

DOSIMETRY



Product Catalog

Independent & Integrated
Quality Assurance
for Radiation Therapy

Life.
Science.

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CHAPTER 1

myQA[®] Quality Assurance Platform



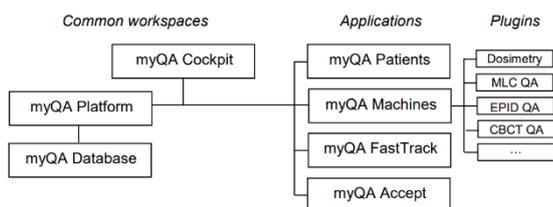
1.1 myQA® Platform



All in One. All Connected. All Secure.

The **myQA® Platform** is a computer program hosting interfaces and modules that can be medical devices or non-medical devices. It provides access to different applications in order to fulfill machine and/or patient related quality control activities.

Overview of myQA® Software (SW) package:



- All users and all applications in one platform -- assures compliance and enables:
 - efficient and flexible workflows
 - easy comparison of data from different applications
 - consistent results
- Central data base server for:
 - data safety (storage, archiving, backups)
 - data control (data mining, filters, search functions), and
 - data security (user management, access rights)
 - enabling easy comparison of data from different applications
- Central management of all users, licenses, facilities, treatment units, devices, detectors, and calibrations.
- Common configurations, protocols, printing & reporting tools.

Major parts in a myQA® system:

Measurement devices	PC with the myQA® SW installed including the main software and Device Setup tool	SQL Server installed on a PC (local or remote) for data storage
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System Requirements:

Supported Operating systems	Windows 10, 64 bit, US English Windows 11, 64 bit, US English Windows Server 2016 (Standard), 64 bit, US English Windows Server 2019 (Standard), 64 bit, US English (For using Gantry Sensor +, Windows 10, version 1703 or higher is required.)
Supported SQL servers	SQL Server 2016 SP2 or SQL 2019
Minimum Hardware Requirements	Processor: Intel Core i5 desktop or mobile processor or better RAM of 8GB or more, 16GB required when SRS Detector is used Graphics Card: DirectX 9c compatible, 256 MB Video RAM, no shared memory Ethernet minimum 10Mbit/s. If a remote SQL is used, higher Ethernet speed is recommended Ethernet (RJ-45) plug to connect controllers and other measurement devices A second Ethernet (RJ-45) plug or a suitable Ethernet switch is needed if LDA-99 SC with emXX is used.
Screen resolution	1920 x 1080 (FHD) with 100% or 125% 2560 x 1600 with 200% 3840 x 2160 (QHD = 4K) with 250%
Ethernet	minimum 100 Mbit/s, 1Gbit/s minimum for myQA SRS usage
Supported Virtual Runtime Environments	Full desktop virtualizations simulating the above requirements, e.g. ■ VMWare ESXi ■ Oracle Virtual Box ■ Microsoft Hyper-V ■ Citrix XEN Desktop 7

Ordering Info myQA® Platform:

MQ00-000	myQA® Platform (per site), <i>required for all myQA® applications</i>
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Note: One site license of the myQA® Platform is mandatory to run any of the myQA® applications (exception: myQA Accept®).

1.2 myQA® Cockpit

The myQA® Cockpit is a software that retrieves and displays previously measured or stored QA results from treatment and diagnostics devices as well as patient QA data. It addresses medical physicists and radio oncologists with a grouped overview of test results, work tasks, and trend analysis on existing data. Multiple users can use the myQA® Cockpit from different computers at the same time.



The myQA® Cockpit provides:

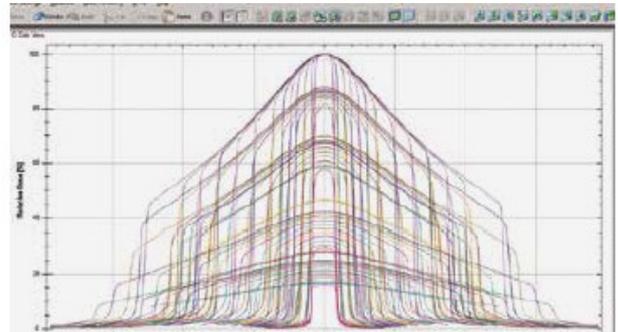
- Instant status overview of your department, treatment units, and patient treatment plans
- Quick access and easy tracking of machine QA and patient QA including trends and statistics
- Simple and clear reporting in traffic light style
- Browser-based application requiring no local installation
- Platform independent access on PCs and tablets (Windows, iOS, Android)
- Accessible from anywhere in your clinic network
- Site license for unlimited number of users

Ordering Info myQA® Cockpit:

MQ01-000	myQA® Cockpit (per site)
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1.3 myQA® Accept

For a full description of this myQA® module, please refer to the specifications provided under the separate section in “Relative Dosimetry.”



1.4 myQA® Accept SMARTSCAN™

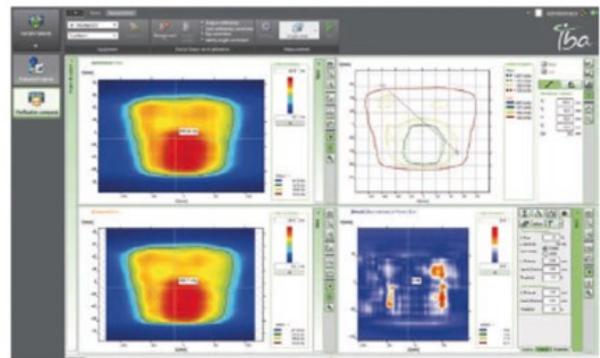
For a full description of myQA® Accept SMARTSCAN™, please refer to the specifications provided under the separate section in “Relative Dosimetry.”



1.5 myQA® Patients

For a full description of this myQA® module, please refer to the specifications provided under the separate section in “Patient QA.”

myQA® Patients



1.6 myQA® Machines

For a full description of this myQA® module, please refer to the specifications provided under the separate section in "Machine QA."



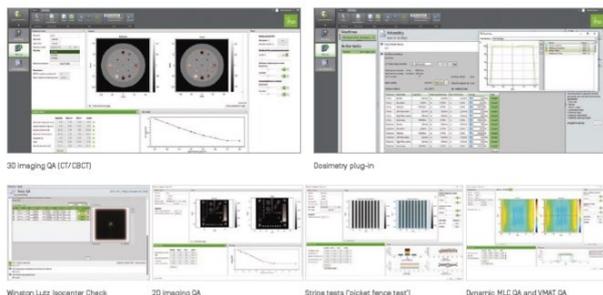
1.7 myQA® FastTrack

For a full description of this myQA® module, please refer to the specifications provided under the separate section entitled "Machine QA."



1.8 Plug-Ins for myQA® Machines

For a full description of this myQA® module, please refer to the specifications provided under the separate section in "Machine QA."



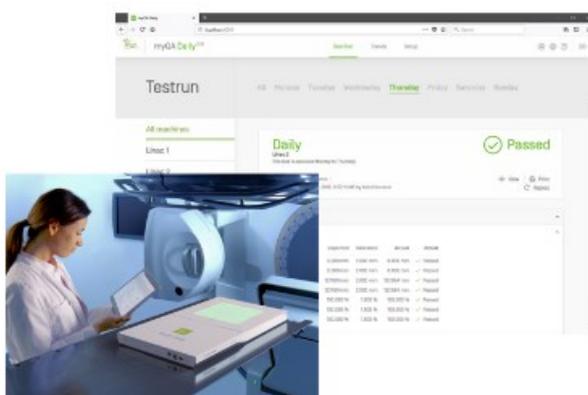
1.10 myQA® Coverage

For a full description of the myQA® coverage options, please refer to the specifications provided under the separate section in "Service & Support."



1.9 myQA® Daily

For a full description of this myQA® module, please refer to the specifications provided under the separate section in "Machine QA."





CHAPTER 2

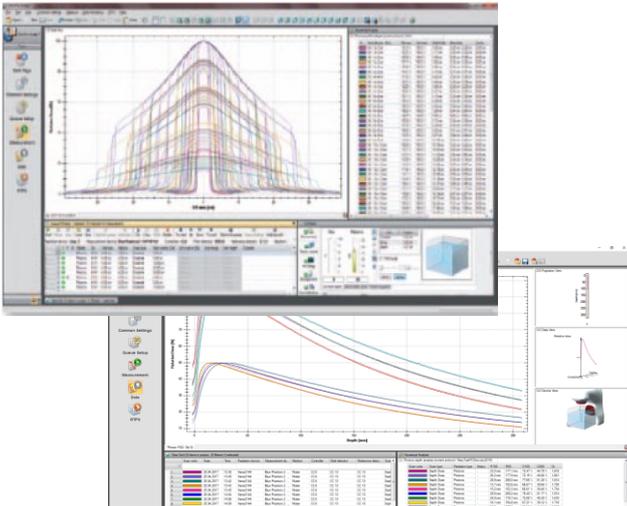
Relative Dosimetry - Water Phantom Solutions

Life,
Science.

2.1 myQA® Accept

The **myQA® Accept** is a software application utilizing hardware components such as water phantoms, scanners, and detectors to measure, verify, and analyze radiation dose distributions in radiotherapy.

The **myQA® Accept system** consists of the myQA® Accept software (SW) and the supported hardware including water phantoms, in-air scanners, and single or array detectors which are manufactured by IBA Dosimetry GmbH.



myQA® Accept SW, flexible and optimized workflow in just 4 steps:

- Scanning queue generation
- Data acquisition
- Numeric analysis of data
- RTPS transfer

General features:

- Beam Data Acquisition software for ultimate efficiency in beam commissioning and QA
- Built on latest Microsoft .NET technology
- Quick software set-up
- Easy and flexible scanning queue handling
- Smooth data exchange within IBA Dosimetry Systems and MS Excel
- Support of all international and industry protocols
- Printed manuals, help files, online help, and IBA RSS feed
- Data storage – file based or database
- Compatible with Citrix® environments (single use)

Common settings:

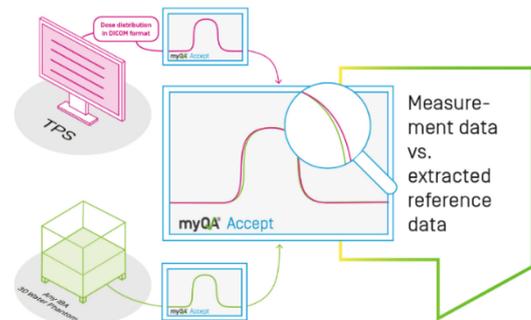
- Reasonable default parameters as well as flexible customization
- RT Device Manager for fastest equipment setup
- Import & export functionality for easy data transfer between different workstations

Queue Set-Up:

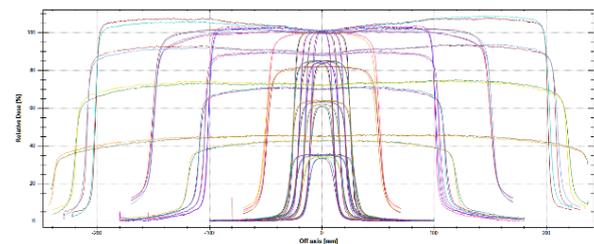
- Quick and intuitive generation of scanning queues
- Advanced queue management (load, save, multiple edits, copy-and-paste)
- Filtering and sorting for grouping scans and optimization of queues
- Built-in plausibility checks and queue optimizer show discrepancies prior to measurement
- Import of RFQ files (queue files) from OmniPro-Accept 6.6c

3D Dose Cube Import

- Import 3D dose distributions from your TPS into myQA Accept and extract reference PDDs and profiles for comparison
- Perfect tool for validation of pre-commissioned machines
- QA of your existing beam models (TPS QA)



Profile Measurement – performed measurements:



Data Analysis:

- Online data analysis for each scan in the data analysis panel
- Electron and photon profiles, depth dose curves and TMR / TPR
- Support of all international and industry protocols
- Calculation and display of Isodoses and 2D arrays
- Huge number of functions for data processing (mathematics, rescale, move, mirror...)
- Tools for data comparison (1D Gamma, subtraction, ...)
- Undo / Redo, restore raw data and auto-save function
- Macros to program data processing
- Output Factor and Wedge tables
- Flexible ASCII tables incl. export to MS Excel

Ordering info myQA® Accept:

MQ04-001	myQA® Accept, full version, site license included
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Additional Licenses:

AQ04-001	Additional license for myQA® Accept
AQ04-005	Additional 5 licenses for myQA® Accept

Software upgrades to myQA® Accept:

UQ04-005	Upgrade from Accept 6.x to myQA® Accept (Upgrade to CCU required), full version, site license included
UQ04-004	Upgrade from OmniPro-Accept 7.x to myQA® Accept, full version, site license included for myQA Platform users
UQ04-007	Upgrade from Omni-Pro Accept 7.x to myQA Accept, site license included (non myQA Platform users)
UQ04-006	Upgrade of myQA Accept to the latest version of myQA Accept

Software Options for existing myQA® Accept users (and OmniPro-Accept 7):

MQ04-003	Wedge Check (for OmniPro-Accept NP10-003)
MQ04-004	<i>Selectable electrometer input (for OmniPro-Accept NP10-004)</i>
MQ04-005	Advanced Measuring Mode (Continuous Scanning Mode) (for OmniPro-Accept NP10-005)
MQ04-006	ASO - Adaptive Scan Optimization (for OmniPro-Accept NP10-006)
MQ04-007	Output Factor Table (for OmniPro-Accept: NP10-007)
MQ04-008	CAX- Check (for OmniPro-Accept NP10-008)
MQ04-120	RTPS interface Module for RTPS measurement and data conversion to Varian® ^(*) Eclipse (for OmniPro-Accept 997-120)
MQ04-121	RTPS interface Module for RTPS measurement and data conversion to Philips Pinnacle (for OmniPro-Accept: 997-121)
MQ04-122	RTPS interface Module for RTPS measurement and data conversion to Nucletron Oncentra® Masterplan™ (for OmniPro-Accept 997 -122)
MQ04-123	RTPS interface Module for RTPS measurement and data conversion to CMS XiO/MONACO® (for OmniPro-Accept 997-123)
MQ04-124	RTPS interface Module for RTPS measurement and data conversion to Accuray Multiplan (for OmniPro-Accept 997-124)
MQ04-125	RTPS interface Module for RTPS measurement and data conversion to TomoTherapy® ^(*) Twin/Me module (for OmniPro-Accept 997-125)

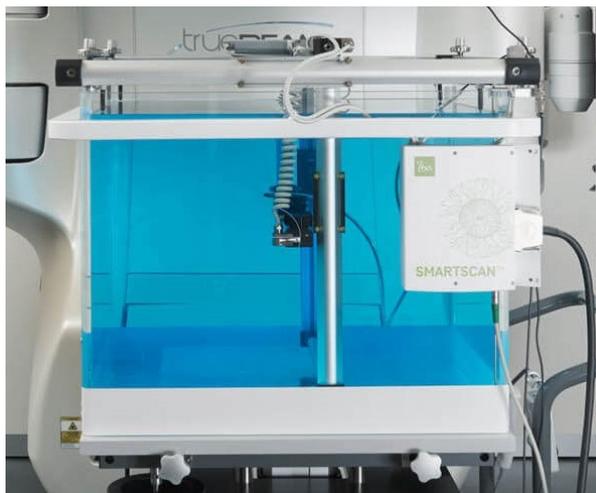
2.2 SMARTSCAN™ System

SMARTSCAN™ is an automated and guided beam commissioning, data collecting and annual QA system.

SMARTSCAN™ is designed to deliver exceptional data quality in the shortest possible time through smart automation and user guidance along the entire workflow!

SMARTSCAN™ plans precisely what needs to be done, optimizes each step of the workflow, automates repetitive tasks, and keeps track of the accuracy of the process.

2.3 SMARTSCAN™ System HW



3D Water Phantom System **SMARTSCAN** for complete Linac Commissioning & QA

- The unique magneto-strictive sensor technology provides continuous readouts of the SMARTSCAN™ absolute position of all 3 axes (even when not moving), with a guaranteed detector repositioning accuracy of $\pm 0.1\text{mm}$
- Crosshairs on all five tank walls for ease of water phantom setup
- High precision detector positioning with advanced horizontal inclination adjustment system
- Small universal detector holder to mount ionization chambers and diode detectors as well as third party detectors with a diameter of 4 mm to 10 mm in vertical and horizontal orientation
- Reference detector holder
- Slanted bottom for complete draining of the tank
- Alignment PINs for fast leveling of the 4-point micro-leveling frame to the water surface
- Quick coupling system for connecting / disconnecting the filling hose

SMARTSCAN™ 3D-Tank specifications:

Exterior water tank dimensions	675 x 645 x 560 mm
Scanning volume	480 x 480 x 410 mm
Position resolution	0.1 mm
Position accuracy	± 0.1 mm
Positioning speed	50 mm/s
Scanning speed	From 3 mm/s up to 25mm/s, in 0.1 mm /s steps
Wall thickness / material	15 mm / acrylic

Ordering Info SMARTSCAN™ System HW:

SC02-000	SMARTSCAN™ 3D Water Phantom system incl. CCU, micro levelling frame, slanted bottom, set of levelling pins
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2.4 myQA® Accept SMARTSCAN™ SW

myQA® Accept SMARTSCAN™, Beam Data Acquisition SW application for beam commissioning and annual QA

Water phantom profiles/curves easily integrated into myQA® Machines as reference data to routine machine QA

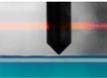
Flexible and optimized workflow in just three steps:

- Scanning queue generation, including automatically optimized scan speed for each profile and PDD regions
 - Automatically determined output step-width for each profile and PDD in the scanning queue
 - Automatic chosen dedicated sensor for field and reference detector from the library according to the field-size
 - Automatically setup of the independent electrometer's individual sensitivities, high voltages, and polarities according to the chosen field and reference detector
- Automated and guided data acquisition
 - With automatically performed electrometer signal normalization at each change of field-size, energy, or detector
 - With online quality check and messaging (correct field-size, signal noise behavior)
- Online monitoring and instant comparison of data
 - Constant quality monitoring of measured data. Warnings in case the quality is out of tolerance
 - Instant data comparison against and reference values and tolerance tables
- RTPS transfer

Ordering Info myQA® Accept SMARTSCAN™:

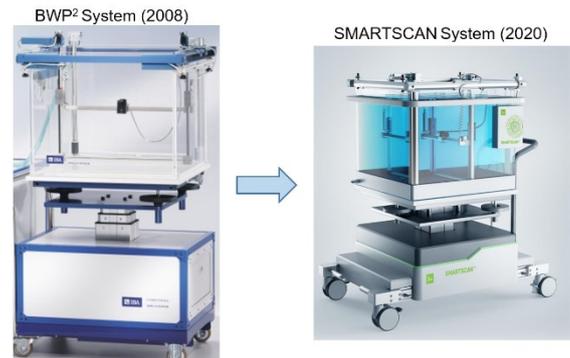
MQ05-000	myQA® Accept SMARTSCAN™ Solution for Guided Scanning, 5 licenses included
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2.4.1 Typical SMARTSCAN™-System Configuration:

SMARTSCAN 3D-WP, incl. CCU and hand-pendant		For CCU and hand-pendant, refer to chapter "Options & accessories for 3D water phantom systems"
myQA Accept SMARTSCAN-SW		For myQA Accept SMARTSCAN-SW, refer to chapter "myQA Accept SMARTSCAN"
Stealth Reference CHAMBER		For Stealth Reference CHAMBER, refer to chapter "Ionization Chambers"
SMARTSCAN electrical lift table		For SMARTSCAN electrical lift table, refer to chapter "Options & accessories for 3D water phantom systems"
SMARTSCAN Water Reservoir		For SMARTSCAN Water reservoir, refer to chapter "Options & accessories for 3D water phantom systems"
Leveling Pins		For Leveling Pins, refer to chapter "Options & accessories for 3D water phantom systems"
Field Chambers		For Field Chambers, refer to chapter "Ionization Chambers"
myQA Platform		For myQA Platform, refer to chapter "myQA Platform"
myQA Coverage		For myQA Coverage, refer to chapter "myQA Coverage"
Accessories		Aquablue dilution allowing long-term keeping of the water and longer lifetime of the water tank mechanics Iso-center alignment cap for field detector dust cover Operation manual (English version)

2.5 SMARTSCAN™ upgrade solutions

Upgrade from earlier Blue Phantom² to SMARTSCAN™:



Ordering info upgrade from earlier Blue Phantom² to SMARTSCAN™:

SC01-501	Upgrade to SMARTSCAN™ for Blue Phantom ² users who have OmniPro Accept
SC01-500	Upgrade to SMARTSCAN™ for Blue Phantom ² users who have myQA® Accept
SC01-502	Upgrade to SMARTSCAN™ for Blue Phantom ² users who have myQA® Accept and Stealth™ Chamber

2.6 Blue Phantom²



3D Water Phantom System **Blue Phantom²** for complete Linac Commissioning & QA

FASTEST, Most ACCURATE, and Most RELIABLE solution

- FASTEST
 - Complete water surface levelling in a few minutes
 - 1/3 faster commissioning versus previous BWP-System
- Most ACCURATE
 - Positioning accuracy of 0.1mm
 - Positioning reproducibility of ± 0.1 mm
 - Long-Term stability. Most Reliable.
 - Absolutely stable system during the entire Linac commissioning
- Most RELIABLE
 - Less post processing needed, e.g., smoothing of the profiles/curves

Blue Phantom² tank with three-dimensional servo:



- superior magneto-strictive sensor technology for each direction (x, y, and z travel) for highest detector positioning accuracy
- Crosshairs on all five tank walls for ease of water phantom setup
- High precision detector positioning with advanced horizontal inclination adjustment system
- Small universal detector holder to mount ionization chambers and diode detectors as well as third party detectors with a diameter of 4 mm to 10 mm in vertical and horizontal orientation
- Reference detector holder
- Alignment pins for fast leveling of the 4-point micro-leveling frame to the water surface
- Quick coupling system for connecting / disconnecting the filling hose
- Includes leveling frame for Blue Phantom²
- Calibrated, high precision mechanics with built-in leveling frame for manual horizontal alignment of the scanning mechanism to the water surface. The scanning mechanics are connected to the tank via 4 points.
- Slanted bottom for draining the tank without the need for lifting tank mechanically
- Leveling Pins

Blue Water Phantom² -Tank specifications:

Exterior water tank dimensions	675 x 645 x 560 mm
Scanning volume	480 x 480 x 410 mm
Position resolution	0.1 mm
Position accuracy	± 0.1 mm
Positioning speed	50 mm/s
Scanning speed	From 3 mm/s up to 25mm/s, in 0.1 mm /s steps
Wall thickness / material	15 mm / acrylic

Ordering Info Blue Phantom² 3D Water Phantom:

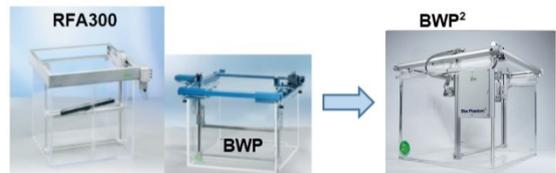
NP01-001	Blue Phantom ² 3D Water Phantom system incl. CCU, micro leveling frame, slanted bottom, set of leveling pins
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2.6.1 Typical Blue Phantom²-System Configuration:

Blue Phantom ² 3D Water Phantom, incl. CCU		For CCU and hand-pendant, refer to chapter "Options & accessories for 3D water phantom systems"
myQA Accept		For myQA Accept, refer to chapter "myQA Accept"
Stealth Reference CHAMBER		For Stealth Reference CHAMBER, refer to chapter "Ionization Chambers"
BP2 electrical lift table		For BP2 electrical lift table, refer to chapter "Options & accessories for 3D water phantom systems"
Water Reservoir		For Water reservoir, refer to chapter "Options & accessories for 3D water phantom systems"
Leveling Pins		For Leveling Pins, refer to chapter "Options & accessories for 3D water phantom systems"
Field Chambers		For Field Chambers, refer to chapter "Ionization Chambers"
myQA Platform		For myQA Platform, refer to chapter "myQA Platform"
myQA Coverage		For myQA Coverage, refer to chapter "myQA Coverage"
Accessories		Aquablue dilution allowing long-term keeping of the water and longer lifetime of the water tank mechanics Iso-center alignment cap for field detector dust cover Operation manual (English version)

2.7 Blue Phantom² upgrade solutions

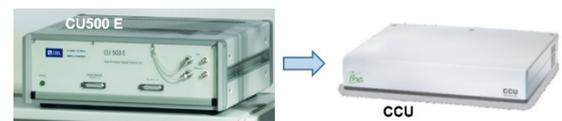
Upgrade of IBA 3D water phantoms to Blue Phantom²:



Ordering info:

NU01-001	Upgrade of IBA 3D water phantom to Blue Phantom ² incl. CCU, micro leveling frame, slanted bottom, leveling pins and myQA [®] Accept software upgrade, full version, 5 licenses included
NU01-501	Upgrade of IBA 3D water phantom to Blue Phantom ² , micro leveling frame, slanted bottom and levelling pins for existing CCU users, myQA [®] Accept software upgrade, full version, 5 licenses included

Upgrade from CU500E to CCU



Ordering info:

CU06-000	Upgrade from CU500E to CCU for use with Blue Phantom: prerequisite for the upgrade is that the mechanics for the existing system are in good condition.
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2.8 Blue Phantom COMPACT

The IBA 2DWP – System, Blue Phantom COMPACT, is used to accurately measure and analyze:

- Beam data acquisition for a radiotherapy planning system (RTPS)
- Acceptance test of treatment machines
- Routine checks (quarterly, annually)
- Verification of complex fields
- Quality assurance on a daily or weekly basis
- Research and scientific work
- Fully supported by myQA® Accept and SMARTSCAN™ SW



Blue Phantom COMPACT Specifications (no lift table required):

Scanning area in water	480 x 410 mm (X/Z)
Water-Tank exterior dimensions	645 mm (L) x 407 mm (W) x 550 mm (H)
Approximate volume	116l
Weight (filled with water):	36 kg (152 kg max)

- Superior Magnetostrictive sensor technology for each direction (x, z travel) for highest detector positioning accuracy
- Small universal detector holder to mount ionization chambers and diode detectors as well as third party detectors with a diameter of 4mm to 10mm in vertical and horizontal orientation
- Quick coupling system for connecting/disconnecting the filling hose

Ordering info Blue Phantom COMPACT:

NP50-000	Blue Phantom COMPACT 2D Water Phantom System incl. levelling pins (myQA® Accept is not included)
NP50-001	Blue Phantom COMPACT 2D Water Phantom System for CCU users

2.8.1 Typical Blue Phantom COMPACT -System Configuration:

BP COMPACT 2D Water Phantom system incl. CCU		For CCU and hand-pendant, refer to chapter "Options & accessories for 3D water phantom systems"
myQA Accept		For myQA Accept, refer to chapter "myQA Accept"
Stealth Reference CHAMBER		For Stealth Reference CHAMBER, refer to chapter "Ionization Chambers"
Leveling Pins		For Leveling Pins, refer to chapter "Options & accessories for 3D water phantom systems"
Field Chambers		For Field Chambers, refer to chapter "Ionization Chambers"
myQA Platform		For myQA Platform, refer to chapter "myQA Platform"
myQA Coverage		For myQA Coverage, refer to chapter "myQA Coverage"
Accessories		Aquablue dilution allowing long-term keeping of the water and longer lifetime of the water tank mechanics Iso-center alignment cap for field detector dust cover Operation manual (English version)

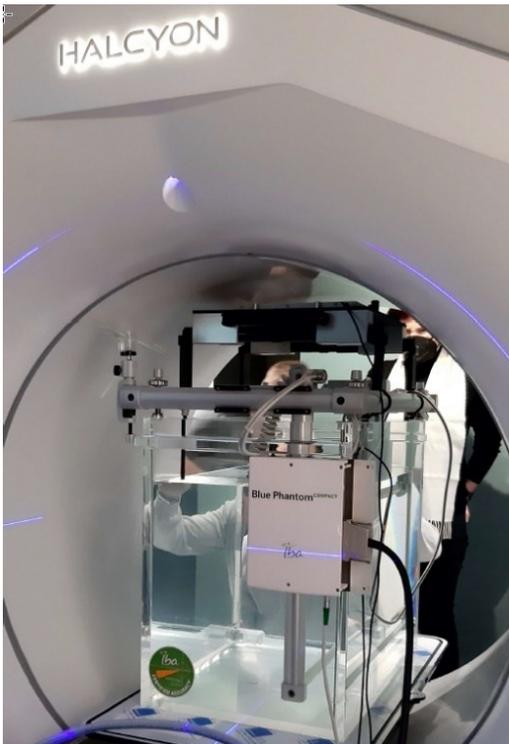
2.9 Varian® Halcyon™/ Ethos™ (*)Solution

myQA® HALO for Varian® Halcyon™ / Ethos™ (*):

myQA® HALO is the dedicated, proven package solution for independent commissioning & validation and beam data collection of the Varian® Halcyon™/Ethos™ (*) as well as for monthly and annual scans.

HALO Package incl. **Blue Phantom COMPACT** and **myQA® Accept:**

- **Blue Phantom COMPACT** tank designed for fast collection of all needed scans, low weight for minimal Varian® Halcyon™ / Ethos™ (*) couch sag



- Water tank fits perfectly into the Halcyon™ bore
 - Weight: 152kg, Volume: 116 liters
 - Rely on the pins provided and imaging to set up the tank

Easy and fast setup with adjusting and levelling mechanisms and pins for correction of the patient couch sag.

For details on “**Micro Leveling Frame**” and “**Leveling Pins**”, refer to chapter “**Options & accessories for 3D water phantom systems**”

- Blue Phantom COMPACT for Varian® Halcyon™ / Ethos™ (*) can be setup for in-plane or cross-plane measurements
 - Field size 40 x (40 cm)
 - PDD: max. 40 cm
- Special rotating table allows for in-plane and cross-plane measurements, without emptying and manually rotating of the water-tank, and repeating CAX setup

For details “**Blue Phantom COMPACT Rotating Table**” refer to chapter “**Options & accessories for 3D water phantom systems.**”

Unique **Stealth™** reference chamber including special holder compensates for the absence of light field:



Stealth reference chamber including special holder for Varian® Halcyon™ / Ethos™ (*) – Linac allows field-size measurements up to max. 28x28 cm without excursions into Linac room for reference chamber re-alignment.

The 3D Water Phantom Systems SMARTSCAN™ and Blue Phantom² can be used for Varian® Halcyon™ / Ethos™ (*) as well.

For further technical details please see the chapters “SMARTSCAN™ Systems” and “Blue Phantom²”

Ordering info HALO™ Package:

NP50-HL01	HALO Package for new customer incl. Blue Phantom COMPACT and myQA® Accept
NP50-HL02	HALO Package for existing Blue Phantom ² customers with myQA® Accept

2.10 Blue Phantom Helix

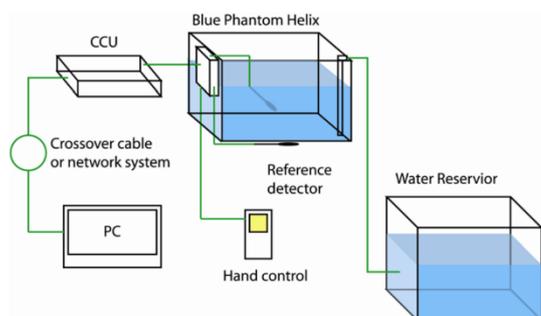
Blue Phantom Helix for Accuray® TomoTherapy® (*)

Blue Phantom Helix is dedicated for full 3D scanning of the Accuray® TomoTherapy® (*) System. Based on the proven Blue Phantom², this water phantom enables fast and accurate commissioning and QA work optimized for Accuray® TomoTherapy® (*).

