

# LCP Proximal Tibial Plate 3.5. Part of the Synthes Small Fragment LCP System.

## Technique Guide



**SYNTHES**

Instruments and implants  
approved by the AO Foundation



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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 Proximal Tibial Plate 3.5. Part of the Synthes Small Fragment LCP System.

The LCP Proximal Tibial Plate 3.5 is part of the Small Fragment LCP System, which merges locking screw technology with conventional plating techniques.

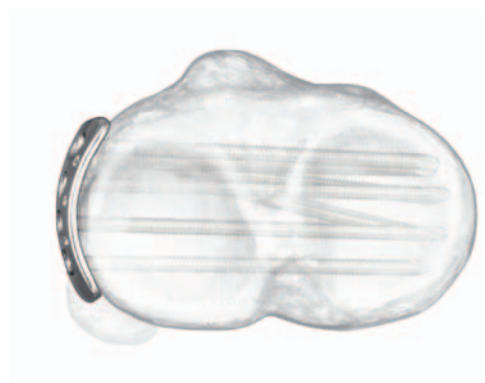
The LCP Proximal Tibial Plate 3.5 has a limited-contact profile. The head and neck portions of the plate accept 3.5 mm Stardrive or hexagonal locking screws. The screw hole pattern allows a raft of subchondral locking screws to buttress and maintain reduction of the articular surface. This provides resistance to local depression loads in addition to the stability of the fixed-angle construct created by locking the screws into the plate.

The Locking Compression Plate (LCP) has combi-holes in the plate shaft which combine a dynamic compression unit (DCU) hole with a locking screw hole. The combi-hole provides flexibility of axial compression and locking capability throughout the length of the plate shaft.

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**Note:** More detailed information on conventional and locked plating principles can be found in the Synthes Locking Compression Plate (LCP) Technique Guide (Art. No. 036.000.019).

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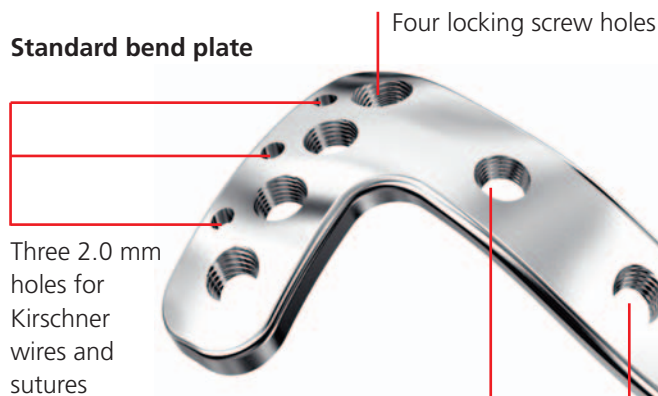
### Plate head

- Anatomically contoured to match the lateral proximal tibia.
- Four convergent threaded screw holes accept 3.5 Stardrive or hexagonal locking screws.
- Three 2.0 mm holes for preliminary fixation with Kirschner wires, or meniscal repair with sutures.

