Part of the 2.7 mm and 3.5 mm VA LCP® Midfoot/Hindfoot System

2.7 mm Variable Angle Locking Calcaneal Plating System

Surgical Technique

DePuy Synthes

PART OF THE Johnson&Johnson FAMILY OF COMPANIES

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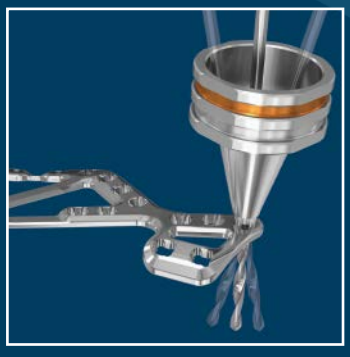
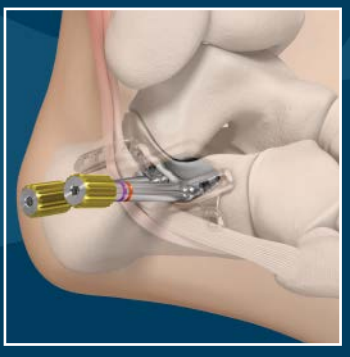
MR Information
The 2.7 mm Variable Angle Locking Calcaneal Plating System has not been evaluated for safety and compatibility in the MR environment. It has not been tested for heating, migration or image artifact in the MR environment. The safety of the 2.7 mm Variable Angle Locking Calcaneal Plating System in the MR environment is unknown. Scanning a patient who has this device may result in patient injury.

Image intensifier control

INTRODUCTION



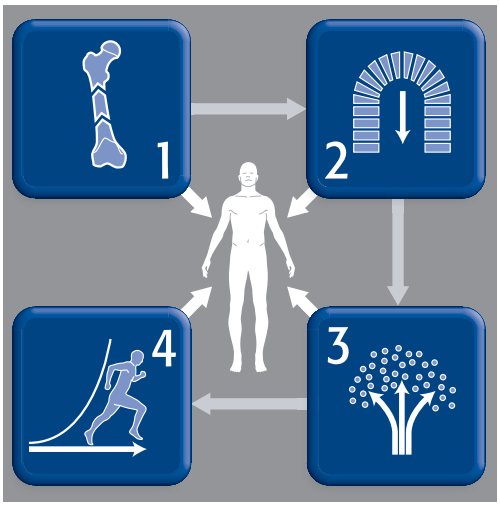


AO PRINCIPLES AND INDICATIONS

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.

INDICATIONS

The DePuy Synthes 2.7 mm and 3.5 mm Variable Angle LCP® Midfoot/Hindfoot System is indicated for fixation of osteotomies, fusions, fractures, nonunions, malunions, and replantations of small bones and small bone fragments in adult and adolescent (aged 12-21 years) patients, including the foot and ankle, and particularly in osteopenic bone.

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.

2.7 MM VARIABLE ANGLE LOCKING CALCANEAL PLATES

2.7 mm Variable Angle Locking Calcaneal Plates are designed to treat complex fractures with multiple fixation points targeting key areas of hard cortical bone in the calcaneus.

The pre-contoured, low profile plates are designed to reduce the likelihood of soft tissue irritation along the lateral calcaneal wall, with VA Locking screws seated flush in the plate.*

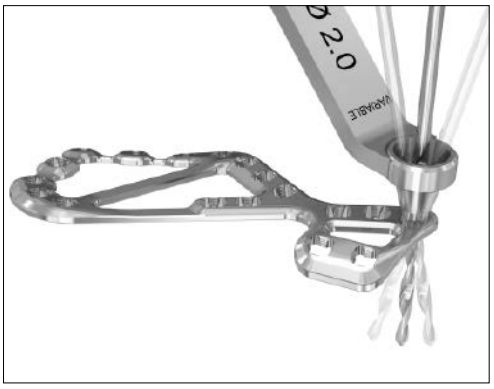
2.7 mm Variable Angle (VA) Locking screws target dense cortical bone around the perimeter of the calcaneus when inserted at nominal (fixed) angle.

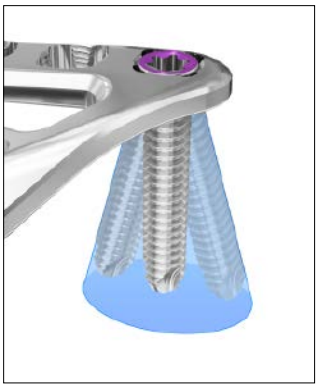
- Screws are targeted to buttress the posterior and middle facet and converge in the sustentaculum
- Anterior process screws are designed to buttress the anterior facet and are angled in line with the calcaneal-cuboid joint
- Tuberosity screws are angled inferior and posterior

*Variable Angle Locking screws sit flush within the plate when inserted at nominal angle.

Variable Angle Locking Technology offers a variety of options for fixation of calcaneal fractures including:

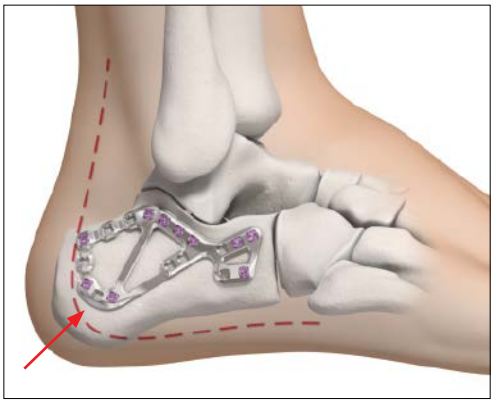
- Ability to adapt screw trajectory to match calcaneal anatomy and fracture pattern
- Ability to angulate screws towards specific fragments or areas of cortical bone
- 2.7 mm Variable Angle Locking screw holes accept 2.7 mm VA Locking, Metaphyseal, Locking,* and Cortex screws





The plate profile is located superior to the incision line to reduce the likelihood of the implant causing stress on the incision area.

The screws in this area of the plate are targeting cortical bone in the inferior portion of the tuberosity.

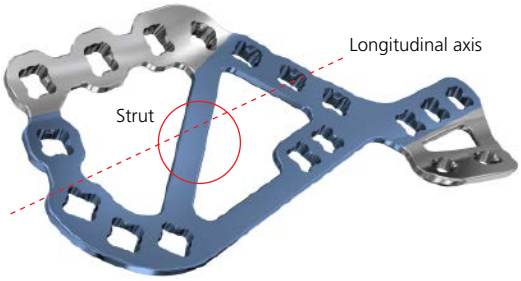


In order to increase plate strength, there are no screw holes in the neutral triangle area of the calcaneus where a fracture line typically lies.

*Locking screws inserted only at nominal angle.

A strut down the center of the plate is designed to provide additional construct strength and support for any lateral wall comminution.

The longitudinal axis of the plate is flat to help maintain reduction and pull the tuberosity out of varus.



Scalloped edge along the posterior facet portion of the plate provides clearance for independent screw fixation.

- Scallops accommodate screws size 2.7 mm, 3.5 mm, and 4.0 mm

2.7 mm Variable Angle Locking Calcaneal Plates, with tabs

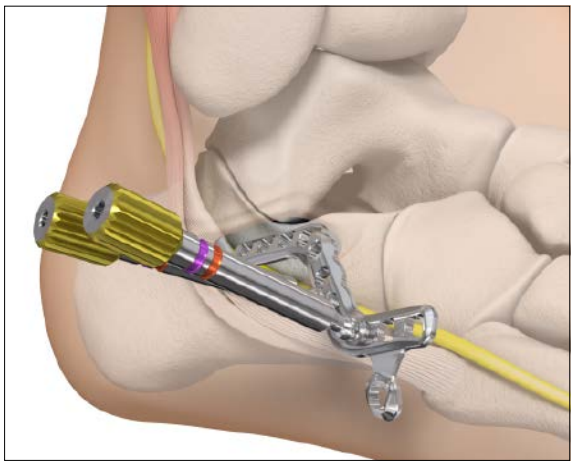
Plates with tabs are designed to provide additional support of fracture fragments, especially in the case of severely comminuted fractures where screw fixation alone is insufficient

- Tabs provide additional support of anterior process and plantar fracture fragments
- Additional superior screw hole is contourable and allows for supplemental fixation through calcaneal body

2.7 MM VARIABLE ANGLE LOCKING ANTEROLATERAL CALCANEAL PLATES

2.7 mm VA Locking Anterolateral Calcaneal plates are designed for a minimally invasive approach to calcaneal fractures to help preserve soft tissue on the lateral calcaneal wall.

The small lateral oblique incision provides direct visualization of the subtalar joint to aid in reduction of the articular surface. Insertion instruments and a tapered tip design on the plates facilitates plate placement.



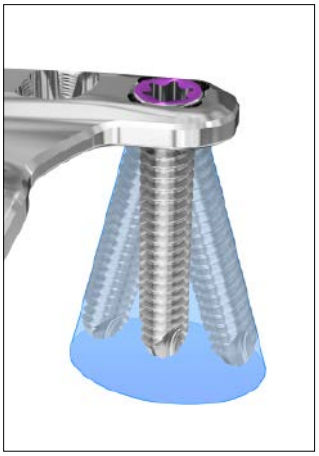
Multiple fixation points target key areas of the calcaneus.* 2.7 mm VA Locking screws are targeted to buttress the anterior and middle facet.

Short and long plates are available, providing options for fracture fixation.

*Independent lag screw fixation is recommended to connect articular surface to the anterior and posterior fracture fragments. Screw size and number of screws is fracture dependent, however it is recommended to insert a minimum of three 3.5 mm or 4.0 mm cortex screws.

Variable Angle Locking Technology offers a variety of options for fixation of calcaneal fractures including:

- Ability to adapt screw trajectory to match calcaneal anatomy and fracture pattern
- Ability to angulate screws towards specific fragments or areas of cortical bone
- 2.7 mm Variable Angle Locking screw holes accept 2.7 mm VA Locking, Metaphyseal, Locking,* and Cortex screws



Plates designed with no screw holes in the neutral triangle area of the calcaneus in order to increase plate strength where the fracture line typically lies.

Scalloped edge along the posterior facet portion of the plate provides clearance for independent screw fixation. Scallops accommodate screws size 2.7 mm, 3.5 mm, and 4.0 mm.

*Locking screws inserted only at nominal angle.

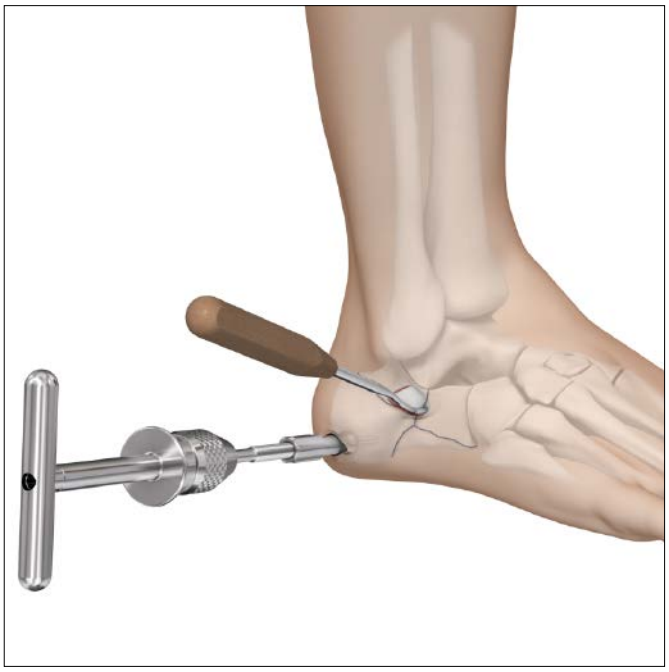
REDUCTION JOYSTICK

Reduction tool to aid in fracture manipulation.

