PH-54

CT QA Phantom JCT Ⅱ

Conforming JIS Z 4923:2015

Instruction Manual

Contents

KYOTO KAGAKU CO.,LTD

Please read

Components and handling precautions

Set includes

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b	Slice thickness unit (axial)	1	h	Fixture for the cylindrical container	1
c	Spatial resolution unit	1	i	Phillips screwdriver	1
d	Repeated pattern unit	1	j	Vaseline	1
e	Low contrast resolution unit	1	k	Screws (spare)	1
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*the phantom is factory assembled.

⚠ Cautions

Handle with care

The phantom is made of breakable plastic. Handle it with utmost at most care to avoid breakage.
Do not drop or give shock to the phantom. Do not leave organic solvent in contact with the phantom.

Use water or mild detergent for cleaning.

To clean the phantom, wipe its surface with soft cloth moistened with water or mild detergent. Never apply thinner or other organic solvent to the phantom.

Store avoiding high temperature and humidity.

To prevent deformation or breakage of the phantom, store the components avoiding direct sunlight, high temperature and high humidity.

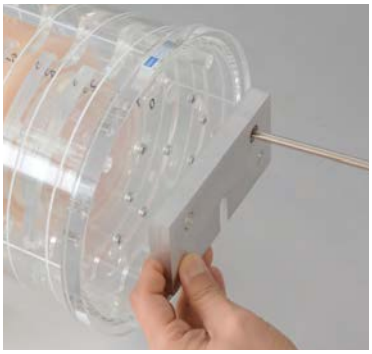
Do not mark on the phantom with a pen.

Do not mark on the phantom with a pen. Ink on the phantom will become irremovable.

Cylindrical Container

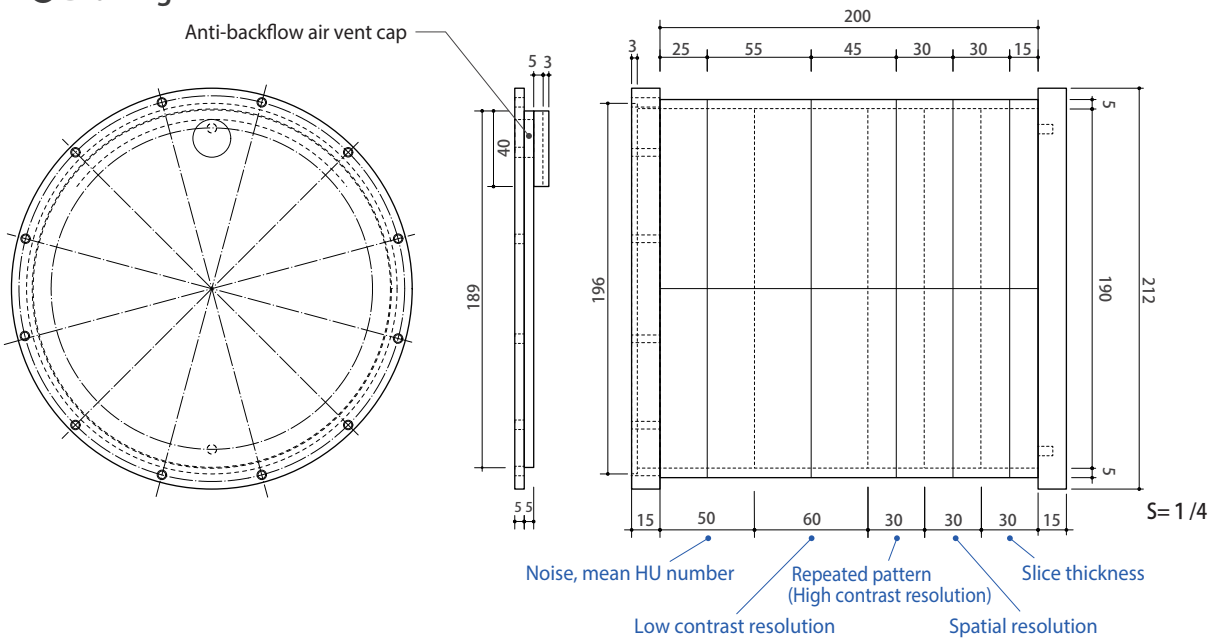
Material: Acrylic

Cylindrical water phantom to evaluate noise, mean UH number and uniformity.
The phantom serve as housing for other QA units.



Attach the fixture to the bottom of the phantom. (Design of the fixture may vary depending on the CT scanner.)

