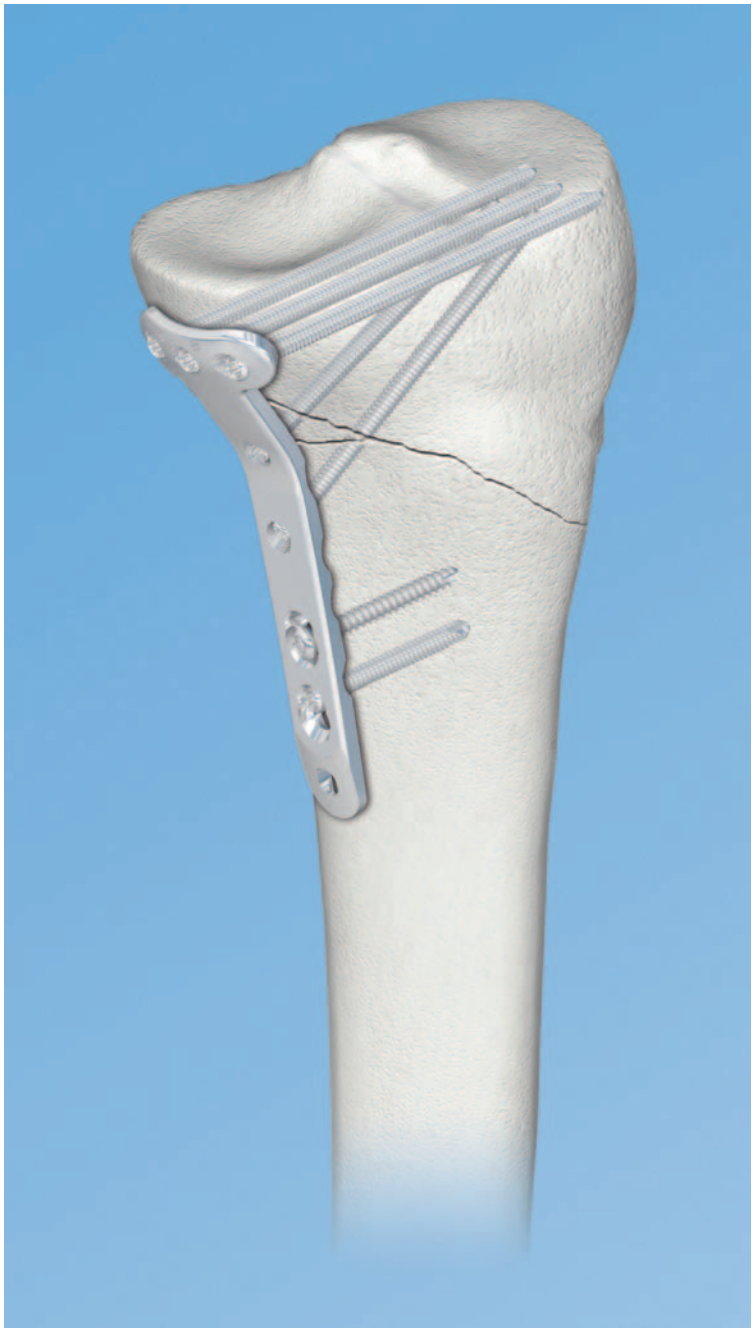
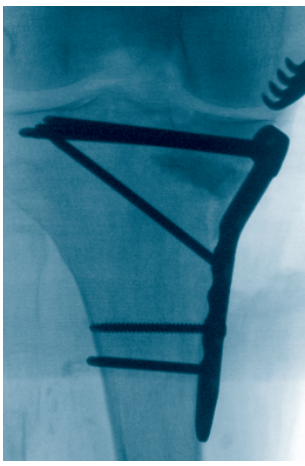
LCP Medial Proximal Tibial Plate 3.5.

Part of the Synthes small fragment Locking Compression Plate (LCP) system.

Technique Guide





SYNTHES®

Instruments and implants
approved by the AO Foundation

Table of contents


Image intensifier control

Warning
This description alone does not provide sufficient background for direct use of the product. Instruction by a surgeon experienced in handling this product is highly recommended.

LCP Medial Proximal Tibial Plate 3.5.

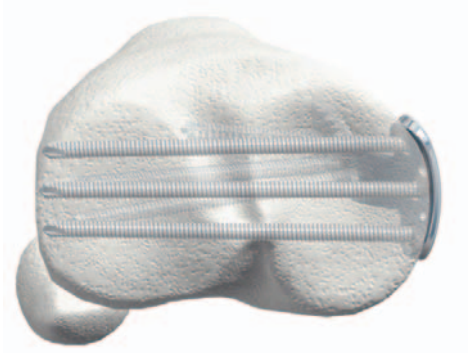
Part of the Synthes small fragment Locking Compression Plate (LCP) system.

