

# PFNA



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## Warning

This publication describes the recommended procedures for using Double Engine devices and instruments. It offers guidance that you should pay attention to. But as with any such technical guide, the guide alone does not provide sufficient background for direct use of the instrument set, each surgeon should also consider the particular needs of each patient and make appropriate adjustments when required. Instruction by experienced surgeon is still highly recommended.

All non-sterile devices must be cleaned and sterilized before use. Multi-component instruments must be disassembled for cleaning. Please follow the instructions provided in our *Reprocessing, Care and Maintenance Guide (RCMG-2012)*.

Please refer to *Package Insert* for a complete list of potential adverse effects, contraindications, warnings and precautions. The surgeon must discuss all relevant risks, including the finite lifetime of the device, with the patient, when necessary.

## Caution

The implants are designed for temporary fixation of fractured bone fragments until the bone heals. Therefore, if bone does not heal or bone consolidation is delayed or not sufficient, the system may break. Post-operative care under the guidance of the surgeon is also very important and it must be done to ensure the promotion of bone consolidation.

## Surgical Technique

### Indications & Contraindications

Short (170mm – 240mm)

#### Indications

- Pertrochanteric fractures
- Intertrochanteric fractures
- High subtrochanteric fractures

#### Contraindications

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

Long (300mm – 420mm)

#### Indications

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

#### Contraindications

- Isolated femoral shaft fractures
- Isolated or combined medial femoral neck fractures

### Patient Position

Place the patient in a supine position on the fracture table. Traction is applied to the fracture, keeping the affected leg straightly with 10–15° in adduction. This leaves for an unimpeded access to the medullary cavity. Abduct the unaffected leg as far as possible to make room for free fluoroscopic examinations.

Internal rotation of 10–15° of affected leg might be good for completing fracture reduction. Closed reduction of the fracture should be achieved as anatomically as possible. If this is not achievable in a closed procedure, open reduction may be necessary.

Image intensifier should be positioned for an easy capture of anterior-posterior and mediolateral views of the affected femoral trochanteric region. The best position is that the rotating axis of the intensifier is centered on the femoral neck of the affected femur.

The patient is then prepared and draped as for standard femoral nailing procedures.

### Surgical Incision

Palpate the great trochanter.

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



### STEP 1 OPEN FEMUR

#### 1.1 Determine entry point

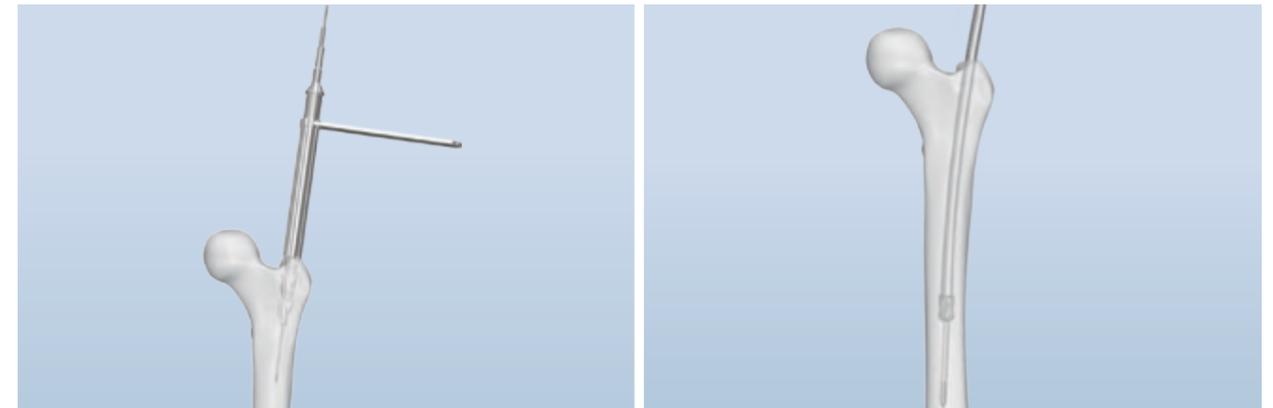
In AP view, the PFNA entry point is on the tip or slightly lateral to the tip of the greater trochanter in the curved extension of the medullary cavity, as the ML angle of the PFNA is 6°.

