GFM

GESELLSCHAFT FÜR MEDIZINTECHNIK

**MEDIZIN TECHNIC MADE IN GERMANY**
**SINCE OVER 30 YEARS**

# Gesellschaft für Medizintechnik (GfM) mbH

is an innovative company that has been developing and producing medical products for radiotherapy for over 30 years with great commitment and passion. Special developments and individual solutions can be implemented on customer request.

**Get to know us!**

Our specialty is the production of diagnostic and therapeutic devices for urology and radiotherapy, especially for brachy therapy.

Extract from our product portfolio:

- treatment tables
- Probe holder (stepper)
- Needle guides
- Phantom Building

Phantoms are also built individually on request for a wide range of applications (physics in general, CT, magnetic resonance imaging, nuclear medicine).

Our particular strength lies in **precision engineering**, special equipment construction and the maintenance of the equipment we manufacture and that of third-party equipment. As a service in this area we also offer maintenance contracts for our customers. In addition, we are able to produce original parts of other manufacturers for our customers individually, which are no longer available, and guarantee fast and competent advice and support by telephone or email.

We are happy to accept individual customer requests, and in order to fulfil these, we work closely with our customers and develop solutions specially tailored to your needs. Conveniently located at the motorway A67, we can quickly serve customers on site or in our workshop in Groß-Gerau (between Frankfurt, Darmstadt, Mainz and Wiesbaden).

What can we do for you?
Phone +49 (0) 6152 / 7110850
kontakt@gfm-gmbh.com

# Our products:

# BRACHY T-table

figure 1

# System description

The Brachy T-table is universally suitable for patient positioning. This particularly applies for treatment in brachy therapy (figure 1). A special feature of this table is the force-free transfer of patients to parallel positioned CT couches of all common manufacturers (figure 2). Further a transfer of the patient to an MRI shuttle outside the MRI room is also possible.
Patients weighing up to 200 kg can be placed on the table.

figure 2

Both the dimensions and the configuration of the table are individually adapted to the local conditions and to the customer's wishes. The Brachy T-table is equipped with a *battery operated* electrical height adjustment, the travers path is 250 mm.

The transfer of the patient takes place in principle as follows:

The Brachy T table is first moved sideways to the target system. By adjusting the table heights and the lateral adjustment of the table top of the table system, the patient can be transferred to the target system with the special interchangeable table top belonging to the system. The patient is transferred back from the CT couch to the Brachy T-table in the same way.

figure 3

# Features of the Brachy T-table (figure 4)

- motor-driven height-adjustment
- split tabletop
- side-mounted DIN rails

## Options (figures 5-7):

- Device for lateral displacement of the interchangeable plate (for transferring a patient to e.g. a CT, NMR, simulator)
- Upholstery support
- fold-away access ladder
- swivelling drip tray
- Legrests
- Armrest
- Film cassette holder
- Exchangeable plate with applicator holder
- transversal shifting of the table top for C-arm compatibility
- lateral displacement of the table top
- Adapter for DIN rails on the interchangeable plate for transferring patients in lithotomy position to a target system
- Table top in CFK design
- Trendelenburg positioning mechanical
- Trendelenburg positioning electrical

figure 4


Adapter for DIN-Rails on transfer slide for transferring a patient in lithotomy position to a target system
Split cushin
Transfer slide
Foldaway step tread
Lateral movement of tabletop

Fig. 5


Transfer brindges
Applicator mounting
Guide rails

Fig. 6


Leg rests
DIN-rails
Arm rest
Carbon optic plates
swivelling drip tray

Fig. 7

| Technical details | |
|---|---|
| Name | Brachy T-Tisch |
| Manufacturer | Gesellschaft für Medizintechnik mbH<br>Wasserweg 19<br>64521 Groß-Gerau<br>Germany |
| Classification in appendix IX of93/42/EWG | class 1 |
| measurements [mm] | 855 x 2000 x 850 – 1100 (W, L , H) |
| weight | 230 kg |
| Permitted patient weight | 200 kg |
| functions<br>(including options) | • Force-free transfer of patients to a CT without changing the patient's position<br>• motorized height adjustment<br>• split table top for gynecological and urological applications<br>• C-arm compatibility<br>• Trendelenburg positioning<br>• fold-away ascending aid<br>• film cassette holder<br>• transfer plate with recess for applicator holder |
| movabiliy<br>(including options) | • vertical 250 mm<br>• transversal 300 mm<br>• lateral 100 mm<br>• Trendelenburg +-10° |
| material<br>(including options) | - stainless steel<br>- PVC<br>- POM<br>- Birkoplex<br>- CFK |

# Universal table for C-arm


Abb. 8

# Universal table for C-arm

The universal table for C-arms is used to support patients for urological and gynecological diagnosis and for the treatment of tumor patients, especially for treatment by interstitial brachytherapy.

The total permissible load of the universal table is 200 kg.

The system is equipped with two mains-independent electric lifting columns. The lifting columns can be moved synchronously (up/down) and asynchronously (trendelenburg) (Fig. 8-10).

There are guiding tracks on the table top in which a two-part, movable transfer plate can be positioned. The transfer plate runs on ball rollers, which allow easy, effortless movement on the table and transfer of the patient to a target system (CT/simulator/MR shuttle) without further movement of the same (Fig. 2).

The universal table for C-arms has a metal-free area of 1 meter between the DIN rails firmly attached to the head and foot ends. In this area, pictures can be taken with a C-arm (Figs. 8-10).

There are two DIN rails on each side of the table top to which leg supports or similar can be attached by means of clamps. The DIN rails can be connected with a removable DIN bridge.

Fig. 9

Fig. 10

# GfM Führungsschiene 2.0

## Systembeschreibung

The GfM guide rail 2.0 is an accessory for the GfM Brachy T-table and the GfM universal table for C-arm, which is intended for positioning patients for gynecological treatment and for the treatment of tumor patients, especially for the treatment of BRACHY patients. The GfM guide rail 2.0 is placed on the CT table and positioned by means of the index system. To transfer the patient, the brachy table is connected to the guide rails using the bridges in order to be able to transfer the transfer plate together with the patient to the CT.

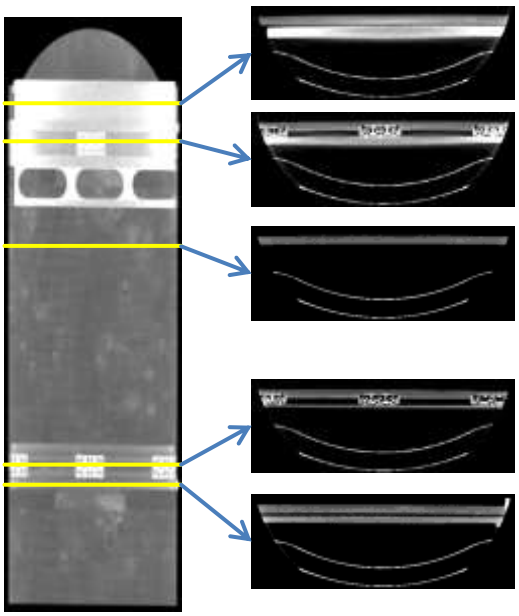
Fig. 11

Fig. 12

The GfM guide rail 2.0 is a further development of the existing guide rail 1.0. In order to improve the transmission properties, a material with low density and homogeneous structure is used for the guide rail 2.0. Furthermore, the geometry of the guide rail has been optimized to minimize artifacts.
The guide rail 2.0 is also significantly more robust. If a guide rail falls, it is virtually impossible for it to break due to the high ductility of the material.

Figures 13, 14 and 15 show the significant improvement due to the materials used in guide rail 2.0. The Hounsfield units of the guide rail could be reduced by 550, see figure 15.
If needed, additional images can be provided to the University Hospital of Frankfurt detailing the improved penetration. Likewise, a video can be sent that illustrates the ease of patient transfer.

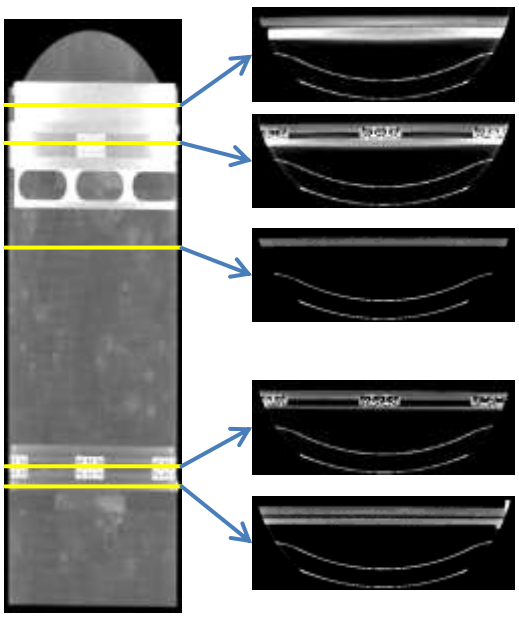
Maximum-intensity-projection (MIP)




C/W: -400/1000 HU

Fig. 13

Forward projection of the patient support (virtual radiography)




C/W: -400/1000 HU

Fig. 14

Previous guide rail under ap. therapy radiation -> clear radiation absorption visible (Fig. 15, top).

Newly designed guide rail under ap. therapy radiation -> significantly lower radiation absorption (Fig. 15, bottom).

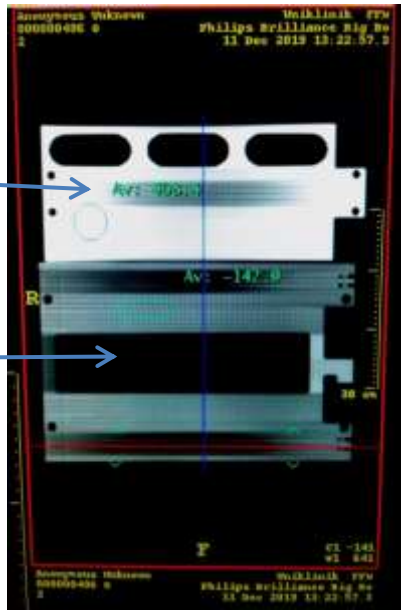



Fig. 15

# Immobiliser 2.0

## System description

The GfM Immobiliser 2.0 is used for the attachment and handling of transrectal ultrasound probe holders (steppers) during insertion and treatment as well as for the positioning of electronic transmitters from NDI .

The system consists of an arm, which is locked by means of a central clamp and can be connected to the mounting rails of a treatment table by means of a clamp.

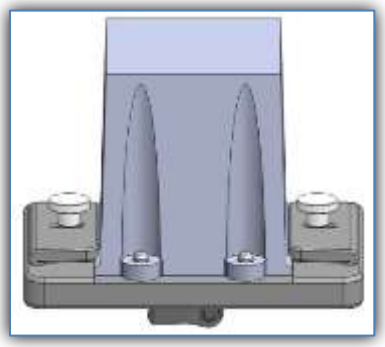
On the arm there is a fine adjustment on which the stepper is fixed. After the arm has been locked, it can be used to reposition the probe in height and inclination. As an alternative to the fine adjustment, a holder for electronic transmitters can be mounted on the arm.

In order to increase the positioning accuracy, the arm can be locked to the mounting rails of the treatment table with the GfM double holder.

## Features

fine adjustment

GfM double arm



Bracket for el. transmitter

# Movable CT plate

figure 20

# System descpription

The movable CT plate serves as a positioning aid for urological and gynaecological diagnosis and treatment of patients, especially for the treatment of urological / anorectal or gynaecological tumors.
Treatment planning, treatment (e.g. positioning of an applicator), position checking and irradiation can be performed with this system without changing the patient's position on the couch (figure 20).

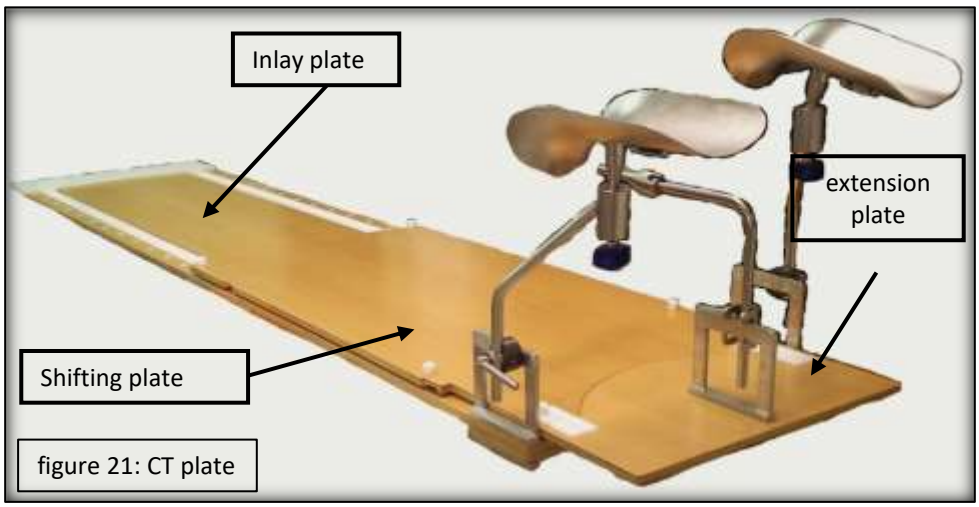


figure 21: CT plate

The system is adapted on a CT couch and consists of an inlay plate, a shifting plate and an extension plate (figure 21).
With the shifting plate (figure 21), the patient can be shifted from a starting position/treatment position (at the head end of the support plate) to a CT scan/control position (in the middle of the support plate) (figure 23, 24).
An extension plate can be installed to the shifting plate, on which an applicator can be positioned, e.g. using a Martin arm (figure 22).
The inlay plate can be adapted to all common CTs and is used to guide and position the shifting plate. The total permissible load of the CT plate is **200 kg**.


figure 22:
CT-plate


figure 23:
CT-plate, starting position


figure 24:
CT-plate, treatment position

# GfM paper role holder

## System description

The GfM paper roll holder is used to fix paper rolls on patient tables of Brilliance and Ingenuity computer tomographs from Philips.
With the holder the paper rolls are where they are needed, unnecessary work steps are avoided. It is easy to mount and allows fast and crease-free unrolling.

The GfM paper roll holder is offered in two sizes: Paper roll holder type 204 is suitable for 400mm long paper rolls, type 205 is suitable for 500mm long paper rolls.

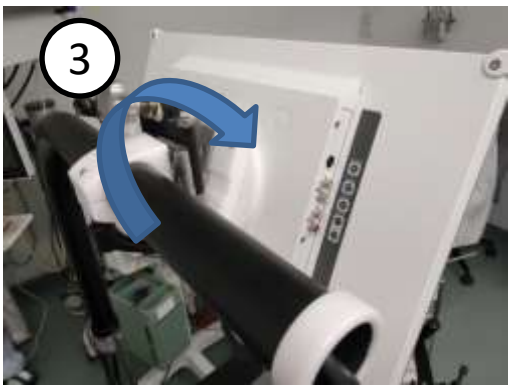
# GfM monitor arm

## System description

With the specially developed GfM monitor arm, a flat screen monitor can be optimally positioned for medical applications. The monitor is connected to the mounting rails of the treatment table by means of the arm.
The monitor can be positioned individually by the user, even above the patient. Patient, probe and imaging are thus permanently in the user's field of vision. The monitor arm can be swiveled sideways from the treatment table (1), so the patient can easily get on and off. Tilt (2) and angle (3) can also be individually adjusted.

All common monitors can be used together with the GfM monitor arm. The monitor must not exceed a weight of 7kg.





# Universal treatment table for vetenary medicine


figure 25

# System description

figure 26

figure 27

The treatment table for veterinary medicine is used to store and position large animals (e.g. horses) for irradiation at a conventional accelerator (figure 25-28).
Depending on the circumference of the large animal, additional carbon plates can be attached to the side of the table. In this way, the animal can also lie on the table with its feet stable (figure 26).
The carbon plate of the table can be moved either lengthwise or at a 90° angle over the treatment table which is firmly connected to the linear accelerator.
Small animals can thus be stored on the conventional irradiation table without any problems, while at the same time a large animal can be stored outside the irradiation room on the special treatment table. After removing the small animal from the conventional table, the large animal storage table in the accelerator room is then moved lengthwise or at right angles over the conventional table. This enables a time-saving sequence of treatment of large and small animals.
Purely surgical treatments, especially in Trendelenburg position of the large animal, are also possible.

**Technical Data:**

| | |
|---|---|
| Maximum load: | 1,200 kg |
| height adjustment: | 700 mm |
| Motor: | 380 V |
| Trendelenburg position: | 15°. |
| CFRP panel length: | 2,500 mm |
| total length: | 3.000 mm |
| CFK panel width: | 800 mm |
| Total width: | 2.000 mm |

**Accessories :**

- Leg plates
- Wedge pillow head
- Side wedge pillows
- Leg holders

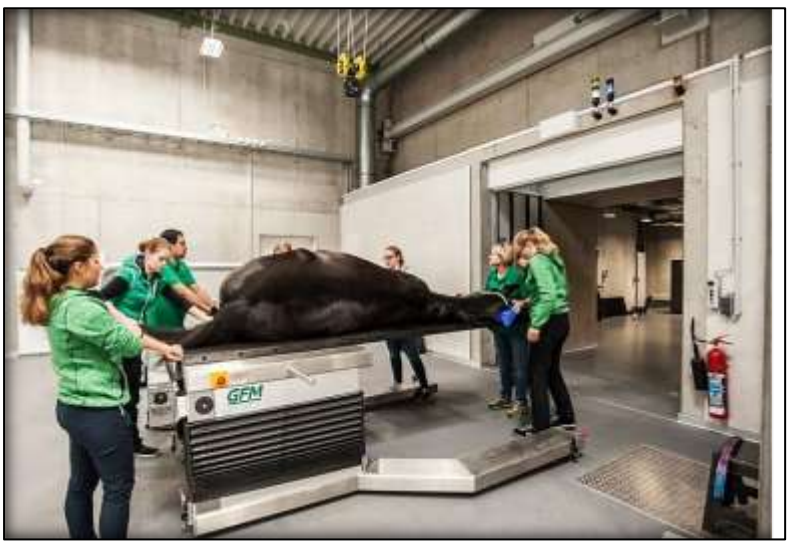


figure 28

# Microstepper MST 50

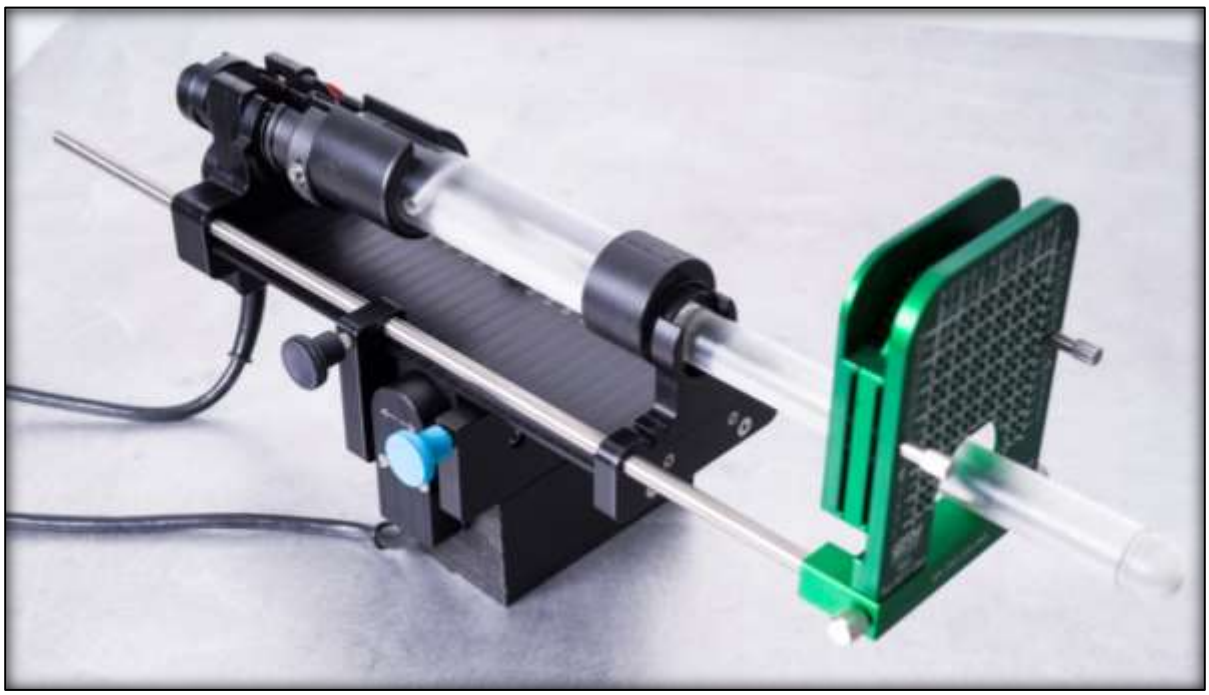


figure 29

# System description

The Microstepper MST 50 (a joint development with the company Medcom, Darmstadt) is used to accomodate ultrasound probes from various manufacturers. The probes can be used to detect tumors or inflammation in or around hollow organs (figure 29).
The probe can be moved and locked in 2 degrees of freedom, transversely by 145 mm and planar by +-90°, by means of the stepper. The position of the probe is recorded electronically, digitized and transmitted to a PC (optional) via USB cable (figure 30).
The available probe holders have an adjustment element with which the sound field of the probe can be calibrated to the 0° zero point of the stepper in a few steps.
A template holder can also be installed on the stepper. Various auxiliary devices can then be attached to the stepper for different tasks (figure 31).
The geometry of the stepper makes it possible to place needles at an angle of up to 90° to the side of the probe (figure 32).
The great advantage of this stepper is its weight. It is extremely light and weighs only 1.8 kg.


figure 30

figure 31

figure 32

# Features

GfM offers a template plate set for almost all applications and especially for biopsy the BiopSee Triple 3.0 and 4.0 Template.
For the adaptation of the stepper to the treatment table we offer a suitable screw attachment.
A special immobiliser and compatible probes are also available.

# Technical Data

| | |
|---|---|
| Measurements (B, L, H): | 153 mm x 280 mm x 130 mm |
| Weight: | 1,8 kg |
| Power consumption : | 5V, 124 mA |
| Transversale movement: | 145 mm |
| Angle of rotation: | +-90° |

## Software support:

BiopSee 3.3 Fa. Medcom

# Microstepper MST 150


figure 33

# System description

The Microstepper MST 150 is designed to accept ultrasonic probes from a wide range of manufacturers. The probes can be used to detect tumors or inflammations in or around hollow organs (figure 33).
The probe can be moved and locked in place by means of rotary knobs in 2 degrees of freedom, transversely by 140 mm and planar by 360° (figure 34).
The position of the probe is recorded by an electrical measuring device and prepared for transmission via USB cable to a PC.
The available probe holders have an adjustment element with which the sound field of the probe can be calibrated to the 0° zero point of the stepper in a few steps.
The stepper can be sterilized as a whole in an autoclave without being disassembled into its individual parts.
A template holder can also be installed on the stepper. Various auxiliary devices can then be attached to the stepper for different tasks (figure 31).
The geometry of the stepper makes it possible to place needles at an angle of up to 90° to the side of the probe.

# Features

GfM offers e.g. the universal template plate set for therapy and the BiopSee Triple 4.0 template for biopsy.
For the adaptation of the stepper to the treatment table we offer a suitable screw attachment. A special immobiliser and compatible probes are also available.

figure 34

## Technical Data

| | |
|---|---|
| Measurements (B, L, H): | 180 mm x 338 mm x 155 mm |
| Weight: | 2,7 kg |
| Power consumption : | 5V, 124 mA |
| Transversale movement: | 140 mm |
| Angle of rotation: | 360° |

## Software support:

| | |
|---|---|
| BiopSee 3.3 | Fa. Medcom |
| VariSeed 9.0.2 | Fa. Varian |
| Vitesse 4.0 | Fa. Varian |

# Overview of available probe holders for the steppers (MST 50, MST 150, MST 200) 1/2

All probe holders have an adjustment element with which the sound field of the probe can be calibrated in a few steps to the 0° zero point of the stepper

probe holder BK8848

probe holder Vermon 1536 / Telemed mit Tracker

probe holder GE ERB

probe holder Hitachi U533/ Fujifilm C41L47RP

probe holder Mindray 6LB7s

probe holder BK8658s
(compatible with modified MST150 only)

# Overview of available probe holders for the steppers (MST 50, MST 150, MST 200) 2/2

probe holder BK8818

probe holder/ tracker holder Esaote TRT33

probe holder Aloka UST 672

probe holder Toshiba PVL715RST

probe holder BK 2052
(compatible with modified MST150 only)

probe holder Chison V6-A
(compatible with modified MST150 only)

probe holder Fujifilm CL4416R1

On request further probe/ tracker holders are available or can be constructed and manufactured.

# Universal template plate system

## System description

The universal template plate system accordingly configured can be used for biopsy as well as for therapy in the prostate, anorectal and vaginal areas. The universal template plate system consists of a template holder, a template frame and a biopsy template. A template plate set with a silicone insert (single use) for fixing the needles (figure 37) is available especially for therapy.
The universal template plate system is used for the precise and guided positioning of probes/needles for interstitial brachy therapy in the above mentioned areas. The needles are guided in an orthogonal hole grid with marked positions - the Template Plate Set. The template plate set should be selected according to the area of treatment, the needle thickness or needle material. The system and its connecting parts are sterilizable in the autoclave.


figure 37

# Features

## Template holder

The *template holder* (figure 38) connects the RFT template frame to a microstepper.


figure 38

## Template frame

The *template frame* connects the template with the template holder. There are different variants of template frames (M or Y scaling, Fig. 39).

The scale is on the same level as the front template plate and is parallax-free.

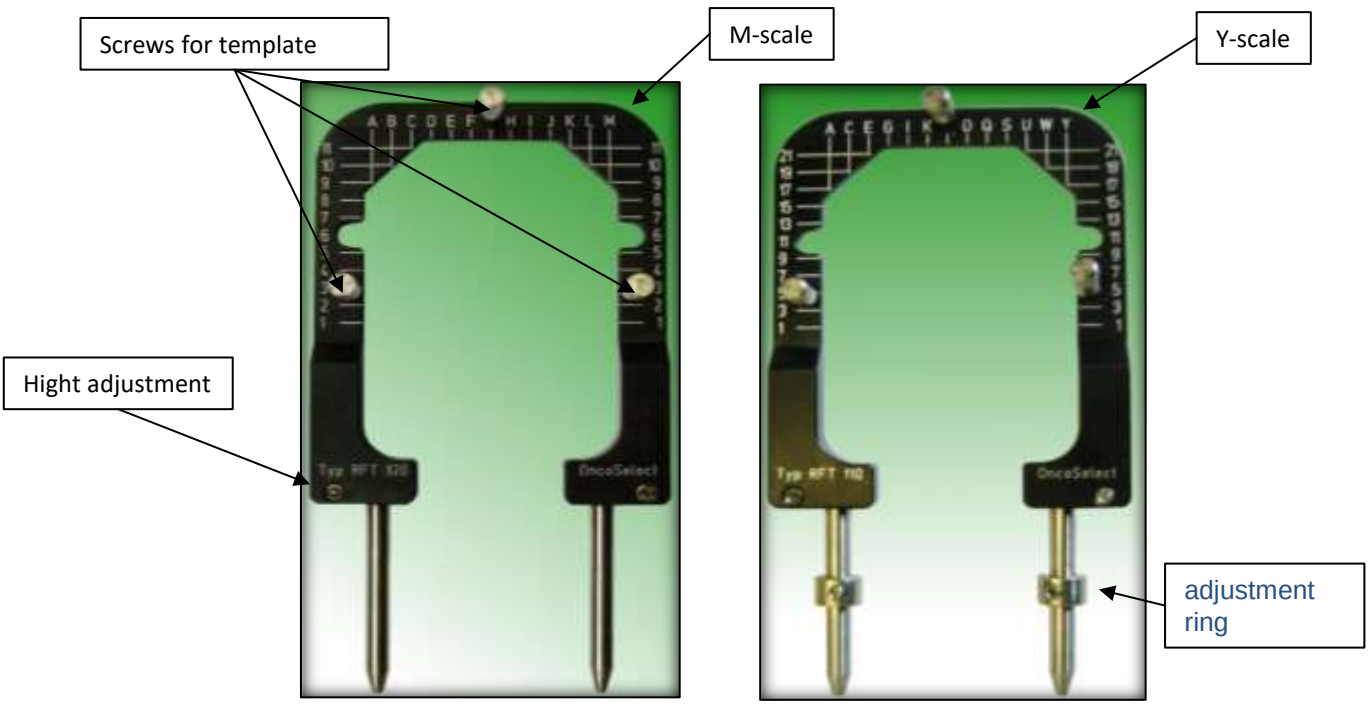



figure 39

# Template plate system for the prostata therapy

*The template plate set* TPS consists of two template plates, the front template plate, TPV, and the rear template plate, TPH (figure 40). The template plate set is connected to the template frame and is used for the precise guided positioning of probes/needles for interstitial brachy therapy of prostate, anorectal and vaginal cancers. The template plate set can also be stitched onto the patient's skin if required. The rows of holes are offset 2.5mm from each other in the X and Y directions, so that a very large number of needle positions are available, about twice as many as with other templates.

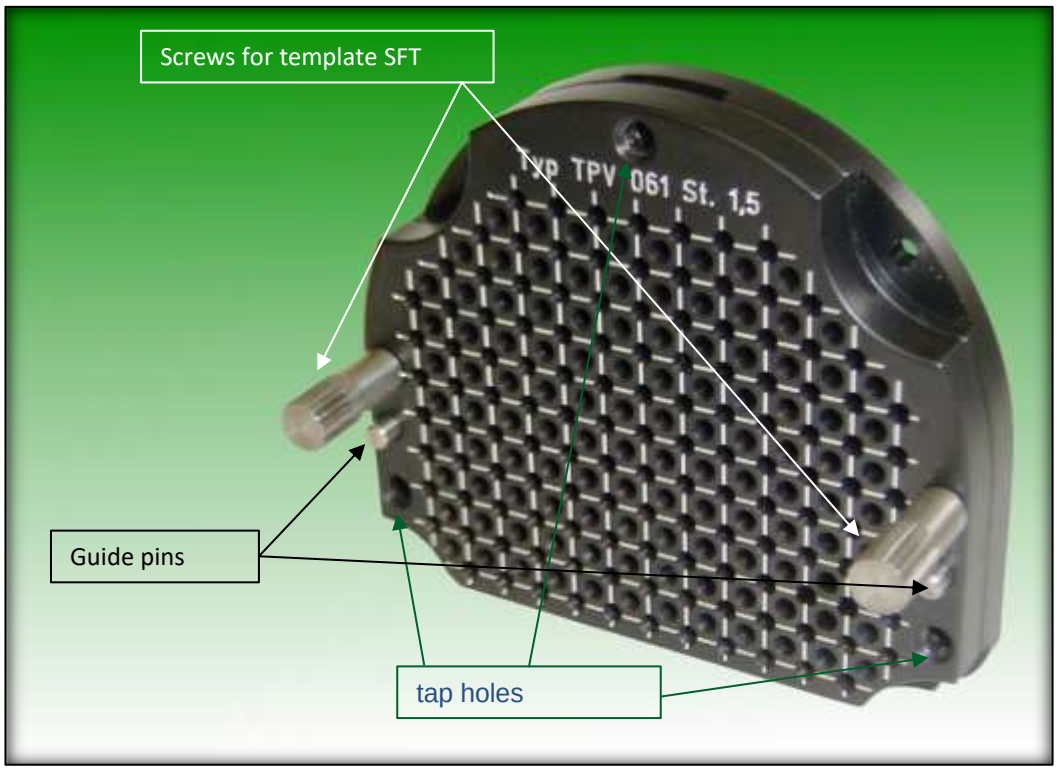



figure 40

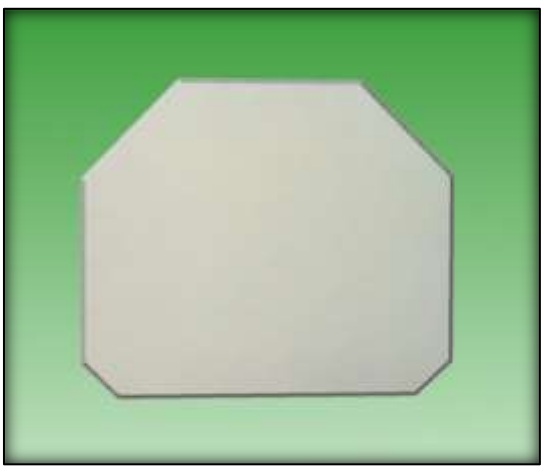


figure 41

The needles are guided in an orthogonal grid of holes. The hole diameter can be adapted to the diameter of the needles used.
The needles are held in place with an insert for fixation, EFT (figure 41).

GfM offers template plate sets for steel, titanium and plastic needles. Template plate sets for plastic and titanium needles are MR-compatible.

# Universal template for biopsy BTP

Like the template plate set TPS, the system is used for precisely guided positioning of needles for biopsy of prostate, anorectal and vaginal carcinomas. The needles are guided through the template in an orthogonal hole grid with marked positions.

In contrast to the Template Plate Set TPS, the Template for Biopsy BTP covers a larger area for special applications for biopsy. The rows of holes are offset 2.5mm from each other in the X and Y directions, so that a very large number of needle positions are available, about twice as many as with other templates.

The hole diameter is adapted to the diameter of the needles used.

figure 42

The template is fixed to the template frame with two screws. This creates a local reference to the stepper (figure 42). The marking system of the perforated grid is adapted to the marking system of the planning system used.

# BiopSee Triple

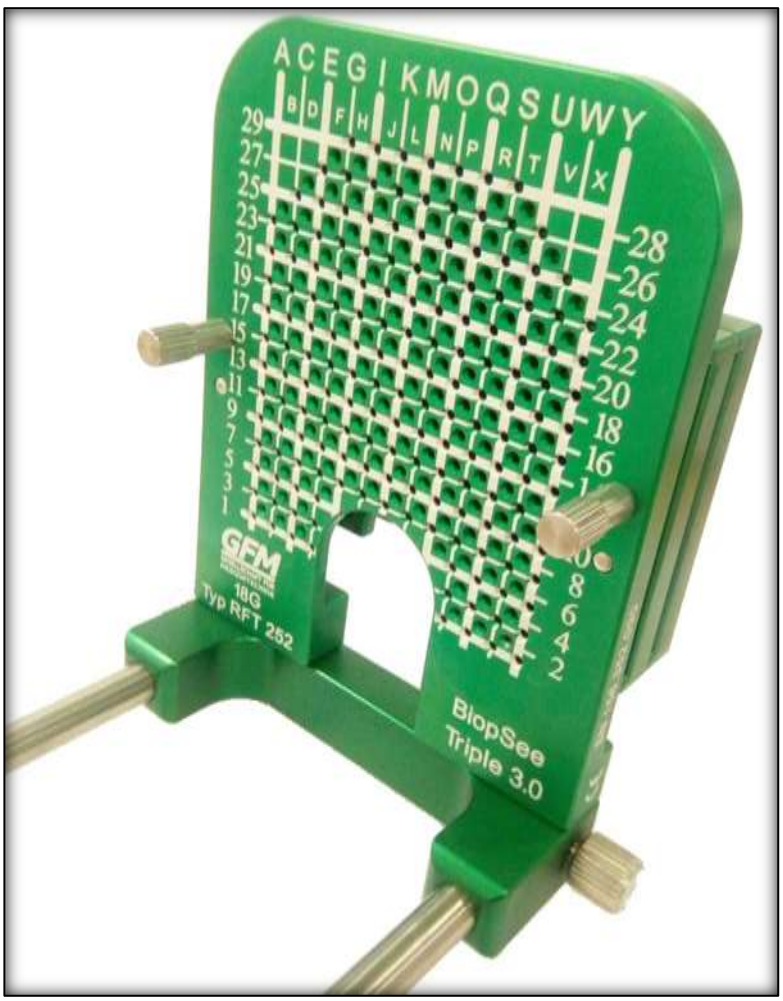



figure 43

# System description

The BiopSee Triple Template was developed especially for biopsy. A perforated grid with a grid spacing of only 2.5 mm enables targeted, pinpoint sample collection (figure 43)., more than double compared with other templates.

The grid extends laterally down to the center of the probe to reach the edges of large prostates (figure 44).

The BiopSee Triple and its connecting parts can be sterilized.

figure 44

Three guide plates connected in series ensure that the needle is aligned orthogonally to the rear template plate when it exits the rear template plate. This means that the needle is only navigated by aligning the needle bevel and is independent of the position of the guide hand (figure 45).

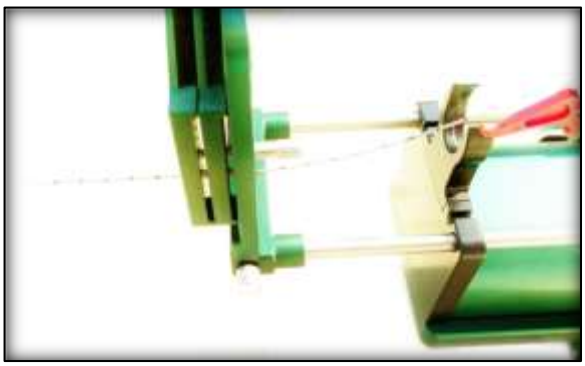


figure 45

If orthogonal needle guidance is not desired, e.g. if the pubic bone covers the planned take out region, the two rear plates can be removed without any problems. If only the front plate guides the needle, a freer needle guidance is possible (figure 46).

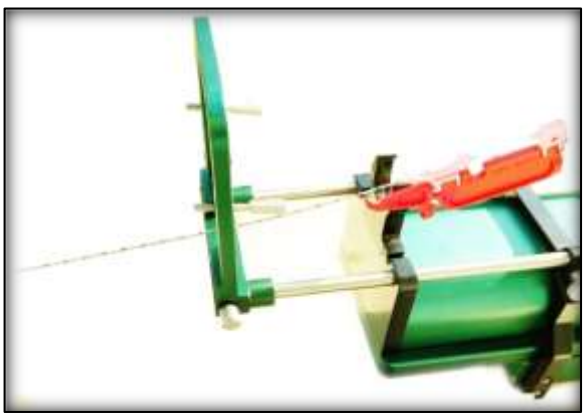


figure 46

## BiopSee Triple 3.0

The BiopSee Triple 3.0 (figure 47-49) offers the possibility to collect samples with an 18G needle at a minimum distance of 15 mm from the probe center.

All positions are triple guided (figure 47-49).

figure 47

figure 48

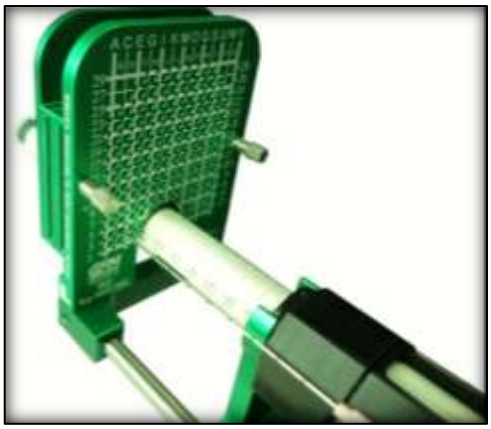


figure 49

## BiopSee Triple 4.0

The BiopSee Triple 4.0 rear plate has a larger recess to allow the template to be turned and positioned over the anterior probe support. This allows deeper penetration of the probe (figures 50-51).

Compared to the BiopSee Triple 3.0, the BiopSee Triple 4.0 plates guide the needle only twice at thirteen positions. The BiopSee Triple 4.0 is designed for 18G needles.

figure 50

figure 51

## BiopSee Triple 5.0

The BiopSee Triple 5.0 is designed to guide and position 16G needles.

It has the same contour as the BiopSee Triple 4.0 with a larger back plate cutout.

The template can be turned over like the BiopSee Triple 4.0 to allow deeper penetration of the probe (figure 52).

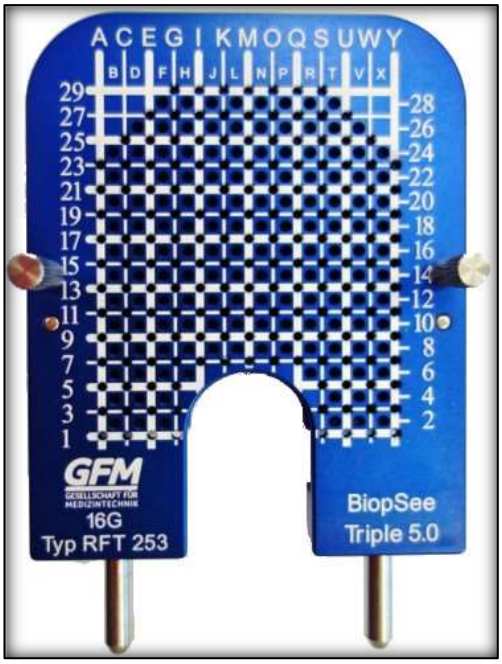



figure 52

## BiopSee Triple 6.0

The BiopSee Triple 6.0 is designed to guide and position 14G needles.

It has the same contour as the BiopSee Triple 4.0 with a larger back plate cut out.

The template can also be turned over to allow deeper penetration of the probe (figure 53).

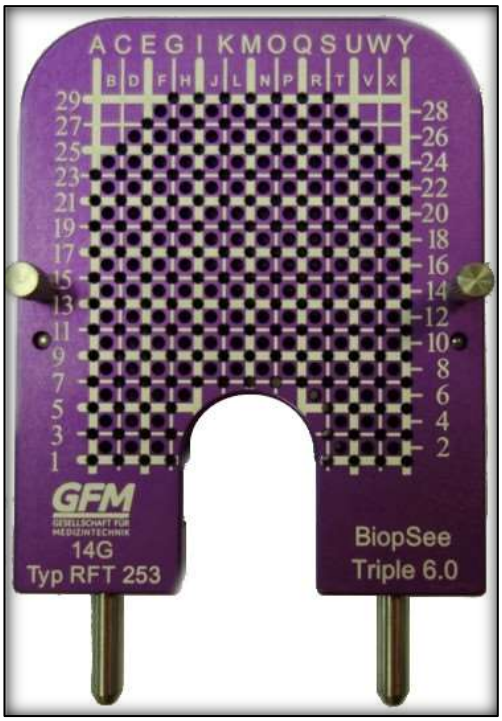



figure 53

# Universal Phantom
# for constancy tests in radiotherapy

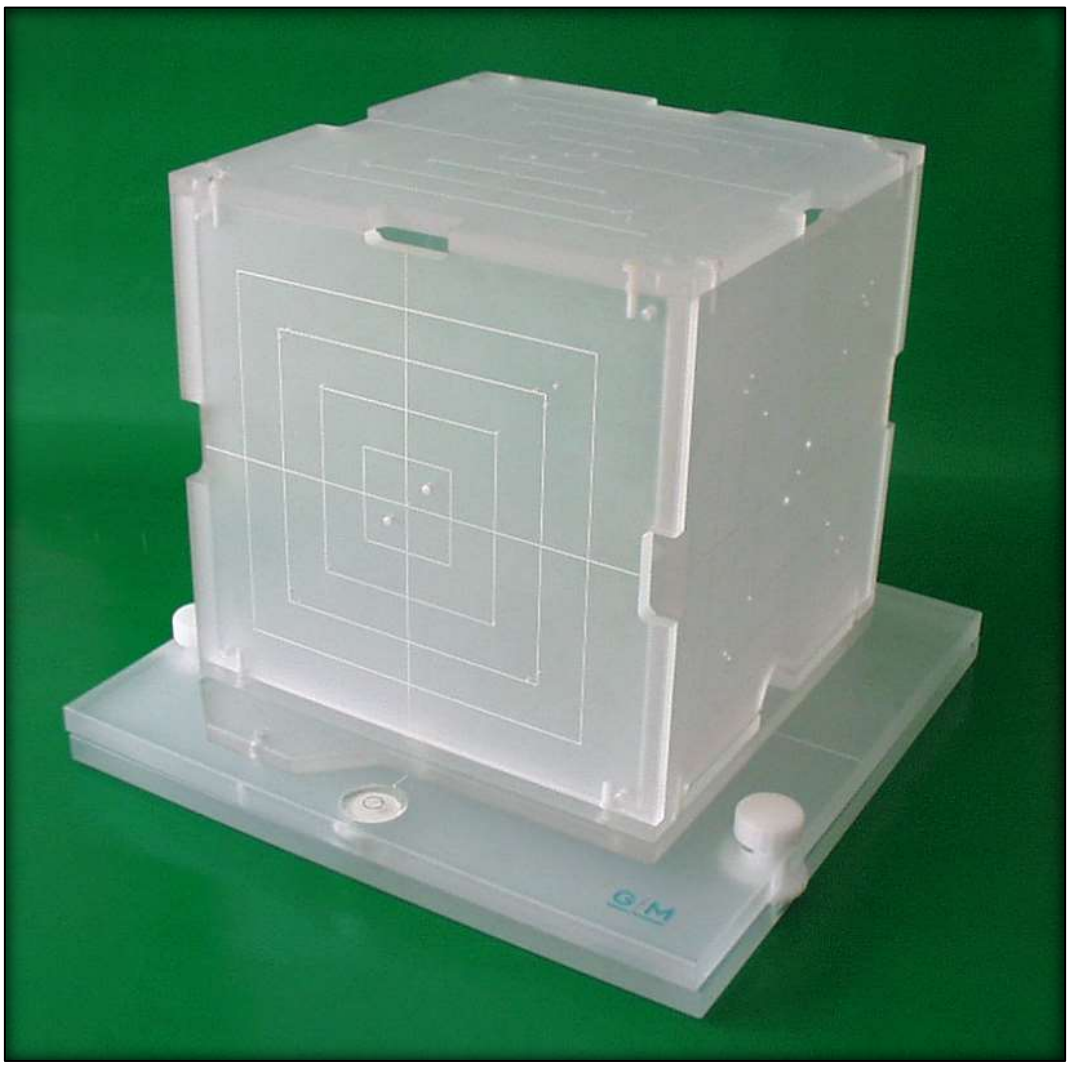


figure 54

# System description

The Universal Phantom was developed for the practical implementation of standardized constancy tests of apparatus quality characteristics of gamma irradiation facilities and electron accelerators (figure 54).
The Phantom is also a flexible instrument for service settings and constancy testing of therapy simulators, including recording, fluoroscopy and slice image applications. The modular design of the entire system enables a fast and flexible testing process.

## SYSTEM COMPONENTS

### Basic plate: *(figure 55)*

- easy and safe placement on the patient table due to non-slip rubber feet
- easily adjustable, both in the radiation field and - with the help of a built-in spirit level - in the horizontal plane

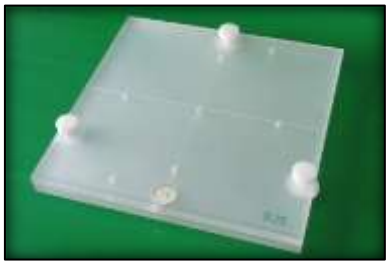


figure 55

### Cube phantom: *(figure 56)*

*used to check the following characteristics:*

- Display of irradiation fields (light and radiation field)
- Display of the central beam
- Congruence of opposing fields
- Field adjustment
- Distance display
- Iso-center display
- Height adjustment of the table top

figure 56

### Disc attachment:

- Attachment for checking the isocenter sphere (starlight).

*(figure 57, 58)*

figure 57

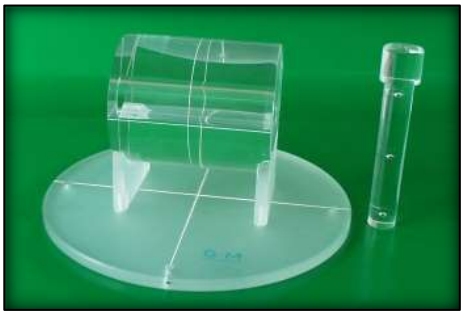


figure 58

## Cylinder extension: *(figure 59)*

- Attachment for checking the isocenter under fluoroscopy on therapy simulators over the entire 360° angle of gantry rotation.

figure 59

## Zylinder-Water-Matrix-Phantom:
*(figure 60)*

Phantom for the constancy check of the sectional image system of the geometric parameters in an irradiation planning based on CT data:

- A built-in, water-filled cylinder with four additionally installed tubes. These can be filled with any liquid of different radiation absorption.
- A matrix phantom for checking the reconstruction accuracy of the sectional image within the entire reconstruction circle.

The cylinder water phantom and the matrix phantom can be used independently of each other.

figure 60

# Phantom for constancy testing in brachy therapy

**after Prof. Dr. Baltas**


figure 61

# System description

The Phantom for constancy testing in brachy therapy (figure 61) was specially developed for quality assurance of afterloading irradiators (figure 62).
The measurement phantom is modular in design. With the basic system for simple autoradiography and the two options "Advanced Autoradiography" and "Dosimetry", it allows each user to put together a system configuration for his specific application.
A later extension of the selected system is possible at any time.

## Usage: *(figure 62)*

- Checking the beam position as well as the accuracy and reproducibility of source positioning according to the autoradiographic method for different applicator types
- Measurement of the dose rate
- constancy tests of the calibration of in vivo dosimetry systems
- constancy tests of the calibration of miniature radiators (HDR sources and LDR sources)

figure 62

## SYSTEM COMPONENTS *(figures 63 - 65)*

figure 63

Accessories
for the
Ring Applicator Set*

figure 64

Top plate for
dosimetric
general
measurements

figure 65

Accessories for
measuring chamber**
and applicator*
and for the AM6
in vivo dosimetry system**

* MicroSelectron-HDR&MicroSelectron PDR, Nucletron International B.V., Holland
** PTW-Freiburg, Germany

