**4.5 mm LCP Proximal Femur Hook Plates.** Part of the Synthes Periarticular LCP Plating System.



Technique Guide



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The Synthes 4.5 mm LCP Proximal Femur Hook Plate is part of the LCP Periarticular Plating System, which merges locking screw technology with conventional plating techniques. The LCP Periarticular Plating System is capable of addressing complex fractures of the proximal femur with the 4.5 mm LCP Proximal Femur and Proximal Femur Hook Plates, complex fractures of the distal femur with the 4.5 mm LCP Condylar Plates, and complex fractures of the proximal tibia with the 4.5 mm LCP Proximal Tibia and LCP Medial Proximal Tibia Plates.

The locking compression plate (LCP) has Combi holes in the plate shaft that combine a dynamic compression unit (DCU) hole with a threaded locking hole. The Combi hole provides the flexibility of cortex screw or locking screw fixation.

**Note:** More detailed information on conventional and locked plating principles can be found in the Synthes *Large Fragment Locking Compression Plate (LCP) Technique Guide.* 

### Features

- Two proximal hooks engage the superior tip of the greater trochanter
- Anatomically contoured to approximate the lateral aspect of the proximal femur
- Use of locking screws provides an angularly stable construct independent of bone quality
- Accepts the Articulated Tension Device to tension the plate and create a load-sharing construct
- Manufactured of implant quality 316L stainless steel
- The most proximal screw hole accepts a 7.3 mm cannulated locking or cannulated conical screw, oriented at 95° to the plate shaft
- The second proximal screw hole accepts a 5.0 mm locking screw oriented at 110° to the plate shaft
- The Combi holes in the plate shaft accept 4.0 mm or 5.0 mm locking screws in the threaded portion or 4.5 mm cortex screws in the DCU portion
- Limited-contact stainless steel plate



In 1958, the AO formulated four basic principles, which have become the guidelines for internal fixation.<sup>1</sup> Those principles, as applied to the 4.5 mm LCP Proximal Femur Hook Plate, are:

### **Anatomic Reduction**

Proximal hooks and anatomic plate profile assist reduction of metaphysis to diaphysis and facilitate restoration of the neck-shaft angle by proper screw placement.

### **Stable Fixation**

The combination of conventional and locking plate fixation offers optimum fixation irrespective of bone density.

### **Preservation of Blood Supply**

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

### Early, Active Mobilization

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

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

# Indications

The Synthes 4.5 mm LCP Proximal Femur Hook Plate is intended for fractures of the femur including:

- Intertrochanteric reversed or transverse or with additional fracture of the medial cortex.
- Fractures of the proximal end of the femur combined with ipsilateral shaft fractures
- Metastatic fracture of the proximal femur
- Osteotomies of the proximal femur
- Also for use in fixation of osteopenic bone and fixation of nonunions or malunions



# 1 Preparation

### **Required Set**

01.240.201	Periarticular LCP Plating System with 5.0 mm Locking Screws
or	Periarticular LCP Plating System
01.240.209	with 4.0 mm Locking Screws

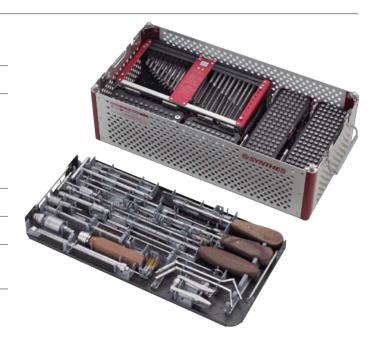
### **Optional Set**

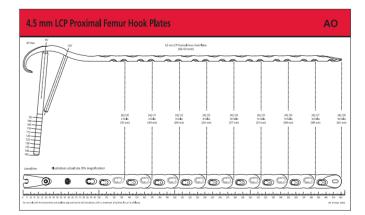
105.272	4.5 mm LCP Proximal Femur Plate Set	
	(without hooks)	

Complete the preoperative radiographic assessment and prepare the preoperative plan. AP and lateral radiographs of the entire femur are necessary for complete evaluation. Traction radiographs and views of the contralateral femur are useful adjuncts in the planning process.

