LCP Wrist Fusion Set. Anatomic plates for total wrist fusion.

Technique Guide

SYNTHES® Instruments and implants approved by the AO Foundation
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The LCP Wrist Fusion System consists of plates, locking screws and cortex screws. Implants are available in implant quality 316L stainless steel and commercially pure titanium.

**Plates**
- Standard bend plates for average-sized individuals
- Short bend plates for small-stature individuals or patients with previous proximal row carpectomy
- Straight plate for patients with unusual anatomy or a severely deformed wrist joint
- Precontoured plates reduce the need for intraoperative bending
- Low-profile plates minimize plate prominence
- Limited-contact design minimizes periosteal contact
- Fusion angle of 10° dorsiflexion provides optimum hand position
- Plates accept 2.7 mm locking and cortex screws distally and 3.5 mm locking and cortex screws proximally
- Plate geometry is identical to the LC-DCP wrist fusion plates, except for overall length
- Combi hole dorsal to the capitate allows lagging or locking the capitate to the plate
Screws
- 2.7 mm and 3.5 mm locking and cortex screws
- Self-tapping for easy insertion
- Self-retaining StarDrive recess provides improved torque transmission and increased resistance to stripping
- Locking screws with threaded head are used in Combi holes to create a fixed-angle construct, particularly advantageous to osteopenic bone
In 1958, the AO formulated four basic principles, which have become the guidelines for internal fixation. These principles as applied to the LCP Wrist Fusion System, are:

**Anatomic reduction**  
The LCP Wrist Fusion System consists of implants designed to restore the anatomy of the wrist after fusion.

**Stable fixation**  
The implants in the LCP Wrist Fusion System use locking compression plate (LCP) technology. Locking the screw to the plate creates a fixed-angle construct that is stronger compared to a similar nonlocking plate and screw combination. The compression screw allows controlled compression of the joint that increases stability and promotes bony union.

**Preservation of blood supply**  
The plates are low profile to allow good soft tissue coverage and improved blood supply to the fusion site.

**Early, active mobilization**  
LCP Wrist Fusion Plates combined with proper AO technique provide stable fusion plating with minimal trauma to the vascular supply. This helps to create an improved environment for bone healing, accelerating the patient’s return to activity.

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The LCP Wrist Fusion System is indicated for wrist arthrodesis and fractures of other small bones. Specific indications include:

– Posttraumatic arthritis of the joints of the wrist
– Rheumatoid wrist deformities requiring restoration
– Complex carpal instability
– Postseptic arthritis of the wrist
– Severe unremitting wrist pain related to motion
– Brachial plexus nerve palsies
– Tumor resection
– Spastic deformities
Evaluate the condition of the soft tissues. Compare the standard bend, short bend and straight plates to the patient’s wrist, and determine which plate to use for fusion.

The standard bend plate is used for medium to large wrist fixation.

The short bend plate is used for smaller wrist fixation and for fusion following proximal row carpectomy.

The straight plate is used for wrist fixation when the standard and short bend plates do not fit the anatomy. This plate can be contoured to the anatomy of the patient’s wrist.
1

Approach

Place the patient in the supine position with the hand and arm on a hand table. Make a longitudinal incision from the radial aspect of the third metacarpal across Lister’s tubercle to the dorsum of the distal radius.

Open the third dorsal compartment, and transpose the extensor pollicis longus (EPL) radially. Retract the digital extensors of the index and middle fingers to expose the dorsal aspect of the third metacarpal.

Make an incision through the wrist capsule and extend it proximally to the radius along its dorsal surface. Elevate the capsule and second dorsal compartment radially, and the capsule and fourth dorsal compartment ulnarly.
2

Prepare joint

Expose and decorticate the joint surfaces to be included in the fusion. These include the scaphocapitate joint, capitolunate joint, radioscaphoid joint and radiolunate joint. In some cases, the ulnar midcarpal, lunotriquetral and second and third carpometacarpal joints may be included.

Remove Lister's tubercle and the dorsal distal aspect of the radius with an osteotome. Decorticate the dorsal surfaces of the scaphoid, lunate, and capitate.

The dorsal shavings can be saved for use as cancellous bone graft. Cancellous bone can also be harvested from the radius, radial to the most distal screw position. If more bone is needed, it may also be obtained from the olecranon or iliac crest.

Insert autogenous bone graft (optional)

Determine if there is a bone void that requires filling to maintain reduction and aid in bone healing.

