LCP Compact Foot/ Compact Hand

Surgical Technique

approved by AO Technical Commission

DePuy Synthes
THE ORTHOPAEDICS COMPANY OF Johnson & Johnson

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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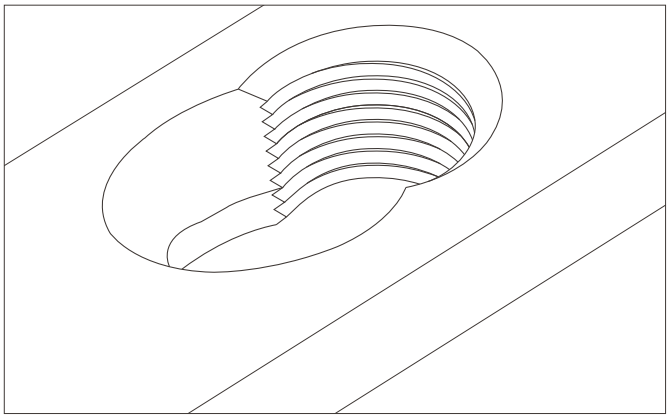
Overview

The Combi-hole

The LCP (Locking Compression Plate) system offers the surgeon the choice, preoperatively and intraoperatively, of using either standard screws or locking screws – or a combination of the two screw types – for fracture fixation.

Experience in the use of LC-DCP or DCP plates or instruction by a surgeon with experience of their use is recommended.

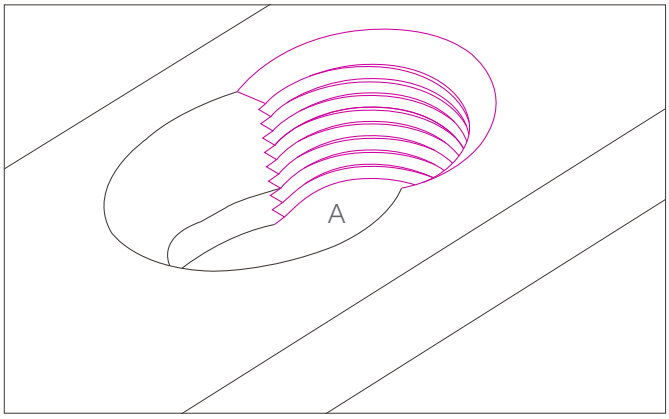


Tapered, threaded hole for Locking Screws (A)

The self-tapping locking screws can be locked in the tapered threaded hole.

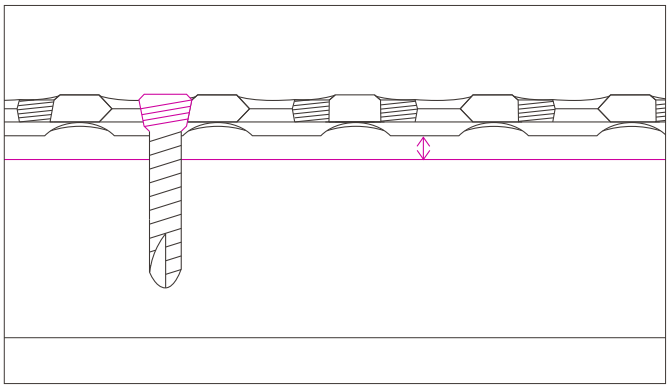
▲ Precaution:

To avoid the phenomenon of cold welding of plates and screws, we recommend the use of a screwdriver shaft with a mini quick coupling and appropriate handle (311.01X) and a torque limiter (511.77X).



