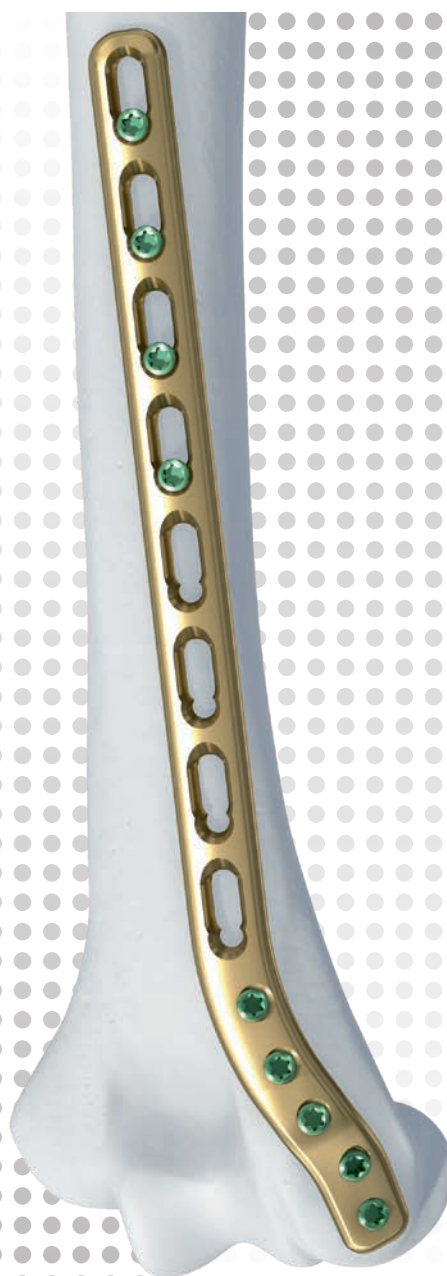


# LCP™ Extra-articular Distal Humerus Plate

The Fixation system for extra-articular fractures of the distal humerus

## Surgical Technique



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 Image intensifier control

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

**Processing, Reprocessing, Care and Maintenance**

For general guidelines, function control and dismantling of multi-part instruments, as well as processing guidelines for implants, please contact your local sales representative or refer to:

<http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance>

For general information about reprocessing, care and maintenance of DePuy Synthes reusable devices, instrument trays and cases, as well as processing of DePuy Synthes non-sterile implants, please consult the Important Information leaflet (SE\_023827) or refer to:

<http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance>

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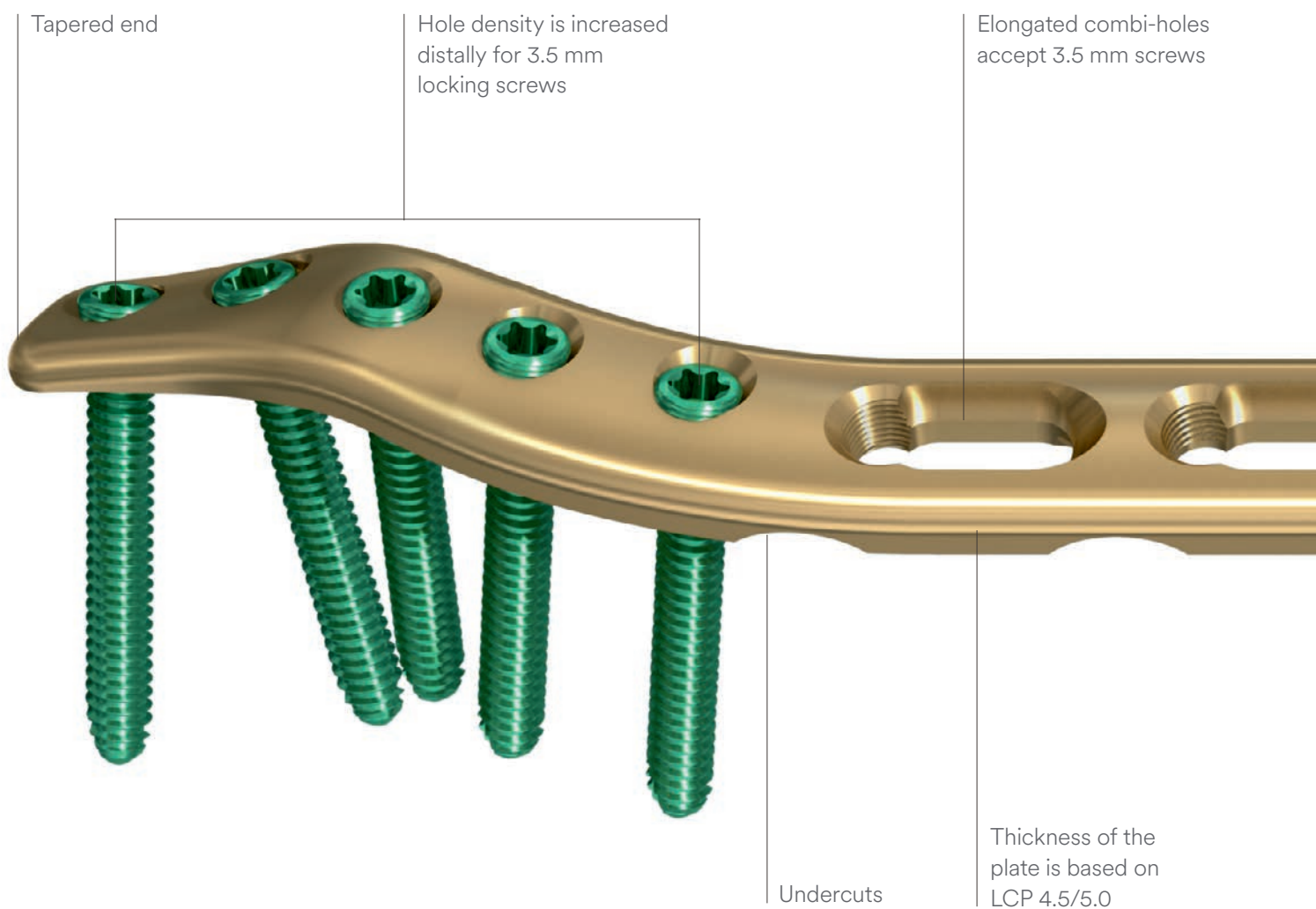
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# LCP™ Extra-articular Distal Humerus Plate

## Product Overview

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**▲ WARNING:**

Do not use the LCP Extra-articular Distal Humerus Plate in case of:

- Acute infections
- Children in the growth phase

Please refer to the corresponding Instructions for Use for specific information on Intended use, Indications, Contraindications, Warnings and Precautions, Potential Adverse Events, Undesirable Side Effect and Residual Risks. Instruction for Use are available at [www.e-ifu.com](http://www.e-ifu.com) and/or [www.depuysynthes.com/ifu](http://www.depuysynthes.com/ifu)

# The AO Principles of Fracture Management

## Mission

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

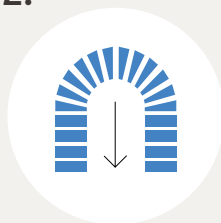
### AO Principles<sup>1,2</sup>

1.



Fracture reduction and fixation to restore anatomical relationships.

2.



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

3.



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

4.



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

<sup>1</sup> Müller ME, Allgöwer M, Schneider R, Willenegger H. Manual of Internal Fixation. 3<sup>rd</sup> ed. Berlin, Heidelberg New York: Springer 1991.

<sup>2</sup> Buckley RE, Moran CG, Apivatthakakul T. AO Principles of Fracture Management: 3<sup>rd</sup> ed. Vol. 1: Principles, Vol. 2: Specific fractures. Thieme; 2017.

# Preparation and Approach

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## ■ Note:

For information on fixation principles using conventional and locked plating techniques, please refer to the LCP Locking Compression Plate Surgical Technique.

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## 1. Preoperative planning

Complete the preoperative radiographic assessment and prepare the preoperative plan.

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## 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°.



### 3. Approach

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.

#### ▲ Precaution:

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 radial 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.





# Surgical Technique

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## **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.

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## **2. Determine plate length**

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

### 3. Position plate on the bone

#### Optional instruments

329.020	Bending Iron for LC-DCP 4.5 and DCP 4.5, length 250 mm
329.300	Bending Press, length 400 mm

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.

