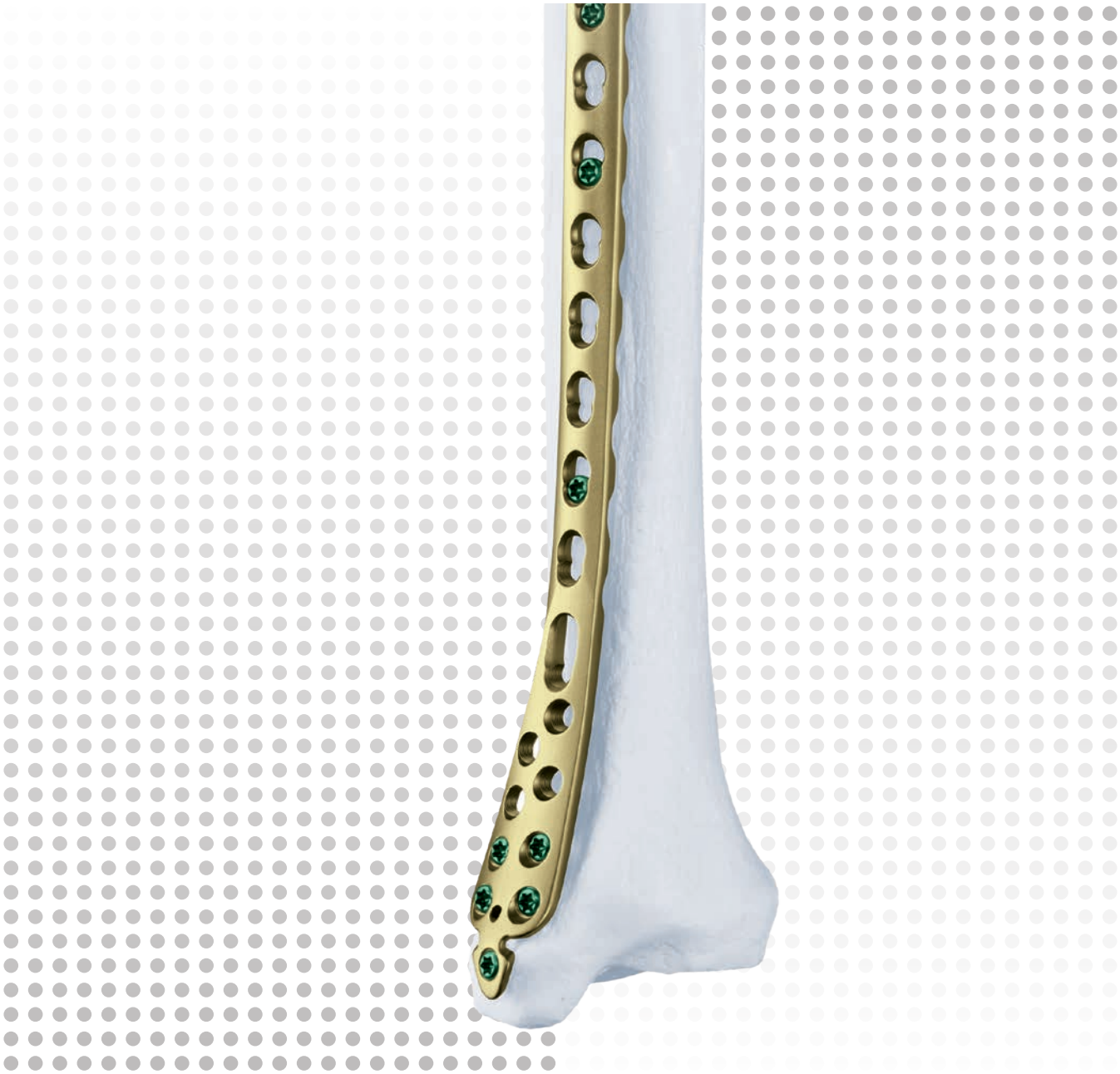
LCP Distal Tibia Plate

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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LCP Distal Tibia Plate

The LCP Distal Tibia Plate is part of the Synthes LCP System that merges locking screw technology with conventional plating techniques.

The plate is offered in stainless steel and titanium and features a limited-contact shaft profile, Combi holes in the shaft, and locking screw holes in the head. The Combi holes in the plate shaft combine a dynamic compression unit (DCU) hole with a locking screw hole.

