

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

The Locking Calcaneal Plate Instrument and Implant Sets

Surgical Technique



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MR Information

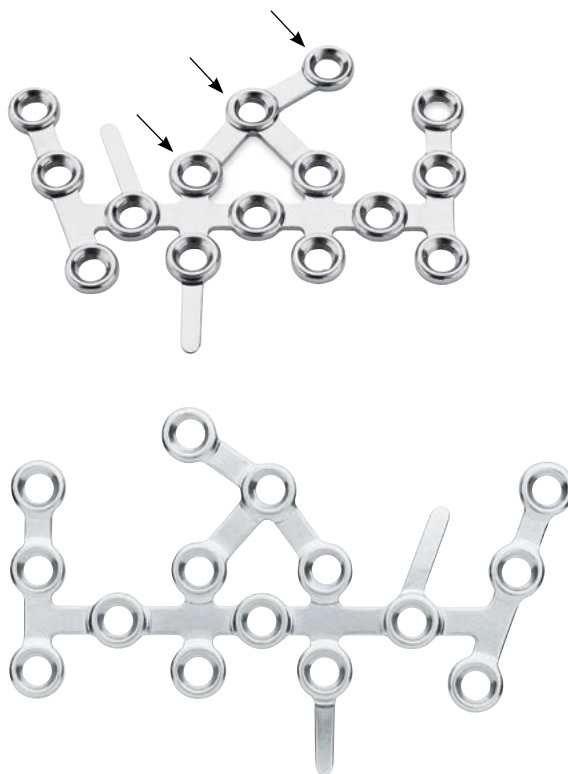
The Locking Calcaneal Plate Instrument and Implant Sets have not been evaluated for safety and compatibility in the MR environment. They have not been tested for heating, migration or image artifact in the MR environment. The safety of the Locking Calcaneal Plate Instrument and Implant Sets in the MR environment are unknown. Scanning a patient who has this device may result in patient injury.

 Image intensifier control

Locking Calcaneal Plate

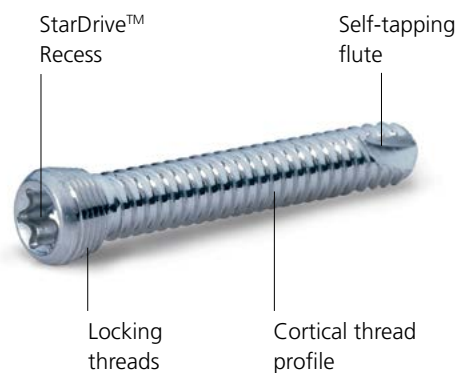
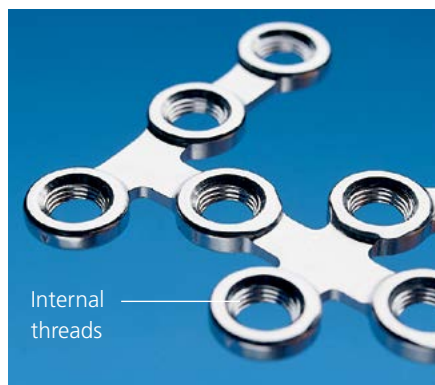
Plate features

- Available in mini, short, long and extra long, in left and right designs
- Versatile— 15 locking holes address multiple fracture patterns
- Bendable tabs provide support for the anterior process and plantar fragments
- Angled and ascending holes (indicated by arrows) buttress the sustentaculum and provide better support of the calcaneotalar articular surface
- Lateral application
- Locking screws provide standard bicortical and/or unicortical fixation



Threaded locking holes

- Offer a fixed-angle construct to buttress the articular surfaces of the calcaneus
- Permit multiple points of fixation to buttress small fragments
- Accept 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



AO Principles

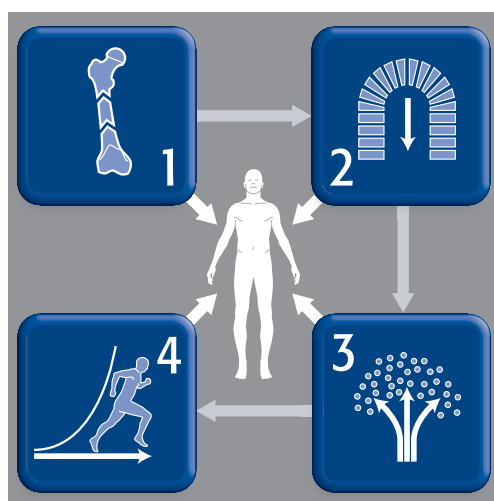
In 1958, the AO formulated four basic principles, which have become the guidelines for internal fixation.^{1,2}

Anatomic reduction

Fracture reduction and fixation to restore anatomical relationships.