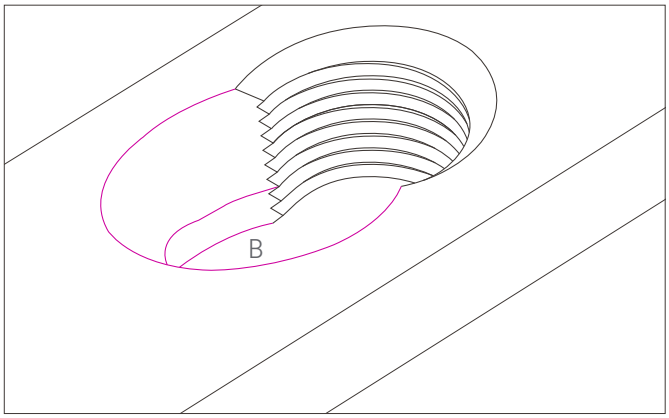
Functional principle of the internal fixator

LCP plates are used with locking screws. The stability of the fracture is mainly dependent on the strength of the resulting assembly. The plate does not need to be compressed against the bone.



DC hole for Standard Screws (B)

The DC hole corresponds to the DCU (Dynamic Compression Unit) of the LC-DCP plate and is compatible with standard cortex screws. As with any standard LC-DCP plate, axial compression of the fracture can be achieved by predrilling off-centre. Lag screws can also be angled laterally and longitudinally in relation to the plate for interfragmental compression. The DC hole is not suitable for the insertion of a locking screw.

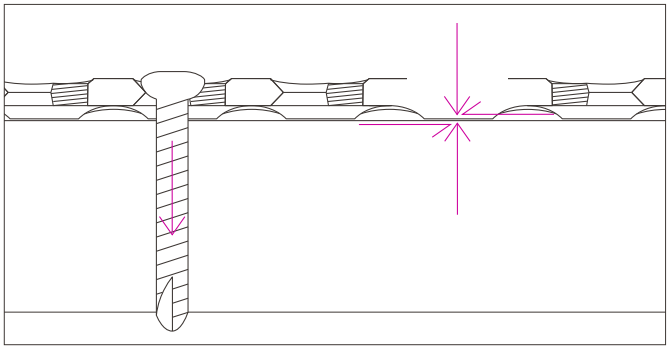


■ Note:

The standard screw must be placed first within a fragment in order to achieve compression.

Functional principle of absolute stability

Securing the plate with standard screws creates friction between the underside of the plate and the surface of the bone by compression at the interface. In order to ensure absolute stability, the frictional resistance must be greater than the forces produced during rehabilitation. Bicortical screws are essential for this type of fixation.



Intended Use, Indications, Contraindications can be found in the corresponding system Instructions for Use.

The AO Principles of Fracture Management

Mission

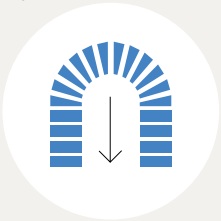
The AO's mission is promoting excellence in patient care and outcomes in trauma and musculoskeletal disorders.

AO Principles[1,2]

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.

[1] Müller ME, Allgöwer M, Schneider R, Willenegger H. Manual of Internal Fixation. 3rd ed. Berlin, Heidelberg New York: Springer 1991.
[2] Buckley RE, Moran CG, Apivatthakakul T. AO Principles of Fracture Management: 3rd ed. Vol. 1: Principles, Vol. 2: Specific fractures. Thieme; 2017.

Surgical Technique

The following surgical technique is described using the example of an LCP T-plate 2.0. Implant handling is identical for the sizes 2.0, 2.4 and 2.7.

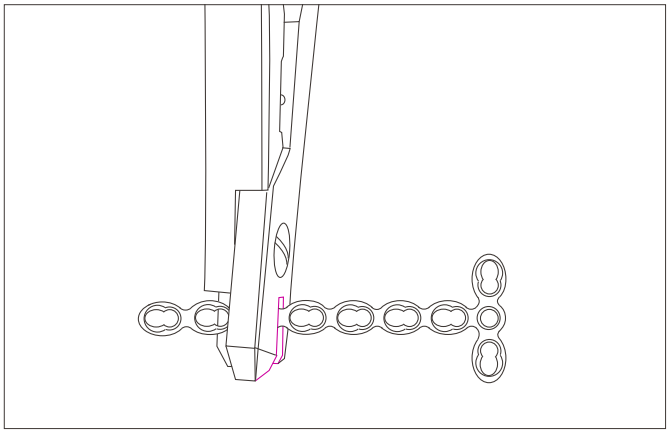
The article numbers for the required instruments are listed in the table on page 9. The instruments are colour-coded as follows: 2.0 blue, 2.4 violet, 2.7 orange. These instruments are identified in the text by an asterisk (*).

