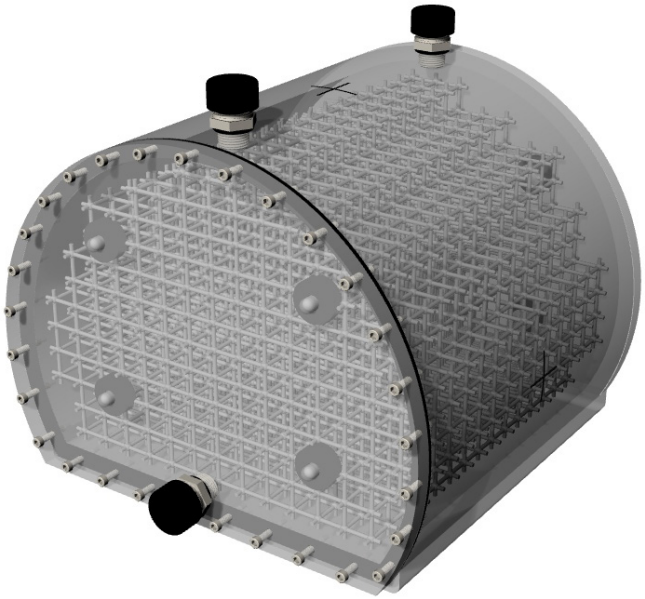
Large Field MR Image Distortion Phantom

Model 604-GS



USER GUIDE

CIRS

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OVERVIEW

The Large Field MR Image Distortion Phantom is designed for assessment of image distortion in whole body MRI for Diagnostics and Radiation Therapy treatment planning. The phantom's large size and grid spacing in all three orthogonal dimensions make it suitable for large bore MRI.

The phantom can be filled with various MR signal-generating solutions. When empty, the grid/air interface provides good contrast in CT imaging.(When the CT images of the phantom are to be analyzed by CIRS MRI Distortion Check Software, it is highly recommended that the phantom is filled with liquid for scanning.)

The phantom is marked with cross-hairs for ease of alignment to positioning lasers and can be used on curved and flat gantry tables. Due to differences in MRI machine design by manufacturers, the lateral cross-hairs on the phantom may not align to lasers. This will not inhibit use of the phantom.

The model 604-GS is used in conjunction with CIRS Distortion Check Software. The 604-GS comes with a complimentary 90-day license for 5 scans using this cloud-based software. For instructions on how to create your account, go to https://www.cirsinc.com/software/distortion-check/

PHANTOM DESCRIPTION

The phantom is a liquid fillable, acrylic cylinder 356 mm (OD) by 300 mm in length. The entire volume is filled with an orthogonal 3D grid of 3 mm diameter rods providing complete geometric data throughout the imaging volume.

SPECIFICATIONS

DIMENSIONS

Ø 35 cm (ID), active part of the phantom, X 30 cm (L) x 27 cm (H)
Weight: 7.7 kg/ 17lbs (Dry)
28 kg/ 62 lbs (Filled with water)

MATERIALS

Acrylic (Housing)
Proprietary Plastic (Grid)

GRID SPACING

21.5 x 20.5 x 20.3 cm, node to node
Number of control points: 2152

MODEL 604-GS INCLUDES

QTY	COMPONENT DESCRIPTION
1	Large Field MR Image Distortion Phantom
1	Filling Funnel
10	Extra plastic screws
1	Harness
1	Plastic tray
1	Complimentary 90 day license for 5 successful analyzed scans using Distortion Check Software: For instructions on how to create your account, go to https://www.cirsinc.com/software/distortion-check/
2	User Guides (604-GS & 603S Distortion Check)
1	Foam-Lined Carry Case
-	60-Month Warranty

USE OF THE PHANTOM

INITIAL SETUP

The phantom is packed and shipped assembled.

Inspect the phantom for any signs of possible damage that could pose a potential leak.

If phantom is damaged, notify CIRS or your distributor.

LEAK TEST

The phantom has been leak tested by sustained pressure testing to 2 psi (13.8 kPa) above hydrostatic pressure. The user is encouraged to perform a leak test with water prior to use. A leak with water is much easier to clean than MR doped liquids.

After filling with water, position the phantom in the plastic tray and let sit for approximately 1 hour. Inspect for wet spots. **DO NOT LEAVE PHANTOM UNATTENDED.**

If a leak is evident, notify CIRS or your distributor.

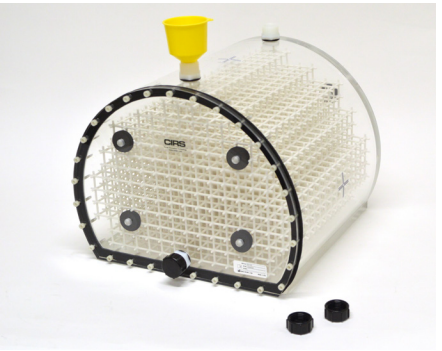
FILLING THE PHANTOM

For safety, familiarize yourself with filling and draining operation prior to filling the phantom with water or test substances.

