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## Nota Bene

The following technique is for informational and educational purposes only. It is not intended to serve as medical advice. It is the responsibility of treating physicians to determine and utilize the appropriate products and techniques, according to their own clinical judgment, for each of their patients. For more information on the product, including its Indications for Use, contraindications, cleaning, sterilization and product safety information, please refer to the product's label and the Instructions for Use (IFU) for the product.

# Introduction

The TRIGEN® META-NAIL® Retrograde Femoral Nail with a range of sizes, is a comprehensive approach to the treatment of femoral fractures. The threaded screw holes and polyethylene bushings are used for fixation of complex fractures.

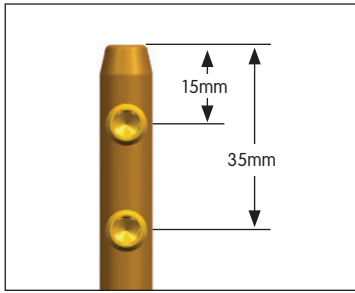
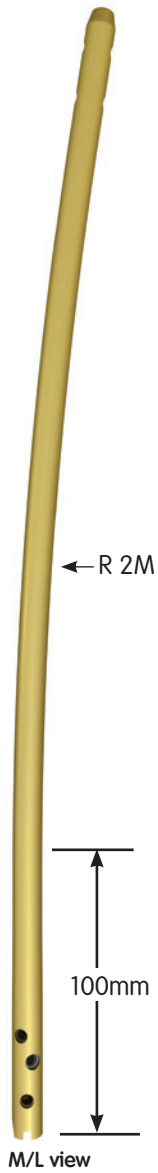
The TRIGEN META Retrograde Femoral Nails have a round, cannulated geometry and are composed of titanium alloy (Ti-6Al-4V). These implants are designed to provide a solution for fracture fixation and are offered in a variety of diameters (10, 11.5 and 13mm) with lengths ranging from 18 to 50cm.

The nails feature a multi-planar locking configuration, threaded screw holes and polyethylene bushings facilitating the fixation of complex fractures, and nail caps for additional fixation.

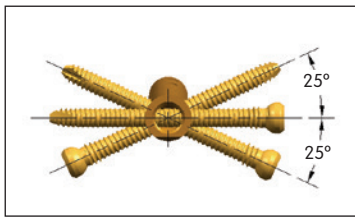
The META-NAIL System can be used with or without the SURESHOT® Distal Targeting System. If using the SURESHOT Distal Targeting System, be sure to read and understand the TRIGEN SURESHOT Distal Targeting System User Manual. Only trained operators are allowed to use the TRIGEN SURESHOT Distal Targeting System.



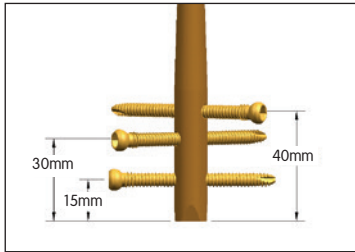
# TRIGEN<sup>◇</sup> META-NAIL<sup>◇</sup> Retrograde Femoral Nail Specifications



Non-driving end of nail



Top view of nail



Driving end of nail

Specifications	TRIGEN META-NAIL Retrograde Femoral
Material	Ti6Al4V
Diameter	10mm, 11.5mm and 13mm
Lengths	18–50cm*
Nail color	Gold
Cross section	Round
Distal diameter (driving end)	12mm (10mm, 11.5mm diameter) 13mm (13mm diameter)
Proximal diameter (non-driving end)	10mm, 11.5mm and 13mm
Smallest through diameter	5.0mm
Wall thickness	2.3mm (10 diameter) 3.0mm (11.5 diameter) 2.3mm (13 diameter)
Guide bolt thread	5/16–24 UNF
Screw diameter	5.0mm
Screw color	Gold
Major diameter	5.0mm
Minor diameter (core)	4.3mm
Screw lengths	25–110mm
Hex size	4.7mm
Alternative hexdrivers	RT Femoral and Recon 7.0mm Cannulated Screw PERI-LOC <sup>®</sup> 4.7mm Hexdriver, PROFIX <sup>®</sup> 4.7mm Hexdriver
Alternative modes	No
<b>Distal Locking (driving end)</b>	
Static lock locations/orientations	15mm/M/L – Threaded, can be locked with META-NAIL cap set screw 30mm/25° – Threaded w/bushing 40mm/25° – Threaded w/bushing
Static locking hole dimensions	Threaded 4.5mm minor diameter Threaded 5.3mm major diameter
<b>Proximal Locking (non-driving end)</b>	
Static lock locations/orientations	15mm/A/P 35mm/A/P
Static locking hole dimensions	5.3mm
Proximal screw hole diameter	5.3mm
A/P bow radius	2m
A/P bow location	Starts 100mm from driving end

**Note:** These views are not to scale and should be used as a pictorial representation only.

\* Set does not include all sizes; Additional sizes may be special order only.

# Surgical technique

## Patient positioning

1. Position the patient supine on a radiolucent table. Flex the affected limb approximately 45° over a posterior support to assist with fracture reduction (Figure 1). Check for length and rotation by comparison to the unaffected limb.
2. Rotate the C-Arm to ensure optimal A/P (anteroposterior) and lateral visualization of the entire femur. The C-Arm should be able to freely access the femur up to and including the intertrochanteric area. A distraction device may also be applied to obtain and/or maintain traction.
3. Address intra-articular fracture components with interfragmentary screw fixation prior to nail insertion. Be sure to place the screws in the anterior and posterior aspect of the distal femur and safely out of the nail's intended path.

**Note:** Cannulated screw Guide Pins allow confirmation of definitive screw placement prior to fracture fixation and nail insertion.

4. Use a bolster or radiolucent triangle to maintain limb position. Rotate the C-Arm to ensure optimal A/P and lateral visualization of the entire femur. A distraction device may also be applied to obtain and/or maintain traction (Figure 2).

**Caution:** If using the TRIGEN® SURESHOT® Distal Targeting System, verify that there are no metal objects in the immediate targeting area. Metal interference will cause the SURESHOT System to be inaccurate.



