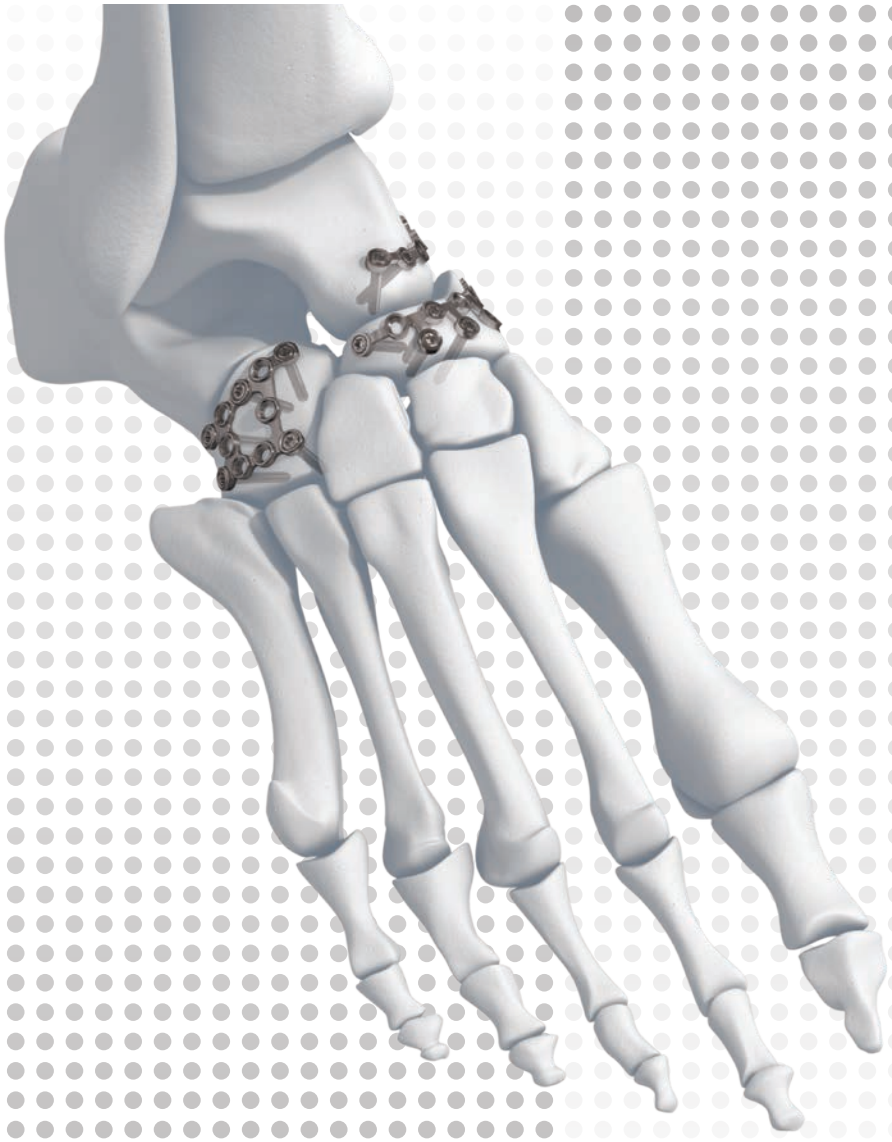
Locking Tarsal Plates 2.4/2.7 mm

Talus Plate, Navicular Plate and Cuboid Plate

Surgical Technique



AO 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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Locking Tarsal Plates 2.4/2.7 mm

Locking Talus Plate

Round locking holes accept 2.4 and 2.7 mm (head LCP 2.4) locking screws and 2.4 mm cortex screws.

Anatomic profile

- The plate can be fitted to the talus medially and laterally.
- The ribs between the plate holes facilitate bending and contouring.
- Plates can be cut to length for the specific fracture pattern or patient anatomy.

Locking Navicular Plate

Round locking holes accept 2.4 and 2.7 mm (head LCP 2.4) locking screws and 2.4 mm cortex screws.

