

LCP Anterolateral Distal Tibia Plate

3.5. The low profile anatomic fixation system with optimal plate placement and angular stability.

Technique Guide



LCP Small
Fragment
System

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 Image intensifier control

Warning

This description is not sufficient for immediate application of the instrumentation. Instruction by a surgeon experienced in handling this instrumentation is highly recommended.

LCP Anterolateral Distal Tibia Plate

3.5. The low profile anatomic fixation system with optimal plate placement and angular stability.

Overview

The LCP Anterolateral Distal Tibia Plate 3.5 is part of the Synthes Small Fragment LCP System that merges locking screw technology with conventional plating techniques.

The combi-holes in the LCP limited-contact plate shaft combine a dynamic compression unit (DCU) hole with a locking screw hole. Combi-holes provide the flexibility of axial compression and locking capability throughout the length of the plate shaft.

The head of the plate features four locking holes that accept locking screws \varnothing 3.5 mm, cortex screws \varnothing 2.7 mm and \varnothing 3.5 mm or cancellous bone screws \varnothing 4.0 mm.

The combi-holes in the plate shaft accept locking screws \varnothing 3.5 mm, cortex screws \varnothing 3.5 mm and cancellous bone screws \varnothing 4.0 mm.

Fixation with the LCP Anterolateral Distal Tibia Plate 3.5 has many similarities to traditional plate fixation methods, with a few important improvements. Locking screws provide the ability to create a fixed-angle construct while using standard AO plating techniques. Locking capability is important for fixed-angle constructs in osteopenic bone or multifragment fractures where screw purchase is compromised. These screws do not rely on plate-to-bone compression to resist patient load, but function similarly to multiple, small, angled blade plates.

Note: For information on fixation principles using conventional and locked plating techniques, please refer to the LCP Locking Compression Plate Technique Guide (Art. No. 036.000.019).

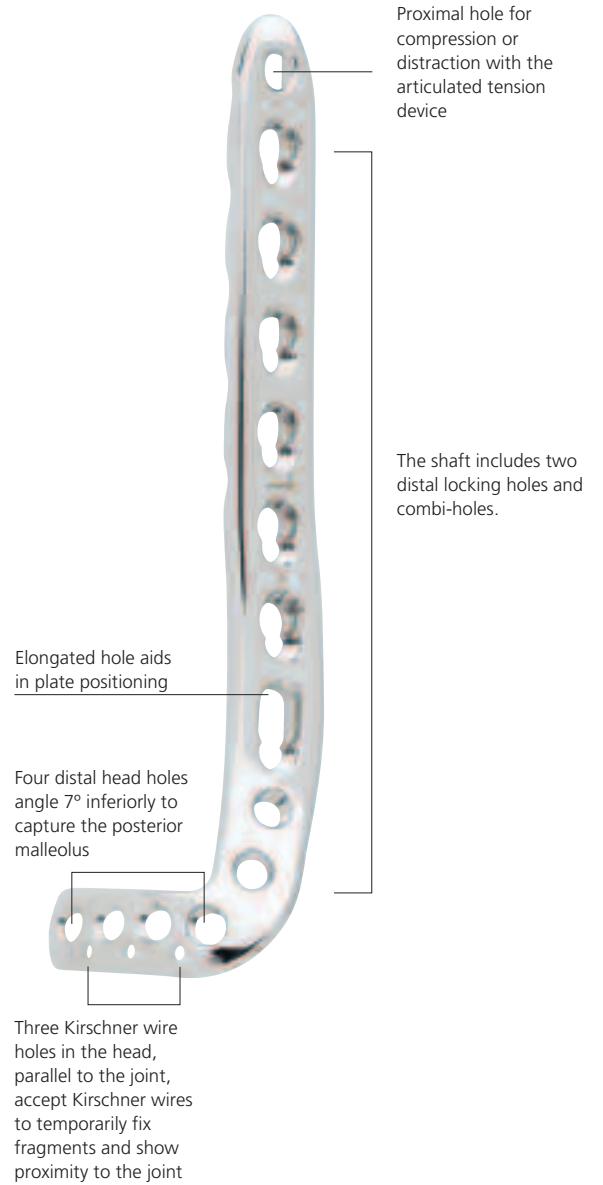


Features

- Anatomically shaped
- Two different plate designs to fit right or left tibia (indicated with R or L on plate)
- Shaft holes accept locking screws \varnothing 3.5 mm, cortex screws \varnothing 3.5 mm and cancellous bone screws \varnothing 4.0 mm
- Head holes accept locking screws \varnothing 3.5 mm, cortex screws \varnothing 2.7 mm and \varnothing 3.5 mm and cancellous bone screws \varnothing 4.0 mm.
- 3.6 mm shaft thickness tapers to 2.5 mm distally
- Tapered tip for submuscular insertion
- Screw heads are recessed in the plate to minimize screw prominence