- Optimized 3D water phantom for faster scanning
- Efficient measurements & analysis with myQA® Accept
- Certified 0.1mm high positioning accuracy and outstanding reliability
- Long-term mechanical stability



Device connection overview:



Blue Phantom Helix Specifications:

Exterior water tank dimensions (L x W x H)	680 mm x 407 mm x 350 mm
Feedback	Magneto strictive sensors
Motors	Precision DC motors
Position accuracy	± 0.1 mm
Position reproducibility	± 0.1 mm
Position resolution	0.1 mm
Scanning speed	max 25 mm/s
Scanning volume (L x W x H)	518 mm x 140 mm x 213 mm
Volume (approx.)	57 l
Wall thickness / material	15 mm / acrylic
Weight	30 kg (without water)

Ordering info:

NP90-000	Blue Phantom Helix 3D Water Phantom System incl. CCU for helical treatment accelerators (myQA® Accept is not included)
NP90-001	Blue Phantom Helix 3D Water Phantom System for helical treatment accelerators for CCU users

2.10.1 Typical Blue Phantom Helix System configuration

Blue Phantom HELIX 2D Water Phantom system incl. CCU		For CCU and hand-pendant, refer to chapter "Options & accessories for 3D water phantom systems"
myQA Accept		For myQA Accept, refer to chapter "myQA Accept"
Field Chambers		For Field Chambers, refer to chapter "Ionization Chambers"
Reference Chamber		For Reference Chamber, DCT10 refer to chapter "Medical Imaging QA in Radiotherapy"
myQA Platform		For myQA Platform, refer to chapter "myQA Platform"
myQA Coverage		For myQA Coverage, refer to chapter "myQA Coverage"
Accessories		Aquablue dilution allowing long-term keeping of the water and longer lifetime of the water tank mechanics Iso-center alignment cap for field detector dust cover Operation manual (English version)



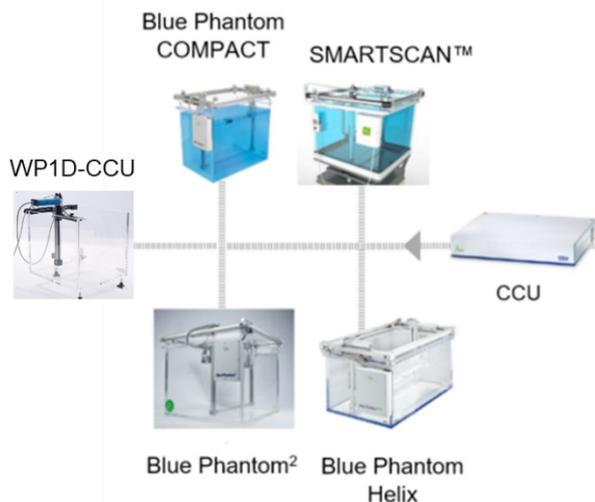
CHAPTER 3

Options & Accessories for Water Phantom Systems

Life,
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3.1 CCU Common Control Unit

CCU Common Control Unit, used with SMARTSCAN™, Blue Phantom², Blue Phantom COMPACT, Blue Phantom Helix Systems, and WP1D CCU



CCU Common Control Unit Specifications:

Resolution	0.5fA at 0.4nA full scale 5fA at 40nA full scale 0.5pA at 4μA full scale
Full scale range	0.4 nA / 40nA / 4μA
Leakage current	<200 fA, typically <20 fA
Bias voltage range	± 50 through ± 500V
Time constant	20 ms
Trigger interface	RS 485 (custom specific)
Comm. interface	Ethernet (100BaseT)
Power supply	100 - 240 V AC ± 10%; 50/60 Hz

Ordering info:

CU07-000	Stand Alone Common Control Unit (CCU)
----------	---------------------------------------

For more details, please contact your IBA Dosimetry sales representative or IBA Dosimetry directly.

- Close-packed unit completely software controlled combining controller and electrometers
- Two integrated independent electrometers (individual sensitivity, high voltage, and polarity) allow for connection of ionization chambers or solid-state detectors (e.g., diodes) at the same time
- Integrated controller for moving the field probe inside the water tank
- TNC triax connectors, floated input by default, grounded input available as an option
- Includes a 30m Ethernet cable between control unit and PC, and a 5m control cable for connection of servo to the CCU



3.2 Hand Pendant

Hand Pendant, included with IBA Dosimetry WP-Systems, e.g., SMARTSCAN™, Blue Phantom², Blue Phantom COMPACT, and Blue Phantom Helix Systems:

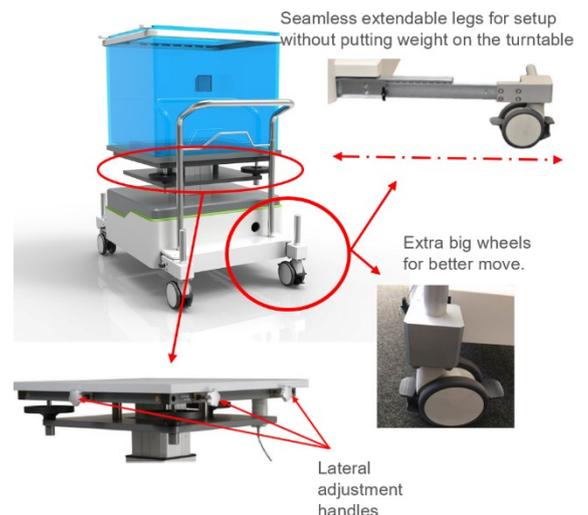
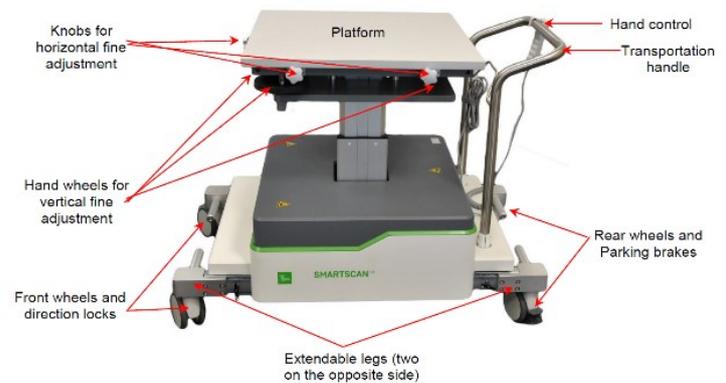


- A joystick enables the movement of the servo in X and Y direction. The speed is set by the deflection of the joystick.
- Two Z buttons (slow and fast moving) allow precise positioning of the probe in Z direction
- Definition of water surface, isocenter, sub-limits and three user-defined positions
- A panel containing soft keys used to re-call error messages, last saved water phantom parameters, e.g., water surface, customized isocenter, predefined detector positions etc.

3.3 SMARTSCAN™ electrical lift table

The Blue Phantom SMARTSCAN™ electrical lift table is a flexible device for positioning and fine adjustment of water phantoms under linear accelerators or other radiation sources.

- The electrical control allows comfortable and smooth lifting / lowering with a vertical range of 660+15mm – 1180-15mm; the table is therefore suitable for measurements in both standard SSD and TPR/TMR conditions.
- The telescope construction is self-locking; the platform rests stably at a given position.
- By using the leveling frame mounted on top of the lift table, the water phantom can be precisely adjusted in vertical and horizontal directions. In the horizontal plane, it can be shifted in two directions and rotated.
- Extended legs ensure better stability of the water phantom without putting weight on the machine's turntable. All four wheels have locking brakes.



SMARTSCAN™ electrical lift table specifications:

Maximum load capacity	250 kg
Maximum load at one wheel	110 kg
Weight (without / with extended legs)	135 kg
Mains connection	115 VAC +/- 10%, 60 Hz 230 VAC +/- 10%, 50 / 60 Hz
Table plate dimensions	Thickness: 25 mm Length / width: 680 x 680 mm
Wheels	Two front wheels: Locking brakes Two rear wheels: Locking brakes, preventing rotation.
Dimensions:	Total length: 1300 mm (legs completely contracted) - 2000 mm (legs fully extended) Total width: 736 mm

Ordering Info SMARTSCAN™ electrical lift table:

SC03-000	SMARTSCAN™ Water phantom Carriage with lifting table 230V
SC03-010	SMARTSCAN™ Water phantom Carriage with lifting table 115 V

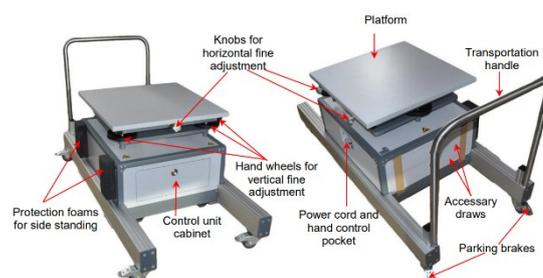
3.4 Lift Table for Blue Phantom-Family

The electrical control allows comfortable and smooth lifting / lowering with a vertical range of 660+15mm – 1180-15mm; the table is therefore suitable for measurements in both standard SSD and TPR/TMR conditions.

The telescope construction is self-locking; the platform rests stably at a given position.

By using the leveling frame mounted on top of the lift table, the water phantom can be precisely adjusted in vertical and horizontal direction. In the horizontal plane, it can be shifted in two directions and rotated.

The lift table is provided with two fixed and two steerable wheels with parking brakes.

**Lift table specifications:**

Maximum load capacity	250 kg
Maximum load at one wheel	124 kg Weight (without / with extended legs) 113 kg / 142 kg
Mains connection	115 V, 60 Hz / 230 V, 50 Hz / 60 Hz
Table plate	Thickness: 25 mm Length / width: 680 x 680 mm
Wheels	Two fixed and two steerable wheels with parking brakes.
Dimensions	Total length: 1600 mm Total width: 730 mm

Ordering info lift table for IBA 3D Water Phantom Systems:

HA01-000	Water Phantom carriage, manually operated, including leveling frame
HA03-000#004	Water Phantom carriage with electrically operated telescope lift mechanism, incl. leveling platform, with extended legs, power supply 230V
HA03-010#004	Water phantom carriage with electrically operated telescope lift mechanism, incl. leveling platform, with extended legs, power supply 115V
HA03-100	extended legs upgrade kit for #HA03-000#003 and #HA03-010#003

3.5 Lift table XM

The Liftable XM table is a flexible device for positioning and fine adjustment of water phantoms under linear accelerators or other radiation sources. **Compatible with all versions of the Elekta Harmony linear accelerator.**

- The electrical control allows comfortable and smooth lifting / lowering with a vertical range of 660+15mm – 1180-15mm; the table is therefore suitable for measurements in both standard SSD and TPR/TMR conditions.
- The telescope construction is self-locking; the platform rests stably at a given position.
- By using the leveling frame mounted on top of the lift table, the water phantom can be precisely adjusted in vertical and horizontal directions. In the horizontal plane, it can be shifted in two directions and rotated.
- Extendable legs ensure better stability of the water phantom without putting weight on the machine's turntable. All four wheels have locking brakes.



Lift table XM specifications:

Maximum load capacity	250 kg
Maximum load at one wheel	110 kg
Weight (without / with extended legs)	135 kg
Mains connection	115 VAC +/- 10%, 60 Hz 230 VAC +/- 10%, 50 / 60 Hz
Table plate dimensions	Thickness: 25 mm Length / width: 680 x 680 mm
Wheels	Two front wheels: Locking brakes Two rear wheels: Locking brakes, preventing rotation.
Dimensions:	Total length: 1300 mm (legs completely contracted) - 2000 mm (legs fully extended) Total width: 736 mm

Ordering Info Lift table XM:

HA03-230	Lift table XM Water phantom Carriage with lifting table 230V
HA03-115	Lift table XM Water phantom Carriage with lifting table 115 V

3.6 SMARTSCAN™ Water Reservoir

Tank trolley on wheels with water reservoir with bi-directional water pump, including compartment for storing water phantom accessories. Prepared for TMR/TPR option.

Tank volume	appr. 208 l
Pump capacity	40 l/min
Power supply	DC motor 24V, 750 W, bi-directional



Storage compartment of SMARTSCAN™ water Reservoir:

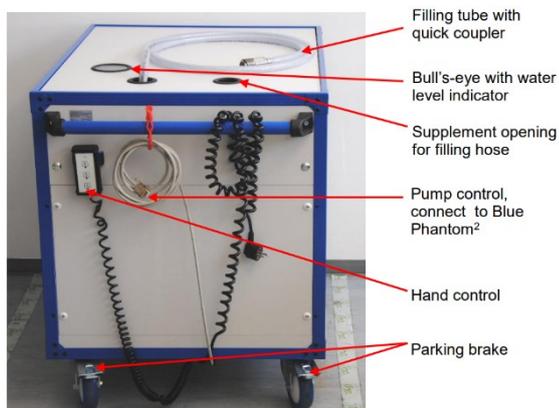


Ordering Info SMARTSCAN™ Water Reservoir:

SC05-000	SMARTSCAN™ Water reservoir 230V with bi-directional pump and EU-plug
SC05-010	SMARTSCAN™ Water reservoir 115V with bi-directional pump US plug

3.7 Water reservoirs for Blue Phantom-Family

Water Reservoir with bidirectional pump, prepared for TMR/TPR option:



Mains connection	230 V, 50 / 60 Hz, 600 W max. / 115 V, 60 Hz, 600 W max.
Maximum load on the floor at one roller	110 kg
Pump	DC motor 24 V, 250 W, bi-directional
Pump capacity	20 l/minute
Tank volume	220 l Weight 82 kg (without water)
Dimensions (L x W x H)	1040 mm x 660 mm x 860 mm
Wheels	Two fixed and two steerable rollers with parking brakes

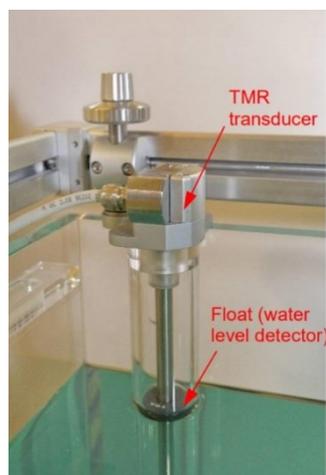
Ordering info for Water Reservoir BWP-Family:

HA06-000	Water reservoir carriage with uni-directional pump, power supply 230V (cannot be upgraded for TMR option)
HA06-010	Water reservoir carriage with uni-directional pump, power supply 115V (cannot be upgraded for TMR option)
HA05-000	Water reservoir carriage with bi-directional pump, power supply 230V (prepared for TMR option)
HA05-010	Water reservoir carriage with bi-directional pump, power supply 115V (prepared for TMR option)

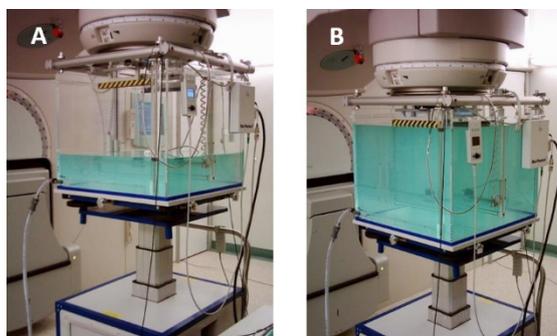
3.8 TPR/TMR measurement set

Tissue Phantom Ratio (TPR) and Tissue Maximum Ratio (TMR) are conveniently measured with a water level transducer mounted on the Blue Phantom² or SMARTSCAN[™].

The TPR/TMR measurement is performed as water is pumped into or out of the Blue Phantom² or SMARTSCAN[™] water tank in combination with the water reservoir and bidirectional pump, while the field detector rests at a stable position.



For TPR/TMR measurements, the water reservoir with bidirectional pump must be used. The water pump is controlled automatically by the myQA[®] Accept software via the CCU.



- Blue Phantom² with low water level ready for TMR measurement:
- Blue Phantom² with high water level at the end of a TMR measurement

Ordering info TPR/TMR set:

NP30-000	TPR/TMR measurement set for SMARTSCAN [™] and Blue Phantom ²
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3.9 Leveling Pins and leveling frame

Available for SMARTSCAN™, Blue Phantom² and Blue Phantom COMPACT Systems.

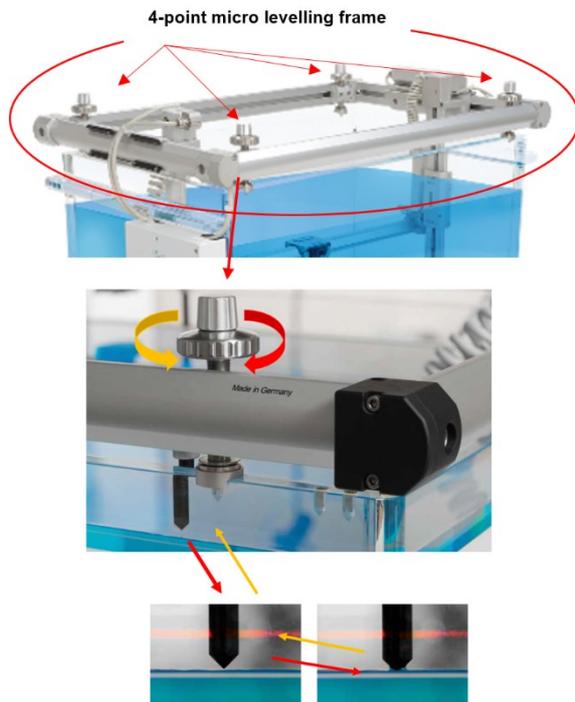
Invented by the ancient Egyptians a fine tip on the water surface makes the perfect alignment visible. **Leveling can be accomplished quickly with little effort.**

The leveling pins are used to level the frame to water surface for SSD 100 cm (a) or 90 cm (b) Linacs



Intuitive and precise 4-point micro leveling for sub-millimeter alignment without moving the heavy filled water phantom tank:

- Water Phantom System servo drive independent of the water tank
- Simple and fast alignment of detector movements to the water surface



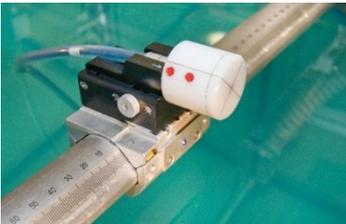
Ordering Info:

NP06-000	Leveling Pins to upgrade existing Blue Phantom ² or Blue Phantom COMPACT
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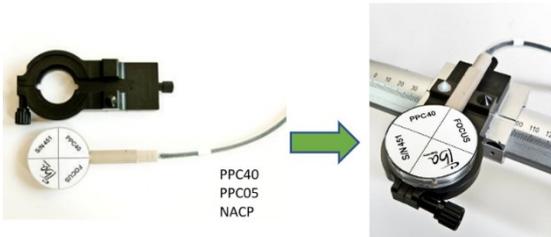
3.10 Detector Holders / Adapters

Article	Model
NP20-100	Small Universal Detector Holder: for compact thimble ionization chambers and diode detectors as well as third party detectors with a diameter of 4 mm to 10 mm
NP20-150	Large Universal Detector Holder: for compact thimble and Farmer type ionization chambers as well as third party detectors with a diameter of 10 mm to 15 mm
NP20-200	Universal parallel plate chambers Detector Holder
NP20-300	Adapter for Sun Nuclear Edge™ Detector Note: Small Universal Detector holder (NP20-100) required.
M1024400	Adapter for PTW TRUFIX™ system
M9503010	Alignment cap for CC04

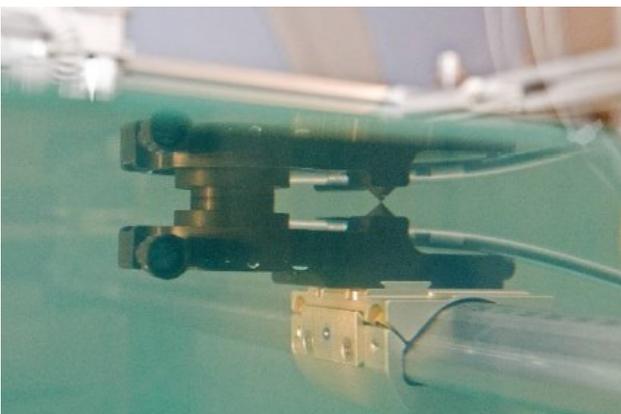
Alignment cap mounted on the CC04:



Universal Detector Holder for plan parallel chamber:



PPC05 exactly positioned at water surface:



Universal Detector Holder for Cylindrical chamber:



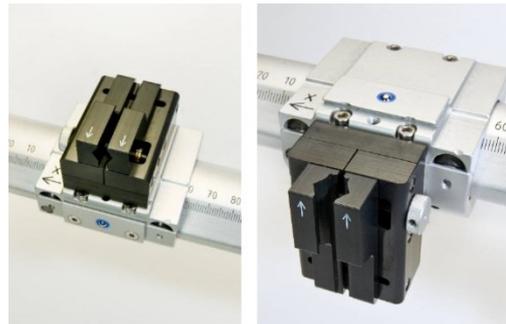
10-15mm
Large

4-10mm
Small

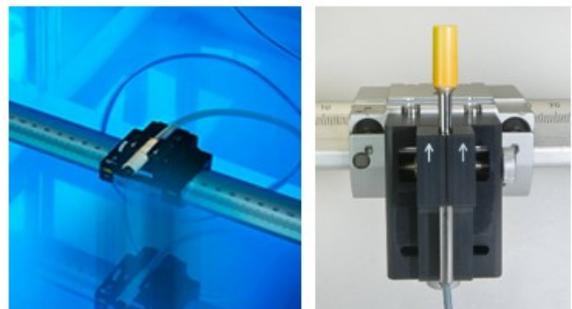
FC65-P
FC65-G
FC23-C
Build-up Caps

CC04
CC08
CC13
CC25
RAZOR Chamber
RAZOR Nano Chamber
RAZOR Diode
PFD
EFD

For horizontal or vertical detector support:



The Universal Detector Holder allows stable and reproducible setup of detectors in the IBA WP-Systems, both horizontally and vertically.



The horizontal orientation is shown with the mounting of the CC13 Ion-Chamber. The vertical orientation is demonstrated with the mounting of the RAZOR™ Diode.

3.11 Cabling - Triaxial Detector Cables

Ordering info cables, 5m length - with TNC triax connectors:

Article	Model
DS10-005	Triaxial ion chamber/diode detector cable (low noise), 5m on cable reel, TNC triax connector
DS13-005	Triaxial ion chamber/diode detector cable (low noise), 5m without cable reel, TNC triax connector
DS10-205	Thick version of triaxial ion chamber/diode detector cable (low noise), 5m on cable reel, TNC triax connector, thick version (Ø 5.3mm)
DS13-205	Thick version of triaxial ion chamber/diode detector cable (low noise), 5m without cable reel, TNC triax connector, thick version (Ø 5.3mm)

Ordering info cables, 5m length - with BNC triax connectors:

Article	Model
DS10-105	Triaxial ion chamber/diode detector cable (low noise), 5m on cable reel, BNC triax connector
DS13-105	Triaxial ion chamber/diode detector cable (low noise), 5m without cable reel, BNC triax connector
DS10-305	Thick version of triaxial ion chamber/diode detector cable (low noise), 5m on cable reel, BNC triax connector, thick version (Ø 5.3mm)
DS13-305	Thick version of triaxial ion chamber/diode detector cable (low noise), 5m without cable reel, BNC triax connector, thick (Ø 5.3mm)

Ordering info cables, 18m length - with TNC triax connectors:

Article	Model
DS10-018	Triaxial ion chamber cable (low noise), 18 m on cable reel, TNC triax connector
DS13-018	Triaxial ion chamber cable without cable reel, 18 m, TNC triax connector
DS10-218	Thick version of triaxial ion chamber/diode detector cable (low noise), 18m on cable reel, TNC triax connector, thick version (Ø 5.3mm)
DS13-218	Thick version of triaxial ion chamber/diode detector cable (low noise), 18m without cable reel, TNC triax connector, thick (Ø 5.3mm)

Ordering info cables, 18m length - with BNC triax connectors:

Article	Model
DS10-118	Triaxial ion chamber cable (low noise), 18 m on cable reel, BNC triax connector
DS13-118	Triaxial ion chamber cable without cable reel, 18 m, BNC triax connector
DS10-318	Thick version of triaxial ion chamber/diode detector cable (low noise), 18m on cable reel, BNC triax connector, thick version (Ø 5.3mm)
DS13-318	Thick version of triaxial ion chamber/diode detector cable (low noise), 18m without cable reel, BNC triax connector, thick (Ø 5.3mm)

Triaxial Cables:



TNC cable

BNC cable

Available on request in various lengths (5, 10, 15, 18, 20, 25 and 30m)

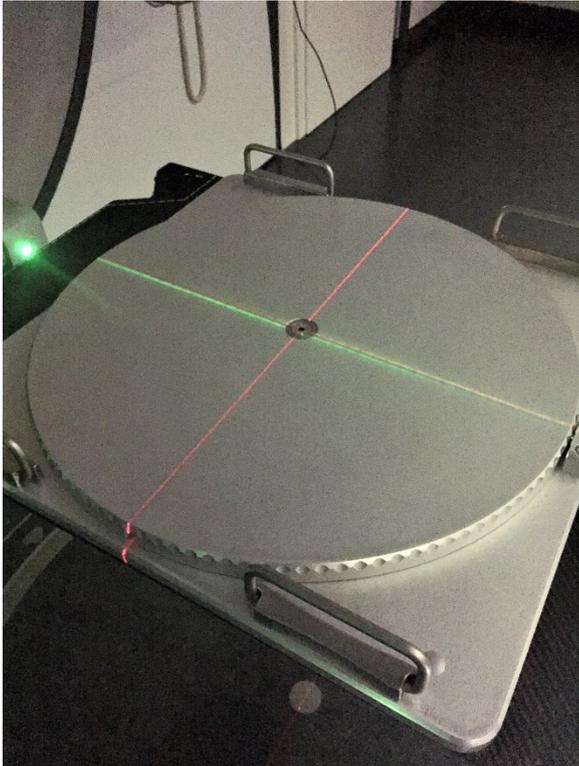
Adapter cables:

SVC-0004	Adapter cable for connection of PTW detectors (M-type connector) to IBA controller (TNC triax connector), 5m without cable reel
SVC-004A	Adapter cable f. connection of PTW detector (M-type connector) to IBA controller (TNC triax connector), 18 m without cable reel
SVC-0006	Adapter cable for connection of PTW detector (PTW-TNC connector) to IBA controller (TNC triax connector), 5m without cable reel
SVC-006A	Adapter cable for connection of PTW detector (PTW-TNC connector) to IBA controller (TNC triax connector), 18m without cable reel
SVC-0007	Adapter cable for connecting IBA detector (TNC triax connector) to PTW controller (PTW-TNC connector), 18 m, without cable reel
SVC-0008	Adapter cable for connection of PTW detector (PTW -TNC connector) to IBA controller (BNC triax connector), 30m, thick cable, without cable reel

3.12 Rotating Table for Blue Phantom COMPACT

With the rotating table from IBA Dosimetry the user receives the rotary axes for inplane-crossplane measurement requirements, without the need of emptying the tank when changing the scanning direction on the patient couch. The IBA Dosimetry rotating table is characterized by precision, durability, and ease of use.

The rotating table, especially designed for the 2D-WP System Blue Phantom COMPACT, for measurements inside the Varian® (*) HALCYON™ Linac bore, is also suitable for use with conventional Linac measurement sessions.



The handles on the turntable enable convenient and safe transport and positioning on the patient table:

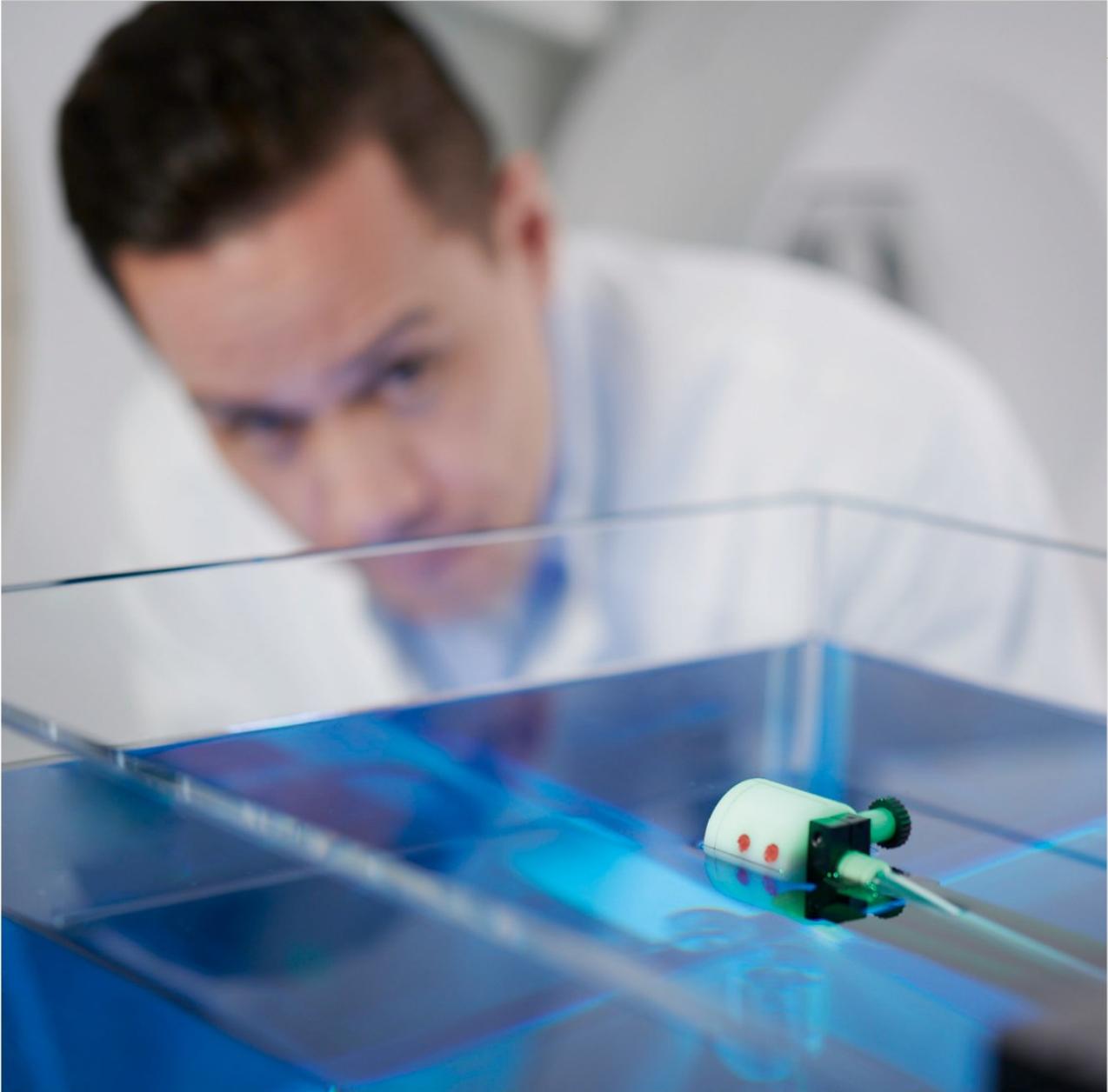


Rotating Table Specifications:

Dimension rotating plate	505mm*20mm (D/H)
Dimension base plate	535mm*525mm*12mm (W/L/H)
Total height	33mm
Locking angles	0°, 90°, 180°, and 270°
Material	Aluminum
Total weight	Approx. 17kg
Maximum load	250kg
Features:	Rubber feet Handles for carrying and positioning Crosshairs for alignment with lasers

Ordering info Blue Phantom COMPACT rotating Table:

HA07-000	Rotating Table for Blue Phantom COMPACT
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CHAPTER 4

Absolute Dosimetry Solutions

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Ordering Info DOSE1™:

Article	Model
DA20-000	DOSE1™ Reference Class Therapy Dose Meter, the standard version , delivered with a TNC triaxial input using floated input technology
DA20-300	DOSE1™ with battery pack The standard DOSE1™ with batteries.
DA21-000	DOSE1™ convertible, delivered with a convertible universal electrometer input with the capability to switch between floated and grounded input technology
DA21-300	DOSE1™ convertible with battery Pack
M1902700	Carrying case for DOSE1™ and accessories

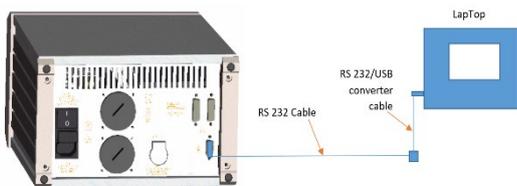
Connecting adapters for DOSE1™ convertible:

Article	Model
DA22-000	TNC triaxial threaded
DA24-000	M-connector PTW, TNC Triaxial
DA25-000	BNC-coaxial/banana
EB908000	TNC triaxial - BNC triaxial

Accessory for DOSE1™:

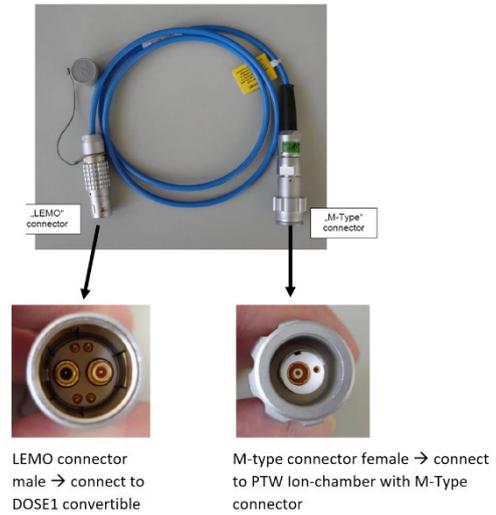
Article	Model
5120-200	All-in-One Handheld Device XA1000 , Thermo-Barometer with flexible probe, extension cable and case

DOSE1™ –PC connection:



Notes DOSE1™ convertible:

Connecting adapter M-connector PTW, TNC Triaxial:

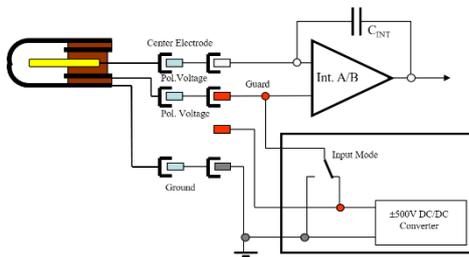


Connecting adapter TNC triaxial - BNC triaxial:



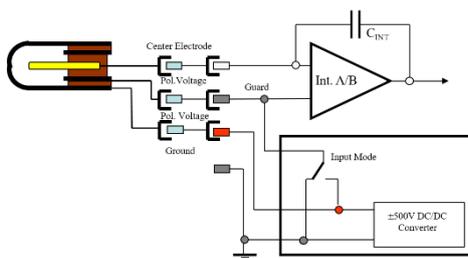
Notes Electrometer Input Technology:

Floated Input Technique:



- The chamber wall is on ground and therefore the entire chamber and cable is properly shielded.
- The outer shield of the triaxial cable is on ground. Standard triaxial connectors (either bayonet or threaded) can be used.
- No protective sleeve needed.