Anatomic profile

- The plate fits the specific anatomic profile of the navicular bone.
- The ribs between the plate holes facilitate bending and contouring.
- Plates can be cut to length for the specific fracture pattern or patient anatomy.

Locking Cuboid Plate

Round locking holes accept 2.4 and 2.7 mm (head LCP 2.4) locking screws and 2.4 mm cortex screws.

Anatomic profile

- Left and right plates for anatomic fit.
- The ribs between the plate holes facilitate bending and contouring.
- Plates can be cut to length for the specific fracture pattern or patient anatomy.

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

The AO Principles of Fracture Management

Mission

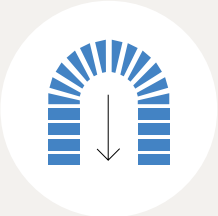
The AO's mission is promoting excellence in patient care and outcomes in trauma and musculoskeletal disorders.

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, 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.

Locking Talus Plate

Preparation

The locking tarsal plates are an addition to the 2.4 mm module of the compact foot set.

Required Sets	
01.282.002	LCP Compact Foot Basic Instrument Set and Screws ∅ 2.7 mm, Stainless Steel
or	
01.282.004	LCP Compact Foot Basic Instrument Set and Screws ∅ 2.7 mm, Titanium Alloy (TAN)
182.678	Compact Foot 2.4 (Stainless Steel Implants)
or	
182.677	Compact Foot 2.4 (Titanium Implants)

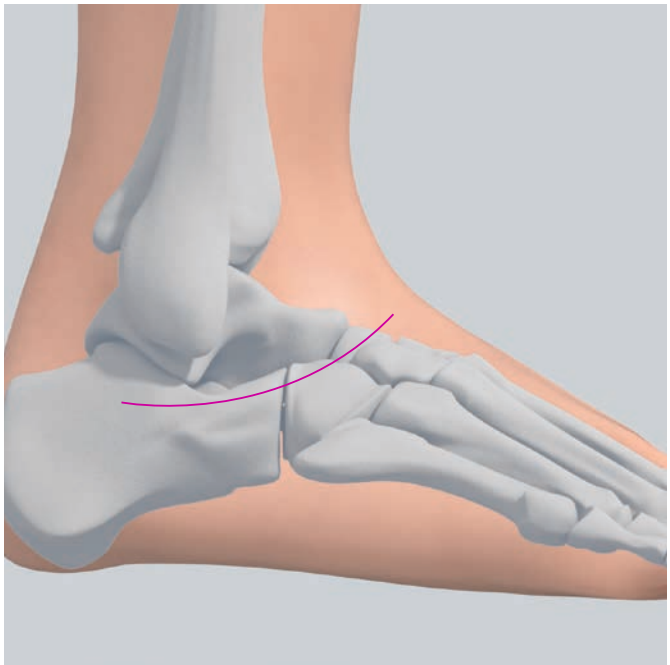
Complete the preoperative radiographic assessment and prepare the preoperative plan. Determine the plate and instruments to be used.

1. Approach

Two approaches are necessary to treat talus fractures, to allow visualization of both the medial and lateral sides of the talus.
Medially, a slightly dorsal incision is made along the bisector angle between the anterior and posterior tibialis. This incision is started distally over the tubercle of the tarsal navicular bone and lengthened proximally over the tip of the medial malleolus, if required.
Laterally, a longitudinal incision is made; this is called the Ollier approach, from the tip of the lateral malleolus to the dorsolateral part of the talonavicular joint.

▲ WARNING:

These incisions are made to the bone, avoiding the dorsal peroneal nerves and vascular structures.



