

Expert R/AFN. Retrograde/Antegrade Femoral Nail.

Technique Guide



EXPERT
Nailing System

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Image intensifier control

Warning

This description alone does not provide sufficient background for direct use of the product. Instruction by a surgeon experienced in handling this product is highly recommended.

Reprocessing, Care and Maintenance of Synthes Instruments

For general guidelines, function control and dismantling of multi-part instruments, please contact your local sales representative or refer to: www.synthes.com/reprocessing

Expert R/AFN

Retrograde/Antegrade Femoral Nail.

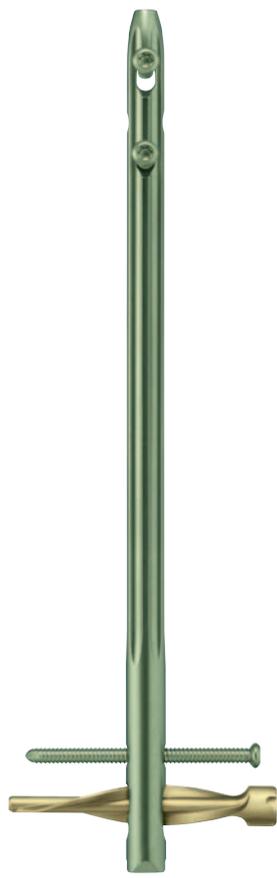
Advanced nail design

The new nail design offers great flexibility

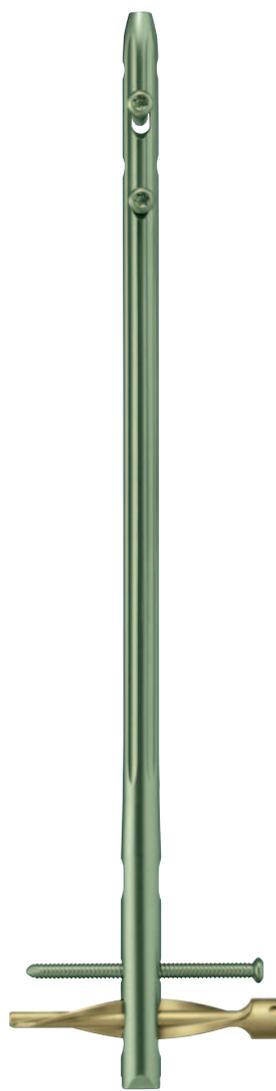
- One system for retrograde and antegrade technique
- One system for left and right femur
- Anatomic bend for ease in insertion and extraction
- Cannulation of all nails for guided insertion in reamed and unreamed technique
- Large portfolio with nail diameters ranging from \varnothing 9.0 to 15.0 mm and lengths ranging from 160 to 480 mm
- Versatile locking configuration for static, dynamic, standard and spiral blade locking



retrograde
RFN, 160–200 mm
straight



retrograde
RFN, 220–280 mm
antecurvature 1500 mm



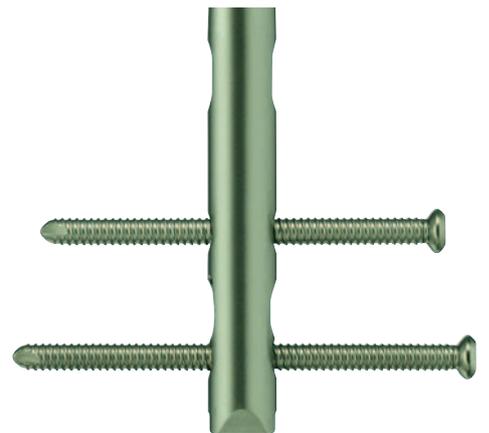
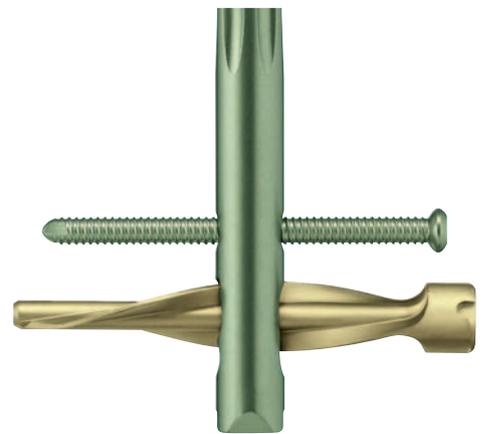
retrograde
R/AFN, 300–480 mm
antecurvature 1500 mm



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

Unique distal locking options

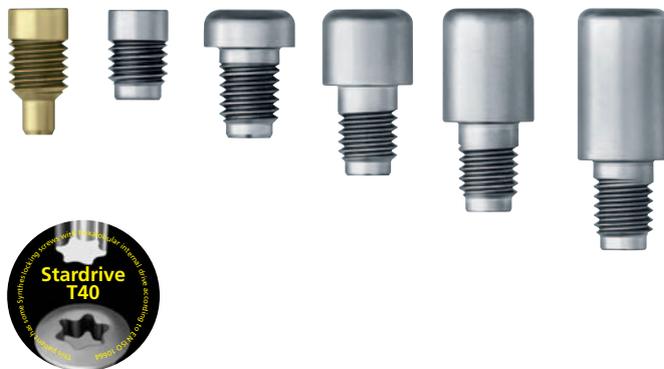
The unique distal combination hole enables the optimal locking for every anatomical situation and fracture type. The surgeon can intraoperatively choose between spiral blade locking (with one spiral blade and one locking screw) and standard locking (with two locking screws). The end cap with self-retaining Stardrive recess allows for angular stable locking of the most distal locking implant in both configurations.



Improved stability

End caps:

- Self-retaining Stardrive recess for effortless and secure end cap pick-up and insertion
- Possibility to block spiral blade or most distal (retrograde) or most proximal locking screw (antegrade) for absolute angular stability
- End cap prevents ingrowth of tissue and facilitates nail removal.



Locking screws:

- Double thread for more contact points leading to enhanced stability
- Larger cross-section for improved mechanical resistance
- Thread closer to screw head providing better bone purchase and improved stability
- Self-holding Stardrive recess for effortless and secure locking screw pick-up
- Titanium alloy TAN for improved mechanical and fatigue properties
- Adapted locking screw diameter to nail diameter:
 - Ø 5.0 mm for nails Ø 9.0–13.0 mm
 - Ø 6.0 mm for nails Ø 14.0 and 15.0 mm



Spiral blades:

- Optimal hold in osteoporotic bone by increased surface area
- Angular stable locking by end cap
- Titanium alloy TAN for improved mechanical and fatigue properties



AO Principles of Internal Fixation

In 1958, the AO formulated four basic principles¹, which have become the guidelines for internal fixation in general, and intramedullary nailing in particular:

Anatomic reduction

Before inserting the nail, the reduction can be achieved manually, using a reduction table, an external fixator or a distractor. A guide wire marks the prescribed path into the medullary canal and secures alignment of the fragments while the cannulated nail is being inserted over the wire (solid nail design will not allow this procedure). The nail insertion is generally monitored using x-rays. The nail is then locked proximally and distally to the bone fragments in order to hold the reduction.

Stable fixation

The intramedullary nail acts as an internal splint that controls but does not prevent micromovements of the fragments. It provides a relative stability that leads to an indirect healing through callus formation. The intramedullary nail allows for restoration of length, and axial and torsional orientation of the injured bone. The nails and the locking screws are available in different diameters and lengths that allow the surgeon to optimise stability. The judicious choice of locking options (number, position and direction) in the proximal and distal parts of the nail further improves the stability of the implant construct to the bone.

¹ M. E. Müller, M. Allgöwer, R. Schneider and R. Willenegger (1991)
AO Manual of Internal Fixation, 3rd Edition. Berlin: Springer.

Preservation of blood supply

When the canal is not reamed, intramedullary nailing generates minimal trauma to the endosteum and, therefore, the blood supply is maximised through the uninjured endosteum and periosteum. Reaming the canal temporarily disrupts the endosteal blood supply but probably stimulates the revascularisation and therefore the bone healing.

Early, active mobilisation

Intramedullary nailing, combined with the AO technique, provides relatively stable fracture fixation with minimal trauma to vascular supply. This helps to create an improved environment for bone healing, accelerating the patient's return to previous mobility and function.

Indications

Indications for retrograde approach

In retrograde approach, the Expert Retrograde/Antegrade Femoral Nail is indicated for fractures in the distal femur:

- 33-A1/A2/A3
- 33-C1/C2/C3.1

For the 33-C fractures, the Expert Retrograde/Antegrade Femoral Nail should be used in combination with other implants (not shown in the illustration).

Additionally, the Expert Retrograde/Antegrade Femoral Nail is indicated for fractures in the femoral shaft:

- 32-A/B/C (except 32-A[1-3].1 and 32-B[1-3].1 (subtrochanteric fractures))
in case of:
 - combination with fractured patella
 - ipsilateral femur/tibia fractures (floating knee)
 - combination with fractured acetabulum, pelvis, or femoral neck
 - combinations of the fractures mentioned above
 - pronounced adipositas
 - pregnancy
 - polytrauma (if numerous surgical teams are involved in treatment of patient)



Note: In case of osteoporotic bone, it is strongly recommended to utilise spiral blade locking in the distal femur.

Indications for antegrade approach

In antegrade approach, the Expert Retrograde/Antegrade Femoral Nail is indicated for fractures in the femoral shaft:

- 32-A/B/C (except 32-A[1-3].1 and 32-B[1-3].1 (subtrochanteric fractures))

Note: ASLS, the Angular Stable Locking System, is indicated in cases where increased stability is needed, such as in fractures closer to the metaphyseal area or in poor quality bone. For more details regarding the intramedullary fixator principle, please consult the ASLS technique guide (036.000.708) and concept flyer (036.001.017).



Cases

Case 1

Retrograde approach – standard locking

Case 2

Retrograde approach – spiral blade locking

Case 3

Antegrade approach – standard locking



preoperative



postoperative



preoperative



postoperative



preoperative



postoperative



Retrograde Approach – Opening the Distal Femur

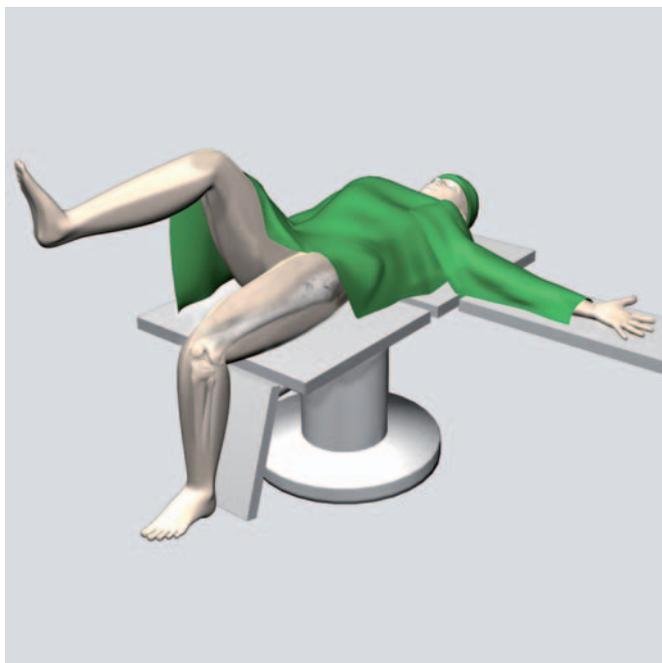
1

Position patient

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

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

- 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 stabilised 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, length 475 mm
03.010.023	Radiographic Ruler for Nail Diameters for Expert Femoral Nails, length 365 mm

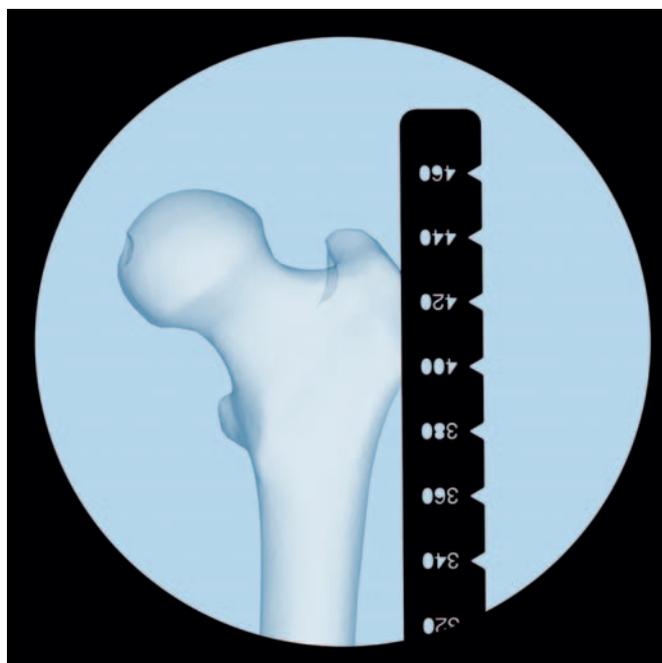
The required nail length must be determined after reduction of the upper leg fracture.

- ① 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.

Notes: 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.

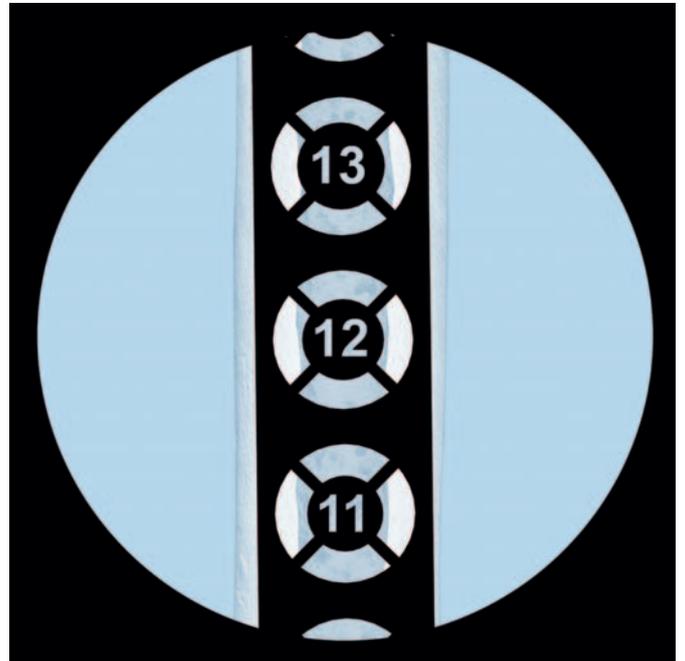


Alternatives

Determine the nail length by the above procedure on the uninjured leg or before draping (non-sterile) or compare the length of two identical SynReam reaming rods \varnothing 2.5 mm (352.032).

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.

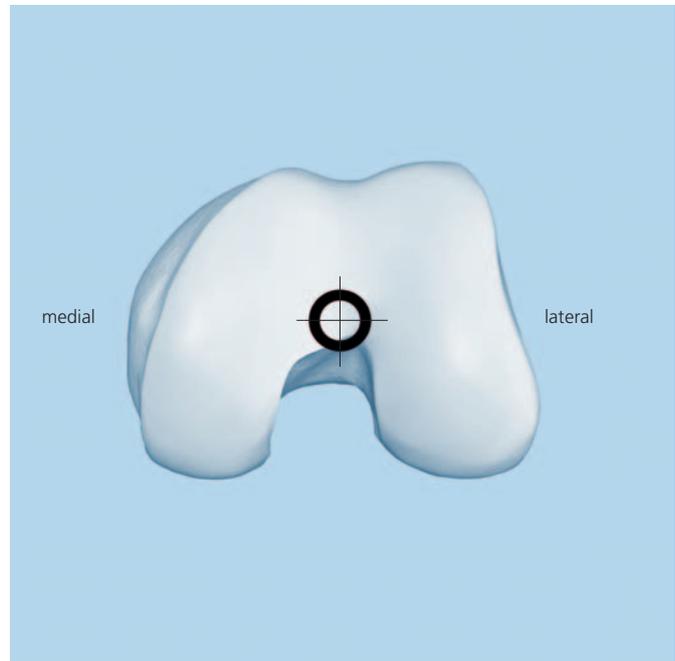
For 33-C.X fractures either make a medial or a lateral parapatellar approach depending on the type and location of fracture.