When considering use of the 4.5 mm LCP Proximal Femur Hook Plate, identify proper placement of the two proximal screws.

Use the AO Preoperative Planner Kit and the 4.5 mm LCP Proximal Femur Hook Plate template to aid in planning the procedure. Determine plate length, and approximate screw lengths and instruments to be used. Position the patient supine on a radiolucent operating table or a fracture extension table for lower energy fractures. Fluoroscopic visualization of the femur in both AP and lateral views must be verified prior to patient draping.





### 2 Reduce fracture

Reduce the fracture using a fracture table, clamps, Schanz screws, or other conventional reduction techniques. Alternatively, provisional indirect fracture reduction may be facilitated by attaching the 4.5 mm LCP Proximal Femur Hook Plate to the proximal segment with appropriately oriented screws, and then to the diaphysis with plate holding forceps or 4.5 mm Cortex Screws.





Instruments		
310.243	2.5 mm Drill Tip Guide Wire	
310.31	3.2 mm Drill Bit	
324.174	2.5 mm Wire Guide, for 5.0 mm screws	
324.175	2.5 mm Wire Guide, for 7.3 mm screws	

**Note:** It is more important to properly place guide wires in the proximal femur (considering the desired screw positions and trajectories) than it is to precisely match the contour of the plate to the anatomy of the femur. The ability to lock the screws to the plate obviates the need for precise plate contouring and compressing the plate to the bone.

Before placing the plate on the bone, thread the wire guides into the plate holes for each of the proximal locking screws. Use the 2.5 mm Wire Guide for 7.3 mm screws in the proximal screw hole, and a 2.5 mm Wire Guide for 5.0 mm screws in the second locking screw hole. The wire guides can also be used as a manipulation aid for positioning the plate on the proximal femur.

Pre-drill a hole for a 4.5 mm Cortex Screw using the 3.2 mm Drill Bit.

Seat hooks using a 4.5 mm Cortex Screw aimed toward the calcar. Screw may be removed following insertion of 7.3 mm screw in proximal fragment.

### **Alternative Instrument**

332.21 Impactor

Alternatively, the Impactor may be used to seat the hooks in the proximal fragment.

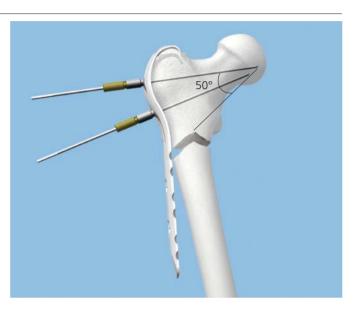




### Insert guide wires continued

- Using fluoroscopic image control (AP and lateral), insert a 2.5 mm Drill Tip Guide Wire through the wire guide in each of the proximal locking holes. Guide wires should reach, but not penetrate, subchondral bone.
  - A. Placement of the proximal guide wire in the AP view is into the midportion of the inferomedial quadrant of the femoral head along a path subtending a 50° angle relative to the calcar femoralis. Guide wire placement in this manner will facilitate placement of the proximal locking screw at a 95° angle to the femoral shaft.
  - B. The proximal wire is ideally placed central in the lateral view. Accurate positioning of the proximal guide wire (and ultimately the locking screw) assures frontal plane alignment.

**Note:** Before a Drill Tip Guide Wire is inserted into the second wire guide, verify correct sagittal plane alignment of the plate on the proximal femur. This usually requires both visual and fluoroscopic assessment and prevents an extension (apex anterior) deformity when the plate is attached to the diaphysis. When this alignment is satisfactory, insert the guide wire through the next (distal) wire guide, maintaining biplanar fluoroscopic control.







