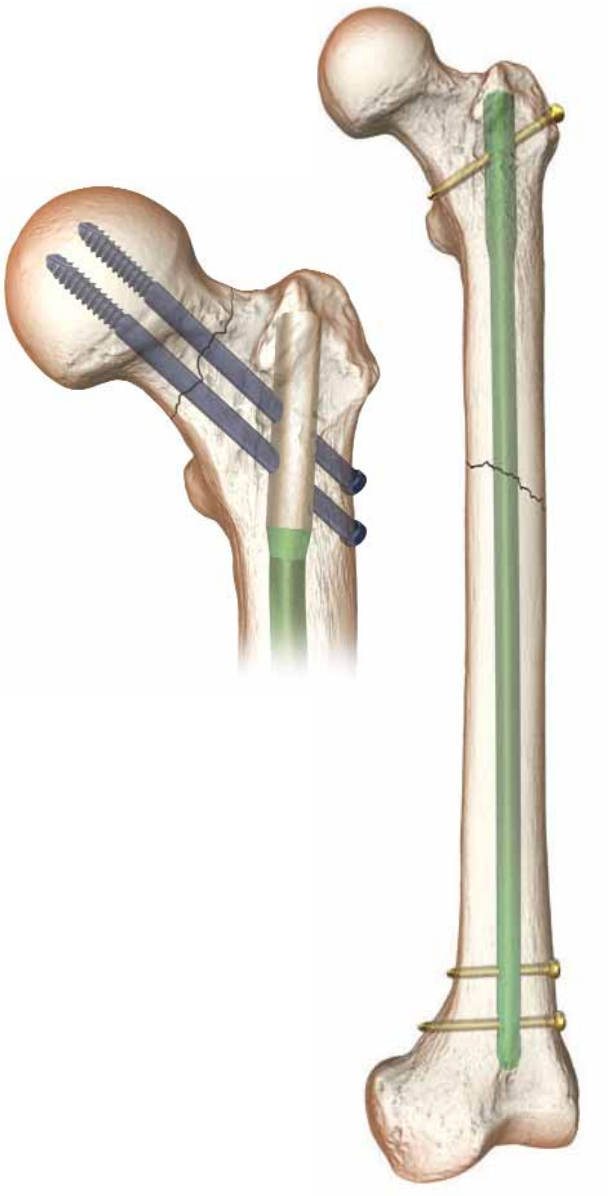
Surgical Technique

smith&nephew

TRIGEN® TAN FAN

Trochanteric and Femoral
Antegrade Intramedullary Nails



TRIGEN◇ TAN and FAN Intramedullary Nails

Surgical Technique

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Nota Bene

The technique description herein is made available to the healthcare professional to illustrate the author's suggested treatment for the uncomplicated procedure. In the final analysis, the preferred treatment is that which addresses the needs of the specific patient.

Indications

The TRIGEN® TAN and FAN intramedullary nails are indicated for fractures of the femur, including intertrochanteric, basi/trans-cervical 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.

TRIGEN◇ TAN and FAN Nail Case Examples

Case 1

Preoperative

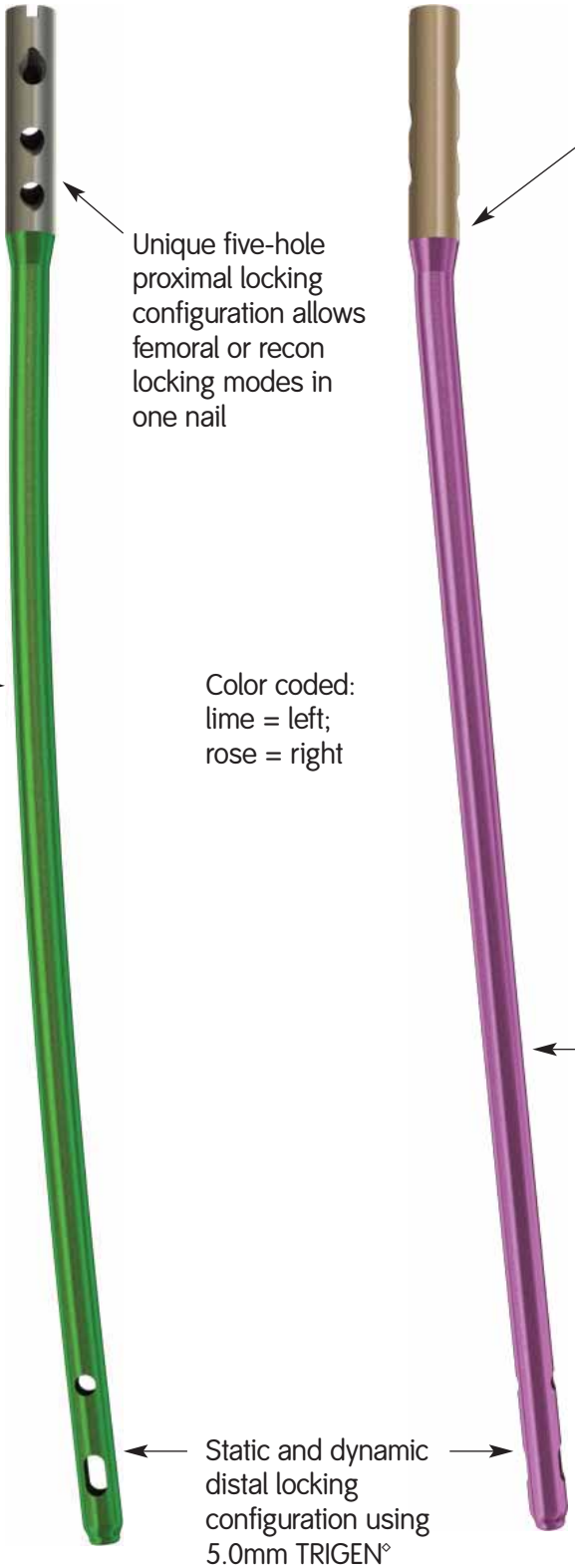
Postoperative

Case 2

Preoperative

Postoperative

Design Features: TAN



130° Femoral and 130°/ 135° Recon screw angles

12° of built-in femoral neck anteversion for optimal proximal screw position

Unique five-hole proximal locking configuration allows femoral or recon locking modes in one nail

5° lateral offset for minimally invasive trochanteric entry

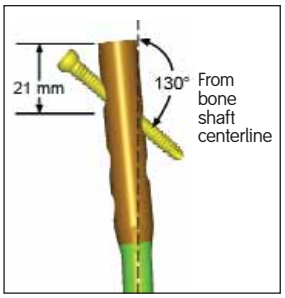
Hybrid proximal-distal AP Bow transition: 1.5m-2.5m

Color coded: lime = left; rose = right

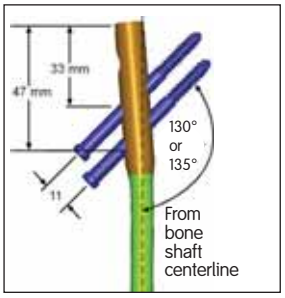
Cannulated, round geometry for ease of insertion using reamed or unreamed technique

