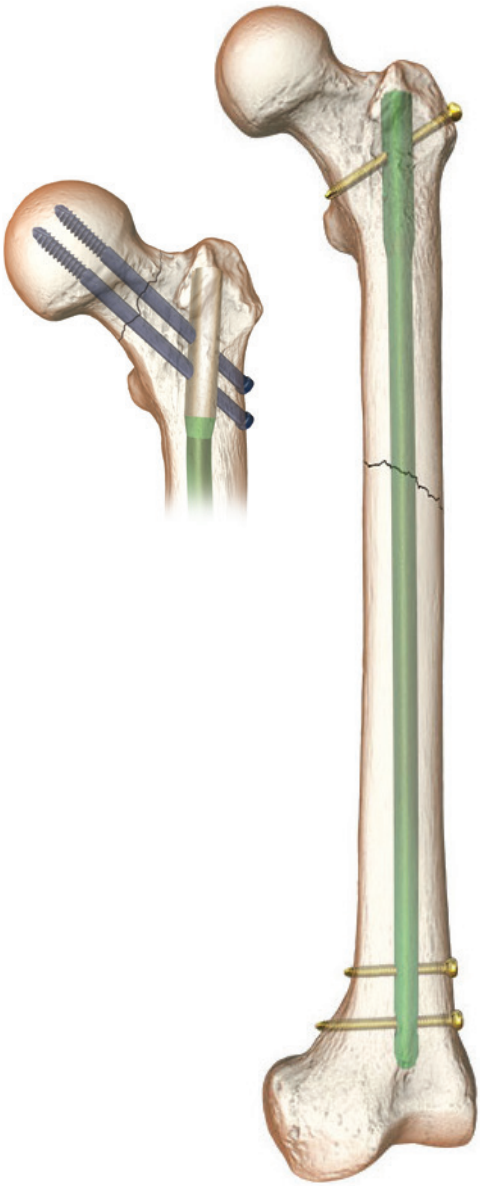
Surgical Technique

smith&nephew

TRIGEN® TAN® FAN

Trochanteric and Femoral
Antegrade Intramedullary Nails



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Introduction

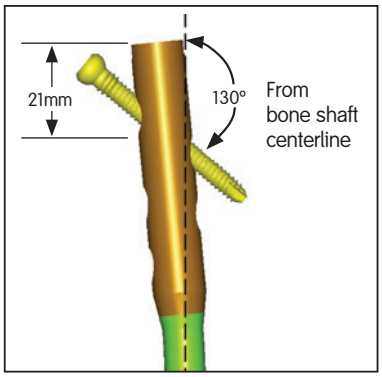
The TRIGEN® TAN® and FAN intramedullary nails are used for fractures of the femur, including intertrochanteric, basi/transcervical femoral neck fractures and subtrochanteric fractures, ipsilateral femoral neck/shaft fractures, stable and unstable shaft fractures, segmental fractures, nonunions and malunions, polytrauma, reconstructions following tumor resection and bone lengthening and shortening.

The TAN and FAN nails 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.

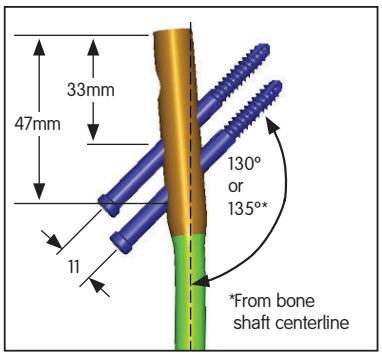
Nota Bene

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.

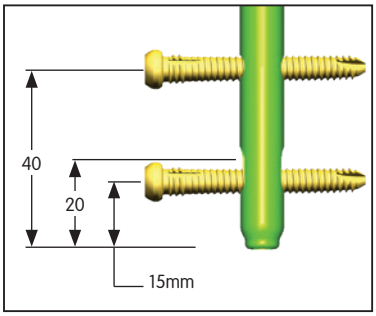
TRIGEN◇ Trochanteric Antegrade Nail (TAN◇) Nail Specifications



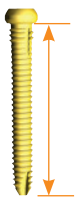
Standard Femoral Lock
130°/135° TAN



Recon Lock (12° Anteversion)
130°/135° TAN



10, 11.5 and 13mm 130°/135°
TAN – Distal Lock (ML view)



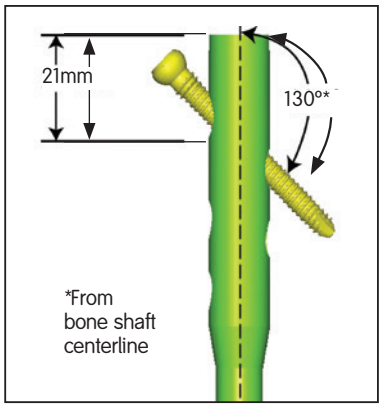
Proper Screw Measurement

All TRIGEN locking screw measuring devices measure from the bottom of the head to the last complete thread of the screw. This is the working length of the screw. Thus, the screw itself is longer than the measurement and adding length is not necessary.

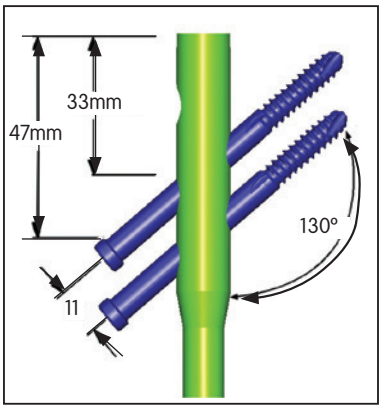
Note: These views are not to scale and should be used as a pictorial representation only.

Specifications	TRIGEN TAN Nail
Material	Ti6Al4V
Diameter	10, 11.5 and 13mm
Lengths	30–50cm
Nail color – left	Lime
Nail color – right	Rose
Cross section	Round
Neck angle	130°/135°
Proximal diameter (driving end)	13mm
Distal diameter (non-driving end)	10, 11.5 and 13mm (diameter of the nail)
Smallest thru diameter	5.4mm
Wall thickness	2.3mm (10 diameter) 3.0mm (11.5 diameter) 2.3mm (13 diameter)
Guide bolt thread	5/16–24
Alternative guide bolts (removal only)	RT Tibial, Retrograde, IMSC, Revision
Alternative modes	Standard femoral Recon locking
Proximal Locking	
Screw diameter	Standard – 5.0mm Recon – 6.4mm
Major diameter	Standard – 5.0mm Recon – 6.4mm
Minor diameter	Standard – 4.3mm Recon – 4.7mm
Shank	N/A Recon – 6.3mm
Hex size	4.7mm
Alternative hexdrivers	RT Femoral and Recon, 7.0mm Cannulated Screw, PERI-LOC◇ Locking Screw guide
Screw color	Standard lock – Gold Recon lock – Blue
Screw lengths	Standard – 25-110mm Recon – 65-125mm
Anteversion	Recon lock – 12°
Location	21, 33 and 47mm
Proximal dynamization slot	No
Proximal screw hole dimensions	Standard – 5.3mm Recon – 6.4mm
Degree of proximal bend	5° lateral
Location of proximal bend	65mm (AP bend)
Distal Locking	
Screw diameter	5.0mm
Major diameter	5.0mm
Minor diameter (core)	4.3mm
Screw color	Gold
Screw lengths	25–110mm
Location	15, 20 and 40mm
Orientation	L–M
Dynamization slot	Yes
Distal screw hole dimensions	5.3mm
AP bow	Proximal – 1.5 meters Distal – 2.5 meters
Location of distal bend	100mm
Dynamization slot location	Distal

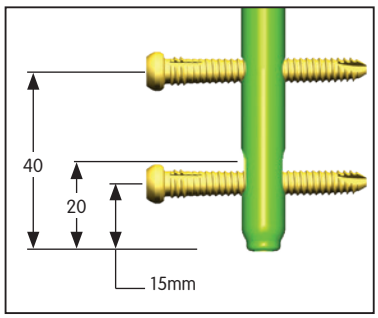
TRIGEN◇ Femoral Antegrade Nail (FAN) Nail Specifications



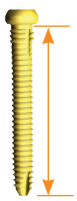
Standard Femoral Lock
(130° standard FAN/Exchange)



Recon Lock (12°Anteversion, 130° standard FAN/Exchange)



Distal Lock (130° standard FAN/Exchange)



Proper Screw Measurement

All TRIGEN locking screw measuring devices measure from the bottom of the head to the last complete thread of the screw. This is the working length of the screw. Thus, the screw itself is longer than the measurement and adding length is not necessary.

