

Femoral Neck System

Surgical Technique



TABLE OF CONTENTS

INTRODUCTION	
▶ Indications, Contraindications, and Warnings	2
SURGICAL TECHNIQUE	
▶ Preparation	3
▶ Implant Insertion	5
▶ Insertion of Locking Screw and Anti-rotation Screw	12
▶ Instrument Disassembly and Final Check	20
▶ Implant Removal	22
PRODUCT INFORMATION	
▶ Implants	25
▶ Instruments	27
▶ Set List	29



Indication

The Femoral Neck System (FNS) is used to treat femoral neck fractures in adults and adolescents, including basilar, transcervical, and subcapital fractures, in which the growth plates have fused or will not cross.

Contraindications

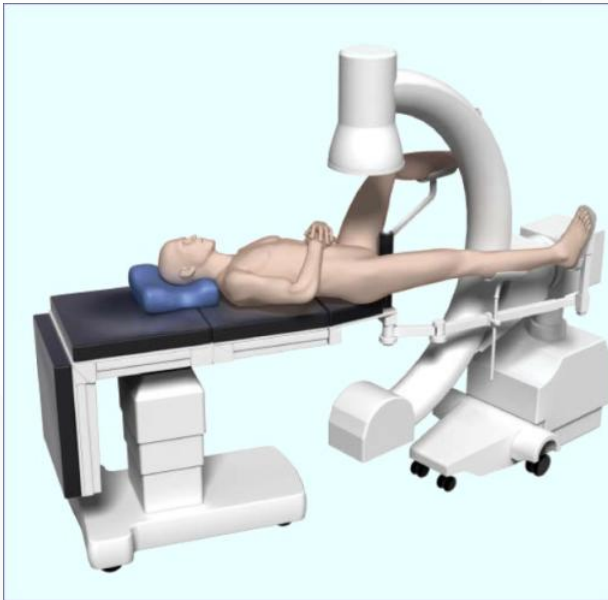
The specific contraindications for the Femoral Neck System (FNS) include:

- ◆ Pertrochanteric fractures
- ◆ Intertrochanteric fractures
- ◆ Subtrochanteric fractures

Warning

This system should not be utilized in situations when there is a high probability of:

- ◆ Sepsis
- ◆ Malignant primary or metastatic tumors
- ◆ Material sensitivity
- ◆ Compromised vascularity

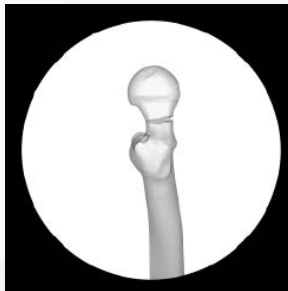


1. Position patient

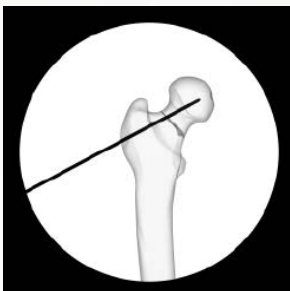
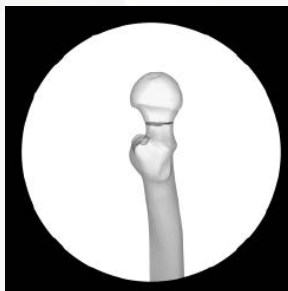
Place the patient on the operating table in a supine posture. Place the image intensifier so that the proximal femur may be seen in both the AP and lateral planes.



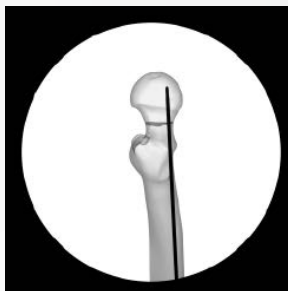
Before Reduction



After Reduction



Temp. Fixation



2. Reduce Fracture

Place the patient on the operating table in a supine posture. Place the image intensifier so that the proximal femur may be seen in both the AP and lateral planes.

Instruments

814.017 Threaded Guide Wire 3.2mm,
Length 400mm for FNS

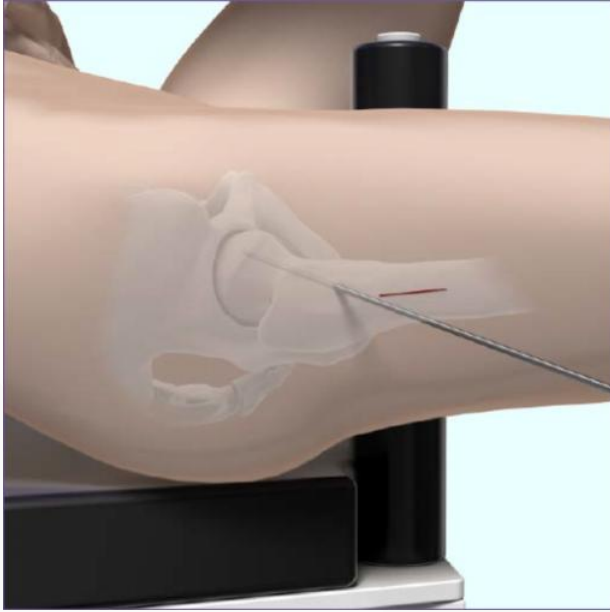
Examine the reduction in two planes while using the image intensifier. Consider open reduction if the reduction is insufficient. To avoid unintended femoral head rotation, insert an unused wire as an anti-rotation wire in the superior/anterior section of the femoral neck.

Note:

It's critical to reduce the fracture properly for proper bone healing and function, as well as to avoid problems. The anti-rotation wire may be positioned incorrectly, obstructing the implant's optimal location. The anti-rotation wire can be inserted percutaneously or by a lateral incision.

Precaution:

During insertion, keep an eye on the wire's position and use the image intensifier to validate the final position. Over insertion of guide wires may result in organ damage.

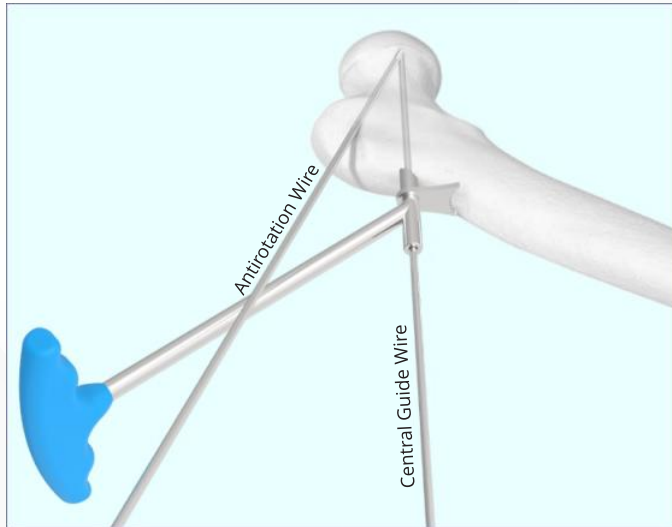


3. Approach

Starting 2 to 3 cm proximal to the middle of the femoral neck axis, make a straight lateral skin incision of approximately 6cm in length.

