Surgical Technique

smith&nephew

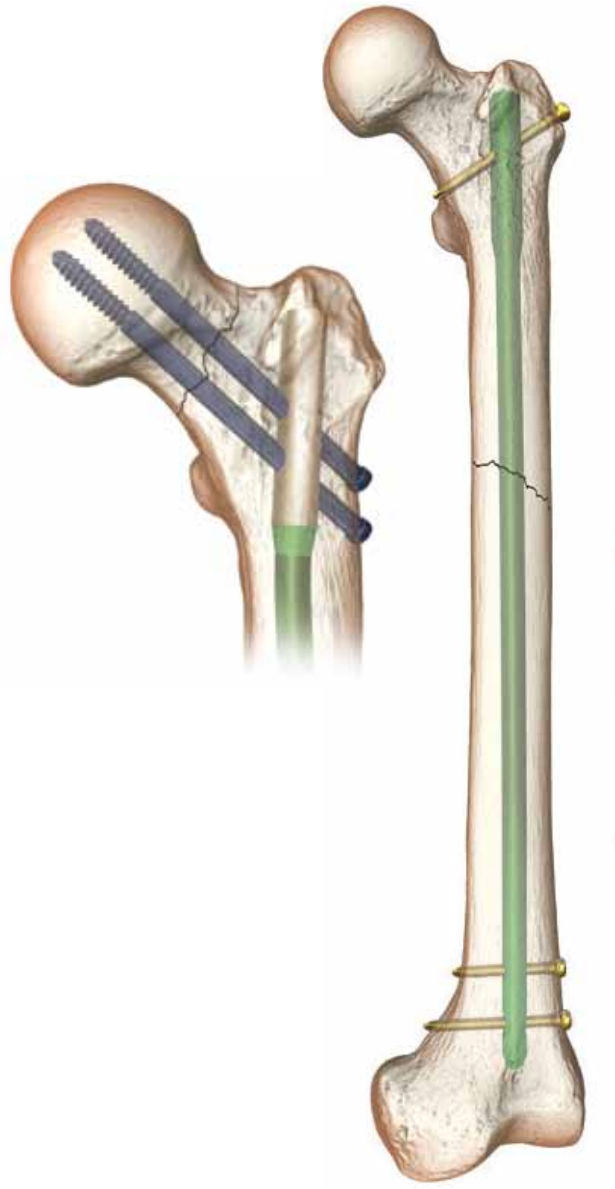
TRIGEN® TAN® FAN

Trochanteric and Femoral
Antegrade Intramedullary Nails

Including

TRIGEN® SURESHOT®

Distal Targeting System





TRIGEN® TAN®/FAN Trochanteric and Femoral Antegrade Intramedullary Nails
Surgical technique

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

Indications

The TRIGEN® TAN® and FAN intramedullary nails are indicated 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.



TRIGEN® SURESHOT® indications

Legend

Important warnings appear in orange

Tips, tricks and important information appear in blue

Indications, contraindications, intended use and training

The Smith & Nephew TRIGEN® SURESHOT® Distal Targeting System is intended to be an intraoperative image-guided localization system. It is a computer-assisted orthopaedic surgery tool to aid the surgeon with drill positioning for screws during intramedullary nail implantation. It provides information to the surgeon that is used to place surgical instruments during surgery utilizing intraoperatively obtained electromagnetic tracking data. The Smith & Nephew TRIGEN SURESHOT Targeting System V2.0 is indicated for long bone fractures treated with intramedullary nails in which the use of stereotactic surgery may be appropriate.

An example of a surgical procedure includes but is not limited to locating and drilling the distal holes in an intramedullary nail.

Contraindications

The screw targeting software application for this system is contraindicated for all IM nails other than Smith & Nephew TRIGEN META-NAIL®, TAN®, FAN, Pediatric and Adolescent nails. Do not operate the TRIGEN SURESHOT Targeter within 200mm of an installed pacemaker. The magnetic field produced by the Targeter may interfere with the operation of the pacemaker.

Intended use

The TRIGEN SURESHOT Distal Targeting System is only designed for use with the indicated implants and instruments. Implants and instruments must be used in accordance with the instructions, as described in this manual and/or in the non-navigated surgical procedure.

Training

Only trained operators are allowed to use the TRIGEN SURESHOT Distal Targeting System. The various operating instructions must be fully read and understood as part of the training. If any part of the instructions is unclear, please contact your local representative.

Plausibility check

As with all technical equipment, malfunctions may occur due to improper use or, more rarely, technical failure. To reduce the risks involved with such technical malfunction the operation can be completed using manually controlled instruments, providing the malfunction is detected without delay.

It is, therefore, important to check the plausibility of the steps, as indicated by the system, and to carry out verification of the software targeting, particularly when using the system for the first time. Should there be any doubt regarding correct functioning, the targeting should be verified or a switch made to a traditional X-Ray technique.