1. Reduce fracture

Reduce the fracture under the image intensifier and, if necessary, fix with Kirschner wires or reduction forceps.

2. Trim plate

Trim plate to the desired length using the cutting pliers* and remove the burrs.

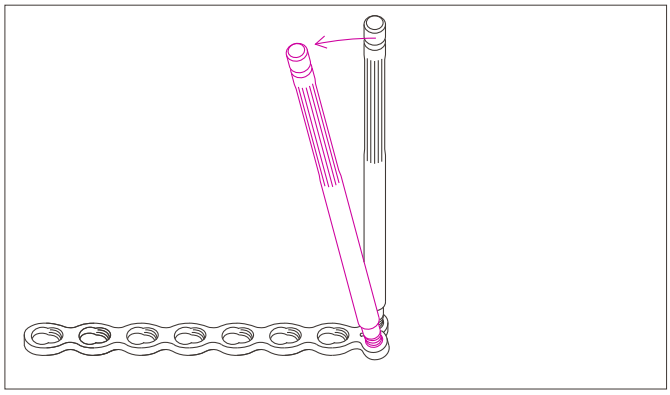


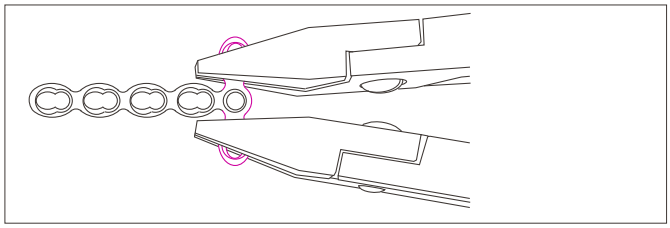
3. Bend plate

Bend the plate using the flat-nosed pliers*. The bending pins* can be used to bend the round threaded holes.

▲ Precaution:

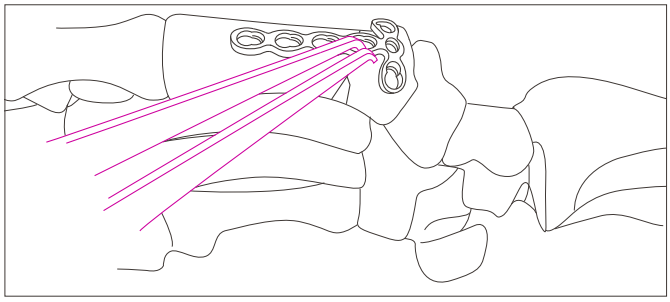
If possible, bend the plate between the combi-holes. Do not deform the combi-holes during bending as this may hinder the subsequent insertion of locking screws. Reverse bending or use of the incorrect instrumentation for bending may weaken the plate and lead to premature plate failure (e.g. breakage). Do not bend the plate beyond what is required to match the anatomy.





4. Position plate

Position the plate over the reduced fracture and, if necessary, fix provisionally with Kirschner wires or reduction forceps.



5. Determine screw type

Depending on the indication and situation in each case, standard screws and/or LCP locking screws may be inserted. If both cortex and locking screws are used in one plate, the cortex screws must be inserted first in order to compress the plate against the bone before the locking screws are inserted.

