MUTARS®

implantcast

Distal Femur

surgical technique

MUTARS®

Distal Femur
surgical technique

MUTARS® was developed in co-operation with
Prof. Dr. W. Winkelmann (former director)
and Prof. Dr. G. Gosheger (director), Clinic and
Polyclinic for General Orthopedics and Tumororthopedics
at the University Hospital of Münster, Germany.
MUTARS® has been in successful clinical use since 1992.

Table of Contents

Nota Bene: The described surgical technique is the suggested treatment for the uncomplicated procedure. In the final analysis the preferred treatment is that which addresses the needs of the individual patient.

The *Silver* coating

Early and late infections represent the most severe complications of tumour arthroplastic treatments. Although local and systemic antibiotic treatments are considered, the scientific literature reports of infection rates from 5 to 35 percent. Reasons for these high rates are, for example, the long surgery time, the large incisions and the immunosupression due to chemo therapy and radio therapy as well as the increasing resistance of the bacteria against antibiotic drugs.
The anti-infective effect of silver ions has been known for centuries i.e. the disinfection of potable water is based on this principle. This special property of silver is used for the silver coated components of MUTARS® to build an intelligent protection against bacteria. Until now only non-articulating surfaces and surfaces without direct bony contact are coated with silver.
In the catalogue information of this brochure you can find the supplement *S indicating which MUTARS® components are available in a silver coated version. The eight digit REF number receives an addition after the last digit (e.g. 5220-0020S).

It is not permitted to flush the wound with antiseptics that contain Iodine or heavy metals (such as Betaisodona®)

Iodine and Silver form insoluble salt complexes not only with the silver ions that are released post-operatively but also with the silver layer of the implant that will be covered with an insoluble silver-iodine (AgI) film. This will destroy the anti-adhesive protective layer irreversibly. Iodine or heavy metal based antiseptics may not be used at any time. Alternatively solutions containing H_2O_2 – (like Lavasept®, Prontosan® or similar) can be used.
The silver coating can be destroyed in its function by two factors: large amounts of albumin from seroma or hematoma can bind larger amounts of silver (1 mol Albumin inactivates 3 moles Silver ions). This should be minimized by using an attachment tube. In the instance that an infection is known pre-operatively, antibiotics like Vancomycin can be mixed with the bone cement. The intramedullary stems are not silver coated and cemented components are preferred in case of a septic revision.

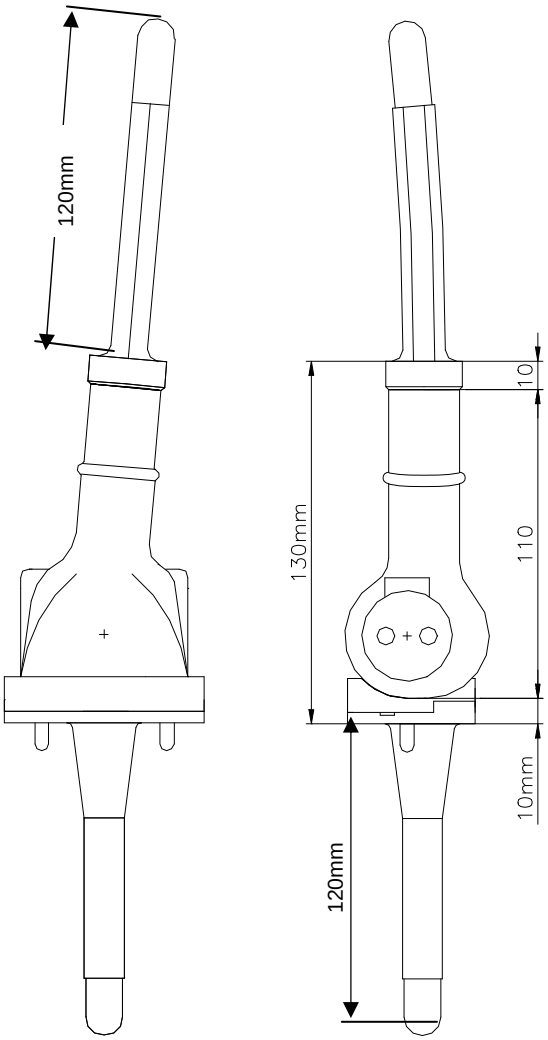
The TiN coating for allergy prophylaxis

As the metallic components of total knee replacements, the articulating metallic parts of the MUTARS® system are made of casted CoCrMo alloy. In the late 70's and 80's of the last century, some of the Cobalt Chromium implants had a small Nickel content to add strength to the implant. Nickel is the primary cause for metal sensitivity, although some patients have shown to be hypersensitive to other metals such as Cobalt and Chromium. The use of titanium components can't solve this problem, because the wear of the articulating polyethylene inlays will increase and so the survival time of the prosthesis is reduced. Since the end of the 1990's TiN (Titanium Nitride coating) has been successfully applied to protect the body against metal ions that could cause allergic reactions.
The metal ion release of TiN coated or TiNbN coated implants is reduced down to 10%.[1]
In order to prevent allergic reactions, certain parts of the prosthesis may be supplied with a ceramic coating (TiN). Since almost all components of the tumor system consist of titanium alloy, this only concerns those components, which are made of a cast CoCr alloy (CoCrMo). The REF-numbers of the TiN coated implants have the suffix N after the last digit (e.g. 5720-0005N).

***S**: For anti-infective treatment, silver coated implants are available.
***N**: For anti-allergic treatment, TiN coated implants are available.
***SN**: Implants are coated with silver and TiN.

[1] Metal Ion Release from Non-Coated and Ceramic Coated Femoral Knee Components: Boil test 240h in NaCl-solution nach FMZ PhysWerk VA 97350, University Würzburg (D) (On File)

System Overview



femoral stem
∅ 12 – 18 mm cementless
∅ 11 – 17 mm cemented

distal femur

PEEK®-OPTIMA lock

PE-inlay

tibial joint
∅ 12 – 18 mm cementless
∅ 11 – 17 mm cemented

Remark:
Modular tibial plateaus with additional stem lengths and tibial spacers are available on request.

MUTARS® Distal Femur

distal femur replacement
assembling options
(length in mm)

reconstruction	components			
	distal femur	connecting part 100 mm	extension piece	bar screw
100 mm	**90***			**25**
120 mm	110	-	-	45
140 mm	90*		40	65
160 mm	110	-	40	85
180 mm	110	-	60	105
200 mm	110	-	80	125
220 mm	110	100	-	45 + 25
240 mm	110	-	80 + 40	165
260 mm	110	100	40	65 + 45
280 mm	110	100	60	85 + 45
300 mm	110	100	80	105 + 45
320 mm	110	100	60 + 40	125 + 45

*A distal femur 90 mm is available on special request
(reconstruction length 100 mm)

Note: Please notice that the amount of implants and instruments send with an individual shipment may differ from the information in the catalogue information of this brochure. Please make sure, during the preoperatively planning, that all necessary implants and instruments are available for the surgery.

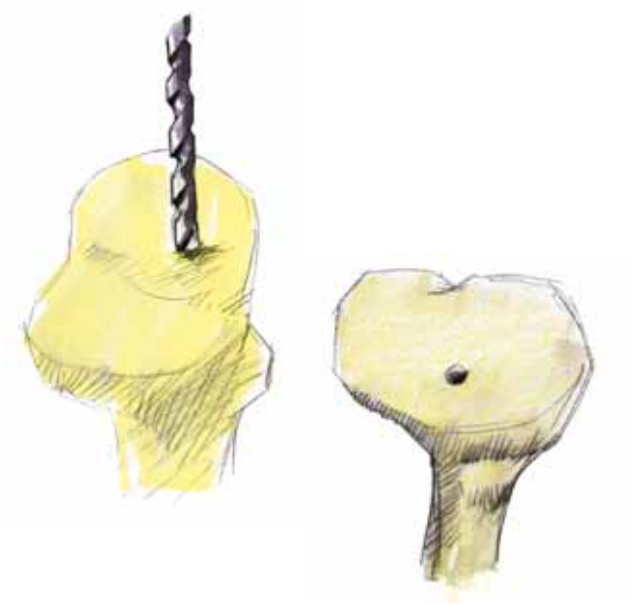


figure 1a and 1b

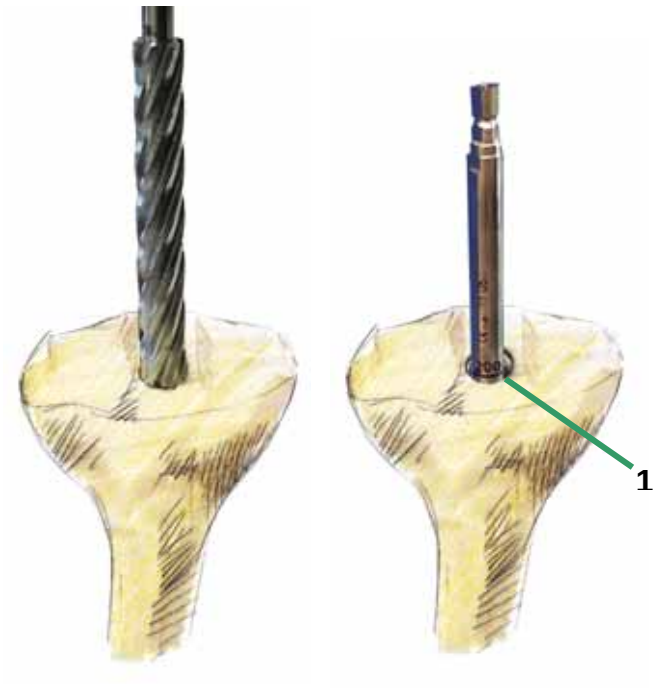


figure 2a and 2b

Tumor resection

Resect the tumor and measure the length of the explant.

The minimum bone resection should be 120mm (or 100 mm if the special distal femur 90 mm is used, available on demand). Remove the menisci.

Tibial bone preparation

Open the tibial medullary cavity with the universal drill ∅ 6 mm (fig. 1a and 1b). The drilling should be orientated to open the center of the medullary cavity (eminentia intercondylaris: ventral 1/3, dorsal 2/3).

Enlarge the opening of the medullary cavity with rigid drills (fig. 2a and 2b).

To choose the correct reamer size for the use of a **cementless tibial joint** consider table 1, for the use of a **cemented tibial joint** consider table 2.

Table 1: cementless implantation
Tibial joint 12 mm ➔ drill 11 mm
Tibial joint 14 mm ➔ drill 13 mm
Tibial joint 16 mm ➔ drill 15 mm
Tibial joint 18 mm ➔ drill 17 mm

Table 2: cemented implantation
Tibial joint 11 mm ➔ drill 13 mm
Tibial joint 13 mm ➔ drill 15 mm
Tibial joint 15 mm ➔ drill 17 mm
Tibial jonit 17 mm ➔ drill 17 mm

To ascertain adequate depth is met, the drills have depth marks (120 mm for 120 mm stems, 160 mm for 160 mm stems and 200 mm for 200 mm stems) corresponding with the tibial stem length (fig. 2a and 2b). The last drill used is left in the tibial canal.

The tibia resection block$_1$ 0° is attached to the intramedullary tibial alignment guide$_2$ and the cutting block is placed over the tibial drill that was left in the intramedullary canal.

Adjust the rotational alignment and lock the alignment guide by inpacting the two spikes into the tibial surface. Mount the tibial resection stylus$_3$ onto the resection block.

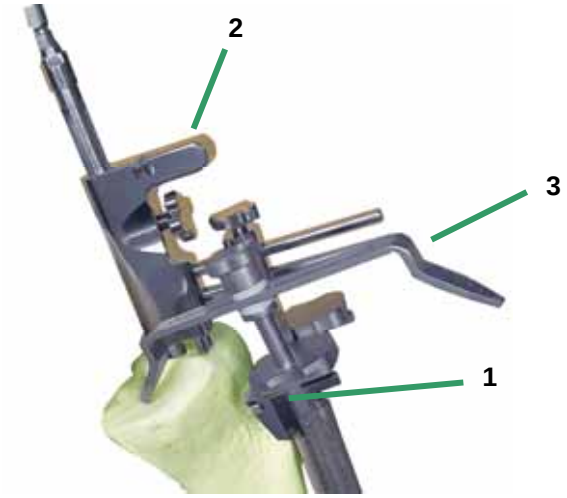


figure 3a

For the primary procedure make sure the 10 mm tip is resting on the highest point of the higher plateau, mainly the lateral side of the joint. Using this technique the 2 mm tip$_4$ from the bone (fig. 3b).

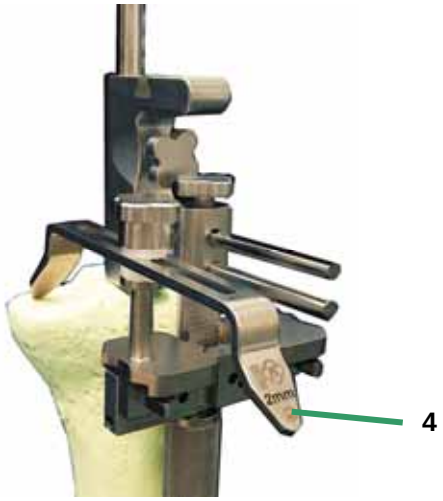
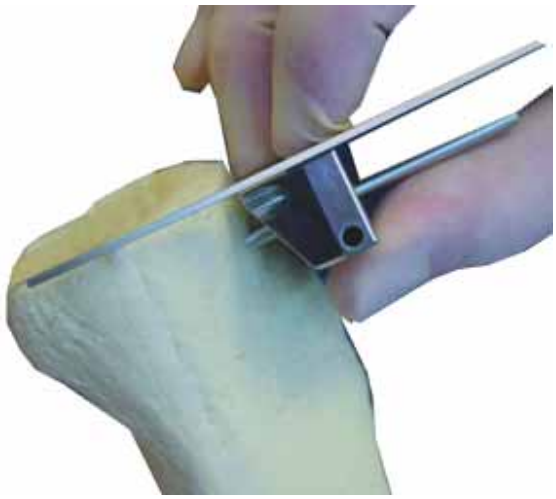


figure 3b

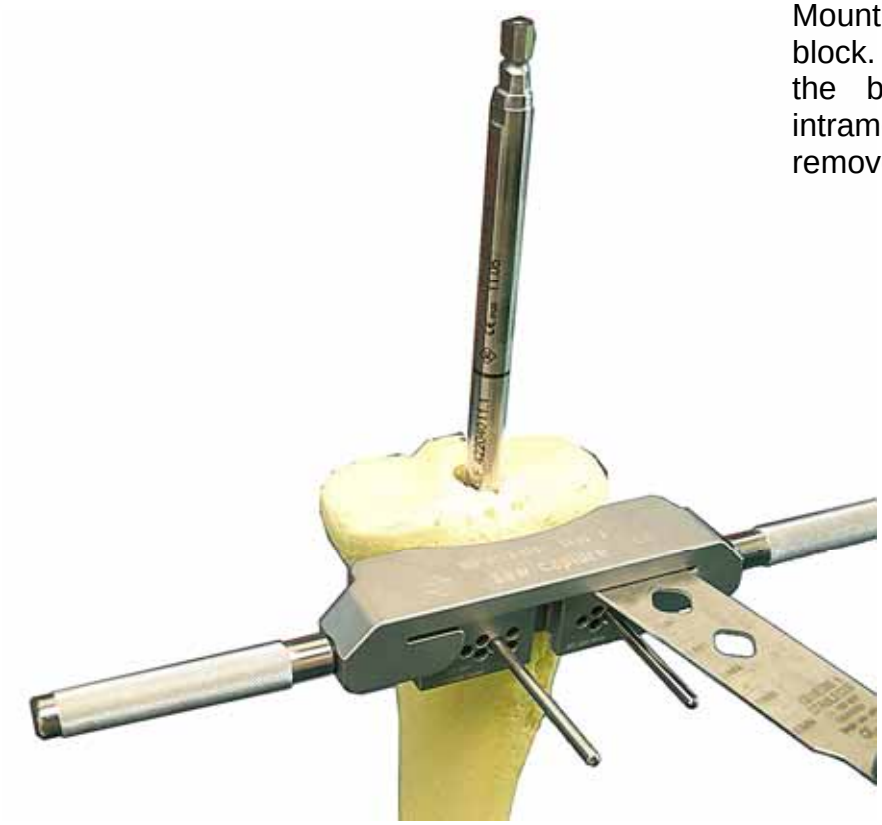
Remove the tibial resection stylus. Fix the resection block to the tibial bone by by inserting two of the fixations pins through marked holes$_5$ of the block. Use the pin inserter to impact the pins or predill with the 3,2 mm drills (fig. 4). Remove the intramedullary alignment guide.

figure 4



Double check the resection angle and height by using the resection check (fig. 5).

figure 5



Mount the saw capture onto the resection block. Use the ACS® saw blade to resect the bone. Prevent damaging of the intramedullary drill. If necessary please remove the drill before resection (fig. 6).

figure 6

Please check the quality of the cut. Make sure that the cut is totally flat and remove the resection block.

Slide the reamer guide and the centering guide over the intramedullary drill (fig. 7).

Use two pins to fix the reamer guide to the bone (fig. 7). Afterwards please remove the centering guide and the drill.

figure 7

Combine the tibial reamer and the T-handle and ream carefully until the reamer is stopped by the chimney of the reamer (fig. 8a and 8b). It is strongly recommended not to use power tools for the reaming.

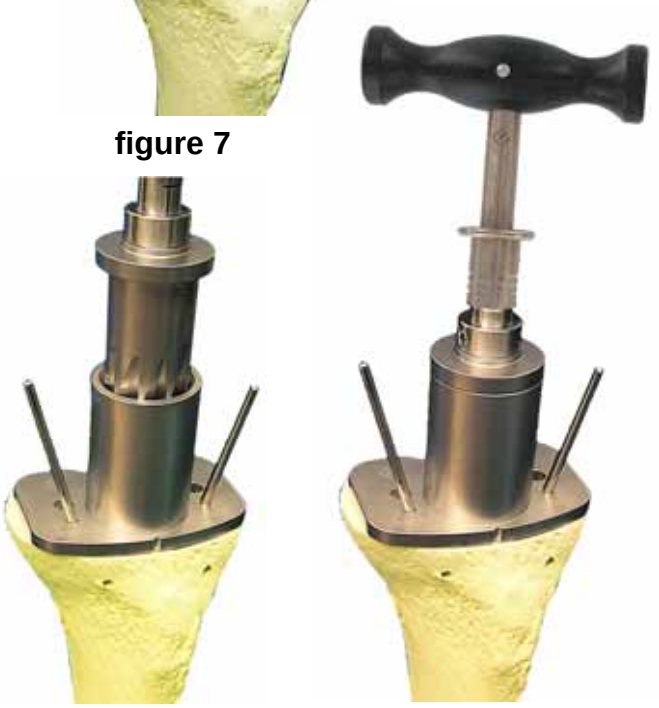


figure 8a and 8b

Please drill the peg holes with the patella drill to complete the tibial bone preparation (fig. 9).

figure 9

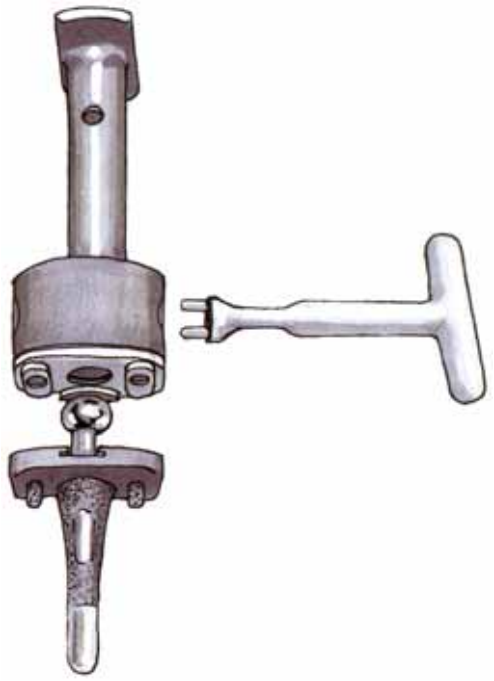


figure 10

figure 11

Implantation of the tibial joint

Connect the MUTARS® impactor for the tibial joint with the chosen tibial joint of the correct size. Lock the impactor for tibial joint by using the wrench for lock (fig. 10).
Impact the tibial joint with the impactor (fig. 11). After impaction remove the impactor.

Especially when cement is used the tibial impactor should be removed to prevent breakage of the cement mantle due to mechanical loads and movements of the heavy impactor.

After cement hardening, insert the PE-Inlay in the tibial joint. Insert the inlay from behind, move it forward towards the anterior locking rim and push it down at the posterior part until it is locked securely (fig. 12a).
Consider to use the impactor for PE-Inlay (fig. 12b).

Although trial inserts are available, it is recommended to insert the final PE-inlay at that time in order to reduce the surgery time.

figure 12a

figure 12b

Femoral bone preparation

Prepare the femoral medullary cavity with the MUTARS® medullary cavity reamer (fig. 13).

figure 13

Cementless fixation

Ream the femoral medullary cavity preferably up to a depth of 130 mm with a flexible reamer 1,5 mm smaller than the preoperatively chosen femoral stem (fig. 14).

Cemented fixation

Ream the femoral medullary cavity preferably up to a depth of 130 mm with a flexible reamer 2 mm larger than the preoperatively chosen femoral stem (fig. 14).

Remark
In case no flexible reamers are in the hospital's stock flexible reamers can be provided on special demand.

figure 14

figure 15

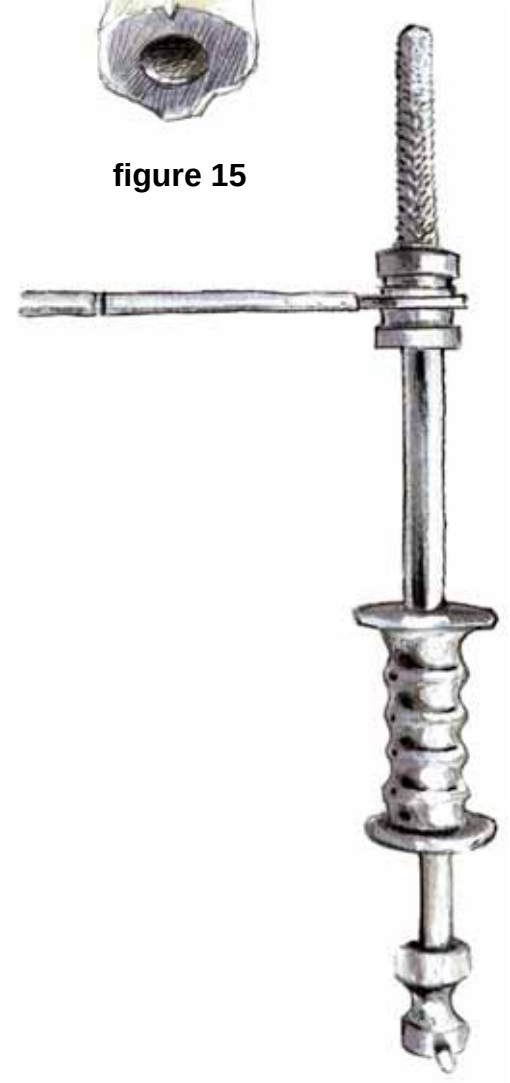


figure 16

Rasping of the femoral cavity

Assemble the femur rasp of the appropriate size (see tables below), the sleeve and the slide hammer. Lock the rasp on the slide hammer by using the engineers' wrench.

Remark
The use of a femoral rasp for a **cemented stem** is optional. Generally you can proceed with the trial reduction (see page 11).

Mark the anterior aspect of the femoral bone to meet the correct antecurvation of the femur (fig. 15).

Use of cementless stems
Use the femur rasp (fig. 16), of the same size as the preoperatively chosen femoral stem (table 3).

Stem size	Rasp size
12mm	12mm
13mm	13mm
14mm	14mm
15mm	15mm
16mm	16mm
17mm	17mm
18mm	18mm

table 3

Rasp the medullary cavity with the chosen femoral rasp (fig. 16). A carefully use of the slide hammer is recommended.

Optional technique for the use of cemented stems

If you want to prepare for a cemented stem with the femoral rasp, please use the rasp which is 2 mm larger than the preoperatively chosen cemented femoral stem (fig. 17).

That will provide a cement mantle of 1 mm thickness (table 4). Use the 18 mm rasp to prepare for the 17 mm stem.

Stem size	Rasp size
11mm	13mm
13mm	15mm
15mm	17mm
17mm	18mm

table 4

Remark
It is recommended to clean the rasp of bone chips during the rasping.

Leave the femoral rasp in the bone for the trialing.

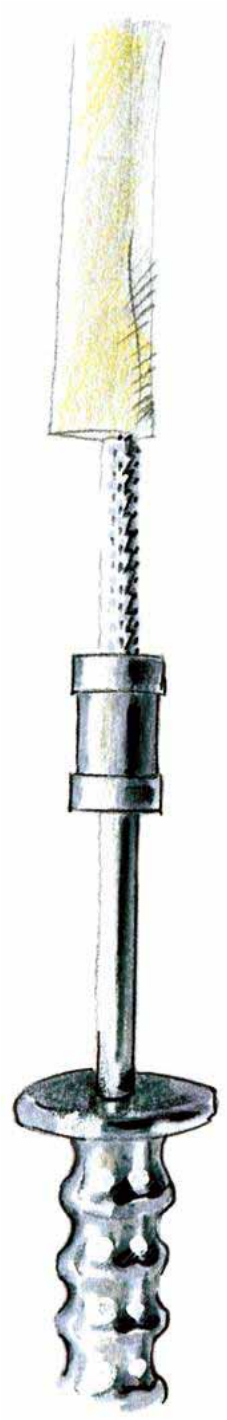


figure 17

figure 18

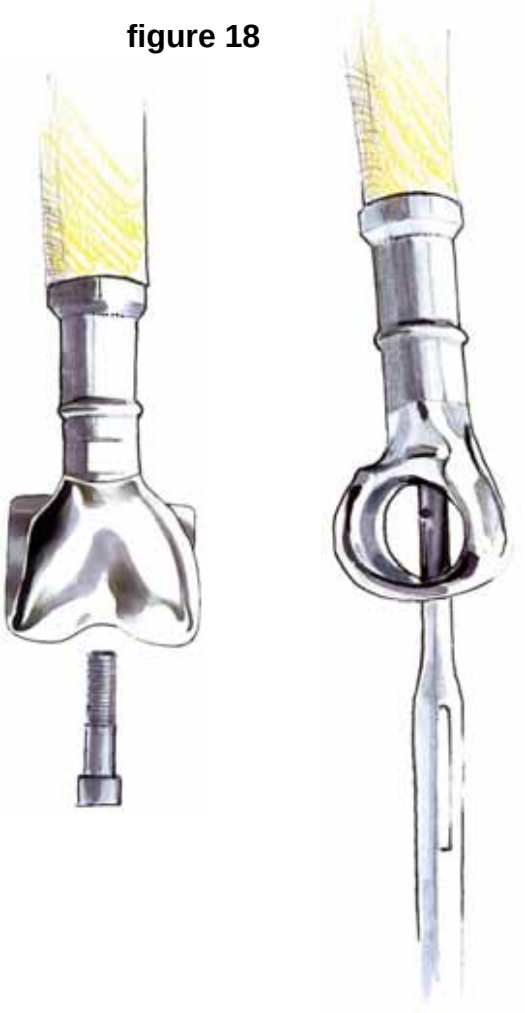


figure 19a and 19b

Trial reduction

Mount the MUTARS® Distal Femur and the possibly needed extension pieces (possible enlargement from 20 to 260 mm; see table page 2) to the top of the rasp (fig. 18).

Remark
For the **cemented procedure** bone rasps are usually not available. Please insert the cemented stem (without cement) for trialing purposes.

At this stage the use of a screw is optional, because the teeth mechanism gives the assembly a reasonable stability (fig. 19a and 19b).

Slide the green trial lock from the side into the Distal Femur. Connect the Distal Femur with the tibial joint (fig. 20a).

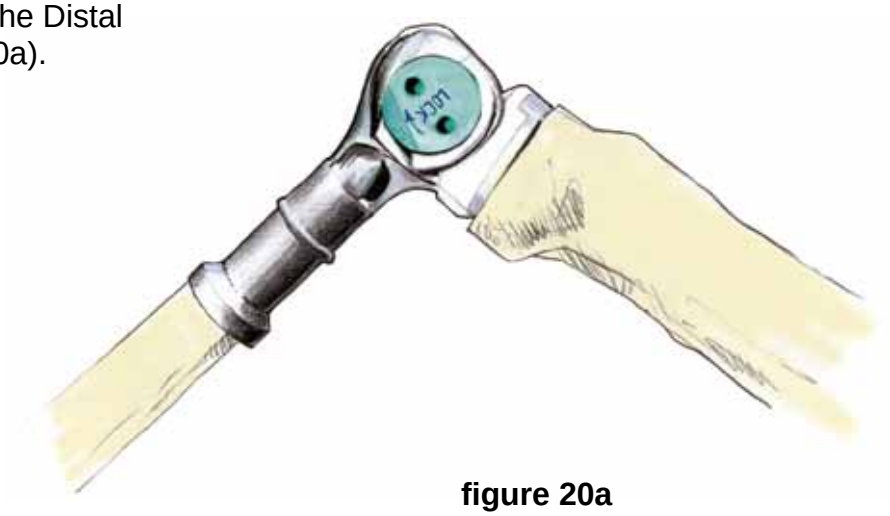


figure 20a

Use the special wrench to turn the trial lock and secure the hinge type locking mechanism (fig. 20b).

Perform a range of motion test with the trial components to check the stability of the joint and the correct leg length as well as the position of the joint line.

The rotational alignment of the Distal Femur can be adapted by unlocking the bar screw. Readjustment can be done in 5° steps of the teeth locking mechanism between the rasp and the distal femur. Mark the correct rotational alignment on the distal femur with regard to the anterior mark of the rasp. The same mark is found on the femoral stem implants.

If the trial reduction shows a sufficient stabillity, remove the trial lock, the bar screw, the Distal Femur and the femoral rasp for the implantation of the final femoral stem.

figure 20b

figure 21

Implantation of the femoral stem

Impact the MUTARS® femoral stem (fig. 21).
Insert the stem of the same size as the rasp if a **cementless stem** is used.
To prevent fractures of the cortical bone it is helpful to fix a bone forceps around the femoral bone during impaction.

If a cemented implantation is planned, insert the cement and use the **cemented stem** which is 2 mm smaller than the previously used reamer or rasp.

Remove all instruments during the cement hardening to prevent bending moments.

Mounting of the distal femoral implant components

Combine the Distal Femur and possibly needed extension pieces with the femoral stem. Make sure that the correct rotation of the distal femur is achieved. Insert the bar screw of the correct length (see table on page 2) (fig. 22).

Lock the screw with the swing wrench while countering the assembly with the engineers' wrench (fig. 23).

Insert the safety screw and lock it in the same way (fig. 24).

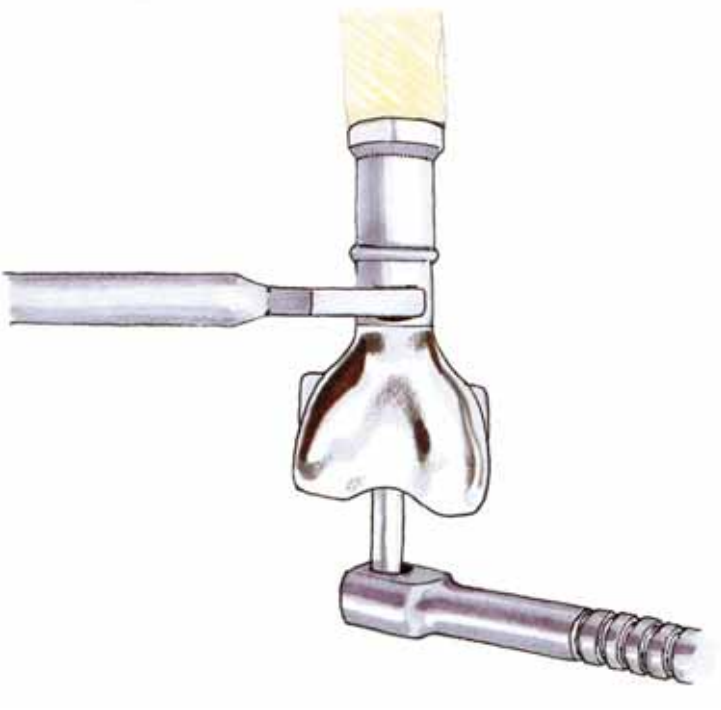


figure 23

figure 22

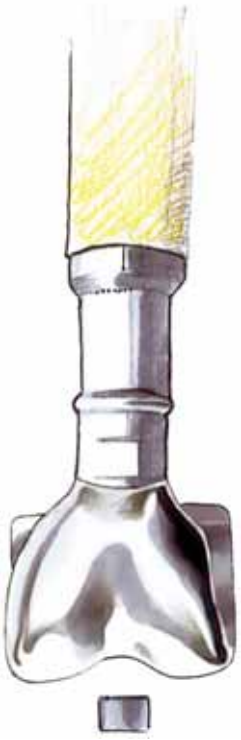


figure 24

figure 25

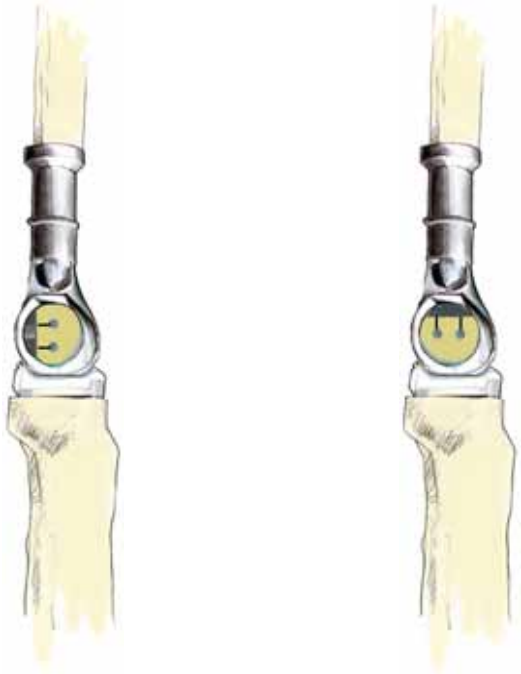
Insert the MUTARS® PEEK® -Optima lock into the Distal Femur. Two versions are available; left medial/right lateral and left lateral/right medial. Please choose the version which fits to the surgical approach you have chosen. Generally the lock is inserted from the medial aspect of the knee joint when the medial approach was used.

figure 26

Connect the Distal Femur with the tibial joint (fig. 25).

Secure the lock by using the special wrench (fig. 26).

Make sure that the lock is positioned in the correct **'locked'** position (fig. 27a and 27b). Therefore make sure the two marks on the PEEK lock are parallel to the notch of the femoral implant (fig. 27b).



unlocked **locked**

figure 27a and 27b

Remark
To lock the PEEK lock it can be helpful to slightly bend the knee before locking the lock.

After correct positioning of the lock add the secure lip by using the MUTARS® universal impactor.

Screw the impactor to the lip and insert the lip from the medial side or the lateral side of the implant (fig. 28a and 28b).

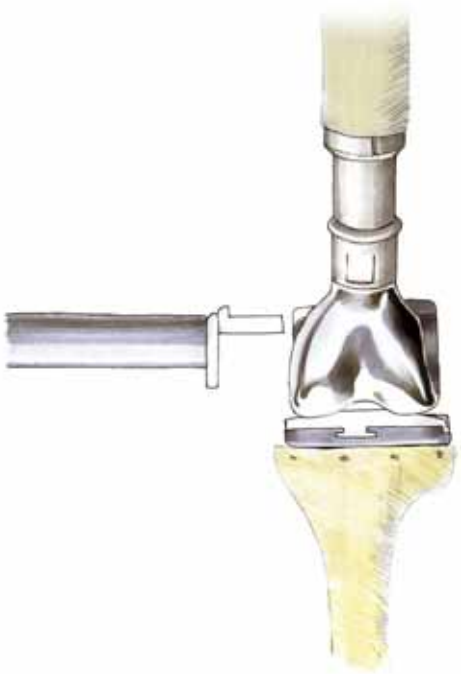


figure 28a

figure 28b

When the secure lip is placed correctly in the host of the Distal Femur (fig. 29), the final range of motion check is performed.

Close the caspule and the wound in the usual manner.

figure 29

IMPLANTS

***S**: For anti-infective treatment, silver coated implants are available.

***N**: For anti-allergic treatment, TiN coated implants are available.

***SN**: Implants are coated with silver and TiN.

MUTARS® Distal Femur incl. safety screw 'N

mat.: implavit®;CoCrMo-casting alloy according to DIN ISO 5832/4

5720-0005	110 mm	left		***S**
5720-0010	110 mm	right		***S**
5720-0015	90 mm	left		
5720-0020	90 mm	right		
5720-0085	110 mm	left	XS	***S**
5720-0080	110 mm	right	XS	***S**
5720-0095	90 mm	left	XS	
5720-0090	90 mm	right	XS	

MUTARS® extension piece *S

mat.: implatan®;$TiAl_6V_4$ according to DIN ISO 5832/3

5772-2504	40 mm
5772-2506	60 mm
5772-2508	80 mm
5772-2510	100 mm

MUTARS® connecting part *S

mat.: implatan®;$TiAl_6V_4$ according to DIN ISO 5832/3

5730-0100	100 mm

IMPLANTS

MUTARS® screw

mat.: implatan®;$TiAl_6V_4$ according to DIN ISO 5832/3

5792-1002	M10x 25 mm
5792-1004	M10x 45 mm
5792-1006	M10x 65 mm
5792-1008	M10x 85 mm
5792-1010	M10x105 mm
5792-1012	M10x125 mm
5792-1014	M10x145 mm
5792-1016	M10x165 mm
5792-1018	M10x185 mm
5792-1020	M10x205 mm
5792-1022	M10x225 mm
5792-1024	M10x245 mm

MUTARS® femoral stem cemented *N

mat.: implavit®;CoCrMo-casting alloy according to DIN ISO 5832/3

5760-0011	11 mm
5760-0013	13 mm
5760-0015	15 mm
5760-0017	17 mm

MUTARS® femoral stem cementless

mat.: implatan®;$TiAl_6V_4$ according to DIN ISO 5832/3 with HA-coating

5760-0012	12 mm
5760-0113	13 mm
5760-0014	14 mm
5760-0115	15 mm
5760-0016	16 mm
5760-0117	17 mm
5760-0018	18 mm
5760-0019	**19 mm***
5760-0020	**20 mm***

***Available on request**

Available without HA-Coating on request.

MUTARS® attachment tube

mat.: polyethylenterephtalat

5900-0300	35 mm
5900-0310	55 mm

IMPLANTS

MUTARS® tibial joint cemented *N
mat.: implavit®;CoCrMo-casting alloy according to DIN ISO 5832/4

5750-0111	11 mm
5750-0113	13 mm
5750-0115	15 mm
5750-0117	17 mm
5750-1011	11 mm small
5750-1013	13 mm small

MUTARS® tibial joint cementless *N
mat.: implavit®;CoCrMo-casting alloy according to DIN ISO 5832/4

5750-0012	12 mm
5750-0014	14 mm
5750-0016	16 mm
5750-0018	18 mm
5750-1012	12 mm small
5750-1014	14 mm small

MUTARS® PE-inlay
mat.: UHMWPE according to DIN ISO 5834/2

5721-0000	xs
5721-0002	small
5721-0001	standard
5721-0006	large

MUTARS® lock, 2-parts
mat.: PEEK®-Optima and UHMWPE according to DIN ISO 5834/2

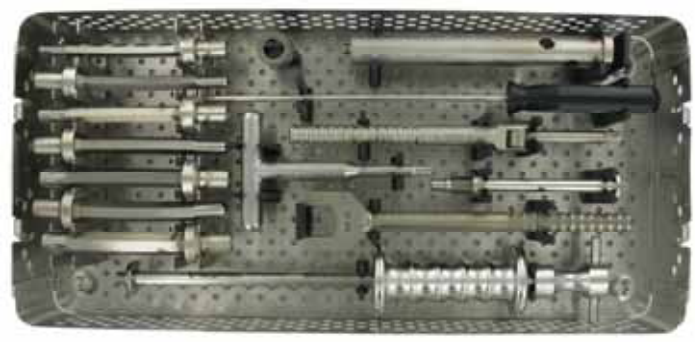
5720-0905	left lat./right med.
5720-0910	right lat./left med.
5720-0915	left lat./right med., XS
5720-0920	right lat./left med., XS