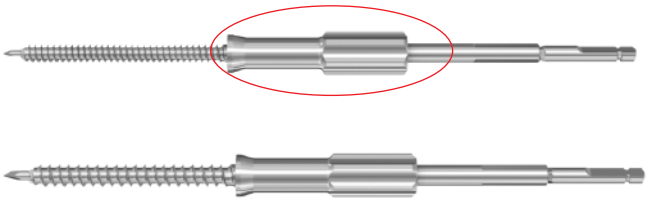
The threaded buttress sleeve provides a large surface area to reduce the likelihood of cut-out in cancellous bone.

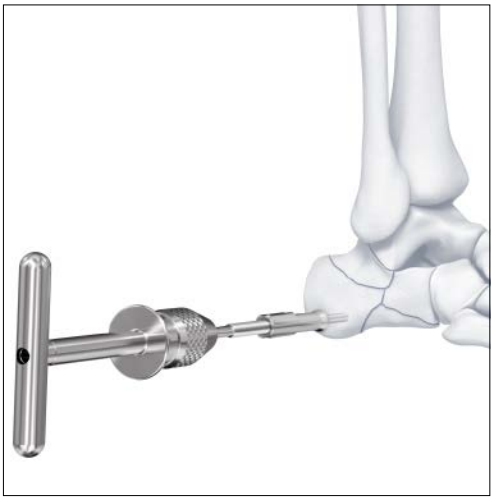
Available in sizes 5.0 mm and 6.5 mm.

Refer to pages 19 and 31 for specific technique information.

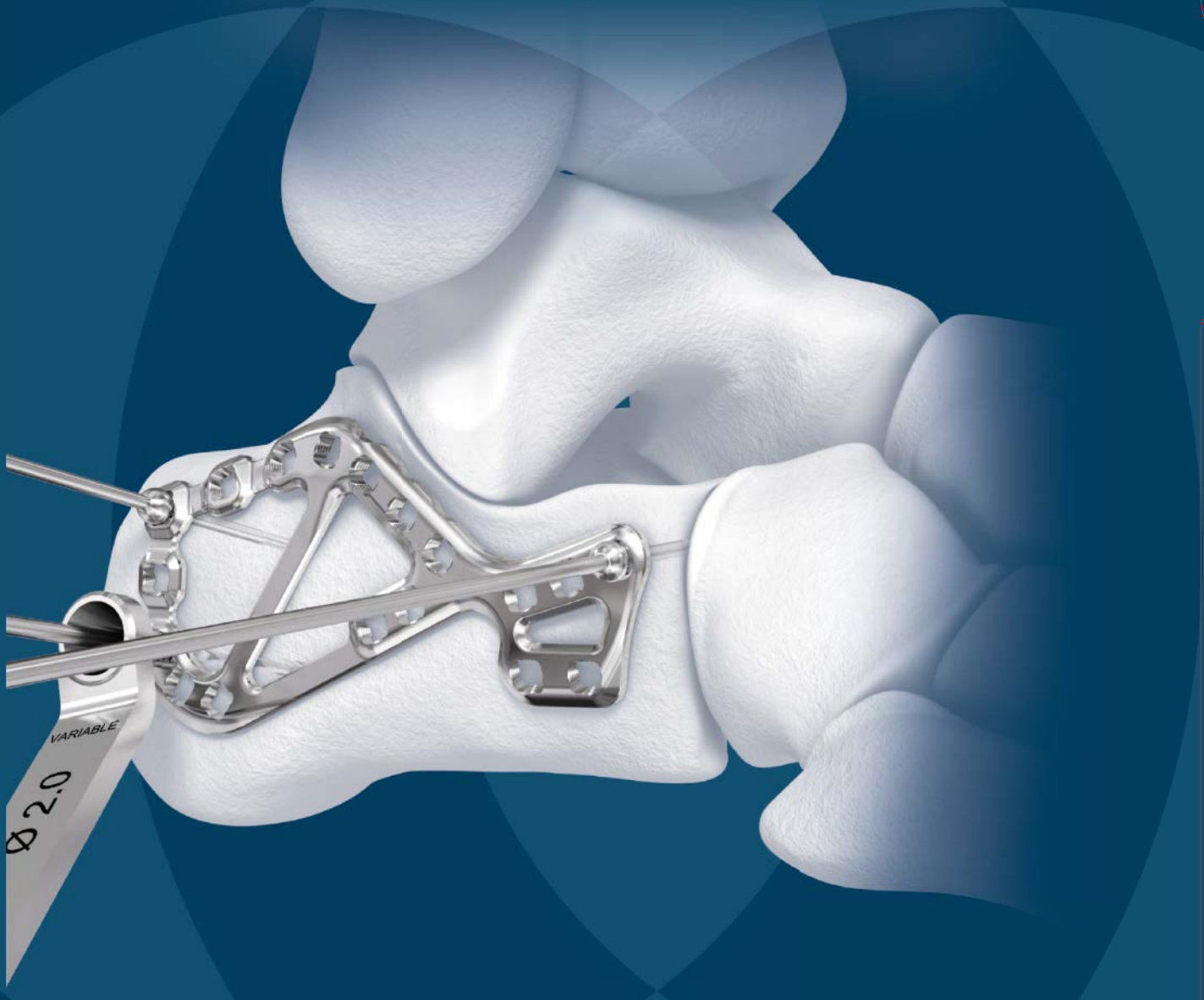


Threaded buttress sleeve





2.7 MM AND VARIABLE ANGLE LOCKING TECHNIQUE



2.7 MM VARIABLE ANGLE LOCKING TECHNIQUE

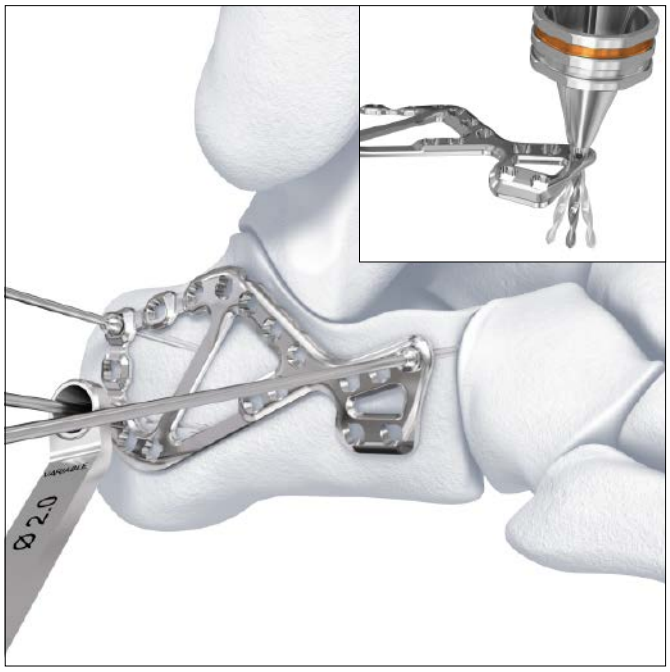
DRILL FOR VARIABLE ANGLE LOCKING SCREWS: CONICAL (VARIABLE ANGLE)

1

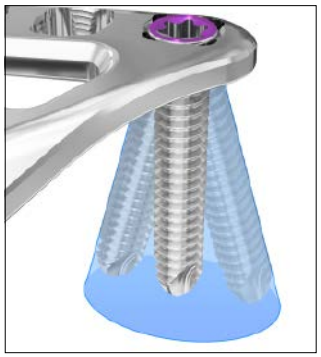
Drill for Variable Angle Locking Screws
A. Conical (off nominal-axis) insertion

Instruments	
03.211.002	2.0 mm Universal Variable Angle Locking Drill Guide
or	
03.211.200	2.0 mm Variable Angle Locking Cone Drill Guide
323.062	2.0 mm Drill Bit with depth mark, quick coupling, 140 mm

Additionally available	
03.211.003	2.0 mm Variable Angle Locking Drill Guide, variable



To insert the Variable Angle Locking screw off the nominal axis, insert the cone-shaped side of drill guide in the desired variable angle locking screw hole in the plate.



The funnel of the drill guide allows a drilling angle within a 30° cone.

When drilling off-axis, the drill guide should remain in place and the drill bit may be aimed in any direction within the cone.

- Verify the drill bit angle and depth under radiographic imaging to ensure the desired angle has been achieved.

- If necessary, drill at a different angle and verify again under imaging.

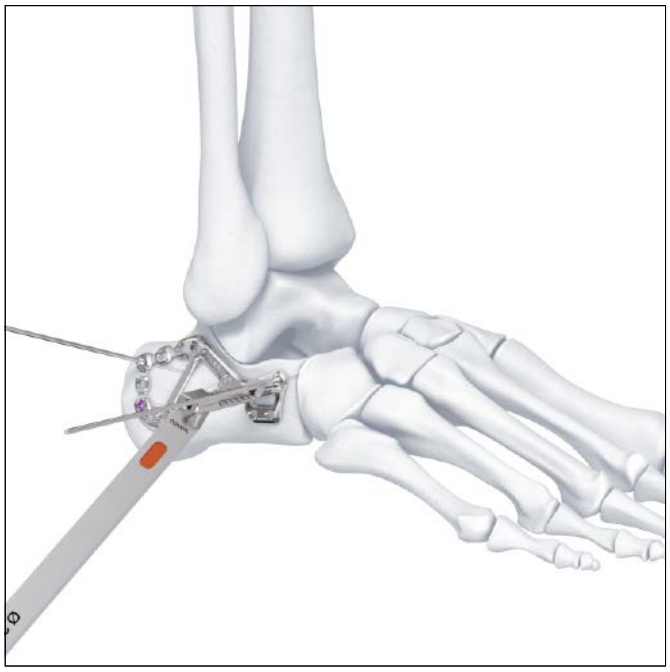
Precautions:

- **Avoid excessive re-drilling, especially in poor bone quality.**
- **Instrument and screws may have sharp edges or moving joints that may pinch or tear user's glove or skin.**
- **Handle device with care and dispose of worn bone cutting instruments in an approved sharps container.**

DRILL FOR VARIABLE ANGLE LOCKING SCREWS: COAXIAL (FIXED ANGLE)

B. Coaxial (fixed angle) insertion

Instruments	
03.211.002	2.0 mm Universal Variable Angle Locking Drill Guide
323.062	2.0 mm Drill Bit with depth mark, quick coupling, 140 mm
Additionally available	
03.211.004	2.0 mm Variable Angle Locking Drill Guide, coaxial



Variable angle locking screws can be inserted into the plate in line with the predefined screw trajectory.

Drill to the desired depth.

- Verify the drill bit depth under radiographic imaging.

USE THE DEPTH GAUGE TO MEASURE FOR THE CORRECT SCREW LENGTH

Instrument

319.09	Depth Gauge for Small Screws

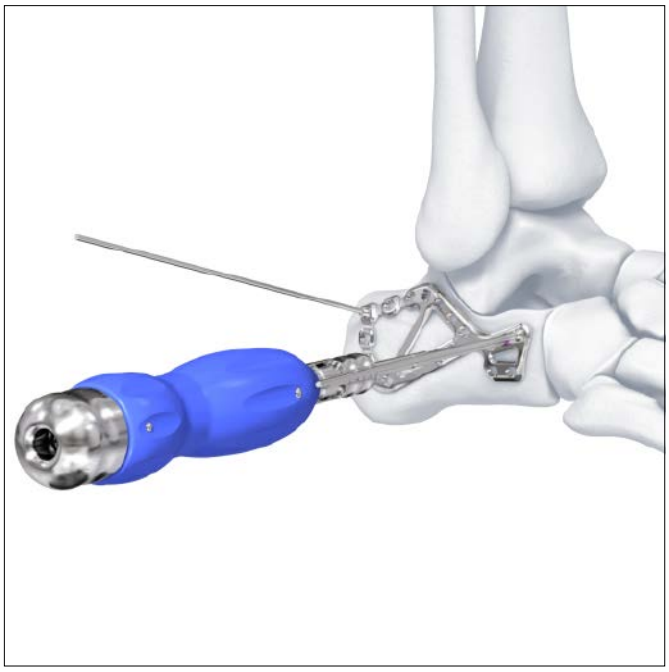
Use the depth gauge to measure for the correct screw length.

