

Retrograde/Antegrade Femoral Nail

Expert R/AFN

Surgical Technique



 Image intensifier control

This description alone does not provide sufficient background for direct use of DePuy Synthes products. Instruction by a surgeon experienced in handling these products is highly recommended.

Processing, Reprocessing, Care and Maintenance

For general guidelines, function control and dismantling of multi-part instruments, as well as processing guidelines for implants, please contact your local sales representative or refer to:

<http://emea.depuyshnthes.com/hcp/reprocessing-care-maintenance>

For general information about reprocessing, care and maintenance of Depuy Synthes reusable devices, instrument trays and cases, as well as processing of Depuy Synthes non-sterile implants, please consult the Important Information leaflet (SE_023827) or refer to:

<http://emea.depuyshnthes.com/hcp/reprocessing-care-maintenance>

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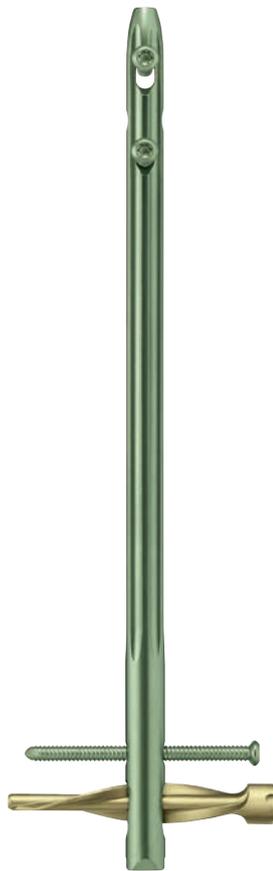
Expert R/AFN Retrograde/Antegrade Femoral Nail

Nail design

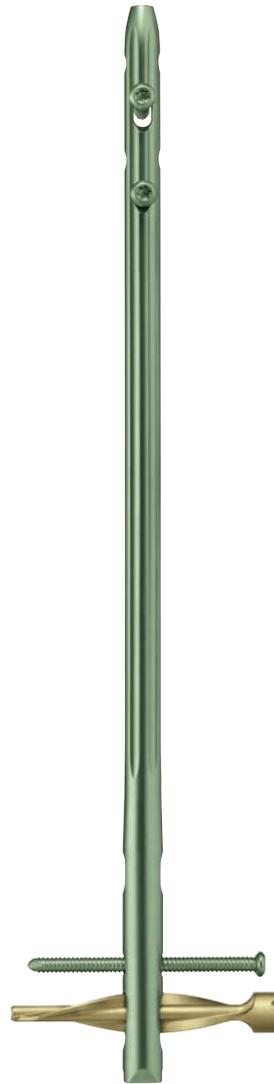
- One system for retrograde and antegrade technique
- One system for left and right femur
- Cannulation of all nails for guided insertion in reamed and unreamed technique
- Nails available with diameters ranging from \varnothing 9.0 to 15.0 mm and lengths ranging from 160 to 480 mm
- Locking configuration available for static, dynamic, standard and spiral blade locking



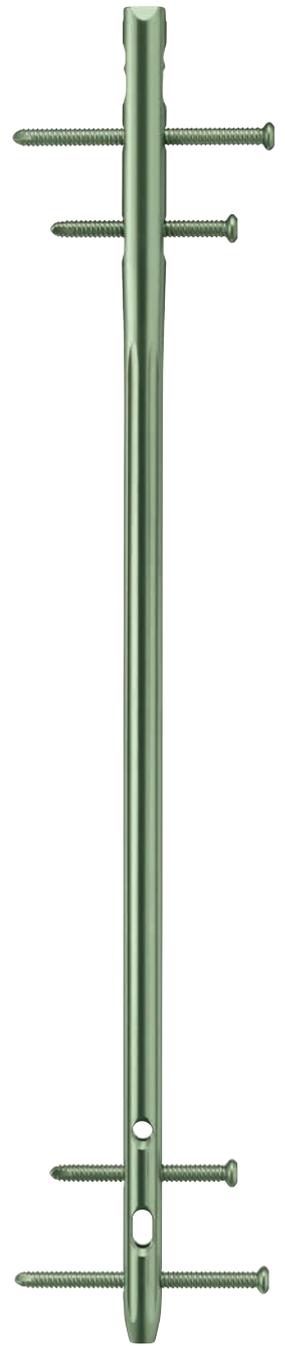
retrograde
RFN, 160–200 mm
straight



retrograde
RFN, 220–280 mm
antecurvature 1500 mm



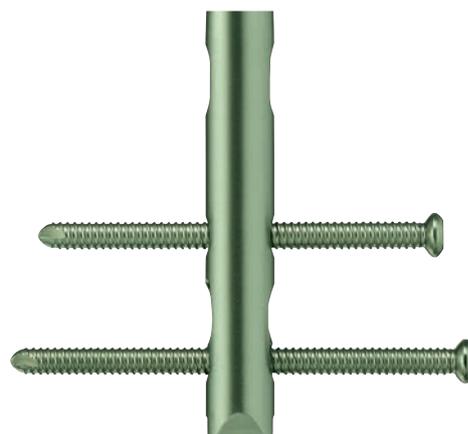
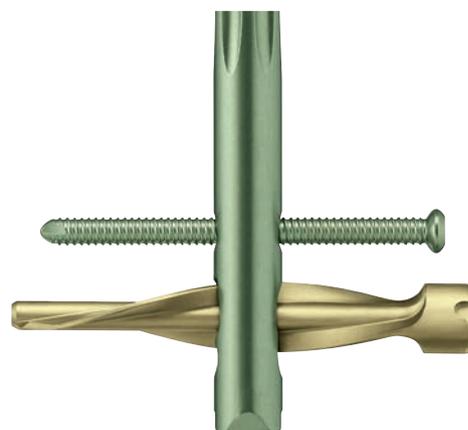
retrograde
R/AFN, 300–480 mm
antecurvature 1500 mm



antegrade
R/AFN, 300–480 mm
antecurvature 1500 mm

Distal locking options

The distal combination hole facilitates locking. The surgeon can intraoperatively choose between spiral blade locking (with one spiral blade and one locking screw) and standard locking (with two locking screws).



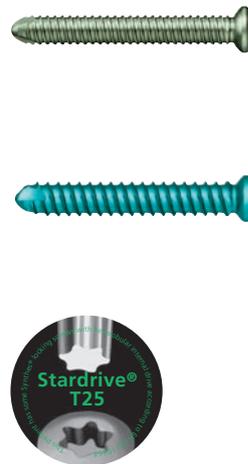
End caps:

- Possibility to block spiral blade or most distal (retrograde) or most proximal locking screw (antegrade)



Locking screws:

- Double thread for more contact points
- Thread closer to screw head facilitates bone purchase
- Self-holding Stardrive recess for locking screw pick-up
- Titanium alloy TAN
- Adapted locking screw diameter to nail diameter:
 - \varnothing 5.0 mm for nails \varnothing 9.0–13.0 mm
 - \varnothing 6.0 mm for nails \varnothing 14.0 and 15.0 mm



Spiral blades:

- Titanium alloy TAN



Intended Use, Indications, and Contraindications can be found in the corresponding system Instructions for Use.

The AO Principles of Fracture Management

Mission

The AO's mission is promoting excellence in patient care and outcomes in trauma and musculoskeletal disorders.

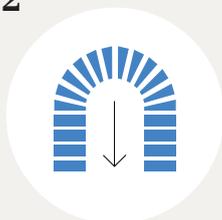
AO Principles^{1,2}

1



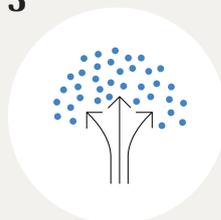
Fracture reduction and fixation to restore anatomical relationships.

2



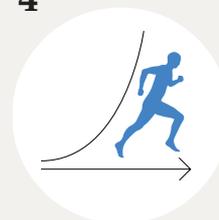
Fracture fixation providing absolute or relative stability, as required by the "personality" of the fracture, the patient, and the injury.

3



Preservation of the blood supply to soft-tissues and bone by gentle reduction techniques and careful handling.

4



Early and safe mobilization and rehabilitation of the injured part and the patient as a whole.

¹ Müller ME, M Allgöwer, R Schneider, H Willenegger. Manual of Internal Fixation. 3rd ed. Berlin, Heidelberg, New York: Springer. 1991

² Buckley RE, Moran CG, Apivatthakakul T. AO Principles of Fracture Management: 3rd ed. Vol. 1: Principles, Vol. 2: Specific fractures. Thieme; 2017.

Retrograde Approach – Opening the Distal Femur

1. Position patient

Position the patient supine on a radiolucent table. The knee of the injured leg should be flexed 70 to 90° allowing for reduction of the fracture and localisation of the nail entry point. A leg roll may be used to allow reduction and stabilisation of the fracture.

- ① Position the image intensifier in such a way that visualisation of the femur including the proximal and distal ends is possible in AP and lateral view. The contralateral leg should be flexed in the hip and in the knee and rested in an elevated position to enable visualisation by image intensifier.



2. Reduce fracture

- ① Perform closed reduction manually by axial traction under image intensifier. In case of older fractures, the use of the large distractor (394.350) or pinless fixator (186.310) may be appropriate under certain circumstances.

Note: Intra-articular fractures should be stabilized with interfragmentary screw fixation prior to insertion of the nail. The screws should be positioned to not interfere with the path of the nail.

3. Measure for length and diameter of nail

Instruments

03.010.020	Radiographic Ruler for Expert Femoral Nails
03.010.023	Radiographic Ruler for Nail Diameters for Expert Femoral Nails, length 365 mm

The required nail length must be determined after reduction of the upper leg fracture.

- Position the image intensifier as for an AP view of the distal femur. Using long forceps, hold the ruler parallel to the femur on the lateral side of the upper leg. Position the ruler such that the distal end is at the desired nail insertion depth. Mark the skin at that site.



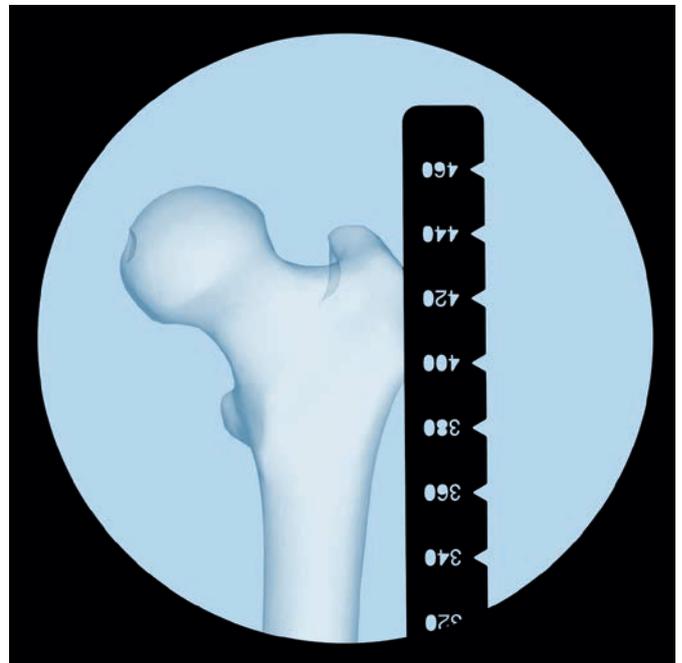
- Move the image intensifier toward the proximal end of the femur, align the distal end of the ruler with the skin marking and record an AP x-ray of the proximal femur. Check the reduction and read off the required nail length on the ruler as it appears in the x-ray.

Precautions:

- It is recommended that the tip of the nail is at least 5 cm above the most proximal extension of the fracture zone. Attention must be paid in the area 4 to 6 cm below the Lesser Trochanter because of the A. femoralis and the branches of the N. femoralis. In cases where such long nails (>320 mm) are used, it is recommended to place the AP locking as proximal as possible and above the Lesser Trochanter.
- The possibility of dynamisation must also be considered when determining the nail length and a correspondingly shorter nail should be chosen. The locking screw in the dynamic locking option can move by up to 5 mm distally.

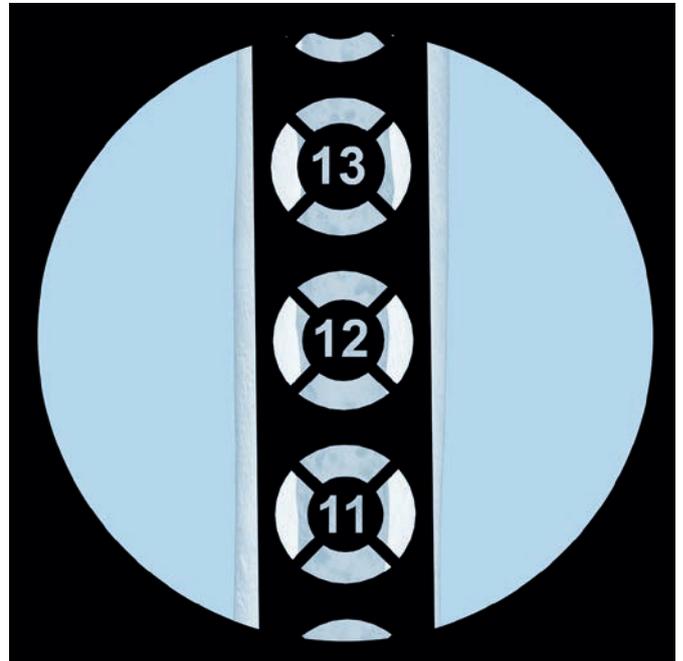
Alternatives

Determine the nail length by the procedure above on the uninjured leg before draping (non-sterile) or compare the length of two identical SynReam reaming rods \varnothing 2.5 mm or use the Depth Gauge for Medullary Nails in combination with the SynReam reaming rod \varnothing 2.5 mm, length 950 mm see RIA surgical technique.



Place the radiographic ruler for nail diameters over the femur so that the measuring edge is located over the isthmus. Select the nail diameter shown when the medullary canal/cortex transition is still visible on both sides of the marking (12 mm in this example).

If the reamed technique is used, the diameter of the largest medullary reamer applied must be 0.5 to 1.5 mm larger than the nail diameter.



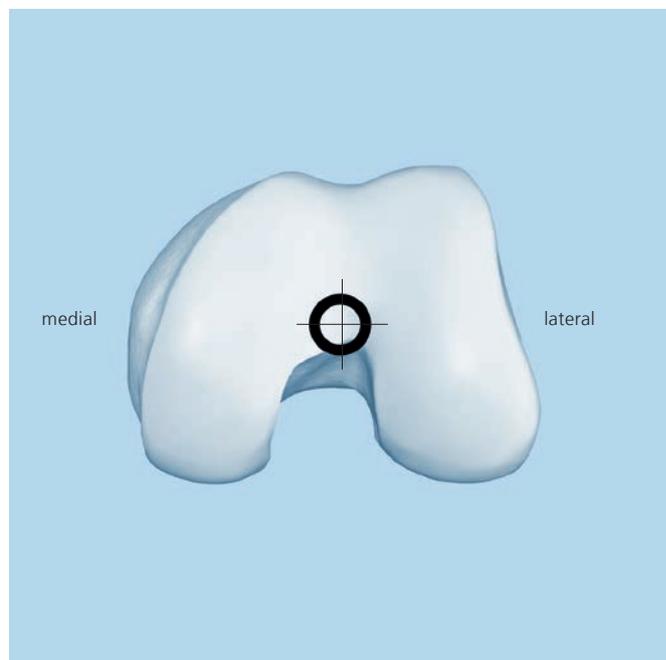
4. Approach

For 33-A.X and 32-X.X fractures either make a transligamentous (ligamentum patellae) or a parapatellar incision. For 33-C.X fractures either make a medial or a lateral parapatellar approach depending on the type and location of fracture.

5. Determine entry point

The entry point for the Expert Retrograde/Antegrade Femoral Nail is in line with the medullary canal. The point is at the top of the intercondylar notch, just anterior and lateral to the femoral attachment of the posterior cruciate ligament.

The entry point is determinant for the entire operation, especially for the final position of the nail in the medullary canal respecting the anatomical conditions. This is mostly important for distal metaphyseal fractures regarding correct fragment placement.



6. Insert guide wire

Instruments

03.010.500 Handle, with Quick Coupling
and

 03.010.502 Protection Sleeve 13.0 for Expert R/AFN,
retrograde, with Quick Coupling
and

 03.010.507 Multihole Drill Guide for Protection
Sleeve 13.0, retrograde

or

357.127 Protection Sleeve 13.0,
for retrograde approach

and
357.128 Drill Sleeve 13.0/3.2, with trocar tip, for
retrograde approach, for No. 357.127

393.100 Universal Chuck with T-Handle

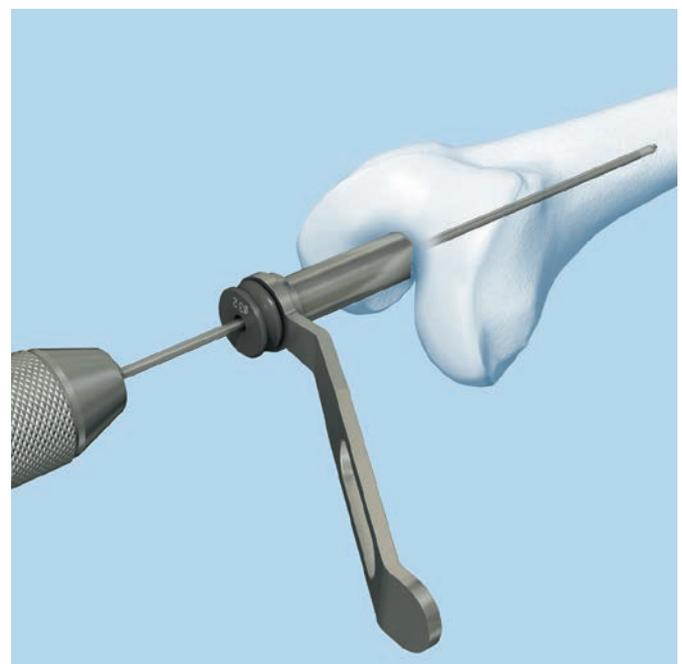
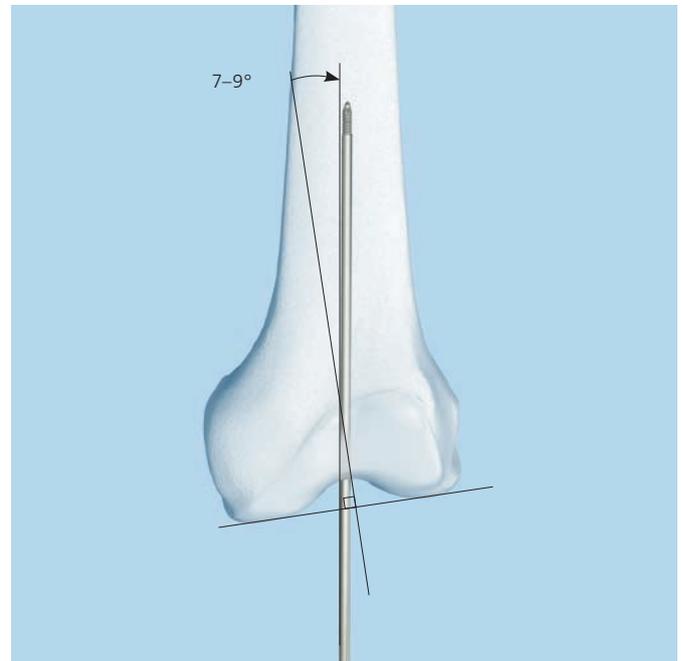
357.399 Guide Wire \varnothing 3.2 mm, length 400 mm

Insert the guide wire for approximately 10 to 15 cm in line with the anatomic axis of the femur, which is 7 to 9° in valgus, i.e. lateral to a line perpendicular to the articular surface.

Thread the drill sleeve into the protection sleeve. Insert the assembly through the incision to the bone.

