PFNA. Proximal Femoral Nail Antirotation.

Technique Guide
Warning
This description alone does not provide sufficient background for direct use of the instrument set. Instruction by a surgeon experienced in handling these instruments is highly recommended.

Reprocessing, Care and Maintenance of Synthes Instruments
For general guidelines, function control and dismantling of multi-part instruments, please contact your local sales representative or refer to: www.synthes.com/reprocessing
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## Bibliography
PFNA. Proximal Femoral Nail Antirotation.

**PFNA Nail**

**Optimal fit**

The anatomical design guarantees an optimal fit in the femur. The nail design has been well proven in over 450,000 cases performed with the PFN and PFNA.

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**The PFNA has a medial-lateral angle of 6°**

This allows insertion at the tip of the greater trochanter.

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**Optimal stress distribution**

The flexible PFNA tip eases insertion and reduces stress on the bone at the tip of the PFNA.

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**Several distal locking options**

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

- **PFNA short**
  - Static
  - Dynamic

- **PFNA long**
  - Static
  - Dynamic
PFNA Nail
Product range

The PFNA is available in 4 sizes:

- PFNA xs, length 170 mm
- PFNA small, length 200 mm
- PFNA, length 240 mm
- PFNA long, length 300–420 mm, with 20 mm increments, bending radius 1500 mm
**PFNA Blade**

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

**Compaction of cancellous bone**

Inserting the PFNA blade compacts the cancellous bone providing additional anchoring, which is especially important in osteoporotic bone.

![Bone structure before insertion of the PFNA blade.](image1)

![Bone structure after PFNA blade insertion – cancellous bone is compacted providing additional anchoring to the PFNA blade.](image2)

**Large surface and increasing core diameter guarantee maximum compaction and optimal hold in bone**

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

![PFNA Blade](image3)

**Lateral locking – fast and reliable insertion of the PFNA blade**

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

![PFNA blade unlocked](image4)

![PFNA blade locked](image5)
In 1958, the AO formulated four basic principles\(^1\), \(^2\), 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 or using a reduction table. 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.

**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 probably stimulates the revascularisation and therefore the bone healing.

**Early, active mobilization**
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.

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Indications and Contraindications

PFNA 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 long (Length 300 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 technique guide (036.000.708) and concept flyer (036.001.017).
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
Use the preoperative planner template for the PFNA 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.
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.
Confirm nail length and diameter

<table>
<thead>
<tr>
<th>Instrument</th>
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</thead>
<tbody>
<tr>
<td>309.602 Radiographic Ruler for PFNA</td>
</tr>
</tbody>
</table>

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.

**Important**

- It is recommended that all fractures are treated with the longest nail possible, taking into account patient anatomy or a previous implant.
- Standard PFNA (length 240 mm) may be too long for small stature people.
- For fractures extending below the lesser trochanter always use a long nail.
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 (352.032) or use the depth gauge (351.717 and 351.719) in combination with the SynReam reaming rod ◊ 2.5 mm, length 950 mm (352.032).

Place the radiographic canal width estimator 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.

Notes

– The ruler provides only an estimate of the canal diameter as it is not at the same level as the femur.
– If the reamed technique is used, the diameter of the largest medullary reamer applied must be 0.5 mm to 1.5 mm larger than the nail diameter.
– Always choose the largest diameter nail that fits into the intramedullary canal (◊ 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.
1

**Determine entry point**

- In AP view, the PFNA 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 is $6^\circ$.

- In lateral view the entry point is in line with the axis of the intramedullary canal.

2

**Insert guide wire**

**Instruments**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>356.830</td>
<td>Guide Wire $\phi$ 3.2 mm, for PFNA Blade</td>
</tr>
<tr>
<td>393.100</td>
<td>Universal Chuck with T-Handle</td>
</tr>
<tr>
<td>357.001</td>
<td>Protection Sleeve 20.0/17.0, for No. 357.005</td>
</tr>
<tr>
<td>309.603</td>
<td>Drill Sleeve 17.0/3.2, for No. 357.001</td>
</tr>
</tbody>
</table>

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.

**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.
3
Open femur

<table>
<thead>
<tr>
<th>Instruments</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>309.600</td>
<td>Drill Bit ( \varnothing 17.0 ) mm, cannulated, for PFNA</td>
</tr>
<tr>
<td>357.001</td>
<td>Protection Sleeve 20.0/17.0, for No. 357.005</td>
</tr>
<tr>
<td>393.100</td>
<td>Universal Chuck with T-Handle</td>
</tr>
</tbody>
</table>

Guide the cannulated 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.

**Note:** 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.
Option: Ream medullary canal

<table>
<thead>
<tr>
<th>Instruments</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>189.060/175.500</td>
<td>SynReam Intramedullary Reaming System</td>
</tr>
<tr>
<td>351.782</td>
<td>Holding Forceps for Reaming Rods</td>
</tr>
</tbody>
</table>

If necessary, enlarge the femoral canal to the desired diameter using the medullary reamer and the corresponding technique guide (036.000.808).

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.

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.
1

Assemble PFNA instruments

<table>
<thead>
<tr>
<th>Instruments</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.405</td>
<td>Insertion Handle, radiolucent, for PFNA</td>
</tr>
<tr>
<td>357.029</td>
<td>Connecting Screw, cannulated, for PFN</td>
</tr>
<tr>
<td>03.023.011</td>
<td>Screwdriver, hexagonal with spherical head 10.0 mm</td>
</tr>
</tbody>
</table>

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

**Important:** Ensure that the connection between PFNA and insertion handle is tight (retighten, if necessary) to avoid deviations when inserting the PFNA blade through the aiming arm. Do not attach the aiming arm yet.
2

Insert PFNA

Use image intensifier control to insert the PFNA.

