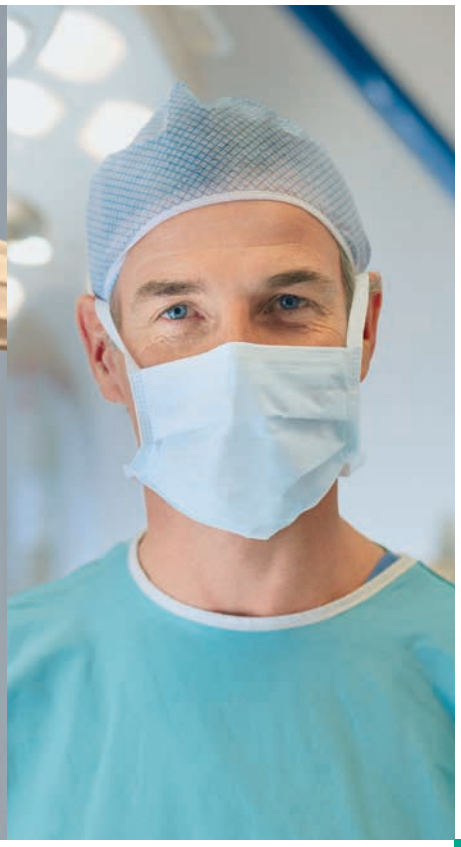
B BRAUN
SHARING EXPERTISE



ORTHOPAEDIC SURGERY

AESCULAP® EnduRo

HINGED KNEE ENDOPROSTHESIS
MANUAL SURGICAL TECHNIQUE

AESCULAP® EnduRo

1 | THE KNEE SYSTEM WITH THE INNOVATIVE HINGE MECHANISM

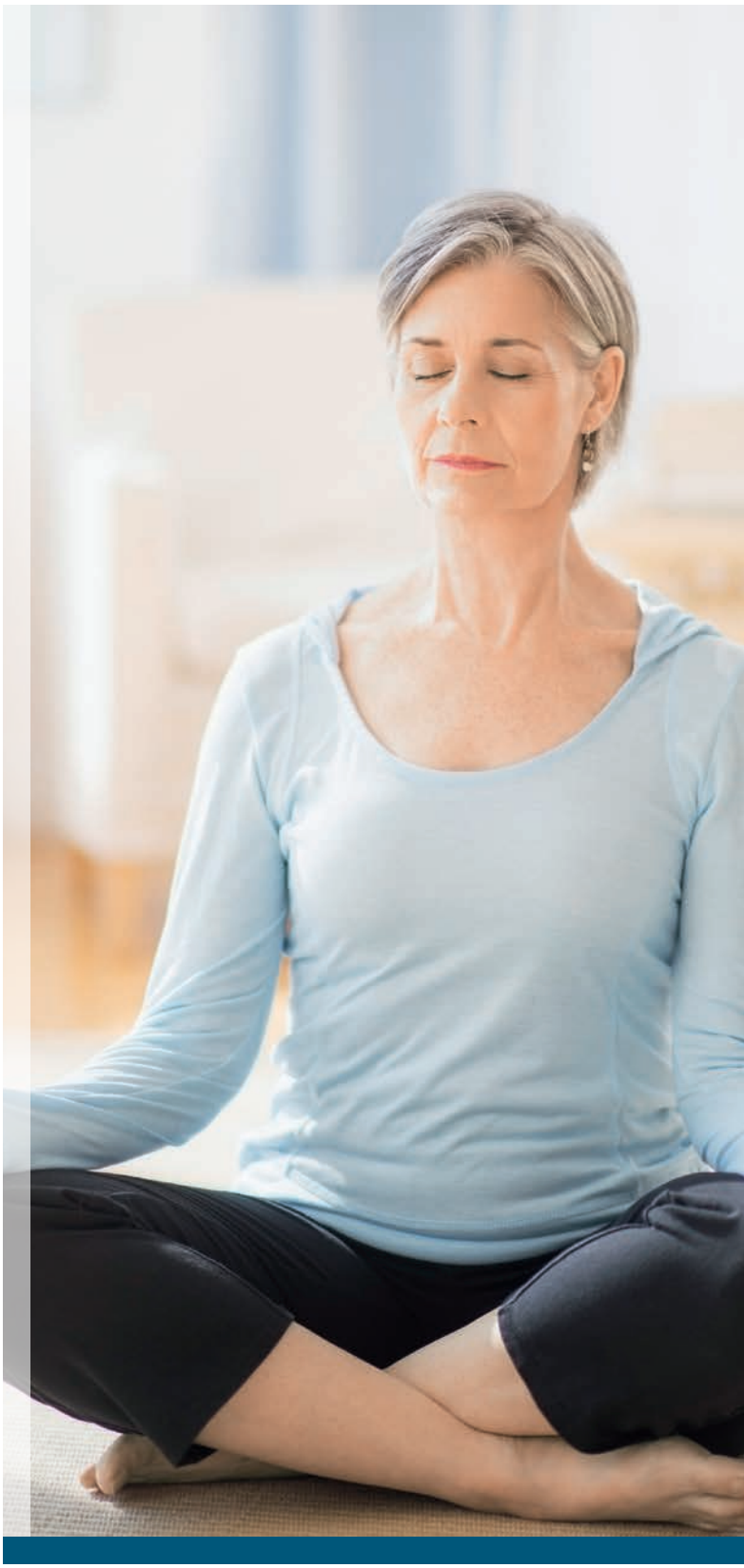
Due to today's growing demographic situation, revision operations will continue to play a significant role in the future. The particular challenges of hinged implant revisions require an implant that performs the functions of the collateral ligaments without restricting essential joint functions such as flexion and rotation.

The EnduRo system offers this flexibility with 24° rotation and a flexion angle of up to 140°. The sophisticated lift technology of the axis mechanism supports the axis while preventing dislocation and allowing for initiation of the tibial stem offset near the joint line. The axis is coupled with the femoral component through a tapered cone and is equipped with a locking nut to prevent dislocation.

An extensive product portfolio including various implant sizes, augments, stem extensions and gliding surfaces gives the surgeon the flexibility to adapt the implant to the patient. The EnduRo system is based on the use of proven cobalt-chromium-molybdenum components in combination with carbon fiber-reinforced PEEK for the materials of the axis-bearing components. Promising in-vitro results have indicated that increased longevity of these implant components can be expected (1).

In addition, the optional AS Advanced Surface version can reduce the release of metal ions and improve abrasion properties, which was demonstrated during in-vitro experiments (2-5).

Precise implementation of the preoperative planning in the operating room is essential for the success of the procedure. The EnduRo instruments are designed to support just that and enable reproducible surgical procedures for the surgeon and the team.



AESCULAP® EnduRo

2 | IMPLANT COMPONENTS

Femur extension stems
- Cementless: 12-20 mm, 2 lenghts (117, 177 mm), 5°/7°
- Cemented: 12, 15, 18 mm, 2 lengths (77, 157 mm), 6°

Femur augments
- Distal
- Postero-distal
- 4, 8, 12 mm (see implant matrix for details)

Femur components with pre-assembled hinge ring
- 3 sizes, left/right resp.
- AP offset option for stems, stepless ± 2 mm

Patellae
- 5 sizes
- Ø 26 x 7 mm, Ø 29 x 8 mm, Ø 32 x 9 mm, Ø 35 x 10 mm, Ø 38 x 11 mm

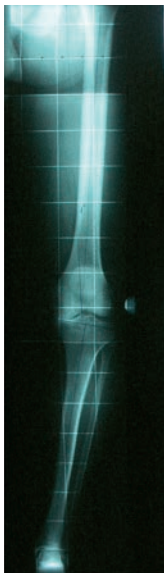
PE gliding surfaces (corresponds to the femur size)
- 3 sizes
- 10, 12, 14, 16, 18, 20, 22, 24 mm (CoCr) 10, 12, 14, 16, 18 mm (AS)
- Rotation ± 12°

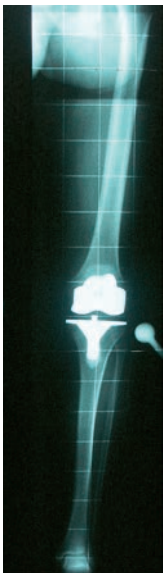
Tibia components
- 3 sizes
- Symmetrical
- ML offset option stepless ± 6 mm (± 4 mm at T1)

Tibia augments
- RM/LL and RL/LM
- 4, 8, 12, 16 mm

Tibia extension stems
- Cementless: 11-20 mm, 2 lengths (92, 172 mm)
- Cemented: 12, 15, 18 mm, 2 lengths (52, 92 mm)

3 | PREOPERATIVE PLANNING



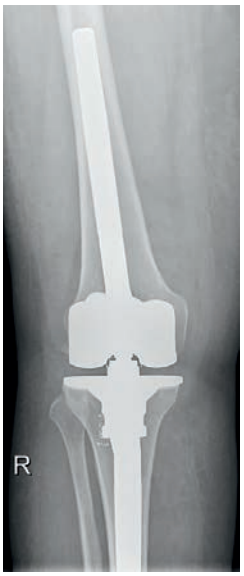


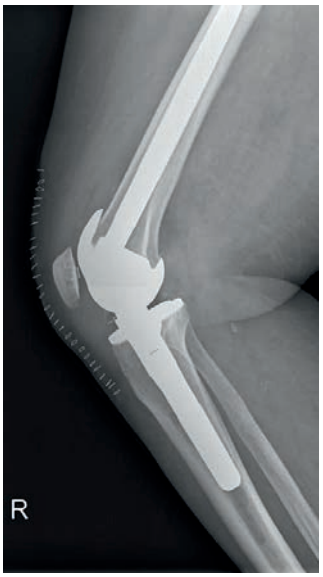
In order to achieve a successful treatment with the EnduRo knee revision system, an in-depth analysis of any bone defects and if applicable, existing soft tissue dysfunctions, must be performed. If the primary endoprosthesis failed, it is mandatory to identify the causes of the failure in order to avoid repeat errors. For this purpose, it is recommended to consult the pre- and postoperative X-ray images. Further parameters to ensure optimal results include:

- Restoration of the joint line
- Proper axis alignment
- Functionality of the extensor mechanism
- Bone-sparing removal of the primary endoprosthesis
- Functional stability
- Evaluation of the the soft tissue condition.

For the purposes of preoperative planning, EnduRo X-ray templates are available for X-ray image analysis to help determine the following:

- The angle between the anatomical and mechanical femoral axis
- Resection heights
- The size of the implants
- The entry points of the intramedullary alignment
- The necessity and dimensions of augments and extension stems





Indications

Indication of major knee joint disease that cannot be treated with other therapies.

- Degenerative arthrosis
- Rheumatoid arthritis
- Post-traumatic arthrosis
- Symptomatic knee joint instability
- Knee-joint ankylosis
- Severe knee-joint deformities
- Revision and replacement surgeries

EnduRo is indicated for use in cases of collateral ligament function deficiency.
The axis coupling of the femur and tibia transfers force from one implant component to the other.
To distribute this force also into the intramedullary canal, AESCULAP® strongly recommends using the EnduRo knee revision system exclusively with tibial and femoral extension stems.
Experience with the system has shown that a defect reconstruction with the available femoral and tibial augments up to and including defect sizes of the AORI* classification type IIB is recommendable.

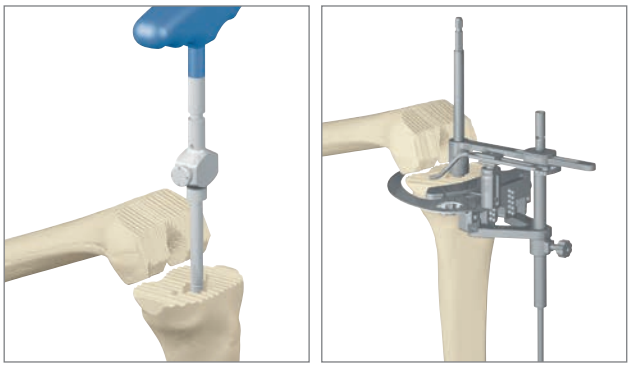
Further information on indications and contraindications can be found in the instruction manual TA012000.

*Anderson Orthopaedic Research Institute

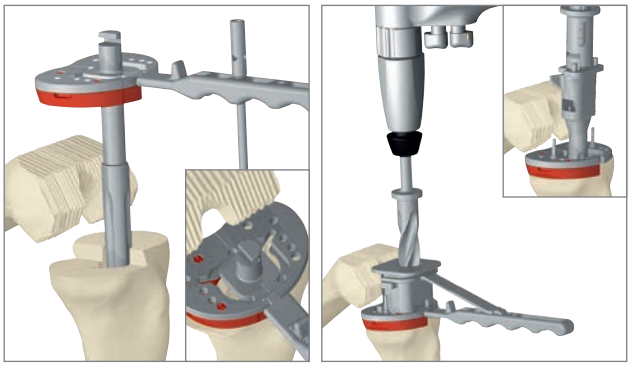
AESCULAP® EnduRo

4 | OVERVIEW OF SURGICAL STEPS

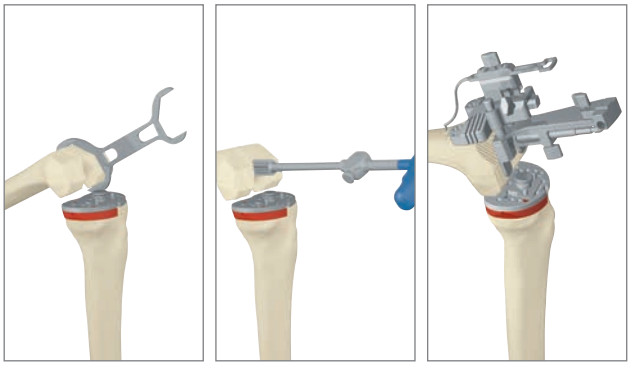
1



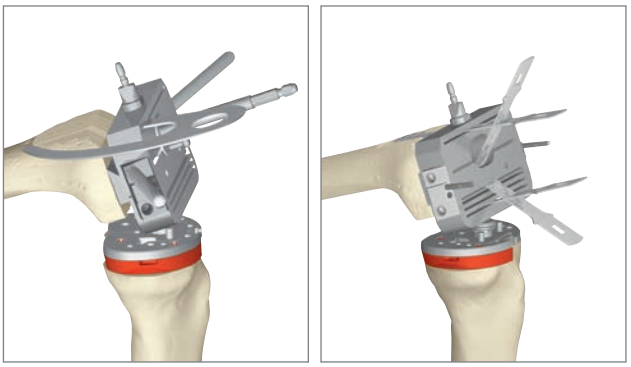
2



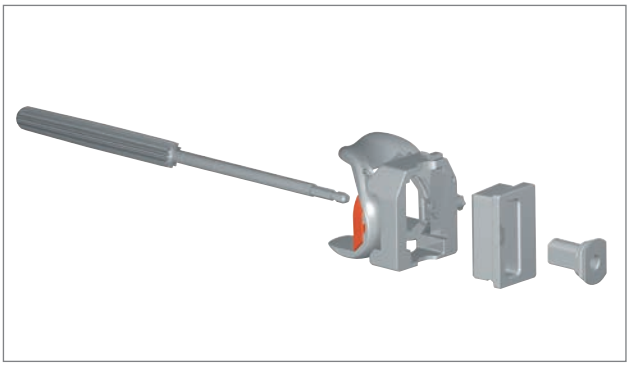
3



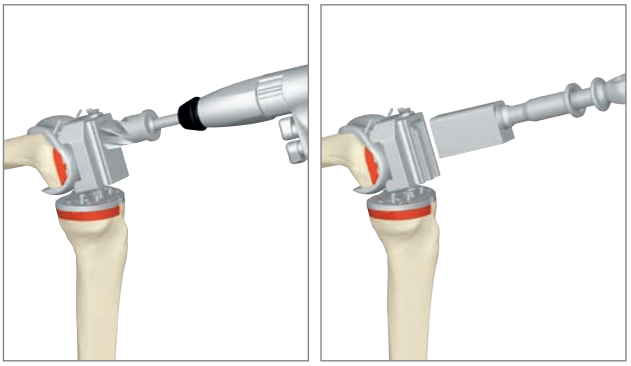
4



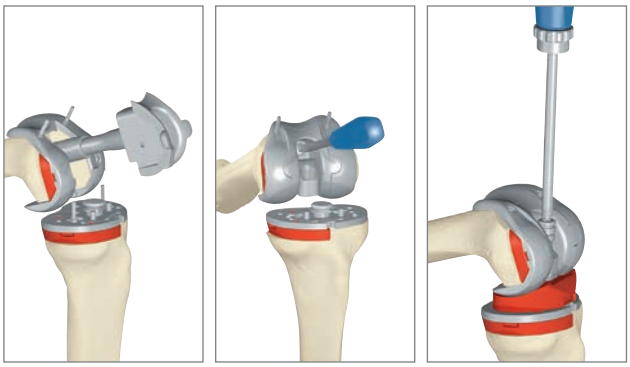
5



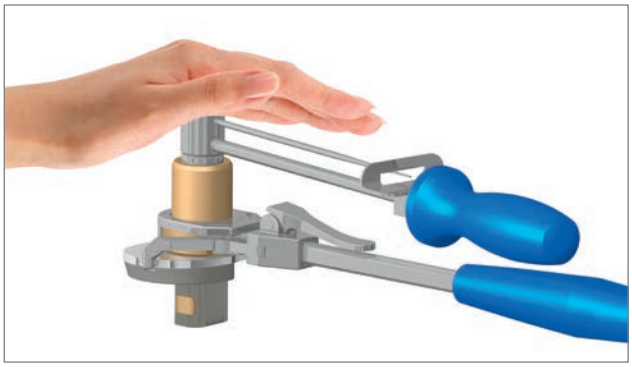
6

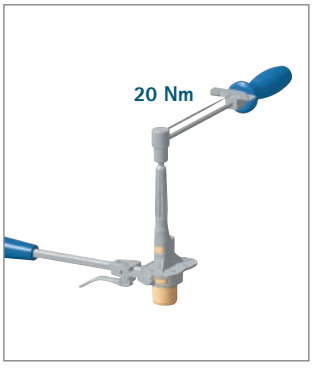


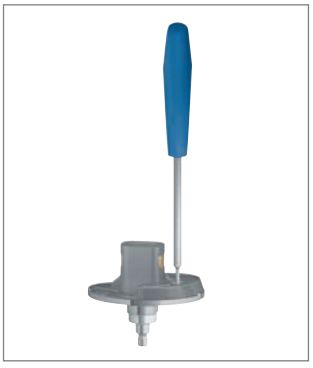
7

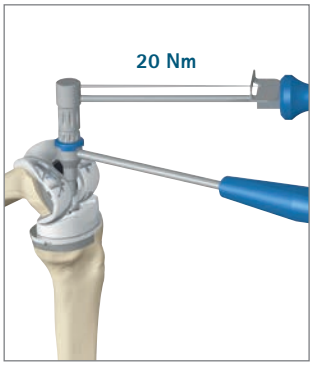


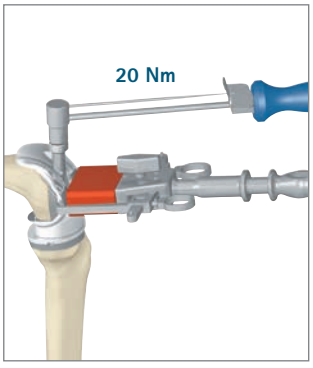
8





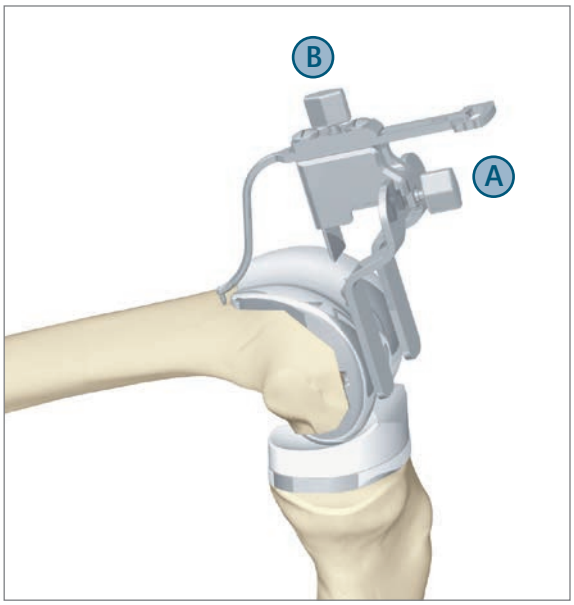






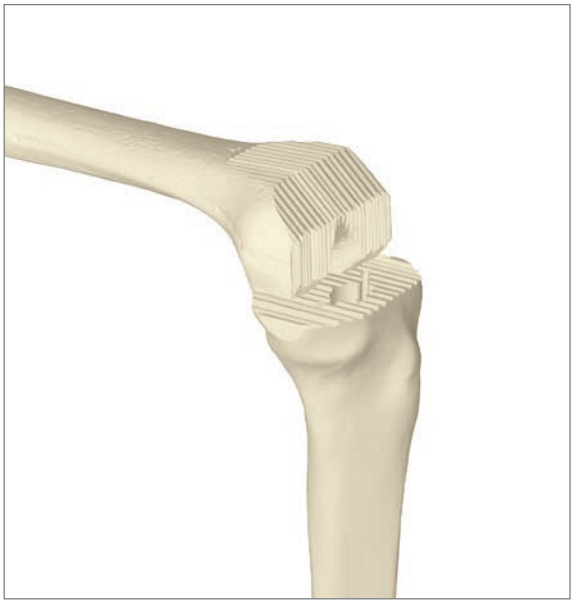
AESCULAP® EnduRo

5 | EXPLANTATION



Set joint line reference

The joint line positioner is placed on the distal contact plate and screwed down with screw A. On the anterior side of the femur, a reference marking is made, for example, at the level where the primary femoral shield ends proximally. In this position, the joint line positioner is fixed using screw B. This will remain tightend during the remaining course of the surgery.



Remove all primary implants.

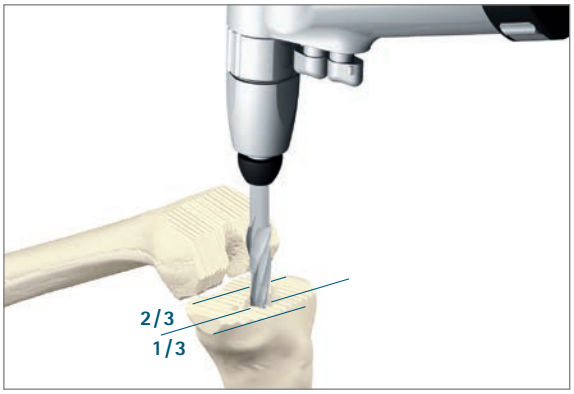
NOTE

The availability of the implants required according to preoperative planning is ensured using the implant matrix (see annex).