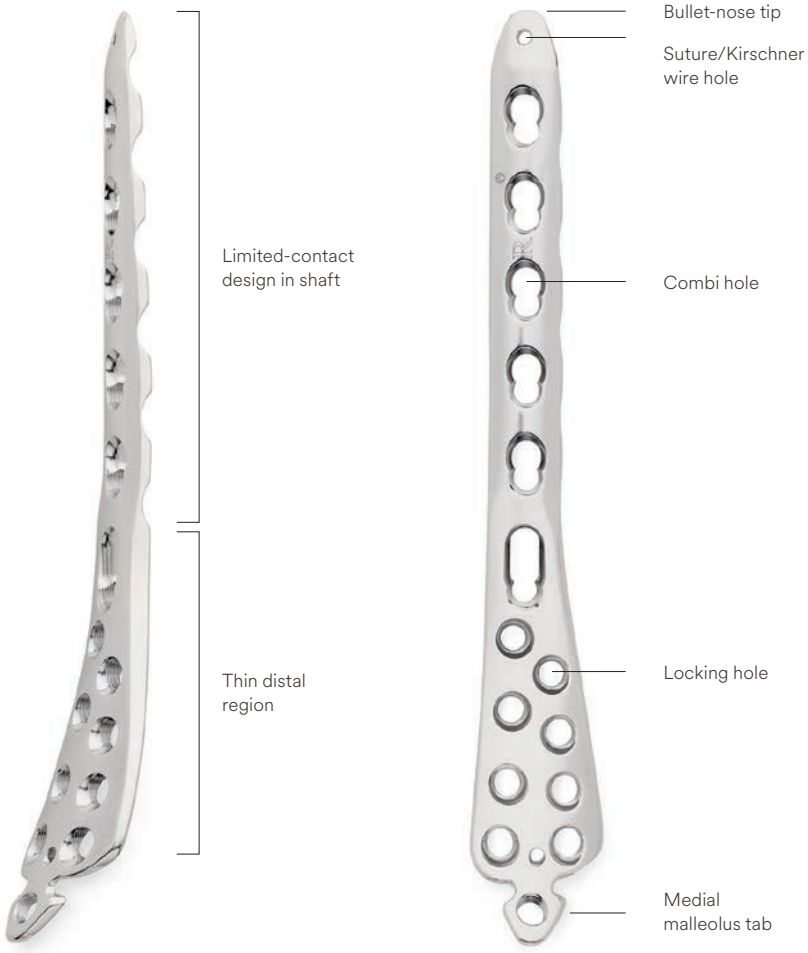
Locking screws provide the ability to create a fixed-angle construct while using standard AO plating techniques. These screws do not rely on plate-to-bone compression to resist patient load.

■ Note:

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

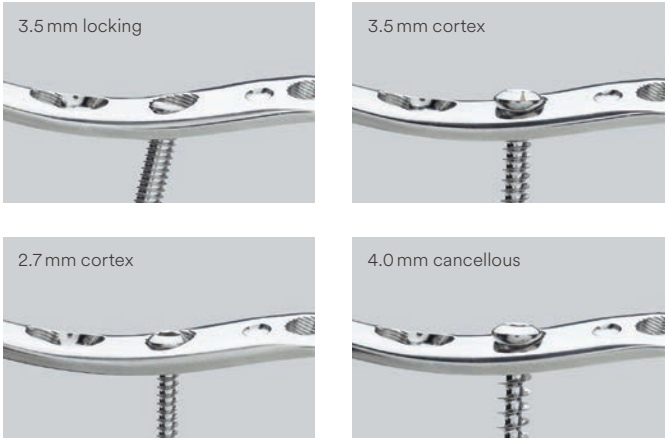
Plate overview

- Available for left and right tibias
- Limited-contact shaft design with 4 to 14 combination locking/compression holes
- Eight distal locking holes accept 2.7 mm cortex, 3.5 mm locking, 3.5 mm cortex, or 4.0 mm cancellous bone screws
- Proximal and distal holes for 1.6 mm or 2.0 mm Kirschner wires
- 316L stainless steel or titanium
- Locking holes in distal region are parallel to the joint
- Elongated hole in shaft aids in initial plate positioning
- The shaft holes accept 3.5 mm locking screws in the threaded portion and 3.5 mm cortex screws, 4.0 mm cortex screws and 4.0 mm cancellous bone screws in the compression portion
- Distal tab for optional medial malleolus screw accepts 3.5 mm locking, 2.7 mm cortex, 3.5 mm cortex, 4.0 mm cortex or 4.0 mm cancellous bone screws



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

Distal screw profile in round locking holes



The AO Principles of Fracture Management

Mission

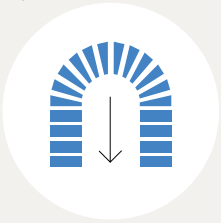
The AO's mission is promoting excellence in patient care and outcomes in trauma and musculoskeletal disorders.