For proper hardware placement, access and expose the lateral femoral area as needed.

Consider making a second incision during the placement of the locking screw in obese patients. The second incision should be made at the site where the protection sleeve enters the body, close to the main incision.



Irrigate and suction to remove any debris that may have been created during implant insertion.

1. Insert Guide wire

Place the patient on the operating table in a supine posture. Place the image intensifier so that the proximal femur may be seen in both the AP and lateral planes.

Instruments

814.017 Threaded Guide Wire 3.2mm,
Length 400mm for FNS

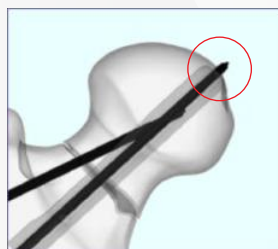
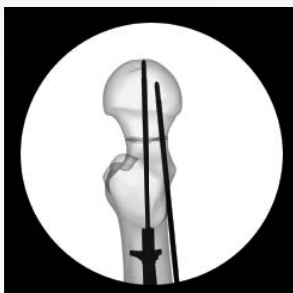
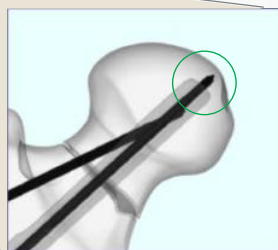
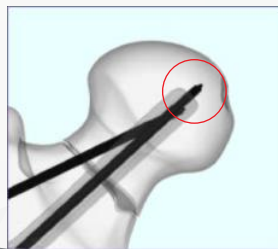
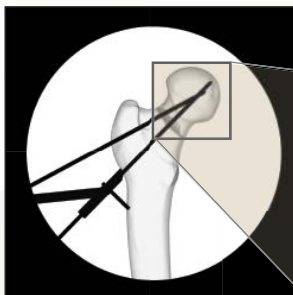
814.008 130° Angled Guide for 3.2mm
Guide Wire for FNS

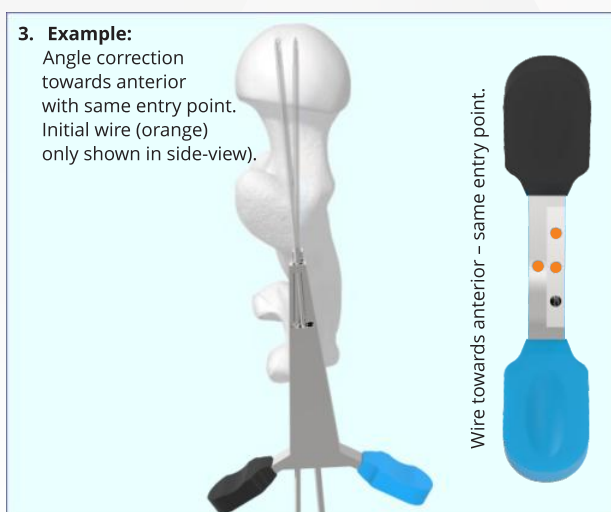
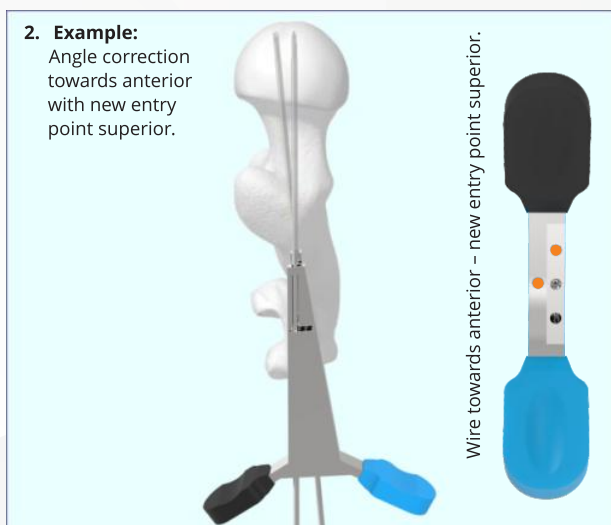
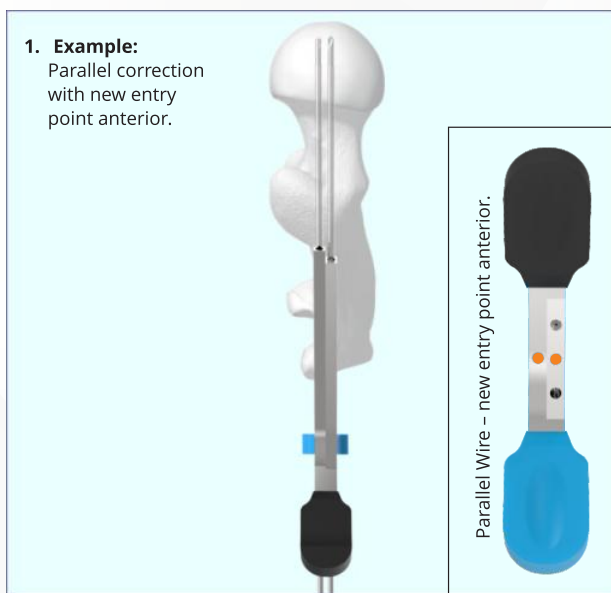
Note:

Before the fracture, the position of the guide wire within the femoral neck and head should be determined based on the patient's anatomy. In comparison to the 130° angle, the implant plate provides for a placement angle of around $\pm 5^\circ$

Precaution:

If the wires become bent after insertion, they must be replaced.





2. Adjust Guide Wire

Adjust the position of the central guide wire in relation to the initial central guide wire using the correction guide and an unused guide wire. There are three types of changes that can be made:

Instruments

814.017 Threaded Guide Wire 3.2mm, Length 400mm for FNS

814.009 Correction Guide for 3.2mm Guide Wire for FNS

Parallel Correction (5mm)

Turn the correction guide to specify the new entrance point (anterior/posterior or inferior/superior) by placing it over the initial wire (orange). Then, in the parallel hole, insert a fresh wire and remove the old one.

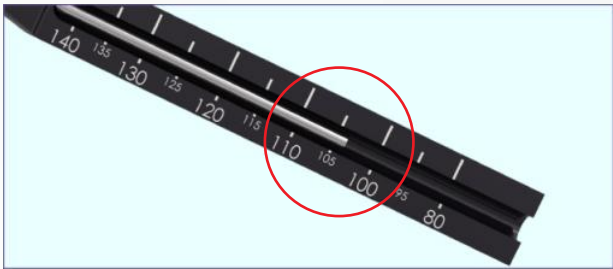
Angle Correction (5°) and Entry Point Correction (5mm)

Turn the correction guide to specify the new entry point after inserting it over the initial wire. Then, in either the left or right 5°-hole, insert a new wire.

Angle Correction (5°) and Same Entry Point

Insert the correction guide over the initial wire, turn the correction guide to choose the new temporary entry point, insert a new wire in the parallel hole and remove the initial wire.

