LCP Extra-articular Distal Humerus Plate. The anatomically shaped and angular stable fixation system for extra-articular fractures of the distal humerus.

Technique Guide
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### Synthes Biomaterials Overview

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**Warning**

This description alone does not provide sufficient background for direct use of the product. Instruction by a surgeon experienced in handling this product is highly recommended.

**Reprocessing, Care and Maintenance of Synthes Instruments**

For general guidelines, function control and dismantling of multi-part instruments, please refer to: www.synthes.com/reprocessing
LCP Extra-articular Distal Humerus Plate. The anatomically shaped and angular stable fixation system for extra-articular fractures of the distal humerus.

**Indications**

- Extra-articular fractures of the distal humerus
- Malunions of the distal humerus
- Non-unions of the distal humerus

**Features and Benefits**

- Tapered end minimizes soft tissue irritation
- Hole density is increased distally and 3.5 mm locking screws are accepted
- Elongated combi-holes accept 3.5 mm screws and facilitate plate positioning
- Two most distal screw holes angled toward the capitellum and trochlea
- Undercuts reduce impairment of blood supply
- Thickness of the plate is based on LCP 4.5/5.0, narrow, and allows stand-alone application
Anatomically pre-contoured LCP selection for the distal humerus

### LCP Extra-articular Distal Humerus Plate

**Primary Indication**
- Extra-articular fractures of the distal humerus

**Features**
- Plate thickness based on LCP 4.5/5.0, narrow
- Optimized angles of distal screw holes
- Tapered plate end near the joint
- Increased hole density in the distal part

**Portfolio**
- Plates in six lengths

### LCP Distal Humerus Plates

**Primary Indication**
- Intra-articular fractures of the distal humerus, especially for osteoporotic bone
- Supracondylar fractures of the distal humerus

**Features**
- 90° plating technique possible
- Small distal screws for multiple fixation options for the distal block
- Position and compression device available
- Aiming block for easy and correct screw insertion

**Portfolio**
- Dorsolateral plates with or without support
- All plates in five lengths

### LCP Metaphyseal Distal Medial Humerus Plate

**Primary Indication**
- Juxta-articular distal humerus fractures

**Features**
- Notches on plate shaft
- Tapered plate end near the joint
- Aiming block for easy and correct screw insertion
- Increased hole density for improved anchorage

**Portfolio**
- One plate for left and right
- Plates in five lengths

### LCP Locking Compression Plate

Angular stable fixation of fragments regardless of bone quality

Minimised risk of primary and secondary loss of reduction, even under high dynamic loading

Reduced impairment of periosteal blood supply due to the limited plate contact

Good purchase also in osteoporotic bone and in multifragment fractures

### LCP combi-hole

Intraoperative choice between compression and angular stable locking

With standard screws: interfragmental or dynamic-axial compression

With locking screws: stable plate-screw connection without loss of reduction, regardless of plate modelling
In 1958, the AO formulated four basic principles, which have become the guidelines for internal fixation.\textsuperscript{1} These principles, as applied to the LCP Extra-articular Distal Humerus Plate, are:

**Anatomic Reduction**
Multiple combi-holes and plate lengths provide fixation options for various fracture patterns. Precontoured plates assist reduction of metaphysis segment to diaphysis.

May be used in combination with the medial distal humerus plate for intra-articular distal humerus fractures.

**Stable Fixation**
Locking screws create a fixed-angle construct, providing angular stability.

**Preservation of Blood Supply**
Limited-contact plate design reduces plate-to-bone contact, limiting vascular trauma and insult to bone.

**Early, Active Mobilization**
Early mobilization per standard AO technique creates an environment for bone healing, expediting a return to optimal function.

Indications

- Extra-articular fractures of the distal humerus
- Malunions of the distal humerus
- Non-unions of the distal humerus
1

Preoperative planning

Complete the preoperative radiographic assessment and prepare the preoperative plan. Use the x-ray template for LCP Extra-articular Distal Humerus Plate (Art. No. 034.000.552 for right and for left humerus) to determine the length of the plate and the position of the screws.