Figure 1

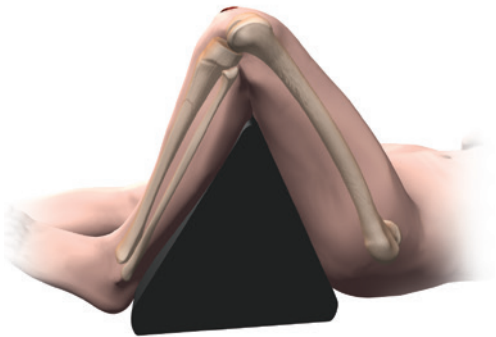


Figure 2

## Establish the incision and entry portal

1. Inspect the Entry Portal Tube (71674060) to ensure that it is not damaged, bent or chipped. Any flaws in the tube can lead to damage of the surrounding tendons and tissues.
2. Assemble the Honeycomb (71674075), Entry Portal Handle (71674092), and Entry Tube (Figure 3) by pulling back the black trigger of the Entry Portal Handle and inserting the Entry Tube into the handle ring.

Turn the tube until it clicks into the locked position.

**Optional:** Suction can be applied to the Entry Portal Handle.

3. Make a 3–4cm midline skin incision, followed by a medial parapatellar capsular incision to expose the intercondylar notch (Figure 4). Gently retract the patellar tendon laterally.

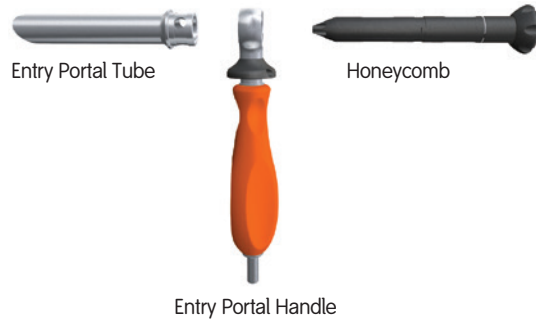


Figure 3

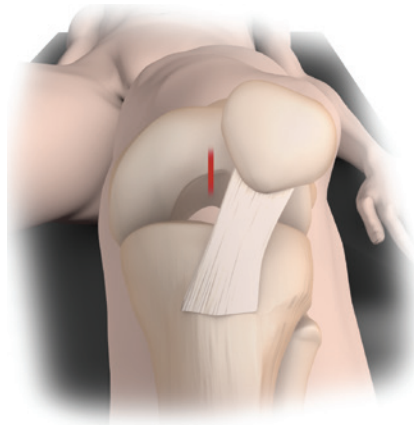


Figure 4

## Entry portal acquisition

Locate the entry point within the intercondylar notch just anterior and lateral to the femoral attachment of the posterior cruciate ligament (Figure 5).

1. Attach a 3.2mm Brad Point Guide Pin (71674130 or 71631436) to the drill via the Mini Connector (71631186).
2. Insert the Guide Pin into the distal femoral metaphysis to a depth of 6–8cm (Figure 6).

**Note:** The entry portal instrumentation serves as a soft-tissue protector.

3. The Guide Pin should be in line with the femoral axis in the A/P view and anterior to *Blumensaat's Line* in the lateral view (Figure 7).

**Note:** If suboptimal Guide Pin insertion occurs, rotate the Honeycomb within the Entry Portal Tube to the desired location and insert another 3.2mm Brad Point Guide Pin (Figure 8).

**Note:** Do not over-insert the Guide Pin as this can establish a false trajectory and cause fracture malalignment.

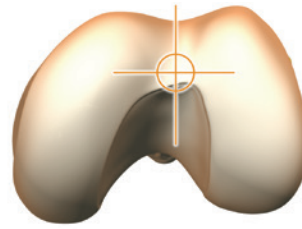


Figure 5

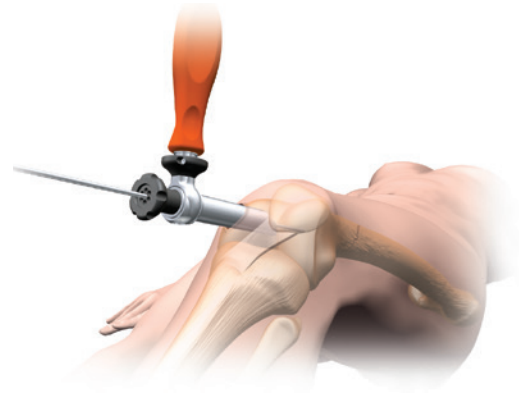


Figure 6

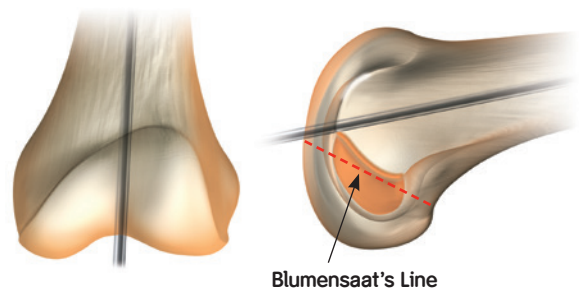


Figure 7

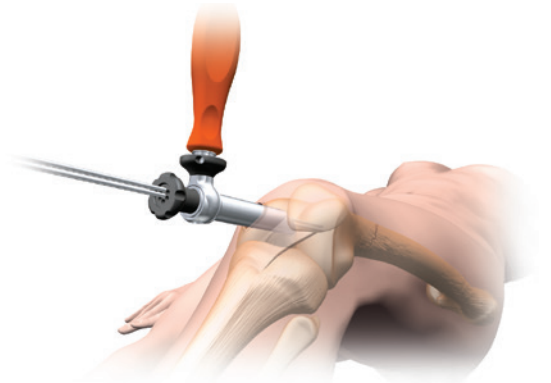


Figure 8

## Entry portal

1. After Guide Pin placement, remove the Honeycomb (71674075) from the Entry Tube along with any additionally inserted Guide Pins.
2. Attach the 12.5mm Entry Reamer (71631116) to a power drill. Advance the reamer over the Guide Pin and through the Entry Tube to a depth of 6–8cm (Figure 8).
3. Check the position of the Entry Reamer via radiographic imaging and then remove the Entry Reamer and Guide Pin.

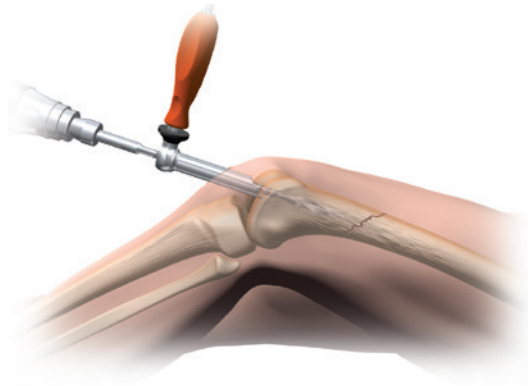


Figure 9

## Alternative technique: Entry portal

1. With the Entry Tube and Entry Portal Handle still in the joint space, attach the T-handle (71674076 or 71674576) to the Cannulated Awl (Figure 9).