2. Contour plate

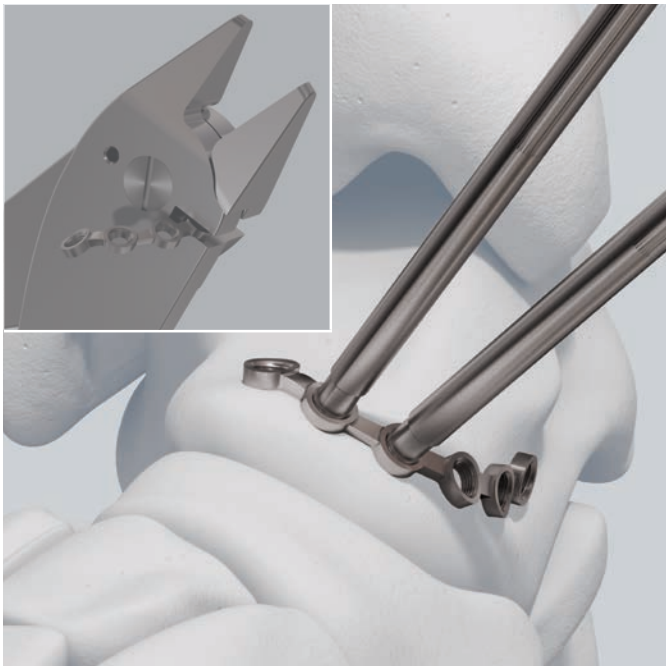
Instrument	
329.922	Bending Pin for LCP Plates 2.4 and 2.7, with thread
Optional instrument	
391.962	Bending/Cutting Pliers

Provisional bone fixation can be obtained using k-wires. Independent lag screws can be used for stabilization.

Medially, the plate fits on the bone with the concavity upward. The posterior portion of the plate is below the medial malleolar facet and the anterior portion runs above the neck, parallel to the talonavicular joint.

Laterally, the plate fits on the bone with the concavity downward. The posterior portion of the plate is almost vertical in front of the lateral process and the anterior portion is horizontal, perpendicular to the talonavicular joint.

Thread the bending pins or drill guides into the plate on each side of the bend location. Ensure the pins are completely engaged into the plate before bending. Contour the plate. Be careful to avoid overbending and damage to the plate threads. The plates can be cut to length and contoured using the Bending/Cutting pliers for the specific fracture pattern or patient anatomy.



▲ Precaution:

Be careful to avoid overbending and damage to the plate threads.

3. Drill and insert 2.4 mm cortex screw

Instruments	
310.509	Drill Bit ∅ 1.8 mm, with marking
310.530	Drill Bit ∅ 2.4 mm, length 100/75 mm
311.430	Handle with quick coupling
314.467	Stardrive Screwdriver Shaft, T8
319.010	Depth Gauge
323.202	Universal Drill Guide 2.4

If a combination of cortex screws and locking screws will be used, a cortex screw should be inserted first. Use the 2.4 mm universal drill guide when inserting the cortex screws. Use the 1.8 mm drill bit for the threaded hole and 2.4 mm drill bit for the gliding hole.

Drill to the desired depth. Verify drilling depth using image intensification. Remove the drill guide and measure for screw length using the depth gauge.

Insert the cortex screw manually with the self-retaining Stardrive screwdriver shaft and handle.

4. Drill and insert locking screw

In the tarsal plates the option of 2.4 mm or 2.7 mm (head LCP 2.4) locking screws can be used.

Instruments	
311.430	Handle with quick coupling
314.467	Stardrive Screwdriver Shaft, T8
511.776	Torque Limiter, 0.8 Nm
323.029	LCP Drill Sleeve 2.4 for Drill Bits ∅ 1.8 mm
310.509	Drill Bit ∅ 1.8 mm, with marking
Optional instruments	
319.010	Depth Gauge
323.061	LCP Drill Sleeve 2.7, for Drill Bits 2.0 mm
323.062	Drill Bit ∅ 2.0 mm with double marking

Screw the drill guide into one of the locking holes until it is fully seated. Insert the drill bit through the drill guide to the bone.

▲ Precaution:

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.