Benefits

- Distal locking screws provide support for the articular surface
- Targeted locking for Volkman's triangle and the Chaput fragment
- The head of the plate is designed to provide a low profile construct when using locking screws or cortex screws \varnothing 2.7 mm, resulting in less soft tissue irritation.
- 60° twist in shaft is contoured for the distal tibia anatomy: less plate contouring is required.



AO ASIF Principles

In 1958, the AO ASIF (Association for the Study of Internal fixation) formulated four basic principles, which have become the guidelines for internal fixation.¹ These principles, as applied to the LCP Anterolateral Distal Tibia Plate 3.5, are:

Anatomic reduction

Anatomic plate profile and four parallel screws near the joint assist reduction of metaphysis to diaphysis to restore alignment and functional anatomy. Anatomic reduction is mandatory for intra-articular fractures to restore joint congruency.

Stable fixation

The combination of conventional and locking screws offers optimum fixation regardless of bone density.

Preservation of blood supply

Limited-contact plate design reduces plate-to-bone contact and helps to preserve the periosteal blood supply.

Early mobilization

Plate features combined with AO technique create an environment for early bone healing, expediting return to function.

¹ M.E. Müller, M. Allgöwer, R. Schneider, H. Willenegger. AO Manual of Internal Fixation. 3rd Edition. Berlin: Springer-Verlag. 1991.

Indications

The LCP Anterolateral Distal Tibia Plate 3.5 is indicated for:

- Extra-articular and simple intra-articular distal tibia fractures
- Distal tibia fracture, percutaneous or reducible by limited arthrotomy
- Distal tibia fracture extending into the diaphyseal area



Case 1

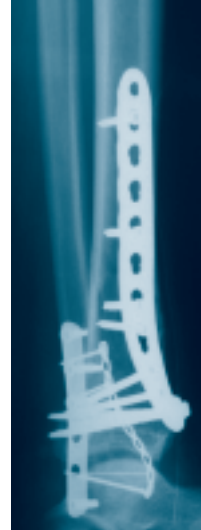
50-year-old male, fall from wall



Preop lateral



Preop AP



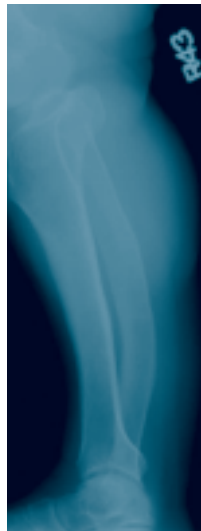
Postop lateral



Postop AP

Case 2

51-year-old female, corrective osteotomy



Preop lateral



Preop AP



Postop lateral



Postop AP

Case 3

75-year-old male, MVA



Preop lateral



Preop AP



Postop lateral



Postop AP

Case 4

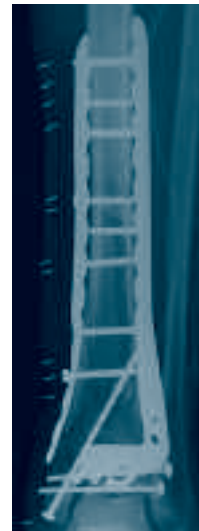
52-year-old female, MVA



Preop lateral



Preop AP



Postop lateral



Postop AP

Preoperative Planning

1

Preparation

Required set (one of the following)

182.400	LCP Compact Small Fragment Instrument Set with Locking Screws Stardrive Ø 3.5 mm and Implants (Pure Titanium) in Vario Case
182.405	LCP Compact Small Fragment Instrument Set with Locking Screws Stardrive Ø 3.5 mm and Implants (Stainless Steel) in Vario Case
182.410	LCP Compact Small Fragment Instrument Set with Locking Screws Ø 3.5 mm and Implants (Pure Titanium) in Vario Case
182.415	LCP Compact Small Fragment Instrument Set with Locking Screws Ø 3.5 mm and Implants (Stainless Steel) in Vario Case