INSERT VARIABLE ANGLE LOCKING SCREWS

2

Insert Variable Angle Locking Screws

Instruments	
03.111.038	Handle with Quick Coupling
314.467	STARDRIVE™ Screwdriver Shaft T8, 105 mm



Insert the correct length variable angle locking screw.

The Variable Angle Locking screws can be inserted manually or with power. For manual insertion, use the STARDRIVE™ Screwdriver Shaft and handle with quick coupling. Initial insertion of Variable Angle Locking screws may be done using power equipment. Do not lock the screws with power tools.

Confirm screw position and length prior to final tightening. Final tightening must be done manually with the torque limiter.

Precautions:

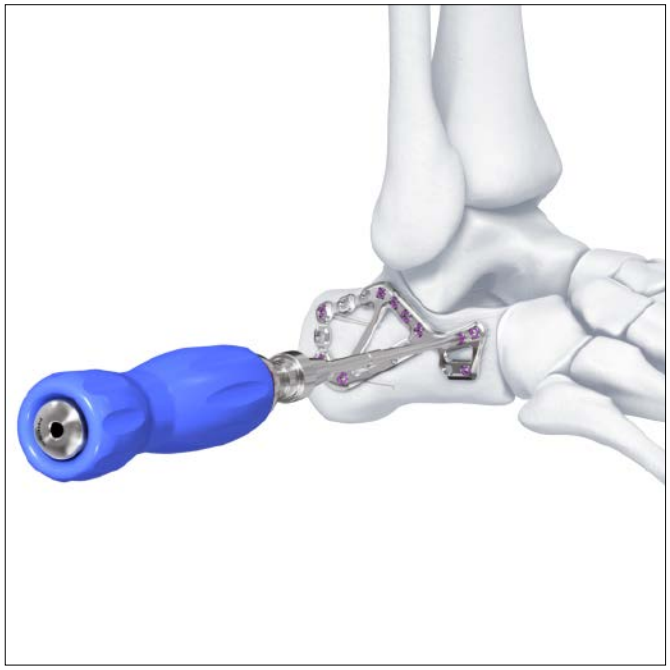
- **Do not engage the screw head with the plate hole while inserting under power. Screw engagement and final locking must be done manually with the torque limiter.**
- **Do not use the torque limiting handle for screw removal.**

LOCK VARIABLE ANGLE LOCKING SCREWS

3

Lock Variable Angle screws

Instruments	
03.110.002	Torque Limiting Attachment, 1.2 Nm
03.110.005	Handle for Torque Limiting Attachment
314.467	STARDRIVE Screwdriver Shaft, T8, 105 mm



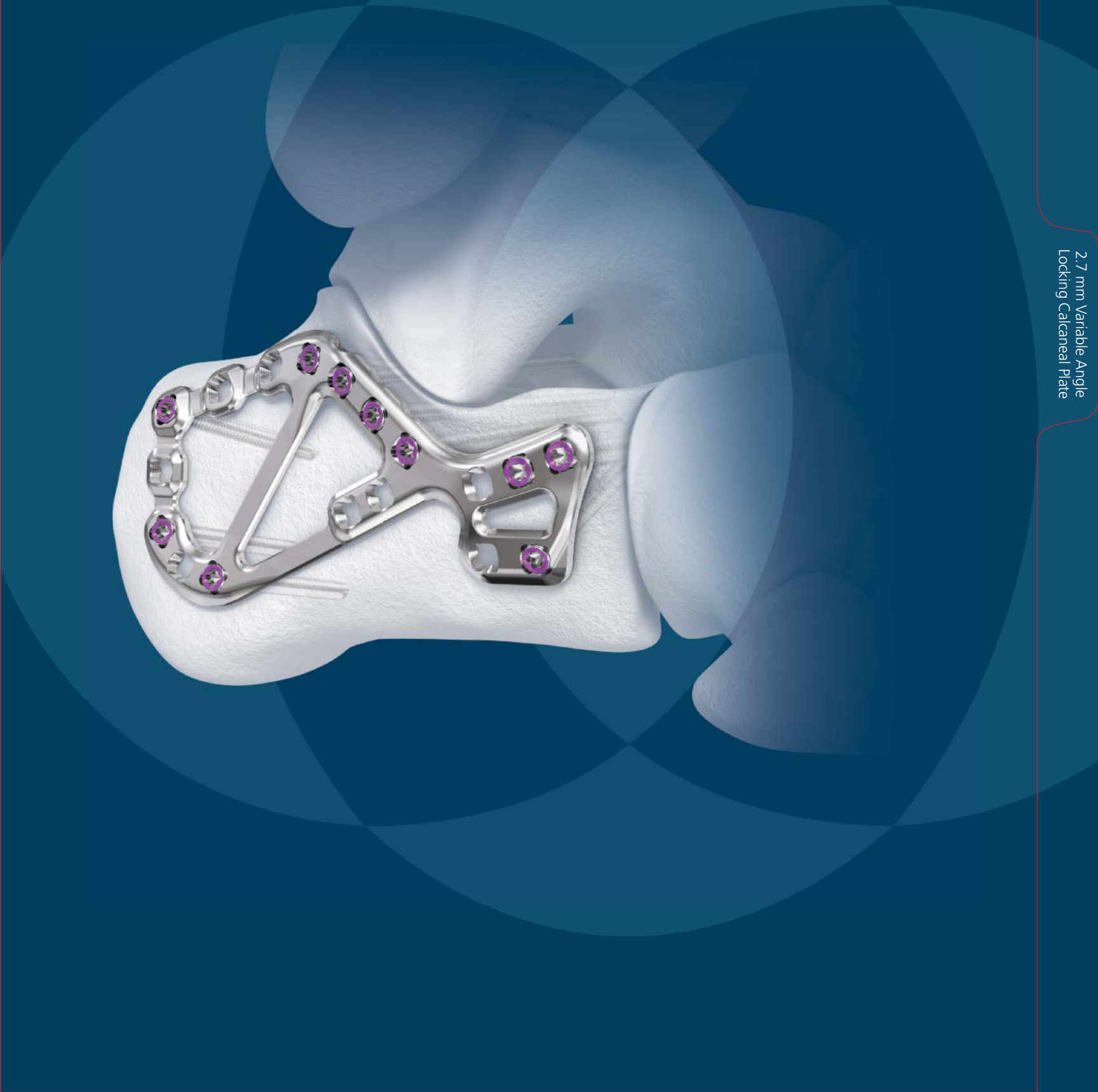
Use the torque limiter for final tightening of Variable Angle Locking screws.

The use of the torque limiter is mandatory when engaging the screws into variable angle locking holes to ensure the appropriate amount of torque is applied. Confirm screw position and length prior to final tightening.

Precaution: **Do not lock the screws to the plate under power. Screw engagement and final tightening must be done manually with the torque limiting attachment or handle:**

- **1.2 Nm torque limiting attachment for 2.7 mm**
- **Do not use the torque limiters for screw removal**

2.7 MM VARIABLE ANGLE LOCKING CALCANEAL PLATE



PREPARATION

Required set(s)	
01.211.041	Variable Angle Locking Calcaneal Instrument and Implant Set (Stainless Steel)
or	
01.211.042/ 01.411.042	Variable Angle Locking Calcaneal Plate Module Set (Stainless Steel or Titanium)
and	
01.211.220/ 01.411.220	2.7 mm Variable Angle LCP Forefoot/ Midfoot Instrument and Implant Set (Stainless Steel or Titanium)

Optional set(s)	
01.211.045	General Instrument Set
01.211.002	Compression Distraction Instrument Set

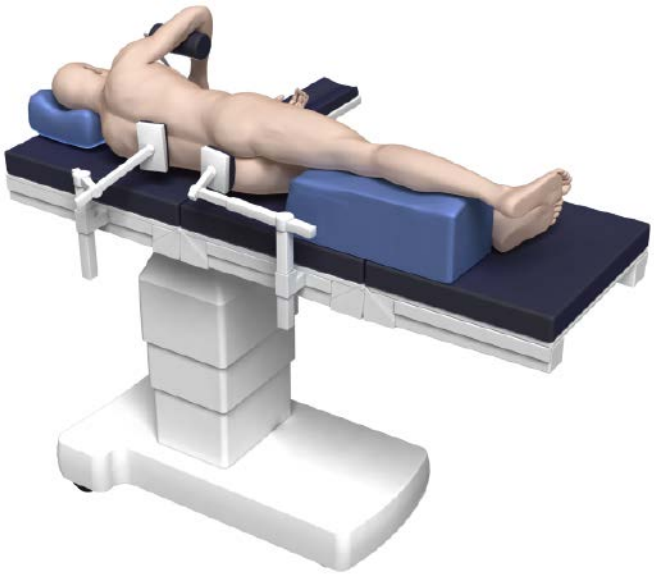
1

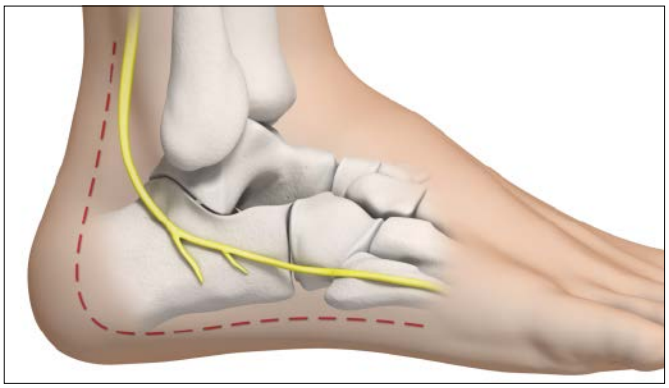
Approach

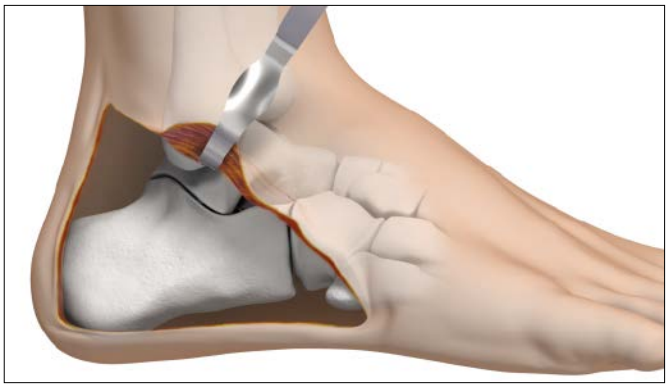
Place the patient in lateral decubitus position. Make an extensile, L-shaped, right-angled lateral incision. The vertical portion of the incision should be just anterior to the heel cord and extend down to the plantar and lateral skin junction. Continue the incision forward, horizontally, exposing the 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.

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







2

Reduce fracture

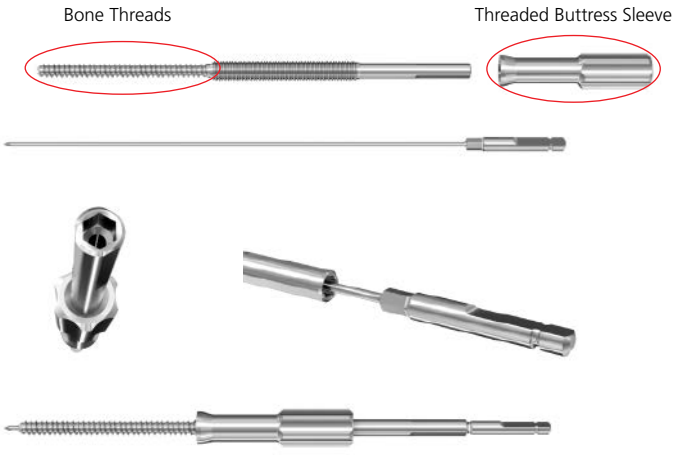
Instrument	
	1.6 mm Kirschner Wire with trocar point 150 mm
292.16	Stainless Steel
492.16	Titanium

Reduce the fracture fragments and hold fragments in place with K-wires. The K-wires should be placed to avoid interference with final plate placement.