Then use a new wire in either the left or the right 5°-hole to correct the angle.



3. Determine Length

Instruments

814.006 Direct Measuring Device for 3.2mm Guide Wire for FNS

Slide the direct measuring device over the central guide wire.

Read the depth of the guide wire on the direct measuring device.

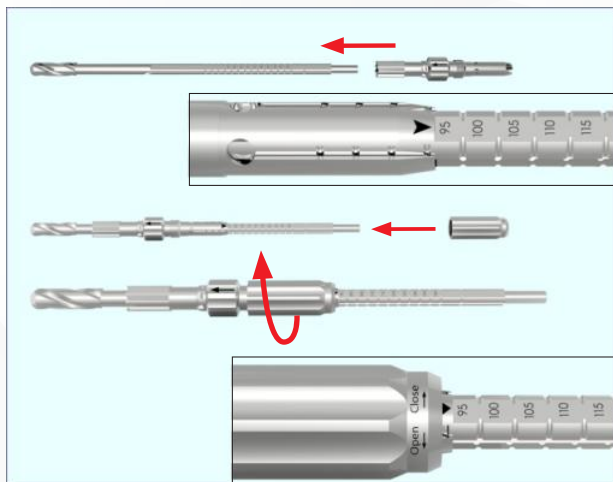
Remove 5mm from the measured depth as the guide wire is placed into the subchondral bone, and choose the next smaller build size, resulting in the estimated construct size.

Example:

If you read 102mm on the direct measuring device, the construct size of the implant should be 95mm (102–5=97 à choose 95mm).

Construct Sizes:

70mm (see notes below)	95mm	120mm
75mm	100mm	125mm
80mm	105mm	130mm
85mm	110mm	
90mm	115mm	



4. Ream for insertion of plate and bolt

Slide the reamer component over the drill bit until it clicks into place at the desired build size. Add the nut and tighten it completely to secure the reamer. Ream down until the reamer stops on the bone.

Instruments

814.007 Reamer for FNS

Note:

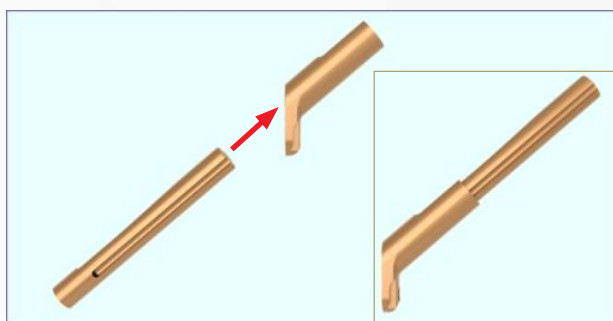
Prior to reaming, it is advised that the femoral head be temporarily fixed with an anti-rotation wire.

The anti-rotation wire may be positioned incorrectly, obstructing the implant's optimal location. Using the image intensifier, control guide wire migration, monitor reaming depth during reaming, and assure full reaming.

Continuous irrigation is recommended when reaming in dense bone.

Remove the Reamer.

If the guide wire is unintentionally removed, it is critical to replace it. Push the reamer back into the reamed hole (without using a power tool) and use the cannulation to reinsert the guide wire back into its original position.



5. Assemble the implant and insertion tools.

Instruments

814.001 Insertion Handle for FNS

814.002 Insertion Handle Device for FNS

Without tightening the black screw, slide the insert into the insertion handle.

Insert the bolt with the chosen build size completely into the plate.

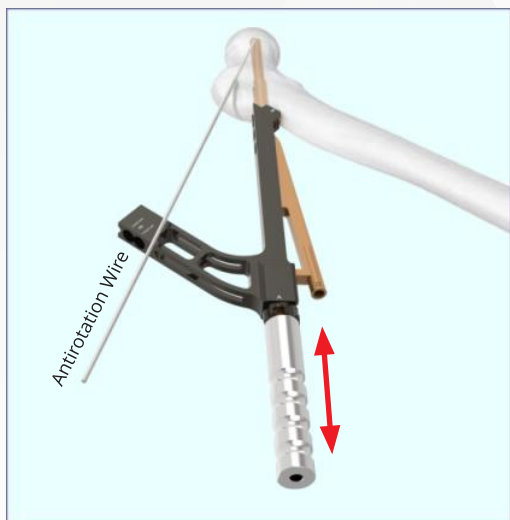
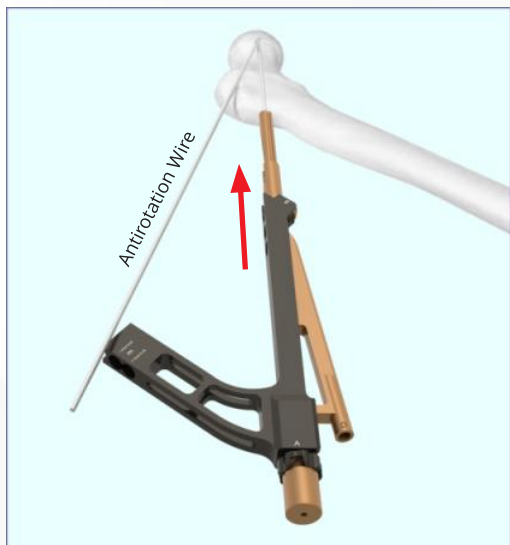
Attach the implant to the insertion handle with the insertion handle.

Note:

Ascertain that the implant is securely attached to the insertion tool and that the bolt is fully extended. To attach the implant, manually tighten the black screw on the insert.

Precaution:

It is sufficient to hand-tighten the black screw. Using more tools may result in overtightening.



6. Insert Implant

In the pre-reamed hole, place the implant over the centre guide wire.

Optional:

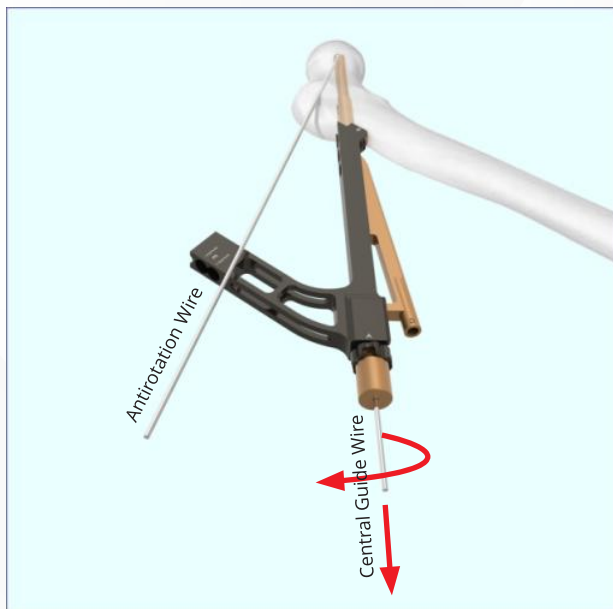
Manually tapping the plate onto the bone can be done using the cylinder. If more tapping is required, lightly tap the cylinder with a normal surgical hammer.

