

PFNA-II. Proximal Femoral Nail Antirotation.

Surgical Technique



This publication is not intended for
distribution in the USA.

Instruments and implants
approved by the AO Foundation.

 Image intensifier control

Warning

This description alone does not provide sufficient background for direct use of DePuy Synthes products. Instruction by a surgeon experienced in handling these products is highly recommended.

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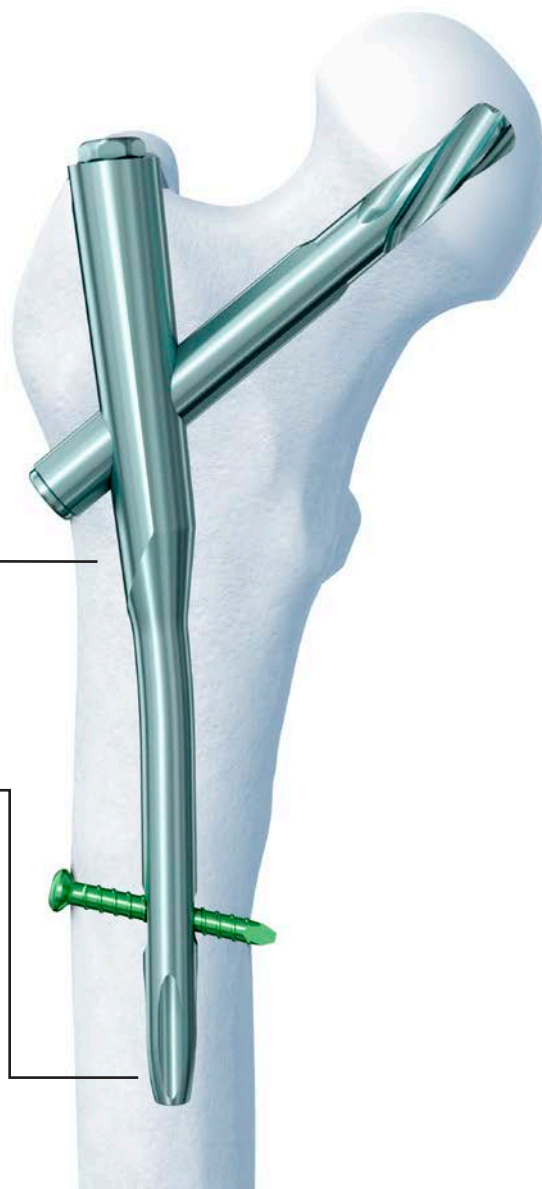
Table of Contents

Introduction	Introduction	2
	AO Principles	5
	Indications and Contraindications	6
	Clinical Cases	7
Surgical Technique	Preoperative Planning	8
	Patient Positioning	9
	Preparation	10
	Open Femur	14
	Insert Nail	19
	Proximal Locking	22
	Distal Locking	40
	– For PFNA-II Short	42
	– For PFNA-II Long	48
	Insert End Cap	51
	Implant Removal	53
	Correction of Insertion Depth of PFNA-II Blade	56
	Cleaning	57
Product Information	Implants	58
	Alternative Implants	64
	Instruments	67
	Cases	76
	Power Tools	80
	Optional: Angular Stable Locking System (ASLS)	81
Bibliography		83
MRI Information		84

PFNA-II. Rapid, reliable and innovative.
Developed for small statured patients.

PFNA-II Nail Excellent fit

- The design is adapted to the anatomical situation in small statured patients.
- The lateral flattened cross-section ease insertion.



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

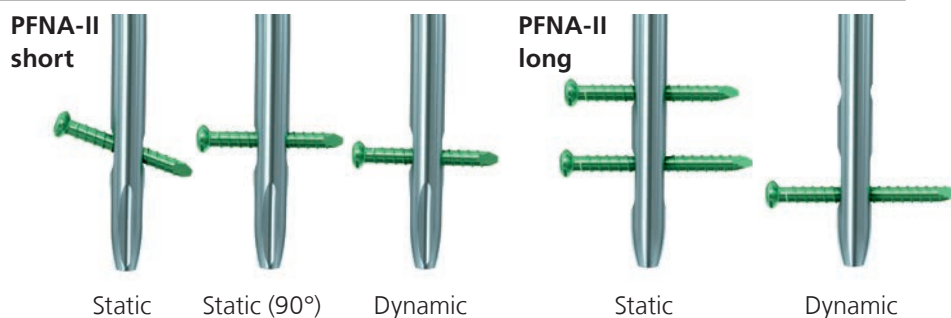
This allows insertion at the tip of the greater trochanter.

Optimal stress distribution

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

Several distal locking options

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



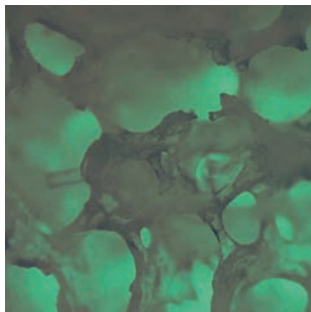
PFNA-II. Proximal Femoral Nail Antirotation.

PFNA-II Blade

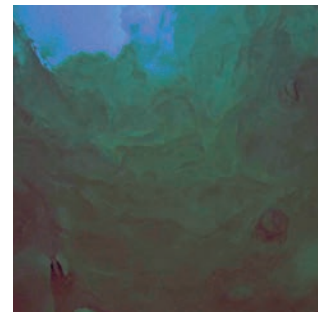
Rotational and angular stability achieved with one single element

Compaction of cancellous bone

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



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.

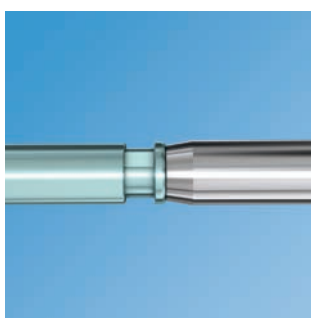
Large surface and increasing core diameter guarantee maximum compaction and optimal hold in bone

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.

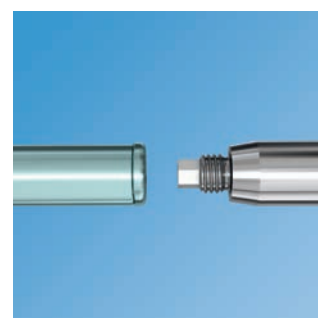


Lateral locking – fast and reliable insertion of the PFNA-II blade

- 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

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.

¹ Müller ME, Allgöwer M, Schneider R, Willenegger H (1995) Manual of Internal Fixation. 3rd, expanded and completely revised ed. 1991. Berlin, Heidelberg, New York: Springer

² Rüedi TP, Buckley RE, Moran CG (2007) AO Principles of Fracture Management. 2nd expanded ed. 2002. Stuttgart, New York: Thieme

Indications and Contraindications

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 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

Preoperative Planning

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

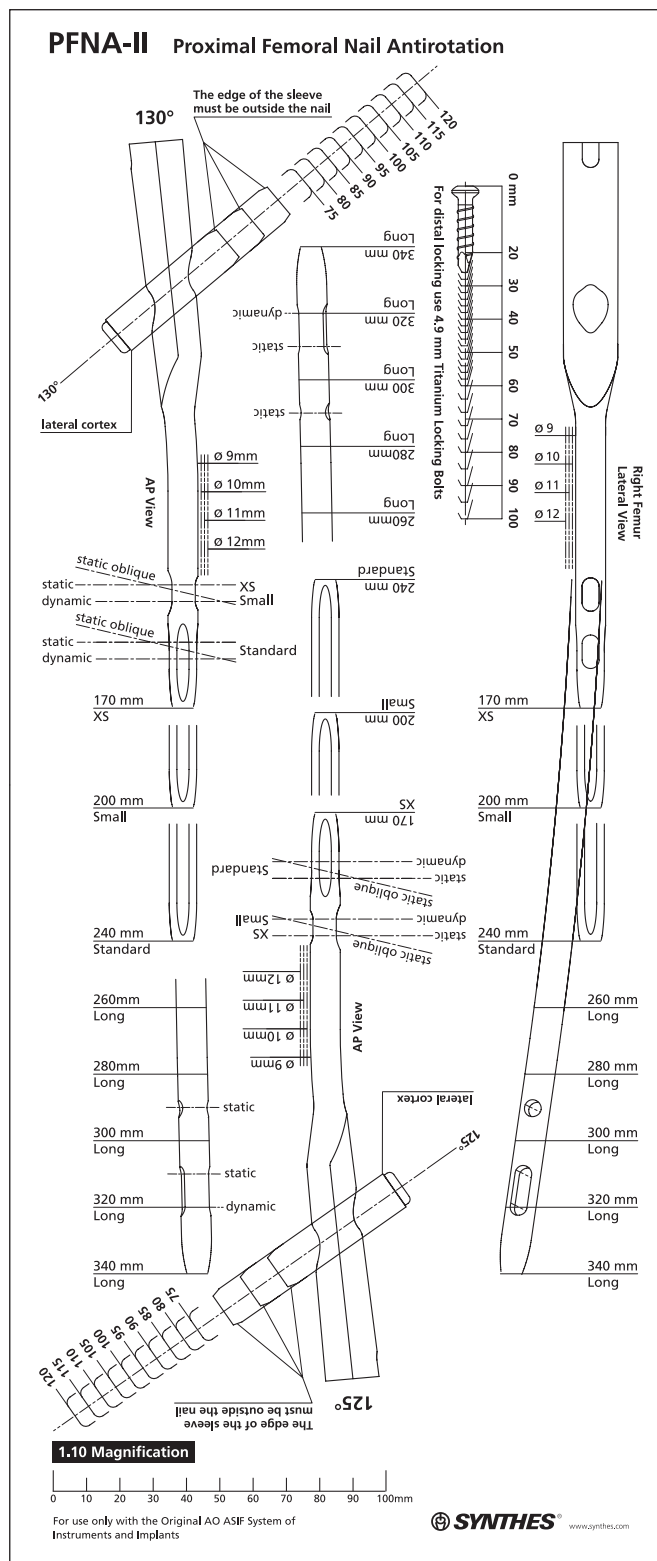
- Take a preoperative AP radiography of the unaffected leg. Determine the CCD angle using a goniometer or the preoperative planning template.

