



ORTHOPAEDIC  
SURGERY

# AESCULAP® OrthoPilot®

OrthoPilot® KNEESUITE – TKA 6.0  
NAVIGATED SURGICAL TECHNIQUE

# AESCULAP® OrthoPilot® TKA

OrthoPilot® TKA – TOTAL KNEE ARTHROPLASTY



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- (2) Jenny JY, Miehke 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) Balthis 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, Fehring 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) Decking R, Markmann Y, Fuchs J, Puhl W, Scharf HP. Leg axis after computer-navigated total knee arthroplasty: a prospective randomized trial comparing computer-navigated and manual implantation. *J Arthroplasty*. 2005 Apr;20(3):282-8.
- (8) Seon JK, Song EK. Navigation-assisted less invasive total knee arthroplasty compared with conventional total knee arthroplasty: a randomized prospective trial. *J Arthroplasty*. 2006 Sep;21(6):777-82.
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## 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
- Over 300 OrthoPilot® publications around the world (7, 8)



# AESCULAP® OrthoPilot® TKA

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# AESCULAP® OrthoPilot® TKA

## 1 | OVERVIEW OF INSTRUMENTS: [UNIVERSAL INSTRUMENTS](#)

### DRILL, DRILL SLEEVE, SCREW LENGTH MEASURING DEVICE



Drill, D= 3.2 mm	NP615R
Drill sleeve	NP616R
Screw length measuring device	NP281R

### TISSUE PROTECTION SLEEVE, BICORTICAL SCREWS, RIGID BODY (RB)



MIOS® tissue protection sleeve	NQ941R
Bicortical screws	NP620R - NP625R
Rigid Body	NP619R

### PASSIVE TRANSMITTER



Yellow	FS633
Blue	FS634
Red	FS635

### TWO-PIN TRANSMITTER ANCHORING



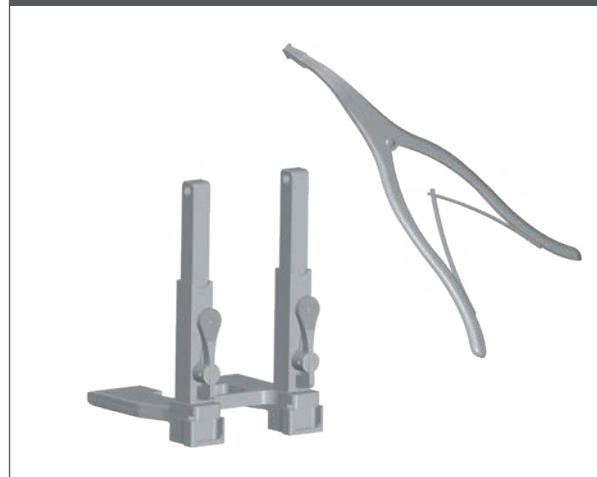
Two-pin transmitter anchoring element	NP1016R**
Pin for two-pin transmitter anchoring, D= 3.2, short	NP1012R**
Pin for two-pin transmitter anchoring, D= 3.2, long	NP1013R**

## TIBIAL INCISION CONTROL PANEL



Tibial incision control panel	NP617R
Tibial incision control panel, modified	NP617RM

## SPREADER AND SPREADING PLIERS



Spreader	NE750R
Spreading pliers	NP609R
Alternative: Power-controlled spreading pliers	NP605R

## TIBIAL ROTATION NAVIGATION ADAPTER



Tibial rotation navigation adapter	NP1017R**
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## POINTER, STRAIGHT



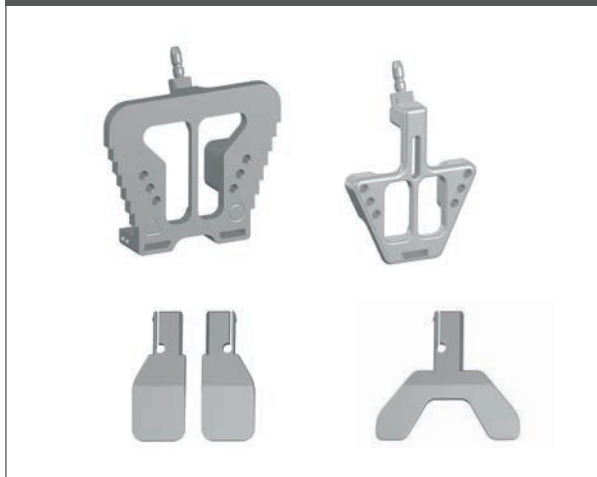
Pointer, straight	FS604
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**\*\* NOTE**  
Only available in NP1000/NP1002

# AESCULAP® OrthoPilot® TKA

1 | OVERVIEW OF INSTRUMENTS: STANDARD AND MIOS® INSTRUMENTS\*

## FEMORAL ALIGNMENT BLOCK WITH FOOT PLATES



e.motion®	NE440R
e.motion® MIOS®	NQ955R
e.motion® MIOS® short	NQ945R
Columbus®	NE324T
Columbus® MIOS®	NQ954R
Columbus® MIOS® short	NQ944R

## TIBIAL SAWING GUIDE



Standard right	NP596R
Standard left	NP597R
MIOS® right	NQ952R
MIOS® left	NQ951R

## DISTAL FEMORAL SAWING GUIDE



Standard	NP598R
MIOS®	NQ953R

\* **NOTE**  
not for VEGA System®

## 1 | OVERVIEW OF INSTRUMENTS: IQ INSTRUMENTS

### FEMORAL ALIGNMENT BLOCK WITH FOOT PLATES



Femoral alignment block	NS320R
Y foot plate	NQ958R

### TIBIAL/DISTAL FEMORAL SAWING GUIDE AND RB ADAPTER, MODULAR



Tibial / distal femoral sawing guide	NS334R
Tibial sawing guide, asymm. left-medial	NS406R
Tibial sawing guide, asymm. right-medial	NS407R
RB adapter, modular	FS626R

### 4-IN-1 FEMORAL CUTTING BLOCK AND RB ADAPTER, MODULAR



e.motion® F2 - F8	NS582R - NS588R
VEGA System® F1 - F8	NS321R - NS328R
Columbus® F1 - F8	NQ1041R - NQ1048R
RB adapter, modular	FS626R

### POSITIONING INSTRUMENT – TIBIAL/FEMORAL SAWING GUIDE



Positioning instrument – tibial/femoral sawing guide	NP1018R**
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#### \*\* NOTE

Only available in NP1000/NP1002

# AESCULAP® OrthoPilot® TKA

## 1 | OVERVIEW OF INSTRUMENTS

MULTITOOL



Multitool

FS640\*\*

PASSIVE CLICK TRANSMITTER, YELLOW



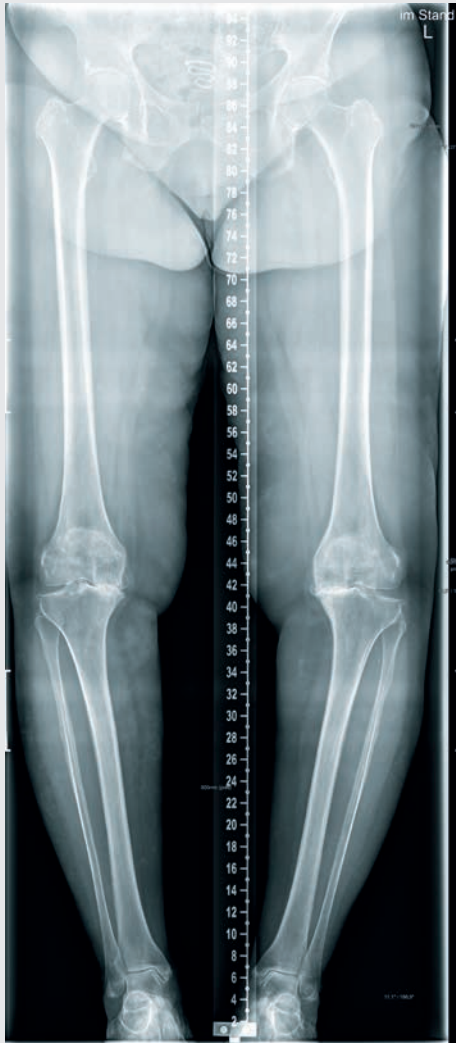
Passive click transmitter, yellow

FS636\*\*

**\*\* NOTE**

Only available in NP1000/NP1002

## 2 | PRE-OPERATIVE PLANNING USING RADIOGRAPHIC IMAGES



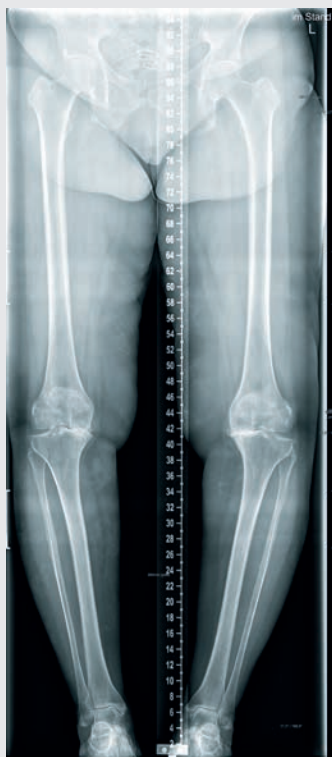
The OrthoPilot® system and the TKA software can be used in any cases for which knee endoprostheses are indicated as primary therapy, provided that the patient has sufficient bone quality and hip joint mobility.

### 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 TKA TA015239. 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.

# AESCULAP® OrthoPilot® TKA

## 2 | PREOPERATIVE PLANNING USING RADIOGRAPHIC IMAGES

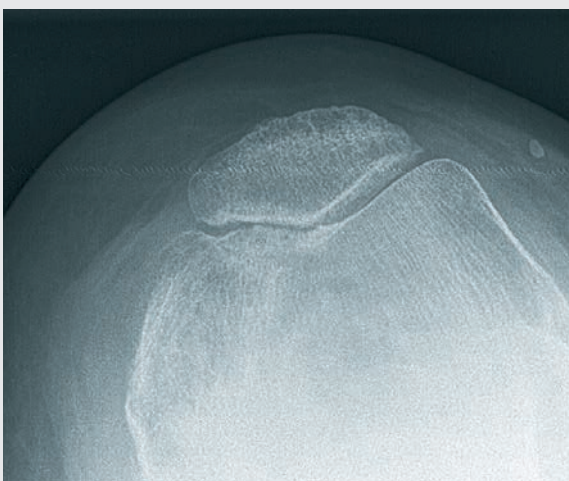


AESCULAP® considers it necessary to conduct sufficient pre-operative planning on the basis of the following radiographic images:

- Full-leg still image
- Knee joint in A/P projection
- Knee joint, lateral projection
- Patella – tangential image

Selected information that may be obtainable from radiographic images:

- Axis misalignment
- Implant alignment, joint gap, implant size ML
- Slope, implant size A/P
- Patella shape, joint gap



Analyzing whether a total knee endoprosthesis is necessary is an essential part of pre-operative planning. In addition to standard radiographic examinations, the surgeon should consider the following factors before performing a total knee endoprosthesis:

- Soft tissue situation
- Extensor mechanism functionality
- Bone conservation
- Restoration of proper axis alignment
- Functional stability
- Restoration of the joint line

The AESCULAP® Columbus®, e.motion®, e.motion® Pro System and VEGA System® radiographic templates can provide the following information when analyzing radiographic images:

- Angle between anatomical and mechanical femoral axis
- Resection levels
- Implant sizes

# AESCULAP® OrthoPilot® TKA

## 3 | PATIENT PREPARATION / POSITIONING

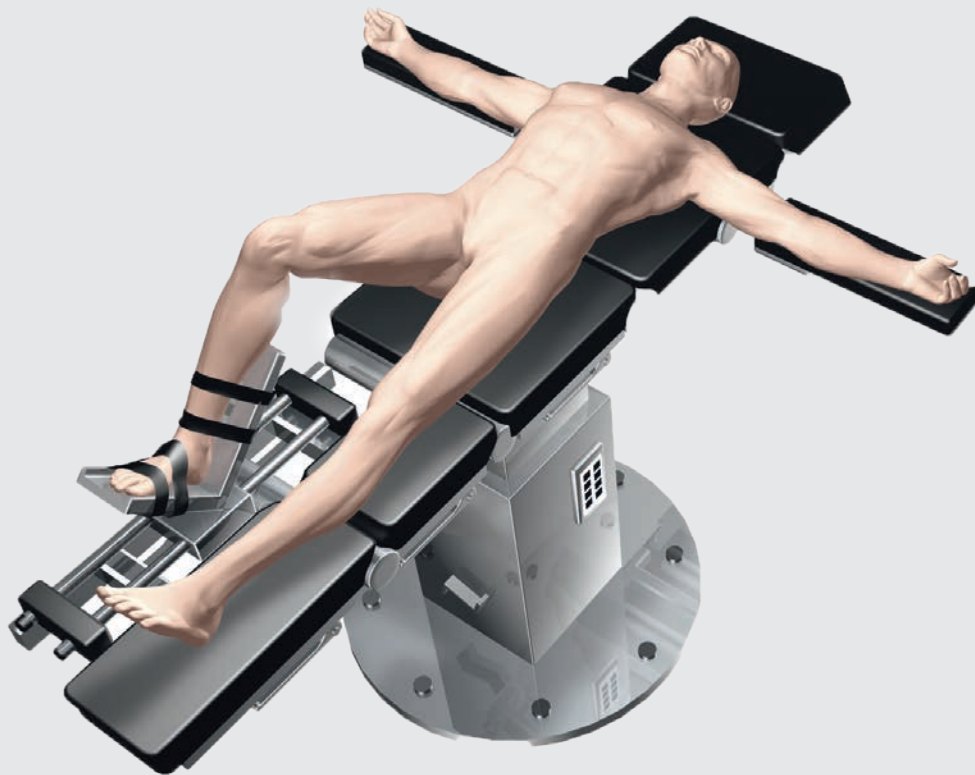


Fig. 1

Positioning and sterile covering of the patient are to be done in accordance with the standard procedures used with conventional surgical techniques.

AESCULAP® recommends using a leg holder to help adjust the patient's leg during different phases of the operation. The leg will need to be repositioned several times while recording the registration points and performing bone incisions. The leg holder allows users complete flexibility in knee positioning, from fully bent to fully extended.

### NOTE

To facilitate quadriceps mobilization, place the knee at a 100° bend before activating the blood arrest. If using a cushion, make sure it does not hinder the hip movement required in order to register the center of the femoral head.

## 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.

Fig. 2

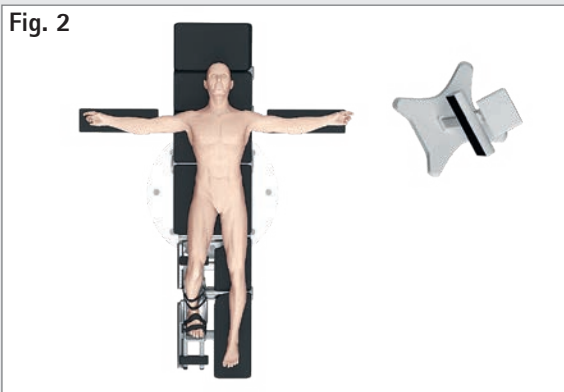


Fig. 3a

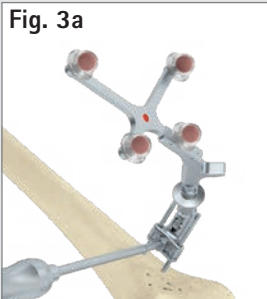


Fig. 3b



### 4.2 Femoral transmitter

General instructions: Position the transmitter such that it will be visible to the camera throughout the entire operation. 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 femur, up to around

10 cm in the proximal direction from the joint line. Aesculap 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 femoral 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

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

#### 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.

If desired, 4.5 mm corticis tapping screws and RB sleeve NP619R can be used to keep the femoral transmitter anchored to the femur bicortically, approximately 10 cm proximal to the joint line. Pre-drilling for the bicortical screw is done using a 3.2 mm drill NP615R through drill sleeve NP616R. Use the scale on the drill or measuring instrument NP281R to determine what length of bicortical screw will be necessary. Rigid Body NP619R is advanced (through protection sleeve NQ941R when using MIOS® or IQ instruments) and brought into contact with the bone, and then one of the bicortical screws (NP620R – NP625R) is inserted. Initial insertion is mechanical, but then the last few turns should be completed using a manual screwdriver. The transmitter adapter should be pointing toward the femoral head and angled in the direction of the camera; check that it is firmly seated.