Use image intensification to validate the insertion depth and that the plate is implanted all the way down to the bone and aligned with the femoral shaft's axis.

Note:

Avoid excessive insertion force. If tapping is required during insertion, be sure the black screw is not turning.

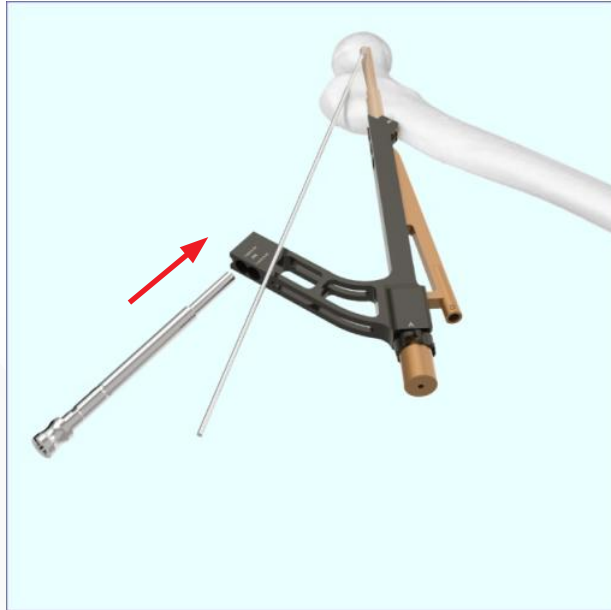




7. Remove Guide Wire

The central guide wire should be removed.

Keep the anti-rotation wire in place to prevent head rotation and loss of reduction.



1. Attach protection sleeve for locking screw insertion

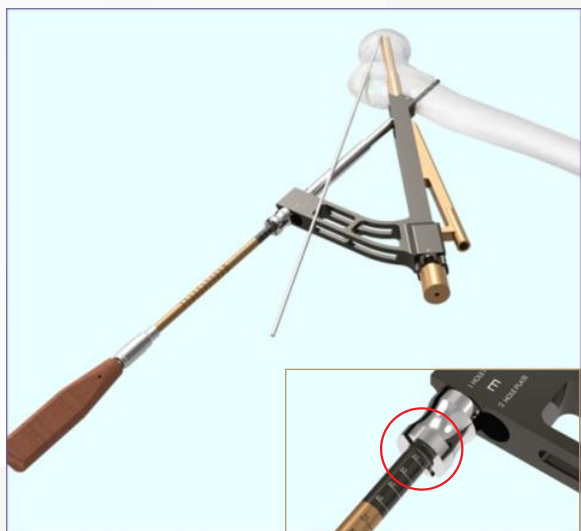
Instruments

814.003 Protection Sleeve for FNS

Attach the insertion handle to the protective sleeve.

Ensure that the central guide wire is removed.





2. Drill For Locking Screw

Instruments

814.019 Drill Bit 4.3mm x 413mm for FNS

814.005 Depth Gauge up to 100mm for FNS

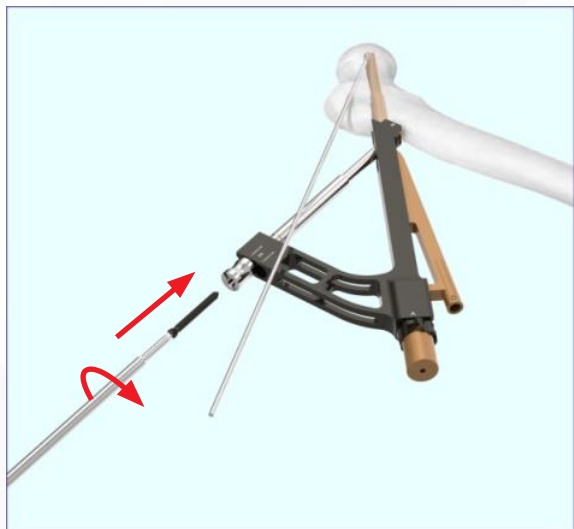
Drill a hole through the protective sleeve for the locking screw.

Read the screw length directly off the etching on the drill bit.

Determine the depth of the drilled hole by using the depth gauge through the protective sleeve.

Note:

The screw length should be at least 4mm greater than the hole depth that has been measured.



3. Insert Locking Screw

Instruments

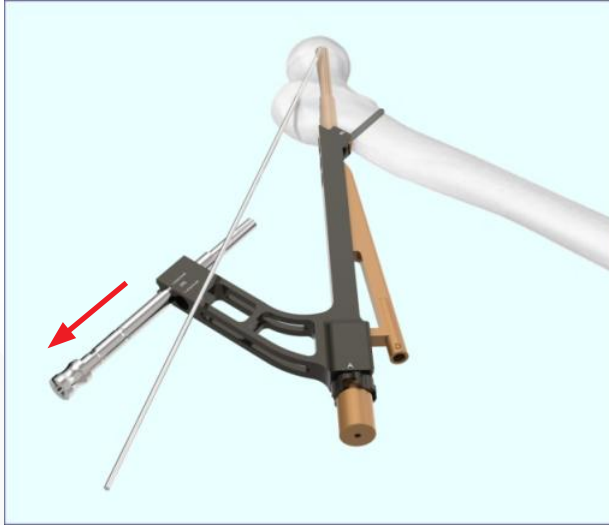
- 814.012 Quick Coupling Handle for FNS
- 814.013 Torque Limit Adapter 4 Nm for FNS
- 814.015 Shaft for Star Screw Driver T25 for FNS

Insert the locking screw to the length determined by the drill bit or depth gauge.

Power tools can be used to insert the locking screw. The screwdriver shaft, along with the 4 Nm torque limiter and the proper handle, must be tightened carefully and by hand for the final tightening.

Note:

Prior to final tightening, use the image intensifier to monitor locking screw insertion and validate screw position and length.

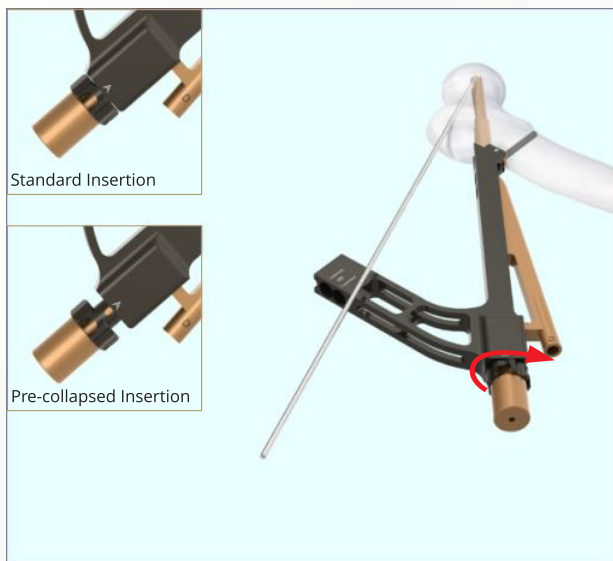


4. Remove Protection Sleeve

Turn the black screw clockwise to ensure that the tip is in contact with the bolt. This will bridge the gap between the insert tip and the bolt if necessary.