**Note:** Introduce the 3.2mm T-handle Trocar (71674074) (Figure 10) into the back of the assembly prior to insertion in order to prevent awl slippage and the accumulation of cortical bone within the cannulation.

2. Insert the awl into the distal femur to a depth of 6–8cm.



Figure 10



Figure 11



## Reduce the fracture

1. Open the Gripper (71674080).
2. Insert the smooth end of the 3.0mm Ball Tip Guide Rod (71631626) into the front of the Gripper (Figure 12) and gently close the trigger grip.
3. Connect the 8.5mm Reducer and the Reducer Connector (71674077) so that the words “Slot Orientation” on the connector are in line with the opening at the Reducer’s tip (Figure 13).
4. Connect the Reducer and connector to the T-handle (71674076 or 71674576) to complete the assembly.

**Note:** If blocking screws are desired at this point in the procedure, refer to *Appendix A*, the “Blocking Screw Technique,” at the back end of this document.

5. Advance the Reducer through the Entry Tube into the intramedullary canal (Figure 14).
6. Use the curved tip of the Reducer to direct the 3.0mm Ball Tip Guide Rod past the fracture into the region of the distal epiphyseal scar.

**Note:** The guide rod should be center-center in the A/P and lateral views (Figure 15).

7. Once the guide rod is at the desired depth, detach the Gripper and prepare to remove the Reducer from the femoral canal.
8. Remove the Reducer from the femoral canal.

**Note:** During extraction, slide the Obturator (71674078) into the T-handle in order to maintain guide rod position within the canal (Figure 16).

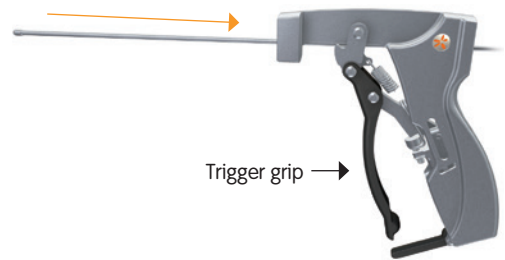


Figure 12

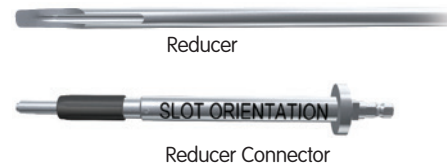


Figure 13

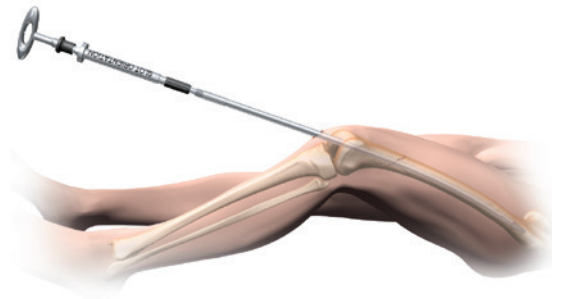


Figure 14



Figure 15

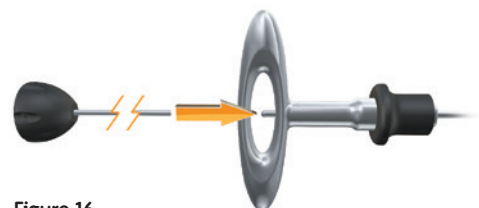


Figure 16

## Determine the implant length

1. Confirm that the Ruler (71674079) opens easily. If it does not, adjust the thumb wheel connection at the end to ensure free movement.
2. After the Reducer has been removed, reconfirm the guide rod placement within the proximal femur.
3. Slide the Ruler over the guide rod until its metal tip contacts the distal femur (Figure 17).
4. Confirm guide rod position in the window at the opposite end of the Ruler in order to ensure accurate implant measurement (Figure 18).
5. Push down on the top of Ruler until it contacts the 3.0mm Ball Tip Guide Rod.
6. Read the implant length from the exposed calibrations at the end of the Ruler.
7. Confirm fracture reduction to ensure that the implant length is not underestimated.

**Note:** When selecting the implant length, consider that the nail must be countersunk below the articular surface of the distal femur.

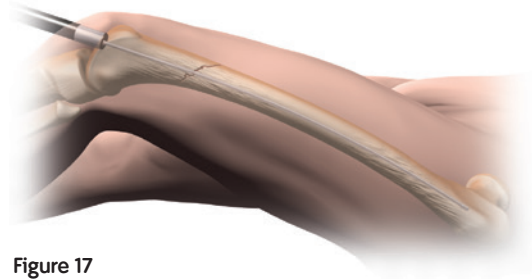


Figure 17



Figure 18

## Reamed technique

1. Use the 9.0mm End Cutting Reamer Head (71118231) and Flexible Reamer Shaft (71118200) to ream the intramedullary canal sequentially in half-millimeter increments to a size 1.0–1.5mm larger than the selected nail size (Figure 19).
3. Insert the Obturator (71674078) into the back of the reamer unit during retraction to ensure proper Guide Rod placement during reaming.
4. Continue to confirm correct Guide Rod placement in the proximal femur throughout reaming.

**Note:** Periodically move the reamer backward and forward in the canal to clear debris from the cutting flutes.

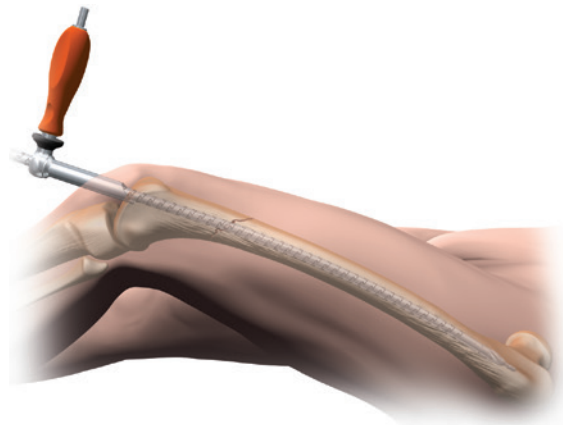


Figure 19

## Nail assembly

1. Use the Guide Bolt (71654506) to attach the META-NAIL<sup>®</sup> Drill Guide (71654502) to the nail.
2. Tighten with the Guide Bolt Wrench (71631140) and T-handle. The nail is correctly aligned when:
  - The vertical black line on the posterior side of the insertion barrel aligns with the line on the posterior side of the nail.
  - The “A” on the anterior side of the nail aligns with the “A” on the anterior side of the insertion barrel (Figure 20).
  - The apex of the nail’s A/P Bow faces posteriorly and the drill guide is oriented anteriorly (Figure 21).