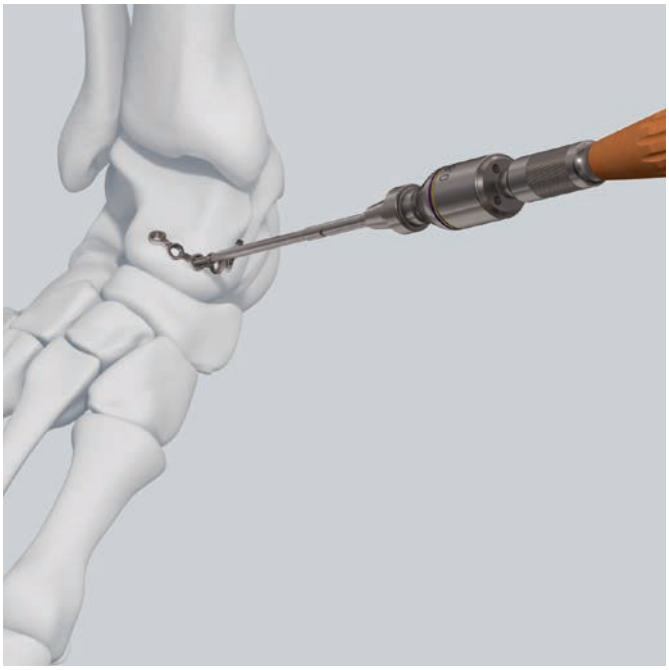
Determine the screw length directly from the mark on the drill bit and the scale on the threaded drill guide.

Alternatively, screw length can be checked by removing the drill guide and using the depth gauge.

Insert the locking screw manually with the self-retaining Stardrive screwdriver shaft, Torque Limiter 0.8 Nm and handle. Carefully tighten the locking screw. Excessive force is not necessary to lock the screw to the plate.

Repeat for the remaining locking screws.

Under image intensification make a final control to ensure that all screws are the correct length and correctly placed.



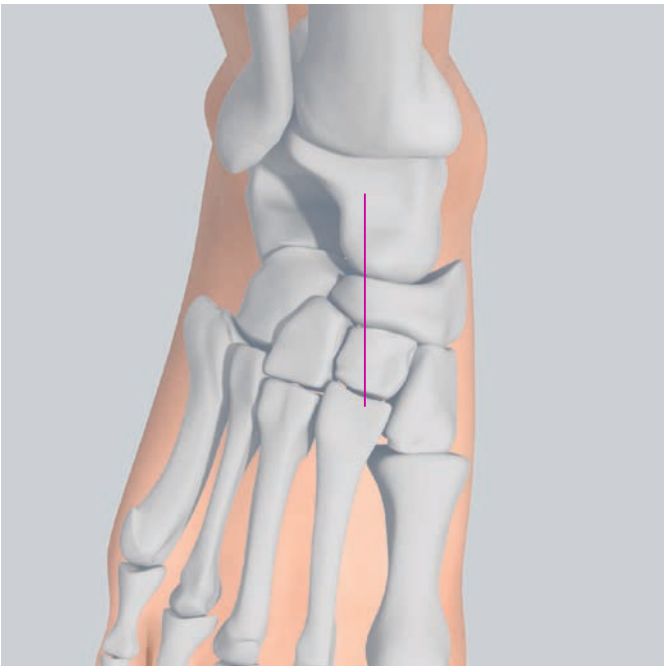
Locking Navicular Plate

1. Approach

Make a dorsal longitudinal incision from the midneck of the talus towards the base of the second metatarsal. It is important to preserve neurovascular and tendinous structures. It may be necessary to open the talonavicular joint capsule to allow visualization of the joint.

▲ WARNING:

To minimize the potential for vascular damage, strip only a small segment of the capsule from the navicular bone.



