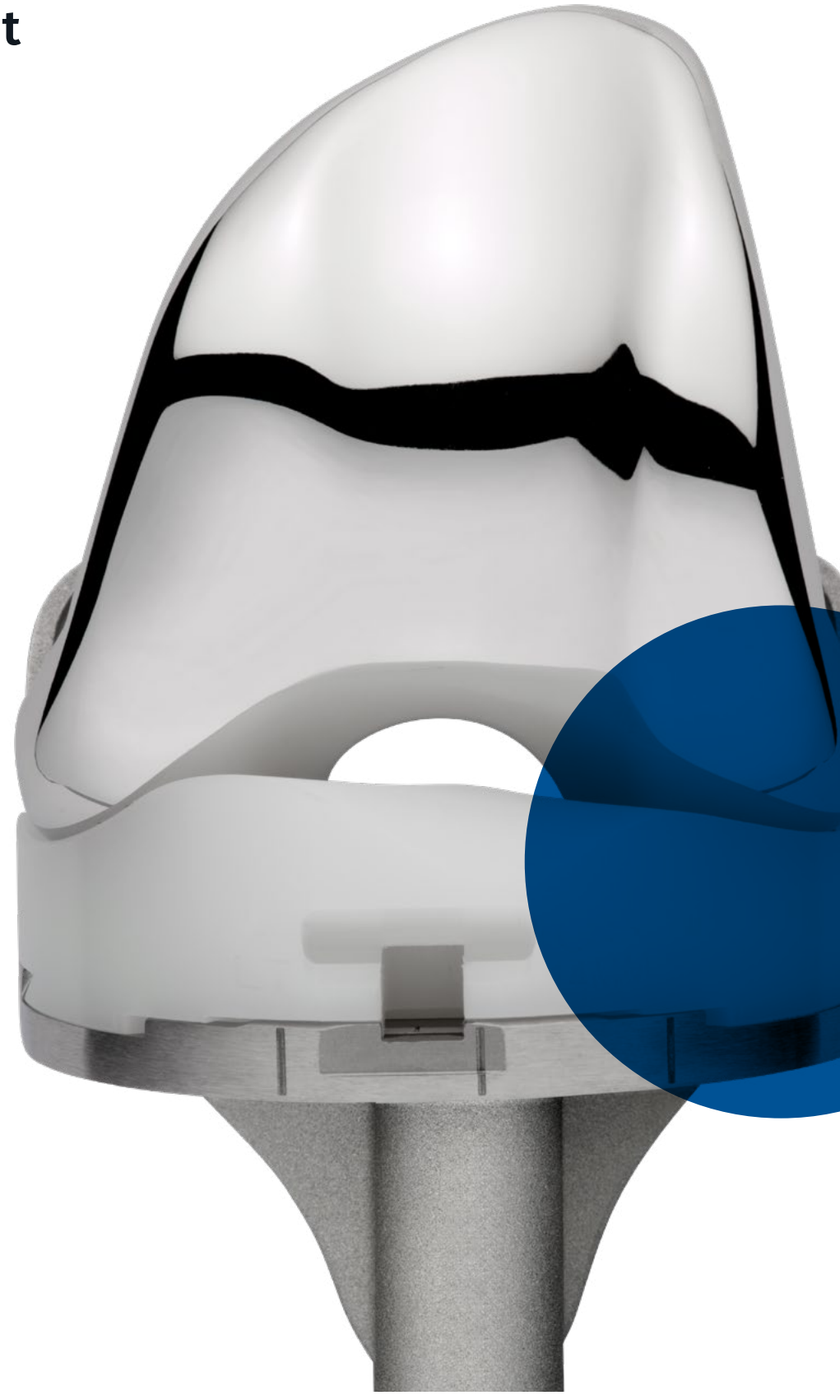
Evolution®

Medial-Pivot Knee System

Anterior Rough Cut

Surgical technique



MicroPort Orthopedics

Full Function, Faster®

EVOLUTION® KNEE SYSTEM

Indications & Warnings

Proper surgical procedures and techniques are the responsibility of the medical professional. The following guidelines are furnished for information purposes only. Each surgeon must evaluate the appropriateness of the procedures based on his or her personal medical training, experience, and patient condition. Prior to use of the system, the surgeon should refer to the product package insert for additional warnings, precautions, indications, contraindications and adverse effects.

Instructions for Use package inserts are also available by contacting the manufacturer. Contact information can be found on the back of this surgical technique and the package insert is available on the website listed.

Package inserts can be found under:
Prescribing Information on ortho.microport.com/ifus

Please contact your local MicroPort Orthopedics representative for product availability.

Product information

The Evolution® Knee System builds on the clinical history of the Advance® Knee System ball-in-socket design.

Device description

FEMORAL IMPLANT

- CS/CR and PS options offered in eight sizes, left and right
- CS/CR offered in nonporous and porous-coated options
- 145° constant radius C-curve
- Anatomic, recessed patellar groove with bone conserving preparation
- Central pegs to minimize bone removal during downsizing

TIBIAL BASE IMPLANT

- Asymmetric for optimal bone coverage
- Innovative locking mechanism
  - Angled 8° in direction of the incision approach (anterior-medial direction)
  - Lower insertion loads while maintaining strong disassociation loads

TIBIAL INSERT IMPLANT – CS

- Asymmetric to position mating femur more posterior
- 1-up interchangeability with plus size insert options
- 1-down interchangeability with standard insert
- Patellar tendon relief
- 15° of permissible femoral rotation

TIBIAL INSERT IMPLANT – CR

- Asymmetric to position mating femur more posterior
- PCL soft tissue relief angled in the direction of PCL pull
- 1-up, 1-down tibiofemoral sizing interchangeability
- Soft tissue friendly patellar tendon relief
- 15° of permissible femoral rotation

TIBIAL INSERT IMPLANT – PS

- Asymmetric to position mating femur more posterior
- Post and cam engagement around 80° of flexion due to high anterior lip
- 1-up, 1-down tibiofemoral sizing interchangeability
- Soft tissue friendly patellar tendon relief
- 15° permissible internal and external femoral rotation
- Same conformity as CR insert

Surgery preparation

SIZE SPECIFIC COMPONENT PART NUMBERS ARE REPRESENTED WITH X'S THROUGHOUT THIS SURGICAL TECHNIQUE.

Not pictured: Oscillating saw loaded with appropriate blade, power drill with 9.5 mm (3/8") pilot drill, and threaded pins

9.5 mm (3/8") diameter drill (E5001002)

T-handle (E5001001) and IM rod (E5001003)

Valgus rod (E11020XX) loaded with crosshair (E1102004), impactor cap (16100162) and pin (16100163)

Confirm 3°, 5°, or 7° valgus with surgeon

10mm distal resection crosshead (E1000010) locked into quick connect (E1102005) Confirm 10mm distal resection with surgeon

ARC resection guide (E1202001) and ARC alignment guide (E1102001) with stylus (E1102003)

Set the stylus to the femoral size determined through pre-operative x-ray templating

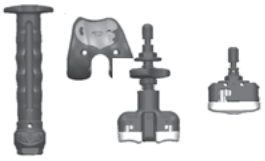
4-in-1 resection guide (E12042XX) with posterior reference gauge (E1200113) and dual reference "angel wing" gauge (E5001006)

Ensure the 4-in-1 resection guide is set to "0."

Sizing caliper (E1100201)

3.5mm hex screwdriver (E5001005)

Slaphammer (E5002001) with attached extraction hook (E5002003) and extraction boss (E5002002)



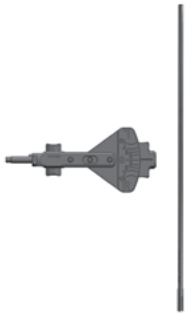
Femoral trial (E130XXXX), patella cap (E13050XX), femoral holder driver (E10051X3 or E10051X7), femoral finishing impactor (E10051X1) and handle (E5005001)

Extramedullary tibial alignment guide (E2102001), standard proximal rod (E2102002), adjustment barrel (K0040109), tibial resection crosshead (K004007L or K004007R), and stylus (E2100210)
(IM guide not pictured)

Tibial base trials (E23020XX), trial base handle (E2001020), and anchoring pins (E1051022)

Keel punch tower (E2004028) or (E2004128)

Keel punch (E2005XXX) and handle (E2000001)



External alignment guide with slope gauge (E5101000) and drop rod (E5101001)

Surgical technique

PN E5001002

PN E5001003

PN E5001001

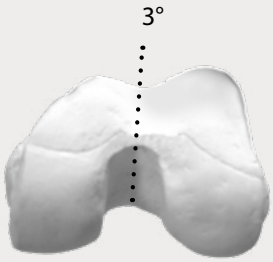


FIGURE 1

Preparation of the distal femur

Prior to femoral preparation, draw a line down the deepest part of the trochlear groove to represent the A/P axis. This line will be utilized later in the technique as a reference for femoral guide rotation. Osteophytes may need to be removed from the intercondylar notch to help visualize anatomical landmarks.

Starter hole preparation

Initiate an opening in the femoral canal with the 9.5 mm (3/8") diameter drill (E5001002). The hole may be placed medial and anterior to the anteromedial corner of the intercondylar notch, in the center of the trochlear groove, or 1 cm (.4") anterior to the PCL origin. | **FIGURE 1**

FIGURE 2

Alignment rod insertion

Insert the fluted IM reamer rod (E5001003) into the femoral canal, being sure to irrigate and aspirate several times to reduce the chance of a fat embolus. Turn the reamer during insertion with the T-handle (E5001001). | **FIGURE 2** Remove the T-handle and reamer rod.