**Note:** The bevel on the front of the nail marks the connection to the drill guide and can be seen in the lateral view as a means to determine proximal insertion depth.

**Note:** Do not use the META-NAIL Extension Drill Guide, as the insertion barrel of the META-NAIL Extension Drill Guide is too short to adequately countersink the nail.

3. Attach the Anterior Drop (71654501) to the Drill Guide (Figure 22).
4. To verify the accuracy, insert a gold 9.0mm Drill Sleeve (71631152) and silver 4.0mm Drill Sleeve (71674083) into the Drop (Figure 22).
5. Pass a 4.0mm Long Pilot Drill (71631110)\* through the drill sleeves.

**Note:** An incorrectly attached nail will not target.

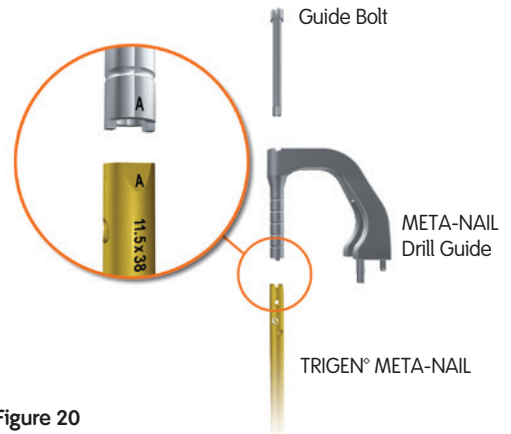


Figure 20



Figure 21



Figure 22

\*The 4.0mm Long Pilot Drill (71631110) is interchangeable with the 4.0mm AO Long Drill (71631121).

## Nail insertion

1. Detach and remove the Anterior Drop.
2. Attach the Cannulated Impactor-Medium (71675081) to the drill guide (Figure 23).
3. Orient the drill guide assembly in the A/P position.
4. Use light blows on the Slotted Hammer (71674082) to tap and advance the nail over the guide rod to the desired depth.

**Note:** If excessive force is required to insert the nail, additional reaming of the intramedullary canal may be required.

5. Verify fracture reduction as the nail crosses the fracture site. Pay close attention to rotation, length, alignment, distraction and/or shortening.
6. Check the final nail position in both the A/P and lateral views for correct alignment.

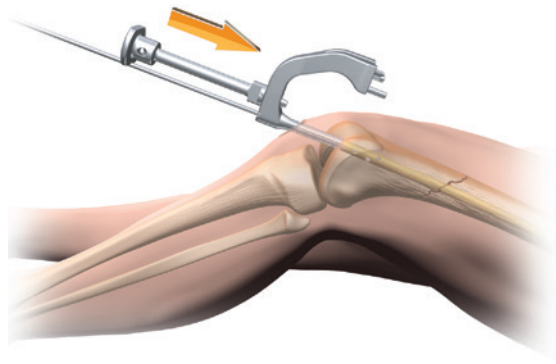


Figure 23

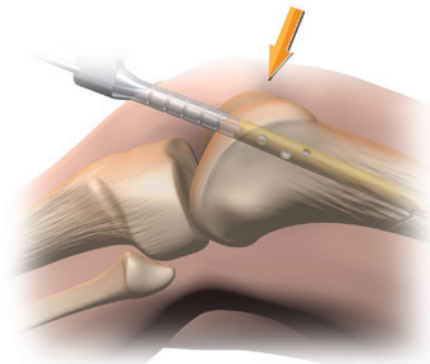


Figure 24

## Check nail depth

### Distal

In the A/P and lateral views, confirm nail position within the distal femur. The notch at the nail/drill guide junction will be visible in the lateral view. Each circular groove on the drill guide's insertion barrel represents a 10mm depth interval (Figure 24).

### Proximal

1. In the A/P view, confirm that the nail has been inserted to the desired depth (Figure 25).

**Note:** Femoral fractures should be treated with the longest nail possible in order to reduce the likelihood of stress risers.

2. Remove the guide rod once the nail has been fully seated.
3. Attach the Anterior Drop.
4. Following nail insertion, confirm that the nail and drill guide are securely connected as hammering can loosen the Guide Bolt.

**Note:** If using the SURESHOT<sup>®</sup> Distal Targeting System, refer to the TRIGEN<sup>®</sup> SURESHOT Distal Targeting System's User Manual for the field accuracy check instructions.

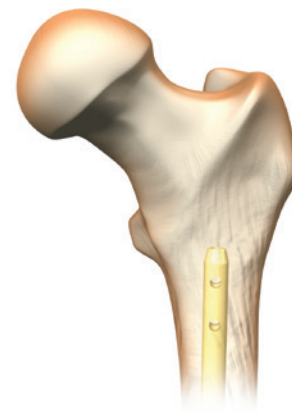


Figure 25

## Lock the screw

### Locking screw options

Distal locking options include three statically locked threaded holes that are targeted through the orange and green color-coded holes on the Anterior Drop (Figure 26).

Proximal locking options include two statically locked, non-threaded A/P holes (Figure 27).

Gold 5.0mm locking screws are compatible with 10, 11.5 and 13mm diameter nails.

**Note:** For information regarding Drill Depth Measurement Software (DDM) using the TRIGEN® SURESHOT® Targeting System, refer to the TRIGEN SURESHOT Targeting System User Manual. The DDM software can be used for distal locking only.

**Note:** The 4.0mm Short Step Drill (71641123) may be used to drill a gold 5.0mm locking screw in the instance of hard cortical bone. The 4.0mm Short Step Drill diameter transitions from 4.7mm to 4.0mm to facilitate screw insertion without compromising purchase.



Figure 26

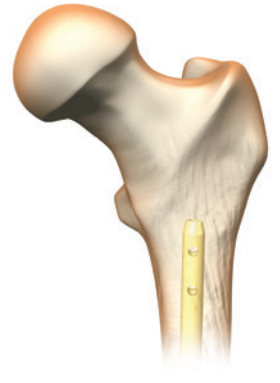


Figure 27

## Distal locking

1. Make a small incision at the site of screw entry.
2. Insert the gold 9.0mm Drill Sleeve (71631152), 4.0mm Drill Sleeve (71674083), and Screw Depth Gauge (71631189) through the desired slot on the Anterior Drop (Figure 28) down to the bone.
3. Drill both cortices with the 4.0mm Long Pilot Drill\*.
4. Measure for screw length using either the calibrations on the 4.0mm Long Pilot Drill\* or by removing the 4.0mm Drill Sleeve and using the Screw Depth Gauge.
5. Attach the appropriate-length screw to the end of the Medium Hexdriver (71631066).
6. Use power to insert the screw through the gold 9.0mm Drill Sleeve until the laser-etched ring on the Hexdriver reaches the back of the Drill Sleeve.
7. Attach the T-handle to the Hexdriver.
8. Manually tighten the screw.