6 | TIBIA PREPARATION

This surgical guide describes the Tibia First technique. However, if the Femur First technique is used, the step Femur Preparation on page 17 will be performed first.

The entry point for the step drill and the IM alignment rod or the reamers is determined, if necessary, by means of X-ray images (AP distance 1/3 to 2/3 or via a tibial trial plateau).



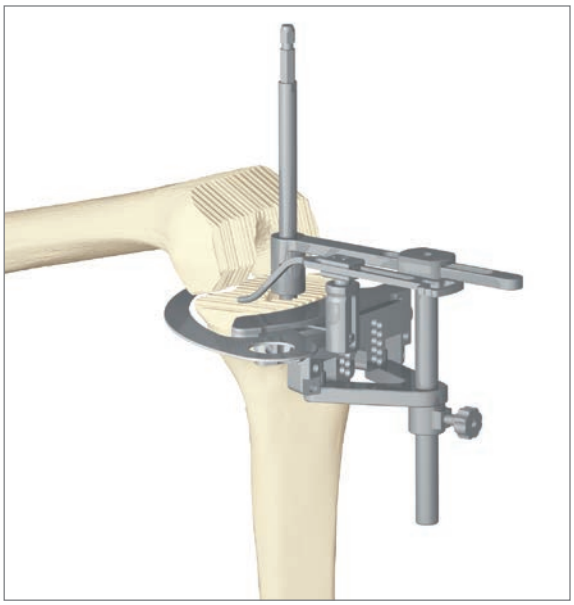
With the reamers or the IM alignment rod, the intramedullary canal is reamed as deeply as possible with the long reamer until a stable anchorage for precise alignment of the axis is achieved. Following the tibial resection, it is reamed again to the required depth with the desired diameter in order to achieve pressfit in the case of a cementless stem fixation or, in the case of a cemented variant, to make room for the cement mantle. The reamers have markings for the different stem lengths. The depth reference is always the back side of the implant without augments. Since bone is removed during proximal resection, it may be necessary to increase the depth so that the stem can be inserted correctly. For cemented stems, a cement mantle of at least 1 mm is required.

NOTE
Cementless tibial stem implants have an excess size of 1 mm compared to the reamer. Reamers and implants are conically shaped until 5.2 cm from the reamer tip. Therefore, the depth of the preparation is crucial.

WARNING
Too aggressive pressfit could lead to pain at the tip of the stem. Therefore, achieving a less aggressive glide fit is recommended.

AESCULAP® EnduRo

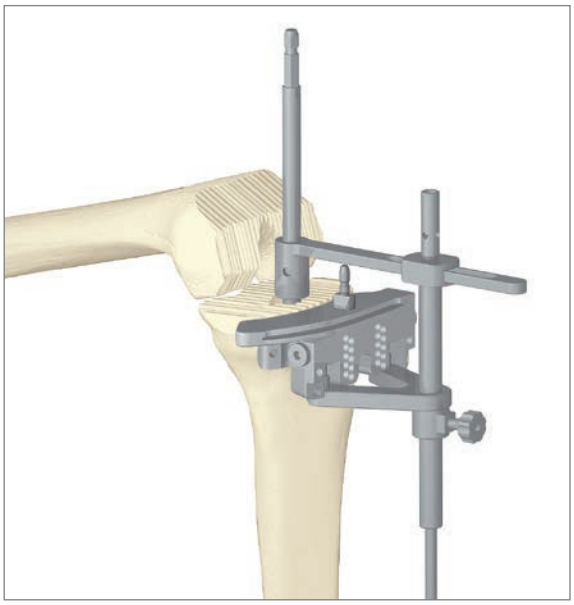
6 | TIBIA PREPARATION



Intramedullary Alignment

1. Version:
The alignment system, incl. the tibial cutting block, is completely assembled and attached to the reamer. The resection height is determined by means of the cutting height feeler NE425R in the cutting slot adjusted to the desired resection height. Fix this position by tightening the fixation screw on the side. The position of the saw cut can be checked with the cutting depth gauge NM350R.

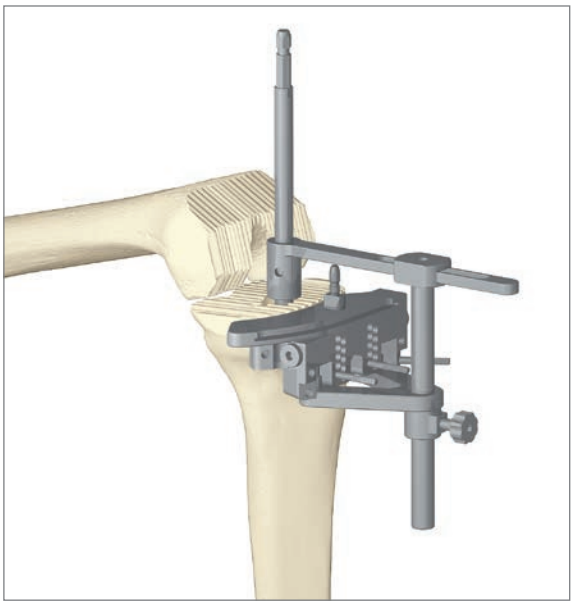
2. Version:
The complete alignment system incl. the tibial cutting block is attached to the reamer. With the cutting depth gauge in the cutting slot, contact with the tibial plateau is made. The cutting depth is now gradually determined using the inserted cutting height feeler (move distally with loosened fixation screw) via its locking mechanism.



Option:
Using the axis control rod NE331R (with sleeve) / NP471R (without sleeve), which is inserted into the bore of the slide bar, the position of the leg axis can be controlled.

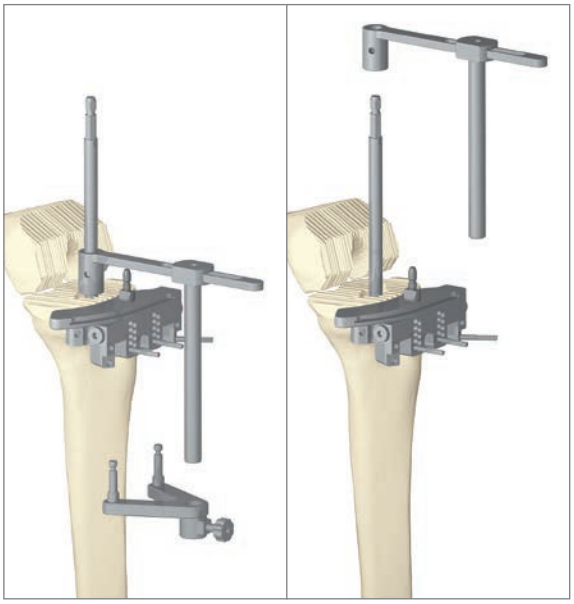
Connection NP677R, connection block (slide bar) NP678R, adapter for tibial cutting block NE195R, tibial cutting block (right NE196R / left NE197R)

The tibial cutting block is fixed in the desired position via two parallel pins without head and a convergent headed pin.



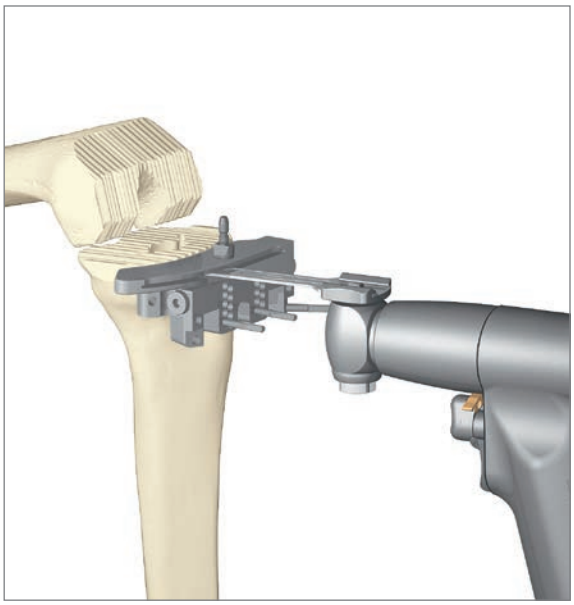
The alignment system and the reamer are removed. For this purpose, the NE195R adapter is released by simultaneously pressing the two pushbuttons on the tibial cutting block and is withdrawn distally.

The NP677R connection and the NP678R connector block are then removed proximally.
The reamer is rotated out proximally with the rejoined handle in a clockwise direction.



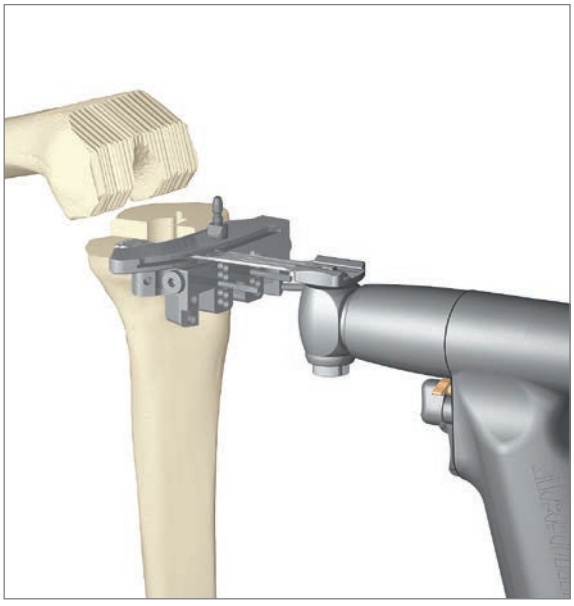
AESCULAP® EnduRo

6 | TIBIA PREPARATION



Tibial Resection

The tibial resection is performed using a 1.27 mm thick saw blade.

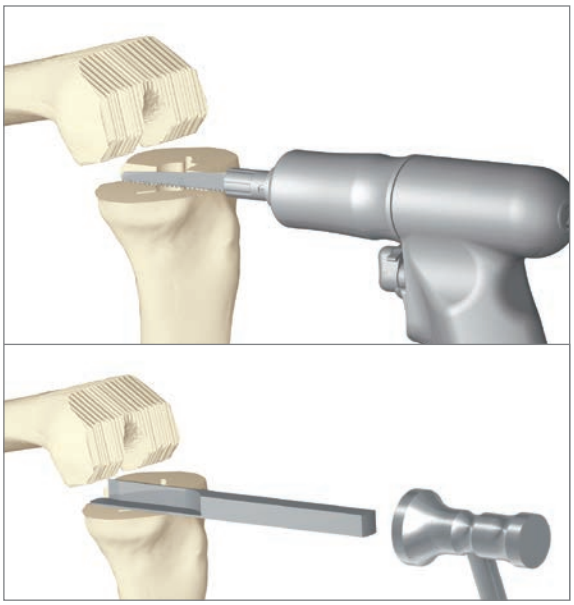


By reconnecting the cutting block distally, it is also possible to make saw cuts for the 4, 8, 12 and 16 mm augments.
The position in which the augment ends sagittally in the center should be marked.

Depending on the operated side, the NP024 or NP025R chisel is used for the sagittal augment resection. The use of a compass saw is also possible.

NOTE

To minimize the risk of tibial fracture, the horizontal cut should be made before the sagittal cut. The sagittal cut should not be deeper than the horizontal cut surface.



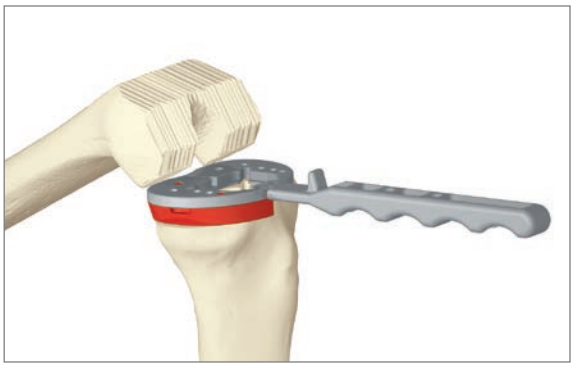
Following the tibial resection, it is reamed again to the required depth with the desired diameter in order to achieve pressfit in the case of a cementless stem fixation or, in the case of a cemented variant, to make room for the cement mantle.

NOTE

The reamers have markings for the different stem lengths.
The reference of the marking, even when using augments, is always the backside of the metal trial tibial plateau.
The marking on the reamer includes the stem length and height of the tibial box.

AESCULAP® EnduRo

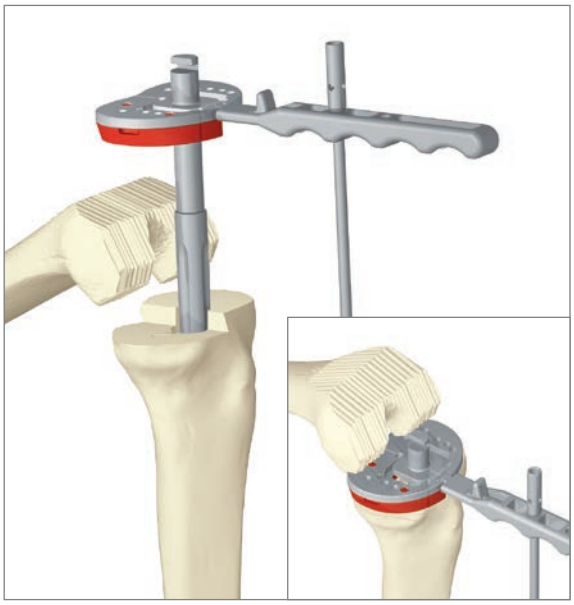
6 | TIBIA PREPARATION



Determining Tibial Size and Offset

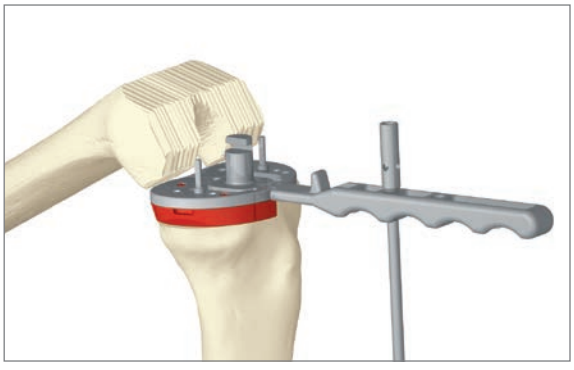
The trial tibial plateau which best covers the bone in ML and AP is selected. If necessary, click on the corresponding trial augment underneath.

Option:
The position of the leg axis can be controlled via the axis control rod, which is inserted into the handle.



The optimal ML, AP and rotation position is determined by means of the inserted ML positioner NP466R. The required trial tibia stem is screwed into this. The anterior marking shows the ML position. This ML value is noted.

Tibial offset options:
stepless
- T1 = ± 4 mm
- T2-T3 = ± 6 mm



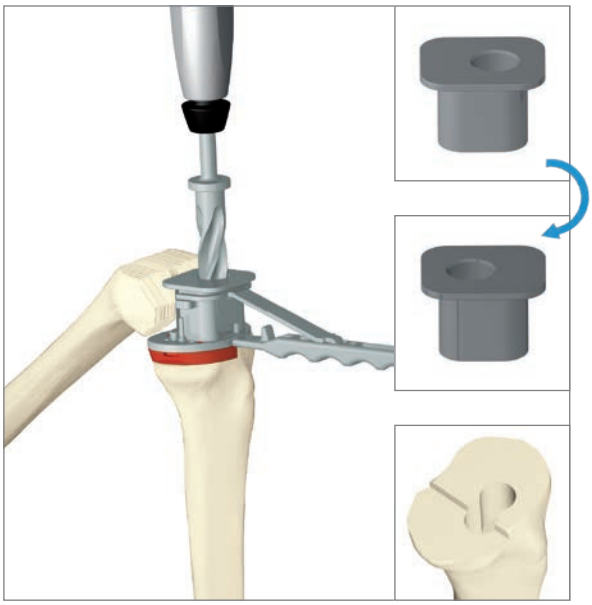
In this correct ML, AP and rotational position, the trial tibial plateau is attached with two short headed pins.

NOTE
In order to avoid perforation of the tibial cortex by the tibial keel in small tibial sizes with limited metaphyseal space and large bone loss, restoration of the tibial joint line through augmentation is preferable to higher PE.
This applies both to the preparation and to the final implant.

The ML positioner is removed.

The NP463R guide link and the drill sleeve, both in their required sizes (T1 NP457R, T2/T3 NP458R) are attached onto the trial tibial plateau (T1 NP451R, T2 NP452R, T3 NP453R). The NP459R holder is placed on the handle and the drill sleeve for stabilization. Two overlapping holes are drilled – by reattaching the drilling sleeve in a 180° rotated position – up to the depth gauge limit using the 18 mm Ø depth gauge drill NP456R.

The result is a binocular-shaped contour.

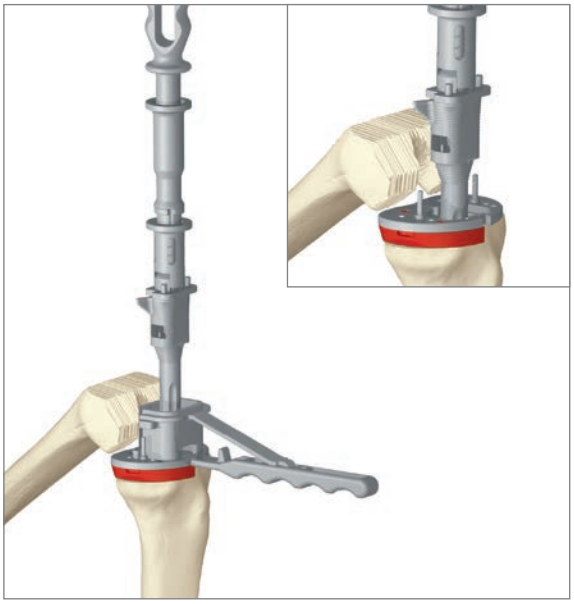


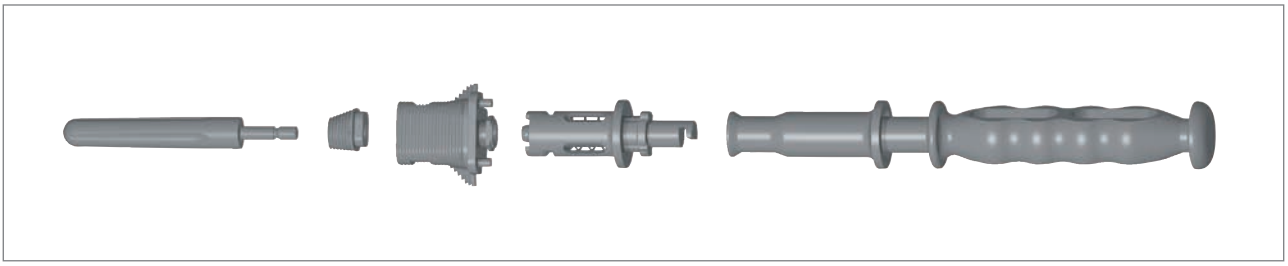
The box shape has to be completed with the rasp:

NP495R handle, NP467R adapter, box rasp (T1 NP464R, T2/T3 NP465R) + connection piece (up to Ø 14 mm NQ846R, up to Ø 17 mm NQ843R, up to Ø 20 mm NQ831R), and trial stem in the required size and ML position are assemled.

This rasp assembly is driven into the tibial plateau up to the stop position through the guide link – or without the guide link.

The depth of the plateau box seating must be taken into account.





Trial stem, connecting piece, box rasp, NP467R adapter, NP495R handle

AESCULAP® EnduRo

6 | TIBIA PREPARATION

The tibia is now prepared and attached to the box rasp in a way that ensures antirotational stability. The two pins can therefore be removed.

Insert covering NP479R in order to prevent contaminants from entering the borehole for the trial rotation axis.

If the Femur First technique is used, femoral preparation is initiated as described below.

Determining Femur Size

The size of the femur is determined with the help of the femoral size determination gauges F1/F2 NP441R and F3 NP442R. The gauges indicate the respective AP and ML measurements. Further markings on the instrument indicate the respective available distal and postero-distal femoral augments.

POSSIBLE FEMUR/TIBIA COMBINATIONS

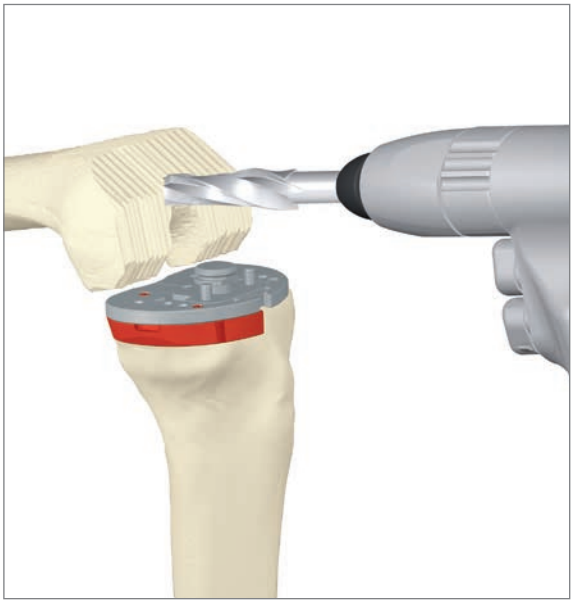
	F1	F2	F3
T1			
T2			
T3			

Compatible

Not compatible

Intramedullary Femoral Alignment

The entry point for the NP410R step drill in the distal femur can be determined using X-ray images, if necessary. Drilling is performed at the selected angle, taking into account the femoral curvature and other patient-specific aspects.



Femoral stem offset options:
- AP: stepless ± 2 mm

AESCULAP® EnduRo

7 | FEMUR PREPARATION

With the reamers or the IM alignment rod, the intramedullary canal is reamed as deeply as possible with the long reamer until a stable anchorage for precise alignment of the axis is achieved. Following the femur resection, it is reamed again to the required depth with the desired diameter in order to achieve pressfit in the case of a cementless stem fixation or, in the case of a cemented variant, to make room for the cement mantle.

The reamers have markings for the different stem lengths. The depth reference is always the back side of the direct implant without augment.

Since bone is removed during distal resection, it may be necessary to increase the depth so that the stem can be inserted correctly. For cemented stems, a cement mantle of at least 1 mm is required.