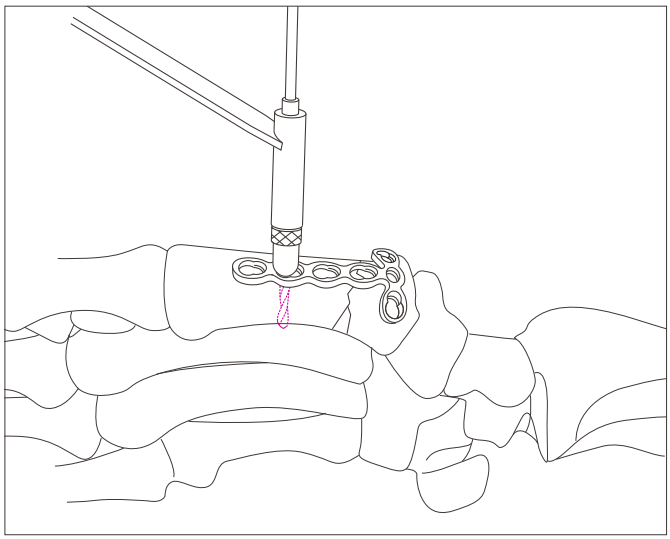
▲ Precaution:

If buttress pins are used for angular stability of the construct, one screw per bone fragment must be inserted additionally.

Insertion of Standard Screws

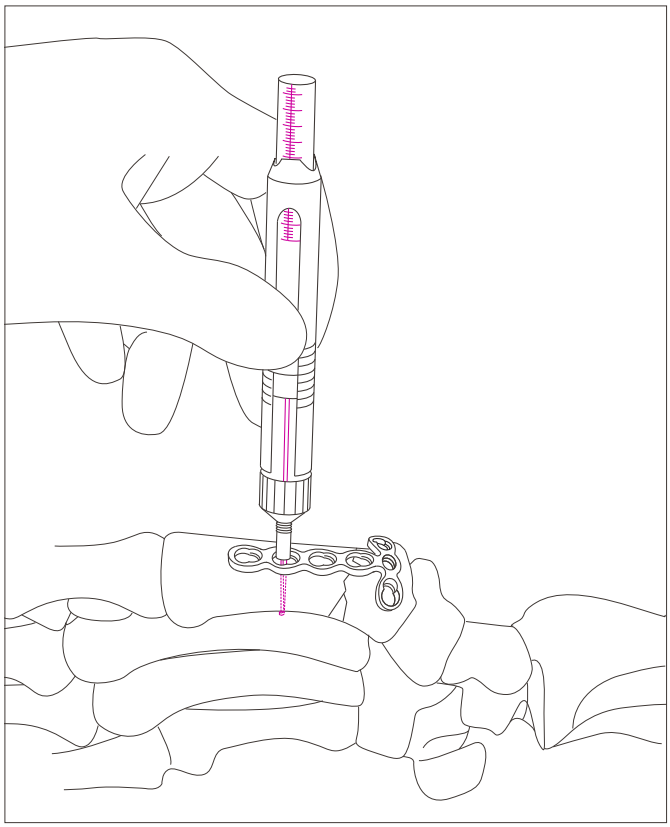
6a. Predrill screw hole

Using the universal drill sleeve*, predrill the screw hole either neutrally or off-centre.



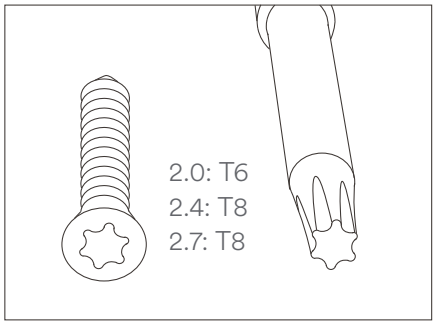
6b. Determine screw length

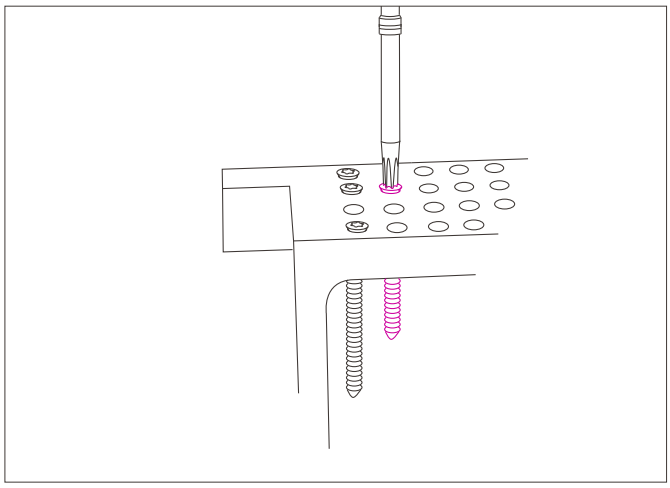
Determine the screw length with the depth gauge*.



