Optional Magnification and Density Rods

The bottom of the CT/PET Table Insert has two 1/8" (3.31 mm) diameter aluminum rods, spaced 30 cm apart that run the length of the insert and are used for magnification measurements.

A 1" (2.54 cm) diameter polystyrene rod and a 1" (2.54 cm) diameter acrylic rod are placed on either side of the center support. Both these rods run 72" (183 cm) along the bottom of the insert. These rods provide a reference for density checks.

Specifications

Table Density: Polycarbonate - 1.2 g/cm³
Rod Density: Acrylic - 1.185 g/cm³ and Polystyrene - 1.05 g/cm³
Size: 84" L x 3/8" T (213.4 x 0.97 cm)
Weight: 55 lb (25 kg)

<table>
<thead>
<tr>
<th>Item #</th>
<th>Table Manufacturer</th>
<th>Magnification and Density Rods</th>
</tr>
</thead>
<tbody>
<tr>
<td>683-310</td>
<td>GE</td>
<td>Included</td>
</tr>
<tr>
<td>683-320</td>
<td>Siemens</td>
<td>Included</td>
</tr>
<tr>
<td>683-330</td>
<td>Philips</td>
<td>Included</td>
</tr>
<tr>
<td>683-410</td>
<td>GE</td>
<td>Not Included</td>
</tr>
<tr>
<td>683-420</td>
<td>Siemens</td>
<td>Not Included</td>
</tr>
<tr>
<td>683-430</td>
<td>Philips</td>
<td>Not Included</td>
</tr>
</tbody>
</table>

GE LIGHTSPEED PHANTOM HOLDER FOR FLAT TABLE TOP 50 CM WIDE

The GE LightSpeed Phantom Holder attaches to a 50 cm wide flat top CT table. The GE LightSpeed Phantom Holder is an easy on, easy off unit for a flat top CT table. The bottom of the front mounting plate references the holder to the front edge of the CT table and the top is where the GE LightSpeed Phantom hooks on to the holder. A small thumb screw allows for leveling of the phantom. The two lock bars are spring loaded upward to be out of the way while securing to the CT table. The large adjustment range allows for different thicknesses of CT table tops. The phantom holder has a built-in handle for easy carrying.

Specifications

Material: Black Anodized Aluminum
Overall Size: 20.8" W x 4.5" L x 6.5" H (52.8 x 11.4 x 16.5 cm)
Mounting Plate Size: 8.45" W x 4.67" H x 0.335" T (21.5 x 11.8 x 0.8 cm)

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>018-250</td>
<td>GE LightSpeed Phantom Holder f/FlatTable Top 50cm W</td>
</tr>
</tbody>
</table>
CT/MR SLESSINGER BOARD V2.0 FOR HDR BRACHYTHERAPY

- CT and/or MR Compatible
- Easy to Clean

The Slessinger Board is a padded sliding board that is CT and MR compatible. It is designed to facilitate HDR brachytherapy, specifically for pelvic treatments. The patient can be transferred onto the board from the operating room couch and remain on the board in recovery, during imaging for planning and until the HDR treatment is given. The intent is to minimize patient movement to ensure that the imaging for planning is not compromised by patient leg movement prior to treatment and thus delivering the treatment plan faithfully. The legs are slightly elevated, affording ready access to the perineum and preventing applicators from resting against anything. Leg elevation is maintained with the use of two (2) tightening knobs at the end of the elevation panels. Transfers on and off CT/MR/simulator couches are relatively easy due to the smooth plastic bottom surface and side handles. The board is also very useful when a patient is transferred via ambulance from the surgical facility to the treatment facility.

The CT/MR Slessinger Board V2.0 for HDR Brachytherapy has the additional benefit of having a hinged flexi-split to allow raising the head when on a stretcher. This version also includes heel cushions for additional patient comfort.

Image guided HDR brachytherapy is gaining in prominence. Prostate and gynecological applications are reliant on patient stability and comfort between the acquisition of imaging for planning and treatment. Although the Slessinger Board was devised to facilitate precise prostate HDR brachytherapy its application for image guided GYN HDR is also very significant with increasing reliance on DVH analyses. The concept of limiting rotation of a multichannel APBI balloon is yet another possible application, by avoiding the patient walking between imaging and treatment prior to each treatment fraction. The rationale and description of the Slessinger Board has also been described in the Brachytherapy Journal article by Slessinger, entitled "Practical considerations for prostate HDR brachytherapy", published early in 2010.

The Slessinger Board can be easily cleaned with non-caustic germicidal cloths or sprays. Patients may not be carried on the Slessinger Board, but rather are transferred directly from one support to another.

MR Safe

Specifications

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>946-004</td>
<td>CT/MR Slessinger Board V2.0 for HDR Brachytherapy</td>
</tr>
</tbody>
</table>
The Adjustable Holder with Slessinger Compatible Board for Dilators with Stem Scale was designed to be used when treating anal cancer in females with chemoradiation. The dilator is used to delineate and displace the vulva and lower vagina away from the primary tumor with the intention of decreasing dose to these areas.

The vertical post scale on the holder ranges from 4.5cm to 16cm and allows for reproducing from day to day the vertical position of the dilator. The dilator can also be angled up or down in the anterior-posterior position with a scale marked every 5° to 45° and a locking thumb screw. All dilators are 6.5” (16.5cm) long not including the stem. The dilators have a scale on the stem that ranges from 1cm to 7cm which is used for depth.

This holder board included is made from HDPE Blue Polyethylene Colorboard and has a 6” titanium rail. A rail block allows the dilator holder to slide forward and backward when positioning as well as being removable from the rail itself.

This item is compatible with the Slessinger Board System (Item # 946-004).

Item 946-210 includes only the Holder and board.

**Specifications**

**Item 946-210**

**Vertical Post Scale:** from 4.5 cm to 16 cm with black markings every 0.5 cm and whole numbers every centimeter starting at 5.0 cm

**Angle Scale:** Marked every 5° to 45°

**Material:** Ertalyte

**Clamp:** Dual clamps with thumb screws allow for vertical and anterior-posterior angle adjustment of the dilator

**Post Assembly Material:** Ertalyte

**Board Size:** 5.5” W x 16” L x 0.25” Thick (13.8 x 40.6 x 0.6cm)

**Handle Cutout:** 4” W x 1” L (10.1 x 2.5 cm)

**Board Material:** HDPE Blue Polyethylene Colorboard

**Sterilization:** Autoclave or gas

**CT/MR Conditional**

**Items 946-220 to 946-235**

**Material:** Nylon

**Overall Length:** 10” (25.4 cm)

**Dilator Length:** 6.5” (16.5 cm), not including stem

**CT/MRI Safe**

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>946-210</td>
<td>Adjustable Holder &amp; Slessinger Compatible Board for Dilators with Stem Scale</td>
</tr>
<tr>
<td>946-220</td>
<td>20 mm Dia. Nylon Dilator with Stem Scale</td>
</tr>
<tr>
<td>946-225</td>
<td>25 mm Dia. Nylon Dilator with Stem Scale</td>
</tr>
<tr>
<td>946-230</td>
<td>30 mm Dia. Nylon Dilator with Stem Scale</td>
</tr>
<tr>
<td>946-235</td>
<td>35 mm Dia. Nylon Dilator with Stem Scale</td>
</tr>
</tbody>
</table>
The Adjustable Holder with Board for Dilators with Stem Scale was designed to be used when treating anal cancer in females with chemoradiation. The dilator is used to delineate and displace the vulva and lower vagina away from the primary tumor with the intention of decreasing dose to these areas.

The vertical post scale on the holder ranges from 4.5 cm to 16 cm and allows for reproducing from day to day the vertical position of the dilator. The dilator can also be angled up or down in the anterior-posterior position with a scale marked every 5° to 45° and a locking thumb screw. All dilators are 6.5" (16.5 cm) long, not including the stem. The dilators have a scale on the stem that ranges from 1 cm to 7 cm which is used for depth.

Specifications
Item 978-610
Vertical Post Scale: From 4.5 cm to 16 cm with black markings every 5 mm and whole numbers every centimeter starting at 3.0 cm
Angle Scale: Marked every 5° to 45°
Clamp: Dual clamps with thumb screws allow for vertical and anterior-posterior angle adjustment of the dilator
Post Assembly Material: Ertalyte

Board Size: 5.5" W x 20.5" L x 0.25" Thick (13.8 x 52.1 x 0.6 cm)
Handle Cutout: 4" W x 1" L (10.1 x 2.5 cm)
Board Material: HDPE Blue Polyethylene Colorboard

Sterilization: Autoclave or gas
CT/MRI Conditional

Items 946-220 to 946-235
Material: Nylon
Overall Length: 10" (25.4 cm)
Dilator Length: 6.5" (16.5 cm), not including stem
CT/MRI Safe
The Visionmark™ is the next generation in general use skin markers. These specially formulated NON-METALLIC markers perform consistently and accurately in a variety of applications. An excellent tool for distinguishing between nipple shadow and lesion, the Visionmark™ reduces the need for repeat examinations.

