

# PFNA-II. Proximal Femoral Nail Antirotation.

## Surgical Technique



This publication is not intended for  
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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.

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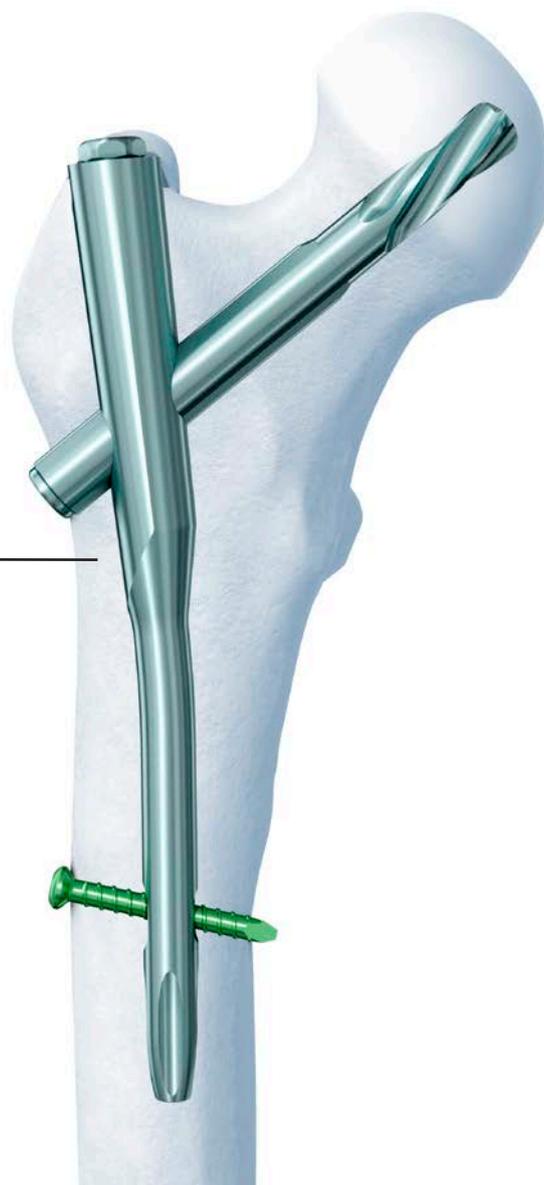
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# PFNA-II. Proximal Femoral Nail Antirotation II.

## PFNA-II Nail

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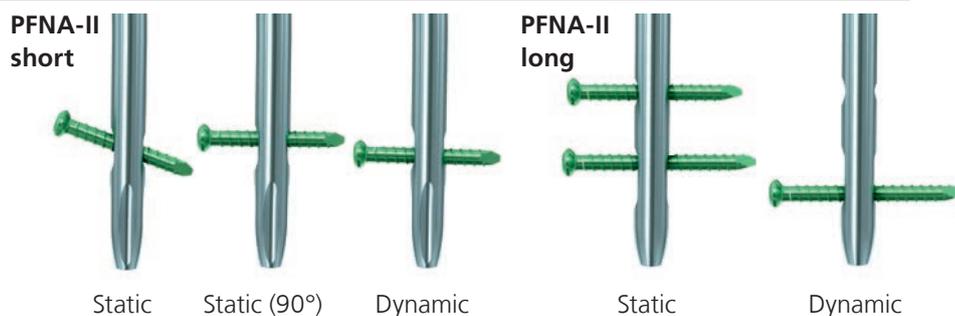
**The PFNA-II has a medial-lateral angle of 5°**

This allows insertion at the tip of the greater trochanter.

## Several distal locking options

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Static or dynamic locking can be performed via the aiming arm with PFNA-II standard, small and xs. The PFNA-II long additionally allows for secondary dynamization.



## PFNA-II Nail Product range

The PFNA-II is available in 4 sizes



PFNA-II xs, length 170 mm



PFNA-II small, length 200 mm



PFNA-II, length 240 mm

PFNA-II long, length 260 – 340 mm  
(with 20 mm increments), length 340 – 420 mm  
(with 40 mm increments, only  $\varnothing$  10 mm nails),  
bending radius 1500 mm



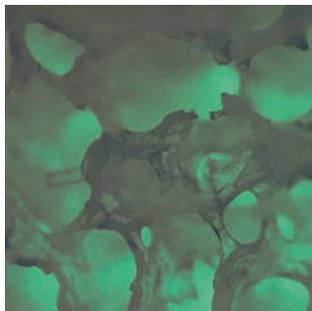
# PFNA-II. Proximal Femoral Nail Antirotation.

## PFNA-II Blade

### Rotational and angular stability achieved with one single element

#### Compaction of cancellous bone

Inserting the PFNA-II blade compacts the cancellous bone providing additional anchoring, which is especially important in osteoporotic bone.<sup>1</sup>



Bone structure before insertion of the PFNA-II blade.



Bone structure after PFNA-II blade insertion – cancellous bone is compacted providing additional anchoring to the PFNA-II blade.

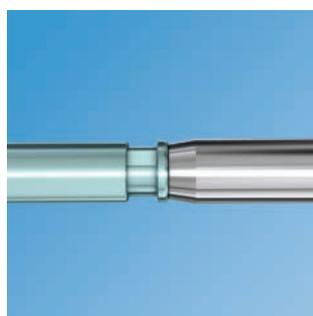
### Large surface and increasing core diameter for maximum compaction and optimal hold in bone

Increased stability caused by bone compaction around the PFNA-II blade has been biomechanically proven to retard rotation and varus collapse. Biomechanical tests have demonstrated that the PFNA-II blade had a significantly higher cut-out resistance in comparison with commonly-used screw systems.<sup>2</sup>

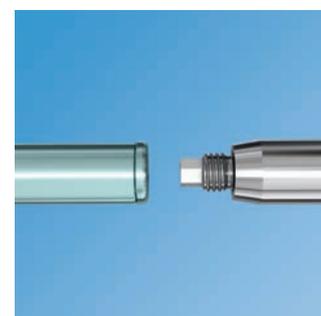


### Lateral locking of the PFNA-II blade

- All surgical steps required to insert the PFNA-II blade are performed through lateral incision
- The PFNA-II blade is automatically locked to prevent rotation of the blade and femoral head



PFNA-II blade unlocked



PFNA-II blade locked

<sup>1</sup> Amir A. Al-Munajjed, Joachim Hammer, Edgar Mayr, Michael Nerlich and Andreas Lenich. Biomechanical characterization of osteosyntheses for proximal fractures: helical blade versus screw. Medicine Meets Engineering. 2008

<sup>2</sup> Data on file.

# AO Principles

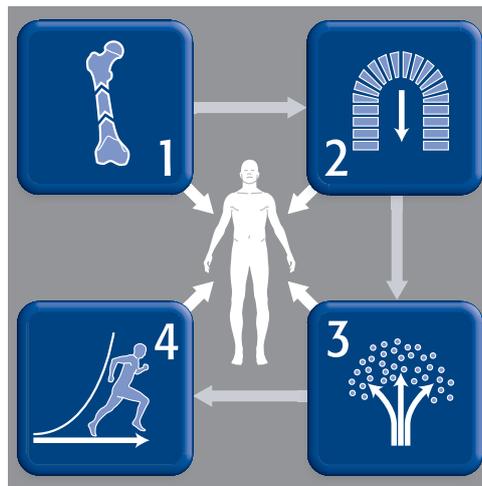
In 1958, the AO formulated four basic principles, which have become the guidelines for internal fixation<sup>1,2</sup>.

## 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.

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

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

# Indications and Contraindications

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## PFNA-II short (Length 170 mm – 240 mm)

### Indications

- Pertrochanteric fractures (31-A1 and 31-A2)
- Intertrochanteric fractures (31-A3)
- High subtrochanteric fractures (32-A1)

### Contraindications

- Low subtrochanteric fractures
- Femoral shaft fractures
- Isolated or combined medial femoral neck fractures



---

## PFNA-II long (Length 260 mm – 420 mm)

### Indications

- Low and extended subtrochanteric fractures
- Ipsilateral trochanteric fractures
- Combination fractures (in the proximal femur)
- Pathological fractures

### Contraindications

- Isolated or combined medial femoral neck fractures



---

**Note:** ASLS, the Angular Stable Locking System, is indicated in cases where increased stability is needed in fractures closer to the metaphyseal area or in poor quality bone. For more details regarding the intramedullary fixator principle, please consult the ASLS surgical technique (DSEM/TRM/0115/0284) and concept flyer (036.001.017).

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# Clinical Cases



94 years, female 31-A1.1



0 days post-op



14 weeks post-op



11 months post-op



93 years, female, 31-A3.3



4 days post-op



4 weeks post-op



5 months post-op

# Preoperative Planning

Use the preoperative planner template for the PFNA-II to estimate the CCD angle, nail diameter and length.

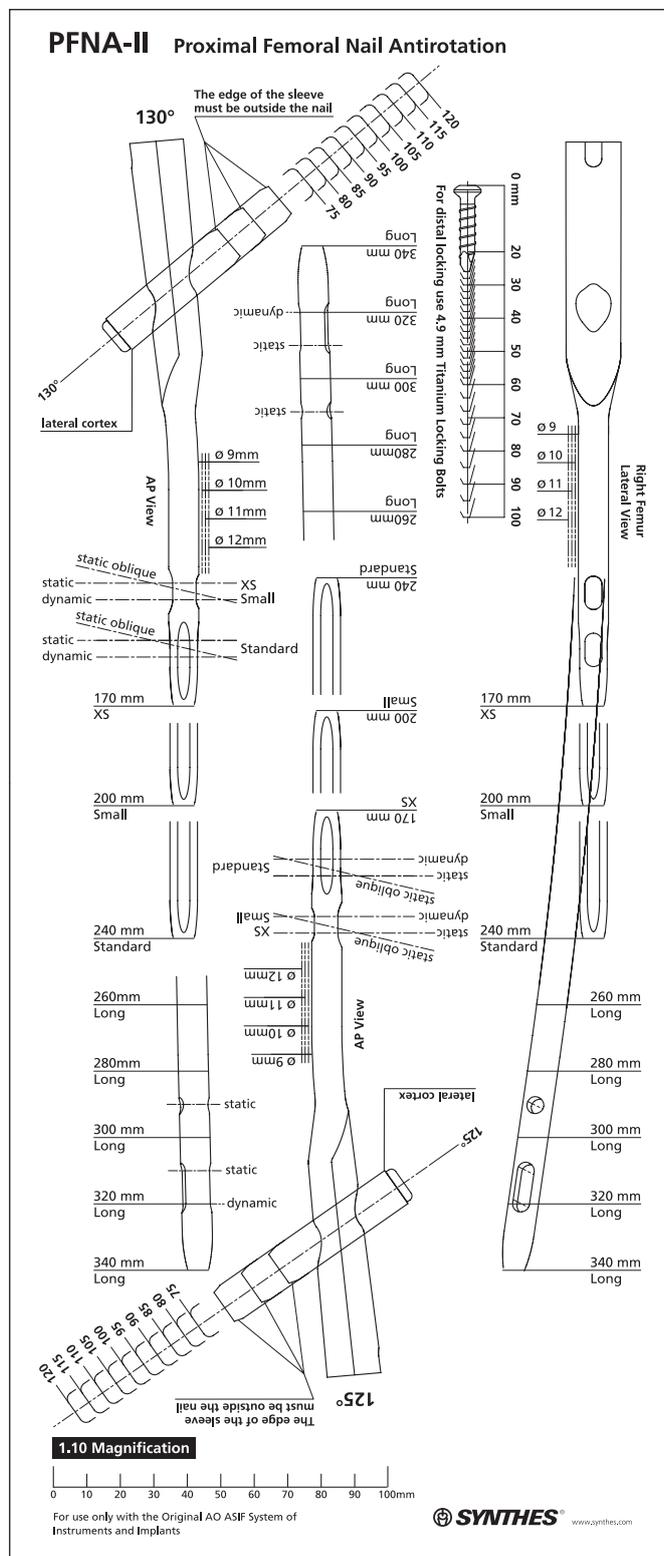
- Take a preoperative AP radiography of the unaffected leg. Determine the CCD angle using a goniometer or the preoperative planning template.

To estimate the CCD angle, place the template on the AP x-ray of the uninjured femur and determine the CCD angle.

To estimate the nail diameter, place the template on the AP 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.

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



## Patient Positioning

Position the patient supine on an extension table or a radiolucent operating table. Abduct the unaffected leg as far as possible and place it on a leg support, so that it allows free fluoroscopic examinations. This should be tested preoperatively.

For unimpeded access to the medullary cavity, abduct the upper body by about 10–15° to the unaffected side (or adduct the affected leg by 10–15°).



## 1

### Reduce fracture

- Perform closed reduction of the fracture under image intensifier control. If the result is not satisfactory, perform open reduction.