If additional fixation is required, the TRIGEN® STABLE-LOK® Nut and Washer (Part #71632001) offers increased purchase in low density or osteoporotic bone. For information about how to use the STABLE-LOK Nut and Washer, refer to *Appendix B*, "TRIGEN STABLE-LOK Nut and Washer," at the back end of this document.

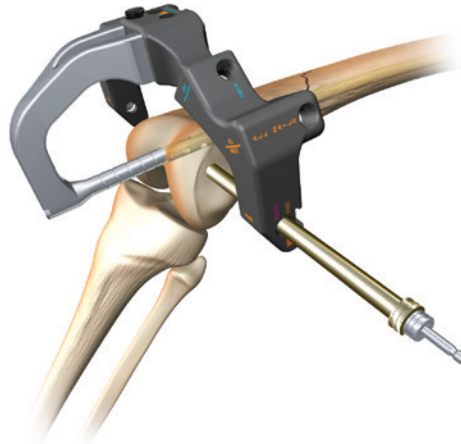


Figure 28

\*The 4.0mm Long Pilot Drill (71631110) is interchangeable with the 4.0mm AO Long Drill (71631121).

## Proximal locking

**Proximal locking is performed in the A/P plane using a free-hand technique.**

1. Confirm fracture reduction and align the C-Arm over the desired locking hole.
2. Obtain a “perfect circle” image of the locking hole.

**Note:** If using the SURESHOT<sup>®</sup> Distal Targeting System, refer to the TRIGEN<sup>®</sup> SURESHOT Distal Targeting System’s User Manual.

3. Use a blunt object to dimple the skin at the approximate location of the locking hole.
4. Make a small stab incision at the site of screw entry.
5. Insert the 4.0mm Long Pilot Drill\* and drill both cortices.
6. Measure for screw length using the Screw Depth Gauge.

Or Leave the drill in place, insert the Long Screw Length Sleeve down to bone, and read the exposed calibrations from the drill (Figure 29).

7. Use the Medium Hexdriver/T-handle assembly to insert the appropriate-length screw.

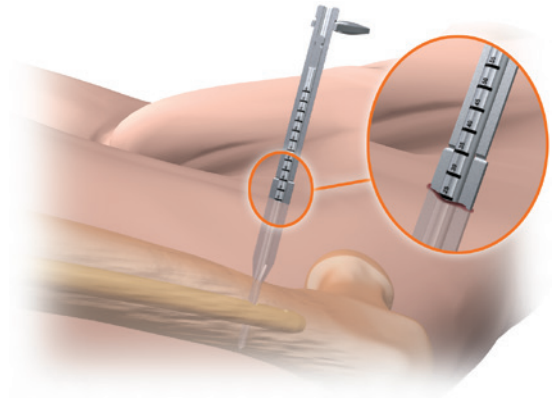


Figure 29

## TRIGEN<sup>®</sup> Nail Cap and Nail Cap Set screw insertion: optional

1. Remove the drill guide/Anterior Drop assembly.
2. Attach the selected Nail Cap (Figure 30) or Nail Cap Set Screw to the Medium Hexdriver/T-handle assembly.
3. Insert the Nail Cap into the end of the nail until it is tight.

**Note:** The TRIGEN Nail Cap Set screw engages the most distal locking screw to create a fixed construct.

**Note:** If cross-threading occurs, rotate the Nail Cap or Nail Cap Set Screw counter-clockwise until its threads line up with those of the nail. Proceed with Nail Cap insertion until it is tight.



Figure 30



Figure 31

\*The 4.0mm Long Pilot Drill (71631110) is interchangeable with the 4.0mm AO Long Drill (71631121)

## Nail extraction: optional

### Standard technique

1. Use the Medium Hexdriver/T-handle assembly to remove the Nail Cap or Nail Cap Set Screw (if implanted), all of the proximal locking screws, and all but one of the distal locking screws.
2. Thread the Cannulated Impactor-Medium (71675081) or Cannulated Impactor-Long (71631185)\* into the back of the Disposable Nail Extractor (71631320)\*\*.
3. Thread the assembly into the end of the nail.
4. Remove the remaining distal locking screw.
5. Use the Slotted Hammer with a back-slapping motion to extract the nail (Figure 32).

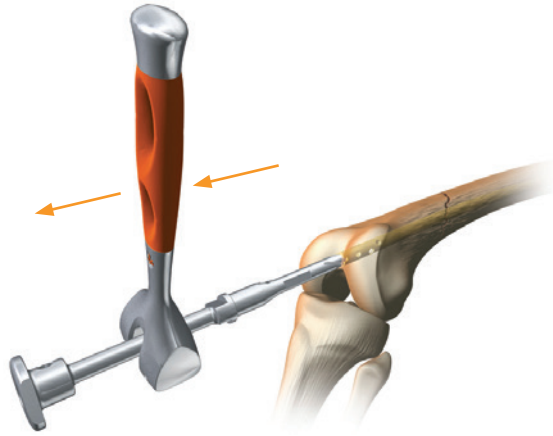


Figure 32

### Percutaneous technique

In the absence of a Nail Cap or Nail Cap Set Screw:

1. Use the Medium Hexdriver/T-handle assembly to remove all proximal locking screws and all but one of the distal locking screws.
2. Under fluoroscopy, insert a 3.2mm Brad Point Guide Pin into the end of the nail either using power or by hand (Figure 33).
3. Make a incision large enough to accept the 12.5mm Entry Reamer at the pin-skin site.
4. Advance the 12.5mm Entry Reamer over the pin and into the end of the nail to remove any bony ingrowth (Figure 34).

