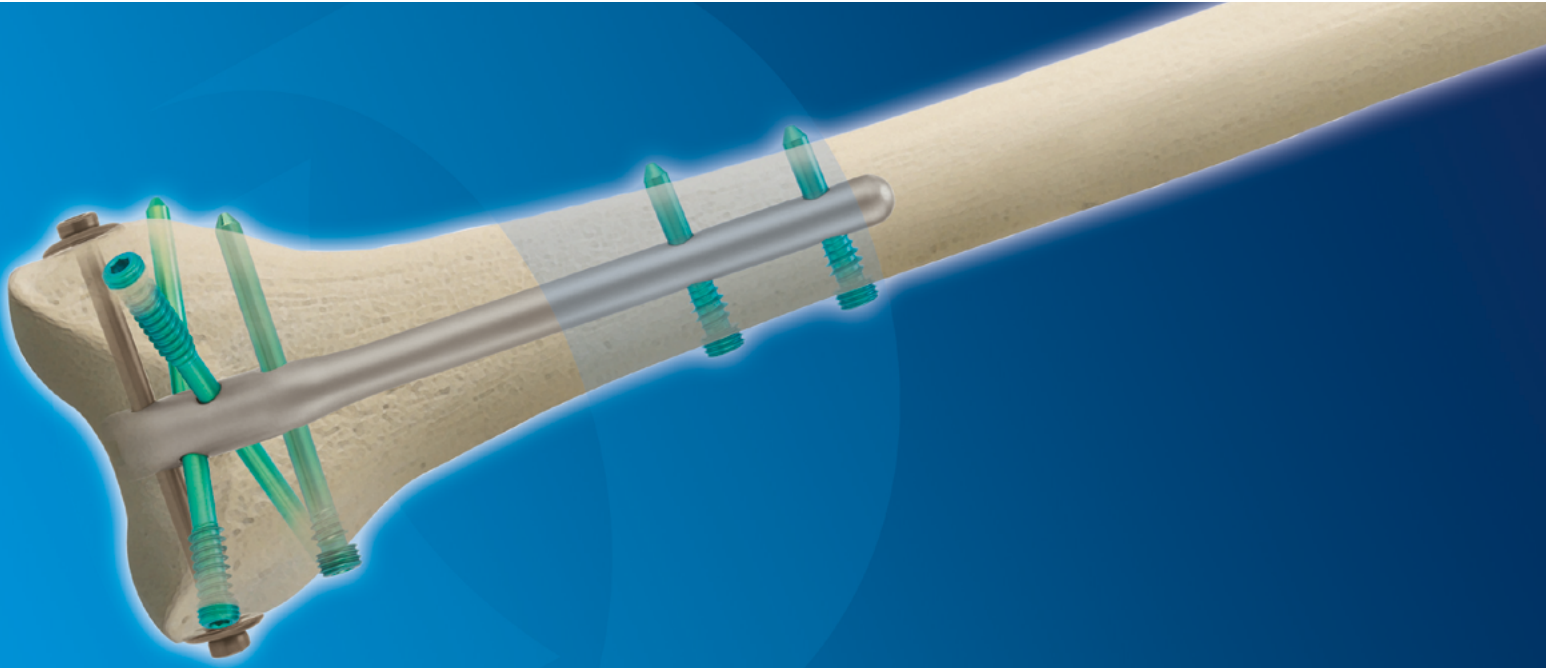




# CentroNail<sup>®</sup>

Nailing System



**The Centronail  
Titanium Supracondylar  
and Retrograde  
Nailing System**

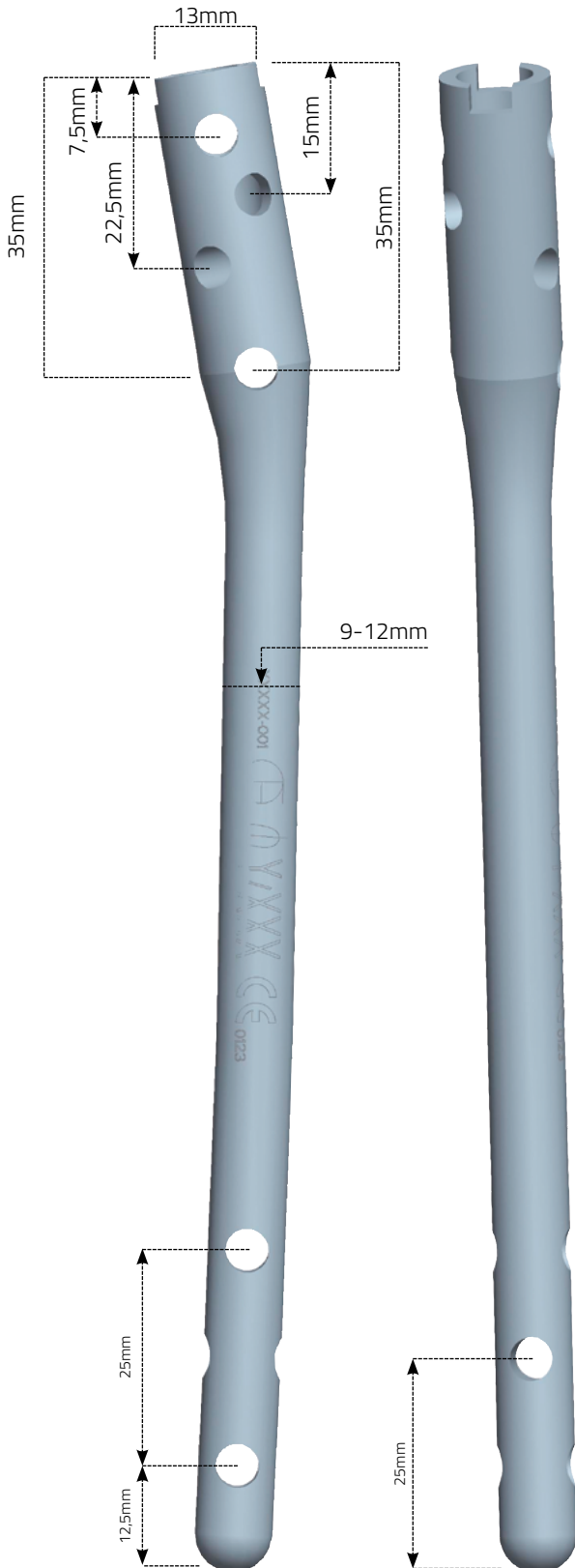
<b>1</b>	<b>FEATURES AND BENEFITS</b>
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<b>3</b>	<b>EQUIPMENT REQUIRED</b>
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7	Entry Portal
8	Measurement of Nail Length
9	Reaming
10	Nail Insertion
11	Distal Locking
14	Proximal Locking
20	Removal of the Handle and Closure
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Orthofix wishes to thank  
the following surgeons for their contribution  
to the development of the technique:

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University and County Hospital, Szentes, Hungary

W. KLEIN, MD  
Department of Trauma Surgery, Wolfsburg Hospital,  
Wolfsburg, Germany

## FEATURES AND BENEFITS



Titanium nail and locking screws  
Allow MRI investigation, if necessary

13mm proximal diameter

9-12mm distal diameter  
9mm is solid

10° Angle

One design for Left and Right femur

130-375mm (25mm increments)

Radius of curve 2500mm

## Locking screws

### TITANIUM STANDARD LOCKING SCREWS

6.8mm thread diameter  
4.8mm shaft diameter  
4.8mm drill bit



Smooth diameter, unthreaded shaft: maximises fatigue strength.  
Reverse thread on screw head: easy screw removal.  
Conical tip: helps insertion.

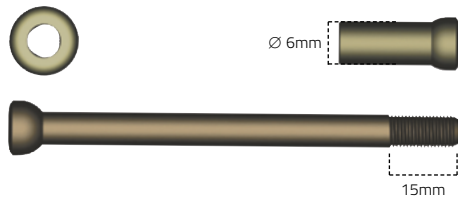
### TITANIUM REVISION LOCKING SCREWS

8mm thread diameter  
Better purchase in poor quality bone  
4.8mm shaft diameter  
4.8mm drill bit



### TITANIUM CONDYLAR COMPRESSION SCREWS

4.8mm diameter  
4.8mm drill bit  
6.0mm drill bit in 2nd cortex for nut



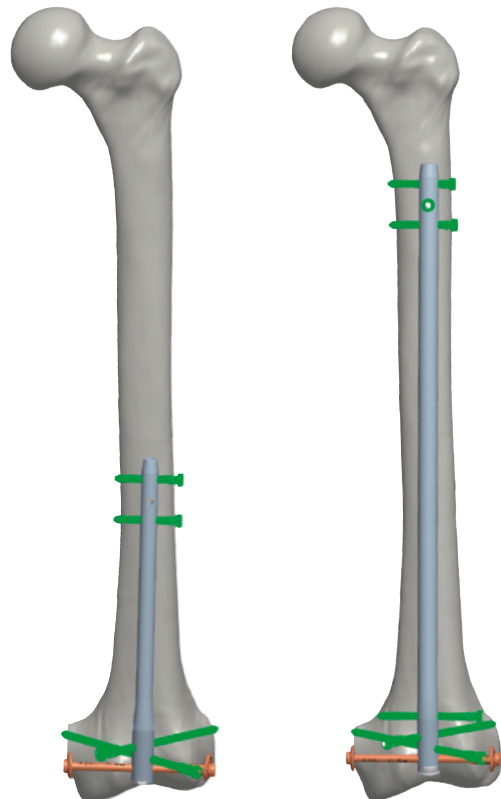
Cannulated: easy placement of condylar washer and nut over a K-wire.

Cloverleaf washer design: adapts to contour of bone surface and permits excellent compression.

