



ORTHOPAEDIC  
SURGERY

# AESCULAP® OrthoPilot®

OrthoPilot® – TKR VERSION 3  
SURGICAL TECHNIQUE

# AESCULAP® OrthoPilot® TKR

OrthoPilot® TKR – TOTAL KNEE REVISION



- (1) Jenny JY, Clemens U, Kohler S, Kiefer H, Konermann W, Mielke RK. Consistency of implantation of a total knee arthroplasty with a non-image-based navigation system: a case-control study of 235 cases compared with 235 conventionally implanted prostheses. *J Arthroplasty*. 2005 Oct;20(7):832-9.
- (2) Jenny JY, Mielke RK, Giurea A. Learning curve in navigated total knee replacement. A multi-centre study comparing experienced and beginner centres. *Knee*. 2008 Mar;15(2):80-4.
- (3) Bähis H, Shafizadeh S, Paffrath T, Simanski C, Grifka J, Lüring C. Are computer assisted total knee replacements more accurately placed? A metaanalysis of comparative studies. *Orthopäde*. 2006 Oct;35(10):1056-65.
- (4) Bauwens K, Matthes G, Wich M, Gebhard F, Hanson B, Ekkernkamp A, Stengel D. Navigated total knee replacement. A meta-analysis. *J Bone Joint Surg Am*. 2007 Feb;89(2):261-9.
- (5) Mason JB, Fehring TK, Estok R, Banel D, Fahrback K. Meta-analysis of alignment outcomes in computer-assisted total knee arthroplasty surgery. *J Arthroplasty*. 2007 Dec;22(8):1097-106.
- (6) Novicoff WM, Saleh KJ, Mihalko WM, Wang XQ, Knaebel HP. Primary total knee arthroplasty: a comparison of computer-assisted and manual techniques. *Instr Course Lect*. 2010;59:109-17.
- (7) Siston RA, Goodman SB, Patel JJ, Delp SL, Giori NJ. The high variability of tibial rotational alignment in total knee arthroplasty. *Clin Orthop Relat Res*. 2006 Nov;452:65-9.



## OrthoPilot®

OrthoPilot® helps with precise implantation of knee and hip endoprotheses (1). Significant criteria when developing the OrthoPilot® included integration into surgical procedure and operation times (2). Another central consideration for us was gentle, patient-friendly navigation: from the very beginning, our goal was to develop a method that did not require expensive and stressful CT/MRI scans, and that kept operation times as short as possible.

- CT-free
- Ergonomic instruments adapted to the procedure
- User-friendly navigation system integrates easily into operation
- Intraoperative documentation with OrthoPilot®
- Numerous international studies confirm precise implant alignment (3-6)
- Routinely used in more than 600 hospitals

The failure rate of knee revisions after 10 years is 22 % (4), and while failures are due to a wide range of reasons, common reasons are:

- Shift, mainly in the form of joint line proximalisation, resulting in patella baja
  - Faulty axis alignment
  - Malrotation of the implants
  - Imbalance of extension gap in relation to flexion gap
- With OrthoPilot TKR, a navigation software especially designed for knee revision, and which addresses these problems, is available. Results show that with OrthoPilot® TKR, precise axis alignment as well as optimised joint line reconstruction and rotational alignment of the femur component can be achieved (3), while taking into account the ligament situation by simulation of the expected extension and flexion gaps for good knee stability. A longer life span and thus a reduction in the failure rate of knee revisions is expected.



# AESCULAP® OrthoPilot® TKR

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# AESCULAP® OrthoPilot® TKR

## 1 | OVERVIEW OF INSTRUMENTS: UNIVERSAL INSTRUMENTS

### TWO-PIN TRANSMITTER ANCHORING



Two-pin transmitter anchoring element	NP1016R*
Pin for two-pin transmitter anchoring, D= 3.2, short	NP1012R*
Pin for two-pin transmitter anchoring, D= 3.2, long	NP1013R*

### FEMUR-RB REVISION, C-HOOK



Large	NE191R
Small	NE163R

### STRAIGHT POINTER



FS604\*\*

### TIBIA-RB REVISION



NE192R\*\*

#### NOTE

\* Only available in NP1004 or NP1006

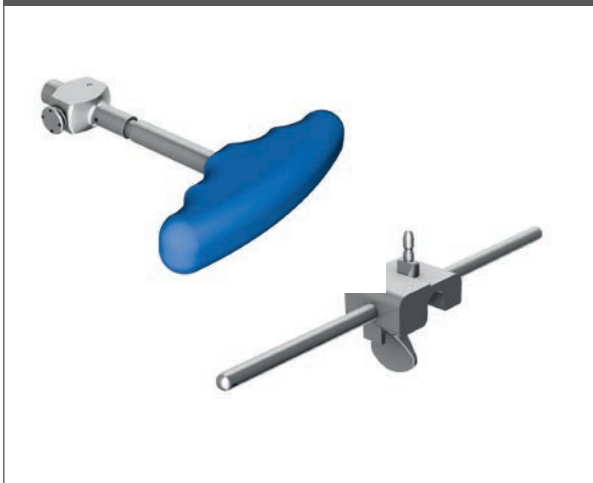
\*\* Only available in NP611/NE194, NP650 or NQ594

### FEMORAL ORIENTATION BLOCK



e.motion®	NE440R
Columbus®	NE324T
EnduRo	NP652R
Footplate, left	NE441RM**
Footplate, right	NE442RM**

### T-HANDLE FOR REVISION AND NAVIGATION ADAPTER



T-handle for revision	NE198R
Navigation adapter	NE199R

### TIBIAL ROTATION NAVIGATION ADAPTER



Tibial rotation navigation adapter NP1017R\*

### TIBIAL CUT CONTROL PLATE



NP617R\*\*  
NP617RM\*\*

#### NOTE

\* Only available in NP1004 or NP1006

\*\* Only available in NP611/NE194, NP650 or NQ594

# AESCULAP® OrthoPilot® TKR

## 1 | OVERVIEW OF INSTRUMENTS: UNIVERSAL INSTRUMENTS

### TIBIAL REVISION SAWING GUIDE



e.motion®/EnduRo, right	NE196R
e.motion®/EnduRo, left	NE197R
Columbus®, right	NQ651R
Columbus®, left	NQ650R

### DISTAL FEMORAL REVISION SAWING GUIDE



e.motion®/EnduRo	NE200R
Columbus®	NQ701R

### REVISION SPREADER WITH SPREADER FORCEPS



Revision spreader	NE750R
Spreader forceps	NP609R
Spreader forceps force-controlled	NP605R

### PASSIVE TRANSMITTERS



Yellow	FS633**
Blue	FS634
Red	FS635



4 IN 1 REVISION SAWING BLOCK  
WITH 2 FIXING CLIPS



e.motion® F2 – F8	NE722R-NE728R
Columbus® F2 – F8	NQ721R-NQ728R
EnduRo F1	NM731R
EnduRo F2	NM732R
EnduRo F3	NM733R

PASSIVE CLICK TRANSMITTER, YELLOW



Passive click transmitter, yellow

FS636\*

MULTITOOL



Multitool

FS640\*

**NOTE**

\* Only available in NP1004 or NP1006

\*\* Only available in NP611/NE194, NP650 or NQ594

# AESCULAP® OrthoPilot® TKR

2 | PREOPERATIVE PLANNING



### Based on X-ray image

The OrthoPilot® system and the revision software can be used in the following cases:

- in revision cases
- in severe primary cases

in which the use of a revision implant is indicated.

Adequate bone quality and range of movement of the hip should be given.

### NOTE

Be sure to follow the instructions in the corresponding surgical technique manuals, instructions for use, and package inserts, especially the instructions for use for the OrthoPilot® application software OrthoPilot® TKR version 3 TA015956.

During surgery, users should check all data for plausibility using the known possibilities as for example plausibility checks to the X-ray images and check of the instruments used. In addition instruments are available, e. g. like the angel-wing or rods for axis verification of the cut.

# AESFULAP® OrthoPilot® TKR

## 2 | PREOPERATIVE PLANNING

AESFULAP® considers it necessary to carry out adequate preoperative planning on the basis of the following X-ray images:

- Whole leg image in standing position
- Knee joint in AP projection
- Knee joint in lateral projection
- Tangential image of the patella

### OPTIONAL:

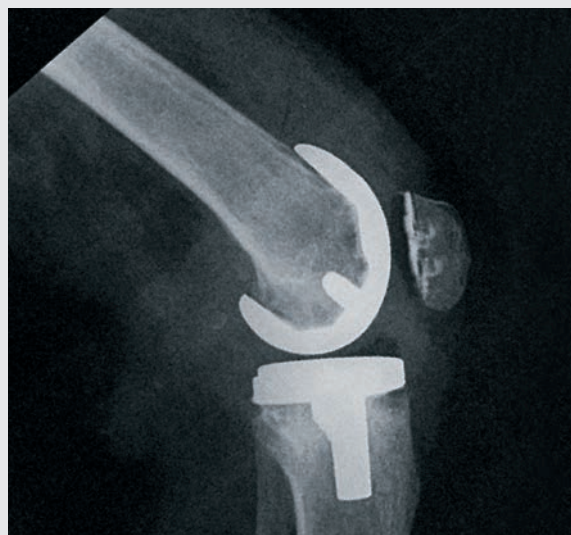
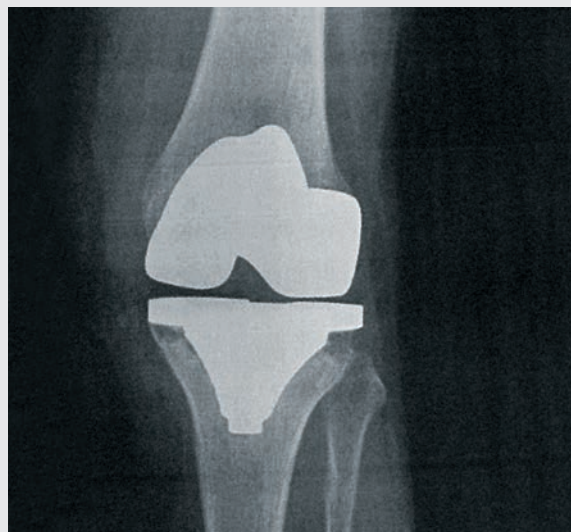
- X-ray images before primary implantation
- X-ray images of the opposite side
- CT image of the primary implant

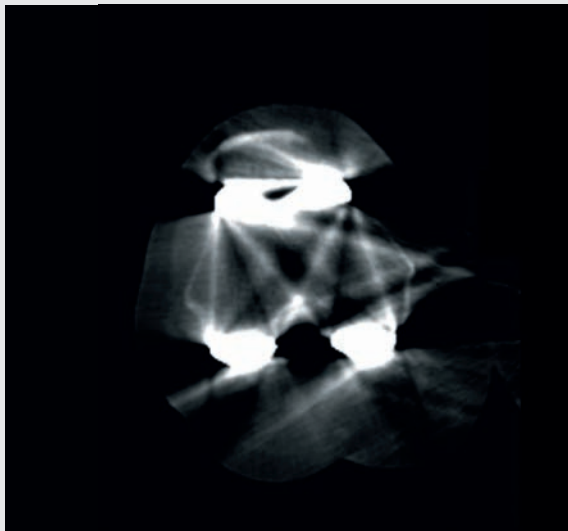
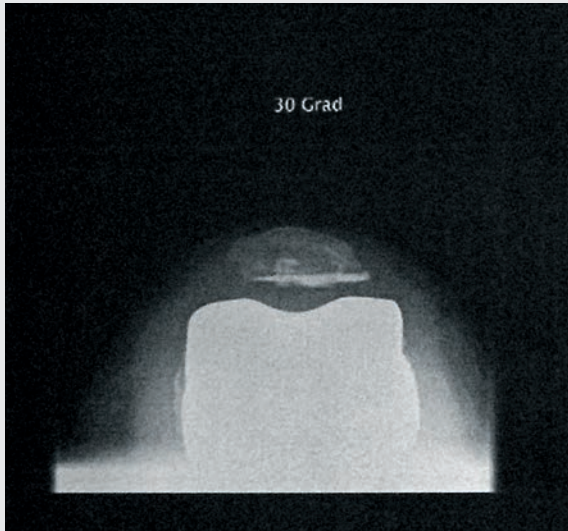
Selected information which can be obtained on the basis of the X-ray images:

- Axis deviation
- Implant alignment, joint gap, ML implant size
- Slope, joint gap in flexion, AP implant size
- Rotational position, patella position

### OPTIONAL:

- Joint line planning (fibula tip, epicondyles, etc.)
- Rotational position (epicondyles)





Analysis of the reason for revision is essential when carrying out preoperative planning, as a repetition of the errors which possibly led to primary implant failure should by all means be avoided. In addition to the standard radiological examinations, the surgeon should take the following points into consideration before performing revision surgery:

- Soft tissue situation
- Functionality of the extensor mechanism
- Removal of the primary prosthesis
- Bone preservation
- Restoration of good axis orientation
- Functional stability
- Restoration of the joint line

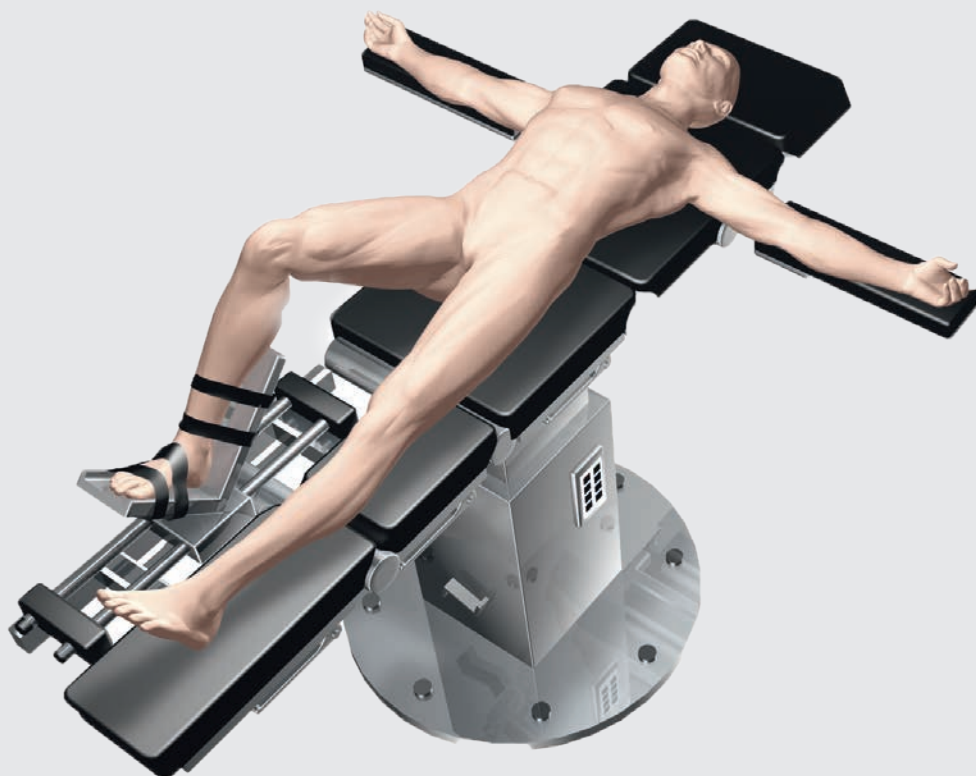
Anatomic landmarks such as the fibula head or the transepicondylar line serve as orientation marks when determining the height of the joint line.

The surgeon can obtain the following information when analysing the X-ray images with the help of the X-ray templates of the AESCULAP® prosthesis systems Columbus® and e.motion®:

- Angle between anatomic and mechanical femur axis
- Resection heights
- Implant sizes
- Tibial and femoral entry points for intramedullary alignment
- Tibial augments and/or femur wedges required

# AESCULAP® OrthoPilot® TKR

## 3 | PATIENT PREPARATION



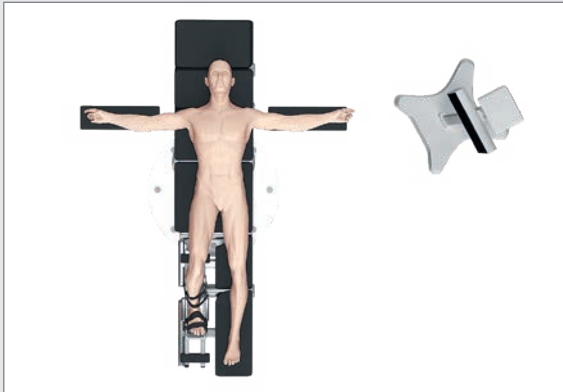
Positioning and sterile draping of the patient is carried out according to the standard procedures which are also applied in the conventional technique.

AESCULAP® recommends using a leg holder, which facilitates leg control during the various phases of the operation. In order to record the points to be registered and to carry out all the necessary bone cuts, it is necessary to change the leg position several times. The leg holder enables the knee position to be varied between full extension and full flexion.

### NOTE

To facilitate mobilisation of the quadriceps, the knee should be brought to 100° flexion prior to activating the tourniquet. If a pad is used, make sure that it does not hinder full circulation of the hip joint required for registering the femoral head center.

## 4 | OrthoPilot® SET-UP AND TRANSMITTER POSITION



### 4.1 OrthoPilot® positioning

When positioning the OrthoPilot®, make sure that the physician will have a clear view of the screen at all times. The device and/or the camera can be positioned either on the opposite side of the leg being operated upon (contralaterally) or on the same side (ipsilaterally). The mean distance to the transmitters should be around 2 m (for the FS101) or 2.5 m (for the OrthoPilot® *Elite*). Enter the chosen positioning (ipsi- or contralateral) at the "Surgery Data" step of the OrthoPilot® set-up rubric. Positioning the camera at shoulder level on the patient's opposite side, tilted around 45° to the operating area, has often proven highly effective.

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#### TIP

The camera alignment can be adjusted at any stage of the operation, except during determination of the hip center.

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### 4.2 Femoral transmitters

The following applies in general: the transmitters should be positioned in such a way that they are visible to the camera during the entire operation. After opening the knee joint, the C-hook NE191R or NE163R is attached in the femoral incision approx. 10 cm proximal from the joint line. For this purpose, the screw of the femoral C-hook is tightened with a manual screw driver. The C-hook should be at a right angle to the femur axis. One of the two transmitter adapters should point towards the femoral head. On the anterior side, it has proven beneficial to place the C-hook on the lateral edge of the cortex.

---

#### TIP

The tip of the pointer with a length of approx. 10 cm can be used as a basis for orientation.

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# AESFULAP® OrthoPilot® TKR

## 4 | OrthoPilot® SET-UP AND TRANSMITTER POSITION

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### NOTE

When anchoring the device into place, make sure it will not come into conflict with any instruments being used later on.

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### NOTE

When removing the two-pin anchoring element at the end of the operation, it is essential to release the anchoring screw before screwing the pins out.

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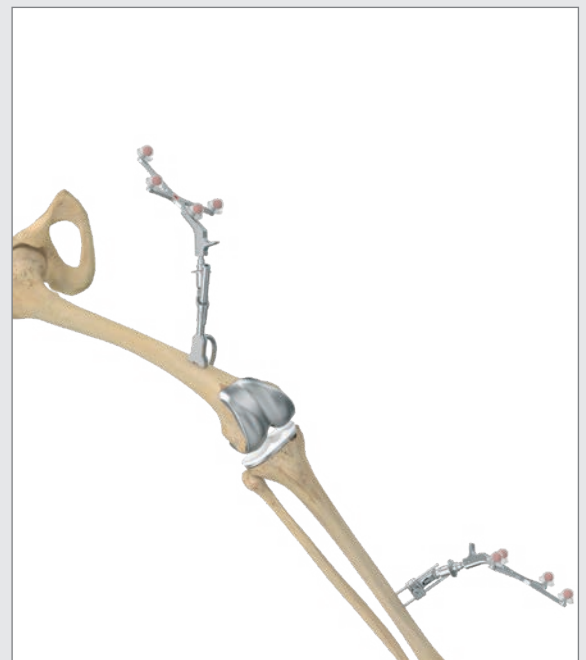
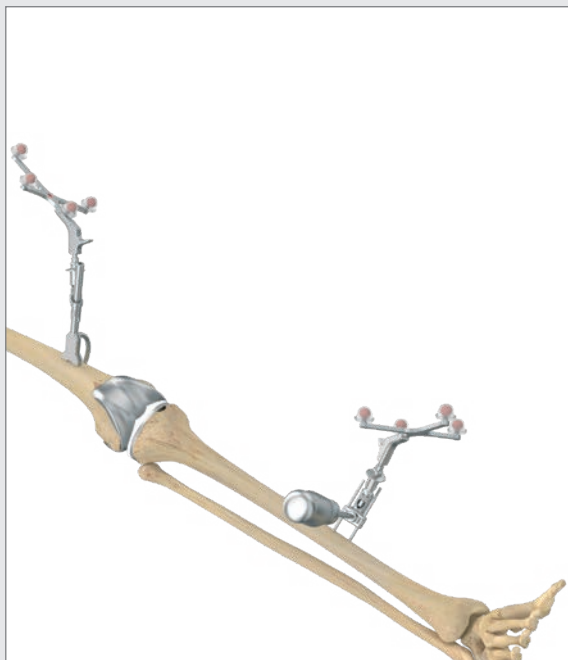
### NOTE

Please turn the screw until it is in contact with the pins, then verify a tight fit and if necessary tighten a little more with moderate force until the assembly is stable. Do not overtighten or force the screw!