AO Principles[1,2]

1.

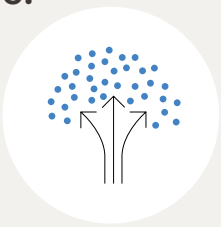
Fracture reduction and fixation to restore anatomical relationships.

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, M Allgöwer, R Schneider, H Willenegger. 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.

Reduce Articular Surface

Instruments	
292.160 or 492.160	Kirschner Wire ∅ 1.6 mm with trocar tip, length 150 mm, Stainless Steel or Titanium Alloy (TAV)
292.200 or 492.200	Kirschner Wire ∅ 2.0 mm with trocar tip, length 150 mm, Stainless Steel or Titanium Alloy (TAV)

■ Note:

Prior to reduction, application of an external fixator or large distractor may facilitate visualization and reduction of the joint.

Reduce the fracture fragments and confirm reduction using image intensification. Reduction may be stabilized using the following methods:

- Independent Kirschner wires
- Kirschner wires through the plate
- Independent lag screws
- Lag screws through the plate
- Locking screws through the plate

Locking screws do not provide interfragment compression; therefore, any desired compression must be achieved with standard lag screws. The articular fractures must be reduced and compressed before fixation of the LCP Distal Tibia Plate with locking screws.

2.7 mm or 3.5 mm cortex screws may also be used as lag screws through the plate by overdrilling the near fragment.

■ Note:

To verify that independent lag screws will not interfere with plate placement, evaluate placement with AP and lateral fluoroscopic image.

Insert Plate

Bend or cut off the distal tab (optional)

Instruments	
391.963	Universal Bending Pliers, length 165 mm
391.931	Cutting Pliers for Plates, length 230 mm
329.916	Bending Pin for LCP Plates 3.5, with thread

Bend/contour the distal tab on the plate using the Bending Pins (329.916) or Bending Pliers (391.963). Alternatively, cut off the distal tab using the Cutting Pliers for Plates (391.931).

▲ Precaution:

Do not repeatedly bend the distal tab back and forth.

Insert plate

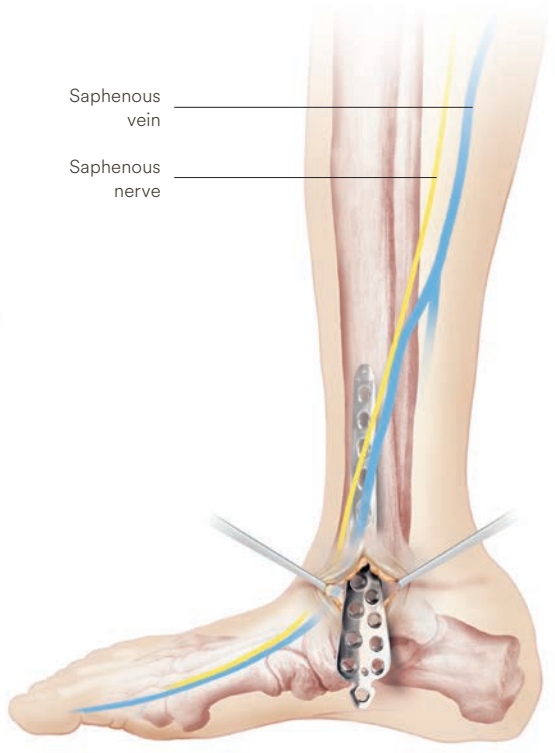
Instruments	
323.505	LCP Universal Drill Guide 3.5, Stainless Steel
324.031	Plate Holder with thread ∅ 3.5 mm, long

For minimally invasive insertion of the plate onto the medial tibia, make a single incision and carefully push the plate under the soft tissue. Perform stab incisions for the insertion of the screws in the shaft area.

■ Note:

Use a threaded plate holder in one of the distal holes as a handle for percutaneous insertion.

Prior to placing the plate against the bone, place the LCP Universal Drill Guide 3.5 into the distal holes.