## INDICATIONS

Inter- and supra-condylar fractures

Supra-condylar fractures with diaphyseal extension



## EQUIPMENT REQUIRED

Centronail Titanium Supracondylar Intramedullary Nails		
Ø 9 L 130	Solid	99-T769130
Ø 9 L 150	Solid	99-T769150
Ø 9 L 175	Solid	99-T769175
Ø 10 L 130	Cannulated	99-T760130
Ø 10 L 150	Cannulated	99-T760150
Ø 10 L 175	Cannulated	99-T760175
Ø 10 L 200	Cannulated	99-T760200
Ø 10 L 225	Cannulated	99-T760225
Ø 11 L 130	Cannulated	99-T761130
Ø 11 L 150	Cannulated	99-T761150
Ø 11 L 175	Cannulated	99-T761175
Ø 11 L 200	Cannulated	99-T761200
Ø 11 L 225	Cannulated	99-T761225
Ø 11 L 250	Cannulated	99-T761250
Ø 11 L 275	Cannulated	99-T761275
Ø 11 L 300	Cannulated	99-T761300
Ø 11 L 325	Cannulated	99-T761325
Ø 11 L 350	Cannulated	99-T761350
Ø 11 L 375	Cannulated	99-T761375
Ø 12 L 130	Cannulated	99-T762130
Ø 12 L 150	Cannulated	99-T762150
Ø 12 L 175	Cannulated	99-T762175
Ø 12 L 200	Cannulated	99-T762200
Ø 12 L 225	Cannulated	99-T762225
Ø 12 L 250	Cannulated	99-T762250
Ø 12 L 275	Cannulated	99-T762275
Ø 12 L 300	Cannulated	99-T762300
Ø 12 L 325	Cannulated	99-T762325
Ø 12 L 350	Cannulated	99-T762350
Ø 12 L 375	Cannulated	99-T762375

End Caps	
L 0mm	99-T760000
L 10mm	99-T760010
L 20mm	99-T760020

4.8mm Titanium  
Standard Locking Screws

Code	Length (mm)
99-T79925	25
99-T79930	30
99-T79935	35
99-T79940	40
99-T79945	45
99-T79950	50
99-T79955	55
99-T79960	60
99-T79965	65
99-T79970	70
99-T79975	75
99-T79980	80
99-T79985	85
99-T79990	90
99-T79995	95
99-T79900	100
99-T79905	105
99-T79910	110

4.8mm Titanium  
Revision Locking Screws

Code	Length (mm)
99-T74530	30
99-T74535	35
99-T74540	40
99-T74545	45
99-T74550	50
99-T74555	55
99-T74560	60
99-T74565	65
99-T74570	70
99-T74575	75
99-T74580	80
99-T74585	85
99-T74590	90
99-T74595	95
99-T74500	100
99-T74505	105
99-T74510	110

Cleaning, disinfection, sterilisation  
and maintenance of instrumentation

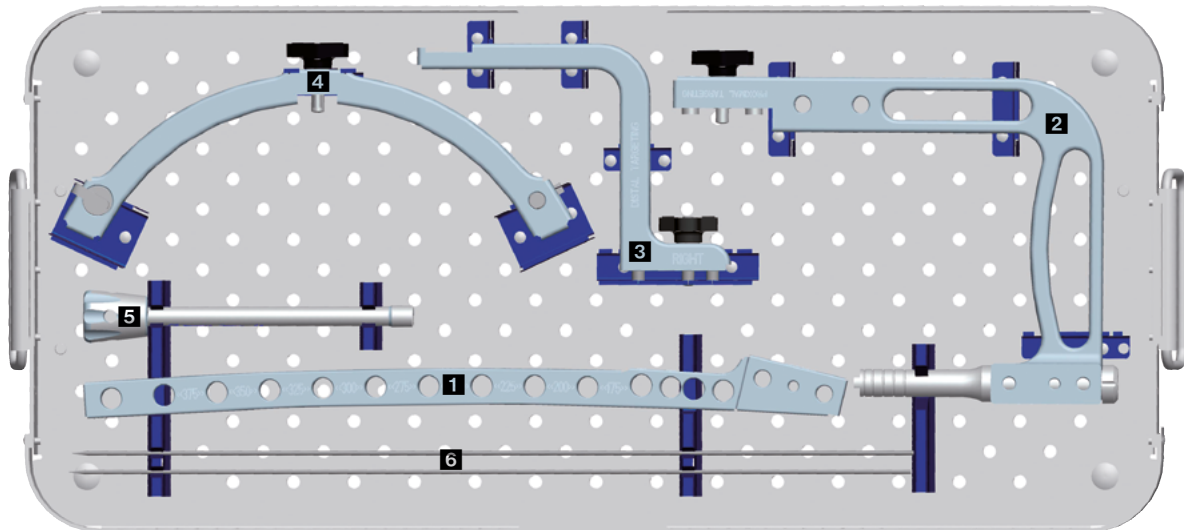
Orthofix supplies the Centronail Titanium Supracondylar and Retrograde Nail, locking screws and end caps in a STERILE package, while the instruments are supplied NONSTERILE. Please check the sterility of each device on the product label.

The surgeon must check that the package has not been damaged and has not expired. The sterilised instruments used during the operation may be cleaned, disinfected and re-sterilised in an autoclave, as described in the instructions for use PQ TNS-s that accompany the product. If the package is damaged, or if there are doubts about its sterility, the implant may be re-sterilised in an autoclave, using a validated sterilisation protocol. The instruments are supplied in a non-sterile state and therefore must be cleaned before use, as described for new products. The whole cleaning, disinfection and sterilisation cycle must be followed before each use, as described in the instructions for use PQ TNS-s.

NB: Disassemble all instruments for thorough cleaning and disinfection prior to sterilization.

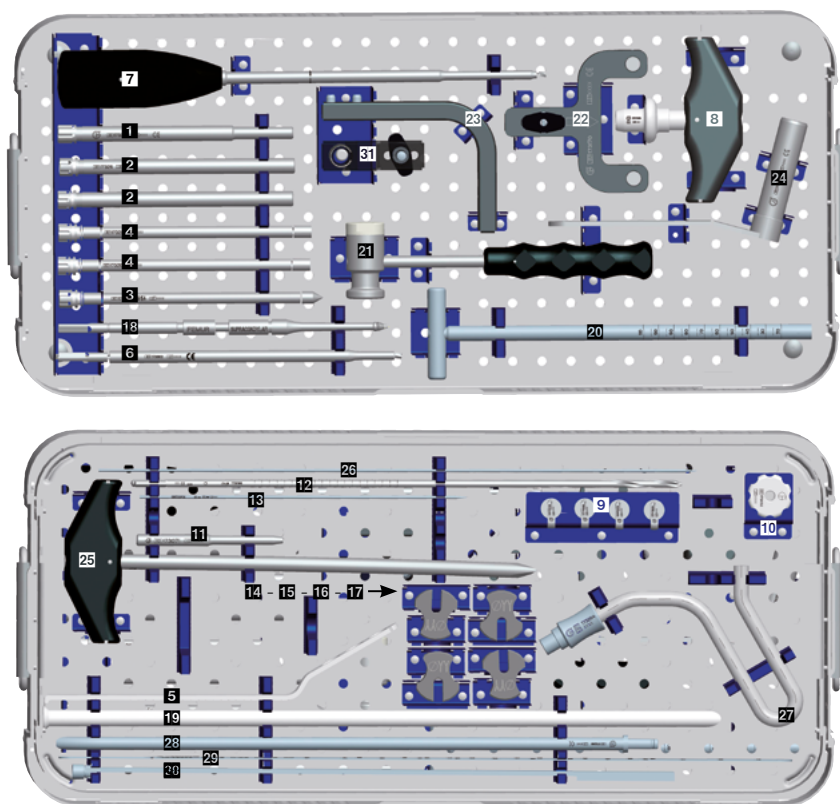
4.8mm Titanium  
Condylar Screw Kit

Code	Length (mm)
99-T766060	60
99-T766065	65
99-T766070	70
99-T766075	75
99-T766080	80
99-T766085	85
99-T766090	90
99-T766095	95
99-T766100	100
99-T766105	105
99-T766110	110
99-T766115	115
99-T766120	120



**SUPRACONDYLAR AND RETROGRADE SPECIFIC  
INSTRUMENTS BOX, EMPTY (176991)  
can accommodate:**

Part #	Description	Qty
176101	1 SC DISTAL ARM	1
176110	2 SC HANDLE	1
176120	3 SC MIDDLE ARM	1
176130	4 SC CURVED ARM	1
176140	5 SC LOCKING ROD	1
80122	6 X-WIRE WITHOUT OLIVE DIAMETER 2MM LENGTH 400MM	3



**GENERAL INSTRUMENTS BOX, EMPTY (173997) can accommodate:**

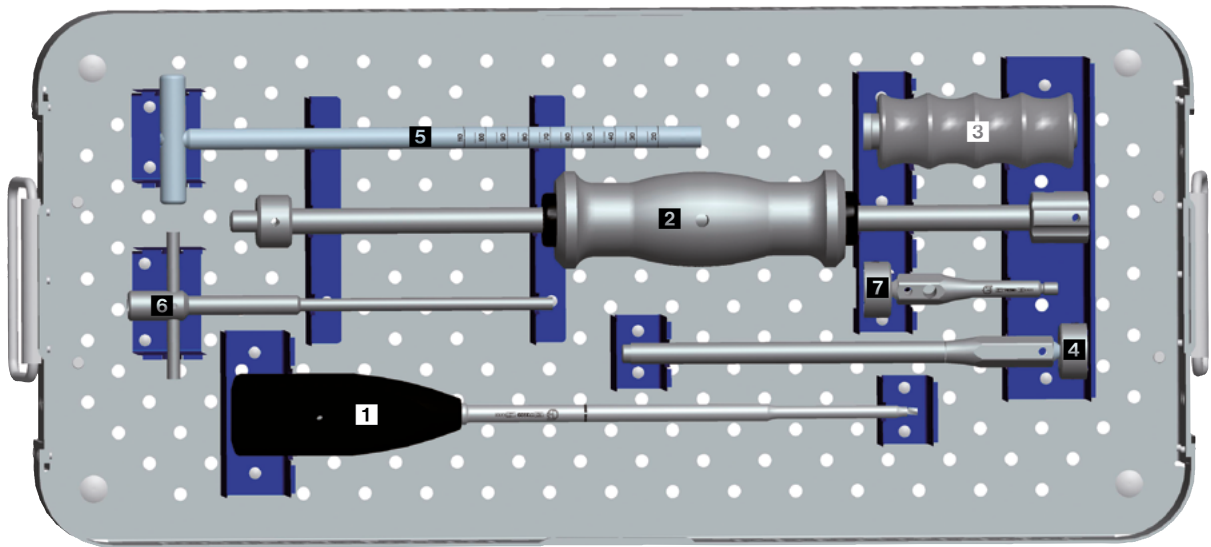
Part #	Description	Qty
173201	1 STABILIZING SLEEVE	1
173211	2 SCREW GUIDE	2
173212	3 TROCER	1
173213	4 DRILL GUIDE	1
173301	5 SCREW SCALE	1
173302	6 CANNULATED SCREW WRENCH ADAPTER	1
173320	7 CANNULATED SCREW DRIVER	1
173350	8 T HANDLE	1
173026	9 LOCKING CAM	4
173032	10 LOCKING NUT	1
173071	11 IMPACTOR	1
173286	12 DRILL BIT D. 4,8 X 365MM	2
173287	13 K-WIRE 2MM	1
173052	14 SPACER NAIL 9MM	1
173053	15 SPACER NAIL 10MM	1
173054	16 SPACER NAIL 11MM	1

**GENERAL INSTRUMENTS BOX, EMPTY (173997) can accommodate:**

Part #	Description	Qty
173055	17 SPACER NAIL 12MM	1
173031	18 STABILIZING ROD	1
17353	19 GUIDE WIRE EXCHANGE TUBE	1
17652	20 LOCKING SCREW EXTRACTOR	1
173380	21 HAMMER	1
173170	22 AP ARM CONNECTOR	1
173180	23 AP ARM CONNECTOR	1
173230	24 FEMORAL REAMER SLEEVE	1
173260	25 AWL	1
80122	26 X-WIRE WITHOUT OLIVE DIAMETER 2MM LENGTH 400MM	1
173264	27 REDUCTION TOOL HANDLE	1
173265	28 REDUCTION TOOL	1
173275	29 RULER	1
173276	30 RULER SUPPORT	1
173185	31 AP CENTERING JIG	1

