Aesculap® EnduRo

Rotating Hinge Knee Endoprosthesis
Surgical Technique

Aesculap Orthopaedics

B BRAUN
SHARING EXPERTISE

Aesculap® EnduRo

The innovative hinged knee

Due to prevailing demographic trends, there will be an upsurge in the demand for knee revision surgery in the near future. The newly developed EnduRo knee endoprosthesis is a suitable and modern treatment option for your patients.

Security against dislocation – joined cone with additional securing nut.

Longevity – due to the use of tried and tested CoCrMo for the metal components, combined with innovative, carbon fibre-reinforced PEEK as bearing material for the axle bearings.

Mobility – 12° rotation on the vertical axis possible – in both medial and lateral directions. At least 140° flexion angle, which is increased still further by sophisticated lift technology.

Aesculap® EnduRo

Portfolio

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

Femur spacer
- Distal
- Postero distal
- 4, 8, 12 mm (for details, see matrix of implants)

Femoral components
- 3 sizes, right/left for each size
- AP offset option for shafts, ± 2 mm

Patellae
- 6 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, Ø 41 x 12 mm

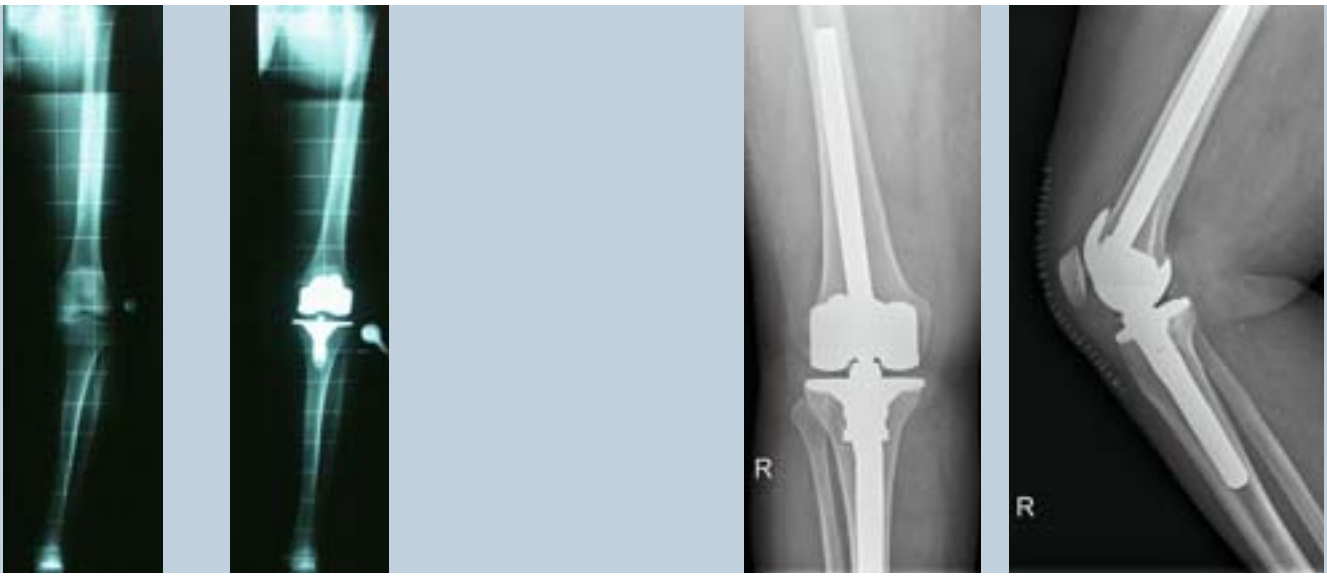
PE gliding surfaces
- 3 sizes
- 10, 12, 14, 16, 18, 20, 22, 24 mm
- Rotation limit ± 12°

Tibial hemi spacer
- 3 sizes
- Symmetric
- ML offset option ± 6 mm (± 4 mm for T1)

Tibial hemi spacer
- RM/LL and RL/LM
- 4, 8, 12, 16 mm

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

Preoperative planning



In order to achieve satisfying therapy results with the EnduRo knee system, bone defects as well as possible functional disorders of the soft tissue must be analysed carefully. It is very important to know the reasons why a primary endoprosthesis failed so that the errors are not repeated in the future.
Further parameters for ensuring best possible operative results are:

- Functionality of the extensor mechanism
- Removal of the primary endoprosthesis
- Preservation of bone substance
- Restoration of good axis orientation
- Functional stability
- Restoration of the joint line

EnduRo X-ray templates for X-ray image analysis during preoperative planning are available, which help to determine the following parameters:

- Angle between anatomic and mechanical femur axis
- Resection heights
- Size of the implants
- Entry points for intramedullary alignment
- Need for and dimensions of spacers and extension stems

Extensive losses of bone substance can be compensated with the EnduRo knee system:

- Maximum distal femur bone losses:

F1 distal: 19 mm, F2 distal: 20.5 mm, F3 distal: 22 mm
F1 posterior: 15 mm, F2 post.: 20.5 mm, F3 post.: 22 mm

- Maximum tibial bone losses:

T1-T3: 40 mm

Indications:
Severe knee joint disorders which cannot be treated by other therapies:

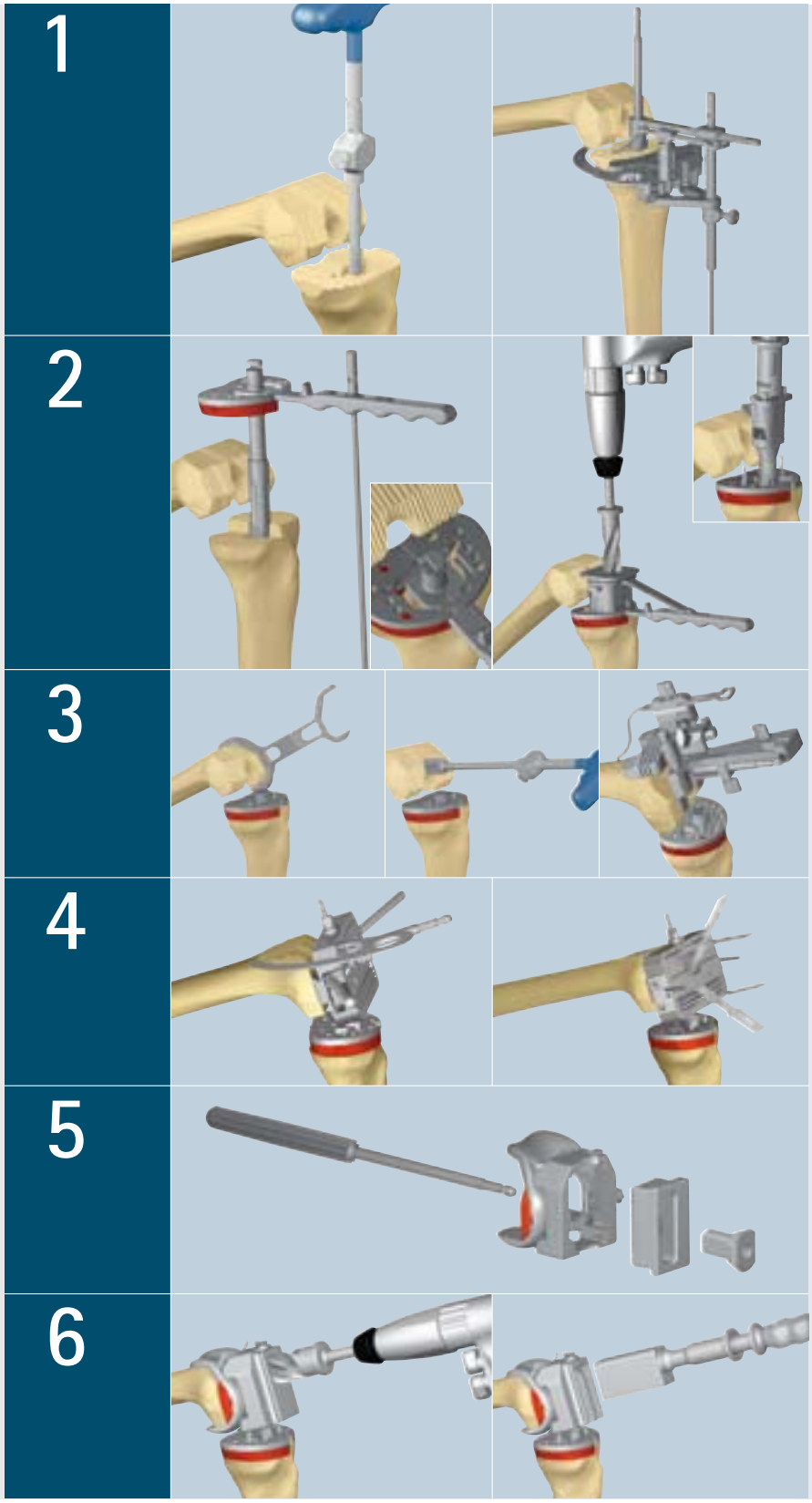
- Degenerative arthrosis
- Rheumatoid arthritis
- Posttraumatic arthrosis
- Symptomatic knee ligament instability
- Knee-joint ankylosis
- Severe knee-joint deformities
- Revision/Replacement operations

EnduRo is indicated for use in cases of functional deficiency of the collateral ligaments.

Contraindications:
See instructions for use, TA012000

Please note:
The EnduRo knee system is used in cases of severe primary bone defects, collateral ligament insufficiency and in cases where revision is indicated. In these cases, varus/valgus and rotational forces are brought to bear on the linked femoral and tibial components, resulting in a potentially increased risk of loosening. Aesculap therefore recommends that the femoral and tibial components for the EnduRo knee system only be implanted with extension stem. The surgeon may deviate from this at his/her own discretion.

Brief instructions



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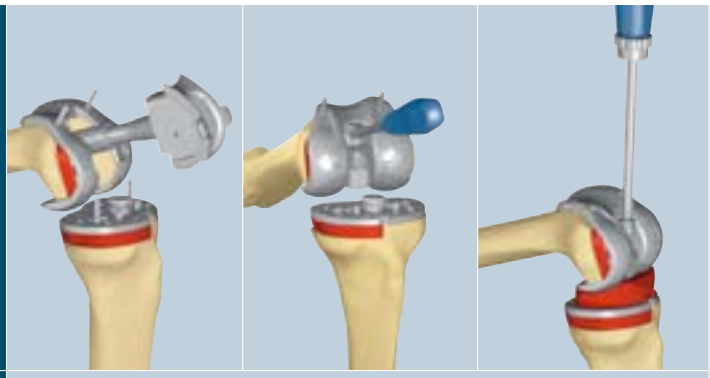

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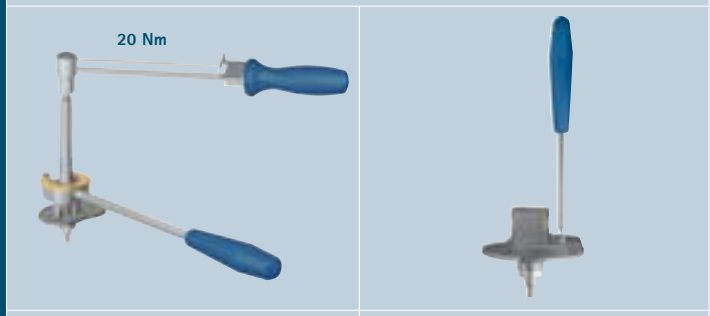

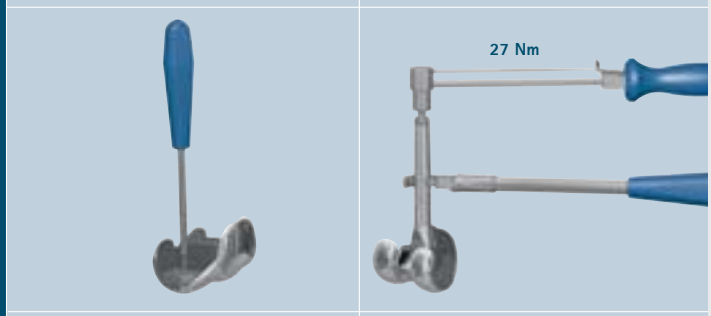

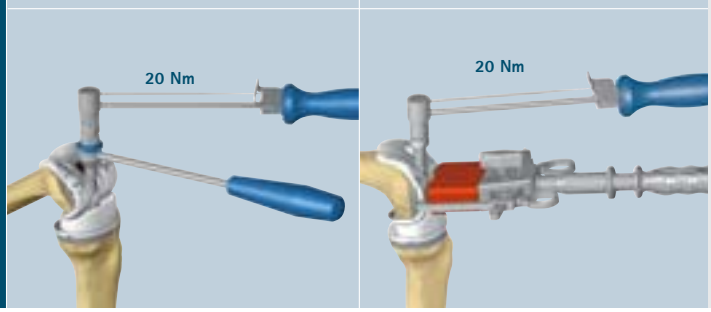

Operative steps

OPTION: Applying reference marks

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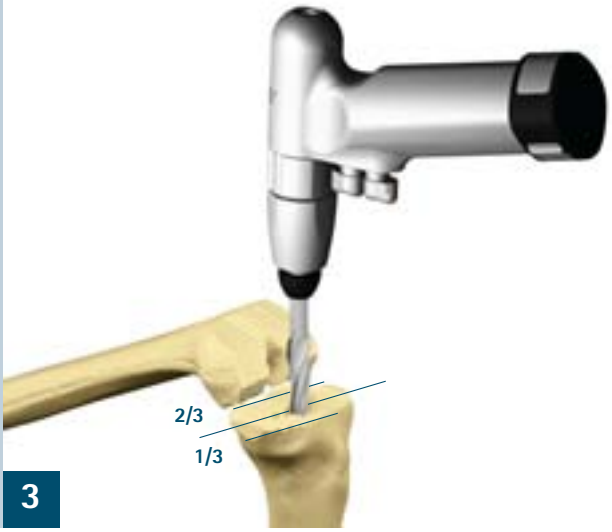
The joint line feeler NQ708R is attached to the distal contact plate NQ709R and screwed in place. A mark is made as reference mark on the anterior side of the femur, e. g. level with the proximal end of the primary femoral shield. The joint line feeler is fixed in this position by means of the screw A, which then remains tightened and is not loosened again during the remaining course of the operation.

Remove all primary implants. Collateral ligaments may also be resected.

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

Preparation of the tibia



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The point of entry for step drill NP410R and reamers is determined if necessary with the help of X-rays or via the AP distance from 1/3 to 2/3. The intramedullary canal is reamed as deeply as possible using the long reamer until stable anchorage is achieved for precise axis alignment. After tibial resection, reaming is repeated at the desired diameter to the required depth in order to achieve a pressfit connection in cementless procedures, or to make room for the cement layer in cemented variants. The reamers have markings for the different extension stem lengths.

Operative steps

Tibial resection variants

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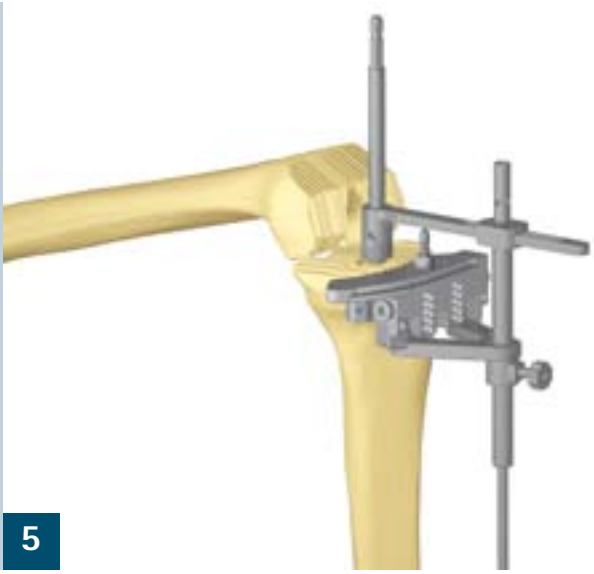

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1. Version:

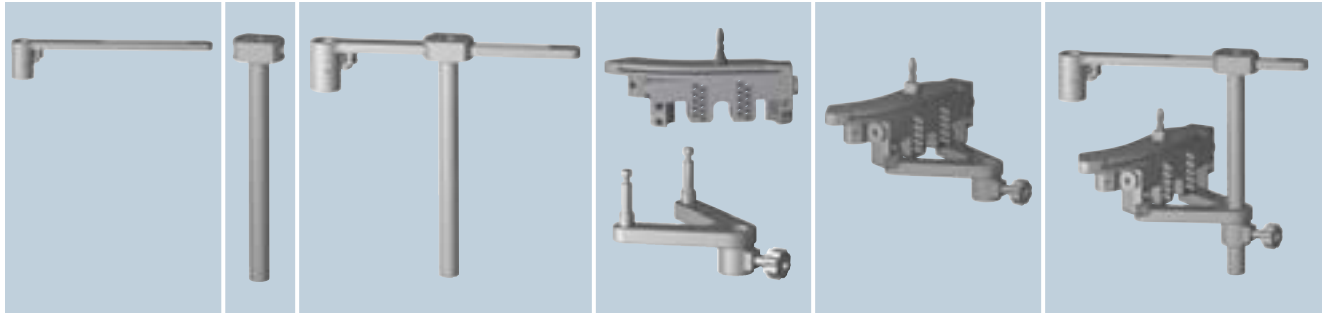
The alignment system, including tibial cutting block, is assembled completely and fitted onto the reamer. The resection height is determined by means of the cutting height feeler NE425R in the sawing slot, which has been adjusted to the desired resection. Fix this position by tightening the fixation screw at the side. The position of the sawing cut can be checked by means of the cutting depth gauge NM350R.

2. Version:

The complete alignment system, including tibial cutting block, is fitted onto the shaft of the reamer. Contact is made with the tibial plateau by means of the cutting depth gauge in the sawing slot. The cutting depth is now determined stepwise via the inserted cutting height feeler (shift distally with fixation screw loosened) by means of the feeler's snap mechanism.

Option:

The position of the leg axis can be checked by means of the axis control rod NE331R (with sleeve) / NP471R (without sleeve), which is inserted into the borehole of the slide bar.



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

6

The tibial cutting block is fixed in the desired position by means of two parallel headless pins and one convergent headed pin.

7

The alignment system and the reamer are removed. For this purpose, the adapter NE195R is released by simultaneously pressing the two pushbuttons of the tibial cutting block, and is then removed by pulling in a distal direction.