Note:

If the implant is inserted pre-collapsed, the black screw can have a distance from the handle of as much as 5mm, even after Tightening.

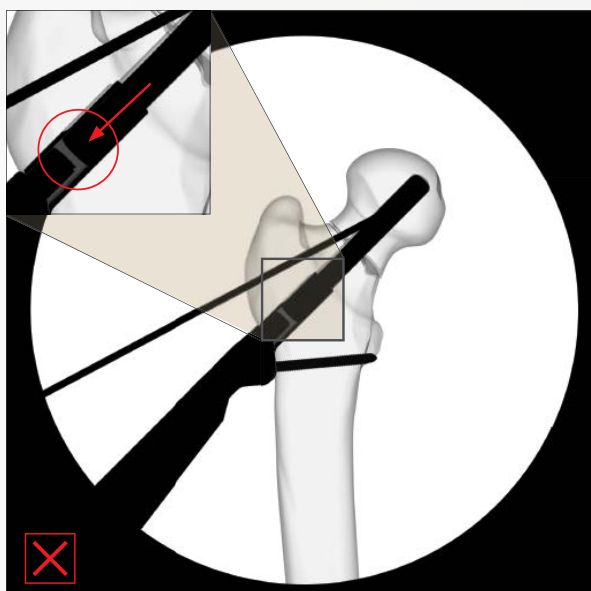
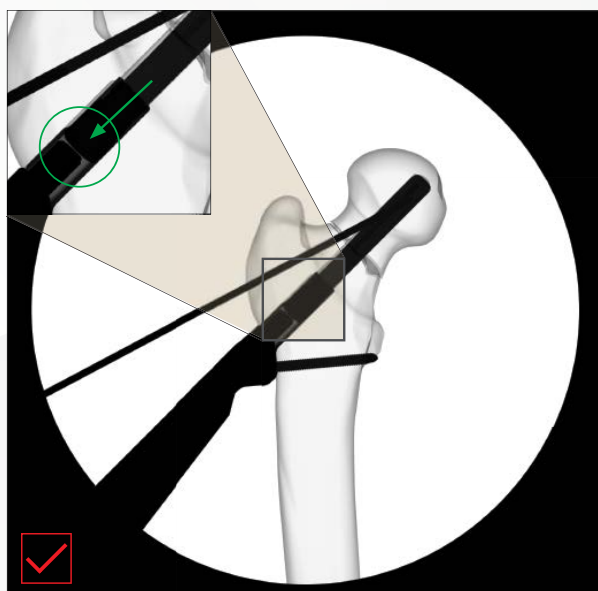


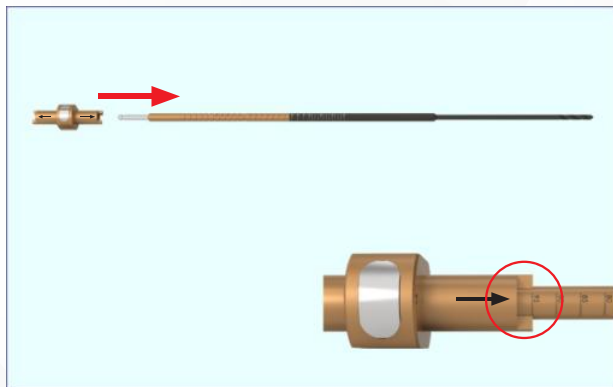
5. Check Insertion Instruments

Turn the black screw clockwise to ensure that the tip is in contact with the bolt. If needed, this will close the gap between insert tip and bolt.

Note:

Even after tightening, the black screw can have a distance of up to 5mm from the handle if the implant is inserted pre-collapsed.





6. Drill For Anti-rotation Screw

Instruments

814.016 Drill Stop for FNS

814.019 Drill Bit 4.3mm x 413mm for FNS

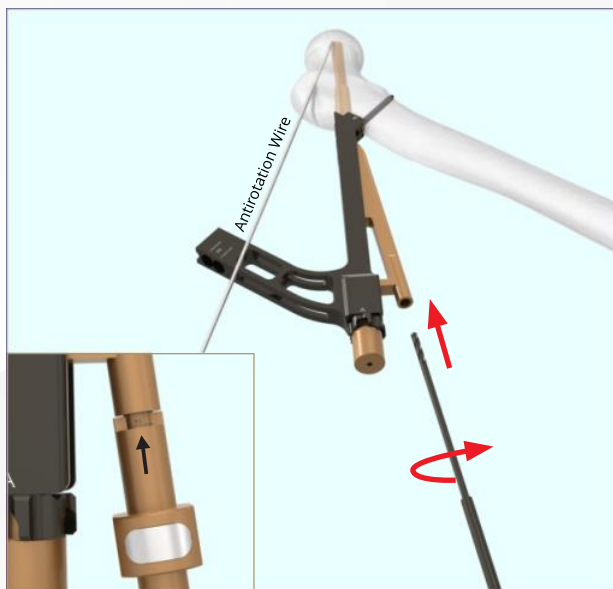
Pass the drill stop over the back end of the drill bit and check the drill stop for wear. Adjust the setting to the same construct size as the bolt.

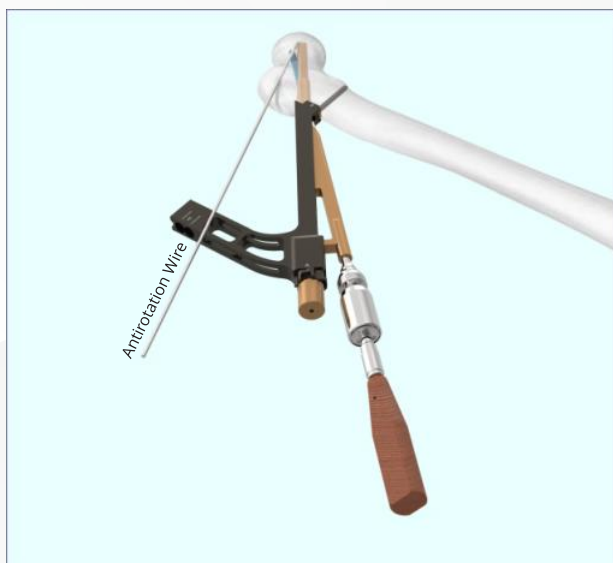
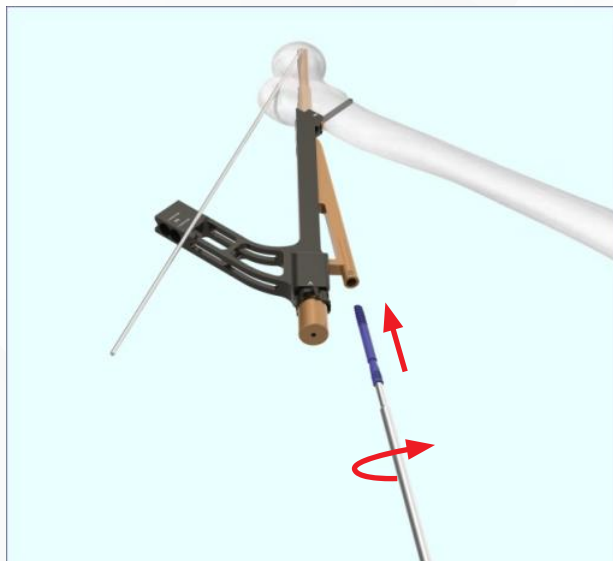
Use the guide of the insert to drill the hole for the antirotation screw.

