Expert Nailing System With Radiolucent Instrumentation

Titanium Cannulated Retrograde/Antegrade Femoral Nail

Surgical Technique
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Introduction</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>AO Principles</strong></td>
<td>4</td>
</tr>
<tr>
<td><strong>Indications</strong></td>
<td>5</td>
</tr>
<tr>
<td><strong>Clinical Cases</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>Preoperative Planning</strong></td>
<td>7</td>
</tr>
<tr>
<td><strong>Surgical Technique—Retrograde Approach</strong></td>
<td>9</td>
</tr>
<tr>
<td><strong>Opening the Distal Femur</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Reaming (optional)</strong></td>
<td>16</td>
</tr>
<tr>
<td><strong>Insert Nail</strong></td>
<td>19</td>
</tr>
<tr>
<td><strong>Standard Locking</strong></td>
<td>23</td>
</tr>
<tr>
<td><strong>Spiral Blade Locking</strong></td>
<td>30</td>
</tr>
<tr>
<td><strong>Freehand Locking</strong></td>
<td>35</td>
</tr>
<tr>
<td><strong>Surgical Technique—Antegrade Approach</strong></td>
<td>42</td>
</tr>
<tr>
<td><strong>Opening the Proximal Femur</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Insert Nail</strong></td>
<td>49</td>
</tr>
<tr>
<td><strong>Standard Locking</strong></td>
<td>53</td>
</tr>
<tr>
<td><strong>Freehand Locking</strong></td>
<td>55</td>
</tr>
<tr>
<td><strong>Implant Removal (optional)</strong></td>
<td>56</td>
</tr>
<tr>
<td><strong>Product Information</strong></td>
<td>62</td>
</tr>
<tr>
<td><strong>Implants</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Instruments</strong></td>
<td>71</td>
</tr>
<tr>
<td><strong>Set Lists</strong></td>
<td>78</td>
</tr>
</tbody>
</table>

**MR Information**
The Titanium Cannulated Retrograde/Antegrade Femoral Nail has not been evaluated for safety and compatibility in the MR environment. It has not been tested for heating, migration or image artifact in the MR environment. The safety of the Titanium Cannulated Retrograde/Antegrade Femoral Nail in the MR environment is unknown. Scanning a patient who has this device may result in patient injury.
Advanced solutions

Nail features

- Universal design for retrograde and antegrade insertion in left or right femur
- Anatomic anteroposterior (AP) curvature for ease in insertion and extraction
- Cannulated nails enable insertion over a guide wire, for reamed or unreamed techniques

- All DePuy Synthes 2.5 mm or 3.0 mm ball-tipped reaming rods may be removed through the nail and insertion handle assembly (no exchange tube required)
- Nail diameters from 9.0 mm to 15.0 mm and lengths ranging from 160 mm to 480 mm

- Multiple locking options for static, dynamic, standard and spiral blade locking
- Intraoperatively choose between spiral blade locking (with one spiral blade and one locking screw) and standard locking (with two locking screws)
- Titanium alloy*

End caps for Femoral Nails—EX (gray)

- Self-retaining T40 StarDrive™ Recess facilitates secure end cap pick-up and insertion
- End cap protects the nail connection threads from bone ingrowth and facilitates nail removal
- 0 mm end cap sits flush with nail and securely locks most distal locking screw (retrograde) to create a fixed-angle construct

- 5, 10, 15 and 20 mm end caps extend nail height if nail is overinserted
- Titanium alloy*

End caps for Femoral Nails—EX

Spiral Blade Locking (gold)

- Self-retaining T40 StarDrive Recess facilitates secure end cap pick-up and insertion
- Securely locks with spiral blade, to create a fixed-angle construct
- Sits flush with end of nail
- Titanium alloy*

* Titanium-6% aluminum-7% niobium alloy
Titanium Cannulated Retrograde/Antegrade Femoral Nail
Expert Nailing System With Radiolucent Instrumentation

**Spiral blades**
- Cannulated for use over a 3.2 mm guide wire
- 12.5 mm blade diameter
- Front-cutting end
- Increased surface area provides increased stability, even in osteoporotic bone
- Securely locks with spiral blade end cap to create a fixed-angle construct
- Titanium alloy* for improved mechanical and fatigue properties

**Locking screws**
- Double-lead thread for ease of insertion
- Thread closer to screw head providing better bone purchase and improved stability
- Self-retaining StarDrive Recess allows improved torque transmission and increased resistance to stripping relative to a hex recess, and secure locking screw pick-up
- Titanium alloy* for improved mechanical and fatigue properties
- 5.0 mm diameter, for 9.0 mm–13.0 mm diameter nails
- 6.0 mm diameter, for 14.0 mm and 15.0 mm diameter nails
- Lengths:
  - 26 mm–100 mm for 5.0 mm locking screws
  - 26 mm–125 mm for 6.0 mm locking screws

---


* Titanium-6% aluminum-7% niobium alloy
In 1958, the AO formulated four basic principles, which have become the guidelines for internal fixation.\textsuperscript{2,3}

**Anatomic reduction**
Fracture reduction and fixation to restore anatomical relationships.

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

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

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


The Titanium Cannulated Retrograde Femoral Nail and Retrograde/Antegrade Femoral Nail–EX are indicated to stabilize fractures of the distal femur and the femoral shaft, including:

- Supracondylar fractures, including those with intra-articular extension
- Ipsilateral hip/shaft fractures
- Ipsilateral femur/tibia fractures
- Femoral fractures in multiple trauma patients
- Fractures proximal to a total knee arthroplasty
- Fractures distal to a hip implant
- Fractures in the morbidly obese patient
- Fractures in osteoporotic bone
- Impending pathologic fractures
- Malunions and nonunions

Fracture zone for retrograde nail insertion

Fracture zone for antegrade nail insertion
Clinical Cases

Case 1
Retrograde approach – standard locking

Case 2
Retrograde approach – spiral blade locking

Case 3
Antegrade approach – standard locking
Preoperative Planning

Use the AO preoperative planner template for the Retrograde Femoral Nail–EX or Retrograde/Antegrade Femoral Nail–EX to estimate nail diameter, nail length and spiral blade length.

To estimate nail diameter, place the template on the AP or lateral x-ray of the uninjured femur and measure the diameter of the medullary canal at the narrowest part that will contain the nail.

To estimate nail length, place the template on the AP x-ray of the uninjured femur and select the appropriate nail length based on patient anatomy or previous implant.

To estimate spiral blade length, place the template on the AP x-ray of the uninjured femoral condyles and select a spiral blade length that ends flush with the medial surface.

When selecting nail size, consider canal diameter, fracture pattern, patient anatomy and postoperative protocol.

**Note:** Templates are available in two sizes: actual size and 115% magnification, in which the image is enlarged 15% to correspond to typical radiographic magnification; however, variations in magnification levels are common.
Retrograde Approach—Locking Options

Retrograde insertion

Standard locking

Spiral blade locking
Retrograde Approach—Opening the Distal Femur

1. **Position patient**

   Position the patient supine on a radiolucent or fracture table. The knee of the injured leg should be flexed 30°–40°. A leg roll may be used to allow proper reduction and stabilization of the fracture.

   ![Image](image_url)

   Position the image intensifier to allow visualization of the proximal and distal femur in AP and lateral views.

2. **Reduce fracture**

   **Instrument**
   - 394.35* Large Distractor

   ![Image](image_url)

   Perform closed reduction manually by axial traction under image intensification. The use of the large distractor or other reduction instrumentation may be appropriate in certain circumstances.

   **Note:** Intra-articular fractures should be stabilized with interfragmentary screw fixation before insertion of the nail. The screws should be positioned to not interfere with the path of the nail.

* Also available
Confirm nail length

Instruments

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.020</td>
<td>Radiographic Ruler, for Titanium Cannulated Femoral Nails</td>
</tr>
<tr>
<td>03.010.023</td>
<td>Radiographic Canal Width Estimator</td>
</tr>
</tbody>
</table>

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

Position the image intensifier for an AP view of the distal femur. Using long forceps, hold the ruler parallel to the femur on the lateral side of the upper leg at the level of the femur. Position the ruler with the distal end at the desired nail insertion depth. Mark the skin at that site.

Move the image intensifier toward the proximal end of the femur, align the distal end of the ruler with the skin marking and take an AP image of the proximal femur. Verify fracture reduction. Read the required nail length directly from the ruler as it appears on the x-ray.

Precautions:
- It is recommended that the tip of the nail is at least 5cm above the most proximal extension of the fracture zone. Attention must be paid in the area 4 to 6 cm below the Lesser Trochanter because of the A. Femoralis and the branches of the N. Femoralis. In cases where such long nails (>320 mm) are used, it is recommended to place the AP locking as proximal as possible and above the Lesser Trochanter.
- The possibility of dynamisation must also be considered when determining the nail length and a correspondingly shorter nail should be chosen. The locking screw in the dynamic locking option can move by up to 5 mm distally.

Alternative techniques
Determine nail length using the above procedure on the uninjured leg before draping (nonsterile).

Insert a reaming rod into the medullary canal of the injured leg and use an identical length reaming rod to determine the length.
Confirm nail diameter

Position the image intensifier for an AP or lateral view of the femur at the level of the isthmus. Hold the radiographic ruler over the femur so that the diameter gauge is centered over the narrowest part of the medullary canal. Read the diameter measurement on the circular indicator that fills the canal.

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

Approach

Make a medial parapatellar incision. Retract the patellar tendon laterally.
Determine entry point

The entry point for the Retrograde/Antegrade Femoral Nail—EX is in line with the medullary canal. The entry point is at the top of the intercondylar notch, just anterior and lateral to the femoral attachment of the posterior cruciate ligament.

The entry point determines the anatomic position of the nail in the medullary canal. Special care should be taken to ensure an accurate entry point.
Insert guide wire

Instruments

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.115</td>
<td>3.2 mm Guide Wire, 290 mm</td>
</tr>
<tr>
<td>03.010.500</td>
<td>Handle for Wire Guides/Protection Sleeves</td>
</tr>
<tr>
<td>03.010.502</td>
<td>13 mm Protection Sleeve for Retrograde Nail</td>
</tr>
<tr>
<td>03.010.507</td>
<td>Wire Guide for 13 mm Protection Sleeve for Retrograde Nail</td>
</tr>
</tbody>
</table>

Assemble the handle, protection sleeve and wire guide. Insert the assembly through the incision to the bone. Hold the protection sleeve firmly and insert the guide wire through the central hole in the wire guide.

Insert the guide wire for approximately 10 cm to 15 cm in line with the anatomic axis of the femur, which is 7° to 9° lateral to a line perpendicular to the articular surface.
Verify guide wire position under image intensification with AP and lateral views.

If the position of the initial wire must be altered, adjust wire guide to the desired position and insert a second guide wire into guide.

Remove the first wire and wire guide.

**Alternative instrument**

03.037.008*  8.0 mm Cannulated Curved Awl

In place of a guide wire, the medullary canal can be initially opened with the curved awl. After opening the canal, insert a reaming rod through the curved awl.

*Also available
Open medullary canal

**Instrument**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>351.27</td>
<td>13.0 mm Cannulated Drill Bit, 300 mm</td>
</tr>
</tbody>
</table>

Pass the drill bit over the guide wire or reaming rod and through the protection sleeve to the bone. Drill to a depth of approximately 3 cm to 5 cm.

**Precautions:**

- The use of the drill bit for opening the medullary canal is suitable for 9.0 mm to 12.0 mm nails. For the larger 13.0 mm to 15.0 mm nails, the use of a reaming system is recommended.
- Take care not to plunge the drill bit into the fracture site, as this may displace the fracture.

Remove the drill bit and protection sleeve.

Dispose of the guide wire. Do not reuse.

**Alternative instrument**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.041</td>
<td>14.0 mm Cannulated Awl</td>
</tr>
</tbody>
</table>

Alternatively, the awl may be used to open the medullary canal. Remove the protection sleeve. Pass the awl over the guide wire and open the medullary canal.

**Precautions:**

- The use of the awl for opening the medullary canal is suitable for 9.0 mm to 13.0 mm nails. For the larger, 14.0 mm and 15.0 mm nails, the use of a reaming system is recommended.
- Take care not to plunge the awl into the fracture site, as this may displace the fracture.

Remove the awl.