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.

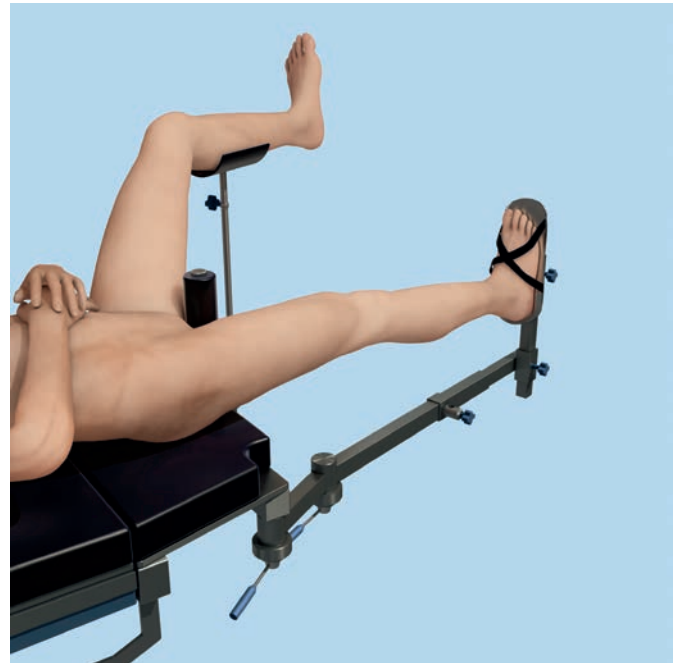
Note: When selecting the nail size, consider canal diameter, fracture pattern, patient anatomy and post-operative protocol.



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.

2

Confirm nail length and diameter

Instrument

309.602	Radiographic Ruler for PFNA
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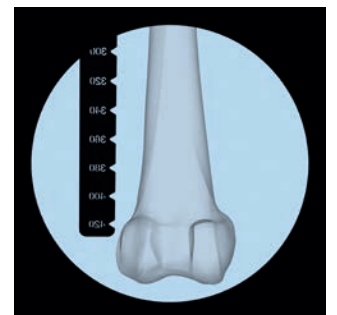
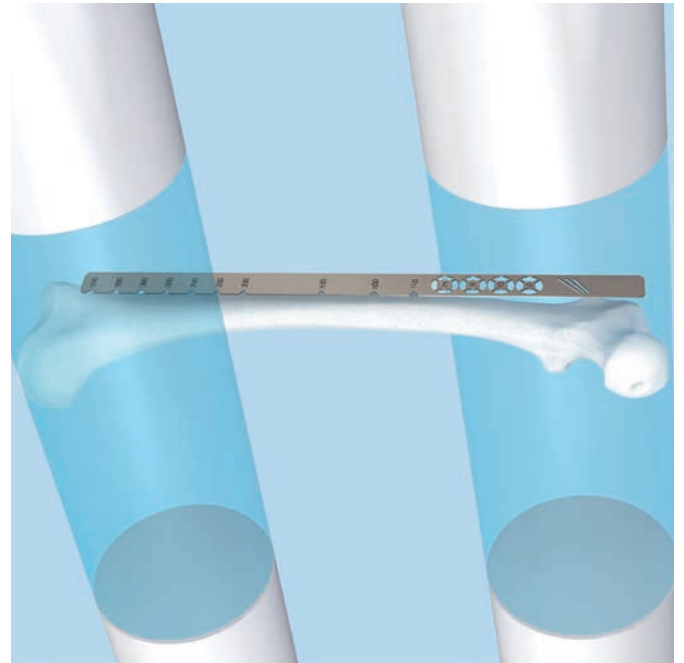
The required nail length must be determined after reduction of the femoral fracture.

- 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.

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-II (length 240 mm) may be too long for small stature people.
 - For fractures extending below the lesser trochanter always use a long nail.
-



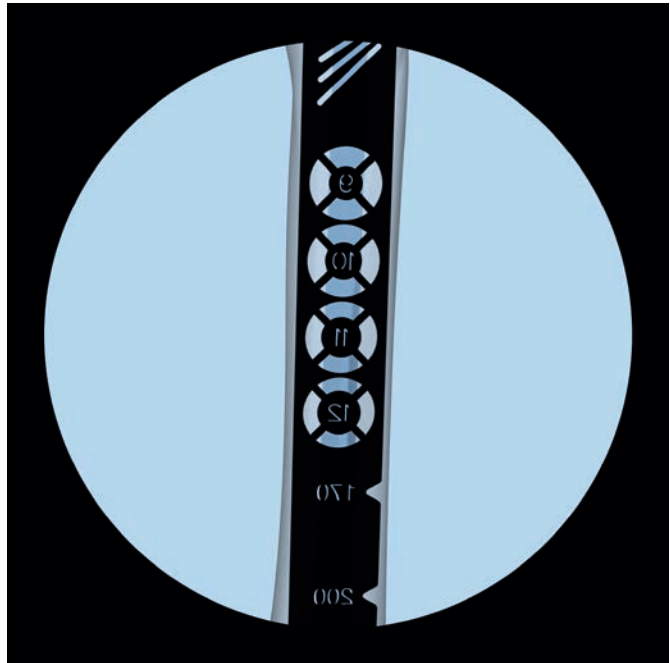
Alternatives

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 \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).

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 (\varnothing 9 mm nails should only be used for an intramedullary canal smaller than 11 mm).
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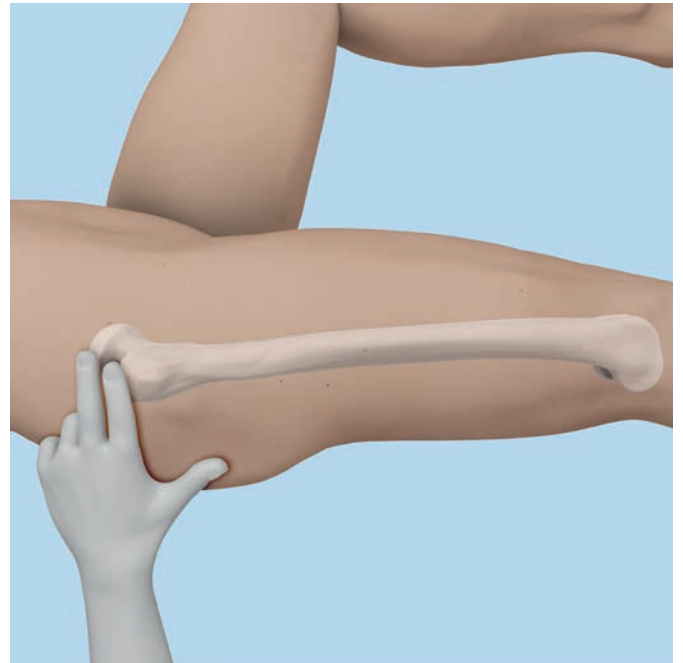


3

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.

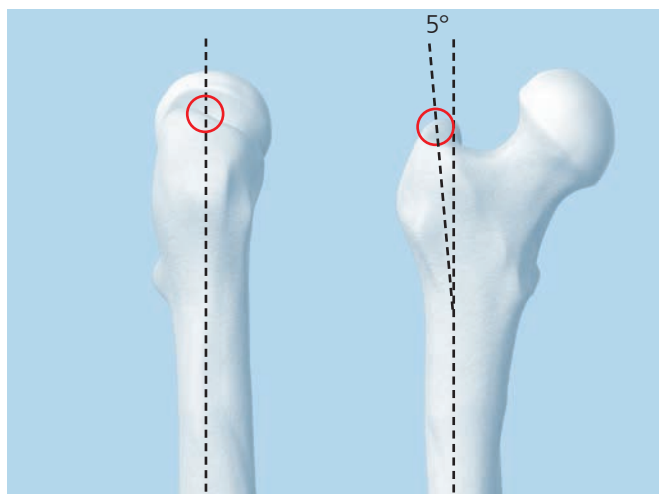


Open Femur

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

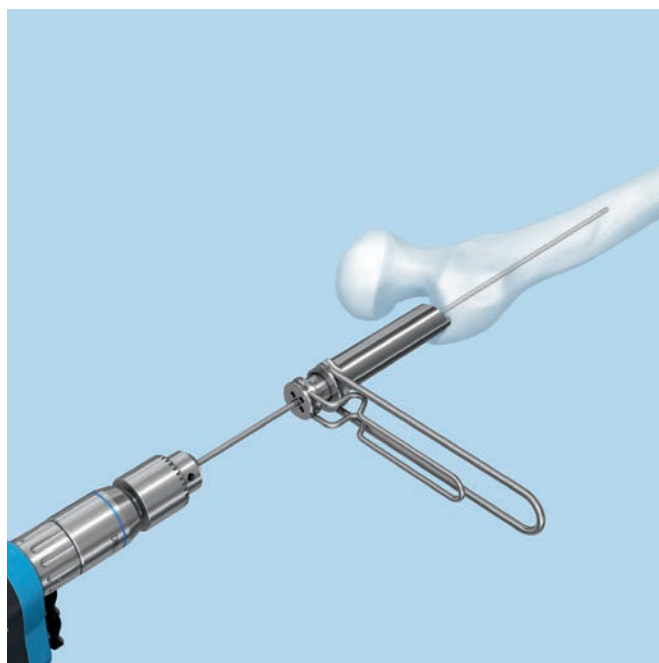
393.100 Universal Chuck with T-Handle

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.