Retractors and placement:

- Knee should be placed in 60° of flexion.
- Curved Single Prong Hohmann – between bone and tissue along lateral tibial plateau
- "Z" Retractor – on anterior medial femoral condyle to pull mobile window medially
- "Z" Retractor – superior on lateral femur

Distal femoral alignment / external rotation

Slide the alignment crosshair (E1102004) down the shaft of the valgus angled IM rod (E11020XX). Next, add the impactor cap (16100162) and pin (16100163) to the end of the rod and insert it into the femoral canal without sinking the antirotation fins. Each valgus rod (E11020XX) can be used for a left or right knee and is marked accordingly. For a left knee, the "LT" marking on the shaft of the rod (E11020XX) should be facing up. | **FIGURE 3**

For a right knee, the "RT" marking should be facing up. To set external rotation of the rod (E11020XX), utilize the alignment crosshair (E1102004).

Alignment crosshairs

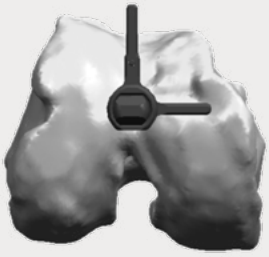
Align the vertical arm of the alignment crosshair (E1102004) with the trochlear groove (A/P axis). The horizontal arm of the crosshair (E1102004) may be utilized to reference the medial epicondyle as a secondary landmark. | **FIGURE 4**

Once the vertical arm is aligned with the trochlear groove, impact the valgus angled IM rod (E11020XX) until the fins are no longer visible. When impacting the fins of the valgus rod (E11020XX), make sure not to completely immerse them in cancellous bone. It is recommended that the cap (16100162) and pin (16100163) always be utilized to impact the valgus rod (E11020XX).

For additional stability, headed pins may be placed in the holes on the distal face.

FIGURE 3

FIGURE 4



PN E1102004

PN E11020XX

PN 16100162

PN 16100163

PN E1102001

PN E5001005

PN E1202001

PN E1102003

FIGURE 5

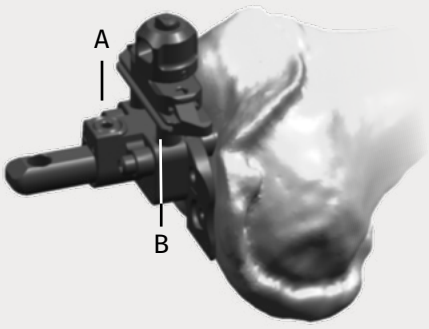
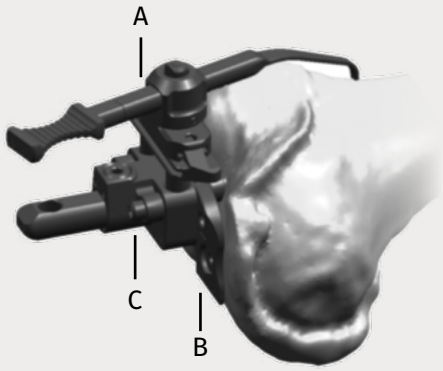


FIGURE 6



Anterior rough cut

NOTE : All femoral resection slots are designed for use with a .050" (1.3mm) thick saw blade.

Slide the ARC alignment guide (E1102001) down the shaft of the valgus angled IM rod (E11020XX) until it contacts the distal femur. Lock the ARC alignment guide (E1102001) to the flats of the valgus rod (E11020XX) by tightening the locking screw with a 3.5mm hex driver (E5001005). | **A IN FIGURE 5** Slide the support bars of the ARC resection guide (E1202001) into the ARC alignment guide (E1102001). | **B IN FIGURE 5** Introduce the tip of the anterior stylus (E1102003) through the anterior hole in the ARC resection guide (E1202001). | **A IN FIGURE 6**

The anterior stylus (E1102003) should be pushed superiorly until it "clicks". Each click represents one femoral size. The stylus (E1102003) should be pushed until the number of clicks equals the estimated femoral size (femoral size is estimated based on pre-operative templating). The femoral size markings are indicated distally on the anterior stylus (E1102003) where it meets the anterior rough cut resection guide (E1202001).

For additional stability, headed pins may be placed in the holes on the distal face of the IM alignment guide (E1102001). | **B IN FIGURE 6** However, these pins should be removed prior to a distal resection and before removal of the alignment guide (E1102001) is attempted. Once the anterior stylus (E1102003) has determined the depth of anterior resection, fix the ARC resection guide (E1202001) position by tightening the two screws on the distal face of the ARC alignment guide (E1102001). | **C IN FIGURE 6** This is performed with the 3.5mm hex driver (E5001005). After making the resection, remove the ARC resection guide (E1202001), leaving the ARC alignment guide (E1102001) in place.

Distal femoral resection

Distal resection crossheads are available in 10mm (E1000010), 12mm (E1000012) and 10 & 14mm (E1000114). Connect the distal resection crosshead (E1000XXX) to the distal resection quick connect guide (E1102005) by pushing the locking button from left to right. A lock icon will be visible. Slide the support bars of the distal resection quick connect guide (E1102005) into the ARC alignment guide (E1102001) and lower the crosshead (E1000XXX) as close as possible to the anterior surface of the femur. | **FIGURES 7 AND 8**

Next, the distal resection crosshead (E1000XXX) is pinned to the anterior cortex with two headless pins through the “STD” holes. Push the locking button to the side to separate the distal resection quick connect guide (E1102005) from the crosshead (E1000XXX). With the ARC alignment body (E1102001) affixed to the valgus rod, utilize the slap-hammer (E5002001) and extraction hook (E5002003) to carefully remove the valgus rod (E11020XX) and assembled ARC alignment guide (E1102001). | **FIGURES 9 AND 10**

If necessary, the distal resection crosshead can be readjusted 2mm proximally by sliding it down the pins through the “+2mm” holes. A divergent pin hole is available and recommended for additional stability. Make the distal resection using a .050” (1.3mm) thick saw blade.

FIGURE 7

FIGURE 8

FIGURE 9

FIGURE 10

PN E1000010

PN E1000012

PN E1000114

PN E1102005

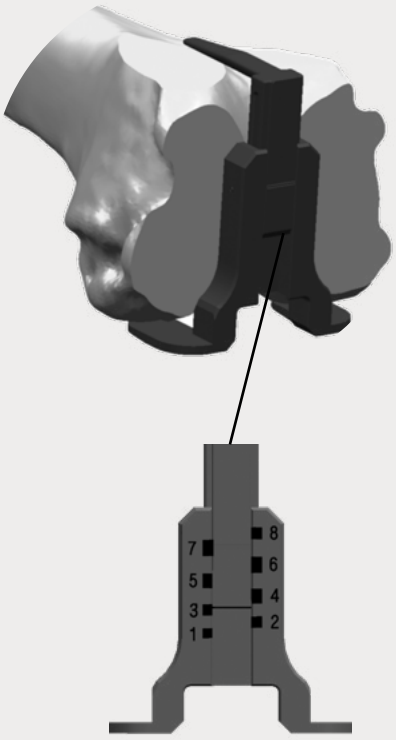
PN E5002001

PN E5002003

PN E1100201

PN E12042XX

FIGURE 11

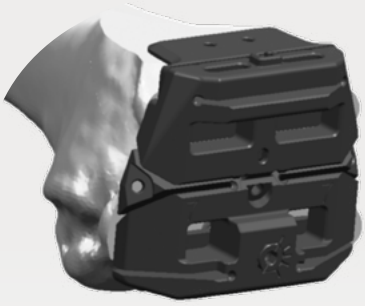


Femoral sizing

NOTE: Resecting the proximal tibia before femoral sizing may facilitate placing the posterior feet of the sizer (E1100201) under the posterior femoral condyles.

Place the ARC femoral sizing caliper (E1100201) flush against the resected distal femur and adjust the caliper (E1100201) so the feet contact the posterior condyles and the stylus rests on the anterior rough cut surface. Femoral sizes are indicated in the shaded regions on the front of the sizing caliper. | **FIGURE 11**

FIGURE 12



Anterior and posterior resections

NOTE: Take care to protect the collateral ligaments during resections.

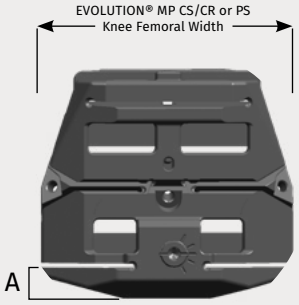
Select the 4-in-1 femoral resection block (E12042XX) corresponding to the size indicated by the femoral sizing caliper (E1100201) . Make sure the 4-in-1 femoral resection block (E12042XX) is set to zero at the beginning of the case. Place the femoral resection block (E12042XX) flush to the resected distal femur, resting the anterior flange on the anterior rough cut surface. | **FIGURE 12**

Retractors and placement:

- Knee should be placed in 90° of flexion to facilitate placement of the sizing caliper feet under the posterior condyles.
- Curved Single Prong Hohmann – on lateral femur to retract patella to side of lateral femoral condyle
- “Z” Retractor – superior lateral under quadriceps

The femoral resection blocks (E12042XX) may be used to double-check the femoral size. The distance between the outside of the pin outriggers on the sides of the block is the same width as the corresponding femoral component. The distance from the top of the posterior slot to the central bottom portion of the guide represents the thickness of the posterior condyles of the implant.| **A IN FIGURE 13**

FIGURE 13

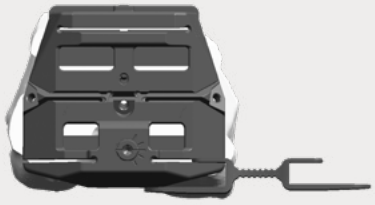


PN E1200113

To ensure appropriate posterior condyle resection, utilize the posterior condylar reference gauge (E1200113). | **FIGURE 14**

The inside of the gauge equals the thickness of the implant posterior condyles (10mm for sizes 1-4; 11mm for sizes 5-8). The thickness of the outside of the gauge equals approximately 2mm more (12mm for sizes 1-4; 13mm for sizes 5-8). It is recommended to remove 2mm more bone than the implant thickness from the medial side during the posterior resection.