TRIGEN◇ TAN◇ and FAN Nail case examples

Case 1



Preoperative

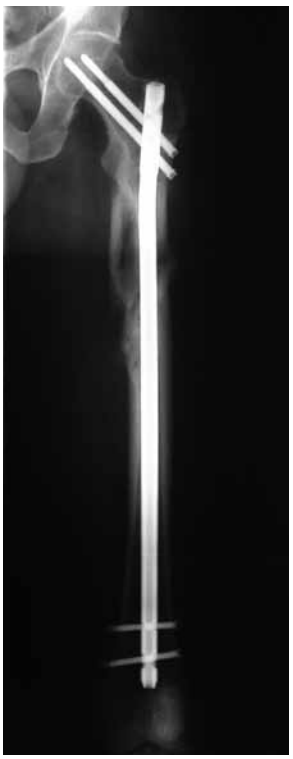


Postoperative

Case 2

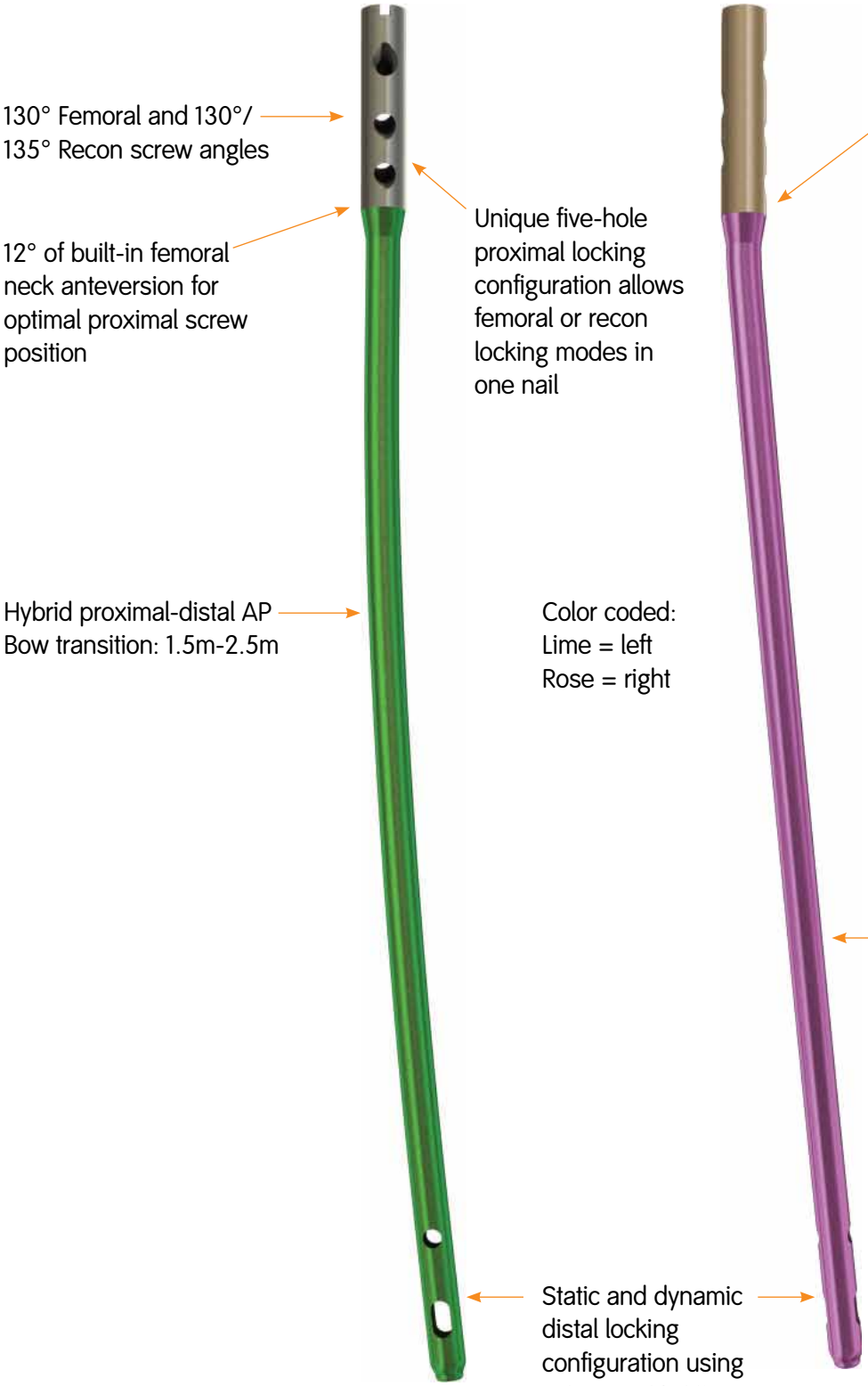


Preoperative

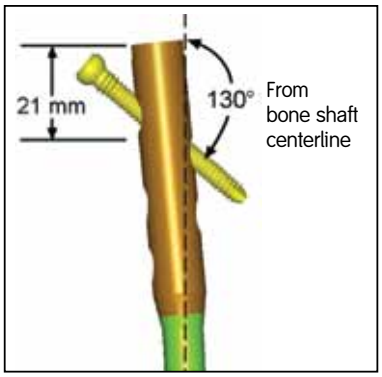


Postoperative

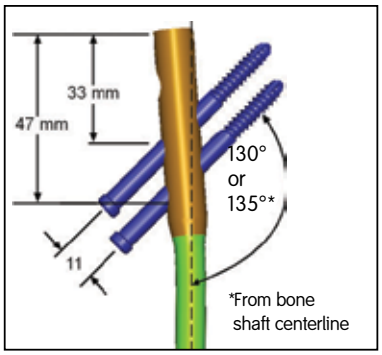
Design features: TAN◇



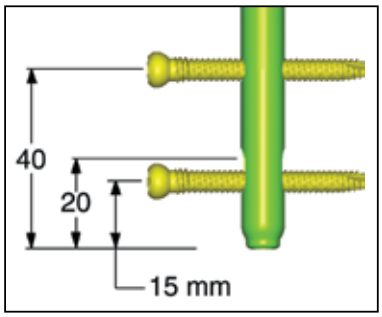
TRIGEN® Trochanteric Antegrade Nail (TAN®) specifications



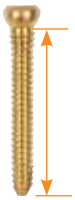
Standard Femoral Lock
130°/135° TAN



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



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



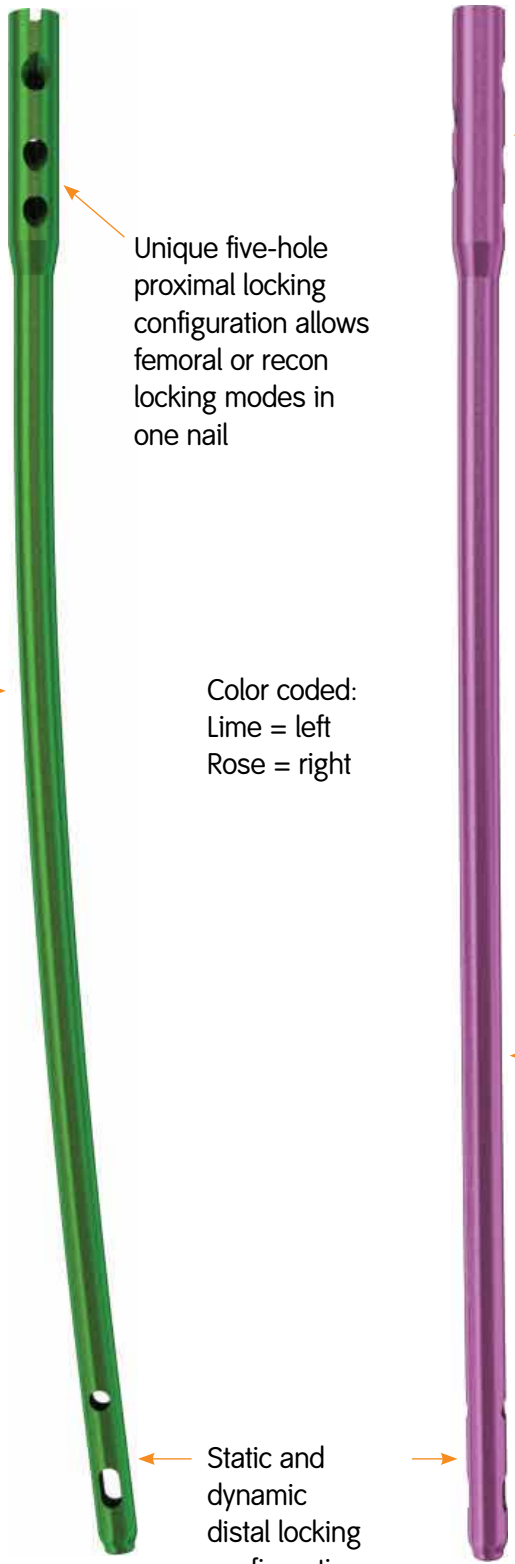
Proper Screw Measurement

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	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 & 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 & 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 (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 & 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

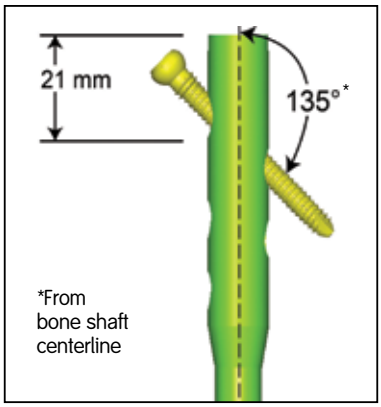
Hybrid proximal-distal AP Bow transition: 1.5m-2.5m

Color coded:
Lime = left
Rose = right

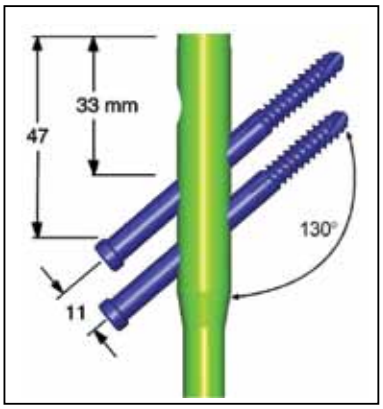
Cannulated, round geometry for ease of insertion using reamed or unreamed technique

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

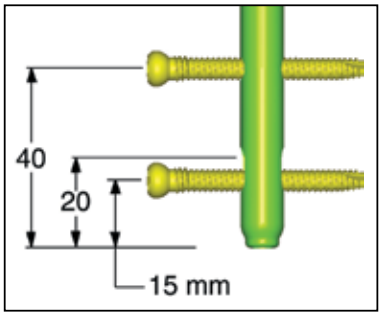
TRIGEN® Femoral Antegrade Nail (FAN) Specifications



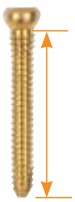
Standard Femoral Lock
(130° standard FAN/Exchange)



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.

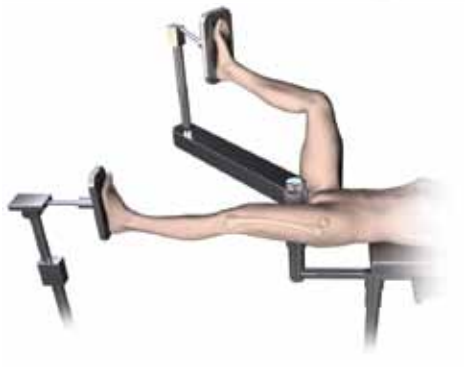
Specifications	TRIGEN FAN Nail
Material	TI6AL4V
Diameter	10, 11.5, 13, 14.5 & 16mm
Lengths	30-50cm, 36-44cm
Nail Color - Left	Lime
Nail Color - Right	Rose
Cross Section	Round
Neck Angle	130°
Proximal Diameter (driving end)	13mm (10, 11.5 & 13 diameter) 14.5mm (14.5 diameter) 16mm (16 diameter)
Distal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

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.

Warnings and cautions for TRIGEN® SURESHOT®

Accessibility of documentation
Please ensure that all instructions are kept in an easily accessible place for operating personnel.

The operator checks and decides
All the information provided by the TRIGEN® SURESHOT® Distal Targeting System is to help the operator make decisions during the operation. The operator must check all the suggestions made by the system and is responsible for all decisions taken.

Responsibility of Smith & Nephew Orthopaedics
In the event of improper use, Smith & Nephew accepts no responsibility or liability whatsoever for the functioning or utility of the TRIGEN SURESHOT Distal Targeting System when used in the operating theatre.

Cleaning and sterilization
All instruments must be sterilized before use. Detailed information on the cleaning and sterilization of components is contained in the separate *Cleaning and Sterilization Instructions* (Smith & Nephew document 7138-1339).

Repair or modifications to the system
The user is not permitted to modify or service the equipment. There are no serviceable parts inside the unit. Refer all service to authorized personnel.

Modifications/additions to the software
The user is not permitted to install or uninstall software. Any new software must be installed by the manufacturer or by authorized personnel.

It is only allowed to connect equipment to the interface and power supply connections of the TRIGEN SURESHOT Distal Targeting System which are IEC60601-1 approved and which are approved by Smith & Nephew Orthopaedics. Do not modify this equipment without authorization of the manufacturer.