NOTE

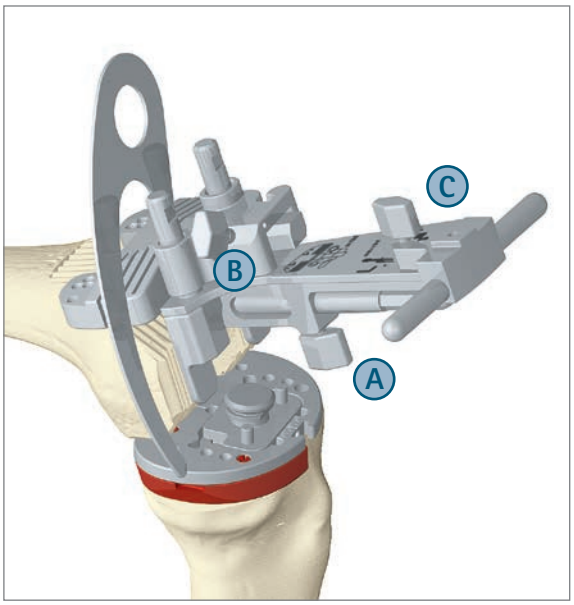
Cementless femur stem implants have an excess size of 1 mm compared to the reamer. Reamers and implants are conically shaped until 5.6 cm from the reamer tip. Therefore, the depth of the preparation is crucial.

WARNING

Too aggressive pressfit could lead to pain at the tip of the stem. Therefore, achieving a less aggressive glide fit is recommended.

Distal Femur Cut

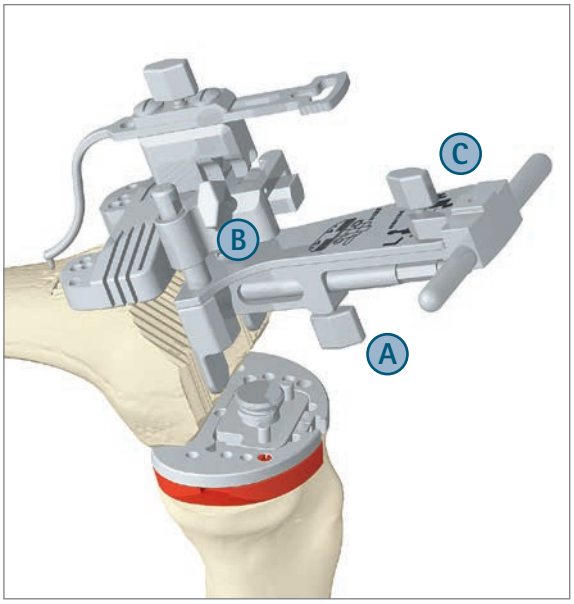
The alignment system NQ702R for the distal femur cut, with inserted handle NQ474R, is fitted with the cutting block holder NQ703R, to which the distal femur cutting block NP411R is in turn attached. This can be locked in place in a neutral position for the respective femur size, or in a more proximal or distal position. Screw B is tightened for this purpose. The desired angle between anatomic leg axis and mechanical axis (5° or 7° for cementless and 6° for cemented femur extension stems) is set for the correct side to be operated on (left or right leg) and fixed using screw C.
The alignment system is then slid onto the reamer until the bone is contacted and is fixed in place via screw A. In revision cases/bone loss the alignment system with in neutral cutting slot inserted cutting depth gauge NM350R can be slid onto the reamer until bone contact of depth gauge. Thereafter the femur cutting block has to be fixed in place by using two headless pins and can be switched 2 mm proximal for plane cut.

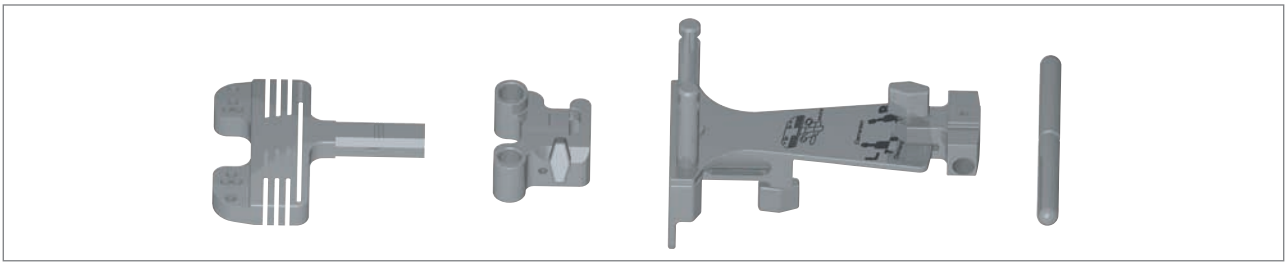


Distal Femur Cut with Joint Line Positioner

The joint line positioning device NQ708R with its guide finger is attached to the continuous cutting slot of the distal femur cutting block NP411R. The alignment system is then slid onto the reamer until the bone is contacted and is fixed in place via screw A.
The cutting block is now shifted until the positioning tip coincides with the anterior mark of the primary femur implant. If necessary, this mark is used as reference for distal or proximal shift of position. This resection position is fixed by means of screw B.

The desired angle between anatomic leg axis and mechanical axis (5° or 7° for cementless and 6° for cemented femur extension stems) is set for the correct side to be operated on (left or right leg) is set and fixed by means of screw C. The cuts can be checked by means of the cutting depth gauge in the cutting slot.

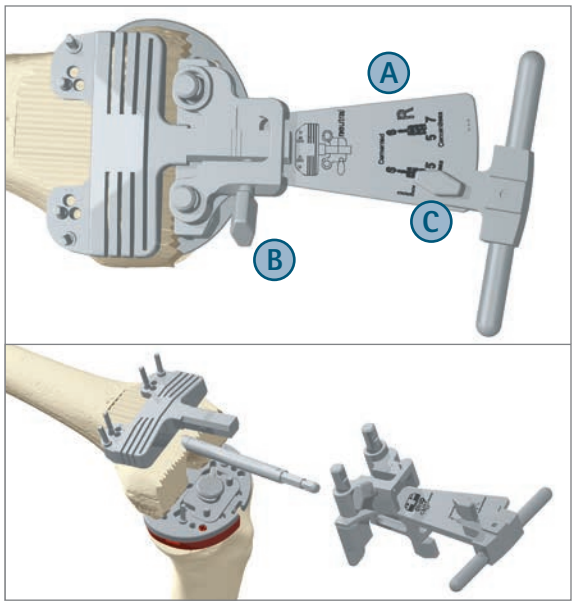




Distal femur cut-alignment system assembly: distal cutting block NP411R, holder NQ703R, distal alignment system NQ702R and handle NQ474R.

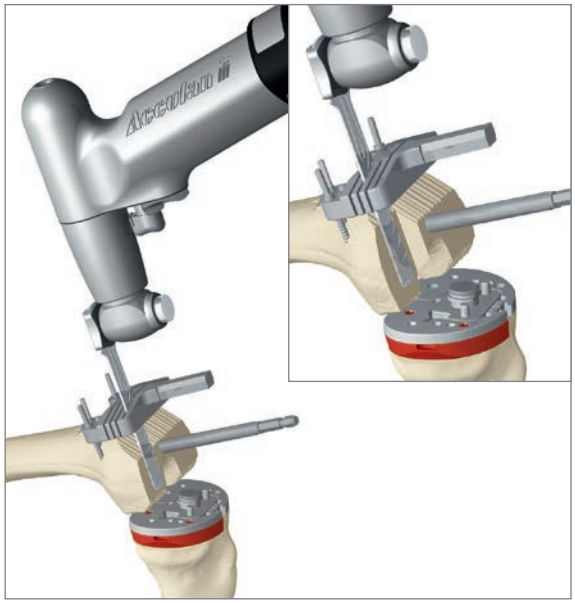
AESCULAP® EnduRo

7 | FEMUR PREPARATION

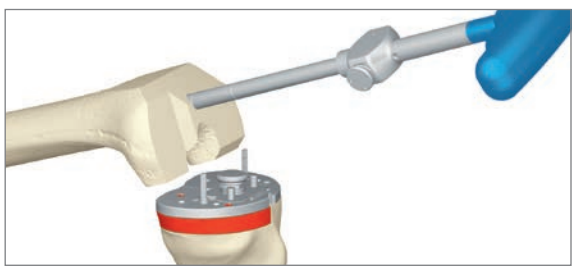


The cutting block is fixed to the anterior femur by means of two parallel headless pins and one/two convergent headed pins. The cutting depth gauge, the joint line positioning device and the alignment system are removed [loosen screws A (underneath, hidden from view) and B].

The reamer can be left in the femoral canal for the sawing cuts.



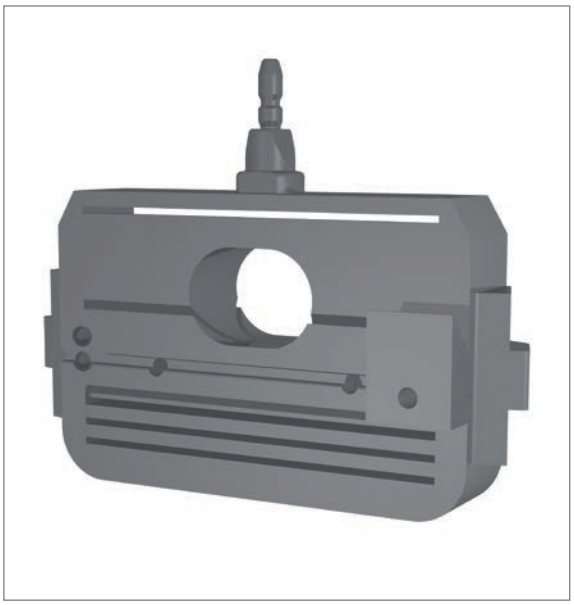
The distal femoral cut is performed in the selected resection direction. If necessary, resection is also performed for the distal or postero-distal femoral augments in the corresponding slot.



Following the distal resection, another check is performed to see if the reamer marking is in the correct position. The reference of the marking, even when using augments, is always the metal back side of the trial femur.

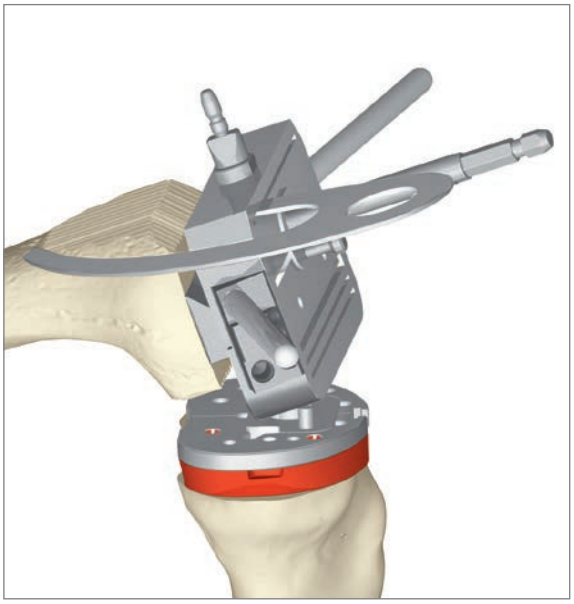
AP and Rotational Alignment

If resection has been performed for distal femoral augments, analogously dimensioned distal trial augments must be placed on the back of the 4-in-1 cutting block.



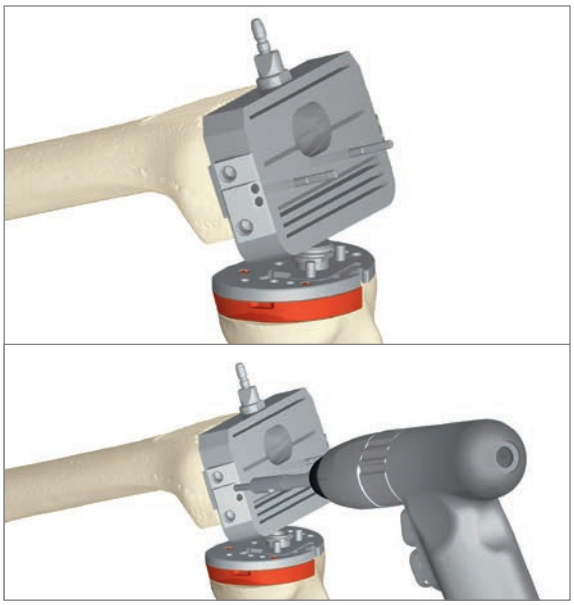
The required 4-in-1 cutting block (F1 NM731R, F2 NM732R and F3 NM733R) is pushed onto the reamer with the inserted AP orientation sleeve, which is available in variant Neutral NE172R and ± 2 mm NE173R. To avoid anterior undercutting of the femoral cortex, the cutting depth gauge is inserted into the anterior slot for verification.

Option:
For better rotational alignment, two NE730R handles can be attached to the cutting block.



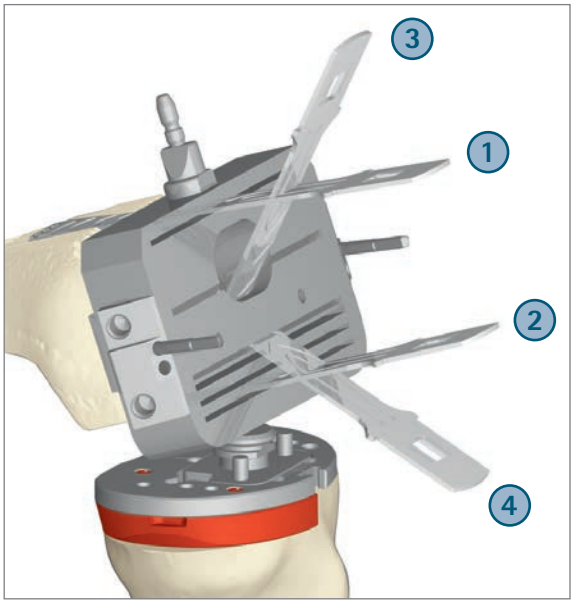
AESCULAP® EnduRo

7 | FEMUR PREPARATION



The cutting block is fixed in the defined rotational position by the two parallel anterior holes using two long headless pins. Handles, orientation sleeve, cutting depth gauge and reamer are removed. For large diameters, the cutting block must be removed and then put back on.

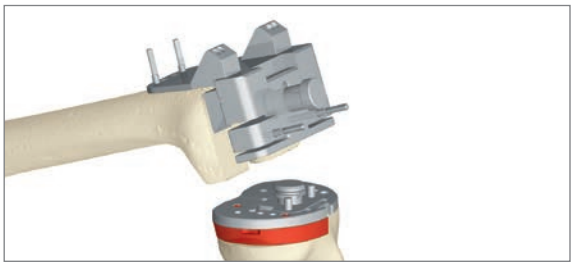
Additionally, the cutting block is attached with two long headless pins through the convergent anchoring holes. Then the two parallel pins are removed.



4-in-1 Resection

The four femoral resections are performed in the following order:

1. Anterior parallel cut
2. Posterior parallel cut (including augment cut if required)
3. Posterior chamfer cut
4. Anterior chamfer cut

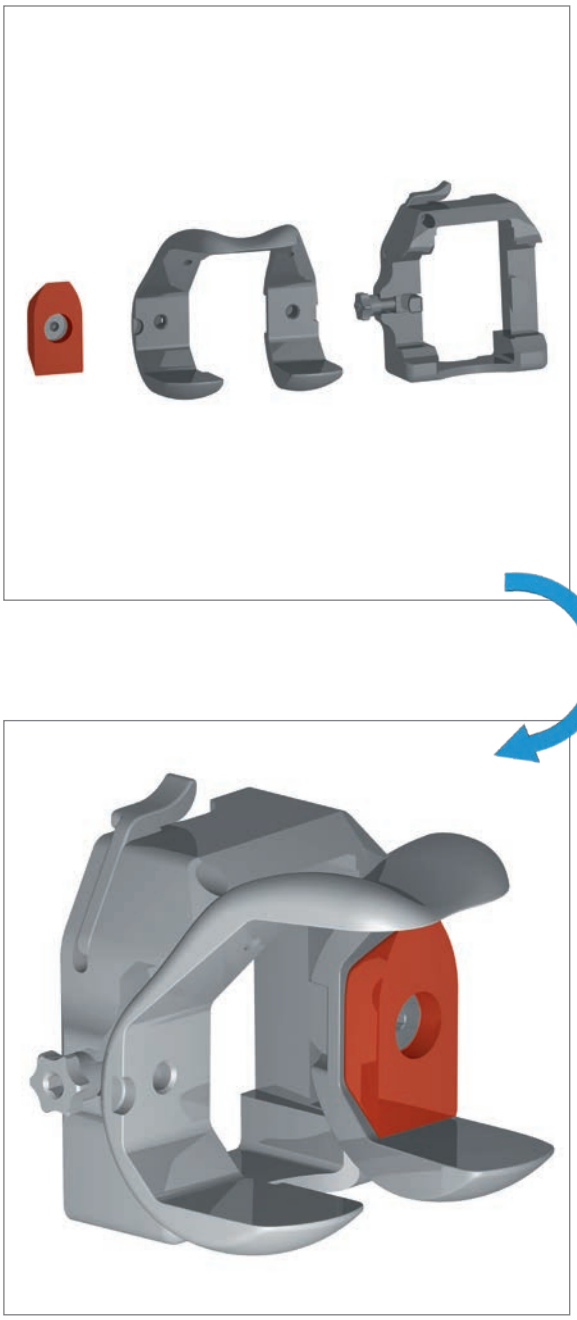


If a 12 mm postero-distal femoral augment is required, the special 12 mm NP431R cutting block is attached to the bone, fastened with a pin and resected in the appropriate slot.

In case of poor anterior support or a change in rotation, it can be fastened via the distally-inserted pins of the 4-in-1 cutting blocks.

Femur Box Preparation

If needed, the distal or postero-distal trial augments are screwed to the trial femur required for the side of the operated leg (right: F1 NP407R, F2 NP408R, F3 NP409R; Left: F1 NP404R, F2 NP405R, F3 NP406R). The frame used to align the trial femur and the femoral box preparation are selected in the required size (F1 NP421R, F2 NP422R, F3 NP423R) and placed distally on the trial femur. It is fastened with the screw on the side.
If necessary, use the NE181R screwdriver.

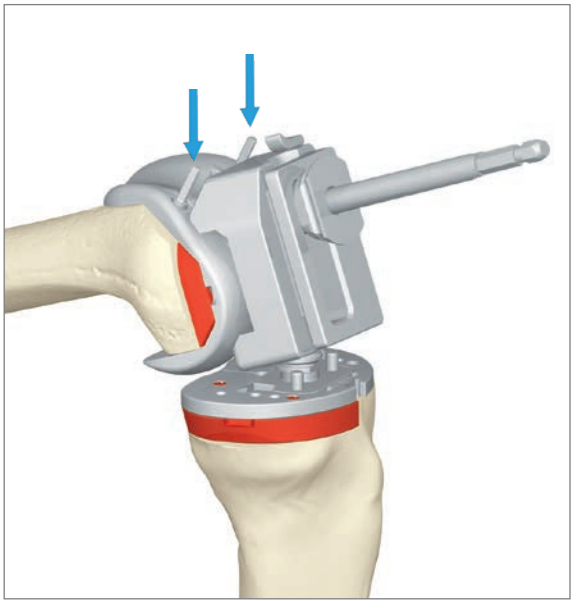


Assembling the femoral box alignment: Reamer, trial femur assembly, femoral box alignment and femoral box alignment sleeve

AESCULAP® EnduRo

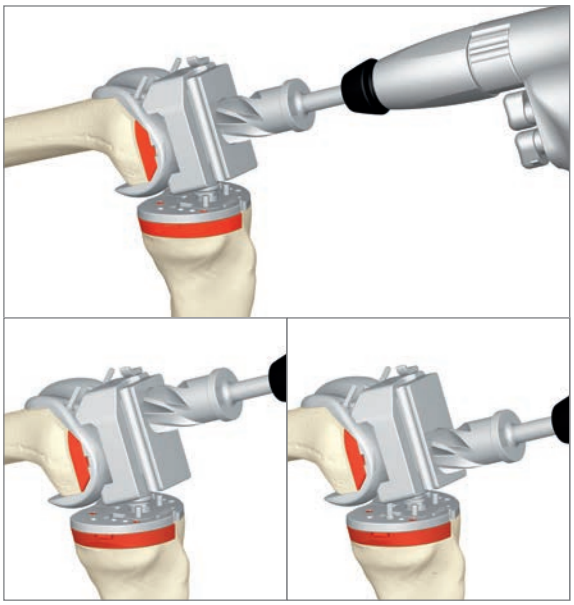
7 | FEMUR PREPARATION

The femoral box alignment (F1 NP415R, F2/3 NP416R) is inserted into the selected trial femur, fitted with a distal or postero-distal trial augment if applicable, and with a screwed-on frame, for femoral box preparation. Make sure to have the right size and marking corresponding to the side of the operated leg (L = left leg, R = right leg) and close the clasp on the frame. The slevee for the femoral box alignment (L6°/R6° NP417R and L7° R5°/ L5° R7° NP418R) is inserted at the correct angle. This femoral box alignment assembly is pushed onto the reamer until the internal femoral geometry makes full contact with the bone, or using the flat femoral impactor (NP414) attached to the handle.



In this position, the trial femur is fastened anteriorally with two headed pins. The sleeve, the femoral box alignment and the reamer are then removed.

The central milling guide in the required size (F1 NP436R, F2/F3 NP437R) is attached to the frame for femoral box preparation and secured in place for preparation of the femoral box. Milling is then performed with the depth gauge milling cutter NP435R up to the stop position.

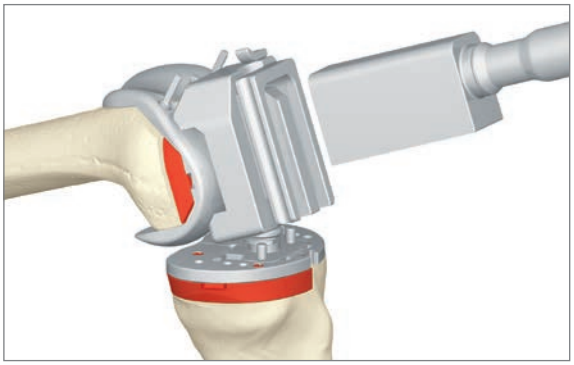


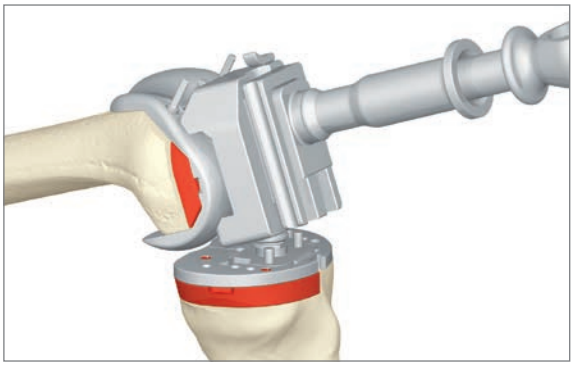
Next, the reversible guide (F1 NP438R F2/F3 NP439R) is inserted, milling is performed and a further hole is milled by rotating the guide for 180°. As last step, the guide is removed.

NOTE

To avoid injury to the dorsal soft tissues, it is advisable to detach them beforehand and protect them with a suitable spatula.