Position Plate and Fix Provisionally

Instrument	
292.160 or 492.160	Kirschner Wire ∅ 1.6 mm with trocar tip, length 150 mm, Stainless Steel or Titanium Alloy (TAV)
292.200 or 492.200	Kirschner Wire ∅ 2.0 mm with trocar tip, length 150 mm, Stainless Steel or Titanium Alloy (TAV)

Position the plate onto the bone and fix provisionally with Kirschner wires. Before inserting the first locking screw, ensure that the plate shows good provisional fixation, otherwise the plate may rotate during screw locking.

Locking screw insertion may prevent any further reduction.

Insert Screws

1. Determine screw type and diameter

Select locking screws ∅ 3.5 mm or cortex screws ∅ 3.5 mm. If cortex and locking screws are both used in one plate, the cortex screws must be inserted first. This ensures that the plate is compressed against the bone before the locking screws are inserted.

Alternative

The following screws may also be used:

- Locking Screws ∅ 2.7 mm, head 3.5 (X02.920–960)
- Locking Screws Stardrive ∅ 2.7 mm, head 3.5 (X03.920–960)
- Cortex Screws ∅ 2.7 mm (X02.820–860)
- Cancellous Bone Screws ∅ 4.0 mm (X07.040–060)

■ Note:

For reasons of stability, only use the locking screws ∅ 2.7 mm, head 3.5 and the cortex screws ∅ 2.7 mm in the distal section of the plate (round threaded holes).

Instruments	
310.190	Drill Bit ∅ 2.0 mm, length 100/75 mm, 2-flute, for Quick Coupling
or	
310.210	Drill Bit ∅ 2.0 mm, length 125/100 mm, 2-flute, for Quick Coupling
310.230	Drill Bit ∅ 2.5mm, length 180/155 mm, 2-flute, for Quick Coupling
or	
310.250	Drill Bit ∅ 2.5mm, length 110/85 mm, 2-flute, for Quick Coupling
310.260	Drill Bit ∅ 2.7 mm length 100/75 mm, 2-flute, for Quick Coupling
or	
310.280	Drill Bit ∅ 2.7 mm, length 125/100 mm, 2-flute, for Quick Coupling
310.284	LCP Drill Bit ∅ 2.8 mm with Stop, length 165 mm, 2-flute, for Quick Coupling
310.350	Drill Bit ∅ 3.5 mm, length 110/85 mm, 2-flute, for Quick Coupling

312.922	LCP Drill Sleeve 2.7, for Drill Bits ∅ 2.0 mm
323.027	LCP Drill Sleeve 3.5, for Drill Bits ∅ 2.8 mm
323.260	Universal Drill Guide 2.7
323.360	Universal Drill Guide 3.5
313.302	Screwdriver Stardrive, T8, cylindrical, with Groove, shaft ∅ 3.5 mm
314.041	Screwdriver Stardrive 3.5, T15, with Groove, length 200 mm
311.431	Handle with Quick Coupling
314.467	Screwdriver Shaft, Stardrive, T8, self-holding
314.116	Screwdriver Shaft Stardrive 3.5, T15, self-holding, for AO/ASIF Quick Coupling
314.020	Screwdriver, hexagonal, small, with Holding Sleeve
314.030	Screwdriver Shaft, hexagonal, small, ∅ 2.5 mm
319.010	Depth Gauge for Screws ∅ 2.7 to 4.0 mm, measuring range up to 60 mm
511.770	Torque Limiter, 1.5 Nm, for Compact Air Drive and Power Drive
or	
511.773	Torque Limiter, 1.5 Nm, for AO/ASIF Quick Coupling
397.705	Handle for Torque Limiter Nos. 511.770 and 511.771

Power tool unit:

511.701	Compact Air Drive II
530.100	Power Drive

2. Drill screw holes

a. Standard screws

When drilling for standard screws with the Universal Drill Guide (323.260 or 323.360) and the matching drill bit, drill the screw hole neutrally (1) or off-centre (2).

Use the following drill bits:
- For cortex screw ∅ 3.5 mm and cancellous bone screw ∅ 4.0 mm (alternative): Drill Bit ∅ 2.5 mm (310.230 or 310.250)
- For cortex screw ∅ 2.7 mm (alternative): Drill Bit ∅ 2.0 mm (310.190 or 310.210)

■ Note:

When using a cortex screw ∅ 3.5 mm or ∅ 2.7 mm (alternative) as a lag screw, drill the cortex of the nearby fragment with a larger bit (Drill Bit ∅ 3.5 mm [310.350] for cortex screw ∅ 3.5 mm and Drill Bit ∅ 2.7 mm [310.260] for cortex screw ∅ 2.7 mm).

b. Locking screws

When drilling for locking screws, screw the LCP Drill Sleeve for locking screws ∅ 3.5 mm (323.027) or ∅ 2.7 mm (312.922) into the desired threaded hole until the sleeve is fully gripped by the thread.