Static and dynamic distal locking configuration using 5.0mm TRIGEN® Internal Hex Captured Locking Screws

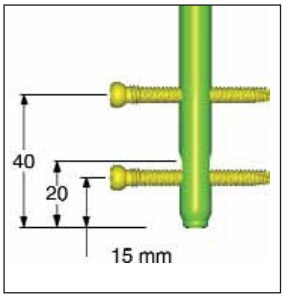
TRIGEN® Trochanteric Antegrade Nail (TAN) Specifications



Standard Femoral Lock
130°/135° TAN



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



10, 11.5 & 13mm 130°/135° TAN -
Distal Lock (M-L view)

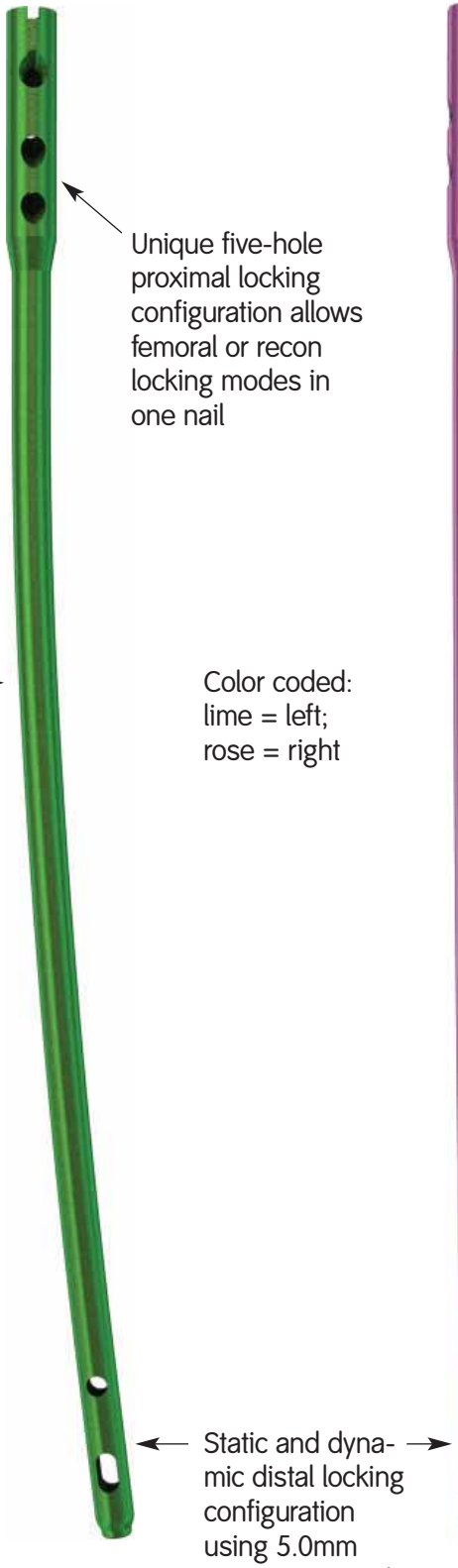
Proper Screw Measurement

All TRIGEN locking screw measuring devices, measure from bottom of head to the last complete thread of 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 & 13mm
Lengths	30-50cm
Nail Color - Left	Tan/Lime
Nail Color - Right	Tan/Rose
Cross Section	Round
Neck Angle	130°/135°
Proximal Diameter (driving end)	13mm
Distal Diameter (non-driving end)	10, 11.5 & 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 Hex Drivers	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 & 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 (a/p 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 & 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

Design Features: FAN



130° Femoral and Recon screw angles

12° of built-in femoral neck anteversion for optimal proximal screw position

Unique five-hole proximal locking configuration allows femoral or recon locking modes in one nail

Straight proximal profile for ease of insertion through the piriformis fossa

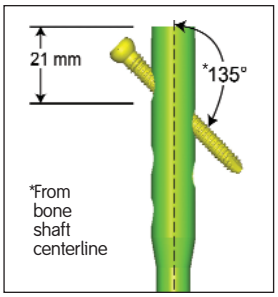
Hybrid proximal-distal AP Bow transition: 1.5m-2.5m

Color coded: lime = left; rose = right

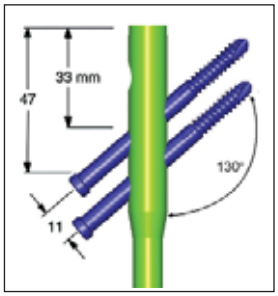
Cannulated, round geometry for ease of insertion using reamed or unreamed technique

Static and dynamic distal locking configuration using 5.0mm TRIGEN® Internal Hex Captured Locking Screws

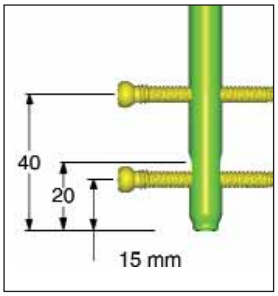
TRIGEN◇ Femoral Antegrade Nail (FAN) Specifications



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 bottom of head to the last complete thread of 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.

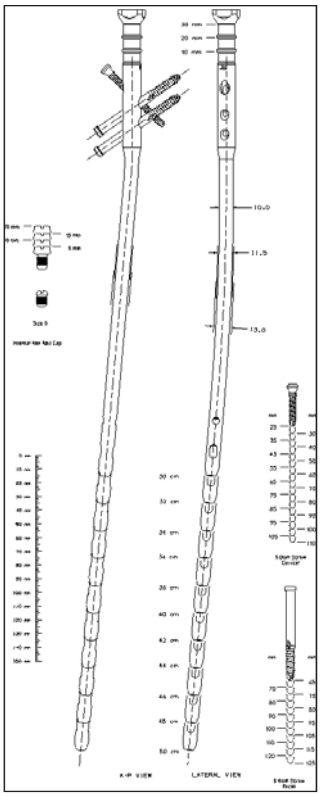
Specifications	TRIGEN FAN Nail
Material	TI6AL4V
Diameter	10, 11.5, 13, 14.5 & 16mm
Lengths	30-50cm, 36-44cm
Nail Color - Left	Lime
Nail Color - Right	Rose
Cross Section	Round
Neck Angle	130°
Proximal Diameter (driving end)	13mm (10, 11.5 & 13 diameter) 14.5mm (14.5 diameter) 16mm (16 diameter)
Proximal Diameter (non-driving end)	10, 11.5, 13, 14.5 & 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 Hex Drivers	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 Degrees
Location	21, 33 & 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 & 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

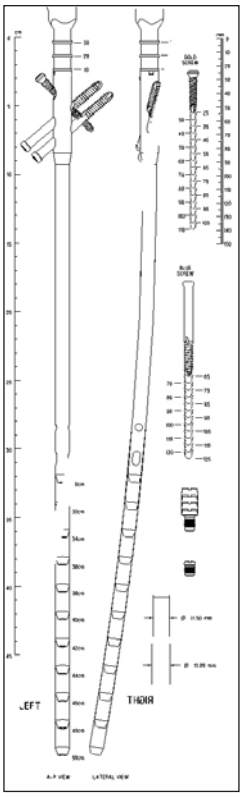
Implant Selection

The TRIGEN® TAN (7118-0884) and TRIGEN FAN (7118-0497) Radiographic Templates may be used to assist with pre-operative implant selection. Nail length, locking screw length and nail cap size may be determined.