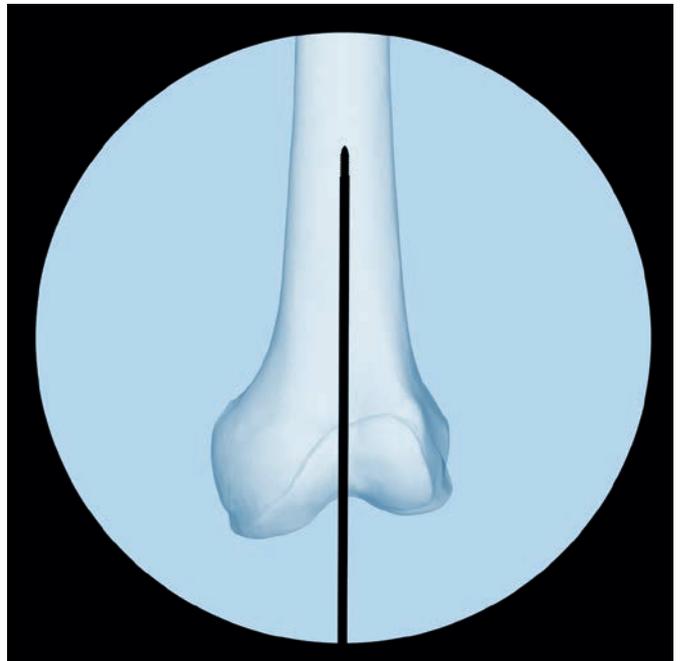
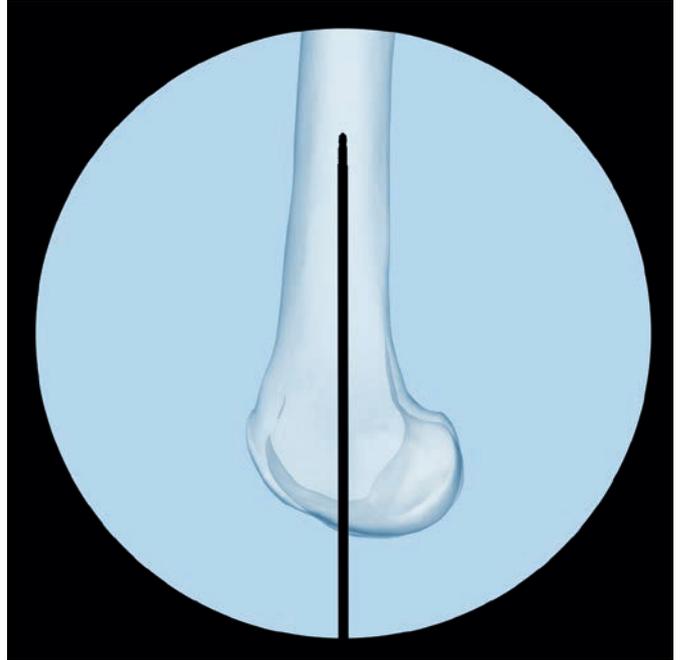
Secure the guide wire in the universal chuck.

Hold the protection sleeve firmly and insert the guide wire through the drill sleeve.



- Check the position under the image intensifier in AP and lateral views.

Remove the drill sleeve.



7a. Open medullary canal – drill bit

Instruments

351.270 Drill Bit \varnothing 13.0 mm, cannulated, length 290 mm, 3-flute, for Quick Coupling No. 511.760

357.127 Protection Sleeve 13.0, for retrograde approach

or

03.010.500 Handle, with Quick Coupling and

 03.010.502 Protection Sleeve 13.0 for Expert R/AFN, retrograde, with Quick Coupling

03.010.115 Guide Wire \varnothing 3.2 mm, length 290 mm



Push the drill bit over the guide wire and through the protection sleeve to the bone. Drill to a depth of approximately 3 to 5 cm to open the cortex.

Precautions:

- **The use of the drill bit for opening the medullary canal is suitable for nails \varnothing 9.0 to 12.0 mm. For the larger nails \varnothing 13.0 to 15.0 mm, the use of a reaming system is recommended.**
- **Take care to not plunge the drill bit into the fracture site because this may displace the fracture.**

Remove the drill bit and the protection sleeve.

7b. Open medullary canal – awl

Instruments

03.010.041 Awl Ø 14.0/3.2 mm, cannulated

03.010.115 Guide Wire Ø 3.2 mm, length 290 mm

Alternatively, the awl may be used to open the medullary canal.

Remove the protection sleeve.

Push the awl over the guide wire and open the medullary canal.

Precaution:

- **The use of the awl for opening the medullary canal is suitable for nails Ø 9.0 to 13.0 mm. For the larger nails Ø 14.0 and 15.0 mm, the use of a reaming system is recommended.**
- **Take care to not plunge the awl into the fracture site because this may displace the fracture.**

Remove the awl.



Retrograde Approach – Reaming (Optional)

Reaming medullary canal (optional)

If necessary, enlarge the femoral canal with the medullary reamer up to the desired diameter.

- ① Check fracture reduction under the image intensifier.

Inserting the reaming rod

Insert the reaming rod into the medullary canal.

Reaming

Starting with the smallest diameter, ream the medullary canal in 0.5 mm increments. The holding forceps is used to control the rotation of the reaming rod. Advance the reamer head with slight forward and backward movements. Do not use force. Continue reaming until the diameter of the canal is 0.5 to 1.5 mm larger than the nail diameter.

Precaution: All Expert Retrograde/Antegrade Femoral Nails can be inserted over the reaming rod. The tip of the reaming rod must be correctly positioned in the medullary canal since it determines the final proximal position of the nail.



Retrograde Approach – Inserting Nail

1. Mount nail on insertion handle

Instruments

03.010.146 Connecting Screw, cannulated, with Internal M6x1 Thread

03.010.046 Insertion Handle, long, for Expert Femoral Nails

or

 03.010.486 Insertion Handle, radiolucent, length 100 mm

03.010.093 Rod Pusher for Reaming Rod with Hexagonal Screwdriver \varnothing 8.0 mm

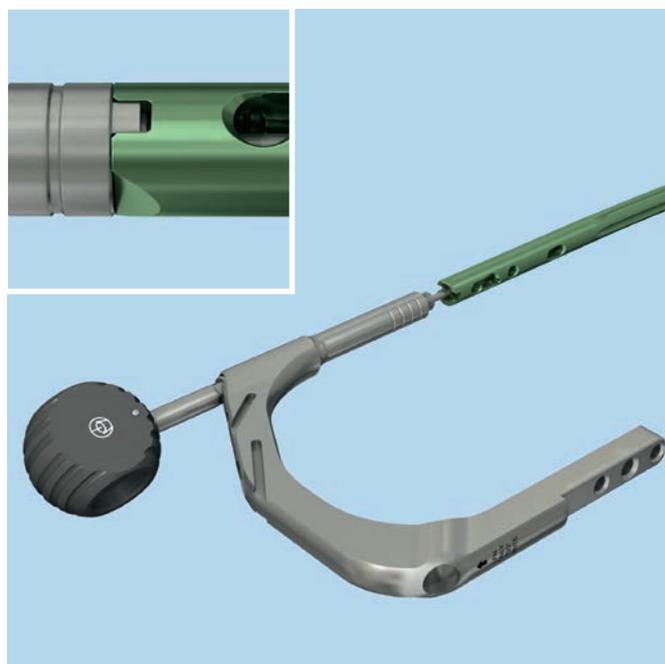
03.010.092 Screwdriver, hexagonal with spherical head \varnothing 8.0 mm

or

 03.010.517 Screwdriver, hexagonal \varnothing 8.0 mm, with T-Handle, with spherical head, length 322 mm

Slide the connecting screw onto the rod pusher until it is secured and insert it into the insertion handle.

The anterior bow of the nail must be aligned with the anterior bow of the femur. Orient the insertion handle anteriorly, match the notch on the insertion handle to the nail, and tighten the connecting screw.



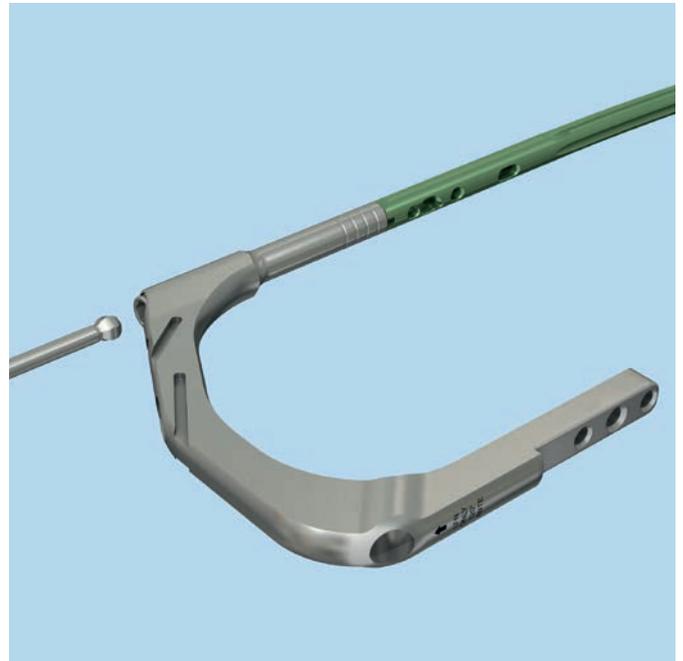
Check that the connecting screw is correctly and well tightened to the nail with the screwdriver. Do not over-tighten.

Alternative instruments

03.010.044 Connecting Screw, cannulated,
for Expert Tibial and Femoral Nails,
for No. 03.010.045

03.010.045 Insertion Handle, for Expert Tibial and
Femoral Nails

Follow the procedure described before.

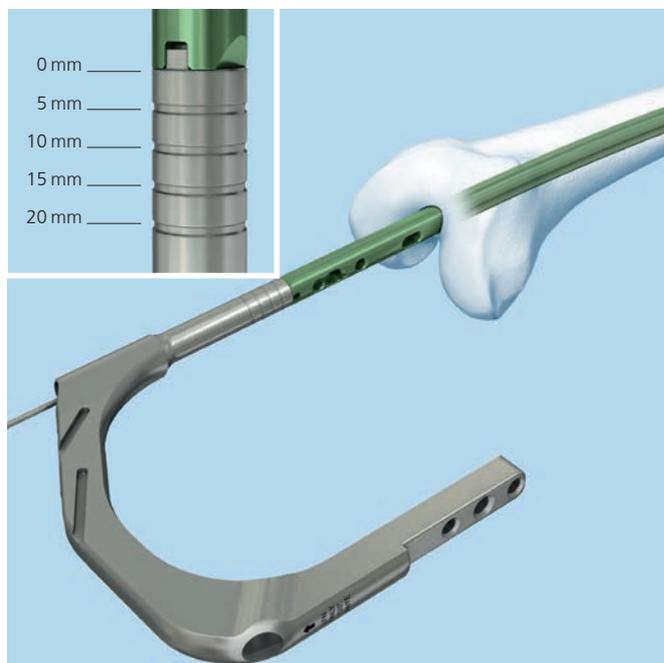


2. Insert nail

Using the insertion handle, insert the nail over the reaming rod, if used, into the medullary canal as far as possible by hand. Rotational movements of small amplitude can help.

- ⦿ Monitor nail passage across the fracture, control in two planes to avoid malalignment.

Use the insertion assembly to manipulate the nail across the fracture. Insert the nail until the distal end is inserted 2 to 5 mm beyond the articular cartilage.



- The insertion depth must be judged from a lateral view (using Blumensaat’s line as reference).

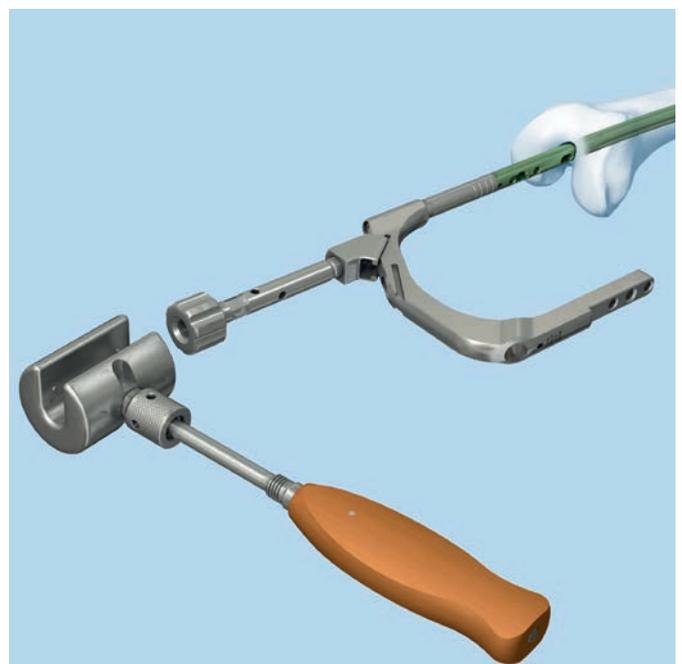
Check the final position of the nail in AP and lateral views.

Note: For distal locking, mount the aiming arm only when the nail has been completely inserted, otherwise the aiming arm may loosen during nail insertion.

Alternative instruments

03.010.047	Connector, length 141 mm, for Insertion Handle
or	
 03.010.523	Driving Cap with thread, for Insertion Handle
03.010.056	Combined Hammer 700 g, can be mounted, for No. 357.220
or	
 03.010.522	Combined Hammer, 500 g
357.220	Hammer Guide, for No. 357.250
or	
 03.010.170	Hammer Guide
321.160	Combination Wrench Ø 11.0 mm
321.170	Pin Wrench Ø 4.5 mm, length 120 mm
03.010.092	Screwdriver, hexagonal with spherical head Ø 8.0 mm
or	
 03.010.517	Screwdriver, hexagonal Ø 8.0 mm, with T-Handle, with spherical head, length 322 mm
357.398	Shaft, hexagonal Ø 8.0 mm, cannulated, short, length 125 mm

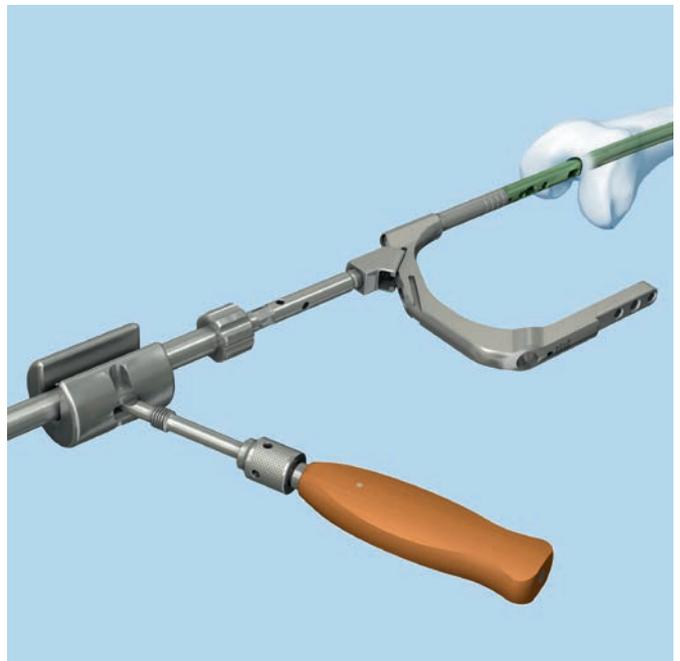
If necessary, insert the nail using light hammer blows. Attach the connector to the insertion handle in the first (medial) slot and tighten it to the insertion handle and use the combined hammer in the fixed mode.



If more insertion forces are necessary, attach the hammer guide to the connector and use the combined hammer in sliding mode. To obtain the “sliding” mode of the combined hammer, first loose the nut on the shaft and fix it at the position close to the handle.

Notes:

- If insertion is not easily possible, you may choose a nail with a smaller diameter or enlarge the entry canal by reaming the medullary canal to a larger diameter.
- Do not strike the insertion handle directly.
- Confirm that the nail is securely connected to the insertion handle, especially after hammering, using either the 8 mm ball hex screwdriver or the cannulated shaft with 8 mm hex.



Retrograde Approach – Standard Locking

If the proximal aiming device is used for interlocking, please refer to page 44.

1. Mount aiming arm for retrograde standard locking

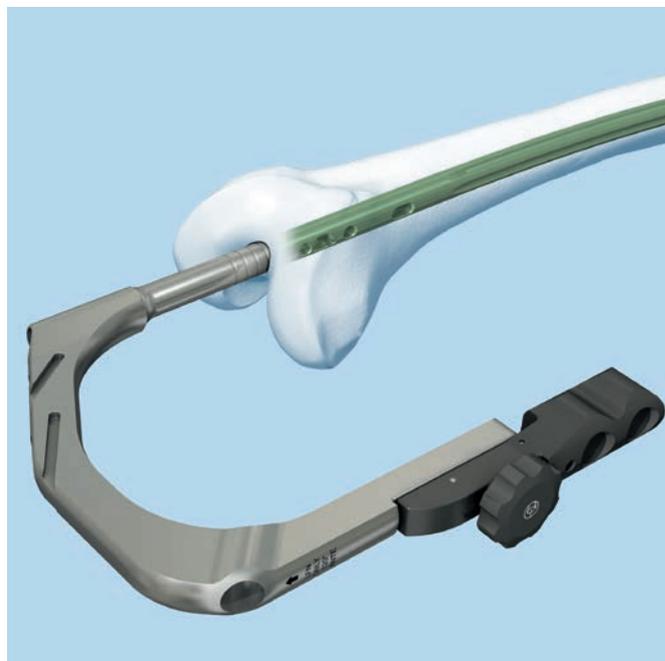
Instrument

03.010.481	Aiming Arm, radiolucent, for Expert R/AFN, retrograde, for Standard Locking
or	
03.010.050	Aiming Arm for Expert R/AFN, retrograde, for Standard Locking

Using the screwdriver confirm that the connecting screw between the insertion handle and the nail is well tightened.

Mount the aiming arm to the insertion handle.

Precaution: Do not exert force on the aiming arm, protection sleeve or drill bits. These forces may prevent accurate targeting through the locking holes and damage the drill bit.



2. Insert trocar combination

Instruments

03.010.063	Protection Sleeve 12.0/8.0, length 188 mm
03.010.065	Drill Sleeve 8.0/4.2, for No. 03.010.063
03.010.070	Trocar Ø 4.2 mm, for No. 03.010.065

**For nails Ø 9.0 to 13.0 mm (light green):
Locking screws Ø 5.0 mm**

Assemble the three-part trocar combination (protection sleeve, drill sleeve and trocar) and insert it through the desired LM hole in the aiming arm. Make a stab incision and insert the trocar to the bone.

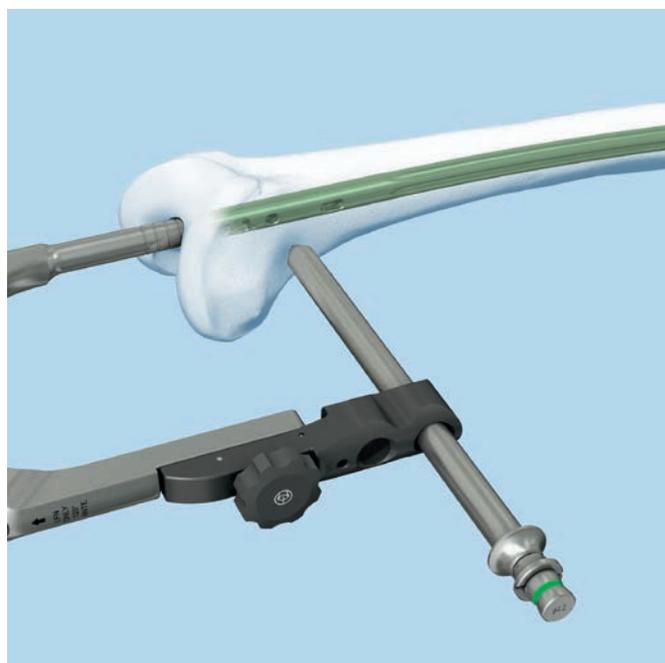
Remove the trocar.