Electrical safety warning
To avoid risk of electric shock, this equipment must only be connected to a supply mains with protective earth (=ground).

Avoid spilling water or other liquids on electronic/electrical equipment.

Use only Smith & Nephew disposables and accessories with the Smith & Nephew TRIGEN SURESHOT Distal Targeting System.

Maintenance
To verify accurate functionality, the device should be checked per the Maintenance Instructions contained in a separate Smith & Nephew document 7118-1540. This accuracy check must be performed at least once every 12 months.

If this accuracy check is not performed as defined in the previous paragraph, all warranty claims expire and the device is operated at the user's own risk.

Recycling
Old electrical and electronic equipment must be disposed separately and may not be included in the regular domestic waste. Alternatively, the unit can be handed over to Smith & Nephew Orthopaedics for correct recycling.

Note Do not unplug the power while the system is running!



Note Danger of damage and tipping over!

Tip Place the unit on a firm, level surface capable



Note To avoid the risk of electric shock, this equipment must only be connected to a supply mains with protective earth.



Devices for system set up



Trauma Interface
Cat. No. 7169-2802

Power Cord
Cat. No. 6680-0193



TRIGEN° SURESHOT° Targeter
Cat. No. 7169-2801

Note The Targeter will be operated within the sterile field and may have contact with the skin of the patient. The drill sleeve inserts will be used in the incision and have direct bone contact.

Note Verify that the Targeter housing is not damaged (holes, tears, cracks). If the housing or the connector is damaged, the Targeter is no longer safe to use.

Note If the Targeter is not recognized after connection to the system, the Targeter is defective and must be exchanged. (See also instrument connection).

Note Broken or damaged instruments must be exchanged immediately and sent back to Smith & Nephew, Inc.

Note This device is provided non-sterile and must be cleaned and sterilized per *Cleaning and Sterilization* (Smith & Nephew document 7138-1339) prior to use.

Note This procedure will cover only the specific steps of freehand targeting of intramedullary locking holes using the TRIGEN® SURESHOT® Distal Targeting System. For the full surgical procedure, please refer to the specific surgical technique for the TRIGEN® IM Nail System being implanted.

Trauma Interface setup

After the sterile areas have been established, place the Trauma Interface (7169-2802) in the desired non-sterile location and turn on the power switch.



Pressing the power button will bring up the start-up screen.



Tip If the Trauma Interface does not power on, make sure the switch is in the "on" position.

Note No other electrical devices should be placed near the Trauma Interface. See the "Guidance and Manufacturer's Declaration – Separation Distances" table contained in Smith & Nephew document 7118-1540.

TRIGEN SURESHOT Targeter connection

When the display prompts for tool connections, connect the TRIGEN SURESHOT Targeter (7169-2801) to the Targeter port on the Trauma Interface.





Note The Targeter body may have contact with the patient and must remain in the sterile field at all times. Only the cable and connector may be removed from the sterile field.

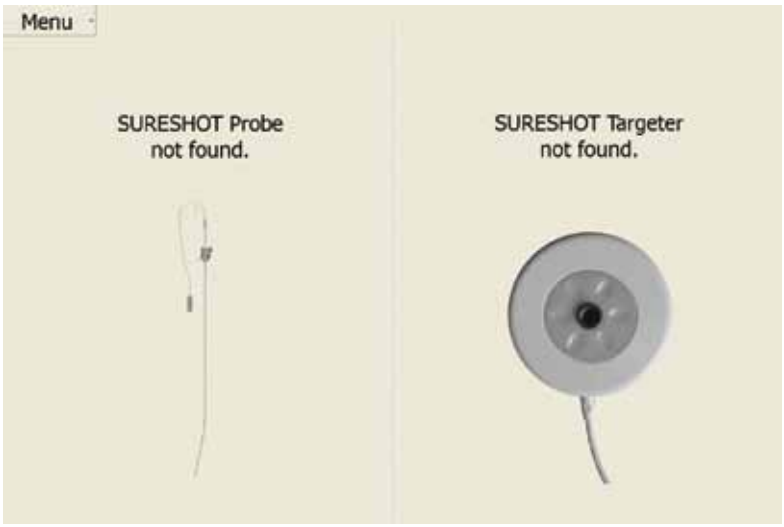
Note This step needs to be performed at least ten minutes prior to targeting in order to ensure proper accuracy.

Tip When oriented as shown, the connector should assemble easily. Do not force the connector into the port.

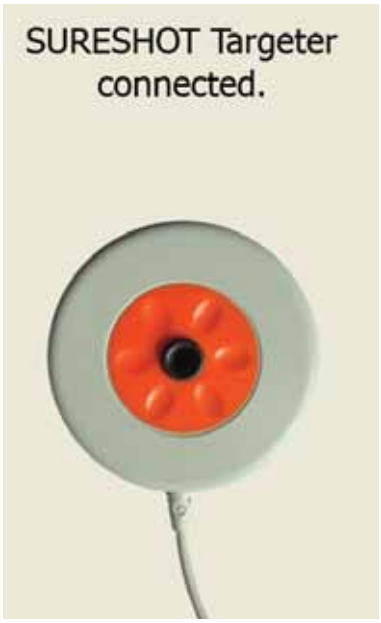
Note If the Targeter is properly connected to the system and the application remains in this screen for more than 30 seconds, the Targeter may have been damaged during cleaning/ sterilization. In this case another Targeter has to be used.

Tip It is possible at any time to disconnect and reconnect tools when the application is running. The display will show a screen reporting the missing instrument.

Targeter and probe have not been connected



Confirmation that the Targeter tool has been connected when the center of the Targeter lights up orange.



Instruments for opening the proximal femur

3.2mm x 343mm Tip Threaded Guide Pin
Cat. No. 7167-4130



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. 7163-1039



T-handle
Cat. No. 7167-4076



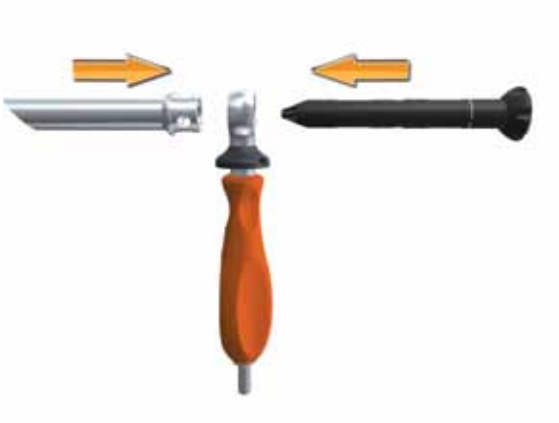
3.2mm T-handle Trocar
Cat. No. 7167-4074



Cannulated Awl
Cat. No. 7167-4000

Incision and entry point*

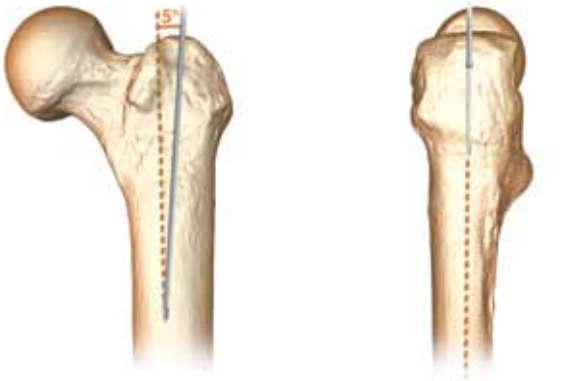
Assemble the Honeycomb (7167-4075), Entry Portal Handle (7167-4092) and Entry Portal Tube (7167-4060). The pieces will lock in place securely at either 0° or 180°.



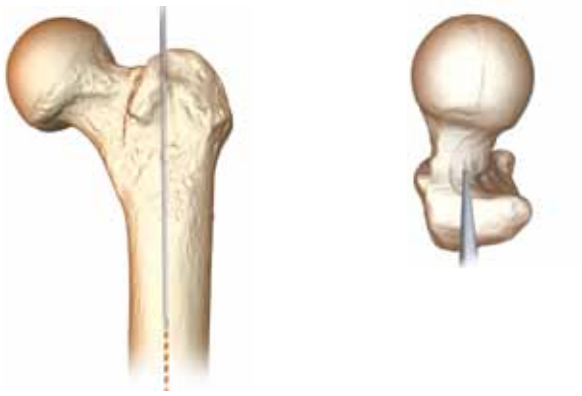
A longitudinal incision is made proximal to the greater trochanter. Carry the incision through to the fascia and palpate the tip of the greater trochanter.



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 view.



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.



* 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 (7167-4130) 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 (7163-1039) 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

Attach the T-handle (7167-4076) to the Cannulated Awl (7167-4000) and insert the 3.2mm T-handle 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**.