Optional Technique: Reduction Joystick
The Reduction Joystick and Small Universal Chuck with T-handle can be used to aid in the reduction of the tuberosity as required.

Instruments	
03.211.454 or 03.211.455	Reduction Joystick, 5.0 mm Reduction Joystick, 6.5 mm
393.105	Small Universal Chuck with T-Handle

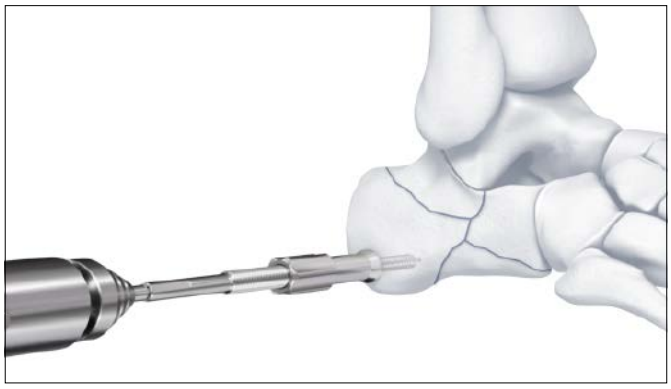
Assemble the Threaded Buttress Sleeve onto the Reduction Joystick. Thread the Buttress sleeve onto the shaft of the Reduction Joystick to expose all of the bone threads.



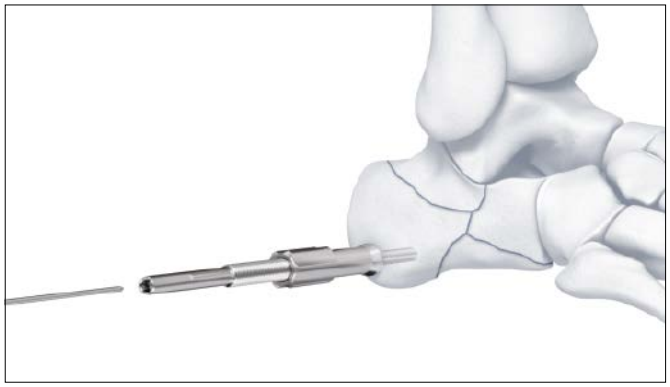
Insert the proper size centering pin into the cannulation of the Reduction Joystick. Fully seat the hexagonal head of the Centering Pin into the recess of the Reduction Joystick.

Precaution: **The proper size centering pin must be inserted through the cannulation of the Reduction Joystick prior to insertion (Reduction Joystick, 5.0 mm takes 1.6 mm Centering Pin; Reduction Joystick, 6.5 mm takes 2.8 mm Centering Pin).**

Insert the Reduction Joystick under power by connecting to the quick coupling on the centering pin, or manually with the Small Universal Chuck with T-handle.

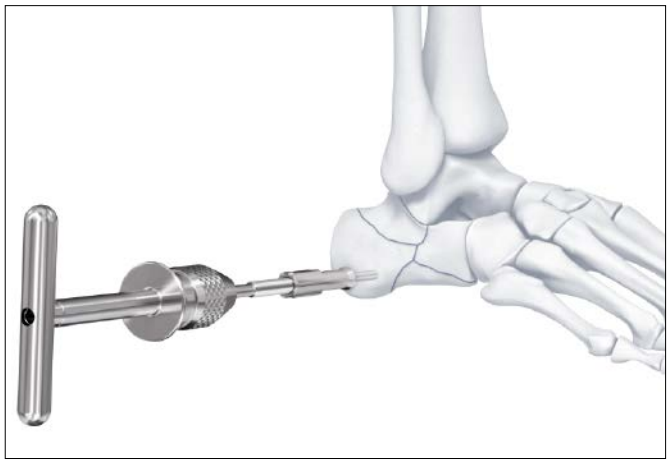


Remove the centering pin and attach the Small Universal Chuck with T-handle to the Reduction Joystick.



Turn the Threaded buttress sleeve down to the bone so that the surface of the device contacts the bone for added stability.

Pull the tuberosity posterior, inferior, and out of varus.



Additionally available set

01.211.002	Compression Distraction Instrument Set

Use the compression/distraction device to distract the calcaneus and restore length. Place one pin in the cuboid or anterior process and one pin in the tuberosity and distract.

Note: **Reference the Orthopaedic Foot Instrument Technique Guide for the Compression Distraction technique steps and product assembly.**

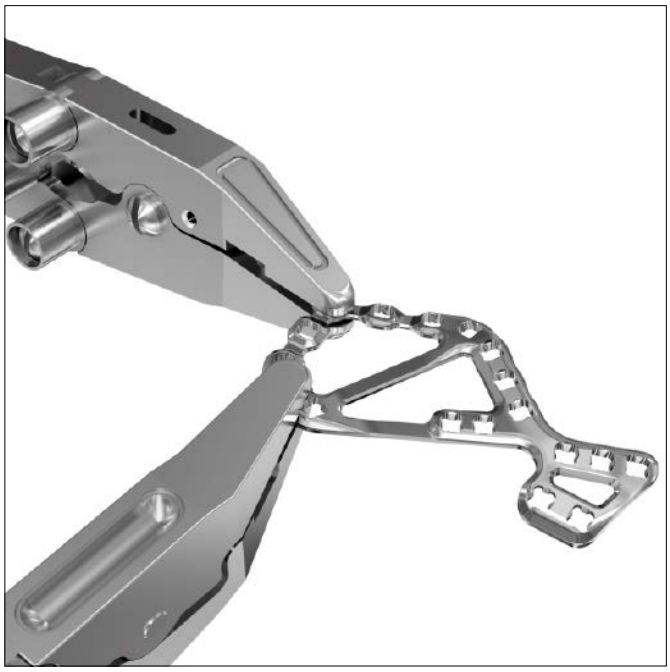
3
Contour plate (optional)

Instrument	
03.211.005	2.4 mm/2.7 mm VA LCP® Bending Pliers

Plates may require additional contouring depending on patient anatomy. Assess the plate fit and contour further if needed after fracture reduction.

The 2.4 mm/2.7 mm VA LCP Plate Bending Pliers can be used to contour the plate further. The 2.4 mm/2.7 mm VA LCP Bending Pliers should be used to protect the variable angle locking screw holes.

Warning: **Extensive contouring may weaken the plate.**



4

Position plate

Instrument(s)	
	1.6 mm Kirschner Wire with trocar point 150 mm
292.16	Stainless Steel
492.16	Titanium
or	
03.211.420–03.211.440	1.6 mm Compression Wires 150 mm length, 20 mm–40 mm thread

Position plate and provisionally fix the plate to bone with K-wires or 1.6 mm Compression Wires. The plate should sit just under the ridge of the subchondral bone located below the subtalar joint.

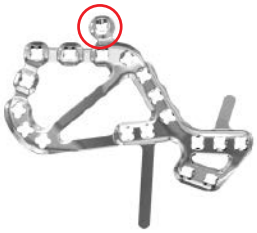
Note: **If enlarged peroneal tubercle prevents ideal plate placement, the tubercle may need to be removed.**

Optional Technique: 2.7 mm Variable Angle Locking Calcaneal Plate with tabs

Instruments	
03.211.005	2.4 mm/2.7 mm VA LCP Bending Pliers
329.155	Locking Calcaneal Plate Tab Bending Pliers
391.963	Universal Bending Pliers

If using the VA Locking Calcaneal Plate with tab, use the 2.4/2.7 mm VA LCP Plate Bending Pliers to contour the superior screw hole.

2.4 mm/2.7 mm VA LCP Bending Pliers

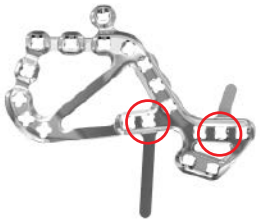


Use the Universal Bending Pliers to pre-bend the tabs, while simultaneously protecting the Variable Angle Locking Screw hole using the 2.4/2.7 mm VA LCP Plate Bending Pliers.

Universal Bending Pliers

Once the plate is positioned on the calcaneus, the Locking Calcaneal Plate Tab Bending Pliers may be used to bend the tabs further if needed.

Locking Calcaneal Plate Tab Bending Pliers



Insert the square portion of the Tab Bending Pliers into the hole adjacent to the tab, and bend the tab.

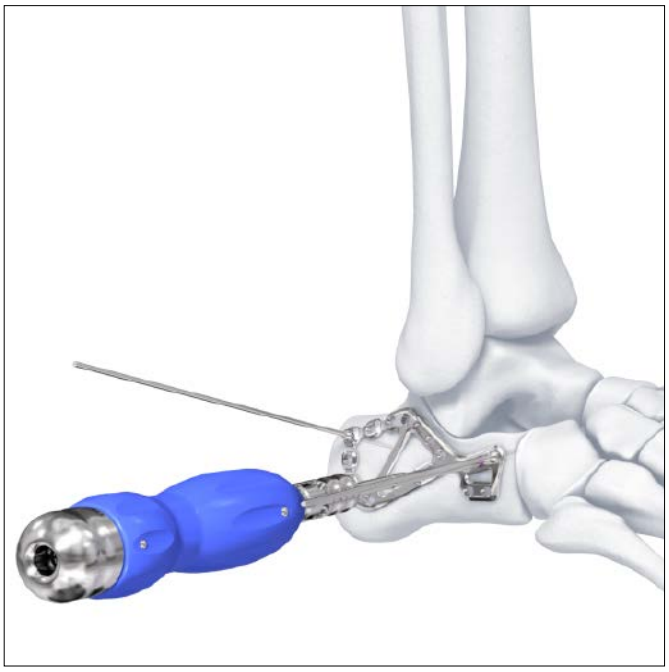
5

Insert screws

For final fixation, insert the 2.7 mm Variable Angle Locking screws as described in the Variable Angle Locking Technique on page 11.

Precaution:

- **A minimum of four Variable Angle Locking or Locking screws should be inserted in the posterior facet portion of the plate to provide adequate fixation.***
- **Only 2.7 mm screws should be inserted in the calcaneal plates.**
- **Use caution when inserting screws targeting the sustentaculum.**



Confirm screw positioning under fluoroscopic imaging.

Optional Technique

2.7 mm Metaphyseal screws can also be inserted prior to Variable Angle locking screws to ensure appropriate bone contact with the plate.

The 2.7 mm Metaphyseal screws can be inserted under power or manually following the 2.7 mm Variable Angle Locking Technique on page 11.

Precaution: Final metaphyseal screw insertion, similar to a cortex screw, should be completed manually using the T8 STARDRIVE Screwdriver shaft and handle with quick coupling.

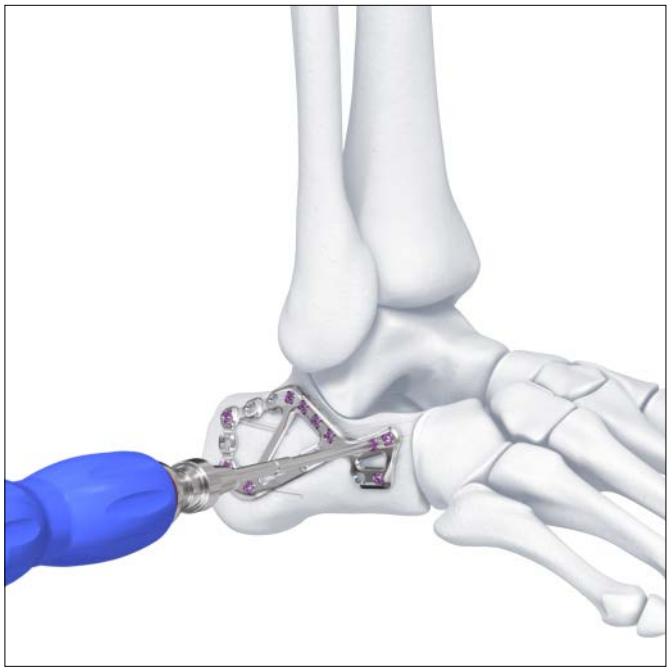
*Testing on file at DePuy Synthes Companies.