Early, active mobilization

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



Stable fixation

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

Preservation of blood supply

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

1. Müller ME, Allgöwer M, Schneider R, Willenegger H. *Manual of Internal Fixation*. 3rd ed. Berlin, Heidelberg, New York: Springer-Verlag; 1991.
2. Rüedi TP, RE Buckley, CG Moran. *AO Principles of Fracture Management*. 2nd ed. Stuttgart New York: Thieme; 2007.

Indications

Locking Calcaneal Plates address complex fractures of the calcaneus.

The Locking Calcaneal Plate is indicated for fractures and osteotomies of the calcaneus including, but not limited to, extra-articular, intra-articular, joint depression, tongue type, and severely comminuted fractures.



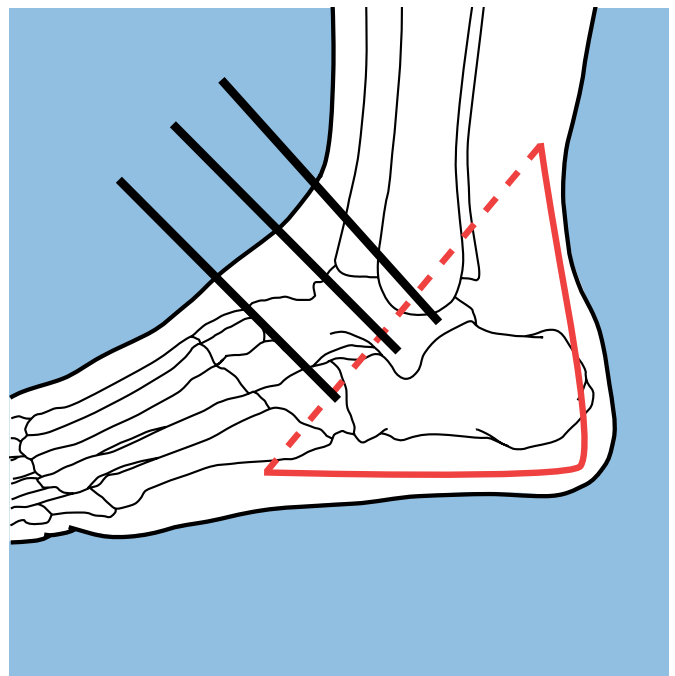
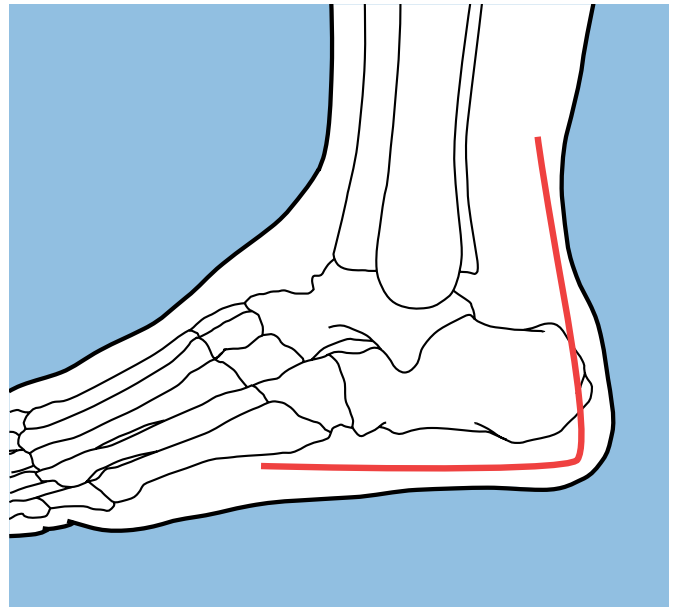
Surgical Approach

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 K-wires in the talus and in the cuboid, or with an oral surgery tongue retractor.

Precaution: Care must be taken to avoid prolonged traction of the flap, especially if K-wires are used.