### Insert proximal 7.3 mm Cannulated Screw

Instruments	
310.632	5.0 mm Cannulated Drill Bit, for 7.3 mm screws
310.634	4.3 mm Cannulated Drill Bit, for 5.0 mm screws
314.05	Cannulated Hexagonal Screwdriver
314.23	Cannulated Hexagonal Screwdriver Shaft
319.701	Cannulated Screw Measuring Device
511.771* or	Torque Limiting Attachment, 4 Nm
511.774	Torque Limiting Attachment, 4 Nm, for AO Reaming Coupler

Use the Cannulated Screw Measuring Device over the guide wire to measure for screw length. Select the appropriate length 7.3 mm Cannulated Locking Screw. Use the Cannulated Hexagonal Screwdriver to remove the wire guide.

Insert the screw, using fluoroscopy, with the Cannulated Hexagonal Screwdriver or Cannulated Hexagonal Screwdriver Shaft. This screw, as with all locking screws not protected by a Torque Limiting Attachment, may be inserted using power; however, final seating and tightening must be done by hand. Once the screw has been locked to the plate, the guide wire may be removed.

**Technique Tip:** The self-drilling, self-tapping flutes of the 7.3 mm and 5.0 mm screws make predrilling and pretapping unnecessary in most cases. In dense bone, the lateral cortex can be predrilled. If necessary, use the 5.0 mm Cannulated Drill Bit, for 7.3 mm screws, or the 4.3 mm Cannulated Drill Bit, for 5.0 mm screws.

**Note:** Recheck each locking screw before closing to verify that the screws are securely locked to the plate. Screw heads must be flush with the plate in the locked position before they can be considered fully seated.

In cases where it is necessary to pull the plate to the bone, use a 7.3 mm Cannulated Conical Screw in the proximal hole.





### Insert 5.0 mm Cannulated Screw

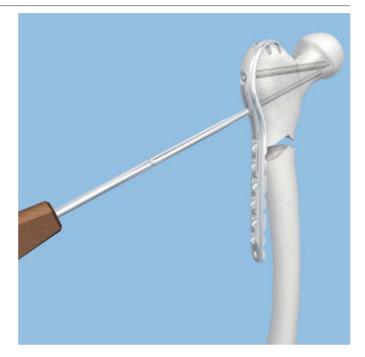
Using the technique described in step 4, select and insert the 5.0 mm Cannulated Screw.

### Screw length considerations:

The angled 5.0 mm Cannulated Locking Screw is intended to converge with the 7.3 mm screw to create a buttress which will provide additional stability. This convergence should occur when using a 5.0 mm Cannulated Locking Screw that is 85 mm in length.

**Important:** Securely hand-tighten all locking screws again before closing.

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



Approximate the plate to the femoral diaphysis

Instruments		
321.12	Articulated Tension Device	
398.814*	Plate Holding Forceps with swivel foot	

Secure the plate to the lateral femoral shaft with bone holding forceps, adjusting horizontal plane alignment (rotation) as appropriate. Length restoration and fracture reduction can be facilitated by a number of indirect means, including a fracture table, the Articulated Tension Device (ATD), the Large Distractor, the Large Distractor/Compressor, or a Large External Fixator. Judicious, soft tissue preserving, direct reduction techniques with clamps may also be appropriate in some cases.

A tensioning device should be applied to the end of the plate to tension the plate and compress the fracture.

**Note:** Using the ATD, tension the plate, and compress the fracture to create a load-sharing construct. Creating a load-sharing construct is required with the 4.5 mm LCP Proximal Femur Hook Plate. If the fracture pattern includes segmental comminution where fracture compression cannot be accomplished and a bridging construct is necessary, use of the 4.5 mm LCP Proximal Femur Plate (without hooks)\*\* may be preferable.



\* Also available

\*\* Found in the 4.5 mm LCP Proximal Femur Plate Set (without hooks)

Insert 4.5 mm Cortex Screws		
Instruments		
03.010.150	Star/HexDrive Screwdriver, T25, 3.5 mm hexagonal	
310.31	3.2 mm Drill Bit	
319.10	Depth Gauge	
323.46	4.5 mm Universal Drill Guide	

**Important:** All 4.5 mm Cortex Screws must be inserted into the plate shaft before insertion of any locking screws in the plate shaft.