---

**Note:** Exact anatomical reduction and secure fixation of the patient to the operating table are essential for easy handling and a good surgical result.

---

#### Precautions:

- Instruments and screws may have sharp edges or moving joints that may pinch or tear user's glove or skin.
  - Handle devices with care and dispose worn bone cutting instruments in an approved sharps container.
-

## 2

### Confirm nail length and diameter

---

#### Instrument

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|         |                             |
|---------|-----------------------------|
| 309.602 | Radiographic Ruler for PFNA |
|---------|-----------------------------|

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

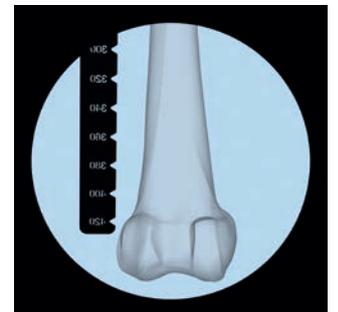
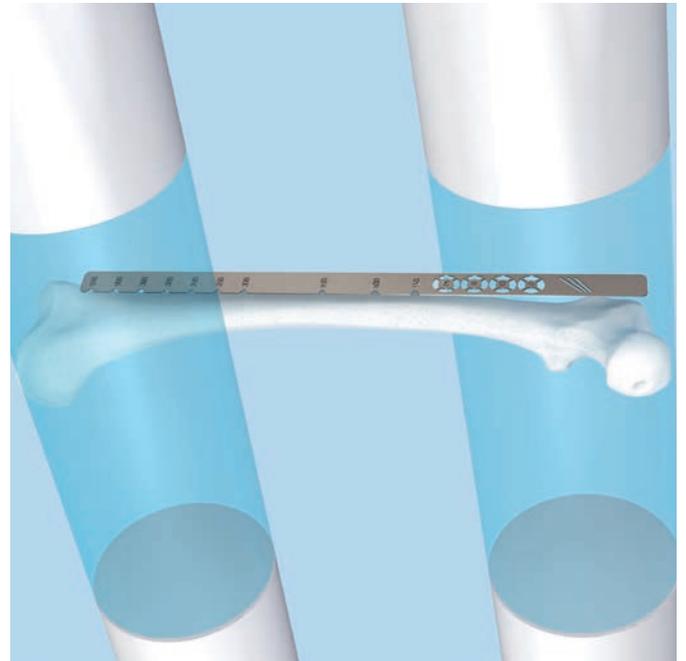
- 1 Position the C-arm for an AP view of the proximal femur. With long forceps, hold the ruler alongside the lateral thigh, parallel to and at the same level as the femur. Adjust the ruler until the proximal end is at the desired nail insertion position. Mark the skin at the proximal end of the ruler.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

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

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

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### Alternatives

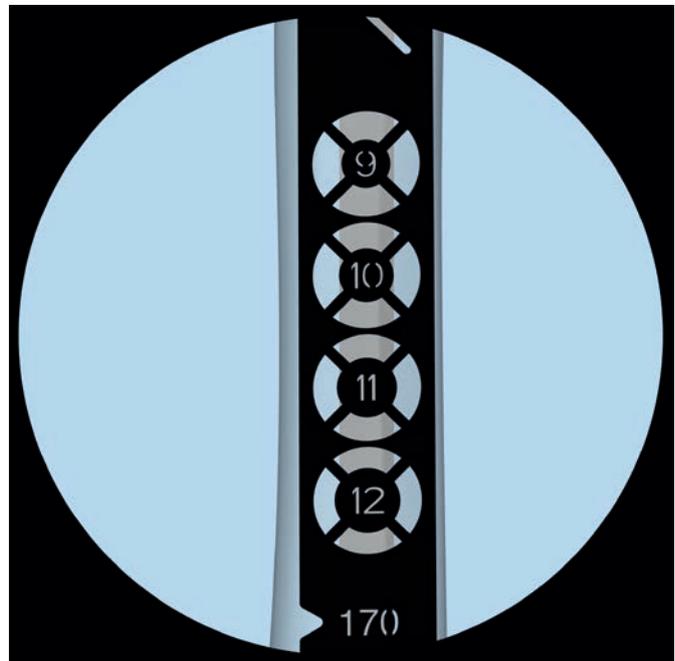
Determine the nail length by the procedure above on the uninjured leg before draping (unsterile) or compare the length of two identical SynReam reaming rods  $\varnothing$  2.5 mm (352.032) or use the depth gauge (351.717 and 351.719) in combination with the SynReam reaming rod  $\varnothing$  2.5 mm, length 950 mm (352.032) before inserting the PFNA-II nail.

Place the Radiographic Ruler for PFNA (309.602) perpendicular to the femur axis so that the diameter gauge is located over the isthmus. Select the nail diameter with which the intramedullary canal-to-cortex transition is still visible on both sides of the diameter gauge.

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.

Always choose the largest diameter nail that fits into the intramedullary canal ( $\varnothing$  9 mm nails should only be used for an intramedullary canal smaller than 11 mm).

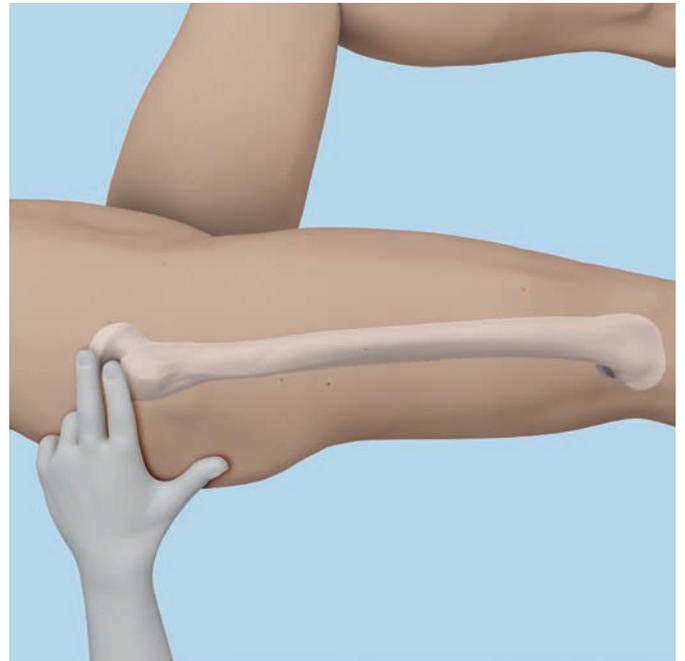


### 3

#### Approach

Palpate the trochanter major.

Make a 5 cm incision proximal from the tip of the greater trochanter. Make a parallel incision of the fasciae of the gluteus medius and split the gluteus medius in line with the fibers.

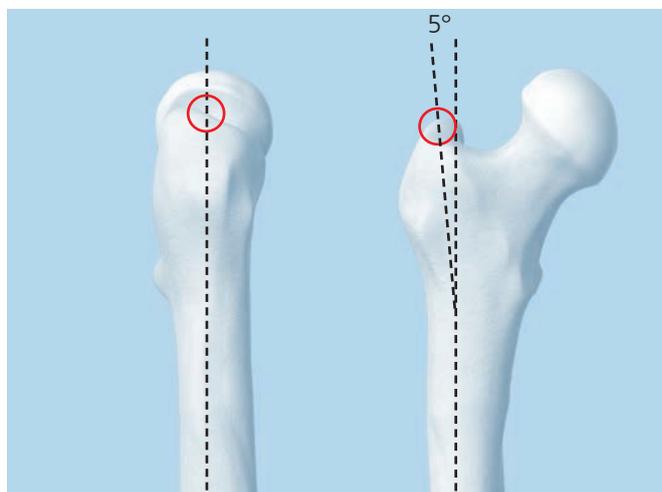


# Open Femur

## 1

### Determine entry point

- In AP view, the PFNA-II entry point is on the tip or slightly lateral to the tip of the greater trochanter in the curved extension of the medullary cavity, as the ML angle of the PFNA-II is 5°.
- In lateral view the entry point is in line with the axis of the intramedullary canal.



## 2

### Insert guide wire

#### Instruments

356.830 Guide Wire Ø 3.2 mm, for PFNA Blade

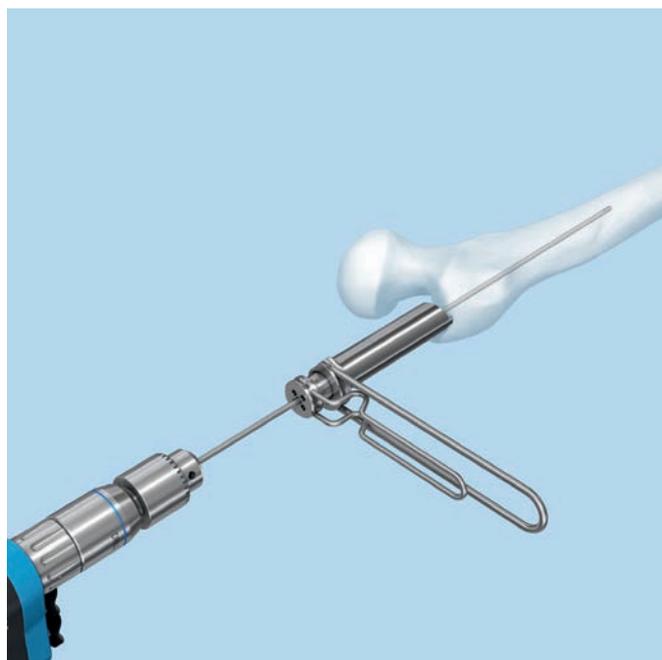
393.100 Universal Chuck with T-Handle

03.023.002 Protection Sleeve 20.0/17.0, for PFNA-II

03.023.006 Drill Sleeve, for PFNA-II

Secure the guide wire in the power tool. Alternatively, the universal chuck with T-handle can be used to insert the guide wire manually.

Position both the protection sleeve and the drill sleeve at the insertion point. Insert the guide wire through the protection sleeve and the drill sleeve. Remove the power tool and the drill sleeve.



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To correct the placement of the guide wire, leave the first guide wire in place and insert a second guide wire through one of the multiple holes of the drill sleeve.

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**Note:** The correct entry point and angle are essential for a successful result. To ensure the correct position of the guide wire, position a guide wire ventrally on the femur and check under image intensifier control.

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### Alternative

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#### Instruments

|         |  |
|---------|--|
| 356.830 | Guide Wire Ø 3.2 mm, for PFNA Blade          |
| 393.100 | Universal Chuck with T-Handle                |
| 357.001 | Protection Sleeve 20.0/17.0, for No. 357.005 |
| 309.603 | Drill Sleeve 17.0/3.2, for No. 357.001       |

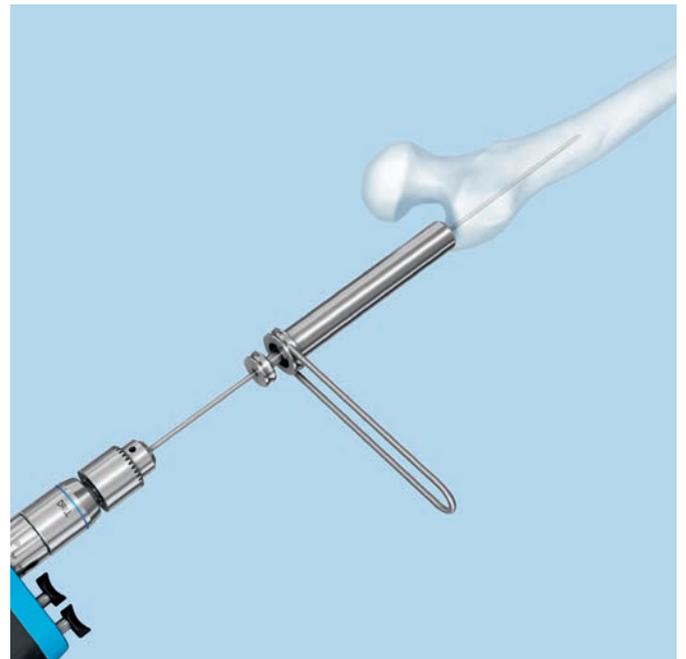
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**Note:** Use drill bit 309.600 only together with protection sleeve 357.001.

---

Secure the guide wire in the power tool. Alternatively, the universal chuck with T-handle can be used to insert the guide wire manually.

Position both protection sleeve and drill sleeve at the insertion point. Insert the guide wire through the protection sleeve and the drill sleeve. Remove the power tool and the drill sleeve.



### 3

#### Open femur with flexible drill bit

##### Instruments

|            |  |
|------------|--|
| 03.023.010 | Drill Bit Ø 16.5 mm, cannulated, flexible, for PFNA-II |
| 03.023.002 | Protection Sleeve 20.0/17.0, for PFNA-II               |
| 393.100    | Universal Chuck with T-Handle                          |

Guide the flexible cannulated drill bit through the protection sleeve over the guide wire and drill the cavity for the proximal part of the PFNA-II nail with the power tool. Remove the drill bit, the protection sleeve and the guide wire.