Optional sets

105.900	Bone Forceps Set
117.700	Instrument Set for Large Distractor
01.900.022	Extraction Module for Screws Ø 3.5, 4.0 and 4.5 mm

Optional instruments

X92.200	Kirschner Wire Ø 2.0 mm with trocar tip
X92.710	Kirschner Wire Ø 1.6 mm with threaded tip
309.520	Extraction Screw, conical
310.250	Drill Bit Ø 2.5 mm
311.430	Handle with Quick Coupling
321.120	Tension Device, articulated
321.150	Socket Wrench Ø 11 mm
323.360	Universal Drill Guide 3.5
324.024	Instrument for Temporary Reduction
324.031	Plate Holder with Thread Ø 3.5 mm
324.214	Drill Bit Ø 2.8 mm, with Scale, length 200/100 mm
329.040	Bending Iron for Plates 2.4 to 3.5
329.050	Bending Iron for Plates 2.4 to 3.5
329.300	Bending Press
394.350	Large Distractor
395.490	Medium Distractor

X=2: stainless steel

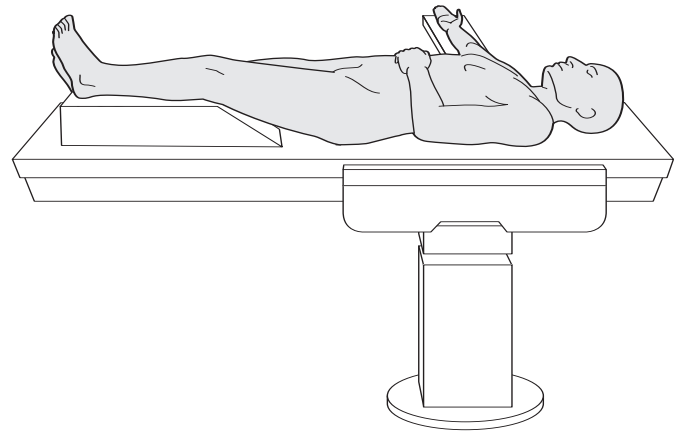
X=4: titanium

Complete the preoperative radiographic assessment and prepare the preoperative plan. Determine plate length and instruments to be used. Determine distal screw placement to ensure proper screw placement in the metaphysis.

Position patient

- ① Position the patient supine on a radiolucent operating table. Visualization of the distal tibia under fluoroscopy in both the lateral and AP views is recommended. Elevate the leg on a padded rest with the knee moderately flexed to placement in a neutral position. Place the opposite leg level on table-top.

Warning: The direction of locking screws is already determined for normal anatomy based on the design of the plate. If manual contouring in the metaphyseal area is necessary, verify new screw trajectories using the Kirschner wire screw placement verification technique on page 14.



Reduction

2

Reduce articular surface

Optional instrument

394.350	Large Distractor
395.490	Medium Distractor

Approach

A longitudinal and straight incision should be centered at the ankle joint, parallel to the fourth metatarsal distally, and between the tibia and fibula proximally. Proximal extension of the incision should end seven or eight centimeters above the joint. Distally the incision can be extended to the level of the talonavicular joint, allowing exposure of the talar neck. The joint can be exposed using an arthrotomy.

Note: The superficial peroneal nerve usually crosses the surgical incision proximal to the ankle joint and should be protected throughout the surgical procedure.

Reduce fracture/articular surface

Technique tip: Application of an external fixator or a distractor may facilitate visualization and reduction of the joint. A lateral distractor can be placed from the talar neck to the mid-tibia (from lateral to medial) to maximize joint visualization by distracting and plantar-flexing the talus.

① The articular reduction is confirmed with image intensification. Temporary reduction can be obtained with multiple Kirschner wires. Multiple options exist for maintaining the reduction including:

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



Kirschner wires can be placed through the distal end of the plate to assist with temporary maintenance of the reduction and for plate placement.

Locking screws do not provide interfragmentary compression; therefore, any desired compression must be achieved with standard lag screws. The articular fractures must be reduced and compressed before fixation of the LCP Anterolateral Distal Tibia Plate 3.5 with locking screws.

① **Technique tip:** To verify that independent lag screws will not interfere with plate placement, evaluate placement intraoperatively with AP and lateral fluoroscopic images.

Plate Insertion

3

Insert plate

Optional instrument

324.031	Plate Holder with Thread
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Open the area as necessary to expose the metaphysis.