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 optimal 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.



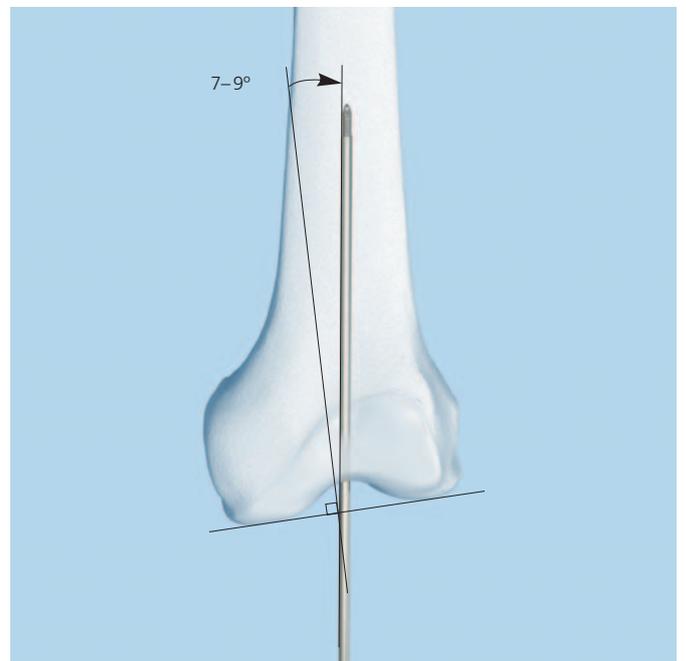
6

Insert guide wire

Instruments

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
393.100	Universal Chuck with T-Handle
03.010.115	Guide Wire \varnothing 3.2 mm, length 290 mm

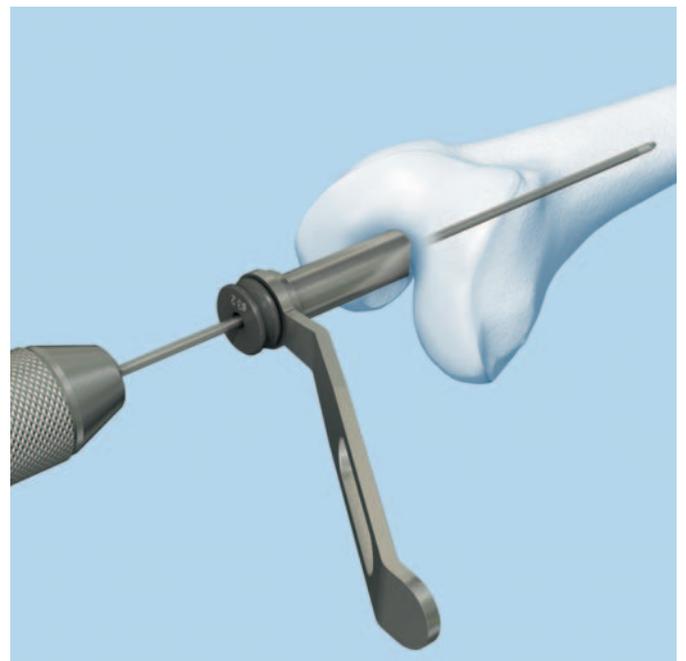
Insert the guide wire for approximately 10 to 15 cm in line with the anatomic axis of the femur, which is 7 to 9° in valgus, i.e. lateral to a line perpendicular to the articular surface.



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

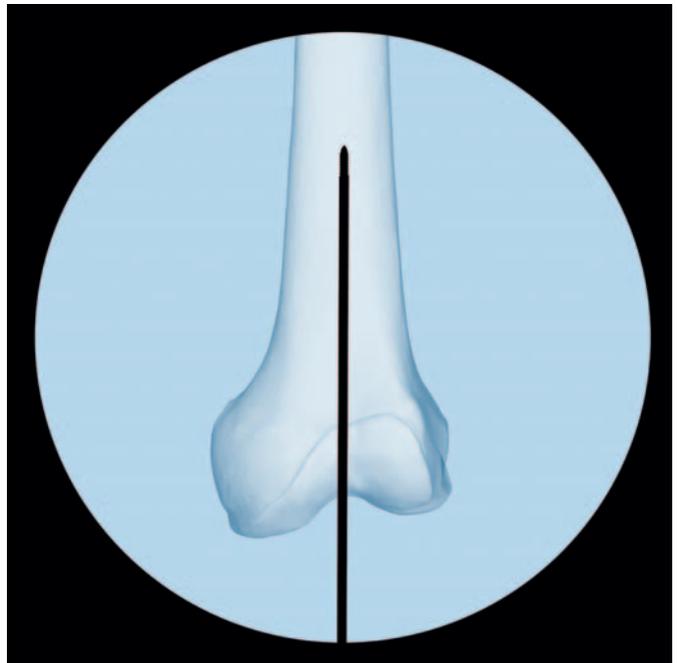
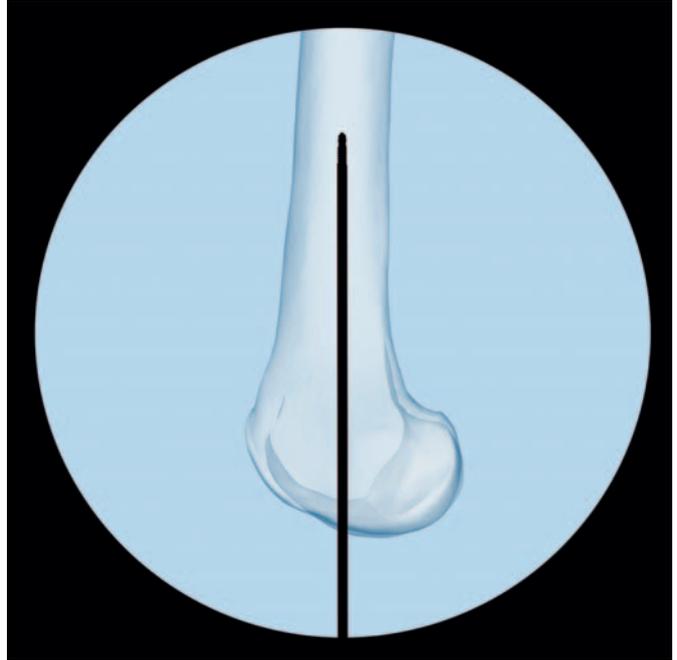
Secure the guide wire in the universal chuck.

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



- ① Check the position under the image intensifier in AP and lateral views.

Remove the drill sleeve.



7a

Open medullary canal – drill bit

Instruments

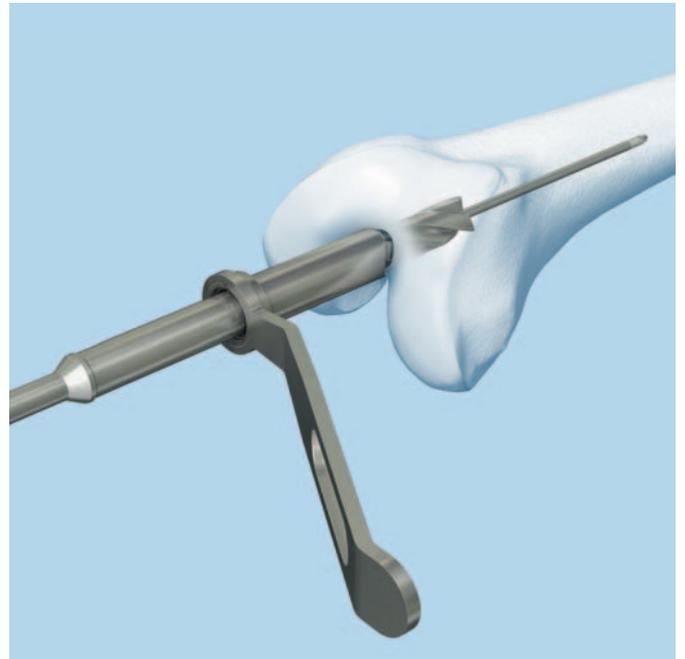
351.270	Drill Bit Ø 13.0 mm, cannulated, length 290 mm, 3-flute, for Quick Coupling No. 511.760
357.127	Protection Sleeve 13.0, for retrograde approach
03.010.115	Guide Wire Ø 3.2 mm, length 290 mm

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

Notes: 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 the protection sleeve.



7b

Open medullary canal – awl

Instruments

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

Notes: 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)

Optional instruments

189.060	SynReam Intramedullary Reaming System
352.032	Reaming Rod \varnothing 2.5 mm, with ball tip, length 950 mm

If necessary, enlarge the femoral canal with the medullary reamer up to 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 diameter 8.5 mm, 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.

Note: 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

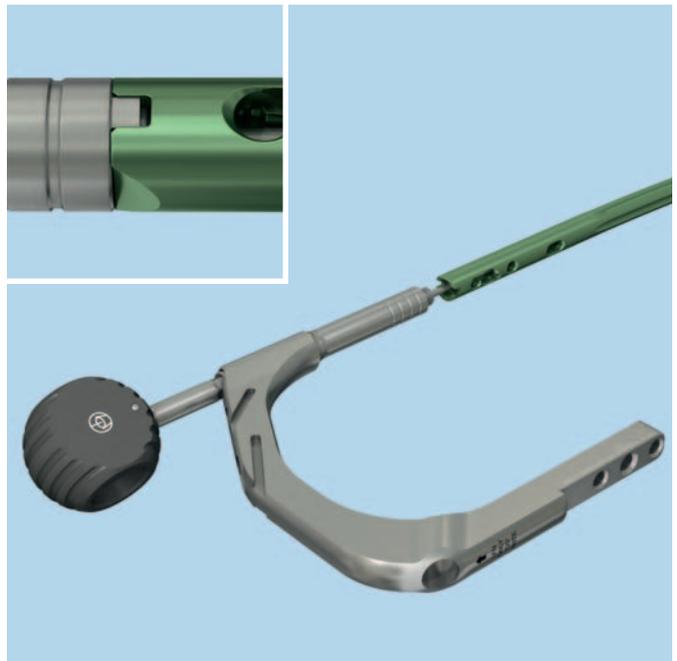
Instruments

03.010.146	Connecting Screw, cannulated, with Internal M6x1 Thread
03.010.046	Insertion Handle, long, for Expert Femoral Nails
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

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 overtighten.

Alternative instruments

03.010.044 Connecting Screw, cannulated,
 for Expert Tibial and Femoral Nails,
 for 03.010.045

03.010.045 Insertion Handle, for Expert Tibial and
 Femoral Nails

Follow the procedure described above.



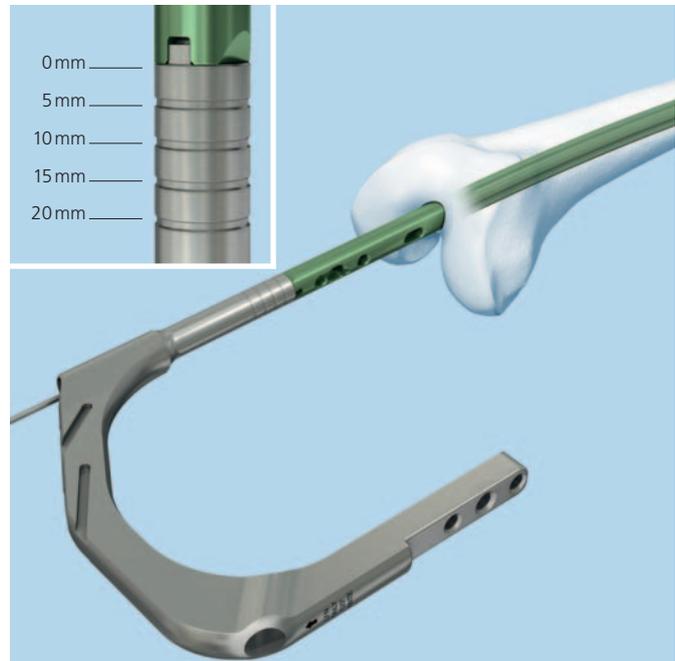
2

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.

- 1 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 correct 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.

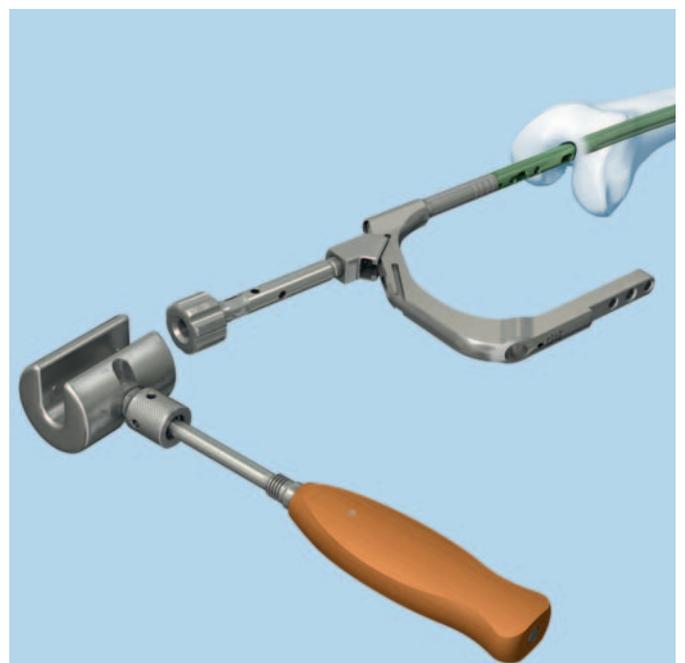
Note: For distal locking, mount the aiming arm only when the nail has been completely inserted, otherwise the aiming arm may loosen during nail insertion.



Alternative instruments

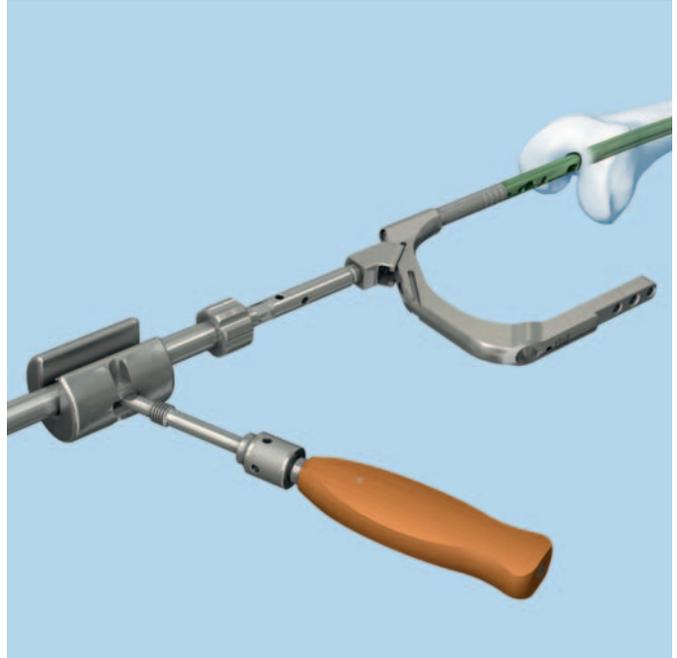
03.010.047	Connector, for Insertion Handle
03.010.056	Combined Hammer 700 g, can be mounted, for No. 357.220
357.220	Hammer Guide, for No. 357.250*
321.160	Combination Wrench \varnothing 11 mm
321.170	Pin Wrench \varnothing 4.5 mm, length 120 mm
03.010.092	Screwdriver hexagonal, with spherical head \varnothing 8.0 mm
357.398	Shaft, hexagonal, \varnothing 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.

Note: 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.



* Also suitable for No. 03.010.056

Retrograde Approach – Standard Locking

If the proximal aiming device is used for interlocking, please refer to page 47.