**Precaution:** It is recommended to open the femur by using a power tool at high speed or carefully by hand. To prevent dislocating the fracture fragments, avoid lateral movements or excessive compression forces.



#### Alternative: Open femur with awl

##### Instrument

|            |                 |
|------------|-----------------|
| 03.023.003 | Awl for PFNA-II |
|------------|-----------------|

Guide the awl over the guide wire and prepare with bi-directional turns the cavity for the proximal part of the PFNA-II nail. Remove the awl and the guide wire.



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**Alternative: Open femur with drill bit**

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**Instruments**

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|         |   |
|---------|---|
| 309.600 | Drill Bit Ø 17.0 mm, cannulated, for PFNA       |
| 357.001 | Protection Sleeve 20.0/17.0,<br>for No. 357.005 |
| 393.100 | Universal Chuck with T-Handle                   |

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**Note:** Use drill bit 309.600 only together with protection sleeve 357.001.

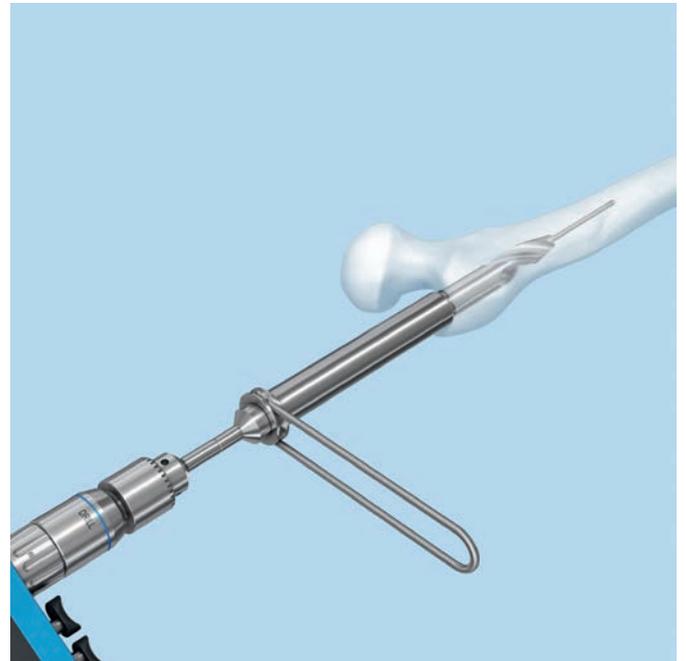
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Guide the drill bit through the protection sleeve over the guide wire and drill as far as the stop on the protection sleeve. Remove the drill bit, the protection sleeve and the guide wire.

---

**Precaution:** It is recommended to open the femur by using a power tool at high speed or carefully by hand. To prevent dislocating the fracture fragments, avoid lateral movements or excessive compression forces.

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**4****Option: Ream medullary canal****Instruments**

|                     |  |
|---------------------|--|
| 189.060/<br>175.500 | SynReam Intramedullary Reaming System                        |
| 351.782             | Holding Forceps for SynReam Reaming Rod $\varnothing$ 2.5 mm |

If necessary, enlarge the femoral canal to the desired diameter using the medullary reamer and the corresponding surgical technique (DSEM/TRM/0614/0103).

- ① Check fracture reduction under image intensifier control.

**Insert reaming rod**

Insert the 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 long PFNA-II.

**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. Remove the reaming rod before locking the intramedullary nail.



# Insert Nail

## 1

### Assemble PFNA-II instruments

---

#### Instruments

|            |  |
|------------|--|
| 03.010.405 | Insertion Handle, radiolucent, for PFNA                                      |
| 357.029    | Connecting Screw, cannulated, for PFNA                                       |
| 03.023.011 | Screwdriver, hexagonal with spherical head $\varnothing$ 10.0 mm, cannulated |

---

Guide the connecting screw through the insertion handle and secure the desired PFNA-II to the insertion handle using the hexagonal screwdriver with spherical head.

---

**Precaution:** Ensure that the connection between PFNA-II and insertion handle is tight (retighten, if necessary) to avoid deviations when inserting the PFNA-II blade through the aiming arm. Do not attach the aiming arm yet.

---



## 2

### Insert PFNA-II

- 1 Use image intensifier control to insert the PFNA-II.

Carefully insert the PFNA-II manually using slight bidirectional turns of the insertion handle as far as possible into the femoral opening. If the PFNA-II cannot be inserted, select a smaller size PFNA-II diameter or ream the medullary cavity to a diameter that is at least 1 mm larger than that of the selected nail.

The correct PFNA-II insertion depth is reached as soon as the projected PFNA-II blade is positioned in the center of the femoral head. A too cranial or too caudal PFNA-II position should be avoided as it can lead to malposition of the PFNA-II blade.

The anteversion can be determined by inserting a guide wire ventral to the femoral neck in the femoral head. In the mediolateral view, place the insertion handle parallel to the guide wire to align the correct rotation of the PFNA-II.

Remove all guide wires.

---

#### Precautions:

- Guide wires are single-use items, do not re-use.
  - Always ensure that the PFNA-II is firmly attached to the insertion handle.
- 



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**Optional instruments**

---

|            |  |
|------------|--|
| 03.010.424 | Connector for Insertion Handle for PFNA                |
| 03.010.124 | Combined Hammer 500 g, can be mounted, for No. 357.117 |
| 357.071    | Hammer Guide, for No. 357.026                          |

---

Attach the connector on the insertion handle and use light hammer blows on the connector to insert the nail.

Remove the connector.

Optionally, instead of the connector, the hammer guide can be threaded into the insertion handle and the hammer can be used as a slide hammer.

Remove the hammer guide.

---

**Precaution:** Use only light blows on the connector for insertion handle. Avoid unnecessary use of force to prevent loss of reduction or an iatrogenic fracture.

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# Proximal Locking

## 1

### Choose aiming arm for PFNA-II blade insertion

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#### Instruments

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|            |                                |
|------------|--------------------------------|
| 03.010.406 | Aiming Arm 125° for PFNA Blade |
| 03.010.407 | Aiming Arm 130° for PFNA Blade |
| 03.010.470 | Plug for Aiming Arm            |

---

Using the hexagonal screwdriver with spherical head, confirm that the connecting screw between the insertion handle and the PFNA-II is sufficiently tightened.

Mount the appropriate aiming arm based on the chosen CCD angle of the PFNA-II and fix it firmly to the insertion handle.

Insert the plug for aiming arm into the locking hole of the nail length that is NOT used in this case.



## 2

### Prepare guide wire insertion

#### Instruments

|         |   |
|---------|---|
| 356.817 | Buttress/Compression Nut, for PFNA Blade          |
| 356.818 | Protection Sleeve 16.0/11.0, for PFNA Blade       |
| 356.819 | Drill Sleeve 11.0/3.2, for PFNA Blade             |
| 356.820 | Trocar $\varnothing$ 3.2 mm, for PFNA Blade, gold |

Screw the buttress nut on the protection sleeve for PFNA blade. Make sure the «lateral side» marking points towards the head of the sleeve. Screw the buttress nut up to the marking on the protection sleeve.

Insert the drill sleeve and the trocar through the protection sleeve.

Advance the entire sleeve assembly for PFNA blade through the aiming arm to the skin until it clicks into the aiming arm. Adjust the position of the buttress nut if necessary.

**Precaution:** Ensure that the sleeve assembly clicks into the aiming arm, otherwise it will not guarantee the exact position of the PFNA-II blade.

Verify nail insertion depth and position for the helical blade/screw. Place a guide wire on the yellow marking of the aiming arm and radiographically check the guide wire position in AP.



### 3

#### Option: Position guide wire with aiming device

##### Instruments

03.010.412 Aiming Device for Guide Wire, for PFNA and TFN, for AP Orientation

03.010.414 Connecting Screw for PFNA, for No. 03.010.412

Attach the guide wire aiming device for AP orientation to the aiming arm using the connecting screw for PFNA.

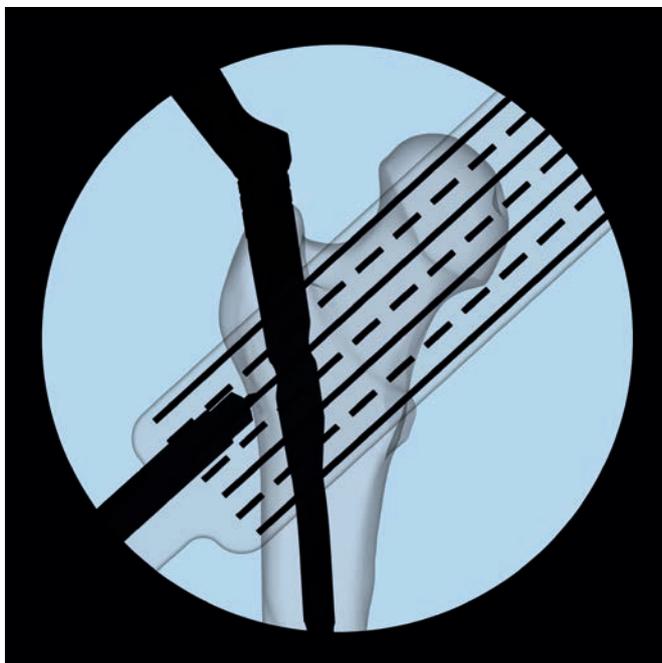
- Position the C-arm for the AP view. Rotate the C-Arm until any two orientation lines are symmetric to the protection sleeve.

The midline in between these two orientation lines predicts the location of the guide wire and PFNA-II Blade.

Adapt the insertion depth of the nail until the midline is centered in the femoral head.

The C-arm may be readjusted to make sure that two lines are symmetric to the sleeve.

**Note:** The outer lines can be used to determine the center of the femoral head.



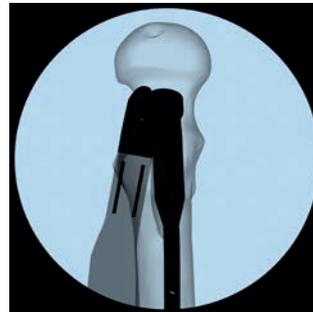
- ① Position the C-arm in the true lateral view (alignment of the axis of the femoral neck congruent with the axis of the femoral shaft<sup>1</sup>).

Adjust nail rotation until the two lines on the insertion handle are symmetric to the PFNA nail.

---

**Note:** A 3.2 mm guide wire can be inserted in the corresponding hole in the insertion handle to predict the location of the guide wire and PFNA blade.

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<sup>1</sup> T. Nishiura, 1077-1083

## 4

### Insert guide wire

#### Instrument

356.830 Guide Wire Ø 3.2 mm, for PFNA Blade

Make a stab incision in the area of the trocar tip. Advance the sleeve assembly through the soft tissues in direction of the lateral cortex.

Insert the sleeve assembly as far as the lateral cortex. Advance the protection sleeve to the lateral cortex using slight clockwise turns of the buttress nut. Prepare the passage of the protection sleeve by turning the internal drill sleeve.

**Note:** The sleeve assembly must be in contact with the bone during the entire blade implantation. Do not tighten the buttress nut too firmly as this could impair the precision of the insertion handle and sleeve assembly.



Incorrect position



Correct position

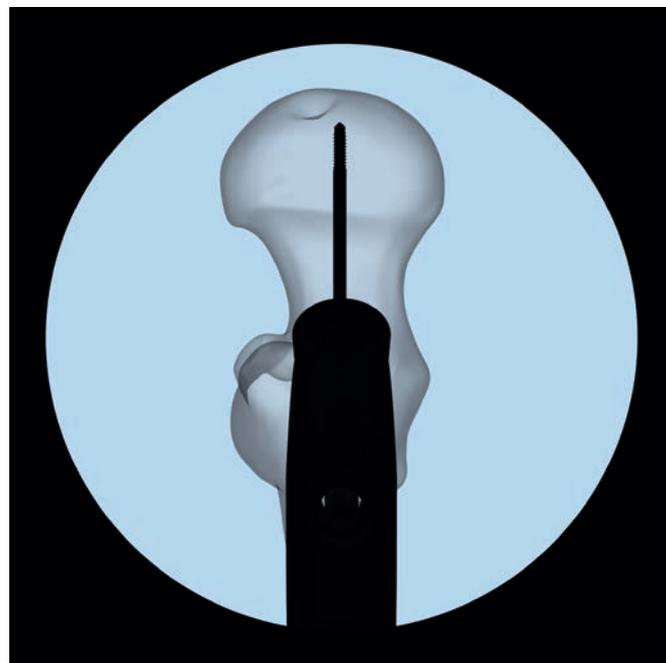
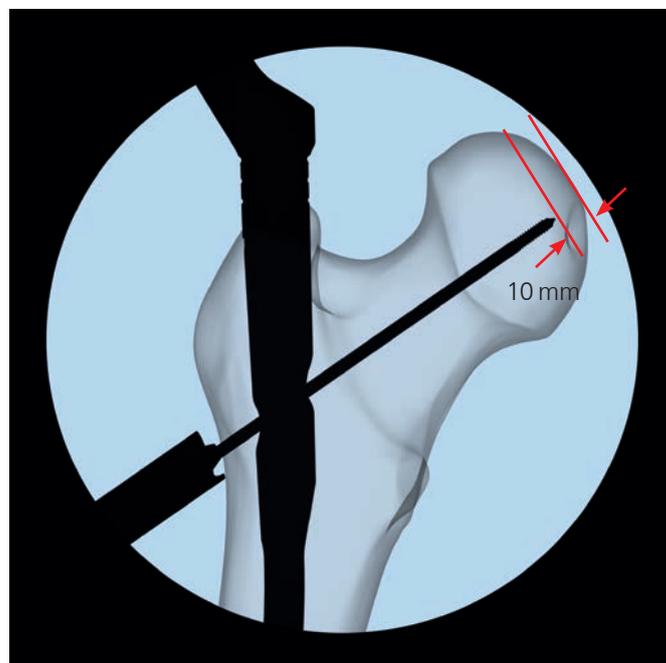
Mark the femur and remove the trocar. Insert a new guide wire through the drill sleeve into the bone. Verify both direction and position under image intensifier control in both AP and lateral view.



