Suprapatellar Instrumentation

For Expert Tibial Nail

Surgical Technique

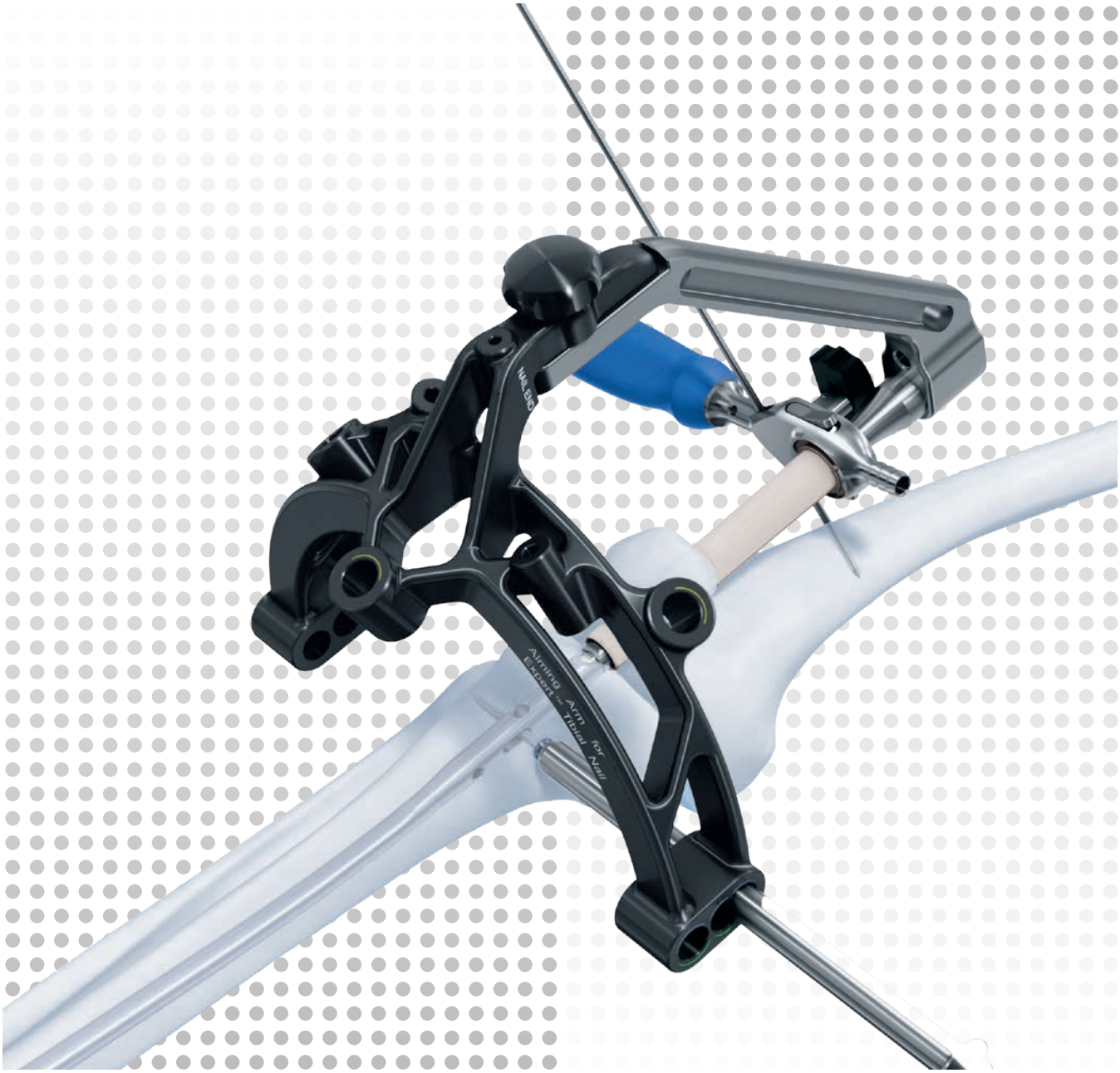

Image intensifier control

This description alone does not provide sufficient background for direct use of DePuy Synthes products. Instruction by a surgeon experienced in handling these products is highly recommended.

Processing, Reprocessing, Care and Maintenance
For general guidelines, function control and dismantling of multi-part instruments, as well as processing guidelines for implants, please contact your local sales representative or refer to:
http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance
For general information about reprocessing, care and maintenance of DePuy Synthes reusable devices, instrument trays and cases, as well as processing of DePuy Synthes non-sterile implants, please consult the Important Information leaflet (SE_023827) or refer to:
http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance

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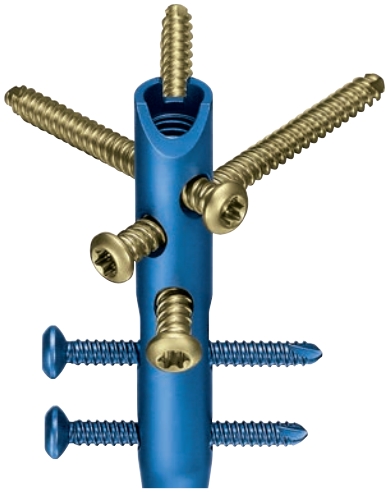
■ **Notes**
▲ **Precautions**
▲ **WARNINGS**

Overview

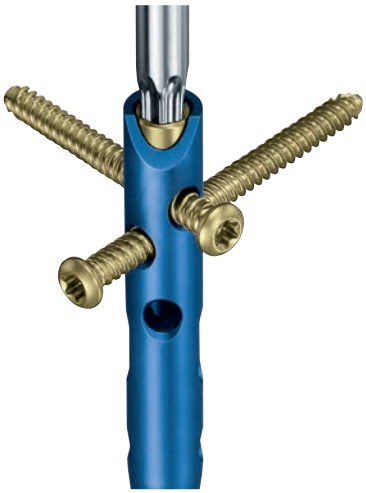
Proximal locking options:

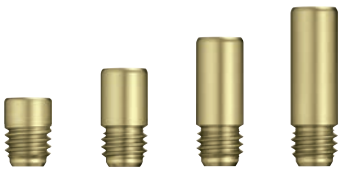
- Three locking options, in combination with cancellous bone locking screws.
- Two medio-lateral (ML) locking options available.



End caps:

- Self-retaining Stardrive SD40
  Recess for end cap pick-up and insertion
- Cannulated
- 0 mm end cap sits flush with nail
- 5, 10 and 15 mm end caps extend nail height if nail is over inserted





Nail design:

- Cannulated nails (from ∅ 8 mm to ∅ 13 mm) for reamed or unreamed techniques, enabling nail insertion over guide wire
- The 2.5 mm or 3.0 mm ball tipped guide wires may be removed through the nail and insertion handle assembly (no exchange tube required)
- Solid nails (from ∅ 8 mm to ∅ 10 mm) for unreamed technique

Distal locking options:

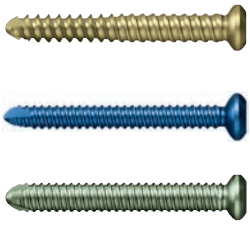
- One distal oblique, two ML and one antero-posterior (AP) locking options available.

Locking screws:

- Double lead thread available.
- Self-tapping blunt tip
- Self-holding Stardrive Recess

Cancellous bone locking screws:

- There are three proximal locking options for different tibial nail diameters of 8.0 mm, 9.0 mm, 10.0 mm, 11.0 mm, 12.0 mm, and 13.0 mm
- Unicortical
- Lengths: 30 mm–90 mm



Standard locking screws:

- ∅ 4.0 mm for ∅ 8 mm and ∅ 9 mm tibial nails, lengths: 18 mm–80 mm
- ∅ 5.0 mm for ∅ 10 mm to ∅ 13 mm tibial nails, lengths: 26 mm–100 mm

The AO Principles of Fracture Management

Mission

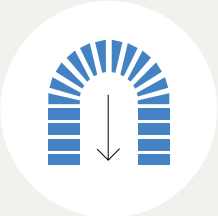
The AO's mission is promoting excellence in patient care and outcomes in trauma and musculoskeletal disorders.

AO Principles[1,2]

1.

Fracture reduction and fixation to restore anatomical relationships.

2.



Fracture fixation providing absolute or relative stability, as required by the "personality" of the fracture, the patient, and the injury.

3.

Preservation of the blood supply to soft-tissues and bone by gentle reduction techniques and careful handling.

4.

Early and safe mobilization and rehabilitation of the injured part and the patient as a whole.

[1] Müller ME, Allgöwer M, Schneider R, Willenegger H. Manual of Internal Fixation. 3rd ed. Berlin, Heidelberg New York: Springer 1991.
[2] Buckley RE, Moran CG, Apivatthakakul T. AO Principles of Fracture Management: 3rd ed. Vol. 1: Principles, Vol. 2: Specific fractures. Thieme; 2017.

■ **Note:**

ASLS, the Angular Stable Locking System, is indicated in cases where stability is needed in fractures closer to the metaphyseal area or in osteopenic bone.

■ **Note:**

The Expert TN PROtect should be used in cases where there is risk of local bone infections. For further information, refer to ETN PROtect IFU.

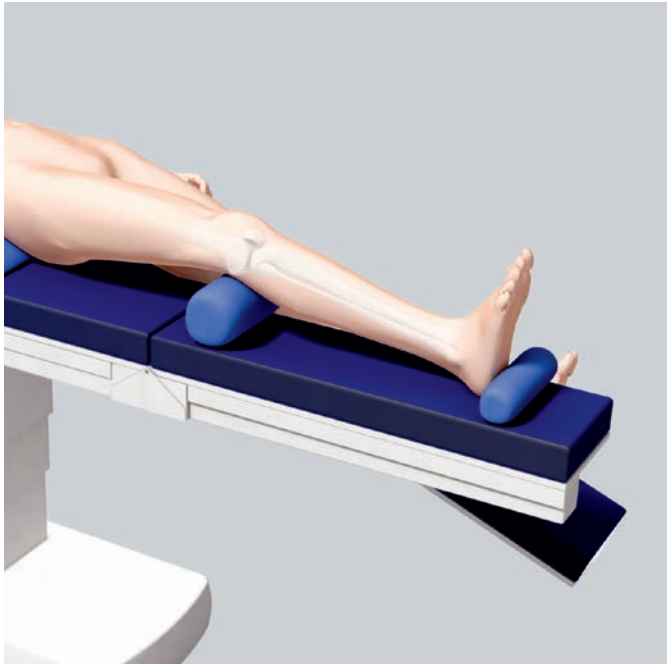
Intended Use, Indications and Contraindications can be found in the corresponding system Instructions for Use.

Opening the Tibia

1. Position patient

Position the patient supine on the radiolucent table. Ensure that the knee of the injured leg can be flexed 10°–20°. Position the image intensifier so that visualization of the tibia, including the articular surface proximally and distally, is possible in AP and lateral views.

The knee roll can be placed under the lower part of the thigh if it obstructs the view of the tibial plateau in the AP view.

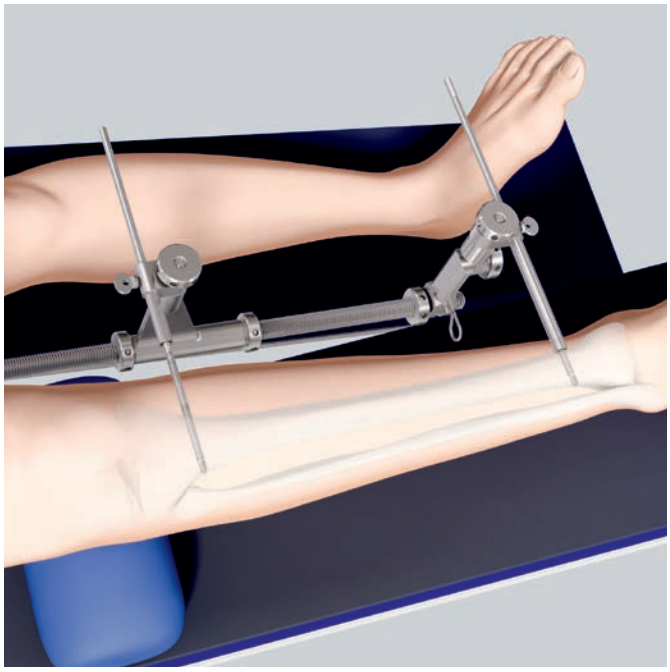


2. Reduce fracture

Perform closed reduction manually by axial traction under image intensifier. The use of the Large Distractor (refer to the surgical technique Large Distractor – Tibia) may be appropriate in certain circumstances.

■ Note:

The reduction can be temporarily fixed with reduction clamps. In epiphyseal fractures, the condyles or the pilon are fixed first in order to enable the nail insertion.

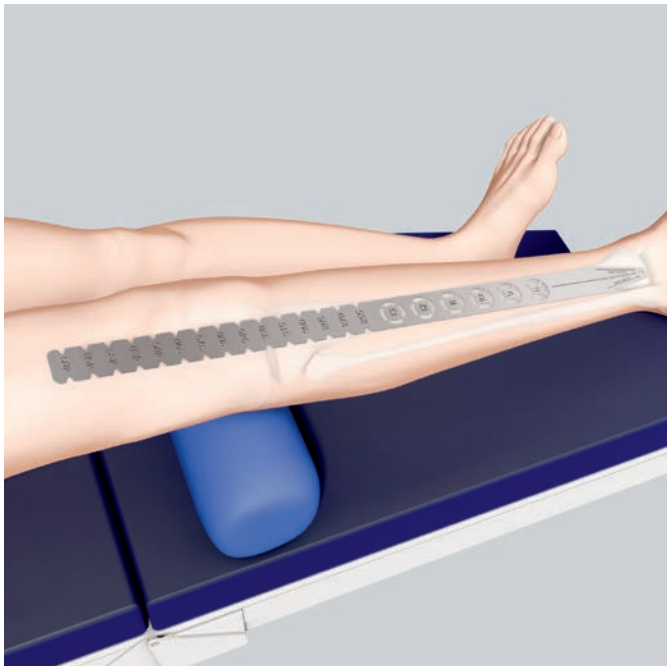


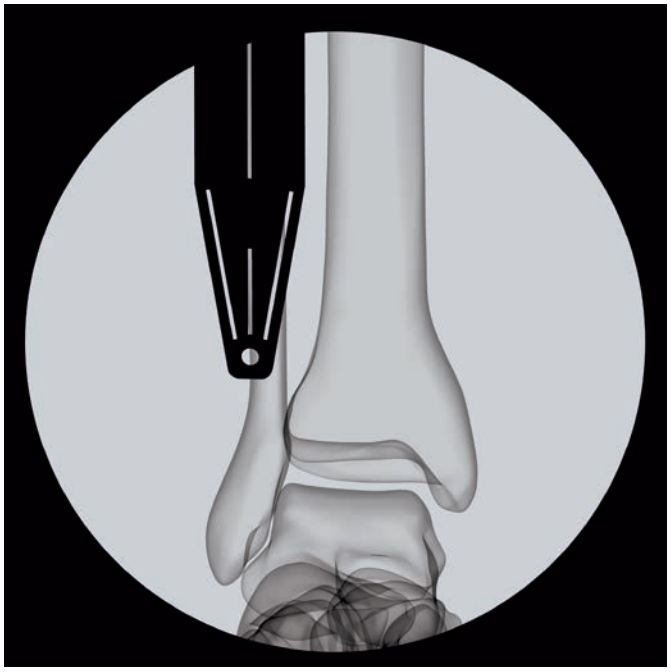
3. Confirm nail length and diameter

Instrument	
03.010.021	Radiographic Ruler for Expert Tibial Nail

The required nail length must be determined after reduction of the lower leg fracture.

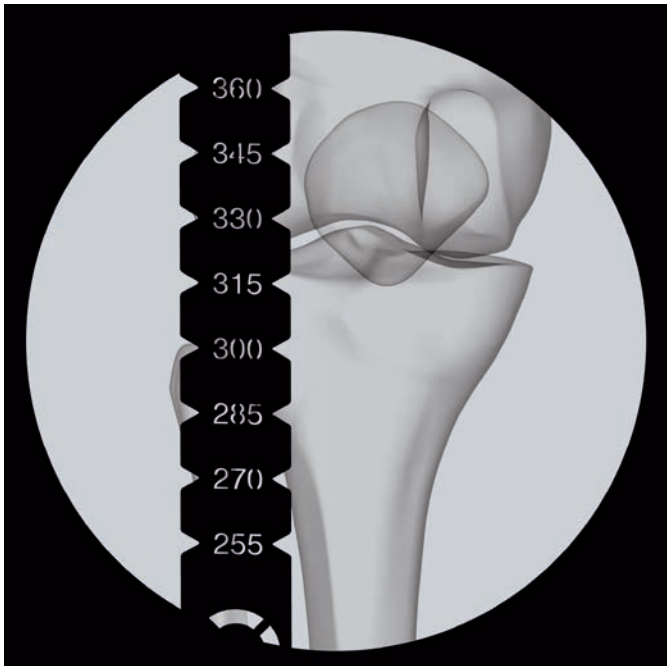
- Position the C-arm for an AP view of the distal tibia. With long forceps, hold the radiographic ruler along the leg, parallel to and at the same level as the tibia. Adjust the ruler until the distal tip is at the level of the physeal scar or the desired nail insertion depth. Mark the skin at that site.