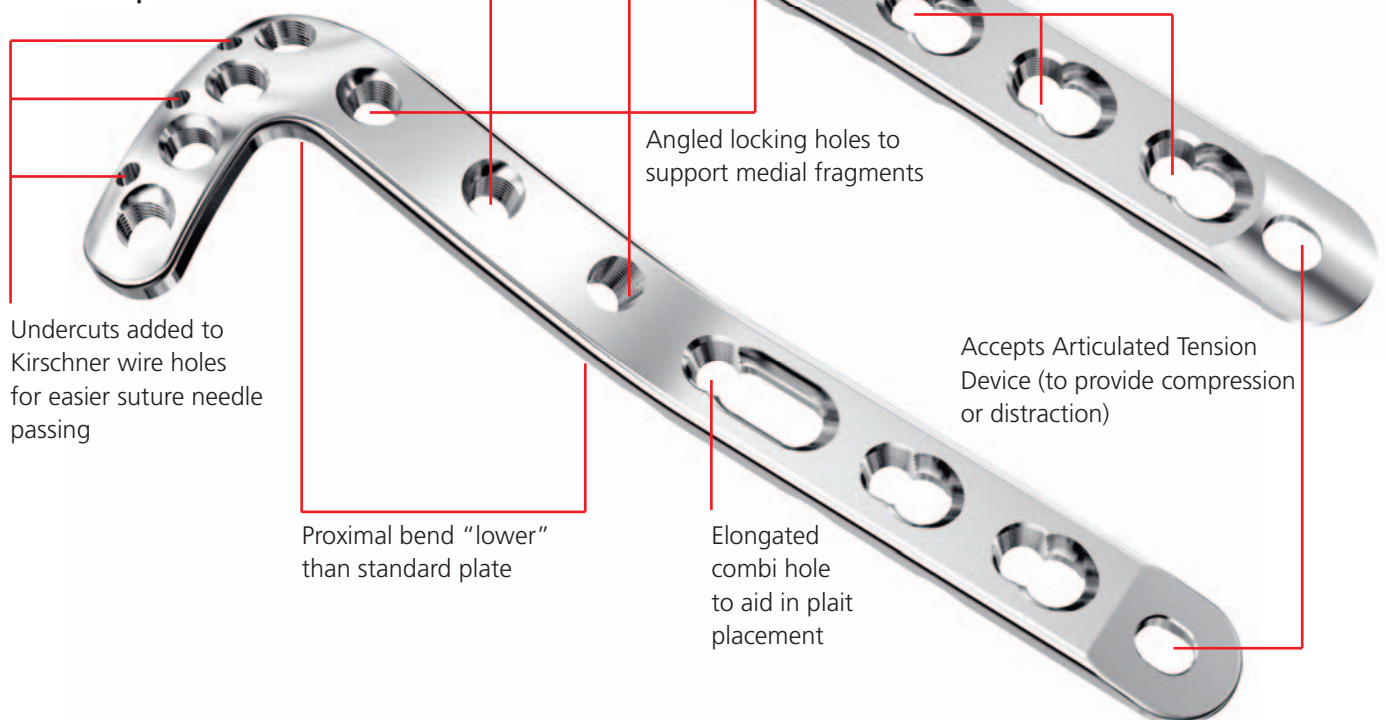
### Plate shaft

- Available with 4, 6, 8, 10, 12, 14, or 16 screw holes.
- The three locking holes distal to the plate head accept 3.5 mm Stardrive or hexagonal locking screws to secure plate position. The hole angles allow the locking screws to converge with three of the four locking screws in the plate head to support medial fragments.
- Combi-holes, distal to the three angled locking holes, combine a DCU hole with a threaded locking hole. The combi-holes accept 3.5 mm Stardrive or hexagonal locking screws in the threaded portion of the hole and 3.5 mm cortex screws or 3.5 mm shaft screws in the DCU portion of the hole.

### Standard bend plate



### Low bend plate



Available in left and right plates, in implant quality 316L stainless steel or commercially pure (CP4) titanium.

# AO Principles

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In 1958, the AO formulated four basic principles<sup>1</sup>, which have become the guidelines for internal fixation. Those principles, as applied to the LCP Proximal Tibial Plate 3.5, are:

## **Anatomic reduction**

Facilitates restoration of the articular surface by exact screw placement utilizing threaded drill sleeves.

## **Stable fixation**

Locking screws create a fixed-angle construct, providing angular stability.

## **Preservation of blood supply**

Tapered end for submuscular plate insertion. Limited-contact design reduces plate-to-bone contact and vascular trauma.

## **Early mobilization**

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

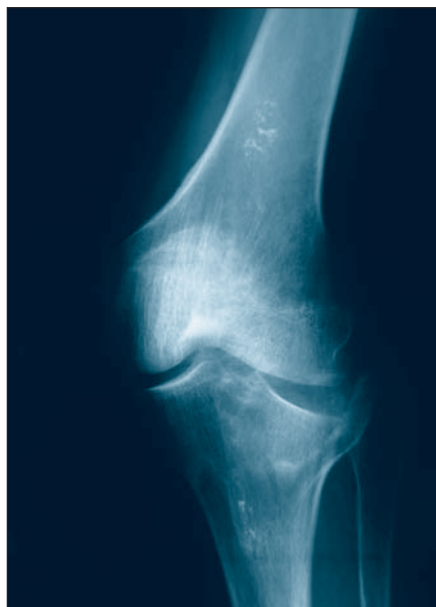
<sup>1</sup> Müller ME, Allgöwer M, Schneider R, Willenegger H (1991) AO Manual of Internal Fixation. 3rd ed. Berlin: Springer