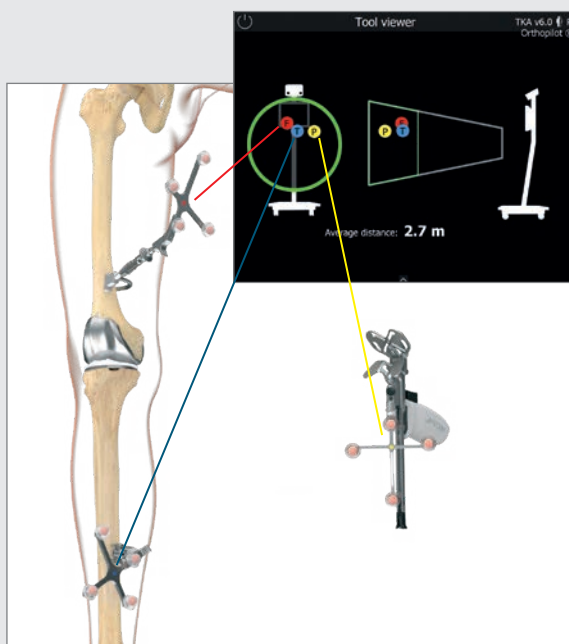
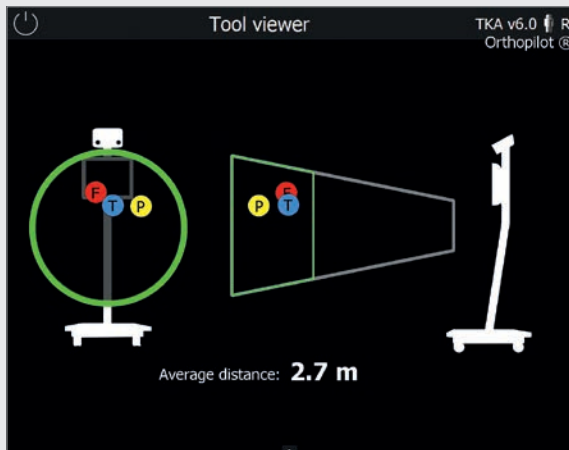
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### 4.3 Tibial transmitter

The transmitter can be positioned monocortically using a two-pin anchoring system. With the clamping screw on the anchoring element open, use two pins to attach it to the tibia, keeping adequate safety distance to the distal end of the planned tibial stem (typically from medial). AESFULAP® recommends using the bone fixation pins NP1012R or NP1013R with a diameter of 3.2 mm. In principle, the transmitter fixation element is compatible with bone fixation pins of 2.5 mm to 4.0 mm in diameter. The tibial transmitter can be placed in any of four positions; a locking mechanism allows the transmitter adapter to be adjusted into an optimal position for the camera. Once the transmitter is in a good position, use the clamping screw and screwdriver (NS423R) to lock the adjustment mechanism. This screw also serves to connect the anchoring element to the pins. Check the transmitter to make sure it is firmly anchored into place.







#### NOTE

Whenever a transmitter is removed from the bone fixation, e. g. the 2 pin fixation or one of the instruments, the user must ensure in case of reattaching, that exactly the same position is chosen for the fixation of the transmitter as before. Otherwise the values displayed differ significantly from the values displayed before.

#### 4.4 Camera adjustment

The camera alignment screen displays the view field of the camera as a three-dimensional volume; users can call it up at any time via the toolbox menu (see instructions for use TKA 6.0 TA15239). Transmitters are displayed within this camera view field as colored (color-coded) balls labeled using corresponding letters:

- Femoral transmitter:  
Red ball labeled "F"
- Transmitter on instrument:  
Yellow ball labeled "P"
- Tibial transmitter:  
Blue ball labeled "T"

If all three transmitters are placed at an optimum distance to the camera (1.8 - 2.2 m for FS101; 2.5 - 3.0 m for OrthoPilot® Elite), the camera view field will be displayed outlined in green. The mean distance from the camera to the transmitters is displayed in meters.

#### TIP

When adjusting camera alignment, make sure that all transmitters remain sufficiently visible as the leg is bent, stretched, adducted or abducted. Sufficient visibility means that the camera can recognize the transmitter in all of these positions. Once users have checked the camera at the beginning of the operation and verified transmitter visibility, it should not be necessary to adjust the camera for the rest of the operation.

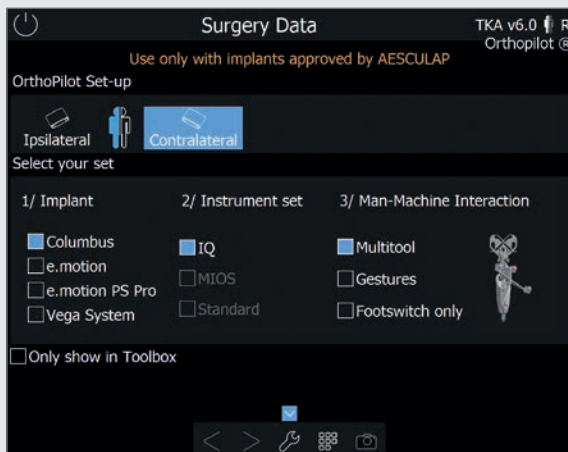
However, it remains possible to adjust the camera at any time during the operation – except while measuring the center of the hip joint – in order to improve visibility.

The passive transmitter marked in red (FS635) is attached to the femoral Rigid Body adapter; the passive transmitter marked in blue (FS634) is attached to the tibial Rigid Body adapter. The yellow passive transmitter (FS633 or FS636) is attached to whichever instruments are necessary.

# AESCALAP® OrthoPilot® TKR

## 5 | CONTROLS AND INTERACTION

The OrthoPilot® system offers three different means of control/interaction.



### 5.1 Multitool (FS640 with mounted FS636 transmitter)

Multifunctional instrument used for data acquisition and software control. Click the control button in the handle briefly to record data or confirm interactions. Press and hold the control button in order to open **the ring menu** in the application. From there, users can perform the following actions:

- Toggling forward or backward within the workflow
- Deleting recorded data in current step
- Deleting previously recorded data and returning to the corresponding software step

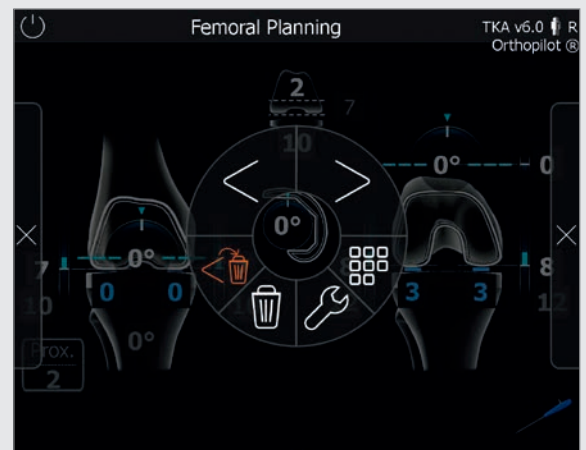
#### NOTE

This function, the only one marked on the menu with a red symbol, is available if no data recording has taken place during the current software step. It cannot be accessed otherwise.

- Accessing the workflow navigator for navigating quickly and easily to selected workflow steps
- Accessing the toolbox for adjusting the camera, acquiring kinematic data, and opening measurement modules for recording points on the femur/tibia
- Accessing an alternative method of determining the center of the hip joint (only during the Determining Hip Joint Center step)

- Using + and - buttons to adjust femur size (only during the Distal Femoral Incision/4-in-1 Cutting Block Positioning step)
  - Skipping extension/flexion gap measurement and femoral planning (only during Extension and Flexion Gap step)
- During software steps that do not use the Multitool or transmitter FS636 with other instruments (e.g., distal cutting block NS334R or one of the 4-in-1 cutting blocks), the user can perform the above-named actions with a quick/long press of the manual trigger (black) directly on the transmitter.

Ring menu functions are independent of the selected interaction.



## 5.2 Gesture controls (with pointer FS604 and mounted FS633 transmitter)

Users can palpate bone reference points and control the software using specific, defined gestures. To record a point, after placing the pointer precisely and stably on the reference point being recorded in that step, withdraw the pointer axially (Fig. 5.2 a). Be sure to use a controlled motion. Gesturing with the pointer in a vertical clockwise circle will call up the next step in the workflow; a vertical counter-clockwise circle will call up the previous step (Fig. 5.2 b). Gesturing with the pointer in a horizontal counter-clockwise circle will open the ring menu described in chapter 5.1 (Fig. 5.2 c).

The pointer also has a timer function for use in pure data acquisition. Hold the tip of the pointer still until the "record" symbol appears on the OrthoPilot® screen, and a blue highlight begins gradually appearing around the edge. Once the record symbol is completely outlined in blue, the data has been successfully recorded, and the software will proceed to the next step. The controls used to switch forward through individual software steps are the same as the ones described in chapter 5.1.

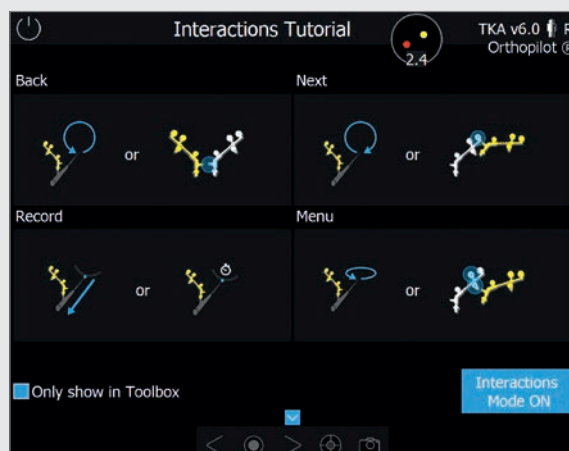
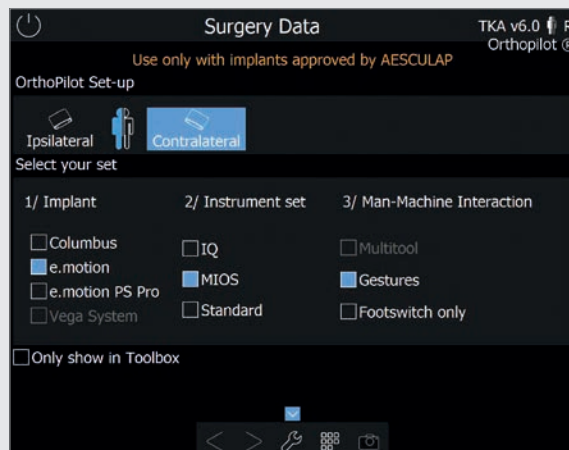


Fig. 5.2 a

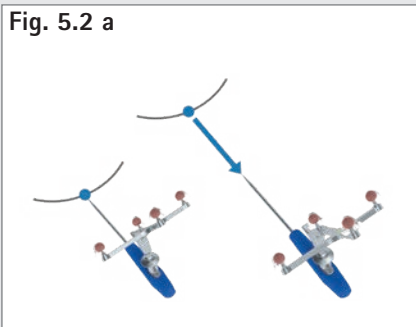


Fig. 5.2 b

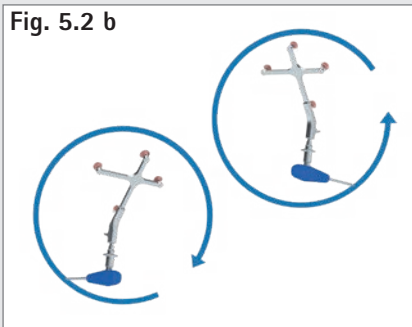
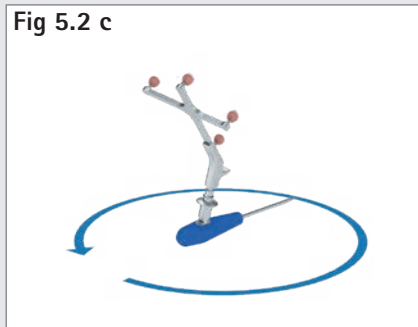


Fig 5.2 c



# AESCULAP® OrthoPilot® TKR

## 5 | CONTROLS AND INTERACTION

Another software control option is to toggle forward/backward or open the ring menu by positioning the yellow transmitter near the tibial/femoral transmitter. Bring the base of the yellow transmitter for opening the ring menu near the color-coding on the tibial or femoral transmitter (Fig. 5.2 d). To toggle forward, the base of the yellow transmitter must be near the marker sphere furthest away from the base of the tibial/femoral transmitter (Fig. 5.2 e). To toggle back, bring it close to the tibial/femoral transmitter base itself (Fig. 5.2 f). The software toolbox includes a tutorial for all gestures, which describes gestures individually and allows users to practice them. Hiding the bottom marker sphere of the yellow transmitter (Fig. 5.2 g) is used to record the last stable position of the reamer during reamer-navigation, whenever gesture MMI is used.

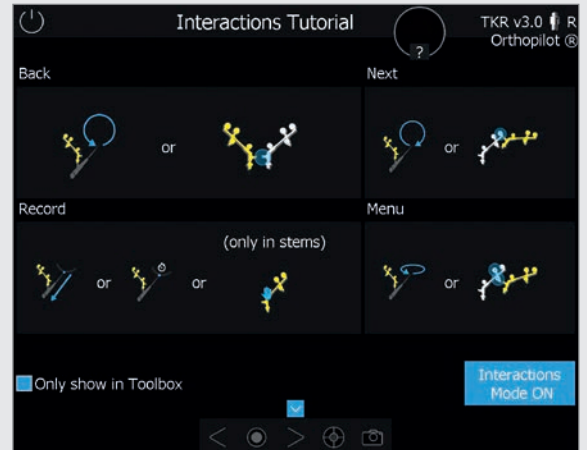


Fig. 5.2 d

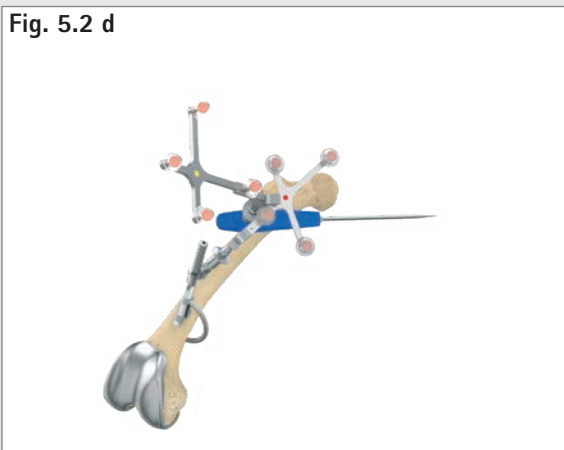


Fig. 5.2 e

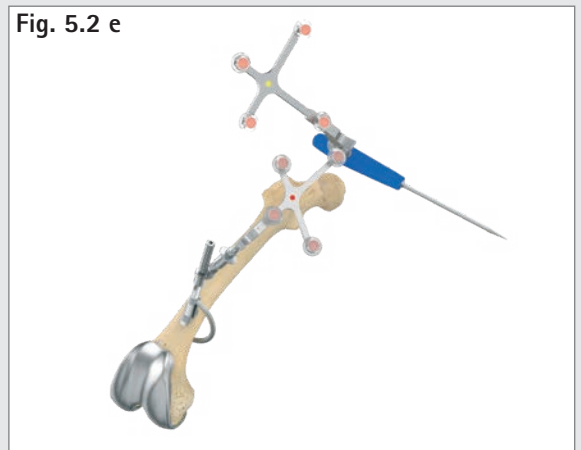


Fig. 5.2 f

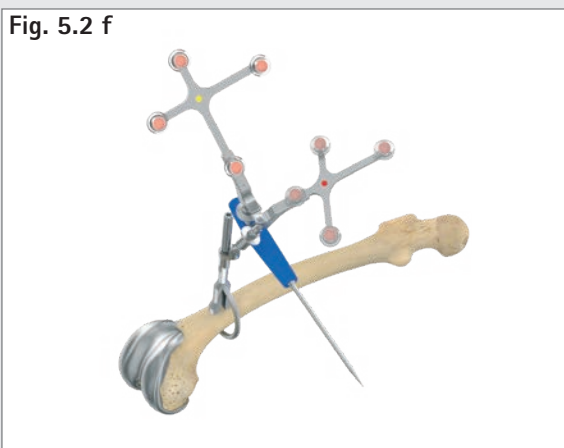


Fig. 5.2 g



### 5.3 Foot pedal (wireless, for use with OrthoPilot® system)

The wireless foot pedal is the third control option available to users.



#### 1) Central foot button

**Short click:** Toggle forward / record data

**Long click:** Only triggers an action during four software steps:

1. Starts the optional data acquisition process during measurement of the hip joint center.
2. Skips the measurement process in the "determining extension gap" step.
3. Within the "distal femoral resection" step, it is used to increase the size of the previously selected femoral component in steps.
4. Likewise, within the "positioning the 4-in-1 sawing guide" step, it is used to increase the size of the previously selected femoral component in steps.

#### 2) Left foot button

**Short click:** Toggle back within a workflow

**Long click:** Delete data within the current step

A long click on the left button only triggers a different action within two steps:

1. Within the "distal femoral resection" step, it is used to reduce the size of the previously selected femoral component in steps.
2. Likewise, within the "positioning the 4-in-1 sawing guide" step, it is used to reduce the size of the previously selected femoral component in steps.

#### 3) Right foot button

**Short click:** Open the ring menu

**Long click:** Screenshot

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#### NOTE

When using the OrthoPilot® System FS101 with pointer and foot pedal, use the wired foot pedal (FS007). A short click of the the right button will toggle forward or begin the data recording process. Use a long click to:

- start the optional process for acquiring data on the hip joint center,
- skip the extension and flexion gap measurement process,
- increase the selected size of the femoral component under the "distal femoral resection" and "positioning the 4-in-1 sawing guide" steps.

The left button is used to toggle backward. Long-pressing the left button deletes any data recorded on the selected screen, or reduces the size of the selected femoral component in the "distal femoral resection" and "positioning the 4-in-1 sawing guide" steps.

Pressing the black button in the middle will open the menu.

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### 5.4 Special software control features

When using Multitool or gesture controls (not the foot pedal) to toggle forward, the flexion angle range (70 +/- 5°) will be marked in yellow on the "knee joint center", "mechanical axis", "mechanical axis – post-operative" and "kinematic measurement" steps. If the leg is held still within that range for a certain period of time, the software will toggle forward one step. Alternatively, users can always toggle forward or trigger data recording by performing the action specifically defined for their chosen interaction method.

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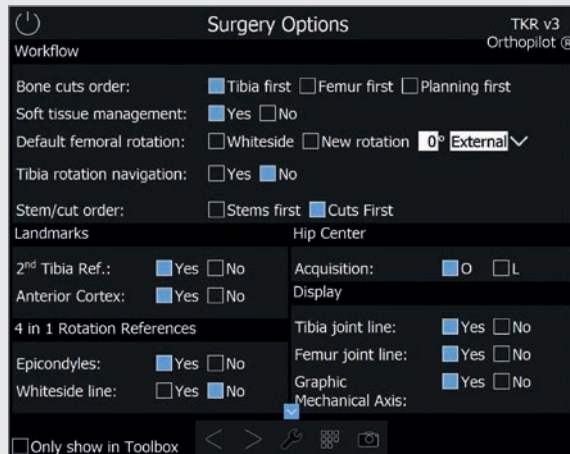
#### NOTE

Should one of the above-named interaction methods experience a technical failure, the OrthoPilot® system touchscreen can also be used as an interaction platform. This will require someone who is not active directly within the operating field to press the symbols on the screen to trigger the corresponding actions during surgery.

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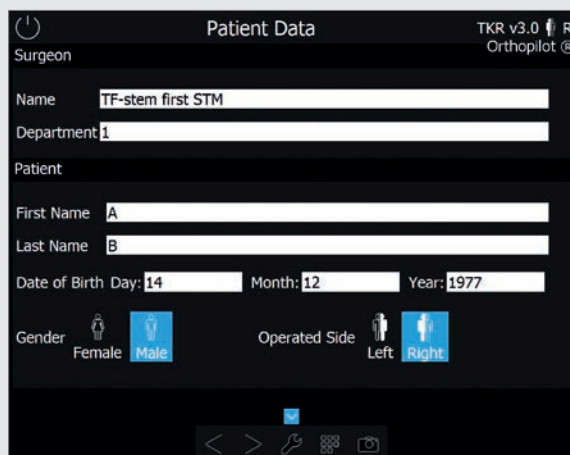
# AESCULAP® OrthoPilot® TKR

## 6 | ENTERING PATIENT-RELATED INFORMATION



- whether to choose the default circle movement (O) or the alternative movement pattern (L) for hip centre acquisition,
- tibia joint line yes or no,
- femur joint line yes or no and
- graphical mechanical axis yes or no.

After having selected these options, the surgeon can use the check-box in the “only show in toolbox” dialog window to decide whether this screen should be displayed each time the software is started. If the box is checked, the next time the software is started, it will go directly to the Patient Data screen with the most recently selected options settings. From this step (“Patient Data”), users can select the toolbox (see chapter 5 for explanation) at any time to call up the options screen and change the settings.