1

Mount aiming arm for retrograde standard locking

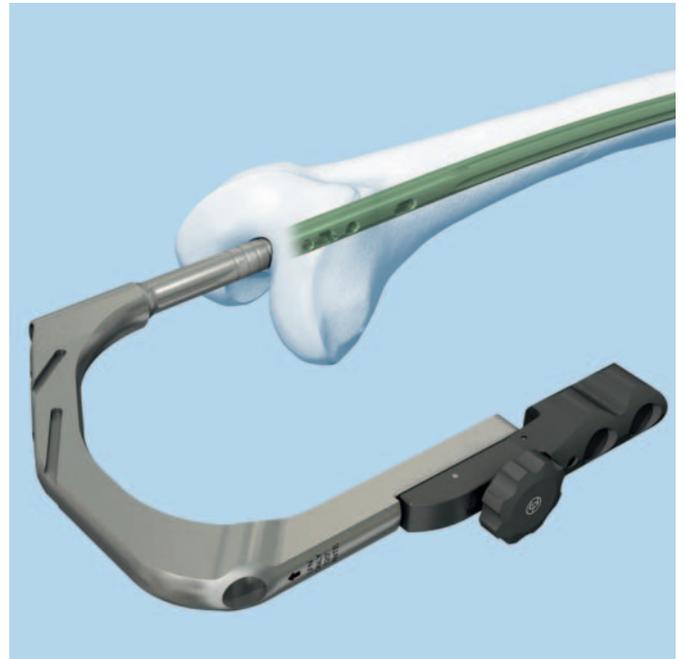
Instrument

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.

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



2

Insert trocar combination

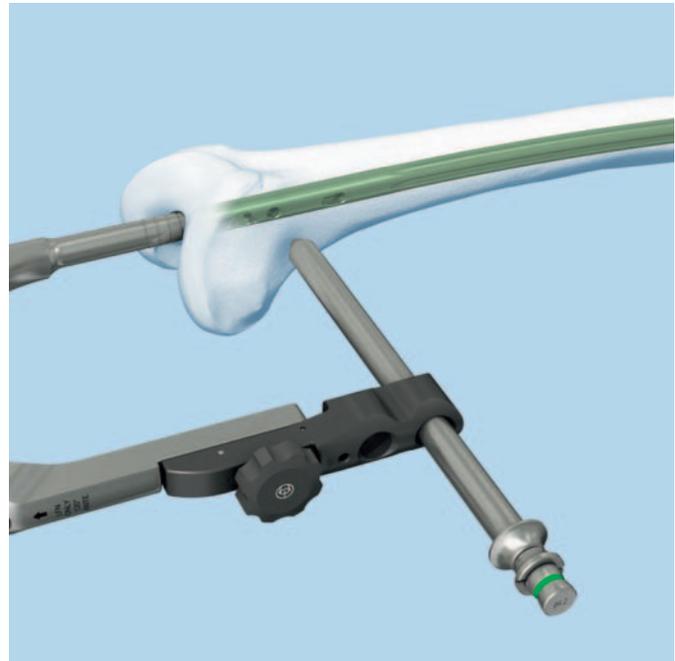
Instruments

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 to 13 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 and 15 mm (aqua):
Locking screws Ø 6.0 mm

Follow the procedure described above.

3

Drill and measure for length of locking screw

Option: ASLS, the Angular Stable Locking System, can be used as an alternative to standard locking screws in any round hole of a Synthes cannulated titanium nail. For more details regarding the intramedullary fixator principle, please consult the ASLS technique guide (036.000.708) and concept flyer (036.001.017). Please note that for the use of ASLS special instruments are required.



Instrument

03.010.061 Drill Bit \varnothing 4.2 mm, calibrated, 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.

- 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.

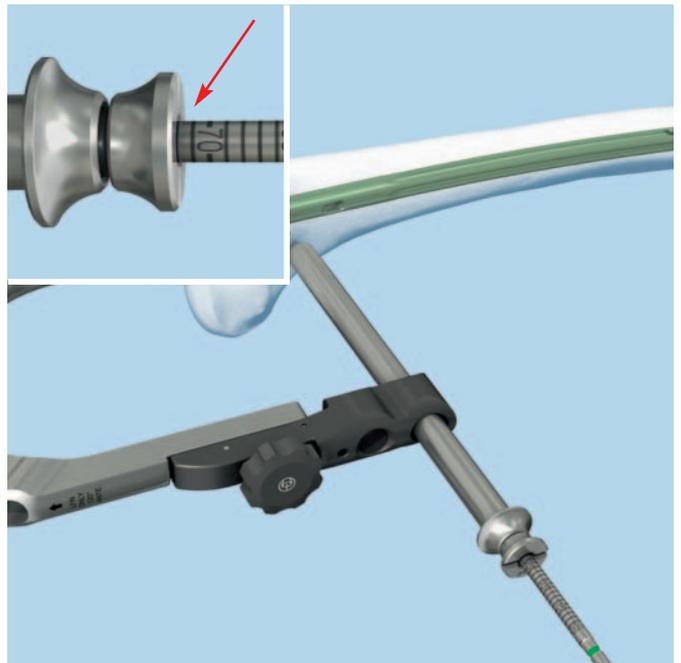
Remove the drill bit and the drill sleeve.

Optional instrument

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

For locking screws \varnothing 6.0 mm (aqua)

Follow the procedure described above.



Alternative instrument

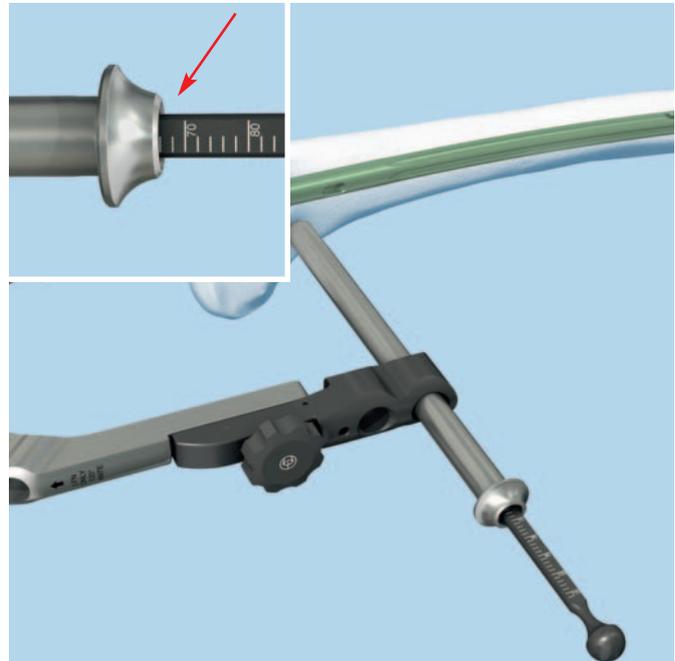
03.010.072 Depth Gauge for Locking Screws,
measuring range up to 110 mm,
for No. 03.010.063

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.

- ⓘ 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

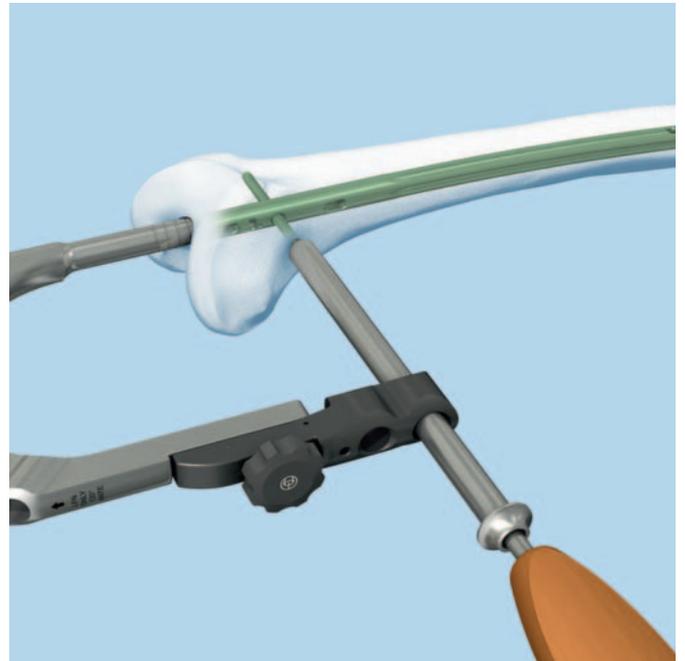
Instrument

03.010.107	Screwdriver Stardrive, T25, length 330 mm
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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

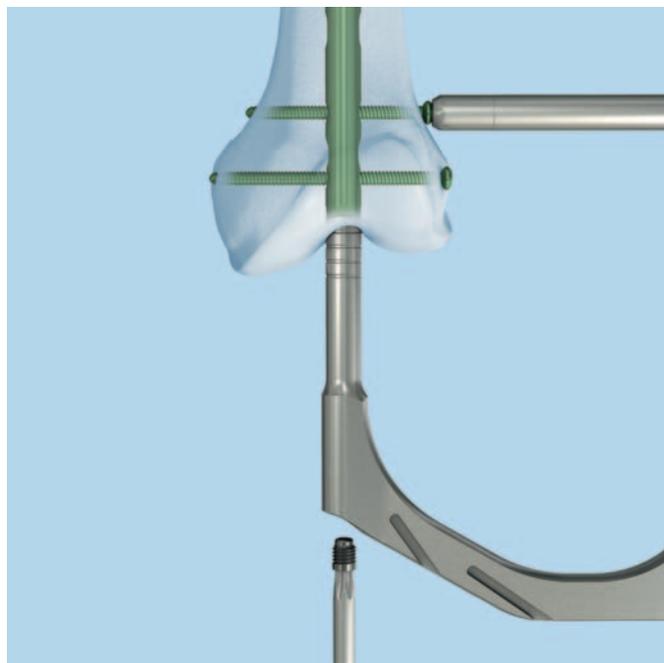
Insert end cap

Instrument

03.010.110	Screwdriver Stardrive, T40, cannulated, length 300 mm
------------	---

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
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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.

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

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



Retrograde Approach – Spiral Blade Locking

If the proximal aiming device is used for interlocking, please refer to page 47.

1

Mount aiming arm for spiral blade locking

Instrument

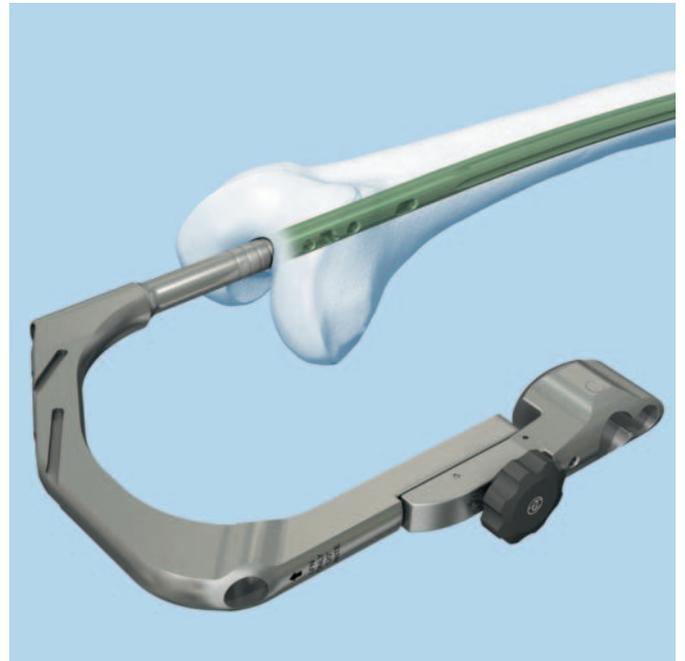
03.010.151	Aiming Arm, for Expert R/AFN, retrograde, for Spiral Blade Locking
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Mount the aiming arm to the insertion handle.

Note: 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 distal locking holes and to avoid breakage of 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”.



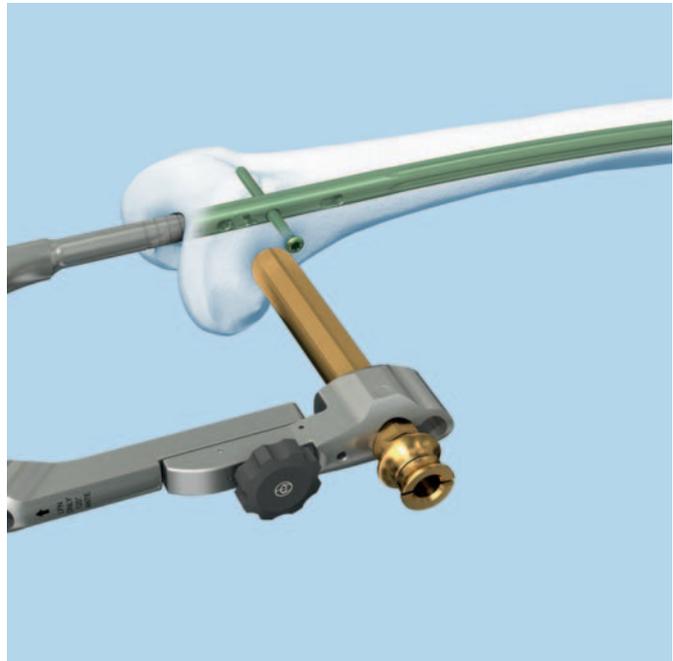
2

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.



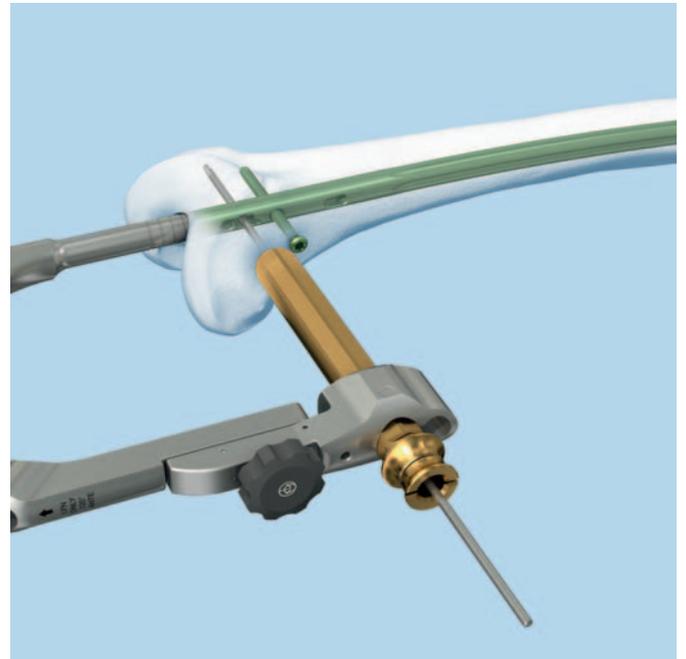
3

Insert guide wire

Instrument

03.010.115 Guide Wire Ø 3.2 mm, length 290 mm

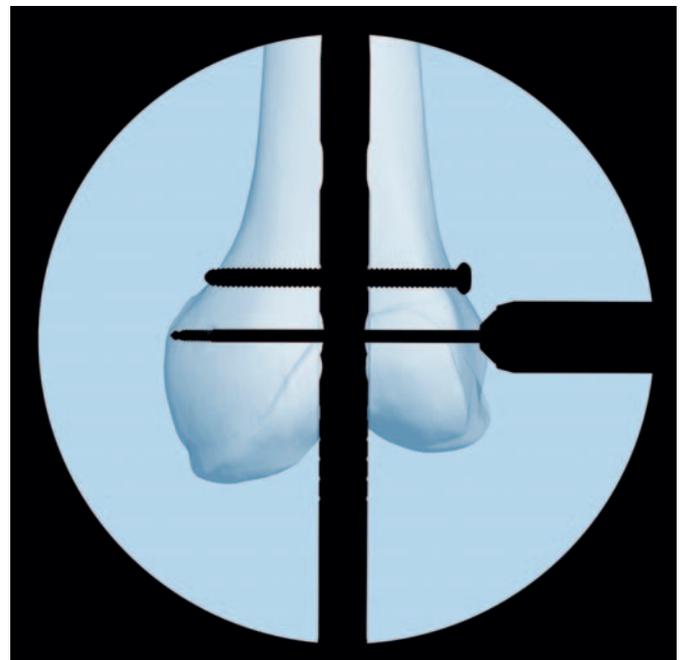
Insert a guide wire through the sleeve combination into the femoral condyles until the tip is flush with the medial cortex.