2. Contour the Plate

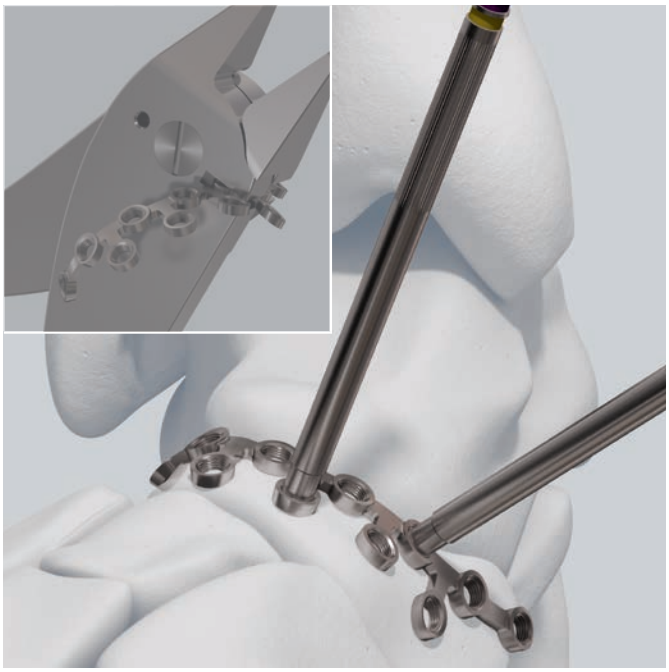
Instrument	
329.922	Bending Pin for 2.4/ 2.7 mm Locking Plates
Optional instrument	
391.962	Bending/Cutting Pliers

Provisional bone fixation can be obtained using K-wires. Independent lag screws can be used for stabilization.

The plate fits the navicular bone in a concave up direction.

Thread the bending pins or drill guides into the plate on each side of the bend location. Ensure the pins are completely engaged into the plate before bending. Contour the plate. Be careful to avoid overbending and damage to plate threads.

The plates can be contoured using the bending/cutting pliers for the specific fracture pattern or patient anatomy.



▲ Precaution:

Be careful to avoid overbending and damage to the plate threads.

3. Drill and insert 2.4 mm cortex screw

Instruments	
310.509	Drill Bit ∅ 1.8 mm, with marking
310.530	Drill Bit ∅ 2.4 mm, length 100/75 mm
311.430	Handle with quick coupling
314.467	Stardrive Screwdriver Shaft, T8
319.010	Depth Gauge
323.202	Universal Drill Guide 2.4

If a combination of cortex screws and locking screws will be used, a cortex screw should be inserted first.

Use the 2.4 mm universal drill guide when inserting the cortex screws. Use the 1.8 mm drill bit for the threaded hole and 2.4 mm drill bit for the gliding hole.

Drill to the desired depth. Verify drill depth using image intensification. Remove the drill guide and measure for screw length using the depth gauge.

Insert the cortex screw manually with the self-retaining Stardrive screwdriver shaft and handle.

4. Drill and insert locking screw

In the tarsal plates the option of 2.4 mm or 2.7 mm (head LCP 2.4) locking screws can be used.

Instruments	
311.430	Handle with quick coupling
314.467	Stardrive Screwdriver Shaft, T8
511.776	Torque Limiter, 0.8 Nm
323.029	LCP Drill Sleeve 2.4 for Drill Bits ∅ 1.8 mm
310.509	Drill Bit ∅ 1.8 mm, with marking
Optional instruments	
319.010	Depth Gauge
323.061	LCP Drill Sleeve 2.7, for Drill Bits ∅ 2.0 mm
323.062	Drill Bit ∅ 2.0 mm with double marking

Screw the drill guide into one of the locking holes until it is fully seated. Insert the drill bit through the drill guide to the bone.

▲ Precaution:

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.

Alternatively, screw length can be checked by removing the drill guide and using the depth gauge.

Insert the locking screw manually with the self-retaining Stardrive screwdriver shaft , Torque Limiter 0.8 Nm and handle. Carefully tighten the locking screw. Excessive force is not necessary to lock the screw to the plate.

Repeat for the remaining locking screws. Under image intensification make a final control to ensure that all screws are the correct length and correctly placed.

Locking Cuboid Plate

1. Approach

Make a linear dorsolateral incision starting at the sinu tarsi and extending to the base of the fourth metatarsal.

▲ WARNING:

This incision may run parallel to or directly over the sural nerve, and crosses the peroneous tertius, care must be taken to avoid injuring these structures.