The phantom is susceptible of producing artifacts in MRI, especially at 3T, if the phantom is filled with water only. Such artifacts affect the performance of the algorithm in detecting the grid intersections. It is recommended to fill the phantom with a solution as recommended by AAPM Report 100 for field strengths ≤ 3T:

1L H2O, 3.6g NaCl, and 1.25g pure CuSO4 or 1.96g CuSO45H2O.

For field strengths ≥ 3T, it is recommended that you consult published specialty literature for choosing the most appropriate filling liquid.



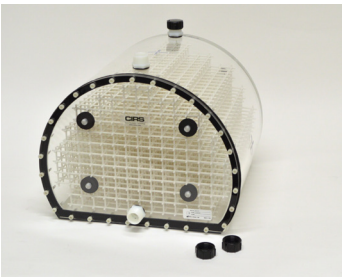
Mineral oil and a mixture solution of water and triethylene glycol are reported as being effective in reducing artifacts. Use caution and due diligence when researching a filling liquid best for your application.

We recommend filling the phantom in the following manner:

1. Ensure front plate of the housing is secured. The gasket for the front plate should have light, even pressure on the front plate.
2. Remove both filling port caps from the top of the housing to ventilate phantom.
3. Place funnel into one of the filling ports at the top of the housing.
4. **SLOWLY** fill the phantom with water or test substance through the funnel. **Note: this should take approximately 15 minutes.**
    - **FILLING THE PHANTOM WITH TAP PRESSURE CAN CAUSE EXCESS PRESSURIZATION ON THE HOUSING WHICH CAN LEAD TO CATASTROPHIC FAILURE.**
5. Remove funnel and replace both filling port caps.

DRAINING THE PHANTOM

1. Remove filling port cap from front plate. Water or test substance will begin to slowly drain from the housing. A catch vessel may be needed to capture test fluids.
2. Remove one (1) of the filling port caps from the top of the housing to vent for air. Test fluids will begin to drain faster.
3. Replace filling port caps when housing is fully dried.



HANDLING AND CARE

The phantom is manufactured from PMMA. It is recommended that the phantom only be cleaned with mild detergent and water.

CAUTION: Do not use any abrasives, rubbing alcohol, or solvents on the phantom. These will irreversibly damage the phantom.

The strap harness included can be used to transport the phantom especially when filled with test fluid. Ensure the buckles are attached on the front and rear ends of the phantom. The straps can be tensioned at the buckle locations. The harness can remain on the phantom if desired during use.

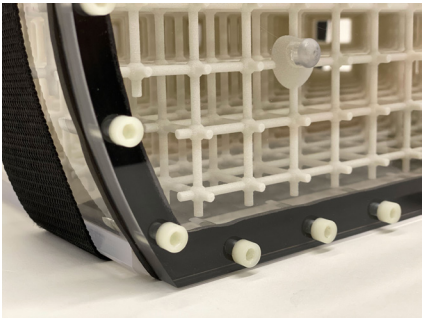
STORAGE

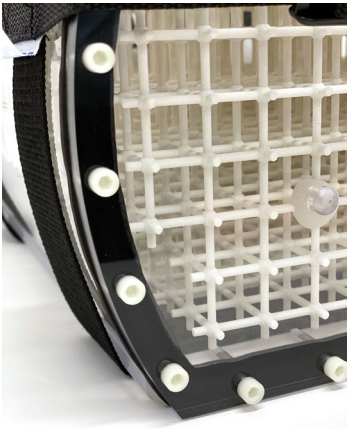
CIRS has tested the 3D grid which maintains geometric stability when the tank is filled. The PMMA housing is hygroscopic which can jeopardize the integrity of the phantom if left filled over a long period of time.

Through water absorption on the inside of the housing, the PMMA exhibits a differential distortion through the inside expanding and outside remaining at atmospheric conditions. This affects different components of the housing and can lead to failure of the glue joints.

It is highly recommended that the phantom be drained for long-term storage. Remove one of the filling port caps from the top of the phantom to allow the inside to dry after ridding test fluids.

Routinely inspect phantom for damage particularly at the glue joints and front plate gasket. Ensure screws are snug-fit to the front plate. The gasket should have even pressure against the front plate and there should be no kinks or wrinkles. Repeating the leak test (page 4) is also recommended.





For assistance, please contact CIRS.

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 Customer Service or your local distributor prior to returning the product. Visit https://www.cirsinc.com/distributors/ to find your local distributor. Call 800-617-1177, email 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
Model 604-GS - Large Field MR Image Distortion Phantom	60 Months

COMPUTERIZED IMAGING REFERENCE SYSTEMS, INC.
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