Drawing

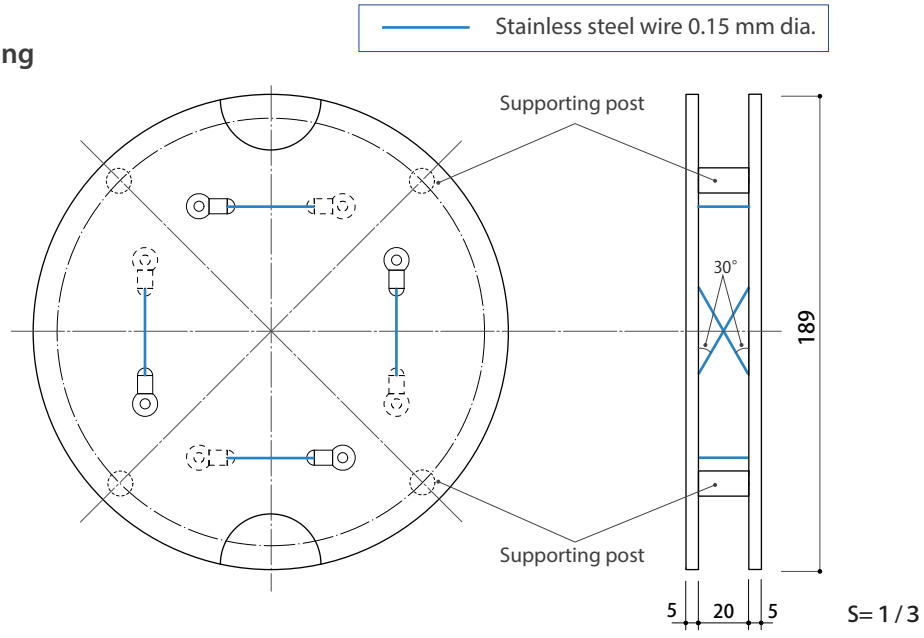


Slice Thickness Unit: Axial (Wire Phantom)

Material: Acrylic, stainless steel wire 0.15mm dia.

4 lines of stainless steel wires are set in the unit at the angle of 30 degrees to the plates.
Calculate FWHM (Full Width at Half Maximum) from SSP of the wires, to find the slice thickness.

Drawing



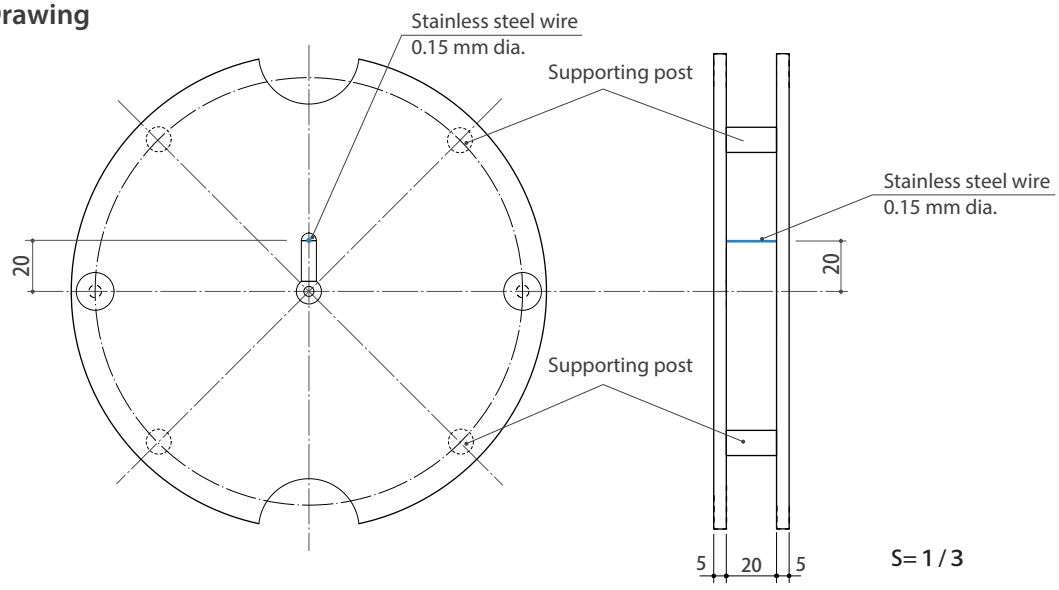
Spatial Resolution Phantom Unit

Materials: Acrylic, stainless steel wire 0.15mm dia.

Determine MTF from PSF (Point Spread Function) of the stainless steel wire target.

Stainless steel wire 0.15 mm dia.