The LCP drill sleeve ensures that the locking screw is locked in the plate in the correct alignment. Angular stability is reduced if the locking screws are inserted obliquely.

■ Note:

Do not bend the plate with the drill sleeve as this may damage the sleeve. Drill the screw hole with a suitable drill bit.

Use the following drill bits:
- For locking screw ∅ 3.5 mm: Drill Bit ∅ 2.8 mm (310.284)
- For locking screw ∅ 2.7 mm: Drill Bit ∅ 2.0 mm (310.190 or 310.210)

3. Determine screw length

Determine the screw length with the Depth Gauge (319.010).

4. Insert standard screws

Insert the cortex screws with the small, hexagonal Screwdriver ∅ 2.5 mm (314.020).

For the insertion of cortex screws with stardrive recess please use the screwdriver T8 (313.302) or the screwdriver T15 (314.041).

5. Insert locking screws

a. Mechanically

To insert the locking screws mechanically, attach the Torque Limiter 1.5 Nm (511.770) to the power tool unit (Compact Air Drive II 511.701 or Power Drive 530.100). Insert the Hexagonal Screwdriver Shaft (314.030) or the Screwdriver Shaft Stardrive 3.5 (314.116) into the torque limiter. Pick up the locking screw and insert it into the plate hole. To insert the screw, start the power tool unit slowly, increase the speed and then reduce again before the screw is fully tightened. The torque is automatically limited and a clearly audible click signifies that the maximum torque has been reached. Stop the power tool unit immediately and disconnect from the screw.

▲ WARNING:

Never insert locking screws under power unless using a torque limiting attachment.

■ Notes:

- Do not lock the screw at full speed as this risks damaging the hexagonal or Stardrive recess, making implant removal more difficult.
- With osteoporotic bone there is a risk that the locking screw will fail to follow the drilled hole, resulting in a slightly oblique hole during mechanical insertion of the screw with subsequent partial loss of angular stability. In case of osteoporotic bone, manual locking (with the handle for torque limiter) of the screws is recommended to ensure guidance through the drilled hole.

b. Manually

To insert the locking screws manually, attach the torque limiter 1.5 Nm to the Handle for Torque Limiter (397.705) and insert the screwdriver shaft.

Lock the locking screws in the plate.

If using a locking screw as the first screw, be sure the plate is held securely to the bone to prevent plate rotation as the screw is locked to the plate.

■ Note:

The locking screw is not a lag screw. Use standard screws when requiring a precise anatomical reduction (e.g. joint surfaces) or interfragmentary compression. Before inserting the first locking screw, perform anatomical reduction and fix the fracture with lag screws, if necessary. After the insertion of locking screws, an anatomical reduction will no longer be possible without loosening the locking screws.

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 Distal Tibial Plate 2.7/3.5, medial

Right	Left	Holes	Length (mm)
X39.900	X39.901	4	116
X39.904	X39.905	6	142
X39.908	X39.909	8	168
X39.912	X39.913	10	194
X39.916	X39.917	12	220
X39.920	X39.921	14	246

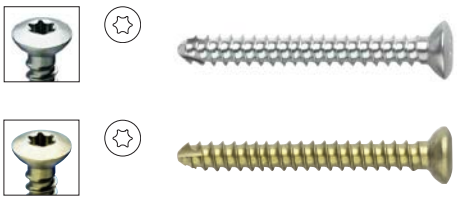
X=2: Steel
X=4: Titanium

All plates are available sterile packed.

Screws

Cortex Screws 2.7 mm

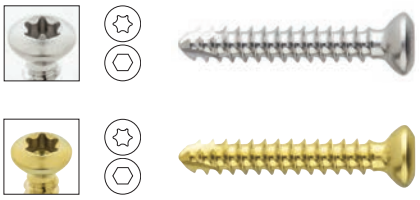
X02.870– X02.969	Cortex Screw Stardrive ∅ 2.7 mm, self-tapping, length 10–60 mm



- May be used in the distal locking holes
- Compresses the plate to the bone
- Fully threaded shaft

Cortex Screws 3.5 mm

0X.200.010– 0X.200.060	Cortex Screw Stardrive ∅ 3.5 mm, self-tapping, length 10–60 mm
or	
X04.810– X04.860	Cortex Screw ∅ 3.5 mm, self-tapping, length 10–60 mm