**Sterile Packaged Instruments**

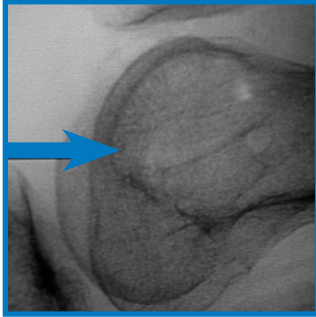
Part #	Description
99-173285	CANNULATED DRILL BIT 6MM STERILE
99-173281	GUIDE WIRE WITH OLIVE D.3X980MM STERILE
99-176281	GUIDE WIRE WITHOUT OLIVE D.2.5X980MM STERILE



**EXTRACTION INSTRUMENTS BOX, EMPTY (173998)**  
can accommodate:

Part #	Description	Qty
173320	1 CANNULATED SCREW DRIVER	1
173370	2 SLIDING HAMMER	1
170035	3 BLACK HANDLE WITH BAYONET FITTING	1
17391	4 FEMORAL NAIL EXTRACTOR	1
17652	5 LOCKING SCREW EXTRACTOR	1
174220	6 TIBIAL EXTRACTOR	1
178390	7 HUMERAL NAIL EXTRACTOR	1



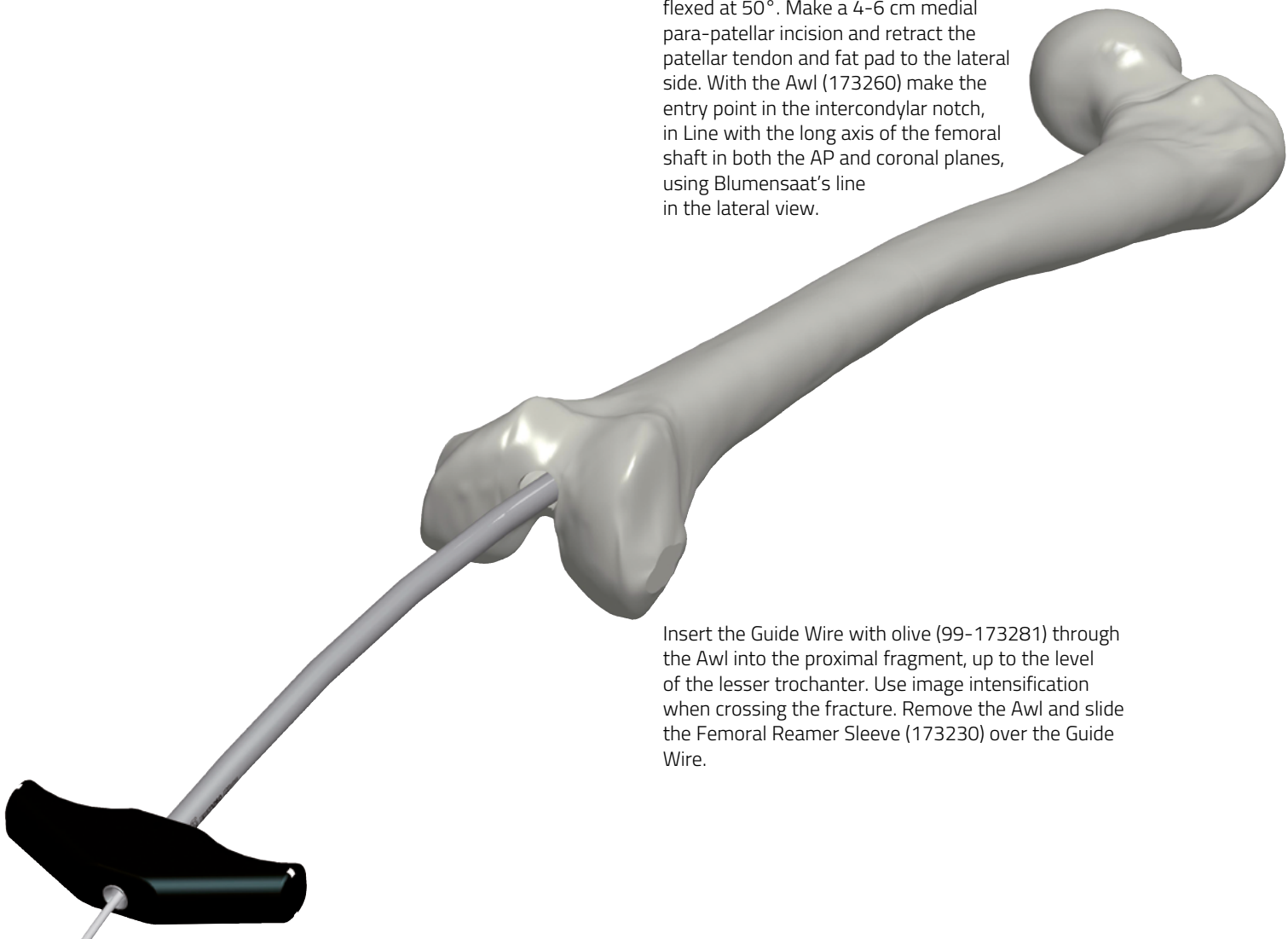


## OPERATIVE TECHNIQUE

Whenever possible, femoral fractures should be stabilized within the first 24 hours following injury, provided the patient's condition will allow it. Do not start surgery unless the fracture is well reduced.

### Entry Portal

The patient is placed supine with the knee flexed at 50°. Make a 4–6 cm medial para-patellar incision and retract the patellar tendon and fat pad to the lateral side. With the Awl (173260) make the entry point in the intercondylar notch, in line with the long axis of the femoral shaft in both the AP and coronal planes, using Blumensaat's line in the lateral view.



Insert the Guide Wire with olive (99-173281) through the Awl into the proximal fragment, up to the level of the lesser trochanter. Use image intensification when crossing the fracture. Remove the Awl and slide the Femoral Reamer Sleeve (173230) over the Guide Wire.

## INSTRUMENTATION



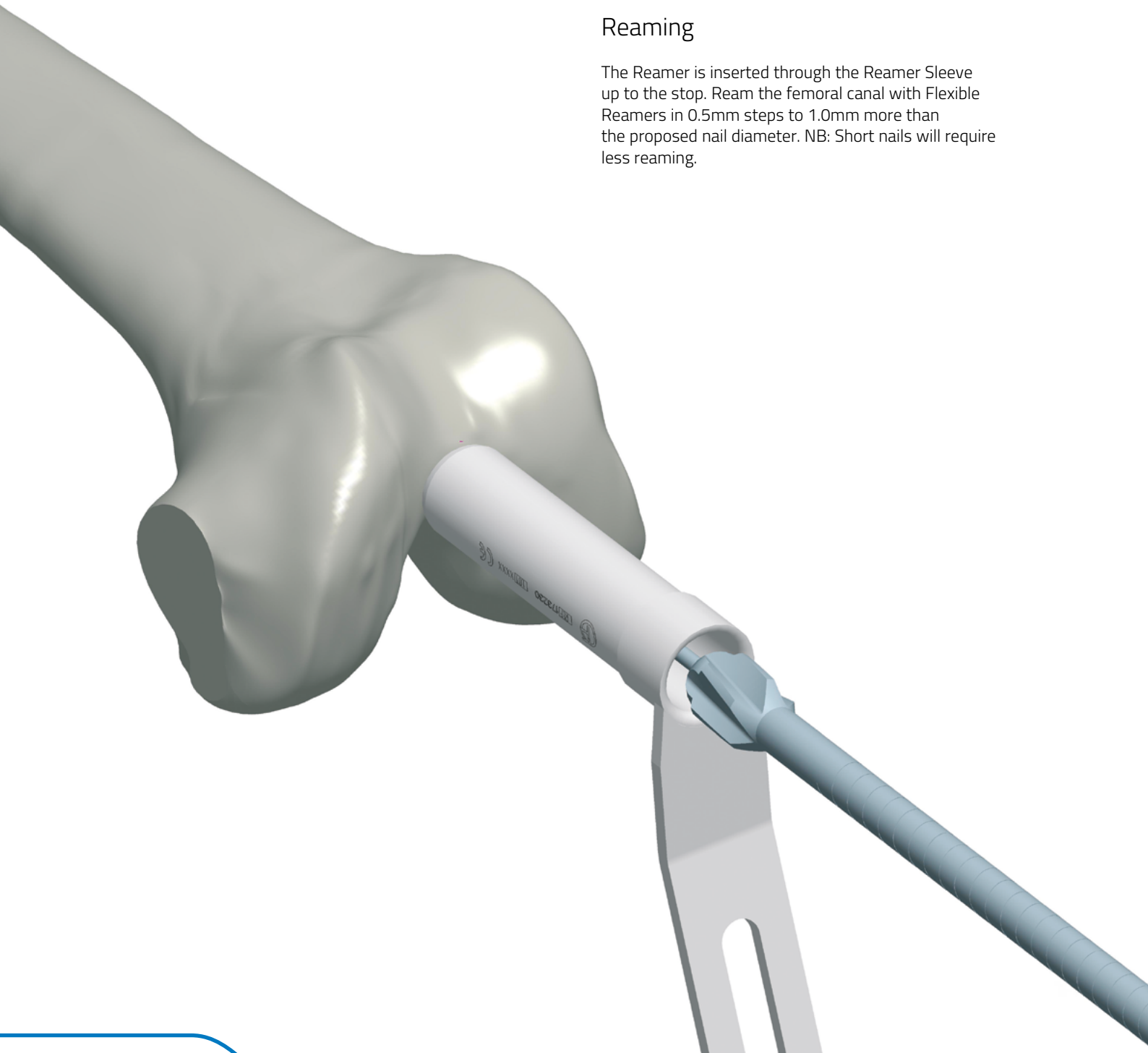
173260  
Awl

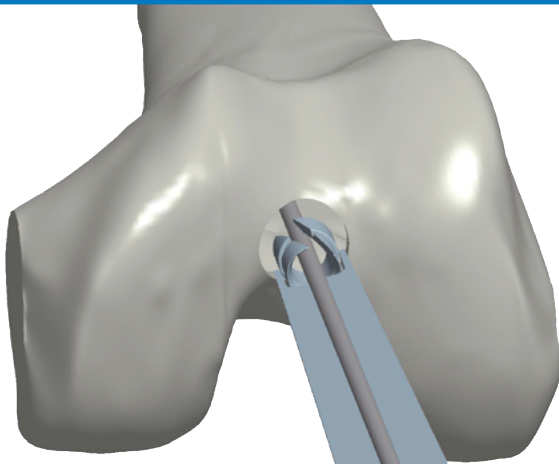


173230  
Femoral Reamer  
Sleeve

## Reaming

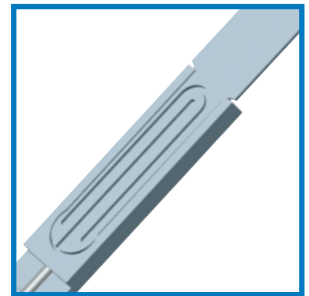
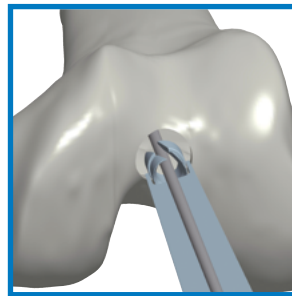
The Reamer is inserted through the Reamer Sleeve up to the stop. Ream the femoral canal with Flexible Reamers in 0.5mm steps to 1.0mm more than the proposed nail diameter. NB: Short nails will require less reaming.