# Indications and Contraindications

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## Indications

- Split-type fractures of the lateral tibial plateau
- Lateral split fractures with associated depressions
- Pure central depression fractures
- Split or depression fractures of the medial plateau



## Contraindications

- Isolated shaft fractures
- Children in period of growth
- Osteotomies
- Sepsis
- Compromised vascularity
- Malignant primary or metastatic tumours
- Heavy/obese patients
- Non-compliant patients

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**Note:** Fractures with associated fractures of the shaft require a special evaluation through the surgeon. It is recommended to use a stronger plate such as the 4.5 mm LCP PTP or the 4.5 mm PLT/LISS plates for obese patients. In all cases an adapted reduced post-operative mobilization is mandatory.

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For contraindications of Norian Drillable or chronOS Inject see the corresponding technique guides (Norian Drillable 036.000.757, chronOS Inject 036.000.794).

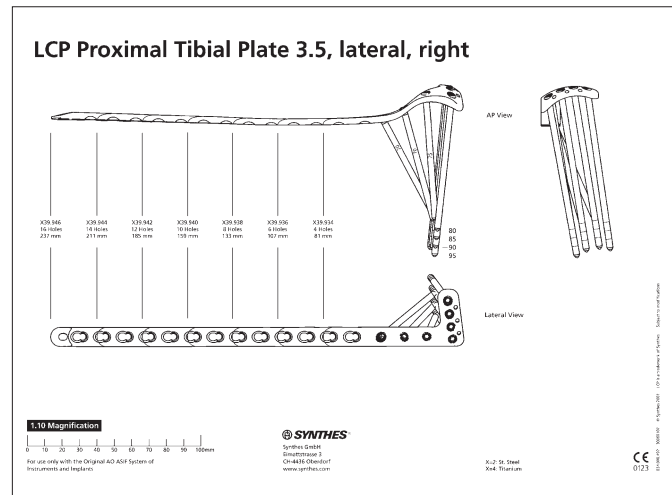


## 1

### Preparation

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

Position the patient supine on a radiolucent operating table. Visualization of the proximal tibia under fluoroscopy in both the lateral and AP views is necessary.



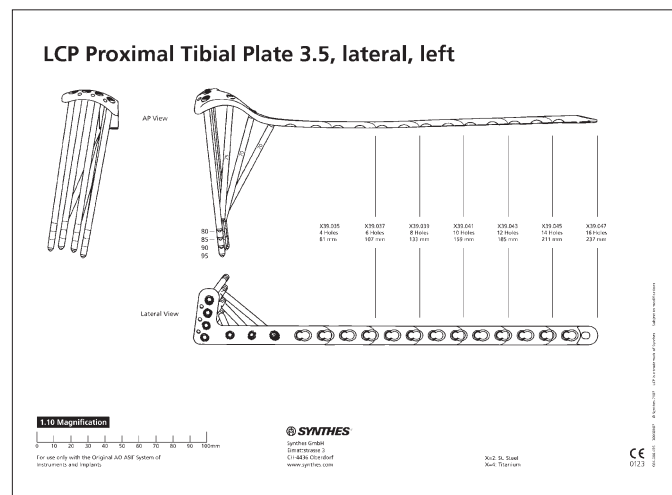
X-ray template for right LCP Proximal Tibial Plates 3.5 (Art. No. 034.000.492)

### Required set

A Small Fragment LCP Instrument Set is required when implanting the LCP Proximal Tibial Plate 3.5.

### Recommended additional sets

- Basic Instrument Set, for LC-DCP and DCP
- Small Fragment Instrument and Implant Set–LC-DCP, with self-tapping screws
- Bone Forceps Set
- Large Distractor Set
- Large External Fixator Set with self-drilling Schanz screws
- Periarticular Reduction Forceps Set
- Pelvic Implant Set, with self-tapping screws (for longer length 3.5 mm cortex screws up to 110 mm)



X-ray template for left LCP Proximal Tibial Plates 3.5 (Art. No. 034.000.495)



