

Expert LFN. Lateral Femoral Nail.

Surgical Technique



EXPERT
Nailing System

This publication is not intended for distribution in the USA.

Instruments and implants approved by the AO Foundation.

 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.depuyshes.com/hcp/reprocessing-care-maintenance>

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

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EXPERT LFN

OPTIMIZED ANATOMICAL DESIGN FOR IMPROVED CLINICAL OUTCOME

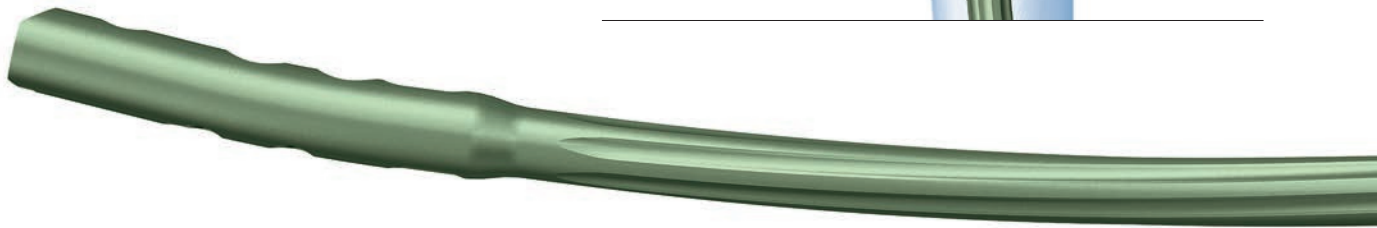
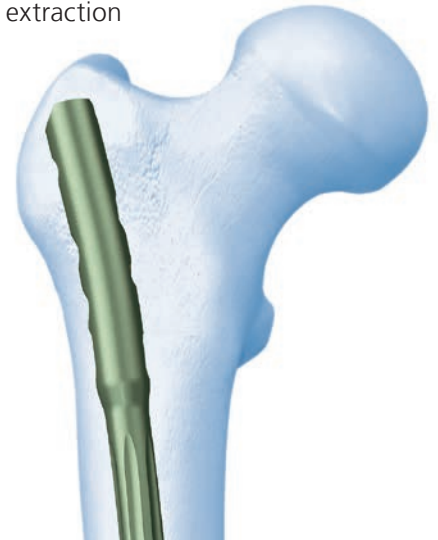
Expert Nailing System

One concept, one system

- Shorter learning curve
- Easier surgical procedure due to streamlined instrumentation
- Cost-efficiency thanks to common implants and instruments

Advanced anatomical nail design

- Optimal fit in bone
- Easier insertion and extraction



Optimized locking implants

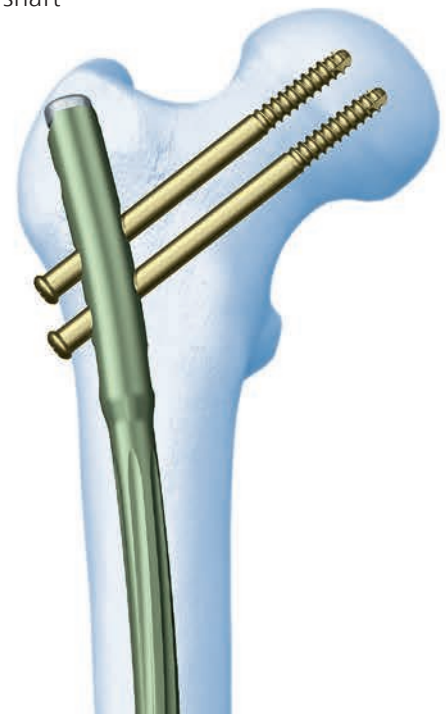
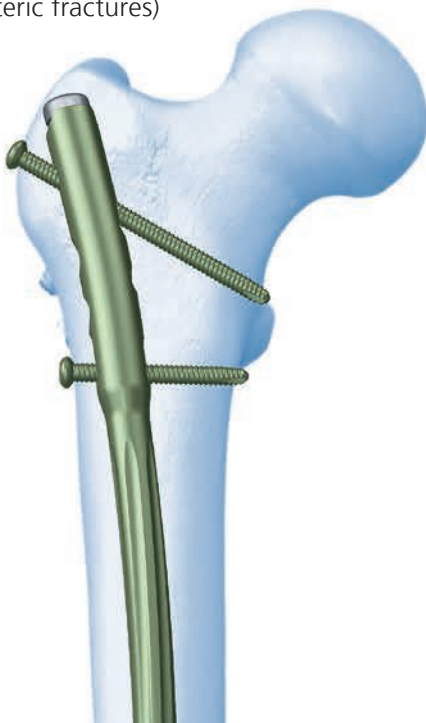
Expanded indications

Standard locking

- Femoral shaft fractures (except subtrochanteric fractures)

Recon locking

- Subtrochanteric fractures
- Combined femoral shaft and neck fractures

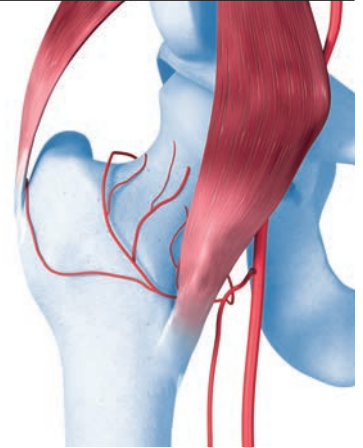


Optimal lateral entry point

- Easier access to entry site
- Time-saving surgical technique



- Less soft tissue damage
- Lower risk of avascular necrosis



Optimized locking implants

- Better purchase in osteoporotic bone
- Time-saving surgical technique
- Optimal torque transmission

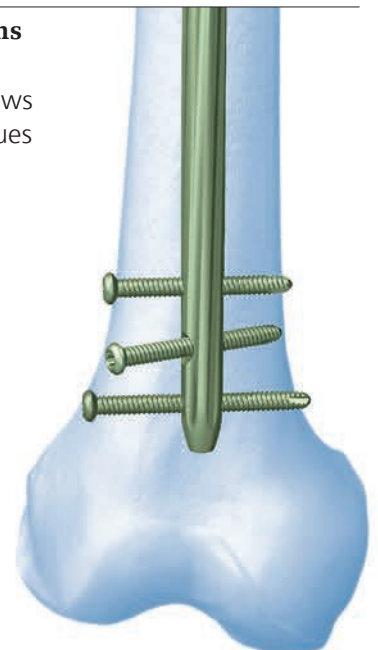
Cannulated end caps

- Easier insertion and extraction
- Self-holding Stardrive recess



Improved locking options

- Higher angular stability through multiplanar screws
- Less damage of soft tissues
- Improved mechanical resistance



AO PRINCIPLES

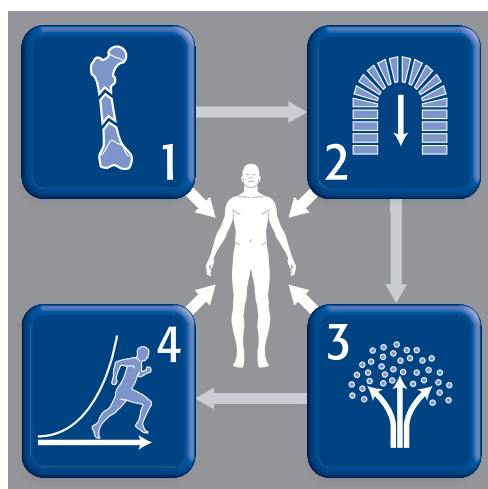
In 1958, the AO formulated four basic principles, which have become the guidelines for internal fixation.^{1,2}

Anatomic reduction

Fracture reduction and fixation to restore anatomical relationships.

Early, active mobilization

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



Stable fixation

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

Preservation of blood supply

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

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

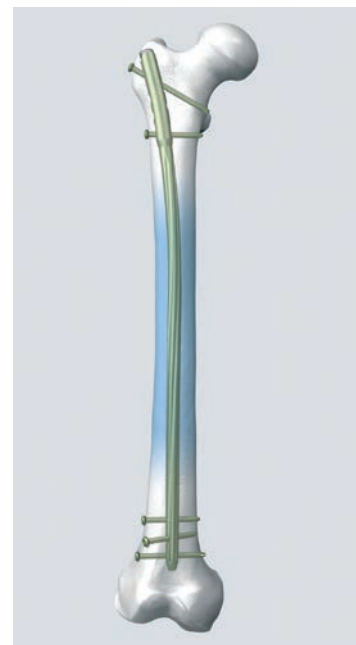
² Rüedi TP, RE Buckley, CG Moran. AO Principles of Fracture Management. 2nd ed. Stuttgart, New York: Thieme. 2007

INDICATIONS AND CONTRAINDICATIONS

Standard Locking Indications:

The Expert Lateral Femoral Nail with standard locking is indicated for fractures in the femoral shaft:

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



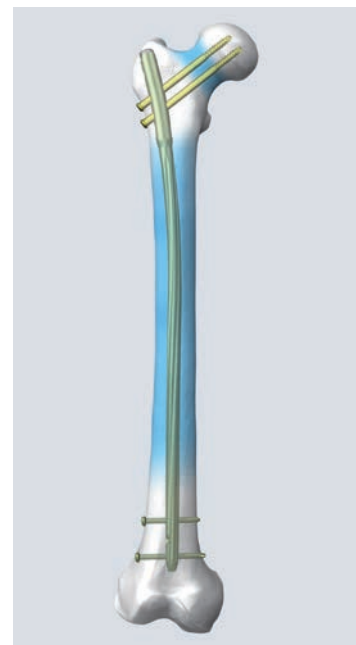
Recon Locking Indications:

The Expert Lateral Femoral Nail with recon locking is indicated for fractures in the femoral shaft in case of combination with femoral neck fractures:

32-A/B/C combined with 31-B (double ipsilateral fractures).

Additionally, the Expert Lateral Femoral Nail is indicated for fractures in the subtrochanteric section:

32-A [1–3].1, 32-B [1–3].1, and 32-C [1–3].1



Contraindications

No specific contraindications.

CLINICAL CASES

Case 1 – standard locking

85 year old female
Isolated femoral shaft fracture (AO 32-A1.2)

For simple shaft fractures, two proximal and two distal ML locking screws are normally sufficient to stabilize the fracture. Stability of the distal fragment can be enhanced by the use of a third locking screw in the oblique hole.



preoperative



follow-up
(1 month after surgery)

Case 2 – recon locking

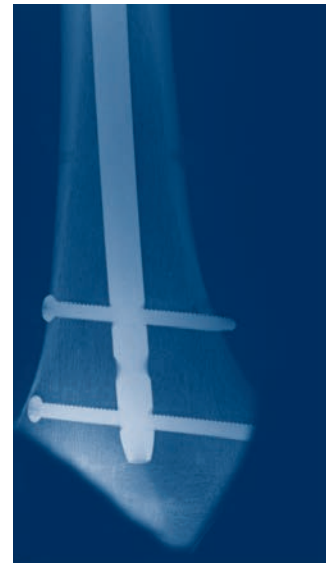
49 year old male
Ipsilateral femoral neck and shaft fractures

The use of two hip screws (recon locking) ensures optimal stabilization for the treatment of combined femoral neck and shaft fractures.

The distal segment can be stabilized by using two ML locking screws. Stability of the distal fragment can be enhanced by the use of a third locking screw in the oblique hole.



preoperative



follow-up
(1 month after surgery)

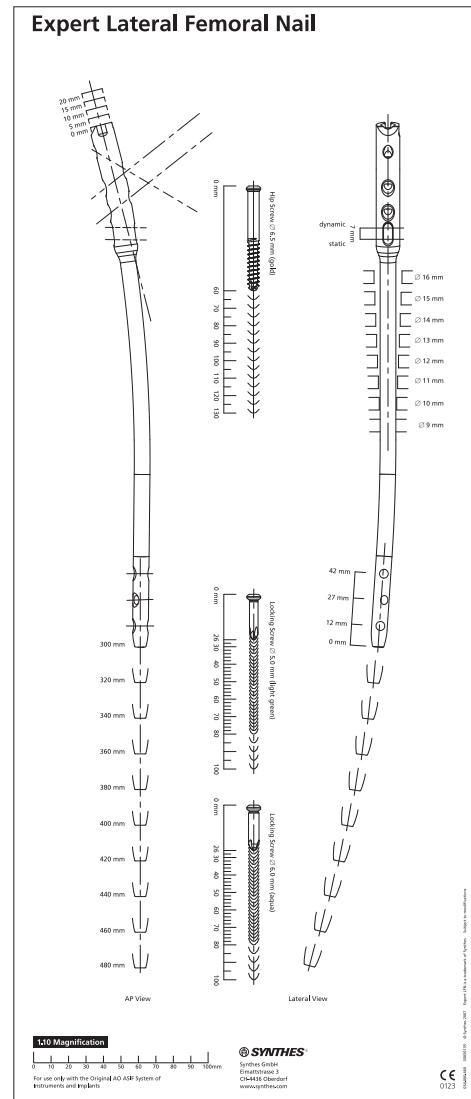
PREOPERATIVE PLANNING

Use the preoperative planner template for the Expert Lateral Femoral Nail (034.000.460) to estimate nail diameter and length.

To estimate the nail diameter, place the template on the lateral x-ray of the uninjured femur and measure the diameter of the medullary canal at the narrowest part that will contain the nail.

To estimate the nail length, place the template on the AP x-ray of the uninjured femur and select the appropriate nail length based on patient anatomy.