FIGURE 14



PN E5001006

FIGURE 15

To ensure an appropriate anterior resection, utilize the dual reference “angel wing” gauge (E5001006). If it appears too much or too little of the posterior condyles are being removed or that there will be anterior notching, the 4-in-1 femoral resection block (E12042XX) may be adjusted up to 1mm anterior or 3mm posterior with the 3.5mm hex head screwdriver (E5001005). Place the screwdriver (E5001005) into the adjustment dial and push the dial inward, then turn the dial in increments of 1mm. | **FIGURE 15**

FIGURE 16

NOTE: A pin can be inserted into the anterior flange of the 4-in-1 femoral resection block if additional stability is needed during anterior-posterior adjustments.

Ensure the resection block (E12042XX) rests flat on the distal surface. | **FIGURE 16**

FIGURE 17

Stabilize the block (E12042XX) against the bone using two headed 3.2 mm (1/8”) diameter pins on the medial and lateral sides of the block (E12041XX). | **FIGURE 17**

A third central pin may also be placed and should not interfere with blade excursion. Pins inserted into the anterior flange must be removed prior to resections being made. The recommended order of resection is: anterior, posterior, posterior chamfer, anterior chamfer. After resections have been made, the pins are withdrawn, and the block (E12042XX) is removed. | **FIGURE 18**

FIGURE 18

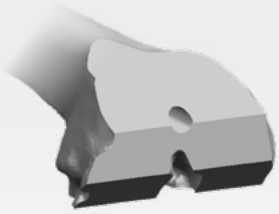
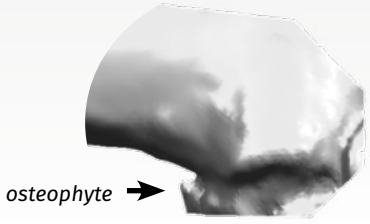


FIGURE 19



Care should be taken to remove posterior condylar osteophytes to avoid impingment with the posterior portion of the tibial component. | **FIGURE 19**

Tibial preparation

The EVOLUTION® tibial resection guides are designed for use with a 1.3 mm (.05”) thick saw blade.

Extramedullary Tibial Resection
The extramedullary tibial resection guide (K0040116) consists of the ankle clamp, distal tower and telescoping rod. Position the ankle clamp of the extramedullary (EM) tibial resection guide (K0040116) against the lower leg just proximal to the malleoli. | **FIGURE 20**

Attach the appropriate left or right tibial resection guide (K004007L or K004007R) onto the guide and adjust the guide until the resection slot is located a few millimeters below the lowest articular surface. | **FIGURE 21**

When the vertical axis of the guide is parallel to the tibial axis, it is positioned for a 3° posterior sloped resection.

FIGURE 20

PN K0040116

PN K004007L

PN K004007R

FIGURE 21

PN K0040042

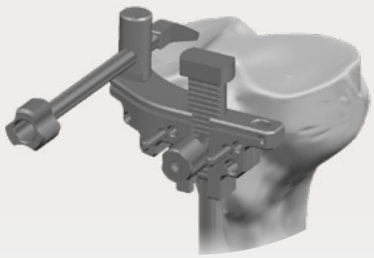
FIGURE 22

For an anatomically sloped resection, place the dual reference gauge (E5001006) or a saw blade in the cutting slot and adjust the long axis of the EM guide by loosening the ankle screw and pulling the distal end of the guide away from the ankle. Adjust the guide until the cutting slot angle matches the anatomic slope of the tibia. | **FIGURE 22**

Place the tibial stylus (K0040042) into the medial hole on the resection guide and adjust the resection guide by loosening its adjustment knob until the proper resection is found. | **FIGURE 23**

Generally the stylus (K0040042) is set to resect 2mm from the most deficient side and/or 10mm from the most prominent. Pin the resection guide to the proximal tibia through the STD holes using threadless pins. Once the ankle, distal tower, and telescoping rod are removed, the alignment guide (E5101000) and rod (E5101001) can be used to check final slope and alignment of the resection guide (K004007L or K004007R). If the resection guide is detached, it can be moved distally 2mm if headless pins are used. The top surface of the resection guide can be used to resect the tibia and is 4 mm proximal to the distal surface of the captured slot. Use of a divergent pin is recommended to prevent the resection block from vibrating off the pins during resections. In the absence of a divergent pin, a kocher can be clipped to the pin to provide stability.

FIGURE 23



Intramedullary tibial resection

Efficiency Suggestion: Some surgeons prefer the tibial crosshead (E220100R or E220100L) and IM alignment guide (E2101012) to be pre-loaded on the IM rod (E5001003) before it is introduced into the tibial canal. After insertion, the T-handle (E5001001) is maintained on the IM rod (E5001003) for easier rod removal.

The 3/8" (9.5 mm) drill bit (E5001002) is used to penetrate the proximal tibia just posterior to the tibial ACL attachment. Insert the fluted IM reamer/rod (E5001003) into the tibial canal, constantly turning the T-handle (E5001001). | **FIGURE 24**

Irrigate and aspirate several times to reduce the chance of a fat embolus. The IM rod (E5001003) with assembled IM guide (E2101012) should be inserted to at least the mid isthmus. | FIGURE 24 Turn the gold anterior lock knob to secure the guide to the IM reamer/rod. Use the varus/valgus screw to set the desired varus/valgus angle with the 3.5mm hex driver (E5001005). | **A IN FIGURE 24**

Set the posterior slope using the posterior slope adjustment knob. | **B IN FIGURE 24** The crosshead is neutral and does not contribute any additional slope to the resection.

Place the tibial stylus (E2100210) into the medial hole on the resection guide (E220100R or E220100L) to set the desired level of tibial resection. Turn the tibial stylus (E2100210) knob to set the desired level of resection. The number in the upright position represents the resection depth. | **A IN FIGURE 25**

PN E2101012

FIGURE 24

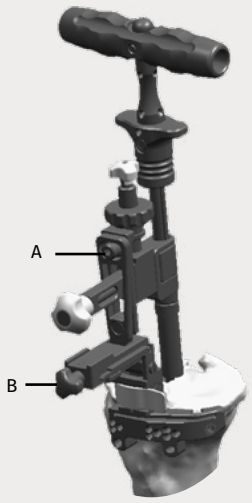
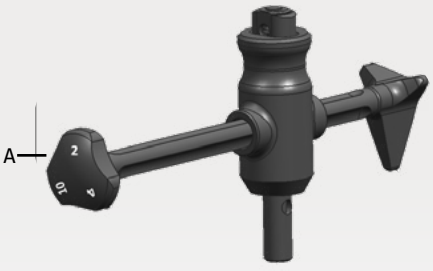


FIGURE 25



PN E2100210

PN E220100R

PN E220100L

PN E5101000

PN E5101001

FIGURE 26

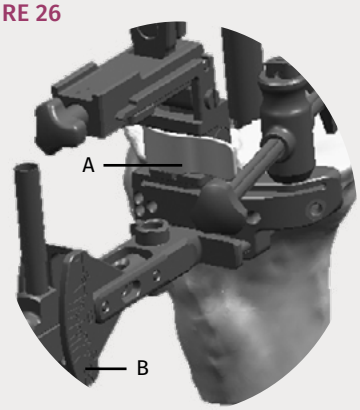


FIGURE 27

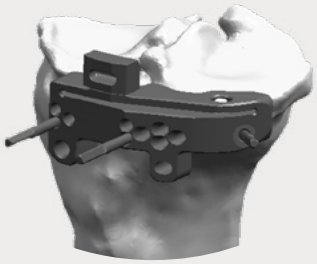
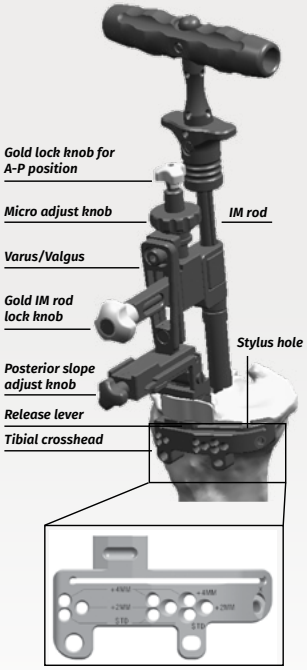


FIGURE 28



Generally the stylus is set to resect 2mm from the most deficient side and/or 10mm from the most prominent. Pin the resection guide (E220100R or E220100L) to the proximal tibia through the "STD" holes. Using the release lever, release the resection guide (E220100R or E220100L) from the intramedullary alignment guide (E2101012). | **A IN FIGURE 26** The rest of the alignment guide assembly will remain connected to the IM rod (E5001003) and can be removed all at once by pulling up on the T-handle (E5001001).

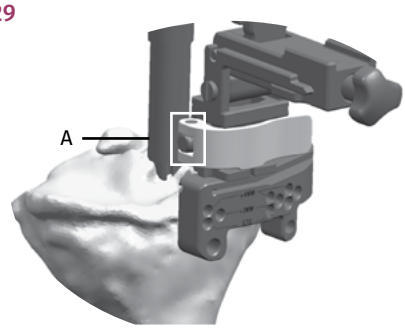
Varus/valgus angulation can be checked to the ankle using the external alignment guide with slope gauge (E5101000) and drop rod (E5101001). With the alignment rod (E5101001) parallel to the tibia, posterior slope can be measured. | **B IN FIGURE 26**

Ensure the tibial resection guide (E220100R or E220100L) is adjacent to the tibia and place a divergent pin. | **FIGURE 27**

Refer to figure 28 for breakdown of IM Guide and for detail of the resection guide.