# AESCULAP® OrthoPilot® TKA

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

Fig. 4a

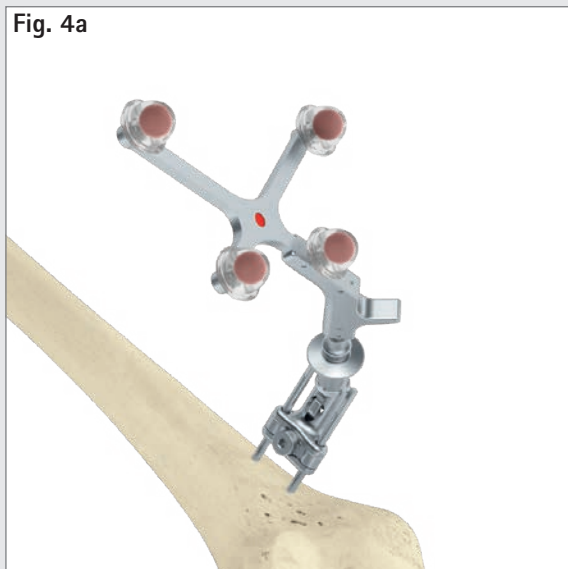
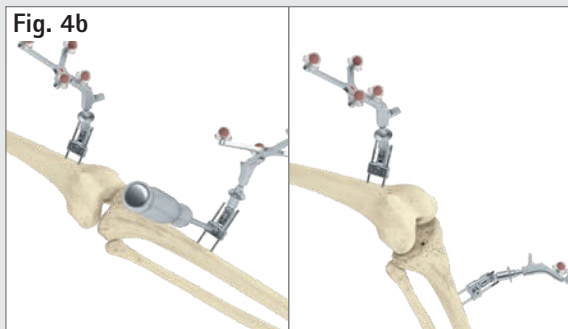


Fig. 4b



### 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, up to around 10 cm in the distal direction from the joint line (typically from medial). Aesculap 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.

#### OPTION

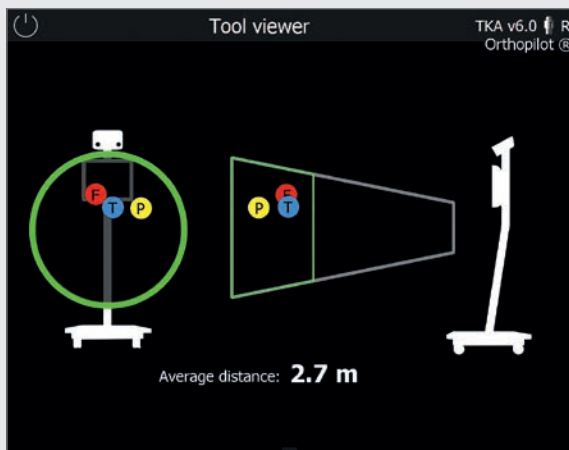
After pre-drilling with the 3.2 mm drill (NP615R) through the drill sleeve (NP616R) and measuring bicortical screw length as described in Chapter 4.2, an RB (NP619R) is anchored to the tibia via a separate incision, approximately 1 cm long, around 10 cm distal from the joint line. The last turns of the screw should be completed using a manual screwdriver.

#### NOTE

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

#### 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.



#### 4.4 Camera alignment

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"

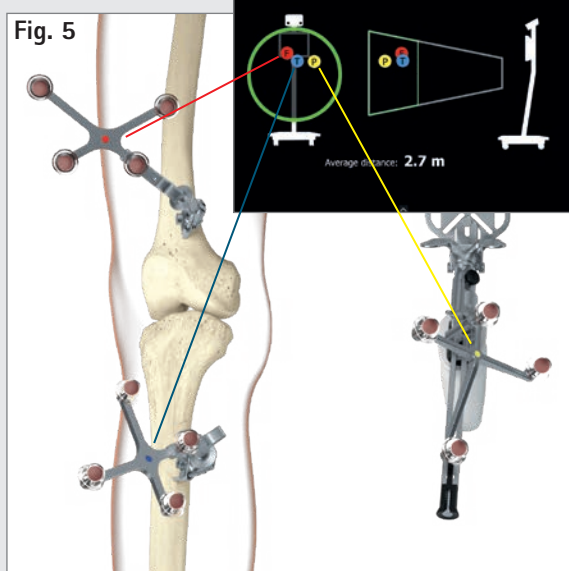
If all three transmitters are placed at an optimum distance to the camera (1.8 – 2.2 m for FS101; 2.5 – 3.0 m for OrthoPilot® *Elite*), the camera view field will be displayed outlined in green. The mean distance from the camera to the transmitters is displayed in meters.

#### 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.

Fig. 5



#### NOTE

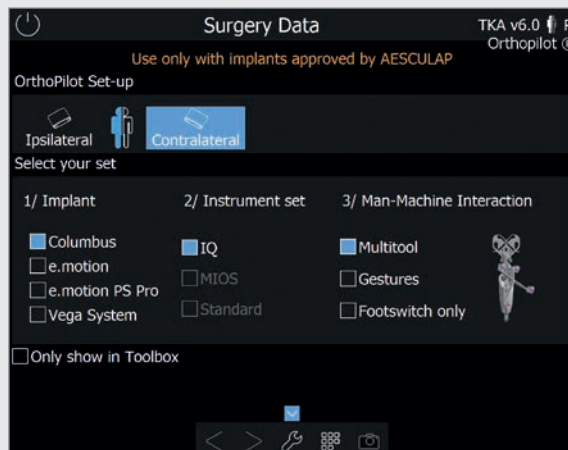
Whenever a transmitter is removed from the bone fixation, e. g. the 2 pin fixation or one of the instruments, the user must ensure in case of reattaching, that exactly the same position is chosen for the fixation of the transmitter as before. Otherwise the values displayed differ significantly from the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

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.

# AESCULAP® OrthoPilot® TKA

## 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

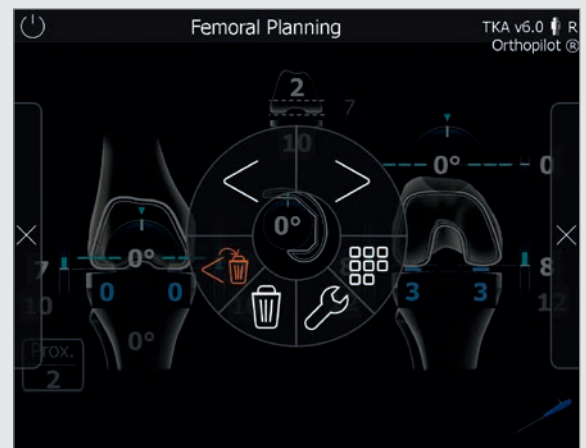
This function, the only one marked on the menu with a red symbol, is available if no data recording has taken place during the current software step. It cannot be accessed otherwise.

- 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. 6a). 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. 6b). Gesturing with the pointer in a horizontal counter-clockwise circle will open the ring menu described in Chapter 5.1 (Fig. 6c).

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.

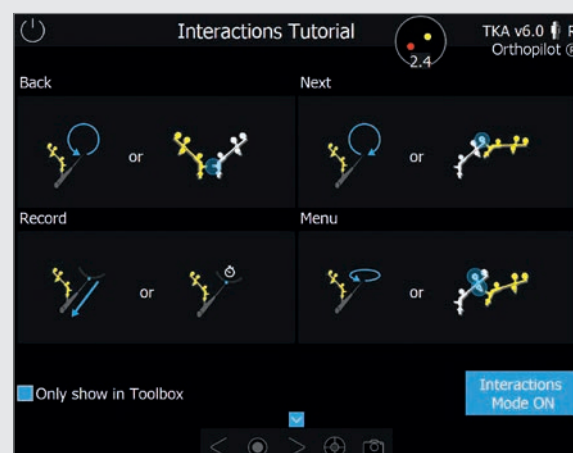
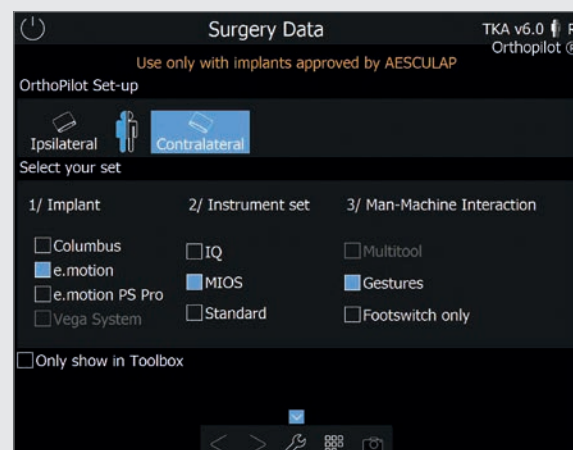


Fig. 6a

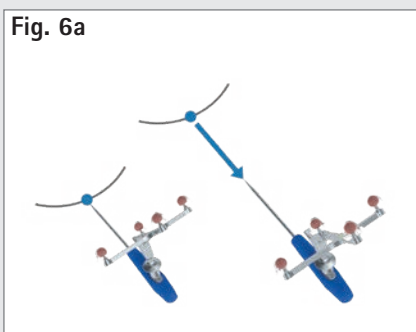


Fig. 6b

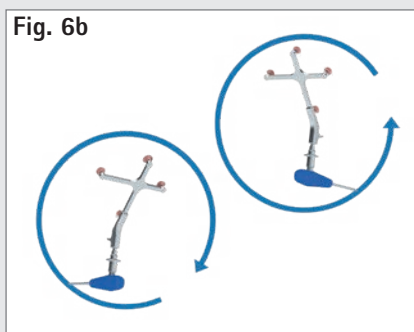
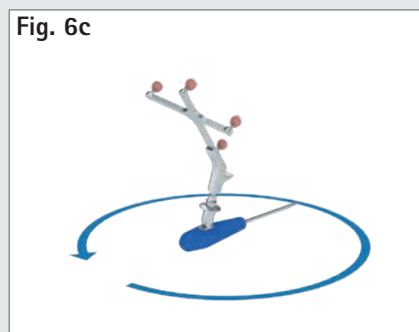


Fig. 6c



# AESCULAP® OrthoPilot® TKA

## 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. 7c). 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. 7b). To toggle back, bring it close to the tibial / femoral transmitter base itself (Fig. 7a). The software toolbox includes a tutorial for all gestures, which describes gestures individually and allows users to practice them.

Fig. 7a

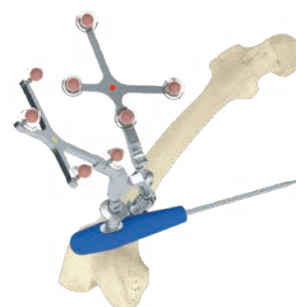


Fig. 7b

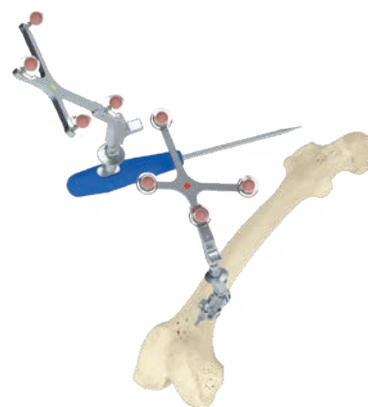
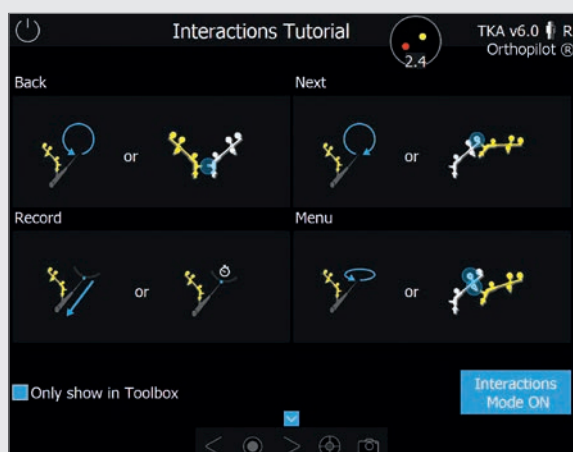
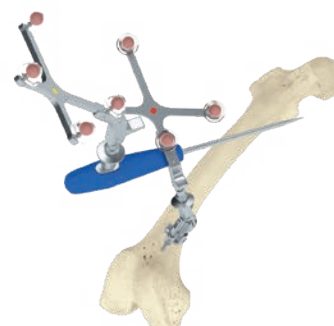


Fig. 7c



### 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:** Screen shot

---

#### 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.

### 5.4 Special software control features

When using Multitool or gesture controls (not the foot pedal) to toggle forward, the flexion angle range ( $70 \pm 5^\circ$ ) 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.

---

#### 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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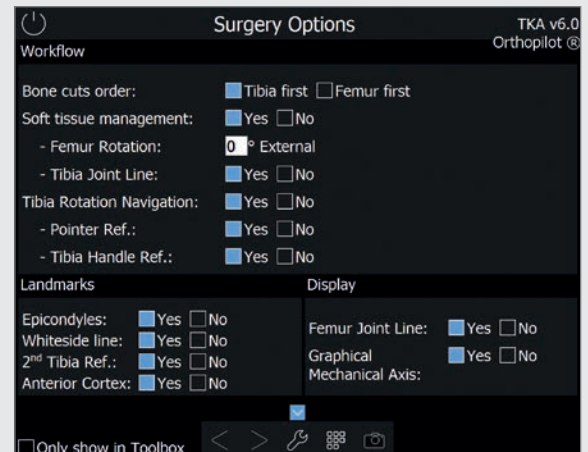
# AESCULAP® OrthoPilot® TKA

## 6 | ENTERING OPERATION- AND PATIENT-SPECIFIC DATA

### 6.1 Options settings

The physician can choose from among the following options based on his or her preferences:

- Tibia first or Femur first technique,
- with or without soft tissue management
- the physician will also need to select
- whether, and what degree of, femoral rotation in relation to the dorsal condyles needs to be preset on the planning screen,
- whether the tibial joint line should be displayed in reference to the "recording tibial reference" or "recording tibial reference – medial" step,
- which reference recording should be used for navigating tibial rotation (pointer reference or reference recording based on trial plateau handle with optional rotational adapter (NP1017R)),
- whether epicondyles are to be additionally palpated (reference: trans-epicondylar line),
- whether to record Whiteside line as additional reference for femur rotation
- whether to use one or two reference points for the tibial incision level indicator,
- whether to include an additional step to optimize the anterior corticalis point,
- whether to display the femoral joint line in reference to the furthest-distal point on the distal condyle, and
- whether, in addition to the mechanical axis, a graphic should be displayed showing medio-lateral stability in varus and valgus stress.



After having selected these options, the physician 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 5.1 for explanation) at any time to call up the options screen and change the settings.