The LCP Medial Proximal Tibial Plate 3.5 is part of the Synthes small fragment LCP system, which merges locking screw technology with conventional plating techniques.

Locking Compression Plate

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

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).

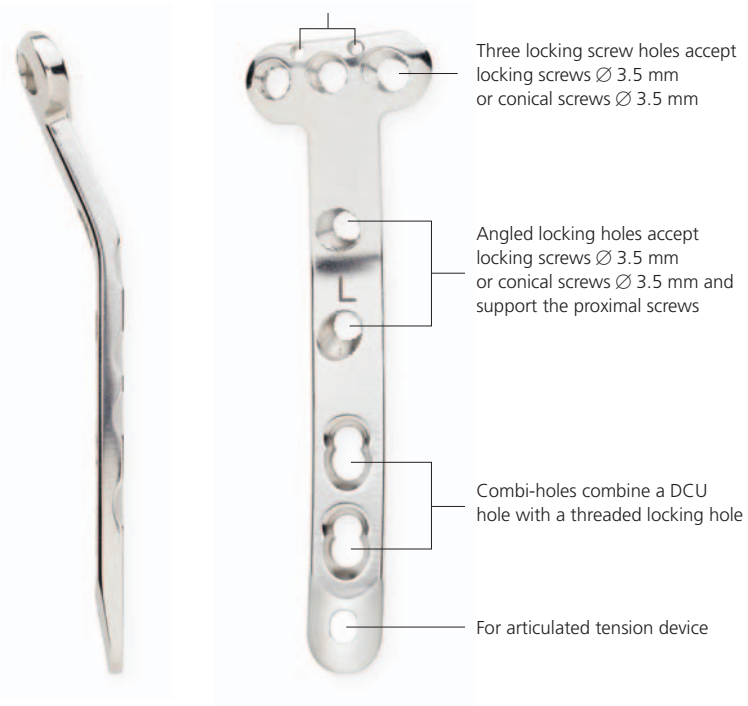


LCP Medial Proximal Tibial Plate
The LCP Medial Proximal Tibial Plate 3.5 is available in stainless steel and titanium and has a limited-contact shaft profile. The head and neck portions of the plate accept locking screws ∅ 3.5 mm and conical screws ∅ 3.5 mm. The screw hole pattern allows a raft of subchondral locking screws to buttress and maintain reduction of the articular surface. This provides fixed-angle support to the tibial plateau.

Plate head
- Anatomically contoured to approximate the anteromedial proximal tibia.
- Three convergent threaded screw holes accept locking screws ∅ 3.5 mm or conical screws ∅ 3.5 mm.
- Two 2.0 mm holes for preliminary fixation with Kirschner wires, or meniscal repair with sutures.

Plate shaft
- The two angled locking holes distal to the plate head accept locking screws ∅ 3.5 mm or conical screws ∅ 3.5 mm to secure the plate position. The hole angles allow the locking screws to converge with two of the three screws in the plate head.
- Combi-holes, distal to the angled locking holes, combine a DCU hole with a threaded locking hole. The combi-holes accept locking screws ∅ 3.5 mm or conical screws ∅ 3.5 mm in the threaded portion of the hole and cortex screws ∅ 3.5 mm in the DCU portion of the hole.
- Available with 4, 6, 8, 10, 12, 14, 16, 18, or 20 combi-holes in the plate shaft.
- Limited-contact profile.

Available in left and right plates.



AO Principles

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

Anatomic reduction
Facilitates restoration of the articular surface by exact screw placement using drill sleeves.

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

Preservation of blood supply
Tapered end simplifies submuscular plate insertion. Limited-contact shaft profile reduces plate-to-bone contact and vascular trauma.

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

[1] Müller ME, Allgöwer M, Schneider R, Willenegger H (1991) AO Manual of Internal Fixation, 3rd Edition. Berlin: Springer.

Indications

The LCP Medial Proximal Tibial Plates 3.5 are intended to buttress metaphyseal fractures of the medial tibial plateau, split-type fractures of the medial tibial plateau, medial split fractures with associated depressions and split or depression fractures of the medial tibial plateau. The plates may also be used for fixation of the proximal quarter (lateral and medial) of the tibia, as well as segmental fractures of the proximal tibia.