NOTE: Lubrication of the crosshead connection cam hinge is particularly important to maintenance of the mechanism. Regular lubrication with surgical-grade lubricant intended for heat sterilized medical instruments per the MicroPort cleaning and handling instructions should be part of the routine instrument maintenance. | **A IN FIGURE 29**

FIGURE 29



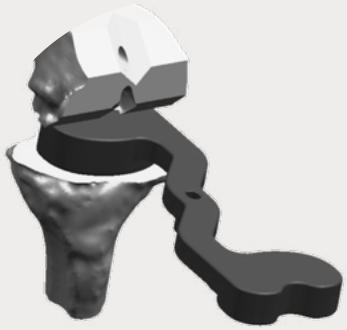
Flexion/extension blocks

Flexion/Extension blocks are not part of the standard kit. They can be ordered under kit # E200KT20.

The flexion/extension gaps are measured following the femoral and tibial resections. With the knee flexed at 90°, insert the 10mm flexion block (E50010XX) into the space between the posterior femoral resection and proximal tibial resection. | **FIGURE 30** If the 10mm spacer block (E50010XX) does not fit in flexion, additional tibial resection or a smaller femoral size may be needed. After the flexion gap has been determined, place the leg in extension. Insert the 10mm extension block (E50010XX) into the space between the distal femoral resection and the proximal tibial resection. | **FIGURE 31** If the 10mm spacer block (E50010XX) does not fit, additional distal femoral bone resection may be required to achieve full extension. The spacer blocks indicate the thickness of the appropriate tibial insert and are available for all insert thicknesses. The thickness of the femoral condyles, tibial base, and tibial insert are built into the spacer block thickness.

Refer to | **FIGURE 32** for more information on flexion/extension gaps.

FIGURE 30



PN E50010XX

FIGURE 31

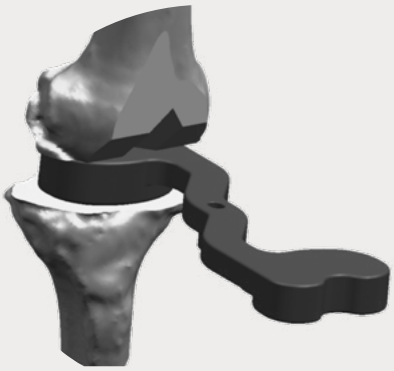


FIGURE 32

EXTENSION

FLEXION	TIGHT	OK	LOOSE
TIGHT	Downsize poly insert Cut more tibia	Cut more posterior condyle (Resulting in smaller femoral componet)	Cut more posterior condyle (Resulting in smaller femoral componet)
OK	Recut distal femur	No adjustment necessary	Cut more posterior slope and use thicker poly
LOOSE	Recut distal femur and use thicker poly (If necessary)	Change may not be necessary. Ball-in-socket design accommodates for slight laxity in flexion If necessary, recut distal femur and use thicker poly	Change may not be necessary. Ball-in-socket design accommodates for slight laxity in flexion If necessary, recut distal femur and use thicker poly

PN E23020XX

PN E2001020

PN E2001020

PN E2004028
OR E2004128

PN E2001238

PN E2001138

FIGURE 33

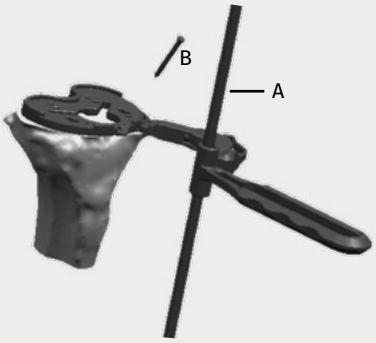
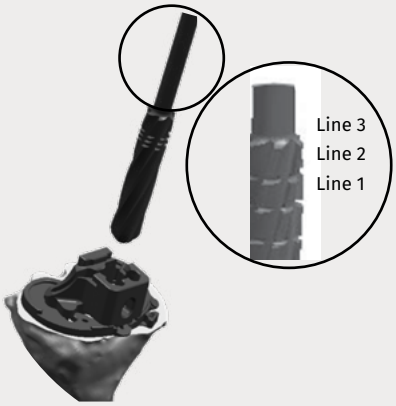


FIGURE 34



Tibial sizing, keel preparation, and trial reduction

The EVOLUTION® Knee System allows 1-up, 1-down interchangeability. (See page 32 for interchangeability information.)

Assemble the appropriate trial tibial base (E2302XXX) to the trial base handle (E2001020) and place it against the proximal tibial surface. The alignment rod (E5101001) can be inserted through the handle (E2001020) to check alignment to the ankle. | **A IN FIGURE 33** Align the base (E2302XXX) (generally to the medial one-third of the tibial tubercle). The base (E2302XXX) may be pinned to the tibia using short headed anchoring pins (K0002007) through the holes with vertical lines. | **B IN FIGURE 33**

Align the four spikes on the keel punch tower (E2004028) with the corresponding holes on the trial base (E2302XXX) and impact the guide with a mallet until the guide is seated on the surface of the trial base (E2302XXX). In the event of hard tibial bone, before punching, prepare the entry hole for the tibial stem using the 15mm (1/2") cemented or cement free reamer. Separate reamers are available for sizes 1, 2 and sizes 2+ through 8+. For the size 2+ through 8+ cemented reamer (E2001238) or the size 2+ through 8+ cement free reamer (E2001138), ream to the first line on the reamer for a size 2+, 3 or 4 base, to the second line for a 5 or 6 base, and to the third line for a 6+, 7, 8 or 8+ base. | **FIGURE 34**

Retractors and placement:

- Knee should be placed in 90° of flexion.
- Curved Single Prong Hohmann – on lateral tibia to cover patella and protect soft tissues
- "Z" Retractor – on medial tibia to expose tibia and protect the medial collateral ligament
- Cobb Elevator – subluxes tibia forward

For leave-in keel punches, assemble the appropriate size keel punch (E2005XXX) to the keel punch handle (E2000001) by pulling back on the trigger mechanism of the handle (E2000001) and inserting it into the opening on the punch (E2005XXX). | **FIGURE 35**

The keel punch handle (E2000001) is impacted with a mallet until fully seated and the bottom edge of the handle (E2000001) aligns with the top of the keel tower (E2004028). | **FIGURE 36**

FIGURE 35

PN E2005XXX

PN E2000001

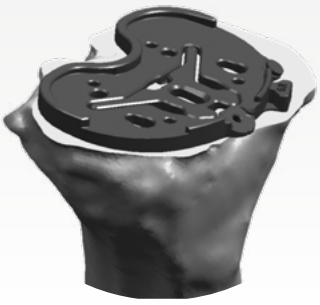
FIGURE 36

PN E5002003

FIGURE 37

FIGURE 38

FIGURE 39



The handle (E2000001) is released from the punch (E2005XXX) by pulling back on the handle's trigger mechanism. The keel punch tower (E2004028) is removed with the slaphammer (E5002001) and the extraction boss (E5002002) | **FIGURE 37** or hook (E5002003) | **FIGURE 38**, leaving the tibial base and keel punch (E2005XXX). | **FIGURE 39**

If desired, the lines on the anterior portion of the trial bases can be marked to aid with alignment of the final tibial base implant.

Trochlear groove resection for CS/CR femoral components (sizes 1-2)

The trochlear groove resection for sizes 3-8 CS/CR femoral components is made through the femoral trial and is performed after the tibial bone has been prepared.

Select the sulcus resection guide (E120100X) corresponding to the size indicated by the sizing caliper (E1100101). Place the sulcus resection guide (E120100X) on the femur. | **FIGURE 40**

The width of the distal aspect of the guide (E120100X) is the same M/L width as the femoral implant, and the lateral proximal edge represents the lateral edge of the implant and dictates the final implant location. | **FIGURE 41**

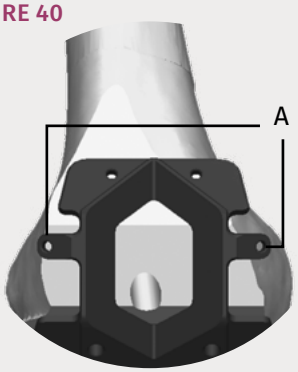
Place the guide (E120100X) along the lateral edge of the femur to reproduce the natural Q-angle. Pin the guide using two collared pins. | **A IN FIGURE 40**

The trochlear groove should be resected by using a 12.7mm (1/2") sawblade on the angled surface and along the sides of the central portion of the guide (E120100X).

The peg holes for the implant are prepared during the femoral trialing step. It is not necessary to drill through the 4.8mm (3/16") distal holes on the sulcus guide (E120100X) to prepare final peg holes. If a femoral re-cut is necessary, the 4-in-1 femoral resection guide (E12041XX) cannot be remounted onto the femur due to the 3.2mm (1/8") pegs on the back of the guides (E12041XX).

Refer to page 34 for instructions on re-cutting the distal femur.

FIGURE 40

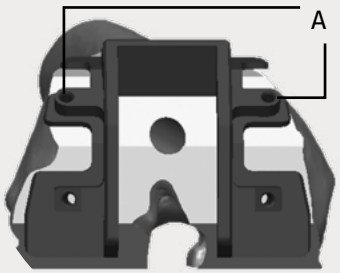


PN E120100X

FIGURE 41

PN E120510X

FIGURE 42



Posterior stabilized femoral housing resection

If preparing for a posterior stabilized femoral component, a housing resection block (E120510X) is utilized at this point for all size EVOLUTION® MP implants. Place the appropriate size femoral housing resection guide (E120510X) flush against the anterior and distal bone surfaces. | **FIGURE 42**

Pin the guide with two collared pins. | **A IN FIGURE 42** The width of the distal aspect of the guide (E120510X) is the same M/L width as the femoral implant, and the lateral proximal edge represents the lateral edge of the implant and dictates the final implant location. Resect the intercondylar notch using a narrow 12.7mm (1/2") saw blade on the angled surface. It is recommended that the proximal notch surface be prepared before the sides of the notch.