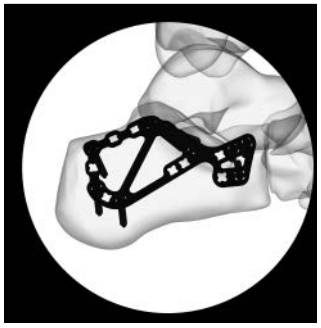
6

Lock Variable Angle Locking Screws

Lock the 2.7 mm Variable Angle Locking screws manually with the 1.2 Nm Torque Limiting Attachment and handle, as described in the Variable Angle Locking Technique on page 16.

- Confirm reduction and fixation under fluoroscopic imaging. Take lateral, axial heel, and Broden's view images.





Implant removal

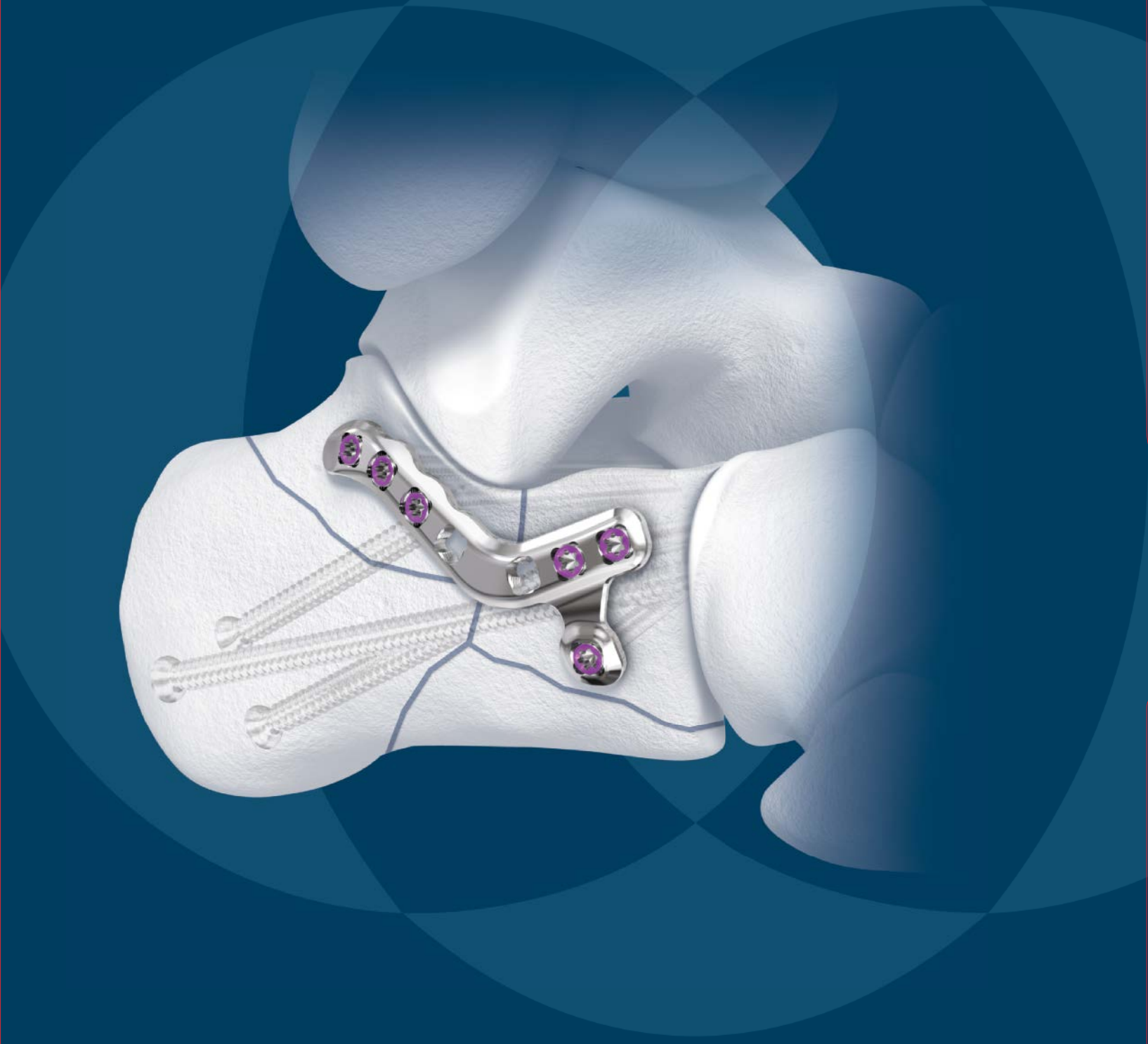
Instruments	
314.467	STARDRIVE Screwdriver Shaft, T8, 105 mm
03.111.038	Handle with Quick Coupling
Optional set	
01.240.001	Screw Removal Set
Optional instrument	
309.520	Conical Extraction Screw, for 2.7 mm and 3.5 mm Cortex screws

If implant removal is desired, unlock all screws manually from the plate using the proper screwdriver shaft and handle. Then remove the screws completely from the bone.

Precaution: **Do not use the torque limiters for screw removal.**

If the screws cannot be removed with the screwdriver, insert the conical extraction screw with the left-handed thread into the screwhead using the handle with quick coupling, and loosen the screw by turning counterclockwise.

2.7 MM VARIABLE ANGLE LOCKING ANTEROLATERAL CALCANEAL PLATE



PREPARATION

Required set(s)	
01.211.041/	Variable Angle Locking Calcaneal Instrument and Implant Set (Stainless Steel)
or	
01.211.042/ 01.411.042	Variable Angle Locking Calcaneal Plate Module Set
01.211.220/ 01.211.420	2.7 mm Variable Angle LCP Forefoot/ Midfoot Instrument and Implant Set (Stainless Steel or Titanium)
For Independent Screw Fixation for use with Calcaneal Plate Module Set:	
105.100	Modular Foot System for 4.0 mm Cortex Screws
or	
01.212.005, 01.212.006/ 01.212.008, 01.212.009	Small Fragment LCP Instrument and Implant Set for 3.5 mm Cortex screws (Stainless Steel or Titanium)

Optional sets	
01.211.045	General Instrument Set
01.211.002	Compression/Distraction Instrument Set

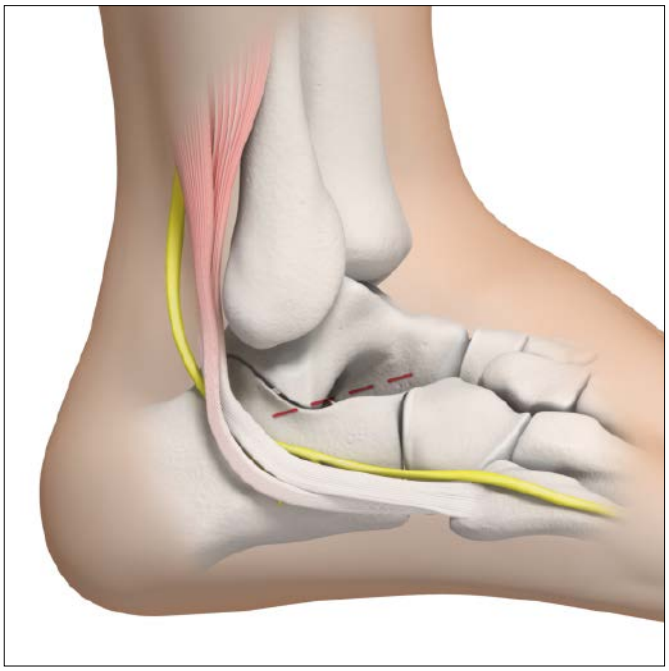
2.7 MM VARIABLE ANGLE LOCKING ANTEROLATERAL CALCANEAL PLATE

1
Approach

Place the patient in the lateral decubitus position. Make a lateral oblique incision about 1 cm distal from the tip of the fibula, along the subtalar joint. The incision should be approximately 3 cm long and can be extended if needed during plate insertion.

Exposure and mobilization of the peroneal tendons is necessary for fracture reduction and plate insertion. The inferior peroneal retinaculum may need to be released to allow for more mobility. Additionally, the calcaneofibular ligament may need to be released for plate insertion.

Warning: **Care should be taken to protect the sural nerve if it crosses the incision.**



2

Reduce fracture

Instrument	
	1.6 mm Kirschner Wire with trocar point 150 mm
292.16	Stainless Steel
492.16	Titanium

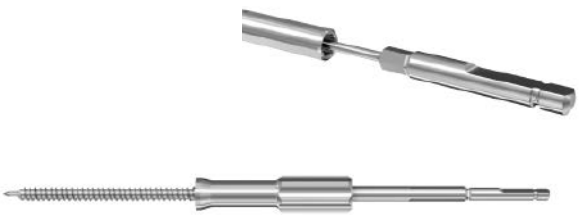
Reduce the fracture fragments and hold fragments in place with K-wires. The K-wires should be placed to avoid interference with final plate placement.

Optional Technique: Reduction Joystick
The Reduction Joystick and Small Universal Chuck with T-handle can be used to aid in the reduction of the tuberosity as required.

Instruments	
03.211.454 or 03.211.455	Reduction Joystick, 5.0 mm Reduction Joystick, 6.5 mm
393.105	Small Universal Chuck with T-Handle

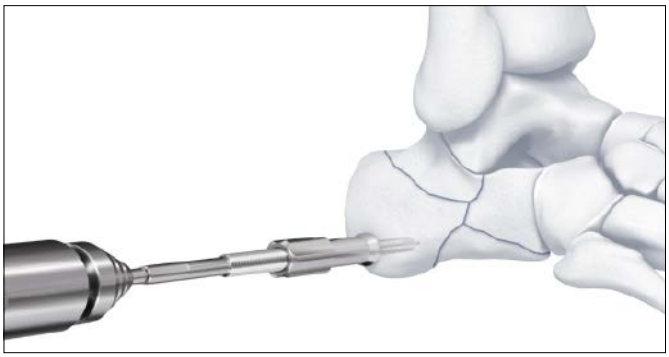
Assemble the Threaded Buttress Sleeve onto the Reduction Joystick. Thread the Buttress sleeve onto the shaft of the Reduction Joystick to expose all of the bone threads.

Insert the proper size centering pin into the cannulation of the Reduction Joystick. Fully seat the hexagonal head of the Centering Pin into the recess of the Reduction Joystick.



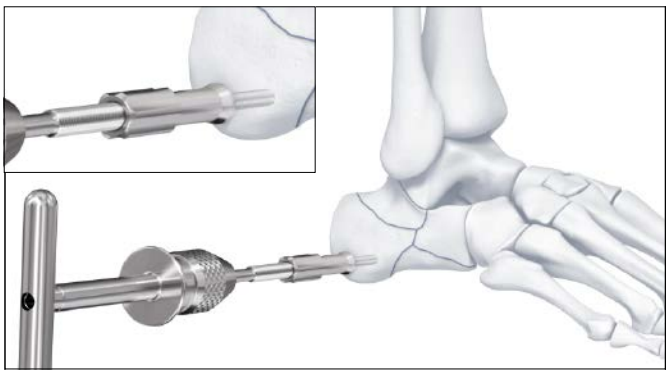
Precaution: **The proper size centering pin must be inserted through the cannulation of the Reduction Joystick prior to insertion (Reduction Joystick, 5.0 mm takes 1.6 mm Centering Pin; Reduction Joystick, 6.5 mm takes 2.8 mm Centering Pin).**

Insert the Reduction Joystick under power by connecting to the quick coupling on the centering pin, or manually with the Small Universal Chuck with T-handle.



Remove the centering pin and attach the Small Universal Chuck with T-handle to the Reduction Joystick.

Turn the Threaded buttress sleeve down to the bone so that the surface of the device contacts the bone for added stability.



