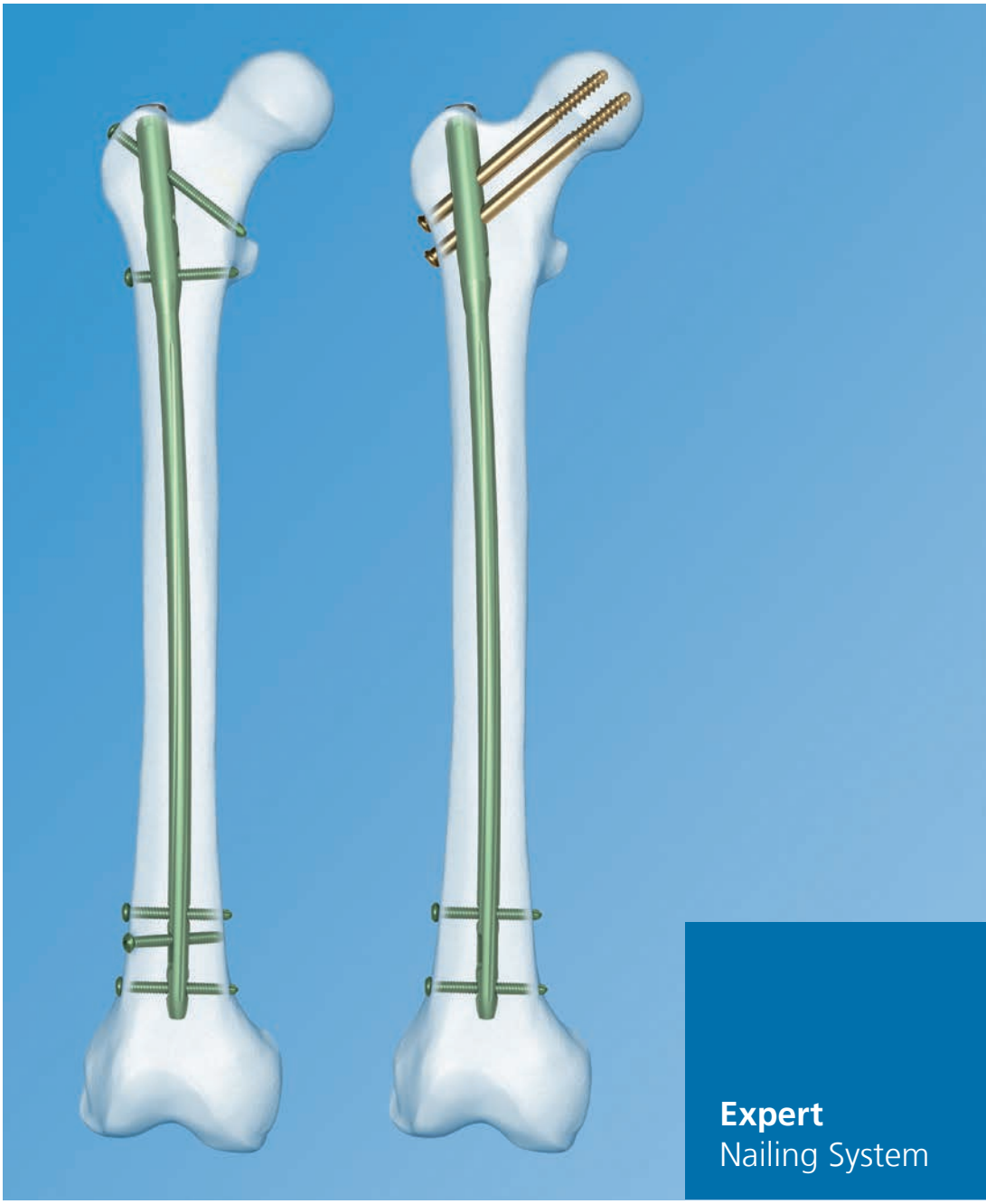
# **Expert A2FN.** Designed for small statured patients.

Surgical Technique



**Expert**
Nailing System



Instruments and implants approved by the AO Foundation.

DePuy Synthes
COMPANIES OF Johnson&Johnson


Image intensifier control

**Warning**
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.depuysynthes.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:
http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance

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**Expert A2FN.** Designed for small statured patients.

## Expert Nailing System

**One concept, one system**
Modulated intramedullary system with streamlined instrumentation

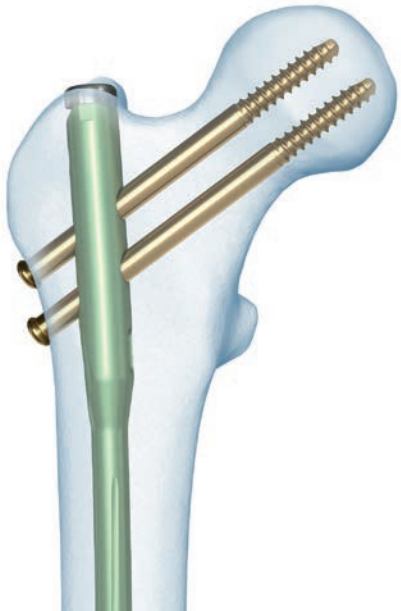
## Advanced anatomical design

– Easy insertion and extraction
– Flattened lateral side reduces impingement of the lateral cortex and decreases medialization

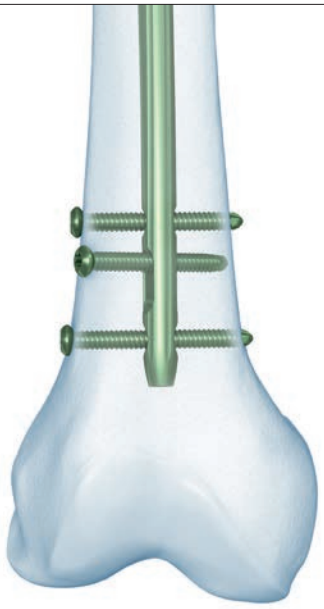
## Multiple locking options

**Standard locking**
– Femoral shaft fractures (except subtrochanteric fractures)

**Recon locking**
– Subtrochanteric fractures
– Combined femoral shaft and neck fractures (ipsilateral)



**Multiple locking options**
– High stability through multiplanar screws
– Antirotational stability
– Distal dynamization option



**Cannulated end caps**
– Easy insertion and extraction
– Stardrive recess

# AO Principles

In 1958, the AO ASIF (Association for the Study of Internal Fixation) formulated four basic principles[1], 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. 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 nails are available in different diameters that allow the surgeon to optimize 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.

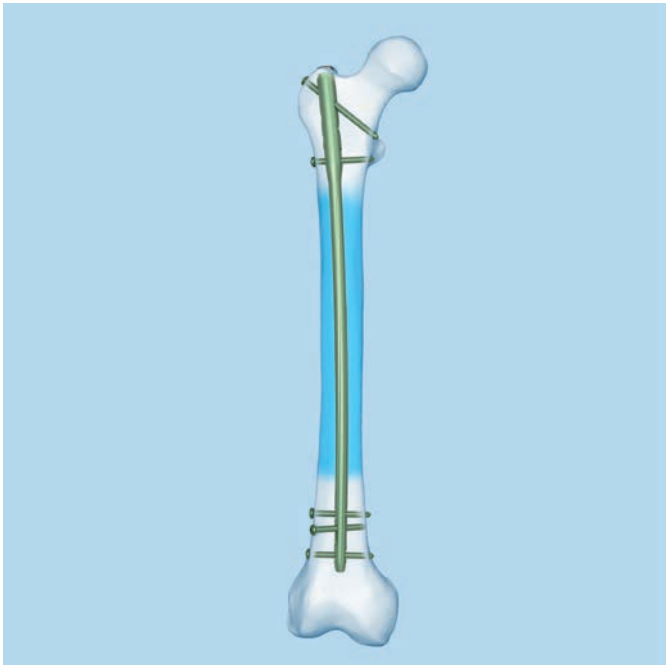
**Preservation of blood supply**
When the canal is not reamed, intramedullary nailing generates minimal trauma to the endosteum and, therefore, the blood supply is maximized through the uninjured endosteum and periosteum. Reaming the canal temporarily disrupts the endosteal blood supply but stimulates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

**Early 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.

[1] Müller ME, Allgöwer M, Schneider R, and Willenegger H (1991) AO Manual of Internal Fixation. 3rd Edition. Berlin: Springer-Verlag

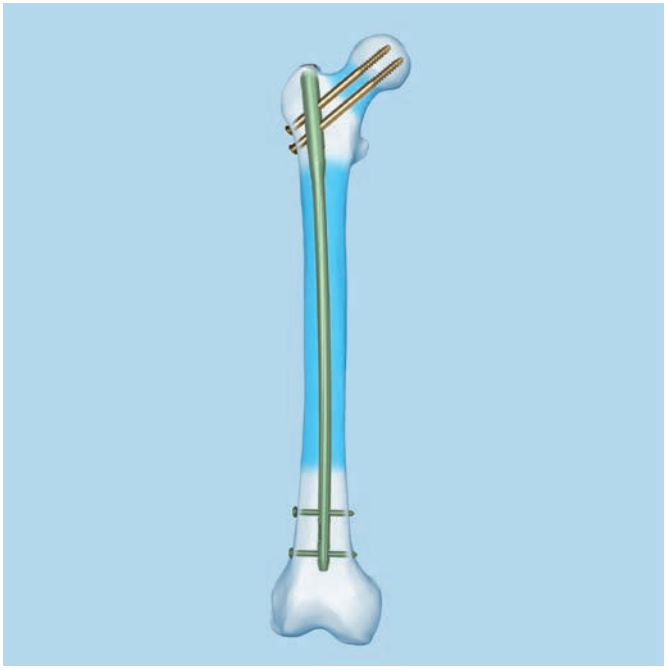
# Indications and Contraindications

**Standard locking indications**
The Expert A2FN with standard locking is indicated for fractures in the femoral shaft:
32-A/B/C (except subtrochanteric fractures 32-A [1–3].1 and 32-B [1–3].1)



**Recon locking indications**
The Expert A2FN 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 A2FN is indicated for fractures in the subtrochanteric section:
32-A [1–3].1 and 32-B [1–3].1



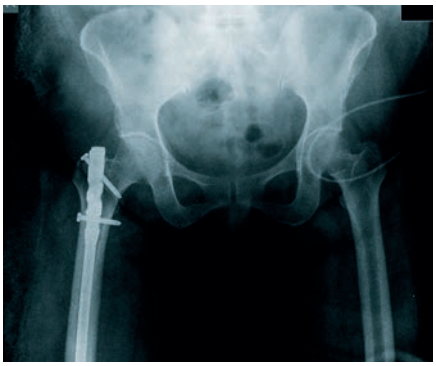
**Contraindications**
– Isolated femoral neck fractures
– Supracondylar fractures (localisation 32)
– Intertrochanteric fractures
– Pertrochanteric fractures

**Case 1 – Standard locking**

55 year old female
Fracture (AO 32-A)

**preoperative**

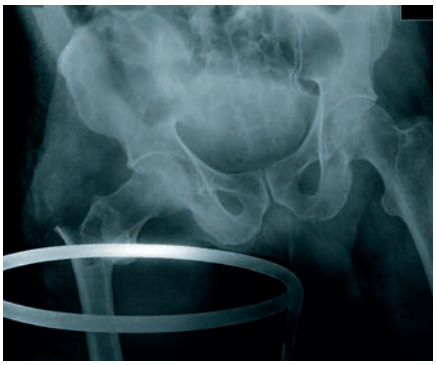
**postoperative**

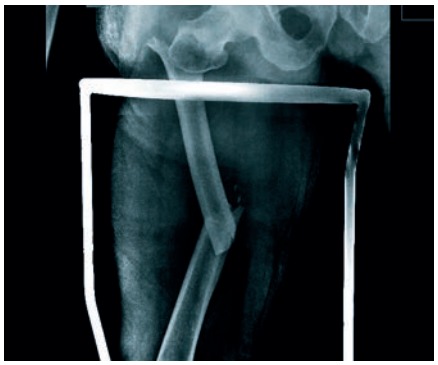


**Case 2 – Recon locking**

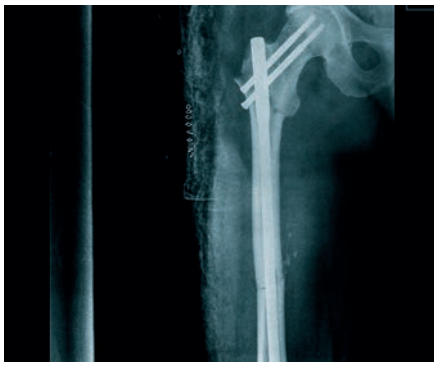
66 year old male
Ipsilateral femoral neck and shaft fractures

**preoperative**





**postoperative**



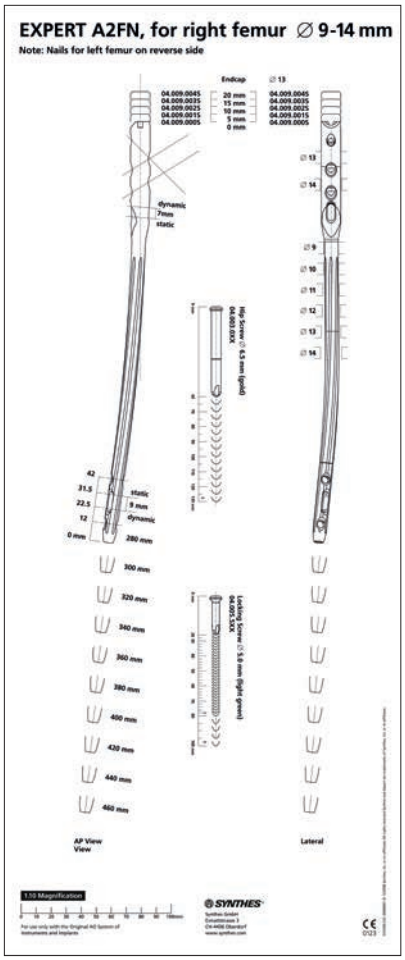
# Preoperative Planning

Use the preoperative planner template for the Expert A2FN (034.000.535) 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.