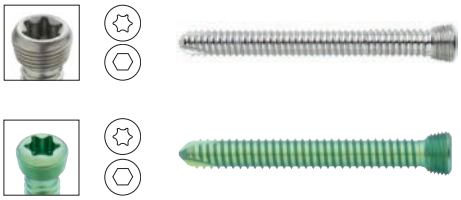
- May be used in the DCU portion of the combi-holes in the plate shaft
- Compresses the plate to the bone or creates axial compression
- Fully threaded shaft

X=2 Stainless Steel
X=4 Titanium

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

Locking Screws 3.5 mm

X12.101– X12.125	Locking Screw Stardrive ∅ 3.5 mm, self-tapping, length 10–65 mm
or	
X13.010– X13.060	Locking Screw ∅ 3.5 mm, self-tapping, length 10–60 mm



- Creates a locked, fixed-angle screw/plate construct
- Fully threaded shaft
- Self-tapping tip
- Used in the locking portion of the combi-holes or in round locking holes

Cancellous Bone Screws 4.0 mm

X06.010– X06.060	Cancellous Bone Screw ∅ 4.0 mm, fully threaded, length 10–60 mm
X07.010– X07.060	Cancellous Bone Screw ∅ 4.0 mm, length 10/5–60/16 mm

- May be used in the DCU portion of the combi-holes in the plate shaft
- Compresses the plate to the bone or creates axial compression
- Fully or partially threaded shaft

X=2 Stainless Steel
X=4 Titanium

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

Instruments

Bending and cutting instruments

391.931	Cutting Pliers for Plates, length 230 mm

391.963	Universal Bending Pliers, length 165 mm

329.916	Bending Pin for LCP Plates 3.5, with thread

Standard screw insertion instruments

292.160	Kirschner Wire ∅ 1.6 mm with trocar tip, length 150 mm, Stainless Steel

292.200	Kirschner Wire ∅ 2.0 mm with trocar tip, length 150 mm, Stainless Steel

492.160	Kirschner Wire ∅ 1.6 mm with trocar tip, length 150 mm, Titanium Alloy (TAV)
492.200	Kirschner Wire ∅ 2.0 mm with trocar tip, length 150 mm, Titanium Alloy (TAV)

310.190	Drill Bit ∅ 2.0 mm, length 100/75 mm, 2-flute, for Quick Coupling	
310.210	Drill Bit ∅ 2.0 mm, length 125/100 mm, 2-flute, for Quick Coupling	
310.230	Drill Bit ∅ 2.5 mm, length 180/155 mm, 2-flute, for Quick Coupling	
310.250	Drill Bit ∅ 2.5 mm, length 110/85 mm, 2-flute, for Quick Coupling	
310.260	Drill Bit ∅ 2.7 mm, length 100/75 mm, 2-flute, for Quick Coupling	
310.280	Drill Bit ∅ 2.7 mm, length 125/100 mm, 2-flute, for Quick Coupling	
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314.020	Screwdriver, hexagonal, small, with Holding Sleeve	
314.030	Screwdriver Shaft, hexagonal, small, ∅ 2.5 mm	
511.770	Torque Limiter, 1.5 Nm, for Compact Air Drive and Power Drive	
511.773	Torque Limiter, 1.5 Nm, for AO/ASIF Quick Coupling	
397.705	Handle for Torque Limiter Nos. 511.770 and 511.771	

Optional instruments

310.370	Drill Bit ∅ 3.5 mm, length 195/170 mm, 2-flute, for Quick Coupling	
324.214	Drill Bit ∅ 2.8 mm, with Scale, length 200/100 mm, 3-flute, for Quick Coupling	
309.039	Extraction Bolt, for Screws ∅ 3.5 and 4.0 mm	
311.320	Tap for Cortex Screws ∅ 3.5 mm, length 110/50 mm	
311.340	Tap for Cancellous Bone Screws ∅ 4.0 mm, length 110/85 mm	
314.070	Screwdriver, hexagonal, small, 2.5 mm, with Groove	
311.430	Handle with Quick Coupling, length 110 mm	
311.431	Handle with Quick Coupling	

310.890	Countersink 3.5	
311.440	T-Handle with Quick Coupling	
309.520	Extraction Screw, conical, for Screws ∅ 2.7, 3.5 and 4.0 mm	
309.521	Extraction Screw for Screws ∅ 3.5 mm	

MRI Information

Torque, Displacement and Image Artifacts according to ASTM F 2213, ASTM F 2052 and ASTM F 2119

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 F 2182

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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