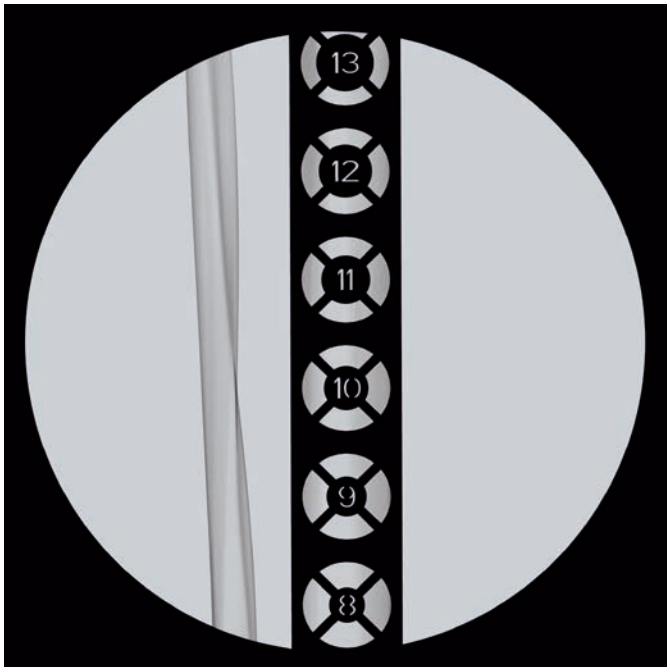


Move the C-arm to the proximal tibia, replace the distal end of the ruler at the skin mark, and take an AP image of the proximal tibia. Read nail length directly from the ruler image, selecting the measurement at or just below the level of the anterior edge of the tibial plateau.

When using the large distractor, measure the distance from the inferior border of the distal pin to the superior border of the proximal pin to determine optimal nail length.



Position the C-arm for an AP or lateral view of the tibia at the level of the isthmus. Hold the radiographic ruler over the tibia with the diameter gauge centered over the narrowest part of the medullary canal. Read the diameter measurement on the circular indicator that fills the canal.



■ Note:

Compression or dynamization must be taken into account when determining the nail length.
A shorter nail should be chosen when active compression is planned for the procedure. The dynamic locking option allows 7 mm of travel.

▲ Precaution:

The ruler is not at the same level as the tibia. This affects the accuracy of the measurement, providing only an estimate of the canal diameter.

4. Make incision and determine entry point

With the knee in full extension, make a 2–4 cm longitudinal skin incision 4 cm proximal to the superior pole of the patella. The deep incision, also longitudinal, splits the quadriceps tendon in its midsubstance, just above its insertion into the patella and enters the knee joint through the suprapatellar pouch. Blunt dissection can be used to loosen the patella in the suprapatellar pouch, allowing the patella to lift off. Displace the patella anteriorly.

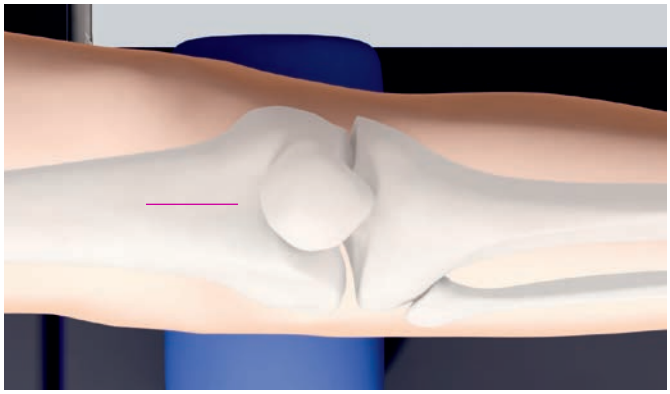
■ Note:

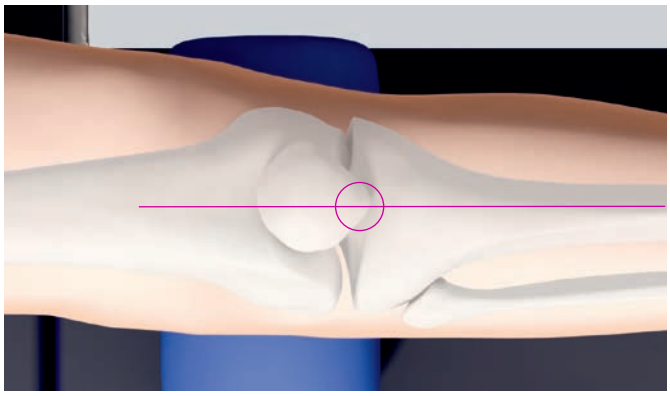
In arthritic knees, blunt release with an elevator or cauterization can be done in the suprapatellar pouch area medially and laterally. If these methods are not sufficient, extend the incision medially or laterally along the patella.

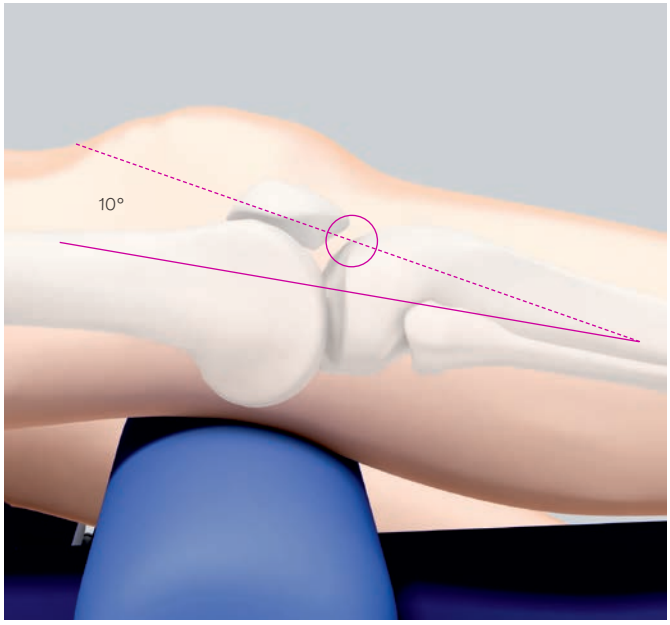
The entry point defines the position of the nail in the intramedullary canal. This is important for proximal and distal-third fractures to prevent fragment displacement.

In the AP view the entry point is in line with the axis of the intramedullary canal and with the lateral tubercle of the intercondylar eminence.

In the lateral view the entry point is at the ventral edge of the tibial plateau.







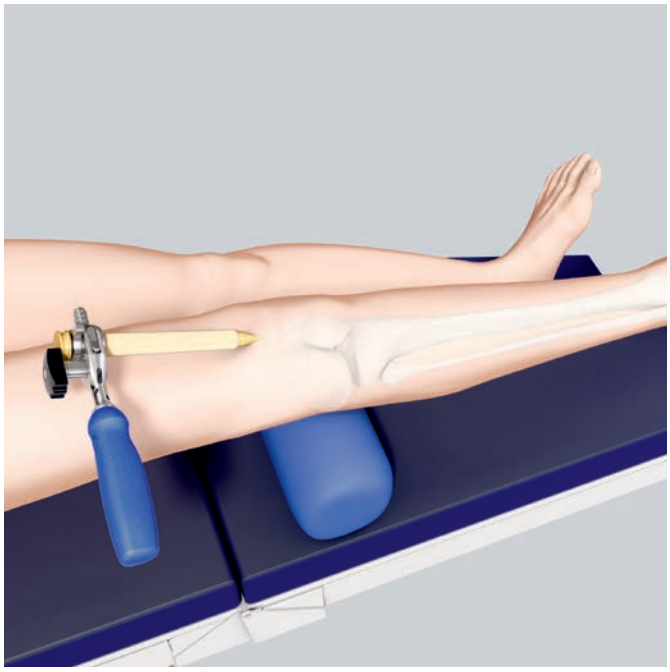
Entry point

5. Insert protection sleeves

Instruments	
03.010.430	Handle for Protection Sleeve for Expert Tibial Nail, for Suprapatellar Approach
03.010.435	Protection Sleeve 12.0, for Expert Tibial Nail, for Suprapatellar Approach, straight, for 8.0–11.0 mm Nails
03.010.436	Protection Sleeve 14.5, for Expert Tibial Nail, for Suprapatellar Approach, straight, for 12.0–13.0 mm Nails
03.010.437S	Outer Protection Sleeve 12.0, for Expert Tibial Nail, for Suprapatellar Approach, straight, for 8.0–11.0 mm Nails, sterile
03.010.438S	Outer Protection Sleeve 14.5, for Expert Tibial Nail, for Suprapatellar Approach, straight, for 12.0–13.0 mm Nails, sterile
03.010.455	Trocar ∅ 12.0 mm, for Expert Tibial Nail, for Suprapatellar Approach, PEEK
03.010.456	Trocar ∅ 14.5 mm, for Expert Tibial Nail, for Suprapatellar Approach, PEEK

Assemble the handle, inner protection sleeve, outer protection sleeve, and trocar. Rotate the knob to lock the assembly into the handle during insertion.

Insert the handle assembly through the incision into the knee joint, so that it glides between the articular surface of the patella and the trochlea of the distal femur and rests securely in this groove, while the patella is displaced anteriorly above the cannula. When the trocar reaches the surface of the tibia, rotate the knob on the handle to allow the trocar to slide out, as the cannula is advanced to the anterior surface of the proximal tibia. Remove the trocar.



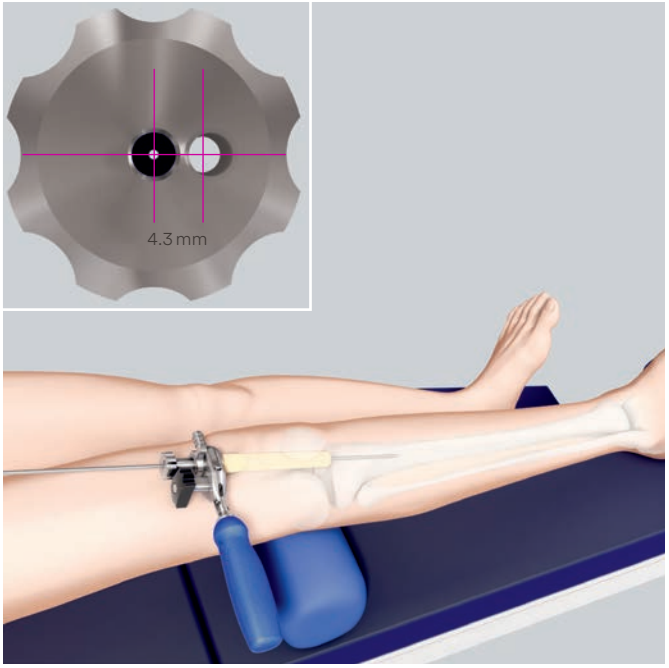
▲ Precaution:

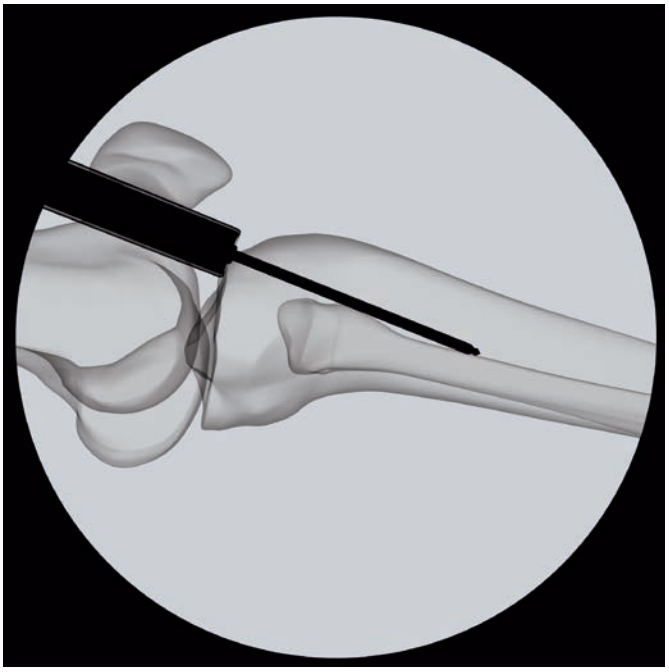
The knee must remain in extension once the handle a ssembly has been inserted.

6. Insert guide wire

Instruments	
03.010.433	Centering Sleeve 12.0/3.2, for Expert Tibial Nail, for Suprapatellar Approach
03.010.434	Centering Sleeve 14.5/3.2, for Expert Tibial Nail, for Suprapatellar Approach
357.399	Guide Wire ∅ 3.2 mm, length 400 mm

After removal of the trocar, insert the centering sleeve through the inner protection sleeve. Advance to the anterior surface of the tibia. Slight adjustment of the knee flexion (between 10° and 20°) will provide the ideal radiographic location for the starting point and insertion of a guide wire. Insert the guide wire approximately 8 cm–10 cm and check the position under imaging in the AP and lateral views. Adjustments to the guide wire location can be "dialed-in" by rotating the centering sleeve to place a second guide wire while the first guide wire remains in place. After correct placement of the second guide wire, remove the initial guide wire and centering sleeve.

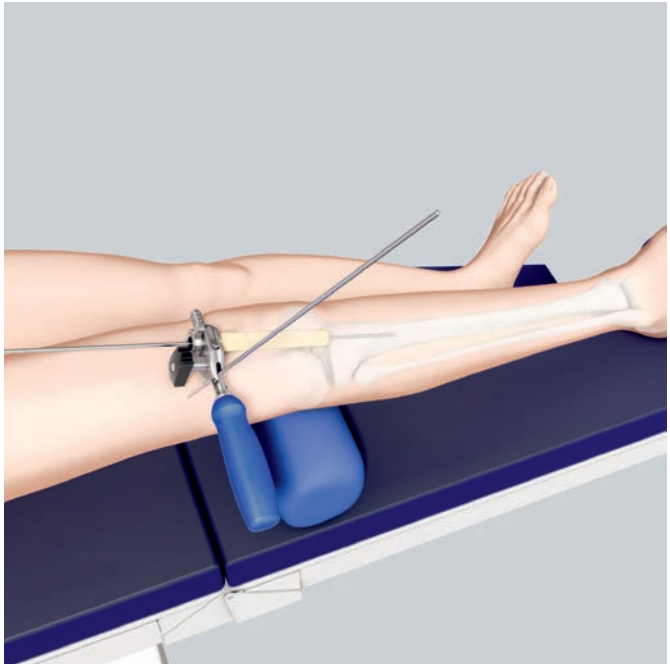




7. Anchor handle for protection sleeves

Instrument	
357.399	Guide Wire ∅ 3.2 mm, length 400 mm

Use a 3.2 mm guide wire to anchor the handle assembly to the femoral condyles and maintain the position of the handle assembly during the procedure. This anchor prevents the cannula from backing out and off of the tibia.



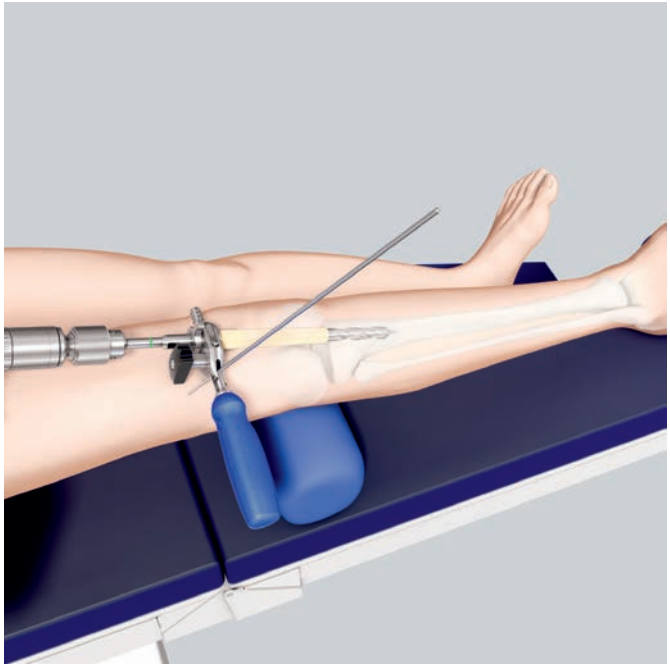
8. Open medullary canal

Instruments	
03.010.439	Drill Bit ∅ 12.0 mm, cannulated, length 270 mm, 3-flute, for Large Quick Coupling
357.399	Guide Wire ∅ 3.2 mm, length 400 mm

Place the drill bit over the guide wire, through the inner protection sleeve, and down to the bone. Drill to a depth of approximately 8–10 cm. The guide wire and drill bit should not reach the posterior cortex. Remove the drill bit and guide wire.