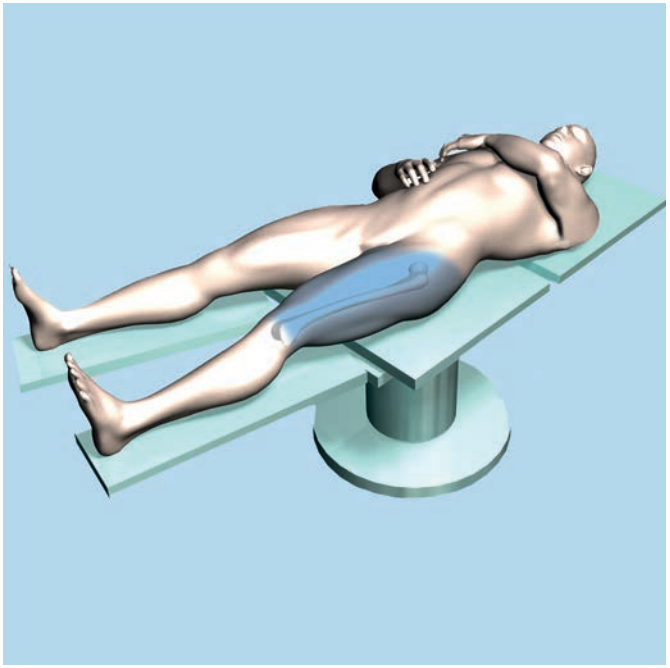
**Precaution:** When selecting the nail size, consider canal diameter, fracture pattern, patient anatomy and post-operative protocol.



## 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 may be appropriate in certain circumstances (refer to the technique guide 036.000.038).

## 3
### Confirm nail length and diameter

| Instruments | |
|---|---|
| 03.010.020 | Radiographic Ruler for Femoral Nails |
| 03.010.023 | Radiographic Ruler for Nail Diameters for Expert Femoral Nails |

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

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.

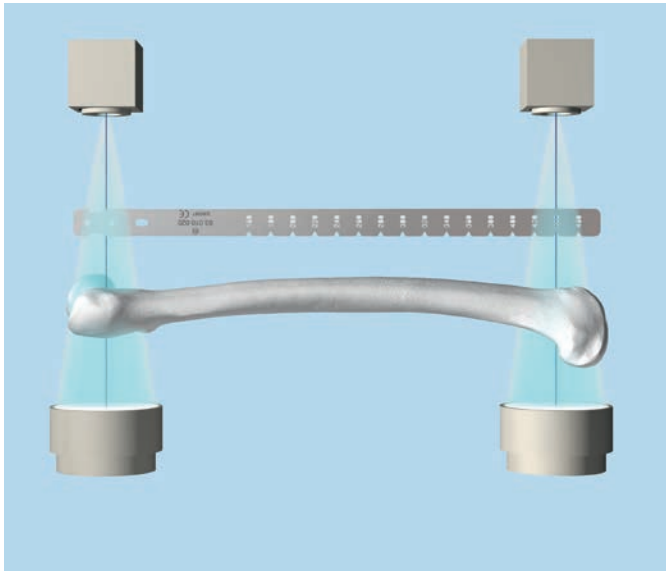
Mark the skin at the proximal end of the ruler.
Move the C-arm to the distal femur. Align the proximal end of the radiographic ruler to the skin mark, and take an AP image of the distal femur. Verify fracture reduction going from proximal to the fracture to distal.

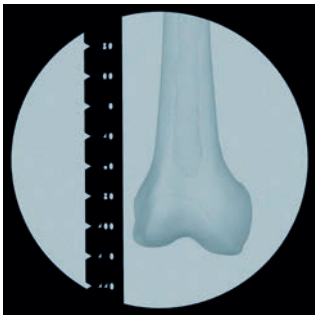
Read nail length directly from the ruler image, selecting the measurement at or just proximal to the epiphyseal scar, or at the chosen insertion position.

Important: It is recommended that all fractures are treated with the longest nail possible, taking into account patient anatomy or a previous implant.

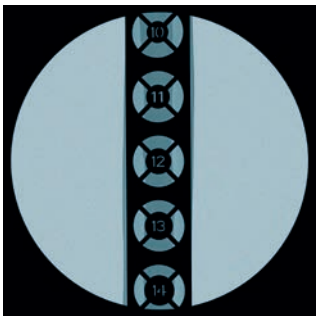
**Precaution:** Compression (with the conventional backstroke technique*) or dynamisation must be taken into account when determining the nail length. A shorter nail should be chosen when back-hammering or dynamisation is planned for the procedure (the dynamic slot allows for 7 mm of movement).

* 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 ∅ 2.5 mm or use the Depth Gauge for Medullary Nails in combination with the SynReam reaming rod ∅ 2.5 mm, Length 950 mm see RIA Technique Guide 036.000.533.




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.

**Precautions:**
- 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.

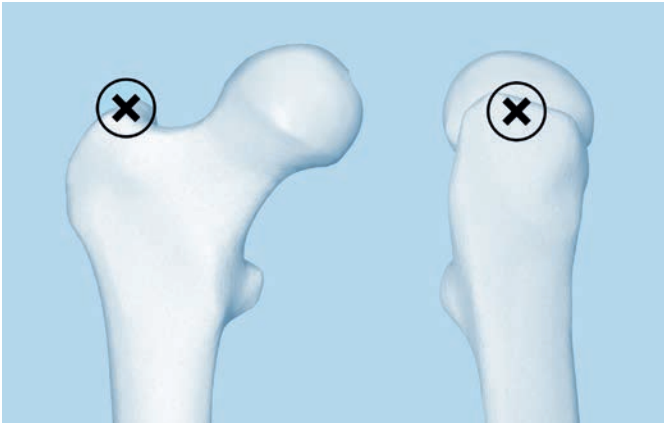
## 4
### Approach

Palpate the posterior edge of the greater trochanter. Make an 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 A2FN in the medullary canal.

- In AP view, the entry point is at the tip of the greater trochanter, approximately 5° lateral to the axis of the medullary canal.
- 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 A2FN can be used

## 6
### Insert guide wire

| Instruments | |
|---|---|
| 357.399 | Guide Wire ∅ 3.2 mm, length 400 mm |
| 393.105 | Universal Chuck with T-Handle |
| 03.010.357 | Protection Sleeve 17.0 |
| 03.010.358 | Multihole Drill Sleeve 17.0/3.2, for No. 03.010.357 |

Secure the guide wire in the universal chuck.

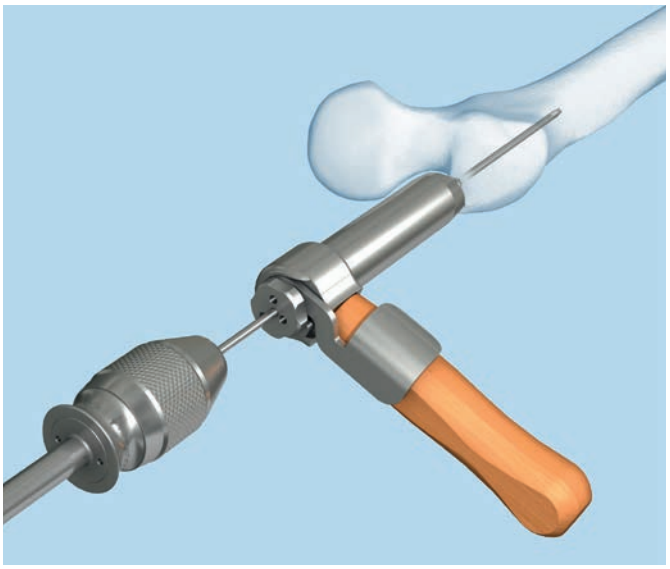
Push the multihole drill sleeve into the protection sleeve and insert the assembly over the guide wire through the incision down to the bone if possible.

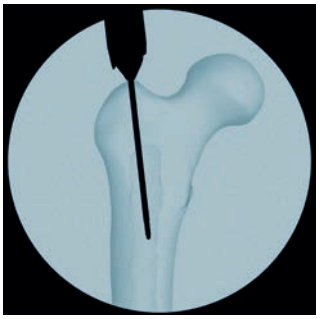
In the lateral view, verify whether the position of the guide wire is straight and in the center of the medullary cavity.

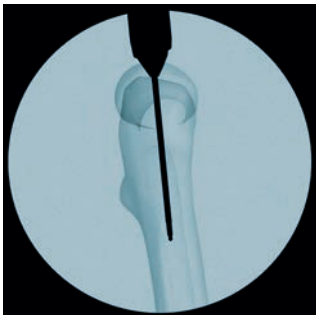
**Precaution:** The correct entry point and angle are essential for a successful result. To ensure the correct position of the guide wire on the AP view, hold a sterile Expert A2FN nail onto the femur and check radiograpically.

**Option: percutaneous technique**
Insert the assembly (protection sleeve and multihole drill sleeve) through the incision and to the bone. Lightly mark the insertion point at a 5° angle to the shaft axis in the AP view. 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.

Remove the universal chuck.







## 7
**Option: realign guide wire**

| Instruments | |
|---|---|
| 357.399 | Guide Wire ∅ 3.2 mm, length 400 mm |
| 393.105 | Universal Chuck with T-Handle |
| 03.010.357 | Protection Sleeve 17.0 |
| 03.010.358 | Multihole Drill Sleeve 17.0/3.2, for No. 03.010.357 |

**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 or repositioned. Slide the multihole drill sleeve over the guide wire. Use the center of the multihole drill sleeve. Turn the sleeve so that the new guide wire can be inserted at the correct entry point. Possible distances from the center are 4 mm, 5 mm and 6 mm.

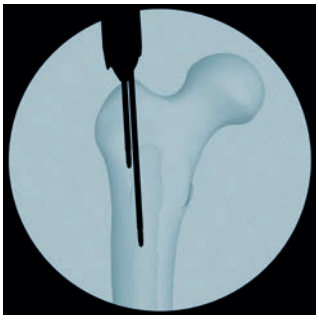
Press the handle to secure the position of the multihole drill sleeve. Secure a new guide wire in the universal chuck.

Press the multihole drill sleeve firmly to the bone and insert the wire through the chosen hole of the multihole drill sleeve.

Verify the correct position of the new guide wire in both views. Remove the multihole drill sleeve and the first guide wire.

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

4 mm too lateral



new guide-wire at the correct position

## 8

**Open medullary canal with flexible drill bit**

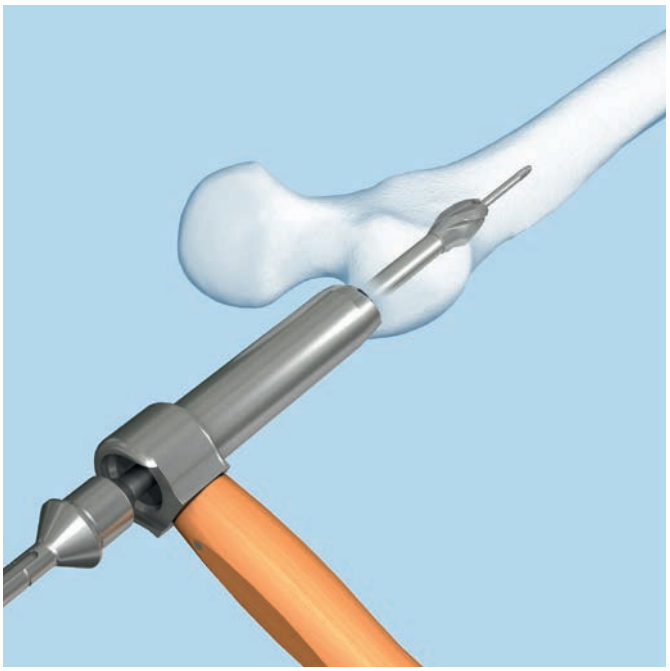
| Instruments | |
|---|---|
| 357.399 | Guide Wire ∅ 3.2 mm, length 400 mm |
| 03.010.357 | Protection Sleeve 17.0 |
| 03.010.367 | Opening Drill Bit ∅ 14.0 mm, cannulated, flexible, length 206 mm, Stainless Steel |

Remove the multihole drill sleeve (Protection sleeve stays in situ).

Secure the flexible cannulated drill bit with the quick coupling for DHS/DCS 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 and the guide wire. The Protection sleeve remains in situ for the reaming of the medullary canal.



**Alternative: Open medullary canal with awl**

| Instruments | |
|---|---|
| 357.399 | Guide Wire ∅ 3.2 mm, length 400 mm |
| 03.010.365 | Awl ∅ 16.5/3.2 mm, cannulated |

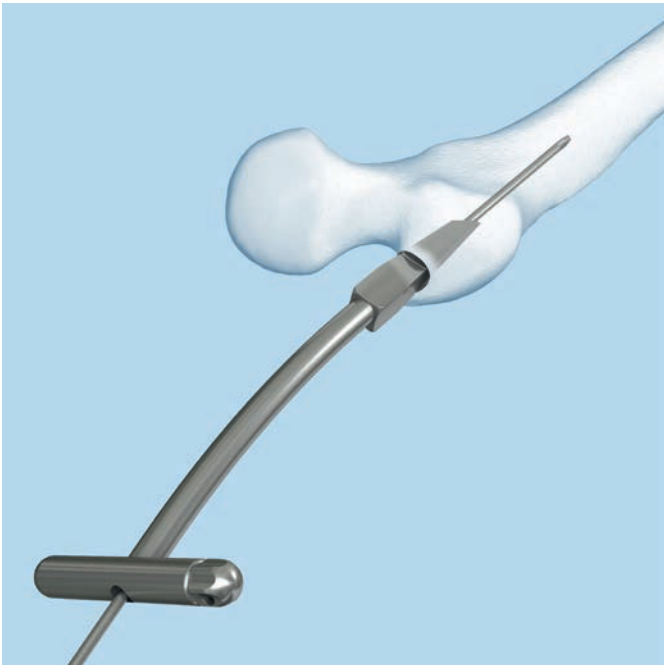
Remove the protection sleeve and the multihole drill sleeve.

Place the cannulated awl over the guide wire and open the medullary canal. Use a twisting motion to advance the awl to a depth of approximately 5 cm.

**Note:** The outer diameter of the awl is 3.5 mm bigger than the proximal nail diameter to allow slight corrections of the entry point.

Remove the awl and the guide wire.