- ⓘ Confirm guide wire position radiographically.

Note: When monitoring the position of the guide wire in AP view, the trapezoidal shape of the condyles must be taken into account. It is recommended to slightly turn the leg for a better view of the tip of the guide wire with respect to the medial cortex. Thus, a too deep insertion of the guide wire may be prevented, and subsequent incorrect measurement.

Remove the drill sleeve.



4

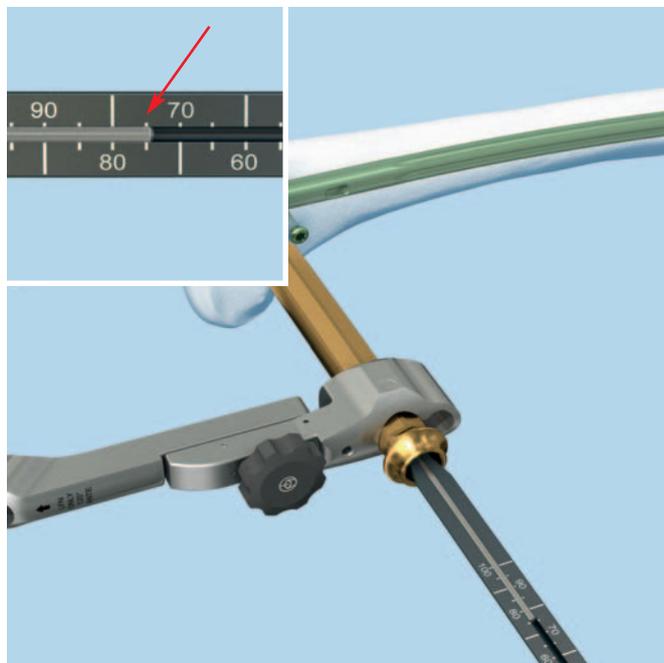
Measure for length of spiral blade

Instrument

03.010.083 Depth Gauge for Spiral Blades

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

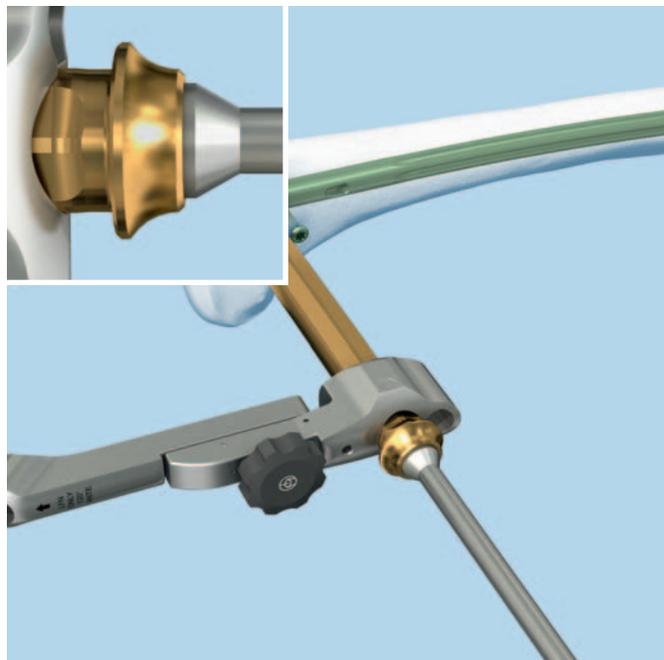
Open lateral cortex

Instrument

351.270 Drill Bit \varnothing 13.0mm, 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 prevents the drill bit from penetrating too far.

Remove the drill bit and the protection sleeve.



6

Insert spiral blade

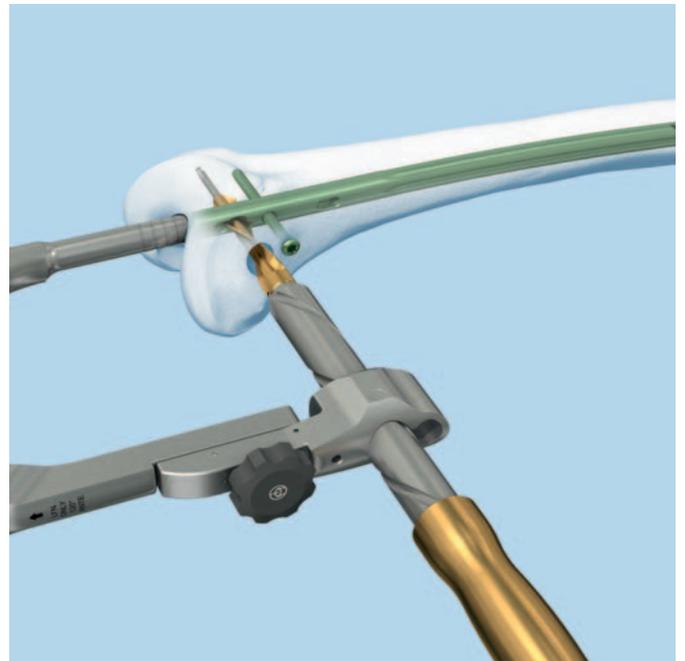
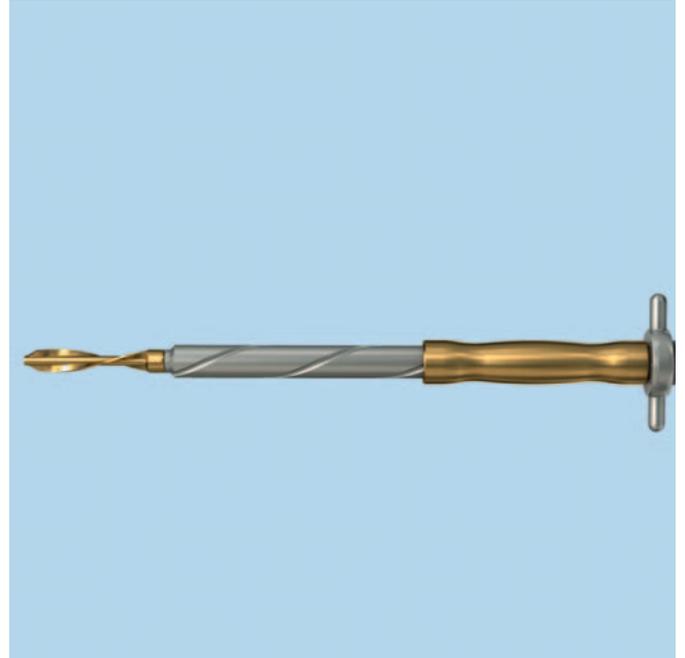
Instruments

03.010.084	Spiral Inserter for Spiral Blade Insertion, for No. 03.010.051
357.340	Connecting Screw for Spiral Blades for UFN/CFN, for No. 357.310*
03.010.056	Combined Hammer 700 g, can be mounted, for No. 357.220

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.



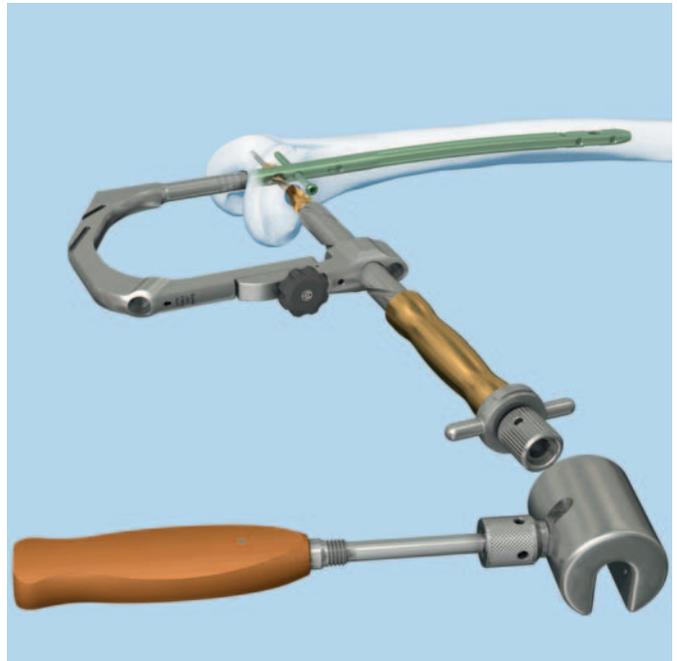
* Also suitable for 03.010.084

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

- ⦿ 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

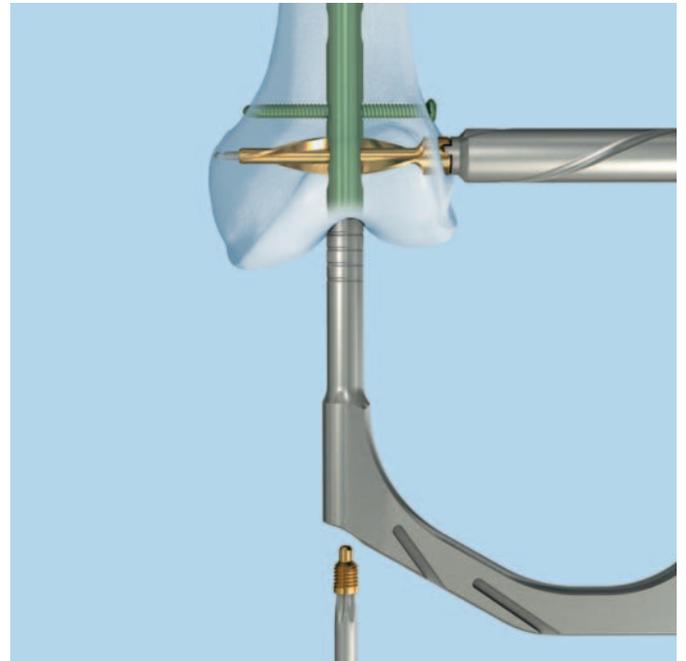
03.010.110	Screwdriver Stardrive, T40, cannulated, length 300 mm
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Align the Expert end cap for spiral blade (04.013.000) with the nail axis using the screwdriver.

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.

Note: 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.



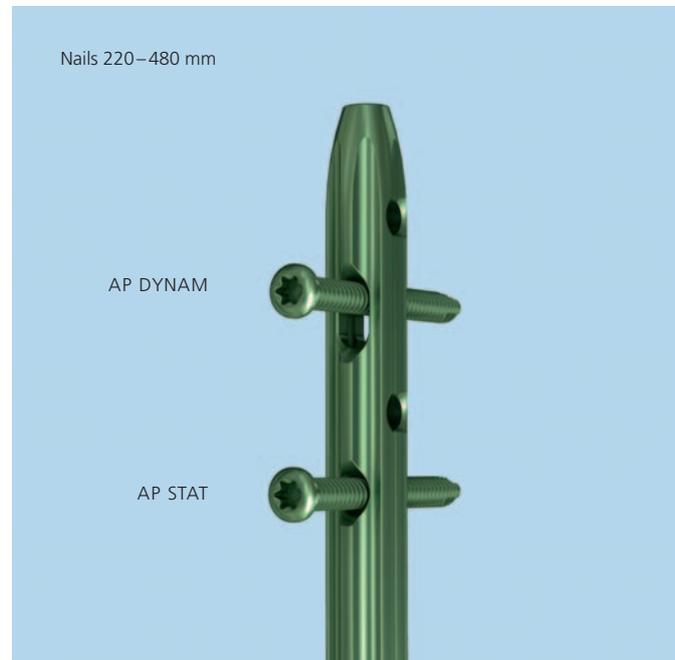
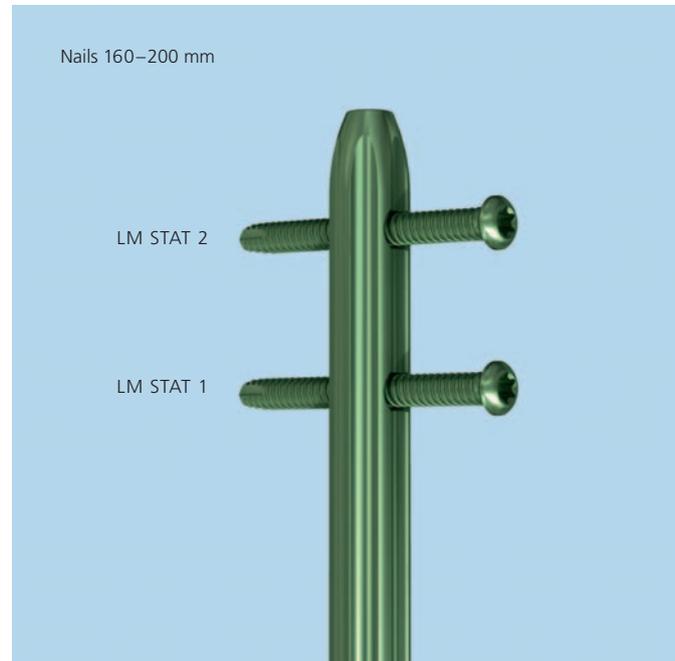
Retrograde Approach – Freehand Locking

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.

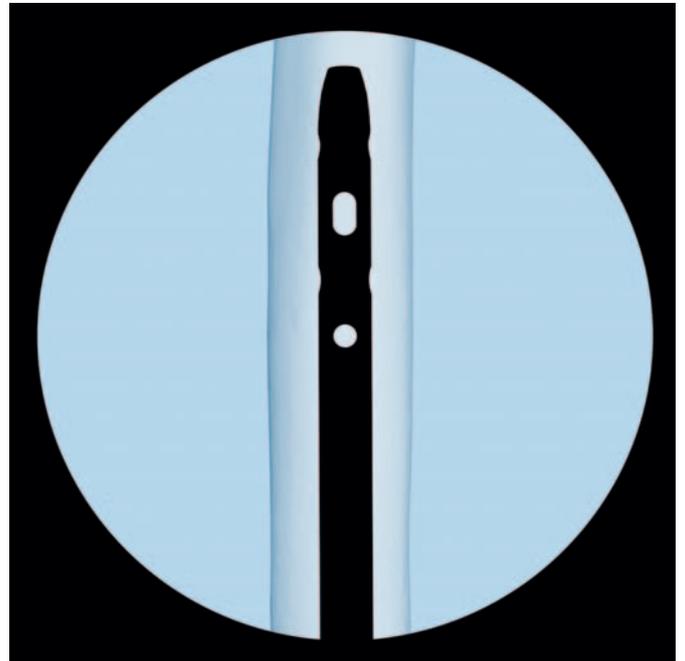


2

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.

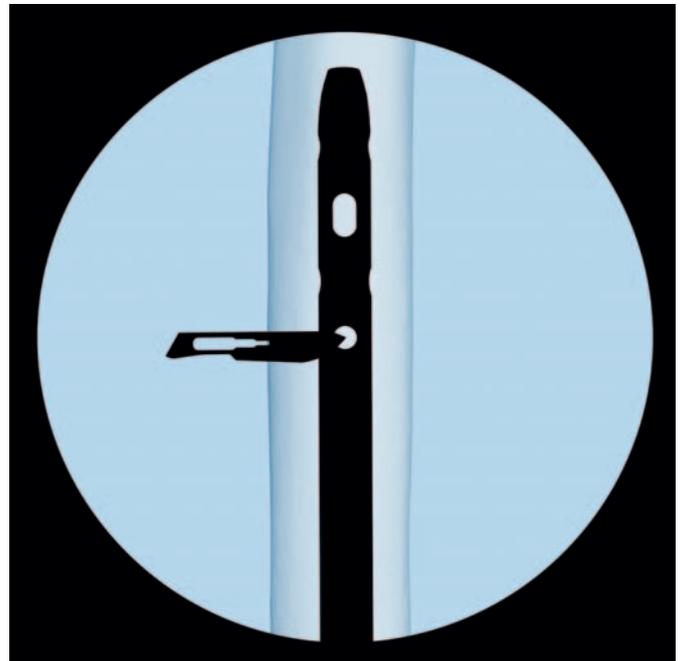
Align the image intensifier until the nail hole appears completely round.