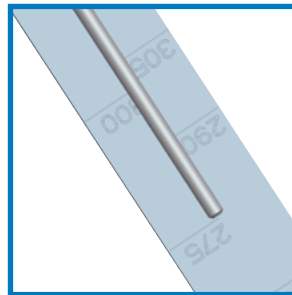


## Measurement of Nail Length

Ensure that the tip of the Guide Wire is at the level desired for the end of the nail. The tip of the Ruler Support (173276) is engaged over the Guide Wire and positioned in the entry portal. Attach the Ruler (173275) to the Ruler Support with the correct side for guide length facing forwards (normally the 980mm Guide Wire is used for femoral and tibial nailing, and the 800mm Guide Wire used for the humerus).



The correct nail length is read at the proximal tip of the Guide Wire. Please note, that if different Guide Wire lengths are used, the difference must be deducted for shorter Guide Wires or added for longer Guide Wires to the measured length.



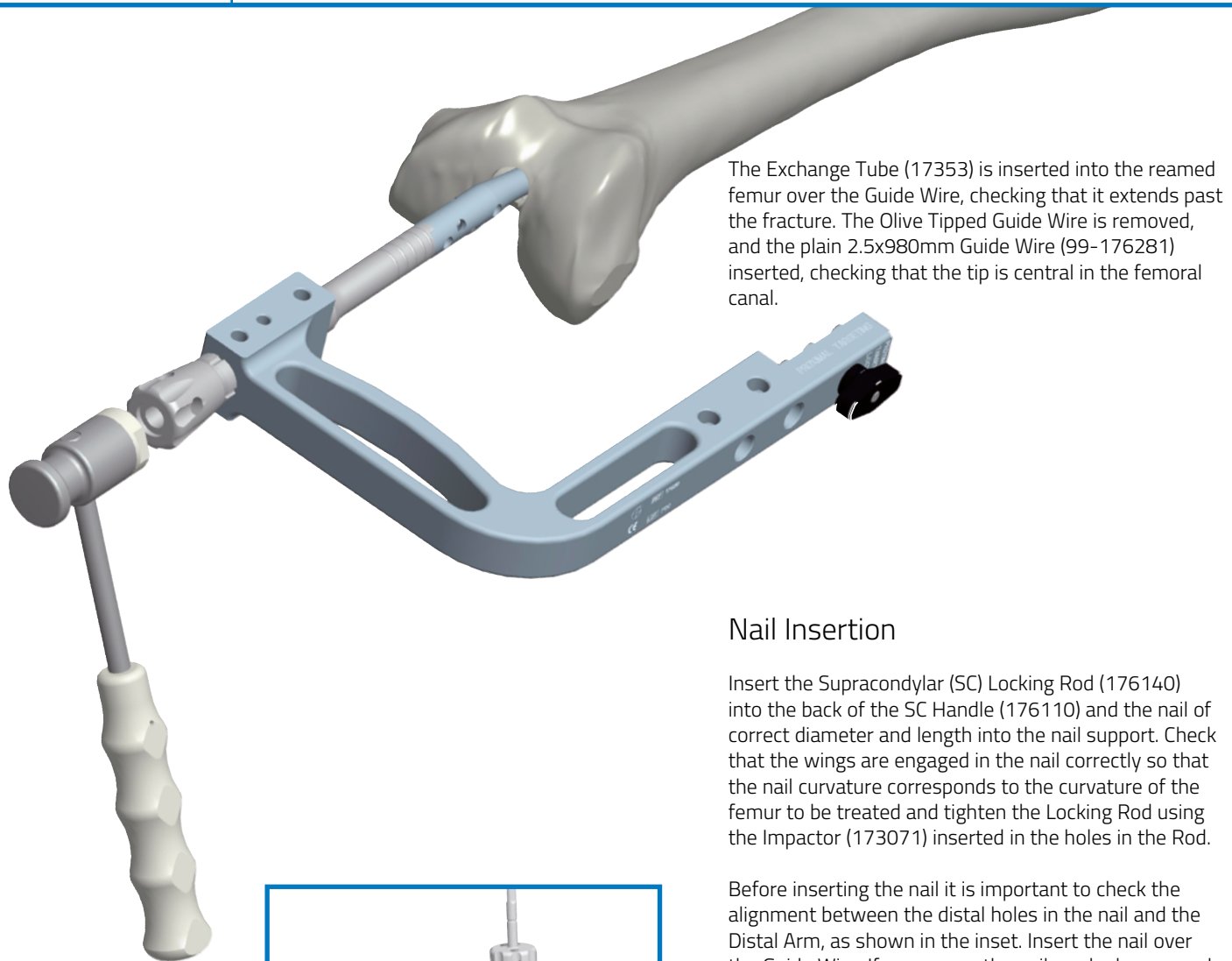
**173270**  
Cannulated  
Rigid Reamer



**173276**  
Ruler Support



**173275**  
Ruler



The Exchange Tube (17353) is inserted into the reamed femur over the Guide Wire, checking that it extends past the fracture. The Olive Tipped Guide Wire is removed, and the plain 2.5x980mm Guide Wire (99-176281) inserted, checking that the tip is central in the femoral canal.

## Nail Insertion

Insert the Supracondylar (SC) Locking Rod (176140) into the back of the SC Handle (176110) and the nail of correct diameter and length into the nail support. Check that the wings are engaged in the nail correctly so that the nail curvature corresponds to the curvature of the femur to be treated and tighten the Locking Rod using the Impactor (173071) inserted in the holes in the Rod.

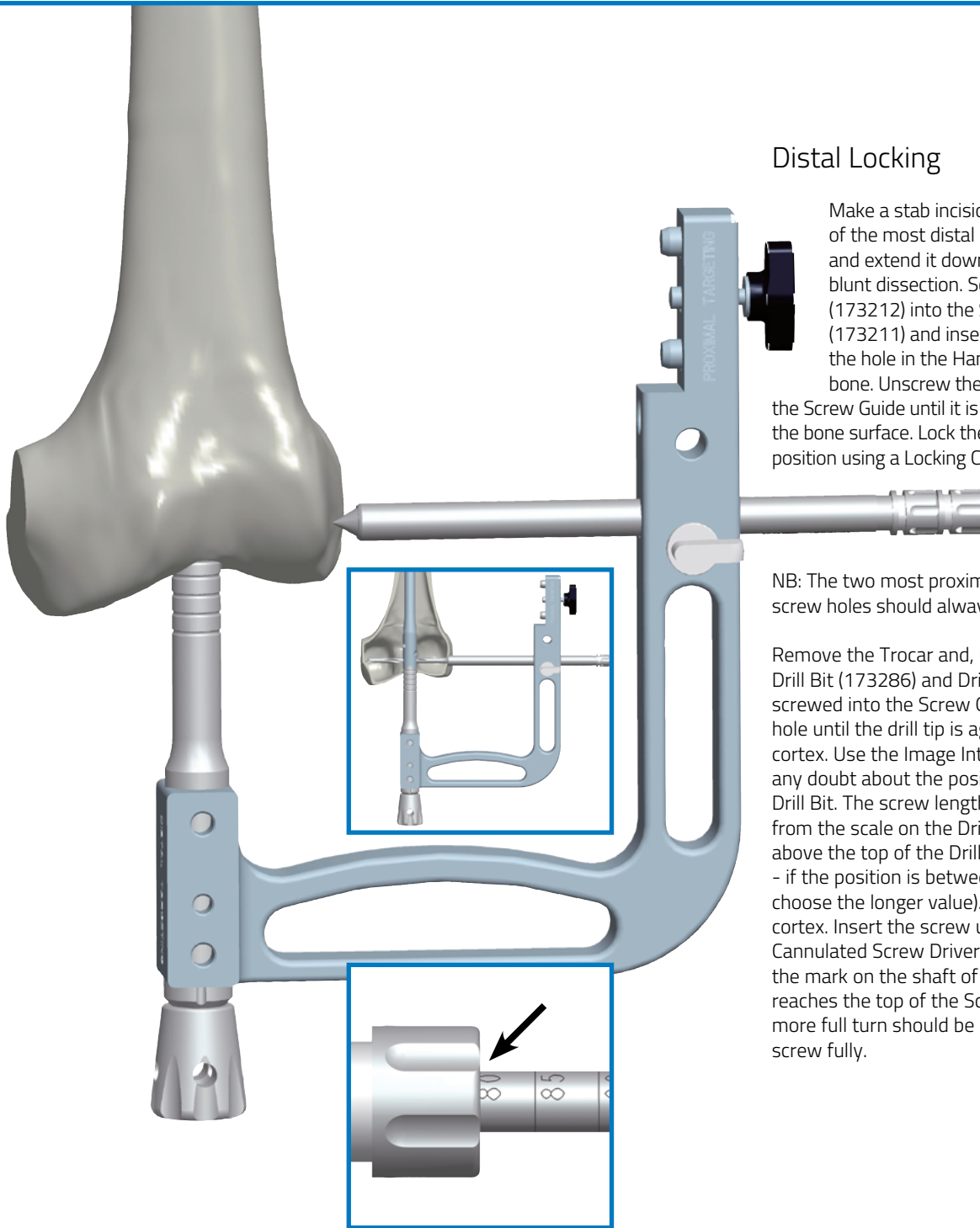


Before inserting the nail it is important to check the alignment between the distal holes in the nail and the Distal Arm, as shown in the inset. Insert the nail over the Guide Wire. If necessary the nail can be hammered into place by tapping on the end of the Locking Rod. Hammering should always be gentle. Do not persist if the nail is not advancing. Remove it and ream some more. The distal end of the nail must be proximal to the surface of the intercondylar notch, to prevent the nail end protruding into the knee joint. Use the rings on the nail support to confirm that the end of the nail is inside the bone.

**DO NOT HAMMER THE HANDLE ITSELF.  
THE GUIDE WIRE MUST NOW BE REMOVED.**

## INSTRUMENTATION





### Distal Locking

Make a stab incision at the level of the most distal hole in the Handle and extend it down to the bone with blunt dissection. Screw the Trocar (173212) into the Screw Guide (173211) and insert them through the hole in the Handle, down to the bone. Unscrew the Trocar and push the Screw Guide until it is sitting flush against the bone surface. Lock the Screw Guide into position using a Locking Cam (173026).

NB: The two most proximal of the distal screw holes should always be filled.

Remove the Trocar and, using a 4.8mm Drill Bit (173286) and Drill Guide (173213) screwed into the Screw Guide, drill the first hole until the drill tip is against the second cortex. Use the Image Intensifier if there is any doubt about the position of the tip of the Drill Bit. The screw length required is read from the scale on the Drill Bit immediately above the top of the Drill Guide (see inset - if the position is between graduations, choose the longer value). Drill the second cortex. Insert the screw using the 3.5mm Cannulated Screw Driver (173320) until the mark on the shaft of the Screw Driver reaches the top of the Screw Guide. One more full turn should be made to tighten the screw fully.