▲ Precaution:

Dispose of the guide wire. Do not reuse.



Reaming (optional)

Instruments

189.060	SynReam Intramedullary Reaming System in Vario Case
03.010.093	Rod Pusher for Reaming Rod with Hexagonal Screwdriver ∅ 8.0 mm
351.704S	Reaming Rod ∅ 2.5 mm, length 1150 mm, with ball tip & extension, sterile

If necessary, enlarge the tibial canal to the desired diameter, using the medullary reamer.

Check fracture reduction under image intensifier control.

▲ Precaution:

Do not ream without the inner protection sleeve in place to protect the outer protection sleeve.

Inserting the reaming rod

Insert the 2.5 mm reaming rod with ball tip and extension into the medullary canal to the desired insertion depth.

Ream

Starting with the 8.5 mm diameter reaming head, ream to a diameter of 0.50 mm–1.0 mm greater than the nail diameter. Ream in 0.5 mm increments and advance the reamer with steady, moderate pressure. Do not force the reamer. Partially retract the reamer often to clear debris from the medullary canal.

■ Notes:

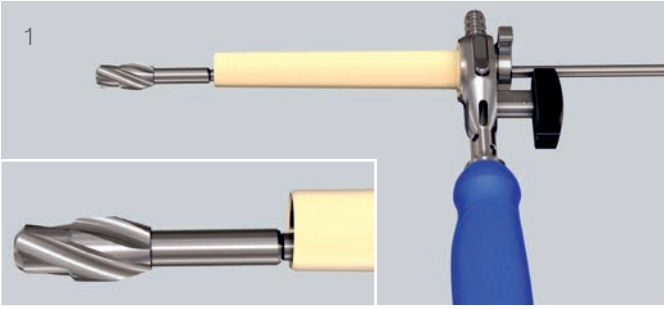
- If a nail length greater than 315 mm is required, the long ∅ 7.0 mm flexible shaft (352.044) must be used.
- All cannulated nails in the Expert Tibial Nail System can be inserted over the reaming rod with ball tip.
- For more details regarding SynReam please consult the Synream surgical technique.

Optional technique

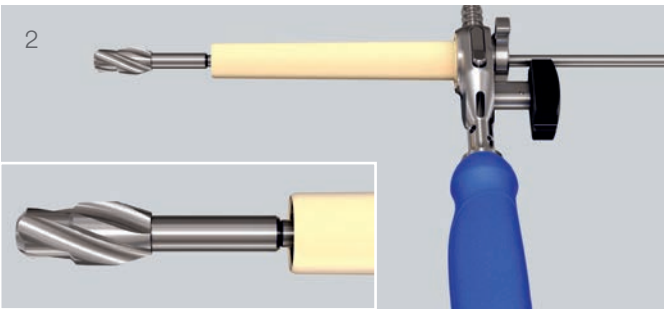
Use the rod pusher to help retain the reaming rod during reamer extraction.

■ Note:

The reamer can catch on the edge of the inner protection sleeve because of the sharp angle entering the tibia (1). Stop reamer rotation and lift up on the drill to center the reamer shaft in the sleeve (2). Move the reamer in and out until the reamer comes out.



Reamer shaft angled through sleeve



Reamer shaft centered through sleeve

Inserting the Nail

1. Assemble insertion instruments

Instruments	
03.010.093	Rod Pusher for Reaming Rod with Hexagonal Screwdriver ∅ 8.0 mm
03.010.404	Connecting Screw, cannulated, for Expert Tibial Nail, for Suprapatellar Approach
03.010.440	Insertion Handle for Expert Tibial Nail, for Suprapatellar Approach

Orient the insertion handle anteriorly, and match the tang on the handle to the notch in the nail.

Place the connecting screw into the insertion handle and thread it into the proximal nail end, using the rod pusher for reaming rod.

Verify the nail is oriented properly on the insertion handle; secure the assembly with the screwdriver.

Alternative instrument	
03.010.092	Screwdriver, hexagonal with spherical head ∅ 8.0 mm

Optionally, secure the assembly using the screwdriver.

Remove the inner protection sleeve from the handle for protection sleeves.

When removing the inner protection sleeve, lift or rotate handle to gain access to the lower lever lock. Depress both upper and lower lever locks and slide the inner protection sleeve out.

■ Note:

If the knee is tight, the pressure on the sleeve will make it difficult to remove the inner protection sleeve.

2. Insert nail

Ensure inner protection sleeve is removed.

Insert the nail into the intramedullary canal. Use a twisting motion to advance the nail.

- Monitor the nail passage across the fracture; control in two planes to avoid malalignment.
- Insert the nail until it is at or below the tibial opening. Check final nail position in AP and lateral views.

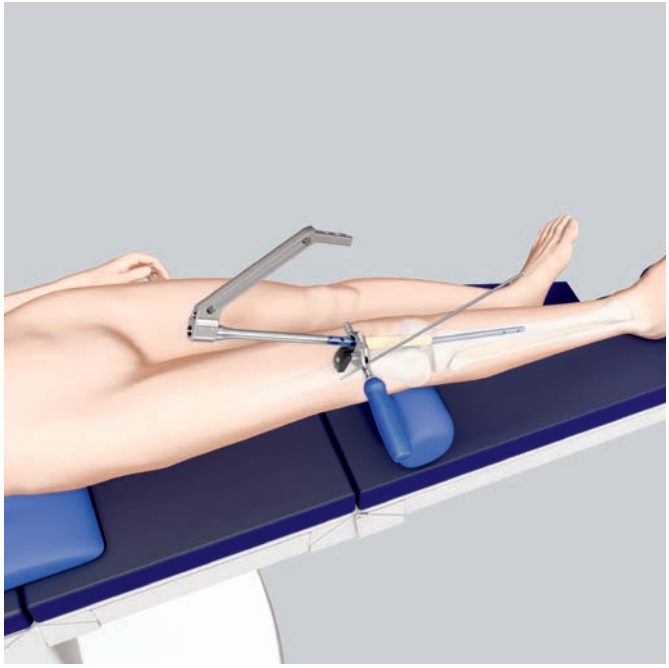
■ Note:

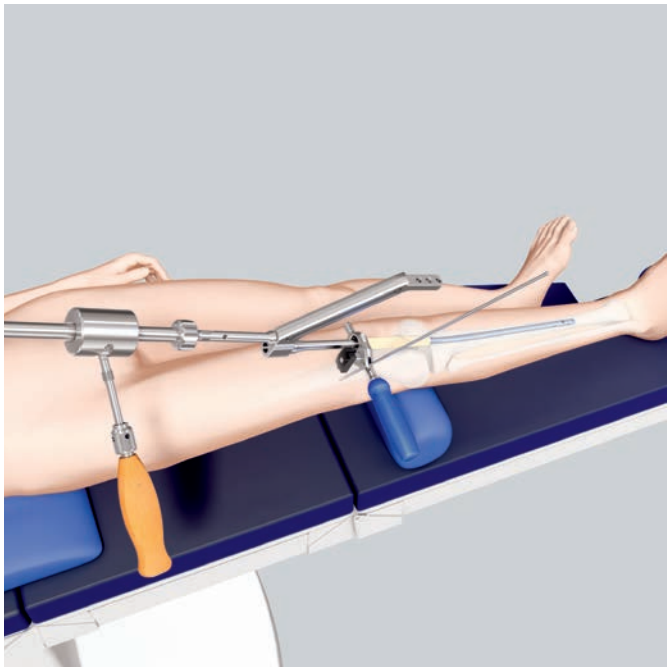
For proximal locking, mount the aiming arm only when the tibial nail has been completely inserted, otherwise the aiming arm may loosen during nail insertion.

Optional instruments	
03.010.056	Combined Hammer 700 g, can be mounted, for No. 357.220
03.010.475	Connector for Insertion Handle for PFNA
321.170	Pin Wrench ∅ 4.5 mm, length 120 mm
321.160	Combination Wrench ∅ 11.0 mm
357.220	Hammer Guide, for No. 357.250*
357.398	Shaft, hexagonal ∅ 8.0 mm, cannulated, short, length 125 mm

If needed, use light, controlled hammer blows to seat the nail. Thread the connector into the insertion handle and secure it, using the 11 mm combination wrench. Lock the head of the hammer in place by tightening the nut onto the threads located below the hammer head, using the 4.5 mm pin wrench. Strike the connector directly.

Optionally, the hammer guide can be threaded into the connector and the hammer can be used as a slide hammer. The hammer guide helps to assure the driving cap is struck optimally. Loosen the nut from the threads located below the hammer head and secure onto the threads located above the handle.





*Also adapted for No. 03.010.056

■ Notes:

- If nail insertion is difficult, choose a smaller diameter tibial nail or ream the medullary canal to a larger diameter.
- If reaming to a larger diameter, assemble the two-hole wire guide into the inner protection sleeve. Insert this assembly through the handle and into the outer protection sleeve. Often the outer protection sleeve is flattened by the pressure of the patella and the wire guide helps to expand the sleeve as the inner protection sleeve is reinserted. This also reduces the potential of the inner protection sleeve damaging the outer protection sleeve.

▲ Precaution:

If the nail is overinserted or a backstroke technique is desired to achieve fracture compression, secure the hammer guide to the driving cap and use the slide hammer. Do not strike directly on the bottom of the insertion handle as this will damage the handle.

■ Note:

Confirm that the nail is securely connected to the insertion handle, especially after hammering, using either the screwdriver 03.010.092 or the cannulated shaft 357.398.

3. Check proximal nail position

Instruments	
03.010.018	Aiming Arm for Expert Tibial Nail
357.399	Guide Wire ∅ 3.2 mm, length 400 mm

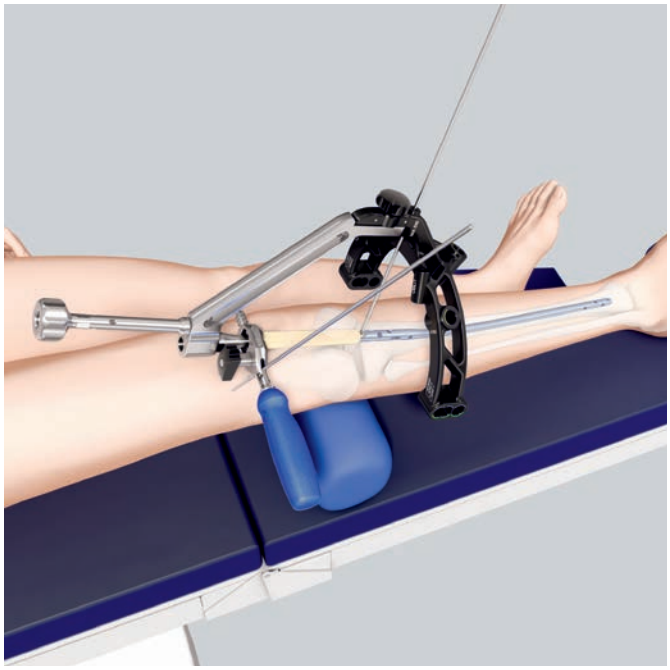
Attach the aiming arm and insert a 3.2 mm guide wire through the hole as shown in the illustration.

The tip of the guide wire indicates the exact proximal position of the tibial nail.

Remove the driving cap.

Remove the aiming arm, unless proximal locking is the next step.

Check proximal nail position under image intensifier control in the lateral view.



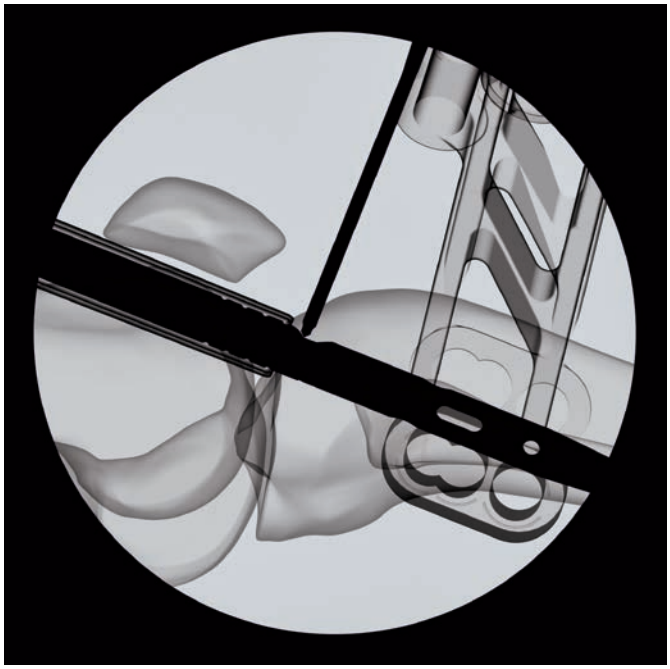
Note:

The distance between the markings on the insertion handle is 5 mm and corresponds to the extensions of the end caps. This feature can be used for overinsertion of the nail or for correcting the nail location within the medullary canal.

If primary compression or secondary dynamization is planned, it is recommended to overinsert the nail by more than 7 mm, which corresponds to the maximum distance between the positions in static and dynamic modes.

Alternative instrument	
03.010.441	Aiming Arm for Expert Tibial Nail, for Suprapatellar Approach

Alternatively, the Aiming Arm 03.010.441 may be used instead of the Aiming Arm 03.010.018.



4. Check distal nail position

Check final nail position under image intensifier control in AP and lateral views.

Remove the reaming rod.

Notes:

- Confirm that the nail is securely connected to the insertion handle, especially after hammering, using either the screwdriver 03.010.092 or the cannulated shaft 357.398.
- Insertion depth is critical for distal third fractures where a minimum of two locking screws below the fracture line are required to stabilize the distal segment.

Locking options

Proximal segment fractures

For proximal fractures, it is recommended to lock the nail with the knee in extension. This neutralizes the deforming forces on proximal fragments caused by the quadriceps mechanism, and relieves the pressure on the soft tissue usually associated with tibial nail insertion instruments. This position also facilitates assessment of rotational alignment prior to locking.

Diaphyseal segment fractures

For diaphyseal fractures, it is recommended to lock distally first to allow intraoperative compression.

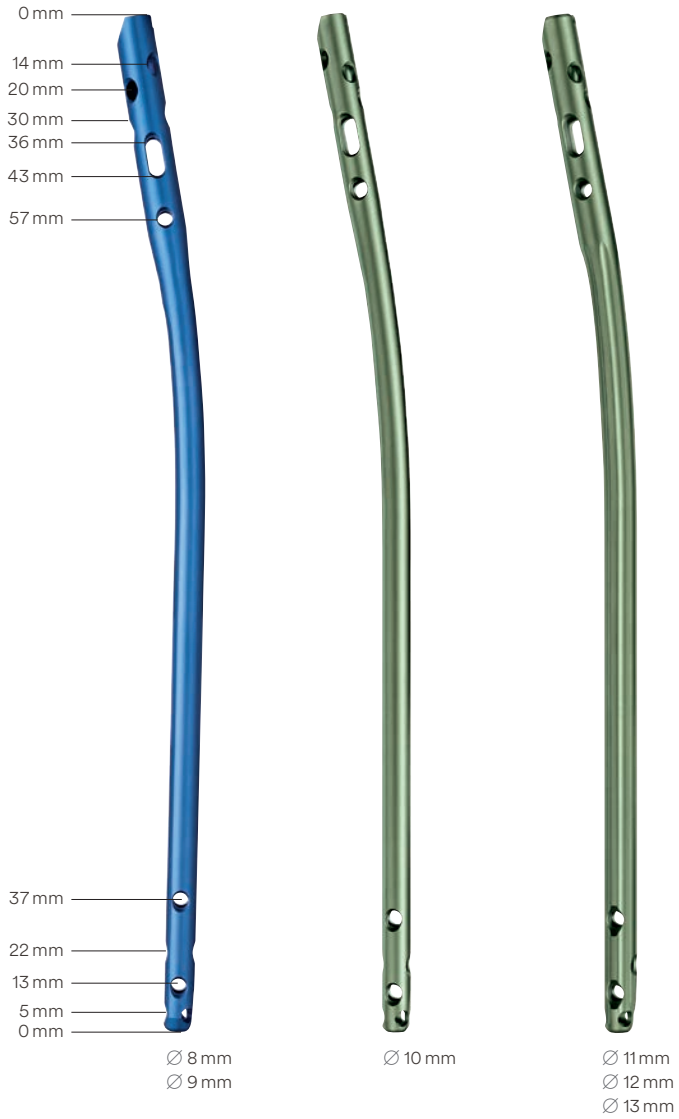
Distal segment fractures

For distal fractures, it is recommended to lock distally first to facilitate reduction.

Option: Locking with ASLS

ASLS, the Angular Stable Locking System, can be used as an alternative to standard locking screws in any round hole of a DePuy Synthes cannulated titanium Tibial nail. Please note that for the use of ASLS special instruments are required.