Dispose of the guide wire. Do not reuse.
Retrograde Approach—Reaming (optional)

Ream medullary canal (optional)

**Required set**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>150.060</td>
<td>Flexible Reamer Set for IM Nails</td>
</tr>
</tbody>
</table>

**Alternative set**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>105.309</td>
<td>Reamer/Irrigator/Aspirator Instrument Set</td>
</tr>
</tbody>
</table>

**Instruments**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.024*</td>
<td>Holding Device, for Guide Wires and Reaming Rods</td>
</tr>
<tr>
<td>03.010.093</td>
<td>Reaming Rod Push Rod with Ball Handle</td>
</tr>
<tr>
<td>351.706S*</td>
<td>2.5 mm Reaming Rod with Ball Tip, 950 mm, sterile</td>
</tr>
<tr>
<td>351.707S*</td>
<td>2.5 mm Reaming Rod with Ball Tip and Extension, 950 mm, sterile</td>
</tr>
<tr>
<td>351.708S*</td>
<td>2.5 mm Reaming Rod with Ball Tip, 1150 mm, sterile</td>
</tr>
<tr>
<td>351.782*</td>
<td>Holding Forceps</td>
</tr>
<tr>
<td>360.251</td>
<td>7.5 mm IM Reduction Tool</td>
</tr>
<tr>
<td>393.10</td>
<td>Universal Chuck with T-Handle</td>
</tr>
</tbody>
</table>

*Also available

If necessary, enlarge the femoral canal with the medullary reamer up to the desired diameter.

Check fracture reduction with the image intensifier.
Inserting the reaming rod

Insert the reaming rod with ball tip into the medullary canal, using the holding device or T-handle chuck, to the desired nail insertion depth.

If using the holding device, set the thumb switch to the ‘RELEASE’ or ‘LOCK’ position (Figure 1).

Insert guide wire/reaming rod. Apply force to the lever as far from the pivot as possible (Figure 2).

RELEASE position: The clamp will free the wire upon releasing the handle (Figure 3).

LOCK position: The clamp will retain the wire. The device will click when set to the LOCK position.

**Note:** To release a wire retained in the LOCK position, apply force to the lever on its lower end, then push the thumb switch to the RELEASE position (Figure 3). This relaxes the engagement of the locking mechanism by deflecting the lever.

To bend reaming rods, insert the extension tip into ‘reaming rod’ hole on the back of the handle. Bend until the reaming rod contacts the handle. This allows for a 15° bend on the reaming rod tip (Figure 4).
Reaming
Starting with the 8.5 mm diameter reaming head, ream to a diameter of 0.5 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.

The holding forceps can be used to control the rotation of the reaming rod.

Precaution: All Expert Retrograde/Antegrade Femoral Nails can be inserted over the reaming rod. The tip of the reaming rod must be correctly positioned in the medullary canal since it determines the final proximal position of the nail.

Optional technique
Use the reaming rod push rod to help retain the reaming rod during reamer extraction.

A reaming rod exchange tube is not required.

Ensure the reaming rod is positioned properly in the medullary canal. This defines the final position of the nail in the canal.
Assemble insertion instruments

<table>
<thead>
<tr>
<th>Instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.093 Reaming Rod Push Rod (in Reaming Set)</td>
</tr>
<tr>
<td>03.010.146 Cannulated Connecting Screw, for 100 mm Insertion Handle</td>
</tr>
<tr>
<td>03.010.486 Radiolucent Insertion Handle for Expert Nails, 100 mm</td>
</tr>
</tbody>
</table>

Slide the connecting screw onto the reaming rod push rod until it is secured and insert it into the insertion handle. Match the tang of the handle to the notch of the nail.

The anterior bow of the nail must be aligned with the anterior bow of the femur. Orient the insertion handle anteriorly, match the notch on the insertion handle to the nail, and tighten the connecting screw.
Alternative instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.487*</td>
<td>Radiolucent Percutaneous Insertion Handle for Expert Nails, 175 mm</td>
</tr>
<tr>
<td>03.010.499*</td>
<td>Cannulated Connecting Screw, for 175 mm Percutaneous Insertion Handle</td>
</tr>
<tr>
<td>03.010.517</td>
<td>T-Handle Ball Hex Screwdriver, 8 mm</td>
</tr>
</tbody>
</table>

Use the ball hex screwdriver to assemble the insertion instruments to the nail.

Slide the connecting screw onto the reaming rod push rod until it is secured and insert it into the insertion handle. Match the tang of the handle to the notch of the nail.

* Also available
2

Insert nail

Using the insertion handle, insert the nail, over the reaming rod if used, into the medullary canal as far as possible by hand. Small twisting motions can help advance the nail.

Monitor nail passage across the fracture, control in two planes to avoid malalignment. Use the insertion assembly to manipulate the nail across the fracture. Verify fracture reduction.

Insert the nail until the distal end is inserted 5 mm to 10 mm beyond the articular cartilage. Insertion depth is indicated by the grooves on the insertion handle.

Insertion depth can be verified with a lateral image. Use Blumensaat’s line as a reference. Check the final position of the nail in AP and lateral views.

Note: For distal locking, mount the aiming arm after the nail has been completely inserted, otherwise the aiming arm may loosen during nail insertion.
If necessary, insert the nail with light hammer blows. Thread the driving cap into the insertion handle in the first (medial) slot and tighten it to the insertion handle, using the pin or ratchet wrench.

If necessary, the hammer guide can be threaded onto the driving cap and the hammer can be used as a slide hammer.

**Note:** If insertion is difficult, choose a nail with a smaller diameter or enlarge the entry canal by reaming the medullary canal to a larger diameter.

**Notes:**
- Do not strike the insertion handle directly.
- Confirm that the nail is securely connected to the insertion handle, especially after hammering, using either the 8 mm ball hex screwdriver or the cannulated shaft with 8 mm hex.
## Choose locking screws and instruments

Choose the locking screws and instruments appropriate for the nail size.

<table>
<thead>
<tr>
<th>Nail diameter</th>
<th>Locking screws</th>
<th>Protection sleeve</th>
<th>Drill sleeve</th>
<th>Trocar</th>
<th>Calibrated drill bit</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.0 mm–13.0 mm</td>
<td>5.0 mm (green)</td>
<td>12.0 mm/8.0 mm (03.010.063)</td>
<td>8.0 mm/4.2 mm (03.010.065)</td>
<td>4.2 mm (03.010.070)</td>
<td>4.2 mm (03.010.061)</td>
</tr>
<tr>
<td>(green)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14.0 mm and 15.0 mm</td>
<td>6.0 mm (aqua)</td>
<td>12.0 mm/8.0 mm (03.010.063)</td>
<td>8.0 mm/5.0 mm (03.010.066)</td>
<td>5.0 mm (03.010.071)</td>
<td>5.0 mm (03.010.062)</td>
</tr>
</tbody>
</table>
2

Connect aiming arm

Instrument

| 03.010.481 | Radiolucent Aiming Arm, for Retrograde Standard Locking |
| 357.398    | Cannulated Shaft with 8 mm hex |

Attach the aiming arm to the insertion handle.

**Notes:**

– Do not strike the insertion handle directly.

– Confirm that the nail is securely connected to the insertion handle, especially after hammering, using either the 8 mm ball hex screwdriver or the cannulated shaft with 8 mm hex.

**Precaution:** Do not exert force on the aiming arm, protection sleeve, drill sleeves and drill bits. These forces may prevent accurate targeting through the locking holes and damage the drill bits.
3

Insert trocar combination

Instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.063</td>
<td>12.0 mm/8.0 mm Protection Sleeve</td>
</tr>
<tr>
<td>03.010.065</td>
<td>8.0 mm/4.2 mm Drill Sleeve</td>
</tr>
<tr>
<td>03.010.066</td>
<td>8.0 mm/5.0 mm Drill Sleeve</td>
</tr>
<tr>
<td>03.010.070</td>
<td>4.2 mm Trocar</td>
</tr>
<tr>
<td>03.010.071</td>
<td>5.0 mm Trocar</td>
</tr>
</tbody>
</table>

Assemble the three-part trocar combination (protection sleeve, drill sleeve and trocar) and insert it through the desired LM hole in the aiming arm. The cam lock lever must be in the unlocked position to insert the assembly. Make a stab incision and insert the trocar to the bone.

Alternative instrument

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.491</td>
<td>Scalpel Handle, Long</td>
</tr>
</tbody>
</table>

The scalpel handle may be used through the aiming arm for precise placement of the incision.

Remove the trocar.
Retrograde Approach—Standard Locking

4

Drill and measure for locking screw length

<table>
<thead>
<tr>
<th>Instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.061</td>
</tr>
<tr>
<td>03.010.062</td>
</tr>
</tbody>
</table>

Ensure that the drill sleeve is pressed firmly to the near cortex. Using the appropriate drill bit (see table, Step 1), 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 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 instruments**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.428</td>
<td>Depth Gauge, for Locking Screws to 100 mm</td>
</tr>
<tr>
<td>or</td>
<td>Depth Gauge, for Locking Screws to 100 mm</td>
</tr>
<tr>
<td>03.010.072*</td>
<td>Depth Gauge, for Locking Screws to 100 mm</td>
</tr>
</tbody>
</table>

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

Ensure that the Protection sleeve is pressed firmly to the near cortex and depress the cam lock lever to lock the protection sleeve in position.

Disassemble the depth gauge into two parts: the sleeve and the slider with hook. Insert the slider with hook into the protection sleeve. Make sure that the hook is just beyond the far cortex.

Confirm depth gauge position in the far cortex of the femur. Read the measurement from the back of the protection sleeve, to determine the appropriate length locking screw.

* Also available
5

Insert locking screw

Instrument

03.010.518  StarDrive Screwdriver, T25, self-retaining, 320 mm

Use the screwdriver to insert the appropriate length locking screw through the protection sleeve, until the head of the locking screw lies against the near cortex and the tip of the locking screw projects no more than 2 mm beyond the far cortex.

Repeat Steps 3 through 5 for the second distal locking screw.

Remove the nail insertion instruments.

Alternative technique

Instrument

03.010.472*  Inter-lock Screwdriver, 330 mm

Ensure that the slider of the screwdriver is fully retracted. Seat the inter-lock screwdriver tip in the appropriate length screwhead recess. Turn the nut clockwise until the tip of the slider is fully wedged into the screwhead recess.

Always use the standard screwdriver for final tightening of the screw.

To disengage the screw from the screwdriver, turn the nut counter-clockwise until the slider is ejected from the screwhead recess.

* Also available
6

**Insert end cap**

**Instrument**

<table>
<thead>
<tr>
<th>Item Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.520</td>
<td>Cannulated StarDrive Screwdriver, T40, self-retaining, 277 mm</td>
</tr>
</tbody>
</table>

**Alternative instrument**

<table>
<thead>
<tr>
<th>Item Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.515*</td>
<td>Inter-lock Screwdriver, T40, 377 mm</td>
</tr>
</tbody>
</table>

Engage the gray end cap with the cannulated T40 StarDrive Screwdriver by exerting axial pressure, or attach to the T40 inter-lock screwdriver. 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. Thread the end cap into the nail until it engages the most distal screw.

The end cap can be inserted through the insertion handle (with the connecting screw removed) to aid in aligning the end cap with the top of the nail.

Always use the standard screwdriver for final tightening of the end cap.

**Alternative instrument**

<table>
<thead>
<tr>
<th>Item Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.115</td>
<td>3.2 mm Guide Wire, 290 mm</td>
</tr>
</tbody>
</table>

The end cap and screwdriver are cannulated for use over a guide wire, if necessary.

Follow the procedure described above.

**Precaution:** Utilize the gray Titanium End Cap, 0 mm extension, for Femoral Nails—EX (04.003.000) to protect the nail connection threads from bone ingrowth. This facilitates nail removal and locks the most distal screw, providing a stable, fixed-angle construct.

* Also available
Retrograde Approach—Spiral Blade Locking

1
Connect aiming arm

**Instrument**

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.489</td>
<td>Aiming Arm, for Retrograde Spiral Blade Locking</td>
</tr>
</tbody>
</table>

Attach the aiming arm to the insertion handle.

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

**Insert superior locking screw**

When using the spiral blade locking option, the superior locking screw must be inserted first. Refer to “Retrograde Approach—Standard Locking,” Steps 3 through 5, pages 24–26.

2
Insert spiral blade protection sleeve and wire guide

**Instruments**

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.081</td>
<td>15.0 mm/13.0 mm Protection Sleeve, for Spiral Blade Aiming Arm</td>
</tr>
<tr>
<td>03.010.082</td>
<td>13.0 mm/3.2 mm Wire Guide, for Spiral Blade Aiming Arm</td>
</tr>
</tbody>
</table>

Assemble the protection sleeve and wire guide. Insert the sleeve combination into the aiming arm. Make a lateral stab incision and advance the sleeves to the bone.
3

**Insert guide wire**

**Instrument**

| 03.010.115  | 3.2 mm Guide Wire, 290 mm |

Insert a guide wire through the sleeve combination into the femoral condyles until the tip is flush with the medial cortex.