**Precaution:** Refrain from hammering on the awl or applying excessive force.

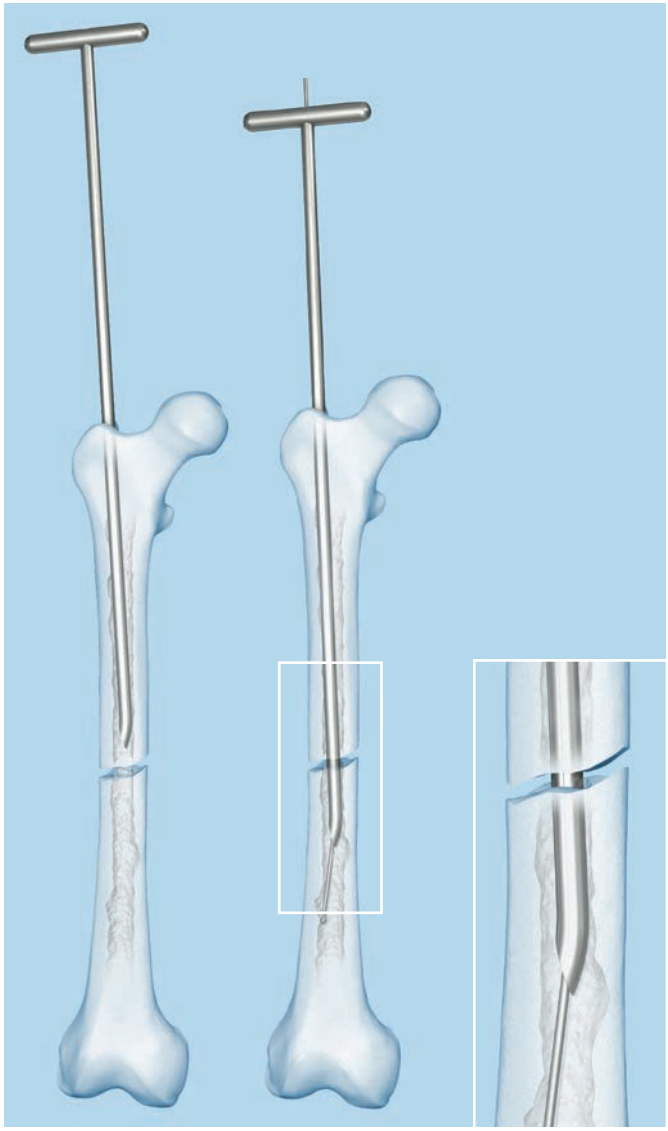


## 9
### Reduce fracture

| Instrument | |
|---|---|
| 03.010.369 | Reduction Instrument for Medullary Nails |

- Perform closed reduction manually by axial traction under image intensifier control. The use of the Reduction Instrument for Medullary Nails may be appropriate in certain circumstances.

- Check fracture reduction under image intensifier.



## 10
**Option: ream medullary canal**

| Instruments | |
|---|---|
| 189.060/<br>175.500 | SynReam Intramedullary<br>Reaming System |
| 03.010.093 | Alternative: Rod Pusher for<br>Reaming Rod with Hexagonal<br>Screwdriver ∅ 8.0 mm |

**Note:** For the detailed reaming procedure, please consult SynReam Surgical Technique 036.000.310.

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

- Check fracture reduction under image intensifier.

**Insert reaming rod**
Insert the SynReam reaming rod into the medullary canal until the desired insertion depth. The tip must be correctly positioned in the medullary canal since it determines the final distal position of the Expert A2FN. The use of the Reduction Instrument for Medullary Nails may be helpful in certain circumstances.

**Reaming**
- Starting with the 8.5 mm 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.

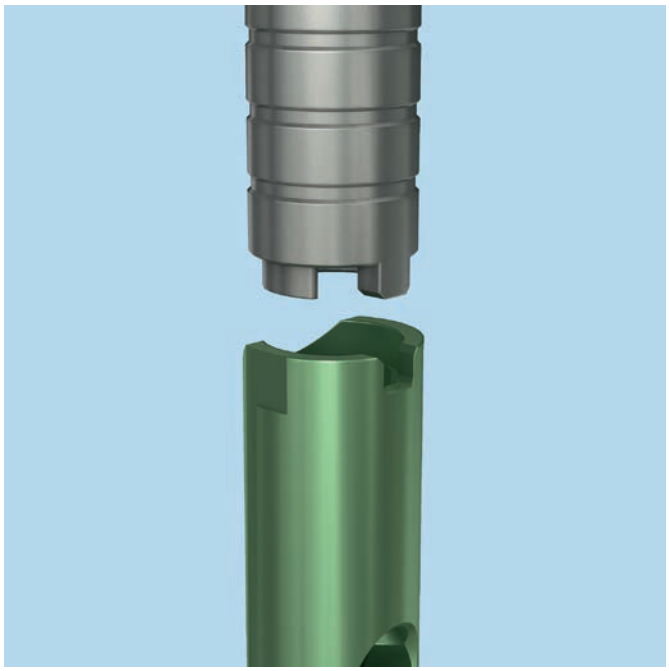
**Note:** All Expert A2FN are cannulated and can be inserted over the SynReam reaming rod. Reaming rod exchange is not required.

## 1
**Assemble insertion instruments**

| Instruments | |
|---|---|
| 03.010.351 | Insertion Handle for Expert A2FN |
| 03.010.356 | Connection Screw, cannulated, for Expert A2FN, for No. 03.010.351 |
| 03.010.092 | Screwdriver, hexagonal with spherical head ∅ 8.0 mm |

Orientate the insertion handle laterally towards the nail and match the notch of the handle to the nail (as is shown in the figure on the right).

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



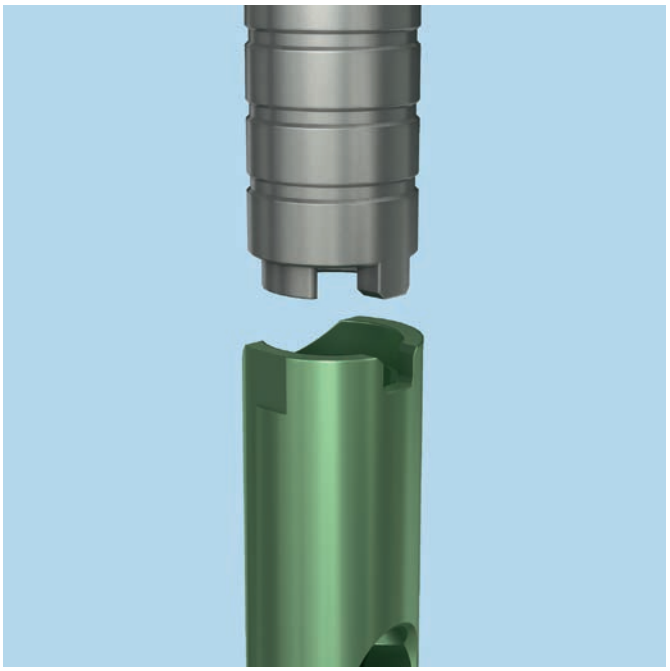
**Note:** The anatomical design of the Expert A2FN requires left and right nails. The nails are therefore labeled "ANTERIOR" on both nails at proximal anterior end.

**Precaution:** Check that the connecting screw is correctly tightened. Do not over-tighten.

## Optional instruments

| Instruments | |
|---|---|
| 03.010.351 | Insertion Handle for Expert A2FN |
| 03.010.356 | Connection Screw, cannulated, for Expert A2FN, for No. 03.010.351 |
| 03.010.093 | Rod Pusher for Reaming Rod with Hexagonal Screwdriver ∅ 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 | |
|---|---|
| 03.010.351 | Insertion Handle for Expert A2FN |
| 03.010.356 | Connection Screw, cannulated, for Expert A2FN, for No. 03.010.351 |

Following correct coupling of insertion handle to the nail.

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

**Notes:**
- 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.
- The Expert A2FN can be passed over the SynReam Reaming Rod without use of the exchange tube.

**Precaution:** If the nail does not rotate to the lateral position during insertion, remove the nail and reinsert.

**Precaution:** Mount the aiming arm for proximal locking only when the nail has been completely inserted.

## Optional instruments

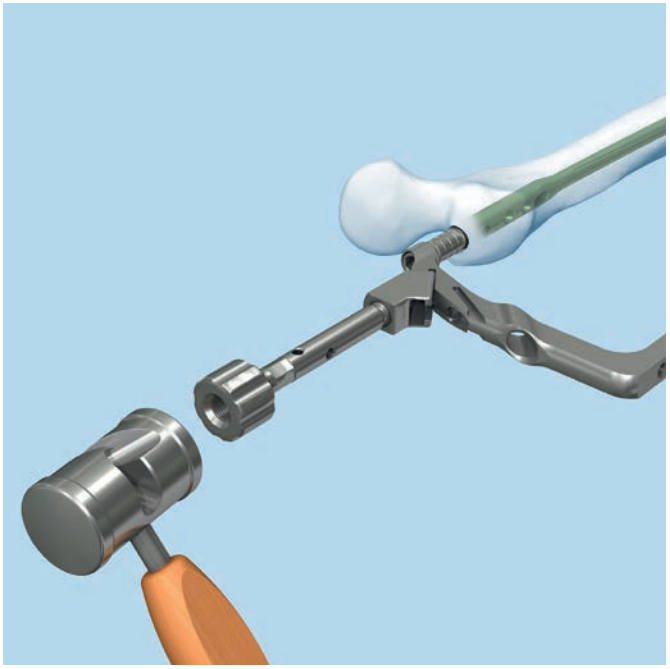
| Instruments | |
|---|---|
| 321.160 | Combination Wrench ∅ 11.0 mm |
| 03.010.047 | Connector, for Insertion Handle |
| 03.010.364 | Combined Hammer 500 gr., for No. 03.010.170 |
| 03.010.170 | Hammer Guide |
| 321.170 | Pin Wrench ∅ 4.5 mm, length 120 mm |
| 357.398 | Cannulated Shaft with 8 mm Hex |

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.

Strike **only** on the connector.

Remove the connector after finishing the insertion.

**Note:** In case of insertion of the nail over the reaming rod retighten the connection screw with the cannulated shaft with 8 mm Hex.

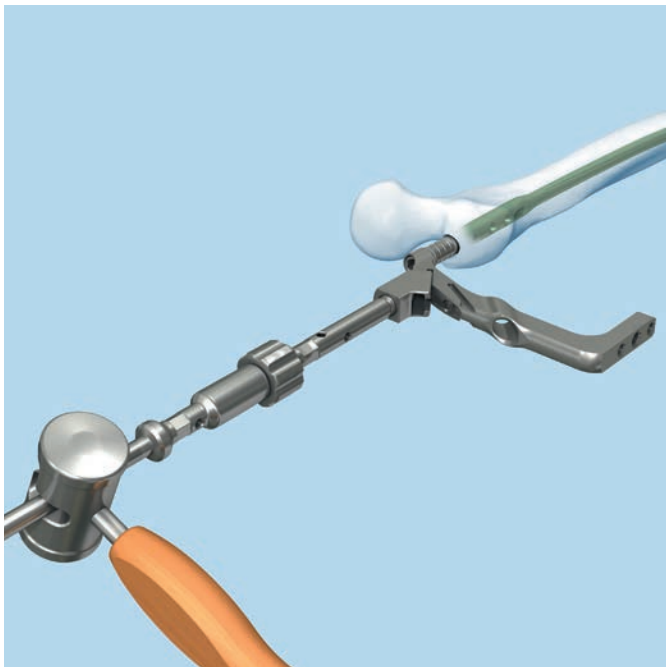


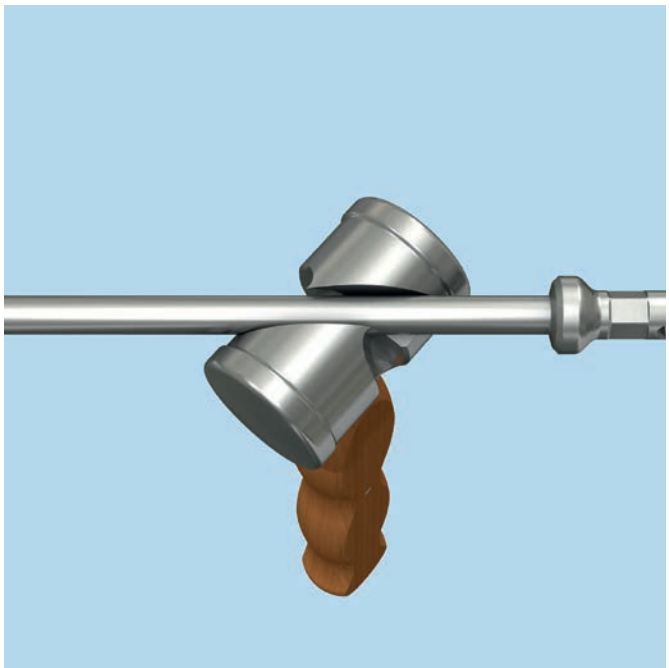
Optionally, the hammer guide can be threaded into the connector and the hammer can be used as a slide hammer. For this the hammer can be attached to the hammer guide as shown in the pictures.

Remove the hammer guide and the connector.

**Precaution:** If nail insertion is difficult, choose a smaller diameter nail or ream the intramedullary canal to a larger diameter.

**Precaution:** Do not hammer directly onto the insertion handle. Retighten and confirm that the nail is securely connected to the insertion handle.



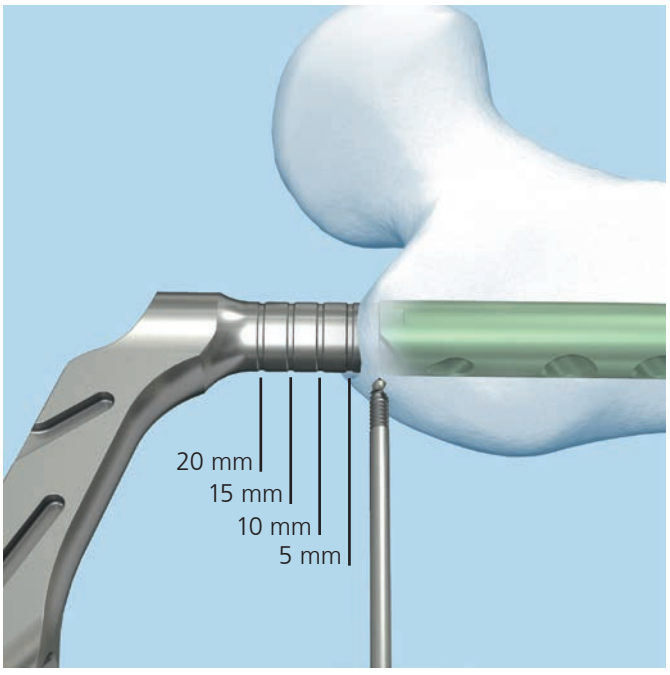


## 3
### Check proximal nail position

| Instruments | |
|---|---|
| 03.010.350 | Aiming Arm for Expert A2FN |
| 357.399 | Guide Wire ∅ 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.