#### ▲ Precautions:

- If cortex screws are used, the plates need to be congruent with the surface of the bone and bending or torquing may be required. Bending should be limited to the region of the Combi holes.
- Contour the plate precisely at the level of the undercuts and/or the level of the reconstruction notches to avoid deformation of the plate holes.



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## 4. Preliminary fixation and compression

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### Instruments

323.360	Universal Drill Guide 3.5
310.250	Drill Bit Ø 2.5 mm, length 110/85 mm, 2-flute, for Quick Coupling
311.431	Handle with Quick Coupling
314.030	Screwdriver Shaft, hexagonal, small, Ø 2.5 mm
314.020	Screwdriver, hexagonal, small, with Holding Sleeve

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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

323.027	LCP Drill Sleeve 3.5, for Drill Bits Ø 2.8 mm
323.055	Centering Sleeve for Kirschner Wire Ø 1.6 mm, length 70 mm, for Nos. 323.027 and 323.054
292.160	Kirschner Wire Ø 1.6 mm with trocar tip, length 150 mm, Stainless Steel
323.060	PHILOS Direct Measuring Device for Kirschner Wire Ø 1.6 mm
310.284	LCP Drill Bit Ø 2.8 mm with Stop, length 165 mm, 2-flute, for Quick Coupling
314.030	Screwdriver Shaft, hexagonal, small, Ø 2.5 mm
or 314.116	Screwdriver Shaft STARDRIVE 3.5, T15, self-holding, for AO/ASIF Quick Coupling
511.770/773	Torque Limiter, 1.5 Nm
397.705/ 311.431	Handle for Torque Limiter Nos. 511.770 and 511.771/Handle with Quick Coupling

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 Kirschner wire through the centering sleeve and drill to the desired depth.

- ① Verify the Kirschner 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.



### ▲ Precautions:

- The Kirschner wire position represents the final position of the locking screw. Confirm that the Kirschner wire does not enter the joint.
- Confirm screw placement and length with image intensification in different planes to ensure screws are not protruding through the articular surface.
- Ensure that the screws do not protrude in the olecranon or coronoid fossa.

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.

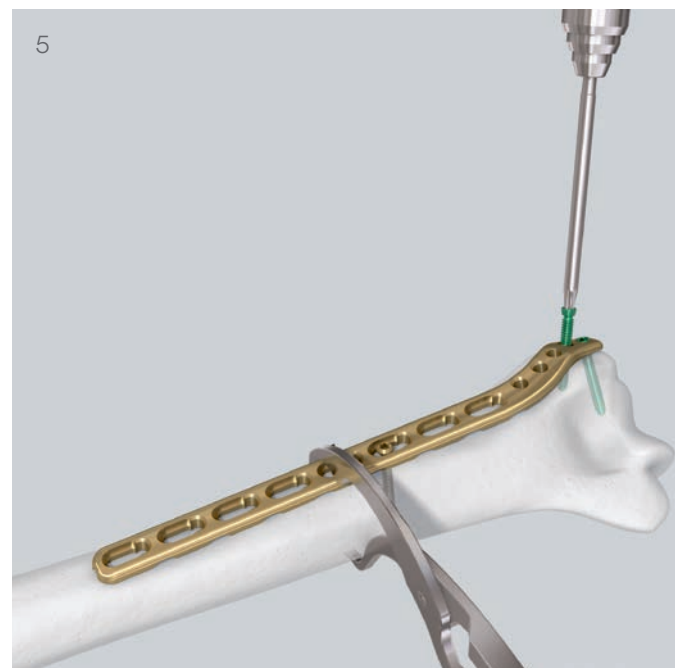
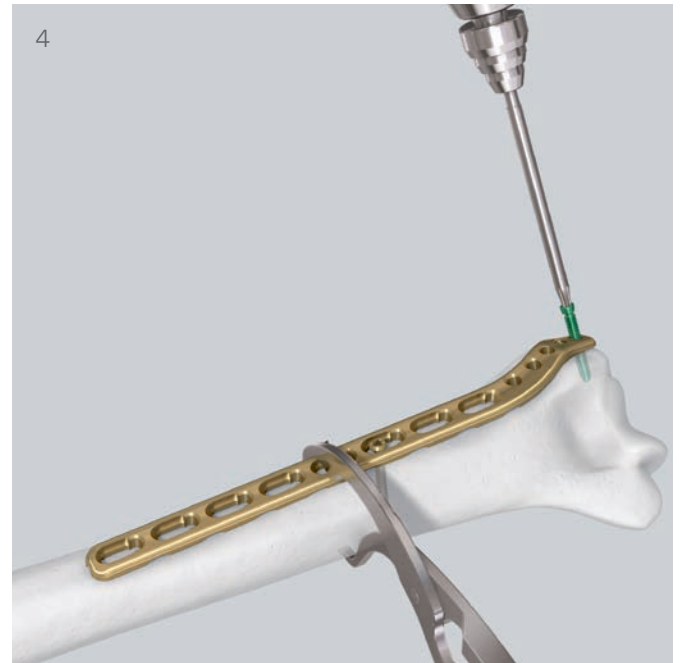
Repeat this process for the second most distal locking screw (5).