When selecting the nail size, consider canal diameter, fracture pattern, patient anatomy and post-operative protocol.



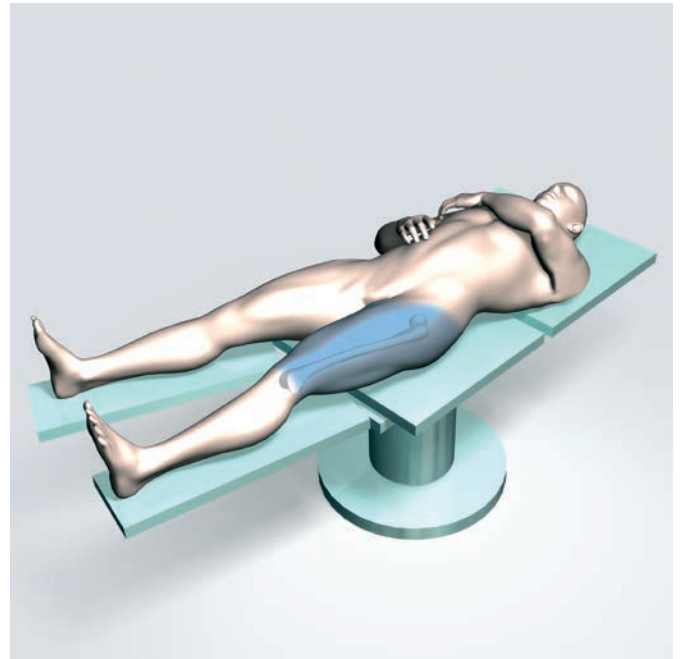
OPEN FEMUR

1

Position patient

- Position the patient supine on a fracture or radiolucent operating table. Position the C-arm to allow visualization of the proximal femur, the fracture and the distal femur in both AP and lateral planes.

Alternatively, the patient can be positioned supine with the injured leg adducted or in the lateral decubitus position.



2

Reduce fracture

- Perform closed reduction manually by axial traction under image intensifier control. The use of the large distractor (refer to the surgical technique 036.000.038) may be appropriate in certain circumstances.



3

Confirm nail length and diameter

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

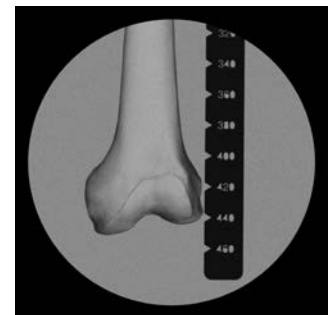
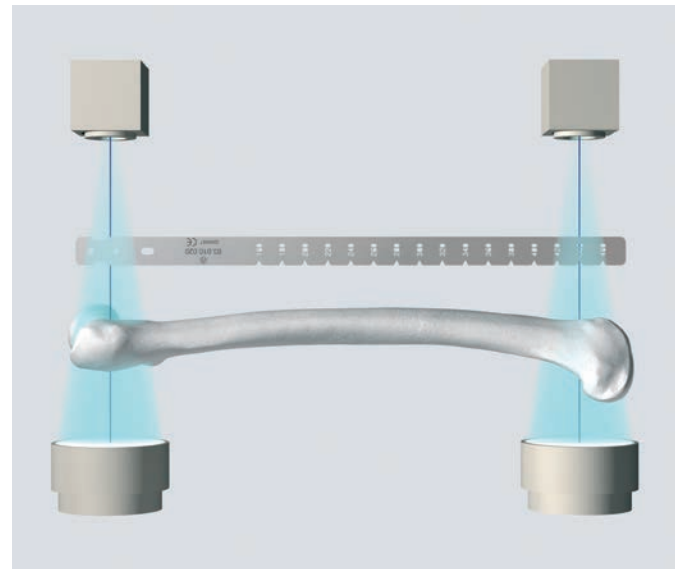
The required nail length must be determined after reduction of the femoral fracture.

- 1 Position the C-arm for an AP view of the proximal femur. With long forceps, hold the ruler alongside the lateral thigh, parallel to and at the same level as the femur. Adjust the ruler until the proximal end is at the desired nail insertion position. Mark the skin at the proximal end of the ruler.
- 2 Move the C-arm to the distal femur. Align the proximal end of the radiographic ruler to the skin mark, and take an AP image of the distal femur. Verify fracture reduction going from proximal to the fracture to distal.

Read nail length directly from the ruler image, selecting the measurement at or just proximal to the epiphyseal scar, or at the chosen insertion position.

Notes:

- **It is recommended that all fractures are treated with the longest nail possible, taking into account patient anatomy or a previous implant.**
- **Compression (with the conventional backstroke technique*) or dynamization must be taken into account when determining the nail length. A shorter nail should be chosen when back-hammering or dynamization is planned for the procedure (the dynamic slot allows for 7 mm of movement).**



* Backstroke technique: with the hammer guide attached to the connector and insertion handle (see Chapter 2 Insert Nail), light reverse hammer blows may be used to compress the fracture; monitor reduction radiographically.

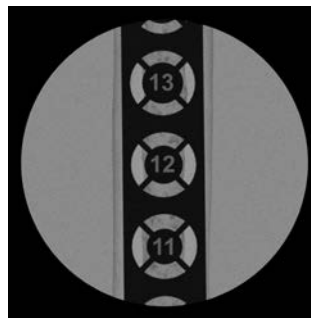
Alternatives

Determine the nail length by the procedure above on the uninjured leg before draping (unsterile), 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 Elongation Tube for Reaming Rods and the SynReam reaming rod \varnothing 2.5 mm, length 950 mm. See RIA Surgical Technique.

- 1 Place the radiographic canal width estimator perpendicular to the femur axis so that the round diameter gauge is located over the isthmus. Select the nail diameter with which the medullary canal-to-cortex transition is still visible on both sides of the diameter gauge.

Notes:

- The ruler provides only an estimate of the canal diameter as it is not at the same level as the femur.
- If the reamed technique is used, the diameter of the largest medullary reamer applied must be 0.5 mm to 1.5 mm larger than the nail diameter.



4

Approach

Palpate the posterior edge of the greater trochanter.

Make a 3 cm incision in line with the central axis of the intramedullary canal in lateral view and 2 to 5 cm proximal to the tip of the greater trochanter, depending on the anatomy of the patient.

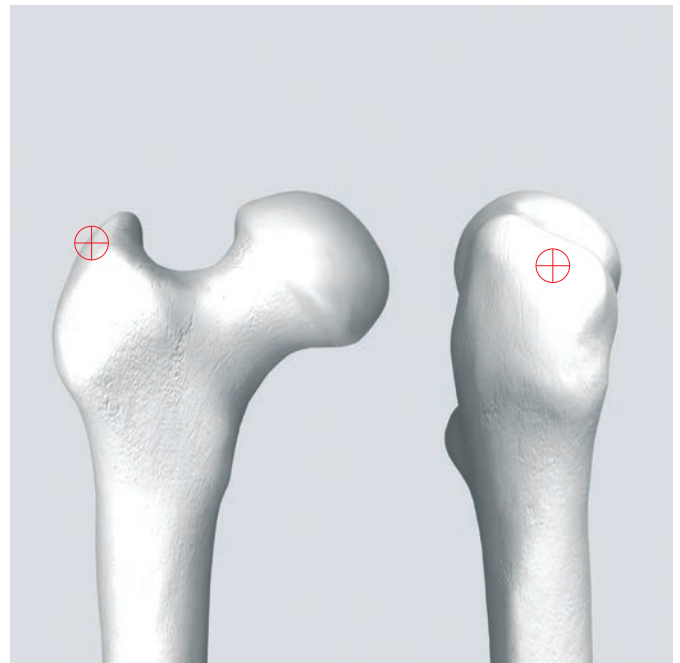
5

Determine entry point

The entry point is a determinant factor for the entire operation, especially for the optimal final position of the Expert Lateral Femoral Nail in the medullary canal.

- In AP view the entry point for the nail is approximately 10° lateral to the axis of the medullary canal. Depending on individual anatomy it is situated slightly lateral from the greater trochanter.
- In lateral view the entry point is in line with the axis of the intramedullary canal.




Note: To ensure a correct entry point the preoperative planner template for the Expert Lateral Femoral Nail can be used.



6




Insert guide wire

Instruments

357.399	Guide Wire Ø 3.2 mm, length 400 mm
393.100	Universal Chuck with T-Handle
 03.010.505	Protection Sleeve 17.0 for Expert Lateral Femoral Nail, with Quick Coupling
and	
 03.010.510	Multihole Drill Guide for Protection Sleeve 17.0, for Expert Lateral Femoral Nail
and	
 03.010.500	Handle, with Quick Coupling
or	
357.410	Protection Sleeve 22.0/17.0, for No. 357.394
and	
357.392	Drill Sleeve 17.0/3.2, length 161 mm, for No. 357.410
and	
357.393	Trocar Ø 3.2 mm, length 172 mm, for No. 357.392

Secure the guide wire in the universal chuck.

The effective mediolateral angle of the Lateral Femoral Nail is 10°; this means that in the AP view the guide wire must be inserted laterally to the greater trochanter at an angle of 10° to the intended extension of the medullary canal. Insert the guide wire for approx. 15 to 20 cm into the medullary canal and check the position under the

-  image intensifier.
-  Thread the drill sleeve into the protection sleeve and insert the assembly over the guide wire through the incision to the bone.
-  In the lateral view, verify whether the position of the guide wire is straight and in the center of the medullary cavity.



Precaution: The correct entry point and angle are essential for a successful result. To ensure the correct position of the guide wire, hold a sterile Expert Lateral Femoral Nail onto the femur and check radiographically.

Option: percutaneous technique

Insert the trocar assembly (protection sleeve, drill sleeve and trocar) through the incision and to the bone. Lightly mark the insertion point at a 10° angle to the shaft axis in the AP view. Remove the trocar and insert the guide wire through the drill sleeve for approx. 15 to 20 cm into the medullary canal. Check the position in the AP and lateral views under the image intensifier.

7

Option: realign guide wire**Instruments**

357.066	Parallel Guide for Guide Wires Ø 3.2 mm
393.100	Universal Chuck with T-Handle
357.399	Guide Wire Ø 3.2 mm, length 400 mm

Precaution: The position of the guide wire will be decisive for the success of the next steps. If the position of the inserted guide wire is not optimal, it needs to be realigned.

Slide the parallel guide over the guide wire. Direct the parallel guide (ML/AP directions) so that the new guide wire can be inserted at the correct entry point.

Secure a new guide wire in the universal chuck. Press the parallel guide firmly to the bone and insert the wire through the free sleeve of the parallel guide.

- Verify the correct position of the new guide wire in both views.

Remove the parallel guide and the first guide wire.



Note: This instrument facilitates the realignment of a guide wire as it uses the first wire as reference for the positioning of the new one.



8

Open medullary canal

Instruments


357.399	Guide Wire Ø 3.2 mm, length 400 mm
 03.010.505	Protection Sleeve 17.0 for Expert Lateral Femoral Nail, with Quick Coupling
and	
 03.010.500	Handle, with Quick Coupling
or	
357.410	Protection Sleeve 22.0/17, for No. 357.394
03.010.165	Drill Bit Ø 15.0 mm, cannulated, flexible, length 250 mm
03.010.167	Drill Bit Ø 17.0 mm, cannulated, flexible, length 250 mm

Remove the drill sleeve.

Alternative instruments

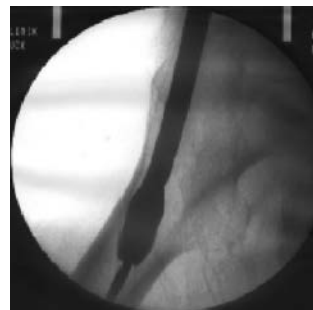
03.010.028	Drill Bit Ø 15.0 mm, cannulated, length 300 mm, 3-flute
03.010.029	Drill Bit Ø 17.0 mm, cannulated, length 280 mm

Secure the flexible cannulated drill bit with the DHS quick coupling and guide it over the guide wire through the protection sleeve to the bone. Drill the medullary canal as far as the stop on the protection sleeve. Move the drill bit continuously backwards and forwards to clear the debris from the medullary cavity and to avoid jamming.

-  Use image intensifier control while drilling the medullary canal.

Remove the drill bit, the protection sleeve and the guide wire.

Precaution: Dispose of the guide wire. Do not reuse.



Note: The drill bit Ø 15.0 mm is suitable for nails with diameters from 9.0 to 12.0 mm and the drill bit Ø 17.0 mm for nails with diameters from 13.0 to 16.0 mm.

Precaution: In case of small or difficult anatomy use the flexible drill bit in order to avoid damage to the far cortex.

Open medullary canal with awl

Instruments

357.399	Guide Wire Ø 3.2 mm, length 400 mm
03.010.041	Awl Ø 14.0/3.2 mm, cannulated

Remove the protection sleeve and the drill sleeve.

- ① Place the cannulated awl Ø 14.0 mm over the guide wire and open the medullary canal. Use a twisting motion to advance the awl to a depth of approximately 10 cm.

Remove the awl and the guide wire.

Precaution: After opening the proximal femur, dispose of the guide wire. Do not reuse.



9

Option: ream medullary canal

Alternative instrument

03.010.093	Rod Pusher for Reaming Rod with Hexagonal Screwdriver Ø 8.0 mm
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Note: For the detailed reaming procedure, please consult **SynReam Surgical Technique**.

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

- ① Check fracture reduction under image intensifier.