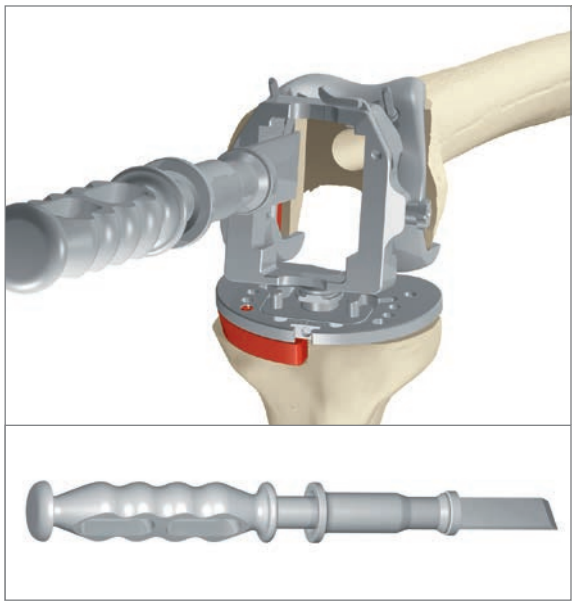
In order to remove the remaining remnants of the bone, the guide for the U-chisel in the required size (F1 NP433R, F2/F3 NP434R) is placed and locked in the frame for the femoral box preparation. The NP443R U-chisel is connected to the handle and driven in to the stop.



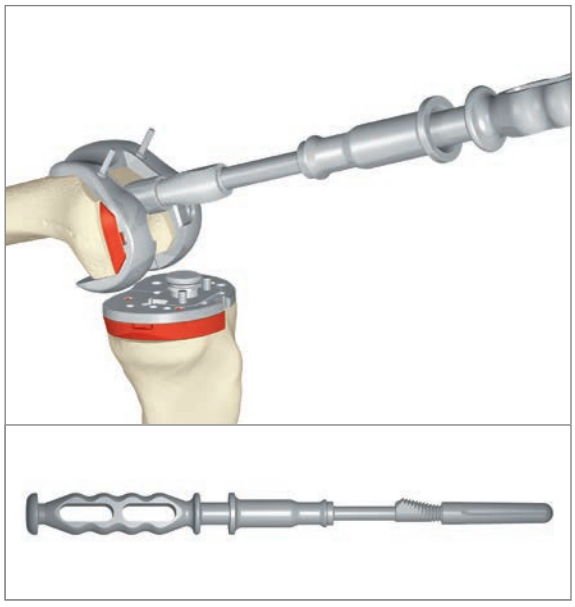


AESCULAP® EnduRo

7 | FEMUR PREPARATION



The NP432R flat chisel is connected to the handle. With the long side of the blade resting against the inner, medial side of the femoral box frame, the femoral box is exposed to the stop.

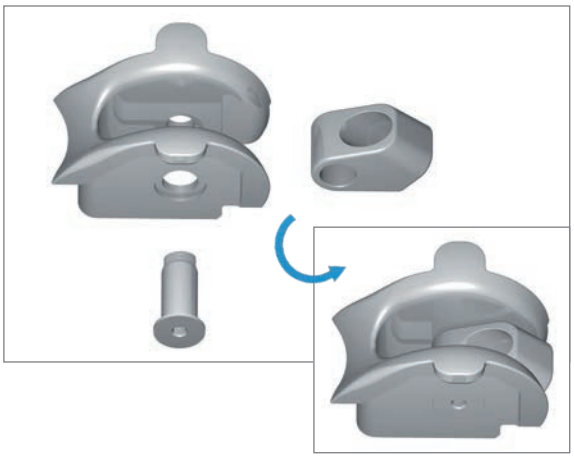


To ensure an optimal fit of the femoral trial stem, the medial and lateral internal geometry is prepared with the NQ832R rasp. This is guided by the trial stem connected to it. The rasp is driven in twice (180° rotation) up to and including the last, wide tooth of the proximal end.

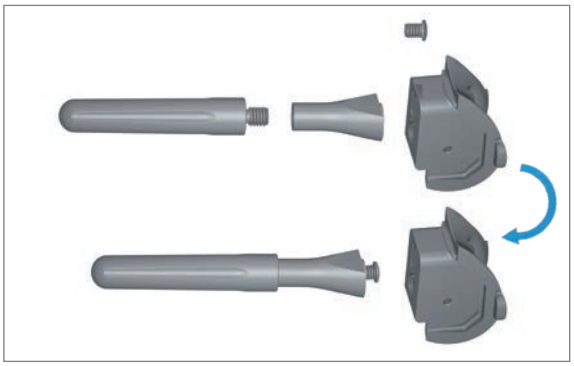
Trial stem, NQ832R rasp and NP495R handle.

Assembling the Trial Femur Box

The appropriate trial hinge ring (F1 / F2 NP445R, F3 NP446R) is inserted into the trial femoral box of the required size and for the correct leg, and screwed in place via the NP444R trial flexion axis.



Trial femoral box, stem adapter, screw (NS001R) for stem adapter (5° / 7° cementless) and trial stem. For the cemented stem variant (6°), the trial stem and stem adapter form one unit.



The selected femoral trial stem is screwed onto the adapter at the correct angle and length. The fastening screw (NS001R) is screwed into this with one or two thread rotations. Subsequently, the stem is inserted into the proximal guide of the trial femoral box and loosely screwed in from the distal side to allow clearance in the AP for self-centering. This trial femoral box assembly is inserted by hand into the trial femur.

AESCULAP® EnduRo

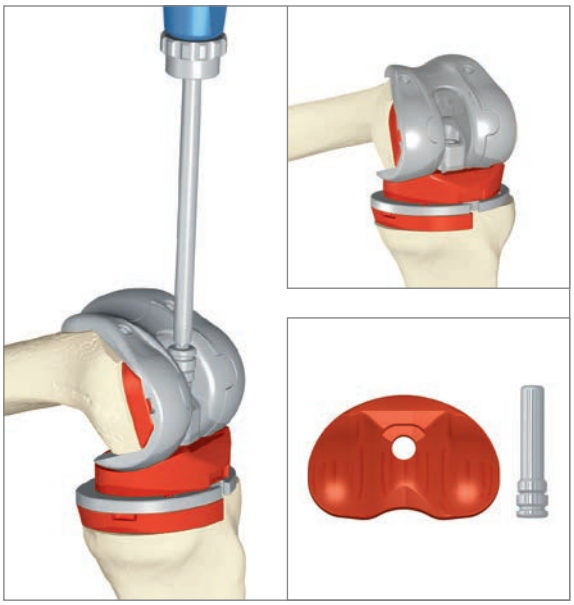
7 | FEMUR PREPARATION

Finally, the configured trial femoral box is completely driven into the trial femur.

The stem, which is now self-aligned in AP, is fastened into this defined position by tightening the intercondylar fastening screw with the NE181R screwdriver.

The two pins can now be removed from the femur.

The trial PE gliding surface of the required size and height can be selected and positioned, after removing the cover of the rotation axis borehole, on the trial tibial plateau.



NOTE

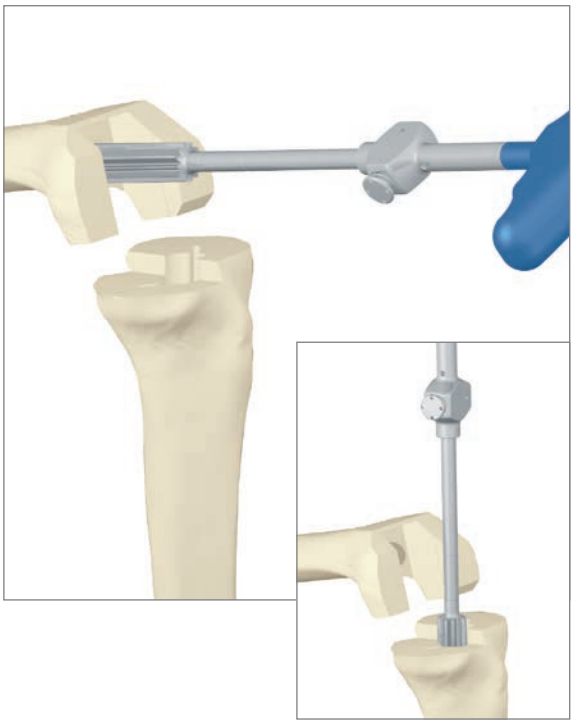
The size of the PE gliding surface depends on the size of the femur.

If needed, with the help of the 6 mm supplementary plates, additional heights of 16 to 24 mm can be assembled. The required trial rotation axis is screwed into the trial hinge ring with the NP440R screwdriver. It is available in two lengths (short NP447R up to PE height 16 mm, or long NP449R starting at a PE height of 18 mm). Now, the joint stability during flexion and extension can be checked. Depending on the result, a higher or lower PE gliding surface is selected. It is recommended to perform a check with the patella. When selecting the height of the PE gliding surface, attention should be paid to sufficient tension even though the system has an inherent anti-luxation protection.

NOTE

A hyperextension of > 3° should be avoided.

If a cemented stem procedure has been selected, it will be necessary to ream with a larger diameter for the cement mantle. Alternatively, thinner stems can be used (-2 mm). Reamers with Ø 14, 15, 17, 18 and 20 mm are available.



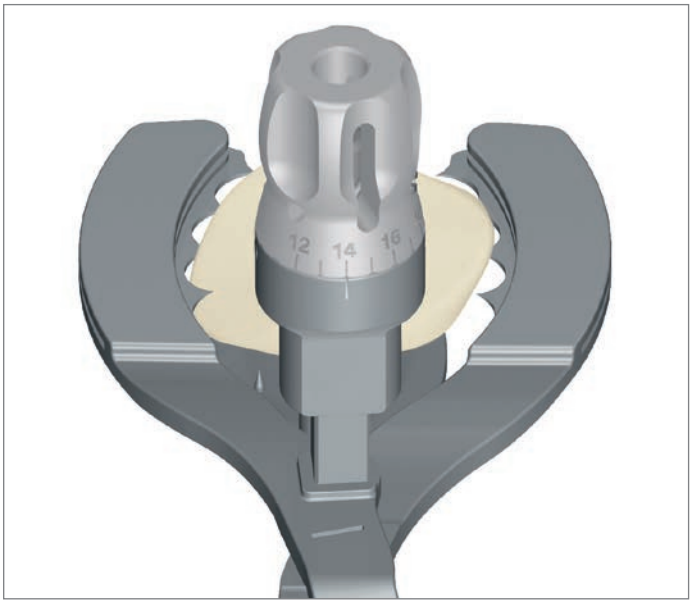
AESCULAP® EnduRo

8 | PATELLA PREPARATION

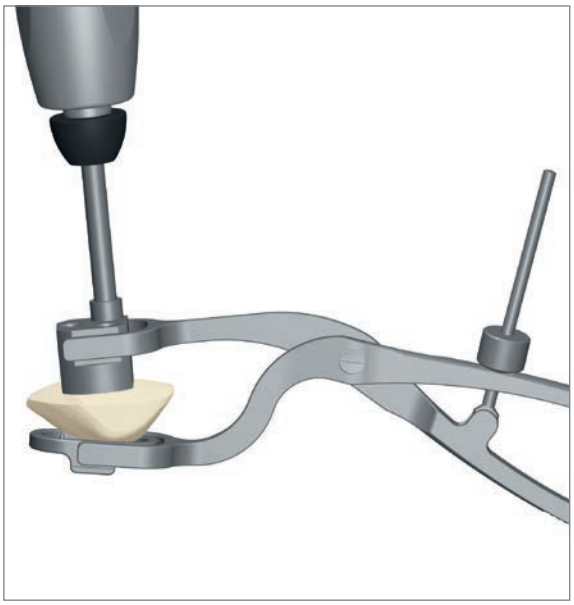
The thickness of the patella is measured using the caliper. This thickness should not be exceeded after implantation of the patella implant. The level of bone resection is calculated.
A minimum thickness of the remaining patella bone should not be less than 12 mm.

The resection level is adjusted by turning the resection depth wheel to the planned level of remaining patellar bone thickness. Then the patella is fixed into the patella resection clamp.

The resection is performed through the cutting slot with a 1.27 mm thick saw blade.



The patella resection clamp is removed. The patella drill/impaction clamp is set onto the osteotomized patellar surface choosing a medialized position to recreate the resected apex of the articular surface; the trial patella can be placed on top of the drill guide in order to check its position to the medial rim and appropriate positioning in the superior and inferior direction.



The peg holes for the implant are drilled through the holes with the Ø 6 mm drill until the stop is reached. The size of the patella is established with the corresponding trial patellar implant.

AESCULAP® EnduRo

9 | ASSEMBLING THE FINAL IMPLANTS

The required final implants are selected and prepared based on the result of the trial reduction.

NOTE
To apply the required torque, all implants that are tightened with a defined torque (tibial locking ring, tibial/femoral stem, cone joining, securing nut) must be subjected to the torque three times!

NOTE
It is of advantage to have two persons perform the implant assembly and the coupling/decoupling. To avoid slippage when tightening to the torque, pressure should be applied to the torque wrench from above.

NOTE
To protect the sterile pad from being pierced during implant assembly, an abdominal cloth should be used as a pad.

Tibial Implant

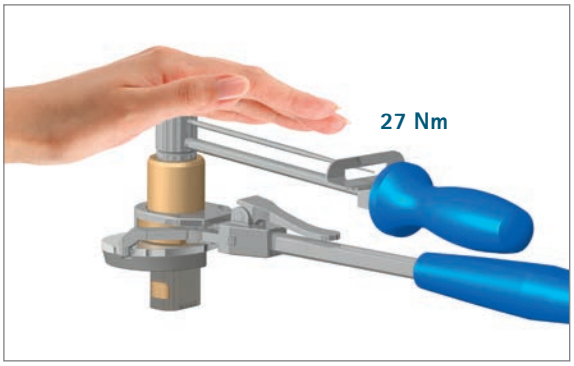
Connecting the Rotation Axis in the Tibia

The rotation axis (1) is correctly inserted into the black bearing bushing (2). Subsequently, both of them are inserted together into seating borehole of the tibial plateau. Finally, the tibia locking ring (3) is preliminarily screwed on by hand.

NOTE
The size of the PE gliding surface depends on the size of the femur.

Now the guide NP144PM for the locking ring wrench is placed on the tibial implant. This is fastened with the NQ839R counterholder. For this purpose, the lever is opened and pushed forward. The arms are pushed together and engage medially and laterally in the recesses on the implant. In this position, the lever is closed again to hold the implant.

The NP454R locking ring wrench is inserted into the guide and turned until the notches engage the locking ring. Then the NE184RM torque wrench is attached. Now the tibial locking ring is tightened to 27 Nm. For PE gliding surfaces F1 – 10 or 12 mm, the NP462RM locking ring wrench must be used. In addition, the NP141R hold-down device is screwed onto the guide with the slider open, until it makes contact with the locking ring wrench. The slide is now closed.

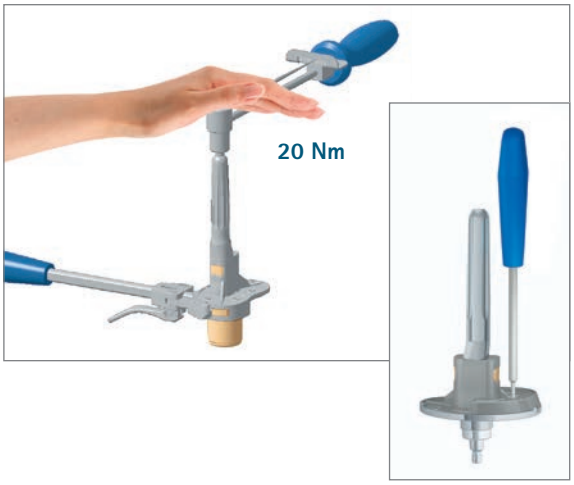


NOTE

Sometimes it may be necessary to turn the hold-down device 1/4 of turn back so that the slider can be closed.

Connecting the Tibia Extension Stem

The tibial implant is flipped over using the attached counterholder. The defined tibial extension stem is first screwed onto the tibial implant by hand, based on the medial/lateral offset position noted earlier. The extension stem is now tightened with the NE184RM torque wrench along with the NE185R nut with 20 Nm.



Connecting the Tibia Augments

If needed, the tibial augments are screwed under the tibial plateau using the NE181R screwdriver with SW 3.0.

AESCULAP® EnduRo

9 | ASSEMBLING THE FINAL IMPLANTS

Femur Implant

The femur securing nut and the plastic sealing mask are packed in sterile packaging and enclosed with the femoral implant. The AP stem position of the explanted trial stem serves as reference for the assembly of the final femoral implant.

Connecting Femoral Augments

If needed, the femoral augments are screwed into the femoral implant using the NE181R screwdriver with SW 3.0.

Connecting the Femoral Extension Stem

The tension screw, which is supplied with the selected femur extension stem, is inserted into the selected femur extension stem and loosely screwed in place with the extension stem nut NR400K, taking into account the ML extension stem marking and the AP extension stem nut marking.

The stem is inserted into the femoral box and screwed in by hand with the correct AP orientation. With the NE184RM torque wrench and the attached NE185R nut, the femoral extension stem held with the NQ834R stem holder is tightened to 27 Nm in the correct AP position. For the cemented 12 mm diameter femoral stem, the NQ834R stem holder has a special retaining opening.

Next, the sealing mask, which can be cut to the required AP length, is inserted into the opening of the femoral box in order to prevent the penetration of cement.

NOTE
Tibial and femoral implants must be cemented. Depending on the selected variant, the stems can be applied cemented or cementless.

NOTE
It must be ensured that the bone preparation, in terms of sizes, diameters, heights and lengths, matches the final implant. This has to be verified with the trial components in advance.

Sequence of implantation:
- Tibial plateau
- Femur
- PE gliding surface
- Patella

Tibia implantation

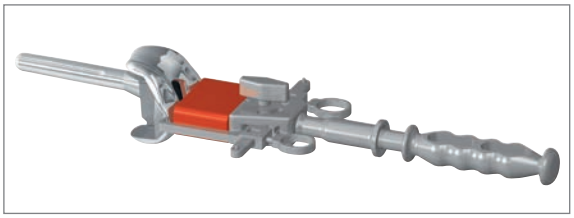
The NQ570R tibial plateau holder is connected to the handle and the NQ569 tibial insert. The tibial plateau is inserted into the L-shaped hooks of this instrument and secured by tightening the toggle screw, then driven in vertically into the bone in the correct rotational position.

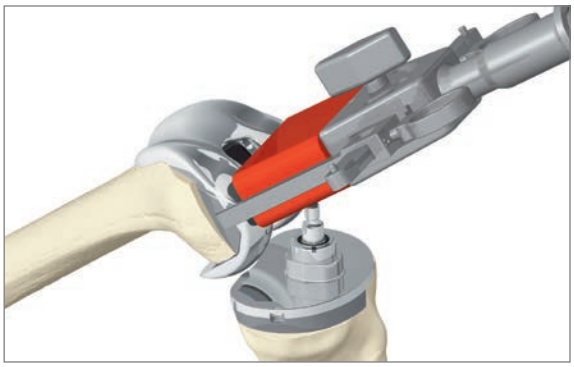
Option:
The NP468 tibial impactor is connected to the handle. The tibial plateau is inserted by hand in the correct rotational position and then driven in vertically into the bone.

NOTE
For possible revision procedures, it is beneficial if bone cement is removed from the recesses for the holding instrument in the implant already during implantation.

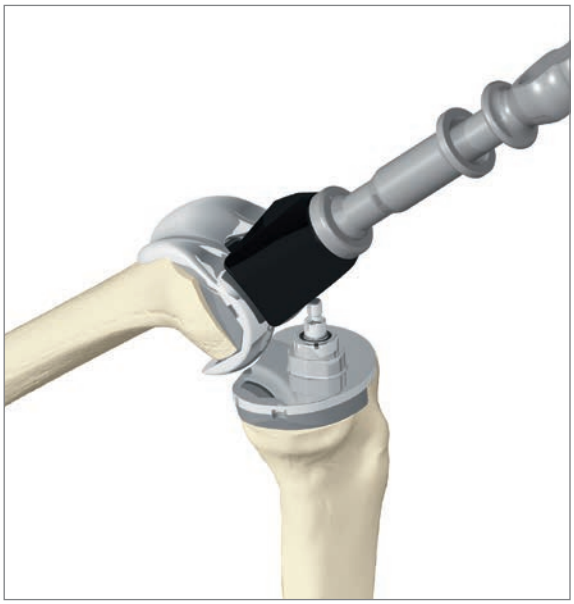
Femur Implantation

The femoral insert in the required size (F1 NQ566, F2 NQ567, F3 NQ568) is inserted into the NQ570R femur holder, and the handle for impacting is attached. Both retaining fingers are pushed apart, the femur is inserted and then pushed back. The retaining fingers engage in the two (medial and lateral) recesses in the femur and are fixed in this position by tightening the toggle screw.



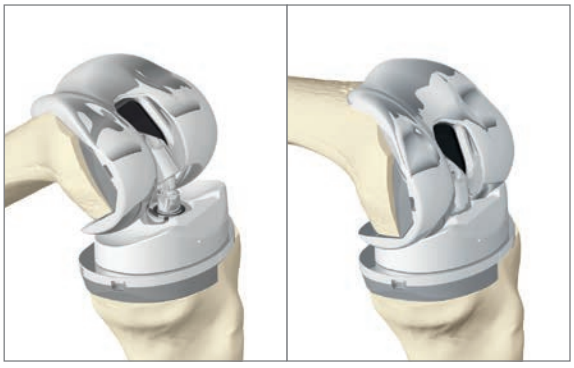


The femoral component is impacted with the implant holder.
This step can also be done with the pre-applied PE gliding surface, which then guides the femur.



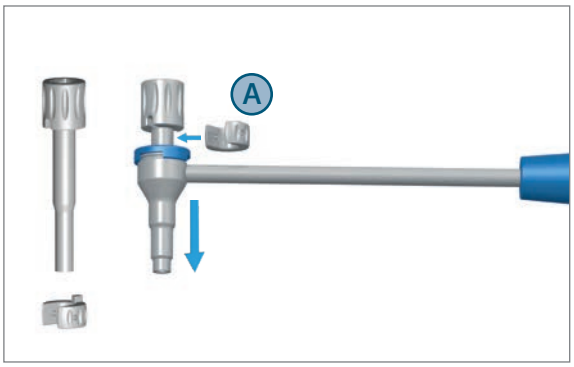
Option:
The femur is fully driven in with the NQ459 (concave) impactor that is connected to the handle, in the correct position.