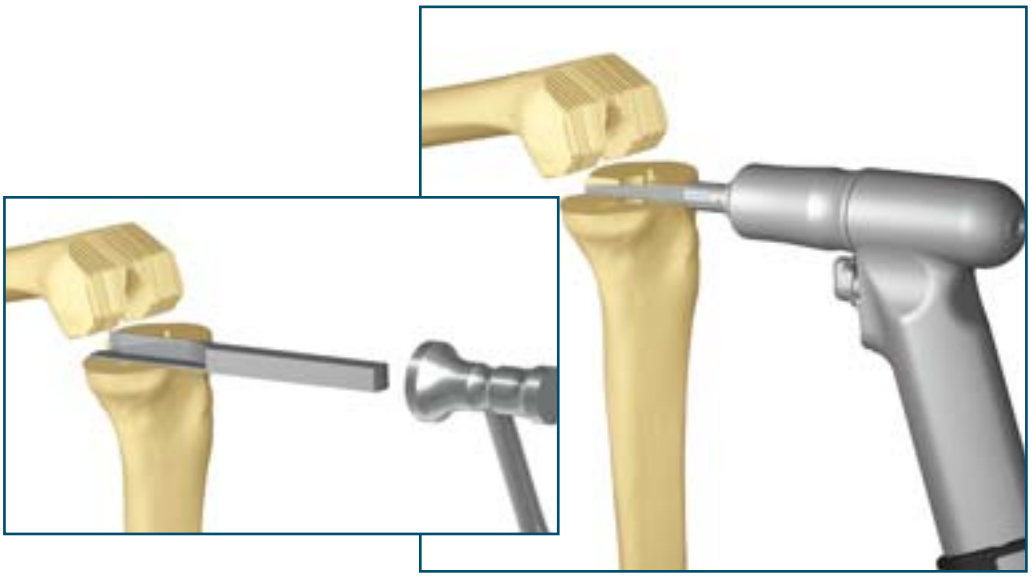
Next remove the connector NP677R and the connection block NP678R in a proximal direction. The reamer is removed in a proximal direction by turning clockwise with the handle, which is first reattached.

Operative steps

Tibial resection

Tibial resection is performed using a sawing blade 1.27 mm thick.

Sawing cuts for the 4, 8, 12 and 16 mm hemispacers may also be performed by distal change of position of the cutting block. The positions at which the hemispacers end in a sagittal and medial/lateral direction must be taken into account.



Depending on which side is being operated on, either the chisel NP024, or NP025R is used for sagittal hemispacer resection. Another option is to use a compass saw.

Determining the size of the tibial components

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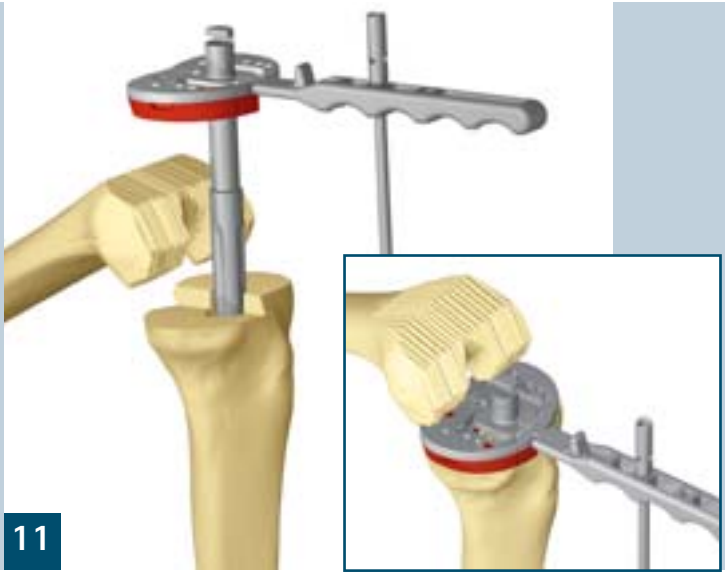

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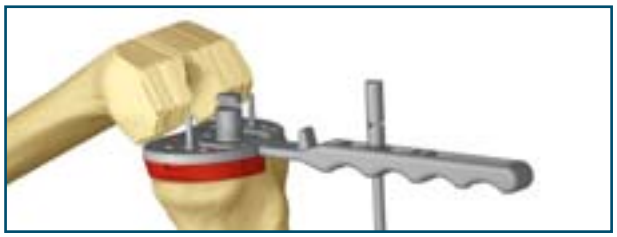
Depending on the tibia resection, the medullary cavity must now be reamed out once more to the required depth using the reamer. If hemispacers are used on both sides, their height is subtracted from the reaming depth.

The trial tibial plateau which best covers the bone in ML and AP directions is selected, and the corresponding trial hemispacer is snapped into place underneath the same, if applicable.

Option:

The position of the leg axis can be checked by means of the axis control rod which is inserted into the handle.

The optimal ML, AP and rotational position is determined by means of the ML positioning device NP466R, which is inserted, and on which the required trial tibia extension stem has been screwed in place. The anterior mark indicates the ML position. This ML value is noted down.



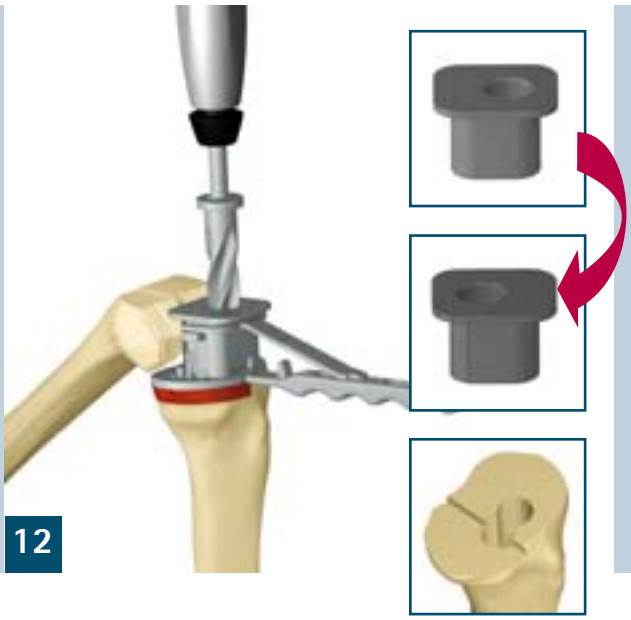
The tibial trial plateau is fixed in place in this correct ML, AP and rotational position by means of two short headed pins.

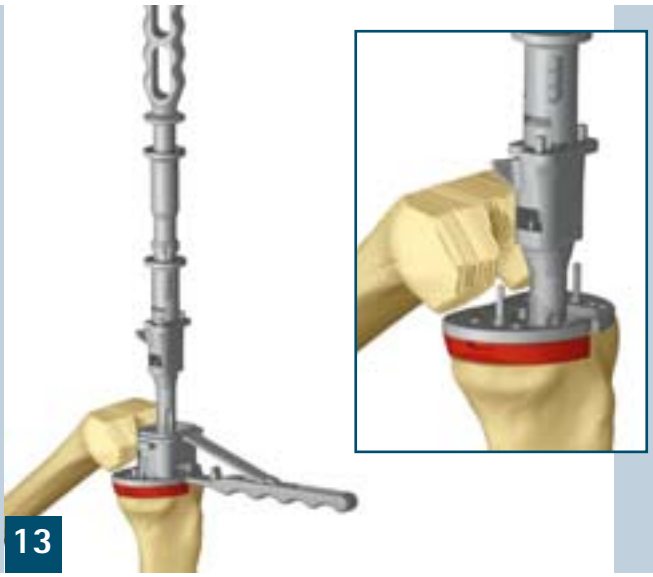
▶ **Please note:**

When preparing the tibia, the required buildup height (thickness of tibial plateau + PE sliding surface + optional spacers) for reconstruction of the joint line should be taken into account at an early stage; in particular, the tibial plateau should not end up too far distal, as otherwise there may not be sufficient space in the ML dimension to accommodate the plateau box in the tibial head, which could result in ruptures due to excessive strain. The buildup height should therefore preferably be achieved by using hemispacers on both sides rather than by a higher uniform surface.

Operative steps

Preparation of the tibial box





The ML positioning device is removed.

The guide link NP463R and the drilling sleeve in the respective required size (T1 NP457R, T2/T3 NP458R) are fitted onto the tibial trial plateau (T1 NP451R, T2 NP452R, T3 NP453R). The holder NP459R is positioned on the handle and the drilling sleeve for steadying. 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.

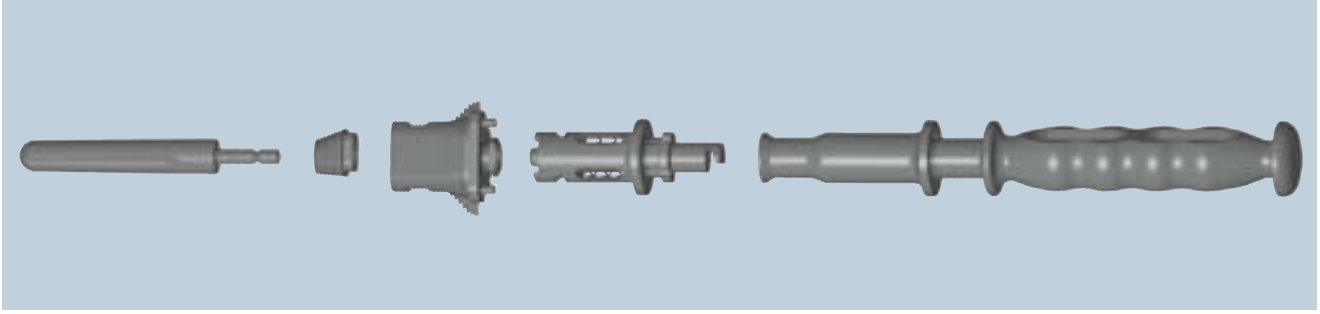
The result is a binocular-shaped contour.

The box shape is completed as follows using the rasp:

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

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 shaft, connecting piece, box rasp, adapter NP467R, handle NP495R

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Preparation of the tibia is now completed, and the tibia is fixed secure against rotation by the box rasp. Both pins can therefore be removed.

15

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

Operative steps

Preparation of the femur

16

The size of the femur is determined with the help of the femur measuring gauges F1/F2 NP441R and F3 NP442R. The gauges indicate the respective AP and ML dimensions. Further marks on the instrument indicate which distal and postero-distal femur spacers are available in each case.

17

The point of entry for the step drill NP410R in the distal femur is determined if necessary with the help of radiographs. Drilling is performed in the selected angle, taking into account the femoral curvature and other patient-specific aspects.

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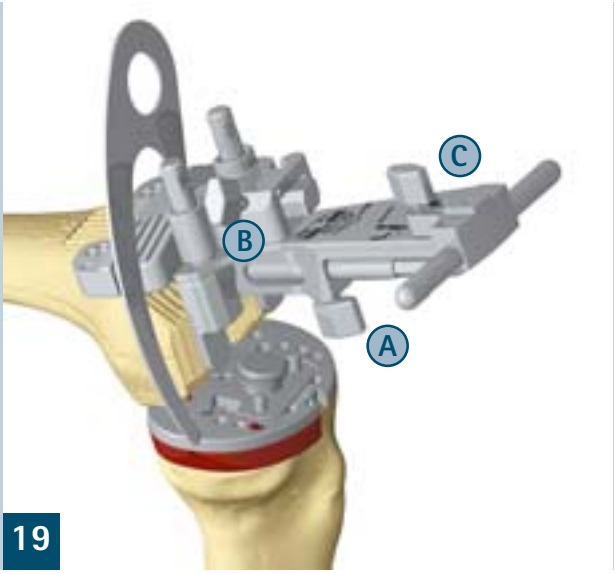
As with the tibia, alignment for distal femur resection should if possible be effected using a long, thin reamer for precise detection of the axis. The reamers have marks for the different femur extension stem lengths.

Distal femur resection



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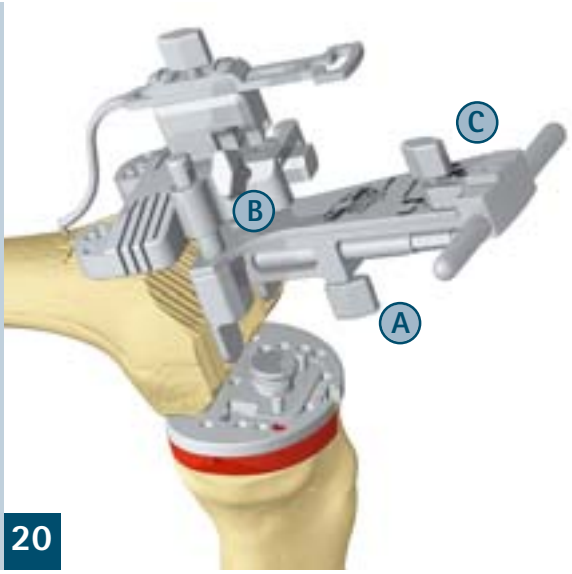

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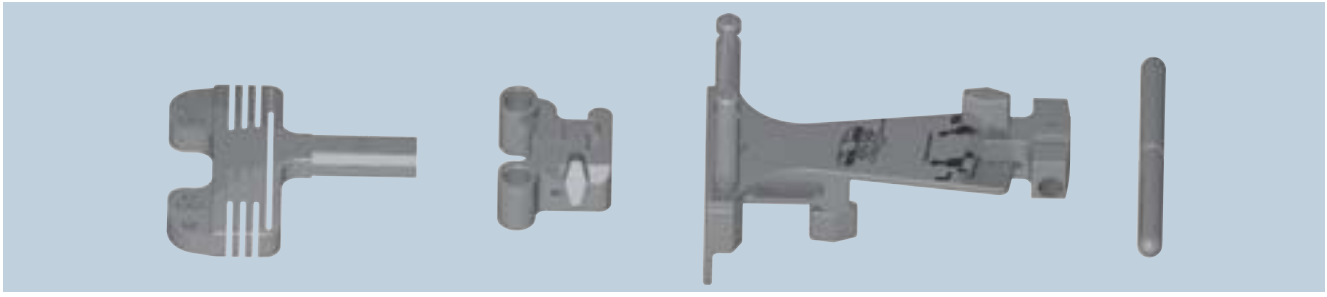
The alignment system NQ702R for the distal femur cut, with inserted handle NQ474R, is fitted with the sawing block holder NQ703R, to which the distal femur sawing block NP411R is in turn attached. This can be locked in place in a neutral position for the respective femur size, or in a more proximal or distal position, and 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) for the correct-side leg which is to be operated on (left or right leg) is set and fixed by means of screw C. The alignment system is then slid onto the reamer shaft 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 slided onto the reamer shaft until bone contact of depth gauge. Thereafter the femur sawing block has to be fixed in place by using two headless pins and can be switched 2 mm proximal for plane cut.

Option:

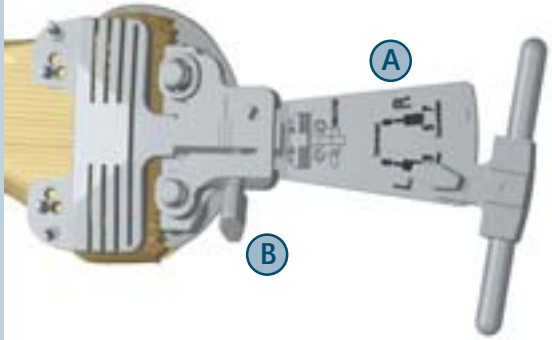
The joint line positioning device NQ708R with its guide finger is attached to the continuous sawing slit of the distal femur sawing block NP411R. The alignment system is then slid onto the reamer shaft until the bone is contacted and is fixed in place via screw A. The cutting block is now shifted until 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) for the correct-side leg which is to be operated on (left or right leg) is set and fixed by means of screw C.
The sawing cuts can be checked by means of the cutting depth gauge in the sawing slot.



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

Operative steps

Distal femur resection



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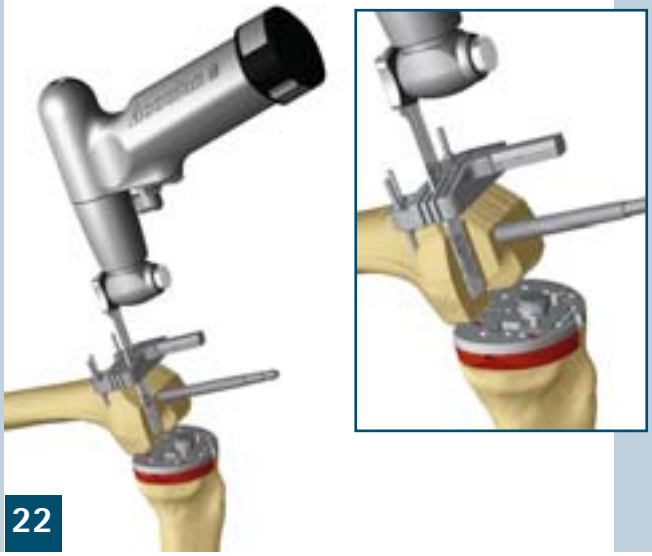

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The cutting block is affixed to the anterior femur by means of two parallel headless pins and one/two convergent headed pins. The cutting depth gauge, the joint line positioning device and the alignment system are removed [undo screw A (underneath,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

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

The distal femur cut is carried out in the selected plane of resection. If required, additional resection cuts are made for the distal or postero-distal femur spacers using the appropriate sawing slit.

23

If resection was made for distal femur spacers, distal trial spacers with analogous dimensions must be slid into place on the reverse side of the 4-in-1 sawing block.

24

The required 4-in-1 cutting block (F1 NM731R, F2 NM732R and F3 NM733R) is slid into position on the reamer shaft with the AP orientation sleeve, which is available in the variants Neutral NE172R and ± 2 mm NE173R, fitted in place. In order to avoid anterior undercutting of the femoral cortex, the cutting depth gauge is affixed in the anterior sawing slit for checking.

Option:

Two handles NE730R can be attached to the cutting block for better rotational alignment.

Operative steps

Completing the femur resection

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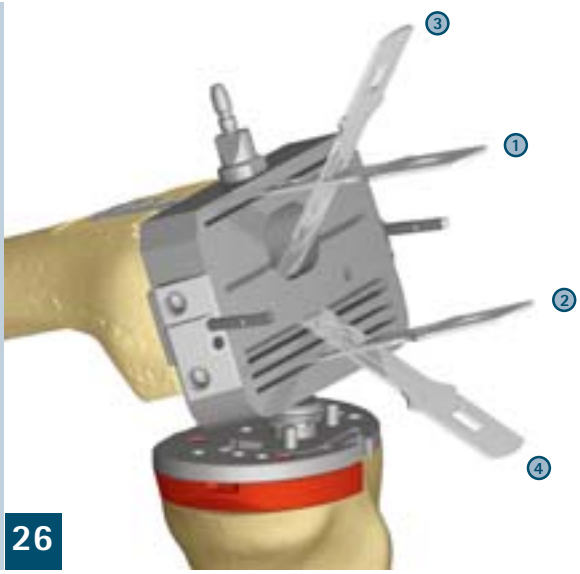

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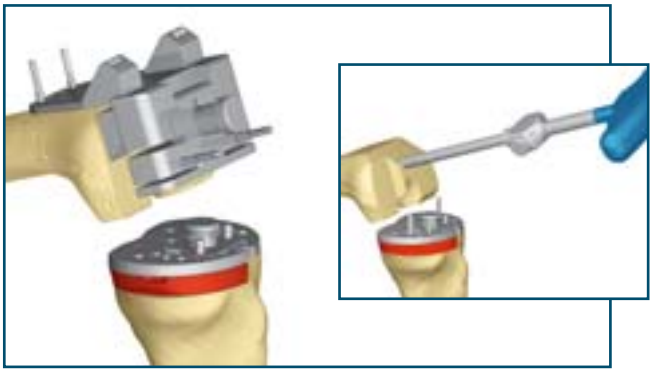
The cutting block is fixed in the def. rotational position via two long headless pins through the two parallel anterior boreholes. The handles, orientation sleeve, cutting depth gauge and reamer are removed. For large diameters, the cutting block must be removed for this and must subsequently be reattached.