Insert reaming rod

Insert a 2.5 mm reaming rod into the medullary canal to the desired insertion depth. The tip must be correctly positioned in the medullary canal since it determines the final distal position of the Expert Lateral Femoral Nail.

Reaming

- ① Starting with the smallest diameter reaming head, ream to a diameter of 0.5 to 1.5 mm greater than the nail diameter. Ream in 0.5 mm increments and advance the reamer with steady, moderate pressure. Do not force the reamer. Partially retract the reamer repeatedly to clear debris from the medullary canal.

Use the holding forceps to retain the reaming rod while reaming and to prevent it from rotating.

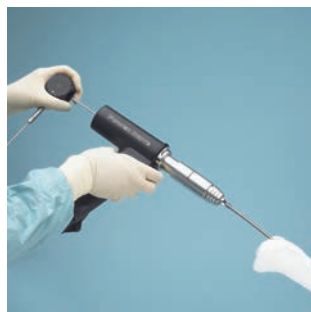


Option

The length of the nail can be measured with two identical reaming rods using the “overlapping method”.

Use the rod pusher to help retain the reaming rod during reamer extraction.

Note: All Expert Lateral Femoral Nails are cannulated and can be inserted over the SynReam reaming rod. Reaming rod exchange is not required.







INSERT NAIL

1

Assemble insertion instruments

Instruments

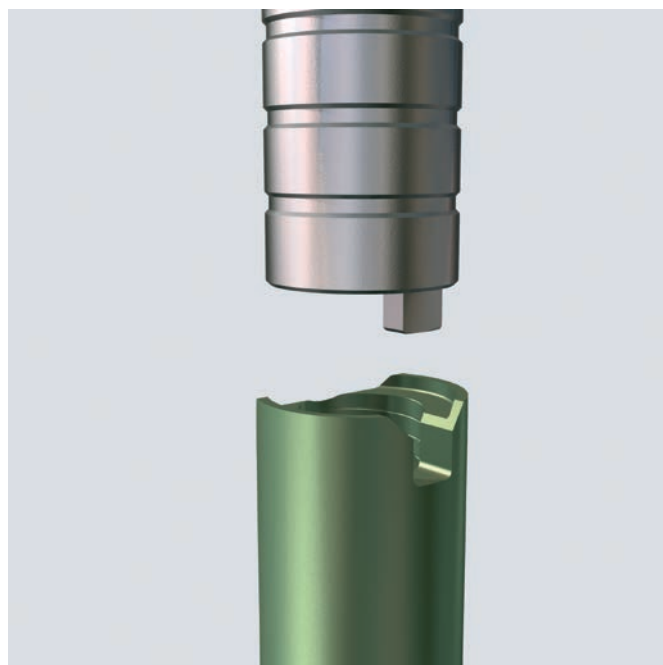
-  03.010.486 Insertion Handle, radiolucent, length 100 mm
 - and
 -  03.010.146 Connecting Screw, cannulated, with Internal M6x1 Thread
 - or
 - 03.010.045 Insertion Handle, for Expert Tibial and Femoral Nails
 - and
 - 03.010.044 Connecting Screw, cannulated, for Expert Tibial and Femoral Nails, for No. 03.010.045
 - or
 - 03.010.046 Insertion Handle, long, for Expert Femoral Nails
 - and
 -  03.010.146 Connecting Screw, cannulated, with Internal M6x1 Thread
-
- 03.010.092 Screwdriver, hexagonal with spherical head \varnothing 8 mm
 - or
 -  03.010.517 Screwdriver, hexagonal \varnothing 8.0 mm, with T-Handle, with spherical head, length 322 mm
-

Orient the insertion handle laterally towards the nail, and match the notch of the handle to the nail.

Place the connecting screw into the insertion handle and thread it into the proximal nail end using the screwdriver.

Note: The anatomical design of the Lateral Femoral Nail requires left and right version nails. The nails are therefore labeled left or right on the proximal anterior end.

Precaution: Check that the connecting screw is correctly tightened. Do not overtighten.



Optional instrument

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




Optionally, slide the connecting screw onto the rod pusher. Slide the assembly through the insertion handle and match the notch of the handle to the nail. Tighten using the rod pusher. Do not over-tighten.

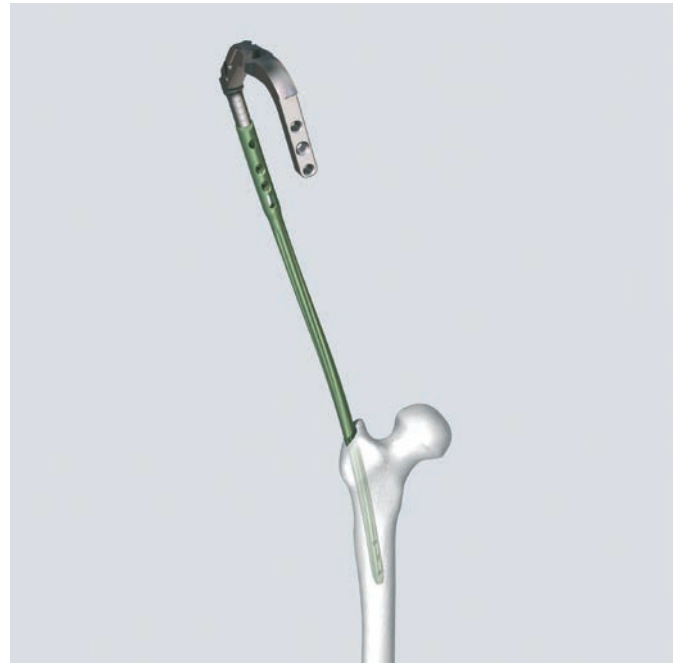


2

Insert nail

Instruments

-  03.010.486 Insertion Handle, radiolucent, length 100 mm
 - and
 -  03.010.146 Connecting Screw, cannulated, with Internal M6x1 Thread
 - or
 - 03.010.045 Insertion Handle, for Expert Tibial and Femoral Nails
 - and
 - 03.010.044 Connecting Screw, cannulated, for Expert Tibial and Femoral Nails, for No. 03.010.045
 - or
 - 03.010.046 Insertion Handle, long, for Expert Femoral Nails
 - and
 -  03.010.146 Connecting Screw, cannulated, with Internal M6x1 Thread
-



- 1 Orient the insertion handle **anteriorly** to insert the nail into the medullary canal.

Use slight twisting motions to advance the nail. Monitor nail passage across the fracture, and control in two planes to avoid malalignment.

Insert the nail until it is at or below the femoral opening.

- 2 Check the final nail position in AP and lateral views.

The nail **rotates** approximately 90° during insertion. The insertion handle rotates from anterior to lateral during insertion of the last one-third of the nail length.

If the nail does not rotate to the lateral position, remove the nail and reinsert.

Precaution: Do not mount the aiming arm until the nail has been completely inserted.

Note: The Lateral Femoral Nail can be passed over the SynReam Reaming Rod without use of the exchange tube.



Optional instruments

 03.010.523	Driving Cap with thread, for Insertion Handle
and	
 03.010.522	Combined Hammer, 500 g
and	
 03.010.170	Hammer Guide
or	
03.010.047	Connector, length 141 mm, for Insertion Handle
and	
03.010.056	Combined Hammer 700 g, can be mounted, for No. 357.220
and	
357.220	Hammer Guide, for No. 357.250
<hr/>	
321.160	Combination Wrench Ø 11 mm
<hr/>	
321.170	Pin Wrench Ø 4.5 mm, length 120 mm



If necessary, use light hammer blows to insert the nail. Slide the connector into the medial grooves on the insertion handle (use the lateral position only when the patient anatomy requires this) and secure it in place using the combination wrench.

Lock the head of the combined hammer in place by tightening the nut onto the threads located below the hammer head using the pin wrench if necessary. Strike the connector directly.

Remove the connector.

Optionally, the hammer guide can be threaded into the connector and the hammer can be used as a slide hammer. Loosen the nut away from the threads located below the hammer head and secure onto the threads located above the handle.

Remove the hammer guide and the connector.

Precautions:

- **If nail insertion is difficult, choose a smaller diameter nail or ream the intramedullary canal to a larger diameter.**
- **Do not hammer directly onto the insertion handle. Especially after hammering, confirm that the nail is securely connected to the insertion handle. Retighten if necessary.**



Alternatives

Compression

It is recommended to close fracture gaps in order to decrease the incidence of non-union or malunion.

If compression is planned, over-insert the nail to compensate for backstriking the nail: the final position of the nail should be flush with the trochanteric cortex.

- ① First lock distally and then use the hammer guide and the slide hammer to backstrike the nail under image intensification.

Precaution: Do not hammer directly on the connector or on the aiming arm.



Dynamization

If dynamization is planned, it is recommended to over-insert the nail by more than 7 mm (maximum distance between positions in static and dynamic modes).



Recon locking (optional)

If Recon locking is planned, insert the nail to a depth that allows centering of two recon screws in the femoral neck.

AP view: To ensure the correct position of the screws, hold two guide wires on the grooves in the insertion

- handle and check radiographically.

Lateral view: Rotate the handle until it bisects the


- femoral head within the lateral view.



3

Check proximal nail position

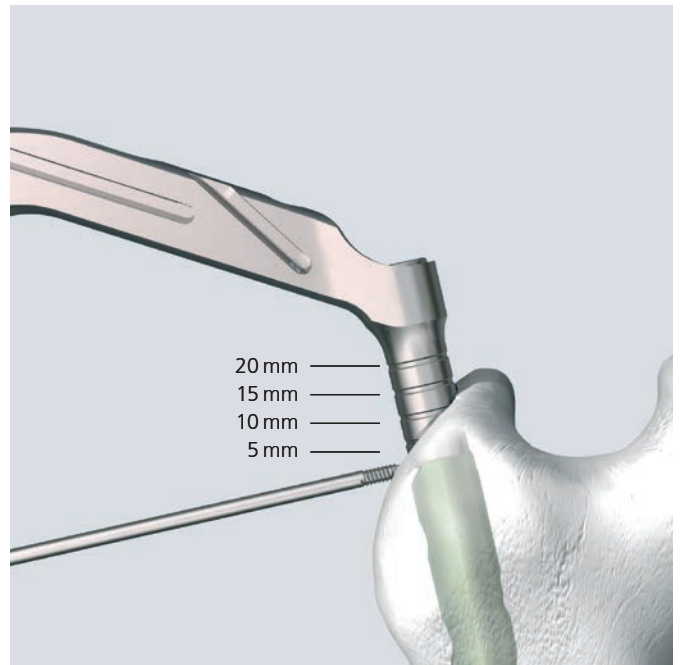
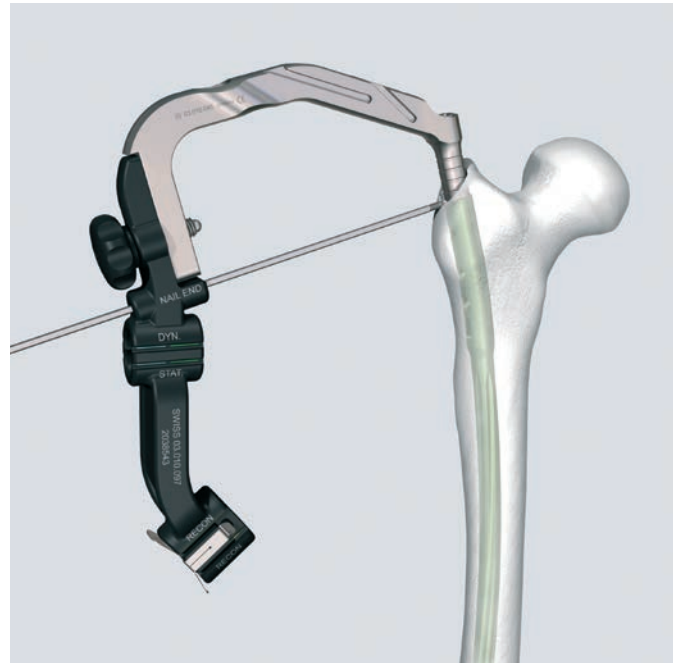
Instruments

03.010.097	Aiming Arm for LFN
or	
 03.010.482	Aiming Arm, radiolucent, for Expert Lateral Femoral Nail
357.399	Guide Wire Ø 3.2 mm, length 400 mm

Attach the aiming arm to the insertion handle and insert a guide wire in the hole as shown in the illustration. The tip of the guide wire indicates the exact proximal position of the nail. Check final nail position under image intensification in AP and lateral views.

Remove the aiming arm when distal locking is the next step.

Note: The distance between the markings on the insertion handle is 5 mm and corresponds to the extensions of the end caps. This feature can be used for over-insertion of the nail or for correcting the nail length.