2

Position patient

Positioning is by surgeon preference. However, the lateral decubitus position is frequently chosen. The arm is rested on a padded bar allowing elbow flexion of 120°.
Possible approaches include a triceps split approach or a posterolateral approach; where the triceps are elevated off the back of the humerus from lateral to medial. Distally, this is the posterior side of a standard Kocher approach. Proximally, one can identify the radial nerve in the manner described by Gerwin et al.²

**Caution:** If the plate is long, the radial nerve needs to be elevated off the back of the humerus and the plate placed underneath. Also consider the nerve when inserting screws.

Otherwise, the ulnar nerve rarely needs to be identified by more than palpation and almost never needs to be isolated or elevated with these fractures.

An olecranon osteotomy is not necessary for plate placement.

---

1
Reduce fracture and fix temporarily

Use pointed forceps for temporary fixation in restoring the anatomy. Ensure that forceps will not interfere with subsequent plate placement.

2
Determine plate length

Choose a plate length that offers sufficient fixation proximal to the fracture.
Position plate on the bone

Optional instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>329.020</td>
<td>Bending Iron for LC-DCP 4.5 and DCP 4.5, length 250 mm (×2)</td>
</tr>
<tr>
<td>329.300</td>
<td>Bending Press, length 400 mm</td>
</tr>
</tbody>
</table>

Position the plate so that the shaft portion of the plate is located centrally on the posterior aspect of the bone while the distal end curves along the back of the lateral column. Ensure that the plate is at a safe distance from the olecranon fossa so that complete elbow extension is not impeded.

The position of the plate should allow distal screw insertion through the lateral flange to reach far into the trochlea.

Due to varying patient anatomy, slight bending may be necessary. Contour plate as needed using the bending irons or the plate-bending press.
4

Preliminary fixation and compression

Instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>323.360</td>
<td>Universal Drill Guide 3.5</td>
</tr>
<tr>
<td>310.250</td>
<td>Drill Bit Ø 2.5 mm, length 110/85 mm, 2-flute, for Quick Coupling</td>
</tr>
<tr>
<td>311.431</td>
<td>Handle with Quick Coupling</td>
</tr>
<tr>
<td>314.030</td>
<td>Screwdriver Shaft, hexagonal, small, Ø 2.5 mm</td>
</tr>
<tr>
<td>314.020</td>
<td>Screwdriver, hexagonal, small, with Holding Sleeve</td>
</tr>
</tbody>
</table>

After reducing the fracture, apply the plate and insert a non-locking screw through the center of the DCU portion of an elongated combi-hole proximal to the fracture.

Use the 2.5 mm drill bit through the 3.5 mm universal drill guide to predrill the bone. For the neutral position, press the drill guide down in the non-threaded hole.

Use the depth gauge to determine screw length.

Select and insert a 3.5 mm cortex screw of appropriate length. Do not completely tighten the screw. Make any final adjustments to plate placement. Manually tighten the screw to maintain the plate placement and compress the plate to the bone.
5

Insert two most distal locking screws

Instruments

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>323.027</td>
<td>LCP Drill Sleeve 3.5, for Drill Bits Ø 2.8 mm</td>
</tr>
<tr>
<td>323.055</td>
<td>Centering Sleeve for Kirschner Wire Ø 1.6 mm, length 70 mm</td>
</tr>
<tr>
<td>292.160</td>
<td>Kirschner Wire Ø 1.6 mm with trocar tip, length 150 mm</td>
</tr>
<tr>
<td>323.060</td>
<td>PHILOS Direct Measuring Device for Kirschner Wire Ø 1.6 mm</td>
</tr>
<tr>
<td>310.284</td>
<td>LCP Drill Bit Ø 2.8 mm with Stop, length 165 mm, 2-flute, for Quick Coupling</td>
</tr>
<tr>
<td>314.030</td>
<td>Screwdriver Shaft, hexagonal, small, Ø 2.5 mm</td>
</tr>
<tr>
<td>or 314.116</td>
<td>Screwdriver Shaft Stardrive 3.5, T15</td>
</tr>
<tr>
<td>511.770/773</td>
<td>Torque Limiter, 1.5 Nm</td>
</tr>
<tr>
<td>397.705/311.431</td>
<td>Handle for Torque Limiter/Handle with Quick Coupling</td>
</tr>
</tbody>
</table>

Insert the centering sleeve into the LCP drill sleeve (1).