- ① In the AP and lateral view, the optimal position of the guide wire is the exact center of the femoral head. Insert the guide wire subchondrally into the femoral head at a distance of 10 mm below the joint level. Minimal distance to the joint is 5 mm. The tip of the guide wire is positioned at the intended blade tip position.

**Note:** If the PFNA-II or the guide wire requires repositioning; remove the guide wire, release the sleeve assembly with buttress nut from the aiming arm by pressing the button on the clamp device, and remove it. The PFNA-II can be repositioned only by rotation, deeper insertion or partial retraction. Reinsert the sleeve assembly and turn the buttress nut clockwise to position the assembly on the bone. Introduce a new guide wire.

**Precaution:** Insert the guide wire for the PFNA blade carefully to avoid penetration into the joint. Penetration of the articular surface might lead to a contraindication for the augmentation of the PFNA blade.



**Optional technique for antirotation wires**

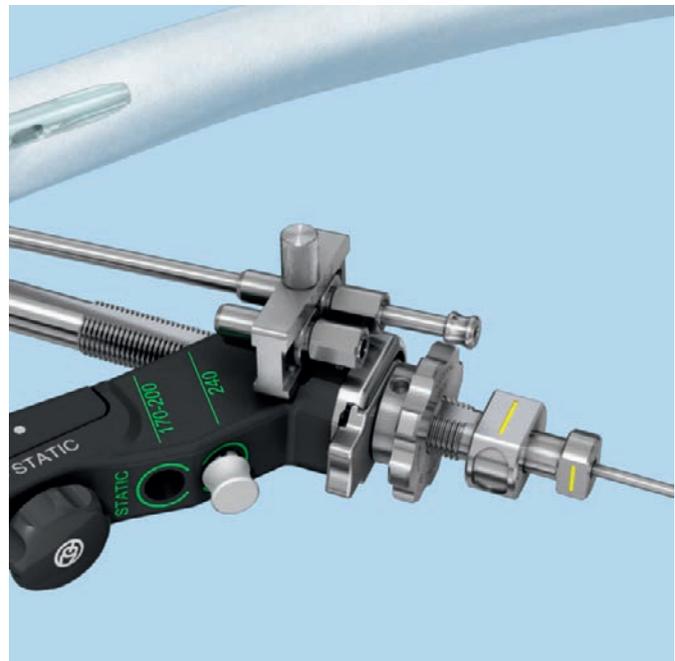
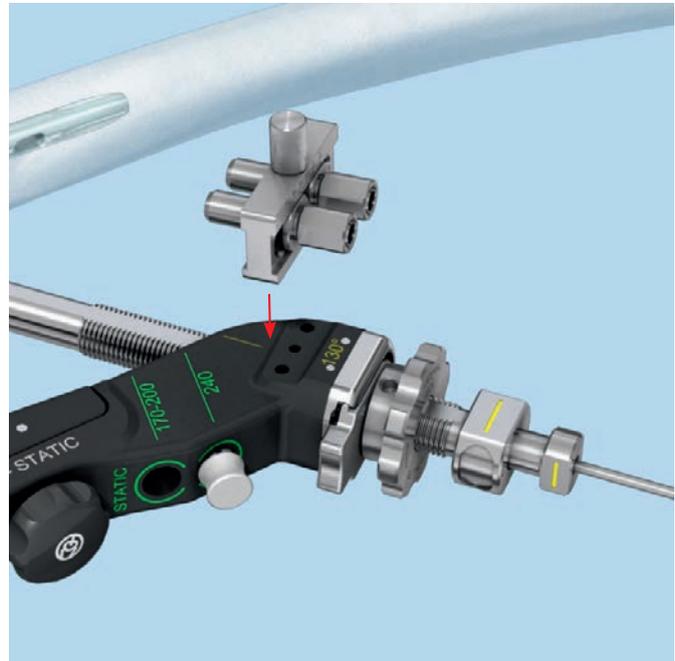
**Instruments**

|         |                                       |
|---------|---------------------------------------|
| 356.826 | Aiming Jig for Anti-rotation Wire     |
| 356.827 | Drill Sleeve 5.6/3.2, for No. 356.826 |
| 356.830 | Guide Wire Ø 3.2 mm, for PFNA Blade   |

In very unstable fractures, insert an additional guide wire to prevent rotation. Leave the drill sleeve in place in the protection sleeve when applying this technique.

After having inserted the guide wire into the femoral head, secure the aiming jig for anti-rotation wire either anterior or posterior to the aiming arm. Secure the position of the anti-rotation wire by tightening the hexagonal nut.

Insert the drill sleeve into the aiming jig for anti-rotation wire. Make a stab incision and insert the drill sleeve to the bone.



- 
- ① Use image intensifier control to insert a guide wire into the femoral head. If a second anti-rotation wire is necessary, use the same procedure to insert it into the femoral head.

---

**Note:** In axial view, the anti-rotation wire will approach, but not touch the blade tip. This anti-rotation wire fixes the femoral head only temporarily and will be removed after the insertion of the blade.

---



## 5

### Measure the PFNA-II blade length

#### Instrument

356.829 Direct Measuring Device  
for Guide Wire Ø 3.2 mm

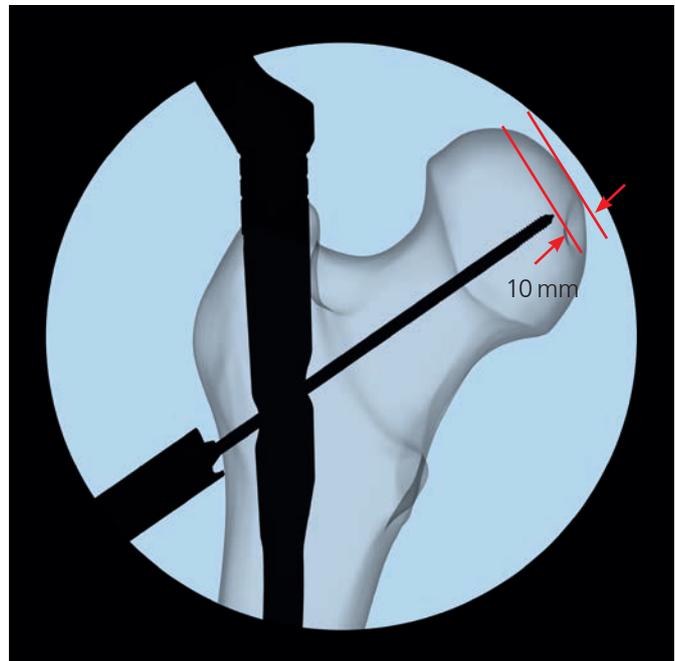
- Verify the position of the guide wire in AP and lateral view before measuring the length.

Guide the measuring device over the guide wire. Advance the measuring device to the protection sleeve and determine the length of the required blade. The measuring device indicates the exact length of the guide wire in the bone.

In the AP and lateral view, the correct position of the PFNA-II blade is 10 mm below the joint level. Minimal distance to the joint is 5 mm. If the guide wire's position is subchondral, subtract 10 mm to measure the PFNA-II blade length correctly.

Remove the measuring device.

Carefully remove the drill sleeve without changing the position of the guide wire.



---

## 6

### Open lateral cortex for PFNA-II blade insertion

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#### Instrument

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356.822      Drill Bit Ø 11.0 mm, for PFNA Blade

---

Push the cannulated drill bit over the 3.2 mm guide wire. Drill to the stop. This opens the lateral cortex.

---

**Precaution:** If the guide wire has been bent slightly during insertion, guide the drill bit over the wire using carefully forward and backward movements. However, if the wire has been bent to a greater extent, reinsert it or replace it by a new guide wire (see step 4). Otherwise, the guide wire may be advanced through the joint.

---



## 7

### Drill hole for PFNA-II blade

#### Instruments

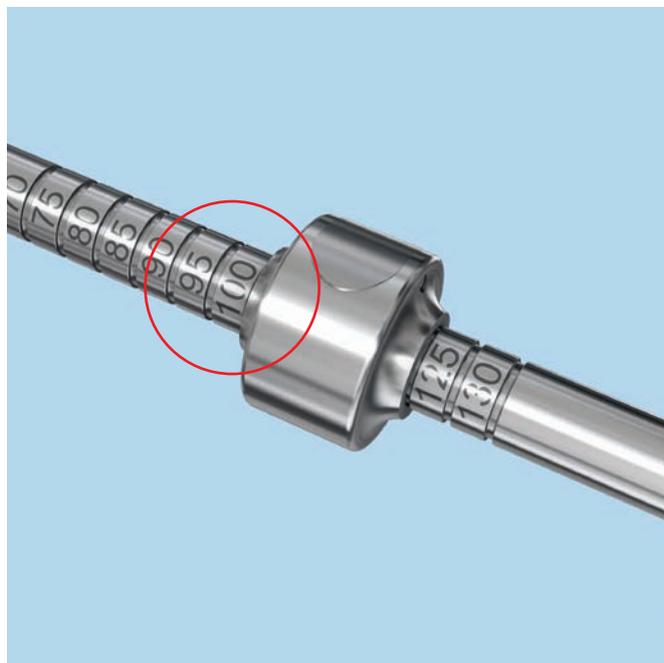
|         |  |
|---------|--|
| 356.821 | Reamer $\varnothing$ 11.0 mm, for PFNA Blade |
| 357.046 | Fixation Sleeve, for No. 357.045             |

**Note:** Use reamer only in a situation with good bone quality.

Set the chosen blade length on the cannulated 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.

Push the reamer over the guide wire. Monitor drilling under image intensifier control. Drill to the stop. The fixation sleeve prevents further drilling.

**Precaution:** Use the reamer only after opening the lateral cortex. If the guide wire has been bent slightly during insertion, guide the reamer over the wire using carefully forward and backward movements. However, if the wire has been bent to a greater extent, reinsert it or replace it with a new guide wire (see step 4). Otherwise, the guide wire may be advanced through the joint.



## 8

### Assemble PFNA-II blade on the impactor

---

#### Instrument

---

03.010.410      Impactor for PFNA Blade

---

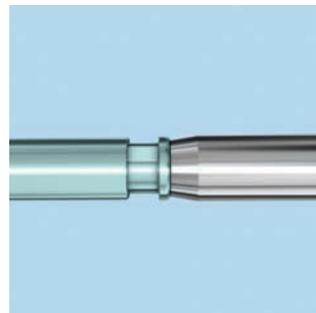
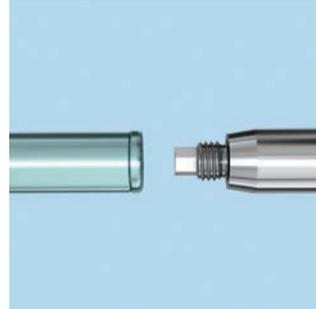
The PFNA-II blade is supplied in a locked state.

While attaching the PFNA-II blade on the impactor, screw the impactor counterclockwise (note the mark "attach" on the impactor) into the end of the PFNA-II blade to unlock the blade. Push the PFNA-II blade gently towards the impactor while attaching the PFNA-II blade. Do not overtighten.

---

**Precaution:** The tip of the PFNA-II blade must rotate freely after attaching it to the impactor. This is essential for the implantation of the PFNA-II blade. Otherwise remove and dispose of the blade. Do not over tighten the connection between the impactor and the PFNA-II blade.