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.

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.

Alternative

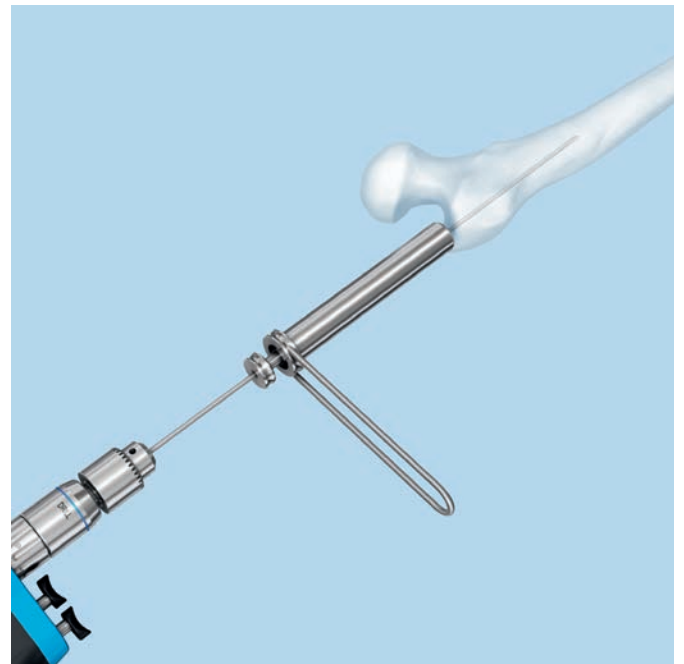
Instruments

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

Important: 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 with the power tool for the proximal part of the PFNA-II nail. 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.



Alternative: Open femur with awl

Instrument

03.023.003	Awl for PFNA-II
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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.



Alternative: Open femur with drill bit

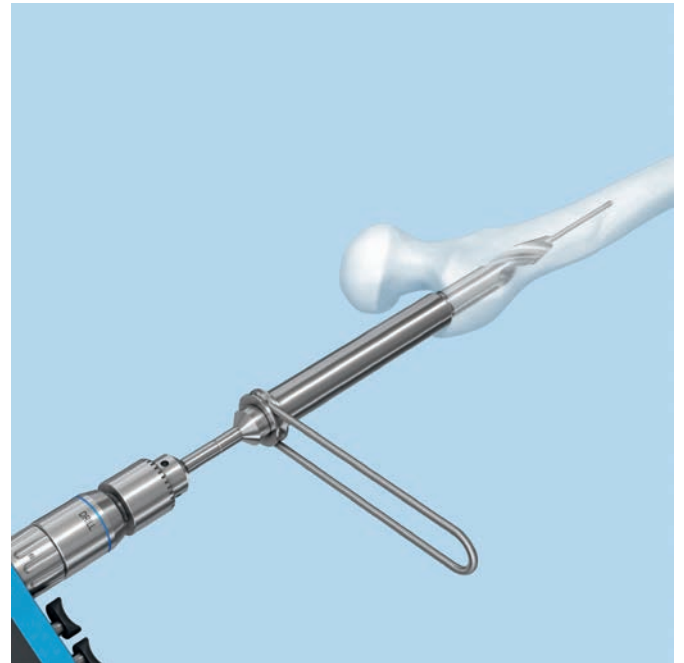
Instruments

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

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

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.

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.



4**Option: Ream medullary canal**

Instruments

189.060/ 175.500	SynReam Intramedullary Reaming System
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351.782	Holding Forceps for Reaming Rods
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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-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.



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

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.

Important: 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

- 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. Do not reuse. Dispose of the guide wires.

Important: Always ensure that the PFNA-II is firmly attached to the insertion handle.



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.

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.



Proximal Locking

1

Choose aiming arm for PFNA-II blade insertion

Instruments

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

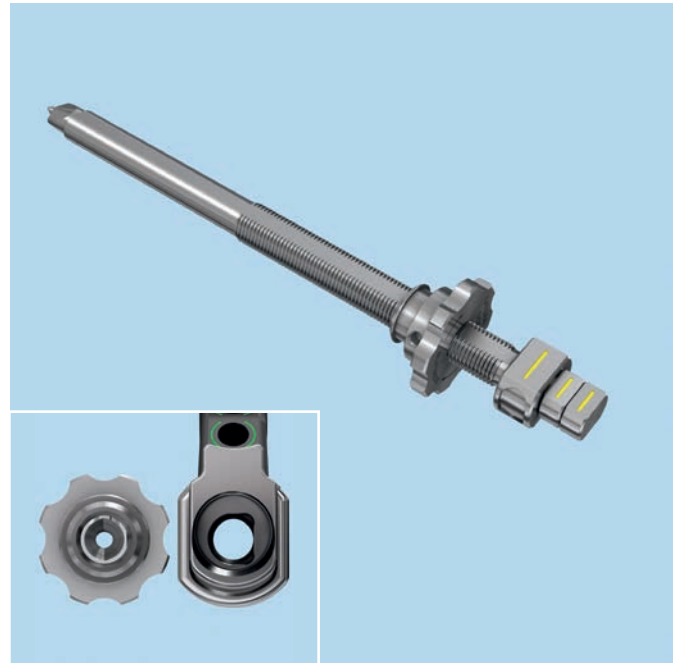
356.817	Buttress/Compression Nut, for PFNA Blade
356.818	Protection Sleeve 16.0/11.0, for PFNA Blade
356.819	Drill Sleeve 11.0/3.2, for PFNA Blade
356.820	Trocar \varnothing 3.2 mm, for PFNA Blade, gold

Screw the buttress nut on the 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-II blade.



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.

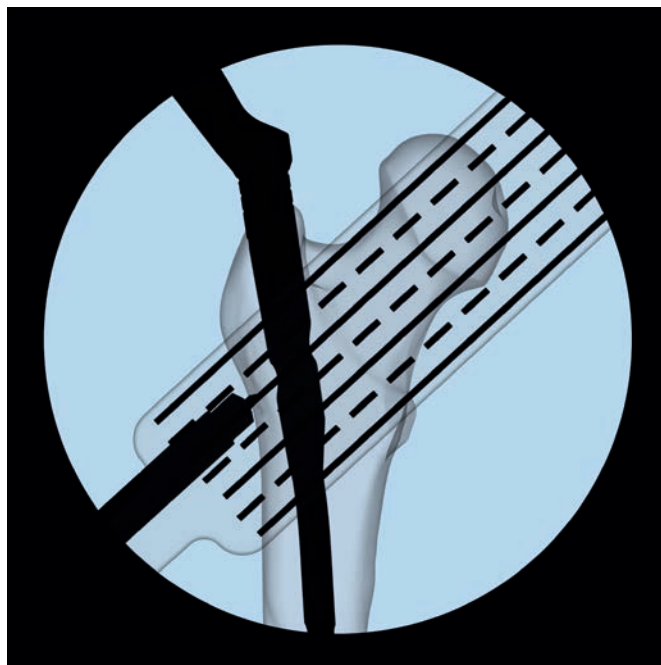
- Position the C-arm for the AP view. Rotate the C-Arm until any two orientation lines are symmetric to the protection sleeve.

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.

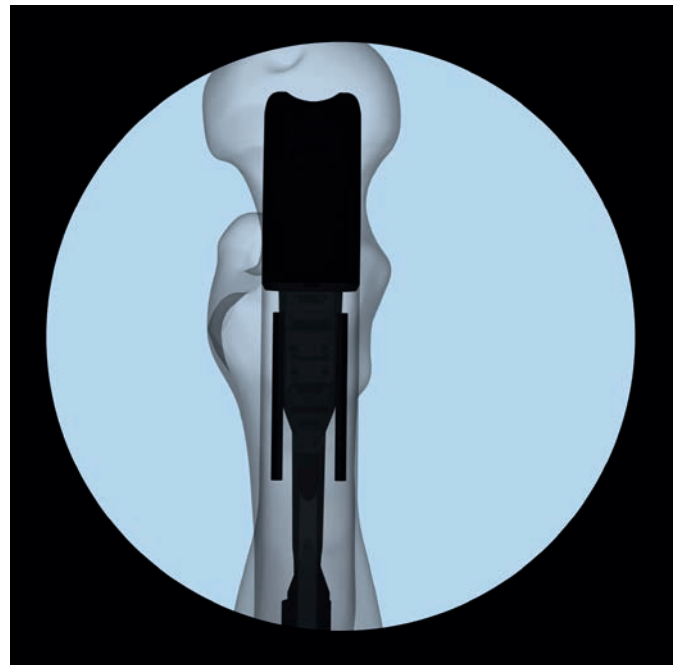
The C-arm may be readjusted to make sure that two lines are symmetric to the sleeve.

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 shaft¹).