6c. Pick up screw

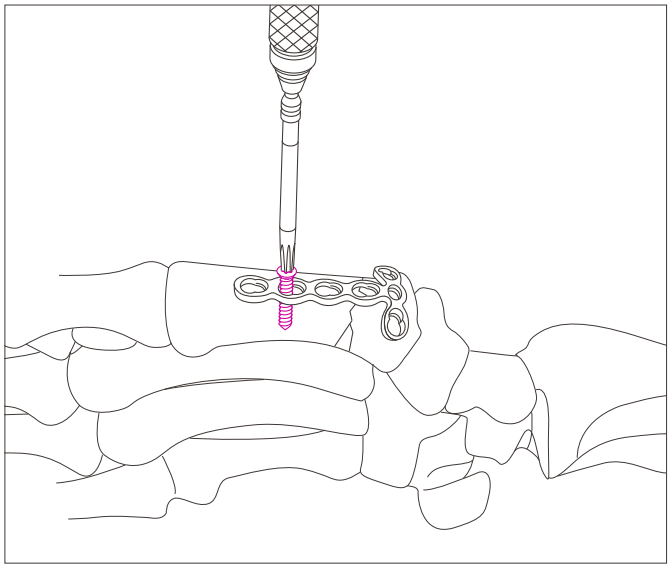
Select and pick up the matching screw using the Stardrive screwdriver shaft* and appropriate handle (311.01X).





6d. Insert Standard Screw

Insert self-tapping standard screw either neutrally or off-centre.



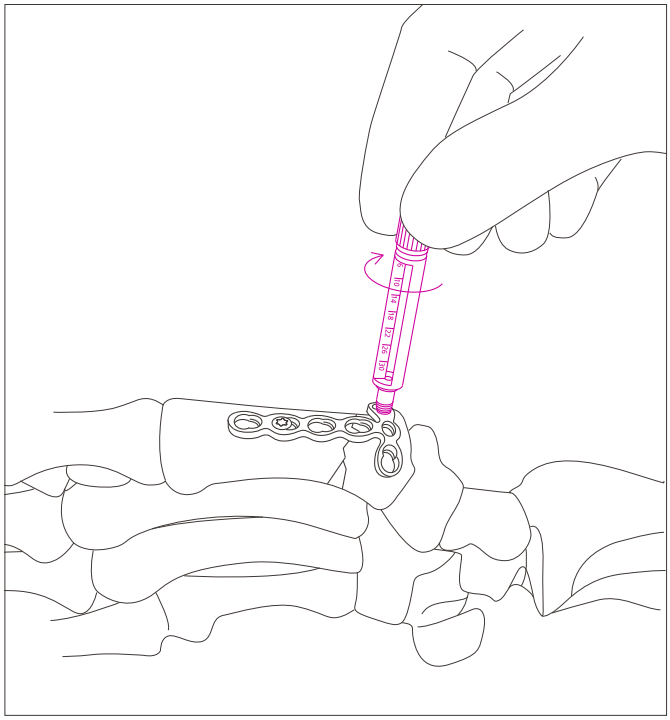
6e. Insert additional Standard Screws

Insert additional standard screws depending on the corresponding indication and situation.