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

Specifications	TRIGEN FAN Nail
Material	Ti6Al4V
Diameter	10, 11.5, 13, 14.5 and 16mm
Lengths	30–50cm, 36–44cm
Nail color – left	Lime
Nail color – right	Rose
Cross section	Round
Neck angle	130°
Proximal diameter (driving end)	13mm (10, 11.5 and 13 diameter) 14.5mm (14.5 diameter) 16mm (16 diameter)
Distal diameter (non-driving end)	10, 11.5, 13, 14.5 and 16mm (diameter of the nail)
Smallest thru diameter	5.4mm
Wall thickness	2.3mm (10 diameter) 3.0mm (11.5 diameter) 2.3mm (13 diameter) 2.3mm (14.5 diameter) 2.4mm (16 diameter)
Guide bolt thread	5/16–24
Alternative guide bolts (removal only)	RT Tibial, Retrograde, IMSC, Revision
Alternative modes	Standard femoral Recon locking
Proximal Locking	
Screw diameter	Standard – 5.0mm Recon – 6.4mm
Major diameter	Standard – 5.0mm Recon – 6.4mm
Minor diameter	Standard – 4.3mm Recon – 4.7mm
Shank	Standard – N/A Recon – 6.3mm
Hex size	4.7mm
Alternative hexdrivers	RT Femoral & Recon, 7.0mm Cannulated Screw, PERI-LOC◇ Locking Screw guide
Screw color	Standard lock – Gold Recon lock – Blue
Screw lengths	Standard – 25–110mm Recon – 65–125mm
Anteversion	Recon Lock – 12°
Location	21, 33 and 47mm
Proximal dynamization slot	No
Proximal screw hole dimensions	Standard – 5.3mm Recon – 6.4mm
Degree of proximal bend	N/A
Location of proximal bend	N/A
Distal Locking	
Screw diameter	5.0mm
Major diameter	5.0mm
Minor diameter (core)	4.3mm
Screw color	Gold
Screw lengths	25–110mm
Location	15, 20 and 40mm
Orientation	L–M
Dynamization slot	Yes
Distal screw hole dimensions	5.3mm
AP bow	Hybrid Bow Proximal 1.5 meters Distal 2.5 meters
Location of distal bend	100mm
Dynamization slot location	Distal

Surgical Technique

This surgical technique is written from the Trochanteric Antegrade Nail (TAN®) perspective. The Femoral Antegrade Nail (FAN) technique changes only with respect to the nail entry point and insertion technique.

Patient positioning

1. Place the patient in the supine or lateral decubitus position on a fracture table (Figure 1).
2. Check the affected limb for length and rotation as compared to the unaffected limb.
3. Place the foot of the affected limb in a foot holder or insert a pin through the calcaneus for traction purposes.
4. Extend the unaffected limb below and away from the affected limb (Figure 1), or flex the unaffected limb and place it in a leg holder (Figure 2).
5. Abduct the torso 10°–15° to allow clear access to the intramedullary canal.
6. Rotate the C-Arm to ensure optimal AP and lateral visualization of the entire femur.

   Note: If using a radiolucent table, a distraction device may be helpful in reducing the fracture.

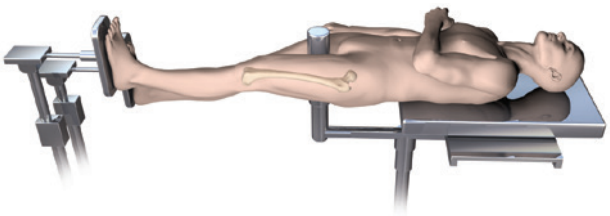


Figure 1

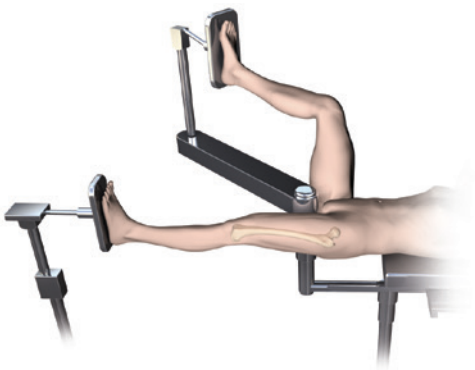


Figure 2

Establish the incision and entry portal

1. Assemble the Honeycomb (71674075), Entry Portal Handle (71674092), and Entry Portal Tube (71674060) (Figure 3). The pieces will lock in place securely at either 0° or 180°.

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

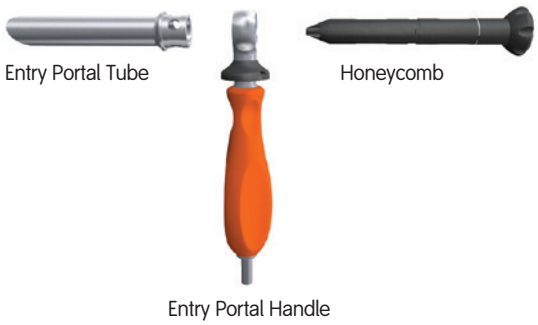


Figure 3

2. Make a longitudinal incision proximal to the greater trochanter. Carry the incision through to the fascia and palpate the tip of the greater trochanter (Figure 4).

   Note: The optimal entry point for the TAN◊ is located lateral to the tip of the greater trochanter, approximately 5° from the anatomical axis in the AP and in line with the intramedullary canal in the lateral view (Figure 5).

   Note: The entry point for the FAN is in line with the center of the intramedullary canal in both the AP and the lateral views. The entry point is slightly posterior in the top view shown, although this varies with patient anatomy (Figure 6).

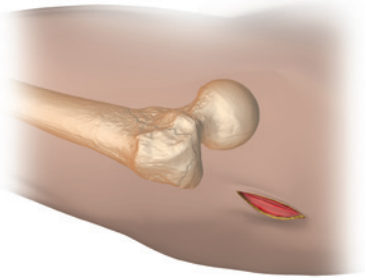


Figure 4

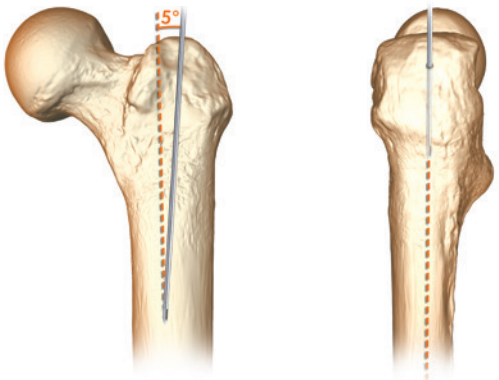


Figure 5

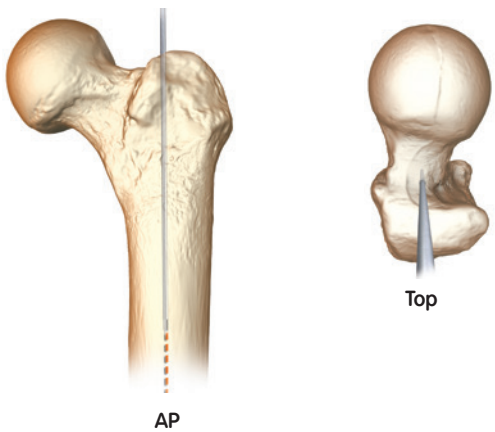


Figure 6

3. Attach a 3.2mm Brad Point Guide Pin (71674130 or 71631436) to the drill via the Mini Connector (71631186).
4. Insert the guide pin into the trochanteric region 2–3cm (Figure 7).

