

# *Proton Therapy Dosimetry Head*

Model 731-HN



## USER GUIDE

**CIRS**

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## OVERVIEW

The CIRS Proton Therapy Dosimetry Head is an anthropomorphic head phantom designed for commissioning and treatment planning system (TPS) verification with any conformal or IMRT Proton Therapy system<sup>1</sup>.

The phantom's internal details provide a most realistic clinical simulation to evaluate the challenging effects of complex intra- and extra-cranial anatomies. Model 731-HN can be used to measure 2D dose distributions in multiple planes for proton and photon treatment plans.

## PHANTOM DESCRIPTION

Model 731-HN is constructed of CIRS tissue-equivalent materials, which mimic reference tissues within 1.5% for protons and within 1% for photons from 50 KeV to 20 MeV<sup>3</sup>. The Proton Therapy Head can be used during all standard IMRT procedures from CT image acquisition to proton beam delivery verification<sup>1,2</sup>.

Tissue equivalency of detailed internal structures makes the phantom ideal for treatment plan evaluation in high density-gradient locations such as air cavity vs. bone structures, which are specifically important in proton therapy<sup>2</sup>. Internal structures include brain, bone with cortical and trabecular distinction, larynx, trachea, fully-open sinus cavities, nasal and mouth cavities, and teeth with distinct dentine, enamel and root structure.

In addition to tissue-equivalent internal details, Model 731-HN approximates the average male human head in both size and shape to allow for intuitive set up with any patient positioning or fixation device.

One half of the phantom is sectioned in 2cm increments for three film locations in the cranio-caudal direction starting from the approximate center of the sagittal plane. Because slices are orthogonal to the CT axial plane, artifacts caused by residual air gaps are noticeably reduced compared to standard axial slices.

Proton system commissioning is enhanced by placement of a tungsten BB in a molar and a titanium prosthesis attached by two screws at C3 and C5 vertebra.

## SPECIFICATIONS

<b>APPROXIMATE DIMENSIONS:</b>	18 cm x 22 cm x 27 cm (7" x 8.6" x 10.6")
<b>WEIGHT:</b>	6.4 kg (14 lbs)
<b>PHANTOM MATERIALS:</b>	Epoxy Resin

### INCLUDED:

Foam lined carry case
User Guide
60 month warranty

### OPTIONAL:

<b>MODEL:</b>	
038-20	SRS Frame Support Cups, Set of 4

COMPOSITION	PHYSICAL DENSITY (G/CC)	ELECTRON DENSITY (1/CM)
Brain	1.07	3.470*10 <sup>23</sup>
Cortical Bone	1.91	5.915*10 <sup>23</sup>
Trabecular Bone	1.16	3.725*10 <sup>23</sup>
Sinus & other Cavities	0.21	0.681*10 <sup>23</sup>
Soft Tissue	1.05	3.434*10 <sup>23</sup>
Spinal Cord	1.07	3.448*10 <sup>23</sup>

## **GENERAL PROCEDURE**

1. Acquire a CT scan of the phantom keeping the provided plastic sheet dividers in place of the film. The dividers are similar in thickness to Gafchromic® film.
2. Calculate a plan (proton or photon) on the acquired CT data sets.
3. Insert radiographic films (e.g. Gafchromic® films) in the slice separation in place of the plastic sheet dividers.

**Note: The provided dividers may be used as a template for film cutting.**

4. Assemble the phantom and secure with rubber bands if needed.
5. Position the phantom and deliver the plan.
6. Digitize films and compare the measured and the calculated dose distribution.

## **CARE AND HANDLING**

The phantom should be stored in a safe place when not in use, preferably within its respective case. The phantom may be cleaned with mild soap and water. Technical questions should be referred to CIRS customer service at (800) 617-1177.

## **REFERENCES**

1. Albertini F, Casiraghi M, Lorentini S, Rombi B, Lomax AJ. Experimental verification of IMPT treatment plans in an anthropomorphic phantom in the presence of delivery uncertainties. *Phys Med Biol.* 2011;56(14):4415-31.
2. Lorentini S, Menegotti L, Delana A, Schwarz M. PO-0873 DOSIMETRIC VERIFICATION OF IMRT PLANS WITH A CUSTOMIZED ANTHROPOMORPHIC PHANTOM. *Radiotherapy and Oncology.* 2012;103:S342.
3. Demez N, Lee T. EP-1320 STUDY ON THE COMPATIBILITY OF TISSUE EQUIVALENT PHANTOMS FOR USE IN PROTON BEAM THERAPY QA. *Radiotherapy and Oncology.* 2012;103:S501.

# WARRANTY

All standard CIRS products and accessories are warranted by CIRS against defects in material and workmanship for a period as specified below. During the warranty period, the manufacturer will repair or, at its option, replace, at no charge, a product containing such defect provided it is returned, transportation prepaid, to the manufacturer. Products repaired in warranty will be returned transportation prepaid.

There are no warranties, expressed or implied, including without limitation any implied warranty of merchantability or fitness, which extend beyond the description on the face hereof. This expressed warranty excludes coverage of, and does not provide relief for, incidental or consequential damages of any kind or nature, including but not limited to loss of use, loss of sales or inconvenience. The exclusive remedy of the purchaser is limited to repair, recalibration, or replacement of the product at manufacturer's option.

This warranty does not apply if the product, as determined by the manufacturer, is defective because of normal wear, accident, misuse, or modification.

## NON-WARRANTY SERVICE

If repairs or replacement not covered by this warranty are required, a repair estimate will be submitted for approval before proceeding with said repair or replacement

## RETURNS

If you are not satisfied with your purchase for any reason, please contact your local distributor prior to returning the product. Visit <https://www.cirsinc.com/distributors/> to find your local distributor. If you purchased your product direct through CIRS, call Customer Service at 800-617-1177, email [rma@cirsinc.com](mailto:rma@cirsinc.com), or fax an RMA request form to 757-857-0523. CIRS staff will attempt to remedy the issue via phone or email as soon as possible. If unable to correct the problem, a return material authorization (RMA) number will be issued. Non-standard or "customized" products may not be returned for refund or exchange unless such product is deemed by CIRS not to comply with documented order specifications. You must return the product to CIRS within 30 calendar days of the issuance of the RMA. All returns should be packed in the original cases and or packaging and must include any accessories, manuals and documentation that shipped with the product. The RMA number must be clearly indicated on the outside of each returned package. CIRS recommends that you use a carrier that offers shipment tracking for all returns and insure the full value of your package so that you are completely protected if the shipment is lost or damaged in transit. If you choose not to use a carrier that offers tracking or insure the product, you will be responsible for any loss or damage to the product during shipping. CIRS will not be responsible for lost or damaged return shipments. Return freight and insurance is to be pre-paid.

## WITH RMA NUMBER, ITEMS MAY BE RETURNED TO:

CIRS  
Receiving  
900 Asbury Ave,  
Norfolk, Virginia, 23513 USA

PRODUCT	WARRANTY PERIOD
Proton Therapy Dose Head	60 Months