<table>
<thead>
<tr>
<th>Item</th>
<th>Visionmark™</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>680-305</td>
<td>2.0 mm Ball</td>
<td>50</td>
</tr>
<tr>
<td>680-310</td>
<td>2.5 mm Ball</td>
<td>50</td>
</tr>
<tr>
<td>680-312</td>
<td>3.0 mm Ball</td>
<td>50</td>
</tr>
<tr>
<td>680-314</td>
<td>4.0 mm Ball</td>
<td>50</td>
</tr>
<tr>
<td>680-316</td>
<td>5.0 mm Ball</td>
<td>50</td>
</tr>
</tbody>
</table>

This specially formulated non-metallic material is the result of years of research and development, resulting in a virtually artifact-free opaque marker that is perfect for nearly all CT marking applications.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>680-349</td>
<td>CT Mark Wire, 1.0 mm</td>
<td>330 cm</td>
</tr>
<tr>
<td>680-350</td>
<td>CT Mark Wire, 2.0 mm</td>
<td>300 cm</td>
</tr>
<tr>
<td>680-352</td>
<td>CT Mark, 2.3 mm</td>
<td>110</td>
</tr>
<tr>
<td>680-354</td>
<td>CT Mark, 4.0 mm</td>
<td>50</td>
</tr>
</tbody>
</table>

The Markers - CT and X-ray

- Creates precise reference points without artifacts
- Works for CT, X-ray, fluoroscopy, angiography
- Disposable
- Flat design

Indicator® Radiopaque Markers can be used in a variety of imaging procedures to identify any point of interest, including: Masses, Scar tissue, Moles, Isocenter, Points of Pain

The markers provide a clear, accurate reference point that is free of spray artifacts. The flat design prevents tissue indentation and the clear adhesive backing aids in precise marker placement. In addition to enhancing accuracy, they promote procedural efficiency with double pull tabs that permit easy application and removal.

NOT for use in MRI

<table>
<thead>
<tr>
<th>Item #</th>
<th>Indicator® Radiopaque Markers-CT/X-Ray</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>680-401</td>
<td>Crosses, 10 mm</td>
<td>130</td>
</tr>
<tr>
<td>680-402</td>
<td>Crosses, 20 mm</td>
<td>130</td>
</tr>
<tr>
<td>680-403</td>
<td>Dots, 1.5 mm</td>
<td>115</td>
</tr>
<tr>
<td>680-404</td>
<td>Dots, 2.0 mm</td>
<td>115</td>
</tr>
<tr>
<td>680-405</td>
<td>Dots, 2.5 mm</td>
<td>115</td>
</tr>
<tr>
<td>680-406</td>
<td>Dots, 3.0 mm</td>
<td>115</td>
</tr>
<tr>
<td>680-408</td>
<td>Dots, 4.0 mm</td>
<td>115</td>
</tr>
<tr>
<td>680-410</td>
<td>Line, 0.5 mm</td>
<td>69 Lines (138°)</td>
</tr>
<tr>
<td>680-411</td>
<td>Line, 1.0 mm</td>
<td>66 Lines (132°)</td>
</tr>
<tr>
<td>680-412</td>
<td>Line, 1.5 mm</td>
<td>62 Lines (125°)</td>
</tr>
</tbody>
</table>
X-LINE™
PRECISION RADIOThERAPY TAPE FOR CT SIMULATION

X-Line™ allows accurate contouring within distorted regions of the CT image, improving radiotherapy outcomes.

Obese patients must be imaged with the extended field of view (eFOV), often resulting in distorted body contours. X-Line™ provides a series of reliable dots within the distorted sections of the eFOV, allowing for easy identification of the true body contour. The radiopaque lines on X-Line™ show up as hyperdense in CT simulation. Connect underneath the dots to get an accurate body contour - it’s that easy!

Body contour distortion from large patients in the eFOV
- GE Discovery CT590 RT, Optima CT580 RT and LightSpeed RT have a scan FOV (sFOV) of 50cm and a 65cm extended FOV (eFOV) option
- Siemens Somotom models have a 50cm sFOV and eFOV up to 80cm
- Body regions within the eFOV is distorted and contains artifact, resulting in an inaccurate body contour
- Body contour inaccuracies can lead to incorrect SSD and dosage calculations

X-Line™ General Instructions
- Apply X-Line™ to all body regions that might fall outside of the scan field of view
- Tear a strip length that fully encompasses the region of interest
- Expect to use 3-5 strips per patient, depending on their size

Step 1 - Peel
- Peel away the protective backing
- X-Line™ is kiss cut to make for easier removal

Step 2 - Apply
- Apply X-Line™ to the region of interest
- Orient the radiopaque lines perpendicular to the direction of the CT cross section
- Space the X-line™ strips approximately 1 inch apart
- Only apply each X-Line™ strip once

Step 3 - Scan
- Then, perform the CT scan as usual
- Remove and discard the X-Line™ strips after the scan

Step 4 - Connect
- Finally, connect just underneath the bright, hyperdense dots in the resulting CT images
- Connecting underneath the dots avoids including these hyperdense regions in the radiation dose planning

Specifications
Size: 2” wide (5.08 cm) with three equally spaced radiopaque lines 1" apart (2.54 cm)
Quantity: Rolls are 50’ long (15.24 m) with perforations spaced every 2” (5.08 cm).

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>680-470</td>
<td>X-Line Tape, Full Adhesive</td>
</tr>
<tr>
<td>680-475</td>
<td>X-Line Tape, Partial Adhesive</td>
</tr>
</tbody>
</table>

A Solution to CT Simulation Image Distortion in Obese Patients
- More Accurate
- Fast and Simple
- Low-Cost
- Optimal Dosage
- Latex Free
MULTI-MODALITY MARKERS

The Multi-Modality Markers provide a clear and accurate reference point on any type of scan. Made of a hydrogel component with a medical grade adhesive, they appear as a bright object on CT, MRI, nuclear medicine, PET and x-Ray scans and can be seen on all MRI sequences. These versatile markers attach securely and detach easily. Our Radiology/Radiation Therapy Marker has an inner center hole that permits hypodermic needle passage, while our Nuclear Med/PET Marker has a well-used for injecting a radionuclide with a conventional hypodermic needle.

Item 462-029 Multi-Modality Markers, Radiation/Radiology have a 2 mm inner center hole for hypodermic needle passage.

Item 462-030 Multi-Modality Markers for NucMed/PET have a Liquid-containing center well for injection of short-life radionuclide.

Item 462-031 Multi-Modality Markers for MRI/CT are a 15mm disc shaped marker.

Specifications
15mm outer diameter
3.5mm thick
50 markers per jar

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>462-029</td>
<td>Multi-Modality Markers, Radiation/Radiology</td>
<td>50</td>
</tr>
<tr>
<td>462-030</td>
<td>Multi-Modality Markers, Nuc Med/PET</td>
<td>50</td>
</tr>
<tr>
<td>462-031</td>
<td>Multi-Modality Markers, MRI/CT</td>
<td>50</td>
</tr>
</tbody>
</table>

CT MARKER

Material: Aluminum Wire
Size: 1" (2.54 cm) Square

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>680-125</td>
<td>CT Marker</td>
</tr>
</tbody>
</table>

CT MARKING WIRE

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>682-080</td>
<td>Aluminum Wire 0.080&quot; (2.03 mm) Diameter</td>
<td>42' (12.8 m)</td>
</tr>
<tr>
<td>682-090</td>
<td>Aluminum Wire 0.040&quot; (1.02 mm) Diameter</td>
<td>165' (50.3 m)</td>
</tr>
<tr>
<td>682-100</td>
<td>Aluminum Wire 0.064&quot; (1.63 mm) Diameter</td>
<td>67' (20.4 m)</td>
</tr>
</tbody>
</table>
**PROBE COVER, STERILE and LATEX FREE**

These high-quality rolled covers are sterile and latex free. All packs include elastic bands. Gel packet not included.

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>460-007</td>
<td>Probe Cover, Sterile &amp; Latex Free, 1&quot; x 11.8&quot;, 24/pkg</td>
</tr>
</tbody>
</table>

**CT RECTAL MARKER**

Rectal - Vaginal - External

The Rectal Marker can be used as a vaginal marker or an external marker.