Optional instruments

03.010.066	Drill Sleeve 8.0/5.0, for No. 03.010.063
03.010.071	Trocar Ø 5.0 mm, for No. 03.010.066

**For nails Ø 14.0 and 15.0 mm (aqua):
Locking screws Ø 6.0 mm**

Follow the procedure described above.



3. Drill and measure for length of locking screw

Instrument

03.010.061 Drill Bit \varnothing 4.2 mm, calibrated, length 340 mm, 3-flute, for Quick Coupling, for No. 03.010.065

For locking screws \varnothing 5.0 mm (light green)

Using the drill bit, drill through both cortices until the tip of the drill bit just breaks through the far cortex.

- 1 Just after drilling both cortices, confirm drill bit position.

Ensure that the drill sleeve is pressed firmly to the near cortex and read the measurement from the drill bit at the back of the drill sleeve. This measurement corresponds to the appropriate length of the locking screw.

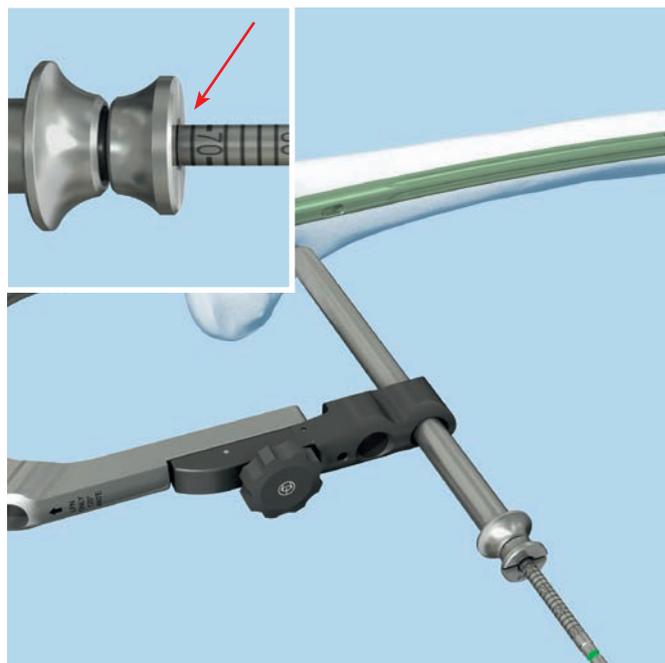
Remove the drill bit and the drill sleeve.

Optional instrument

03.010.062 Drill Bit \varnothing 5.0 mm, calibrated, length 340 mm, 3-flute, for Quick Coupling

For locking screws \varnothing 6.0 mm (aqua)

Follow the procedure described above.



Alternative instrument

03.010.072 Depth Gauge for Locking Screws,
measuring range up to 110 mm,
for No. 03.010.063

or

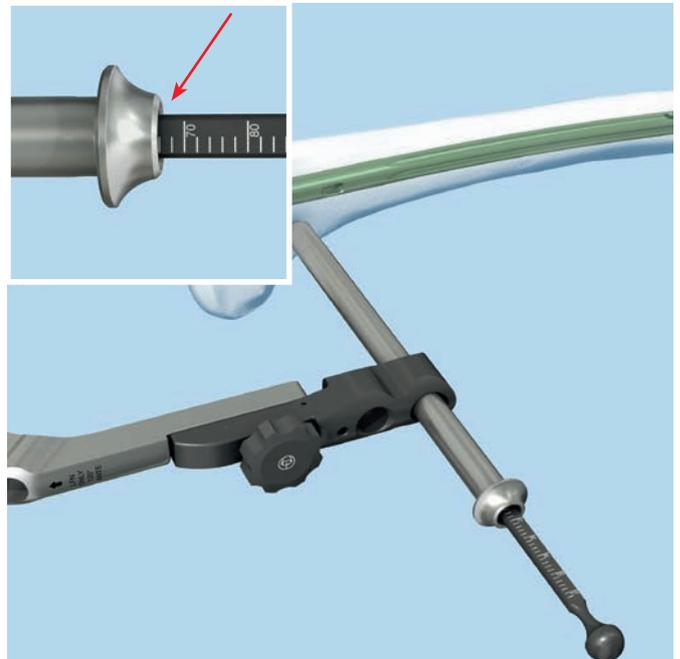
 03.010.428 Depth Gauge for Locking Screws,
measuring range to 110 mm

After drilling both cortices, remove the drill bit and the drill sleeve.

Disassemble the depth gauge into two parts: the sleeve and the slider with hook. Insert the slider with hook into the protection sleeve. Make sure that the hook is just outside the far cortex and that the protection sleeve is firmly pressed against the near cortex.

- ① Control the correct position of the hook of the depth gauge in regard to the far cortex of the femur.

Read the measurement on the shaft of the depth gauge, which corresponds to the appropriate length of the locking screw.



4. Insert locking screw

Instrument

03.010.107 Screwdriver Stardrive, T25,
length 330 mm

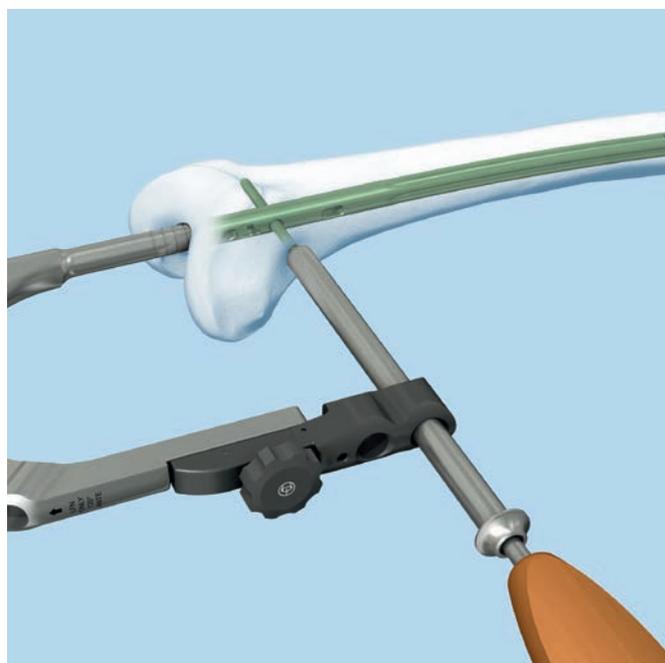
or

 03.010.518 Screwdriver Stardrive, T25,
self-holding, length 319 mm

Insert a locking screw of the measured length with the screwdriver through the protection sleeve until the locking screw head lies against the near cortex. The tip of the locking screw should project beyond the far cortex by no more than 1 to 2 mm.

Repeat the steps 2 to 4 for the second distal locking screw.

Remove the connecting screw.



Retrograde Approach – End Cap Insertion

Insert end cap

Instrument

03.010.110 Screwdriver Stardrive, T40, cannulated, length 300 mm

or

 03.010.520 Screwdriver Stardrive, T40, with spherical head, cannulated, length 277 mm

Align the Expert end cap, cannulated, with extension 0 mm (04.003.000) with the nail axis using the screwdriver.

To minimise the chance of cross threading, turn the end cap counter-clockwise until the thread of the end cap aligns with that of the nail. By turning clockwise, screw the end cap into the nail and tighten it firmly.

Alternative instrument

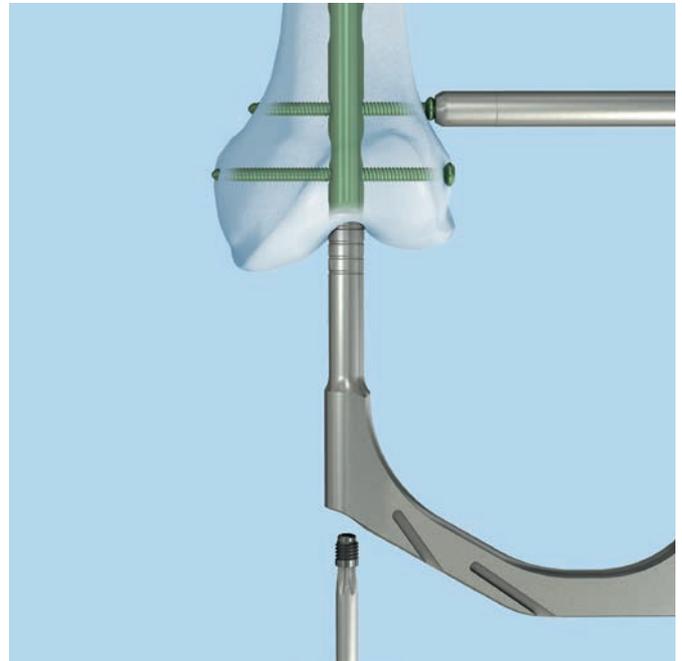
03.010.115 Guide Wire Ø 3.2 mm, length 290 mm

Insert the guide wire into the distal end of the nail and push the end cap and the screwdriver over the guide wire.

Follow the procedure described above.

Precaution: Utilize the gray Titanium End Cap, 0 mm extension, for Femoral Nails – EX (04.003.000) to protect the nail connection threads from bone ingrowth. This facilitates nail removal and locks the most distal screw, providing a stable, fixed-angle construct.

Remove the drill system, aiming arm and insertion handle (and guide wire if used).



Retrograde Approach – Spiral Blade Locking (Optional)

If the proximal aiming device is used for interlocking, please refer to page 44.

1. Mount aiming arm for spiral blade locking

Instrument

03.010.051	Aiming Arm for Expert R/AFN, retrograde, for Spiral Blade Locking
or	
03.010.489	Aiming Arm for Expert R/AFN, retrograde, for Spiral Blade Locking

Mount the aiming arm to the insertion handle.

Precaution: Do not exert force on the aiming arm, protection sleeve or drill bits. These forces may prevent accurate targeting through the locking holes and damage the drill bits.

Distal locking screw

For the distal locking screw, follow the procedure described in section “Retrograde approach – Standard locking”, steps 2 to 4.

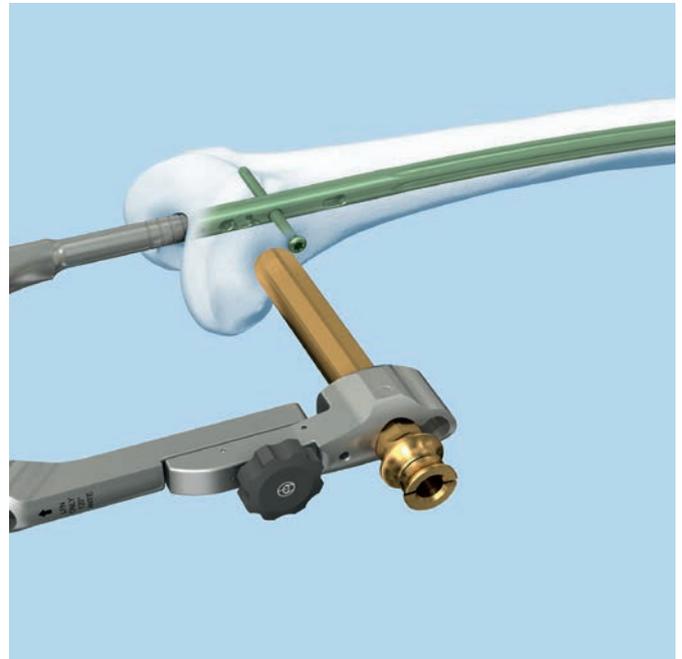


2. Insert spiral blade protection sleeve and drill sleeve

Instruments

03.010.081	Protection Sleeve 15.0/13.0, for Spiral Blade Locking, yellow
03.010.082	Drill Sleeve 13.0/3.2, for No. 03.010.081, yellow

Assemble the protection sleeve and the drill sleeve. Insert the sleeve combination into the aiming arm. Make a lateral stab incision and advance the sleeves to the bone.

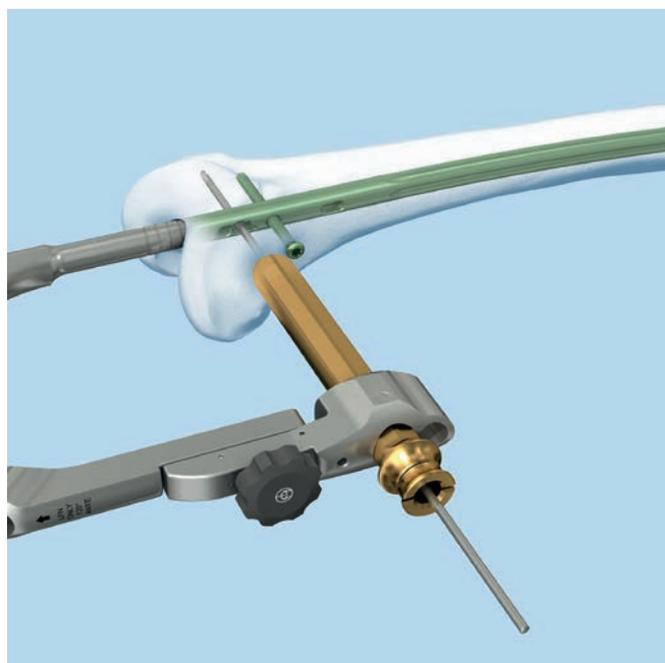


3. Insert guide wire

Instrument

03.010.115 Guide Wire Ø 3.2 mm, length 290 mm

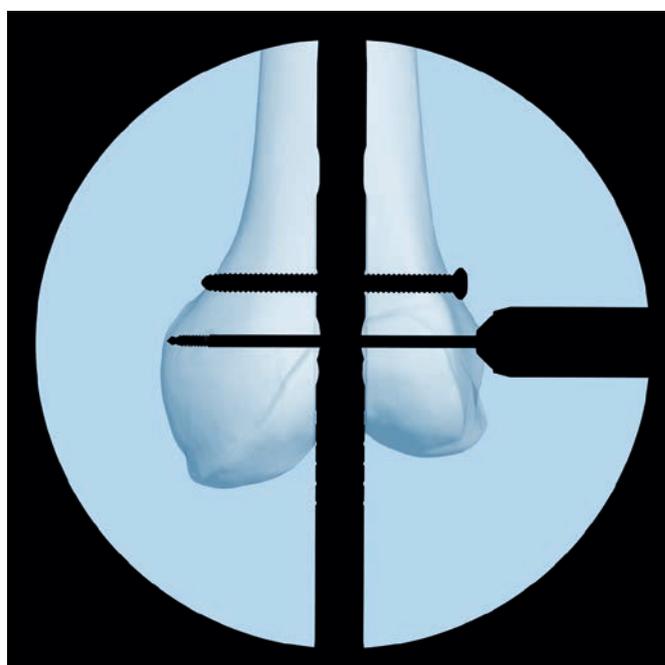
Insert a guide wire through the sleeve combination into the femoral condyles until the tip is flush with the medial cortex.



- Confirm guide wire position radiographically.

Precaution: When monitoring the position of the guide wire in AP view, the trapezoidal shape of the condyles must be taken into account. Turning the leg slightly, for a better view of the guide wire tip with respect to the medial cortex, will ensure an accurate measurement.

Remove the drill sleeve.



4. Measure for length of spiral blade

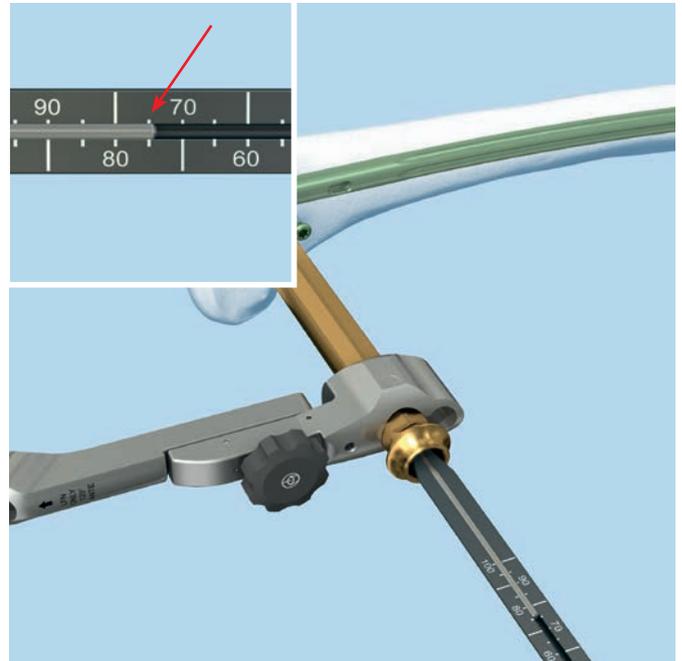
Instrument

03.010.083 Depth Gauge for Spiral Blades
or

 03.010.492 Measuring Device for Expert R/AFN
Spiral Blade

Place the depth gauge over the guide wire and advance it to the bone. Read the graduation of the measuring device at the end of the guide wire indicating the appropriate length of the spiral blade.

Remove the depth gauge.



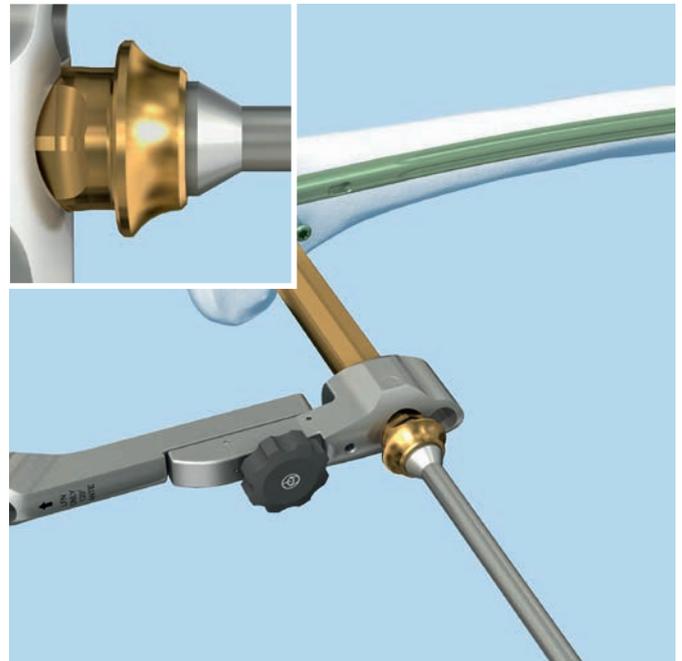
5. Open lateral cortex

Instrument

351.270 Drill Bit \varnothing 13.0 mm, cannulated,
length 290 mm, 3-flute, for Quick
Coupling No. 511.760

Insert the drill bit over the guide wire and through the protection sleeve to perforate the lateral cortex. An automatic stop reduces the risk of the drill bit from penetrating too far.

Remove the drill bit and the protection sleeve.