Drawing

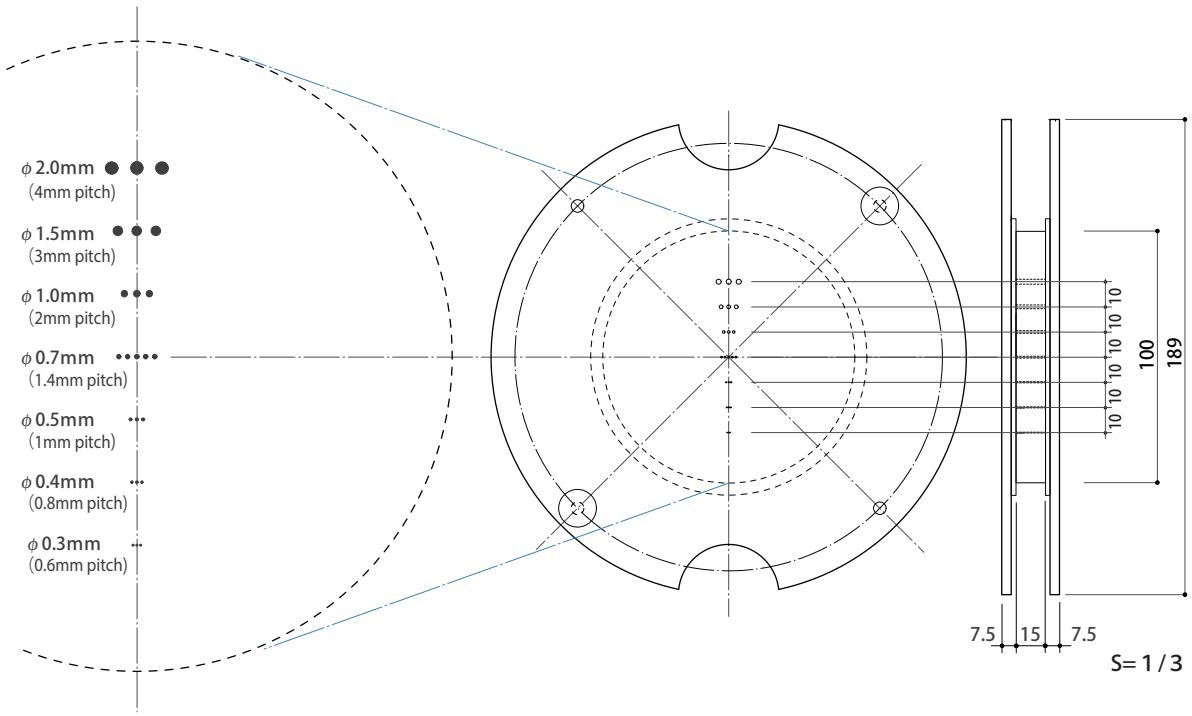


Repeated Pattern Unit (High Contrast Resolution)

Materials: Acrylic with holes of 2.0, 1.5, 1.0, 0.7, 0.5, 0.4 and 0.3 mm dia.

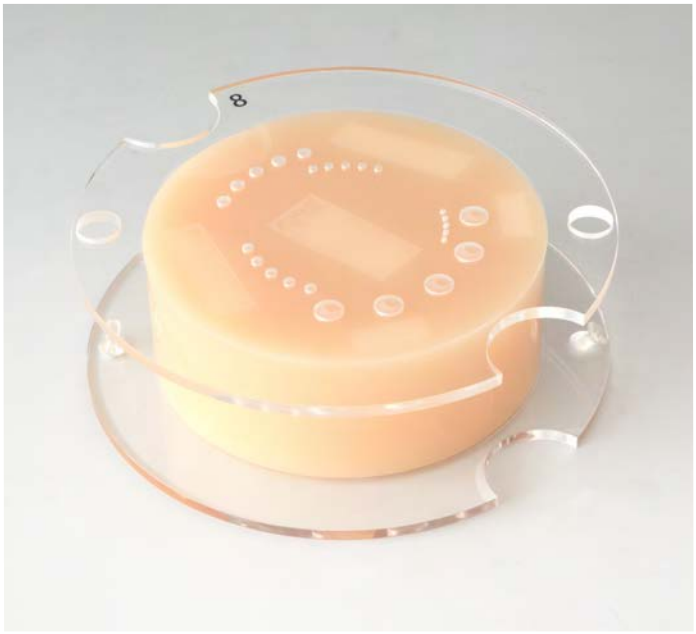
The unit is designed for visual evaluation to determine smallest detectable diameter on the slice.
Each tree holes are prepared for respective diameter, except for the 0.7mm dia.
5 x 0.7mm dia. holes are prepared to determine the center of the phantom.

Drawing



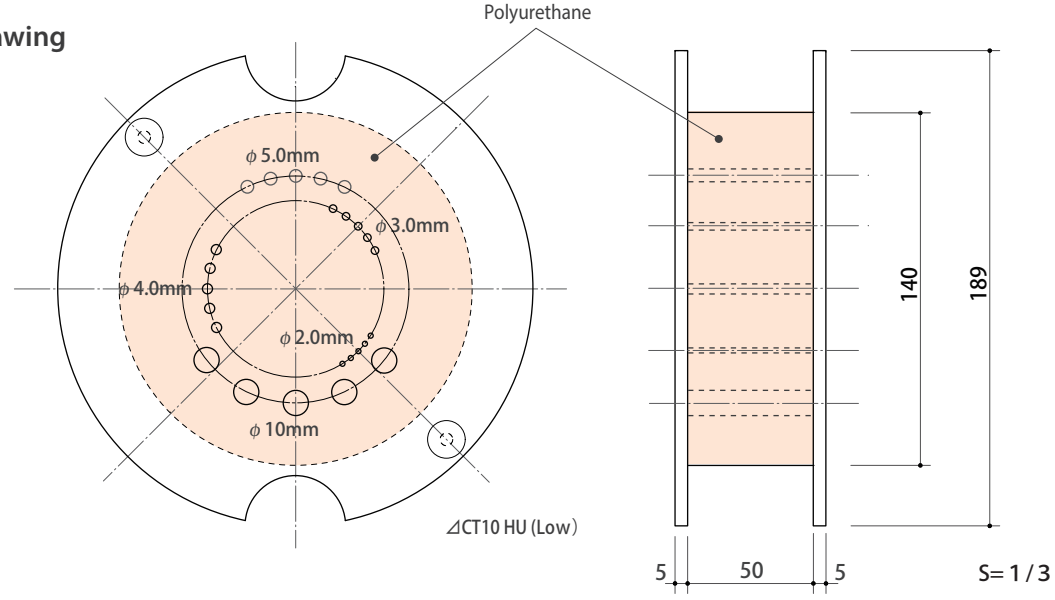
Low Contrast Resolution Unit

Materials: Acrylic, Polyurethane



The phantom contains cylindrical targets of 2, 3, 4, 5 and 10mm dia.
Each 5 targets are prepared for respective diameter.
HU number of targets is 10HU lower than the background. (*calculated value)