**Patient Data** TKA v6.0 R Orthopilot®

Surgeon

Name:

Department:

Patient

First Name:

Last Name:

Date of Birth Day:  Month:  Year:

Gender: ☐ Female ☒ Male

Operated Side: ☐ Left ☒ Right

**Surgery Data** TKA v6.0 R Orthopilot®

Use only with implants approved by AESCULAP

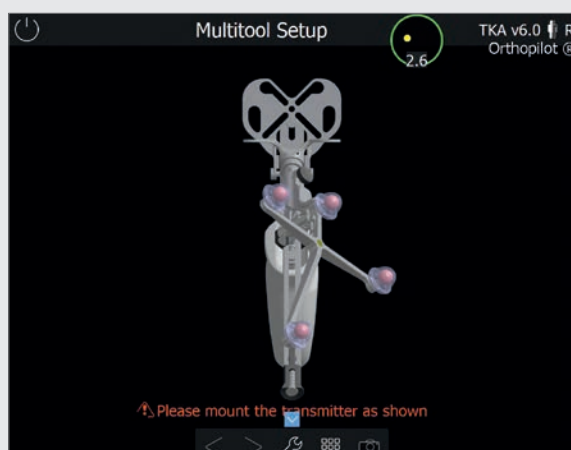
OrthoPilot Set-up

Ipsilateral ☐ Contralateral ☒

Select your set

1/ Implant	2/ Instrument set	3/ Man-Machine Interaction
<input checked="" type="checkbox"/> Columbus	<input checked="" type="checkbox"/> IQ	<input checked="" type="checkbox"/> Multitool
<input type="checkbox"/> e.motion	<input type="checkbox"/> MIOS	<input type="checkbox"/> Gestures
<input type="checkbox"/> e.motion PS Pro	<input type="checkbox"/> Standard	<input type="checkbox"/> Footswitch only
<input type="checkbox"/> Vega System		

☐ Only show in Toolbox



## 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 Operation data

### Position of the OrthoPilot® camera

Ipsi- or contralateral

### Implant selection

AESCULAP® Columbus®, e.motion®, e.motion® Pro and VEGA System® implants are supported.

### Instrument selection

IQ, Standard and MIOS® instruments are supported.

### Selection of interaction options

Users can elect to control the software using the Multitool, the foot pedal, or gesture controls.

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

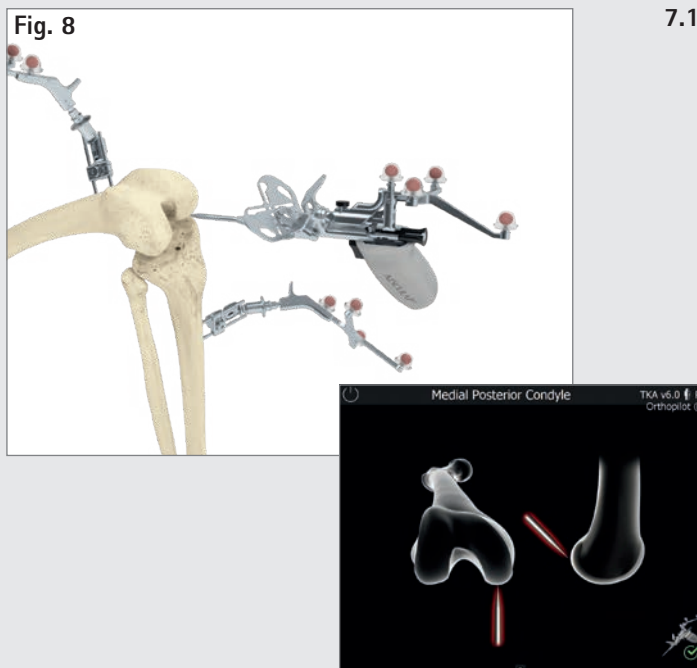
## 6.4 Multitool set-up

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 on a separate screen.

# AESCULAP® OrthoPilot® TKA

## 7 | GENERAL DATA RECORDING

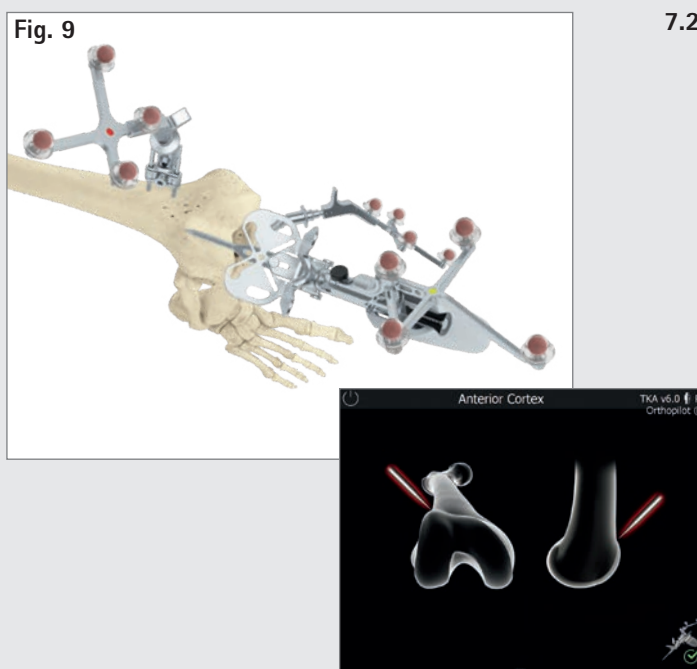
Fig. 8



### 7.1 Recording the medial and lateral dorsal condyles

Place the pointer tip of the Multitool (FS640) or the pointer (FS604) at the center of the dorsal medial condyle. Choose the point furthest in the dorsal direction – in other words, the one furthest from the ventral femoral corticalis. Do the same for the lateral side.

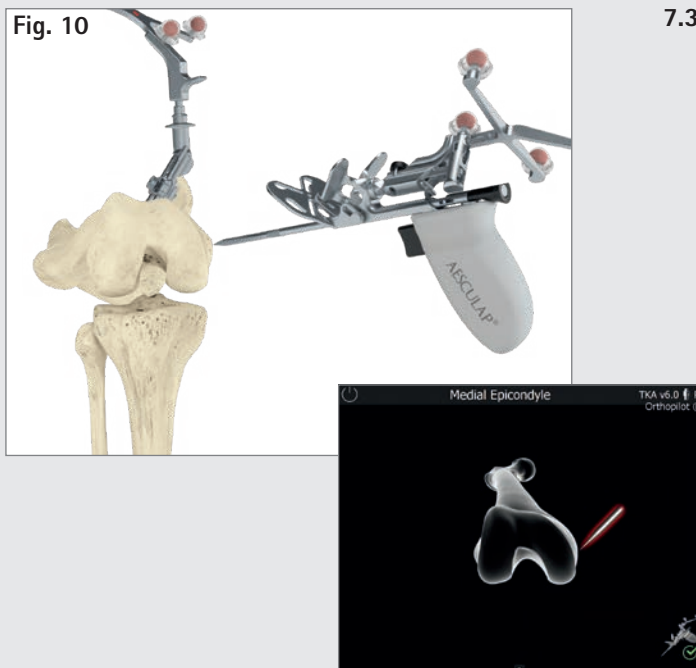
Fig. 9



### 7.2 Registering the ventral corticalis point

This reference point is located at the place where the anterior shield ends proximally. In the medio-lateral direction, palpate the point located furthest in the ventral direction.

The distance between this point and the dorsal condyles is used as the basis for suggesting femoral component sizes and for calculating the theoretical center of the knee joint. Later on, it is also used to determine whether there is a risk of sawing into the ventral cortex.



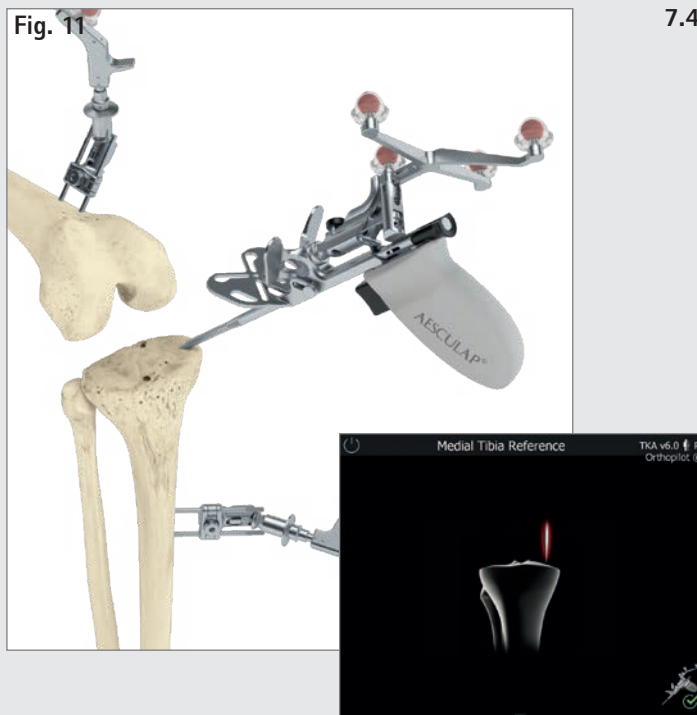
### 7.3 Recording the medial and lateral epicondyles (optional)

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 dorsal 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.

# AESCULAP® OrthoPilot® TKA

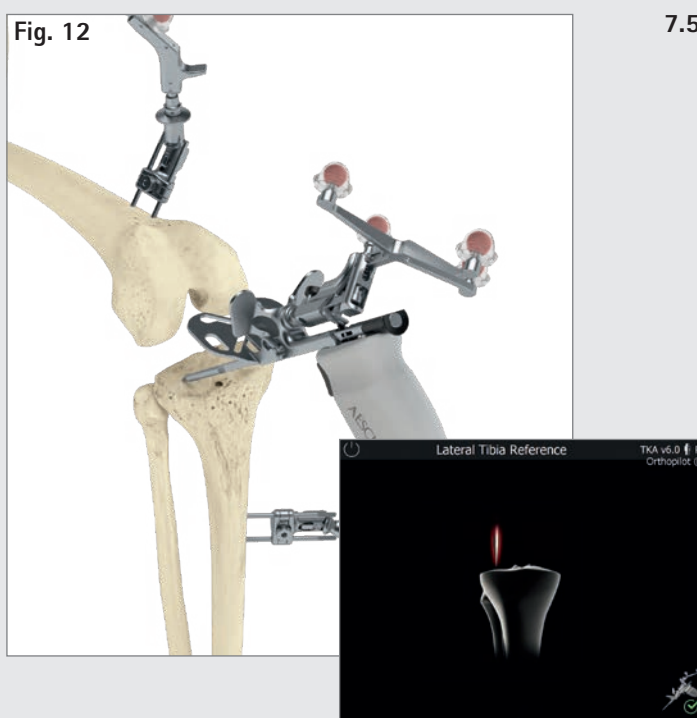
## 7 | GENERAL DATA RECORDING



### 7.4 Reference for medial cutting-height display

This step entails recording the reference point for the medial cutting-height display.

It is advisable to use significant landmarks during palpation, e.g., the deepest point of the defect or the joint surface.

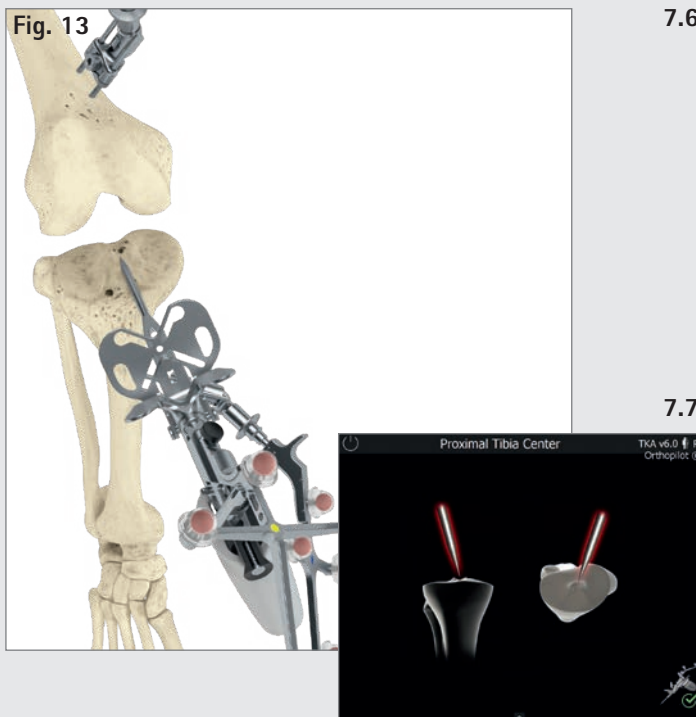


### 7.5 Reference for lateral cutting-height display

This step entails recording the reference point for the lateral cutting-height display. It is advisable to use significant landmarks during palpation, e.g., the deepest point of the defect or the joint surface.

#### OPTION

The default settings include palpation of both reference points. Users have the option of changing the settings so that only one reference point is queried. Changing this setting will mean that only one reference point is recorded, and that single reference point will be used to display the cutting height during the "tibial resection" step.



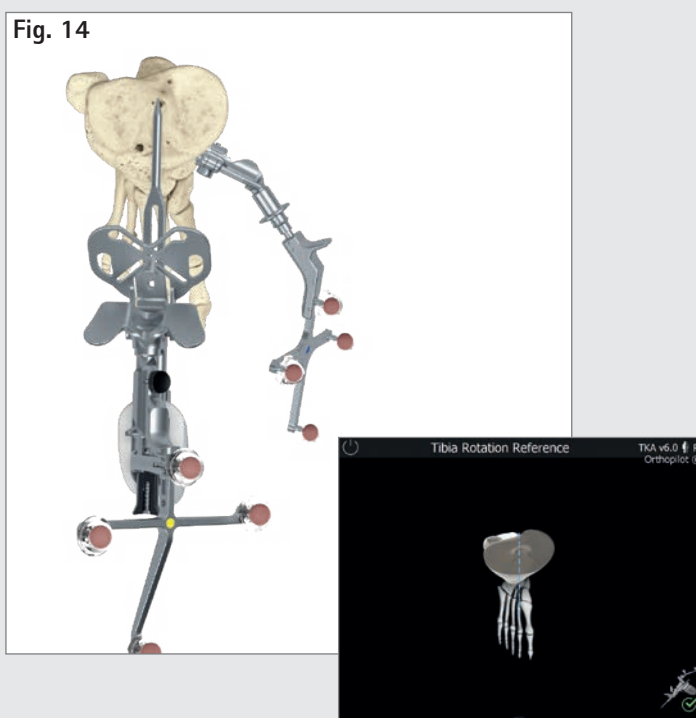
## 7.6 Identifying the tibial center

This step is used to register the center of the ventral insertion of the ACL. If the patient has no ACL, or degenerative changes have occurred, the point can be found:

- in the center of the medial-lateral diametric line of the tibial head,
- at the transition between the first and second thirds of the anterior-posterior diametric line of the tibial head, measured from the anterior edge.

## 7.7 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 stem 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 point facing toward the dorsal edge of the tibial plateau (target reference: aiming the pointer tip at the PCL insertion) (9).



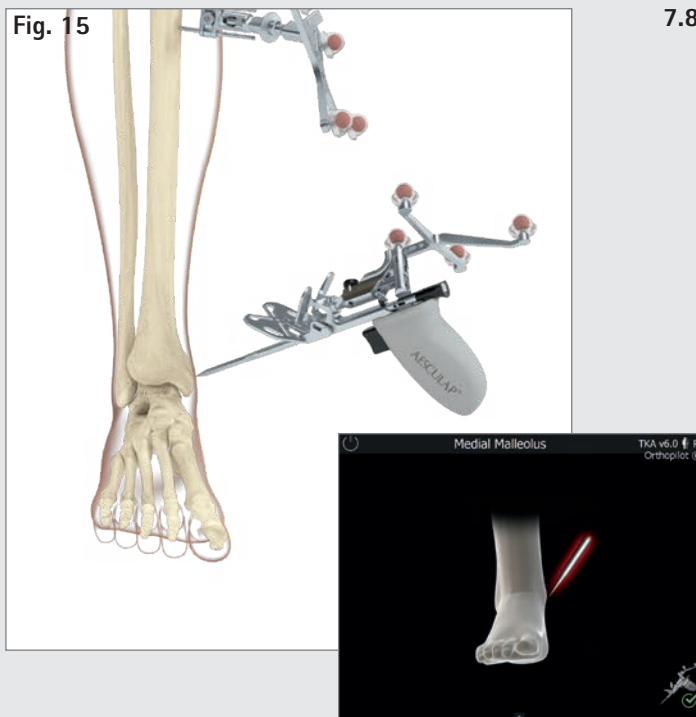
## TIP

Note the different degrees of variability among different reference points registered intraoperatively; some of these may involve a very high degree of variability (9). Avoid inward rotation of the tibial component, as it would result in lateralization of the tuberositas tibiae, which could cause problems with patella guidance. Inward 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.