Note As template magnification levels are set at 117%, all measurements are estimates of true size. All measurements must be verified intraoperatively.



TRIGEN TAN
Preoperative Template
Cat. No. 7118-0884

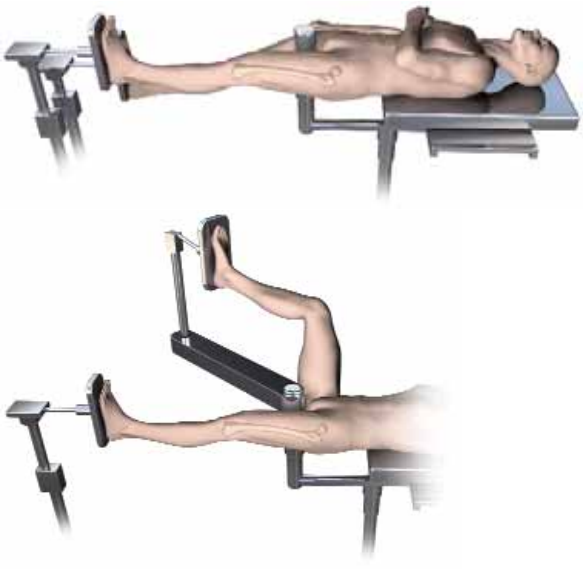


TRIGEN FAN
Preoperative Template
Cat. No. 7118-0497

Patient Positioning

Place the patient in the supine or lateral decubitus position on a fracture table. The foot of the affected limb is placed in a foot holder or a pin is inserted through the calcaneus for traction purposes. The unaffected limb is extended below and away from the affected limb or flexed and placed in a leg holder.

Check the affected limb for length and rotation by comparison to the unaffected limb. Abduct the torso 10°-15° to allow clear access to the intramedullary canal. 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.

Instruments for Opening the Proximal Femur

3.2mm x 343mm Tip Threaded Guide Pin
Cat. No. 7167-4029

Mini Connector
Cat. No. 7163-1186

Honeycomb
Cat. No. 7167-4075

Entry Portal Tube
Cat. No. 7167-4060

Entry Portal Handle
Cat. No. 7167-4092

12.5mm Entry Reamer
Cat. No. 7163-1116

14mm Channel Reamer
Cat. No. 7163-1023

T-Handle
Cat. No. 7167-4076

3.2mm T-Handle Trocar
Cat. No. 7167-4074

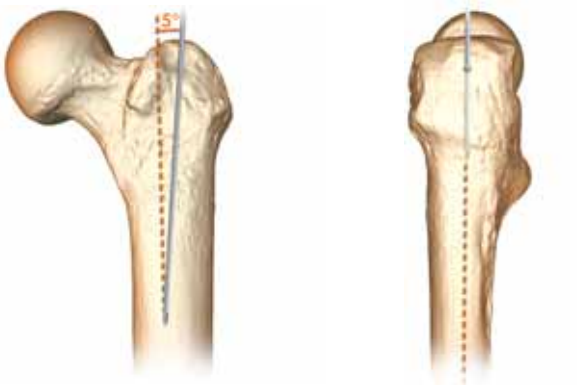
Cannulated Awl
Cat. No. 7167-4000

Opening the Proximal Femur

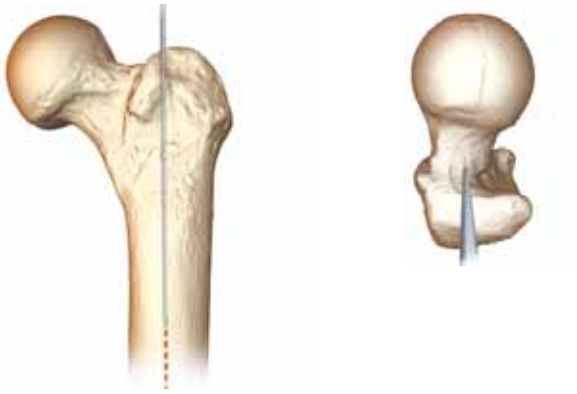
Incision and Entry Point*
Assemble the Honeycomb (7167-4075), Entry Handle (7167-4092) and Entry Portal Tube (7167-4060). The pieces will lock in place securely at either 0° or 180°.

A longitudinal incision is made proximal to the greater trochanter. Carry the incision through to the fascia and palpate the tip of the greater trochanter.

The optimal entry point for the Trochanteric Antegrade Nail (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.



The entry point for the FAN is through the piriformis fossa, in-line with the intramedullary canal in the AP and the lateral. The entry point is slightly posterior in the lateral although this varies with patient anatomy.



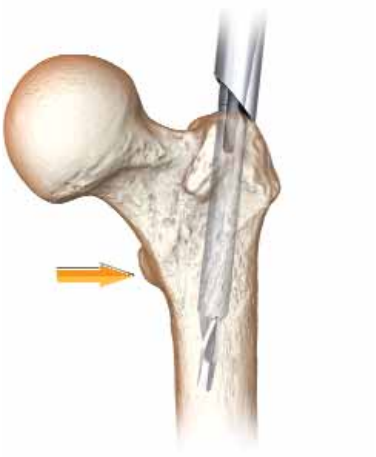
* This surgical technique is written from the Trochanteric Antegrade Nail (TAN) perspective. The Femoral Antegrade Nail (FAN) technique changes with respect to nail entry point and insertion technique

Entry Portal Acquisition
Insert the Entry Portal Instrumentation through the incision down to bone. Attach a 3.2mm x 343mm Tip Threaded Guide Pin (7167-4029) to power via the Mini Connector (7163-1186) and insert 2-3cm into the trochanteric region. Avoid over-insertion of the guide pin as this can establish a false trajectory and lead to fracture malalignment. Confirm guide pin placement in the AP and lateral planes.

Note In the instance of suboptimal guide pin placement, rotate the Honeycomb within the Entry Portal Tube to the desired location and insert another 3.2mm guide pin.

Following guide pin placement, remove the Honeycomb from the Entry Portal Tube along with any additionally inserted guide pins. Insert the 12.5mm Entry Reamer (7163-1116) into the 14mm Channel Reamer (7163-1023) until it clicks and attach to power. Advance the assembly through the Entry Portal Instrumentation 2-3cm into the trochanteric region. Evaluate reamer position before proceeding.

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. If the Entry Portal Instrumentation is not used, the channel reamer must still be advanced to the same point. Confirm the reamer assembly's final position in both the AP and lateral planes. Detach and remove the 12.5mm Entry Reamer from the 14mm Channel Reamer.



Note The channel reamer and Entry Portal Instrumentation will serve as a soft tissue protector.

