Large Fragment LCP Instrument and Implant Set. Part of the Synthes Large Fragment LCP System.

Technique Guide

SYNTHES® Instruments and implants approved by the AO Foundation

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Image intensifier control

Large Fragment LCP Instrument and Implant Set

The aim of any surgical fracture treatment is to reconstruct the anatomy and restore its function. According to the AO, internal fixation is distinguished by anatomic reduction, stable fixation, preservation of blood supply and early, functional mobilization. Plate and screw osteosynthesis has been established as clinically beneficial for quite some time. Clinical results have improved by using internal fixation with angular stability (internal fixators) in complicated fractures and in osteopenic bone.

The Synthes Locking Compression Plate (LCP) is part of a stainless steel and titanium plate and screw system that merges locking screw technology with conventional plating techniques. The Locking Compression Plate System has many similarities to conventional plate fixation methods, but with a few important improvements. Locking screws provide the ability to create a fixed-angle construct while utilizing familiar AO plating techniques. A fixed-angle construct provides improved fixation in osteopenic bone or multi-fragment fractures where traditional screw purchase is compromised. LCP constructs do not rely on plate-to-bone compression to maintain stability, but function similarly to multiple small multi-angled blade plates.

The following points distinguish treatment using Locking Compression Plate technology:

- Allows fracture treatment using conventional plating with conventional cortex or cancellous bone screws;
- Allows fracture treatment using locked plating with bicortical or unicortical locking screws;
- Permits the combination of conventional and locking screw techniques.

Note: The LCP system applies to many different plate types and is therefore suitable for a large number of fracture types. For that reason, this technique guide does not deal with any specific fracture type. For more information please refer to *AO Principles of Fracture Management*,[1] to AO courses (www.ao-asif.ch), and to the appropriate plate specific technique guide.

1. Thomas P. Rüedi, et al, ed., *AO Principles of Fracture Management*, New York: Thieme, 2000.

Locking compression plates

The Locking Compression Plates (LCP) have these LC-DCP features:

– 50° of longitudinal screw angulation
– 14° of transverse screw angulation
– Uniform hole spacing
– Load (compression) and neutral screw positions

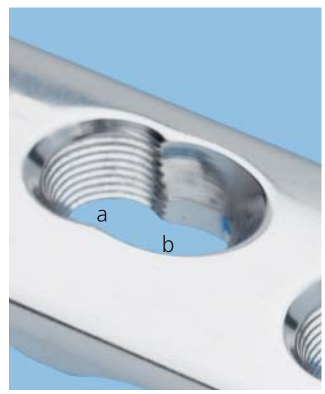
224.591

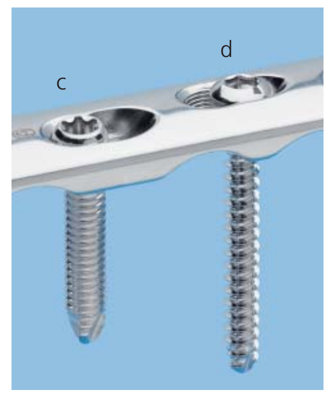
Combination locking and compression (Combi) holes

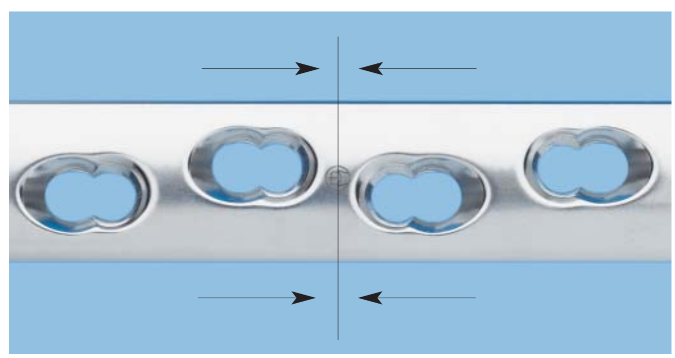
The Combi holes allow placement of conventional cortex and cancellous bone screws on one side or threaded conical locking screws on the opposite side of each hole.

a. Threaded hole section for locking screws
b. DCU hole section for conventional screws
c. Locking screw in threaded side of Combi hole
d. Cortex screw in compression side of Combi hole

Note: Combi holes in straight plates are oriented with the conventional portion of each hole further from the middle of the plate. This facilitates utilization of LCP plates for dynamic compression using traditional AO techniques.

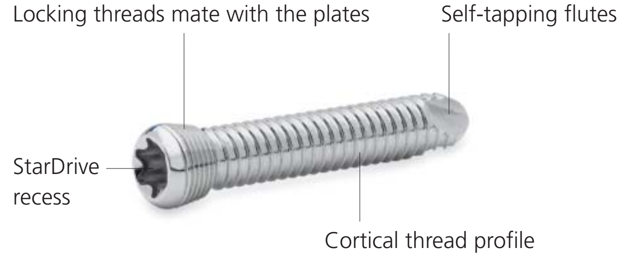






4.0 mm and 5.0 mm locking screws, self-tapping, with StarDrive recess

The locking screws mate with the threaded portion of the Combi holes to form a fixed-angle construct.



Locking Screws

Locking screw design
The screw design has been modified, from standard 4.5 mm cortex screw design, to enhance fixation and facilitate the surgical procedure.

New features include:

Conical screw head
The conical head facilitates alignment of the locking screw in the threaded plate hole to provide a fixed angle connection between the screw and the plate.

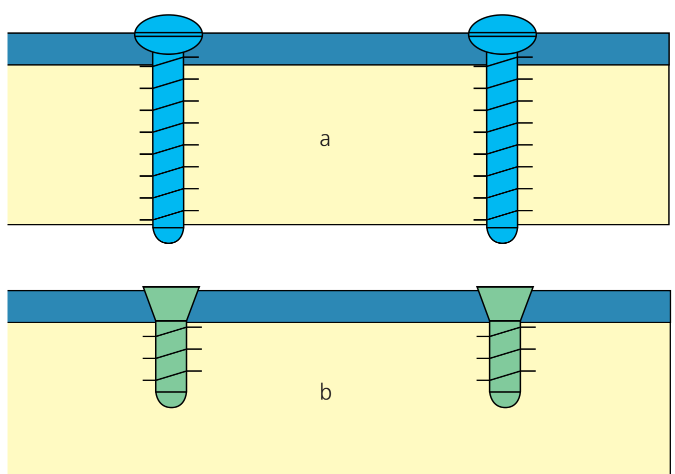
Large core diameter
The large core diameter improves bending and shear strength of the screw, and distributes the load over a larger area in the bone.