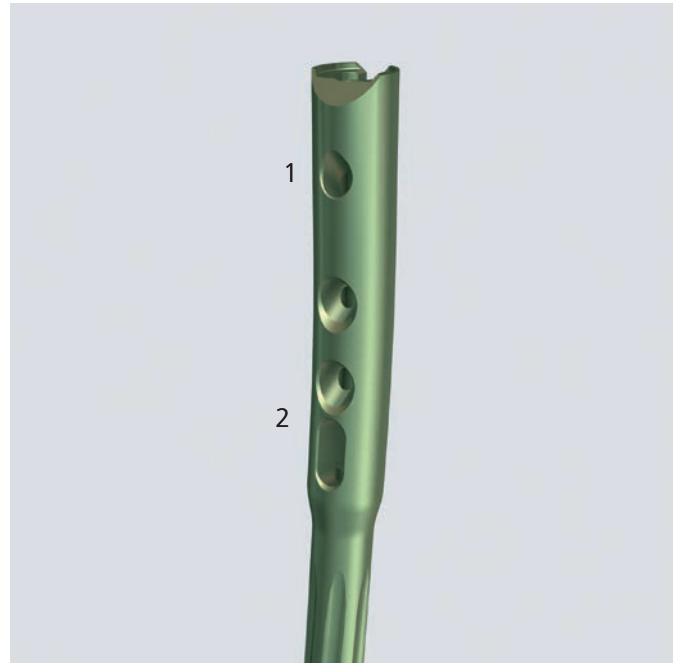
PROXIMAL LOCKING – STANDARD

1

Locking options

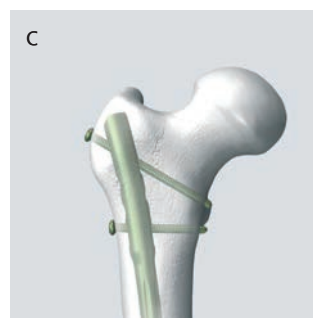
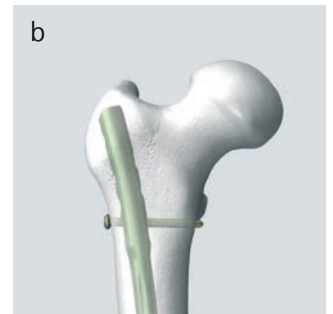
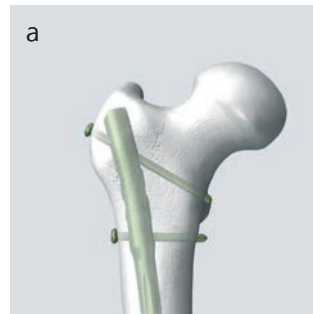
There are three standard locking positions:

1. The 120° antegrade locking option allows static locking.
2. The dynamic locking option (DYN) corresponds to the proximal position of the standard locking slot.
3. The static locking option (STAT) corresponds to the distal position of the standard locking slot.



Proximal standard locking options:

- a For sufficient proximal static locking, always use the 120° antegrade locking option together with the transverse static screw.
- b For immediate primary dynamization, insert only one proximal locking screw through the dynamic slot.
- c For secondary dynamization use both the dynamic and the 120° antegrade locking positions.



2

Choose locking screws and instruments


Use the correct locking screw, drill sleeve, trocar and drill bit for the selected nail diameter as shown in the table.

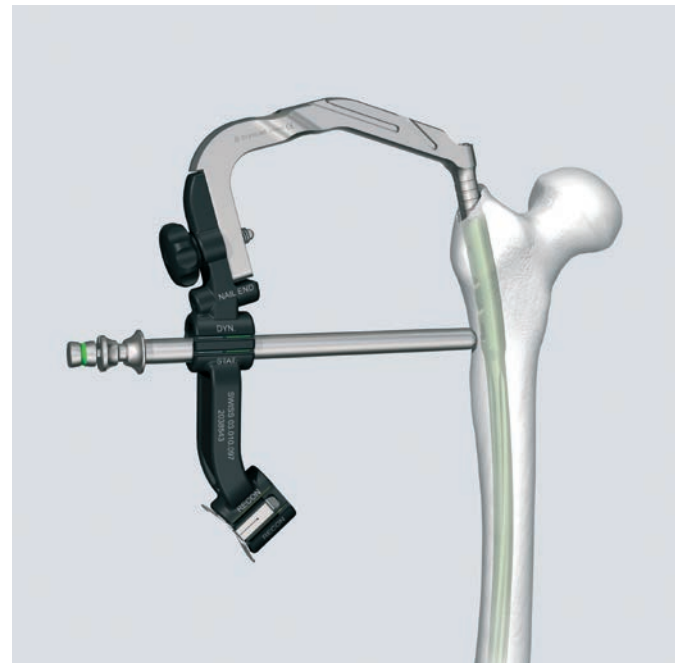
Nail diameter	Locking screw	Protection sleeve	Drill sleeve	Trocar	Drill bit
Ø 9–13 mm (light green)	Ø 5.0 mm (light green)	12.0/8.0 mm 03.010.063 (no color)	8.0/4.2 mm 03.010.065 (green)	Ø 4.2 mm 03.010.070 (green)	Ø 4.2 mm 03.010.061 (green)
Ø 14–16 mm (aqua)	Ø 6.0 mm (aqua)	12.0/8.0 mm 03.010.063 (no color)	8.0/5.0 mm 03.010.066 (no color)	Ø 5.0 mm 03.010.071 (no color)	Ø 5.0 mm 03.010.062 (no color)

3

Insert trocar combination

Instruments

03.010.097	Aiming Arm for LFN
or	
 03.010.482	Aiming Arm, radiolucent, for Expert Lateral Femoral Nail
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
or	
03.010.066	Drill Sleeve 8.0/5.0, for No. 03.010.063
03.010.070	Trocar Ø 4.2 mm, for No. 03.010.065
or	
03.010.071	Trocar Ø 5.0 mm, for No. 03.010.066



Confirm that the insertion handle is securely connected to the nail and attach the aiming arm to the insertion handle.

Insert the three-part trocar combination (protection sleeve, corresponding drill sleeve and trocar) through the desired ML hole marked green/aqua in the aiming arm, make a stab incision and insert the trocar to the bone. Remove the trocar.

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

4 Drill and determine locking screw length

Instruments

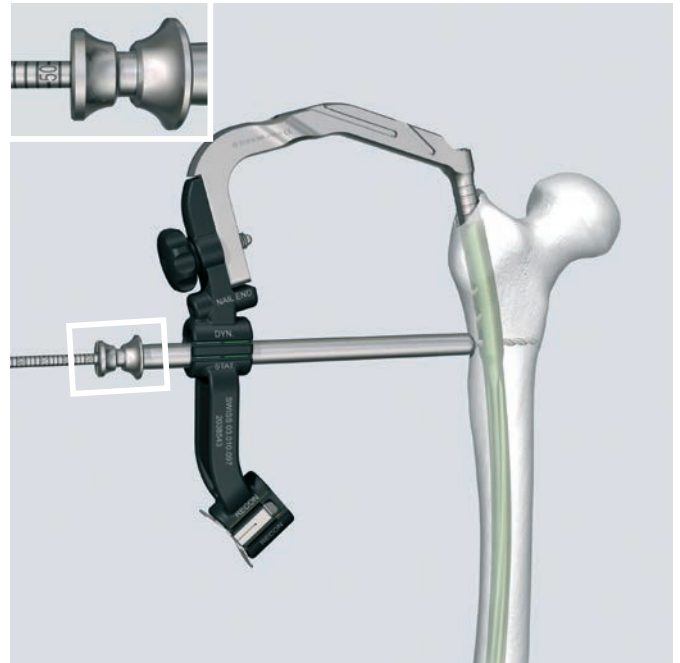
03.010.061	Drill Bit \varnothing 4.2 mm, calibrated, length 340 mm, 3-flute, for Quick Coupling, for No. 03.010.065
or	
03.010.062	Drill Bit \varnothing 5.0 mm, calibrated, length 340 mm, 3-flute, for Quick Coupling

Use the corresponding drill bit (\varnothing 4.2 mm for \varnothing 5.0 mm locking screws or \varnothing 5.0 mm for \varnothing 6.0 mm locking screws) to drill through both cortices until the tip of the drill bit just penetrates the far cortex.

- 1 Confirm drill bit position after drilling both cortices.

Ensure that the drill sleeve is pressed firmly to the lateral cortex and read the measurement corresponding to the appropriate length of the locking screw at the back of the drill sleeve. Remove the drill bit and the drill sleeve.


Note: A correct end position of the drill sleeve is important in order to choose the correct length of the locking screw.



Alternative instrument

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

or

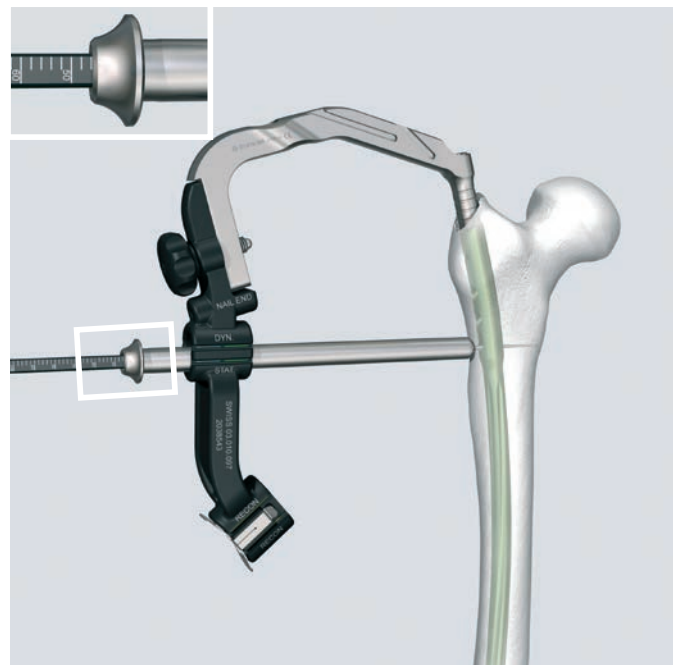
 03.010.428 Depth Gauge for Locking Screws,
measuring range to 110 mm

After both cortices are drilled, remove the drill bit and the drill sleeve.

Disassemble the depth gauge into two parts: the outer sleeve and the measuring device with hook. Insert the measuring device into the protection sleeve. Make sure that the hook grasps the far cortex and that the protection sleeve is firmly pressed against the lateral cortex.

Read the measurement from the back of the protection sleeve, which corresponds to the appropriate length of the locking screw.

Note: A correct end position of the protection sleeve is important in order to choose the correct length of the locking screw.




5

Insert locking screws

Instruments

03.010.107 Screwdriver Stardrive, T25,
length 330 mm

or

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

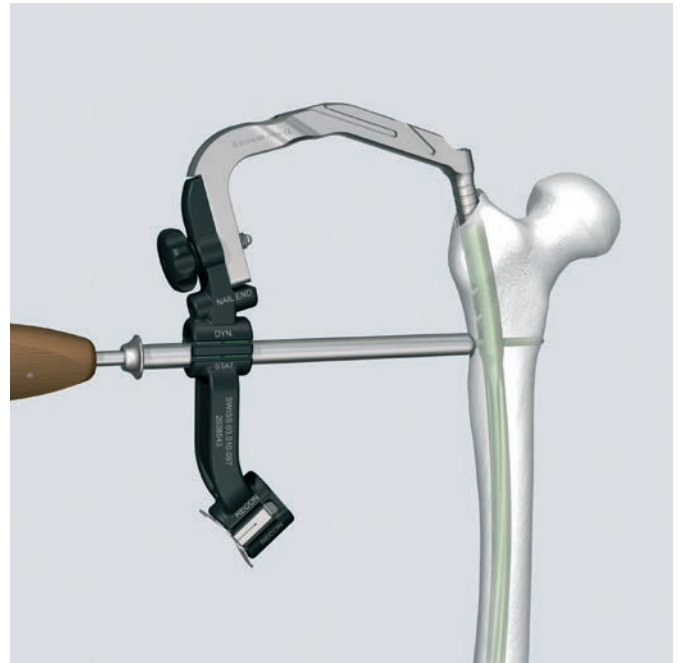
Insert the appropriate locking screw through the protection sleeve using the screwdriver Stardrive T25. Verify the position of the locking screw under image intensifier.

The tip of the locking screw should not project more than 1 to 2 mm beyond the medial far cortex.

Note: A groove on the screwdriver provides a rough indication that the locking screw is fully inserted through the sleeve.

Repeat steps 3 to 5 for the second proximal standard locking screw.

If using 120° antegrade locking option, insert the trocar combination through the hole labeled 120° on the insertion handle.



PROXIMAL LOCKING – RECON (OPTIONAL)


1

Check nail position

Instruments

03.010.097 Aiming Arm for LFN

or

 03.010.482 Aiming Arm, radiolucent, for
Expert Lateral Femoral Nail

357.399 Guide Wire Ø 3.2 mm, length 400 mm

Confirm that the insertion handle is securely connected to the nail and attach the aiming arm to the insertion handle.

- ① In the AP view adjust the nail insertion depth to ensure that the two recon screws can be placed into the femoral neck. The position of the nail can be verified by placing two guide wires onto the aiming arm and checking radiographically.

- ① Ensure the correct anteversion of the implant in the lateral view. To improve visibility, insert an additional guide wire into the femoral head on the ventral side of the femoral neck.

Precaution: Adjusting for the correct anteversion before making a skin incision is crucial to allow uncomplicated guide wire and screw insertion.



2

Insert guide wires for hip screws

Instruments

03.010.075	Protection Sleeve 11.5/8.5, for LFN Reconstruction Locking
03.010.076	Drill Sleeve 8.5/3.2, for No. 03.010.075
03.010.077	Trocar Ø 3.2 mm, for No. 03.010.076

Insert both yellow three-part trocar combinations (protection sleeve, drill sleeve and trocar) through the yellow marked holes in the aiming arm, make a stab incision and insert the trocars to the bone.

Remove the caudal trocar.

Insert a guide wire subchondrally into the femoral head.

- ① Check guide wire placement radiographically in both planes.

Remove the cranial trocar.

Insert the second guide wire subchondrally into the femoral head. Check the guide wire placement radiographically in both AP and lateral views.

