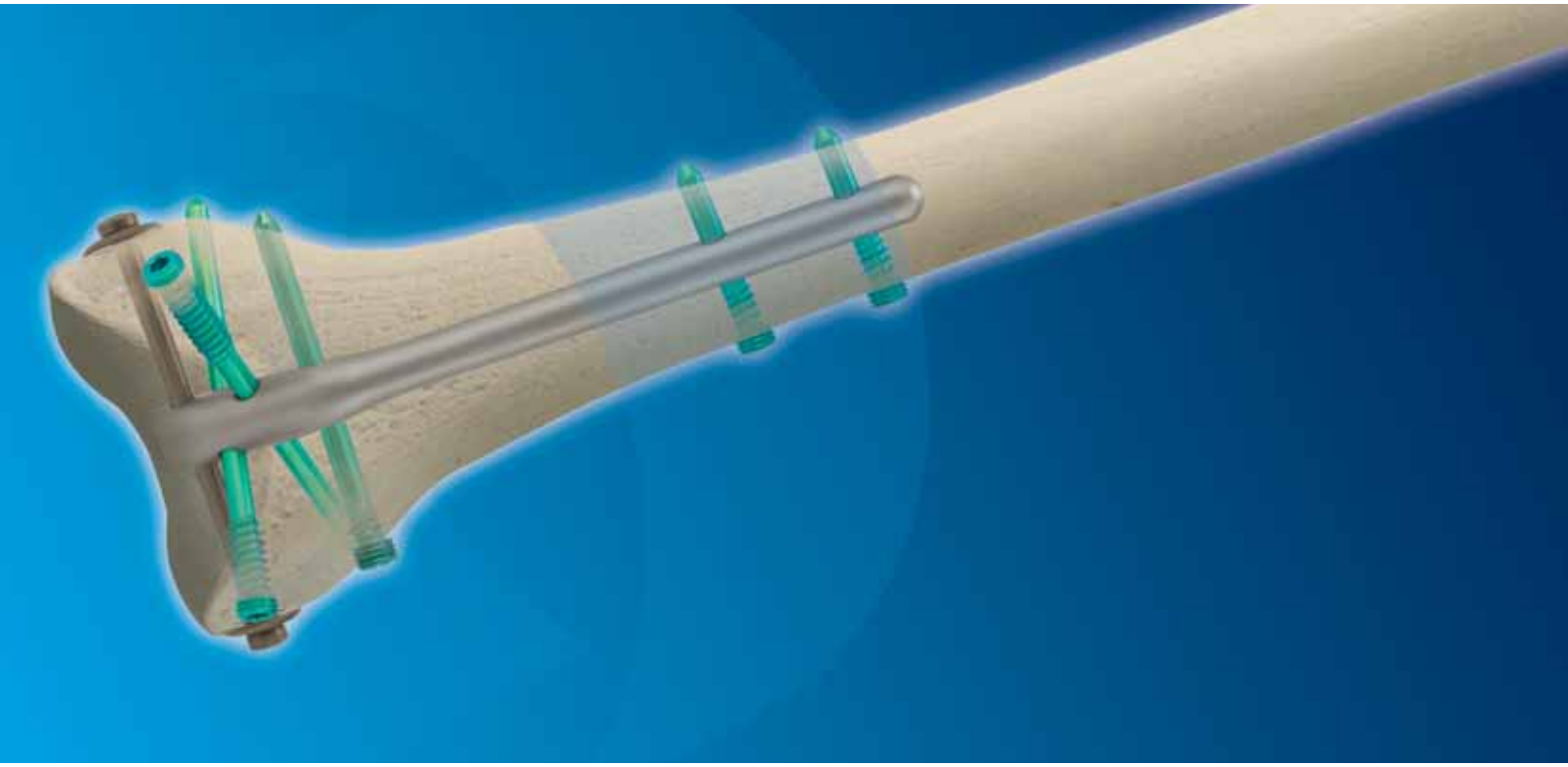
OPERATIVE TECHNIQUE

centro nail
TARGETING YOUR NEEDS



The Centronail Titanium Supracondylar and Retrograde Nailing System

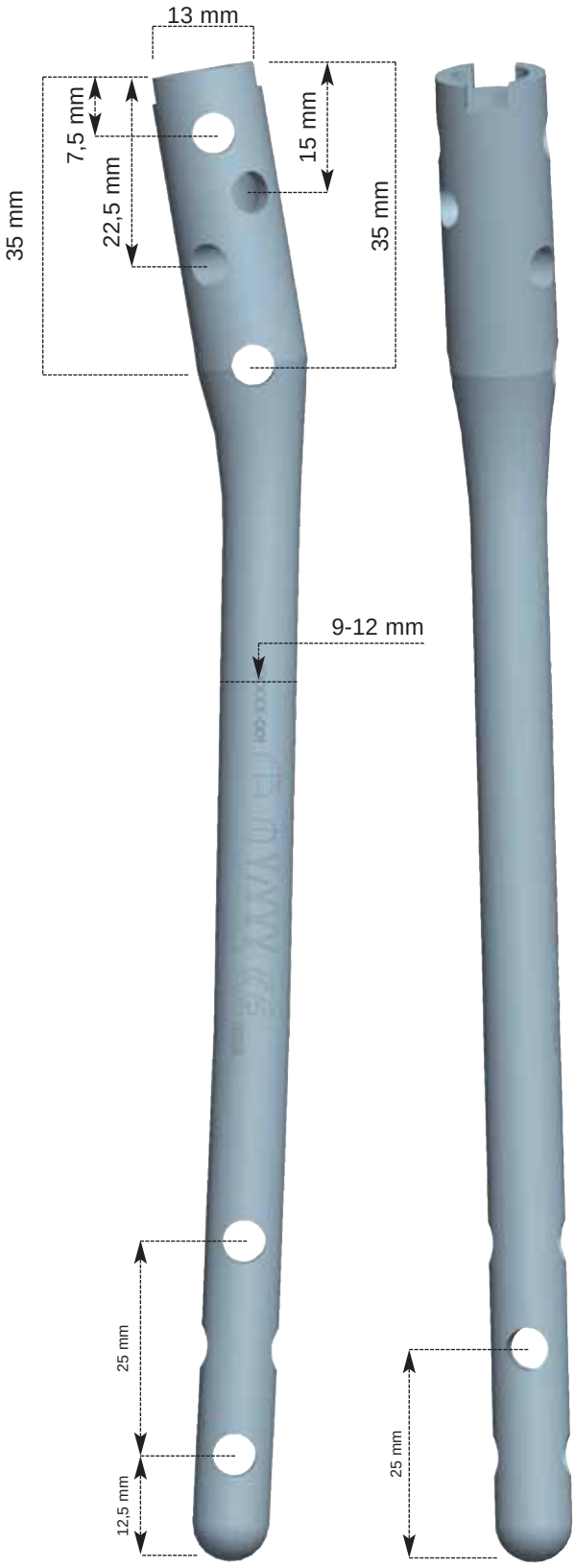
ORTHOFIX®

Orthofix wishes to thank the following surgeons for their contribution to the development of the technique:

S. BERKI, MD
Department of General, Trauma and Hand Surgery, 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
Allows MRI investigation, if necessary

13 mm proximal diameter

9-12 mm distal diameter
9 mm is solid

10° Angle

One design for Left and Right femur

130-375 mm (25 mm increments)

Radius of curve 2500 mm

Locking screws

TITANIUM STANDARD LOCKING SCREWS

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

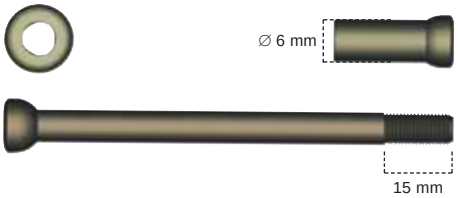
TITANIUM REVISION LOCKING SCREWS

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

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

TITANIUM CONDYLAR COMPRESSION SCREWS

4.8 mm diameter
4.8 mm drill bit
6.0 mm 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 0 mm	99-T760000
L 10 mm	99-T760010
L 20 mm	99-T760020