6. Insert spiral blade

Instruments

03.010.084 Spiral Inserter for Spiral Blade Insertion,
for No. 03.010.051

357.340 Connecting Screw for Spiral Blade for
UFN/CFN, for No. 357.310

03.010.056 Combined Hammer 700 g,
can be mounted, for No. 357.220

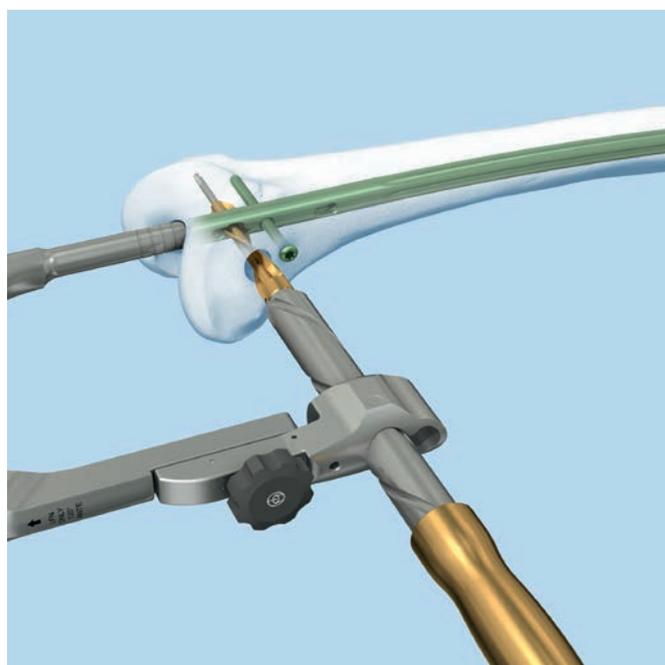
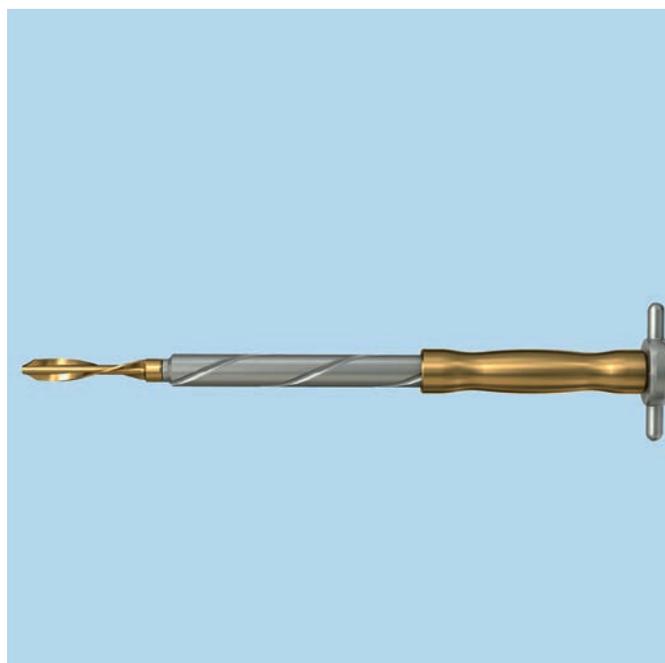
or

 03.010.522 Combined Hammer, 500 g

Attach a spiral blade with appropriate length to the spiral inserter using the connecting screw.

Pass the spiral blade assembly over the guide wire. Advance the spiral inserter through the aiming arm, ensuring engagement of the inserter's helical grooves with the mating pins of the aiming arm.

Manually advance the spiral blade to the bone.

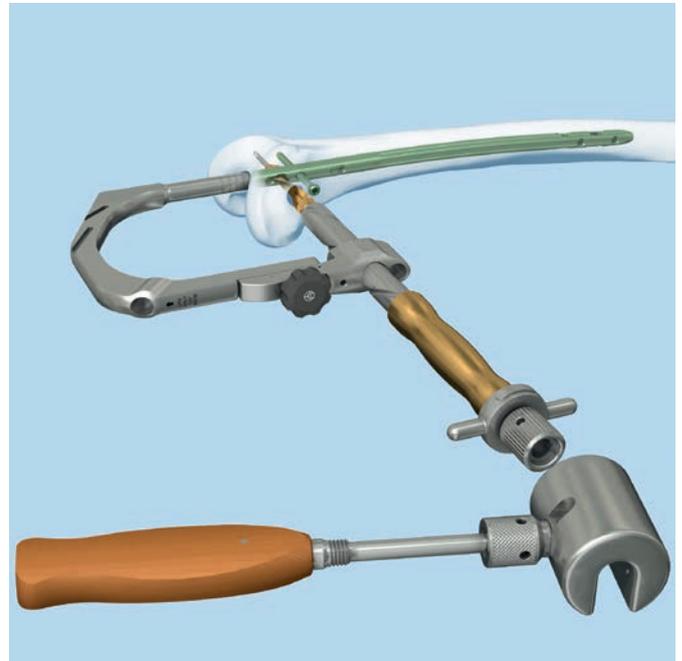


Use light, controlled blows of the combined hammer in the fixed position to seat the spiral blade.

- ① Advancement should be monitored radiographically.

The correct insertion depth is reached when the spiral blade head is flush with the lateral cortex.

Remove the connecting screw.



Retrograde Approach – End Cap Insertion

Insert end cap

Instrument

03.010.110 Screwdriver Stardrive, T40,
cannulated, length 300 mm

or

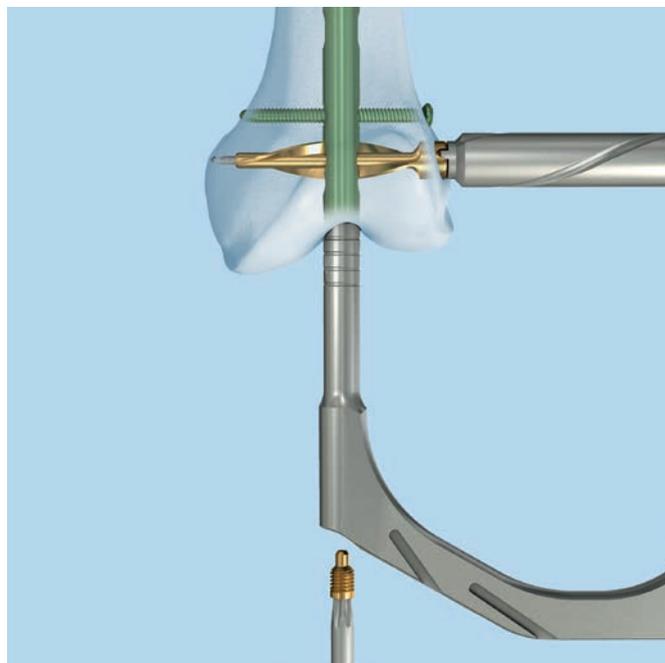
 03.010.520 Screwdriver Stardrive, T40, with
spherical head, cannulated,
length 277 mm

Align the Expert end cap for spiral blade locking (04.013.000) with the nail axis using the screwdriver.

To minimise the chance of cross threading, turn the end cap counter-clockwise until the thread of the end cap aligns with that of the nail. By turning clockwise, screw the end cap into the nail and tighten it firmly.

Precaution: The use of the end cap is mandatory. Besides enabling angular stability of the spiral blade, it prevents bone ingrowth into the distal end of the nail and, therefore, facilitates the nail removal.

Remove the spiral inserter, aiming arm and insertion handle.



Retrograde Approach – Freehand Locking

1. Freehand locking

For the short nails with lengths 160–200 mm, use the two LM holes for proximal locking.

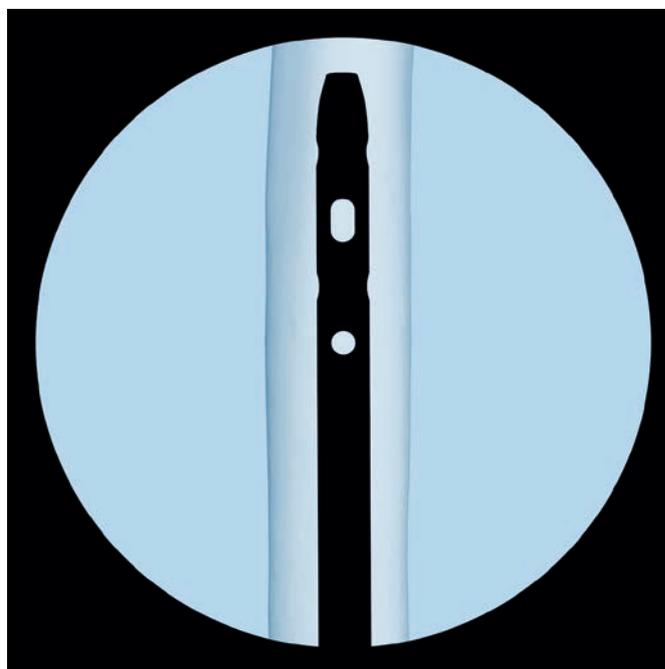
For the intermediate and long nails with lengths 220–480 mm, use the AP hole and AP slot for proximal locking. The dynamic locking option corresponds to the lower position of the AP slot. This type of locking allows controlled dynamisation of the bone fragments.



2. Align image intensifier

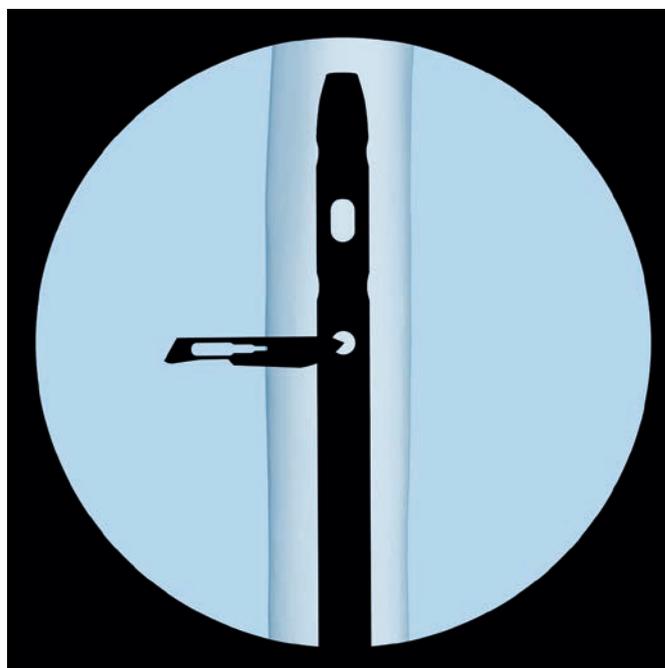
- 1 Check the reduction, the correct alignment of the fragments and the leg length before locking the Expert Retrograde/Antegrade Femoral Nail.

Align the image intensifier until the nail hole appears completely round.



3. Make incision

- 1 Determine the point of skin incision and perform a stab incision with the scalpel.



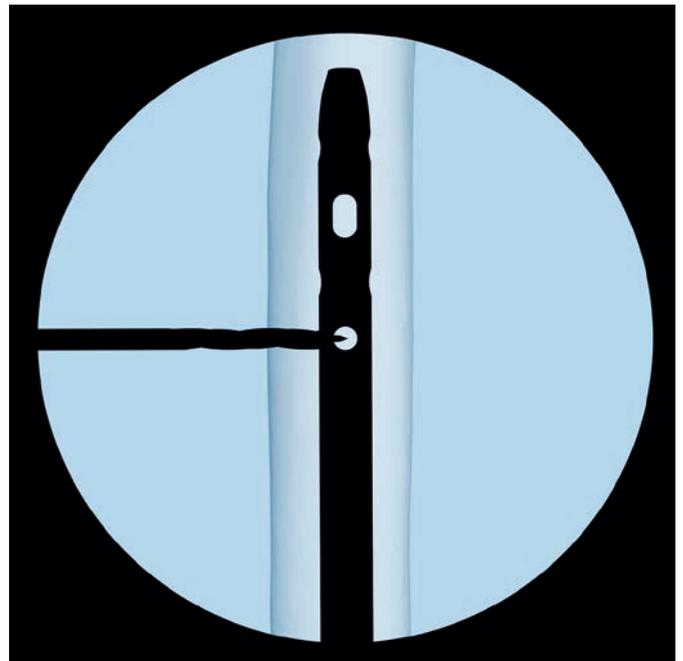
4. Drill

Instrument

03.010.101	Drill Bit \varnothing 4.2 mm, calibrated, length 145 mm, 3-flute, with Coupling for RDL
------------	---

For nails \varnothing 9.0 to 13.0 mm (light green): Locking screws \varnothing 5.0 mm

Insert the desired drill bit into the radiolucent drive (511.300) and push through the incision down to the bone.



Incline the drive so that the tip of the drill bit is centred over the locking hole. The drill bit should almost completely fill the circle of the locking hole. Hold the drill bit in this position and drill through both cortices until the tip of the drill bit just breaks through the far cortex.

Note: For greater drill bit control, discontinue drill power after perforating the near cortex. Manually guide the drill bit through the nail before resuming power to drill the far cortex.

Alternative instrument

03.010.104 Drill Bit Ø 4.2 mm, calibrated,
length 145 mm, 3-flute,
for Quick Coupling

If there is no radiolucent drive available and locking is performed with the standard freehand technique, use the drill bit for quick coupling.

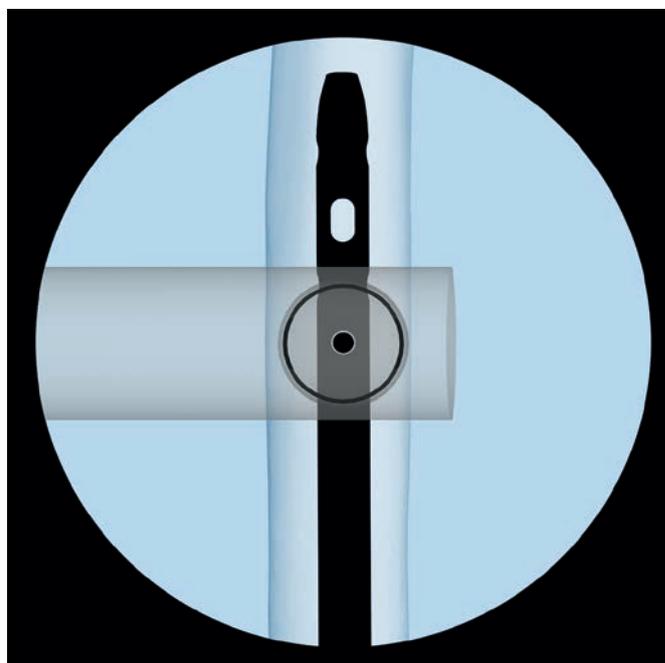
Optional instruments

03.010.102 Drill Bit Ø 5.0 mm, calibrated,
length 145 mm,
with Coupling for RDL

03.010.105 Drill Bit Ø 5.0 mm, calibrated,
length 145 mm,
for Quick Coupling

**For Nails Ø 14.0 and 15.0 mm (aqua):
Locking screws Ø 6.0 mm**

Follow the procedure described above.



5. Measure for length of locking screw

Instrument

03.010.072 Depth Gauge for Locking Screws, measuring range up to 110 mm, for No. 03.010.063

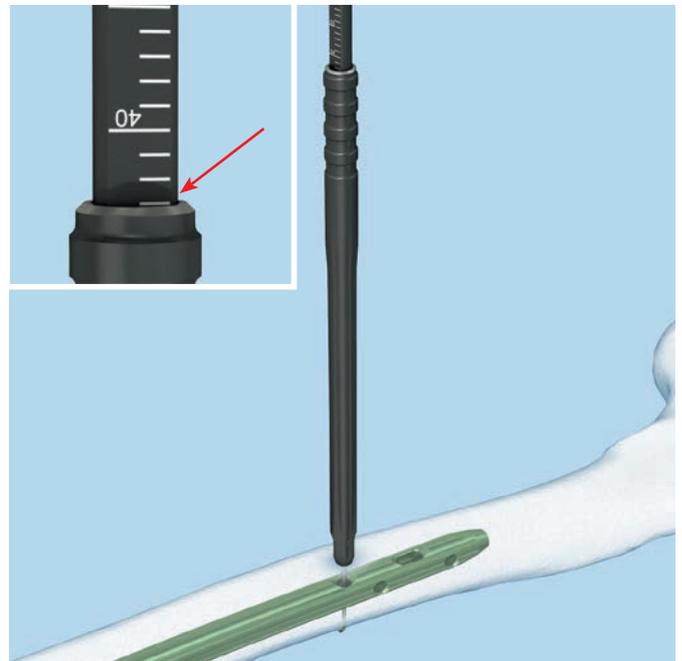
or

 03.010.428 Depth Gauge for Locking Screws, measuring range to 110 mm

Measure the locking screw length using the depth gauge. Make sure that the hook is just outside the far cortex and that the sleeve is firmly pressed against the near cortex.

-  Control the correct position of the hook of the depth gauge in regard to the far cortex of the femur.

Read the measurement on the shaft of the depth gauge, which corresponds to the appropriate length of the locking screw.



Alternative instrument

03.010.106 Direct Measuring Device for
Drill Bits of length 145 mm,
for Nos. 03.010.100 to 03.010.105

or

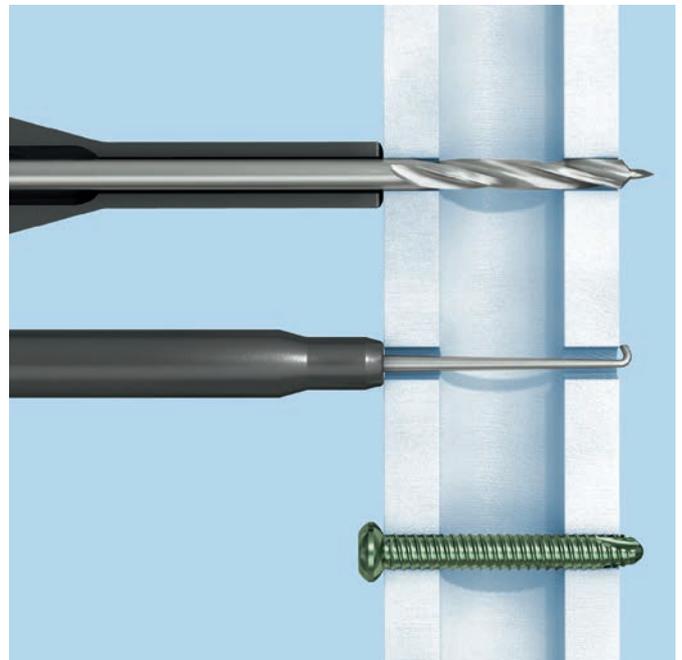
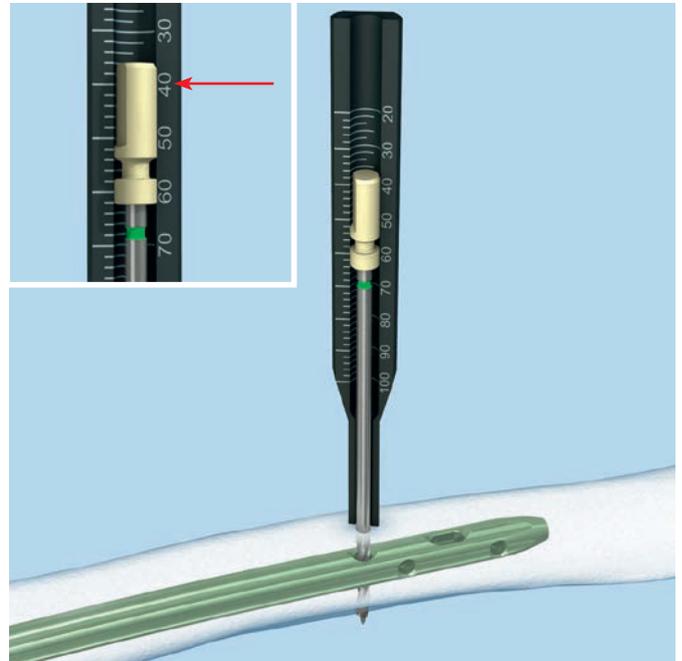
 03.010.429 Direct Measuring Device for Drill Bits,
length 145 mm

Stop drilling immediately after both cortices and disassemble the drill bit from the radiolucent drive. Slide the measuring device onto the drill bit.

- ⓘ Control the correct position of the drill bit in regard to the far cortex of the femur.

Read the measurement on the measuring device, which corresponds to the appropriate length of the locking screw.

Note: Correct placement of the hook of the depth gauge and correct end position of the drill bit, respectively, are important in order to choose the correct locking screw length.