Confirm guide wire position radiographically.

**Precaution:** When monitoring the position of the guide wire in AP view, the trapezoidal shape of the condyles must be taken into account. Turning the leg slightly, for a better view of the guide wire tip with respect to the medial cortex, will ensure an accurate measurement.
4
**Measure for spiral blade length**

**Instrument**

- 03.010.492  Spiral Blade Measuring Device, for Retrograde Femoral Nails—EX
- or
- 03.010.083*  Spiral Blade Measuring Device, for Retrograde Femoral Nails—EX

Remove the wire guide.

Place the measuring device over the guide wire and advance it to the bone. Read the graduation of the measuring device at the end of the guide wire to determine the appropriate length of the spiral blade.

Remove the measuring device.

5
**Open lateral cortex**

**Instrument**

- 351.27  13.0 mm Cannulated Drill Bit, 300 mm

Insert the drill bit over the guide wire and through the protection sleeve to perforate the lateral cortex. An automatic stop prevents the drill bit from penetrating too far.

Remove the drill bit and the protection sleeve.

* Also available
6

Insert spiral blade

Instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.084</td>
<td>Spiral Blade Inserter, for Retrograde Femoral Nails–EX</td>
</tr>
<tr>
<td>03.010.522</td>
<td>Spiral combination Hammer, 500 grams</td>
</tr>
<tr>
<td>357.34</td>
<td>Connecting Screw, for Spiral Blade Inserter</td>
</tr>
</tbody>
</table>

Use the connecting screw to attach the appropriate length spiral blade to the spiral blade inserter.

Pass the spiral blade assembly over the guide wire. Advance the inserter through the aiming arm, ensuring engagement of the inserter's helical grooves with the mating pins of the aiming arm.

Manually advance the spiral blade to the bone.

Use light, controlled blows of the slide/fixed hammer, in the fixed position, to seat the spiral blade.

Monitor advancement radiographically.

The correct insertion depth is reached when the spiral blade head is flush with the lateral cortex.

Remove the cannulated connecting screw that attaches the insertion handle to the nail. Do not remove the connecting screw for the spiral blade inserter.
7

Insert end cap

Instrument

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.520</td>
<td>Cannulated StarDrive Screwdriver, T40, self-retaining, 277 mm</td>
</tr>
</tbody>
</table>

Alternative instrument

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.515*</td>
<td>Inter-lock Screwdriver, T40, 377 mm</td>
</tr>
</tbody>
</table>

Engage the gold cannulated end cap with cannulated T40 StarDrive Screwdriver by exerting axial pressure, or attach to the T40 inter-lock screwdriver. 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. Thread the end cap into the nail until it engages the spiral blade.

Always use the standard screwdriver for final tightening of the end cap.

Precaution: The use of the gold end cap for spiral blade is mandatory. It protects the nail connection threads from bone ingrowth and locks the spiral blade, providing a stable fixed-angle construct.

The end cap can be inserted through the insertion handle (with the cannulated connecting screw removed) to aid in aligning the end cap with the nail.

8

Remove the spiral blade inserter

Remove the spiral blade connecting screw, then loosen the black thumb screw on the aiming arm. Remove the aiming arm and spiral blade inserter simultaneously.

Remove the insertion handle.

* Also available
Retrograde Approach—Freehand Locking

1

Choose locking screws and instruments

Choose the locking screws and instruments appropriate for the nail diameter.

<table>
<thead>
<tr>
<th>Nail diameter</th>
<th>Locking screws</th>
<th>Drill bit</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.0 mm–13.0 mm (green)</td>
<td>5.0 mm (green)</td>
<td>4.2 mm (03.010.104 or 03.010.101*)</td>
</tr>
<tr>
<td>14.0 mm and 15.0 mm (aqua)</td>
<td>6.0 mm (aqua)</td>
<td>5.0 mm (03.010.105 or 03.010.102*)</td>
</tr>
</tbody>
</table>

For short nails (160 mm–200 mm lengths), use the two LM holes for proximal locking.

For intermediate and long nails (220 mm–480 mm lengths), use the AP hole and AP slot for proximal locking. The dynamic locking option corresponds to the proximal position of the AP slot, to allow dynamization of the bone fragments.
2
Align image intensifier

Check the reduction, the correct alignment of the fragments, and the leg length before locking the nail.

Align the image intensifier with the hole in the nail closest to the fracture until a perfect circle is visible in the center of the screen.

3
Make incision

Place a scalpel blade on the skin over the center of the hole to mark the incision point and make a stab incision.
## 4

### Drill

#### Instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.101*</td>
<td>4.2 mm Three-Fluted Drill Bit, quick coupling, 145 mm, for Radiolucent Drive</td>
</tr>
<tr>
<td>03.010.102*</td>
<td>5.0 mm Three-Fluted Drill Bit, quick coupling, 145 mm, for Radiolucent Drive</td>
</tr>
<tr>
<td>511.30*</td>
<td>Radiolucent Drive</td>
</tr>
</tbody>
</table>

Insert the drill bit into the radiolucent drive and insert it, through the incision, 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

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.104</td>
<td>4.2 mm Three-Fluted Drill Bit, quick coupling, 145 mm</td>
</tr>
<tr>
<td>03.010.105</td>
<td>5.0 mm Three-Fluted Drill Bit, quick coupling, 145 mm</td>
</tr>
</tbody>
</table>

Standard freehand locking technique can be performed without the radiolucent drive. Use a quick coupling drill bit.

* Also available
5

Measure for locking screw length

Instrument

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.429</td>
<td>Direct Measuring Device, for Locking Screws to 100 mm</td>
</tr>
<tr>
<td>or 03.010.106*</td>
<td>Direct Measuring Device, for Locking Screws to 100 mm</td>
</tr>
</tbody>
</table>

Stop drilling immediately after both cortices and disassemble the drill bit from the power equipment. Slide the measuring device onto the drill bit.

Ensure the correct position of the drill bit beyond the far cortex, and that the measuring device is against the bone.

Read the measurement on the measuring device at the end of the drill bit.

Note: Correct placement of the drill bit and measuring device are important for accurate locking screw length measurement.

* Also available
**Alternative instruments**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.428</td>
<td>Depth Gauge, for Locking Screws to 100 mm</td>
</tr>
<tr>
<td>or 03.010.072*</td>
<td>Depth Gauge, for Locking Screws to 100 mm</td>
</tr>
<tr>
<td>03.010.494</td>
<td>Depth Gauge for Distal Locking Screws, 100 mm</td>
</tr>
</tbody>
</table>

* Also available

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

Ensure the correct position of the depth gauge beyond 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

<table>
<thead>
<tr>
<th>Instrument Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.112*</td>
<td>Holding Sleeve, with Locking Device</td>
</tr>
<tr>
<td>03.010.518</td>
<td>StarDrive Screwdriver, T25, self-retaining, 320 mm</td>
</tr>
</tbody>
</table>

Alternative Instrument

<table>
<thead>
<tr>
<th>Instrument Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.472*</td>
<td>Inter-lock Screwdriver, 330 mm</td>
</tr>
</tbody>
</table>

Insert the appropriate length locking screw using the screwdriver, and the holding sleeve if needed.

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

Repeat Steps 2 to 6 for the second proximal locking screw.

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

- b Lock the holding sleeve by tightening it counterclockwise.

- c Release the holding sleeve, after insertion of the locking screw, by loosening it clockwise and pushing backward.

* Also available
Antegrade Approach—Standard Locking

Antegrade insertion

Standard locking
Position patient

Place the patient in a supine position or lateral decubitus position (not shown) on a fracture or radiolucent table. It is recommended to slightly heighten and adduct the fractured leg, to facilitate the approach to the nail insertion site.

Position the image intensifier to allow visualization of the proximal and distal femur in both the AP and lateral views. The contralateral leg can be flexed at the hip and knee for optimum image intensifier positioning.

Reduce fracture

Instrument

| 394.35* | Large Distractor |

Perform closed reduction manually by axial traction, under image intensification. The use of the large distractor or other reduction instrumentation may be appropriate in certain circumstances.

* Also available
3
Confirm nail length

Instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.020</td>
<td>Radiographic Ruler, for Titanium Cannulated Femoral Nails</td>
</tr>
<tr>
<td>03.010.023</td>
<td>Radiographic Canal Width Estimator</td>
</tr>
</tbody>
</table>

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

Position the image intensifier for an AP view of the proximal femur. Using long forceps, hold the ruler parallel to the femur on the lateral side, and at the level of the femur. Position the ruler with the end at or just below the level of the tip of the greater trochanter. Mark the skin on the lateral side.

Move the image intensifier toward the distal femur, align the proximal end of the ruler with the skin marking and take an AP image of the distal femur. Verify fracture reduction. Read the required nail length directly from the ruler as it appears on the x-ray.

**Precaution:** It is recommended to treat all fractures with the longest nail possible, taking into account patient anatomy or previous implant. Dynamization must be taken into account when determining nail length. The dynamic locking option allows 5 mm of travel, therefore, a shorter nail would be chosen.

**Alternative techniques**
Determine nail length using the above procedure on the uninjured leg before draping (nonsterile).

Insert a reaming rod into the medullary canal of the injured leg and use an identical length reaming rod to determine the length.
4

Confirm nail diameter

Position the image intensifier for an AP or lateral view of the femur at the level of the isthmus. Hold the radiographic ruler over the femur so that the diameter gauge is centered over the narrowest part of the medullary canal. Read the diameter measurement on the circular indicator that fills the canal.

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

If the reamed technique is used, the diameter of the largest medullary reamer applied must be 0.5 mm to 1.5 mm larger than the nail diameter.

5

Approach

Make a longitudinal incision proximal to the tip of the greater trochanter, through the gluteus medius.

6

Determine entry point

The entry point for the Retrograde/Antegrade Femoral Nail–EX is in line with the medullary canal in the AP and lateral views. The point is posterior in the proximal femur, in the piriform fossa, but varies with patient anatomy.

The entry point determines the optimal anatomic position of the nail in the medullary canal. Special care should be taken to ensure an accurate entry point.
7

**Insert guide wire**

<table>
<thead>
<tr>
<th>Instruments</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.115  3.2 mm Guide Wire, 290 mm</td>
</tr>
<tr>
<td>03.010.500  Handle for Wire Guides and Protection Sleeves</td>
</tr>
<tr>
<td>03.010.503  13 mm Protection Sleeve for Antegrade Nail</td>
</tr>
<tr>
<td>03.010.508  Wire Guide for 13 mm Protection Sleeve for Antegrade Nail</td>
</tr>
</tbody>
</table>

Assemble the handle, protection sleeve and wire guide. Insert the assembly through the incision to the bone.

Hold the protection sleeve firmly and insert the guide wire through the central hole in the wire guide, and into the piriformis fossa in line with the anatomic axis of the femur.
Antegrade Approach—Opening the Proximal Femur

Verify guide wire position under image intensification with AP and lateral views. If the position of the initial wire must be altered, adjust wire guide to the desired position and insert a second guide wire into guide.

Remove the first wire and wire guide.

**Alternative instrument**

| 03.037.008*  | 8.0 mm Cannulated Curved Awl |

In place of a guide wire, the medullary canal can be initially opened with the curved awl. After opening the canal, insert a reaming rod through the curved awl.

* Also available
8
Open medullary canal

Instrument

03.010.034   13.0 mm Flexible Cannulated Drill Bit, large quick coupling, 465 mm

Pass the drill bit over the guide wire or reaming rod and through the protection sleeve to the bone. Drill to a depth of approximately 10 cm, to the level of the lesser trochanter.

Precautions:
– The use of the drill bit for opening the medullary canal is suitable for 9.0 mm to 12.0 mm nails. For the larger, 13.0 mm to 15.0 mm nails, the use of a reaming system is recommended.
– Take care not to plunge the drill bit into the fracture site, as this may displace the fracture.

Remove the drill bit and protection sleeve.

Dispose of the guide wire. Do not reuse.

Alternative instrument

03.010.041   14.0 mm Cannulated Awl

Alternatively, the awl may be used to open the medullary canal.

Remove the protection sleeve.

Pass the awl over the guide wire and open the medullary canal.

Precautions:
– The use of the awl for opening the medullary canal is suitable for 9.0 mm to 13.0 mm nails. For the larger, 14.0 mm and 15.0 mm nails, the use of a reaming system is recommended.
– Take care not to plunge the awl into the fracture site, as this may displace the fracture.

Remove the awl.