4.8 mm 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

4.8 mm 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

4.8 mm Titanium Condylar Screw Kit

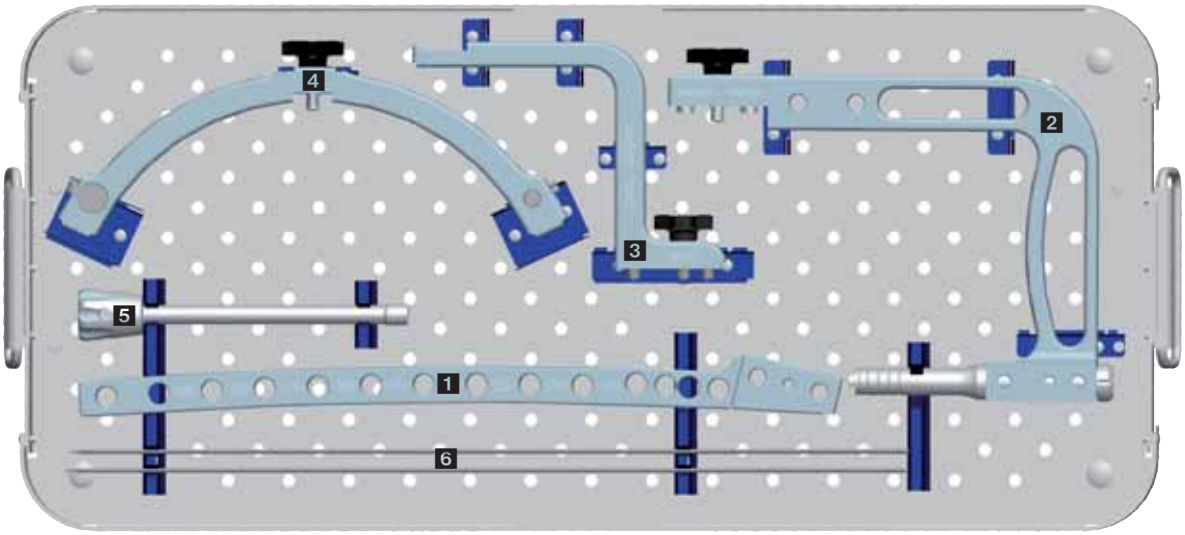
Code	Length (mm)
99-T766060	60
99-T766065	65
99-T766070	70
99-T766075	75
99-T766080	80
99-T766085	85
99-T766090	90
99-T766095	95
99-T766100	100
99-T766105	105
99-T766110	110
99-T766115	115
99-T766120	120

Cleaning, disinfection, sterilisation and maintainance of instrumentation

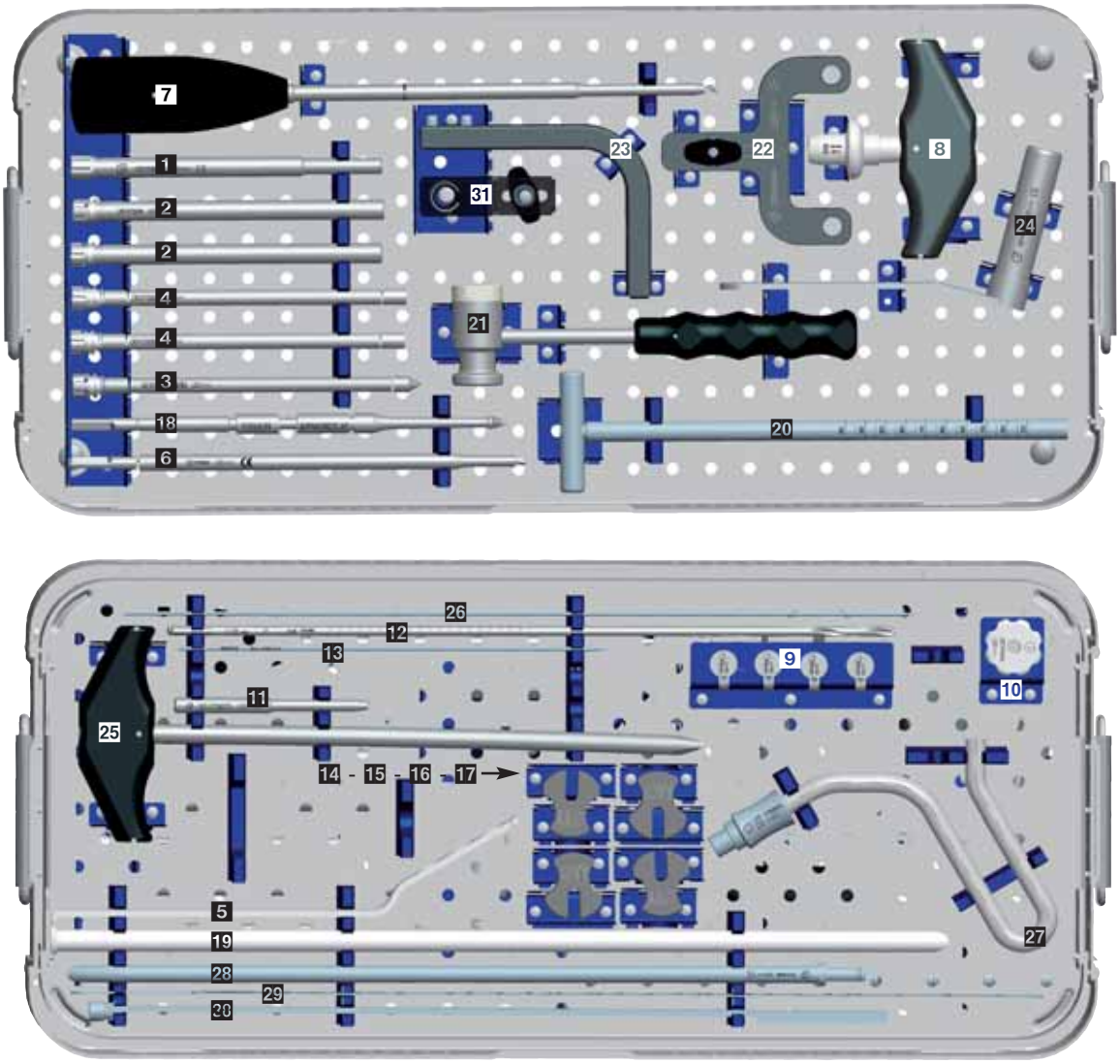
Orthofix supplies the Centronail Titanium Supracondylar and Retrograde Nail, locking screws and end caps in a STERILE package, while the instruments are supplied NONSTERILE. Please check the sterility of each device on the product label.

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.

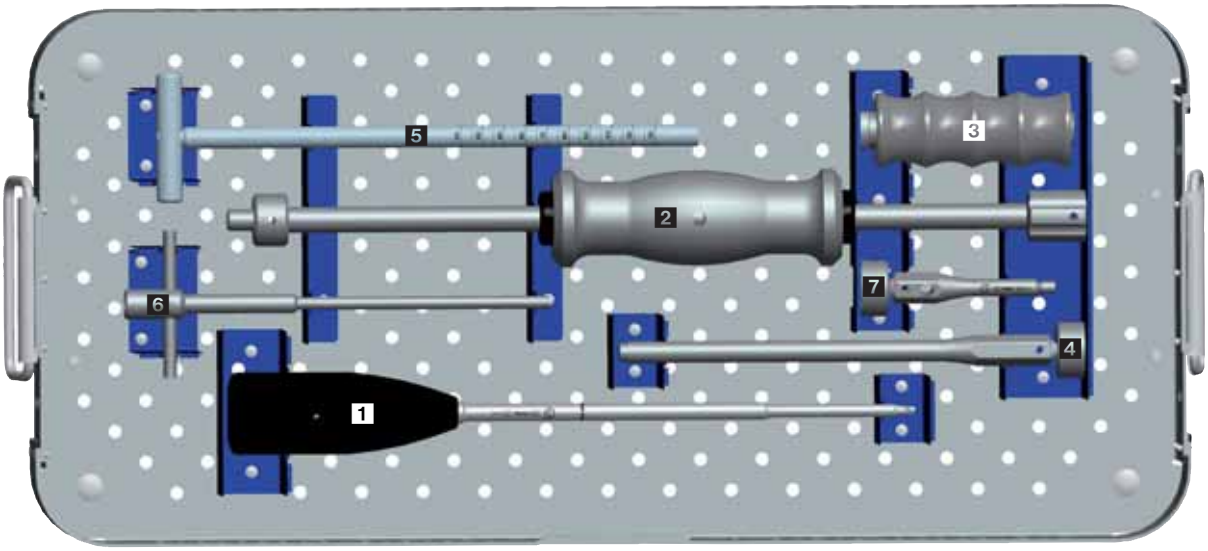


SUPRACONDYLAR AND RETROGRADE SPECIFIC INSTRUMENTS BOX			
1) SC Proximal Arm	176101	4) SC Curved Arm	176130
2) SC Handle	176110	5) SC Locking Rod	176140
3) SC Middle Arm	176120	6) 2x400 mm XWire	80122