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## 2

### Reduce articular surface

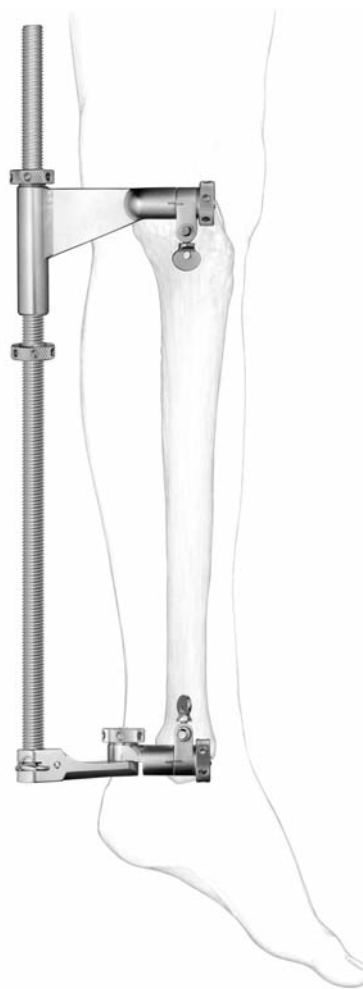
**Technique tip:** Prior to reduction, application of an external fixator or Large Distractor (394.350) may facilitate visualization and reduction of the joint.

- 1 Reduce the fracture fragments and confirm reduction using image intensification. Fragments may be reduced using independent Kirschner wires; however, Kirschner wire holes are also provided on the plate to help achieve provisional reduction, plate position, or fixation.

The locking screws do not provide interfragment or plate-to-bone compression; therefore, any desired compression must be achieved with traditional lag screws. The articular fragments must be reduced and compression must be obtained prior to applying the LCP Proximal Tibial Plate 3.5 with locking screws.

**Technique tip:** To verify that lag screws will not interfere with plate placement, hold the plate laterally to the bone.

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## 3

### Determine proximal screw placement

Prior to placing the plate on the bone, thread two 2.8 mm Threaded Drill Guides (312.648) into two nonadjacent threaded holes in the plate head. Insert 2.8 mm Percutaneous Drill Bits (324.214) through the guides and confirm that the drill bits are parallel in the transverse plane. This verifies that the guides are properly threaded into the plate, which ultimately ensures accurate screw placement.



## 4

### Determine plate position

- Using anatomic landmarks and fluoroscopy, mount the plate on the intact or reconstructed plateau without attempting to reduce the distal portion of the fracture.

Insert a 2.0 mm Kirschner Wire (292.200) through a Kirschner wire hole. Readjust plate position, if necessary. Place a second Kirschner wire in a Kirschner wire hole to prevent rotation of the plate and to secure provisional fixation of the plate to the tibial plateau. The Kirschner wires should penetrate and extend several millimeters beyond the medial cortex.



**Note:** An additional 2.0 mm Kirschner wire may be placed in the third Kirschner wire hole to hold the plate in position.

- Prior to proceeding, confirm plate head placement. Use clinical examination and fluoroscopy to confirm that:
  - Screw trajectories in the proximal locking holes are parallel to the joint in the transverse plane, and the plate is orientated properly on the plateau.
  - Screw and plate placement are consistent with the pre-operative plan.
  - Alignment of the plate to the shaft of the tibia is correct in both the AP and lateral views. Placement of the plate at this point will determine final flexion/extension reduction.



## 5

### Drill for proximal screws

- While the plate is placed against the bone, use the 2.8 mm Percutaneous Drill Bit (324.214) to drill for the locking screw through one of the two threaded guides attached to the plate. It is imperative to drill using fluoroscopy to ensure proper screw trajectory and screw placement. Drill through to the medial cortex or the desired screw tip location.

Determine the appropriate screw length indicated on the calibrated drill bit. Remove the drill bit and drill guide.

Alternatively, the Depth Gauge (319.090) can be used to determine the appropriate screw length.



## 6

### Insert proximal screws

**Note:** This plate can serve as a buttress for a medial wedge. This is accomplished by the convergence of the metaphyseal locking screws and the oblique locking screws from below.

The screws in the head of the plate are typically 80 mm in length.

If lag screw reduction of a fragment is required, this must be accomplished prior to inserting locking screws into the fragment. It may be necessary to predrill the lateral cortex using the 2.8 mm percutaneous drill bit.