Dispose of the guide wire. Do not reuse.
9
Reaming the medullary canal (optional)
See reaming information on page 16.
Antegrade Approach—Insert Nail

1
Assemble insertion instruments

Instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.093</td>
<td>Reaming Rod Push Rod (in Reaming Set)</td>
</tr>
<tr>
<td>03.010.146</td>
<td>Cannulated Connecting Screw, for 100 mm Insertion Handle</td>
</tr>
<tr>
<td>03.010.486</td>
<td>Radiolucent Insertion Handle for Expert Nails, 100 mm</td>
</tr>
</tbody>
</table>

Slide the connecting screw onto the reaming rod push rod until it is secured and insert it into the insertion handle. Match the tang of the handle to the notch of the nail.

The anterior bow of the nail must be aligned with the anterior bow of the femur. Orient the insertion handle anteriorly, match the notch on the insertion handle to the nail, and tighten the connecting screw.
**Alternative instruments**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.487*</td>
<td>Radiolucent Percutaneous Insertion Handle for Expert Nails, 175 mm</td>
</tr>
<tr>
<td>03.010.499*</td>
<td>Cannulated Connecting Screw, for 175 mm Percutaneous Insertion Handle</td>
</tr>
<tr>
<td>03.010.517</td>
<td>T-Handle Ball Hex Screwdriver, 8 mm</td>
</tr>
</tbody>
</table>

Use the ball hex screwdriver to assemble the insertion instruments to the nail.

Slide the connecting screw onto the reaming rod push rod until it is secured and insert it into the insertion handle. Match the tang of the handle to the notch of the nail.

* Also available
2

Insert nail

Insert the nail over the reaming rod, if used, into the medullary canal as far as possible by hand. Small twisting motions can help advance the nail.

Monitor nail passage across the fracture, controlling in two planes to avoid malalignment. Use the insertion assembly to manipulate the nail across the fracture. Verify fracture reduction.

Insert the nail until the proximal end is at or just below the greater trochanter. Insertion depth is indicated by the grooves on the insertion handle.

Check the final position of the nail in AP and lateral views.

**Note:** For proximal locking, mount the aiming arm after the nail has been completely inserted, otherwise the aiming arm may loosen during nail insertion.
### Alternative instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.170</td>
<td>Hammer Guide</td>
</tr>
<tr>
<td>03.010.522</td>
<td>Spiral Combination Hammer, 500 grams</td>
</tr>
<tr>
<td>03.010.523</td>
<td>Driving Cap, threaded</td>
</tr>
<tr>
<td>321.17</td>
<td>4.5 mm Pin Wrench</td>
</tr>
<tr>
<td>321.20</td>
<td>11 mm Ratchet Wrench</td>
</tr>
</tbody>
</table>

If necessary, insert the nail with light hammer blows. Thread the driving cap into the insertion handle in the first (medial) slot and tighten it to the insertion handle, using the pin or ratchet wrench.

If necessary, the hammer guide can be threaded onto the driving cap and the hammer can be used as a slide hammer.

### Notes:
- If insertion is difficult, choose a nail with a smaller diameter or enlarge the entry canal by reaming the medullary canal to a larger diameter.
- Do not strike the insertion handle directly.
Antegrade Approach—Standard Locking

1
Choose locking screws and instruments

Choose the locking screws and instruments appropriate for the nail diameter (see table on page 23).

2
Connect aiming arm

Instrument

<table>
<thead>
<tr>
<th>Instrument Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.480</td>
<td>Radiolucent Aiming Arm, for Antegrade Standard Locking</td>
</tr>
<tr>
<td>357.398</td>
<td>Cannulated Shaft with 8 mm hex</td>
</tr>
</tbody>
</table>

Attach the aiming arm to the insertion handle.

Note: Confirm that the nail is securely connected to the insertion handle, especially after hammering, using either the 8 mm ball hex screwdriver or the cannulated shaft with 8 mm hex.

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

Precaution: Utilize the gray Titanium End Cap, 0 mm extension, for Femoral Nails—EX (04.003.000) to protect the nail connection threads from bone ingrowth. This facilitates nail removal and locks the most distal screw, providing a stable, fixed-angle construct.

3
Static and dynamic locking

For the proximal locking screws, follow the procedure described in section “Retrograde Approach—Standard Locking,” Steps 3 to 5 (pages 25–28).

Use the LM hole and LM slot for proximal locking. The dynamic locking option corresponds to the upper position of the LM slot, to allow dynamization of the bone fragments.

For immediate dynamization, insert one proximal locking screw through the distal hole in the aiming arm.

For later, controlled dynamization, insert both proximal locking screws. When dynamization is desired, remove the most proximal locking screw.
Insert end cap

Instrument

03.010.520  Cannulated StarDrive Screwdriver, T40, self-retaining, 277 mm

Alternative instrument

03.010.515*  Inter-lock Screwdriver, T40, 377 mm

Remove the nail insertion instruments.

The gray, cannulated end caps are available in 0 mm–20 mm lengths, in 5 mm increments.

Engage the gray end cap with cannulated T40 StarDrive Screwdriver by exerting axial pressure, or attach to the T40 inter-lock screwdriver. 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. Thread the end cap into the nail and tighten firmly.

Always use the standard screwdriver for final tightening of the end cap.

**Precaution:** The use of the end cap is recommended. Besides enabling angular stability of the distal locking screw, it prevents bone ingrowth into the proximal end of the nail and, therefore, facilitates nail removal.

Optional instrument

03.010.115  3.2 mm Guide Wire, 290 mm

Insert the guide wire into the proximal end of the nail and slide the end cap and the screwdriver over the guide wire.

Follow the procedure described above.

* Also available
Antegrade Approach—Freehand Locking

1 Choose locking screws and instruments

Choose the locking screws and instruments appropriate to the nail diameter (see table on page 35).

2 Freehand distal locking

Use the two LM holes for distal locking. Follow the procedure described in section “Retrograde Approach—Freehand Locking,” Steps 2 to 6 (pages 36–40).
Implant Removal (optional)

1
Remove end cap

Instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.520</td>
<td>Cannulated StarDrive Screwdriver, T40, self-retaining, 277 mm</td>
</tr>
</tbody>
</table>

Alternative instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.515*</td>
<td>Inter-lock Screwdriver, T40, 377 mm</td>
</tr>
<tr>
<td>03.010.111*</td>
<td>Cannulated StarDrive Screwdriver, T40, with lever handle, self-retaining</td>
</tr>
</tbody>
</table>

Clear the StarDrive Recess of the end cap of any ingrown tissue.

Remove the end cap with the StarDrive Screwdriver.

**Note:** When removing implants after long-term implantation, especially in the presence of large amounts of bony ingrowth, first use a solid screwdriver to loosen the end cap and locking screws. The T40 inter-lock screwdriver can be used to remove the end cap or locking screws from the surgical site.
2

Remove spiral blade (for retrograde nail with spiral blade)

**Instruments**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.170</td>
<td>Hammer Guide</td>
</tr>
<tr>
<td>03.010.522</td>
<td>Spiral combination Hammer, 500 grams</td>
</tr>
<tr>
<td>321.17</td>
<td>4.5 mm Pin Wrench</td>
</tr>
<tr>
<td>357.36</td>
<td>Extraction Screw (for spiral blades)</td>
</tr>
</tbody>
</table>

Clear the recess of the spiral blade of any ingrown tissue.

Thread the extraction screw into the hub of the spiral blade.

Thread the hammer guide into the extraction screw.

Use controlled blows of the slide/fixed hammer, while attached to the hammer guide, to extract the spiral blade.

Leave a loose grip on the extraction assembly, as it and the spiral blade rotate during extraction.
Implant Removal (optional)

3

Remove screws

Instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.518</td>
<td>StarDrive Screwdriver, T25, self-retaining, 320 mm</td>
</tr>
</tbody>
</table>

Alternative instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.112*</td>
<td>Holding Sleeve, with Locking Device</td>
</tr>
<tr>
<td>03.010.473*</td>
<td>Inter-lock Screwdriver, 224 mm</td>
</tr>
</tbody>
</table>

Clear the StarDrive Recess of the locking screws of any ingrown tissue.

For retrograde nails, remove all locking screws except one distal locking screw. For antegrade nails, remove all locking screws except one proximal locking screw.

Refer to page 40, for holding sleeve operation.

Precaution: When removing implants after long term implantation, especially in the presence of large amounts of bony ingrowth, first use a solid screwdriver to loosen the screw. The inter-lock screwdriver can then be used to remove the screw from the surgical site. If using the inter-lock screwdriver with locking screws, use a solid screwdriver for final tightening.
Implant Removal (optional)

4
Attach extraction screw and hammer guide

Instrument

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>357.133</td>
<td>Extraction Screw, for Titanium Femoral and Tibial Nails</td>
</tr>
</tbody>
</table>

Thread the extraction screw into the nail and tighten it to prevent rotation or displacement of the nail.

Attach the hammer guide to the extraction screw.

Remove the remaining locking screw.

5
Remove nail

Instrument

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.522</td>
<td>Spiral Combination Hammer, 500 grams</td>
</tr>
</tbody>
</table>

Extract the nail by applying gentle blows with the hammer.
Alternative Technique – Extraction Hook

For removal of broken nail

Instruments

<table>
<thead>
<tr>
<th>Product Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>355.399◊</td>
<td>Extraction Hook, for Titanium Cannulated Nails</td>
</tr>
<tr>
<td>393.10</td>
<td>Universal Chuck with T-Handle</td>
</tr>
<tr>
<td>or</td>
<td></td>
</tr>
<tr>
<td>393.105*</td>
<td>Small Universal Chuck with T-Handle</td>
</tr>
</tbody>
</table>

Begin with Steps 1–4 of Implant Removal, then remove the extraction screw from the nail.

**Option 1**

1 Assemble extraction hook and universal chuck

Insert the extraction hook into the universal chuck with T-handle. The hook should be parallel with the T-handle. This facilitates visualization of the hook position in the bone.

2 Insert extraction hook through nail

Pass the extraction hook through the cannula of the nail, including the distant fragment.

*Note:* Under image intensification, verify that the hook has passed through and engaged the distant end of the nail.

3 Extract nail

Extract both nail fragments.

*Note:* Keep the patient’s limb restrained to increase the efficiency of the extraction force.

* Also available
◊ Available nonsterile or sterile-packed.
Add “S” to product number to indicate sterile product.
Option 2

1
**Remove near nail fragment**
Attach the appropriate extraction bolt to the nail. Remove the near nail fragment using the extraction bolt or connecting screw.

*Note:* The extraction hook can be used as an alternative to extraction instrumentation.

2
**Ream canal**
Ream the medullary canal 1 mm larger than the nail diameter to clear a path for the distant nail fragment.

3
**Align extraction hook**
Insert the extraction hook and explanted near nail fragment into the medullary canal. The near nail fragment aligns the extraction hook with the cannulation of the distant nail fragment.

4
**Engage distant fragment**
Pass the extraction hook through the cannula of the distant nail fragment.

*Note:* Under image intensification, verify that the hook has passed through and engaged the distant end of the nail.

5
**Extract nail**
Extract both nail fragments.