Carefully insert the PFNA manually using slight bidirectional turns of the insertion handle as far as possible into the femoral opening. If the PFNA cannot be inserted, select a smaller size PFNA 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 insertion depth is reached as soon as the projected PFNA blade is positioned in the center of the femoral head. A too cranial or too caudal PFNA position should be avoided as it can lead to malposition of the PFNA 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.

Remove all guide wires. Do not reuse. Dispose of the guide wires.

**Important:** Always ensure that the PFNA is firmly attached to the insertion handle.
Optional instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.424</td>
<td>Connector for Insertion Handle for PFNA</td>
</tr>
<tr>
<td>03.010.124</td>
<td>Combined Hammer 500 g, can be mounted, for No. 357.117</td>
</tr>
<tr>
<td>357.071</td>
<td>Hammer Guide, for No. 357.026</td>
</tr>
</tbody>
</table>

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.

**Important:** Use only light blows on the connector for insertion handle. Avoid unnecessary use of force to prevent loss of reduction or an iatrogenic fracture.
Choose aiming arm for PFNA blade insertion

**Instruments**

<table>
<thead>
<tr>
<th>Item Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.406</td>
<td>Aiming Arm 125°, for PFNA Blade</td>
</tr>
<tr>
<td>03.010.407</td>
<td>Aiming Arm 130°, for PFNA Blade</td>
</tr>
<tr>
<td>03.010.408</td>
<td>Aiming Arm 135°, for PFNA Blade</td>
</tr>
<tr>
<td>03.010.470</td>
<td>Plug for Aiming Arm</td>
</tr>
</tbody>
</table>

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

Mount the appropriate aiming arm based on the chosen CCD angle of the PFNA 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

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>356.817</td>
<td>Buttress/Compression Nut, for PFNA Blade</td>
</tr>
<tr>
<td>356.818</td>
<td>Protection Sleeve 16.0/11.0, for PFNA Blade</td>
</tr>
<tr>
<td>356.819</td>
<td>Drill Sleeve 11.0/3.2, for PFNA Blade</td>
</tr>
<tr>
<td>356.820</td>
<td>Trocar Ø 3.2 mm, for PFNA Blade, gold</td>
</tr>
</tbody>
</table>

Screw the buttress nut on the golden 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 golden drill sleeve and the golden 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.

**Important:** Ensure that the sleeve assembly clicks into the aiming arm, otherwise it will not guarantee the exact position of the PFNA blade.
3 Option: Position guide wire with aiming device

Instruments

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.412</td>
<td>Aiming Device for Guide Wire, for PFNA and TFN, for AP Orientation</td>
</tr>
<tr>
<td>03.010.414</td>
<td>Connecting Screw for PFNA, for No. 03.010.412</td>
</tr>
</tbody>
</table>

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 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.
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\(^1\)).

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

\(^1\)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 golden drill sleeve.

**Important:** 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.

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

**Important:** If the PFNA 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 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. Reinsert the guide wire.
Optional technique for antirotation wires

**Instruments**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>356.826</td>
<td>Aiming Jig for Anti-rotation Wire</td>
</tr>
<tr>
<td>356.827</td>
<td>Drill Sleeve 5.6/3.2, for No. 356.826</td>
</tr>
<tr>
<td>356.830</td>
<td>Guide Wire Ø 3.2 mm, for PFNA Blade</td>
</tr>
</tbody>
</table>

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

After having inserted the guide wire into the femoral head, secure the aiming jig for antirotation wire either anterior or posterior to the aiming arm. Secure the position of the antirotation 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.
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 antirotation wire will approach, but not touch the blade tip. This antirotation wire fixes the femoral head only temporarily and will be removed after the insertion of the blade.
5
Measure the PFNA 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 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 blade length correctly.

Remove the measuring device.

Carefully remove the golden drill sleeve without changing the position of the guide wire.
6
Open lateral cortex for PFNA blade insertion

**Instrument**

| 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.

**Important:** 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 blade

**Instruments**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>356.821</td>
<td>Reamer ø 11.0 mm, for PFNA Blade</td>
</tr>
<tr>
<td>357.046</td>
<td>Fixation Sleeve, for No. 357.045</td>
</tr>
</tbody>
</table>

**Important:** 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.

**Note:** 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 blade on the impactor

**Instrument**

- 03.010.410 Impactor for PFNA Blade

The PFNA blade is supplied in a locked state.

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

**Important:** The tip of the PFNA blade must rotate freely after attaching it to the impactor. This is essential for the implantation of the PFNA blade. Otherwise remove and dispose of the blade. Do not overtighten the connection between the impactor and the PFNA blade.
Insert PFNA blade

**Instrument**

| 03.010.124 | Combined Hammer 500 g, 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.
Use monitoring during insertion of the PFNA blade.

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

**Important:** 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 blade.
10

Lock PFNA blade

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

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

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

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

**Important**
- The blade must be locked to apply intraoperative compression.
- Control compression under image intensifier control.
- Do not use excessive force in order to avoid pulling out the blade from the femoral head.

**Note:** The blade may be slightly overinserted before applying intraoperative compression (see correction of insertion depth of PFNA blade, page 51) to prevent it from sticking out laterally.

Release strain by turning the buttress nut clockwise.

Remove the compression instrument. Verify PFNA blade locking under image intensifier control. The PFNA 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 Short
*(Length 170 mm – 240 mm)*

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

<table>
<thead>
<tr>
<th>PFNA short</th>
<th>Static</th>
<th>Dynamic</th>
</tr>
</thead>
</table>

### Distal Locking for PFNA Long
*(Length 300 mm – 420 mm)*

The PFNA long (Length 300 mm – 420 mm) additionally allows for secondary dynamization.

Distal locking of PFNA long is performed with the freehand technique. Alternatively distal locking can be performed using the SureLock System and the corresponding technique guide (036.000.778).