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



¹T. Nishiura, 1077-1083

4

Insert guide wire

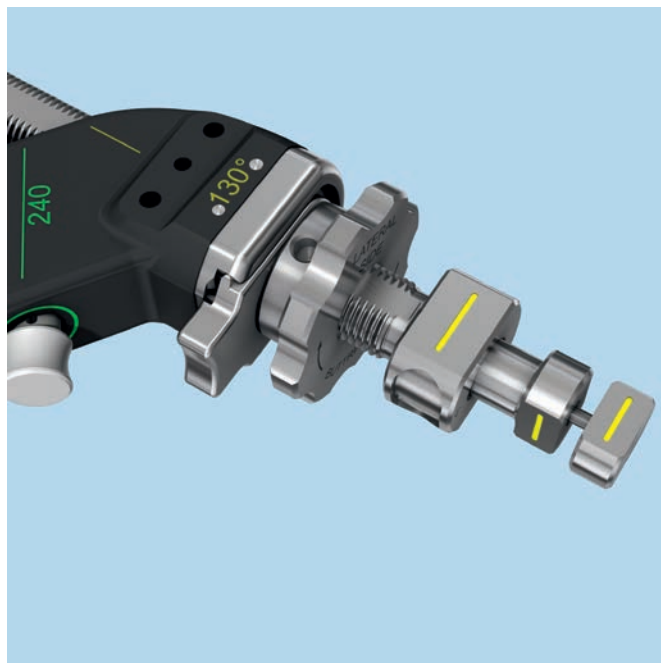
Instrument

356.830 Guide Wire Ø 3.2 mm, for PFNA Blade

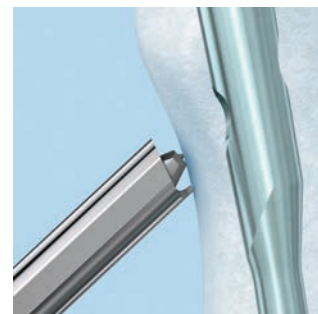
Make a stab incision in the area of the trocar tip. Advance the sleeve assembly through the soft tissues in direction of the lateral cortex.

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.

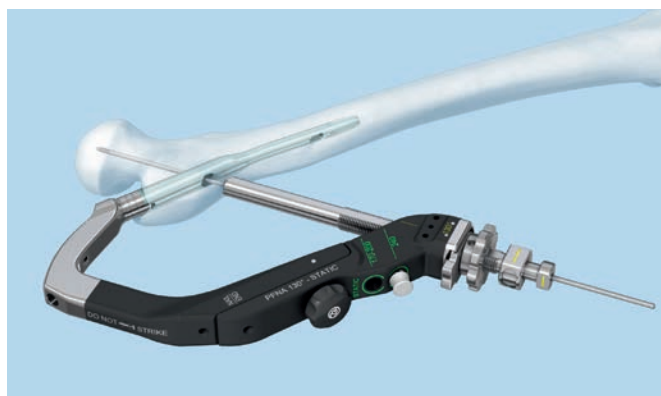


Incorrect position



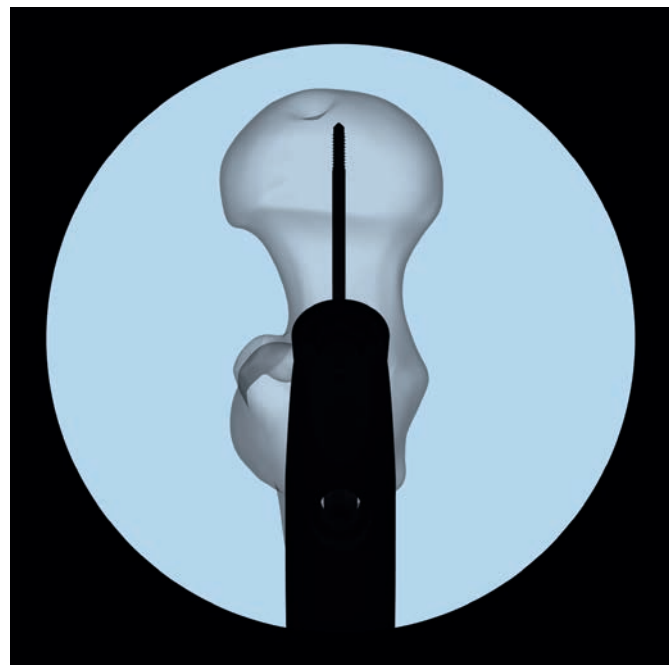
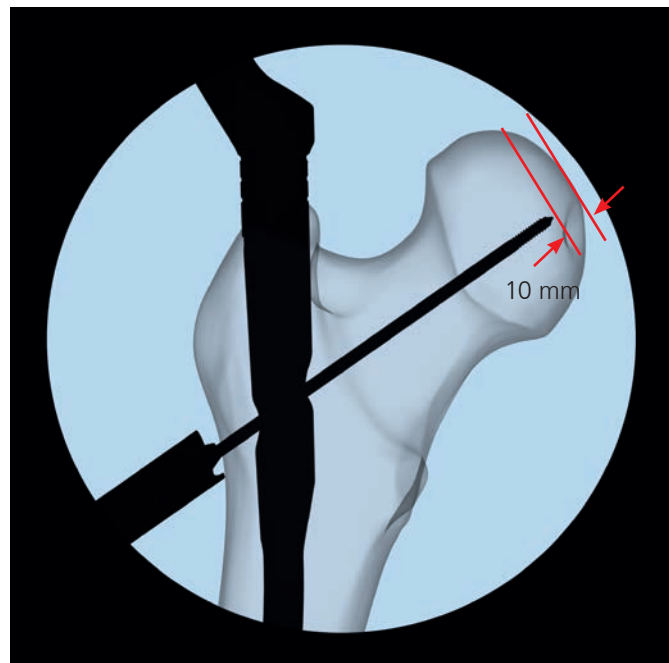
Correct position

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.



- ④ 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-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. Reinsert the guide wire.



Optional technique for antirotation wires

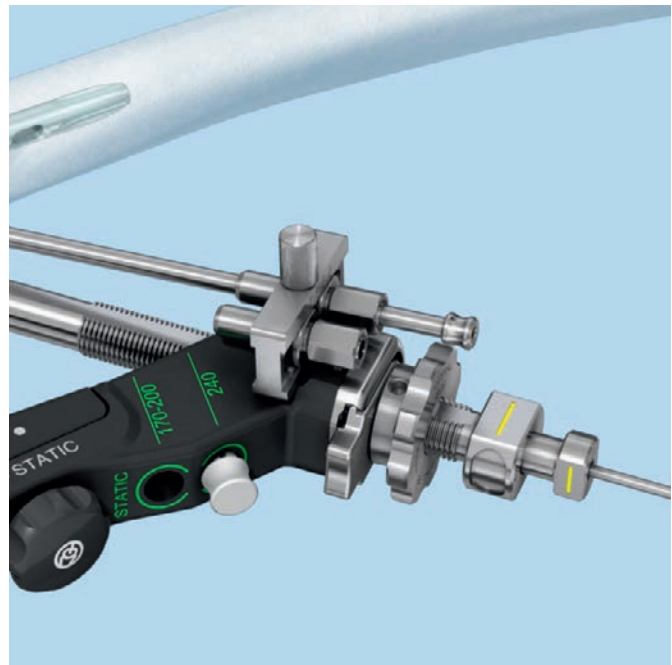
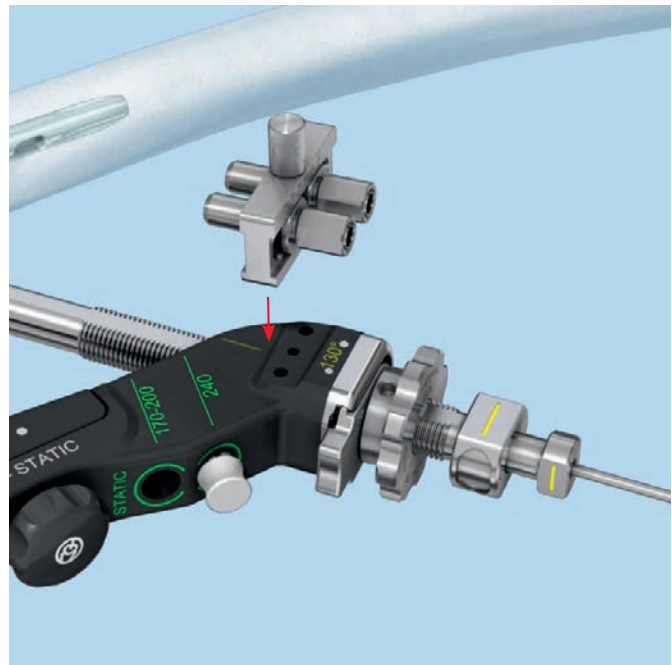
Instruments

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 golden drill sleeve in place in the golden protection sleeve when applying this technique.

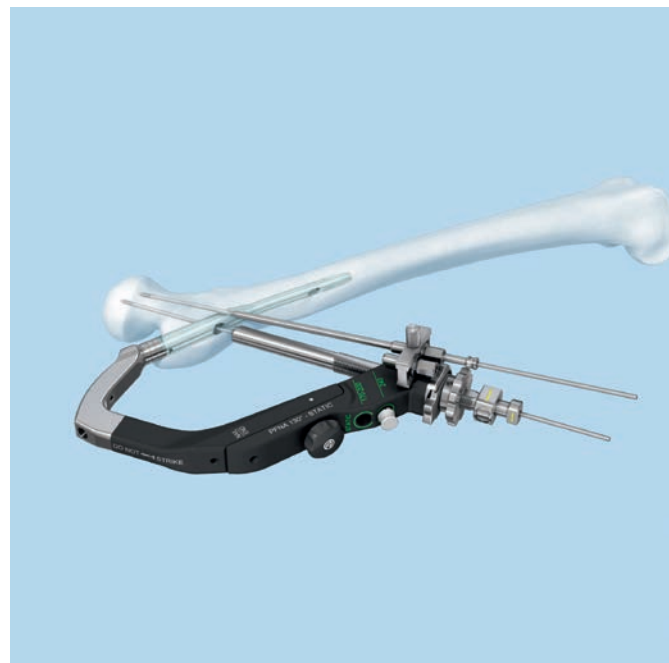
After having inserted the guide wire into the femoral head, secure the aiming jig for anti-rotation wire either anterior or posterior to the aiming arm. Secure the position of the anti-rotation wire by tightening the hexagonal nut.