**173212**  
Trocar



**173211**  
Screw Guide



**173026**  
Locking Cam



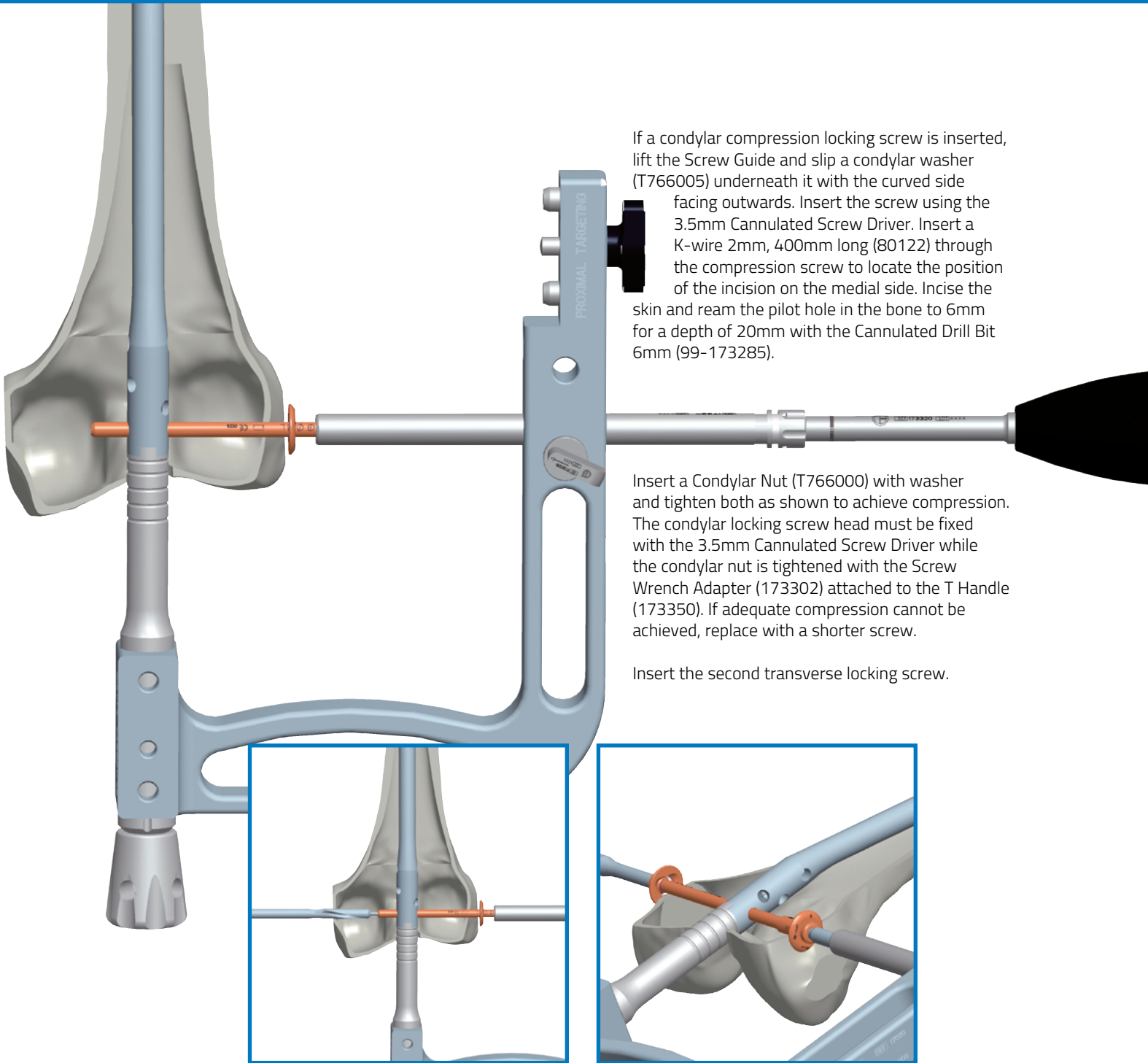
**173286**  
4.8mm Drill Bit



**173213**  
Drill Guide



**173320**  
3.5mm Cannulated  
Screw Driver



If a condylar compression locking screw is inserted, lift the Screw Guide and slip a condylar washer (T766005) underneath it with the curved side facing outwards. Insert the screw using the 3.5mm Cannulated Screw Driver. Insert a K-wire 2mm, 400mm long (80122) through the compression screw to locate the position of the incision on the medial side. Incise the skin and ream the pilot hole in the bone to 6mm for a depth of 20mm with the Cannulated Drill Bit 6mm (99-173285).

Insert a Condylar Nut (T766000) with washer and tighten both as shown to achieve compression. The condylar locking screw head must be fixed with the 3.5mm Cannulated Screw Driver while the condylar nut is tightened with the Screw Wrench Adapter (173302) attached to the T Handle (173350). If adequate compression cannot be achieved, replace with a shorter screw.

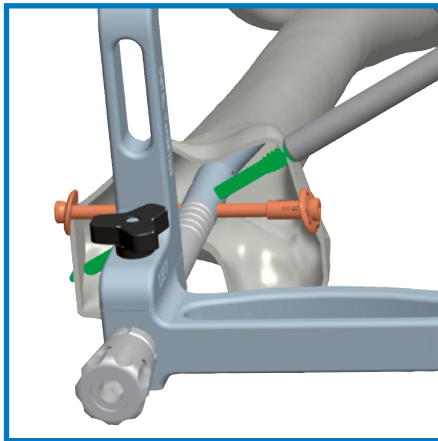
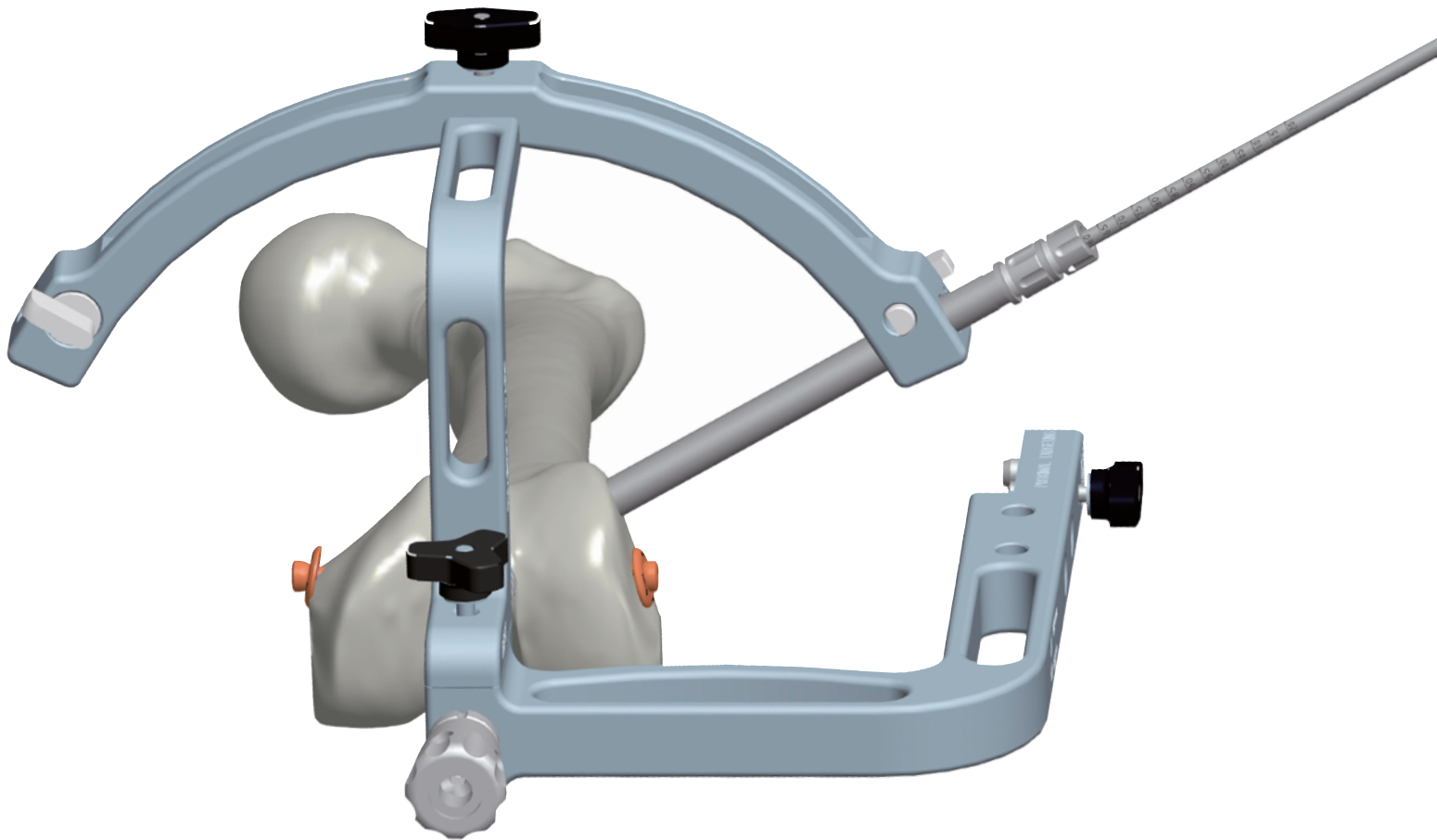
Insert the second transverse locking screw.

## INSTRUMENTATION

99-173285  
Cannulated  
Drill Bit 6mm

173302  
Screw Wrench  
Adapter

173350  
T Handle



If oblique locking screws are required, attach the SC Middle Arm (176120) and then the SC Curved Arm (176130) to the Handle. Tighten both knobs firmly. Screw the Trocar into the Screw Guide and insert them into the lateral hole in the curved arm. Push them down to the bone. Unscrew the Trocar and push the Screw Guide until it is sitting flush against the bone surface. Lock the Screw Guide into position. Remove the Trocar and, using a 4.8mm Drill Bit and Drill Guide screwed into the Screw Guide, drill the hole. Measure the correct screw length as before.