Grounded Input Technique:



- The conventional system, e.g., “grounded input,” clamps the electrometer amplifier and center electrode of the chamber on ground potential and provides the polarization voltage to the outer chamber wall.

Please contact IBA Dosimetry or your local representative about receiving the details for DOSE1™ and package configuration for use in clinical dosimetry.

4.2 Radioactive Stability Check Devices

4.2.1 Radioactive Stability Check Device Type CDC

The check device type CDC is used to check the stability of the response of cylindrical ionization chambers.

In addition, it can be used to determine the air density correction factor.

The check source library of the DOSE1™ reference class electrometers allow for an initial calibration of the check device CDC and storage of the data in the internal library.

Upon subsequent constancy measurements, the DOSE1™ automatically corrects the measurement for the decay of the radionuclide.

The determined air density factor can be entered in the DOSE1™ and is automatically used for correcting the measurement.

The radioactive stability check device is a radioactive source enclosed by a protective container.

The container has a chamber well into which ionization chambers are inserted by use of adapters.

If not in use, the chamber well is closed by a protective cover.

Various adapters are available to accommodate the cylindrical ionization chambers for absolute dosimetry. The adapter is generally designed as follows:



Available adapters for:

- Farmer type chambers:
 - FC23-C, FC65-G, FC65-P
- Compact thimble ion chambers
 - CC08, CC13, CC25

The holders have a unique mounting mechanism that facilitates accurate and reproducible positioning of the chamber with respect to the source.



Technical specifications:

Radionuclide	90Sr
Initial activity	30 MBq ±10%
Half-Life	28.7 years
ISO Classification	C6X444
Dose rate at 10 cm distance	< 1 µSv/h
Weight	5.5 kg

The CDC is optionally delivered with a precision thermometer (aluminum encapsulated, mercury with a glass capillary), to determine the temperature at the position of the ionization chamber.



Ordering Info Radioactive Stability Check Device Type CDC:

Article	Model
CD10-000	Radioactive Check Device type CDC for cylindrical detectors
CD11-000	Adapter for use of " Farmer " type chambers with CDC radioactive check Device for FC65-P, FC65-G, FC23-C
CD12-000	Adapter for use of CC type chambers with CDC radioactive check device for CC08, CC13, CC25 chambers
CD30-000	Thermometer for CDC radioactive check device

4.2.2 Radioactive Stability Check Device Type CDP

The check device type CDP is used to check the stability of the response of plan parallel ionization chambers.

In addition, it can be used to determine the air density correction factor.

The check source library of the DOSE1™ reference class electrometer allows for an initial calibration of the check device CDP and storage of the data in the internal library.

Upon subsequent constancy measurements, the DOSE1™ automatically corrects the measurement for the decay of the radionuclide.

The determined air density factor can be entered in the DOSE1™ and is automatically used for correcting the measurement.

The radioactive stability check device is a radioactive source enclosed by a protective container.

The container has a chamber well into which ionization chambers are inserted by use of adapters

If not in use, the chamber well is closed by a protective cover.

The adapters for plate parallel chambers are all designed in the same way. One side of the adapter is placed on the chamber, and the check source is mounted on the other side of the adapter. Depending on the construction, the adapter has an opening for the chamber stem. The adapter is generally designed as follows:



Available adapters for:

- Plan parallel chambers
 - NACP, PPC-05, PPC-40, PTW Marcus chamber

The holder adapters have a unique mounting mechanism that facilitates accurate and reproducible positioning of the chamber with respect to the source.



Technical specifications:

Radionuclide	90Sr
Initial activity	30 MBq ±10%
Half-Life	28.7 years
ISO Classification	C6X444
Dose rate at 10 cm distance	< 1 µSv/h
Weight	6.7 kg

The CDP is optionally delivered with a precision thermometer (aluminum encapsulated, mercury with a glass capillary), to determine the temperature at the position of the ionization chamber.



Ordering Info Radioactive Stability Check Device Type CDP:

CD20-000	Radioactive Check Device type CDP for parallel plate detectors
CD21-000	Adapter for use of PPC05 with CDP radioactive check device
CD22-000	Adapter for use of PPC40 with CDP radioactive check device
CD23-000	Adapter for use of NACP and PTW Marcus chamber with CDP radioactive check device
CD30-000	Thermometer for CDC radioactive check device

4.3 Water Phantoms for Absolute Dosimetry

4.3.1 WP1D Water Phantom

The WP1D phantom is used to position radiation detectors in water or air. It is suitable for reference dosimetry according to dosimetric protocols, e.g., IAEA's TRS-398 or AAPM's TG-51.

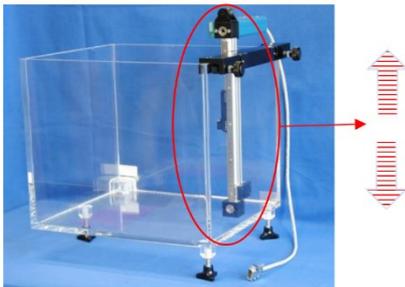
Three versions of WP1D phantom are available:

- **Manual version**, using a hand crank to move the detector
- **Smart Control Unit (SCU) version** to control the movement.
- **Common Control Unit (CCU) version** to control the movement

The **WP1D** comprises a one-dimensional high precision servo mechanism and a Perspex water tank. The z-axis has a slider with detector holder. The detector is on the holder for positioning in different depths according to the requirements of the IAEA TRS-398 or TG-51 protocols for X-ray, photon, and electron reference dosimetry.

The WP1D phantom consists of:

- A. Cubic tank and a one-dimensional moving mechanics to move the detector up and down along the Z-axis:

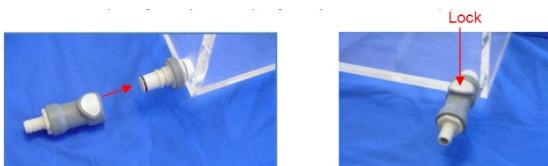


- B. Three adjustable feet support the tank and provide horizontal leveling adjustment:



Leveling plate and WP1D -Tank on leveling plate

- C. Water inlet/outlet that is equipped with a quick coupler for easy connection of the water-filling tube:



Connecting and Removing

Technical Specifications for Manual and SMART Control Unit (SCU) versions:

Tank size	34 x 40 x 35 cm ³ (inner diameter W x L x D) 36 x 42 x 36 cm ³ (outer diameter W x L x D)
Volume	~ 45 liters
Wall material	Acrylic plastic (PMMA)
Wall thickness	10 mm
Draining hose	½ inch
Leveling plate	3 point leveling mechanism
Leveling range:	± 18 mm
Lead filter size	100 x 100 mm ²
Lead filter thickness	1 mm, ± 5%, lacquer coated
Scanning mechanics	Time belt driven
Max. Scan range	25 cm
Weight	~ 11kg without leveling plate

4.3.2 WP1D manual water phantom



One dimensional, stand-alone water phantom for absolute dose measurements according to TG-51 (lead filter options needed) and IAEA TRS-398 dosimetry protocol

Technical Specifications:

Position indicator	Incremental encoder with display, battery operated
Battery lifetime	~ 10 years (lithium cell)
Position resolution	0.1 mm
Position accuracy	± 0.2 mm
Reproducibility	± 0.1 mm
Mechanical drift	Negligible, self-locking hand crank
Measurement depth	Adjusted manually with 0.1 mm steps and read out on the incremental encoder with integrated display.

Ordering Info WP1D manual version:

DA01-000	WP1D manual water phantom
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4.3.3 WP1D motorized (SCU) water phantom



One dimensional, stand-alone motorized water phantom for absolute dose measurements according to AAPM TG-51 (lead filter option needed) and IAEA TRS-398 dosimetry protocols.

The positioning system of the SCU version is called Smart Control Unit (SCU). It consists of a remote control, a motor control unit, and an interface box for positioning the detector to a preset depth. The depth is either stored or numerically input to the remote control.

The SCU can be operated from both the treatment room as well as the control room for convenient remote adjustment of the different measurement depths.

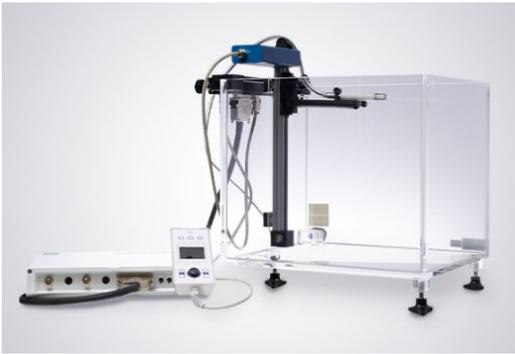
Technical Specifications:

Positioning	Torque limited DC motor with gearbox
Position feedback	10-turn high precision wire wound potentiometer
Interfacing to	SCU on interconnection box
Position resolution	0.1 mm
Position accuracy	max. ± 0.5 mm, dominated by the potentiometer linearity
Reproducibility	± 0.1 mm
Mechanical drift	Negligible; closed servo loop
PDD Steps, adjustable in steps of	0.1 – 100 mm
# of Linacs	Up to 8 Linac data sets with each 62 measurement depths can be preset and stored in the SCU.

Ordering Info WP1D SCU version:

DA02-000	WP1D motorized water phantom including Smart Control Unit (SCU)
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4.3.4 WP1D motorized (CCU) water phantom

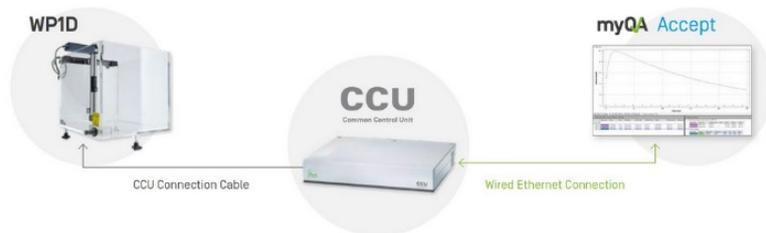


One dimensional, stand-alone motorized water phantom for absolute dose measurements according to AAPM TG-51 (lead filter option needed) and IAEA TRS-398 dosimetry protocols and automated PDDs (myQA Accept 9.0 or higher required).

Ordering Info WP1D for use with CCU:

DA03-100	WP1D for use with CCU for BP2/SMARTSCAN customers
DA03-102	WP1D for use with CCU for BP1 (CCU) customers
DA03-101	Upgrade kit for WP1D motorized (SCU) to use with CCU

Time-saving and easy setup for your TG-51 and TRS-398 checks



- Conduct your annual and periodic Machine QA
 - Easy, efficient setup and handling saves time vs. larger 3D water phantom
- Automate PDDs
 - In combination with myQA Accept 9.0 or higher
- Measure output factors
 - Field class dose measurements acquired with the CCU
 - Reference class dose measurements in combination with the Dose 1 or Dose 2
- Complete dose calibrations
 - In combination with the Dose 1 or Dose 2

Technical Specifications:

Motor	Precision DC Motor
Position feedback	High linearity potentiometer
Position accuracy	Fulfills TG-51 and TRS-398 requirements
Reproducibility	± 0.1 mm
Maximum scanning length	250mm
Weight	11kg
Tank size	360 x 420 x 360mm (outer dimensions) 340 x 400 x 350mm (inner dimensions)

4.3.5 Accessories for the WP1D

(Manual & SCU version)

Lead filter for photon beam quality determination above 10 MV according to the TG-51 protocol:



Detector holders for cylindrical and parallel plate chambers:



Three-point leveling plate for easy adjustment and carrying of the WP1D:



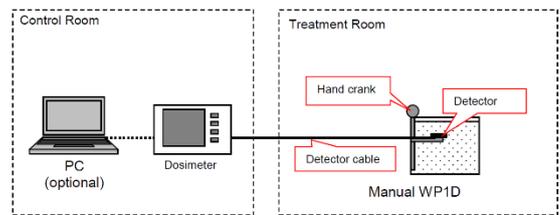
WP1D SCU version, equipped with lead filter for photon beam quality determination and leveling plate:



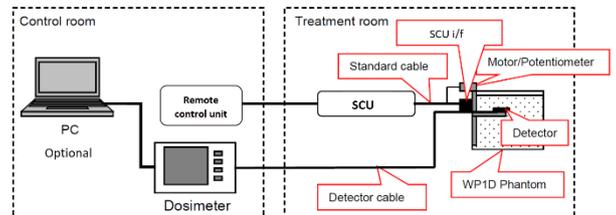
WP1D Options:

DA08-000	Three-point leveling plate made of reinforced epoxy
DA05-000	Lead filter for photon beam quality determination above 10 MV, according to TG-51 protocol, 30 cm tripod
DA05-100	Lead filter for photon beam quality determination above 10 MV, according to TG-51 protocol, 50 cm tripod
DA06-005	Extension cable, 5 m length, for WP1D with Smart Control Unit (SCU) to connect to 20 m cable
DA06-010	Extension cable, 10 m length, for WP1D with Smart Control Unit (SCU) to connect to 20 m cable
DA06-020	Extra extension cable, 20 m length, for WP1D with Smart Control Unit (SCU)

WP1D Manual version in reference dosimetry:



WP1D Smart Control Unit (SCU) version in reference dosimetry:



WP1D for use with CCU version in reference dosimetry:

Same as WP1D Smart Control Unit (SCU), but controller Common Control Unit (CCU) instead of SCU and myQA Accept 9.0 or higher required.

Detector holders for WP1D:

DA07-100	Detector holder for use of FC "Farmer type" detectors with WP1D
DA07-200	Detector holder for use of NE Farmer chamber type 2571/ 2581 with WP1D
DA07-300	Detector holder for use of PPC05, NACP and PTW Markus type detector with WP1D
DA07-400	Detector holder for use of PPC40 detector with WP1D
DA07-500	Detector holder for use of CC type detectors with WP1D
DA07-600	Detector holder for use of EFD 3G-pSi diode field detector for electrons with WP1D
DA07-800	Detector holder for use of Exradin chamber, diameter 6-10 mm with WP1D
DA07-900	Detector holder for use of Exradin chamber, diameter 10-13 mm with WP1D

WP1D Upgrade:

DA11-100	Upgrade of WP1D manual water phantom to motorized water phantom with SCU
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WP1D Phantom, manual version



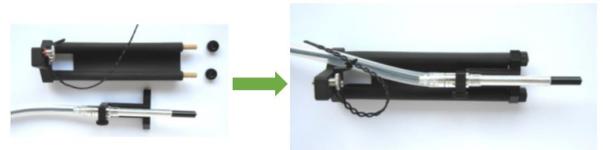
WP1D Phantom, SCU version

WP1D with mounted chamber:

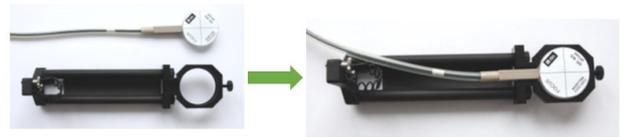


Mounting the detector on its holder:

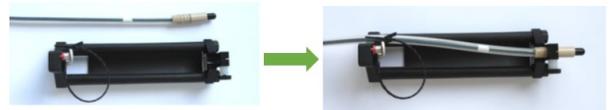
Mounting a Farmer type Chamber:



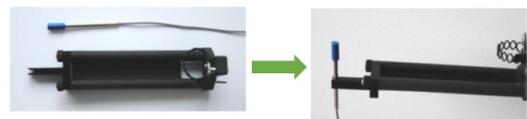
Mounting a Plan Parallel type Chamber:



Mounting a CC Thimble Ion Chamber:



Mounting semiconductor detectors:



4.3.6 WP34 water phantom

The WP34 water phantom has been designed for absolute dose measurements in radiation beams with horizontal beam incidence. Furthermore, it is suitable for the calibration of ionization chambers used in radiation therapy.

The phantom design allows cross calibration of a field ionization chamber against a calibrated reference chamber at the user facility.



Technical Specifications WP34:

Reference medium for measurement of absorbed dose	Water
Phantom material	PMMA
Beam incidence	Horizontal
Wall thickness of entrance window	4 mm ± 0.2 mm
Measuring depth (continuously variable)	18 - 250 mm (cylindrical chambers), 8 (resp. 12) - 250 mm (parallel plate chambers, depending on chamber type)
Exterior dimensions	410 x 326 x 320 mm
Interior dimensions	300 x 300 x 300 mm
Net weight	10 kg

Ordering Info WP34:

DA49-000	WP34 Advanced dosimetric and calibration water phantom for horizontal beams incl. storage case
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Chamber Adapters for WP34™:

DA41-000	Adapter for CC01 / RAZOR™ chamber
DA42-000	Adapter for CC13
DA44-000	Adapter for FC65-P or FC65-G "Farmer" type
DA45-000	Adapter for FC23-C
DA47-000	Adapter for PPC05 or NACP chamber
DA48-000	Adapter for PPC40 parallel type

Farmer type chambers:



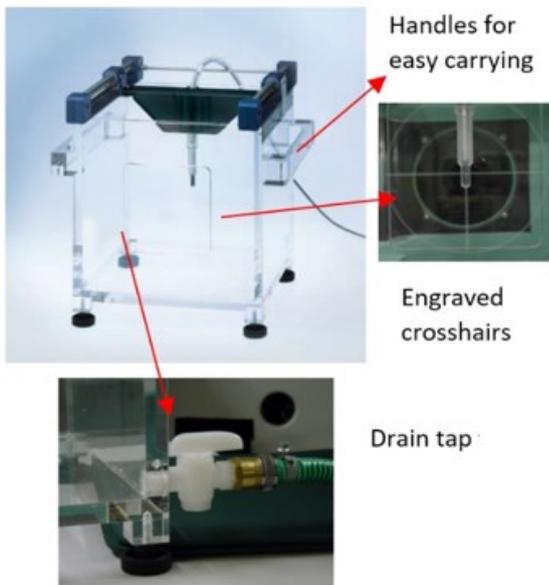
PTW 0.3cc flexible stem chambers:



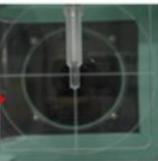
CC type chambers:



PPC05, NACP and Markus chambers:



Handles for easy carrying



Engraved crosshairs

Drain tap

4.4 Phantoms

4.4.1 SP22 Standard Calibration Phantom

The SP22 is designed for constancy checks as well as for comparison measurements of ionization chambers.

The phantom consists of a PMMA block, with a drilling for inserting adapters for various ionization chambers.

Two adapters can be inserted tip to tip without air gap for simultaneous irradiation of chambers.



Technical specifications SP22:

Density	1.18 g/cm ³
Measuring depth	50,70,100 mm
Energy range	60Co-X-Ray...50MV
Exterior dim. (L x W x H)	20x20x20 cm
Additional plate	20x20x3 cm
Weight	7 kg

Ordering Info. SP22:

DA50-000	SP22 PMMA Solid calibration phantom
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Adapters for SP22™:

DA52-000	Adapter for CC13
DA54-000	Adapter for FC65-P or FC65-G "Farmer" type
DA55-000	Adapter for FC23-C

4.4.2 SP33 PMMA Phantom

SP33 phantom solid plates are suitable for quality assurance dosimetry measurements in photon and electron beams, based on the relation between ionization chamber reading in plastic and water in the user beam with different types of ionization chambers.

The phantom consists of:

Number of plates	Thickness
1	1mm
2	2mm
1	5mm
29	10mm



Technical specifications SP33:

Material	PMMA
The density	1.18 g/cm ³
The electron density (Ne)	3.25 x10 ²³ /g
The effective Atomic Number	6.56

Ordering Info SP33:

DA60-000	SP33, 300 x 300 mm PMMA Plate phantom consisting of 33 PMMA plates including storage case
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4.4.3 SP34 Phantom

The SP34 phantom with RW3 solid plates is suitable for quality assurance dosimetry measurements in photon and electron beams, based on the relation between ionization chamber reading in plastic and water in the user beam with different types of ionization chambers.



Technical specifications SP34:

Material/Application	Water equivalent white polystyrene "RW3" for high-energy photon and electron energy.
Energy range	Photons 60Co – 25 MV Electrons 4 – 23 MeV
Material composition	Polystyrene (C ₈ H ₈) with an admixture of 2.1% ± 0.2% TiO ₂
Mass density	1.045 g/cm ³
(Z/A) _r value	0.536
Electron density (e-/g)	3.386 x 10 ²³
Electron concentration (e-/cm ³)	3.539 x 10 ²³

The SP34 with 33 RW3 plates in a storage case:



Number of plates	Thickness
1	1mm
2	2mm
1	5mm
29	10mm

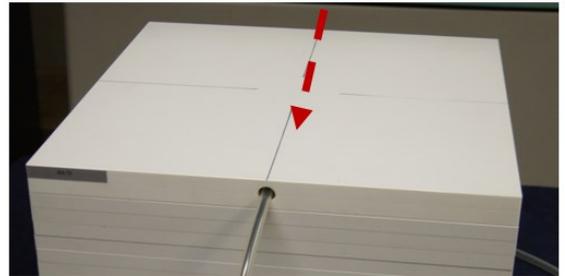
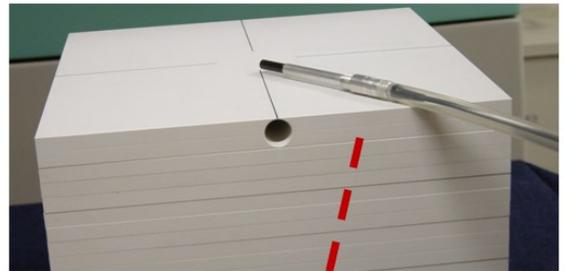
Ordering Info Solid Phantoms for Absolute Dosimetry SP34:

DA70-000	SP34, 300 x 300 mm RW3 Plate phantom consisting of 33 RW3 plates including storage case
DA70-400	SP34, 400 x 400 mm RW3 Plate phantom consisting of 33 RW3 plates including storage case

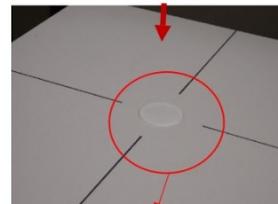
Adapter plates for IBA Dosimetry Ion-Chambers, Ion-Chambers from other suppliers and additional single plates for SP33 (PMMA), SP34 (RW3) are available. **Please contact IBA Dosimetry directly or your local representative for more details.**

Principle of adapter plates, representative for all other chambers:

FC65-G inserted in the adapter plate:



Plan Parallel PPC05 inserted in the adapter plate:



An RW3 cap to fill out the gap in the plate lid in the chamber package.



CHAPTER 5

Ionization Chambers & Diode Detectors

Life.
Science.

5.1 General Info Ionization Chambers



IBA Dosimetry offers a full range of ionization chambers for various clinical applications. All detectors are produced in-house and have been extensively tested to meet the highest standards in radiotherapy dosimetry.

All IBA Dosimetry Ion-Chambers are **waterproof, fully guarded, air-vented**, supplied with a **60Co factory calibration certificate (N_{D,w}), traceable to PTB**.

5.1.1 IBA Dosimetry Farmer type ionization chambers:

The Farmer type ionization chambers are intended for the **absolute dosimetry of photon and electron beams** at therapy level dose rates.

Furthermore, these chambers are suitable for dosimetry in proton fields and for depth dose measurements and field profile analysis.

Farmer type ionization chambers:

FC65-G	FC65-GX	FC65-P	FC23-C
Standard reference detector for reference dosimetry and scientific applications	Standard reference detector for reference dosimetry and scientific applications. Preferred chamber for low energies	Used for all routine applications	Yields higher precision in measuring of isodose contours

5.1.2 IBA Dosimetry Parallel plate ion chambers:

The parallel plate ionization chambers are designed for **absolute and relative electron beam dosimetry** in the quantity of absorbed dose to water. It can be used for proton beam absolute and relative dosimetry and for photon beam depth-dose measurements as well.

Parallel plate ionization chambers:

NACP	PPC-05 (Marcus Type)	PPC-40 (Roos Type)
Designed according to recommendations of the Nordic Association of Clinical Physicists (NACP), Acta Radiologica Oncology 19,55. The chamber is used for absolute dosimetry of electron beams	For absolute dosimetry of electron, photon and proton beams in radiotherapy.	

5.1.3 IBA Dosimetry compact thimble ion chambers:

CC25	Sensitive Volume: 0.25 cm ³ For quality assurance in air and for low dose measurements in water phantoms.
CC13	Sensitive Volume: 0.13 cm ³ Standard chamber for clinical use in water phantoms and for output factor measurements.
CC08	Sensitive Volume: 0.08 cm ³ For customized applications during manufacturing and installation of linear accelerators.
CC04	Sensitive Volume: 0.04 cm ³ Conventional ionization chamber for relative dosimetry, for measurement of small fields and of ranges with high dose gradients, e.g., stereotactic fields.
RAZOR™	Sensitive Volume: 0.01 cm ³ For measurement of small fields and of ranges with high dose gradients, e.g., stereotactic fields.
RAZOR™ Nano	Sensitive Volume: 0.003 cm ³ Worldwide smallest available high-performance ionization chamber, for field profile analysis, stereotactic, IMRT and any small field measurements

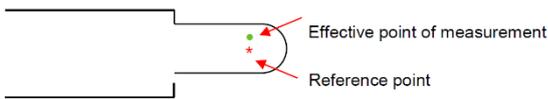
Effective point of measurement (cylindrical chambers):

Reference point (*)

For cylindrical ionization chambers, the reference point is the geometrical center of the active chamber volume. It is located on the rotational axis of the chamber. In the data sheet, the distance from the distal end of the chamber to the reference point is usually given.

Effective point of measurement (•)

Depending on the radiation type and the conventions used, there is a deviation from the reference point. The corrected reference point is called effective point of measurement. It is closer to the radiation source. The measured signal would be at this point if the chamber were not present.



Currently used in the relative dosimetry application SW:

- Photons: $P_{eff} = 0.6 * r$
- Electrons and Co60: $P_{eff} = 0.5 * r$

(r = inner radius of the active volume)

Air vented Ionization Chambers:

Each IBA Dosimetry chamber is covered by a watertight silicone sleeve that allows for air ventilation (here as an example the NACP-02 chamber).

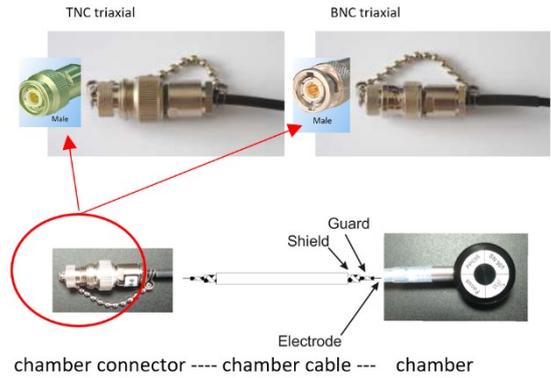


Inside the sleeve, there are two **humidity indicators**. The indicator color changes according to the humidity of the environment. Only the white color of the indicator indicates that the humidity is suitable for the chamber operation.

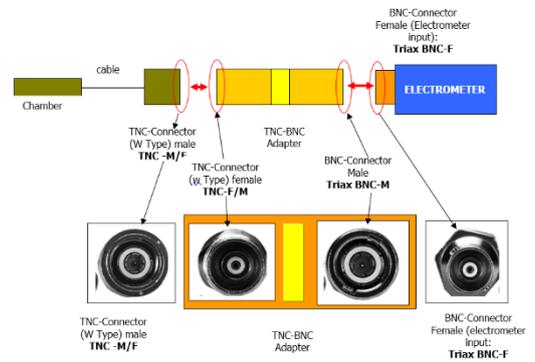


If its color changes to pink, check the chamber for increased leakage current.

Chamber connectors - cable:



Adapter Chamber-Electrometer:



Recommended Chambers for Relative Dosimetry:

Field-Size	Field detector	Reference - Chamber
≤5x 5 cm	RAZOR™ Chamber (preferably)	Stealth™ Chamber
>5x5 cm	CC04	Stealth™ Chamber / CC13
0.5 x 0.5 cm – 3cm x 3cm	RAZOR™ Nano Chamber	Stealth™ Chamber

5.2 Farmer Type Ionization Chambers

5.2.1 FC65-G



FC65-G ionization chamber for reference dosimetry and calibrations.

FC65-G is PTB approved.

The Farmer type chamber FC65-G is an air cavity ionization chamber, vented through a silicon sleeve. It is waterproof and fully guarded.

Materials:

Part	Material	Characteristic
Outer electrode	Graphite	$\rho = 1.8 \text{ g/cm}^3$
Inner electrode	Aluminum	$\rho = 2.7 \text{ g/cm}^3$
Chamber stem	Aluminum	$\rho = 2.7 \text{ g/cm}^3$
Build-up cap	POM (CH ₂ O)	$\rho = 1.4 \text{ g/cm}^3$

Energy ranges:

Beam Quality	Nominal range
Photons	Co-60 to 25 MV
Electrons	10 to 50 MeV
Protons	40 to 230 MeV

The FC65-G Farmer Chamber is **compatible with MRI Linacs**

The FC65-G chamber delivered with:

- 60Co factory calibration certificate ($N_{D,w}$) traceable to PTB
- Build-up cap for Co-60 / alignment cap

Ordering Info FC65-G chamber:

DS04-000	FC65-G "Farmer" type ion chamber with sensitive volume: 0.65 cm ³ , graphite wall, waterproof, TNC triax
DS04-100	FC65-G "Farmer" type ion chamber with sensitive volume: 0.65 cm ³ , graphite wall, waterproof, BNC triax

5.2.2 FC65-GX



FC65-GX ionization chamber for reference dosimetry and calibrations.

The Farmer type chamber FC65-GX is an air cavity ionization chamber, vented through a silicon sleeve. It is waterproof and fully guarded.

Materials:

Part	Material	Characteristic
Outer electrode	Graphite	$\rho = 1.8 \text{ g/cm}^3$
Inner electrode	Aluminum	$\rho = 2.7 \text{ g/cm}^3$
Chamber stem	Aluminum	$\rho = 2.7 \text{ g/cm}^3$
Build-up cap	POM (CH ₂ O)	$\rho = 1.4 \text{ g/cm}^3$

Energy ranges:

Beam Quality	Nominal range
X-ray (air kerma)	50kV to Co-60
X-ray (absorbed dose to water)	140kV to Co-60
Photons	Co-60 to 25 MV
Electrons	10 to 50 MeV
Protons	40 to 230 MeV

The FC65-GX chamber delivered with:

- 60Co factory calibration certificate ($N_{D,w}$) traceable to PTB
- Build-up cap for Co-60 / alignment cap

Ordering Info FC65-G chamber:

DS04-500	FC65-GX "Farmer" type ion chamber with sensitive volume: 0.65 cm ³ , graphite wall, waterproof, TNC triax
DS04-600	FC65-GX "Farmer" type ion chamber with sensitive volume: 0.65 cm ³ , graphite wall, waterproof, BNC triax

5.2.3 FC65-P



The Farmer type chamber FC65-P is an air cavity ionization chamber, vented through a waterproof silicon sleeve. It is waterproof and fully guarded.

FC65-P is PTB approved.

Materials:

Part	Material	Characteristic
Outer electrode	POM (CH ₂ O) black	$\rho = 1.4 \text{ g/cm}^3$
Inner electrode	Aluminum	$\rho = 2.7 \text{ g/cm}^3$
Chamber stem	Aluminum	$\rho = 2.7 \text{ g/cm}^3$
Build-up cap for Co-60	POM (CH ₂ O) white	$\rho = 1.4 \text{ g/cm}^3$

Energy ranges:

Beam Quality	Nominal range
Photons	Co-60 to 25 MV
Electrons	10 to 50 MeV
Protons	40 to 230 MeV

The FC65-P chamber delivered with:

- 60Co factory calibration certificate ($N_{D,w}$) traceable to PTB
- Build-up cap for Co-60 / alignment cap

Ordering Info FC65-P chamber:

DS24-000	FC65-P "Farmer" type ion chamber with sensitive volume: 0.65 cm ³ POM, waterproof, TNC triax
DS24-100	FC65-P "Farmer" type ion chamber with sensitive volume: 0.65 cm ³ , POM, waterproof, BNC triax

5.2.4 FC23-C



The FC23-C is a shortened Farmer-type ionization chamber intended for:

- Absolute dosimetry of **photon** and **electron** beams
- Dosimetry in **proton** fields and for depth dose measurements and field profile analysis

FC23-C is PTB approved.

The Farmer type chamber FC23-C is an air cavity ionization chamber, vented through a silicon sleeve. It is waterproof and fully guarded.