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

#### 1.2 Insert guide wire

- 110350600 Cannulated Reverse Awl
- 110351900 Guide Wire,  $\phi 3.2$ , length 400mm, with threaded tip
- 110350700 Tissue Protector

Make a hole in the entry point with the awl (tissue protector may be used) and then insert the guide wire along the awl into the medullary cavity at an appropriate depth of 15cm.



#### 1.3 Open femur

- 110356900 Drill Bit,  $\phi 17.0/\phi 3.2$ , cannulated, for PFNA
- 110357000 Protection Sleeve,  $\phi 17.0$
- 110357100 Drill Sleeve,  $\phi 17.0/\phi 3.2$

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.

#### Option: Reaming for PFNA(long)

- 110313600 Guide Wire  $\phi 2.5$ , length 660mm, with olive head

When reaming for PFNA(long), insert the guide wire with olive head, and then place the flexible reamer along the guide wire to enlarge the medullary canal gradually.



**STEP 2**  
**NAIL INSERTION**

2.1 Assemble PFNA

- 110350800 Insertion Handle for PFNA
- 110350900 Connecting Screw for PFNA
- 110351000 Wrench, hexagonal, with T-Handle, for Connecting Screw

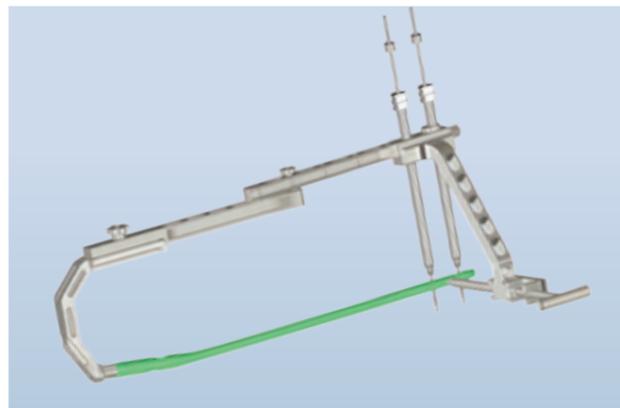
Guide the connecting screw through the insertion handle and secure the desired PFNA to the insertion handle using the wrench.

Note: 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.

2.2 Insert PFNA

- 110351100 Connector for PFNA
- 110351300 Hammer

Carefully insert the PFNA manually using slight bidirectional turns of the insertion handle as far as possible into the femoral opening. If it is difficult to insert the nail by hand, attach the connector on the insertion handle and use light hammer blows on the connector to insert the nail.



Note: The PFNA(long) needs to be calibrated preoperatively.

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.

Always ensure that the PFNA is firmly attached to the insertion handle.

**STEP 3**  
**PROXIMAL LOCKING**

3.1 Prepare guide wire insertion

- 110351400 Aiming Arm, for PFNA Blade
- 110351500 Protection Sleeve,  $\phi 10.9$ , for PFNA Blade
- 110351600 Buttress/Compression Nut, for PFNA blade
- 110351700 Drill Sleeve,  $\phi 10.9/\phi 3.2$ , for PFNA blade
- 110351800 Trocar  $\phi 3.2$ , for PFNA Blade

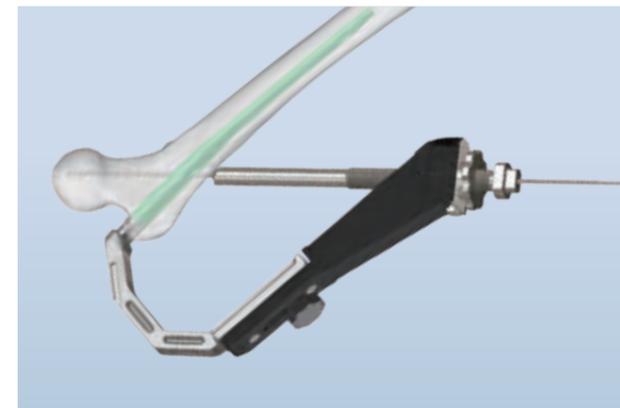


Connect the aiming arm on the insertion handle tightly. Screw the buttress nut on the protection sleeve for PFNA blade. Make sure the lateral side marking points towards the head of the sleeve. Screw the buttress nut up to the marking on the protection sleeve.

