EXTREMiLOCK™
Ankle Plating System

Surgical Technique Guide

OSTEOMED
SMALL BONE ORTHOPEDICS
Rethinking Possibilities, Reshaping Lives
# Table of Contents

## System Overview

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indications</td>
<td>4</td>
</tr>
</tbody>
</table>

## System Components

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implant Tray</td>
<td>5-6</td>
</tr>
<tr>
<td>Instrument Tray</td>
<td>7-8</td>
</tr>
<tr>
<td>Solid Core Screw Module</td>
<td>9</td>
</tr>
<tr>
<td>Cannulated Screw Module</td>
<td>10</td>
</tr>
</tbody>
</table>

## Implant Selection

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plates</td>
<td>11</td>
</tr>
<tr>
<td>Screws &amp; Washer</td>
<td>11</td>
</tr>
</tbody>
</table>

## Surgical Procedures

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lag Screw Technique (Solid Core Screws)</td>
<td>12-13</td>
</tr>
<tr>
<td>Lag Screw Technique (Cannulated Screws)</td>
<td>14-15</td>
</tr>
<tr>
<td>Plating (Contouring)</td>
<td>15</td>
</tr>
<tr>
<td>Plating (Provisional Fixation)</td>
<td>16</td>
</tr>
<tr>
<td>Plating (Screw Preparation and Insertion)</td>
<td>16-17</td>
</tr>
<tr>
<td>Plating (Compression Hole)</td>
<td>18</td>
</tr>
<tr>
<td>Plating (Syndesmosis Fixation)</td>
<td>19</td>
</tr>
<tr>
<td>Plating (Hook Plate Fixation)</td>
<td>20</td>
</tr>
<tr>
<td>Plating (Cannulated Screw)</td>
<td>21-22</td>
</tr>
</tbody>
</table>
System Overview

The ExtremiLOCK Ankle Plating System is a comprehensive ankle fracture system intended to provide solutions for various bony fractures, including simple to complex fractures of the distal tibia and fibula. All system components are contained in a single-instrument tray which houses:

- 6 Different Types of Fracture Plating Options
- 7 Different Types of Screw Fixation Options
- Comprehensive, Color-coded Instrumentation

Indications

The OsteoMed ExtremiLOCK Ankle Plating System is intended for fixation of fractures, arthrodesis, osteotomies, and non-unions of the tibia and fibula. The ExtremiLOCK Ankle Plating System implants are intended for single use only.

The 1/3 tubular plates, hook plates, screws and washers are also intended for use in trauma, general surgery and reconstructive procedures of bones appropriate for the size of the device.

The OsteoMed ExtremiLOCK Ankle Plating System can be used for adult and pediatric patients.
Implant Tray

320-2921 ExtremiLOCK Ankle Plate Removable Tray

**Anterior Lateral Tibia**

- 336-2107 7H Anterior Lateral Plate, Left
- 336-2110 10H Anterior Lateral Plate, Left
- 336-2113 13H Anterior Lateral Plate, Left
- 336-2207 7H Anterior Lateral Plate, Right
- 336-2210 10H Anterior Lateral Plate, Right
- 336-2213 13H Anterior Lateral Plate, Right

**Lateral Fibula**

- 336-5103 3H Fibula Fracture Plate, Left
- 336-5106 6H Fibula Fracture Plate, Left
- 336-5109 9H Fibula Fracture Plate, Left
- 336-5203 3H Fibula Fracture Plate, Right
- 336-5206 6H Fibula Fracture Plate, Right
- 336-5209 9H Fibula Fracture Plate, Right

**Anterior Tibia**

- 336-1006 6H Anterior Tibia Plate, Universal

**Universal Hook**

- 336-6007 7H Hook Plate, Universal

**Medial Tibia**

- 336-4004 4H Tibia Fracture Plate
- 336-4006 6H Tibia Fracture Plate

**1/3 Tubular**

- 336-0004 4H 1/3 Tubular
- 336-0006 6H 1/3 Tubular
- 336-0008 8H 1/3 Tubular
Implant Tray

Instruments

- **320-2780** Slotted Plate Bender #1
- **320-2781** Slotted Plate Bender #2
- **320-2702** Plate File
- **220-0711** Plate Cutter
- **320-1029** Plate Bending Pliers
**Instrument Tray**