<table>
<thead>
<tr>
<th>PFNA long</th>
<th>Static</th>
<th>Dynamic</th>
</tr>
</thead>
</table>
Locking implants for distal locking

Distal locking for PFNA described in this technique guide is using the 4.9 mm locking bolts and the corresponding instruments (68.027.002.03: Insert 1, for 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 (68.027.002.04: Insert 1, for 5.0 mm locking screws, from instrument set 01.027.102) for distal locking of the PFNA.

See table below for corresponding instruments.

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

<table>
<thead>
<tr>
<th>Locking Bolts ø 4.9 mm</th>
<th>Locking Screws ø 5.0 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part No. Description</td>
<td>Part No. Description</td>
</tr>
<tr>
<td>356.834 Drill Bit ø 4.0 mm, for PFNA</td>
<td>03.010.061 Drill Bit ø 4.2 mm, length 340 mm, for Quick Coupling</td>
</tr>
<tr>
<td>356.831 Protection Sleeve 11.0/8.0, green</td>
<td>03.025.040 Protection Sleeve 11.0/8.0</td>
</tr>
<tr>
<td>356.828 Drill Sleeve 8.0/4.0, green</td>
<td>03.010.065 Drill Sleeve 8.0/4.2</td>
</tr>
<tr>
<td>356.833 Trocar ø 4.0 mm, green</td>
<td>03.010.070 Trocar ø 4.2 mm</td>
</tr>
<tr>
<td>356.835 Measuring Device for Locking Bolt</td>
<td>03.010.428 Depth Gauge for Locking Screws</td>
</tr>
<tr>
<td>314.260 Screwdriver, hexagonal, large, ø 3.5 mm, length 300 mm</td>
<td>03.010.107 Screwdriver Stardrive, T25, length 330 mm</td>
</tr>
</tbody>
</table>

### Long PFNA Nails (300 mm – 420 mm)

<table>
<thead>
<tr>
<th>Locking Bolts ø 4.9 mm</th>
<th>Locking Screws ø 5.0 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part No. Description</td>
<td>Part No. Description</td>
</tr>
<tr>
<td>356.834 Drill Bit ø 4.0 mm, for PFNA</td>
<td>03.010.101 Drill Bit ø 4.2 mm, length 145 mm, with Coupling for RDL</td>
</tr>
<tr>
<td>356.835 Measuring Device for Locking Bolt</td>
<td>03.010.019 Depth Gauge for Locking Screws, short</td>
</tr>
<tr>
<td>314.260 Screwdriver, hexagonal, large, ø 3.5 mm, length 300 mm</td>
<td>03.010.362 Screwdriver Stardrive, T25, length 275 mm</td>
</tr>
<tr>
<td>314.280 Holding Sleeve, large</td>
<td>03.010.112 Holding Sleeve, with Locking Device</td>
</tr>
</tbody>
</table>
Distal Locking for PFNA Short  
(Length 170 mm–240 mm)

1  
Choose aiming arm for distal locking

Distal locking of PFNA 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.

<table>
<thead>
<tr>
<th>Nail length</th>
<th>Locking</th>
<th>Aiming arm</th>
</tr>
</thead>
<tbody>
<tr>
<td>170–240 mm</td>
<td>Static</td>
<td>03.010.406 Aiming Arm 125°, for PFNA Blade</td>
</tr>
<tr>
<td>170–240 mm</td>
<td>Static</td>
<td>03.010.407 Aiming Arm 130°, for PFNA Blade</td>
</tr>
<tr>
<td>170–240 mm</td>
<td>Static</td>
<td>03.010.408 Aiming Arm 135°, for PFNA Blade</td>
</tr>
<tr>
<td>170–240 mm</td>
<td>Dynamic</td>
<td>03.010.409 Aiming Arm, for dynamic locking of PFNA</td>
</tr>
</tbody>
</table>

2  
Option A: Static distal locking of PFNA 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 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. Remove the trocar.
**Option B: Dynamic distal locking of PFNA short**

### Instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.409</td>
<td>PFNA Aiming Arm for dynamic locking</td>
</tr>
<tr>
<td>356.831</td>
<td>Protection Sleeve 11.0/8.0, green</td>
</tr>
<tr>
<td>356.828</td>
<td>Drill Sleeve 8.0/4.0, green</td>
</tr>
<tr>
<td>356.833</td>
<td>Trocar Ø 4.0 mm, green</td>
</tr>
</tbody>
</table>

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

Remove the aiming arm for PFNA 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. Remove the trocar.
3
Drill

Instrument

| 356.834 | Drill Bit Ø 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.

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.

**Important:** 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, insertion handle and aiming arm is good, otherwise drilling for distal locking may damage the PFNA.
Determine length of the locking bolt

**Instrument**

<table>
<thead>
<tr>
<th>Instrument Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>356.835</td>
<td>Measuring Device for Locking Bolt</td>
</tr>
</tbody>
</table>

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

Advance the depth gauge through the protection sleeve and 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, \( \varnothing \) 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 Long
(Length 300 mm – 420 mm)

1
Align C-arm

- Check reduction, then 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.
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 (036.000.708) and concept flyer (036.001.017). Please note that for the use of ASLS special instruments are required.

Instrument

| 511.417 | Drill Bit Ø 4.0 mm with centering tip, length 148/122 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.