Insert the drill sleeve and 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. Advance the protection sleeve to the lateral cortex using slight clockwise turns of the buttress nut.

Note:

- (1) Ensure that the sleeve assembly clicks into the aiming arm, otherwise it will not guarantee the exact position of the PFNA blade.
- (2) 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.



3.2 Insert guide wire

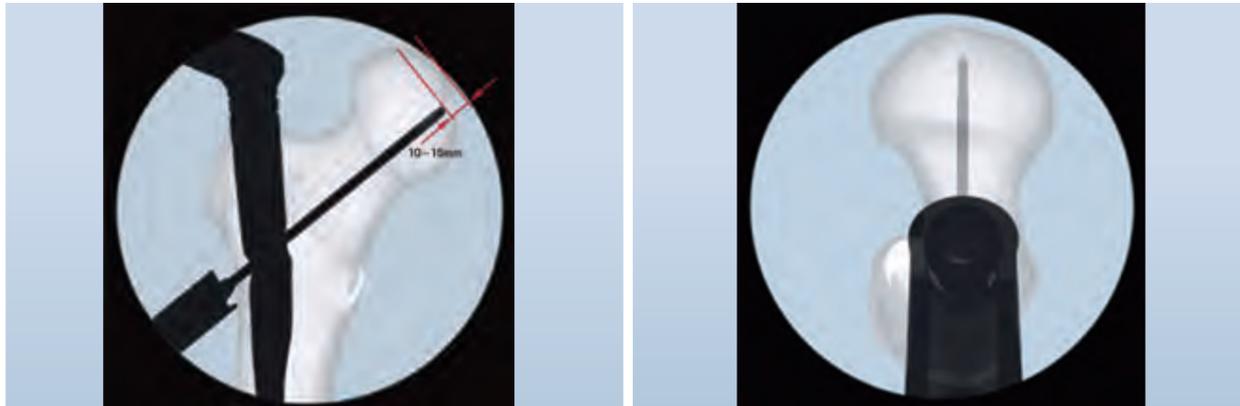
- 110351900 Guide Wire,  $\phi 3.2$ , length 400mm, with threaded tip

Remove the trocar. Insert a guide wire through the drill sleeve into the bone. Verify both direction and position under image intensifier control in both AP and lateral view. Insert the guide wire into the femoral head at a distance of 10 mm below the bone surface level. Minimal distance to the bone surface is 5 mm. The tip of the guide wire is positioned at the intended blade tip position.

3.3 Measure the length

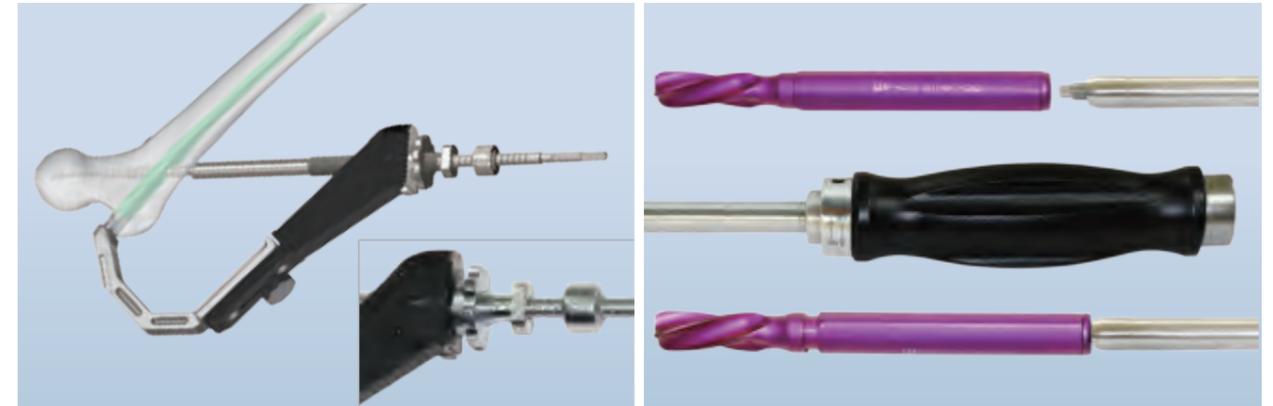
- 110352000 Direct Measuring Device for Guide Wire,  $\phi 3.2$