3

Make incision

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



4

Drill

Option: ASLS, the Angular Stable Locking System, can be used as an alternative to standard locking screws in any round hole of a Synthes cannulated titanium nail. For more details regarding the intramedullary fixator principle, please consult the ASLS technique guide (036.000.708) and concept flyer (036.001.017). Please note that for the use of ASLS special instruments are required.

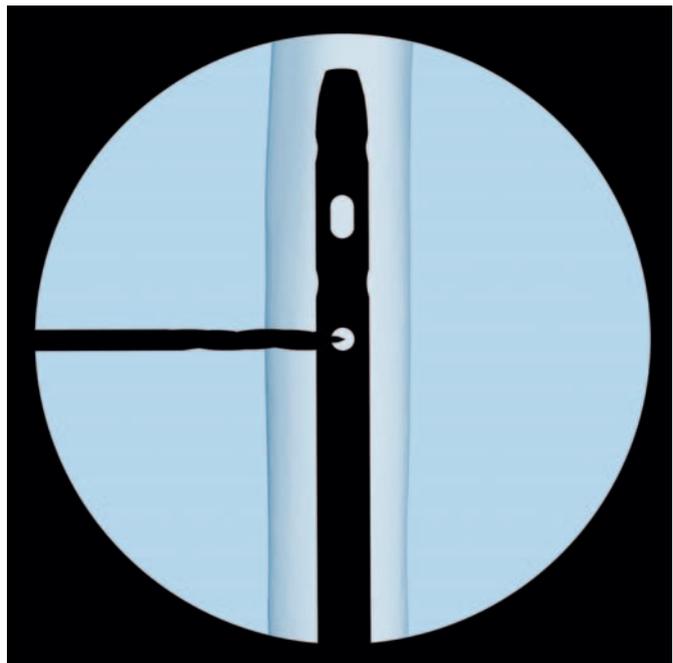


Instrument

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

**For nails \varnothing 9 to 13 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.

Alternative instrument

03.010.104 Drill Bit \varnothing 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.

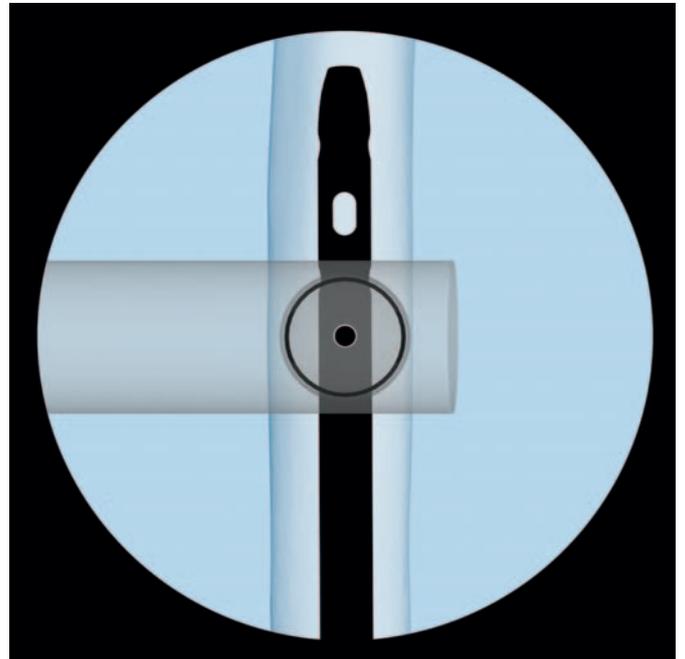
Optional instruments

03.010.102 Drill Bit \varnothing 5.0 mm, calibrated, length 145 mm, 3-flute, with Coupling for RDL

03.010.105 Drill Bit \varnothing 5.0 mm, calibrated, length 145 mm, 3-flute, for Quick Coupling

For Nails \varnothing 14 and 15 mm (aqua): Locking screws \varnothing 6.0 mm

Follow the procedure described above.



5

Measure for length of locking screw

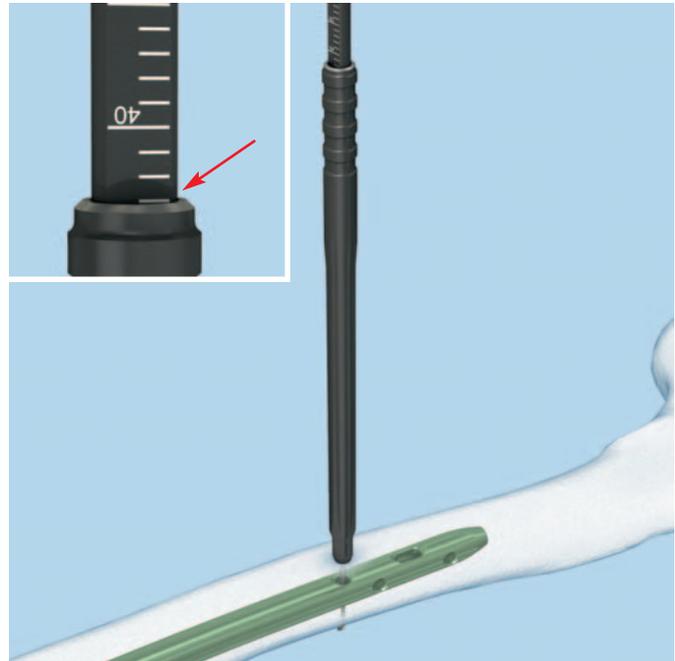
Instrument

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

- 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.



Alternative instrument

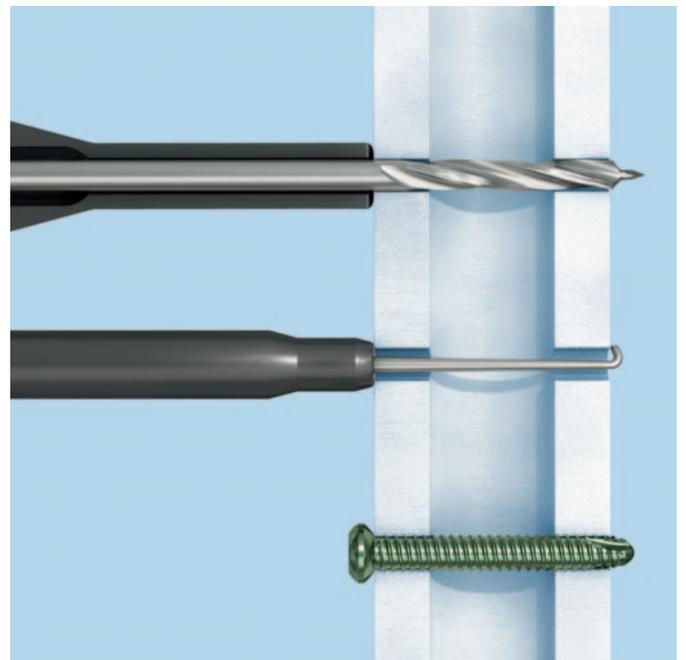
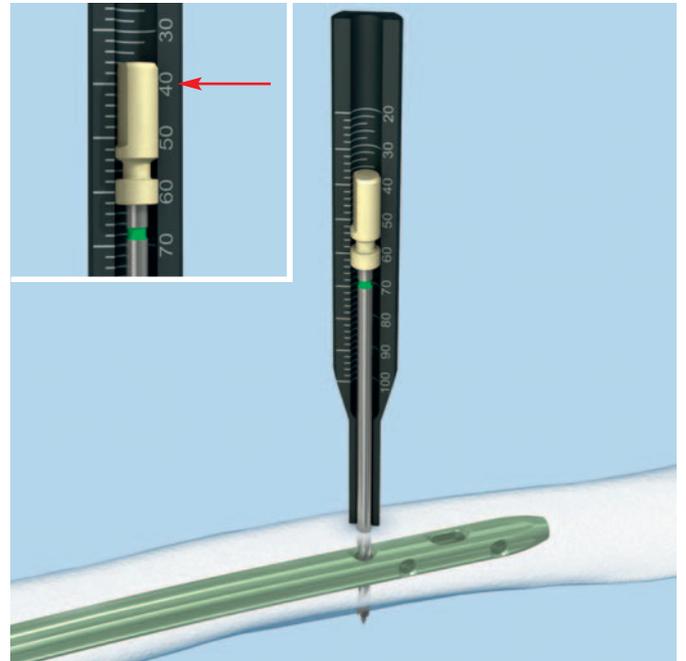
03.010.106 Direct Measuring Device for
Drill Bits of length 145 mm,
for Nos. 03.010.100 to 03.010.105

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 optimal locking screw length.



6

Insert locking screw

Instruments

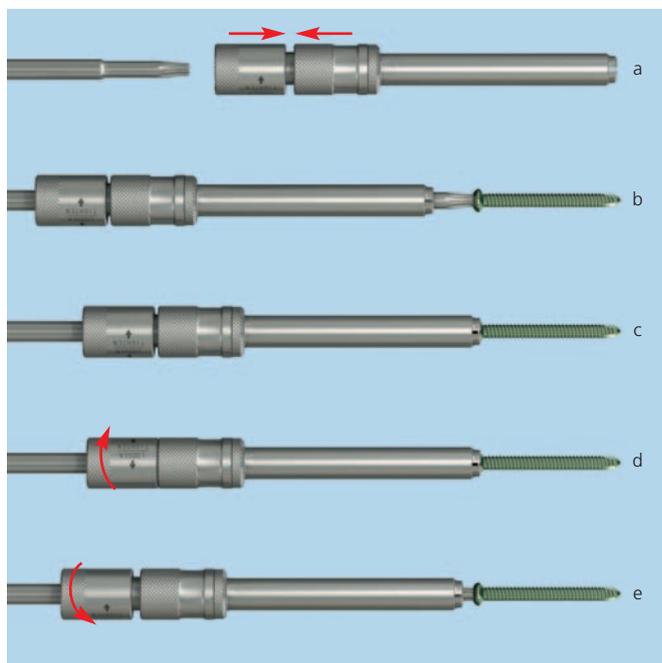
03.010.107 Screwdriver Stardrive, T25, length 330mm

03.010.112 Holding Sleeve, with Locking Device

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:

- a Insert the holding sleeve onto the shaft of the screwdriver.
- b Place the tip of the screwdriver in the recess of the locking screw.
- c Push the holding sleeve in the direction of the locking screw; the sleeve now holds the locking screw.
- d Lock the holding sleeve by tightening it anticlockwise.
- e 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

Besides distal standard or spiral blade locking, the proximal aiming device for Expert Retrograde Femoral Nail (03.010.142, 03.010.043, 03.010.044 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 well 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
03.010.144	Module for Spiral Blade 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 well 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

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.

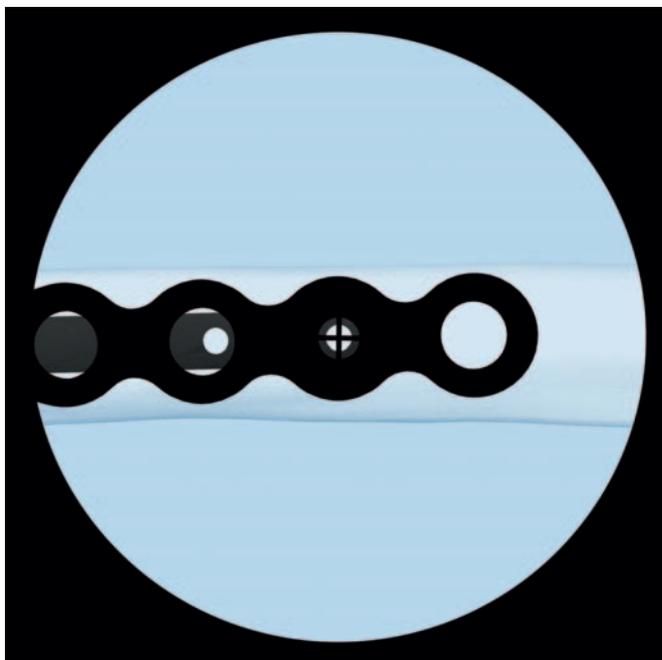
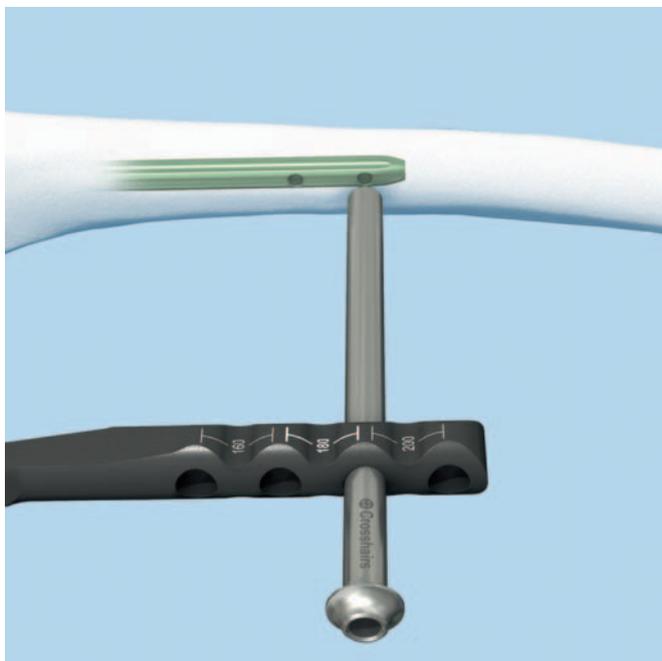
Remove the aiming sleeve.

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.

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



2

Reduce fracture

- 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

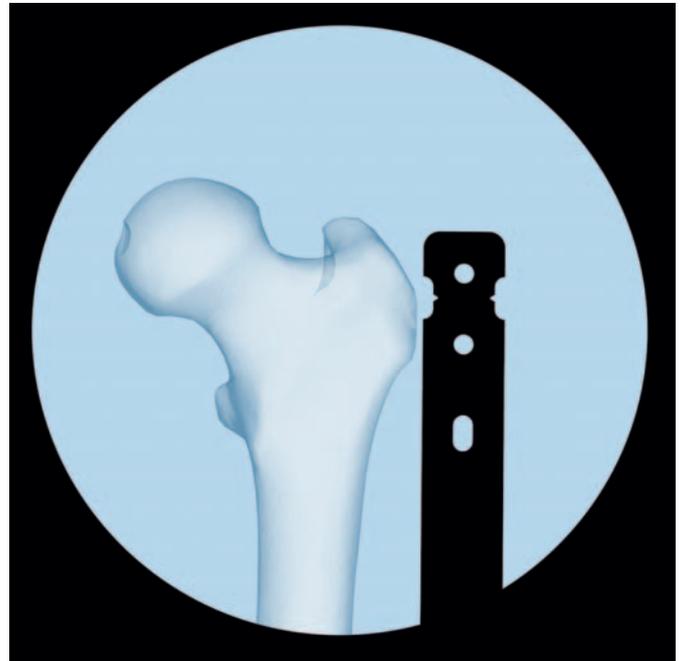
Measure for length and diameter of nail

Instruments

03.010.020	Radiographic Ruler for Expert Femoral Nails, length 475 mm
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.

- ① 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. 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.

Note: 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.