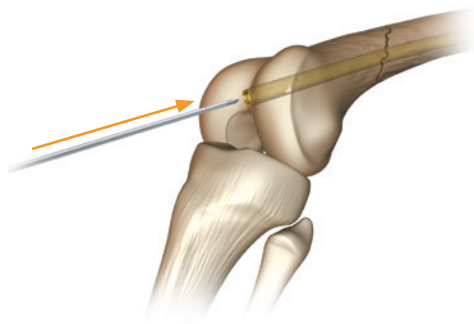


Figure 33

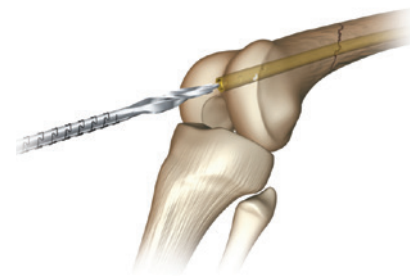


Figure 34

**Note:** It is the flared portion of the Entry Reamer that enters the top of the nail.

5. Thread the Cannulated Impactor-Medium or Cannulated Impactor-Long (71631185) into the back of the Disposable Nail Extractor\*\* (71631320).
6. Thread the assembly into the end of the nail.
7. Remove the remaining distal locking screw.
8. Extract the nail with a back-slapping motion

\* The Cannulated Impactor-Long is located in the original TRIGEN® Instrument Set (71631326).

\*\* The Disposable Nail Extractor (71631320) is interchangeable with the Large Nail Extractor located in the original TRIGEN Instrument Set (71631326) and the HFN® Instrument Set (71700001).



## An alternative method for extraction

### Guide rod jamming technique

1. Advance the end of a 3.0mm Ball Tip Guide Rod through the end of the nail.
2. Insert the smooth end of a 2.0mm ball tip guide rod (71751146) in the same manner.
3. With both guide rods in place, attach the Gripper to the end of the 3.0mm Ball Tip Guide Rod.
4. Pull the Gripper back so that it wedges the ball tip against the 2.0mm Guide Rod.
5. Backslap against the Gripper with the Slotted Hammer to extract the nail.

Guide rods	
Cat. No.	Description
71751146	2.0mm x 600mm Ball Tip Guide Rod
71631626	3.0mm x 1000mm Ball Tip Guide Rod

Additional removal items	
Cat. No.	Description
115074	Large Extractor Hook*
115073	Small Extractor Hook*

\*Available sterile packed. For nail removal only; do not use for nail insertion.

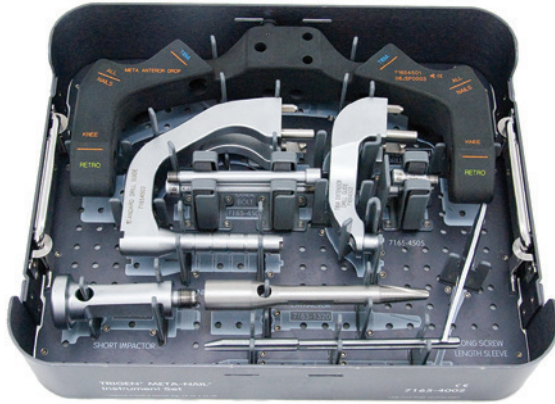
# Catalog information



## TRIGEN<sup>®</sup> Base Instrument Set

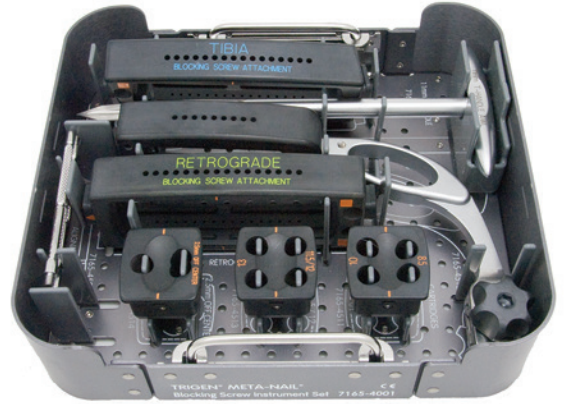
Set No. 71674012

Cat. Item	Description	Qty	Cat. Item	Description	Qty
71129401	Small Outer Case	1	71674078	Obturator	1
71129402	Lid for Outer Case	1	71674079	Ruler	1
71674021	TRIGEN Base Tray	1	71674080	Gripper	1
71631066	Medium Hexdriver	1	71674081	Impactor	1
71631068	Short Hexdriver	1	71674082	Slotted Hammer	1
71631116	12.5mm Entry Reamer	1	71674083	4.0mm Drill Sleeve	2
71631140	Guide Bolt Wrench	1	71674084	Screwdriver Release Handle	1
71631152	9.0mm Drill Sleeve	2	71674085	Screw Length Sleeve	1
71631161	Multipurpose Driver	1	71674092	Entry Portal Handle	1
71631186	Mini Connector	1	71671212	TRIGEN Reamer Set, Optional	1
71631189	Screw Depth Gauge	1	71118200	SCULPTOR <sup>®</sup> Flexible Reamer, Optional	1
71674000	Cannulated Awl	1	71631130	Flexible Reamer Extender, Optional	1
71674060	Entry Portal Tube	1	71641123	TRIGEN 4.0mm Diaphyseal Drill	1
71674074	3.2mm T-handle Trocar	1	71631121	4.0mm Long AO Pilot Drill, 333mm, Disposable	2
71674075	Honeycomb	1	71671123	4.0mm Short AO Pilot Drill, 161mm, Disposable	1
71674076 or 71754576	T-handle	1	71674130	3.2mm x 343mm Brad Point Tip Guide Pin, Disposable	3
71674077	Reducer	1	71631070	Long Hexdriver, Optional	1
71674077	Reducer Connector	1	71751153	AO Mini Connector, Optional	1
			71631187	Trinkle to Mini Connector, Optional	1



TRIGEN<sup>®</sup> META-NAIL<sup>◇</sup>  
Instrument Set  
Set No. 71654002

Cat. Item	Description	Qty
71654501	META-NAIL Anterior Drop	1
71654502	META-NAIL Drill Guide	1
71654503	META-NAIL Extension Drill Guide	1
71654505	Extension Guide Bolt (23mm)	2
71654506	Guide Bolt Long (51mm)	2
71654520	Long Screw Length Sleeve	1
71654554	Cannulated Impactor-Short	1
71631025	Large Nail Extractor	1



Blocking Screw  
Instrument Set (Optional)  
Set No. 71654001

Cat. Item	Description	Qty
71654515	Blocking Screw Device	1
71654509	Tibial Blocking Screw Attachment	1
71654522	11.0mm T-handle Awl	1
71654511	8.5mm/10mm Blocking Screw Cartridge	1
71654513	11.5mm/13mm Blocking Screw Cartridge	1
71654514	Offset Blocking Screw Cartridge	1
71654523	Blocking Screw Alignment Pin	2
71634508	Retrograde Femoral Blocking Screw Attachment	1