### 6.1 Option settings

The surgeon has – according to his preferences – the possibility to choose among the following options:

- tibia first, femur first of planning first technique,
- with or without soft tissue management,
- Whiteside, new rotation or preset of default femur rotation,
- tibia rotation navigation yes or no,
- stems or cuts first workflow,
- 2nd tibia reference yes or no,
- anterior cortex as additional step yes or no,
- epicondyles yes or no,
- Whiteside line record yes or no,

### 6.2 Entering hospital- and patient-specific data

#### Entering hospital-specific data

Name of surgeon

Hospital/department name

#### Entering patient data

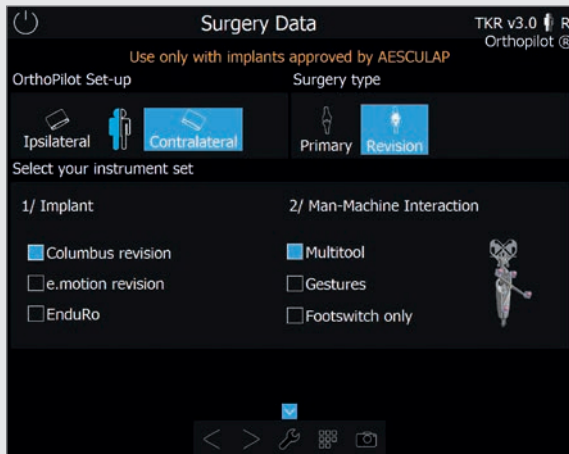
First name

Last name

Date of birth

Sex

Side being operated on



### 6.3 Surgery Data

#### OrthoPilot® Set-up:

Ipsi- or contralateral

#### Surgery type:

Primary or Revision

#### Implant type:

Columbus® Revision, e.motion® Revision or EnduRo

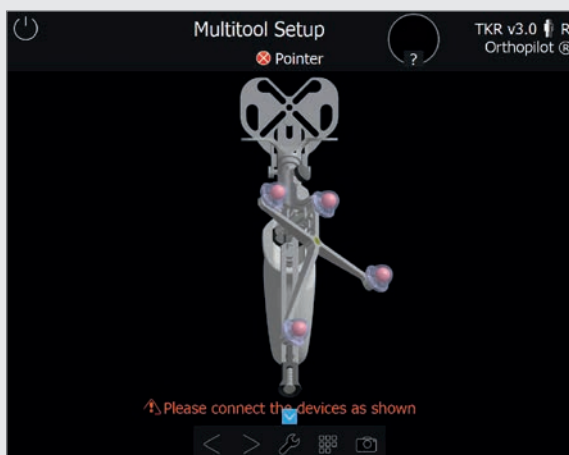
#### Man-Machine Interaction:

Multitool, Gesture recognition or wireless footswitch

Implants and instruments not added during installation will not be displayed for selection. The software prevents any impermissible combination of interaction methods and instruments.

#### NOTE

For the sake of simplicity, the surgical procedure is illustrated based on a revision case. In addition the workflows described are limited to stems first technique. For cuts first workflow the stem navigation is performed after the corresponding cuts and works in the same manner. Any deviation between cuts and stems can be observed and adapted.

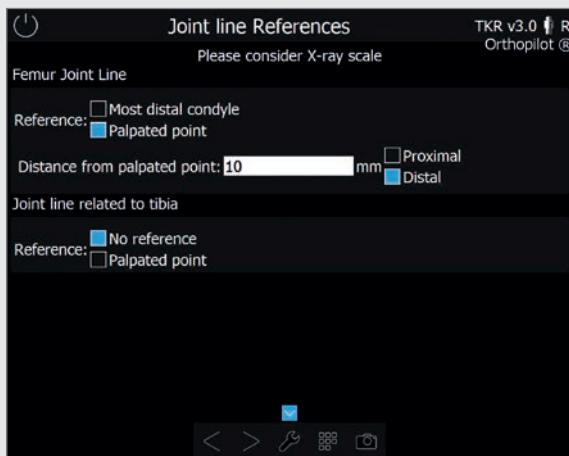
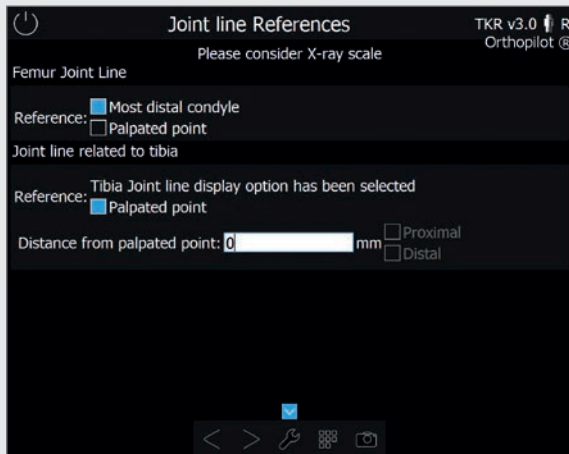


### 6.4 Multitool Setup

When the Multitool is selected, a Multitool correctly assembled for the side undergoing surgery and the camera position will be displayed on the right side of the Surgery Data screen as well as in the center on a separate screen.

# AESCULAP® OrthoPilot® TKR

## 6 | ENTERING PATIENT-RELATED INFORMATION



### 6.5 Joint line planning: Planning of the desired post-OP joint line using X-ray images

The joint line can be planned starting either from the femur and/or from the tibia.

The following options can be selected for planning from the femoral side:

- the most distal condyle or
- palpation of a point with appropriate offset-specification (in mm) to proximal or distal.

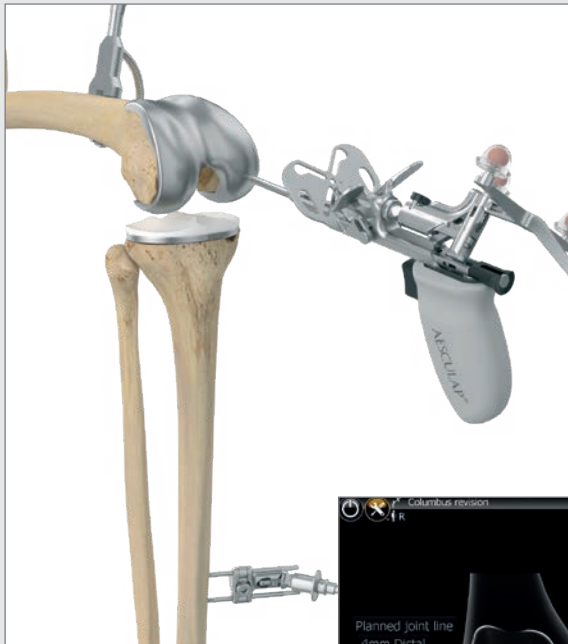
The following options can be selected for planning from the tibial side:

- no reference because of no tibia-related joint line planning or
- palpation of a point with appropriate offset-specification (in mm) to proximal or distal.

The distances in millimeters between reference points which can be freely selected and the planned post-operative joint line of the femur or tibia are entered directly from the X-ray image, while taking into account the respective magnification factor.

In every case, it should be indicated whether the joint line is to be distalised or proximalised by selecting "=>Distal" or "=>Proximal". Joint line planning either from the femoral or the tibial side is mandatory. If choosing "the most distal condyle" in the planning from the femoral side, the record with the orientation block in the step "Record Condyles" will be used for definition of the most distal condyle.

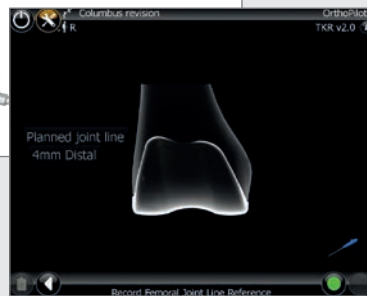




### 6.6 Planning the femoral joint line (optional)

In this step, a reference point for planning the joint line is recorded from the femoral perspective. Examples of reference points that can also be easily located on the X-ray image prior to surgery:

- Epicondyles
- Implant/bone interface
- Distal condyles of the implant which is in position



### 6.7 Planning the tibial joint line (optional)

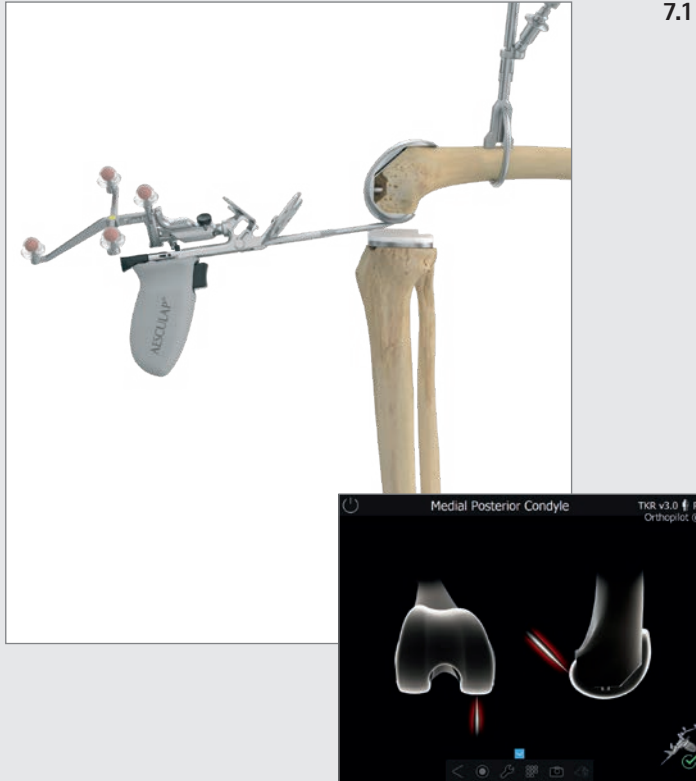
In this step, the reference point for planning the joint line which was selected in preoperative X-ray planning is recorded from the tibial perspective. Examples of possible reference points:

- Fibula head
- PE inlay
- Implant/bone interface

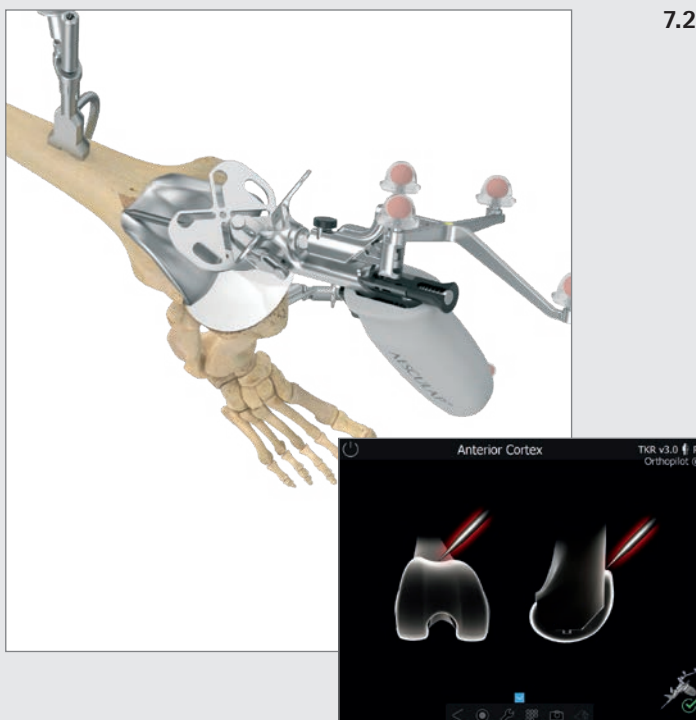


# AESCLAP<sup>®</sup> OrthoPilot<sup>®</sup> TKR

## 7 | GENERAL DATA ACQUISITION

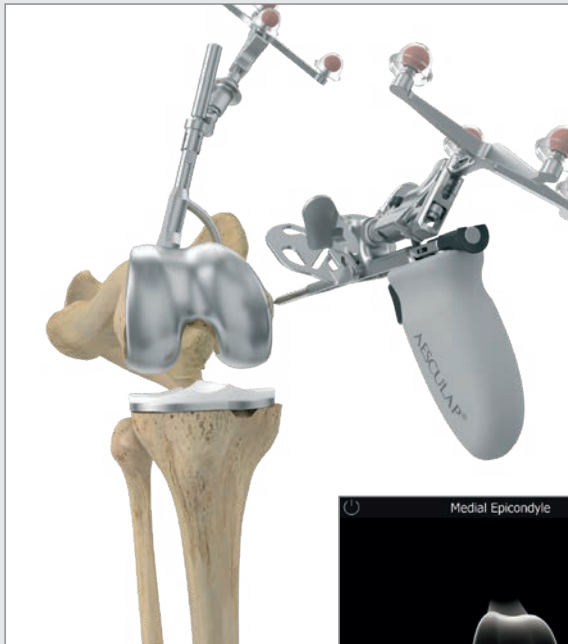


- 7.1 Recording the medial and lateral posterior condyle**  
Place the pointer tip of the Multitool (FS640) or the pointer (FS604) at the center of the postero-medial condyle. Choose the point furthest in the posterior direction – in other words, the one furthest from the anterior femoral cortex. Do the same for the lateral side.



- 7.2 Recording the anterior cortex point**  
This point is required for determining the size of the femoral component. It is located at the place where the anterior shield of the implant in position ends/planned femur should end proximally. In the medio-lateral direction, the most anterior point should be palpated. In cases of "notching" of the actual primary implant in position, a point located somewhat higher on the bone should be selected in order to avoid renewed "notching".

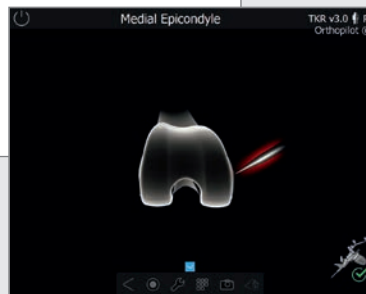
The proposal for the size of the femoral component is calculated on the basis of the distance between this point and the posterior condyles. This point is furthermore used later on to determine whether there is a danger of notching.



### 7.3 Recording the medial and lateral epicondyles (optional)

The trans-epicondylar line can be determined by palpating the medial and lateral epicondyles if the corresponding option has been activated. In a later program step, in addition to the posterior condylar line, the user will also be shown rotation in reference to the trans-epicondylar line.

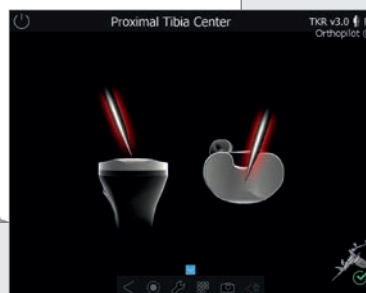
Start by placing the tip of the pointer on the medial epicondyle and recording the point. After that, record the lateral point in the same manner.



### 7.4 Determination of the proximal tibia center

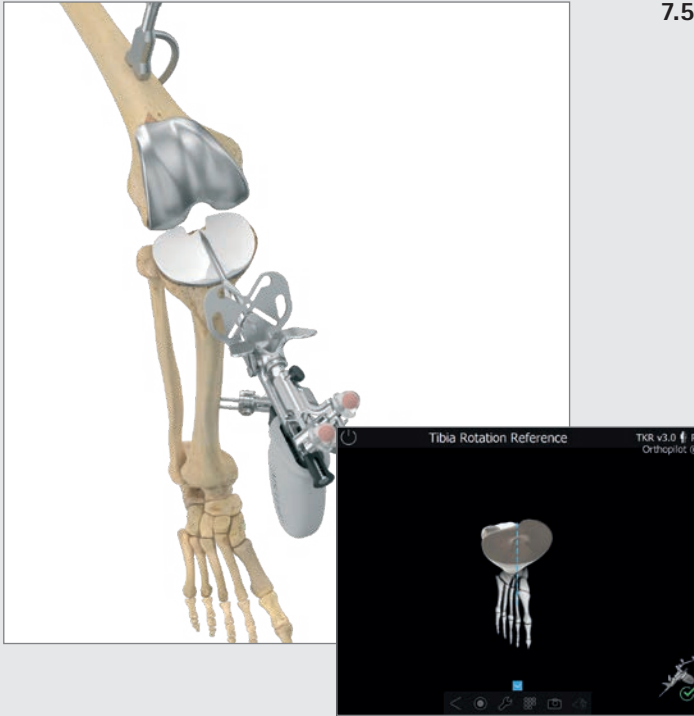
In this step, the center of the proximal tibia is recorded at the polyethylene surface of the implant which is in position using the pointer tip. For this procedure, the entry point of the intramedullary channel is:

- at the center of the medial-lateral diametral line of the tibial head,
- at the transition from the first to the second third of the anterior/posterior diametral line of the tibial head, as measured from the anterior edge.



# AESCULAP® OrthoPilot® TKR

## 7 | GENERAL DATA ACQUISITION

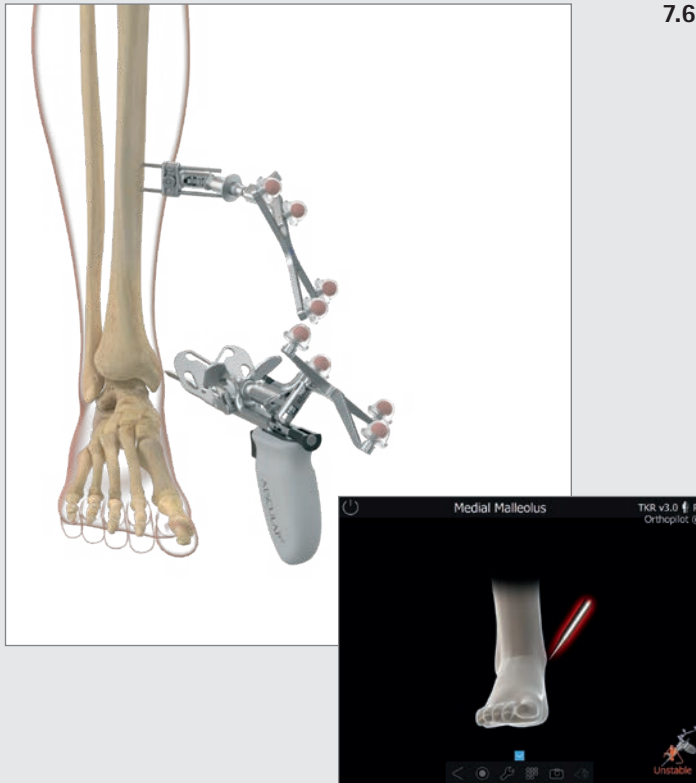


### 7.5 Registering tibial rotation (optional)

The user has the option of registering approximate tibial rotation in order to perform a dedicated investigation of tibial component rotational alignment later on during the operation. Place the pointer shaft axis on the desired rotation position. For example, the pointer stem can be placed on the tibial plateau along an imaginary line oriented to the medial edge of the tuberositas tibiae, with the tip facing toward the posterior edge of the tibial plateau (target reference: pointer tip at the PCL insertion) (7).

#### TIP

Note the different degrees of variability among different reference points registered intraoperatively; some of these may involve a very high degree of variability (7). Avoid internal rotation of the tibial component, as it would result in lateralization of the tuberositas tibiae, which could cause problems with patella tracking. Internal rotation of both the femoral and the tibial component, in particular, can result in aggravated patella dislocation, increased patella tilt, and subluxation positioning of the patella. Improper rotation of the tibial component also causes excessive stress on the inlay, resulting in accelerated wear.



- 7.6 Recording the medial and lateral malleolus**  
Place the pointer tip at the center of the medial malleolus and record the point. Do the same for the lateral side.



- 7.7 Anterior ankle joint point**  
Register the point by placing the pointer tip at the front edge of the distal tibia, as close as possible to the ankle-joint gap.

The display on screen will assist the surgeon in verifying the anterior palpation point by showing a percentage display starting from the medial malleolus palpation point, with a green safety zone around 50% +/- 5%.

**TIP**

The second metatarsus/second ray or the M. extensor hallucis longus tendon can be used as a landmark. The percentage display serves as a plausibility check. If the point is outside of the green safety zone, it is advisable to re-palpate the malleoli.