Alternative Technique:
Entry Portal Acquisition
Attach the T-Handle (7167-4076) to the Cannulated Awl (7167-4000) and insert the 3.2mm Trocar (7167-4074) into the back of the assembly. Introduce the awl into the proximal femur at the designated entry point until it is below the level of the lesser trochanter*. Remove the 3.2mm Trocar and pass a 3.0mm Ball Tip Guide Rod (7163-1626) into the back of the T-Handle. Remove the awl from the proximal femur.

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. 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** (pp. 13-15).

* The entry point for the Cannulated Awl will differ depending on whether a TAN or FAN is being implanted
** The largest Reamer Head that the TRIGEN® Base Instrument Tray can hold is 16mm. Larger sizes are available in the SculptOR Reamer System (7111-8330)

Instruments for Fracture Reduction and Intramedullary Reaming

Entry Portal Tube
Cat. No. 7167-4060

Entry Portal Handle
Cat. No. 7167-4092

Gripper
Cat. No. 7167-4080

Ruler
Cat. No. 7167-4079

14mm Channel Reamer
Cat. No. 7163-1023

T-Handle
Cat. No. 7167-4076

Obturator
Cat. No. 7167-4078

Reamer Heads
Cat. No. 7111-8231 to 7111-8256*

Reamer Shaft
Cat. No. 7111-8200

Reducer
Cat. No. 7167-4077

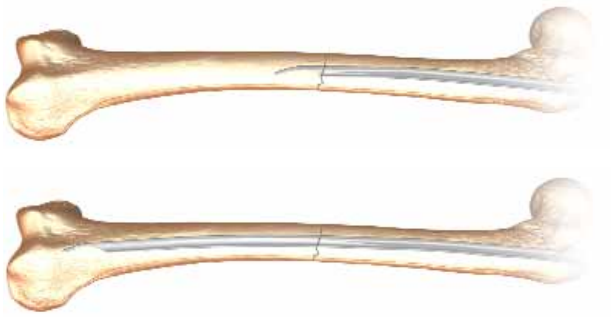
3.0mm x 1000mm Ball Tip Guide Rod
Cat. No. 7163-1626

* The largest Reamer Head that the TRIGEN® Base Instrument Tray can hold is 16.0mm. Larger sizes are available in the SculptOR Reamer Set (7111-8330)

Intramedullary Reaming

Fracture Reduction
Insert the back end of the 3.0mm Ball Tip Guide Rod (7163-1626) into the front end of the Gripper (7167-4080) and gently close the trigger-grip. Connect the Reducer and Reducer Connector (7167-4077) so that the words "Slot Orientation" are in line with the opening at the tip. Complete the Reducer assembly by connecting it to the T-Handle (7167-4076).

Introduce the Reducer into the intramedullary canal through the channel reamer and Entry Portal Instrumentation. Care should be taken to maintain fracture reduction. 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. The guide rod should be center-center in the AP and lateral views.



Once the guide rod is in position, detach the Gripper and remove the Reducer from the intramedullary canal. Slide the Obturator (7167-4078) into the back of the T-Handle during extraction in order to maintain guide rod position within the canal.

Implant Measurement
After Reducer removal, re-confirm guide rod position in the distal femur. Advance the Ruler (7167-4079) over the guide rod through the channel reamer and Entry Portal Instrumentation to the desired depth. The bottom of the Ruler's metal tip denotes the driving end of the nail.

Note Fractures should be treated with the longest nail possible in order to reduce the likelihood of stress risers.

Confirm guide rod position in the window at the proximal end of the Ruler as shown in order to ensure accurate implant measurement. Push down on the top of the Ruler until contact is made with the guide rod. Implant length is read from the exposed calibrations near the thumbwheel on the Ruler.

Note Resistance on the Ruler may be adjusted by tightening or loosening the thumbwheel.

Preparing the Canal
Beginning with the 9.0mm End Cutting Reamer Head (7111-8231) and Flexible Reamer Shaft (7111-8200), ream the intramedullary canal sequentially in half millimeter increments to a size 1-1.5mm larger than the selected nail diameter*.

Ensure guide rod position during reaming by inserting the Obturator into the back of the reamer unit during retraction. Continue to confirm guide rod position throughout reaming. Periodically move the reamer back and forth in the canal to clear debris from the cutting flutes.

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

* The largest Reamer Head that the TRIGEN® Base Instrument Tray can hold is 16.0mm. Larger sizes are available in the SculptOR Reamer Set (7111-8330)

Instruments for Nail Assembly and Insertion

Percutaneous Drill Guide
Cat. No. 7163-1021

AP Alignment Arm
Cat. No. 7163-1015

Percutaneous Guide Bolt
Cat. No. 7163-1024

AP Alignment Tower
Cat. No. 7163-1025

T-Handle
Cat. No. 7167-4076

Slotted Hammer
Cat. No. 7167-4082

Radiolucent Drop
Cat. No. 7163-1022

Guide Bolt Wrench
Cat. No. 7163-1140

Impactor*
Cat. No. 7167-4081

9.0mm Drill Sleeve
Cat. No. 7163-1152

4.0mm Trocar Drill Sleeve
Cat. No. 7163-1026

6.4mm Step Drill
Cat. No. 7163-1035

4.0mm Long Pilot Drill**
Cat. No. 7163-1110

* The Impactor (7167-4081) is interchangeable with the One-Piece Impactor (7163-1185)
** 4.0mm AO Long Drill (7163-1121) is interchangeable with 4.0mm Long Pilot Drill (7163-1110)

Nail Insertion

Nail Assembly
Attach the Percutaneous Drill Guide (7163-1021) to the nail with the Percutaneous Guide Bolt (7163-1024) and tighten with the Guide Bolt Wrench (7163-1140) and T-Handle.

The nail is correctly aligned when:

1. The apex of the nail's AP bow points anterior
2. The three proximal locking holes on the lateral side of the nail mirror the image depicted on the underside of the drill guide

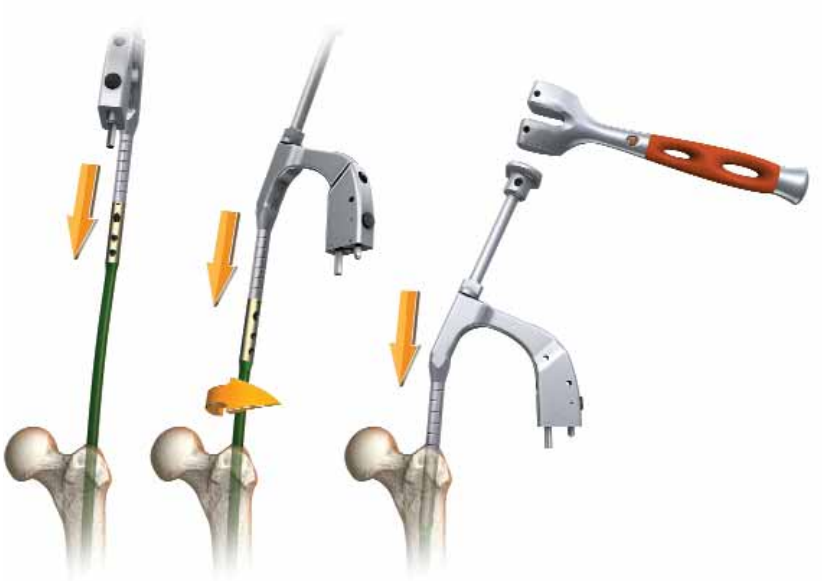
Example For a left 130° TAN, orient the drop on the drill guide so that the two lime colored arrows indicating 130° TAN on its surface point towards the nail. The Smith & Nephew mark on the drop will face laterally.

