Arthrex Retrograde Femoral Nail System

Surgical Technique

Arthrex®

Arthrex Retrograde Femoral Nail System

Introduction

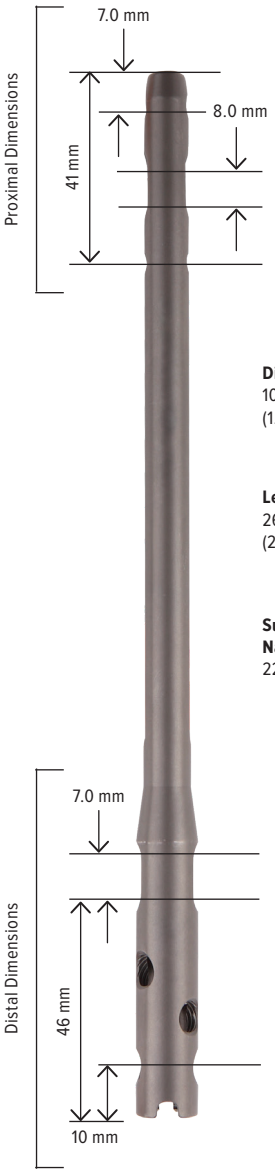
Indications
The retrograde femoral nail is intended for use in intramedullary fixation of fractures of the femur to include the following:

- Open and closed femoral fractures
- Pseudoarthrosis and correction osteotomy
- Pathologic fractures, impending pathologic fractures, and tumor resections
- Supracondylar fractures, including those with severe comminution and intraarticular extension
- Ipsilateral femur fractures
- Bone lengthening
- Fractures proximal to a total knee arthroplasty or prosthesis
- Fractures distal to a total hip joint
- Nonunions and malunions
- Fractures resulting from osteoporosis

Preoperative Planning
Preoperative planning is recommended before beginning the surgical procedure. A/P and lateral x-rays of the injured femur should be taken preoperatively and evaluated for nail length, canal size, expected amount of reaming, and screw length. A/P and lateral x-rays of the contralateral uninjured femur can also be taken preoperatively to provide insight into the characteristics of the pre-injured femur.

Implant Features

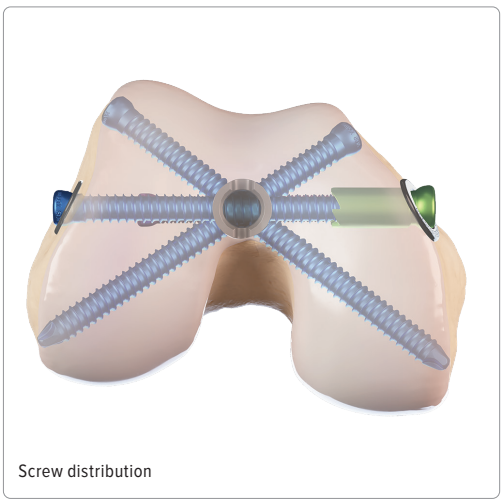
Supracondylar Nail



Diameters
10 mm-13 mm
(1.0 mm increments)

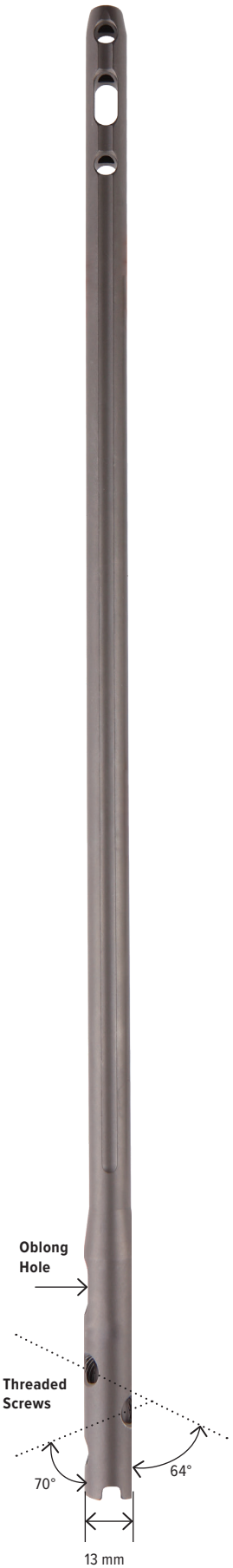
Lengths
26 cm-46 cm
(2.0 mm increments)

Supracondylar Nail Length
22 cm

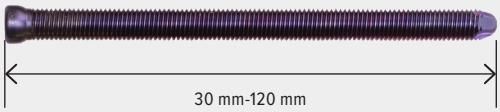


Screw distribution

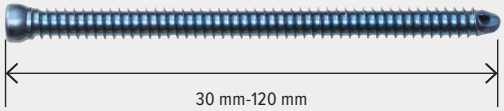
Retrograde Nail



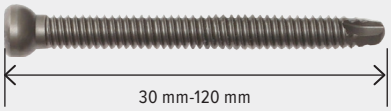
6.5 mm Captured Cortical Screw, Distal



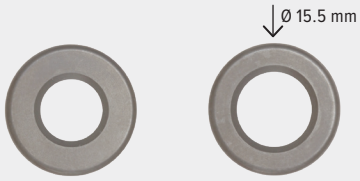
6.5 mm Captured Cancellous Screw, Distal



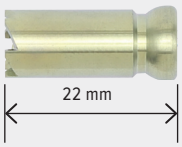
5.0 mm Captured Cortical Bone Screw, Proximal



Condyle Fixation Washers



Condyle Fixation Nut



Captured End Caps

Locking Spacer

Patient Positioning

The patient should be positioned in a supine position on a radiolucent table with the injured leg draped free and a bump under the ipsilateral hip. The C-arm should be positioned to allow imaging of the femur in both planes along the entire length of the bone. Place the knee on a sterile bolster to maintain approximately 30° of flexion. Use manual distraction or a femoral distractor to reduce severely displaced fractures and to restore length.

Incision

Approach the distal femur through one of two incisions. Make a longitudinal incision from the inferior/medial aspect of the patella to the level of the tibial tubercle, along the medial border of the patellar tendon. Obtain access to the intercondylar notch by making a small medial parapatellar incision and retracting the patellar tendon laterally.

