

The Locking Calcaneal Plate

Part of the DePuy Synthes Small Fragment Locking Compression Plate (LCP) System

Surgical Technique



 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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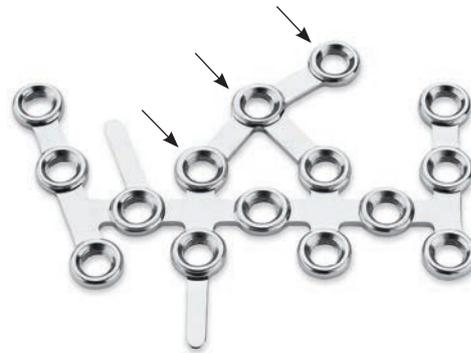
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The Locking Calcaneal Plate

Overview

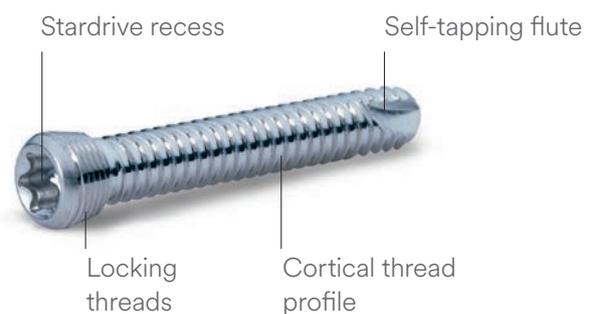
Plate features

- Available in extra-small, small, large and extra-large in left and right versions
- 15 locking holes available
- Bendable tabs
- Locking holes throughout the plate (indicated by arrows) for the screws buttressing the articular surface
- Lateral application
- Locking screws provide bicortical and/or unicortical fixation



Threaded locking holes

- Provides a fixed-angle construct to buttress surfaces
- Permits multiple points of fixation
- Are compatible with standard 2.7 mm and 3.5 mm cortex screws as alternatives to, or in conjunction with, 3.5 mm locking screws
- Provide 15° of angulation when using 2.7 mm cortex screws and 5° of angulation when using 3.5 mm cortex screws



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

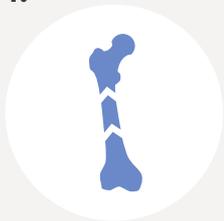
The AO Principles of Fracture Management

Mission

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

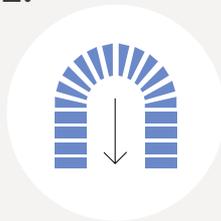
AO Principles^{1,2}

1.



Fracture reduction and fixation to restore anatomical relationships.

2.



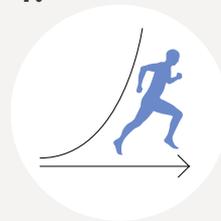
Fracture fixation providing absolute or relative stability, as required by the “personality” of the fracture, the patient, and the injury.

3.



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

4.



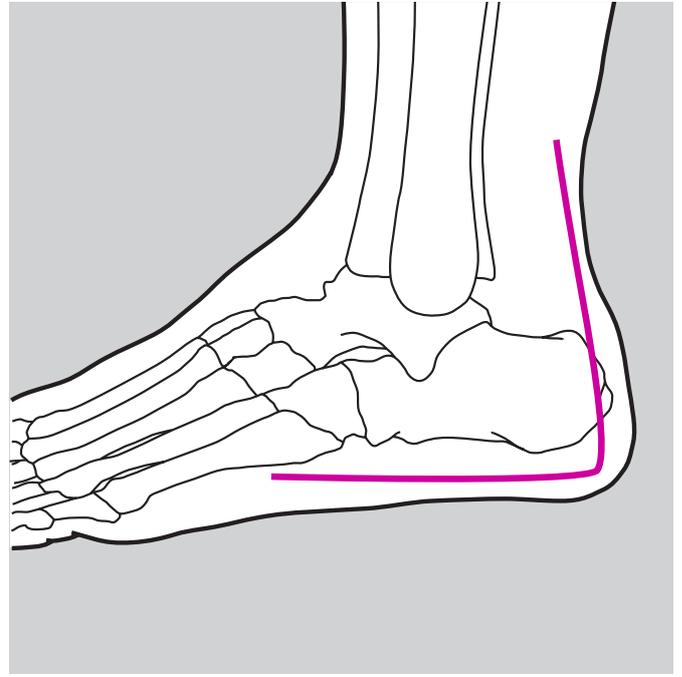
Early and safe mobilization and rehabilitation of the injured part and the patient as a whole.