Guide the measuring device over the guide wire. Advance the measuring device to the protection sleeve and determine the length of the required blade by subtracting 5mm of the scale. 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 head of PFNA blade is 10 mm-15mm below the bone surface level.



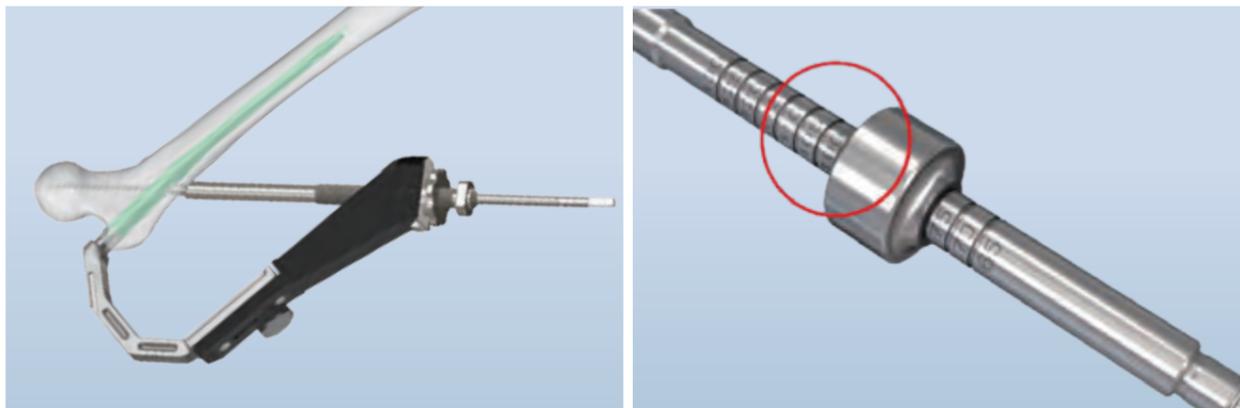
**3.3.(1) Ensure the correct position of the guide wire in AP view**  
 In the AP view, the optimal position of the guide wire is in the 1/3 part of the middle low femoral neck.  
 Note: It is acceptable if the guide wire leans to the back lower as the bone in this area is good and the blade can supply much stronger power of anti-rotation.

**3.3.(2) Ensure the correct position of the guide wire in lateral view**  
 In the lateral view, the optimal position of the guide wire is in the exact center of the femoral neck.  
 Note: 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.



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. Otherwise, the guide wire may be advanced through the bone surface.

**3.6 Assemble PFNA blade on the impactor**  
 110352400 Impactor for PFNA Blade  
 110352500 Key for PFNA Blade  
 The PFNA blade is supplied in a locked state. While attaching the PFNA blade on the impactor, screw the impactor counterclockwise 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 over tighten.  
 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 over tighten the connection between the impactor and the PFNA blade.