Locking holes



Distal Locking

1. Determine instrumentation

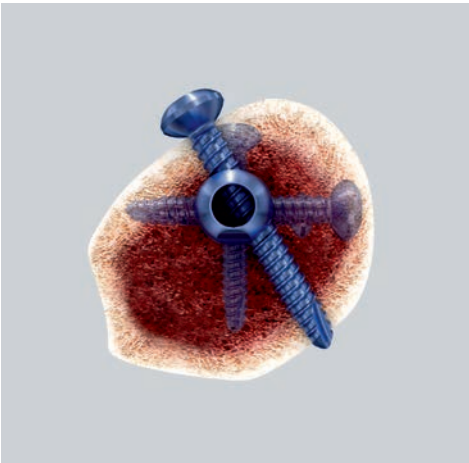
Use the appropriate locking screws and drill bit for the nail diameter selected.

Nail diameter	Locking screw	Drill bit
8 mm and 9 mm (dark blue)	4.0 mm (dark blue)	3.2 mm 03.010.100* or 03.010.103
10 mm to 13 mm (light green)	5.0 mm (light green)	4.2 mm 03.010.101* or 03.010.104

If using the backstroke technique**, distal locking must be performed prior to proximal locking to prevent loss of reduction. Verify the nail has been inserted to the appropriate depth.

Locking of the tibial nail is usually performed from the medial side. The knee must be in extension during nail locking. This position helps counteract the forces exerted by the quadriceps muscle that would tend to deform the proximal fragment and also facilitates rotational control of the tibial axis before locking.

Distal locking with the radiolucent drive is described on pages 26–29.



■ Note:

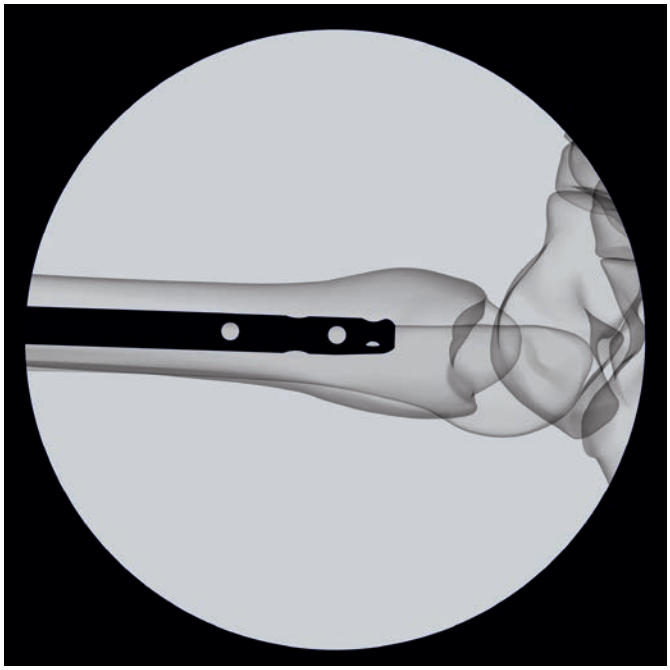
The use of the most distal locking option is recommended for distal fractures. This locking option is oriented 30° from the sagittal plane.

* For Radiolucent Drive 511.300

** Backstroke technique: with the hammer guide attached to the connector and insertion handle (see page 18), light reverse hammer blows may be used to compress the fracture; monitor reduction radiographically.

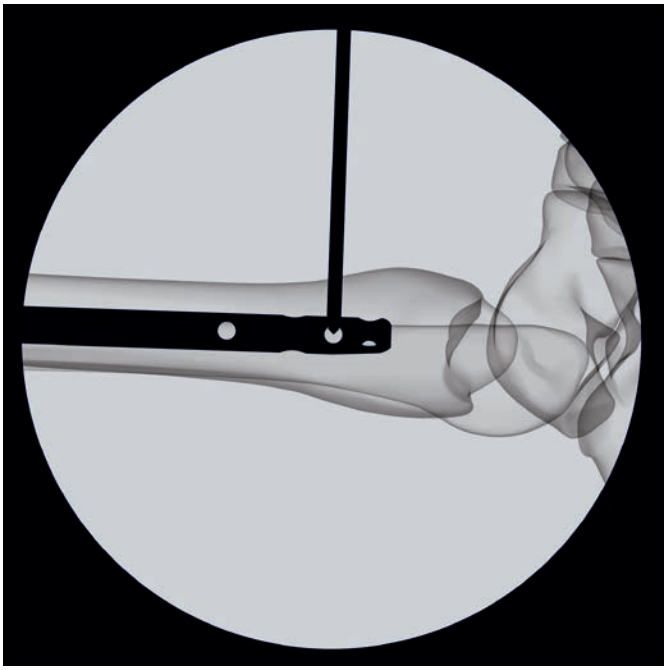
2. Align image

- Check the reduction, correct alignment of the fragments, and leg length before locking the nail.
- Align the C-arm with the hole in the nail closest to the fracture until a perfect circle is visible in the center of the screen. (Distal ML hole shown in illustration).



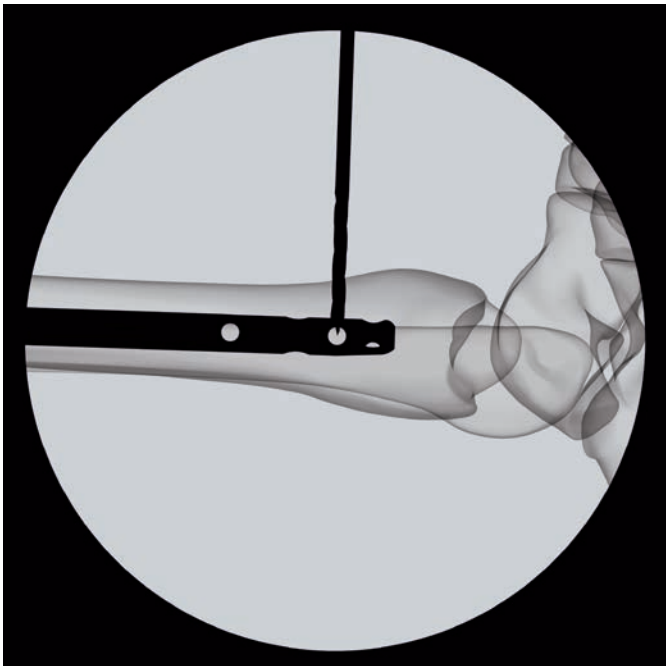
3. Determine incision point

- Place a guide wire on the skin over the center of the hole to mark the incision point and make a stab incision.



4. Drill

Instruments	
03.010.100	Drill Bit ∅ 3.2 mm, calibrated, length 145 mm, 3-flute, with Coupling for RDL
03.010.101	Drill Bit ∅ 4.2 mm, calibrated, length 145 mm, 3-flute, with Coupling for RDL

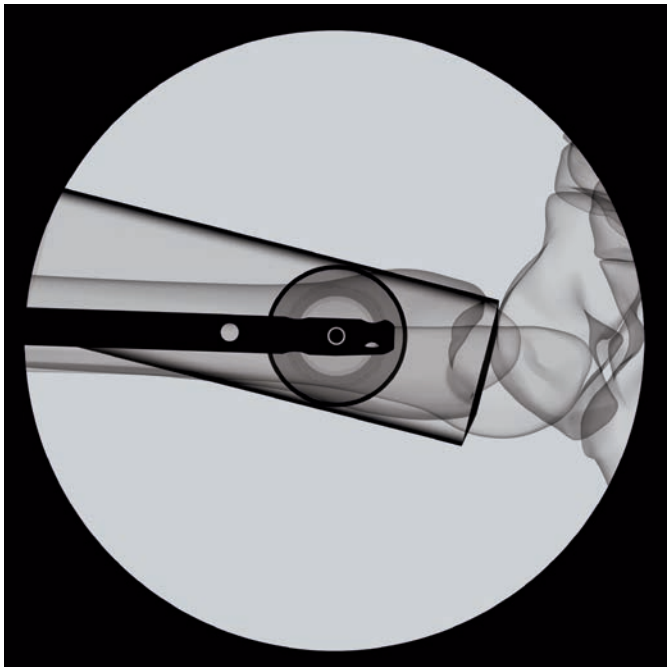


- Using the radiolucent drive under image intensifier, insert the tip of the appropriate drill bit through the incision and down to the bone.
- Incline the drive so that the tip of the drill bit is centered over the locking hole. The drill bit should almost completely fill the circle of the locking hole. Hold the drill bit in this position and drill through both cortices.

■ Note:

For greater drill bit control, discontinue drill power after perforating the near cortex. Manually guide the drill bit through the nail before resuming power to drill the far cortex.

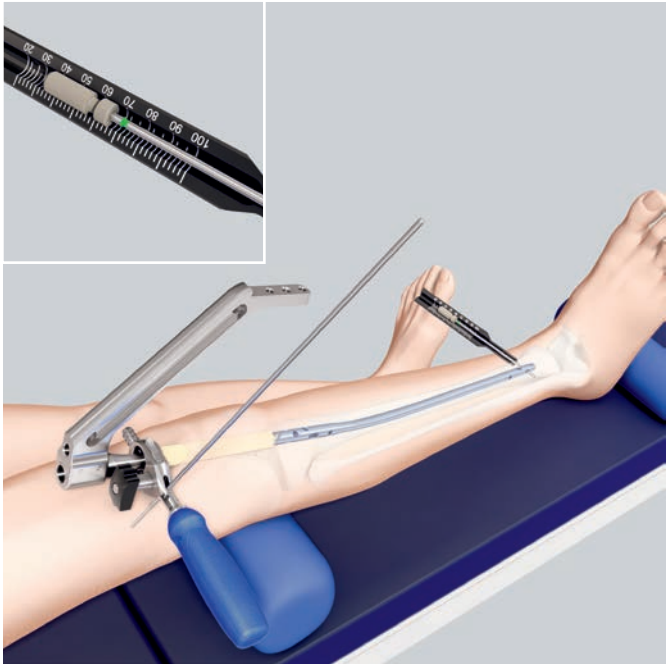
Alternative instruments	
03.010.103	Drill Bit ∅ 3.2 mm, calibrated, length 145 mm, 3-flute, for Quick Coupling
03.010.104	Drill Bit ∅ 4.2 mm, calibrated, length 145 mm, 3-flute, for Quick Coupling



Standard freehand locking technique can be performed without the radiolucent drive. Use the appropriate drill bit shown above.

5. Determine locking screw length

Instrument	
03.010.106	Direct Measuring Device for Drill Bits of length 145 mm, for Nos. 03.010.100 to 03.010.105



Stop drilling immediately after both cortices and disassemble the drill bit from the radiolucent drive.

Under image intensifier control, ensure the correct position of the drill bit beyond the far cortex.

Place the direct measuring device onto the drill bit. Read the graduation of the measuring device at the end of the drill bit. This corresponds to the appropriate locking screw length.

Note:

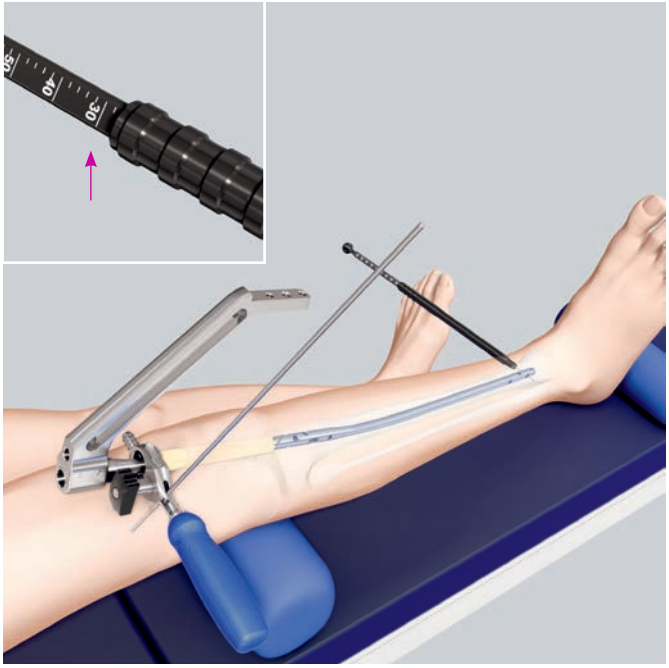
Drill bit location with respect to the far cortex is critical for measuring the appropriate locking screw length.

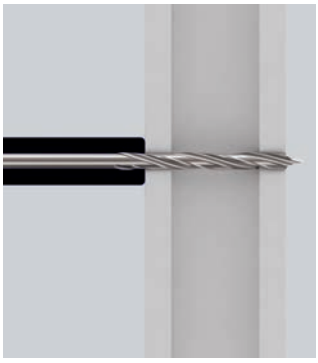
Alternative instrument

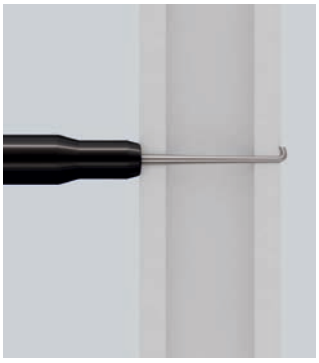
03.010.072	Depth Gauge for Locking Screws, measuring range up to 110 mm, for No. 03.010.063

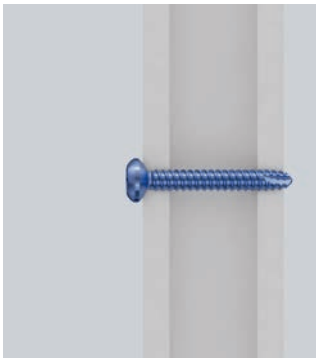
Measure the locking screw length using the depth gauge for locking screws. Ensure the outer sleeve is in contact with the bone and the hook grasps the far cortex.

Read the locking screw length directly from the depth gauge at the back of the outer sleeve.









6. Insert locking screw

Instruments	
03.010.107	Screwdriver Stardrive, SD25, length 330 mm
03.010.112	Holding Sleeve, with Locking Device

Insert the appropriate length locking screw using the SD25 Stardrive Screwdriver and the holding sleeve with locking device, if needed.

Verify locking screw length under image intensifier control. If needed, a second locking screw may be inserted using the same technique.

Note:

If compression is desired, the backstroke technique* can be used after insertion of the second distal locking screw. Alternatively, the compression device can be used (refer to section Insert compression device).

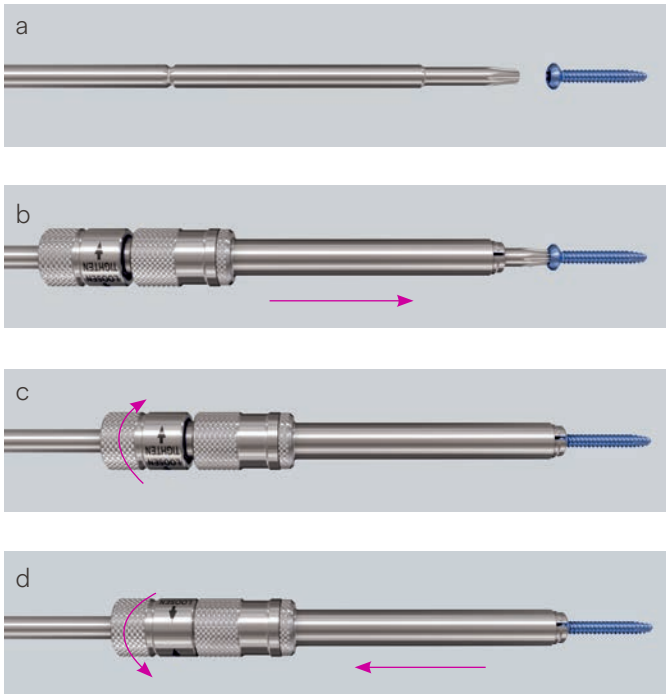
Use the holding sleeve as described below:

a Insert the holding sleeve onto the shaft of the screwdriver and place the tip of the screwdriver in the recess of the locking screw.

b Push the holding sleeve in the direction of the locking screw, the sleeve now holds the locking screw.

c Lock the holding sleeve by tightening it counterclockwise.

d Release the holding sleeve after insertion of the locking screw by loosening it clockwise and pushing backwards.



* Backstroke technique: with the hammer guide attached to the connector and insertion handle (see page 18), light reverse hammer blows may be used to compress the fracture; monitor reduction radiographically.