Drawing



Slice Thickness Unit: Helical

Materials: Polyurethane, tungsten bead 0.3mm dia. and tungsten disc of 0.05mm dia. x 1mm thick

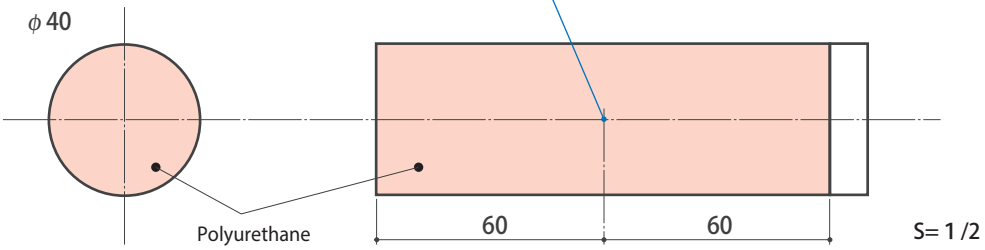
Bead phantom
tungsten bead 0.3mm dia.

Disc phantom
tungsten disc of 0.05mm dia. x 1mm thick

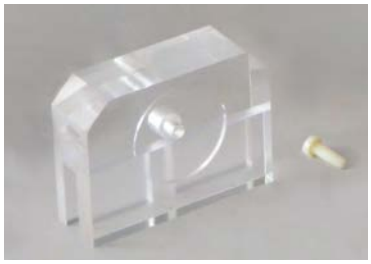
A tiny metal target is embedded in the tissue substitute material. Select the phantom that fits for the slice thickness of the scanner. The phantom with the target that is closer to 1/10 of the scanner's slice thickness is recommended.

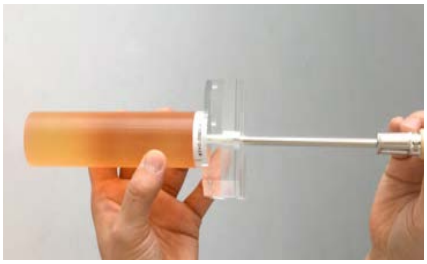
Bead phantom
for thick slice setting (e.g. 3-5mm)

Disc phantom
for thin slice setting (e.g. 0.05-2mm)



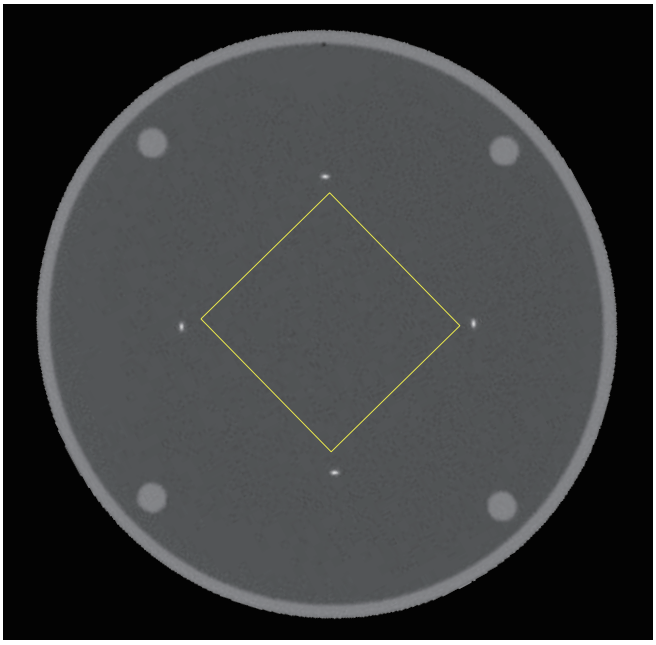
Assemble the fixture to the bottom of the phantom.





1 Initializing

Adjust the angle of the phantom using the slice thickness unit (axial).
The phantom is set horizontally when the four lines form square on the scanned slice as shown below.



The angle adjustment unit is available as an optional part for easy adjustment.

Phantom

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Angle adjustment holder

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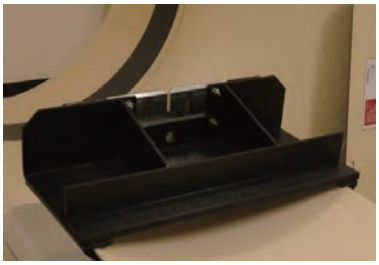
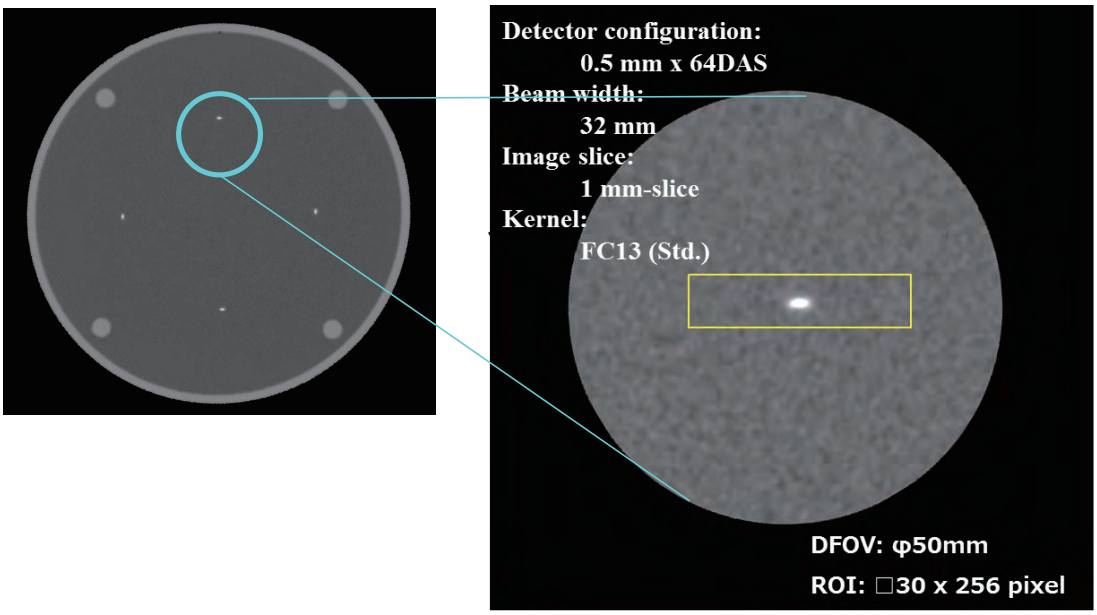