Insert the LCP drill sleeve assembly into the most distal locking hole until fully seated.

Insert a 1.6 mm K-wire through the centering sleeve and drill to the desired depth.

Verify the K-wire placement under image intensification to determine if final screw placement will be acceptable. This wire should be at or slightly distal to the equator of the capitellum for plate placement to be correct.

Important: The K-wire position represents the final position of the locking screw. Confirm that the K-wire does not enter the joint.
Measure for screw length by sliding the tapered end of the direct measuring device over the K-wire down to the centering sleeve (2).

Remove the direct measuring device, K-wire and 1.6 mm centering sleeve, leaving the threaded drill sleeve in place (3).

Under image intensification, use the 2.8 mm drill bit to predrill for the screw.

Remove the threaded drill sleeve.
Select a locking screw with the appropriate length.

Insert the locking screw with the appropriate screwdriver shaft (hexagonal or Stardrive recess) mounted on the 1.5 Nm torque limiter (4).

Insert the screw manually or by power until a click is heard. If a power tool is used, reduce speed when screwing the head of the locking screw into the plate.

Repeat this process for the second most distal locking screw (5).

Tip: If additional compression of the distal fragment to the plate is needed, insert a 4.0 mm cancellous screw prior to inserting the locking screws. This screw may be inserted into one of the proximal locking holes in the head of the plate (but not one of the two most distal holes). After fixation with locking screws through the remaining holes, this screw can be replaced with a locking screw.
6

Insert locking screws

**Instruments**

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>323.027</td>
<td>LCP Drill Sleeve 3.5, for Drill Bits ø 2.8 mm</td>
</tr>
<tr>
<td>310.284</td>
<td>LCP Drill Bit ø 2.8 mm with Stop, length 165 mm, 2-flute, for Quick Coupling</td>
</tr>
<tr>
<td>319.010</td>
<td>Depth Gauge for Screws ø 2.7 to 4.0 mm, measuring range up to 60 mm</td>
</tr>
<tr>
<td>314.030</td>
<td>Screwdriver Shaft, hexagonal, small, ø 2.5 mm</td>
</tr>
<tr>
<td>or 314.116</td>
<td>Screwdriver Shaft Stardrive 3.5, T15</td>
</tr>
<tr>
<td>511.770/773</td>
<td>Torque Limiter, 1.5 Nm</td>
</tr>
<tr>
<td>397.705/311.431</td>
<td>Handle for Torque Limiter / Handle with Quick Coupling</td>
</tr>
</tbody>
</table>

Insert locking screws into the remaining head holes.

Determine where locking screws will be used in the shaft portion of the plate. Working from the fracture up the shaft, insert locking screws into the desired holes until desired fixation is achieved.

Insert the LCP drill sleeve into the locking portion of the combi-hole until fully seated (1).

Use the 2.8 mm drill bit to drill to the desired depth (2).

Remove the drill guide.

Use the depth gauge to determine screw length.
Select a locking screw with the appropriate length.

Insert the locking screw with the appropriate screwdriver shaft (Hexagonal or Stardrive recess) mounted on the 1.5 Nm torque limiter (3).

Insert the screw manually or by power until a click is heard. If a power tool is used, reduce speed when screwing the head of the locking screw into the plate.

7

Insert bone graft (optional)

If desired, fill any bone defect with autogenous bone graft or bone graft substitute. When using bone graft substitute, follow the manufacturer’s directions for use.
**Instruments**

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<thead>
<tr>
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<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>314.030</td>
<td>Screwdriver Shaft, hexagonal, small, ⌀2.5 mm</td>
</tr>
<tr>
<td>or 314.116</td>
<td>Screwdriver Shaft Stardrive 3.5, T15</td>
</tr>
<tr>
<td>309.521</td>
<td>Extraction Screw</td>
</tr>
<tr>
<td>311.430</td>
<td>Handle with Quick Coupling</td>
</tr>
</tbody>
</table>

To remove the plate, first unlock all the screws with the screwdriver. Remove the plate in a second step since it could otherwise rotate while unlocking the last screw, which can cause soft tissue damage.