- ① **Note:** Verify in the AP view the guide wires are straight, and in the lateral view that they are in the center of the femoral neck.

Precaution: Do not exert force on the aiming arm, protection sleeves, or drill bits. Such force may prevent accurate targeting through the locking holes.



3 Determine length and drill for caudal hip screw

Instruments

03.010.493	Direct Measuring Device for Guide Wires Ø 3.2 mm, length 400 mm
or	
03.010.085	Direct Measuring Device for Guide Wires Ø 3.2 mm, length 400 mm
03.010.078	Reamer Ø 4.5/6.5 mm, length 484 mm, for Hip Screws LFN
03.010.079	Fixation Sleeve, for No. 03.010.078

It is recommended that you start with the insertion of the caudal hip screw.

Remove the drill sleeve and insert the direct measuring device over the guide wire into the protection sleeve to the bone. Read the length of the required hip screw directly on the measuring device.

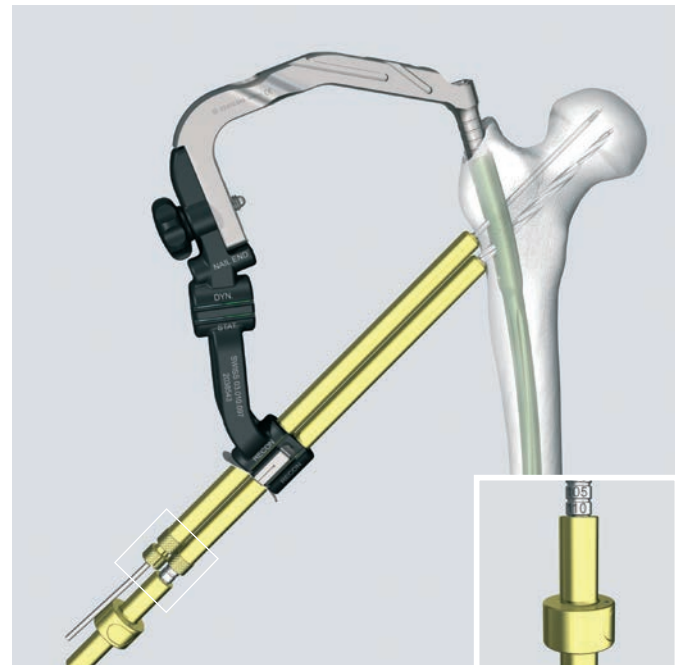
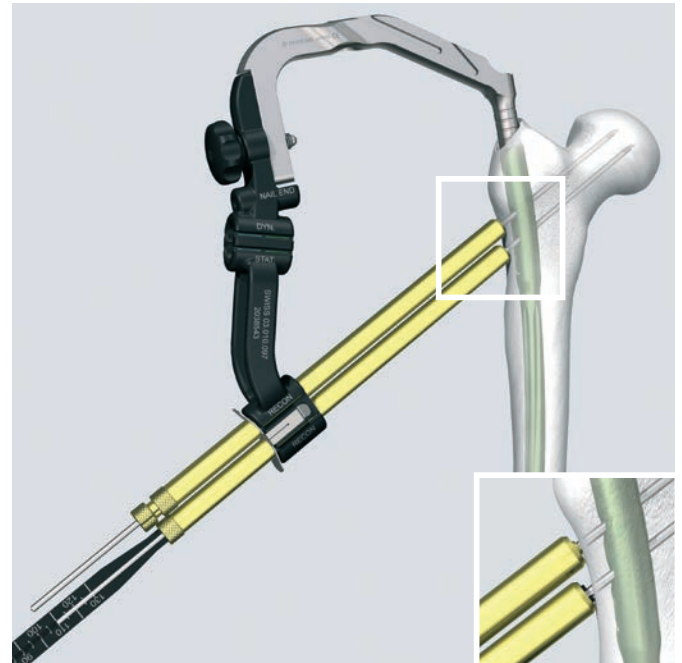
Remove the measuring device and the caudal guide wire.

Note: The determined length indicates the effective screw length.

Set the previously measured length for the screw on the reamer by fixing the fixation sleeve in the corresponding position. Read off the correct length on the side of the fixation sleeve pointing towards the tip of the reamer.

- ① Guide the reamer through the protection sleeve to the bone and drill to the stop. The fixed fixation sleeve prevents further drilling.

Note: Secure the fixation sleeve by engaging the locking mechanism in the locking grooves of the drill.




4

Insert caudal hip screw

Instrument

03.010.108 Screwdriver Stardrive, T25,
length 380 mm

or

 03.010.519 Screwdriver Stardrive, T25,
self-holding, length 440 mm

Insert the appropriate hip screw through the protection sleeve into the femoral head using the longer screwdriver Stardrive T25. Verify the position of the locking screw under image intensification in both planes.

 Verify the position of the locking screw under image intensification in both planes.

A groove on the screwdriver indicates when the locking screw is fully inserted.

Repeat steps 3 and 4 for the second more cranial hip screw.



DISTAL LOCKING

1

Choose locking screws and instruments

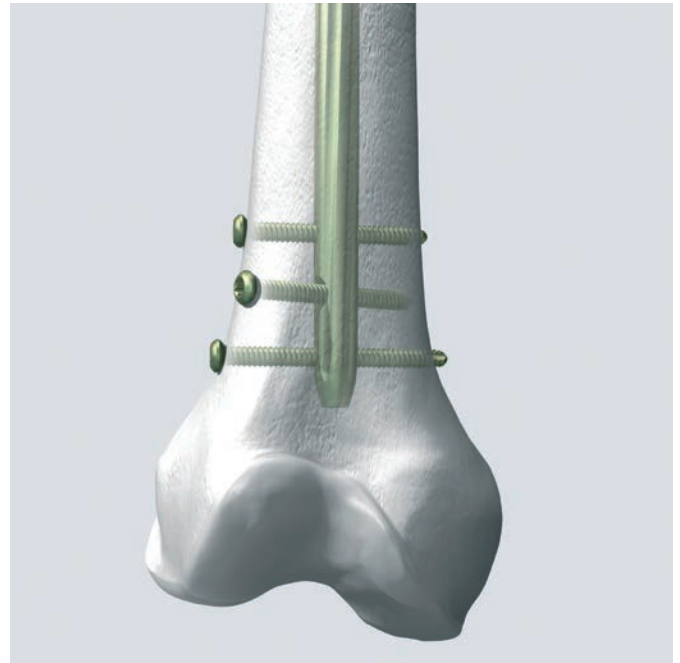
Use the appropriate locking screws and drill bit for the nail diameter selected:

Nail diameter	Locking screw	Drill bit
Ø 9.0–13.0 mm (light green)	Ø 5.0 mm (light green)	Ø 4.2 mm 03.010.101* or 03.010.104
Ø 14.0–16.0 mm (aqua)	Ø 6.0 mm (aqua)	Ø 5.0 mm 03.010.102* or 03.010.105

* For radiolucent drive

It is recommended that you lock distally first, enabling the use of the backstroke technique to prevent diastasis.

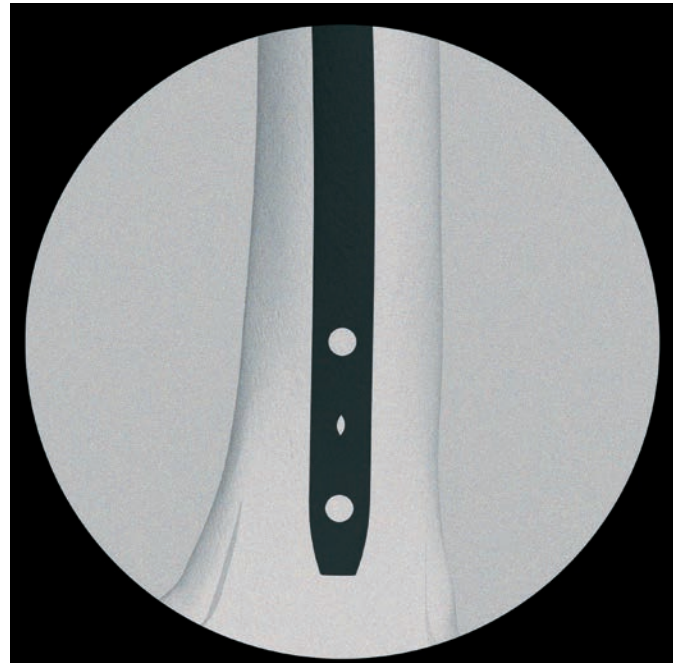
- Verify that the nail has been inserted to the appropriate depth.



2

Align image

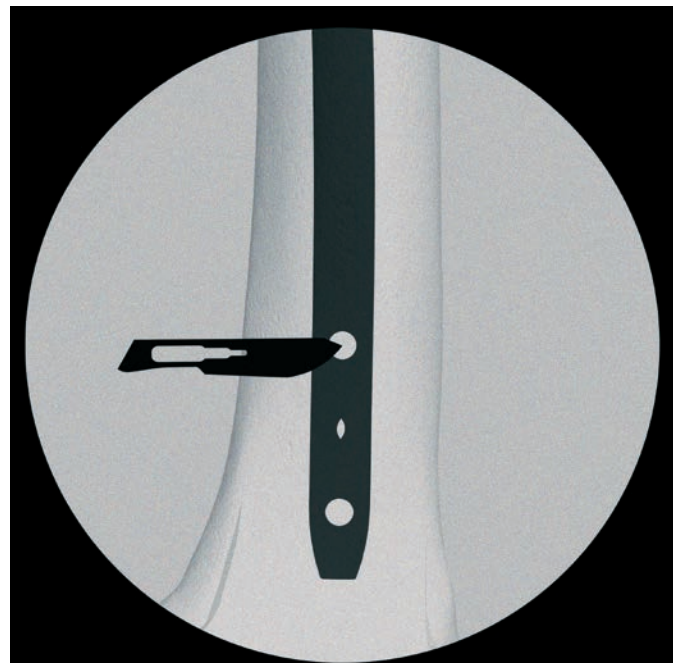
- 1 Check reduction, correct alignment of the fragments and leg length before locking the nail.
- 1 Align the C-arm with the hole in the nail until a perfect circle is visible in the center of the screen.



3

Determine incision point

- 1 Place a scalpel blade on the skin over the center of the hole to mark the incision point and make a stab incision.



4 Drill

Instrument

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

or

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

- 1 Using the Radiolucent Drive (511.300), under image intensification, insert the tip of the appropriate drill bit through the incision down to the bone.
- 2 Incline the drive in order that the tip of the drill bit is centered 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 penetrates the medial 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 drilling the far cortex.

Alternative instruments

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

or

03.010.102 Drill Bit Ø 5 mm, calibrated, length 145 mm, with Coupling for RDL

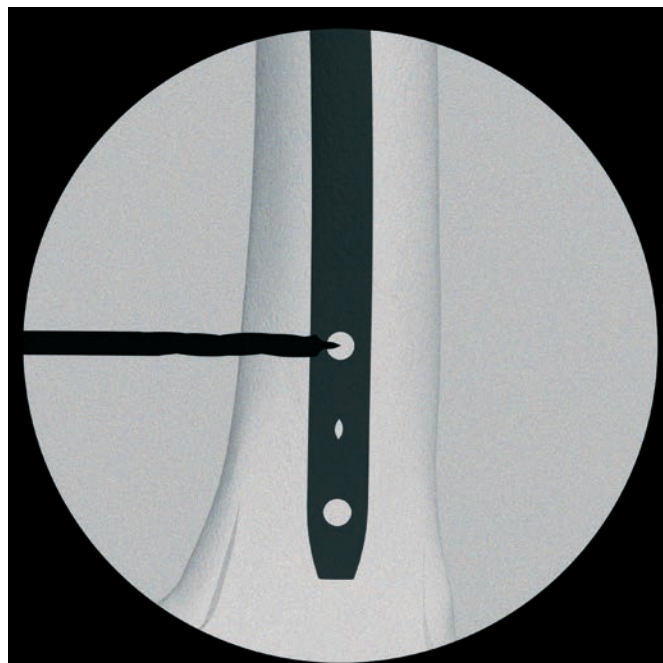
or

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

or

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


- 1 Standard freehand locking technique can be performed without the radiolucent drive. Use the appropriate drill bit shown in the table above.




5

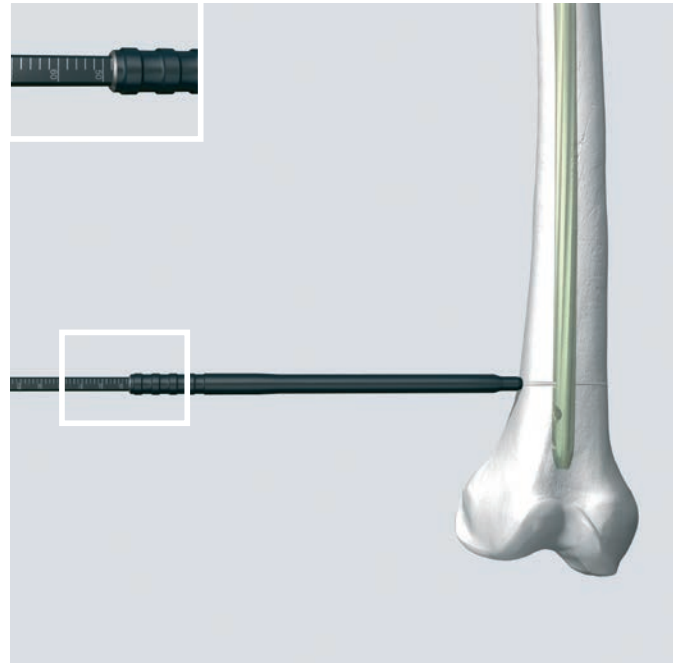
Determine length of the locking screw

Instrument

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

-  Measure the locking screw length using the depth gauge. Ensure that the outer sleeve is in contact with the bone and the hook grasps the far cortex.