# AESCULAP® OrthoPilot® TKR

## 7 | GENERAL DATA ACQUISITION

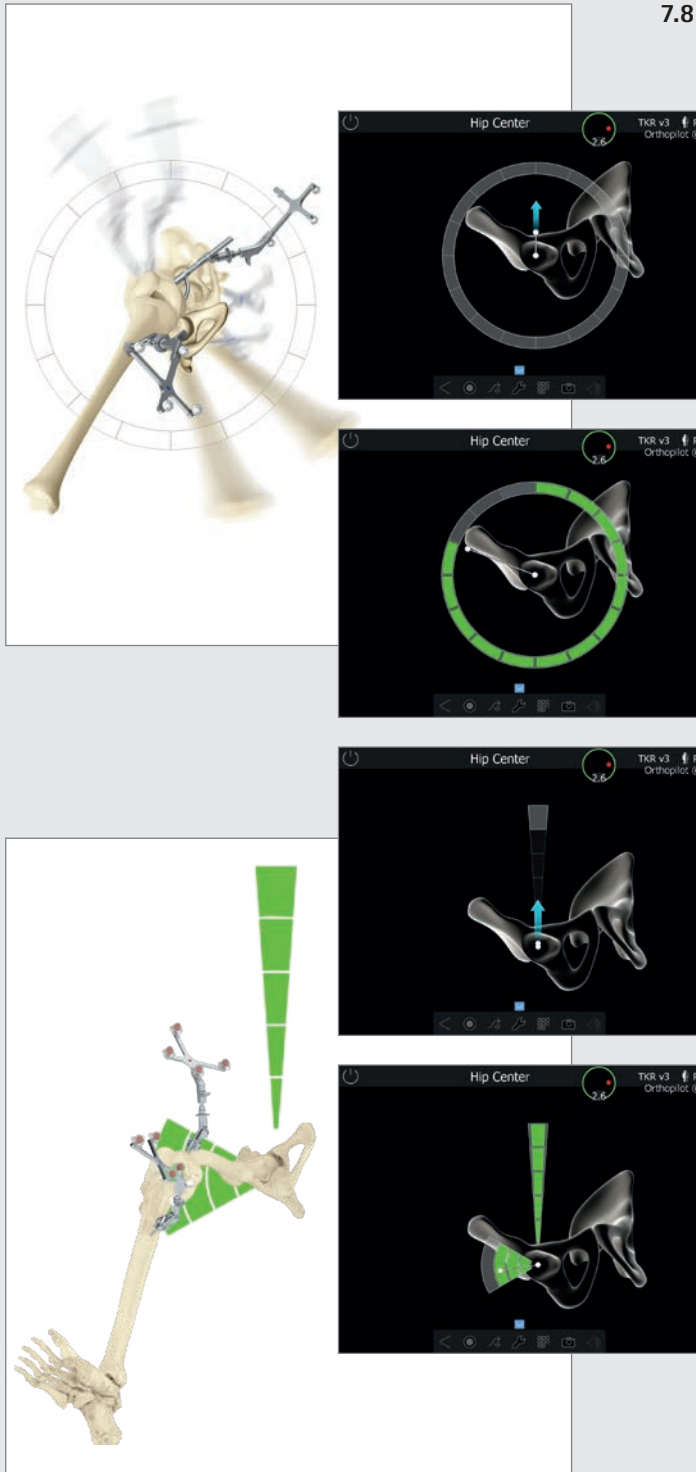
### 7.8 Registration of the hip center

Once the leg is kept still, an arrow pointing upwards will appear, and the user can start to move the leg towards 12 o'clock.

The default way of hip center registration is the circle (O). The regular circle registration can be started after having reached the topmost grey segment of the circle at 12 o'clock position. The motion can be performed in a clockwise or counterclockwise direction depending on the physician's preference. Thereby the femur is moved in such a way, so that the white point is moving over the fields arranged in a circle.

An alternative hip center acquisition movement (L) pattern can be installed. If installed it is the surgeon's choice and decision in the surgery options screen, which movement pattern to be used for this registration. The alternative L-registration can be started after having reached the topmost grey segment at 12 o'clock position. The motion is performed vertically from top to bottom (12 in direction downwards to 6 o'clock). The vertical motion should be followed by a horizontal one in the lateral direction (abduction of the leg).

For both acquisition movements, be cautious during the movement to stay within the indicated grey fields until they turn green one by one. Once sufficient data has been obtained, the program will automatically jump to the next step. If the motion described above was uneven or not sufficiently precise, a message reading "Bad acquisition" or "Movement too wide" will appear, and the process will need to be repeated beginning from the first position.

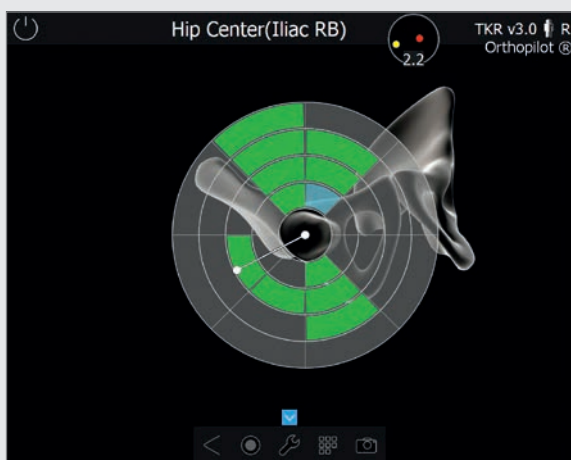


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## NOTE

Be particularly mindful of:

- not moving the camera during this step,
  - whether the femoral transmitter will remain visible through the entire motion,
  - whether unrestricted motion is possible (no limitations due to side support, etc.),
  - not exerting force on the pelvis through the femur,
  - avoiding any type of pelvis movement (responsibility of the surgeon) If this cannot be avoided, please see next chapter,
  - Avoidance of a hip flexion angle  $> 45^\circ$  (for O acquisition)
  - start with the position of the femur low enough, in order to allow the full upward movement until 12 o'clock position (for L acquisition)
  - starting a little in adduction allows for enough movement into abduction (for L acquisition)
  - moving the femur back to the initial position before performing the abduction (for L acquisition)
- 

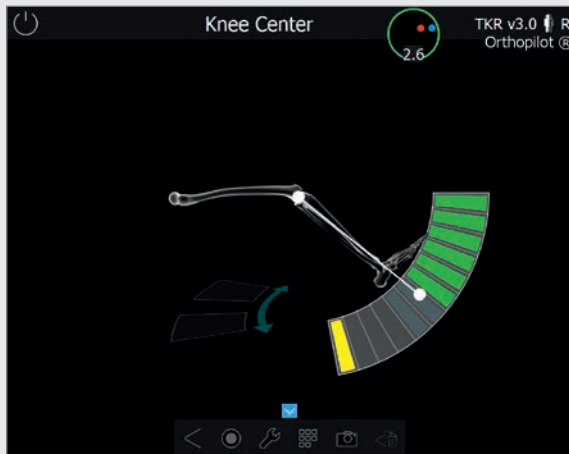


## 7.9 Optional determination of the hip joint center with pelvic reference

Registering the center of the femoral head will require a reference transmitter firmly anchored to the crista iliaca. This step can be reached via the ring menu in the step "Hip Center" choosing the arrow symbol. The mode itself is displayed in a special window with the note "Femoral head center (pelvic ref)". Perform large motions with the hip joint until the screen indicates that sufficient data has been obtained. As soon as enough data has been recorded, the program will automatically move to the next step.

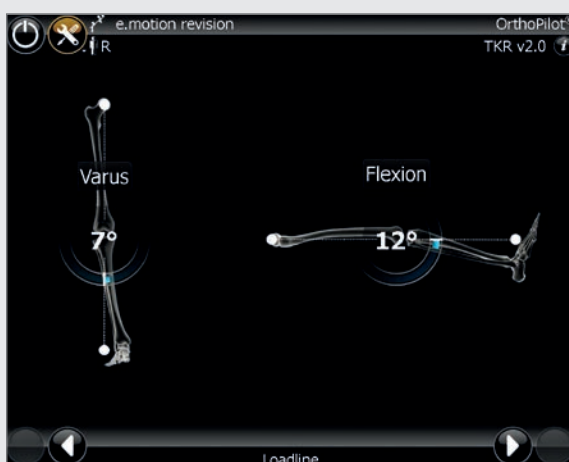
# AESCULAP® OrthoPilot® TKR

## 7 | GENERAL DATA ACQUISITION



### 7.10 Determination of the knee joint center

In this step, the program tracks the motion of the femoral transmitter in relation to the tibial transmitter and uses it to determine the center of the knee joint. The screen will display a message reading "Knee Center". Extend and flex the leg. Hold the leg with one hand in the hollow of the knee. Support with the other hand heel or ankle. Performing a tibial rotation is not absolutely essential, but it can help provide additional precision when performing a 90° bend once two arrows are being displayed on the screen. Fields filled in green indicate that the data has been recorded. Once enough measurement data has been recorded, the software will automatically move on to the next step of the program. After having covered the maximum range of motion (even without inward or outward rotation) multiple times, the user can also manually trigger the next step, e. g. in case of flexion contracture that does not allow for full extension.



### 7.11 Display of the mechanical leg axis

The following step dynamically displays the current state and position of the leg in coronal and saggittal view.

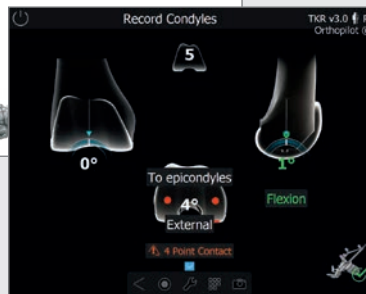
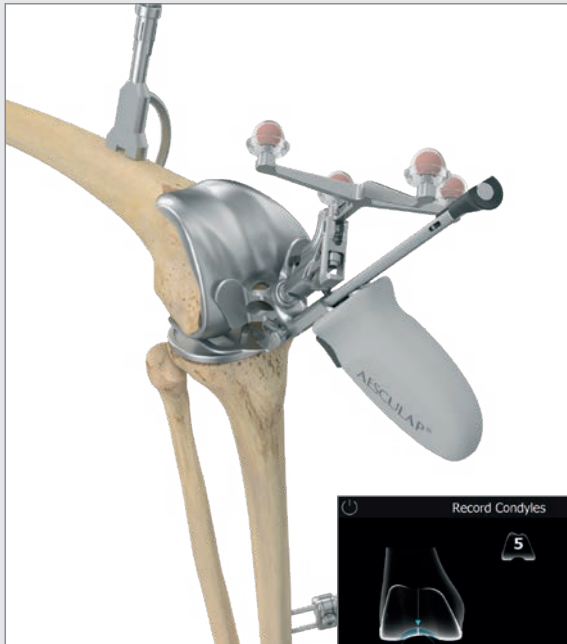
The optionally displayed graphic shows all varus/valgus leg positions in relation to the flexion angle. Adding varus or valgus stress allows the user to record the maximum values for each flexion angle. This indicates the medio-lateral stability of the knee joint, which can offer initial information on the need for a release to be carried out later on.

#### TIP

This step can serve to check the plausibility of an axis malalignment in comparison to a full-leg X-ray taken pre-operatively.







## 7.12 Record Condyles

The distal and posterior condyles are registered with the Multitool (see illustration at left). If using gesture or footswitch, it is also possible to register the distal and posterior condyles using the corresponding alignment instrument NE440R (e.motion®), NE324T (Columbus®) or NP652R (EnduRo) (with foot plates NE441RM/ NE442RM). Sagittal alignment is shown on the right-hand side of the screen. Record the data when the block is vertical to the mechanical femoral axis on the sagittal plane (i. e., the screen shows a slope of around 0°). If the epicondyles have been palpated (optional), the angle between the trans-epicondylar line and the posterior condylar line (determined using the procedure described above) will be shown in the middle of the screen. If this value is not plausible, it is advisable to re-palpate the epicondyles.

### NOTE

Four-point contact is essential!

It is used as the basis for

- recommending femoral component sizes,
- displaying extension and flexion gap measurements (in primary situation only),
- displaying cutting height for distal and posterior femoral resections and
- displaying femoral component rotation.

### NOTE FOR REVISION SITUATION

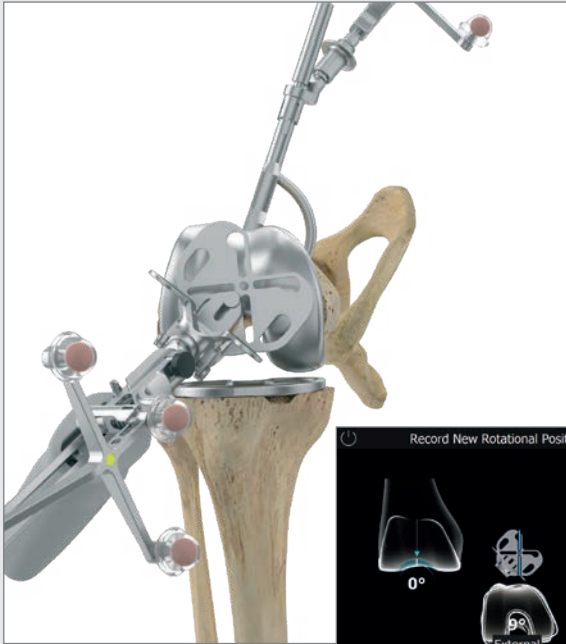
If an internal rotation of the primary implant was detected by means of a pre-operative CT image, the palpated epicondylar line consequently appears to be rotated externally in the display in relation to the implant which is rotated internally. If this value is not plausible, renewed palpation of the epicondyles is recommended. Before recording the condyles, the tibial implant, or at least the polyethylene inlay should be removed.

### NOTE FOR PRIMARY SITUATION

As 4 Point Contact is essential, you might consider the precut of the proximal tibia in order to ensure enough space to get contact between foot plate and posterior condyles.

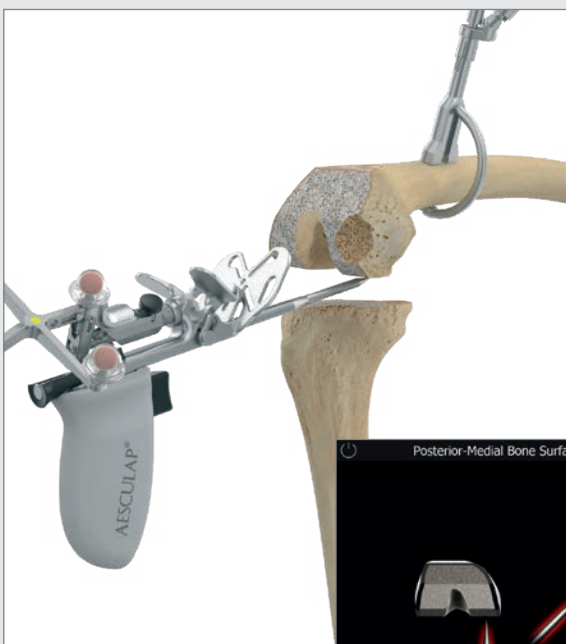
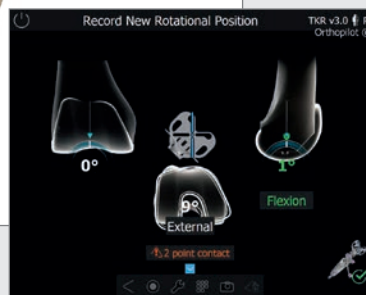
# AESCLAP<sup>®</sup> OrthoPilot<sup>®</sup> TKR

## 7 | GENERAL DATA ACQUISITION



### 7.13 Define new rotational position of the femur (optional)

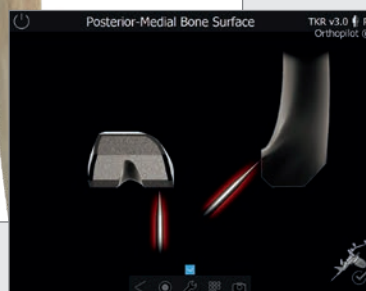
The new rotational position of the femoral revision prosthesis is adjusted using the tibia checkplate of the Multitool or any of the orientation blocks without foot-plates. This rotational value is decisive for calculation and display of anterior notching as the femoral prosthesis cannot be freely positioned in AP direction. Its position is determined by the stem position +/- implant specific offset option. The rotation value is considered in the femoral planning screen, but can also be readjusted there later on.

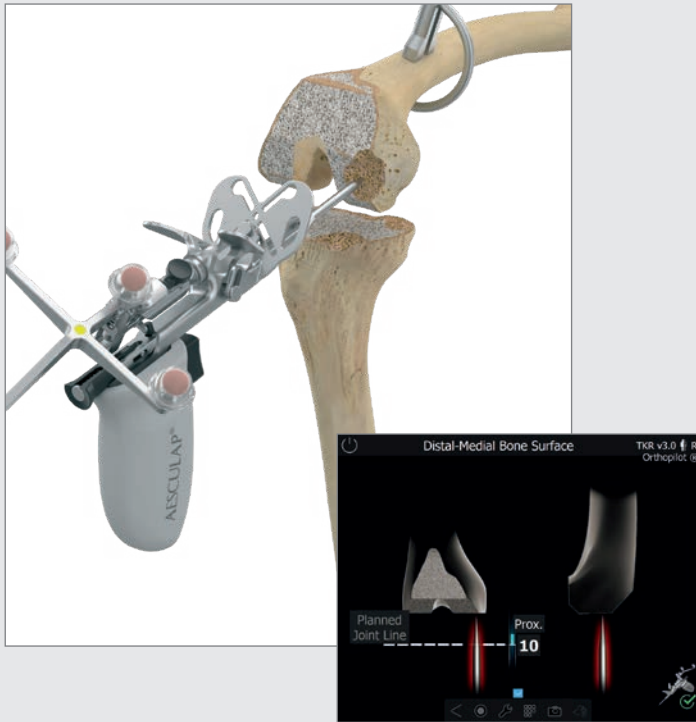


### 7.14 Recording the femoral bone

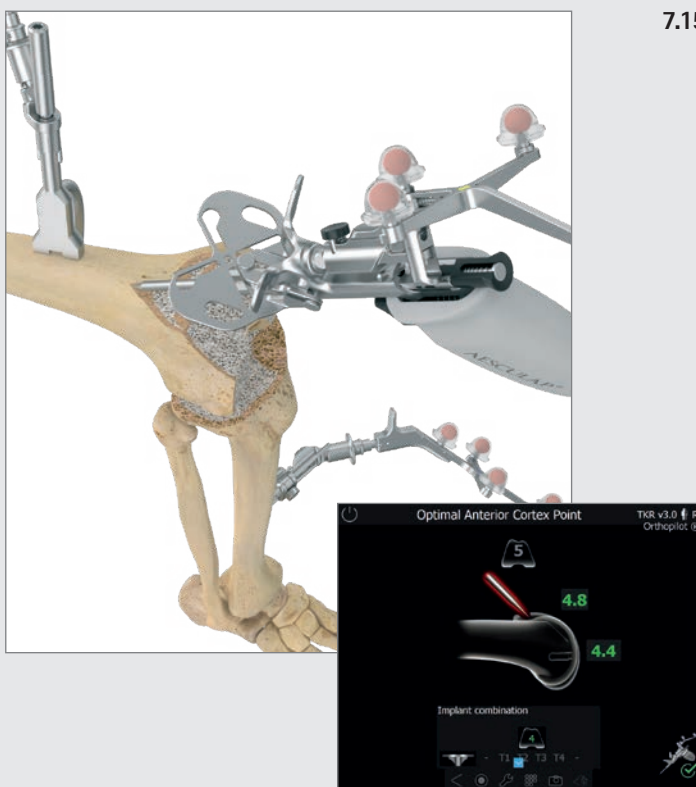
The objective of the following steps is to use the pointer tip to record the distal and posterior condylar defects for augmentation planning later on. The data are recorded in the following sequence:

- Posterior condyle, medial
- Posterior condyle, lateral
- Distal condyle, medial
- Distal condyle, lateral





The values displayed for the two distal palpations are the distances in millimeters from the respective bone palpations to the planned femoral joint line. This distance must be filled out by the implant (distal implant thickness) together with appropriate augments.



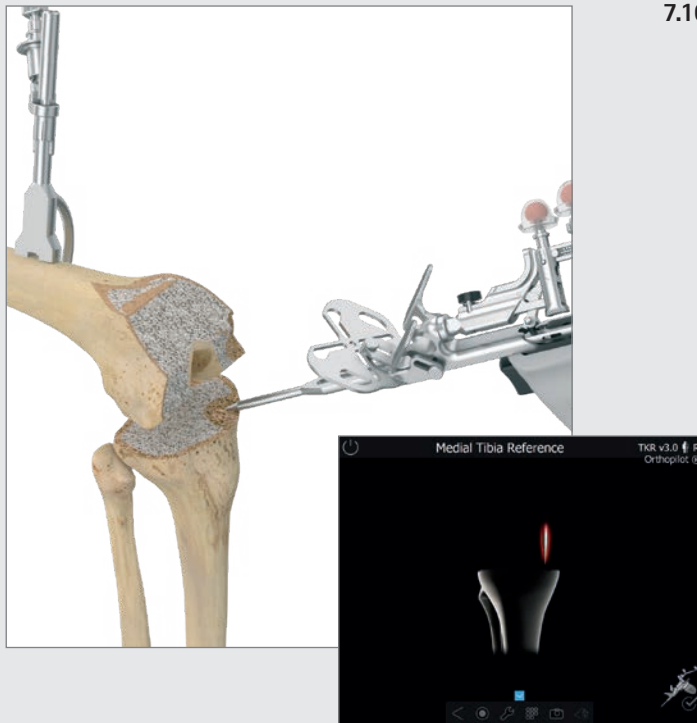
### 7.15 Optimization of the anterior cortex

After the distal and posterior condyles have been recorded, the next step is to optimize the anterior point on the femur using the pointer tip. Position the tip of the pointer near the initially recorded anterior cortex point. OrthoPilot® will guide you with blue arrows to the spot at which the A/P size of the femoral implant matches the proximo-distal dimension. The value field positioned distally to the femoral component shows the size of the femoral implant in the A/P direction. The value field above the femoral component shows the size of the femoral implant in the proximo-distal direction.