■ **Note:**

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.

▲ **Precautions:**

- When inserting screws under power, final tightening should be done using manual screwdriver and torque limiter.
- Always use Torque Limiter when final tightening LCP locking screws, otherwise plate and/or screws might be damaged.



## 6. Insert locking screws

### Instruments

323.027	LCP Drill Sleeve 3.5, for Drill Bits Ø 2.8 mm
310.284	LCP Drill Bit Ø 2.8 mm with Stop, length 165 mm, 2-flute, for Quick Coupling
319.010	Depth Gauge for Screws Ø 2.7 to 4.0 mm, measuring range up to 60 mm
314.030	Screwdriver Shaft, hexagonal, small, Ø 2.5 mm
or 314.116	Screwdriver Shaft STARDRIVE 3.5, T15, self-holding, for AO/ASIF Quick Coupling
511.770/773	Torque Limiter, 1.5 Nm
397.705/ 311.431	Handle for Torque Limiter Nos. 511.770 and 511.771/Handle with Quick Coupling

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).

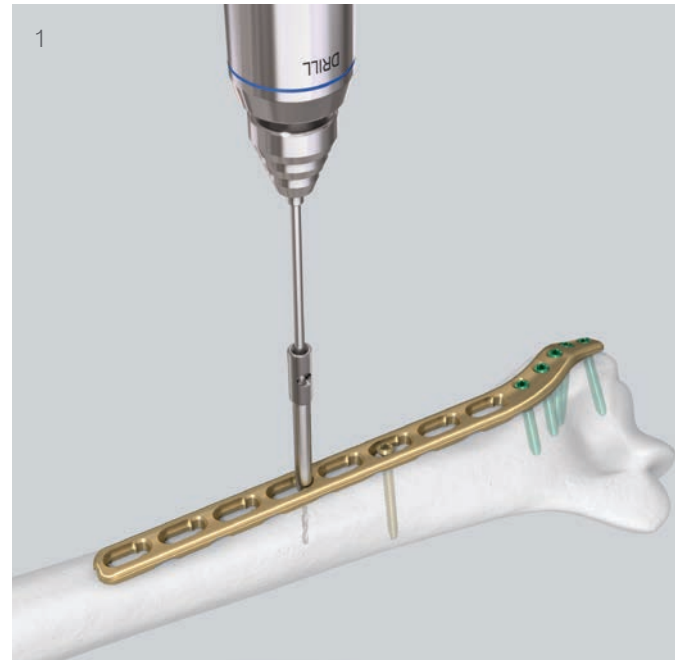
Use the 2.8 mm drill bit to drill to the desired depth (2).

Remove the drill guide.

Use the depth gauge to determine screw length.

### ▲ Precaution:

The screws should not protrude through the articular surface.



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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.

**▲ Precautions:**

- When inserting screws under power, final tightening should be done using manual screwdriver and torque limiter.
- Always use Torque Limiter when final tightening LCP locking screws, otherwise plate and/or screws might be damaged.



