iba

DOLPHIN

Transmission Detector for Patient QA & Monitoring*

dolphin®
ONLINE READY

CARE. CONTROL. CONFIDENCE.

PROTECT +
ENHANCE +
SAVE LIVES

ONLINE-READY design*

Unique multi-purpose Transmission Detector for Pre-Treatment QA, Online Monitoring, and Machine QA

Confidence from the TPS plan check to the last fraction
- Pre-treatment TPS plan verification supported
- Online patient treatment monitoring during each fraction*
- Machine QA checks

### High-resolution, high-accuracy detector array
- Detector is perpendicular to the beam, no angular dependence
- Measures the actual treatment instead of pre-treatment beam*

Cable-free design
- Wireless data connection
- Battery-powered; seconds to change

Optimized for rotational treatments
- Built-in gantry angle sensor
- Time resolved (4D) segment-by-segment response detection

40 cm

40 cm

Unique detector array design
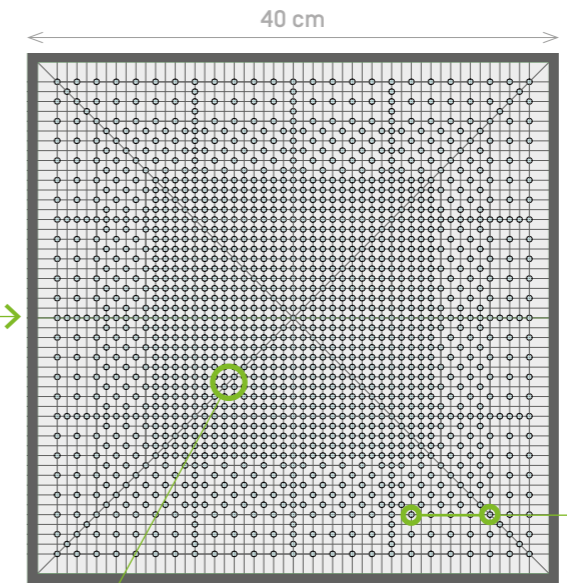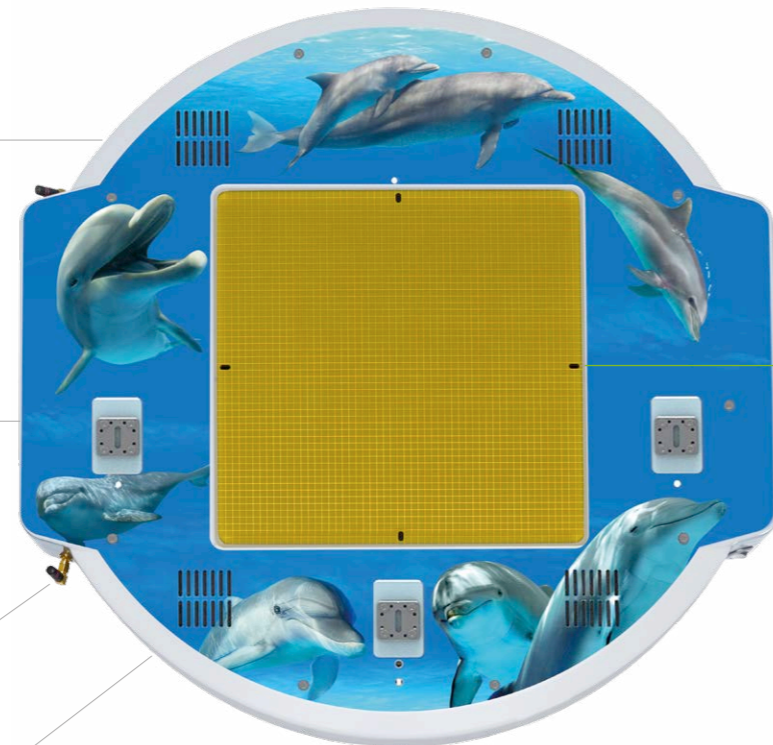
Unique multifunctional detector array design
- Pre-treatment QA
- Online treatment monitoring of each fraction*
- Machine and Morning QA
- Full 40 x 40 cm² treatment field size coverage