Reduce Fracture and Shape Template

1

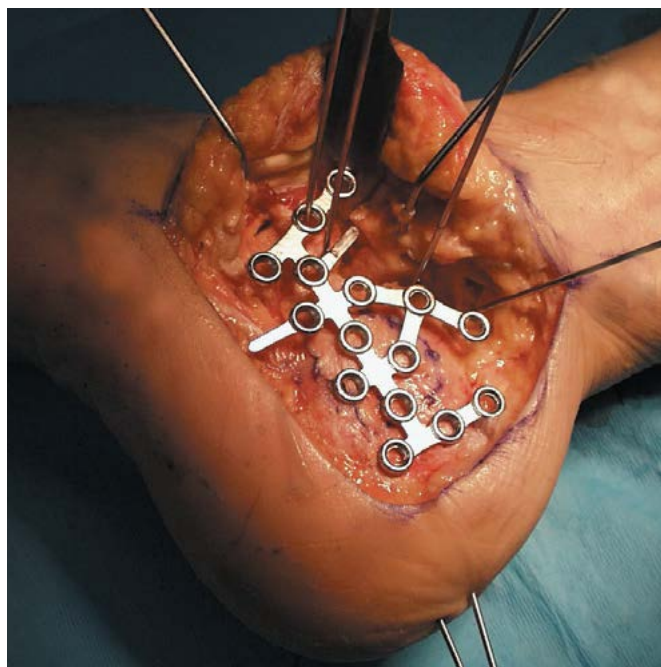
Reduce fracture

Reduce fracture fragments. If K-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 template

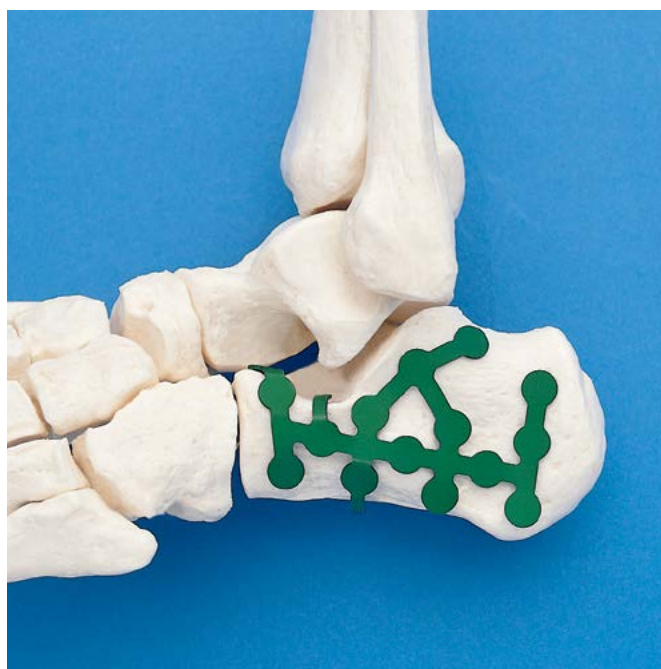
Bending Templates, for Locking Calcaneal Plates

329.606	mini
329.607	short
329.608	long
329.609	extra long

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 (mini, short, long or extra long).

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



Cut/Contour Plate

3

Cut/contour plate

Instruments

324.023	Threaded Plate Holder
329.142	Combination Bending Pliers
329.151	Locking Calcaneal Plate Cutter
329.155	Locking Calcaneal Plate Tab Bending Pliers
391.962	Bending/Cutting Pliers
391.963	Universal Bending Pliers

If necessary, remove a hole or tab of the plate using the locking calcaneal plate cutter (if not available, use the bending/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.

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



3

Cut/contour plate continued

Note: The locking calcaneal plate tab bending pliers may be used to bend the tabs after the plate is on the calcaneus.

Using the appropriate bending template as a guide, contour the plate using the combination 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 threaded plate holders. 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

310.21	2.0 mm Drill Bit, quick coupling, 125 mm
310.23	2.5 mm Drill Bit, quick coupling, 180 mm
310.28	2.7 mm Drill Bit, quick coupling, 125 mm
310.288	2.8 mm Drill Bit, quick coupling, 165 mm
310.35	3.5 mm Drill Bit, quick coupling, 110 mm
312.648	2.8 mm Threaded Drill Guide
314.02	Small Hexagonal Screwdriver with Holding Sleeve
314.115	StarDrive Screwdriver, T15, self-retaining
314.116	StarDrive Screwdriver Shaft, T15, self-retaining, quick coupling
319.01	Depth Gauge
323.26	2.7 mm Universal Drill Guide
323.36	3.5 mm Universal Drill Guide
511.773	Torque Limiting Attachment, 1.5 Nm, quick coupling

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.