Drill until the drill stop stops on the guide of the insert.
Remove the drill bit.

Note:

Prior to final tightening, use the image intensifier to monitor locking screw insertion and validate screw position and length.





7. Insert anti-rotation Screw

Instruments

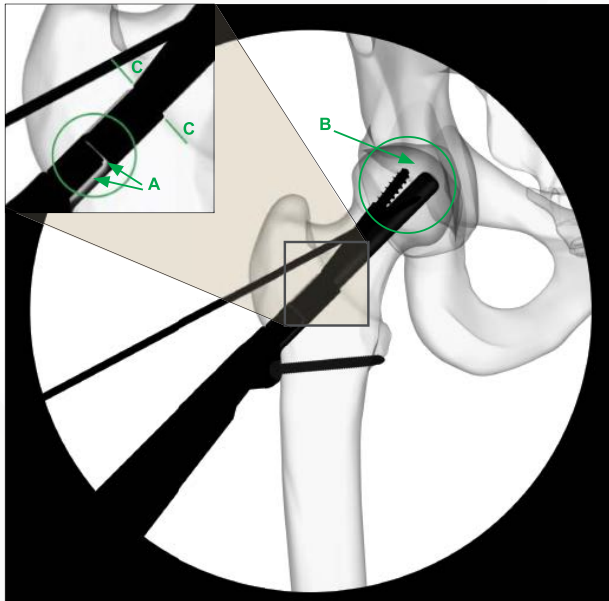
- 814.012 Quick Coupling Handle for FNS
- 814.013 Torque Limit Adapter 4 Nm for FNS
- 814.015 Shaft for Star Screw Driver T25 for FNS

Insert the anti-rotation-screw with the same construct size as the bolt.

The screwdriver shaft, along with the 4 Nm torque limiter and the proper handle, should be used to insert and final tighten the screws gently and by hand.

If dense bone prevents anti-rotation screw insertion, carefully insert the screw using the handle without the torque limiter.

Remove any anti-rotation wires.

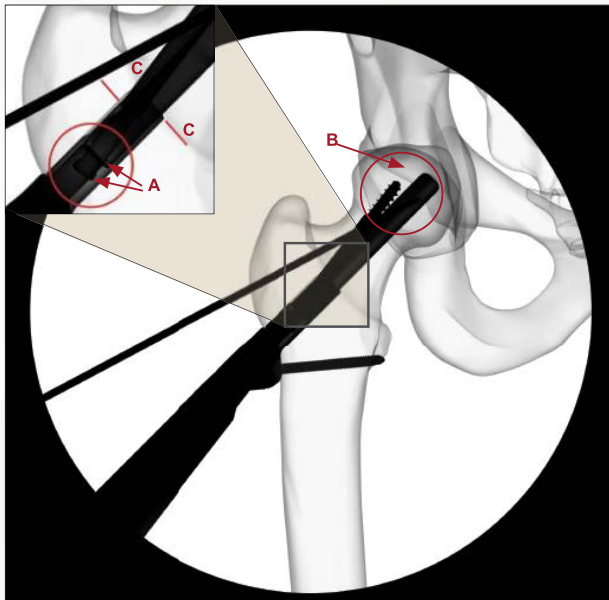


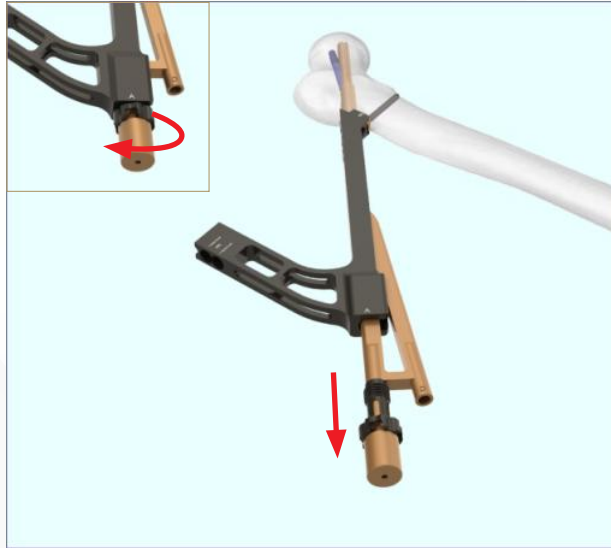
8. Check Anti-rotation Screw

The head of the anti-rotation screw should not appear outside of the bolt.

When compared to the tip of the bolt, the anti-rotation-screw tip should have a similar insertion depth.

The anti-rotation screw's notch should be at the same level as the plate barrel's notch.





1. Remove insertion instruments

Completely loosen the insert's screw to release it from the insertion handle in a counterclockwise direction.

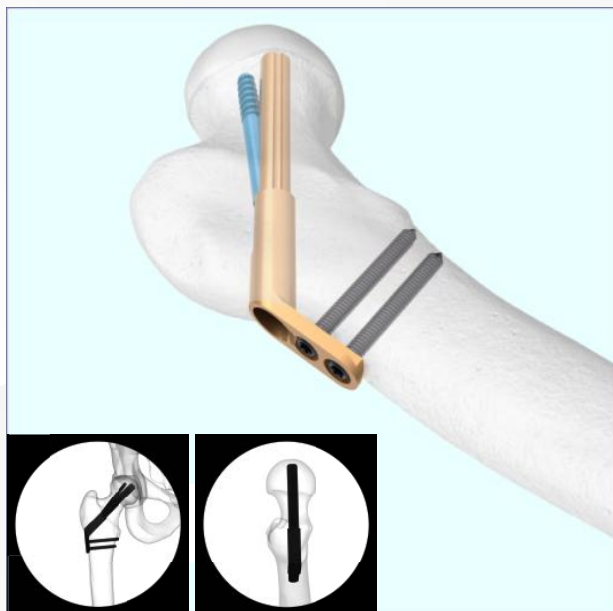
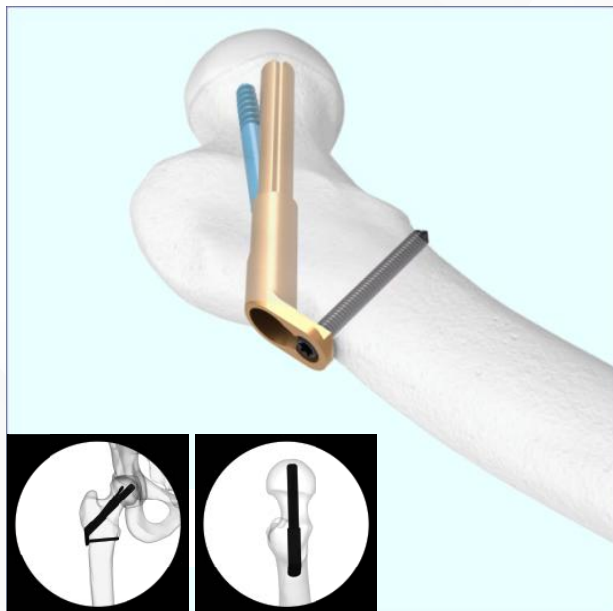
From the insertion handle, remove the insert.