Tip: 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

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>356.835</td>
<td>Measuring Device for Locking Bolt</td>
</tr>
<tr>
<td>314.260</td>
<td>Screwdriver, hexagonal, large, Ø 3.5 mm, with Groove, length 300 mm</td>
</tr>
<tr>
<td>314.280</td>
<td>Holding Sleeve, large, for Nos. 314.190, 314.240, 314.260, 314.270 and 314.750</td>
</tr>
</tbody>
</table>

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.
1

Remove PFNA instruments

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.023.011</td>
<td>Screwdriver, hexagonal with spherical head Ø 10.0 mm</td>
</tr>
</tbody>
</table>

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

**Tip:** 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

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>356.717</td>
<td>Guide Wire Ø 2.8 mm, length 460 mm, with Hook</td>
</tr>
<tr>
<td>03.023.001</td>
<td>Screwdriver Stardrive with spherical head, T40, cannulated, length 300 mm</td>
</tr>
</tbody>
</table>

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 blade**

**Instruments**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>356.830</td>
<td>Guide Wire Ø 3.2 mm, for PFNA Blade</td>
</tr>
<tr>
<td>03.010.411</td>
<td>Extraction Screw for PFNA Blade</td>
</tr>
<tr>
<td>03.010.124</td>
<td>Combined Hammer 500 g, can be mounted</td>
</tr>
<tr>
<td>356.832</td>
<td>Key for PFNA Blade</td>
</tr>
</tbody>
</table>

*Note:* Implant removal is an elective procedure.

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

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

**Tips**

- If the extraction of the PFNA blade is difficult, remove the locking bolt and the end cap, screw the hammer guide into the PFNA 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 blade is not possible with the standard instruments use the special instruments from the PFNA/PFNA-II Blade Extraction Set (01.010.181) and the corresponding technique guide (036.000.489).

## 2
### Remove end cap

#### Instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>356.717</td>
<td>Guide Wire Ø 2.8 mm, length 460 mm, with Hook</td>
</tr>
<tr>
<td>356.715</td>
<td>Socket, hexagonal, Ø 11.0/11.0 mm, cannulated, for AFN</td>
</tr>
<tr>
<td>321.160</td>
<td>Combination Wrench Ø 11.0 mm</td>
</tr>
</tbody>
</table>

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**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>357.071</td>
<td>Hammer Guide, for No. 357.026</td>
</tr>
<tr>
<td>314.260</td>
<td>Screwdriver, hexagonal, ( \varnothing 3.5 \text{ mm} ), with Groove, length 300 mm</td>
</tr>
<tr>
<td>314.280</td>
<td>Holding Sleeve, large, for Nos. 314.190, 314.240, 314.260, 314.270 and 314.750</td>
</tr>
<tr>
<td>03.010.124</td>
<td>Combined Hammer 500 g, can be mounted</td>
</tr>
</tbody>
</table>

Before removing the locking bolt, screw the hammer guide into the PFNA 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 handling technique (036.000.918) is recommended.

Extract the nail by applying gentle blows with the hammer.

**Note:** Remove the locking bolt after screwing the hammer guide into the PFNA. Thereby a rotation of the PFNA in the bone will be avoided.
Correction of Insertion Depth of PFNA Blade

Instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.411</td>
<td>Extraction Screw for PFNA Blade</td>
</tr>
<tr>
<td>03.010.124</td>
<td>Combined Hammer 500 g, can be mounted</td>
</tr>
</tbody>
</table>

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 blade (note “attach” marking).

Advance the now unlocked PFNA 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 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 blade and removing the extraction screw.

- Verify PFNA blade locking intraoperatively.

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

Intra- and postoperative cleaning

<table>
<thead>
<tr>
<th>Instruments</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>319.460</td>
<td>Cleaning Stylet ∅ 2.8 mm, for Cannulated Instruments</td>
</tr>
<tr>
<td>357.009</td>
<td>Cleaning Stylet ∅ 2.8 mm, length 450 mm, for Cannulated Instruments</td>
</tr>
<tr>
<td>319.240</td>
<td>Cleaning Brush ∅ 2.9 mm, for Cannulated Instruments</td>
</tr>
</tbody>
</table>

Use the 2.8 mm stylet or the long 2.8 mm cleaning stylet (length 450 mm) for intraoperative cleaning of the instrument cannulations. Clean the instruments postoperatively with the 2.8 mm stylet and the 2.9 mm cleaning brush for cannulated instruments.
### PFNA Nails

<table>
<thead>
<tr>
<th>Material:</th>
<th>Ti-6Al-7Nb (TAN), color: gold Stainless Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameters:</td>
<td>Proximal:</td>
</tr>
<tr>
<td></td>
<td>Ø 16.5 mm (XS and small)</td>
</tr>
<tr>
<td></td>
<td>Ø 17.0 mm (standard and long)</td>
</tr>
<tr>
<td>Distal:</td>
<td>Ø 9–12 mm with 1 mm increments (short nails)</td>
</tr>
<tr>
<td></td>
<td>Ø 9, Ø 10, Ø 12, Ø 14 mm (long nails)</td>
</tr>
<tr>
<td>Lengths:</td>
<td>Short nails:</td>
</tr>
<tr>
<td></td>
<td>170 mm xs</td>
</tr>
<tr>
<td></td>
<td>200 mm small</td>
</tr>
<tr>
<td></td>
<td>240 mm standard</td>
</tr>
<tr>
<td></td>
<td>(one nail for left and right)</td>
</tr>
<tr>
<td>Long nails:</td>
<td>300 mm – 420 mm</td>
</tr>
<tr>
<td></td>
<td>(left and right nails, 20 mm increments)</td>
</tr>
<tr>
<td>CCD-Angle:</td>
<td>125° and 130°</td>
</tr>
<tr>
<td></td>
<td>Additionally 135° for standard nails</td>
</tr>
<tr>
<td>Cannulation:</td>
<td>All nails are cannulated</td>
</tr>
</tbody>
</table>
### PFNA Extra Small, length 170 mm