* 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. 7163-1039



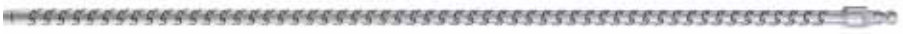
T-handle
Cat. No. 7167-4076



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)

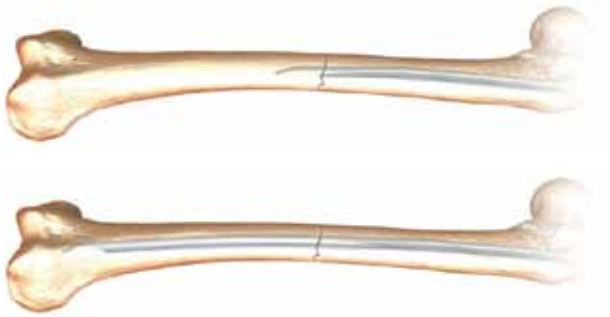
Fracture reduction

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.



Reducer removal

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, reconfirm guide rod position in the distal femur. Advance the Ruler (7167-4079) over the guide rod through the Channel Reamer (7163-1039) 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 Confirm fracture reduction so as not to underestimate correct implant length. Reference the fibula for accurate fracture distraction or compression.

Note Confirm that the Ruler opens easily. Adjust the thumb-wheel connection at the end to allow for free movement.

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*.

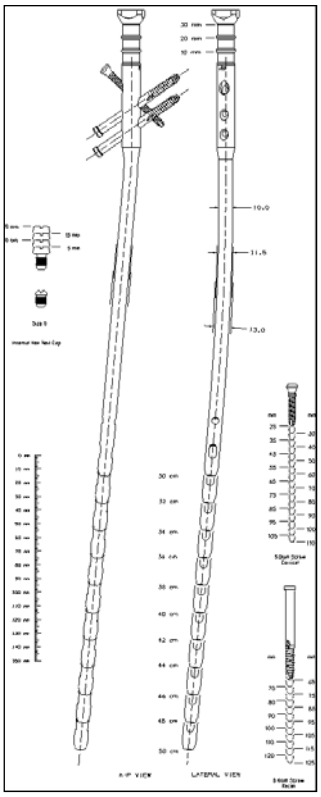
Ensure guide rod position during reaming by inserting the Obturator into the back of the reamer unit during retraction. Continue to confirm guide rod position throughout reaming. Periodically move the reamer back and forth in the canal to clear debris from the cutting flutes.

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

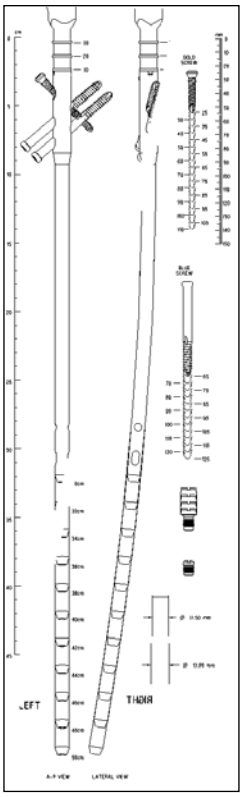
* The largest Reamer Head that the TRIGEN® Base Instrument Tray can hold is 16.0mm. Larger sizes are available in the SculptOR® Reamer Set (7111-8330).

Unreamed technique

Radiographic templating is used to determine nail size. The appropriate diameter implant will provide translational fill within the isthmus of the intramedullary canal. Generally, selection of a nail approximately 1-1.5mm less than the narrowest canal measurement on the lateral radiograph assists in avoiding implant incarceration during insertion.



TRIGEN° TAN°
Preoperative Template
Cat. No. 7118-0884



TRIGEN FAN
Preoperative Template
Cat. No. 7118-0497

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



Cannulated Impactor-Medium*
Cat. No. 7167-5081



9.0mm Drill Sleeve
Cat. No. 7163-1152



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



6.4mm Step Drill
Cat. No. 7163-1160

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

AO Drill Bit, Long
Cat. No. 7169-2811



Percutaneous TAN/FAN Drill Guide Probe
Cat. No. 7169-2815



TAN° Anteversion Locking Guide
(pictured with drill)
Cat. No. 7169-2816



TAN Set Stop
Cat. No. 7169-2807

* The Cannulted Impactor-Medium (7167-5081) is interchangeable with the Cannulated Impactor-Long (7163-1185)
** 4.0mm AO Long Drill (7163-1121) is interchangeable with 4.0mm Long Pilot Drill (7163-1110)

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 (7167-4076).



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.

Note See page 28 for the field accuracy check with the TRIGEN® SURESHOT® Distal Targeting System.



System setup

Connect probe to Trauma Interface unit. Make sure to use the adequate probe with the correct nail (color coded). Connect the probe to either of the probe sensor ports on the Trauma Interface.

Note For assembly, screw on set stop to drill guide, then insert probe.

Note The probe will be used as an intramedullary tool inside the nail placed in the patient's bone.

Note If the probe is not recognized after connection to the system, the probe is defective and must be exchanged. (See also instrument connection).

Note Broken or damaged instruments must be exchanged immediately and sent back to Smith & Nephew, Inc.

Note This device is provided sterile by ethylene oxide gas and is single use.





Red probe
Use only with META-NAIL Standard Drill Guide

Blue probe
Use only with META-NAIL Semi-extended Drill Guide

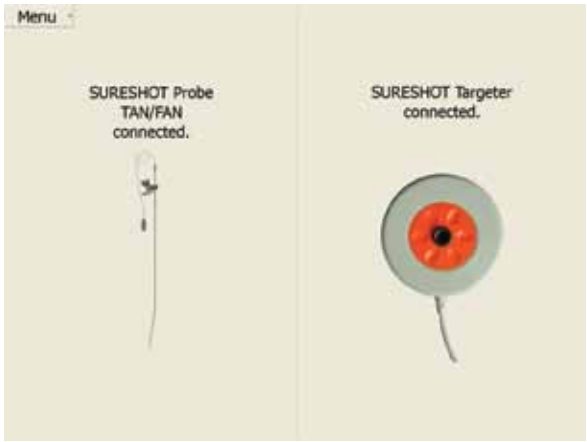
Green probe
Use only with Percutaneous TAN®/FAN Drill Guide (7163-1021)

There will be a confirmation on the screen of the Trauma Interface that implies that the probe has been connected.

Tip When oriented as shown, the connector should assemble easily. Do not force the connector into the port.

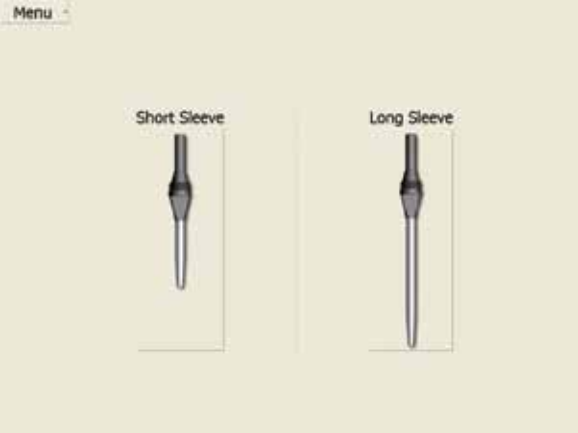
Note If the probe is properly connected to the system and the application reports "Probe not found" for more than 10 seconds, the probe may be damaged or defective. In this case, the probe has to be exchanged.

Tip It is possible at any time to disconnect and reconnect tools when the application is running. The display will show a screen reporting the missing instrument.



After TRIGEN® SURESHOT® Targeter and probe have been connected, attach drill sleeve to Targeter. The displayed screen will occur. Select the length of the drill sleeve (7169-2804 or 7169-2805) that will be used. Generally the short sleeve is sufficient. In some cases using the femoral retrograde technique, the long sleeve needs to be used.

Tip A different sleeve can be selected at any time during the procedure by choosing the drill sleeve option from the drop down menu after the implant has been selected. The selected sleeve will be noted on the Trauma Interface screen.



Drill sleeve attachment

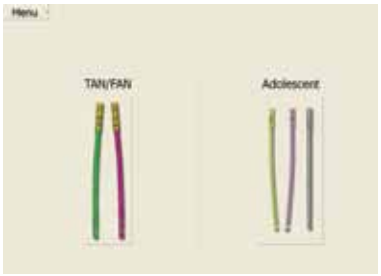
Tightly secure the selected drill sleeve to the Targeter.



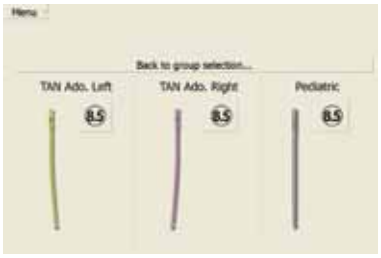
Tip The drill sleeve (7169-2804 and 7169-2805) can be loosened from the Targeter using the slot in the TRIGEN Slotted Hammer (7167-4082).

Select the TRIGEN IM nail and size that will be used.

Tip A different TRIGEN IM nail and/or size can be selected at any time during the procedure by choosing the Implant option from the drop down menu. The selected implant and diameter will be noted on the Trauma Interface screen.