The cutting block is additionally in place by two long fixed in place by means of one or two long headless pins through the convergent anchorage boreholes. Afterwards, the two parallel pins have to be removed.

Completing the femur resection:

The four femur resection cuts are performed in the following sequence:

1. Anterior parallel cut
2. Posterior parallel cut (incl. spacer cut if required)
3. Posterior chamfer cut
4. Anterior chamfer cut



If a 12 mm postero-distal femur spacer is required, the special 12 mm cutting block NP431R is attached to the bone and fixed in place with a pin, and resection is then performed using the appropriate sawing slit.

If bad quality of anterior surface or because of change of rotational position, the 12 mm cutting block can be fixed by the distal pin of the 4-in-1 cutting block.

The reamer with the appropriate diameter is screwed into the medullary canal up to the desired depth for final preparation of the medullary space.

Preparation of the femoral box

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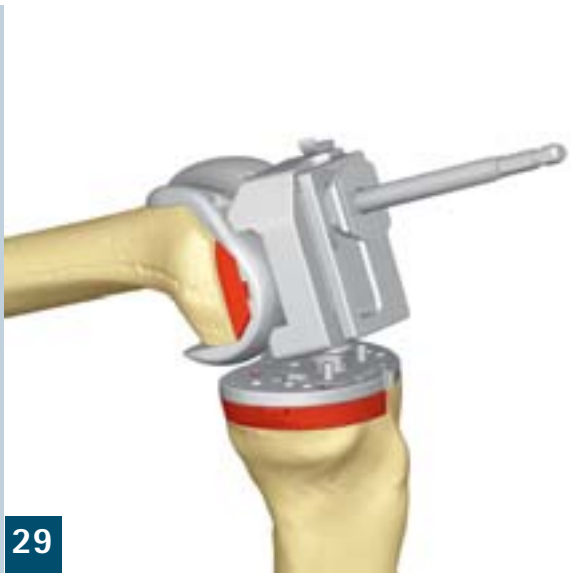
The required distal or postero-distal trial spacer(s) are, if applicable, screwed onto the right or left trial femur as appropriate for the leg undergoing surgery (right: F1 NP407R, F2 NP408R, F3 NP409R; left: F1 NP404R, F2 NP405R, F3 NP406R). The frame for alignment of the trial femur and for femoral box preparation is selected in the required size (F1 NP421R, F2 NP422R, F3 NP423R) and fitted onto the distal part of the trial femur. It is fixed in place by the screw at the side.

If necessary, the screw driver NE181R can also be used for this purpose.

Femoral box alignment assembly: reamer, trial femur assembly, femoral box alignment device and sleeve for femoral box alignment

Operative steps

Preparation of the femoral box



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The femoral box alignment device (F1 NP415R, F2/3 NP416R) is inserted into the selected trial femur fitted with distal or postero-distal trial spacers, if applicable, and on which the frame for femoral box preparation has been screwed in place. When doing this, care must be taken to ensure that the alignment device has the correct size and the appropriate marking for the left or right leg undergoing surgery (L=left, R=right leg), and the fastener on the frame must be closed. The sleeve for femoral box alignment (L6°/R6° NP417R and L7°R5°/L5°R7° NP418R) is inserted into the femoral box alignment device at the correct angle. This assembly of the femoral box alignment device is slid onto the reamer shaft, or driven into position using the planar femoral impactor attachment (NQ414) connected to the handle, until fully in contact with the inner femoral bone surface.

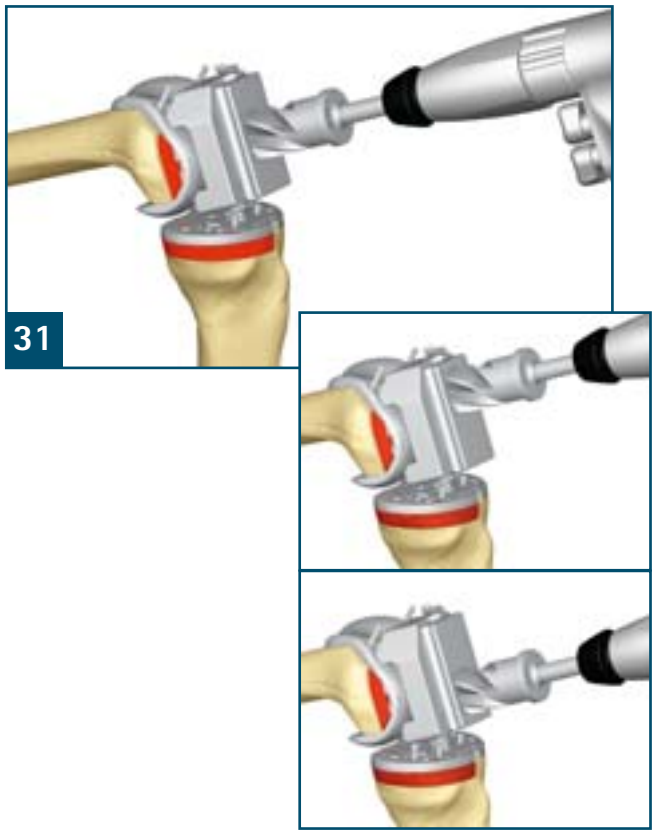
▶ **Please note:**

In order to avoid injury of the dorsal soft tissue structures it is advisable to detach these beforehand and to protect them with a suitable spatula.

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

The trial femur is fixed in place in this position by means of two anterior headed pins. The sleeve, the femoral box alignment device and the reamer are subsequently removed.



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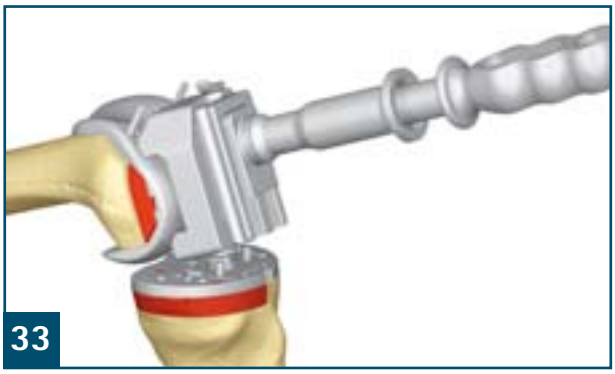
In order to remove the remaining bone, the guide for the U-chisel in the required size (F1 NP433R, F2/F3 NP434R) is inserted into the frame for femoral box preparation and secured in place. The U-chisel NP443R is connected to the handle and driven in up to the stop position.



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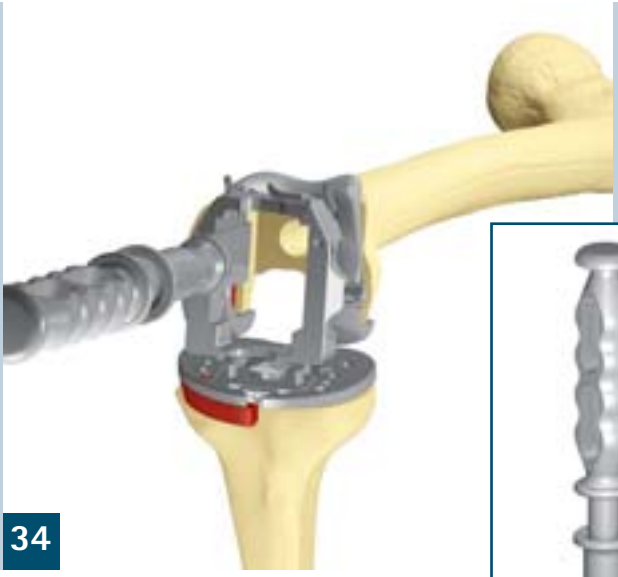

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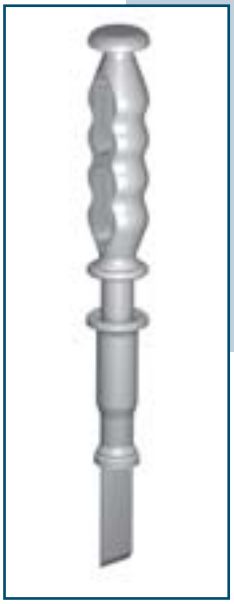
The flat chisel NP432R is connected to the handle. The femoral box is carved out on the medial side up to the stop position with the long side of the blade touching the inner, medial side of the femoral box frame.



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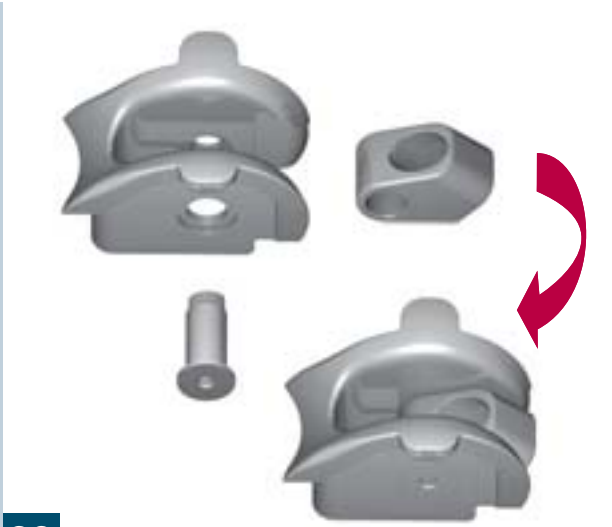
In order to ensure optimal fit of the femur trial shaft, the medial and lateral inner surfaces are shaped with the rasp NQ832R, which is guided by the trial shaft connected to it. The rasp is driven in twice (rotating it by 180°) up to and including the last, wide tooth at the proximal end.

Trial shaft, rasp NQ832R and handle NP495R.

Operative steps

Assembly of the femoral trial box



36

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

37

Complete femoral trial box assembly:

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

38

The selected femoral trial extension stem is screwed onto the adapter that has the correct angle and length. The attachment screw (NS001R) is screwed into the adapter for one or two revolutions of the thread. The extension stem is next inserted into the proximal guide of the femoral trial box and loosely screwed in place from the distal side, so that there is still some play in the AP direction for self-centring. This trial femoral box assembly is inserted manually into the trial femur.

39

The configured trial femoral box is finally driven completely into the trial femur.

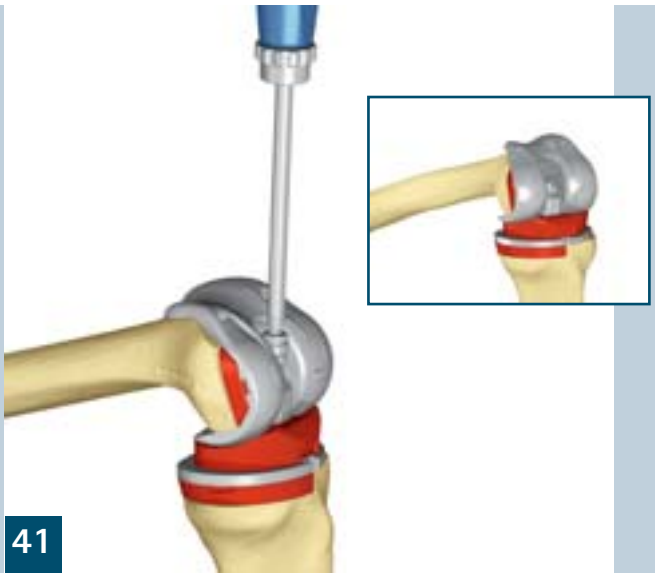
40

The extension stem, which has now aligned itself in the AP direction, is fixed in this defined position by tightening the intercondylar attachment screw using the screw driver NE181R.

The two pins in the femur can now be removed.

Operative steps

Assembly of the femoral trial box



41

42

The trial PE gliding surface in the required size (which depends on the femur size) and height can now be selected and fitted onto the tibial trial plateau after removing the covering of the borehole for the rotational axis.

Further heights from 16 to 24 mm are formed if required by combination with the 6 mm supplementary plates. The required trial rotational axis is screwed into the trial hinge ring using the screw driver NP440R. The rotational axis is available in two lengths (short, NP447R, up to 16 mm PE height, or long, NP449R, from 18 mm PE height upwards). Joint stability in flexion and extension can now be tested, and a higher or lower PE gliding surface is selected in accordance with the result. It is recommended to do the testing with patella. When selecting the height of the PE gliding surface, care should be taken to ensure that the system is sufficiently under tension despite the protection from dislocation immanent in the system.

If a cemented extension stem procedure was selected, a larger diameter must be reamed up to allow for the cement layer. Alternatively, thinner extension stem can be used (-2 mm). Reamers with Ø 14, 15, 17, 18 and 20 mm are available.

Preparation of the patella

43

The thickness of the patella is measured using the patella forceps. This thickness should not be exceeded after implantation of the patella implant (see table on page 35). A decreased patella thickness after implantation should be aimed for.

The forceps are adjusted for the selected resection height.

44

Resection is performed through the cutting blade guide.

The cutting attachment is subsequently removed.

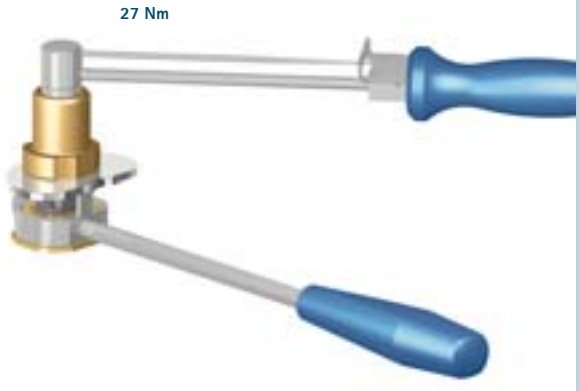
45

The drilling gauge is inserted into the patella forceps. The patella is held in place in the patella forceps by the snap-in mechanism. The three holes for the pins are drilled using the 6 mm Ø depth gauge drill. The patella size is determined by means of the patella trial implants.

Operative steps

Assembling the final implants

46



47

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

The rotational axis (metal) is correctly inserted into the black bearing sleeve (synthetic material). Both together are then inserted into the seating borehole of the tibial plateau. Finally, the locking ring is screwed on.

The locking ring is tightened with 27 Nm using the torque wrench NE184RM – connected to the locking ring spanner (F1 NP462R (for heights 10 mm and 12 mm), F2/F3 NP454R), and over this the guide NP144P and the tibial plateau holder as counterholder.

The defined tibial extension shaft is screwed under the tibial plateau, taking into account the correct medial/ lateral position of the tibial trial extension stem.

The nut NE185R is fitted onto the torque wrench NE184RM. The extension stem is now tightened with 20 NM, using the tibial plateau holder NQ830R as counterholder.

The tibial spacers are, if required, screwed underneath the tibial plateau using the screw driver NE181R.

48

50

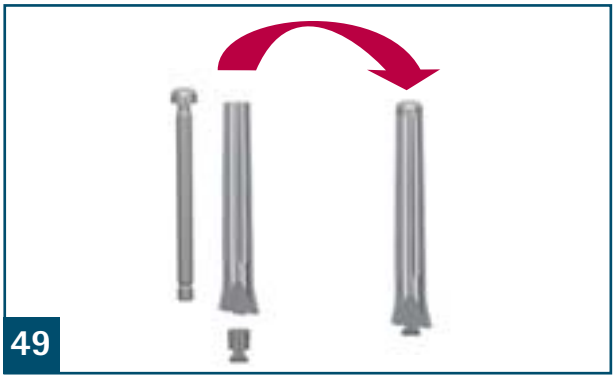
The AP extension stem position of the explanted trial femur serves as reference for assembling the final femur implant.

▶ **Please note:**

The securing nut is in sterile package together with the femur implant.

Option:

The distal or postero-distal fermur spacers are, if required, screwed into the femur implant using the screw driver NE181R.



49

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 extension stem is inserted into the femur box and screwed tightly in place by hand in the correct AP alignment. The femoral extension stem, which is held by the extension stem holder NQ834R, is tightened in place with 27 Nm in the correct AP position using the torque wrench NE184RM with attached nut NE185R. The extension stem holder NQ834R has a special holding aperture for the cemented femur extension stem with 12 mm diameter.

The sealing mask, which can be cut to size for the required AP length, is then inserted into the femur box aperture in order to prevent entry of cement. This mask is in a sterile package together with the femur implant.

Operative steps

Assembling the final implants

51

52

▶ **Please note:**

Tibia and femur implants must be cemented. The extension stem can be used either with cement or cementless, depending on the selected variant.

Implantation sequence:

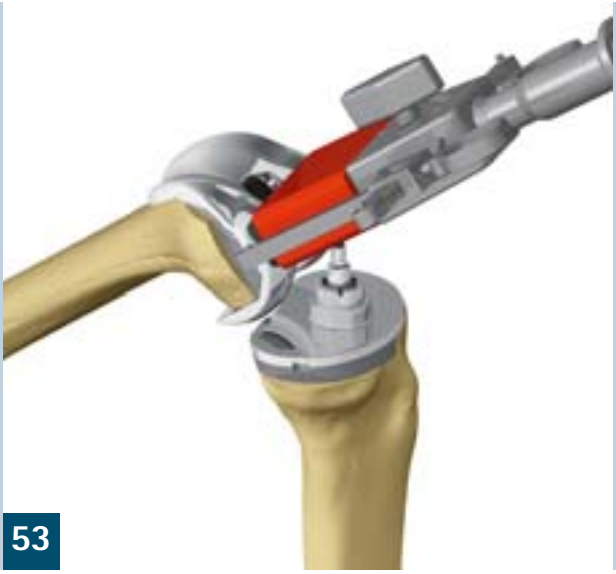
- Tibial plateau
- Femur
- PE gliding surface
- Patella

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

Option:

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

The femur insert in the required size (F1 NQ566, F2 NQ567, F3 NQ568) is inserted into the femur holder NQ570R, and the handle for driving in is attached. The two holding fingers are pushed apart, the femur is inserted and they are then pushed back together again. The holding fingers engage the two (medial and lateral) gaps in the femur and are fixed in this position by tightening the toggle screw.



53

55

The femur component is driven in using the implant holder. This step can be done with the PE gliding surface already fitted, which then guides the femur.