The proximal notch resection surface is angled at 14° to match the 14° posteriorly angled housing on the implant. The blade should pass straight anterior to posterior to prevent undercutting the condyle.

Trochlear groove resection for CS/CR femoral components (sizes 3-8)

The femoral holder driver (E10051X3 or E10051X7) may be used to seat the femoral trial (E130XXXX) and the final implant. There is a separate holder driver for each type of femur [CS/CR (E10051X3) and PS (E10051X7)].
| **FIGURES 43 AND 44**

Assemble the appropriate holder driver to the modular impaction handle (E5005001). | **FIGURE 45**

Loosen the knob to retract the impactor pad housing to expose the intracondylar hook. Place the intercondylar hook on the appropriate size femur as shown. Use the knob to tighten the holder driver to the femoral trial/ implant. Many surgeons lateralize the femoral component to reproduce the natural Q-angle. Fully seat the femoral trial against the bone. | **FIGURE 46**

FIGURE 43

PN E10051X3

FIGURE 44

PN E10051X7

FIGURE 45

PN E130XXXX

PN E5005001

FIGURE 46

PN E10051X1

PN E1000301

PN E1051022

FIGURE 47

FIGURE 48

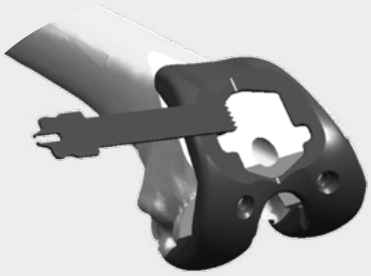


FIGURE 49

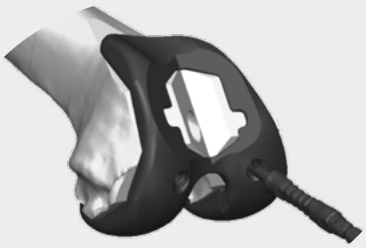


FIGURE 50

Impaction of the trial femur is made with the femoral finishing impactor (E10051X1). | **FIGURE 47**

Resect the trochlear bone using the V-shaped flat on the CS/CR femoral trial as a guide. | **FIGURE 48**

Prepare the final peg holes for the implant by drilling the distal holes on the femoral trial with the 4.8mm (3/16”) drill bit (E1000301). The bit features a collar at the correct depth. | **FIGURE 49** Femoral trial pins (E1051022) may also be used to prepare for the pegs on the final implant. | **FIGURE 50**

CAUTION: Be careful not to plunge the saw blade past the intended V-shaped trochlear groove resection. This can possibly lead to stress risers on the distal femur and periprosthetic fractures of the bone.

Patella preparation

Choose the appropriate patella resection depth stylus. The 6mm (E4202002) and 8mm (E4202001) resection depth gauge come standard in the patella kit. Attach the resection depth gauge to the top of the resection guide (E4202000). | **A IN FIGURE 51** Position the resection guide (E4202000) jaws parallel to the articular margin and securely clamp the guide to the bone; ensuring the gauge is contacting the apex of the articular surface. | **FIGURE 52** Remove the gauge (E420200X) and make the patellar resection.

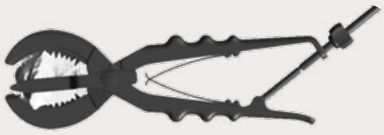
Attach the single peg (K0031109) or tri-peg (K0031104)

FIGURE 51

PN E4202002

PN E4202001

FIGURE 52



PN E4202000

PN K0031109

PN K0031104

PN K0031103

PN E4001015

PN E4001035

PN E4001008

FIGURE 53

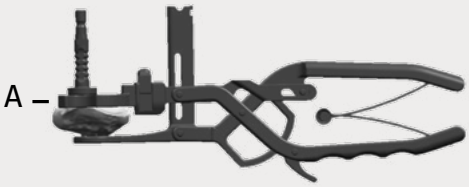
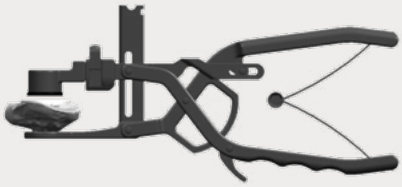


FIGURE 54



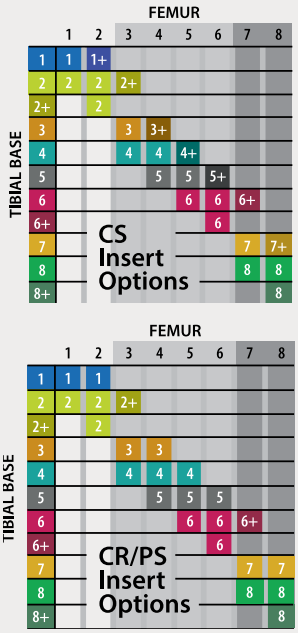
drill guide to the patellar clamp (K0031103). | **A IN FIGURE 53** The drill guides have grooves on their surfaces indicating the patellar diameter options. The single peg (E4001015) or tri-peg (E4001035) drill is used to prepare the peg hole(s). The single peg and tri-peg patella componets have the same peg position between sizes and can be easily changed during trial reduction. The patellar implant can be held in place while the cement cures using the parallel patellar clamp (K0031103) and implant seater (E4001008).
| **FIGURE 54**

The surgical technique for the patella reaming system (K100KT75) can be found in the Addendum on page 34.

Trial reduction and implant insertion

The EVOLUTION® MP system allows for 1 size mismatch between the femur and tibia for all styles. Refer to the sizing chart below for size interchangeability and see the implant specification charts at the end of this surgical technique for a more detailed look at the options available for use. | **FIGURE 55** Be aware of the size 2+ and 6+ tibial bases; these are required for the articular surface groupings built into this system.

FIGURE 55



PN E13050XX

PN E3XXXXXX

Trial reduction

CS/CR TRIAL REDUCTION

Place the appropriate size CS/CR femoral trial patella cap (E13050XX) on the femoral trial. | **FIGURE 56**

Insert the trial tibial insert (E3XXXXXX) of the appropriate size and thickness onto the trial base (E2302XXX) and complete the trial reduction. | **FIGURE 57**

To achieve an insert trial with a thickness of more than

NOTE: When assembling the tibial insert trial (E3XXXXXX), slightly angle the insert trial with some posterior slope during insertion to clear the anterior lip of the trial base (E2302XXX).

FIGURE 56

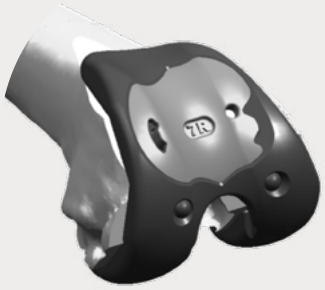
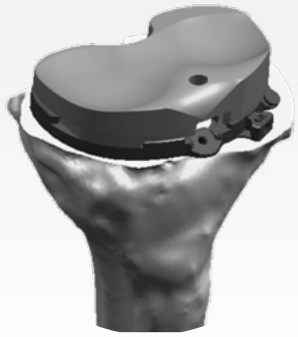


FIGURE 57



PN E340XXXX

PN ETPKNXXX

FIGURE 58

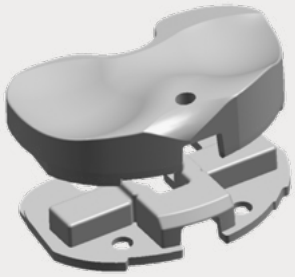


FIGURE 59

14mm, use the trial insert spacers (E340XXXX) which make 17mm, 20mm and 24mm increments. Trial insert spacers work in conjunction with the size 14mm insert trials. | **FIGURE 58** Trial inserts (E3XXXXXX) may be assembled in conjunction with the final tibia base implant (ETPKNXXX) to allow the surgeon to continue to trial.

After the trial reduction is complete, remove the femoral trial (E130XXXX), along with the femoral trial pins (E1051022), with the slaphammer (E5002001) by sliding the extraction boss (E5002002) into the slot between the femoral condyles. | **FIGURE 59** During removal, keep one hand on the trial (E130XXXX) to control its extraction.

2mm recut guide, 2° posterior slope recut guide and 2° varus/valgus recut guide

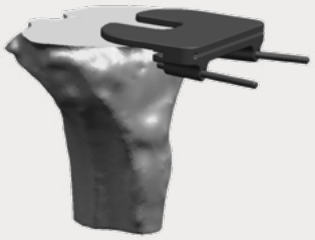
These guides are generally employed to alter the proximal tibial resection. The holes on all guides are convergent and do not correlate to the holes on the distal femoral or proximal tibial resection guides. To position the guides, place the wings on the resected surface with the resection slot touching the edge of the surface. | **FIGURE 60** Pin the guide while applying downward pressure on the surface to prevent it from raising up during pinning.

Re-cutting the distal femur

Assemble the T-handle (E5001001), IM rod (E5001003), valgus bushing (E1100357), and 10mm distal resection guide (E1000010). Place the 2mm distal recut spacer (E1101007) against the interior face of the distal femoral alignment guide (E1101001). | **FIGURE 61** When utilized, the distal spacer (E1101007) will reduce the distal resection made by 8mm. (For example, it will allow a 2mm distal resection when cutting through the 10mm distal resection slot.) Slide the reamer (E5001003) into the intramedullary canal until the distal spacer (E1101007) contacts the distal femur.

| **FIGURE 62** Pin the resection guide (E1000110) in place and remove the IM reamer rod (E5001003), valgus bushing (E1100357) and distal femoral alignment guide (E1101001).

FIGURE 60



PN E2201002

PN E2201020

FIGURE 61

PN E2201010

PN E1101007

FIGURE 62

PN E2001021

PN E20051X1

FIGURE 63

FIGURE 64

Final implant and insert implantation

The recommended order for implantation is left to the discretion of the orthopaedic surgeon.