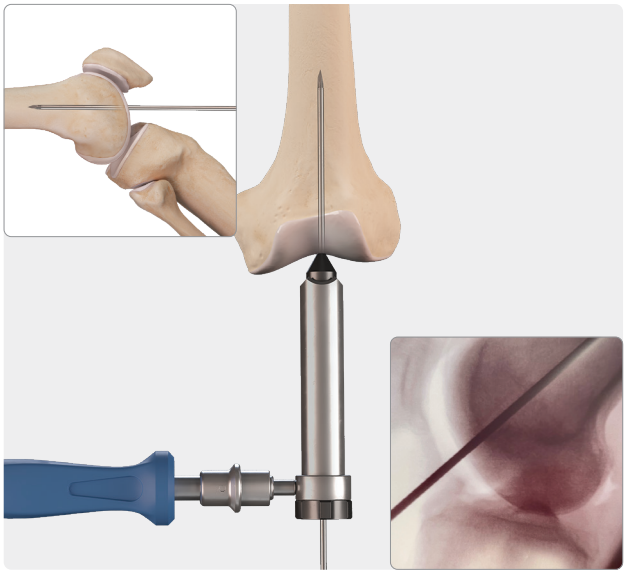
Alternatively, make a longitudinal midline incision from the inferior patella to the tibial tubercle. Obtain access to the intercondylar notch by splitting the patellar tendon longitudinally in its midline.

Entry Point

The entry point for the nail is located in line with the femoral canal on the AP view, and just anterior to where Blumensaat's line intersects the anterior intercondylar notch on the lateral view.

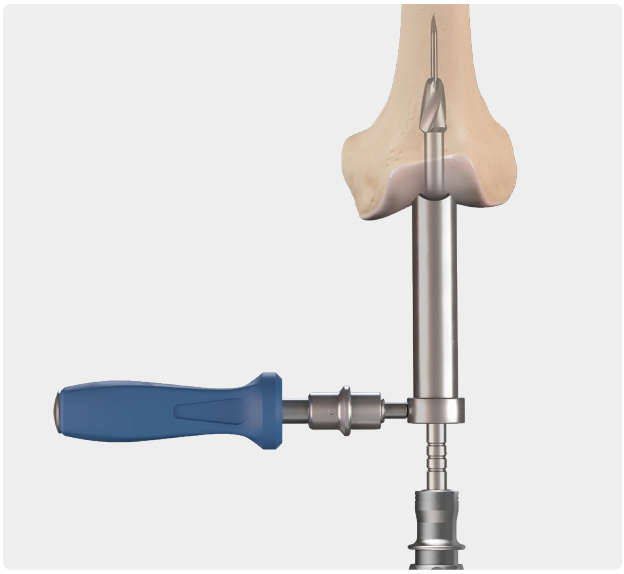
Arthrex Retrograde Femoral Nail System Surgical Technique

Entry Option 1



1a

Assemble the 3.2 mm pin guide into the soft-tissue protector and place it through the incision. Align the soft-tissue protector with the femoral shaft on the A/P and lateral image views and insert a 3.2 mm guide pin.

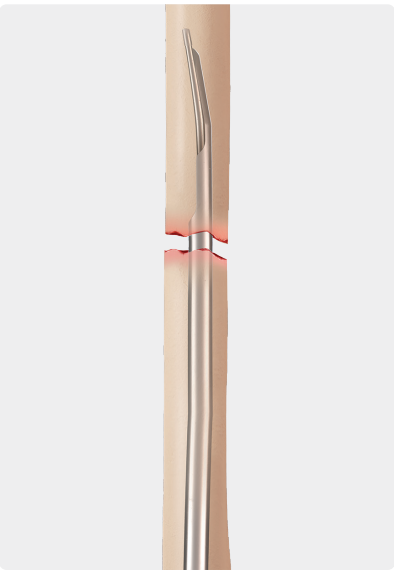


Place the 13.5 mm cannulated entry reamer over the guide pin and ream the distal femur through the soft-tissue protector. The grooves on the entry reamer in relation to the soft-tissue sleeve represent how far the nail can be countersunk at 0 mm, 5.0 mm, and 10 mm.

Entry Option 2

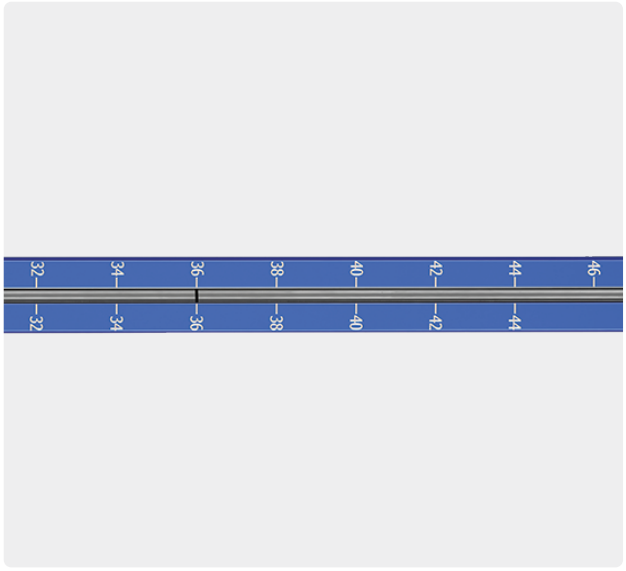
1b

Alternatively, the surgeon may open the entry point with a cannulated curved awl followed by a 3.0 mm ball nose guidewire that is placed through the curved awl to the desired depth. Remove the awl and introduce the 13.5 mm cannulated entry reamer over the 3.0 mm ball nose guidewire as described in step 5.



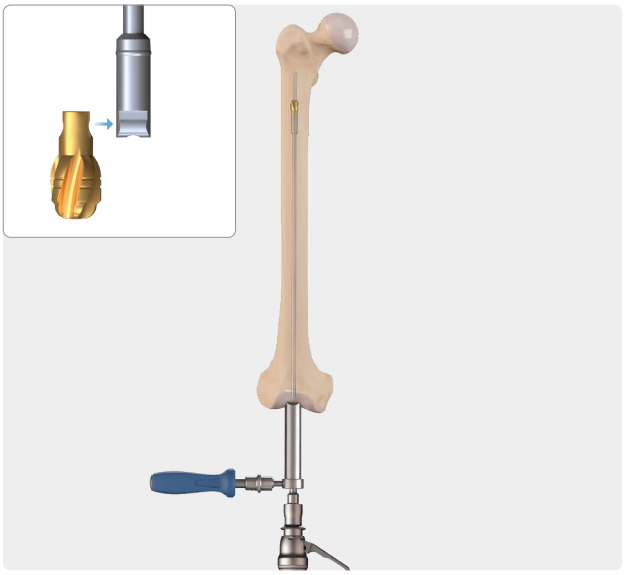
2

Introduce the 3.0 mm ball nose guidewire by means of the guidewire gripper past the level of the fracture. To assist in fracture reduction, a curved reduction tool and handle may be used.