High sensitive for Patient QA
- 1513 ionization chambers, 5 mm spacing (central area)
- Fluence generated from the detector response
- High-resolution Monte Carlo modelling of the detector response

Configured for Machine QA
- Use Dolphin measurements for machine QA with myQA Machines and myQA FastTrack
- Online detector advantage: Dolphin is ready anytime for your QA without the typical hardware setup*
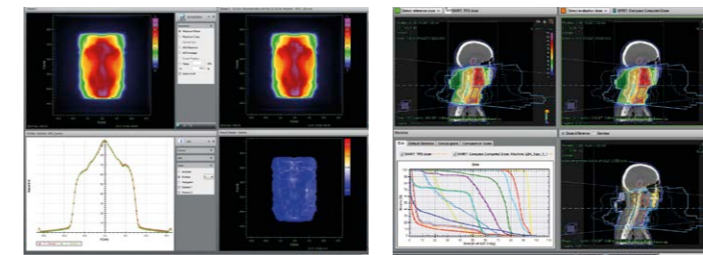
Dolphin real Linac output measurements used for 2D and/or 3D plan QA, for pre-treatment and for online QA in future

myQA

Check your dose output and profiles, beam uniformity, constancy, flatness, and more

Dolphin accuracy and efficiency in numbers

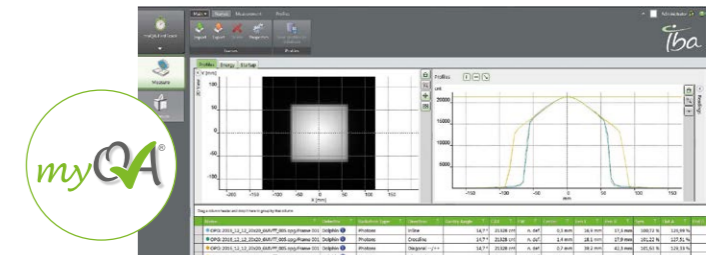|	
1513	ionization chambers in Dolphin detector
40x40 cm²	full field size for QA of largest fields in one setup
5 mm	detector resolution for high accuracy
1 min	setup and readiness for QA measurements

Dolphin Publications ☞

J. Thoelking et al:
Characterization of a new transmission detector for patient individualized online plan verification. Medizinische Physik, 26, Issue 3

J. Godart et al:
Reconstruction of high-resolution 3D dose from matrix measurements: error detection capability of the COMPASS correction kernel method. PMB, 56, Nr. 15

Dolphin is released for pre-treatment QA. Approval for online use during patient treatment is pending by Linac manufacturers.

Pre-Treatment QA

Setup Efficiency

Be ready to measure in 1 minute
- Simply attach Dolphin to your gantry and operate wirelessly, no cables needed!
- Excellent setup positioning accuracy. Skip time-consuming setup and alignment of couch-based detector solutions
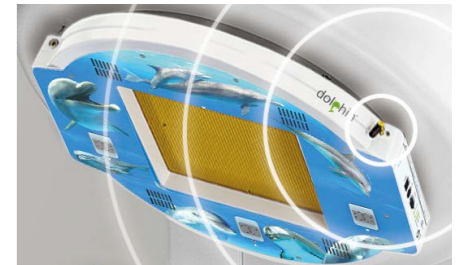
Measurement Accuracy

Designed to verify real dose in 3D
- Highly accurate and proven ion chamber detector
- High error detection capability based on the real treatment delivery (vs. log file "calculation only" or EPID solutions[1])
- High-resolution full 40x40 cm^2 field size measurements