6. Insert locking screw

Instruments

03.010.107 Screwdriver Stardrive, T25, length 330 mm

and
03.010.112 Holding Sleeve, with Locking Device

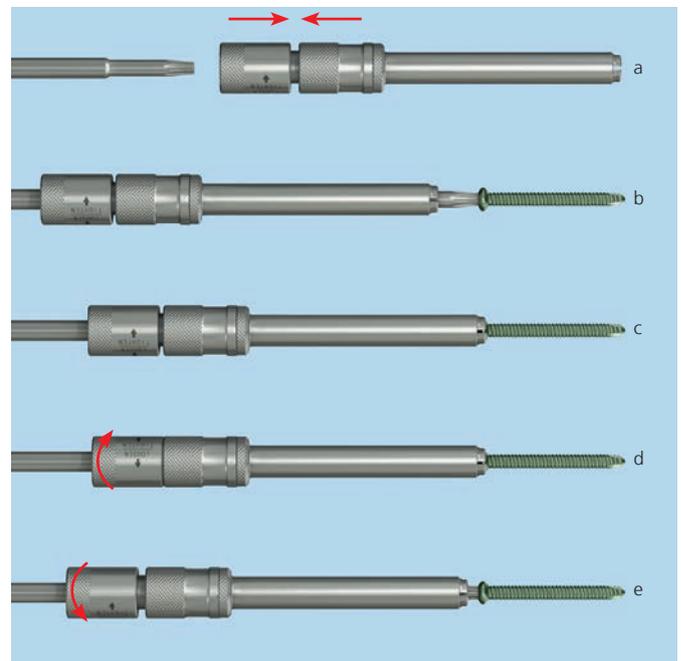
or

 03.010.518 Screwdriver Stardrive, T25, self-holding, length 319 mm

and
03.010.112 Holding Sleeve, with Locking Device

or

 03.010.473 Inter-Lock Screwdriver, combined, Stardrive, T25 / hexagonal Ø 3.5, length 224 mm



Insert the locking screw with the correct length with the screwdriver alone, or used in combination with the holding sleeve.

-  Control the correct position and length of the locking screws radiographically. Exchange the locking screws with the appropriate length if necessary.

Repeat the steps 2 to 6 for the second proximal locking screw.

Use the holding sleeve as described below:

- Insert the holding sleeve onto the shaft of the screwdriver.
- Place the tip of the screwdriver in the recess of the locking screw.
- Push the holding sleeve in the direction of the locking screw; the sleeve now holds the locking screw.
- Lock the holding sleeve by tightening it anticlockwise.
- Release the holding sleeve after insertion of the locking screw by loosening it clockwise and pushing backwards.

Retrograde Approach –

Interlocking with PAD for Expert RFN (Optional)

Besides distal standard or spiral blade locking, the proximal aiming device for Expert Retrograde Femoral Nail (03.010.142, 03.010.143, 03.010.144 and 03.010.129), allows for guided proximal locking of all Expert Retrograde Femoral Nails of length 160 to 200 mm.

Distal Standard Locking

Mount arm and module of PAD for standard locking

Instruments

03.010.142	Arm for Proximal Aiming Device for Expert Retrograde Femoral Nail, lengths 160 to 200 mm
03.010.143	Module for Standard Locking, for Proximal Aiming Device for Expert Retrograde Femoral Nail, lengths 160 to 200 mm

Using the screwdriver (03.010.092) confirm that the connecting screw between the insertion handle and the nail is tightened.

Mount the arm of the proximal aiming device and the module for standard locking to the insertion handle.

For the two distal locking screws, follow the procedure described in section "Retrograde approach – Standard locking", steps 2 to 4.



Distal Spiral Blade Locking

Insert spiral blade protection sleeve and drill sleeve

Instruments

03.010.142	Arm for Proximal Aiming Device for Expert Retrograde Femoral Nail, lengths 160 to 200 mm
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03.010.144	Module for Spiral Blade Locking, for Proximal Aiming Device for Expert Retrograde Femoral Nail, lengths 160 to 200 mm
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Using the screwdriver (03.010.092), confirm that the connecting screw between the insertion handle and the nail is tightened.

Mount the arm of the proximal aiming device and the module for spiral blade locking to the insertion handle.

For the distal locking screw and the spiral blade, follow the procedure described in section “Retrograde approach – Spiral blade locking”, steps 2 to 6.



Proximal Locking

Check alignment of proximal aiming device

Instruments

03.010.129	Aiming Sleeve 12.0/8.0, with Cross Wires, length 188 mm
03.010.092	Screwdriver, hexagonal with spherical head \varnothing 8.0 mm
or	
 03.010.517	Screwdriver, hexagonal \varnothing 8.0 mm, with T-Handle, with spherical head, length 322 mm

Using the screwdriver confirm that the connecting screw between the insertion handle and the nail is well tightened.

Insert the aiming sleeve through one of the desired holes in the proximal aiming device (see markings for nails of length 160, 180 or 200 mm). Make a stab incision and insert the aiming sleeve to the bone.

- ⓘ Orient the image intensifier in the axis of the aiming sleeve and check the correct alignment, i.e. the cross wires of the aiming sleeve should be centred in the respective locking hole of the nail.

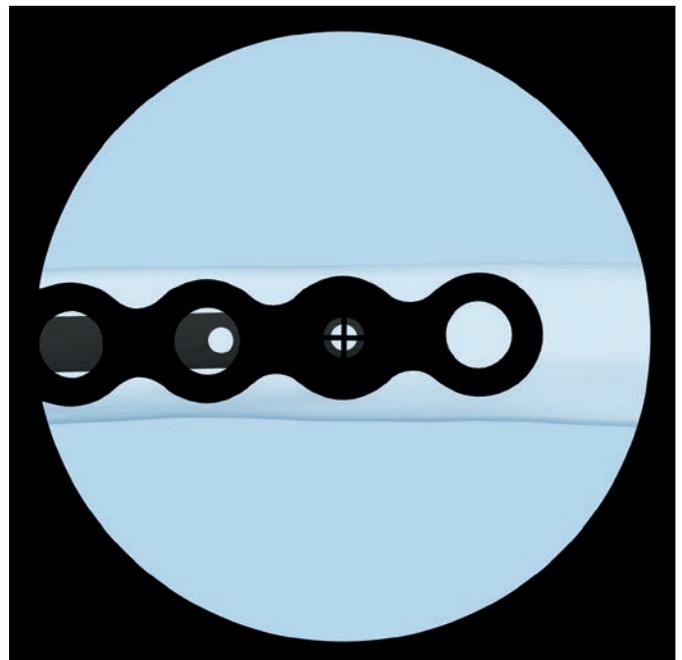
Remove the aiming sleeve.

Two proximal locking screws: if alignment is correct

Follow the procedure for guided locking described in section "Retrograde approach – Standard locking", steps 2 to 4.

Two proximal locking screws: if alignment is not correct

Remove the proximal aiming device and follow the procedure for freehand locking described in section "Retrograde approach – Freehand locking", steps 2 to 6.



Final view of implanted Expert Retrograde/Antegrade Femoral Nail in retrograde approach with standard locking.



Final view of implanted Expert Retrograde/Antegrade Femoral Nail in retrograde approach with spiral blade locking.



Antegrade Approach – Opening the Proximal Femur

1. Position patient

Place the patient in a supine position or lateral decubitus position (not shown) on a fracture or radiolucent table. It is recommended to slightly heighten and adduct the fractured leg, which facilitates the approach to the nail insertion site.

Position the C-arm to enable visualisation of the proximal and distal femur in both the AP and lateral views.

- ① The contralateral leg should be flexed in the hip and in the knee to facilitate visualisation by image intensifier.



2. Reduce fracture

- ① Perform closed reduction manually by axial traction under image intensifier. In case of older fractures, the use of the large distractor (394.350) or pinless fixator (186.310) may be appropriate under certain circumstances.

3. Measure for length and diameter of nail

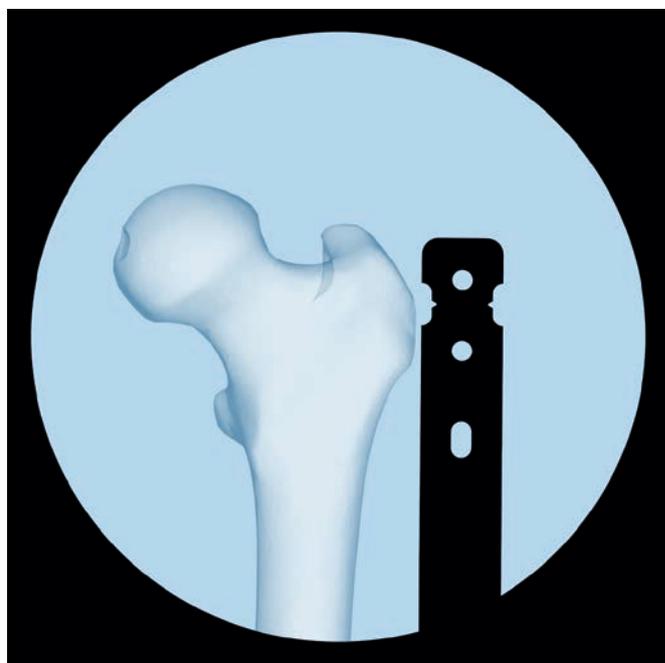
Instruments

03.010.020	Radiographic Ruler for Expert Femoral Nails
03.010.023	Radiographic Ruler for Nail Diameters for Expert Femoral Nails, length 365 mm

The required nail length must be determined after reduction of the upper leg fracture.

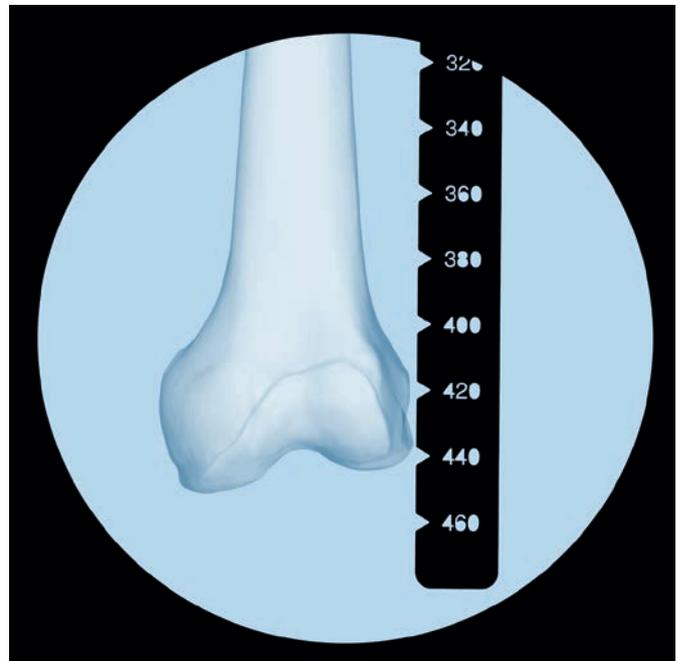
Position the image intensifier as for an AP view of the proximal femur. Using long forceps, hold the ruler parallel to the femur on the lateral side of the upper leg.

- ① position the ruler such that the end is located at or just below the level of the tip of the greater trochanter. Mark the skin on the lateral side.



- Move the image intensifier toward the distal femur, align the proximal end of the ruler with the skin marking and record an AP x-ray of the distal femur. Check the reduction and read off the required nail length on the radiographic ruler as it appears in the x-ray.

Precaution: It is recommended that the tip of the nail is at least 5 cm below the most distal extension of the fracture zone. The possibility of dynamisation must also be taken into account when determining the nail length and a correspondingly shorter nail should be chosen. The locking screw in the dynamic locking option can move by up to 5 mm distally.



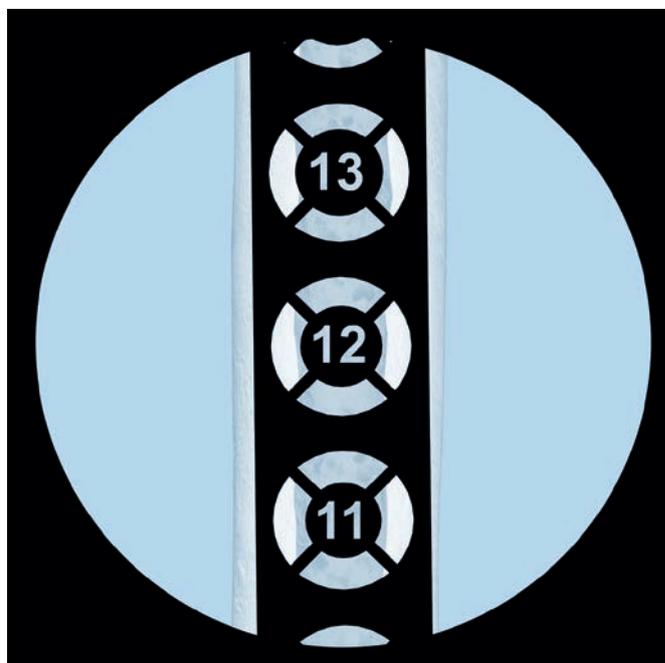
Alternatives

Determine the nail length by the procedure above on the uninjured leg before draping (non-sterile) or compare the length of two identical SynReam reaming rods \varnothing 2.5 mm or use the Depth Gauge for Medullary Nails in combination with the SynReam reaming rod \varnothing 2.5 mm, length 950 mm see SynReam surgical technique or RIA surgical technique.

Place the radiographic ruler for nail diameters over the femur so that the measuring edge is located over the isthmus. Select the nail diameter shown when the medullary canal/cortex transition is still visible on both sides of the marking (12 mm in this example).

If the reamed technique is used, the diameter of the largest medullary reamer applied must be 0.5 to 1.5 mm larger than the nail diameter.

Note: The ruler is not at the same level as the femur. This affects the accuracy of the measurement, providing only an estimate of the canal diameter.



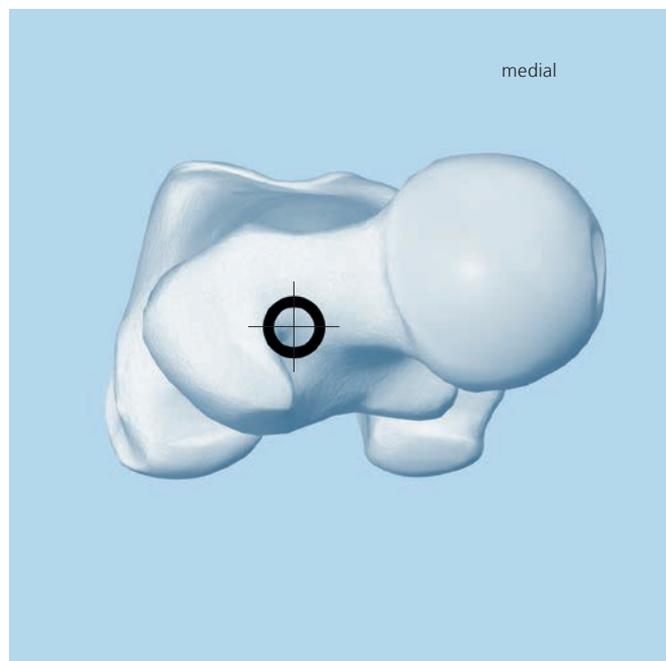
4. Approach

Make a longitudinal stab incision about 3 cm long approximately 10 to 15 cm proximal to the tip of the greater trochanter towards the tip, through the gluteus medius.

5. Determine entry point

The entry point for the Expert Retrograde/Antegrade Femoral Nail is in line with the medullary canal in the AP and lateral views. The point is posterior in the proximal femur, in the piriformis fossa.

The entry point is determinant for the correct final position of the nail in the medullary canal.



6. Insert guide wire

Instruments

03.010.500 Handle, with Quick Coupling
and

 03.010.503 Protection Sleeve 13.0 for Expert R/AFN,
antegrade, with Quick Coupling

and

 03.010.508 Multihole Drill Guide for Protection
Sleeve 13.0, for Expert R/AFN,
antegrade

or

03.010.030 Protection Sleeve 13.0,
for antegrade approach

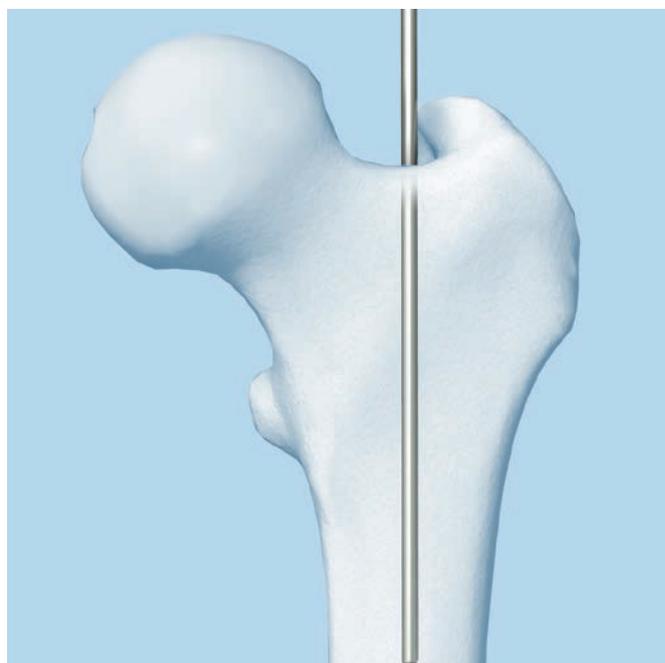
and

03.010.031 Drill Sleeve 13.0/3.2, for antegrade
approach, for No. 03.010.030

393.100 Universal Chuck with T-Handle

357.399 Guide Wire Ø 3.2 mm, length 400 mm

Insert the guide wire into the piriformis fossa and in line with the anatomic axis of the femur in both the AP and lateral views.



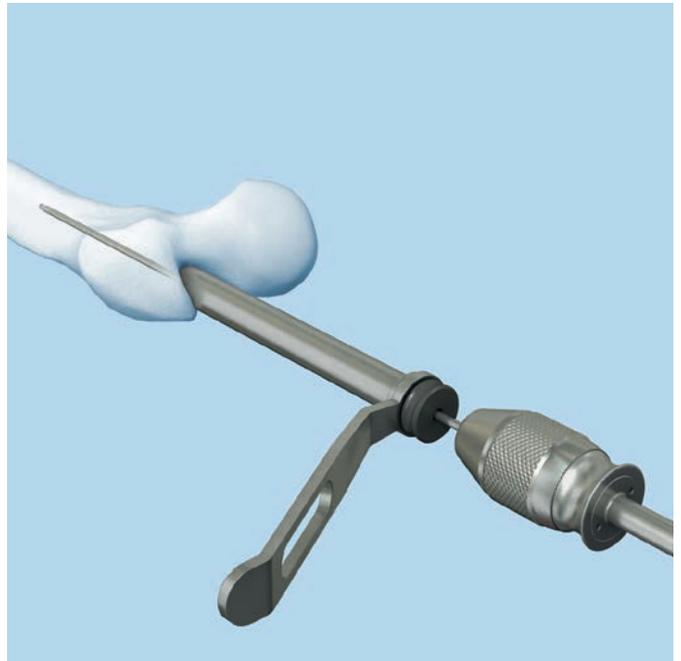
Thread the drill sleeve into the protection sleeve. Insert the assembly through the incision to the bone.

Secure the guide wire in the universal chuck.

Hold the protection sleeve firmly and insert the guide wire through the trocar and into the piriformis fossa.

- ① Insert the guide wire in line with the anatomic axis of the femur. Check the position under the image intensifier in AP and lateral views.

Remove the drill sleeve.



7a. Open medullary canal – drill bit

Instruments

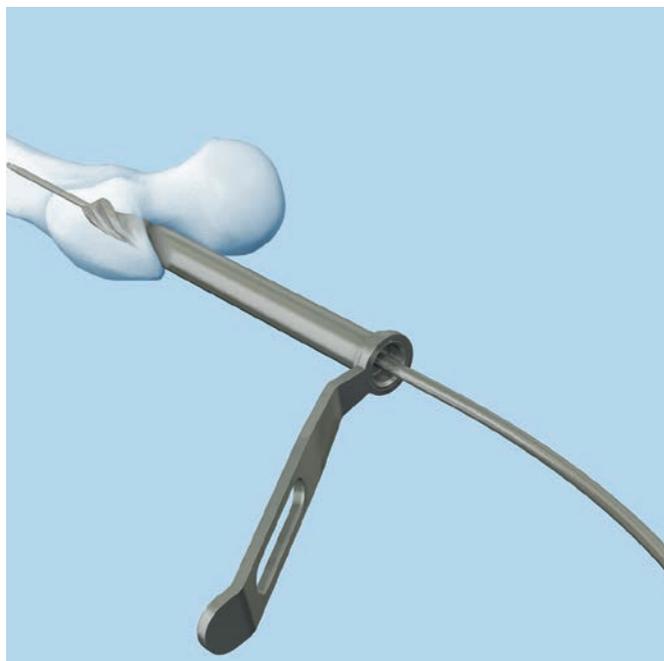
03.010.034	Drill Bit Ø 13.0 mm, cannulated, flexible
03.010.030	Protection Sleeve 13.0, for antegrade approach
or	
03.010.500 and 03.010.503	Handle, with Quick Coupling Protection Sleeve 13.0 for Expert R/AFN, antegrade, with Quick Coupling
03.010.115	Guide Wire Ø 3.2 mm, length 290 mm

Push the drill bit over the guide wire and through the protection sleeve and open the medullary canal over approximately 10 cm, to the level of the lesser trochanter.

