS® I, II or optional DIAMOND® secondary check software
- Immediate detection of errors or malfunctions (e.g. lost MLC positions) during each session
- Truly independent measurements, acquired and transmitted in real time
- Entirely wireless operation and data transfer during treatment verification
- Quickly installed, ready for operation in a few minutes (no cables, no detector placement on patient)
- Available for all standard MLCs

Why In Vivo IMRT Dosimetry?
- More potential for treatment-related incidents due to increased complexity of planning and new technologies
- Certain types of tumors require accuracy better (up to 3.5%) than 5% as recommended by ICRU Report 24 (1976).
- Of the more than 4,000 near misses without adverse outcome to patients reported in the years 1992 to 2007, more than 50% were related to the planning or treatment delivery stage.
- More system or equipment-related errors were reported as compared to other errors, e.g. dose prescription.

Statistics from: Radiotherapy Risk Profile, World Health Organization 2008

Closing the Gap in IMRT QA

OCTAVIUS® III cleverly combines pre-treatment verification using OCTAVIUS® I or II with the DAVID® detector, a truly innovative real-time in vivo dosimetry system for IMRT.

... and In Vivo Treatment Verification

Step 1: Pre-treatment plan verification with OCTAVIUS® I or II and DAVID® reference measurement

Step 2: In vivo verification of dose and MLC position with DAVID® during each session

DAVID® consists of measurement wires which run parallel to the direction of the MLC. Each measurement wire monitors the opening of a leaf pair. The measured dose length product consequently correlates with the opening of the leaf pair and supplied dose.

Prior to daily measurements, a reference measurement is to be taken that can be simultaneously recorded during patient plan verification with an OCTAVIUS® QA system. The dose subsequently measured during each session is then compared real-time to the reference dose. Deviations are displayed immediately according to predefined warning and alarm levels.

To maximize both efficiency and patient safety, DAVID® operates and communicates completely wireless via Bluetooth. As an ultra lightweight, cable-free device, it can be quickly inserted for measurement and swiftly removed as needed (e.g. for electron treatments), requiring no complicated setup or commissioning procedures.

Pioneering, clinically validated detector technology

DAVID® is a multi-wire transmission detector specially developed for patient delivery QA. It is inserted into the LINAC accessory tray to monitor dose delivery and MLC accuracy while the patient is treated. Since it is transparent, the DAVID® detector does not interfere with the LINAC’s light field.
**DIAMOND®**

Secondary check software for independent dose or MU verification

**Key Features**
- Clinically established solution for precise, independent verification of point dose or MU calculations
- Fast and simple – no LINAC time or phantom setup required
- Dose comparisons at one or multiple points (field-by-field, composite)
- Advanced calculation capabilities, e.g., wedge support, corrections of “flash” in breast treatments, fluence/dose mapping
- Multiple treatment techniques supported, including IMRT, RapidArc®, and VMAT

**CyberKnife® Accessory Package**

CyberKnife® patient and machine QA with OCTAVIUS® 1000 SRS

**Key Features**
- Unique, ready-to-use accessory package for CyberKnife® patient-specific QA in combination with OCTAVIUS® Detector 1000 SRS and VeriSoft® software
- Quick, comfortable setup – ready for measurement within a few minutes
- Suitable for CyberKnife® VSI and M6 systems
- Optional MultiCheck® software for quick and easy CyberKnife® machine-specific QA
- Package includes: Positioning device for VSI or M6 birdcage, fiducial marker plate for beam release, foam rubber padding

**LINAC QA for OCTAVIUS®**

LINAC QA Upgrade Package

**Key Features**
- Complete package for machine-specific QA in combination with an OCTAVIUS® detector and MultiCheck® LINAC QA software
- Fast, efficient check of all relevant beam profile parameters, including beam quality and absolute dose, in one single shot
- QA checks at all gantry angles without gantry mounts using optional OCTAVIUS® 4D phantom
- EFF analysis
- Record and playback function for a quick assessment of the LINAC startup behavior
- Profile and trend display

**Options**
- OCTAVIUS® 4D Rotating Phantom
- Universal Gantry Mount

**Supported QA Procedures**
- X-ray and electron output constancy
- Electron and photon beam profile constancy
- Electron beam energy constancy
- Electron and x-ray output constancy vs. gantry angle
- Electron and x-ray off-axis factor constancy vs. gantry angle
- Check of wedge angle for 60°
- Dose rate and symmetry over time
- Segmental IMRT (step and shoot) test
- Moving Window IMRT (four cardinal gantry angles)*

**OCTAVIUS® 4D Upgrade Package**

The easiest way to 4D dosimetry

**Key Features**
- Budget-friendly solution for users of PTW two-dimensional detector arrays who wish to upgrade to 4D dosimetry
- Upgrade package includes: Motorized OCTAVIUS® 4D phantom, wireless inclinometer, electronics, VeriSoft® upgrade with Navigator single user interface
- Supported detector arrays: OCTAVIUS® Detector 1500, OCTAVIUS® Detector 1000 SRS, OCTAVIUS® Detector 729, 2D-Array seven29®

*In combination with OCTAVIUS® 4D Rotating Phantom
Options & Accessories

Film Measurement
Polystyrene holding device for OCTAVIUS® phantom to insert a GafChromic® EBT / EBT 2 film (max. size 20.32 cm x 25.4 cm, 8” x 10”) for film measurements.