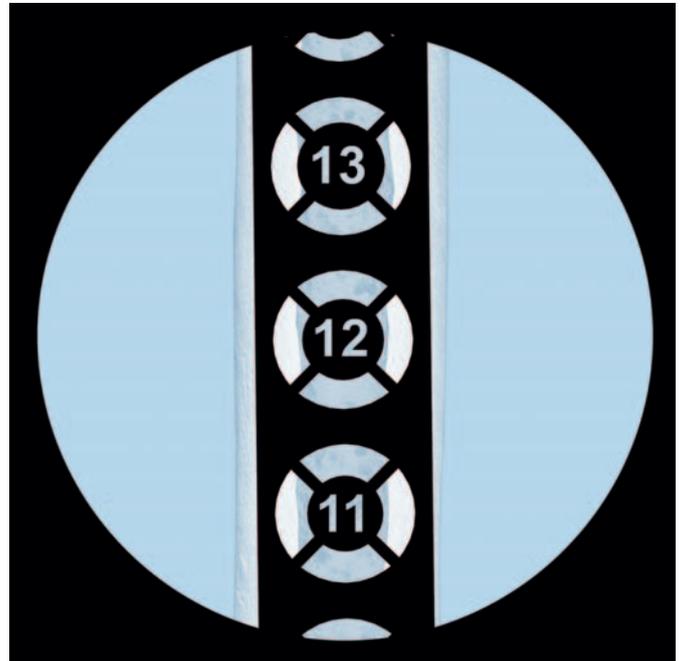


Alternatives

Determine the nail length by the above procedure on the uninjured leg or before draping (non-sterile) or compare the length of two identical SynReam reaming rods \varnothing 2.5 mm (352.032).

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

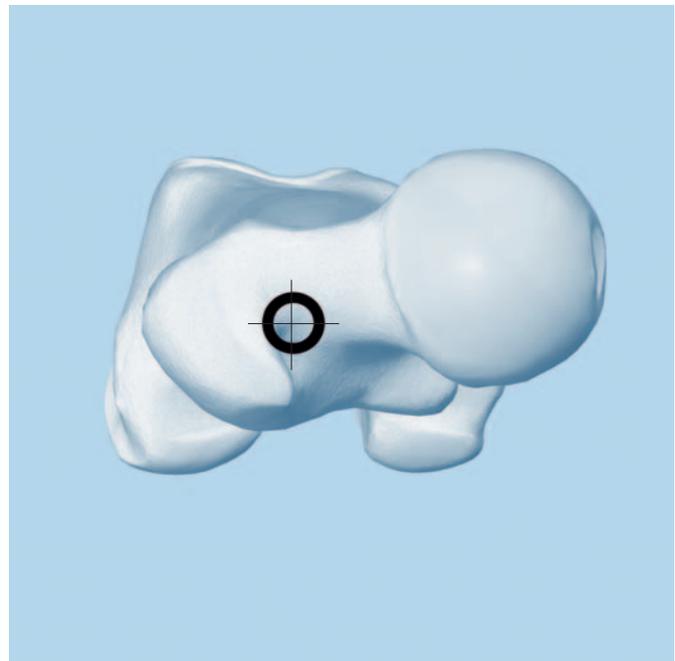
Make a longitudinal stab incision about 3 cm long approximately 10 to 15 cm proximal to the tip of the greater trochanter towards the tip, through the gluteus medius.

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 optimal final position of the nail in the medullary canal.



6

Insert guide wire

Instruments

03.010.030	Protection Sleeve 13.0, for antegrade approach
03.010.031	Drill Sleeve 13.0/3.2, with trocar tip, for antegrade approach, for No. 03.010.030
393.100	Universal Chuck with T-Handle
03.010.115	Guide Wire \varnothing 3.2 mm, length 290 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

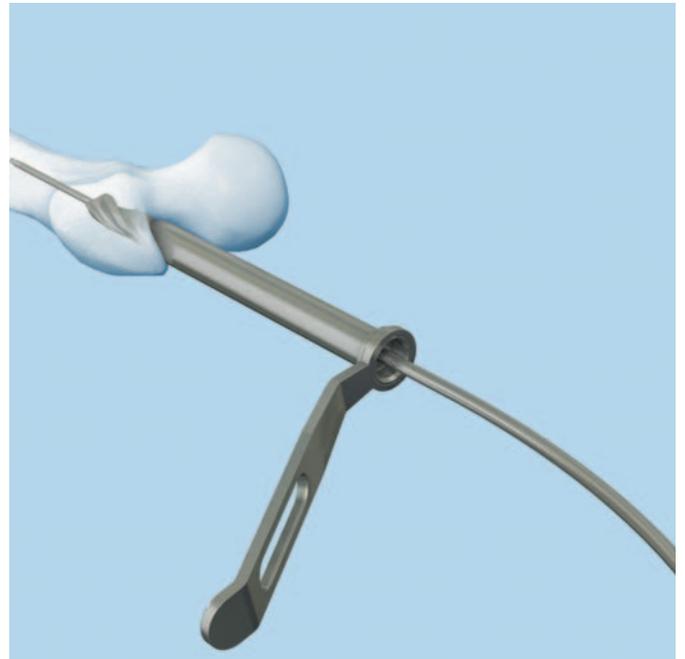
03.010.034	Drill Bit \varnothing 13.0 mm, cannulated, flexible
03.010.030	Protection Sleeve 13.0, for antegrade approach
03.010.115	Guide Wire \varnothing 3.2 mm, length 290 mm

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

Notes: 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 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.

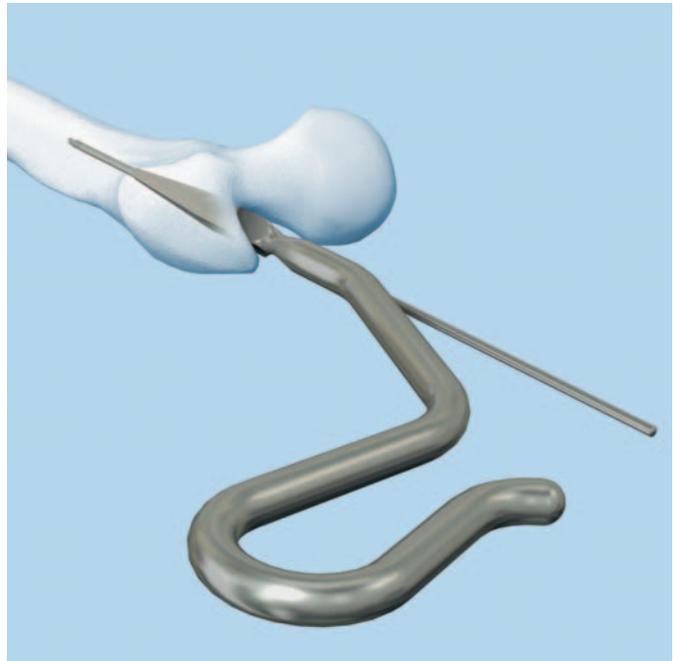
Remove the protection sleeve.

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

Notes: 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)

Optional instruments

189.060	SynReam Intramedullary Reaming System
352.032	Reaming Rod \varnothing 2.5 mm with ball tip, length 950 mm

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

- ⦿ Check fracture reduction under the image intensifier.

Inserting the reaming rod

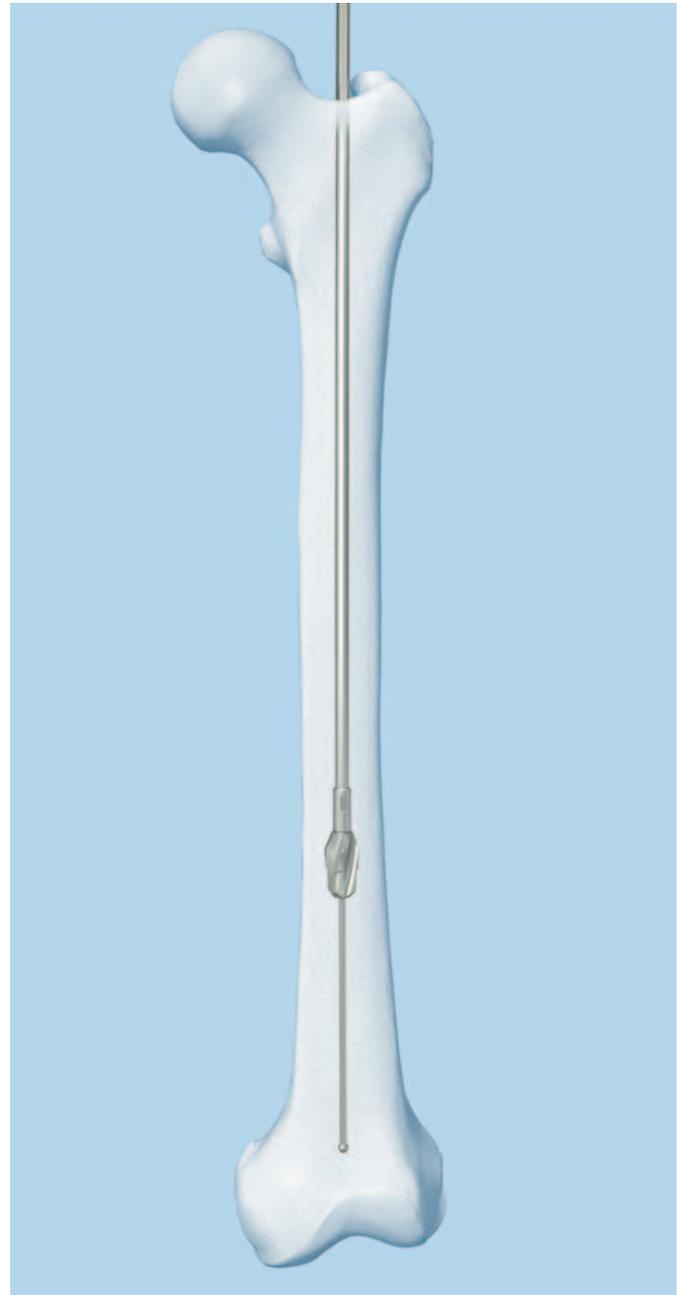
Insert the reaming rod into the medullary canal.

Reaming

Starting with the diameter 8.5 mm, 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.

Note: 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

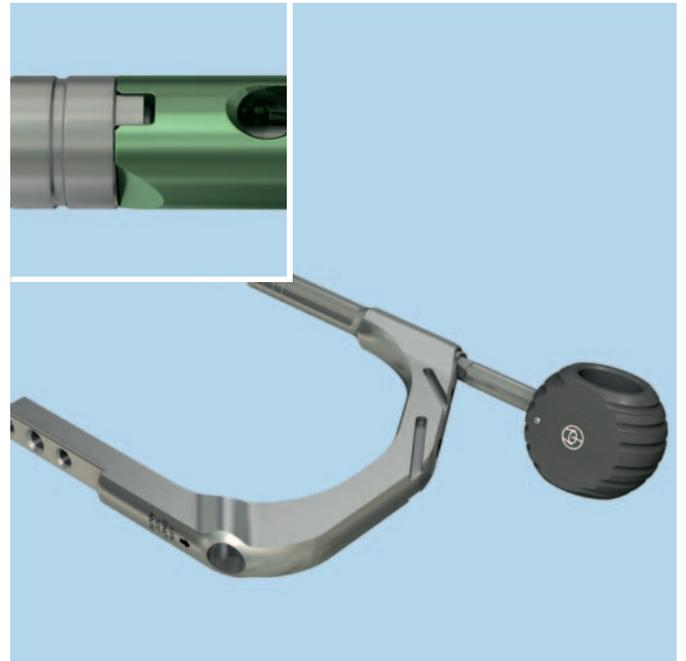
Instruments

03.010.146	Connecting Screw, cannulated, with Internal M6x1 Thread
03.010.046	Insertion Handle, long, for Expert Femoral Nails
03.010.092	Screwdriver hexagonal, with spherical head \varnothing 8.0 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.



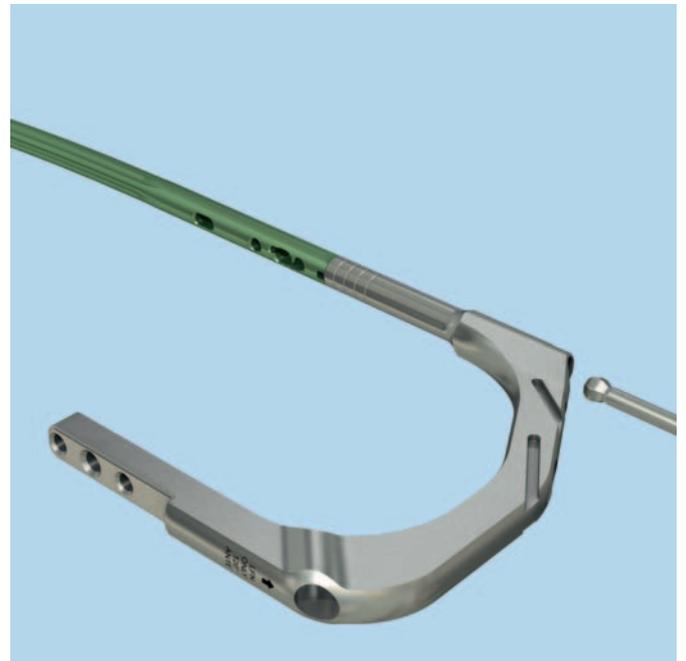
Check that the connecting screw is correctly and well tightened to the nail with the screwdriver, but do not over-tighten.

Alternative instruments

03.010.044 Connecting Screw, cannulated, for Expert Tibial and Femoral Nails, for 03.010.045

03.010.045 Insertion Handle, for Expert Tibial and Femoral Nails

Follow the procedure described above.

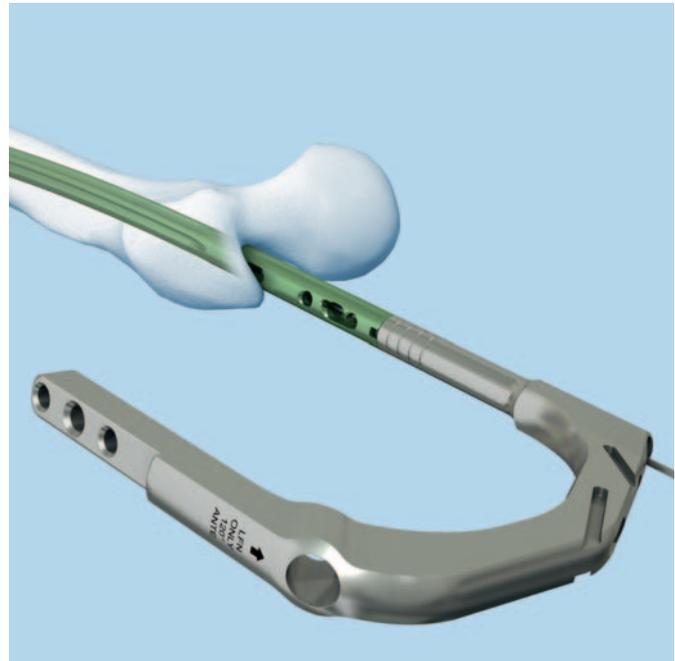


2

Insert nail

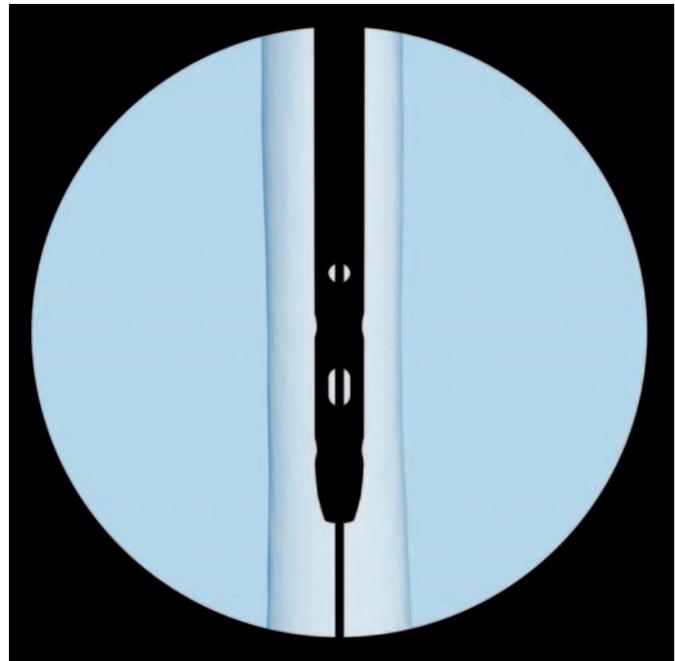
Using the insertion handle, insert the nail over the reaming rod, if used, into the medullary canal as far as possible by hand. Rotational movements of small amplitude can help.