Pack all joints to be fused with cancellous bone before plate fixation.
3

Insert distal 2.7 mm cortex screw

Instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>311.43</td>
<td>Handle, with quick coupling</td>
</tr>
<tr>
<td>314.467</td>
<td>StarDrive Screwdriver Shaft, T8, 105 mm</td>
</tr>
<tr>
<td>319.01</td>
<td>Depth Gauge, for 2.7 mm and 3.5 mm screws up to 60 mm</td>
</tr>
<tr>
<td>323.062</td>
<td>2.0 mm Drill Bit with depth mark, quick coupling, 140 mm</td>
</tr>
<tr>
<td>323.26</td>
<td>2.7 mm Universal Drill Guide</td>
</tr>
</tbody>
</table>

Fix the plate to the third metacarpal and then to the radius. Insert screws in the sequence shown. Position the plate directly over the dorsal aspect of the third metacarpal.

**Note:** Screw sequence may vary depending on patient anatomy and surgeon preference.

Place the drill guide in the nonlocking portion of the #1 hole in the **neutral** position.

Insert the 2.0 mm drill bit through the drill guide to the bone.

**Caution:** Do not start drilling until the drill bit touches the bone. Inserting the drill bit into the drill guide while the drill is running may cause damage to the drill bit or drill guide.

Drill to the desired depth, being sure to drill precisely in the midline, dorsal to volar. Verify drill depth using image intensification.
3

Insert distal 2.7 mm cortex screw continued

Remove the drill and drill guide. Use the depth gauge to measure for screw length.

Insert the 2.7 mm cortex screw manually, using the self-retaining StarDrive screwdriver shaft and handle, and tighten carefully.

Alternative technique: Insert distal 2.7 mm locking screw

A unicortical locking screw can be inserted in the threaded portion of the distal hole instead of the cortex screw.

This unicortical locking screw can limit fracture propagation at the end of the plate.

The technique for inserting a 2.7 mm locking screw is described on page 11.
4
Insert distal 2.7 mm locking screws

Instruments

<table>
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<tr>
<th>Code</th>
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<td>311.43</td>
<td>Handle, with quick coupling</td>
</tr>
<tr>
<td>314.467</td>
<td>StarDrive Screwdriver Shaft, T8, 105 mm</td>
</tr>
<tr>
<td>323.061</td>
<td>2.0 mm Threaded Drill Guide, with Depth Gauge</td>
</tr>
<tr>
<td>323.062</td>
<td>2.0 mm Drill Bit with depth mark, quick coupling, 140 mm</td>
</tr>
</tbody>
</table>

Insert 2.7 mm locking screws in the sequence shown (2, 3, 4).

Screw the threaded drill guide into the locking portion of the LCP hole.
Insert distal 2.7 mm locking screws

Insert the 2.0 mm drill bit through the drill guide to the bone.

**Caution:** Do not start drilling until the drill bit touches the bone. Inserting the drill bit into the drill guide while the drill is running may cause damage to the drill bit or drill guide.

Drill to the desired depth. Verify drill depth using image intensification.

Determine the screw length directly from the mark on the drill bit and the scale on the threaded drill guide.

**Alternative instrument**

| 319.01 | Depth Gauge, for 2.7 mm and 3.5 mm cortex screws up to 60 mm |

Screw length can be checked by removing the drill guide and using the depth gauge.

Insert the locking screw manually using the self-retaining StarDrive screwdriver shaft and handle, and tighten carefully. Excessive force is not necessary to lock the screw to the plate. Repeat for the remaining 2.7 mm locking screws.

Fix the plate to the capitate in a similar manner.

**Note:** If the plate sits off of the dorsal capitate, be careful not to lag the capitate up to the plate. This would distort the carpal canal and lead to volar screw prominence.
5

**Insert proximal 3.5 mm cortex screw**

<table>
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<th>Instruments</th>
<th>Description</th>
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<tr>
<td>310.25</td>
<td>2.5 mm Drill Bit, quick coupling, 110 mm</td>
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<tr>
<td>311.43</td>
<td>Handle, with quick coupling</td>
</tr>
<tr>
<td>314.116</td>
<td>StarDrive Screwdriver Shaft, T15</td>
</tr>
<tr>
<td>319.01</td>
<td>Depth Gauge, for 2.7 mm and 3.5 mm screws up to 60 mm</td>
</tr>
<tr>
<td>323.36</td>
<td>3.5 mm Universal Drill Guide</td>
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</tbody>
</table>

In aligning the plate over the radius, a small amount of ulnar deviation may be preferred.