1
Preparation and preoperative planning

Required sets

Set for LCP Medial Proximal Tibial Plates 3.5

LCP Small Fragment Instrument Set

Small Fragment LCP Screw Set

Recommended additional sets

Large Distractor Set

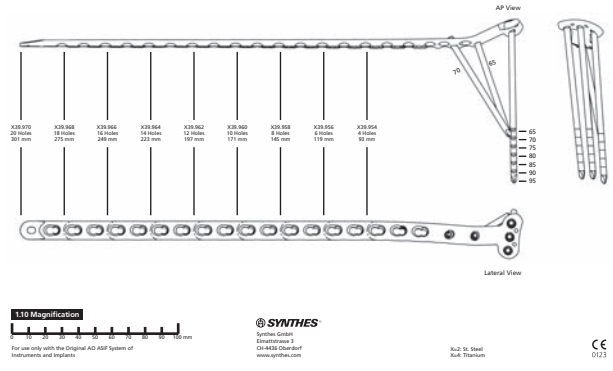
Large External Fixator Set with Self-Drilling Schanz Screws

Complete the preoperative radiographic assessment and prepare the preoperative plan. Determine plate length and instruments to be used.

Important: Determine proximal screw placement and screw lengths to ensure proper screw placement in the metaphysis.

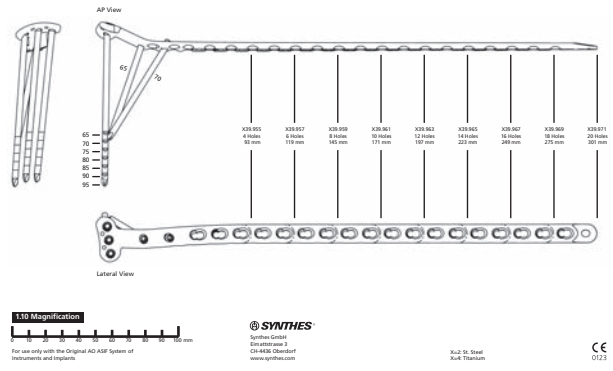
Position the patient supine on a radiolucent operating table. Visualization of the proximal tibia under fluoroscopy in both the lateral and AP views is necessary.

LCP Medial Proximal Tibial Plate 3.5, right



X-ray template for right LCP Medial Proximal Tibial Plate 3.5 (Art. No. 034.000.502)

LCP Medial Proximal Tibial Plate 3.5, left



X-ray template for left LCP Medial Proximal Tibial Plate 3.5 (Art. No. 034.000.505)

2
Reduce articular surface

Optional Instruments	
01.301.000	Large External Fixator in Vario Case
117.700	Instrument Set for Large Distractor in Sterilization Tray
394.350	Large Distractor

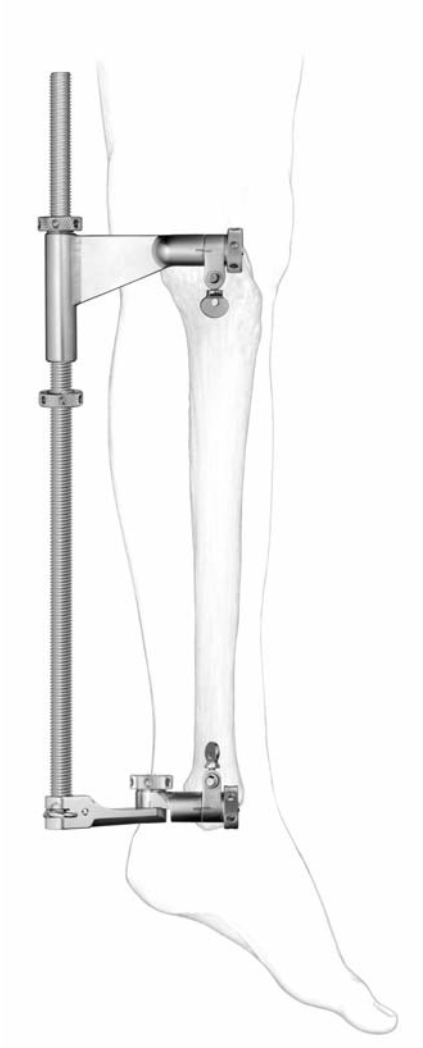
Technique Tip: Prior to reduction, application of an external fixator or large distractor may facilitate visualization and reduction of the joint.

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 interfragmentary or plate-to-bone compression; therefore, any desired compression must be achieved with traditional lag screws or conical screws ∅ 3.5 mm. The articular fragments must be reduced and compression must be obtained prior to applying the LCP Medial Proximal Tibial Plate with locking screws.