**Specifications**

- **Sterilization:** Gas
- **Tubing:** 5/16" (8 mm) Dia. x 30 cm Flexible
- **Balls:** 3/16" (5 mm) Dia. Spaced Every cm
- **Anus Locator:** Adjustable Delrin
- **Latex Cover:** 2.0 cm Dia. x 30 cm L

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>460-010</td>
<td>CT Rectal Marker with Anus Marker</td>
</tr>
<tr>
<td>460-007</td>
<td>Probe Cover, Sterile &amp; Latex Free, 1&quot; x 11.8&quot;, 24/pkg</td>
</tr>
</tbody>
</table>

**SHADOWFORM MARKERS**

- T-Bar handle which can be removed for insertion of barium
- Disposable
- Rectal markers are available in two lengths and are marked at 1 cm intervals
- No cross contamination
- Outlines the soft tissue of the pelvic region
- Latex-free
- Markers are made from a soft, smooth, flexible plastic
- Used for Simulation and CT Planning
- Provides excellent localization of pelvic structures

<table>
<thead>
<tr>
<th>Item</th>
<th>Shadowform Markers</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>460-501</td>
<td>18 cm Vaginal Marker</td>
<td>10</td>
</tr>
<tr>
<td>460-502</td>
<td>38 cm Rectal Marker</td>
<td>10</td>
</tr>
<tr>
<td>460-503</td>
<td>10 cm Rectal Marker</td>
<td>10</td>
</tr>
</tbody>
</table>

The **NON-METALLIC** CT Rectal Marker is a flexible tube packed with teflon balls spaced at 1 cm intervals from center to center.

The Rectal Marker is used to accurately obtain both the rectum position and magnification by counting the balls. This determines the rectum location relative to the radiation field.

An adjustable anus marker can be utilized during CT simulation.

These high-quality rolled covers are sterile and latex free. All packs include elastic bands. Gel packet not included.

<table>
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<tr>
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</tr>
</thead>
<tbody>
<tr>
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<td>Probe Cover, Sterile &amp; Latex Free, 1&quot; x 11.8&quot;, 24/pkg</td>
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</tbody>
</table>

**PROBE COVER, STERILE and LATEX FREE**

These high-quality rolled covers are sterile and latex free. All packs include elastic bands. Gel packet not included.

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<tr>
<th>Item #</th>
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</tr>
</thead>
<tbody>
<tr>
<td>460-007</td>
<td>Probe Cover, Sterile &amp; Latex Free, 1&quot; x 11.8&quot;, 24/pkg</td>
</tr>
</tbody>
</table>

**CT RECTAL MARKER**

Rectal - Vaginal - External

The Rectal Marker can be used as a vaginal marker or an external marker.

**Specifications**

- **Sterilization:** Gas
- **Tubing:** 5/16" (8 mm) Dia. x 30 cm Flexible
- **Balls:** 3/16" (5 mm) Dia. Spaced Every cm
- **Anus Locator:** Adjustable Delrin
- **Latex Cover:** 2.0 cm Dia. x 30 cm L

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>460-010</td>
<td>CT Rectal Marker with Anus Marker</td>
</tr>
<tr>
<td>460-007</td>
<td>Probe Cover, Sterile &amp; Latex Free, 1&quot; x 11.8&quot;, 24/pkg</td>
</tr>
</tbody>
</table>

**SHADOWFORM MARKERS**

- T-Bar handle which can be removed for insertion of barium
- Disposable
- Rectal markers are available in two lengths and are marked at 1 cm intervals
- No cross contamination
- Outlines the soft tissue of the pelvic region
- Latex-free
- Markers are made from a soft, smooth, flexible plastic
- Used for Simulation and CT Planning
- Provides excellent localization of pelvic structures

<table>
<thead>
<tr>
<th>Item</th>
<th>Shadowform Markers</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>460-501</td>
<td>18 cm Vaginal Marker</td>
<td>10</td>
</tr>
<tr>
<td>460-502</td>
<td>38 cm Rectal Marker</td>
<td>10</td>
</tr>
<tr>
<td>460-503</td>
<td>10 cm Rectal Marker</td>
<td>10</td>
</tr>
</tbody>
</table>
**CT VAGINAL DEPTH SCALE**

The **NON-METALLIC** CT Vaginal Depth Scale is 1.6 cm in diameter and 26 cm long and has teflon balls which are spaced 1 cm apart and are 5 mm diameter. A delrin introitus marker is included with the 1.6 cm diameter vaginal scale (Item 707-145). A thumb screw holds the introitus marker in position.

The Vaginal Depth Scale Holder (Item 707-020) can be used in CT if the area to be scanned does not include the holder.

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>707-145</td>
<td>CT Vaginal Depth Scale with Introitus Marker</td>
</tr>
<tr>
<td>707-020</td>
<td>Vaginal Depth Scale Holder</td>
</tr>
<tr>
<td>460-007</td>
<td>Probe Cover, Sterile &amp; Latex Free, 1&quot; x 11.8&quot;, 24/pkg</td>
</tr>
</tbody>
</table>

**Specifications**

- **Material:** Acrylic
- **Density:** 1.1859 g/cm³

- **Material:** Teflon
- **Density:** 2.16 g/cm³

**ADJUSTABLE HOLDER WITH BASE FOR DILATOR WITH STEM SCALE**

This CT/MR Safe Adjustable Holder with Base for Dilators with Stem Scale was designed to be used when treating anal cancer in females with chemoradiation. The use of a dilator is used to delineate and displace the vulva and lower vagina away from the primary tumor with the intention of decreasing dose to these areas.

The verticle post scale on the holder ranges from 2.5cm to 15cm and allows for reproducing from day to day the vertical position of the dilator. The dilator can also be angled up or down in the anterior - posterior position with a scale marked every 5° to 45° and a locking thumb screw. All dilators are 6.5" (16.5cm) long, not including stem. The dilators have a scale on the stem that ranges from 1cm to 7cm which is used for depth.

Because the base that this item includes is made entirely from ertalyte plastic, it is completely CT/MR safe. The base can be set into position in the vacuum cushion that is used for positioning the patient legs. This will give a reproducible base location on a daily basis.

**Specifications**

- **Item 946-200** includes only the Holder and base.

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>946-200</td>
<td>Adjustable Holder w/Base for Dilator with Stem Scale</td>
</tr>
</tbody>
</table>

- **Base Size:** 3" x 5" x 0.5" Thick (7.6 x 12.7 x 1.27 cm)
- **Vertical Post Scale:** From 2.5 cm to 15 cm with black markings every 5 mm and whole numbers every centimeter starting at 3.0 cm
- **Angle Scale:** Marked every 5° to 45°
- **Clamp:** Dual clamps with thumb screws allow for vertical and anterior-posterior angle adjustment of the dilator
- **Post Assembly and Base Material:** Ertalyte
- **Sterilization:** Autoclave or gas
- **CT/MRI Conditional**

**Items 946-220 to 946-235**

- **Material:** Nylon
- **Overall Length:** 10" (25.4 cm)
- **Dilator Length:** 6.5" (16.5 cm), not including stem
- **CT/MRI Safe**

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>946-200</td>
<td>Adjustable Holder w/Base for Dilator with Stem Scale</td>
</tr>
<tr>
<td>946-220</td>
<td>20mm Dia. Nylon Dilator with Stem Scale</td>
</tr>
<tr>
<td>946-225</td>
<td>25mm Dia. Nylon Dilator with Stem Scale</td>
</tr>
<tr>
<td>946-230</td>
<td>30mm Dia. Nylon Dilator with Stem Scale</td>
</tr>
<tr>
<td>946-235</td>
<td>35mm Dia. Nylon Dilator with Stem Scale</td>
</tr>
</tbody>
</table>
Exradin CT Chambers are durable detectors for performing the measurements necessary in the Computed Tomography Dose Index (CTDI) calculations described in TG-74.

The A17 is tailored for MV and tomotherapy applications such as weekly QA checks or patient dose verification with phantoms and water tanks. It has excellent response uniformity over the chamber length with variation less than ±1.5%.

**Fast, Precise Measurements**

Its waterproof construction makes it ideal for checking the consistency of beams at various jaw widths. The chamber vents through a flexible tube that surrounds the triaxial cable, ensuring the collecting volume is in pressure equilibrium with the surroundings. The design assures there are no stem or voltage soakage effects, providing precise and reliable measurements.