With the plate aligned and the hand properly positioned, begin fixation to the radius with hole 5.

Place the drill guide in the nonlocking portion of hole 5 in the *load* position.

Insert the 2.5 mm drill bit through the drill guide to the bone.

**Caution:** Do not start drilling until the drill bit touches the bone. Inserting the drill bit into the drill guide while the drill is running may cause damage to the drill bit or drill guide.

Drill to the desired depth. Verify drill depth using image intensification.
5

**Insert proximal 3.5 mm cortex screw** continued

Remove the drill and drill guide. Measure for screw length using the depth gauge.

Insert a 3.5 mm cortex screw manually, using the self-retaining StarDrive screwdriver shaft and handle, and tighten carefully.

**Alternative technique: Insert 3.5 mm locking screw**

A unicortical locking screw can be inserted in the threaded portion of the hole instead of the cortex screw.

The technique for inserting a 3.5 mm locking screw is described on page 15.
Insert Proximal 3.5 mm Locking Screws

6
Insert proximal 3.5 mm locking screws

Instruments

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<td>310.288</td>
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<tr>
<td>311.43</td>
<td>Handle, with quick coupling</td>
</tr>
<tr>
<td>312.648</td>
<td>2.8 mm Threaded Drill Guide for 3.5 mm Locking Screws</td>
</tr>
<tr>
<td>314.116</td>
<td>StarDrive Screwdriver Shaft, T15</td>
</tr>
<tr>
<td>319.01</td>
<td>Depth Gauge, for 2.7 mm and 3.5 mm screws up to 60 mm</td>
</tr>
</tbody>
</table>

Insert screws in the sequence shown (6, 7, 8).

Screw the drill guide into the locking portion of the LCP hole.

Insert the 2.8 mm drill bit through the drill guide to the bone.

**Caution:** Do not start drilling until the drill bit touches the bone. Inserting the drill bit into the drill guide while the drill is running may cause damage to the drill bit or drill guide.

Drill to the desired depth. Verify drill depth using image intensification.
Insert Proximal 3.5 mm Locking Screws continued

6
Insert proximal 3.5 mm locking screws continued

Remove the drill and drill guide. Measure for screw length using the depth gauge.

Insert a 3.5 mm locking screw manually, using the self-retaining StarDrive screwdriver shaft and handle, and tighten carefully. Excessive force is not necessary to lock the screw to the plate. Repeat for the remaining 3.5 mm locking screws.
Close and Optional Implant Removal

7

Close

Close the wound in a routine fashion. Close the capsule over the plate as completely as possible. Leave the EPL radially transposed and check that it does not rub against the plate. Apply a soft, bulky dressing and/or splint to protect the wrist.

Implant removal (optional)

To remove locking screws, unlock all screws from the plate and then begin to remove the screws completely from the bone. This avoids rotation of the plate when removing the last locking screw.
## Screws Used with the LCP Wrist Fusion Plates

### Stainless Steel and Titanium

### 2.7 mm Locking Screws*
- For use in the locking portion of Combi holes in the distal plate shaft
- Threaded, conical head
- T8 StarDrive recess
- Self-tapping
- 10 mm to 24 mm lengths (2 mm increments)

### 2.7 mm Cortex Screws*
- For use in the nonlocking portion of Combi holes in the distal plate shaft
- Provide compression or neutral fixation
- T8 StarDrive recess
- Self-tapping
- 10 mm–24 mm lengths (2 mm increments)

### 3.5 mm Locking Screws*
- For use in the locking portion of Combi holes in the proximal plate shaft
- Threaded, conical head
- T15 StarDrive recess
- Self-tapping
- 12 mm–28 mm lengths (2 mm increments)

### 3.5 mm Cortex Screws*
- For use in the nonlocking portion of Combi holes in the proximal plate shaft
- Provide compression or neutral fixation
- T15 StarDrive recess
- Self-tapping
- 12 mm–28 mm lengths (2 mm increments)

* All screws are made of implant-quality 316L stainless steel or titanium alloy (Ti-6Al-7Nb)
**LCP Wrist Fusion Plates**  
**Stainless Steel and Titanium**