# AESCULAP® OrthoPilot® TKA

## 7 | GENERAL DATA RECORDING

Fig. 15

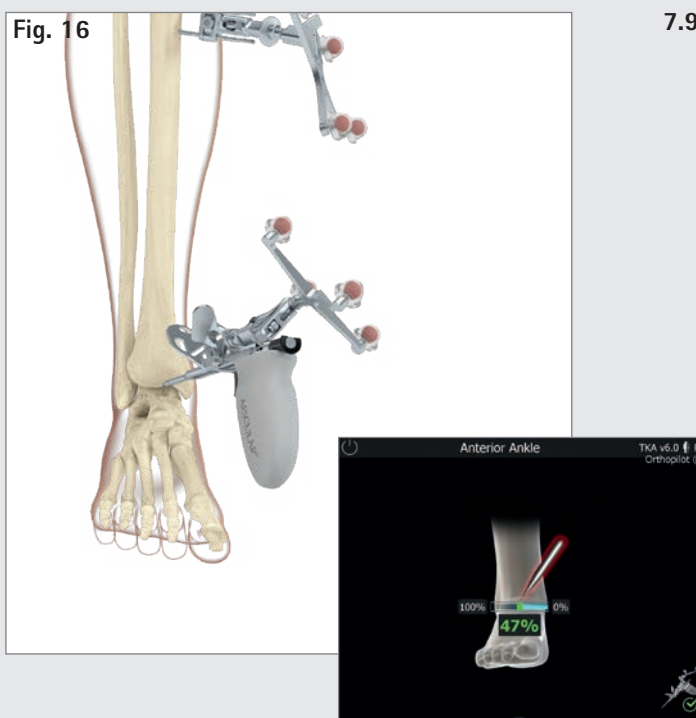


### 7.8

#### 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.

Fig. 16



### 7.9

#### Ventral ankle-joint point

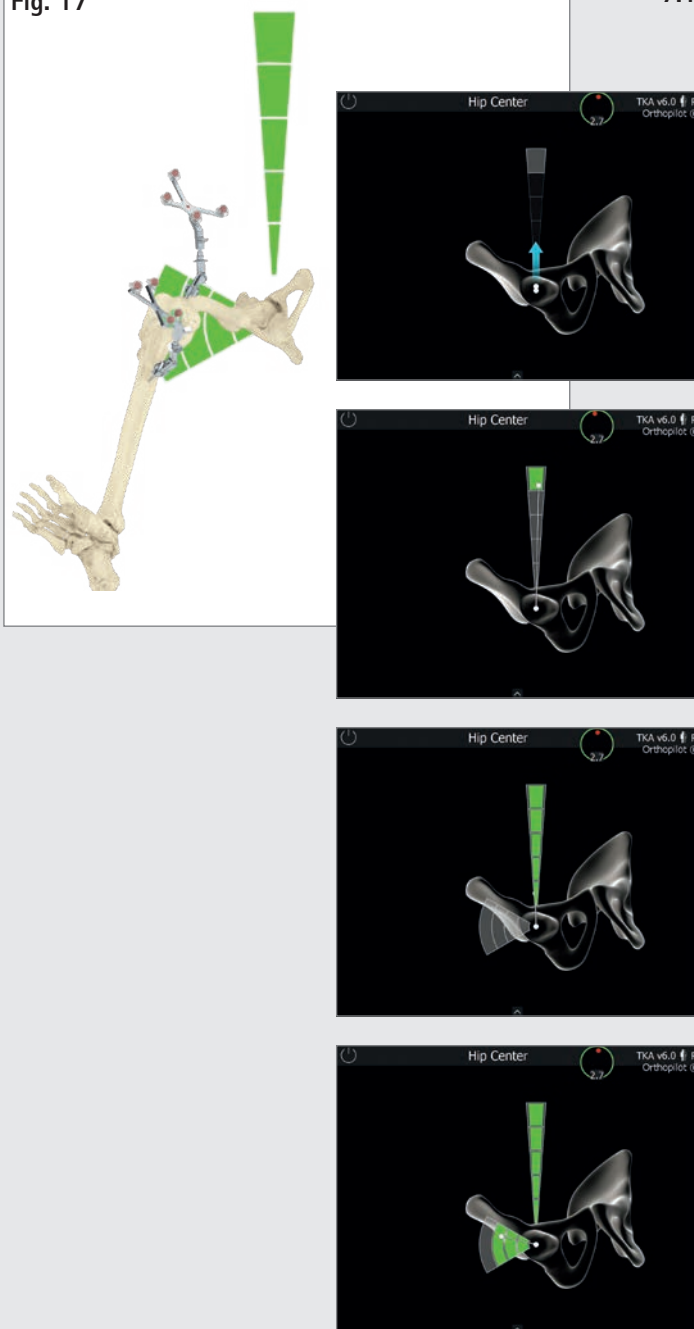
Register the point by placing the pointer tip at the front edge of the distal tibial, as close as possible to the ankle-joint gap. The following step will be displayed: "Ventral ankle joint". This palpation point should lie on the central tibial axis, directly beside the center of the ankle joint.

Palpate at that point (indicated using a white dot). The display on screen will assist the surgeon in verifying the ventral palpation point by showing a percentage display starting from the medial malleolus palpation point, with a green safety zone around 50%  $\pm$  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 (second ray) is outside of the green safety zone, it is advisable to re-palpate the malleolae.

Fig. 17



### 7.10 Determining the center of the hip joint

The start screen for registering the center of the hip joint is displayed here. Once the leg is being kept still, an arrow pointing upward will appear, and the user can begin the data registration process by making a vertical motion upward (towards 12 o'clock). Move the femur such that the white dot is touching the vertically/horizontally arranged fields. When the top-most gray segment has been reached, the segments will turn green one by one, from top to bottom. The vertical motion should be followed by a horizontal motion in the lateral direction (abduction of the leg).

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.

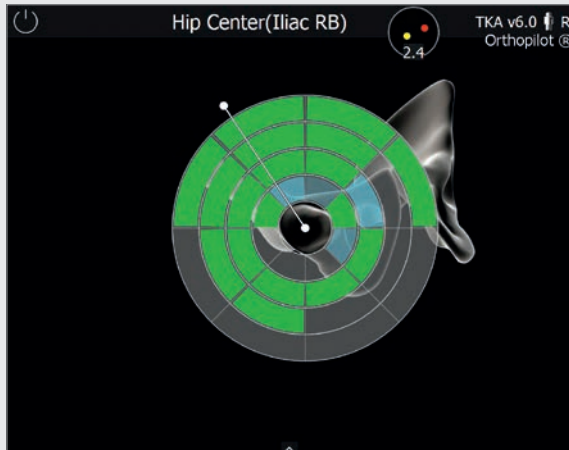
#### NOTE

Be particularly mindful of:

- whether the femoral transmitter will remain visible through the entire motion
- whether unrestricted vertical and horizontal motion is possible (no limitations due to anchoring or holding mechanisms)
- not exerting force on the pelvis through the femur
- avoiding any type of pelvis movement (responsibility of the surgeon)

# AESCULAP® OrthoPilot® TKA

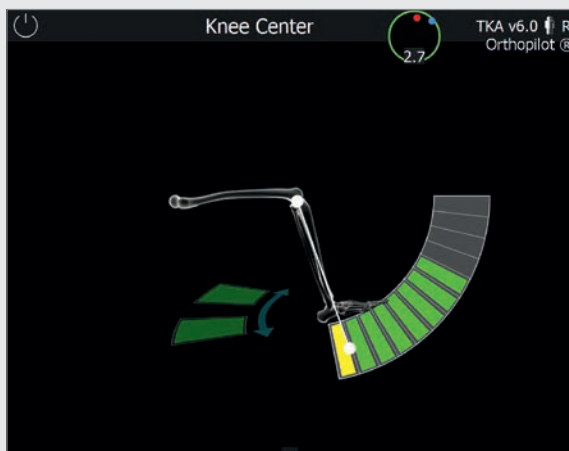
## 7 | GENERAL DATA RECORDING



### 7.11 Optional determination of hip joint center with pelvic reference

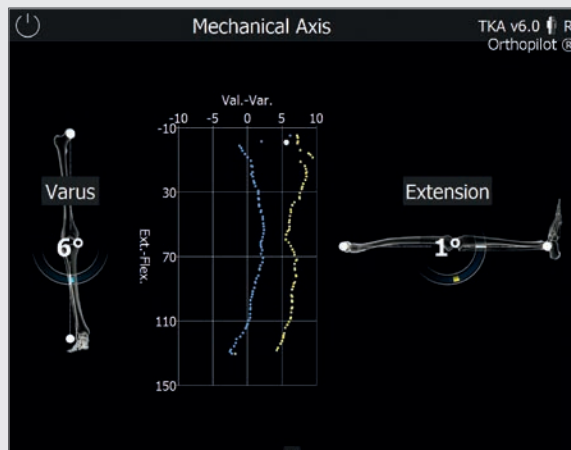
Registering the center of the femoral head will require a reference transmitter firmly anchored to the crista iliaca. This mode is displayed in a special window with the note "Femoral head center (pelvic ref)".

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.



### 7.12 Registering 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". Perform bending and stretching movements with the leg. Hold the leg under the heel with one hand while doing this. In order to coordinate actual movements with the ones shown on the screen, it is advisable to start with the knee bent at around a 90° angle and then extending the leg. 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.



#### NOTE

For information on the Femur first technique, see Chapter 9: Femur first technique

#### 7.13 Representation of the mechanical leg axis

The following step entails displaying the registered axis relationships in coronal and sagittal views. This relationship is depicted dynamically by calculating the relationship between the mechanical tibial axis and the mechanical femoral axis from one moment to the next. This allows the system to perform dynamic goniometry of the knee joint based on the current axial deviation/flexion position within the scope of motion. 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, which can offer initial information on the need for a release to be carried out later on.

#### TIP

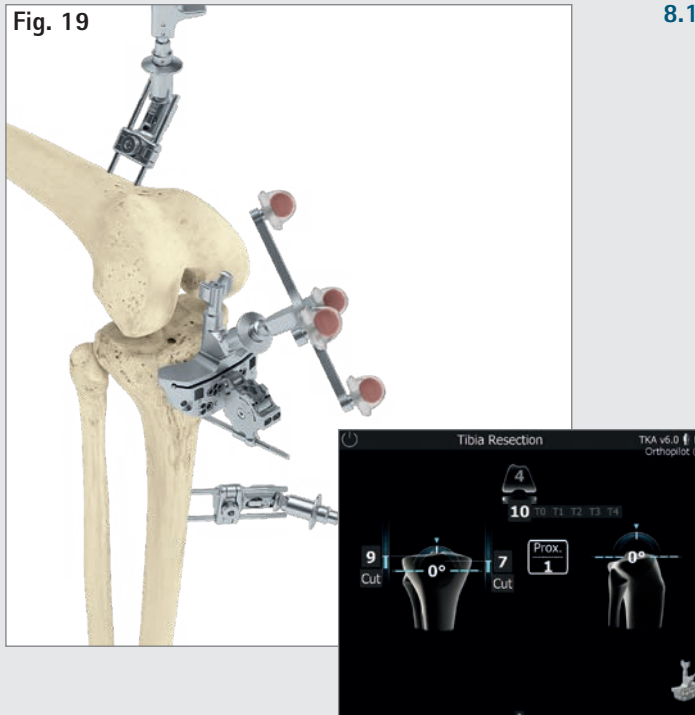
This step can serve to check the plausibility of an axis misalignment in comparison to a full-leg still image taken pre-operatively.

Fig. 18



# AESCU LAP® OrthoPilot® TKA

## 8 | TIBIA FIRST TECHNIQUE



### TIP

Users also have the option of using a alignment instrument (NP1018R) to assist with IQ cutting block alignment. Start by connecting the alignment instrument to the cutting block (with attached FS626R and corresponding transmitter (FS633 or FS636)) using the correct interface, and then anchoring it at a resection height of around 10 mm (distal to the tibial joint line) using a headless screw pin. Rotate around the screw pin to adjust varus/valgus settings. Adjust to the desired resection height (+/- 4 mm) and tibial slope (+/- 8°) manually using the two adjustment knobs or screwdriver NP618R.

### 8.1 Resection of the tibial plateau

Connect the modular transmitter adapter (FS626R) and the cutting block (NS334R, IQ instruments) to the corresponding transmitter (FS633 or FS636). Move the cutting block proximally or distally (from the joint line) to determine the exact resection height in relation to the bony reference points palpated medially and laterally on the tibia (program steps "medial tibial reference" and "lateral tibial reference"). The tibial cutting block can be navigated freely to the desired varus/valgus and slope values in relation to the mechanical axis. AESCULAP® recommends a 0° dorsal slope for its prosthesis systems.

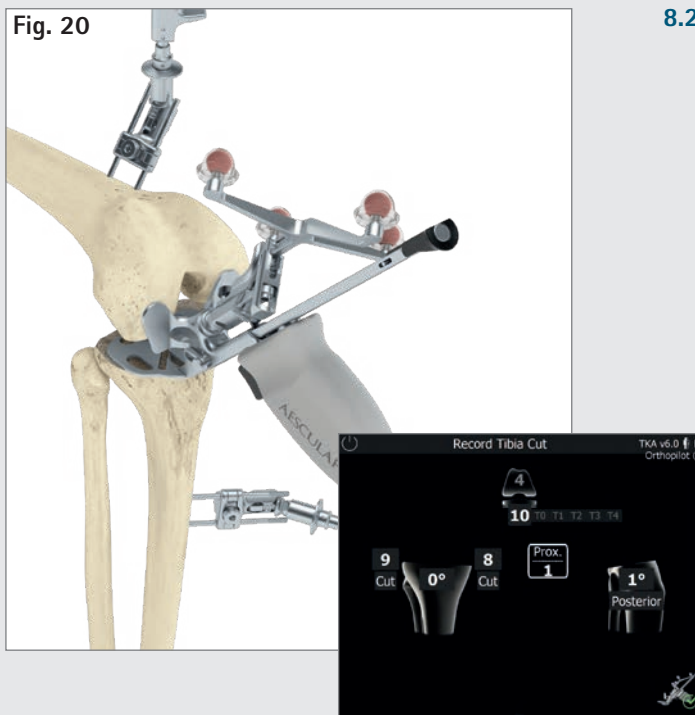
Start by anchoring the tibial cutting block using two headless screw pins from the ventral direction. After that, if necessary, use the available pin holes to maneuver the cutting block and adjust the cutting height in 2 mm steps.

Once the desired resection height, slope, and varus/valgus alignment have been achieved, use an additional screw pin with head (at an angle, from the medial/lateral direction) to finish anchoring the cutting block into place, and then proceed with the resection.

Based on previous palpations in the anterior-posterior dimension, preliminary femoral size calculations and possible combinations with tibial sizes in the selected prosthesis system will be displayed at the top of the screen in the center.