If a screw cannot be removed with the screwdriver, use the handle with quick-coupling to insert the conical extraction screw into the screw head, and unscrew the screw in a counter-clockwise direction.

**Important:** For problem-free removal of an implant, the proper instruments must be available.
### LCP Extra-articular Distal Humerus Plates

<table>
<thead>
<tr>
<th>Right</th>
<th>Left</th>
<th>Holes</th>
<th>Length (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0X.104.004</td>
<td>0X.104.024</td>
<td>4</td>
<td>122</td>
</tr>
<tr>
<td>0X.104.006</td>
<td>0X.104.026</td>
<td>6</td>
<td>158</td>
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<tr>
<td>0X.104.008</td>
<td>0X.104.028</td>
<td>8</td>
<td>194</td>
</tr>
<tr>
<td>0X.104.010</td>
<td>0X.104.030</td>
<td>10</td>
<td>230</td>
</tr>
<tr>
<td>0X.104.012</td>
<td>0X.104.032</td>
<td>12</td>
<td>266</td>
</tr>
<tr>
<td>0X.104.014</td>
<td>0X.104.034</td>
<td>14</td>
<td>302</td>
</tr>
</tbody>
</table>

All plates and screws are also available sterile packed. For sterile implants add suffix "S" to article number.

- X = 2: stainless steel
- X = 4: titanium

### Screws used with the LCP Extra-articular Distal Humerus Plate

1. **X12.102–124**
   - Locking Screw Stardrive $\oplus$ 3.5 mm, length 12–60 mm, self-tapping

2. **X13.012–060**
   - Locking Screw $\oplus$ 3.5 mm, length 12–60 mm, self-tapping, with hexagonal recess

3. **X04.814–860**
   - Cortex Screw $\oplus$ 3.5 mm, length 12–60 mm, self-tapping, with hexagonal recess
The LCP Extra-articular Distal Humerus Plate is compatible with 3.5 LCP instruments and standard small-fragment instruments. In addition to the 3.5 LCP instruments, this instrument is also required:

323.055 Centering Sleeve for Kirschner Wire
Ø 1.6 mm, length 70 mm,
for Nos. 323.027 and 323.054
## Sets

### Modular tray for the LCP Extra-articular Distal Humerus Plates

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>68.104.010</td>
<td>Tray for LCP Distal Humeral Plates, extraarticular, for Vario Case</td>
</tr>
</tbody>
</table>

### Modular small fragment instrument trays

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>68.122.013</td>
<td>Modular Small Fragment Basic Instrument Tray</td>
</tr>
<tr>
<td>68.122.019</td>
<td>Modular Small Fragment Bending Instrument Tray</td>
</tr>
<tr>
<td>68.122.014</td>
<td>Modular Small Fragment Reduction Instrument Tray</td>
</tr>
<tr>
<td>68.122.015</td>
<td>Modular Small Fragment Screw Insertion Tray</td>
</tr>
</tbody>
</table>

Also available:

### Modular tray for LCP Elbow Plates 3.5/2.7

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>68.104.005</td>
<td>Tray for LCP Elbow Plates 3.5/2.7, for Vario Case</td>
</tr>
</tbody>
</table>
Synthes Biomaterials Overview

Synthetic and allogenic bone replacement materials have the advantage of uniform quality, unlimited availability and absence of potential complications at a donor site. Additionally, the application of synthetic and allogenic bone graft substitutes reduces the duration of the surgery.

Synthes offers a wide range of synthetic biomaterial products in different application forms and with distinct biological properties:

**chronOS**
- Osteoconductive, resorbable, synthetic

**chronOS Perfusion Concept**
- Enhancing chronOS with biological factors

**chronOS Inject**
- Injectable remodelling

**Norian SRS**
- Injectable stability

**DBX***
- Osteoinductive power

Furthermore a comprehensive portfolio of allograft products is available in selected countries. For more detailed information about a specific product or availability of allografts please contact your local Synthes representative.

*Musculoskeletal Transplant Foundation 
*Facilitated through Synthes