---



## 9

### Insert PFNA-II blade

---

#### Instrument

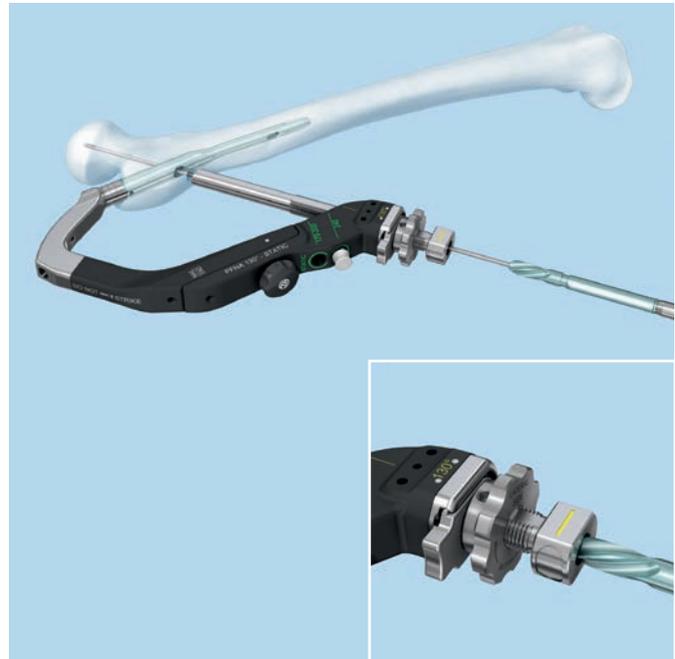
---

|            |   |
|------------|---|
| 03.010.124 | Combined Hammer 500 g,<br>can be mounted, for No. 357.117 |
|------------|---|

---

Insert the blade-impactor assembly over the guide wire. Push the button on the protection sleeve, align the blade (note marking on the protection sleeve) and advance the blade impactor assembly further through the protection sleeve.

Manually insert the blade over the guide wire advancing as far as possible into the femoral head.



- 
- ① Use monitoring during insertion of the PFNA-II blade.

Insert the PFNA-II blade to the stop by applying gentle blows with the hammer.

---

**Precaution:** Inserting the blade to the stop is important, as the impactor must click into the protection sleeve. Do not use unnecessary force when inserting the PFNA-II blade.

---



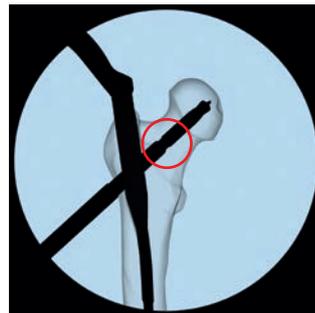
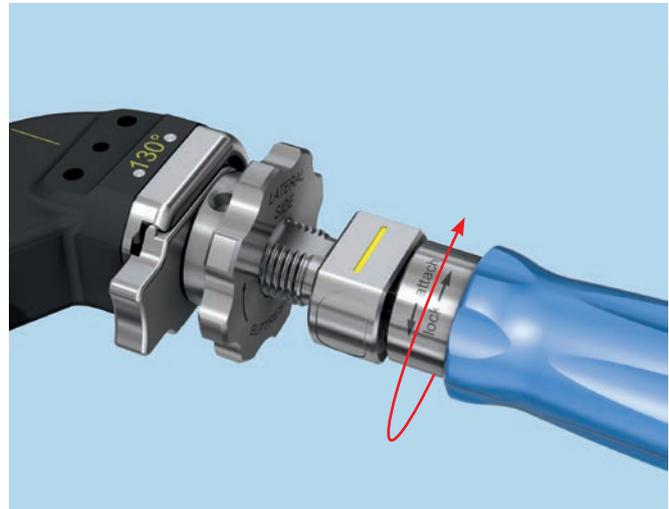
## 10

### Lock PFNA-II blade

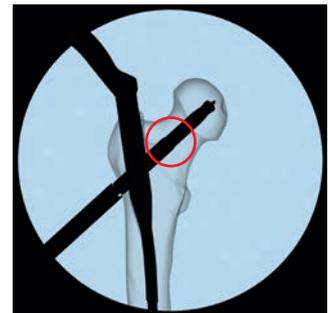
To lock the PFNA-II blade, turn the impactor clockwise (note «lock» marking on the handle) and tighten the blade.

- Verify PFNA-II blade locking intraoperatively. The PFNA-II blade is locked if all gaps are closed.

**Note:** The gliding of the PFNA-II blade is guaranteed. If the PFNA-II blade cannot be locked, remove it and replace it with a new PFNA-II blade (see implant removal, step 1).

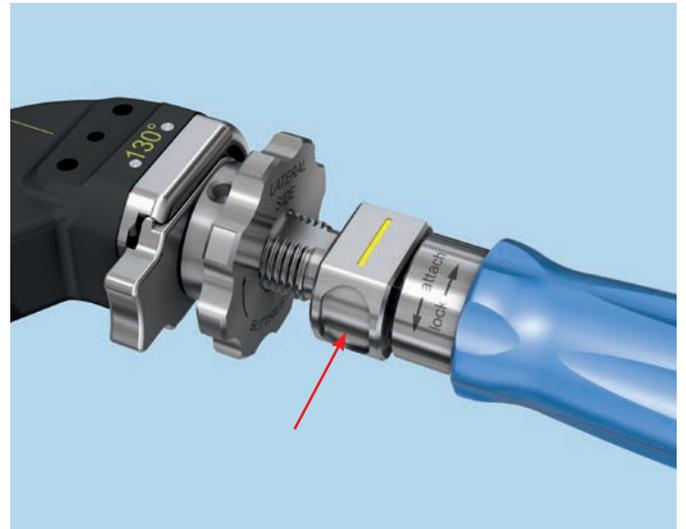


PFNA-II blade unlocked

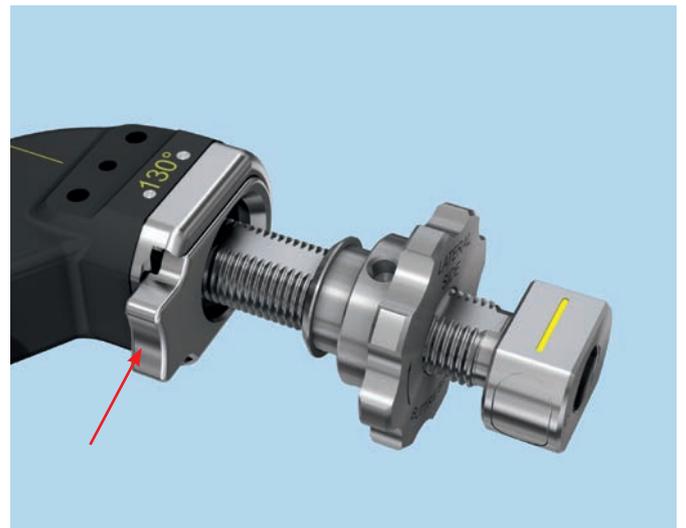


PFNA-II blade locked

Press the button on the protection sleeve to remove the impactor. Remove and dispose of the guide wire.



When proximal locking is complete, release and remove the protection sleeve and the buttress nut by pressing the button on the clamp device of the aiming arm in order to continue with distal locking or leave it in place to continue with intra-operative compression.



## 11

### Option: Intraoperative compression

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#### Instrument

03.010.423      Compression Instrument for PFNA Blade

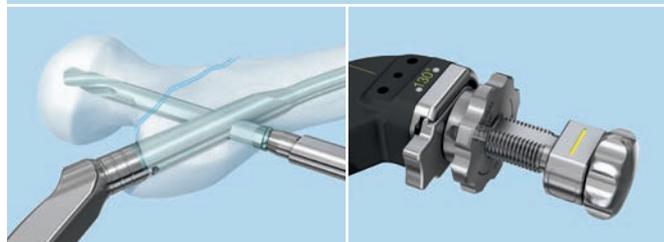
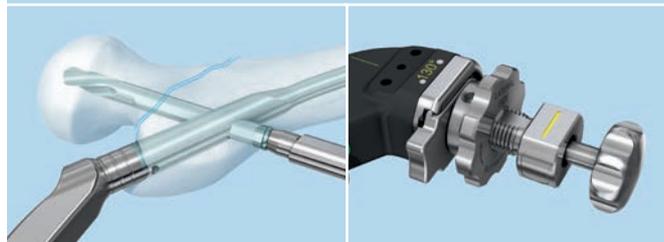
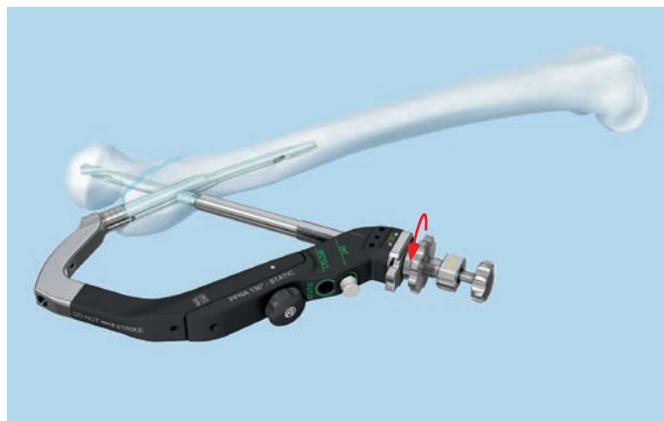
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**Precaution:** Do not use intraoperative compression in osteoporotic bone.

---

Screw the compression instrument into the blade through the protection sleeve.

Turn the buttress nut counterclockwise to move the protection sleeve backwards until it is pushing towards the compression instrument.



- ① Under image intensifier control, further turn the buttress nut counterclockwise to achieve intraoperative compression and close the fracture gap.

**Precautions:**

- The blade must be locked to apply intraoperative compression.
- ① – Control compression under image intensifier control.
- Do not use excessive force in order to avoid pulling out the blade from the femoral head.
- The blade may be slightly overinserted before applying intraoperative compression (see correction of insertion depth of PFNA-II blade, page 56) to prevent it from sticking out laterally.

Release strain by turning the buttress nut clockwise.

- ① Remove the compression instrument. Verify PFNA-II blade locking under image intensifier control. The PFNA-II blade is locked if all gaps are closed. If necessary, relock the blade using the extraction screw.

Release and remove the protection sleeve and the buttress nut by pressing the button on the clamp device of the aiming arm to continue with distal locking.

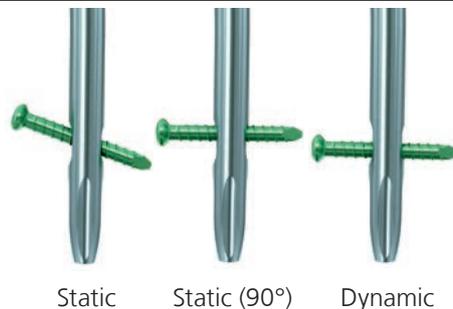


# Distal Locking

## Distal Locking for PFNA-II Short (Length 170 mm – 240 mm)

Static or dynamic locking can be performed via the aiming arm with PFNA-II short (Length 170 mm – 240 mm).

### PFNA short

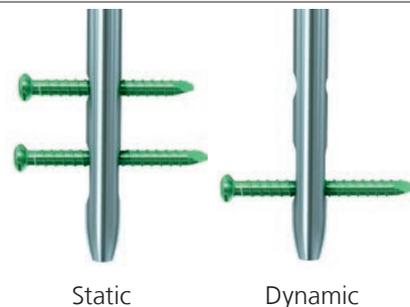


## Distal Locking for PFNA-II Long (Length 260 mm – 420 mm)

The PFNA-II long (Length 260 mm – 420 mm) additionally allows for secondary dynamization.

Distal locking of PFNA-II long is performed with the freehand technique. Alternatively distal locking can be performed using the SureLock System and the corresponding surgical technique (DSEM/TRM/0816/0728).

### PFNA long



---

## Locking implants for distal locking

Distal locking for PFNA-II described in this surgical technique is using the 4.9 mm locking bolts and the corresponding instruments (68.027.002.02: Insert 1, for Ø 4.9 mm locking bolts, from instrument set 01.027.101).

Alternatively, the 5.0 mm locking screws from the Expert Nailing Systems can be used with the corresponding instruments (68.027.002.03: Insert 1, for Ø 5.0 mm locking screws, from instrument set 01.027.102) for distal locking of the PFNA-II.

See table below for corresponding instruments.