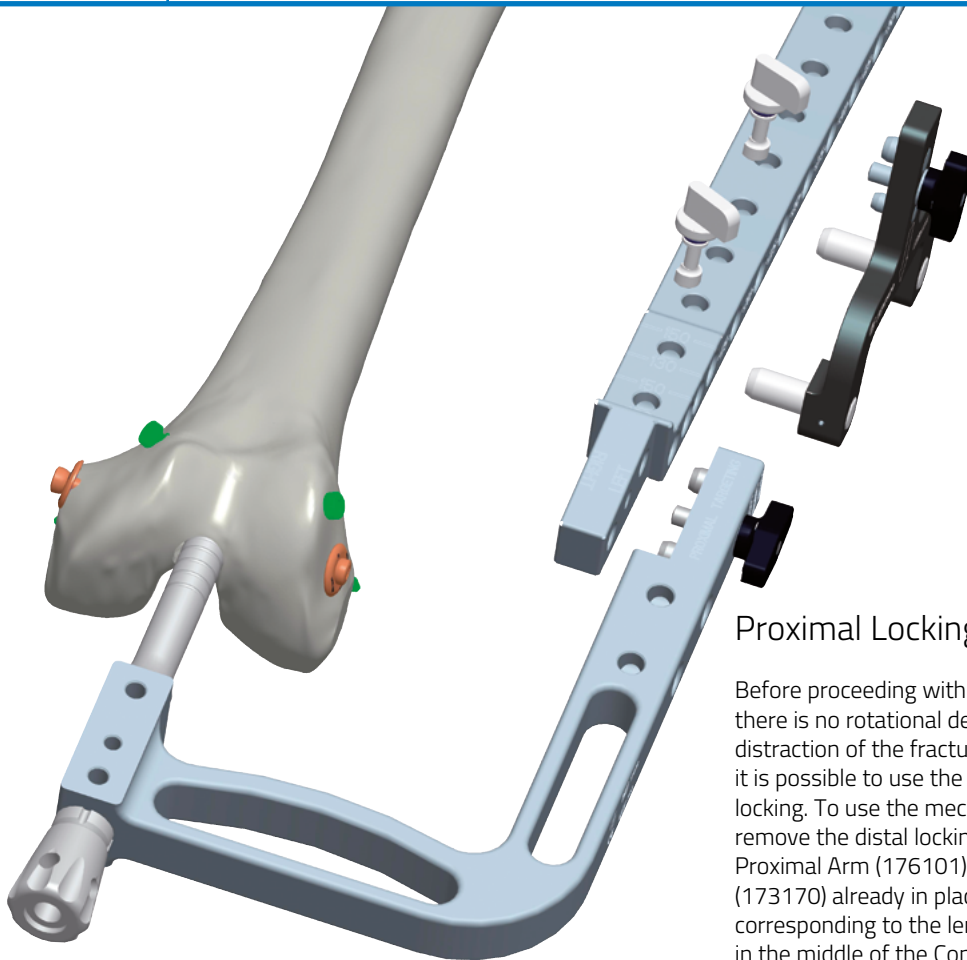
Insert the screw using the 3.5mm Cannulated Screw Driver. Repeat the same procedure for the medial hole.



**176120**  
SC Middle Arm

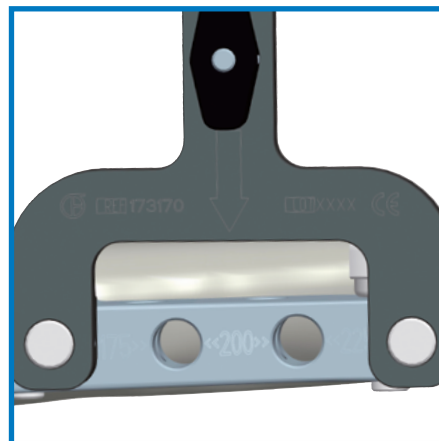


**176130**  
SC Curved Arm



### Proximal Locking

Before proceeding with proximal locking, check that there is no rotational deformity, and that there is no distraction of the fracture site. If the surgeon prefers, it is possible to use the freehand technique for proximal locking. To use the mechanical distal targeting system, remove the distal locking arms and mount the SC Proximal Arm (176101) with the AP Arm Connector (173170) already in place, with the correct number corresponding to the length of the nail positioned in the middle of the Connector. The AP Arm Connector is secured using the Locking Cams.



### INSTRUMENTATION



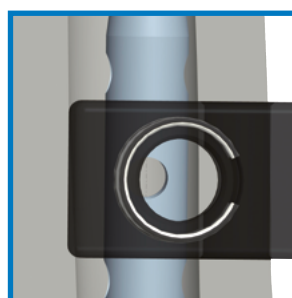
176101  
SC Proximal Arm



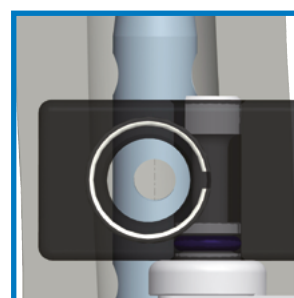
173170  
AP Arm  
Connector



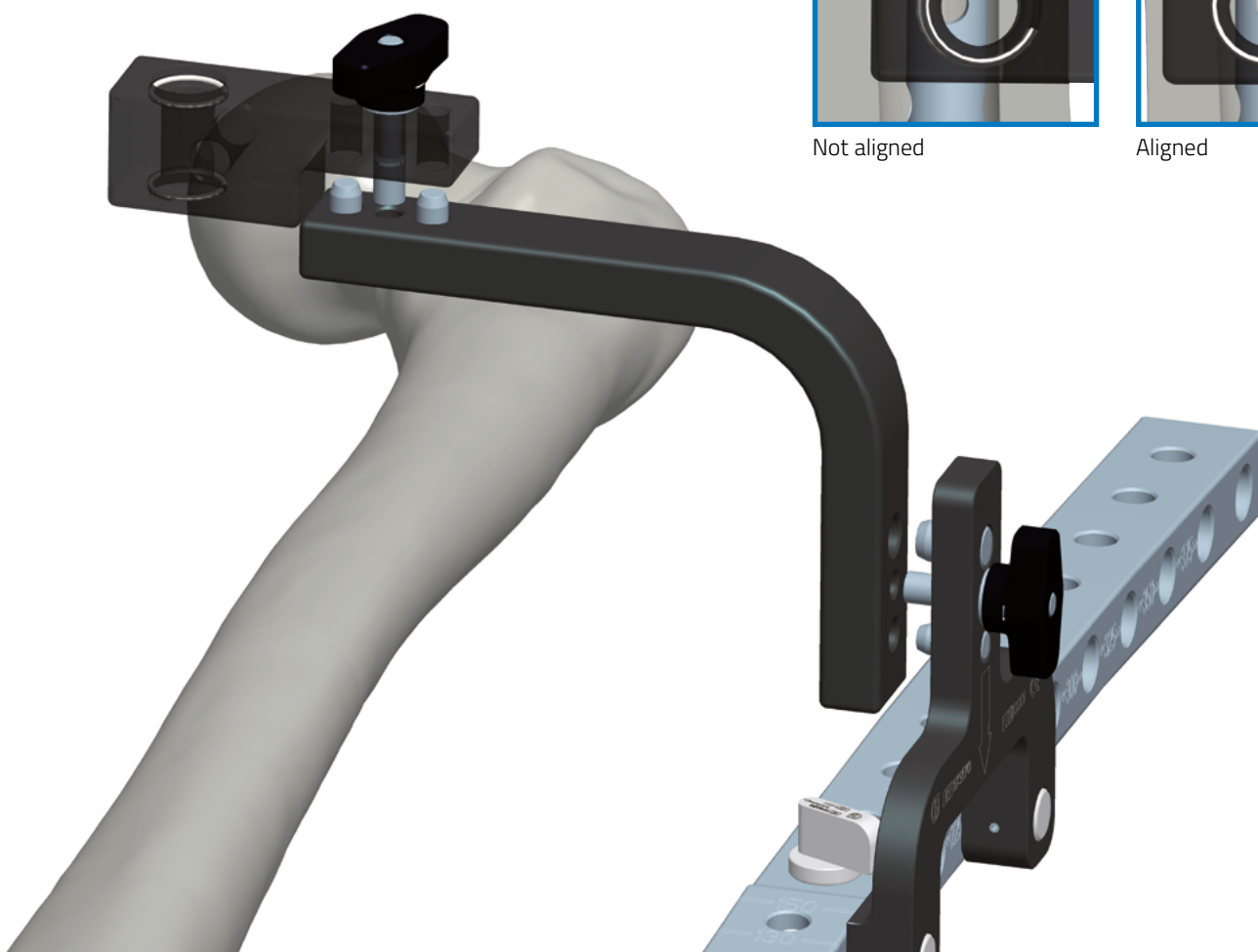
Mount the AP Arm (173180) with the AP Centering Jig. The hole in the Centering Jig (173185) has two targeting rings to enable it to be centred over the nail. The Image Intensifier is positioned over the Jig so that the two rings appear as one ring. If the rings are not central over the nail hole the Jig is moved medially or laterally until they are centered.



Not aligned



Aligned



173180  
AP Arm



173185  
AP Centering Jig



Insert the Stabilizing Sleeve through the hole in the AP Arm down to the skin anteriorly. Position it over the centre of the femur, make a 20-25mm incision and extend it down to the deep fascia. Split the muscles longitudinally down to the bone. Insert the Cannulated Drill Bit 6mm (99-173285) into the Stabilizing Sleeve and push the two together down to the bone. Lock the Sleeve in place. Insert the K-wire 2mm (173287), and tap it with the Hammer (173380) and the Impactor (173071), until it is flush with the end of the Cannulated Drill Bit. Drill the anterior cortex.

NB: The Cannulated Drill Bit is SINGLE USE ONLY.