*Note:* Keep the patient’s limb restrained to increase the efficiency of the extraction force.
Implant Specifications

Titanium Cannulated Retrograde Femoral Nails–EX

Titanium Cannulated Retrograde/Antegrade Femoral Nails–EX
– Universal design for the left or right femur

Material
– Titanium-6% aluminum-7% niobium alloy

Diameters
9 mm–15 mm (1 mm increments)
– 9 mm–11 mm are 12 mm in diameter at instrumented end
– 12 mm–15 mm have an instrumented end diameter consistent with the shaft

Colors
– 9 mm–13 mm (green) use 5.0 mm titanium locking screws (green)
– 14 mm–15 mm (aqua) use 6.0 mm titanium locking screws (aqua)

Lengths
Retrograde Femoral Nails–EX
– 160 mm–280 mm (20 mm increments)
Retrograde/Antegrade Femoral Nails–EX
– 300 mm–480 mm (20 mm increments)

Cross Section
– 9 mm–10 mm nails are round
– 11 mm–15 mm nails are fluted
Titanium Cannulated Retrograde Femoral Nails—EX, sterile*

<table>
<thead>
<tr>
<th>Length (mm)</th>
<th>9 mm dia. green</th>
<th>10 mm dia. green</th>
<th>11 mm dia. green</th>
</tr>
</thead>
<tbody>
<tr>
<td>160</td>
<td>04.013.312S</td>
<td>04.013.412S</td>
<td>04.013.512S</td>
</tr>
<tr>
<td>180</td>
<td>04.013.316S</td>
<td>04.013.416S</td>
<td>04.013.516S</td>
</tr>
<tr>
<td>200</td>
<td>04.013.320S</td>
<td>04.013.420S</td>
<td>04.013.520S</td>
</tr>
<tr>
<td>220</td>
<td>04.013.324S</td>
<td>04.013.424S</td>
<td>04.013.524S</td>
</tr>
<tr>
<td>240</td>
<td>04.013.328S</td>
<td>04.013.428S</td>
<td>04.013.528S</td>
</tr>
<tr>
<td>260</td>
<td>04.013.332S</td>
<td>04.013.432S</td>
<td>04.013.532S</td>
</tr>
<tr>
<td>280</td>
<td>04.013.336S</td>
<td>04.013.436S</td>
<td>04.013.536S</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Length (mm)</th>
<th>12 mm dia. green</th>
<th>13 mm dia. green</th>
</tr>
</thead>
<tbody>
<tr>
<td>160</td>
<td>04.013.612S</td>
<td>04.013.712S</td>
</tr>
<tr>
<td>180</td>
<td>04.013.616S</td>
<td>04.013.716S</td>
</tr>
<tr>
<td>200</td>
<td>04.013.620S</td>
<td>04.013.720S</td>
</tr>
<tr>
<td>220</td>
<td>04.013.624S</td>
<td>04.013.724S</td>
</tr>
<tr>
<td>240</td>
<td>04.013.628S</td>
<td>04.013.728S</td>
</tr>
<tr>
<td>260</td>
<td>04.013.632S</td>
<td>04.013.732S</td>
</tr>
<tr>
<td>280</td>
<td>04.013.636S</td>
<td>04.013.736S</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Length (mm)</th>
<th>14 mm dia. aqua</th>
<th>15 mm dia. aqua</th>
</tr>
</thead>
<tbody>
<tr>
<td>160</td>
<td>04.013.812S</td>
<td>04.013.912S</td>
</tr>
<tr>
<td>180</td>
<td>04.013.816S</td>
<td>04.013.916S</td>
</tr>
<tr>
<td>200</td>
<td>04.013.820S</td>
<td>04.013.920S</td>
</tr>
<tr>
<td>220</td>
<td>04.013.824S</td>
<td>04.013.924S</td>
</tr>
<tr>
<td>240</td>
<td>04.013.828S</td>
<td>04.013.928S</td>
</tr>
<tr>
<td>260</td>
<td>04.013.832S</td>
<td>04.013.932S</td>
</tr>
<tr>
<td>280</td>
<td>04.013.836S</td>
<td>04.013.936S</td>
</tr>
</tbody>
</table>

- 9 and 10 mm diameter nails are round
- 11 to 15 mm diameter nails are fluted
- 160 to 200 mm nails are straight
- 220 to 280 mm nails are bent (antecurvature = 1500 mm)

* Titanium-6% aluminum-7% niobium alloy
## Titanium Cannulated Retrograde/Antegrade Femoral Nails—EX, sterile

<table>
<thead>
<tr>
<th>Length (mm)</th>
<th>9 mm dia. green</th>
<th>10 mm dia. green</th>
<th>11 mm dia. green</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>04.013.340S</td>
<td>04.013.440S</td>
<td>04.013.540S</td>
</tr>
<tr>
<td>320</td>
<td>04.013.344S</td>
<td>04.013.444S</td>
<td>04.013.544S</td>
</tr>
<tr>
<td>340</td>
<td>04.013.348S</td>
<td>04.013.448S</td>
<td>04.013.548S</td>
</tr>
<tr>
<td>360</td>
<td>04.013.352S</td>
<td>04.013.452S</td>
<td>04.013.552S</td>
</tr>
<tr>
<td>380</td>
<td>04.013.356S</td>
<td>04.013.456S</td>
<td>04.013.556S</td>
</tr>
<tr>
<td>400</td>
<td>04.013.360S</td>
<td>04.013.460S</td>
<td>04.013.560S</td>
</tr>
<tr>
<td>420</td>
<td>04.013.364S</td>
<td>04.013.464S</td>
<td>04.013.564S</td>
</tr>
<tr>
<td>440</td>
<td>04.013.368S</td>
<td>04.013.468S</td>
<td>04.013.568S</td>
</tr>
<tr>
<td>460</td>
<td>04.013.372S</td>
<td>04.013.472S</td>
<td>04.013.572S</td>
</tr>
<tr>
<td>480</td>
<td>04.013.376S</td>
<td>04.013.476S</td>
<td>04.013.576S</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Length (mm)</th>
<th>12 mm dia. green</th>
<th>13 mm dia. green</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>04.013.640S</td>
<td>04.013.740S</td>
</tr>
<tr>
<td>320</td>
<td>04.013.644S</td>
<td>04.013.744S</td>
</tr>
<tr>
<td>340</td>
<td>04.013.648S</td>
<td>04.013.748S</td>
</tr>
<tr>
<td>360</td>
<td>04.013.652S</td>
<td>04.013.752S</td>
</tr>
<tr>
<td>380</td>
<td>04.013.656S</td>
<td>04.013.756S</td>
</tr>
<tr>
<td>400</td>
<td>04.013.660S</td>
<td>04.013.760S</td>
</tr>
<tr>
<td>420</td>
<td>04.013.664S</td>
<td>04.013.764S</td>
</tr>
<tr>
<td>440</td>
<td>04.013.668S</td>
<td>04.013.768S</td>
</tr>
<tr>
<td>460</td>
<td>04.013.672S</td>
<td>04.013.772S</td>
</tr>
<tr>
<td>480</td>
<td>04.013.676S</td>
<td>04.013.776S</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Length (mm)</th>
<th>14 mm dia. aqua</th>
<th>15 mm dia. aqua</th>
</tr>
</thead>
<tbody>
<tr>
<td>300</td>
<td>04.013.840S</td>
<td>04.013.940S</td>
</tr>
<tr>
<td>320</td>
<td>04.013.844S</td>
<td>04.013.944S</td>
</tr>
<tr>
<td>340</td>
<td>04.013.848S</td>
<td>04.013.948S</td>
</tr>
<tr>
<td>360</td>
<td>04.013.852S</td>
<td>04.013.952S</td>
</tr>
<tr>
<td>380</td>
<td>04.013.856S</td>
<td>04.013.956S</td>
</tr>
<tr>
<td>400</td>
<td>04.013.860S</td>
<td>04.013.960S</td>
</tr>
<tr>
<td>420</td>
<td>04.013.864S</td>
<td>04.013.964S</td>
</tr>
<tr>
<td>440</td>
<td>04.013.868S</td>
<td>04.013.968S</td>
</tr>
<tr>
<td>460</td>
<td>04.013.872S</td>
<td>04.013.972S</td>
</tr>
<tr>
<td>480</td>
<td>04.013.876S</td>
<td>04.013.976S</td>
</tr>
</tbody>
</table>

- 9 and 10 mm diameter nails are round
- 11 to 15 mm diameter nails are fluted

* Titanium-6% aluminum-7% niobium alloy
Titanium Spiral Blades, for Retrograde Femoral Nails–EX (gold)

- Titanium alloy*
- Lengths: 45 mm–100 mm (5 mm increments)
- Cannulated for insertion over a 3.2 mm guide wire
- 12.5 mm blade diameter
- Front-cutting edge

<table>
<thead>
<tr>
<th>Length (mm)</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>04.013.041</td>
<td>45</td>
</tr>
<tr>
<td>04.013.042</td>
<td>50</td>
</tr>
<tr>
<td>04.013.043</td>
<td>55</td>
</tr>
<tr>
<td>04.013.044</td>
<td>60</td>
</tr>
<tr>
<td>04.013.045</td>
<td>65</td>
</tr>
<tr>
<td>04.013.046</td>
<td>70</td>
</tr>
<tr>
<td>04.013.047</td>
<td>75</td>
</tr>
<tr>
<td>04.013.048</td>
<td>80</td>
</tr>
<tr>
<td>04.013.049</td>
<td>85</td>
</tr>
<tr>
<td>04.013.050</td>
<td>90</td>
</tr>
<tr>
<td>04.013.051</td>
<td>95</td>
</tr>
<tr>
<td>04.013.052</td>
<td>100</td>
</tr>
</tbody>
</table>

Titanium End Cap, for Retrograde Femoral Nails–EX Spiral Blade Locking (gold)

- Titanium alloy*
- Securely locks spiral blade
- Sits flush with end of nail
- Protects nail threads from tissue ingrowth
- T40 StarDrive Recess

04.013.000 End Cap, 0 mm extension

◊ Available nonsterile or sterile-packed.
Add “S” to product number to indicate sterile product.
* Titanium-6% aluminum-7% niobium alloy
5.0 mm Titanium Locking Screws◊, with T25 StarDrive Recess, for IM Nails (green)

- Titanium alloy*
- Lengths: 26 mm–80 mm (2 mm increments)
  85 mm–100 mm (5 mm increments)
- 4.3 mm core diameter
- Fully threaded
- Self-tapping, blunt tip
- T25 StarDrive Recess for improved torque transmission and self-retention on screwdriver

<table>
<thead>
<tr>
<th>Length (mm)</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>04.005.516</td>
<td>04.005.548</td>
</tr>
<tr>
<td>04.005.518</td>
<td>04.005.550</td>
</tr>
<tr>
<td>04.005.520</td>
<td>04.005.552</td>
</tr>
<tr>
<td>04.005.522</td>
<td>04.005.554</td>
</tr>
<tr>
<td>04.005.524</td>
<td>04.005.556</td>
</tr>
<tr>
<td>04.005.526</td>
<td>04.005.558</td>
</tr>
<tr>
<td>04.005.528</td>
<td>04.005.560</td>
</tr>
<tr>
<td>04.005.530</td>
<td>04.005.562</td>
</tr>
<tr>
<td>04.005.532</td>
<td>04.005.564</td>
</tr>
<tr>
<td>04.005.534</td>
<td>04.005.566</td>
</tr>
<tr>
<td>04.005.536</td>
<td>04.005.568</td>
</tr>
<tr>
<td>04.005.538</td>
<td>04.005.570</td>
</tr>
<tr>
<td>04.005.540</td>
<td>04.005.575</td>
</tr>
<tr>
<td>04.005.542</td>
<td>04.005.580</td>
</tr>
<tr>
<td>04.005.544</td>
<td>04.005.585</td>
</tr>
<tr>
<td>04.005.546</td>
<td>04.005.590</td>
</tr>
</tbody>
</table>

◊ Available nonsterile or sterile-packed.
Add "S" to product number to indicate sterile product.
* Titanium-6% aluminum-7% niobium alloy
**6.0 mm Titanium Locking Screws,◊ with T25 StarDrive Recess, for IM Nails (aqua)**

- Titanium alloy*
- Lengths: 26 mm–60 mm (2 mm increments)
  - 64 mm–80 mm (4 mm increments)
  - 85 mm–125 mm (5 mm increments)
- 4.8 mm core diameter
- Fully threaded
- Self-tapping, blunt tip
- T25 StarDrive Recess for improved torque transmission and self-retention on screwdriver

<table>
<thead>
<tr>
<th>Length (mm)</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>04.005.616</td>
<td>04.005.644</td>
</tr>
<tr>
<td>26</td>
<td>54</td>
</tr>
<tr>
<td>04.005.618</td>
<td>04.005.646</td>
</tr>
<tr>
<td>28</td>
<td>56</td>
</tr>
<tr>
<td>04.005.620</td>
<td>04.005.648</td>
</tr>
<tr>
<td>30</td>
<td>58</td>
</tr>
<tr>
<td>04.005.622</td>
<td>04.005.650</td>
</tr>
<tr>
<td>32</td>
<td>60</td>
</tr>
<tr>
<td>04.005.624</td>
<td>04.005.654</td>
</tr>
<tr>
<td>34</td>
<td>64</td>
</tr>
<tr>
<td>04.005.626</td>
<td>04.005.658</td>
</tr>
<tr>
<td>36</td>
<td>68</td>
</tr>
<tr>
<td>04.005.628</td>
<td>04.005.662</td>
</tr>
<tr>
<td>38</td>
<td>72</td>
</tr>
<tr>
<td>04.005.630</td>
<td>04.005.666</td>
</tr>
<tr>
<td>40</td>
<td>76</td>
</tr>
<tr>
<td>04.005.632</td>
<td>04.005.670</td>
</tr>
<tr>
<td>42</td>
<td>80</td>
</tr>
<tr>
<td>04.005.634</td>
<td>04.005.675</td>
</tr>
<tr>
<td>44</td>
<td>85</td>
</tr>
<tr>
<td>04.005.636</td>
<td>04.005.680</td>
</tr>
<tr>
<td>46</td>
<td>90</td>
</tr>
<tr>
<td>04.005.638</td>
<td>04.005.685</td>
</tr>
<tr>
<td>48</td>
<td>95</td>
</tr>
<tr>
<td>04.005.640</td>
<td>04.005.690</td>
</tr>
<tr>
<td>50</td>
<td>100</td>
</tr>
<tr>
<td>04.005.642</td>
<td></td>
</tr>
<tr>
<td>52</td>
<td></td>
</tr>
</tbody>
</table>

◊ Available nonsterile or sterile-packed.
Add “S” to product number to indicate sterile product.
* Titanium-6% aluminum-7% niobium alloy
Titanium Angular Stable Locking Screws, with T25 StarDrive Recess, for intramedullary nails, sterile*

- Titanium alloy**
- 5.0 mm (light blue) ASLS screws, 30 mm–100 mm, are compatible with titanium cannulated retrograde/antegrade femoral nails in diameters 9 mm–13 mm
- 6.0 mm (dark purple) ASLS screws, 32 mm–125 mm, are compatible with titanium cannulated retrograde/antegrade femoral nails in diameters 14 mm–15 mm

- Fully threaded shaft with 3 diameters
  - D1: Provides purchase in reamed near cortex
  - D2: Expands sleeve, providing angular stability
  - D3: Holds unexpanded sleeve for screw insertion, provides purchase in far cortex
- T25 StarDrive Recess
- Sterile packaged

Note: For more information, please see ASLS technique guide and brochure.