**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.



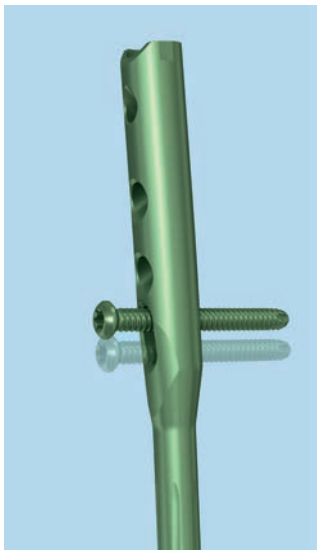
**Compression**

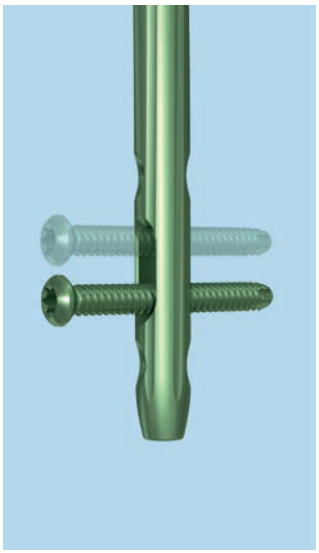
It is recommended to close fracture gaps in order to decrease the incidence of non-union or malunion.

The Expert A2FN offers two compression options.

**Proximal:**
– Active compression via compression screw
– Back stroke technique
– Dynamisation

**Distal:**
– Dynamisation





**Note for proximal compression:** If proximal compression is planned, over-insert the nail to compensate for backstriking the nail, active compression with compression screw or proximal dynamisation: the final position (after compression) of the nail should be flush with the trochanteric cortex.

**Note for distal dynamisation:** If distal dynamisation is planned, the tip of the nail will slide max. 9 mm distally. In order to protect the articulating surface of the distal femur this movement has to be taken into account when choosing the length and insertion of the implant.

## 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.

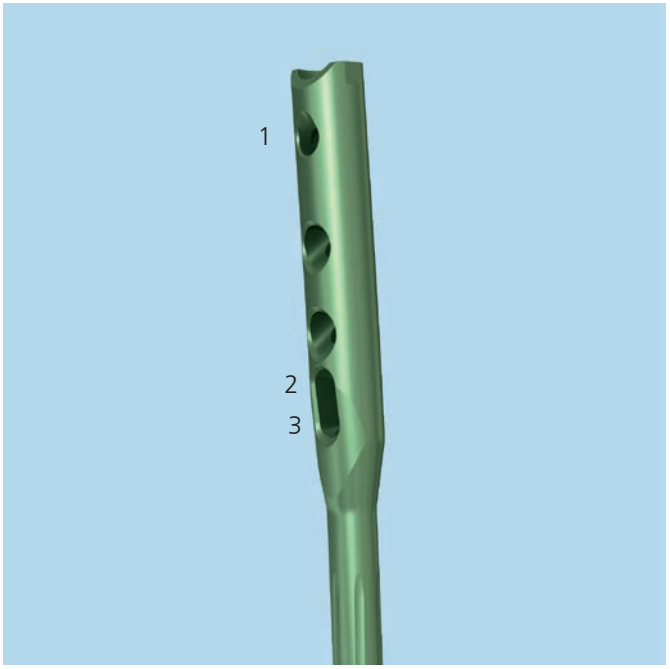
3. The static locking option (STAT) corresponds to the distal position of the standard locking slot.

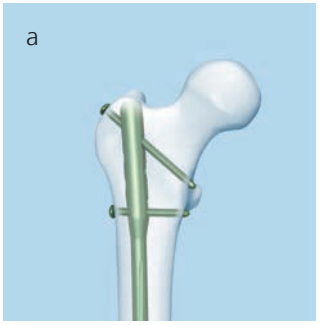
Proximal standard locking options:

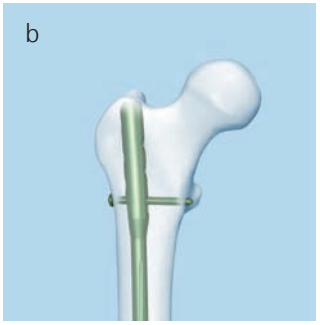
a. For sufficient proximal static locking, it is suggested to use the 120° antegrade locking option together with the transverse static screw.

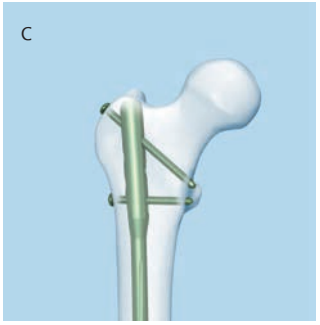
b. For immediate primary dynamisation, insert only one proximal locking screw through the dynamic slot.

c. For secondary dynamisation use both the dynamic and the 120° antegrade locking positions and remove the 120 degree locking when required.



## 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 ∅ 4.2 mm, for No. 03.010.065 |

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

Insert the three-part trocar combination (protection sleeve, drill sleeve and trocar) through the desired ML hole in the aiming arm (STAT for static locking, DYN for dynamic locking). 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 sleeve and trocar. This force may prevent accurate targeting through the proximal locking holes and damage the drill bits.

## 3
### Drill and determine locking screw length

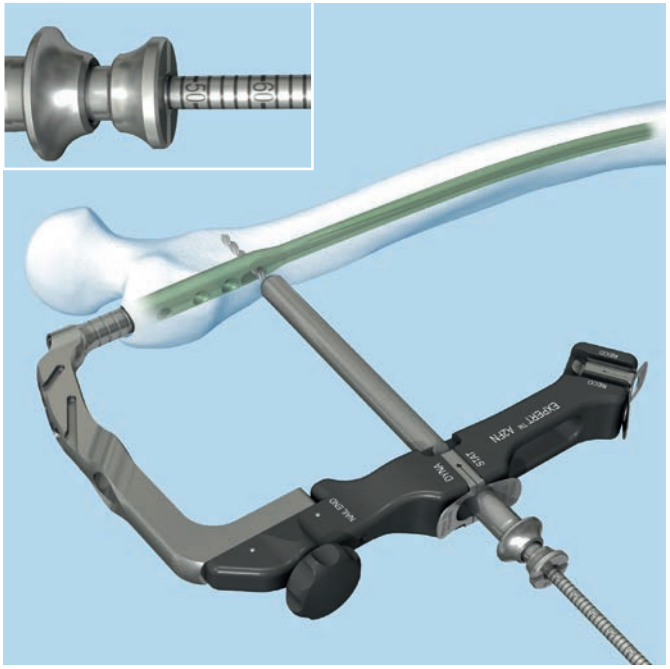
| Instruments | |
|---|---|
| 03.010.063 | Protection Sleeve 12.0/8.0, length 188 mm |
| 03.010.065 | Drill Sleeve 8.0/4.2, for No. 03.010.063 |
| 03.010.061 | Drill Bit ∅ 4.2 mm, calibrated, length 340 mm, 3-flute, for Quick Coupling, for No. 03.010.065 |

Drill through both cortices. Stop as soon as the tip of the drill bit penetrates the far cortex.

Confirm drill bit position after drilling both cortices.

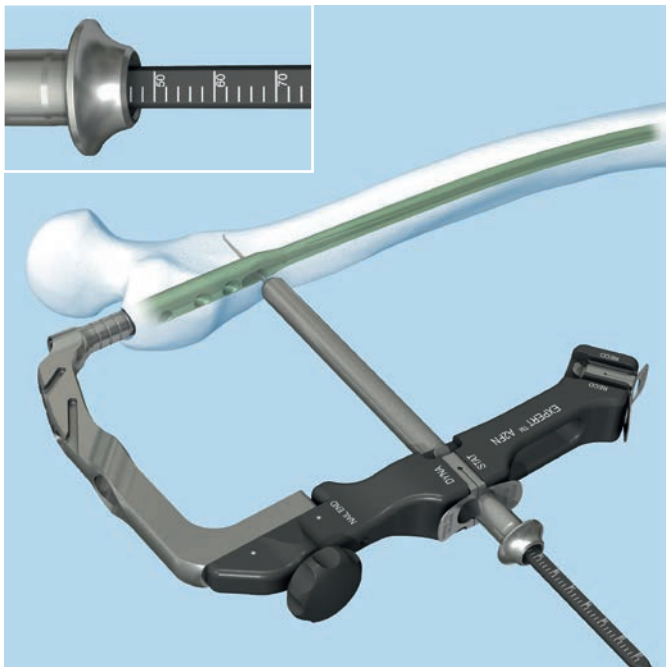
Ensure that the drill sleeve is pressed firmly to the lateral cortex and read the measurement corresponding to the appropriate length of the locking screw at the back of the drill sleeve. Remove the drill bit and the drill sleeve.

**Note:** The final position of the drill tip will determine the correct length of the locking screw.



**Alternative instrument**

| **Instruments** | |
|---|---|
| 03.010.063 | Protection Sleeve 12.0/8.0, length 188 mm |
| 03.010.072 | Depth Gauge for Locking Screws, measuring range up to 110 mm, for No. 03.010.063 |



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

Disassemble the depth gauge into 2 parts: the outer sleeve and the measuring device with hook. Insert the measuring device into the protection sleeve. Make sure that the hook engages 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.

## 4
### Insert locking screws

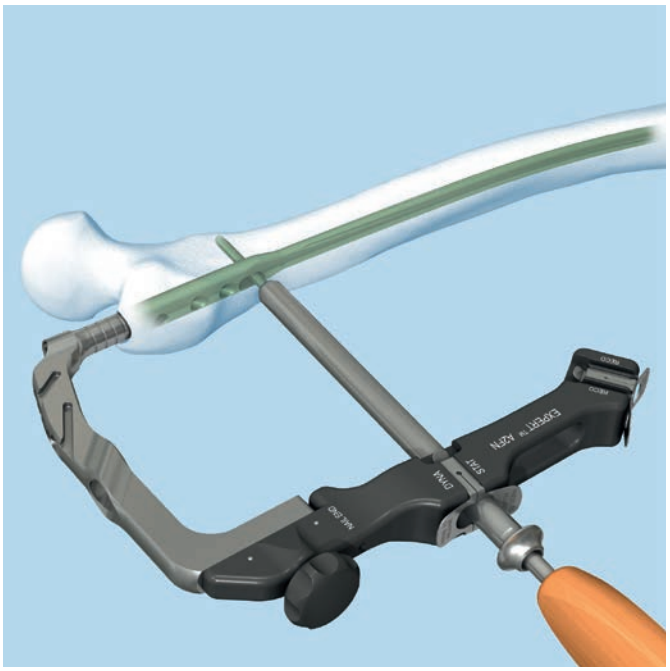
| Instruments | |
|---|---|
| 03.010.063 | Protection Sleeve 12.0/8.0, length 188 mm |
| 03.010.107 | Screwdriver Stardrive, T25, length 330 mm |

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 protrude more than 1 to 2 mm beyond the medial far cortex.

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

When using the 120° antegrade locking option, insert the trocar combination through the hole labeled 120° on the insertion handle and follow the steps 2 to 4.

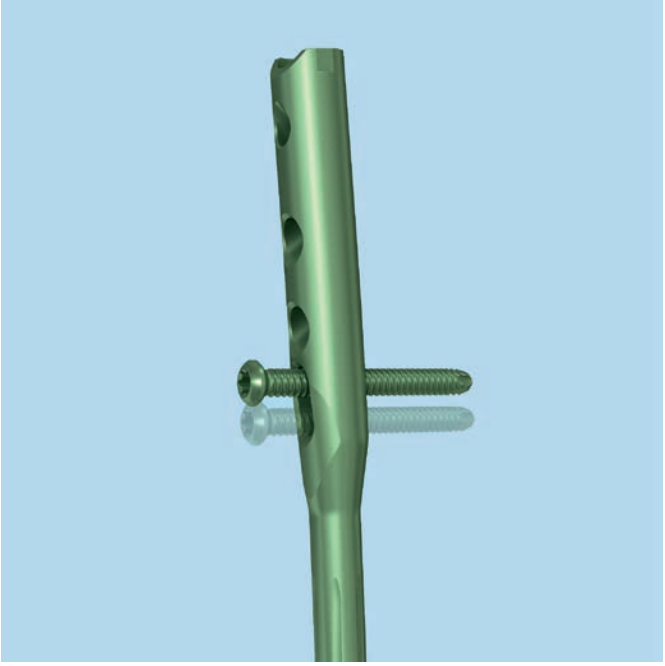


## 5
### Active compression locking (optional)

For situations where the fracture gap needs compression after nail insertion, compression of the fracture gap can be accomplished without removing the insertion instruments.

The Expert A2FN allows for a maximum compression of 7 mm. If more compression of the fracture gap is needed, the conventional backstroke technique is recommended.

**Note:** Insert one proximal locking screw in the dynamic locking hole (DYN), refer to page 27 to 31 for details on inserting this locking screw.