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

   Note: The Entry Portal instrumentation serves as a soft-tissue protector.

   Note: Do not over-insert the guide pin as this can establish a false trajectory and cause fracture malalignment.
5. After the guide pin is in place, remove the Honeycomb from the Entry Tube, along with any other guide pins.
6. Check the guide pin position via radiographic imaging.
7. Advance the 12.5mm Entry Reamer (71631116) into the 14mm Channel Reamer (71631039) until it clicks, and then attach the reamer assembly to power.
8. Advance the assembly through the Entry Portal instrumentation 2–3cm into the trochanteric region (Figure 9). Evaluate reamer position before proceeding.
9. Adjust the trajectory of the reamer assembly if desired and advance to the positive stop on the Entry Portal Tube. The channel reamer will stop just below the level of the lesser trochanter (Figure 10).

   Note: If the Entry Portal instrumentation is not used, the channel reamer must still be advanced to the same point.
10. Confirm the reamer assembly's final position in both the AP and lateral planes.
11. Detach and remove the 12.5mm Entry Reamer from the 14mm Channel Reamer.
12. Remove the Entry Reamer and guide pin.

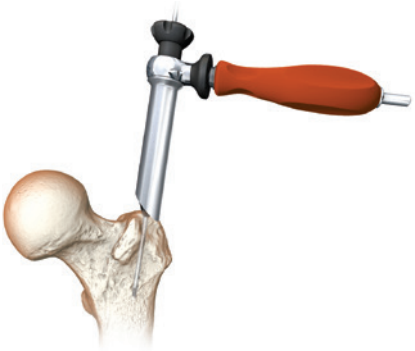


Figure 7

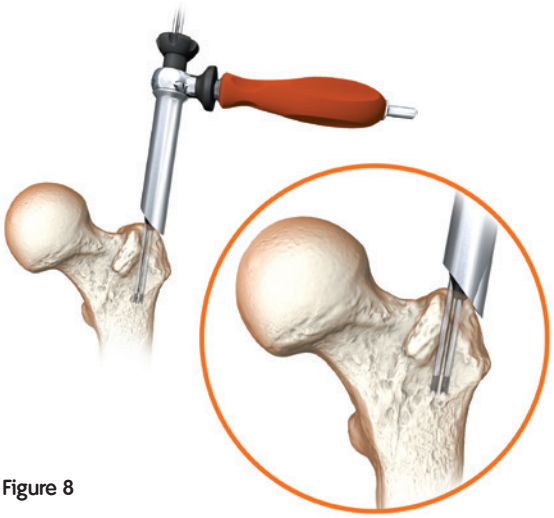


Figure 8

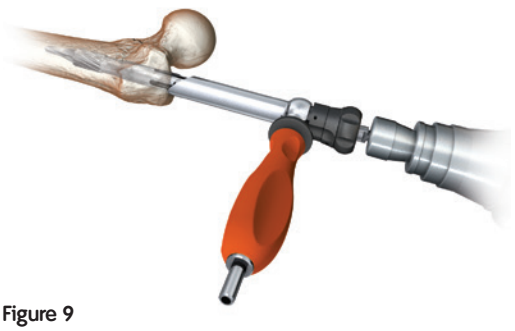


Figure 9

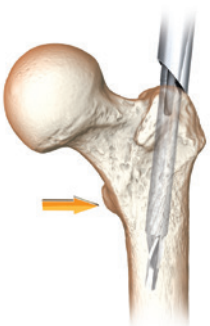


Figure 10

Alternative technique: Entry portal

1. Attach the T-handle (71674076 or 71674576) to the Cannulated Awl (71674000).
2. Insert the 3.2mm T-handle Trocar (71674074) into the back of the assembly.
3. Introduce the awl into the proximal femur at the designated entry point until it is below the level of the lesser trochanter* (Figure 11).

   Note: The region of the proximal femur extending to the lesser trochanter must be enlarged to 14mm in order to accommodate the proximal geometry of a 10mm, 11.5mm or 13mm TAN®/FAN nail.
4. Remove the 3.2mm Trocar and pass a 3.0mm Ball Tip Guide Rod (71631626) into the back of the T-handle.
5. Remove the awl from the proximal femur.

   Note: If inserting a 14.5mm or 16mm FAN, the proximal femur must be reamed to 17.5mm.

   Note: Intramedullary reamers should be used to prepare the proximal femur if the 14mm Channel Reamer is not used**.

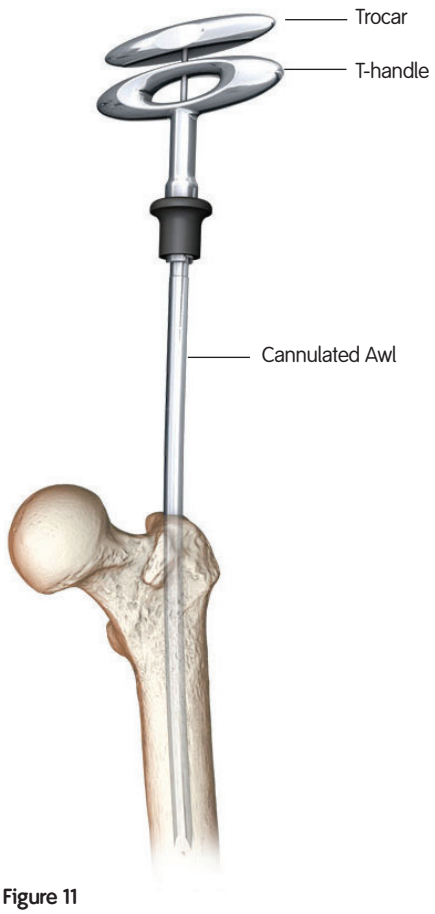


Figure 11

* The entry point for the Cannulated Awl will differ depending on whether a TAN or FAN is being implanted.

** The largest Reamer Head contained in the TRIGEN® Base Instrument Tray is 16mm. Larger sizes are available in the SCULPTOR® Reamer Set (71118330). Please order through Loaner services.

Reduce the fracture

1. Open the Gripper (71674080) (Figure 12).
2. Insert the smooth end of the 3.0mm Ball Tip Guide Rod into the front end of the Gripper.
3. Close the Gripper.
4. Connect the Reducer and 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).
5. Complete the assembly by connecting the Reducer and connector to the T-handle.
6. Advance the Reducer into the intramedullary canal through the Channel Reamer and Entry Portal instrumentation.

   Note: Care should be taken to maintain fracture reduction.
7. Pass the Ball Tip Guide Rod through the back of the T-handle and insert to the desired depth using the Reducer’s curved tip to avoid any areas of comminution (Figure 14).

   Note: The guide rod should be center-center in the AP and lateral views.
8. Once the guide rod is at the desired depth, detach the Gripper and prepare to remove the Reducer from the intramedullary canal.
9. During extraction, slide the Obturator (71674078) into the T-handle in order to maintain guide rod position within the canal (Figure 15).