Proximal Locking – Diaphyseal and Distal Segment Fractures

1. Choose locking screws and instruments

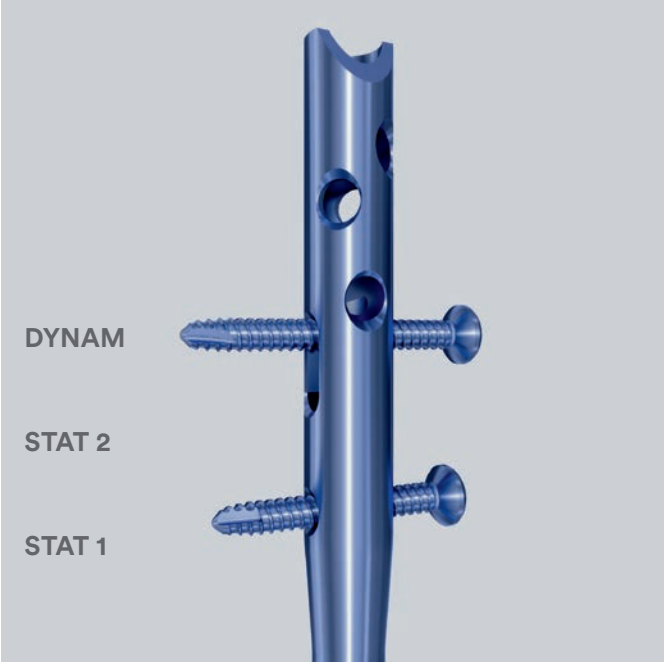
Use the correct locking screw, drill sleeve, trocar and drill bit for the selected nail diameter, as shown in the table.

Three proximal ML locking options can be targeted using the aiming arm:

1 The dynamic locking option (DYNAM) corresponds to the upper position of the proximal locking slot. This type of locking potentially allows primary compression or secondary, controlled dynamization of the bone fragments.

2 Static 2 (STAT 2) corresponding to the lower position of the proximal locking slot. This type of locking does not allow primary compression or secondary controlled dynamization.

3 Static 1 (STAT 1) corresponding to most distal proximal locking hole.



Nail Diameter	Locking Screws	Protection Sleeve	Drill Sleeve	Trocar	Calibrated Drill Bit
8 mm and 9 mm (dark blue)	∅ 4.0 mm (dark blue)	12.0 mm/8.0 mm 03.010.442 for 03.010.441 or 03.010.063 for 03.010.018	8.0 mm/3.2 mm 03.010.064	∅ 3.2 mm 03.010.069	∅ 3.2 mm 03.010.060
10 mm–13 mm (light green)	∅ 5.0 mm (light green)	12.0 mm/8.0 mm 03.010.442 for 03.010.441 or 03.010.063 for 03.010.018	8.0 mm/4.2 mm 03.010.065	∅ 4.2 mm 03.010.070	∅ 4.2 mm 03.010.061

2. Mount aiming arm

Instrument	
03.010.018	Aiming Arm for Expert Tibial Nail

Confirm that the nail is securely connected to the insertion handle using the screwdriver 03.010.092. Mount the aiming arm to the insertion handle.

■ Note:

Do not exert forces on the aiming arm, protection sleeve, drill sleeves and drill bits. These forces may prevent accurate targeting through the proximal locking holes and damage the drill bits.

Alternative instrument	
03.010.441	Aiming Arm for Expert Tibial Nail, for Suprapatellar Approach

Alternatively, the Aiming Arm 03.010.441 may be used instead of the Aiming Arm 03.010.018.

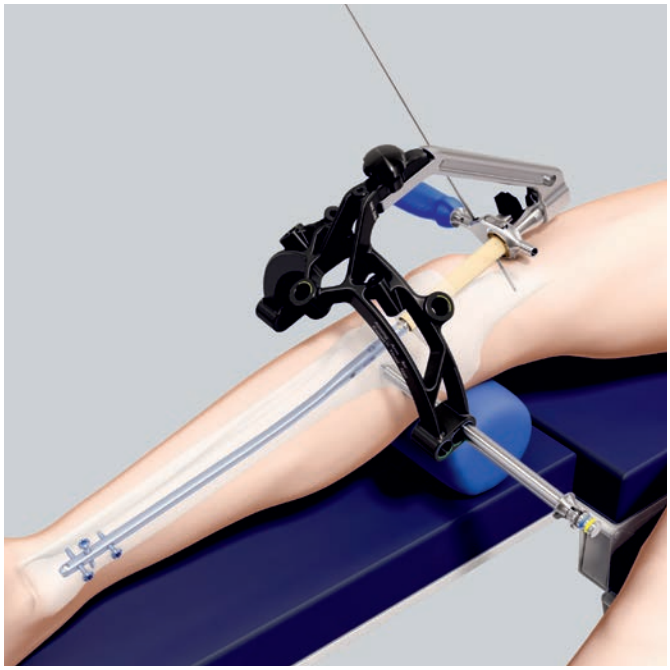
3. Insert trocar assembly

Instruments	
03.010.064	Drill Sleeve 8.0/3.2, for No. 03.010.063
03.010.065	Drill Sleeve 8.0/4.2, for No. 03.010.063
03.010.069	Trocar ∅ 3.2 mm, for No. 03.010.064
03.010.070	Trocar ∅ 4.2 mm, for No. 03.010.065
03.010.063	Protection Sleeve 12.0/8.0, length 188 mm

Insert the three-part trocar assembly (protection sleeve, corresponding drill sleeve and trocar) through the desired ML hole in the aiming arm, make a stab incision and insert the trocar to the bone. Remove the trocar.

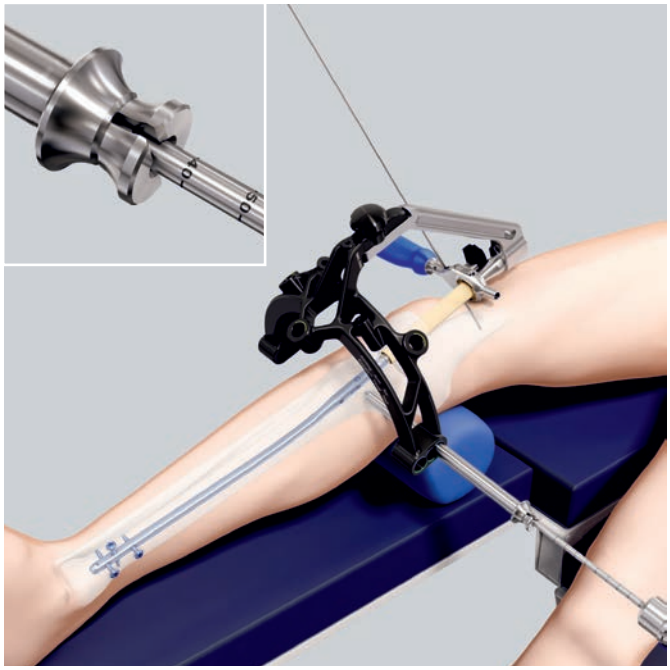
Alternative instruments	
03.010.442	Protection Sleeve 12.0/8.0, self-holding

The self-holding protection sleeve 03.010.442 must be used in combination with the alternative aiming arm 03.010.441.



4. Drill and determine locking screw length

Insruments	
03.010.060	Drill Bit ∅ 3.2 mm, calibrated, length 340 mm, 3-flute, for Quick Coupling, for No. 03.010.064
03.010.061	Drill Bit ∅ 4.2 mm, calibrated, length 340 mm, 3-flute, for Quick Coupling, for No. 03.010.065

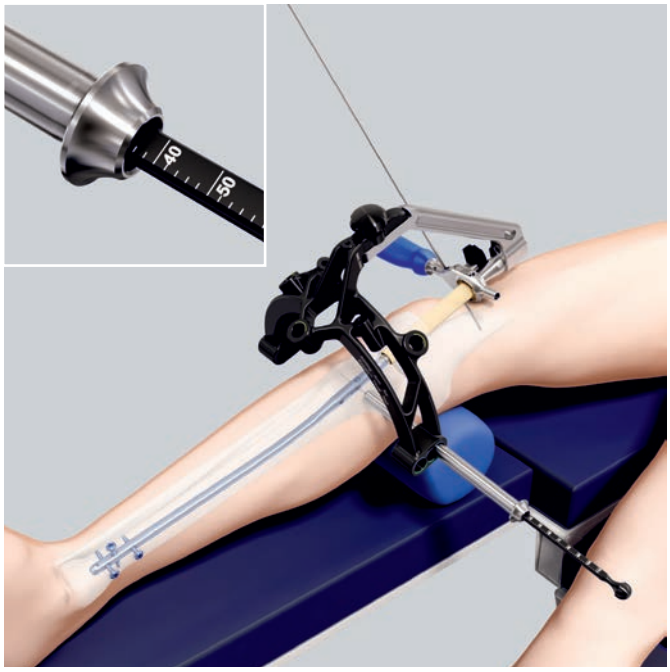


Ensure that the drill sleeve is pressed firmly to the near cortex. Using the corresponding drill bit (3.2 mm for 4.0 mm locking screws, or 4.2 mm for 5.0 mm locking screws), drill through both cortices until the tip of the drill bit penetrates the far cortex.

Confirm drill bit position.

Ensure that the drill sleeve is pressed firmly to the near cortex and read the measurement from the calibrated drill bit at the back of the drill sleeve. This measurement corresponds to the appropriate length locking screw. Remove the drill bit and the drill sleeve.

Alternative instrument	
03.010.072	Depth Gauge for Locking Screws, measuring range up to 110 mm, for No. 03.010.063



After drilling both cortices, remove the drill bit and the drill sleeve.

Disassemble the depth gauge into two parts: the outer sleeve and the measuring device with hook. Insert the measuring device into the protection sleeve. Make sure that the hook grasps the far cortex and that the protection sleeve is on the bone.

Read the measurement from the back of the protection sleeve, which indicates the appropriate length locking screw.

5. Insert locking screw

Instrument	
03.010.107	Screwdriver Stardrive, SD25, length 330 mm

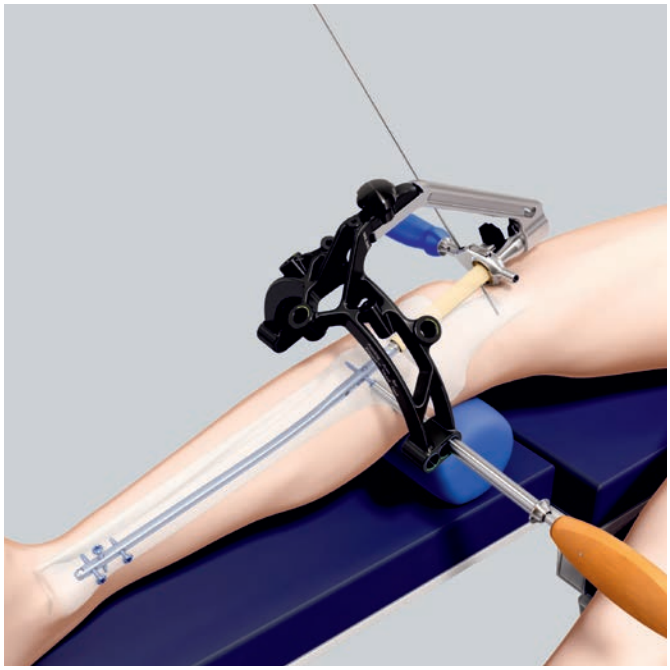
Insert the appropriate length locking screw through the protection sleeve using the SD25 Stardrive Screwdriver. Verify locking screw length under image intensifier control. The tip of the locking screw should not project more than 1–2 mm beyond the far cortex.

Repeat the steps 3 to 5 for the second proximal ML locking screw.

Note:

Additional cancellous bone locking screw can be added for proximal fractures and highly unstable fractures.

For details on proximal locking with the cancellous bone locking screw, refer to section Proximal Locking – Proximal Segment Fractures.



Proximal Locking – Compression Locking Mode (Optional)

1. Compression locking mode

The Expert Tibial Nail allows a maximum compression of 7 mm. If more compression of the fracture gap is needed, the conventional backstroke technique is recommended.

Distal locking is required prior to compression locking.

Insert one proximal locking screw in the dynamic locking hole (DYNAM). For details on inserting this locking screw, refer to section Diaphyseal and Distal Segment Fractures.

2. Insert compression device

Instruments	
03.010.092	Screwdriver, hexagonal with spherical head ∅ 8.0 mm
03.010.443	Compression Tool for Expert Tibial Nail, for Suprapatellar Approach

Confirm that the nail is securely connected to the insertion handle using the screwdriver.

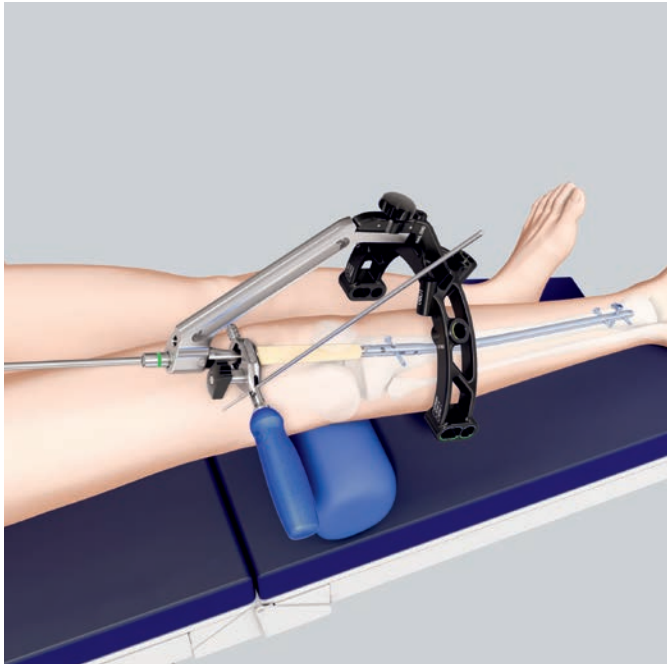
Insert the compression device through the connecting screw and into the nail using the screwdriver.

The compression device will contact the dynamic locking screw.

Advance the compression device until the fracture gap is reduced. Monitor reduction with the image intensifier. Each revolution of the compression device corresponds to compression of 1 mm (maximum 7 mm).

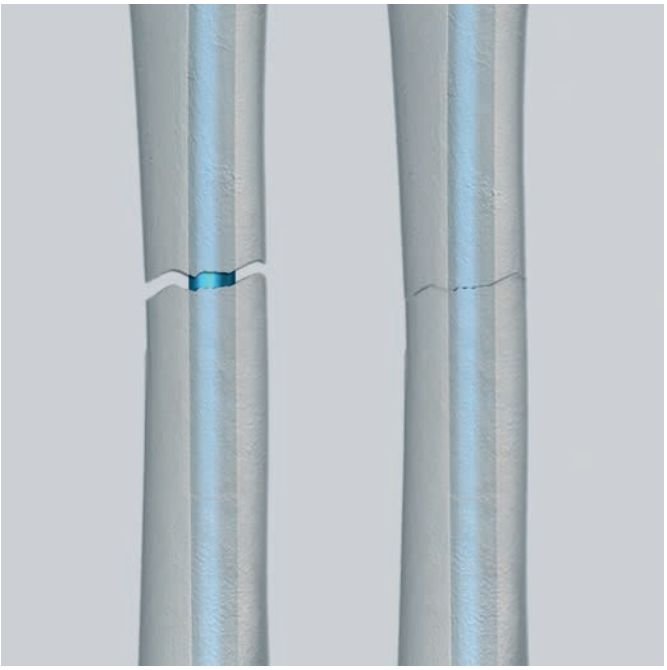
▲ Precaution:

Do not overtighten the compression device, it may deform the locking screw.



3. Monitor fracture

Control the fracture gap before, during, and after the compression procedure.

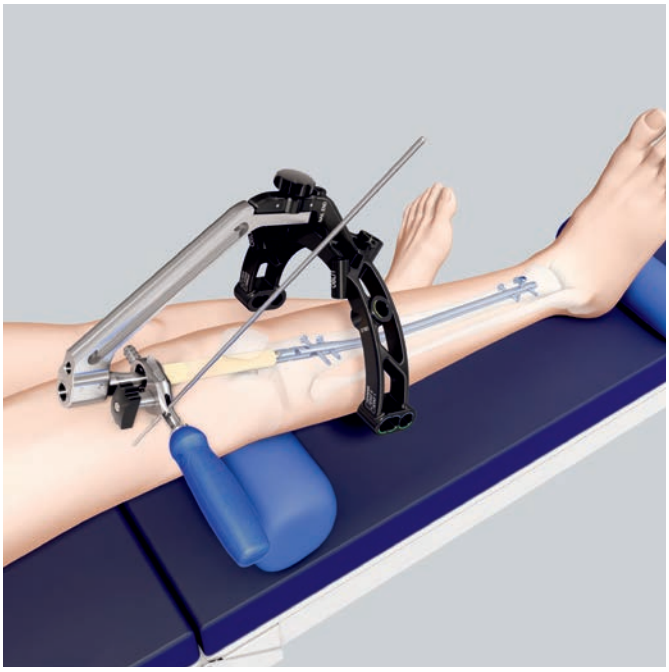


4. Insert static locking screw

Insert second proximal locking screw in the most distal hole of the proximal locking options (Static 1). Refer to section Diaphyseal and Distal Segment Fractures.

Remove the compression device.

Additional oblique cancellous bone locking screw can be inserted if required. Refer to section Proximal Segment Fractures.