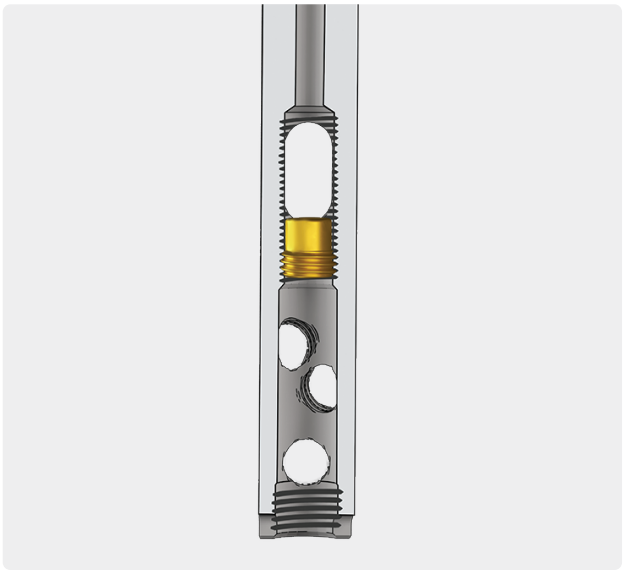
3

Determine the proper nail length by sliding the guidewire depth gauge over the guidewire to the level of the intercondylar notch cortex. Read the appropriate length directly from the etch line on the ball nose guidewire.



4

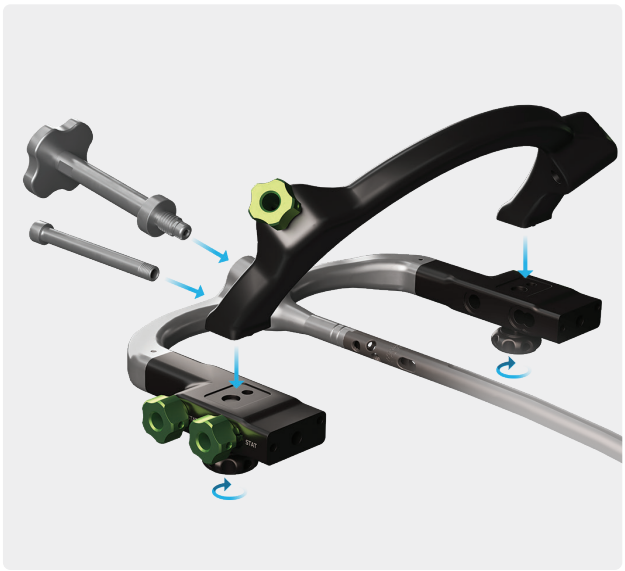
Begin reaming with the 8.0 mm end-cutting reamer. Progressively ream until cortical chatter is achieved. Ream 1.0 mm to 1.5 mm over the desired nail diameter.



5

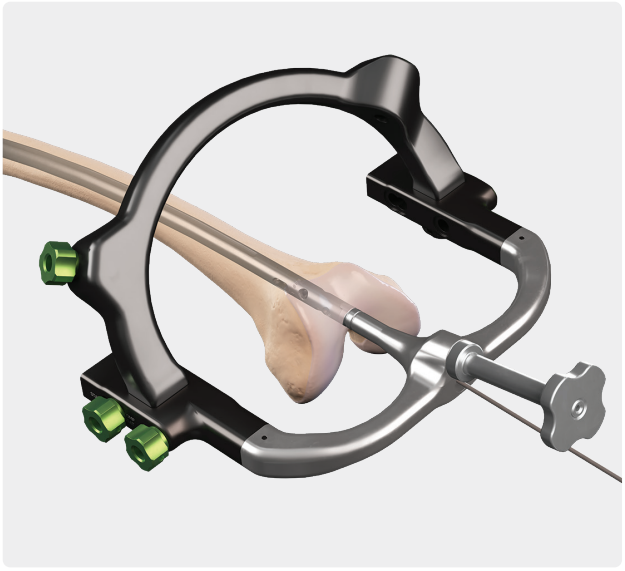
When using controlled compression, the compression spacer should be inserted past the oblique holes, but distal to the oblong hole.

> **Note:** This must be done prior to placing the nail onto the jig.



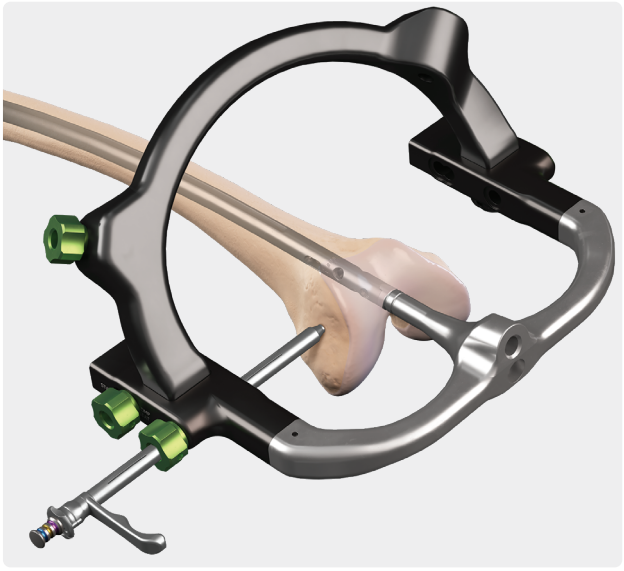
6

Attach the retrograde radiolucent targeting guide to the nail using the connection bolt, T-handle, and ball hex driver. If using oblique screws, the retrograde targeting guide arch should be attached to the main body.