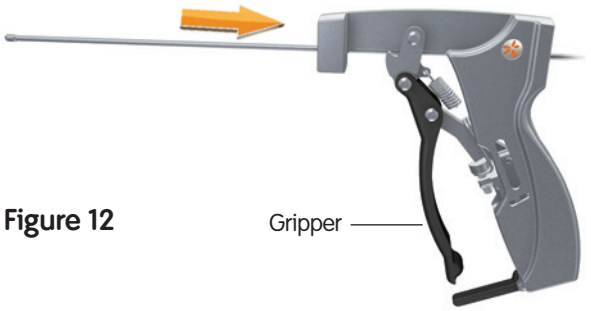


Figure 12

Figure 13

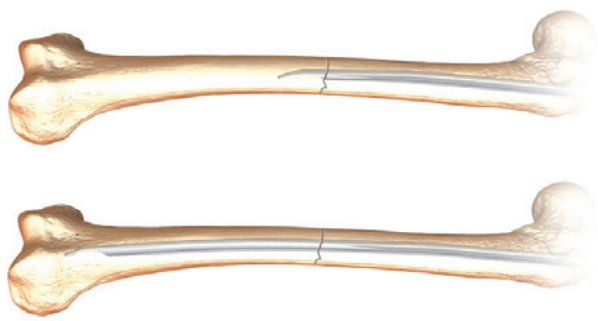


Figure 14

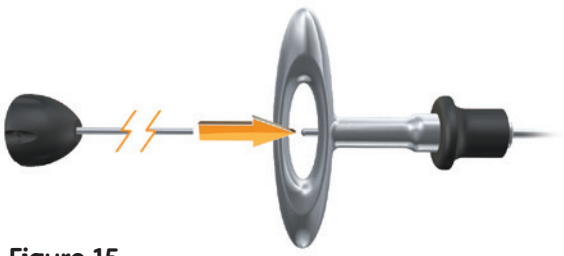


Figure 15

Determine the implant length

1. Confirm that the Ruler (71674079) opens easily. If it does not, adjust the thumbwheel connection at the end to allow free movement.
2. After the Reducer has been removed, reconfirm guide rod placement within the distal femur.
3. Slide the Ruler over the guide rod and through the Channel Reamer and Entry Portal instrumentation to the desired depth. The bottom of the Ruler's metal tip indicates the driving end of the nail (Figure 16).

   Note: Fractures should be treated with the longest nail possible in order to reduce the likelihood of stress risers.
4. Confirm guide rod position in the window at the opposite end of the Ruler (Figure 17) in order to ensure accurate implant measurement.
5. Push down on the top of the Ruler until it contacts the guide rod.
6. Read the implant length from the exposed calibrations near the thumbwheel of the Ruler.
7. Confirm fracture reduction so as not to underestimate the correct implant length.

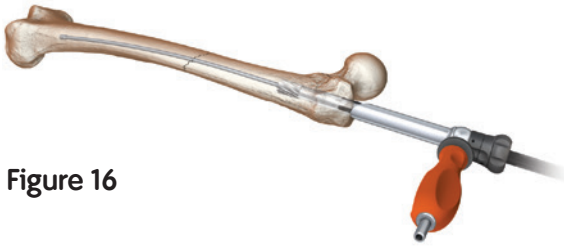


Figure 16

Figure 17

Unreamed technique

1. Use radiographic templating to determine nail size (Figure 18).

   Note: The appropriate-diameter implant provides translational fill within the isthmus of the intramedullary canal.

2. To help avoid implant incarceration during insertion, select a nail approximately 1.0–1.5mm narrower than the narrowest canal measurement on the lateral radiograph.

Reamed technique

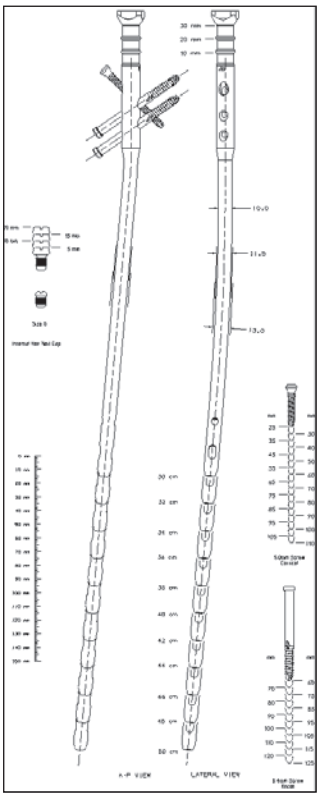
1. Use radiographic templating to determine nail size (Figure 18).
2. Use the 9.0mm End Cutting Reamer Head (71118231) and Flexible Reamer Shaft (71118200) to ream the intramedullary canal sequentially in half-millimeter increments to a size 1.0–1.5mm larger than the selected nail size* (Figure 19).

   Note: To ensure guide rod position during reaming, insert the Obturator into the back of the Reamer unit during retraction.

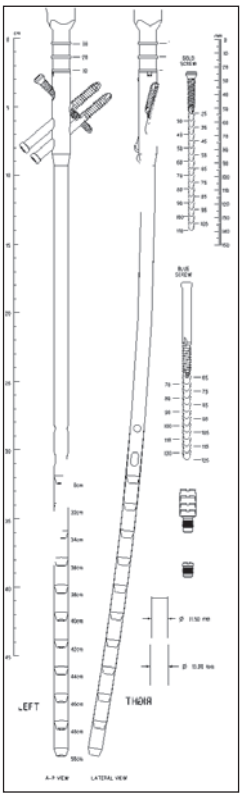
   Note: The channel reamers will not accommodate reamer heads larger than 12.5mm.

3. Continue to confirm guide rod placement throughout reaming.

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



TRIGEN® TAN®
Preoperative Template
Cat. No. 71180884



TRIGEN FAN
Preoperative Template
Cat. No. 71180497

Figure 18

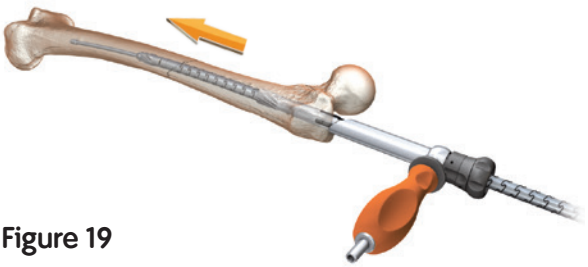


Figure 19

*The largest reamer head contained in the TRIGEN® Base Instrument Tray is 16.0mm. Larger sizes are available in the SCULPTOR® Reamer Set (71118330). Please order through Loaner services.

Nail assembly

1. Attach the Percutaneous Drill Guide (71631021) to the nail with the Percutaneous Guide Bolt (71631024) (Figure 20).
2. Tighten with the Guide Bolt Wrench (71631140) and T-handle. The nail is correctly aligned when:
   - The apex of the nail's AP bow points anteriorly.
   - The three proximal locking holes on the lateral side of the nail mirror the image depicted on the underside of the drill guide (Figure 21).

   Example, TAN°: For a left 130° TAN, orient the Radiolucent Drop (71631022) on the drill guide so that the two lime-colored arrows indicating 130° TAN on its surface point towards the nail. The Smith & Nephew mark on the drop will face laterally (Figure 21).

   Example, FAN: For a 130° FAN, orient the Radiolucent Drop on the drill guide so that the two lime-colored arrows indicating FAN / 135° TAN on its surface point toward the nail. The Smith & Nephew mark on the drop will face medially towards the patient.

   Note: An incorrectly attached nail will not target.

Figure 20

Figure 21

Verify targeting accuracy

Attach the Radiolucent Drop to the drill guide to verify targeting accuracy. The drop is etched with color-coded markings to allow for accurate nail/drill guide assembly.

Note: If using the TRIGEN® SURESHOT® Distal Targeting System, refer to the User Manual for Field Accuracy Check instructions.

Femoral locking mode

1. Insert a 9.0mm Drill Sleeve (71631152) and 4.0mm Trocar Drill Sleeve (71631026) into the Percutaneous Drill Guide (Figure 22A).
2. Pass a 4.0mm Long Pilot Drill (71631110)* through the drill sleeves and nail (Figure 22A).