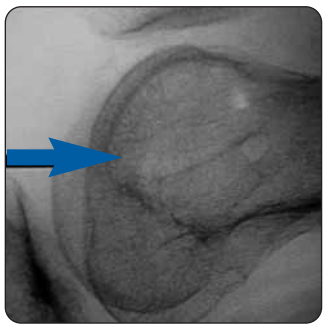


GENERAL INSTRUMENTS BOX			
1) Stabilizing Sleeve	173201	17) Spacer 12 mm	173055
2) Screw Guide	173211	18) Stabilizing Rod	173031
3) Trocar	173212	19) Guide Wire Exchange Tube	17353
4) Drill Guide	173213	20) Locking Screw Extractor	17652
5) Screw Scale	173301	21) Hammer	173380
6) Cannulated Screw Wrench	173302	22) AP Arm Connector	173170
7) Cannulated Screw Driver	173320	23) AP Arm	173180
8) T Handle	173350	24) Femoral Reamer Sleeve	173230
9) Locking Cam	173026	25) Awl	173260
10) Locking Nut	173032	26) XWire d. 2x400 mm	80122
11) Impactor	173071	27) Reduction Tool Handle	173264
12) Drill Bit d. 4.8x365 mm	173286	28) Reduction Tool	173265
13) K-Wire 2 mm	173287	29) Ruler	173275
14) Spacer 9 mm	173052	30) Ruler Support	173276
15) Spacer 10 mm	173053	31) AP Centering Jig	173185
16) Spacer 11 mm	173054		

STERILE PACKAGED INSTRUMENTS	
Cannulated Drill Bit 6 mm	99-173285
Guide Wire with olive d. 3x980 mm	99-173281
Guide Wire without olive d. 2.5x980 mm	99-176281



EXTRACTION INSTRUMENTS BOX			
1) Cannulated Screw Driver	173320	5) Locking Screw Extractor	17652
2) Sliding Hammer	173370	6) Tibial Nail Extractor	174220
3) Extractor Handle	170035	7) Humeral Nail Extractor	178390
4) Femoral Nail Extractor	17391		

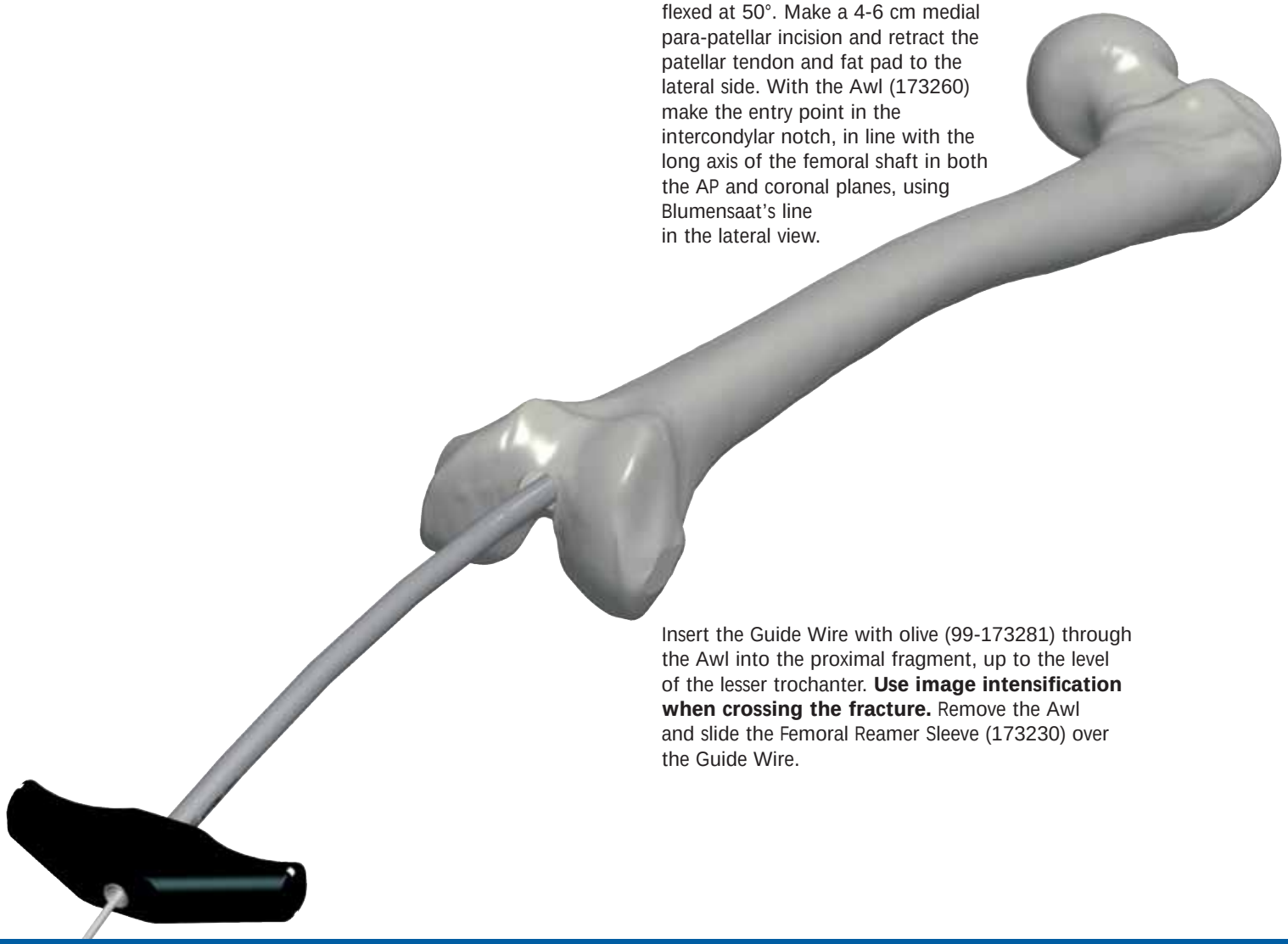


OPERATIVE TECHNIQUE

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.