54

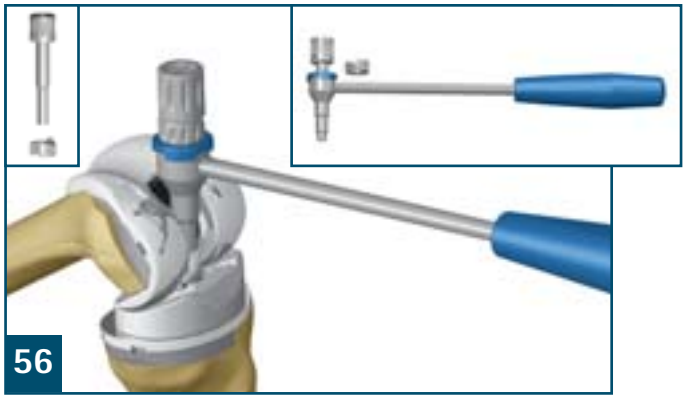
Option:

The femur is fully driven in in the correct position using the impactor NQ459 (concave) which is attached to the handle.

All cement residues must be removed carefully in order to avoid third body wear. Especially the rotational axis must be free of cement residues in order to avoid contact corrosion. It is recommended to allow the cement to harden in extension with PE gliding surface fitted and hinge ring placed over the rotational axis. The selected extension strain is reached by this procedure, and the femur implant centres itself on the joint line.

▶ Please note:

Especially by using cemented extension stems, cement residues can be left in the dorsal area. To remove all cement, the pre coupled hinge mechanism has to be disconnected and the PE gliding surface need to be removed.

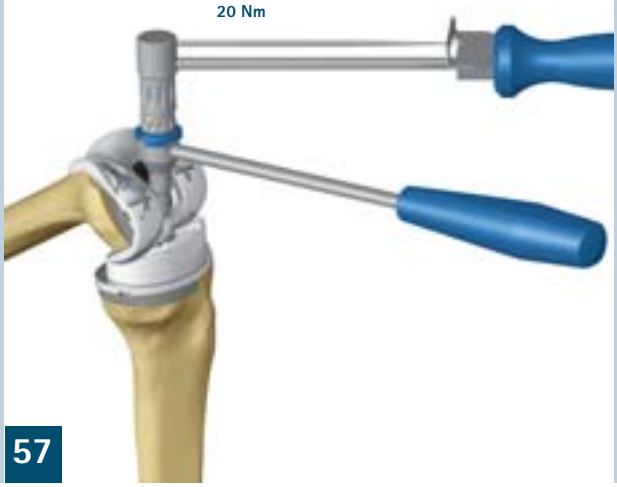


56

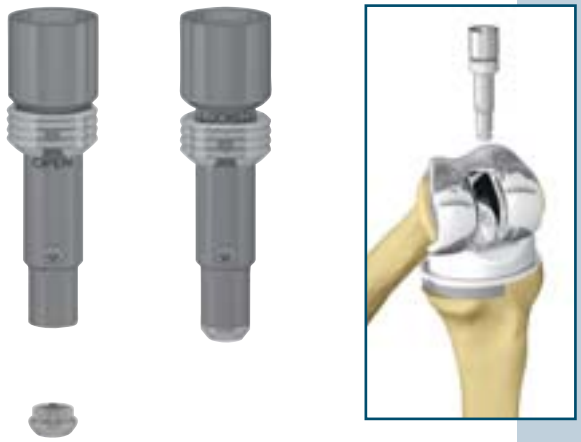
The PE gliding surface is placed back and the hinge ring is again placed over the rotational axis. The axis is now centered in the hinge ring and the knee joint is in flexion. Afterwards the adapter for cone joining NP420R is inserted into the counterholder NP419R that his tip with internal thread looks forth some millimeters. The adapter is now screwed by visibility onto the rotational axis by hand and following the counterholder has to be slidet to tibia plateau direction. The spacer piece is now inserted into the free space between both instruments.

Operative steps

Assembling the final implants



57



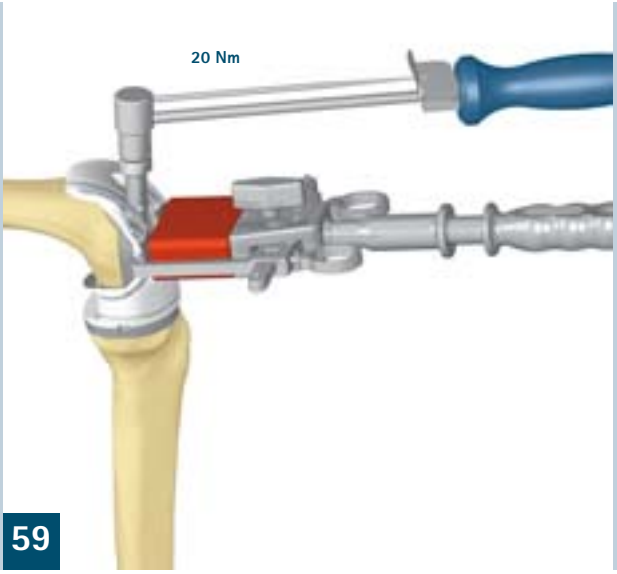
58

The cone is joined applying the torque wrench NE184RM with 20 Nm in clockwise direction.

Since the thread has a low gradient, several revolutions are necessary.

The adapter for joining the cone is then removed by turning counterclockwise.

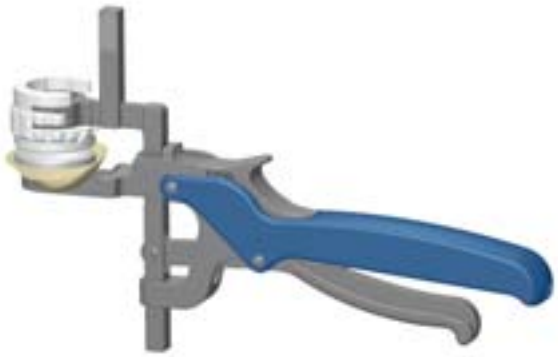
The securing nut, which is supplied with the femur implant, is inserted into the holder NP455R, is secured by shifting the locking ring downward and is screwed onto the thread by hand.



59

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

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



60

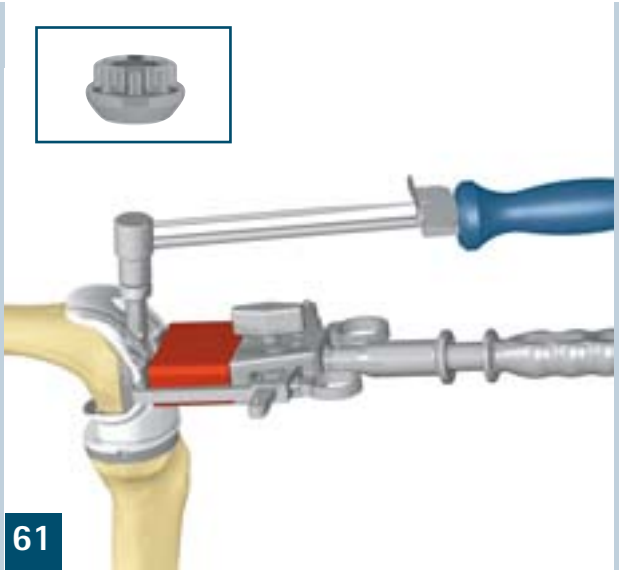
The patella is implanted using the press-on adapter which is inserted in the patella preparation forceps.

▶ **Please note:**

All cement residues must be removed carefully in order to avoid third body wear.

Instruction for explantation

Decoupling of femur and tibia plateau



61

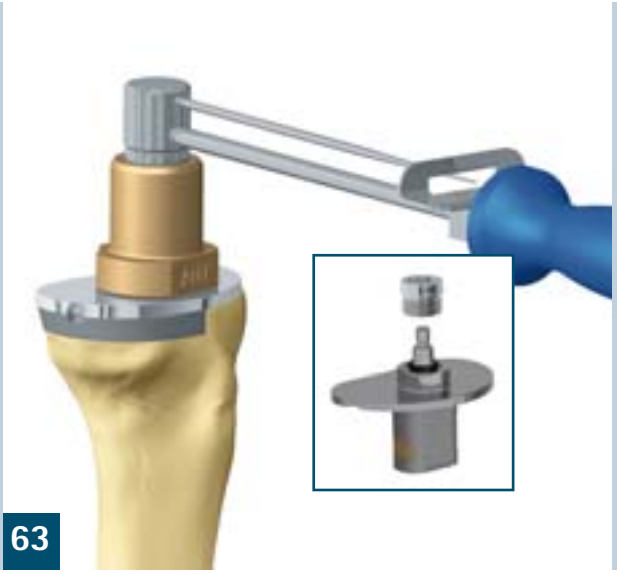
Remove femur securing nut by turning counter-clockwise. Use torque wrench NE184RM with inserted holder NP455R.

As counterholder attached to the femur, the handle NP495R connected to holder NQ570R with inserted femur insert (F1 NQ566, F2 NQ567 or F3 NQ568) is used.

62

The rotational axis has to be loosen from hinge ring by giving an impulse shock in distal direction. Use therefore a suitable punch with tip (not content of the instruments).

Situation – PE exchange



63

64

Detach old PE gliding surface. Loose locking ring counter-clockwise by using torque wrench spanner and guide. Detach now locking ring. Remove old parts inside tibia plateau.

▶ **Please note:**

Hold tibia by hand as the counterholder can not be used with implanted tibia plateau.

Select new PE which fit to femur size. Open package and use all four sterile parts which are inside.

The old rotational axis could have a cone or thread defect. The locking ring could be defect which would lead to a not tightened situation.

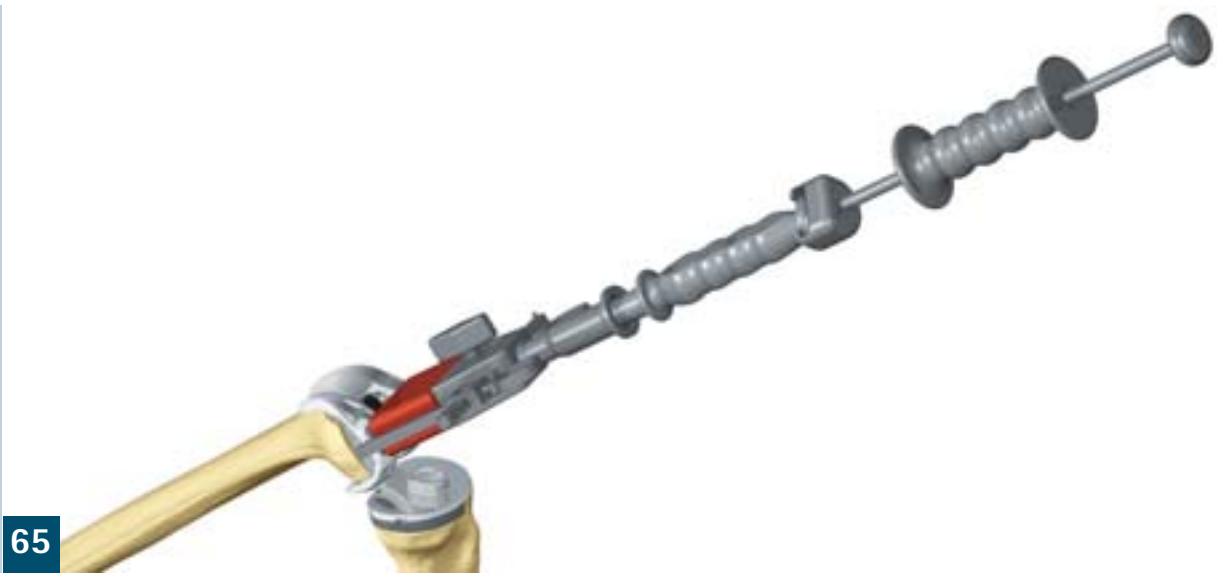
The new components have to be inserted in the tibia plateau and tightened with 27 Nm.

Hold tibia by hand as the counterholder can not be used with implanted tibia plateau.

Connect femur and tibia plateau again by following the surgical technique.

Aesculap EnduRo®

Situation – Femur exchange



Separate femur from tibia plateau as described in chapter "Decoupling of femur and tibia plateau".

Detach old PE gliding surface. Loose locking ring counter-clockwise by using torque wrench spanner and guide described in chapter "PE exchange". Detach locking ring. Remove old parts inside tibia plateau.

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 handle and used to remove the femur by sliding handle piece distal.

Prepare new femur implant. Select new PE which fit to femur size. Open package and use all four sterile parts which are inside as old parts could be defect. The new components have to be inserted in the tibia plateau and tightened with 27 Nm.

▶ **Please note:**

Hold tibia by hand as the counterholder can not be used with implanted tibia plateau.

Configurate femur, attach bone cement, implant and joining cone as described in the surgical technique.

Situation – Tibia exchange

66

Separate femur from tibia plateau as described in chapter "Decoupling of femur and tibia plateau".

Detach old PE gliding surface. Loose locking ring counter-clockwise by using torque wrench spanner and guide described in chapter "PE exchange". Take off locking ring. Remove old parts inside tibia plateau.

Loosen old tibia plateau e. g. by chisel. Maybe the medial and lateral recess have to be cleaned from cement leftovers.

The tibia plateau holder NQ570R is connected to the handle NP495R with inserted tibia insert NQ569. This assembly is attached to the tibia plateau by the L-shaped hooks and secured by tightening the toggle srew. Afterwards extractor NP684R is latched to handle and used to remove the tibia plateau by sliding handle piece distal.

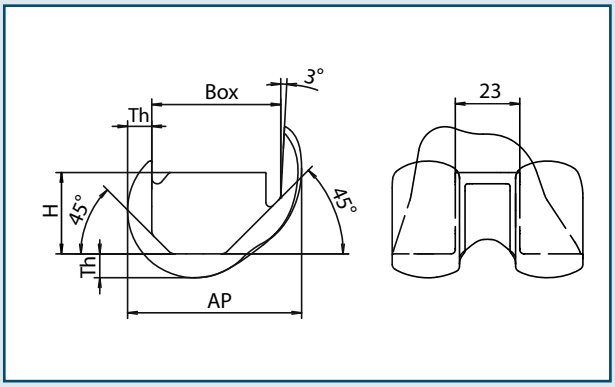
Configurate tibia plateau, attach bone cement, implant and joining cone as described in the surgical technique.

Implants

EnduRo implant dimensions and design

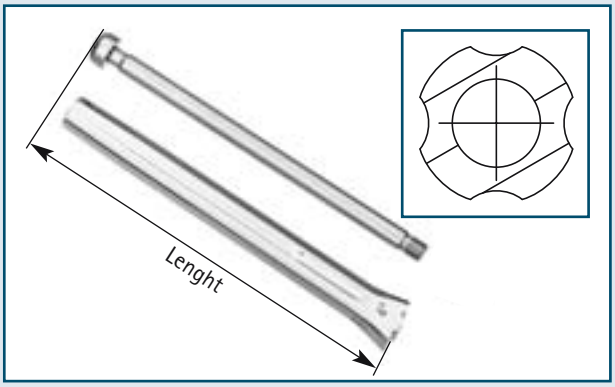
Important characteristics of the EnduRo femur – femur extension stems and femur spacer implants

- 3 sizes (comp. e.motion® Size F3/F5/F7), left/right
- Bone cuts (condyles) correspond to e.motion®
- Width of femur box 23 mm
- Hyperextension stoppage at 3° for all sizes

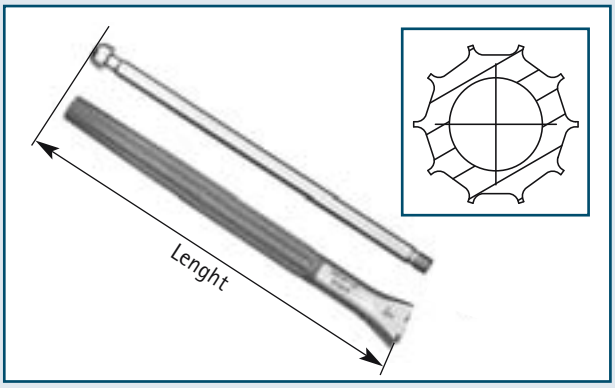


Size	ML	AP	Box	H	Trochlear depth	Th
F1	60.0	54.0	40.0	26.5	4.5	7.0
F2	68.0	62.1	46.0	29.0	5.0	8.5
F3	76.0	70.0	52.0	31.5	5.5	10.0

- Cemented: 6°
- Length: 77, 157 mm
- Diameter: 12, 15, 18 mm
- Cylindrical and polished
- 4 longitudinal grooves to avoid risk of embolism

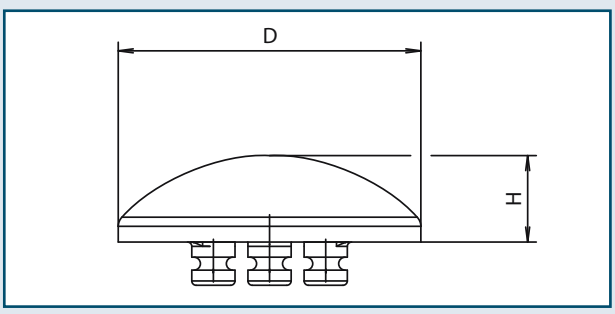


- Cementless: 5°/7°
- Length: 117, 177 mm
- Diameter: 12 – 20 mm (steps of 1 mm)
- Slightly tapered
- 10 longitudinal grooves (Wagner profile)



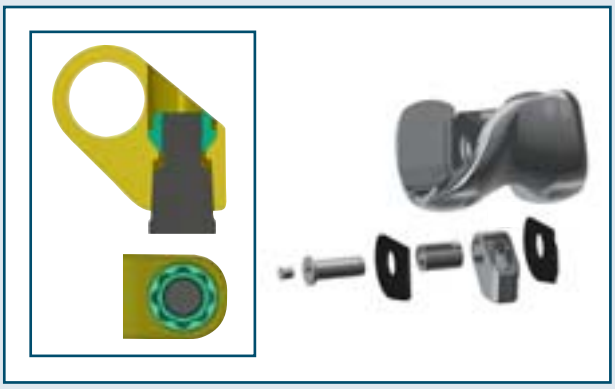
- Patella dimensions

Size	D	H
1	26	7
2	29	8
3	32	9
4	35	10
5	38	11
6	41	12



- Distal spacers, heights 4, 8 and 12 mm
- Postero-distal femur spacers, heights 4, 8 and 12 mm (for details, see matrix of implants)
- Fixed in place via a screw in the distal part
- Cement pockets 1 mm deep

- The details of the axis and cone mechanism



Compatibility of rotation axis elements

In case of unsterile or damaged rotation axis, bearing sleeve or nut you`ll find spare parts for proper treatment in the displayed matrix.