## 6
### Insert compression screw

| Instruments | |
|---|---|
| 03.010.372 | Compression Screw, for Expert A2FN, for 03.010.356 |
| 03.010.092 | Screwdriver, hexagonal with spherical head ∅ 8.0 mm |

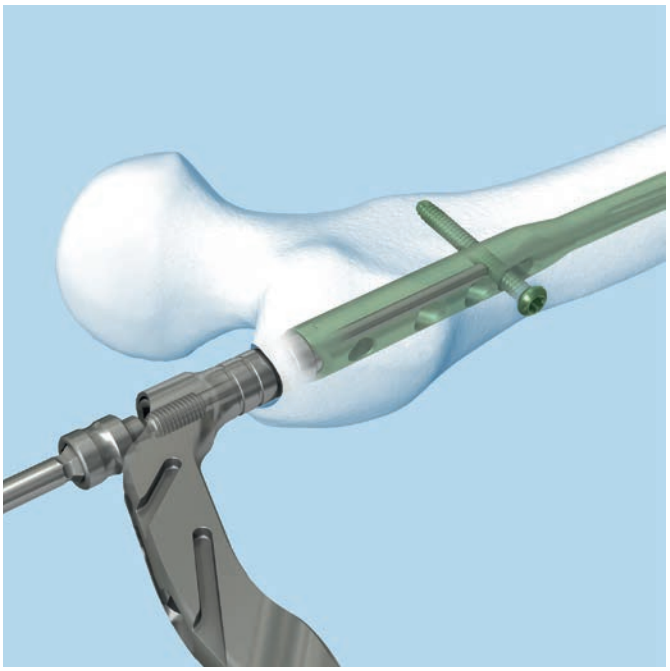
**Note:** Distal locking must be performed prior to application of compression. (see page 32)

Confirm that the nail is securely connected to the insertion handle. Insert the compression screw through the connecting screw and into the nail using the screwdriver.

The compression screw will contact the dynamic locking screw. Advance the compression screw until the fracture gap is reduced.

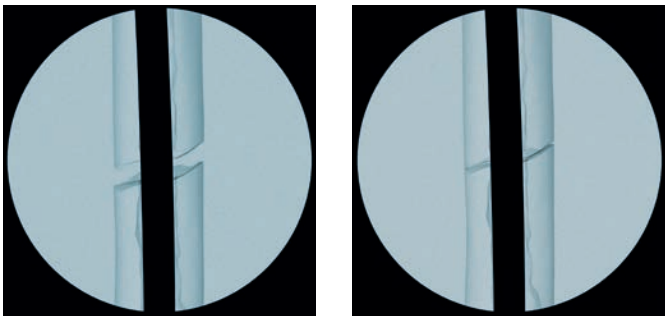
Monitor reduction under image intensification.
Each revolution of the compression screw corresponds to a compression of 1 mm (maximum 7 mm).

**Precaution:** Do not over tighten the compression screw; it may deform the locking screw.



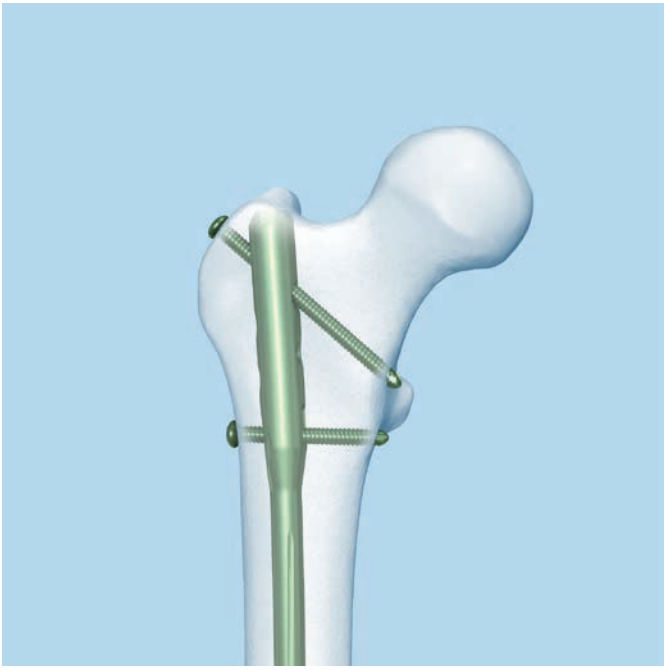
## 7
### Monitor fracture

Control the fracture gap before, during and after the compression procedure by monitoring on image intensifier.



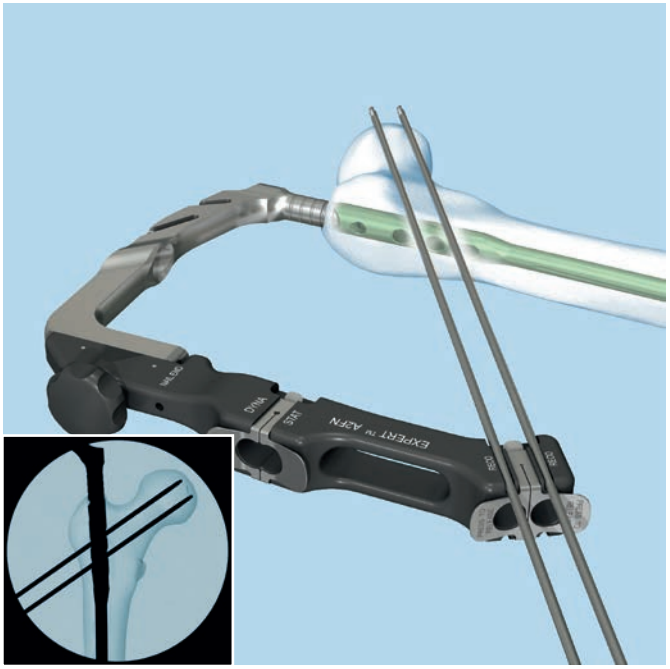
## 8
### Insert static locking screw (120 degree locking)

Remove the compression screw.
Insert second proximal locking screw in the 120 degree locking hole, refer to steps 2 to 4 pages 28–31.



## 1
### Check nail position

| Instruments | |
|---|---|
| 03.010.351 | Insertion Handle for Expert A2FN |
| 03.010.350 | Aiming Arm for Expert A2FN |
| 357.399 | Guide Wire ∅ 3.2 mm, length 400 mm |
| 03.010.353 | Protection Sleeve 11.5/8.5, for Expert A2FN, yellow |
| 03.010.354 | Drill Sleeve 8.5/3.2, for No. 03.010.353, yellow |
| 03.010.355 | Trocar ∅ 3.2 mm, for No. 03.010.354, yellow |
| 03.010.363 | Screwdriver Stardrive, T25, length 480 mm, for Hip Screws |
| 03.010.368 | Reamer ∅ 4.5/6.5 mm, length 450 mm, for Hip Screws Expert A2FN |

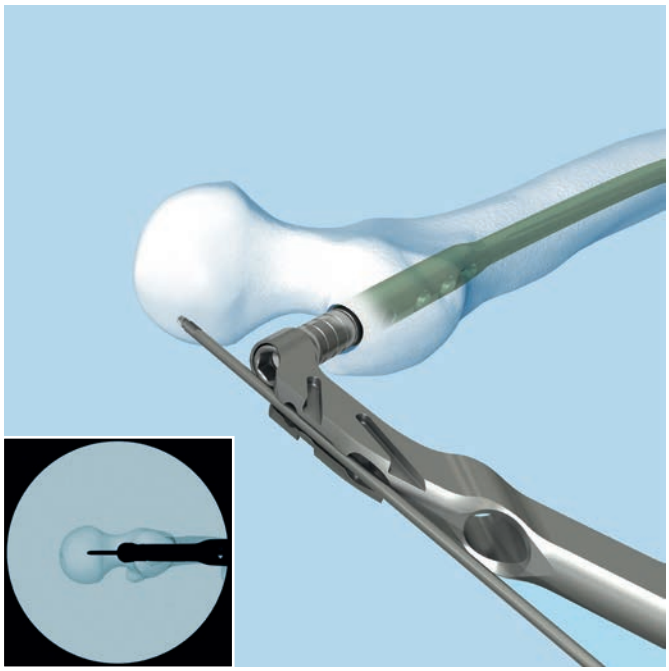


Confirm that the insertion handle is securely connected to the nail and attach the aiming arm to the insertion handle.

In the AP view adjust the nail insertion depth to ensure that the two recon screws can be optimally placed into the femoral neck.

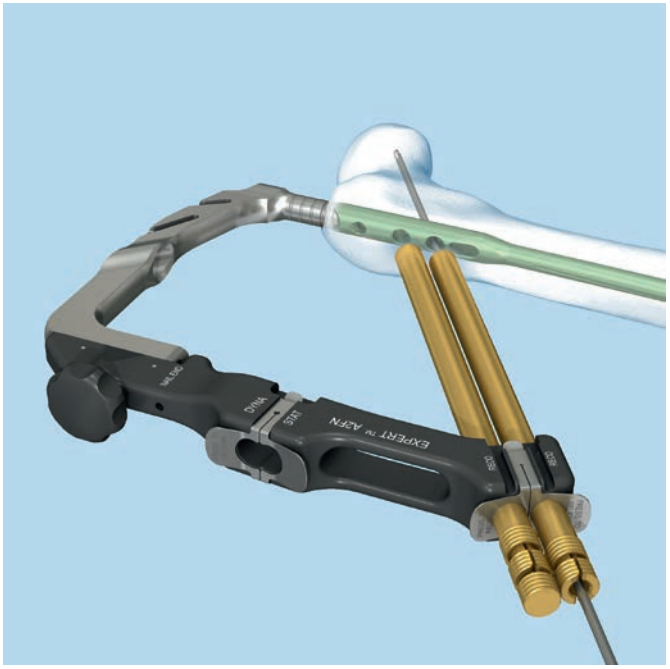
The position of the nail can be verified by placing two guide wires onto the aiming arm and checking radiographically.

To ensure the correct anteversion of the implant, insert an additional guide wire into the groove on the insertion handle. This will indicate the rotation of the implant. Alternatively an additional guide wire can be placed into the femoral head on the ventral side of the femoral neck.



## 2
### Insert guide wires for hip screws

| Instruments | |
|---|---|
| 357.399 | Guide Wire ∅ 3.2 mm, length 400 mm |
| 03.010.353 | Protection Sleeve 11.5/8.5, for Expert A2FN, yellow |
| 03.010.354 | Drill Sleeve 8.5/3.2, for No. 03.010.353, yellow |
| 03.010.355 | Trocar ∅ 3.2 mm, for No. 03.010.354, yellow |



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. Check guide wire placement radiographically in both AP and lateral views.

Remove the cranial trocar.

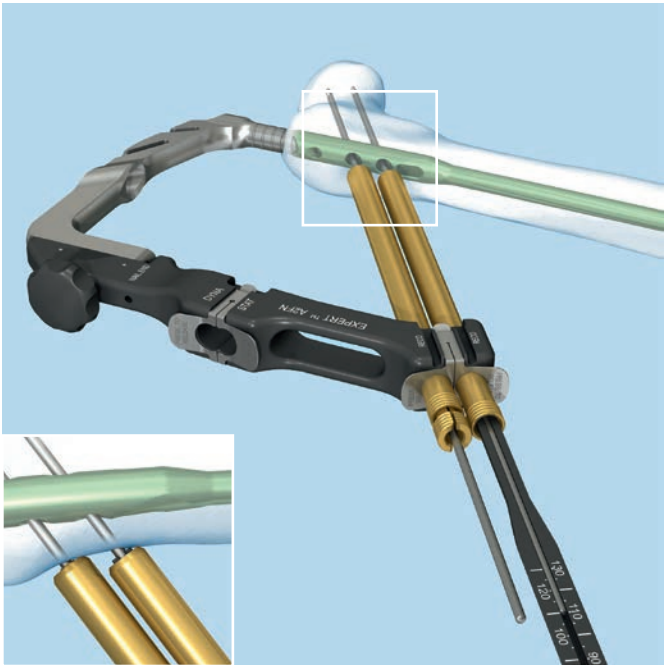
Insert the second guide wire subchondrally into the femoral head. Check the guide wire placement radiographically in both AP and lateral views.

**Precaution:** 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, drill sleeves and trocars. This force may prevent accurate targeting through the proximal locking holes and damage the drill bits.

## 3
**Determine length and drill for caudal hip screw**

| Instruments | |
|---|---|
| 03.010.085 | Direct Measuring Device for Guide Wires ∅ 3.2 mm, length 400 mm |
| 03.010.368 | Reamer ∅ 4.5/6.5 mm, length 450 mm, for Hip Screws Expert A2FN |
| 03.010.079 | Fixation Sleeve, for No. 03.010.078 |



It is recommended to 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. It is necessary to ensure contact between the direct measuring device and the bone. Read the length of the required hip screw directly from the measuring device.

Remove the measuring device and the caudal guide wire.

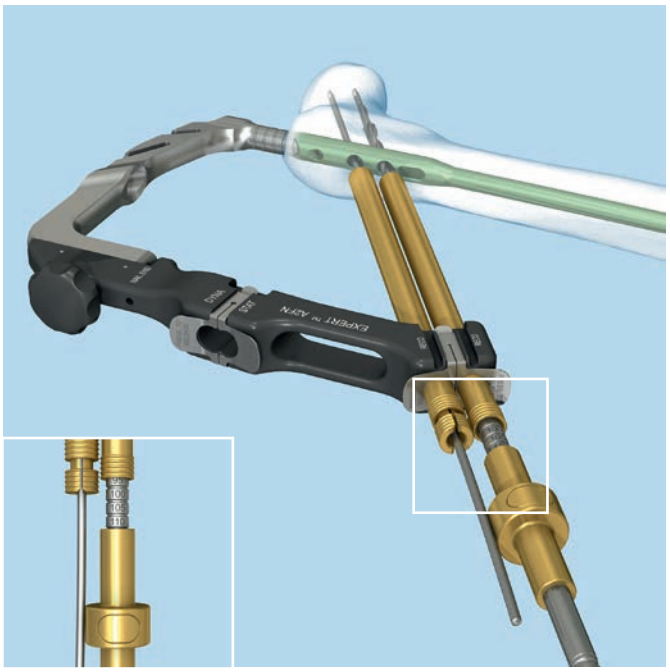
**Note:** The determined length indicates the effective screw length.

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.

**Precaution:** Before drilling, check whether the fixation sleeve locks accordingly onto the reamer by performing the function control 2.40 (see www.synthes.com/reprocessing).

Guide the reamer through the protection sleeve to the bone and drill to the stop. The fixed fixation sleeve prevents further drilling. Verify the position of the reamer under image intensification in AP view.