Locking hole accuracy check in the operative field

Insert the probe with the assembled set stop through the drill guide and cannulation of the TRIGEN® IM nail.

Tip The Guide Bolt Wrench (7163-1140) may be used as a lever to release the set stop from the drill guide if overtightened.

Note The TRIGEN® SURESHOT® Distal Targeting System cannot be used with the Standard TRIGEN Drill Guide (7163-1134).





Ensure that the probe is oriented correctly and the set stop position and IM nail length match.

Note Verify the set stop position and nail length match, align the drill sleeve with one of the distal holes of the nail. Verify on the display that the representation of the nail/drill sleeve is true. Remove the probe from inside the nail and begin nail insertion. Take off set stop before inserting the nail and place the impactor.



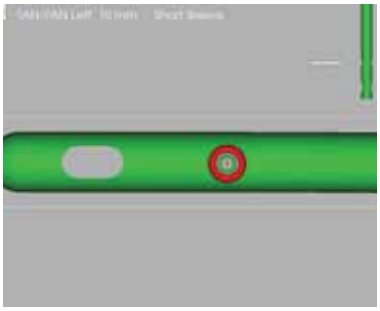
Note Verify the probe is oriented correctly in the set stop (notches should face medially). If the probe is rotated 180°, it will not be accurate.

Note The probe is bent for easier insertion. Do not straighten it as this may cause inaccuracy or even missing the lock.



Note All tool cables should be uncoiled completely and any excess cables should be kept out of the Targeter measurement volume.

Note To guarantee system accuracy, the accuracy check has to be performed directly in the operative field.



Field accuracy check: Optional

A field accuracy check procedure should be performed at least once a year or whenever the accuracy of a TRIGEN® SURESHOT® probe or TRIGEN SURESHOT Targeter needs to be verified. This procedure can also be performed during surgery to verify all components are working correctly prior to their use on a patient.



Field accuracy check steps

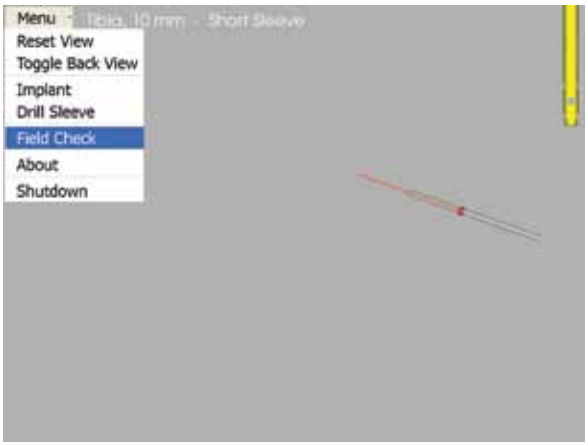
1 Attach TRIGEN SURESHOT Field Accuracy Gauge (7169-2808) to TRIGEN SURESHOT Targeter. The knob on the Field Accuracy Gauge should be hand tightened only.



2 Attach the TRIGEN SURESHOT META Set Stop (7169-2806) to the end of the Field Accuracy Gauge, insert a TRIGEN SURESHOT probe into the set stop and set the depth to the “REF” mark on the probe body.



3 From the software “Menu” button, select “Field Check” option.

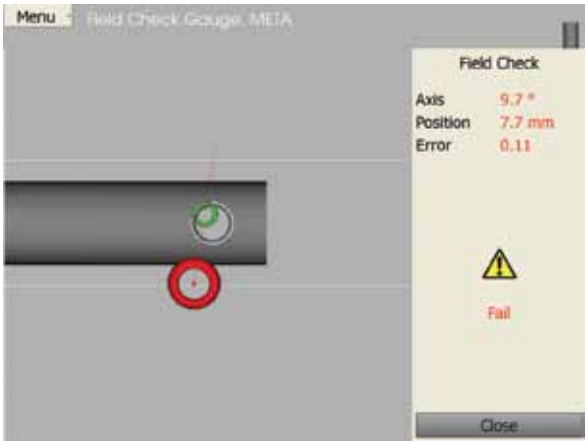


4 A software window will appear informing the user if the TRIGEN® SURESHOT® Targeter and Probe combination is within the predefined accuracy parameters (“Pass” or “Fail” message).



5 If the field accuracy check fails, check the “Troubleshooting” section of this document for possible solutions.

Note This step should be performed at least once a year to ensure that the device is working properly.



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.

Nail insertion

Note Detach set stop before attaching Impactor and inserting nail.

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 Cannulated Impactor-Medium (7167-5081) 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

Check nail 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.



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.





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.

When using the TRIGEN® SURESHOT® system to distally lock TAN/FAN nails, the Anteversion Locking Guide (7169-2816) is used to provisional lock the proximal fragment to the nail.

Attach TAN® Anteversion Locking Guide (7169-2816) to the Percutaneous Drill Guide (7163-1021). Insert 4.0mm Long Drill (7163-1121) and drill deep enough into bone to hold anteversion position.

Note Anteversion Locking Guide places the drill in the bone just anteriorly to the nail.







Devices to lock distally



Trauma Interface
Cat. No. 7169-2802

Power Cord
Cat. No. 6680-0193



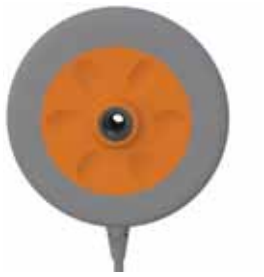
Drill Sleeve, Long
Cat. No. 7169-2804



Drill Sleeve, Short
Cat. No. 7169-2805



Percutaneous TAN/FAN Drill Guide Probe
Cat. No. 7169-2815



TRIGEN° SURESHOT° Targeter
Cat. No. 7169-2801

AO Drill Bit, Short
Cat. No. 7169-2810

AO Drill Bit, Long
Cat. No. 7169-2811



Hexdriver
Cat. No. 7169-2809



TAN° Set Stop
Cat. No. 7169-2807

Note When the Targeter is out of the preferred range or there is metal or electrical interference, the green and red Targeter circles on the Trauma Interface screen may become unstable and/or a warning message will be displayed. If the interference is excessive, the IM nail image on the Trauma Interface screen will disappear. If interference cannot be avoided, a standard X-Ray technique must be used.

Note All tool cables should be uncoiled completely and any excess cables should be kept out of the Targeter measurement volume.

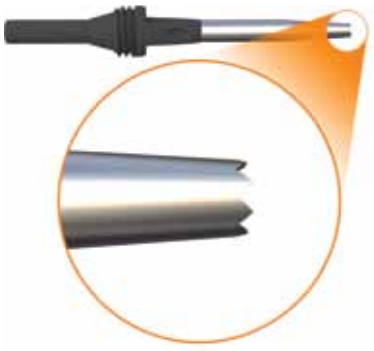
Detach Cannulated Impactor-Medium (7167-5081) from drill guide. Reattach TAN® Set Stop (7169-2807) and insert Percutaneous TAN/FAN Drill Guide Probe (7169-2815) in the nail. Adjust probe to nail length.

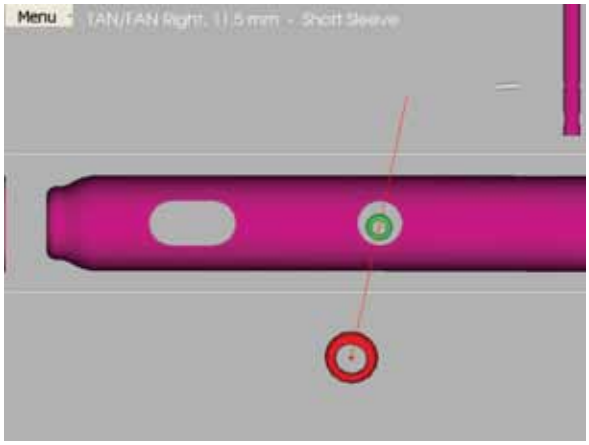
Skin incision

Use serrated tip of Drill Sleeve to identify where to make incision. The tip is at the right position when the green circle is aligned with the desired hole on screen.

Make incision and place tip of the drill sleeve down to bone where the green circle is aligned directly over the hole on screen.

Note No X-Rays necessary.





Targeting the locking hole

With the appropriate length TRIGEN® SURESHOT® 4.0mm Drill Bit (7169-2810 or 7169-2811) inserted into the Targeter, insert the tip of the drill sleeve (represented by the green circle) through the incision and down to bone.

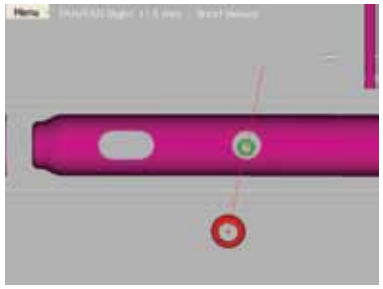




Critical Verify there are no other metal objects (including metal triangles) in the field. Metal interference will cause the system to be inaccurate.