Underneath, in the center of the screen, there is a “running display” showing the corresponding femoral size when the pointer is moved proximally or distally, and indicating possible combinations with tibial sizes. These combination options are based on the implant system selected at the beginning.

# AESCULAP® OrthoPilot® TKR

## 7 | GENERAL DATA ACQUISITION

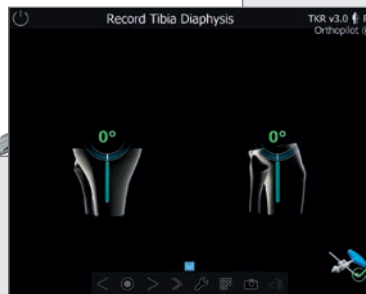
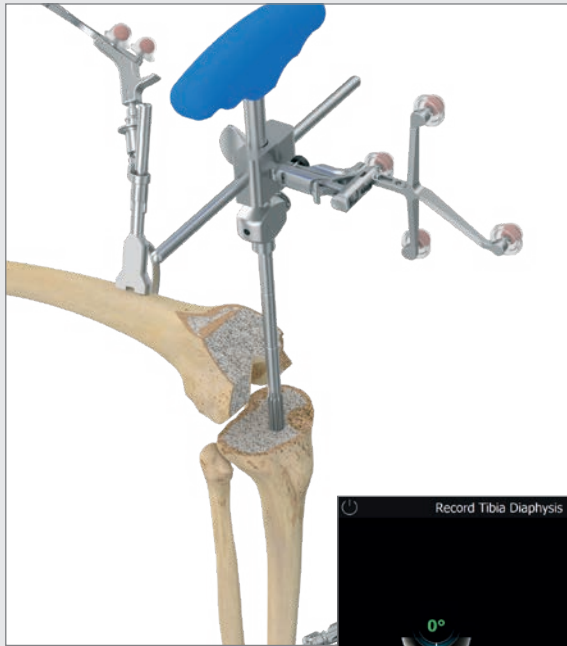


### 7.16 Recording the medial and lateral tibial bone situation

The tip of the pointer is placed on the medial tibial plateau. Then the lateral tibial plateau is recorded. For palpation, it is recommended to use significant landmarks, such as one of the lowest points of the more severely damaged side and one of the highest points of the less severely damaged side. In a later step, the position or resection height of the tibial cutting block is shown as determined by these two palpations.

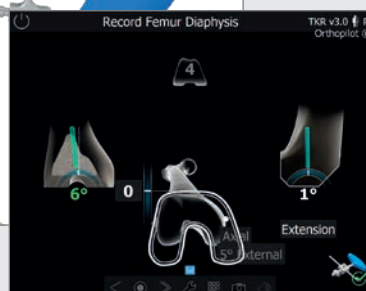
# AESCULAP® OrthoPilot® TKR

## 8 | TIBIA FIRST TECHNIQUE



### 8.1 Recording the tibial and femoral diaphysis

The deviation of the tibial intramedullary canal in relation to the mechanical axis in terms of varus/valgus angle and tibial slope can be both recorded and also modified/corrected to a minor extent via the navigation adapter NE199R equipped with the yellow transmitter and attached to the revision T-handle NE198R.



At this stage of the surgical procedure, the alignment of the femoral intramedullary canal is determined, just as for the tibia, by means of reamers of different diameters, i. e. the angle between mechanical axis and femoral diaphysis is indicated. This value in turn indicates which angled stem should ideally be selected in order to avoid ending up with a femoral distal varus or valgus cut. Corrections can also, to a minor extent, be achieved during femoral shaft preparation of the diaphysis via the different reamers which are always inserted under navigation control.

### TIP

For the target values 5°, 6° oder 7° different angled stems are available in the implant systems:  
5° and 7° cementless: Columbus® Revision, e.motion® PS Revision and EnduRo  
5° and 7° cemented: e.motion® PS Revision  
6° cemented: Columbus® Revision and EnduRo

# AESCALAP® OrthoPilot® TKR

## 8 | TIBIA FIRST TECHNIQUE



The precise resection height in relation to the bony reference points palpated on the tibia medially and laterally can be determined by moving the cutting guide in a proximal or distal direction.

The tibial cutting guide is initially fixed from the anterior side using two headless screw pins, after which the connecting element to the reamer and the reamer itself are removed. The cutting guide can now still be relocated via the available pin holes, e.g. for a step cut if this is required.

If the tibial medullary channel recording step was skipped by prolonged pressing of the pedal, the tibial cutting guide with the yellow transmitter attached can be freely navigated to the desired varus/valgus and slope value in relation to the mechanical axis, irrespective of the alignment of the tibial diaphysis or the medullary channel. The height of the tibial resection can be navigated to the points previously recorded.

At the center of the upper border of the screen, the PE inlay best suited on the basis of given resection planning for achieving the planned joint line for a possible joint line planned from the tibial side is indicated. In addition, the deviation from the planned joint line on the basis of given cutting template alignment and the PE inlay indicated appears centrally in the middle of the screen.

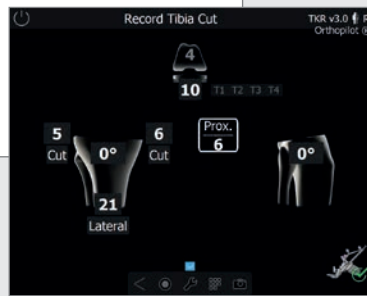
When the desired resection height has been set, the cutting guide is additionally fixed medially and laterally via oblique headed pins, and the resection can then be performed.

### TIP

In order to avoid contamination of the marker spheres on the transmitters, it is advisable to either remove the transmitters or to cover them appropriately until resection has been completed.

### 8.2 Tibial plateau resection

Reamers from the e.motion®, Columbus® or EnduRo instrument set are inserted gradually and this is continued until the desired length and diameter is reached under continuous navigation control with respect to varus/valgus angle and slope. The revision T-handle NE198R with navigation adapter NE199R is removed. The 0° tibial connection sleeve NE190R can then be attached to the stem. Depending on which leg, left or right, is being operated on, the yellow transmitter is either attached directly to the tibial cutting guide – for e.motion® and EnduRo: NE196R for the right leg, NE197R for the left leg – or, for Columbus®, to the adapter NE162R which is attached to either of the cutting guide NQ651R (right leg) or NQ650R (left leg). The connecting element NE171R is used to establish connection through the respective sawing slit with the 0° tibial sleeve attached to the reamer. Due to the connection to the intramedullary reamer which is fixed in position, the varus/valgus angle and the tibial slope can no longer be modified.



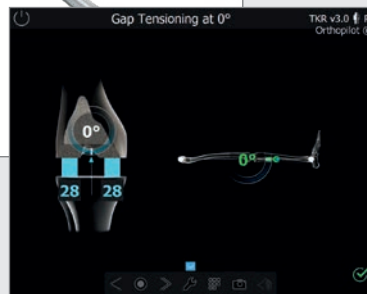
### 8.3 Checking tibial resection

The tibia check plate of the Multitool (or tibia check plate NP617R/ NP617RM) is used with the yellow transmitter to check and record the tibial resection. The actual position and orientation of the resection plane in relation to the mechanical axis (with respect to varus/valgus angle and tibial slope) will be shown on the screen. As soon as the check plate is stable, values can be recorded. The data recorded when checking the tibial resection will be used in later calculations, which is why it is essential that the value has to be re-recorded if any tibial resections are performed later on.

If augmentation of the tibia is intended, either medially or laterally or even on both sides, it is mandatory during this step to put the appropriate trial augmentations underneath the tibia check plate before performing the measurement. If joint line planning from the tibial side was performed, the PE inlay that suits best for achieving the planned joint line is indicated at the center of the upper part of the screen. As central information, the deviation from the planned joint line appears in the center of the screen.

# AESCULAP® OrthoPilot® TKR

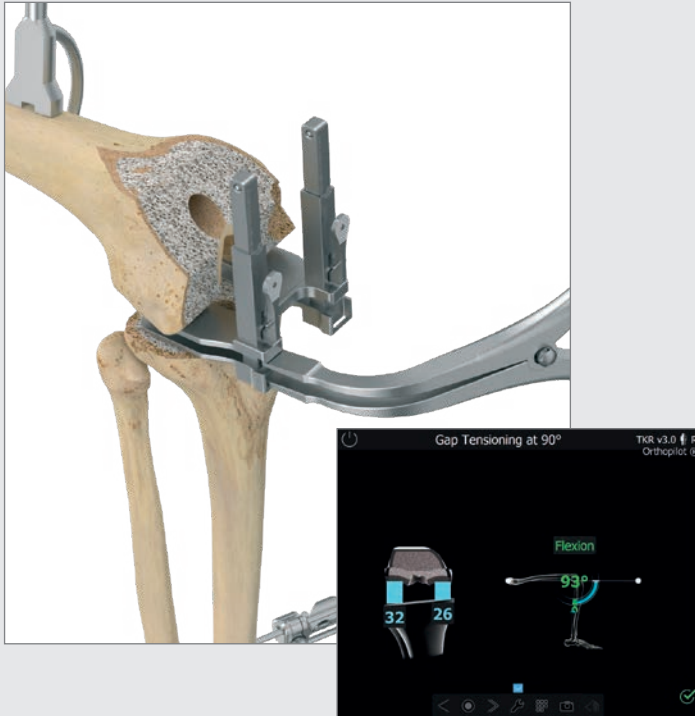
## 8 | TIBIA FIRST TECHNIQUE



### 8.4 Measuring the joint gap in extension and flexion

Before measuring flexion/extension gaps, remove any osteophytes that could affect ligament and capsular tension. With the leg extended as far as possible ( $0^\circ \pm 5^\circ$ ) place the distractor (NE750R) between the tibial resection and the distal femoral condyles, and then spread using the spreading pliers (NP609R or NP605R), applying equal medial and lateral force. To ensure precise measurement, the plates of the distractor must be flush with the tibial resection plane. The OrthoPilot® screen will show the medial and lateral gap measurements in millimeters and the mechanical leg axis in degrees (which provides initial information about potential ligament release), as well as the degree of flexion. Once this data has been recorded, release the distractor and bend the leg at a  $90^\circ$  angle. Measurements can be taken as long as the leg is in the flexion position marked in green. Make sure to keep the leg as stable as possible during the measurement process. Real-time gap values will be shown on the tibia in blue. By recording the values, the software takes you into the next step. In this step, it is possible to skip completely the distraction and the femoral planning steps by choosing the double forward arrow in the toolbar or the ring menu, or by doing a long footswitch press (see chapter 5.3).





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#### TIP IN CASE OF REVISION SITUATION:

In revision the gap distances represent the distance from the recorded tibial resection surface to the defects recorded on the medial and lateral distal as well as posterior condyles. On the tibial side a preparation plateau can be placed underneath the distractor preventing possible sinking of the distractor plates into the weak bone. If application of the distractor on the femoral side should prove difficult, a femoral trial prosthesis could be attached here, and distraction could thus be carried out against the femoral trial prosthesis. The gap distances indicated on the OrthoPilot® screen remain unaffected, regardless of whether the distraction procedure is carried out with or without tibial preparation plateau and/or trial femur.

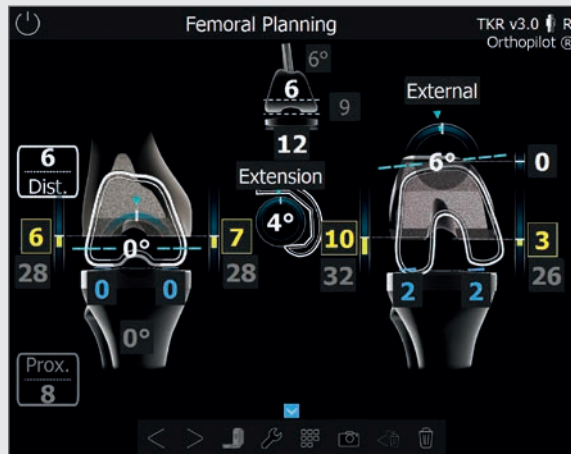
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Data is recorded in this step using the same process as described for extension.

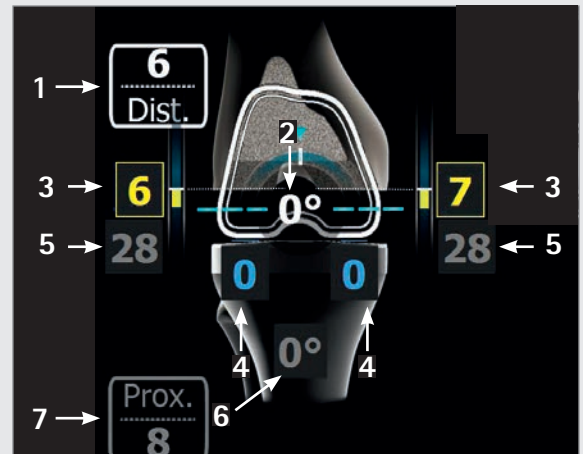
It is always possible to redo these gap measurements (e. g., following a ligament release) using the software's back and delete functions.

# AESCULAP® OrthoPilot® TKR

## 8 | TIBIA FIRST TECHNIQUE



Femoral planning screen exemplary illustrating a revision situation



### In extension

- 1 Information on proximal / distal joint line shift (6 mm here), starting from either the most prominent distal condyle recorded during the "condyle reference" step or the initially planned jointline. Displaying the joint line is optional. It can be switched on or off in the options screen and /or the jointline planning screen.
- 2 Varus/valgus display ( $0^\circ$  here), indicated with the arch in the femur and the number given in degrees.
- 3 Distal femoral cutting height (here: 6 mm distance from lateral defect point, 7 mm distance from medial defect point), indicated using yellow bars and yellow numbers. If an actual bone cut is planned (no defect), the figures are displayed in white with blue bars.
- 4 Remaining extension gap after planned position of femur implant components (here: 0 mm lateral, 0 mm medial), indicated using blue bars and blue numbers. If the remaining gap values are negative, they will be shown using yellow bars and yellow numbers. Clinically speaking, a negative /yellow gap value means stretching of the soft tissue (e. g., ligaments).
- 5 The grey numbers (here: 28 mm lateral and 28 mm medial) are non-changeable reminder values based on the ligament tension measured in extension.
- 6 Reminder of recorded tibial resection (here:  $0^\circ$  varus).
- 7 Tibial joint line shift (starting from the most proximal reference point recorded or relative to the planned tibial joint line in the step joint line planning); here: 8 mm proximal.

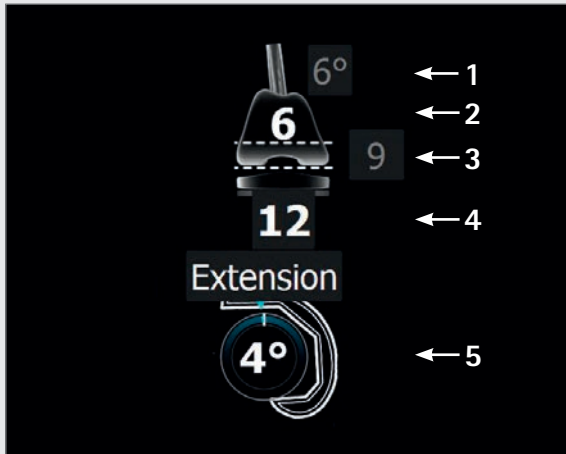
### 8.5 Femoral Planning

#### TIP

Yellow values in the cutting height display indicate that cutting is performed above the respective reference points recorded at the distal and posterior condyles, i.e. no bone is actually resected. The yellow value also shows the distance from the palpated bony reference point of the respective condyle to the rear surface of the femoral implant which must be filled up with cement or with augments.

#### TIP

When elements on the planning screen are selected using the virtual mouse pointer, various control symbols (plus and minus symbols, rotation arrows) will appear; they can be operated using the control options described in chapter 5.



#### Display and control elements (center)

- 1 Stem-reminder from the reamer navigation step in the grey ellipse, here 6°.
- 2 Femoral implant of size 6.
- 3 Distal implant thickness of 9 mm.
- 4 Total height of the tibial component (metal plate with PE inlay), here 12 mm.
- 5 Femoral component extension/flexion display; here: 4° extension.

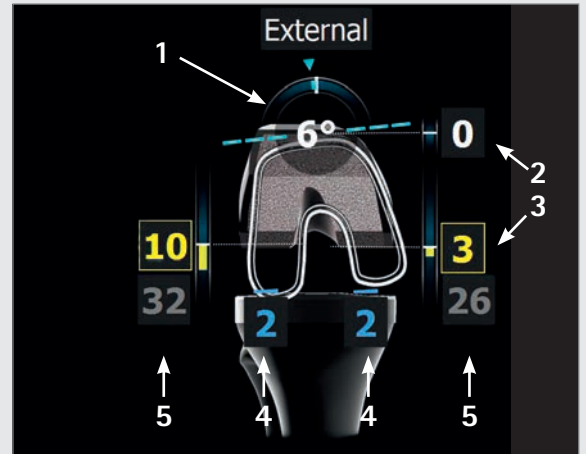
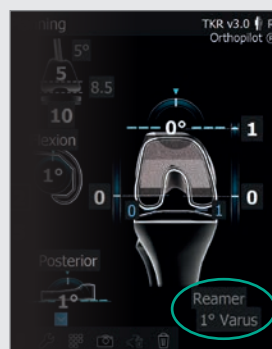
#### NOTE FOR STEMS FIRST WORKFLOWS

As soon as extension/flexion or varus/valgus are changed, the corresponding reminder values of previously recorded reamer positions appear on screen. They remind the limitations regarding tuning these angles, given by the reamer/stem position. (see following screens A and B)

Screen A



Screen B

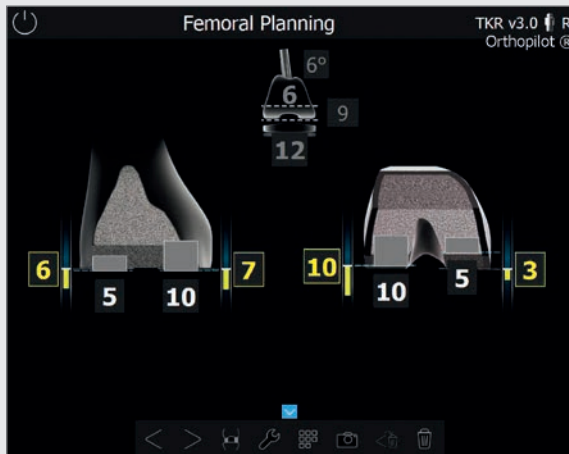


#### In flexion

- 1 Rotation (here: 6° external rotation to the posterior condyles recorded (primary case) or posterior condyles of primary implant (revision case)), indicated using the arch in the femur and a number in degrees.
- 2 Anterior cutting height (here: 0 mm in relation to the anterior cortex point palpated (the location of the anterior femoral shield to that measured point). If the femoral shield would end up underneath that palpated point (notching), the number will turn red (see chapter 7.2 and chapter 7.15).
- 3 Posterior femoral cutting height (here: 10 mm distance from defect point lateral, 3 mm distance from defect point medial), indicated using yellow bars and yellow numbers. If an actual bone cut is planned (no defect), the figures are displayed in white with blue bars.
- 4 Remaining flexion gap following planned position of implant components (here: 2 mm lateral and 2 mm medial), indicated using blue numbers and blue bars, or yellow numbers and bars if the remaining flexion gap is negative. Clinically speaking, a negative or yellow gap value means stretching of the soft tissue (e. g., ligaments).
- 5 The grey numbers (here: 32 mm lateral and 26 mm medial) are non-changeable reminder values based on the ligament tension measured in flexion.

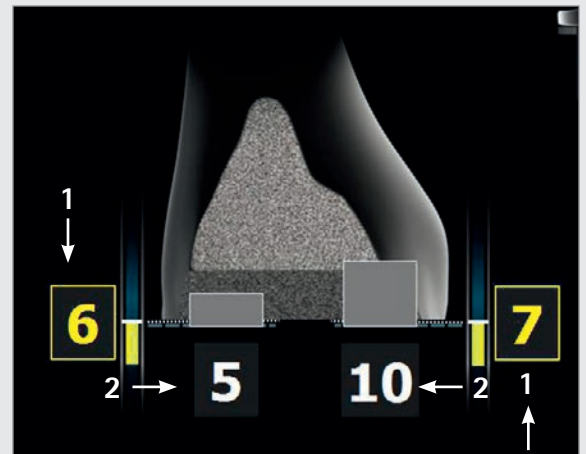
# AESCULAP® OrthoPilot® TKR

## 8 | TIBIA FIRST TECHNIQUE



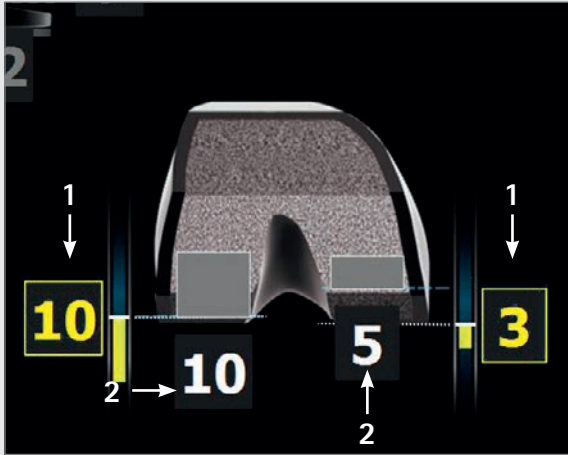
### 8.6 Augmentation planning

Augmentation planning is accessed via the "Augmentation" button of the ring menu. Yellow bars and numbers represent negative bone cuts, i. e. resection is carried out distal to the defect point, which can indicate that an augment needs to be used.