---

### Short PFNA-II Nails (170 mm – 240 mm)

| Locking Bolts Ø 4.9 mm |   | Locking Screws Ø 5.0 mm |  |
|------------------------|---|-------------------------|--|
| Part No.               | Description   | Part No.                | Description  |
| 356.834                | Drill Bit Ø 4.0 mm, for PFNA  | 03.010.061              | Drill Bit Ø 4.2 mm, calibrated, length 340 mm, 3-flute, for Quick Coupling |
| 356.831                | Protection Sleeve 11.0/8.0, green                                   | 03.025.040              | Protection Sleeve 11.0/8.0, length 188 mm                                  |
| 356.828                | Drill Sleeve 8.0/4.0, green   | 03.010.065              | Drill Sleeve 8.0/4.2   |
| 356.833                | Trocar Ø 4.0 mm, green  | 03.010.070              | Trocar Ø 4.2 mm  |
| 356.835                | Measuring Device for Locking Bolt                                   | 03.010.428              | Depth Gauge for Locking Screws, measuring range to 110 mm                  |
| 314.260                | Screwdriver, hexagonal, large, Ø 3.5 mm, with Groove, length 300 mm | 03.010.107              | Screwdriver Stardrive, SD25, length 330 mm                                 |

---

### Long PFNA-II Nails (260 mm – 420 mm)

| Locking Bolts Ø 4.9 mm |   | Locking Screws Ø 5.0 mm |   |
|------------------------|---|-------------------------|---|
| Part No.               | Description   | Part No.                | Description   |
| 356.834                | Drill Bit Ø 4.0 mm, for PFNA  | 03.010.101              | Drill Bit Ø 4.2 mm, calibrated, length 145 mm, 3-flute, with Coupling for RDL   |
|                        |   | 03.010.104              | Drill Bit Ø 4.2 mm, calibrated, length 145 mm, 3-flute, for Quick Coupling      |
| 356.835                | Measuring Device for Locking Bolt                                   | 03.010.019              | Depth Gauge for Locking Screws, measuring range up to 110 mm for No. 03.010.009 |
|                        |   | 03.010.429              | Direct Measuring Device for Drill Bits, length 145 mm                           |
| 314.260                | Screwdriver, hexagonal, large, Ø 3.5 mm, with Groove, length 300 mm | 03.010.362              | Screwdriver Stardrive, SD25, length 275 mm                                      |
| 314.280                | Holding Sleeve, large   | 03.010.112              | Holding Sleeve, with Locking Device   |

# Distal Locking

## For PFNA-II Short

### Distal Locking for PFNA-II Short (Length 170 mm – 240 mm)

#### 1

##### Choose aiming arm for distal locking

Distal locking of PFNA-II short is performed through the aiming arm (see steps 2 and 3). Choose an appropriate aiming arm according to the table below. Make sure the plug for aiming arm is inserted into the locking hole of the nail length that is NOT used in this case.

| Nail length  | Locking      | Aiming arm |  |
|--------------|--------------|------------|--|
| 170 – 240 mm | Static       | 03.010.406 | Aiming Arm 125° for PFNA Blade             |
| 170 – 240 mm | Static       | 03.010.407 | Aiming Arm 130° for PFNA Blade             |
| 170 – 240 mm | Static (90°) | 03.023.004 | Aiming Arm for static locking, for PFNA-II |
| 170 – 240 mm | Dynamic      | 03.010.409 | Aiming Arm, for dynamic locking of PFNA    |

#### 2

##### Option A: Static distal locking of PFNA-II short

###### Instruments

|         |                                   |
|---------|-----------------------------------|
| 356.831 | Protection Sleeve 11.0/8.0, green |
| 356.828 | Drill Sleeve 8.0/4.0, green       |
| 356.833 | Trocar Ø 4.0 mm, green            |

Using the hexagonal screwdriver with spherical head, confirm that the connecting screw between the insertion handle and the PFNA-II is sufficiently tightened.

Insert the three-part trocar combination (protection sleeve, drill sleeve and trocar) through the hole in the aiming arm that corresponds with the nail length, make a stab incision and insert the trocar to the bone. Mark the femur and remove the trocar.



### Option B: Static distal locking (90°) of PFNA-II short

---

#### Instruments

---

|            |  |
|------------|--|
| 03.023.004 | Aiming Arm for static locking, for PFNA-II |
| 356.831    | Protection Sleeve 11.0/8.0, green          |
| 356.828    | Drill Sleeve 8.0/4.0, green                |
| 536.833    | Trocar Ø 4.0 mm, green                     |

---

Using the hexagonal screwdriver with spherical head, confirm that the connecting screw between the insertion handle and the PFNA-II is well tightened.

Remove the aiming arm for PFNA-II blade. Mount the aiming arm for static locking 90° and fix it firmly to the insertion handle.

Insert the three-part trocar combination (protection sleeve, drill sleeve and trocar) through the hole in the aiming arm that corresponds with the nail length, make a stab incision and insert the trocar to the bone. Mark the femur and remove the trocar.



---

**Option C: Dynamic distal locking of PFNA-II short**

---

**Instruments**

---

|            |                                     |
|------------|-------------------------------------|
| 03.010.409 | PFNA Aiming Arm for dynamic locking |
| 356.831    | Protection Sleeve 11.0/8.0, green   |
| 356.828    | Drill Sleeve 8.0/4.0, green         |
| 356.833    | Trocar Ø 4.0 mm, green              |

---

Using the hexagonal screwdriver with spherical head, confirm that the connecting screw between the insertion handle and the PFNA-II is well tightened.

Remove the aiming arm for PFNA-II blade. Mount the aiming arm for dynamic locking and fix it firmly to the insertion handle.

Insert the three-part trocar combination (protection sleeve, drill sleeve and trocar) through the hole in the aiming arm that corresponds with the nail length, make a stab incision and insert the trocar to the bone. Mark the femur and remove the trocar.



### 3 Drill

---

#### Instrument

---

356.834      Drill Bit  $\varnothing$  4.0 mm, for PFNA

---

Use the drill bit to drill through both cortices. The tip of the drill bit should protrude by 2 to 4 mm.

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

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

---

**Precaution:** Always make sure that no diastasis has occurred intraoperatively before beginning distal locking. Diastasis can cause delayed healing. Always ensure that the connection between PFNA-II, insertion handle and aiming arm is good, otherwise drilling for distal locking may damage the PFNA-II.

---



## 4

### Option: Determine length of the locking bolt

---

#### Instrument

---

|         |                                   |
|---------|-----------------------------------|
| 356.835 | Measuring Device for Locking Bolt |
|---------|-----------------------------------|

---

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

Insert the depth gauge through the protection sleeve to the near cortex and advance the hook through both cortices. Draw back the hook until it engages in the opposite cortex. Read the measurement from the depth gauge. Add 2 to 4 mm to the measured length to ensure good engagement of the locking bolt in the opposite cortex.



## 5

### Insert locking bolt

---

#### Instrument

---

|         |   |
|---------|---|
| 314.260 | Screwdriver, hexagonal, large, Ø 3.5 mm, with Groove, length 300 mm |
|---------|---|

---

Insert a locking bolt of the measured length with the hexagonal screwdriver through the protection sleeve until the locking bolt head lies against the near cortex. The tip of the locking bolt should not project more than 1–2 mm beyond the far cortex.

Remove the screwdriver and the protection sleeve.



# Distal Locking

## For PFNA-II Long

### Distal Locking for PFNA-II Long (Length 260 mm – 420 mm)

#### 1

##### Align C-arm

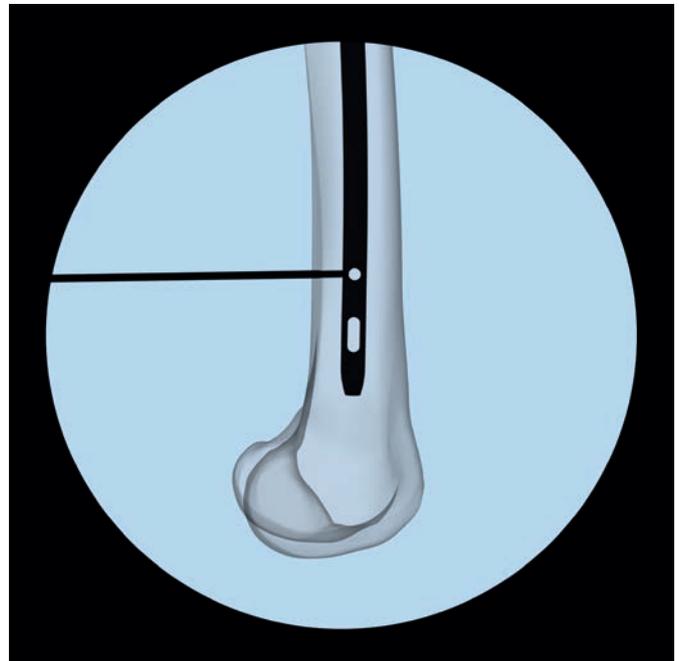
- 1 Check reduction, then correct alignment of the fragments and leg length before locking the nail.
- 2 Align the C-arm with the hole in the nail until a perfect circle is visible in the center of the screen.



#### 2

##### Determine incision point

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



### 3

#### Drill

##### Option: Locking with ASLS

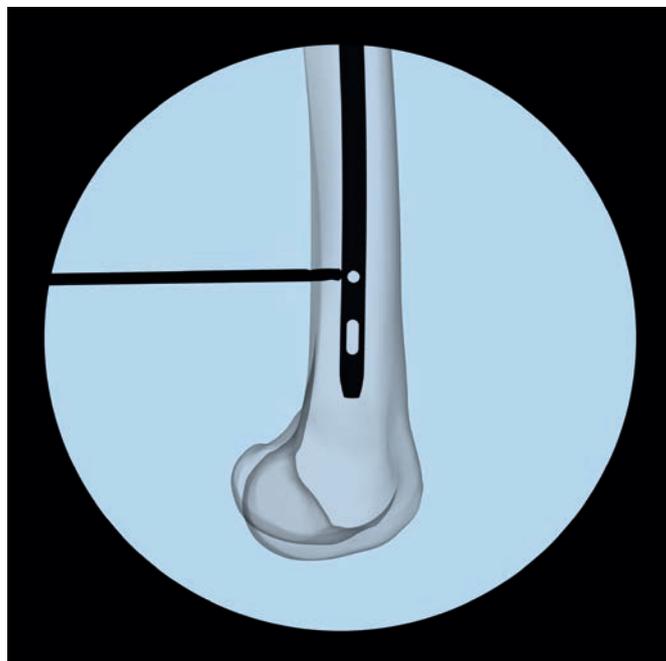
ASLS, the Angular Stable Locking System, can be used as an alternative to standard locking screws in any round hole of a Synthes cannulated titanium nail. For more details regarding the intramedullary fixator principle please consult the ASLS surgical technique (DSEM/TRM/0115/0284) and concept flyer (036.001.017). Please note that for the use of ASLS special instruments are required.

##### Instrument

|         |  |
|---------|--|
| 511.417 | Drill Bit $\varnothing$ 4.0 mm with centering tip, length 148/122 mm, 3-flute, with Coupling for RDL |
|---------|--|

- Using the radiolucent drive, 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.

**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.



## 4

### Determine length of the locking bolt and insert locking bolt

#### Instruments

|         |  |
|---------|--|
| 356.835 | Measuring Device for Locking Bolt  |
| 314.260 | Screwdriver, hexagonal, large, Ø 3.5 mm, with Groove, length 300 mm            |
| 314.280 | Holding Sleeve, large, for Nos. 314.190, 314.240, 314.260, 314.270 and 314.750 |

Measure the locking bolt length using the measuring device. Ensure that the outer sleeve is in contact with the bone and the hook grasps the far cortex. Add 2 to 4 mm to the measured length in order to ensure that the locking bolt is well engaged in the opposite cortex.

Insert the locking bolt with the appropriate length using the hexagonal screwdriver and the holding sleeve, if required.

- Verify the bolt length under image intensification. The bolt tip should be about 1–2 mm outside of the cortex. Exchange the locking bolt with the appropriate length if necessary.



# Insert End Cap

## 1

### Remove PFNA-II instruments

---

#### Instrument

---

03.023.011      Screwdriver, hexagonal with spherical head  $\varnothing$  10.0 mm, cannulated

---

Remove the aiming arm. Loosen the connection screw with the hexagonal screwdriver with spherical head. Remove the connecting screw and the insertion handle.

---

**Note:** The end cap with 0 mm extension can be inserted through the insertion handle barrel. Only remove the connecting screw and leave the insertion handle in place.

---



## 2

### Insert end cap

---

#### Instruments

---

|            |  |
|------------|--|
| 356.717    | Guide Wire Ø 2.8 mm, length 460 mm, with Hook                              |
| 03.023.001 | Screwdriver Stardrive with spherical head, SD40, cannulated, length 300 mm |

---

If the proximal end of the nail is flush with the upper edge of the trochanter major use the end cap with 0 mm extension. Use the end cap with 5 to 15 mm extension to lengthen the nail end.

Insert the hook of the guide wire through the selected end cap. Guide the cannulated screwdriver over the guide wire to the end cap. The end cap is retained automatically as soon as this connection is established.

Screw the end cap into the proximal end of the nail and tighten it firmly.

Remove the screwdriver and the guide wire.