Read the screw length directly from the measuring device at the back of the outer sleeve.



Alternative instrument

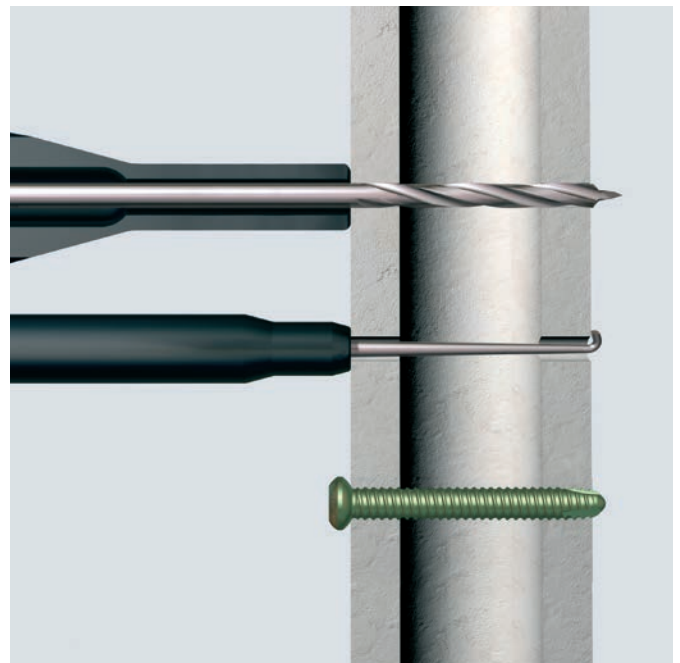
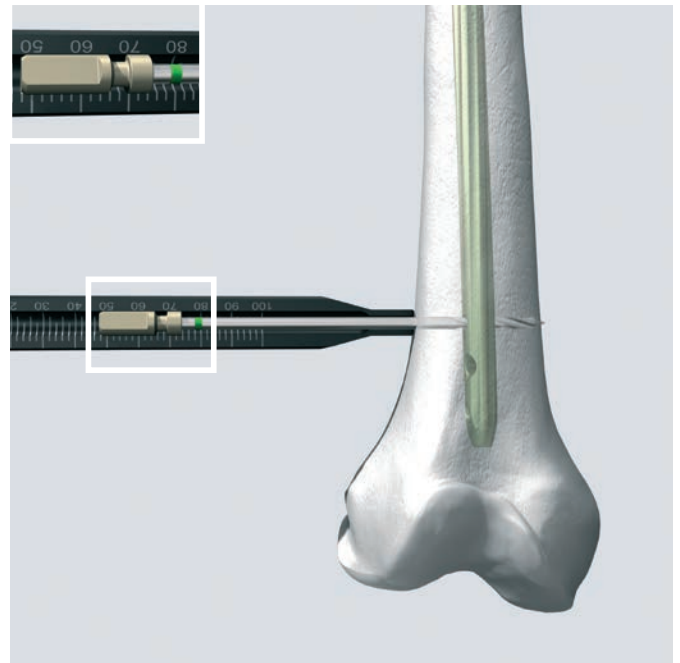
- 03.010.429
Direct Measuring Device for Drill Bits, length 145 mm
- or
- 03.010.106
Direct Measuring Device for Drill Bits of length 145 mm, for Nos. 03.010.100 to 03.010.105

- Stop drilling immediately after both cortices are penetrated and disassemble the drill bit from the radiolucent drive. Ensure the correct position of the drill bit beyond the far cortex.

Place the direct measuring device onto the drill bit. Read the measurement on the measuring device at the end of the drill bit.

This corresponds to the appropriate locking screw length.


Precaution: Drill bit location with respect to the far cortex is critical for measuring the appropriate locking screw length.




6

Insert locking screw


Instruments

-  03.010.518 Screwdriver Stardrive, T25, self-holding, length 319 mm
- or
- 03.010.107 Screwdriver Stardrive, T25, length 330 mm

Optional instruments

- 03.010.112 Holding Sleeve, with Locking Device or
-  03.010.472 Inter-Lock Screwdriver, combined, Stardrive, T25 / hexagonal \varnothing 3.5, length 330 mm

Insert the locking screw with the appropriate length using the screwdriver Stardrive T25 and the holding sleeve, if required.

-  Verify the screw length under image intensification. The screw tip should be about 2 mm outside of the cortex. Exchange the locking screw with the appropriate length if necessary.

Use the holding sleeve:

- a Insert the holding sleeve onto the shaft of the screwdriver and place the tip of the screwdriver in the recess of the locking screw.
- b Push the holding sleeve in the direction of the locking screw. The sleeve now holds the locking screw.
- c Lock the holding sleeve by tightening it counter-clockwise.
- d Release the holding sleeve after insertion of the locking screw by loosening it clockwise and pushing backwards.

Repeat steps 2 to 6 for the second and third locking screws.




Note: In the event of diastasis, the backstroke technique can be used after insertion of the second distal locking screw.

INSERT END CAP

1

Insert end cap

Instruments

 03.010.520	Screwdriver Stardrive, T40, with spherical head, cannulated, length 277 mm
or	
03.010.110	Screwdriver Stardrive, T40, cannulated, length 300 mm
357.399	Guide Wire Ø 3.2 mm, length 400 mm

The end caps for the Expert Lateral Femoral Nails are available in extension lengths from 0 to 20 mm as shown in the table.

Nail diameter	End Cap extension	0 mm	5 mm	10 mm	15 mm	20 mm
Ø 9–12 mm	(grey)	04.003.000	04.003.001	04.003.002	04.003.003	04.003.004
Ø 13–16 mm	(grey)	04.003.000	04.003.006	04.003.007	04.003.008	04.003.009

Note: End caps fulfill two functions: they prevent bone ingrowth into the nail, and they extend the nail height if it is over-inserted.

Remove the insertion handle, the aiming arm and the connecting screw.

The end caps are cannulated for use over a guide wire if necessary. Insert the guide wire into the proximal end of the nail. Engage the end cap with the screwdriver Stardrive T40 by exerting axial pressure. To minimize the chance of cross threading turn the end cap counter-clockwise until the thread of the end cap aligns with that of the nail. Then turn the end cap clockwise to thread it into the nail.

Remove the screwdriver and the guide wire.



IMPLANT REMOVAL


1

Remove end cap and locking screws

Instruments

	03.010.520	Screwdriver Stardrive, T40, with spherical head, cannulated, length 277 mm
	or	
	03.010.110	Screwdriver Stardrive, T40, length 300 mm
	03.010.518	Screwdriver Stardrive, T25, self-holding, length 319 mm
	or	
	03.010.107	Screwdriver Stardrive, T25, length 330 mm

Optional instruments

	03.010.472	Inter-Lock Screwdriver, combined, Stardrive, T25 / hexagonal \varnothing 3.5, length 330 mm
	or	
	03.010.112	Holding Sleeve, with Locking Device
	357.399	Guide Wire \varnothing 3.2 mm, length 400 mm

Implant removal is an optional procedure.

Clear the Stardrive socket of the end cap and the locking implants from any tissue ingrowth. Remove the end cap with the screwdriver Stardrive T40. A guide wire can be inserted for easy aligning of the screwdriver into the cannulated end cap.

Remove all locking screws except one of the proximal locking screws using the screwdriver Stardrive T25 and the holding sleeve.



2

Remove nail

Instruments

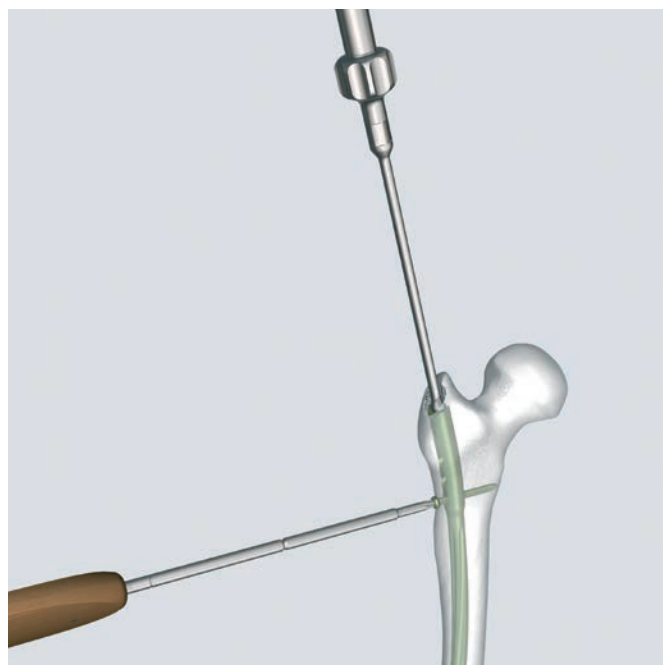
	03.010.522	Combined Hammer, 500 g
	and	03.010.170
		Hammer Guide
	or	
	03.010.056	Combined Hammer 700 g, can be mounted, for No. 357.220
	and	357.220
		Hammer Guide, for No. 357.250
	03.010.000	Extraction Screw, for Tibial and Femoral Nails
	03.010.107	Screwdriver Stardrive, T25, length 330 mm
	or	
	03.010.518	Screwdriver Stardrive, T25, self-holding, length 319 mm

Before removing the final locking screw, attach the extraction screw to 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 Stardrive T25.

Extract the nail by applying gentle blows with the hammer.

Note: The nail will rotate about 90°, similar to the movement during the insertion.



Alternative Technique – Extraction Hook

For removal of broken nail

Instruments

355.399	Extraction Hook Ø 3.7 mm, for cannulated Nails
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393.100	Universal Chuck with T-Handle
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Begin with Steps 1 and 2 of Implant Removal, then remove the extraction screw from the nail.



Option 1

1

Assemble extraction hook and universal chuck

Insert the extraction hook into the universal chuck with T-handle. The hook should be parallel with the T-handle. This facilitates visualization of the hook position in the bone.

2

Insert extraction hook through nail

Pass the extraction hook through the cannula of the nail, including the distant fragment.

- ⓘ **Precaution:** Under image intensification, verify that the hook has passed through and engaged the distant end of the nail.

3

Extract nail

Extract both nail fragments.

Note: Keep the patient's limb restrained to increase the efficiency of the extraction force.

Option 2

1

Remove near nail fragment

Attach the appropriate extraction bolt or extraction screw to the nail. Remove the near nail fragment using the extraction bolt or extraction screw.

Note: The extraction hook can be used as an alternative to extraction instrumentation.

2

Ream canal

Ream the medullary canal 1 mm larger than the nail diameter to clear a path for the distant nail fragment.

3

Align extraction hook

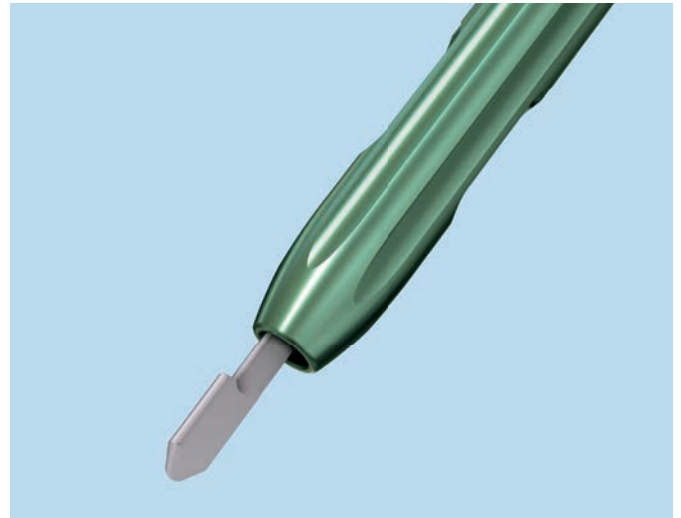
Insert the extraction hook and explanted near nail fragment into the medullary canal. The near nail fragment aligns the extraction hook with the cannulation of the distant nail fragment.

4

Engage distant fragment

Pass the extraction hook through the cannula of the distant nail fragment.

- ⓘ **Precaution:** Under image intensification, verify that the hook has passed through and engaged the distant end of the nail



5

Extract nail

Extract both nail fragments.

Note: Keep the patient's limb restrained to increase the efficiency of the extraction force.

IMPLANTS

Expert Lateral Femoral Nail

Anatomical design with left and right nails

Material: Ti-6Al-7Nb (TAN)

Diameters: 9.0–16.0 mm (1.0 mm increments)
9.0–12.0 mm nails have a proximal diameter of 13.5 mm
13.0–16.0 mm nails have a proximal diameter of 16.0 mm

Colors: 9.0–13.0 mm (light green) use locking screws \varnothing 5.0 mm (light green)
14.0–16.0 mm (aqua) use locking screws \varnothing 6.0 mm (aqua)

Lengths: 300–480 mm (20.0 mm increments)

Cannulation: All nails are cannulated.

In the Vario Case for Expert Lateral Femoral Nails (68.003.000 for right nails; 68.003.001 for left nails) space is provided for 40 nails (20 right and 20 left nails, each space is available to all diameters and lengths).