**Durable Construction, Built to Last**

The Model A17 Exradin Slice Therapy Chamber is constructed of rugged C552 Shonka air-equivalent plastic, providing excellent conductivity and years of reliable use.

**Specifications**

- Active Collecting Volume: 2.65 cc
- Active Collecting Volume Length: 11.11 cm
- Nominal Volume: 1.91 cm³
- Outside Diameter of Shell: 12.7 mm
- Inside Diameter of Shell: 6.0 mm
- Shell Wall Thickness: 3.3 mm
- Collector Diameter: 2.5 mm
- Collector Length: 2.5 mm
- Overall Chamber Length: 17.0 cm
- Nominal Length: 80 mm
- Shell, Collector and Guard Material: A, Shonka air-equivalent C552 plastic
- Nominal Air Kerma Calibration Factor: 1.5E+7 Gy/C
- Response Uniformity Over the Nominal Length: ±1.5%
- Collector Material: Carbon fiber
- Electrical Power Requirements: Operates at ±300 VDC
- Nominal Collection Efficiency: 100%
- Maximum Polarizing Potential: 1000 V
- Nominal Inherent Leakage Currents: 10⁻¹⁵ A
- Low-Noise Triaxial Cable: 1.5m long, 50 ohms, 29 pF/ft
- Connector: Triaxial BNC plug (2-Lug, male pin) and protective cap connected by chain (standard); others available upon request
- Waterproof: Yes
- Operating Parameters
  - Humidity: 20 to 80%, non-condensing
  - Temperature: 50° to 104° F (10° to 40° C)
  - Pressure: 680 to 770 mm Hg

**Integral 60Co Buildup in Shell Wall**

**Product Standards:** CE, IEC 60601-1, IEC 61674

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>300-540</td>
<td>Exradin A17 CT Ion Chamber, 1.91cc Slice Therapy</td>
</tr>
</tbody>
</table>
EXRADIN A101 CT ION CHAMBER, 4.54 cc

Durable Construction, Built to Last
The Model A101 CT Chamber is constructed of rugged C552 Shonka air-equivalent plastic, providing excellent conductivity and years of reliable use.

Specifications
Active Collecting Volume: 5.48 cc
Active Collecting Volume Length: 12.08 cm
Nominal Volume: 4.54 cm³
Nominal Length: 10.0 cm
Collector Diameter: 2.5 mm
Outside Diameter of Shell: 1.0 mm
Inside Diameter of Shell: 8.0 mm
Shell Wall Thickness: 1.0 mm
Overall Chamber Length: 164.3 mm
Shell, Collector and Guard Material: A, Shonka air-equivalent C552 plastic
Nominal Air Kerma Calibration Factor: 1.62E+6 Gy/C
Response Uniformity Over the Nominal Length: ±3%
Energy Response: 80 kVp to 150 kVp ±4%
Collector Material: Carbon fiber
Electrical Power Requirements: Operates at ±300 VDC
Nominal Collection Efficiency: 100%
Maximum Polarizing Potential: 1000 V
Nominal Inherent Leakage Currents: 10⁻¹⁵ A
Low-Noise Triaxial Cable: 1.5 m long, 50 ohms, 29 pF/ft
Included Adapter Sleeve: PMMA sleeve to adapt chamber for 0.50” (12.7mm) phantom holes
Connector: Triaxial BNC plug (2-Lug, male pin) and protective cap connected by chain (standard); others available upon request
Waterproof: No
Operating Parameters
Humidity: 20 to 80%, non-condensing
Temperature: 50° to 104° F (10° to 40° C)
Pressure: 680 to 770 mm Hg
Product Standards: CE0413, IEC 60601-1, IEC 61674

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>300-550</td>
<td>Exradin A101 CT Ion Chamber, 4.54 cc</td>
</tr>
</tbody>
</table>

Fast, Precise Measurements
Model A101 is ideal for checking the consistency of beams at various jaw widths. The chamber is vented to the ambient, ensuring the collecting volume is in pressure equilibrium with the surroundings. The design assures there are no stem or voltage soakage effects, providing precise and reliable measurements.

• Fiducial markers identify the center and both ends of the collecting volume for easy setup in relation to the beam
• Air-equivalent conductive plastic eliminates fragility or flaking of painted conductive layers
• Proven guard design yields stable, precise measurements and minimizes settling time by creating uniform field lines
• Shell and guard are made of durable, long lasting Shonka conductive plastic
• Use of homogeneous material throughout the chamber minimizes perturbation of the beam due to the presence of the chamber and optimizes measurements
• Axially symmetric design of the chamber provides a uniform, isotropic response
• Ionization collection efficiency is 99.9% or better
• Collecting volume is 4.54 cc

The Exradin Model A101 CT Ion Chamber performs the measurements necessary for calculating the CTDI (computed tomography dose index) as described in the AAPM TG 74. It has excellent response uniformity over the chamber length with variation less than ±3%.
**PTW CT CHAMBERS**

**PTW 30009 CT CHAMBER**

Vented cylindrical pencil chamber for dose length product measurements in computed tomography

- Pencil type chamber for measurements within a CT head or body phantom or free in air
- Provides a sensitive measuring length of 10 cm
- Shows a homogeneous response over the whole chamber length

The CT chamber is a vented cylinder chamber designed for dose length product and dose length product rate measurements in computed tomography. The chamber allows the determination of the CTDI<sub>100</sub><sup>1</sup>, CTDI<sub>W</sub><sup>2</sup> and CTDI<sub>Vol</sub><sup>3</sup> according to IEC 61223-2-6 and IEC 61223-3-5.

1CTDI<sub>100</sub> = Computed Tomography Dose Index 100
2CTDI<sub>W</sub> = Weighted CTDI<sub>100</sub>
3CTDI<sub>Vol</sub> = Volume CTDI<sub>W</sub>

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>300-560</td>
<td>PTW 30009 CT Chamber, 3.14 cc</td>
</tr>
</tbody>
</table>

**PTW 30017 CT CHAMBER**

Vented cylindrical pencil chamber for dose length product measurements in computed tomography

- Pencil type chamber for measurements free in air
- Provides a sensitive measuring length of 30 cm
- Shows a homogeneous response over the whole chamber length

The CT chamber is a vented cylinder chamber designed for dose length product and dose length product rate measurements in computed tomography according to the amendment to IEC 60601-2-44.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>300-565</td>
<td>PTW 30017 CT Chamber, 9.3 cc</td>
</tr>
</tbody>
</table>
MINI CT QC PHANTOM

The low-cost, all-in-one QC phantom accurately evaluates
- Laser beam alignment
- Slice thickness, spacing and contiguity
- Table movement
- CT numbers and noise level
- CT number uniformity
- Relative radiation dose
- Video monitor and image processing equipment
- Scout and axial scan correspondence
- High-contrast resolution
- Low-contrast resolution (optional insert)

Optional Inserts
- Item 682-305: Low-contrast resolution insert
- Item 682-307: Teflon® insert
- Item 682-309: Lung insert
- Item 682-311: Teflon®-Bone 270° semi-ring for evaluation of beam hardening correction software

Specifications

BODY
Material: acrylic (PMMA)
Dimensions: 6" dia. x 1" thick (15.25 cm dia. 2.54 cm thick)
Holes: six(6) - 1.125" dia. and seven(7)- 0.50" dia. through holes
Weight: 1.35 kg (3 lbs)

INSERTS
Material: One (1) - 1.125" dia. plug of each: Plastic Water™, nylon, bone-equivalent, polyethylene, polystyrene, polycarbonate, and acrylic.
Six(6) - 0.50" dia. acrylic plugs, for chamber holes

BASE
Material: acrylic
Construction: copper wire approx. 0.02" dia., fixed into a 0.02" deep groove centered along base, disc is attached to the side of the body with 2 removable nylon slotted screws
Dimensions: 30.3 cm L x 4.6 cm W x 1.75 cm thick

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
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<tbody>
<tr>
<td>682-300</td>
<td>Mini CT QC Phantom</td>
</tr>
<tr>
<td>682-305</td>
<td>Low-contrast resolution insert</td>
</tr>
<tr>
<td>682-307</td>
<td>Teflon® insert</td>
</tr>
<tr>
<td>682-309</td>
<td>Lung insert</td>
</tr>
<tr>
<td>682-311</td>
<td>Teflon®-Bone 270° semi-ring Insert</td>
</tr>
</tbody>
</table>

Lightweight, compact and extremely portable, ideal for field service use

Can be used with any CT scanner

For measurement and analysis of all major CT scanner functions and radiation dose

For making inhomogeneity corrections in radiation oncology

The Mini CT QC Phantom, Item 682-300 is a highly-versatile phantom designed for routine monitoring of the consistency of all the major parameters of CT image quality and radiation dose. Its unique, compact design allows for unparalleled portability, easy setup and reliable parameter determinations. It is perfect for use by physicists, technologists and service engineers.