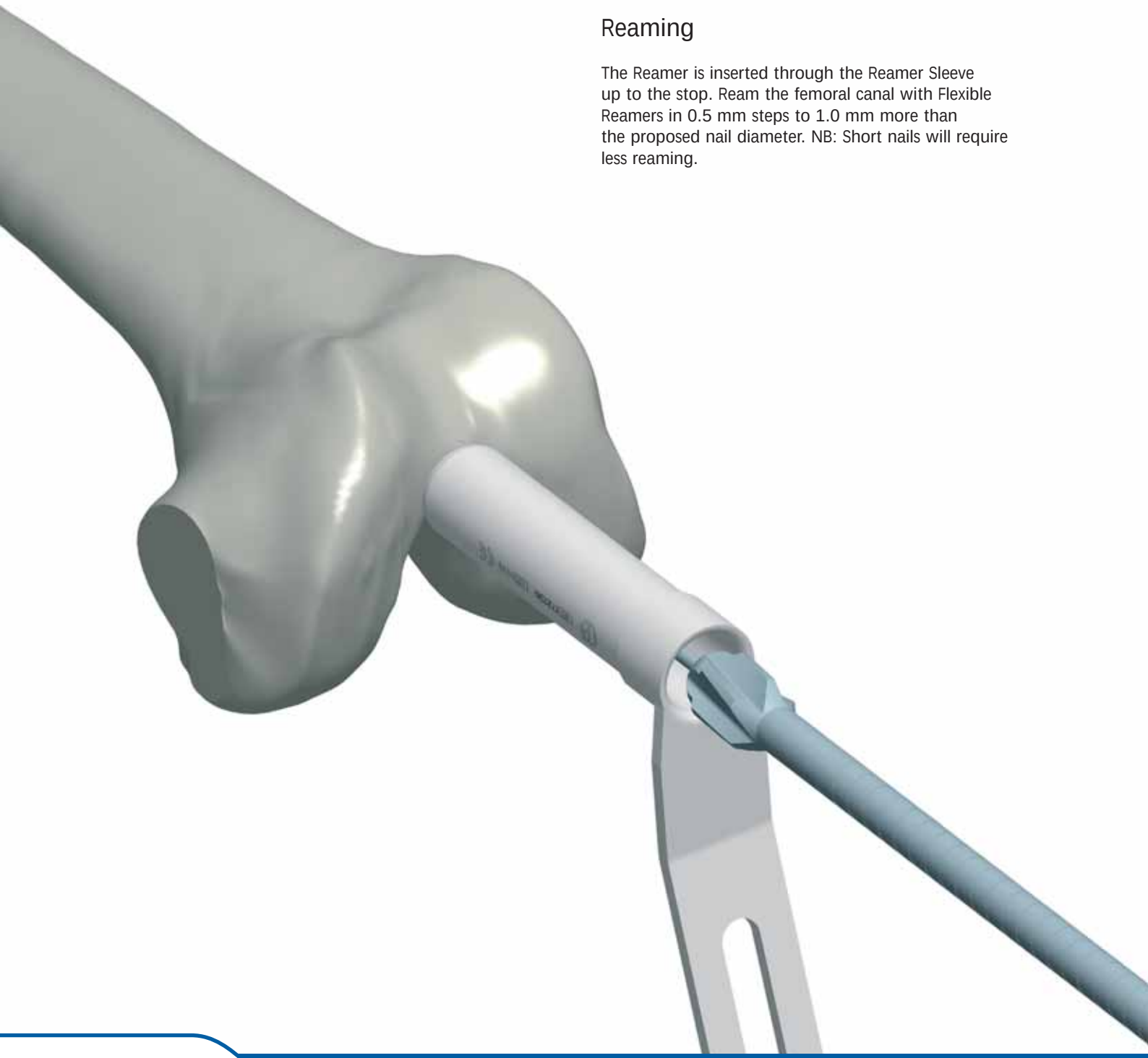
INSTRUMENTATION

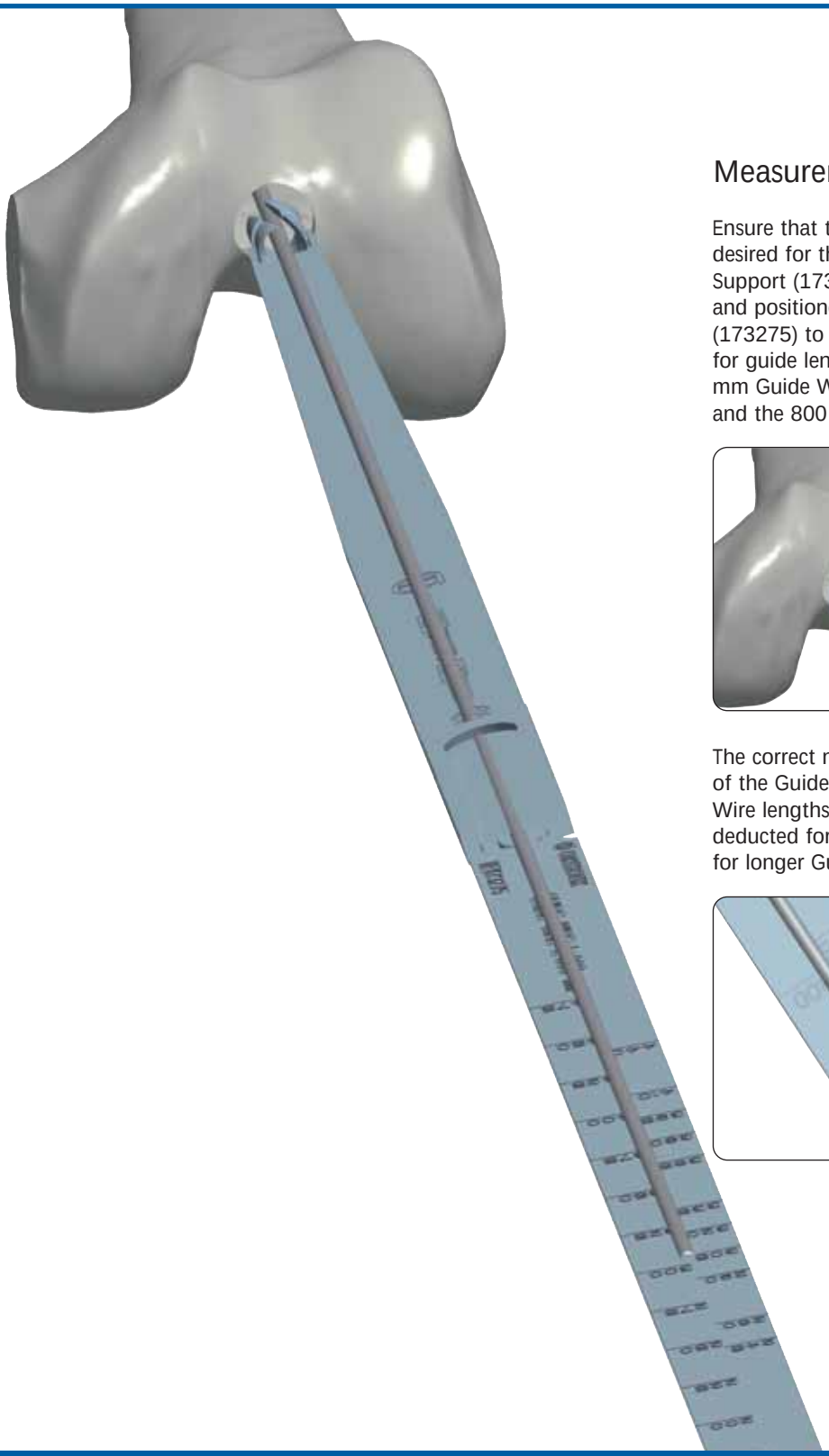
173260
Awl

173230
Femoral Reamer Sleeve

Reaming

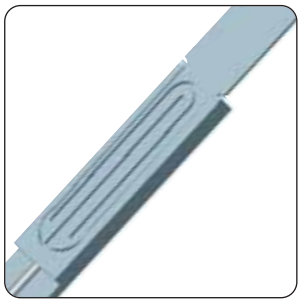
The Reamer is inserted through the Reamer Sleeve up to the stop. Ream the femoral canal with Flexible Reamers in 0.5 mm steps to 1.0 mm more than the proposed nail diameter. NB: Short nails will require less reaming.





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 980 mm Guide Wire is used for femoral and tibial nailing, and the 800 mm Guide Wire used for the humerus).

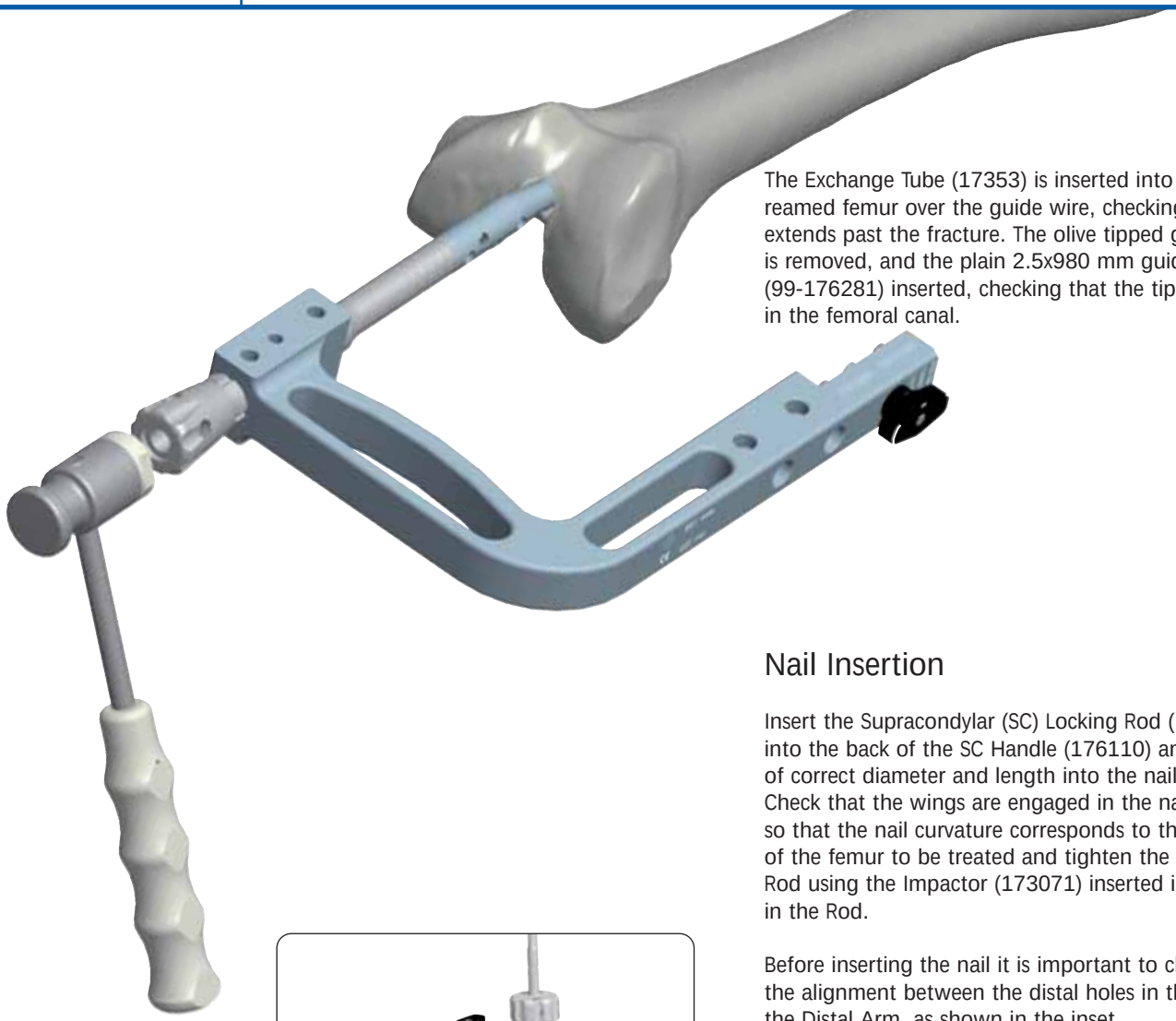


The correct nail length is read at the proximal tip of the Guide Wire. Please note, that if different Guide Wire lengths are used, the difference must be deducted for shorter Guide Wires or added for longer Guide Wires to the measured length.