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

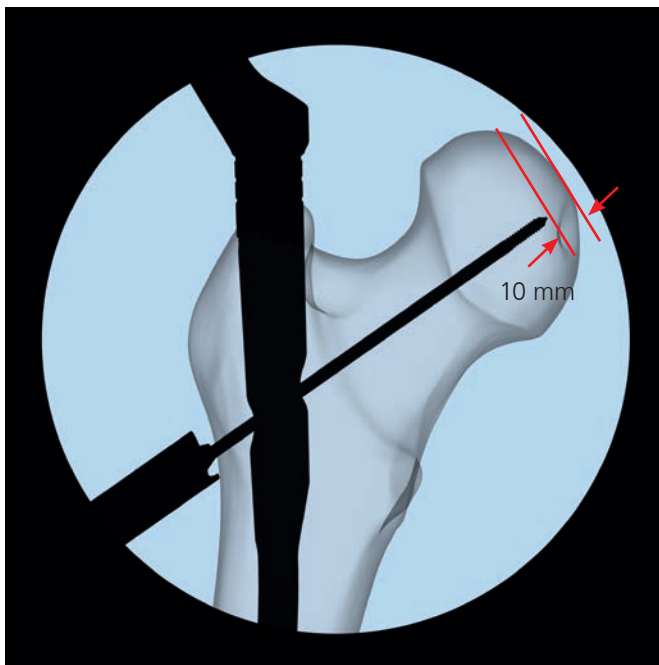
- Verify the position of the guide wire in AP and lateral view before measuring the length.

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 golden drill sleeve without changing the position of the guide wire.



6

Open lateral cortex for PFNA-II 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-II blade

Instruments

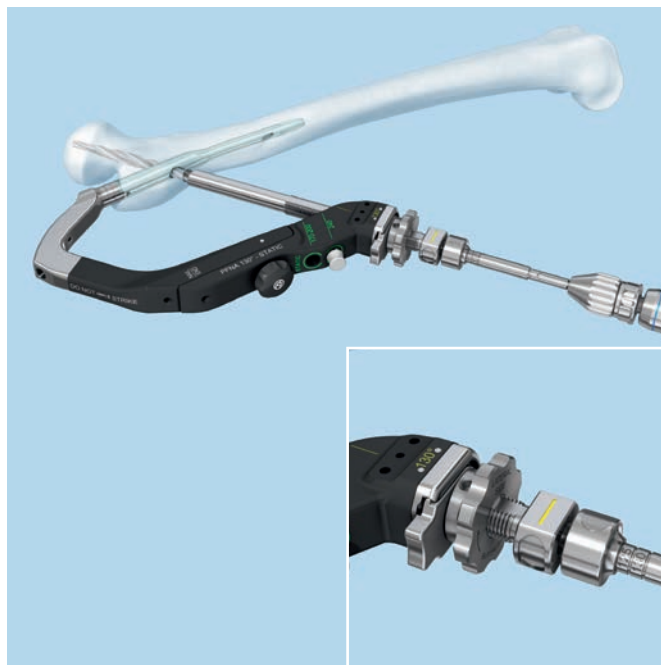
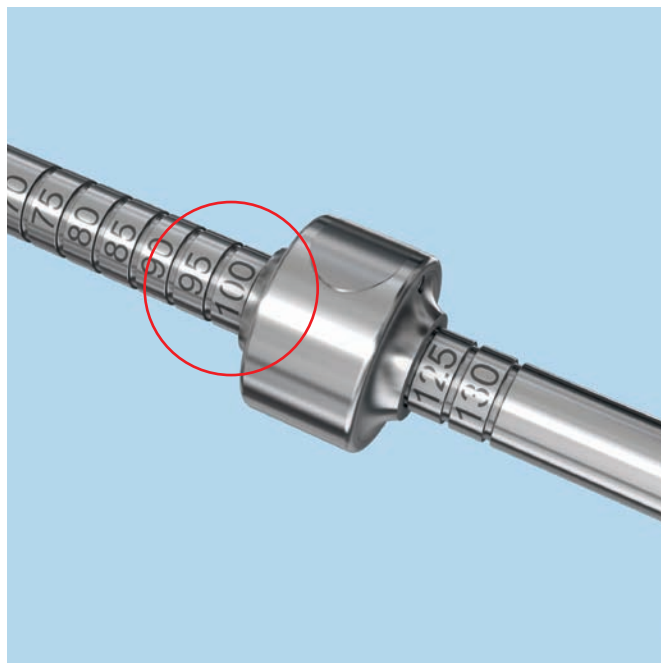
356.821	Reamer \varnothing 11.0 mm, for PFNA Blade
357.046	Fixation Sleeve, for No. 357.045

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-II blade on the impactor

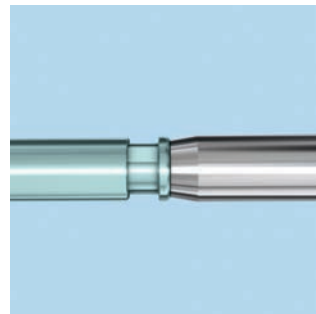
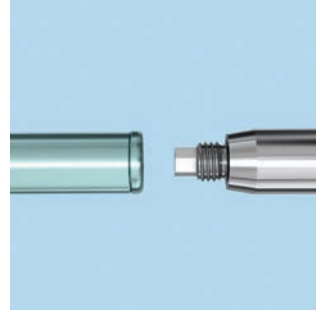
Instrument

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.

Important: 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

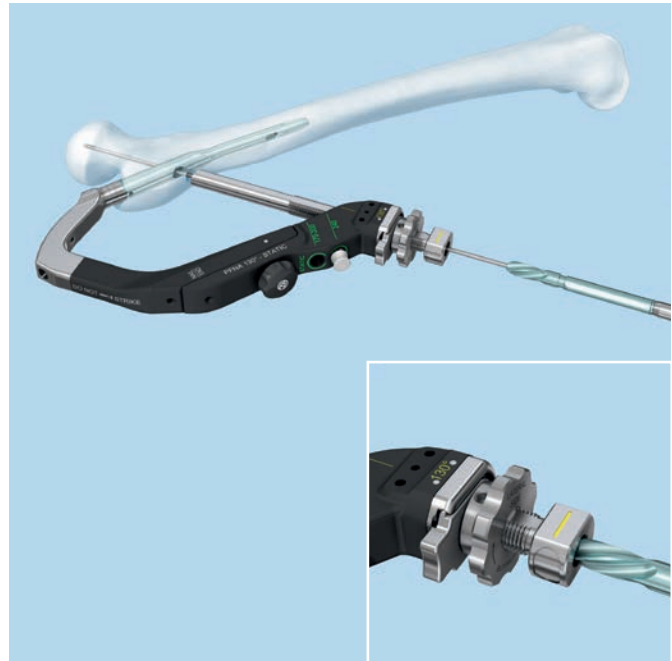
Insert PFNA-II blade

Instrument

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

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-II blade.



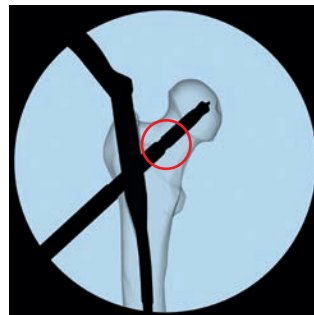
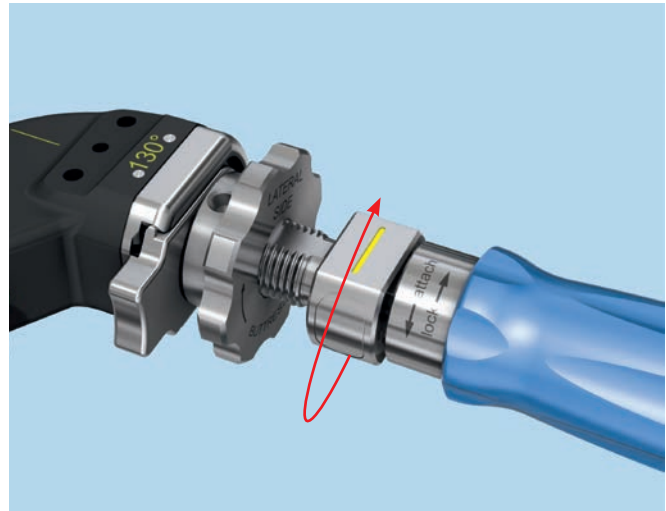
10

Lock PFNA-II blade

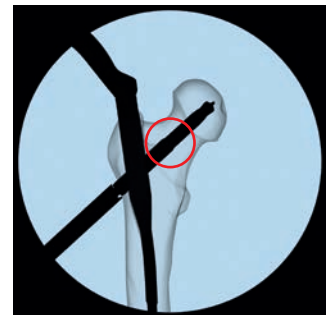
To lock the PFNA-II blade, turn the impactor clockwise (note «lock» marking on the handle) and tighten the blade.

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

Important: 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).