Length mm	Ø 9 mm, right* light green	Ø 9 mm, left* light green
300	04.003.240	04.003.241
320	04.003.244	04.003.245
340	04.003.248	04.003.249
360	04.003.252	04.003.253
380	04.003.256	04.003.257
400	04.003.260	04.003.261
420	04.003.264	04.003.265
440	04.003.268	04.003.269
460	04.003.272	04.003.273
480	04.003.276	04.003.277
Length mm	Ø 10 mm, right* light green	Ø 10 mm, left* light green
300	04.003.340	04.003.341
320	04.003.344	04.003.345
340	04.003.348	04.003.349
360	04.003.352	04.003.353
380	04.003.356	04.003.357
400	04.003.360	04.003.361
420	04.003.364	04.003.365
440	04.003.368	04.003.369
460	04.003.372	04.003.373
480	04.003.376	04.003.377



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

Length mm	∅ 11 mm, right* light green	∅ 11 mm, left* light green
300	04.003.440	04.003.441
320	04.003.444	04.003.445
340	04.003.448	04.003.449
360	04.003.452	04.003.453
380	04.003.456	04.003.457
400	04.003.460	04.003.461
420	04.003.464	04.003.465
440	04.003.468	04.003.469
460	04.003.472	04.003.473
480	04.003.476	04.003.477
Length mm	∅ 12 mm, right* light green	∅ 12 mm, left* light green
300	04.003.540	04.003.541
320	04.003.544	04.003.545
340	04.003.548	04.003.549
360	04.003.552	04.003.553
380	04.003.556	04.003.557
400	04.003.560	04.003.561
420	04.003.564	04.003.565
440	04.003.568	04.003.569
460	04.003.572	04.003.573
480	04.003.576	04.003.577
Length mm	∅ 13 mm, right* light green	∅ 13 mm, left* light green
300	04.003.640	04.003.641
320	04.003.644	04.003.645
340	04.003.648	04.003.649
360	04.003.652	04.003.653
380	04.003.656	04.003.657
400	04.003.660	04.003.661
420	04.003.664	04.003.665
440	04.003.668	04.003.669
460	04.003.672	04.003.673
480	04.003.676	04.003.677



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

Length mm	∅ 14 mm, right* aqua	∅ 14 mm, left* aqua
300	04.003.740	04.003.741
320	04.003.744	04.003.745
340	04.003.748	04.003.749
360	04.003.752	04.003.753
380	04.003.756	04.003.757
400	04.003.760	04.003.761
420	04.003.764	04.003.765
440	04.003.768	04.003.769
460	04.003.772	04.003.773
480	04.003.776	04.003.777
Length mm	∅ 15 mm, right* aqua	∅ 15 mm, left* aqua
300	04.003.840	04.003.841
320	04.003.844	04.003.845
340	04.003.848	04.003.849
360	04.003.852	04.003.853
380	04.003.856	04.003.857
400	04.003.860	04.003.861
420	04.003.864	04.003.865
440	04.003.868	04.003.869
460	04.003.872	04.003.873
480	04.003.876	04.003.877
Length mm	∅ 16 mm, right* aqua	∅ 16 mm, left* aqua
300	04.003.940	04.003.941
320	04.003.944	04.003.945
340	04.003.948	04.003.949
360	04.003.952	04.003.953
380	04.003.956	04.003.957
400	04.003.960	04.003.961
420	04.003.964	04.003.965
440	04.003.968	04.003.969
460	04.003.972	04.003.973
480	04.003.976	04.003.977



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

LOCKING IMPLANTS

Locking Screw Ø 5.0 mm

Used for standard proximal locking and for distal locking (nails Ø 9–13 mm)



Material: Ti-6Al-7Nb (TAN)

Drill: Ø 4.2 mm

Color: Light green

Lengths: 26–80 mm (2 mm increments)
85–100 mm (5 mm increments)

Design: 4.3 mm core diameter
Stardrive T25 recess (self-holding)
Fully threaded
Self-tapping, blunt tip
Double lead

Length mm	Ø 5.0 mm* light green	Length mm	Ø 5.0 mm* light green
26	04.005.516	58	04.005.548
28	04.005.518	60	04.005.550
30	04.005.520	62	04.005.552
32	04.005.522	64	04.005.554
34	04.005.524	66	04.005.556
36	04.005.526	68	04.005.558
38	04.005.528	70	04.005.560
40	04.005.530	72	04.005.562
42	04.005.532	74	04.005.564
44	04.005.534	76	04.005.566
46	04.005.536	78	04.005.568
48	04.005.538	80	04.005.570
50	04.005.540	85	04.005.575
52	04.005.542	90	04.005.580
54	04.005.544	95	04.005.585
56	04.005.546	100	04.005.590

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

In the Vario Case for the Expert LFN, R/AFN and HAN Locking Implants (68.003.010), space is provided for two locking screws Ø 5.0 mm per length.

Locking Screws Ø 6.0 mm

Used for standard proximal locking and for distal locking (nails Ø 14–16 mm)



Material: Ti-6Al-7Nb (TAN)

Drill: Ø 5.0 mm

Color: Aqua

Lengths: 26.0–80.0 mm (2.0 mm increments)
85.0–100 mm (5.0 mm increments)

Design: 4.8 mm core diameter
Stardrive T25 recess (self-holding)
Fully threaded
Self-tapping, blunt tip
Double lead

Length mm	Ø 6.0 mm* aqua	Length mm	Ø 6.0 mm* aqua
26	04.005.616	58	04.005.648
28	04.005.618	60	04.005.650
30	04.005.620	62	04.005.652
32	04.005.622	64	04.005.654
34	04.005.624	66	04.005.656
36	04.005.626	68	04.005.658
38	04.005.628	70	04.005.660
40	04.005.630	72	04.005.662
42	04.005.632	74	04.005.664
44	04.005.634	76	04.005.666
46	04.005.636	78	04.005.668
48	04.005.638	80	04.005.670
50	04.005.640	85	04.005.675
52	04.005.642	90	04.005.680
54	04.005.644	95	04.005.685
56	04.005.646	100	04.005.690

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

In the Vario Case for the Expert LFN, R/AFN and HAN Locking Implants (68.003.010), space is provided for two locking screws Ø 6.0 mm per length (requires optional screw rack 68.003.010.06).

Hip Screw Ø 6.5 mm

Used for recon locking (all nails)

**Material:** Ti-6Al-7Nb (TAN)**Drill:** Ø 6.5/4.5 mm**Color:** Gold**Lengths:** 60.0–130 mm (5.0 mm increments)**Design:** 6.5 mm shaft diameter/
4.5 mm core diameter
Stardrive T25 recess (self-holding)
Thread length 30.0 mm
Self-tapping, blunt tip

Length mm	Ø 6.5 mm* gold	Length mm	Ø 6.5 mm* gold
60	04.003.022	100	04.003.030
65	04.003.023	105	04.003.031
70	04.003.024	110	04.003.032
75	04.003.025	115	04.003.033
80	04.003.026	120	04.003.034
85	04.003.027	125	04.003.035
90	04.003.028	130	04.003.036
95	04.003.029		

* Available non-sterile or sterile packed.

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

In the Vario Case for the Expert LFN, R/AFN and HAN Locking Implants (68.003.010), space is provided for two hip pin screws Ø 6.5 mm per length (requires optional module 685.132)

End Caps

Used to protect nail threads from tissue ingrowth

Material: Ti-6Al-7Nb (TAN)

Color: Grey

Diameters: 12.0 mm for nails Ø 9.0–12.0 mm
16.0 mm for nails Ø 13.0–16.0 mm

Lengths: 0 mm – sits flush with end of nail
5.0 mm, 10.0 mm, 15.0 mm and
20.0 mm
extensions – extend nail height if nail
is overinserted

Cannulation: All end caps are cannulated

Design: Stardrive T40 recess (self-holding)



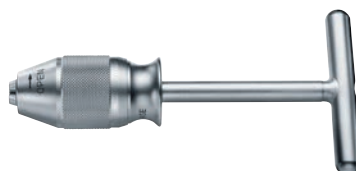
Extensions mm	Ø 12 mm*	Ø 16 mm*
0	04.003.000	04.003.000
5	04.003.001	04.003.006
10	04.003.002	04.003.007
15	04.003.003	04.003.008
20	04.003.004	04.003.009

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

INSTRUMENTS

Standard instruments

393.100 Universal Chuck with T-Handle



321.160 Combination Wrench Ø 11.0 mm



321.170 Pin Wrench Ø 4.5 mm, length 120 mm



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



357.399 Guide Wire Ø 3.2 mm, length 400 mm



511.300 Radiolucent Drive



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



03.010.061 Drill Bit Ø 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 Ø 4.2 mm, for No. 03.010.065



03.010.146	Connecting Screw, cannulated, with Internal M6x1 Thread	
03.010.165	Drill Bit Ø 15.0 mm, cannulated, flexible, length 250 mm	
03.010.170	Hammer Guide	
03.010.428	Depth Gauge for Locking Screws, measuring range to 110 mm	
03.010.482	Aiming Arm, radiolucent, for Expert Lateral Femoral Nail	
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	

03.010.505	Protection Sleeve 17.0 for Expert Lateral Femoral Nail, with Quick Coupling	
03.010.510	Multihole Drill Guide for Protection Sleeve 17.0, for Expert Lateral Femoral Nail	
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	

Note: Do not use standard instruments together with alternative instruments without contacting your Synthes representative first.

Optional instruments

357.066 Parallel Guide for Guide Wires Ø 3.2 mm



355.399 Extraction Hook Ø 3.7 mm,
for cannulated Nails



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













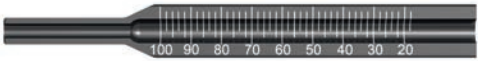


03.010.062 Drill Bit Ø 5.0 mm, calibrated,
length 340 mm, 3-flute,
for Quick Coupling












03.010.066 Drill Sleeve 8.0/5.0, for No. 03.010.063



03.010.071	Trocar Ø 5.0 mm, for No. 03.010.066	
03.010.075	Protection Sleeve 11.5/8.5, for LFN Reconstruction Locking	
03.010.076	Drill Sleeve 8.5/3.2, for No. 03.010.075	
03.010.077	Trocar Ø 3.2 mm, for No. 03.010.076	
03.010.078	Reamer Ø 4.5/6.5 mm, length 484 mm, for Hip Screws LFN	
03.010.079	Fixation Sleeve, for No. 03.010.078	
03.010.093	Rod Pusher for Reaming Rod with Hexagonal Screwdriver Ø 8.0 mm	
03.010.101	Drill Bit Ø 4.2 mm, calibrated, length 145 mm, 3-flute, with Coupling for RDL	
03.010.102	Drill Bit Ø 5.0 mm, calibrated, length 145 mm, with Coupling for RDL	
03.010.104	Drill Bit Ø 4.2 mm, calibrated, length 145 mm, 3-flute, for Quick Coupling	
03.010.105	Drill Bit Ø 5.0 mm, calibrated, length 145 mm, for Quick Coupling	
03.010.167	Drill Bit Ø 17.0 mm, cannulated, flexible, length 250 mm	
03.010.429	Direct Measuring Device for Drill Bits, length 145 mm	

Note: Do not use standard instruments together with alternative instruments without contacting your Synthes representative first.

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	
03.010.491	Handle for Scalpel, long	
03.010.493	Direct Measuring Device for Guide Wires \varnothing 3.2 mm, length 400 mm	
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	
03.010.519	Screwdriver Stardrive, T25, self-holding, length 440 mm	

Alternative instruments

357.117 Hammer Guide for DFN,
for No. 357.026



357.220 Hammer Guide, for No. 357.250



357.392 Drill Sleeve 17.0/3.2, length 161 mm,
for No. 357.410



357.393 Trocar Ø 3.2 mm, length 172 mm,
for No. 357.392



357.410 Protection Sleeve 22.0/17.0,
for No. 357.394



03.010.028 Drill Bit Ø 15.0 mm, cannulated,
length 300 mm, 3-flute



03.010.029 Drill Bit Ø 17.0 mm, cannulated,
length 280 mm



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



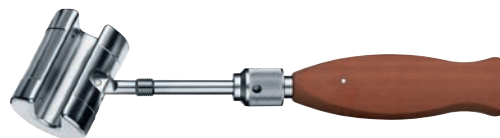
03.010.046 Insertion Handle, long, for Expert Femoral Nails



03.010.047 Connector, length 141 mm, for Insertion Handle



03.010.056 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



03.010.085 Direct Measuring Device for Guide Wires \varnothing 3.2 mm, length 400 mm



03.010.092 Screwdriver, hexagonal with spherical head \varnothing 8.0 mm



03.010.097 Aiming Arm for LFN



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



03.010.108 Screwdriver Stardrive, T25, length 380 mm



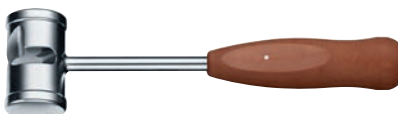
03.010.110 Screwdriver Stardrive, T40, cannulated, length 300 mm





03.010.112 Holding Sleeve, with Locking Device






03.010.124 Combined Hammer 500 g, can be mounted, for No. 357.117



COMPARISON TABLE









Standard Article	Alternative Article
03.010.482	03.010.097
	

Standard Article	Alternative Article
<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
	

Standard Article	Alternative Article
<ol style="list-style-type: none"> 1 03.010.505 2 03.010.510 3 03.010.500 	<ol style="list-style-type: none"> 1 357.410 2 357.392 3 357.393
	

Standard Article	Alternative Article
03.010.493 	03.010.085 
03.010.517 	03.010.092 
03.010.518 	03.010.107 

Standard Article	Alternative Article
03.010.519 	03.010.108 
03.010.520 	03.010.110 
03.010.522 	03.010.056 

Standard Article	Alternative Article
03.010.170 	357.220 
03.010.428 	03.010.072 
03.010.429 	03.010.106 
03.010.472 	<ul style="list-style-type: none"> ① 03.010.107 ② 03.010.112 

HANDLING INFORMATION

Insertion Handle

(03.010.486)

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



Aiming Arm

(03.010.482)

- Easy snap-on and snap-off mechanism
- “Friction” and “True locking”
- Radiolucent
- More soft tissue clearance
- Easy disassembly for cleaning

1. Some force is required to push the cam lock mechanism over the wings.
2. To fix the cam lock mechanism at the corresponding pins, the cam lock must be pushed back in open position.