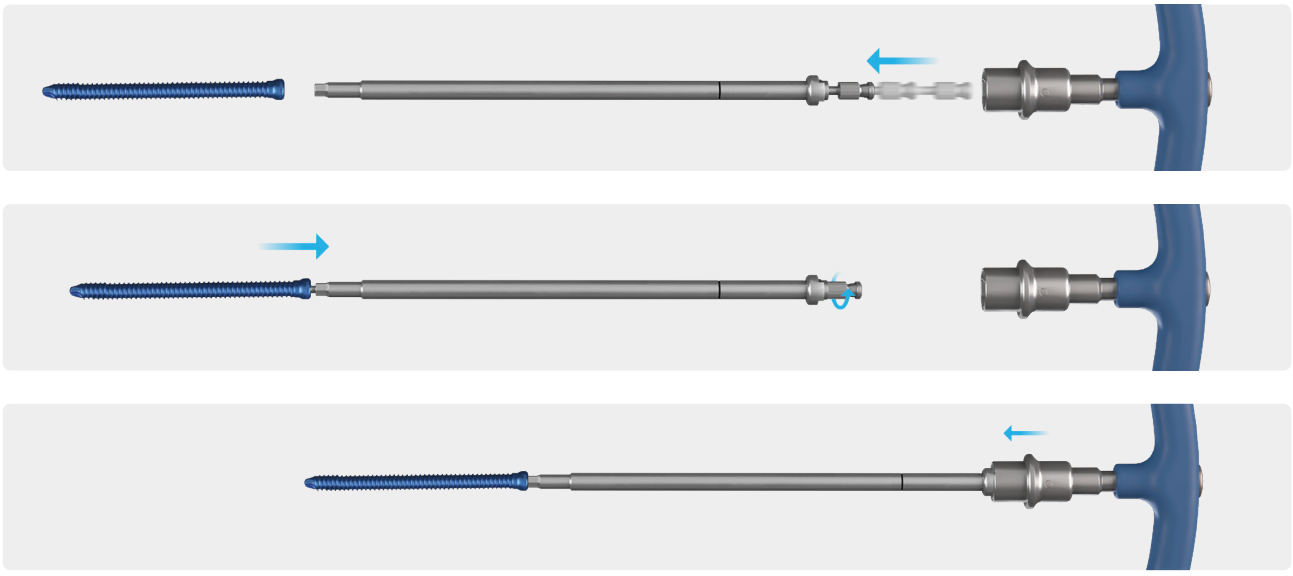
7

Introduce the nail into the femur using the retrograde radiolucent targeting guide. Pass the nail over the guidewire.



8

Remove the 3.0 mm ball nose guidewire. Make a small incision and insert the sheath, drill guide, and obturator laterally until they contact the cortex of the femur. When desired orientation is achieved, remove the obturator and drill with a calibrated 5.5 mm drill bit. The length of the screw can be read off of the guide.



9

Assemble the appropriate screw onto the captured screw driver system and T-handle. The screw capture also creates a Hudson attachment should power insertion be desired.

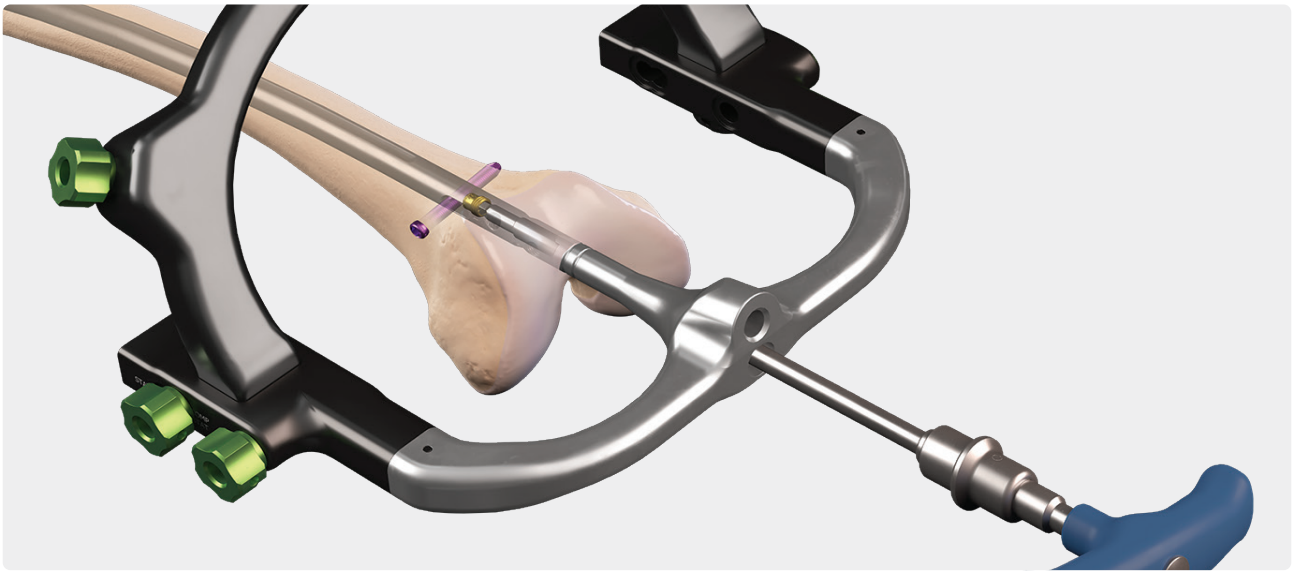
Compression Options

10a

Static Locking
For static locking, advance the compression spacer to the proximal end of the oblong hole using the 5.0 mm compression hex driver. Insert the desired screw into the distal end of the slot.