<table>
<thead>
<tr>
<th>Distal diameter (mm)</th>
<th>Angle</th>
<th>TAN</th>
<th>SSt</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>125°</td>
<td>472.436S</td>
<td>272.436S</td>
</tr>
<tr>
<td>10</td>
<td>125°</td>
<td>472.385S</td>
<td>272.385S</td>
</tr>
<tr>
<td>11</td>
<td>125°</td>
<td>472.386S</td>
<td>272.386S</td>
</tr>
<tr>
<td>12</td>
<td>125°</td>
<td>472.387S</td>
<td>272.387S</td>
</tr>
<tr>
<td>9</td>
<td>130°</td>
<td>472.437S</td>
<td>272.437S</td>
</tr>
<tr>
<td>10</td>
<td>130°</td>
<td>472.390S</td>
<td>272.390S</td>
</tr>
<tr>
<td>11</td>
<td>130°</td>
<td>472.391S</td>
<td>272.391S</td>
</tr>
<tr>
<td>12</td>
<td>130°</td>
<td>472.392S</td>
<td>272.392S</td>
</tr>
</tbody>
</table>

### PFNA Small, length 200 mm

<table>
<thead>
<tr>
<th>Distal diameter (mm)</th>
<th>Angle</th>
<th>TAN</th>
<th>SSt</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>125°</td>
<td>472.430S</td>
<td>272.430S</td>
</tr>
<tr>
<td>10</td>
<td>125°</td>
<td>472.370S</td>
<td>272.370S</td>
</tr>
<tr>
<td>11</td>
<td>125°</td>
<td>472.371S</td>
<td>272.371S</td>
</tr>
<tr>
<td>12</td>
<td>125°</td>
<td>472.372S</td>
<td>272.372S</td>
</tr>
<tr>
<td>9</td>
<td>130°</td>
<td>472.431S</td>
<td>272.431S</td>
</tr>
<tr>
<td>10</td>
<td>130°</td>
<td>472.375S</td>
<td>272.375S</td>
</tr>
<tr>
<td>11</td>
<td>130°</td>
<td>472.376S</td>
<td>272.376S</td>
</tr>
<tr>
<td>12</td>
<td>130°</td>
<td>472.377S</td>
<td>272.377S</td>
</tr>
</tbody>
</table>

### PFNA, length 240 mm

<table>
<thead>
<tr>
<th>Distal diameter (mm)</th>
<th>Angle</th>
<th>TAN</th>
<th>SSt</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>125°</td>
<td>472.400S</td>
<td>–</td>
</tr>
<tr>
<td>10</td>
<td>125°</td>
<td>472.260S</td>
<td>272.260S</td>
</tr>
<tr>
<td>11</td>
<td>125°</td>
<td>472.261S</td>
<td>272.261S</td>
</tr>
<tr>
<td>12</td>
<td>125°</td>
<td>472.262S</td>
<td>272.262S</td>
</tr>
<tr>
<td>9</td>
<td>130°</td>
<td>472.401S</td>
<td>–</td>
</tr>
<tr>
<td>10</td>
<td>130°</td>
<td>472.265S</td>
<td>272.265S</td>
</tr>
<tr>
<td>11</td>
<td>130°</td>
<td>472.266S</td>
<td>272.266S</td>
</tr>
<tr>
<td>12</td>
<td>130°</td>
<td>472.267S</td>
<td>272.267S</td>
</tr>
<tr>
<td>10</td>
<td>135°</td>
<td>472.270S</td>
<td>272.270S</td>
</tr>
<tr>
<td>11</td>
<td>135°</td>
<td>472.271S</td>
<td>272.271S</td>
</tr>
<tr>
<td>12</td>
<td>135°</td>
<td>472.272S</td>
<td>272.272S</td>
</tr>
</tbody>
</table>
### PFNA 9.0 mm, long

<table>
<thead>
<tr>
<th>Length (mm)</th>
<th>Angle</th>
<th>TAN right</th>
<th>TAN left</th>
<th>SST right</th>
<th>SST left</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>125°</td>
<td>04.023.100S</td>
<td>04.023.101S</td>
<td>02.023.100S</td>
<td>02.023.101S</td>
</tr>
<tr>
<td>320</td>
<td>125°</td>
<td>04.027.162S</td>
<td>04.027.163S</td>
<td>02.027.162S</td>
<td>02.027.163S</td>
</tr>
<tr>
<td>340</td>
<td>125°</td>
<td>472.410S</td>
<td>472.411S</td>
<td>272.410S</td>
<td>272.411S</td>
</tr>
<tr>
<td>360</td>
<td>125°</td>
<td>04.027.166S</td>
<td>04.027.167S</td>
<td>02.027.166S</td>
<td>02.027.167S</td>
</tr>
<tr>
<td>380</td>
<td>125°</td>
<td>04.027.168S</td>
<td>04.027.169S</td>
<td>272.416S</td>
<td>272.417S</td>
</tr>
<tr>
<td>400</td>
<td>125°</td>
<td>04.027.170S</td>
<td>04.027.171S</td>
<td>02.027.170S</td>
<td>02.027.171S</td>
</tr>
<tr>
<td>420</td>
<td>125°</td>
<td>04.027.172S</td>
<td>04.027.173S</td>
<td>272.422S</td>
<td>272.423S</td>
</tr>
<tr>
<td>300</td>
<td>130°</td>
<td>04.023.104S</td>
<td>04.023.105S</td>
<td>02.023.104S</td>
<td>02.023.105S</td>
</tr>
<tr>
<td>320</td>
<td>130°</td>
<td>04.027.182S</td>
<td>04.027.183S</td>
<td>02.027.182S</td>
<td>02.027.183S</td>
</tr>
<tr>
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### PFNA 10.0 mm, long

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<th>SSt left</th>
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<td>02.027.247S</td>
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<td>02.027.253S</td>
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<td>02.027.269S</td>
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<td>02.027.271S</td>
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<td>04.027.272S</td>
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### PFNA 14.0 mm, long

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<th>TAN left</th>
<th>SSt right</th>
<th>SSt left</th>
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<td>02.027.301S</td>
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<td>02.027.303S</td>
</tr>
<tr>
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<td>130°</td>
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<td>02.027.305S</td>
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<td>02.027.307S</td>
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<tr>
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<td>130°</td>
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<td>04.027.309S</td>
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<td>02.027.309S</td>
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<td>130°</td>
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<td>130°</td>
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PFNA Blades