* Also available
** Titanium-6% aluminum-7% niobium alloy
ASLS Sleeves*  

Resorbable Sleeves for Angular Stable Locking Screws, sterile*  
- 70:30 poly(L/DL-lactide)  
- Inner thread for secure fit to ASLS screw  
- Expands in nail’s locking hole to provide angular stability  
- 5.0 mm and 6.0 mm sleeves used with corresponding ASLS screws  
- Sterile packaged (2 per package)  

Resorbable Sleeve for Angular Stable Locking Screws, sterile, 2/pkg.  
08.025.044S for 5.0 mm ASLS Screws  
08.025.057S for 6.0 mm ASLS Screws  

ASLS Compatibility with Existing Nails  
The Angular Stable Locking System is compatible with all DePuy Synthes titanium cannulated nailing systems.  

<table>
<thead>
<tr>
<th>Nailing System</th>
<th>Nail Diameters (mm)</th>
<th>Angular Stable Locking Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5.0 mm (light blue)</td>
<td>6.0 mm (dark purple)</td>
</tr>
<tr>
<td>Femur, Titanium Cannulated</td>
<td>9 – 13</td>
<td>•</td>
</tr>
<tr>
<td>Femur, Retrograde/Antegrade Femoral Nail-EX</td>
<td>14, 15</td>
<td>•</td>
</tr>
</tbody>
</table>

* Must be ordered separately.
**Titanium End Caps,** with T40 StarDrive Recess, for IM Nails (gray)

- Titanium alloy*
- End cap protects the nail connection threads from bone ingrowth and facilitates nail removal
- Self-retaining T40 StarDrive Recess facilitates secure end cap pick-up and insertion

**0 mm (retrograde or antegrade)**

- Securely locks most distal locking screw in retrograde approach
- Sits flush with end of nail

**5 mm, 10 mm, 15 mm and 20 mm extensions (antegrade)**

- Extend nail height if nail is overinserted

<table>
<thead>
<tr>
<th>Extension (mm)</th>
<th>Product Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>04.003.000</td>
</tr>
<tr>
<td>5</td>
<td>04.003.001</td>
</tr>
<tr>
<td>10</td>
<td>04.003.002</td>
</tr>
<tr>
<td>15</td>
<td>04.003.003</td>
</tr>
<tr>
<td>20</td>
<td>04.003.004</td>
</tr>
</tbody>
</table>

◊ Available nonsterile or sterile-packed.
Add “S” to product number to indicate sterile product.
* Titanium-6% aluminum-7% niobium alloy
<table>
<thead>
<tr>
<th>Instrument Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.020</td>
<td>Radiographic Ruler, for Titanium Cannulated Femoral Nails</td>
</tr>
<tr>
<td>03.010.023</td>
<td>Radiographic Canal Width Estimator</td>
</tr>
<tr>
<td>03.010.034◊</td>
<td>13.0 mm Flexible Cannulated Drill Bit, large quick coupling, 465 mm</td>
</tr>
<tr>
<td>03.010.041</td>
<td>14.0 mm Cannulated Awl</td>
</tr>
<tr>
<td>03.010.061◊</td>
<td>4.2 mm Three-Fluted Drill Bit, quick coupling, 330 mm, 100 mm calibration</td>
</tr>
<tr>
<td>03.010.062◊</td>
<td>5.0 mm Three-Fluted Drill Bit, quick coupling, 330 mm, 100 mm calibration</td>
</tr>
<tr>
<td>03.010.063</td>
<td>12.0 mm/8.0 mm Protection Sleeve, 188 mm</td>
</tr>
<tr>
<td>03.010.065</td>
<td>8.0 mm/4.2 mm Drill Sleeve, 200 mm</td>
</tr>
</tbody>
</table>

◊ Available nonsterile or sterile-packed. Add “S” to product number to indicate sterile product.
### Instruments

<table>
<thead>
<tr>
<th>Product Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.066</td>
<td>8.0 mm/5.0 mm Drill Sleeve, 200 mm</td>
</tr>
<tr>
<td>03.010.070</td>
<td>4.2 mm Trocar, 210 mm</td>
</tr>
<tr>
<td>03.010.071</td>
<td>5.0 mm Trocar, 210 mm</td>
</tr>
<tr>
<td>03.010.081</td>
<td>15.0 mm/13.0 mm Protection Sleeve, for Spiral Blade Aiming Arm</td>
</tr>
<tr>
<td>03.010.082</td>
<td>13.0 mm/3.2 mm Wire Guide, for Spiral Blade Aiming Arm</td>
</tr>
<tr>
<td>03.010.084</td>
<td>Spiral Blade Inserter, for Retrograde Femoral Nails–EX</td>
</tr>
<tr>
<td>03.010.104◊</td>
<td>4.2 mm Three-Fluted Drill bit, quick coupling, needle point, 145 mm</td>
</tr>
</tbody>
</table>

◊ Available nonsterile or sterile-packed.
Add “S” to product number to indicate sterile product.
<table>
<thead>
<tr>
<th>Product Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.105◊</td>
<td>5.0 mm Three-Fluted Drill bit, quick coupling, needle point, 145 mm</td>
</tr>
<tr>
<td>03.010.115</td>
<td>3.2 mm Guide Wire, 290 mm</td>
</tr>
<tr>
<td>03.010.146</td>
<td>Cannulated Connection Screw For 100 mm Insertion Handle</td>
</tr>
<tr>
<td>03.010.151</td>
<td>Star/Hex Screwdriver Shaft, 165 mm</td>
</tr>
<tr>
<td>03.010.152</td>
<td>Star/Hex Screwdriver Shaft, 280 mm</td>
</tr>
<tr>
<td>03.010.170</td>
<td>Spiral Hammer Guide</td>
</tr>
<tr>
<td>03.010.428</td>
<td>Depth Gauge for Locking Screws to 100 mm for IM Nails</td>
</tr>
</tbody>
</table>

◊ Available nonsterile or sterile-packed.
Add “5” to product number to indicate sterile product.
<table>
<thead>
<tr>
<th>Product Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.429</td>
<td>Direct Measuring Device for Locking Screws to 100 mm for IM Nails</td>
</tr>
<tr>
<td>03.010.480</td>
<td>Radiolucent Aiming Arm for Antegrade Standard Locking</td>
</tr>
<tr>
<td>03.010.481</td>
<td>Radiolucent Aiming Arm for Retrograde Standard Locking</td>
</tr>
<tr>
<td>03.010.486</td>
<td>Radiolucent Standard Insertion Handle, 100 mm</td>
</tr>
<tr>
<td>03.010.489</td>
<td>Aiming Arm for Retrograde Spiral Blade Locking</td>
</tr>
<tr>
<td>03.010.491</td>
<td>Scalpel Handle, long</td>
</tr>
</tbody>
</table>

◊ Available nonsterile or sterile-packed. Add “S” to product number to indicate sterile product.
<table>
<thead>
<tr>
<th>Product Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.492</td>
<td>Spiral Blade Measuring Device for Retrograde Femoral Nail–EX</td>
</tr>
<tr>
<td>03.010.494</td>
<td>Depth Gauge for Distal Locking Screws, 100 mm</td>
</tr>
<tr>
<td>03.010.500</td>
<td>Handle for Wire Guide/Protection Sleeves</td>
</tr>
<tr>
<td>03.010.502</td>
<td>13 mm Protection Sleeve for Retrograde Nail</td>
</tr>
<tr>
<td>03.010.503</td>
<td>13 mm Protection Sleeve for Antegrade Nail</td>
</tr>
<tr>
<td>03.010.507</td>
<td>Wire Guide for 13 mm Protection Sleeve for Retrograde Nail</td>
</tr>
<tr>
<td>03.010.508</td>
<td>Wire Guide for 13 mm Protection Sleeve for Antegrade Nail</td>
</tr>
</tbody>
</table>

◊ Available nonsterile or sterile-packed. Add “S” to product number to indicate sterile product.
## Instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>03.010.516</td>
<td>Large Handle with Quick Coupling</td>
</tr>
<tr>
<td>03.010.517</td>
<td>T-Handle Ball Hex Screwdriver, 8 mm</td>
</tr>
<tr>
<td>03.010.518</td>
<td>StarDrive Screwdriver, T25, self-retaining, 320 mm</td>
</tr>
<tr>
<td>03.010.519</td>
<td>StarDrive Screwdriver, T25, self-retaining, 440 mm</td>
</tr>
<tr>
<td>03.010.520</td>
<td>Cannulated StarDrive Screwdriver, T40, self-retaining, 277 mm</td>
</tr>
<tr>
<td>03.010.522</td>
<td>Combination Hammer 500g</td>
</tr>
<tr>
<td>03.010.523</td>
<td>Driving Cap with Handle Adapter</td>
</tr>
<tr>
<td>03.900.044</td>
<td>T40 Stardrive Screwdriver Shaft</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
</tr>
<tr>
<td>--------</td>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>321.17</td>
<td>4.5 mm Pin Wrench, 120 mm</td>
</tr>
<tr>
<td>321.20</td>
<td>Ratchet Wrench, 11 mm width across flats</td>
</tr>
<tr>
<td>351.27◊</td>
<td>13.0 mm Cannulated Drill Bit, 300 mm</td>
</tr>
<tr>
<td>357.133</td>
<td>Extraction Screw, for Titanium Femoral and Tibial Nails</td>
</tr>
<tr>
<td>357.34</td>
<td>Connecting Screw, for Inserter for Titanium Spiral Blades</td>
</tr>
<tr>
<td>357.36</td>
<td>Extraction Screw</td>
</tr>
<tr>
<td>357.398</td>
<td>Cannulated Shaft with 8 mm hex, 125 mm</td>
</tr>
</tbody>
</table>

◊ Available nonsterile or sterile-packed. Add “S” to product number to indicate sterile product.
### Rack
690.502  Locking Screw/Spiral Blade Rack for Femoral Nail–EX Implants

### Implants
5.0 mm Titanium Locking Screws,◊ with T25 StarDrive Recess, for IM Nails, 2 ea.

<table>
<thead>
<tr>
<th>Length (mm)</th>
<th>04.005.516</th>
<th>04.005.518</th>
<th>04.005.520</th>
<th>04.005.522</th>
<th>04.005.524</th>
<th>04.005.526</th>
<th>04.005.528</th>
<th>04.005.530</th>
<th>04.005.532</th>
<th>04.005.534</th>
<th>04.005.536</th>
<th>04.005.538</th>
<th>04.005.540</th>
<th>04.005.542</th>
<th>04.005.544</th>
<th>04.005.546</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (mm)</td>
<td>26</td>
<td>28</td>
<td>30</td>
<td>32</td>
<td>34</td>
<td>36</td>
<td>38</td>
<td>40</td>
<td>42</td>
<td>44</td>
<td>46</td>
<td>48</td>
<td>50</td>
<td>52</td>
<td>54</td>
<td>56</td>
</tr>
<tr>
<td>--------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
</tr>
<tr>
<td>04.005.516</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.518</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.520</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.522</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.524</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.526</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.528</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.530</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.532</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.534</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.536</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.538</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.540</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.542</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.544</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.546</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.548</td>
<td>58</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.550</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.552</td>
<td>62</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.554</td>
<td>64</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.556</td>
<td>66</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.558</td>
<td>68</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.560</td>
<td>70</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.562</td>
<td>72</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.564</td>
<td>74</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.566</td>
<td>76</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.568</td>
<td>78</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.570</td>
<td>80</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.575</td>
<td>85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.580</td>
<td>90</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.585</td>
<td>95</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>04.005.590</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

◊ Available nonsterile or sterile-packed.
Add “S” to product number to indicate sterile product.