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 2.5x980 mm 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

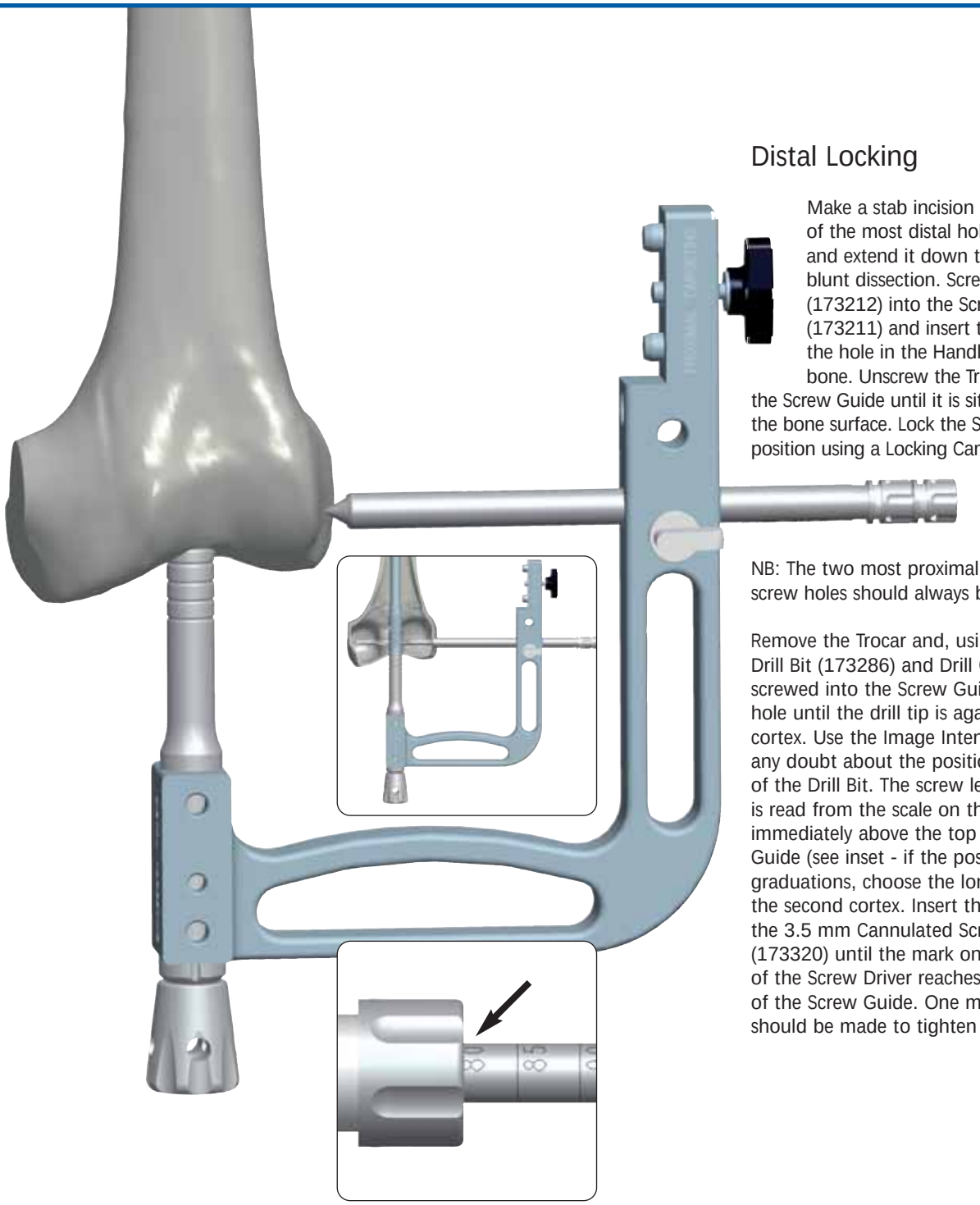
17353
Exchange Tube

176140
SC Locking Rod

176110
SC Handle

173071
Impactor

173380
Hammer



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 4.8 mm 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 3.5 mm 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
4.8 mm Drill Bit

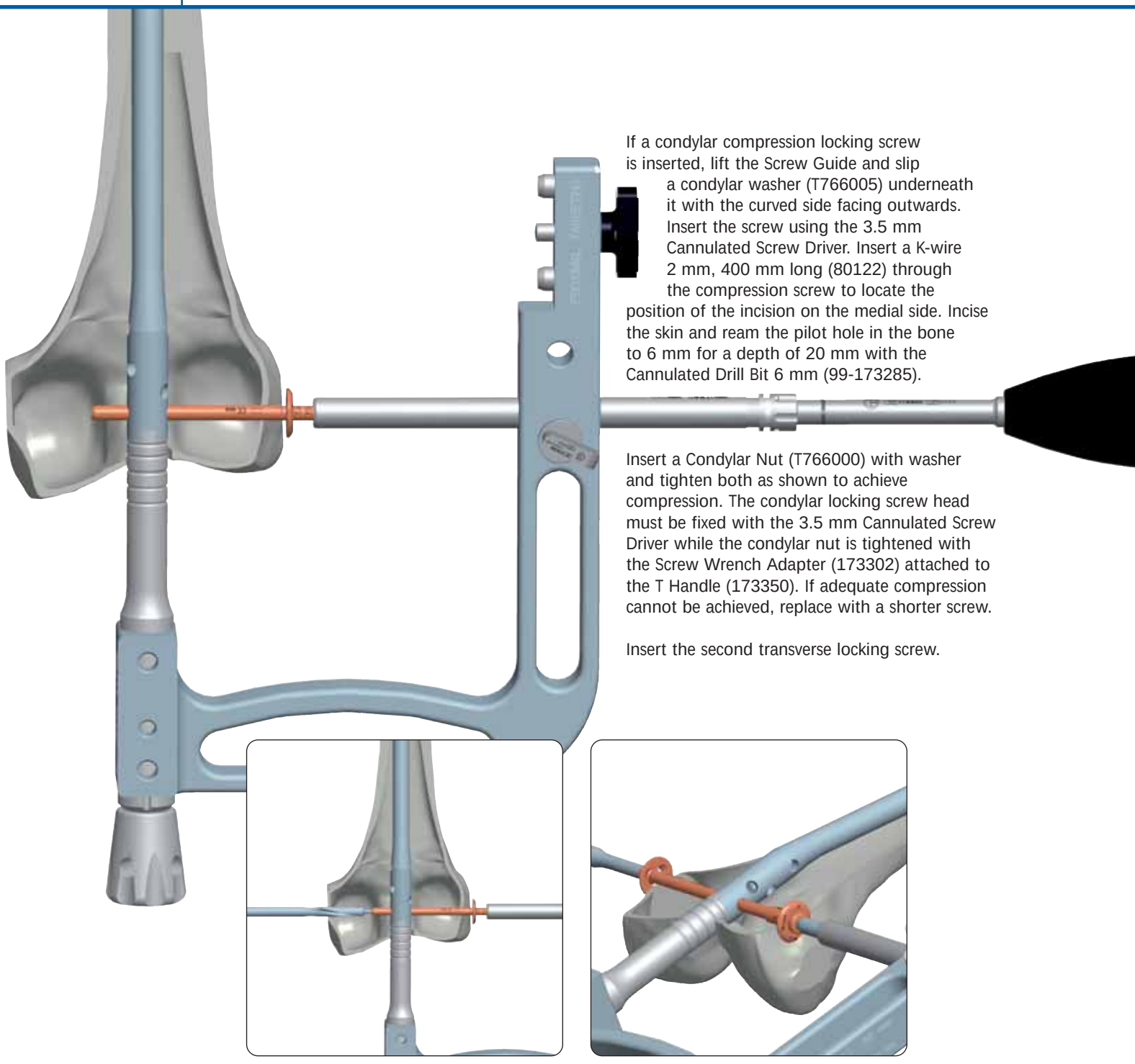
173213
Drill Guide

173320
3.5 mm 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 3.5 mm Cannulated Screw Driver. Insert a K-wire 2 mm, 400 mm 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 6 mm for a depth of 20 mm with the Cannulated Drill Bit 6 mm (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 3.5 mm 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.