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.



- 1 Monitor nail passage across the fracture, control in two planes to avoid malalignment.
- 2 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, for Insertion Handle
03.010.056	Combined Hammer 700 g, can be mounted, for No. 357.220
357.220	Hammer Guide, for No. 357.250*
321.160	Combination Wrench \varnothing 11 mm
321.170	Pin Wrench \varnothing 4.5 mm, length 120 mm
03.010.092	Screwdriver hexagonal with spherical head \varnothing 8.0 mm
357.398	Shaft, hexagonal, \varnothing 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.

Note: 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.



* Also suitable for No. 03.010.056

Antegrade Approach – Standard Locking

1

Mount aiming arm

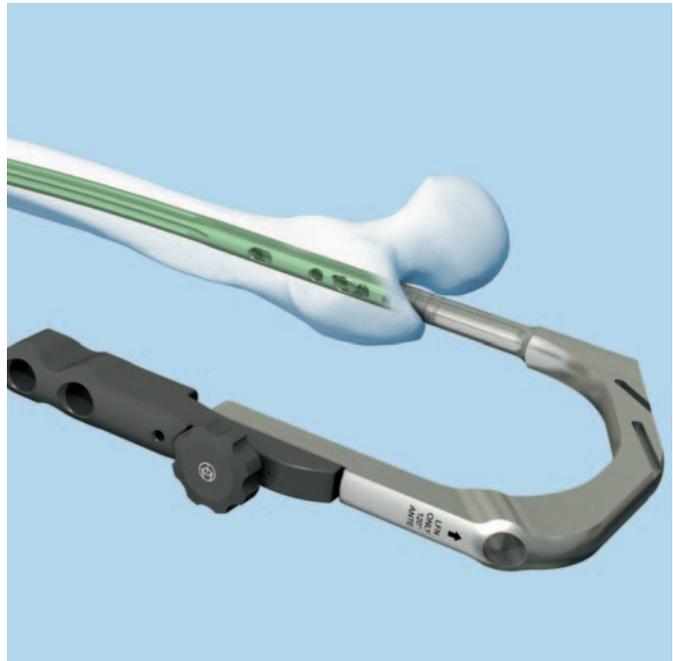
Instrument

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

Note: 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

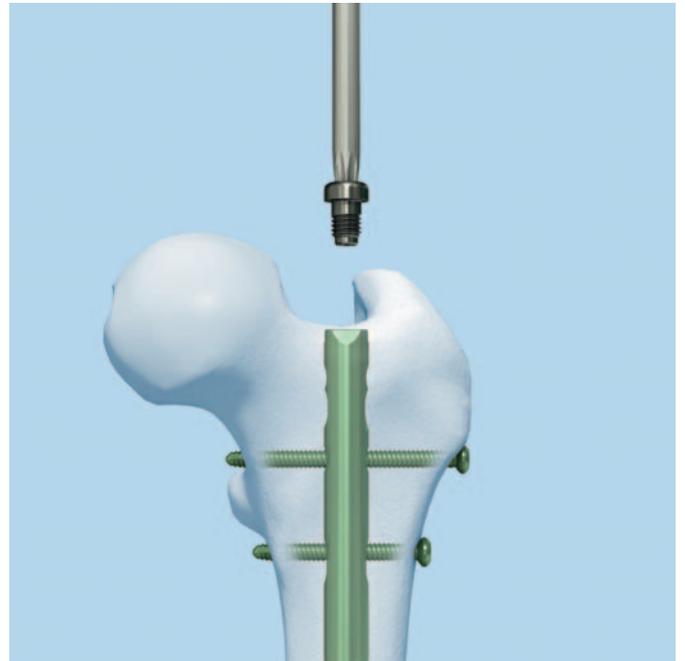
03.010.110	Screwdriver Stardrive, T40, length 300 mm
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Remove the nail insertion instruments.

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.

Note: 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

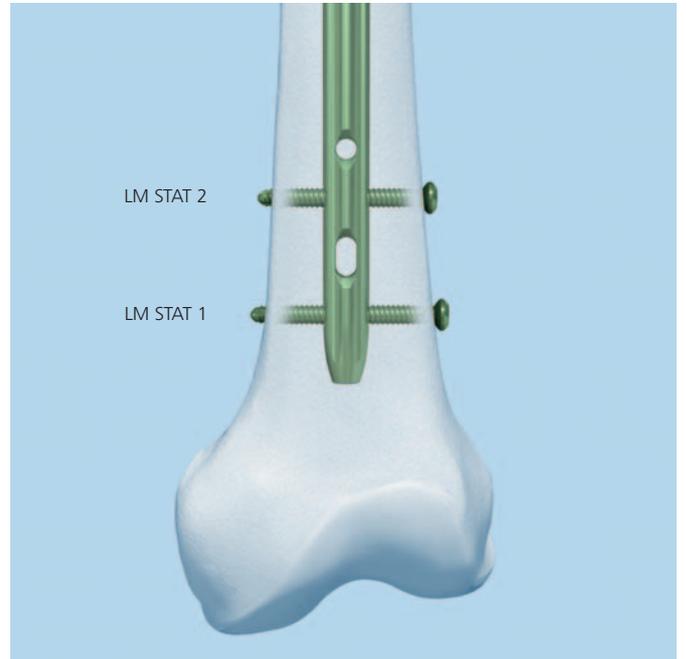
1

Freehand distal locking

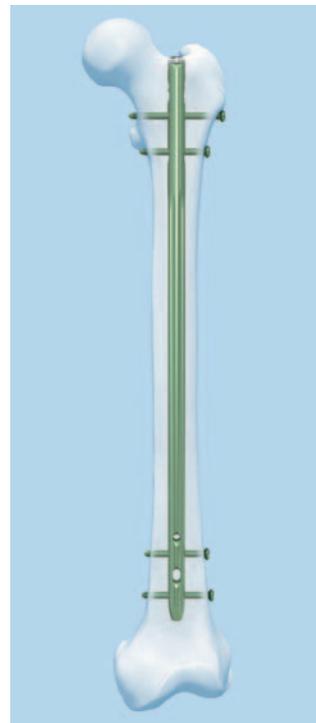
Use the two LM holes for distal locking.

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

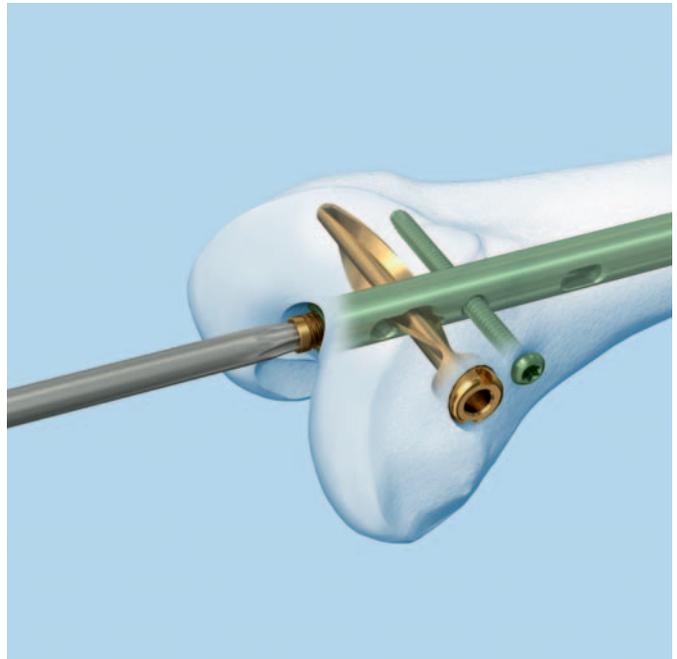
Instrument

03.010.110	Screwdriver Stardrive, T40, length 300 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.



2

Remove spiral blade

Instruments

357.360	Spiral Blade Extraction Screw for UFN/CFN and Spiral Blade
321.170	Pin Wrench Ø 4.5 mm, length 120 mm
357.220	Hammer Guide, for No. 357.250*

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.



* Also suitable for No. 03.010.056

3

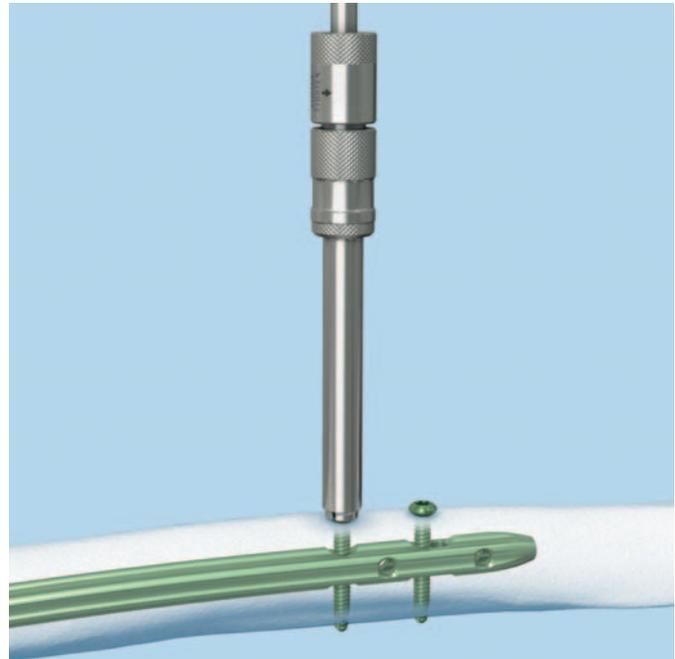
Remove proximal locking screws

Instruments

03.010.107	Screwdriver Stardrive, T25, length 330 mm
03.010.112	Holding Sleeve, with Locking Device

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

03.010.100	Extraction Screw, for Tibial and Femoral Nails
357.220	Hammer Guide, for No. 357.250*
03.010.107	Screwdriver Stardrive, T25, length 330 mm

Before removing the distal locking screw, screw the extraction screw into the nail and tighten it to prevent 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
------------	---

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.

Intramedullary Fixator. Using the Angular Stable Locking System (ASLS).

What is ASLS?

The Angular Stable Locking System (ASLS) provides the ability to create a fixed-angle construct to an intramedullary nail. Therefore, it combines the advantages of angular stability and a minimally invasive approach. ASLS together with an intramedullary nail form the principle of the Intramedullary Fixator.

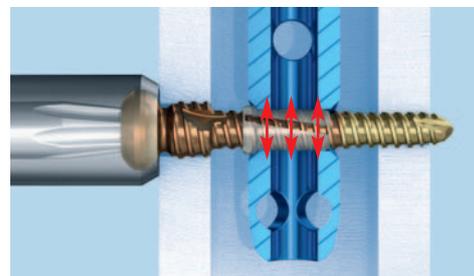
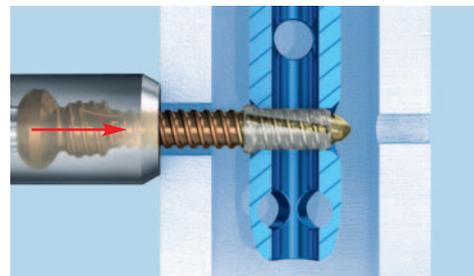


How does ASLS work?

The system consists of a screw with three outer diameters and a resorbable sleeve.

The resorbable sleeve is placed on the screw tip which has the smallest screw diameter and is pushed into the locking hole of the nail.

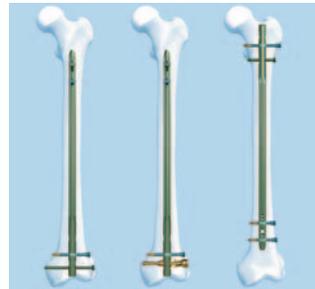
During screw advancement, the resorbable sleeve is expanded by the larger middle diameter. Radial expansion of the sleeve and its fixation in the nail creates the angular stability.



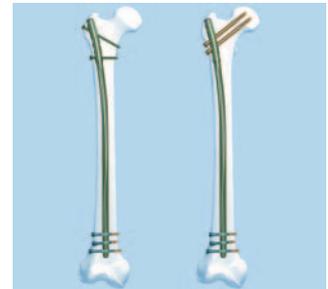
Where can I use ASLS?

ASLS is particularly indicated in cases where increased stability is needed, for example in fractures closer to the metaphyseal area or in poor quality bone.

ASLS can be used in combination with all Synthes cannulated titanium nails as an alternative to standard locking screws. It is especially suited for the use with the Expert Nailing System.



Expert Retrograde/Antegrade Femoral Nail (R/AFN)



Expert Lateral Femoral Nail (LFN)



Expert Humeral Nail (HN) and Expert Proximal Humeral Nail (PHN)



Expert Tibia Nail (TN)



Expert Hindfoot Arthodesis Nail (HAN)

Implants

ASLS screws

- Titanium-6% aluminium-7% niobium alloy (TAN)
- Fully threaded shaft with 3 diameters
- Self-tapping, blunt tip
- Stardrive T25 recess
- Sterile-packed



ASLS sleeves

- 70:30 poly (L-lactide-co-D,L-lactide)
- Bioresorbable, provides 80% decreased fracture site motion during first 12 weeks of healing
- Gradually degrades within 2 years (resorption rate varies per patient and implant site)
- Inner thread for secure fit to screw
- Expands in nail locking hole
- Available in diameters of 4.0 mm (ASLS4), 5.0 mm (ASLS5) and 6.0 mm (ASLS6)
- Sterile-packed



Nails

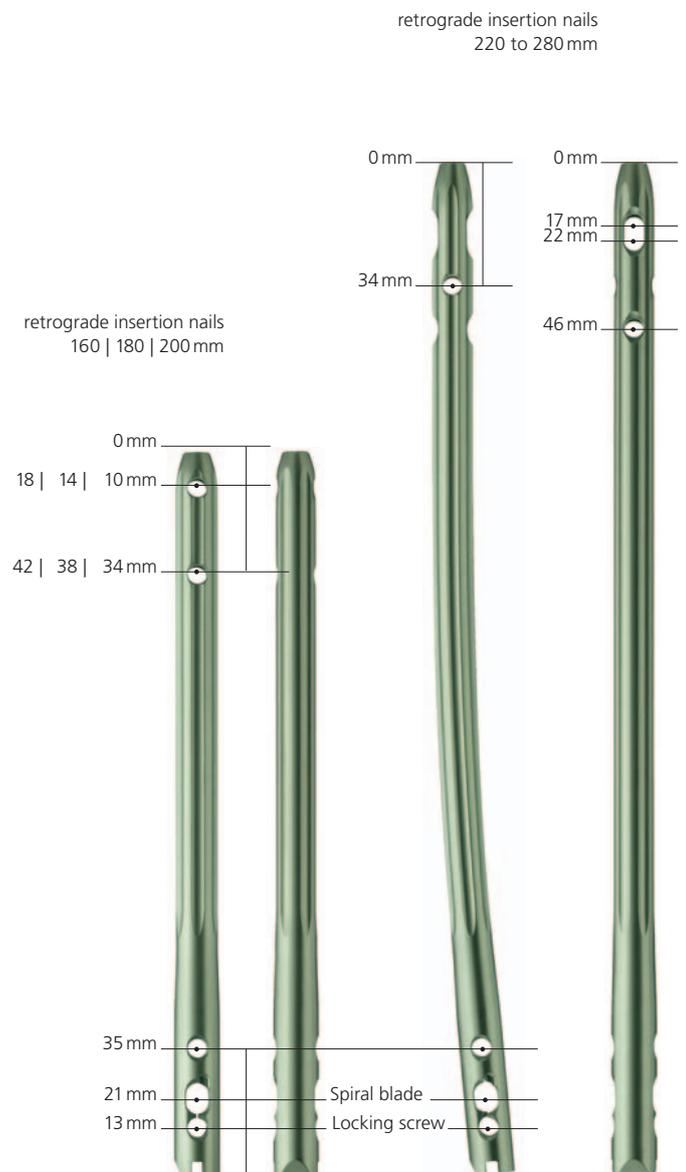
All implants are available in TAN*.