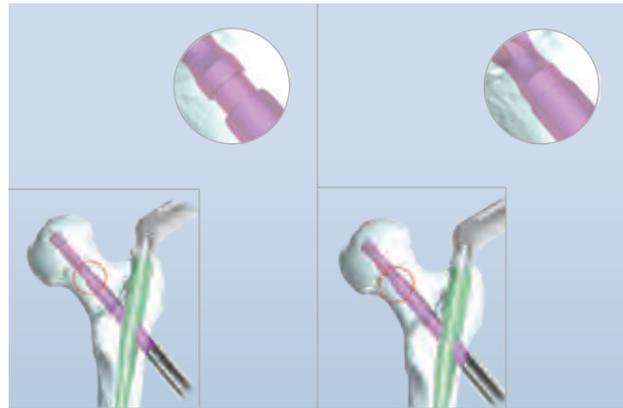
**3.4 Open lateral cortex for PFNA blade insertion**  
 110352100 Drill Bit,  $\phi 10.5/\phi 3.2$ , cannulated, for PFNA Blade  
 Push the cannulated drill bit over the 3.2 mm guide wire. Drill to the stop. This opens the lateral cortex.

**3.5 Drill for PFNA blade**  
 110352200 Reamer,  $\phi 9.3/\phi 3.2$ , cannulated, for PFNA Blade  
 110352300 Fixation Sleeve  
 Set the measured 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. (This procedure is not allowed for patients with severe osteoporosis.)  
 Important: Use reamer only in a situation with good bone quality.



**3.7 Insert PFNA blade**  
 110351300 Hammer  
 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.  
 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.

**3.8 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).



PFNA blade unlocked

PFNA blade locked



**STEP 4**  
**DISTAL LOCKING**

4.1 Choose aiming arm for distal locking

- 110352600 PFNA Aiming Arm for Dynamic and Static Locking, length 170mm
- 110352700 PFNA Aiming Arm for Dynamic and Static Locking, length 200mm
- 110352800 PFNA Aiming Arm for Dynamic and Static Locking, length 240mm

Remove the proximal aiming arm.  
Choose an appropriate distal aiming arm.



4.2 Drill

- 110352900 Protection Sleeve,  $\phi 11.0/\phi 8.2$
- 110353000 Drill Sleeve,  $\phi 8.2/\phi 4.2$
- 110353100 Trocar,  $\phi 4.2$
- 110310700 Drill Bit,  $\phi 4.2$ , 300mm
- 110314700 Drill Bit,  $\phi 4.2$ , 350mm
- 110310900 Fixation Sleeve for Drill Bits,  $\phi 4.2$

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

Note: The drill bit has both long and short types. It's suggested to use the short drill bit to drill the first distal hole then use the long one to drill the second distal hole (to avoid the resistance of inserting the long drill bit). Remove the long drill bit and screw the locking screw in the second distal hole, then remove the short drill bit and screw the first distal locking screw.



4.3 Determine length of the locking screw

- 110353500 Measuring Device for Locking Bolts

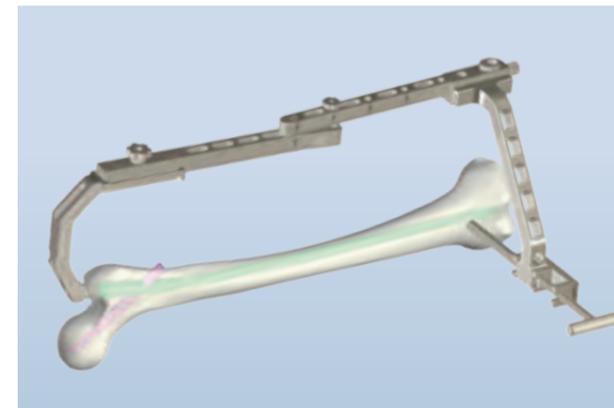
After drilling both cortices, remove the drill bit and the drill sleeve. Advance the depth gauge through the protection sleeve and through both cortices. Draw back the hook until it engages in the opposite cortex. Read the measurement from the depth gauge. Add 2 to 4 mm to the measured length to ensure good engagement of the locking screw in the opposite cortex.