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### Standard bend

<table>
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<tr>
<th>Stainless Steel</th>
<th>Titanium</th>
<th>Length</th>
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<tr>
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### Short bend

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### Straight

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<tbody>
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<td>02.110.152</td>
<td>04.110.152</td>
<td>112 mm</td>
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Plates are made of 316L stainless steel or commercially pure (CP) titanium.
Instruments

310.25  2.5 mm Drill Bit, quick coupling, 110 mm

310.288  2.8 mm Drill Bit, quick coupling, 165 mm

311.43  Handle, with quick coupling

312.648  2.8 mm Threaded Drill Guide, for 3.5 mm locking screws

314.116  StarDrive Screwdriver Shaft, T15, self-retaining, quick coupling
314.467  StarDrive Screwdriver Shaft, T8

319.01   Depth Gauge, for 2.7 mm and 3.5 mm screws up to 60 mm

323.061  2.0 mm Threaded Drill Guide with Depth Gauge

323.062  2.0 mm Drill Bit with Depth Mark, quick coupling, 140 mm

323.26   2.7 mm Universal Drill Guide

323.36   3.5 mm Universal Drill Guide
399.48 Periosteal Elevator, straight edge

Optional instrument

319.04 Depth Gauge, for 2.7 mm and 3.5 mm screws up to 50 mm
LCP Wrist Fusion Implant Module Sets
Stainless Steel (01.110.052) and Titanium (01.110.062)

Graphic Case
60.110.052 LCP Wrist Fusion Implant Module

Implants
LCP Wrist Fusion Plates◊

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<tr>
<th>Stainless Steel</th>
<th>Titanium</th>
<th>Description</th>
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<tbody>
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<td>standard bend</td>
</tr>
<tr>
<td>02.110.151</td>
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<tr>
<td>02.110.152</td>
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2.7 mm Locking Screws, self-tapping, with T8 StarDrive recess, 5 ea.

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2.7 mm Cortex Screws, self-tapping, with T8 StarDrive recess, 5 ea.

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

Note: For additional information, please refer to package insert.

For detailed cleaning and sterilization instructions, please refer to
http://us.synthes.com/Medical+Community/Cleaning+and+Sterilization.htm
or to the below listed inserts, which will be included in the shipping container:
—Processing Synthes Reusable Medical Devices—Instruments, Instrument Trays
  and Graphic Cases—DJ1305
—Processing Non-sterile Synthes Implants—DJ1304
### Implants continued

3.5 mm Locking Screws, self-tapping, with T15 StarDrive recess, 5 ea.

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3.5 mm Cortex Screws, self-tapping, with T15 StarDrive recess, 5 ea.

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**Note:** The LCP wrist fusion implant module is compatible with a variety of Synthes modular systems.
# LCP Wrist Fusion Instrument Set (01.110.050)

## Graphic Case
- 60.110.050 LCP Wrist Fusion Graphic Case

## Instruments
- **310.25** 2.5 mm Drill Bit, with quick coupling, 110 mm, 2 ea.
- **310.288** 2.8 mm Drill Bit, with quick coupling, 165 mm, 2 ea.
- **311.43** Handle, with quick coupling
- **312.648** 2.8 mm Threaded Drill Guide, 2 ea.
- **314.116** StarDrive Screwdriver Shaft, T15, with quick coupling, 2 ea.
- **314.467** StarDrive Screwdriver Shaft, T8, with quick coupling, 2 ea.
- **319.01** Depth Gauge
- **323.061** 2.0 mm Threaded Drill Guide with Depth Gauge, 2 ea.
- **323.062** 2.0 mm Drill Bit with Depth Mark, quick coupling, 140 mm, 2 ea.
- **323.26** 2.7 mm Universal Drill Guide
- **323.36** 3.5 mm Universal Drill Guide
- **399.48** Periosteal Elevator, 3 mm, curved blade, straight edge

## Also Available
- **319.04** Depth Gauge
Also Available

LCP Wrist Fusion Instrument and Implant Set (01.110.051) consists of:
01.110.050  LCP Wrist Fusion Instrument Set
01.110.052  LCP Wrist Fusion Implant Module Set

LCP Wrist Fusion Instrument and Titanium Implant Set (01.110.061) consists of:
01.110.050  LCP Wrist Fusion Instrument Set
01.110.062  LCP Wrist Fusion Titanium Implant Module Set