Thread profile
The shallow thread profile of the locking screws results from the larger core diameter, and is acceptable because locking screws do not rely solely on screw purchase in the bone to maintain stability.

Drive mechanism
The StarDrive recess provides improved torque transmission to the screw, while retaining the screw without the use of a holding sleeve.

Unicortical screw fixation
Bicortical screw fixation has long been the traditional method of compressing a plate to the bone where friction between the plate and the bone maintains stability. Screw stability and load transfer are accomplished at two points along the screw: the near and far cortices.

Unicortical locking screws provide stability and load transfer only at the near cortex due to the threaded connection between the plate and the screw. Screw stability and load transfer are accomplished at two points along the screw: the screw head and near cortex. Because the screw is locked to the plate, fixation does not rely solely on the pullout strength of the screw or on maintaining friction between the plate and the bone.



a. Bicortical screws require two (2) cortices to achieve stability
b. Unicortical screws utilize the locked screw head and the near cortex to achieve stability

AO Principles

In 1958, the AO formulated four basic principles which have become the guidelines for internal fixation.[2] Those principles, as applied to the Large Fragment Compression Plate (LCP), are:

Anatomic reduction
Exact screw placement utilizing wire sleeves facilitates restoration of the articular surface.

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

Preservation of blood supply
Tapered end for submuscular plate insertion, improving tissue viability. Limited-contact plate design reduces plate-to-bone contact, minimizing vascular trauma.

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

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

Indications

The Synthes Locking Compression Plates—Narrow and Broad, are intended for fixation of various long bones, such as the humerus, femur and tibia. They are also for use in fixation of periprosthetic fractures, osteopenic bone, and nonunions or malunions.

The Synthes Locking Compression Plates—T-Plates are intended to buttress metaphyseal fractures of the proximal humerus, medial tibial plateau and distal tibia. They are also for use in fixation of osteopenic bone and fixation of nonunions and malunions.

The Synthes LCP Proximal Tibia Plate is intended for treatment of nonunions, malunions, and fractures of the proximal tibia, including simple, comminuted, lateral wedge, depression, medial wedge, bicondylar, combinations of lateral wedge and depression, periprosthetic, and fractures with associated shaft fractures.

Bone Void Fillers

Whether from traumatic injury or surgical manipulations, filling bony defects with autogenic, allogenic or synthetic bone is often needed. The osteoconductive properties in these bone void fillers bridge the bone gap and provide a scaffold for new bone formation. Autografts and allografts additionally provide osteoinductive potential* to induce new bone formation.

Synthetic and allograft based bone void fillers are available in several formulations to meet bone grafting requirements. They include:
– Calcium phosphate injectable paste or moldable putty
– ß-Tricalcium phosphate granules or preformed blocks and wedges, rectangular and semi-circular
– Calcium sulfate pellets
– Allograft demineralized bone matrix in paste, putty, and morselized corticocancellous mix

Selection of bone void fillers is generally based on surgeon preference as well as other desired properties such as: resorption/remodeling time, handling characteristics, osteoconductive and osteoinductive properties, etc.

Autogenic, allogenic, or synthetic bone grafts are indicated for use in bony voids or gaps that are not intrinsic to the stability of the bony structure. Following placement in the bony void, bone void fillers will be replaced with bone during the healing process.

For more information on bone graft substitutes, please contact your Synthes Consultant.

* It is unknown how the osteoinductive potential of allograft bone void fillers that is demonstrated in the athymic mouse may correlate with human clinical results.

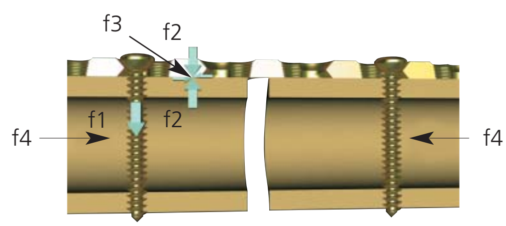
Fixation Principles—Conventional Plating

The following pages show the biomechanical features of conventional plating techniques, locked or bridge plating techniques, and a combination of both.

Note: Please refer also to the *AO Principles of Fracture Management*,[3] to AO courses (www.ao-asif.ch), and to the corresponding special literature.

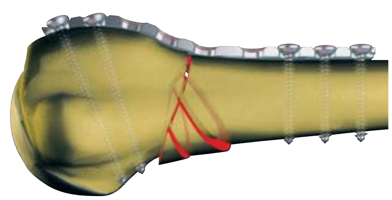
Construct stability

The tensile force (f1) originating from tightening the screws compresses the plate onto the bone (f2). The developing frictional force (f3) between the plate and the bone leads to stable plate fixation. To ensure construct stability, the frictional force must be greater than the patient load (f4).



Anatomic contouring of the plate

The aim of internal fixation is anatomic reduction, particularly in articular fractures. Therefore, the plate must be contoured exactly to match the shape of the bone.

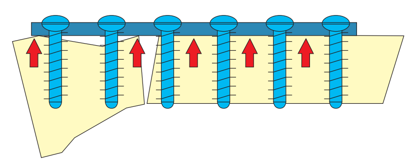


Lag screw

Interfragmentary compression is accomplished with a lag screw. This is particularly important in intra-articular fractures which require a precise reduction of the joint surfaces. Lag screws can be angled in the plate hole, allowing placement of the screw perpendicular to the fracture line.

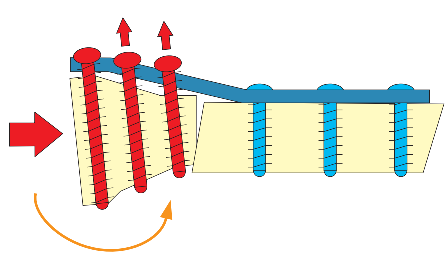
Primary loss of reduction

In conventional plating, even though the bone fragments are correctly reduced prior to plate application, fracture dislocation will result if the plate does not precisely fit the bone. In addition, if the lag screw is not placed perpendicular to the fracture line, shear forces will be introduced. These forces may also cause loss of reduction.