2. Contour the plate

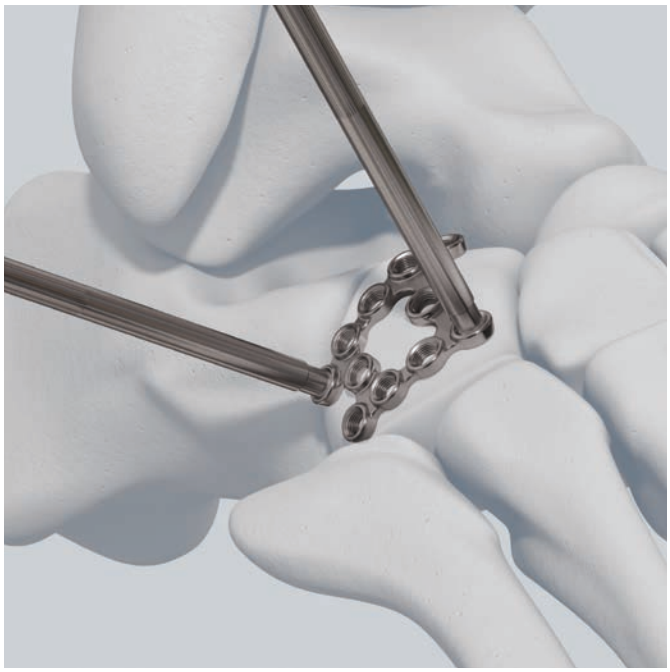
Instrument	
329.922	Bending Pin for 2.4/ 2.7 mm Locking Plates
Optional instrument	
391.962	Bending/Cutting Pliers

Provisional bone fixation can be obtained using K-wires. Independent lag screws can be used for stabilization.

The cuboid plate is available in left and right plates to match the anatomy of each foot. The longest arm, with 5 screw holes, is to be placed proximally.

Thread the bending pins or drill guides into the plate on each side of the bend location. Ensure the pins are completely engaged into the plate before bending. Contour the plate. Be careful to avoid overbending and damage to plate threads.

The plates can be contoured using the bending/cutting pliers for the specific fracture pattern or patient anatomy.



▲ Precaution:

Be careful to avoid overbending and damage to the plate threads.

3. Drill and insert 2.4 mm cortex screw

Instruments	
310.509	Drill Bit ∅ 1.8 mm, with marking
310.530	Drill Bit ∅ 2.4 mm, length 100/75 mm
311.430	Handle with quick coupling
314.467	Stardrive Screwdriver Shaft, T8
319.010	Depth Gauge
323.202	Universal Drill Guide 2.4

If a combination of cortex screws and locking screws will be used, a cortex screw should be inserted first.

Use the 2.4 mm universal drill guide when inserting the cortex screws. Use the 1.8 mm drill bit for the threaded hole and 2.4 mm drill bit for the gliding hole.

Drill to the desired depth. Verify drill depth using image intensification. Remove the drill guide and measure for screw length using the depth gauge.

Insert the cortex screw manually with the self-retaining Stardrive screwdriver shaft and handle.

4. Drill and insert locking screw

In the tarsal plates the option of 2.4 mm or 2.7 mm (head LCP 2.4) locking screws can be used.

Instruments	
311.430	Handle with quick coupling
314.467	Stardrive Screwdriver Shaft, T8
511.776	Torque Limiter, 0.8 Nm
323.029	LCP Drill Sleeve 2.4 for Drill Bits ∅ 1.8 mm
310.509	Drill Bit ∅ 1.8 mm, with marking
Optional instruments	
319.010	Depth Gauge
323.061	LCP Drill Sleeve 2.7, for Drill Bits ∅ 2.0 mm
323.062	Drill Bit ∅ 2.0 mm with double marking

Screw the drill guide into one of the locking holes until it is fully seated. Insert the drill bit through the drill guide to the bone.

▲ Precaution:

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.

  Alternatively, screw length can be checked by removing the drill guide and using the depth gauge.