Expert Retrograde Femoral Nails**

Ø 9 – 13 mm, unsterile and sterile

Length mm	Ø 9 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 mm	Ø 12 mm light green	Ø 13 mm 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



* TiAl₆Nb₇

** In Vario Case for Expert Retrograde/Antegrade Femoral Nails (68.013.307) space is provided for 48 nails (four different diameters from Ø 9 to 13 mm, 12 lengths per diameter).

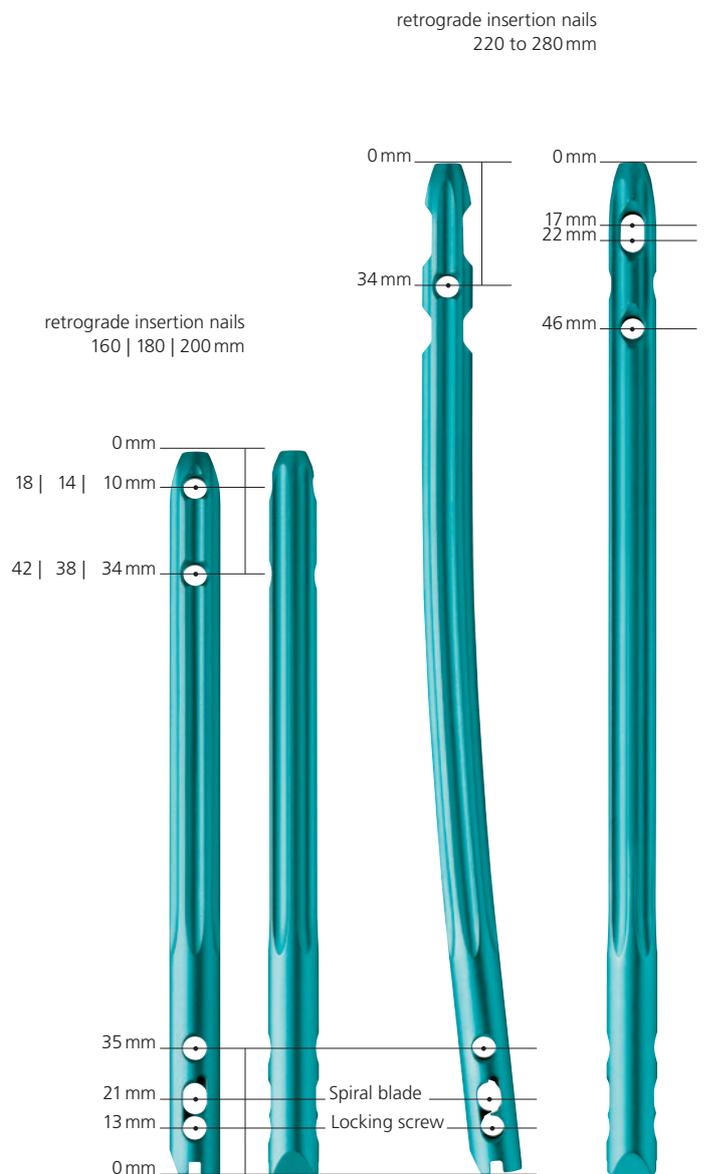
Expert Retrograde Femoral Nails

Ø 14 and 15 mm, sterile only

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

Nails Ø 9 and 10 mm are round.
Nails Ø 11 to 15 mm are fluted.

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



Expert Retrograde/Antegrade Femoral Nails

Ø 9 – 13 mm, unsterile and sterile

Length mm	Ø 9 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 mm	Ø 12 mm light green	Ø 13 mm 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

Retrograde or Antegrade Insertion, 300 mm to 480 mm



Expert Retrograde/Antegrade Femoral Nails

Ø 14 and 15 mm, sterile only

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

Nails Ø 9 and 10 mm are round.
 Nails Ø 11 to 15 mm are fluted.
 Nails 160 to 200 mm are straight.
 Nails 220 to 480 mm are bent (antecurvature = 1500 mm)



Locking Implants

Spiral blades for Expert Retrograde Femoral Nails*

unsterile and sterile



Article No.	Length mm
04.013.040	40
04.013.041	45
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

Expert end cap for spiral blade locking**

unsterile and sterile



Article No.	Extension mm
04.013.000	0

* In Vario Case for Locking Implants for Expert Femoral Nails (68.003.010), space is provided for eleven Spiral Blades (50–100 mm).

** In Vario Case for Locking Implants for Expert Femoral Nails (68.003.010), space is provided for two end caps for spiral blade locking.

Expert end caps with extension for standard locking*
 unsterile 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 Femoral Nails (68.003.010), space is provided for nine end caps with extension for standard locking (3×0 mm, 2×5 mm, 2×10 mm, 1×15 mm, 1×20 mm).

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

unsterile 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

* In Vario Case for Locking Implants, for Expert Femoral Nails (68.003.010), space is provided for two locking screws per length.

**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 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



357.127 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. 357.220*



* also suitable for 03.010.056

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



357.360 Extraction Screw for UFN/CFN and Spiral Blade



357.398 Shaft, hexagonal, Ø 8.0 mm, cannulated, short, length 125 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, length 475 mm

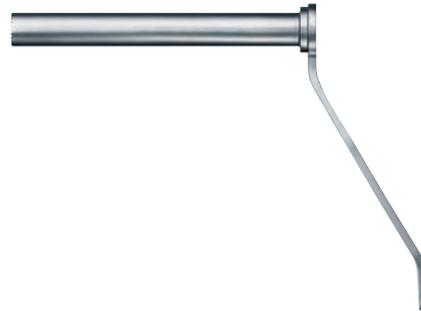


03.010.023 Radiographic Ruler for Nail Diameters for Expert Femoral Nails, length 365 mm



* Also suitable for 03.010.084

03.010.030 Protection Sleeve 13.0,
for antegrade approach



03.010.031 Drill Sleeve 13.0/3.2, with trocar tip,
for antegrade approach,
for No. 3.010.030



03.010.034 Drill Bit \varnothing 13.0mm, cannulated, flexible



03.010.146 Connecting Screw, cannulated, with
Internal M6x1 Thread



03.010.046 Insertion Handle, long,
for Expert Femoral Nails



03.010.047 Connector, for Insertion Handle



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



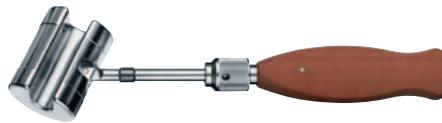
03.010.050 Aiming Arm for Expert R/AFN, retrograde, for Standard Locking



03.010.051 Aiming Arm for Expert, retrograde, for Spiral Blade Locking



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



03.010.061 Drill Bit Ø 4.0 mm, calibrated, length 340 mm, 3-flute, for Quick Coupling, for No. 03.010.065



03.010.063 Protection Sleeve 11.0/8.0, length 188 mm



03.010.065 Drill Sleeve 8.0/4.0, for No. 03.010.063



03.010.070	Trocar Ø 4.0 mm, for No. 03.010.065	
03.010.072	Depth Gauge for Locking Screws, measuring range up 110 mm, for No. 03.010.063	
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	
03.010.083	Spiral Blade Measuring Device	
03.010.084	Spiral Inserter for Spiral Blade Insertion, for No. 03.010.051	
03.010.092	Screwdriver, hexagonal, with spherical head Ø 8.0 mm	
03.010.093	Rod Pusher for Reaming Rod, with Hexagonal Screwdriver Ø 8.0 mm	

03.010.101	Drill Bit \varnothing 4.2 mm, length 145 mm, 3-flute, with Coupling for RDL	
03.010.104	Drill Bit \varnothing 4.2 mm, length 145 mm, 3-flute, for Quick Coupling	
03.010.106	Direct Measuring Device for Drill Bits of length 145 mm, for Nos. 03.010.100–105	
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 \varnothing 3.2 mm, length 290 mm	

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

Optional instruments

351.050 Tissue Protector



03.010.041 Awl \varnothing 14.0/3.2 mm, cannulated



03.010.044 Connecting Screw, cannulated,
for Expert Tibial and Femoral Nails,
for 03.010.045*



03.010.045 Insertion Handle,
for Expert Tibial and Femoral Nails**



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



03.010.066 Drill Sleeve 8.0/5.0, for No. 03.010.063



* Alternative instrument for 03.010.042

** Alternative instrument for 03.010.046

03.010.071 Trocar Ø 5.0 mm, for 03.010.066



03.010.102 Drill Bit Ø 5.0 mm, calibrated, length 145 mm, 3-flute, with Coupling for RDL



03.010.105 Drill Bit Ø 5.0 mm, calibrated, length 145 mm, 3-flute, for Quick Coupling



03.010.111 Screwdriver Stardrive, T40, cannulated, length 190 mm, with lever handle



Optional instrument for PAD

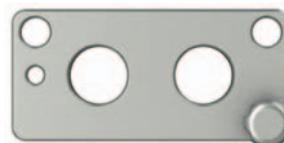
03.010.129 Aiming Sleeve 12.0/8.0, with cross wires, length 188 mm



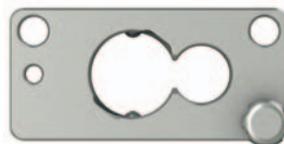
03.010.142 Arm for Proximal Aiming Device for Expert Retrograde Femoral Nail, lengths 160 to 200 mm



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



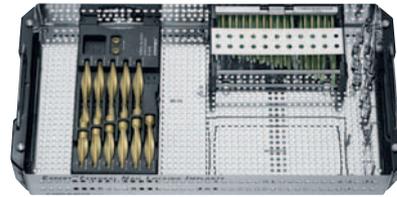
03.010.144 Module for Spiral Blade Locking, for Proximal Aiming Device for Expert Retrograde Femoral Nail, lengths 160 to 200 mm



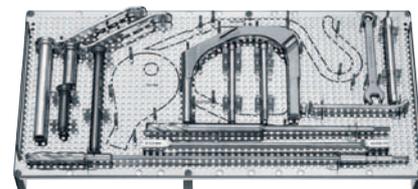
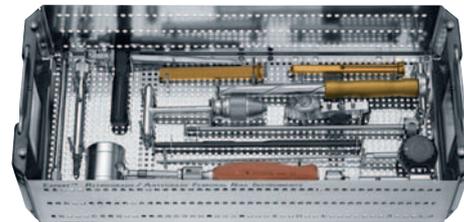
Do not use standard instruments together with alternative instruments before contacting your Synthes representative.

Vario Case

68.003.010 Vario Case for Locking Implants for Expert Femoral Nails, without Lid, without Content*

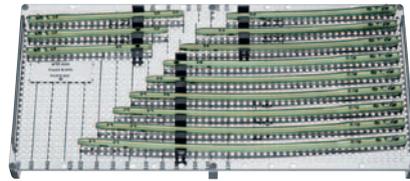
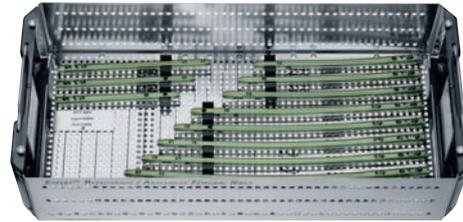


68.013.306 Vario Case for Instruments for Expert Retrograde/Antegrade Femoral Nails, without Lid, without Content

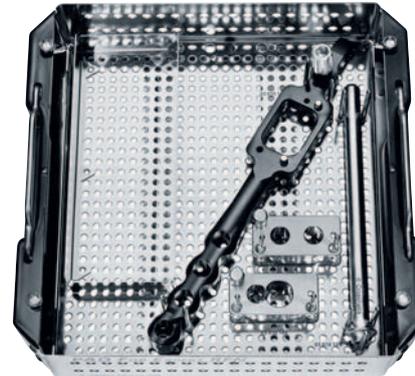


* Insert for Spiral Blades: 68.003.010.02

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



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 |
|------------|---|
-
- | | |
|------------|--|
| 05.001.210 | Attachment for Acetabular and Medullary Reaming, for Trauma Recon System |
|------------|--|
-
- | | |
|------------|---|
| 05.001.212 | Quick Coupling for Kirschner Wires 1.0 to 4.0 mm, for Trauma Recon System |
|------------|---|
-
- | | |
|------------|--|
| 05.001.213 | Quick Coupling for DHS/DCS Triple Reamers, for Trauma Recon System |
|------------|--|



DFN Compatibility and Instrumentation Upgrade

DFN compatibility

Instruments

321.170	Pin Wrench Ø 4.5 mm, length 120 mm
351.270	Drill Bit Ø 13.0 mm, cannulated, length 290 mm, 3-flute, for Quick Coupling No. 511.760
357.112	Insertion Handle for DFN
357.115	Aiming Arm for Standard Locking, for No. 357.112
357.116	Aiming Arm for Spiral Blade Locking, for No. 357.112
357.117	Hammer Guide for DFN, for No. 357.026
357.123	Protection Sleeve 15.0/13.0, for DFN Spiral Blade, pink
357.124	Drill Sleeve 13.0/3.2, for No. 357.123
357.129	Guide Wire Ø 3.2 mm, calibrated
357.132	Connecting Screw for Spiral Blade for DFN, for No. 357.120
357.135	Connecting Screw for DFN for SynReam
357.360	Extraction Screw for UFN/CFN and Spiral Blade
357.530	Protection Sleeve 17.0/15.0, for No. 357.531
357.531	Drill Sleeve 15.0/3.2, for No. 357.530

The Expert Retrograde/Antegrade Femoral Nail is compatible with the DFN instruments listed in the table, i.e. the instruments used for inserting the nail and the spiral blade (and their removal) and both aiming arms.

DFN instrumentation upgrade

356.980 Drill Bit \varnothing 4.0 mm, calibrated,
length 270/245 mm, 3-flute,
for Quick Coupling*



357.710 Drill Sleeve 8.0/4.0, green,
for No. 357.760*



357.750 Trocar \varnothing 4.0 mm, for No. 357.710, green*



357.760 Protection Sleeve 11.0/8.0,
for UFN/CFN, green*



03.010.107 Screwdriver Stardrive T25,
length 330 mm



03.010.110 Screwdriver Stardrive T40, cannulated,
length 300 mm



* The instruments 356.980, 357.710 and 357.750 and 357.760 are part of the known UFN/CFN instrumentation.

To use the locking screws Stardrive \varnothing 5.0 mm (04.005.516–590), the Expert end cap for spiral blade locking (04.013.000) and the Expert end cap, cannulated, with extension 0 mm (04.003.000), an upgrade of the DFN instrumentation is required. It consists of six instruments (drill system for locking screws \varnothing 5.0 mm and two Stardrive screwdrivers), which are shown in the table above.

New inserts to accommodate the DFN upgrade instrumentation in the Vario Case (685.330) and in the SynCase (675.300), respectively, will be offered.

Notes: With the upgraded DFN instrumentation, the Expert Retrograde/Antegrade Femoral Nail is recommended to be used in combination with the locking screws Stardrive \varnothing 5.0 mm (04.005.516–590), the spiral blades for Expert R/AFN (04.013.041–052), the Expert end cap, cannulated, with extension 0 mm (04.003.000) and the Expert end cap for spiral blade locking (04.013.000) only.

The Expert R/AFN should not be used in combination with the old locking bolts \varnothing 4.9 mm (459.260–680), the locking screws \varnothing 6.0 mm (450.861–875), the end cap for locking screw \varnothing 6.0 mm (451.896) and the end cap for DFN Spiral Blade (451.895).

The only exception is the spiral blade for DFN (450.880–892), which can be used in combination with the Expert R/AFN.



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