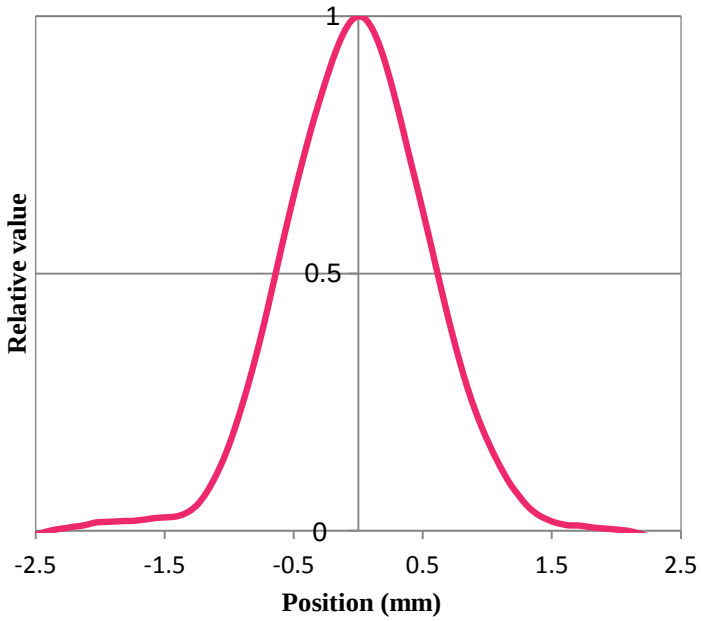
Phantom fixture of the scanner

When air bubbles in the phantom cannot be removed completely, adjust the angle using the angle adjustment unit so that the bubbles will not disturb the image.
The angle adjustment unit is to be attached between the phantom and the phantom fixture of the scanner.