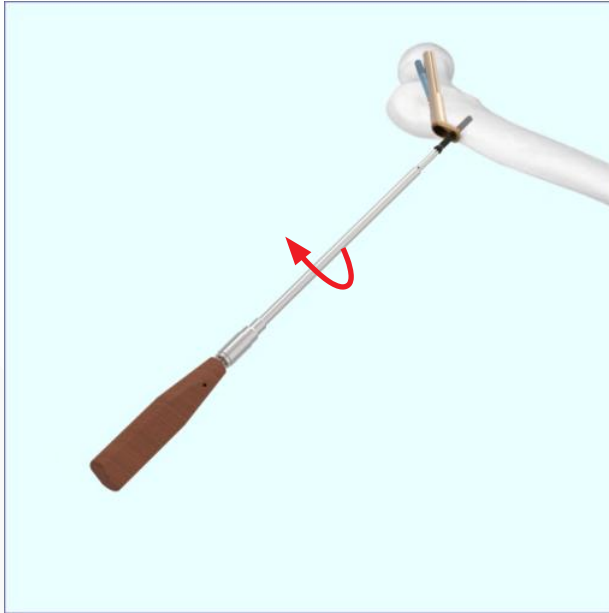
Slide the insertion handle off the plate by moving it in a distal direction.



2. Final Check

Before closing the wound, use the image intensifier to confirm implant size as well as positioning and re-confirm that the anti-rotation screw and the locking screw are fully locked.





1. Remove Locking Screw

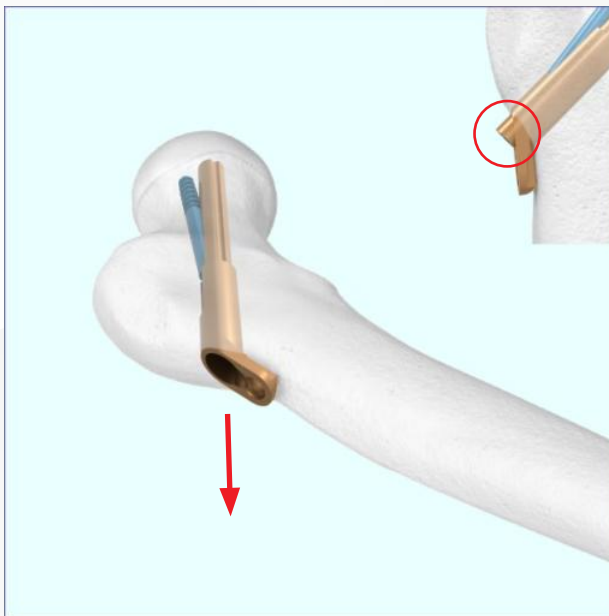
Instruments

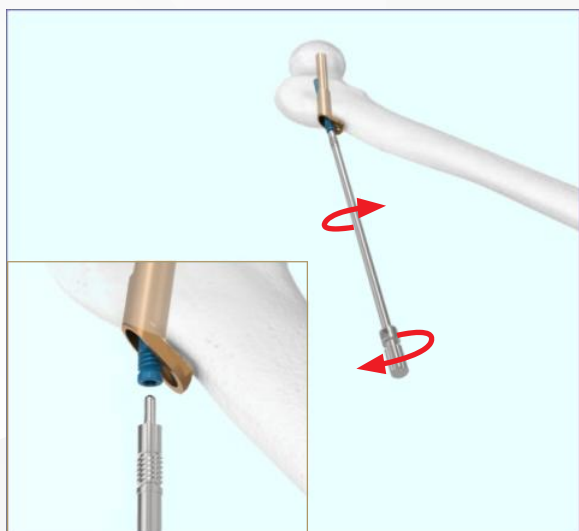
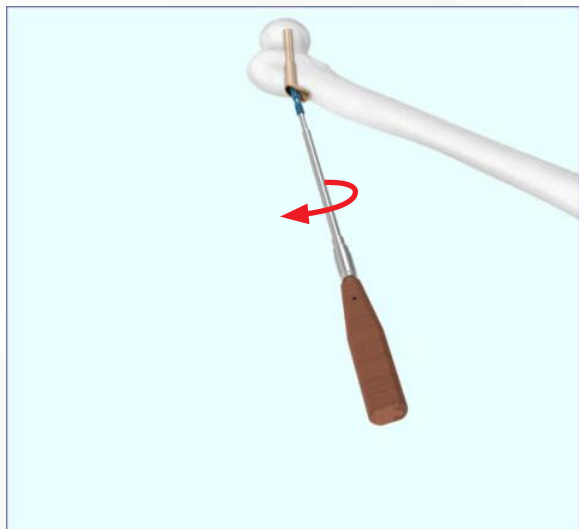
814.012 Quick Coupling Handle for FNS

814.015 Shaft for Star Screw Driver T25 for FNS

Remove the locking screw(s) by hand, without the use of a torque limiter, using the screwdriver shaft and the suitable handle.

If the screw cannot be removed with the screwdriver, consult the "Screw Removal Set".





2. Remove Anti-rotation Screw

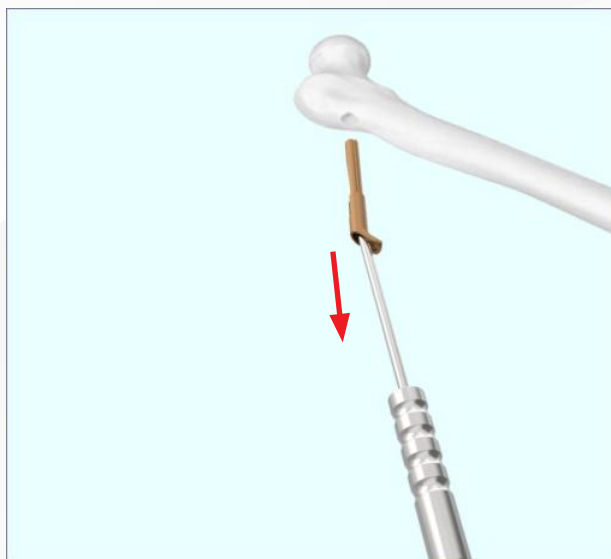
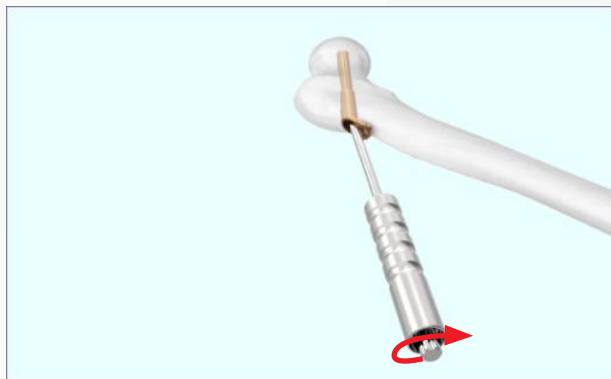
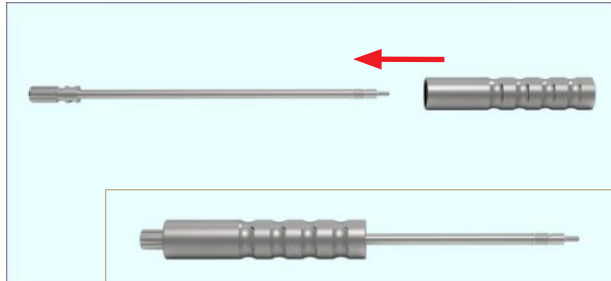
Instruments