![Image of instrument tray]

**Instruments**

- **320-2227** 2.0mm Pilot/2.7mm Over Drill Guide
- **320-2235** 2.5mm Pilot/3.5mm Over Drill Guide
- **320-2240** 3.0mm Pilot/4.0mm Over Drill Guide
- **320-2328** 2.7mm Drill Guide - Angled / Compression
- **320-2335** 3.5mm Drill Guide - Angled / Compression
- **320-2340** 4.0mm Drill Guide - Angled / Compression
- **320-2528** 2.7mm Depth Gauge, 10mm - 60mm
- **320-2535** 3.5mm / 4.0mm Depth Gauge, 10mm - 70mm
- **320-2800** Ratcheting Driver Handle
- **323-1719** Hook Plate Drill Guide Handle
- **320-2710** Hook Plate Drill Guide
- **320-2712** Hook Plate Impactor
- **320-1024** Sharp Hook
- **320-0402** Hohmann Retractor, 15mm Blade
- **320-1021** Hohmann Retractor, 8mm Blade
- **320-0401** Curved Periosteal Elevator, 6mm Straight
- **320-2775** 2.4 x 230mm Threaded Tip Guide Pin
- **320-2776** 3.2 x 230mm Threaded Tip Guide Pin
Instrument Tray

- 320-2795 Reduction Clamp
- 320-2795 Reduction Clamp
- 316-0046 Reduction Forceps with Serrated Jaw
- 320-2771 2.4 / 3.2mm Compressor Instrument
- 320-0102 Bone Clamp
- 320-2771 2.4 / 3.2mm Distractor Instrument

osteomed.com
Solid Core Screw Module

**Screws**

- **342-27xx** 2.7mm, Double Lead, Non-Locking Screw, 10mm - 40mm
- **343-27xx** 2.7mm, Double Lead, Locking Screw, 10mm - 40mm
- **337-35xx** 3.5mm, Double-Lead Non-Locking, 10mm - 60mm
- **338-35xx** 3.5mm, Double-Lead Locking, 10mm - 60mm
- **337-40xx** 4.0mm, Double-Lead Non-Locking, 10mm - 60mm
- **338-40xx** 4.0mm, Double-Lead Locking, 10mm - 60mm

**Instruments & Consumables**

- **337-3599** 3.5/4.0mm Washer
- **337-0001** 1.6mm Threaded Holding TAK™
- **320-2720** Driver Sleeve
- **320-2400** Self-Retaining Screw Driver, Quick Release
- **320-2020** 2.0mm Short Pilot Drill, Quick Release
- **320-2025** 2.5mm Short Pilot Drill, Quick Release
- **320-2030** 3.0mm Short Pilot Drill, Quick Release
- **320-2027** 2.7mm Over Drill, Quick Release
- **320-2035** 3.5mm Over Drill, Quick Release
- **320-2040** 4.0 Over Drill, Quick Release
- **320-2728** 2.7mm Countersink, Quick Release
- **320-2735** 3.5/4.0mm Countersink, Quick Release
- **320-2120** 2.0mm Long Pilot Drill, Quick Release
- **320-2130** 3.0mm Long Pilot Drill, Quick Release
- **320-2125** 2.5mm Long Pilot Drill, Quick Release
- **320-2021** 2.7mm Over Drill, Quick Release
- **320-2035** 3.5mm Over Drill, Quick Release
- **320-2040** 4.0 Over Drill, Quick Release
- **320-2728** 2.7mm Countersink, Quick Release
- **320-2735** 3.5/4.0mm Countersink, Quick Release
Cannulated Screw Module

**Screws**

- 339-00xx  4.0mm, Double-Lead, Non-Locking, Cannulated 20mm - 60mm

**Instruments**

- 320-0123  1.6mm x 150mm K-wire
- 320-2216  Cannulated Drill Guide
- 320-2627  2.7mm Cannulated Pilot Drill, Quick Release
- 320-2640  4.0mm Cannulated Over Drill, Quick Release
- 320-2675  Cannulated Depth Gauge
- 320-2785  Screw Remover
- 320-2615  Cannulated Screw Driver, Quick Release
- 320-2800  Ratcheting Driver Handle
Implant Selection

Plates

Preoperative planning, knowledge of the surgical technique, proper implant selection and placement are important considerations when using the ExtremiLOCK Ankle Plating System. Choose implants that address the specific needs dictated by the fracture location, type and classification. Additional considerations include the anatomical variables of the patient.