Use the 3.2 mm Drill Bit through the 4.5 mm Universal Drill Guide to predrill the bone. For the neutral position, press the drill guide down in the nonthreaded hole. To obtain compression, place the drill guide at the end of the nonthreaded hole away from the fracture (do not apply downward pressure on the spring-loaded tip).

Measure for screw length using the Depth Gauge.





Select and insert the appropriate length 4.5 mm Cortex Screw using the Star/HexDrive Screwdriver. Insert as many 4.5 mm Cortex Screws as necessary.



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Insert 4.0 mm or 5.0 mm Locking Screws		
Instruments		
03.010.150 Star/HexDrive Screwdriver, T25, 3.5 mm hexagonal		
03.010.151	Star/HexDrive Screwdriver Shaft, T25, 3.5 mm hexagonal	
310.31 or	3.2 mm Drill Bit	
310.431	4.3 mm Drill Bit	
319.10	Depth Gauge	
324.176 or	3.2 mm Drill Guide, for 4.0 mm screws	
312.449	4.3 mm Threaded Drill Guide	
511.771 or	Torque Limiting Attachment, 4 Nm	
511.774	Torque Limiting Attachment, 4 Nm, for AO Reaming Coupler	

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Attach the appropriate drill guide to the locking portion of a Combi hole.

- Use the 3.2 mm Drill Guide when inserting 4.0 mm Locking Screws
- Use the 4.3 mm Threaded Drill Guide when inserting 5.0 mm Locking Screws

**Note:** Use of the drill guide is required. It will center the drill bit in the threaded portion of the Combi hole to create a screw trajectory that ensures the screw properly engages the plate.

Use the appropriate drill bit to drill to the desired depth:

- Use the 3.2 mm Drill Bit for 4.0 mm Locking Screws
- Use the 4.3 mm Drill Bit for 5.0 mm Locking Screws

**Note:** Holes for locking screws may be drilled unicortically or bicortically, depending on bone quality.





Screw Size	Drill Guide Size (Drill Guide Part #)	Drill Bit Size (Drill Bit Part #)	Color Code
4.0 mm Locking	3.2 mm (324.176)	3.2 mm (310.31)	Green
5.0 mm Locking	4.3 mm (312.449)	4.3 mm (310.431)	Blue

Remove the drill guide and measure screw length using the Depth Gauge. Insert the appropriate length 4.0 mm or 5.0 mm Locking Screw using the appropriate screwdriver.

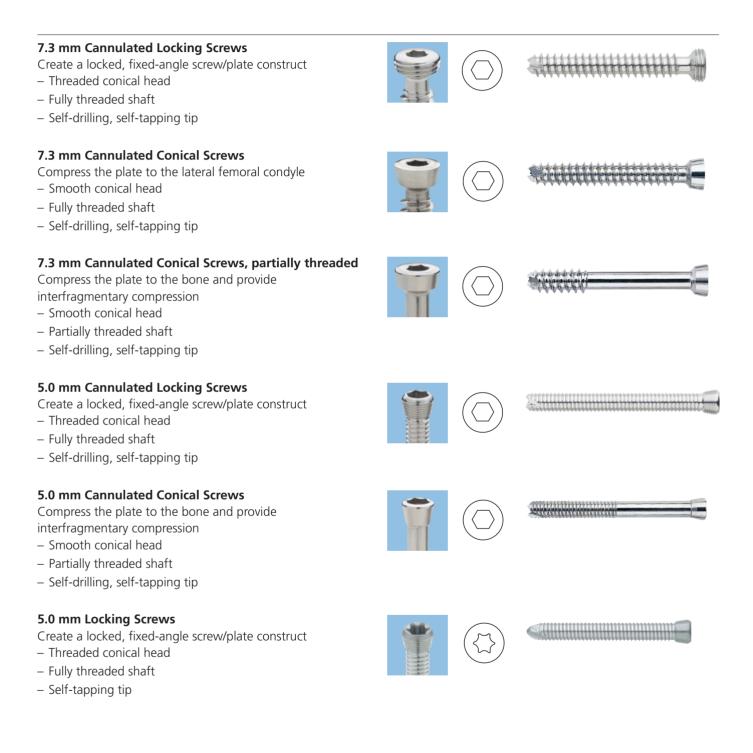
**Warning:** If the Torque Limiting Attachment is unavailable, do not tighten locking screws to the plate using power. Perform final tightening by hand.