Precautions:

- **The use of the drill bit for opening the medullary canal is suitable for nails Ø 9.0 to 12.0 mm. For the larger nails Ø 13.0 to 15.0 mm, the use of a reaming system is recommended.**
- **Take care to not plunge the drill bit into the fracture site because this may displace the fracture.**

Remove the drill bit and protection sleeve.



7b. Open medullary canal – awl

Alternative instruments

03.010.041	Awl Ø 14.0/3.2 mm, cannulated
03.010.115	Guide Wire Ø 3.2 mm, length 290 mm

Alternatively, the awl may be used to open the medullary canal.

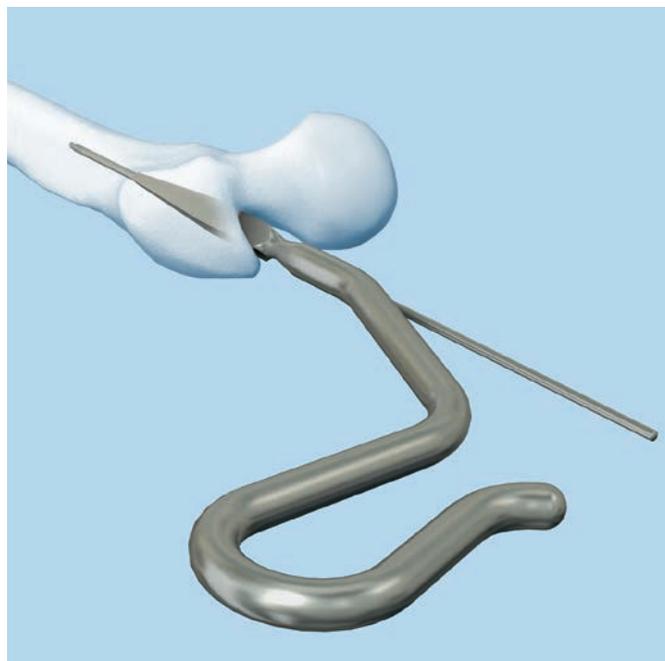
Remove the protection sleeve.

Push the awl over the guide wire and open the medullary canal.

Precautions:

- **The use of the awl for opening the medullary canal is suitable for nails Ø 9.0 to 13.0 mm. For the larger nails Ø 14.0 and 15.0 mm, the use of a reaming system is recommended.**
- **Take care to not plunge the awl into the fracture site because this may displace the fracture.**

Remove the awl.



Antegrade Approach – Reaming (Optional)

Reaming medullary canal (optional)

If necessary, use a reaming system intended for femur reaming procedures to enlarge the medullary femoral canal of the desired diameter.

- ⓘ Check fracture reduction under the image intensifier.

Inserting the reaming rod

Insert the reaming rod into the medullary canal.

Reaming

Starting with the smallest diameter, ream the medullary canal in 0.5 mm increments. The holding forceps is used to control the rotation of the reaming rod. Advance the reamer head with slight forward and backward movements.

Do not use force. Continue reaming until the diameter of the canal is 0.5 to 1.5 mm larger than the nail diameter.

Precaution: All Expert Retrograde/Antegrade Femoral Nails can be inserted over the reaming rod. The tip of the reaming rod must be correctly positioned in the medullary canal since it determines the final distal position of the nail.



Antegrade Approach – Inserting Nail

1. Mount nail on insertion handle

Instruments

03.010.146 Connecting Screw, cannulated, with Internal M6x1 Thread

03.010.046 Insertion Handle, long, for Expert Femoral Nails

or

 03.010.486 Insertion Handle, radiolucent, length 100 mm

03.010.092 Screwdriver, hexagonal with spherical head \varnothing 8.0 mm

or

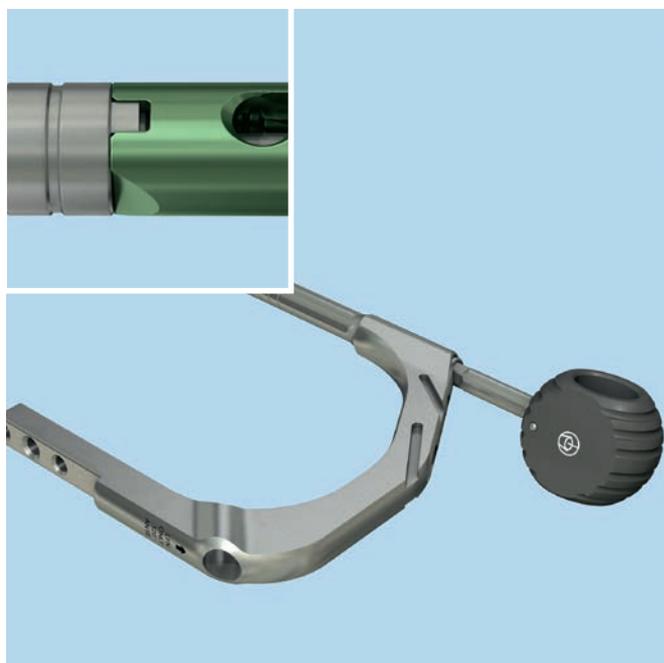
 03.010.517 Screwdriver, hexagonal \varnothing 8.0 mm, with T-Handle, with spherical head, length 322 mm

03.010.093 Rod Pusher for Reaming Rod with Hexagonal Screwdriver \varnothing 8.0 mm

Slide the connecting screw onto the rod pusher until it is secured and insert it into the insertion handle.



The anterior bow of the nail must be aligned with the anterior bow of the femur. Orient the insertion handle anteriorly, match the notch on the insertion handle to the nail, and tighten the connecting screw.



Check that the connecting screw is correctly and well tightened to the nail with the screwdriver, but do not over-tighten.

Alternative instruments

03.010.044 Connecting Screw, cannulated,
for Expert Tibial and Femoral Nails,
for No. 03.010.045

03.010.045 Insertion Handle, for Expert Tibial and
Femoral Nails

Follow the procedure described above.



2. Insert nail

Using the insertion handle, insert the nail over the reaming rod, if used, into the medullary canal as far as possible by hand. Rotational movements of small amplitude can help.

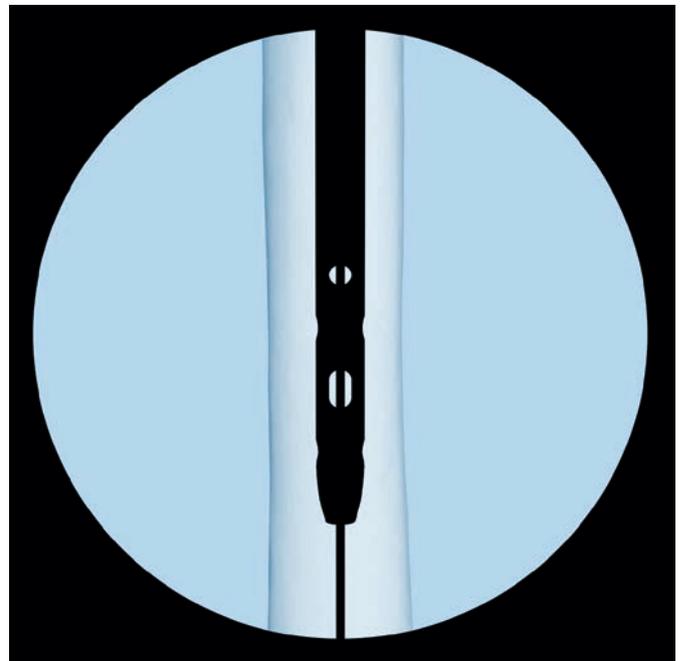
Use the insertion assembly to manipulate the nail across the fracture. Insert the nail until the proximal end is at or just below the level of the tip of the greater trochanter.

Note: Confirm that the nail is securely connected to the insertion handle, especially after hammering, using either the 8 mm ball hex screwdriver or the cannulated shaft with 8 mm hex.



- ⓘ Monitor nail passage across the fracture, control in two planes to avoid malalignment.
- ⓘ Check the final position of the nail in AP and lateral views.

Note: For proximal locking, mount the aiming arm only when the nail has been completely inserted, otherwise the aiming arm may loosen during nail insertion.



Alternative instruments

03.010.047	Connector, length 141 mm, for Insertion Handle
03.010.056	Combined Hammer 700 g, can be mounted, for No. 357.220
or	
 03.010.522	Combined Hammer, 500 g
357.220	Hammer Guide, for No. 357.250
or	
 03.010.170	Hammer Guide
321.160	Combination Wrench Ø 11.0 mm
321.170	Pin Wrench Ø 4.5 mm, length 120 mm
03.010.092	Screwdriver, hexagonal with spherical head Ø 8.0 mm
or	
 03.010.517	Screwdriver, hexagonal Ø 8.0 mm, with T-Handle, with spherical head, length 322 mm
357.398	Shaft, hexagonal Ø 8.0 mm, cannulated, short, length 125 mm



If necessary, insert the nail using light hammer blows. Attach the connector to the insertion handle in the first (medial) slot if possible and tighten it. If the soft tissue does not allow to do so, use the second (lateral) slot for the attachment of the connector. Use the combined hammer in the fixed mode.

If more insertion forces are necessary, attach the hammer guide to the connector and use the combined hammer in sliding mode. To obtain the “sliding” mode of the combined hammer, first loose the nut on the hammer shaft and fix it at the position close to the insertion handle.

Notes:

- **If insertion is not easily possible, you may choose a nail with a smaller diameter or enlarge the entry canal by reaming the medullary canal to a larger diameter.**
- **Do not strike the insertion handle directly.**

Antegrade Approach – Standard Locking

1. Mount aiming arm

Instrument

03.010.480	Aiming Arm, radiolucent, for Expert R/AFN, antegrade, for Standard Locking
or	
03.010.049	Aiming Arm for Expert R/AFN, antegrade, for Standard Locking

Using the screwdriver (03.010.092) confirm that the connecting screw (03.010.042) between the insertion handle (03.010.046) and the nail is well tightened.

Mount the aiming arm to the insertion handle.

Precaution: Do not exert forces on the aiming arm, protection sleeve, drill sleeves and drill bits in order to guarantee a good drilling precision through the proximal locking holes and to avoid breakage of the drill bits.

Proximal locking screws

For the two proximal locking screws, follow the procedure described in section “Retrograde approach – Standard locking”, steps 2 to 4.

Use the LM hole and LM slot for proximal locking. The dynamic locking option corresponds to the upper position of the LM slot. This type of locking allows controlled dynamisation of the bone fragments.



Antegrade Approach – End Cap Insertion

1. Insert end cap

Instrument

03.010.110 Screwdriver Stardrive, T40, cannulated, length 300 mm

or

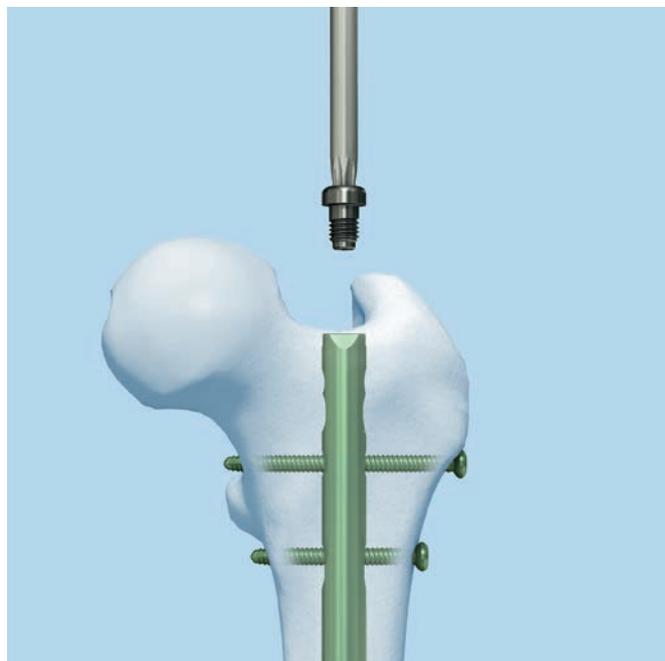
 03.010.520 Screwdriver Stardrive, T40, with spherical head, cannulated, length 277 mm

Remove the nail insertion instruments.

Align the end cap, cannulated, with extension 0–20 mm (04.003.000–004) with the nail axis using the screwdriver Stardrive T40 (03.010.110).

To minimise the chance of cross-threading, turn the end cap counter-clockwise until the thread of the end cap aligns with that of the nail.

By turning clockwise, screw the end cap into the nail and tighten it firmly.



Alternative instrument

03.010.115 Guide Wire Ø 3.2 mm, length 290 mm

Insert the guide wire into the proximal end of the nail and push the end cap and the screwdriver over the guide wire.

Follow the procedure described above.

Precaution: The use of the end cap is mandatory. Besides enabling angular stability of the distal locking screw, it prevents bone ingrowth into the proximal end of the nail and, therefore, facilitates nail removal.

Remove the screwdriver (and guide wire if used).



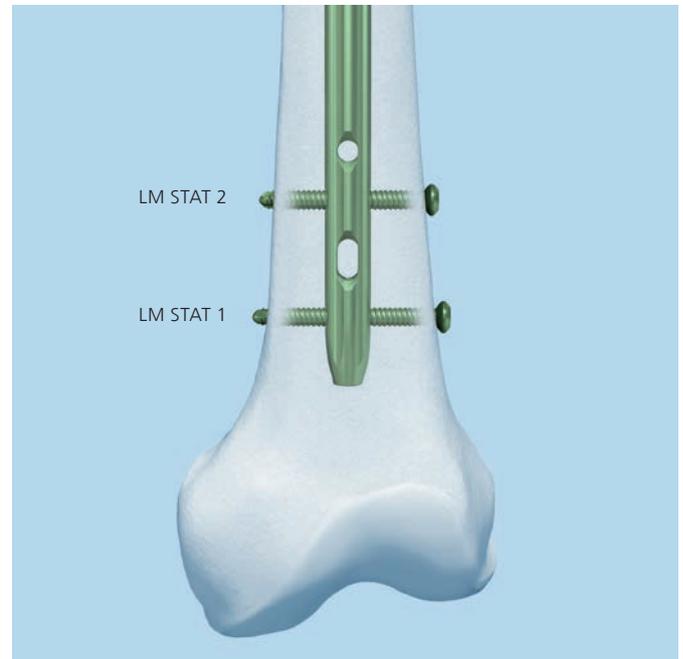
Antegrade Approach – Freehand Locking

1. Freehand distal locking

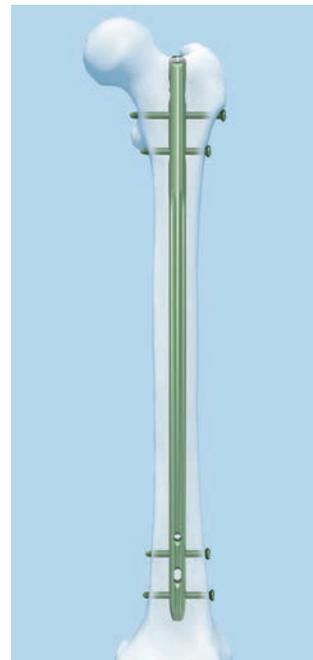
Use the two LM holes for distal locking.

Freehand distal locking screws

For the freehand distal locking screws, follow the procedure described in section “Retrograde approach – freehand locking”, steps 2 to 6.



Final view of implanted Expert Retrograde/Antegrade Femoral Nail in antegrade approach with standard locking



Implant Removal

For R/AFN in retrograde position with spiral blade locking:

1. Remove end cap

Instrument

03.010.110 Screwdriver Stardrive, T40, cannulated, length 300 mm

or

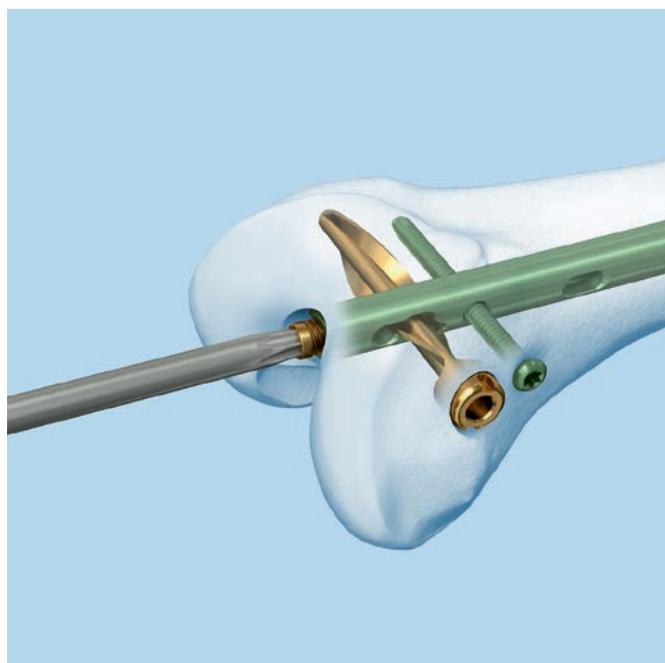
 03.010.520 Screwdriver Stardrive, T40, with spherical head, cannulated, length 277 mm

Implant removal is an elective procedure.

Clear the Stardrive socket of the end cap from any ingrown tissue.

Remove the end cap with the screwdriver.

Note: When removing implants after long-term implantation, especially in the presence of large amounts of bony ingrowth, first use a solid screwdriver to loosen the end cap and locking screws. The T40 inter-lock screwdriver can be used to remove the end cap or locking screws from the surgical site.



2. Remove spiral blade

Instruments

357.360	Extraction Screw for UFN/CFN and Spiral Blade
321.170	Pin Wrench Ø 4.5 mm, length 120 mm
03.010.056	Combined Hammer 700 g, can be mounted, for No. 357.220
or	
03.010.522	Combined Hammer, 500 g
357.220	Hammer Guide, for No. 357.250
or	
03.010.170	Hammer Guide



Clear the socket of the spiral blade from any ingrown tissue.

Thread the extraction screw into the hub of the spiral blade. Thread the hammer guide into the extraction screw.

Use controlled blows of the combined hammer in “sliding” mode to extract the spiral blade. Leave a loose grip on the extraction assembly as it and the spiral blade rotate during extraction.



3. Remove proximal locking screws

Instruments

03.010.107 Screwdriver Stardrive, T25,
length 330 mm

or

03.010.112 Holding Sleeve, with Locking Device

 03.010.518 Screwdriver Stardrive, T25,
self-holding, length 319 mm

and

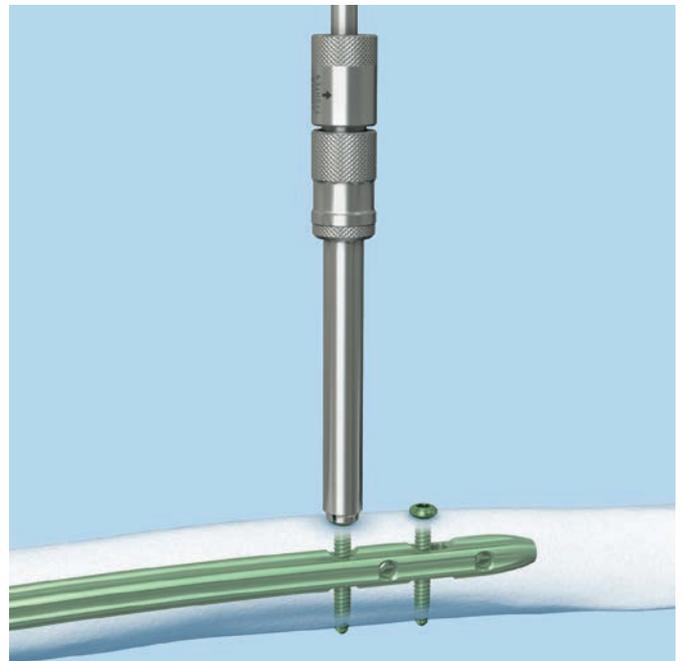
03.010.112 Holding Sleeve, with Locking Device

or

 03.010.473 Inter-Lock Screwdriver, combined,
Stardrive, T25 / hexagonal \varnothing 3.5,
length 224 mm

Clear the Stardrive socket of the locking screws from any ingrown tissue.