### 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.

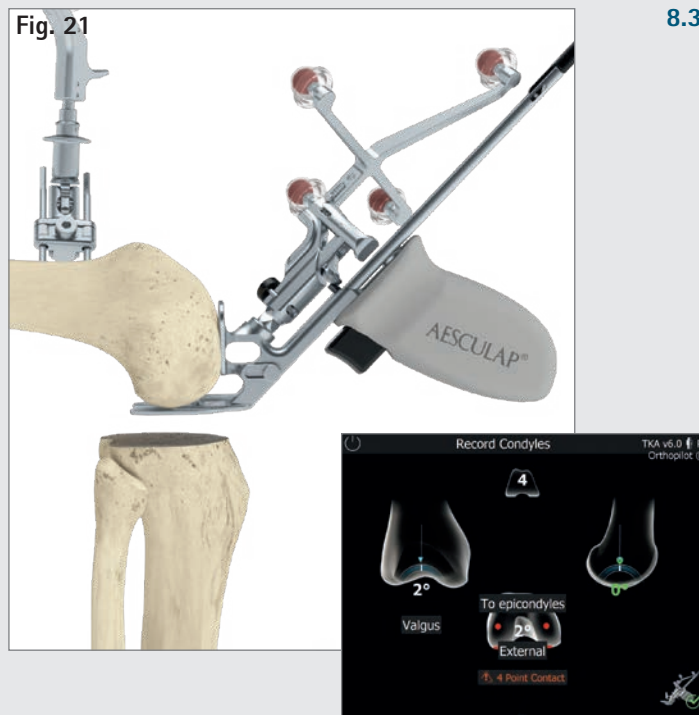


## 8.2 Checking tibial resection

The tibial control panel on the Multitool (or tibial incision control panel NP617R/ NP617RM) is used 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 control panel is still, the system will record. The data recorded when checking the tibial resection will be used in later calculations, which is why it is essential that the value be re-recorded if any follow-up tibial resections are performed later on.

# AESCULAP® OrthoPilot® TKA

## 8 | TIBIA FIRST TECHNIQUE



### 8.3 Registering condyles

The distal and dorsal condyles are registered with the help of the Multitool (see illustration at left). If using gesture or foot pedal controls, it is also possible to register the distal and dorsal condyles using the corresponding alignment instrument (NS320R) with foot plates (NQ958R). 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 dorsal 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.

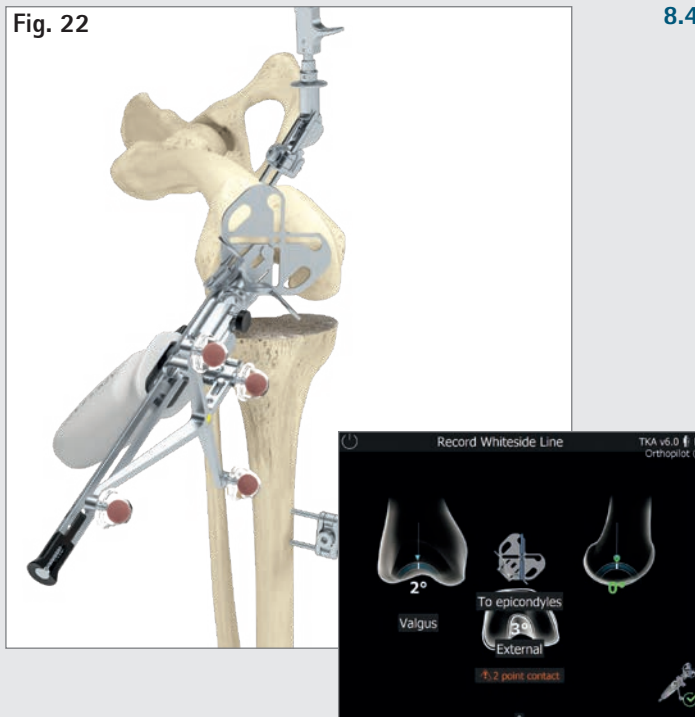
#### NOTE

Four-point contact is essential!

It is used as the basis for

- recommending femoral component sizes,
- displaying extension and flexion gap measurements,
- displaying cutting height for distal and dorsal femoral resections, and
- displaying femoral component rotation.

Fig. 22



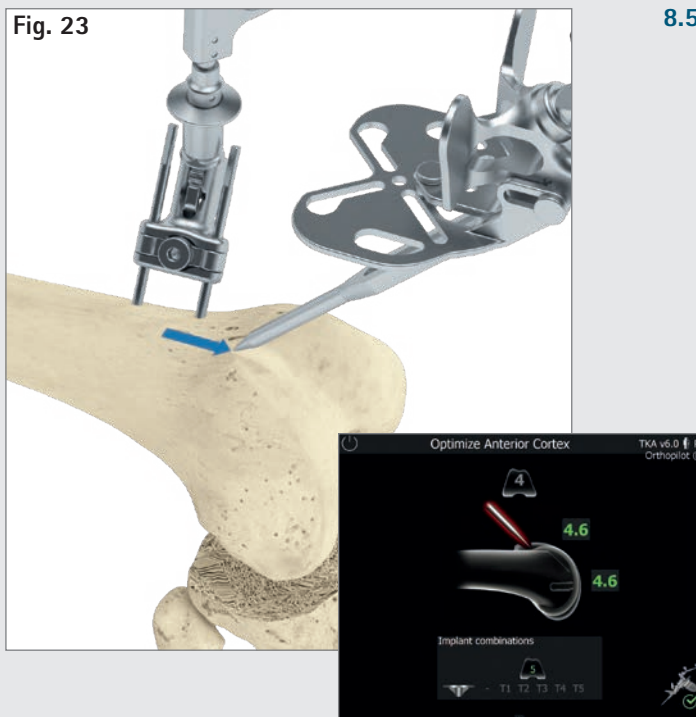
#### 8.4 Recording Whiteside line

The Whiteside line is recorded using the tibial control panel on the Multitool, or with alignment block NS320R without foot plates.

At 0° extension/flexion, maneuver the recess to be used (marked in blue on the screen) visually to overlap with the Whiteside line.

# AESCULAP® OrthoPilot® TKA

## 8 | TIBIA FIRST TECHNIQUE

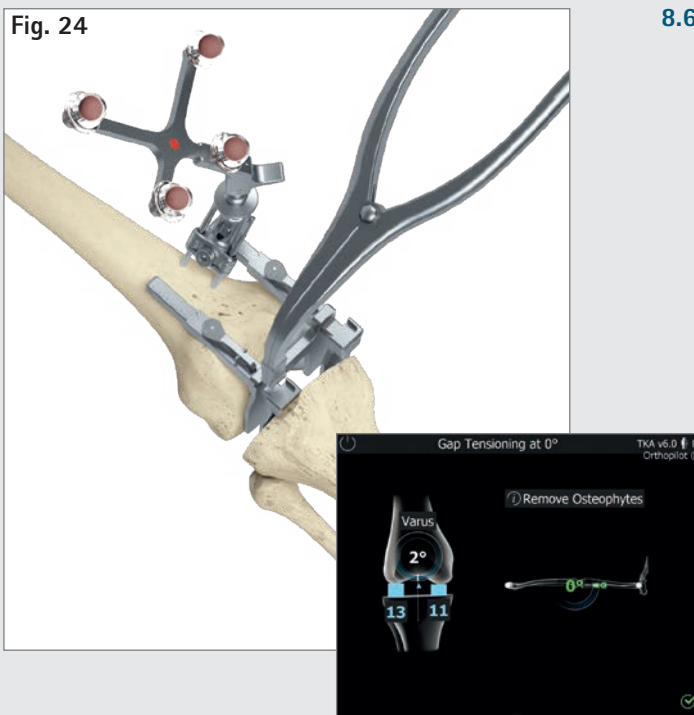


### 8.5 Ventral cortex optimization

After the distal and dorsal condyles have been recorded, the next step is to optimize the anterior point on the femur using the pointer and the corresponding transmitter. Position the tip of the pointer near the initially recorded ventral corticalis point. The software will then use blue arrows to point at the spot at which the size of the femoral implant matches in terms of A/P and proximal-distal elongation. 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 proximal-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.



## 8.6 Measuring the joint gap during stretching and bending

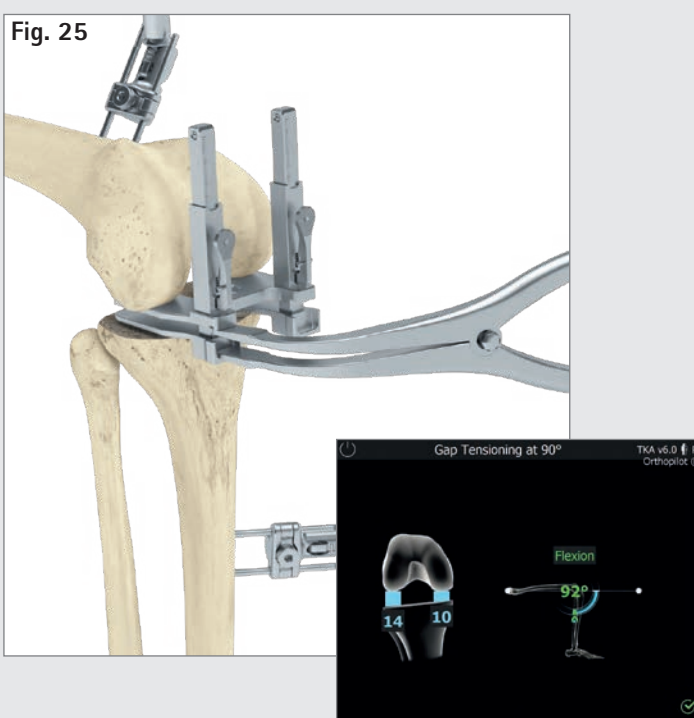
Before measuring flexion/extension gaps, remove any osteophytes that could affect ligament and capsular tension. Extend the leg as fully as possible ( $0^\circ \pm 5^\circ$ ). Place the distractor (NE750R) between the tibial resection and the distal femoral condyles, and then spread using the spreading 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 bending in the leg.

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 still as possible during the measurement process. Real-time gap values will be shown on the tibia in blue. At the same time, the software will automatically move on to measuring the joint gap in flexion.

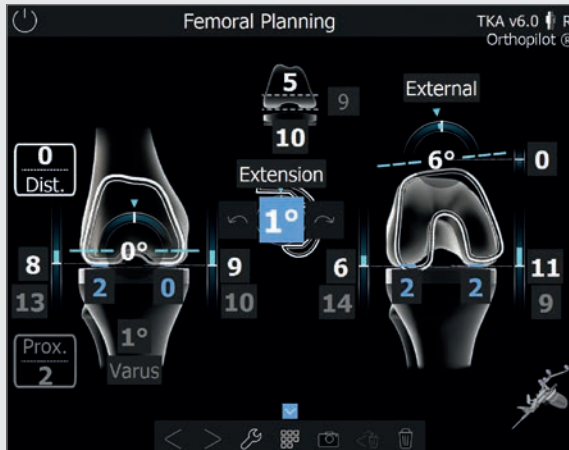
In this step, it is possible to skip completely the distraction and the femoral planning steps by choosing the double forward arrow in the toolbar or the ring menu, or by doing a long footswitch press (see Chapter 5).



Data is recorded in this step using the same process as described for extension. As described in Chapter 5, 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® TKA

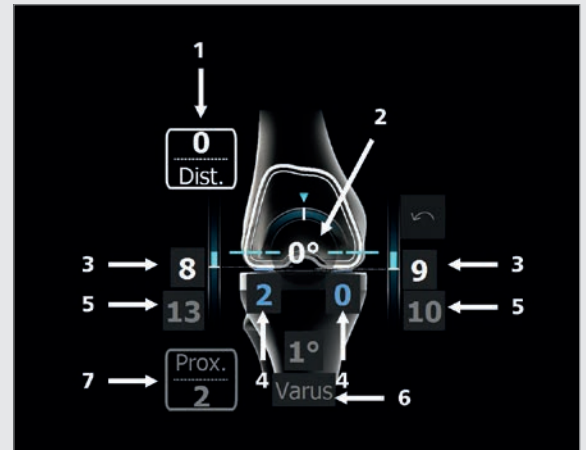
## 8 | TIBIA FIRST TECHNIQUE



### 8.7 Femoral planning

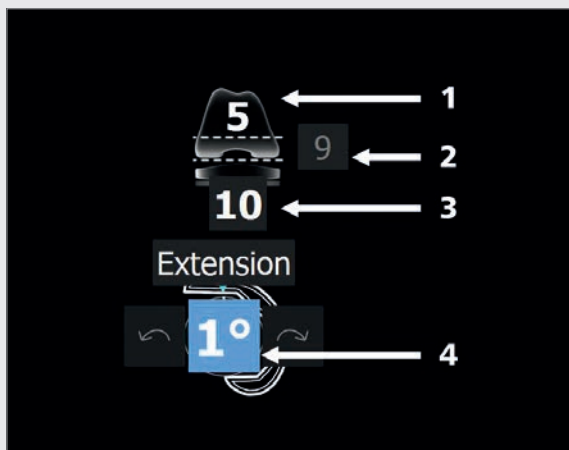
#### TIP

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.



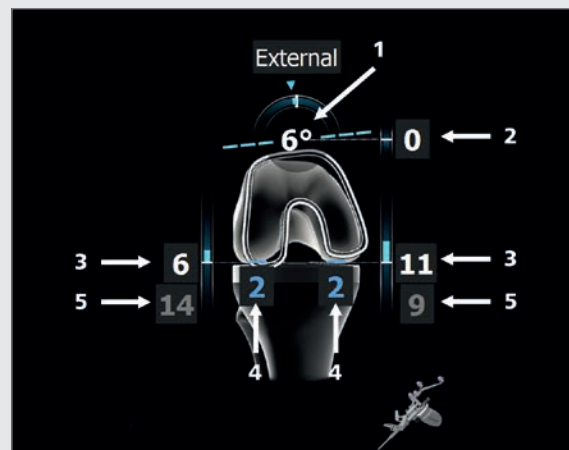
#### In extension

- 1 Information on proximal/distal joint line shift (0 mm here), starting from the most prominent distal condyle recorded during the "condyle reference" step. Displaying the joint line is optional. It can be switched on or off under the options screen.
- 2 Varus/valgus display (0° here), indicated with the arch in the femur and the number given in degrees.
- 3 Distal femoral cutting height (here: 8 mm from lateral, 9 mm from medial), indicated using blue bars and white numbers.
- 4 Remaining extension gap after planned installation of implant components (here: 2 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 columns and yellow numbers. Clinically speaking, a negative/yellow gap value means stretching of the soft tissue (e.g., ligaments).
- 5 The grey numbers (here, 13 mm lateral and 10 mm medial) are non-changeable reminder values based on the ligament tension measured in extension.
- 6 Recording of tibial resection (here: 1° varus).
- 7 Tibial joint line shift (starting from the most proximal reference point recorded); here: 2 mm proximal.



#### Display and control elements (center)

- 1 & 2 Size 5 femoral implant with distal implant thickness of 9 mm for Columbus®.
- 2 Total height of tibial components (metal plate with PE inlay); here: 10 mm.
- 3 Femoral component extension/flexion display; here: 1° extension.