## META-NAIL Disposables

Set No. 71654003

Cat. Item	Description
71631110	4.0mm Long Pilot Drill*
71631117	4.0mm Short Drill**
71631626	3.0mm x 1000mm Ball Tip Guide Rod
71674130 or 71631436	3.2mm Brad Point Guide Pin
71654528	Universal Compression Driver
71631320	Disposable Nail Extractor***

\*The 4.0mm Long Pilot Drill (71631110) is interchangeable with 4.0mm AO Long Drill (71631121)

\*\*The 4.0mm Short Drill (71631117) is interchangeable with 4.0mm AO Short Drill (71631123)

\*\*\*The Disposable Nail Extractor (71631320) is interchangeable with the Large Nail Extractor (71631278) located in the original TRIGEN Instrument Set (71631326) and the HFN<sup>®</sup> Instrument Set (71700001)

# Implants

## 5.0mm Low Profile Screws (Gold)

Cat. Item	Length
71645020	5.0mm x 20mm
71645022	5.0mm x 22.5mm
71645025	5.0mm x 25mm
71645027	5.0mm x 27.5mm
71645030	5.0mm x 30mm
71645032	5.0mm x 32.5mm
71645035	5.0mm x 35mm
71645037	5.0mm x 37.5mm
71645040	5.0mm x 40mm
71645042	5.0mm x 42.5mm
71645045	5.0mm x 45mm
71645047	5.0mm x 47.5mm
71645050	5.0mm x 50mm
71645052	5.0mm x 52.5mm
71645055	5.0mm x 55mm
71645057	5.0mm x 57.5mm
71645060	5.0mm x 60mm
71645062	5.0mm x 62.5mm
71645065	5.0mm x 65mm
71645067	5.0mm x 67.5mm
71645070	5.0mm x 70mm
71645072	5.0mm x 72.5mm
71645075	5.0mm x 75mm
71645077	5.0mm x 77.5mm
71645080	5.0mm x 80mm
71645085	5.0mm x 85mm
71645090	5.0mm x 90mm
71645095	5.0mm x 95mm
71645100	5.0mm x 100mm
71645105	5.0mm x 105mm
71645110	5.0mm x 110mm



5.0mm

## TRIGEN® META-NAIL® 10mm Retrograde Femoral Set No. 71651000

Cat. Item	Length
71653018	18cm
71653020	20cm
71653022	22cm
71653024	24cm
71653026	26cm
71653028	28cm
71653030*	30cm
71653032*	32cm
71653034*	34cm

Cat. Item	Length
71653036*	36cm
71653038*	38cm
71653040*	40cm
71653042*	42cm
71653044	44cm
71653046	46cm
71653048	48cm
71653050	50cm



\* Contained in the standard implant set

## TRIGEN® META-NAIL® 11.5mm Retrograde Femoral

Set No. 71651001

Cat. Item	Length
71653218	18cm
71653220	20cm
71653222	22cm
71653224	24cm
71653226	26cm
71653228	28cm
71653230*	30cm
71653232*	32cm
71653234*	34cm

Cat. Item	Length
71653236*	36cm
71653238*	38cm
71653240*	40cm
71653242*	42cm
71653244	44cm
71653246	46cm
71653248	48cm
71653250	50cm



## TRIGEN META-NAIL 13mm Retrograde Femoral

Set No. 71651002

Cat. Item	Length
71653418	18cm
71653420	20cm
71653422	22cm
71653424	24cm
71653426	26cm
71653428	28cm
71653430*	30cm
71653432*	32cm
71653434*	34cm

Cat. Item	Length
71653436	36cm
71653438*	38cm
71653440*	40cm
71653442*	42cm
71653444	44cm
71653446	46cm
71653448	48cm
71653450	50cm



## Nail Cap Set Screw

Cat. No. 71656000



## TRIGEN Nail Caps

Cat. Item	Length
71634000	0mm
71634005	5mm
71634010	10mm
71634015	15mm
71634020	20mm



## STABLE-LOK® Nut

(Used with 5.0mm Low Profile screws)

Cat. No. 71632001



\* Contained in the standard implant set

# Appendix A

## Blocking screw technique

### Incision and entry point

1. Make a 3–4cm midline incision, followed by a medial parapatellar capsular incision to expose the intercondylar notch.
2. Gently retract the patellar tendon laterally.

**Note:** Locate the entry point within the intercondylar notch just anterior and lateral to the femoral attachment of the posterior cruciate ligament (Figure 1).

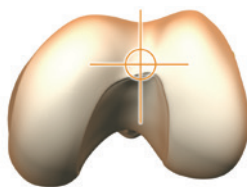


Figure 1

### Establish the entry portal

Insert the 11.0mm T-handle Awl (71654522) manually to a depth just distal to the fracture (Figure 2).

**Note:** When creating the initial entry point, pay close attention to the trajectory of the awl and the relationship to the anatomic axis of the femur. Correct awl trajectory in the distal fragment must be established prior to alignment with the anatomic axis of the proximal fragment to ensure accurate fracture reduction when the nail is inserted.

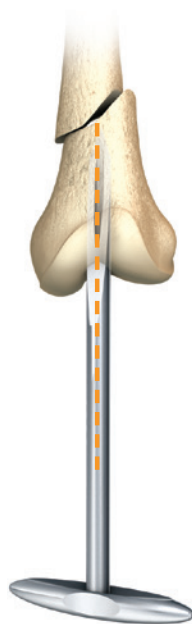


Figure 2

### A/P blocking screw insertion

In order to prevent varus or valgus malalignment of the distal fragment, blocking screws can be placed in the A/P plane.

1. Attach the Blocking Screw Device (71654515) to the 11.0mm T-handle Awl and move it into the desired position in the A/P plane (Figure 3).

**Note:** The Blocking Screw Alignment Pins (71654523) can be screwed into the three threaded holes on the metal handle of the Blocking Screw Device to serve as external points of reference during fracture alignment.

2. Tighten the device to the awl and insert the appropriate Blocking Screw Cartridge (71654511, 71654513, or 71654514).



Figure 3

3. Adjust the cartridge proximally or distally within the Blocking Screw Device to determine blocking screw position.
4. Insert the gold 9.0mm Drill Sleeve and silver 4.0mm Drill Sleeve into the desired cartridge hole and down to the bone (Figure 4).
5. Drill both cortices with the 4.0 mm Long Pilot Drill\*.

**Note:** Use caution during drilling and insertion of blocking screws in the A/P plane. Do not drill past the posterior cortex or insert a screw that is too long. Damage to the neurovascular structures located posterior and distal femur may result.