Verifying Targeting Accuracy
Attach the Radiolucent Drop (7163-1022) to the drill guide to verify targeting accuracy. The drop is etched with color-coded markings to allow for accurate nail/drill guide assembly.

1. **Femoral locking mode:** Insert a 9.0mm Drill Sleeve (7163-1152) and 4.0mm Trocar Drill Sleeve (7163-1026) into the Percutaneous Drill Guide. Pass a 4.0mm Long Pilot Drill (7163-1110)* through the drill sleeves and nail.
2. **Recon locking mode:** Insert a 9.0mm Drill Sleeve into the appropriately color-coded locking hole on the Radiolucent Drop. Pass a 6.4mm Step Drill (7163-1160) through the drill sleeve and nail.

   An incorrectly attached nail will not target. With targeting accuracy confirmed, remove the drop and any drill sleeves.

Insertion



Orient the drill guide assembly in the AP plane and manually insert the nail into the intramedullary canal as far as possible**. If necessary, attach the Impactor (7167-4081) to the drill guide and advance the nail over the guide rod using light blows from the Slotted Hammer (7167-4082). As the distal tip of the nail reaches the isthmus of the canal, rotate the drill guide to the lateral position. Insert the nail to the desired depth.

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

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

*4.0mm AO Long Drill (7163-1121) is interchangeable with 4.0mm Long Pilot Drill (7163-1110)
**Orient the drill guide assembly in the lateral plane for FAN insertion

Insertion Depth

Proximal
Insert the nail until its driving end is at or below the top of the greater trochanter. Each gauge on the insertion barrel represents a 10mm depth interval.

1. **Femoral locking mode:** Attach the AP Alignment Tower (7163-1025) to the drill guide and slide the back end of the AP Alignment Arm (7163-1015) into the tower. Under fluoroscopy, the center portion of the alignment arm indicates the path of the 5.0mm locking screw through the trochanteric region.

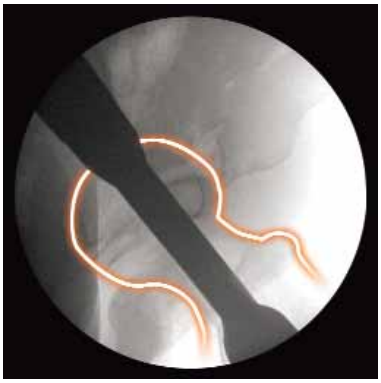
2. **Recon locking mode:** Attach the alignment tower to the drop and slide the back end of the alignment arm into the tower. Under fluoroscopy, the parallel slots and threaded screw tips of the alignment arm indicate the position of both 6.4mm recon locking screws in the femoral neck and head.

Distal
Verify center-center placement of the nail in the distal femoral metaphysis in both the AP and lateral planes.

Note Remove the 3.0mm Ball Tip Guide Rod.

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.



Instruments for Proximal Locking

Radiolucent Drop
Cat. No. 7163-1022

Percutaneous Drill Guide
Cat. No. 7163-1021

T-Handle
Cat. No. 7167-4076

4.0mm Trocar Drill Sleeve
Cat. No. 7163-1026

4.0mm Trocar
Cat. No. 7163-1191

9.0mm Drill Sleeve
Cat. No. 7163-1152

Screw Depth Gauge
Cat. No. 7163-1189

Screwdriver Release
Cat. No. 7167-4084

Medium Hexdriver
Cat. No. 7163-1066

Long Hexdriver*
Cat. No. 7163-1070

Mini Connector
Cat. No. 7163-1186

4.0mm Long Pilot Drill**
Cat. No. 7163-1110

6.4mm Step Drill
Cat. No. 7163-1035

6.4mm Tap
Cat. No. 7163-1036

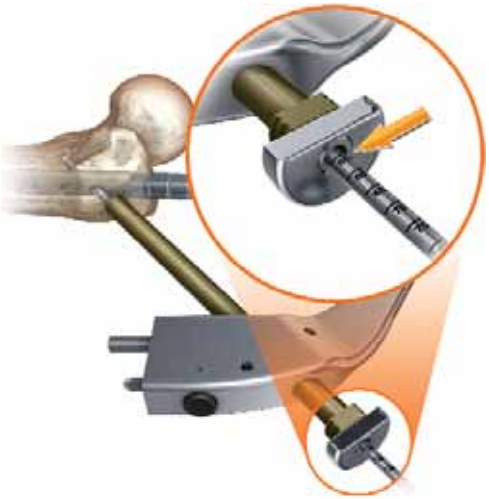
* Not included in the TRIGEN Base Instrument Set (7167-4012)
** 4.0mm AO Long Drill (7163-1121) is interchangeable with 4.0mm Long Pilot Drill (7163-1110)

Proximal Locking

Standard Femoral Locking
Slide the 4.0mm Trocar (7163-1191) into the 4.0mm Drill Sleeve Trocar (7163-1026) and insert into a 9.0mm Drill Sleeve. 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 bone. Attach the 4.0mm Long Pilot Drill* to power via the Mini Connector, remove the trocar from the drill sleeve assembly and drill both cortices.

Measure for screw length using either the calibrations on the 4.0mm Long Pilot Drill or by removing the Drill Sleeve Trocar and using the Screw Depth Gauge (7163-1189).

Note The 4.0mm Drill Sleeve Trocar must be against the lateral cortex for accurate locking screw length measurement.



Attach the appropriate length 5.0mm locking screw to the end of the Medium Hexdriver (7163-1066) and insert through the 9.0mm Drill Sleeve on power until the laser etched ring on the hexdriver reaches the back of the drill sleeve. Attach the T-Handle to the hexdriver and tighten the locking screw by hand.

* 4.0mm AO Long Drill (7163-1121) is interchangeable with 4.0mm Long Pilot Drill (7163-1110)

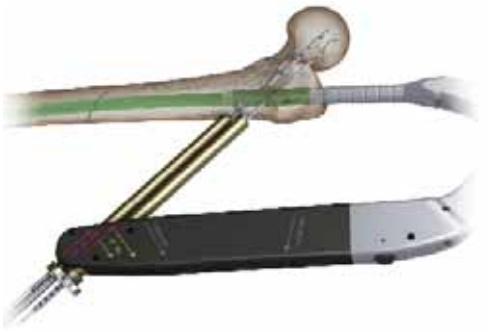
Recon Locking

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

Remove the 4.0mm Trocar from the inferior trocar/sleeve assembly. Attach the 4.0mm Long Pilot Drill to power via the Mini Connector and drill to the desired depth in the femoral neck and head. Leave the 4.0mm drill in place and repeat the process for the superior trocar/sleeve assembly. Measure for screw length using the calibrations on the 4.0mm Long Pilot Drill.