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 Approach

Place the patient in lateral decubitus position. Make an extensile, right-angled lateral incision. The vertical portion of the incision should be just anterior to the heel cord and extend down to the plantar and lateral skin junction. Continue the incision forward, horizontally, exposing the calcaneocuboid joint. The incision is carried straight down to bone at its angle and then developed to allow a single, thick flap to be lifted from the periosteal surface. This approach allows raising a single flap consisting of skin and soft tissue which includes the peroneal tendons, sural nerve and the detached calcaneofibular ligament.



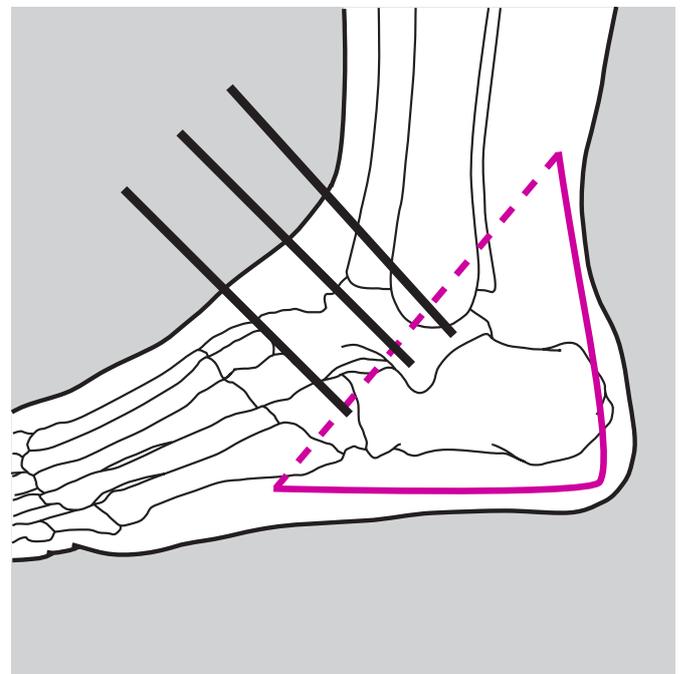
A “no-touch” technique may be employed by retracting the flap with Kirschner wires in the talus and in the cuboid, or with an oral surgery tongue retractor.

▲ WARNING:

Care should be taken to avoid the sural nerve when dissecting.

▲ Precautions:

- Instruments and screws may have sharp edges or moving joints that may pinch or tear user's glove or skin.
- Handle devices with care and dispose worn bone cutting instruments in an approved sharps container.
- Care must be taken to avoid prolonged traction of the flap, especially if Kirschner wires are used.



Reduction

1. Reduce the fracture

Reduce fracture fragments. If Kirschner wires are used to temporarily reduce the fracture, they must be placed to avoid interference with final plate placement. To accomplish this, lay a plate or bending template on the calcaneus.

■ Notes:

- A Schanz screw and universal chuck with T-Handle, or the DePuy Synthes small distractor, can be used to aid in the reduction of fracture fragments.
- The proximal tab should be placed in front of the crucial angle of Gissane to push down the anterior process fragment.



2. Shape the template

Instruments

329.606	Bending Template for Calcaneal Locking Plates 3.5, extra-small, length 64 mm
329.607	Bending Template for Calcaneal Locking Plates 3.5, small, length 69 mm
329.608	Bending Template for Calcaneal Locking Plates 3.5, large, length 76 mm
329.609	Bending Template for Calcaneal Locking Plates 3.5, extra-large, length 81 mm

Temporarily position the appropriate bending template over the calcaneus. Verify template length and contour.