6. Read the exposed drill bit calibrations to determine the screw length or remove the 4.0mm Drill Sleeve and measure with the Screw Depth Gauge.
7. Use the Medium Hexdriver/T-handle assembly to insert the screw until the screw engages the far cortex.
8. Implant the distal blocking screw and reduce the fracture.
9. Pass the 11.0mm T-handle Awl into the proximal fragment (Figure 5).
10. Reposition either the Blocking Screw Cartridge or the awl as necessary and repeat this blocking screw technique for additional nails.

### M/L blocking screw insertion

To prevent anterior or posterior malalignment of the distal fragment, blocking screws may also be placed in the mediolateral (M/L) plane.

1. Attach the Blocking Screw Device to the 11.0mm T-handle Awl.
2. Rotate the Blocking Screw Device into the desired position in the M/L plane (Figure 6).
3. Tighten the device to the awl and insert the appropriate Blocking Screw Cartridge (Figure 7).
4. Adjust the Cartridge proximally or distally within the Blocking Screw Device to determine the blocking screw position.
5. Insert the blocking screw as previously described.



Figure 4



Figure 5



Figure 6



Figure 7

\* The 4.0mm Long Pilot Drill (71631110) is interchangeable with the 4.0mm AO Long Drill (71631121).

## Blocking screw insertion with a reducer

Blocking screws can also be inserted by attaching the Blocking Screw Device to the Reducer instead of the 11.0mm T-handle Awl (Figure 8). Follow the previously described blocking screw insertion technique.



Figure 8

## Final view: A/P and M/L blocking screw insertion

1. Once blocking screw insertion is complete, remove the Blocking Screw Device from the 11.0mm T-handle Awl or Reducer.

2. Obtain both A/P and lateral radiographic images to confirm accurate placement.

**Note:** The Awl or Reducer provides a reliable indication of the nail's insertion trajectory based upon the location of the blocking screws.

3. Confirm proper screw placement (Figure 9).

4. Proceed with nail insertion.

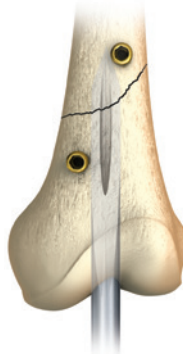


Figure 9

## Stability blocking screw insertion

Following nail insertion and confirmation of fracture reduction, blocking screws may be placed on either side of the nail in the metaphyseal region for additional stability. Screws may be inserted in both the A/P and M/L planes.

1. With the nail inserted, attach the Retrograde Femoral Blocking Screw Attachment (71654508) (Figure 10) to the Anterior Drop (triangle to triangle for A/P screws and square to square for M/L screws).

2. Follow the previously described techniques for cartridge positioning and blocking screw insertion (Figure 11).

**Note:** The A/P blocking screws targeted through the two holes built into the Anterior Drop cannot be used if the most superior oblique distal locking screw has been inserted.



Figure 10



Figure 11



## Final view: Stability blocking screws

1. Once stability blocking screw insertion is complete, remove the Blocking Screw Attachment and Anterior Drop from the drill guide.
2. Obtain both A/P and lateral radiographic images to confirm accurate placement (Figures 12 and 13).

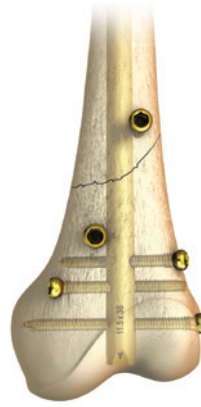


Figure 12

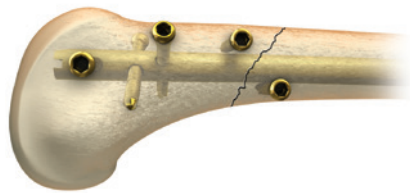


Figure 13

# Appendix B

## TRIGEN<sup>®</sup> STABLE-LOK<sup>®</sup> Nut and Washer

The TRIGEN STABLE-LOK Nut and Washer (71632001) designed to increased bone purchase. Used with a corresponding 5.0mm TRIGEN Low Profile Screw (Figure 1), the STABLE-LOK Nut and Washer resists screw back-out while improving fixation.

To implant the cortical screw, use the TRIGEN 4.0mm Long Pilot Drill (71631121), the TRIGEN Screw Depth Gauge (71631189) and a second TRIGEN T-Handle (71674076 or 71674576). Alternatively, use the optional Straight Ratcheting Driver (71751141) attached to a short or medium TRIGEN Hexdriver (71631068; 71631066).

1. Use powered instrumentation to advance the TRIGEN 4.0mm Long Pilot Drill into the bone.
2. Continue to advance the drill until full penetration of the opposite cortex and soft tissue is complete.
3. Make a small incision over the drill bit and down to the cortex to allow a path for the STABLE-LOK Nut.

**Note:** Ensure sufficient soft tissue release to properly seat the nut.

4. Remove the retaining rod from the Multipurpose Driver (71631161).
5. Assemble the STABLE-LOK Nut (Figure 2) onto the driver, guide it over the Long Pilot Drill, and thread the nut securely into the bone.
6. Remove the drill.
7. Insert the TRIGEN Screw Depth Gauge (71631189) into the 4.0mm hole and hook it onto the far side of the nut.

**Note:** The length of the Low Profile Screw should correspond exactly with the reading on the Screw Depth Gauge.

**Note:** If a lag technique will be used, consider the appropriate amount of compression when choosing the correct screw length.



Figure 1



Figure 2. STABLE-LOK Nut

8. Attach the Multipurpose Driver (Part #71631161) to a second T-handle or Straight Ratcheting Driver (71751141).
9. Insert the Multipurpose Driver through the STABLE-LOK<sup>®</sup> incision portal to hold the nut in place while inserting the screw.
10. Place the Washer on the Low Profile Screw, and advance the screw through the pre-drilled hole until it engages the STABLE-LOK Nut on the far cortex (Figure 3).

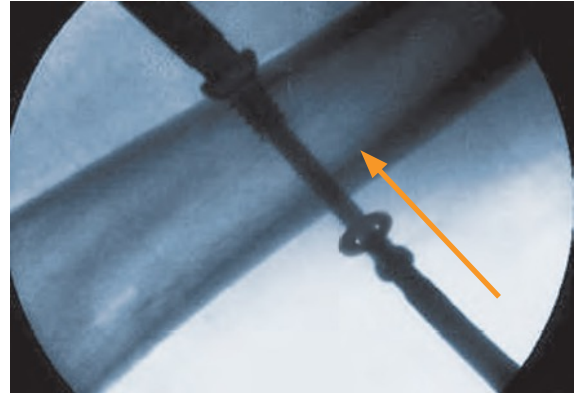


Figure 3

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