Femoral implantation

The femoral holder driver (E10051X3 or E10051X7) may be used for initial positioning and impaction of final implant (Porous, EFSRPXXX or Nonporous, EFSRNXXX). Final impaction of the femur needs to be performed with the finishing impactor (E10051X1). | **FIGURE 63**

CAUTION: Use Porous coated femoral components only when there is no need for cement. Use Nonporous coated femoral components only when there is need for cement.

Tibial base seating

The tibial holder driver (E2001021) may be used to seat the final implant. To engage the tibial holder driver (E2001021), depress and engage the locking mechanism with the front of tibial base implant. | **FIGURE 64**

The tibial finishing impactor (E20051X1) may be used to fully impact the tibial implant.

Tibial insert seating

Ensure the posterior and peripheral captures of the tibial base implant (ETPKNXXX) are completely clear of soft tissue and bone. If these captures are not clear, the tibial insert will not be able to seat. The tips of the dual reference “angel wing” gauge (E5001006) are contoured to fit in the lock detail to help clear debris.

Once the cement has cured, the appropriate EVOLUTION® MP tibial insert may be locked into place. Initial seating is accomplished by pushing the insert as far posterior as possible with hand pressure, paying special attention to engage the medial and lateral dovetails. The 45° insert impactor (E30051X1) may be utilized by placing the impactor tip in the anterior slot of the tibial insert at approximately a 45° angle to the tibia base.
| **FIGURE 65**

While maintaining this 45° angle, apply several strong mallet blows directing the insert posteriorly. After the anterior edge of the insert has been pushed past the anterior capture of the tibial base, it will automatically drop behind the anterior capture and the insert face will be flush against the surface of the tibial base.

If implanting the EVOLUTION® Medial-Pivot PS insert, initial seating of the insert is performed with the knee in flexion, but final insertion is easier if the knee is in extension.

PN E30051X1

FIGURE 65

Explant information

If the removal of the implant is required due to revision or failure of the device, the surgeon should contact the manufacturer using the contact information located on the back cover of this surgical technique to receive instructions for returning the explanted device to the manufacturer for investigation.

Femur, tibia, and patella components

To remove the components, small osteotomes, power saws, or other surgical instruments may be used to disrupt the bone-cement interface and bone ingrowth into porous coating. Once the components have been removed, rongeurs or small osteotomes as well as other surgical instruments may be used to remove the remaining cement.

Insert replacement

A narrow osteotome may be inserted into the anterior region of the insert to facilitate removal. A hemostat may be used to remove the insert once it is no longer locked to the tibial base. Care must be taken not to scratch or mar any component that is not intended to be removed.

Addendum

Replaceable plastic impaction surfaces

The femoral finishing impactor (E10051X1), tibial finishing impactor (E20051X1), CS/CR holder driver (E10051X3), PS holder driver (E10051X7), and tibial holder driver (E2001021) have replaceable plastic impaction surfaces. All can be disassembled by inserting a pin in each hole in the impaction surface and depressing the locking mechanism. | **FIGURE 66** Slide each impactor pad to the side and pull up to remove.

FIGURE 66

PN E1005102 or PN E1005212

PN E2005102 or PN E2005212

PN E1005104 or PN E1005114

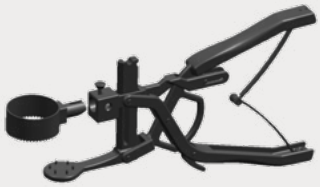
PN E1005108 or PN E1005118

PN E2001022

PN K0031103

PN E42000XX

FIGURE 67



Advance® patellar reaming system

The ADVANCE® Patellar Reamer may be utilized for both recessed and onlay patellar implants.

Sizing the Patella
To determine which patellar implant will be used, compare the patient's patella with the patellar trials. This will help determine how much patellar bone should be removed to replicate patellar anatomy.

Reamer Guide Choice
Load the appropriate reamer guide into the upper jaw of the patellar clamp (K0031103). | **FIGURE 67** Reamer guides are available in seven diameters: 25, 28, 32, 35, 38, 41, and 45mm. The actual diameter of the guide is 2mm larger than the indicated size. The largest possible guide that holds the patella securely should be utilized to ensure complete resurfacing. This will avoid creating a rim of unresurfaced bone around the patella periphery.

The 45mm reamer guide is already labeled as 47mm to reflect its outer diameter.

Clamp the patella ensuring the basket is positioned to remove the greatest surface area of bone. Feed the reamer driver (K0031101) through the outrigger (K0031102). | A **IN FIGURE 68** Insert the corresponding reamer (E42001XX) into the reamer driver (K0031101) by retracting the spring-loaded locking collet on the driver (K0031101). | **B IN FIGURE 68** Attach the outrigger (K0031102) to the patellar clamp (K0031103) with the locking lever. | **A IN FIGURE 69** Lower the reamer until it is contacting the patellar surface.

The onlay reaming depth stop (K0031105) may be utilized to control how much bone is removed during reaming, or how much bone remains after reaming. The depth stop (K0031105) offers bone resection amounts of 2, 7, 8, 9, 10, or 11mm | **FIGURE 70** or retention of 12, 13, 14, 15 or 16mm of bone after resection. | **FIGURE 71**

FIGURE 68

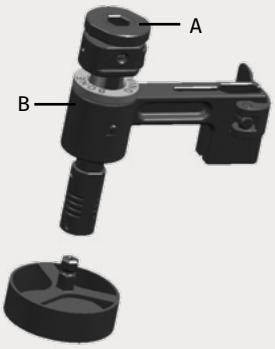
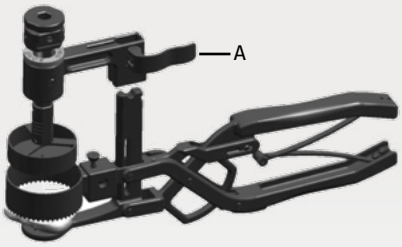


FIGURE 69



PN K0031101

PN E42001XX

PN K0031102

PN K0031105

FIGURE 70

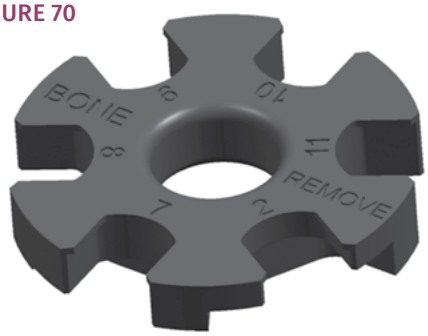


FIGURE 71

FIGURE 72

FIGURE 73

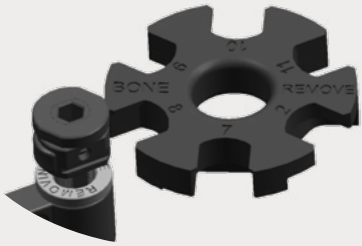
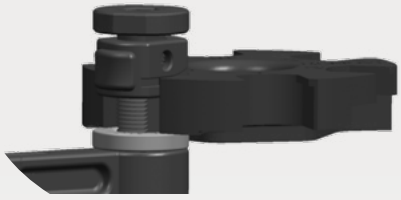


FIGURE 74



Setting the bone resection

To control the amount of bone reamed from the patellar surface, orient the onlay reaming depth stop (K0031105) with the “Bone Remove” side up. Generally, the amount of bone removed correlates to the thickness of the expected patellar implant thickness. | **FIGURE 72**

Identify the notch which correlates to the required amount of bone resection. Each notch features rails which must be inserted into the proximal slots on the reamer driver (K0031101). Rotate the reamer driver (K0031101) until the depth resection button is facing the onlay reaming depth stop (K0031105). | **FIGURE 73**

Insert the depth stop into the driver until the depth stop depresses the button; this will allow the depth stop gauge and the depth resection stop to be lowered. Lower the depth stop until it contacts the plastic “Bone Resection” collet. | **FIGURE 74**

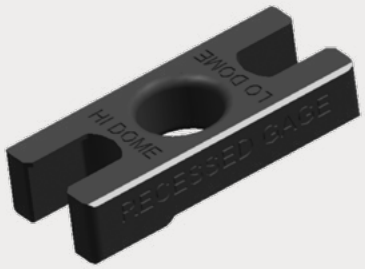
Remove the depth stop.

When preparing for a recessed patellar implant, a recessed depth gauge (E4201002) is available. | **FIGURE 75**

Setting the amount of bone retained

To ensure a specified patellar bone thickness after patellar reaming, orient the onlay reaming depth stop (K0031105) with the “Bone Remain” side up. Identify the notch which correlates to the required amount of bone resection. Each notch features rails which must be inserted into the proximal slots on the reamer driver (K0031101). Rotate the reamer driver (K0031101) until the depth resection button is facing the onlay reaming depth stop (K0031105). Insert the depth stop into the driver until the depth stop depresses the button; this will allow the depth stop guide and the depth resection stop to be raised. Raise the depth stop until it contacts the top of the reamer driver (K0031101). | **FIGURE 76** Remove the depth stop.