1 Example of a scan

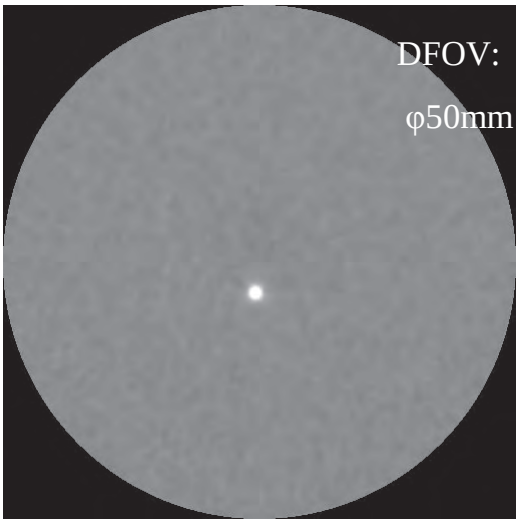
Slice Thickness Unit: Axial





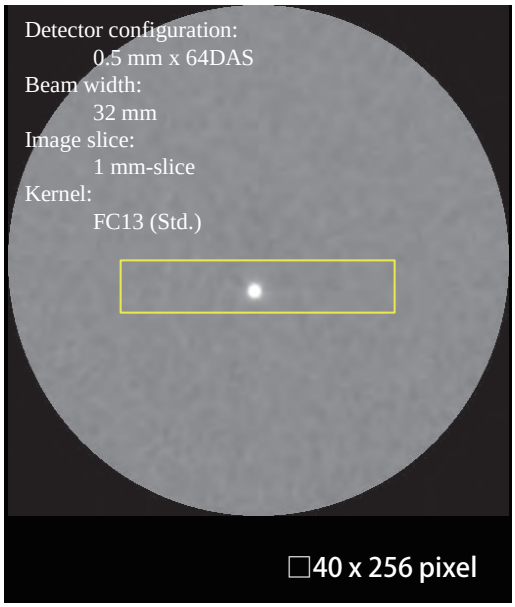
2 Example of a scan

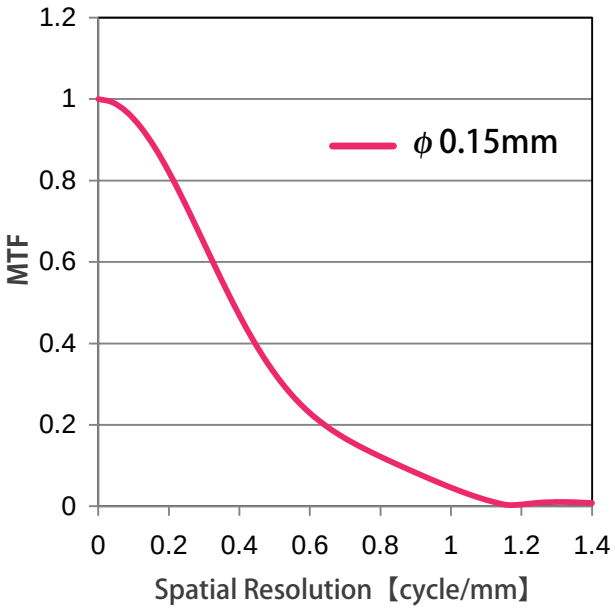
Spatial Resolution Unit: 0.15mm dia. Wire (Axial)



Detector configuration:
0.5 mm x 64DAS

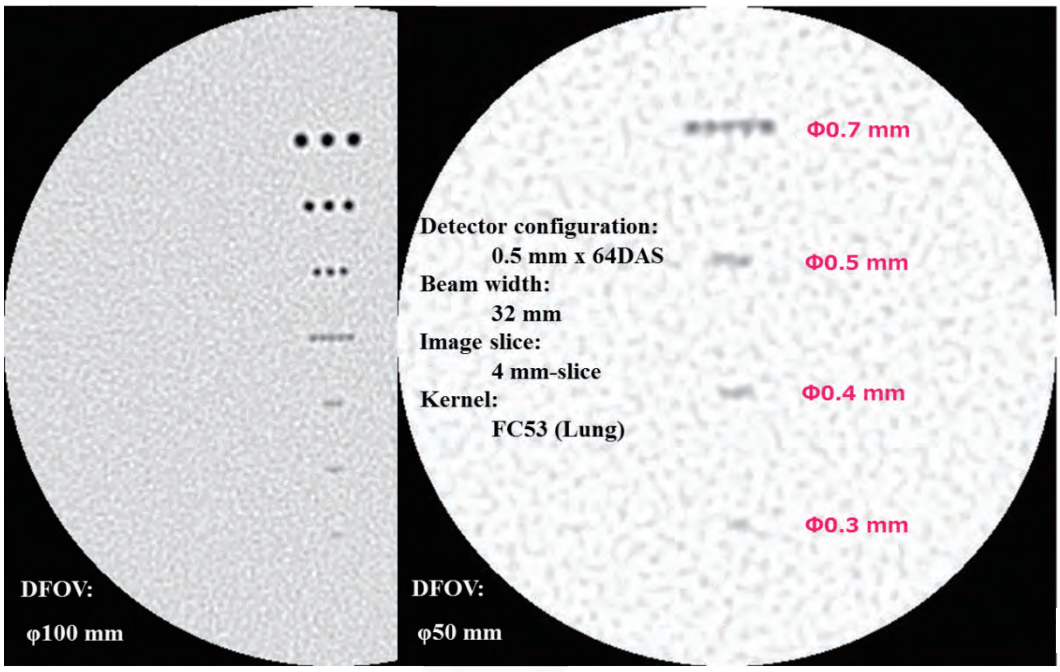
Beam width: 32 mm
Image slice: 1 mm-slice
Kernel: FC13 (Std.)

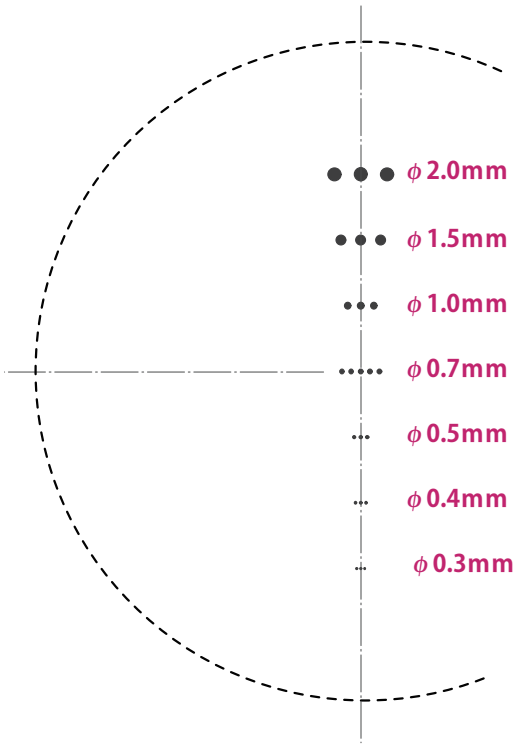




3 Example of a scan

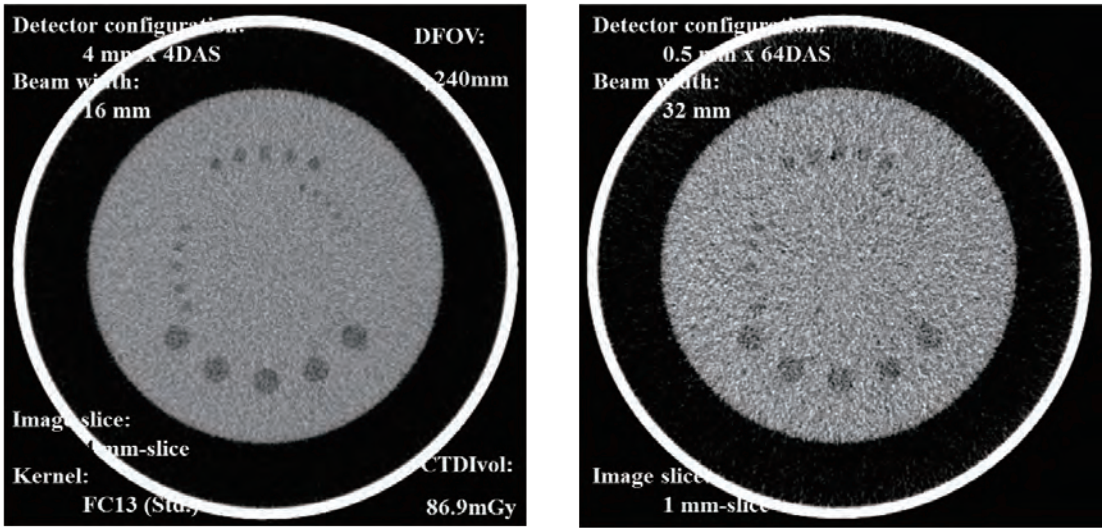
Repeated Pattern Unit (High Contrast Resolution)



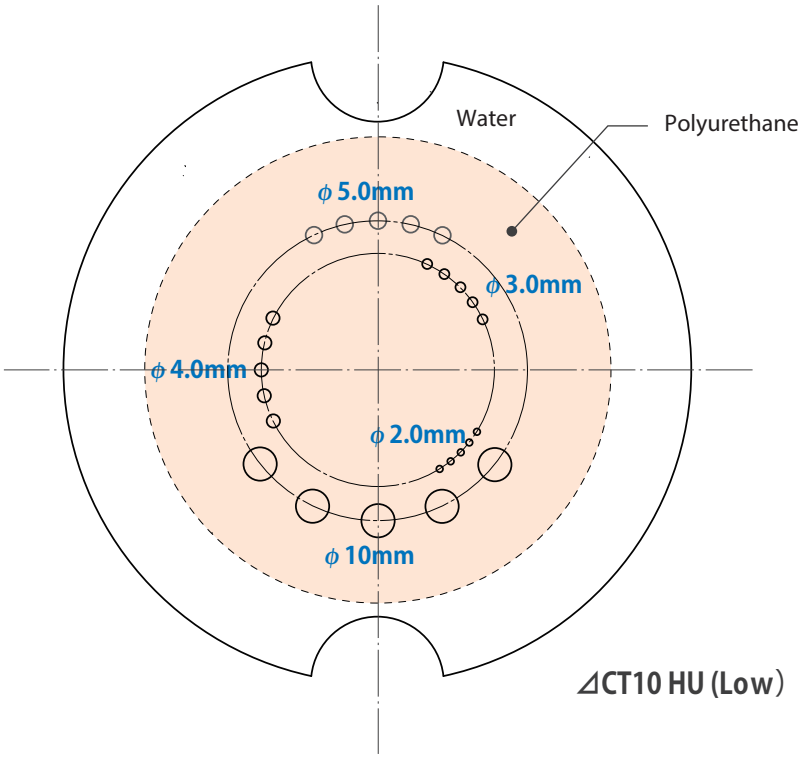


4 Example of a scan

Low Contrast Resolution Unit (Axial)