Remove the proximal locking screws using the screwdriver and the holding sleeve.



4. Attach extraction screw and hammer guide

Instruments

03.010.000 Extraction Screw,
for Tibial and Femoral Nails

357.220 Hammer Guide, for No. 357.250*
or

 03.010.170 Hammer Guide

03.010.107 Screwdriver Stardrive, T25,
length 330 mm

or

 03.010.518 Screwdriver Stardrive, T25,
self-holding, length 319 mm

Before removing the distal locking screw, screw the extraction screw into the nail and tighten it to reduce the risk of rotation or displacement of the nail.

Attach the hammer guide to the extraction screw.

Remove the remaining locking screw with the screwdriver.



* Also suitable for No. 03.010.056

5. Remove nail

Instrument

03.010.056 Combined Hammer 700 g,
can be mounted, for No. 357.220

or

 03.010.522 Combined Hammer, 500 g

Extract the nail by applying gentle blows with the combined hammer.



For R/AFN in retrograde position with standard locking:

Follow the procedure described above by removing the locking implants in the order: end cap, first distal locking screw, both proximal locking screws, second distal locking screw.

For R/AFN in antegrade position with standard locking:

Follow the procedure described above by removing the locking implants in the order: end cap, first proximal locking screw, both distal locking screws, second proximal locking screw.

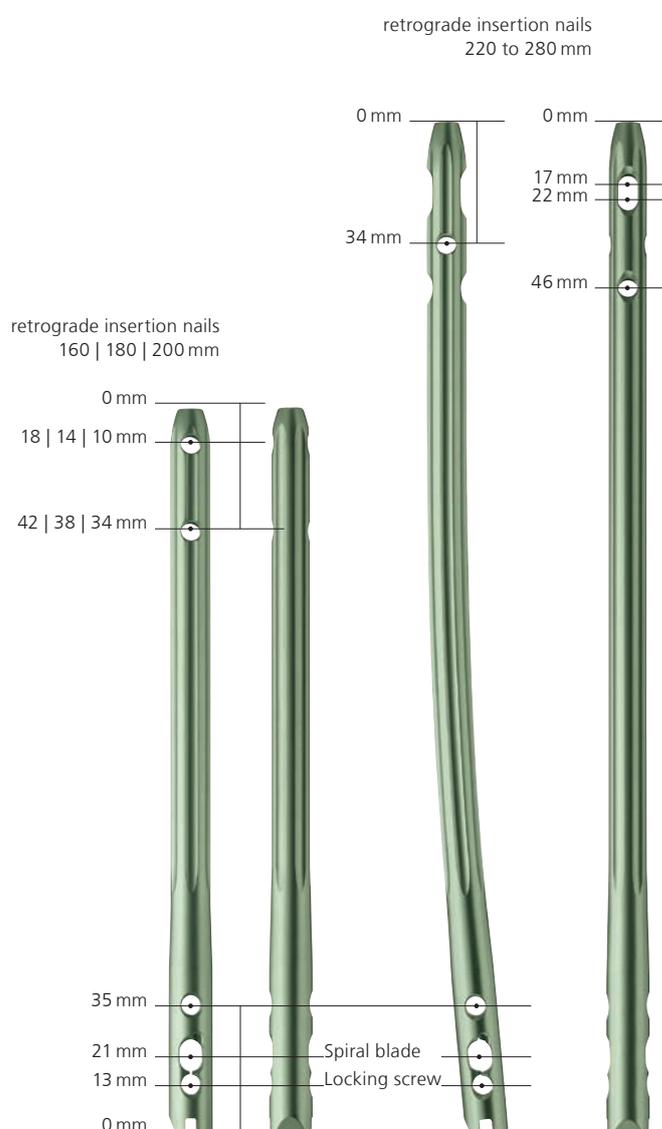
Nails

All implants are available in TAN*.

Expert Retrograde Femoral Nails**
 Ø 9.0–13.0 mm, non-sterile and sterile

Length	Ø 9 mm mm light green	Ø 10 mm light green	Ø 11 mm light green
160	04.013.312	04.013.412	04.013.512
180	04.013.316	04.013.416	04.013.516
200	04.013.320	04.013.420	04.013.520
220	04.013.324	04.013.424	04.013.524
240	04.013.328	04.013.428	04.013.528
260	04.013.332	04.013.432	04.013.532
280	04.013.336	04.013.436	04.013.536

Length	Ø 12 mm mm	Ø 13 mm light green	light green
160	04.013.612	04.013.712	
180	04.013.616	04.013.716	
200	04.013.620	04.013.720	
220	04.013.624	04.013.724	
240	04.013.628	04.013.728	
260	04.013.632	04.013.732	
280	04.013.636	04.013.736	



Available non-sterile or sterile packed.
 Add "S" to the catalogue number to order sterile products.
 Retrograde or Antegrade Insertion, 300 mm to 480 mm

* TiAl6Nb7

** In Vario Case for Expert Retrograde/Antegrade Femoral Nails, without Lid, without Contents (68.013.307) space is provided for 48 nails (four different diameters from Ø 9.0 to 13.0 mm, 12 lengths per diameter).

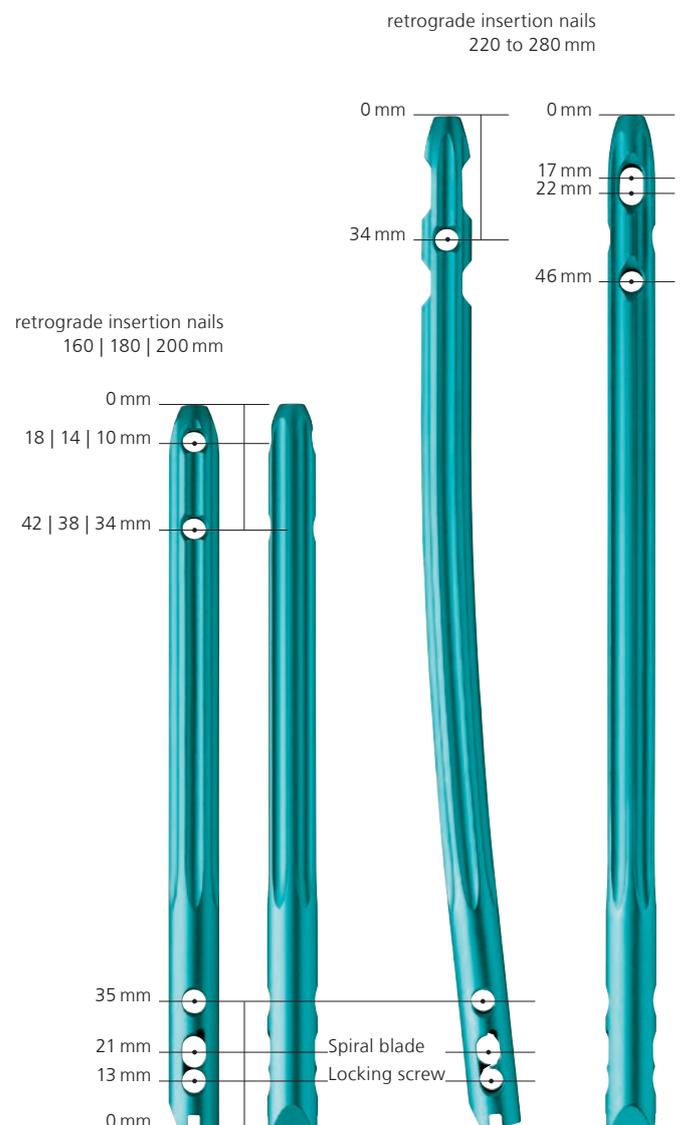
Expert Retrograde Femoral Nails

Ø 14.0 and 15.0 mm

Length	Ø 14 mm	Ø 15 mm	
	mm	aqua	aqua
160	04.013.812	04.013.912	
180	04.013.816	04.013.916	
200	04.013.820	04.013.920	
220	04.013.824	04.013.924	
240	04.013.828	04.013.928	
260	04.013.832	04.013.932	
280	04.013.836	04.013.936	

Nails Ø 9.0 and 10.0 mm are round.
Nails Ø 11.0 to 15.0 mm are fluted.

Nails 160 to 200 mm are straight.
Nails 220 to 480 mm are bent
(antecurvature = 1500 mm).



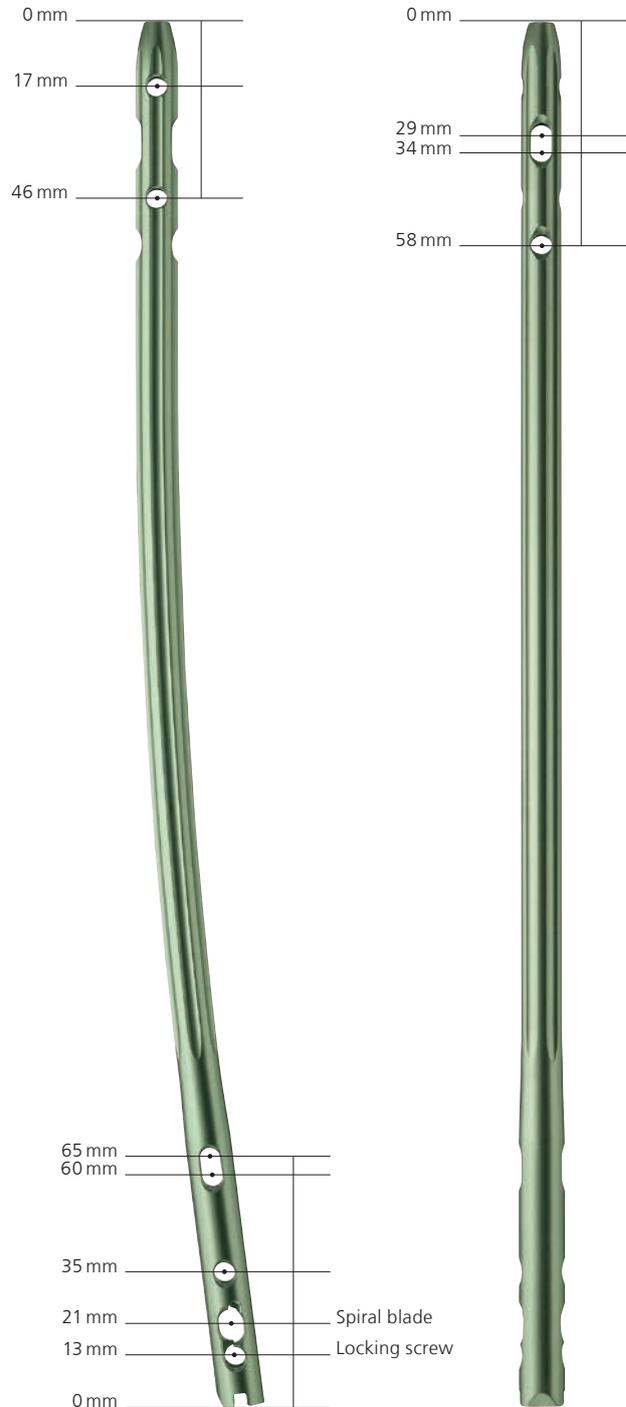
Available non-sterile or sterile packed.
Add "S" to the catalogue number to order sterile products.

Expert Retrograde/Antegrade Femoral Nails

Ø 9.0–13.0 mm

Length	Ø 9 mm mm light green	Ø 10 mm light green	Ø 11 mm light green
300	04.013.340	04.013.440	04.013.540
320	04.013.344	04.013.444	04.013.544
340	04.013.348	04.013.448	04.013.548
360	04.013.352	04.013.452	04.013.552
380	04.013.356	04.013.456	04.013.556
400	04.013.360	04.013.460	04.013.560
420	04.013.364	04.013.464	04.013.564
440	04.013.368	04.013.468	04.013.568
460	04.013.372	04.013.472	04.013.572
480	04.013.376	04.013.476	04.013.576

Length	Ø 12 mm mm	Ø 13 mm light green	light green
300	04.013.640	04.013.740	
320	04.013.644	04.013.744	
340	04.013.648	04.013.748	
360	04.013.652	04.013.752	
380	04.013.656	04.013.756	
400	04.013.660	04.013.760	
420	04.013.664	04.013.764	
440	04.013.668	04.013.768	
460	04.013.672	04.013.772	
480	04.013.676	04.013.776	



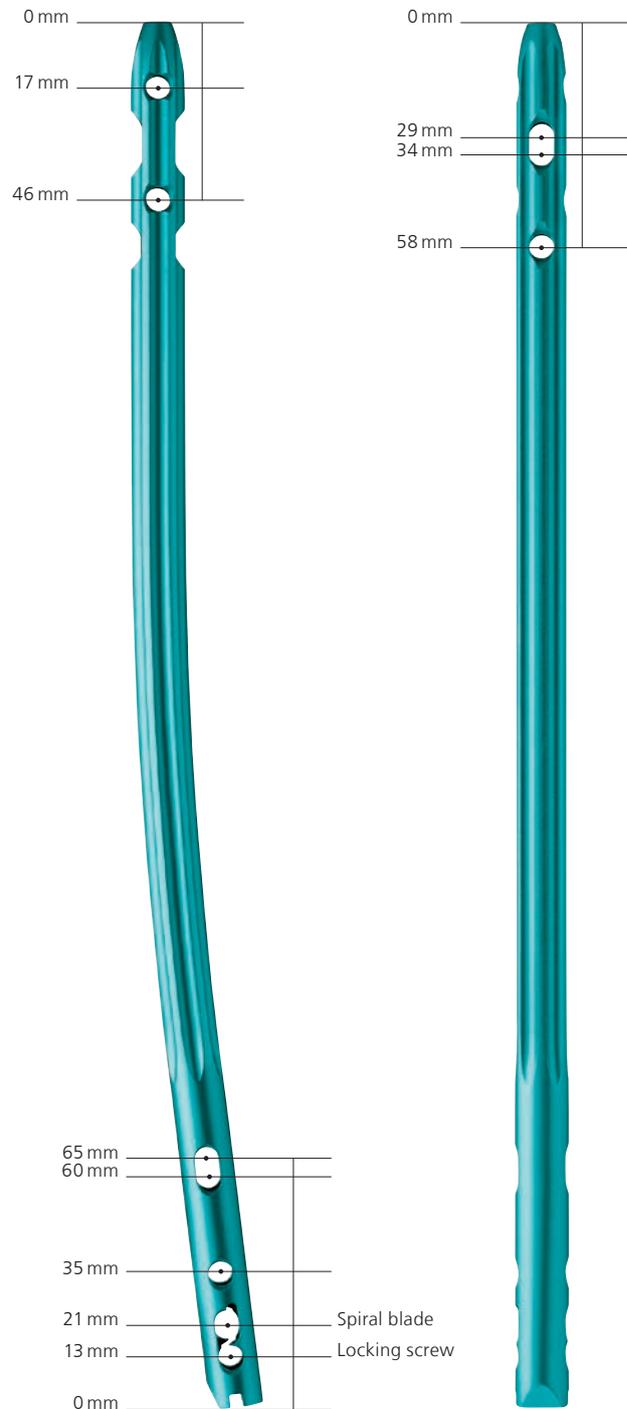
Available non-sterile or sterile packed.
 Add "S" to the catalogue number to order sterile products.
 Retrograde or Antegrade Insertion, 300 mm to 480 mm

Expert Retrograde/Antegrade Femoral Nails

Ø 14.0 and 15.0 mm

Length	Ø 14 mm	Ø 15 mm	
	mm	aqua	aqua
300	04.013.840	04.013.940	
320	04.013.844	04.013.944	
340	04.013.848	04.013.948	
360	04.013.852	04.013.952	
380	04.013.856	04.013.956	
400	04.013.860	04.013.960	
420	04.013.864	04.013.964	
440	04.013.868	04.013.968	
460	04.013.872	04.013.972	
480	04.013.876	04.013.976	

Nails Ø 9.0 and 10.0 mm are round.
 Nails Ø 11.0 to 15.0 mm are fluted.
 Nails 160 to 200 mm are straight.
 Nails 220 to 480 mm are bent
 (antecurvature = 1500 mm).



Available non-sterile or sterile packed.
 Add "S" to the catalogue number to order sterile products.

Locking Implants

Spiral Blades for Expert Retrograde Femoral Nails*

Article No.	Length mm
-------------	-----------

04.013.041	45
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04.013.042	50
------------	----

04.013.043	55
------------	----

04.013.044	60
------------	----

04.013.045	65
------------	----

04.013.046	70
------------	----

04.013.047	75
------------	----

04.013.048	80
------------	----

04.013.049	85
------------	----

04.013.050	90
------------	----

04.013.051	95
------------	----

04.013.052	100
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Expert End Cap for Spiral Blade Locking**

non-sterile and sterile

Article No.	Extension mm
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04.013.000	0
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Available non-sterile or sterile packed.

Add "S" to the catalogue number to order sterile products.

* In Vario Case for Locking Implants, for Expert LFN, R/AFN and HAN (68.003.010), space is provided for eleven Spiral Blades (50–100 mm).

** In Vario Case for Locking Implants, for Expert LFN, R/AFN and HAN (68.003.010), space is provided for two end caps for spiral blade locking.

Expert End Caps, with extension, for Standard Locking*

non-sterile and sterile



Article No.	Extension mm
04.003.000	0
04.003.001	5
04.003.002	10
04.003.003	15
04.003.004	20

* In Vario Case for Locking Implants, for Expert LFN, R/AFN and HAN (68.003.010), space is provided for nine end caps with extension for standard locking (320 mm, 225 mm, 2210 mm, 1215 mm, 1220 mm).