FIGURE 75



PN E4201002

FIGURE 76

PN K0031206

Load the power driver shaft (K0031206) into a powered reamer. Insert the hexagonal end of the driver shaft (K0031206) into the end of the reamer driver (K0031101). | **A IN FIGURE 77** While reaming, apply downward pressure until the stop no longer allows progression. | **FIGURE 78**

FIGURE 77

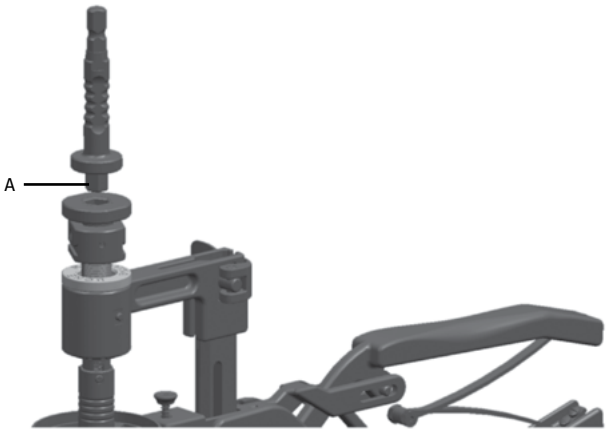
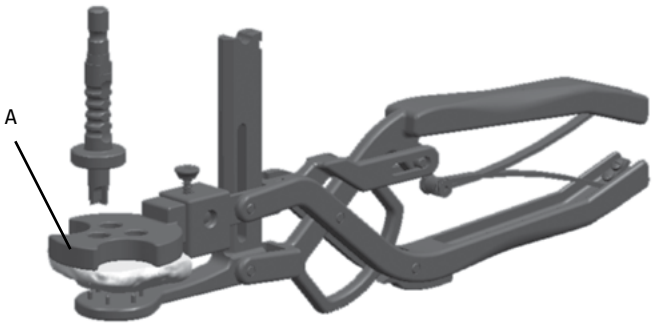


FIGURE 78

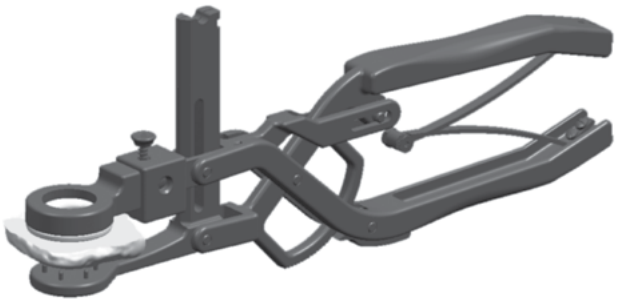
Release the locking lever to remove the clamp outrigger assembly. Loosen the clamp and remove the reamer basket. For an onlay patella, insert the peg endmill guide (K0031109 for single peg, K0031104 for tri-peg) into the patellar clamp. | **A IN FIGURE 79** Load the peg drill (K0031108 for single peg, K0031107 for tri-peg) into a powered reamer and drill the patellar bone to accept the implant pegs. The single peg and tri-peg patella componets have the same peg position between sizes and can be easily changed during trial reduction.

FIGURE 79



For final patellar implantation, the implant seater (K0031120) may be inserted into the patellar clamp (K0031103) and used to maintain force between the patellar implant and host bone. | **FIGURE 80**