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



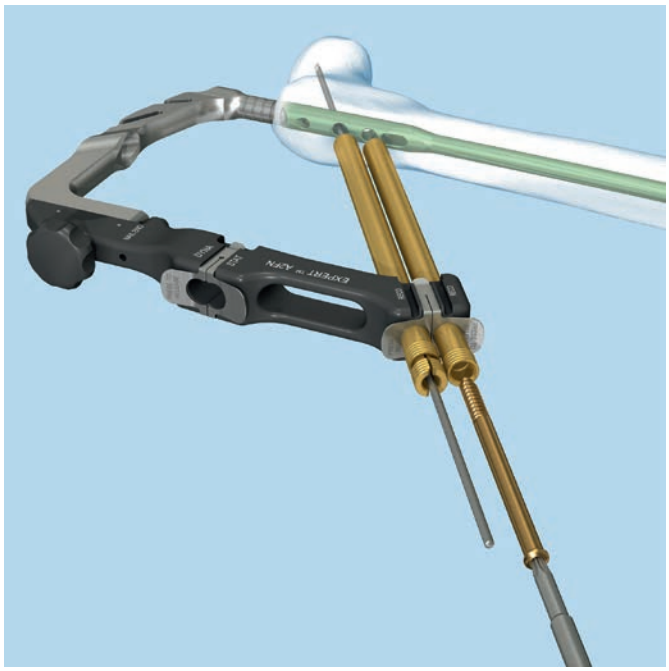
## 4
**Insert caudal hip screw**

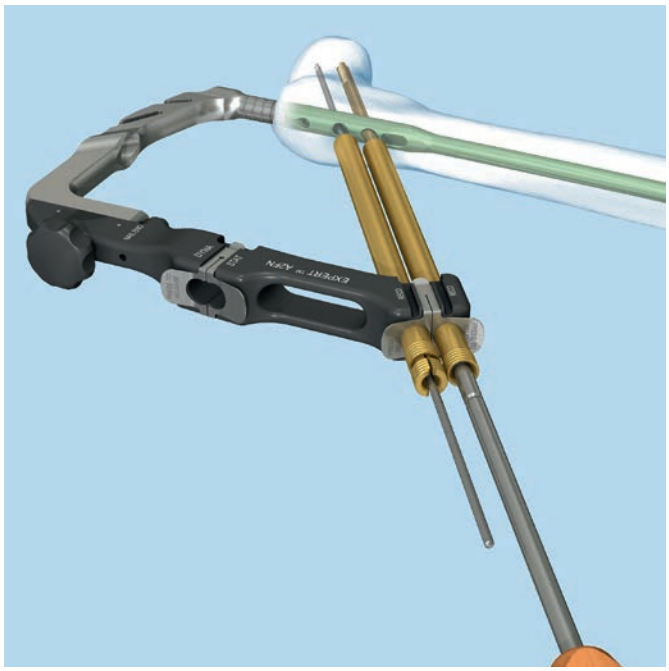
| Instrument | |
|---|---|
| 03.010.363 | Screwdriver Stardrive, T25, length 480 mm, for Hip Screws |

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

**Note:** A groove on the screwdriver indicates when the locking screw is approximately fully inserted.

**Repeat steps 3 and 4 for the second (cranial) hip screw.**



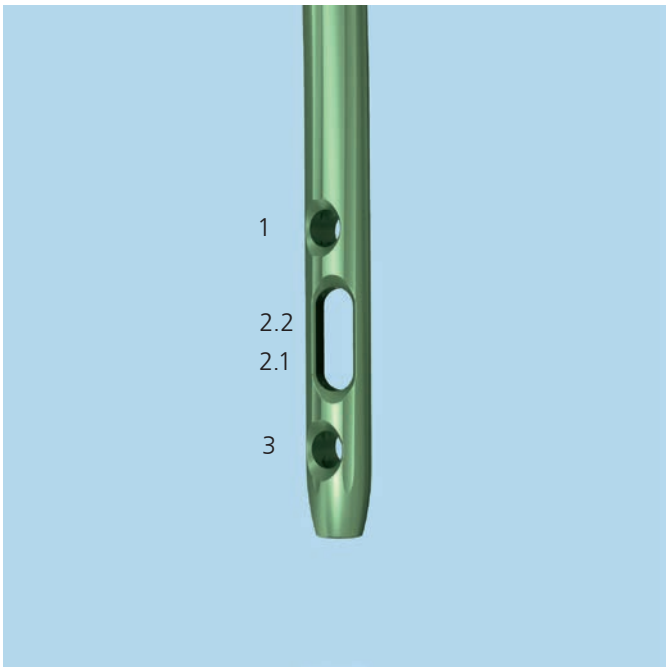


# Distal Locking

**Important Notes for distal locking options:**

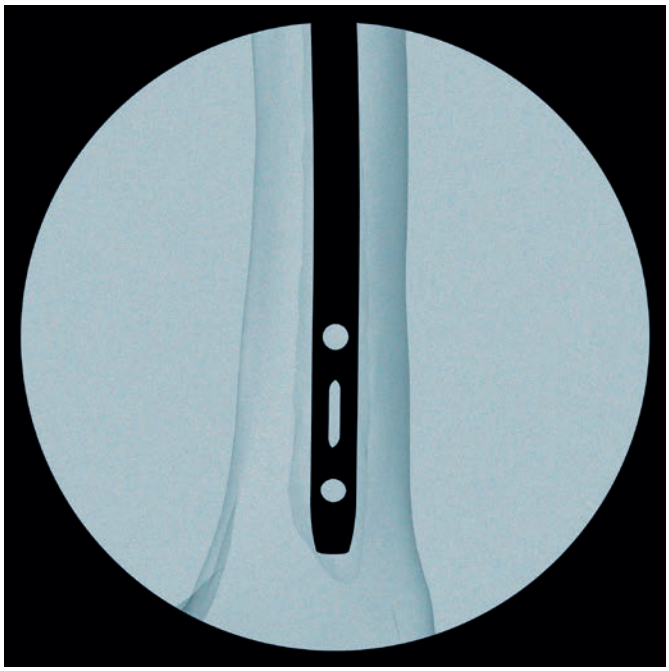
1. Static hole
2. Dynamic hole (2.1. dynamic position, 2.2 static position or dynamized)
3. Static hole

For sufficient distal **static** locking, it is suggested that **a minimum of two locking screws** are used.



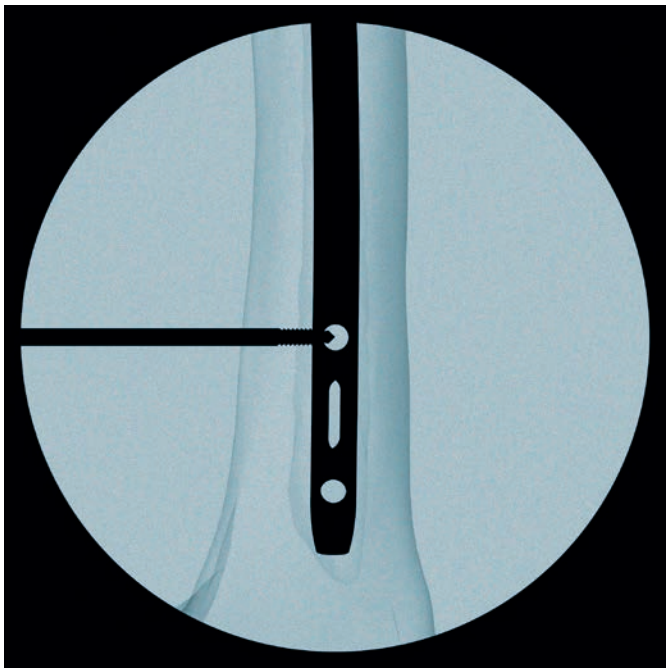
## 1
### Align image

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



## 2
### Determine incision point

- Place a guide wire on the skin over the center of the hole to mark the incision point and make a stab incision.



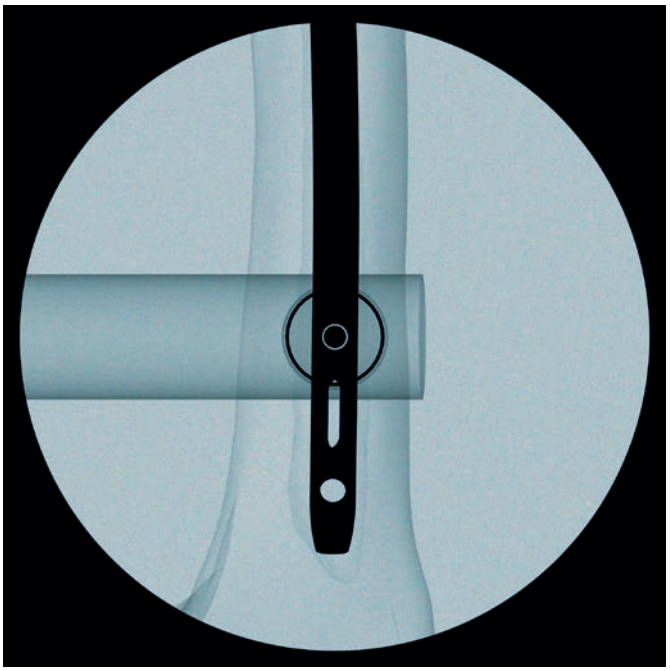
## Drill

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

- Using the radiolucent drive (511.300), under image intensification, insert the tip of the drill bit through the incision down to the bone.

- 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.

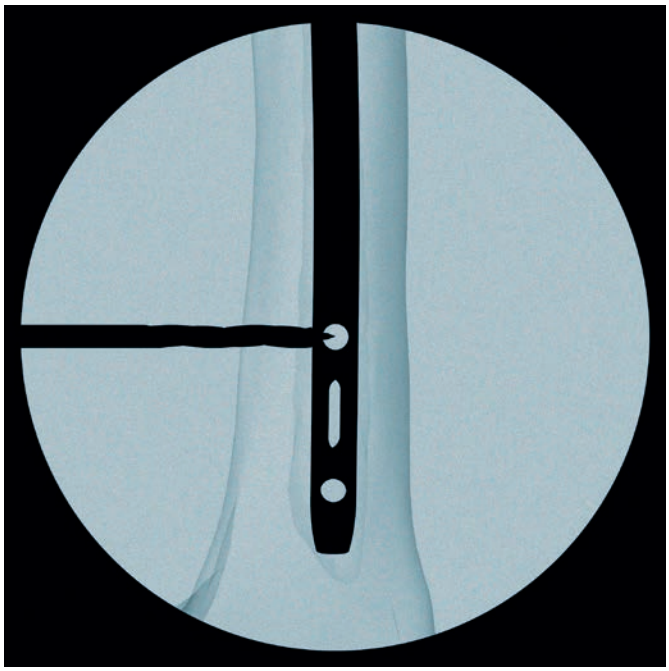
**Technique Tip:** For greater drill bit control, stop the powered insertion of the drill bit as soon as the first cortex has been perforated. Manually guide the drill bit through the nail before drilling the far cortex.



**Alternative instrument**

| Instrument | |
|---|---|
| 03.010.104 | Drill Bit ∅ 4.2 mm, calibrated, length 145 mm, 3-flute, for Quick Coupling |

- Standard freehand locking technique can be performed without the radiolucent drive.



## 4

**Determine length of the locking screw**

| Instrument | |
|---|---|
| 03.010.072 | Depth Gauge for Locking Screws, measuring range up to 110 mm |

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

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

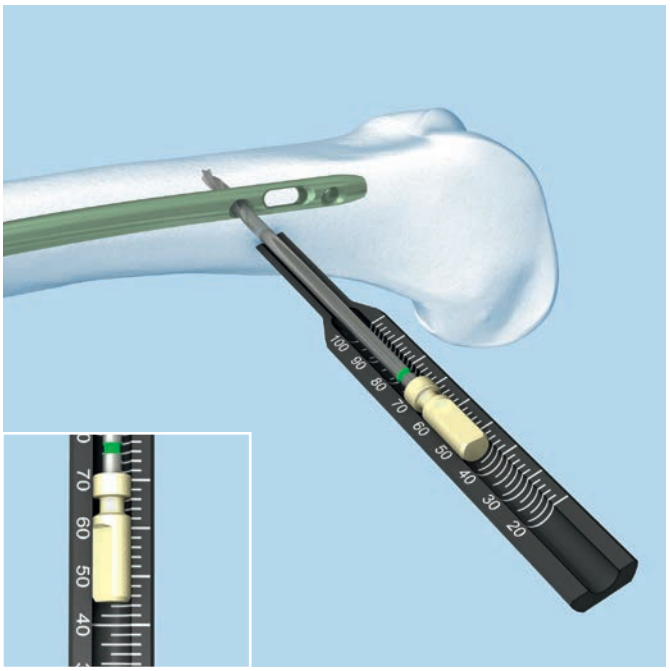
**Alternative instrument**

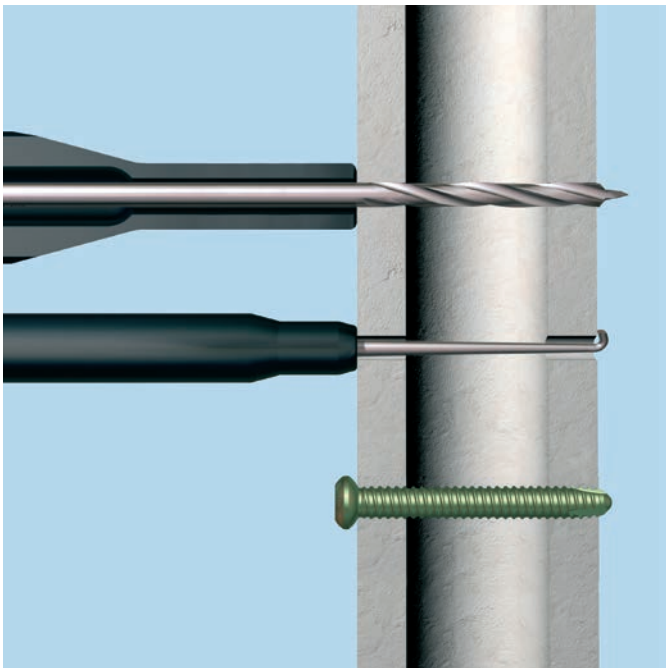
| Instrument | |
|---|---|
| 03.010.106 | Direct Measuring Device for Drill Bits of length 145 mm, for Nos. 03.010.100 to 03.010.105 |

Stop drilling immediately after distal cortex is 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 over the drill bit. Read the value on the measuring device at the end of the drill bit.

**Precaution:** The position of the drill bit beyond the far cortex as well as the correct position of the measuring device is important in order to choose the optimal locking screw length.



## 5
### Insert locking screw

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

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

Verify the screw length under image intensifier. The screw tip should protrude about 2 mm outside of the medial 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.