Additionally available set

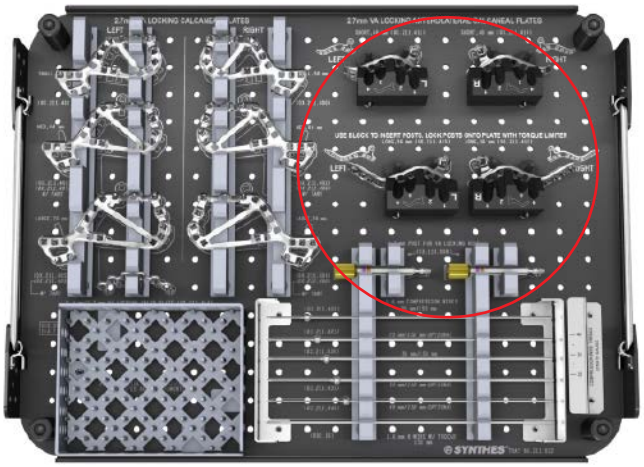
01.211.002	Compression Distraction Instrument Set

Use the compression/distraction device to distract the calcaneus and restore length. Place one pin in the anterior process and one pin in the tuberosity and distract.

Note: **Reference the Orthopaedic Foot Instrument Technique Guide for the Compression Distraction technique steps and product assembly.**

3
Assemble posts onto plate (optional)

Instruments	
03.118.008	2.7 mm Compression/Distraction Post for VA Locking Hole
314.467	STARDRIVE Screwdriver Shaft T8, 105 mm
03.110.002	Torque Limiting Attachment, 1.2 Nm
03.110.005	Handle for Torque Limiting Attachment



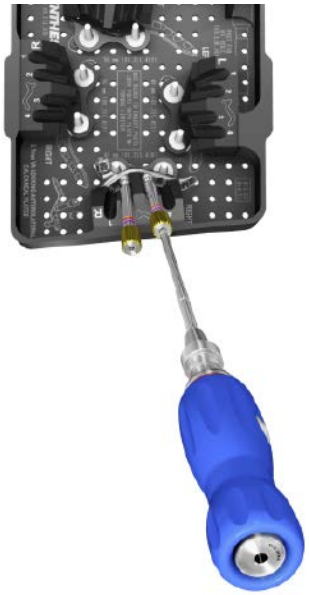
60.211.022

60.211.031

Assemble the 2.7 mm posts in two of the designated screw holes of the plate using the appropriate insertion post guide block located in the instrument tray or module. Hold the plate up against the back wall of the guide block while threading in the posts.

Precaution: **The 2.7 mm posts must be inserted and locked using the 1.2 Nm torque limiting attachment. Do not use the posts to bend the plate. This could damage the Variable Angle Locking screw hole.**

Note: **The insertion post guide blocks are designed to help insert the posts at the nominal angle.**



4

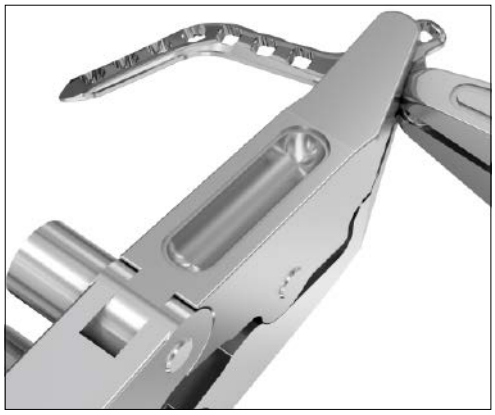
Contour plate (optional)

Instrument	
03.211.005	2.4 mm/2.7 mm VA LCP Bending Pliers

The 2.4 mm/2.7 mm VA LCP Bending Pliers can be used to contour the anterior portion of the 2.7 mm Variable Angle Locking Anterolateral Calcaneal plate if needed. The 2.4 mm/2.7 mm VA LCP Bending Pliers should be used to protect the Variable Angle Locking screw holes.

Warning: **Excessive contouring may weaken the plate.**

Note: **If using the 2.7 mm Posts to insert the plate, plate contouring must be done after the posts are inserted. The plate will not fit back into the Insertion Post Guide Block once contoured.**

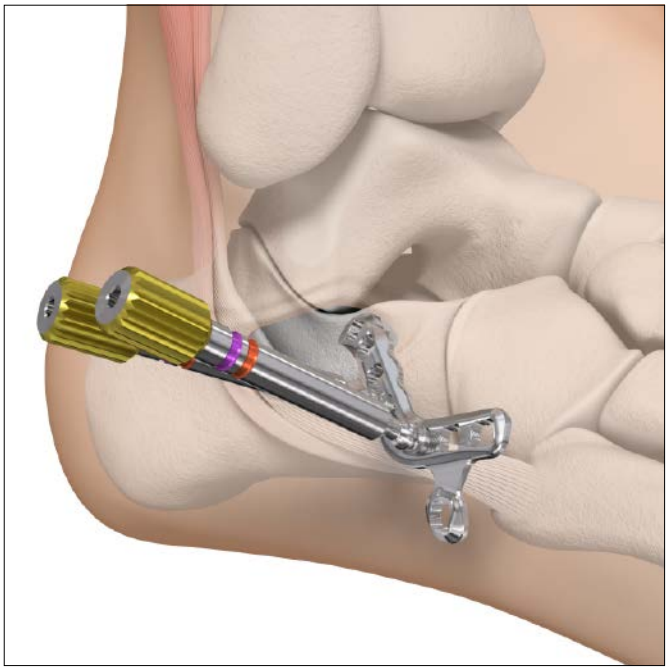


5

Insert plate

Elevate the peroneal tendons and soft tissues on the lateral side of the calcaneus to allow for plate insertion. Using the posts as a handle, slide the plate under the peroneal tendons.

Note: **A periosteal elevator may be needed to create a path for insertion of the plate, specifically when inserting the Anterolateral Calcaneal Plate, long.**

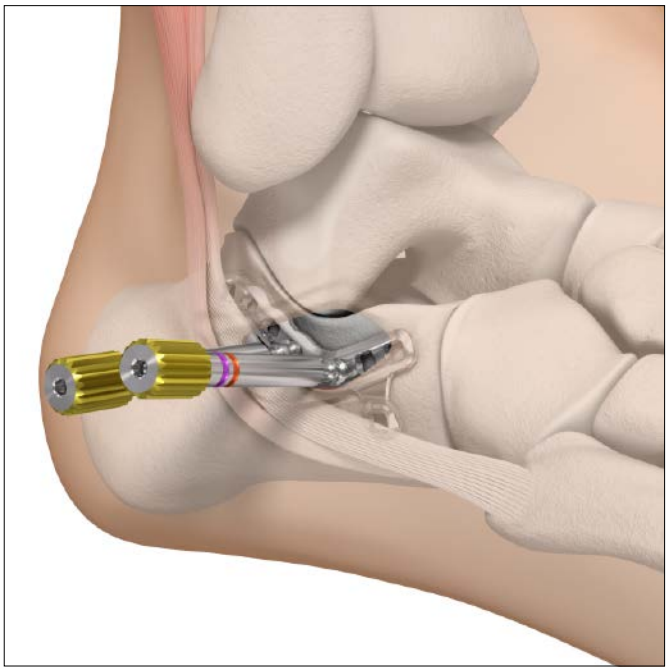


6

Position plate

Instruments	
	1.6 mm Kirschner Wire with trocar point 150 mm
292.16	Stainless Steel
492.16	Titanium
03.211.420–03.211.440	1.6 mm Compression Wires, 150 mm length, 20 mm–40 mm thread

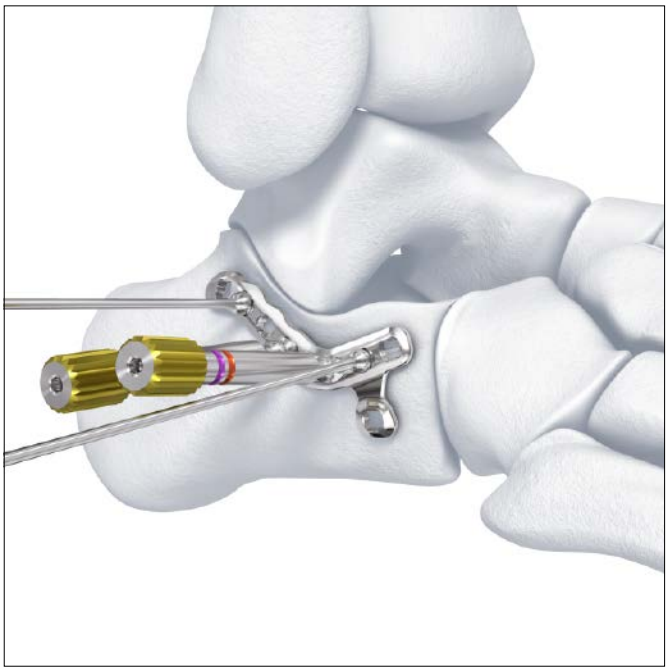
Place the plate 2-3 mm below the posterior facet under the ridge of the subchondral bone in line with the angle of Gissane. The posts can be used to rotate the plate superior or inferior.



Provisionally fix the plate to the bone using 1.6 mm K-wires or 1.6 mm Compression Wires. Use fluoroscopic imaging during plate placement in the lateral plane to ensure a safe implant location along the calcaneal body.

Remove the 2.7 mm Posts from the plate using the STARDRIVE Screwdriver Shaft and handle with quick coupling.

Precaution: Do not remove the posts with the torque limiter.



Optional technique

Additionally available	
03.211.400	Compression Forceps
03.211.401	Distraction Forceps

Compression or Distraction Forceps may be used as a handle extension to insert the plate and/or when taking C-arm images. The compression/distraction forceps fit around the 2.7 mm Posts for VA Locking holes.

7

Insert screws

Insert the 2.7 mm Variable Angle Locking screws as described in the Variable Angle Locking Technique on page 11.

Precaution:

- **A minimum of five Variable Angle Locking or Locking screws, two anterior and three posterior, should be inserted through the plate to provide adequate fixation.***
- **Only 2.7 mm screws should be inserted in the calcaneal plates.**
- **Screws along the posterior facet are angled superior to the lateral joint line when inserted at the nominal screw trajectory, targeting the sustentaculum.**

Confirm screw positioning under fluoroscopic imaging.

Optional Technique

2.7 mm Metaphyseal screws can also be inserted prior to Variable Angle Locking screws to ensure appropriate bone contact with the plate.

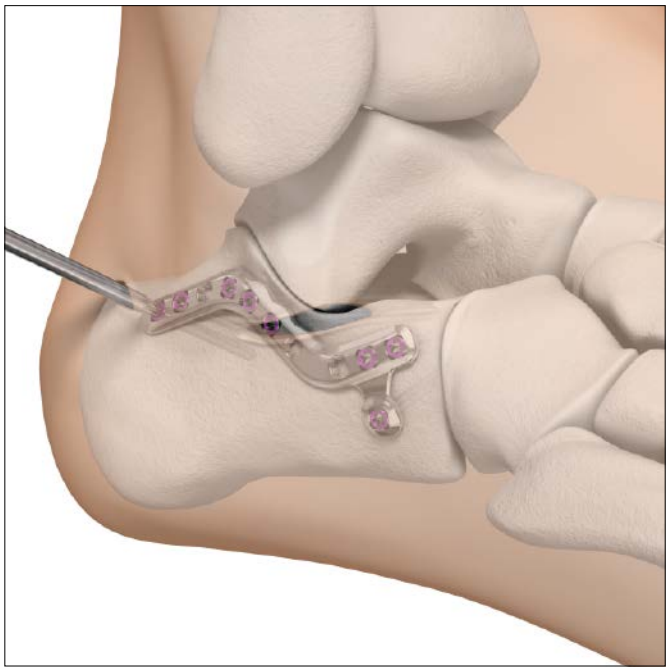
The 2.7 mm Metaphyseal screws can be inserted under power or manually following the 2.7 mm Variable Angle Locking technique on page 11.

Precaution: **Final metaphyseal screw insertion, similar to a cortex screw, should be completed manually using the T8 STARDRIVE Screwdriver shaft and handle with quick coupling.**

*Testing on file at DePuy Synthes Companies.