Perfect circles

Align the tip of the drill sleeve over the desired hole in the nail. This will be represented on the screen when the green circle is centered in the hole as shown. Push serrated tip firmly against bone to keep the green circle static on the screen.



Note The orientation of the view is determined based on the orientation of the Targeter relative to the implant. For example, if the desired hole to target is an AP hole, direct the Targeter generally on the Anterior side of the leg. For more options, please see section: "Trauma Interface Screen Operation."

Adjust the trajectory (represented by red line between two circles) of the red circle until both circles are concentric and centered with the desired hole on the screen. Then start drilling.



Note The green ring must be fully within the hole of the IM nail displayed on the Trauma Interface screen to ensure accurate drilling.

Drilling distal hole

Drill through near cortex and the nail using the TRIGEN® SURESHOT® 4.0mm Drill Bit (7169-2810 or 7169-2811). Before drilling through far cortex, obtain the screw measurement.

Note Important: if standard 4.0mm drill from TRIGEN set is used, magnetic metal can adversely affect accuracy causing the drill to miss. Verify there is no other magnetic metal object in area other than the items shown. The standard 4.0mm drill cannot be used with the TRIGEN SURESHOT system.

A note will appear on screen warning of compromised targeting field, if magnetic metal is close. If it is in the field, image disappears.



Screw measurement

With the tip of the drill against the far cortex, measure for length, then drill through the far cortex. Ensure the serrated tip of the drill sleeve is pushed against the bone.

Example

Measure 35mm, add approximately 5mm, the screw length would be 40mm.

Alternative screw measurement with depth gauge (7163-1189).

After successfully drilling through the screw hole of the nail with the TRIGEN SURESHOT 4.0mm Drill Bit, remove the drill bit being careful not to move the leg.



Screw insertion

Detach drill seeve from Targeter. Introduce Hexdriver with the screw attached through Targeter.

TRIGEN® SURESHOT® Targeter is backed away from bone by sleeve length, approximately 80mm for the short sleeve.



Note Image disappears if too close.

Note The standard TRIGEN Hexdrivers are made from magnetic stainless steel that will cause interference with the system and cannot be used.

Insert the bone screw into the pre-drilled hole through the nail, and through the far cortex.



Note For 10/11.5/13mm nails, use TRIGEN Internal Captured Screws 5.0mm (gold), for 8.5mm nails, use TRIGEN Internal Captured Screws 4.5mm (grey).

Before fully inserting the screw, remove power drill and Targeter. Final screw seating must be done by hand by attaching the T-handle (7167-4076) to the Medium Hexdriver (7163-1066).

The depth of the screw can be verified by placing a gold 9.0mm Drill Sleeve (7163-1152) down to bone over the hexdriver. There is a profile of the screw head and a groove on the hexdriver that may be used as an indicator for the position of the screw head relative to the near cortex. Positioning of the screw can be verified with the C-Arm.

Repeat with other distal screws.

Note Remove probe before proceeding to proximal locking. Remove the probe from the set stop. Detach set stop from the drill guide. Do not pull the cable to remove probe.

Instruments for proximal locking



Radiolucent Drop
Cat. No. 7163-1022



Percutaneous Drill Guide
Cat. No. 7163-1021



T-handle
Cat. No. 7167-4076



Medium Hexdriver
Cat. No. 7163-1066



Long Hexdriver*
Cat. No. 7163-1070

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



6.4mm Step Drill
Cat. No. 7163-1035



6.4mm Tap
Cat. No. 7163-1036



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



Mini Connector
Cat. No. 7163-1186

*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)

Note Make sure to remove probe before proximal locking.

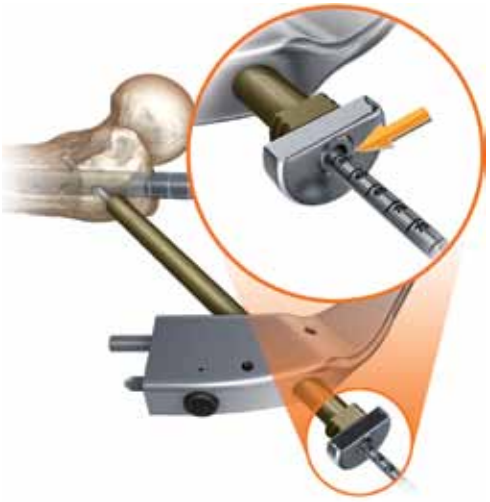
Proximal locking

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 (7163-1152). 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* (7163-1110) to power via the Mini Connector (7163-1186), 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 (7167-4076) 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 (7163-1022) 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 (7163-1035) 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 without the use of the TRIGEN◇ SURESHOT◇ system



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 without the TRIGEN® SURESHOT® system

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 (7163-1189). 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.



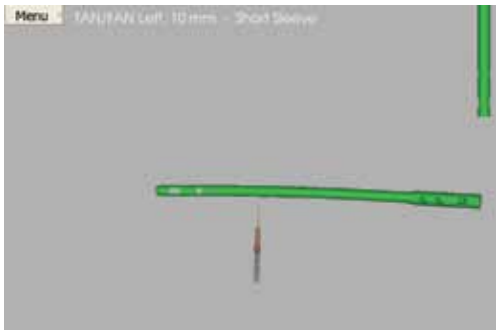
* 4.0mm AO Short Drill (7163-1123) is interchangeable with 4.0mm Short Drill (7163-1117)

Closure

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

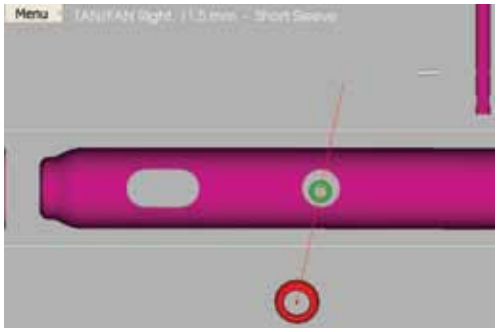


Trauma Interface screen operation



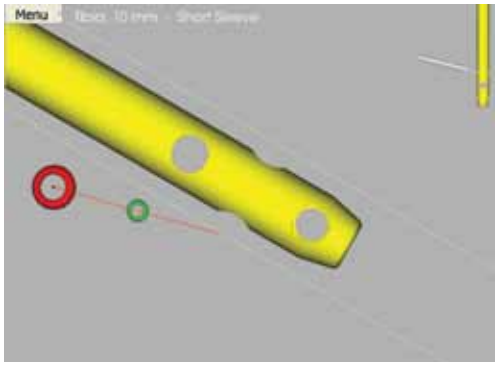
Overview mode
When the Targeter is greater than 5cm from the interlocking holes, the Trauma Interface screen will display the IM nail in the overview mode. This provides the user with a larger field of view in order to help find the general location of the interlocking holes.

The view in the upper right corner is the profile view. It is collinear to the drill sleeve axis and the position is aligned with the tip of the drill sleeve.



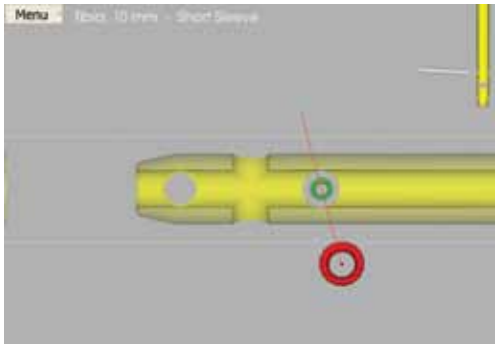
Drilling mode
When the Targeter is moved within 5cm of the interlocking holes, the Trauma Interface screen will display the IM nail in the drilling mode. This provides the user with a smaller field of view that automatically zooms in to the interlocking holes.

The white lines displayed on either side of the IM nail can be used for targeting blocking screws. These lines are located 2.5mm from the side of the IM nail for all IM nails 10mm and larger in diameter. These lines are located 2mm from the sides of 8.5mm IM nails.



Drilling mode manual rotation
Each IM nail has several predefined views that are automatically selected depending on the position of the Targeter to the IM nail. Depending on the operating environment, these predefined views might not be appropriate and can be manually adjusted.

To rotate the view
Touch the screen near the outside and "drag" the view in a clockwise or counterclockwise direction.



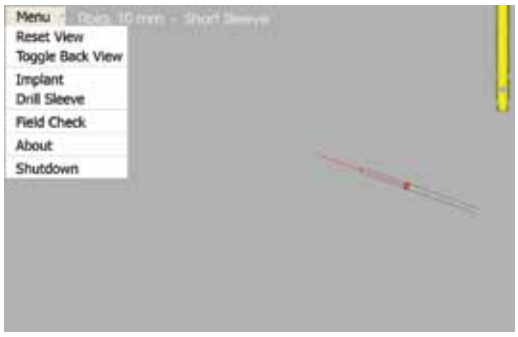
To flip the view
Touch the "Menu" button and select "Toggle Back View."

All changes made for a view are temporarily stored for that view until program exit.