Technique Tip: To verify that independent lag screws will not interfere with plate placement, hold the plate to the bone.

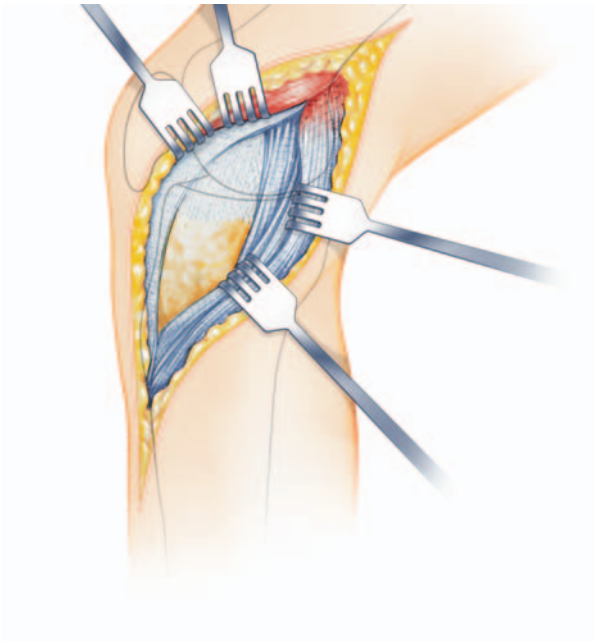
Apply the distractor to assist in the visualization and reduction of the joint.



3
Determine plate position

Instruments	
312.648	LCP Drill Sleeve 3.5, for Drill Bits ∅ 2.8 mm
292.210	Kirschner Wire ∅ 2.0 mm with trocar tip
Alternative instruments	
323.027	LCP Drill Sleeve 3.5, for Drill Bits ∅ 2.8 mm

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



Mount the plate
Attach a drill sleeve to the central hole in the head of the plate. Insert a Kirschner wire Ø 2.0 mm through a Kirschner wire hole.

If necessary, readjust the plate position. Place a second wire in the other Kirschner wire hole to prevent rotation of the plate and to secure provisional fixation of the plate to the tibial plateau.

4

Insert proximal provisional (conical) screw

Instruments	
324.214	Drill Bit ∅ 2.8 mm, with Scale, length 200/100 mm, 3-flute, for Quick Coupling
319.090	Depth Gauge for Long Screws ∅ 3.5 mm
Alternative instruments	
310.284	LCP Drill Bit ∅ 2.8 mm with Stop, length 165 mm, 2-flute, for Quick Coupling

Drill for central proximal screw

While the plate is placed against the bone, use a ∅ 2.8 mm drill bit to drill the hole for the locking screw through the drill sleeve attached to the central plate hole. It is imperative to use fluoroscopy while drilling in order to ensure proper screw trajectory and screw placement. Drill through to the lateral cortex or the desired screw tip location.

Determine proper screw trajectory by using clinical examination and fluoroscopy to confirm:

- Drill bit trajectory in the proximal locking hole is parallel to the joint and the reduction is maintained.
- Screw and plate placement will be consistent with the preoperative 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.

Measure for screw length

Measure for screw length using the depth gauge. Remove the drill sleeve, pass the measuring hook through the hole in the plate, and read the screw length from the depth gauge.

Alternatively, read the calibration directly after drilling from the drill bit at the back of the drill sleeve. Then remove the drill bit and drill sleeve.

Insert proximal (conical) screw

Instruments	
314.116	Screwdriver Shaft Stardrive 3.5, T15, self-holding
or	
314.030	Screwdriver Shaft, hexagonal, small, ∅ 2.5 mm
314.041	Screwdriver Stardrive 3.5, T15
or	
314.070	Screwdriver, hexagonal, small, ∅ 2.5 mm

Insert a conical screw ∅ 3.5 mm in the central hole in the plate head to pull the plate to the bone and gain interfragmentary compression through the plate by using a power tool with the screwdriver shaft.

Perform final tightening
Perform final tightening by hand using a screwdriver. Carefully tighten the conical screw, as excessive force is not necessary to produce effective interfragmentary compression.

Notes: When interfragmentary compression is desired, use conical screws ∅ 3.5 mm or cortex screws ∅ 3.5 mm. Locking screws are not lag screws.