For detailed cleaning and sterilization instructions, please refer to [www.synthes.com/cleaning-sterilization](http://www.synthes.com/cleaning-sterilization) or sterilization instructions, if provided.
6.0 mm Titanium Locking Screws,◊ with T25 StarDrive Recess, for IM Nails, 2 ea.

<table>
<thead>
<tr>
<th>Length (mm)</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>04.005.616</td>
<td>26</td>
</tr>
<tr>
<td>04.005.618</td>
<td>28</td>
</tr>
<tr>
<td>04.005.620</td>
<td>30</td>
</tr>
<tr>
<td>04.005.622</td>
<td>32</td>
</tr>
<tr>
<td>04.005.624</td>
<td>34</td>
</tr>
<tr>
<td>04.005.626</td>
<td>36</td>
</tr>
<tr>
<td>04.005.628</td>
<td>38</td>
</tr>
<tr>
<td>04.005.630</td>
<td>40</td>
</tr>
<tr>
<td>04.005.632</td>
<td>42</td>
</tr>
<tr>
<td>04.005.634</td>
<td>44</td>
</tr>
<tr>
<td>04.005.636</td>
<td>46</td>
</tr>
<tr>
<td>04.005.638</td>
<td>48</td>
</tr>
<tr>
<td>04.005.640</td>
<td>50</td>
</tr>
<tr>
<td>04.005.642</td>
<td>52</td>
</tr>
</tbody>
</table>

◊ Available nonsterile or sterile-packed.
Add "S" to product number to indicate sterile product.
<table>
<thead>
<tr>
<th>Titanium Spiral Blades, for Retrograde Femoral Nails–EX (gold)</th>
<th>Length (mm)</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>04.013.041</td>
<td>45</td>
<td>04.013.047</td>
</tr>
<tr>
<td>04.013.042</td>
<td>50</td>
<td>04.013.048</td>
</tr>
<tr>
<td>04.013.043</td>
<td>55</td>
<td>04.013.049</td>
</tr>
<tr>
<td>04.013.044</td>
<td>60</td>
<td>04.013.050</td>
</tr>
<tr>
<td>04.013.045</td>
<td>65</td>
<td>04.013.051</td>
</tr>
<tr>
<td>04.013.046</td>
<td>70</td>
<td>04.013.052</td>
</tr>
</tbody>
</table>

04.013.000◊  Titanium End Cap, with T40 StarDrive Recess, for Retrograde Femoral Nails–EX Spiral Blade Locking, 0 mm extension (gold), 2 ea.

Titanium End Caps◊ with T40 StarDrive Recess, for Femoral Nails–EX (gray), 2 ea.

<table>
<thead>
<tr>
<th>Extension (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>04.003.000</td>
</tr>
<tr>
<td>04.003.001</td>
</tr>
<tr>
<td>04.003.002</td>
</tr>
<tr>
<td>04.003.003</td>
</tr>
<tr>
<td>04.003.004</td>
</tr>
</tbody>
</table>

◊ Available nonsterile or sterile-packed.
Add “S” to product number to indicate sterile product.
## ASLS Screw Sets

**5.0 mm Angular Stable Locking System Screw Set**

5.0 mm Titanium Angular Stable Locking Screws, with T25 StarDrive Recess, for intramedullary nails, sterile, 2 ea.

<table>
<thead>
<tr>
<th>Length (mm)</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>04.025.520S</td>
<td>04.025.550S</td>
</tr>
<tr>
<td>30</td>
<td>60</td>
</tr>
<tr>
<td>04.025.522S</td>
<td>04.025.552S</td>
</tr>
<tr>
<td>32</td>
<td>62</td>
</tr>
<tr>
<td>04.025.524S</td>
<td>04.025.554S</td>
</tr>
<tr>
<td>34</td>
<td>64</td>
</tr>
<tr>
<td>04.025.526S</td>
<td>04.025.556S</td>
</tr>
<tr>
<td>36</td>
<td>66</td>
</tr>
<tr>
<td>04.025.528S</td>
<td>04.025.558S</td>
</tr>
<tr>
<td>38</td>
<td>68</td>
</tr>
<tr>
<td>04.025.530S</td>
<td>04.025.560S</td>
</tr>
<tr>
<td>40</td>
<td>70</td>
</tr>
<tr>
<td>04.025.532S</td>
<td>04.025.562S</td>
</tr>
<tr>
<td>42</td>
<td>72</td>
</tr>
<tr>
<td>04.025.534S</td>
<td>04.025.564S</td>
</tr>
<tr>
<td>44</td>
<td>74</td>
</tr>
<tr>
<td>04.025.536S</td>
<td>04.025.566S</td>
</tr>
<tr>
<td>46</td>
<td>76</td>
</tr>
<tr>
<td>04.025.538S</td>
<td>04.025.568S</td>
</tr>
<tr>
<td>48</td>
<td>78</td>
</tr>
<tr>
<td>04.025.540S</td>
<td>04.025.570S</td>
</tr>
<tr>
<td>50</td>
<td>80</td>
</tr>
<tr>
<td>04.025.542S</td>
<td>04.025.572S</td>
</tr>
<tr>
<td>52</td>
<td>82</td>
</tr>
<tr>
<td>04.025.544S</td>
<td>04.025.580S</td>
</tr>
<tr>
<td>54</td>
<td>90</td>
</tr>
<tr>
<td>04.025.546S</td>
<td>04.025.585S</td>
</tr>
<tr>
<td>56</td>
<td>95</td>
</tr>
<tr>
<td>04.025.548S</td>
<td>04.025.590S</td>
</tr>
<tr>
<td>58</td>
<td>100</td>
</tr>
</tbody>
</table>

**6.0 mm Angular Stable Locking System Screw Set**

6.0 mm Titanium Angular Stable Locking Screws, with T25 StarDrive Recess, for intramedullary nails, sterile, 2 ea.

<table>
<thead>
<tr>
<th>Length (mm)</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>04.025.622S</td>
<td>04.025.652S</td>
</tr>
<tr>
<td>32</td>
<td>66</td>
</tr>
<tr>
<td>04.025.624S</td>
<td>04.025.654S</td>
</tr>
<tr>
<td>34</td>
<td>68</td>
</tr>
<tr>
<td>04.025.626S</td>
<td>04.025.656S</td>
</tr>
<tr>
<td>36</td>
<td>70</td>
</tr>
<tr>
<td>04.025.628S</td>
<td>04.025.658S</td>
</tr>
<tr>
<td>38</td>
<td>72</td>
</tr>
<tr>
<td>04.025.630S</td>
<td>04.025.660S</td>
</tr>
<tr>
<td>40</td>
<td>74</td>
</tr>
<tr>
<td>04.025.632S</td>
<td>04.025.662S</td>
</tr>
<tr>
<td>42</td>
<td>76</td>
</tr>
<tr>
<td>04.025.634S</td>
<td>04.025.664S</td>
</tr>
<tr>
<td>44</td>
<td>78</td>
</tr>
<tr>
<td>04.025.636S</td>
<td>04.025.666S</td>
</tr>
<tr>
<td>46</td>
<td>80</td>
</tr>
<tr>
<td>04.025.638S</td>
<td>04.025.668S</td>
</tr>
<tr>
<td>48</td>
<td>82</td>
</tr>
<tr>
<td>04.025.640S</td>
<td>04.025.670S</td>
</tr>
<tr>
<td>50</td>
<td>84</td>
</tr>
<tr>
<td>04.025.642S</td>
<td>04.025.672S</td>
</tr>
<tr>
<td>52</td>
<td>86</td>
</tr>
<tr>
<td>04.025.644S</td>
<td>04.025.674S</td>
</tr>
<tr>
<td>54</td>
<td>88</td>
</tr>
<tr>
<td>04.025.646S</td>
<td>04.025.676S</td>
</tr>
<tr>
<td>56</td>
<td>90</td>
</tr>
<tr>
<td>04.025.648S</td>
<td>04.025.678S</td>
</tr>
<tr>
<td>58</td>
<td>92</td>
</tr>
<tr>
<td>04.025.650S</td>
<td>04.025.680S</td>
</tr>
<tr>
<td>60</td>
<td>94</td>
</tr>
<tr>
<td>04.025.652S</td>
<td>04.025.682S</td>
</tr>
<tr>
<td>62</td>
<td>96</td>
</tr>
<tr>
<td>04.025.654S</td>
<td>04.025.684S</td>
</tr>
<tr>
<td>64</td>
<td>98</td>
</tr>
<tr>
<td>04.025.656S</td>
<td>04.025.686S</td>
</tr>
<tr>
<td>66</td>
<td>100</td>
</tr>
</tbody>
</table>

**ASLS Sleeves**

Resorbable Sleeve for Angular Stable Locking Screws, sterile, 2/pkg.

- **08.025.044S** for 5.0 mm ASLS Screws
- **08.025.057S** for 6.0 mm ASLS Screws

*Must be ordered separately.*
Titanium Cannulated Retrograde/Antegrade Femoral Nail–EX Opening Instrument Set (01.116.039)

**Note:** Opening, Insertion, and Locking Sets required for procedure.

**Graphic Case Tray**

1 Level High, fully loaded weight 5.61 lbs.

- 60.116.139 Opening RAFN Tray
- 60.116.159 Label Sheet for RAFN–EX Opening Instrumentation

**Instruments**

- 03.010.020 Radiographic Ruler for Titanium Cannulated Femoral Nails
- 03.010.023 Radiographic Canal Width Estimator
- 03.010.034 13.0 mm Flexible Cannulated Drill Bit, 465 mm
- 03.010.041 14.0 mm Cannulated Awl
- 03.010.115 3.2 mm Guide Wire 290 mm, 10 ea.
- 03.010.500 Handle for Wire Guide/Protection Sleeves
- 03.010.502 13 mm Protection Sleeve for Retrograde Nail
- 03.010.503 13 mm Protection Sleeve for Antegrade Nail
- 03.010.507 Wire Guide for 13 mm Protection Sleeve for Retrograde Nail
- 03.010.508 Wire Guide for 13 mm Protection Sleeve for Antegrade Nail
- 351.27 13.0 mm Cannulated Drill Bit, 300 mm

**Graphic Cases**

- 60.037.001 Graphic Case, Full Length 1-High
- 60.037.002 Graphic Case, Full Length 2-High
- 60.037.003 Graphic Case, Full Length 3-High
- 60.037.004 Graphic Case, Full Length 4-High

**Graphic Cases** must be ordered separately, they are not part of set. Choose the graphic case necessary to hold selected set trays by height and weight restrictions.

- 60.116.170 Lifting Posts, 8 pack
Titanium Cannulated Retrograde/Antegrade Femoral Nail–EX Insertion Instrument Set (01.116.046)

**Note:** Opening, Insertion, and Locking Sets required for procedure.

**Graphic Case Tray**
1.5 Level High*, fully loaded weight 12.0 lbs.
- 60.116.146 RAFN Insertion Tray
- 60.116.166 Label Sheet for RAFN–EX Insertion Instrumentation

**Instruments**
- 03.010.061 4.2 mm Three-Fluted Drill Bit, quick coupling, 330 mm/100 mm calibration, 2 ea.
- 03.010.062 5.0 mm Three-Fluted Drill Bit, quick coupling, 330 mm/100 mm calibration, 2 ea.
- 03.010.063 12.0 mm/8.0 mm Protection Sleeve, 188 mm, 2 ea.
- 03.010.065 8.0 mm/4.2 mm Drill Sleeve, 200 mm, 2 ea.
- 03.010.066 8.0 mm/5.0 mm Drill Sleeve, 200 mm, 2 ea.
- 03.010.070 4.2 mm Trocar, 210 mm, 2 ea.
- 03.010.071 5.0 mm Trocar, 210 mm, 2 ea.
- 03.010.081 15.0 mm/13.0 mm Protection Sleeve for Spiral Blade Aiming Arm
- 03.010.082 13.0 mm/3.2 mm Wire Guide for Spiral Blade Aiming Arm
- 03.010.084 Spiral Blade Inserter for Retrograde Femoral Nails–EX
- 03.010.104 4.2 mm Three-Fluted Drill Bit, quick coupling, needle point, 145 mm, 2 ea.
- 03.010.105 5.0 mm Three-Fluted Drill Bit, quick coupling, needle point, 145 mm, 2 ea.
- 03.010.115 3.2 mm Guide Wire 290 mm, 3 ea.
- 03.010.146 Cannulated Connection Screw for 100 mm Insertion Handle, 2 ea.
- 03.010.480 Radiolucent Aiming Arm for Antegrade Standard Locking
- 03.010.481 Radiolucent Aiming Arm for Retrograde Standard Locking
- 03.010.486 Radiolucent Standard Insertion Handle
- 03.010.489 Aiming Arm for Retrograde Spiral Blade Locking

- 03.010.492 Spiral Blade Measuring Device for Retrograde Femoral Nail–EX
- 03.010.517 T-Handle Ball Hex Screwdriver 8 mm
- 03.010.523 Driving Cap with Handle Adapter
- 357.34 Connecting Screw for Inserter for Titanium Spiral Blades
- 357.36 Extraction Screw

**Graphic Cases**
- 60.037.001 Graphic Case, Full Length 1-High
- 60.037.002 Graphic Case, Full Length 2-High
- 60.037.003 Graphic Case, Full Length 3-High
- 60.037.004 Graphic Case, Full Length 4-High

Graphic Cases must be ordered separately, they are not part of set. Choose the graphic case necessary to hold selected set trays by height and weight restrictions.