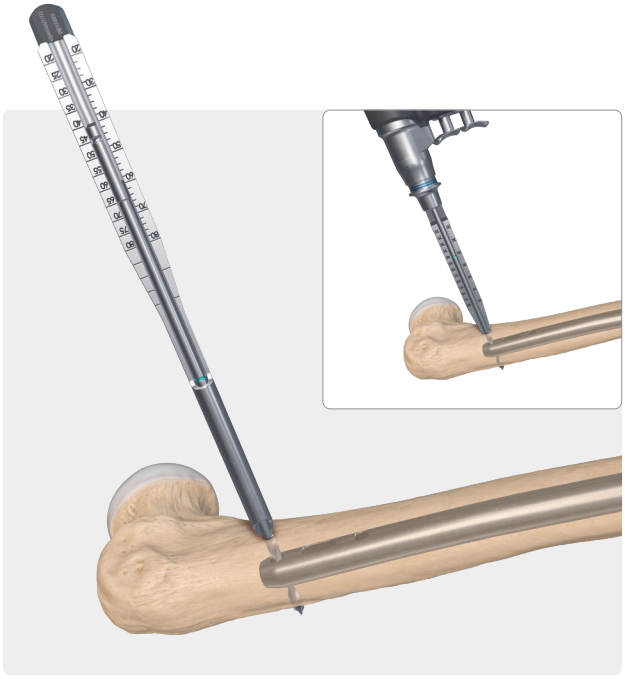
10b

Controlled Compression
For controlled compression, it is important to countersink the nail by at least 10 mm to avoid backing the nail out into the joint. Use the comp/stat hole to place a 6.5 mm screw. The proximal portion of the nail must be fixed with a 5.0 mm cortical screw prior to compression.



11

Use the 5.0 mm compression hex driver to drive the compression spacer against the transverse screw within the oblong hole. This will compress the fracture site.



12

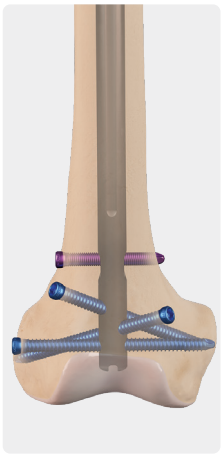
Use a freehand technique to accomplish 5.0 mm cortical locking technique. Using fluoroscopy, verify perfect circles in the A/P view. Using the extended distal depth gauge, screw length is determined by measuring off the back of the short 4.0 mm drill bit.

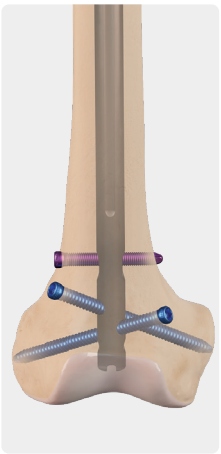
Alternatively, when using the depth gauge sled, screw length is determined by referencing the calibrated line of the 4.0 mm short drill bit.

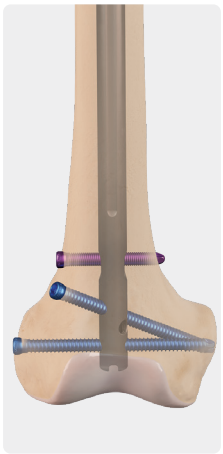
13

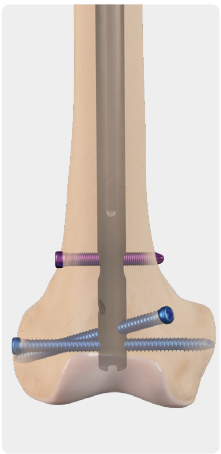
Final fixation.

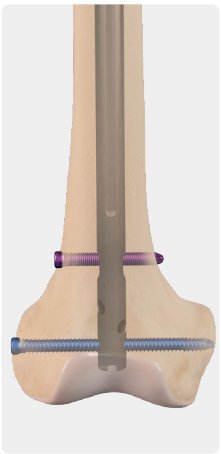
Distal Screw Configuration







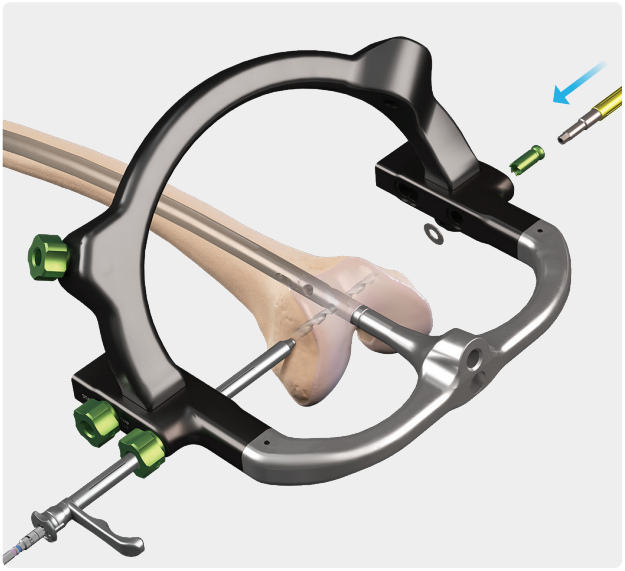




Condylar Nut Procedure

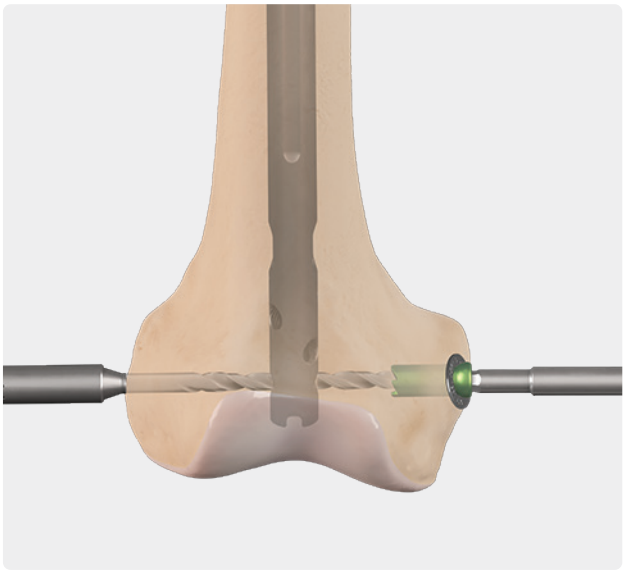
14

Drill both cortices in the desired transverse location. Note the calibration for the screw length when the drill has just reached the far cortex. Do not remove the drill.