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.

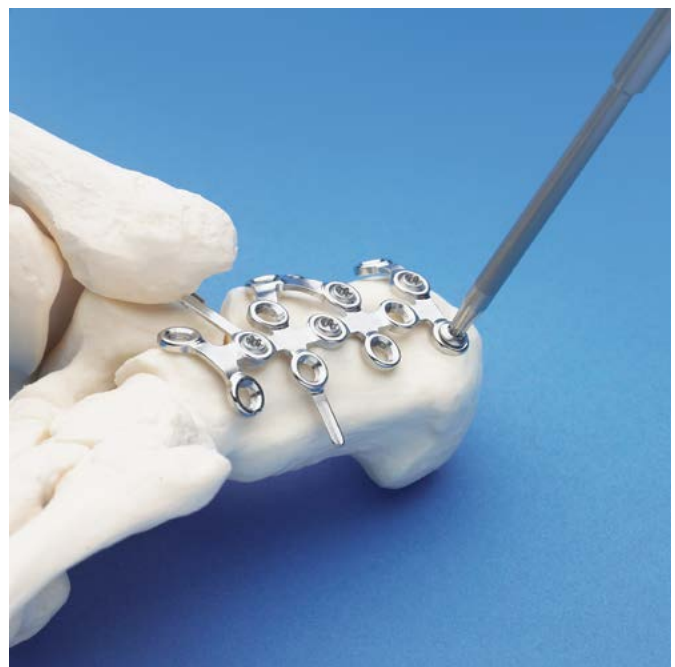
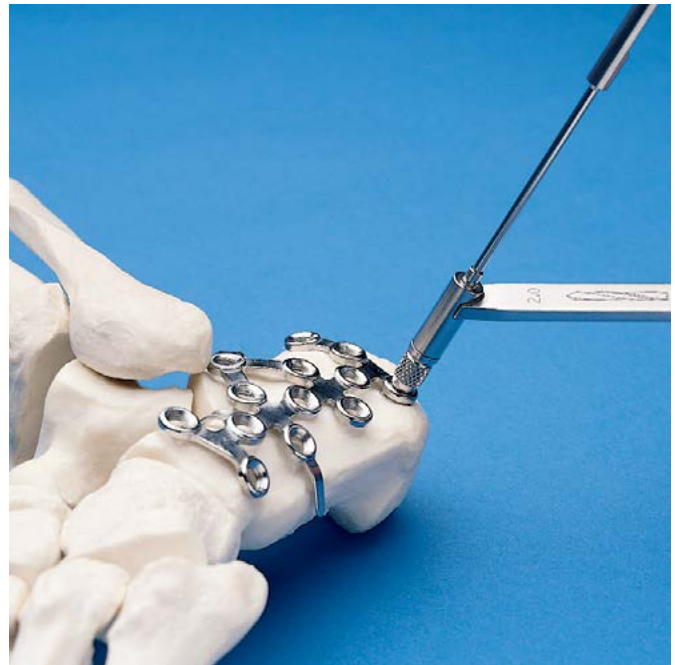
Note: To lag a 2.7 mm screw through a plate hole, use a 2.7 mm drill bit to overdrill the near cortex. Insert the 2.7 mm end of the 2.7 mm universal drill guide into the plate hole and drill through the near cortex with a 2.7 mm drill bit.

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 StarDrive 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.



4

Secure plate to bone continued

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 (01.106.012); 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. Whenever possible, locking screws should be inserted under power using the torque limiting attachment. The audible 'click' will notify the surgeon that the maximum torque value has been reached and that power insertion is completed.

After screw insertion using the torque limiting attachment, always check that the screws are fully inserted by hand tightening them.