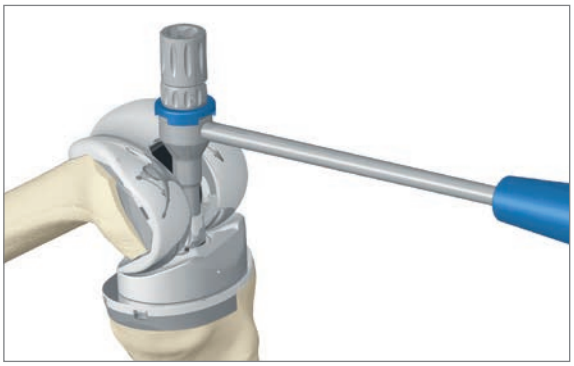
NOTE
All cement residues must be carefully removed to avoid third-body wear. Especially the rotation axis must be free from cement residues, so that no contact corrosion occurs. It is recommended to allow the cement to harden in extension, with the PE gliding surface attached and the hinge ring slipped over the rotation axis. As a result, the selected extension strain is achieved and the femoral implant centers itself on the joint line.



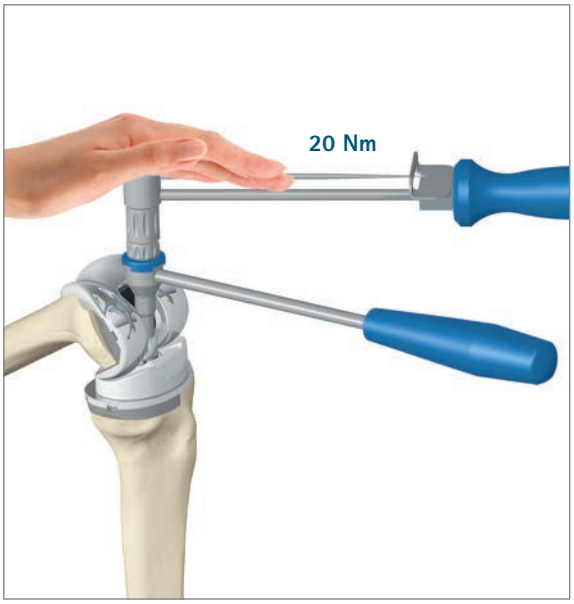
NOTE
Since cement residues may have accumulated in the dorsal area, especially in the case of cemented stems, the pre-coupling must be released and the PE gliding surface taken off again in order to completely remove all cement residues.

The PE gliding surface is attached again, and the hinge ring is slipped over the rotation axis, which is now positioned in it centrally. The knee has a flexion of >90°. Then the NP420R adapter for cone joining is inserted into the NP419R counterholder for cone joining so that its internally threaded end extends out a few millimeters. Subsequently, the adapter is screwed onto the rotation axis under vision. Then the counterholder is pushed towards the tibial plateau so that the spacer piece (A) can be inserted into the free space between the two instruments.





Using the NE184RM torque wrench, the cone is joined clockwise with 20 Nm. Since the thread has a small pitch, several rotations are necessary. By turning it counterclockwise, the adapter for joining the cone is unscrewed.

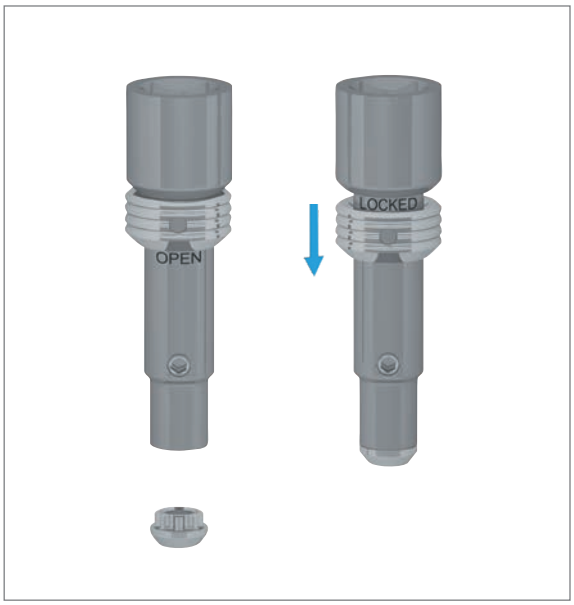


NOTE

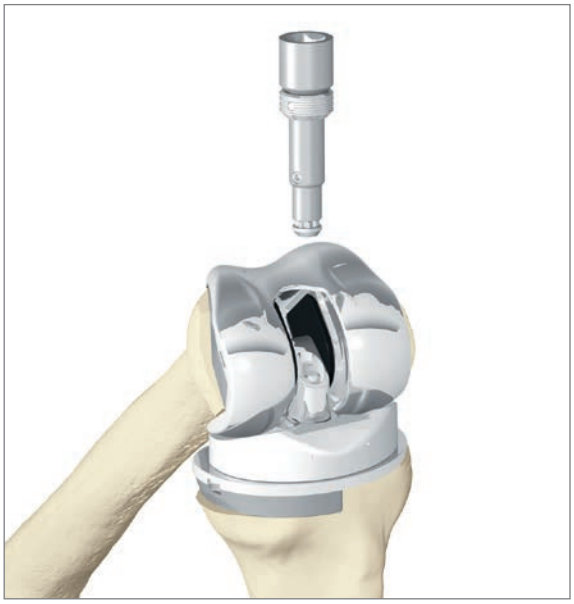
Should there be a problem with connecting the rotation axis and the hinge ring, the initial cone joining can be performed without the NP419R counterhold for starters. With complete vision and with the rotational axis standing centrally in the hinge ring, the NP420R adapter for cone joining is placed freehand and screwed on by moderately turning clockwise. Under light tension, the rotation axis can now be inserted in the cone. Then the adapter for joining the cone is unscrewed again, and the final joining of the cone with the counterholder is performed as described above.

AESCULAP® EnduRo

11 | AXIS COUPLING



Insert the securing nut included with the femoral implant into the NP455R holder and secure it by sliding down the silver retaining ring.

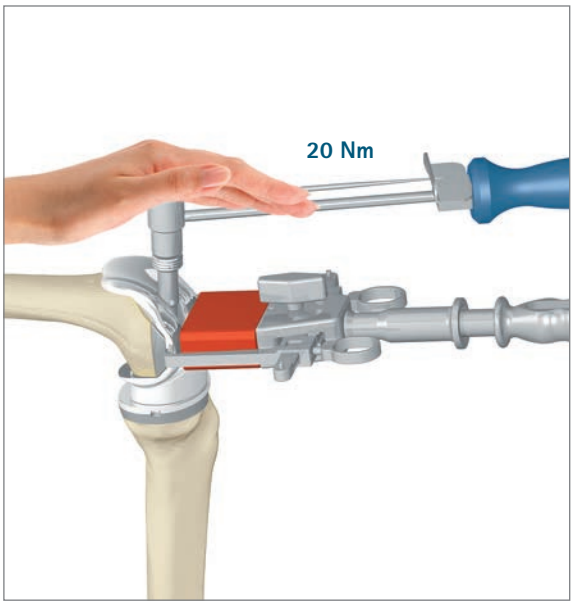


With the help of the holder, the femoral securing nut is initially screwed onto the axis thread by hand.

The femoral insert is inserted into the NQ570R holder, connected to the handle and attached to the femur as a counterholder.

The securing nut is tightened to 20 Nm with the torque wrench.

NOTE
It is recommended that the implant assembly and the coupling are performed by two persons.
To avoid slippage when tightening to the torque, pressure should be applied to the torque wrench from above.



The patella is implanted using the patella drill / impaction clamp and the concave plastic cap, which allows good transmission of forces during the cement hardening process and at the same time protects the patella implant against damage.

AESCULAP® EnduRo

12 | CEMENTING TECHNIQUE

- Regardless of what fixation method is utilized it is critical that correct techniques are employed in order to avoid complications and early failure. Also, even with accurate cuts it is important to ensure that components are fully seated, as it is easy for this to be obscured when cementing is taking place. Varus/valgus alignment can be significantly affected by unequal medial-lateral cement mantles and poorly seated components and there can be a tendency to place femoral components in relatively flexed positions if specific care is not taken.

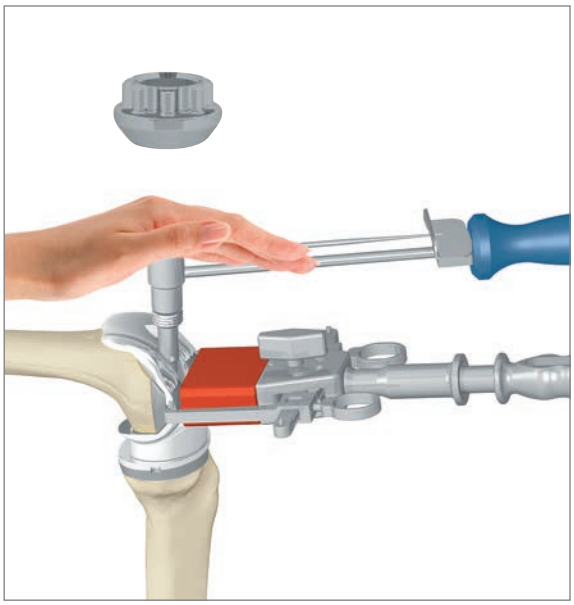
- It should also be noted that when definitive components are cemented in, they may prove more stable and seat better than the trials, which are often a little loose. It is therefore worthwhile to recheck the balancing and stability at this point so that further adjustments can be made if necessary. It has been possible to relate poor cementing techniques to early and continuous component migration, which in turn is of positive prognostic significance when predicting aseptic loosening so proper attention to the cementation steps must be taken (6).

- Preparation of the bony surfaces and cancellous bone should be performed with pulsatile type lavage with the knee under a pressure tourniquet. This step allows for well-fitting cement penetration and interlocking to the bony prepared surfaces and also removes bone debris that can serve as third body particles that increase polyethylene wear after surgery (7, 8). The surfaces should be properly dried prior to cementation and appropriate exposure of all bony surfaces achieved (9, 10). All of the surfaces should be pressurized for optimal cement penetration. Emphasizing the importance of effective cementation of the posterior femoral condylar surfaces is also recommended since it can have a major effect on the longevity of the fixation of the femoral implant (11). A further point worth noting is that if holding the knee out in full extension while cement is hardening is used to compress components down and possibly improve cement intrusion.

- Care should be taken to completely remove all excess cement that protrudes from the implant bone interface. Any remnants of overhanging cement can impinge on surrounding soft tissue or can provide a source of debris that can serve as a generator of third body wear and may contribute to the demise of the fixation earlier than expected (12). Further recommendations for cementation technique are published in the scientific information brochures "AESCULAP® Implant Fixation in TKA", order number 061802 and BonOs® R and BonOs® R Genta, order number 065002.

- After cement polymerization and removal of all cement excess, thoroughly irrigate the joint. If a tourniquet is used, hemostasis is achieved after its deflation.

- Close soft tissue in the normal layered fashion.

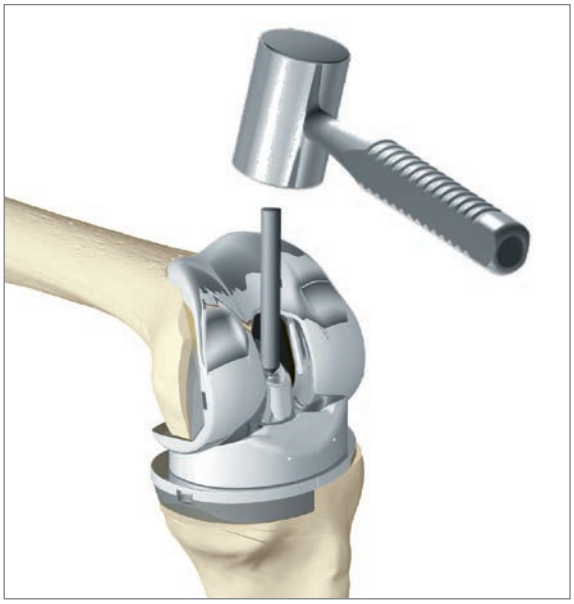


Decoupling of Femur and Tibia

In the event that an EnduRo implant is to be changed, the femur and tibia must be decoupled. To do this, the femoral securing nut must be turned counterclockwise with the NP455R holder, inserted into the NE184RM torque wrench.

The NQ570R implant holder with the respective femoral insert (F1 NQ566, F2 NQ567 or F3 NQ568) must be used as a counterholder, possibly with the NP495R handle.

NOTE
It is of advantage to have two persons perform the implant assembly and the coupling/decoupling. To avoid slippage when loosening the torque, pressure should be applied to the torque wrench from above.



Apply an impact punch using an appropriate tappet with a tip (not included in the instrumentation) to knock the axis distally out of the hinge ring.

15 | SITUATION – PE REPLACEMENT

NOTE

In the case of a partial replacement of the PE gliding surface, the respective tibial and femoral axis components must remain undamaged. To avoid damage, it is recommended to replace them with new ones.

Tibial axis components (rotation axis, PEEK bearing sleeve, tibial locking ring)

Femoral axis components (hinge ring, femoral securing nut)

The tibial axis components depend on the PE height.

The gliding surface to be exchanged is removed from the tibia. Now the guide for the locking ring wrench NP144PM is placed on the tibial implant. This is fastened with the NQ839R counterholder. For this purpose, the lever is opened and pushed forward. The arms are pushed together and engage medially and laterally in the recesses on the implant. In this position, the lever is closed again to hold the implant.

The NP454R locking ring wrench is inserted into the guide and turned until the notches engage the locking ring. Then the NE184RM torque wrench is attached. Now the tibial locking ring is turned counterclockwise.

For PE gliding surfaces F1 – 10 or 12 mm, the NP462RM locking ring wrench must be used. In addition, the NP141R hold-down device is screwed onto the guide with the slider open, until it makes contact with the locking ring wrench. The slide is now closed.

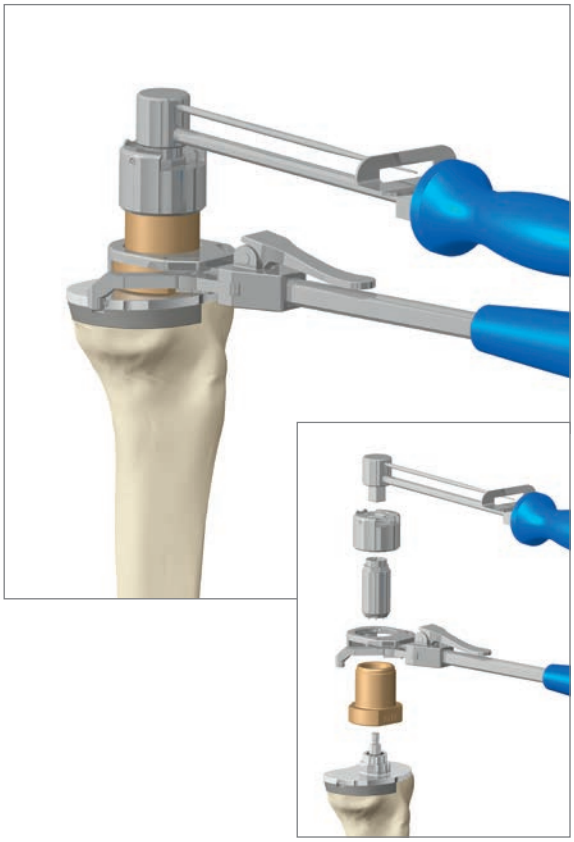
NOTE

Sometimes it may be necessary to turn the hold-down device 1/4 of turn back so that the slider can be closed.

AESCULAP® EnduRo

15 | SITUATION – PE REPLACEMENT

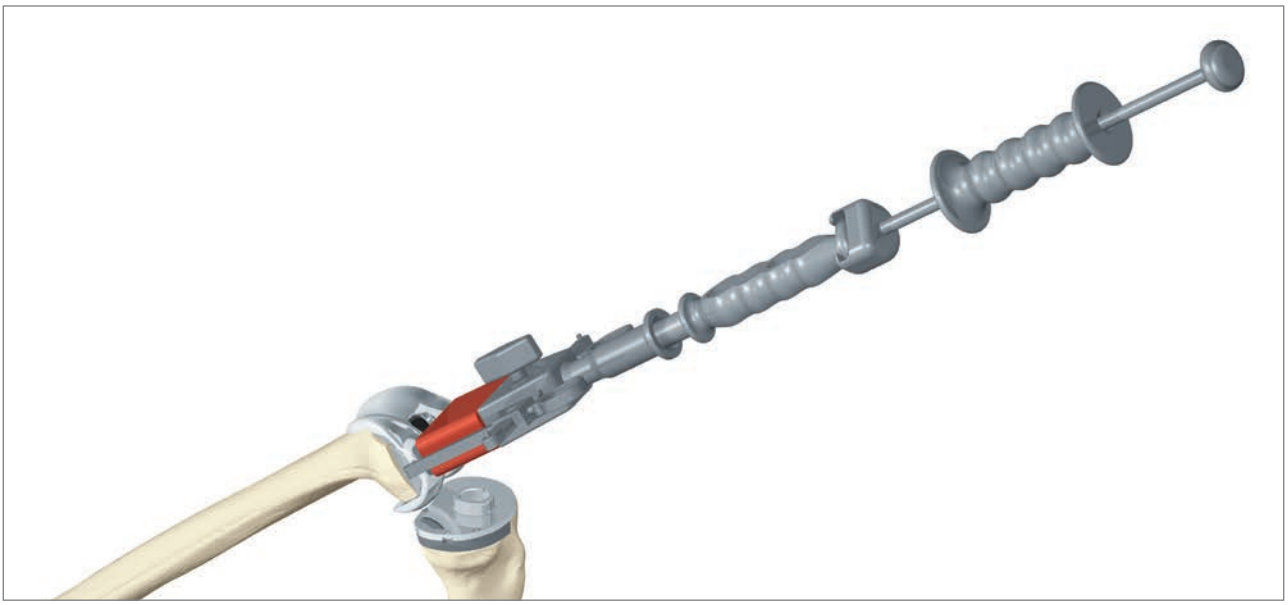
Open a new PE that corresponds to the femur and use all four new parts.



Insert the new components into the tibia and screw on with 27 Nm. Since the tibial plateau is already implanted, the NQ839R tibial plateau holder and the other instruments mentioned in the step "Connecting the Rotation Axis in the Tibia" must be used.

The femur and tibia are then connected as described in the "Axis Coupling" step.

16 | FEMUR REPLACEMENT



NOTE

In the case of partial femoral replacement, the respective tibial axis components must remain undamaged. To avoid damage, it is recommended to replace them with new ones.

Tibial axis components (rotation axis, PEEK bearing sleeve, tibial locking ring)

Femoral axis components (hinge ring, femoral securing nut)

The tibial axis components depend on the PE height.

Separate femur and tibia as described in the section "Decoupling of Femur and Tibia".
After release of femur by e.g. chisel, the handle NP495R connected to holder NQ570R with inserted femur insert is attached to the femur. Afterwards extractor NP684R is latched to the handle and used to remove the femur by sliding handle piece distally.
The new femur implant is then prepared. Open a new PE that corresponds to the new femur and use all four new parts. Insert the new components into the tibia and screw on with 27 Nm as described in the step "Connecting the Rotation Axis in the Tibia". Configure, implant and connect the new femoral component, as shown in the "Axis Coupling" step.

NOTE

In case of a partial tibial replacement, the respective femoral axis components must remain undamaged. To avoid damage, it is recommended to replace the femoral component completely.

Tibial axis components (rotation axis, PEEK bearing sleeve, tibial locking ring)

Femoral axis components (hinge ring, femoral securing nut)

The tibial axis components depend on the PE height.

Separate femur and tibia as described in the section "Decoupling of Femur and Tibia".

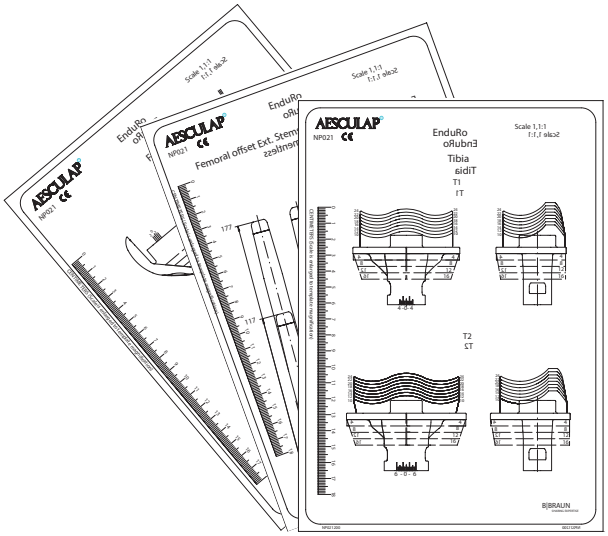
The PE is removed from the tibial plateau. The tibial plateau can be loosened using a flat chisel. If necessary, the medial and lateral tibial recesses must be cleaned of cement residues. The NQ570R tibial plateau holder is connected to the NP495R handle and the NQ569 tibial insert. The two L-shaped hooks are inserted into the recesses, and the tibial plateau is held in place by tightening the toggle screw. Then NP684R extractor is clipped into the handle, and the plateau is proximally knocked out with the sliding handle.

Configure, implant and connect the new tibial component with the axis elements, as shown in the "Axis Coupling" step.