IMPLANTS

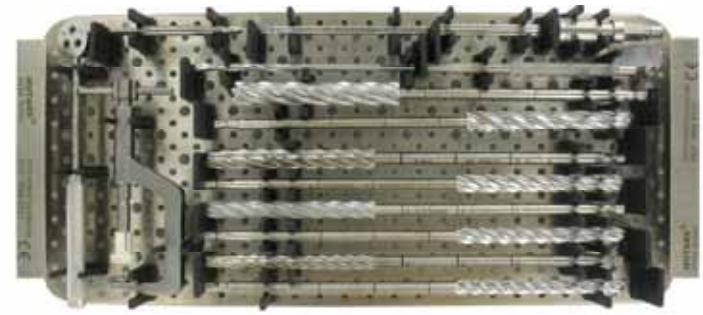
MUTARS® patella component, cemented
UHMW-PE according to DIN ISO 5834/2
5720-1000 standard
5720-1001 large

Intramedullary plug
UHMW-PE according to DIN ISO 5834/2
0299-4000 small
0299-4010 large

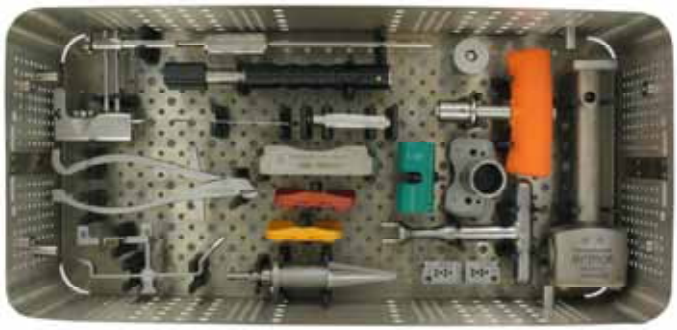
INSTRUMENTS



MUTARS® basic container
7999-5712



MUTARS® distal femur container
upper tray
7999-5721



MUTARS® distal femur container
bottom tray
7999-5721

INSTRUMENTS

Content MUTARS® basic container

MUTARS® universal impactor
7210-0000

MUTARS® impact and extract sleeve
7230-0000

MUTARS® socket wrench
7420-0000

MUTARS® swing wrench
7411-0000

MUTARS® engineers wrench SW 24
7490-0000

MUTARS® slide hammer
7220-0001

MUTARS® rasp for femoral stem

7760-0112	12 mm
7760-0113	13 mm
7760-0114	14 mm
7760-0115	15 mm
7760-0116	16 mm
7760-0117	17 mm
7760-0118	18 mm

handle for intramedullary plug
7512-4001

MUTARS® medullary cavity reamer
7760 0501

INSTRUMENTS

Content MUTARS® distal femur container

MUTARS® patella - drill guide
7350-0000

MUTARS® patella - drill
7351-0000

MUTARS® patella - clamp
7352-0001

MUTARS® rigid drills
4220.4010.1 10 mm / 310 mm
4220.4011.1 11 mm / 310 mm
4220.4012.1 12 mm / 310 mm
4220.4013.1 13 mm / 310 mm
4220.4014.1 14 mm / 310 mm
4220.4015.1 15 mm / 310 mm
4220.4016.1 16 mm / 310 mm
4220.4017.1 17 mm / 310 mm

fixations pin L: 77mm, D: 3.2 mm
4223-0029

pin impactor
4223- 0006

MUTARS® universal drill ∅ 6 mm
7630-0106

drill 126 x 3,2 mm
4221-0019

ic adapter outside A/O, inside ic canulated
7512-3602

INSTRUMENTS

MUTARS® wrench for lock
7430-0000

MUTARS® trial lock
7800-1000

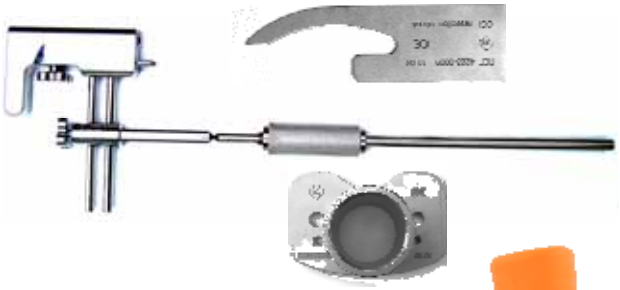
MUTARS® impactor for tibial joint
7800-0000

tibial cutting block 0°
4221-0000

saw capture 1,5mm
4223-0001

resection check
4223-0009

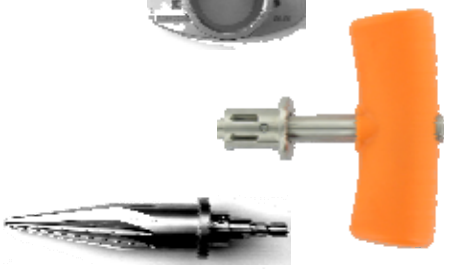
I/M tibial resection host
4221-0021
4221-0022



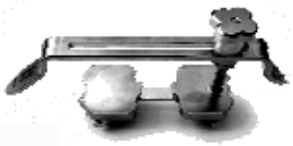
tibial reamer guide
7755-0006

ic-t-handle
4223-0023

tibial reamer
7755- 0003



tibial stylus 2/10 mm
4221-0006



ic-pin extractor
7512-0800

MUTARS® tibial centralizer
7755-0007

MUTARS® trial inlay
7721-0001 standard
7721-0002 small

MUTARS® setting instrument for PE-inlay
7210-0001

implantcast GmbH
Lüneburger Schanze 26
D-21614 Buxtehude
Germany
phone: +49 4161 744-0
fax: +49 4161 744-200
e-mail: info@implantcast.de
internet: www.implantcast.de

CE 0482

Your local distributor:

MUTA2OPE-070813