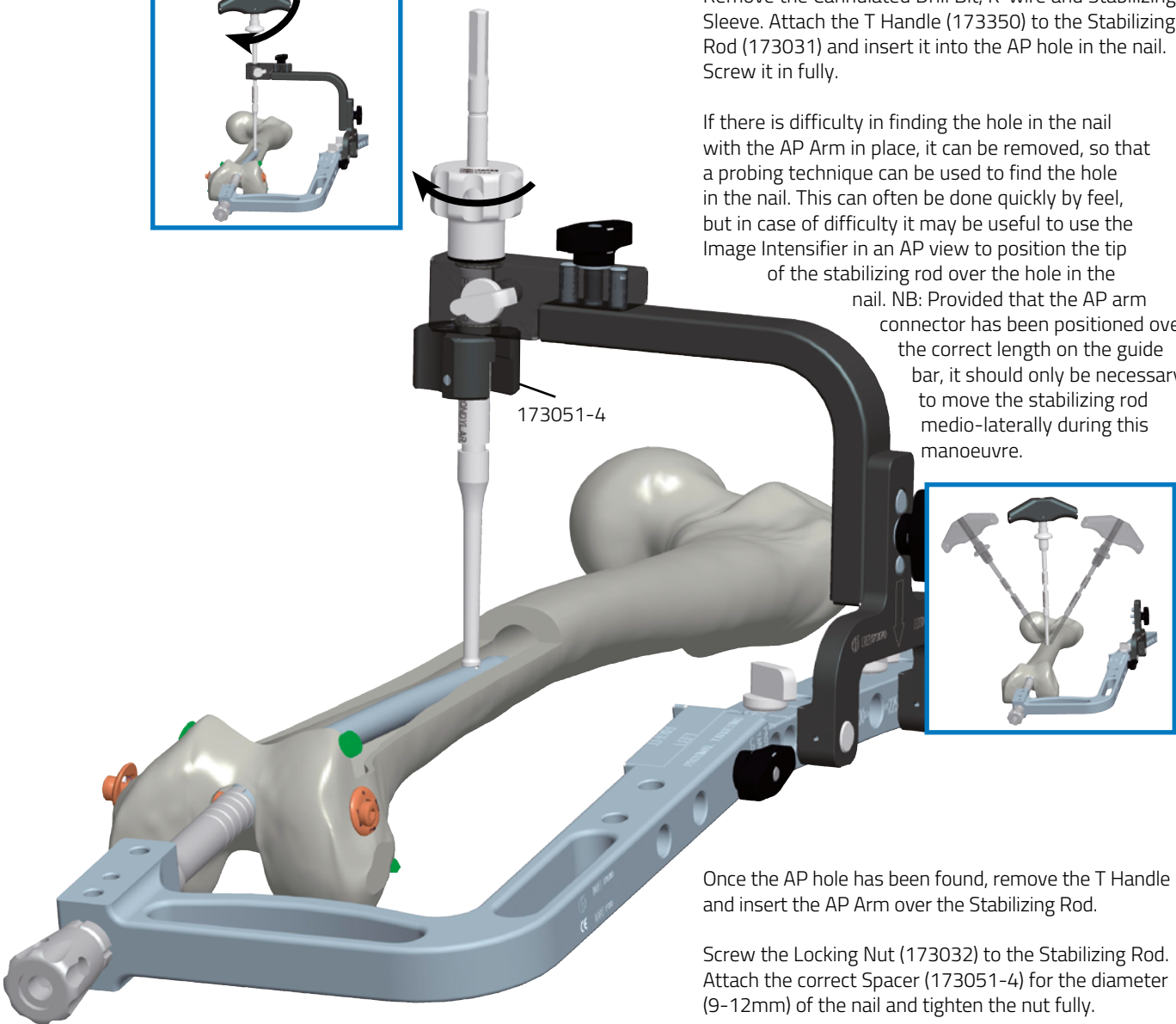
**INSTRUMENTATION**

-   
**173201**  
 Stabilizing Sleeve
-   
**99-173285**  
 Cannulated Drill Bit 6mm
-   
**173380**  
 Hammer
-   
**173071**  
 Impactor



Remove the Cannulated Drill Bit, K-wire and Stabilizing Sleeve. Attach the T Handle (173350) to the Stabilizing Rod (173031) and insert it into the AP hole in the nail. Screw it in fully.

If there is difficulty in finding the hole in the nail with the AP Arm in place, it can be removed, so that a probing technique can be used to find the hole in the nail. This can often be done quickly by feel, but in case of difficulty it may be useful to use the Image Intensifier in an AP view to position the tip of the stabilizing rod over the hole in the nail. NB: Provided that the AP arm connector has been positioned over the correct length on the guide bar, it should only be necessary to move the stabilizing rod medio-laterally during this manoeuvre.



Once the AP hole has been found, remove the T Handle and insert the AP Arm over the Stabilizing Rod.

Screw the Locking Nut (173032) to the Stabilizing Rod. Attach the correct Spacer (173051-4) for the diameter (9-12mm) of the nail and tighten the nut fully.

NB: it is very important to use the correct spacer for the diameter of nail.



173350  
T Handle



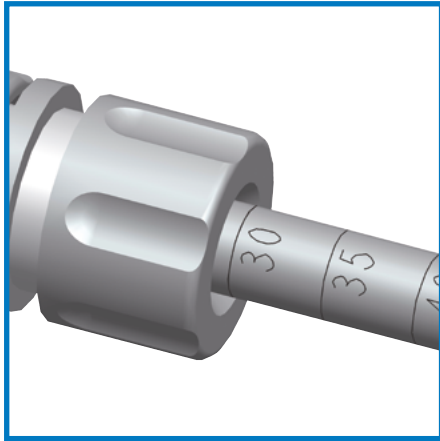
173031  
Stabilizing Rod



173032  
Locking Nut



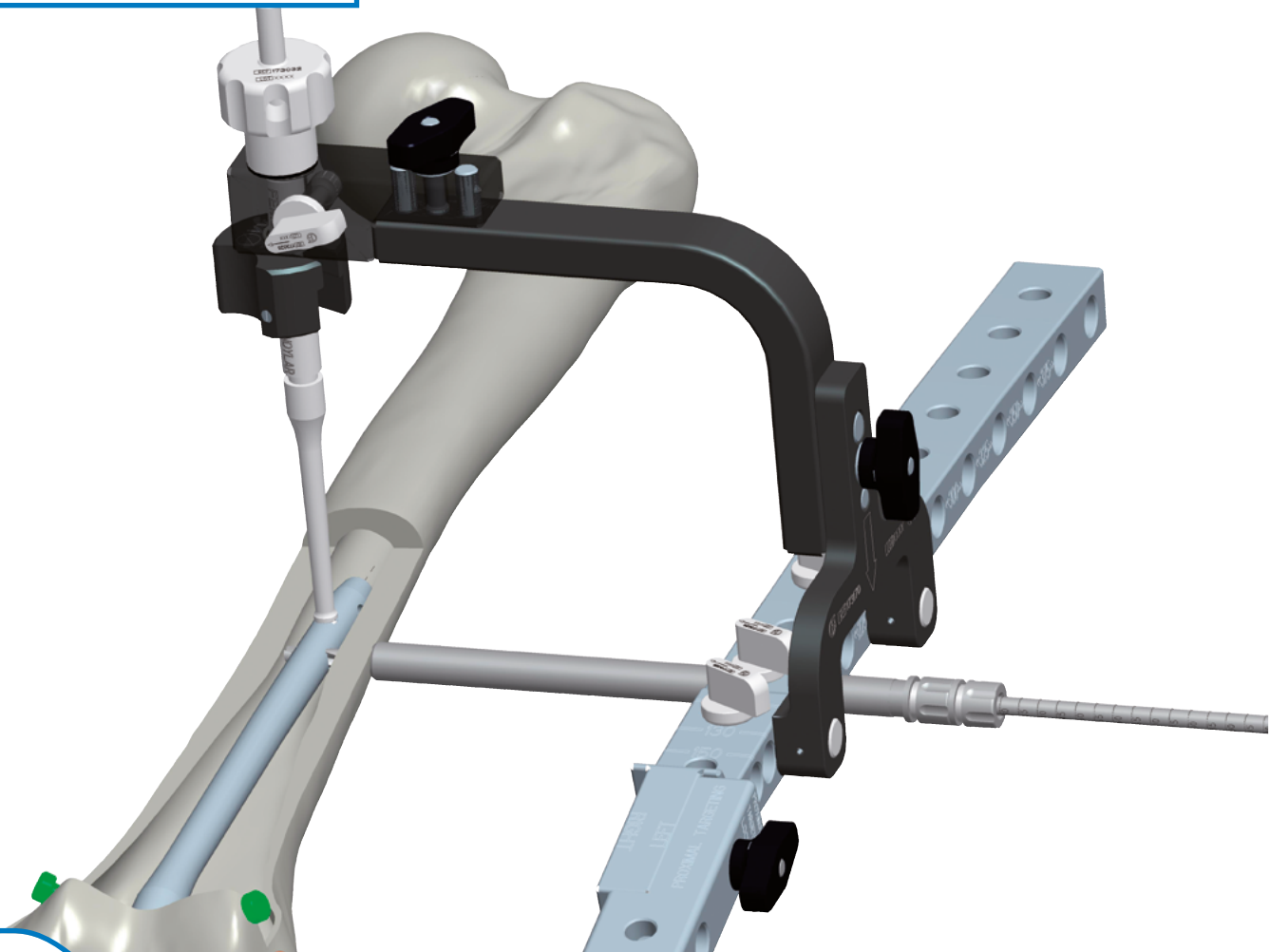
173051-4  
Spacer



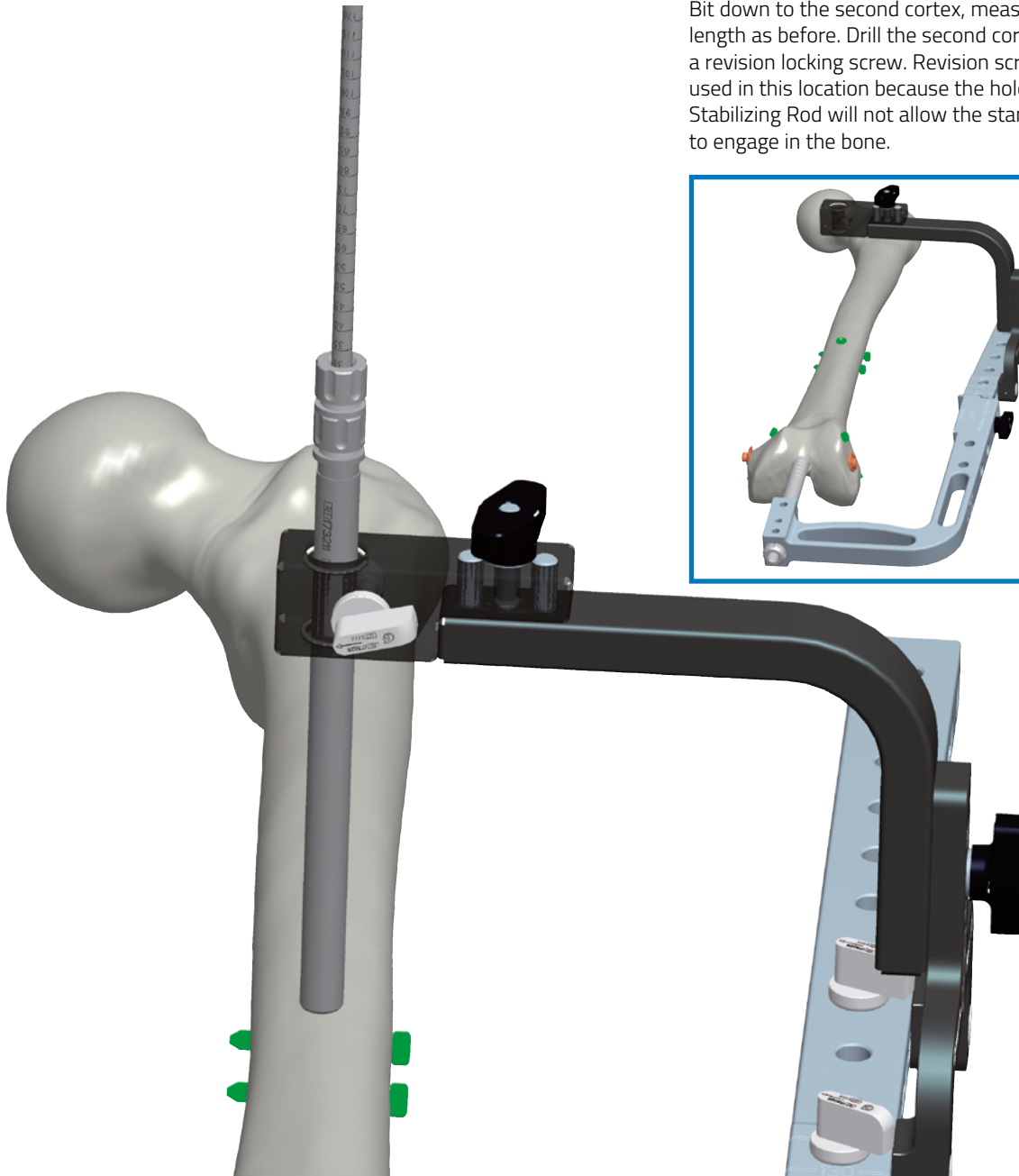
Screw the Trocar into the Screw Guide and insert them both into one of the two holes in the SC Proximal Arm (176101). Unscrew the Trocar and push the Screw Guide until it is sitting flush against the bone surface. Tighten the Screw Guide with the Locking Cam. Remove the Trocar and screw the Drill Guide into the Screw Guide. Drill with the 4.8mm Drill Bit as before. Stop at the second cortex and measure the screw length using the scale on the Drill Bit.