4.4 Insert locking screw

- 110353600 Screwdriver, hexagonal,  $\phi 4.0$

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

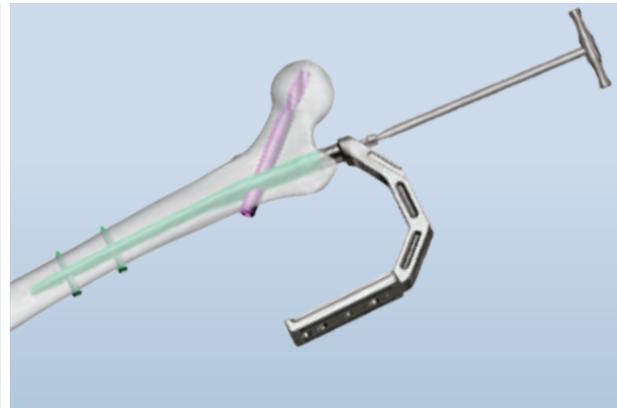
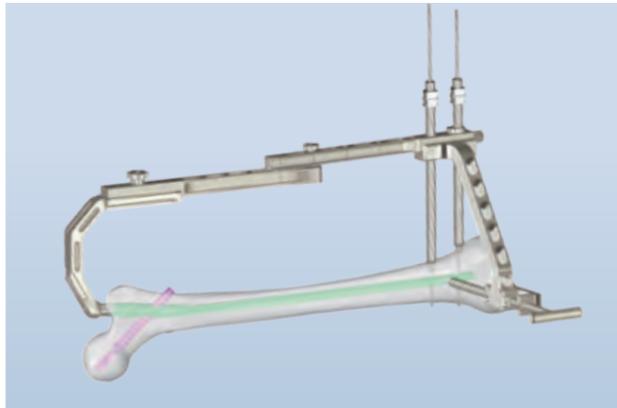


Attachment: Distal Locking for PFNA long

1. Assemble calibrating pin

- 110355000 Stretch Aiming Arm for PFNA
- 110355100 Stretch Aiming Arm Shaft, for PFNA, long
- 110355200 Stretch Aiming Arm for PFNA, distal
- 110355300 Drill Bit with Flat Head,  $\phi 5.0$
- 110355400 Drill Bit,  $\phi 5.0$
- 110355500 Fixation Sleeve for Calibrating Pin
- 110355600 Drill Sleeve for Calibrating Pin,  $\phi 5.0$
- 110355700 Trocar for Calibrating Pin
- 110356100 U-Clip
- 110356200 Calibrating Pin

Remove the proximal aiming arm and assemble the stretch aiming arm shaft, stretch aiming arm and distal stretch aiming arm. Insert the fixation sleeve and trocar to bone cortex. Then remove the trocar, insert the drill sleeve and drill bit to drill through the cortical bone. Clean the bone debris in the platform using the drill bit with flat head. Extract the drill bit, drill sleeve and place the calibrating pin. Ensure the calibrating pin palpate the PFNA platform, using the U-clip to connect the calibrating pin and the distal stretch aiming arm tightly.



2. Insert locking screw

- 110352900 Protection Sleeve,  $\phi 11.0/\phi 8.2$
- 110353000 Drill Sleeve,  $\phi 8.2/\phi 4.2$
- 110353100 Trocar,  $\phi 4.2$
- 110310700 Drill Bit,  $\phi 4.2$
- 110310900 Fixation Sleeve for Drill Bits,  $\phi 4.2$

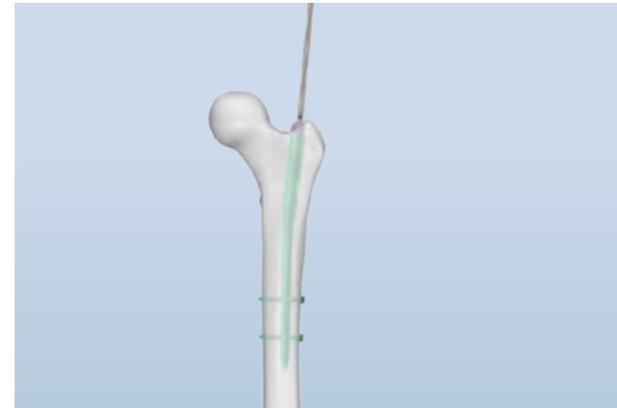
Insert the fixation sleeve and trocar through the aiming hole of the stretch aiming arm shaft, then same steps as distal locking for standard PFNA.