Additional technique for 2.7 mm Variable Angle Locking Anterolateral Calcaneal Plate, long

- To insert screws through the posterior section of the plate, create small incision(s) using image intensification to verify screw placement.



8

Lock Variable Angle Locking screws

Lock the 2.7 mm Variable Angle Locking screws manually with the 1.2 Nm torque limiting attachment and handle, as described in the Variable Angle Locking Technique on page 16.

- Confirm reduction and fixation under fluoroscopic imaging. Take lateral, axial heel, and Broden's view images.

9

Insert independent screws

4.0 mm Cortex Screw technique

Instruments	
310.229	2.9 mm Drill Bit, quick coupling, 150 mm
310.401	4.0 mm Drill Bit, quick coupling, 160 mm
312.401	4.0 mm/2.9 mm Double Drill Sleeve
314.03	Small Hexagonal Screwdriver Shaft
314.06	Holding Sleeve for use with Small Hexagonal Screwdriver Shafts

The 2.7 mm Variable Angle Locking Anterolateral Calcaneal Plate is used to rebuild the articular surface. Once the articular surface is intact, independent lag screws are used to connect the articular surface to the anterior and posterior fracture fragments.

Insert independent lag screws through the tuberosity of the calcaneus for additional fixation of the posterior fragments.

Precaution: **Screw size and number of screws is fracture dependent, however it is recommended to insert a minimum of three 3.5 mm or 4.0 mm cortex screws.**

Reference the examples to the right for independent screw placement depending on fracture type.

Implant removal

Instruments	
314.467	STARDRIVE Screwdriver Shaft, T8, 105 mm
03.111.038	Handle with Quick Coupling
Optional set	
01.240.001	Screw Removal Set
Optional instrument	
309.520	Conical Extraction Screw, for 2.7 mm and 3.5 mm Cortex screws

If implant removal is desired, unlock all screws manually from the plate using the proper screwdriver shaft and handle. Then remove the screws completely from the bone.

Precaution: **Do not use the torque limiters for screw removal.**

If the screws cannot be removed with the screwdriver, insert the conical extraction screw with the left-handed thread into the screwhead using the handle with quick coupling, and loosen the screw by turning counterclockwise.

IMPLANTS AND INSTRUMENTS

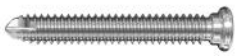
SCREWS FOR THE 2.7 MM VARIABLE ANGLE LOCKING CALCANEAL PLATES

The 2.7 mm Variable Angle Locking Calcaneal plates accept the following screws:

2.7 mm Variable Angle Locking Screws

- Threaded, rounded head locks securely into the variable angle locking holes
- Locked screws allow unicortical screw fixation and load transfer to near cortex
- Used with 2.0 mm drill bit
- T8 STARDRIVE Recess
- Self-tapping tip
- Color coded for easier identification
- Screws in set: 16 mm to 56 mm lengths (0X.211.016– 0X.211.056)
- Additionally available: 8 mm to 60 mm lengths (0X.211.008–0X.211.060)

2.7 mm Metaphyseal Screws

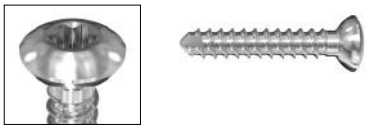


- For use in locking, nonlocking, or Combi holes
- Used to provide compression of plate to the bone
- Feature locking screw thread in screw shaft
- Low-profile head
- Used with 2.0 mm drill bit
- T8 STARDRIVE Recess
- Self-tapping tip
- Screws in set: 16 mm to 56 mm lengths (0X.118.516–0X.118.556)
- Additionally available: 10 mm to 70 mm lengths (0X.118.510–0X.118.570)

X = 2 (Stainless Steel)

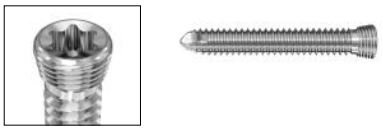
2.7 mm Cortex Screws*

- For use in locking, nonlocking, or Combi holes
- Used to provide compression or neutral fixation
- Used with 2.0 mm drill bit
- T8 STARDRIVE Recess
- Self-tapping tip
- Additionally available: 10 mm to 60 mm (X02.870–X02.969)



2.7 mm Locking Screws*

- Threaded, conical head locks securely into the variable angle locking holes
- Only for axial insertion in the variable angle locking holes
- Used with 2.0 mm drill bit
- T8 STARDRIVE Recess
- Self-tapping tip
- Additionally available: 8 mm to 60 mm (X02.208–X02.260)



*Also available.
X = 2 (Stainless Steel)

SCREWS FOR INDEPENDENT FIXATION, FOR USE WITH THE 2.7 MM VARIABLE ANGLE LOCKING ANTEROLATERAL CALCANEAL PLATE TECHNIQUE

4.0 mm Cortex Screws

- Used to provide compression or neutral fixation
- Used with 2.9 mm and 4.0 mm drill bit
- Hexagonal recess
- Self-tapping tip
- Screws in Set: 40 mm to 85 mm (X06.440–X06.485)
- Additionally available: 14 mm to 100 mm (206.414–206.500)

3.5 mm Cortex Screws*

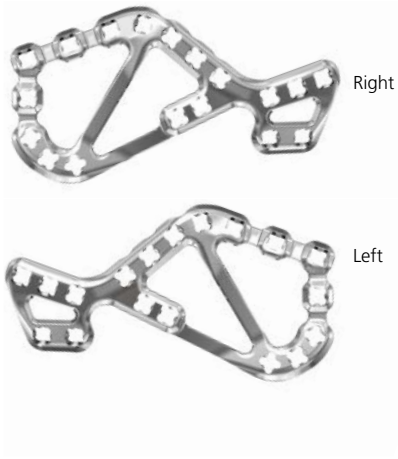
For use in locking, nonlocking, or Combi holes

- Used to provide compression or neutral fixation
- Used with 2.5 mm drill bit
- Self-tapping tip
- Available with T15 STARDRIVE or Small Hexagonal Recess
- Additionally available: STARDRIVE Recess 10 mm–150 mm (0X.200.010–0X.200.150)
  Hexagonal Recess 10 mm–110 mm (X04.810–X04.910)

*Also available.
X = 2 (Stainless Steel), 4 (Titanium)

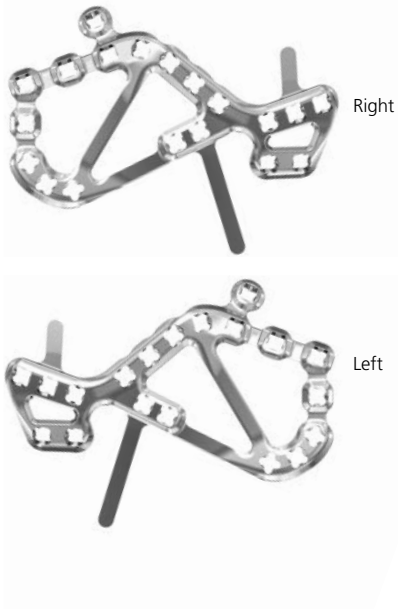
2.7 mm Variable Angle Locking Calcaneal Plates*

Stainless Steel	Titanium	Right/Left	Size	Length (mm)
02.211.400	04.211.400	Right	Small	58
02.211.401	04.211.401	Left	Small	58
02.211.402	04.211.402	Right	Medium	64
02.211.403	04.211.403	Left	Medium	64
02.211.404	04.211.404	Right	Large	70
02.211.405	04.211.405	Left	Large	70



2.7 mm Variable Angle Locking Calcaneal Plates, with tabs*

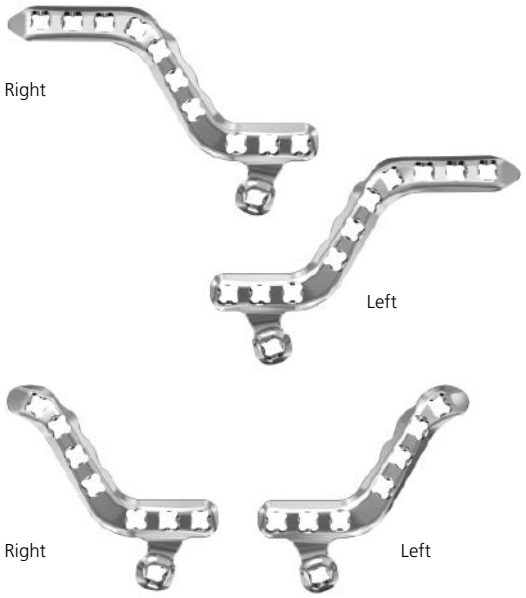
Stainless Steel	Titanium	Right/Left	Size	Length (mm)
02.211.406	04.211.406	Right	Medium	64
02.211.407	04.211.407	Left	Medium	64
02.211.408	04.211.408	Right	Large	70
02.211.409	04.211.409	Left	Large	70



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

2.7 mm Variable Angle Locking Anterolateral Calcaneal Plates*

Stainless Steel	Titanium	Right/Left	Size	Length (mm)
02.211.410	04.211.410	Right	Short	40
02.211.411	04.211.411	Left	Short	40
02.211.412	04.211.412	Right	Long	56
02.211.413	04.211.413	Left	Long	56



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

INSTRUMENTS FOR THE VARIABLE ANGLE LOCKING CALCANEAL PLATES

FOR 2.7 MM VARIABLE ANGLE LOCKING AND METAPHYSEAL SCREWS

323.062	2.0 mm Drill Bit with Depth Mark, quick coupling, 140 mm	
315.28	2.7 mm Three-Fluted drill bit, quick coupling, 125 mm	
03.211.002	2.0 mm Universal Variable Angle Locking Drill Guide	
319.09	Depth Gauge for small screws	
03.211.200	2.0 mm Variable Angle Locking Cone Drill Guide	
314.467	STARDRIVE Screwdriver Shaft T8, 105 mm	
03.111.038	Handle with quick coupling	
314.468	Holding Sleeve for STARDRIVE Screwdriver Shaft, T8	

03.110.002	Torque Limiting Attachment, 1.2 Nm	
03.110.005	Handle for Torque Limiting Attachment	

ALSO AVAILABLE

03.211.003	2.0 mm Variable Angle Locking Drill Guide, variable	
03.211.004	2.0 mm Variable Angle Locking Drill Guide, coaxial	
311.43	Handle with quick coupling, small	

FOR 4.0 MM CORTEX SCREWS (FOR INDEPENDENT SCREW FIXATION)

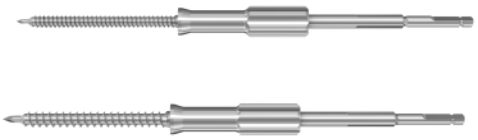
310.229	2.9 mm Drill Bit, quick coupling, 150 mm	
310.401	4.0 mm Drill Bit, quick coupling, 160 mm	
312.401	4.0 mm/2.9 mm Double Drill Sleeve	
314.03	Small Hexagonal Screwdriver Shaft	
314.06	Holding Sleeve for use with small hexagonal screwdriver shafts	

OTHER

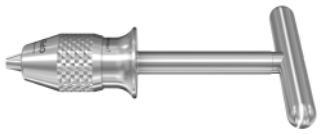
03.118.008	2.7 mm Compression/Distraction Post for VA locking hole	

BENDING PLIERS AND REDUCTION INSTRUMENTS

	Reduction Joystick
03.211.454	5.0 mm
03.211.455	6.5 mm



393.105	Small Universal Chuck with T-Handle



1.6 mm Compression Wires, 150 mm	
	Thread Length (mm)
03.211.415	15
03.211.420	20
03.211.425	25
03.211.430	30
03.211.435	35
03.211.440	40

	1.6 mm Kirschner Wire with Trocar Point, 150 mm
292.16	Stainless Steel
492.16	Titanium