5
Secure plate to plateau

Instruments	
312.648	LCP Drill Sleeve 3.5, for Drill Bits ∅ 2.8 mm
324.214	Drill Bit ∅ 2.8 mm, with Scale, length 200/100 mm, 3-flute, for Quick Coupling
319.090	Depth Gauge for Long Screws ∅ 3.5 mm
511.770	Torque Limiter, 1.5 Nm, for Compact Air Drive and for Power Drive
or	
511.773	Torque Limiter, 1.5 Nm, for AO/ASIF Quick Coupling
314.116	Screwdriver Shaft Stardrive 3.5, T15, self-holding
or	
314.030	Screwdriver Shaft, hexagonal, small, ∅ 2.5 mm
314.041	Screwdriver Stardrive 3.5, T15
or	
314.070	Screwdriver, hexagonal, small, ∅ 2.5 mm
Alternative instruments	
323.027	LCP Drill Sleeve 3.5, for Drill Bits ∅ 2.8 mm
310.284	LCP Drill Bit ∅ 2.8 mm with Stop, length 165 mm, 2-flute, for Quick Coupling

Drill for anterior and posterior screws in plate head
Attach drill sleeves to the anterior and posterior holes in the head of the plate. Use the drill bit to drill through the drill sleeves.

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

Measure for screw length
Measure for screw length using the depth gauge. Remove the drill sleeve, pass the measuring hook through the hole in the plate, and read the screw length from the depth gauge.

Alternatively, read the calibration directly after drilling from the drill bit at the back of the drill sleeve. Then remove the drill bit and drill sleeve.

Remove the 2.0 mm Kirschner wires.

Insert anterior and posterior locking screws
Insert the appropriate length locking screws ∅ 3.5 mm using a power tool with the torque limiter and the screwdriver shaft.

Perform final tightening
Perform final tightening by hand using the screwdriver. Carefully tighten the locking screw, as excessive force is not necessary to produce effective screw to plate locking. After one click, the optimum torque is reached.

Warning: If the torque limiter is unavailable, do not tighten the screws to the plate using power. Perform final tightening by hand.

Once both the anterior and posterior locking screws are securely locked to the plate, the central conical screw ∅ 3.5 mm may be removed and replaced with a locking screw ∅ 3.5 mm using the technique described on page 11.

6
Reduce shaft to tibial plateau

Instruments	
398.810	Bone Holding Forceps, self-centering, speed lock
or	
398.811	Plate Holding Forceps, with Swivel Foot
321.120	Tension Device, articulated

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.

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

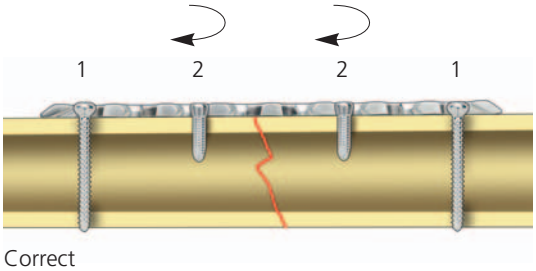
7

Insert screws in plate shaft

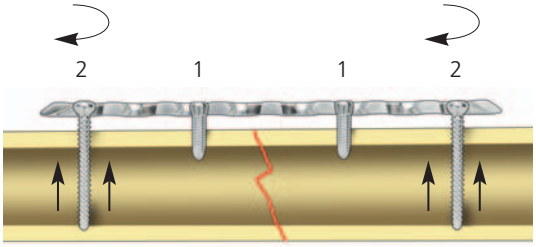
In addition to having threaded locking holes, the plate functions similarly to DCP plates which offer the ability to axially compress fracture fragments. Therefore, a combination of cortex screws and locking screws may be used.

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.

Note: 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.