Insertion of Locking Screws

7a. Insert LCP Drill Sleeve

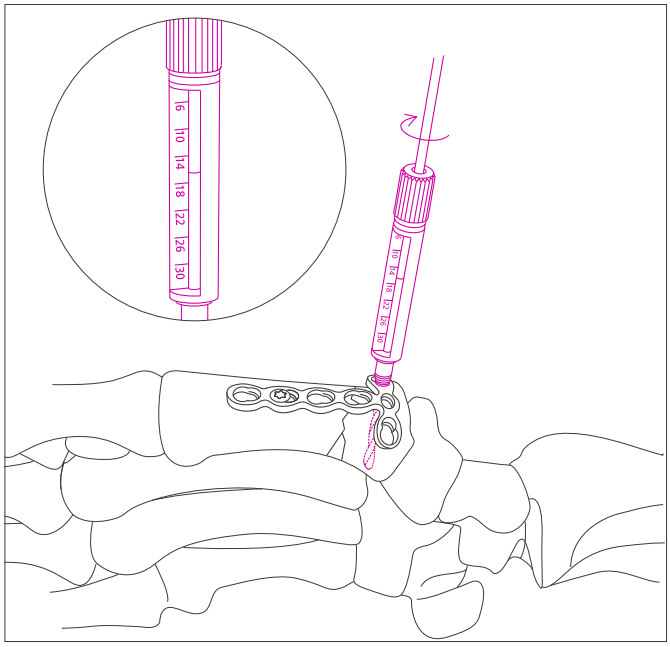
Screw the LCP drill sleeve* into the desired plate hole at right angles to the plate.



7b. Predrill screw hole and determine screw length

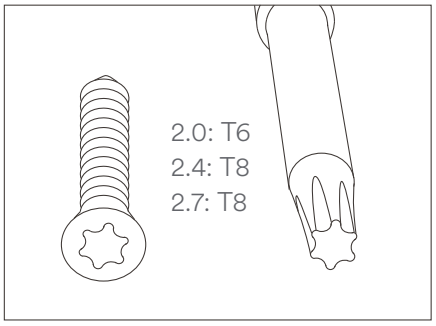
Predrill screw hole through the LCP drill sleeve* using the appropriately sized drill bit with marking*. Read off the screw length directly on the scale of the drill sleeve. Then remove the drill sleeve.

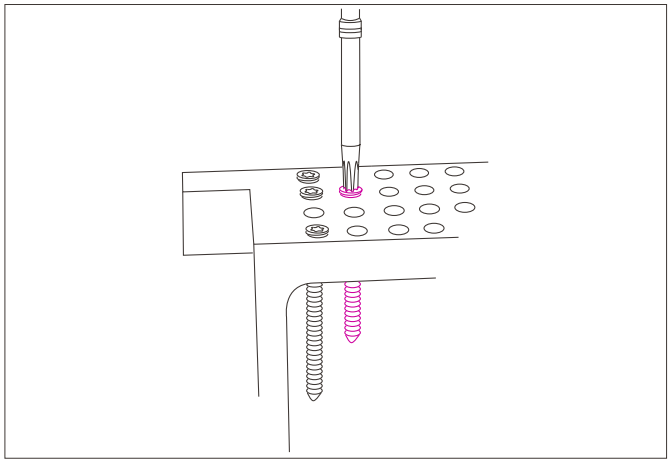
Alternatively, the screw length can be determined using the depth gauge*.



7c. Pick up screw

Select and pick up the matching screw using the self-holding Stardrive screwdriver shaft* and the appropriate handle (311.01X).