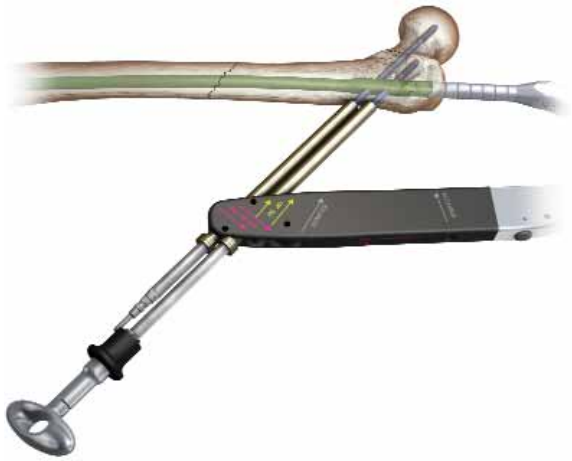
Note The 4.0mm Drill Sleeve Trocar must be against the lateral cortex for accurate locking screw measurement.

Remove the 4.0mm drill and drill sleeve trocar from the inferior 9.0mm Drill Sleeve. Attach the 6.4mm Step Drill to power and drill to the depth measured for the 6.4mm recon locking screw. The calibration on the drill will be flush with the back of the drill sleeve. Leave the step drill in place and repeat the process for the superior locking screw.



Note It is recommended to monitor all drilling under fluoroscopy to avoid penetration of the acetabulum.

Attach the appropriate length 6.4mm recon locking screw to the Medium Hexdriver and T-Handle. Remove the inferior 6.4mm Step Drill and insert the locking screw through the 9.0mm Drill Sleeve. Do not tighten definitively. Repeat the process for the superior Recon locking screw using the Long Hexdriver (7163-1070)* and T-Handle. Release any traction and tighten both locking screws definitively.



* Not included in the TRIGEN Base Instrument Set (7167-4012)

Instruments for Distal Locking

T-Handle
Cat. No. 7167-4076

Screwdriver Release
Cat. No. 7167-4084

Screw Length Sleeve
Cat. No. 7167-4085

Screw Depth Gauge
Cat. No. 7163-1189

4.0mm Short Drill*
Cat. No. 7163-1117

Medium Hexdriver
Cat. No. 7163-1066

Short Hexdriver
Cat. No. 7163-1068

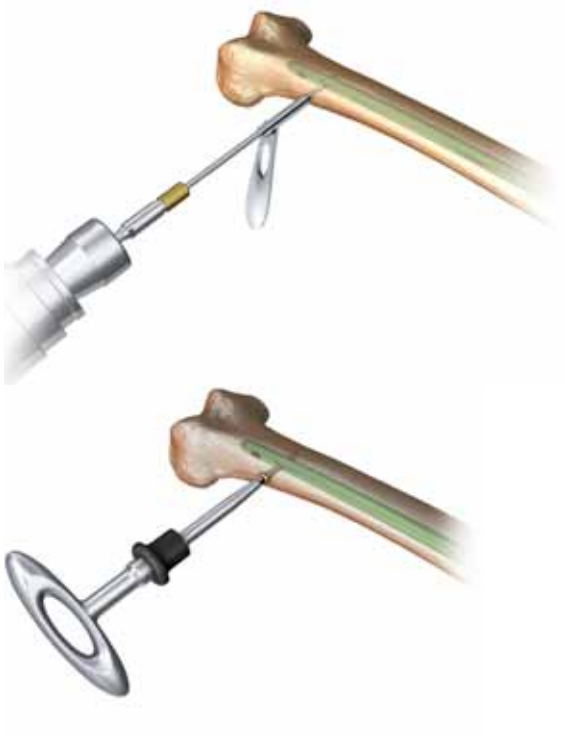
Mini Connector
Cat. No. 7163-1186

* 4.0mm AO Short Drill (7163-1123) is interchangeable with 4.0mm Short Drill (7163-1117)

Distal Locking

Distal locking is performed in the lateral plane using a free-hand technique. Reconfirm fracture reduction and align the C-Arm over the desired locking hole. Obtain a “perfect circle” image of the locking hole and use a blunt object to approximate the location of the locking hole by dimpling the skin.

Make a stab incision at the site of screw entry, insert the 4.0mm Short Drill (7163-1117)* down to bone, and drill both cortices. Measure for screw length using the Screw Depth Gauge. Alternatively, leave the 4.0mm Short Drill in place, insert the Screw Length Sleeve (7167-4085) down to bone, and read the exposed calibrations off the drill. Insert the appropriate length 5.0mm locking screw using either the Medium or Short Hexdriver (7163-1068) and T-Handle.



Nail Cap Insertion: Optional

Remove the Percutaneous Drill Guide and Radiolucent Drop. Attach the selected nail cap to the Medium Hexdriver and T-Handle and insert into the top of the nail until tight.

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.

* 4.0mm AO Short Drill (7163-1123) is interchangeable with 4.0mm Short Drill (7163-1117)

Closure

Obtain final AP and lateral radiographic images to confirm implant position and fracture reduction. Closure follows standard technique.

Instruments for Implant Removal

Medium Hexdriver
Cat. No. 7163-1066

Mini Connector
Cat. No. 7163-1186

12.5mm Entry Reamer
Cat. No. 7163-1116

Disposable Nail Extractor
Cat. No. 7163-1320

Impactor
Cat. No. 7167-4081

One Piece Impactor*
Cat. No. 7163-1185

Slotted Hammer
Cat. No. 7167-4082

T-Handle
Cat. No. 7167-4076

3.0mm x 1000mm Ball Tip Guide Rod
Cat. No. 7163-1626

3.2mm x 343mm Tip Threaded Guide Pin
Cat. No. 7167-4029

* The One Piece Impactor is found in the original TRIGEN® Instrument Set (7163-1326)

Implant Removal: Optional

Open Nail Extraction Technique
Remove the nail cap if implanted and all but one of the locking screws using the Medium Hexdriver and T-Handle. Thread the Disposable Nail Extractor (7163-1320) into the Impactor or One Piece Impactor (7163-1185)* and introduce the extraction assembly into the top of the nail. Remove the final locking screw(s) and extract the nail with a back-slapping motion using the Slotted Hammer.

Percutaneous Nail Extraction Technique
This technique assumes the absence of a nail cap. Attach a 3.2mm x 343mm Tip Threaded Guide Pin to power via the Mini Connector and insert into the top of the nail under fluoroscopy. This may also be performed manually.

Attach the 12.5mm Entry Reamer to power. Make a one inch incision around the guide pin and advance the entry reamer over the guide pin and into the top of the nail to remove bony in-growth. Nail extraction follows the previously described technique.

Note The tip of the entry reamer is straight for approximately one inch before flaring out. It is this portion of the entry reamer that enters the top of the nail.

* The One Piece Impactor is found in the original TRIGEN® Instrument Set (7163-1326)

Guide Rod Jamming Technique

This technique assumes the absence of a nail cap. Under fluoroscopy, insert a 3.2mm x 343mm Tip Threaded Guide Pin into the top of the nail under power or manually.