Recon locking mode

1. Insert a 9.0mm Drill Sleeve into the appropriately color-coded locking hole on the Radiolucent Drop (Figure 22B).
2. Pass a 6.4mm Step Drill (71631160) through the drill sleeve and nail (Figure 22B).
3. When targeting accuracy is confirmed, remove the drop and any drill sleeves.

Figure 22

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

Nail insertion

Note: If excessive force is required to implant the nail, it may be necessary to widen the intramedullary canal.

Note: The depth of the nail should ultimately be determined by the optimal position of the screw.

TAN° insertion

1. Orient the drill guide assembly in the AP plane (Figure 23A).
2. Manually insert the nail into the intramedullary canal.
3. As the distal tip of the nail reaches the isthmus of the canal, rotate the drill guide to the lateral position (Figure 23B).
4. Continue to insert the nail into the intramedullary canal until it reaches the desired depth.

Note: If necessary, attach the Cannulated Impactor-Medium (71675081) to the drill guide and advance the nail over the guide rod using light blows from the Slotted Hammer (71674082) (Figure 23C).

FAN Insertion

1. Orient the drill guide assembly in the lateral plane.
2. Manually insert the nail into the intramedullary canal as far as possible. If necessary, attach the Cannulated Impactor-Medium to the drill guide and advance the nail over the guide rod using light blows from the Slotted Hammer.

Then, for TAN or FAN

1. Insert the nail to the desired depth.
2. Verify fracture reduction as the nail crosses the fracture site, paying close attention to rotation, length, alignment, distraction and shortening.
3. After nail insertion, confirm that the nail and drill guide are securely connected as hammering can loosen the guide bolt.

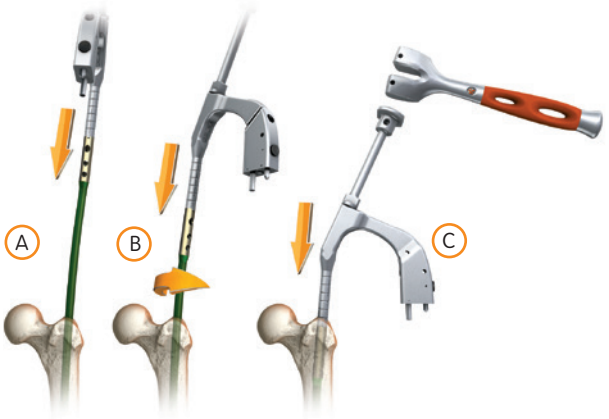


Figure 23

Confirm screw position

Femoral locking mode

Attach the AP Alignment Tower (71631025) to the drill guide and slide the back end of the AP Alignment Arm (71631015) into the tower (Figure 24). Under fluoroscopy, the center portion of the alignment arm indicates the path of the 5.0mm locking screw through the trochanteric region (Figure 25).

Figure 24

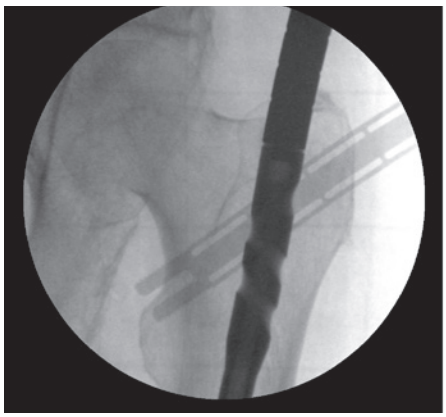


Figure 25

Recon locking mode

Attach the alignment tower to the drop and slide the back end of the alignment arm into the tower (Figure 26). Under fluoroscopy, the parallel slots and threaded screw tips of the alignment arm indicate the position of both 6.4mm recon locking screws in the femoral neck and head (Figure 27).

Figure 26

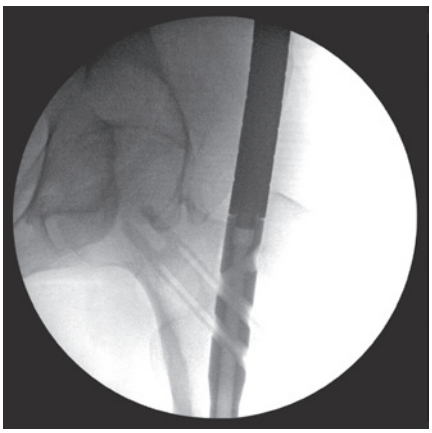


Figure 27

Confirm distal nail position

1. Verify center-center placement of the nail in the distal femoral metaphysis in both the AP and lateral planes (Figure 28).
2. Remove the 3.0mm Ball Tip Guide Rod.

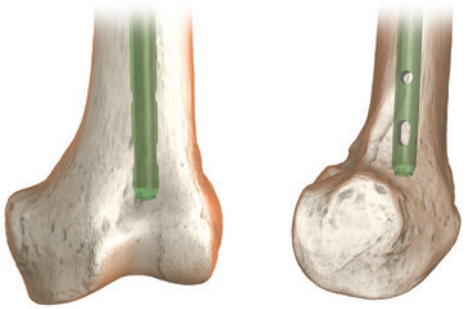


Figure 28

Nail anteversion

With the C-Arm in the lateral position, rotate the drill guide until it transects the nail and is center-center in the femoral neck and head (Figure 29).

Note: If using the TRIGEN® SURESHOT® System to distally lock TAN®/FAN nails, refer to the TRIGEN SURESHOT Distal Targeting System User Manual.

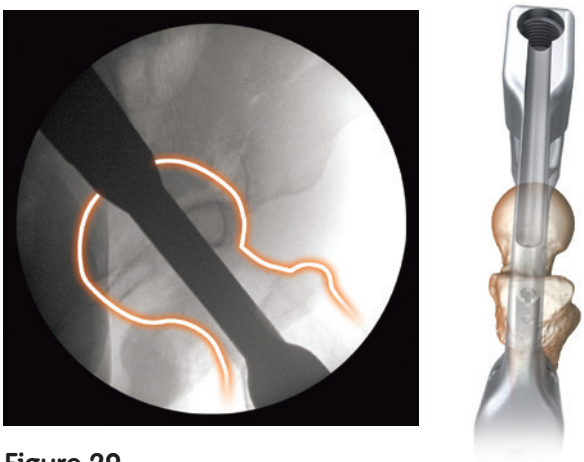


Figure 29

Proximal locking

Standard femoral locking

1. Slide the 4.0mm Trocar (71631191) into the 4.0mm Drill Sleeve Trocar (71631026) and insert into a 9.0mm Drill Sleeve (71631152).
2. Make a small incision at the site of screw entry and insert the trocar/sleeve assembly through the hole on the drill guide and down to the bone (Figure 30).
3. Attach the 4.0mm Long Pilot Drill* to power via the Mini Connector.
4. Remove the 4.0mm Trocar from the drill sleeve assembly.
5. Drill both cortices.
6. Measure for screw length using either the calibrations on the 4.0mm Long Pilot Drill (Figure 31) or by removing the Drill Sleeve Trocar and using the Screw Depth Gauge (71631189).

   Note: The 4.0mm Drill Sleeve Trocar must contact the lateral cortex to ensure accurate locking screw length measurement.
7. Attach the appropriate length 5.0mm locking screw to the end of the Medium Hexdriver (71631066).
8. Use power to insert the screw through the 9.0mm Drill Sleeve until the laser-etched ring on the hexdriver reaches the back of the drill sleeve (Figure 32).
9. Attach the T-handle to the hexdriver and tighten the locking screw by hand.