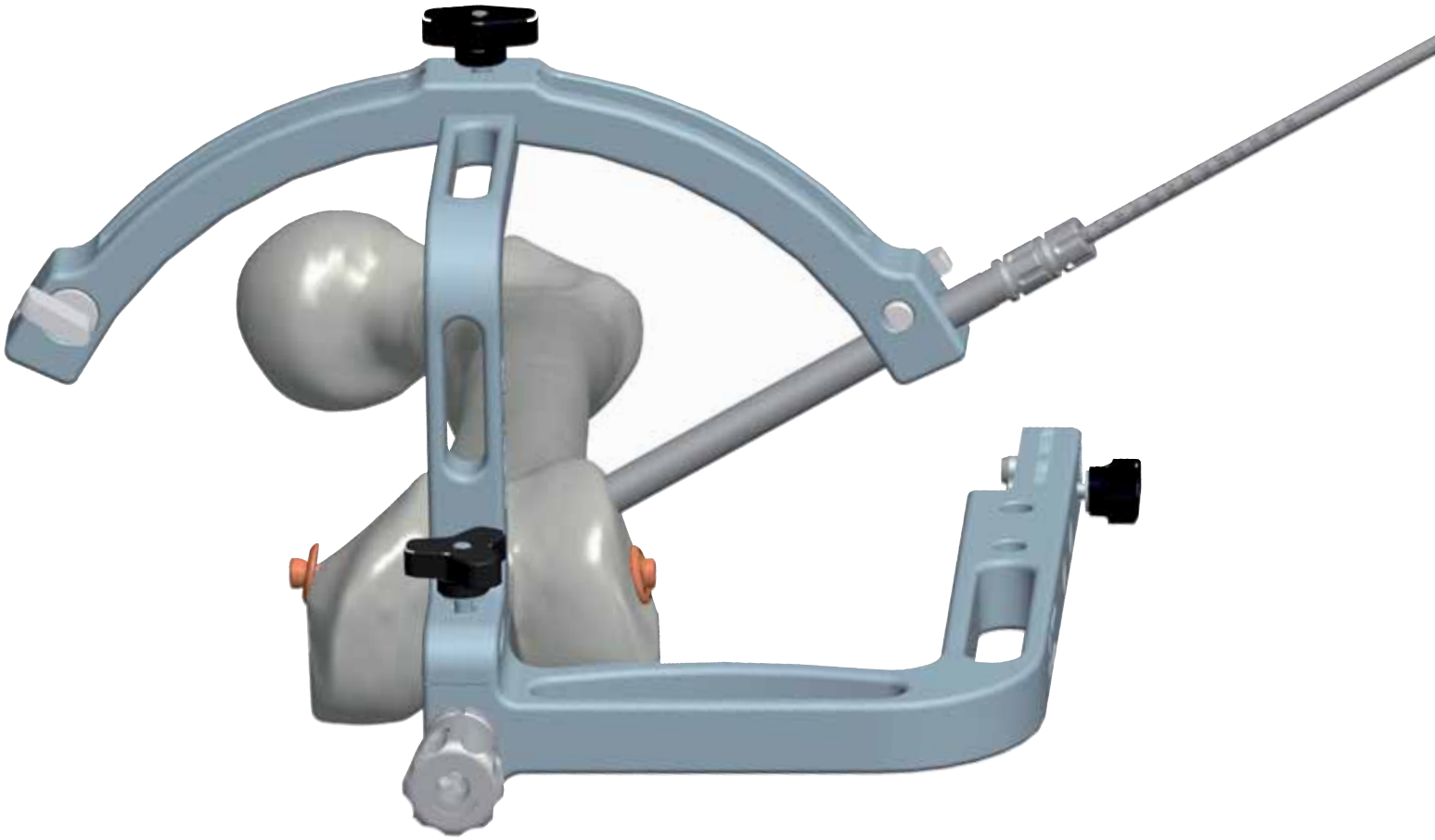


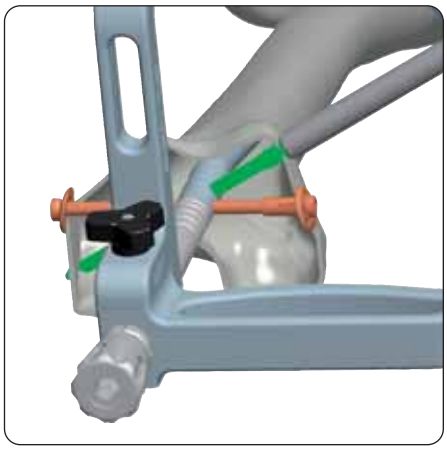
INSTRUMENTATION

99-173285
Cannulated Drill Bit 6 mm

173302
Screw Wrench Adapter

173350
T Handle



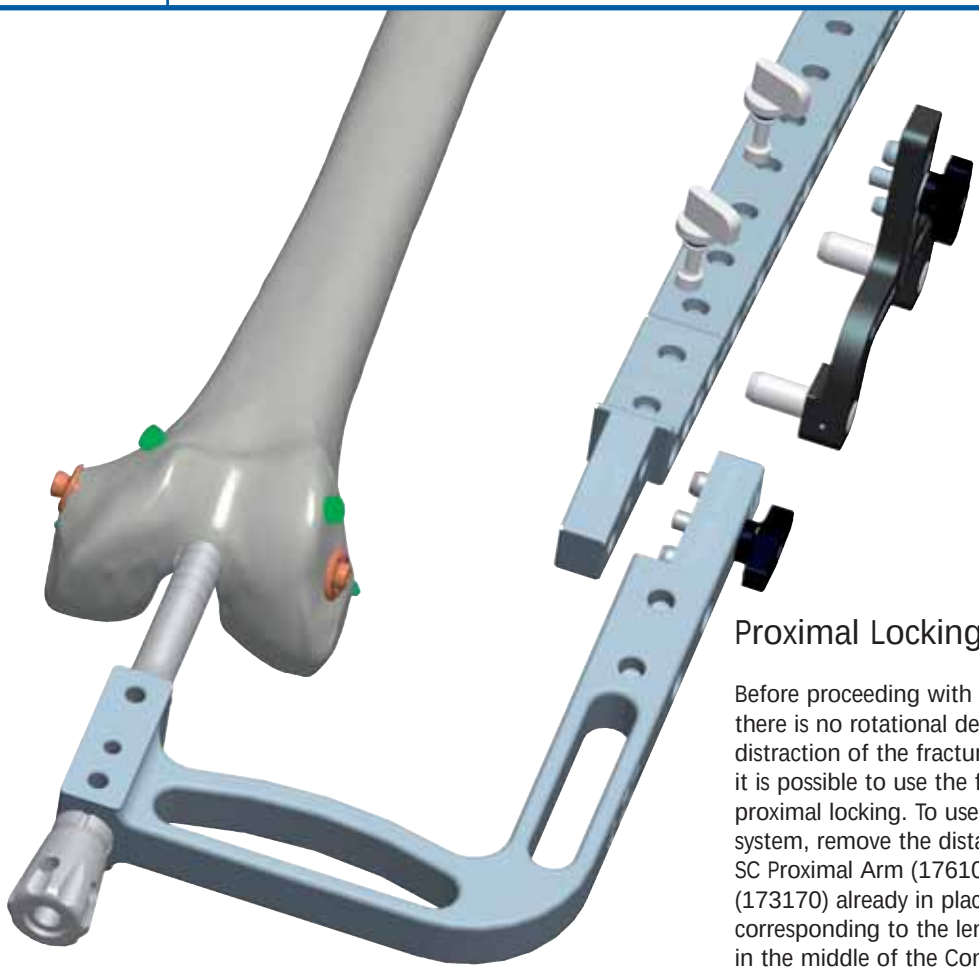


If oblique locking screws are required, attach the SC Middle Arm (176120) and then the SC Curved Arm (176130) to the Handle. Tighten both knobs firmly. Screw the Trocar into the Screw Guide and insert them into the lateral hole in the curved arm. Push them down to the bone. Unscrew the Trocar and push the Screw Guide until it is sitting flush against the bone surface. Lock the Screw Guide into position. Remove the Trocar and, using a 4.8 mm 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 3.5 mm Cannulated Screw Driver. Repeat the same procedure for the medial hole.