- 60.116.170 Lifting Posts, 8 pack

* Some graphic case trays are 1.5 levels high. If these trays are to be stored individually in a 2-High Graphic case, the lifting posts pack (60.116.170) must be ordered.
Note: Opening, Insertion, and Locking Sets required for procedure.

Graphic Case Tray
1.5 Level High,* fully loaded weight 11.02 lbs.
60.116.149 Locking Tray
60.116.169 Label Sheet for All EX–Nail Locking Instrumentation

Instruments
03.010.151 Star/Hex Screwdriver Shaft, 165 mm
03.010.152 Star/Hex Screwdriver Shaft, 280 mm
03.010.170 Spiral Hammer Guide
03.010.428 Depth Gauge for Locking Screws to 100 mm for IM Nails
03.010.429 Direct Measuring Device for locking screw to 100 mm for IM Nails
03.010.491 Scalpel Handle, long
03.010.494 Depth Gauge for Distal Locking Screws, 100 mm
03.010.513 StarDrive Screwdriver, T25, self-retaining, 250 mm
03.010.516 Large Handle with Quick Coupling
03.010.518 StarDrive Screwdriver, T25, self-retaining, 320 mm
03.010.519 StarDrive Screwdriver, T25, self-retaining, 440 mm
03.010.520 Cannulated Stardrive Screwdriver, T40, self-retaining, 277 mm
03.010.522 Combination Hammer 500g
03.900.044 T40 Stardrive Screwdriver Shaft
321.17 4.5 mm Pin Wrench, 120 mm, 2 ea.
321.20 Ratchet Wrench, 11 mm width across flats
357.133 Extraction Screw for Titanium Nails
357.398 Cannulated Shaft with 8 mm Hex, 125 mm

Graphic Cases
60.037.001 Graphic Case, Full Length 1-High
60.037.002 Graphic Case, Full Length 2-High
60.037.003 Graphic Case, Full Length 3-High
60.037.004 Graphic Case, Full Length 4-High

Graphic Cases must be ordered separately, they are not part of set. Choose the graphic case necessary to hold selected set trays by height and weight restrictions.

60.116.170 Lifting Posts, 8 pack

* Some graphic case trays are 1.5 levels high. If these trays are to be stored individually in a 2-High Graphic case, the lifting posts pack (60.116.170) must be ordered.
Reduction Instrument Set with MIPO (01.116.041)

### Graphic Case Tray

1.5 Level High,* fully loaded weight 10.82 lbs.

- **60.116.141** Reduction Tray
- **60.116.162** Label Sheet for Reduction Instrumentation

### Instruments

- **03.010.495** Reduction Finger
- **03.010.496** Universal Quick Coupling T-Handle
- **292.655** 1.6 mm Guide Wire, 4 ea.
- **294.788** 5.0 mm Self Drilling Schanz Screws, 250 mm, 2 ea.
- **310.37** 3.5 mm Drill Bit
- **321.16** Combination Wrench
- **328.020** Reduction Handle, toothed, 2 ea.
- **328.100** Protection Sleeve, slotted
- **328.120** 5.0 mm/1.6 mm Wire Guide
- **328.130** 11.0 mm/5.0 mm Drill Sleeve
- **328.140** Cannulated Tap for 5.0 mm Threaded Rod
- **328.150** Adjusting Nut, 2 ea.
- **328.160** 5.0 mm Threaded Rod, self-drilling tip, 2 ea.
- **328.170** 5.0 mm Threaded Rod, blunt tip, 2 ea.
- **359.212** Large F-Tool
- **360.251** 7.5 mm IM Reduction Tool
- **390.005** Large Combination Clamp, 2 ea.
- **393.10** Universal Chuck with T-Handle, 2 ea.
- **394.86** 11.0 mm Carbon Fiber Rod, 350 mm
- **398.54** Straight Ball Spike, 337 mm length

### Graphic Cases

- **60.037.001** Graphic Case, Full Length 1-High
- **60.037.002** Graphic Case, Full Length 2-High
- **60.037.003** Graphic Case, Full Length 3-High
- **60.037.004** Graphic Case, Full Length 4-High

Graphic Cases must be ordered separately, they are not part of set. Choose the graphic case necessary to hold selected set trays by height and weight restrictions.

- **60.116.170** Lifting Posts, 8 pack

---

* Some graphic case trays are 1.5 levels high. If these trays are to be stored individually in a 2-High Graphic case, the lifting posts pack (60.116.170) must be ordered.
Reduction Instrument Set (01.116.042)

Graphic Case Tray
1.5 Level High*, fully loaded weight 7.63 lbs.
60.116.142 Reduction Tray
60.116.162 Label Sheet for Reduction Instrumentation

Instruments
03.010.495 Reduction Finger
03.010.496 Universal Quick Coupling with T-Handle, 2 ea.
294.788 5.0 mm Self Drilling Schanz Screws, 250 mm, 2 ea.
359.212 Large F-Tool
360.251 7.5 mm IM Reduction Tool
393.10 Universal Chuck with T-handle, 2 ea.
398.54 Straight Ball Spike, 337 mm length

Graphic Cases
60.037.001 Graphic Case, Full Length 1-High
60.037.002 Graphic Case, Full Length 2-High
60.037.003 Graphic Case, Full Length 3-High
60.037.004 Graphic Case, Full Length 4-High

Graphic Cases must be ordered separately, they are not part of set. Choose the graphic case necessary to hold selected set trays by height and weight restrictions.

60.116.170 Lifting Posts, 8 pack

* Some graphic case trays are 1.5 levels high. If these trays are to be stored individually in a 2-High Graphic case, the lifting posts pack (60.116.170) must be ordered.
Titanium Cannulated Retrograde/Antegrade Femoral Nail Surgical Technique

DePuy Synthes

Reaming Instrument Set (01.116.043)

Graphic Case Tray

1 Level High, fully loaded weight 5.54 lbs.
60.116.143 Reaming Tray
60.116.163 Label Sheet for Reaming Instrumentation
690.382.40 Reamer Head Tray

Instruments

03.010.093 Reaming Rod Push Rod with Ball Handle
351.05 Tissue Protector
351.15 Flexible Shaft Handle with Quick Coupling
351.16J Jacobs Chuck Adapter
351.717 Depth Gauge
351.719 Extension Tube for Depth Gauge
351.783 Removal Tool
352.040 5.0 mm Flexible Shaft, 2 ea.
352.050 7 mm Head, straight
352.055 7 mm Head, angled
393.10 Universal Chuck with T-Handle

Reamer Heads

<table>
<thead>
<tr>
<th>Length (mm)</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>352.085</td>
<td>352.140</td>
</tr>
<tr>
<td>352.090</td>
<td>352.145</td>
</tr>
<tr>
<td>352.095</td>
<td>352.150</td>
</tr>
<tr>
<td>352.100</td>
<td>352.155</td>
</tr>
<tr>
<td>352.105</td>
<td>352.160</td>
</tr>
<tr>
<td>352.110</td>
<td>352.165</td>
</tr>
<tr>
<td>352.115</td>
<td>352.170</td>
</tr>
<tr>
<td>352.120</td>
<td>352.175</td>
</tr>
<tr>
<td>352.125</td>
<td>352.180</td>
</tr>
<tr>
<td>352.130</td>
<td>352.185</td>
</tr>
<tr>
<td>352.135</td>
<td>352.190</td>
</tr>
</tbody>
</table>

Graphic Cases

60.037.001 Graphic Case, Full Length 1-High
60.037.002 Graphic Case, Full Length 2-High
60.037.003 Graphic Case, Full Length 3-High
60.037.004 Graphic Case, Full Length 4-High

Graphic Cases must be ordered separately, they are not part of set. Choose the graphic case necessary to hold selected set trays by height and weight restrictions.

60.116.170 Lifting Posts, 8 pack
Also Available

Sets
01.116.041 Reduction Set with MIPO Instrumentation
01.116.042 Reduction Set
01.116.043 Reaming Set
105.309 Reamer/Irrigator/Aspirator Instrument Set
150.060 Flexible Reamer Set for IM Nails

03.010.487 Radiolucent Percutaneous Insertion Handle
03.010.497 Cam Lock Lever
03.010.497S Cam Lock Lever, 2 pack, sterile
03.010.499 Cannulated Connection Screw for Percutaneous Insertion Handle
03.010.515 Inter-lock Screwdriver, T40, 377 mm
03.037.008 8 mm Cannulated Awl
319.97 Screw Forceps
351.7065 2.5 mm Reaming Rod with Ball Tip, 950 mm, sterile
351.707S 2.5 mm Reaming Rod with Ball Tip and Extension, 950 mm, sterile
351.708S 2.5 mm Reaming Rod with Ball Tip, 1150 mm, sterile
351.782 Holding Forceps
355.399 Extraction Hook
357.408 Cleaning Stylet, 3.2 mm
357.409 Cleaning Brush, 3.2 mm
393.105 Small Universal Chuck
394.35 Large Distractor, Complete
394.87 11.0 mm Carbon Fiber Rod, 400 mm

Graphic Cases
60.116.151 Auxillary Tray, Full Length, 1-High
60.116.152 Auxillary Tray, Full Length, 2-High
60.116.173 Auxillary Tray Divider, 1-High, 6 pack
60.116.174 Auxillary Tray Divider, 1-High, 12 pack
60.116.183 Auxillary Tray Divider, 2-High, 6 pack
60.116.184 Auxillary Tray Divider, 2-High, 12 pack

60.116.151 Auxillary Tray, Full Length, 1-High
60.116.152 Auxillary Tray, Full Length, 2-High
60.116.173 Auxillary Tray Divider, 1-High, 6 pack
60.116.174 Auxillary Tray Divider, 1-High, 12 pack
60.116.183 Auxillary Tray Divider, 2-High, 6 pack
60.116.184 Auxillary Tray Divider, 2-High, 12 pack

Instruments
03.010.024 Holding Device for Guide Wires and Reaming Rods
03.010.072 Depth Gauge
03.010.083 Spiral Blade Measuring Device
03.010.101◊ 4.2 mm Three-Fluted Drill Bit, quick coupling, 145 mm, for Radiolucent Drive
03.010.102◊ 5.0 mm Three-Fluted Drill Bit, quick coupling, 145 mm, for Radiolucent Drive
03.010.106 Direct Measuring Device
03.010.111 Cannulated StarDrive Screwdriver, T40, with lever handle, self-retaining
03.010.112 Holding Sleeve
03.010.119 4.6 mm Cleaning Brush
03.010.120 4.6 mm Cleaning Stylet
03.010.472 Inter-lock Screwdriver, T25, 3.5 mm Hex, 330 mm
03.010.473 Inter-lock Screwdriver, T25, 3.5 mm Hex, 224 mm
03.010.484 Connecting Screw for Radiolucent Aiming Arms

Power Equipment
511.30 Radiolucent Drive Mark II
511.73 Jacobs Chuck with Key, large
511.75 Quick Coupling, for drill bits
511.761 Large Quick Coupling
511.785 Reduction Drive Unit
511.791 Quick Coupling, for Kirschner wires
530.100 Power Drive
530.200 Battery, for Power Drive
530.280 Battery Casing, for Power Drive

◊ Available nonsterile or sterile-packed.
Add “S” to product number to indicate sterile product.
Limited Warranty and Disclaimer: DePuy Synthes products are sold with a limited warranty to the original purchaser against defects in workmanship and materials. Any other express or implied warranties, including warranties of merchantability or fitness, are hereby disclaimed.
Please also refer to the package insert(s) or other labeling associated with the devices identified in this surgical technique for additional information.
CAUTION: Federal Law restricts these devices to sale by or on the order of a physician.
Some devices listed in this surgical technique may not have been licensed in accordance with Canadian law and may not be for sale in Canada.
Please contact your sales consultant for items approved for sale in Canada.
Not all products may currently be available in all markets.