Correct



Incorrect

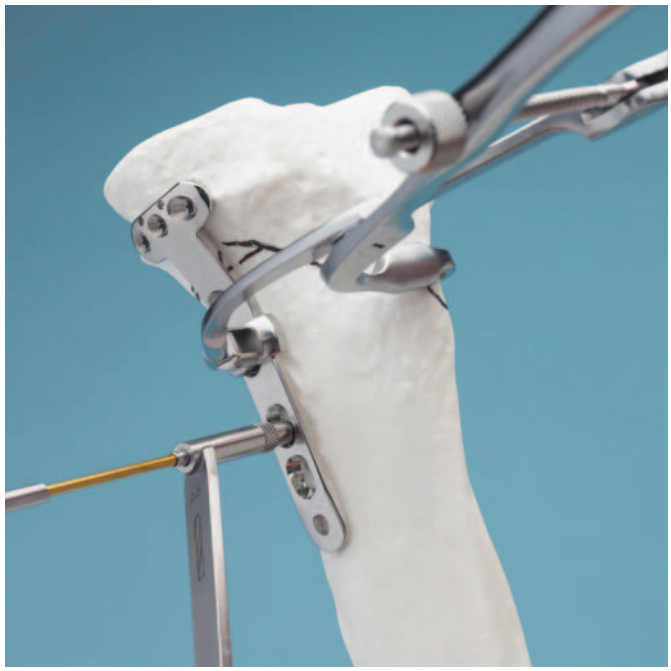
7a

Insert cortex screws

Instruments	
323.360	Universal Drill Guide 3.5
310.230	Drill Bit ∅ 2.5 mm, length 180/155 mm
319.090	Depth Gauge for Long Screws ∅ 3.5 mm
314.070	Screwdriver, hexagonal, small, ∅ 2.5 mm

Insert as many self-tapping cortex screws ∅ 3.5 mm as necessary into the distal portion of the plate.

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



Drill for cortex screw
Use the universal drill guide and drill bit ∅ 2.5 mm to predrill for the cortex screws ∅ 3.5 mm. Drill through both cortices. 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
Measure for screw length using the depth gauge.

Insert cortex screw
Select and insert the appropriate length cortex screws ∅ 3.5 mm.

Perform final tightening
Perform final tightening by hand using the hexagonal screwdriver.

7b
Insert locking screws

Instruments	
312.648	LCP Drill Sleeve 3.5, for Drill Bits ∅ 2.8 mm
324.214	Drill Bit ∅ 2.8 mm, with Scale, length 200/100 mm, 3-flute, for Quick Coupling
319.090	Depth Gauge for Long Screws ∅ 3.5 mm
511.770	Torque Limiter, 1.5 Nm, for Compact Air Drive and for Power Drive
or	
511.773	Torque Limiter, 1.5 Nm, for AO/ASIF Quick Coupling
314.116	Screwdriver Shaft Stardrive 3.5, T15, self-holding
or	
314.030	Screwdriver Shaft, hexagonal, small, ∅ 2.5 mm
For final tightening and locking	
397.705	Handle for Torque Limiter Nos. 511.770 and 511.771
or	
311.431	Handle with Quick Coupling
Alternative instruments	
323.027	LCP Drill Sleeve 3.5, for Drill Bits ∅ 2.8 mm
310.284	LCP Drill Bit ∅ 2.8 mm with Stop, length 165 mm, 2-flute, for Quick Coupling

Drill for locking screw
Attach the LCP drill sleeve to a locking hole in the plate shaft. Drill a hole using the LCP drill bit ∅ 2.8 mm.

Note: Use of the drill sleeve is mandatory for properly locking the screws to the plate.

Measure for screw length
Remove the drill sleeve and determine the screw length with the depth gauge. Alternatively, read the screw length directly from the drill bit at the back of the drill sleeve. Then remove the drill bit and drill sleeve.

Insert locking screw
Insert the appropriate length locking screw ∅ 3.5 mm by using a power tool with the torque limiter and the screwdriver shaft.

Perform final tightening
Perform final tightening by hand using the screwdriver shaft together with the torque limiter and the handle for torque limiter. After one click, the optimum torque is reached.

Repeat as necessary to insert additional locking screws.

Warning: If the torque limiter is unavailable, do not tighten the screws to the plate using power. Perform final tightening by hand.

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

Important: Securely tighten all locking screws again.

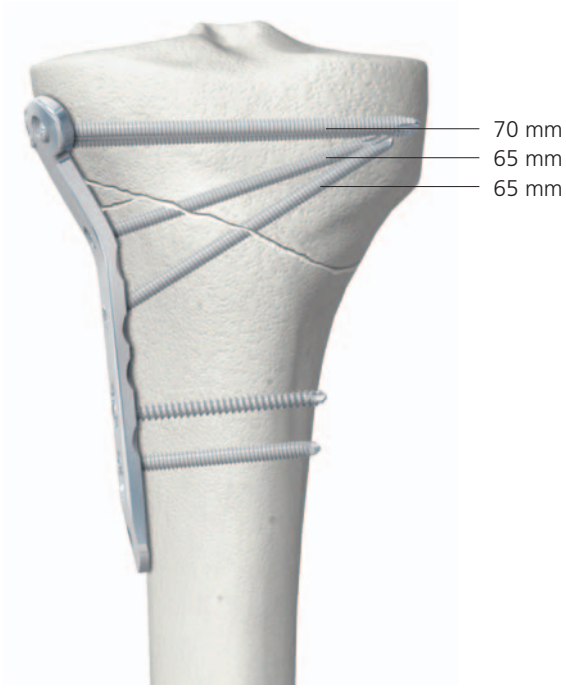
8

Insert locking screws in the angled holes

Repeat steps for locking screw insertion for the remaining angled holes.