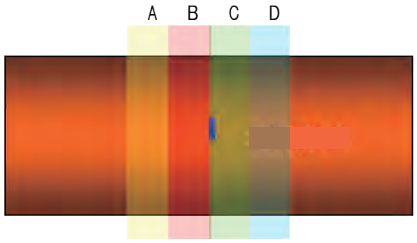
WW/WL: 80 / 45

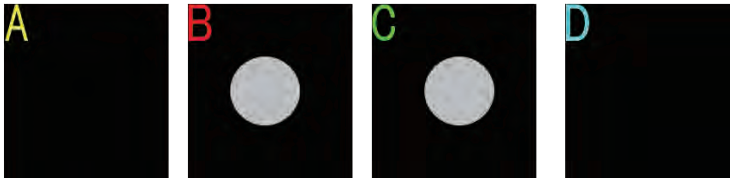


5 Example of a scan

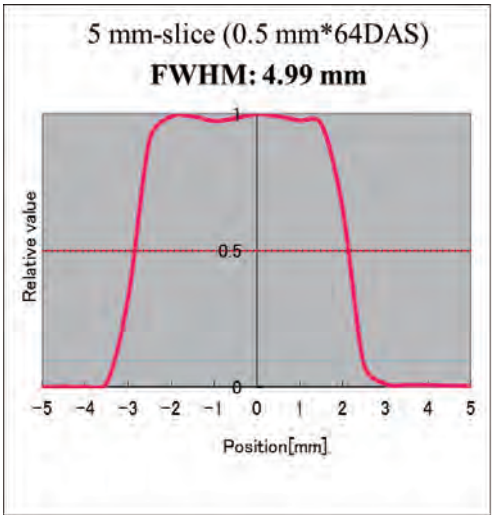
Slice Thickness Unit: Helical

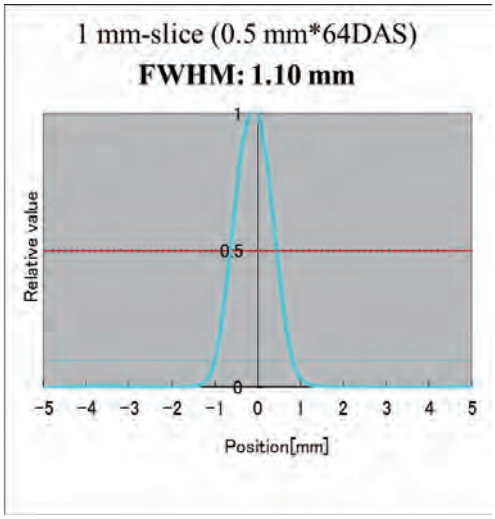
Set the phantom to the center of the gantry, using the fixture.
*Be sure to not to tilt the phantom especially when the disc phantom is used.
Axial scan the central part of the phantom and verify that the target is in the center.
If the target is not in the center, reposition the phantom.
Axial scan around the area of the micro disc with the thinnest slice and slowest speed of the delivery of the bed.
Define the position of the bed where the highest HU number of the target is obtained, as reference position (zero position).



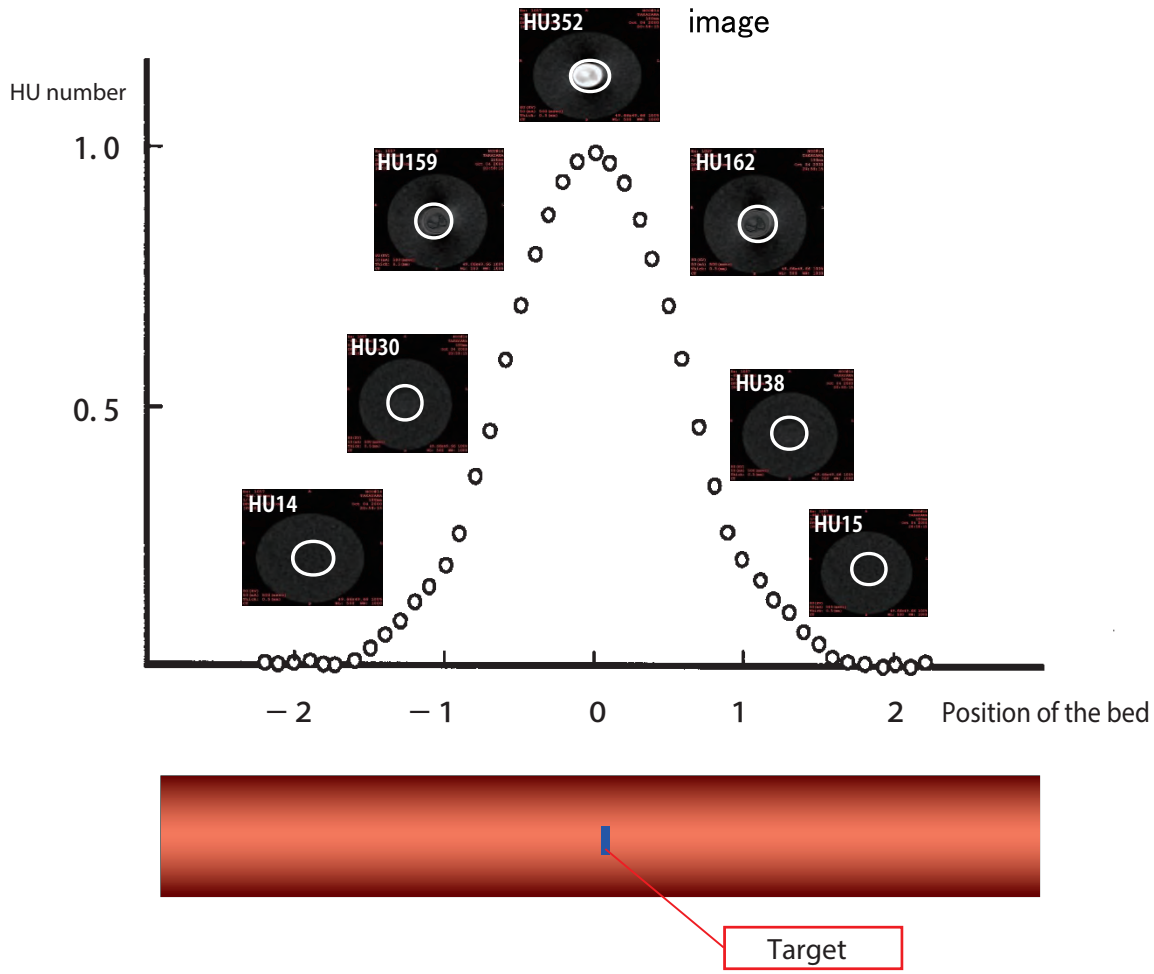


In case of the disc phantom to position the phantom so that the disc is parallel to the beam is essential. Verify that two central slices visualize the micro disc fully and that disc in the two images are of identical shape. Align the phantom till such images are acquired.
In case of the bead phantom, the tilt affect less on the outcome.





5 Example of a scan



Helical scan the phantom and measure SSPz.
Variation of HU of the target is proportional to the variation of SSP when the disc moves through the thin sections.
SSP graph can be obtained by mapping measured HU value of the target on each section according to the distance from zero position.
Make the graph as X=HU value of the disc and Y= position of the bed.
Effective slice thickness is defined as FWHM of SSP.

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