Insert the appropriate length locking screw into the bone with power, using the 1.5 Nm Torque Limiting Attachment (TLA) (511.770 or 511.773) and Stardrive or Hexagonal Screwdriver Shaft (314.116 or 314.030).

**Warning:** Always use the TLA when using power.

**Reminder:** The locking screw is not a lag screw. When inter-fragmentary compression is desired, use a standard 3.5 mm cortex screw.

- At this point, verify screw placement using C-arm imaging.



### Alternative

Use the Stardrive or Hexagonal Screwdriver (314.115 or 314.070) to manually insert the appropriate locking screw. Carefully tighten the locking screw, as excessive force is not necessary to produce effective screw-to-plate locking.



Repeat for remaining proximal locking holes. Securely tighten all locking screws to lock them to the plate.

## 7

### Reduce shaft to tibial plateau

Reduce the tibial plateau to the shaft of the tibia, using indirect reduction techniques whenever possible. Using atraumatic technique, secure the plate to the tibial shaft with bone forceps.

Confirm rotational alignment of the extremity by clinical examination.

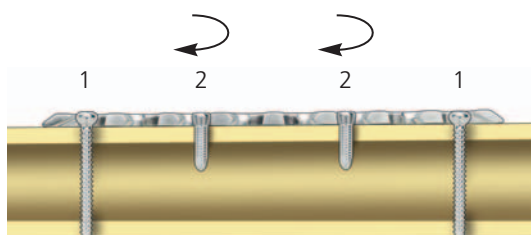
Once reduction is satisfactory, and if it is appropriate based on the fracture morphology, the plate should be loaded in tension using the Articulated Tension Device (321.120).\*

**Note:** With multifragment fractures, it may not always be possible or desirable to achieve anatomic reduction of the fracture. However, in simple fracture patterns, the Articulated Tension Device may facilitate anatomic reduction. This device may be used to generate either compression or distraction.

In addition to having threaded locking holes, the plate functions similarly to DCP plates which offer the ability to self-compress fracture fragments. Therefore, a combination of lag screws and locking screws may be used.

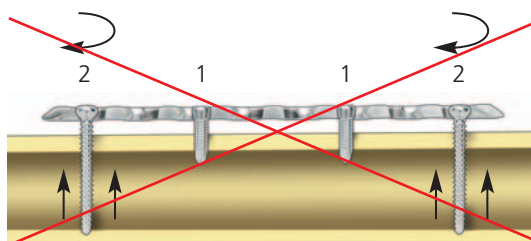


**Important:** If a combination of cortex (1) and locking screws (2) is used, a cortex screw should be inserted first to pull the plate to the bone.



Correct

If locking screws (1) have been used to fix the plate to a fragment, subsequent insertion of a cortex screw (2) in the same fragment without loosening and retightening the locking screw is not recommended.



Incorrect

\* Found in the Basic Instrument Set, for LC-DCP and DCP

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## 8

### Insert cortex screws in shaft of plate

Insert as many standard 3.5 mm cortex screws as necessary into the distal portion of the plate.

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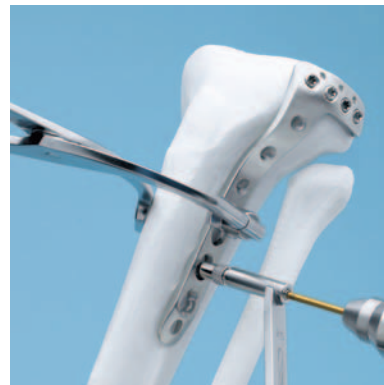
**Important:** All of the 3.5 mm cortex screws must be inserted prior to insertion of 3.5 mm locking screws.

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Use the 3.5 mm Universal Drill Guide (323.360) to predrill for the 3.5 mm cortex screws and drill through both cortices with the 2.5 mm Drill Bit (310.250).

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 drill guide's spring-loaded tip.

Measure for screw length using a depth gauge. Select and insert the appropriate length 3.5 mm cortex screw.



Neutral



Compression

## 9

### Insert 3.5 mm locking screws in shaft of plate

Attach the 2.8 mm Threaded Drill Guide (312.648) to a locking hole in the plate shaft. Drill a hole using the 2.8 mm Percutaneous Drill Bit (324.214).

**Note:** Use of the drill guide is mandatory for screws to lock to the plate properly.

Determine the appropriate screw length indicated on the calibrated drill bit.