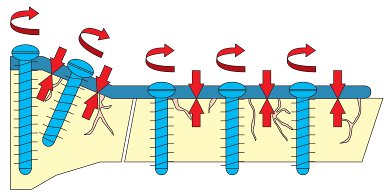
Secondary loss of reduction

Under axial load, postoperative secondary loss of reduction may occur by toggling of the screws in the plate. Since cortex screws do not lock to the plate, the screws cannot oppose the acting force and may loosen, or be pushed axially through the plate holes.



3. Thomas P. Rüedi, et al, ed., *AO Principles of Fracture Management*, New York: Thieme, 2000.

Blood supply to the bone
Construct stability depends upon compressing the plate to the bone. Therefore, the periosteum is compressed under the plate, reducing or even interrupting blood supply to the bone. The result is delayed bone healing due to temporary osteoporosis underneath the plate.



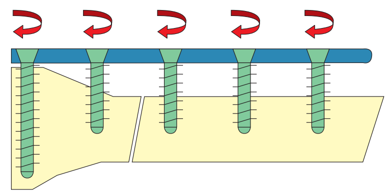
Osteoporosis
Due to a compromised cortical structure, screws cannot be tightened sufficiently to obtain the compression needed for a stable construct. This may cause loosening of the screws and loss of stability, and may cause loss of reduction.

Conventional plating achieves good results in:
1. Good quality bone; and
2. Fractures which are traditionally fixed with lag screws to achieve direct bone healing.

Special attention must be paid to:
1. Osteoporotic bone—during rehabilitation, the load should be kept to a minimum to prevent postoperative loss of reduction; and
2. Multifragment fractures—the anatomic reduction may be accomplished at the expense of extensive soft tissue trauma and denudation.

Fixation Principles—Locked Plating

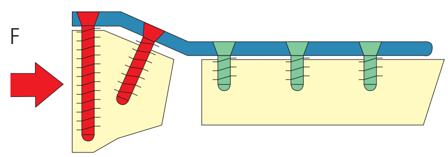
Screws lock to the plate, forming a fixed-angle construct.



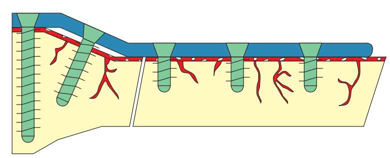
Maintenance of primary reduction
Once the locking screws engage the plate, no further tightening is possible. Therefore, the implant locks the bone segments in their relative positions regardless of degree of reduction.

Precontouring the plate minimizes the gap between the plate and the bone, but an exact fit is not necessary for implant stability. This feature is especially advantageous in minimally or less invasive plating techniques because these techniques do not allow exact contouring of the plate to the bone surface.

Stability under load
By locking the screws to the plate, the axial force is transmitted over the length of the plate. The risk of a secondary loss of reduction is reduced.



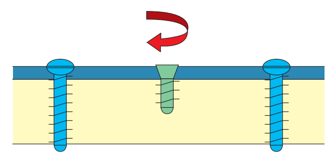
Blood supply to the bone
Locking the screw into the plate does not generate plate-to-bone compression. Therefore, the periosteum will be protected and the blood supply to the bone preserved.



Combining Conventional and Locked Plating Techniques— The Locking Compression Plate (LCP)

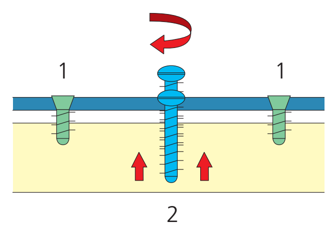
The combination of conventional compression plating and locked plating techniques enhances plate osteosynthesis. The result is a Combi hole that, depending on the indication, allows conventional compression plating, locked plating, or a combination of both.

Internal fixation using a combination of locking screws and standard screws



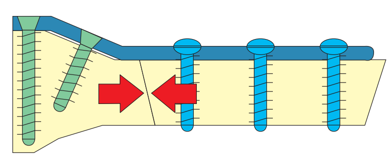
Note: If a combination of cortex and locking screws is used, a cortex screw should be inserted first to pull the plate to the bone.

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



Note: If a locking screw is used first, care should be taken to ensure that the plate is held securely to the bone to avoid spinning of the plate about the bone.

Dynamic compression
In this example, once the metaphyseal fragment has been fixed with locking screws, the fracture can be dynamically compressed using a conventional screw in the DCU portion of the Combi hole.



Locked and conventional plating techniques

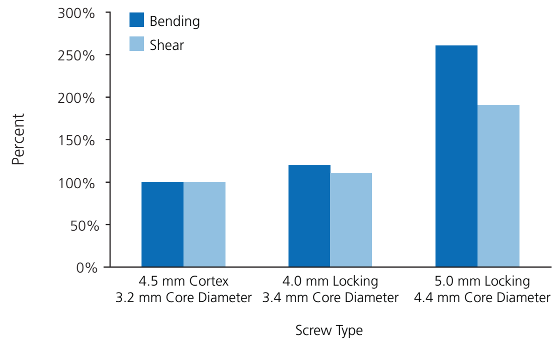
– Lag screws can be used to anatomically reduce the fracture and promote absolute stability.
– The behavior of a locking screw is not the same as that of a lag screw. With the locked plating technique, the implant locks the bone segments in their relative positions regardless of how they are reduced. Therefore, anatomical reduction must be achieved prior to implanting any locking screws.
– A plate used as a locked plate does not produce any additional compression between the plate and the bone.
– The unicortical insertion of locking screws creates a construct that is at least as strong as a construct made with bicortical insertion of conventional screws.

Screw Selection

The 4.0 mm and 5.0 mm locking screws are suitable for both diaphyseal and metaphyseal fractures. The 5.0 mm locking screw was designed as the principle screw for use with LCP. It provides greater bending and shear strength than 4.0 mm locking screws (Chart 1). The 4.0 mm locking screw, with a 3.4 mm core diameter versus the 4.4 mm core diameter of the 5.0 mm locking screw, was developed to provide the option of placing a smaller diameter screw in small-statured patients or in cases where it is desirable to leave a smaller hole on explantation.