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

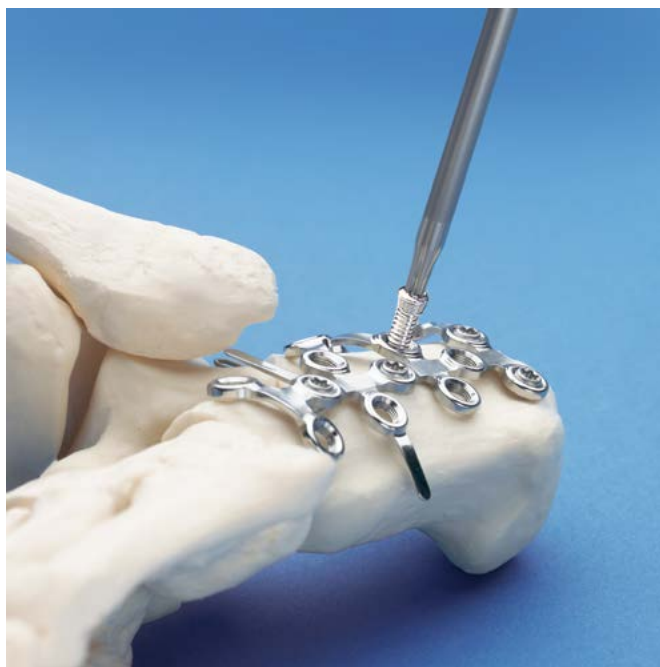


Incorrect

Wound Closure

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.

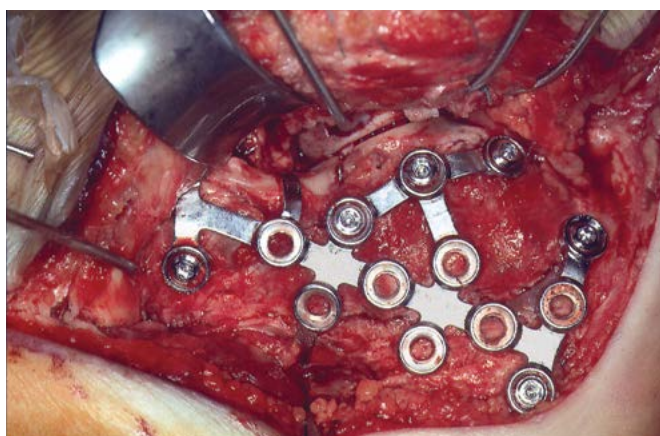


5

Wound 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

Implant removal

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.

Featured Instruments

312.648 2.8 mm Threaded Drill Guide



314.115 StarDrive Screwdriver, T15, self-retaining



314.116 StarDrive Screwdriver Shaft, T15, self-retaining, quick coupling



324.023 Threaded Plate Holder



329.142 Combination Bending Pliers, for 2.0 mm–2.4 mm plates



329.151 Locking Calcaneal Plate Cutter



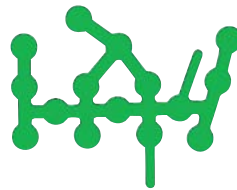
329.155 Locking Calcaneal Plate Tab Bending Pliers



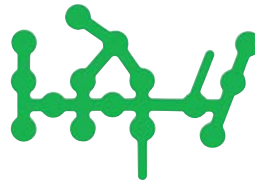
329.606 Bending Template, for Locking Calcaneal Plate, mini



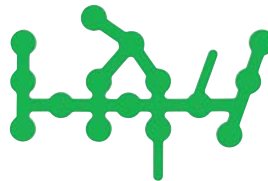
329.607 Bending Template, for Locking Calcaneal Plate, short



329.608 Bending Template, for Locking Calcaneal Plate, long



329.609 Bending Template, for Locking Calcaneal Plate, extra long



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



Locking Calcaneal Plate and Screw Instrument and Implant Set (01.106.012)

Graphic Case

690.550 Graphic Case with Screw Rack for Locking Calcaneal Plate Set

Implants

Locking Calcaneal Plates

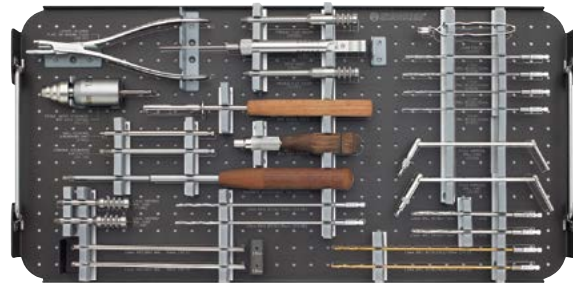
241.618 Mini, right
 241.619 Mini, left
 241.622 Short, right
 241.623 Short, left
 241.624 Long, right
 241.625 Long, left
 241.626 Extra long, right
 241.627 Extra long, left

2.7 mm Cortex Screws, self-tapping, 4 ea.

	Length (mm)		Length (mm)
202.816	16	202.836	36
202.818	18	202.838	38
202.820	20	202.840	40
202.822	22	202.842	42
202.824	24	202.844	44
202.826	26	202.846	46
202.828	28	202.848	48
202.830	30	202.850	50
202.832	32	202.855	55
202.834	34		

3.5 mm Locking Screws, self-tapping, with StarDrive Recess, 4 ea.