Remove the drill bit and drill guide.

Insert the appropriate length locking screw into the bone with power, using the 1.5 Nm Torque Limiting Attachment (TLA) (511.770 or 511.773) and Stardrive or Hexagonal Screwdriver Shaft (314.116 or 314.030).

**Warning:** Always use the TLA when using power.

Repeat as necessary to insert additional locking screws.

Examine the limb clinically and radiographically. It is important that the tibial plateau is in proper orientation to the tibial shaft.

### Alternative

Use the Stardrive or Hexagonal Screwdriver (314.115 or 314.070) to manually insert the appropriate locking screw. Carefully tighten the locking screw, as excessive force is not necessary to produce effective screw-to-plate locking.



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## 10

### Insert 3.5 mm locking screws in the oblique holes

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**Note:** Use the oblique locking screws to buttress medial fragments.

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Thread a 2.8 mm Threaded Drill Guide (312.648) into the distal oblique locking hole.

Drill with the 2.8 mm Percutaneous Drill Bit (324.214).

Determine the appropriate screw length indicated on the calibrated drill bit.

Insert the appropriate length locking screw into the bone with power, using the 1.5 Nm Torque Limiting Attachment (TLA) (511.770 or 511.773) and Stardrive or Hexagonal Screwdriver Shaft (314.116 or 314.030).

Repeat steps for the last two oblique locking screws.

#### Alternative

Use the Stardrive or Hexagonal Screwdriver (314.115 or 314.070) to manually insert the appropriate locking screw. Carefully tighten the locking screw, as excessive force is not necessary to produce effective screw-to-plate locking.

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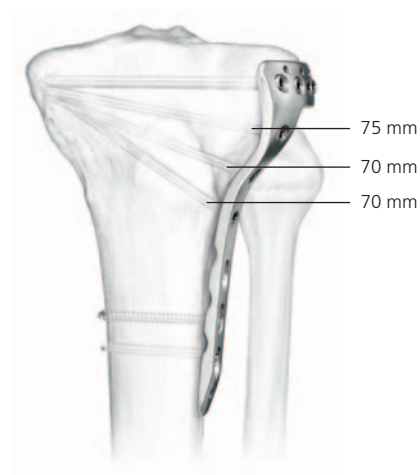
**Note:** Securely tighten all locking screws to lock them to the plate.

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#### Screw length considerations

When using the appropriate length screws in the oblique locking holes, the screw tips should meet the proximal locking screws.



Suggested screw lengths to achieve desired screw convergence.

# Cleaning of Instruments

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Cleaning the cannulation in the threaded drill guides is imperative for proper function.

Instruments should be cleared intraoperatively using the 2.5 mm Cleaning Stylet (319.461) to prevent accumulation of debris in the cannulation. Instruments should be cleaned postoperatively using the stylet and the 2.9 mm Cleaning Brush (319.240).



## LCP Proximal Tibial Plate 3.5, lateral

Stainless steel	Titanium	Shaft holes	Length (mm)	
239.934	439.934	4	81	right
239.936	439.936	6	107	right
239.938	439.938	8	133	right
239.940	439.940	10	159	right
239.942	439.942	12	185	right
239.944	439.944	14	211	right
239.946	439.946	16	237	right
239.935	439.935	4	81	left
239.937	439.937	6	107	left
239.939	439.939	8	133	left
239.941	439.941	10	159	left
239.943	439.943	12	185	left
239.945	439.945	14	211	left
239.947	439.947	16	237	left