Verification Power

TPS-class error analysis
- Comprehensive 3D measurement-based QA. Evaluate the plan in the Patient CT based on gamma and DVH metrics
- Possibility of independent TPS calculation with integrated Collapsed Cone algorithm
- Independent QA compared to Linac dependent log file solutions
- Save time by eliminating the need for hybrid plans
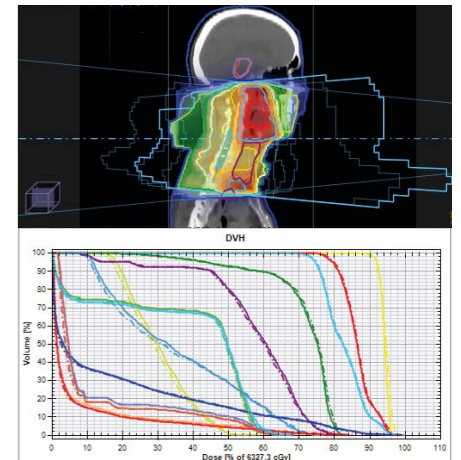
Patient pre-treatment QA at the most advanced level

QA efficiency, confidence, and safety before you treat your patients
- Save time for your equipment setup, measurements, and verifications.
- Start using your Dolphin for pre-treatment QA and Machine QA, and gain experience for future upgrades to online treatment monitoring!*

> *In our institution we have clinically implemented Dolphin on our three Linacs. Prior to each patient treatment, an advanced measurement-based quality assurance is performed with Dolphin. This is our basis to achieve the highest QA standards and safe treatments for all our IMRT patients today and in the future.*

Mathias Dierl
Head of Medical Physics at the Klinikum Bayreuth, Germany

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[1] EPID "online" solutions are built for imaging and compromise dose measurement accuracy; EPID solutions typically require a separate "pre-treatment" QA step. Log file based "calculation only" QA solutions rely only on Linac parameters and do not measure the real output of the treatment machine.

Watch Dolphin user M. Dierl

Pre-Treatment QA
Workflow simplicity

dolphin®

> **Easy setup**
> **and QA measurements**

> **Automatic**
> **instant verification results**

> **Optional full 3D**
> **patient dose analysis with** *COMPASS*

The Physicist and Radiation Oncologists **evaluate** the case using IBA's comprehensive 3D / 4D verification software.

DVH

RTPS   Measured

4000   5000

Dose [cGy]

Evaluate! !

OK ✓ → **Patient Treatment**

- Fast detector setup in just 1 minute
- Simply attach Dolphin to your gantry without cables or calibrations
- Transmit your measured data wirelessly for efficient verification at your QA console

- Instant verification of Dolphin measurements vs. TPS plan and display of the result
- "**OK**" for a test that is successfully passed
- "**Evaluate**" for discrepancies exceeding your individual threshold
- In case further analysis is required, a full 3D measurement-based evaluation can be performed

- Proven DVH metrics and TPS evaluation tools support comprehensive evaluation and decision making
- Determine when re-planning is required, or when machine-specific tests are necessary
- Understand the clinical impact of the actual delivery in the patient anatomy