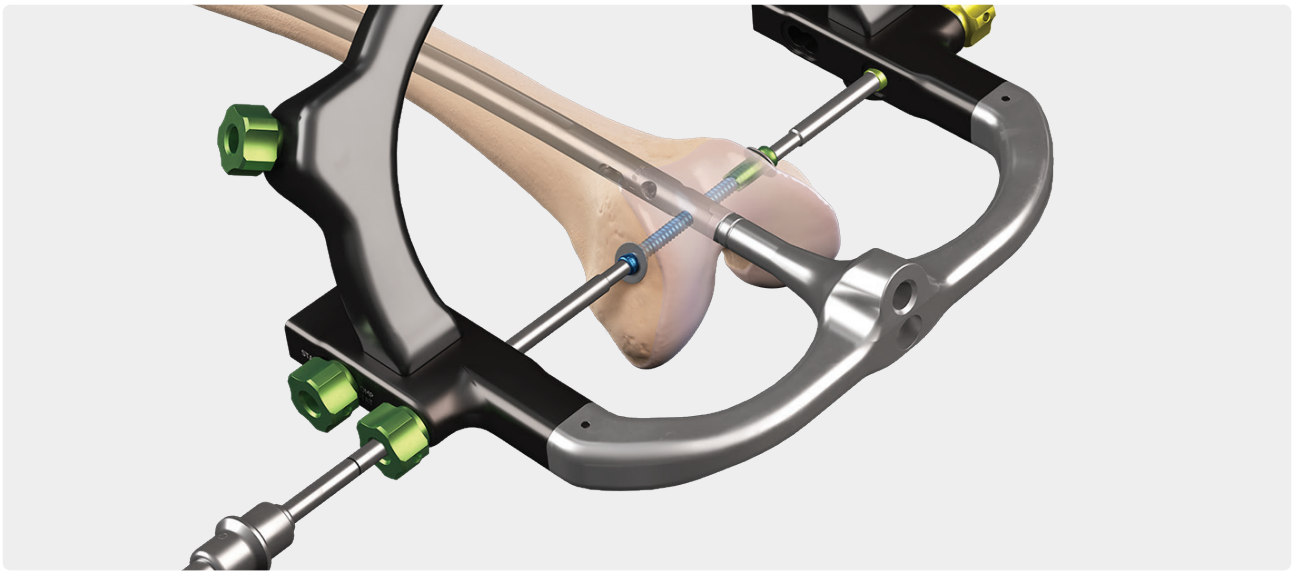
15

Assemble the condylar nut, hex driver, and condyle locking collet. A washer must be added to the condylar nut on the inside of the retrograde nail jig. The condylar nut can be captured by the hex driver, similar to step 14.



16

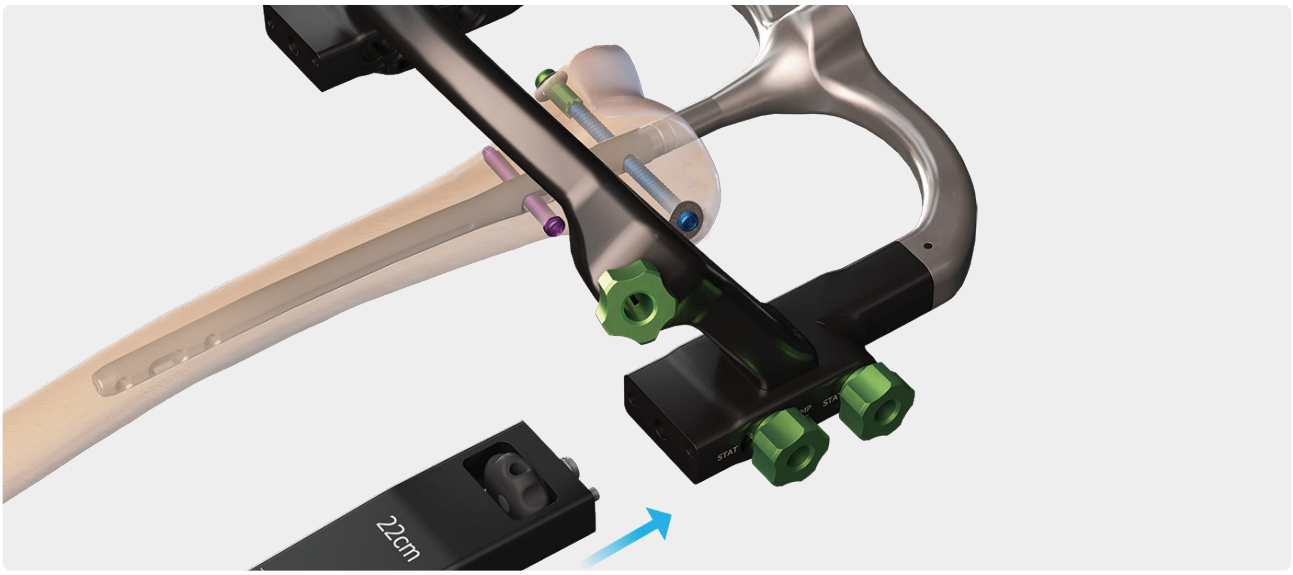
The distal aspect of the condylar nut has teeth and is self-drilling. Drive the condylar nut through the femoral cortex. The condylar nut will go over the previously placed 5.5 mm drill bit. Turn the condyle locking collet clockwise until it is snug, keeping the 5.0 mm hex driver engaged with the condylar nut.



17

Remove the drill bit and select a screw that is 5.0 mm shorter than the measured length. Insert the 6.5 mm cortical or cancellous screw. Add a washer to the screw on the inside of the jig as it exits the sheath.

The screw will follow the drill path and thread into the condylar nut on the opposite cortex. Apply compression across the fracture until the washers on each side of the femoral condyles are flush with the bone.

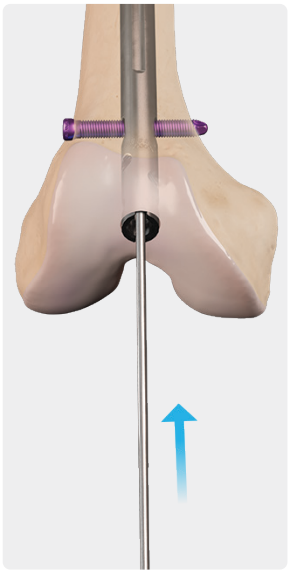


18

The proximal locking holes on the 22 cm supracondylar retrograde femoral nails are transverse holes that are targeted using an extension to the targeting guide. These holes on the nail are threaded to lock the 5.0 mm cortical screws to the nail.