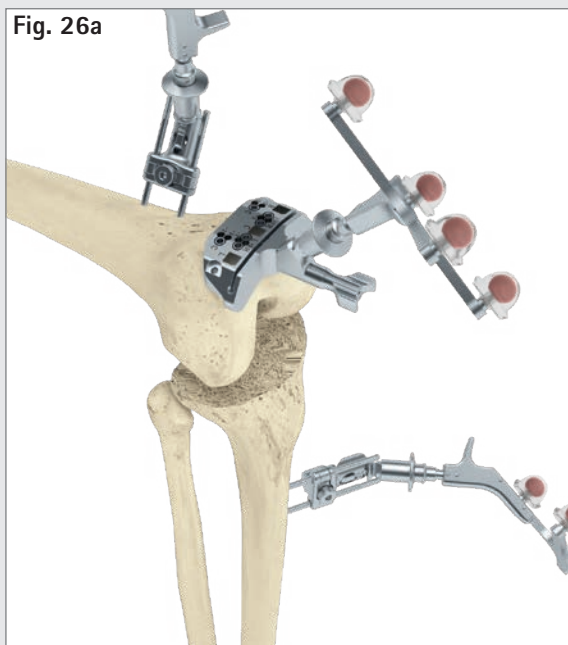
#### In flexion

- 1 Rotation (here: 6° external rotation to the dorsal condyles recorded), indicated using the arch in the femur and a number in degrees.
- 2 Ventral cutting height (here: 0 mm in relation to the ventral point palpated (the location of the ventral 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 8.5).
- 3 Dorsal femoral cutting height (here: 6 mm lateral, 11 mm medial), indicated using blue bars and white numbers.
- 4 Remaining flexion gap following planned installation of implant components (here: 2 mm lateral and 2 mm medial), indicated using blue numbers and blue columns, or yellow numbers and columns 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, 14 mm lateral and 9 mm medial) are non-changeable reminder values based on the ligament tension measured in extension.

# AESCULAP® OrthoPilot® TKA

## 8 | TIBIA FIRST TECHNIQUE

Fig. 26a



### 8.8 Distal femoral resection

Attach the distal femoral resection block to the corresponding passive transmitter (FS633 or FS636). The precise resection plane in relation to the medial and lateral distal bony condyles recorded on the femur is determined by moving the cutting block in the proximal or distal direction.

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 number values will turn green. Another orientation guide for determining approximate resection height is the distal thickness of the femoral implant, which is displayed at the top of the screen in the middle. Users also have the option of specifying a deviation from the joint level measured during the "condyle references" step (in the example shown: 0 mm).

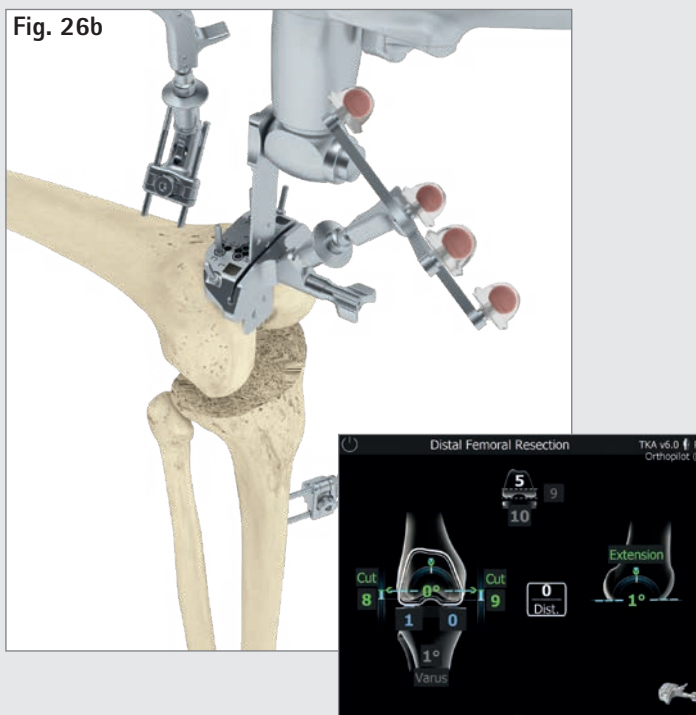
#### TIP

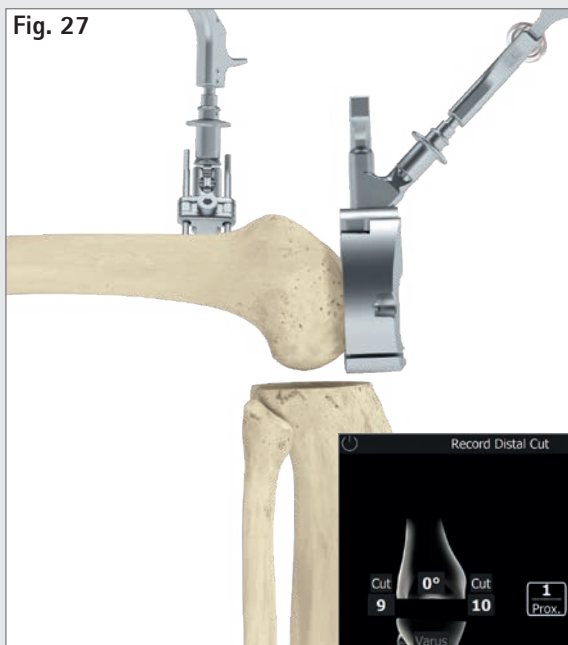
Users also have the option of using an alignment instrument (NP1018R) to assist with IQ cutting block alignment. Start by connecting the alignment instrument to the cutting block (with attached FS626R and corresponding transmitter (FS633 or FS636)) using the correct interface, and then anchoring it at a resection height of around 10 mm (proximal to the femoral joint line) using a headless screw pin. Rotate around the screw pin to adjust varus/valgus settings. Adjust to the desired resection height (+/- 4 mm) and tibial slope (+/- 8°) manually using the two adjustment knobs or screwdriver NP618R.

#### 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.

Fig. 26b





### 8.9 Checking distal resection

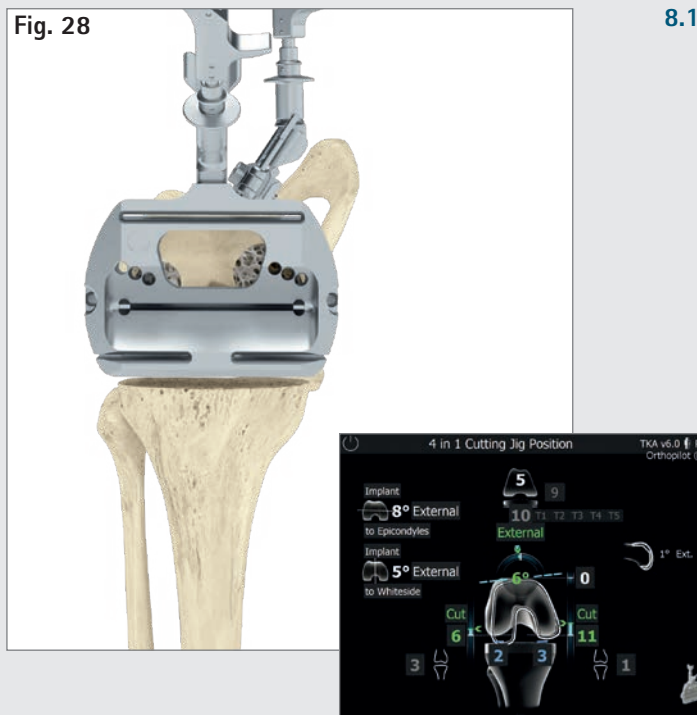
After completing the distal femoral resection, check the resection plane using the corresponding 4-in-1 cutting block with adapter FS626R and transmitter (FS633 or FS636).



# AESCULAP® OrthoPilot® TKA

## 8 | TIBIA FIRST TECHNIQUE

Fig. 28



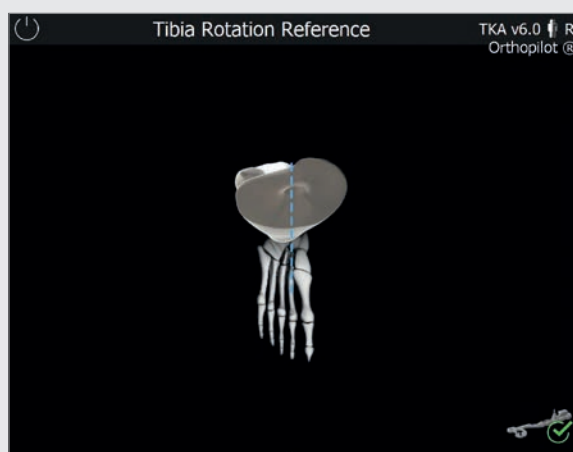
### 8.10 Setting rotation and A/P positioning

Rotation is set using the 4-in-1 sawing guides directly. Once the desired rotation position has been attained, the corresponding cutting block for the femoral size (plus RB adapter (FS626) and transmitter (FS633 or FS636)) can be anchored into position. After that, proceed with incisions: first anterior, then posterior, then diagonal. After completing the resections, proceed with implantation – starting with trial implants, and then moving to permanent implants.

#### TIP

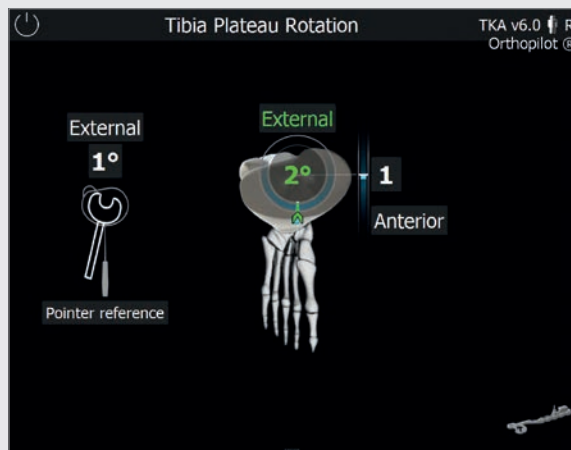
The rotation value is displayed in relation to the dorsal condyles recorded.

At this juncture, users have the option of running a comparison to the palpated epicondyles (optional, see Chapter 7.3) and/or the Whiteside line (optional, see Chapter 8.4). 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.



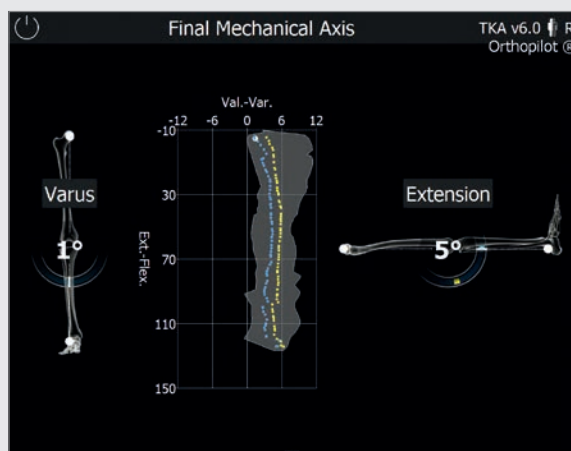
### 8.11 Tibial rotation reference

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.



### 8.12 Setting tibial rotation

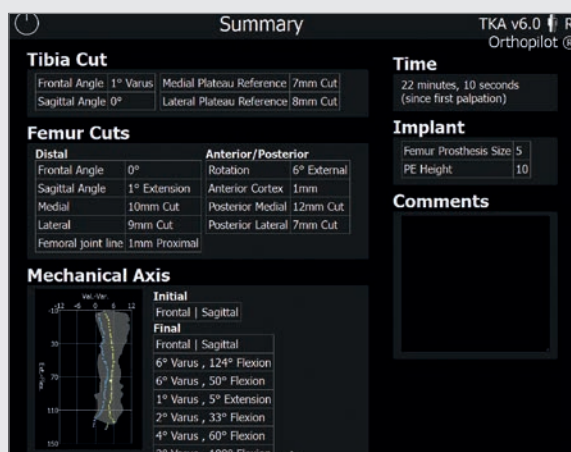
Use the tibial handle with mounted navigation adapter (NP1017R) and the corresponding transmitter (FS633/FS636) to navigate the position of the tibial plateau in relation to one or both of the previously recorded references (see Chapter 7.7/Chapter 8.11). If both references are selected (optional), a 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.



### 8.13 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.

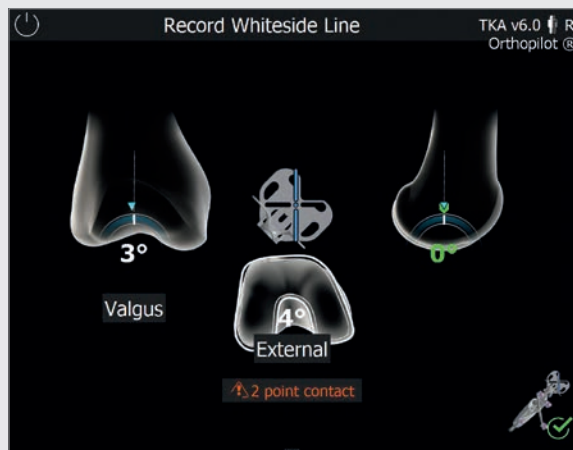


### 8.14 Summary

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® TKA

## 9 | FEMUR FIRST TECHNIQUE



### NOTE

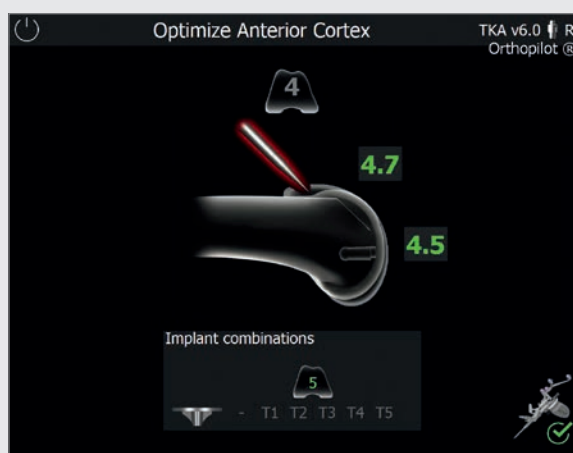
Please follow all steps through the end of Chapter 7 and then proceed from the beginning of Chapter 9.

#### 9.1 Condyle reference/Recording the Whiteside line

See Chapter 8.4

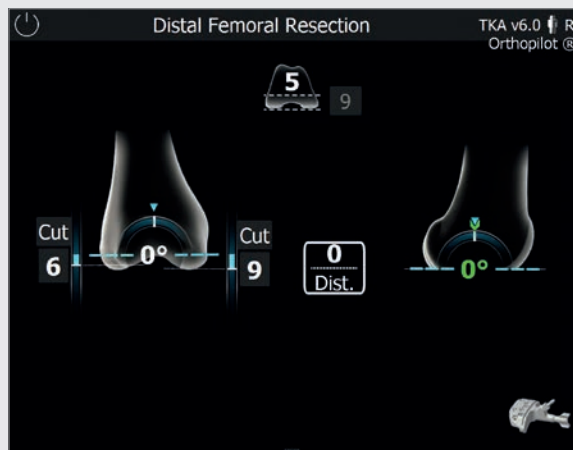
Differences with Femur first:

Simultaneous recording of Whiteside line and distal condyles.



#### 9.2 Optimizing the ventral corticalis point

See Chapter 8.5



### 9.3 Distal femoral resection

See Chapter 8.8

Differences with Femur first: No target values shown, as femoral planning not carried out.

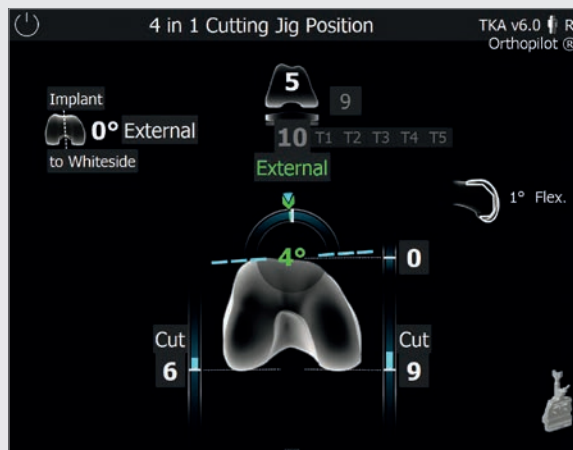


### 9.4 Recording the distal femoral resection

See Chapter 8.9

# AESCULAP® OrthoPilot® TKA

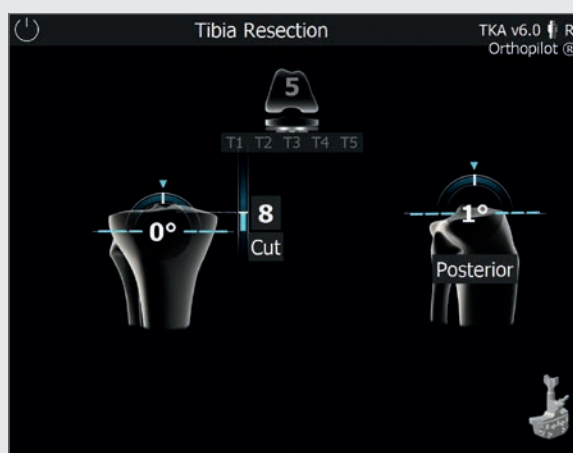
## 9 | FEMUR FIRST TECHNIQUE



### 9.5 Positioning the 4-in-1 sawing guide

See Chapter 8.10

Differences with Femur first: No femoral planning takes place, so no target values from the planning stage are shown, but the rotation value corresponding to the position of the previously recorded Whiteside line is shown in green.



