

# MUTARS<sup>®</sup>

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The  
Modular  
Knee System

**GenuX<sup>®</sup> MK**  
**Revision Knee**  
Surgical Technique



implantcast



# MUTARS®

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## GenuX® MK Revision Knee 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.  
*\*currently Consultant for Orthopaedic Oncology,  
Schönklinik Eilbek*

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

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**MUTARS® GenuX® MK -  
modular knee system**



**characteristics**

- fully constrained knee system
- Mobile-Bearing and Fixed Bearing PE-inserts
- up to 20° rotation (Mobile-Bearing)
- cemented and cementless
- 360° free adjustable offset
- offsets of 0, 2, 4 and 6mm
- fixation of spacer femorally and tibially
- 4 femoral and tibial sizes



# MUTARS® GenuX® MK

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## Preoperative Planning

Pre-operative planning and precise surgical techniques are mandatory for optimal results. The instructions and the procedure given in the surgical technique to the system must be adhered to. Familiarity with the recommended surgical technique and its careful application is essential to achieve the best possible outcome.

Prior to surgery, a surgical planning with regard to the dimensions of the prosthetic model and the positioning of the implant components in the bone has to be carried out by the surgeon. For this purpose, x-ray templates are available from implantcast GmbH.



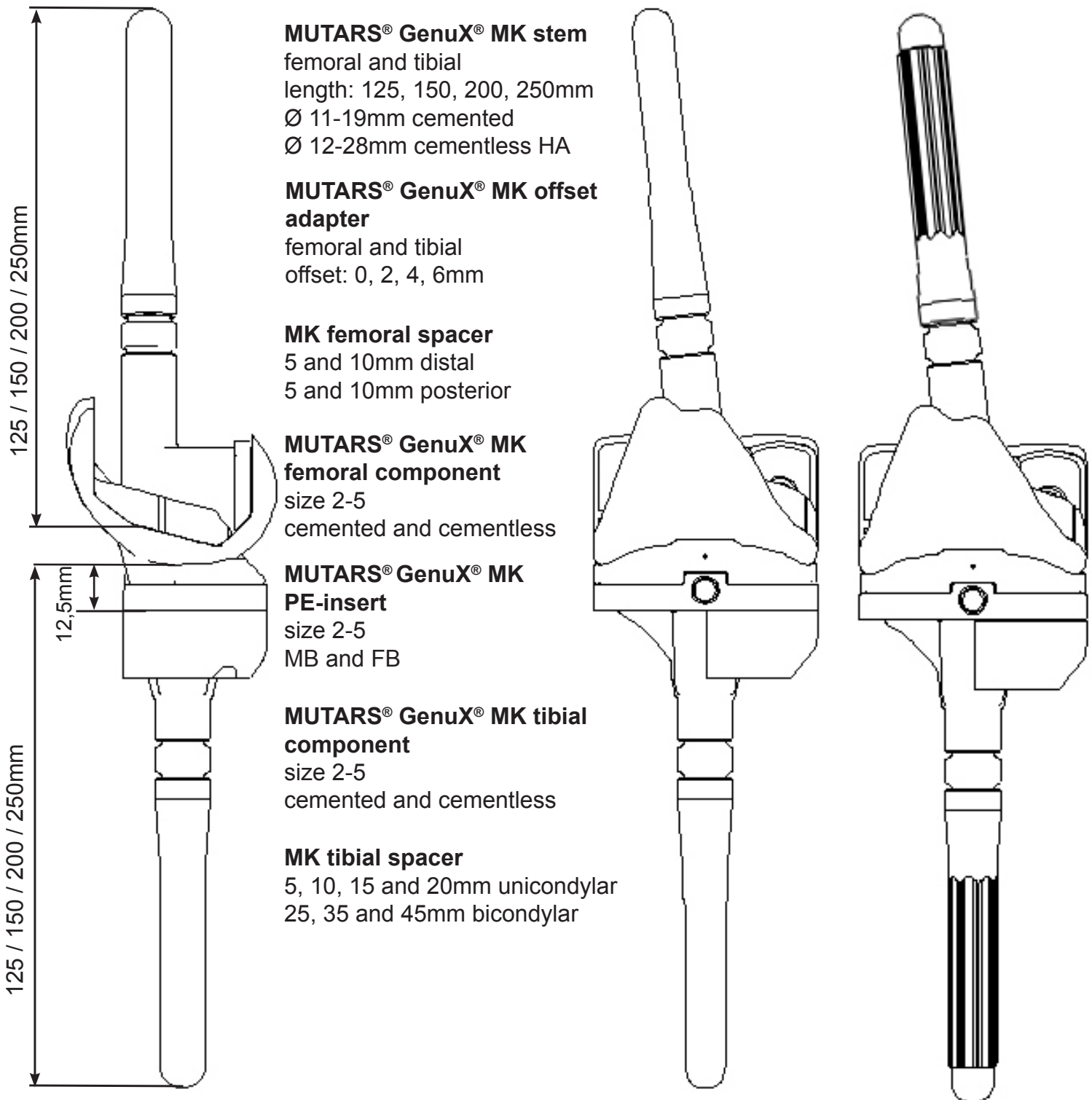
Figure A: MUTARS® GenuX® MK implant in A/P-view



Figure B: MUTARS® GenuX® MK implant in M/L-view



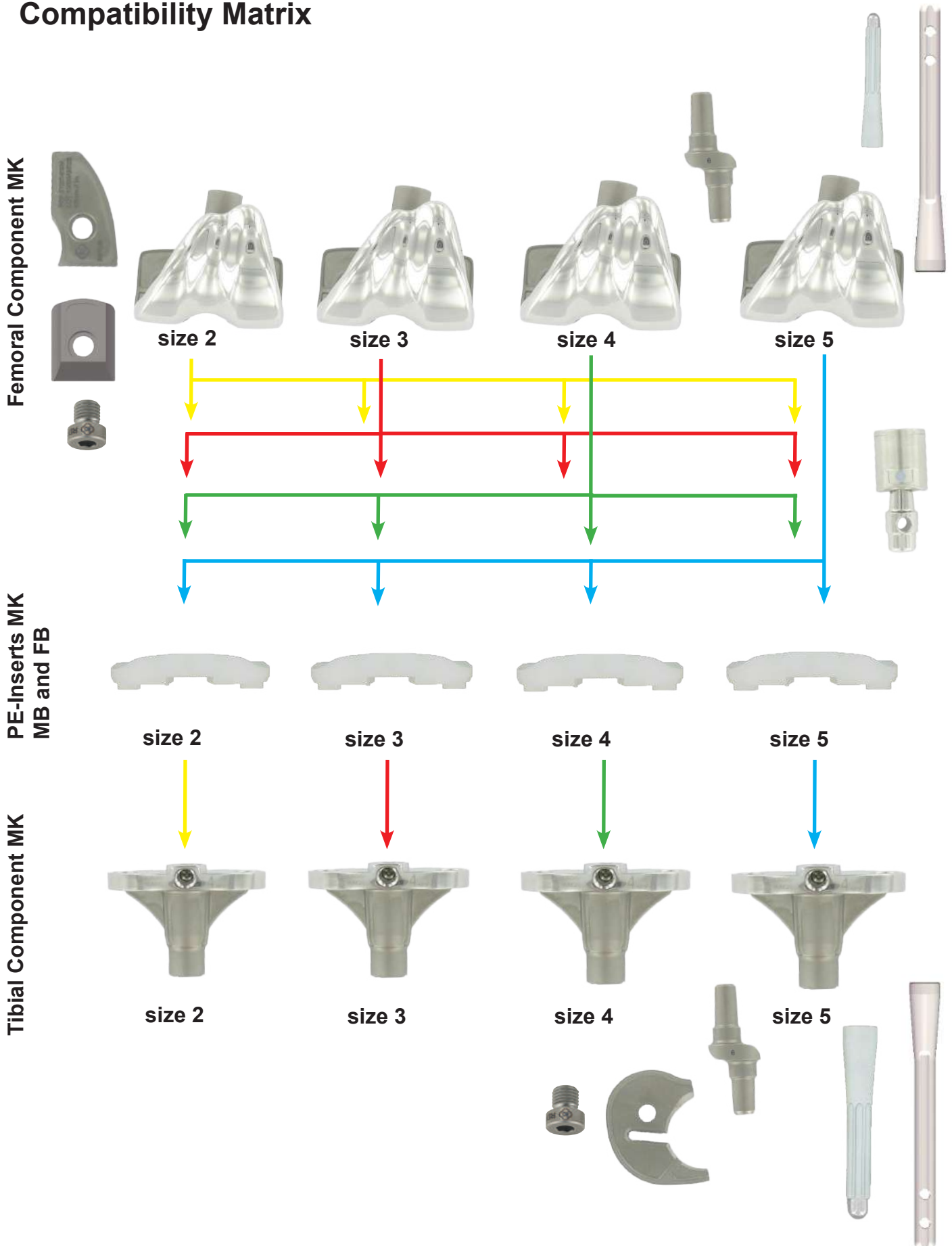
## System Overview





# MUTARS® GenuX® MK

## Compatibility Matrix



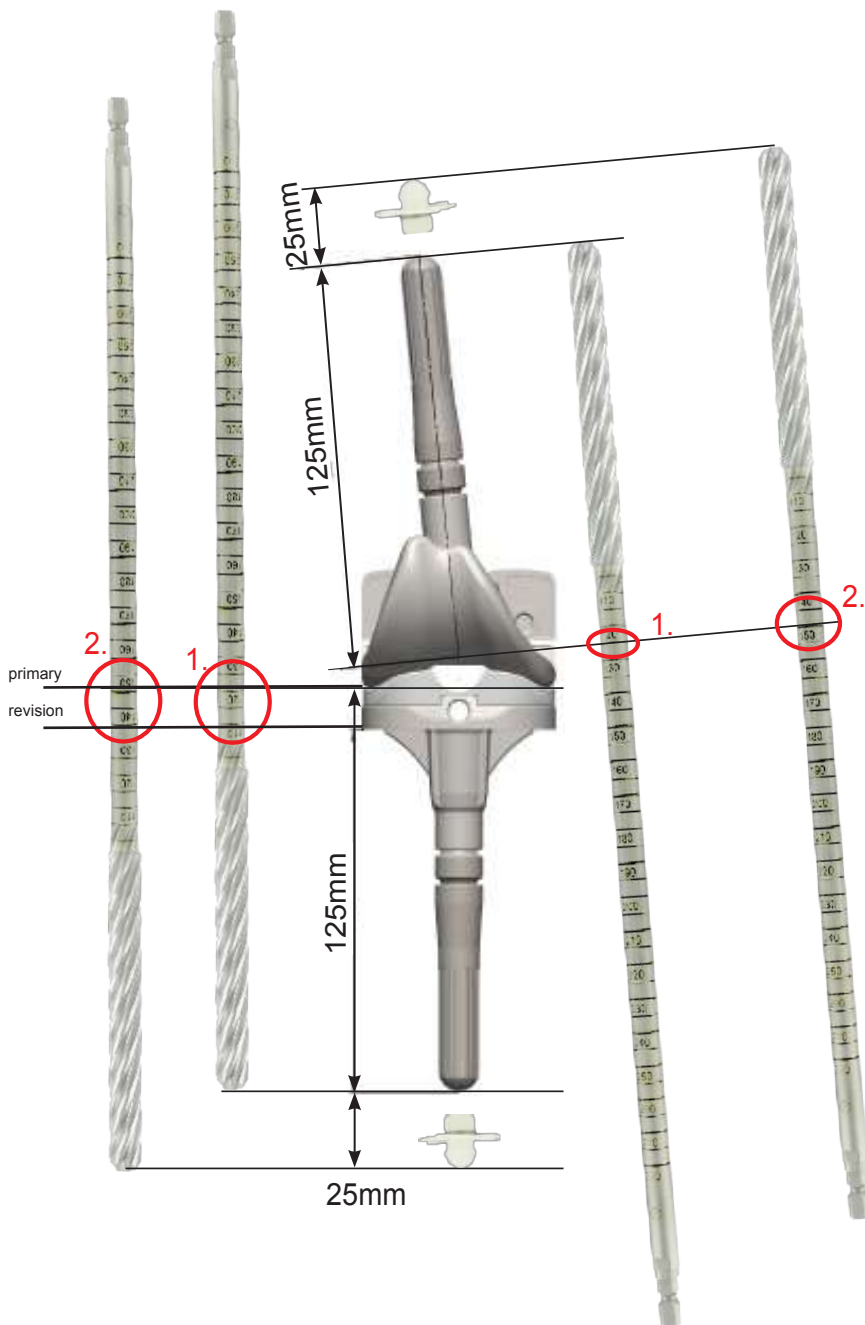


## Nomenclature stem and rigid drill lengths

The MUTARS® GenuX® MK stems are available in lengths of 125mm, 150mm, 200mm and 250mm and they can be used both femorally and tibially.

These length descriptions reflect the respective length measured from the resection plane and not the effective stem length. For a planned 125mm cementless stem, the medullary canal is to be reamed until the 125mm marking reaches the resection plane. In case of a revision surgery, the reaming depth is 115mm (10mm less). This enables that the reaming depth to correspond with the actual stem length. Please consider the table for reaming depth (page 10 tibial, page 13 femoral).

If a cemented stem is used, a 25mm safety length is to be added in order to drill deep enough for an intramedullary plug.



reaming depth femorally and tibially i.e. 125mm stem:

femur	
fixation	marking
cementless	125
cemented	150

tibia	
fixation	marking
cementless	115
cemented	140

fixation	marking
cementless	125
cemented	150

**Note:** After each resection the drill needs to be inserted to the depth indicated for revision surgery.



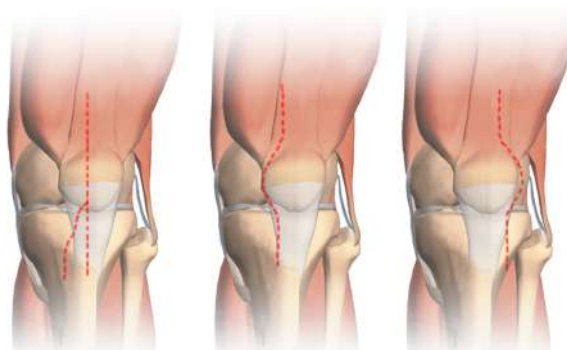
# MUTARS® GenuX® MK

## Surgical approach

Make a central skin incision across the patella. Then choose the preferred medial or lateral approach to open the knee joint. For the skin incision take note of scarring of previous surgeries. Invert the patella and remove the medial respectively the lateral periosteal structures.

For an improved exposure a preliminary resection of the patella back side could be helpful.

Remove all femoral and tibial implant components of the prosthesis, which needs to be revised.



## Tibial preparation

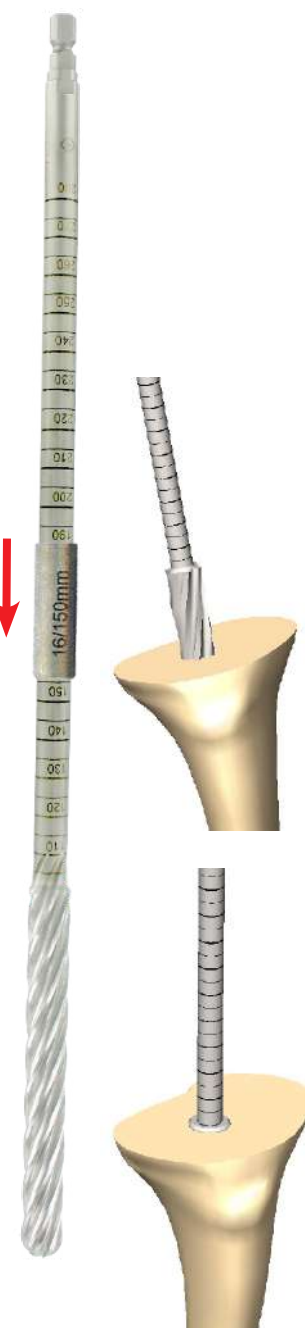
Flex the knee joint to 90°. If necessary, open the tibial medullary canal with the 9mm initiator drill. The entry point should be set 1/3 ventrally and 2/3 dorsally relative to the eminentia intercondylaris to open the centre of the medullary canal.

Ream with the rigid drills till the preoperatively determined stem diameter and stem length is reached. For planned stem lengths larger than 125mm place the drill sleeve of the corresponding drill diameter and the planned stem length over the rigid drill. It is recommended to use the 150mm drill sleeve for all stem length, longer than 125mm, to ensure that the drill sleeve is completely countersink in the bone. Make sure that the sleeve is countersink in the medullary canal while reaming. Thus the rigid drill is centered over its whole length in the medullary canal.

The drill diameter, as well as the sleeve diameter if applicable, is increased stepwise till the pre-operatively determined stem diameter and stem length is reached.

For optimal anchorage of the stem in the medullary canal, you should drill till cortical contact occurs at the drill tip.

**Note:** To ensure adequate drill depth, adhere to the “Table for tibial drill depth“ on the next page (page 10). Make sure that the correct stem length mark, located on the drill, matches the tibial resection plane.





Leave the lastly used rigid drill (the largest used drill diameter) together with the corresponding drill sleeve if applicable in the medullary canal.

This drill indicates the implant diameter to choose for a cementless respectively a cemented stem implantation.

**Note:** Ensure that the largest used drill diameter is of an uneven number. Thus a press-fit is reached with the cementless stems and space for a 1mm cement layer is given for the cemented stems.

drill diameter	MUTARS® GenuX® MK stem cementless	MUTARS® GenuX® MK stem cemented
11mm	12mm	/
13mm	14mm	11mm
15mm	16mm	13mm
17mm	18mm	15mm
19mm	20mm	17mm
21mm	22mm	19mm
23mm	24mm	/
25mm	26mm	/
27mm	28mm	/

**Table for tibial drill depth**

revision		
Stem length	cementless*	cemented*
125mm	115	140
150mm	140	165
200mm	190	215
250mm	240	265

primary		
Stem length	cementless*	cemented*
125mm	125	150
150mm	150	175
200mm	200	225
250mm	250	275



**After resection always drill until this drilling depth!**

**Note:** After each resection the drill needs to be inserted deeper. Make sure that the correct mark reach the resection plane. After tibial resection always drill up to the depth indicated in the table for revision surgery, no matter whether you are performing primary or revision surgery.

# MUTARS® GenuX® MK

## Tibial alignment

The tibial alignment is carried out intramedullary. Fix the tibial cutting block revision 0° to the I/M tibial alignment guide. Slide the tibial alignment guide over the drill in the medullary canal and adjust the desired rotation of the instruments.

Fix the position by impacting the proximal pins of the tibial alignment guide into the tibial bone.

## Alignment of the tibial cutting block

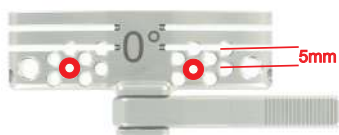


The tibial resection height is adjusted by means of the tibial stylus. Use the stylus tip with the 2mm marking **1** to resect 2mm below the pre-operated tibial surface.

Attach the tibial stylus to the tibial cutting block; use the proximal slot of the cutting block.

The stylus and the connected cutting block need to be lowered till the tip of the stylus touches the deepest point of the tibial surface. The cutting block is fixed in this position to the alignment guide.

In case of a primary implantation, use the stylus tip with the 12.5mm marking **2** to reference on the highest tibial point of the less affected joint side. Thus an adequate tibial resection height is ensured for primary implantation of the tibial component.

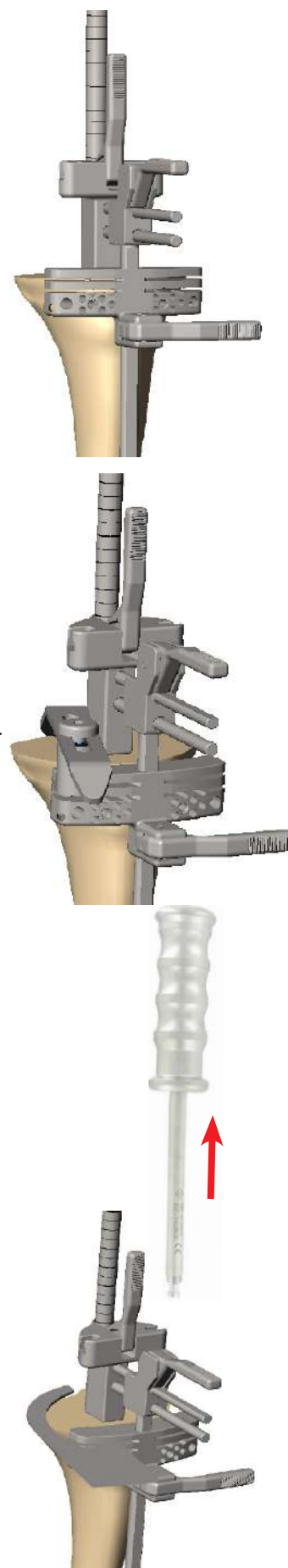


Fix the tibial cutting block with two pins. It is recommended to use the two countersunk holes. Thus shifting of the block in both directions is possible in case of a tibial reresection, respectively a decrease of the planned resection.

**Note:** Screw pins can be used alternatively.



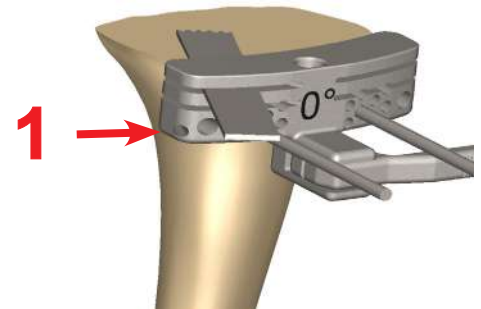
The resection level is checked with the long resection check. Remove the tibial alignment by means of the slap hammer and the rigid drill.



## Tibial resection

Resect the tibia through the proximal slot of the cutting block. If required, insert a third oblique pin to secure the position of the tibial cutting block **1**.

After resection, the cutting block is removed via the pins. The pins are left in bone for a possible spacer preparation at a later step.



## Femoral preparation

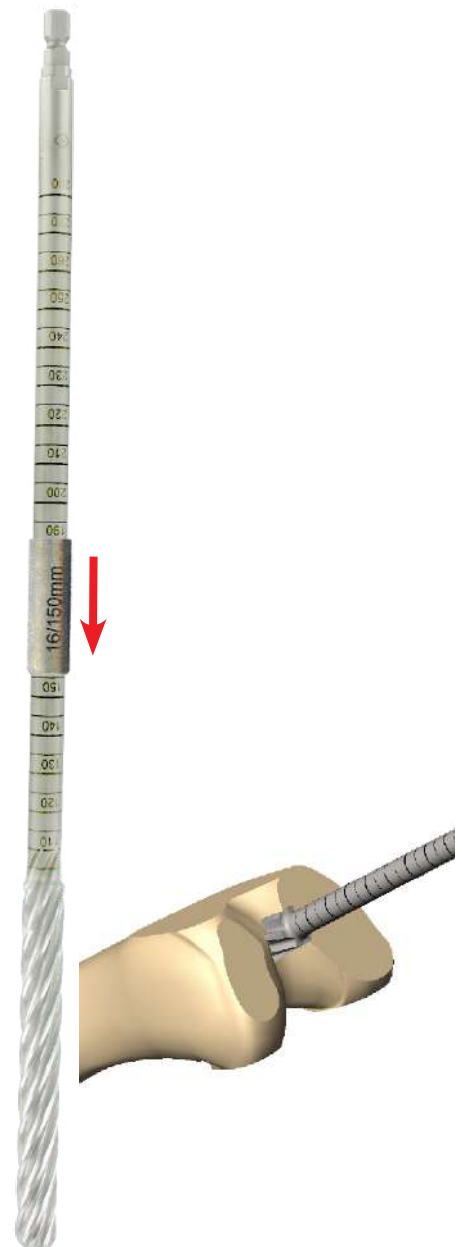
Open the femoral intramedullary canal by use of the 9mm initiator drill.

Ream with the rigid drills till the preoperatively determined stem diameter and stem length is reached. For planned stem lengths larger than 125mm place the drill sleeve of the corresponding drill diameter and the planned stem length over the rigid drill. It is recommended to use the 150mm drill sleeve for all stem lengths, longer than 125mm, to ensure that the drill sleeve is completely countersink in the bone. Make sure that the sleeve is countersink in the medullary canal while reaming. Thus the rigid drill is centered over its whole length in the medullary canal.

The drill diameter, as well as the sleeve diameter if applicable, is increased stepwise till the pre-operatively determined stem diameter and stem length is reached.

For optimal anchorage of the stem in the medullary canal, you should drill till cortical contact occurs at the drill tip.

**Note:** To ensure adequate drill depth, adhere to the “Table for femoral drill depth“ on the next page (page 13). Make sure that the correct stem length mark, located on the drill, matches the femoral distal resection plane.

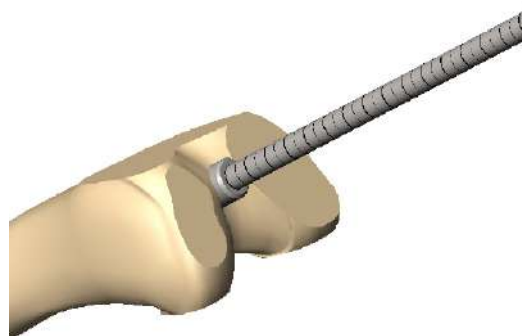


## MUTARS® GenuX® MK

Leave the lastly used rigid drill (the largest used drill diameter) together with the corresponding drill sleeve if applicable in the medullary canal.

This drill indicates the implant diameter to choose for a cementless respectively a cemented stem implantation.

**Note:** Ensure that the largest used drill diameter is of an uneven number. Thus a press-fit is reached with the cementless stems and space for a 1mm cement layer is given for the cemented stems.



drill diameter	MUTARS® GenuX® MK stem cementless	MUTARS® GenuX® MK stem cemented
11mm	12mm	/
13mm	14mm	11mm
15mm	16mm	13mm
17mm	18mm	15mm
19mm	20mm	17mm
21mm	22mm	19mm
23mm	24mm	/
25mm	26mm	/
27mm	28mm	/

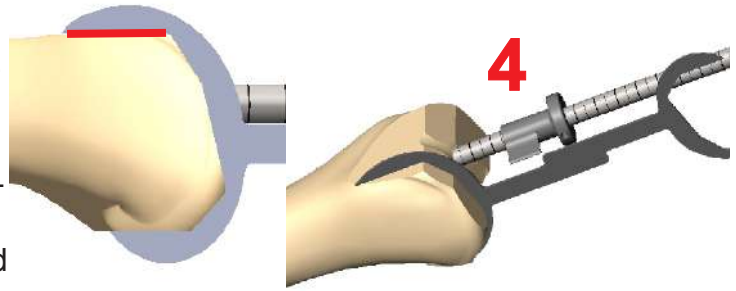
### Table for femoral drill depth

Stem length	femoral	
	cementless*	cemented*
125mm	125	150
150mm	150	175
200mm	200	225
250mm	250	275

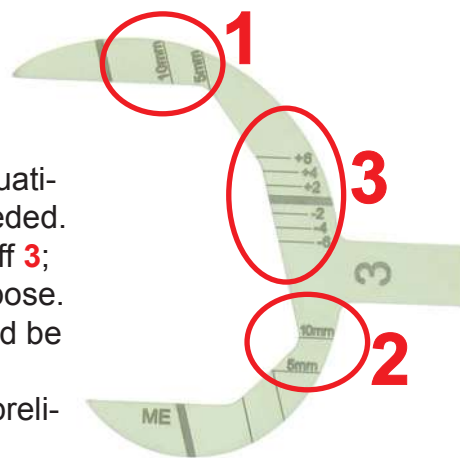
**Note:** After each resection the drill needs to be inserted deeper. Make sure that the correct mark reach the resection plane.

## Determination of femoral size

For size determination of the femoral component the femoral sizing template of the supposed size is applied to the femoral bone. The inner contours of the template correspond to the inner contours of the femoral implant component of the respective size. The anterior inner edge of the template should be parallel to the anterior femoral cortex.

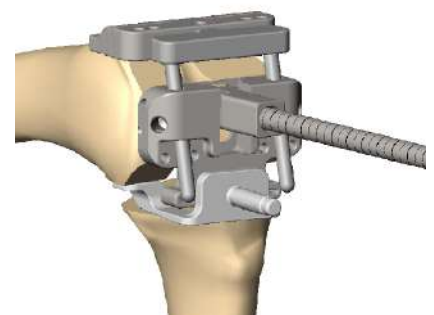
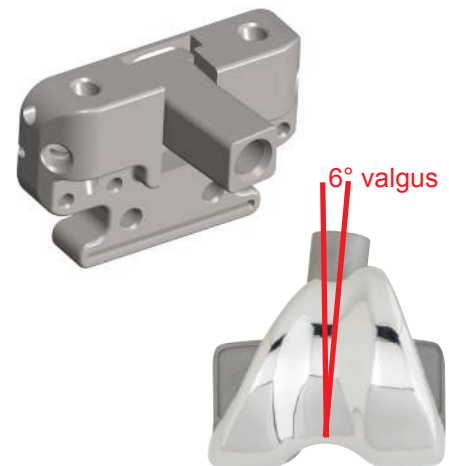


The femoral sizing template further allows for the evaluation if femoral spacer (distal **1** or posterior **2**) will be needed. Furthermore a potentially needed offset can be read off **3**; slide the offset indicator over the rigid drill for that purpose. The indicator blade should point to medial and it should be aligned in parallel with the epicondylar line. The indicator blade points to the scale to read off the preliminary offset. Remove the indicator and the sizing template afterwards.



## Femoral alignment

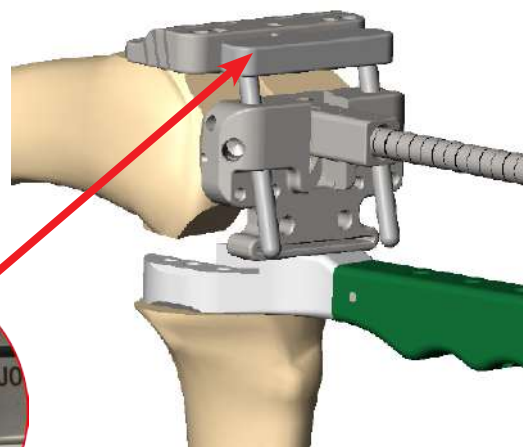
Use the femoral alignment guide to align the distal femoral cutting block to 6° valgus, as the femoral stem is orientated in 6° valgus.



Stick the femoral alignment guide over the rigid drill. By use of the rotation guide neutral the rotation can be adjusted by referencing the posterior condyles.

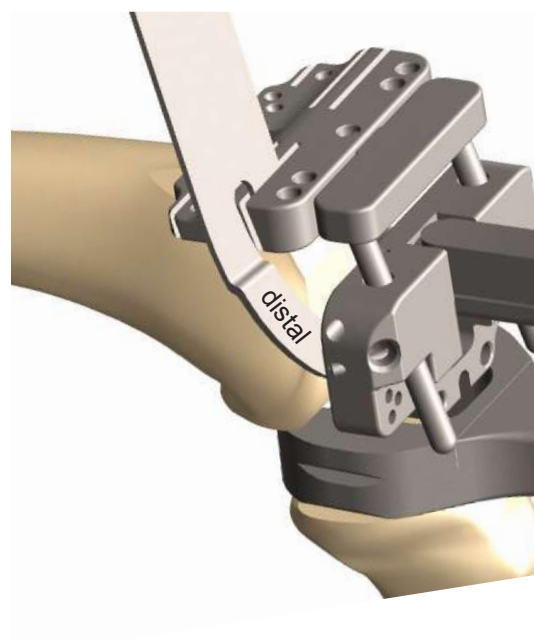
## MUTARS® GenuX® MK

Optionally, the joint space gauge can be used for tibial rotational alignment. Afterwards attach the distal femoral cutting block to the alignment guide. The coupling is correct, when the implantcast logo (ic-cloverleaf) of the alignment guide is visible through the central hole on the anterior side of the distal femoral cutting block.

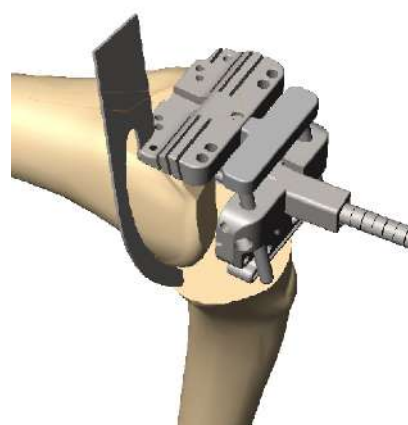


Lower the cutting block till it contacts the anterior femoral bone.

With the 4in1 femoral resection guide 1,5mm can be gauged to perform a distal refreshment resection. The resection guide is attached to the distal slot, whereas the „bone“ marked surface rests on the femoral bone and the „distal“ marked surface is visible.



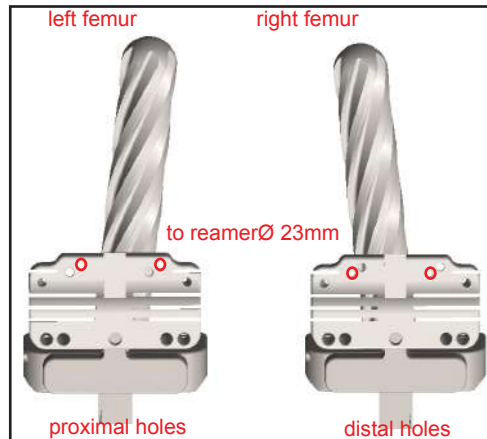
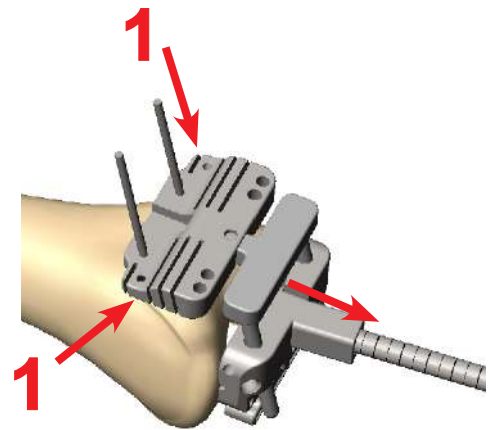
In the proximal slot the epicondylar line can be checked with help of the resection check.



## Distal femoral resection

Fix the distal cutting block with two pins to the anterior femur. To avoid interference between pin and rigid drill, use the holes for pin fixation up to rigid drill diameter of 23mm as follows.

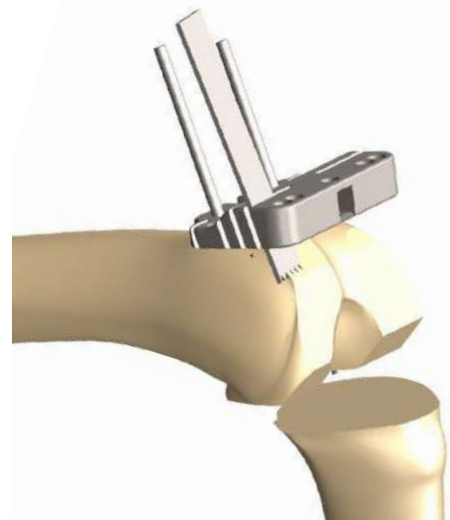
**Note:** Screw pins can be used alternatively.



holes to use for pin fixation up to drill  $\varnothing$ 23mm

In case of using rigid drills larger than 23mm in diameter, use the lateral oblique holes **1** for pin fixation. Use these holes also for increased stability by insertion of a third pin. Remove the rigid drill and the femoral alignment guide afterwards.

Resect the distal femur through the distal slot of the cutting block.

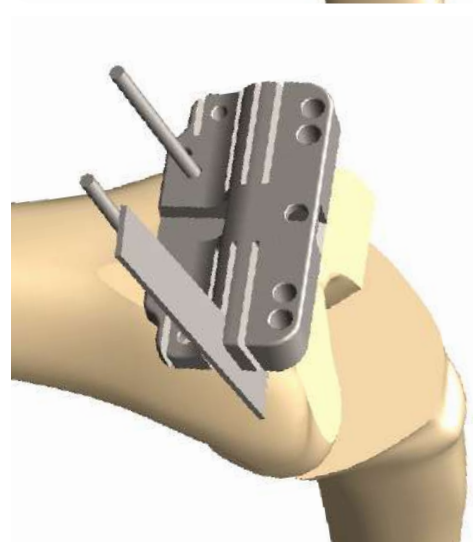


By use of the middle slot further 5mm can be resected to prepare the femur for distal spacer.

For 10mm spacer the proximal one of the three slots is used.

In the shown case the femur is prepared medially for a 5mm distal spacer.

Afterwards the pins as well as the cutting block are removed.





# MUTARS® GenuX® MK

## Determination of the femoral offset

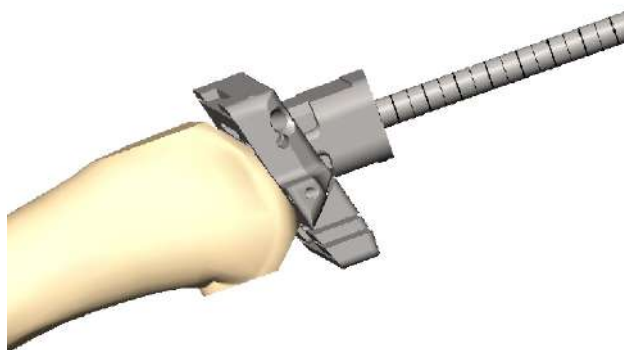
Reinsert the lastly used rigid drill (together with the corresponding drill sleeve if applicable).

**Note:** Ensure an adequate drill depth. Consider „Table for femoral drilling depth“ page 13.

After each resection the drill needs to be inserted deeper. Make sure that the correct mark reach the resection plane.

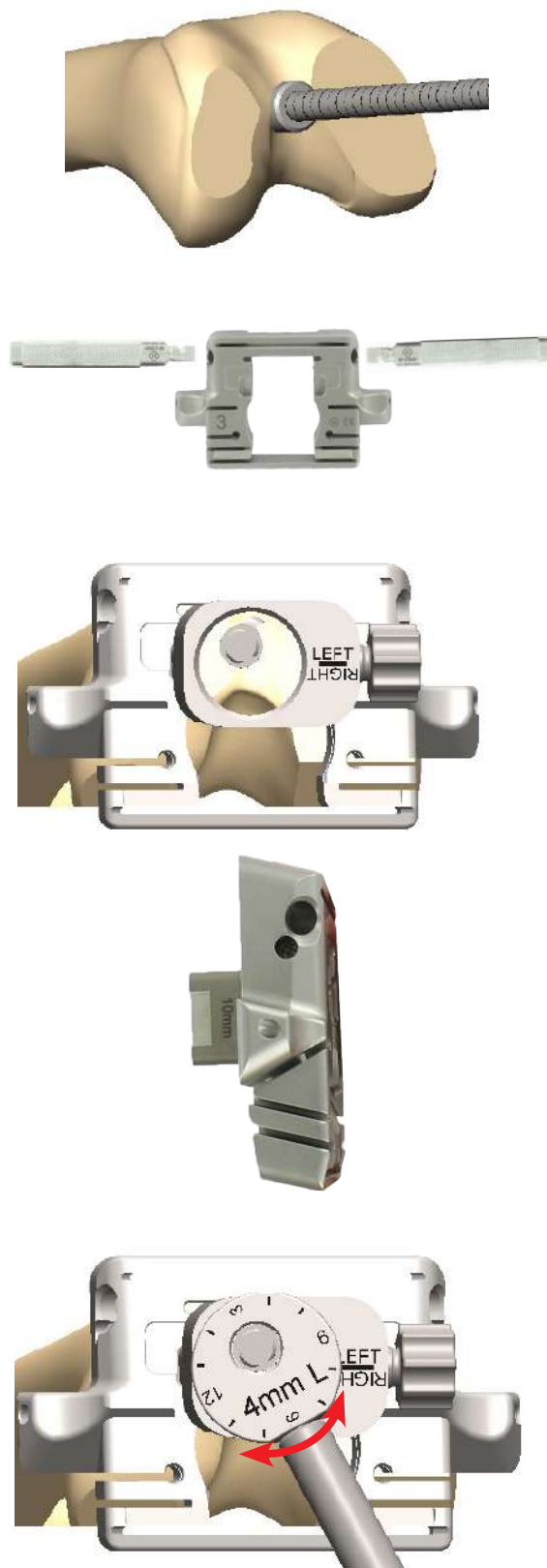
In the use of 150mm stems the drill sleeve must be removed for the subsequent preparation.

Connect the 4in1 femoral cutting block of the afore determined size and the long stem sleeve offset. In doing so the etching for the affected side „left“ respectively „right“ of the long stem sleeve offset should be legible anteriorly in case of topview on the cutting block. Attach the cutting block and the sleeve to the rigid drill till the cutting block rests flush on the distal femur. For ease the positioning handles can be fixed to the 4in1 cutting block.

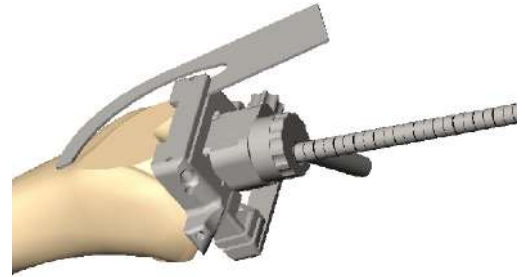


If the femur is prepared for femoral spacer the magnetic distal distance adapters of the corresponding thickness (5mm or 10mm) can be attached for stabilization.

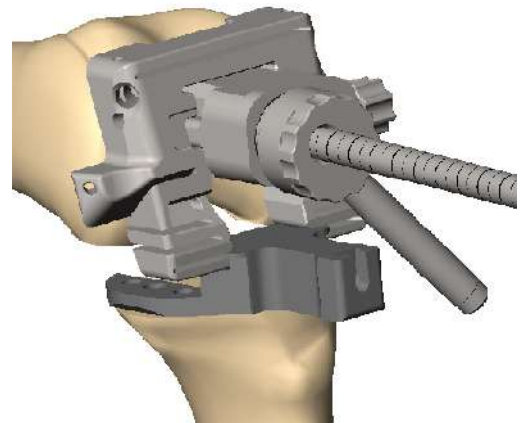
Insert the offset sleeve 0, 2, 4 or 6mm of the affected side into the long stem sleeve offset. A „fast fix“ handle can be applied to the offset sleeve for manipulation. The position of the cutting block is adjusted by rotating the offset sleeve.



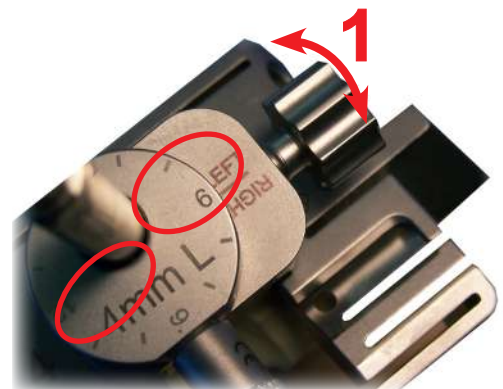
Check the anterior and posterior resection plane with the resection check.



With the femoral positioner the rotational alignment is adjusted in relation to the resected tibia. Attach the spacer shim 12,5mm to the femoral positioner and insert it into the posterior resection slot of the cutting block. Additional spacer shims are available if the tibia shows tibial defects. These can be fixed to the femoral positioner.



Is the optimal position of the 4in1 cutting block defined, fix the set-up with the lateral screw of the long stem offset sleeve **1**. Keep in mind the position of the offset and the offset sleeve (in the shown case 4mm offset sleeve and position 6) for assembling the trial as well as the implant components.



# MUTARS® GenuX® MK

There are different holes for fixation of the 4in1 cutting block with pins.

Depending on the used rigid drill and the offset, the 4in1 cutting block needs to be removed temporary via the pins to remove the rigid drill and the offset sleeve. The table below shows at which combination of offset sleeve and rigid drill the 4in1 cutting block can be left in place on the bone (✓) and when it needs to be removed via the pins (✗) to remove the rigid drill and the offset sleeve.

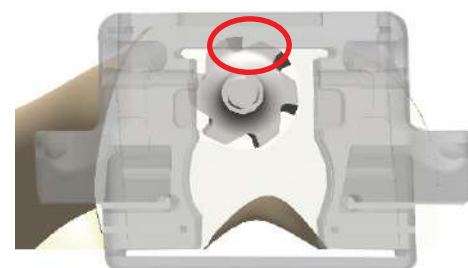


If the 4in1 cutting block can be left in place on the bone according to the table below, use the lateral oblique holes for fixation with pins **1**.

If the 4in1 cutting block needs to be removed via the pins, use the frontal holes **2** for pin fixation.

**Note:** If screw pins are used, it is necessary to insert the screw pins axially to the pin holes.

Offset 0 mm	Offset 2 mm	Offset 4 mm	Offset 6 mm	rigid drill Ø [mm]
✓	✓	✓	✓	10
✓	✓	✓	✓	11
✓	✓	✓	✓	12
✓	✓	✓	✗	13
✓	✓	✓	✗	14
✓	✓	✓	✗	15
✓	✓	✓	✗	16
✓	✓	✗	✗	17
✓	✓	✗	✗	18
✓	✓	✗	✗	19
✓	✓	✗	✗	20
✓	✗	✗	✗	21
✓	✗	✗	✗	22
✓	✗	✗	✗	23
✓	✗	✗	✗	24
✗	✗	✗	✗	25
✗	✗	✗	✗	26
✗	✗	✗	✗	27



Also use the holes **2** in case of changing the femoral size. The femoral cutting block is removed than via the two pins and the cutting block of another size is applied afterwards.

**Note:** In case of changing the femoral size the position of the anterior cut remains the same.

## Femoral preparation 4in1

Resect the anterior and posterior femur through the corresponding slots of the cutting block.

If posterior spacer are needed, the cutting block allows for reresection of 5mm respectively 10mm. For 5mm spacer use the middle one of the three posterior slots and for 10mm the anterior one of the three slots.

Afterwards remove the rigid drill and the long stem sleeve offset.

**Note:** Pay attention that the 4in1 cutting block needs to be removed via the frontal pins where required to remove the rigid drill (table previous page). After removal of the rigid drill the 4in1 cutting block can be put onto the distal femur again via the pins. For increased stability lateral pins can be inserted.

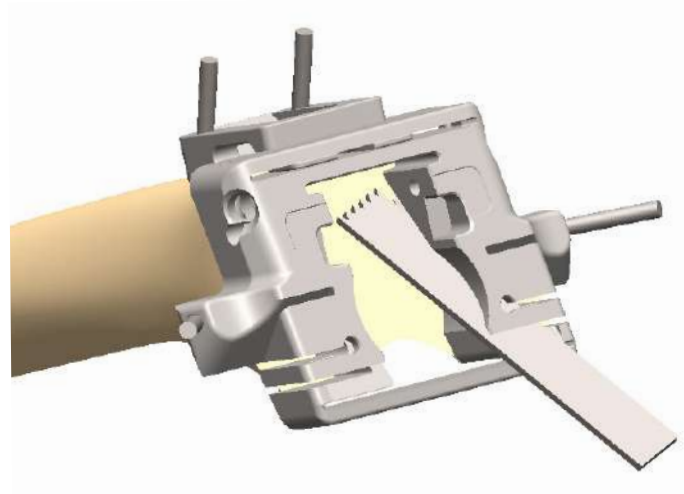
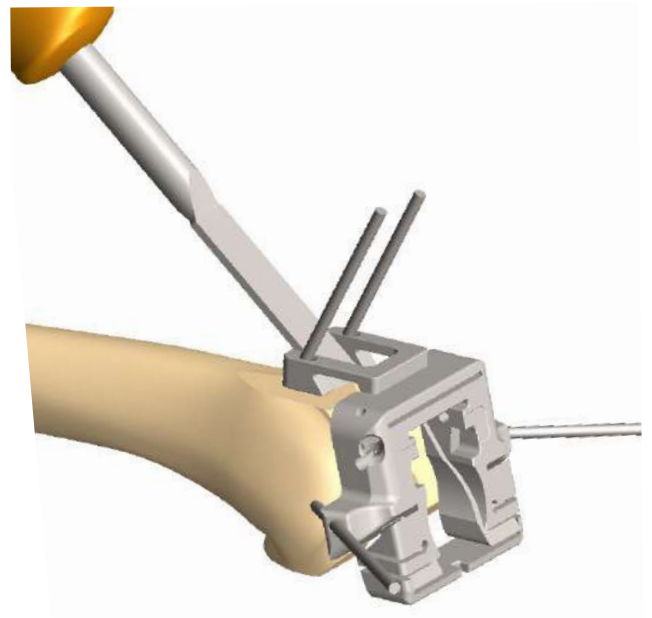
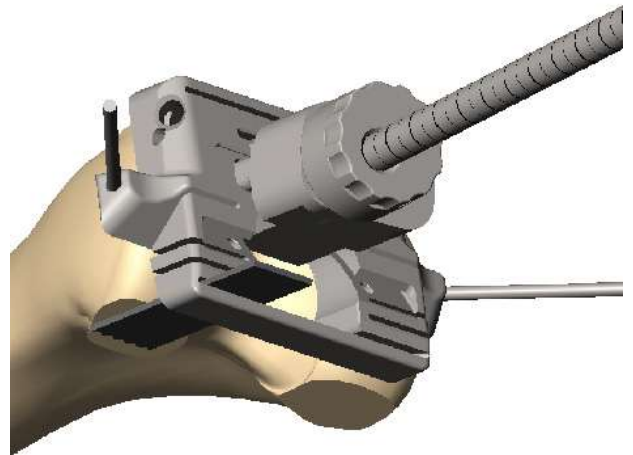
Apply the MK 4in1 attachment notch preparation of the corresponding size (size 2-4 and 5-6) to the cutting block and fix it with two pins to the anterior femur.

Use the osteotome to prepare the anterior notch.

**Note:** Screw pins can be used alternatively.

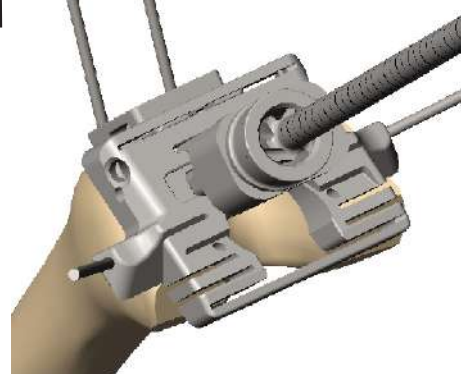
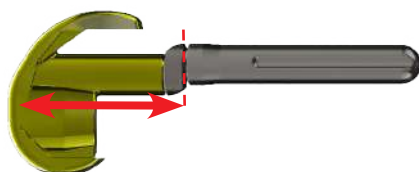


Perform the anterior and posterior chamfer cuts through the corresponding slots of the 4in1 cutting block. Avoid interference of the saw blade with the attachment notch preparation. Where required the attachment notch preparation needs to be removed.



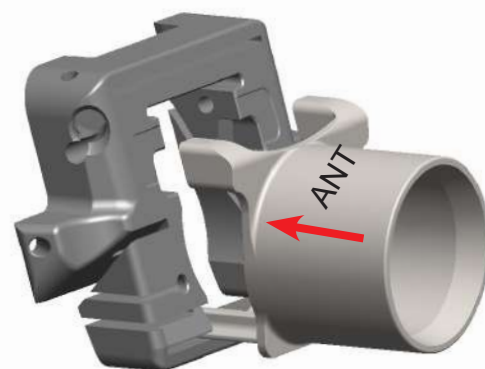
## MUTARS® GenuX® MK

Insert the GenuX® MK femoral drill guide 16mm in the long stem sleeve offset and drill with the rigid drill Ø16mm till the end of the cutting flutes is aligned with the femoral drill guide. This step prepares the transition stem-offset adapter.



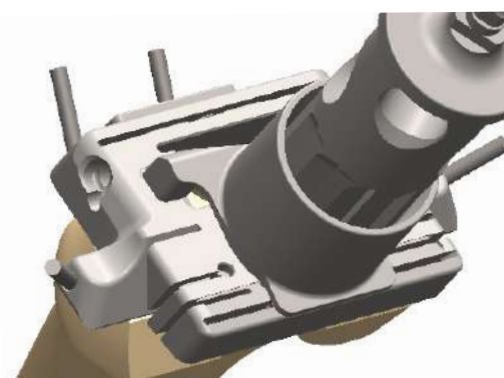
### Femoral box preparation

Remove the offset long stem sleeve and attach the GenuX® MK femoral box reamer guide as shown to the bottom slot of the cutting block. The etching „ANT“ is aligned to the anterior femur.



Ream with the GenuX® MK femoral box reamer till the stop through the reamer guide. In case of using a power-tool ensure that the reamer is rotating prior to contact to the bone.

Remove potential bone residues in the posterior part of the box preparation with a Lüer forceps.



Afterwards remove the 4in1 cutting block and the attachment notch preparation.

### Optional: check of the joint space

Assemble the adapter and the joint space gauger to check the joint space after resection of the tibia and the femur simulating the use of the PE-insert.

Insert the spacer block into the flexion and extension gap to check the joint situation and to make corrections if necessary.



## Short stem preparation

The following stems feature a conical stem portion:

- stem diameter 11mm cemented all lengths
- stem diameter 12mm cementless all lengths
- stem diameter 14mm cementless all lengths



For preparation of this conical portion, connect the GenuX® MK stem reamer conical (diameter 11mm respectively 13mm) to the ic T-handle as follows:

### stem Ø12mm cementless:

stem reamer conical diameter 11mm

### stem Ø11mm cemented and Ø14mm cementless:

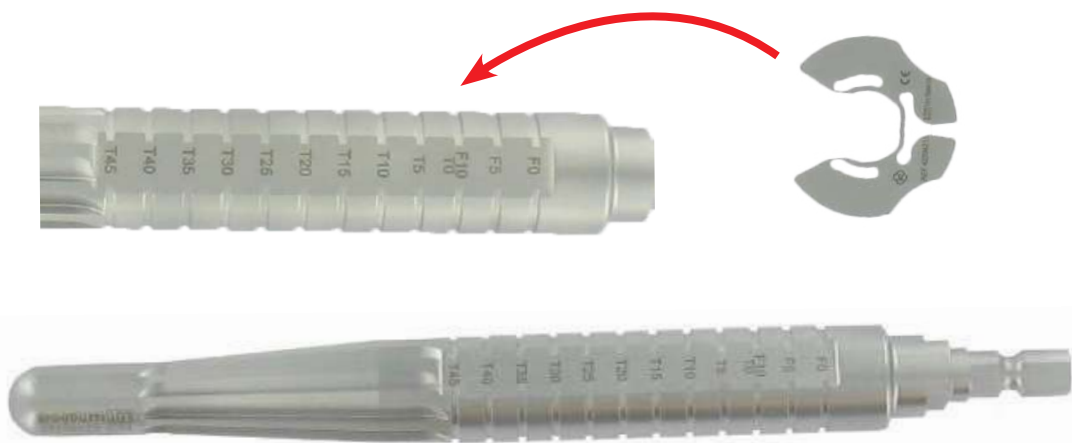
stem reamer conical diameter 13mm

To ensure the correct reaming depth, attach the stop to the corresponding marking of the reamer:

F0: femoral no use of distal spacer

F5: femoral use of 5mm distal spacer, uni- or bilateral

F10: femoral use of 10mm distal spacer, uni- or bilateral



Drive the stem reamer carefully into the prepared intramedullary canal and prepare manually the conical stem portion till the stop touches the distal femur.



Thereby the femoral preparation is finished.

# MUTARS® GenuX® MK

## Tibial preparation

Insert the lastly used rigid drill (together with the corresponding drill sleeve if applicable) in the tibial medullary canal.

**Note:** Ensure an adequate drill depth. Consider „Table for femoral drilling depth“ page 13.

After each resection the drill needs to be inserted deeper. Make sure that the correct mark reach the resection plane.

I Determine the size of the tibial component by means of tibial reaming guide (the outer contour of the reaming guide corresponds to the outer contour of the tibial component). Attach the tibial reaming guide of the corresponding size to the tibia via the rigid drill.

Use the tibial offset alignment (0mm, 2mm, 4mm, 6mm) to evaluate a potential tibial offset.

By turning the respective offset alignment in the tibial reaming guide the optimal position of the reaming guide on the proximal tibia is determined.

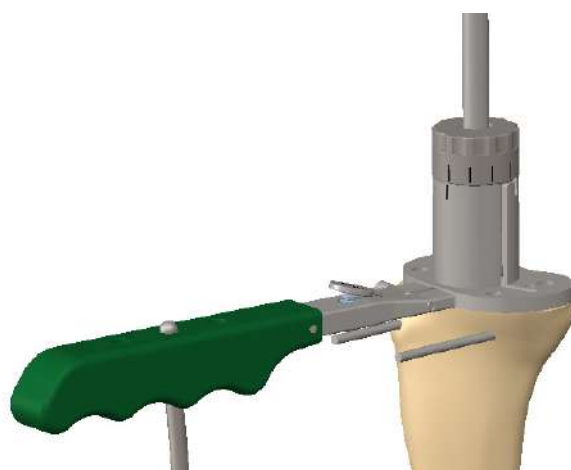
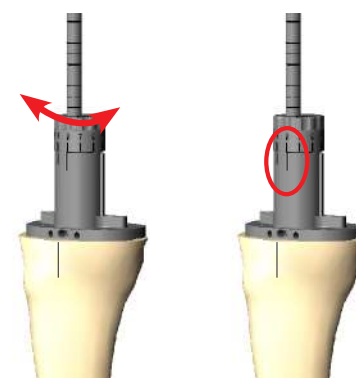
Keep in mind the used offset alignment and the offset position, which is read off the anterior edge of the reaming guide (see marking).

These are necessary for the correct assembling of the trial as well as the implant components.

Tibial trial spacer can be attached to the reaming guide if needed.

When the optimal position is determined, mark the centre of the tibial reaming guide (corresponds later to the centre of the implant) at the anterior edge of the tibia.

The rotational alignment can be checked by use of the tibial alignment handle combined with the external alignment rod.





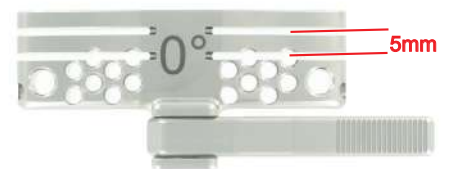
If tibial spacer should be used, the tibial bone is prepared as follows:  
First remove the tibial reaming guide, the offset alignment and the rigid drill.

To compensate tibial bone defects, the tibial cutting block allows for preparation for spacer.  
For 5mm tibial spacer 5mm are resected accordingly. Use the more distal one of both slots of the affected side for this. Use the previous marked position at the anterior tibial edge for orientation for the vertical resection.

**Note:** If the tibia needs to be prepared for 10mm spacer, use the pin holes of the bottom row to fix the cutting block. Thus the distal one of both slots can be used after shifting the block down via the pins.

For spacer of increased thickness use a ruler to measure the defect respectively to determine the required height.

After resection the tibial cutting block and the pins are removed.



Insert again the lastly used rigid drill (together with the respective drill sleeve where required) into the tibial medullary canal. Attach again the tibial reaming guide as well as the offset alignment via the rigid drill and adjust again the previous determined offset position.

Fix the tibial reaming guide with two pins to the tibial bone.

**Note:** Screw pins can be used alternatively..



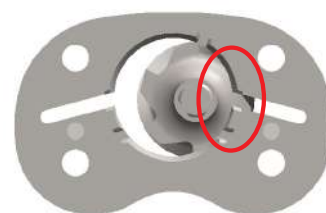


## MUTARS® GenuX® MK

Afterwards remove the offset alignment and the rigid drill. Depending on the used offset and the rigid drill diameter, the tibial reaming guide needs to be removed temporary via the pins, to allow for removal of the rigid drill from the medullary canal.

The table below indicates at which combinations of offset alignment and rigid drill the tibial reaming guide can be left in place on the bone ( ✓ ) and when it needs to be removed temporary via the pins ( ✗ ).

Offset 0 mm	Offset 2 mm	Offset 4 mm	Offset 6 mm	rigid drill Ø [mm]
✓	✓	✓	✓	10
✓	✓	✓	✓	11
✓	✓	✓	✓	12
✓	✓	✓	✗	13
✓	✓	✓	✗	14
✓	✓	✓	✗	15
✓	✓	✓	✗	16
✓	✓	✗	✗	17
✓	✓	✗	✗	18
✓	✓	✗	✗	19
✓	✓	✗	✗	20
✓	✗	✗	✗	21
✓	✗	✗	✗	22
✓	✗	✗	✗	23
✓	✗	✗	✗	24
✗	✗	✗	✗	25
✗	✗	✗	✗	26
✗	✗	✗	✗	27



Attach the tibial reaming guide again via the pins to the bone where required

Prepare the tibia with the GenuX® MK tibial reamer by reaming till the stop through the reaming guide.





## MUTARS® GenuX® MK

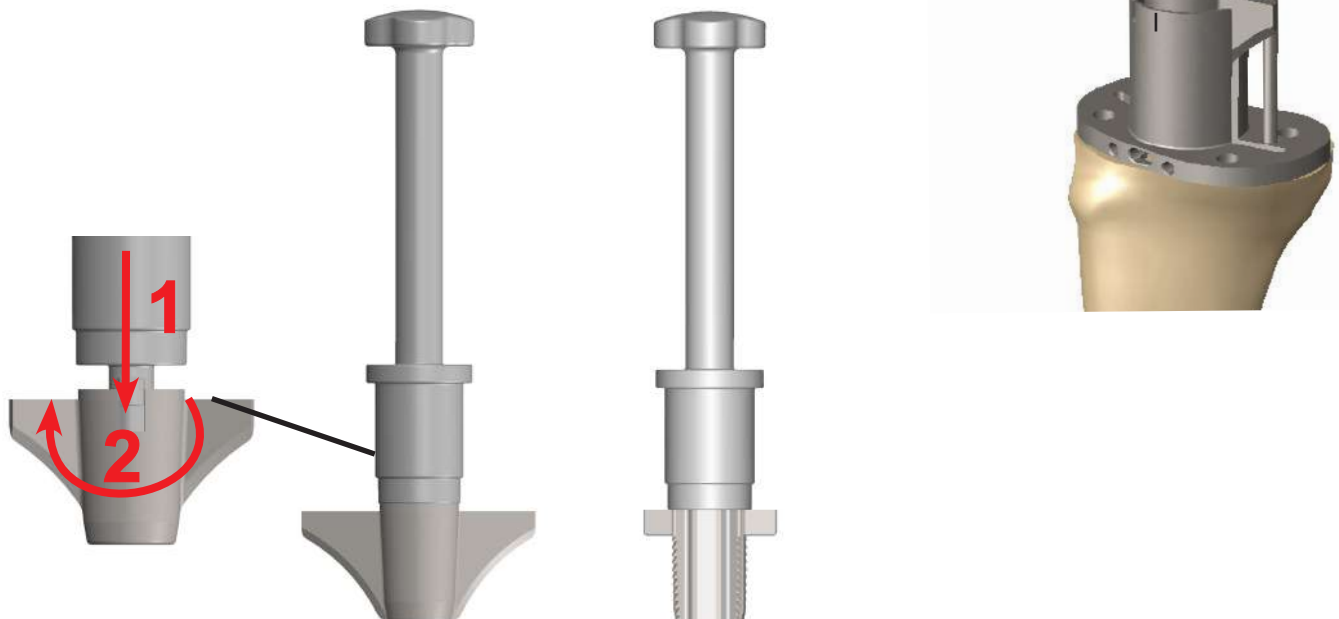
For preparation of the portion covering the tibial coupling insert **1** the GenuX® MK guide for reamer tibial coupling. The positioning is correct when the three bars are aligned with the corresponding three notches of the tibial reaming guide (see markings **2**) and when the etching „ANT“ is directed to the anterior tibia.  
Ream with the GenuX® MK reamer tibial coupling till the stop through the reaming guide.



For the fin preparation connect the the handle to the fin punch of the determined tibial size (size 2-4 and 5-6).  
Punch till the stop through the tibial reaming guide.

Proceed simila with the MK attachments tibial fins.

Remove the fin punch, the reaming guide and the pins afterwards.



# MUTARS® GenuX® MK

## Short stem preparation

The following stems feature a conical stem portion:

- stem diameter 11mm cemented all lengths
- stem diameter 12mm cementless all lengths
- stem diameter 14mm cementless all lengths



For preparation of this conical portion, connect the GenuX® MK stem reamer conical (diameter 11mm respectively 13mm) to the ic T-handle as follows:

### stem Ø12mm cementless:

stem reamer conical diameter 11mm

### stem Ø11mm cemented and Ø14mm cementless:

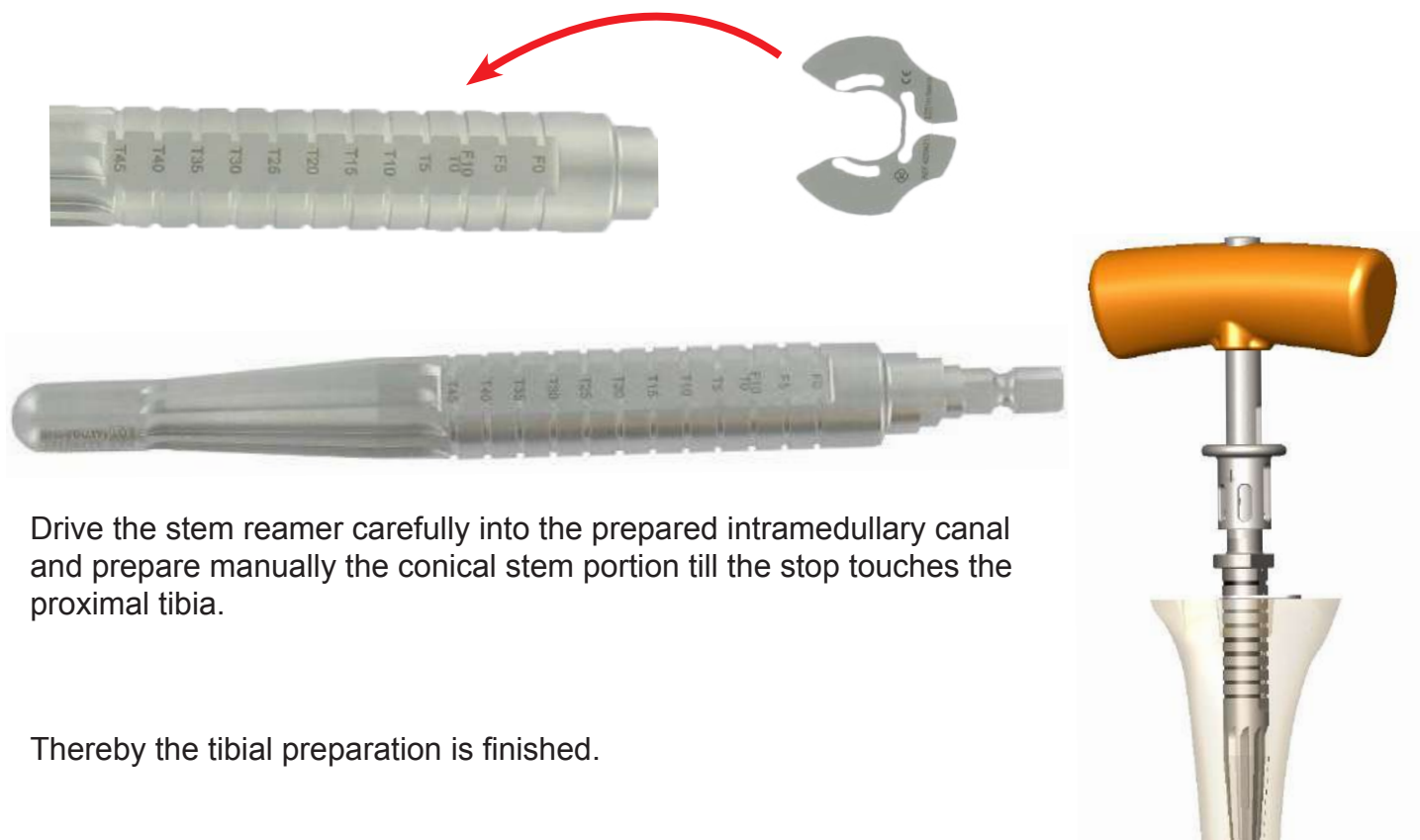
stem reamer conical diameter 13mm

To ensure the correct reaming depth, attach the stop to the corresponding marking of the reamer:

T0: tibial no use of spacer

Tx: tibial use of xmm spacer, uni- or bilateral

x = thickness of tibial spacer (0 / 5 / 10 / 15 / 20 / 25 / 35 / 45mm)



Drive the stem reamer carefully into the prepared intramedullary canal and prepare manually the conical stem portion till the stop touches the proximal tibia.

Thereby the tibial preparation is finished.

## Trial reduction

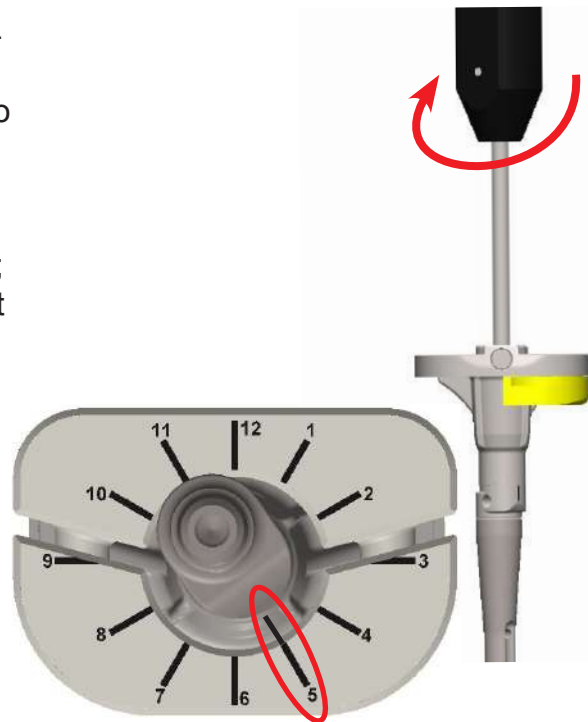
For a trial reduction the components are assembled as followed.

Connect the GenuX® MK tibial trial component to the GenuX® MK trial offset adapter of the afore determined offset by means of the 3.5mm hexagon screw driver.

Ensure the correct position of the offset adapter; use the tibial offset alignment to adjust the offset position (in the shown case offset 4mm position 5). The marking of the offset adapter should be consistent with the afore determined offset position.

Afterwards the trial stem of the determined diameter and length is screwed to the trial offset adapter.

Depending on the planned stem fixation (cemented or cementless) the following use of trial stems is recommended:



trial stem diameter	drill diameter	MUTARS® GenuX® MK stem cementless	MUTARS® GenuX® MK stem cemented
11mm	11mm	12mm	/
13mm	13mm	14mm	11mm
15mm	15mm	16mm	13mm
17mm	17mm	18mm	15mm
19mm	19mm	20mm	17mm
21mm	21mm	22mm	19mm
23mm	23mm	24mm	/
25mm	25mm	26mm	/
27mm	27mm	28mm	/

For simulation of spacer tibial trial spacer of the determined size can be attached to the tibial trial component.

**Note:** If spacer of 25mm or 35mm height are used, the spacer need to be fixed to the tibial component prior to fixation of the offset adapter.

**Note:** If spacer of 45mm height are used, just the 0mm offset adapter can be combined with the tibial component.

Use the GenuX® MK tibial impactor to insert the tibial trial component to the prepared tibia.



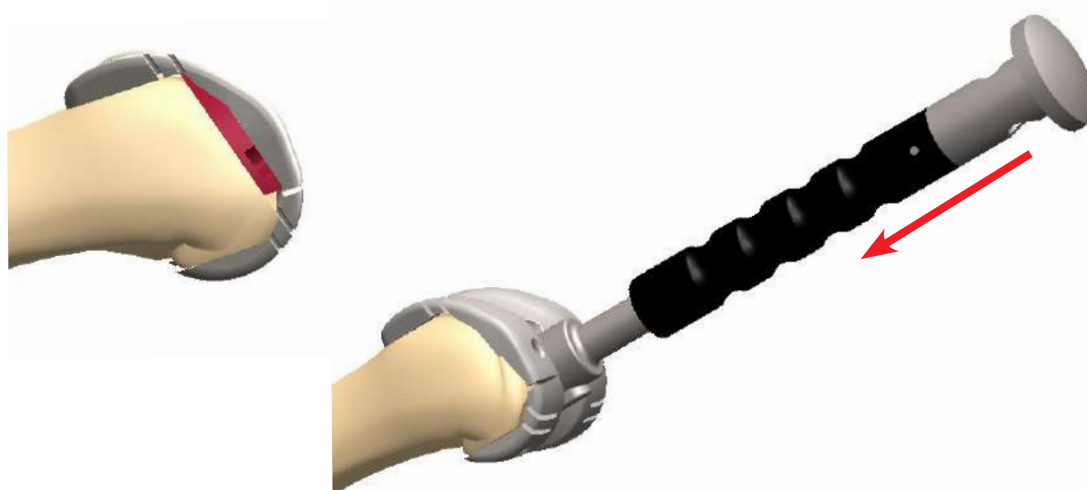
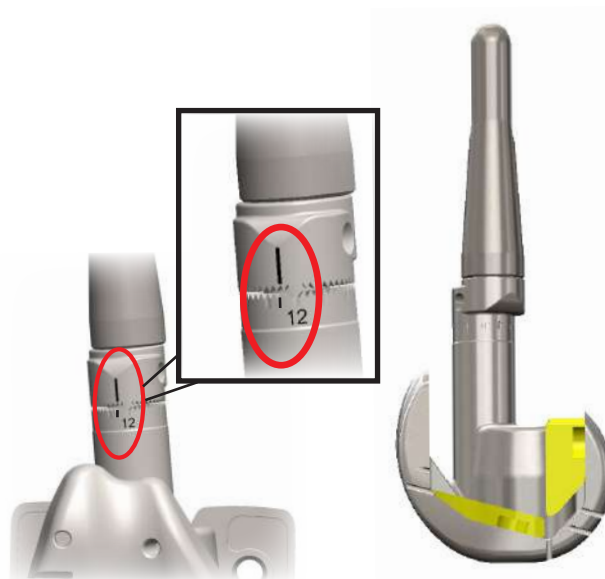
## MUTARS® GenuX® MK

Femorally the trial offset adapter of the afore determined offset is also connected to the femoral trial component. Ensure the correct positioning of the adapter and fix it by means of the hexagon screw driver 3.5mm (in the shown case position 1).

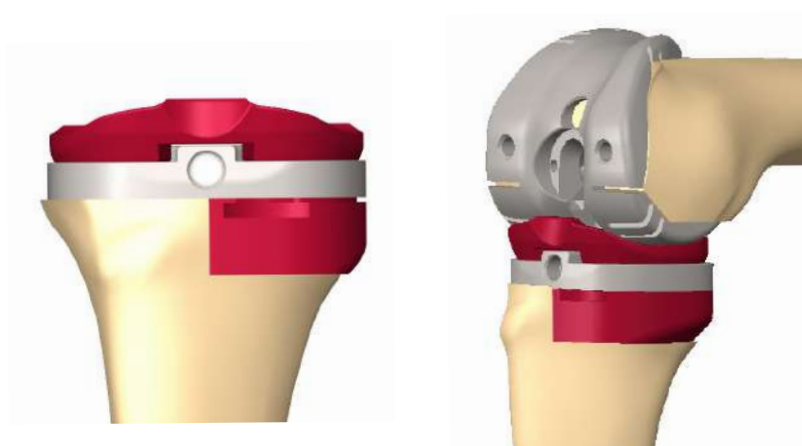
Afterwards the respective trial stem is screwed to the trial offset adapter.

If femoral spacer are used, first attach the posterior and than the distal spacer of the corresponding size to the femoral trial component.

Insert the femoral trial component by means of the femoral impactor.



Select the tibial trial insert of the desired type (Mobile-Bearing or Fixed-Bearing trial PE-insert) and place it to the tibial trial component. The size of the PE-insert corresponds to the size of the tibial component.





## MUTARS® GenuX® MK

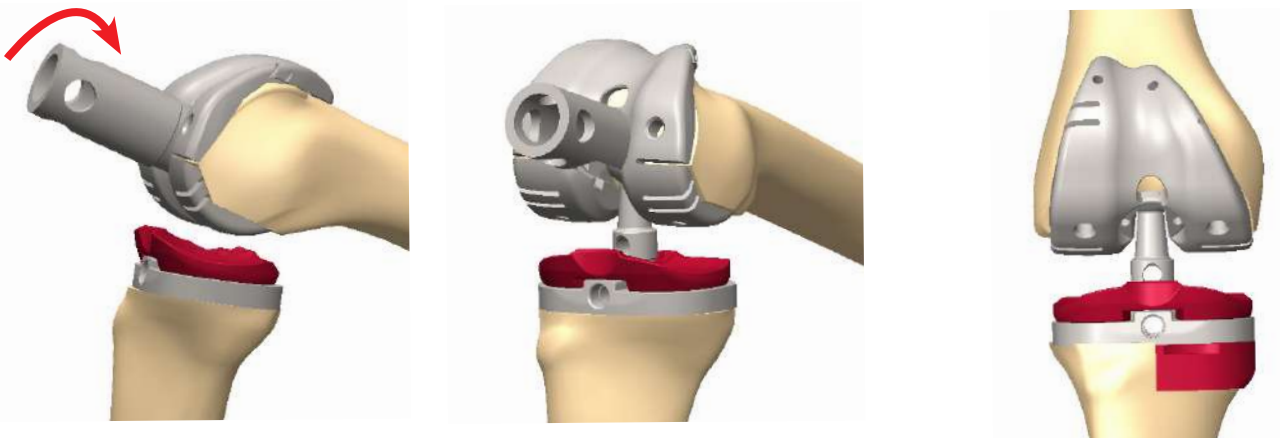
Use the instrument for the locking mechanism to insert the GenuX® MK trial coupling into the femoral trial component.

The trial coupling and the instrument for the locking mechanism are assembled as shown **1**. Turn the coupling in a way that it falls into the sleeve of the instrument **2**.



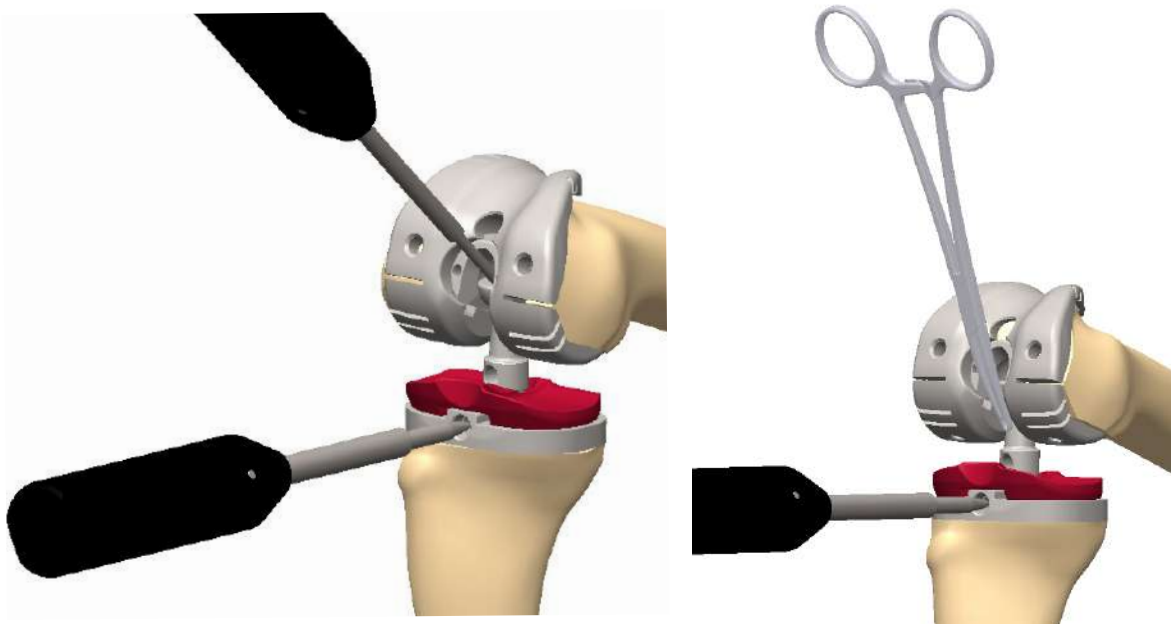
Afterwards insert the coupling into the femoral box with the knee in flexion. For fixation turn the coupling via the instrument by 90° clockwise.

The coupling is positioned correct, when the peg falls out of the sleeve of the instrument. Remove the instrument afterwards.



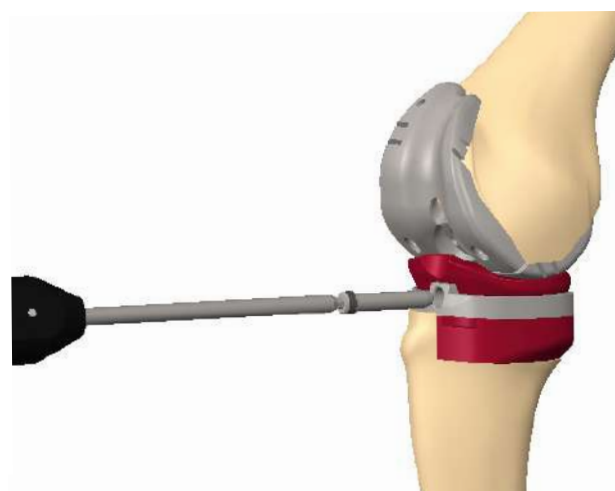
Place the peg of the coupling in the opening of the tibial trial component in a way that the hole is directed towards anterior. Use the setting instrument for the locking mechanism or the assembling forceps as aid in positioning.

Insert the positioner from ventral into the hole of the tibial trial component to ensure the correct positioning of the peg.



## MUTARS® GenuX® MK

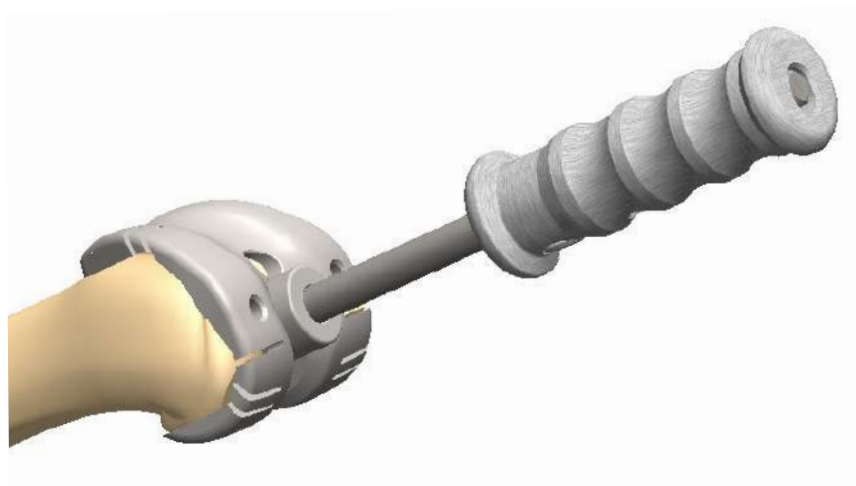
Lock the coupling from ventral with the trial screw for coupling and the hexagon screwdriver 3,5mm.



Check the joint stability in flexion and extension.  
If the femur needs to be prepared for spacer at this point of time, the preparation can be performed accordingly through the slots of the femoral trial component (distal 5mm and 10mm, posterior 10mm).



Remove all trial components. Use the slap hammer combined with the extractor for the femoral component respectively the tibia extractor.



## Implantation of the components

The assembling of the implant components is performed analogue to the description for the trial components.

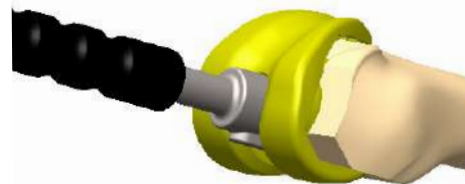
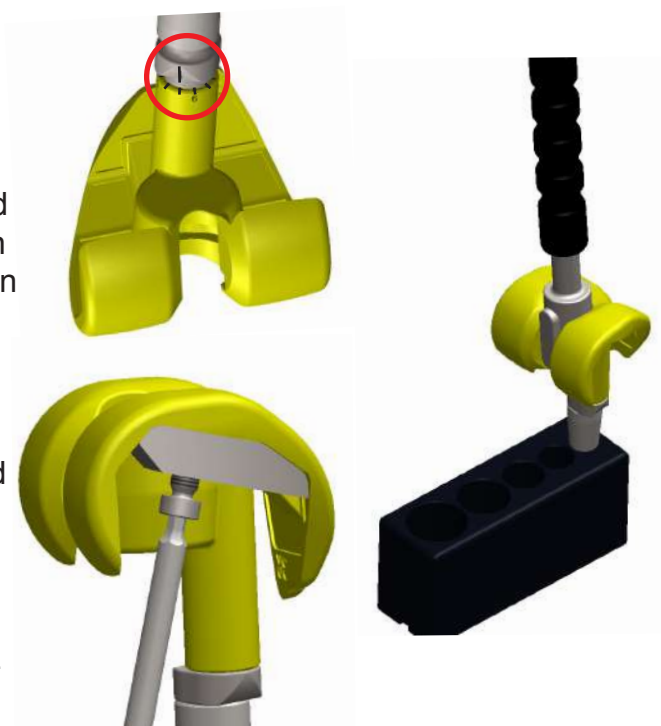
Place the offset adapter of the determined offset into the taper of the femoral component.

Ensure the correct positioning of the offset adapter.

Afterwards attach the stem of the determined size and length to the offset adapter. Fix the conical connection by means of the impactor for the femoral component in the stem assembly block.

If femoral spacer are used, first fix the posterior spacer and afterwards the distal spacer of the determined size to the femoral component. For fixation use the delivered screw and the hexagon screw driver 3.5mm respectively the flexible screw driver 3.5mm.

Impact the femoral component by means of the femoral impactor.

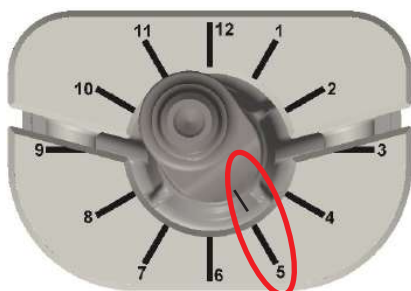


Attach the offset adapter of the determined offset to the taper of the tibial component. Ensure again the correct positioning of the offset adapter (in the shown case offset 4mm position 5).

Afterwards attach the stem of the determined size and length to the offset adapter. Fix the conical connection by means of the tibial impactor in the stem assembly block.

If tibial spacer are used, fix the tibial spacer with the delivered screw by use of the hexagon screw driver 3.5mm to the tibial component.

Impact the tibial component by means of the the tibial impactor.



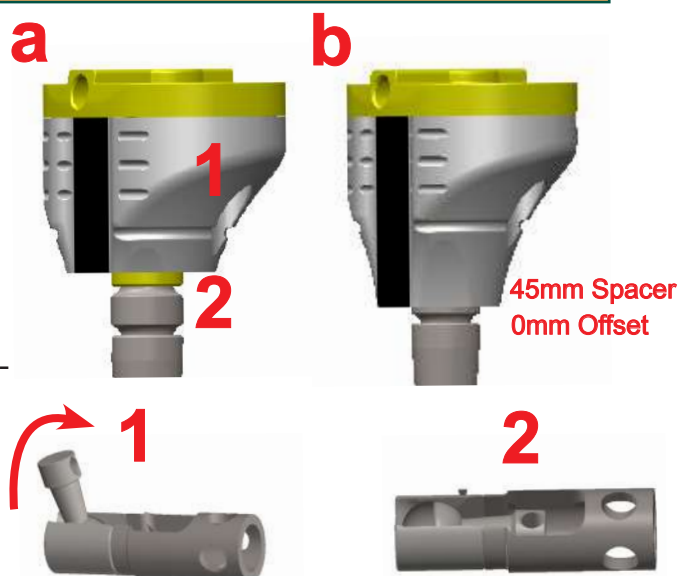


## MUTARS® GenuX® MK

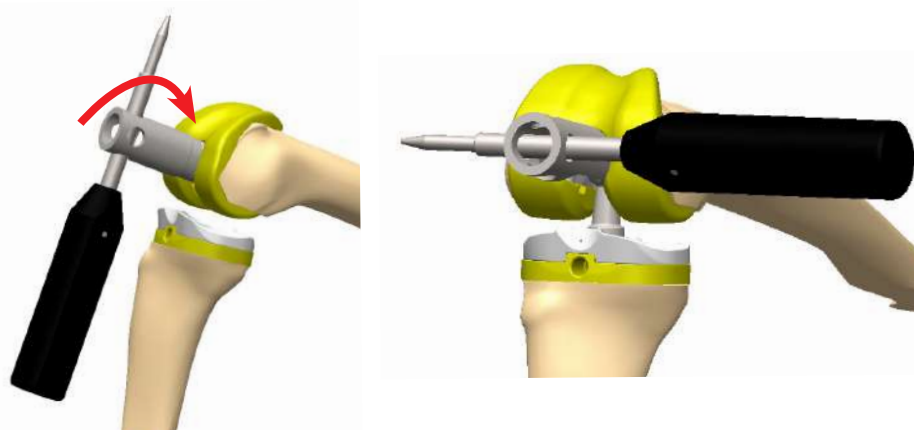
**Note:** If spacer of the height 25mm or 35mm are used, first the spacer needs to be fixed to the tibial component before the offset adapter is attached to the tibial component **a**.

**Note:** If spacer of a height from 45mm are used, just the offset adapter 0mm can be combined with the tibial component **b**.

Use the instrument for the locking mechanism to insert the GenuX® MK coupling into the femoral component. The coupling and the instrument are assembled as shown **1**. Turn the coupling and the instrument in a way that the coupling falls into the sleeve of the instrument **2**.

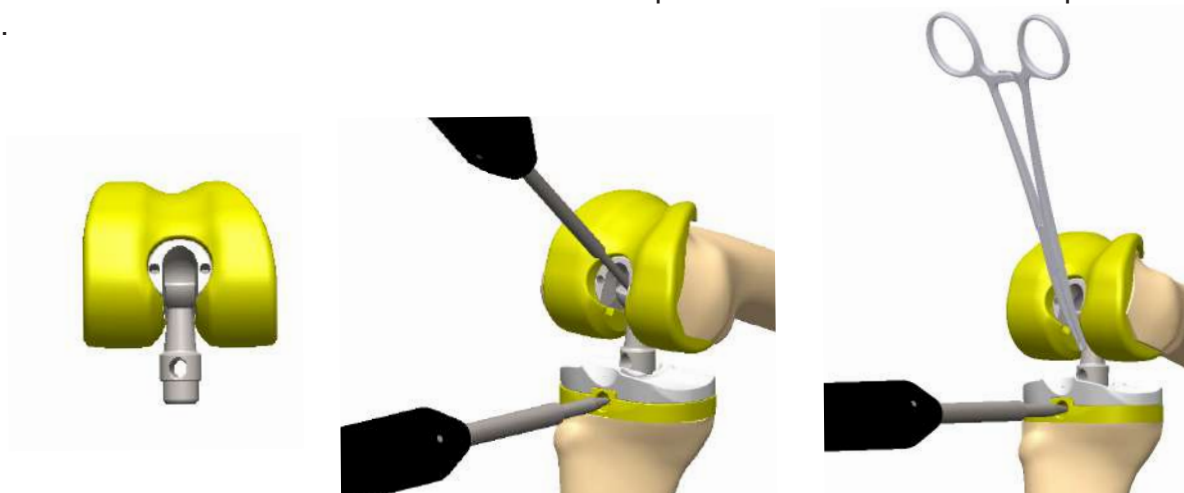


Afterwards insert the coupling into the femoral box with the knee in flexion. For fixation of the coupling turn the coupling by 180° clockwise by use of the positioner as lever. The coupling is positioned correct, when the peg of the coupling falls out of the sleeve of the instrument. Remove the instrument for the locking mechanism afterwards.



Place the peg of the coupling in the opening of the tibial component in a way that the hole is directed towards anterior. Use the setting instrument for the locking mechanism or the assembling forceps as aid in positioning.

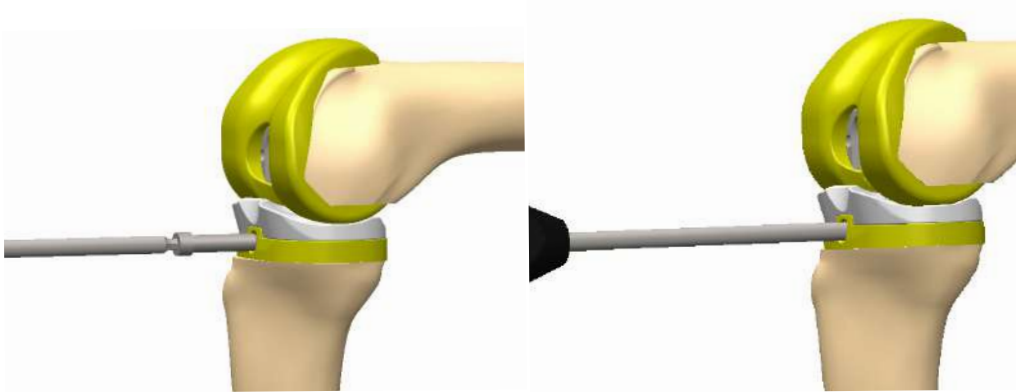
Insert the positioner from ventral into the hole of the tibial component to ensure the correct positioning of the peg.





## MUTARS® GenuX® MK

Lock the coupling from ventral with the GenuX® MK locking screw for the coupling and the hexagon screwdriver 3.5mm.



Use the hexagon screwdriver 3.5mm to insert the counterscrew and to lock the screw. In doing so the implantation of the components is finished. Make final joint stability tests in flexion and extension prior to closure of the lesion.

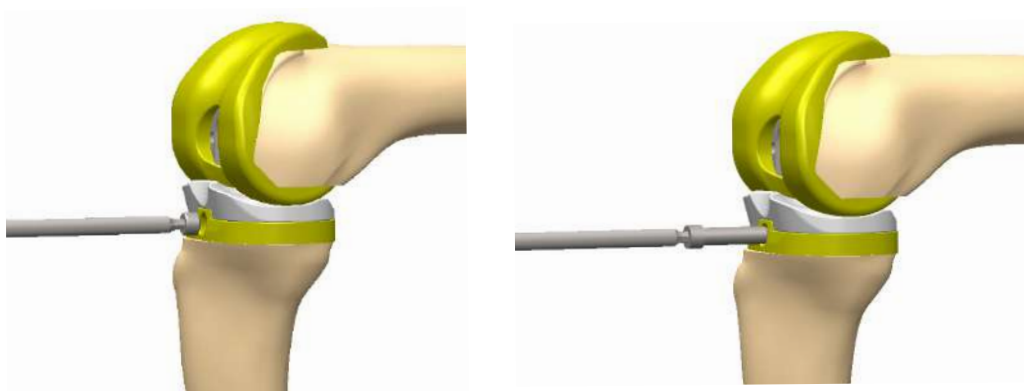


# MUTARS® GenuX® MK

## Explantation of the components

In case of an explantation loosen the tibial counterscrew and the locking screw from ventral first by use of the hexagon screwdriver 3.5mm.

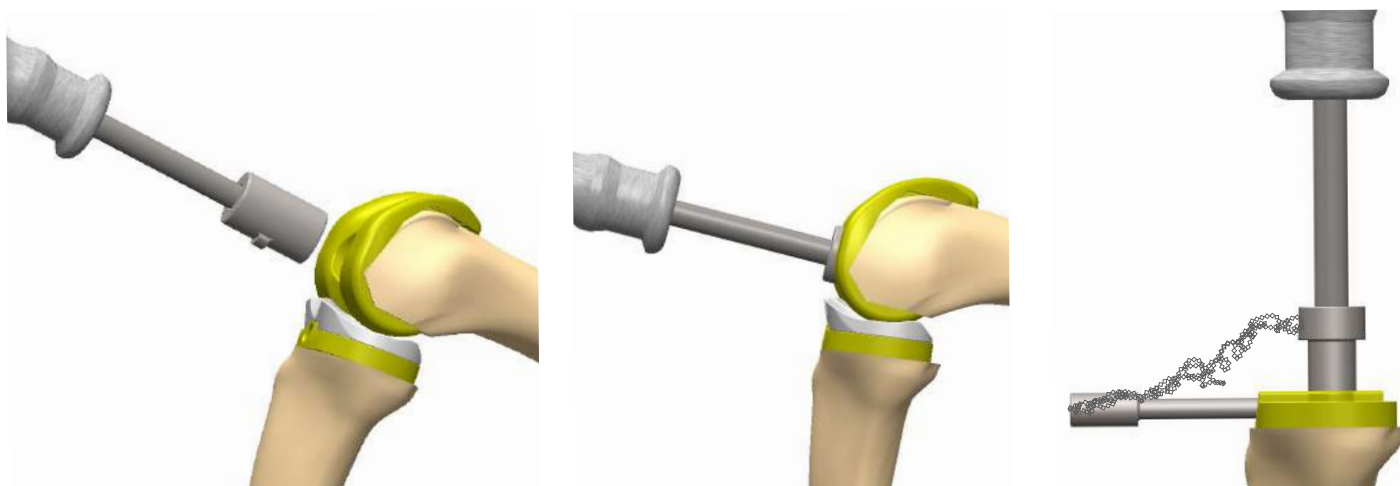
Use the instrument for the locking mechanism to remove the coupling from the femoral component.



Afterwards the femoral component can be removed by means of the extractor for the femoral component and the slap hammer.

Tibially fix the tibial extractor to the slap hammer and place it on top of the tibial component into the locking hole of the tibial component.

Lock the extractor with the locking bolt from ventral. Afterwards the tibial component can be removed with the slap hammer.



If the connection between femoral and tibial component becomes loose during explantation, the slap hammer adapter M5 can be screwed into the offset adapter, to remove it by means of the slap hammer.

If the connection between offset adapter and stem becomes loose during explantation, the adapter for the slap hammer can be screwed into the stem to remove it with the slap hammer.

## Implants

### MUTARS® GenuX® MK stem cementless HA

*implatan®*,  $TiAl_6V_4$  acc. to ISO 5832-3 with HA-coating acc. To ISO 13779-2



diameter	L:125mm	L: 150mm	L: 200mm	L: 250mm
12mm	5767-1212	5767-1215	5767-1220*	5767-1225*
14mm	5767-1412	5767-1415	5767-1420*	5767-1425*
16mm	5767-1612	5767-1615	5767-1620*	5767-1625*
18mm	5767-1812	5767-1815	5767-1820*	5767-1825*
20mm	5767-2012	5767-2015	5767-2020*	5767-2025*
22mm	5767-2212	5767-2215	5767-2220*	5767-2225*
24mm	5767-2412			
26mm	5767-2612			
28mm	5767-2812			

\* 2 distal holes (Ø5mm) for possible screw fixation

### MUTARS® GenuX® MK stem cemented \*N

*implavit®*, CoCrMo acc. to ISO 5832-4



diameter	L:125mm	L: 150mm	L: 200mm	L: 250mm
11mm	5766-1112	5766-1115	5766-1120*	5766-1125*
13mm	5766-1312	5766-1315	5766-1320*	5766-1325*
15mm	5766-1512	5766-1515	5766-1520*	5766-1525*
17mm	5766-1712	5766-1715	5766-1720*	5766-1725*
19mm	5766-1912	5766-1915	5766-1920*	5766-1925*

\* 2 distal holes (Ø5mm) for possible screw fixation

### MUTARS® GenuX® MK offset adapter

*implatan®*,  $TiAl_6V_4$  acc. to ISO 5832-3



0mm	+2mm	+4mm	+6mm
5751-0000	5751-0002	5751-0004	5751-0006

# MUTARS® GenuX® MK



## MUTARS® GenuX® MK femoral component cemented \*N

*implavit®, CoCrMo acc. to ISO 5832-4*

size	left	right
2	5720-0505	5720-0500
3	5720-0515	5720-0510
4	5720-0525	5720-0520
5	5720-0535	5720-0530



## MUTARS® GenuX® MK femoral component cementless \*N

*implavit®, CoCrMo acc. to ISO 5832-4*

size	left	right
2	5720-1405	5720-1400
3	5720-1415	5720-1410
4	5720-1425	5720-1420
5	5720-1435	5720-1430



## MK femoral spacer posterior (incl. MK screw) \*S

*implatan®, TiAl<sub>6</sub>V<sub>4</sub> acc. to ISO 5832-3*

size	5mm	10mm
2	5722-2005	5722-2010
3	5722-3005	5722-3010
4	5722-4005	5722-4010
5	5722-5005	5722-5010



## MK femoral spacer distal (incl. MK screw) \*S

*implatan®, TiAl<sub>6</sub>V<sub>4</sub> acc. to ISO 5832-3*

size	5mm		10mm	
	distal ll/rm	distal rl/lm	distal ll/rm	distal rl/lm
2	5722-5205	5722-5200	5722-0205	5722-0200
3	5722-5305	5722-5300	5722-0305	5722-0300
4	5722-5405	5722-5400	5722-0405	5722-0400
5	5722-5505	5722-5500	5722-0505	5722-0500


**MK screws for spacer**
*implatan®*,  $TiAl_6V_4$  acc. to ISO 5832-3

5720-1216


**MUTARS® GenuX® MK coupling \*N**
*CoCrMo* acc. to ISO 5832-12

5720-1210


**MUTARS® GenuX® MK MB PE insert**
*UHMW-PE* acc. to ISO 5834-2

**size**

<b>2</b>	5721-0102
<b>3</b>	5721-0103
<b>4</b>	5721-0104
<b>5</b>	5721-0105


**MUTARS® GenuX® MK FB PE insert**
*UHMW-PE* acc. to ISO 5834-2

**size**

<b>2</b>	5721-0202
<b>3</b>	5721-0203
<b>4</b>	5721-0204
<b>5</b>	5721-0205


**MUTARS® GenuX® MK tibial component cemented  
incl. counter screw + screw for coupling \*N**
*implavit®*, *CoCrMo* acc. to ISO 5832-4

**size**

<b>2</b>	5751-0602
<b>3</b>	5751-0603
<b>4</b>	5751-0604
<b>5</b>	5751-0605

## MUTARS® GenuX® MK tibial component cementless incl. counter screw + screw for coupling \*N

*implavit®, CoCrMo acc. to ISO 5832-4*



### size

<b>2</b>	5751-0702
<b>3</b>	5751-0703
<b>4</b>	5751-0704
<b>5</b>	5751-0705

## MK tibial spacer (incl. MK screws) \*S

*implatan®, TiAl<sub>6</sub>V<sub>4</sub> acc. to ISO 5832-3*



size	5mm	10mm	5mm	10mm
	LL/RM	LL/RM	RL/LM	RL/LM
2	5740-5052	5740-5102	5741-0052	5741-0102
3	5740-5053	5740-5103	5741-0053	5741-0103
4	5740-5054	5740-5104	5741-0054	5741-0104
5	5740-5055	5740-5105	5741-0055	5741-0105

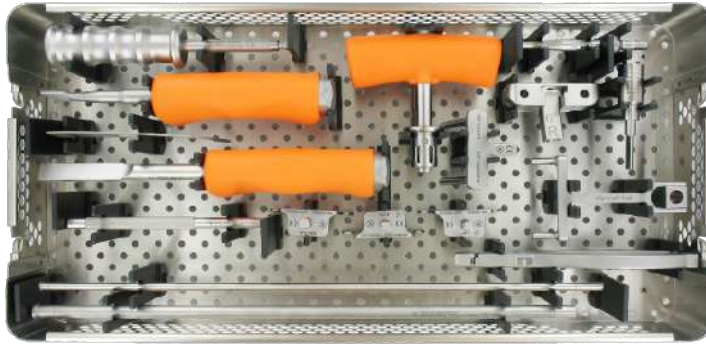
size	15mm	20mm	15mm	20mm
	LL/RM	LL/RM	RL/LM	RL/LM
2	5740-5152	5740-5202	5741-0152	5741-0202
3	5740-5153	5740-5203	5741-0153	5741-0203
4	5740-5154	5740-5204	5741-0154	5741-0204
5	5740-5155	5740-5205	5741-0155	5741-0205



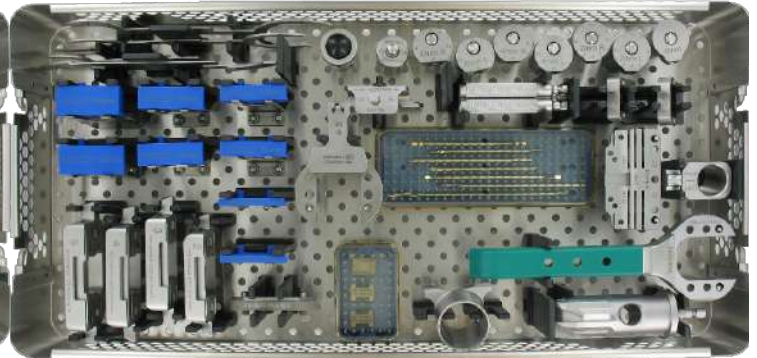
size	25mm	35mm	45mm
	2	5740-0252	5740-0352
3	5740-0253	5740-0353	5740-0453
4	5740-0254	5740-0354	5740-0454
5	5740-0255	5740-0355	5740-0455



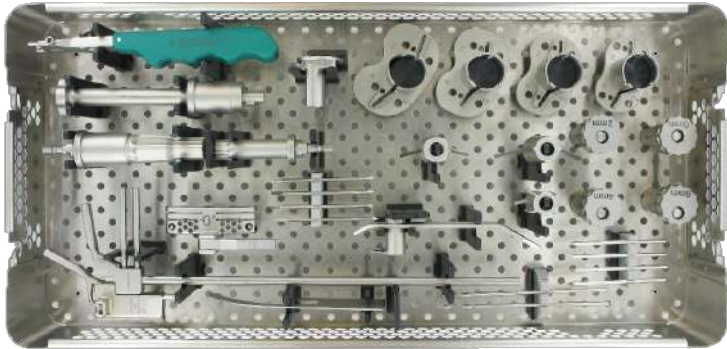
**Instrument containers**



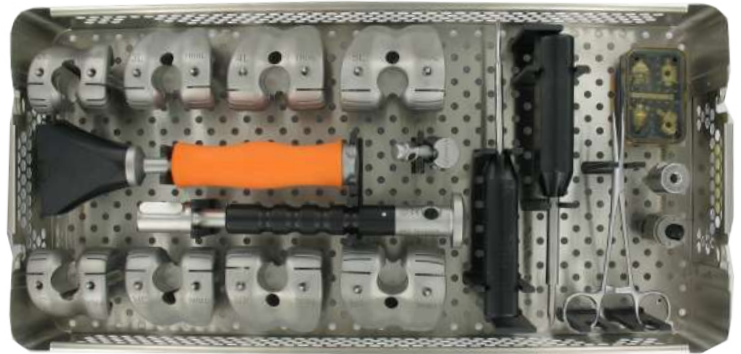
**7999-5800 GenuX® MK Basic container**



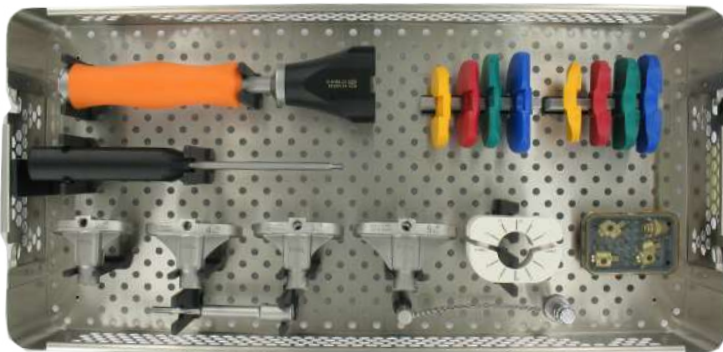
**7999-5801 MK femoral container**



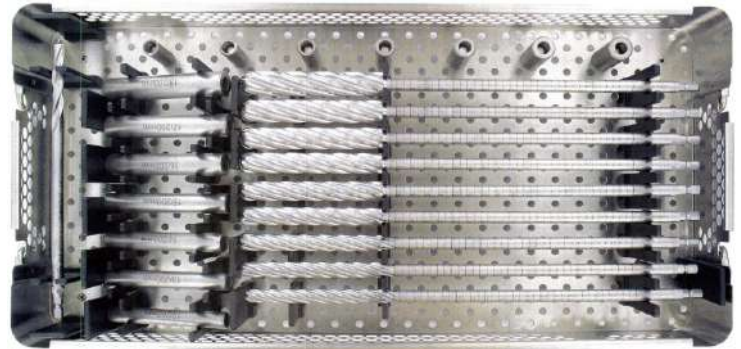
**7999-5802 MK tibial container**



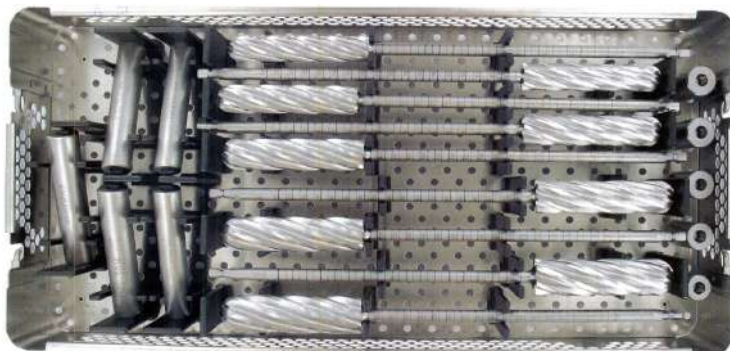
**7999-5803 MK femoral trial container**