### In extension

- 1 Resection height, here 6 mm distance from the defect point lateral and 7 mm distance from the defect point medial.
- 2 Selected distal augments, here 5 mm lateral and 10 mm medial.



#### In flexion

- 1 Cutting height of the posterior femoral condyle, here 10 mm distance from the defect point lateral and 3 mm medial.
- 2 Selected posterior augments, here 10 mm lateral and 5 mm medial.

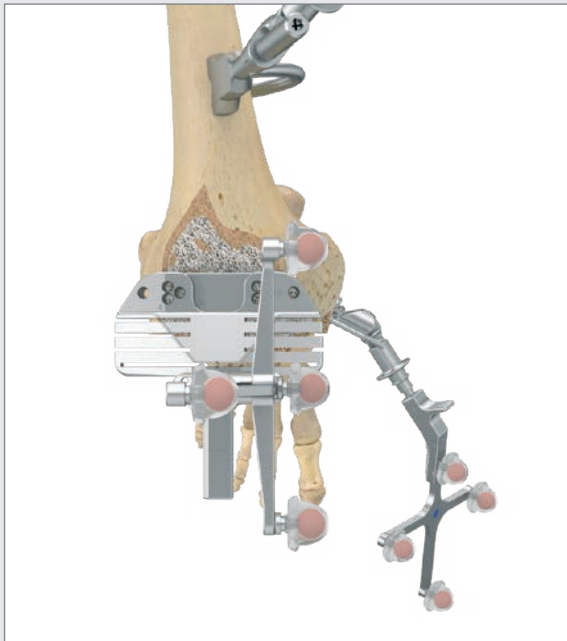


#### Display elements (center)

- 1 Stem reminder from the reamer navigation step in the grey ellipse, here 6°.
- 2 Size 6 femoral implant.
- 3 Distal thickness of the implant, here 9 mm.
- 4 Total height of the tibial component (metal plate with PE inlay), here 12 mm.

# AESCULAP® OrthoPilot® TKR

## 8 | TIBIA FIRST TECHNIQUE



### 8.7 Distal femoral resection

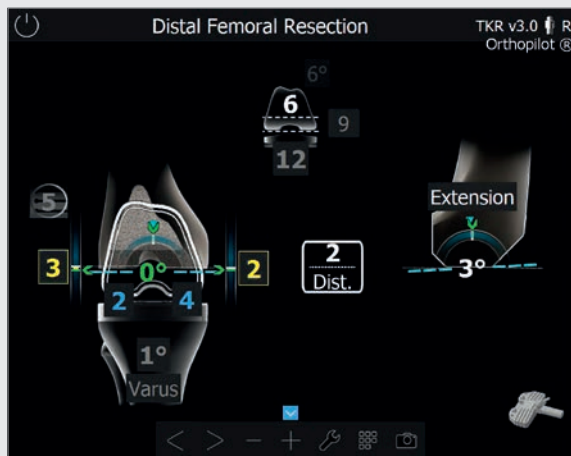
Attach the corresponding yellow transmitter to the distal femoral cutting block NE200R (e.motion® and EnduRo) or NQ704R (Columbus®). The precise resection plane in relation to the medial and lateral distal condyles recorded on the native femur ("Record condyles") or in a revision case on the bone (distal medial and lateral bone palpations) is determined by moving the cutting block in the proximal or distal direction. Users obtain additional information about the joint line shift in relation to the previously planned joint line.

Target values are the values selected during femoral planning. Once these values are attained in terms of varus/valgus angle, resection plane, and slope, the values will turn green. The distal cutting jig can be oriented freehand to the target values or as an option guided by the intramedullary reamer. Therefore the corresponding angled sleeve, complying to the display of the indicated stem at the center on top of the screen, here 6°, is attached to the last pressfit sitting intramedullary reamer. With the help of the connecting element NE171R, the cutting guide is connected via the cutting slot to the 5°, 6° or 7° sleeve attached to the reamer. Due to the connection to the intramedullary reamer which is fixed in position, the varus/valgus angle and the slope can no longer be modified and it is only necessary to adjust the cutting height to the target values.

If the step "Recording the femoral diaphysis" was skipped, the distal femoral cutting guide with the yellow transmitter attached can be freely navigated to the desired varus/valgus and slope value in relation to the mechanical axis. The alignment of the femoral diaphysis and the medullary canal are not taken into account in this procedure.

#### TIP

To prevent contamination of the marker spheres on the transmitters, it is advisable to either remove the transmitters or cover them until the resection is finished.

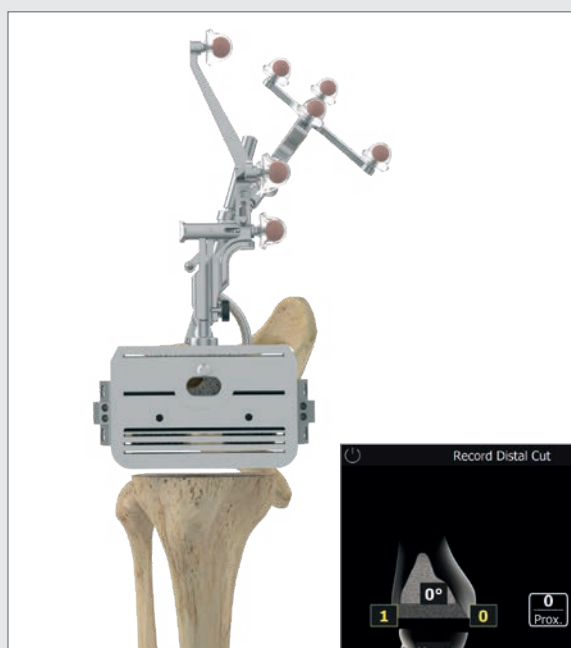


The femoral cutting guide is initially fixed from the anterior side using two headless screw pins, after which the connecting element to the reamer and the reamer itself are removed. The cutting guide can now still be relocated via the available pin holes.

When the desired resection height has been set, the cutting guide is additionally fixed medially and laterally via oblique headed pins, and the resection can then be carried out through the indicated cutting slots in grey, here 5 mm lateral.

**TIP**

The cutting slot labelled "0" is decisive for regular resection, and the 4 or 8 mm slot (e.motion® and EnduRo) or the 5, 10 or 15 mm slots (Columbus®) must be selected in cases where augments are needed. For 12 mm augments in e.motion®, the cutting guide can be shifted proximally by a further 4 mm via the existing holes.

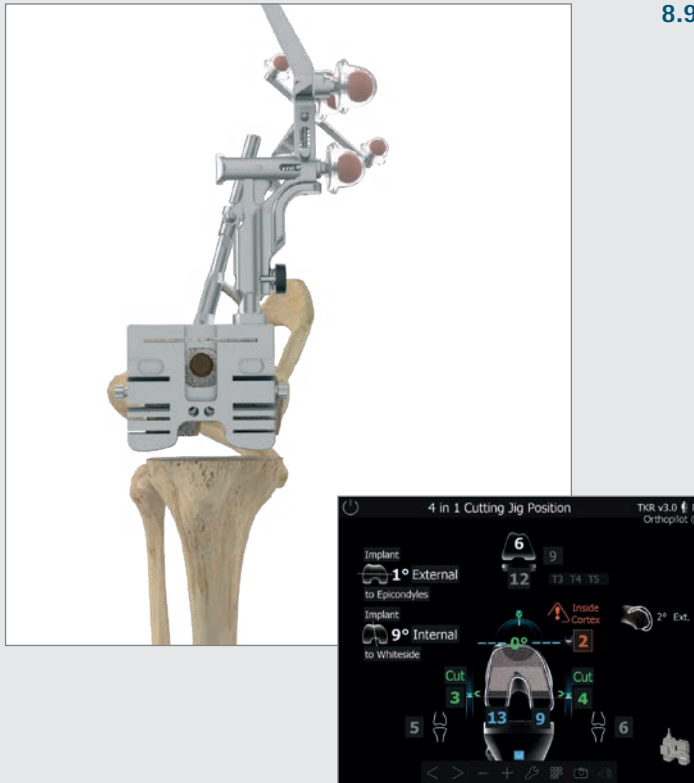


**8.8 Checking distal resection**

After completing the distal femoral resection, check the resection plane using the corresponding 4-in-1 cutting blocks, NE 722R-NE 728R (e.motion®) or NQ 721R-NQ 728R (Columbus®) or NM 731R-NM 733R (EnduRo).

# AESCULAP® OrthoPilot® TKR

## 8 | TIBIA FIRST TECHNIQUE



### 8.9 Setting rotation and A/P positioning

Rotation and A/P position is set using the 4-in-1 cutting block. The rotation value is displayed in relation to the recorded posterior condyles, either native or primary implant. The A/P position in relation to the anterior cortex as well as the posterior cutting height (referring to the cutting slot marked 0) and the resultant remaining gaps is displayed. Once the desired rotation and A/P position has been attained, the corresponding cutting block for the femoral size can be fixed distally in the bone with two pins. The reamer can be removed via the 4-in-1 cutting block, provided its diameter does not exceed 16 mm. For larger diameters, the cutting block must be removed for removal of the reamer and must subsequently be refitted onto the two pins. The cutting block is thereupon additionally fixed from the medial and lateral side using pins through the convergent holes. After that, proceed with resections: first anterior, then posterior, then chamfer. After completing the resections, proceed with implantation – starting with trial implants, and then moving to final implants. Instrumentation and implant assembly is implemented as described in the manual surgical techniques and instructions for use of e.motion® PS/Revision Columbus® Revision or EnduRo, respectively.

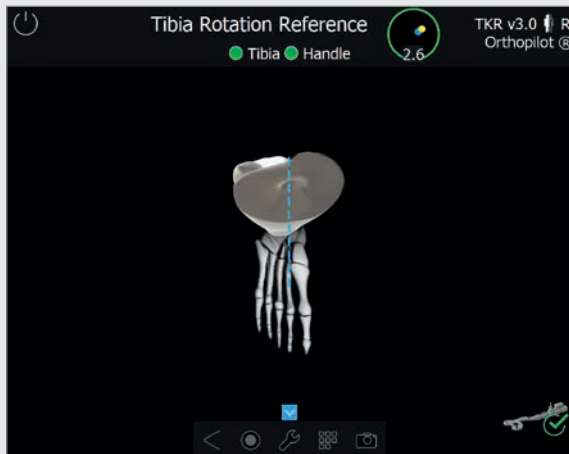
#### TIP

Regarding rotation, users have the option of running a comparison to the palpated epicondyles and/or the Whiteside line (optional, see chapter 6.1). The corresponding information will be displayed at the left edge of the screen. In addition to the planned femoral size, the screen will display possible tibial implant combinations based on the prosthesis system selected. The slope and/or extension/flexion angle of the distal resection will also be shown on the right-hand side of the screen. The femoral size can be adjusted at this stage if desired.

#### TIP

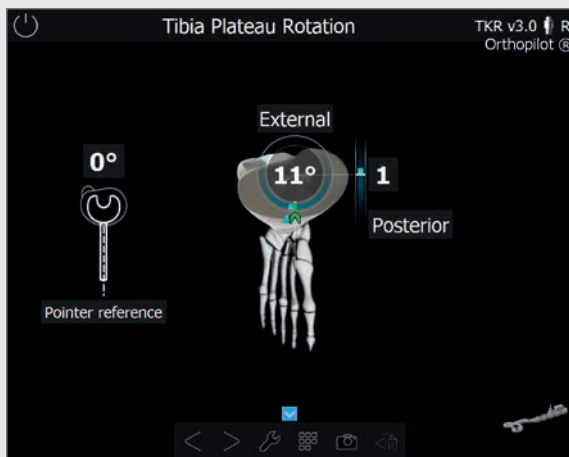
The posterior cutting slots to be used in grey appear on the screen if augmentation planned beforehand in the software. The cutting slots marked 4 or 8 mm (e.motion®, EnduRo), or 5, 10 or 15 mm (Columbus®) can be selected. For 12 mm augmentations at the posterior condyles in e.motion® and EnduRo, a special cutting guide from the manual instrument set must be used (NE721R for e.motion® F4-F6 and NE739R for e.motion® F7/F8 and NP431R for EnduRo F2 and F3) which is applied and fixed to the anterior cut surface after the anterior cut and the two oblique cuts have been performed.





### 8.10 Tibia Rotation Reference (optional)

The trial tibial plateau and the tibial handle (NQ378R) can be used along with the navigation adapter (NP1017R) to record a reference position. Selected examples include anatomical coverage of the tibial plateau, or positioning the trial tibial plateau after moving the leg into a deep bend or full extension. With the latter, in particular, make sure to position the femoral transmitter such that it will not conflict with other instruments.

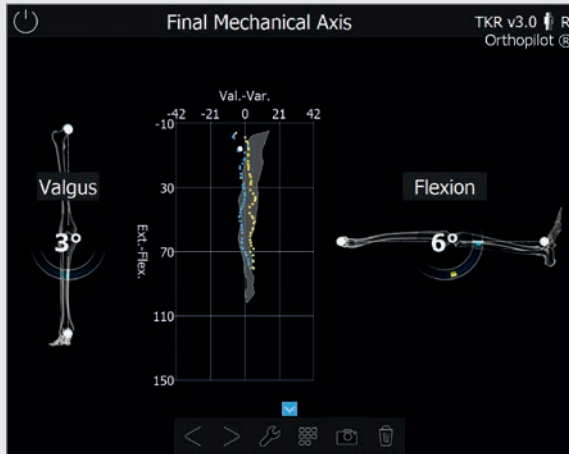


### 8.11 Setting tibial rotation (optional)

Use the tibial handle with mounted navigation adapter (NP1017R) and the corresponding transmitter (FS633 / FS636) to navigate the position of the tibial plateau in relation to one or both of the previously recorded references (see chapter 7.5 / chapter 8.10). If both references are selected (optional), a separate window on the left will show the deviation to the pointer reference. The indicator in the middle of the screen will then show the deviation to the plateau reference just recorded, including A/P shift.

# AESCULAP® OrthoPilot® TKR

## 8 | TIBIA FIRST TECHNIQUE



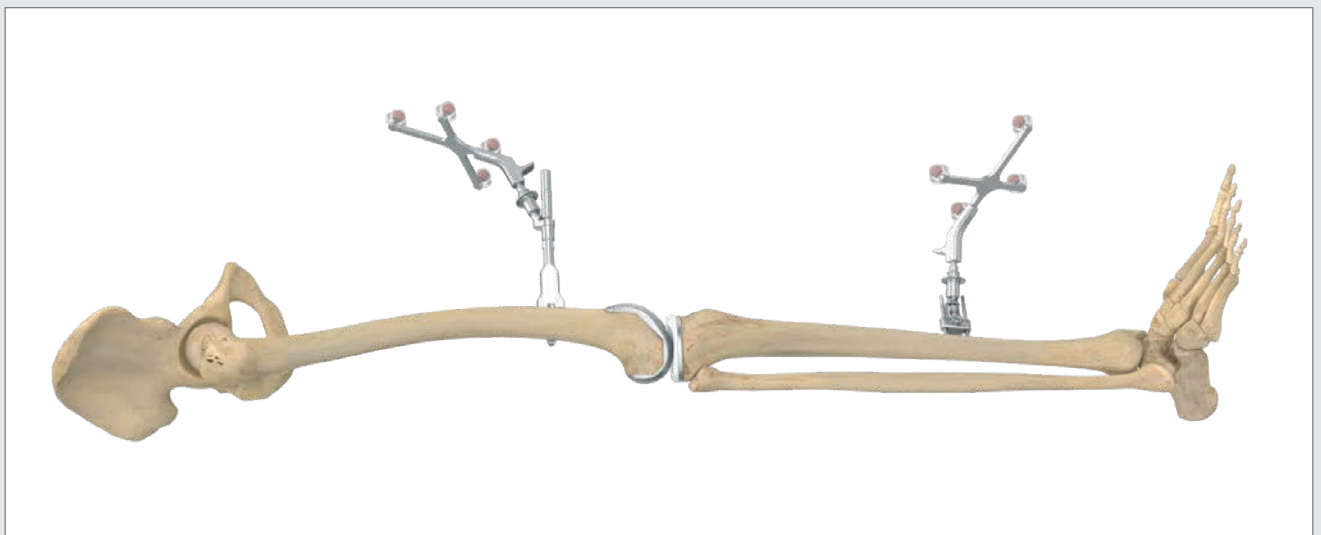
### 8.12 Mechanical Axis

The mechanical axis (varus/valgus angle) and maximum possible leg extension/flexion achieved can be checked intraoperatively using trial implants, and then post-operatively using the final implants. This gives users documented results of the surgery, which can be added to the patient's medical record if desired. The optionally displayed graphic shows all varus/valgus leg positions based on the flexion angle. Adding varus or valgus stress allows the user to record the maximum values for each flexion angle. This indicates the medio-lateral stability of the knee joint. The initial situation recorded during pre-op mechanical axis step (chapter 7.11) is displayed as background in grey.



### 8.13 Summary

The final screen summarizes the main steps of the operation. It shows information regarding the resections performed, the navigation time required, the implants used, and the pre- and post-operative mechanical axes. It also provides a commentary field for any additional notes and comments on the operation.

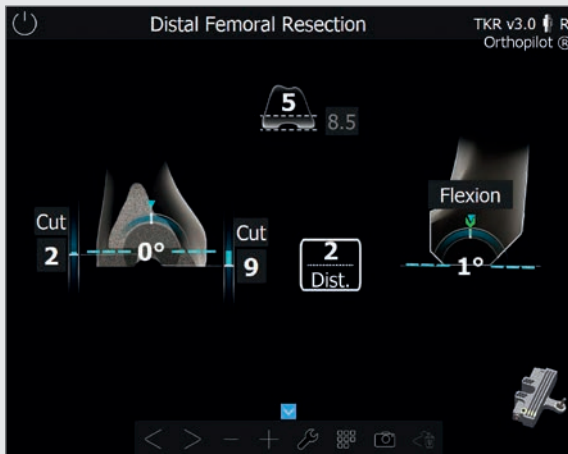


# AESCULAP® OrthoPilot® TKR

## 9 | FEMUR FIRST-TECHNIQUE

### NOTE

Please consider all steps up to and including chapter 8.1 and then continue with steps starting with chapter 9.1.



### 9.1 Distal femur resection see chapter 8.7 (tibia first workflow)

Differences with femur first:

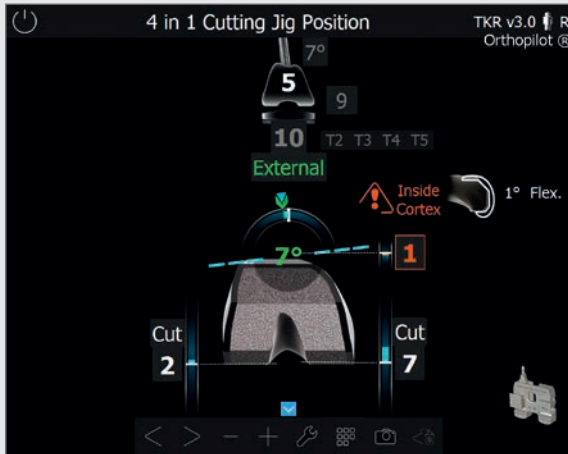
- No target values shown, as femoral planning has not been carried out.
- No gap information displayed as gaps have not been measured.



### 9.2 Checking distal resection see chapter 8.8 (tibia first workflow)

# AESCULAP® OrthoPilot® TKR

## 9 | FEMUR FIRST-TECHNIQUE



### 9.3 Setting rotation and A/P positioning see chapter 8.9 (tibia first technique)

Differences with femur first:

- No gap information displayed as gaps have not been measured
- No femoral planning took place, so no target values from the planning stage are shown.
- The rotation value in relation to the posterior condyles turns green as soon as it corresponds to the previously recorded position according to Whiteside, i. e. the Whiteside display in the upper left corner shows 0°.

#### NOTE

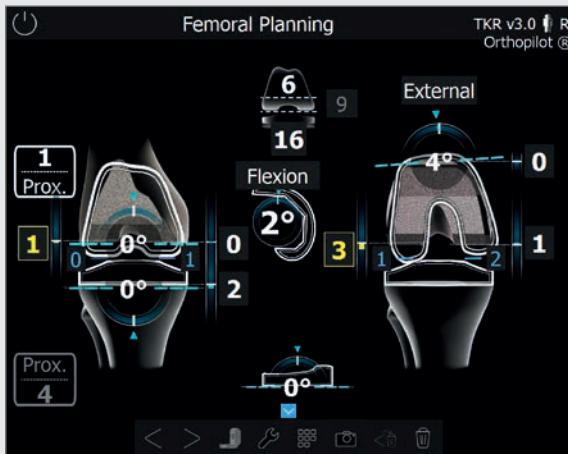
After preparation of the femur, the procedure is continued by following the steps described in chapters 8.2, 8.3 and chapter 8.10 until 8.13.