176120
SC Middle Arm

176130
SC Curved Arm



Proximal Locking

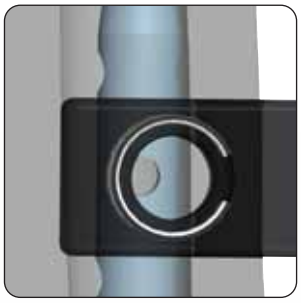
Before proceeding with proximal locking, check that there is no rotational deformity, and that there is no distraction of the fracture site. If the surgeon prefers, it is possible to use the freehand technique for proximal locking. To use the mechanical distal targeting system, remove the distal locking 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

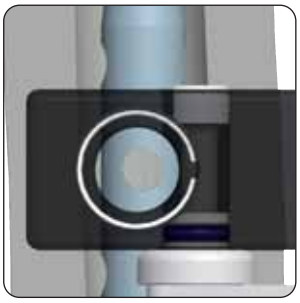
176101
SC Proximal Arm

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 20-25 mm incision and extend it down to the deep fascia. Split the muscles longitudinally down to the bone. Insert the Cannulated Drill Bit 6 mm (99-173285) into the Stabilizing Sleeve and push the two together down to the bone. Lock the Sleeve in place. Insert the K-wire 2 mm (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.

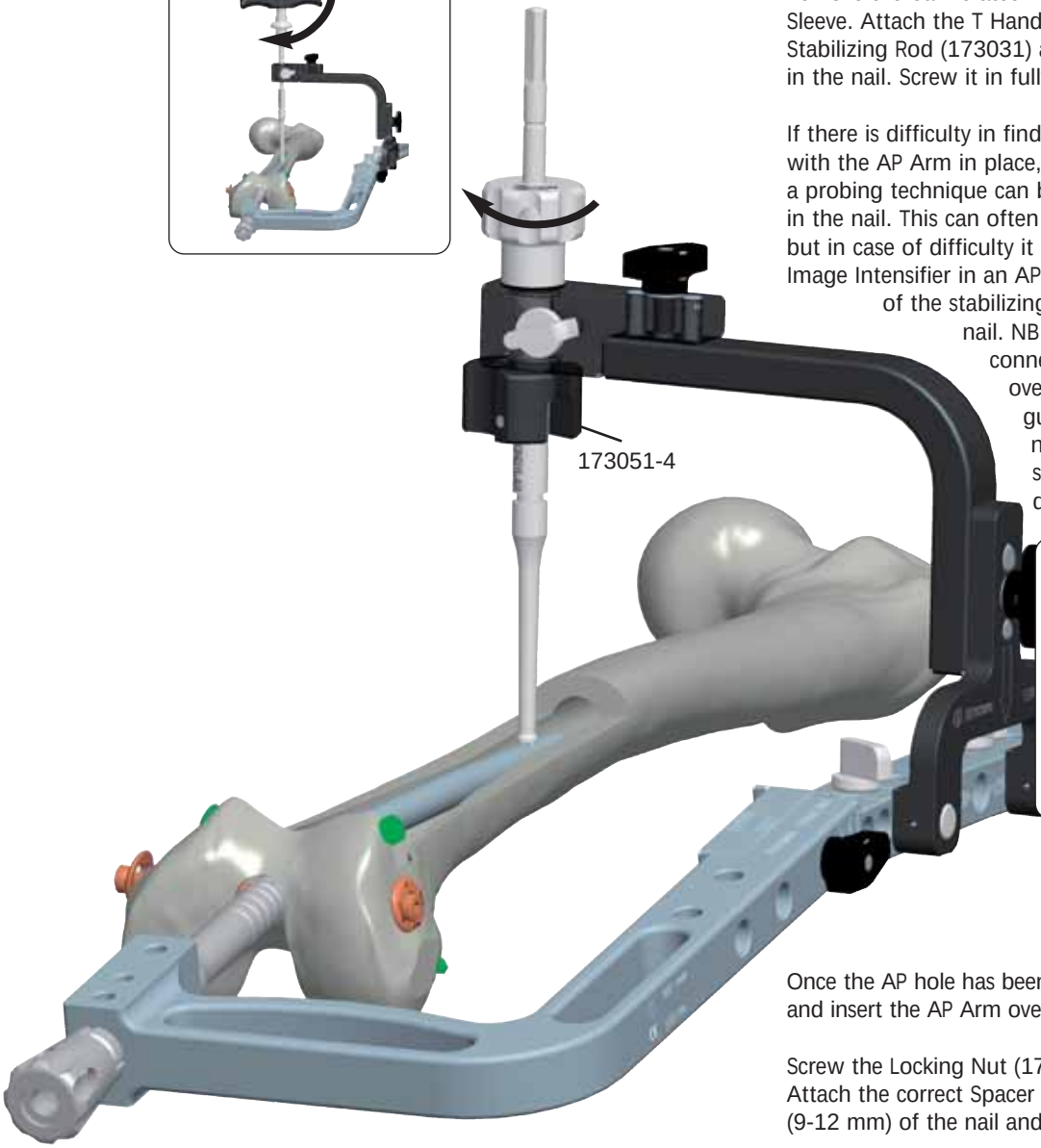
INSTRUMENTATION

173201
Stabilizing Sleeve

99-173285
Cannulated Drill Bit 6 mm

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 (9-12 mm) 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