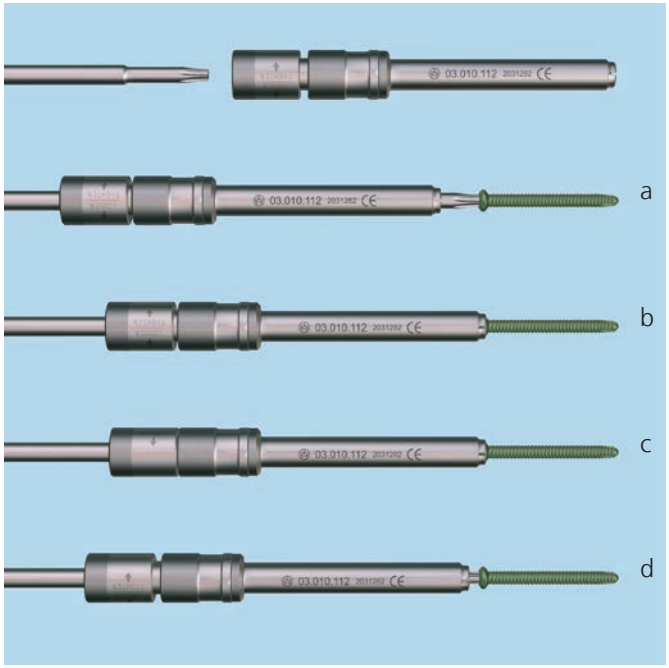
b. Push the holding sleeve in the direction of the locking screw. The sleeve now holds the locking screw.

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.

**Technique Tip:** In the event of a diastasis, the backstroke technique can be used after insertion of the second distal locking screw.



## 6
### Dynamic locking (distal)

For immediate **primary dynamisation**, insert only one middle locking screw through the dynamic slot.

For **secondary dynamisation** use the dynamic and one static locking positions (depending on fracture type).
The static screw need to be removed to allow dynamisation.
Reconfirm reduction of the distal fragment.

**Precaution:** If the distance from the tip of the nail to the cortex is less than 9 mm, distal dynamisation should not be performed.

# Insert End Cap

**Insert end cap**

| Instruments | |
|---|---|
| 03.010.110 | Screwdriver Stardrive, T40, cannulated, length 300 mm |
| 356.717 | Guide Wire ∅ 2.8 mm, length 460 mm, with Hook |
| 357.399 | Guide Wire ∅ 3.2 mm, length 400 mm |

The end caps for the Expert A2FN are available in extension lengths from 0 to 20 mm as shown in the table.

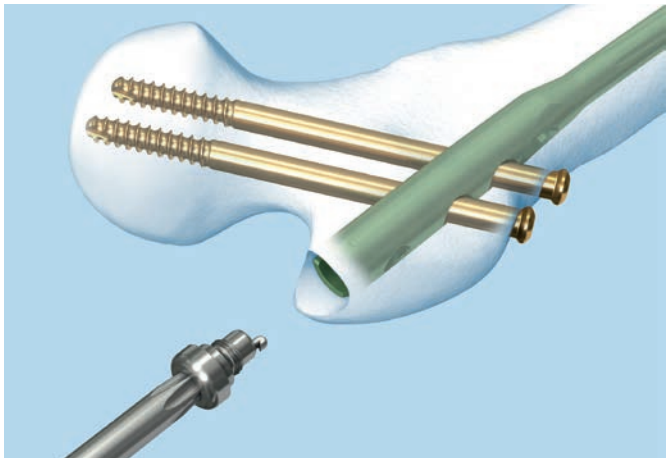
| Nail diameter | End Cap extension: | 0 mm | 5 mm | 10 mm | 15 mm | 20 mm |
|---|---|---|---|---|---|---|
| ∅ 9–14 mm | (grey) | 04.009.000 | 04.009.001 | 04.009.002 | 04.009.003 | 04.009.004 |

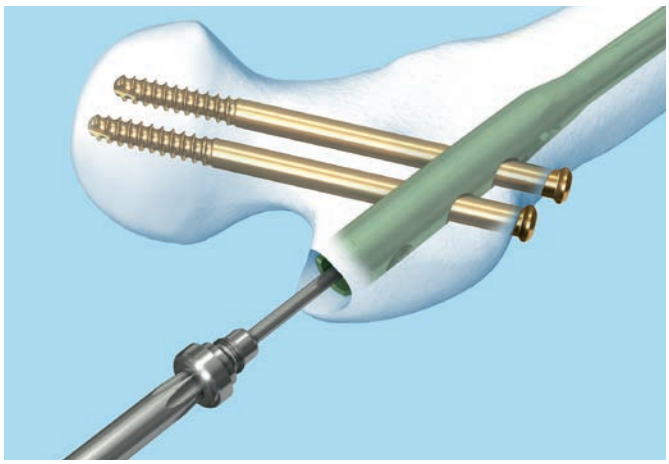
**Technique Tip:** End caps fulfill two functions: they prevent bone ingrowth into the nail; and they extend the nail height if it is overinserted.

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

The end caps are cannulated to enable the insertion over a guide wire.

Insert the hook of the guide wire with hook through the selected end cap. Now guide the cannulated screwdriver Stardrive T40 over the guide wire to the end cap. The end cap is secured as soon as this connection is made. Engage the end cap with the cannulated 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 align with that of the nail.
Then turn the end cap clockwise to thread it into the nail.





**Alternative:** Instead of the guide wire with hook a guide wire ∅ 3.2 mm can be used. Follow the steps above to secure the end cap

Remove the screwdriver and the guide wire.

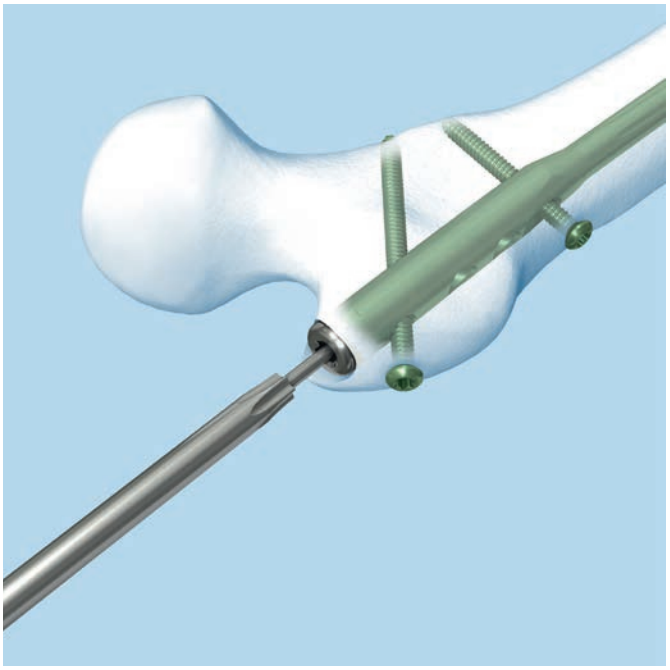
# Implant Removal

Implant removal is an optional procedure.

## 1
**Remove end cap**

| Instruments | |
|---|---|
| 03.010.110 | Screwdriver Stardrive, T40, cannulated, length 300 mm |
| 357.399 | Guide Wire ∅ 3.2 mm, length 400 mm |

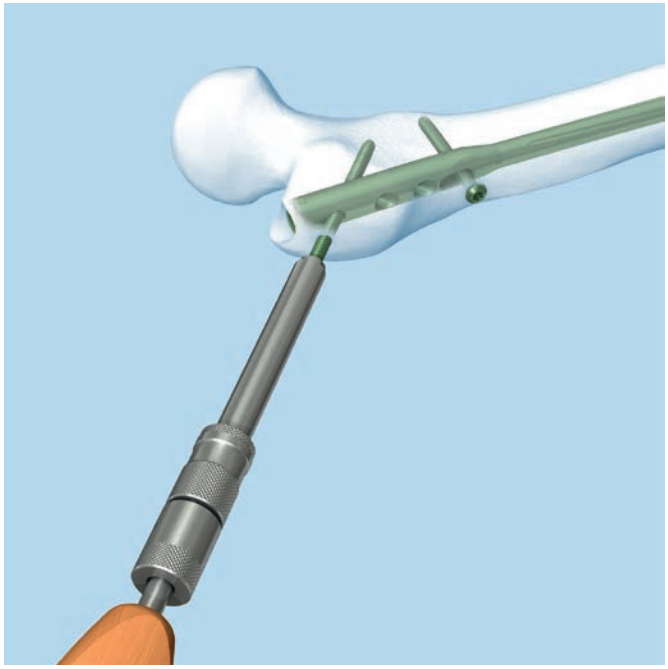
Clear the Stardrive socket of the end cap and the locking implants from any tissue ingrowth. Remove the end cap with the cannulated screwdriver Stardrive T40. A guide wire can be inserted to align the screwdriver into the cannulated end cap.



## 2
**Remove locking screws**

| Instruments | |
|---|---|
| 03.010.362 | Screwdriver Stardrive, T25, length 275 mm |
| 03.010.112 | Holding Sleeve, with Locking Device |

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



## 3
**Remove hip screws**

| Instruments | |
|---|---|
| 03.010.371 | Holding Sleeve, long, length 245 mm, for No. 03.010.363 |
| 03.010.363 | Screwdriver Stardrive, T25, length 480 mm, for Hip Screws |
| 03.010.350 | Aiming Arm for Expert A2FN |
| 03.010.351 | Insertion Handle for Expert A2FN |

Remove all hip screws using the screwdriver Stardrive T25 480 mm and the holding sleeve.

**Technique Tip:** The holding sleeve can be guided via aiming arm and insertion handle (analog to the insertion of hip screws Page 35).

**Note:** The springs must be removed from the aiming arm before using the holding sleeve.

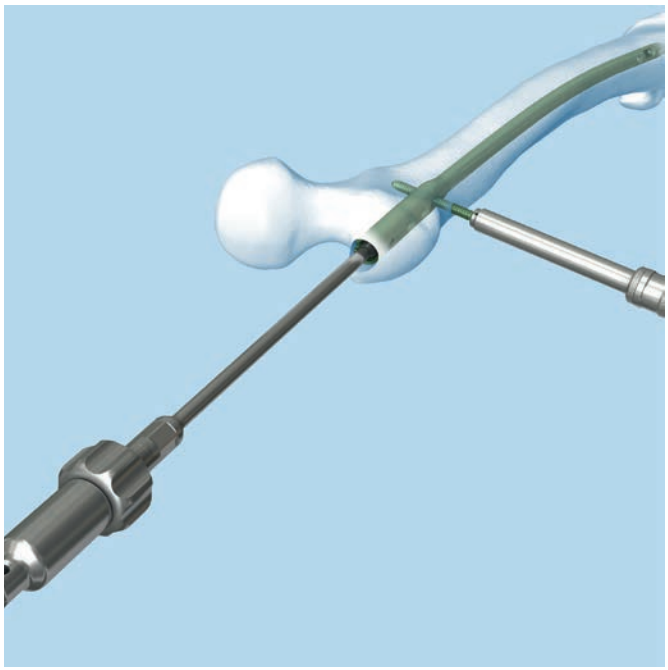
## 4
**Remove nail**

| Instruments | |
|---|---|
| 03.010.373 | Extraction Screw, for Expert A2FN |
| 03.010.170 | Hammer Guide |
| 03.010.107 | Screwdriver Stardrive, T25, length 330 mm |
| 03.010.364 | Combined Hammer 400 g, for No. 03.010.170 |

**Technique Tip:** Before removing the final locking screw, attach the extraction screw to the nail and tighten to prevent rotation or displacement of the nail.

Connect the extraction screw to the nail.

**Technique Tips:**
- The extraction screw must be in line with the proximal end of the nail to allow insertion. Ensure that the position of the leg and the incision point allows for insertion of the removal screw in line with the proximal end of the nail.
- In case of difficulties when inserting the extraction screw, check the connection thread of the nail for bony ingrowth and remove.
- Alternatively, the extraction hook can be used to remove the nail (see pages 53-56).



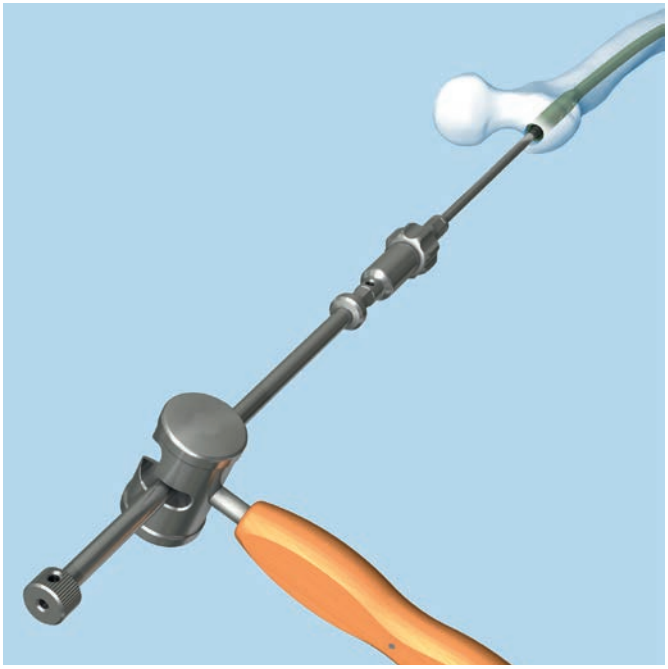
Attach the hammer guide to the extraction screw.

Remove the remaining locking screw with the screwdriver Stardrive T25.

Attach the hammer to the hammer guide as shown in the picture below.

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

**Note:** The nail will rotate about 90° during the extraction.



**Alternative Technique – Extraction Hook**

**For removal of broken nail**

| **Instruments** | |
|---|---|
| 355.399* | Extraction Hook ∅ 3.7 mm, for Cannulated Nails |
| 393.100 | Universal Chuck with T-Handle |
| or | |
| 393.105 | Universal Chuck, small, with T-Handle |

Begin with Steps 1 and 2 of Implant Removal, then remove the extraction screw from the nail.

* Available nonsterile or sterile-packed.
Add "S" to catalog number to order sterile product.