# AESCULAP® OrthoPilot® TKR

## 10 | PLANNING FIRST WORKFLOW

### NOTE

Please follow all steps of tibia first workflow but skipping the tibia cut.



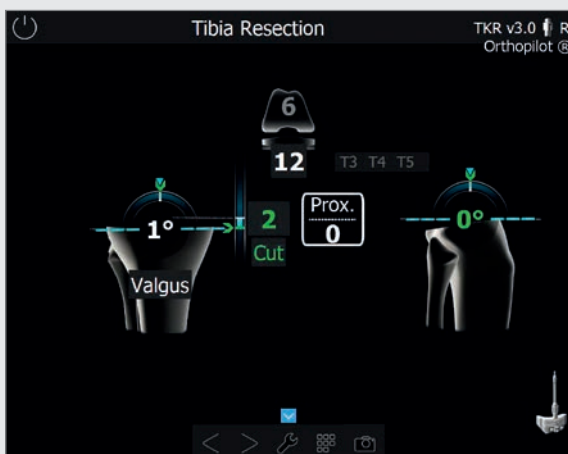
### 10.1 Planning screen

Difference in planning first workflow:

The planning screen allows to plan also the tibia resection in addition regarding:

- varus/valgus orientation
- anterior/posterior slope
- cut height (tibia jointline shift)

The interpretation of values displayed and colours corresponds to the descriptions in Tibia first workflow, chapter 8.5.



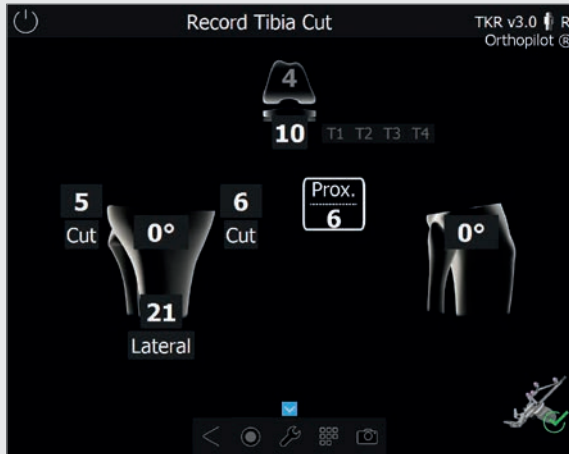
### 10.2 Tibia resection

Difference in planning first workflow:

Based on the previous planning screen, target values for the previously planned tibia cut will appear and turn green, when reached.

# AESCULAP® OrthoPilot® TKR

## 10 | PLANNING FIRST WORKFLOW



### NOTE

After the tibia resection please follow the steps according to tibia first workflow starting with chapter 8.7 distal femoral resection until chapter 8.13 summary.

### 10.3 Record tibia cut see chapter 8.3 (tibia first workflow)

Cuts first option:

Whenever cuts first option is selected instead of stems first, independent from primary or revision situation and independent from the chosen workflow (tibia, femur or planning first), the reamer navigation step is performed at the end of the workflow.

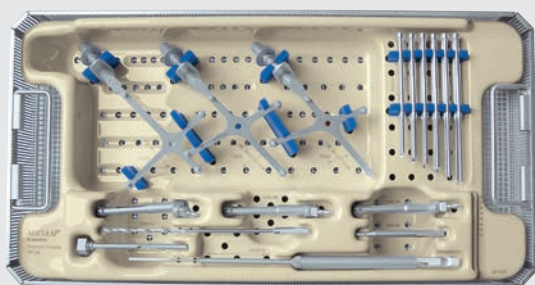
Particularly noteworthy in reamer navigation screens after both femur and tibia cuts having been recorded beforehand, is that target values are displayed in green depending on previously recorded distal femur and proximal tibia cut as a guidance for the reamer/stem position.



# AESCLAP® OrthoPilot® TKR

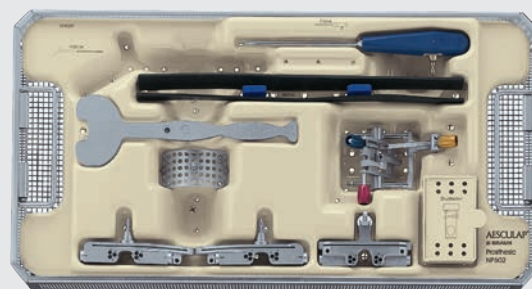
11 | INSTRUMENT-SET OVERVIEW OrthoPilot® TKR e.motion®

## 11.1 OrthoPilot® TKR e.motion®



### OrthoPilot® TKA V4.0 PERIPH.INSTR.PASSIVE NP168

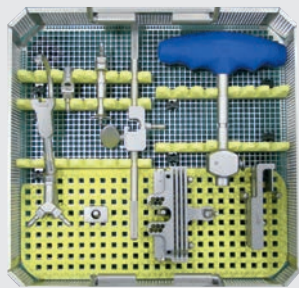
NP169P	OrthoPilot® TKA V4.0 TRAY PERIPH.PASSIVE	1
JF213R	1/1 SIZE PERF BASKET 485X253X76MM	1
JF511	CLOTH F.LINING DEEP CONTAINERS	1
FS633	OrthoPilot® PASSIVE TRANSMITTER (YELLOW)	1
FS634	OrthoPilot®T PASSIVE TRANSMITTER (BLUE)	1
FS635	OrthoPilot® PASSIVE TRANSMITTER (RED)	1
NP615R	BICORTICAL SCREW DRILL BIT 3.2MM DIA.	1
NP281R	OrthoPilot® SCREW LENGTH GAUGE	1
NP616R	BICORTICAL SCREW DRILL GUIDE 3.2/100MM	1
NP618R	RB SCREW DRIVER ON MOTOR	1
NP619R	OrthoPilot® TRANSMITTER MOUNTING SLEEVE	3
NP620R	OrthoPilot® BICORTICAL SCREW 30MM	2
NP621R	OrthoPilot® BICORTICAL SCREW 35MM	2
NP622R	OrthoPilot® BICORTICAL SCREW 40MM	2
NP623R	OrthoPilot® BICORTICAL SCREW 45MM	2
NP624R	OrthoPilot® BICORTICAL SCREW 50MM	2
NP625R	OrthoPilot® BICORTICAL SCREW 55MM	2
TA011029	INSTRUCTIONS FOR PASSIVE RIGID	1
TE899	PACKING STENCIL F/NP169P (NP168)	1



### OrthoPilot® TKA V4.0 SET PROSTH.INSTR. NP602

NP603P	PROSTHESIS INSTRUMENTS MOLDED TRAY #2	1
JF213R	STANDARD DIN PERF BASKET 485X253X76MM	1
FS604	OrthoPilot® STRAIGHT POINTER	1
NP617RM	OrthoPilot® CUT CHECK PLATE	1
NP596R	TIBIAL CUTTING BLOCK RIGHT (NAV)	1
NP597R	TIBIAL CUTTING BLOCK LEFT (NAV)	1
NP598R	FEMORAL CUTTING BLOCK DISTAL (NAV)	1
NP608R	OrthoPilot® UNIVERSAL POSITIONING GEARS	1
NM769R	OrthoPilot® TRANSMITTER FOOT PLATE	1
NM743	OrthoPilot® ELASTIC FOOT STRAP	2
JF511	CLOTH F.LINING DEEP CONTAINERS	1





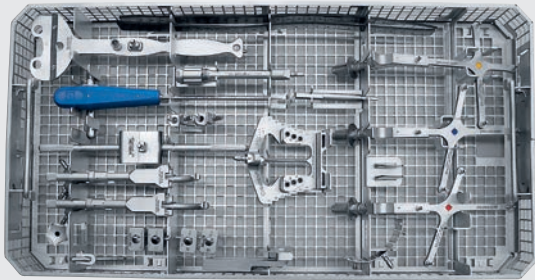
**e.motion® PS/REV NAVIG.INSTR.COMPLEM.SET  
NE194**

NE191R	REVISION FEMUR RIGID BODY ADAPTER LARGE	1
NE192R	REVISION TIBIA RIGID BODY ADAPTER	1
NE199R	REVISION NAVIGATION ADAPTER F/T-HANDLE	1
NE190R	SLIDING LINK BLOCK 0° F/TIBIA CUTT. GUIDE	1
NE200R	e.motion® PS/REV DISTAL CUTT.GUIDE NAVIG.	1
NE171R	REVISION ADAPTER F/DISTAL CUTTING GUIDE	1
TA020007	USER MANUAL FOR KNEE-INSTRU- MENTS	1
TA020011	INSTRUCTION MANUAL	1
NE193R	e.motion® PS/REV TRAY F/NE194	1
NE198R	REVISION NAVIGATED T-HANDLE	1
NE163R	REVISION FEMUR RIGID BODY ADAPTER SMALL	1
NE292R	REVISION SCREW TAP F/TIBIA RB-ADAPTER	1

# AESCALAP® OrthoPilot® TKR

11 | INSTRUMENT-SET OVERVIEW OrthoPilot® TKR Columbus®

## 11.2 OrthoPilot® TKR Columbus®

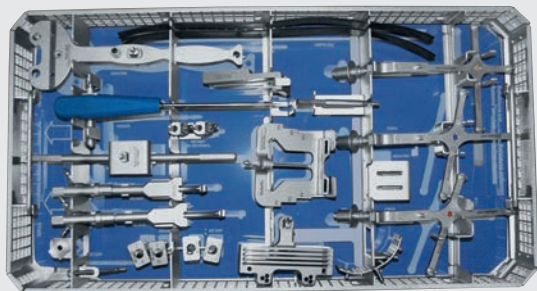


### Columbus® PS/REV NAV.INSTR.COMPLEM.PASS. NQ594

NE191R	REVISION FEMUR RIGID BODY ADAPTER LARGE	1
NE163R	REVISION FEMUR RIGID BODY ADAPTER SMALL	1
NE192R	REVISION TIBIA RIGID BODY ADAPTER	1
NE199R	REVISION NAVIGATION ADAPTER F/T-HANDLE	1
NE190R	SLIDING LINK BLOCK 0° F/TIBIA CUTT. GUIDE	1
NE171R	REVISION ADAPTER F/DISTAL CUTTING GUIDE	1
NE445R	e.motion® INSERT 5° FEM.ALIGNMENT BLOCK	1
NE446R	e.motion® INSERT 6° FEM.ALIGNMENT BLOCK	1
NE447R	e.motion® INSERT 7° FEM.ALIGNMENT BLOCK	1
NE324T	Columbus® FEM ORIENTATION BLOCK (NAV)	1
NE441RM	DORSAL CONDYLE PLATE LEFT MODIFIED	1
NE442RM	DORSAL CONDYLE PLATE RIGHT MODIFIED	1
NP615R	BICORTICAL SCREW DRILL BIT 3.2MM DIA.	1
NP618R	RB SCREW DRIVER ON MOTOR	1

FS633	OrthoPilot® PASSIVE TRANSMITTER (YELLOW)	1
FS634	OrthoPilot® PASSIVE TRANSMITTER (BLUE)	1
FS635	OrthoPilot® PASSIVE TRANSMITTER (RED)	1
FS604	OrthoPilot® STRAIGHT POINTER	1
NP617RM	OrthoPilot® T TIBIAL CHECKING PLATE MODIF.	1
NE162R	REVISION EXTENSION F/RIGID BODY ADAPTER	1
NE292R	REVISION SCREW TAP F/TIBIA RB-ADAPTER	1
NQ595R	Columbus® PS/REV TRAY F/NQ594	1
JH217R	1/1 SIZE WIDE PERF.BASKET LID 489X257MM	1
TA011029	INSTRUCTIONS FOR PASSIVE RIGID	1
NE191801	ATTACHMENT COMPLETE	1
NM769R	OrthoPilot® TRANSMITTER FOOT PLATE	1
NM743	OrthoPilot® ELASTIC FOOT STRAP	2

### 11.3 OrthoPilot® TKR EnduRo



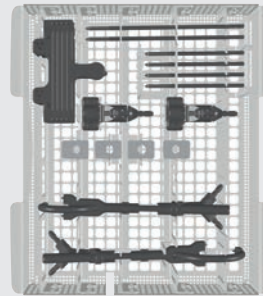
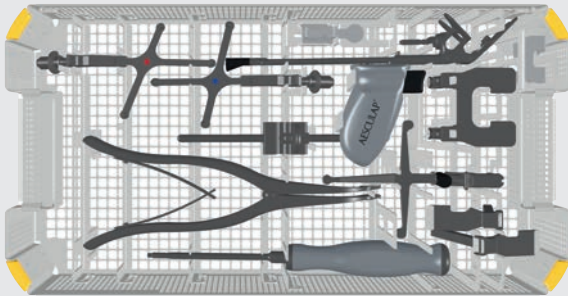
#### ENDURO COMPLEM.SET NAVIGATED INSTRUMENTS NP650

NE192R	REVISION TIBIA RIGID BODY ADAPTER	1	NE442RM	DORSAL CONDYLE PLATE RIGHT MODIFIED	1
NE191R	REVISION FEMUR RIGID BODY ADAPTER LARGE	1	NE445R	e.motion® INSERT 5° FEM.ALIGNMENT BLOCK	1
NE163R	REVISION FEMUR RIGID BODY ADAPTER SMALL	1	NE446R	e.motion® INSERT 6° FEM.ALIGNMENT BLOCK	1
FS633	OrthoPilot® PASSIVE TRANSMITTER (YELLOW)	1	NE447R	e.motion® INSERT 7° FEM.ALIGNMENT BLOCK	1
FS634	OrthoPilot® PASSIVE TRANSMITTER (BLUE)	1	NP617RM	OrthoPilot® TIBIAL CHECKING PLATE MODIF.	1
FS635	OrthoPilot® PASSIVE TRANSMITTER (RED)	1	NP618R	RB SCREW DRIVER ON MOTOR	1
NP615R	BICORTICAL SCREW DRILL BIT 3.2MM DIA.	1	NP651R	ENDURO TRAY F/COMPLEM.SET NAVIG. INSTR.	1
NE292R	REVISION SCREW TAP F/TIBIA RB-ADAPTER	1	TF005	GRAPHIC TEMPLATE F/NP651R (NP650)	1
NE199R	REVISION NAVIGATION ADAPTER F/T-HANDLE	1	JH217R	1/1 SIZE WIDE PERF.BASKET LID 489X257MM	1
NE171R	REVISION ADAPTER F/DISTAL CUTTING GUIDE	1	TA020007	USER MANUAL FOR KNEE-INSTRUMENTS	1
NE190R	SLIDING LINK BLOCK 0° F/TIBIA CUTT. GUIDE	1	TA011029	INSTRUCTIONS FOR PASSIVE RIGID	1
NE200R	e.motion® PS/REV DISTAL CUTT.GUIDE NAVIG.	1	NE191801	ATTACHMENT COMPLETE	1
FS604	OrthoPilot® STRAIGHT POINTER	1	NM769R	OrthoPilot® TRANSMITTER FOOT PLATE	1
NP652R	ENDURO NAVIGATED FEMORAL ALIGNMENT BLOCK	1	NM743	OrthoPilot® ELASTIC FOOT STRAP	2
NE441RM	DORSAL CONDYLE PLATE LEFT MODIFIED	1			

# AESCULAP® OrthoPilot® TKR

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## 11.4 OrthoPilot® TKR Columbus® e.motion® & EnduRo



### SET NAV.INSTR.MULTI TOOL E.MO REV/ENDURO NP1006

JA455R	LID FOR Aesculap OrthoTray® DIN W/O HANDLE	1
NP1005R	TRAY NAVIG.INSTR.MULTI TOOL REVISION	1
FS634	OrthoPilot® PASSIVE TRANSMITTER (BLUE)	1
FS635	OrthoPilot® PASSIVE TRANSMITTER (RED)	1
NS423R	IQ SCREW DRIVER SW3.5	1
FS640	OrthoPilot® TKA MULTI TOOL	1
FS636	OrthoPilot® PASS.CLICK TRANSMITTER YELLOW	1
NP609R	FEMOROTIBIAL GAP DISTRACTOR FOR NP604R	1
NE750R	e.motion® PS/REV FEMUR-TIBIA-DISTRACTOR	1
NP1016R	2-PIN TRANSMITTER FIXATION ELEMENT	2
NP1012R	PIN F/2-PIN TRANSM.FIXATI.D3.2MM WL70MM	4
NP1013R	PIN F/2-PIN TRANSM.FIXAT.D3.2MM WL120MM	2
NE163R	REVISION FEMUR RIGID BODY ADAPTER SMALL	1
NE191R	REVISION FEMUR RIGID BODY ADAPTER LARGE	1
NE199R	REVISION NAVIGATION ADAPTER F/T-HANDLE	1

NE200R	e.motion® PS/REV DISTAL CUTT.GUIDE NAVIG.	1
TA015999	IFU instrument set navigation	1
TF235	PACKING STENCIL F/NP1005R (NP1006)	1

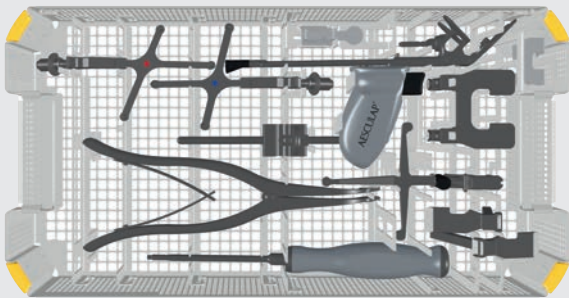
### Optional

NE190R	SLIDING LINK BLOCK 0° F/TIBIA CUTT. GUIDE	1
NE445R	e.motion® INSERT 5° FEM.ALIGNMENT BLOCK	1
NE446R	e.motion® INSERT 6° FEM.ALIGNMENT BLOCK	1
NE447R	e.motion® INSERT 7° FEM.ALIGNMENT BLOCK	1
NE171R	REVISION ADAPTER F/DISTAL CUTTING GUIDE	1
TF275	GRAPHIC TEMPLATE F/NP1005R (NP1006)	1
TA014010	IFU FOR ALUMINIUM GRAFIC TEMPLATES	1
NP1017R	IQ NAVIGATION ADAPTER F/TIBIA ROTATION	1

### Alternative

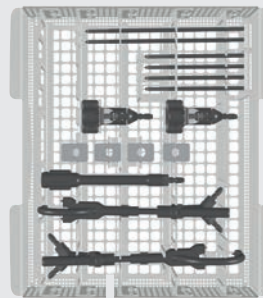
NP605R	FEMUR-TIBIA-DISTRCT.FCPS W/FORCE CONTR.	1
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## 11.5 OrthoPilot® TKR Columbus® Revision



### SET NAVIG.INSTR.MULTI TOOL Columbus® REV NP1004

JA455R	LID FOR Aesculap OrthoTray® DIN W/O HANDLE	1
NP1005R	TRAY NAVIG.INSTR.MULTI TOOL REVISION	1
FS634	OrthoPilot® PASSIVE TRANSMITTER (BLUE)	1
FS635	OrthoPilot® PASSIVE TRANSMITTER (RED)	1
NS423R	IQ SCREW DRIVER SW3.5	1
FS640	OrthoPilot® TKA MULTI TOOL	1
FS636	OrthoPilot® PASS.CLICK TRANSMITTER YELLOW	1
NP609R	FEMOROTIBIAL GAP DISTRACTOR FOR NP604R	1
NE750R	e.motion® PS/REV FEMUR-TIBIA-DISTRACTOR	1
NP1016R	2-PIN TRANSMITTER FIXATION ELEMENT	2
NP1012R	PIN F/2-PIN TRANSM.FIXATI.D3.2MM WL70MM	4
NP1013R	PIN F/2-PIN TRANSM.FIXAT.D3.2MM WL120MM	2
NE163R	REVISION FEMUR RIGID BODY ADAPTER SMALL	1
NE191R	REVISION FEMUR RIGID BODY ADAPTER LARGE	1
NE199R	REVISION NAVIGATION ADAPTER F/T-HANDLE	1



NE162R	REVISION EXTENSION F/RIGID BODY ADAPTER	1
TA015999	IFU instrument set navigation	1
TF234	PACKING STENCIL F/NP1005R (NP1004)	1

### Optional

NE190R	SLIDING LINK BLOCK 0° F/TIBIA CUTT. GUIDE	1
NE445R	e.motion® INSERT 5° FEM.ALIGNMENT BLOCK	1
NE446R	e.motion® INSERT 6° FEM.ALIGNMENT BLOCK	1
NE447R	e.motion® INSERT 7° FEM.ALIGNMENT BLOCK	1
NE171R	REVISION ADAPTER F/DISTAL CUTTING GUIDE	1
TF274	GRAPHIC TEMPLATE F/NP1005R (NP1004)	1
TA014010	IFU FOR ALUMINIUM GRAFIC TEMPLATES	1
NP1017R	IQ NAVIGATION ADAPTER F/TIBIA ROTATION	1

### Alternative

NP605R	FEMUR-TIBIA-DISTRCT.FCPS W/FORCE CONTR.	1
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# AESCU LAP<sup>®</sup> OrthoPilot<sup>®</sup> TKR

11 | INSTRUMENT-SET OVERVIEW OrthoPilot<sup>®</sup> TKR Columbus<sup>®</sup>

## 11.6 OrthoPilot<sup>®</sup> Software

### Software module

FS240	OrthoPilot <sup>®</sup> SOFTWARE TKR VERSION 3
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## 11.7 Disposables

### Passive marker spheres

FS616	OrthoPilot <sup>®</sup> DISPOS.PASSIVE MARKER STERILE
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FS618SU	OrthoPilot <sup>®</sup> CAP SINGLE-USE MARKERS
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## 11.8 Consumables

### Instruments care oil

JG600	Sterilit <sup>®</sup> I OIL SPRAY
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JG598	Sterilit <sup>®</sup> I DRIP FEED OILER
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### NOTE


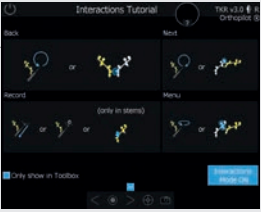

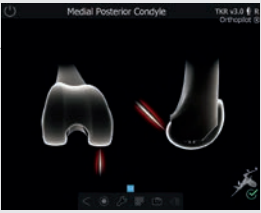
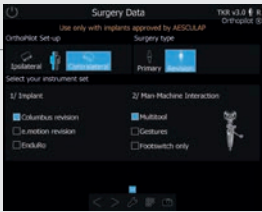
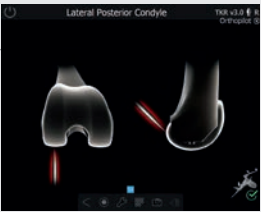
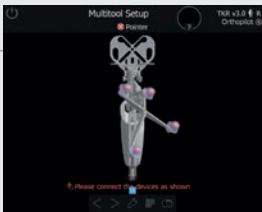
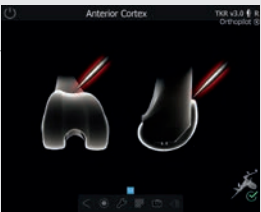
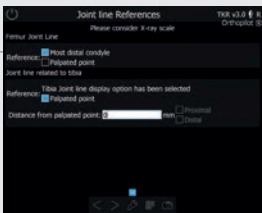
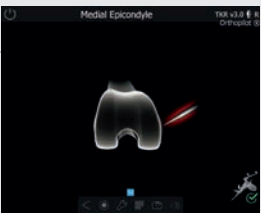

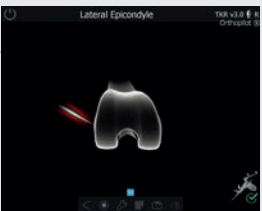
Prior to function checks, lubricate moving parts (e.g. joints, pusher components and threaded rods) with maintenance oil suitable for the respective sterilization process (e.g. for steam sterilization: AESCULAP<sup>®</sup> Sterilit<sup>®</sup> oil spray JG600 or Sterilit<sup>®</sup> drip lubricator JG598).