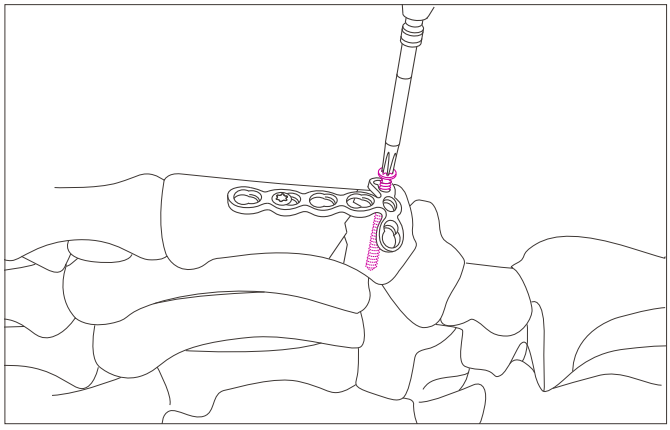


7d. Insert self-tapping Locking Screw

- For manual insertion of LCP locking screws, use the self-holding Stardrive screwdriver shaft and the appropriate handle (311.01X).
- For mechanical insertion of LCP locking screws 2.7* (head LCP 2.4), attach the 0.8 nm torque limiter* to the Colibri drive unit (532.001). Insert the Stardrive 2.4/2.7 screwdriver shaft* into the torque limiter and pick up the LCP locking screw.

▲ Precautions:

- When inserting screws using a power tool, do not fully tighten them. Finally, lock the screws manually with a screwdriver using the torque limiter. Optimum torque is reached after one click.
- To ensure sufficient tightening of locking head screws and to reduce the risk of cold welding of the screw head to the plate, locking head screws should always be tightened by hand using a torque limiter.



- Overtightening the LCP screws can cause thread deformation, making subsequent screw removal impossible. We therefore recommend the use of a screwdriver shaft with a mini quick coupling and appropriate handle (311.01X) and a torque limiter (511.77X).

7e. Insert additional Locking Screws

Insert additional locking screws depending on the indication and situation.

Implant Removal

8. Remove Implants

▲ WARNING:

To remove locking screws, first unlock all locking screws before removing them completely, otherwise the plate may rotate and damage the soft tissue.

Implants

LCP 2.0 Implants

Plates

LCP plate 2.0, straight, 4–8 holes (X47.344–348)

LCP T-plate 2.0 (X47.615)

LCP condylar plate 2.0 (X47.349)

LCP Y-adaption plate 2.0 (X47.350)

LCP T-adaption plate 2.0 (X47.351)

Standard Screws

Cortex screws ∅ 2.0 mm, self-tapping,
with Stardrive T6 (X01.356–381)

LCP Locking Screws

LCP locking screws ∅ 2.0 mm, self-tapping,
with Stardrive T6 (X01.876–900)

X = 2: Stainless Steel
X = 4: Titanium

All non-sterile plates and screws are also available sterile packed.
Add suffix “S” to article number to order sterile product.

LCP 2.4 Implants

Plates

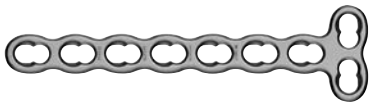
LCP plate 2.4, straight, 4–8 holes (X49.674–678, X49.674S, X49.676S, X49.678S)

LCP T-plate 2.4 (X49.615, X49.615S)

LCP condylar plate 2.4 (X49.679, X49.679S)

LCP Y-adaptation plate 2.4 (X49.669, X49.669S)

LCP T-adaptation plate 2.4 (X49.670, X49.670S)



Standard Screws

Cortex screws ∅ 2.4 mm, self-tapping, with Stardrive T8 (X01.756–790)

LCP Locking Screws

LCP locking screws ∅ 2.4 mm, self-tapping, with Stardrive T8 (X12.806–830)

Buttress Pin

Buttress pin 1.8 (head LCP 2.4), with Stardrive T8 (400.190–193)

All non-sterile screws and pins are also available sterile packed.
Add suffix “S” to article number to order sterile product.

LCP 2.7 Implants

Plates

LCP plate 2.7, straight, 4–7 holes (X49.680–683)

LCP 2.7, straight 8 holes X47.372

LCP 2.7, straight 10 holes X47.374

LCP-Adapt-Plate 2.7 12 holes X47.370

LCP condylar plate 2.7 (X49.684)

LCP T-plate 2.7 (X49.685, X49.697)

LCP L-plate 2.7, oblique (X49.686–687, X49.698–699)

LCP L-plate 2.7 (X49.688–689, X49.701–702)

H-locking plate 2.7 (X49.690–691)