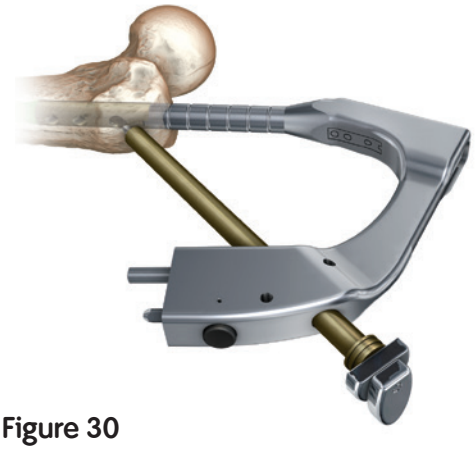


Figure 30

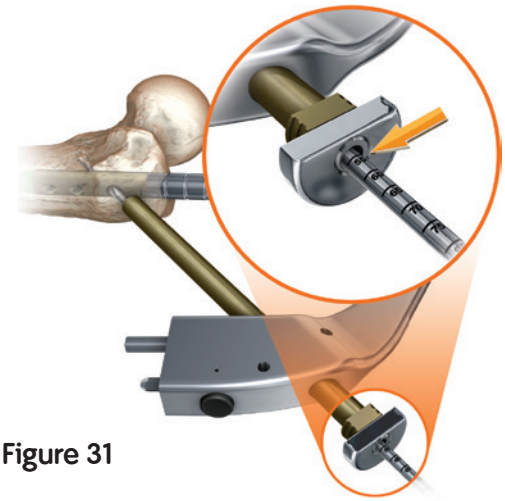


Figure 31

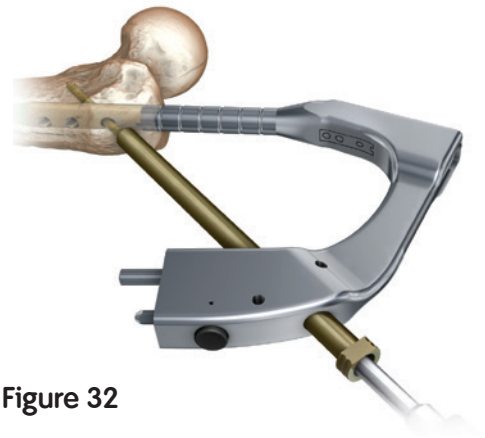


Figure 32

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

Recon locking

1. After confirming nail insertion depth and femoral neck anteversion, make two small incisions at the site of screw entry.
2. Insert a 9.0mm Drill Sleeve, 4.0mm Drill Sleeve, and 4.0mm Trocar into the inferior-most recon locking hole on the Radiolucent Drop and down to the bone (Figure 33).

   Note: The 4.0mm Drill Sleeve Trocar must contact the lateral cortex to ensure accurate locking screw measurement.

   Note: To ease insertion of the 9.0mm Drill Sleeve through the Radiolucent Drop, rotate the Drill Sleeve back and forth.
3. Repeat the process for the superior locking hole.
4. Remove the 4.0mm Trocar from the inferior trocar/sleeve assembly.
5. Attach the 4.0mm Long Pilot Drill to power via the Mini Connector.
6. Drill to the desired depth in the femoral neck and head.
7. Leave the 4.0mm drill in place and repeat the process for the superior trocar/sleeve assembly.
8. Measure for screw length using the calibrations on the 4.0mm Long Pilot Drill (Figure 34).

   Note: The calibration on the drill will be flush with the back of the drill sleeve.
9. Remove the 4.0mm drill and Drill Sleeve from the inferior 9.0mm Drill Sleeve.
10. Attach the 6.4mm Step Drill (71631035) to power and drill to the depth measured for the 6.4mm recon locking screw.

    Note: Monitor all drilling under fluoroscopy in order to avoid penetration of the acetabulum.
11. Leave the step drill in place and repeat the process for the superior locking screw.
12. Attach the appropriate length 6.4mm recon locking screw to the Medium Hexdriver and T-handle.
13. Remove the inferior 6.4mm Step Drill.
14. Insert the locking screw through the 9.0mm Drill Sleeve. Do not tighten definitively.
15. Repeat the process for the superior recon locking screw using the Long Hexdriver (71631070)* and T-handle (Figure 36).
16. Release any traction and tighten both locking screws definitively.

Figure 33

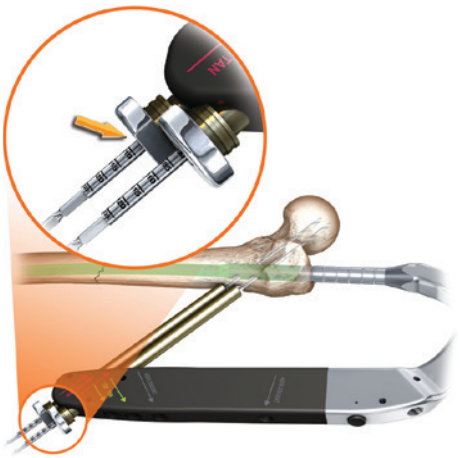


Figure 34

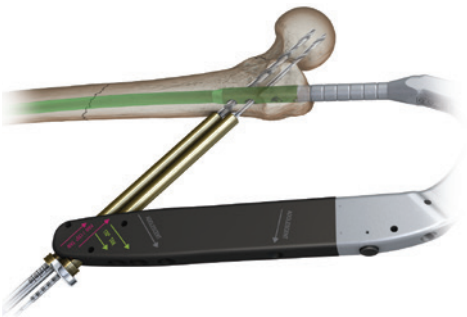


Figure 35

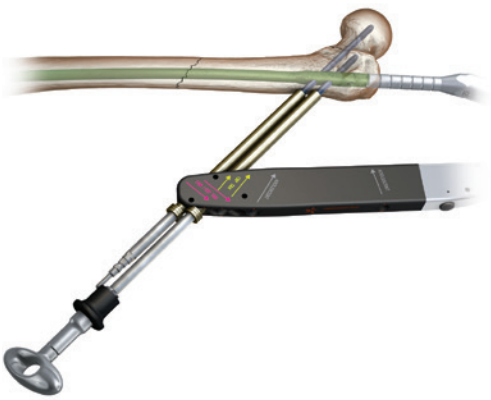


Figure 36

*Not included in the TRIGEN® Base Instrument Set (71674012).

Distal locking

Use a free-hand technique to perform distal locking in the lateral plane.

1. Reconfirm 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® Distal Targeting System, refer to the TRIGEN® 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 stab incision at the site of screw entry.
5. Insert the 4.0mm Short Drill (71631117)* down to bone (Figure 37).
6. Drill both cortices.
7. Measure for screw length using the Screw Depth Gauge.

   or

   Leave the 4.0mm Short Drill in place, insert the Screw Length Sleeve (71674085) down to the bone, and read the exposed calibrations from the drill.
8. Insert the appropriate length 5.0mm locking screw using either the Medium or Short Hexdriver (71631068) and T-handle (Figure 38).

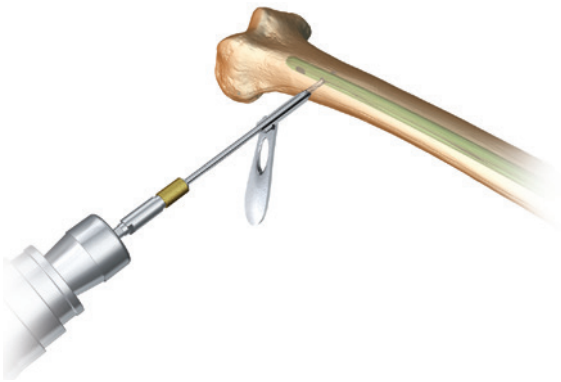


Figure 37

Figure 38

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

Nail cap insertion: optional

1. Remove the Percutaneous Drill Guide and Radiolucent Drop.
2. Attach the selected TRIGEN® Nail Cap to the Medium Hexdriver and T-handle.
3. Screw the nail cap into the top of the nail until tight (Figure 39).
4. Note: If cross-threading occurs, rotate the nail cap counterclockwise until its threads line up with those of the nail. Proceed with insertion until tight.