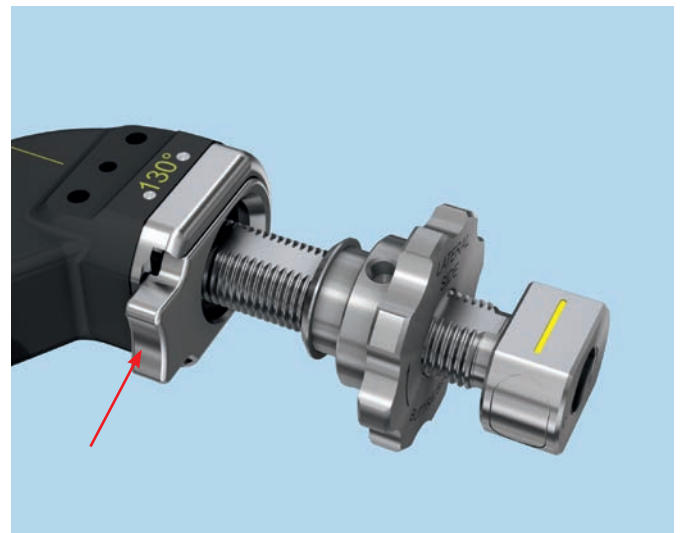
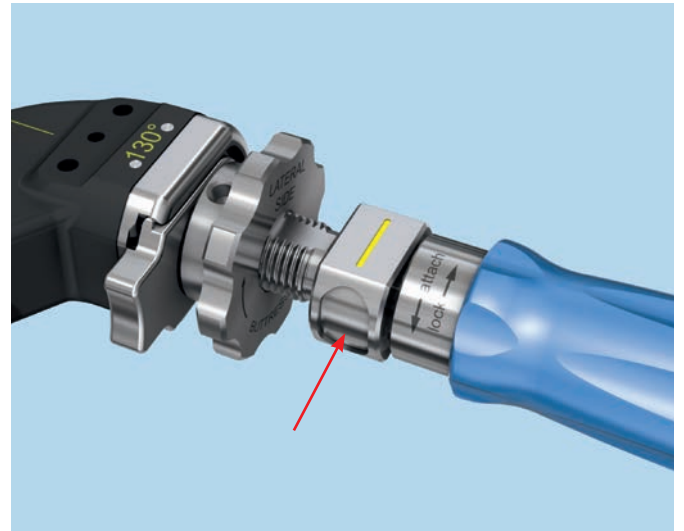
PFNA-II blade unlocked



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

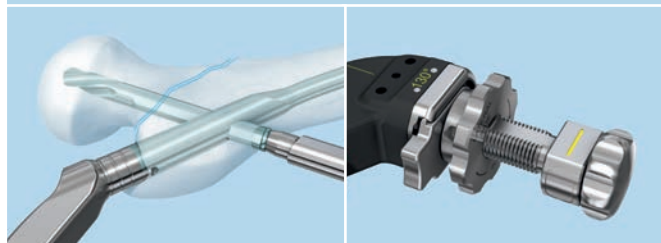
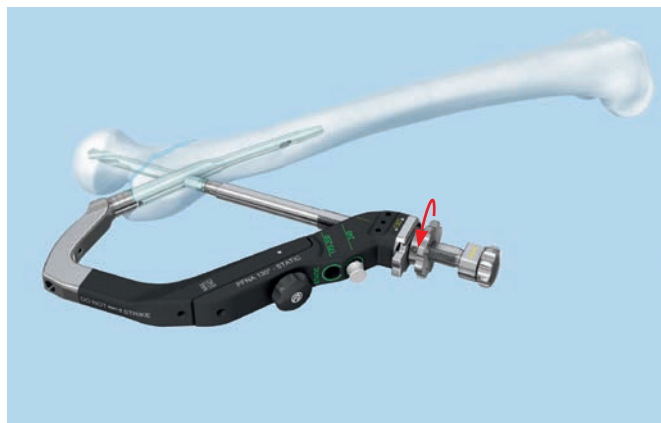
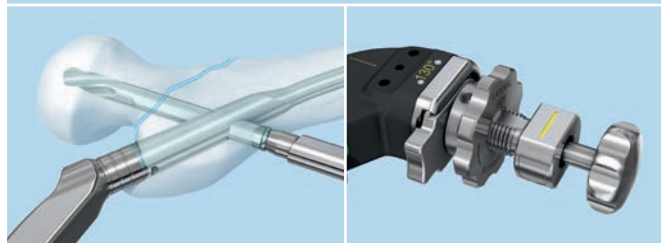
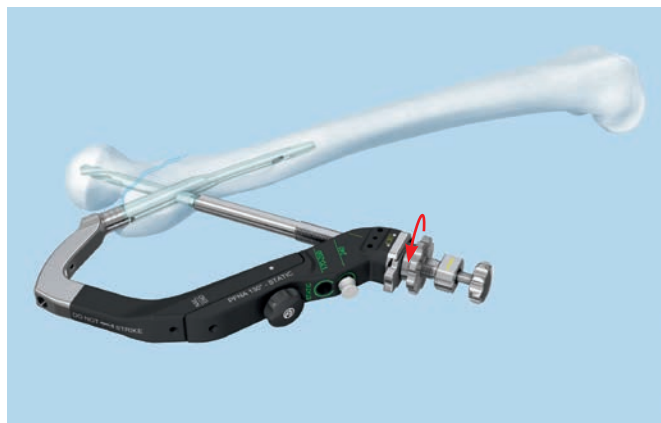
Instrument

03.010.423 Compression Instrument for PFNA Blade

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.



- ④ Under image intensifier control, further turn the buttress nut counterclockwise to achieve intraoperative compression and close the fracture gap.

Important

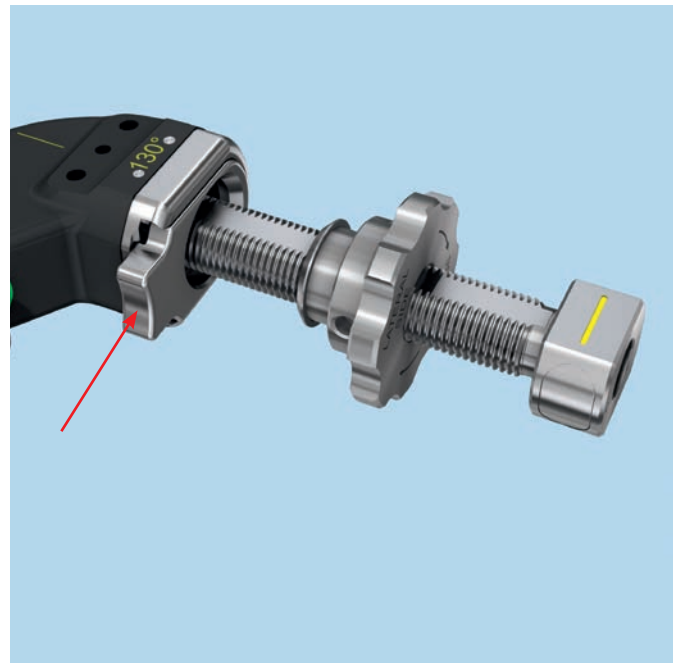
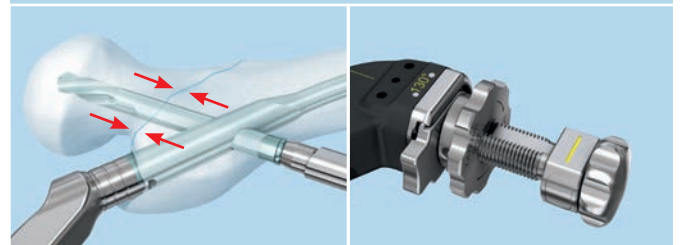
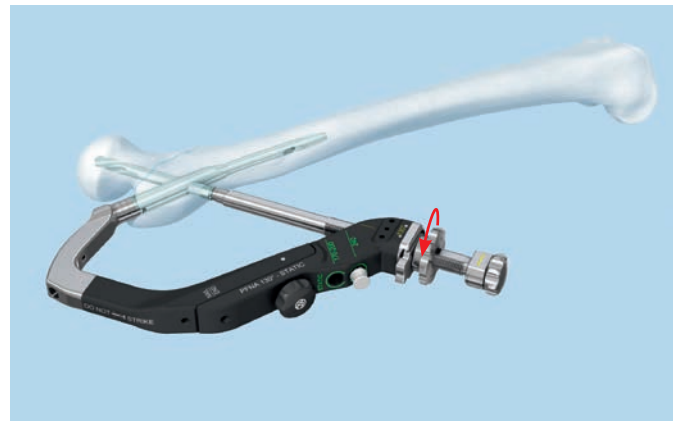
- The blade must be locked to apply intraoperative compression.
- ④ – Control compression under image intensifier control.
- Do not use excessive force in order to avoid pulling out the blade from the femoral head.

Note: The blade may be slightly overinserted before applying intraoperative compression (see correction of insertion depth of PFNA-II blade, page 56) to prevent it from sticking out laterally.

Release strain by turning the buttress nut clockwise.

- ④ 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.

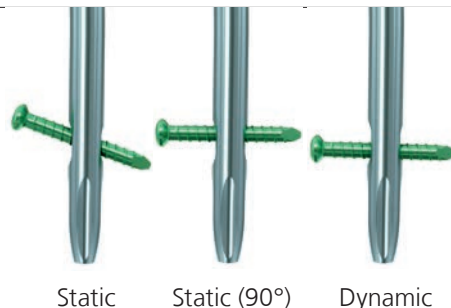


Distal Locking

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

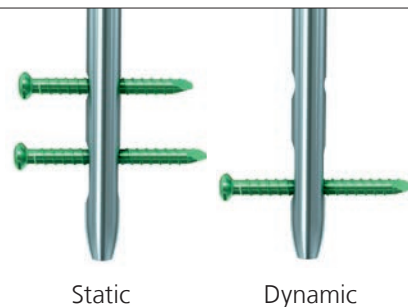


Distal Locking for PFNA-II Long (Length 260 mm – 420 mm)

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 technique guide (036.000.778).

PFNA long



Locking implants for distal locking

Distal locking for PFNA-II described in this technique guide is using the 4.9 mm locking bolts and the corresponding instruments (68.027.002.03: 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 (68.027.002.04: 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, length 340 mm, for Quick Coupling
356.831	Protection Sleeve 11.0/8.0, green	03.025.040	Protection Sleeve 11.0/8.0
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
314.260	Screwdriver, hexagonal, large, Ø 3.5 mm, 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, length 145 mm, with Coupling for RDL
		03.010.104	Drill Bit Ø 4.2 mm, length 145 mm, for Quick Coupling
356.835	Measuring Device for Locking Bolt	03.010.019	Depth Gauge for Locking Screws, short
		03.010.429	Direct Measuring Device for Drill Bits of length 145 mm
314.260	Screwdriver, hexagonal, large, Ø 3.5 mm, 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. 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.