	Replaceable by axis/nut or PEEK bearing sleeve of PE gliding surface:		
Axis / parts to swap	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

	Replaceable by axis/nut or PEEK bearing sleeve of PE gliding surface:		
Axis / parts to swap	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

	Replaceable by axis/nut or PEEK bearing sleeve of PE gliding surface:		
Axis / parts to swap	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	-	-	-

- This means e. g. for F1 10 mm: Axis, nut, PEEK bearing sleeve and PE gliding surface F1 12 mm have to be used.

Spare part

Just in case the femur securing nut becomes unsterile, this implant is separately available with article code: NR860K

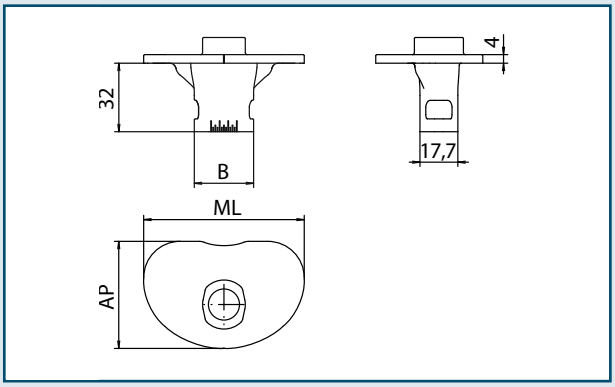
Implants

EnduRo implant dimensions and design

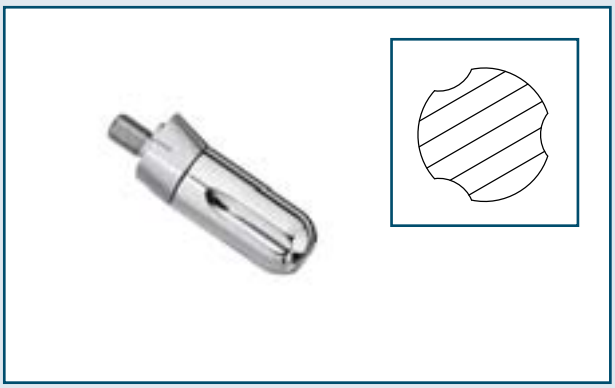
Important characteristics of the EnduRo tibia – tibia extension stems and tibia spacer implants

- 3 sizes (comp. e.motion® sizes T3/T5/T7)
- Seating for tibial extension stems
- Offset ± 6 mm (for size T1 ± 4 mm)
- Symmetric plateau design
- Cemented

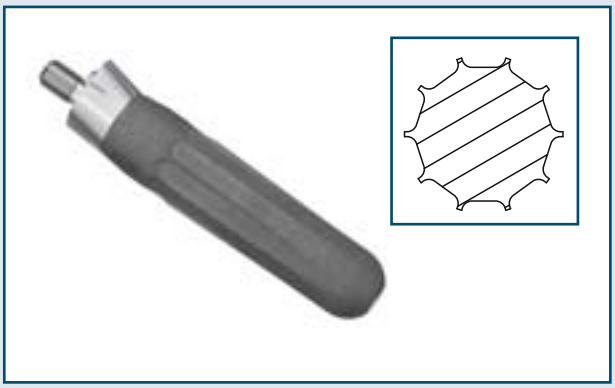
Size	ML	AP	AP/ML	B
T1	67	44	2/3	23.7
T2	75	50	2/3	27.7
T3	83	56	2/3	27.7



- Cemented
- Length: 52, 92 mm
- Diameter: 12, 15, 18 mm
- Cylindrical and polished
- With asymmetric "collar" for increased stability
- 3 grooves to avoid risk of embolism



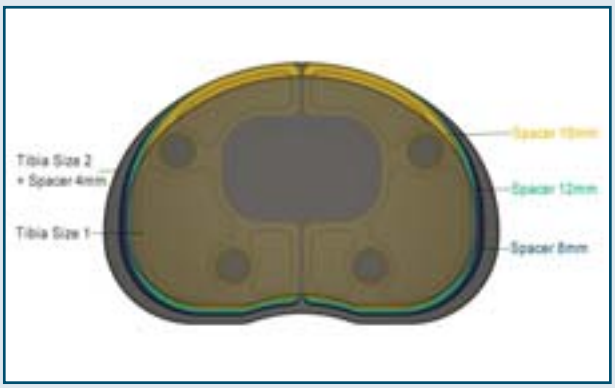
- Cementless
- Length: 92, 172 mm
- Diameter: 11 – 20 mm (steps of 1 mm)
- Slightly tapered
- With asymmetric "collar" for increased stability
- 10 grooves (Wagner profile)



- Spacers, heights 4, 8, 12 and 16 mm
- Screwed in from underneath
- Anatomic medial or lateral design
- Cement pockets 1 mm deep

EnduRo tibia spacer (dimensions in mm)

		Tibia 1	Tibia 2	Tibia 3
	Original ML	67	75	83
With 2 Tibia spacer	Original AP	44	50	56
With 2 Tibia spacer	4 mm ML	67	75	83
With 2 Tibia spacer	4 mm AP	44	50	56
With 2 Tibia spacer	8 mm ML	61	69	77
With 2 Tibia spacer	8 mm AP	42	48	54
With 2 Tibia spacer	12 mm ML	58.5	66.5	74.5
With 2 Tibia spacer	12 mm AP	41.5	47.5	53.5
With 2 Tibia spacer	16 mm ML	55.5	63.5	71.5
With 2 Tibia spacer	16 mm AP	40.5	46.5	52.5



Combination options

	F1	F2	F3
T1	OK	OK	–
T2	OK	OK	OK
T3	–	OK	OK

– not compatible

27 Nm for femur extension stems and locking ring

20 Nm for all other implants

PE size = femur size!

Implants

Compact matrix of implants – Femur elements

Femur, cemented

Femur	F1	F2	F3
Left	NB014K	NB015K	NB016K
Right	NB017K	NB018K	NB019K

27 Nm for femur extension stems and locking ring
PE size = femur size!

Combination options femur/tibia

	F1	F2	F3
T1	OK	OK	–
T2	OK	OK	OK
T3	–	OK	OK

– not compatible

Femur spacer, distal

with screws

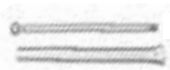
Femur	4 mm	8 mm	12 mm
F1	NR861K	NR862K	NR863K
F2	NR864K	NR865K	NR866K
F3	NR867K	NR868K	NR869K

Femur spacer, post./dist.

with screws

Femur	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	NR366K	NR367K	NR396K	NR368K	NR369K	NR397K	-	-	-
F2	NR376K	NR377K	NR590K	NR378K	NR379K	NR591K	NR592K	NR593K	NR594K
F3	NR386K	NR387K	NR595K	NR388K	NR389K	NR596K	NR597K	NR598K	NR599K

Femoral extension stems, cemented, 6°



	Ø 12 mm ream: 14		Ø 15 mm ream: 17		Ø 18 mm ream: 20	
Femur	77 mm	157 mm	77 mm	157 mm	77 mm	157 mm
F1-F3	NR291K	NR294K	NR292K	NR295K	NR293K	NR296K

Femur extension stem nut

Femur types	neutral
F1-F3	NR400K

Femoral extension stems, cementless, 5°/7°

		Ø 12 mm		Ø 13 mm		Ø 14 mm		Ø 15 mm		Ø 16 mm	
Femur		117 mm	177 mm	117 mm	177 mm	117 mm	177 mm	117 mm	177 mm	117 mm	177 mm
F1-F3	5°	NR402K	NR432K	NR403K	NR433K	NR404K	NR434K	NR405K	NR435K	NR406K	NR436K
F1-F3	7°	NR502K	NR532K	NR503K	NR533K	NR504K	NR534K	NR505K	NR535K	NR506K	NR536K

		Ø 17 mm		Ø 18 mm		Ø 19 mm		Ø 20 mm	
Femur		117 mm	177 mm	117 mm	177 mm	117 mm	177 mm	117 mm	177 mm
F1-F3	5°	NR407K	NR437K	NR408K	NR438K	NR409K	NR439K	NR410K	NR440K
F1-F3	7°	NR507K	NR537K	NR508K	NR538K	NR509K	NR539K	NR510K	NR540K

PE gliding surface

Femur	10 mm	12 mm	14 mm	16 mm	18 mm	20 mm	22 mm	24 mm
F1	NR870M	NR871M	NR872M	NR873M	NR874M	NR875M	NR876M	NR877M
F2	NR880M	NR881M	NR882M	NR883M	NR884M	NR885M	NR886M	NR887M
F3	NR890M	NR891M	NR892M	NR893M	NR894M	NR895M	NR896M	NR897M

Patella

	P1	P2	P3	P4	P5	P6
Ø	26 mm	29 mm	32 mm	35 mm	38 mm	41 mm
Height	7 mm	8 mm	9 mm	10 mm	11 mm	12 mm
	NO481	NO482	NO483	NO484	NO485	NO486

Compact matrix of implants – Tibia elements

Tibia, cemented

Tibia	T1	T2	T3
	NB011K	NB012K	NB013K

20 Nm for all tibia stems
PE size = femur size!

Combination options femur/tibia

	F1	F2	F3
T1	OK	OK	–
T2	OK	OK	OK
T3	–	OK	OK

– not compatible

Tibial hemi-spacer RM/LL

with screws

Tibia	4 mm	8 mm	12 mm	16 mm
T1	NB025K	NB026K	NB027K	NB028K
T2	NB045K	NB046K	NB047K	NB048K
T3	NB065K	NB066K	NB067K	NB068K

Tibial hemi-spacer RL/LM

with screws

4 mm	8 mm	12 mm	16 mm
NB035K	NB036K	NB037K	NB038K
NB055K	NB056K	NB057K	NB058K
NB075K	NB076K	NB077K	NB078K

Tibial extension stems, cemented

	Ø 12 mm Ream: 14		Ø 15 mm Ream: 17		Ø 18 mm Ream: 20	
Tibia	52 mm	92 mm	52 mm	92 mm	52 mm	92 mm
T1-T3	NR191K	NR194K	NR192K	NR195K	NR193K	NR196K

Patella

	P1	P2	P3	P4	P5	P6
Ø	26 mm	29 mm	32 mm	35 mm	38 mm	41 mm
Height	7 mm	8 mm	9 mm	10 mm	11 mm	12 mm
	NO481	NO482	NO483	NO484	NO485	NO486

Tibial extension stems, cementless

	Ø 11 mm		Ø 12 mm		Ø 13 mm		Ø 14 mm		Ø 15 mm	
Tibia	92 mm	172 mm	92 mm	172 mm	92 mm	172 mm	92 mm	172 mm	92 mm	172 mm
T1-T3	NR171K	NR491K	NR172K	NR492K	NR173K	NR493K	NR174K	NR494K	NR175K	NR495K

	Ø 16 mm		Ø 17 mm		Ø 18 mm		Ø 19 mm		Ø 20 mm	
Tibia	92 mm	172 mm	92 mm	172 mm	92 mm	172 mm	92 mm	172 mm	92 mm	172 mm
T1-T3	NR176K	NR496K	NR177K	NR497K	NR178K	NR498K	NR179K	NR499K	NR180K	NR500K

Compatibility of rotation axis elements

	Replaceable by axis/nut or PEEK bearing sleeve of PE gliding surface:		
Axis / parts to swap	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

	Replaceable by axis/nut or PEEK bearing sleeve of PE gliding surface:		
Axis / parts to swap	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

	Replaceable by axis/nut or PEEK bearing sleeve of PE gliding surface:		
Axis / parts to swap	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	-	-	-

[-] This means e. g. for F1 10 mm: Axis, nut, PEEK bearing sleeve and PE gliding surface F1 12 mm have to be used.

Spare part

Just in case the femur securing nut becomes unsterile, this implant is separately available with article code: NR860K

Implants

Implant ordering details

Femur, cemented

NB014K	Femur, F1, left
NB015K	Femur, F2, left
NB016K	Femur, F3, left
NB017K	Femur, F1, right
NB018K	Femur, F2, right
NB019K	Femur, F3, right

Femur spacer, distal, with screw

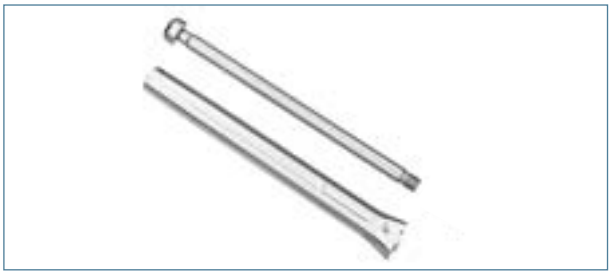
NR861K	Femur spacer, distal, F1, 4 mm
NR864K	Femur spacer, distal, F2, 4 mm
NR867K	Femur spacer, distal, F3, 4 mm
NR862K	Femur spacer, distal, F1, 8 mm
NR865K	Femur spacer, distal, F2, 8 mm
NR868K	Femur spacer, distal, F3, 8 mm
NR863K	Femur spacer, distal, F1, 12 mm
NR866K	Femur spacer, distal, F2, 12 mm
NR869K	Femur spacer, distal, F3, 12 mm

Femur spacer, postero/distal, with screw

NR366K	Femur spacer, post./dist., F1, 4 x 4 mm
NR376K	Femur spacer, post./dist., F2, 4 x 4 mm
NR386K	Femur spacer, post./dist., F3, 4 x 4 mm
NR367K	Femur spacer, post./dist., F1, 4 x 8 mm
NR377K	Femur spacer, post./dist., F2, 4 x 8 mm
NR387K	Femur spacer, post./dist., F3, 4 x 8 mm
NR396K	Femur spacer, post./dist., F1, 4 x 12 mm
NR590K	Femur spacer, post./dist., F2, 4 x 12 mm
NR595K	Femur spacer, post./dist., F3, 4 x 12 mm
NR368K	Femur spacer, post./dist., F1, 8 x 4 mm
NR378K	Femur spacer, post./dist., F2, 8 x 4 mm
NR388K	Femur spacer, post./dist., F3, 8 x 4 mm
NR369K	Femur spacer, post./dist., F1, 8 x 8 mm
NR379K	Femur spacer, post./dist., F2, 8 x 8 mm
NR389K	Femur spacer, post./dist., F3, 8 x 8 mm
NR397K	Femur spacer, post./dist., F1, 8 x 12 mm
NR591K	Femur spacer, post./dist., F2, 8 x 12 mm
NR596K	Femur spacer, post./dist., F3, 8 x 12 mm

NR592K	Femur spacer, post./dist., F2, 12 x 4 mm
NR597K	Femur spacer, post./dist., F3, 12 x 4 mm
NR593K	Femur spacer, post./dist., F2, 12 x 8 mm
NR598K	Femur spacer, post./dist., F3, 12 x 8 mm
NR594K	Femur spacer, post./dist., F2, 12 x 12 mm
NR599K	Femur spacer, post./dist., F3, 12 x 12 mm

Femoral extension stems, cemented, 6°



NR291K	Femur stem, 6°, 12 x 77 mm, cemented
NR294K	Femur stem, 6°, 12 x 157 mm, cemented
NR292K	Femur stem, 6°, 15 x 77 mm, cemented
NR295K	Femurstem, 6°, 15 x 157 mm, cemented
NR293K	Femur stem, 6°, 18 x 77 mm, cemented
NR296K	Femur stem, 6°, 18 x 157 mm, cemented

Femur extension stem nut

NR400K	Femur extension stem nut, neutral

Femoral extension stems, cementless, 5°

NR402K	Femur stem, 5°, 12 x 117 mm, cementless
NR432K	Femur stem, 5°, 12 x 177 mm, cementless
NR403K	Femur stem, 5°, 13 x 117 mm, cementless
NR433K	Femur stem, 5°, 13 x 177 mm, cementless
NR404K	Femur stem, 5°, 14 x 117 mm, cementless
NR434K	Femur stem, 5°, 14 x 177 mm, cementless
NR405K	Femur stem, 5°, 15 x 117 mm, cementless
NR435K	Femur stem, 5°, 15 x 177 mm, cementless
NR406K	Femur stem, 5°, 16 x 117 mm, cementless
NR436K	Femur stem, 5°, 16 x 177 mm, cementless
NR407K	Femur stem, 5°, 17 x 117 mm, cementless
NR437K	Femur stem, 5°, 17 x 177 mm, cementless
NR408K	Femur stem, 5°, 18 x 117 mm, cementless
NR438K	Femur stem, 5°, 18 x 177 mm, cementless
NR409K	Femur stem, 5°, 19 x 117 mm, cementless
NR439K	Femur stem, 5°, 19 x 177 mm, cementless
NR410K	Femur stem, 5°, 20 x 117 mm, cementless
NR440K	Femur stem, 5°, 20 x 177 mm, cementless

Femoral extension stems, cementless, 7°

NR502K	Femur stem, 7°, 12 x 117 mm, cementless
NR532K	Femur stem, 7°, 12 x 177 mm, cementless
NR503K	Femur stem, 7°, 13 x 117 mm, cementless
NR533K	Femur stem, 7°, 13 x 177 mm, cementless
NR504K	Femur stem, 7°, 14 x 117 mm, cementless
NR534K	Femur stem, 7°, 14 x 177 mm, cementless
NR505K	Femur stem, 7°, 15 x 117 mm, cementless
NR535K	Femur stem, 7°, 15 x 177 mm, cementless
NR506K	Femur stem, 7°, 16 x 117 mm, cementless
NR536K	Femur stem, 7°, 16 x 177 mm, cementless
NR507K	Femur stem, 7°, 17 x 117 mm, cementless
NR537K	Femur stem, 7°, 17 x 177 mm, cementless
NR508K	Femur stem, 7°, 18 x 117 mm, cementless
NR538K	Femur stem, 7°, 18 x 177 mm, cementless
NR509K	Femur stem, 7°, 19 x 117 mm, cementless
NR539K	Femur stem, 7°, 19 x 177 mm, cementless
NR510K	Femur stem, 7°, 20 x 117 mm, cementless
NR540K	Femur stem, 7°, 20 x 177 mm, cementless

Implants

Implant ordering details

Tibia plateau, cemented

NB011K	Tibia T1
NB012K	Tibia T2
NB013K	Tibia T3

Tibia spacer, cemented, with screws

NB035K	Tibia spacer, RL/LM, T1, 4 mm
NB036K	Tibia spacer, RL/LM, T1, 8 mm
NB037K	Tibia spacer, RL/LM, T1, 12 mm
NB038K	Tibia spacer, RL/LM, T1, 16 mm
NB055K	Tibia spacer, RL/LM, T2, 4 mm
NB056K	Tibia spacer, RL/LM, T2, 8 mm
NB057K	Tibia spacer, RL/LM, T2, 12 mm
NB058K	Tibia spacer, RL/LM, T2, 16 mm
NB075K	Tibia spacer, RL/LM, T3, 4 mm
NB076K	Tibia spacer, RL/LM, T3, 8 mm
NB077K	Tibia spacer, RL/LM, T3, 12 mm
NB078K	Tibia spacer, RL/LM, T3, 16 mm
NB025K	Tibia spacer, RM/LL, T1, 4 mm
NB026K	Tibia spacer, RM/LL, T1, 8 mm
NB027K	Tibia spacer, RM/LL, T1, 12 mm
NB028K	Tibia spacer, RM/LL, T1, 16 mm
NB045K	Tibia spacer, RM/LL, T2, 4 mm
NB046K	Tibia spacer, RM/LL, T2, 8 mm
NB047K	Tibia spacer, RM/LL, T2, 12 mm
NB048K	Tibia spacer, RM/LL, T2, 16 mm
NB065K	Tibia spacer, RM/LL, T3, 4 mm
NB066K	Tibia spacer, RM/LL, T3, 8 mm
NB067K	Tibia spacer, RM/LL, T3, 12 mm
NB068K	Tibia spacer, RM/LL, T3, 16 mm