Materials:

Part	Material	Characteristic
Outer electrode	Shonka (C-552)	$\rho = 1.76 \text{ g/cm}^3$
Inner electrode	Shonka (C-552)	$\rho = 1.76 \text{ g/cm}^3$
Chamber stem	Aluminum	$\rho = 2.7 \text{ g/cm}^3$
Build-up cap for Co-60	POM (CH ₂ O)	$\rho = 1.4 \text{ g/cm}^3$

Energy ranges:

Beam Quality	Nominal range
Photons	Co-60 to 25 MV
Electrons	10 to 50 MeV
Protons	40 to 230 MeV

The FC23-C chamber is delivered with:

- 60Co factory calibration certificate ($N_{D,w}$) traceable to PTB
- Build-up cap for Co-60 POM / alignment cap

Ordering Info Farmer type chamber FC23-C:

DS23-000	FC23-C "Farmer" type ion chamber with sensitive volume: 0.23 cm ³ , shonka plastic, waterproof, TNC triax
DS23-100	FC23-C "Farmer" type ion chamber with sensitive volume: 0.23 cm ³ , shonka plastic, waterproof, BNC triax

5.3 Plane Parallel Ion-Chambers

5.3.1 NACP –Chamber



The NACP is designed according to recommendations of the Nordic Association of Clinical Physicists (NACP).

The chamber is used for absolute dosimetry of **electron beams**.

A thinner front wall (entrance window) minimizes contamination of the beam, allows measurements at shallow depths, and guarantees high accuracy even at low electron energies.

A watertight silicon sleeve that allows for air ventilation covers the NACP chamber cable.

Supplied with a ^{60}Co factory calibration certificate ($N_{D,w}$) traceable to PTB.

Materials:

Part	Material	Characteristic
Entrance window (polarizing electrode)	Graphite/Mylar foil	1.8 g/cm ³
Back wall (collecting electrode)	Polystyrene (coated with graphite)	1.05 g/cm ³
Chamber encapsulation	Polystyrene	1.05 g/cm ³

Energy ranges:

Beam Quality	Nominal range
Electrons	2 to 50 MeV
Protons	40 to 230 MeV

Ordering Info NACP chamber:

953-000-TT	NACP Parallel plate ionization chamber, sensitive volume: 0.16 cm ³ , TNC triax
953-000-BT	NACP Parallel plate ionization chamber, sensitive volume: 0.16 cm ³ , BNC triax
953-000	NACP Parallel plate ionization chamber, sensitive volume: 0.16 cm ³ , BNC/Banana

5.3.2 PPC05 – Chamber



The parallel plate ionization chamber PPC05 is designed for **absolute and relative electron beam dosimetry** above 2 MeV in the measuring quantity absorbed dose to water.

The chamber is constructed with a circular sensitive volume of planar geometry covered by a rigid 1 mm thick entry window.

The small collecting volume with 0.6 mm plate spacing, 9.9 mm diameter and a 3.4-mm-wide guard ring enables excellent resolution in depth dose studies and requires a small perturbation correction.

The chamber is waterproof and vented through a silicone sleeve.

Supplied with a ^{60}Co factory calibration certificate ($N_{D,w}$) traceable to PTB.

Materials:

Part	Material	Characteristic
Entry window (polarizing electrode)	Shonka (C-552)	$\rho = 1.76 \text{ g/cm}^3$
Back wall (collecting electrode)	PEEK graphitized	$\rho = 1.32 \text{ g/cm}^3$
sidewalls	PEEK and PPE	

Energy ranges:

Beam Quality	Nominal range
Photons	Co-60 to 25 MV
Electrons	2 to 20 MeV
Protons	40 to 230 MeV

Ordering Info PP05 chamber:

DS30-000	PPC05 Parallel plate chamber for electron beams, sensitive volume: 0.05 cm ³ , TNC triax
DS30-100	PPC05 Parallel plate chamber for electron beams, sensitive volume: 0.05 cm ³ , BNC triax

5.3.3 PPC40 – Chamber



The parallel plate ionization chamber PPC40 is designed for absolute and relative electron beam dosimetry above 2 MeV in the measuring quantity absorbed dose to water.

It is constructed with a circular sensitive volume of planar geometry covered by a rigid 1 mm thick entrance window.

As an associated measuring instrument for precise absolute dose determinations, in reference dosimetry, compliance testing or installation and set-up of treatment machines or other equipment, it is recommended to use the reference-class therapy dosimeter DOSE1™.

The PPC40 is waterproof, and its cable is covered by a watertight silicon sleeve that allows for air ventilation.

Inside the sleeve, there are two humidity indicators. The indicator color changes according to the humidity of the environment. Only white color of the indicator indicates that the humidity is suitable for the chamber operation.

Supplied with a ⁶⁰Co factory calibration certificate ($N_{D,w}$) traceable to PTB.

Materials:

Part	Material	Characteristic
Entrance window (polarizing electrode)	PMMA (coated with graphite)	1.19 g/cm ³
Back wall (collecting electrode)	PMMA (coated with graphite)	1.19 g/cm ³
Chamber stem	PEEK	1.32 g/cm ³
Build-up cap	PMMA	1.19 g/cm ³

Energy ranges:

Beam Quality	Nominal range
Photons	Co-60 to 25 MV
Electrons	2 to 20 MeV
Protons	40 to 230 MeV

Ordering Info PP40 chamber:

DS31-000	PPC40 Parallel plate ion chamber for electron beams, Sensitive volume: 0.4 cm ³ , TNC triax
DS31-100	PPC40 Parallel plate ion chamber for electron beams, Sensitive volume: 0.4 cm ³ , BNC triax

5.4 Compact thimble Ion-Chambers

5.4.1 CC13 – Ion Chamber



The waterproof, ventilated thimble chamber **CC13** is the standard chamber for clinical use in radiotherapy.

Supplied with a ^{60}Co factory calibration certificate ($N_{D,w}$) traceable to PTB.

Measurements can be performed in air, water phantoms, or solid phantoms.

Materials:

Part	Material	Characteristic
Outer electrode	Shonka (C-552)	$\rho = 1.76 \text{ g/cm}^3$
Inner electrode	Shonka (C-552)	$\rho = 1.76 \text{ g/cm}^3$
Chamber stem	PEEK	$\rho = 1.32 \text{ g/cm}^3$

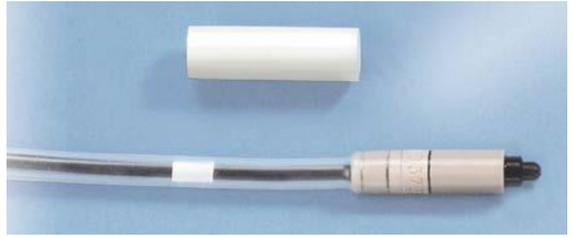
Energy ranges:

Beam Quality	Nominal range
Photons	Co-60 to 25 MV
Electrons	2 to 20 MeV
Protons	40 to 230 MeV

Ordering Info CC13 chamber:

DS02-000	CC13 Ion chamber, sensitive volume: 0.13 cm^3 , shonka plastic, waterproof, TNC triax
DS02-100	CC13 Ion chamber, sensitive volume: 0.13 cm^3 , shonka plastic, waterproof, BNC triax

5.4.2 CC04- Ion Chamber



Waterproof, ventilated thimble chamber for relative dosimetry, absolute dosimetry, especially for stereotactic, IMRT or any small field measurements.

Supplied with a ^{60}Co factory calibration certificate ($N_{D,w}$) traceable to PTB.

Measurements can be performed in air, water phantoms, or solid phantoms.

Materials:

Part	Material	Characteristic
Outer electrode	Shonka (C-552)	$\rho = 1.76 \text{ g/cm}^3$
Inner electrode	Shonka (C-552)	$\rho = 1.76 \text{ g/cm}^3$
Chamber stem	PEEK	$\rho = 1.32 \text{ g/cm}^3$

Energy ranges:

Beam Quality	Nominal range
Photons	Co-60 to 25 MV
Electrons	2 to 20 MeV
Protons	40 to 230 MeV

Ordering Infor CC04 chamber:

DS03-000	CC04 Ion chamber, sensitive volume: 0.04 cm^3 , shonka plastic, waterproof, TNC triax
DS03-100	CC04 Ion chamber, sensitive volume: 0.04 cm^3 , shonka plastic, waterproof, BNC triax

5.4.3 CC08 – Ion Chamber



Waterproof, ventilated thimble chamber suitable for electron and photon beam dosimetry. Supplied with a ^{60}Co factory calibration certificate ($N_{D,w}$) traceable to PTB.

It is intended for absolute and relative dosimetry of **photon**, **electron**, and **proton beams** in air, water phantoms, or solid phantoms.

Materials:

Part	Material	Characteristic
Outer electrode	Shonka (C-552)	$\rho = 1.76 \text{ g/cm}^3$
Inner electrode	Shonka (C-552)	$\rho = 1.76 \text{ g/cm}^3$
Chamber stem	PEEK	$\rho = 1.32 \text{ g/cm}^3$

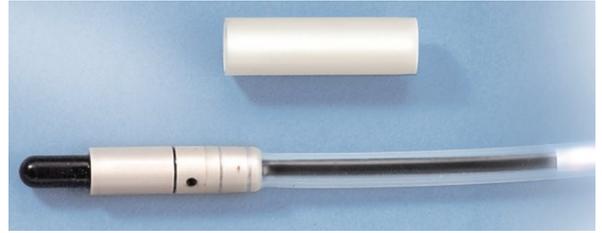
Energy ranges:

Beam Quality	Nominal range
Photons	Co-60 to 25 MV
Electrons	2 to 20 MeV
Protons	40 to 230 MeV

Ordering Info CC08 chamber:

DS21-000	CC08 Ion chamber: 0.08 cm^3 , shonka plastic, waterproof, TNC triax
DS21-100	CC08 Ion chamber: 0.08 cm^3 , shonka plastic, waterproof, BNC triax

5.4.4 CC25 - Ion Chamber



Waterproof, ventilated thimble chamber suitable for quality assurance in air and for low dose measurements in water phantoms. Supplied with a ^{60}Co factory calibration certificate ($N_{D,w}$) traceable to PTB.

It is intended for absolute and relative dosimetry of **photon**, **electron**, and **proton beams** in air, water phantoms, or solid phantoms.

Materials:

Part	Material	Characteristic
Outer electrode	Shonka (C-552)	$\rho = 1.76 \text{ g/cm}^3$
Inner electrode	Shonka (C-552)	$\rho = 1.76 \text{ g/cm}^3$
Chamber stem	PEEK	$\rho = 1.32 \text{ g/cm}^3$

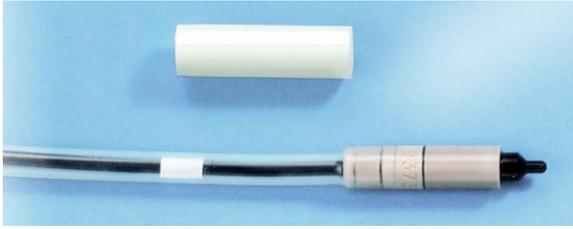
Energy ranges:

Beam Quality	Nominal range
Photons	Co-60 to 25 MV
Electrons	2 to 20 MeV
Protons	40 to 230 MeV

Ordering Info CC25 chamber:

DS22-000	CC25 Ion chamber: 0.25 cm^3 , shonka plastic, waterproof, TNC triax
DS22-100	CC25 Ion chamber: 0.25 cm^3 , shonka plastic, waterproof, BNC triax

5.4.5 RAZOR™ Chamber



The **RAZOR™ Chamber** is a waterproof, ventilated thimble chamber for measurements of small fields and ranges with high dose gradients, such as stereotactic, IMRT and any other small fields. Supplied with a ^{60}Co factory calibration certificate ($N_{D,w}$) traceable to PTB.

It is intended for dosimetry of **photon** and **electron** beams in air, water phantoms, or solid phantoms.

Materials:

Part	Material	Characteristic
Outer electrode	Shonka (C-552)	$\rho = 1.76 \text{ g/cm}^3$
Inner electrode	Graphite	$\rho = 1.60 \text{ g/cm}^3$
Chamber stem	PEEK	$\rho = 1.32 \text{ g/cm}^3$

Energy ranges:

Beam Quality	Nominal range
Photons	Co-60 to 25 MV
Electrons	2 to 20 MeV

Ordering Info RAZOR™ Chamber:

DS05-001	RAZOR™ chamber, sensitive volume: 0.01 cm^3 , shonka plastic-graphite, waterproof, TNC triax
DS05-101	RAZOR™ chamber, sensitive volume: 0.01 cm^3 , shonka plastic-graphite, waterproof, BNC triax

5.4.6 RAZOR™ Nano Chamber



The **RAZOR™ Nano Chamber** with its **smallest volume in the market** and high-performance physics characteristics is a unique ionization chamber solution for Small Field Dosimetry.

Waterproof, ventilated thimble ionization chamber RAZOR™ Nano Chamber is intended for relative dose determination, depth dose measurements, and field profile analysis for stereotactic, IMRT and any small field measurements. Supplied with a ^{60}Co factory calibration certificate ($N_{D,w}$) traceable to PTB.

Measurements can be performed in air, water phantoms, or solid phantoms.

Materials:

Part	Material	Characteristic
Outer electrode	Shonka (C-552)	$\rho = 1.76 \text{ g/cm}^3$
Inner electrode	Graphite-EDM3	$\rho = 1.81 \text{ g/cm}^3$
Chamber stem	PEEK	$\rho = 1.32 \text{ g/cm}^3$

Energy ranges:

Beam Quality	Nominal range
Photons	Co-60 to 25 MV
Electrons	10 MeV to 20 MeV

Ordering Info RAZOR™ Nano chamber:

DS05-002	RAZOR™ Nano chamber, sensitive volume: 0.003 cm^3 , shonka plastic-graphite, waterproof, TNC triax
DS05-102	RAZOR™ Nano chamber, sensitive volume: 0.003 cm^3 , shonka plastic-graphite, waterproof, BNC triax

5.5 Reference Signal Chambers

5.5.1 Reference Signal Chamber Stealth™

The Stealth™ Chamber is a large transmission ionization chamber designed for relative dosimetry at therapy level dose rates and intended to be used as **reference signal chamber** in relative dosimetry for clinical use in water phantom scanning systems.

It is used especially for PDDs and profiles of small fields.

5.5.2 Square Stealth™ Chamber:

The Stealth™ Chamber is a fully guarded and air vented ionization chamber.



Square Stealth™ Chamber Technical Specifications:

Active area (AW × AL)	21.9 cm x 21.9 cm
Sensitive volume	588 cm ³
Optical transparency	≥ 75%
Material	Lexan 9030
Material density	1.2 g/cm ³
Weight without / with holder	~420 g / 2150 g

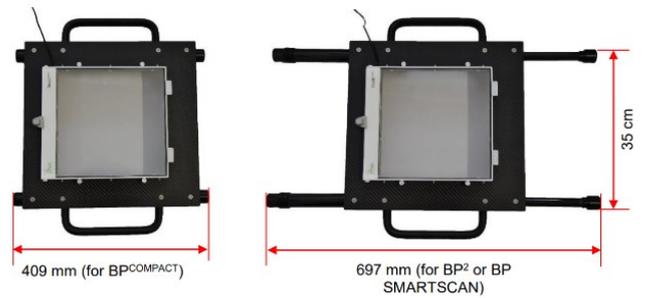
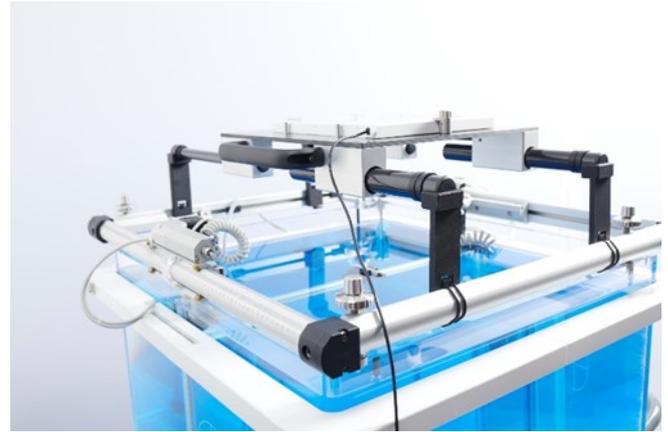
Square Stealth™ Chamber Operational Parameters:

Parameter	Value
Energy	6MV and 10 MV
Charge	30 pC/mGy cm ²
Field size	0.5 cm × 0.5 cm – 20 cm × 20 cm (max.)
Bias voltage	+/- 300 V

Mounting Stealth™ Chamber on a Linac head:



Square Stealth™ Chamber mounted on a Water Phantom:



Legs fully retracted and Legs fully extended.

5.5.3 Round Stealth™ Chamber:

The round Stealth™ Chamber is a transmission detector with a **circular active area** with a diameter of **92 mm**.

The active detecting area is constructed the **same as square Stealth™ Chamber** and has a total attenuation equivalent of less than **0.5 mm Al**.



Round Stealth™ Chamber on Linac head with rounded exit:



Materials for square and round Stealth™ Chamber:

Part	Material
Plates	Polycarbonate
Plate coatings	Proprietary vacuum evaporated thin film
Chamber outside frame	ABS plastic (acrylonitrile butadiene styrene)
Screws	Nylon

Ordering info Stealth™ Chamber:

DS50-000-T	Round Stealth™ CHAMBER Parallel Plate Ref.-Signal Ion-Chamber, TNC Triax, 10 cm in diameter for stereotactic cones
DS50-001-XL-T	Square Stealth™ CHAMBER Parallel Plate Ref.-Signal Ion-Chamber, TNC Triax, Active area 23 cm x 23 cm, including SIEMENS® (*) Linac Adapter
DS50-002-XL-T	Square Stealth™ CHAMBER Parallel Plate Ref.-Signal Ion-Chamber, TNC Triax, Active area 23 cm x 23 cm, including ELEKTA® (*) Linac Adapter
DS50-003-XL-T	Square Stealth™ CHAMBER Parallel Plate Ref.-Signal Ion-Chamber, TNC Triax, Active area 23 cm x 23 cm, including VARIAN® (*) Linac Adapter
DS50-102-XL-T	Upgrade from existing Stealth™ Chamber for Elekta® (*) to XL-Version
DS50-103-XL-T	Upgrade from existing Stealth™ Chamber for VARIAN® (*) to XL-Version
DS50-004-XL-T	Stealth™ Chamber for use w/ Halcyon™ Linac Parallel Plate Ref.-Signal Ion-Chamber

Plastic cases for Stealth Chamber:

Article	Model
M1903000	HEAVY 4040 ELEKTA® (*) hard shell plastic case for the Stealth™ Chamber
M1903010	HEAVY 4054 VARIAN® (*) hard shell plastic case for the Stealth™ Chamber

5.5.4 Reference Chamber DCT 10 Chamber

DCT 10 air vented Ionization chamber as reference signal source for Blue Phantom Helix WP-System


Specifications DCT 10 ionization chamber:

Outer electrode	carbon fiber reinforced epoxy resin (CFK)
Inner electrode	carbon fiber reinforced epoxy resin (CFK)
Connector	Triaxial TNX, BNC Triax, BNC Banana
Length of chamber cable	2 m flexible, low noise
Volume	4,9 cm³
Active length	100 mm
Inner radius of outer electrode	8,0 mm
Inner radius of inner electrode	1,0 mm
Weight	ca. 60 g

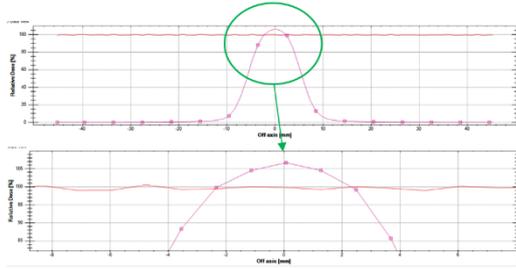
Ordering info DCT 10:

VD1002103	ionization chamber DCT 10
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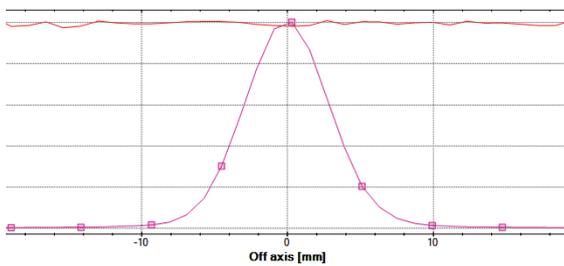
5.5.5 General Stealth™ Chamber Info:

With the Stealth™ reference chamber, the reference signal is highly stable and smooth. Profiles and curves are less noisy and post measurement processing, e.g., applying a smoothing algorithm, becomes unnecessary.

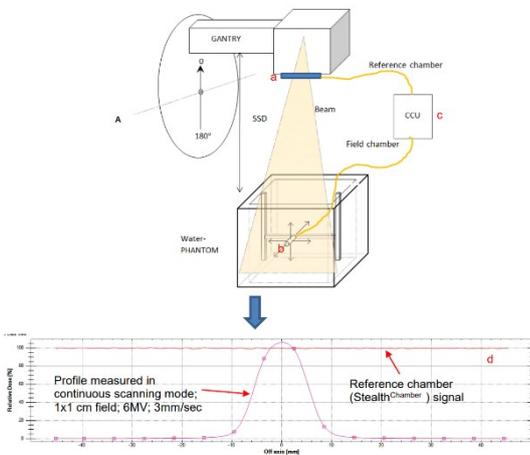
Example: **Field 1 x 1 cm; Energy: 6MV**



Example: **Field 0.5 x 0.5 cm; Energy: 6MV**



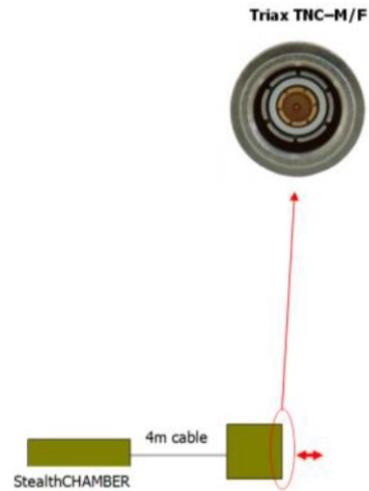
Measurements with reference chamber Stealth™:



The transmission Stealth™ Chamber (a) mounted with a Stealth holder in the beam, where it does not shadow the field detector for the entire area of programmed positions in order to produce accurate and reproducible scans (d).

The field detector (b) and Stealth™ Chamber (a) are connected to the connectors labeled Field Sensor Detector and Reference Sensor Detector of the IBA Dosimetry Common Control Unit (CCU; c), respectively.

Stealth™ (square/round) connector:



5.6 Diode Detectors

5.6.1 PFD 3 G-pSi photon diode field detector:

The Semiconductor diode field detector PFD is intended for relative Dosimetry of photon beams Photon beams, 1 to 20 MeV, in radiotherapy. The detector is designed for depth dose and profile measurements in air and water phantoms, and for output factor measurements in small to medium sized photon beams.



Specifications PFD 3 G-pSi:

Item	Value
Stem material	Stainless steel
Enclosure material	ABS and epoxy
Position of measurement point	Indicated by a crosshair at the top of the detector
Effective measurement point* (mm)	1.2 ± 0.2 from surface
Chip size (mm)	2.1 × 2.1 × 0.4
Active detector diameter (mm)	1.6
Active detector thickness (mm)	0.08

Outer dimensions PFD 3 G-pSi:

Part	value (mm)
Type Head diameter	7.2
Head length	17
Stem diameter	4.0
Total length	58

Ordering info PFD 3 G-pSi photon diode:

999-702-T	PFD diode field detector, photon beams with TNC triax connector
999-702-BT	PFD diode field detector, photon beams with BNC triax connector

Required adapters for PFD 3-GpSi:

DS09-000	TNC triax - BNC coaxial adapter to connect existing 3G-pSi diode detector required for Water Phantom with TNC triax
DS09-100	BNC triax - BNC coaxial adapter to connect existing 3G-pSi diode detector required for Water Phantom with BNC triax

5.6.2 EFD 3 G-pSi electron diode field detector:

The Semiconductor diode field detector EFD is intended for relative Dosimetry of electron beams, **4 to 25 MeV**, in radiotherapy. The detector is designed for depth dose and profile measurements in air and water phantoms.



Specifications EFD 3 G-pSi:

Item	Value
Stem material	Stainless steel
Enclosure material	ABS and epoxy
Position of measurement point	Indicated by a crosshair at the top of the detector
Effective measurement point (mm):	1.2 ± 0.2 from surface
Chip size (mm)	2.1 × 2.1 × 0.4
Active detector diameter (mm)	1.6
Active detector thickness (mm)	0.08

Outer dimensions EFD 3 G-pSi:

Part	value (mm)
Type Head diameter	7.2
Head length	17
Stem diameter	4.0
Total length	58

Ordering info EFD 3 G-pSi electron diode:

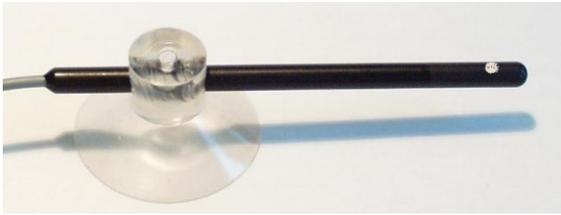
Article	Model
999-602-T	EFD diode field detector, electron beams with TNC triax connector
999-602-BT	EFD diode field detector, electron beams with BNC triax connector

Required adapters for EFD 3-GpSi:

DS09-000	TNC triax - BNC coaxial adapter to connect existing 3G-pSi diode detector required for Water Phantom with TNC triax
DS09-100	BNC triax - BNC coaxial adapter to connect existing 3G-pSi diode detector required for Water Phantom with BNC triax

5.6.3 RFD 3 G-pSi diode:

The **reference detector** is used only to obtain a reference signal for relative field measurements. By calculating the quotient of the field and the reference signals, the effect of the variations in the accelerator output is eliminated.



Specifications RFD 3 G-pSi:

Item	Value
Enclosure material	ABS and epoxy
Measurement point	Indicated by a white dot on the detector
Chip size (mm)	2.1 × 2.1 × 0.4
Active detector diameter (mm)	1.6
Active detector thickness (mm)	0.08

Outer dimensions RFD 3 G-pSi:

Part	value (mm)
Type Head diameter	5
Head length	90
Stem diameter	n.a.
Total length	90

Ordering info RFD 3 G-pSi electron diode:

999-802-T	RFD diode reference detector with TNC triax connector
999-802-BT	RFD diode reference detector with BNC triax connector

Required adapters for PFD 3-GpSi:

Article	Model
DS09-000	TNC triax - BNC coaxial adapter to connect existing 3G-pSi diode detector required for Water Phantom with TNC triax
DS09-100	BNC triax - BNC coaxial adapter to connect existing 3G-pSi diode detector required for Water Phantom with BNC triax

5.6.4 RAZOR™ Diode detector:

The **unshielded RAZOR™ Diode detector** is intended for relative Dosimetry of **photon and electron beams** in radiotherapy. The detector is designed for depth dose and profile measurements “in air” (i.e., inside a solid phantom) and in a water phantom, and for output factor measurements in small to medium sized photon beams.



The RAZOR™ detector is based on a **p-type silicon diode** chip, specifically designed for radiation therapy applications, and for the relative dosimetry of electron and stereotactic photon fields.

Performances verified in the range of photon beam qualities ^{60}Co -15MV, and 6- 15MeV electron energies.

Size, Materials, and Dimensions:

Item	Value
Stem material	Stainless steel
Enclosure material	ABS plastic (acrylonitrile butadiene styrene) and epoxy
Position of measurement point	Indicated by a crosshair at the top of the detector
Effective measurement point	0.8 ± 0.2 mm from surface
Chip size (mm)	$0.95 \times 0.95 \times 0.4$
Active detector diameter (mm)	0.6
Active detector thickness (mm)	0.02
Head diameter (mm)	4.0
Head length (mm)	15
Stem diameter (mm)	4.0
Total length (mm)	60

Dosimetric Performance:

Parameter	Value
Sensitivity	4.1 nC/Gy
Dose linearity	Typ.: <0.2%; max:0.5%
Energy dependence (6MV)	Typ.: 0.5%; max: 1%
Lifetime	≥ 200 kGy
Temperature dependence	0.05%/°C

Ordering info RAZOR™ Diode:

999-760-T	RAZOR™ Detector, Field Diode Detector for stereotactic beams with TNC Triax connector
999-760-BT	RAZOR™ Detector, Field Diode Detector for stereotactic beams with BNC Triax connector

Required adapters and holders RAZOR™ Diode:

PH47-000	Detector holder for 3G-pSi and RAZOR™ semiconductor detectors
NP20-100	Detector holder for Blue Phantom ² for semiconductor detectors with diameter of 4 mm to 10 mm
DS09-000	TNC (triax) – BNC (coaxial) adapter for 3G-pSi and RAZOR™ diode detectors, required for Water Phantom with TNC triax
DS09-100	BNC (triax) - BNC (coaxial) adapter for 3G-pSi and RAZOR™ diode detectors, required for Water Phantom with BNC triax

5.7 Summary IBA Dosimetry Chambers / Diodes:

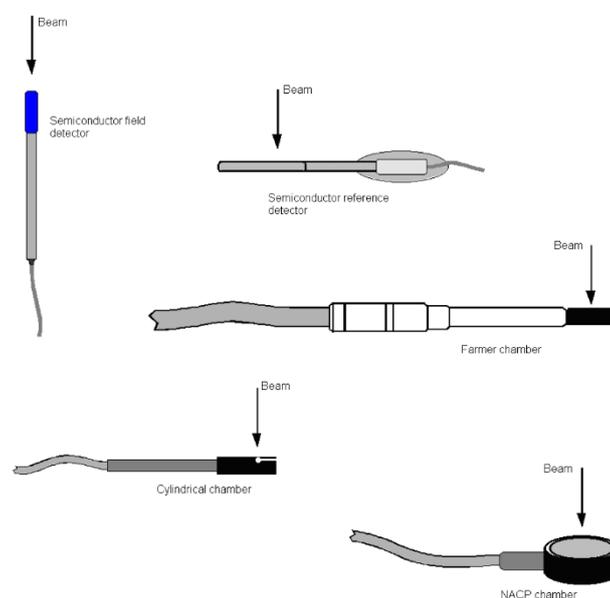
Name/Volume	Type	Sensitivity	Application
RAZOR™ Nano Chamber 0.003 cm ³	graphite; pinpoint	0,11 nC/Gy	Small Field Dosimetry for field sizes ≤ 5x5 cm ²
RAZOR™ Chamber 0.01 cm ³	graphite; pinpoint	0,33 nC/Gy	Small Field Dosimetry for field sizes ≤ 5x5 cm ²
CC 04 0.04 cm ³	thimble	1,00 nC/Gy	Relative & Abs. – Dosimetry; For field-sizes ≥ 5x5 cm ²
CC 08 0.08 cm ³	thimble	2,00 nC/Gy	Relative & Abs. – Dosimetry
CC 13 0.13 cm ³	thimble	4,00 nC/Gy	Relative & Abs. – Dosimetry
CC 25 0.25 cm ³	thimble	8,00 nC/Gy	Abs.-Dosimetry
FC 23-C 0.23 cm ³	Farmer type	7,00 nC/Gy	Abs. photon dos., no profile scanning
FC 65-G/P 0.65 cm ³	Farmer type	21,00 nC/Gy	Abs photon dos., no profile scanning
PPC 05 0.05 cm ³	parallel plate	2,00 nC/Gy	electrons, Relative/Abs.- Dosimetry
PPC 40 0.4 cm ³	parallel plate	12,00 nC/Gy	electrons, Relative/Abs.- Dosimetry
NACP 0.16 cm ³	parallel plate	6,00 nC/Gy	electrons, Relative/Abs.- Dosimetry
PFD3G	diode	35,00 nC/Gy	photon field
EFD3G	diode	25,00 nC/Gy	electron field
RAZOR™ Diode	diode	4.1 nC/Gy	Small Field Dosimetry for field sizes ≤ 5x5 cm ²
Square Stealth™ 588 cm ³	Parallel plate	33 nC/Gy	Reference signal chamber
Round Stealth™ Φ 92 mm	Parallel plate		Reference signal chamber
RFD3G	diode	35,00 nC/Gy	Reference signal source

Beam Direction:

The way of positioning detectors in the beam depends on the type of detector.

- Semiconductor field detectors should be mounted vertically (i.e., parallel to the beam, axial radiation).
- Semiconductor reference detectors should be mounted horizontally (i.e., perpendicular to the beam, radial radiation).
- Plane parallel chambers (PPC chambers, NACP) and cylindrical chambers (FC chambers, CC13) should be mounted horizontally (i.e., perpendicular to the beam, radial radiation).
- Cylindrical compact chambers (CC chambers) can be mounted either horizontally or vertically, or, if used as reference chamber, at any other angle between 0° and 90°, since they are of isotropic construction.

Beam direction for different types of detectors (examples):



5.8 LDA-99SC Linear detector array system



The LDA-99 SC consists of 99 semiconductor detectors, produced by IBA Dosimetry GmbH, arranged in a linear holder. The LDA-99 SC provides fast and reliable measurements in dynamic fields.

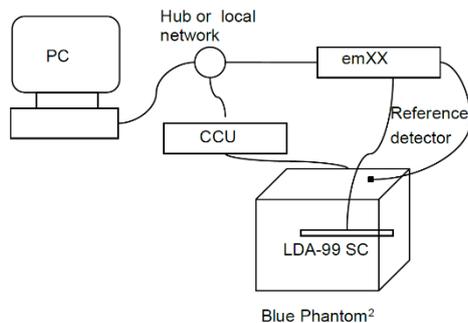
The detectors used in LDA-99 SC are energy compensated 3G-pSi detectors; do have excellent spatial resolution and a well-defined depth of measurement, independent of energy.