ExtremiLOCK fracture plating options include: Anterior Tibia, Anterior Lateral Tibia, Medial Tibia, Lateral Fibula, 1/3 Tubular and Universal Hook plating options. All plates accommodate 2.7mm, 3.5mm and 4.0mm locking and non-locking screws. Each plating option, excluding the 1/3 Tubular plates, feature a bulleted tip to facilitate a minimally-invasive surgical approach.

Screws & Washers

The ExtremiLOCK Ankle Plating System provides surgeons with a broad range of screw fixation options. Screw options include: 2.7mm, 3.5mm and 4.0mm cortical locking and non-locking screws, as well as 4.0mm cancellous non-locking, cannulated screws. Locking screws can be locked on-axis with the plate threads or up to 20 degrees of angled-locking in any direction (40 degree conical). All screws are self-tapping, and feature a universal drive mechanism and a double-lead thread pattern to promote efficient bony purchase. The 4.0mm cannulated screws also incorporate a self-drilling feature to facilitate screw insertion.

Bone screw washers accommodate 2.7mm, 3.5mm and 4.0mm non-locking screws and are intended to prevent screws from breaking through the cortex of the bone. Bone washers are not intended to be used with the fracture plates.
Surgical Procedure

Incision

Preoperative fluoroscopy and/or CT scans should be used to determine the proper approach and surgical incision. The incision location should take into account the fracture type and individual patient anatomy.

Fracture Reduction

Reduction / Tissue Manipulation Instruments

- 1.6mm x 150mm K-wire
- Bone Clamp
- Reduction Forceps, with Serrated Jaw
- Holman Retractor, 8mm Blade
- Holman Retractor, 15mm Blade
- Curved Periosteal Elevator, 6mm Straight
- Sharp Hook
- 2.4 / 3.2mm Compressor Instrument
- 2.4 / 3.2mm Distractor Instrument
- 2.4 x 230mm Threaded Tip Guide Pin
- 3.2 x 230mm Threaded Tip Guide Pin

Anatomic reduction should be performed based on the surgeon's best judgment. In cases of comminution and bone loss, the contra-lateral ankle may be used as a reference to assist with anatomic reduction. Bone reduction forceps and K-wires may be used to facilitate temporary bony fixation. Anatomic reduction should be confirmed fluoroscopically.

Lag Screw Technique (Solid Core Screws)

<table>
<thead>
<tr>
<th>2.7mm Instruments</th>
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<tr>
<td>2.7mm Over Drill</td>
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<tr>
<td>2.0mm Pilot / 2.7mm Drill Guide</td>
<td>2.5mm Pilot / 3.5mm Drill Guide</td>
<td>3.0mm Pilot / 4.0mm Drill Guide</td>
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<tr>
<td>2.7mm Countersink</td>
<td>3.5/4.0mm Countersink</td>
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<tr>
<td>2.7mm Depth Gauge</td>
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<tr>
<td>Screw Driver</td>
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The ExtremiLOCK Ankle Plating System incorporates 2.7mm, 3.5mm and 4.0mm fully-threaded screws and corresponding instrumentation to address various types of distal tibia and fibula fractures. The following steps describe insertion of a solid core screw using the lag screw technique:

1. Drill

Choose the appropriate overdrill and drill the proximal fragment to create a gliding hole. To maximize compression, the hole should be drilled as perpendicular to the fracture line as possible. Use the appropriate drill guide and corresponding pilot drill to create the pilot hole through the distal fragment. Care should be taken to ensure the fragments are properly reduced prior to drilling through the distal fragment.
Lag Screw Technique (Solid Core Screws)

2. Countersink (Optional)
   If desirable, the countersink may be used to reduce the profile of the screw head and to decrease cortical stress. Place the appropriately-sized countersink in the pre-drilled hole and rotate clock-wise to remove the desired amount of bone to accommodate the screw head. Care should be taken to not remove too much bone.