Proximal Locking – Proximal Segment Fractures

1. Oblique proximal locking

Instruments	
03.010.404	Connecting Screw, cannulated, for Expert Tibial Nail, for Suprapatellar Approach
03.010.440	Insertion Handle for Expert Tibial Nail, for Suprapatellar Approach

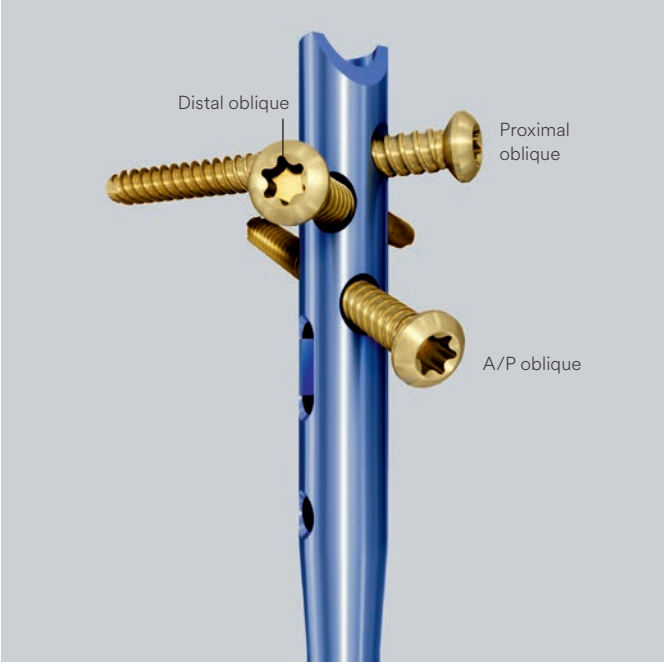
Proximal locking is performed with the knee in extension when using the suprapatellar technique. This neutralizes the deforming forces on proximal fragments caused by the quadriceps mechanism and relieves the pressure on the soft tissue usually associated with tibial nail insertion instruments. This position also facilitates assessment of rotational alignment prior to locking.

■ Note:

When locking with the leg in full extension, it is recommended to use the insertion handle for Expert Tibial Nail and cannulated connecting screw to prevent impingement on the patella. These devices are not compatible with the compression device.

The aiming arm can target all three proximal oblique locking options:

1. The oblique locking option (PROXIMAL OBLIQUE) corresponds to the most proximal locking position. Inserting a tibial nail end cap with this locking screw will create a fixed-angle construct.
2. The oblique locking option (DISTAL OBLIQUE) corresponds to the second proximal locking position.
3. The oblique locking option in anteroposterior direction (A/P) corresponds to the third proximal locking position.



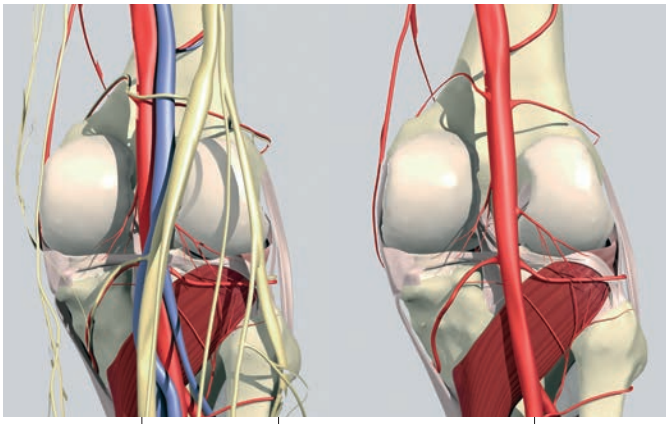
Use the cancellous bone locking screw (gold) only in combination with the two oblique proximal locking holes (PROXIMAL OBLIQUE, DISTAL OBLIQUE) and A/P proximal locking hole for all nail diameters.

Use a 3.2 mm drill bit for the 5.0 mm cancellous bone locking screw.

▲ Precaution:

Drilling for the oblique proximal locking screws requires special attention. To avoid lesion of the popliteal artery, the tibial nerve and the common peroneal nerve, as well as damage to the proximal tibiofibular joint, drilling must be stopped immediately before penetrating the far cortex.

Drilling for the oblique proximal locking requires special attention. To avoid lesion of the popliteal artery, the tibial nerve and the common peroneal nerve, as well as damage to the proximal tibiofibular joint, drilling must be stopped immediately before penetrating the far cortex.



2. Mount aiming arm

Instruments	
03.010.092	Screwdriver, hexagonal with spherical head ∅ 8.0 mm
03.010.018	Aiming Arm for Expert Tibial Nail

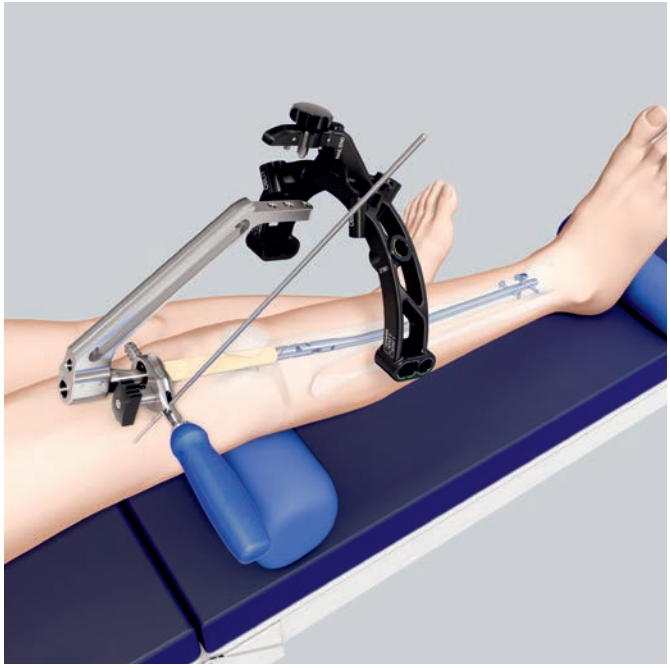
Confirm that the nail is securely connected to the insertion handle using the screwdriver. Mount the aiming arm to the insertion handle as shown in the illustration.

■ Note:

Do not exert forces on the aiming arm, protection sleeve, drill sleeves and drill bits. These forces may prevent accurate targeting through the proximal locking holes and damage the drill bits.

Alternative instrument	
03.010.441	Aiming Arm for Expert Tibial Nail, for Suprapatellar Approach

Alternatively, the Aiming Arm 03.010.441 may be used instead of the Aiming Arm 03.010.018.



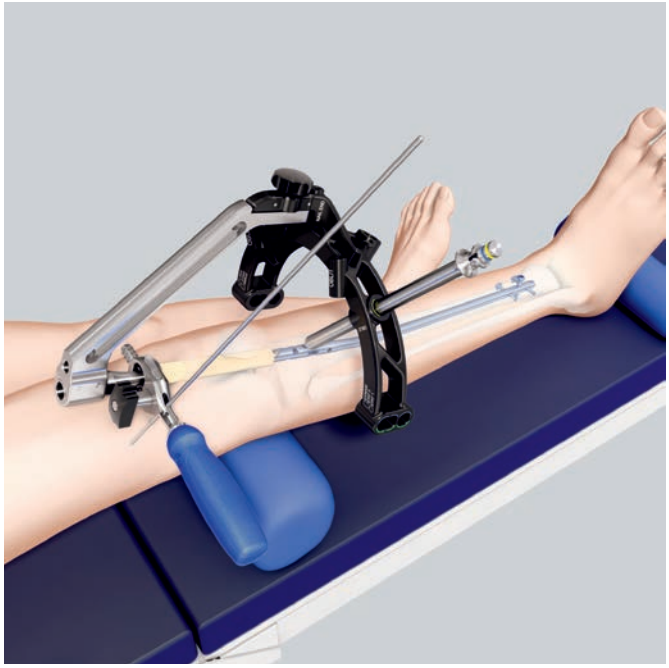
3. Insert trocar assembly

Instruments	
03.010.064	Drill Sleeve 8.0/3.2, for No. 03.010.063
03.010.069	Trocar ∅ 3.2 mm, for No. 03.010.064
03.010.063	Protection Sleeve 12.0/8.0, length 188 mm

Insert the three-part trocar assembly (protection sleeve, corresponding drill sleeve and trocar) through the desired hole for oblique locking options in the aiming arm, make a stab incision and insert the trocar to the bone. Remove the trocar.

Alternative instruments	
03.010.442	Protection Sleeve 12.0/8.0, self-holding

The self-holding protection sleeve 03.010.442 must be used in combination with the alternative aiming arm 03.010.441.



4. Drill and determine dual core locking screw length

Instrument	
03.010.060	Drill Bit ∅ 3.2 mm, calibrated, length 340 mm, 3-flute, for Quick Coupling, for No. 03.010.064

Ensure that the drill sleeve is pressed firmly to the near cortex.

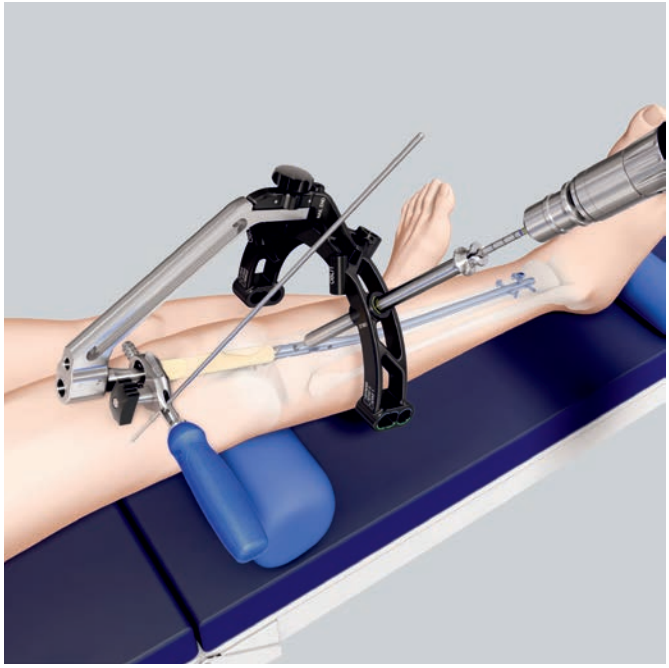
Insert the calibrated drill bit and start drilling the near cortex.

▲ Precaution:

Stop drilling immediately after penetrating the near cortex. DO NOT penetrate the far cortex.

Monitor the position of the drill bit with the image intensifier. This can be done by orienting the image intensifier perpendicular to the drill bit.

Drill to the desired depth. A long dual core locking screw will achieve better bone purchase than a shorter dual core locking screw.



▲ Precaution:

Do not perforate the far cortex with the drill bit. Do not damage the tibial plateau.

Confirm drill bit position after drilling.

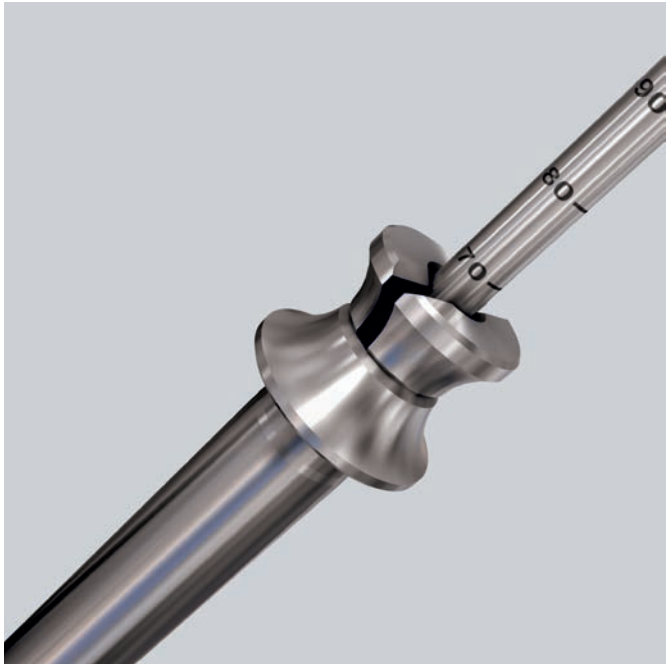
Ensure that the drill sleeve is pressed firmly to the bone and read the measurement from the calibrated drill bit at the back of the drill sleeve.

This measurement indicates the appropriate length of the dual core locking screw.

Remove the drill bit and the drill sleeve.

▲ Precaution:

To avoid perforation of the far cortex with the dual core locking screw, a dual core locking screw 5 mm shorter than the measured length is recommended.



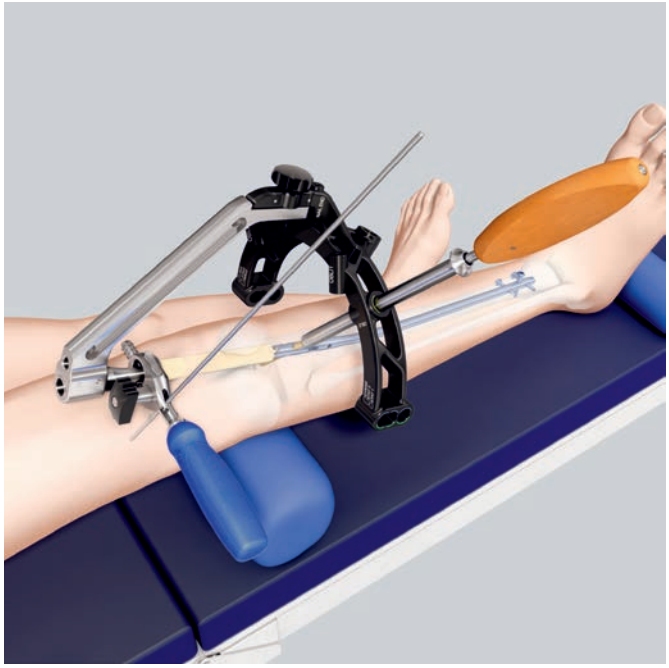
5. Insert cancellous bone locking screw

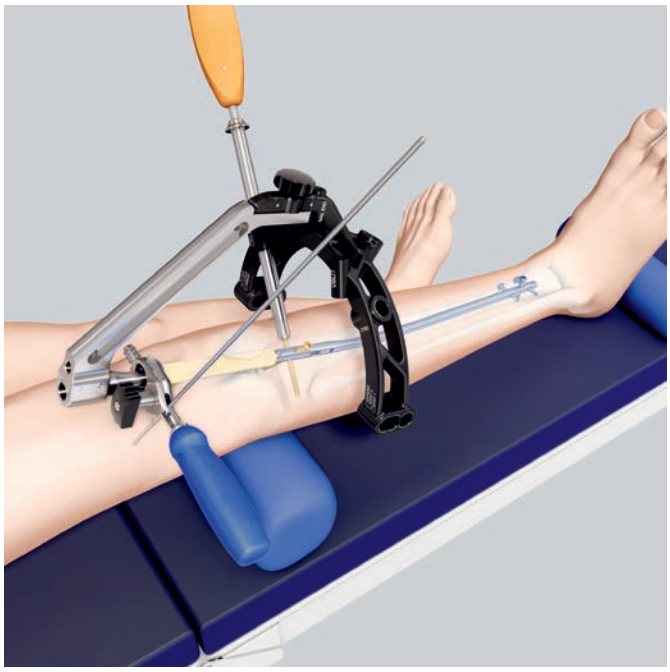
Instrument	
03.010.107	Screwdriver Stardrive, SD25, length 330 mm

Insert the appropriate 5.0 mm dual core locking screw through the protection sleeve, using the SD25 Stardrive Screwdriver. Do not overtighten.

Verify locking screw length under image intensifier control.

Repeat this procedure for the second dual core locking screw.





If required, repeat the steps described above for the third proximal dual core locking screw in the AP direction.

The position of the dual core locking screw should be controlled with the image intensifier to ensure a correct position of the AP dual core locking screw.

Removal of Connecting Screws

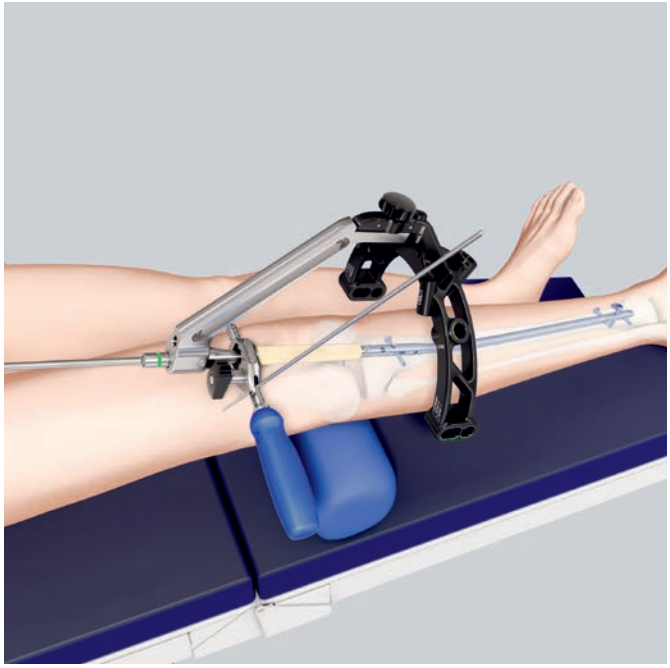
Instrument

03.010.092	Screwdriver, hexagonal with spherical head ∅ 8.0 mm

Remove the connecting screw using the hexagonal spherical head screwdriver. The insertion handle can remain in place to help align the end cap to the top of the nail. The end cap fits through the barrel of the insertion handle.