# Implant Removal

## 1

### Remove PFNA-II blade

#### Instruments

|            |                                       |
|------------|---------------------------------------|
| 356.830    | Guide Wire Ø 3.2 mm, for PFNA Blade   |
| 03.010.411 | Extraction Screw for PFNA Blade       |
| 03.010.124 | Combined Hammer 500 g, can be mounted |
| 356.832    | Key for PFNA Blade                    |

**Note:** Implant removal is an elective procedure.

- After an incision through the old scars, locate the PFNA-II blade by palpation or under image intensifier control. Insert the guide wire through the cannulated PFNA-II blade. Push the extraction screw over the guide wire and use gentle pressure to screw it counterclockwise into the PFNA-II blade (note "attach" marking on the extraction screw shaft).

Extract the PFNA-II blade by applying gentle blows with the hammer.

#### Notes:

- If the extraction of the PFNA-II blade is difficult, remove the locking bolt and the end cap, screw the hammer guide into the PFNA-II and mobilize the nail to loosen the nail-blade connection.
- To detach the blade from the bone use light hammer blows to slightly drive in the blade before removal of the blade.



Use the key for PFNA blade to detach the blade from the extraction screw if necessary.

**Note:** If the removal of the PFNA-II blade is not possible with the standard instruments use the special instruments from the PFNA/PFNA-II Blade Extraction Set and the corresponding surgical technique (DSEM/TRM/0816/0727).

## 2 Remove end cap

### Instruments

|         |  |
|---------|--|
| 356.717 | Guide Wire Ø 2.8 mm, length 460 mm, with Hook          |
| 356.715 | Socket, hexagonal, Ø 11.0/11.0 mm, cannulated, for AFN |
| 321.160 | Combination Wrench Ø 11.0 mm                           |

Insert the hook of the guide wire with hook through the end cap. Guide the cannulated hexagonal socket over the guide wire to the end cap. Remove the end cap with the combination wrench.



### 3

#### Remove locking bolt and nail

---

##### Instruments

---

|            |  |
|------------|--|
| 357.071    | Hammer Guide, for No. 357.026  |
| 314.260    | Screwdriver, hexagonal, large, Ø 3.5 mm, with Groove, length 300 mm            |
| 314.280    | Holding Sleeve, large, for Nos. 314.190, 314.240, 314.260, 314.270 and 314.750 |
| 03.010.124 | Combined Hammer 500 g, can be mounted  |

---

Before removing the locking bolt, screw the hammer guide into the PFNA-II and tighten it.

Remove the locking bolt with the hexagonal screwdriver. Mount the large holding sleeve onto the hexagonal screwdriver to facilitate removal of the locking bolt.

---

**Note:** If removal of the locking bolt is not possible and/or in case of broken locking bolts, the Screw Extraction Set and the corresponding surgical technique (DSEM/TRM/0614/0727) is recommended.

---

Extract the nail by applying gentle blows with the hammer.

---

##### Notes:

- Remove the locking bolt after screwing the hammer guide into the PFNA/PFNA-II. Thereby a rotation of the PFNA/PFNA-II in the bone will be avoided.
  - If the removal of the nail is not possible with the standard instruments use the special instruments from the Proximal Femoral Nail Removal Set for PFN, TFN and PFNA/PFNA-II (01.010.180) and the corresponding surgical technique (DSEM/TRM/1214/0253).
- 



# Correction of Insertion Depth of PFNA-II Blade

## Instruments

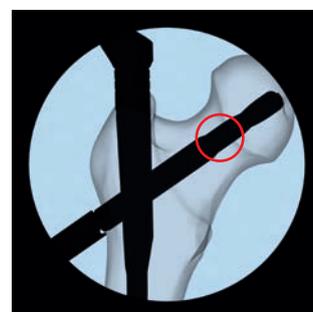
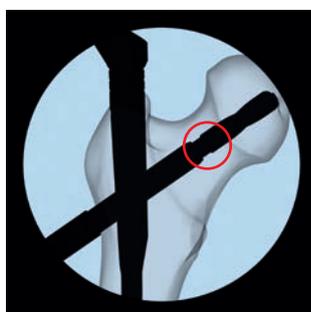
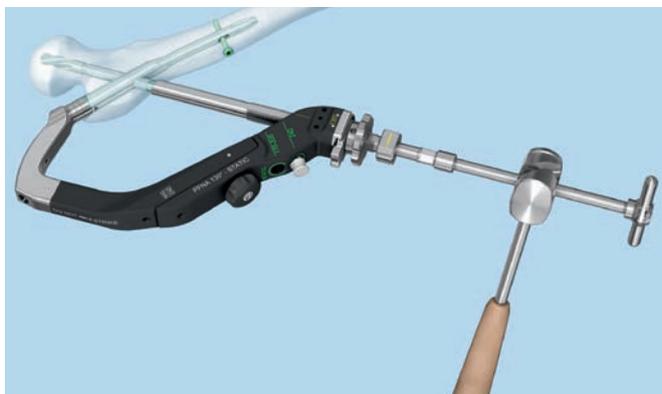
|            |  |
|------------|--|
| 03.010.411 | Extraction Screw for PFNA-II Blade       |
| 03.010.124 | Combined Hammer 500 g,<br>can be mounted |

Remove the impactor if it is still in place. Insert the extraction screw over the guide wire and through the sleeve assembly using gentle counterclockwise pressure to attach the extraction screw to the PFNA-II blade (note "attach" marking).

Advance the now unlocked PFNA-II blade to the desired insertion depth by applying gentle blows with the combined hammer. In the AP and lateral view, the correct position of the PFNA-II blade is 10 mm below the joint level. Minimal distance to the joint is 5 mm. Turning the extraction screw clockwise to the stop (note "lock" marking) allows for relocking of the PFNA-II blade and removing the extraction screw.

- Verify PFNA-II blade locking intraoperatively.

**Note:** The PFNA-II blade is locked if all gaps are closed.



# Cleaning

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## Intra- and postoperative cleaning

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### Instruments

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|         |   |
|---------|---|
| 319.460 | Cleaning Stylet Ø 2.8 mm,<br>for Cannulated Instruments                   |
| 357.009 | Cleaning Stylet Ø 2.8 mm,<br>length 450 mm, for Cannulated<br>Instruments |

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Use the 2.8 mm stylet or the long 2.8 mm cleaning stylet (length 450 mm) for intraoperative cleaning of the instrument cannulations.

# Implants

## PFNA-II Nails

**Material:** Titanium alloy\* (TAN)

**Color:** Aqua

**Diameters:** Ø 9 to Ø 12 mm (short nails, 1 mm increments)  
Ø 9 and Ø 10 mm (long nails)  
All nails have a proximal diameter of 16.5 mm with a lateral flattened surface

### Lengths short Nails:

170 mm XS  
200 mm Small  
240 mm  
(one nail for left and right)

### Lengths long Nails:

260 mm – 340 mm  
(with 20 mm increments)  
340 mm – 420 mm  
(with 40 mm increments,  
only Ø 10 mm nails)  
(left and right nails)

**CCD-Angle:** 125° and 130°

**Cannulation:** All nails are cannulated



\*Ti-6Al-7Nb

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**PFNA-II XS, Length 170 mm, Titanium Alloy (TAN)**

| Distal Diameter (mm) | Angle | Length<br>170 mm |
|----------------------|-------|------------------|
| 9                    | 125°  | 472.100S         |
| 10                   | 125°  | 472.101S         |
| 11                   | 125°  | 472.102S         |
| 12                   | 125°  | 472.103S         |
| <hr/>                |       |                  |
| 9                    | 130°  | 472.104S         |
| 10                   | 130°  | 472.105S         |
| 11                   | 130°  | 472.106S         |
| 12                   | 130°  | 472.107S         |

**PFNA-II Small, Length 200 mm, Titanium Alloy (TAN)**

| Distal Diameter (mm) | Angle | Length<br>200 mm |
|----------------------|-------|------------------|
| 9                    | 125°  | 472.110S         |
| 10                   | 125°  | 472.111S         |
| 11                   | 125°  | 472.112S         |
| 12                   | 125°  | 472.113S         |
| <hr/>                |       |                  |
| 9                    | 130°  | 472.114S         |
| 10                   | 130°  | 472.115S         |
| 11                   | 130°  | 472.116S         |
| 12                   | 130°  | 472.117S         |

**PFNA-II, Length 240 mm, Titanium Alloy (TAN)**

| Distal Diameter (mm) | Angle | Length<br>240 mm |
|----------------------|-------|------------------|
| 9                    | 125°  | 473.800S         |
| 10                   | 125°  | 473.801S         |
| 11                   | 125°  | 473.802S         |
| 12                   | 125°  | 473.803S         |
| <hr/>                |       |                  |
| 9                    | 130°  | 473.804S         |
| 10                   | 130°  | 473.805S         |
| 11                   | 130°  | 473.806S         |
| 12                   | 130°  | 473.807S         |



**PFNA-II Nail Long, Titanium alloy (TAN)**

| Length (mm) | Angle | ∅ 9 mm right | ∅ 9 mm left |
|-------------|-------|--------------|-------------|
| 260         | 125°  | 473.060S     | 473.070S    |
| 280         | 125°  | 473.062S     | 473.072S    |
| 300         | 125°  | 473.035S     | 473.031S    |
| 320         | 125°  | 473.064S     | 473.074S    |
| 340         | 125°  | 473.037S     | 473.033S    |

| Length (mm) | Angle | ∅ 9 mm right | ∅ 9 mm left |
|-------------|-------|--------------|-------------|
| 260         | 130°  | 473.061S     | 473.071S    |
| 280         | 130°  | 473.063S     | 473.073S    |
| 300         | 130°  | 473.036S     | 473.032S    |
| 320         | 130°  | 473.065S     | 473.075S    |
| 340         | 130°  | 473.038S     | 473.034S    |

| Length (mm) | Angle | ∅ 10 mm right | ∅ 10 mm left |
|-------------|-------|---------------|--------------|
| 260         | 125°  | 473.040S      | 473.050S     |
| 280         | 125°  | 473.042S      | 473.052S     |
| 300         | 125°  | 473.015S      | 473.023S     |
| 320         | 125°  | 473.044S      | 473.054S     |
| 340         | 125°  | 473.017S      | 473.025S     |
| 380         | 125°  | 473.019S      | 473.027S     |
| 420         | 125°  | 473.021S      | 473.029S     |

| Length (mm) | Angle | ∅ 10 mm right | ∅ 10 mm left |
|-------------|-------|---------------|--------------|
| 260         | 130°  | 473.041S      | 473.051S     |
| 280         | 130°  | 473.043S      | 473.053S     |
| 300         | 130°  | 473.016S      | 473.024S     |
| 320         | 130°  | 473.045S      | 473.055S     |
| 340         | 130°  | 473.018S      | 473.026S     |
| 380         | 130°  | 473.020S      | 473.028S     |
| 420         | 130°  | 473.022S      | 473.030S     |



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**PFNA-II Blades**

|              |                                    |
|--------------|------------------------------------|
| Material:    | Titanium Alloy* (TAN), color: aqua |
| Lengths:     | 75 –120 mm (5 mm increments)       |
| Cannulation: | All blades are cannulated          |

**PFNA-II Blades**

| Length (mm) | TAN         |
|-------------|-------------|
| 75          | 04.027.050S |
| 80          | 04.027.051S |
| 85          | 04.027.052S |
| 90          | 04.027.053S |
| 95          | 04.027.054S |
| 100         | 04.027.055S |
| 105         | 04.027.056S |
| 110         | 04.027.057S |
| 115         | 04.027.058S |
| 120         | 04.027.059S |

\*Ti-6Al-7Nb

**PFNA-II End Caps**

Used to protect nail threads from tissue ingrowth

|              |   |
|--------------|---|
| Material:    | Titanium Alloy* (TAN), color: aqua  |
| Lengths:     | 0 mm – sits flush with end of nail<br>5, 10 and 15 mm extensions – extend nail height if nail is overinserted |
| Cannulation: | All end caps are cannulated   |
| Design:      | Stardrive SD40 / hexagonal recess<br>Ø 11 mm  |



**PFNA-II End Caps**

| Extension (mm) | TAN         |
|----------------|-------------|
| 0              | 04.027.005S |
| 5              | 04.027.006S |
| 10             | 04.027.007S |
| 15             | 04.027.008S |

\*Ti-6Al-7Nb

## Locking Bolts



|           |   |
|-----------|---|
| Material: | Titanium alloy* (TAN), color: light green   |
| Drill:    | Ø 4 mm  |
| Lengths:  | 16 – 60 mm (2 mm increments)<br>60 – 80 mm (4 mm increments)<br>80 – 100 mm (5 mm increments) |
| Design:   | Hexagonal recess Ø 3.5 mm   |