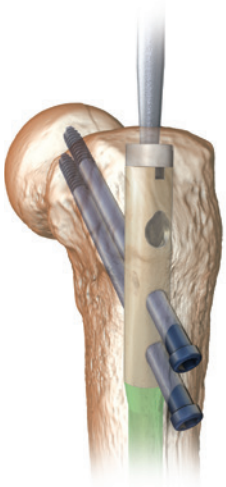


Figure 39

Nail extraction: optional

1. Use the Medium Hexdriver and T-handle to remove the nail cap, if implanted, and all but one of the locking screws.
2. Thread the Disposable Nail Extractor (71631320) into the Cannulated Impactor-Medium or Cannulated Impactor-Long (71631185)*.
3. Introduce the extraction assembly into the top of the nail.
4. Remove the final locking screw.
5. Extract the nail with a back-slapping motion using the Slotted Hammer (Figure 40).

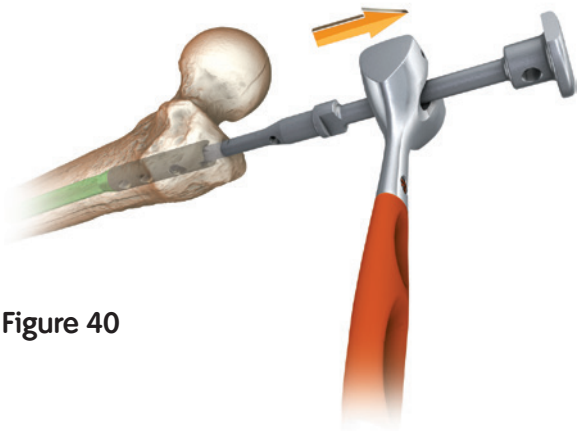


Figure 40

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

Percutaneous technique

This technique assumes the absence of a nail cap.

1. Use the Medium Hexdriver and T-handle to remove all but one of the locking screws.
2. Attach a 3.2mm Brad Point Guide Pin (71674130 or 7163436) to power via the Mini Connector.
3. Under fluoroscopy, insert the guide pin into the top of the nail (Figure 41).

   Note: This may also be performed manually.
4. Attach the 12.5mm Entry Reamer to power.
5. Make an incision large enough to accept the 12.5mm Entry Reamer at the pin-skin site.
6. Advance the Entry Reamer over the guide pin and into the top of the nail to remove any bony ingrowth (Figure 42).

   Note: The tip of the Entry Reamer is straight for approximately one inch before flaring out. It is this straight portion of the Entry Reamer that enters the top of the nail.
7. Remove the remaining locking screw.
8. Extract the nail with a back-slapping motion using the Slotted Hammer.

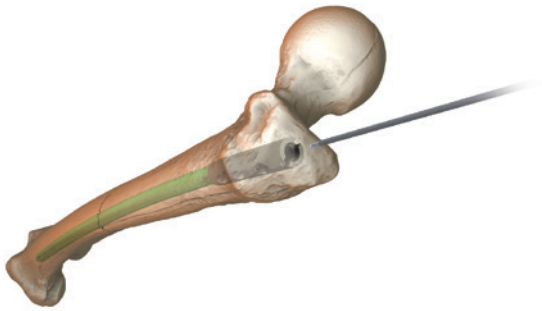


Figure 41

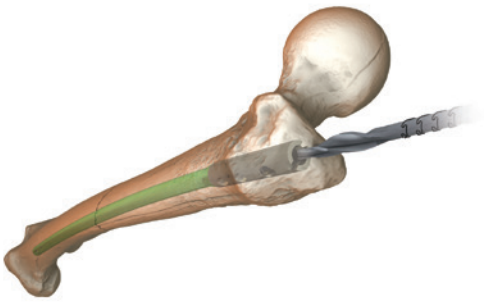


Figure 42

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 a 2.0mm Smooth Guide Rod (71118280) 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**
71118280	2.0mm x 900mm Smooth (RUSSELL-TAYLOR® System)
71631626	3.0mm x 1000mm Ball Tip (TRIGEN® System)

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.

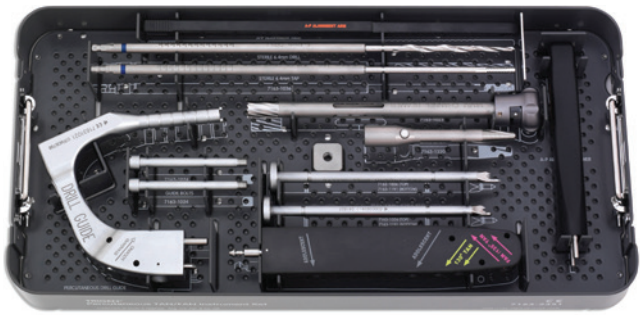
Catalog information

TRIGEN® Base Instrument Set

Set No. 71674012

Cat. Item	Description	Qty
71129401	Small Outer Case	1
71129402	Lid for Outer Case	1
71674021	TRIGEN Base Tray	1
71631066	Medium Hexdriver	1
71631068	Short Hexdriver	1
71631116	12.5mm Entry Reamer	1
71631140	Guide Bolt Wrench	1
71631152	9.0mm Drill Sleeve	2
71631161	Multipurpose Driver	1
71631186	Mini Connector	1
71631189	Screw Depth Gauge	1
71674000	Cannulated Awl	1
71674060	Entry Portal Tube	1
71674074	3.2mm T-handle Trocar	1
71674075	Honeycomb	1
71674076 or 71674576	T-handle	1
71674077	Reducer	1
71674077	Reducer Connector	1

Cat. Item	Description	Qty
71674078	Obturator	1
71674079	Ruler	1
71674080	Gripper	1
71674081	Impactor	1
71674082	Slotted Hammer	1
71674083	4.0mm Drill Sleeve	2
71674084	Screwdriver Release Handle	1
71674085	Screw Length Sleeve	1
71674092	Entry Portal Handle	1
71671212	TRIGEN Reamer Set, Optional	1
71118200	SCULPTOR® Flexible Reamer, Optional	1
71631130	Flexible Reamer Extender, Optional	1
71641123	TRIGEN 4.0 Diaphyseal Drill	1
71631121	4.0mm Long AO Pilot Drill, 333mm, Disposable	2
71671123	4.0mm Short AO Pilot Drill, 161mm, Disposable	1
71674130	3.2mm x 343mm Brad Point Tip Guide Pin, Disposable	3
71631070	Long Hexdriver, Optional	1
71751153	AO Mini Connector, Optional	1
71631187	Trinkle to Mini Connector, Optional	1



TRIGEN® Percutaneous TAN® and FAN Instrument Set

Set No. 71632351

Cat. Item	Description	Qty
71631021	Percutaneous Drill Guide	1
71631022	Radiolucent Drop	1
71631039	14mm Channel Reamer	1
71631024	Percutaneous Guide Bolt	2
71631036	Sterile 6.4mm Tap	1
71631026	4.0mm Trocar Drill Sleeve	2

Cat. Item	Description	Qty
71631191	4.0mm Trocar	1
71631025	AP Alignment Tower	1
71631015	AP Alignment Arm	1
71631035	Sterile 6.4mm Drill	1
71631320	TRIGEN Disposable Nail Extractor	1

TRIGEN Percutaneous TAN and FAN Instrument Case

Cat. Item	Description
71631027	Percutaneous Instrument Tray
71631028	Percutaneous Instrument Lid

TRIGEN Percutaneous TAN and FAN Instrument

Cat. Item	Description	Qty
71631021	Percutaneous Drill Guide	1
71631022	Radiolucent Drop	1
71631039	14mm Channel Reamer	1
71631024	Percutaneous Guide Bolt	2
71631036	Sterile 6.4mm Tap	1