# AESCULAP® OrthoPilot® TKR

## 12 | SCHEMATIC WORKFLOW

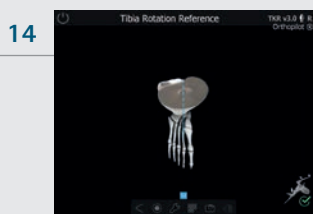
### 12.1 OrthoPilot® TKR Tibia first with soft tissue management

<b>01</b>		Surgery Options	<b>07</b>		Record Femur Joint Line Reference Point
<b>02</b>		Patient Data	<b>08</b>		Registration Medial Posterior Condyle
<b>03</b>		Set Surgery Data	<b>09</b>		Registration Lateral Posterior Condyle
<b>04</b>		Multitool Setup	<b>10</b>		Registration Anterior Cortex
<b>05</b>		Joint line References	<b>11</b>		Registration Medial Epicondyle
<b>06</b>		Record Tibia Joint Line Reference Point	<b>12</b>		Registration Lateral Epicondyle

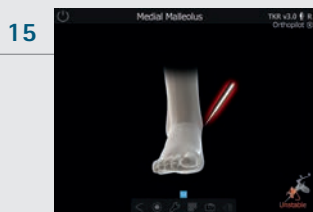




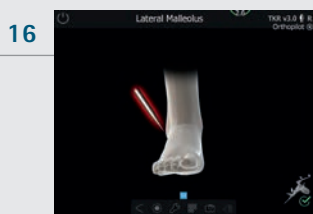
13 Registration Proximal Tibia Center



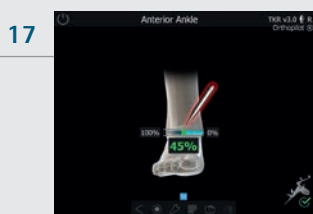
14 Tibia Rotation Reference



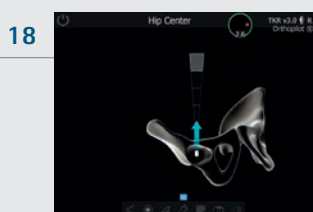
15 Registration Medial Malleolus



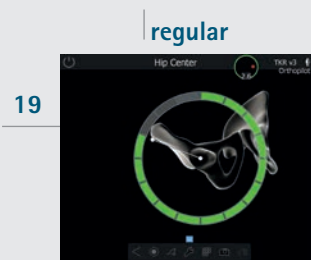
16 Registration Lateral Malleolus



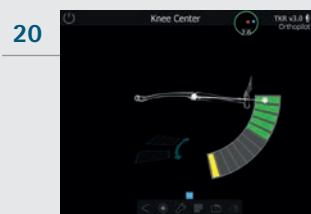
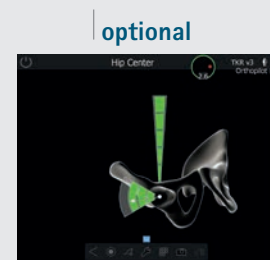
17 Registration Anterior Ankle



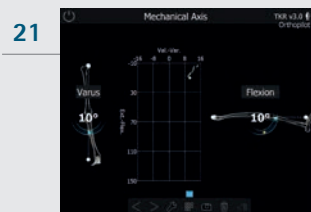
18 Registration Hip Center



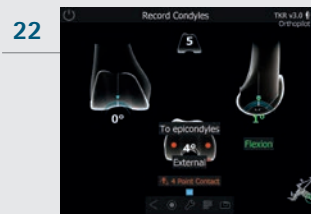
19



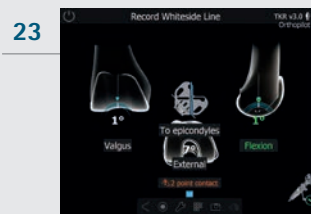
20 Registration Knee Center



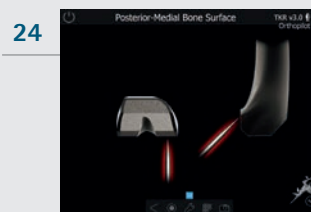
21 Registration of Mechanical Axis



22 Record Condyles



23 Record Whiteside Line



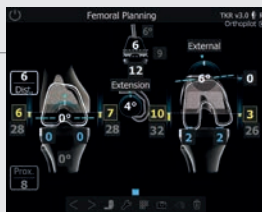
24 Registration Posterior-Medial Bone Surface

# AESCULAP® OrthoPilot® TKR

## 12 | SCHEMATIC WORKFLOW

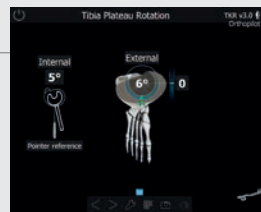
- |    |  |   |    |  |                             |
|----|--|---|----|--|-----------------------------|
| 25 |  | Registration<br>Posterior-Lateral<br>Bone Surface | 31 |  | Record Tibia Diaphysis      |
| 26 |  | Registration<br>Distal-Medial<br>Bone Surface     | 32 |  | Record Femur Diaphysis      |
| 27 |  | Registration<br>Distal-Lateral<br>Bone Surface    | 33 |  | Tibia Resection             |
| 28 |  | Optimize Anterior Cortex                          | 34 |  | Record Tibia Cut            |
| 29 |  | Registration<br>Medial Tibia Reference            | 35 |  | Gap Tensioning in extension |
| 30 |  | Registration<br>Lateral Tibia Reference           | 36 |  | Gap Tensioning in flexion   |

37



Femoral Planning

43



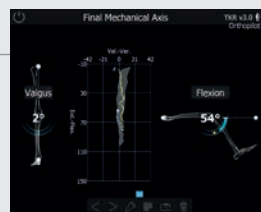
Tibia Rotation

38



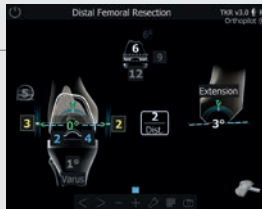
Augmentation Planning

44



Registration of Mechanical Axis post-op

39



Distal Femoral Resection

45



Summary screen

40



Record Distal Cut

41



4-in-1 Cutting Jig Position

42


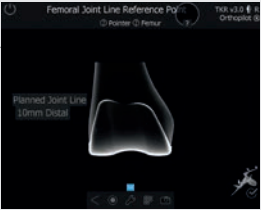

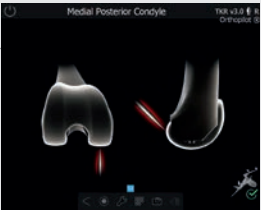
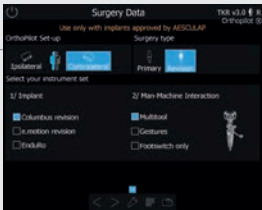
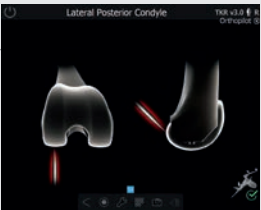
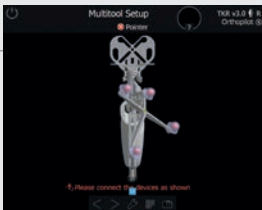
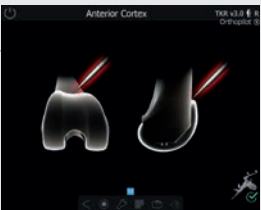
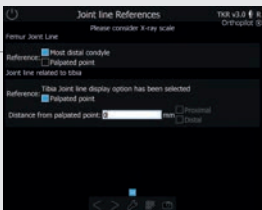
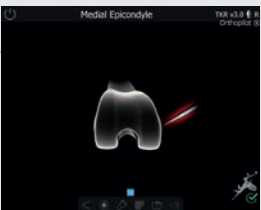

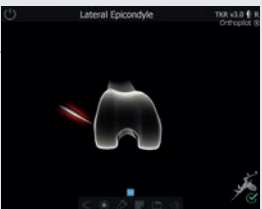


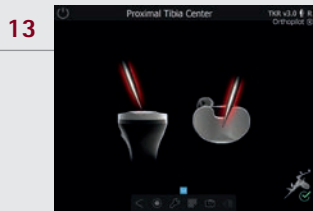
Tibia Rotation Reference

# AESCU LAP® OrthoPilot® TKR

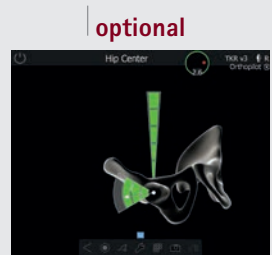
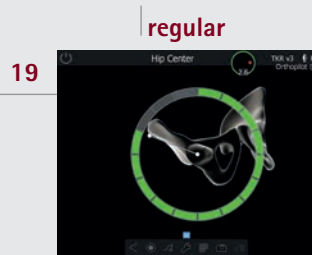
## 12 | SCHEMATIC PROGRAM FLOW TKR

### 12.2 OrthoPilot® TKR Femur First

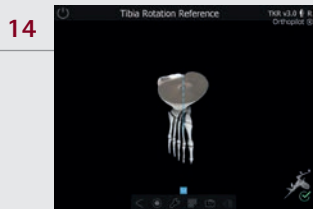
01		Surgery Options	07		Record Femur Joint Line Reference Point
02		Set Patient Data	08		Registration Medial Posterior Condyle
03		Set Surgery Data	09		Registration Lateral Posterior Condyle
04		Multitool Setup	10		Registration Anterior Cortex
05		Joint line References	11		Registration Medial Epicondyle
06		Record Tibia Joint Line Reference Point	12		Registration Lateral Epicondyle



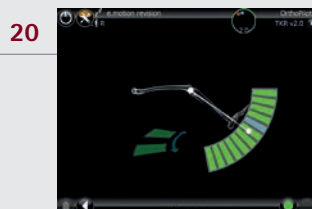
13 Registration Proximal Tibia Center



19



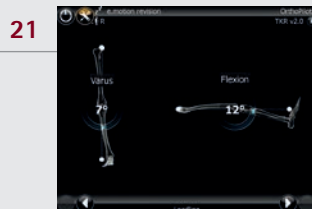
14 Tibia Rotation Reference



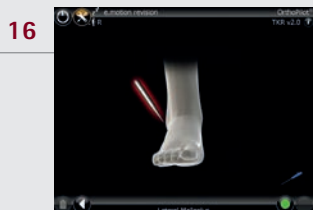
20 Registration Knee Center



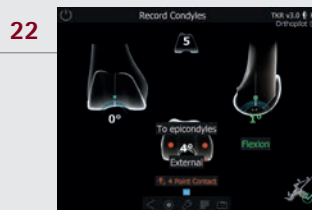
15 Registration Medial Malleolus



21 Registration Loadline pre-op



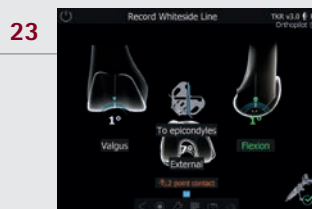
16 Registration Lateral Malleolus



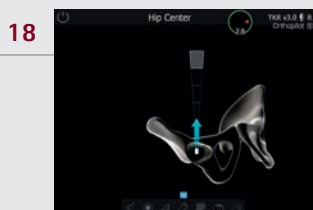
22 Record Condyles



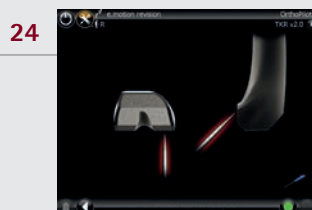
17 Registration Anterior Ankle



23 Define new Rotation



18 Registration Hip Center



24 Registration Posterior-Medial Bone Surface

# AESCU LAP<sup>®</sup> OrthoPilot<sup>®</sup> TKR

## 12 | SCHEMATIC PROGRAM FLOW TKR

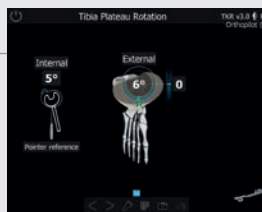
<p>25</p> 	<p>Registration Posterior-Lateral Bone Surface</p>	<p>31</p> 	<p>Record Tibia Diaphysis</p>
<p>26</p> 	<p>Registration Distal-Medial Bone Surface</p>	<p>32</p> 	<p>Record Femur Diaphysis</p>
<p>27</p> 	<p>Registration Distal-Lateral Bone Surface</p>	<p>33</p> 	<p>Distal Femoral Resection</p>
<p>28</p> 	<p>Optimize Anterior Cortex</p>	<p>34</p> 	<p>Record Distal Cut</p>
<p>29</p> 	<p>Registration Medial Tibia Reference</p>	<p>35</p> 	<p>Positioning 4-in-1 Cutting Jig Position</p>
<p>30</p> 	<p>Registration Lateral Tibia Reference</p>	<p>36</p> 	<p>Tibia Resection FF</p>

37



Tibia Cut FF

38



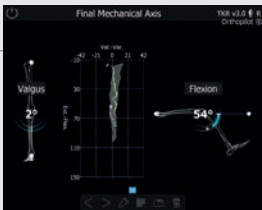
Tibia Rotation

39



Tibia Rotation Reference

40



Registration of Mechanical Axis post-op

41



Summary screen

# AESCULAP® OrthoPilot® TKR

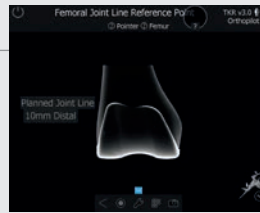
## 12 | SCHEMATIC WORKFLOW

### 12.3 OrthoPilot® TKR planning first

01 Surgery Options



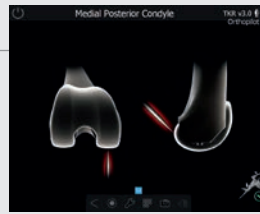
07 Record Tibia Joint Line Reference Point



02 Patient Data



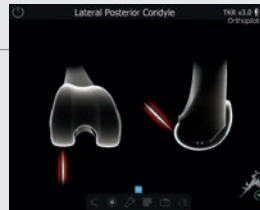
08 Registration Medial Posterior Condyle



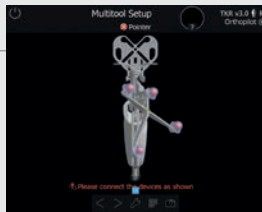
03 Set Surgery Data



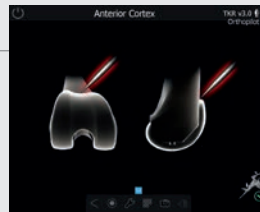
09 Registration Lateral Posterior Condyle



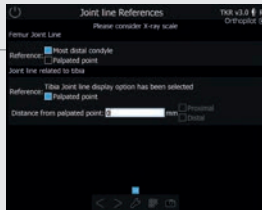
04 Multitool Setup



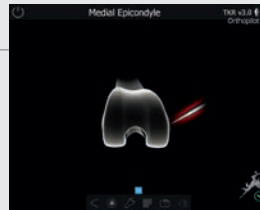
10 Registration Anterior Cortex



05 Joint line References



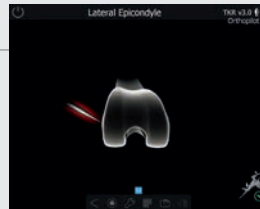
11 Registration Medial Epicondyle



06 Record Tibia Joint Line Reference Point

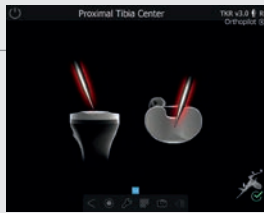


12 Registration Lateral Epicondyle



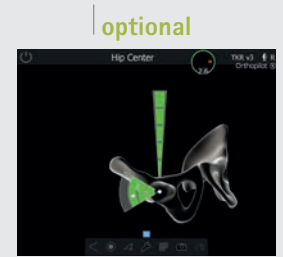
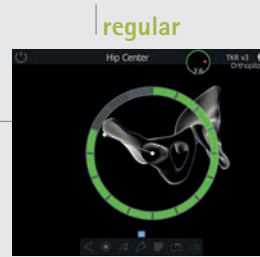


13



Registration Proximal Tibia Center

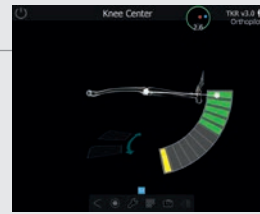
19



Tibia Rotation Reference

20

14



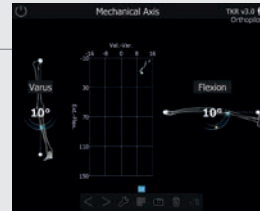
Registration Knee Center

15



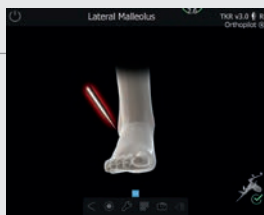
Registration Medial Malleolus

21



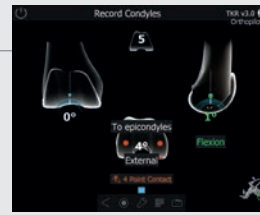
Registration of Mechanical Axis

16



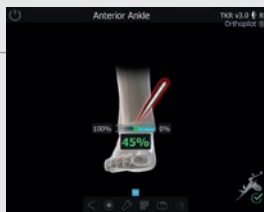
Registration Lateral Malleolus

22



Record Condyles

17



Registration Anterior Ankle

23



Record Whiteside Line

18



Registration Hip Center

24



Registration Posterior-Medial Bone Surface

# AESCULAP® OrthoPilot® TKR

## 12 | SCHEMATIC WORKFLOW

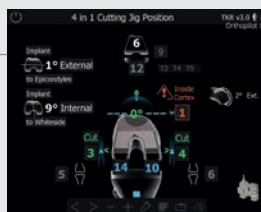
- |    |  |   |    |  |                             |
|----|--|---|----|--|-----------------------------|
| 25 |  | Registration<br>Posterior-Lateral<br>Bone Surface | 31 |  | Gap Tensioning in extension |
| 26 |  | Registration<br>Distal-Medial<br>Bone Surface     | 32 |  | Gap Tensioning in flexion   |
| 27 |  | Registration<br>Distal-Lateral<br>Bone Surface    | 33 |  | Femoral and Tibial Planning |
| 28 |  | Optimize Anterior Cortex                          | 34 |  | Tibia Resection             |
| 29 |  | Registration<br>Medial Tibia Reference            | 35 |  | Distal Femoral Resection    |
| 30 |  | Registration Lateral Tibia Reference              | 36 |  | Record Tibia Cut            |

37



Record Distal Cut

38



4-in-1 Cutting Jig Position

39



Record Tibia Diaphysis

40



Record Femur Diaphysis

41



Summary screen

# 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](http://www.aesculap.com)

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