# VeriSuite Eye Treatment Phantom

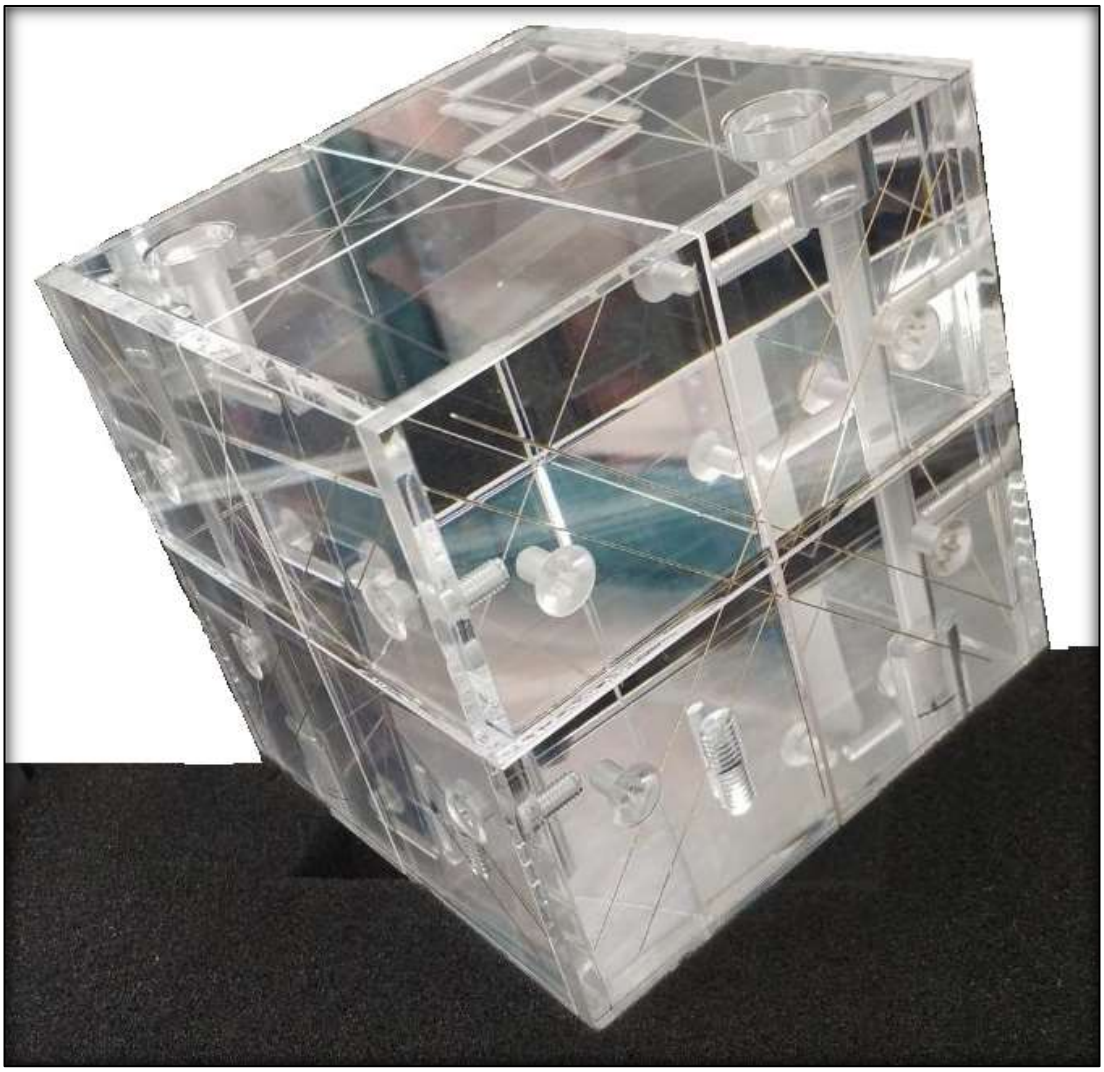


figure 66

# System description

The VeriSuite Eye Treatment Phantom is a solid state phantom of very high precision used to calibrate X-ray equipment. It can be used to detect both left-right and up-down shifting as well as a deviation in the axis of rotation.

It consists of marker rods and a marker ball (figure 67).

figure 67

# 3D Matrix Phantom

**(after Prof. Dr. Baltas)**

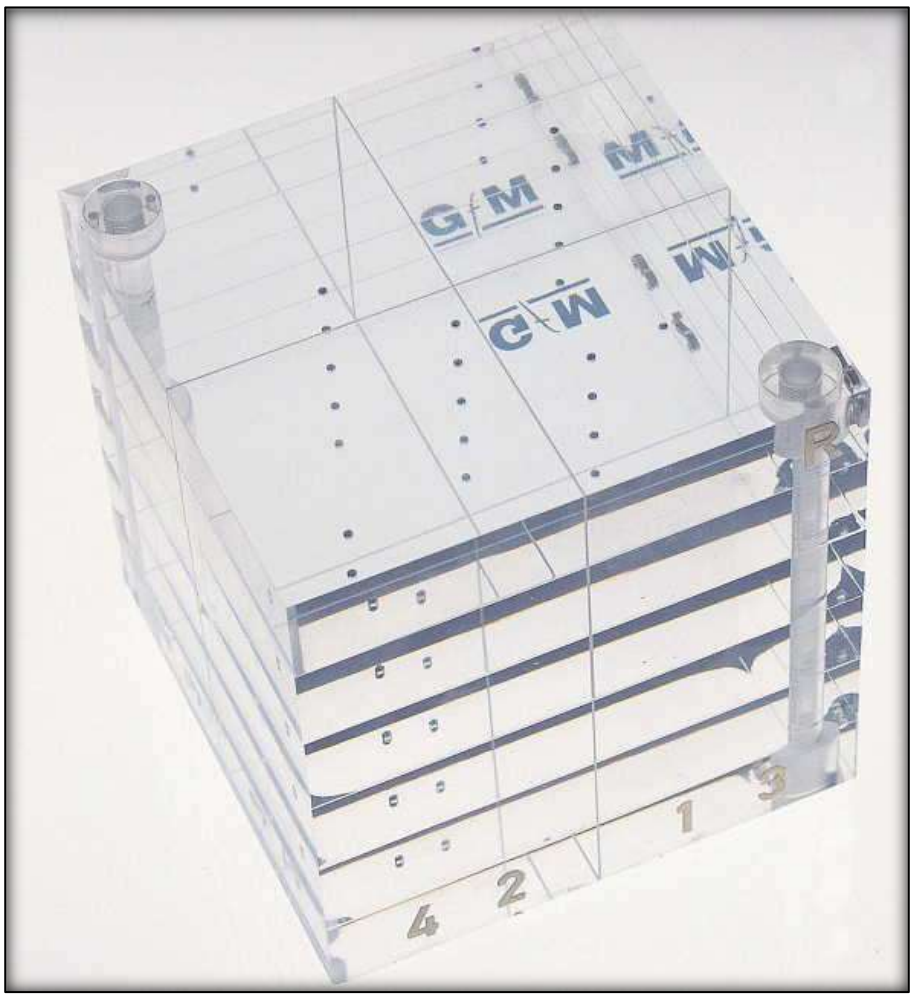



figure 68

# System description

The *3D Matrix Phantom* (figure 69) is a solid state phantom of very high precision. It can be used to check the various reconstruction techniques used in brachy therapy and external radiation therapy, e.g:

- Checking the orthogonality of X-rays
- the determination of the semi-orthogonality of X-rays
- Determination of the accuracy of the stereo-shift method and the isocentric technique using a C-arm X-ray machine or a radiation therapy simulator


figure 69

The *3D Matrix Phantom* can also be used to test reconstruction algorithms and devices based on CT-based radiation planning systems in brachy therapy. The 3D Phantom is used both during commissioning of the system and in the constancy testing procedure.

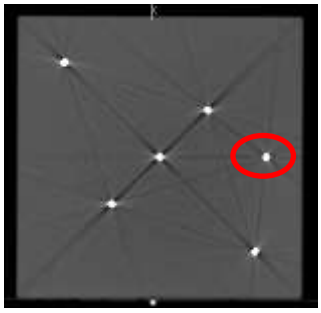


figure 70

The phantom is a cube with 12 cm side length. Every 2 cm there are 5 marker spheres made of radiopaque material. An additional marker (figure 70: marker marked in red, ap pa irradiation; figure 71: oblique irradiation) is embedded in the centre of the cube to make it easier to identify the horizontal axis of the phantom and the marker matrix. In total, 25 spherical markers form a matrix.

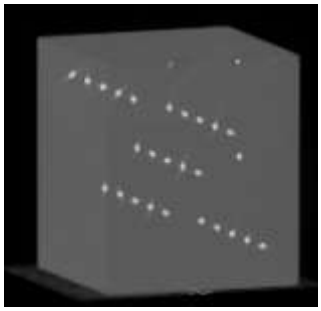


figure 71

A line number made of radiopaque material is located on the front of the cube. This facilitates the identification of the marker lines during the reconstruction process.

# TLD Storage bowl

## System description

With the TLD storage bowl, 120 samples (max. Ø 6.5 mm, max. height 1 mm) for thermo-luminescence dosimetry can be stored in a matrix of 1-10 and A-M (figure.) 72-73.

figure 72

figure
73

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