3. Determine Screw Length
   Select the appropriate depth gauge to determine the correct screw length.

4. Screw Insertion
   Select the appropriate screw and insert. Screw length can be verified using the length gauge on the screw block. Closely observe compression along the fracture line as the screw is being inserted. Repeat as necessary for additional screw placement.
Lag Screw Technique (Cannulated Screws)

The ExtremiLOCK Ankle Plating System incorporates 4.0mm fully-threaded cannulated screws and corresponding instrumentation. The following steps describe insertion of a cannulated screw using the lag screw technique:

1. Insert K-wire

   Insert the k-wire to the appropriate depth under fluoroscopy. Care should be taken to not bend the wire when placing it in bone. The cannulated drill guide may be used to facilitate k-wire insertion.

2. Determine Screw Length

   Place the Cannulated Depth Gauge over the K-wire and measure the correct screw length. If desirable, the distal end of the depth gauge can also be used to remove additional bone to accommodate any screw head prominence. Screw length should be measured after any bony removal with the countersink.

3. Drill

   Place the cannulated overdrill over the k-wire and drill the proximal fragment to create a gliding hole. The Cannulated Drill Guide can be used to facilitate drill insertion. To maximize compression, the hole should be drilled as perpendicular to the fracture line as possible. Care should be taken to ensure the fragments are properly reduced prior to drilling through the distal fragment. The cannulated pilot drill can be used to drill the distal fragment if desired.
Lag Screw Technique (Cannulated Screws)

4. Screw Insertion
Select the appropriate screw and insert over the K-wire. Screw length can be verified using the length gauge on the screw block. Closely observe compression along the fracture line as the screw is being inserted. Remove and discard the K-wire. Repeat as necessary.

Plating (Contouring)

Contouring Instruments
Plate Bending Pliers
Slotted Plate Bender #1
Slotted Plate Bender #2
Plate Cutter
Plate File

The ExtremiLOCK ankle plates are pre-contoured to match the anatomy of the distal tibia and fibula. However, if additional contouring is necessary, plate bending pliers or slotted plate benders may be used to achieve the desired contour. The slotted benders feature various slot heights to accommodate plate thicknesses. Care should be taken to avoid over-bending or bending plates multiple times to prevent stress risers.

A plate cutter is also available to the cut the distal aspect of the anterior tibia, medial tibia, and anterior lateral tibia plates. The 1/3 tubular plates can also be cut to the desired length. A plate file is available to blunt any sharp edges.
Plating (Provisional Fixation)

Provisional Fixation Instruments
1.6mm x 150mm K-wire
1.6mm Threaded Plate Holding TAK

Based on the type of fracture, choose the most appropriate ankle fracture plate. Position the plate over the fracture. Care should be taken to ensure adequate points of fixation can be achieved on all sides of the fracture line(s). If desirable, temporary fixation can be achieved using K-wires or plate TAKs.

Plating (Screw Preparation and Insertion)

<table>
<thead>
<tr>
<th>2.7mm Instruments</th>
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<tbody>
<tr>
<td>2.0mm Pilot / 2.7mm Over Guide</td>
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<tr>
<td>2.7mm Drill Guide-Angled/Comp</td>
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<tr>
<td>2.7mm Depth Gauge</td>
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<tr>
<td>Screw Driver</td>
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All circular plate holes can accommodate 2.7mm, 3.5mm and 4.0mm locking and non-locking screws as well as 4.0mm cannulated screws. All locking screws can be locked on-axis with the plate threads or up to 20 degrees angled-locking in any direction (40 degree conical). Once the appropriate screw diameter has been selected, follow the steps below for screw insertion through a plate:
Plating (Screw Preparation and Insertion)

1. Drill

If using non-locking screws, select the appropriate pilot/over drill guide and insert the pilot drill side through the target plate hole. Continue to drill a pilot hole using the appropriately-sized pilot drill.

If using locking screws, select the appropriate size angled locking/compression drill guide and insert the guide into the desired plate hole. Ensure the guide is fully engaged in the corresponding plate hole. The cone will ensure the drill remains within the 40° angled locking screw range (±20° from center).

2. Determine Screw Length

Select the corresponding depth gauge to determine the correct screw length.