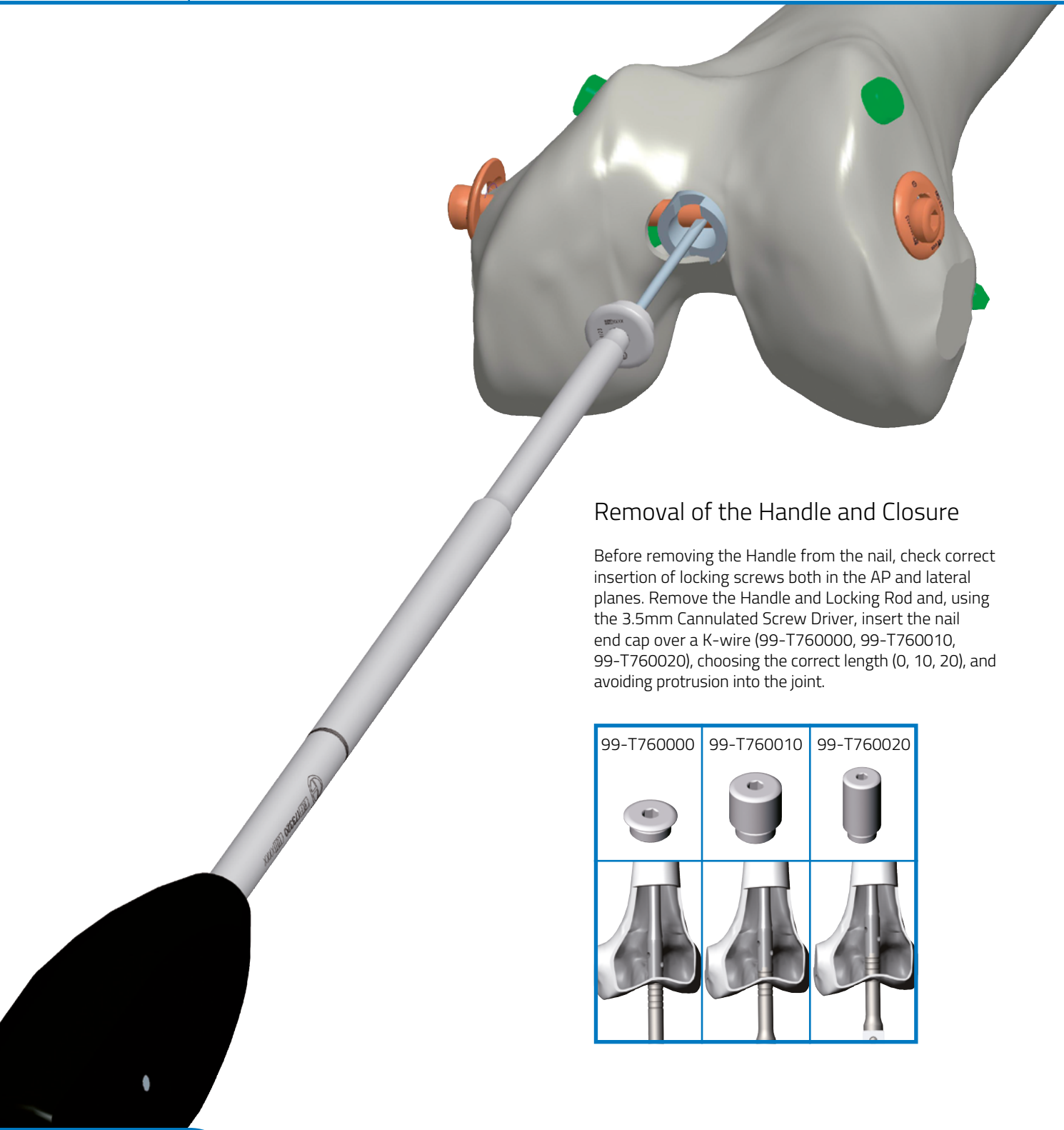
Complete drilling, and insert the screw using the 3.5mm Cannulated Screw Driver (173320).

Repeat the procedure for the second hole.



If a third distal screw is required in the AP direction, a revision locking screw must be used. Remove the Spacer and Stabilizing Rod with the T Handle. Insert a Screw Guide and Drill Guide. Insert the 4.8mm Drill Bit down to the second cortex, measure the screw length as before. Drill the second cortex and insert a revision locking screw. Revision screws must be used in this location because the hole drilled for the Stabilizing Rod will not allow the standard screw thread to engage in the bone.

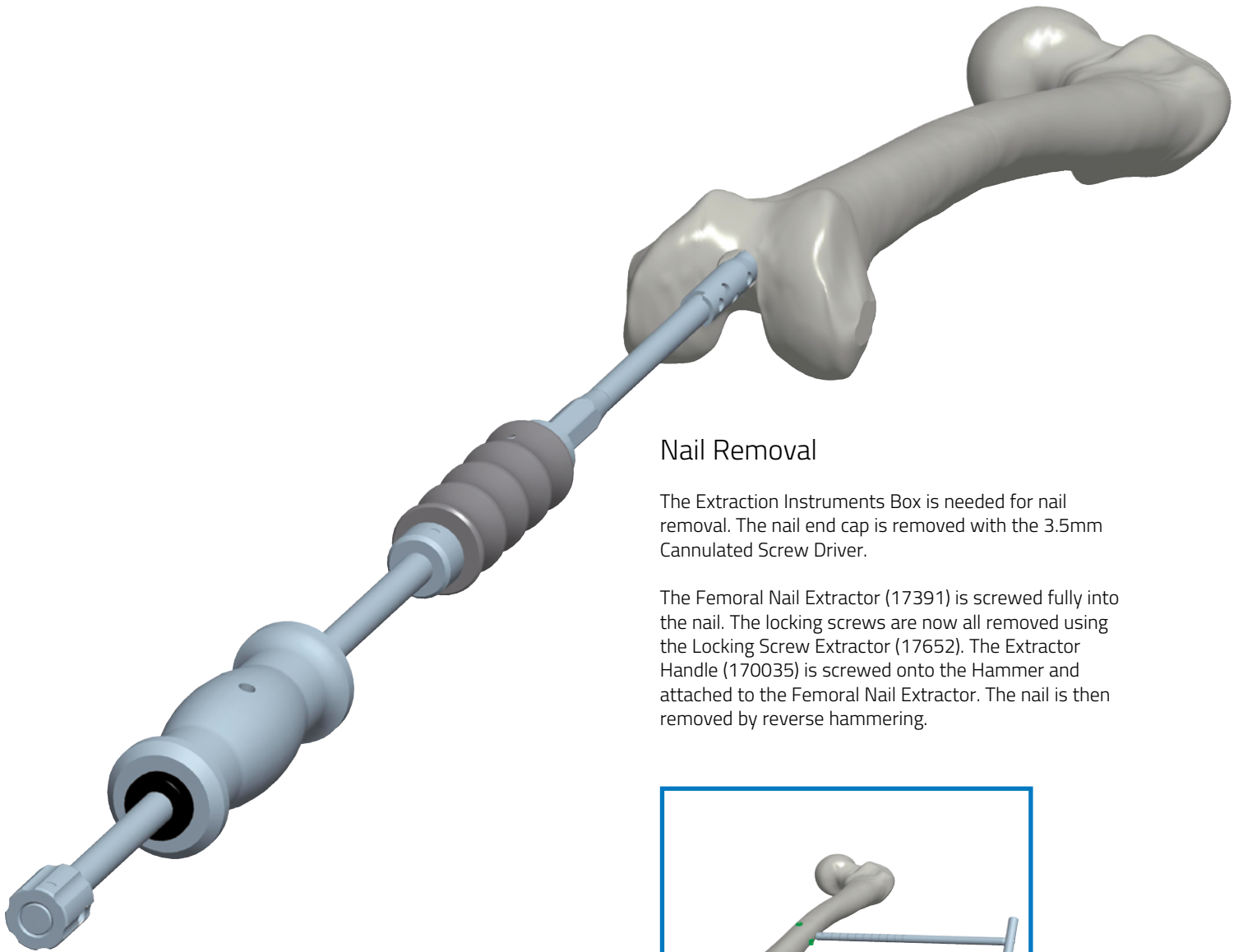




### Removal of the Handle and Closure

Before removing the Handle from the nail, check correct insertion of locking screws both in the AP and lateral planes. Remove the Handle and Locking Rod and, using the 3.5mm Cannulated Screw Driver, insert the nail end cap over a K-wire (99-T760000, 99-T760010, 99-T760020), choosing the correct length (0, 10, 20), and avoiding protrusion into the joint.

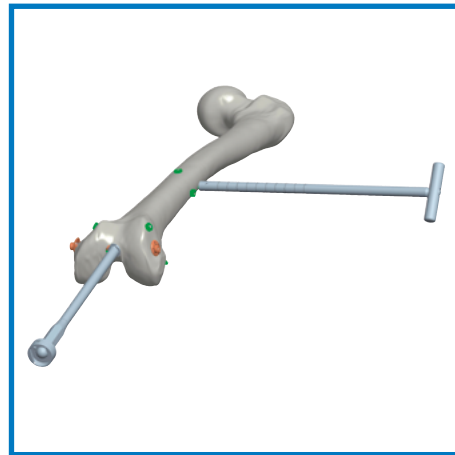




## Nail Removal

The Extraction Instruments Box is needed for nail removal. The nail end cap is removed with the 3.5mm Cannulated Screw Driver.

The Femoral Nail Extractor (17391) is screwed fully into the nail. The locking screws are now all removed using the Locking Screw Extractor (17652). The Extractor Handle (170035) is screwed onto the Hammer and attached to the Femoral Nail Extractor. The nail is then removed by reverse hammering.



**17391**  
Femoral Nail  
Extractor



**17652**  
Locking Screw  
Extractor



**170035**  
Extractor Handle











Please refer to the "Instructions for Use" supplied with the product for specific information on indications for use, contraindications, warnings, precautions, adverse reactions and sterilization.

Electronic Instructions for use available at the website <http://ifu.orthofix.it>

Electronic Instructions for use - Minimum requirements for consultation:

- Internet connection (56 Kbit/s)
- Device capable to visualize PDF (ISO/IEC 32000-1) files
- Disk space: 50 Mbytes

Free paper copy can be requested from customer service (delivery within 7 days):

tel +39 045 6719301, fax +39 045 6719370,

e-mail: [customerservice@orthofix.it](mailto:customerservice@orthofix.it)

Caution: Federal law (USA) restricts this device to sale by or on the order of a physician. Proper surgical procedure is the responsibility of the medical professional. Operative techniques are furnished as an informative guideline. Each surgeon must evaluate the appropriateness of a technique based on his or her personal medical credentials and experience.



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