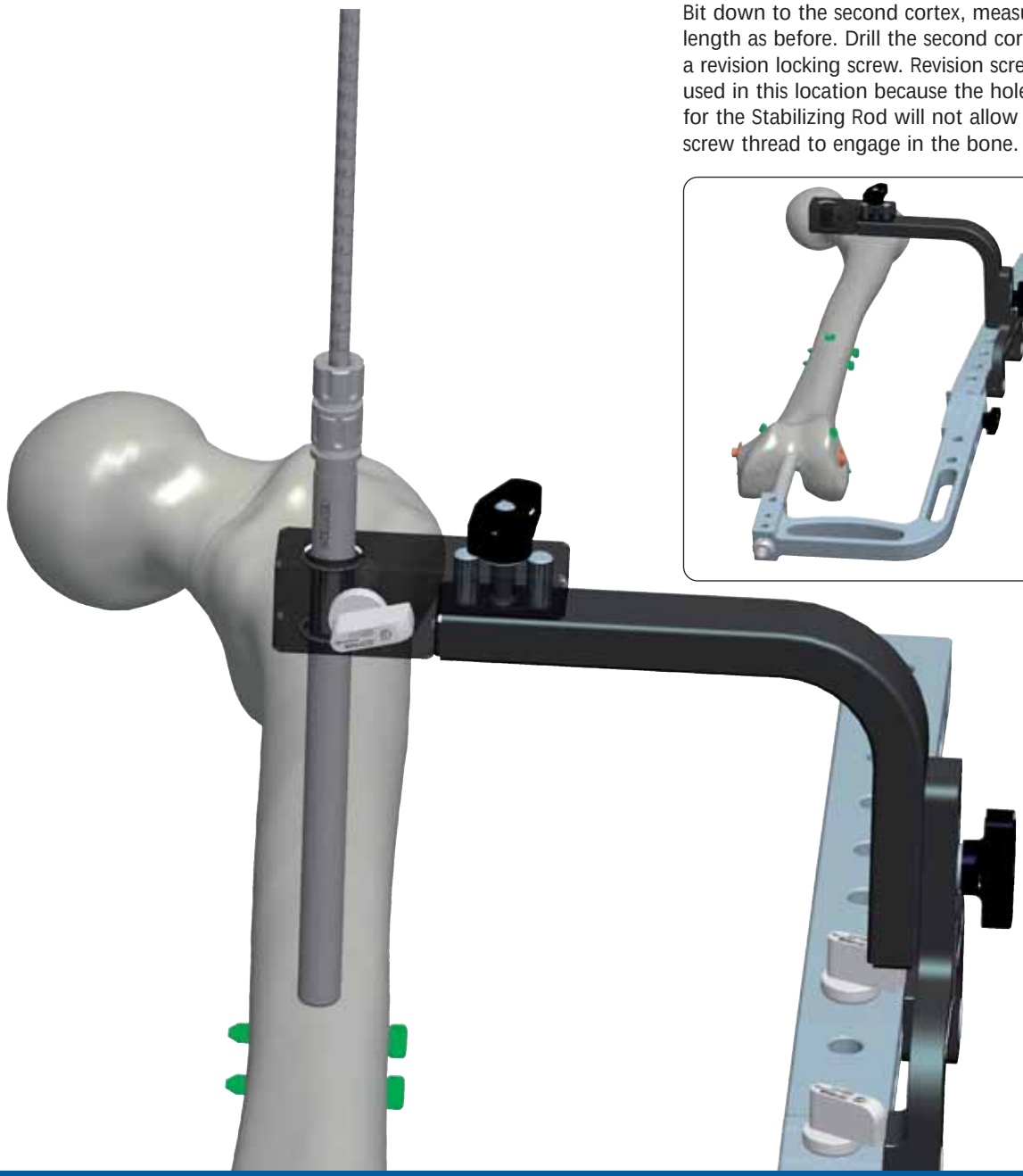
173051-4
Spacer

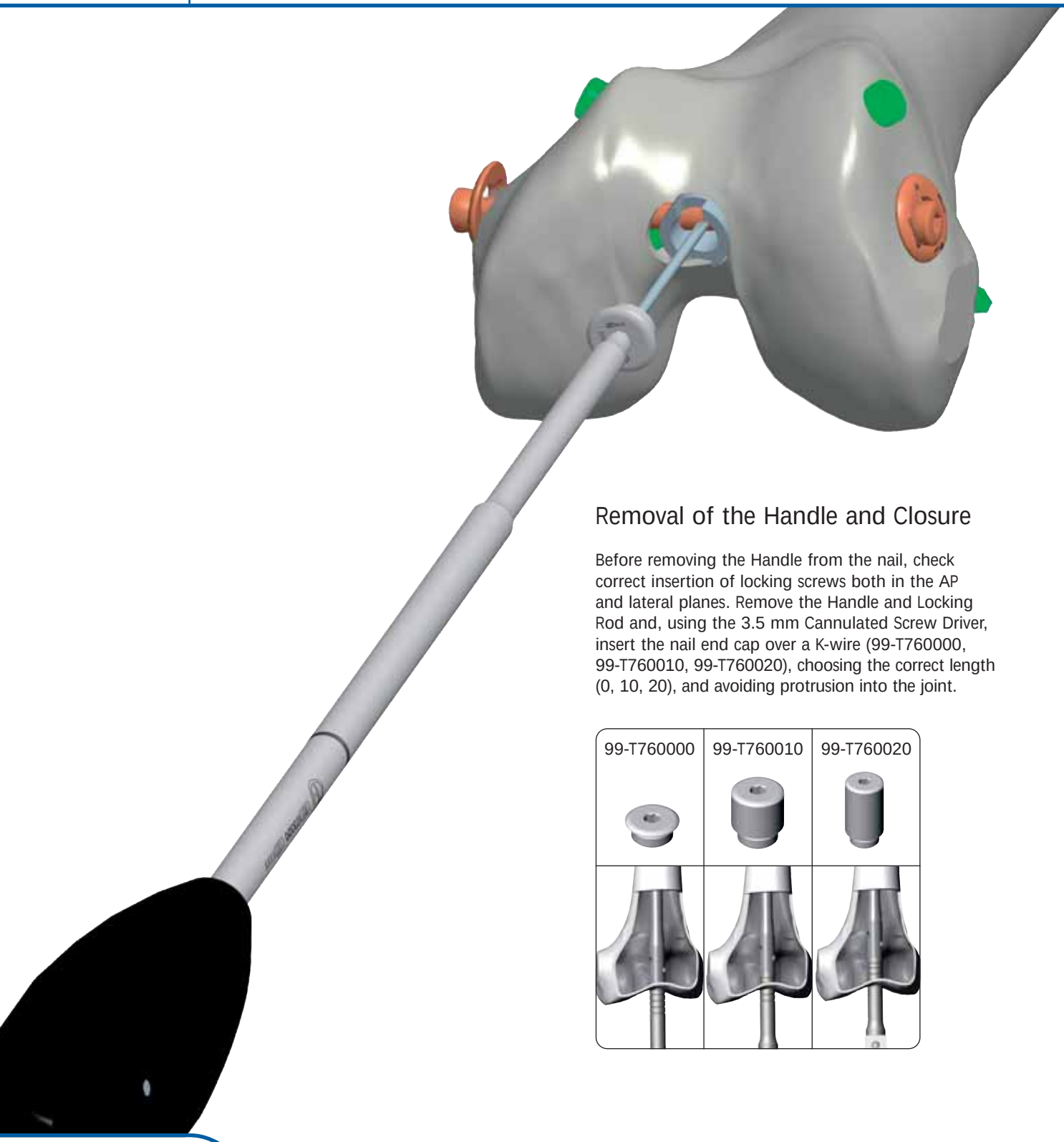
Screw the Trocar into the Screw Guide and insert them both into one of the two holes in the SC Proximal Arm (176101). Unscrew the Trocar and push the Screw Guide until it is sitting flush against the bone surface. Tighten the Screw Guide with the Locking Cam. Remove the Trocar and screw the Drill Guide into the Screw Guide. Drill with the 4.8 mm 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 3.5 mm Cannulated Screw Driver (173320).

Repeat the procedure for the second hole.

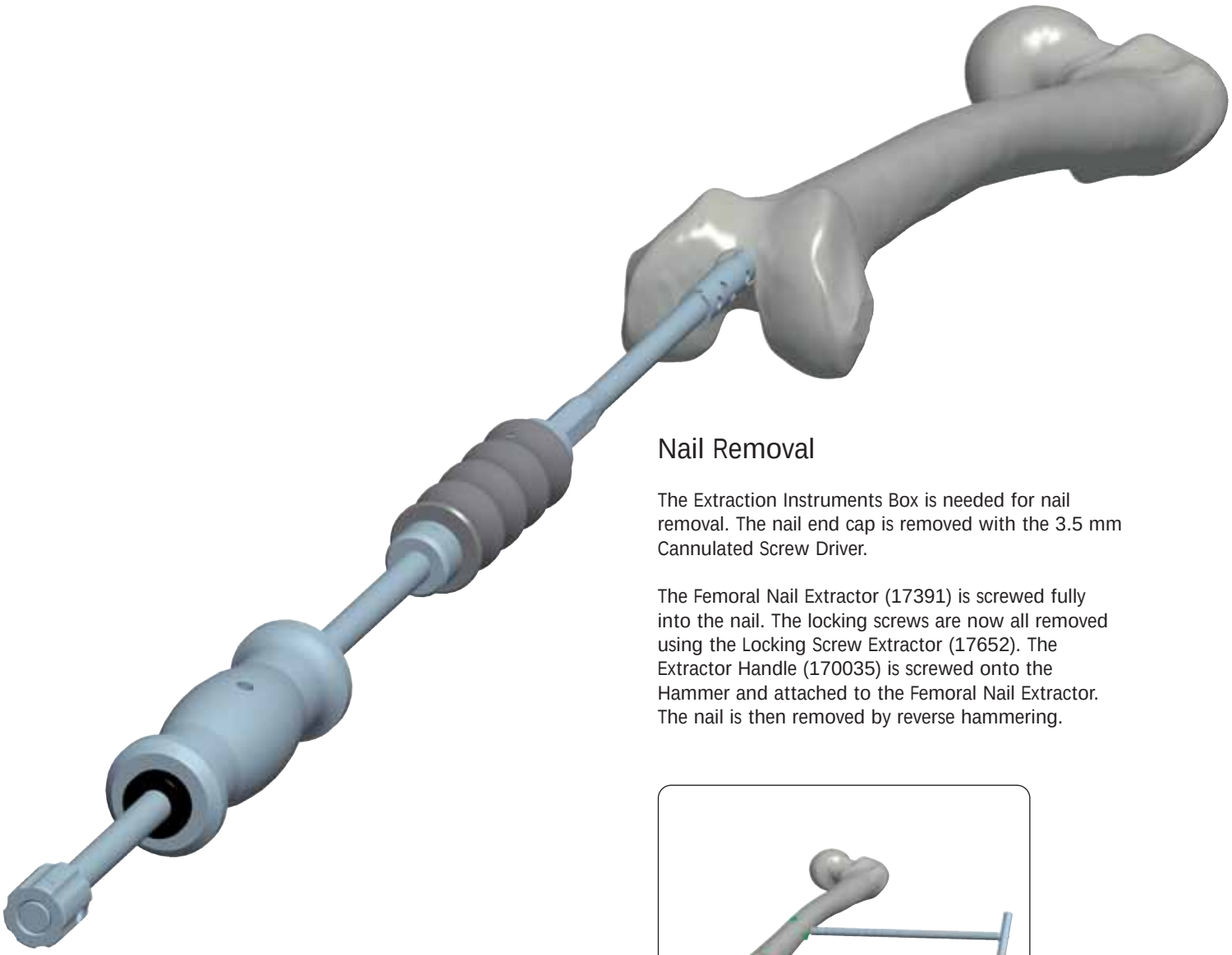
If a third distal screw is required in the AP direction, a revision locking screw must be used. Remove the Spacer and Stabilizing Rod with the T Handle. Insert a Screw Guide and Drill Guide. Insert the 4.8 mm Drill Bit down to the second cortex, measure the screw length as before. Drill the second cortex 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 3.5 mm 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 3.5 mm 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 Scew Extractor

170035
Extractor Handle

CENTRONAIL OPERATIVE TECHNIQUES

CN-0701-OPT The Centronail Titanium Universal Femoral Nailing System

CN-0702-OPT The Centronail Titanium Tibial Nailing System

CN-0703-OPT The Centronail Titanium Supracondylar and Retrograde Nailing System

CN-0704-OPT The Centronail Titanium Humeral Nailing System

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