Use the template to assist in selecting the appropriate plate length (extra-small, small, large or extra large).

■ Note:

The bending template can be used for either left or right plate.



Cut/Contour Plate

3. Cut/contour the plate

Instruments

329.916	Bending Pin for LCP Plates 3.5, with thread
391.963	Universal Bending Pliers, length 167.5 mm
329.151	Cutting Pliers with Positioning Pin \varnothing 3.0 mm

If necessary, remove a hole or tab of the plate using the cutting pliers. A combination of holes and/or tabs may be removed as needed. Place the plate into jaws of the cutter as shown.

■ Note:

The hole or tab to be removed should be inside the jaws as depicted. To aid in alignment, the adjacent plate hole should be positioned on the seating pin.

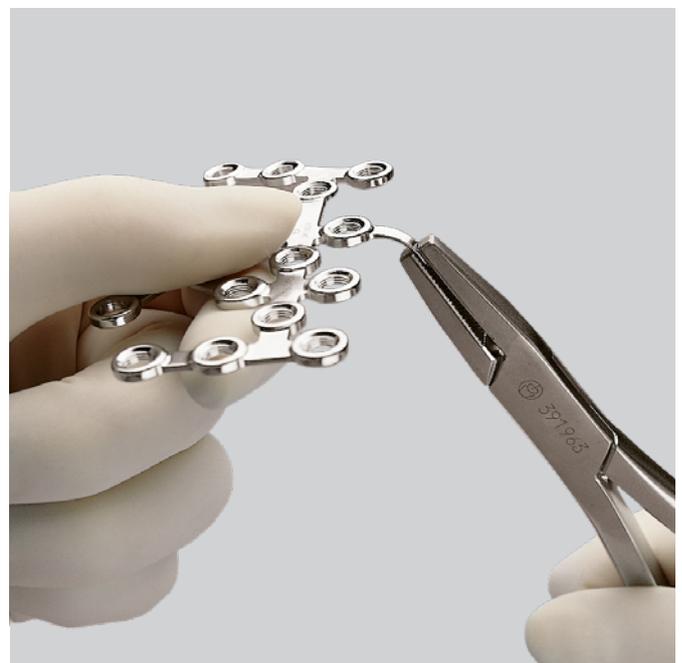
▲ Precaution:

Cut plates, Instruments and screws may have sharp edges or moving joints that may pinch or tear user's glove or skin.

▲ WARNING:

Do not bend the plate beyond what is required to match the anatomy. Reverse bending or use of the incorrect instrumentation for bending may weaken the plate and lead to premature plate failure.

Due to calcaneal soft tissue anatomy, it may be helpful to pre-bend the superior and inferior tabs prior to plate application. Using the universal bending pliers, contour the tabs in fine increments until a desired fit is achieved.



Using the appropriate bending template as a guide, contour the plate using the universal bending pliers until an acceptable fit is achieved.

■ **Note:**

With a well-reduced calcaneus, it should not be necessary to contour the longitudinal axis of the plate.

If necessary, fine bending may be achieved in situ with two bending pins for LCP plates. Thread one holder into a hole and thread a second holder into an adjacent hole. Apply small incremental force to achieve the required bending.

▲ **Precaution:**

Care should be taken to avoid overbending because the holders may become dislodged from the plate hole and damage the plate threads.



Secure Plate to Bone

4. Secure plate to bone

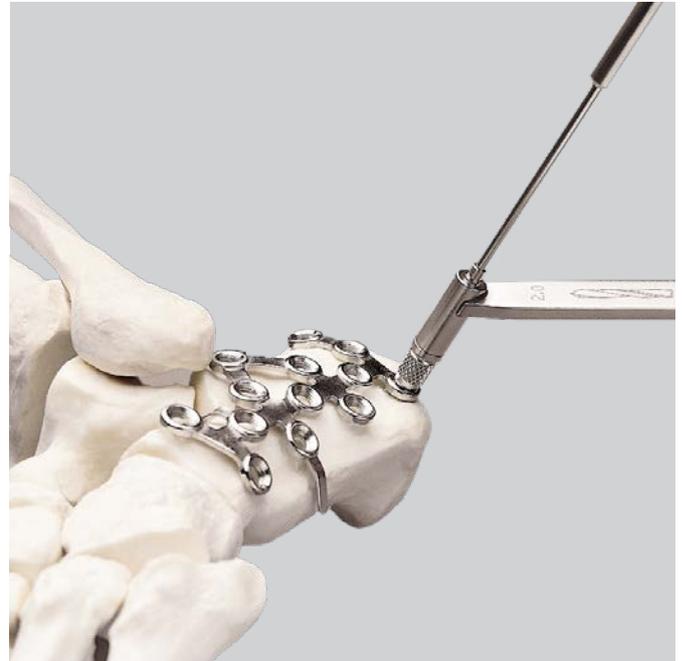
Instruments

310.210	Drill Bit Ø 2.0 mm, length 125/100 mm, 2-flute, for Quick Coupling
or	
310.190	Drill Bit Ø 2.0 mm, length 100/75 mm, 2-flute, for Quick Coupling
310.230	Drill Bit Ø 2.5 mm, length 180/155 mm, 2-flute, for Quick Coupling
or	
310.250	Drill Bit Ø 2.5 mm, length 110/85 mm, 2-flute, for Quick Coupling
310.280	Drill Bit Ø 2.7 mm, length 125/100 mm, 2-flute, for Quick Coupling
310.284	LCP Drill Bit Ø 2.8 mm with Stop, length 165 mm, 2-flute, for Quick Coupling
310.350	Drill Bit Ø 3.5 mm, length 110/85 mm, 2-flute, for Quick Coupling
323.027	LCP Drill Sleeve 3.5, for Drill Bits Ø 2.8 mm
314.020	Screwdriver, hexagonal, small, with Holding Sleeve
314.116	Screwdriver Shaft Stardrive 3.5, SD15, self-holding, for AO/ASIF Quick Coupling
319.010	Depth Gauge for Screws Ø 2.7 to 4.0 mm, measuring range up to 60 mm
323.260	Universal Drill Guide 2.7
323.360	Universal Drill Guide 3.5
511.770	Torque Limiter, 1.5 Nm, for Compact Air Drive and for Power Drive

Determine whether 2.7 mm or 3.5 mm Cortex Screws or 3.5 mm Locking Screws will be used for fixation. A combination of all three screws may be used.

■ Note:

If a combination of cortex and locking screws is used, a cortex screw should be used first to achieve plate-to-bone contact.



▲ Precautions:

- Avoid excessive re-drilling, especially in poor bone quality.
- Instruments and screws may have sharp edges or moving joints that may pinch or tear user's glove or skin.
- Handle devices with care and dispose worn bone cutting instruments in an approved sharps container.
- Use caution when inserting screws targeting the sustentaculum.

- A.** To secure the plate with 2.7 mm cortex screws, insert the 2.0 mm end of the 2.7 mm universal drill guide into the plate hole and drill through both cortices with a 2.0 mm drill bit.

Measure for screw length using the depth gauge.

Select and insert an appropriate length 2.7 mm self-tapping cortex screw using the small hexagonal screwdriver.

■ Note:

To lag a 2.7 mm screw through a plate hole, use a 2.7 mm drill bit to overdrill the near cortex. Insert the 2.7 mm end of the 2.7 mm universal drill guide into the plate hole and drill through the near cortex with a 2.7 mm drill bit.

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- B.** To secure the plate with 3.5 mm cortex screws, insert the 2.5 mm end of the 3.5 mm universal drill guide into a plate hole and drill through both cortices with a 2.5 mm drill bit.

Measure for screw length using the depth gauge.

Select and insert an appropriate length 3.5 mm self-tapping cortex screw using the star-drive screwdriver or the small hexagonal screwdriver, whichever is appropriate.

■ **Note:**

To lag a 3.5 mm cortex screw through a plate hole, use a 3.5 mm drill bit to overdrill the near cortex. Insert the 3.5 mm end of the 3.5 mm universal drill guide into the plate hole and drill through the near cortex with a 3.5 mm drill bit.

- C.** To secure the plate with 3.5 mm locking screws, screw the 2.8 mm threaded drill guide into a threaded plate hole until seated.

■ **Note:**

To assure the locking screw seats itself fully into the threaded hole, the threaded drill guide must be used to ensure the proper drilling angle.

▲ **Precaution:**

Do not bend the plate using the threaded drill guide because damage may occur to the plate threads and/or guide.



Using the 2.8 mm drill bit through the threaded drill guide, drill through both cortices.

Remove the drill guide.

Measure for screw length using the depth gauge.

■ **Note:**

3.5 mm locking screws, with stardrive recess, are included in the locking calcaneal plate and screw instrument and implant set however, 3.5 mm locking screws with small hexagonal recess may also be used.

Insert the appropriate length 3.5 mm self-tapping locking screw under power using a torque limiting attachment (TLA) and Stardrive screwdriver shaft, or small hexagonal screwdriver shaft, as appropriate.

■ **Note:**

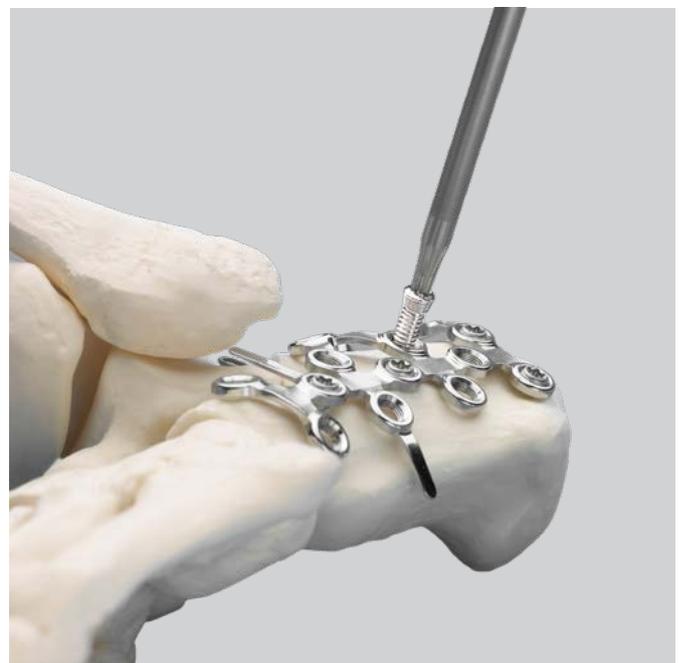
The screw is securely locked to the plate when a “click” is heard.

▲ **Precaution:**

Never use a screwdriver shaft with power equipment unless used with a torque limiting attachment.

Alternative method of locking screw insertion

Manually insert the appropriate length 3.5 mm self-tapping locking screw using the stardrive screwdriver or small hexagonal screwdriver, as appropriate. Carefully tighten the locking screw, as excessive force is not necessary to produce effective screw-to-plate locking.



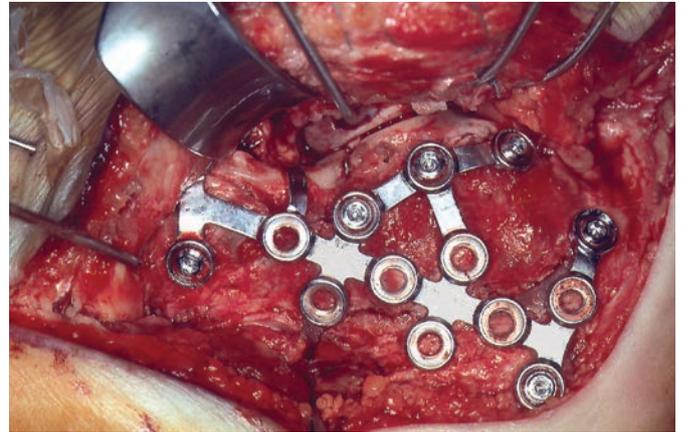
Closure

5. Closure

Close the wound in a routine fashion.

▲ Precaution:

Ensure proper reconstruction, screw placement and screw length under image intensification. Verify that the screws are not in the joint or in the soft tissue.



Implant Removal

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

▲ Precaution:

Do not use torque limiter for screw removal.

Implants

X41.618*	Calcaneal Locking Plate 3.5, right, extra-small, length 64 mm
X41.619*	Calcaneal Locking Plate 3.5, left, extra-small, length 64 mm
X41.622*	Calcaneal Locking Plate 3.5, right, small, length 69 mm
X41.623*	Calcaneal Locking Plate 3.5, left, small, length 69 mm
X41.624*	Calcaneal Locking Plate 3.5, right, large, length 76 mm
X41.625*	Calcaneal Locking Plate 3.5, left, large, length 76 mm
X41.626*	Calcaneal Locking Plate 3.5, right, extra-large, length 81 mm
X41.627*	Calcaneal Locking Plate 3.5, left, extra-large, length 81 mm



Locking Screws

X12.101-124	LCP Locking Screw Stardrive \varnothing 3.5 mm, self-tapping, length 10-60 mm
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Standard Screws

X02.820-860	Cortex Screw \varnothing 2.7 mm, self-tapping, length 20-60 mm
X04.810-860	Cortex Screw \varnothing 3.5 mm, self-tapping, length 10-60 mm

X = 2: Stainless steel
X = 4: Titanium

*Available nonsterile or sterile-packed. Add "S" to catalog number to order sterile product.

Instruments

323.027 LCP Drill Sleeve 3.5, for Drill Bits
Ø 2.8 mm



314.116 Screwdriver Shaft Stardrive 3.5,
SD15, self-holding, for AO/ASIF Quick
Coupling



329.916 Bending Pin for LCP Plates 3.5,
with thread



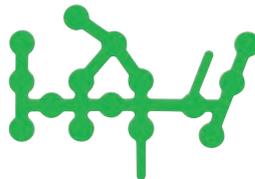
329.151 Cutting Pliers with Positioning Pin
Ø 3.0 mm



391.963 Universal Bending Pliers,
length 167.5 mm



329.606 Bending Template for Calcaneal Locking
Plates 3.5, extra-small, length 64 mm



329.607 Bending Template for Calcaneal Locking
Plates 3.5, small, length 69 mm

329.608 Bending Template for Calcaneal Locking
Plates 3.5, large, length 76 mm

329.609 Bending Template for Calcaneal Locking
Plates 3.5, extra-large, length 81 mm

511.770 Torque Limiter, 1.5 Nm, for Compact
Air Drive and for Power Drive



Optional Instrument

511.773 Torque Limiter Attachment (TLA),
1.5 Nm, quick coupling

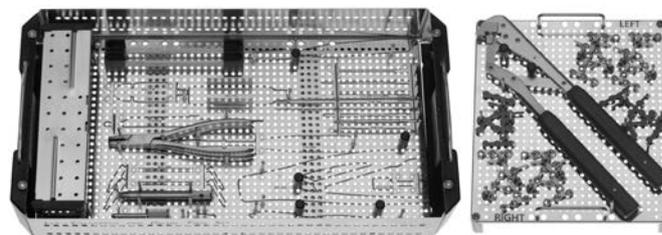


Sets

- Calcaneal Locking Plate (Titanium) and LCP Locking Screws Stardrive (TAN) in Vario Case (182.709)
- Calcaneal Locking Plate and LCP Locking Screws Stardrive (Stainless Steel) in Vario Case (182.710)

■ **Note:**

The locking calcaneal plates are also available in combination with the LCP Pilon Plate (182.705, Ti; 182.706, SSt) and in combination with the LCP Pilon Plate and the LCP Distal Tibia Plate (182.711, Ti; 182.712, SSt).



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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