### Locking Bolts Ø 4.9 mm, self-tapping

| Length (mm) | TAN**   |
|-------------|---------|
| 26          | 459.260 |
| 28          | 459.280 |
| 30          | 459.300 |
| 32          | 459.320 |
| 34          | 459.340 |
| 36          | 459.360 |
| 38          | 459.380 |
| 40          | 459.400 |
| 42          | 459.420 |
| 44          | 459.440 |
| 46          | 459.460 |
| 48          | 459.480 |
| 50          | 459.500 |
| 52          | 459.520 |

| Length (mm) | TAN**   |
|-------------|---------|
| 54          | 459.540 |
| 56          | 459.560 |
| 58          | 459.580 |
| 60          | 459.600 |
| 64          | 459.640 |
| 68          | 459.680 |
| 72          | 459.720 |
| 76          | 459.760 |
| 80          | 459.800 |
| 85          | 459.850 |
| 90          | 459.900 |
| 95          | 459.950 |
| 100         | 459.960 |

\*Ti-6Al-7Nb

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

# Alternative Implants

## PFNA-II End Caps

Used to protect nail threads from tissue ingrowth

|              |   |
|--------------|---|
| Material:    | Titanium Alloy* (TAN), color: aqua  |
| Lengths:     | 0 mm – sits flush with end of nail<br>5, 10 and 15 mm extensions – extend nail height if nail is overinserted |
| Cannulation: | All end caps are cannulated   |
| Design:      | Hexagonal recess $\varnothing$ 4.0 mm / $\varnothing$ 11.0 mm   |



## PFNA-II End Caps

| Extension (mm) | TAN      |
|----------------|----------|
| 0              | 473.170S |
| 5              | 473.171S |
| 10             | 473.172S |
| 15             | 473.173S |

\*Ti-6Al-7Nb

## Locking Screws



|           |   |
|-----------|---|
| Material: | Titanium Alloy* (TAN), color: light green                           |
| Drill:    | Ø 4.2 mm  |
| Lengths:  | 26 mm – 80 mm (2 mm increments)<br>85 mm – 100 mm (5 mm increments) |
| Design:   | StarDrive SD25 recess   |

## Locking Screws StarDrive Ø 5.0 mm, for Medullary Nails

| Length (mm) | TAN**      |
|-------------|------------|
| 26          | 04.005.516 |
| 28          | 04.005.518 |
| 30          | 04.005.520 |
| 32          | 04.005.522 |
| 34          | 04.005.524 |
| 36          | 04.005.526 |
| 38          | 04.005.528 |
| 40          | 04.005.530 |
| 42          | 04.005.532 |
| 44          | 04.005.534 |
| 46          | 04.005.536 |
| 48          | 04.005.538 |
| 50          | 04.005.540 |
| 52          | 04.005.542 |
| 54          | 04.005.544 |
| 56          | 04.005.546 |

| Length (mm) | TAN**      |
|-------------|------------|
| 58          | 04.005.548 |
| 60          | 04.005.550 |
| 62          | 04.005.552 |
| 64          | 04.005.554 |
| 66          | 04.005.556 |
| 68          | 04.005.558 |
| 70          | 04.005.560 |
| 72          | 04.005.562 |
| 74          | 04.005.564 |
| 76          | 04.005.566 |
| 78          | 04.005.568 |
| 80          | 04.005.570 |
| 85          | 04.005.575 |
| 90          | 04.005.580 |
| 95          | 04.005.585 |
| 100         | 04.005.590 |

\*Ti-6Al-7Nb

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

# Instruments

309.602 Radiographic Ruler for PFNA



314.050 Screwdriver, hexagonal, cannulated, for Cannulated Screws  $\varnothing$  6.5 and 7.3 mm



314.260 Screwdriver, hexagonal, large,  $\varnothing$  3.5 mm, with Groove, length 300 mm



314.280 Holding Sleeve, large, for Nos. 314.190, 314.240, 314.260, 314.270 and 314.750



321.160 Combination Wrench  $\varnothing$  11.0 mm



321.170 Pin Wrench  $\varnothing$  4.5 mm, length 120 mm



356.715 Socket, hexagonal,  $\varnothing$  11.0/11.0 mm, cannulated, for AFN



356.717 Guide Wire  $\varnothing$  2.8 mm, length 460 mm, with Hook



356.817 Buttress/Compression Nut, for PFNA Blade



|         |  |  |
|---------|--|--|
| 356.818 | Protection Sleeve 16.0/11.0 for PFNA Blade         |    |
| 356.819 | Drill Sleeve 11.0/3.2, for PFNA Blade              |    |
| 356.820 | Trocar Ø 3.2 mm, for PFNA Blade, gold              |    |
| 356.821 | Reamer Ø 11 mm, for PFNA Blade                     |    |
| 356.822 | Drill Bit Ø 11 mm, for PFNA Blade                  |    |
| 356.826 | Aiming Jig for Anti-rotation Wire                  |    |
| 356.827 | Drill Sleeve 5.6/3.2, for No. 356.826              |  |
| 356.828 | Drill Sleeve 8.0/4.0, green                        |  |
| 356.829 | Direct Measuring Device for Guide Wire<br>Ø 3.2 mm |  |
| 356.830 | Guide Wire Ø 3.2 mm, for PFNA Blade                |  |
| 356.831 | Protection Sleeve 11.0/8.0, green                  |  |

|            |  |  |
|------------|--|--|
| 356.832    | Key for PFNA Blade                                     |    |
| 356.833    | Trocar Ø 4.0 mm, green                                 |    |
| 356.834    | Drill Bit Ø 4.0 mm, for PFNA                           |    |
| 356.835    | Measuring Device for Locking Bolt                      |    |
| 357.029    | Connecting Screw, cannulated, for PFN and PFNA         |     |
| 357.046    | Fixation Sleeve, for No. 357.045                       |    |
| 357.071    | Hammer Guide, for No. 357.026                          |  |
| 393.100    | Universal Chuck with T-Handle                          |  |
| 03.010.124 | Combined Hammer 500 g, can be mounted, for No. 357.117 |  |
| 03.010.405 | Insertion Handle, radiolucent, for PFNA                |  |

|            |  |  |
|------------|--|--|
| 03.010.407 | Aiming Arm 130° for PFNA Blade   |    |
| 03.010.410 | Impactor for PFNA Blade  |    |
| 03.010.411 | Extraction Screw for PFNA Blade  |    |
| 03.010.423 | Compression Instrument for PFNA Blade                                      |    |
| 03.010.424 | Connector for Insertion Handle for PFNA                                    |    |
| 03.010.470 | Plug for Aiming Arm  |   |
| 03.023.001 | Screwdriver Stardrive with spherical head, SD40, cannulated, length 300 mm |  |
| 03.023.002 | Protection Sleeve 20.0/17.0, for PFNA-II                                   |  |
| 03.023.006 | Drill Sleeve, for PFNA-II  |  |
| 03.023.010 | Drill Bit Ø 16.5 mm, cannulated, flexible, for PFNA-II                     |  |
| 03.023.011 | Screwdriver, hexagonal with spherical head Ø 10.0 mm, cannulated           |  |

**Optional instruments**

309.600 Drill Bit Ø 17.0 mm, cannulated, for PFNA



309.603 Drill Sleeve 17.0/3.2, for No. 357.001



319.970 Screw Forceps, self-holding, length 85 mm



351.050 Tissue Protector



356.830S Guide Wire Ø 3.2 mm, for PFNA Blade, sterile



357.001 Protection Sleeve 20.0/17.0, for No. 357.005



357.009 Cleaning Stylet Ø 2.8 mm, length 450 mm, for Cannulated Instruments



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



03.010.362 Screwdriver Stardrive, SD25, length 275 mm



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03.010.406 Aiming Arm 125° for PFNA Blade



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03.010.408 Aiming Arm 135° for PFNA Blade



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03.010.409 PFNA Aiming Arm for dynamic locking



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03.010.412 Aiming Device for Guide Wire,  
for PFNA and TFN, for AP Orientation



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03.010.414 Connecting Screw for PFNA,  
for No. 03.010.412



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03.023.003 Awl for PFNA-II



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03.023.004 Aiming Arm for static locking,  
for PFNA-II small and extra-small



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**Alternative instruments**

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321.200 Ratchet Wrench for Nut, hexagonal, 11.0 mm




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357.012 Insertion Handle for PFN




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357.013 Thread Gland for Hammer Guide, for No. 357.012




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357.020 Insertion Handle for PFN and PFNA




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357.021 Connecting Screw for PFN, for no. 357.012




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357.023 Wrench, hexagonal, with T-Handle, for No. 357.021




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357.026 Slotted Hammer 400 g, can be mounted



|            |   |  |
|------------|---|--|
| 357.027    | Socket, hexagonal, with T-Handle, short                                       |    |
| 357.028    | Connector for PFN, for No. 357.020  |    |
| 399.420    | Hammer 500 g  |    |
| 03.025.040 | Protection Sleeve 11.0/8.0, length 188 mm                                     |    |
| 03.010.061 | Drill Bit Ø 4.2 mm, calibrated, length 340 mm, 3-flute, for Quick Coupling    |  |
| 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   |  |
| 03.010.101 | Drill Bit Ø 4.2 mm, calibrated, length 145 mm, 3-flute, with Coupling for RDL |  |
| 03.010.104 | Drill Bit Ø 4.2 mm, calibrated, length 145 mm, 3-flute, for Quick Coupling    |  |

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03.010.107 Screwdriver Stardrive, SD25,  
length 330 mm



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03.010.112 Holding Sleeve, with Locking Device



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03.010.126 Wrench, hexagonal with T-handle



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



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03.010.429 Direct Measuring Device for Drill Bits,  
length 145 mm



# Cases

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## SynCases

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### 01.027.110 Instrument Set for PFNA-II Locking Bolts $\varnothing$ 4.9 mm, in SynCase

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68.027.013 Lid for SynCase No. 68.027.010



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68.027.012 Insert 2 for Instruments for PFNA/PFNA-II (part 1), for SynCase No. 68.027.010



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68.027.011 Insert 1 for Instruments for PFNA/PFNA-II (part 1), for SynCase No. 68.027.010



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68.027.023 Lid for SynCase No. 68.027.020



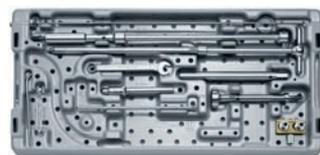
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68.027.022 Insert 2 for Instruments for PFNA/PFNA-II (part 2), for SynCase No. 68.027.020



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68.027.021 Insert 1 for Instruments for PFNA/PFNA-II (part 2), for SynCase No. 68.027.020



**01.027.120 Instrument Set for PFNA-II Locking Screws  $\varnothing$  5.0 mm, in SynCase**

68.027.013 Lid for SynCase No. 68.027.010



68.027.012 Insert 2 for Instruments for PFNA/PFNA-II (part 1), for SynCase No. 68.027.010



68.027.011 Insert 1 for Instruments for PFNA/PFNA-II (part 1), for SynCase No. 68.027.010



68.027.023 Lid for SynCase No. 68.027.020



68.027.022 Insert 2 for Instruments for PFNA/PFNA-II (part 2), for SynCase No. 68.027.020



68.027.021 Insert 1 for Instruments for PFNA/PFNA-II (part 2), for SynCase No. 68.027.020



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**Vario Cases**

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**01.027.101 Instrument Set for PFNA Locking Bolts  
Ø 4.9 mm, in Vario Case**

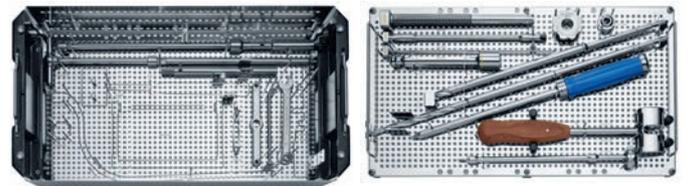
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68.027.001 Vario Case for PFNA Instrument Set  
(part 1), without Lid, without Contents



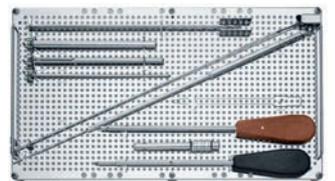
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68.027.002 Vario Case for PFNA Instrument Set  
(part 2), without Lid, without Contents



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68.027.002.02 Insert 1, for Ø 4.9 mm Locking Bolts,  
for PFNA Instrument Set (part 2),  
for Vario Case No. 68.027.002



**01.027.102 Instrument Set for PFNA Locking Screws Ø 5.0 mm, in Vario Case**

68.027.001 Vario Case for PFNA Instrument Set (part 1), without Lid, without Contents



68.027.002 Vario Case for PFNA Instrument Set (part 2), without Lid, without Content



68.027.002.03 Insert 1, for Ø 5.0 mm Locking Screws, for PFNA Instrument Set (part 2), for Vario Case No. 68.027.002



**Optional**

68.027.003 Rack for Locking Implants Ø 4.9 mm or Ø 5.0 mm, for Vario Case



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



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## **Torque, Displacement and Image Artifacts according to ASTM F 2213-06, ASTM F 2052-06e1 and ASTM F 2119-07**

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 F 2182-11a**

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]).

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**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.
-