Online Treatment Monitoring*

dolphin® ONLINE READY

H&N SRT
OK ✓

Brain SRT
OK ✓

Lung Hypo-FX
OK ✓

Spine SBRT
OK ✓

Prostate VMAT
OK ✓

Online confidence of treating your SBRT, hypo-fractionation, and advanced RT patients exactly as planned.
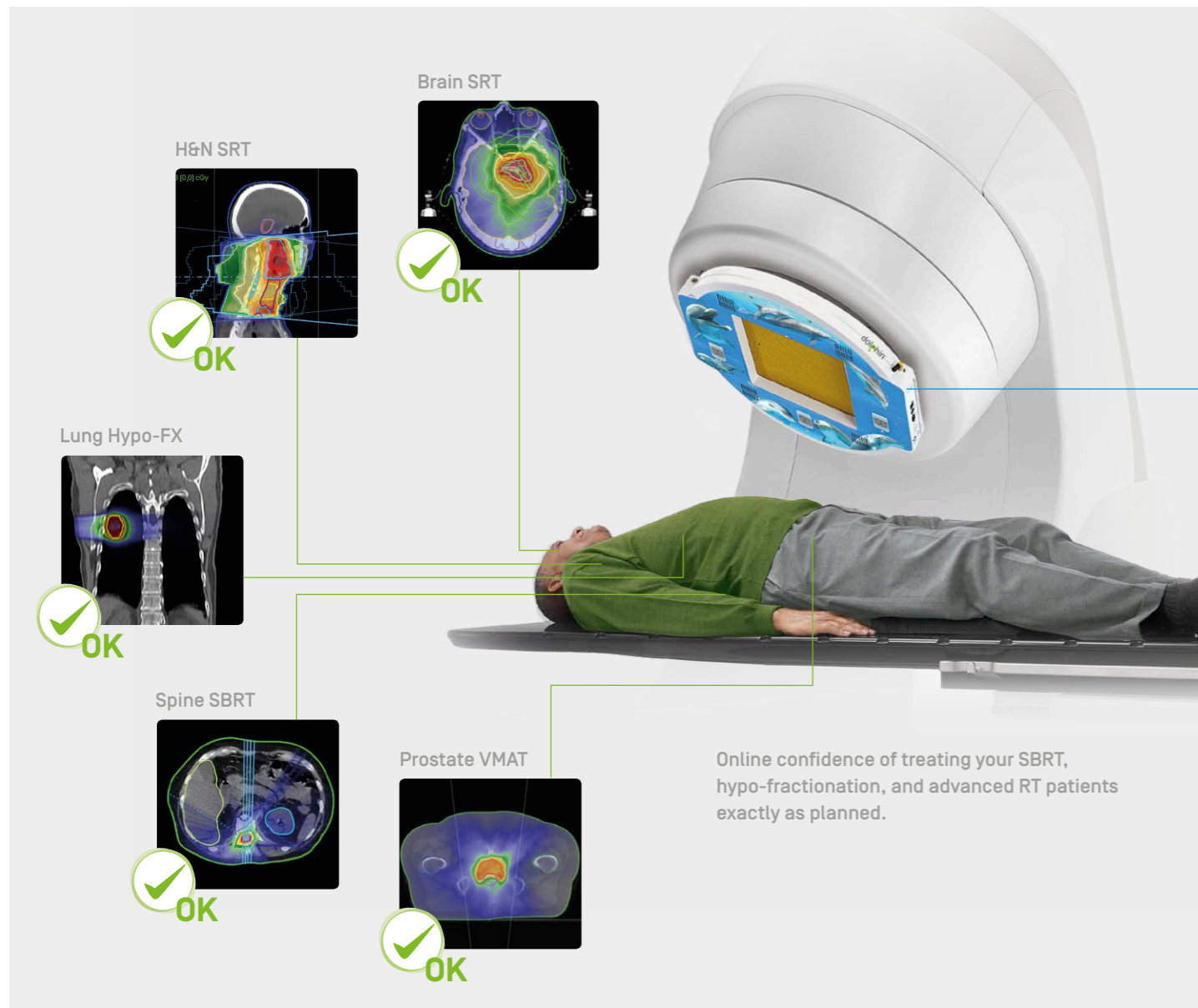
Verification Efficiency
Instant automatic check and display of results
- Instant verification and confirmation of each delivered fraction in seconds

OK ✓   Evaluate! ⚠
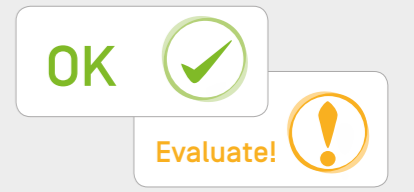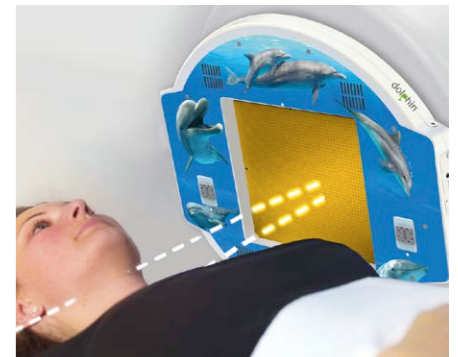
Patient Friendly
Unique design
- Comfort and peace of mind for your patients
- Marketing possibility for your institution

Possibility to Replace Pre-Treatment QA
Only with Dolphin
- Dolphin accurate dose measurements enables full patient QA of each fraction and the possibility to replace pre-treatment QA[2]

Slim design for maximum clearance[3]
- Support of non-coplanar beams

Dolphin Online Treatment Monitoring* during each fraction
Control and safety until the last fraction is delivered!
- Safe time and gain confidence with the possibility to reduce or skip your pre-treatment QA[2]
- Verify your TPS plan based on the Dolphin measurements of the first treatment fraction
- Detect errors after your pre-treatment QA
- Detect data transfer errors within the treatment chain
- Capture Linac errors: Detect beam line issues, MLC deviations, dose rate changes, sudden flatness/symmetry drifts, gantry/collimator positioning errors, etc.