Slide the shaft submuscularly along the lateral tibial cortex, beneath the anterior compartment muscles and neurovascular bundle. Use special care to protect the superficial peroneal nerve, which typically crosses under the incision proximal to the ankle joint. The distal row of screws will sit just proximal to the joint. Use fluoroscopic imaging during plate placement in both the AP and lateral planes to ensure a safe implant location proximally along the lateral tibia.

Technique tip: Insert a threaded plate holder into one of the distal holes as a handle for insertion.



4

Position plate and fix provisionally

Optional instruments

X92.200	Kirschner Wire \varnothing 2.0 mm, with trocar tip
324.024	Instrument for Temporary Reduction

The plate may be temporarily held in place using any of the following options. These options also prevent plate rotation while inserting the first locking screw:

- Instrument for temporary reduction in a screw hole that will not immediately be used (as shown in this technique guide)
- Cortex screw \varnothing 3.5 mm or cancellous bone screw \varnothing 4.0 mm in a locking or combi-hole
- Standard plate holding forceps
- Kirschner wires through the plate
- Cortex screw \varnothing 2.7 mm in one of the distal holes

- ⌚ After plate insertion, check alignment on the bone using fluoroscopy. Ensure proper reduction before inserting the first locking screw. Once locking screws are inserted, further reduction is not possible without loosening the locking screws.

Note: This locking plate is precontoured to fit the anterolateral distal tibia. If the plate contour is changed, it is important to check the position of the screws in relation to the joint, using the screw placement verification technique on page 14.

Technique tip: To adjust the plate into final position, insert a Kirschner wire or partially insert a cortex screw or cancellous bone screw into the elongated hole or a combi-hole before inserting a locking screw.



Optional instruments

324.214 Drill Bit \varnothing 2.8 mm, with Scale, length 200/100 mm

324.024 Instrument for Temporary Reduction

The instrument for temporary reduction is placed through plate holes to push or pull bone fragments in relation to the plate. This instrument can be used for:

- Minor varus-valgus adjustment
- Translational adjustments
- Provisional fixation
- Stabilization of plate-bone orientation during insertion of the first screws
- Alignment of segmental fragments

Connect the instrument for temporary reduction to a power drive and place it in the desired hole. With the nut in the highest position possible, begin power insertion of the instrument for temporary reduction into the near cortex. Stop insertion before the end of the threaded portion meets the plate surface. Attempting to advance beyond this point may cause screw threads to strip in the bone.

- 1 Remove the power tool and begin tightening the nut toward the plate while monitoring progress under C-arm. Stop when the desired reduction is achieved.



Screw Insertion

5

Option: screw placement verification

Instruments

X92.710	Kirschner Wire \varnothing 1.6 mm with threaded tip
310.284	LCP Drill Bit \varnothing 2.8 mm
323.027	LCP Drill Sleeve 3.5, for Drill Bits \varnothing 2.8 mm
323.055	Centering Sleeve for Kirschner Wire \varnothing 1.6 mm
323.060	Direct Measuring Device for Kirschner Wire \varnothing 1.6 mm

Since the direction of the locking screw depends on the contour of the plate, final screw position may be verified with Kirschner wires before insertion. This becomes especially important when the plate has been manually contoured, applied near the joint, or for non-standard anatomy.

With the LCP drill sleeve in the desired locking hole, insert the centering sleeve into the drill sleeve.

Insert a 1.6 mm threaded Kirschner wire through the centering sleeve and drill to the desired depth.

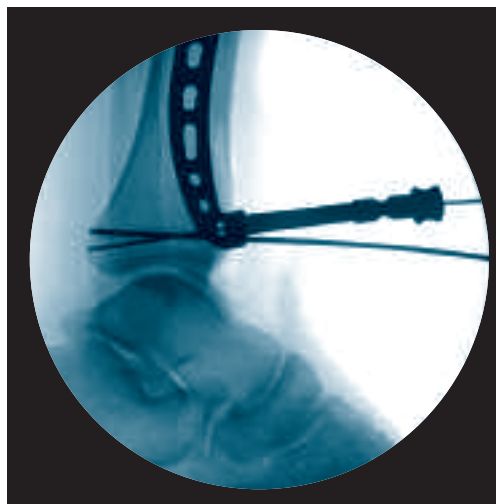
- Verify Kirschner wire placement under image intensification to determine if final screw placement will be acceptable.