The high spatial resolution permits even a very steep penumbra to be reconstructed by the measurement. Hot spots are displayed as they are, and not smoothed out as when using larger detectors, like ionization chambers.

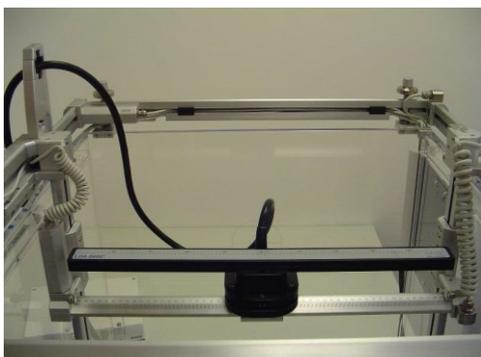
The LDA-99 SC is designed for profile measurements in water and in air. For in-air measurements, LDA-99 SC is fitted with a specially designed build-up cap and installed on a gantry-mounted servo or an empty Blue Phantom².

The LDA-99 SC is used in conjunction with a 99 + 1 channel electrometer, called emXX. For measurements with the LDA-99 SC, the control unit CCU, and a reference detector with inverted output signal (RIO) are also required.

Device connection overview Blue Phantom², CCU, LDA-99 SC, emXX and computer:



LDA-99 SC in the Blue Phantom²:



Specifications Linear Detector Array, LDA-99 SC

Active length	490 mm
Build-up for in-air measurements	15 mm (optional 10 mm, 20 mm, and 25 mm) water equivalent thickness polyethylene blocks
Detector type	Semiconductor, energy compensated 3G-pSi detectors
Distance between detectors	5 mm
Housing material	PVC
Number of detectors	99
Size (L x W x H)	516 mm x 36 mm x 17 mm
Weight	2 kg

Specifications Electrometer, emXX

Input range	0 – 500 nA
Accuracy	±1% for currents >10pA
Resolution	100 fC (for charge values up to 0.2 mC)
A/D converter	120 simultaneously working A/D converters
Classification	Protection class 1
Size (L x W x H)	320 mm x 265 mm x 70 mm
Main supply	100 – 240 VACS (±10%)
Mains frequency	50 or 60 Hz
Housing material	ABS and aluminum
Weight	3.75 kg

Ordering info LDA-99 SC:

LA10-500	LDA-99 SC Linear detector array system for Blue Phantom ²
----------	--

Ordering info RIO Reference detector:

999-832	RIO, 3G-pSi diode reference detector with negative polarity, BNC
MD500200	Reduction tube for reference holder to be used with RFD/RIO-diode



CHAPTER 6

Caps for TPS in-air Measurements

Life,
Science.

6.1 Metal Caps for TPS Air Measurements

6.1.1 Nickel Silver caps for CC13:

Article	Model
PS11-000	Set of 8 caps for ion chamber CC13, made of Nickel-Silver (density 8.62 g/cm ³) for Oncentra® Masterplan



Set of eight build-up caps for ion chamber CC13:



SA76-000	Cap for CC04, 4 - 6 MV
SA76-100	Cap for CC04, 8 - 10 MV
SA76-200	Cap for CC04, 10 - 12 MV
SA76-300	Cap for CC04, 12 - 15 MV
SA76-400	Cap for CC04, 15 - 18 MV
SA76-500	Cap for CC04, 18 - 20 MV

Nickel Silver (density 8.62 g/cm³) caps CC04:



6.1.2 Brass Build-up caps for PFD 3G-pSi diodes:

IBA Dosimetry supplies a set of 5 brass build-up caps as accessories to the IBA PFD 3G-pSi field detectors. The brass build-ups are intended to be used together with PFD 3G-pSi field detectors for the measurement of head scatter factors in-air for ELEKTA® Renderplan™/Preciseplan™ and Nucletron Oncentra® DCM™/ Oncentra® Masterplan™ (*).

Build-Up	1	2	3	4	5
External length (mm)	22.0	24.0	26.0	28.0	30.0
External ø (mm)	11.2	15.2	19.2	23.2	27.2
Inner ø (mm)	7.2	7.2	7.2	7.2	7.2
Wall thickness(mm)	2.0	4.0	6.0	8.0	10.0
Energy (MV)	4 - 6	8 - 12	15	18 - 20	25

Set of Brass Build-up caps for PFD 3G-pSi Diodes:

Material	Brass EN CuZn39Pb3 (Cu: 58 %, Zn: 39 %, Pb: 3 %)
Density	8.5 g/cm ³



A PFD 3G-pSi diodes and a brass build-up cap



PFD 3G-pSi diodes inside a brass build-up cap

Ordering info Brass Build-up caps for PFD 3G-pSi:

735491	Set of 5 brass build-up caps for PFD 3G-pSi field detectors for in-air measurements for Oncentra Masterplan™
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6.2 PMMA Caps for TPS Air Measurements

6.2.1 PMMA Build-up caps for CC13:

Article	Model
SA61-000	13 mm diameter for 1 - 4 MV photon and 4 - 8 MeV electron
SA62-000	30 mm diameter for 4 - 6 MV photon and 8 - 12 MeV electron
SA63-000	40 mm diameter for 6 - 10 MV photon and 12 - 18 MeV electron
SA64-000	50 mm diameter for 10 - 15 MV photon and > 18 MeV electron
SA65-000	60 mm diameter for 15 - 20 MV photon
SA66-000	80 mm diameter for 20 - 30 MV photon

PMMA Build-up caps for CC13:



SA61-000 SA62-000 SA63-000 SA64-000 SA65-000

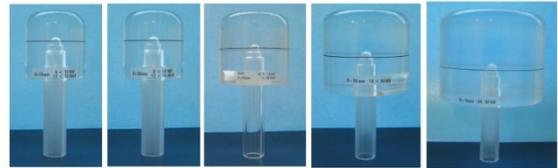
CC13 with PMMA build-up cap:



6.2.2 PMMA Build-up caps for CC04:

Article	Model
SA75-000	28 mm diameter for 4 - 6 MV photon and 8 - 12 MeV electron
SA75-100	38 mm diameter for 6 - 10 MV photon and 12 - 18 MeV electron
SA75-200	48 mm diameter for 10 - 15 MV photon and > 18 MeV electron
SA75-300	58 mm diameter for 15 - 20 MV photon
SA75-400	78 mm diameter for 20 - 30 MV photon

PMMA Build-up caps for CC04:



SA75-000 SA75-100 SA75-200 SA75-300 SA75-400

PMMA Build-up caps FC65-G/FC65-P:

Article	Model
SA69-000	30 mm diameter for 4 - 6 MV photon and 8 - 12 MeV electron
SA70-000	40 mm diameter for 6-10 MV photon and 12 - 18 MeV electron
SA71-000	50 mm diameter for 10-15 MV photon and 18 MeV electron
SA72-000	60 mm diameter for 15 - 20 MV photon

PMMA Build-up caps for FC65-G/FC65-P:



SA69-000 SA70-000 SA71-000 SA72-000

Specifications Build-Up cap material:

Material	PMMA
The density	1.18 g/cm ³
The electron density (Ne)	3.25 x10 ²³ /g
The effective Atomic Number	6.56



CHAPTER 7

Patient QA Solutions

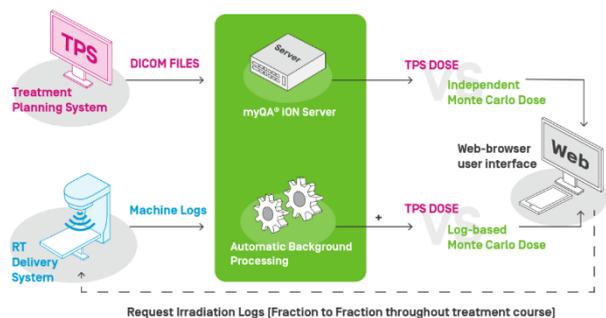
Life.
Science.

7.1 myQA iON for Radiation Therapy

myQA iON is a unique Patient QA software environment featuring an automated workflow and best-in-class algorithm to maximize departmental efficiency and accuracy.

myQA iON offers combined efficiency in Patient QA provided by

- Powerful combination of best-in-class SciMoCa™ Monte-Carlo dose calculation and log files
- Task based automation for optimized workflow efficiency
- Fast analysis of all sources of possible errors for increased patient safety



Combined Monte Carlo and log file Patient QA

myQA iON combines machine log files with a Monte Carlo algorithm from the beginning to the end of your patient treatments.

- Achieve an accuracy of <1% with the SciMoCa Monte Carlo algorithm
- Perform your pre-treatment QA with the SciMoCa Monte Carlo algorithm
- Validate delivered dose during treatment with the SciMoCa Monte Carlo algorithm combined with log files
- Prepare for an adaptive future with tools such as plan complexity analysis

Efficient task-based workflow

- myQA iON has an optimized, automated workflow to save time and speed up your QA process.
- Speed up your QA process with automated dose calculations, in the background
- Assign tasks to specific users with the optimized patient or task lists view
- Identify any potential errors or dose deviations using advanced, yet easy to use, tools

Safe delivery of patient treatments

To ensure accurate and unbiased QA results, a system is required that is unbiased and independent from the treatment planning system vendor.

- Utilize all DICOM information from your based treatment planning systems
- Analyze your results using advanced 3D tools such as DVH's and clinical goals

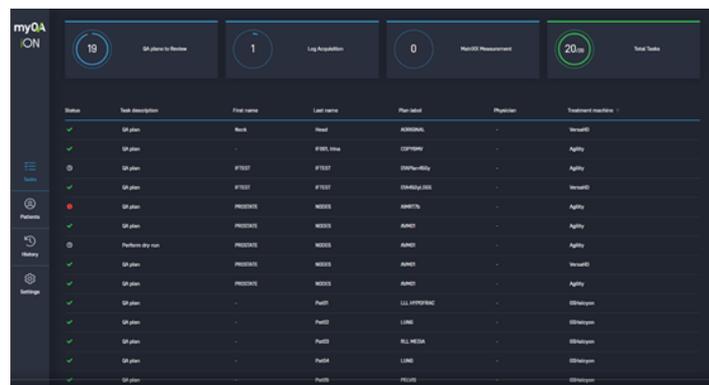
- Identify the source of any potential dose deviations or errors
- Understand the clinical relevance and source of potential deviation and errors

Supported systems:

Treatment techniques	Treatment machines	Treatment Planning System
Photon and electron treatment techniques supported	Elekta – all C-arm machines Varian – all C-arm machines Varian – Halcyon® and Ethos™ <i>CyberKnife®, TomoTherapy®, Radixact®, Zap-X® and MR-linac devices coming soon</i>	All TPS capable of DICOM-RT Export
Additional information: 3D– with and without wedged fields IMRT, IMAT, VMAT SBRT, SRS, SRS cones	Additional information: All photon and electron energies supported All MLC devices supported Both custom and standard beam models supported Log files supported: .ivx, trajectory logs, DynaLog™	

Task-based workflow:

- Task list with automatic updates
- Task status
- Verification results in the task list

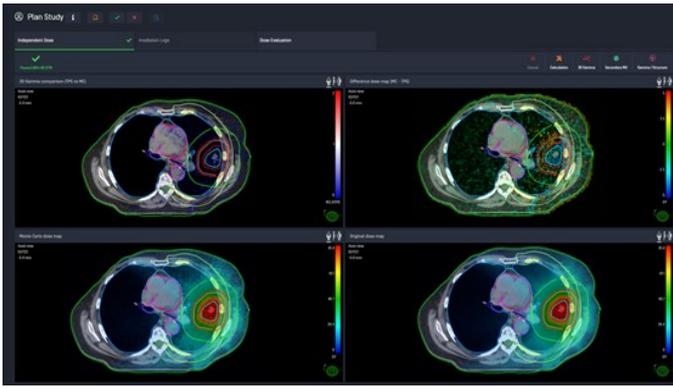


Patient worklist:

- Automated Workflow
- Automatic import, DICOM listener
- Automatic calculation queueing
- Auto-updating of worklist

Plan evaluation:

- Configurable clinical plan evaluation templates
- Comprehensive measures
- User-defined metrics



Beam information table:

- TPS and Monte Carlo monitor unit calculation and comparison for reimbursement
- Comparative MU and beam doses (absolute and relative)
- Treatment geometry information (Gantry and collimator angle, etc.)
- Plan complexity scores
- Beam type

Approval and report:

- Approval and Rejection
- Automatic update of worklist
- Pdf - reports

Recommended System Requirements:

Operating System	Windows Server 2016 or 2019 OS
CPU	24-core
RAM	64 GB
Free hard disk space	2 6TB HDD drives
Web browser	Chrome™, Firefox™

Ordering info myQA iON for RT:

MQ20-000	myQA iON Core
MQ20-100	Monte Carlo dose engine (1 - 3 linacs)
MQ20-200	Monte Carlo dose engine (4 - 6 linacs)
MQ20-300	Monte Carlo dose engine (7 - 9 linacs)
MQ20-400	Monte Carlo dose engine (10+ linacs)
MQ21-000	Treatment device license per linac
MQ22-000	Customized beam model for one standard photon energy for Varian and Elekta accelerators
MQ22-100	Golden beam data (GBD) based Monte Carlo beam model for one photon energy
MQ22-200	Electron beam Monte Carlo model for one treatment device (incl. 6 electron energies of one Linac)
MQ23-000	Log file interface per linac
MQ02-300	myQA Patients for myQA iON RT customers (incl. Platform and all required measurement licenses for myQA SRS and MatriXX Resolution)

DVH and γ -Analysis:

- Custom structure controls
- Interactive cursor
- Tabular data display
- Gamma per ROI calculations

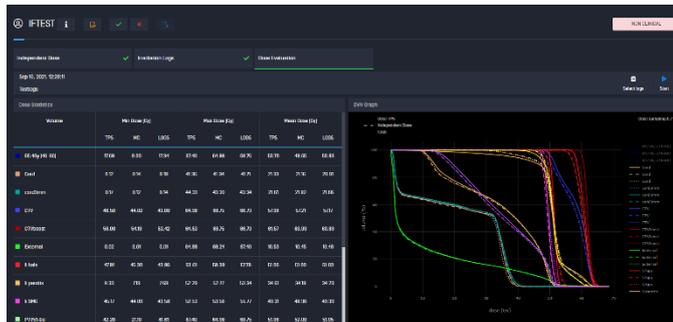
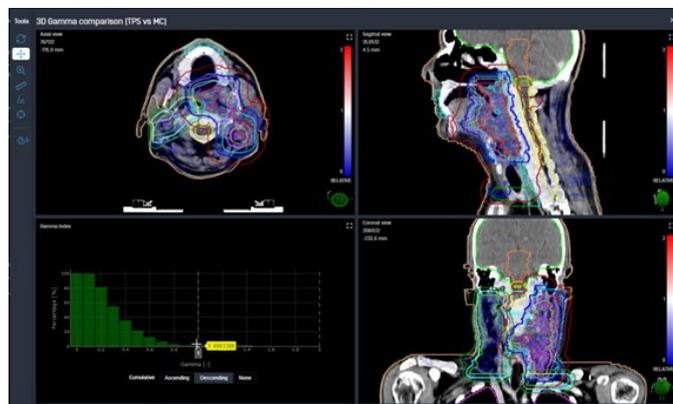


Image viewer:

- Full 3D viewer
- Recalculated Monte Carlo dose from TPS plan and log files
- Gamma analysis and dose difference in 3D
- Permits detecting dose discrepancies on the patient anatomy level



Golden beam data (GBD) myQA iON Packages

MQ25-001	myQA iON for Halcyon <i>(with everything required incl. 1 photon golden beam model & log files)</i>
MQ25-002	myQA iON for additional Halcyon device <i>(to be used with MQ25-001; includes unique log files interface)</i>
MQ25-003	myQA iON for C-arm 1 linac GBD <i>(with everything required, incl. 4 photon golden beam models & log files interface)</i>
MQ25-005	myQA iON for 2 matched C-arm linacs GBD <i>(with everything required, incl. 4 photon golden beam models to be used for both linacs & log files interface for every linac)</i>
MQ25-007	myQA iON for C-arm additional linac GBD <i>(with everything required incl. 4 photon golden beam models & log files interface)</i>
MQ25-009	myQA iON for C-arm additional matched linac GBD <i>(to be used with MQ25-003, log file interface included)</i>

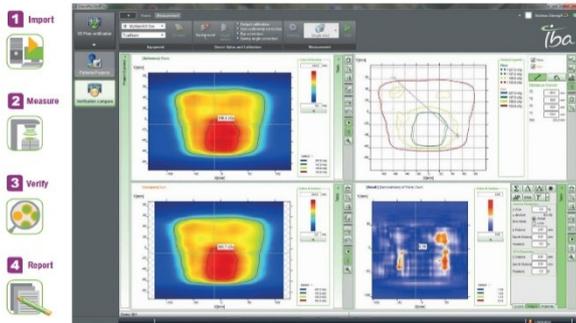
Customized beam data myQA iON Packages

MQ25-004	myQA iON for C-arm 1 Linac customized <i>(with everything required incl. 4 custom photon beam models & log files interface)</i>
MQ25-006	myQA iON for 2 matched C-arm Linacs customized <i>(with everything required incl. 4 custom photon beam models to be used for both linacs & log files interfaces)</i>
MQ25-008	myQA iON for C-arm additional Linac customized <i>(with everything required incl. 4 custom photon beam models & log files interface)</i>
MQ25-010	myQA iON for C-arm additional matched Linac customized <i>(to be used with MQ25-004, log files interface included)</i>
9Q20-001	myQA iON Coverage, net price per year

7.2 myQA® Patients

Platform-based plan verification

myQA® Patients is an efficient, intuitive, and connected solution for patient plan verification of IMRT, rotational and FFF treatments. Designed to increase efficiency and to reduce QA time, myQA® Patients offers full control of patient data.



The myQA® Patients software is intended for pre-treatment verification and reporting of patient plans in modulated and static radiation therapy:

	<p>Flexible & Full DICOM Interface:</p> <ul style="list-style-type: none"> ● Read DICOM files ● Query and retrieve from DICOM Server ● DICOM listener for import via network ● Import from a DICOMDIR ● Import of proprietary dose and fluence files <p>Variety of supported dose and fluence map formats, e.g., RTDOSE, Monaco®™, Eclipse™, XiO™, Pinnacle™, ...</p>	<p>Efficiency:</p> <ul style="list-style-type: none"> ● Automated gamma results ● Improved new gamma algorithm with more accurate and faster results ● Auto alignment of Reference and Compare datasets ● Automatic Isocenter-Plane selection <p>Comprehensive Verification:</p> <ul style="list-style-type: none"> ● Single/composite IMRT fields ● Relative/absolute dose evaluation ● Advanced local and global gamma evaluation ● Histogram analysis and automated statistics ● Excellent visualization of 1D and 2D data including profiles, isodose contours, and 2D dose distributions ● Extensive cursor analysis functions like distance, position and angle measurements ● Wide range of analysis algorithms: Sum, (absolute) Difference, DTA, Multiplication, Correlation ● Gamma index calculation with TG-218 reference dose formalism ● Restore raw data anytime ● Full traceability
	<p>Workflow Oriented – Measurement Control:</p> <ul style="list-style-type: none"> ● Intuitive operation ● Visual confirmations ● Beam trigger mode ● Real-time display during measurements ● Consistency in all myQA®™ applications <p>Interface to MatriXX detectors</p> <ul style="list-style-type: none"> ● High accuracy for rotational cases with Gantry Angle Sensor ● Automated correction of the angular dependency ● User uniformity and absolute dose calibration ● Automated ktp correction ● Look up table creator for custom angular correction 	 <p>Fast reporting and archiving on the database:</p> <ul style="list-style-type: none"> ● Full control of the patient data in the central database of myQA® ● Electronic approval including comments ● Flexible and safe user management / ● User rights ● Report as RTF, HTML, or PDF ● Data export via clipboard e.g., to MS Excel, via ACSII or CSV

Typical configuration myQA® Patients with MatriXX Resolution:

myQA Platform		For myQA Platform, refer to chapter "myQA Platform"
myQA Patients		Refer to myQA Patients SW
myQA Coverage		Refer to chapter "Customer-first Service & Support"
MatriXX Resolution™		Refer to "MatriXX™ Resolution"
Gantry Sensor +		Refer to "Gantry mount solutions for 2D-Arrays"
miniPhantom R		Refer to "Patient QA miniPhantom R"
Build-up/Backscatter-plates		Refer to "Solid Phantoms".

Ordering info myQA® Patients:

MQ02-000	myQA® Patients, site license included
MQ02-104	myQA® Patients measurement interface for MatriXX detectors
MQ00-200	myQA® FastTrack, site license included
MQ00-201	myQA® FastTrack for existing OmniPro-I'mRT / OmniPro Advance installations
MQ02-210	myQA Patients SRS QA Plug-In measurement interface
MQ02-200	myQA Patients SRS QA standalone version

Upgrades to myQA® Patients:

UQ02-001	Upgrade from OmniPro-I'mRT 1.X to myQA® Patients, site license
UQ02-002	Upgrade from OmniPro-I'mRT+ to myQA® Patients, site license
UQ02-010	myQA® Patients for COMPASS Pro customers
UQ02-003	Upgrade from older myQA Patients to the latest version of myQA Patients

Typical configuration myQA® Patients with myQA SRS:

myQA Platform		For myQA Platform, refer to chapter "myQA Platform"
myQA Patients		Refer to myQA Patients SW
myQA Coverage		For myQA Coverage, refer to chapter "Customer-first Service & Support"
myQA® SRS		Refer to "myQA® SRS detector"
Gantry Sensor +		Refer to "Gantry mount solutions for 2D-Arrays"
myQA® SRS phantom		Refer to "myQA® SRS Phantom"

7.3 MatriXX Evolution / MatriXX FFF

MatriXX ionization chamber detector arrays are designed for fast and accurate verification of patient dose, as well as Linac QA.

- Unique universal detector for Patient QA and Machine QA: Both applications powered by the myQA® - global QA platform
- Fast and intuitive, from measurement setup to analysis
- Most accurate for rotational and IMRT QA: Shortest 20ms data sampling time, high dose rate, high spatial resolution with 1020 ionization chambers
- Most reliable solution with more than 1500 systems in the world



Technical specifications:

2D-Array	MatriXX Evolution	MatriXX FFF
Sensor type	Vented parallel ion chamber	Vented parallel ion chamber
Number of sensors	1020 , arranged in a 32 × 32 grid except for the 4 corner positions	1020 , arranged in a 32 × 32 grid except for the 4 corner positions
Active measurement area	24.4 cm × 24.4 cm (SSD:100cm)	24.4 cm × 24.4 cm (SSD:100cm)
Chamber diameter	4.5 mm	4.5 mm
Chamber height	5.0 mm	2.0 mm
Chamber volume	80 mm ³	32 mm ³
Distance between chambers	7.62 mm (center to center)	7.62 mm (center to center)
Nominal sensitivity	2.4 nC/Gy	1.4 nC/Gy
Dose Range	0 – 10 Gy	0...48 Gy/min
Bias voltage	500 ± 30 V	500 ± 30 V
Absorber material on top	3 mm ABS Tecaran (density 1.06 g/ cm ³)	6 mm ABS Tecaran (density 1.06 g/cm ³)
Water equivalent depth	3.1 mm	6.4 mm
Effective point of measurement (Peff)	3.5 mm below the surface, indicated by engraved markers on the housing sides.	6.5 mm below the surface, indicated by engraved markers on the housing sides.
Deviation from Linearity	≤ 1% for dose ≥ 0.02 Gy	≤ 1% if dose ≥ 0.15 Gy

Software requirements:

MatriXX Evolution	MatriXX FFF
2D detector array optimized for fast and accurate verification of rotational delivery IMRT beams versus planned data as well as Linac Machine QA	Advanced 2D detector array optimized for fastest and most accurate verification of rotational delivery IMRT beams versus planned data as well as Linac Machine QA in conventional and high-dose-rate beams : Charge collection efficiency greater than 99% at 1.0 mGy/pulse (10MV FFF at 100 cm SDD).
COMPASS myQA® Patients myQA® Machines myQA® FastTrack	myQA® Patients myQA® Machines myQA® FastTrack

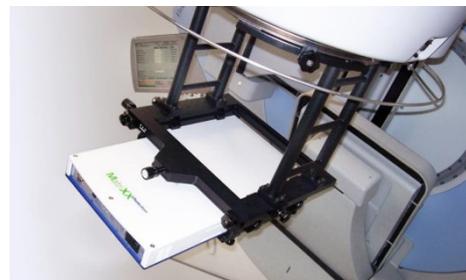
Ordering info MatriXX detectors:

BS60-500	MatriXX Evolution for rotational plan verification
BS60-600	MatriXX FFF for conventional and high dose rate plan verification
BS64-000	Additional Gantry Angle Sensor for existing MatriXX Evolution
BS64-100	Base plate for Gantry Angle Sensor
BS64-110	Base plate cover for Gantry Angle Sensor

7.3.1 Gantry mount solutions for 2D-Arrays:

A complete gantry mount consists of an (advanced) holder and a gantry fixture.

Gantry mounts for IBA Dosimetry 2D-Arrays MatriXX FFF and MatriXX Evolution are available. Please see section 8.9, contact IBA Dosimetry directly, or your local representative about receiving the details for holders and gantry fixtures.



7.4 Patient QA miniPhantom



Patient QA Phantom that provides an efficient and precise way to validate the dose in a reproducible and well-defined environment:

- Fast and easy setup
- High-end material: RW3
- Made in Germany

Ideal for rotational applications in conjunction with the MatriXX detector, the Gantry Angle Sensor and myQA® Patients:

- Optimally adapted cylindrical shape
- Precise correction factors
- Automatic Gantry Angle correction

Technical Specification:

Outer Dimension	384 mm x 300 mm x 140 mm
Weight	12.2 kg
Material	RW3
Mass-Density	1.045 g/cm ³
Electron-Density	3.386 x 1.023 1/cm ³

Ordering info miniPhantom:

BS50-500	miniPhantom
BS50-501	miniPhantom insert for film and ionization chamber

7.5 MatriXX Resolution

MatriXX ionization chamber detector arrays are designed for fast and accurate verification of patient dose, as well as Linac QA.

MatriXX Resolution is designed with 50 % more chambers compared to MatriXX Evolution™ and is completely wireless with WLAN data transfer and battery powered.

It is delivered in combination with a wireless Gantry Sensor + and optionally with a newly designed **miniPhantom R**. The **MatriXX Resolution** is designed and optimized for the needs of highly precise and advanced QA procedures.



- Unique universal detector for Patient QA and Machine QA: Both applications powered by the myQA® - global QA platform
- Fast and intuitive, from measurement setup to analysis
- Most accurate for rotational and IMRT QA: while range of clinical dose rate, highest spatial resolution with 1521 ionization chambers

Technical specifications MatriXX Resolution:

2D-Array	MatriXX Resolution*
Sensor type	Vented parallel ion chamber
Number of sensors	1521, arranged in a 39 x 39 grid
Active measurement area	25.3 cm × 25.3 cm (SSD:100cm)
Chamber diameter	3.2 mm
Chamber height	2 mm
Chamber volume	16 mm ³
Distance between chambers	6.5 mm (center to center)
Array dimensions	56 cm x 6 cm x 32 cm
Array weight	8.5 kg
Supported energies	Co60-25 MV photons and electrons
Dose rate range	up to 24 Gy/min
Power	Battery
Data transfer	WLAN or Ethernet

Software:

myQA® 2020-002 and newer is required

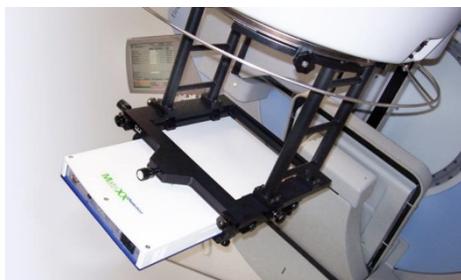
Ordering info MatriXX Resolution detector:

BS60-700	MatriXX Resolution - wireless detector for rotational and static plan verification
BS62-700	Upgrade from MatriXX Evolution to MatriXX Resolution
BS62-701	MatriXX Resolution - Special offer for existing MatriXX customers
BS64-200	Additional Gantry Sensor + for existing MatriXX Resolution/myQA® SRS
BS64-100	Base Plate for Gantry Sensor +
BS64-120	Gantry Sensor+ set for Halcyon/Ethos incl. adapter

7.5.1 Gantry mount solutions for 2D-Arrays:

A complete gantry mount consists of an (advanced) holder and a gantry fixture.

Gantry mounts for IBA Dosimetry 2D-Array MatriXX Resolution are available. Please see section 8.9, contact IBA Dosimetry directly, or your local representative about receiving the details for holders and gantry fixtures.

**7.6 Patient QA miniPhantom R**

Patient QA Phantom, to be used with MatriXX Resolution, that provides an efficient and precise way to validate the dose in a reproducible and well-defined environment:

- Fast and easy setup
- High-end material: RW3
- Made in Germany

Ideal for rotational applications in conjunction with the MatriXX Resolution detector, the Gantry Sensor + and myQA® Patients:

- Optimally adapted cylindrical shape
- Precise correction factors
- Automatic Gantry Angle correction
- Insert for film
- Uniform insert and adapters to be used with different chambers for precise clinical measurements.

Technical Specification:

Outer Dimension	380 mm x 321.2 mm x 144.5 mm
Weight (without inserts)	12.5 kg
Material	RW3

Ordering info miniPhantom R:

BS55-000	miniPhantom R
BS55-100	Film Insert for miniPhantom R
BS55-200	Uniform chamber insert for miniPhantom R
BS55-210	FC65 chamber Adapter for miniPhantom R
BS55-220	CC13 chamber Adapter for miniPhantom R
BS55-230	CC04 chamber Adapter for miniPhantom R

7.7 myQA® SRS detector

myQA® SRS detector is designed for film-class QA accuracy with the workflow efficiency of a detector array solution.

- QA in native plan geometry including couch kick / non-coplanar beams
- 12 cm x 14 cm active detector area
- 0.4 mm resolution
- 105.000 measurement points
- Unique CMOS detector or Patient QA
- Powered by myQA® Patients - your known QA Platform with versatile tools for any plan complexity



myQA® SRS detector specifications:

Detector type	CMOS
Active measurements area	12 cm x 14 cm
Resolution	0.4 mm
Number of detectors	105 000
Array dimensions	48cm X 15.4 cm X 10.4 cm
Array weight	4.5 kg
Supported energies	6 MV, 10 MV, FF/FFF
Dose rate range	up to 24 Gy/min
Power	power cable
Data Transfer	Ethernet

Ordering info myQA® SRS detector and measurement SW:

SR01-000	myQA® SRS detector
BS64-200	Additional Gantry Sensor+ for existing MatriXX Resolution/ myQA® SRS
MQ02-000	myQA Patients, 5 licenses
MQ02-200	myQA® Patients SRS QA standalone SW-Version (not included / required: myQA® Platform; MatriXX measurement interface)
MQ02-210	myQA® Patients SRS QA Plugin measurement interface for existing myQA® Patients customers
BS64-120	HALO GS+ set for Halcyon/Ethos Linac

myQA® SRS Performance characteristics:

- Importance of resolution
- With myQA SRS no dose information is missed, no interpolation between dose measurement points is required. Steep dose gradients are measured with submillimeter precision.
- Avoid false QA results
- Using standard SRS detectors with only a few discrete dose point measurements means that a significant part of the dose between the detector points cannot be realistically measured.
- Make better QA decisions
- Avoid pixelized results of poor-resolution detectors.
- Avoid falsely failing QA results caused by low resolution.
- myQA SRS provides superior gradient and peak detection.
- High-quality gamma verification results for better QA decisions

To upgrade from the myQA® Patients SRS stand-alone version to a full myQA® Patients version that allows the connection to myQA®™, adding additional myQA®™ modules and applications, and performing measurements with the MatriXX, Dolphin, or StarTrack detectors, the following licenses are required:

- myQA® Platform™ (MQ00-000)
- myQA® Patients measurement interface (MQ02-104)

7.8 myQA® SRS Phantom

myQA® SRS Phantom helps you to simulate cylindrical patient geometry and to precisely validate SRS/SBRT plan dose in reproducible and well-defined geometry.

- Laser alignment for easy setup
- Lightweight design
- Cylindrical cap
- Film and small field dosimetry chamber inserts for dosimetry checks and easy clinical detector acceptance



Technical specifications myQA® SRS Phantom:

Outer Dimension	59 cm X 29.7 cm X 45.2 cm
Weight	14.7 kg
Material	RW3

Order details:

SR02-000	myQA® SRS Phantom
SR03-200	Uniform chamber insert for myQA SRS phantom
SR03-250	PTW PinPoint 3D Adapter for myQA SRS Phantom
SR03-251	PTW MicroDiamond Adapter for myQA SRS Phantom
SR03-260	Standard Imaging Exradin A1SL Adapter for myQA SRS Phantom
SR03-261	Standard Imaging Exradin A12 Adapter for myQA SRS Phantom
SR03-262	Standard Imaging Exradin A19 Adapter for myQA SRS Phantom
SR02-300	End to End insert for myQA SRS Phantom Winston Lutz and localization
SR02-310	End to End insert for myQA SRS Phantom Imaging and Planning

7.9 Universal I'mRT Phantom

For calibration and verification of the treatment planning system and CT simulator regarding the Hounsfield Units (HU).

Universal, water equivalent (RW3) I'mRT phantom for multiple film measurements and the verification of the absolute dose.

The innovative design allows for both universal body as well as head and neck and stereotactic applications (Item number BS41-000).

Includes adapter for Farmer type (FC65-P/G) ionization chamber.



- Simultaneous exposure of up to 15 large films in universal body shaped section
- Three integrated markers for convenient film-TPS alignment and registration
- Simultaneous exposure of up to 15 films with a maximum size of 16 x 16 cm in the modular, removable cubic phantom
- Flexible positioning of ionization chambers for absolute dosimetry verification measurements

Size of complete phantom	33 cm (L) x 36 cm (W) x 18 cm (H)
Size of modular cubic phantom part	18 cm (L) x 18 cm (W) x 18 cm (H)
Phantom material	RW3 (polystyrene), 1.045 g/cm ³ density

- Film thickness compensation plates for cubic phantom:
 - 16 x 10 mm
 - 1 x 1 mm
 - 2 x 2 mm
 - 1 x 5 mm
- Two lateral stray bodies that can be mounted on all sides of the cubic phantom
- PMMA carriage and leveling plate (33 cm x 44 cm x 1cm)
- Carrying case



7.10 Cubic Phantom

Cubic Phantom for head and neck and stereotactic applications



Dimensions (outer)	18 cm x 18 cm x 18 cm
Film size	16 cm x 16 cm
Film spacing	Minimum 1 cm
Number of films	Up to 15; flexible positioning of ionization chambers for absolute dosimetry verification measurements
Geometry	Transversal, coronal, or sagittal orientation
Phantom material	RW3 (polystyrene), 1.045 g/cm ³ density

Ordering info Phantoms for IMRT Verification:

BS40-000	Universal I'mRT Phantom
BS41-000	Cubic phantom for head and neck and stereotactic applications
BS40-500	Upgrade from Cubic phantom (BS41-000) to Universal I'mRT Phantom (BS40-000)
BS41-500	Adapter plate for cubic phantom for customized Gafchromic films (size 15 x 15 cm)

OPTIONS for I'mRT phantom / Cubic phantom:

BS42-000	Lateral stray bodies (2 pcs.) - can be mounted on all sides of the cube. Width of the cubic phantom with stray bodies: 36 cm
BS43-000	CT localizer plates (6 pcs.) for prismatic TLD rods
BS44-000	TLD plate insert for prismatic TLD rods

7.11 Options for I'mRT Phantom / Cubic Phantom

Lateral stray bodies

Lateral stray bodies (2 pcs.). Can be mounted on all sides of the cube. Width of the cubic phantom with stray bodies: 36 cm.

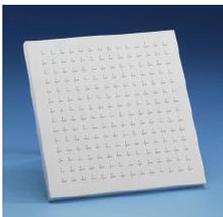


CT localizer plates (6 pcs.) for prismatic TLD rods



TLD plate insert for prismatic TLD rods

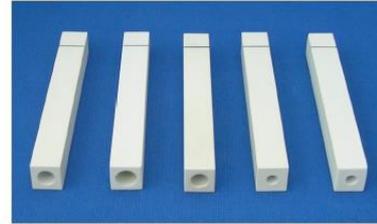
Up to 196 TLD detectors (rods 1 x 6 mm diameter) on each side, 1 cm spacing



Ordering info options for I'mRT phantom / Cubic phantom:

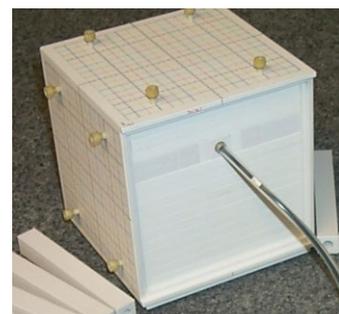
BS42-000	Lateral stray bodies (2 pcs.) - can be mounted on all sides of the cube. Width of the cubic phantom with stray bodies: 36 cm.
BS43-000	CT localizer plates (6 pcs.) for prismatic TLD rods
BS44-000	TLD plate insert for prismatic TLD rods

Ionization Chamber Inserts for Universal I'mRT Phantom and/or Cubic Phantom:



Ordering info inserts:

BS45-000	Ionization chamber insert for compact chamber CC01
BS46-000	Ionization chamber insert for compact chamber CC04
BS47-000	Ionization chamber insert for compact chamber CC13
BS47-100	Ionization chamber insert for RK chamber
BS47-200	Ionization chamber insert for compact chamber CC13-S
BS48-000	Ionization chamber insert for FC65-G/P, PTW 0.6 ccm and NE 0.6 ccm "Farmer" type chambers
BS48-100	Ionization chamber insert for FC23-C "Farmer" type chambers
BS49-000	Ionization chamber insert for PTW 0.3 ccm semiflex chamber type 31003
BS49-001	Ionization chamber insert for PTW chamber type 31002 and 31010 and 233642 0.125 ccm
BS49-100	Ionization chamber insert for Exradin A12 chamber
BS49-200	Ionization chamber insert for Exradin A14 chamber
BS49-201	Ionization chamber insert for Exradin A14SL chamber
BS49-300	Ionization chamber insert for PTW chamber type 31009
BS49-400	Ionization chamber insert for PTW chamber type 23332, 0.3 ccm
BS49-500	Ionization chamber insert for Exradin A16 chamber
BS49-600	Ionization chamber insert for Exradin AISL chamber
BS49-700	Ionization chamber insert for PTW chamber type 31006 and 31014
BS49-720	Ionization chamber insert for PTW chamber type 31015 (31009)
BS49-730	Ionization chamber insert for PTW chamber type 31016
BS49-800	Ionization chamber insert for Capintec PR05



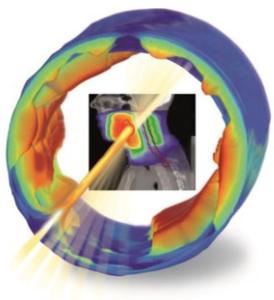
7.12 COMPASS - 3D anatomy-based verification

Compass – Application for patient-specific, anatomy-based 3D plan verification. By maximizing efficiency and minimizing errors with accuracy, it is the ultimate solution in patient-specific plan verification. The complete package comes with a MatriXX Evolution and/or Dolphin detector.



7.12.1 COMPASS Pro

- Two-in-One Solution for Patient Dose Analysis
- Workflow efficiency and flexibility with measurement- and calculation-based verification
- Comprehensive and advanced 3D plan verification with the special package COMPASS Pro.
- Calculation- and measurement-based pre-treatment plan verification for IMRT, FFF and rotational treatment techniques (VMAT / RapidArc™) on the patient-specific CT using the MatriXX and/or Dolphin detector array.



Application for patient-specific 3D plan verification

2-in-1 solution for measurement-based and calculation-based plan verification comprising a dose engine to verify the plan delivery throughout the treatment planning chain, from the TPS calculation to the Linac delivery.

The system verifies the plan, the arcs/beams and the control points/segments of the VMAT arcs or IMRT fields. A measurement-assisted 3D dose reconstruction in the patient anatomy is performed using the MatriXX and/or Dolphin for the indirect verification of the fluence and an advanced collapsed cone algorithm for the accurate dose calculation on the planning CT.

The result is finally compared to the TPS using modern analysis tools.

The license for one-time installation of every module includes the following:

- Advanced Collapsed Cone dose engine for state-of-the-art accuracy in the dose calculation
 - TPS class algorithm
- 3D Dose distributions rendered in the patient anatomy, based on original heterogenic planning CT
 - No QA-Plan (hybrid plan) required, verify the original treatment plan
- Linac modeling with enhanced beam commissioning workspace (machine templates for main Linac versions available, auto-modeling tools included for fast commissioning)
 - Independent secondary dose calculation
- Dose reconstruction in 3D on patient anatomy based on the measurements to display the effect of measured deviations on the dose distribution
 - No dose deformation
 - Independent dose reconstruction
- Advanced and proven validation tools (DVH, local and global 3D gamma, 3D dose difference)
 - Confidence in the verification result
- Advanced statistics tools (clinical goals, comparative goals) with pass/fail indication in one look
 - Common platform for Oncologist and Physicist
- DICOM RT import/export (RTDose, RTPlan, RTStruct, CT)
- Flexible report generator (pdf, rft, xls, xlsx, docl, mht, image file format)
- Central database using reliable technology (Microsoft SQL Server)

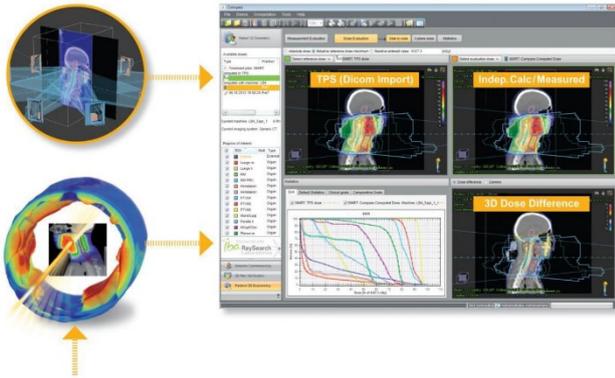
Ordering info COMPASS Pro:

CS10-351	COMPASS Pro for SIEMENS® Linacs ^(*) (SDD = 76.2 cm)
CS10-352	COMPASS Pro for ELEKTA® Linacs ^(*) (SDD = 76.2 cm)
CS10-353	COMPASS Pro for VARIAN® Linacs ^(*) (SDD = 76.2 cm)
CS10-354	COMPASS Pro for SIEMENS® Linacs ^(*) (SDD = 100 cm)
CS10-355	COMPASS Pro for ELEKTA® Linacs ^(*) (SDD = 100 cm)
CS10-356	COMPASS Pro for VARIAN® Linacs ^(*) (SDD = 100 cm)

Upgrade to COMPASS Pro

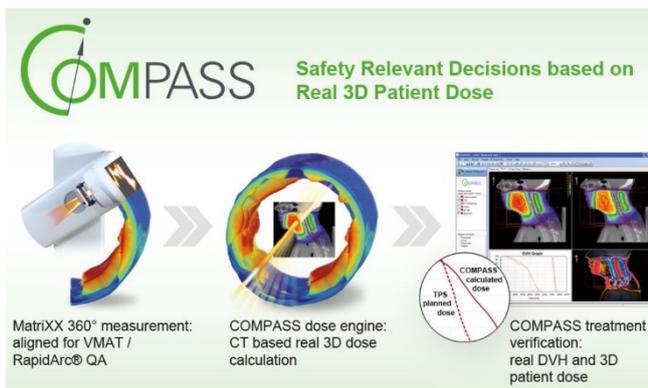
CS10-360	Upgrade to COMPASS Pro for MatriXX Evolution users
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7.12.2 COMPASS Measurement Console



Measurement Console software with the MatriXX and/or Dolphin Detector

- Detector measurements for pre-treatment verification
- Auto-mode for efficient handling and seamless integration in the clinical workflow
- Quick Check:
 - fully automated analysis of the indirect fluence measurement
 - gamma or dose difference results in one look
 - automatic evaluation based on individual protocols
- Detector response prediction based on individual Linac head model, 3.5 high resolution Monte Carlo modeling of the detector response
- Time resolved indirect fluence analysis based on measured response
- Smart measurement browser for efficient measurement data handling
- 2D Plan verification workspace for comprehensive analysis of detector responses and dose distributions
- Advanced and efficient detector administration
- Data is safely stored in the main database



Ordering info COMPASS measurement console:

CS10-380	COMPASS measurement console for measurement operations
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7.12.3 COMPASS TPS Check

Advanced Secondary Dose Calculation Software



Verify the patient plans beyond the standard MU check quality.

The license for one-time installation of the COMPASS TPS Check module includes:

- Advanced Collapsed Cone dose engine for state-of-the-art accuracy in the dose calculation
 - TPS class algorithm
- 3D Dose distributions rendered in the patient anatomy, based on original heterogenic planning CT
 - No QA-Plan (hybrid plan) required, verify the original treatment plan
- Linac modeling with enhanced beam commissioning workspace (machine templates for main Linac versions available, auto-modeling tools included for fast commissioning)
 - Independent secondary dose calculation
- Dose reconstruction in 3D on patient anatomy based on the measurements to display the effect of measured deviations on the dose distribution
 - No dose deformation
 - Independent dose reconstruction
- Advanced and proven validation tools (DVH, local and global 3D gamma, 3D dose difference)
 - Confidence in the verification result
- Advanced statistics tools (clinical goals, comparative goals) with pass/fail indication in one look
 - Common platform for Oncologist and Physicist
- DICOM RT import/export (RTDose, RTPlan, RTStruct, CT)
- Flexible report generator (pdf, rft, xls, xlsx, docl, mht, image file format)
- Central database using reliable technology (Microsoft SQL Server)

Ordering info COMPASS TPS Check:

CS10-250	COMPASS TPS Check secondary 3D dose calculation on patient anatomy for TPS dose cross check
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7.12.4 COMPASS Viewing Station

Evaluate your COMPASS data wherever you want.



The license for one-time installation of this module includes:

- Evaluation of dose distributions and statistics
- Approval of treatment plans
- Access to the main COMPASS Database

Ordering info COMPASS Viewing Station:

CS10-500	COMPASS Software License for each viewing station
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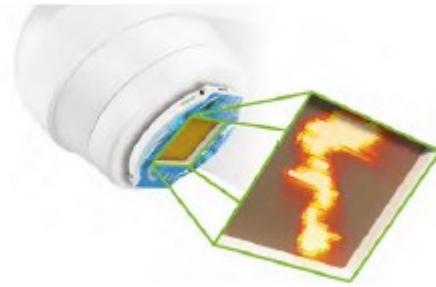
Additional Beam Commissioning for existing COMPASS users:

Implementation of an additional beam model for a clinical use of COMPASS

Ordering info SW Service - Additional Beam Modeling

CS10-800	Additional Beam Modeling for existing COMPASS users
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7.13 DOLPHIN System - for 3D Patient QA



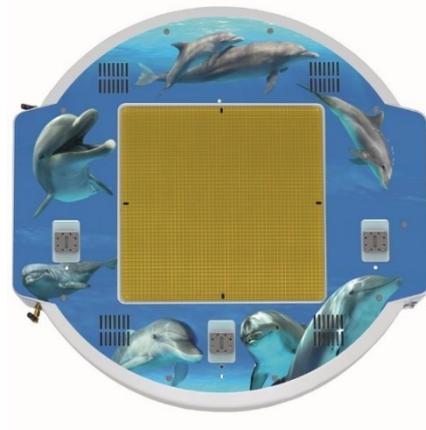
Dolphin –System includes the following:

- Dolphin Detector
- Dolphin Measurement Console
- Application for Patient-specific 3D Plan Verification
- Software Coverage

7.13.1 Dolphin Detector

The Detector for Pre-Treatment Patient QA as well as Machine QA.

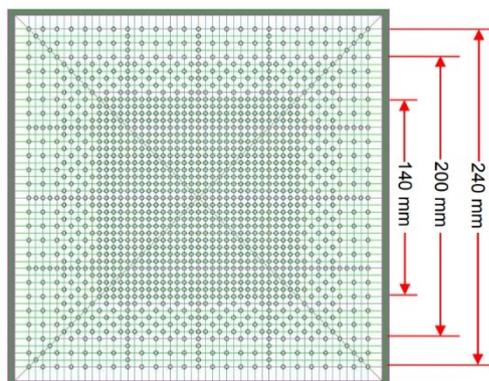
Designed for Performance, the wireless Dolphin transmission detector is mounted and secured on the Linac gantry head.



- Unique patient-friendly design
- 1513 gold standard air vented ionization chambers
- 5 mm resolution in the central area
- Full 40 x 40 cm² field size coverage
- Sensor layout designed for efficient treatment plan QA and machine QA
- Optimized for rotational treatments: Built-in Gantry Angle & Tilt Sensor
- Cable-free operation (battery powered and wireless data transfer)
- Slim design – Maximum clearance
- Fast and easy attachment to the Linac head
- No hardware setup time

Technical Specifications of Dolphin Detector:

Sensor	1513 air vented ionization chambers
Active area	24.4 x 24.4 cm ² , full field size 40 x 40 cm ² supported
Sensor layout	5 mm center to center distance in the inner 15 x 15 cm ² field 10 mm in the outer area Center, Inline, Crossline and Diagonals covered
Chamber size	3.2 mm diameter x 2 mm height
Sensitive chamber volume	16 mm ³
Nominal sensitivity	1.8 nC/Gy, measured in the central detector area with 1Gy at the isocenter at 5cm depth with a 10x10cm ² 6MV field.
Sampling rate	20 ms, parallel readout, no dead time
Battery life	2 x 5 h, LED charge indicator
Outer dimensions	600 mm diameter x 57 mm height
Approximate weight	12 kg
Gantry Angle accuracy	+/- 1°

**Dolphin Measurement Console:**

Measurement Console software for measurement operations with the Dolphin Detector

Application for Patient-Specific 3D Plan Verification:

2-in-1 Solution for calculation and measurement-based plan verification comprising a dose engine to verify the plan delivery throughout the entire treatment chain, from the TPS calculation to the Linac delivery.

Dolphin transmission detector is mounted and secured on the Linac gantry head:

**Ordering info DOLPHIN:**

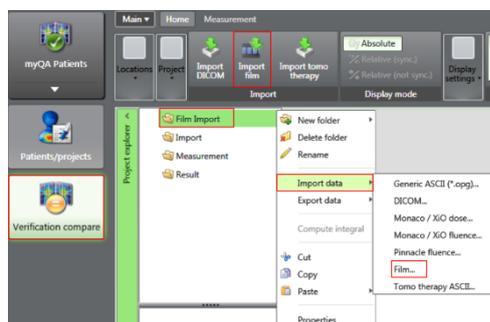
CS42-002	DOLPHIN - Most advanced 3D Patient QA System for ELEKTA® (*)
CS42-003	DOLPHIN - Most advanced 3D Patient QA System for VARIAN® (*)
CS42-002-E	DOLPHIN - Most advanced 3D Patient QA System for ELEKTA® (*) (Europe)
CS42-003-E	DOLPHIN - Most advanced 3D Patient QA System for VARIAN® (*) (Europe)
CS42-002-K	DOLPHIN - Most advanced 3D Patient QA System for ELEKTA® (*) (Korea)
CS42-003-K	DOLPHIN - Most advanced 3D Patient QA System for VARIAN® (*) (Korea)

Dolphin upgrade for existing COMPASS users

CS42-032	DOLPHIN - Upgrade for existing COMPASS users for ELEKTA® (*)
CS42-033	DOLPHIN - Upgrade for existing COMPASS users for VARIAN® (*)
CS42-032-E	DOLPHIN - Upgrade for existing COMPASS users for ELEKTA® (*) (Europe)
CS42-033-E	DOLPHIN - Upgrade for existing COMPASS users for Varian® (*) (Europe)
CS42-032-K	DOLPHIN - Upgrade for existing COMPASS users for ELEKTA® (*) (Korea)
CS42-033-K	DOLPHIN - Upgrade for existing COMPASS users for VARIAN® (*) (Korea)

7.14 Film Dosimetry

Film Dosimetry is available with myQA® Patients with the comprehensive film processing in Film Panel and single or multichannel dosimetry options.



7.14.1 Film Plug-In (single channel)

(Included in myQA® Patients)

Film Plug-In for myQA® Patients for single channel film dosimetry.

This includes:

- Scanner background calibration procedure
- Film calibration optical density to dose
- Scanner artifacts correction and lateral correction
- Selection of the color channel for the calibration and analysis

7.14.2 Film Plug-In Multichannel Option for myQA® Patients

Multichannel Film dosimetry data import, calibration, and analysis with myQA® Patients. Highest accuracy for IMRT, VMAT and SBRT/SRS cases, eliminating artifacts of films and scanners, and supports high doses.

This includes:

- Read in of the film in multichannel mode
- Lateral correction extended in multichannel modes
- Enhanced fit function for the generation of the calibration curves (based on Tamponi Med. Phys. 43 (2016) 4435).
- Implementation of multichannel algorithm analysis based on Meyer Med. Phys. 39 (2012) 214.

7.14.3 myQA® Patients Multichannel Film QA standalone version

myQA® Patients Multichannel Film QA stand alone is the powerful Patient QA Film analysis tool for highest accuracy, eliminating artifacts of films and scanners, and supports high doses.

7.14.4 Overview Film Panel functions

Film Import

- Flexible & Full DICOM Interface
 - Read DICOM files
 - Query and retrieve from DICOM Server
 - DICOM listener for import via network
 - Import from a DICOMDIR
 - Import of proprietary dose and fluence files

Compare film measurements to variety of supported dose and fluence map formats, e.g., RTDOSE, Monaco®, Eclipse™, XiO™, Pinnacle™ ...

- Quick Patient Overview
 - Intuitive data organization in patient browser
 - Patient list with extensive sorting and filtering function (e.g., by case or workflow status)
 - Automatic Project Creation with the DICOM information
 - Automatization features (see myQA® Patients chapter for more details)
 - Approval status
 - Workflow status flags
 - Workflow due dates

Multichannel Film Plug-in Module

- Scanner calibration procedure
- Film calibration optical density to dose
- Scanner artifacts correction and lateral correction
- Read in of the film in multichannel mode
- User defines the empty scan
- Lateral correction extended in multichannel modes
- Optical density directly calculated from the Analog to Digital Conversion value
- Enhanced fit function for the generation of the calibration curves (based on Tamponi, Med. Phys. 43 (2016) 4435).
- Implementation of multichannel algorithm analysis based on Meyer Med. Phys. 39 (2012) 214.

Efficient and Comprehensive Verification

- Automated gamma results
- Single/composite IMRT fields
- Relative/absolute dose evaluation
- Advanced local and global gamma evaluation
- Histogram analysis and automated statistics
- Excellent visualization of 1D and 2D data including profiles, isodose contours, and 2D dose distributions
- Extensive cursor analysis functions like distance, position, and angle measurements
- Wide range of analysis algorithms: Sum, (absolute) Difference, DTA, Multiplication, Correlation
- Restore raw data anytime
- Full traceability

Reporting and Approval

- Fast reporting and archiving on the database
 - Full control of the patient data in the central database of myQA®
 - Electronic approval including comments
 - Flexible and safe user management / user rights
 - Report as RTF, HTML, or PDF
 - Data export via clipboard e.g., to MS Excel, via ACSII or CSV

Notes:

To upgrade from the Film QA stand-alone version to a full myQA® Patients version that allows the connection to myQA®, adding additional myQA® modules and applications, and performing measurements with the MatriXX, Dolphin, or StarTrack detectors, the following licenses are required:

- myQA® Platform (MQ00-000)
- myQA® Patients measurement interface (MQ02-104)

System requirements:

For operation of the above software a computer with at least the following minimum configuration is necessary:

- Supported Operating systems:
 - Windows 10 (64-Bit)
 - Supported SQL servers:
 - SQL Server 2008 SP1 - SQL Server 2016 SP1
- Minimum Hardware Requirements:
 - Processor: Intel Core i5 desktop or mobile processor or better
 - RAM of 4GB or more, recommended 8GB
- Minimum screen resolution of 1280x720, recommended 1920x1080
- Ethernet minimum 10Mbit/s

Ordering info Film Dosimetry:

MQ02-100	Film Plug-In included in myQA® Patients (single color channel analysis)
MQ02-101	Film Plug-In Multichannel Option for myQA® Patients
MQ02-102	myQA® Patients Multichannel Film QA stand-alone version (does not include or require myQA® Platform, no measurement interface)
PC15-000#001	EPSON 1200 XL Flatbed Scanner upon request
FD17-000	Step table for film scanner calibration – un-calibrated
FD17-100	Step table for film scanner calibration - calibrated
FD17-620	Gafchromic EBT3 films, 8"x10" (20.32x25.4cm ²) size, 25 sheets/box
FD17-810	Gafchromic RTQA2 Films, 10 sheets/box



CHAPTER 8

Machine QA Solutions

Life,
Science.

8.1 myQA® Machines

myQA® Machines is the software module that provides a complete set of functions to plan, perform, analyze, and document quality assurance of treatment units, imaging devices and their accessories, based on customizable protocols.



myQA® Machines, the complete protocol-based independent machine QA integrated on one platform.

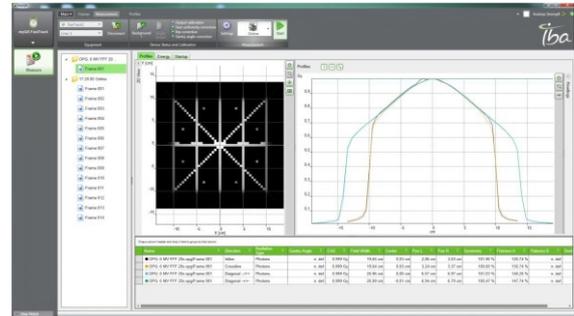
- Easy QA execution with intuitive and consistent software menu for all machine QA software modules (Plug-Ins)
- Designed to integrate seamlessly with the myQA® platform
- Protocol-based machine QA (including TG-142 and other customizable protocols)
- Flexible scheduling tool to manage your tasks, resources, and time
- Integrate any of your hospital-specific tests with the individual test's module
- Interface to myQA® Cockpit for quick and easy access to all QA results and trends
- Export any QA test result to a comprehensive report, traceable anytime
- Comprehensive analysis, archiving, and reporting tools
- Compatible with Citrix® environments (single- and multi-user)

Ordering info myQA® Machines:

MQ03-000	myQA® Machines, site license included
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8.2 myQA® FastTrack

Software application for fast measurement and data analysis with StarTrack or MatriXX detector.

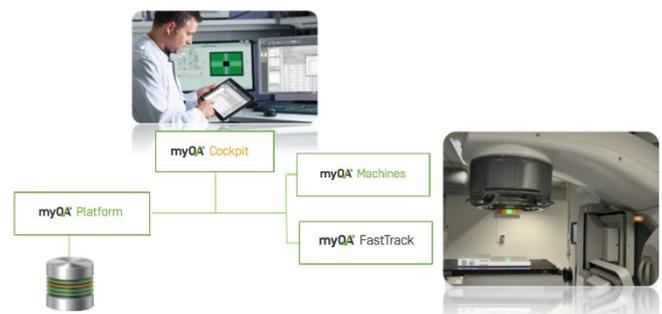


Connect StarTrack or MatriXX detector to measure:

- Instant display of results and real-time analysis (e.g., for beam steering) such as:
 - Dose output
 - Energy check with energy verification plates
 - Profile analysis according to standard protocols (symmetry, flatness, penumbra etc.)
 - Profile comparison
 - Time based measurements (e.g., for analysis of start-up behavior)

Measured data can be imported and exported via ASCII files.

The application is fully integrated into the **myQA®** platform for common set-up, calibrations, and interfacing with **myQA® Patients** and **myQA® Machines**.



Ordering info myQA® FastTrack™:

MQ00-200	myQA® FastTrack, site license included
MQ00-201	myQA® FastTrack for existing OmniPro ImRT / Advance installations

Related Detectors and Accessories:

BS60-500	MatriXX Evolution
BS60-600	MatriXX FFF
BS60-700	MatriXX Resolution - wireless detector for rotational and static plan verification
BS80-100	StarTrack including Energy Verification Plates

8.3 Plug-Ins for myQA® Machines

myQA® Plug-Ins is the solution for easy, automated, and accurate Imaging QA.

State-of-the-art layout and workflow, same test-setup structure for all tests allows the most efficient Imaging-QA, tailored for the existing delivery system and environment.

Fast definition of baseline values gives huge freedom to the user to modify input parameters, baselines, and tolerances for fastest and most accurate Imaging QA!

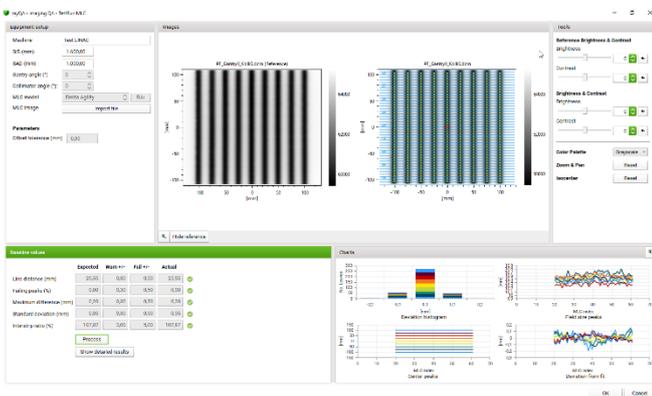


8.3.1 MLC QA Plug-In for myQA® Machines

Automated MLC stripe tests ('picket fence test')

- EPID and film image analysis to determine leaf position accuracy & MLC transmission characteristics
- Identification of if any MLC leaf is out of tolerance or which leaf number failed
- Verification of MLC at the 4 gantry cardinal angles
- Copy & paste detailed results for additional analysis

Analyze actual vs reference image:



- Reset isocenter; home button (zooming and panning)
- Different color palettes, Import of .tiff files
- Detailed information in test setup
- Additional graphs for field size, center, and deviation.
- Combined test for test setup and test run

Ordering info MLC QA Plug-In:

MQ03-201	MLC QA Plug-In for myQA® Machines, site license
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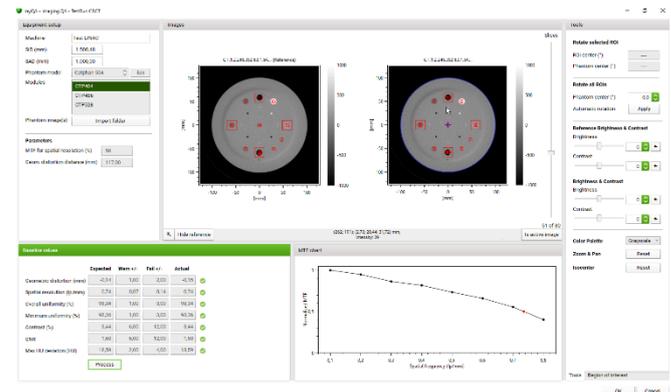
8.3.2 CBCT QA Plug-In for myQA® Machines

TG-142 compliant automated imaging QA for CT and CBCT, including contrast, contrast to noise ratio, uniformity, HU deviation, spatial resolution, imaging scaling, and more!

Compatible with all common imaging phantoms.

Enables verification of CT scanner parameters with CT phantom.

Analyze actual vs reference image:



Geometric distortion	Spatial Resolution	Contrast
Uniformity	Noise	HU contrast

Supported CBCT Phantoms:

CatPhan 503,504,600,604	CIRS S 610	AAPM 062QA
Gammex 464	GE QA Phantom	Tomo Cheese Phantom

Ordering info CBCT QA Plug-In:

MQ03-301	CBCT QA Plug-In for myQA® Machines, site license
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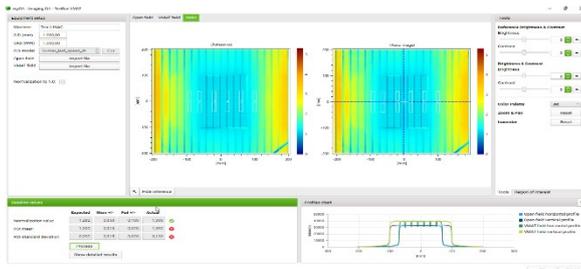
8.3.3 VMAT & dynamic MLC QA Plug-In for myQA® Machines

Automatic test analysis to verify accurate dose delivery using different dose rates, gantry speeds, and MLC leaf speeds.

Ensure perfect synchronization of changing dose rates, gantry, and MLC speeds.

Compatible with established VMAT commissioning guidelines.

Fully automated analysis of the DICOM files, instant QA results overview in one screen:



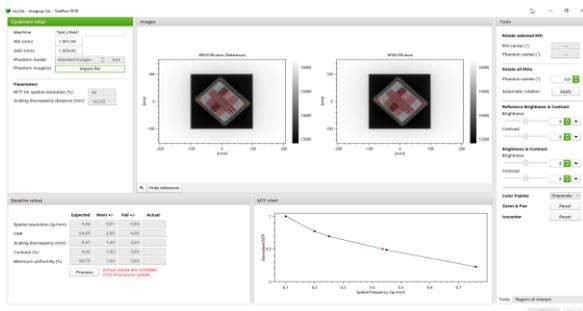
Ordering info VMAT & dynamic MLC QA Plug-In:

MQ03-501	VMAT & dynamic MLC QA Plug-In for myQA® Machines, site license
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8.3.4 Planar Imaging QA Plug-In for myQA® Machines

TG-142 compliant and automated imaging QA for EPIDs and for planar imaging (kV and MV).

Analyze actual vs reference image:



- Contrast
- Scaling
- Spatial Resolution
- Uniformity

Supported Planar Imaging Phantoms:

IBA DIGI-13	IBA Primus A	Las Vegas
Leeds TOR 18 FG	Mobius MC2 kV	Mobius MC2 MV
PTW EPID QC	SNC kV-QA	SNC MV-QA

Ordering info Planar Imaging QA Plug-In:

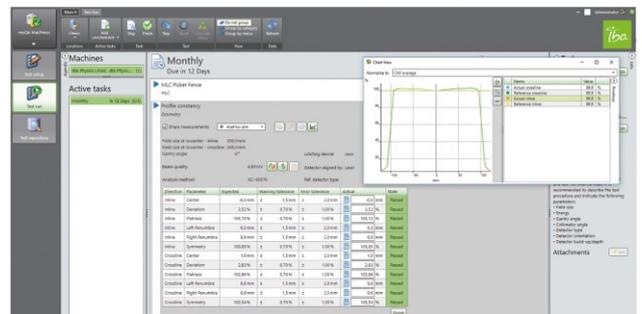
MQ03-401	Planar Imaging QA Plug-In for myQA® Machines, site license	Planar Imaging QA Plug-In for myQA® Machines
----------	--	--

8.3.5 Dosimetry Plug-In for myQA® Machines

Perform automated dosimetry tests with the StarTrack, MatriXX, or Dolphin detector arrays, or by loading water phantom measurements.

Efficiency:

- Acquire all key beam parameters in just one shot (dose output, profile analysis, energy verification).
- Analysis of main axes and diagonals (field size, symmetry, flatness, center, penumbra, light field).



- Run dosimetry test: connect the detector and compare the actual measurement with reference.
- Passes and fails automatically displayed and the test status recorded accordingly.
- Detailed view of the reference and actual measurements (profiles).
- Test Run ribbon for managing of tasks and their status.
- Finished tasks can be tracked in myQA® Cockpit.
- Select machine and visualize tasks due or add unscheduled tasks e.g., in case of maintenance.

Ordering info Dosimetry Plug-In:

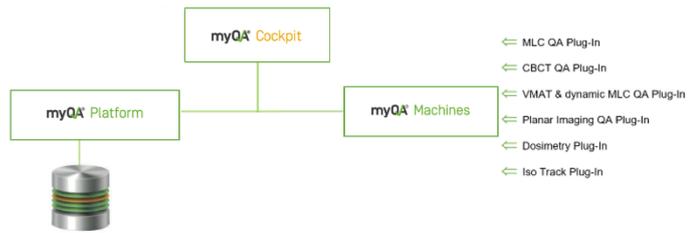
MQ03-100	Dosimetry Plug-In for myQA® Machines, site license (included in myQA® Machines), site license
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8.3.6 Iso Track Plug-In for myQA® Machines

Ordering info Iso Track Plug-In:

MQ03-600	Iso Track Plug-In for myQA® Machines, site license
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Summary Plug-Ins for myQA® Machines:



8.4 Beam Data Verification Audit

A TPS model is only as good as quality of the beam data used for the beam model generation. Low quality scans are appearing in the clinics all around the world, and until now no efficient scan quality check tool/service was available. The comparison of the measured and the predicted scans (profiles, depth dose curves) allows a detailed verification of the measured base data, and it will reveal deficiencies and errors in the data used for the TPS commissioning.

With the proprietary control process, dedicated expert tools, and in-depth experience a beam data verification report is created. The report not only identifies, but also explains inconsistencies and errors in the beam data. This process and the report are now available as a service for customers who would like to have their beam data verified independently, e.g., when commissioning their TPS with SMARTSCAN™ or any other water phantom, or for checking historical or beam data acquired by third party.

Why is this valuable?

- Commissioning is a challenging process that requires in-depth experience
- Usually, the commissioning is done under time pressure; the job is repetitive and error prone
- Small field dosimetry is especially complex and difficult
- The data varies with phantoms and detectors, and the choice of a proper detector can be overwhelming
- Acceptance testing is only done on a subset of the data
- International recommendations for an independent audit of the data by a qualified medical physicist (e.g., AAPM TG-106, AAPM TG-53, ESTRO booklet 10...)
- Errors in the commissioning are one of the main error sources for incidents in RT (see WHO statistics 2008, IROC studies e.g., 2019)
- Only about 15% of commissioning data sets are without deficiencies

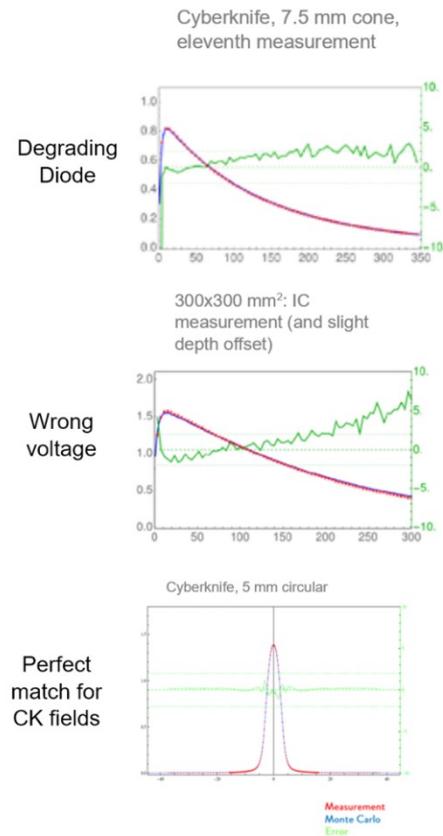
Key benefits:

- More confidence in the TPS model from an independent evaluation of the commissioning data
- Guidance for improving the quality in case of inconsistencies and measurement errors
- Faster “go live” by sending correct and consistent data to the TPS for modeling
- Great additional offer for SMARTSCAN™ customers with lower entrance barrier to SciMoCa/myQA iON (optional), as the beam model is already available (no extra costs for the models, only for the SciMoCa/myQA iON license).



The following examples show how accurately the beam data can be evaluated and two typical errors that can be found.

See also IBA Webinar “Ensuring Beam Data Quality” by M. Kowatsch MSc, from Feldkirch, Austria.



Compatibility

The beam data verification audit can be ordered for all Linacs, which are supported by SciMoCa:

- all C-Gantry based conventional Linacs from ELEKTA®, SIEMENS®, and VARIAN® (*)
- CyberKnife® (Cones, Iris, and MLC), Tomotherapy® / Radixact® (*)
- Halcyon™/Ethos™ (*)
- ZAP-X

Order process

Customers purchasing the Beam Data Verification Audit will receive the Beam data requirements information sheet from our Service team. When the data is processed, the beam data verification report can be sent to the customer.

Ordering info:

PS-SMC-1	Beam data verification audit for one photon energy, Monte-Carlo-based
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8.5 myQA® Daily System

myQA® Daily - easy, efficient, accurate by design

myQA® Daily is the only solution for fast, easy, and high-quality morning Linac QA.

The largest number of ionization chambers provides more beam data for more accurate beam quality verification.

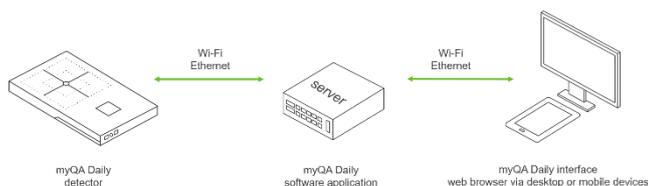


- The web-browser-based myQA® Daily application allows flexible test execution from any network PC or tablet and easy access to test results. User may choose wired or wireless operation.
- Simple (Start, Stop, Record) operation for the therapist – reduces questions for the physicist
- myQA® Daily – SW offers extreme customization and data editing for physics convenience
- myQA® Machines integrated workflow

Technical specifications myQA® Daily device:

Type of detectors	ionization chambers, carbon electrodes
Number of detectors	121 (+ 4 for energy verification)
Detector size	3.2mm diameter, 2mm height, 16.08mm ³
Bias voltage	500 V ± 10 V
Built-in energy verification attenuation disks	2 mm ABS +; 4.0 mm aluminum; 4.0 mm air; 4.0 mm copper, 4.0 mm steel
Inherent buildup above detectors	6.0 mm ABS
Inherent backscatter	0

IT integration:



- Easy and fast integration in your IT infrastructure
- Execute QA tests and reviews on any network device

Performance:

Radiation Qualities	Photons: Co-60 to 25 MV Electrons: 4 MeV to 25 MeV
Rated ranges of measurement	Dose: unlimited Dose rate: minimum 0.3 Gy/min, maximum 24 Gy/min Dose/pulse: max. 0.3 cGy/pulse
Combined standard uncertainty	Typically, ±1.35% with respect to baseline measurement
Environmental sensors	Temperature: ±0.3°C (-40°C..90°C) without user calibration Pressure: ±1hPa (260...1260hPa) without user calibration

Alignment:

Light Field	Field outlines: 20 × 20 cm ² ; 10 × 10 cm ² Crosshair: inline & crossline"
Laser	Engraved marks on side of device (±0.5mm): sagittal, coronal, transversal
Electrical	Power: battery (supplied) & ext. battery charger, 9 V DC power supply (supplied) Wireless connections: Ethernet, Wi-Fi, Bluetooth Communication to software: Ethernet, Wi-Fi
Construction	Weight: approx. 6.5 kg

myQA® Daily System consist of:

- myQA® Daily Device
 - Wireless communication WLAN according to IEEE-802.11
 - Wired communication 10/100/1000 Base-T Ethernet i/f according to IEEE-802.3
 - Rechargeable battery with a nominal voltage of 7.2V/12Ah + Battery charger
 - External DC power supply with 110V to 240V and 50Hz to 60Hz AC input and 9V/3A DC output
- myQA® Daily SW application

System requirements

- PC (WIN 7/8.1/10) with myQA® Daily SW
- Mobile Device (Smartphone, Tablet)

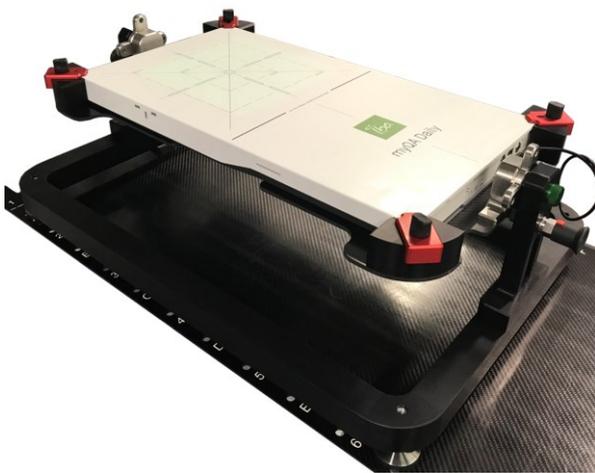
Ordering info myQA® Daily:

DQ01-000	myQA® Daily - Solution for daily Machine QA
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8.5.1 myQA Daily rotating holder:

The rotating holder is an optional accessory for the myQA Daily to support machine QA measurements with Linac angles of 0°, 90°, 180°, and 270°

- Comfortable fixations holding the 2D array in its position
- Fast and accurate locking mechanism for different measurement angles
- Easy to use four-point leveling mechanism
- Rubber feet prevent unintended movements of the holder
- Easy and fast integration in your IT infrastructure
- Compatible with MatriXX Resolution (myQA Machines required)



Ordering info rotating holder:

DQ02-000	Rotating holder for myQA Daily and MatriXX Resolution
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8.6 2D-Array StarTrack

High-End Detector for Advanced Machine QA

StarTrack provides an accurate, efficient method to validate TPS beam data, especially with regards to profile and penumbra accuracy.

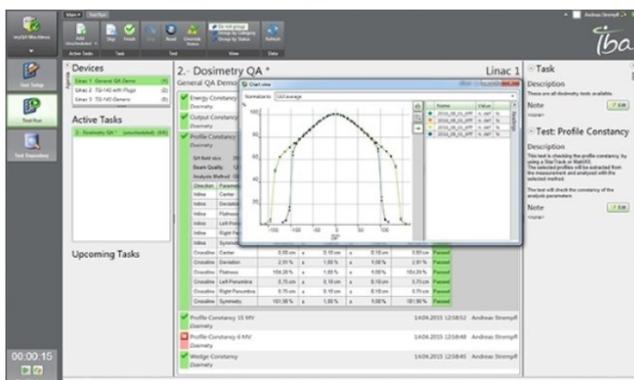
Combined with measurements in water tank, TPS validation can be easily accomplished and could be incorporated into annual calibration routine.

- All main tests in one shot: dose, profiles, diagonals energy verification, etc.
- 453 air-vented ionization chambers with optimized geometry for Machine QA
- Convenient beam constancy verification in one single shot using specific build-up plates
- Automatic k(t,p) correction
- Parallel readout from independent electrometers
- Instant results and real-time analysis using the Dosimetry plug-in for myQA® Machines
- Patented energy verification method



StarTrack is seamlessly integrated into **myQA® Machines** and **myQA® FastTrack**.

Attain instant and real-time analysis using the Dosimetry Plug-in for myQA® Machines. With myQA®, you integrate your dosimetry measurements with all your other QA checks. This enables you to verify and reference easily your daily or monthly QA data with your reference data collected during beam commissioning.



Linac Performance check by using StarTrack:

Application	Description
Numerical analysis of Flatness; Symmetry (Inplane/Cross-Plane Profiles at CAX))	Stability of Flatness and Symmetry affects dose rate for small fields. Flatness: sensitive indicator of energy quality
Beam Energy Quality check (Electrons, Photons)	Beam energy quality factor is an indicator for Linac performance
Off-Axis Ratio (OAR) → "horns" check	The "horns" tends to be larger at lower scans. If the OAR-scans are out of spec, the energy is too low. "Solution": → raising the bending magnet current (BMI) will lower the "horns" OAR% ≤ 110% for all energies > 4MV /OAR% ≤ 115% for all energies < 4MV
Dose Rate Stability	CAX-Dose rate stability measurement: Measure CAX-Dose value and compare with "gold" standard. With IMRT delivery, there is the potential for short irradiation times (MUs). Dose rate stability influences the treatment precision.
Beam Steering	Check profiles while beam-on (online check), e.g., Point symmetry check
Jaw Concentricity	Test the symmetry of Y and X jaws. Check the coordinates of the 50 % dose values for 2 scans with a 180° collimator rotation.
MLC Leaf's check at CAX	Position Accuracy of leaf's at CAX in all Gantry positions to Check the Influence of Gravity (with gantry holder)
Wedge Factor	Verification of MU
MLC Leaf Positioning Check	Check MLC leaf's positioning accuracy and positioning accuracy reproducibility using additional StarTrack rows for MLC QA
Beam start-up	Change in Start-Up is an indicator for Linac performance change
Light-Radiation Field Coincidence	Check light field vs. radiation field

StarTrack mounted on the Linac head using the Gantry holder:



Specifications StarTrack:

Sensor dimensions	27cm x 27cm
Number of detectors	453
Distance between detectors	5mm (7mm along diagonals)
Field size determination accuracy	0.5mm
Detector diameter	3.0mm
Detector volume/size	0.035 ccm; cylindrical 3 (Ø) x 5 (h) mm
Typical sensitivity	1.1nC/Gy (Co60)
Electrometer	453 channels
8 TERA ASICs (each contains 64 individual electrometers), charge resolution	0.1 pC/count
Readout	parallel with no dead time
Sampling time	min. 10 ms
Interfaces	Windows Excel via ASCII (ASCII in general)
Intrinsic Buildup	3mm
Power supply	100 - 240 V, 50/60 Hz, power cord for 230V included
Approximate weight	10 kg

Ordering info StarTrack:

BS80-100	StarTrack including Energy Verification Plates, for myQA® Machines
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Build-Up Plates, for StarTrack / MatriXX:

RW3 build-up plates, 300 mm x 300 mm	4 x 10 mm, 1 x 5 mm, 2 x 2 mm, 1 x 1 mm
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Ordering info RW3 Build-Up Plates for StarTrack /MatriXX:

BS69-000	StarTrack including Energy Verification Plates, for myQA® Machines
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Backscatter Plates, for StarTrack / MatriXX:

RW3 build-backscatter plates, 300 mm x 300 mm	8 x 10 mm, 1 x 5 mm, 2 x 2 mm, 1 x 1 mm
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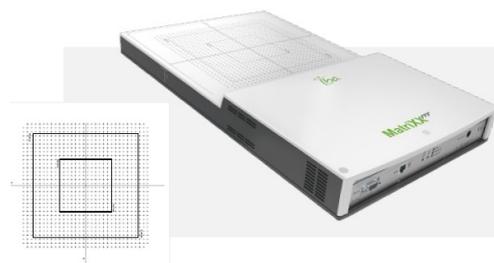
Ordering info Backscatter Plates for StarTrack / MatriXX:

BS70-000	Backscatter Plates for StarTrack / MatriXX, incl. backscatter plate holder
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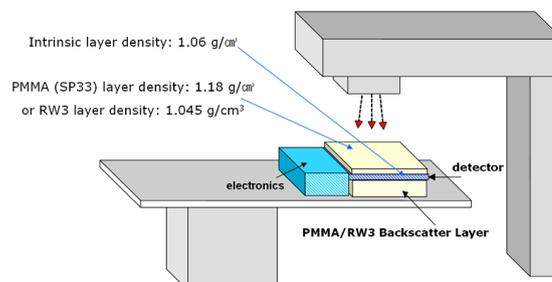
8.7 2D-Array MatriXX for Machine QA

The Flexible Detector MatriXX for Patient QA, connected to myQA® Machines for fast and accurate Linac Machine QA:

- 1020 air-vented ionization chambers
- Choose the right detector from the MatriXX family
 - MatriXX Evolution
 - MatriXX FFF
 - MatriXX Resolution
- Patented energy verification method
- Tabletop or gantry mount (optional)

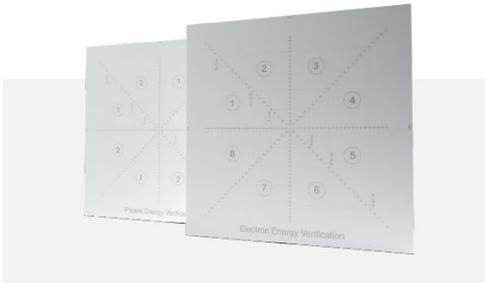


For technical specifications and ordering information for MatriXX, please refer to chapter Patient QA, **2D-Array MatriXX for Plan verification.**

Typical MatriXX set-up on patient couch, using single water equivalent plates:

8.8 Energy Verification Plates

Specific Energy Constancy Verification build-up plates for StarTrack and MatriXX detectors.



Convenient beam constancy verification in one single shot:

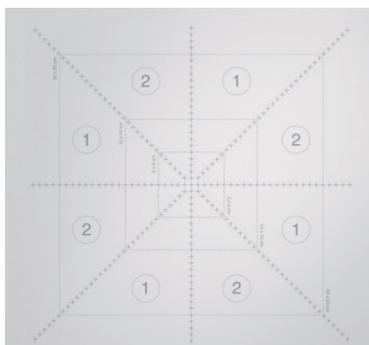
When the plate is properly placed on the top of the StarTrack / MatriXX, the cylindrical absorbers are aligned to a set of dedicated chambers in the device.

The design allows performing **at once and with only one acquisition** both a set of 8 measurements corresponding to the 8 (for electron beams 6 to 22 MeV) or 2 (for photon beams Co60 to 25 MV) given depths and a full set of field profiles on both main axis and main diagonals.

The characteristics of the metallic cylinders are such as not to perturb the measurement of the field profiles.

Specifications Energy Verification Plates:

Material	RW3
Area	30cm x 30cm
Thickness	1 cm for electron beams, 5 cm for x-ray beams, each with 8 recesses of 1cm depth.
Attenuators for energy check	8 cylinders of Ti or Cu or Pb for electron and x-ray beams located in the circular recesses of the energy verification plates.
Location of recesses/attenuators	approximately equidistant, symmetrically positioned approximately 8.5 cm from the center of the plates.



Ordering info Energy Verification Plates:

BS71-000	Energy Verification Plates for StarTrack / MatriXX
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8.9 Gantry mount solutions for 2D-Arrays

A complete gantry mount consists of an (advanced) holder and a gantry fixture.

- To detect dosimetry errors introduced with Linac rotation angles
- Available for StarTrack / MatriXX to attach the detector to all major Linac accessory mount interfaces
- Ideal for VMAT commissioning with StarTrack / MatriXX



Ordering info Advanced holder StarTrack / MatriXX / MatriXX Resolution / myQA Daily:

BS65-000	Advanced holder for StarTrack / MatriXX for mounting to accelerator gantry incl. adjustable XY table with high precision knobs for additional flexibility of extremely accurate positioning.
BS66-000	Holder for StarTrack / MatriXX for mounting to accelerator gantry incl. non-adjustable XY table.
BS65-500	Advanced holder for mounting MatriXX Resolution / myQA Daily to accelerator gantry incl. adjustable XY table
BS65-550	Upgrade kit from BS65-000 to BS65-500

Ordering info Gantry fixture for StarTrack / MatriXX gantry holder:

BS67-100	Gantry fixture for StarTrack / MatriXX gantry holder at 100 cm SSD for SIEMENS® (*) Linac
BS67-200#001	Gantry fixture for StarTrack / MatriXX gantry holder at 100 cm SSD for ELEKTA® (*) Linac
BS67-300	Gantry fixture for StarTrack / MatriXX gantry holder at 100 cm SSD for VARIAN® (*) Clinac
BS68-100	Gantry fixture for StarTrack / MatriXX gantry holder at 76 cm SSD for SIEMENS® (*) Linac
BS68-200#001	Gantry fixture for StarTrack / MatriXX gantry holder at 76 cm SSD for ELEKTA® (*) Linac
BS68-300	Gantry fixture for StarTrack / MatriXX gantry holder at 76 cm SSD for VARIAN® (*) Clinac (Note: Gantry fixture to VARIAN® (*) Clinac at 76 cm SSD cannot be used with holder BS66-000)

8.10 Phantoms for Machine QA

Designed according to IEC/TR 60977 and DIN 6874-5

Integrated phantoms and test devices for comprehensive Machine and Imaging QA needs.

Select from a range of phantoms for dedicated machine QA tasks.

- IBA Dosimetry imaging phantoms for 2D and 3D image quality verification
- Integrate your existing phantoms

(myQA® supports most common imaging phantoms)

8.10.1 Light vs. Radiation Field Verification phantom including base plate:

Consisting of orthogonally mounted cube faces accommodating film with metal markers for radiation field edge detection. For constancy checks of medical electron accelerators or gamma sources according to IEC/TR 60977.

The base plate is designed for an exact leveling of the phantom independent of the surface used to support the phantoms.



Base plate for cubic phantom:

Easy to adjust in the radiation field and also on the horizontal level with the aid of a built-in water level.

8.10.2 Disk phantom for isocenter check:



For determination of the isocentric accuracy. The film is held between the two perspex disks and a tool provided defines the center of crosshairs on the film.

8.10.3 Cylindrical phantom for isocenter & monitor check:



For checking the constancy of the calibration of the dosimetry system in dependence on the gantry rotation by using an adapter for existing chambers. Adapters for checking the isocenter and dose constancy at any angle (especially for Winston-Lutz test) are included in the system.

Specifications Phantoms for Machine QA:

	Base Plate	Cubic Phantom	Disk Phantom	Cylindric Phantom
Material	PMMA	PMMA	PMMA	PMMA
Weight	2.5 kg	8.5 kg	2.3 kg	2.2 kg
Size (LxWxH)	(300 x 300 x 25) mm	(300 x 300 x 310) mm	(200 x 200 x 260) mm	(200 x 200 x 210) mm
Build-up layer	-	10mm	-	-
Thickness of disks	-	20mm	-	-
Diameter	-	200mm	100mm	-
Measuring depth	-	-	-	R= 50mm

Ordering Info Phantoms for Machine QA:

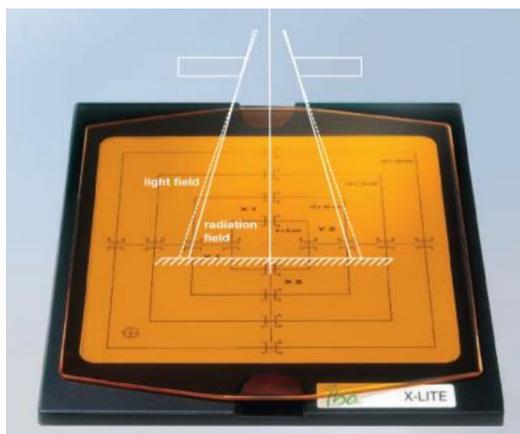
SA20-000	Light vs. Radiation Field Verification phantom including base plate
SA27-000	Base plate
SA21-000	Disk phantom for isocenter check (base plate - item SA27-000 - required)
SA22-000	Cylindrical phantom for isocenter & monitor check (base plate - item SA27-000 - required)

8.10.4 X-Lite for light and radiation field check

X-LITE is used to check light and radiation field coincidence. The fluorescent plate equals an active area of 23 x 23 cm² with scales. This allows us to check a field size of max. 20 x 20 cm².

The plate is activated by exposure to ionizing radiation, which produces fluorescence with a lifetime of a few minutes.

A removable red filter over the active surface protects the fluorescent plate from activation by ambient light or by the gantry field light. After irradiation, the fluorescent response can be compared with the set-up field size on the scale.



Correct alignment of the light field with the radiation field is essential for reliable treatment set-up. According to national and international recommendations, e.g., NACP (Acta Radiologica Oncology 19 Fasc 1, 1980) and IAEA (Technical Report Series No 277, 1987), this alignment should be checked at least once a week and should correspond to within ± 2 mm at SSD 100 cm.

The X-LITE with a fluorescent plate helps you to align the accelerator radiation fields on the treatment table quickly and directly. The plate is activated by ionizing radiation, producing a green fluorescence which is clearly visible for a few minutes after the radiation is switched off. The 5 x 5, 10 x 10, 15 x 15 and 20 x 20 cm² active areas are permanently marked with field scales in centimeters.

A protective red filter prevents activation of the phosphor by the light field from the gantry head or by ambient light. Irradiation photons and electrons penetrate the filter to activate the plate.

Using X-LITE is easy, and alignment checks can be part of the daily routine. With the filter in place, align the light field according to the scale on X-LITE. Put any required build-up material on the plate and irradiate. Remove the filter from X-LITE and check the radiation field alignment. It is not necessary to wait for the afterglow to fade between irradiations, since the contrast is high as long as the following irradiation uses the same dose or higher.

Specifications X-Lite Scintillator:

Active area	23 cm x 23 cm
Field scale	5 cm x 5 cm 10 cm x 10 cm 15 cm x 15 cm 20 cm x 20 cm
Deviation scale	± 5 mm in steps of 1 mm from each field scale
Scale accuracy	± 0.1 mm
Fluorescence	green (max 530 nm)
Fluorescence Lifetime	readable 2-4 minutes after irradiation
Fluorescence intensity	240 mcd/m ² 1 min after irradiation, 150 mcd/m ² 2 min after irradiation (irradiation with 6 MV at 100 cm SSD, 2 Gy dose, 13 mm build-up)
Energy range	> 1 MeV
Maximum dose	6 Gy/exposure
Radiation type	photons, electrons
Daylight filter	red, removable
Material	Plexiglas / polycarbonate
Operating temperature	15 – 45°C
Dimensions	320 mm (L) x 276 mm (W) x 14 mm (H)
Weight	1.4 kg

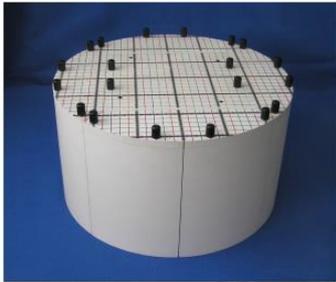
Ordering Info X-Lite:

994-000	X-LITE for light field verification
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8.11 Round CT and RTPS QA phantom

For calibration and verification of the treatment planning system and CT simulator with regard to the Hounsfield Units (HU), including:

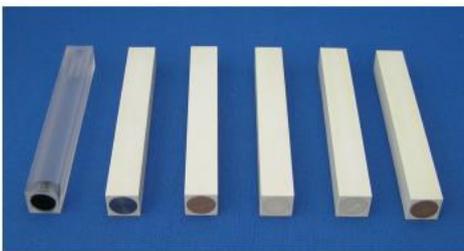
- Cubic phantom for head and neck and stereotactic applications (item number BS41-000)
- RW3 adapter shells for upgrading the cubic phantom to a round geometry (item number BS41-300)
- Transportation case



Ordering info Round-CT and RTPS-QA Phantom:

BS41-200	Round CT and RTPS QA phantom
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Set of inhomogeneous inserts for round CT and RTPS QA phantom:



Hollow inserts with 1.7 cm diameter and 16 cm length embedded in 2 cm x 2 cm RW3 block:

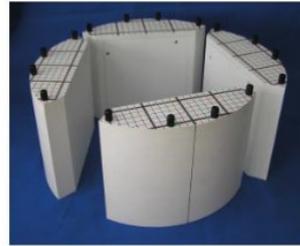
Water	Insert to be filled with water prior to measurement
Lung	Physical density of 0.20 g/ccm Electron density rel. to water 0.194
Adipose	With a physical density of 0.97 g/ccm and electron density rel. to water 0.946
Muscle	With a physical density of 1.06 g/ccm and electron density rel. to water 1.048
Bone	With a physical density of 1.640 g/ccm and electron density rel. to water 1.544
Titanium	Grade 2 with a physical density of 4.51 g/ccm

Ordering info set of inhomogeneous inserts:

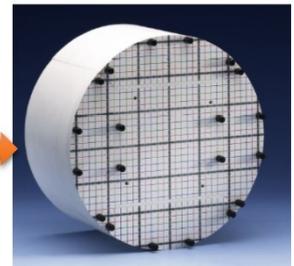
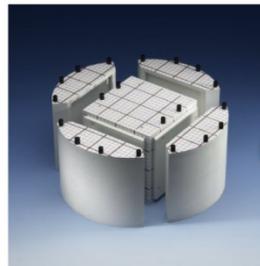
BS41-290	Set of inhomogeneous inserts for round CT and RTPS QA phantom
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8.11.1 Upgrade of cubic head and neck (BS41-000) to round CT and RTPS phantom:

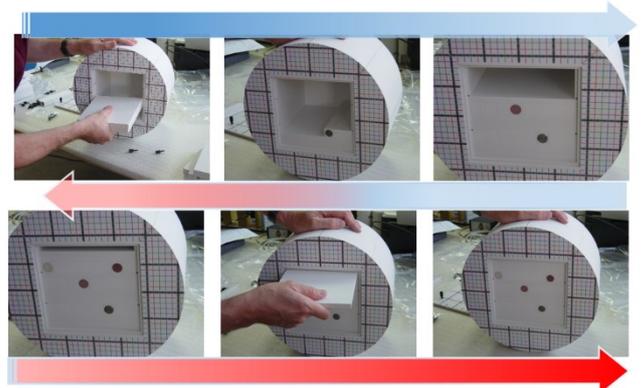
RW3 adapter shells and Cubic Head & Neck Phantom



adapted to round geometry:



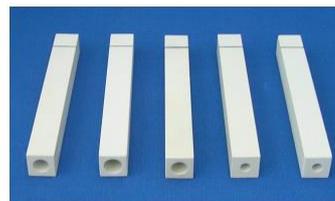
Positioning inhomogeneous inserts in the RTPS QA Phantom:



Ordering info Upgrade to round CT and RTPS phantom:

BS41-300	RW3 adapter shells for upgrading the cubic phantom to a round geometry
----------	--

Ionization chamber adapter inserts:



See Chapter "Cubic Phantom": Ionization Chamber Inserts for Universal ImRT Phantom and/or Cubic Phantom

8.12 QUASAR™ GRID^{3D} Image Distortion Analysis System

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 0.1 mm 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:

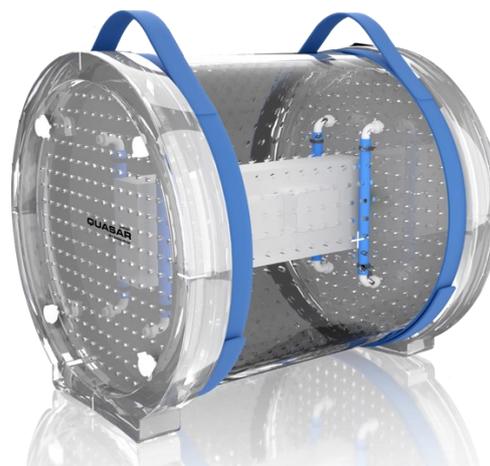
- Advanced, automated control point detection algorithm.
- Evaluate distortion values and detection uncertainty for each control point.
- Evaluate results directly within the GammaPlan™ reference space for increased confidence.
- Increased support for frameless distortion analysis.

8.13 QUASAR™ MRID^{3D} Geometric Distortion Analysis System

The QUASAR™ MRID^{3D} is a lighter, larger, and more efficient way to quantify MRI geometric distortion in 3D. This 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, Geometric Distortion



Phantom Highlights:

- Workflow Efficiency: Quick setup, scanning and analysis with auto-detection and auto-registration features.
- Geometric Accuracy/Stability: NEMA/MITA MS-12 and IEC 62464-1 standard-setting design ensures geometric integrity over the lifetime of the phantom.
- Spherical Harmonic Analysis Detection Method: Quantifies MR Geometric Distortion with algorithms used in B0 shimming and gradient coil design.
- Automatic Phantom Registration: automatic detection of correct laser alignment or positioning error.
- Large FOV Without the Weight: At 21 kg, the pre-filled 37 cm x 32 cm imaging FOV contains 1496 5 mm fiducials designed to evaluate 11,253 data points.