Material: Ti-6Al-7Nb (TAN), color: gold

Stainless Steel

Lengths: 75–130 mm (5 mm increments)

Cannulation: All blades are cannulated

<table>
<thead>
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<th>Length (mm)</th>
<th>TAN</th>
<th>SSSt</th>
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<td>85</td>
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<td>02.027.012S</td>
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<tr>
<td>90</td>
<td>04.027.013S</td>
<td>02.027.013S</td>
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<td>02.027.014S</td>
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<tr>
<td>130</td>
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</table>
PFNA End Caps
Used to protect nail threads from tissue ingrowth

<table>
<thead>
<tr>
<th>Material:</th>
<th>Ti-6Al-7Nb (TAN), color: gold Stainless Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lengths:</td>
<td>0 mm – sits flush with end of nail</td>
</tr>
<tr>
<td></td>
<td>5, 10 and 15 mm extensions – extend nail</td>
</tr>
<tr>
<td></td>
<td>height if nail is overinserted</td>
</tr>
<tr>
<td>Cannulation:</td>
<td>All end caps are cannulated</td>
</tr>
<tr>
<td>Design:</td>
<td>Stardrive T40/hexagonal recess Ø 11 mm</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>PFNA End Caps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extension (mm)</td>
</tr>
<tr>
<td>0</td>
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<tr>
<td>5</td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td>15</td>
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</tbody>
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### Locking Bolts

<table>
<thead>
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<th>Material:</th>
<th>Ti-6Al-7Nb (TAN), color: light green Stainless Steel</th>
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<tbody>
<tr>
<td>Drill:</td>
<td>☞ 4.0 mm</td>
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<tr>
<td>Lengths:</td>
<td>26 – 60 mm (2 mm increments)</td>
</tr>
<tr>
<td></td>
<td>60 – 80 mm (4 mm increments)</td>
</tr>
<tr>
<td></td>
<td>80 – 100 mm (5 mm increments)</td>
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<tr>
<td>Design:</td>
<td>Hexagonal recess ☞ 3.5 mm</td>
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### Locking Bolt ☞ 4.9 mm, self-tapping

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<td>259.320</td>
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### Locking Bolt ☞ 4.9 mm, self-tapping

<table>
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<tr>
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*Available non-sterile or sterile packed. Add “S” to the article number to order sterile products.*
**PFNA Blades**

| Material: Ti-6Al-7Nb (TAN), color: gold Stainless Steel |
| Lengths: 80–120 mm (5 mm increments) |
| Cannulation: All blades are cannulated |

<table>
<thead>
<tr>
<th>PFNA Blades</th>
<th></th>
</tr>
</thead>
<tbody>
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<td>Length (mm)</td>
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<tr>
<td>90</td>
<td>456.714S</td>
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<tr>
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<td>456.715S</td>
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<tr>
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<td>456.716S</td>
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<td>456.719S</td>
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<tr>
<td>120</td>
<td>456.720S</td>
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</table>
PFNA End Caps
Used to protect nail threads from tissue ingrowth

- **Material:** Ti-6Al-7Nb (TAN), color: gold
- **Stainless Steel**

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

- **Cannulation:** All end caps are cannulated

- **Design:** Hexagonal recess ø 4.0 mm/ø 11.0 mm

---

### PFNA End Caps

<table>
<thead>
<tr>
<th>Extension (mm)</th>
<th>TAN</th>
<th>SSSt</th>
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<td>473.156S</td>
<td>273.156S</td>
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<tr>
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<td>473.157S</td>
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<tr>
<td>15</td>
<td>473.158S</td>
<td>273.158S</td>
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**Locking Screws**

<table>
<thead>
<tr>
<th>Material:</th>
<th>Ti-6Al-7Nb (TAN), color: light green</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drill:</td>
<td>(\Phi) 4.2 mm</td>
</tr>
<tr>
<td>Lengths:</td>
<td>26 mm – 80 mm (2 mm increments)</td>
</tr>
<tr>
<td></td>
<td>85 mm – 100 mm (5 mm increments)</td>
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<tr>
<td>Design:</td>
<td>Stardrive T25 recess</td>
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</tbody>
</table>

**Locking Screw Stardrive \(\Phi\) 5.0 mm, for Medullary Nails**

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<tr>
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<td>34</td>
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<td>36</td>
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*Available non-sterile or sterile packed. Add “S” to the article number to order sterile products.*
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<td>309.600</td>
<td>Drill Bit Ø 17.0 mm, cannulated, for PFNA</td>
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<td>309.602</td>
<td>Radiographic Ruler for PFNA</td>
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<td>309.603</td>
<td>Drill Sleeve 17.0/3.2, for No. 357.001</td>
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<td>314.260</td>
<td>Screwdriver, hexagonal, large, Ø 3.5 mm, with Groove, length 300 mm</td>
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<td>314.280</td>
<td>Holding Sleeve, large, for Nos. 314.190, 314.240, 314.260, 314.270 and 314.750</td>
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<td>321.160</td>
<td>Combination Wrench Ø 11.0 mm</td>
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<td>321.170</td>
<td>Pin Wrench Ø 4.5 mm, length 120 mm</td>
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<td>Socket, hexagonal, Ø 11.0/11.0 mm, cannulated, for AFN</td>
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<td>356.717</td>
<td>Guide Wire Ø 2.8 mm, length 460 mm, with Hook</td>
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<td>356.817</td>
<td>Buttress/Compression Nut, for PFNA Blade</td>
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<td>356.818</td>
<td>Protection Sleeve 16.0/11.0 for PFNA Blade</td>
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<td>356.819</td>
<td>Drill Sleeve 11.0/3.2, for PFNA Blade</td>
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<td>356.820</td>
<td>Trocar Ø 3.2 mm, for PFNA Blade, gold</td>
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<tr>
<td>356.821</td>
<td>Reamer Ø 11 mm, for PFNA Blade</td>
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<td>356.822</td>
<td>Drill Bit Ø 11 mm, for PFNA Blade</td>
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<td>Aiming Jig for Anti-rotation Wire</td>
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<td>356.827</td>
<td>Drill Sleeve 5.6/3.2, for No. 356.826</td>
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<td>Drill Sleeve 8.0/4.0, green</td>
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<td>356.829</td>
<td>Direct Measuring Device for Guide Wire Ø 3.2 mm</td>
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<td>Guide Wire Ø 3.2 mm, for PFNA Blade</td>
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<td>356.831</td>
<td>Protection Sleeve 11.0/8.0, green</td>
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<td>356.832</td>
<td>Key for PFNA Blade</td>
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<td>356.833</td>
<td>Trocar Ø 4.0 mm, green</td>
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<td>356.834</td>
<td>Drill Bit Ø 4.0 mm, for PFNA</td>
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<tr>
<td>356.835</td>
<td>Measuring Device for Locking Bolt</td>
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<td>357.001</td>
<td>Protection Sleeve 20.0/17.0, for No. 357.005</td>
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<tr>
<td>357.029</td>
<td>Connecting Screw, cannulated, for PFN</td>
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<td>357.046</td>
<td>Fixation Sleeve, for No. 357.045</td>
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<tr>
<td>357.071</td>
<td>Hammer Guide, for No. 357.026</td>
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<tr>
<td>393.100</td>
<td>Universal Chuck with T-Handle</td>
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<td>03.010.124</td>
<td>Combined Hammer 500 g, can be mounted, for No. 357.117</td>
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<td>03.010.405</td>
<td>Insertion Handle, radiolucent, for PFNA</td>
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<tr>
<td>03.010.407</td>
<td>Aiming Arm 130°, for PFNA Blade</td>
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<tr>
<td>03.010.410</td>
<td>Impactor for PFNA Blade</td>
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<tr>
<td>03.010.411</td>
<td>Extraction Screw for PFNA Blade</td>
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<td>03.010.423</td>
<td>Compression Instrument for PFNA Blade</td>
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<td>03.010.424</td>
<td>Connector for Insertion Handle for PFNA</td>
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<td>03.010.470</td>
<td>Plug for Aiming Arm</td>
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<td>03.023.001</td>
<td>Screwdriver Stardrive with spherical head, T40, cannulated, length 300 mm</td>
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<td>03.023.011</td>
<td>Screwdriver, hexagonal with spherical head Ø 10.0 mm, cannulated</td>
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### Optional instruments

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<tr>
<td>319.240</td>
<td>Cleaning Brush Ø 2.9 mm, for Cannulated Instruments</td>
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<td>319.970</td>
<td>Screw Forceps, self-holding, length 85 mm</td>
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<td>351.050</td>
<td>Tissue Protector</td>
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<td>356.830S</td>
<td>Guide Wire Ø 3.2 mm, for PFNA Blade, sterile</td>
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<tr>
<td>357.009</td>
<td>Cleaning Stylet Ø 2.8 mm, length 450 mm, for Cannulated Instruments</td>
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<tr>
<td>03.010.019</td>
<td>Depth Gauge for Locking Screws, short</td>
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<td>03.010.362</td>
<td>Screwdriver Stardrive, T25, length 275 mm</td>
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<tr>
<td>03.010.406</td>
<td>Aiming Arm 125°, for PFNA Blade</td>
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<tr>
<td>03.010.408</td>
<td>Aiming Arm 135°, for PFNA Blade</td>
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<tr>
<td>Instrument Code</td>
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<tr>
<td>03.010.409</td>
<td>PFNA Aiming Arm for dynamic locking</td>
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<tr>
<td>03.010.412</td>
<td>Aiming Device for Guide Wire, for PFNA and TFN, for AP Orientation</td>
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<td>Connecting Screw for PFNA, for No. 03.010.412</td>
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<td>Protection Sleeve 20.0/17.0, for PFNA-II</td>
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<td>Awl for PFNA-II</td>
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<td>03.023.004</td>
<td>Aiming Arm for static locking, for PFNA-II small and extra-small</td>
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<td>03.023.006</td>
<td>Drill Sleeve, for PFNA-II</td>
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<tr>
<td>03.023.010</td>
<td>Drill Bit Ø 16.5 mm, cannulated, flexible, for PFNA-II</td>
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**Alternative instruments**

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<td>314.050</td>
<td>Screwdriver, hexagonal, cannulated, for Cannulated Screws Ø 6.5 and 7.3 mm</td>
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<tr>
<td>321.200</td>
<td>Ratchet Wrench for Nut, hexagonal, 11.0 mm</td>
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<td>356.714</td>
<td>Socket, hexagonal, ⌀ 4.0/11.0 mm, cannulated, for AFN</td>
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<td>356.810</td>
<td>Aiming Arm 125°, for PFNA Blade</td>
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<td>356.811</td>
<td>Aiming Arm 130°, for PFNA Blade</td>
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<td>356.812</td>
<td>Aiming Arm 135°, for PFNA Blade</td>
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<tr>
<td>356.813</td>
<td>Aiming Arm for PFNA Blade 125°, for small and extra-small PFNA</td>
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<tr>
<td>356.814</td>
<td>Aiming Arm for PFNA Blade 130°, for small and extra-small PFNA</td>
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<tr>
<td>356.823</td>
<td>Impactor for PFNA Blade</td>
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<td>PFNA Aiming Arm for dynamic locking</td>
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<td>Extraction Screw for PFNA Blade</td>
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<td>Insertion Handle for PFN</td>
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### Instruments

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<td>Connecting Screw for PFN, for no. 357.012</td>
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<td>357.023</td>
<td>Wrench, hexagonal, with T-Handle, for No. 357.021</td>
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<td>Slotted Hammer 400 g, can be mounted</td>
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<td>Socket, hexagonal, with T-Handle, short</td>
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<td>Connector for PFN, for No. 357.020</td>
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<td>399.420</td>
<td>Hammer 500 g</td>
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<td>Protection Sleeve 11.0/8.0, length 188 mm</td>
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<td>03.010.061</td>
<td>Drill Bit ⊗ 4.2 mm, calibrated, length 340 mm, 3-flute, for Quick Coupling, for No. 03.010.065</td>
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<td>Trocar $\Phi$ 4.2 mm, for No. 03.010.065</td>
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<td>Drill Bit $\Phi$ 4.2 mm, calibrated, length 145 mm, 3-flute, with Coupling for RDL</td>
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<td>03.010.104</td>
<td>Drill Bit $\Phi$ 4.2 mm, calibrated, length 145 mm, 3-flute, for Quick Coupling</td>
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<td>03.010.107</td>
<td>Screwdriver Stardrive, T25, length 330 mm</td>
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<td>03.010.112</td>
<td>Holding Sleeve, with Locking Device</td>
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<td>03.010.125</td>
<td>PFNA Aiming Arm for dynamic locking, for PFNA small and extra-small</td>
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<tr>
<td>03.010.126</td>
<td>Wrench, hexagonal with T-handle</td>
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<td>Depth Gauge for Locking Screws, measuring range up to 110 mm, for No. 03.010.063</td>
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<td>03.010.429</td>
<td>Direct Measuring Device for Drill Bits of length 145 mm, for Nos. 03.010.100 to 03.010.105</td>
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Vario Cases

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<td>01.027.101</td>
<td><strong>Instrument for PFNA for Ø 4.9 mm Locking Bolts in Vario Case</strong></td>
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<td>68.027.001</td>
<td>Vario Case for PFNA Instrument Set (part 1), without Lid, without Contents</td>
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<tr>
<td>68.027.002</td>
<td>Vario Case for PFNA Instrument Set (part 2), without Lid, without Contents</td>
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<tr>
<td>68.027.002.02</td>
<td>Insert 1, for Ø 4.9 mm Locking Bolts, for PFNA Instrument Set (part 2), vor Vario Case No. 68.027.002</td>
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01.027.102  Instrument for PFNA for ⃞ 5.0 mm Locking Screws 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 Contents

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

Optional

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

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

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<td>01.027.110</td>
<td>Instrument for PFNA-II for Ø 4.9 mm Locking Bolts in SynCase</td>
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<tr>
<td>68.027.010</td>
<td>SynCase for Instrument for PFNA-II (part 1)</td>
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<td>SynCase for Instrument for PFNA-II (part 2)</td>
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<tr>
<td>01.027.120</td>
<td>Instrument for PFNA-II for Ø 5.0 mm Locking Screws in SynCase</td>
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## Power Tools

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<td>05.001.201</td>
<td>Battery Handpiece, modular, for Trauma Recon System</td>
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<tr>
<td>05.001.202</td>
<td>Power Module, for Trauma Recon System</td>
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<tr>
<td>05.001.203</td>
<td>Sterile Cover, for Trauma Recon System</td>
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<tr>
<td>05.001.204</td>
<td>Universal Battery Charger II</td>
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<tr>
<td>05.001.205</td>
<td>AO/ASIF Quick Coupling, for Trauma Recon System</td>
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<tr>
<td>05.001.207</td>
<td>Drill Chuck (Reaming Speed), with Key, for Trauma Recon System, clamping range up to $\varnothing$ 7.3 mm</td>
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<tr>
<td>05.001.210</td>
<td>Attachment for Acetabular and Medullary Reaming, for Trauma Recon System</td>
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<tr>
<td>05.001.212</td>
<td>Quick Coupling for Kirschner Wires $\varnothing$ 1.0 to 4.0 mm, for Trauma Recon System</td>
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<td>05.001.213</td>
<td>Quick Coupling for DHS/DCS Triple Reamers, for Trauma Recon System</td>
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<td>05.001.226</td>
<td>Adapter for RDL, for Trauma Recon System</td>
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<tr>
<td>511.300</td>
<td>Radiolucent Drive</td>
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What is ASLS?
The Angular Stable Locking System (ASLS) provides the ability to create a fixed-angle construct to an intramedullary nail. Therefore, it combines the advantages of angular stability and a minimally invasive approach. ASLS together with an intramedullary nail form the principle of the Intramedullary Fixator.

How does ASLS work?
The system consists of a screw with three outer diameters and a resorbable sleeve.

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

During screw advancement, the resorbable sleeve is expanded by the larger middle diameter. Radial expansion of the sleeve and its fixation in the nail creates the angular stability.
ASLS screws
- Titanium alloy*
- Screws ASLS4: Length 26 mm – 80 mm, are compatible with Expert Adolescent Lateral Femoral Nails
- Fully threaded shaft with 3 diameters
  - D1: Provides purchase in reamed near cortex
  - D2: Expands sleeve, providing angular stability
  - D3: Holds unexpanded sleeve for screw insertion, provides purchase in far cortex
- T25 Stardrive recess
- Sterile packaged

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

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

*Titanium-6% aluminum-7% niobium alloy


Regazzoni P Method of Treatment of Proximal Femoral Fractures; Choice of the Implant. Proximal Femoral Fractures, Volume 2, Chapter 7 Part III


Van Vugt AB Osteosynthesis versus Endoprosthesis in Treatment of unstable Intracapsular Hip Fractures in the Elderly. A Randomised Clinical Trial Proximal Femoral Fractures, Volume 2, Chapter 17