Chart 1*

Comparative Bending and Shear Strength of Locking Screws Relative to 4.5 mm Cortex Screws



Locking screw fixation provides the greatest advantage over conventional screw fixation in poor quality bone. Even though 5.0 mm locking screws are significantly stronger in bending and shear than 4.0 mm locking screws, the behavior of both locking screw constructs provides relatively similar results in mechanical tests using 15 lb/ft³ foam, which simulates osteopenic bone, under axial load (Chart 2). Both bicortical locking screw constructs outperform a construct with conventional 4.5 mm cortex screws. When all constructs are tested in 40 lb/ft³ foam simulating good quality cortical bone, both locking and conventional constructs yield similar results when loaded axially (Chart 3).

Chart 2*

Locked Plate and Screw Testing (15 lb/ft³ foam)

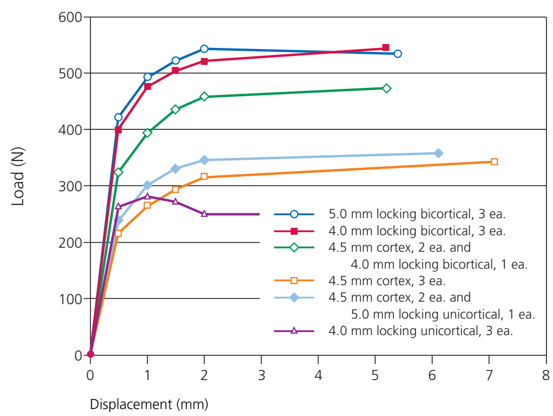
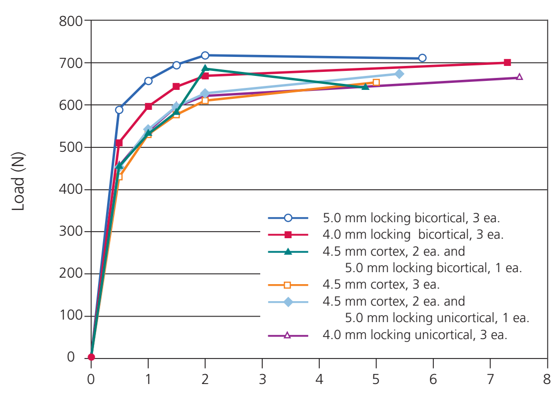


Chart 3*

Locked Plate and Screw Testing (40 lb/ft³ foam)



* Data is on file at Synthes. Data represents test results from stainless steel implants only.

1
Plate selection

The plates are available in various lengths and configurations similar to the Synthes basic plate set. If necessary, use a bending template to determine plate length and configuration.

2
Contouring

Use the current bending instruments to contour the locking compression plate to the anatomy.

Note: The plate holes have been designed to accept some degree of deformation. When bending the plate, place the bending irons on two consecutive holes. This ensures that the threaded holes will not be distorted. Significant distortion of the locking holes will reduce locking effectiveness.

Important: Please refer also to the *AO Principles of Fracture Management*.[4]

4. Thomas P. Rüedi, et al, ed., *AO Principles of Fracture Management*, New York: Thieme, 2000. pp 181, 182.

3
Reduction and temporary plate placement


311.449

Instruments

311.449	Push-Pull Reduction Device
324.075	Threaded Plate Holder

The plate may be temporarily held in place with standard plate holding forceps or the push-pull reduction device.

Note: The middle of the plate should be positioned over the fracture site if compression of the fracture fragments is desired.

The push-pull reduction device is designed to temporarily hold the plate to the bone through a plate hole. The device is self-drilling and connects with the Synthes quick coupling for power insertion. Insert into the near cortex only. After power insertion, turn the collet clockwise until it pulls the plate securely to the bone.

Note: Care should be taken to avoid inserting this device in a Combi hole that will be needed immediately for plate fixation. Also, if the chosen Combi hole is needed for placement of a locking screw, it is desirable to place the push-pull reduction device in the conventional portion of the Combi hole so that it does not interfere with the correct placement of the locking screw.

Alternatively, the threaded plate holder can be used as an aid to position the plate on the bone. The plate holder may also function as an insertion handle for use with minimally invasive plating techniques.

4
Screw insertion

Instrument	
323.46	4.5 mm Universal Drill Guide

Determine whether conventional cortex screws, cancellous bone screws or locking screws will be used for fixation. A combination of all may be used.

Note: If a combination of cortex, cancellous and locking screws is used, a conventional screw should be used first to pull the plate to the bone.

Warning: If a locking screw is used first, care should be taken to ensure that the plate is held securely to the bone to avoid spinning of the plate about the bone as the locking screw is tightened to the plate.

Insertion of a cortex or cancellous bone screw
Use the 4.5 mm universal drill guide for an eccentric (compression) or neutral (buttress) insertion of cortex screws.

Note: The 4.5 mm LC-DCP Drill Guide (323.45) and the 4.5 mm DCP Drill Guide (322.44) are NOT suitable for use with LCP plates.

Neutral insertion of a conventional screw
When pressing the universal drill guide into the DCU portion of the Combi hole, it will center itself and allow neutral predrilling.

Dynamic compression, eccentric insertion of a cortex screw
To drill a hole for dynamic compression, place the universal drill guide eccentrically at the edge of the DCU portion of the Combi hole, without applying pressure. Tightening of the cortex screws will result in dynamic compression corresponding to that of LC-DCP plates.

Neutral position

Dynamic compression

4
Screw insertion continued

Instruments	
310.31	3.2 mm Drill Bit
310.431	4.3 mm Drill Bit
312.445	3.2 mm Threaded Drill Guide (for 4.0 mm screws)
312.449	4.3 mm Threaded Drill Guide (for 5.0 mm screws)
314.118	StarDrive Screwdriver, T25
314.119	StarDrive Screwdriver Shaft, T25
319.10	Depth Gauge
511.771 or	Torque Limiting Attachment, 4 Nm
511.774	Torque Limiting Attachment, 4 Nm, for AO Reaming Coupler

Insertion of 4.0 mm and 5.0 mm locking screws

Reminder: The locking screw is not a lag screw. Use nonlocking screws when requiring a precise anatomical reduction (e.g., joint surfaces) or interfragmentary compression. Before inserting the first locking screw, perform anatomical reduction and fix the fracture with lag screws, if necessary. After the insertion of locking screws, an anatomical reduction will no longer be possible without loosening the locking screw.