Standard Screws

Cortex screws ∅ 2.7 mm, self-tapping,
with Stardrive T8 (X02.866–900; X02.965–969)

LCP Locking Screws

LCP locking screws ∅ 2.7 mm (head 2.4 mm),
self-tapping, with Stardrive (X02.206–240)

All non-sterile plates and screws are also available sterile packed.
Add suffix “S” to article number to order sterile product.
Add 4 for Titanium 2 for Stainless steel

Specific Instruments

Bending Instruments

Bending pin for LCP plates 2.0 (329.921)
Bending pin for LCP plates 2.4 and 2.7 (329.922)

Drill Sleeves

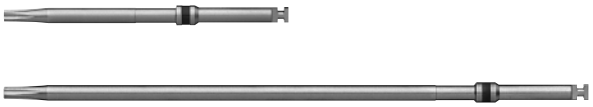
LCP drill sleeve 2.0, with scale, for drill bits ∅ 1.5 mm (323.034)
LCP drill sleeve 2.4, with scale, for drill bits ∅ 1.8 mm (323.029)
LCP drill sleeve 2.7, with scale, for drill bits ∅ 2.0 mm (323.033)

Drills

Drill bit ∅ 1.5 mm, with marking, length 96 mm, 2-flute, for mini quick coupling (310.507)
Drill bit ∅ 1.8 mm, with marking, length 96 mm, 2-flute, for mini quick coupling (310.508)
Drill bit ∅ 2.0 mm, with marking, length 110 mm, 2-flute, for quick coupling (310.534)

Screwdriver Shafts

Screwdriver shaft Stardrive 2.0, short/long, self-holding, for mini quick coupling (313.842/843)
Screwdriver shaft Stardrive 2.4/2.7, short/long, self-holding, for mini quick coupling (314.451/452)



Torque Limiter

Torque limiter for screws 2.0, with mini quick coupling (0.4 Nm) (511.777)
Torque limiter for screws 2.4 and 2.7, with AO/ASIF quick coupling (0.8 Nm) (511.776)

Instrument Overview

Art. No.	Article name	2.0	2.4	2.7
391.951	Cutting pliers for plates 1.0 to 2.4	•	•	•
329.921	Bending pins for LCP plates 2.0	•		
329.922	Bending pins for LCP plates 2.4/2.7		•	•
347.901	Flat-nosed pliers, pointed, for plates 1.0 to 2.4	•	•	
391.963	Universal bending pliers, length 165 mm			•
323.200	Universal drill sleeve 2.0	•		
323.202	Universal drill sleeve 2.4		•	
323.260	Universal drill sleeve 2.7			•
323.034	LCP drill sleeve 2.0 with scale, for drill bits ∅ 1.5 mm	•		
323.029	LCP drill sleeve 2.4 with scale, for drill bits ∅ 1.8 mm		•	
323.033	LCP drill sleeve 2.7 with scale, for drill bits ∅ 2.0 mm			•
310.507	Drill bit ∅ 1.5 mm, with marking for mini quick coupling	•		
310.508	Drill bit ∅ 1.8 mm, with marking for mini quick coupling		•	
310.534	Drill bit ∅ 2.0 mm, with marking for AO/ASIF quick coupling			•
319.005	Depth gauge for screws 2.0 and 2.4 mm	•	•	
319.010	Depth gauge for screws 2.7			•
313.842/843	Screwdriver shaft Stardrive T6, 2.0, short/long	•		
314.451/452	Screwdriver shaft Stardrive T8, 2.4, short/long		•	•
511.777	Torque limiter 2.0, with mini quick coupling (0.4 Nm)	•		
511.776	Torque limiter 2.4/2.7, with AO/ASIF quick coupling (0.8 Nm)		•	•

MRI Information

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 lead to 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.

Not all products are currently available in all markets.
This publication is not intended for distribution in the USA.
Intended use, Indications and Contraindications can be found in the corresponding system Instructions for Use.
All Surgical Techniques are available as PDF files at www.depuysynthes.com/ifu

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