Chamber Measurement
Insert plates for OCTAVIUS® phantom with cavities to allow point measurements with up to nine 0.125 cm³ Semiflex ionization chambers. Unneeded cavities can be closed with blind plugs.

0.125 cm³ Semiflex Ionization Chamber
Vented cylindrical ionization chamber with a sensitive volume of 0.125 cm³ which is inserted into the chamber insert plate of the OCTAVIUS® phantom to allow point measurements.

Inhomogeneity
30 cm x 30 cm x 2.5 cm acrylic phantom to test TPS with consideration of inhomogeneities. Includes five exchangeable inserts, three of different density (lung, bone and soft tissue), two of acrylic glass (PMMA) and a specific adapter plate for OCTAVIUS® phantom.

The inhomogeneity phantom is not a CT test phantom. The Hounsfield units of the phantom must be determined by a CT scan.

Universal Gantry Mount
Vendor-specific gantry holding device designed to keep PTW ionization chamber arrays secure at isocenter at any gantry position.

Inclinometer
Device to measure the gantry angle. Allows dose measurements as a function of time or gantry angle to verify partial plans.

OCTAVIUS® Trolley
Robust, functionally designed trolley to conveniently store and move OCTAVIUS® phantom and detector. Dimensions (WDH): 60 cm x 64 cm x 94 cm, weight: 33 kg.

Workflow: Pre-Treatment Verification “Field-by-Field”

TPS Transfer
Verification plan is calculated in TPS system.

QA Device Setup
TPS dose plans are loaded into VeriSoft®.

Evaluation
Verification plan is displayed in VeriSoft®.

OCTAVIUS® phantom is set up on patient couch.

Made dose map is displayed in VeriSoft®.

Measured and calculated dose maps are compared in VeriSoft®.

Green: Verification passed.

Red: Deviations outside tolerance.

Workflow: Pre-Treatment Verification “Composite Plan”

TPS Transfer
Verification plan is calculated in TPS system.

QA Device Setup
TPS dose plans are loaded into VeriSoft®.

Evaluation
Verification plan is displayed in VeriSoft®.

OCTAVIUS® phantom with detector is set up and aligned on patient couch.

OCTAVIUS® phantom with detector is irradiated according to plan.

OCTAVIUS® detector is set up and aligned on patient couch.

OCTAVIUS® phantom with detector is set up and aligned on patient couch.

OCTAVIUS® phantom with detector is irradiated according to plan.

DAVID® detector is inserted into accessory tray of LINAC.

OCTAVIUS® phantom with detector is irradiated according to plan. Simultaneously, a reference measurement with DAVID® is taken.

Measured dose map is displayed in VeriSoft®.

Measured and calculated dose maps are compared in VeriSoft®.

Green: Verification passed.

Red: Deviations outside tolerance.

Workflow: Pre-Treatment Verification

TPS Transfer
Verification plan is calculated in TPS system.

QA Device Setup
TPS dose plans are loaded into VeriSoft®.

Evaluation
Verification plan is displayed in VeriSoft®.

OCTAVIUS® phantom with detector is set up and aligned on patient couch.

OCTAVIUS® phantom with detector is irradiated according to plan.

DAVID® detector is inserted into accessory tray of LINAC.

OCTAVIUS® phantom with detector is irradiated according to plan. Simultaneously, a reference measurement with DAVID® is taken.

Measured dose map is displayed in VeriSoft®.

Measured and calculated dose maps are compared in VeriSoft®.

Green: Verification passed.

Red: Deviations outside tolerance.

Workflow: In Vivo Treatment Verification during each fraction

QA Device Setup
DAVID® detector is inserted into accessory tray of LINAC.

Patient Setup
Reference measurement is located to DAVID® software and shown as transparent bar graph.

Treatment Delivery
Patient is set up on patient couch.

Treatment Verification & Monitoring
Patient is being irradiated. DAVID® measures dose length product of each field pair and transfers data wirelessly to a remote PC.

Measured dose is overlaid with reference dose. Deviations are displayed color-coded:

Green bars: Irradiation delivered as planned.

Red bars: Deviations outside tolerance.
Dosimetry Pioneers since 1922.

It all started with a brilliant invention - the revolutionary Hammer dosemeter in 1922. Ingenuity coupled with German engineering know-how shaped the company's history, leading to innovative dosimetry products that later became an industry standard. Over the years, PTW has maintained its pioneering spirit, growing into a global market leader of dosimetry and QA solutions well known for its product excellence and innovative strength. Today, PTW dosimetry is one of the first choices for healthcare professionals in radiation therapy, diagnostic radiology, nuclear medicine and health physics.

For more information on OCTAVIUS® QA systems and other PTW products, visit www.ptw.de or contact your local PTW representative: