Surgical Technique

Unicompartmental Knee System

HLS Uni Evolution

Optimal Approach

TORNIER

SURGICAL IMPLANTS

CONTENTS

CONTENTS

INTRODUCTION

Proper patient selection and accurate use instruments are critical to the success of unicompartmental knee arthroplasty[1,2].

Since 1987, the HLS UNI knee has been implanted in thousands of patients worldwide. Results of the HLS UNI knee were included in the multi-centric study presented at SOFCOT 1995, and have been reported in recent publications[3,4].
The 20 years of clinical success prove the excellence of the original HLS UNI design.
These outstanding results also emphasize the critical role of ancillary instruments.

Our new Optimal Approach instrumentation is the summation of the clinical experience of several surgeons renowned as experts in unicompartmental knee arthroplasty (UKA).
It has been specially designed for minimally invasive knee surgery.

We therefore have a combination of proven implants and well-thought instruments that meet all requirements of medial and lateral unicompartmental knee arthroplasty[5].

Indications: The HLS Uni Evolution system is indicated for the replacement of the medial or lateral compartment of the femorotibial knee joint when only one compartment is affected. This device is indicated for treatment of primary or secondary femorotibial Osteoarthritis. The HLS Uni Evolution prosthesis is intended for cemented use only.

Known contraindications to date: Ligamentous instability of the knee. Failure of one or both cruciate ligaments. Important axial deformation of the knee. Obesity. Chondrocalcinosis. Patello femoral problem. Systemic infection is an absolute contraindication. Every effort should be made to rule out the possibility of preoperative sepsis in a patient who has one or more of the following abnormalities: fever and/or local inflammation; rapid joint destruction or bone resorption apparent or roentgenograms and elevation of sedimentation rate unexplained by other disease, elevation of WBC count. Distant foci of infection from genitourinary, pulmonary, skin and other sites, dental focus infection which may cause hematogenous spread to the implant site. Skeletally immature patients. Cases where there is inadequate neuromuscular status, poor bone stock, or poor skin coverage around the knee joint that would make the procedure unjustifiable. Neuromuscular or psychiatric disorders which might jeopardise fixation and postoperative care. Known allergy to one of the materials. Pregnancy.

[1]How to select candidates for lateral unicompartimental prosthesis. E. Servien, PCM Verdonk, T. Aït Si Selmi, P. Neyret Centre Livet, Lyon, France). Techniques in Knee Surgery 2006

[2]The ideal candidate: Indications and limitations of unicompartimental knee replacement : Gérard Deschamps. Unicompartimental Knee Arthroplasty SOFCOT 1995 RCO 1996

[3]Results at 6 years minimum Follow-up of a continuous series of 113 Unicompartimental Kenne Arthroplasties ISAKOS 2005 Laurent Jacquot, Gérard Deschamps

[4]Résultats d'une série consécutive de 100 prothèses unicompartimentales du genou avec un recul moyen de 5 ans. Jean-Luc Paillot, Elvire Servien, Tarik Aït Si Selmi, Philippe Neyret. Revue de Chirurgie Orthopédique (vol 92 suppl. n° 6 octobre 2006)

*[5]Results of lateral 81 UKR at 6 years mean follow_up ESSKA 2002
R. Badet, K. Baïtour, T. Aït Si Selmi, H. Dejour, P.Neyret*

DESIGN RATIONALE

1. DESIGN RATIONALE

The HLS UNI EVOLUTION knee consists of a symmetric cobalt chromium (CoCr) femoral component, and an all-polyethylene (PE) tibial component.

The resurfacing femoral component with its specific sagittal radius of curvature allows minimal bone sacrifice.
Broad M/L radius in coronal plane provides better load distribution on PE, which decreases its potential wear.
The femoral component has a tapered anterior tip which prevents patellar impingement during flexion.
The small cylindrical fixation peg is reinforced with a thin extended fin.
The peg and posterior condylar surface are inclined by 15 degrees to increase flexion and significantly decrease the push-out forces in hyperflexion.

TIBIAL PREPARATION

2. TIBIAL PREPARATION

1 Use of Patellar Retractors

Patellar Retractors have been specially designed to retract the patella either medially or laterally:
- Insert the claw into the femoral notch.
- Press the wing on the patella to shift it medially or laterally.
  The curved handle facilitates insertion through a mini incision.

2. TIBIAL PREPARATION

2 Assembly of Tibial Cutting Guide

- Slide the Tibial Cutting Guide down the Jig for Tibial Cut.
- Assemble the Malleolar Clamp to the distal end of the Alignement Jig for Tibial Cut. (fig. 01)

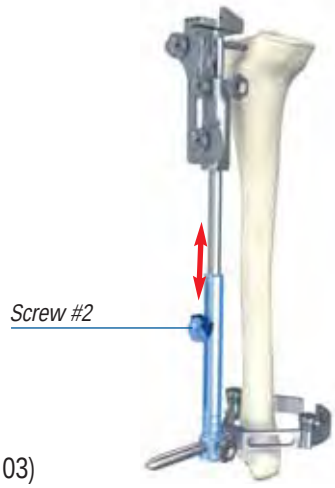
(fig. 01)

- Raise the top of the Cutting Guide 5 mm above the Central Positioning Hole, and tighten screw #1.
- Center the Malleolar Clamp over the ankle, proximal to the malleoli, and tighten screw #3. (fig. 02)

(fig. 02)

- Adjust the height of the Telescopic Alignment Rod to the length of the tibia and tighten screw #2. (fig. 03)

The Central Positioning Hole of the Cutting Guide should sit 15 mm below the tibial intercondylar eminence.



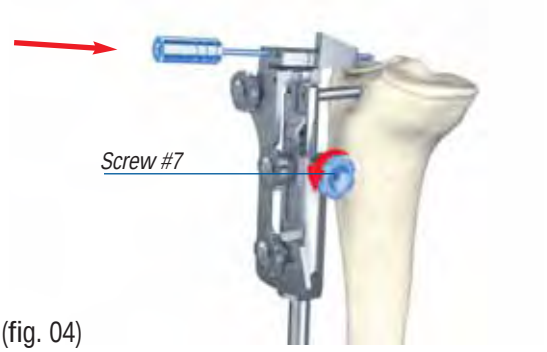
(fig. 03)

2. TIBIAL PREPARATION

3 Adjustment of posterior slope

The cutting guide is built with 5° of posterior inclination. However, the Optimal Approach Instrumentation also offers the possibility of replicating the natural slope of the patient's knee:

- Insert the Joint Line Probe Pin into the Central Positioning Hole of the Cutting Guide.
- Loosen screws #1 and #3. (fig 04)



(fig. 04)

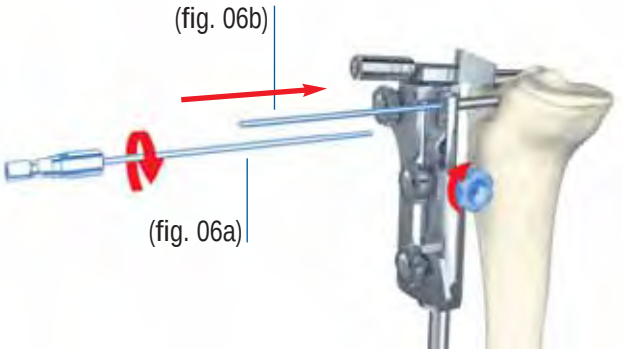
- Slide the Alignment Rod anteriorly or posteriorly at the Malleolar Clamp to bring the Joint Line Probe Pin into contact with both anterior and posterior margins of the tibial plateau. (fig. 05)
- Tighten screws #1 and #3.

(fig. 05)

- Drive the 3 mm Flat Ended Drill through the Central Positioning Hole. (fig. 06a)

Caution: Check that the Extra Medullary rod is aligned perpendicular to the frontal plane.

- Insert the 110 mm Fixation Pin. (fig. 06b)

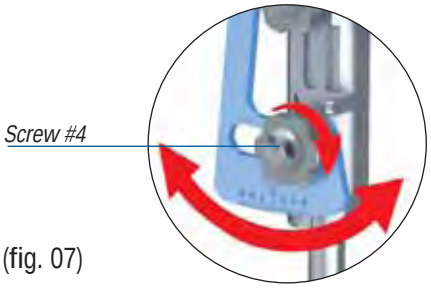


2. TIBIAL PREPARATION

4 Adjustment in the frontal plane

- The tibial epiphyseal varus (angle formed by the joint line and the tibial mechanical axis) should be measured during preoperative planning.
- Set the callipers of the Cutting Guide to this angle.
- Tighten screw #4. (fig. 07)
  The angle can be adjusted in 1° increments.

The tibial epiphyseal varus and posterior slope are now established.



(fig. 07)

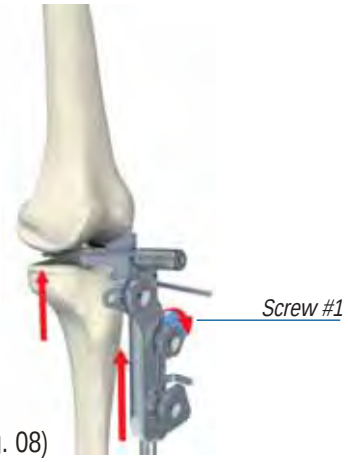
Alternative method

Considering that UKR can only be performed in mild angular deformities, the frontal resection angle may be referenced off the tibial crest. In this case, Extra Medullary alignment is achieved using a V-Alignment Jig.
Remove the Malleolar Clamp.
Assemble the V-Alignment Jig with the Telescopic Rod and apply it to the tibial crest, which is a suitable anatomic landmark for the tibial axis.
Adjust the posterior slope and frontal resection angle as previously described.
This method may facilitate centering of the proximal part of the alignment guide.

5 Determination of tibial resection level

In extension, the subchondral bone of the distal femoral condyle is considered a reliable reference for determining the tibial resection level. Remove cartilage debris that might induce measurement errors.

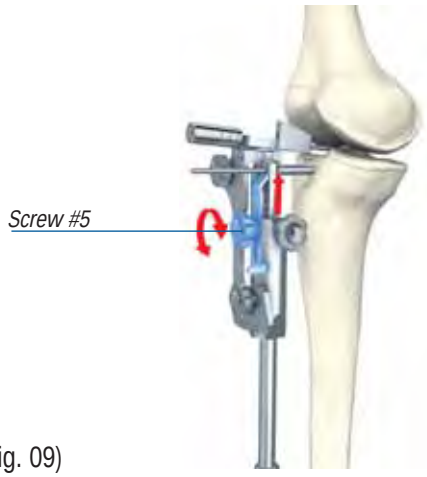
- The knee is brought to extension, slightly stressed in valgus for a medial UKR or moderately stressed in varus for a lateral UKR (to allow for the physiological “laxity”). This will restore correct alignment.
- Loosen screw #1 and place the Joint Line Probe Pin flush against the subchondral bone of the distal femoral condyle. Tighten screw #1. (fig. 08)



(fig. 08)

2. TIBIAL PREPARATION

- Loosen screw #5 and move the Sliding Tongue upward until it touches the 110 mm Fixation Pin at level “zero”.
  Tighten screw #5. (fig. 09)



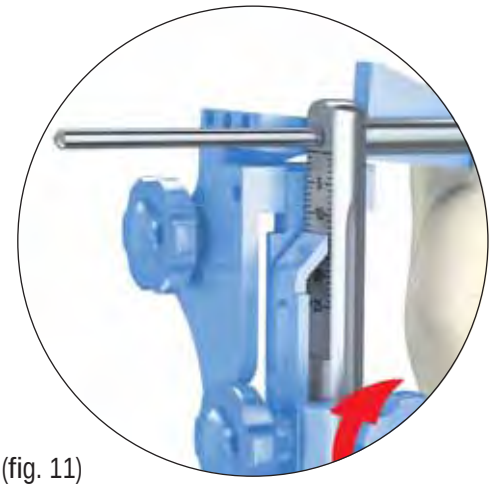
(fig. 09)

- The Joint Line Probe Pin can now be removed.

- Loosen screw #1.
- Move the Sliding Arm of the Cutting Jig to the 13 mm graduation on the scale, and tighten screw #1. (figs. 10 and 11)

A 13 mm resection corresponds to the total thickness of the femoral + tibial components, and leaves 1 mm for “safety laxity”.

(fig. 10)

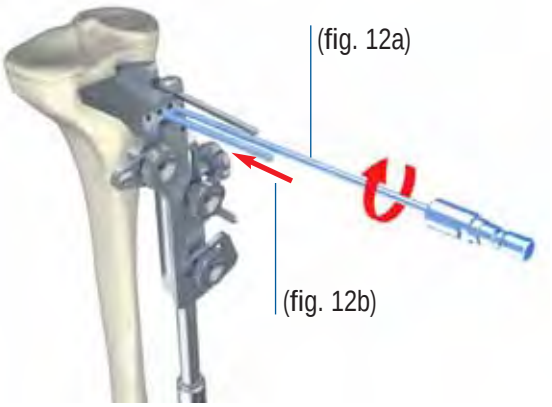


(fig. 11)

2. TIBIAL PREPARATION

6 Resection of the proximal tibia

- Drill holes through the Cutting Guide as far as the posterior cortex, using the 3 mm Flat Ended Drill. (fig. 12a)
- Insert the 75 mm Cutting Pin. (fig. 12b)



- Insert Cutting Pin using the Pin Punch. (fig. 13)
- The sagittal cut can now be performed.


(fig. 13)

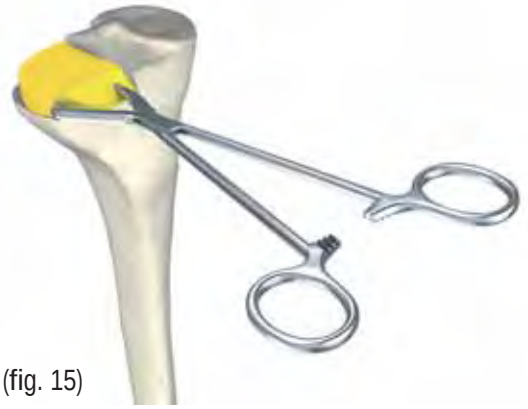
- The horizontal cut is pin-guided; it is complete when the Cutting Pins are visible on the bone surface. (fig. 14)
(If necessary, remove the 110 mm Fixation Pin and the Cutting Guide).


(fig. 14)

2. TIBIAL PREPARATION

7 Trialing

- Select the tibial component size that corresponds to the thickness of the tibial cut.
- Position the Trial Tibial Component with the Grasper. Insertion should be easy in both flexion and extension. (fig. 15)



(fig. 15)

- Extend the knee, and mark the projection of the anterior tibial margin on the femoral cortex. Later on, this will indicate the anterior limit of the Femoral Component and will be most helpful for selection of the appropriate component size. (fig. 16)

(fig. 16)

3. FEMORAL PREPARATION

1 Insert the Femoral Guide for Condyle Positioning

- Flex the knee slightly (20°) to insert the Femoral Guide for Condyle Positioning between the Trial Tibial Component and the femoral condyle, and then extend the knee fully.

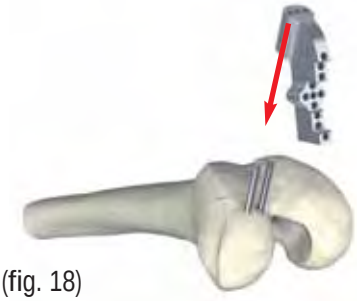
Care should be taken to maintain the Trial Tibial Component flush with the anterior margin of the tibial plateau, and the Tibiofemoral Alignment Guide flush against the anterior bevel of the trial.

- The Femoral Guide should be positioned in neutral rotation, lie flat on the Trial Component and be properly centered.
- Drill two holes with the 3 mm Flat Ended Drill and insert two 3 mm pins. (fig. 17)
- Flex the knee 90° to allow removal of the trial tibial component and the Femoral Guide for Condyle Positioning.

(fig. 17)

2 Position the Femoral Drill Guide

- Insert the Femoral Drill Guide over the two pins. (fig. 18)



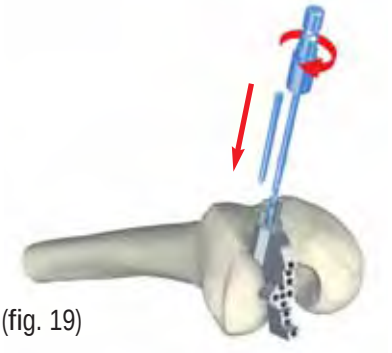
(fig. 18)

3 Determine correct orientation of the Femoral Drill Guide

a/ Medio-Lateral

The Femoral Drill Guide can be shifted sideways:

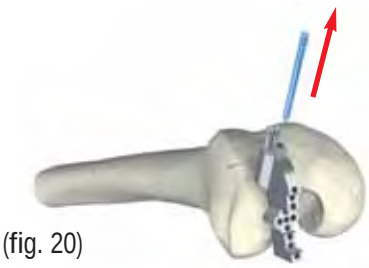
- Drive the 3 mm Flat Ended Drill through the anterior hole in the middle of the guide.
- Insert a 3 mm Fixation Pin. (fig. 19)



(fig. 19)

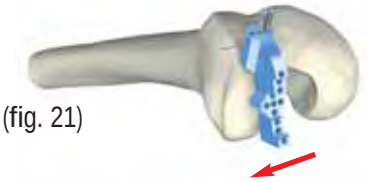
3. FEMORAL PREPARATION

- Remove the medial or lateral Fixation Pin. (fig. 20)



(fig. 20)

- Remove the Drill Guide and reinsert it over the two pins, using the medial or lateral hole. (fig. 21)



(fig. 21)

b/ Rotation

The rotational position of the Drill Guide can be changed, if necessary, to avoid excessive tilt of the femoral component in flexion.
Caution: In genu valgum, a false visual impression can suggest that rotation indicated by instruments is inadequate. Keep in mind that excessive medial rotation of the Femoral Drill Guide will inevitably result in impingement of the anterior aspect of the femoral component on the intercondylar eminence in extension.

(fig. 22)

- Drill a 3 mm Stop Drill trough the central hole of the Femoral Drill Guide.
- Insert a 3 x 40 mm fixation pin. (fig. 22)

- Remove the Anterior Pins.
- Place the Drill Guide in the desired rotational position. (fig. 23)

(fig. 23)

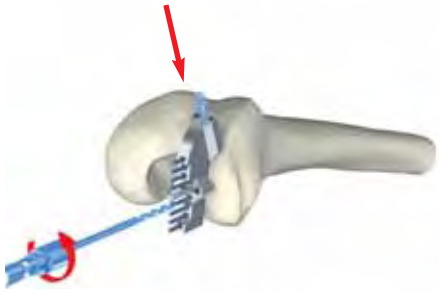
IMPORTANT

The Femoral Drill Guide can be shifted sideways (if necessary), using the central holes. In this case, the two anterior pins must be removed to avoid interference with the 3 mm Stop Drill when drilling through the central holes of the guide.

3. FEMORAL PREPARATION

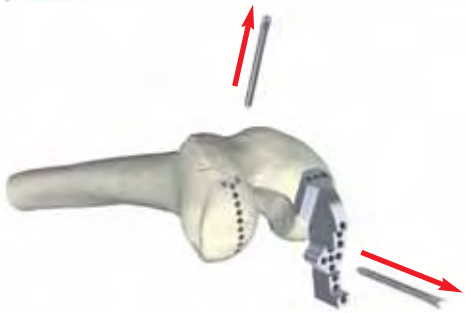
4 Preparation of the fin slot

- Drive a 3 mm Stop Drill trough the central part of the Drill Guide. (fig. 24)



(fig. 24)

- Remove the Femoral Drill Guide. (fig. 25)



(fig. 25)

- The slot is initiated with the Oscillating Saw, then a Femoral Bone Punch is used to compact the cancellous bone. (fig. 26)
- The Femoral Bone Punch must be inserted all the way through.

(fig. 26)

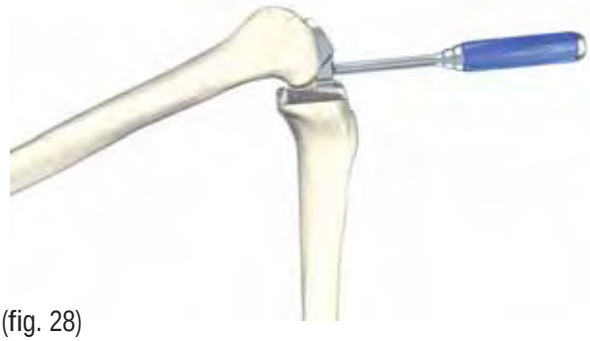
5 Femoral sizing

- Assemble the Universal Handle to the Femoral Cutting guide.
- Flex the knee more than 110°.
- Insert the Condyle Cutting Guide into the prepared slot. (fig. 27)

(fig. 27)

- Ensure the handle is inclined by 15 degrees relative to the long axis of the femur, such that the posterior skid is also tilted by 15 degrees. (fig. 28)

Selection of the appropriate size femoral component is based on the following criteria:
- the posterior skid should be flush against the posterior condyle,
- the anterior part of the Cutting Guide should be as close as possible to the mark on the femoral condyle,
- the Cutting Guide must have a tight fit with its the bony contours.



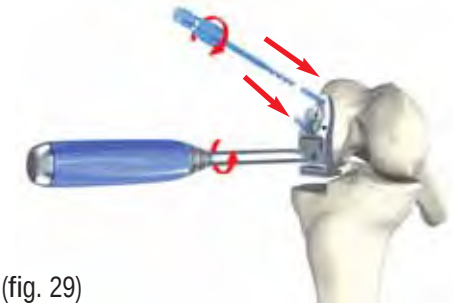
(fig. 28)

3. FEMORAL PREPARATION

6 Secure the Condyle Cutting Guide to the condyle

The Universal Handle can be shifted laterally by turning through the orifice next to the central hole at 45°.

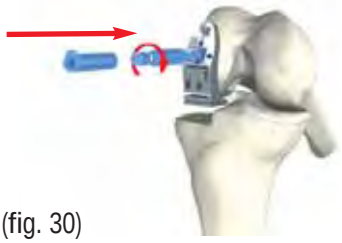
- Drill the anterior hole and insert a 3 mm headed pin.
- Drill the lateral holes and insert 3 mm headed pins.
- Unthread the handle. (fig. 29)



(fig. 29)

- Drive the 8 mm Drill all the way through the central hole.
- Insert the Fixing Pin until the small tab is level with the slot. (fig. 30)

The Fixing Pin can be inserted using the Universal Handle.



(fig. 30)

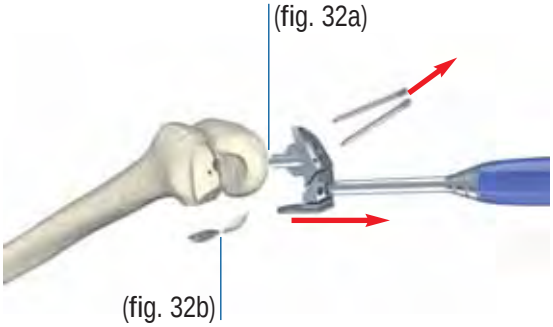
7 Femoral Chamfer cuts

- Perform the posterior and chamfer cuts. (fig. 31)

(fig. 31)

- Remove the Fixation Pins using the pin extractor.
- Remove the Fixing Pin using the universal handle.
- Thread the Universal Handle into the Cutting Guide and remove the guide. (fig. 32a)
- Remove the resected bone fragments. (fig. 32b)

- If necessary, complete preparation of condylar fin using the Femoral Bone Punch, which must absolutely intersect with the middle of the fin.



(fig. 32a)

(fig. 32b)

4. TRIAL REDUCTION

1 Trial components

- Insert the Trial Femoral Component using the Tibial Component Grasper. (fig. 33)

With the knee in deep flexion, check that there are no prominences or uncut bones posteriorly. Such residuals should be resected to avoid impingement on PE and to increase flexion range.


(fig. 33)

- Insert the Trial Femoral Component using the Femoral Impactor and then the selected Trial Tibial Component. (fig. 34)


(fig. 34)

2 Static test in extension

(fig. 35)

- The prosthetic condyle should rest flat on the Trial Tibial Component, with no medial no lateral lift-off.
- A “safety laxity” should persist to ensure there is no overcorrection.
  If this is not the case, additional bone must be removed from the tibia, which will eliminate the indentations from the fixation pins.


(fig. 35)

3 Dynamic test

The Trial Tibial Component must remain perfectly stable during ROM assessment:

- There should be no tilt effects in flexion, otherwise the tibial slope must be readjusted.
- There should be no antero-posterior translation, as this indicates that the ligaments are too tight or the Trial Tibial Component is too thick.

5. COMPONENT IMPLANTATION

- Apply a thin layer of cement to the inner surfaces of the components.

With the knee flexed:

- Insert the Tibial Component and seat it using the Tibial Impactor. (fig. 37)

(fig. 37)

- Insert the Femoral Component and seat it using the Femoral Impactor. (fig. 38)

- Extend the knee and remove any excess cement.