■ Note:

Flexion of the knee might have changed during the procedure. This might block the connecting screw and impede removal. Slight adjustment of knee flexion (between 10° and 30°) will provide a neutral position that facilitates removal of connecting screw and insertion of the end cap.



End Cap Insertion

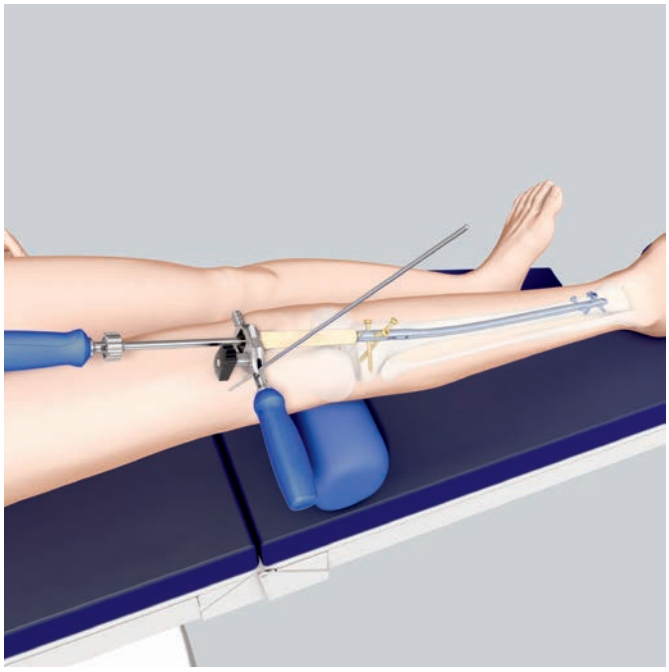
Instrument

03.010.445	Inter-Lock Screwdriver Stardrive, SD40

The end caps for Expert Tibial Nails are available in extension lengths of 0 mm (04.004.000 and 04.004.004), 5 mm (04.004.001), 10 mm (04.004.002), and 15 mm (04.004.003).

Remove the connecting screw. The insertion handle can remain in place to help align the end cap to the top of the nail. The end cap fits through the barrel of the insertion handle.

Alternatively, remove the connecting screw and insertion handle. Reinsert the inner protection sleeve to open the cannula through the outer protection sleeve.



Alternative instruments

03.010.447	Screwdriver Stardrive, SD40, cannulated, long
357.399	Guide Wire ∅ 3.2 mm, length 400 mm

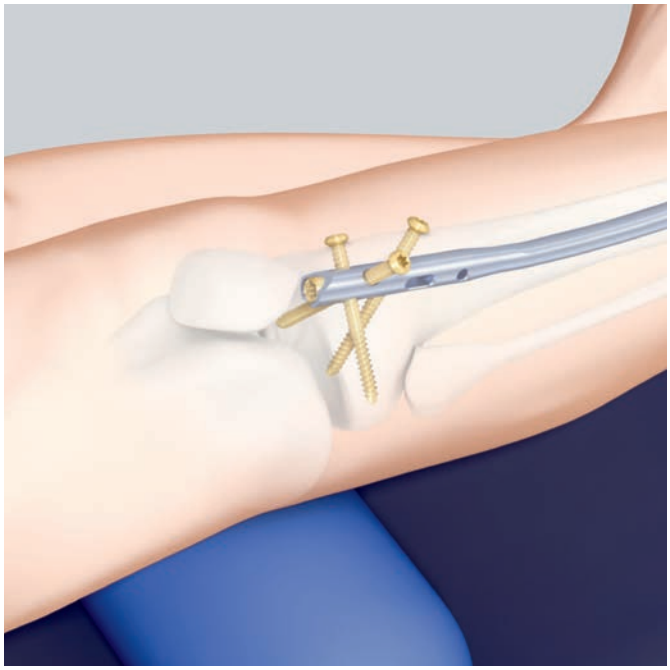
The end caps are cannulated and can be used over a guide wire with the cannulated screwdriver 03.010.447.

Engage the end cap with the cannulated SD40 Stardrive Screwdriver, inter-lock. To prevent cross threading, align the end cap with the nail axis and turn the end cap counterclockwise, until the thread of the end cap aligns with that of the nail.

Turn the end cap clockwise to thread the end cap into the nail. Remove the guide wire and SD40 Stardrive Screwdriver.

■ Note:

The end cap will engage the most proximal oblique locking screw to create a fixed-angle construct.



Weight-bearing

When deciding on weight-bearing, fracture pattern, fracture location, conditions of soft tissues and quality of bone stock should be taken into account.

Partial weight bearing is the basic form of loading the fractured leg. Complete non-weightbearing should be avoided.

Increase in load is determined according to fracture pattern and location, conditions of soft tissues and quality of bone as well as absence or presence of load induced pain.

Implant Removal

1. Remove end cap and locking screws

Instruments	
03.010.107	Screwdriver Stardrive, SD25, length 330 mm
03.010.112	Holding Sleeve, with Locking Device
03.010.445	Inter-Lock Screwdriver Stardrive, SD40

■ Note:

Implant removal may be performed through a standard approach or a suprapatellar approach.
The suprapatellar approach is shown for illustrative purposes only.

Clear the Stardrive socket of the end cap and the locking implants of any tissue ingrowth. Remove the end cap with the long inter-lock SD40 Stardrive Screwdriver.

Remove all locking screws except one of the proximal locking screws, using the SD25 Stardrive Screwdriver and holding sleeve.

■ Note:

Always remove the most proximal cancellous bone locking screw in order to insert the extraction screw into the proximal end of the nail.

Alternative instruments	
03.010.447	Screwdriver Stardrive, SD40, cannulated, long
357.399	Guide Wire ∅ 3.2 mm, length 400 mm

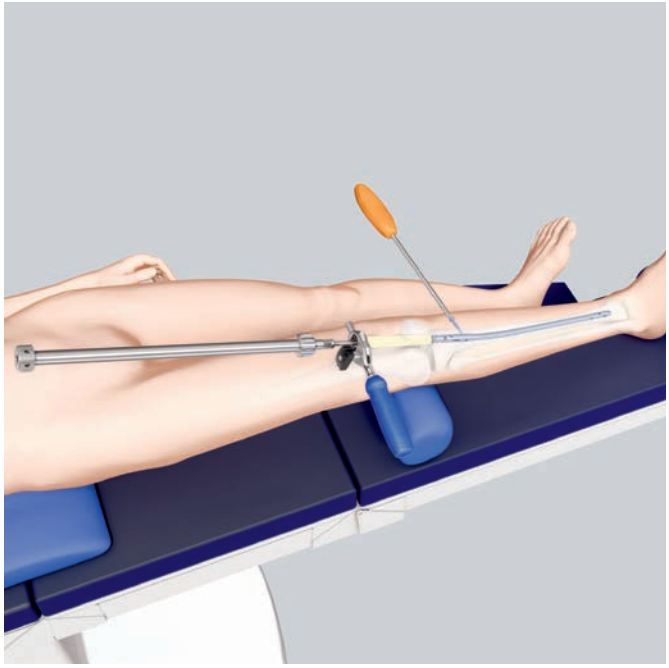
The end caps are cannulated and can be used over a guide wire with the cannulated screwdriver 03.010.447.

2. Attach extraction screw and hammer guide

Instruments	
03.010.107	Screwdriver Stardrive, SD25, length 330 mm
03.010.446	Extraction Screw for Expert Tibial Nail, for Suprapatellar Approach
357.220	Hammer Guide, for No. 357.250

Before removing the final locking screw, screw the extraction screw into the tibial nail and tighten it to prevent rotation or displacement of the nail posteriorly below the tibial plateau.

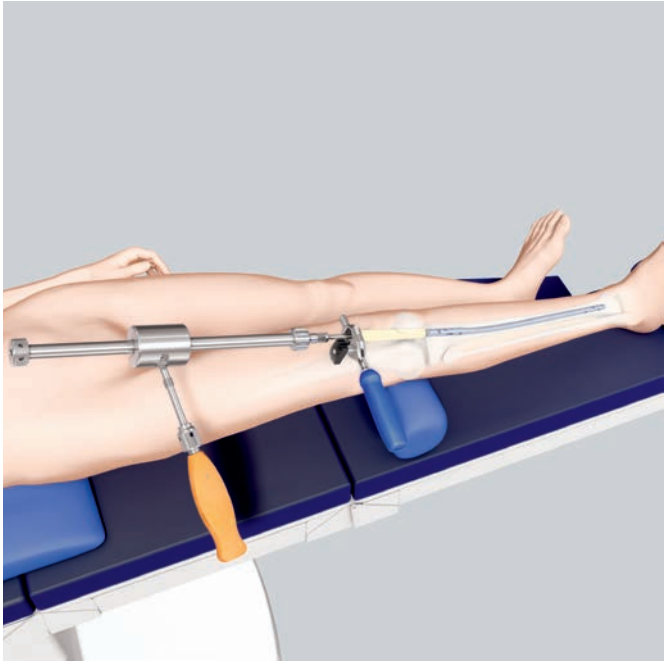
Attach the hammer guide to the extraction screw. Remove the remaining locking screw with the SD25 Stardrive Screwdriver.



3. Remove nail

Instrument	
03.010.056	Combined Hammer 700 g, can be mounted, for No. 357.220

Extract the nail by applying gentle blows with the hammer.



Implant Specifications

Expert Tibial Nail

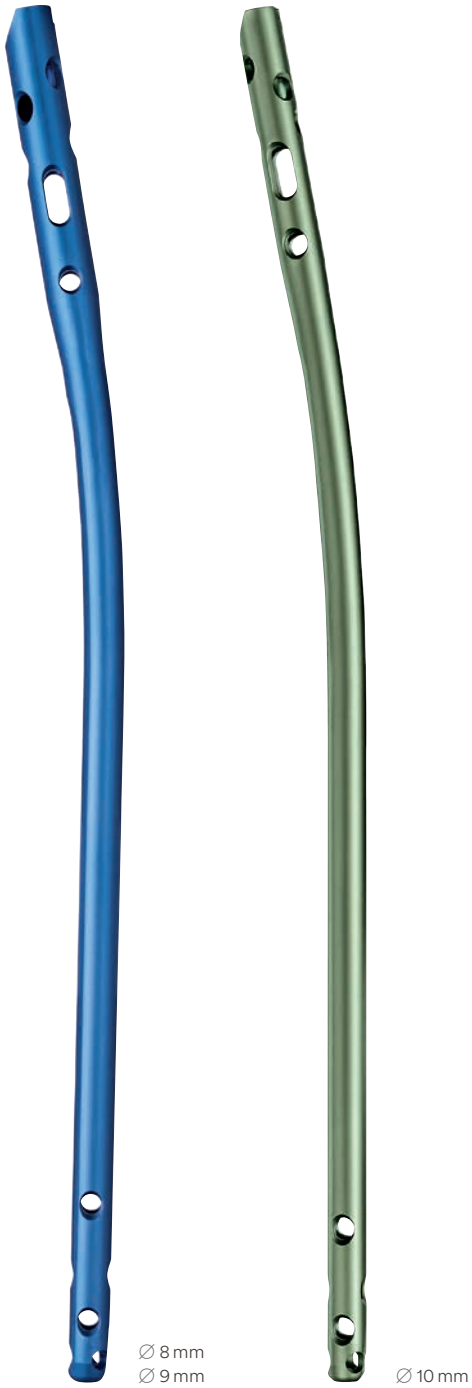
Designed for the left and right tibia

Material:	Titanium-6% aluminum-7% niobium alloy (TAN)
Diameters:	8 mm–13 mm (1 mm increments) 8 mm–10 mm nails have a proximal diameter of 11 mm, 11 mm–13 mm nails have a proximal diameter consistent with the shaft diameter
Colors:	8 mm and 9 mm (dark blue) use ∅ 4.0 mm locking screws (dark blue) 10 mm–13 mm (light green) use ∅ 5.0 mm locking screws (light green)
Lengths:	255 mm–465 mm (15 mm increments)
Cross section:	8 mm–10 mm nails are round 11 mm–13 mm nails are fluted

Implants

Expert Tibial Nails, cannulated*

Length mm	∅ 8 mm dark blue	∅ 9 mm dark blue	∅ 10 mm light green
255	04.004.231	04.004.331	04.004.431
270	04.004.234	04.004.334	04.004.434
285	04.004.237	04.004.337	04.004.437
300	04.004.240	04.004.340	04.004.440
315	04.004.243	04.004.343	04.004.443
330	04.004.246	04.004.346	04.004.446
345	04.004.249	04.004.349	04.004.449
360	04.004.252	04.004.352	04.004.452
375	04.004.255	04.004.355	04.004.455
390	04.004.258	04.004.358	04.004.458
405	04.004.261	04.004.361	04.004.461
420	04.004.264	04.004.364	04.004.464
435	04.004.267	04.004.367	04.004.467
450	04.004.270	04.004.370	04.004.470
465	04.004.273	04.004.373	04.004.473



*Available nonsterile or sterile packed. Add “S” to the catalogue number to order sterile products.

Length mm	∅ 11 mm light green	∅ 12 mm light green	∅ 13 mm light green
255	04.004.531	04.004.631	04.004.731
270	04.004.534	04.004.634	04.004.734
285	04.004.537	04.004.637	04.004.737
300	04.004.540	04.004.640	04.004.740
315	04.004.543	04.004.643	04.004.743
330	04.004.546	04.004.646	04.004.746
345	04.004.549	04.004.649	04.004.749
360	04.004.552	04.004.652	04.004.752
375	04.004.555	04.004.655	04.004.755
390	04.004.558	04.004.658	04.004.758
405	04.004.561	04.004.661	04.004.761
420	04.004.564	04.004.664	04.004.764
435	04.004.567	04.004.667	04.004.767
450	04.004.570	04.004.670	04.004.770
465	04.004.573	04.004.673	04.004.773

∅ 11 mm
∅ 12 mm
∅ 13 mm

*Available nonsterile or sterile packed. Add “S” to the catalogue number to order sterile products.

Expert Tibial Nails, solid

Length mm	∅ 8 mm dark blue	∅ 9 mm dark blue	∅ 10 mm light green
255	04.024.231	04.024.331	04.024.431
270	04.024.234	04.024.334	04.024.434
285	04.024.237	04.024.337	04.024.437
300	04.024.240	04.024.340	04.024.440
315	04.024.243	04.024.343	04.024.443
330	04.024.246	04.024.346	04.024.446
345	04.024.249	04.024.349	04.024.449
360	04.024.252	04.024.352	04.024.452
375	04.024.255	04.024.355	04.024.455
390	04.024.258	04.024.358	04.024.458
405	04.024.261	04.024.361	04.024.461
420	04.024.264	04.024.364	04.024.464
435	04.024.267	04.024.367	04.024.467
450	04.024.270	04.024.370	04.024.470
465	04.024.273	04.024.373	04.024.473

∅ 8 mm
∅ 9 mm

∅ 10 mm

Expert Tibial Nail PROtect

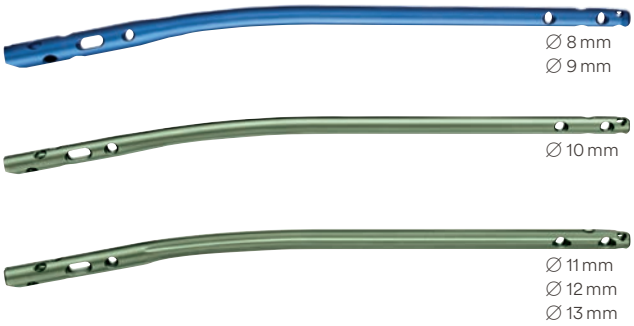
The Expert TN PROtect should be used in cases where there is an increased risk of local bone infections.
For further information refer to the ETN Protect IFU.

Implants

Expert Tibial Nails with PROtect coating, cannulated

Length (mm)	Art. Nr.	Length (mm)	Art. Nr.
255	04.004.X31SAB	360	04.004.X52SAB
270	04.004.X34SAB	375	04.004.X55SAB
285	04.004.X37SAB	390	04.004.X58SAB
300	04.004.X40SAB	405	04.004.X61SAB
315	04.004.X43SAB	420	04.004.X64SAB
330	04.004.X46SAB	435	04.004.X67SAB
345	04.004.X49SAB	450	04.004.X70SAB

Only available in sterile packaging



■ Note:

The Expert Tibial Nail PROtect is available in a variety of diameters. Replace the X in the article numbers above for the desired diameter (B).