3. Screw Insertion

Select the appropriate screw and insert. Screw length can be verified using the length gauge on the screw block. Final tightening should be performed using a two-finger technique to avoid over-tightening. Locking screws can be locked/unlocked up to three times in a single hole prior to final tightening. Repeat as necessary for additional screw placement.
Plating (Compression Hole)

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Compression screw holes are used for providing compression across a fracture site and can only accommodate non-locking screws. Compression is created as the screw travels to the distal side of the compression screw hole. Follow the steps below for screw insertion through a compression hole:

1. **Drill**
   Select the appropriate angled/compression guide and insert into the target compression hole. The arrow will be pointing toward the fracture/fusion site to drill eccentrically. To maximize compression, ensure the drill guide is fully engaged with the target compression hole. Drill using the appropriately-sized pilot drill.

2. **Determine Screw Length**
   Select the corresponding depth gauge to determine the correct screw length.

3. **Screw Insertion**
   Select the appropriate screw and insert. Screw length can be verified using the length gauge on the screw block. Final tightening should be performed using a two-finger technique to avoid over-tightening. Repeat as necessary for additional compression screw placement.
Plating ( Syndesmosis Fixation )

**Syndesmosis Instrument**
- Reduction Clamp

The ExtremiLOCK fibula plates feature a syndesmotic slot that can accommodate up to two non-locking screws. The syndesmotic slot has been designed to place fixation in the correct anatomical location and also accommodate anterior screw angulation. A syndesmotic reduction clamp is available to assist with fixation. Follow the steps below for syndesmotic fixation through a plate:

1. **Drill**
   - Select the appropriate pilot and drill through the syndesmotic slot.

2. **Determine Screw Length**
   - Select the corresponding depth gauge to determine the correct screw length.

3. **Screw Insertion**
   - Select the appropriate screw and insert. Final tightening should be performed using a two-finger technique to avoid over-tightening. Verify fixation with fluoroscopy.
Plating (Hook Plate Fixation)

The ExtremiLOCK Hook plates are universal and intended to be used on either the tibia or fibula. The following steps describe implantation of a hook plate:

1. Contour
   If applicable, contour the plate as needed to accommodate the patient’s anatomy.

2. Pre-Drill (Optional)
   If desirable, the hook drill guide, handle and k-wires or 2.0mm drills may be used to pre-drill for the hooks.

3. Placement
   Position the plate so that the hooks capture the bony fragment(s). The hook impactor may be used to secure the hook plate position.

4. Screw Insertion
   Insert screws using the previously described Screw Preparation and Insertion Technique.
Plating (Cannulated Screw)

4.0mm Cannulated Instruments
1.6mm x 150mm K-wire
4.0mm Cannulated Depth Gauge
Cannulated Drill Guide
2.7mm Cannulated Pilot Drill
Cannulated Screw Driver

The ExtremiLOCK 4.0mm cannulated screws can be used with any ankle fracture plate. When using a cannulated screw, the cannulated screw must be implanted prior to any other screw. Only one cannulated screw can be used per plate. Follow the steps below for cannulated screw insertion through a plate:

1. Insert K-wire

   Insert the K-wire to the appropriate depth under fluoroscopy. Care should be taken to not bend the wire when placing it in bone.

2. Determine Screw Length

   Place the cannulated depth gauge over the K-wire and measure the correct screw length. Care should be taken to ensure the distal end of the depth gauge does not damage the plate.
3. Drill

Place the cannulated pilot drill over the K-wire and drill to the corresponding depth.

4. Screw Insertion

Select the appropriate cannulated screw and insert over the K-wire. Screw length can be verified using the length gauge on the screw block. Remove and discard the K-wire. Insert screws using the previously described Screw Preparation and Insertion Technique.
OsteoMed Products

- ExtremiLOCK Foot Plating System
- ExtremiFix Headless Cannulated Screws
- ExtremiFix Cannulated Screws
- Large Cannulated Screws
- ExtremiFuse
- EnCompass
- EnCompass Lessers
- Hemi
- ReFlexion
- InterPhlex
- Talar-Fit
- OsteoVation EX
- OsteoVation QWIK
- Comprehensive Allograft Offering