Important: The Kirschner wire position represents the final position of the locking screw. Confirm that the Kirschner wire does not enter the joint.

Measure for screw length by sliding the tapered end of the direct measuring device over the Kirschner wire down to the centering sleeve.

Remove the direct measuring device, Kirschner wire and centering sleeve, leaving the drill sleeve in place.

Use the 2.8 mm drill bit to drill. Remove the drill sleeve. Insert the appropriate length locking screw.



6

Insert screws in distal fragment

Instruments

310.284	LCP Drill Bit Ø 2.8 mm
323.027	LCP Drill Sleeve 3.5, for Drill Bits Ø 2.8 mm
● 314.115	Screwdriver Stardrive
● 314.116	Screwdriver Shaft Stardrive
● 314.070	Screwdriver hexagonal
● 314.030	Screwdriver Shaft hexagonal
319.010	Depth Gauge for Screws
511.770 or 511.773	Torque Limiter

Determine the combination of screws to be used for fixation. If a combination of locking and cortex screws is used, cortex screws should be inserted first to pull the plate to the bone.

Note: To secure the plate to the tibia prior to locking screw insertion, it is recommended to pull the plate to the bone using a cortex screw or the Instrument for Temporary Reduction (324.024).

If a locking screw is used as the first screw, be sure the fracture is reduced and the plate is held securely to the bone. This prevents plate rotation as the screw is locked to the plate.



Locking screw insertion

- Insert the drill sleeve into a locking hole or combi-hole until fully seated.
- Use the 2.8 mm drill bit to drill to the desired depth.
- Remove the drill sleeve.
- Use the depth gauge to determine screw length.
- Insert screw.

Insert the locking screw under power, using the torque limiter and the screwdriver shaft, or insert it manually, using the screwdriver. Hold the plate securely on the bone to prevent plate rotation as the screw is locked to the plate.

Note: When using the torque limiter, the screw is securely locked into the plate when a “click” is heard.

Warning: Never use the screwdriver shaft directly with power equipment unless using a torque limiter.



Alternative

Instruments

323.027	LCP Drill Sleeve 3.5, for Drill Bits Ø 2.8 mm
324.214	Drill Bit Ø 2.8 mm, with Scale, length 200/100 mm

Instead of using the LCP drill bit and depth gauge, the drill bit with scale can be used for drilling the hole and determining the required screw length.



7**Option: articulated tension device**

Instrument

321.120	Tension Device, articulated
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Once reduction is satisfactory, and if it is appropriate based on fracture morphology, the plate can be loaded in tension using the articulated tension device .

Note: In simple fracture patterns, the articulated tension device may facilitate anatomic reduction. This device may be used to generate either compression or distraction.



8

Insert screws in proximal fragment

A Non-locking screws

Instruments

310.250	Drill Bit Ø 2.5 mm
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323.360	Universal Drill Guide 3.5
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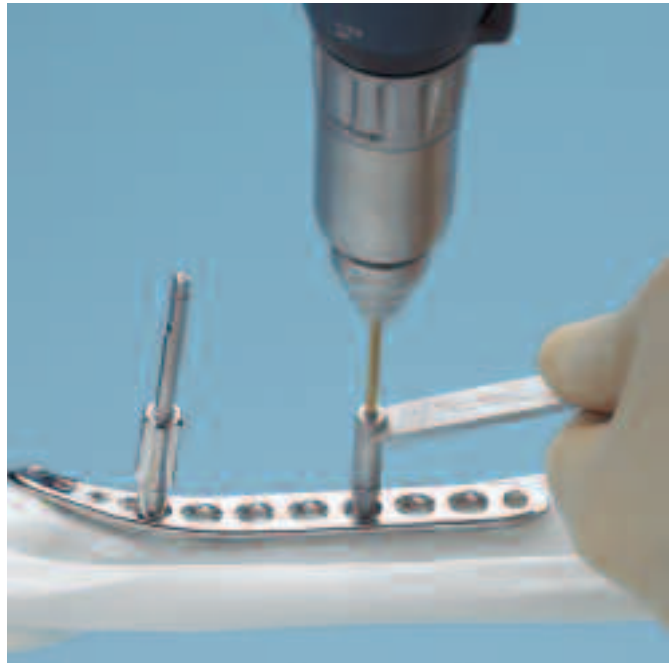
● 314.070	Screwdriver hexagonal
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● 314.030	Screwdriver Shaft hexagonal
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319.010	Depth Gauge
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Use the drill bit through the universal drill guide to predrill the bone. For the neutral position, press the drill guide down in the nonthreaded hole. To obtain compression, place the drill guide at the end of the nonthreaded hole away from the fracture (do not apply downward pressure on the spring-loaded tip).