The disc section consists of a 1 in thick acrylic disc with a 6" diameter. Five of the six large holes are for the placement of inserts for the evaluation of CT number consistency. The sixth hole is for a high-contrast resolution insert or an optional low contrast resolution insert. The seven small holes are for inserting an ion chamber at differing locations within the phantom. Six acrylic inserts are provided to fill these holes, leaving one hole to accommodate an ion chamber during a given measurement.

The disc section is attached to a rectangular acrylic bar containing a thin copper wire embedded along a central groove. This section of the phantom is used to evaluate laser beam alignment and accuracy of the slice thickness, slice spacing, slice contiguity and pilot scan to transverse; or longitudinal scan correspondence. This is achieved by exposing a non-screen film placed underneath the phantom and making several cuts while the phantom is advanced along the gantry in a pre-programmed measurement.

Teflon® is a registered trademark of E.I. DuPont de Nemours & Co.
CT DOSE PHANTOM
Acrylic and Carry Case

- Usable on all CT scanners
- Head and abdominal configurations included
- Made from acrylic with a density of 1.19 gm/cc
- Includes 10 PMMA plugs
- 1.31 cm inside hole dia. sized for standard CT Dose probes
- Rugged foam lined carrying case included

The CT Dose Phantom consists of two 15 cm thick Solid PMMA disks measuring 16 cm (head) and 32 cm (body) in diameter.

The disks have five through-holes with an inside diameter of 1.31 cm to accommodate standard CT dose probes and five acrylic rods to plug the holes not in use. One hole is at center and four are around the perimeter, 90° apart and 1 cm from hole center to the outside edge of the phantom.

The head and body phantoms along with the ten acrylic rod plugs are packaged in an extremely rugged foam lined carrying case.

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>682-005</td>
<td>CT Dose Phantom, Acrylic and Carry Case</td>
</tr>
</tbody>
</table>
CTDI PHANTOM

• Gain greater efficiency for a key part of your CT quality assurance program.
• Measure absorbed dose and monitor scanner output
• New, easy-to-use design available in two models
• Customized case with built-in wedges for use as a phantom holder

Computed Tomography Dose Index (CTDI) is a key part of your CT Quality Control Program.

The CTDI Phantom addresses specifications outlined by the FDA (FDA 21 CFR 1020.33) and IEC (IEC 60601-2-44, IEC 61223-2-6 and IEC 61223-3-5 IEC 60601-2-44).

The phantom is offered as a 2-piece (Item 682-040) or 3-piece (Item 682-045) telescopic configuration with each configuration consisting of nested modules, allowing the user to adapt the phantom to the desired size required by the protocol in use.

Central & Periphery Measurements
Each module allows dose measurements on the central axis of the phantom or at periphery positions located every 90 degrees at 1.0-cm depth from the surface.

TG-66 Compliance
CTDI Phantoms supports CT Dose Index measurements recommended by AAPM Task Group-66.

User-Friendly
Smart design features like tips on chamber plugs and scribe lines support fast and accurate setup.

Custom Wheeled Case
Included is a water-tight hard case that includes built-in wedges to hold and protect the phantom during transport.

Specifications
Material: Polymethyl-Methacrylate (PMMA/Acrylic)
Density: 1.19 g/cm²
Alignment Markings: Etched lines centered at the transverse, coronal and sagittal planes
Chamber Ports Diameter: 1.31 cm
Dimensions (OD X Length)
Adult Body: 32 cm x 14.5 cm
Adult Head/Pediatric Body: 16 cm x 14.5 cm
Pediatric Head (Item 682-045 only): 10 cm x 14.5 cm
Weight: 30.5 lb (19.9 kg)

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>682-040</td>
<td>CTDI Phantom - Adult, 2-Piece</td>
</tr>
<tr>
<td>682-045</td>
<td>CTDI Phantom - Adult &amp; Pediatric, 3-Piece</td>
</tr>
</tbody>
</table>
CT DOSE PHANTOM
COMPLY WITH FDA PERFORMANCE STANDARD

682-008 shown with 682-009 Optional support bracket

682-007-14, 682-007-15 and 682-007-16

- Abdominal, Adult Head, Pediatric Head configurations
- PMMA disks and plugs with density of 1.19 g/cc
- 1.31 cm diameter holes sized for standard CT Dose probes
- Nesting PMMA disks minimize storage space
- Compatible with all CT scanners

For all computed tomography systems, the FDA recommends measuring the CT Dose Index (CTDI). With this in mind, each section of the CIRS CT Dose Phantom can provide separate dose information. The user can also measure maximum, minimum and mid-range values of the nominal tomographic section thickness when performing dose profile measurements.

The phantom consists of a set of nesting 15 cm thick solid PMMA disks measuring 16 cm (head) and 32 cm (body) in diameter. The adult head disk is also suitable for pediatric body measurements. Model 007A additionally includes a third nesting disk measuring 10 cm in diameter for pediatric head measurements. Handles on the body and head are provided for ease in handling and maneuverability.

Through holes measuring 1.31 cm in diameter will accommodate standard CT probes, and acrylic rods are provided to plug the holes when not in use. The acrylic rods are machined to receive 1 mm diameter TLD rods.

The Model 007A is manufactured to comply with the FDA's performance standard, 21 CFR 1020.33 that details measurement requirements.

Item 682-009 is an optional Support Bracket can be used to suspend the CT Dose Phantom above the imaging couch and align it along the axis of X-ray tube rotation. This enables the phantom to be used to assess CT dose in helical mode or any mode that requires the extended travel of the imaging couch or a wide beam. This set-up might be used to address the dosimetry approach described in TG111. An additional application of the support bracket is to provide a body to simulate continuous scatter radiation from the patient during helical CT for dose safety measurements inside and outside the exam room.

Replacement acrylic rods are available in 14, 15 or 16 cm long.

Item 682-007 CT Dose Phantom Includes
(1) Abdominal Cylinder
(1) Adult Head Cylinder
(1) Pediatric Head Cylinder
(13) Acrylic Rods
(1) Foam Lined Carry Case
(1) User Guide
(1) 48 Month Warranty

Specifications
Overall Dimensions: 12.6" x 12.6" x 5.9" (32 x 32 x 15 cm)
Materials: PMMA
Weight: 29 lb (13 kg)

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>682-008</td>
<td>CT Dose Phantom</td>
</tr>
<tr>
<td>682-009</td>
<td>CT Dose Phantom Support Bracket, Optional</td>
</tr>
<tr>
<td>682-007-14</td>
<td>Acrylic Rod CT Probe, 1.31cm Dia. x 14cm Long</td>
</tr>
<tr>
<td>682-007-15</td>
<td>Acrylic Rod CT Probe, 1.31cm Dia. x 15cm Long</td>
</tr>
<tr>
<td>682-007-16</td>
<td>Acrylic Rod CT Probe, 1.31cm Dia. x 16cm Long</td>
</tr>
</tbody>
</table>
ELECTRON DENSITY PHANTOM
Correlate CT Number and Tissue Electron Density

The Electron Density Phantom consists of two nested disks made from Plastic Water®-LR. They can represent both head and abdomen configurations. Nine (9) different tissue equivalent electron density plugs can be positioned at 17 different locations within the scan field. Included is a water vial plug that can be filled with any fluid. Optional distance marker plugs enable quick assessment of the CT scanner’s distance measurement accuracy.

Specifications

Overall Dimensions
Electronic Density Head Insert: 7” Dia x 1.97” D (180 x 50 mm)
Electronic Density Body without Head Insert: 12” W x 10.7” H x 1.97” D (330 x 270 x 50 mm)

Weights
Electronic Density Head Insert: approx 2 lb (0.950 kg)
Electronic Density Body without Head Insert: approx 4.7 lb (2.1 kg)

Materials: Water and Tissue Equivalent Epoxy Materials

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
<th>Physical Density, (g/cc)</th>
<th>Electron Density x 10^23 Electrons/cc</th>
<th>RED (Relative to H₂O)</th>
</tr>
</thead>
<tbody>
<tr>
<td>682-062</td>
<td>Electron Density Phantom</td>
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</tr>
</tbody>
</table>

**Description**

- Evaluate CT scan data
- Correct for inhomogeneities
- Document relationship between CT number and tissue electron density
- Simulate indicated tissue within the diagnostic energy range
- Quick assessment of distance registration

Because CT scans are used to correct for tissue inhomogeneities in radiotherapy treatment planning, it is important to obtain a precise relationship between CT number (in Housfield units) and electron densities. The Electron Density Phantom enables precise correlation of CT data to electron density of various tissues. The phantom is manufactured from CIRS Tissue Equivalent Materials.

<table>
<thead>
<tr>
<th>Qty</th>
<th>Description</th>
<th>*Physical Density, (g/cc)</th>
<th>Electron Density x 10^23 Electrons/cc</th>
<th>RED (Relative to H₂O)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Electron Density Head Insert</td>
<td>1.029</td>
<td>3.333</td>
<td>0.998</td>
</tr>
<tr>
<td>1</td>
<td>Electron Density Body without Head Insert</td>
<td>1.029</td>
<td>3.333</td>
<td>0.998</td>
</tr>
<tr>
<td>2</td>
<td>Lung (Inhale) Equivalent Electron Density Plug</td>
<td>0.205</td>
<td>0.668</td>
<td>0.200</td>
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<tr>
<td>2</td>
<td>Lung (Exhale) Equivalent Electron Density Plug</td>
<td>0.507</td>
<td>1.658</td>
<td>0.496</td>
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<tr>
<td>2</td>
<td>Breast (50% Gland / 50% Adipose) Equivalent Electron Density Plug</td>
<td>0.99</td>
<td>3.261</td>
<td>0.976</td>
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<tr>
<td>2</td>
<td>Solid Trabecular Bone (200 mg/cc HA) Equivalent Electron Density Plug</td>
<td>1.16</td>
<td>3.730</td>
<td>1.117</td>
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<tr>
<td>2</td>
<td>Liver Equivalent Electron Density Plug</td>
<td>1.07</td>
<td>3.516</td>
<td>1.052</td>
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<tr>
<td>2</td>
<td>Muscle Equivalent Electron Density Plug</td>
<td>1.06</td>
<td>3.483</td>
<td>1.043</td>
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<tr>
<td>2</td>
<td>Adipose Equivalent Electron Density Plug</td>
<td>0.96</td>
<td>3.171</td>
<td>0.949</td>
</tr>
<tr>
<td>2</td>
<td>Solid Dense Bone (800mg/cc HA) Equivalent Electron Density Plug</td>
<td>1.53</td>
<td>4.862</td>
<td>1.456</td>
</tr>
<tr>
<td>1</td>
<td>Solid Dense Bone (1250mg/cc HA) Equivalent Electron Density Plug</td>
<td>1.82</td>
<td>5.663</td>
<td>1.695</td>
</tr>
<tr>
<td>1</td>
<td>Water-fillable Electronic Density Plug (Real water data provided)</td>
<td>1.00</td>
<td>3.340</td>
<td>1.000</td>
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<tr>
<td>1</td>
<td>Set of 2 Feet for 682-062</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Soft Carry Case</td>
<td></td>
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</tr>
<tr>
<td>1</td>
<td>User Guide</td>
<td></td>
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<tr>
<td>1</td>
<td>60 Month Warranty</td>
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</tbody>
</table>

CUSTOMERS ARE ENCOURAGED TO COMPLETE THEIR ORDER WITH THE PURCHASE OF THE INSERT OPTION LISTED BELOW

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>*Physical Density, (g/cc)</th>
<th>Electron Density x 10^23 Electrons/cc</th>
<th>RED (Relative to H₂O)</th>
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</thead>
<tbody>
<tr>
<td>682-214</td>
<td>Water Equivalent Chamber Rod with Cavity for Ion Chamber</td>
<td>1.029</td>
<td>3.333</td>
<td>0.998</td>
</tr>
</tbody>
</table>

*Refer to Appendix A for the CIRS cavity and plug code list of available chamber cavities.
If the ion chamber cavity is not specified by customer, phantom is supplied with cavity that accommodates a Farmer type ion chamber.
### ELECTRON DENSITY PHANTOM OPTIONAL ACCESSORIES

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Physical Density, (g/cc)</th>
<th>Electron Density x 10^20 Electrons/cc</th>
<th>RED (Relative to H2O)</th>
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<tbody>
<tr>
<td>682-207</td>
<td><strong>800 mg/cc HA in Water Equivalent - Core Insert</strong></td>
<td>1.53</td>
<td>4.862</td>
<td>1.456</td>
</tr>
<tr>
<td>682-212</td>
<td><strong>Titanium Rod Core Insert</strong></td>
<td>4.51</td>
<td>12.475</td>
<td>3.735</td>
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<tr>
<td>682-213</td>
<td>Distance Marker Insert</td>
<td>1.029</td>
<td>3.333</td>
<td>0.998</td>
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<tr>
<td>682-216</td>
<td>Water Equivalent Insert</td>
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<td>3.333</td>
<td>0.998</td>
</tr>
<tr>
<td>682-217</td>
<td><strong>1000 mg/cc HA in Water Equivalent - Core Insert</strong></td>
<td>1.66</td>
<td>5.243</td>
<td>1.570</td>
</tr>
<tr>
<td>682-218</td>
<td><strong>1250 mg/cc HA in Water Equivalent - Core Insert</strong></td>
<td>1.82</td>
<td>5.663</td>
<td>1.695</td>
</tr>
<tr>
<td>682-219</td>
<td><strong>ICRU Cortical Bone Equivalent Core Insert</strong>*</td>
<td>1.91</td>
<td>5.915</td>
<td>1.771</td>
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<tr>
<td>682-220</td>
<td><strong>1500 mg/cc HA in Water Equivalent - Core Insert</strong></td>
<td>1.99</td>
<td>6.134</td>
<td>1.837</td>
</tr>
<tr>
<td>682-221</td>
<td><strong>1750 mg/cc HA in Water Equivalent - Core Insert</strong></td>
<td>2.15</td>
<td>6.600</td>
<td>1.976</td>
</tr>
<tr>
<td>682-226</td>
<td>Solid Dense Bone (1000 mg/cc HA) Equivalent Electron Density Plug</td>
<td>1.66</td>
<td>5.243</td>
<td>1.570</td>
</tr>
<tr>
<td>682-228</td>
<td>Solid Dense Bone (1500 mg/cc HA) Equivalent Electron Density Plug</td>
<td>1.99</td>
<td>6.134</td>
<td>1.837</td>
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<td>682-229</td>
<td>Solid Dense Bone (1750 mg/cc HA) Equivalent Electron Density Plug</td>
<td>2.15</td>
<td>6.600</td>
<td>1.976</td>
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<tr>
<td>682-230</td>
<td>Water Equivalent Material Surrounding 6.4mm Diameter Stainless Steel (Alloy 20) Rod Core Electron Density Plug</td>
<td>8.03</td>
<td>23.101</td>
<td>6.917</td>
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<td>682-231</td>
<td>Water Equivalent Material Surrounding 6.4mm Diameter Aluminum Rod Core Electron Density Plug</td>
<td>2.70</td>
<td>8.008</td>
<td>2.398</td>
</tr>
</tbody>
</table>

* Physical Density - The actual physical density of the insert can vary within ±1% of the manufacturing target density.

** These inserts have a standard 30 mm diameter and contain a 10 mm diameter core of the indicated reference surrounded by H2O-equivalent background. Hydroxyapatite (unit mg/cc) in H2O background. Plugs to accommodate chambers, TLD’s and films available upon special request. The titanium reference has a unique diameter of 6.35 mm.

*** CIRS Cortical bone reference is based on ICRU Report No.44, and represents approximately 12.2% H2O, 24.6% protein, 58% mineral (assumed to be Calcium Hydroxyapatite (HA)), and 5.2% monosaccharides. CIRS further offers a series of mineral density references that mimic various HA concentrations in a pure water-equivalent epoxy background matrix.

† Refer to Appendix A for the CIRS cavity and plug code list of available chamber cavities.
CBCT ELECTRON DENSITY PHANTOM
Increase HU Value Confidence for Adaptive RT

A large number of HU readings can be obtained by placing the electron density plugs in different positions both in central axis and offset configurations. Using the equation of curve fitting for collected values, a CBCT to electron density calibration curve can be calculated.

- Evaluate CT scan data
- Correct for inhomogeneities
- Document relationship between CT number and tissue electron density
- Simulate indicated tissue within the diagnostic and therapeutic energy range
- Quick assessment of distance registration (optional)

The Cone Beam (CBCT) Electron Density Phantom is an extended version of Item 682-062 Electron Density Phantom specifically designed for Cone Beam CT Imaging systems. Preliminary data shows that there may be differences between the HU readings for Diagnostic CT and Cone Beam CT. The geometry of the Cone Beam CT requires additional material and suggests that off central axis measurements should be taken.

The phantom was designed in collaboration with Dr. Peter H. Cossmann, PhD to provide a reliable tool for CT number to electron density calibration in volumetric imaging. Reliable CT calibration curves help enable treatment plan adaptation directly from Cone Beam CT data. Additionally, the phantom can accommodate any ion chamber for dose measurements and validation of heterogeneity correction based on the corrected CT calibration curve.

The CBCT Electron Density Phantom’s size covers geometries for imagers with dimensions of up to 40 cm x 40 cm. It is made of Plastic Water®-LR and contains the same set of tissue equivalent electron density inserts as the standard Item 682-062. Additional interchangeable slabs allow for repositioning of the electron density section off axis.

**Specifications**

- **Overall Dimensions:** 13” W x 10.6” H x 9.8” D (33 x 27 x 5 cm)
- **Weight:** 40 lb (18 kg)
- **Materials:** Water and Tissue Equivalent Epoxy Resin

<table>
<thead>
<tr>
<th>Item #</th>
<th>Description</th>
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<tbody>
<tr>
<td>682-200</td>
<td>CBCT Electron Density Phantom</td>
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### CBCT ELECTRON DENSITY PHANTOM ITEM 682-200 INCLUDES

<table>
<thead>
<tr>
<th>Qty</th>
<th>Description</th>
<th>Physical Density (g/cc)</th>
<th>Electron Density x 10^{23} Electrons/cc</th>
<th>RED (Relative to H2O)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Electron Density Head Insert</td>
<td>1.029</td>
<td>3.333</td>
<td>0.998</td>
</tr>
<tr>
<td>1</td>
<td>Electron Density Body without Head Insert</td>
<td>1.029</td>
<td>3.333</td>
<td>0.998</td>
</tr>
<tr>
<td>2</td>
<td>Lung (Inhaled) Equivalent Electron Density Plug</td>
<td>0.205</td>
<td>0.668</td>
<td>0.200</td>
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<tr>
<td>2</td>
<td>Lung (Exhaled) Equivalent Electron Density Plug</td>
<td>0.507</td>
<td>1.658</td>
<td>0.496</td>
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<td>2</td>
<td>Breast (50% Gland / 50% Adipose) Equivalent Electron Density Plug</td>
<td>0.99</td>
<td>3.261</td>
<td>0.976</td>
</tr>
<tr>
<td>2</td>
<td>Solid Trabecular Bone (200 mg/cc HA) Equivalent Electron Density Plug</td>
<td>1.16</td>
<td>3.730</td>
<td>1.117</td>
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<td>2</td>
<td>Liver Equivalent Electron Density Plug</td>
<td>1.07</td>
<td>3.518</td>
<td>1.052</td>
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<td>2</td>
<td>Muscle Equivalent Electron Density Plug</td>
<td>1.06</td>
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<td>2</td>
<td>Adipose Equivalent Electron Density Plug</td>
<td>0.96</td>
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<tr>
<td>2</td>
<td>Solid Dense Bone (800 mg/cc HA) Equivalent Electron Density Plug</td>
<td>1.53</td>
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<tr>
<td>1</td>
<td>Solid Dense Bone (1250 mg/cc HA) Equivalent Electron Density Plug</td>
<td>1.82</td>
<td>5.663</td>
<td>1.695</td>
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<td>Water-fillable Electronic Density Plug (Real water data provided)</td>
<td>1.00</td>
<td>3.34</td>
<td>1.00</td>
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<td>Set of 2 Feet for 682-062</td>
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</tr>
<tr>
<td>1</td>
<td>Soft Carry Case for 682-062</td>
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<td></td>
</tr>
<tr>
<td>1</td>
<td>50 mm Thick Bolus Slab</td>
<td>1.029</td>
<td>3.333</td>
<td>0.998</td>
</tr>
<tr>
<td>2</td>
<td>100 mm L x 30 mm dia Background Equivalent Plug</td>
<td>1.029</td>
<td>3.333</td>
<td>0.998</td>
</tr>
<tr>
<td>1</td>
<td>12.5 mm Thick Bolus Slab</td>
<td>1.029</td>
<td>3.333</td>
<td>0.998</td>
</tr>
<tr>
<td>1</td>
<td>37.5 mm Thick Bolus Slab</td>
<td>1.029</td>
<td>3.333</td>
<td>0.998</td>
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<tr>
<td>1</td>
<td>CBCT Electron Density Phantom -Annulus (100 mm Thick)</td>
<td>1.029</td>
<td>3.333</td>
<td>0.998</td>
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<tr>
<td>1</td>
<td>CBCT Electron Density Phantom-Annulus Solid Insert (100 mm Thick)</td>
<td>1.029</td>
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<td>Holder/Support set for 682-200 &amp; Model 062MQA</td>
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<tr>
<td>1</td>
<td>Soft Carry Case for 682-200</td>
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</tr>
<tr>
<td>1</td>
<td>User Guide</td>
<td></td>
<td></td>
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</table>

**CUSTOMERS ARE ENCOURAGED TO COMPLETE THEIR ORDER WITH THE PURCHASE OF THE INSERT OPTION LISTED BELOW**

### CBCT ELECTRON DENSITY PHANTOM OPTIONAL ACCESSORIES

#### Reference Material Density Values

- **Water Equivalent Material**
  - 8.008 g/cc
  - 23.101 x 10^{23} Electrons/cc
  - 1.976 (Relative to H2O)

- **Liver Equivalents**
  - 6.600 g/cc
  - 20.801 x 10^{23} Electrons/cc
  - 1.976 (Relative to H2O)

- **Bone Equivalents**
  - 12.5 mm Thick Slab: 1.029 g/cc
  - 3.333 x 10^{23} Electrons/cc
  - 0.998 (Relative to H2O)

- **Hydroxyapatite (HA)**
  - 1.029 g/cc
  - 3.333 x 10^{23} Electrons/cc
  - 0.998 (Relative to H2O)

- **Water**
  - 1.029 g/cc
  - 3.333 x 10^{23} Electrons/cc
  - 0.998 (Relative to H2O)

- **Electron Density Body without Head Insert**
  - 1.029 g/cc
  - 3.333 x 10^{23} Electrons/cc
  - 0.998 (Relative to H2O)

**Note:**
- Values provided are approximate and may vary slightly due to manufacturing tolerances.
- For detailed information, refer to Appendix A for the CIRS cavity and plug code list of available chamber cavities.
- If the ion chamber cavity is not specified by customer, phantom is supplied with cavity that accommodates a Farmer type ion chamber.

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**CIRS Cortical Bone Reference** is based on ICRU Report No.44, and represents approximately 12.2% H2O, 24.6% protein, 58% mineral (assumed to be Calcium Hydroxyapatite (HA)), and 5.2% monosaccharides. CIRS further offers a series of mineral density references that mimic various HA concentrations in a pure water-equivalent epoxy background matrix.
The AAPM CT Performance Phantom offers the user a single test object that measures ten distinct CT performance parameters. The phantom design is based on the guidelines presented in Report #1 of the American Association of Physicists in Medicine Task Force on CT Scanner Phantoms. The goals of report #1 were to "(1) define 'performance' of a CT scanner and (2) describe methods of performance testing through utilization of particular phantoms."

A CT number linearity insert, high contrast resolution insert and slice width insert are housed in an 8.5" diameter (21.6 cm) PMMA water tank with quick disconnect valves for ease of filling and draining between use. Also included is a 0.25" (0.64 cm) bone equivalent ring that can be interchanged with a polystyrene TLD insert for dose measurements.

Contrast Test Object
(This option is only available with purchase of the phantom body)
8.5" OD x 2.5" L (21.6 x 6.35 cm) solid acrylic equivalent disk block with 12 fillable cavities 2.25" deep (5.72 cm). Two of each cavity with diameters: 0.125", 0.25", 0.375", 0.5", 0.75", 1.0", 1.25", 1.5", 1.75", 2.0", 2.25", and 2.5" (2.54, 3.18, 4.95, 12.7, 1.9, 1.27, 0.95, 0.64, 0.32 cm), spaced twice their diameter apart from a center line. Cavities can be easily filled from the outside with dextrose or sodium chloride solutions of various concentrations.

CT Number Linearity Insert
7.5" OD x 2.5" L (19.05 x 6.35 cm) includes 1" diameter (2.54 cm) rods of polyethylene, PMMA (acrylic), polycarbonate, polystyrene, and nylon. Density values (g/cc): polyethylene - 0.95, polystyrene - 1.05, nylon - 1.1, acrylic - 1.19, polycarbonate - 1.20.