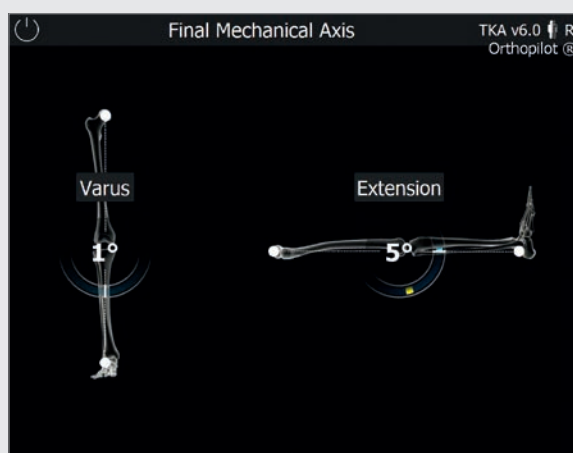
### 9.6 Positioning the tibial sawing guide

See Chapter 8.1



## 9.7 Recording the tibial resection

See Chapter 8.2



## 9.8 Mechanical axis – post-operative

See Chapter 8.13

# AESCULAP® OrthoPilot® TKA

## 9 | FEMUR FIRST TECHNIQUE

The screenshot displays the 'Summary' screen of the OrthoPilot TKA system. It is organized into several sections: 'Tibia Cut', 'Femur Cuts', 'Mechanical Axis', 'Time', 'Implant', and 'Comments'. The 'Tibia Cut' section shows a Frontal Angle of 0° and a Sagittal Angle of 1° Posterior, with a Plateau Reference of 7mm Cut. The 'Femur Cuts' section is divided into 'Distal' and 'Anterior/Posterior' measurements. The 'Mechanical Axis' section lists 'Initial' and 'Final' alignment values. The 'Time' section shows a duration of 16 minutes and 46 seconds. The 'Implant' section shows a Femur Prosthesis Size of 5 and a PE Height of 10. The 'Comments' section is a large empty box for notes.

Tibia Cut	
Frontal Angle	0°
Sagittal Angle	1° Posterior
Plateau Reference: 7mm Cut	

Femur Cuts	
Distal	Anterior/Posterior
Frontal Angle	1° Valgus
Sagittal Angle	1° Flexion
Medial	8mm Cut
Lateral	6mm Cut
Femoral joint line	1mm Distal
Rotation	4° External
Anterior Cortex	0mm
Posterior Medial	9mm Cut
Posterior Lateral	5mm Cut

Mechanical Axis	
Initial	Frontal   Sagittal
6° Varus , 121° Flexion	
6° Varus , 8° Flexion	
7° Varus , 29° Flexion	
7° Varus , 59° Flexion	
6° Varus , 95° Flexion	
Final	Frontal   Sagittal
6° Varus , 127° Flexion	

Time	
16 minutes, 46 seconds (since first palpation)	

Implant	
Femur Prosthesis Size	5
PE Height	10

Comments	

### 9.9 Surgery summary

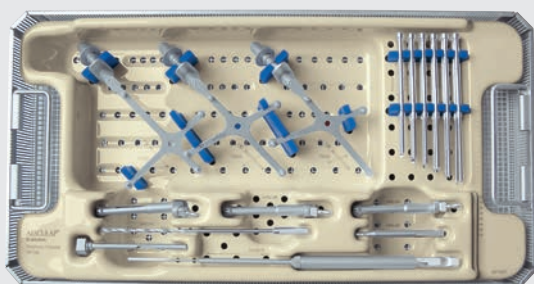
See Chapter 8.14

Differences with Femur first: The following information cannot be displayed, unlike with Tibia first:

- PE height
- Dorsal condyle cutting height

## 10 | INSTRUMENT SET OVERVIEW – OrthoPilot® TKA 6.0

### 10.1 Standard instruments – NP611



#### OrthoPilot® TKA peripheral instruments, passive NP168

FS633	OrthoPilot® passive transmitter, yellow	1
FS634	OrthoPilot® passive transmitter, blue	1
FS635	OrthoPilot® passive transmitter, red	1
JF213R	1 / 1 strainer basket, perforated, 485 x 253 x 76 mm	1
JF511	Wrapping cloth, 1400 x 1000 mm	1
NP169P	Storage – TKA ph. instruments, passive	1
NP281R	OrthoPilot® screw length measuring device	1
NP615R	OrthoPilot® spiral drill, D= 3.2 mm 160/80 mm	1
NP616R	OrthoPilot® drill sleeve, D= 3,2 mm, L= 100 mm	1
NP618R	OrthoPilot® RB screw inswinger for motor	1
NP619R	OrthoPilot® Rigid Body (RB) adapter f. scr.	3
NP620R	OrthoPilot® bicort. RB retain. screw, 30 mm	2
NP621R	OrthoPilot® bicort. RB retain. screw, 35 mm	2
NP622R	OrthoPilot® bicort. RB retain. screw, 40 mm	2
NP623R	OrthoPilot® bicort. RB retain. screw, 45 mm	2
NP624R	OrthoPilot® bicort. RB retain. screw, 50 mm	2
NP625R	OrthoPilot® bicort. RB retain. screw, 55 mm	2
TA011029	Passive Rigid Body instructions for use	1
TA020007	Knee instruments – instructions for use	1
TE899	Packing template for NP169P (NP168)	1



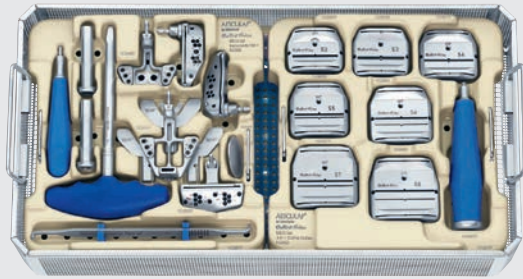
#### OrthoPilot® TKA implantation instruments NP602

FS604	OrthoPilot® active pointer 0°	1
JF213R	1 / 1 strainer basket, perforated, 485 x 253 x 76 mm	1
NM743	OrthoPilot® elastic support strap	2
NM769R	OrthoPilot® foot plate	1
NP596R	Tibial sawing guide, right	1
NP597R	Tibial sawing guide, left	1
NP598R	Distal femoral sawing guide	1
NP603P	Storage – TKA implantation instruments	1
NP608R	Universal alignment system	1
NP617RM	OrthoPilot® tibial control panel	1
JF511	Wrapping cloth, 1400 x 1000 mm	1
TA020011	Sawing guide instructions for use	1

# AESCULAP® OrthoPilot® TKA

## 10 | INSTRUMENT SET OVERVIEW – OrthoPilot® TKA 6.0

### 10.2 Optional: MIOS® set



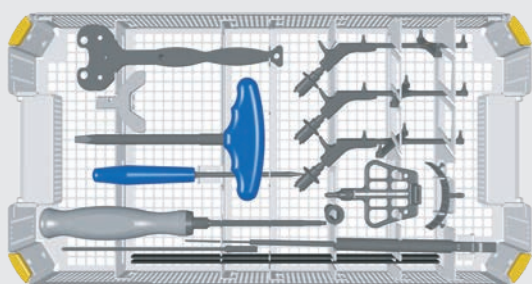
#### Columbus® MIOS® instruments NE340

JF214R	1 / 1 strainer basket, perforated, 458 x 253 x 106 mm	1
JF511	Wrapping cloth, 1400 x 1000 mm	1
NQ934	Columbus® MIOS® set – Instruments part 1	1
NQ936	Columbus® MIOS® set 4-in-1 cutting blocks	1
NQ939P	MIOS® mount for bone lever set	1
TE894	Packing template for NQ935P + NQ937P (NE340)	1

#### e.motion® MIOS® instruments NE490

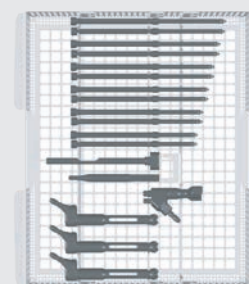
JF214R	1 / 1 strainer basket, perforated, 458 x 253 x 106 mm	1
JF511	Wrapping cloth, 1400 x 1000 mm	1
NQ930	e.motion® MIOS® set – Instruments part 1	1
NQ932	e.motion® MIOS® set 4-in-1 cutting blocks	1
NQ939P	MIOS® mount for bone lever set	1
TE893	Packing template for NQ931P + NQ933P (NE490)	1

### 10.3 IQ Instruments



#### OrthoPilot® TKA IQ set navigation instruments NS720

FS604	OrthoPilot® active pointer 0°	1
FS626R	IQ OrthoPilot® TKA RB adapter, modular	1
FS633	OrthoPilot® passive transmitter, yellow	1
FS634	OrthoPilot® passive transmitter, blue	1
FS635	OrthoPilot® passive transmitter, red	1
JA455R	Lid for AESCULAP® OrthoTray® DiN without handles	1
NM743	OrthoPilot® elastic support strap	1
NM769R	OrthoPilot® foot plate	1
NP281R	OrthoPilot® screw length measuring device	1
NP615R	OrthoPilot® spiral drill, D= 3.2 mm 160/80 mm	1
NP616R	OrthoPilot® drill sleeve, D= 3.2 mm, L= 100 mm	1
NP617RM	OrthoPilot® tibial control panel	1
NP618R	OrthoPilot® RB screw inswinger for motor	1
NP619R	OrthoPilot® Rigid Body (RB) adapter for screws	3

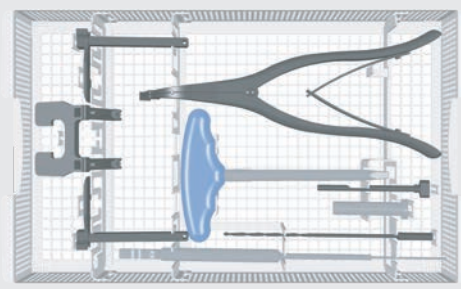
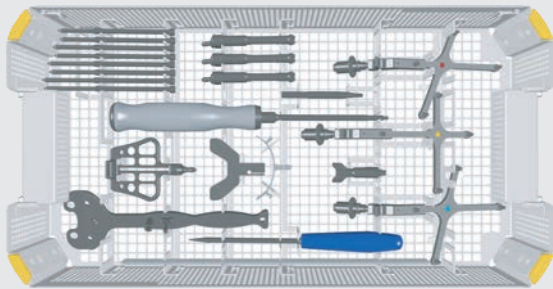


NP620R	OrthoPilot® bicortical RB retaining screw 30 mm	2
NP621R	OrthoPilot® bicortical RB retaining screw 35 mm	2
NP622R	OrthoPilot® bicortical RB retaining screw 40 mm	2
NP623R	OrthoPilot® bicortical RB retaining screw 45 mm	2
NP624R	OrthoPilot® bicortical RB retaining screw 50 mm	2
NP625R	OrthoPilot® bicortical RB retaining screw 55 mm	2
NQ940R	MIOS® handle for protection sleeve	1
NQ941R	MIOS® tissue protection sleeve for Rigid Body	1
NQ958R	MIOS® Y foot plate for alignment block	1
NS320R	IQ femoral alignment block, navigated	1
NS423R	IQ screwdriver SW 3.5	1
NS721R	IQ navigation instrument storage	1
NS726R	IQ e.motion® navigation instruments insert for NS721R	1
TA014010	Graphic templates – instructions for use	1
TA020007	Knee instruments – instructions for use	1
TF070	Graphic template for NS721R (NS720)	1

# AESCULAP® OrthoPilot® TKA

## 10 | INSTRUMENT SET OVERVIEW – OrthoPilot® TKA 6.0

### 10.4 OrthoPilot® TKA AESCULAP® RESET® – IQ navigation instruments



#### OrthoPilot® TKA AESCULAP® RESET® – IQ navigation instruments NP138

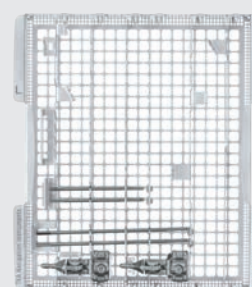
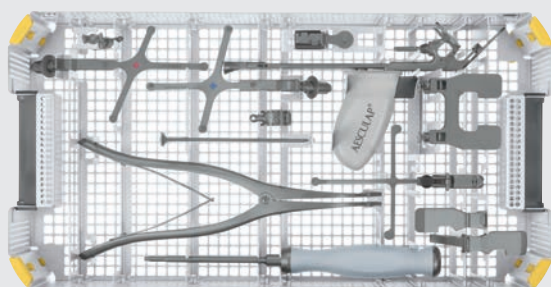
FS604	OrthoPilot® active pointer 0°	1
FS626R	IQ OrthoPilot® TKA RB adapter, modular	1
FS633	OrthoPilot® passive transmitter, yellow	1
FS634	OrthoPilot® passive transmitter, blue	1
FS635	OrthoPilot® passive transmitter, red	1
JA455R	Lid for AESCULAP® OrthoTray® DiN without handles	1
NE358R	OrthoPilot® RB screw inswinger for motor	1
NE750R	e.motion® PS/Rev femoral/tibial distractor	1
NP139R	AESCULAP® RESET® IQ navigation instrument storage	1
NP609R	Spreading pliers for femoral/tibial distractor	1
NP615R	OrthoPilot® spiral drill, D= 3.2 mm 160/80 mm	1
NP616R	OrthoPilot® drill sleeve, D= 3.2 mm, L= 100 mm	1
NP617RM	OrthoPilot® tibial control panel	1
NP619R	OrthoPilot® Rigid Body (RB) adapter for screws	3
NP620R	OrthoPilot® bicortical RB retaining screw, 30 mm	2

NP621R	OrthoPilot® bicortical RB retaining screw, 35 mm	2
NP622R	OrthoPilot® bicortical RB retaining screw, 40 mm	2
NP623R	OrthoPilot® bicortical RB retaining screw, 45 mm	2
NQ958R	MIOS® Y foot plate for alignment block	1
NS320R	IQ femoral alignment block, navigated	1
NS423R	IQ screwdriver SW 3.5	1
TA020007	Knee instruments – instructions for use	1
TF149	Graphic template for NP139R (NP138)	1

#### Optional

NM743	OrthoPilot® elastic support strap	1
NM769R	OrthoPilot® foot plate	1
NP281R	OrthoPilot® screw length measurement device	1
NQ940R	MIOS® handle for tissue protection sleeve	1
NQ941R	MIOS® tissue protection sleeve for Rigid Body	1