Insert as many locking screws as necessary.

Postoperative AP and lateral views



# Screws Used with the 4.5 mm LCP Proximal Femur Hook Plate



### 4.0 mm Locking Screws

Create a locked, fixed-angle screw/ plate construct

- Threaded conical head
- Fully threaded shaft
- Self-tapping tip

### 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
- Fully threaded shaft
- Self-tapping tip



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# Selected Instruments from Periarticular LCP Plating System (01.240.201)

03.010.150	Star/HexDrive Screwdriver	
310.243	2.5 mm Drill Tip Guide Wire	
310.31	3.2 mm Drill Bit	
310.431	4.3 mm Drill Bit	
310.632	5.0 mm Cannulated Drill Bit	
310.634	4.3 mm Cannulated Drill Bit	
312.449	4.3 mm Threaded Drill Guide	

313.93	Solid Hexagonal Screwdriver, 4.0 mm width across flats	Zen 162
314.05	Cannulated Hexagonal Screwdriver, 4.0 mm width across flats	
319.10	Depth Gauge	
319.701	Cannulated Screw Measuring Device	, 125   105   85   65   45   25   115   95   75   55   35
321.12	Articulated Tension Device	
323.46	4.5 mm Universal Drill Guide	



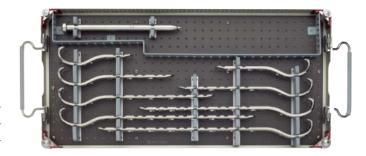
# 4.5 mm LCP Proximal Femur Hook Plate Set (105.273)

### **Graphic Case**

690.481 4.5 mm LCP Proximal Femur Hook Plate Graphic Case

### Implants

4.5 mm LCP Proximal Femur Hook Plates					
	Holes	Length (mm)			
242.120	2	133			
242.121	4	169			
242.122	6	205			
242.123	8	241			
242.124	10	277			
242.125	12	313			
242.126	14	349			
242.127	16	385			



### Instrument

332.21 Impactor

### **Required Set**

01.240.201 Periarticular LCP Plating System, with 5.0 mm Locking Screws

Periarticular LCP Plating System, with 4.0 mm

or

01.240.209

Locking Screws

### **Recommended Additional Sets**

- 105.90 Bone Forceps Set
- 115.400 Large Fragment LCP Instrument and Implant Set
- 115.700 Large Distractor Set
- 115.720Large External Fixator Set with self-drilling<br/>Schanz screws

### Also Available

242.128	4.5 mm LCP Proximal Femur Hook Plate,
	18 holes, 421 mm
398.814	Plate Holding Forceps with swivel foot

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

For detailed cleaning and sterilization instructions, please refer to http://us.synthes.com/Medical+Community/Cleaning+and+Sterilization.htm or to the below listed inserts, which will be included in the shipping container:

<sup>—</sup>Processing Synthes Reusable Medical Devices—Instruments, Instrument Trays and Graphic Cases—DJ1305

<sup>-</sup>Processing Non-sterile Synthes Implants-DJ1304

### **Graphic Cases**

60.240.201	Locking Periarticular Plating System Graphic Case
60.240.203	Screw Rack for 4.5 mm Cortex Screws
60.240.204	Screw Rack for 5.0 mm Locking Screws
	with T25 StarDrive recess
60.240.205	Screw Rack for 5.0 mm and 7.3 mm
	Cannulated Locking Screws and 7.3 mm
	Conical Screws
60.240.206	Screw Rack for 5.0 mm Cannulated Conical
	Screws
60.240.208	Locking Periarticular Plating System
	Instrument Tray