03.211.005	2.4 mm/2.7 mm VA LCP Bending Pliers

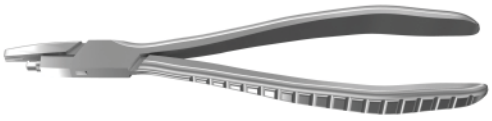
391.963	Universal Bending Pliers

319.26	1.75 mm Cleaning Brush
319.35	1.6 mm Cleaning Stylet

319.24	2.9 mm Cleaning Brush
319.46	2.8 mm Cleaning Stylet

ALSO AVAILABLE

329.155	Locking Calcaneal Plate Tab Bending Pliers

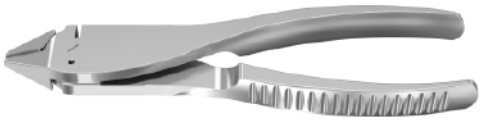


391.94	Small Wire Cutter, 230 mm length

03.211.401	Distraction Forceps

	Centering Pin for Reduction Joystick
03.211.431	1.6 mm for 5.0 mm
03.211.432	2.8 mm for 6.5 mm

GENERAL INSTRUMENTS

03.211.456	Bone Spreader, 8 mm beak width, one tooth, 210 mm length	
03.211.467	Hohmann Retractor, 8 mm width, narrow tip, 148 mm length	
319.391	Sharp Hook-Small Taper	
	Bending Irons	
329.04	for 2.7 mm and 3.5 mm plates	
329.05	for 2.7 mm and 3.5 mm plates	
391.962	Bending/Cutting Pliers	
391.963	Universal Bending Pliers	
398.96	Stagbeetle Forceps, 125 mm	

	Periosteal Elevators
399.36	6 mm Curved Blade, round edge
399.48	3 mm Curved Blade, straight edge
399.481	3 mm Curved Blade, round edge

	Reduction Forceps with ratchet points
399.94	174 mm
399.97	130 mm
399.98	200 mm

399.99	Reduction Forceps with serrated Jaw ratchet, 144 mm

ALSO AVAILABLE

399.195	Hohmann Retractor, 8 mm round tip, 215 mm

399.197	Hohmann Retractor, 8 mm narrow tip, 215 mm

VARIABLE ANGLE LOCKING CALCANEAL INSTRUMENT AND IMPLANT SET STAINLESS STEEL (01.211.041)

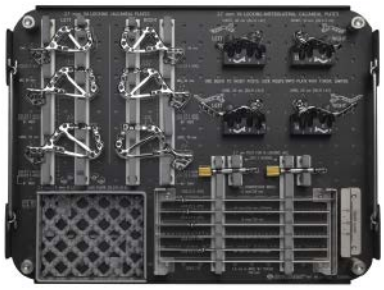
Graphic Case

61.116.035	Graphic Case, Full Length, 3 High
60.211.022	2.7 mm Variable Angle Locking Calcaneal Plate Tray
60.211.023	Tray for Variable Angle Locking Calcaneal Plating System Reduction Instruments
60.211.024	Instrument Tray, 2.7 mm Variable Angle Locking and 4.0 Cortex Instruments
60.211.025	Screw Rack for 2.7 mm Variable Angle Locking, Metaphyseal and 4.0 mm Cortex Screws
60.211.032	Label pack for 2.7 mm Variable Angle Locking Calcaneal Plate Set
60.116.019	Support Posts for Screw Rack for Modular Graphic Cases

Instruments

Tray 60.211.022

03.118.008	2.7 mm Compression/Distraction Post for VA Locking hole, 2 ea.
	1.6 mm Kirschner Wire with Trocar Point, 150 mm, 10 pack
292.16	Stainless Steel
	1.6 mm Compression Wires, 150 mm
03.211.420	20 mm
03.211.430	30 mm



60.211.022

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

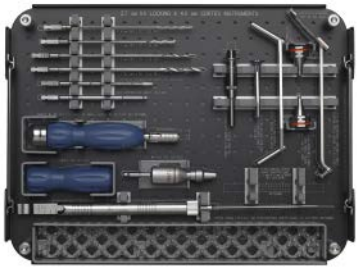
Tray 60.211.023

03.211.005	2.4 mm/2.7 mm VA LCP Bending Pliers, 2 ea.
391.963	Universal bending pliers
393.105	Small Universal Chuck with T-Handle
03.211.455	Reduction Joystick, 6.5 mm
03.211.454	Reduction Joystick, 5.0 mm, 2 ea.
319.24	2.9 mm Cleaning Brush
319.46	2.8 mm Cleaning Stylet
319.26	1.75 mm Cleaning Brush
319.35	1.6 mm Cleaning Stylet

60.211.023

Tray 60.211.024

310.229	2.9 mm Drill Bit, 150 mm, 2 ea.
310.401	4.0 mm Drill Bit, quick coupling, 160 mm, 2 ea.
312.401	4.0 mm/2.9 mm Double Drill Sleeve
314.03	Small Hexagonal Screwdriver Shaft
314.06	Holding Sleeve
323.062	2.0 mm Drill Bit with Depth Mark, quick coupling, 140 mm, 2 ea.
315.28	2.7 mm Three-Fluted Drill Bit, quick coupling, 125 mm, 2 ea.
319.09	Depth Gauge for Small Screws
03.211.002	2.0 mm Universal Variable Angle Locking Drill Guide
314.467	STARDRIVE Screwdriver Shaft T8, 105 mm, 2 ea.
314.468	Holding Sleeve for STARDRIVE Screwdriver Shaft, T8
03.111.038	Handle with quick coupling
03.110.002	Torque Limiting Attachment, 1.2 Nm
03.110.005	Handle for Torque Limiting Attachment
03.211.200	2.0 mm Variable Angle Locking Cone drill guide, 2 ea.



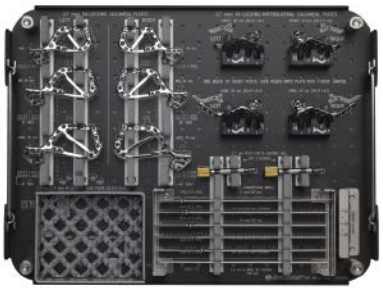
60.211.024

Screw Rack 60.211.025

319.97	Screw Forceps

Implants

Tray 60.211.022



60.211.022

2.7 mm Variable Angle Locking Calcaneal Plates*

Stainless Steel	Right/ Left	Size	Length (mm)
02.211.400	Right	Small	58
02.211.401	Left	Small	58
02.211.402	Right	Medium	64
02.211.403	Left	Medium	64
02.211.404	Right	Large	70
02.211.405	Left	Large	70

2.7 mm Variable Angle Locking Anterolateral Calcaneal Plates*

Stainless Steel	Right/ Left	Size	Length (mm)
02.211.410	Right	Short	40
02.211.411	Left	Short	40
02.211.412	Right	Long	56
02.211.413	Left	Long	56

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

Screw Rack 60.211.025

2.7 mm Variable Angle Locking Screws, self-tapping, with T8 STARDRIVE Recess, 4 ea.

Stainless Steel	Length (mm)	Stainless Steel	Length (mm)
02.211.016	16	02.211.038	38
02.211.018	18	02.211.040	40
02.211.020	20	02.211.042	42
02.211.022	22	02.211.044	44
02.211.024	24	02.211.046	46
02.211.026	26	02.211.048	48
02.211.028	28	02.211.050	50
02.211.030	30	02.211.052	52
02.211.032	32	02.211.054	54
02.211.034	34	02.211.056	56
02.211.036	36		

60.211.025

2.7 mm Metaphyseal Screws, self-tapping, with T8 STARDRIVE Recess, 2 ea.

Stainless Steel	Length (mm)	Stainless Steel	Length (mm)
02.118.516	16	02.118.538	38
02.118.518	18	02.118.540	40
02.118.520	20	02.118.542	42
02.118.522	22	02.118.544	44
02.118.524	24	02.118.546	46
02.118.526	26	02.118.548	48
02.118.528	28	02.118.550	50
02.118.530	30	02.118.552	52
02.118.532	32	02.118.554	54
02.118.534	34	02.118.556	56
02.118.536	36		

4.0 mm Cortex Screws, self-tapping, 2 ea.

Stainless Steel	Length (mm)	Stainless Steel	Length (mm)
206.440	40	206.456	56
206.442	42	206.458	58
206.444	44	206.460	60
206.446	46	206.465	65
206.448	48	206.470	70
206.450	50	206.475	75
206.452	52	206.480	80
206.454	54	206.485	85

VARIABLE ANGLE LOCKING CALCANEAL PLATE MODULE SET STAINLESS STEEL (01.211.042) AND TITANIUM (01.411.042)

Graphic Case

60.116.052	Module Shell
60.211.021	Module Bin for Variable Angle Locking Calcaneal Plates
60.211.031	Module Bin for Variable Angle Locking Anterolateral Calcaneal Plates
60.211.032/ 60.211.033	Label pack for 2.7 mm Variable Angle Locking Calcaneal Plate Set (Stainless Steel or Titanium)

Instruments

Module Bin 60.211.031

03.118.008	2.7 mm Compression/Distraction Post for VA Locking hole, 2 ea.

Implants

Module Bin 60.211.021

2.7 mm Variable Angle Locking Calcaneal Plates*

Stainless Steel	Titanium	Right/ Left	Size	Length (mm)
02.211.400	04.211.400	Right	Small	58
02.211.401	04.211.401	Left	Small	58
02.211.402	04.211.402	Right	Medium	64
02.211.403	04.211.403	Left	Medium	64
02.211.404	04.211.404	Right	Large	70
02.211.405	04.211.405	Left	Large	70

60.211.021

Module Bin 60.211.031

2.7 mm Variable Angle Locking Anterolateral Calcaneal Plates*

Stainless Steel	Titanium	Right/ Left	Size	Length (mm)
02.211.410	04.211.410	Right	Short	40
02.211.411	04.211.411	Left	Short	40
02.211.412	04.211.412	Right	Long	56
02.211.413	04.211.413	Left	Long	56

60.211.031

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

GENERAL INSTRUMENT SET (01.211.045)

Graphic Case

61.116.003	Graphic Case, Full Length, 1 High
60.211.030	General Instrument Tray, Full Length
60.211.037	Label pack for General Instrument Set

Instruments

03.211.467	Hohmann Retractor, 8 mm width, narrow tip, 148 mm, 4 ea.
03.211.456	Bone Spreader, 8 mm tip width, one tooth, 210 mm length
319.391	Sharp Hook-Small Taper
	Bending Irons
329.04	for 2.7 mm and 3.5 mm plates
329.05	for 2.7 mm and 3.5 mm plates
391.962	Bending/Cutting Pliers
391.963	Universal Bending Pliers, 2 ea.
398.96	Stagbeetle Forceps, 125 mm
	Periosteal elevators
399.36	6 mm curved blade, round edge
399.48	3 mm curved blade, straight edge
399.481	3 mm curved blade, round edge
	Reduction Forceps with points, ratchet
399.94	174 mm
399.97	130 mm
399.98	200 mm
399.99	Reduction Forceps with serrated jaw ratchet, 144 mm

VARIABLE ANGLE LOCKING CALCANEAL INSTRUMENT AND IMPLANT SET, WITH GENERAL INSTRUMENT SET STAINLESS STEEL (01.211.040)

Combined set includes the full Variable Angle Locking Calcaneal Instrument and Implant set, and the full General Instrument Set.

Graphic Cases include:

For Variable Angle Locking Calcaneal Instrument and Implant Set:

61.116.035	Graphic Case, Full Length, 3 High
60.211.022	2.7 mm Variable Angle Locking Calcaneal Plate Tray
60.211.023	Tray for Variable Angle Locking Calcaneal Plating System Reduction Instruments
60.211.024	Instrument Tray, 2.7 mm Variable Angle Locking and 4.0 Cortex Instruments
60.211.025	Screw Rack for 2.7 mm Variable Angle Locking, Metaphyseal and 4.0 mm Cortex Screws
60.211.032	Label pack for 2.7 mm Variable Angle Locking Calcaneal Plate Set
60.116.019	Support Posts for Screw Rack for Modular Graphic Cases

For General Instrument Set:

61.116.003	Graphic Case, Full Length, 1 High
60.211.030	General Instrument Tray, Full Length
60.211.037	Label pack for General Instrument Set

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