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## 7. Insert bone graft (optional)

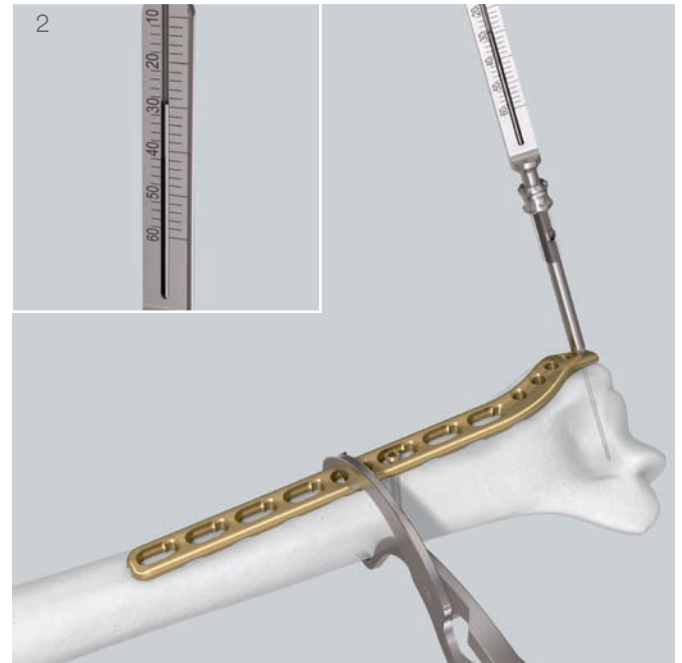
If desired, fill any bone defect with autogenous bone graft or bone graft substitute. When using bone graft substitute, follow the manufacturer's directions for use.

Measure for screw length by sliding the tapered end of the direct measuring device over the Kirschner wire down to the centering sleeve (2).

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

- ① Under image intensification, use the 2.8 mm drill bit to predrill for the screw.

Remove the threaded drill sleeve.





# Implant Removal

## Instruments

314.030	Screwdriver Shaft, hexagonal, small, Ø 2.5 mm
or	
314.116	Screwdriver Shaft STARDRIVE 3.5, T15, self-holding, for AO/ASIF Quick Coupling
309.520	Extraction Screw, conical, for Screws Ø 2.7, 3.5 and 4.0 mm
309.521	Extraction Screw for Screws Ø 3.5 mm
311.430	Handle with Quick Coupling, length 110 mm
311.440	T- Handle with Quick Coupling

## Implant removal

Unlock all screws from the plate, then remove the screws completely from the bone. This prevents simultaneous rotation of the plate when unlocking the last locking screw. If a screw cannot be removed with the screwdriver (e.g. if the hexagonal or STARDRIVE recess of the locking screw is damaged or if the screw is stuck in the plate), use the T-Handle with Quick-Coupling (311.440) to insert the conical Extraction Screw (309.520 or 309.521) into the screw head, and unscrew the screw in a counter-clockwise direction.



# Implants

## LCP Extra-articular Distal Humerus Plates

Right	Left	Holes	Length (mm)
OX.104.004	OX.104.024	4	122
OX.104.006	OX.104.026	6	158
OX.104.008	OX.104.028	8	194
OX.104.010	OX.104.030	10	230
OX.104.012	OX.104.032	12	266
OX.104.014	OX.104.034	14	302



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

X=2: stainless steel  
X=4: TiCP

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

- \*X12.102–124      Locking Screw STARDRIVE  
 $\varnothing$  3.5 mm, length 12–60 mm,  
 self-tapping  
 For sterile tube, add suffix "TS" to article number

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- \*X13.012–060      Locking Screw  $\varnothing$  3.5 mm,  
 length 12–60 mm,  
 self-tapping

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- \*\*X04.814–860      Cortex Screw  $\varnothing$  3.5 mm,  
 length 14–60 mm,  
 self-tapping



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

X=2: Stainless Steel  
\*X=4: TAN  
\*\*X=4: TiCP

- STARDRIVE
- Hexagonal

# Instruments

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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:

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



# MRI Information

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## **Torque, Displacement and Image Artifacts according to ASTM F 2213, ASTM F 2052 and ASTM F2119**

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

## **Radio-Frequency-(RF-)induced heating according to ASTM F2182**

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

### **▲ Precautions:**

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

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







Please refer to the corresponding Instructions for Use for specific information on Intended use, Indications, Contraindications, Warnings and Precautions, Potential Adverse Events, Undesirable Side Effect and Residual Risks. Instruction for Use are available at [www.e-ifu.com](http://www.e-ifu.com) and/or [www.depuysynthes.com/ifu](http://www.depuysynthes.com/ifu)

Not all products are currently available in all markets.  
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