## LCP Proximal Tibial Plate 3.5, low bend

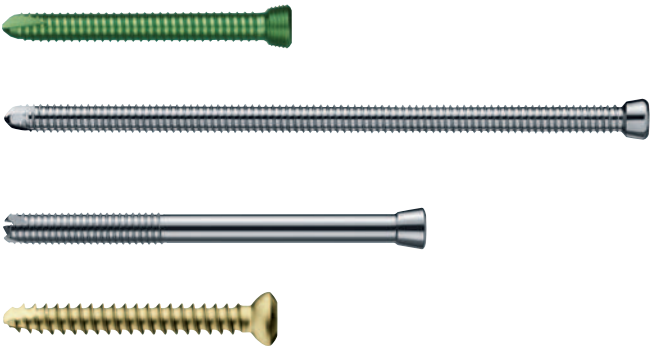
Stainless steel	Titanium	Shaft holes	Length (mm)	
02.124.200	04.124.200	4	76	right
02.124.204	04.124.204	6	102	right
02.124.208	04.124.208	8	128	right
02.124.212	04.124.212	10	154	right
02.124.216	04.124.216	12	180	right
02.124.220	04.124.220	14	206	right
02.124.224	04.124.224	16	232	right
02.124.201	04.124.201	4	76	left
02.124.205	04.124.205	6	102	left
02.124.209	04.124.209	8	128	left
02.124.213	04.124.213	10	154	left
02.124.217	04.124.217	12	180	left
02.124.221	04.124.221	14	206	left
02.124.225	04.124.225	16	232	left

All plates are available sterile packed. For sterile implants add suffix S to article number.



Screws

● Hex	⬤ Stardrive	
X13.010– X13.095	X12.101– X12.131	Locking Screw, Ø 3.5 mm, self-tapping
X12.367– X12.381	X12.317– X12.331	Screw Ø 3.5 mm with Conical Head, self-tapping, fully threaded
X12.467– X12.481	X12.417– X12.431	Screw Ø 3.5 mm with Conical Head, self-tapping, short thread
X04.810– X04.910		Cortex Screw Ø 3.5 mm, self-tapping





X=2: Stainless steel  
X=4: Titanium



**Vario Case for LCP Proximal Tibial Plates 3.5**

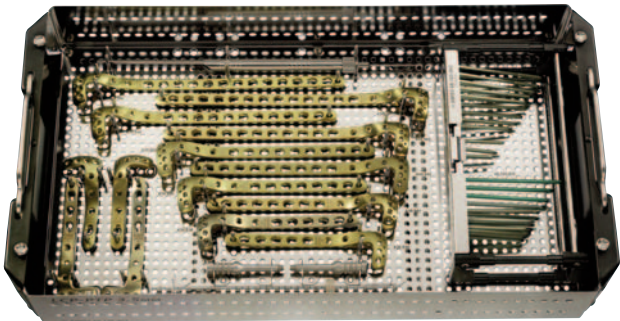
68.120.403	Vario Case for LCP Proximal Tibial Plates 3.5
689.507	Lid (Stainless Steel), size 1/1
68.120.402	Insert for Screws Ø 3.5 mm

**Set for LCP Proximal Tibial Plates 3.5,  
with Screws Ø 3.5 mm**

	 Hex	 Stardrive
Titanium	01.120.407	01.120.417
Stainless steel	01.120.408	01.120.418

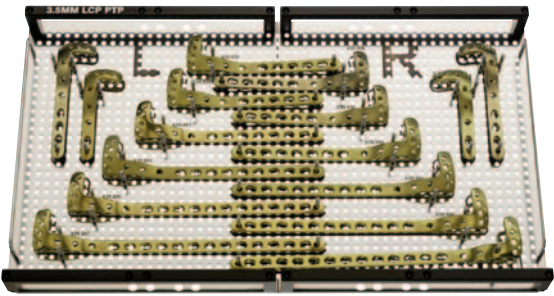
**Set for LCP Proximal Tibial Low Bend Plates 3.5,  
with screws Ø 3.5 mm**

	 Hex	 Stardrive
Titanium	01.120.480	01.120.482
Stainless steel	01.120.481	01.120.483



Vario Case for Plate Set LCP Proximal Tibial Plates 3.5

68.120.401	Vario Case for Plate Set LCP-PTP 3.5
689.508	Vario Case Framing, size 1/1, height 45 mm
689.507	Lid (Stainless Steel), size 1/1
01.120.405	Plate Set LCP Proximal Tibial Plates 3.5 (Pure Titanium) in Vario Case
01.120.406	Plate Set LCP Proximal Tibial Plates 3.5 (Stainless Steel) in Vario Case



Additionally required instruments

312.648	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, 3-flute, for Quick Coupling
319.090	Depth Gauge for Long Screws Ø 3.5 mm, measuring range up to 110 mm

Additionally required

LCP Small Fragment Instrument Set









Synthes GmbH  
Eimattstrasse 3  
CH-4436 Oberdorf  
[www.synthes.com](http://www.synthes.com)

Presented by:



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