Attach the 12.5mm Entry Reamer to power. Make a one inch incision around the guide pin and advance the entry reamer over the guide pin and into the top of the nail to remove bony in-growth. Nail extraction follows the previously described technique.

Guide Rods

Cat. No.	Description
7111-8280	2.0mm x 900mm Smooth (RUSSELL-TAYLOR®)*
7111-8202	3.0mm x 900mm Ball Tip (RUSSELL-TAYLOR)*
7163-1626	3.0mm x 1000mm Ball Tip (TRIGEN®)

Additional Removal Items

Cat. No.	Description
115074	Large Extractor Hook**
115073	Small Extractor Hook**
914658	Large Easy Out**
914659	Small Easy Out**

* Available sterile. For nail removal only, do not use for nail insertion
** Located in Russell-Taylor Extraction Kit (Set #7508) available through Loaners

Catalog Information

TRIGEN® Instrument Set

Set No. 7163-1326

Instrument Case

Cat. No.	Description
7112-9400	Large Outer Case
7112-9402	Lid for Outer Case
7163-1199	TRIGEN Instrument Tray 1
7163-1201	TRIGEN Instrument Tray 2

Instruments

Cat. No.	Description	Tray Qty
7163-1066	Medium Hexdriver	1 ea
7163-1068	Short Hexdriver	1 ea
7163-1100	Gripper	1 ea
7163-1114	Entry tool	1 ea
7163-1116	Entry Reamer	1 ea
7163-1118	14mm Channel Reamer	1 ea
7163-1119	8.5mm FAN Guide	1 ea
7163-1120	Entry Reamer Connector	1 ea
7163-1122	Obturator	1 ea
7163-1124	Reducer	1 ea
7163-1128	Ruler	1 ea
7163-1130	Flexible Reamer Extender	1 ea
7163-1132	Soft Tissue Protector	1 ea
7163-1134	Drill Guide	1 ea
7163-1161	Multipurpose Driver	1 ea
7163-1158	Supracondylar Guide	1 ea
7163-1160	6.4mm Drill	1 ea
7163-1162	6.4mm Tap	1 ea
7163-1172	T-Handle	1 ea
7163-1185	One Piece Impactor	1 ea
7163-1186	Mini Connector	1 ea
7163-1189	Screw Depth Gauge	1 ea

Cat. No.	Description	Tray Qty
7163-1192	Flexible Reamer Shaft, 50cm	1 ea
7163-1208	Screw Driver Release Handle	1 ea
7163-1278	Large Nail Extractor	1 ea
7163-1136	Guide Bolt	2 ea
7163-1138	Quick Bolt	1 ea
7163-1140	Guide Bolt Wrench	1 ea
7163-1142	Knee Guide	1 ea
7163-1144	Hip Guide	1 ea
7163-1150	Hammer	1 ea
7163-1152	9.0mm Drill Sleeve	2 ea
7163-1156	4.0mm Drill Sleeve	2 ea
7111-8231	9.0mm Reamer Head	1 ea
7111-8233	9.5mm Reamer Head	1 ea
7111-8234	10.0mm Reamer Head	1 ea
7111-8235	10.5mm Reamer Head	1 ea
7111-8236	11.0mm Reamer Head	1 ea
7111-8237	11.5mm Reamer Head	1 ea
7111-8238	12.0mm Reamer Head	1 ea
7111-8239	12.5mm Reamer Head	1 ea
7111-8240	13.0mm Reamer Head	1 ea
7111-8241	13.5mm Reamer Head	1 ea
7111-8242	14.0mm Reamer Head	1 ea

Disposables

Set No. 7167-1200

Cat. No.	Description	Tray Qty
7163-1121	4.0mm Long AO Pilot Drill, 333mm	2 ea
7163-1123	4.0mm Short AO Pilot Drill, 161mm	2 ea
7163-1626	3.0mm x 1000mm Ball Tip Guide Rod	2 ea
7167-4029	3.2mm x 343mm Tip Threaded Guide Pin	3 ea

TRIGEN◊ INTERTAN◊ Base Instrument Set*

Set No. 7167-4012

Instrument Case

Cat. No.	Description
7112-9401	Small Outer Case
7112-9402	Lid for Outer Case
7167-4021	TRIGEN Base Tray

Instruments

Cat. No.	Description	Tray Qty
7163-1066	Medium Hexdriver	1 ea
7163-1068	Short Hexdriver	1 ea
7163-1116	12.5mm Entry Reamer	1 ea
7163-1140	Guide Bolt Wrench	1 ea
7163-1152	9.0mm Drill Sleeve	2 ea
7163-1161	Multipurpose Driver	1 ea
7163-1186	Mini Connector	1 ea
7163-1189	Screw Depth Gauge	1 ea
7167-4000	Cannulated Awl	1 ea
7167-4060	Entry Portal Tube	1 ea
7167-4074	3.2mm T-Handle Trocar	1 ea
7167-4075	Honeycomb	1 ea
7167-4076	T-Handle	1 ea
7167-4077	Reducer	1 ea
7167-4078	Obturator	1 ea
7167-4079	Ruler	1 ea
7167-4080	Gripper	1 ea
7167-4081	Impactor	1 ea
7167-4082	Slotted Hammer	1 ea
7167-4083	4.0mm Drill Sleeve	2 ea
7167-4084	Screwdriver Release Handle	1 ea
7167-4085	Screw Length Sleeve	1 ea
7167-4092	Entry Portal Handle	1 ea

* Instrument Set pictured with additional instruments

TRIGEN® Percutaneous TAN and FAN Instrument Set

Set No. 7163-2351

Instrument Case

Cat. No.	Description
7112-9401	Small Outer Case
7112-9402	Lid for Outer Case
7167-4020	INTERTAN® Instrument Tray

Instruments

Cat. No.	Description	Tray Qty
7163-1021	Percutaneous Drill Guide	1 ea
7163-1022	Radiolucent Drop	1 ea
7163-1023	14mm Channel Reamer	1 ea
7163-1024	Percutaneous Guide Bolt	2 ea
7163-1026	4.0mm Trocar Drill Sleeve	2 ea
7163-1191	4.0mm Trocar	1 ea
7163-1025	AP Alignment Tower	1 ea
7163-1015	AP Alignment Arm	1 ea

Disposables

Set No. 7163-1000

Cat. No.	Description	Tray Qty
7163-1035	Sterile 6.4mm Drill	1 ea
7163-1036	Sterile 6.4mm Tap	1 ea
7163-1320	TRIGEN Disposable Nail Extractor	1 ea
7163-1121	4.0mm Long AO Pilot Drill	1 ea
7163-1123	4.0mm Short AO Pilot Drill	1 ea
7163-1626	3.0mm X 1000mm Ball Tip Guide Rod	1 ea
7167-4029	3.2mm X 343mm Tip Threaded Guide Pin	1 ea

TRIGEN® TAN Trochanteric Antegrade Nails

10mm Diameter Nails (30cm-50cm)