### Implants

4.5 mm Cortex Screws, self-tapping

	Length			Length	
	(mm)	Qty.		(mm)	Qty.
214.814	14	4	214.844	44	4
214.816	16	4	214.846	46	2
214.818	18	4	214.848	48	2
214.820	20	4	214.850	50	2
214.822	22	4	214.852	52	2
214.824	24	4	214.854	54	2
214.826	26	6	214.856	56	2
214.828	28	6	214.858	58	2
214.830	30	6	214.860	60	2
214.832	32	6	214.862	62	2
214.834	34	6	214.864	64	2
214.836	36	6	214.866	66	2
214.838	38	6	214.868	68	2
214.840	40	6	214.870	70	2
214.842	42	6			

5.0 mm Periprosthetic Locking Screws, self-tapping, with T25 StarDrive recess  $\diamond$ 

	Length	
	(mm)	Qty.
02.221.508	8	2
02.221.510	10	2
02.221.512	12	2





 $\Diamond$  Also available sterile-packed. Add "S" to catalog number for sterile product.

#### Implants continued

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

7.3 mm Cannulated Locking Screws

	Length		
	(mm)	Qty.	
212.201	14	4	2
212.202	16	4	2
212.203	18	4	2
212.204	20	4	2
212.205	22	4	$\begin{array}{c} 2\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\ 2\\ $
212.206	24	4	2
212.207	26	6	2
212.208	28	6	2
212.209	30	6	2
212.210	32	6	2
212.211	34	6	2
212.212	36	6	2
212.213	38	6	2
212.214	40	6	

5.0 mm Cannulated Locking Screws Length

(mm)

25

30

35

40

45

50

55

60

65

70

75

80

85

02.205.025 02.205.030

02.205.035

02.205.040

02.205.045

02.205.050

02.205.055

02.205.060

02.205.065

02.205.070

02.205.075

02.205.080

02.205.085

Qty.

2

2

2

2

2

2

4

4

4

4

4

4

4

ling, with	125 StarDrive	recess
	Length	
	(mm)	Qty.
212.215	42	6
212.216	44	2
212.217	46	2
212.218	48	2
212.219	50	2
212.220	55	2
212.221	60	2
212.222	65	2
212.223	70	2
212.224	75	2
212.225	80	2
212.226	85	2
212.227	90	2

Length

Qty.

2

2

2 2

2

2

2

2

2

2

2

(mm)

90

95

100

105

110

115

120

125

130

135

140

145

02.205.090

02.205.095

02.205.100

02.205.105

02.205.110

02.205.115

02.205.120

02.205.125

02.205.130

02.205.135

02.205.140

02.205.145

	Length			Length	
	(mm)	Qty.		(mm)	Qty.
02.207.020	20	2	02.207.085	85	2
02.207.025	25	2	02.207.090	90	2
02.207.030	30	2	02.207.095	95	2
02.207.035	35	2	02.207.100	100	2
02.207.040	40	2	02.207.105	105	2
02.207.045	45	2	02.207.110	110	2
02.207.050	50	2	02.207.115	115	2
02.207.055	55	2	02.207.120	120	2
02.207.060	60	2	02.207.125	125	2
02.207.065	65	2	02.207.130	130	2
02.207.070	70	2	02.207.135	135	2
02.207.075	75	2	02.207.140	140	2
02.207.080	80	2	02.207.145	145	2

### 7.3 mm Cannulated Conical Screws

	Length (mm)		Length (mm)
02.207.250	50	02.207.275	75
02.207.255	55	02.207.280	80
02.207.260	60	02.207.285	85
02.207.265	65	02.207.290	90
02.207.270	70	02.207.295	95