PE gliding surfaces with bearing sleeve, rotation axis and locking ring

NR870M	Gliding surface, F1, 10 mm
NR871M	Gliding surface, F1, 12 mm
NR872M	Gliding surface, F1, 14 mm
NR873M	Gliding surface, F1, 16 mm
NR874M	Gliding surface, F1, 18 mm
NR875M	Gliding surface, F1, 20 mm
NR876M	Gliding surface, F1, 22 mm
NR877M	Gliding surface, F1, 24 mm
NR880M	Gliding surface, F2, 10 mm
NR881M	Gliding surface, F2, 12 mm
NR882M	Gliding surface, F2, 14 mm
NR883M	Gliding surface, F2, 16 mm
NR884M	Gliding surface, F2, 18 mm
NR885M	Gliding surface, F2, 20 mm
NR886M	Gliding surface, F2, 22 mm
NR887M	Gliding surface, F2, 24 mm
NR890M	Gliding surface, F3, 10 mm
NR891M	Gliding surface, F3, 12 mm
NR892M	Gliding surface, F3, 14 mm
NR893M	Gliding surface, F3, 16 mm
NR894M	Gliding surface, F3, 18 mm
NR895M	Gliding surface, F3, 20 mm
NR896M	Gliding surface, F3, 22 mm
NR897M	Gliding surface, F3, 24 mm

Tibia extension stems, cemented

NR191K	Tibia stem, 12 x 52 mm, cemented
NR194K	Tibia stem, 12 x 92 mm, cemented
NR192K	Tibia stem, 15 x 52 mm, cemented
NR195K	Tibia stem, 15 x 92 mm, cemented
NR193K	Tibia stem, 18 x 52 mm, cemented
NR196K	Tibia stem, 18 x 92 mm, cemented

Tibia extension stems, cementless

NR171K	Tibia stem, 11 x 92 mm, cementless
NR491K	Tibia stem, 11 x 172 mm, cementless
NR172K	Tibia stem, 12 x 92 mm, cementless
NR492K	Tibia stem, 12 x 172 mm, cementless
NR173K	Tibia stem, 13 x 92 mm, cementless
NR493K	Tibia stem, 13 x 172 mm, cementless
NR174K	Tibia stem, 14 x 92 mm, cementless
NR494K	Tibia stem, 14 x 172 mm, cementless
NR175K	Tibia stem, 15 x 92 mm, cementless
NR495K	Tibia stem, 15 x 172 mm, cementless
NR176K	Tibia stem, 16 x 92 mm, cementless
NR496K	Tibia stem, 16 x 172 mm, cementless
NR177K	Tibia stem, 17 x 92 mm, cementless
NR497K	Tibia stem, 17 x 172 mm, cementless
NR178K	Tibia stem, 18 x 92 mm, cementless
NR498K	Tibia stem, 18 x 172 mm, cementless
NR179K	Tibia stem, 19 x 92 mm, cementless
NR499K	Tibia stem, 19 x 172 mm, cementless
NR180K	Tibia stem, 20 x 92 mm, cementless
NR500K	Tibia stem, 20 x 172 mm, cementless

Patellae

NO481	Patella, P1, Ø 26 x 7 mm
NO482	Patella, P2, Ø 29 x 8 mm
NO483	Patella, P3, Ø 32 x 9 mm
NO484	Patella, P4, Ø 35 x 10 mm
NO485	Patella, P5, Ø 38 x 11 mm
NO486	Patella, P6, Ø 41 x 12 mm

Instruments

Overview of instruments and X-ray templates

EnduRo instruments

NP300	
NP301	General instruments
NP302	Manual instruments
NP303	Tibia preparation
NP304	Femur preparation
NP352	Femoral box preparation
NS134	Tibia extension stem preparation, cementless
NS136	Femoral trial extension stems, cementless
NS138	Extension stem preparation, cemented
NP270	Trial spacers

NP350	Hinge axis revision

NP502	Patella instruments

LSET - K0003	EnduRo Revision

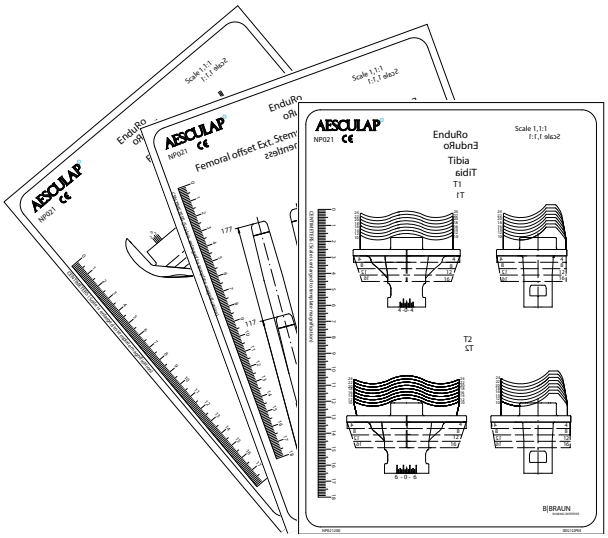
(Only via Aesculap loaner service)

X-ray templates

NP021	Set of X-ray templates, scale 1,10:1

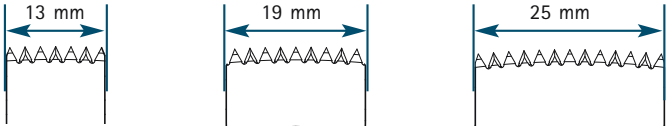
NP022	Set of X-ray templates, scale 1,15:1

NQ289	Axis planning



Saw blades overview

■ Thickness: 1.27 mm
Length: 90 mm



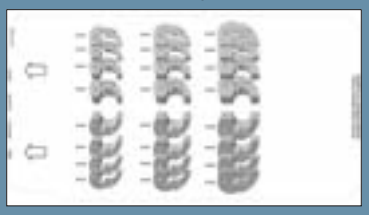
Connection / Width	Aesculap	Aesculap Acculan 3 Ti	Stryker System 4+5 System 2000	Conmed/ Linvatec/Hall PowerPro Versipower plus	Synthes
					
13 mm	GE206R	GE236SU	GE222R	GE220R	GE224R
19 mm	GE208R	GE241SU	-	-	-
25 mm	GE213R	GE246SU	GE223R	GE221R	GE225R

Implant:	Material:	
Femur	CoCrMo (casting alloy)	Cobalt-chromium-molybdenum casting alloy according to ISO 5832-4
Cover for femoral box	PEEK Optima® (LT1)	Medical Grade Polyetheretherketone (provided by Invibio)
Femur hinge axis	CoCrMo (wrought alloy)	Wrought cobalt-chromium-molybdenum alloy according to ISO 5832-12
Cover plug for femur hinge axis	UHMWPE	Ultra-high molecular weight polyethylene according to ISO 5834-2
Securing nut	CoCrMo (wrought alloy)	Wrought cobalt-chromium-molybdenum alloy according to ISO 5832-12
Bearing elements inside femur	PEEK Optima® (LT1CA30)	Medical Grade Carbon Fibre-Reinforced Polyetheretherketone (Invibio)
Femur spacer	CoCrMo (wrought alloy)	Wrought cobalt-chromium-molybdenum alloy according to ISO 5832-12
Screws for fermur spacer	CoCrMo (wrought alloy)	Wrought cobalt-chromium-molybdenum alloy according to ISO 5832-12
Femur extension stem cementless	CoCrMo (wrought alloy)	Wrought cobalt-chromium-molybdenum alloy according to ISO 5832-12
Femur extension stem cemented	CoCrMo (wrought alloy)	Wrought cobalt-chromium-molybdenum alloy according to ISO 5832-12
AP offset nut for femur extension stems	CoCrMo (wrought alloy)	Wrought cobalt-chromium-molybdenum alloy according to ISO 5832-12
Tibia plateau	CoCrMo (casting alloy)	Cobalt-chromium-molybdenum casting alloy according to ISO 5832-4
Mask for tibial component	PEEK Optima® (LT1)	Medical Grade Polyetheretherketone (provided by Invibio)
Nut for tibia offset stems (in tibia plateau)	CoCrMo (wrought alloy)	Wrought cobalt-chromium-molybdenum alloy according to ISO 5832-12
Tibias spacer	CoCrMo (wrought alloy)	Wrought cobalt-chromium-molybdenum alloy according to ISO 5832-12
Screws for tibia spacer	Ti6AL4V (wrought alloy)	Wrought titanium 6-aluminium 4-vanadium alloy according to ISO 5832-3
Tibia extension stem cementless	CoCrMo (wrought alloy)	Wrought cobalt-chromium-molybdenum alloy according to ISO 5832-12
Tibia extension stem cemented	CoCrMo (wrought alloy)	Wrought cobalt-chromium-molybdenum alloy according to ISO 5832-12
Rotation axis	CoCrMo (wrought alloy)	Wrought cobalt-chromium-molybdenum alloy according to ISO 5832-12
Gliding surface	UHMWPE	Ultra-high molecular weight polyethylene according to ISO 5834-2
X-ray marker pin	Ti6AL4V (wrought alloy)	Wrought titanium 6-aluminium 4-vanadium alloy according to ISO 5832-3
X-ray marker ball	Tantal (unalloyed)	Unalloyed tantalum for surg. implant applications acoording to ISO 13782
Locking ring	CoCrMo (wrought alloy)	Wrought cobalt-chromium-molybdenum alloy according to ISO 5832-12
Bushing for rotation axis	PEEK Optima® (LT1CA30)	Medical Grade Carbon Fibre-Reinforced Polyetheretherketone (Invibio)

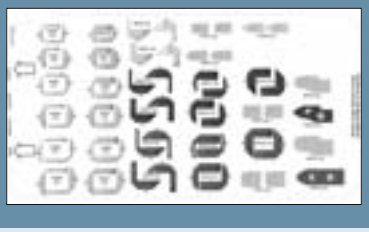
Instruments

Compact overview of instruments

NP270 Tibial trial spacers, basic tray



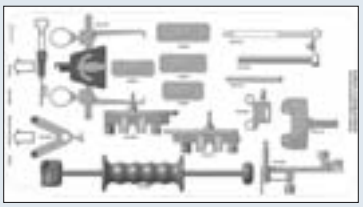
NP270 Femoral trial spacers, tray insert



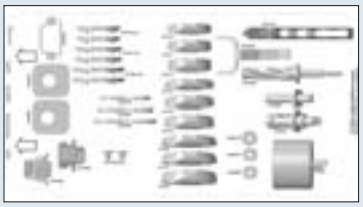
NP301 General instruments, basic tray

NP301 General instruments, tray insert

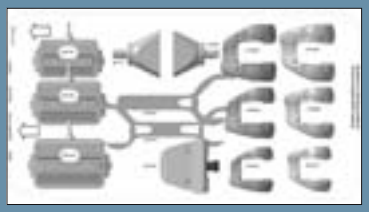
NP302 Manual instruments



NP303 Tibia preparation

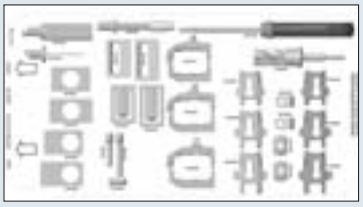


NP304 Femur preparation, basic tray

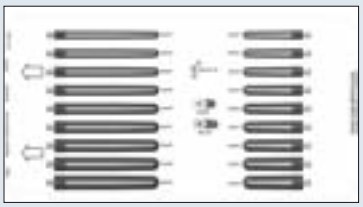


NP304 Femur preparation, tray insert

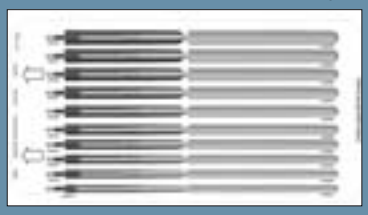
NP352 Femoral box preparation



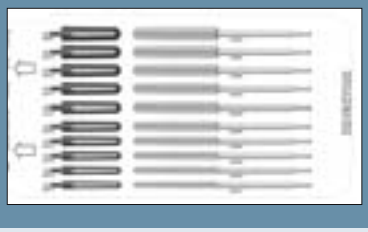
NS136 Femoral trial extension stems, cementless



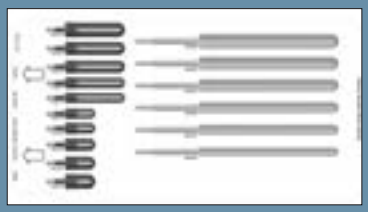
NS134 Tibia ext. stem preparation, cementless, basic tray



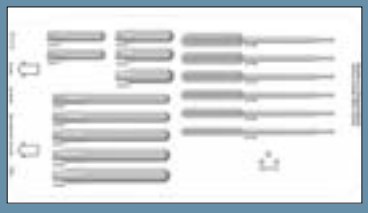
NS134 Tibia ext. stem preparation, cementless, tray insert



NS138 Ext. stem preparation, cemented, basic tray



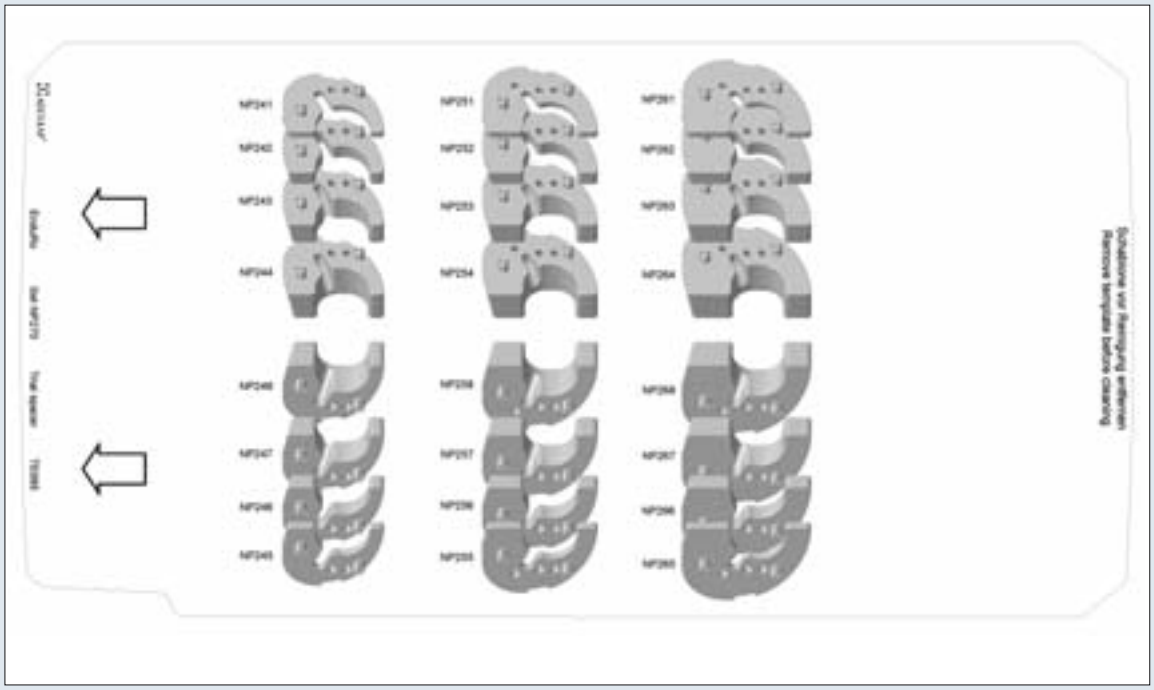
NS138 Ext. stem preparation, cemented, tray insert