Left (Lime)	Right (Rose)	Length	Neck Angle	Left (Lime)	Right (Rose)	Length	Neck Angle
7163-7230	7163-8230	30	135°	7164-7230	7164-8230	30	130°
7163-7232	7163-8232	32	135°	7164-7232	7164-8232	32	130°
7163-7234	7163-8234	34	135°	7164-7234	7164-8234	34	130°
7163-7236	7163-8236	36	135°	7164-7236	7164-8236	36	130°
7163-7238	7163-8238	38	135°	7164-7238	7164-8238	38	130°
7163-7240	7163-8240	40	135°	7164-7240	7164-8240	40	130°
7163-7242	7163-8242	42	135°	7164-7242	7164-8242	42	130°
7163-7244	7163-8244	44	135°	7164-7244	7164-8244	44	130°
7163-7246	7163-8246	46	135°	7164-7246	7164-8246	46	130°
7163-7248	7163-8248	48	135°	7164-7248	7164-8248	48	130°
7163-7250	7163-8250	50	135°	7164-7250	7164-8250	50	130°

11.5mm Diameter Nails (30cm-50cm)

Left (Lime)	Right (Rose)	Length	Neck Angle	Left (Lime)	Right (Rose)	Length	Neck Angle
7163-7330	7163-8330	30	135°	7164-7330	7164-8330	30	130°
7163-7332	7163-8332	32	135°	7164-7332	7164-8332	32	130°
7163-7334	7163-8334	34	135°	7164-7334	7164-8334	34	130°
7163-7336	7163-8336	36	135°	7164-7336	7164-8336	36	130°
7163-7338	7163-8338	38	135°	7164-7338	7164-8338	38	130°
7163-7340	7163-8340	40	135°	7164-7340	7164-8340	40	130°
7163-7342	7163-8342	42	135°	7164-7342	7164-8342	42	130°
7163-7344	7163-8344	44	135°	7164-7344	7164-8344	44	130°
7163-7346	7163-8346	46	135°	7164-7346	7164-8346	46	130°
7163-7348	7163-8348	48	135°	7164-7348	7164-8348	48	130°
7163-7350	7163-8350	50	135°	7164-7350	7164-8350	50	130°

13mm Diameter Nails (30cm-50cm)

Left (Lime)	Right (Rose)	Length	Neck Angle	Left (Lime)	Right (Rose)	Length	Neck Angle
7163-7430	7163-8430	30	135°	7164-7430	7164-8430	30	130°
7163-7432	7163-8432	32	135°	7164-7432	7164-8432	32	130°
7163-7434	7163-8434	34	135°	7164-7434	7164-8434	34	130°
7163-7436	7163-8436	36	135°	7164-7436	7164-8436	36	130°
7163-7438	7163-8438	38	135°	7164-7438	7164-8438	38	130°
7163-7440	7163-8440	40	135°	7164-7440	7164-8440	40	130°
7163-7442	7163-8442	42	135°	7164-7442	7164-8442	42	130°
7163-7444	7163-8444	44	135°	7164-7444	7164-8444	44	130°
7163-7446	7163-8446	46	135°	7164-7446	7164-8446	46	130°
7163-7448	7163-8448	48	135°	7164-7448	7164-8448	48	130°
7163-7450	7163-8450	50	135°	7164-7450	7164-8450	50	130°

TRIGEN® FAN Femoral Antegrade Nails

10mm Diameter Nails (30cm-50cm)

Left (Lime)	Right (Rose)	Length	Neck Angle
7163-4230	7163-5230	30	130°
7163-4232	7163-5232	32	130°
7163-4234	7163-5234	34	130°
7163-4236	7163-5236	36	130°
7163-4238	7163-5238	38	130°
7163-4240	7163-5240	40	130°

Left (Lime)	Right (Rose)	Length	Neck Angle
7163-4242	7163-5242	42	130°
7163-4244	7163-5244	44	130°
7163-4246	7163-5246	46	130°
7163-4248	7163-5248	48	130°
7163-4250	7163-5250	50	130°

11.5mm Diameter Nails (30cm-50cm)

Left (Lime)	Right (Rose)	Length	Neck Angle
7163-4330	7163-5330	30	130°
7163-4332	7163-5332	32	130°
7163-4334	7163-5334	34	130°
7163-4336	7163-5336	36	130°
7163-4338	7163-5338	38	130°
7163-4340	7163-5340	40	130°

Left (Lime)	Right (Rose)	Length	Neck Angle
7163-4342	7163-5342	42	130°
7163-4344	7163-5344	44	130°
7163-4346	7163-5346	46	130°
7163-4348	7163-5348	48	130°
7163-4350	7163-5350	50	130°

13mm Diameter Nails (30cm-50cm)

Left (Lime)	Right (Rose)	Length	Neck Angle
7163-4430	7163-5430	30	130°
7163-4432	7163-5432	32	130°
7163-4434	7163-5434	34	130°
7163-4436	7163-5436	36	130°
7163-4438	7163-5438	38	130°
7163-4440	7163-5440	40	130°

Left (Lime)	Right (Rose)	Length	Neck Angle
7163-4442	7163-5442	42	130°
7163-4444	7163-5444	44	130°
7163-4446	7163-5446	46	130°
7163-4448	7163-5448	48	130°
7163-4450	7163-5450	50	130°

14.5mm Diameter Nails (36cm-44cm)

Left (Lime)	Right (Rose)	Length	Neck Angle
7164-4536	7164-5536	36	130°
7164-4538	7164-5538	38	130°
7164-4540	7164-5540	40	130°
7164-4542	7164-5542	42	130°
7164-4544	7164-5544	44	130°

16mm Diameter Nails (36cm-44cm)

Left (Lime)	Right (Rose)	Length	Neck Angle
7164-4636	7164-5636	36	130°
7164-4638	7164-5638	38	130°
7164-4640	7164-5640	40	130°
7164-4642	7164-5642	42	130°
7164-4644	7164-5644	44	130°

Implants

5.0mm Internal Hex Captured Screws (Gold)

Cat. No.	Length
7164-2225	25mm
7164-2230	30mm
7164-2235	35mm
7164-2240	40mm
7164-2245	45mm
7164-2250	50mm
7164-2255	55mm
7164-2260	60mm
7164-2265	65mm

Cat. No.	Length
7164-2270	70mm
7164-2275	75mm
7164-2280	80mm
7164-2285	85mm
7164-2290	90mm
7164-2295	95mm
7164-2200	100mm
7164-2205	105mm
7164-2210	110mm

6.4mm Captured Recon Screw (Blue)

Cat. No.	Length
7164-2365	65mm
7164-2370	70mm
7164-2375	75mm
7164-2380	80mm
7164-2385	85mm
7164-2390	90mm
7164-2395	95mm

Cat. No.	Length
7164-2300	100mm
7164-2305	105mm
7164-2310	110mm
7164-2315	115mm
7164-2320	120mm
7164-2325	125mm

Nail Caps

Cat. No.	Length
7163-4000	0mm
7163-4005	5mm
7163-4010	10mm
7163-4015	15mm
7163-4020	20mm

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