Cat. Item	Description	Qty
71631026	4.0mm Trocar Drill Sleeve	2
71631191	4.0mm Trocar	1
71631025	AP Alignment Tower	1
71631015	AP Alignment Arm	1

TRIGEN Percutaneous TAN and FAN Disposables

Set No. 71631000

Cat. Item	Description	Qty
71631035	Sterile 6.4mm Drill	1
71631320	TRIGEN Disposable Nail Extractor	1
71631121	4.0mm Long AO Pilot Drill	2
71631123	4.0mm Short AO Pilot Drill	2

Cat. Item	Description	Qty
71631626	3.0mm x 1000mm Ball Tip Guide Rod	2
71674130	3.2mm x 343mm Tip Threaded	3
71674130 or 71631436	3.2mm Brad Point Guide Pin	

Implants

TRIGEN® TAN® Trochanteric Antegrade Nails
Set No. 71631236

10mm Diameter Nails (30cm–50cm)

Left (Lime)	Right (Rose)	Length	Neck Angle
71647230	71648230	30	130°
71647232*	71648232*	32	130°
71647234*	71648234*	34	130°
71647236*	71648236*	36	130°
71647238*	71648238*	38	130°
71647240*	71648240*	40	130°
71647242*	71648242*	42	130°
71647244*	71648244*	44	130°
71647246	71648246	46	130°
71647248	71648248	48	130°
71647250	71648250	50	130°

11.5mm Diameter Nails (30cm-50cm)

Left (Lime)	Right (Rose)	Length	Neck Angle
71647330	71648330	30	130°
71647332*	71648332*	32	130°
71647334*	71648334*	34	130°
71647336*	71648336*	36	130°
71647338*	71648338*	38	130°
71647340*	71648340*	40	130°
71647342*	71648342*	42	130°
71647344*	71648344*	44	130°
71647346	71648346	46	130°
71647348	71648348	48	130°
71647350	71648350	50	130°

13mm Diameter Nails (30cm-50cm)

Left (Lime)	Right (Rose)	Length	Neck Angle
71647430	71648430	30	130°
71647432*	71648432*	32	130°
71647434*	71648434*	34	130°
71647436*	71648436*	36	130°
71647438*	71648438*	38	130°
71647440*	71648440*	40	130°
71647442*	71648442*	42	130°
71647444*	71648444*	44	130°
71647446	71648446	46	130°
71647448	71648448	48	130°
71647450	71648450	50	130°

* Contained in the standard implant set

TRIGEN® FAN Femoral Antegrade Nails

Set No. 71631337

10mm Diameter Nails (30cm–50cm)

Left (Lime)	Right (Rose)	Length	Neck Angle
71634230	71635230	30	130°
71634232*	71635232*	32	130°
71634234*	71635234*	34	130°
71634236*	71635236*	36	130°
71634238*	71635238*	38	130°
71634240*	71635240*	40	130°

Left (Lime)	Right (Rose)	Length	Neck Angle
71634242*	71635242*	42	130°
71634244*	71635244*	44	130°
71634246*	71635246*	46	130°
71634248	71635248	48	130°
71634250	71635250	50	130°

11.5mm Diameter Nails (30cm–50cm)

Left (Lime)	Right (Rose)	Length	Neck Angle
71634330	71635330	30	130°
71634332*	71635332*	32	130°
71634334*	71635334*	34	130°
71634336*	71635336*	36	130°
71634338*	71635338*	38	130°
71634340*	71635340*	40	130°

Left (Lime)	Right (Rose)	Length	Neck Angle
71634342*	71635342*	42	130°
71634344*	71635344*	44	130°
71634346*	71635346*	46	130°
71634348	71635348	48	130°
71634350	71635350	50	130°

13mm Diameter Nails (30cm–50cm)

Left (Lime)	Right (Rose)	Length	Neck Angle
71634430	71635430	30	130°
71634432*	71635432*	32	130°
71634434*	71635434*	34	130°
71634436*	71635436*	36	130°
71634438*	71635438*	38	130°
71634440*	71635440*	40	130°

Left (Lime)	Right (Rose)	Length	Neck Angle
71634442*	71635442*	42	130°
71634444*	71635444*	44	130°
71634446*	71635446*	46	130°
71634448	71635448	48	130°
71634450	71635450	50	130°

14.5mm Diameter Nails (36cm–44cm)

Left (Lime)	Right (Rose)	Length	Neck Angle
71644536	71645536	36	130°
71644538	71645538	38	130°
71644540	71645540	40	130°

Left (Lime)	Right (Rose)	Length	Neck Angle
71644542	71645542	42	130°
71644544	71645544	44	130°

16mm Diameter Nails (36cm–44cm)

Left (Lime)	Right (Rose)	Length	Neck Angle
71644636	71645636	36	130°
71644638	71645638	38	130°
71644640	71645640	40	130°

Left (Lime)	Right (Rose)	Length	Neck Angle
71644642	71645642	42	130°
71644644	71645644	44	130°

* Contained in the standard implant set

FAN 8.5mm Diameter Nails (26cm–40cm)

Cat. Item	Length	Neck Angle
71636126	26	130°
71636128	28	130°
71636130	30	130°
71636132	32	130°
71636134	34	130°
71636136	36	130°
71636138	38	130°
71636140	40	130°

Adolescent TAN° Left 8.5mm Diameter Nails (24cm–40cm)

Cat.Item	Length	Neck Angle
71645124	24	130°
71645126	26	130°
71645128	28	130°
71645130	30	130°
71645132	32	130°
71645134	34	130°
71645136	36	130°
71645138	38	130°
71645140	40	130°

Adolescent TAN° Right 8.5mm Diameter Nails (24cm–40cm)

Cat.Item	Length	Neck Angle
71646124	24	130°
71646126	26	130°
71646128	28	130°
71646130	30	130°
71646132	32	130°
71646134	34	130°
71646136	36	130°
71646138	38	130°
71646140	40	130°

5.0mm Internal Captured Screw

Set No. 71642000

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

Cat. Item	Length
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

4.5mm Internal Captured Screws

Set No. 71642005

Cat. Item	Length
71645420	4.5mm x 20mm
71645422	4.5mm x 22.5mm
71645425*	4.5mm x 25mm
71645427*	4.5mm x 27.5mm
71645430*	4.5mm x 30mm
71645432*	4.5mm x 32.5mm
71645435*	4.5mm x 35mm
71645437*	4.5mm x 37.5mm
71645440*	4.5mm x 40mm
71645442*	4.5mm x 42.5mm
71645445*	4.5mm x 45mm
71645447*	4.5mm x 47.5mm
71645450*	4.5mm x 50mm
71645452*	4.5mm x 52.5mm
71645455*	4.5mm x 55mm
71645457*	4.5mm x 57.5mm
71645460*	4.5mm x 60mm
71645462*	4.5mm x 62.5mm
71645465*	4.5mm x 65mm

4.5mm

* Contained in the standard implant set

6.4mm Captured Recon Screw (Blue)

Set No. 71631341

Cat. Item	Length
71642365*	65mm
71642370*	70mm
71642375*	75mm
71642380*	80mm
71642385*	85mm
71642390*	90mm
71642395*	95mm

Cat. Item	Length
71642300*	100mm
71642305*	105mm
71642310*	110mm
71642315*	115mm
71642320*	120mm
71642325*	125mm

TRIGEN® Nail Caps

Cat. Item	Length
71634000	0mm
71634005	5mm
71634010	10mm

Cat. Item	Length
71634015	15mm
71634020	20mm

Notes

Notes

Products may not be available in all markets because product availability is subject to the regulatory and/or medical practices in individual markets. Please contact your Smith & Nephew representative or distributor if you have questions about the availability of Smith & Nephew products in your area.

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