Screw the appropriate threaded drill guide for 4.0 mm screws and for 5.0 mm screws into an LCP plate hole until fully seated (a). The use of a threaded drill guide is critical to ensure proper mating of the locking screw in the threaded portion of the Combi hole. The drill guide also has internal threads so guides can be assembled in series to increase length for percutaneous use.


a

Warning: Do not try to bend the plate using the threaded drill guide because damage may occur to the threads.

Notes:
Since the direction of a locking screw is determined by plate design, final screw position may be verified with a guide wire before insertion. This is especially important when the plate has been contoured or applied in metaphyseal regions around joint surfaces.

The 5.0 mm cannulated locking screws and 5.0 mm cannulated conical screws for the locking periarticular plating system are compatible with the large fragment LCP plates.

Use the appropriate drill bit (3.2 mm for 4.0 mm screws and 4.3 mm for 5.0 mm screws) to drill to the desired depth (b).

Remove the drill guide.

Use the depth gauge to determine screw length (c).

Insert the locking screw under power using the torque limiting attachment and StarDrive screwdriver shaft (d).

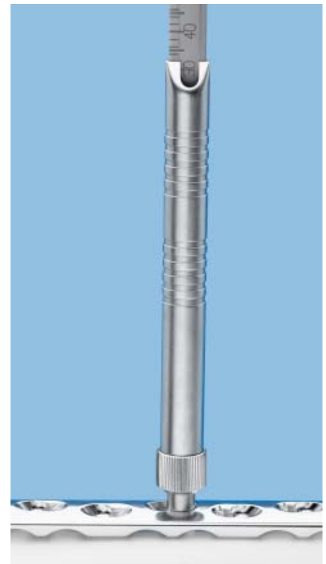
The torque limiting attachment controls the tightening torque to 4 Nm:
– Ensures that enough torque is used to minimize the risk of the locking screw backing out of the plate;
– Avoids locking the screw to the plate at full speed and minimizes the risk of cold-welding the screw to the plate;
– DO NOT fully insert the locking screws by power without using the torque limiting attachment.

Note: The screw is securely locked to the plate when a click is heard.

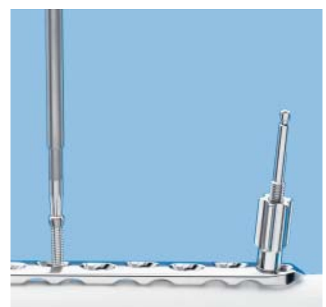
Warning: Locking screws may be partially inserted using power equipment alone. However, never use power equipment to seat the locking screws into the plate without a torque limiting attachment (TLA).

Alternative method of locking screw insertion
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.


b


c


d


Alternative method

Screw Placement Verification

5
Screw placement verification

Instruments

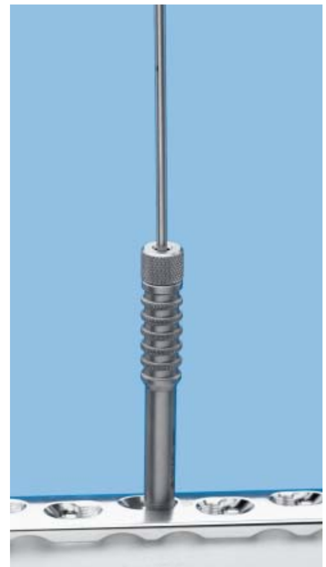
292.656	2.0 mm Non-Threaded Guide Wire
323.021	Direct Measuring Device
323.046	2.0 mm Wire Sleeve

Since the direction of a locking screw is determined by plate design, final screw position may be verified with a guide wire prior to insertion. This becomes especially important when the plate has been contoured or applied in metaphyseal regions around joint surfaces.

With the threaded drill guide in place, thread the 2.0 mm wire sleeve into the threaded drill guide until fully seated (a).

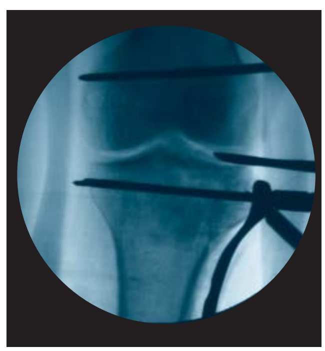
a

Insert a 2.0 mm non-threaded guide wire through the wire sleeve to the desired depth (b).



b

Verify guide wire placement under image intensification to determine if final screw placement is acceptable (c).



c

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

Measurement may be taken by sliding the tapered end of the direct measuring device over the guide wire down to the wire sleeve (d).

d

Remove the direct measuring device, guide wire and wire sleeve, leaving the threaded drill guide intact.

Use the appropriate size drill bit to drill the near cortex. Remove the threaded drill guide. Insert the appropriate length locking screw.

Optional Bone Void Filler Insertion, Postoperative Treatment and Implant Removal

Optional bone void filler insertion

Determine if there is a bone void that requires filling to maintain reduction and aid in bone healing. Use autogenous bone graft or a synthetic bone graft or allograft product (see page 7).

Postoperative treatment

Postoperative treatment with locking compression plates does not differ from conventional internal fixation procedures.

Implant removal

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

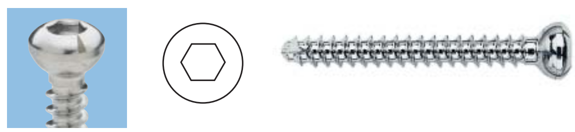
Screws

4.0 mm Locking Screws, self-tapping

Create a locked, fixed-angle screw/plate construct
- Available in 14 mm–62 mm lengths (2 mm increments)
- Threaded conical head
- Fully-threaded shaft
- Self-tapping tip
- Available in stainless steel or titanium alloy**

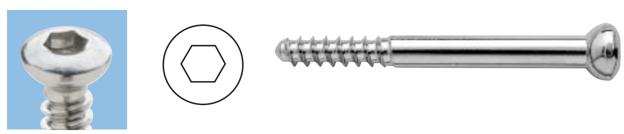
4.5 mm Cortex Screws

- May be used in the DCU portion of the Combi holes in the plate shaft
- Compress the plate to the bone or create axial compression
- Self-tapping tip
- Available in stainless steel or titanium