7.3 mm Cannulated Conical Screws, partially threaded

	Length		Length
	(mm)		(mm)
02.207.450	50	02.207.475	75
02.207.455	55	02.207.480	80
02.207.460	60	02.207.485	85
02.207.465	65	02.207.490	90
02.207.470	70	02.207.495	95

### 5.0 mm Cannulated Conical Screws

	Length			Length	
	(mm)	Qty.		(mm)	Qty.
02.205.240	40	2	02.205.270	70	2
02.205.245	45	2	02.205.275	75	2
02.205.250	50	2	02.205.280	80	2
02.205.255	55	2	02.205.285	85	2
02.205.260	60	2	02.205.290	90	2
02.205.265	65	2	02.205.295	95	2

### 222.578

5.0 mm Screw Nut, 2 ea.

Instruments		Also Availab	
03.010.150	Star/HexDrive Screwdriver, T25, 3.5 mm hexagonal, self-retaining	5.0 mm Peripi with T25 Starl	rosthetic Locking Screws, self-tapping, Drive recess
03.010.151	Star/HexDrive Screwdriver Shaft, T25,		Length
	3.5 mm hexagonal, self-retaining, 165 mm		(mm)
292.652	2.0 mm Non-Colored Threaded Guide Wire,	02.221.514◊	14
	spade point, 230 mm, 10 ea.	02.221.518◊	18
310.243	2.5 mm Drill Tip Guide Wire, 200 mm, 10 ea.		
310.31	3.2 mm Drill Bit, quick coupling, 145 mm	292.20	2.0 mm Kirschner Wire, 150 mm, trocar point
310.431	4.3 mm Drill Bit, quick coupling, 180 mm,	311.66	Tap for 6.5 mm Cancellous Bone Screws
	for 5.0 mm Locking Screws	312.67	6.5 mm/3.2 mm Double Drill Sleeve
310.44	4.5 mm Drill Bit, quick coupling, 145 mm	394.35	Large Distractor
310.632	5.0 mm Cannulated Drill Bit, quick coupling, 200 mm (short flute)	397.705	Handle, quick coupling, for ComPact Air Drive Connection
310.634	4.3 mm Cannulated Drill Bit, quick coupling,	398.81	Bone Forceps
	200 mm (long flute)	398.813	Plate Holding Forceps with swivel foot
310.99	Countersink, for 4.5 mm and 6.5 mm Screws	511.761	Large Quick Coupling
311.44	T-Handle, with quick coupling	511.771	Torque Limiting Attachment, 4 Nm
311.449	Push-Pull Reduction Device, for use with 4.5 mm LCP plates, 2 ea.	60.240.207	Screw Rack for 6.5 mm Cancellous
311.46	Tap for 4.5 mm Screws	0012 101207	Bone Screws
312.449	4.3 mm Threaded Drill Guide, 4 ea.		
312.48	4.5 mm/3.2 mm Insert Drill Sleeve		
313.93	Solid Hexagonal Screwdriver, 4.0 mm width across flats		
314.05	Cannulated Hexagonal Screwdriver, 4.0 mm width across flats		
314.11	Holding Sleeve		
314.23	Cannulated Hexagonal Screwdriver Shaft		
319.10	Depth Gauge, for 4.5 mm and 6.5 mm Screws		
319.24	2.9 mm Cleaning Brush		
319.461	2.5 mm Cleaning Stylet		
319.701	Cannulated Screw Measuring Device		
321.12	Articulated Tension Device		
321.16	Combination Wrench, 11 mm width across flats		
323.46	4.5 mm Universal Drill Guide		
324.174	2.5 mm Wire Guide, for 5.0 mm Screws, 5 ea.		
324.175	2.5 mm Wire Guide, for 7.3 mm Screws, 2 ea.		
324.176	3.2 mm Drill Guide, for 4.0 mm Screws, 2 ea.		
338.49	Large Quick Coupling		
397.706	Handle, for AO Reaming Coupler Connection		
511.774	Torque Limiting Attachment, 4 Nm, for AO Reaming Coupler		ile and sterile-packed. og number for sterile product.



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