(fig. 38)

Femoral instrument case
YKAG67

Femoral Guide for Condyle Positionning
MDU701

Femoral Impactor
MDU702

Universal Handle
MDU703

Femoral Drill Guide
MDU704

Condyle Cutting Guide LL/MR

T1	MDU711
T2	MDU712
T3	MDU713
T4	MDU714

Condyle Cutting Guide ML/LR

T1	MDU721
T2	MDU722
T3	MDU723
T4	MDU724

Femoral Bone Punch
MDU705

Headed Pin, Ø 3 mm
MDU706

Fixing Pin
MDU707

INSTRUMENTS

INSTRUMENTS

Fixation Pin,
3 x 40 mm
MDU708

Rasp
MDU730

Drill Bit, Ø 8 mm
MDU731

Drill Bit w/hub, Ø 3 mm
MDU732

Flat Ended Drill,
Ø 3 mm
MDU742

Ø 3 mm L.75mm Cutting Pin
MDU907

Trial Femoral Component
Extraction Pin
MDU518

Trial Femoral Component,
Thick. 3 mm

T1	MDU531
T2	MDU532
T3	MDU533
T4	MDU534

Saw blades
• Zimmer
MDU503
MDU556 *(new design)*

• Stryker B
MDU555

• Aesculap
MDU506

• AO Müller
MDU507

INSTRUMENTS

Tibial instrument case
YKAG68

Patellar Retractor, ML/LR
MDU709

Patellar Retractor, LL/MR
MDU710

Tibial Impactor
MDU733

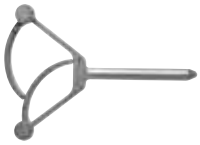
Alignement Jig for Tibial Cut
MDU734

Tibial Cutting Guide, LL/MR
MDU735

Tibial Cutting Guide, ML/LR
MDU736

INSTRUMENTS

Malleolar Clamp
MDU739



Fixation Pin,
3 x 110 mm
MDU905

Flat Ended Drill
Ø 3 mm
MDU742

Ø 3 mm
L. 75mm Cutting Pin
MDU907

Trial Tibial Components, MR/LL

#1

T 9 mm	MDU112
T 11 mm	MDU114
T 13 mm	MDU116

#2

T 9 mm	MDU122
T 11 mm	MDU124
T 13 mm	MDU126

#3

T 9 mm	MDU132
T 11 mm	MDU134
T 13 mm	MDU136

#4

T 9 mm	MDU142
T 11 mm	MDU144
T 13 mm	MDU146

#5

T 9 mm	MDU152
T 11 mm	MDU154
T 13 mm	MDU156

Trial Tibial Components, ML/LR

#1

T 9 mm	MDU212
T 11 mm	MDU214
T 13 mm	MDU216

#2

T 9 mm	MDU222
T 11 mm	MDU224
T 13 mm	MDU226

#3

T 9 mm	MDU232
T 11 mm	MDU234
T 13 mm	MDU236

#4

T 9 mm	MDU242
T 11 mm	MDU244
T 13 mm	MDU246

#5

T 9 mm	MDU252
T 11 mm	MDU254
T 13 mm	MDU256

INSTRUMENTS

Tibial Component Grasper
MDU919

Pin Puller
MVV062

Osteotome
MDU500

Joint Line Probe Pin
MDU501

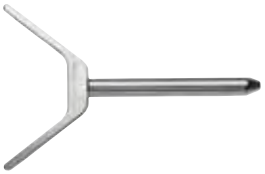
Pin Punch
MDU511

Optional instruments

Tibial Cutting Guide, LL/MR
MDU738

Tibial Cutting Guide, ML/LR
MDU737

Ankle "V"
MDU740



V-Shaped Device for EM Alignment Guide
MDU741

NOTES

NOTES

IMPLANTS

Femoral component, thickness 3 mm

T1	GDU531
T2	GDU532
T3	GDU533
T4	GDU534

All-PE Tibial component

Thickness 9 mm

T1	GDU112
T2	GDU122
T3	GDU132
T4	GDU142
T5	GDU152

Thickness 11 mm

T1	GDU114
T2	GDU124
T3	GDU134
T4	GDU144
T5	GDU154

Thickness 13 mm

T1	GDU116
T2	GDU126
T3	GDU136
T4	GDU146
T5	GDU156

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