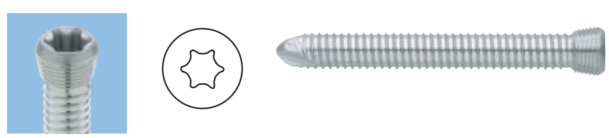
4.5 mm Shaft Screws

- May be used in the DCU portion of the Combi hole in the plate shaft or in round locking holes
- Compress the plate to the bone or create axial compression
- Partially-threaded shaft provides interfragmentary compression
- Available in stainless steel or titanium



5.0 mm Locking Screws, self-tapping

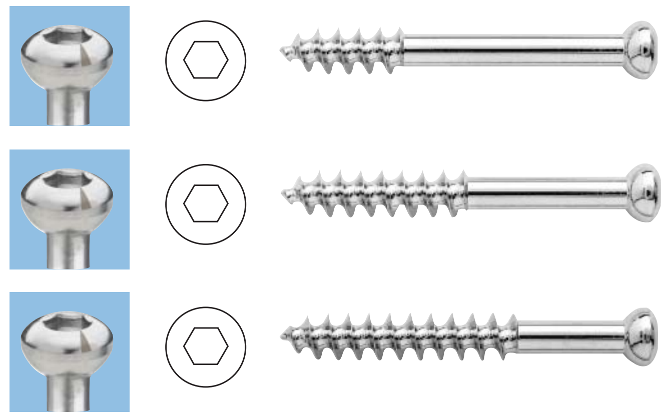
Create a locked, fixed-angle screw/plate construct
- Available in 14 mm–50 mm lengths (2 mm increments)
- Available in 55 mm–90 mm lengths (5 mm increments)
- Threaded conical head
- Fully-threaded shaft
- Self-tapping tip
- Available in stainless steel or titanium alloy**



** Ti-6Al-7Nb

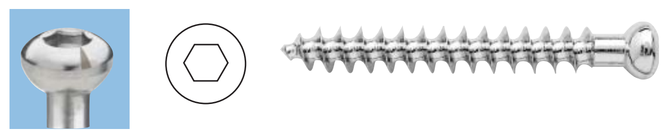
6.5 mm Cancellous Bone Screws, partially threaded

- Compress the plate to the bone and provide interfragmentary compression
- May be used in the DCU portion of the first and last Combi holes of the 4.5 mm narrow and broad LCP plates
- Available in 16 mm, 24 mm and 32 mm thread lengths
- Available in stainless steel or titanium



6.5 mm Cancellous Bone Screws, fully threaded

- Compress the plate to the bone
- May be used in the DCU portion of the first and last Combi holes of the 4.5 mm narrow and broad LCP plates
- Available in stainless steel or titanium



Plates

4.5 mm Narrow LCP Plates
– Available with 2–22 holes
– Available in stainless steel or titanium


224.591

4.5 mm Broad LCP Plates
– Available with 6–22 holes
– Available in stainless steel or titanium


226.591

4.5 mm LCP Proximal Tibia Plates*
– Available in stainless steel with 4, 6, 8, 10, 12, 14, 16, 18 and 20 shaft holes†
– Available in titanium with 4, 6, 8, 10, 12 and 14 shaft holes
– Available in left and right configurations


240.039

4.5 mm LCP T-Plates
– Available with 4, 6 and 8 shaft holes
– Available in stainless steel or titanium


240.161

* Also available
† Plates with 16, 18 and 20 holes available sterile only

Selected Instruments

310.31 3.2 mm Drill Bit

310.431 4.3 mm Drill Bit

312.445 3.2 mm Threaded Drill Guide

312.449 4.3 mm Threaded Drill Guide

314.118 StarDrive Screwdriver, T25

314.119 StarDrive Screwdriver Shaft, T25

323.021 Direct Measuring Device

323.046 2.0 mm Wire Sleeve

324.075 Threaded Plate Holder

397.706 Handle, for AO Reaming Coupler Connection

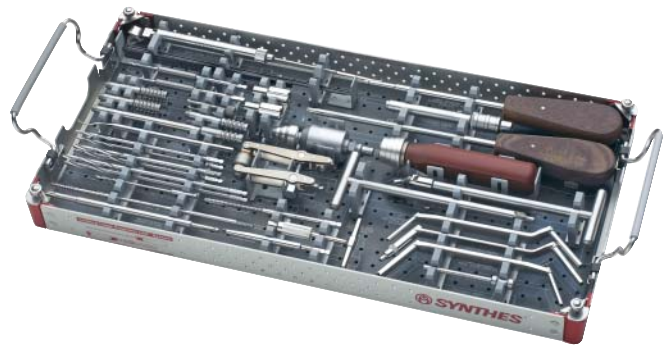
511.774 Torque Limiting Attachment (TLA), 4 Nm,
for AO Reaming Coupler

Large Fragment LCP Instrument and Implant Sets with 4.0 mm and 5.0 mm Locking Screws

Stainless Steel (115.400) and Titanium (146.400)

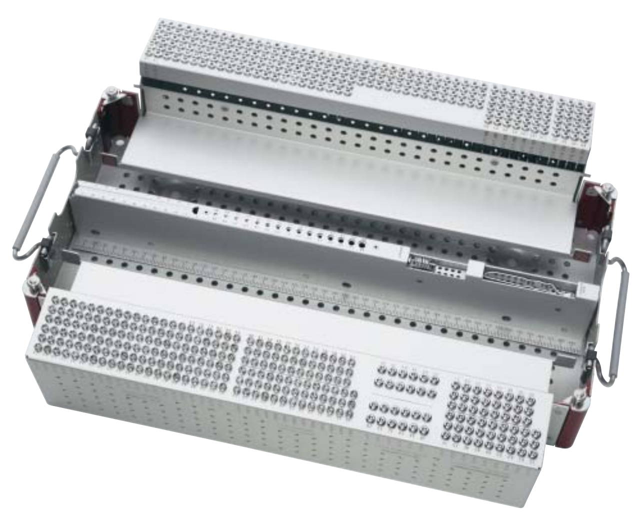
Graphic Case

690.360	Large Fragment LCP Implant Set Graphic Case (for stainless steel implants)
690.362	Large Fragment LCP Screw Set Graphic Case (for stainless steel screws)
690.363	Large Fragment LCP Instrument Set Graphic Case
690.420	Large Fragment LCP Titanium Implant Set Graphic Case
690.425	Large Fragment LCP Titanium Screw Set Graphic Case



Instruments

292.656	2.0 mm Non-Threaded Guide Wire, 230 mm, spade point, 10 ea.
310.19	2.0 mm Drill Bit, 100 mm, quick coupling, 2 ea.
310.31	3.2 mm Drill Bit, 145 mm, quick coupling, 2 ea.
310.431*	4.3 mm Drill Bit, 180 mm, quick coupling, for 5.0 mm Locking Screws, 2 ea.
310.44	4.5 mm Drill Bit, 145 mm, quick coupling, 2 ea.
310.99	Countersink, for 4.5 mm and 6.5 mm screws
311.44	T-Handle, with quick coupling
311.449*	Push-Pull Reduction Device, for use with 4.5 mm LCP plates, 2 ea.
311.46	Tap for 4.5 mm screws, 2 ea.
311.66	Tap for 6.5 mm Cancellous Bone Screws, 2 ea.
312.445*	3.2 mm Threaded Drill Guide, 2 ea.
312.449*	4.3 mm Threaded Drill Guide, 4 ea.
312.46	4.5 mm/3.2 mm Double Drill Sleeve
312.48	4.5 mm/3.2 mm Insert Drill Sleeve
312.67	6.5 mm/3.2 mm Double Drill Sleeve
314.11	Holding Sleeve
314.118*	StarDrive Screwdriver, T25, self-retaining, 245 mm
314.119*	StarDrive Screwdriver Shaft, T25, self-retaining, 165 mm, for use with Torque Limiting Attachment (511.771 or 511.774)
314.15	Large Hexagonal Screwdriver Shaft
314.27	Large Hexagonal Screwdriver
319.10	Depth Gauge, for 4.5 mm and 6.5 mm screws
319.39	Sharp Hook
319.97	Screw Forceps



* LCP-specific instruments

Note: For additional information, please refer to package insert.

Large Fragment LCP Instrument and Implant Sets with 4.0 mm and 5.0 mm Locking Screws

Stainless Steel (115.400) and Titanium (146.400) continued

Instruments continued

321.12	Articulated Tensioning Device
321.15	Socket Wrench with universal joint, 11.0 mm width across flats
323.021*	Direct Measuring Device
323.046*	2.0 mm Wire Sleeve, 2 ea.
323.46	4.5 mm Universal Drill Guide
324.075*	Threaded Plate Holder
	Bending Templates
329.92	12 holes
329.97	7 holes
329.99	9 holes
397.706*	Handle, for AO Reaming Coupler connection
511.774*	Torque Limiting Attachment, 4 Nm, for AO Reaming Coupler

Implants

4.0 mm Locking Screws, self-tapping, with T25 StarDrive recess, 3 ea.

Stainless Steel	Titanium	Length (mm)
02.204.014	04.204.014	14
02.204.016	04.204.016	16
02.204.018	04.204.018	18
02.204.020	04.204.020	20
02.204.022	04.204.022	22
02.204.024	04.204.024	24
02.204.026	04.204.026	26
02.204.028	04.204.028	28
02.204.030	04.204.030	30
02.204.032	04.204.032	32
02.204.034	04.204.034	34
02.204.036	04.204.036	36
02.204.038	04.204.038	38
02.204.040	04.204.040	40
02.204.042	04.204.042	42
02.204.044	04.204.044	44
02.204.046	04.204.046	46
02.204.048	04.204.048	48
02.204.050	04.204.050	50
02.204.052	04.204.052	52

* LCP-specific instruments

4.0 mm Locking Screws, self-tapping, with T25 StarDrive recess, 3 ea. continued

Stainless Steel	Titanium	Length (mm)
02.204.054	04.204.054	54
02.204.056	04.204.056	56
02.204.058	04.204.058	58
02.204.060	04.204.060	60
02.204.062	04.204.062	62

5.0 mm Locking Screws, self-tapping, with T25 StarDrive recess

Stainless Steel	Titanium	Length (mm)	Qty.
212.201	412.201	14	5
212.202	412.202	16	5
212.203	412.203	18	5
212.204	412.204	20	5
212.205	412.205	22	5
212.206	412.206	24	5
212.207	412.207	26	5
212.208	412.208	28	5
212.209	412.209	30	5
212.210	412.210	32	5
212.211	412.211	34	5
212.212	412.212	36	5
212.213	412.213	38	5
212.214	412.214	40	5
212.215	412.215	42	5
212.216	412.216	44	3
212.217	412.217	46	3
212.218	412.218	48	3
212.219	412.219	50	3
212.220	412.220	55	3
212.221	412.221	60	3
212.222	412.222	65	3
212.223	412.223	70	3
212.224	412.224	75	3
212.225	412.225	80	3
212.226	412.226	85	3
212.227	412.227	90	3

Implants continued

4.5 mm Shaft Screws, 2 ea.

Stainless Steel	Titanium	Length (mm)
214.228	414.228	28
214.230	414.230	30
214.232	414.232	32
214.234	414.234	34
214.236	414.236	36
214.238	414.238	38
214.240	414.240	40
214.242	414.242	42
214.244	414.244	44
214.246	414.246	46
214.248	414.248	48
214.250	414.250	50

4.5 mm Cortex Screws, self-tapping

Stainless Steel	Titanium	Length (mm)	Qty.
214.814	414.814	14	4
214.816	414.816	16	4
214.818	414.818	18	4
214.820	414.820	20	6
214.822	414.822	22	6
214.824	414.824	24	6
214.826	414.826	26	12
214.828	414.828	28	12
214.830	414.830	30	12
214.832	414.832	32	12
214.834	414.834	34	12
214.836	414.836	36	12
214.838	414.838	38	12
214.840	414.840	40	12
214.842	414.842	42	12
214.844	414.844	44	4
214.846	414.846	46	4
214.848	414.848	48	4
214.850	414.850	50	4
214.852	414.852	52	4
214.854	414.854	54	4

4.5 mm Cortex Screws, self-tapping continued

Stainless Steel	Titanium	Length (mm)	Qty.
214.856	414.856	56	4
214.858	414.858	58	4
214.860	414.860	60	4
214.862	414.862	62	4
214.864	414.864	64	4
214.866	414.866	66	4
214.868	414.868	68	4
214.870	414.870	70	4

6.5 mm Cancellous Bone Screws, 16 mm thread length, 3 ea.

Stainless Steel	Titanium	Length (mm)
216.030	416.030	30
216.035	416.035	35
216.040	416.040	40
216.045	416.045	45
216.050	416.050	50
216.055	416.055	55
216.060	416.060	60
216.065	416.065	65
216.070	416.070	70
216.075	416.075	75
216.080	416.080	80
216.085	416.085	85
216.090	416.090	90
216.095	416.095	95
216.100	416.100	100
216.105	416.105	105
216.110	416.110	110

Large Fragment LCP Instrument and Implant Sets with 4.0 mm and 5.0 mm Locking Screws

Stainless Steel (115.400) and Titanium (146.400) continued

6.5 mm Cancellous Bone Screws, 32 mm thread length, 3 ea.

Stainless Steel	Titanium	Length (mm)
217.045	417.045	45
217.050	417.050	50
217.055	417.055	55
217.060	417.060	60
217.065	417.065	65
217.070	417.070	70
217.075	417.075	75
217.080	417.080	80
217.085	417.085	85
217.090	417.090	90
217.095	417.095	95
217.100	417.100	100
217.105	417.105	105
217.110	417.110	110

6.5 mm Cancellous Bone Screws, fully threaded, 3 ea.

Stainless Steel	Titanium	Length (mm)
218.025	418.025	25
218.030	418.030	30
218.035	418.035	35
218.040	418.040	40
218.045	418.045	45
218.050	418.050	50
218.055	418.055	55
218.060	418.060	60

Washer

Stainless Steel	Titanium	Length (mm)	Qty.
219.99	419.99	13	6

4.5 mm Narrow LCP Plates

Stainless Steel	Titanium	Holes	Length (mm)	Qty.
224.541	424.541	4	80	1
224.551	424.551	5	98	1
224.561	424.561	6	116	2
224.571	424.571	7	134	1
224.581	424.581	8	152	2
224.591	424.591	9	170	1
224.601	424.601	10	188	2
224.611	424.611	11	206	1
224.621	424.621	12	224	2
224.641	424.641	14	260	1
224.661	424.661	16	296	1

4.5 mm Broad LCP Plates

Stainless Steel	Titanium	Holes	Length (mm)
226.561	426.561	6	116
226.571	426.571	7	134
226.581	426.581	8	152
226.591	426.591	9	170
226.601	426.601	10	188
226.611	426.611	11	206
226.621	426.621	12	224
226.641	426.641	14	260
226.661	426.661	16	296

4.5 mm LCP T-Plates

Stainless Steel	Titanium	Holes	Length (mm)
240.141	440.141	4	83
240.161	440.161	6	115
240.181	440.181	8	147

Also Available

Sets

01.225.602	LCP Periprosthetic System
01.225.604	Titanium LCP Periprosthetic System
01.106.902	LCP Metaphyseal Plate Set
01.106.904	Titanium LCP Metaphyseal Plate Set
01.120.432	4.5 mm LCP Medial Proximal Tibia Plate Implant Set
01.240.201	Periarticular LCP Plating System, with 5.0 mm Locking Screws
105.221	4.5 mm LCP Condylar Plate Implant Set
105.222	4.5 mm LCP Proximal Tibia Plate Implant Set
105.272	4.5 mm LCP Proximal Femur Plate Set
105.273	4.5 mm LCP Proximal Femur Hook Plate Set
115.401	Large Fragment LCP Instrument Set
115.402	Large Fragment LCP Plate Set
146.402	Large Fragment Titanium LCP Plate Set
115.403	Large Fragment LCP Screw Set
146.403	Large Fragment Titanium LCP Screw Set

Instruments

292.652	2.0 mm Threaded Guide Wire
397.705*	Handle, quick coupling, for ComPact Air Drive connection
511.771*	Torque Limiting Attachment, 4 Nm

Implants

02.001.300– 02.001.332	4.5 mm LCP Curved Condylar Plates, 10–22 holes, 242 mm–458 mm◊
222.656– 222.669	4.5 mm LCP Condylar Plates, 6–18 holes, 170 mm–386 mm◊

4.5 mm Narrow LCP Plates

Stainless Steel	Titanium	Holes	Length (mm)
224.521	424.521	2	44
224.531	424.531	3	62
224.631	424.631	13	242
224.651	424.651	15	278
224.681	424.681	18	332
224.701	424.701	20	368
224.721	424.721	22	404

224.753– 224.765	4.5 mm/3.5 mm LCP Metaphyseal Plates, 8–20 holes, 118 mm–334 mm

4.5 mm Curved Broad LCP Plates◊

Stainless Steel	Titanium	
226.622– 226.682	426.622– 426.682	12–18 holes, 229 mm–336 mm
226.702S– 226.762S	426.702S– 426.762S	20–26 holes†, 372 mm–479 mm

4.5 mm Broad LCP Plates

Stainless Steel	Titanium	Holes	Length (mm)
226.681	426.681	18	332
226.701	426.701	20	368
226.721	426.721	22	404

4.5 mm LCP Straight Reconstruction Plates

Stainless Steel	Titanium	
229.331– 229.461	429.331– 429.461	3–16 holes, 56 mm–303 mm

4.5 mm Medial Proximal Tibia Plates◊

Stainless Steel	Titanium	
239.984– 239.997	439.984 439.997	4–16 holes, right and left, 106 mm–322 mm

* LCP-specific instruments
◊ These implants are available nonsterile and sterile-packed. Add "S" to catalog number for sterile product.
† Sterile only

Large Fragment LCP Instrument and Implant Sets with 4.0 mm and 5.0 mm Locking Screws

Stainless Steel (115.400) and Titanium (146.400) continued

4.5 mm LCP Proximal Tibia Plates◊

Stainless Steel	Titanium	
240.036–240.047	440.036–440.047	4–14 holes, right and left 82 mm–262 mm
240.048S–240.055S	N/A	16–20 holes, right and left† 298 mm–370 mm

242.102–242.116	4.5 mm LCP Proximal Femur Plates, 2–16 holes, left, 139 mm–391 mm◊
242.802–242.816	4.5 mm LCP Proximal Femur Plates, 2–16 holes, right, 139 mm–391 mm◊
242.120–242.128	4.5 mm LCP Proximal Femur Hook Plates, 2–18 holes, 133 mm–421 mm

◊ These implants are available nonsterile and sterile-packed. Add “S” to catalog number for sterile product.
† Sterile only

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