Resolution Insert
7.5" OD x 2.5" L (19.05 x 6.35 cm) with acrylic equivalent test object with 8 sets of air thru holes (five holes per set). Diameter of holes is 1.75, 1.5, 1.25, 1.00, 0.75, 0.61, 0.50, and 0.40 mm. Distance between each hole equal to hole diameter. Each row is 5 mm apart. Insert also contains a 0.009" (0.023 cm) stainless steel wire positioned longitudinally for calculation of line-spread function.

Slice Thickness Insert
7.5" OD x 3.5" L (19.05 x 8.89 cm) Contains three 0.02 x 1" (0.064 x 2.54 cm) aluminum strips angled at 45°, positioned on center and aligned vertically.

Bone Ring
7.65" ID x 0.2" wall thickness x 2.8" L (19.43 x 0.5 x 7.1 cm) cortical bone ring. Fits over linearity, resolution and slice thickness insert to harden the beam.

Optional Accessories
Item 682-014 TLD Insert
0.5" dia. x 3.5" L (1.3 x 8.9 cm) PMMA rod drilled 3" deep (7.6 cm) to accept TLD’s. Can be swapped with Alignment pin in housing cover without removing the cover.

Item 682-015 Low Contrast Insert- Spherical Targets
8" OD x 1.18" L (20.3 x 3 cm) Plastic Water® LR equivalent background. The test object contains spheres 5, 10 & 20 CTU above background and 3 reference plugs for each material used as spheres.

Item 682-021 Carrying Case for 682-010
Custom carry case for easy storage and handling of complete Model 610.
Cost-conscious positioning precision
The ASTOR room lasers allow precisely reproducible positioning of the patient on the linear accelerator. The finest laser lines, with a max. 1 mm width, project the isocenter for highly precise patient positioning. Room lasers are also a fundamental element of phantom alignment for quality assurance.

The ASTOR system has three (optionally four) lasers for alignment with skin markings. You can choose laser color, design variant, and line or cross lasers, all individually adapted to your room situation and workflow. A fourth laser can be used to prevent potential shadowing from the gantry.

Ultra-precise laser lines in red or green are made possible by state-of-the-art precision mechanics and optics. ASTOR room lasers are reduced to the maximum, so even a modest budget can achieve the highest degree of precision.

Precise
Even at a distance of 4 meters, the maximum laser line width is 1 mm. The line straightness within the line shows barely any deviations, even at a distance of 3 meters. You can always be sure of the precision of our lasers.

Optimally visible
The optical room laser components are designed and manufactured with extreme accuracy. Plane parallel glass with anti-reflective coating prevents any interference with the red or green laser beam. The brightness distribution remains constant at all times. Benefit from optimal visibility for precise patient positioning.

Robust
A high-quality aluminum housing reliably protects the fine mechanics and optical components inside. You don't need to fear damage even from gentle impacts. Highly shatterproof glass stands up to all the rigors of clinical daily life.

Flexible
Adapt the room laser design to the circumstances of your space. Direct wall mounting or on a freestanding floor support are both possible. In addition, the room laser can be inclined up to 45°. This gives you flexibility even in tight spaces.

Resistant to radiation
Scattered radiation occurs in environments surrounding linear accelerators. The components in our room lasers have been tested under extreme exposure conditions and optimized for these conditions. The many years of availability without compromising on quality is an exceptional track record that speaks for itself.

Durable
The quality of our products is also reflected in their service life.

The ASTOR laser’s horizontal and vertical tilt can be easily adjust without removing the cover. Translation, rotation and focus are adjusted after removing the cover via the convenient quick lock mechanism.
1 Tilt vertical plane
2 Tilt horizontal plane

ASTOR lasers are equipped with adjustable tilting brackets allowing for rotation up to 45°. The ASTOR’s compact design makes it an ideal solution for tight mounting locations.

Specifications
Laser Colour (Typical Wave Length):
Red: 638 nm
Green: 520 nm,
Laser Class: 2
Focusable Range: 1 - 4 m
Line Width Up to 4 m Distance: < 1mm
Line Length at 3 m Distance: > 3 m
Max. Laser Output Power: < 1mW
External Power Supply: 100 - 240 VAC, 50-60 Hz
Internal Voltage: 24 V DC
Operating Temperature: 59°-86° F (15°-30°C)
Ambient conditions: 35 - 80 % rel. humidity, non-condensing
Dimensions: 7.2" H x 3.4" W x 3.5" D (182 x 86 x 90 mm)
Weight: 3.3 lb (1.4 kg)
Swivel Angle: 45°
International Protection Rating: IP20
LAP APOLLO LASERS
Advanced Laser Systems for Patient Alignment

Flexible
Adapt the room laser mounting according to your individual room situation. Direct wall mounting or mounting on a freestanding support are both possible. In addition, the room laser can be inclined up to 45°. This gives you flexibility even in small rooms.

Easily adjustable
Laser adjustment is convenient via remote control. The remote control offers 6 degrees of freedom. The remote control performs all laser positioning for the ultrafine lines including focus.

Resistant to radiation
In environments surrounding linear accelerators, scattered radiation occurs. The components in our room lasers have been tested under extreme exposure conditions and optimized for these conditions. The many years of availability without compromising on quality is an exceptional track record that speaks for itself.

Specifications

<table>
<thead>
<tr>
<th>Laser Colour (Typical Wave Length):</th>
<th>Red: 638 nm</th>
<th>Green: 520 nm</th>
<th>Blue: 450 nm</th>
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<tbody>
<tr>
<td>Laser Class:</td>
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<tr>
<td>Focusable Range:</td>
<td>1 - 4 m</td>
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<tr>
<td>Line Width Up to 4 m Distance:</td>
<td>Red/Green: &lt; 1 mm</td>
<td>Blue: &lt; 0.5 mm</td>
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<tr>
<td>Line Length at 3 m Distance:</td>
<td>&gt; 3 m</td>
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</tr>
<tr>
<td>Max. Laser Output Power:</td>
<td>&lt; 1 mW</td>
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<tr>
<td>External Power Supply:</td>
<td>100 - 240 VAC, 50 - 60 Hz</td>
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<tr>
<td>Internal Voltage:</td>
<td>24 V DC</td>
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<td>Operating Temperature:</td>
<td>59°-86° F (15°-30°C)</td>
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<tr>
<td>Ambient conditions:</td>
<td>35 - 90 % rel. humidity, non-condensing</td>
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<tr>
<td>Dimensions:</td>
<td>8.7&quot; H x 4.3&quot; W x 3.9&quot; D (221 x 110 x 100 mm)</td>
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<tr>
<td>Weight:</td>
<td>5.7 lb (2.6 kg)</td>
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<tr>
<td>Swivel Angle:</td>
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<td>International Protection Rating:</td>
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</table>

Remote Control

| Dimensions:                       | 6.4" H x 2.5" W x 0.8" D (163 x 63 x 21 mm) |     |
| Weight:                           | 0.28 lb (130 gm) |             |
| Power Supply:                     | 6 V DC (4 batteries type AAA/LR 03/Micro, 1.5 V) |     |
| International Protection Rating:  | IP40        |               |              |

High precision, remotely adjustable room lasers for patient alignment at LINAC isocenter

Highest precision you can rely on
APOLLO room lasers are used for precise and repeatable positioning of radiotherapy patients. After imaging-based planning via CT or MRI, the patient is positioned at the linear accelerator. The finest laser lines project the LINAC isocenter coordinates onto the patient’s skin, allowing for precise alignment to millimeter accuracy with the CT/MRI. In addition, the room lasers are a fundamental component of quality assurance. They aid in the precise orientation of the phantom, to achieve measurement accuracy.

The APOLLO system has three (optionally four) lasers for the coronal, sagittal and transversal body planes. You can choose the laser color, line and/or cross laser, and mounting option, all adapted to your individual room situation. An optional fourth laser prevents possible shadowing from the LINAC gantry.

Precise
Even at a distance of 4 meters, the maximum laser line width is 1 mm. The line straightness within the line shows barely any deviations, even at a distance of 3 meters. You can always be sure of the precision of our lasers.

Optimally visible
The different red, green, and blue diode colors, the optical room laser components are designed and manufactured with extreme accuracy. Plane parallel glass with anti-reflective coating prevents any interference with the laser beam. The brightness distribution remains constant at all times. Benefit from optimal visibility for precise patient positioning.

Stable
A high-quality aluminum housing reliably protects the fine mechanics and optical components inside. You don't need to fear damage even from gentle impacts. Highly shatterproof glass stands up to all the rigors of clinical daily life.