Item No.	Decription	Container recommended	Lid	Height of tray incl. Lid
NP300	EnduRo Instrumentation (consisting of):			
NP301	General instruments	JK444	JK489	114 mm
NP302	Manual instruments	JK442	JK489	84 mm
NP303	Tibia preparation	JK442	JK489	84 mm
NP304	Femur preparation	JK444	JK489	114 mm
NP352	Femoral box preparation	JK442	JK489	84 mm
NS134	Tibia stem preparation, cementless	JK444	JK489	114 mm
NS136	Femoral trial stems, cementless	JK442	JK489	84 mm
NS138	Stem preparation, cemented	JK442	JK489	84 mm
NP270	Trial augments	JK442	JK489	84 mm
Option:				
NS709	IQ Patella preparation	JK444	JK489	114 mm
NP650	OrthoPilot® TKR – EnduRo Navigation, passive	JK442	JK489	84 mm
LSET - K0003	EnduRo Revision (only via ELSA loan service)			

X-RAY TEMPLATES

Item No.	Name
NP021	Set of X-ray templates M 1,10:1 (incl. axis planning)
NP022	Set of X-ray templates M 1,15:1 (incl. axis planning)



AESCULAP® EnduRo

NP301 | GENERAL INSTRUMENTS

Pin with head, Ø 3.2 mm
4 x **NP585R** L 30 mm
2 x **NP586R** L 50 mm
2 x **NP587R** L 75 mm

NE185R
Adapter for
ext. stems/NE184R

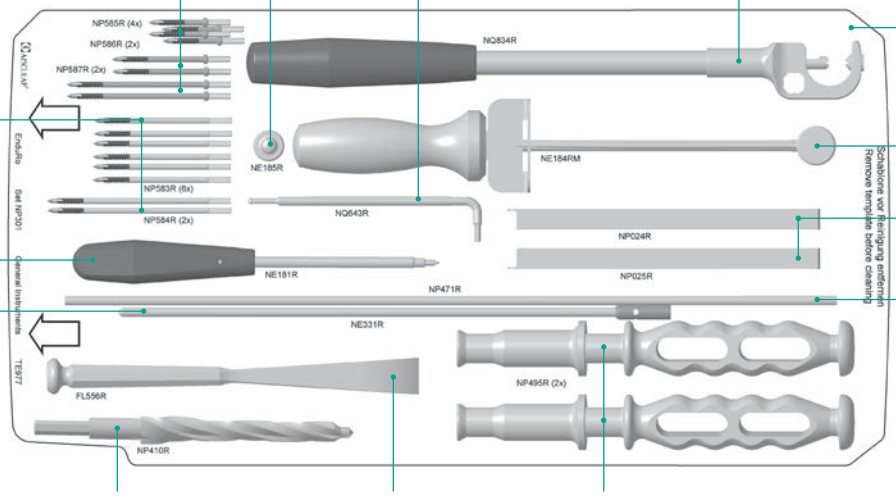
NQ643R
Cranked wrench key

NQ834R
Femoral stem holding key

Pin w/o head,
Ø 3.2 mm
6 x **NP583R** NL 63 mm
2 x **NP584R** NL 88 mm

NE181R
Screwdriver
SW 3.0

NE331R
Alignment control
rod w/sleeve



NP311R
EnduRo tray
general instruments

NE184RM
Torque wrench 20/27 Nm

Tibia chisel
NP024R RL/LM
NP025R RM/LL

NP471R
Alignment control
rod w/o sleeve

TE977
Graphic template for
NP311R (NP301)

NP410R
Step drill, Ø 10 mm

FL556R
Stille osteotome,
20/205 mm

NP495R
2 x Impactor/extractor
handle

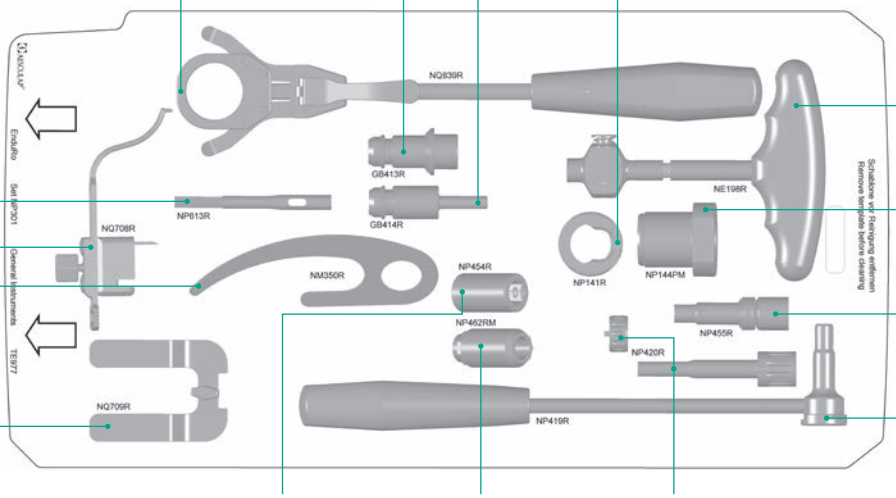
TRAY INSERT FOR NP301

NQ839R
Tibial plateau
holding key

GB413R
Acculan II hex.
chuck

GB414R
Hex. chuck with
triangleshank

NP141R
Hold-down device for
NP144PM guide



NP613R
Pin driver attachment

NQ708R
Joint line positioner

NM350R
Cutting check blade

NQ709R
Distal femur contact plate

NE198R
Revision T-handle
navigated

NP144PM
Guide for locking
ring key

NP455R
Holder/inserter for
securing nut

NP419R
Counterholder for
cone joining

NP454R
Key for tibial locking
ring

NP462RM
Key for tibial
locking ring
F1/10+12

NP420R
Adapter for cone joining

NP302 | MANUAL INSTRUMENTS

NQ569
Insert for Tibia
for NQ570R

Insert for Femur
for NQ570R
NQ566 F1
NQ567 F2
NQ568 F3

NQ474R
Handle for femur
alignment system

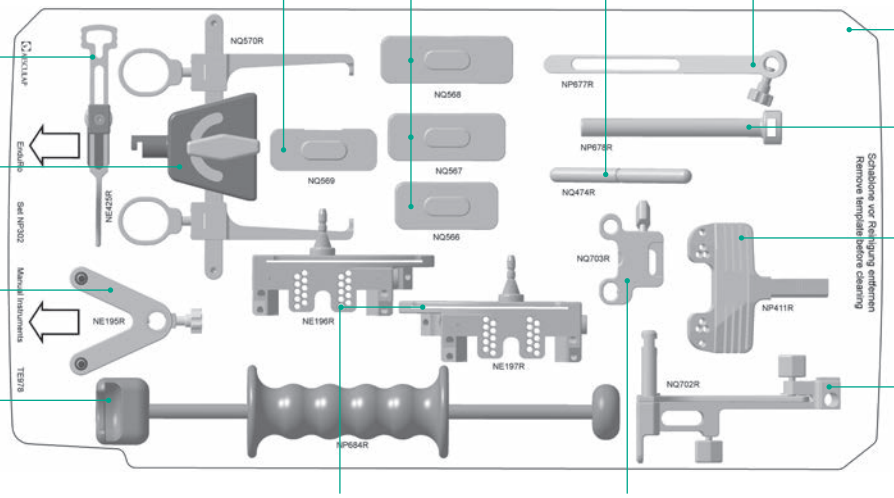
NP677R
Connection block (slide bar)
for intramed. alignment system

NE425R
Tibia cutting height stylus

NQ570R
Implant
holding / insertion inst.

NE195R
Adapter for tibial
revision cutting guide

NP684R
Universal extraction
instr. (slap hammer)



NP312R
EnduRo tray
manual instruments

NP678R
Intramed. align. System
connecting block

NP411R
Distal femoral cutting
block

NQ702R
Distal femur alignment
system

Tibial revision cutting guide
NE196R right
NE197R left

NQ703R
Distal femur cutting
guide support

TE978
Graphic template for NP312R
(NP302)

NP303 | TIBIA PREPARATION

Supplement Meniscus-trial
comp. 6 mm
2 x **NP164** F1
2 x **NP165** F2
2 x **NP166** F3

Meniscus trial components
NP150 F1 10 mm
NP151 F1 12 mm
NP152 F1 14 mm
NP153 F2 10 mm
NP154 F2 12 mm
NP155 F2 14 mm
NP156 F3 10 mm
NP157 F3 12 mm
NP158 F3 14 mm

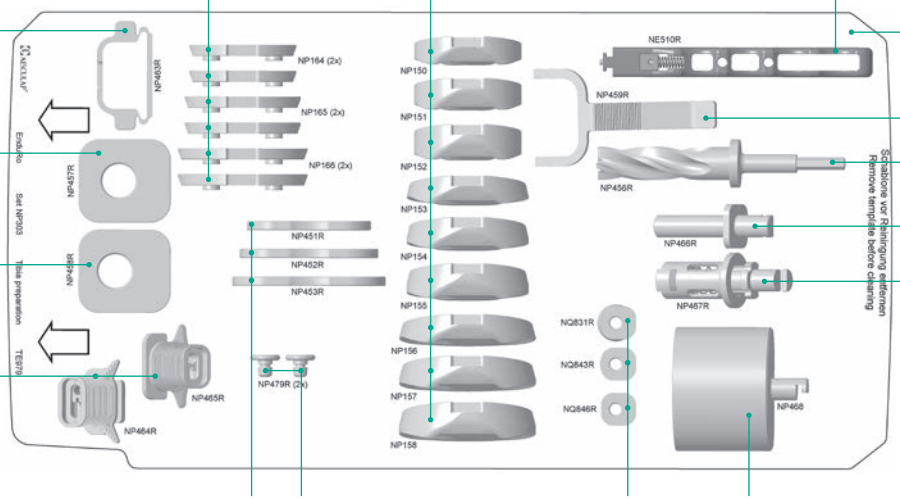
NE510R
Removable handle

NP463R
Guide for tibia
osteodenser

NP457R
Milling guide tibia
stem prep. T1

NP458R
Milling guide tibia
stem prep. T2 / T3

Tibia osteodenser
NP464R T1
NP465R T2 / T3



NP313R
EnduRo tray
tibia preparation

NP459R
Mounting bracket for
osteodenser guide

NP456R
Milling cutter Ø 18 mm

NP466R
M-L tibia positioner

NP467R
Adapter for tibia
osteodenser

Tibia trial / preparation
plateau
NP451R T1
NP452R T2
NP453R T3

NP479R
2 x cover for tibia
osteodenser

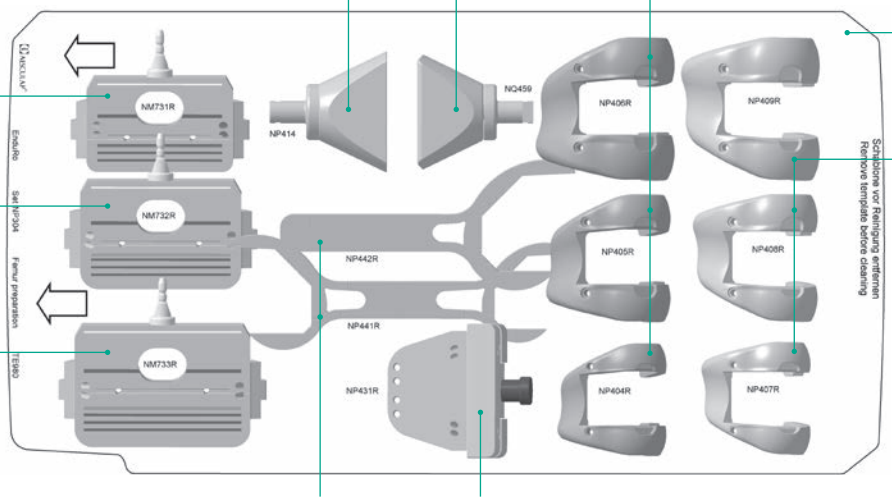
Rasp for tib. trial stem
NQ831R up to Ø 20 mm
NQ843R up to Ø 17 mm
NQ846R up to Ø 14 mm

NP468
Impactor for
tibial plateau

TE979
Graphic template for
NP313R (NP303)

AESCULAP® EnduRo

NP304 | FEMUR PREPARATION



NP414
Impactor for femur comp. flat

NQ459
Impactor for femur comp. large

Trial femur
NP407R F1R
NP408R F2R
NP409R F3R

NP314R
EnduRo tray femur preparation

Trial femur
NP404R F1L
NP405R F2L
NP406R F3L

NM731R
4-in-1 femoral cutting block F1

NM732R
4-in-1 femoral cutting block F2

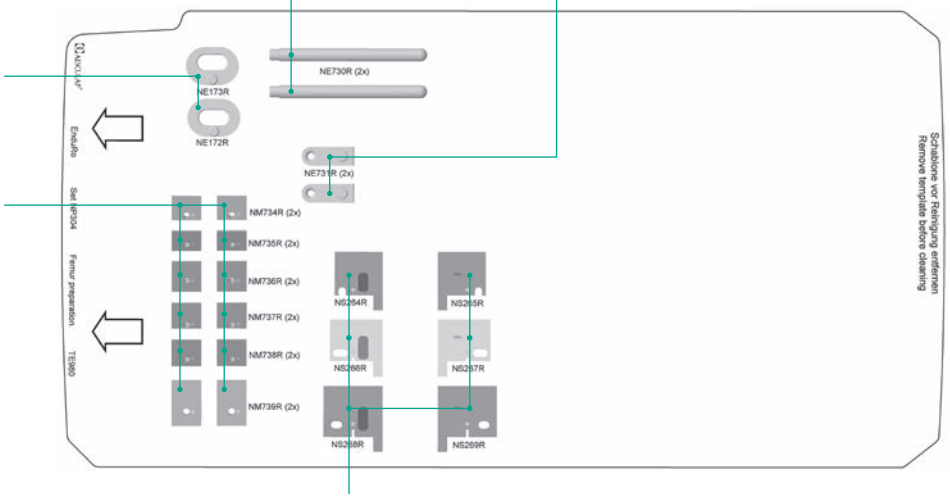
NM733R
4-in-1 femoral cutting block F3

TE980
Graphic template for NP314R (NP304)

Femur size gauge
NP441R F1/F2
NP442R F3

NP431R
Additional instr. post. 12 mm resection F2/F3

TRAY INSERT FOR NP304



NE730R
2 x Handle for 4-in-1 cutting block

NE731R
2 x Fixation plate for 4-in-1 cutting block

AP orientation sleeve for stem
NE172R neutral
NE173R excentr.

Trial augment for 4-in-1 cutting block

4 mm
2 x **NM734R** F1
2 x **NM735R** F2
2 x **NM736R** F3

8 mm
2 x **NM737R** F1
2 x **NM738R** F2
2 x **NM739R** F3

Trial augment for 4-in-1 cutting block
NS264R F1L **NS265R** F1R
NS266R F2L **NS267R** F2R
NS268R F3L **NS269R** F3R

NP352 | FEMORAL BOX PREPARATION

Femoral box alignment
NP415R F1
NP416R F2/F3

NQ832R
Rasp for femur ext. stem

Frame for femoral box preparation
NP421R F1
NP422R F2
NP423R F3

NP440R
Extractor for trial rotation axis

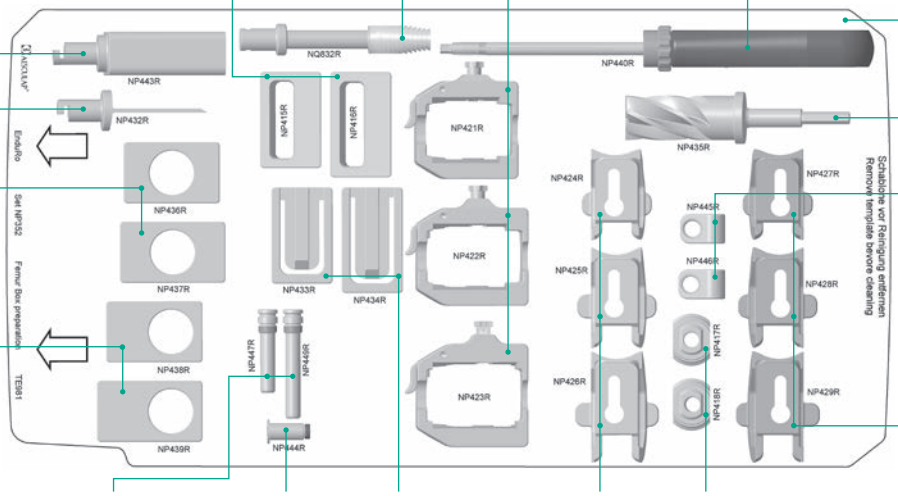
NP315R
EnduRo tray femoral box preparation

NP443R
U-shaped chisel

NP432R
Flat chisel

Milling guide for box prep
NP436R F1
NP437R F2/F3

Reverse milling guide
NP438R F1
NP439R F2/F3



NP435R
Milling cutter
Ø 24 mm

Trial hinge ring
Ø 24 mm
NP445R F1/F2
NP446R F3

Femoral trial box
NP427R F1R
NP428R F2R
NP429R F3R

Trial rotation axis
NP447R short
NP449R long

NP444R
Trial hinge axis

Chisel guide for box preparation
NP433R F1
NP434R F2/F3

Femoral trial box
NP424R F1L
NP425R F2L
NP426R F3L

Sleeve for femoral box alignm.
NP417R neutral
NP418R +/-1°

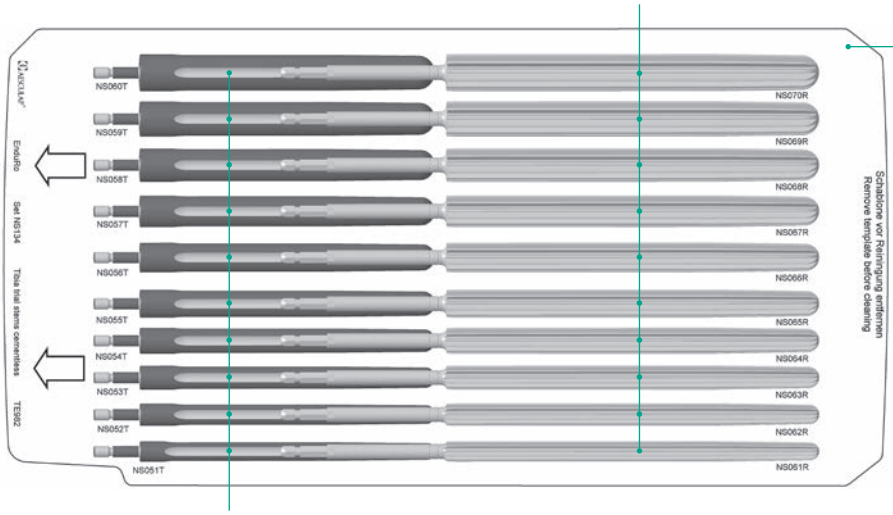
TE981
Graphic template for NP315R (NP352)

AESCULAP® EnduRo

NS134 | TIBIA STEM PREPARATION, CEMENTLESS

Reamer, long, stem trial, cementless

NS061R	Ø 11 mm	**NS066R**	Ø 16 mm
NS062R	Ø 12 mm	**NS067R**	Ø 17 mm
NS063R	Ø 13 mm	**NS068R**	Ø 18 mm
NS064R	Ø 14 mm	**NS069R**	Ø 19 mm
NS065R	Ø 15 mm	**NS070R**	Ø 20 mm



NS135R
EnduRo tray tibia stem prep., cementless

TE982
Graphic template for NS135R (NS134)

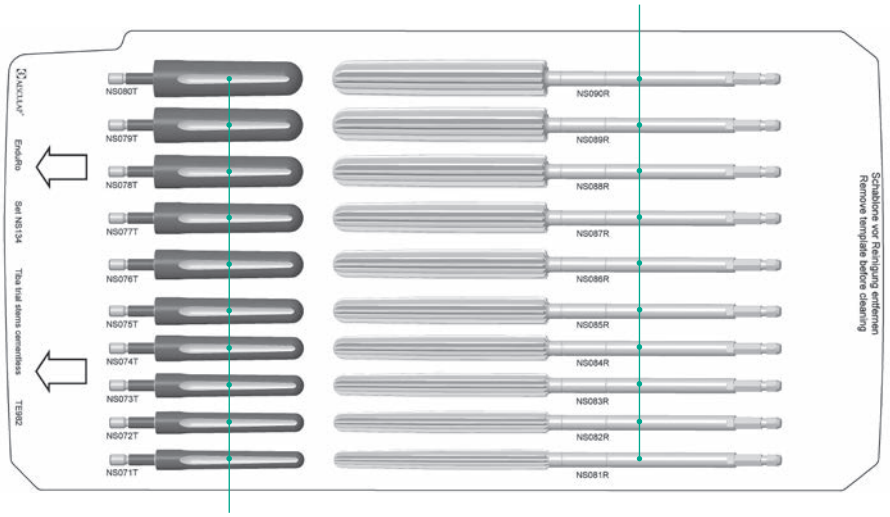
Tibia trial stem 172 mm, cementless

NS051T	Ø 11 mm	**NS056T**	Ø 16 mm
NS052T	Ø 12 mm	**NS057T**	Ø 17 mm
NS053T	Ø 13 mm	**NS058T**	Ø 18 mm
NS054T	Ø 14 mm	**NS059T**	Ø 19 mm
NS055T	Ø 15 mm	**NS060T**	Ø 20 mm

TRAY INSERT FOR NS134

Reamer, short, stem trial, cementless

NS081R	Ø 11 mm	**NS086R**	Ø 16 mm
NS082R	Ø 12 mm	**NS087R**	Ø 17 mm
NS083R	Ø 13 mm	**NS088R**	Ø 18 mm
NS084R	Ø 14 mm	**NS089R**	Ø 19 mm
NS085R	Ø 15 mm	**NS090R**	Ø 20 mm



Tibia trial stem 92 mm, cementless

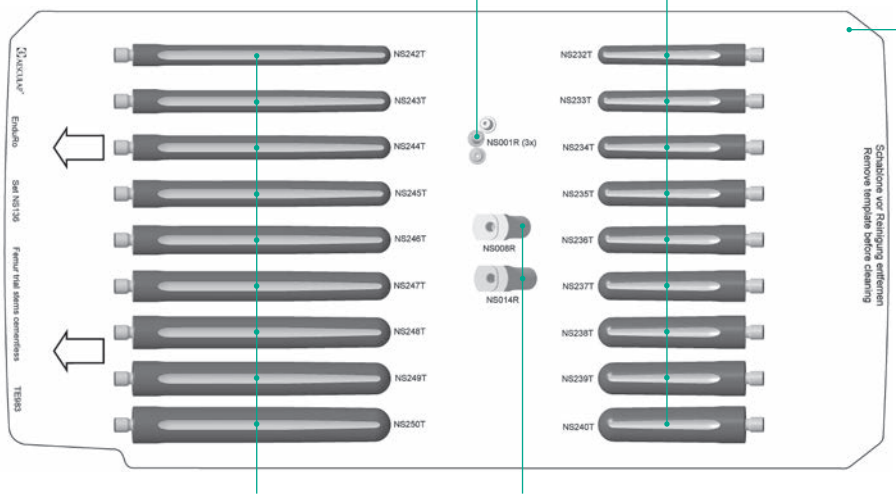
NS071T	Ø 11 mm	**NS076T**	Ø 16 mm
NS072T	Ø 12 mm	**NS077T**	Ø 17 mm
NS073T	Ø 13 mm	**NS078T**	Ø 18 mm
NS074T	Ø 14 mm	**NS079T**	Ø 19 mm
NS075T	Ø 15 mm	**NS080T**	Ø 20 mm

NS136 | FEMUR TRIAL STEMS, CEMENTLESS

NS001R
3 x Trial stem screw SW 3.0

Femur trial stem 117 mm, cementless

NS232T	Ø 12 mm	**NS237T**	Ø 17 mm
NS233T	Ø 13 mm	**NS238T**	Ø 18 mm
NS234T	Ø 14 mm	**NS239T**	Ø 19 mm
NS235T	Ø 15 mm	**NS240T**	Ø 20 mm
NS236T	Ø 16 mm		



NS137R
EnduRo tray
femur stem prep.,
cementless

Femur trial stem 177 mm, cementless

NS242T	Ø 12 mm	**NS247T**	Ø 17 mm
NS243T	Ø 13 mm	**NS248T**	Ø 18 mm
NS244T	Ø 14 mm	**NS249T**	Ø 19 mm
NS245T	Ø 15 mm	**NS250T**	Ø 20 mm
NS246T	Ø 16 mm		