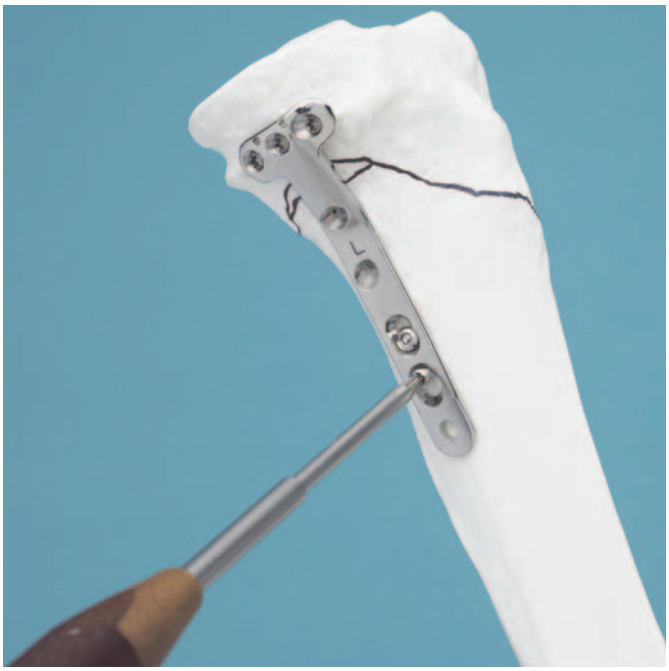
Screw length considerations

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



Suggested screw lengths to achieve desired screw convergence.

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

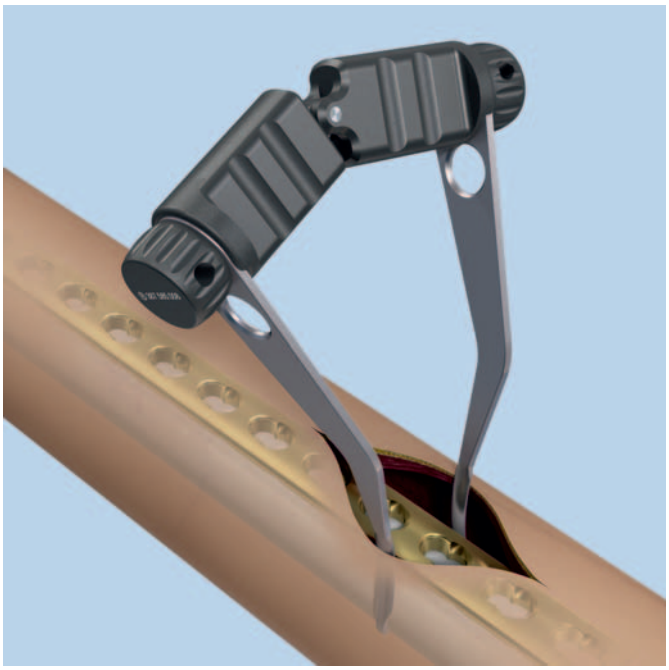


Instruments for Minimally Invasive Osteosynthesis

Hohmann Retractor Holder
The Hohmann retractor holder was developed to support minimally invasive, percutaneous plate osteosynthesis. Its unique design enables the easy and reliable percutaneous insertion of plates. These characteristics make the Hohmann retractor holder the ideal instrument for use in combination with modern implant systems such as LCP and LISS.

– The Hohmann retractor holder allows better visualization of the inserted plate.
– Serves as a guide for the inserted plate.
– Ensures that the inserted plate is centered on the bone.

For additional information see the separate Synthes publication on the Hohmann retractor holder (Art. No. 036.000.219).



Soft Tissue Retractor
The offset blade facilitates an easy preparation of the epipereosteal cavity for percutaneous plate insertion.

– Adjustable blade for free choice of insertion angle and blade length
– Available in two sizes: for small and large fragment plates

For additional information see the separate Synthes publication on the soft tissue retractor (Art. No. 036.000.127).