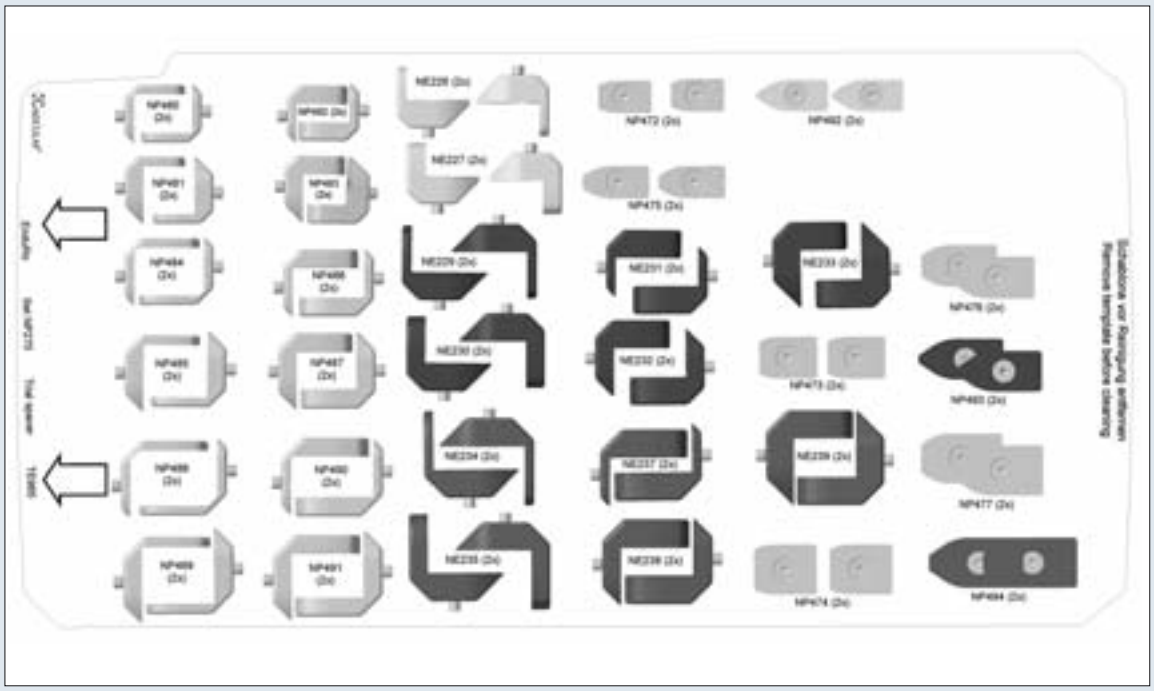
Instruments

Overview of instruments

NP270 Tibial trial spacers, basic tray



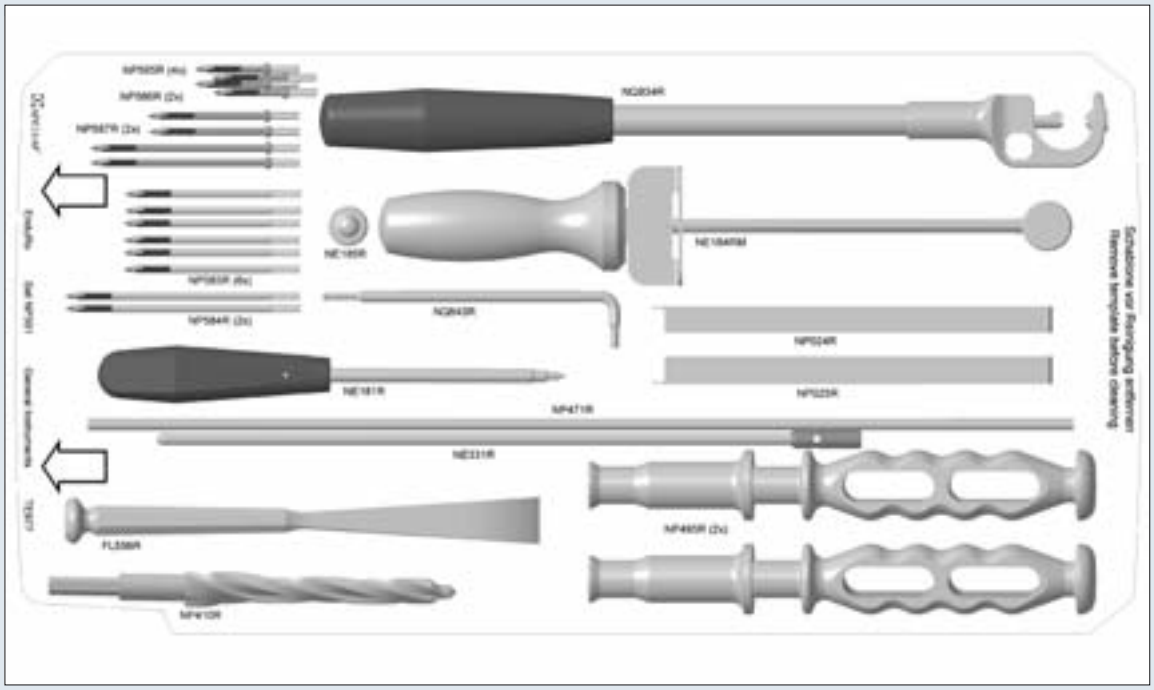
NP270 Femoral trial spacers, tray insert