Inter-Lock Screwdriver

Compatible with all Synthes T25 or 3.5 mm hexagonal recess. For further information, please refer to brochure 036.001.581.

- 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.

Scalpel Handle

(03.010.491)

- For channel cutting to minimize muscle force on the protection sleeves
- Yellow Silicon handle for “SHARP”

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.

IMN Reduction Tool and T-Handle with Quick Coupling

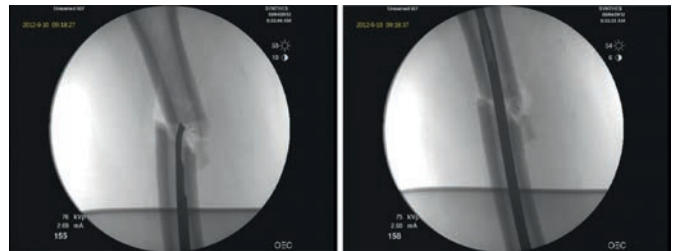
(03.010.495 and 03.010.496)

Fracture Reduction Tool

- Flat curved tip to aid fragment alignment
- Supplied separately due to length

T-Handle

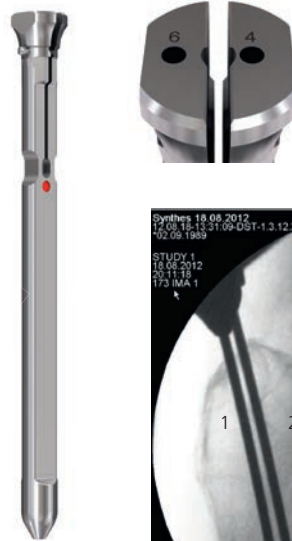
- Can be added to the auxiliary bin in the Modular Femur Set
- 12.0 mm Hexagonal Quick Coupling with marking for orientation



Multihole Drill Guide for Protection Sleeve

(03.010.500–03.010.510)

- Center hole and offset holes (4.0 mm and/or 6.0 mm)
- Color coded



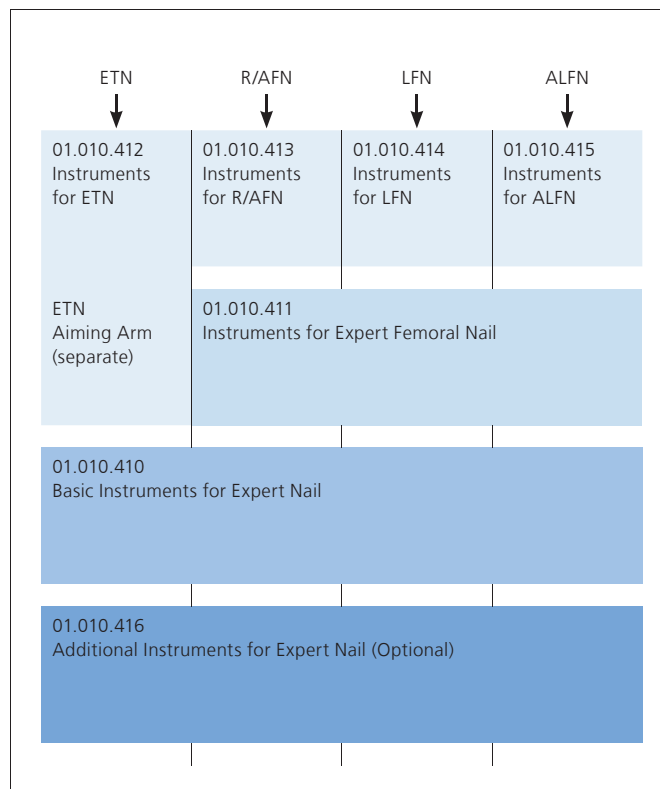
If the initial Kirschner wire (1) is placed slightly offset, a second Kirschner wire (2) can be inserted to correct the placement.

SET LIST

MODULAR CASES

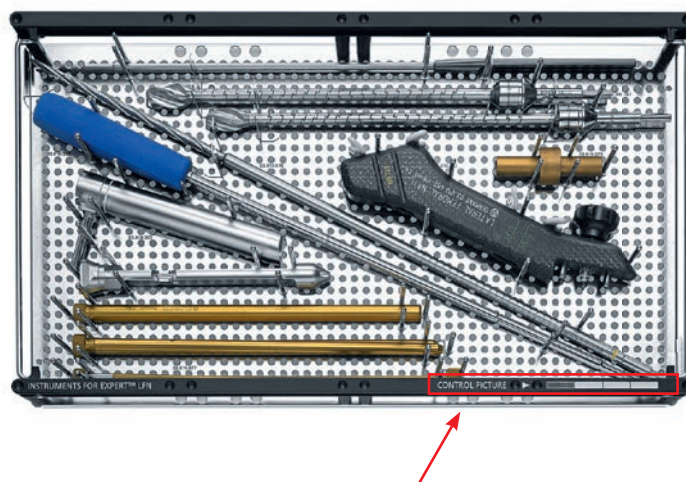
The modularity of the system enables sets to be configured according to the hospital's clinical needs. Each set configuration consists of basic instruments, dedicated system instruments and optional instruments (if required). For femoral nails (LFN, ALFN, R/AFN) the femur set must be added to the set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

The instrument modules listed on the right side are available.



For ease of 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



Control Picture



LFN Instruments



Basic Instruments 01.010.410



Femur Instruments 01.010.411

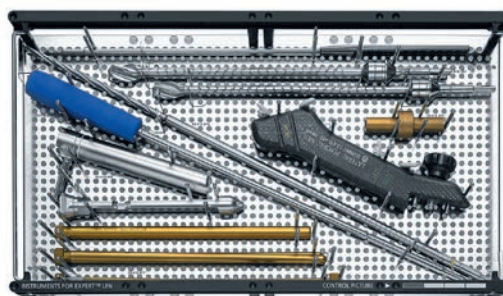


Optional Instruments 01.010.416



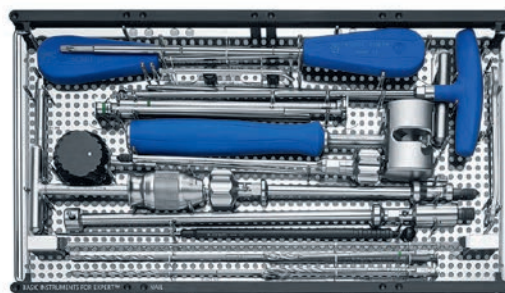
Modular Tray for LFN Instruments

68.010.415 Modular Tray for Instruments for LFN,
size 1/1, without Contents,
Vario Case System



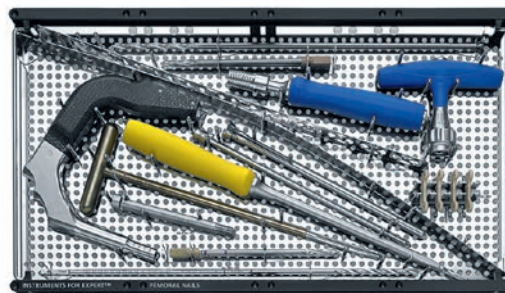
Modular Tray for Basic Expert Nail Instruments

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



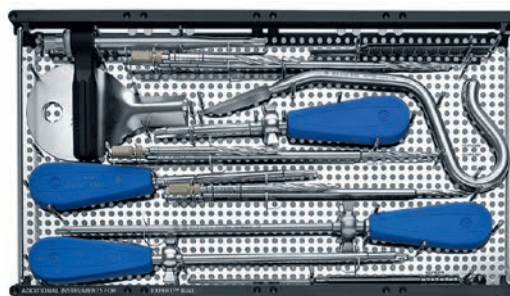
Modular Tray for Femur Expert Nail Instruments

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



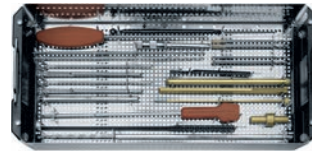
Modular Tray for Optional Expert Nail Instruments

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

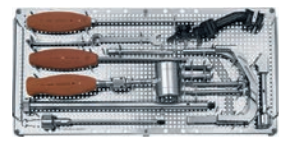
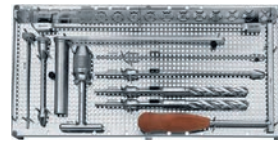


VARIO CASE

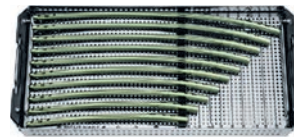
68.003.301 Vario Case for Standard Instruments,
for Expert LFN, without Lid,
without Contents



689.530 Lid (Stainless Steel), extra-large,
for Vario Case



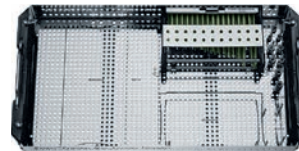
68.003.000 Vario Case for Expert Lateral Femoral
Nails, right



68.003.001 Vario Case for Expert Lateral Femoral
Nails, left



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



68.003.010.06 Rack for Locking Screws Stardrive
6.0 mm, for Vario Case No. 68.003.010

685.132 Module for Hip Screws Ø 6.5 mm,
for Vario Case No. 685.130



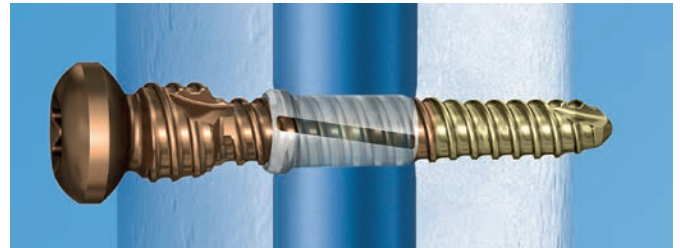
689.507 Lid (Stainless Steel), size 1/1,
for Vario Case

OPTIONAL: ANGULAR STABLE LOCKING SYSTEM (ASLS)

The following description contains general information about ASLS. For further details on the application and compatibility of ASLS please refer to the Surgical Technique 036.000.708.

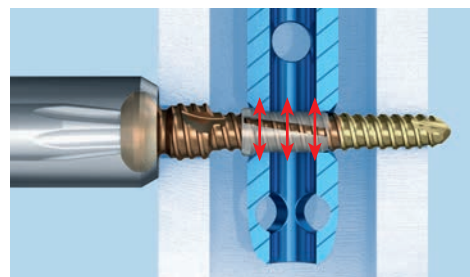
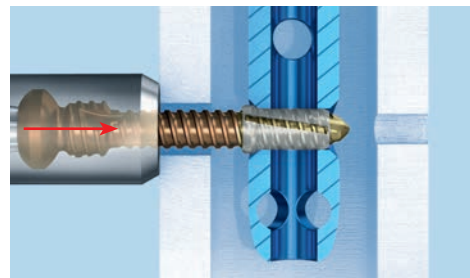
What is ASLS?

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 intra medullary 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.



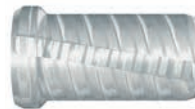
ASLS screws

- Titanium alloy*
- Screws ASLS4: Length 26 mm–80 mm, are compatible with Expert Adolescent Lateral Femoral Nails
- Fully threaded shaft with 3 diameters
 - D1: Provides purchase in reamed near cortex
 - D2: Expands sleeve, providing angular stability
 - D3: Holds unexpanded sleeve for screw insertion, provides purchase in far cortex
- T25 Stardrive recess
- Sterile packaged



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 mm (ASLS4), 5 mm (ASLS5) and 6 mm (ASLS6)
- Sterile-packed



Note: For more details regarding the intramedullary fixator principle please consult the ASLS surgical technique (036.000.708) and concept flyer (036.001.017).

* Titanium-6% Aluminum-7% Niobium alloy

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McConnell T, Tornetta P, Benson E, Manuel J (2003). Gluteus Medius Tendon Injury During Reaming for Gamma Nail Insertion. *Clinical Orthopaedics and related research*, Number 407: 199–202

Benirschke SK, Melder I, Henley MB, Routt ML, Smith DG, Chapman JR, Swiontkowski M F (1993). Closed Interlocking Nailing of Femoral Shaft Fractures: Assessment of Technical complications and Functional Outcomes by Comparison of a Prospective Database with Retrospective Review. *Journal of Orthopaedic Trauma*, Vol. 7, No. 2: 118–122

Bain GI, Zacest AC, Paterson DC, Middleton J, Pohl AP (1997). Abduction Strength Following Intramedullary Nailing of the Femur. *Journal of Orthopaedic Trauma*, Vol. 11, No. 2: 93–97

MRI INFORMATION

Torque, Displacement and Image Artifacts according to ASTM F 2213-06, ASTM F 2052-06e1 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.