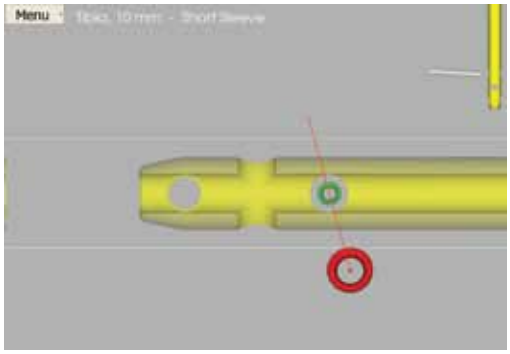
To reset the view
The default view settings can be restored by touching the "Menu" button and selecting "Reset View" or double tapping the center of the screen.

Menu – Options

Menu
Tapping on the Menu button will open up several Menu options.

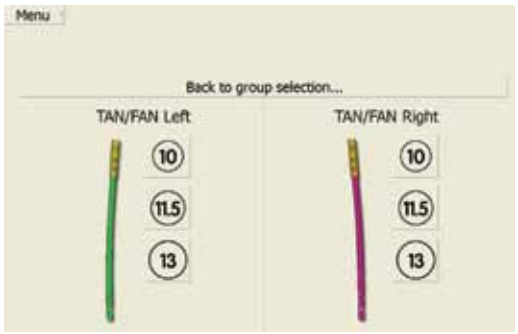


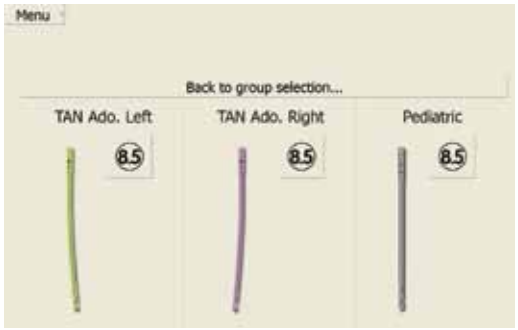
Toggle back view
This view may be used in cases where the Trauma Interface cannot be placed in front of the surgeon. It is intended to be used similar to the mirror option commonly available on C-Arm machines.



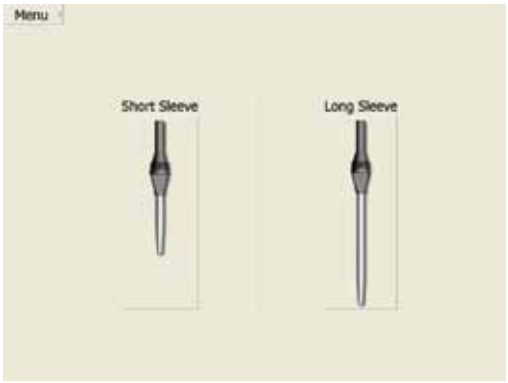
Implant
When choosing an implant, several options are given. Tap on screen to select.



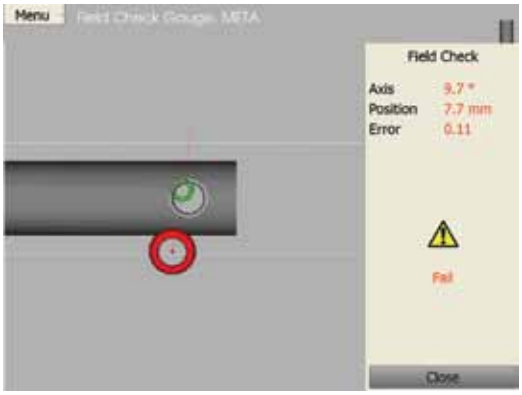




Drill sleeve
Tap on screen to select appropriate drill sleeve.



Field check Fail screen, meaning that something is not targeting correctly. See “Troubleshooting” section for further information.



Pass screen
When targeting correctly, a “pass screen” will occur.



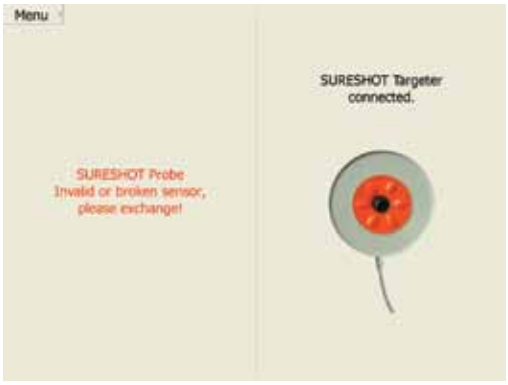
About
The “About” screen provides more information about the software used.



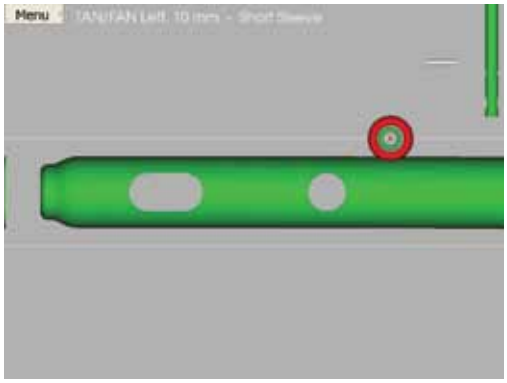
Shutdown
Tap on screen to shut down the system before flipping the power switch.

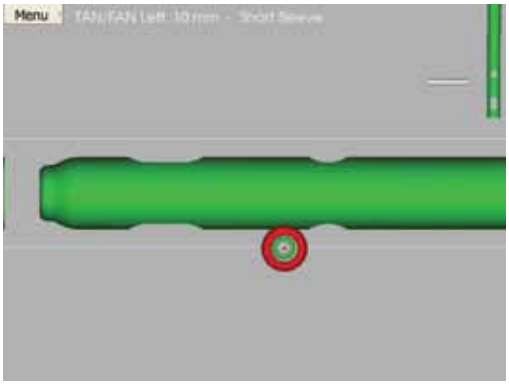


Error message
An error message will occur if a probe-sensor is invalid or broken.



Distal blocking screws with TRIGEN® SURESHOT®
The white lines displayed on either side of the IM nail can be used for targeting blocking screws. These lines are located 2.5mm from the side of the IM nail for all IM nails 10mm and larger in diameter. These lines are located 2mm from the sides of 8.5mm IM nails.





Troubleshooting

Problem	Possible cause	Suggested action
Trauma Interface unit is without power	Mains power plug is not inserted (properly) or there is no mains power	Insert mains power plug into reliable power supply
	No power on the wall outlet	Try other power outlet
	One or both mains power fuses are blown	Replace mains fuses
Buttons or items are difficult to select on the touchscreen	Touchscreen is de-calibrated	Access calibration software by selecting “Maintenance” from the “About” option under the “Menu” options (password required)
VGA video out not functioning	VGA port not activated on Trauma Interface	Connect VGA cable to both Trauma Interface and video monitor before powering on Trauma Interface
	Damaged VGA cable	Replace VGA cable
	Video monitor not on correct input	Select proper input on video monitor
TRIGEN® SURESHOT® Targeter not recognized	Error reading data from Targeter	Unplug Targeter wait 10 seconds, plug back in
	Damaged Targeter	Replace Targeter with new unit
Probe not recognized	Error reading data from probe	Unplug probe, wait 10 seconds, plug back in
	Damaged probe	Replace probe with new unit
Probe will not insert to the proper depth in the nail	Obstruction within the nail cannulation	Re-insert the ball tip guide rod into the nail cannulation to clear any obstruction
Nail not visible on the screen	Metal interference within the TRIGEN SURESHOT electromagnetic field	Remove any metal objects from the targeting field
	TRIGEN SURESHOT Targeter and probe not within range of each other	Move the TRIGEN SURESHOT Targeter closer to the sensor end of the probe
Drill bit too short	Short drill bit being used and long drill sleeve option selected within software	Press “Menu”, “Drill Sleeve” and **select the short drill sleeve option** and use the short drill bit
Drill bit too long	Long drill bit being used and short drill sleeve option selected within software	Press “Menu”, “Drill Sleeve” and **select the long drill sleeve option** and use the long drill bit

Problem	Possible cause	Suggested action
Red and Green targeting circles representing the drill sleeve appear incorrect	Incorrect drill sleeve length selected	Verify the correct drill sleeve length is selected from the software menu
	Metal interference within the TRIGEN® SURESHOT® electromagnetic field	Remove any metal objects from the targeting field
	Probe not inserted correctly within set stop	Verify probe is oriented and seated correctly in the notches of the set stop
	Damaged probe	Verify probe accuracy with Field Accuracy Gauge
Targeting missed the intended hole	Metal interference within the TRIGEN SURESHOT electromagnetic field	Remove any metal objects from the targeting field
	Probe not inserted correctly within set stop	Verify probe is oriented and seated correctly in the notches of the set stop
	Damaged probe	Verify probe accuracy with Field Accuracy Gauge
Drill sleeve cannot be removed from TRIGEN SURESHOT Targeter	Over-tightening of drill sleeve	Use the Slotted Hammer from the instrument tray as a wrench to unscrew the drill sleeve counter-clockwise from the Targeter
The 4.7mm/4.0mm step drill will not fit through the drill sleeve	Not compatible with the TRIGEN SURESHOT Distal Targeting System	Only use the long (7169-2811) and short (7169-2810) drills designated for use with the TRIGEN SURESHOT Distal Targeting System
Field Accuracy Check fails	Metal interference within the TRIGEN SURESHOT electromagnetic field	Remove any metal objects from the targeting field
	Field Accuracy Gauge improperly installed on Targeter	Verify Field Accuracy gauge is fully seated within Targeter port and knob is hand tightened to Targeter
	META Set Stop improperly installed on Field Accuracy Gauge	Verify META Set Stop is correctly oriented and tightened securely to Field Accuracy Gauge
	Probe is incorrectly inserted within META Set Stop	Verify probe is oriented properly and inserted to the “REF” notches on probe body
	Probe is damaged	Replace probe with a new probe
	Targeter is damaged	Replace Targeter with a new Targeter and return old one for service