FIGURE 80



PN K0031109

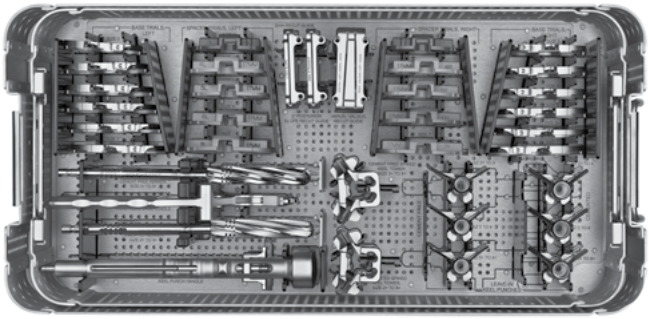
PN K0031104

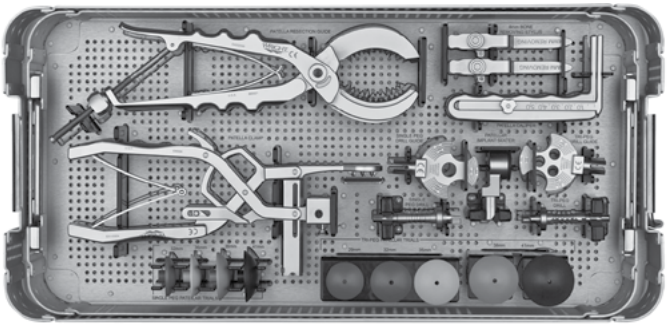
PN K0031108

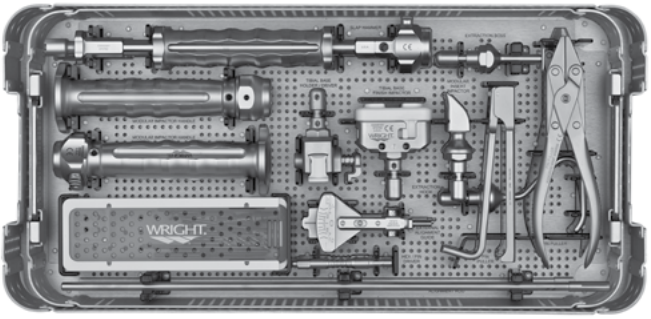
PN K0031107

PN K0031120

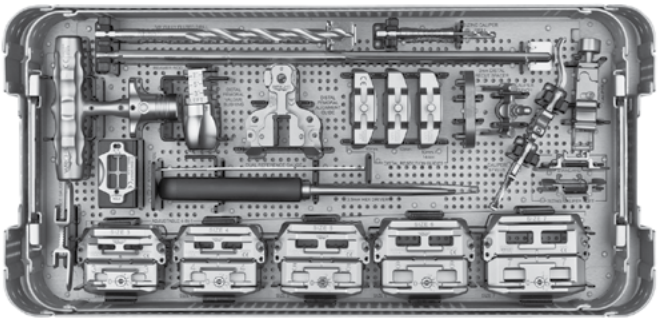
Instrument kit information



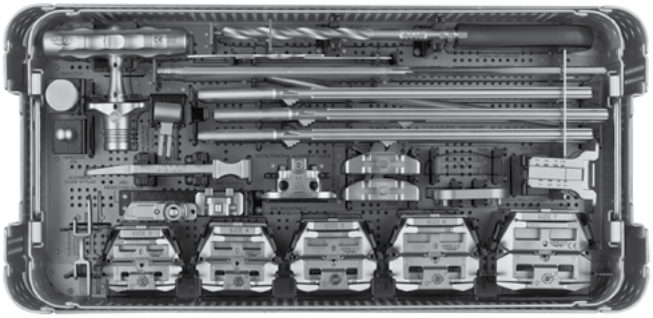




E200KT10 - Evolution® Core Instruments

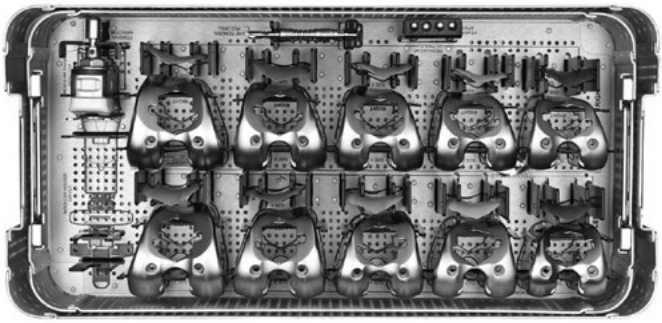


E200KIT1 - Evolution® DCF Instruments

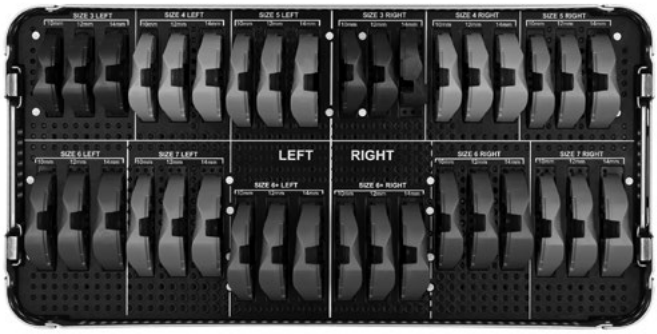


E200KT40 - Evolution® ARC Instruments

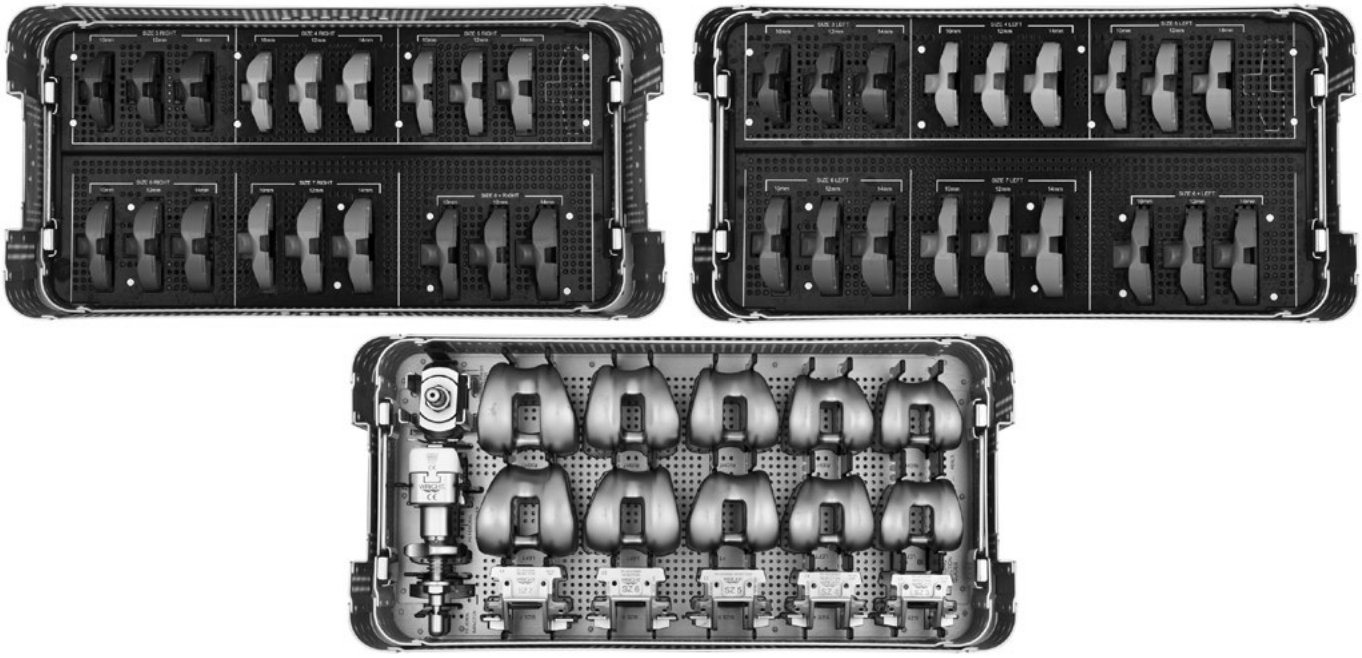
E200KIT7 - CS Insert Trials



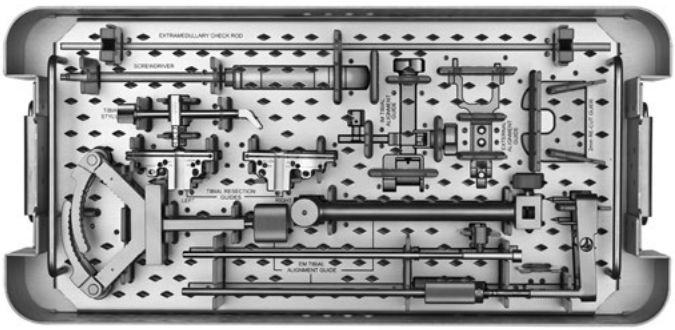
E200KT29 - CS / CR Femoral Trials



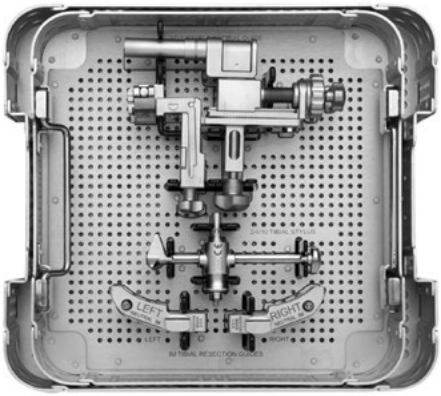
E200KIT6 - CR Insert Trials



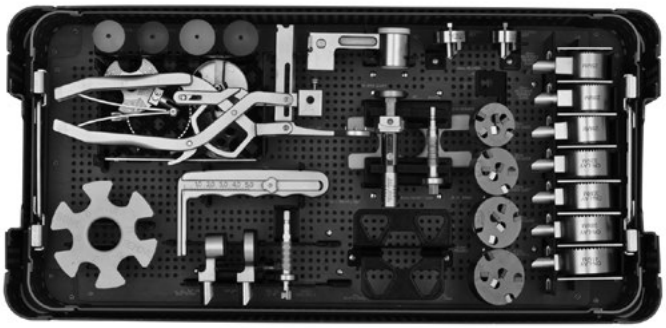
E200KT30 - PS Femoral / Insert Trials



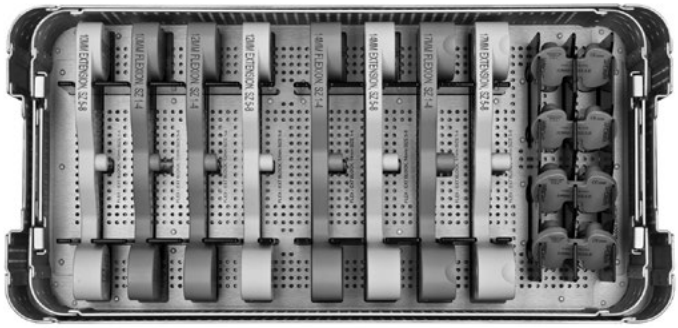
E200KT93 - Odyssey® EM Tibial Guide Kit



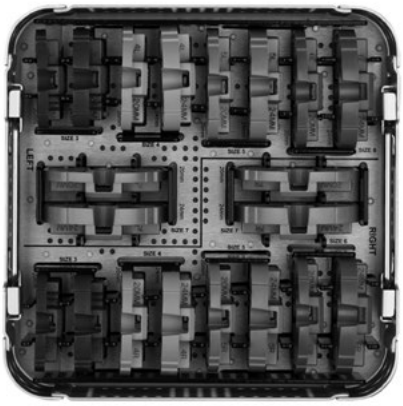
E200KIT4 - EVOLUTION® IM Tibial Guide Kit



K100KT75 - Advance® Patella Reaming Kit

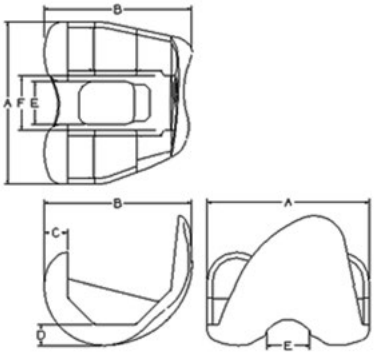


E200KT20 - Flexion / Extension Blocks



E200KT23 - 20mm and 24mm Trials (CS and PS)

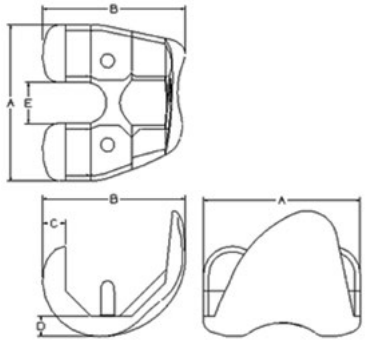
Implant Dimensions



Evolution®
MP PS Femoral Components
EFPSN(X)P(L/R)

Size	A	B	C	D	E	F (PS Only)
1	59	51	10	9	16	20
2	61	54	10	9	16	20
3	64	57	10	9	18	22
4	66	60	10	9	18	22
5	70	64	11	9	18	22
6	73	68	11	9	18	22
7	77	72	11	9	20	25
8	80	76	11	9	20	25

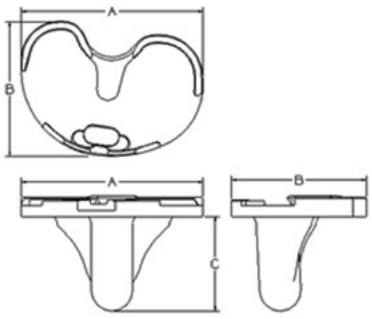
Dimensions are in mm



Evolution®
MP CS/CR Femoral Components
EFSRN(X)P(L/R)
EFSRP(X)P(L/R)

Size	A	B	C	D	E
1	59	51	10	9	16
2	61	54	10	9	16
3	64	57	10	9	18
4	66	60	10	9	18
5	70	64	11	9	18
6	73	68	11	9	18
7	77	72	11	9	20
8	80	76	11	9	20

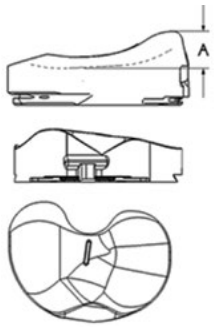
Dimensions are in mm



Evolution®
MP Tibial Base Components
ETPKN(X)S(L/R)
ETPKN(X)P(L/R)

Size	A	B	C
1	54	40	31
2	58	43	31
2+	62	46	34
3	62	46	34
4	66	49	34
5	70	52	38
6	74	55	38
6+	78	58	41
7	78	58	41
8	82	61	41
8+	86	64	41

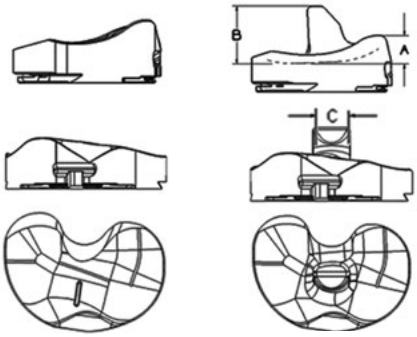
Dimensions are in mm



Evolution® MP CS Insert
(Available Thicknesses 10, 12, 14, 17, 20, 24mm)
EIS(X)S(T)(L/R)
EIS(X)P(T)(L/R)

CS	A
1	11
1+	11
2	11
2+	11
3	11
3+	11
4	11
4+	11
5	11
5+	11
6	11
6+	11
7	11
7+	11
8	12

Dimensions are in mm

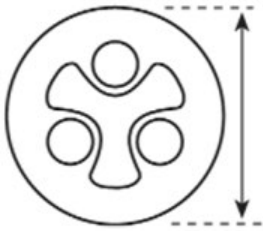


Evolution® MP CR Insert
Available Thicknesses
10, 12, 14, 17mm
EIC(X)S(T)(L/R)
EIC(X)P(T)(L/R)

Evolution® MP PS Insert
Available Thicknesses
10, 12, 14, 17, 20, 24mm
EIP(X)S(T)(L/R)
EIP(X)P(T)(L/R)

CR/PS	A	B	C (PS Only)
1	9	19	14
2	9	19	14
2+	9	20	16
3	9	20	16
4	9	20	16
5	9	21	16
6	10	22	16
6+	10	23	19
7	10	23	19
8	11	24	19

Dimensions are in mm



Advance®
Patella Components
KPONTP(X)
KPON(X)(SP/TP)

Size (Diameter)	Single Peg	Tripeg	Thickness (mm)
25	•	n/a	7 or 9
26	n/a	•	8
28	•	n/a	7 or 9
29	n/a	•	8
32	•	•	8
35	•	•	8
38	•	•	10
41	•	•	11

Dimensions are in mm

(X) Size
(T) Thickness
(L/R) Left/Right

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