Note: To safely place screws in the tibial diaphysis, a second incision may be required to avoid damage to the neurovascular bundle in the anterior compartment and the superficial peroneal nerve.



Measure for screw length using the depth gauge for small screws.

Select and insert the appropriate cortex screw \varnothing 3.5 mm using the hexagonal screwdriver or the hexagonal screwdriver shaft.

If used, remove the Instrument for Temporary Reduction (324.024).



B Locking screws

If using the threaded portion of the combi-holes, repeat the steps as described for distal locking screw insertion (see pages 15–16).



Bone Graft and Implant Removal

Option: bone graft

If required, fill any metaphyseal bone defect with autogenous bone graft or bone graft substitute. When using bone graft substitute, follow the manufacturer's directions for use.



chronOS granules medium 1.4 mm to 2.8 mm (5, 10, 20 cc)

Implant removal

To remove locking screws, first unlock all screws from the plate, then remove the screws completely from the bone. This prevents rotation of the plate when unlocking the last locking screw.

Problems with screw removal

Set

01.900.022	Extraction Module for Screws Ø 3.5, 4.0 and 4.5 mm
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Instruments

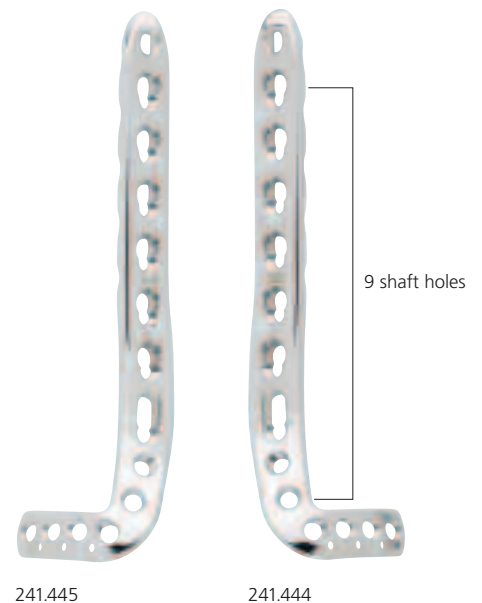
309.520	Extraction Screw, conical
311.430	Handle with Quick Coupling

If a screw cannot be removed with the screwdriver (e.g. if the hexagonal or Stardrive recess of the locking screw is damaged or if the screw is stuck in the plate), use the conical extraction screw which has a left-hand thread. Mount the extraction screw onto the handle with quick coupling and insert the tip of the extraction screw into the problem screw head. Remove the screw by turning the handle in a counter-clockwise direction.

Implants and Trays

Implants					Trays	
Stainless Steel	Titanium	Holes	Length (mm)			
241.440	441.440	5	80	right	68.124.001	Tray for Implants, for LCP Anterolateral Distal Tibia Plates X41.440–X41.449
241.442	441.442	7	106	right	68.124.002	Tray for Implants, for LCP Anterolateral Distal Tibia Plates extra-long X41.450–X41.457
241.444	441.444	9	132	right	689.508	Vario Case Framing
241.446	441.446	11	158	right	689.507	Vario Case Lid
241.448	441.448	13	184	right		
241.450	441.450	15	210	right		
241.452	441.452	17	236	right		
241.454	441.454	19	262	right		
241.456	441.456	21	288	right		
241.441	441.441	5	80	left		
241.443	441.443	7	106	left		
241.445	441.445	9	132	left		
241.447	441.447	11	158	left		
241.449	441.449	13	184	left		
241.451	441.451	15	210	left		
241.453	441.453	17	236	left		
241.455	441.455	19	262	left		
241.457	441.457	21	288	left		

All plates are available sterile packed. For sterile implants add suffix S to article numbers (e.g. 241.440S).



Sets and Instruments

Required set (one of the following)

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Optional sets

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329.050	Bending Iron for Plates 2.4 to 3.5
329.300	Bending Press
394.350	Large Distractor
395.490	Medium Distractor

X=2: stainless steel

X=4: titanium



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Presented by:

