3.5 mm LCP™ Medial Proximal Tibia Plates. 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

3.5 mm LCP Medial Proximal Tibia Plates

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

The 3.5 mm LCP Medial Proximal Tibia Plate is available in stainless steel and has a limited-contact shaft profile. The head and neck portions of the plate accept 3.5 mm Locking Screws and 3.5 mm Conical Screws. 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.

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: For information on fixation principles using conventional and locked plating techniques, please refer to the Synthes *Small Fragment Locking Compression Plate (LCP) System Technique Guide*.

Available in left and right plates, in implant quality 316L stainless steel.

Plate head

– Anatomically contoured to approximate the anteromedial proximal tibia.
– Three convergent threaded screw holes accept 3.5 mm Locking Screws or 3.5 mm Conical Screws.
– Two 2.0 mm holes for preliminary fixation with K-wires, or meniscal repair with sutures.

Plate shaft

– The two angled locking holes distal to the plate head accept 3.5 mm Locking Screws or 3.5 mm Conical Screws, 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 3.5 mm Locking Screws or 3.5 mm Conical 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.
– Available with 4, 6, 8, 10, 12, 14, 16, 18, or 20 Combi holes in the plate shaft.
– Limited-contact profile.

AO ASIF Principles of Internal Fixation

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] Those principles, as applied to the 3.5 mm LCP Medial Proximal Tibia Plate, are:

Anatomic Reduction
Facilitates restoration of the articular surface by exact screw placement using 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 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 M. E. Müller, M. Allgöwer, R. Schneider, and H. Willenegger. *AO Manual of Internal Fixation*, 3rd Edition. Berlin: Springer-Verlag. 1991.

Indications

The 3.5 mm LCP Medial Proximal Tibia Plates 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

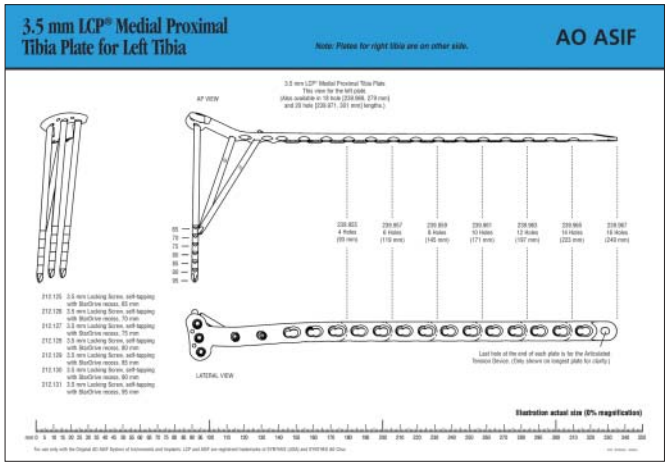
Required Set

105.434	Small Fragment LCP Instrument and Implant Set

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.



Reduce Articular Surface

2
Reduce articular surface

Optional Sets	
115.700	Large Distractor Set
115.720	Large External Fixator Set with Self-Drilling Schanz Screws

Instruments	
394.35	Large Distractor or External Fixator

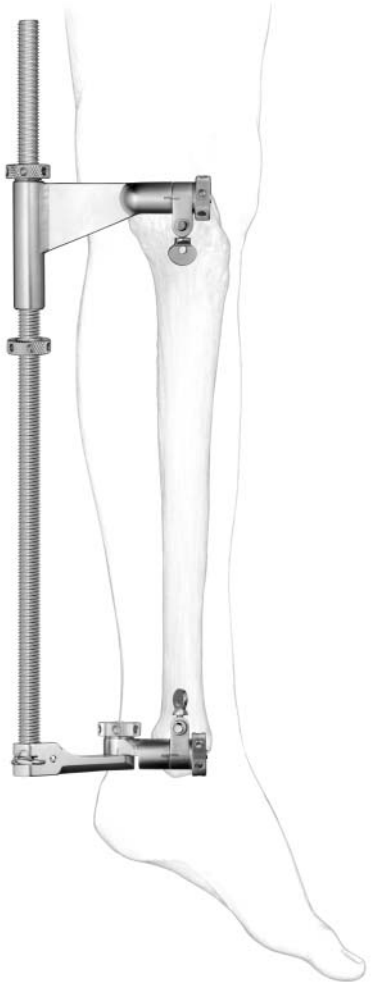
Technique Tip: Prior to reduction, application of an external fixator or Large Distractor may facilitate visualization and reduction of the joint.

Reduce the fracture fragments and confirm reduction using image intensification. Fragments may be reduced using independent Kirschner wires; however, K-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 or 3.5 mm Conical Screws. The articular fragments must be reduced and compression must be obtained prior to applying the 3.5 mm LCP Medial Proximal Tibia 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.

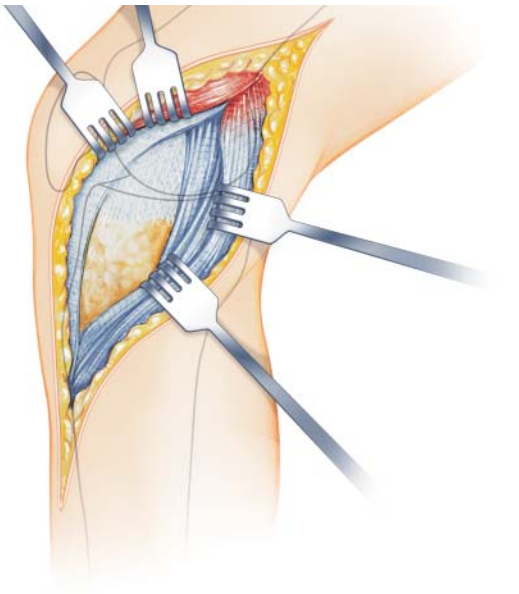


Position Plate

3
Determine plate position

Instruments	
292.20	2.0 mm Kirschner Wire
312.648	2.8 mm Threaded Drill Guide

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
With a 2.8 mm Threaded Drill Guide attached to the central hole in the head of the plate, insert a 2.0 mm Kirschner Wire through a K-wire hole. Readjust the plate position, if necessary. Place a second Kirschner wire in the other K-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

Instrument	
324.214	2.8 mm Percutaneous Drill Bit

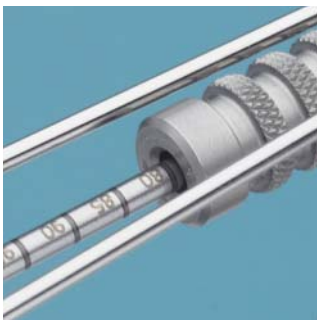
Alternative Instruments	
03.122.001	2.8 mm LCP Drill Guide, long, for 3.5 mm LCP plates
03.122.002	2.8 mm Drill Bit, quick coupling, 248 mm/95 mm calibration
319.09	Depth Gauge

Drill for central proximal screw
While the plate is placed against the bone, use a calibrated 2.8 mm Percutaneous Drill Bit to drill for the locking screw through the 2.8 mm Threaded Drill Guide attached to the central plate hole. It is imperative to drill using fluoroscopy 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;
- That the screw and plate placement will be consistent with the preoperative plan; and
- 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.

Screw length
To determine the appropriate screw length, read the calibration directly from the percutaneous drill bit at the back of the threaded drill guide. Remove the drill bit and drill guide.

The Depth Gauge may also be used to determine screw length. Remove the 2.8 mm Threaded Drill Guide, pass the measuring hook through the hole in the plate, and read the screw length directly from the Depth Gauge.



4

Insert proximal provisional screw continued

Instruments	
314.116	StarDrive Screwdriver Shaft, T15
511.770	Torque Limiting Attachment (TLA), 1.5 Nm
	or
511.773	Torque Limiting Attachment (TLA), 1.5 Nm, quick coupling

Using a Torque Limiting Attachment (TLA), insert a 3.5 mm Conical Screw in the central hole in the plate head to pull the plate to the bone and gain interfragment compression through the plate. Insert a screw that is approximately 5 mm shorter than the measurement from the calibrated drill bit.

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

Alternative Instrument	
314.115	StarDrive Screwdriver, T15

Use the StarDrive Screwdriver to manually insert the appropriate conical screw. Carefully tighten the conical screw, as excessive force is not necessary to produce effective interfragmentary compression.

Reminder: Locking screws are not lag screws. When interfragmentary compression is desired, use 3.5 mm Conical Screws or 3.5 mm Cortex Screws.

Reduce Shaft to Plateau

5

Secure the plate to the plateau

Instruments	
312.648	2.8 mm Threaded Drill Guide
314.116	StarDrive Screwdriver Shaft, T15
324.214	2.8 mm Percutaneous Drill Bit
511.770 or 511.773	Torque Limiting Attachment (TLA), 1.5 Nm Torque Limiting Attachment (TLA), 1.5 Nm, quick coupling

Alternative Instruments	
03.122.001	2.8 mm LCP Drill Guide, long, for 3.5 mm LCP plates
03.122.002	2.8 mm Drill Bit, quick coupling, 248 mm/95 mm calibration

Attach Threaded Drill Guides to the anterior and posterior holes in the head of the plate. Use the calibrated 2.8 mm Percutaneous Drill Bit to drill through the drill guides. Read the screw lengths directly from the percutaneous drill bit at the back of the drill guides.

Remove the 2.0 mm Kirschner Wires and drill guides.

Insert the appropriate length 3.5 mm Locking Screws into the bone with power using the Torque Limiting Attachment and StarDrive Screwdriver Shaft.

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

5

Secure the plate to the plateau continued

Alternative Instrument

314.115	StarDrive Screwdriver, T15

Use the StarDrive Screwdriver 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.

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

6

Reduce shaft to the tibial plateau

Instruments

321.12	Articulated Tension Device*
398.81	Bone Forceps
	or
398.811	Plate Holding Forceps

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.

* Found in the Basic Instrument Set, for LC-DCP and DCP (115.04) or Large Fragment LCP Instrument and Implant Set (115.400) or Periarticular LCP Plating System (01.240.201).

Insert Screws in Plate Shaft

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

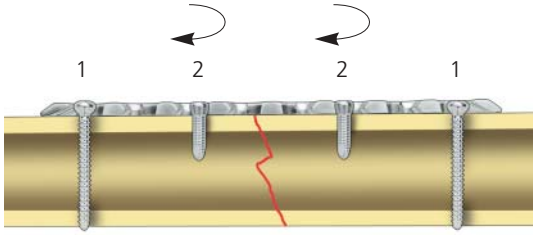
7

Insert screws in plate shaft

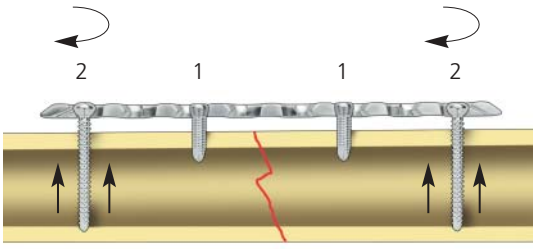
In addition to having threaded locking holes, the plate functions similarly to DCP plates which offer the ability to axially compress fracture fragments. Therefore, a combination of cortex screws and locking screws may be used.

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

7

Insert screws in plate shaft continued

Instruments	
310.25	2.5 mm Drill Bit
314.02	Small Hexagonal Screwdriver
319.09	Depth Gauge
323.36	3.5 mm Universal Drill Guide

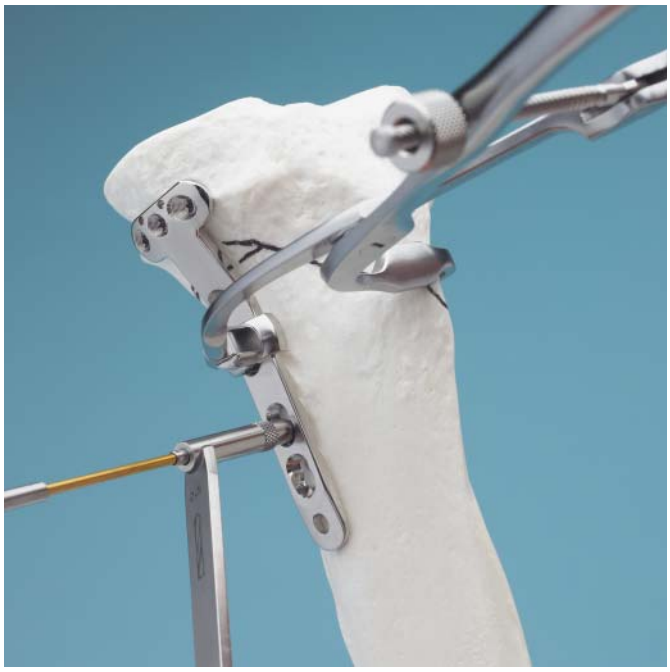
3.5 mm Cortex Screws
Insert as many self-tapping 3.5 mm Cortex Screws as necessary into the distal portion of the plate.

Important: All of the 3.5 mm Cortex Screws must be inserted prior to insertion of 3.5 mm Locking Screws.

Use the 3.5 mm Universal Drill Guide and 2.5 mm Drill Bit to predrill for the 3.5 mm Cortex Screws. 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 using a Depth Gauge. Select and insert the appropriate length 3.5 mm Cortex Screw.



Instruments

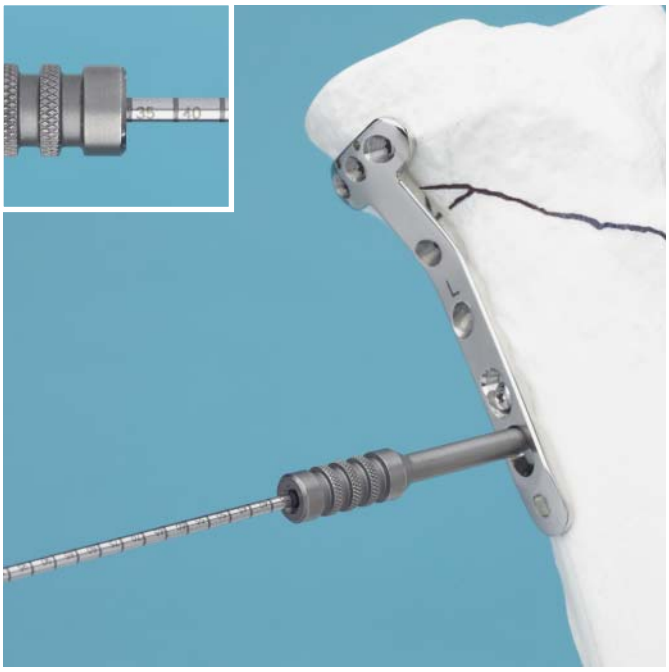
312.648	2.8 mm Threaded Drill Guide
324.214	2.8 mm Percutaneous Drill Bit

3.5 mm Locking Screws

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

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

Read the screw length directly from the drill bit at the back of the Threaded Drill Guide. Remove the drill bit and drill guide.



Alternative Instruments

03.122.001	2.8 mm LCP Drill Guide, long, for 3.5 mm LCP plates
03.122.002	2.8 mm Drill Bit, quick coupling, 248 mm/95 mm calibration
319.09	Depth Gauge

The Depth Gauge may be used to determine screw length. Remove the 2.8 mm Threaded Drill Guide, pass the measuring hook through the hole in the plate, and read the screw length directly from the Depth Gauge.

7

Insert screws in plate shaft continued

Instruments

314.116	StarDrive Screwdriver Shaft, T15
511.770	Torque Limiting Attachment (TLA), 1.5 Nm
	or
511.773	Torque Limiting Attachment (TLA), 1.5 Nm, quick coupling

Insert the appropriate length locking screw into the bone with power, using the Torque Limiting Attachment (TLA) and StarDrive Screwdriver Shaft.

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

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.

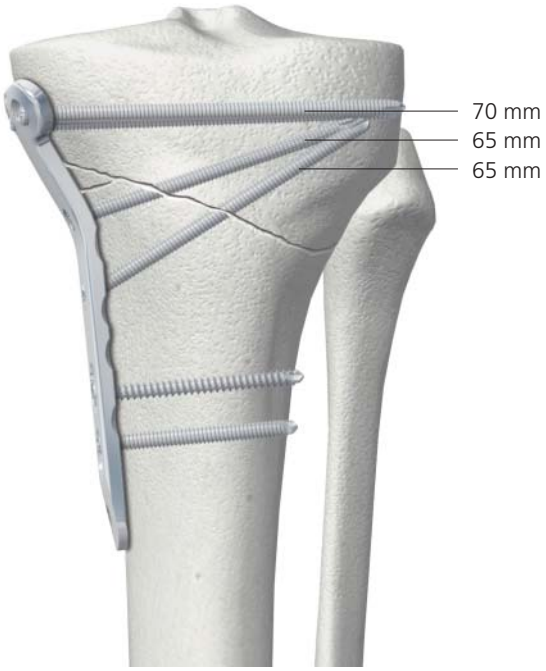
8

Insert 3.5 mm 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.

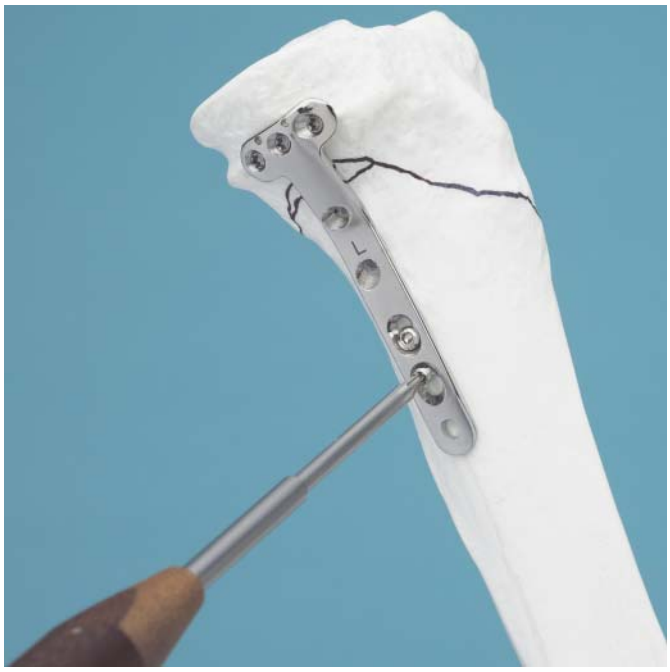


Suggested screw lengths to achieve desired screw convergence.

8

Insert 3.5 mm Locking Screws in the angled holes continued

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



Screws Used with the 3.5 mm LCP Medial Proximal Tibia Plate

3.5 mm Locking Screw, self-tapping, with StarDrive recess
– Threaded conical head
– Fully threaded shaft
– StarDrive recess
– Self-tapping tip



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



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



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



3.5 mm Locking and Conical Screw 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 guide 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.