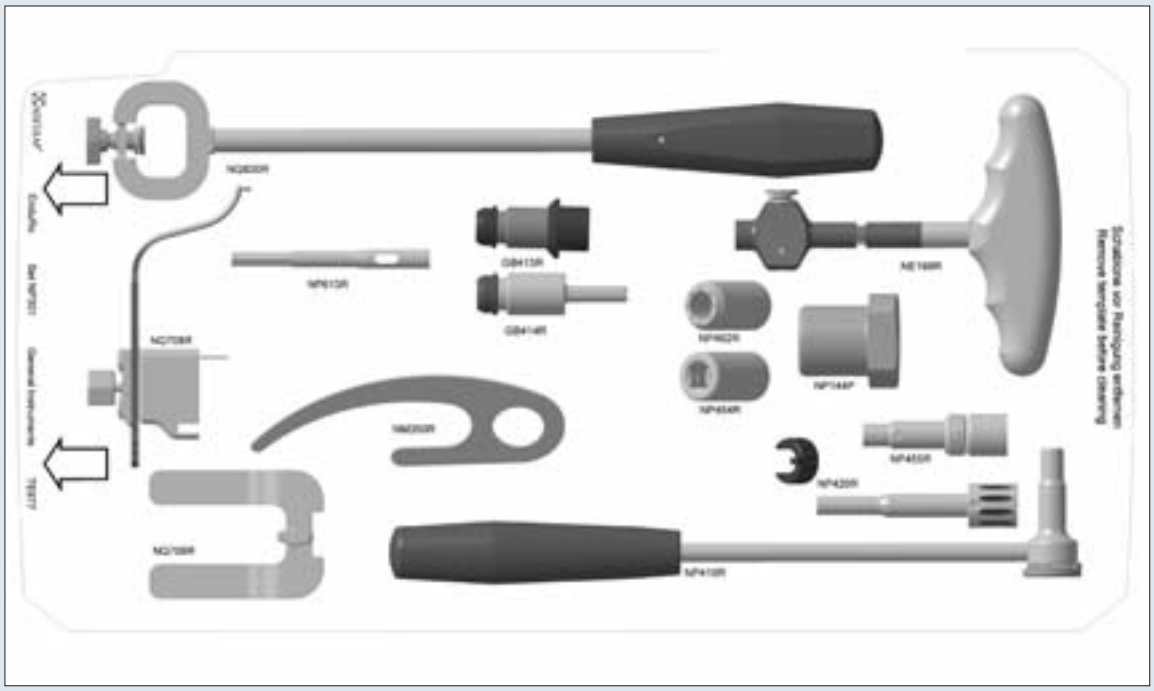
Instruments

Overview of instruments

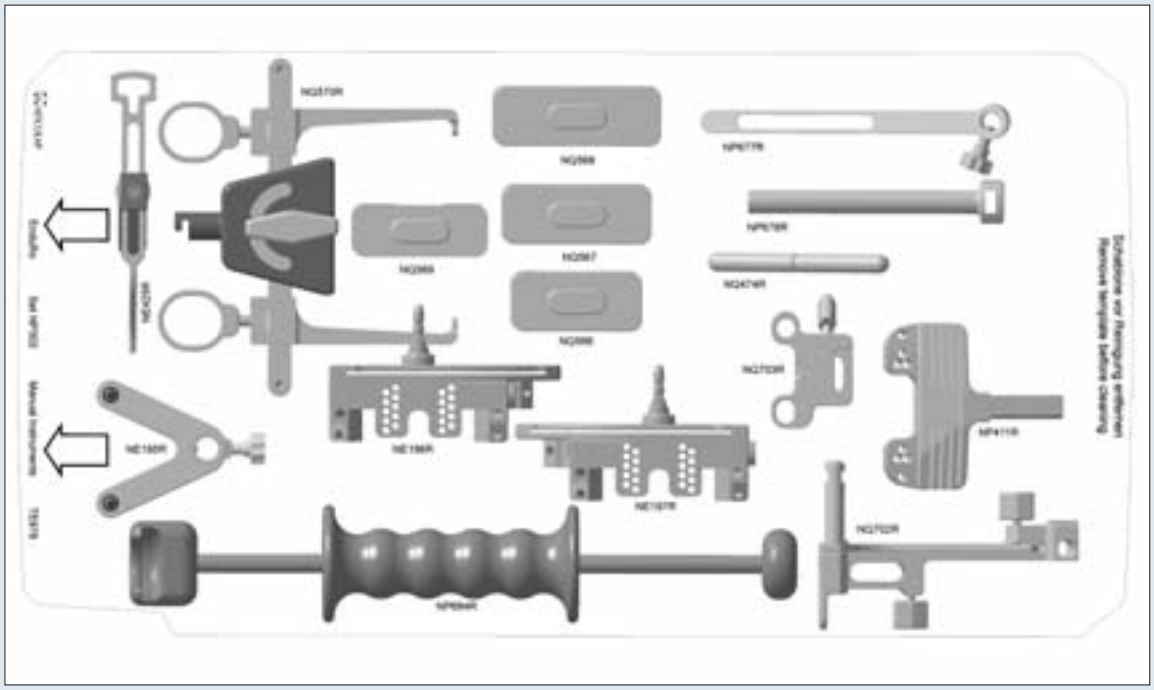
NP301 General instruments, basic tray



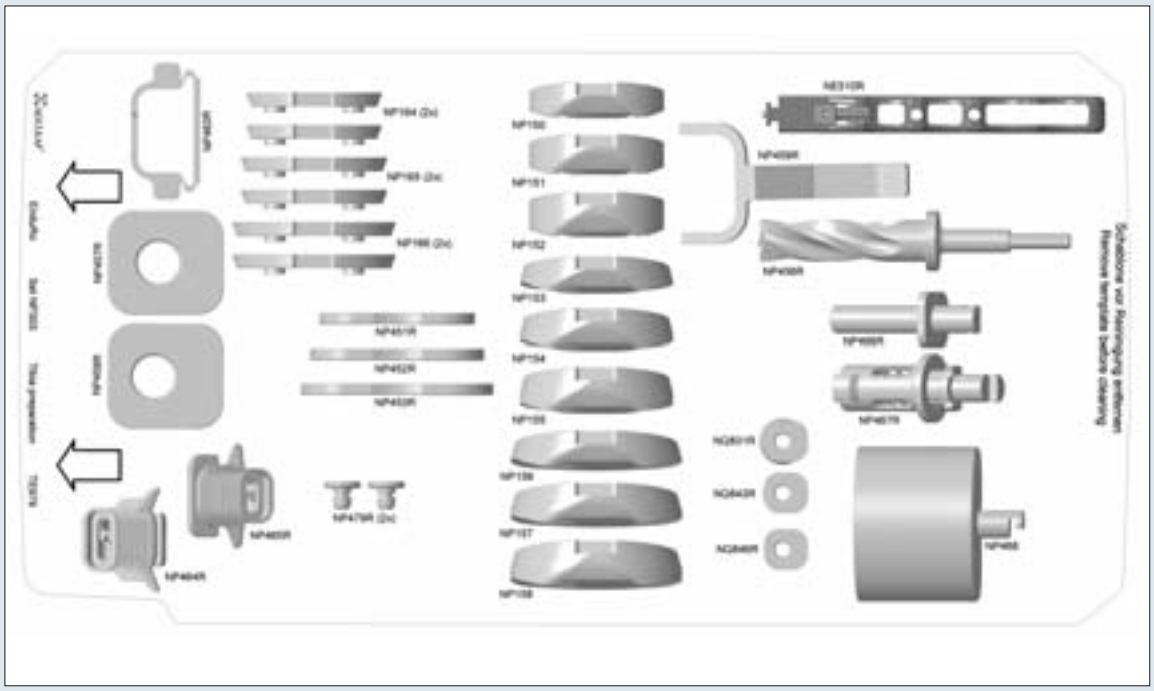
NP301 General instruments, tray insert



NP302 Manual instruments



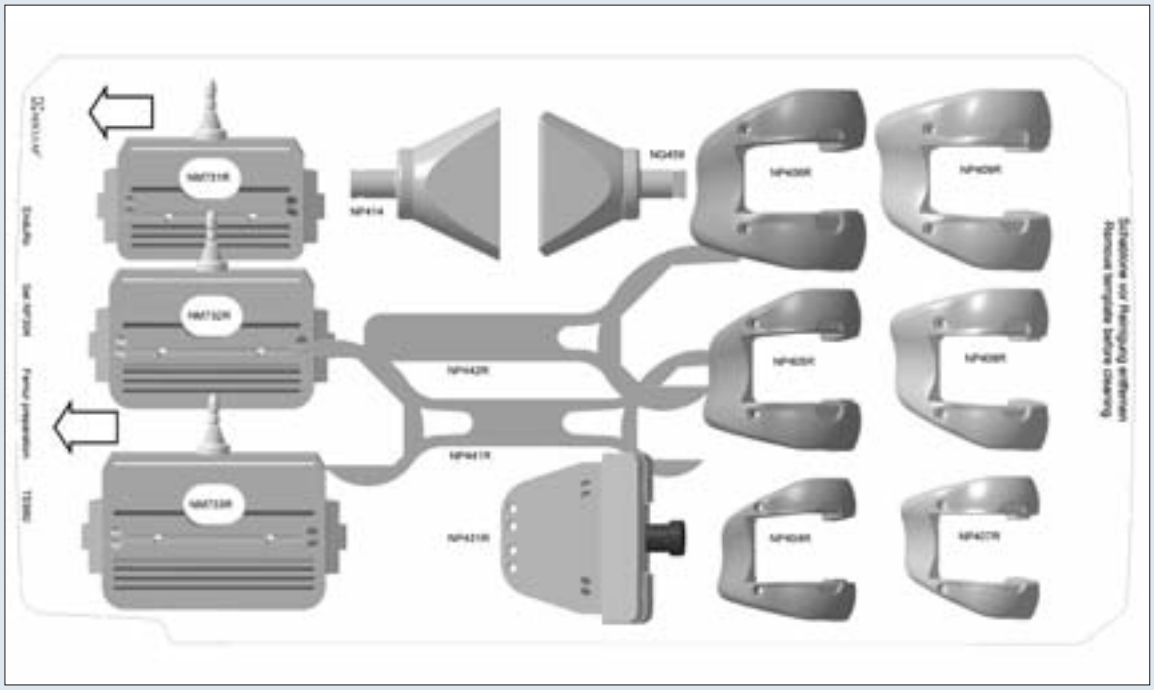
NP303 Tibia preparation



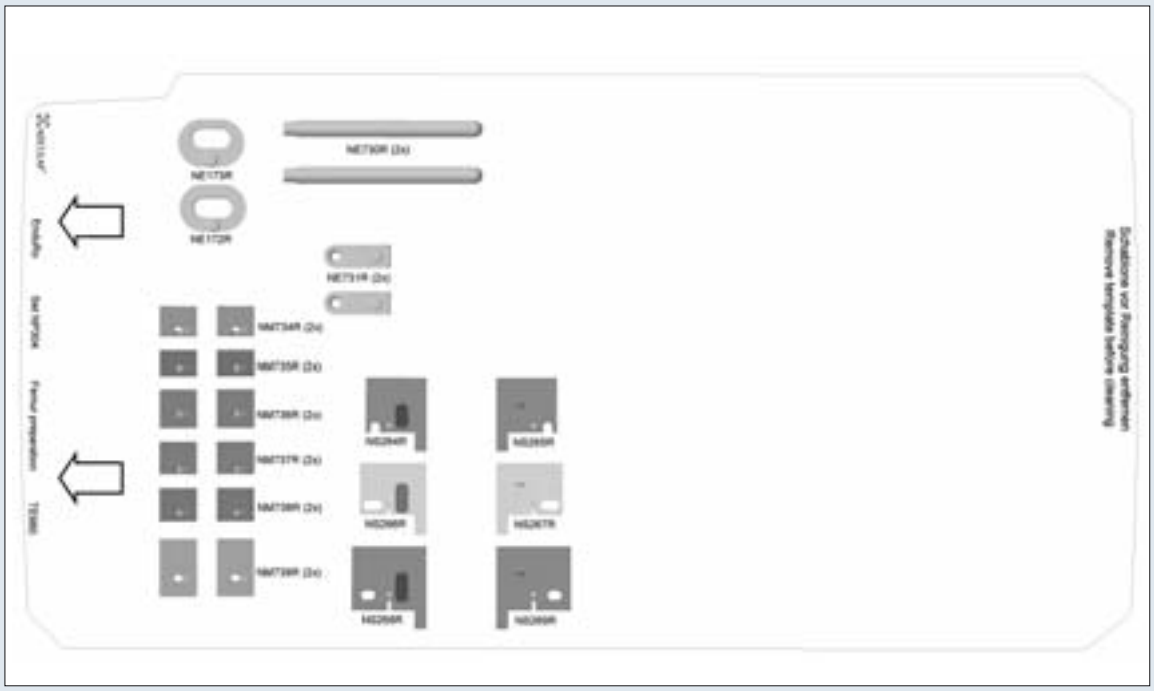
Instruments

Overview of instruments

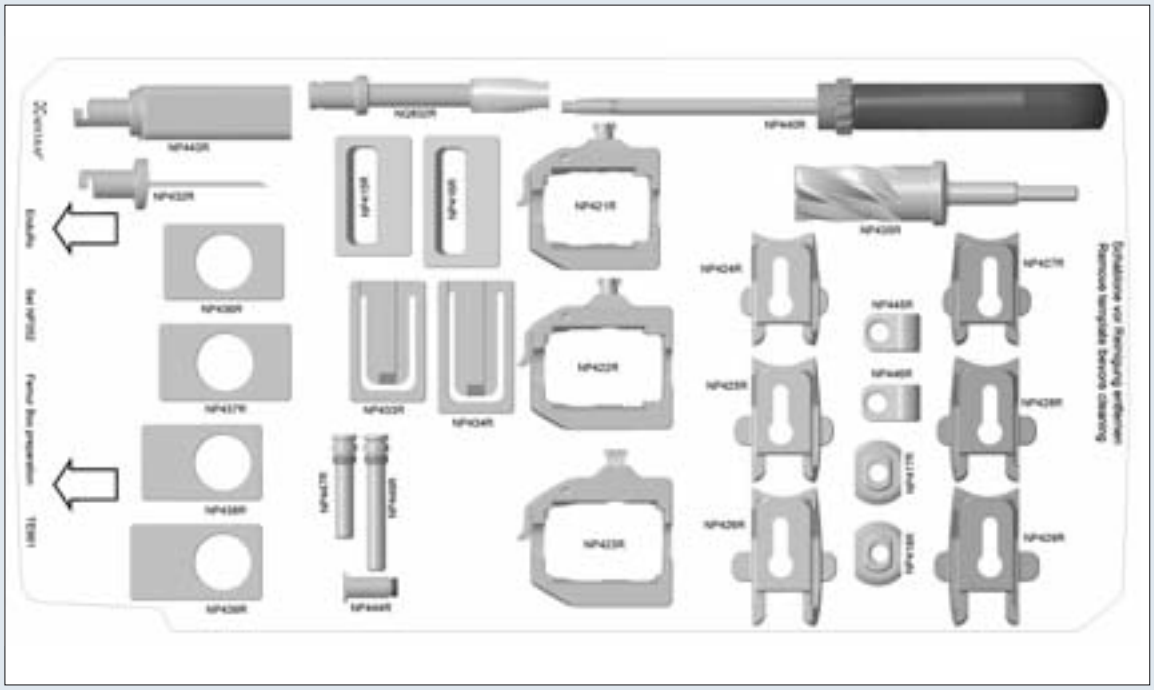
NP304 Femur preparation, basic tray



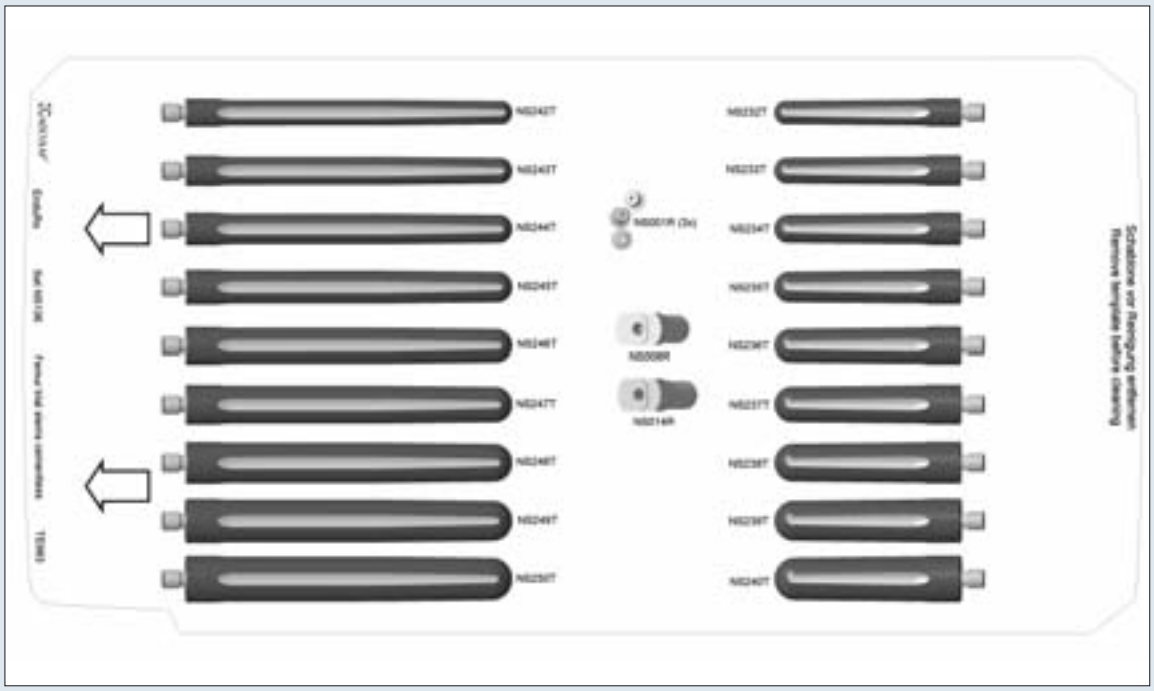
NP304 Femur preparation, tray insert



NP352 Femoral box preparation



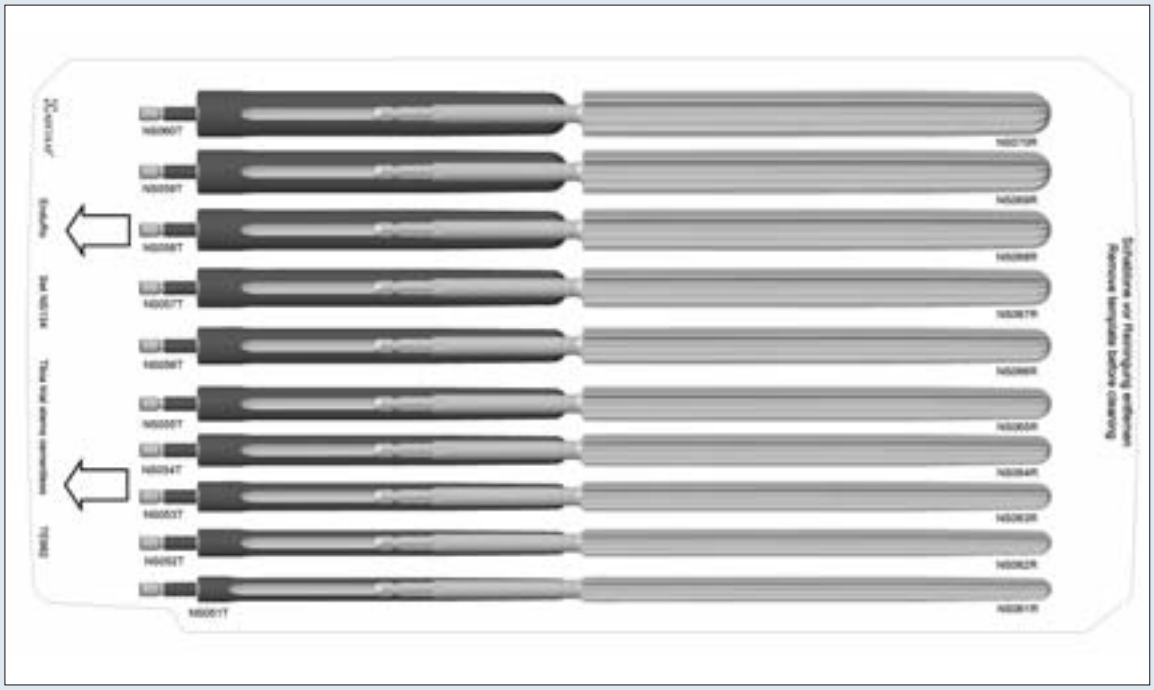
NS136 Femoral trial extension stems, cementless



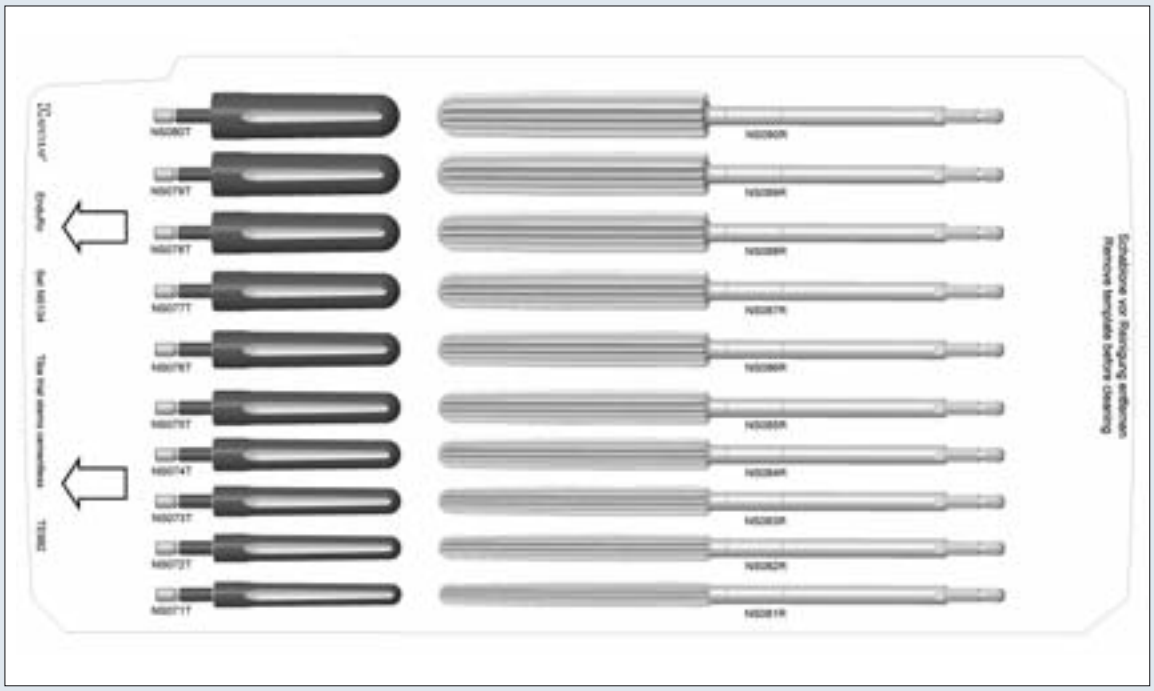
Instruments

Overview of instruments

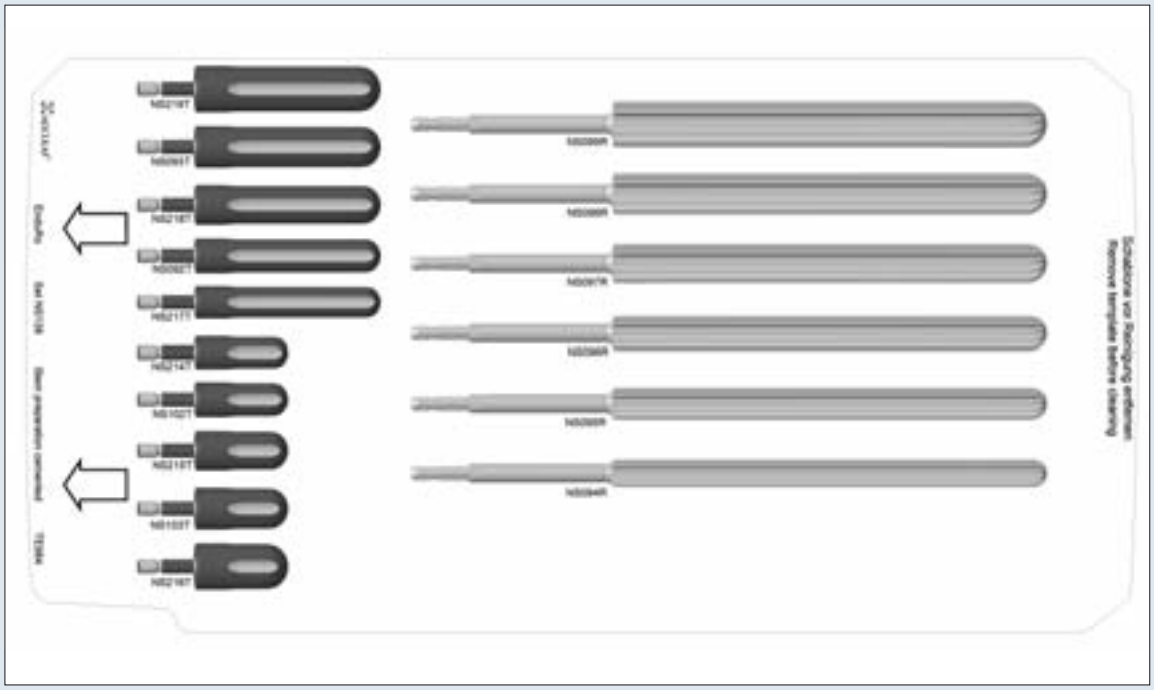
NS134 Tibia ext. stem preparation, cementless, basic tray



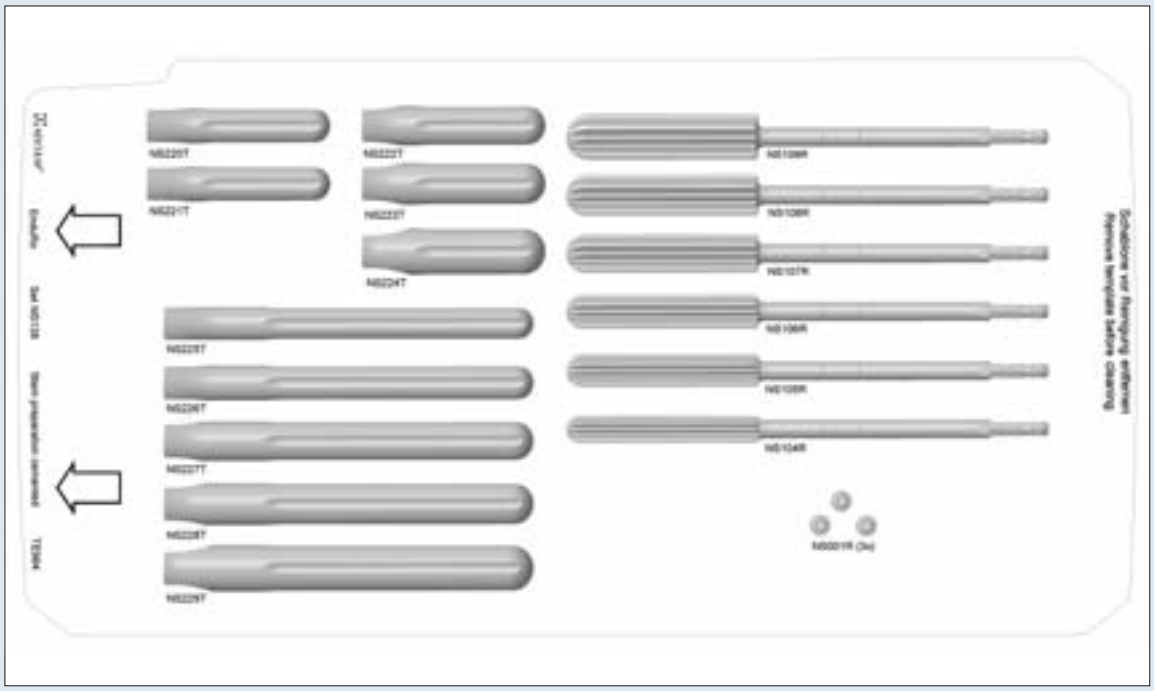
NS134 Tibia extension stem preparation, cementless, tray insert



NS138 Extension stem preparation, cemented, basic tray



NS138 Extension stem preparation, cemented, tray insert



Notes

Compact matrix of implants – Femur elements

Femur, cemented

Femur	F1	F2	F3
Left	NB014K	NB015K	NB016K
Right	NB017K	NB018K	NB019K

27 Nm for femur extension stems and locking ring
PE size = femur size!

Combination options femur/tibia

	F1	F2	F3
T1	OK	OK	–
T2	OK	OK	OK
T3	–	OK	OK

– not compatible

Femur spacer, distal

with screws

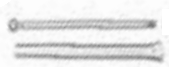
Femur	4 mm	8 mm	12 mm
F1	NR861K	NR862K	NR863K
F2	NR864K	NR865K	NR866K
F3	NR867K	NR868K	NR869K

Femur spacer, post./dist.

with screws

Femur	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	NR366K	NR367K	NR396K	NR368K	NR369K	NR397K	-	-	-
F2	NR376K	NR377K	NR590K	NR378K	NR379K	NR591K	NR592K	NR593K	NR594K
F3	NR386K	NR387K	NR595K	NR388K	NR389K	NR596K	NR597K	NR598K	NR599K

Femoral extension stems, cemented, 6°



	Ø 12 mm ream: 14		Ø 15 mm ream: 17		Ø 18 mm ream: 20	
Femur	77 mm	157 mm	77 mm	157 mm	77 mm	157 mm
F1-F3	NR291K	NR294K	NR292K	NR295K	NR293K	NR296K

Femur extension stem nut

Femur types	neutral
F1-F3	NR400K

Femoral extension stems, cementless, 5°/7°

		Ø 12 mm		Ø 13 mm		Ø 14 mm		Ø 15 mm		Ø 16 mm	
Femur		117 mm	177 mm	117 mm	177 mm	117 mm	177 mm	117 mm	177 mm	117 mm	177 mm
F1-F3	5°	NR402K	NR432K	NR403K	NR433K	NR404K	NR434K	NR405K	NR435K	NR406K	NR436K
F1-F3	7°	NR502K	NR532K	NR503K	NR533K	NR504K	NR534K	NR505K	NR535K	NR506K	NR536K

		Ø 17 mm		Ø 18 mm		Ø 19 mm		Ø 20 mm	
Femur		117 mm	177 mm	117 mm	177 mm	117 mm	177 mm	117 mm	177 mm
F1-F3	5°	NR407K	NR437K	NR408K	NR438K	NR409K	NR439K	NR410K	NR440K
F1-F3	7°	NR507K	NR537K	NR508K	NR538K	NR509K	NR539K	NR510K	NR540K

PE gliding surfac

Femur	10 mm	12 mm	14 mm	16 mm	18 mm	20 mm	22 mm	24 mm
F1	NR870M	NR871M	NR872M	NR873M	NR874M	NR875M	NR876M	NR877M
F2	NR880M	NR881M	NR882M	NR883M	NR884M	NR885M	NR886M	NR887M
F3	NR890M	NR891M	NR892M	NR893M	NR894M	NR895M	NR896M	NR897M

Patella

	P1	P2	P3	P4	P5	P6
Ø	26 mm	29 mm	32 mm	35 mm	38 mm	41 mm
Height	7 mm	8 mm	9 mm	10 mm	11 mm	12 mm
	NO481	NO482	NO483	NO484	NO485	NO486

Compact matrix of implants – Tibia elements

Tibia, cemented

Tibia	T1	T2	T3
	NB011K	NB012K	NB013K

20 Nm for all tibia stems

PE size = femur size!

Combination options femur/tibia

	F1	F2	F3
T1	OK	OK	–
T2	OK	OK	OK
T3	–	OK	OK

– not compatible

Patellae

	P1	P2	P3	P4	P5	P6
Ø	26 mm	29 mm	32 mm	35 mm	38 mm	41 mm
Height	7 mm	8 mm	9 mm	10 mm	11 mm	12 mm
	NO481	NO482	NO483	NO484	NO485	NO486

Tibial hemi-spacer RM/LL

with screws

Tibia	4 mm	8 mm	12 mm	16 mm
T1	NB025K	NB026K	NB027K	NB028K
T2	NB045K	NB046K	NB047K	NB048K
T3	NB065K	NB066K	NB067K	NB068K

Tibial hemi-spacer RL/LM

with screws

4 mm	8 mm	12 mm	16 mm
NB035K	NB036K	NB037K	NB038K
NB055K	NB056K	NB057K	NB058K
NB075K	NB076K	NB077K	NB078K

Tibial extension stems, cemented

	Ø 12 mm ream: 14		Ø 15 mm ream: 17		Ø 18 mm ream: 20	
Tibia	52 mm	92 mm	52 mm	92 mm	52 mm	92 mm
T1-T3	NR191K	NR194K	NR192K	NR195K	NR193K	NR196K

Tibial extension stems, cementless

	Ø 11 mm		Ø 12 mm		Ø 13 mm		Ø 14 mm		Ø 15 mm	
Tibia	92 mm	172 mm	92 mm	172 mm	92 mm	172 mm	92 mm	172 mm	92 mm	172 mm
T1-T3	NR171K	NR491K	NR172K	NR492K	NR173K	NR493K	NR174K	NR494K	NR175K	NR495K

	Ø 16 mm		Ø 17 mm		Ø 18 mm		Ø 19 mm		Ø 20 mm	
Tibia	92 mm	172 mm	92 mm	172 mm	92 mm	172 mm	92 mm	172 mm	92 mm	172 mm
T1-T3	NR176K	NR496K	NR177K	NR497K	NR178K	NR498K	NR179K	NR499K	NR180K	NR500K

Compatibility of rotation axis elements

Axis / parts to swap	Replaceable by axis/nut or PEEK bearing sleeve of PE gliding surface: 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

Axis / parts to swap	Replaceable by axis/nut or PEEK bearing sleeve of PE gliding surface: 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

Axis / parts to swap	Replaceable by axis/nut or PEEK bearing sleeve of PE gliding surface: 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	-	-	-

[-] This means e. g. for F1 10 mm: Axis, nut, PEEK bearing sleeve and PE gliding surface F1 12 mm have to be used.

Spare part

Just in case the femur securing nut becomes unsterile, this implant is separately available with article code: NR860K

Aesculap AG | Am Aesculap-Platz | 78532 Tuttlingen | Germany
Phone +49 7461 95-0 | Fax +49 7461 95-26 00 | www.aesculap.com

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