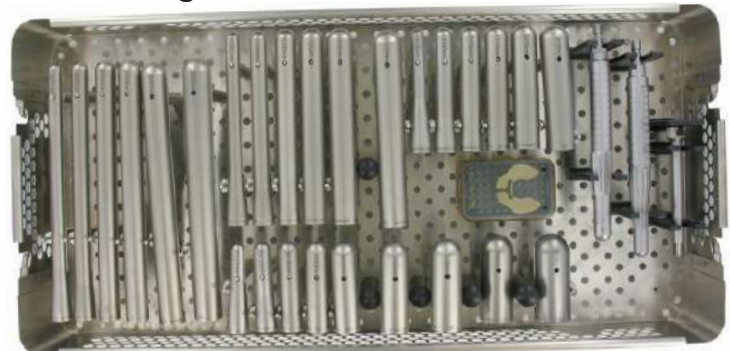
**7999-5804 MK tibial trial container**



**7999-5774 rigid drill container 1**



**7999-5775 rigid drill container 2**

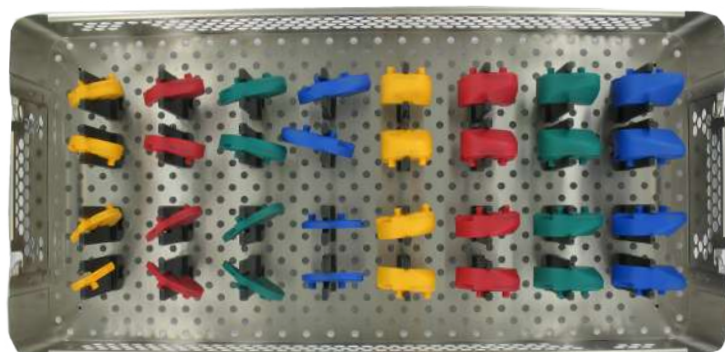


**7999-5805 MK trial stem container**

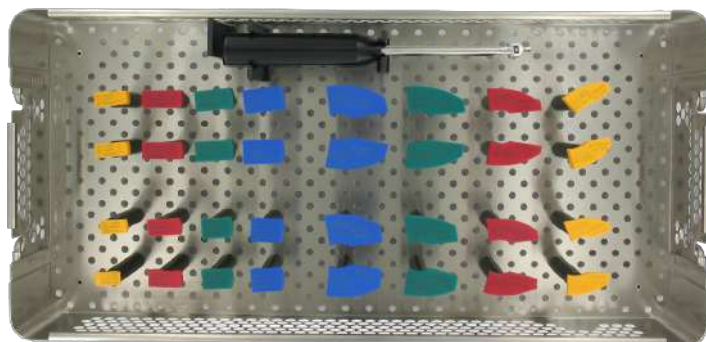




# MUTARS® GenuX® MK



7999-5808 MK tibial trial spacer container



7999-5807 MK femoral trial spacer container



7999-5770 stem assembly container



### Instruments

#### GenuX® MK Basic container 7999-5800

external alignment rod 6x400mm  
4223-0035



resection check long  
4220-0318



Femoral alignment guide 6°  
4220-0880



Distal cutting-block  
adapter  
4220-0819



external rotation guide  
4220-0820 neutral  
4220-0824 3° right  
4220-0825 3° left



external alignment host  
4223-0004



pin inserter 3,2mm  
4223-0006



ic-T-handle Zimmer-Jakobs  
4223-0023



slap hammer short  
4223-0031



adapter M8 for slap hammer  
4223-0032



femoral/tibial extractor  
4223-0036



osteotom size 2-6  
4223-0060



pin extractor  
7512-0800



ic adapter  
4223-0022



ic pin-adapter  
4220-0421



#### MK tibial trial container 7999-5804

GenuX® MK tibial impactor  
4214-0130



hexagon screw driver short 3,5mm  
0280-1007



GenuX® MK trial tibial component  
7751-0602 size 2  
7751-0603 size 3  
7751-0604 size 4  
7751-0605 size 5



MK tibial offset alignment instrument  
4220-4210



GenuX® MK trial offset adapter  
7751-0000 0mm  
7751-0002 2mm  
7751-0004 4mm  
7751-0006 6mm



GenuX® MK MB trial PE-insert  
7721-0102 size 2  
7721-0103 size 3  
7721-0104 size 4  
7721-0105 size 5



GenuX® MK FB trial PE-insert  
7721-0202 size 2  
7721-0203 size 3  
7721-0204 size 4  
7721-0205 size 5



MUTARS® tibia extractor m-o-m  
7755-0020



adapter for slap hammer M5  
7801-0025



## Rigid drill container 1 7999-5774

### Drill sleeve

4211-1512 12/150mm  
 4211-1513 13/150mm  
 4211-1514 14/150mm  
 4211-1515 15/150mm  
 4211-1516 16/150mm  
 4211-1517 17/150mm  
 4211-1518 18/150mm

4211-2012 12/200mm  
 4211-2013 13/200mm  
 4211-2014 14/200mm  
 4211-2015 15/200mm  
 4211-2016 16/200mm  
 4211-2017 17/200mm  
 4211-2018 18/200mm



### Rigid drill

4220-3110 Ø10/330mm  
 4220-3111 Ø11/330mm  
 4220-3112 Ø12/330mm  
 4220-3113 Ø13/330mm  
 4220-3114 Ø14/330mm  
 4220-3115 Ø15/330mm  
 4220-3116 Ø16/330mm  
 4220-3117 Ø17/330mm  
 4220-3118 Ø18/330mm



### initiator drill 9mm

4220-0014



## Rigid drill container 2 7999-5775

### Drill sleeve

4211-1519 19/150mm  
 4211-1520 20/150mm  
 4211-1521 21/150mm  
 4211-1522 22/150mm  
 4211-1523 23/150mm

4211-2019 19/200mm  
 4211-2020 20/200mm  
 4211-2021 21/200mm  
 4211-2022 22/200mm  
 4211-2023 23/200mm



### Rigid drill

4220-3119 Ø19/330mm  
 4220-3120 Ø20/330mm  
 4220-3121 Ø21/330mm  
 4220-3122 Ø22/330mm  
 4220-3123 Ø23/330mm  
 4220-3124 Ø24/330mm  
 4220-3125 Ø25/330mm  
 4220-3126 Ø26/330mm  
 4220-3127 Ø27/330mm



**MK Femur container 7999-5801**

GenuX® MK femoral box reamer  
4214-0126



GenuX® MK femoral box reamer guide  
4214-0122



adapter for joint space gauger  
4210-4301



spacer shim 12,5mm  
4210-4312



MK 4in1 femoral cutting block  
4220-4220 Size 2  
4220-4230 Size 3  
4220-4240 Size 4  
4220-4250 Size 5



MK joint space gauger  
4210-4310



fixation pin 3,2mm x 77mm (4 pieces)  
4223-0029



MK long stem sleeve offset  
4220-0522



MK distal femoral cutting block  
4220-0520



drill 126 x 3,2 mm  
4221-0019



MK distal distance adapter magnetic  
4219-0505 5mm  
4219-0510 10mm  
4219-0515 +5mm



femoral positioner  
4220-0521



MK spacer for femoral positioner  
4211-1005 5mm  
4211-1010 10mm  
4211-1015 15mm  
4211-1020 20mm



femoral sizing template  
4220-4020 size 2  
4220-4033 size 3-4  
4220-4035 size 5-6



femoral resection guide 1,5mm  
4220-0515



MK rotation guide neutral  
4220-0500



GenuX® MK femoral drill guide Ø16mm  
4214-0121



MK 4in1 attachment notch preparation  
4220-0624 size 2-4  
4220-0565 size 5-6



modular handle "fast fix" (3 pieces)  
4223-0017



MK offset sleeve  
4220-0530 0mm  
4220-0532 left 2mm  
4220-1032 right 2mm  
4220-0534 left 4mm  
4220-1034 right 4mm  
4220-0536 left 6mm  
4220-1036 right 6mm



offset indicator  
4220-0533



fixation pin 3,2mm x 97mm (2 pieces)  
4223-0008



drilling pin 3,2mm x 97mm  
4224-0133



drilling pin 3,2mm x 77mm  
4224-0132



# MUTARS® GenuX® MK

## MK femoral trial container 7999-5803

GenuX® MK extractor for femoral component  
4214-0129



femoral impactor short  
4223-0044



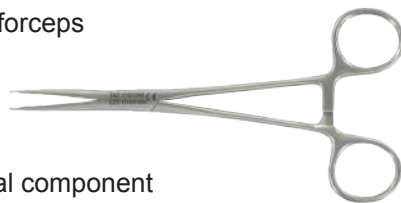
MUTARS® impactor for femoral component  
7610-0000



MUTARS® positioner for locking mechanism  
7610-0003



MUTARS® assembling forceps  
7720-1202



GenuX® MK trial femoral component  
7720-1500 size 2 right  
7720-1505 size 2 left  
7720-1510 size 3 right  
7720-1515 size 3 left  
7720-1520 size 4 right  
7720-1525 size 4 left  
7720-1530 size 5 right  
7720-1535 size 5 left



GenuX® MK trial offset adapter  
7751-0000 0mm  
7751-0002 2mm  
7751-0004 4mm  
7751-0006 6mm



setting instrument for locking mechanism  
7751-1200



MUTARS® instrument for locking mechanism  
7720-1201



GenuX® MK trial coupling  
7720-1210



GenuX® MK trial screw for coupling  
7720-1213



## MK femoral trial spacer container 7999-5807

MK trial femoral spacer

distal ll/rm  
7724-2005 2/5mm  
7724-3005 3/5mm  
7724-4005 4/5mm  
7724-5005 5/5mm  
7724-2010 2/10mm  
7724-3010 3/10mm  
7724-4010 4/10mm  
7724-5010 5/10mm



distal rl/lm  
7725-2005 2/5mm  
7725-3005 3/5mm  
7725-4005 4/5mm  
7725-5005 5/5mm  
7725-2010 2/10mm  
7725-3010 3/10mm  
7725-4010 4/10mm  
7725-5010 5/10mm

posterior  
7723-2005 2/5mm  
7723-3005 3/5mm  
7723-4005 4/5mm  
7723-5005 5/5mm  
7723-2010 2/10mm  
7723-3010 3/10mm  
7723-4010 4/10mm  
7723-5010 5/10mm



flexible screw driver 3,5mm short  
0270-1000





**MK Tibial trial spacer container**

**7999-5808**

MK trial tibial spacer  
ll/rm

- 7740-5052 2/5mm
- 7740-5053 3/5mm
- 7740-5054 4/5mm
- 7740-5055 5/5mm
- 7740-5102 2/10mm
- 7740-5103 3/10mm
- 7740-5104 4/10mm
- 7740-5105 5/10mm
- 7740-5152 2/15mm
- 7740-5153 3/15mm
- 7740-5154 4/15mm
- 7740-5155 5/15mm
- 7740-5202 2/20mm
- 7740-5203 3/20mm
- 7740-5204 4/20mm
- 7740-5205 5/20mm



rl/lm

- 7741-0052 2/5mm
- 7741-0053 3/5mm
- 7741-0054 4/5mm
- 7741-0055 5/5mm
- 7741-0102 2/10mm
- 7741-0103 3/10mm
- 7741-0104 4/10mm
- 7741-0105 5/10mm
- 7741-0152 2/15mm
- 7741-0153 3/15mm
- 7741-0154 4/15mm
- 7741-0155 5/15mm
- 7741-0202 2/20mm
- 7741-0203 3/20mm
- 7741-0204 4/20mm
- 7741-0205 5/20mm

**MK trial stem container 7999-5805**

GenuX® MK stem reamer conical

- 4214-0127 Ø11mm
- 4214-0128 Ø13mm



Stop for GenuX® MK stems reamer conical

4220-4211



adapter for slap hammer

4223-0033



GenuX® MK trial stem

- 7766-1112 11/125mm
- 7766-1115 11/150mm
- 7766-1120 11/200mm
- 7766-1125 11/250mm
- 7766-1312 13/125mm
- 7766-1315 13/150mm
- 7766-1320 13/200mm
- 7766-1325 13/250mm
- 7766-1512 15/125mm
- 7766-1515 15/150mm
- 7766-1520 15/200mm
- 7766-1525 15/250mm
- 7766-1712 17/125mm
- 7766-1715 17/150mm
- 7766-1720 17/200mm
- 7766-1725 17/250mm
- 7766-1912 19/125mm
- 7766-1915 19/150mm
- 7766-1920 19/200mm
- 7766-1925 19/250mm
- 7766-2112 21/125mm
- 7766-2115 21/150mm
- 7766-2120 21/200mm
- 7766-2125 21/250mm
- 7766-2312 23/125mm
- 7766-2512 25/125mm
- 7766-2712 27/125mm



# MUTARS® GenuX® MK

## MK tibial container 7999-5802

tibial alignment handle  
4210-2215



MK tibial offset sleeve  
4210-4261 2mm  
4210-4263 4mm  
4210-4267 6mm  
4210-4270 0mm



GenuX® MK tibial reamer  
4214-0120



GenuX® MK reamer tibial coupling  
4214-0124



GenuX® MK guide for reamer tibial coupling  
4214-0125



MK fin punch  
4214-0142 size 2-4  
4214-0145 size 5-6



handle for tibial fin punch  
4215-0447



resection check long  
4220-0318



MK tibial reamer guide  
4220-4202 size 2  
4220-4203 size 3  
4220-4204 size 4  
4220-4205 size 5



drill 126 x 3,2 mm (2 pieces)  
4221-0019



tibial stylus 2/12,5mm for slotted resection  
4220-0428



I/M tibial alignment guide  
7755-0024



tibia cutting block revision 0°  
7755-0054



fixation pin 3,2mm x 77mm (4 pieces)  
4223-0029



MK attachments tibial fins  
4214-0146



drilling pin 3,2mm x 77mm  
4224-0132



## stem assembly container 7999-5770

MK stem assembly block  
4223-4003





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