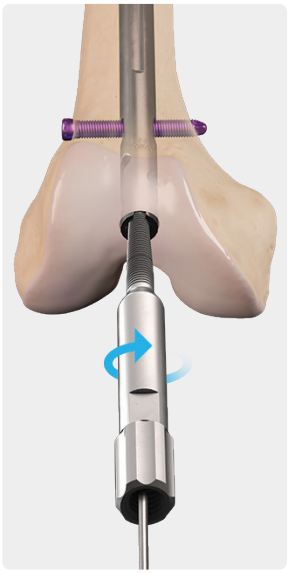
Drill both cortices using the 4.0 mm calibrated drill. Read the calibration for the length of the screw and insert the screw using a 5.0 mm hex driver.

Nail Extraction Technique



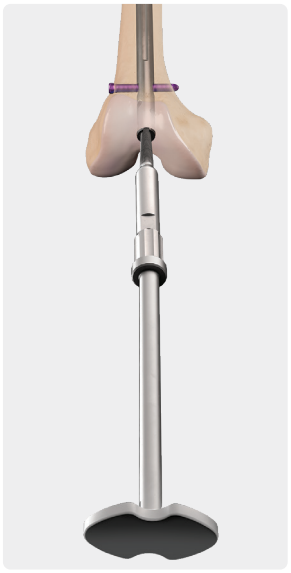
1

Insert a guide pin into the distal aspect of the nail.



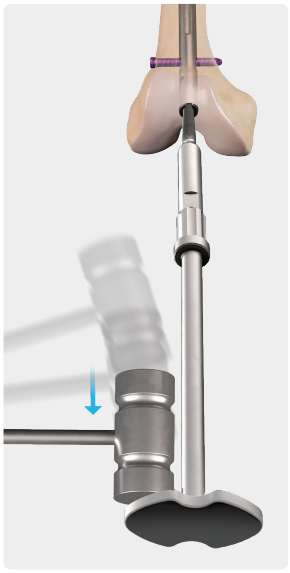
2

Slide the cannulated conical extractor over the wire and thread it into the distal aspect of the retrograde nail. Remove the wire.



3

Add/thread the hammer pad into the extractor.



4

Remove the screw and mallet out the nail.

Ordering Information

Arthrex Retrograde Femoral Nail System

Product Description	Legacy System Number	Item Number
Sets and Cases		
Femoral nail system, tray 1	-	AR-9097S-01
Femoral nail instrument case 1	9922-000	AR-9097C-01
Femoral nail system, tray 2	-	AR-9097S-02
Femoral nail instrument case 2	9924-000	AR-9097C-02
Instrumentation		
Impactor rod	0826-000	AR-9095-31
Extractor bolt	0828-000	AR-9095-32
Impactor pad, long	0835-000	AR-9097-24
Locking knob, insertion guide, tibial nail	1239-100	AR-9097-25
Locking collet, targeting module, tibial nail	1242-100	AR-9097-26
Antegrade targeting module, femoral nail system	1271-300	AR-9097-27
Antegrade option, antegrade targeting guide	1272-000	AR-9097-28
Locking bolt, antegrade nail	1273-100	AR-9097-29
Retrograde targeting guide	1280-000	AR-9097-30
Retrograde targeting guide, arch	1281-000	AR-9097-31
Retrograde targeting guide, 22 cm extension	1283-000	AR-9097-32
Locking bolt, retrograde femoral nail	1284-000	AR-9097-33
Driver locking collet, retrograde femoral nail	1285-000	AR-9097-34
Awl t-handle, silicone blue, cannulated, curved	0256-200	AR-9095-50
Entry reamer, femoral nail, cannulated, 13.5 mm	0266-000	AR-9097-02
Tap, calibrated, cancellous, 6.0 mm	0271-000	AR-9097-03
Cortical tap, calibrated, cortical, 6.5 mm	0272-000	AR-9097-04
Obturator, 3.6 mm	0273-000	AR-9097-05
Pin guide, 3.2 mm	0335-000	AR-9097-06
Pin guide, soft-tissue protector, 3.2 mm	0338-000	AR-9097-08
Drill guide, 4.0 mm	0337-000	AR-9097-07
Drill guide, 6.0 mm	0339-000	AR-9097-09
T-handle, cannulated, Hudson female/J-Hall connect	0468-000	AR-9097-10
Quick connect, cannulated, Hudson female/J-Hall	0469-100	AR-9095-27
Driver, ball hex, large Hudson, 9/32 in	0474-000	AR-9095-07
Guidewire gripper	0481-100	AR-9095-54
Compression hex driver, hudson, antegrade, 5.0 mm	0487-000	AR-9097-11
Power hex screw driver, 5.0 mm	0488-200	AR-9097-12
Power capturing rod, 5.0 mm	0489-100	AR-9097-13
Power hex screw driver, short, 5.0 mm	0491-100	AR-9097-14
Power capturing rod, short, 5.0 mm	0492-100	AR-9097-15
Distal depth gauge	0514-200	AR-9095-15
Depth gauge, hook tip, trochanteric nail	0531-000	AR-9095-19
Guide pin depth gauge, femoral nail	0534-000	AR-9097-16
Guidewire depth gauge, femoral nail	0535-000	AR-9097-14
Drill guide, obturator, 4.0 mm	0622-000	AR-9095-12
Screw sheath	0624-000	AR-9097-18
Obturator, 3.2 mm	0625-000	AR-9097-19
Soft-tissue protector, Hudson quick connector	0634-100	AR-9097-20
Obturator, 6.0 mm	0635-000	AR-9097-21
Ball spike	0817-000	AR-9095-30
Reduction tool, curved	0831-000	AR-9097-22
Square quick connect assembly	0834-000	AR-9097-23