**STEP 5**  
**INSERT END CAP**

5.1 Remove the aiming device

- 110353700 Wrench, hexagonal, with T-Handle and Universal Joint for Connecting Screw

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



6.2 Remove end cap

- 110353600 Screwdriver, hexagonal,  $\phi 4.0$

Remove the end cap by the screwdriver.

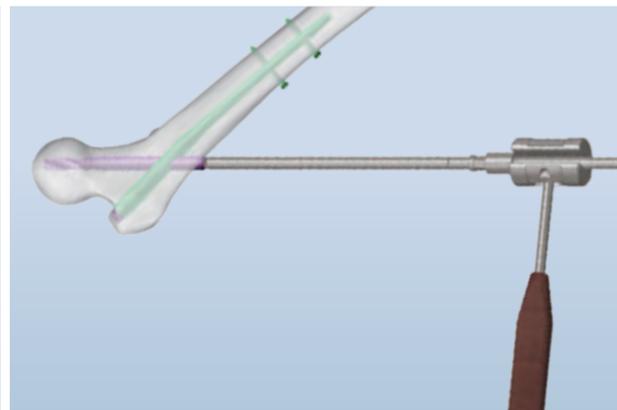
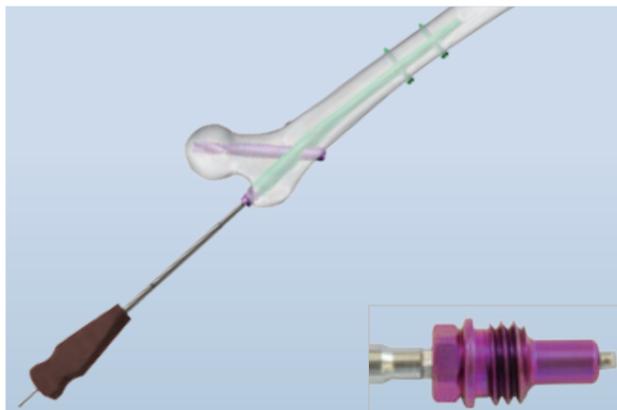
6.3 Remove locking screw and nail

- 110353600 Screwdriver, hexagonal,  $\phi 4.0$
- 110354200 Slide Hammer
- 110354300 Hammer Guide for Slide Hammer

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

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

Extract the nail by applying gentle blows with the hammer.



5.2 Insert end cap

- 110353900 Screwdriver Shaft for End Cap,  $\phi 4.0$
- 110354000 Screwdriver, hexagonal, cannulated, for End Cap  $\phi 4.0$
- 110353800 Guide Wire for End Cap, with Hook,  $\phi 2.8$

a. Use the screwdriver shaft to hold the end cap. Gently screw it into the proximal end of the nail and tighten it firmly using the cannulated hexagonal screwdriver.

b. 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.

**STEP 6**  
**IMPLANT REMOVAL**

6.1 Remove PFNA blade

- 110354100 Extraction Screw for PFNA Blade
- 110354200 Slide Hammer

After an incision through the old scars, locate the PFNA blade by palpation or under image intensifier control. Insert the guide wire through the cannulated PFNA blade. Push the extraction screw over the guide wire and use gentle pressure to screw it counterclockwise into the PFNA blade.