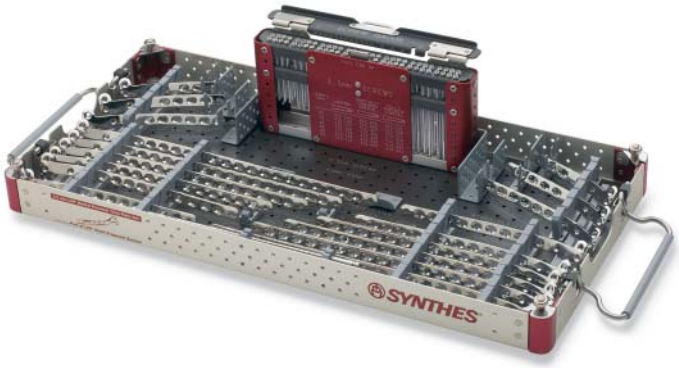
3.5 mm LCP Medial Proximal Tibia Plate Implant Set (01.120.442)

Graphic Case

690.392 3.5 mm LCP Medial Proximal Tibia Plate Set Graphic Case

Instruments

324.214 2.8 mm Percutaneous Drill Bit, quick coupling, 200 mm, 100 mm calibration, 2 ea.



Implants

3.5 mm LCP Medial Proximal Tibia Plates◊

	Holes	Length (mm)	
239.954	4	93	right
239.955	4	93	left
239.956	6	119	right
239.957	6	119	left
239.958	8	145	right
239.959	8	145	left
239.960	10	171	right
239.961	10	171	left
239.962	12	197	right
239.963	12	197	left
239.964	14	223	right
239.965	14	223	left
239.966	16	249	right
239.967	16	249	left
239.968	18	275	right
239.969	18	275	left
239.970	20	301	right
239.971	20	301	left

◊ Available nonsterile or sterile-packed. Add 'S' to catalog number to order sterile product.

Sterilization Parameters for Set (01.120.442)

This Synthes set with all additionally available items, as marked in the case, can be sterilized by the following parameters. For more information, please refer to graphic case package insert.

Method	Cycle	Temperature	Exposure Time
Steam	Prevacuum (Wrapped)	132°–135°C (270°–275°F)	8 Minutes
Steam	Gravity Displacement (Wrapped)	132°–135°C (270°–275°F)	22 Minutes

Implants continued

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

	Length (mm)		Length (mm)
212.125	65	212.129	85
212.126	70	212.130	90
212.127	75	212.131	95
212.128	80		

3.5 mm Conical Screws, self-tapping, with StarDrive recess, fully threaded, 2 ea.

	Length (mm)		Length (mm)
212.325	65	212.329	85
212.326	70	212.330	90
212.327	75	212.331	95
212.328	80		

3.5 mm Conical Screws, self-tapping, with StarDrive recess, partially threaded, 2 ea.

	Length (mm)		Length (mm)
212.425	65	212.429	85
212.426	70	212.430	90
212.427	75	212.431	95
212.428	80		

Required Additional Set

105.434	Small Fragment LCP Instrument and Implant Set, with self-tapping screws

Recommended Additional Sets

01.100.002	3.5 mm Low Profile Pelvic System Implant Set (for longer length 3.5 mm cortex screws up to 150 mm)
105.90	Bone Forceps Set
105.909	Periarticular Reduction Forceps Set
115.700	Large Distractor Set
115.720	Large External Fixator Set with Self-Drilling Schanz Screws

Also Available

394.35	Large Distractor
511.770	Torque Limiting Attachment (TLA), 1.5 Nm

SYNTHES®

Synthes (USA)
1302 Wrights Lane East
West Chester, PA 19380
Telephone: (610) 719-5000
To order: (800) 523-0322
Fax: (610) 251-9056

Synthes (Canada) Ltd.
2566 Meadowpine Boulevard
Mississauga, Ontario L5N 6P9
Telephone: (905) 567-0440
To order: (800) 668-1119
Fax: (905) 567-3185

www.synthes.com

Printed in U.S.A. 11/06 J5954-A