LCP Medial Proximal Tibial Plates 3.5

Steel	Titanium	Holes	Length (mm)	
239.954	439.954	4	93	right
239.956	439.956	6	119	right
239.958	439.958	8	145	right
239.960	439.960	10	171	right
239.962	439.962	12	197	right
239.964	439.964	14	223	right
239.966	439.966	16	249	right
239.968	439.968	18	275	right
239.970	439.970	20	301	right
239.955	439.955	4	93	left
239.957	439.957	6	119	left
239.959	439.959	8	145	left
239.961	439.961	10	171	left
239.963	439.963	12	197	left
239.965	439.965	14	223	left
239.967	439.967	16	249	left
239.969	439.969	18	275	left
239.971	439.971	20	301	left

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

Screws

3.5 mm Locking Screw, self-tapping, with Stardrive/hexagonal recess
– Threaded conical head
– Fully threaded shaft
– Stardrive or hexagonal recess
– Self-tapping tip

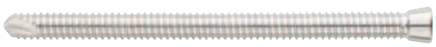
	Titanium	Stainless Steel
⬢	413.010–413.095	213.010–213.095
⯃	412.101–412.131	212.101–212.131

3.5 mm Conical Screw, self-tapping, with Stardrive/hexagonal recess, partially threaded
– Smooth conical head
– Partially threaded shaft
– Stardrive or hexagonal recess
– Self-tapping tip

	Titanium	Stainless Steel
⬢	412.467–412.481	212.467–212.481
⯃	412.417–412.431	212.417–212.431

3.5 mm Conical Screw, self-tapping, with Stardrive/hexagonal recess, fully threaded
– Smooth conical head
– Fully threaded shaft
– Stardrive or hexagonal recess
– Self-tapping tip

	Titanium	Stainless Steel
⬢	412.367–412.381	212.367–212.381
⯃	412.317–412.331	212.317–212.331



3.5 mm Cortex Screw, self-tapping, hexagonal recess
– May be used in the DCU portion of the combi-holes
– Used to compress the plate to the bone or create axial compression
– Self-tapping tip

	Titanium	Stainless Steel
⬢	404.810–404.910	204.810–204.910

Locking and Conical Screw ∅ 3.5 mm

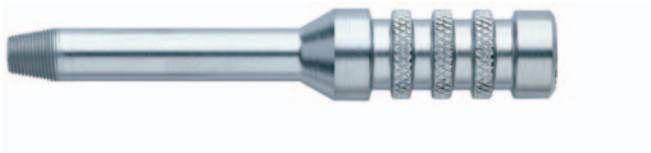
Design
The screw designs enhance fixation and facilitate the surgical procedure.

Screw head
The conical head simplifies alignment in the plate hole. This is of particular importance when using locking screws. The threaded screw head must align with the plate hole threads to provide a secure screw/plate construct. To ensure proper alignment and prevent cross-threading, the appropriate threaded drill sleeve must always be used.

Thread profile
Locking screws do not rely on screw purchase in bone to achieve compression between the plate and the bone for stability. Therefore, the locking screw core diameter can be larger since its thread profile can be shallower. When required, interfragmentary compression can be achieved with the partially threaded conical screws, especially when near the articular surface.

Drill Sleeves and Drill Guides

312.648 LCP Drill Sleeve 3.5, for Drill Bits ∅ 2.8 mm



323.360 Universal Drill Guide 3.5

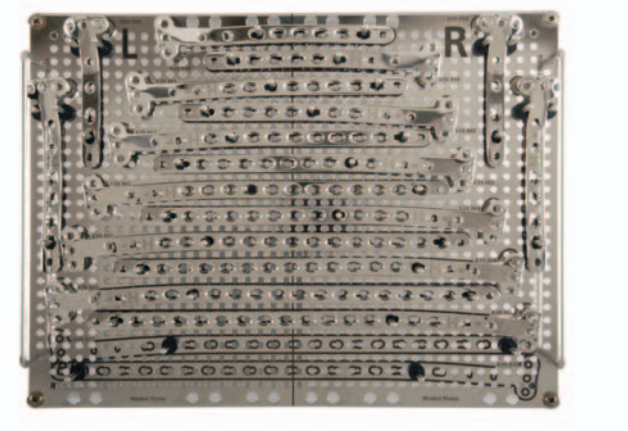
Alternative instruments

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

Sets

Plate Set LCP Medial Proximal Tibial Plates 3.5 in Vario Case

01.120.409	Stainless Steel
01.120.411	Titanium
68.120.403	Vario Case
68.120.405	Insert
689.507	Lid



Additionally required

– LCP Small Fragment Instrument Set
– LCP Screw Set ∅ 3.5 mm
– Insert for Screws ∅ 3.5 mm
(included in Vario Case 68.120.403)

Synthes GmbH
Eimattstrasse 3
CH-4436 Oberdorf
www.synthes.com

Presented by:

CE
0123