You Tube — Watch Dolphin Online Monitoring workflow

* Dolphin is released for pre-treatment QA. Approval for online use during patient treatment is pending by Linac manufacturers.

[2] Using Dolphin in online mode, pre-treatment QA may be replaced with QA measuring real patient treatment output at the first patient fraction(s). Other online patient monitoring QA solutions require a separate full "pre-treatment" QA step as these solutions only monitor consistency vs. a separate base measurement; thus other solutions do not allow the replacement of pre-treatment QA. Replacing pre-treatment QA may depend on your hospital protocol and country specific QA requirements.

[3] Ask for the Dolphin white paper about clearance.

Online Treatment Monitoring
Workflow simplicity for each fraction*

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ONLINE READY

> **Online measurement of treatment fractions**

> **Fraction by fraction online control**

> **Confidence to the last fraction**

Care

Control

Confidence

QuickCheck Fraction Summary

QuickCheck result
for the last measurement

OK

Verification during assignment

Close

Gain full online control to ensure that each fraction was delivered as planned!

OK ✓

✓ ✓ ✓ ✓ ✓ ✓

End of Treatment

Evaluate! ❗

Dolphin provides Online Care by enabling a safer and more positive treatment experience
- Dolphin measures the actual patient treatment delivery during each fraction
- Measured detector response is transmitted wirelessly to the Dolphin workstation at the treatment console

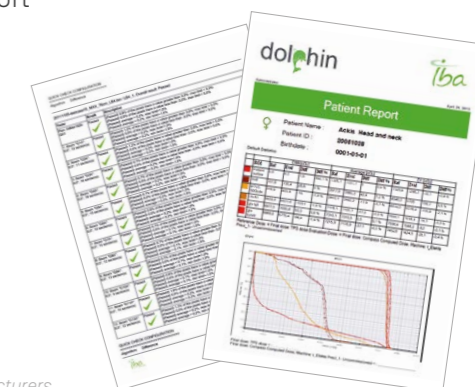**Dolphin Online treatment evaluation immediately after each fraction**
- Instant automatic analysis of the delivered fraction vs. the TPS plan
- Set automatic verification thresholds for "**OK**" and "**Evaluate**" according to your individual protocol
- Seamless integration into therapist's workflow by simple confirmation of the correctness of each fraction

In case of a detected fraction discrepancy
- A notification message is displayed within seconds after the treatment
- Notifications can be sent automatically via email for further evaluation
- Evaluate the cause and dose impact in patient anatomy using Compass

Dolphin provides you with full confidence
- Have confidence that the entire treatment was delivered safely*
- Reporting: Document safe delivery with your detailed report

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Patient Report

▶ Watch the Dolphin workflow

Machine QA

dolphin®

Unique detector layout

Dolphin is designed also for Machine QA
- Optimized detector layout for high-resolution profile measurements and diagonals
- Excellent stability, reproducibility (0.5%), and linearity (1.0%)
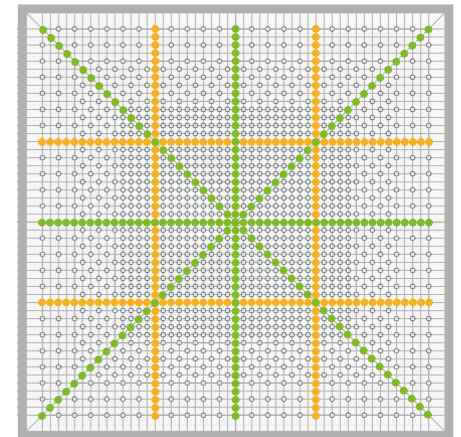
Setup consistency and efficiency

Overcome cumbersome table-based detector setup
- Dolphin features excellent repositioning accuracy by simply attaching the detector to the gantry mount
- Ready to measure in 1 minute

Positioning variation   Dolphin setup consistency
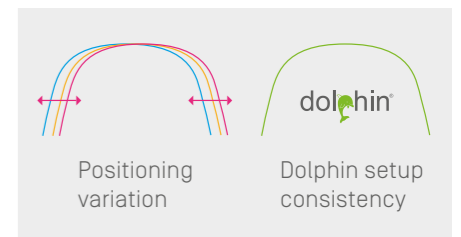
myQA Machines

For routine scheduled machine QA dosimetry tests
- Verify your profile, output, and wedge constancy
- Check your machine behavior per gantry angle

myQA Cockpit gives you full overview of your machine QA status and trend analysis. The browser-based application ensures access anytime, anywhere!

myQA FastTrack

For instant dosimetry measurements
- For your measurements beyond scheduled routine machine QA workflow
- Display of results and real-time analysis e.g. for beam steering, start-up behavior, or profile comparison

Machine QA efficiency

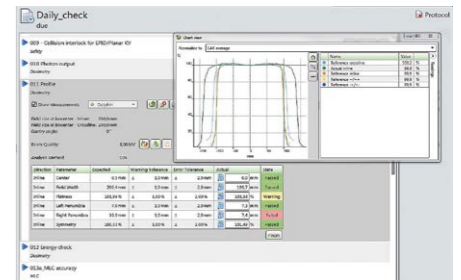**Dosimetry tests with Dolphin Transmission Detector and myQA**
- Save time: Check your dosimetry constancy with the same Dolphin setup and in one session with your patient QA
- Easy comparison of test results and trend analysis
- myQA Machines connects Dolphin into your global QA platform

myQA®
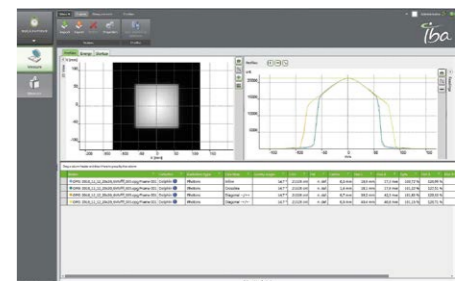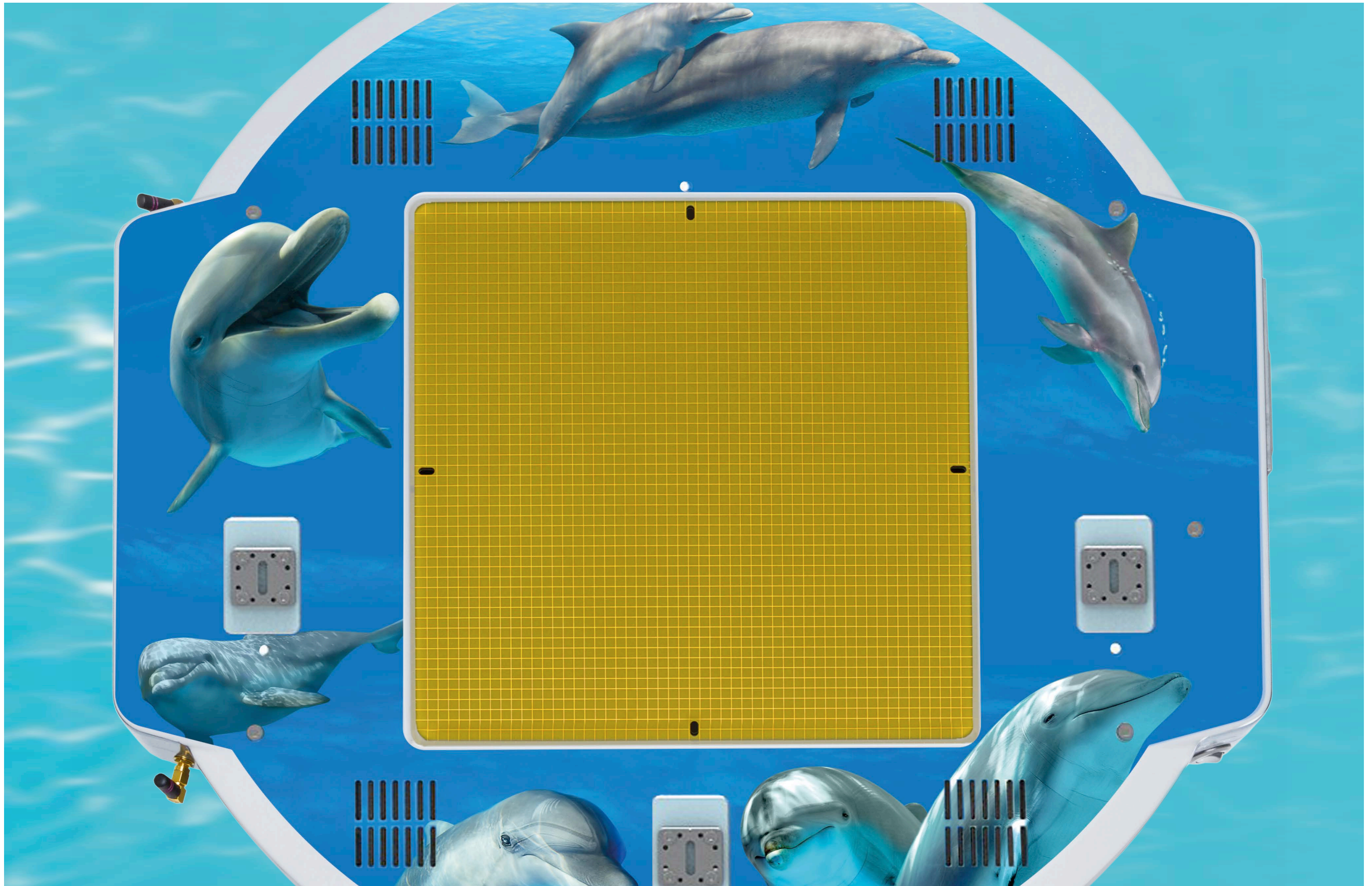
DOLPHIN SPECIFICATIONS

Outer dimensions	600 mm (Ø) x 57 mm (h)
Weight incl. battery	12 kg / 26.45 lbs (ca)
Detector field size	40 x 40 cm²; Full treatment fields supported (Detector size of 24.3 x 24.3 cm²)
Detector resolution	5 mm high-resolution in the inner 15 x 15 cm² detector area (center-to-center distance). Chamber board layout with central detector and dedicated patterns to support future machine QA (diagonals, MLC check layout).
Ionization chamber specs	1513 air-vented plain parallel ionization chambers of 3.2 mm (Ø) x 2.0 mm (h); Chamber volume 0.016 cm³
Max. dose rate	Collection efficiency (pulsed beam at 360Hz PRF): >98% at 2.8 mGy / pulse (corres. to 2400 MU / min with 10MF FFF)
Sampling time	20 ms sampling time; Parallel readout of 1513 Ionization Chambers
Nominal sensitivity	1.8 nC/Gy (measured in transmission in central detector area with 1 Gy at isocenter at 5 cm depth with a 10 x 10 cm² field and 6 MV photons)
Angle sensor resolution	+/- 1 °
Mechanical connection	Linac head accessory mounts supported including accessory mounted coding. Double locking mechanism for maximum security
Data connection	WiFi access to 802.11 g/b; Ethernet option for test purposes
Battery life (max)	2 x 5 h for battery-powered function supporting a full treatment day; LED charge indicator included
Software	The Dolphin software workflow is optimized for automatic verification for pre-treatment and online plan verification. Comprehensive 3D/4D verification is supported with advanced TPS-class software for dose analysis in patient anatomy including comparative DVH. Connect Dolphin optionally to myQA Machines for your routine scheduled dosimetry tests or to myQA FastTrack for unscheduled instant dosimetry measurements.

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