Adapter fem. trial stem,
ntr. 37 mm
NS008R 5°
NS014R 7°

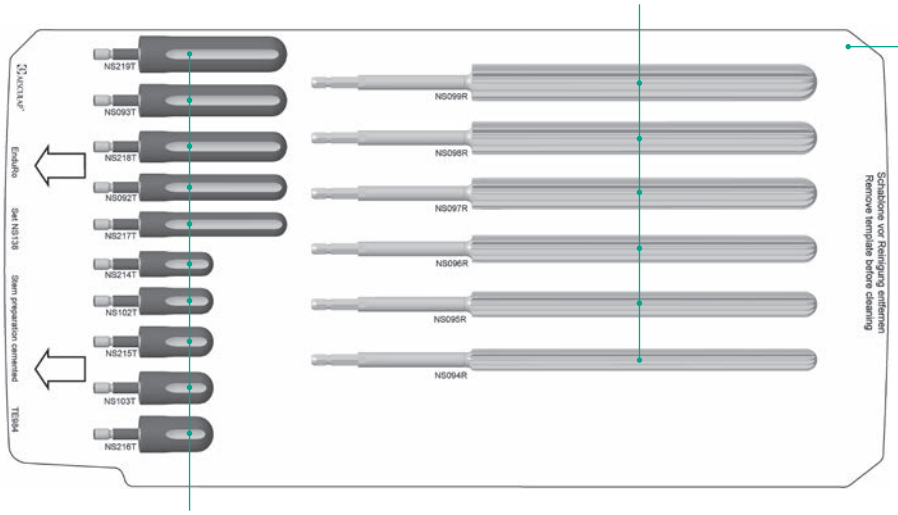
TE983
Graphic template for
NS137R (NS136)

AESCULAP® EnduRo

NS138 | STEM PREPARATION, CEMENTED

Reamer, long, stem trial, cemented

NS094R	Ø 12 mm	**NS097R**	Ø 17 mm
NS095R	Ø 14 mm	**NS098R**	Ø 18 mm
NS096R	Ø 15 mm	**NS099R**	Ø 20 mm



NS139R
EnduRo tray
stem preparation,
cemented

TE984
Graphic template for NS139R
(NS138)

Tibia trial stem, cemented

52 mm		92 mm	
NS214T	Ø 14 mm	**NS217T**	Ø 14 mm
NS102T	Ø 15 mm	**NS092T**	Ø 15 mm
NS215T	Ø 17 mm	**NS218T**	Ø 17 mm
NS103T	Ø 18 mm	**NS093T**	Ø 18 mm
NS216T	Ø 20 mm	**NS219T**	Ø 20 mm

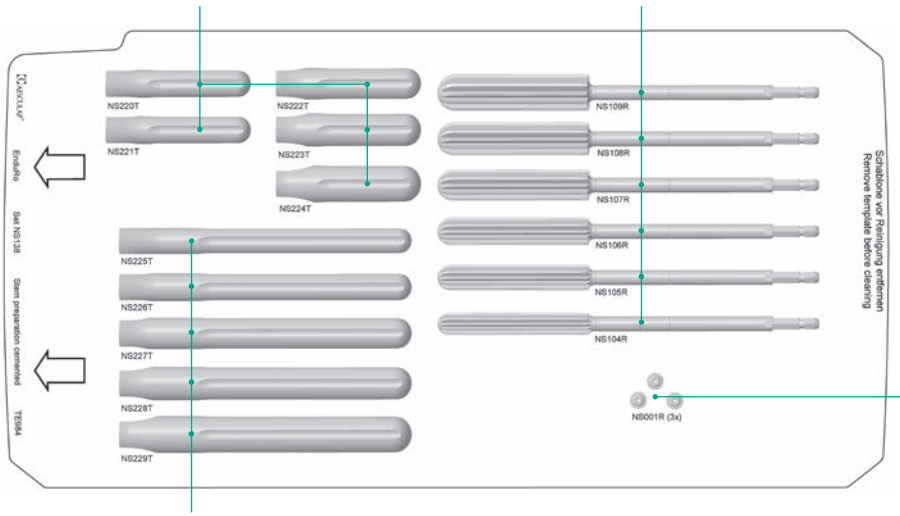
TRAY INSERT FOR NS138

Femur trial stem 77 mm, cemented

NS220T	Ø 14 mm	**NS223T**	Ø 18 mm
NS221T	Ø 15 mm	**NS224T**	Ø 20 mm
NS222T	Ø 17 mm		

Reamer, short, stem trial, cemented

NS104R	Ø 12 mm	**NS107R**	Ø 17 mm
NS105R	Ø 14 mm	**NS108R**	Ø 18 mm
NS106R	Ø 15 mm	**NS109R**	Ø 20 mm



NS001R
3 x Trial stem screw
SW 3.0

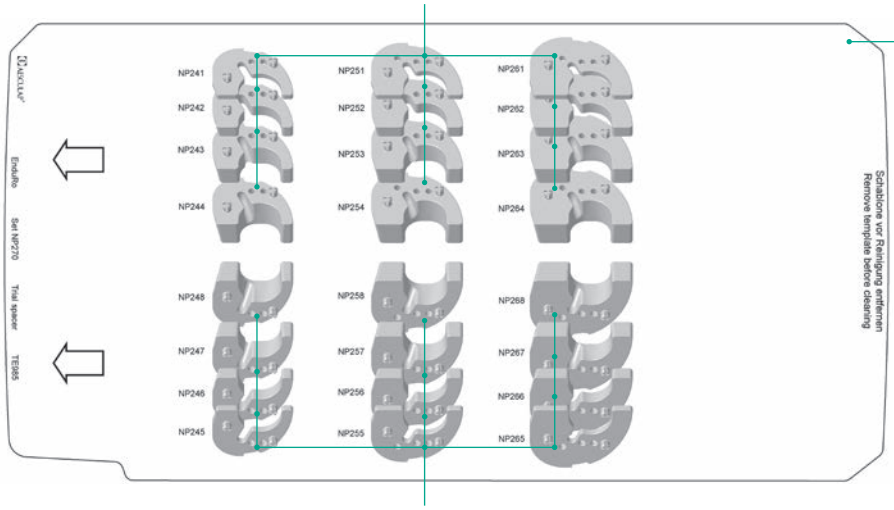
Femur trial stem 157 mm, cemented

NS225T	Ø 14 mm	**NS228T**	Ø 18 mm
NS226T	Ø 15 mm	**NS229T**	Ø 20 mm
NS227T	Ø 17 mm		

NP270 | TRIAL AUGMENTS

Trial tibia augment RM/LL

T1		T2		T3	
NP241	4 mm	**NP251**	4 mm	**NP261**	4 mm
NP242	8 mm	**NP252**	8 mm	**NP262**	8 mm
NP243	12 mm	**NP253**	12 mm	**NP263**	12 mm
NP244	16 mm	**NP254**	16 mm	**NP264**	16 mm



NP271R
EnduRo tray
trial augments

Trial tibia augment RL/LM

T1		T2		T3	
NP245	4 mm	**NP255**	4 mm	**NP265**	4 mm
NP246	8 mm	**NP256**	8 mm	**NP266**	8 mm
NP247	12 mm	**NP257**	12 mm	**NP267**	12 mm
NP248	16 mm	**NP258**	16 mm	**NP268**	16 mm

TE985
Graphic template for NP271R
(NP270)

TRAY INSERT FOR NP270

Femur trial augments post./dist.

F1
2 x **NE226** 4 x 12 mm
2 x **NE227** 8 x 12 mm

F2
2 x **NE229** 4 x 12 mm
2 x **NE230** 8 x 12 mm
2 x **NE231** 12 x 4 mm
2 x **NE232** 12 x 8 mm
2 x **NE233** 12 x 12 mm

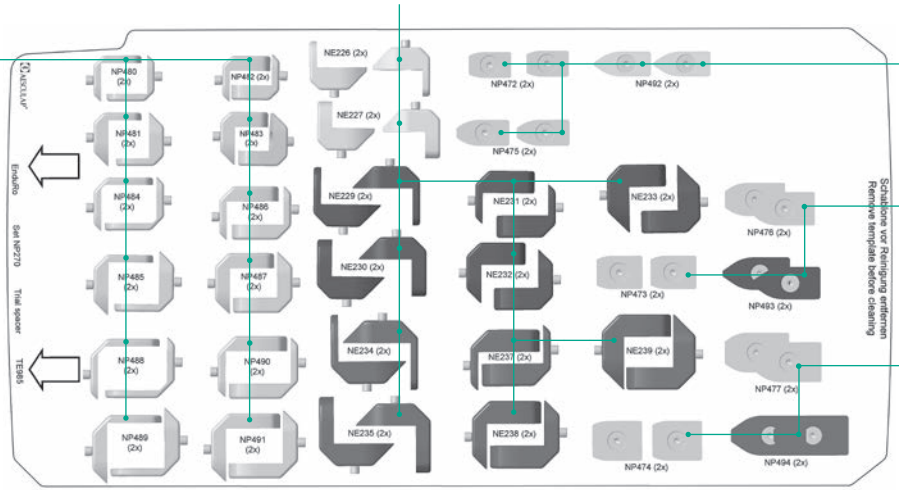
F3
2 x **NE234** 4 x 12 mm
2 x **NE235** 8 x 12 mm
2 x **NE237** 12 x 4 mm
2 x **NE238** 12 x 8 mm
2 x **NE239** 12 x 12 mm

Femur trial augments
post./dist.

F1
2 x **NP480** 4 x 4 mm
2 x **NP481** 4 x 8 mm
2 x **NP482** 8 x 4 mm
2 x **NP483** 8 x 8 mm

F2
2 x **NP484** 4 x 4 mm
2 x **NP485** 4 x 8 mm
2 x **NP486** 8 x 4 mm
2 x **NP487** 8 x 8 mm

F3
2 x **NP488** 4 x 4 mm
2 x **NP489** 4 x 8 mm
2 x **NP490** 8 x 4 mm
2 x **NP491** 8 x 8 mm



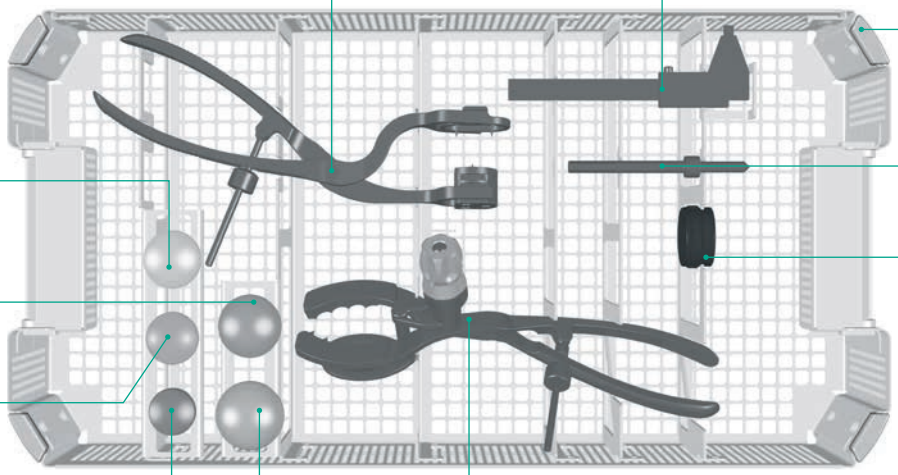
Femur trial augments
distal F1
2 x **NP472** 4 mm
2 x **NP475** 8 mm
2 x **NP492** 12 mm

Femur trial augments
distal F2
2 x **NP473** 4 mm
2 x **NP476** 8 mm
2 x **NP493** 12 mm

Femur trial augments
distal F3
2 x **NP474** 4 mm
2 x **NP477** 8 mm
2 x **NP494** 12 mm

AESCULAP® EnduRo

NS709 | IQ PATELLA PREPARATION



NS841R
Patella drilling and impacting clamp

AA847R
Caliper with nonius measurement range 100 mm

NS719R
Tray patella preparation

NQ449R
Drill with stop Ø 6 mm

NS842
Insert for NS841R

NQ283
Trial patella 3 pegs
P3 Ø 32 x 9 mm

NQ284
Trial patella 3 pegs
P4 Ø 35 x 10 mm

NQ282
Trial patella 3 pegs
P2 Ø 29 x 8 mm

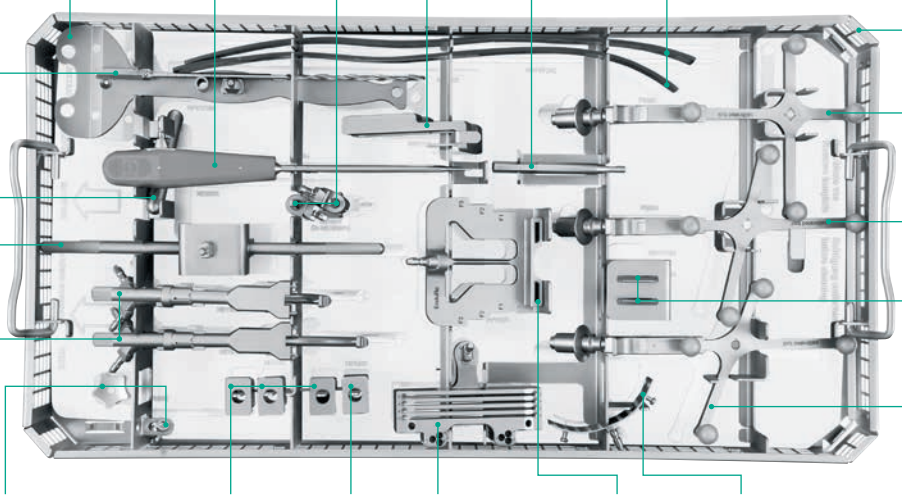
TF069
Graphic template for NS719R (NS709)

NQ281
Trial patella 3 pegs
P1 Ø 26 x 7 mm

NQ285
Trial patella 3 pegs
P5 Ø 38 x 11 mm

NS840R
Patella resection clamp

NP650 | OrthoPilot® TKR – NAVIGATION EnduRo, PASSIVE INSTRUMENTS



NP617RM
OrthoPilot® tibia control plate modif.

FS604
OrthoPilot® pointer

NE191801
Rigid Body – complete attachment

NE171R
Revision adapter for distal cutting guide

NP618R
OrthoPilot® Screwdriver, RB screw for motor

NM743
2 x OrthoPilot® elastic retaining band

NP615R
OrthoPilot® spiral drill Ø 3.2 mm 160/80 mm

NE292R
Revision screw tap for tibia RB adapt.

NE199R
Revision navigation adapter for T-handle

Revision femur Rigid Body adapter
NE163R small
NE191R large

NP651R
EnduRo support for additional set navig. Instr.

FS633
OrthoPilot® passive Rigid Body, yellow

FS634
OrthoPilot® passive Rigid Body, blue

Dorsal condylar plate, modif.
NE441RM left
NE442RM right

FS635
OrthoPilot® passive Rigid Body, red

TF005
Graphic template for NP651R (NP650)

NE192R
Revision tibia Rigid Body adapter

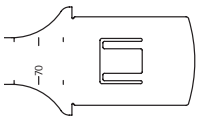
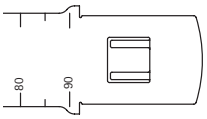
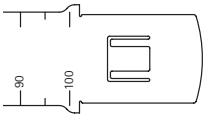
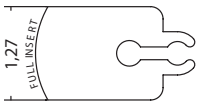
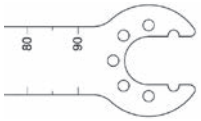
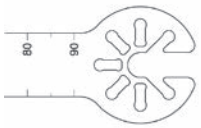
Insert, femur alignment block
NE445R 5°
NE446R 6°
NE447R 7°

NE190R
Glide conn. block 0° for tibia cutting guide

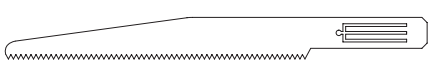
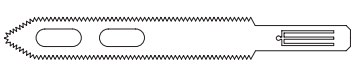
NE200R
Distal cutting guide, navig.

NP652R
EnduRo femur alignment block, navigated

NM769R
OrthoPilot® base plate

System	Item No.	Width	Thickness	Sawblades 1 steril 2
AESCULAP® Acculan Length 75 mm	GE231SU	9 mm	1.27 mm	
AESCULAP® Acculan Length 90 mm	GE233SU	13.5 mm	1.27 mm	
	GE236SU	13 mm	1.27 mm	
	GE241SU	19 mm	1.27 mm	
	GE246SU	23 mm	1.27 mm	
AESCULAP® Acculan Length 100 mm	GE249SU	19 mm	1.27 mm	
Stryker System 2000, System 6-8 Length 90 mm	GE330SU	13 mm	1.27 mm	
	GE331SU	19 mm	1.27 mm	
	GE332SU	25 mm	1.27 mm	
Synthes **Trauma Recon System** **Battery Power Line** **Battery Power Line II** Length 90 mm **Zimmer** Universal Length 90 mm	GE323SU	13 mm	1.27 mm	
	GE326SU	25 mm	1.27 mm	
Conmed Linvatec/Hall Power Pro Mpower Mpower 2 Length 90 mm	GE327SU	13 mm	1.27 mm	
	GE329SU	25 mm	1.27 mm	

For a complete overview of all available saw blades with AESCULAP® coupling, see our Burrs & Blades catalog O17599.

System	Sawblades for reciprocating saws 75/10/1.0/1.2 mm	Sawblades for reciprocating saws 75/12/1.0/1.2 mm
Acculan	 GC769R	 GC771R

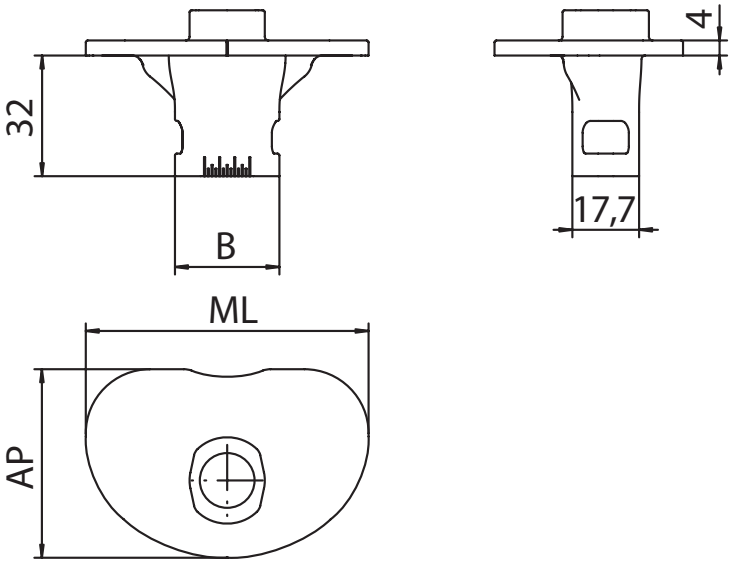
AESCULAP® EnduRo

20 | IMPLANT DIMENSIONS AND DESIGN

TIBIA IMPLANT

Dimensions in mm

Size	ML	AP	B
T1	67	44	23.7
T2	75	50	27.7
T3	83	56	27.7



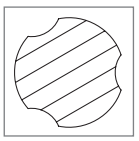
- 3 sizes (comp. e.motion® sizes T3/T5/T7)
- Seating for tibia extension stems
- Offset:
  T1 = ± 4 mm
  T2-T3 = ± 6 mm
- Symmetrical plateau design
- Cemented

TIBIA EXTENSION STEMS, CEMENTED

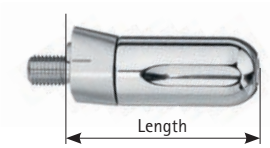
Dimensions in mm

Length	Diameter		
52	12	15	18
92			

Stem profile



- Cylindrical
- Polished
- With an asymmetrical "collar" for increased stability
- Three longitudinal grooves to avoid the risk of embolism

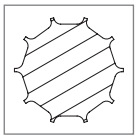


TIBIA EXTENSION STEMS, CEMENTLESS

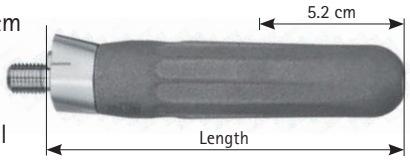
Dimensions in mm

Length	Diameter									
92	11	12	13	14	15	16	17	18	19	20
172										

Stem profile



- 3° conical up to 5.2 cm from the stem tip
- Corundum radiated
- With an asymmetrical "collar" for increased stability
- 10 longitudinal grooves (Wagner profile)



TIBIA AUGMENTS

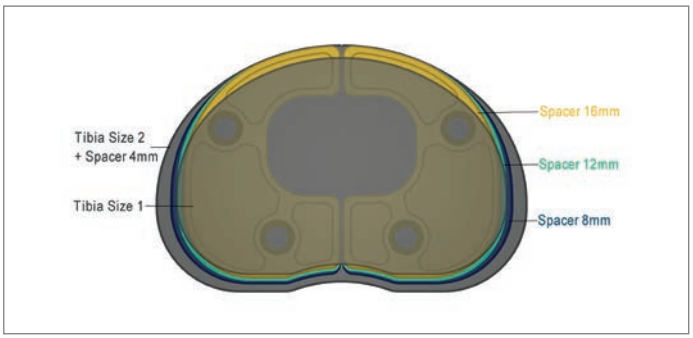
Dimensions in mm

- Augments in heights of 4, 8, 12 and 16 mm
- Screwed in from the bottom
- Anatatomic medial or lateral design
- Cement pockets 1 mm deep

MEDIO-LATERAL TAPERING WITH TIBIAL AUGMENTS

Dimensions in mm

EnduRo tibial augments	Tibia 1	Tibia 2	Tibia 3
Original ML width	**67**	**75**	**83**
With 2 tibial augments 4 mm	67	75	83
With 2 tibial augments 8 mm	61	69	77
With 2 tibial augments 12 mm	58.5	66.5	74.5
With 2 tibial augments 16 mm	55.5	63.5	71.5



ANTERO-POSTERIOR TAPERING WITH TIBIAL AUGMENTS

Dimensions in mm

EnduRo tibial augments	Tibia 1	Tibia 2	Tibia 3
Original AP depth	**44**	**50**	**56**
With 2 tibial augments 4 mm	44	50	56
With 2 tibial augments 8 mm	42	48	54
With 2 tibial augments 12 mm	41.5	47.5	53.5
With 2 tibial augments 16 mm	40.5	46.5	52.5

POSSIBLE FEMUR/TIBIA COMBINATIONS

	F1	F2	F3
T1			
T2			
T3			

Compatible

Not compatible

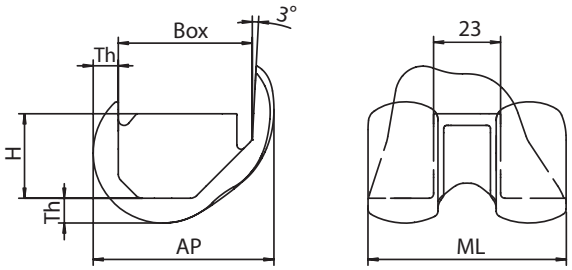
AESCULAP® EnduRo

20 | IMPLANT DIMENSIONS AND DESIGN

FEMUR IMPLANT

Dimensions in mm

Size	ML	AP	Box	H	Th
F1	60.0	54.0	40.0	26.5	7.0
F2	68.0	62.1	46.0	29.0	8.5
F3	76.0	70.0	52.0	31.5	10.0