**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.

**Technique Tip:** 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.

**Technique Tip:** 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.

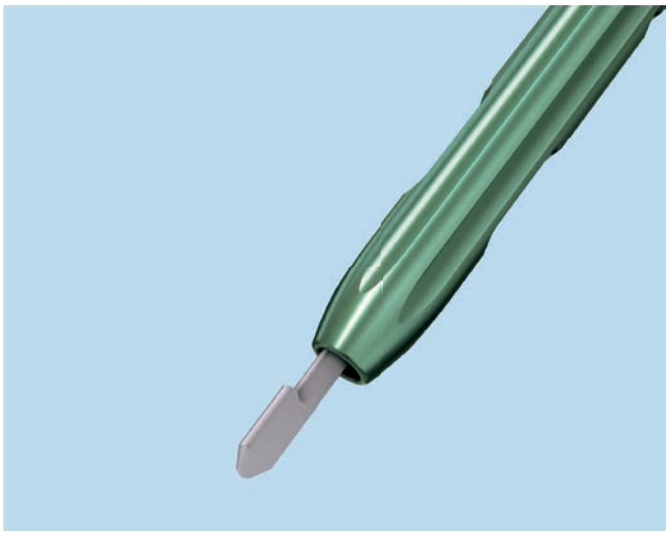
## 3
**Align extraction hook**

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.

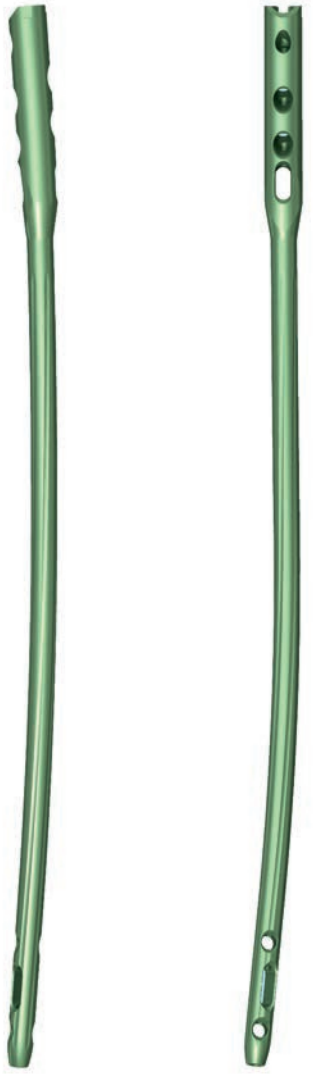
**Technique Tip:** Keep the patient's limb restrained to increase the efficiency of the extraction force.

# Nails

**Expert A2FN**
Anatomical design with left and right nails.

**Material:** Ti-6Al-7Nb (TAN)
**Diameters:** 9 – 14 mm (1 mm increments)
**Colors:** 9 – 14 mm (light green) use locking screws
∅ 5.0 mm (light green)
**Lengths:** 280 – 460 mm (20 mm increments)
**Cannulation:** All nails are cannulated.

The nails are available sterile packed only.



**Expert A2FN, cannulated, Titanium Alloy (TAN), light green, sterile**

| Length mm | ∅ 9 mm, right* light green | ∅ 9 mm, left* light green |
|---|---|---|
| 280 | 04.009.236S | 04.009.237S |
| 300 | 04.009.240S | 04.009.241S |
| 320 | 04.009.244S | 04.009.245S |
| 340 | 04.009.248S | 04.009.249S |
| 360 | 04.009.252S | 04.009.253S |
| 380 | 04.009.256S | 04.009.257S |
| 400 | 04.009.260S | 04.009.261S |
| 420 | 04.009.264S | 04.009.265S |
| 440 | 04.009.268S | 04.009.269S |
| 460 | 04.009.272S | 04.009.273S |

* Sterile packed

| Length mm | ∅ 10 mm, right* light green | ∅ 10 mm, left* light green |
|---|---|---|
| 280 | 04.009.336S | 04.009.337S |
| 300 | 04.009.340S | 04.009.341S |
| 320 | 04.009.344S | 04.009.345S |
| 340 | 04.009.348S | 04.009.349S |
| 360 | 04.009.352S | 04.009.353S |
| 380 | 04.009.356S | 04.009.357S |
| 400 | 04.009.360S | 04.009.361S |
| 420 | 04.009.364S | 04.009.365S |
| 440 | 04.009.368S | 04.009.369S |
| 460 | 04.009.372S | 04.009.373S |

| Length mm | ∅ 11 mm, right* light green | ∅ 11 mm, left* light green |
|---|---|---|
| 300 | 04.009.440S | 04.009.441S |
| 320 | 04.009.444S | 04.009.445S |
| 340 | 04.009.448S | 04.009.449S |
| 360 | 04.009.452S | 04.009.453S |
| 380 | 04.009.456S | 04.009.457S |
| 400 | 04.009.460S | 04.009.461S |
| 420 | 04.009.464S | 04.009.465S |
| 440 | 04.009.468S | 04.009.469S |
| 460 | 04.009.472S | 04.009.473S |

* Sterile packed

**Expert A2FN**

| Length mm | ∅ 12 mm, right* light green | ∅ 12 mm, left* light green |
|---|---|---|
| 300 | 04.009.540S | 04.009.541S |
| 320 | 04.009.544S | 04.009.545S |
| 340 | 04.009.548S | 04.009.549S |
| 360 | 04.009.552S | 04.009.553S |
| 380 | 04.009.556S | 04.009.557S |
| 400 | 04.009.560S | 04.009.561S |
| 420 | 04.009.564S | 04.009.565S |
| 440 | 04.009.568S | 04.009.569S |
| 460 | 04.009.572S | 04.009.573S |

| Length mm | ∅ 13 mm, right* light green | ∅ 13 mm, left* Light green |
|---|---|---|
| 300 | 04.009.640S | 04.009.641S |
| 320 | 04.009.644S | 04.009.645S |
| 340 | 04.009.648S | 04.009.649S |
| 360 | 04.009.652S | 04.009.653S |
| 380 | 04.009.656S | 04.009.657S |
| 400 | 04.009.660S | 04.009.661S |
| 420 | 04.009.664S | 04.009.665S |
| 440 | 04.009.668S | 04.009.669S |
| 460 | 04.009.672S | 04.009.673S |

| Length mm | ∅ 14 mm, right* light green | ∅ 14 mm, left* Light green |
|---|---|---|
| 300 | 04.009.740S | 04.009.741S |
| 320 | 04.009.744S | 04.009.745S |
| 340 | 04.009.748S | 04.009.749S |
| 360 | 04.009.752S | 04.009.753S |
| 380 | 04.009.756S | 04.009.757S |
| 400 | 04.009.760S | 04.009.761S |
| 420 | 04.009.764S | 04.009.765S |
| 440 | 04.009.768S | 04.009.769S |
| 460 | 04.009.772S | 04.009.773S |

* Sterile packed
The locking screws are also available nonsterile. In the Vario Case for the Expert Femoral Nails Locking Implants (68.003.010), space is provided for two locking screws ∅ 5.0 mm and two hip screws ∅ 6.5 mm per length (requires optional module 685.132).

# Locking Implants

**Locking Screw ∅ 5.0 mm**
Used for standard proximal locking and for distal locking (nails ∅ 9 – 14 mm)

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

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

* Sterile packed
The locking screws are also available nonsterile. In the Vario Case for the Expert Femoral Nails Locking Implants (68.003.010), space is provided for two locking screws ∅ 5.0 mm and two hip screws ∅ 6.5 mm per length (requires optional module 685.132).

**Hip Screw ∅ 6.5 mm**
Used for recon locking (all nails)

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

**Drill:** ∅ 6.5/4.5 mm

**Color:** Gold

**Lengths:** 60 – 130 mm (5 mm increments)

**Design:** 6.5 mm shaft diameter/
4.5 mm core diameter
Stardrive T25 recess (self-holding)
Thread length 30 mm
Self-tapping, blunt tip

| Length mm | ∅ 6.5 mm* gold |
|---|---|
| 60 | 04.003.022S |
| 65 | 04.003.023S |
| 70 | 04.003.024S |
| 75 | 04.003.025S |
| 80 | 04.003.026S |
| 85 | 04.003.027S |
| 90 | 04.003.028S |
| 95 | 04.003.029S |

| Length mm | ∅ 6.5 mm* gold |
|---|---|
| 100 | 04.003.030S |
| 105 | 04.003.031S |
| 110 | 04.003.032S |
| 115 | 04.003.033S |
| 120 | 04.003.034S |
| 125 | 04.003.035S |
| 130 | 04.003.036S |

* Sterile packed
The locking screws are also available nonsterile. In the Vario Case for the Expert Femoral Nails Locking Implants (68.003.010), space is provided for two locking screws ∅ 5.0 mm and two hip screws ∅ 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:** 13 mm for nails ∅ 9 – 14 mm

**Lengths:** 0 mm – sits flush with end of nail
5, 10, 15 and 20 mm extensions – extend nail height if nail is overinserted

**Cannulation:** All end caps are cannulated

**Design:** Stardrive T40 recess (self-holding)

| Extensions mm | ∅ 13 mm* |
|---|---|
| 0 | 04.009.000S |
| 5 | 04.009.001S |
| 10 | 04.009.002S |
| 15 | 04.009.003S |
| 20 | 04.009.004S |

* Sterile packed

# Standard Instruments

| | | |
|---|---|---|
| 321.160 | Combination Wrench ∅ 11.0 mm |  |
| 321.170 | Pin Wrench ∅ 4.5 mm, length 120 mm |  |
| 356.717 | Guide Wire ∅ 2.8 mm,<br>length 460 mm, with Hook |  |
| 357.398 | Shaft, hexagonal, ∅ 8.0 mm, cannulated,<br>short, length 125 mm |  |
| 357.399 | Guide Wire ∅ 3.2 mm, length 400 mm |  |
| 393.105 | Universal Chuck with T-Handle |  |
| 03.010.020 | Radiographic Ruler for Expert Femoral<br>Nails |  |
| 03.010.023 | Radiographic Ruler for Medullary Nails,<br>length 365 mm |  |
| 03.010.047 | Connector, for Insertion Handle |  |
| 03.010.061 | Drill Bit ∅ 4.2 mm, calibrated,<br>length 340 mm, 3-flute, for Quick<br>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 ∅ 4.2 mm, for No. 03.010.065 |  |
| 03.010.072 | Depth Gauge for Locking Screws, measuring range up to 110 mm, for No. 03.010.063 |  |
| 03.010.079 | Fixation Sleeve, for No. 03.010.368 |  |
| 03.010.085 | Direct Measuring Device for Guide Wires ∅ 3.2 mm, length 400 mm |  |
| 03.010.092 | Screwdriver, hexagonal with spherical head ∅ 8.0 mm |  |
| 03.010.101 | Drill Bit ∅ 4.2 mm, calibrated, length 145 mm, 3-flute, with Coupling for RDL |  |
| 03.010.106 | Direct Measuring Device for Drill Bits of length 145 mm, for Nos. 03.010.100 to 03.010.105 |  |
| 03.010.107 | Screwdriver Stardrive, T25, length 330 mm |  |
| 03.010.110 | Screwdriver Stardrive, T40, cannulated, length 300 mm |  |
| 03.010.112 | Holding Sleeve, with Locking Device |  |
| 03.010.170 | Hammer Guide |  |

| | | |
|---|---|---|
| 03.010.350 | Aiming Arm for Expert A2FN |  |
| 03.010.351 | Insertion Handle for Expert A2FN |  |
| 03.010.353 | Protection Sleeve 11.5/8.5, for Expert A2FN, yellow |  |
| 03.010.354 | Drill Sleeve 8.5/3.2, for No. 03.010.353, yellow |  |
| 03.010.355 | Trocar ∅ 3.2 mm, for No. 03.010.354, yellow |  |
| 03.010.356 | Connection Screw, cannulated, for Expert A2FN, for No. 03.010.351 |  |
| 03.010.357 | Protection Sleeve 17.0, for No. 03.010.367 |  |
| 03.010.358 | Multihole Drill Sleeve 17.0/3.2, for No. 03.010.357 |  |

| | | |
|---|---|---|
| 03.010.362 | Screwdriver Stardrive, T25, length 275 mm |  |
| 03.010.363 | Screwdriver Stardrive, T25, length 480 mm, for Hip Screws |  |
| 03.010.364 | Combined Hammer 500 gr., for No. 03.010.170 |  |
| 03.010.365 | Awl ∅ 16.5/3.2 mm, cannulated |  |
| 03.010.367 | Opening Drill Bit ∅ 14.0 mm, cannulated, flexible, length 206 mm, Stainless Steel |  |
| 03.010.368 | Reamer ∅ 4.5/6.5 mm, length 450 mm, for Hip Screws Expert A2FN |  |
| 03.010.369 | Reduction Instrument for Medullary Nails |  |
| 03.010.371 | Holding Sleeve, long, length 245 mm, for No. 03.010.363 |  |
| 03.010.372 | Compression Screw, for Expert A2FN, for 03.010.356 |  |

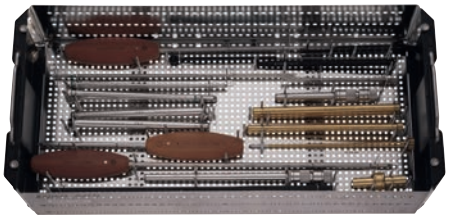
| | | |
|---|---|---|
| 03.010.373 | Extraction Screw, for Expert A2FN |  |

**Optional Instruments**

| | | |
|---|---|---|
| 319.970 | Screw Forceps self-hold, length 85 mm |  |
| 03.010.093 | Rod Pusher for Reaming Rod with Hexagonal Screwdriver ∅ 8.0 mm |  |
| 03.010.104 | Drill Bit ∅ 4.2 mm, calibrated, length 145 mm, 3-flute, for Quick Coupling |  |
| 355.399 | Extraction Hook ∅ 3.7 mm, for Cannulated Nails |  |
| 393.100 | Universal Chuck with T-Handle |  |

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

# Vario Case

| | | |
|---|---|---|
| 68.010.001 | Vario Case for Expert A2FN, with lid, with out content |  |

# Bibliography

Fernández Dell'Oca AA (2002) The principle of helical implants – Unusual ideas worth considering. Injury, Vol. 33, Suppl. 1, S-A-1-27

Dora C, Leunig M, Beck M, Rothenfluh D and Ganz R (2001) Entry Point Soft Tissue Damage in Antegrade Femoral Nailing: A Cadaver Study. Journal of Orthopaedic Trauma, Vol. 15, No. 7: 488–493

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 thermo regulation 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.

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