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 time-limited license or depleting a quota of eligible scans.
- 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.

8.14 QUASAR™ MRI^{4D} Motion Phantom

The 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.

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

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



Phantom Highlights:

- **System Compatibility:** Utility within MR, CT, and PET-based systems.
- **Testing Versatility:** Fillable components allow customization of contrast media.
- **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 analysis.
- **Complex Motion:** Programmable 3D target motion provides in-depth QA of MRgRT gating and tracking systems.

Software Highlights:

- **Complex Motion Control Options:** Respiratory Motion QA Software offers multiple operation modes, from adjustable sinusoidal motion and simple test patterns to accurate playback of complex 3D waveforms.
- **Customizable Waveforms:** Enables import of customizable waveforms from a number of respiratory gating and motion tracking systems.
- **Latency Data Reporting:** Using the detailed latency reporting capabilities, physicists can improve the accuracy and confidence of their MRgRT delivery.

8.15 QUASAR™ Respiratory Motion Phantom (pRESP)

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

MR-SIM APPLICATION(S): Motion Management, Machine Targeting



Phantom Highlights:

- **Simplicity:** Easy to operate motion phantom with advanced tools for intuitive motion management QA.
- **Versatility:** collection of interchangeable inserts provides end-to-end testing on multiple treatment and imaging platforms. Additional features for SGRT systems include capturing motion waveforms and confirming 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.
- **Motion Precision:** A responsive motor repositions the translation stage every 10ms (100x per second), giving real-life breathing replication. Waveforms from 0-60 BPM are replicated testing a large range of 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 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.

8.16 QUASAR™ Penta-Guide

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, MR-SIM

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.

8.17 QUASAR™ Penta-Guide Tilt Plate

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.

8.18 QUASAR™ Multi-Purpose Body Phantom

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

MR-SIM 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.

8.19 QUASAR™ IsoCenter Cube

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 5 cm³ acrylic enclosure housing a 6 mm 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 0.1 mm precision.

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.

8.20 QUASAR™ Winston-Lutz Wand

The QUASAR™ Winston-Lutz Wand 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 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

MR-SIM 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 submillimeter 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.



CHAPTER 9

Imaging QA in Radiation Therapy

Life,
Science.

The new flexible solution in beam QA.

Tailored Medical Imaging kits to specific Imaging QA applications in RT.

9.1 Combined IGRT kV Kit, EPID and CBCT

Consisting of:

Multimeter
MagicMaX-Universal,
Basic Unit



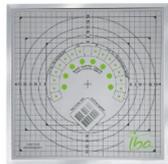
Ionization chamber
DCT10-MM



XR Multi detector



Test device Primus A



9.2 IGRT kV Kit, EPID

Consisting of:

Multimeter
MagicMaX-Universal,
Basic Unit



XR Multi detector



Test device Primus A



9.3 IGRT kV Kit, CBCT

Consisting of:

Multimeter
MagicMaX-
Universal,
Basic Unit



Ionization
chamber
DCT10-MM



9.4 Quality Assurance tools Medical Imaging kits

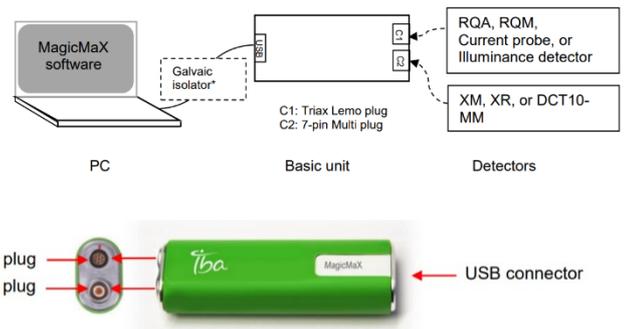
9.4.1 Therapy Multimeter MagicMaX-Universal, Basic Unit:



The MagicMaX Universal Multimeter is a PC based, USB powered automatic precision instrument that measures and displays, simultaneously

- DOSE, DOSE rate, and DOSE per pulse
- Exposure time
- Noninvasively practical peak voltage
- Total Filtration
- First Half Value layer
- Waveform

The measurements are controlled and displayed by easy-to-use software:



The Multimeter is designed according to IEC 61674 & IEC 61676.

Specifications Multimeter MagicMaX-Universal:

External Input Connector	LEMO triaxial male (NIM-CAMAC) 7-pin Multi-connector
Interface	USB 2.0
Max. data rate	12 Mbit/s
Max. USB load	2 Unit Loads (200mA)
USB connector type	USB Mini-B
USB cable type	USB 2.0 compliant ($t_{delay} < 5.2$ ns/m)
Leakage Current	≤ 0.1 pA
Max. Input Current	≤ -3 μ A
Power Supply	USB powered
Recording time resolution	0.1 ms
Max. recording time	300 s
Size (L x W x H)	100 mm x 30 mm x 20 mm (3.9" x 1.2" x 0.8")
Weight	75g (0.17 lbs)

9.4.2 Multi-Detector XR

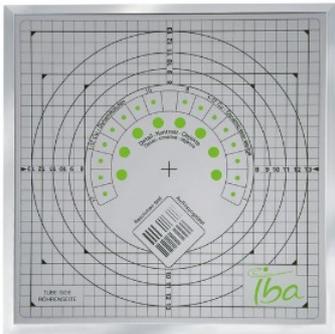
Multi-Detector is to be used with the MagicMaX Universal in kV a range of 40 - 150kV.

The small footprint detector has 2 marked active areas: one for dose, dose rate, dose/pulse and time and the other one for kVp, PPV, Half Value Layer, and total filtration.



Size (mm): 20 x 52 x 10

9.4.3 Test device Primus A



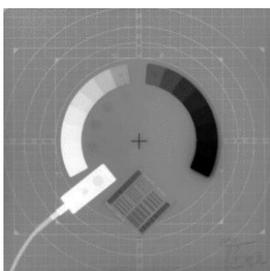
Advanced design for multiple test parameters.

For quality checks at digital & conventional, radiographic, and fluoroscopic X-ray units.

The test device Primus A is applicable for expert inspections, acceptance tests and constancy tests according to DIN 6868-150, 2013 and DIN 6868-4:

- Spatial resolution
- Contrast resolution
- Alignment of light and X-ray field
- Geometrical distortion
- Image scale

X-Ray exposure of the Primus A with detector:

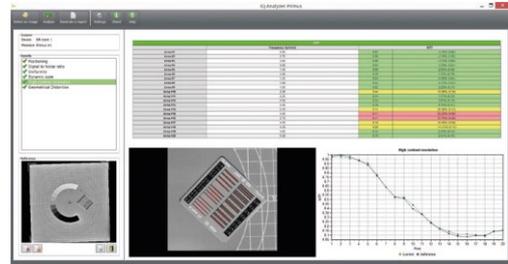


An Attenuation Body is necessary if no Solid-State Detector DEDX is available:

PMMA-Attenuation Body VD0203521

Consisting of 30 mm PMMA and 1 mm Copper

Software IQ Analyzer Primus for automatic fast analysis of Primus A images:



Technical specifications Primus A:

Description	Specification
Absorber (close to focal spot)	25 mm AL with a purity of 99.5% minimum, fixed to a rectangular Al support plate 169 x 176 mm
Structured plate Type Primus A	300 x 300 x 18.5 mm (L x W x H)
In the structured plate included are:	
Copper plate (close to detector)	300 x 300 x 1.50 mm (L x W x H)
Copper plate in the region of the resolution test	1.10 mm (H)
Copper step wedge with 17 steps	150 mm outer diameter and 110 mm inner diameter. The step thicknesses are given below.
Resolution test of 100 µm lead with at least three periods per spatial frequency. The higher frequencies are positioned close to the center of the image	0.6 Lp/mm; 0.7 Lp/mm; 0.8 Lp/mm; 0.9 Lp/mm; 1.0 Lp/mm; 1.2 Lp/mm; 1.4 Lp/mm; 1.6 Lp/mm; 1.8 Lp/mm; 2.0 Lp/mm; 2.2 Lp/mm; 2.5 Lp/mm; 2.8 Lp/mm; 3.1 Lp/mm; 3.4 Lp/mm; 3.7 Lp/mm; 4.0 Lp/mm; 4.3 Lp/mm; 4.6 Lp/mm; 5.0 Lp/mm
	17 mm total thickness
PMMA plate in which the copper step wedge, resolution test and detail contrast objects are embedded.	13 mm 5.0 mm
Depth of the pocket in the location of dynamic steps 1 – 8	
And at the location of dynamic steps 10 – 17	
Weight	Approx. 3000 g

9.4.4 Ionization Chamber 10XF-3CT



For DLP (in mGy*cm) and CTDI measurements at CT scanners, according to IEC 61223-2-6, -3-5, 100 - 150 kV.

- Active length: 100 mm
- Length of chamber cable: 2 m
- Works with the Multimeter MagicMaX
- Integrates into IBA CT Phantoms

Ordering info Combined IGRT kV Kit, EPID and CBCT:

VD0250141	Combined IGRT kV Kit, EPID and CBCT
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Consisting of:

VD0202010	Multimeter MagicMaX-Universal, Basic Unit
VD1020115	Ionization chamber 10XF-3CT
VD0225133	Trolley case "MagicMaX CT"
VD0202030	XR Multi detector
VD0203650	Test device Primus A
VD0203521	PMMA-attenuation body for test device Primus
VD0225134	Carrying case MagicMaX Full-QA (for Primus and PMMA-attenuation body)

Ordering info IGRT kV kit, EPID:

VD0250142	IGRT kV Kit, EPID
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Consisting of:

VD0202010	Multimeter MagicMaX-Universal, Basic Unit
VD0202030	XR Multi detector
VD0225131	Carrying case "MagicMaX Rad-Flu"
VD0203650	Test device Primus A
VD0203521	PMMA-attenuation body for test device Primus

Ordering info IGRT kV kit, CBCT:

VD0250143	IGRT kV Kit, CBCT
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Consisting of:

VD0202010	Multimeter MagicMaX-Universal, Basic Unit
VD1020115	Ionization chamber 10XF-3CT
VD0225137	Carrying case MagicMaX-Universal

9.4.5 CT-Phantom

3-part PMMA CT-Phantom



Adult Head & Body / Pediatric Head & Body Innovative 3-part nested PMMA phantom for CTDI measurements. Designed to image pediatric and adult head and body in accordance with FDA performance standard for diagnostic X-ray systems (21CFR 1020.33).

Consisting of:

- Pediatric head phantom, 10 cm diameter, 5 holes
- Adult head-/pediatric body phantom, 16 cm diameter, 4 holes
- Adult body annulus, 32 cm diameter, 4 holes (the above-mentioned 3 phantoms fit into each other!)
- 13 acrylic rods for plugging all the phantom holes

Ordering info PMMA CT Phantom:

VD1003105	3-part PMMA CT-Phantom (Head / Body / Pediatric)
VD1003110	PMMA CT Phantom (head and body) (alternative)
VD0225133	Trolley case "MagicMaX CT"

For full Medical Imaging QA Solutions, please refer to IBA Dosimetry catalog, "Quality Control in Medical Imaging"





CHAPTER 10
Customer-first
Service & Support

Life,
Science.

10.1 Service & Support

You assure patient safety every day, for today's patients, tomorrow's patients and all your future patients alike. At IBA Dosimetry, we know this is a long-term mission, you will use your QA equipment for many years and there will always be the next patient. The next person, who relies on you and the performance of your QA systems. Therefore, you can rely on being top of mind for us, at any stage in your long-term mission to assure patient safety. From implementation of new QA systems and during all the QA you perform until the end of your QA system's lifetime and beyond, you will always get the right service:

- Expert training and educational programs
- Integration consultation
- 24/7/365 live product support
- Innovative software upgrades
- Rapid loaner deployment
- Product inspections and calibrations

The right service in the right way. You choose whether you want to get services quickly on demand or if you want to plan ahead with multi-year coverage. We are happy to recommend the right match for our flexible solutions and no matter how you decide, our support is always 24/7/365, reliable and without cost.



10.2 This is who you can rely on, anytime

You can rely on each and every one of us in our professional global service organization. For more than 45 years we are constantly optimizing our ways of providing excellent services by listening to our customer's feedback and their changing needs.

At IBA Dosimetry, you have easy access to more than 40 medical physicists, certified engineers, subject matter experts, and IT-specialists engaged with customer-first service.

- More than 40 medical physicists, certified engineers, subject matter experts, and IT-specialists working closely with certified partners around the globe

- Fully compliant with Medical Device regulations, comprehensive and certified quality management system compliant with ISO 13485
- Services carried out in IBA Dosimetry's DAkkS accredited Secondary Standard Dosimetry Lab, our original factory in Germany and our regional Service locations in APAC and the US.

“We are here for our customers, around the clock and around the world. At IBA Dosimetry you have easy access to our experts, educational programs, and deep knowledge – anytime!”

– Timo Hausbeck, Director of Customer Support: EMEA



10.3 Do you need an answer quickly? - Visit our Help Center!

The IBA Dosimetry Help center is our extensive product support knowledgebase that offers you direct access to our service teams and their knowledge. Visit us at: helpcenter.iba-dosimetry.com

- Connect with our 24/7 Global Support Team – all contact details on one page
- Enter a support question – let the AI-based search engine guide you through our support knowledge base
- Browse through more than 1000 product and support articles
- Submit a request – and get connected to your Support Team
- Log in – and review your open support tickets

10.4 Benefit from our advanced installation and training program

Our global team of experienced Customer Support Specialists, all trained and certified, is available to offer you a variety of support, installation, and training services. All training and installations are provided by qualified and certified professionals and medical physicists online or on-site depending on your preference and needs.

We ensure the fast clinical implementation of your new IBA Dosimetry solutions and the efficient and safe use of your new products with confidence.

Our educational program also includes valuable consultation and coaching services, dedicated training courses in our International Competence Center (ICC) and our Clinical Presentations Hub at www.iba-dosimetry.com/clinical-presentations-hub.

Contact us for more information and a customized offer.

It is our ambition to provide you with excellent support – no matter if we are on-site or working with you online.

“Our team of experienced product trainers take a holistic and customized approach to learning. From sharing best practices and new research, to connecting new users with other clinical experts, IBA Dosimetry empowers its customers to use its products with confidence.”

– Nick Narloch, Director of Customer Support: Americas

10.5 Connect with our 24/7 Global Support Team



USA, Canada, Latin America

Phone (24/7): +1 786 288 0369

Email: service-usa@iba-group.com

Modus Medical Services

Phone: +1 519 438-2409

Email: support@modusqa.com

Europe, Middle East, Africa

Phone (24/7): +49 9128 607 38

Email: service-emea@iba-group.com

WhatsApp: +49 9128 607 38

German Speaking Support

Phone: +49 9128 607 911

Asia Pacific, Australia, New Zealand

Phone (24/7): +65 3129 2472

Email: service-apac@iba-group.com

WhatsApp: +65 3129 2472

Chinese Speaking Support

Phone: +86 400 0422 367

WeChat: "IBA Dosimetry Service"

10.6 Product Inspection, Calibration, Maintenance

Routine calibrations are traditionally regarded as highly important for absolute dosimetry systems and carried out on a regular basis. Ever evolving treatment modalities have since continuously increased the importance of highly accurate quality assurance. Patient safety is based on many different QA systems, from initial beam commissioning as the basis for all treatments, to patient QA as the ultimate check to assure safety of individual patients. With a product inspection at the IBA Dosimetry factory and SSDL or one of the regional Service locations, you verify and document the accuracy and performance of all your crucial quality assurance systems.

During the inspection in our factory and calibration laboratory, we thoroughly check and scrutinize your product according to a protocol of device-specific tests and steps.

When the Inspection Protocol is successfully passed, a Certificate of Compliance and, if applicable, a Calibration Certificate are issued to confirm that your quality assurance system complies with our high-quality standards.



What we will do:

- Incoming tests, visual and serial number checks
- Firmware check and update
- Functionality and bench tests
- Mechanical checks and adjustments
- Specific tests and calibrations, such as
 - Factory calibration in our SSDL
 - Laser calibration of positioning accuracy
 - Electrical calibration
 - Stability and reproducibility tests in our SSDL
- Electrical tests
- Cleaning
- Formal certification upon successful completion
- Application of quality seals

For a full device specific inspection protocol please ask your IBA Dosimetry representative.

What you will get:

- Control over accuracy and performance of your device
- Early identification of corrective maintenance requirements
- Certificate of Compliance or Calibration Certificate as proof that your device complies to our high factory standards
- Highest confidence in accuracy and performance of your quality assurance system at any point throughout its lifetime

You would like to have your crucial quality assurance system inspected and at the same time, you cannot afford to be without it? Ask us for a loan unit.

For more information and to request an Inspection, Calibration or Maintenance, please contact your local IBA Dosimetry representative.



10.7 Coverage Contracts for Software and Hardware

What if you could predict the future? With Coverage Contracts you can plan for the future and the lifetime of your equipment. You will eliminate surprises and difficult decisions, reduce administrative effort, and better yet gain control, secure performance, and enjoy peace of mind.

For a custom fit to your individual needs, you can

- cover only selected products or gain maximum security with a Coverage for your entire equipment set
- select the best service level for each product
- start with one year and prolong your coverage on the go or make a plan for several years and secure the lifetime of your equipment

For an individual recommendation based on your needs and expectations, please contact your IBA Dosimetry representative.

Software Coverage for myQA®, myQA® iON, SciMoCa and COMPASS

What if you could be using brand new software all the time? With myQA® Coverage, myQA® iON Coverage, SciMoCa Coverage and COMPASS Coverage you will turn this into reality.

What we will do:

- Automatically deliver every newly released version of your software package
- Keep our experienced Service Experts on stand-by to support you 24/7 via our emergency hotline
- Support you directly in your environment via remote online support
- Provide on-the-go access to relevant resources, such as whitepapers, tech-notes and more, through our Customer Support Portal

What you will get:

- Up-to-date software versions, in line with performance, workflow and security standards
- Peace of mind to know whom to call and where to look when you need support, at any time
- Confidence that your investment is under control and protected

Ordering info myQA® Coverage:

9Q00-001	myQA® Coverage for all purchased myQA® Applications
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Ordering info myQA® iON Coverage:

9Q20-001	myQA® iON Coverage
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Ordering info SciMoCa Coverage:

SMC10-000	SciMoCa - Software Coverage
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Ordering info COMPASS Coverage:

CS10-600	Software Coverage for the Main 3D Software Application
CS10-604	Software Coverage for MatriXX Measurement Console
CS10-605	Software Coverage for Dolphin Measurement Console,
CS10-603	Software Coverage for Viewing Station
CS10-610	Software Coverage for Upgrade to newest software version

myQA® Coverage, myQA® iON Coverage, SciMoCa Coverage and COMPASS Coverage can be ordered for your complete myQA®, myQA® iON, SciMoCa or COMPASS package. For full details please contact your IBA Dosimetry representative and consult our general service contract terms and conditions.

Hardware Coverage Plus

If you want full control over the state of your high-accuracy device and the confidence of up-to-date and documented product inspections, our top service level Hardware Coverage Plus is the right choice.



What we will do:

- Perform a thorough product inspection (PMI) once per year and provide a certificate for your documentation needs
- Cover spare parts and labor of required repairs
- Provide you with a loan unit while your device is in our factory or SSDL
- Keep our experienced Service Experts on stand-by to support you 24/7 via our emergency hotline
- Provide on-the-go access to relevant resources, such as whitepapers, tech-notes and more, through our Customer Support Portal

What you will get:

- Highest confidence in accuracy and performance of your quality assurance system throughout its lifetime with official certificates to document it
- Full control over preventive and corrective maintenance
- Flexibility to use a loan unit while we take care of your device
- Peace of mind to know whom to call and where to look when you need support, at any time
- Confidence that your investment is under control and protected

Hardware Coverage Plus is available for major IBA Dosimetry devices and most IBA Dosimetry ionization chambers. For full details please contact your IBA Dosimetry representative and consult our general service contract terms and conditions.

Ordering info Hardware Coverage Plus

999-991-100	Hardware Coverage Plus
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Hardware Coverage

If you are focused on the availability of your device and want to eliminate any cost surprises from corrective maintenance, Hardware Coverage is the right choice.

What we will do:

- Cover spare parts and labor for required repairs
- Provide you with a loan unit while your device is in our factory or SSDL
- Keep our experienced Service Experts on stand-by to support you 24/7 via our emergency hotline
- Provide on-the-go access to relevant resources, such as whitepapers, tech-notes and more, through our Customer Support Portal

What you will get:

- Full control over corrective maintenance costs
- Flexibility to use a loan unit while we take care of your device
- Peace of mind to know whom to call and where to look when you need support, at any time
- Confidence that your investment is under control and protected

Hardware Coverage is available for most IBA Dosimetry devices and ionization chambers. For full details please contact your IBA Dosimetry representative and consult our general service contract terms and conditions.

Ordering info Hardware Coverage

999-991-200	Hardware Coverage
-------------	-------------------

Pre-selected Coverage Packages

What if peace of mind would already start while selecting your coverage plan? Cover your full IBA Dosimetry set with a coverage package, composed of carefully pre-selected service levels per product. Feel free to contact your IBA Dosimetry representative and ask for the right package for the equipment you want or the equipment you already own.



10.8 Beam Data Verification Audit

What if you could perform QA on your commissioning data, independently and with Monte Carlo? With our independent, Monte Carlo based Beam Data Verification Audit you will gain clarity and confidence about your beam data, which is especially crucial for small fields, SRS and SBRT applications.

For full information on the Monte Carlo based Beam Data Verification Audit please refer to chapter **Machine QA**, “**Beam Data Verification Audit**.”

10.9 Physics Service

What if you have a new treatment machine to commission, want to keep your department running without putting your performance at risk, and need to start treating your patients as quickly as possible?

Rely on our experienced team of medical physicists and our network of internationally renowned experts. Whether you are looking for beam data collection, TPS modelling, output calibration, modality validation, acceptance testing or consulting, contact your IBA Dosimetry representative and get a tailor-made offer, fitting your exact needs.

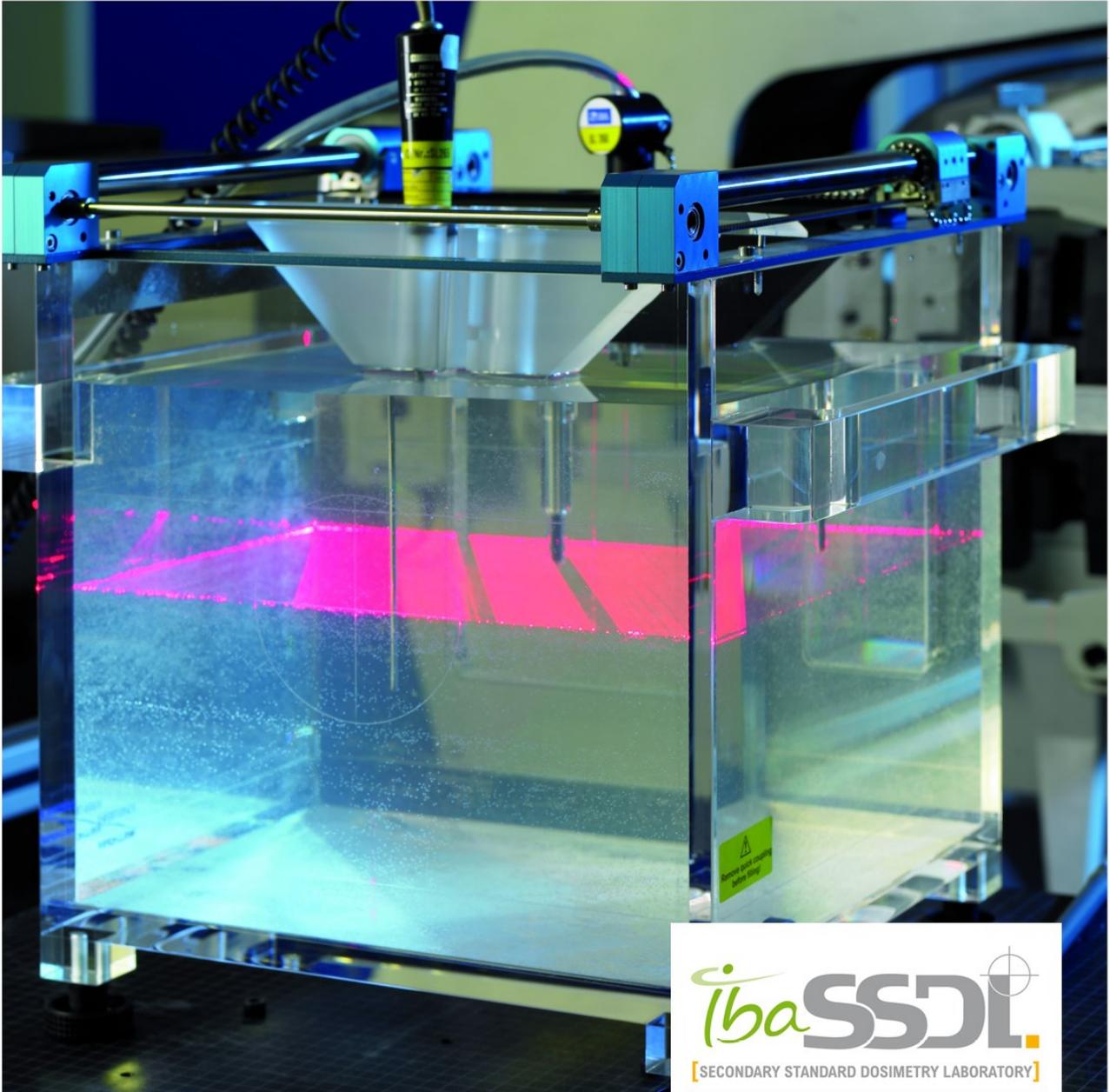
10.10 Coaching Services

Whether you are working with a new team, a new setup or you are looking for the latest best practices, with our remote coaching services you will achieve maximum efficiency and confidence.

Ordering info Coaching Services

PS-CS-001	Beam Data Audit Preparation and Report Analysis
PS-CS-002	Advance clinical training for photon beam dosimetry
PS-CS-003	Advanced Small field Data measurements
PS-CS-004	Assisted Monte Carlo-based Beam data audit package

Note: Availability of coaching services differs regionally. Above coaching services are not available in the USA.



Iba **SSDL**

SECONDARY STANDARD DOSIMETRY LABORATORY

Member of the IAEA/WHO SSDL NETWORK

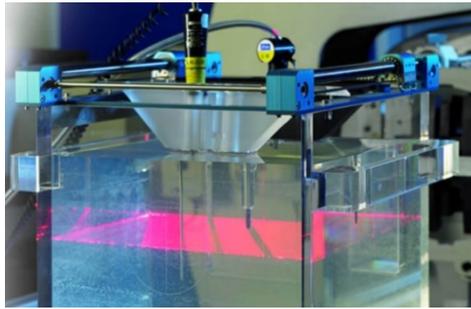
Accredited by DAkkS

CHAPTER 11

Calibration Service for Dosimetry Devices

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11.1 SSDL Secondary Standard Dosimetry Laboratory Calibration



Benefit from IBA's Secondary Standard Dosimetry Laboratory's wide range of calibration services for equipment in radiation therapy & diagnostic radiology.

- SSDL Calibration Service: High level calibrations with certified accuracy
- Stay compliant with standards and regulations
- Ensure accuracy of your patient and machine QA
- Highest patient safety of your measurement devices
- Test of Functionality
- Regular Factory Calibrations
- Metrological Check of Medical Measuring Devices
- Special services
 - Expert consulting in absolute dosimetry including dosimetry protocols (IAEA, AAPM), per hour irradiation of material samples with high dose in Co-60 beam available on request.
- SSDL accredited calibration services according to accreditation scope
 - available also for 3rd party dosimetry devices



For additional calibrations of dosimeters in 33 photon, x-ray qualities in the range from 20 kV up to 280 kV (covering therapeutic and diagnostic range), please contact us in this case at: service-emea@iba-group.com

The Secondary Standard Dosimetry Laboratory (SSDL) of IBA Dosimetry offers calibration of dosimeters used in radiation therapy and diagnostic radiology according to the recent dosimetry codes of practice and standards (IAEA TRS, AAPM TG, IEC and DIN) in a wide range of quantities and radiation qualities (see table below). The SSDL calibration services for dosimetry quantities and the electrometer calibrations are accredited according to the DIN EN ISO/IEC 17025:2018 (DIN EN ISO/IEC 17025:2018 is a German adoption of ISO/IEC 17025:2017) standard. Additionally, factory calibrations are available for all dosimetry quantities except for high energy x-ray/electron beams and electrometer calibrations.

Table: Calibration quantities, beam qualities, standards, and dosimetry protocols, and combined expanded uncertainties of calibration coefficients:

Quantity	Measurement range	Measurement conditions		U (k = 2)	
		Beam quality	Specification	SSDL	Factory
Air kerma rate	100 mGy/min to 5 Gy/min	Co-60	TRS-277, TG-21	1.0 %	2.2 %
	1 mGy/min to 200 mGy/min	X-rays 40 kV to 280 kV	IEC 61627	1.2 %	2.3 %
Air kerma	100 mGy to 20 Gy	Co-60	TRS-277, TG-21	1.0 %	2.2 %
	1 mGy to 10 Gy	X-rays 40 kV to 280 kV	IEC 61627	1.2 %	2.3 %
Kerma area product	20 µGy.m ² to 100 µGy.m ²	40 kV to 160 kV	IEC 61627, DIN 6809-5	1.8 %	3.3 %
Kerma length product	0.1 µGy.m to 1 mGy.m	40 kV to 160 kV	IEC 61627, DIN 6809-5	1.8 %	3.3 %
Absorbed dose rate to water	100 mGy/min to 5 Gy/min	Co-60	TRS-398, TG-51, DIN 6800-2	1.0 %	2.2 %
	1 mGy/min to 300 mGy/min	X-rays 120 kV to 280 kV	DIN 6809-5	2.3 %	3.5 %
	5 mGy/min to 100 mGy/min	X-rays 20 kV to 100 kV	TRS-398, DIN 6809-4	3.2 %	4.0 %
Absorbed dose to water	1 Gy to 20 Gy	Electrons 6 MeV to 15 MeV	TRS-398	2.2 %	N/A
	1 Gy to 20 Gy	High energy x-rays 6 MV to 15 MV	TRS-398	1.6 %	N/A
	0.1 Gy to 20 Gy	Co-60	TRS-398, TG-51, DIN 6800-2	1.0 %	2.2 %
	1 mGy to 5 Gy	X-rays 120 kV to 280 kV	DIN 6809-5	2.3 %	3.5 %
	5 mGy to 3 Gy	X-rays 20 kV to 100 kV	TRS-398, DIN 6809-4	3.5 %	4.0 %
DC current	200 pA to 10 µA		IEC 60731	0.2 %	N/A
	20 pA to 199 pA		IEC 60731	0.3 %	N/A
	1 pA to 19.9 pA		IEC 60731	0.5 %	N/A





CHAPTER 12

International Competence Center

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12.1 IBA Academy



With the International Competence Center (ICC) in Nuremberg, Germany, IBA Dosimetry created one of the most modern and sophisticated training centers for Dosimetry. It is equipped with an ELEKTA® Linac, TPS workstations and the full range of Dosimetry instruments.

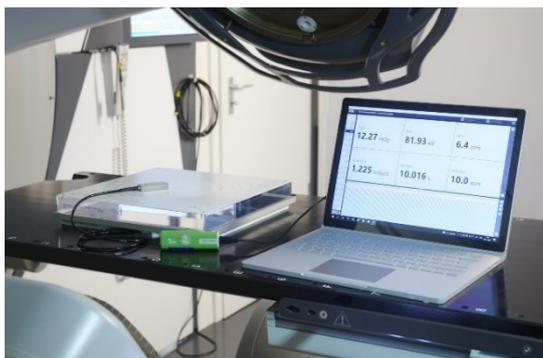


Academy-on-the-road is our concept to provide content rich courses and hands-on experience worldwide.

The IBA Academy offers high-level training and expertise for Radiation Therapy and Medical Imaging Dosimetry for healthcare professionals.

The IBA Academy training portfolio consists of intensive training courses in small groups, webinars, and white papers. You can expect renowned international speakers, state-of-the-art equipment, and technology for hands-on trainings as well as latest news in Radiotherapy and Dosimetry.

Courses are offered in our ICC International Competence Center and Radiotherapy centers around the world.



12.2 About the ICC



The innovative International Competence Center (ICC) training facility was opened at the IBA Dosimetry headquarters in Schwarzenbruck, Germany, in July 2012. The ICC is the first training center in the world where trainees can simulate treatment verification and quality assurance systems without patient traffic, in a facility that mirrors a real clinical environment.

The aim of the ICC is to train healthcare professionals in using Radiation Therapy and Medical Imaging Dosimetry equipment safer and more efficiently.

The training courses are held by renowned clinical speakers as well as by highly qualified IBA Dosimetry staff members.

Apart from the trainings in the ICC facilities at the IBA Dosimetry headquarters, we offer courses in selected top-level clinics worldwide.



Please visit the ICC webpages for information about upcoming trainings, or for individual training requests.

<https://www.iba-dosimetry.com/academy/>

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