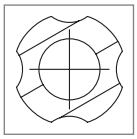
- 3 sizes (comp. e.motion® Sizes F3 / F5 / F7), left / right
- Bone cuts (condyles) corresponding to e.motion®
- Hyperextension stoppage at 3°
- Preassembled hinge ring
- Femur securing nut and sealing mask enclosed

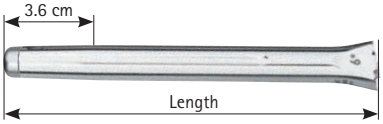
FEMUR EXTENSION STEMS, CEMENTED

Dimensions in mm

Length	Diameter		
77	12	15	18
157			

Stem profil





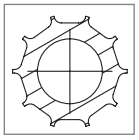
- Valgus angle: 6°
- ML offset: Neutral
  AP offset: ± 2 mm
- 3° conical up to 3.6 cm
  from the stem tip
- Polished
- 4 longitudinal grooves
  to avoid the risk of embolism

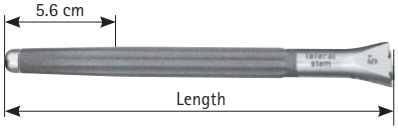
FEMUR EXTENSION STEMS, CEMENTLESS

Dimensions in mm

Length	Diameter								
117	12	13	14	15	16	17	18	19	20
177									

Stem profile





- Valgus angle: 5° / 7°
- ML offset: Neutral
  AP offset: ± 2 mm
- 3° conical up to
  5.6 cm from the stem tip
- Corundum radiated
- 10 longitudinal grooves
  (Wagner profile)

Femur stem nut

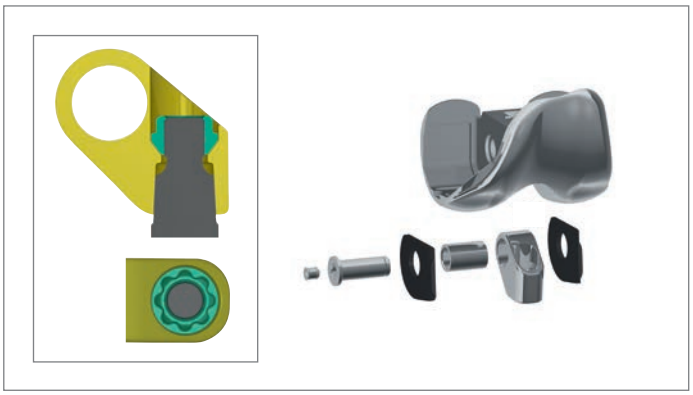
FEMUR AUGMENTS

	Distal		
	4 mm	8 mm	12 mm
F1	x	x	x
F2	x	x	x
F3	x	x	x

	Posterior / distal								
	4 x 4 mm	4 x 8 mm	4 x 12 mm	8 x 4 mm	8 x 8 mm	8 x 12 mm	12 x 4 mm	12 x 8 mm	12 x 12 mm
F1	x	x	x	x	x	x			
F2	x	x	x	x	x	x	x	x	x
F3	x	x	x	x	x	x	x	x	x

- Distal augments in heights of 4, 8 and 12 mm
- Postero-distal femoral augments in heights of 4, 8 and 12 mm (for details, see matrix above)
- Fixation via screw in the distal part
- Cement pockets 1 mm deep

- Details of the axis and cone mechanism



AESCULAP® EnduRo

PE GLIDING SURFACE

- Rotational freedom ± 12°
- Including axis elements rotation axis, tibial locking ring, PEEK bearing sleeve
- PE heights
  CoCr: 10-24 mm
  AS: 10-18 mm
- Axis elements increase with PE height

NOTE

The PE size is always chosen matching the size of the femur.

AXIS COMPATIBILITY

In the case that a rotation axis, tibia locking ring or PEEK bearing sleeve become unsterile or damaged, the treatment can be performed according to the matrix shown.

F1	Replaceable by axis, tibial locking ring + PEEK sleeve of the gliding surface:		
axis/parts to be replaced	F1	F2	F3
F1 10 mm	–	–	–
F1 12 mm	–	–	–
F1 14 mm	–	10 mm	–
F1 16 mm	–	12 mm	10 mm
F1 18 mm	–	14 mm	12 mm
F1 20 mm	–	16 mm	14 mm
F1 22 mm	–	18 mm	16 mm
F1 24 mm	–	20 mm	18 mm

F2	Replaceable by axis, tibial locking ring + PEEK sleeve of the gliding surface:		
axis/parts to be replaced	F1	F2	F3
F2 10 mm	14 mm	–	–
F2 12 mm	16 mm	–	10 mm
F2 14 mm	18 mm	–	12 mm
F2 16 mm	20 mm	–	14 mm
F2 18 mm	22 mm	–	16 mm
F2 20 mm	24 mm	–	18 mm
F2 22 mm	–	–	20 mm
F2 24 mm	–	–	22 mm

F3	Replaceable by axis, tibial locking ring + PEEK sleeve of the gliding surface:		
axis/parts to be replaced	F1	F2	F3
F3 10 mm	16 mm	12 mm	–
F3 12 mm	18 mm	14 mm	–
F3 14 mm	20 mm	16 mm	–
F3 16 mm	22 mm	18 mm	–
F3 18 mm	24 mm	20 mm	–
F3 20 mm	–	22 mm	–
F3 22 mm	–	24 mm	–
F3 24 mm	–	–	–

Example:
Axis elements of the gliding surface F2 16 mm are damaged.
These could be replaced by axis elements of the gliding surfaces F1 20 mm or F3 14 mm (see table F2, line F2 16 mm).

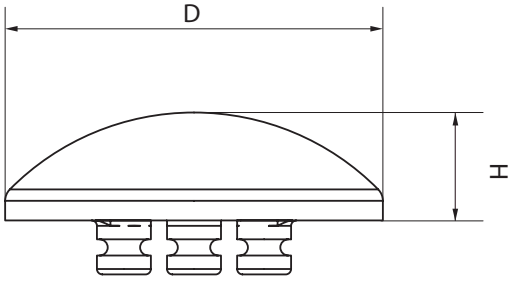
– means that no replaceable components are available from the gliding surfaces for the respective femur size in the respective column. Accordingly, a replacement must be identified in the next femur size column in the row of components to be replaced.

For the gliding surfaces F1 10 mm, F1 12 mm and F3 24 mm, there is no replacement option from another gliding surface. Therefore, it is necessary to switch completely to the next higher/flatter gliding surface, including axis components.

PATELLA

Dimensions in mm

	Patella P1	Patella P2	Patella P3	Patella P4	Patella P5
D Patella x H	Ø 26 x 7	Ø 29 x 8	Ø 32 x 9	Ø 35 x 10	Ø 38 x 11



TIGHTENING TORQUES

- 27 Nm for femur extension stems
- 27 Nm for tibia locking ring
- 20 Nm for tibia extension stems
- 20 Nm for axis coupling
- 20 Nm formal securing nut

AESCULAP® EnduRo

21 | IMPLANT MATERIALS

Implant	Material
Femur	CoCrMo*2
Femur box sealing mask	PEEK-OPTIMA™ (LT1)*6
Femur hinge axis	CoCrMo*3
Femur hinge axis sealing plugs	UHMWPE*4
Securing nut	CoCrMo*3
Bearing elements in the femur	PEEK-OPTIMA™ (LT1CA30)*6
Femur augments	CoCrMo*3
Screws for femur augments	CoCrMo*3
Femur extension stems, cementless	CoCrMo*3
Femur extension stems, cemented	CoCrMo*3
Offset nut for femur extension stems	CoCrMo*3
Tibial plateau	CoCrMo*2
Mask for tibial plateau (holds the offset nut)	PEEK-OPTIMA™ (LT1)*6
Nut for tibia offset stems (in the tibial plateau)	CoCrMo*3
Tibial augments	CoCrMo*3
Screws for tibial augments	Ti6Al4V*1
Tibia extension stems, cementless	CoCrMo*3
Tibia extension stems, cemented	CoCrMo*3
Rotation axis	CoCrMo*3
Gliding surfaces	UHMWPE
X-ray marker in the gliding surface (pin)	Ti6Al4V*1
X-ray marker in the sliding surface (ball)	Tantal*5
Locking ring	CoCrMo*3
Bearing sleeve for the rotation axis	PEEK-OPTIMA™ (LT1CA30)*6

*1 in accordance with ISO 5832-3
*2 in accordance with ISO 5832-4
*3 in accordance with ISO 5832-12
*4 in accordance with ISO 5834-2
*5 in accordance with ISO 13782
*6 PEEK-OPTIMA™ is a trademark of Victrex plc or its group companies.

FEMUR, CEMENTED

Variant:	F1	F2	F3
Left CoCr	NB014K	NB015K	NB016K
Left AS	NB014Z	NB015Z	NB016Z
Right CoCr	NB017K	NB018K	NB019K
Right AS	NB017Z	NB018Z	NB019Z

Torque for securing nut: 20 NM

PE size = femur size!

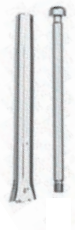
POSSIBLE FEMUR/TIBIA COMBINATIONS

	F1	F2	F3
T1			
T2			
T3			

Compatible

Not compatible

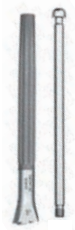
FEMUR EXTENSION STEMS, CEMENTED 6°



Variant [mm]:	77	157	77	157	77	157
	Ø 12 mm		Ø 15 mm		Ø 18 mm	
F1-F3 CoCr	NR291K	NR294K	NR292K	NR295K	NR293K	NR296K
F1-F3 AS	NR291Z	NR294Z	NR292Z	NR295Z	NR293Z	NR296Z

Torque: 27 NM

FEMUR EXTENSION STEMS, CEMENTLESS, 5°/7°



Variant [mm]:	117	177	117	177	117	177
	Ø 12 mm		Ø 13 mm		Ø 14 mm	
F1-F3 5° CoCr	NR402K	NR432K	NR403K	NR433K	NR404K	NR434K
F1-F3 5° AS	NR402Z	NR432Z	NR403Z	NR433Z	NR404Z	NR434Z
F1-F3 7° CoCr	NR502K	NR532K	NR503K	NR533K	NR504K	NR534K
F1-F3 7° AS	NR502Z	NR532Z	NR503Z	NR533Z	NR504Z	NR534Z
	Ø 15 mm		Ø 16 mm		Ø 17 mm	
F1-F3 5° CoCr	NR405K	NR435K	NR406K	NR436K	NR407K	NR437K
F1-F3 5° AS	NR405Z	NR435Z	NR406Z	NR436Z	NR407Z	NR437Z
F1-F3 7° CoCr	NR505K	NR535K	NR506K	NR536K	NR507K	NR537K
F1-F3 7° AS	NR505Z	NR535Z	NR506Z	NR536Z	NR507Z	NR537Z
	Ø 18 mm		Ø 19 mm		Ø 20 mm	
F1-F3 5° CoCr	NR408K	NR438K	NR409K	NR439K	NR410K	NR440K
F1-F3 5° AS	NR408Z	NR438Z	NR409Z	NR439Z	NR410Z	NR440Z
F1-F3 7° CoCr	NR508K	NR538K	NR509K	NR539K	NR510K	NR540K
F1-F3 7° AS	NR508Z	NR538Z	NR509Z	NR539Z	NR510Z	NR540Z

Torque: 27 NM

FEMUR STEM NUT

Variant:	
F1-F3 CoCr	NR400K
F1-F3 AS	NR400Z

PATELLAE WITH 3 PINS

	P1	P2	P3
Variant:	Ø 26 x 7	Ø 29 x 8	Ø 32 x 9
F1-F7	NX041	NX042	NX043
	P4	**P5**	
Variant:	Ø 35 x 10	Ø 38 x 11	
F1-F7	NX044	NX045	

DISTAL FEMUR AUGMENTS WITH SCREW

Variant:	4 mm	8 mm	12 mm
F1 CoCr	NR861K	NR862K	NR863K
F1 AS	NR861Z	NR862Z	NR863Z
F2 CoCr	NR864K	NR865K	NR866K
F2 AS	NR864Z	NR865Z	NR866Z
F3 CoCr	NR867K	NR868K	NR869K
F3 AS	NR867Z	NR868Z	NR869Z

FEMUR SECURING NUT

Replacement part:	
CoCr	NR860K
AS	NR860Z

POSTERO-DISTAL FEMUR AUGMENTS WITH SCREW

Variant:	4x4 mm	4x8 mm	4x12 mm	8x4 mm	8x8 mm	8x12 mm	12x4 mm	12x8 mm	12x12 mm
F1 CoCr	NR366K	NR367K	NR396K	NR368K	NR369K	NR397K	–	–	–
F1 AS	NR366Z	NR367Z	NR396Z	NR368Z	NR369Z	NR397Z	–	–	–
F2 CoCr	NR376K	NR377K	NR590K	NR378K	NR379K	NR591K	NR592K	NR593K	NR594K
F2 AS	NR376Z	NR377Z	NR590Z	NR378Z	NR379Z	NR591Z	NR592Z	NR593Z	NR594Z
F3 CoCr	NR386K	NR387K	NR595K	NR388K	NR389K	NR596K	NR597K	NR598K	NR599K
F3 AS	NR386Z	NR387Z	NR595Z	NR388Z	NR389Z	NR596Z	NR597Z	NR598Z	NR599Z

PE GLIDING SURFACES

Variant:	10 mm	12 mm	14 mm	16 mm	18 mm	20 mm	22 mm	24 mm
F1 CoCr	NR870M	NR871M	NR872M	NR873M	NR874M	NR875M	NR876M	NR877M
F1 AS	NR870Z	NR871Z	NR872Z	NR873Z	NR874Z	–	–	–
F2 CoCr	NR880M	NR881M	NR882M	NR883M	NR884M	NR885M	NR886M	NR887M
F2 AS	NR880Z	NR881Z	NR882Z	NR883Z	NR884Z	–	–	–
F3 CoCr	NR890M	NR891M	NR892M	NR893M	NR894M	NR895M	NR896M	NR897M
F3 AS	NR890Z	NR891Z	NR892Z	NR893Z	NR894Z	–	–	–

PE size = femur size!

Torque for locking ring: 27 NM

Torque for axis coupling: 20 NM

CoCr VERSION AS VERSION

TIBIA, CEMENTED

Variant:	T1	T2	T3
CoCr	NB011K	NB012K	NB013K
AS	NB011Z	NB012Z	NB013Z

PE size = femur size!

POSSIBLE FEMUR/TIBIA COMBINATIONS

	F1	F2	F3
T1			
T2			
T3			

Compatible

Not compatible

TIBIA EXTENSION STEMS, CEMENTED

	Ø 12 mm		Ø 15 mm		Ø 18 mm	
Variant:	52 mm	92 mm	52 mm	92 mm	52 mm	92 mm
T1-T3 CoCr	NR191K	NR194K	NR192K	NR195K	NR193K	NR196K
T1-T3 AS	NR191Z	NR194Z	NR192Z	NR195Z	NR193Z	NR196Z

Torque: 20 NM

TIBIA EXTENSION STEMS, CEMENTLESS

	Ø 11 mm		Ø 12 mm		Ø 13 mm		Ø 14 mm		Ø 15 mm	
Variant:	92 mm	172 mm	92 mm	172 mm	92 mm	172 mm	92 mm	172 mm	92 mm	172 mm
T1-T3 CoCr	NR171K	NR491K	NR172K	NR492K	NR173K	NR493K	NR174K	NR494K	NR175K	NR495K
T1-T3 AS	NR171Z	NR491Z	NR172Z	NR492Z	NR173Z	NR493Z	NR174Z	NR494Z	NR175Z	NR495Z
	Ø 16 mm		**Ø 17 mm**		**Ø 18 mm**		**Ø 19 mm**		**Ø 20 mm**	
Variant:	92 mm	172 mm	92 mm	172 mm	92 mm	172 mm	92 mm	172 mm	92 mm	172 mm
T1-T3 CoCr	NR176K	NR496K	NR177K	NR497K	NR178K	NR498K	NR179K	NR499K	NR180K	NR500K
T1-T3 AS	NR176Z	NR496Z	NR177Z	NR497Z	NR178Z	NR498Z	NR179Z	NR499Z	NR180Z	NR500Z

Torque: 20 NM

TIBIAL AUGMENTS RM/LL WITH SCREWS

TIBIAL AUGMENTS RL/LM WITH SCREWS

Variant:	4 mm	8 mm	12 mm	16 mm	4 mm	8 mm	12 mm	16 mm
T1 CoCr	NB025K	NB026K	NB027K	NB028K	NB035K	NB036K	NB037K	NB038K
T1 AS	NB025Z	NB026Z	NB027Z	NB028Z	NB035Z	NB036Z	NB037Z	NB038Z
T2 CoCr	NB045K	NB046K	NB047K	NB048K	NB055K	NB056K	NB057K	NB058K
T2 AS	NB045Z	NB046Z	NB047Z	NB048Z	NB055Z	NB056Z	NB057Z	NB058Z
T3 CoCr	NB065K	NB066K	NB067K	NB068K	NB075K	NB076K	NB077K	NB078K
T3 AS	NB065Z	NB066Z	NB067Z	NB068Z	NB075Z	NB076Z	NB077Z	NB078Z

AXIS COMPATIBILITY

F1	Replaceable by axis, tibial locking ring + PEEK sleeve of the gliding surface:		
axis/parts to be replaced	F1	F2	F3
F1 10 mm	–	–	–
F1 12 mm	–	–	–
F1 14 mm	–	10 mm	–
F1 16 mm	–	12 mm	10 mm
F1 18 mm	–	14 mm	12 mm
F1 20 mm	–	16 mm	14 mm
F1 22 mm	–	18 mm	16 mm
F1 24 mm	–	20 mm	18 mm

F2	Replaceable by axis, tibial locking ring + PEEK sleeve of the gliding surface:		
axis/parts to be replaced	F1	F2	F3
F2 10 mm	14 mm	–	–
F2 12 mm	16 mm	–	10 mm
F2 14 mm	18 mm	–	12 mm
F2 16 mm	20 mm	–	14 mm
F2 18 mm	22 mm	–	16 mm
F2 20 mm	24 mm	–	18 mm
F2 22 mm	–	–	20 mm
F2 24 mm	–	–	22 mm

F3	Replaceable by axis, tibial locking ring + PEEK sleeve of the gliding surface:		
axis/parts to be replaced	F1	F2	F3
F3 10 mm	16 mm	12 mm	–
F3 12 mm	18 mm	14 mm	–
F3 14 mm	20 mm	16 mm	–
F3 16 mm	22 mm	18 mm	–
F3 18 mm	24 mm	20 mm	–
F3 20 mm	–	22 mm	–
F3 22 mm	–	24 mm	–
F3 24 mm	–	–	–

Example:
Axis elements of the gliding surface F2 16 mm are damaged.
These could be replaced by axis elements of the gliding surfaces F1 20 mm or F3 14 mm (see table F2, line F2 16 mm).

– means that no replaceable components are available from the gliding surfaces for the respective femur size in the respective column. Accordingly, a replacement must be identified in the next femur size column in the row of components to be replaced.

For the gliding surfaces F1 10 mm, F1 12 mm and F3 24 mm, there is no replacement option from another gliding surface. Therefore, it is necessary to switch completely to the next higher/flatter gliding surface, including axis components.

AESCULAP® EnduRo

23 | LITERATURE

(1) Schierjott RA, Giurea A, Neuhaus HJ, Schwiesau J, Pfaff AM, Utzschneider S, Tozzi G, Grupp TM. Analysis of Carbon Fiber Reinforced PEEK Hinge Mechanism Articulation Components in a Rotating Hinge Knee Design: A Comparison of In Vitro and Retrieval Findings. Biomed Res Int. 2016;2016:7032830. Epub 2016 Dec 22.

(2) Grupp TM, Giurea A, Miehlke RK, Hintner M, Gaisser M, Schilling C, Schwiesau J, Kaddick C. Biotribology of a new bearing material combination in a rotating hinge knee articulation. Acta Biomater. 2013 Jun;9(6):7054-63. Epub 2013 Feb 26.

(3) Affatato S, Spinelli M, Lopomo N, Grupp TM, Marcacci M, Toni A. Can the method of fixation influence the wear behaviour of ZrN coated unicompartmental mobile knee prostheses? Clin Biomech (Bristol, Avon). 2011 Feb;26(2): 152-8. Epub 2010 Oct 8.

(4) Grupp TM, Schwiesau T. Determination of the wear behavior of the UNIVATION mobile knee system T018, Mar 2007.

(5) Reich J, Hovy L, Lindenmaier HL, Zeller R, Schwiesau J, Thomas P, Grupp TM. Präklinische Ergebnisse beschichteter Knieimplantate für Allergiker. Orthopäde. 2010 Mai;39(5): 495-502.

(6) Amirfeyz R, Bannister G. The effect of bone porosity on the shear strength of the bone-cement interface. Int. Orthop. 2009 Jun;33(3):843-6.

(7) Seeger JB1, Jaeger S, Bitsch RG, Mohr G, Rohner E, Clarius M. The effect of bone lavage on femoral cement penetration and interface temperature during Oxford unicompartmental knee arthroplasty with cement. J Bone Joint Surg Am. 2013 Jan 2;95(1):48-53.

(8) Schlegel UJ1, Puschel K, Morlock MM, Nagel K. An in vitro comparison of tibial tray cementation using gun pressurization or pulsed lavage. 2014 May;38(5):967-71.

(9) Norton MR, Eyres KS. Irrigation and suction technique to ensure reliable cement penetration for Total Knee Arthroplasty. J Arthroplasty. 2000 Jun;15(4):468-74.

(10) British Orthopaedic Association and British Association for Surgery of the Knee. Knee Replacement: a guide to good practice: London: British Orthopaedic Association.

(11) Vaninbroukx M, Labey L, Innocenti B, Bellemans J. Cementing the femoral component in total knee arthroplasty: which technique is the best? Knee. 2009 Aug;16(4):265-8. doi: 10.1016 / j.knee.2008.11.015.

(12) De Baets T, Waelput W, Bellemans J. Analysis of third body particles generated during Total Knee Arthroplasty: is metal debris an issue? Knee. 2008 Mar;15(2):95-7.

NOTES

AESCULAP® – a B. Braun brand

Aesculap AG | Am Aesculap-Platz | 78532 Tuttlingen | Germany
Phone +49 7461 95-0 | Fax +49 7461 95-2600 | www.aesculap.com

038602 0820/PDF/4