**Locking Screws Stardrive \varnothing 5.0 mm (light green),
Drill \varnothing 4.2 mm**

non-sterile and sterile



Article No.	Extension mm
04.005.516	26
04.005.518	28
04.005.520	30
04.005.522	32
04.005.524	34
04.005.526	36
04.005.528	38
04.005.530	40
04.005.532	42
04.005.534	44
04.005.536	46
04.005.538	48
04.005.540	50
04.005.542	52
04.005.544	54
04.005.546	56
04.005.548	58
04.005.550	60
04.005.554	64
04.005.558	68
04.005.562	72
04.005.566	76
04.005.570	80
04.005.575	85
04.005.580	90
04.005.585	95
04.005.590	100

Locking Screws Stardrive \varnothing 6.0 mm (aqua),
Drill \varnothing 5.0 mm
sterile only



Article No.	Extension mm
04.005.616S	26
04.005.618S	28
04.005.620S	30
04.005.622S	32
04.005.624S	34
04.005.626S	36
04.005.628S	38
04.005.630S	40
04.005.632S	42
04.005.634S	44
04.005.636S	46
04.005.638S	48
04.005.640S	50
04.005.642S	52
04.005.644S	54
04.005.646S	56
04.005.648S	58
04.005.650S	60
04.005.654S	64
04.005.658S	68
04.005.662S	72
04.005.666S	76
04.005.670S	80
04.005.675S	85
04.005.680S	90
04.005.685S	95
04.005.690S	100
04.005.691S	105
04.005.692S	110
04.005.693S	115
04.005.694S	120
04.005.695S	125

Instruments

Standard instrumentation

321.160 Combination Wrench \varnothing 11.0 mm



321.170 Pin Wrench \varnothing 4.5 mm, length 120 mm



351.270 Drill Bit \varnothing 13.0 mm, cannulated, length 290 mm, 3-flute, for Quick Coupling No. 511.760



357.398 Shaft, hexagonal \varnothing 8.0 mm, cannulated, short, length 125 mm



357.399 Guide Wire \varnothing 3.2 mm, length 400 mm



393.100 Universal Chuck with T-Handle



03.010.000 Extraction Screw, for Tibial and Femoral Nails



03.010.020 Radiographic Ruler for Expert Femoral Nails



03.010.023	Radiographic Ruler for Nail Diameters for Expert Femoral Nails, length 365 mm	
03.010.034	Drill Bit \varnothing 13.0 mm, cannulated, flexible	
03.010.061	Drill Bit \varnothing 4.2 mm, calibrated, length 340 mm, 3-flute, for Quick Coupling, for No. 03.010.065	
03.010.063	Protection Sleeve 12.0/8.0, length 188 mm	
03.010.065	Drill Sleeve 8.0/4.2, for No. 03.010.063	
03.010.070	Trocar \varnothing 4.2 mm, for No. 03.010.065	
03.010.146	Connecting Screw, cannulated, with Internal M6x1 Thread	
03.010.170	Hammer Guide	

03.010.428 Depth Gauge for Locking Screws,
measuring range to 110 mm



03.010.480 Aiming Arm, radiolucent,
for Expert R/AFN, antegrade,
for Standard Locking



03.010.486 Insertion Handle, radiolucent,
length 100 mm



03.010.497 Cam-Lock Lever for Aiming Arm



03.010.500 Handle, with Quick Coupling



03.010.502 Protection Sleeve 13.0 for
Expert R/AFN, retrograde,
with Quick Coupling



03.010.503 Protection Sleeve 13.0 for
Expert R/AFN, antegrade,
with Quick Coupling



03.010.507	Multihole Drill Guide for Protection Sleeve 13.0, for Expert R/AFN, retrograde	
03.010.508	Multihole Drill Guide for Protection Sleeve 13.0, for Expert R/AFN, antegrade	
03.010.517	Screwdriver, hexagonal \varnothing 8.0 mm, with T-Handle, with spherical head, length 322 mm	
03.010.518	Screwdriver Stardrive, T25, self-holding, length 319 mm	
03.010.520	Screwdriver Stardrive, T40, with spherical head, cannulated, length 277 mm	
03.010.522	Combined Hammer, 500 g	
03.010.523	Driving Cap with thread, for Insertion Handle	

Do not use standard instruments together with alternative instruments before contacting your DePuy Synthes representative.

Optional instruments

351.050 Tissue Protector



357.340 Connecting Screw for Spiral Blade for UFN/CFN, for No. 357.310



357.360 Extraction Screw for UFN/CFN and Spiral Blade



03.010.019 Depth Gauge for Locking Screws, measuring range up to 110 mm, for No. 03.010.009



03.010.041 Awl Ø 14.0/3.2 mm, cannulated



03.010.062 Drill Bit Ø 5.0 mm, calibrated, length 340 mm, 3-flute, for Quick Coupling



03.010.066 Drill Sleeve 8.0/5.0, for No. 03.010.063



03.010.071 Trocar \varnothing 5.0 mm, for 03.010.066



03.010.081 Protection Sleeve 15.0/13.0,
for Spiral Blade Locking, yellow



03.010.082 Drill Sleeve 13.0/3.2,
for No. 03.010.081, yellow



03.010.084 Spiral Inserter for Spiral Blade Insertion,
for No. 03.010.051



03.010.093 Rod Pusher for Reaming Rod
with Hexagonal Screwdriver \varnothing 8.0 mm



03.010.101 Drill Bit \varnothing 4.2 mm, calibrated, length
145 mm, 3-flute, with Coupling for RDL



03.010.102 Drill Bit \varnothing 5.0 mm, calibrated,
length 145 mm, with Coupling for RDL



03.010.104 Drill Bit \varnothing 4.2 mm, calibrated, length
145 mm, 3-flute, for Quick Coupling



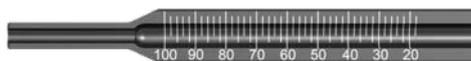
03.010.105 Drill Bit \varnothing 5.0 mm, calibrated,
length 145 mm, for Quick Coupling



03.010.111 Screwdriver Stardrive, T40, cannulated,
length 190 mm, with Lever Arm



03.010.429 Direct Measuring Device for Drill Bits,
length 145 mm



03.010.472 Inter-Lock Screwdriver, combined,
Stardrive, T25 / hexagonal \varnothing 3.5,
length 330 mm



03.010.473 Inter-Lock Screwdriver, combined,
Stardrive, T25 / hexagonal \varnothing 3.5,
length 224 mm



03.010.481 Aiming Arm, radiolucent,
for Expert R/AFN, retrograde,
for Standard Locking



03.010.489 Aiming Arm for Expert R/AFN,
retrograde, for Spiral Blade Locking



03.010.491 Handle for Scalpel, long



03.010.492 Measuring Device for Expert R/AFN Spiral Blade



03.010.495 Intramedullary Reduction Tool, curved, with Quick Coupling, Hex 12 mm



03.010.496 T-Handle, cannulated, with Quick Coupling, Hex 12 mm



03.010.513 Screwdriver Stardrive, T25, self-holding, length 250 mm



03.010.515 Inter-Lock Screwdriver Stardrive, T40, length 377 mm



Optional instrument for PAD

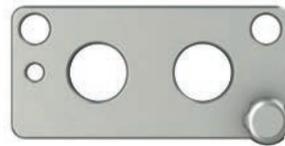
03.010.129 Aiming Sleeve 12.0/8.0, with Cross Wires, length 188 mm



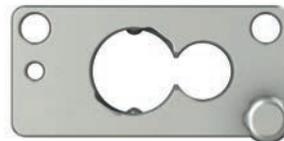
03.010.142 Arm for Proximal Aiming Device for Expert Retrograde Femoral Nail, lengths 160 to 200 mm



03.010.143 Module for Standard Locking, for Proximal Aiming Device for Expert Retrograde Femoral Nail, lengths 160 to 200 mm



03.010.144 Module for Spiral Blade Locking, for Proximal Aiming Device for Expert Retrograde Femoral Nail, lengths 160 to 200 mm



Do not use standard instruments together with alternative instruments before contacting your DePuy Synthes representative.

Alternative instruments

357.127 Protection Sleeve 13.0,
for retrograde approach



357.128 Drill Sleeve 13.0/3.2, with trocar tip,
for retrograde approach, for
No. 357.127



357.220 Hammer Guide, for No. 357.250



03.010.030 Protection Sleeve 13.0,
for antegrade approach



03.010.031 Drill Sleeve 13.0/3.2, for antegrade
approach, for No. 03.010.030



03.010.044 Connecting Screw, cannulated,
for Expert Tibial and Femoral Nails,
for No. 03.010.045



03.010.045 Insertion Handle, for Expert Tibial and
Femoral Nails*



03.010.046 Insertion Handle, long,
for Expert Femoral Nails



03.010.047 Connector, length 141 mm, for Insertion
Handle



03.010.049 Aiming Arm for Expert R/AFN,
antegrade, for Standard Locking



03.010.050 Aiming Arm for Expert R/AFN,
retrograde, for Standard Locking



* Alternative instrument for 03.010.046

03.010.051 Aiming Arm for Expert R/AFN,
retrograde, for Spiral Blade Locking



03.010.056 Combined Hammer 700 g,
can be mounted, for No. 357.220



03.010.072 Depth Gauge for Locking Screws,
measuring range up to 110 mm,
for No. 03.010.063



03.010.083 Depth Gauge for Spiral Blades



03.010.092 Screwdriver, hexagonal with spherical
head \varnothing 8.0 mm



03.010.106 Direct Measuring Device for Drill Bits
of length 145 mm, for Nos. 03.010.100
to 03.010.105



03.010.107 Screwdriver Stardrive, T25,
length 330 mm



03.010.110 Screwdriver Stardrive, T40, cannulated,
length 300 mm



03.010.112 Holding Sleeve, with Locking Device



03.010.115 Guide Wire Ø 3.2 mm, length 290 mm



Instruments

Comparison Table

Standard Article	Alternative Article	Standard Article	Alternative Article	Standard Article	Alternative Article
03.010.480	03.010.049	<ol style="list-style-type: none"> 1 03.010.486 2 03.010.146 3 03.010.523 	<ol style="list-style-type: none"> 1 03.010.046 2 03.010.146 3 03.010.047 	<ol style="list-style-type: none"> 1 03.010.503 2 03.010.508 3 03.010.500 	<ol style="list-style-type: none"> 1 03.010.030 2 03.010.031 
Optional Article	Alternative Article	<ol style="list-style-type: none"> 1 03.010.502 2 03.010.507 3 03.010.500 	<ol style="list-style-type: none"> 1 357.127 2 357.128 		
03.010.481	03.010.050				
03.010.489	03.010.051				

Instruments
Comparison Table

Optional Article	Alternative Article	Standard Article	Alternative Article
03.010.492 	03.010.083 	03.010.520 	03.010.110 
03.010.517 	03.010.092 	03.010.522 	03.010.056 
03.010.518 	03.010.107 	03.010.428 	03.010.072 
		03.010.429 	03.010.106 

Handling Information

Insertion Handle

(03.010.486)

- Radiolucent
- Attachment for driving cap with threaded end (03.010.523)



Inter-Lock Screwdriver

Compatible with all DePuy Synthes T25 or 3.5 mm hexagonal recess.

- Tear drop shape
- Silicon handle

Precaution: When removing implants after long-term implantation, especially in the presence of large amounts of bony ingrowth, first use a solid screwdriver to loosen the screw. The inter-lock screwdriver can then be used to remove the screw from the surgical site. If using the inter-lock screwdriver with locking screws, use a solid screwdriver for final tightening.



Handle for Scalpel

(03.010.491)

- For channel cutting
- Yellow Silicon handle indicates sharpness of instrument

1. Attach a blade to the scalpel holding the end of the handle.
2. Pass the scalpel handle through the aiming arm holes and perform a minimally invasive and accurate incision.
3. Remove the scalpel from the aiming arm.



Intramedullary Reduction Tool and T-Handle with Quick Coupling

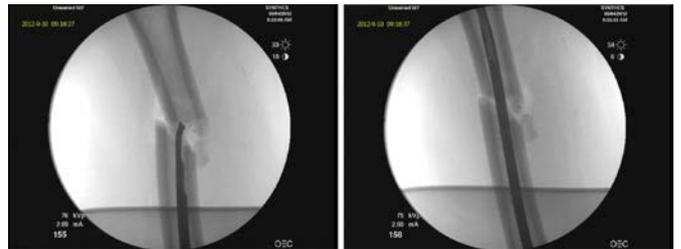
(03.010.495 and 03.010.496)

Fracture Reduction Tool

- Flat curved tip to aid fragment alignment

T-Handle

- Can be added to the auxiliary bin in the Modular Femur Set
- 12 mm Hexagonal Quick Coupling with marking for orientation



Multihole Drill Guide for Protection Sleeve

(03.010.500–03.010.510)

- Center hole and offset holes (4 mm and/or 6 mm)
- Color coded



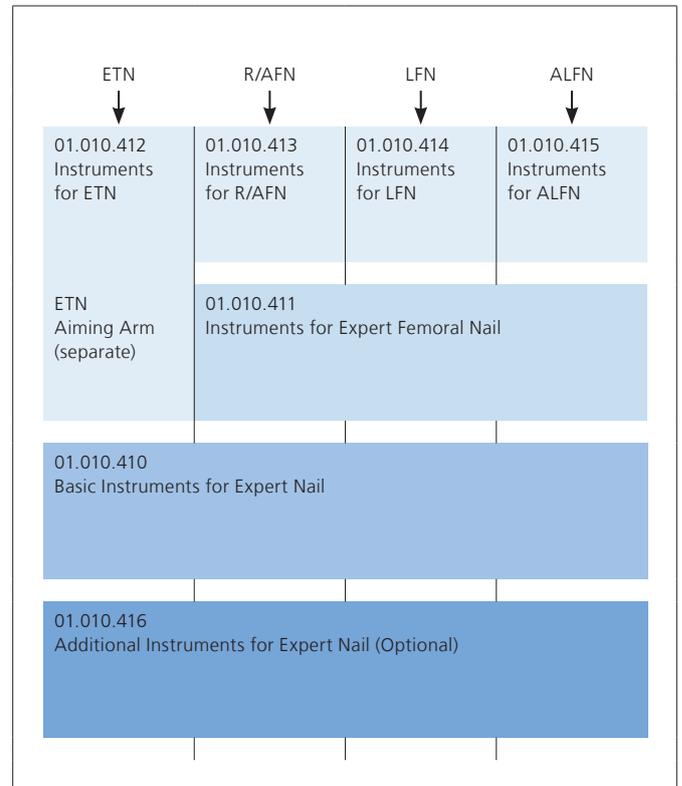
If the initial Kirschner wire (1) is placed slightly offset, a second Kirschner wire (2) can be inserted to correct the placement.

Instruments

Modular Cases

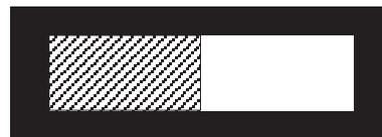
The modularity of the system enables sets to be configured according to the hospital's clinical needs. Each set configuration consists of basic instruments, dedicated system instruments and optional instruments (if required). For femoral nails (LFN, ALFN, R/AFN) the femur set must be added to the set configuration.

The instrument modules listed on the right side are available.



For use within the operating theatre, all modular trays have an additional marking:

- Mandatory modular trays have a solid white marking
- Optional trays have a hatched black marking
- Each system has a control picture for reference



Modular R/AFN Set 01.010.414

Control Picture



R/AFN Instruments Tray



Basic Instruments Tray



Femur Instruments Tray



Optional Instruments Tray



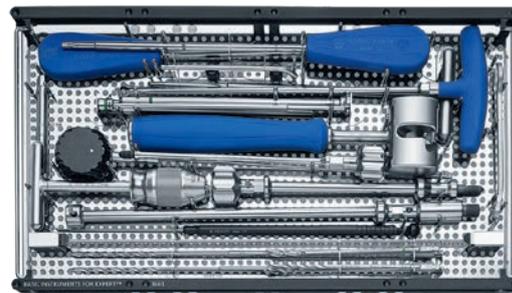
Modular Tray for Instruments for R/AFN

68.010.414 Modular Tray for Instruments for R/AFN, size 1/1, without Contents, Vario Case System



Modular Tray for Basic Expert Nail Instruments

68.010.410 Modular Tray for Basic Instruments, for Expert Nail, size 1/1, without Contents, Vario Case System



Modular Tray for Femur Expert Nail Instruments

68.010.411 Modular Tray for Instruments, for Expert
Femoral Nails, size 1/1, without
Contents, Vario Case System



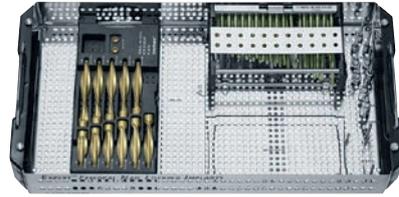
Modular Tray for Optional Expert Nail Instruments

68.010.416 Modular Tray, for Additional
Instruments, for Expert, size 1/1,
without Contents, Vario Case System

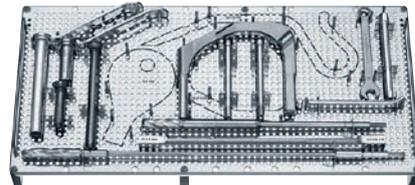
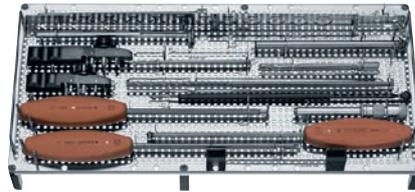
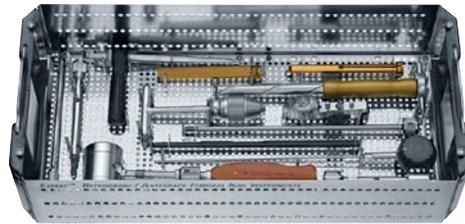


Vario Case

68.003.010 Vario Case for Locking Implants, for Expert LFN, R/AFN and HAN

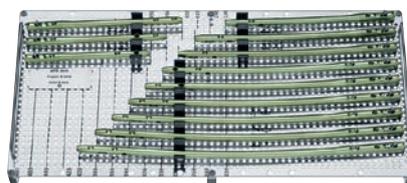
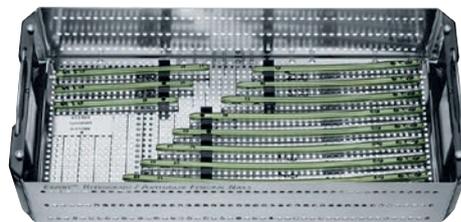


68.013.306 Vario Case for Instrument Set for Expert Retrograde/Antegrade Femoral Nails, without Lid, without Contents

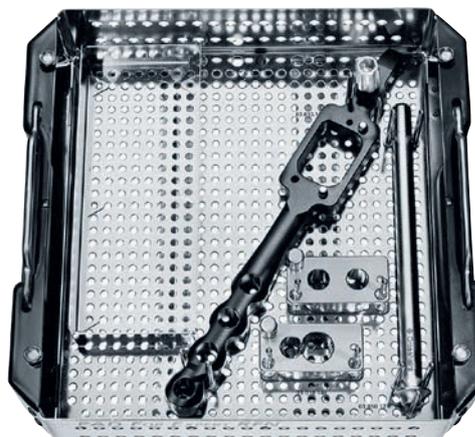


* Insert for Spiral Blades: 68.003.010.02

68.013.307 Vario Case for Expert
Retrograde/Antegrade Femoral Nails,
without Lid, without Contents



68.013.308 Vario Case for Proximal Aiming Device
for Expert Retrograde Femoral Nail



Power Tools

05.001.201 Battery Handpiece, modular, for Trauma Recon System



05.001.202 Power Module, for Trauma Recon System



05.001.227 Lid for Battery Handpiece No. 05.001.201, for Trauma Recon System

511.300 Radiolucent Drive

05.001.205 AO/ASIF Quick Coupling, for Trauma Recon System

05.001.206 Drill Chuck Drilling Speed, with Key, for Trauma Recon System, clamping range up to \varnothing 7.3 mm

05.001.210 Attachment for Acetabular and Medullary Reaming, for Trauma Recon System

05.001.212 Quick Coupling for Kirschner Wires \varnothing 1.0 to 4.0 mm, for Trauma Recon System

05.001.213 Quick Coupling for DHS/DCS Triple Reamers, for Trauma Recon System

MRI Information

Torque, Displacement and Image Artifacts according to ASTM F 2213-06, ASTM F 2052-014 and ASTM F2119-07

Non-clinical testing of worst case scenario in a 3 T MRI system did not reveal any relevant torque or displacement of the construct for an experimentally measured local spatial gradient of the magnetic field of 3.69 T/m. The largest image artifact extended approximately 169 mm from the construct when scanned using the Gradient Echo (GE). Testing was conducted on a 3 T MRI system.

Radio-Frequency-(RF-)induced heating according to ASTM F2182-11a

Non-clinical electromagnetic and thermal testing of worst case scenario lead to peak temperature rise of 9.5 °C with an average temperature rise of 6.6 °C (1.5 T) and a peak temperature rise of 5.9 °C (3 T) under MRI Conditions using RF Coils (whole body averaged specific absorption rate [SAR] of 2 W/kg for 6 minutes [1.5 T] and for 15 minutes [3 T]).

Precautions: The above mentioned test relies on non-clinical testing. The actual temperature rise in the patient will depend on a variety of factors beyond the SAR and time of RF application. Thus, it is recommended to pay particular attention to the following points:

- It is recommended to thoroughly monitor patients undergoing MR scanning for perceived temperature and/or pain sensations.
- Patients with impaired thermoregulation or temperature sensation should be excluded from MR scanning procedures.
- Generally, it is recommended to use a MR system with low field strength in the presence of conductive implants. The employed specific absorption rate (SAR) should be reduced as far as possible.
- Using the ventilation system may further contribute to reduce temperature increase in the body.