- 814.004 Multifunction Rod Insertion for FNS
- 814.012 Quick Coupling Handle for FNS
- 814.015 Shaft for Star Screw Driver T25 for FNS

Remove the anti-rotation screw by hand using the screwdriver shaft and the suitable handle, without utilising the torque limiter.

If the anti-rotation screw comes loose from the screwdriver, use the multifunction rod to catch the anti-rotation screw by turning it clockwise. To fully remove the anti-rotation screw, pull on the multifunction rod and turn it anticlockwise.

If the screw cannot be removed with the screwdriver, consult the "Screw Removal Set".



3. Remove Plate

Instruments

- 814.004 Multifunction Rod Insertion for FNS
- 814.010 Hammer Guide for FNS
- 814.012 Quick Coupling Handle for FNS
- 814.015 Shaft for Star Screw Driver T25 for FNS

Slide the cylinder over the multifunction rod.

Attach the multifunction rod by turning it clockwise. Use the direction of the previously removed anti-rotation screw.

Tap outward with the cylinder to remove the plate and bolt simultaneously.



Plates

271B.01 Femoral Neck System Plate 130° 1hole

271B.02 Femoral Neck System Plate 130° 2hole

Femoral Neck System Bolt

Code No.	Construct Length
272.75	75mm
272.80	80mm
272.85	85mm
272.90	90mm
272.95	95mm
272.100	100mm
272.105	105mm
272.110	110mm
272.115	115mm
272.120	120mm
272.125	125mm
272.130	130mm



Antirotation Screw for FNS

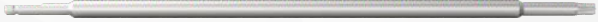
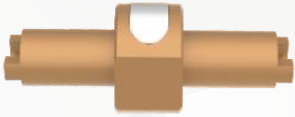
Code No.	Construct Length
273.75	75mm
273.80	80mm
273.85	85mm
273.90	90mm
273.95	95mm
273.100	100mm
273.105	105mm
273.110	110mm
273.115	115mm
273.120	120mm
273.125	125mm
273.130	130mm



5.0mm Locking Screws

- 466.30- 5.0mm Locking Compression Screws
- 466.60 (Self Tapping) Star Head

814.001 Insertion Handle for FNS	814.002 Insertion Handle Device for FNS
	
814.003 Protection Sleeve for FNS	814.004 Multifunction Rod Insertion for FNS
	
814.005 Depth Gauge up to 100mm for FNS	814.006 Direct Measuring Device for 3.2mm Guide Wire for FNS
	
814.007 Reamer for FNS	814.008 130° Angled Guide for 3.2mm Guide Wire for FNS
	
814.009 Correction Guide for 3.2mm Guide Wire for FNS	814.010 Hammer Guide for FNS
	

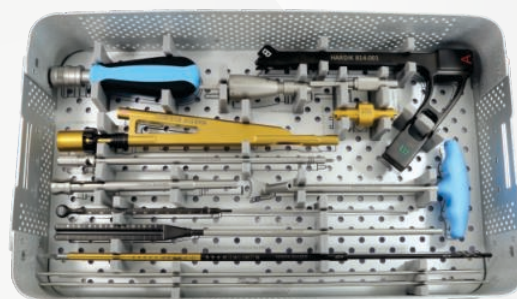
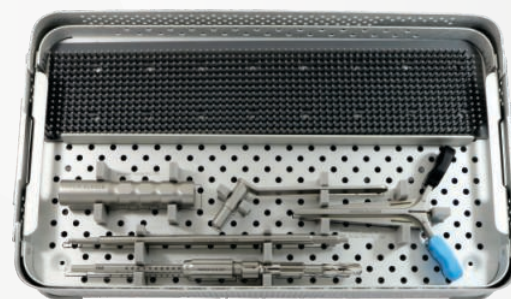
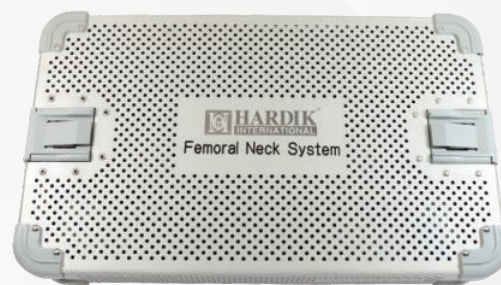
814.012 Quick Coupling Handle for FNS 	814.013 Torque Limit Adapter 4 Nm for FNS 
814.014 Quick Coupling Adaptor for FNS 	814.015 Shaft for Star Screw Driver T25 for FNS 
814.016 Drill Stop for FNS 	814.017 Threaded Guide Wire 3.2mm Length 400mm for FNS 
814.018 Guide Pin for FNS 	814.019 Drill Bit 4.3mm x 413 mm for FNS 

Femoral Neck System Instrument Set

AGC.20 FNS Instrument Set

Instruments

814.001	Insertion Handle for FNS
814.002	Insertion Handle Device for FNS
814.003	Protection Sleeve for FNS
814.004	Multifunction Rod Insertion for FNS
814.005	Depth Gauge up to 100 mm for FNS
814.006	Direct Measuring Device for 3.2mm Guide Wire for FNS
814.007	Reamer for FNS
814.008	130° Angled Guide for 3.2 mm Guide Wire for FNS
814.009	Correction Guide for 3.2 mm Guide Wire for FNS
814.010	Hammer Guide for FNS
814.011	Guide Pin Resetter
814.012	Quick Coupling Handle for FNS
814.013	Torque Limit Adapter 4 Nm for FNS
814.014	Quick Coupling Adaptor for FNS
814.015	Shaft for Star Screw Driver T25 for FNS
814.016	Drill Stop for FNS
814.017	Threaded Guide Wire 3.2mm Length 400mm for FNS
814.018	Guide Pin for FNS
814.019	Drill Bit 4.3mm x 413 mm for FNS





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