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

Instruments 110820000

110350100 Measuring Device, for PFNA



110358200 Protection Sleeve,  $\phi 17.5$   
For PFNA with Proximal Diameter  $\phi 17.0$



110358300 Drill Sleeve,  $\phi 17.5/\phi 3.2$   
For PFNA with Proximal Diameter  $\phi 17.0$



110358100 Drill Bit,  $\phi 17.5/\phi 3.2$ , cannulated  
For PFNA with Proximal Diameter  $\phi 17.0$



110357000 Protection Sleeve,  $\phi 17.0$   
For PFNA with Proximal Diameter  $\phi 16.5$



110357100 Drill Sleeve,  $\phi 17.0/\phi 3.2$   
For PFNA with Proximal Diameter  $\phi 16.5$



110356900 Drill Bit,  $\phi 17.0/\phi 3.2$ , cannulated  
For PFNA with Proximal Diameter  $\phi 16.5$



110350500 T-Handle with Quick Coupling



110350600 Reverse Awl, cannulated, for PFNA



110350700 Tissue Protector



110350800 Insertion Handle for PFNA



110350900 Connecting Screw for PFNA



110351000 Wrench, hexagonal, with T-Handle, for Connecting Screw



110351100 Connector for PFNA



110351200 Combination Wrench, φ11.0



110351300 Hammer, for Inserting PFNA Blade



110351400 Aiming Arm, for PFNA Blade



110351500 Protection Sleeve, φ10.9, for PFNA Blade



110351600 Buttress/Compression Nut, for PFNA blade



110351700 Drill Sleeve, φ10.9/φ3.2, for PFNA blade



110351800 Trocar φ3.2, for PFNA Blade



110351900 Guide Wire, φ3.2, length 400mm, with threaded tip



110352000 Direct Measuring Device for Guide Wire, φ3.2



110352100 Drill Bit, φ10.5/φ3.2, cannulated, for PFNA Blade



110352200 Reamer, φ9.3/φ3.2, cannulated, for PFNA Blade



110352300 Fixation Sleeve



110352400 Impactor for PFNA Blade



110352500 Key for PFNA Blade



110352600 PFNA Aiming Arm for Dynamic and Static Locking, length 170mm



110352700 PFNA Aiming Arm for Dynamic and Static Locking, length 200mm



110352800 PFNA Aiming Arm for Dynamic and Static Locking, length 240mm



110352900 Protection Sleeve,  $\phi 11.0/\phi 8.2$



110353000 Drill Sleeve,  $\phi 8.2/\phi 4.2$



110353100 Trocar,  $\phi 4.2$



110310700 Drill Bit,  $\phi 4.2$ , 300mm



110314700 Drill Bit,  $\phi 4.2$ , 350mm



110310900 Fixation Sleeve for Drill Bits,  $\phi 4.2$



110311000 L-Wrench, hexagonal,  $\phi 3.0$



110353500 Measuring Device for Locking Bolts



110353600 Screwdriver, hexagonal,  $\phi 4.0$



110353700 Wrench, hexagonal, with T-Handle and Universal Joint for Connecting Screw



110353800 Guide Wire for End Cap, with Hook,  $\phi 2.8$



110353900 Screwdriver Shaft for End Cap,  $\phi 4.0$



110354000 Screwdriver, hexagonal, cannulated, for End Cap  $\phi 4.0$



110354100 Extraction Screw for PFNA Blade



110354200 Slide Hammer



110354300 Hammer Guide for Slide Hammer



110354400 Cleaning Stylet,  $\phi 2.8$ , for Cannulated Instruments



110313600 Guide Wire  $\phi 2.5$ , length 660mm, with olive head



110313700 Guide Wire  $\phi 2.5$ , length 660mm, without olive head



110313900 Drill Guide for Guide Wire



110354900 Connecting Shaft for Extracting PFNA Blade



110355000 Stretch Aiming Arm for PFNA



110355100 Stretch Aiming Arm Shaft, for PFNA, long



110355200 Stretch Aiming Arm for PFNA, distal



110355300 Drill Bit with Flat Head,  $\phi 5.0$



110355400 Drill Bit,  $\phi 5.0$



110355500 Fixation Sleeve for Calibrating Pin



110355600 Drill Sleeve for Calibrating Pin,  $\phi$ 5.0



110355700 Trocar for Calibrating Pin



110355800 L-Wrench, hexagonal,  $\phi$ 5.0



110355900 Locking Screw I for Aiming Arm



110356000 Locking Screw II for Aiming Arm



110356100 U-Clip



110356200 Calibrating Pin



110820001 Instrument Case