	Length (mm)		Length (mm)
212.105	18	212.113	34
212.106	20	212.115	36
212.107	22	212.116	38
212.108	24	212.117	40
212.109	26	212.118	42
212.110	28	212.119	45
212.111	30	212.120	48
212.112	32	212.121	50



Note: For additional information, please refer to package insert.

For detailed cleaning and sterilization instructions, please refer to www.synthes.com/cleaning-sterilization or sterilization instructions, if provided.

Implants continued

3.5 mm Cortex Screws, self-tapping, with StarDrive Recess, 4 ea.

	Length (mm)		Length (mm)
02.200.018	18	02.200.036	36
02.200.020	20	02.200.038	38
02.200.022	22	02.200.040	40
02.200.024	24	02.200.042	42
02.200.026	26	02.200.044	44
02.200.028	28	02.200.046	46
02.200.030	30	02.200.048	48
02.200.032	32	02.200.050	50
02.200.034	34	02.200.055	55

Instruments

292.16	1.6 mm Kirschner Wire, trocar point, 150 mm, 1 pkg. of 10
292.20	2.0 mm Kirschner Wire, trocar point, 150 mm, 1 pkg. of 10
	Drill Bits, quick coupling, 2 ea.
310.21	2.0 mm, 125 mm
310.23	2.5 mm, gold, 180 mm
310.28	2.7 mm, 125 mm
310.288	2.8 mm, 165 mm
310.35	3.5 mm, 110 mm
311.43	Handle, with quick coupling
312.648	2.8 mm Threaded Drill Guide, 2 ea.
314.02	Small Hexagonal Screwdriver with Holding Sleeve
314.03	Small Hexagonal Screwdriver Shaft, quick coupling
314.115	StarDrive Screwdriver, T15, self-retaining
314.116	StarDrive Screwdriver Shaft, T15, self- retaining, quick coupling
319.01	Depth Gauge, for 2.7 mm and small screws
319.97	Screw Forceps
323.26	2.7 mm Universal Drill Guide
323.36	3.5 mm Universal Drill Guide
324.023	Threaded Plate Holder, 2 ea.
329.142	Combination Bending Pliers, for 2.0 mm– 2.4 mm plates
329.151	Locking Calcaneal Plate Cutter
329.155	Locking Calcaneal Plate Tab Bending Pliers

	Bending Templates, for Locking Calcaneal Plates
329.606	Mini
329.607	Short
329.608	Long
329.609	Extra long
391.962	Bending/Cutting Pliers
391.963	Universal Bending Pliers
511.773	Torque Limiting Attachment, 1.5 Nm, quick coupling

Locking Calcaneal Plate and Implant Set (01.106.002)

Graphic Case

690.552 Graphic Case for Locking Calcaneal Plate Set

Implants

Locking Calcaneal Plates

- 241.618 Mini, right
- 241.619 Mini, left
- 241.622 Short, right
- 241.623 Short, left
- 241.624 Long, right
- 241.625 Long, left
- 241.626 Extra long, right
- 241.627 Extra long, left

Instruments

- 329.142 Combination Bending Pliers
- 329.151 Locking Calcaneal Plate Cutter
- 329.155 Locking Calcaneal Plate Tab Bending Pliers

- Bending Templates for Locking Calcaneal Plates
- 329.606 Mini
- 329.607 Short
- 329.608 Long
- 329.609 Extra long

- 391.962 Bending/Cutting Pliers
- 391.963 Universal Bending Pliers

Also Available

- 204.818– 3.5 mm Cortex Screws, self-tapping,
- 204.855 (with 2.5 mm hexagonal recess) 18 mm – 55 mm
- 213.018– 3.5 mm Locking Screws, self-tapping,
- 213.055 (with 2.5 mm hexagonal recess) 18 mm – 55 mm
- 241.61 Calcaneal Plate, 60 mm
- 241.62 Calcaneal Plate, 70 mm
- 241.65 Calcaneal Y-Plate, 87 mm
- 690.554 Implant Tray for Locking Calcaneal Plate Set
- 690.555 Screw Rack for Locking Calcaneal Plate Set
- 690.558 Lid for Locking Calcaneal Plate Set Implant Tray
- 690.559 Lid for Locking Calcaneal Plate Set Screw Rack



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