Product Description	Legacy System Number	Item Number
Retrograde Femoral Nail		
Retrograde femoral nail, 10 mm × 26 cm	1340-026	AR-9096R-10-26
Retrograde femoral nail, 10 mm × 28 cm	1340-028	AR-9096R-10-28
Retrograde femoral nail, 10 mm × 30 cm	1340-030	AR-9096R-10-30
Retrograde femoral nail, 10 mm × 32 cm	1340-032	AR-9096R-10-32
Retrograde femoral nail, 10 mm × 34 cm	1340-034	AR-9096R-10-34
Retrograde femoral nail, 10 mm × 36 cm	1340-036	AR-9096R-10-36
Retrograde femoral nail, 10 mm × 38 cm	1340-038	AR-9096R-10-38
Retrograde femoral nail, 10 mm × 40 cm	1340-040	AR-9096R-10-40
Retrograde femoral nail, 10 mm × 42 cm	1340-042	AR-9096R-10-42
Retrograde femoral nail, 10 mm × 44 cm	1340-044	AR-9096R-10-44
Retrograde femoral nail, 11 mm × 26 cm	1341-026	AR-9096R-11-26
Retrograde femoral nail, 11 mm × 28 cm	1341-028	AR-9096R-11-28
Retrograde femoral nail, 11 mm × 30 cm	1341-030	AR-9096R-11-30
Retrograde femoral nail, 11 mm × 32 cm	1341-032	AR-9096R-11-32
Retrograde femoral nail, 11 mm × 34 cm	1341-034	AR-9096R-11-34
Retrograde femoral nail, 11 mm × 36 cm	1341-036	AR-9096R-11-36
Retrograde femoral nail, 11 mm × 38 cm	1341-038	AR-9096R-11-38
Retrograde femoral nail, 11 mm × 40 cm	1341-040	AR-9096R-11-40
Retrograde femoral nail, 11 mm × 42 cm	1341-042	AR-9096R-11-42
Retrograde femoral nail, 11 mm × 44 cm	1341-044	AR-9096R-11-44
Retrograde femoral nail, 12 mm × 26 cm	1342-026	AR-9096R-12-26
Retrograde femoral nail, 12 mm × 28 cm	1342-028	AR-9096R-12-28
Retrograde femoral nail, 12 mm × 30 cm	1342-030	AR-9096R-12-30
Retrograde femoral nail, 12 mm × 32 cm	1342-032	AR-9096R-12-32
Retrograde femoral nail, 12 mm × 34 cm	1342-034	AR-9096R-12-34
Retrograde femoral nail, 12 mm × 36 cm	1342-036	AR-9096R-12-36
Retrograde femoral nail, 12 mm × 38 cm	1342-038	AR-9096R-12-38
Retrograde femoral nail, 12 mm × 40 cm	1342-040	AR-9096R-12-40
Retrograde femoral nail, 12 mm × 42 cm	1342-042	AR-9096R-12-42
Retrograde femoral nail, 12 mm × 44 cm	1342-044	AR-9096R-12-44
Retrograde femoral nail, 13 mm × 26 cm	1343-026	AR-9096R-13-26
Retrograde femoral nail, 13 mm × 28 cm	1343-028	AR-9096R-13-28
Retrograde femoral nail, 13 mm × 30 cm	1343-030	AR-9096R-13-30
Retrograde femoral nail, 13 mm × 32 cm	1343-032	AR-9096R-13-32
Retrograde femoral nail, 13 mm × 34 cm	1343-034	AR-9096R-13-34
Retrograde femoral nail, 13 mm × 36 cm	1343-036	AR-9096R-13-36
Retrograde femoral nail, 13 mm × 38 cm	1343-038	AR-9096R-13-38
Retrograde femoral nail, 13 mm × 40 cm	1343-040	AR-9096R-13-40
Retrograde femoral nail, 13 mm × 42 cm	1343-042	AR-9096R-13-42
Retrograde femoral nail, 13 mm × 44 cm	1343-044	AR-9096R-13-44
Supracondylar Femoral Nail		
Supracondylar femoral nail, 10 mm × 22 cm	1344-022	AR-9096S-10-22
Supracondylar femoral nail, 11 mm × 22 cm	1345-022	AR-9096S-11-22
Supracondylar femoral nail, 12 mm × 22 cm	1346-022	AR-9096S-12-22
Supracondylar femoral nail, 13 mm × 22 cm	1347-022	AR-9096S-13-22

Product Description	Legacy System Number	Item Number
Implants		
End cap, antegrade nail, 5.0 mm	1322-005	AR-9096CA-05
End cap, antegrade nail, 10 mm	1322-010	AR-9096CA-10
Locking end cap, recon lock, antegrade nail, 0 mm	1323-000	AR-9096CP-A
End cap, antegrade nail, 0 mm	1324-000	AR-9096C-A
Screw spacer/compression bolt, femoral nails	1326-000	AR-9096B
End cap, retrograde femoral nail, 1.0 mm	1339-001	AR-9096CR-01
End cap, retrograde femoral nail, 5.0 mm	1339-005	AR-9096CR-05
End cap, retrograde femoral nail, 10 mm	1339-010	AR-9096CR-10
Condyle fixation nut, retrograde femoral nail	1348-000	AR-9096NW
Fixation screw washer, retrograde femoral nail	1349-000	AR-9096W
Fixation nut washer, retrograde femoral nail	1351-000	AR-9096NW
Captured Screws		
5.0 mm cortical Lengths: 30 mm–50 mm (2 mm increments)	8001-030-50	AR-9093-50-030-50
5.0 mm cortical Lengths: 55 mm–100 mm (5 mm increments)	8001-055-100	AR-9093-50-055-100
6.5 mm cortical, fully threaded Lengths: 30 mm–120 mm (5 mm increments)	8059-030-120	AR-9096FT-65-030-120
6.0 mm cancellous, partially threaded Lengths: 30 mm–120 mm (5 mm increments)	8061-030-120	AR-9096PT-60-30-120
6.5 mm cancellous, partially threaded Lengths: 30 mm–120 mm (5 mm increments)	8065-030-120	AR-9096CA-65-30-120
Disposbles		
Drill, large Hudson, cannulated, 5.5 mm	0232-100	AR-9097-01S
Drill, AO, 4.0 mm × 165 mm	S0210-200	AR-9095-43S
Drill, AO, calibrated, 4.0 mm × 280 mm	S0219-100	AR-9095-44S
Drill, AO, calibrated, sterile, 5.5 mm	S0288-200	AR-9097-35S
Step drill, AO, calibrated, sterile, 4.8 mm/6.0 mm	S0289-100	AR-9097-36S
Guide pin, 3.2 mm × 330 mm	S0100-000	AR-9095-40S
Tap, large Hudson, cortical, 5.0 mm	S0260-000	AR-9095-45S

Arthrex manufacturer, authorized representative, and importer information (Arthrex eIFUs)

US patent information