X	2	3	4	5	6	7
∅ mm	8	9	10	11	12	13

Locking Screws for Expert Tibial Nail

Cancellous Bone Locking Screws 5.0 mm (gold)*

- Drill 3.2 mm
- Titanium-6% aluminium-7% niobium alloy (TAN)
- Lengths: 30 mm–90 mm (5 mm increments)
- Used for proximal locking in the metaphysis (through the 3 most proximal holes)
- Stardrive SD25 Recess
- Fully threaded
- Self-tapping, blunt tip

Article No.	Length mm
04.015.520	30
04.015.525	35
04.015.530	40
04.015.535	45
04.015.540	50
04.015.545	55
04.015.550	60

Article No.	Length mm
04.015.555	65
04.015.560	70
04.015.565	75
04.015.570	80
04.015.575	85
04.015.580	90

*Available nonsterile or sterile packed. Add “S” to the catalogue number to order sterile products.

Locking Screws 4.0 mm (dark blue)*

- Drill 3.2 mm
- Titanium-6% aluminium-7% niobium alloy (TAN)
- Lengths: 18 mm–80 mm (2 mm increments)
- 3.3 mm core diameter
- Stardrive SD25 Recess
- Fully threaded
- Self-tapping, blunt tip

Article No.	Length mm	Article No.	Length mm
04.005.408	18	04.005.440	50
04.005.410	20	04.005.442	52
04.005.412	22	04.005.444	54
04.005.414	24	04.005.446	56
04.005.416	26	04.005.448	58
04.005.418	28	04.005.450	60
04.005.420	30	04.005.452	62
04.005.422	32	04.005.454	64
04.005.424	34	04.005.456	66
04.005.426	36	04.005.458	68
04.005.428	38	04.005.460	70
04.005.430	40	04.005.462	72
04.005.432	42	04.005.464	74
04.005.434	44	04.005.466	76
04.005.436	46	04.005.468	78
04.005.438	48	04.005.470	80

*Available nonsterile or sterile packed. Add “S” to the catalogue number to order sterile products.

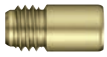
Locking Screws 5.0 mm (light green)*

- Drill 4.2 mm
- Titanium-6% aluminium-7% niobium alloy (TAN)
- Lengths: 26 mm–80 mm (2 mm increments)
  85 mm–100 mm (5 mm increments)
- 4.3 mm core diameter
- Stardrive SD25 Recess
- Fully threaded
- Self-tapping, blunt tip

Article No.	Length mm	Article No.	Length mm
04.005.516	26	04.005.548	58
04.005.518	28	04.005.550	60
04.005.520	30	04.005.552	62
04.005.522	32	04.005.554	64
04.005.524	34	04.005.556	66
04.005.526	36	04.005.558	68
04.005.528	38	04.005.560	70
04.005.530	40	04.005.562	72
04.005.532	42	04.005.564	74
04.005.534	44	04.005.566	76
04.005.536	46	04.005.568	78
04.005.538	48	04.005.570	80
04.005.540	50	04.005.575	85
04.005.542	52	04.005.580	90
04.005.544	54	04.005.585	95
04.005.546	56	04.005.590	100

*Available nonsterile or sterile packed. Add “S” to the catalogue number to order sterile products.

End Caps for Expert Tibial Nails, (gold)*



- Titanium-6% aluminium-7% niobium alloy (TAN)
- Cannulated
- Stardrive SD40 Recess
- Securely lock the most proximal oblique cancellous bone locking screw

0 mm

- Sits flush with end of nail

5 mm, 10 mm and 15 mm extensions

- Extend nail height if nail is overinserted

Article No.	Extension (in mm)
04.004.000	0
04.004.001	5
04.004.002	10
04.004.003	15

Securely locks the second proximal oblique cancellous bone locking screw.

Article No.	Extension (in mm)
04.004.004	0

*Available nonsterile or sterile packed. Add “S” to the catalogue number to order sterile products.

Suprapatellar Insertion Instruments

03.010.404	Connecting Screw, cannulated, for Expert Tibial Nail, for Suprapatellar Approach	
03.010.430	Handle for Protection Sleeve for Expert Tibial Nail, or Suprapatellar Approach	
03.010.433	Centering Sleeve 12.0/3.2, for Expert Tibial Nail, for Suprapatellar Approach	
03.010.434	Centering Sleeve 14.5/3.2, for Expert Tibial Nail, for Suprapatellar Approach	
03.010.435	Protection Sleeve 12.0, for Expert Tibial Nail, for Suprapatellar Approach, straight, for 8.0–11.0 mm Nails	
03.010.436	Protection Sleeve 14.5, for Expert Tibial Nail, for Suprapatellar Approach, traight, for 12.0–13.0 mm Nails	
03.010.437S	Outer Protection Sleeve 12.0, for Expert Tibial Nail, for Suprapatellar Approach, straight, for 8.0–11.0 mm Nails, sterile	

03.010.438S	Outer Protection Sleeve 14.5, for Expert Tibial Nail, for Suprapatellar Approach, straight, for 12.0–13.0 mm Nails, sterile	
03.010.439	Drill Bit ∅ 12.0 mm, cannulated, length 270 mm, 3-flute, for Large Quick Coupling	
03.010.440	Insertion Handle for Expert Tibial Nail, for Suprapatellar Approach	
03.010.441	Aiming Arm for Expert Tibial Nail, for Suprapatellar Approach	
03.010.442	Protection Sleeve 12.0/8.0, self-holding	
03.010.443	Compression Tool for Expert Tibial Nail, for Suprapatellar Approach	

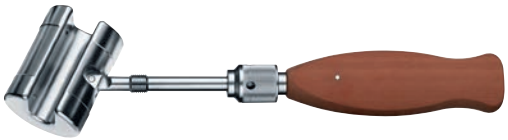
03.010.444	Inter-Lock Screwdriver, hexagonal ∅ 8.0 mm, cannulated	
03.010.445	Inter-Lock Screwdriver Stardrive, SD40	
03.010.446	Extraction Screw for Expert Tibial Nail, for Suprapatellar Approach	
03.010.447	Screwdriver Stardrive, SD40, cannulated, long	
03.010.455	Trocar ∅ 12.0 mm, for Expert Tibial Nail, for Suprapatellar Approach, PEEK	
03.010.456	Trocar ∅ 14.5 mm, for Expert Tibial Nail, for Suprapatellar Approach, PEEK	
03.010.475	Connector for Insertion Handle for PFNA	

Standard Instruments

03.010.021	Radiographic Ruler for Expert Tibial Nail	
357.399	Guide Wire ∅ 3.2 mm, length 400 mm	
393.100	Universal Chuck with T-Handle	
03.010.008	Cutter for Tibial Nails, ∅ 12.0 mm, length 350 mm	
03.010.035	Protection Sleeve 14.0/12.0, for Nos. 03.010.008 and 03.010.036	
03.010.044	Connecting Screw, cannulated, for Expert Tibial and Femoral Nails, for No. 03.010.045	

03.010.092	Screwdriver, hexagonal with spherical head ∅ 8.0 mm	
03.010.093	Rod Pusher for Reaming Rod with Hexagonal Screwdriver ∅ 8.0 mm	
03.010.047	Connector, for Insertion Handle	
321.160	Combination Wrench ∅ 11 mm	
321.170	Pin Wrench ∅ 4.5 mm, length 120 mm	
357.220	Hammer Guide, for No. 357.250 (*)	

(*) Also suitable for No. 03.010.056

03.010.056	Combined Hammer, 700 g, can be mounted, for No. 357.220	
357.398	Shaft, hexagonal ∅ 8.0 mm, cannulated, short, length 125 mm	
03.010.100	Drill Bit ∅ 3.2 mm, calibrated, length 145 mm, 3-flute, with Coupling for RDL	
03.010.101	Drill Bit ∅ 4.2 mm, calibrated, length 145 mm, 3-flute, with Coupling for RDL	
03.010.106	Direct Measuring Device for Drill Bits of length 145 mm, for Nos. 03.010.100 to 03.010.105	
03.010.107	Screwdriver Stardrive, SD25, length 330 mm	
03.010.112	Holding Sleeve, with Locking Device	

03.010.018	Aiming Arm for Expert Tibial Nail	
03.010.063	Protection Sleeve 12.0/8.0, length 188 mm	
03.010.064	Drill Sleeve 8.0/3.2, for No. 03.010.063	
03.010.065	Drill Sleeve 8.0/4.2, for No. 03.010.063	
03.010.069	Trocar ∅ 3.2 mm, for No. 03.010.064	
03.010.070	Trocar ∅ 4.2 mm, for No. 03.010.065	

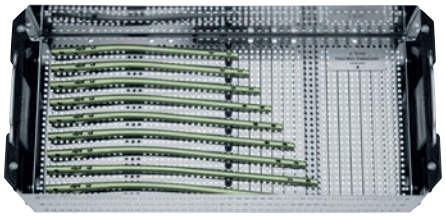
Optional Instruments

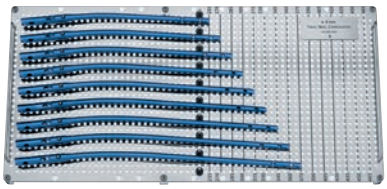
189.060	SynReam Intramedullary Reaming System in Vario Case	
03.010.103	Drill Bit ∅ 3.2 mm, calibrated, length 145 mm, 3-flute, for Quick Coupling	
03.010.104	Drill Bit ∅ 4.2 mm, calibrated, length 145 mm, 3-flute, for Quick Coupling	
03.010.009	Protection Sleeve 12.0/8.0, length 128 mm	
03.010.073	Drill Sleeve 8.0/3.2, for No. 03.010.009	
03.010.074	Drill Sleeve 8.0/4.2, for No. 03.010.009	

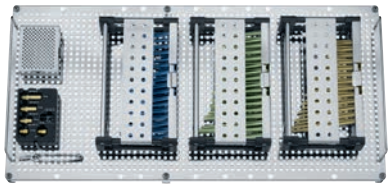
03.010.098	Trocar ∅ 3.2 mm, for No. 03.010.073	
03.010.099	Trocar ∅ 4.2 mm, for No. 03.010.074	
03.010.122	Drill Bit ∅ 3.2 mm, calibrated, length 270 mm, 3-flute, for Quick Coupling, for No. 03.010.073	
03.010.123	Drill Bit ∅ 4.2 mm, calibrated, length 270 mm, 3-flute, for Quick Coupling, for No. 03.010.074	
03.010.019	Depth Gauge for Locking Screws, measuring range up to 110 mm, for No. 03.010.009	
511.300	Radiolucent Drive	

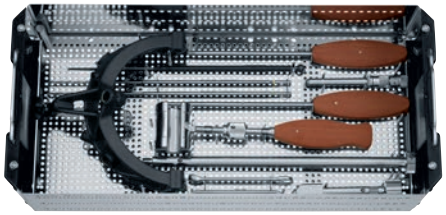
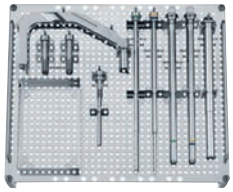
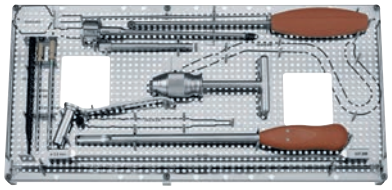
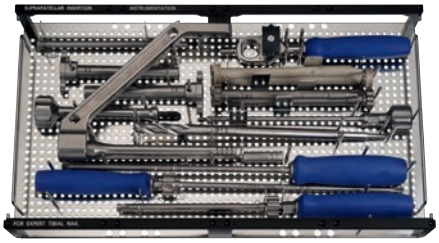
Vario Case

68.004.001 Vario Case for Expert Tibial Nails (Titanium Alloy), incl. Locking Screws and End Caps, without Lid, without Contents





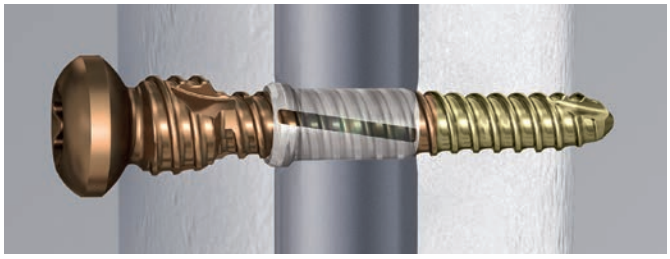


68.004.002	Vario Case for Standard Instruments for Expert Tibial Nail, without Lid, without Contents	  
68.004.003	Vario Case for Radiolucent Instruments for Expert Tibial Nail, without Lid, without Contents (not shown here)	
68.010.401	Vario Case for Suprapatellar Insertion Instruments	

Optional: Angular Stable Locking System (ASLS)

What is ASLS?

The Angular Stable Locking System (ASLS) provides the ability to create a fixed-angle construct to an intramedullary tibial nail. ASLS together with an intramedullary tibial nail form the principle of the Intramedullary Fixator.

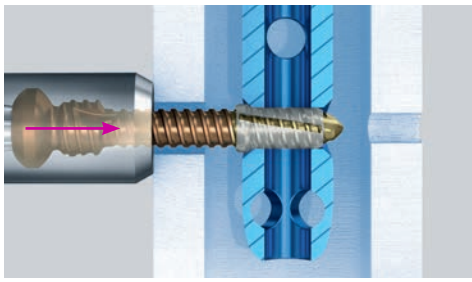


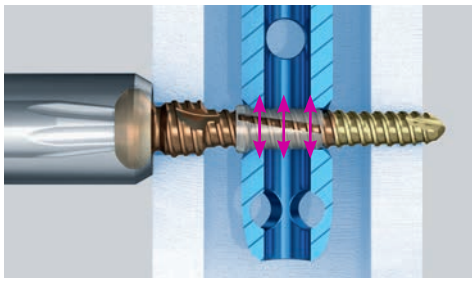
How does ASLS work?

The system consists of a screw with three outer diameters and a resorbable sleeve.

The resorbable sleeve is placed on the screw tip which has the smallest screw diameter and is pushed into the locking hole of the nail.

During screw advancement, the resorbable sleeve is expanded by the larger middle diameter.





Where can I use ASLS?

ASLS is particularly indicated in cases where increased stability is needed, for example in fractures closer to the metaphyseal area or in osteopenic bone.

ASLS can be used in combination with DePuy Synthes cannulated titanium tibial nails as an alternative to standard locking screws.


Expert Tibial Nail (TN)

ASLS screws

- Titanium-6% aluminium-7% niobium alloy (TAN)
- Fully threaded shaft with 3 diameters
- Self-tapping, blunt tip
- Stardrive SD25 Recess
- Sterile-packed

ASLS sleeves

- 70:30 poly (L-lactide-co-D,L-lactide)
- Bioresorbable
- Inner thread for fit to screw
- Expands in nail locking hole
- Available in diameters of 4.0 mm (ASLS4), and 5.0 mm (ASLS5)
- Sterile-packed

■ Note:

For more details regarding the intramedullary fixator principle, please consult the ASLS surgical technique.

MRI Information

Torque, Displacement and Image Artifacts according to ASTM F 2213-06, ASTM F 2052-14 and ASTM F2119-07

Non-clinical testing of worst case scenario in a 3 T MRI system did not reveal any relevant torque or displacement of the construct for an experimentally measured local spatial gradient of the magnetic field of 3.69 T/m. The largest image artifact extended approximately 169 mm from the construct when scanned using the Gradient Echo (GE). Testing was conducted on a 3 T MRI system.

Radio-Frequency-(RF-)induced heating according to ASTM F2182-11a

Non-clinical electromagnetic and thermal testing of worst case scenario lead to peak temperature rise of 9.5 °C with an average temperature rise of 6.6 °C (1.5 T) and a peak temperature rise of 5.9 °C (3 T) under MRI Conditions using RF Coils (whole body averaged specific absorption rate [SAR] of 2 W/kg for 6 minutes [1.5 T] and for 15 minutes [3 T]).

▲ Precautions:

The above mentioned test relies on non-clinical testing. The actual temperature rise in the patient will depend on a variety of factors beyond the SAR and time of RF application. Thus, it is recommended to pay particular attention to the following points:

- It is recommended to thoroughly monitor patients undergoing MR scanning for perceived temperature and/or pain sensations.
- Patients with impaired thermoregulation or temperature sensation should be excluded from MR scanning procedures.
- Generally, it is recommended to use a MR system with low field strength in the presence of conductive implants. The employed specific absorption rate (SAR) should be reduced as far as possible.
- Using the ventilation system may further contribute to reduce temperature increase in the body.

Not all products are currently available in all markets.
This publication is not intended for distribution in the USA.
Intended use, Indications and Contraindications can be found in the corresponding system Instructions for Use.
All Surgical Techniques are available as PDF files at www.depuysynthes.com/ifu

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