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. Remove the trocar.



3 Drill

Instrument

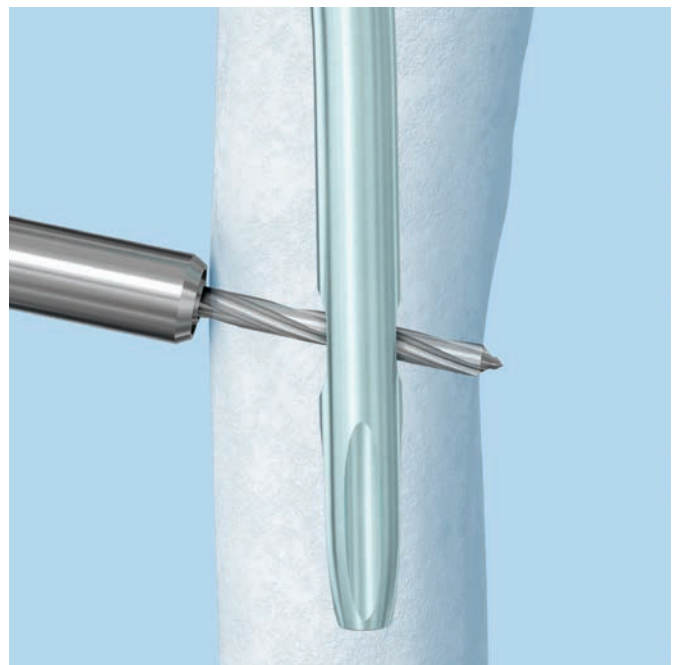
356.834 Drill Bit \varnothing 4.0 mm, for PFNA

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.

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-II, insertion handle and aiming arm is good, otherwise drilling for distal locking may damage the PFNA-II.



4

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.

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, 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

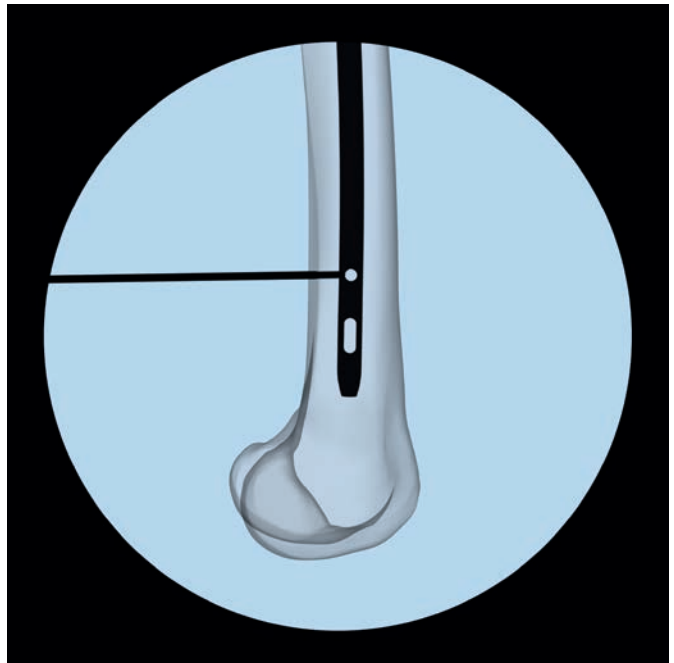
- 1 Check reduction, then correct alignment of the fragments and leg length before locking the nail.
- 2 Align the C-arm with the hole in the nail until a perfect circle is visible in the center of the screen.



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

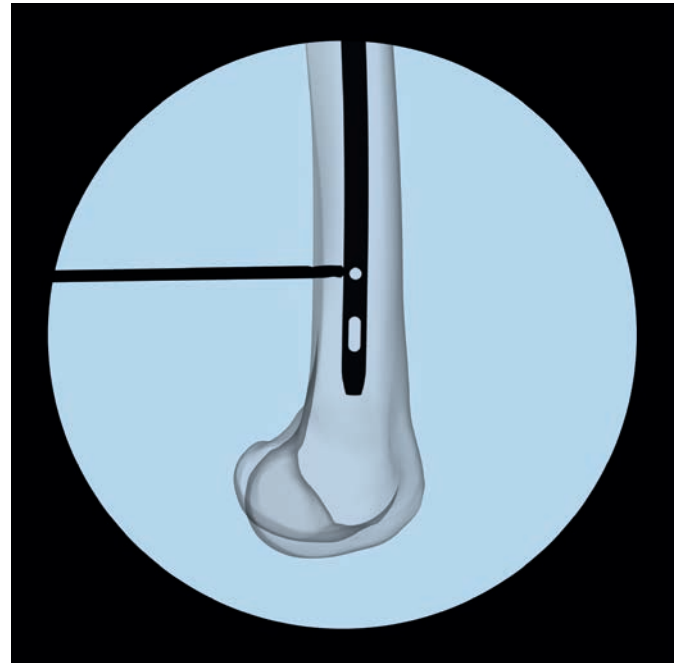
Instrument

511.417	Drill Bit \varnothing 4.0 mm with centering tip, length 148/122 mm, 3-flute, with Coupling for RDL
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- 1 Using the radiolucent drive (511.300), under image intensification, insert the tip of the drill bit through the incision down to the bone.

- 2 Incline the drive in order that the tip of the drill bit is centered over the locking hole. The drill bit should almost completely fill the circle of the locking hole. Hold the drill bit in this position and drill through both cortices until the tip of the drill bit penetrates the medial far cortex.

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

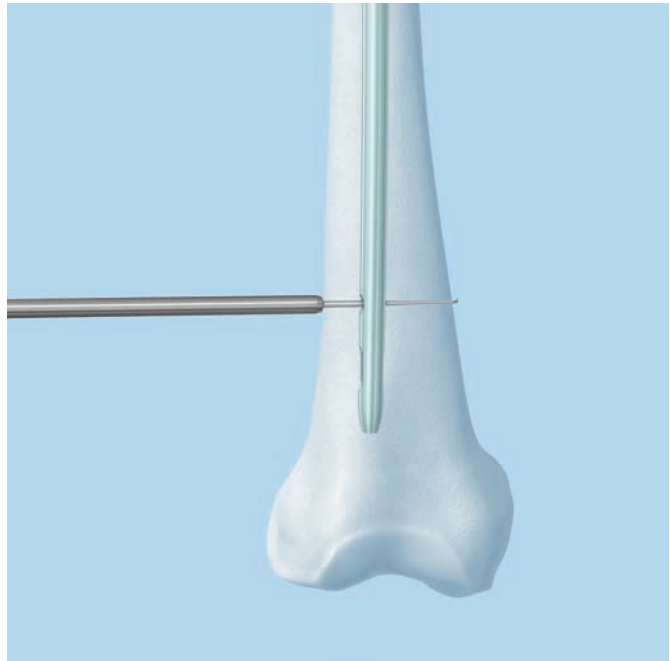
Instruments

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

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

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.

Tips

- 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 (01.010.181) and the corresponding technique guide (036.000.489).

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 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-II. Thereby a rotation of the PFNA-II in the bone will be avoided.



Correction of Insertion Depth of PFNA-II Blade

Instruments

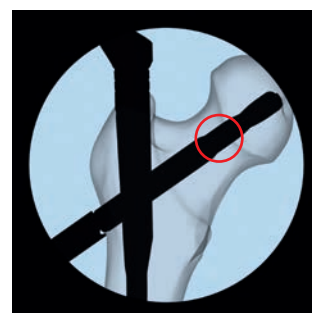
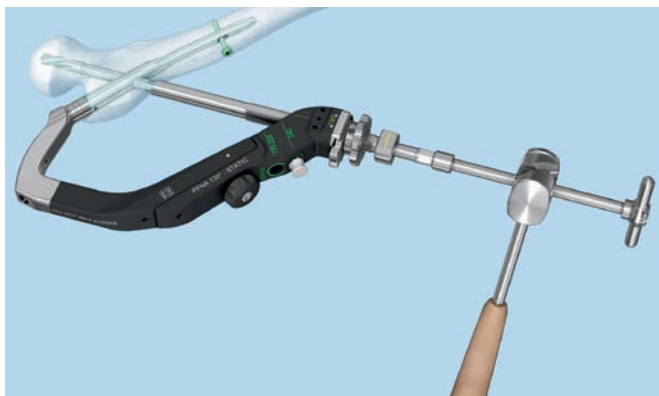
03.010.411	Extraction Screw for PFNA-II Blade
03.010.124	Combined Hammer 500 g, can be mounted

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

Intra- and postoperative cleaning

Instruments

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



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: Ti-6Al-7Nb (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



PFNA-II XS, Length 170 mm

Distal Diameter (mm)	Angle	Length 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

Distal Diameter (mm)	Angle	Length 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

Distal Diameter (mm)	Angle	Length 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	Ø 9 mm right	Ø 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	Ø 9 mm right	Ø 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	Ø 10 mm right	Ø 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	Ø 10 mm right	Ø 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



PFNA-II Blades

Material:	Ti-6Al-7Nb (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

PFNA-II End Caps

Used to protect nail threads from tissue ingrowth

Material:	Ti-6Al-7Nb (TAN), color: aqua
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:	Stardrive SD40 / hexagonal recess 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