  Insert the locking screw manually with the self-retaining Stardrive screwdriver shaft, Torque Limiter 0.8 Nm and handle. Carefully tighten the locking screw. Excessive force is not necessary to lock the screw to the plate.

- Repeat for the remaining locking screws. Under image intensification make a final control to ensure that all screws are the correct length and correctly placed.

Implant Removal

In case the physician decides to remove the implants, implants can be removed by using general surgical instruments. In case of difficult removal circumstances, a Screw Extraction Set is available with corresponding instructions.

Plates

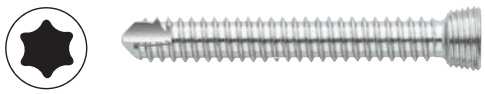
0X.100.020	Navicular Plate 2.4, locking	
0X.100.021	Cuboid Plate 2.4, locking, left	
0X.100.022	Cuboid Plate 2.4, locking, right	
0X.100.023	Talus Plate 2.4, locking	

X = 2: Stainless steel
X = 4: Titanium

Implants (or products as appropriate) are available nonsterile or sterile packed. Add suffix “S“ to article number to order sterile product.

Screws

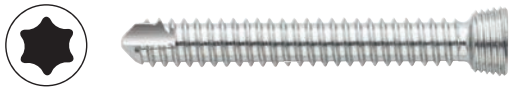
LCP Locking Screw Stardrive ∅ 2.4 mm, self-tapping



- Thread diameter 2.4 mm
- Drill bit for threaded hole 1.8 mm
- Drill bit for gliding hole 2.4 mm
- Core diameter 1.9 mm
- Head diameter 3.5 mm
- Stardrive T8

2.4 mm locking screws available from 6 mm to 30 mm lengths (2 mm increments)

LCP Locking Screw Stardrive ∅ 2.7 mm (head LCP 2.4), self-tapping



- Thread diameter 2.7 mm
- Drill bit for threaded hole 2.0 mm
- Drill bit for gliding hole 2.7 mm
- Core diameter 2.1 mm
- Head diameter 3.5 mm
- Stardrive T8

2.7 mm locking screws available from 10 mm to 60 mm lengths (2 mm increments up to 50 mm, 5 mm increments up to 60 mm)

Cortex Screw Stardrive ∅ 2.4 mm, self-tapping

- Thread diameter 2.4 mm
- Drill bit for threaded hole 1.8 mm
- Drill bit for gliding hole 2.4 mm
- Core diameter 1.7 mm
- Head diameter 4.0 mm
- Stardrive T8

2.4 mm cortex screws available from 6 mm to 40 mm lengths (1 mm increments up to 14 mm, 2 mm increments from 16 mm up to 40 mm)

Notes:

- For information on fixation principles using conventional and locked plating techniques, please refer to the LCP Locking Compression Plate Surgical Technique.
- All screws of this 2.4/2.7 locking Tarsal plate system use T8 Stardrive recesses in the screw head. Please note the Stardrive recess in the surgical report. This will remind the surgeon to have a Stardrive screwdriver available when removing these screws.

Instruments

329.922	Bending Pin for LCP Plates 2.4 and 2.7, with thread	
391.962	Bending/Cutting Pliers	
310.509	Drill Bit ∅ 1.8 mm, with marking	
310.530	Drill Bit ∅ 2.4 mm, length 100/75 mm	
311.430	Handle with quick coupling	
314.467	Stardrive Screwdriver Shaft, T8	

319.010	Depth Gauge	
323.202	Universal Drill Guide 2.4	
511.776	Torque Limiter, 0.8 Nm	
323.029	LCP Drill Sleeve 2.4 for Drill Bits ∅ 1.8 mm	
323.061	LCP Drill Sleeve 2.7, for Drill Bits ∅ 2.0 mm	
323.062	Drill Bit ∅ 2.0 mm with double marking	

MRI Information

Torque, Displacement and Image Artifacts according to ASTM F2213, ASTM F2052 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 thermo regulation 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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