## 10.5 OrthoPilot® TKA AESCULAP® RESET® – IQ navigation instrument Multitool, two-pin anchoring



### OrthoPilot® TKA AESCULAP® RESET® – IQ navigation instrument Multitool, two-pin anchoring NP1000

FS626R	IQ OrthoPilot® TKA RB adapter, modular	1
FS634	OrthoPilot® passive transmitter, blue	1
FS635	OrthoPilot® passive transmitter, red	1
FS636	OrthoPilot® passive click transmitter, yellow	1
FS640	OrthoPilot® Multitool	1
JA455R	Lid for AESCULAP® OrthoTray® DiN without handles	1
NE750R	e.motion® PS/Rev femoral/tibial distractor	1
NP1001R	IQ navigation instrument storage	1
NP1012R	Pin for two-pin transmitter anchoring, D= 3.2 mm, short	4
NP1013R	Pin for two-pin transmitter anchoring, D= 3.2 mm, long	2
NP1016R	Two-pin transmitter anchoring element	2
NP609R	Spreading pliers for femoral/tibial distractor	1
NP618R	OrthoPilot® RB screw inswinger for motor	1
NS423R	IQ screwdriver SW 3.5	1
TA015099	TKA 6.0 instrument set instructions for use	1
TF277	Packing template for NP1001R (NP1000)	1

### Optional

NP1013R	Pin for two-pin transmitter anchoring, D= 3.2 mm, long	1
NP1017R	IQ tibial rotation navigation adapter	1
NP1018R	IQ alignment inst. for fem./tib. cutting block	1
TA014010	Graphic templates – instructions for use	1
TF272	Graphic template for NP1001R (NP1000)	1

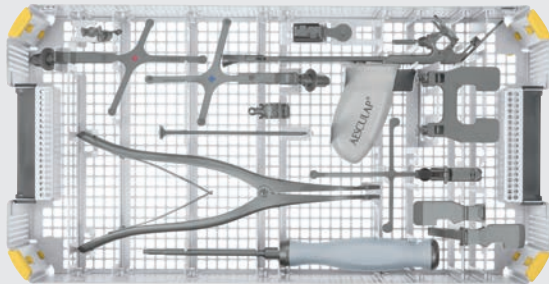
### Alternative

NP605R	Spreading pliers for femoral/tibial distractor w/force control	1
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# AESCULAP® OrthoPilot® TKA

## 10 | INSTRUMENT SET OVERVIEW – OrthoPilot® TKA 6.0

### 10.6 OrthoPilot® TKA AESCULAP® RESET® – IQ navigation instrument Multitool, bicortical anchoring



#### OrthoPilot® TKA AESCULAP® RESET® – IQ navigation instrument Multitool, bicortical anchoring NP1002

FS626R	IQ OrthoPilot® TKA RB adapter, modular	1
FS634	OrthoPilot® passive transmitter, blue	1
FS635	OrthoPilot® passive transmitter, red	1
FS636	OrthoPilot® passive click transmitter, yellow	1
FS640	OrthoPilot® Multitool	1
JA455R	Lid for AESCULAP® OrthoTray® DiN without handles	1
NE750R	e.motion® PS/Rev femoral/tibial distractor	1
NP1001R	IQ navigation instrument storage	1
NP609R	Spreading pliers for femoral/tibial distractor	1
NP615R	OrthoPilot® spiral drill, D= 3.2 mm 160/80 mm	1
NP616R	OrthoPilot® drill sleeve, D= 3.2 mm, L= 100 mm	1
NP618R	OrthoPilot® RB screw inswinger for motor	1
NP619R	OrthoPilot® Rigid Body (RB) adapter for screws	3
NP621R	OrthoPilot® bicortical RB retaining screw, 35 mm	2
NP622R	OrthoPilot® bicortical RB retaining screw, 40 mm	2

NP623R	OrthoPilot® bicortical RB retaining screw, 45 mm	2
NP624R	OrthoPilot® bicortical RB retaining screw, 50 mm	2
NS423R	IQ screwdriver SW 3.5	1
TA015099	TKA 6.0 instrument set instructions for use	1
TF278	Packing template for NP1001R (NP1002)	1

#### Optional

NP1013R	Pin for two-pin transmitter anchoring, D= 3.2 mm, long	1
NP1017R	IQ tibial rotation navigation adapter	1
NP1018R	IQ alignment inst. for fem./tib. cutting block	1
NQ940R	MIOS® handle for tissue protection sleeve	1
NQ941R	MIOS® tissue protection sleeve for Rigid Body	1
TA014010	Graphic templates – instructions for use	1
TF273	Graphic template for NP1001R (NP1002)	1

#### Alternative

NP605R	Spreading pliers for femoral/tibial distractor w/force control	1
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## 11 | SOFTWARE AND CONSUMABLES

### 11.1 Software OrthoPilot® TKA 6.0

Software module	
FS238	OrthoPilot® TKA 6.0

### 11.2 Disposables

Passive marker spheres	
FS616	NDI single-use passive marker (3 x 4 units)
FS618SU	CAP single-use passive marker (3 x 4 units)

### 11.3 Consumables

Instruments care oil	
JG600	Sterilit® – oil spray
JG598	Sterilit® – drip lubricator


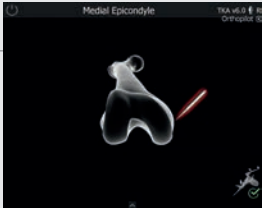

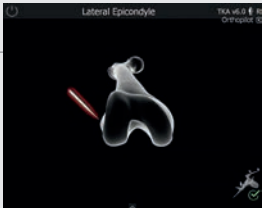
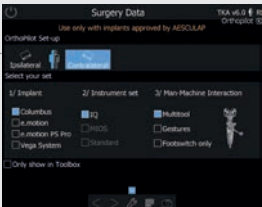

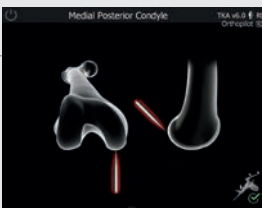
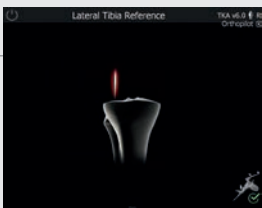
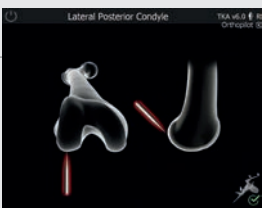

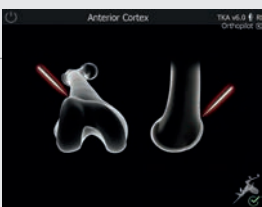

#### NOTE

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® Sterilit® oil spray JG600 or Sterilit® drip lubricator JG598).

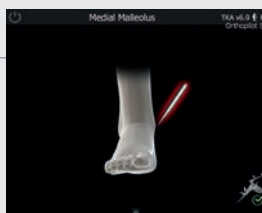
# AESCU LAP® OrthoPilot® TKA

## 12 | OrthoPilot® TKA 6.0 SCHEMATIC PROGRAM SEQUENCE

### 12.1 OrthoPilot® TKA 6.0 Tibia first with soft tissue management

- |    |   |                                       |    |  |  |
|----|---|---------------------------------------|----|--|--|
| 01 |    | Selecting surgical options            | 07 |    | Registering medial epicondyle (optional)             |
| 02 |   | Entering patient data                 | 08 |   | Registering lateral epicondyle (optional)            |
| 03 |  | Entering operation data               | 09 |  | Registering medial tibia reference                   |
| 04 |  | Registering medial posterior condyle  | 10 |  | Registering lateral tibia reference                  |
| 05 |  | Registering lateral posterior condyle | 11 |  | Identifying tibial center                            |
| 06 |  | Registering ventral corticalis point  | 12 |  | Recording first tibial rotation reference (optional) |

13



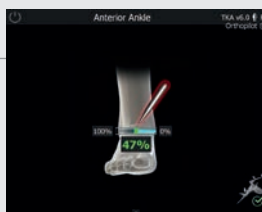
Registering medial malleolus

14



Registering lateral malleolus

15



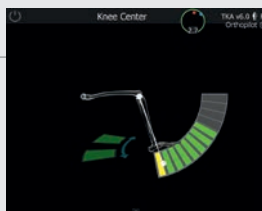
Registering front ankle-joint point

16



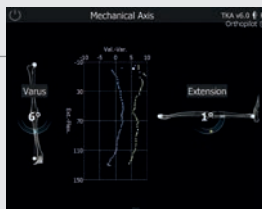
Registering hip joint center

17



Registering knee joint center

18



Depiction of mechanical axis – pre-operative

19



Planning tibial incision

20



Registering tibial incision

21



Registering distal and dorsal condyles (condyle references)

22



Optimizing ventral corticalis point

23



Recording extension gap

24

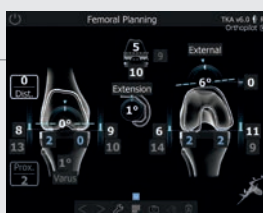


Recording flexion gap

# AESCULAP® OrthoPilot® TKA

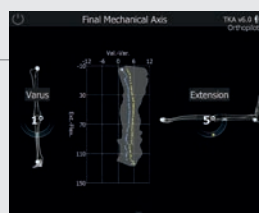
## 12 | TKA 6.0 SCHEMATIC PROGRAM SEQUENCE

25



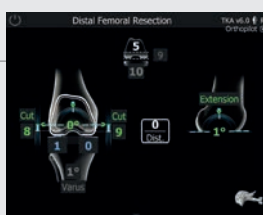
Femoral planning

31



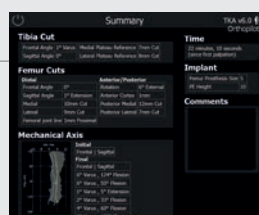
Depiction of mechanical axis – post-operative

26



Planning distal femoral resection

32



Surgery summary

27



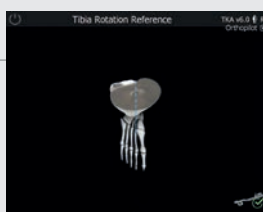
Registering femoral resection

28



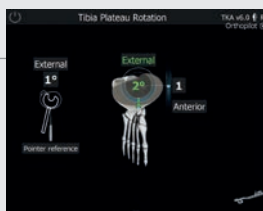
Positioning 4-in-1 saw guide

29



Tibial rotation reference (optional)

30




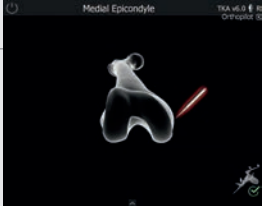

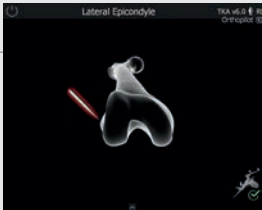
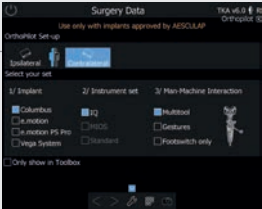

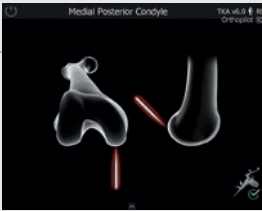

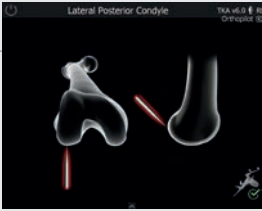
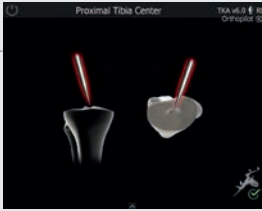
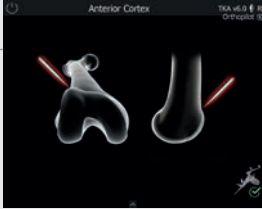

Tibial rotation navigation (optional)



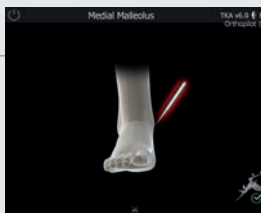
# AESCU LAP® OrthoPilot® TKA

## 12 | TKA 6.0 SCHEMATIC PROGRAM SEQUENCE

### 12.2 OrthoPilot® TKA 6.0 Femur first

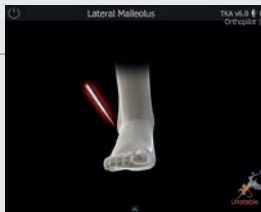
- |           |   |                                       |           |  |  |
|-----------|---|---------------------------------------|-----------|--|--|
| <b>01</b> |    | Selecting surgical options            | <b>07</b> |    | Registering medial epicondyle (optional)             |
| <b>02</b> |   | Entering patient data                 | <b>08</b> |   | Registering lateral epicondyle (optional)            |
| <b>03</b> |  | Entering operation data               | <b>09</b> |  | Registering medial tibia reference                   |
| <b>04</b> |  | Registering medial posterior condyle  | <b>10</b> |  | Registering lateral tibia reference                  |
| <b>05</b> |  | Registering lateral posterior condyle | <b>11</b> |  | Identifying tibial center                            |
| <b>06</b> |  | Registering ventral corticalis point  | <b>12</b> |  | Recording first tibial rotation reference (optional) |

13



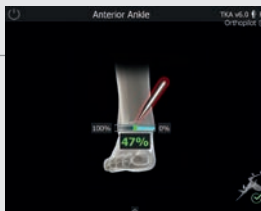
Registering medial malleolus

14



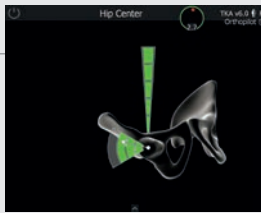
Registering lateral malleolus

15



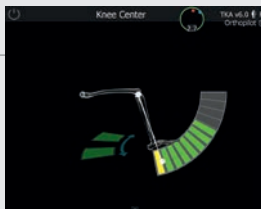
Registering front ankle-joint point

16



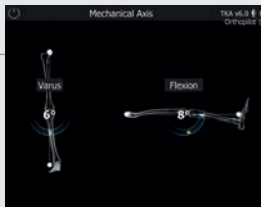
Registering hip joint center

17



Registering knee joint center

18



Depiction of mechanical axis – pre-operative

19



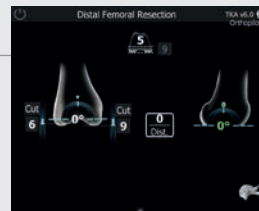
Recording Whiteside line

20



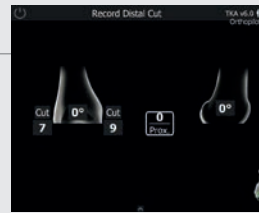
Optimizing ventral corticalis point

21



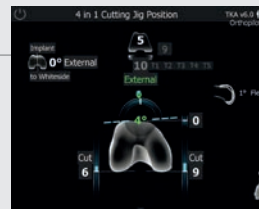
Planning distal femoral resection

22



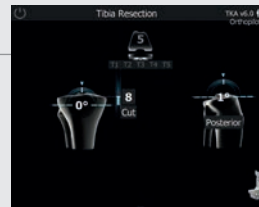
Registering femoral resection

23



Positioning 4-in-1 saw guide

24



Planning tibial resection

# AESCULAP® OrthoPilot® TKA

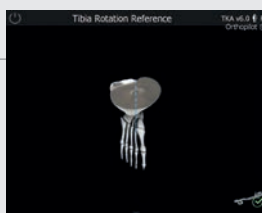
## 12 | TKA 6.0 SCHEMATIC PROGRAM SEQUENCE

25



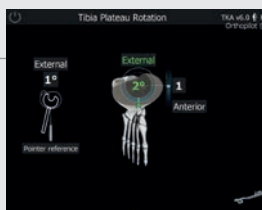
Registering tibial resection

26



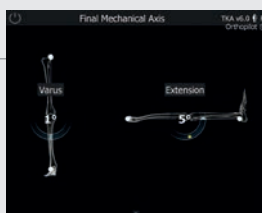
Tibial rotation reference (optional)

27



Tibial rotation navigation (optional)

28



Depiction of mechanical axis – post-operative

29



Surgery summary

## NOTES

# AESCULAP® – a B. Braun brand

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NDI-marker:

NDI | 103 Randall Drive | Waterloo | Ontario | Canada

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