Locking Bolts

Material:	Ti-6Al-7Nb (TAN), color: light green
Drill:	∅ 4 mm
Lengths:	16 – 60 mm (2 mm increments) 60 – 80 mm (4 mm increments) 80 – 100 mm (5 mm increments)
Design:	Hexagonal recess ∅ 3.5 mm



Locking Bolts ∅ 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

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

Alternative Implants

PFNA-II Blades

Material:	Ti-6Al-7Nb (TAN), color: aqua
Lengths:	75 –120 mm (5 mm increments)
Cannulation:	All blades are cannulated



PFNA-II Blades

Length (mm)	TAN
75	456.759S
80	456.760S
85	456.761S
90	456.762S
95	456.763S
100	456.764S
105	456.765S
110	456.766S
115	456.767S
120	456.768S

PFNA-II End Caps

Used to protect nail threads from tissue ingrowth

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

Locking Screws



Material:	Ti-6Al-7Nb (TAN), color: light green
Drill:	Ø 4.2 mm
Lengths:	26 mm – 80 mm (2 mm increments) 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

*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 Ø 6.5 and 7.3 mm	
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	
321.160	Combination Wrench Ø 11.0 mm	
321.170	Pin Wrench Ø 4.5 mm, length 120 mm	
356.715	Socket, hexagonal, Ø 11.0/11.0 mm, cannulated, for AFN	
356.717	Guide Wire Ø 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 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	
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 \varnothing 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 \varnothing 3.2 mm, for PFNA Blade, sterile



357.001 Protection Sleeve 20.0/17.0, for No. 357.005



357.009 Cleaning Stylet \varnothing 2.8 mm, length 450 mm, for Cannulated Instruments



03.010.019 Depth Gauge for Locking Screws, short



03.010.362 Screwdriver Stardrive, SD25, length 275 mm



03.010.406 Aiming Arm 125°, for PFNA Blade



03.010.408 Aiming Arm 135°, for PFNA Blade



03.010.409 PFNA Aiming Arm for dynamic locking



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



03.023.003 Awl for PFNA-II



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



Alternative instruments

321.200 Ratchet Wrench for Nut, hexagonal, 11.0 mm



356.810 Aiming Arm 125°, for PFNA Blade



356.811 Aiming Arm 130°, for PFNA Blade



356.812 Aiming Arm 135°, for PFNA Blade



356.813 Aiming Arm for PFNA Blade 125°, for small and extra-small PFNA



356.814 Aiming Arm for PFNA Blade 130°, for small and extra-small PFNA



356.823 Impactor for PFNA Blade



356.824 PFNA Aiming Arm for dynamic locking




356.825 Extraction Screw for PFNA Blade



357.012 Insertion Handle for PFN



357.013	Thread Gland for Hammer Guide, for No. 357.012	
357.020	Insertion Handle for PFN and PFNA	
357.021	Connecting Screw for PFN, for no. 357.012	
357.023	Wrench, hexagonal, with T-Handle, for No. 357.021	
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 \varnothing 4.2 mm, calibrated, length 340 mm, 3-flute, for Quick Coupling, for No. 03.010.065	

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	
03.010.107	Screwdriver Stardrive, SD25, length 330 mm	
03.010.112	Holding Sleeve, with Locking Device	
03.010.125	PFNA Aiming Arm for dynamic locking, for PFNA small and extra-small	
03.010.126	Wrench, hexagonal with T-handle	
03.010.428	Depth Gauge for Locking Screws, measuring range up to 110 mm, for No. 03.010.063	
03.010.429	Direct Measuring Device for Drill Bits of length 145 mm, for Nos. 03.010.100 to 03.010.105	

Cases

SynCases

01.027.110 Instrument for PFNA-II for B 4.9 mm Locking Bolts 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



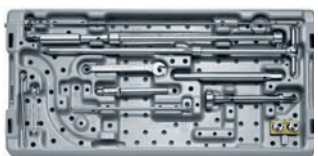
68.027.023 Lid for SynCase No. 68.027.020



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

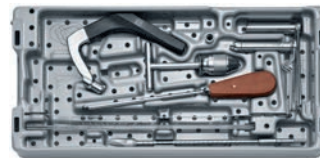


01.027.120 Instrument for PFNA-II for \varnothing 5.0 mm Locking Screws in SynCase

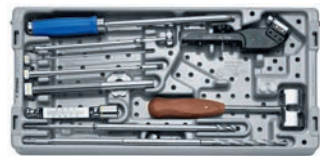
68.027.013 Lid for SynCase No. 68.027.010



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



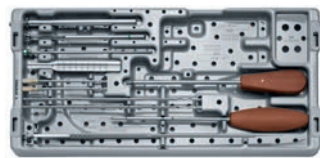
68.027.011 Insert 1 for Instruments for PFNA/PFNA-II (part 1), for SynCase No. 68.027.010



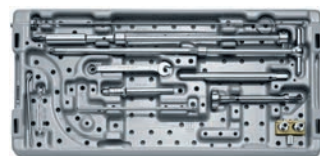
68.027.023 Lid for SynCase No. 68.027.020



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



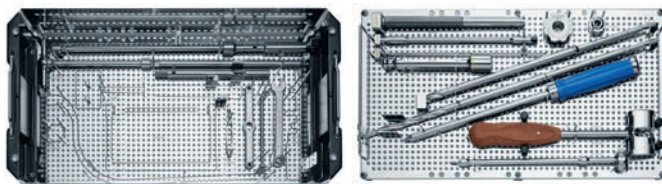
Vario Cases

01.027.101 Instrument for PFNA for B 4.9 mm Locking Bolts in Vario Case

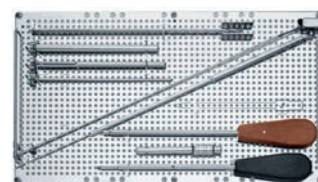
68.027.001 Vario Case for PFNA Instrument Set (part 1), without Lid, without Contents



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

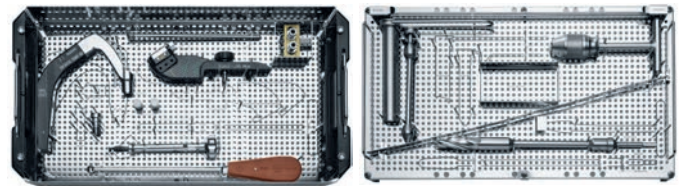


68.027.002.02 Insert 1, for Ø 4.9 mm Locking Bolts, for PFNA Instrument Set (part 2), for Vario Case No. 68.027.002

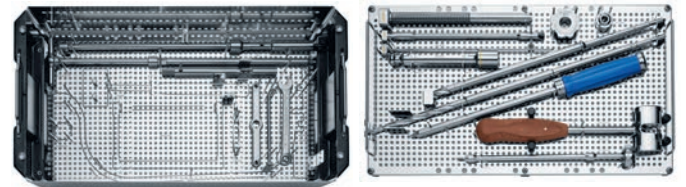


01.027.102 Instrument for PFNA for B 5.0 mm Locking Screws in Vario Case

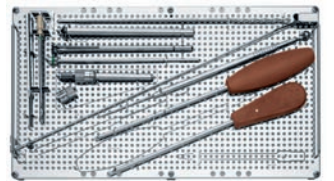
68.027.001 Vario Case for PFNA Instrument Set (part 1), without Lid, without Contents



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



Power Tools

05.001.201	Battery Handpiece, modular, for Trauma Recon System
05.001.202	Power Module, for Trauma Recon System
05.001.203	Sterile Cover, for Trauma Recon System
05.001.204	Universal Battery Charger II
05.001.227	Lid for Battery Handpiece No. 05.001.201, for Trauma Recon System
05.001.205	AO/ASIF Quick Coupling, for Trauma Recon System
05.001.207	Drill Chuck (Reaming Speed), with Key, for Trauma Recon System, clamping range up to \varnothing 7.3 mm
05.001.210	Attachment for Acetabular and Medullary Reaming, for Trauma Recon System
05.001.212	Quick Coupling for Kirschner Wires \varnothing 1.0 to 4.0 mm, for Trauma Recon System
05.001.213	Quick Coupling for DHS/DCS Triple Reamers, for Trauma Recon System
05.001.226	Adapter for RDL, for Trauma Recon System
511.300	Radiolucent Drive

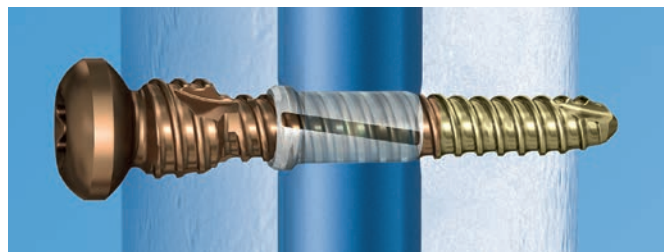


Optional: Angular Stable Locking System (ASLS)

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

What is ASLS?

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

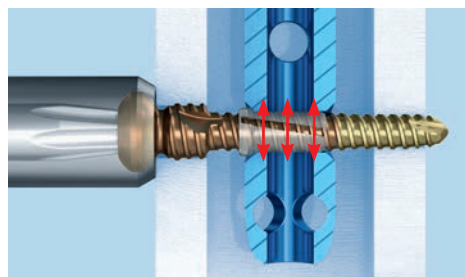
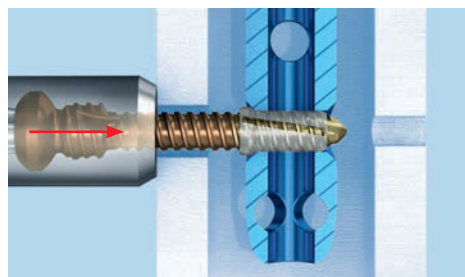


How does ASLS work?

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
- SD25 Stardrive recess
- Sterile packaged



ASLS sleeves

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

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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)].

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.
-