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



Cannulated Impactor-Medium
Cat. No. 7167-5081



Cannulated Impactor-Long*
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

Brad Point Drill Tip Threaded Guide Pin
Cat. No. 7167-4130

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

Implant removal: *optional*

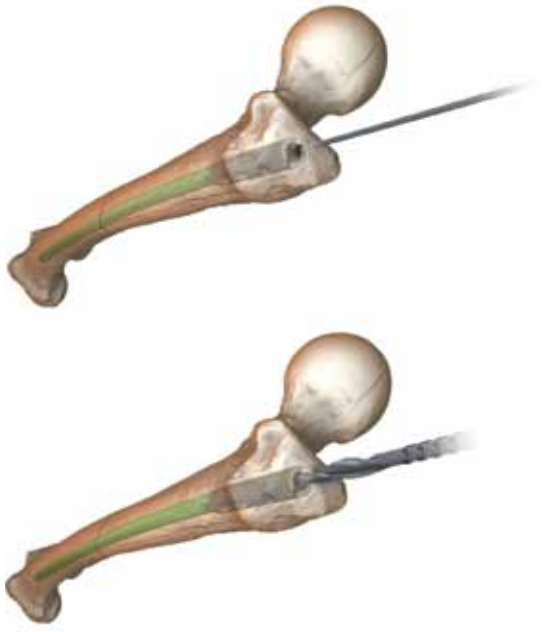
Open nail extraction technique
Remove the nail cap if implanted and all but one of the locking screws using the Medium Hexdriver (7163-1066) and T-handle. Thread the Disposable Nail Extractor (7163-1320) into the Cannulated Impactor-Medium or Cannulated Impactor-Long (7163-1185)* and introduce the extraction 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 (7163-1116) 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 Cannulated Impactor-Long is found in the original TRIGEN® Instrument Set (7163-1326)

An alternative method for extraction

Guide rod jamming technique

Advance the end of a 3.0mm Ball Tip Guide Rod through the end of the nail. Insert a 2.0mm Smooth Guide Rod (7111-8280) in the same manner. With both guide rods in place, attach the Gripper to the end of the 3.0mm Ball Tip Guide Rod and pull it back so that it wedges the ball tip against the 2.0mm Smooth Guide Rod. Backslap against the Gripper with the Slotted Hammer to extract the nail.

Guide rods

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

Additional removal items

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

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



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

Cat. No.	Description	Tray Qty
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
7167-4082	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
7167-5081	Cannulated Impactor-Medium	1 ea

* Instrument Set pictured with additional instruments

Catalog information – TRIGEN® TAN®/FAN 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
7163-1039	14mm Channel Reamer	1 ea
7163-1024	Percutaneous Guide Bolt	2 ea

Cat. No.	Description	Tray Qty
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

Cat. No.	Description	Tray Qty
7163-1123	4.0mm Short AO Pilot Drill	1 ea
7163-1626	3.0mm X 1000mm Ball Tip Guide Rod	1 ea
7167-4130	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°

Catalog information – TRIGEN® TAN®/FAN Implants

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°

Left (Lime)	Right (Rose)	Length	Neck Angle
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°

Left (Lime)	Right (Rose)	Length	Neck Angle
7164-4642	7164-5642	42	130°
7164-4644	7164-5644	44	130°

5.0mm Internal Captured Screw (Gold)
For 10mm, 11.5mm & 13mm Implants



Cat. No.	Length	Cat. No.	Length
7164-2225	25mm	7164-2270	70mm
7164-2230	30mm	7164-2275	75mm
7164-2235	35mm	7164-2280	80mm
7164-2240	40mm	7164-2285	85mm
7164-2245	45mm	7164-2290	90mm
7164-2250	50mm	7164-2295	95mm
7164-2255	55mm	7164-2200	100mm
7164-2260	60mm	7164-2205	105mm
7164-2265	65mm	7164-2210	110mm

6.4mm Captured Recon Screw (Blue)



Cat. No.	Length	Cat. No.	Length
7164-2365	65mm	7164-2300	100mm
7164-2370	70mm	7164-2305	105mm
7164-2375	75mm	7164-2310	110mm
7164-2380	80mm	7164-2315	115mm
7164-2385	85mm	7164-2320	120mm
7164-2390	90mm	7164-2325	125mm
7164-2395	95mm		

TRIGEN® Nail Caps



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

Catalog information – TRIGEN◇ SURESHOT◇ Instruments

TRIGEN SURESHOT Targeting Interface

Cat. No. 7165-7000

Cat. No.	Device	Case Qty
7169-2802	Trauma Interface	1



TRIGEN SURESHOT Targeting Instrument Set

Set No. 7165-7001

Cat. No.	Description	Tray Qty
7169-2801	Targeter	1
7169-2804	Drill Sleeve - Long	2
7169-2805	Drill Sleeve - Short	2
7169-2806	META Set Stop	1
7169-2807	TAN◇ Set Stop	1
7169-2808	Field Accuracy Gauge	1
7169-2809	Hexdriver	1
7169-2816	TAN Anteversion Locking Guide	1
7169-2830	Targeting Instrument Tray	1
7169-2831	Targeting Instrument Tray Lid	1



TRIGEN SURESHOT Targeting Disposables Set

Set No. 7165-7002

Cat. No.	Description	Qty
7169-2810	AO Drill Bit - Short	2
7169-2811	AO Drill Bit - Long	1

Additional Disposables

Cat. No.	Description
7169-2803	META-NAIL◇ Semi-Extended Drill Guide Probe (used with TRIGEN META-NAIL Semi-Extended Instrument Set, 7165-4004)
7169-2814	META-NAIL Standard Drill Guide Probe (used with TRIGEN META-NAIL Nail Instrument Set, 7165-4002)
7169-2815	Percutaneous TAN/FAN Drill Guide Probe (used with TRIGEN Percutaneous TAN/FAN Instrument Set, 7163-2351)



TRIGEN® SURESHOT® Country Kit – North America

Cat. No. 7165-7003

Cat. No.	Description	Qty
6680-0193	Power Cord, 125 Volt 10 Amp – North America (Hospital Grade)	1
7118-1540	User Manual, English	1

Additional country kits

TRIGEN SURESHOT Country Kit – Australia

Cat. No. 7165-7004

Cat. No.	Description	Qty
6680-0303	Power Cord, 250 Volt 10 Amp – Australia/NZ	1
7118-1540	User Manual, English	1

TRIGEN SURESHOT Country Kit – Continental Europe

Cat. No. 7165-7005

Cat. No.	Description	Qty
6680-0291	Power Cord, 250 Volt 10 Amp – Continental Europe	1
7118-1540	User Manual, English	1

TRIGEN SURESHOT Country Kit – Germany

Cat. No. 7165-7006

Cat. No.	Description	Qty
6680-0291	Power Cord, 250 Volt 10 Amp – Continental Europe	1
7118-1538	User Manual, German	1

TRIGEN SURESHOT Country Kit – Spain

Cat. No. 7165-7007

Cat. No.	Description	Qty
6680-0291	Power Cord, 250 Volt 10 Amp – Continental Europe	1
7118-1539	User Manual, Spanish	1

TRIGEN SURESHOT Country Kit – France

Cat. No. 7165-7008

Cat. No.	Description	Qty
6680-0291	Power Cord, 250 Volt 10 Amp – Continental Europe	1
7118-1537	User Manual, French	1

TRIGEN SURESHOT Country Kit – Italy

Cat. No. 7165-7009

Cat. No.	Description	Qty
6680-0291	Power Cord, 250 Volt 10 Amp – Continental Europe	1
7118-1536	User Manual, Italian	1

TRIGEN SURESHOT Country Kit – United Kingdom

Cat. No. 7165-7011

Cat. No.	Description	Qty
6680-0213	Power Cord, 250 Volt 10 Amp – UK	1
7118-1540	User Manual, English	1

TRIGEN SURESHOT Country Kit – South Africa/India

Cat. No. 7165-7012

Cat. No.	Description	Qty
6680-0302	Power Cord, 250 Volt 10 Amp – So. Africa/India	1
7118-1540	User Manual, English	1

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