

LCP Periarticular Proximal Humerus Plate 3.5

The Anatomic Fixation System with Anterolateral Shaft Placement

Surgical Technique

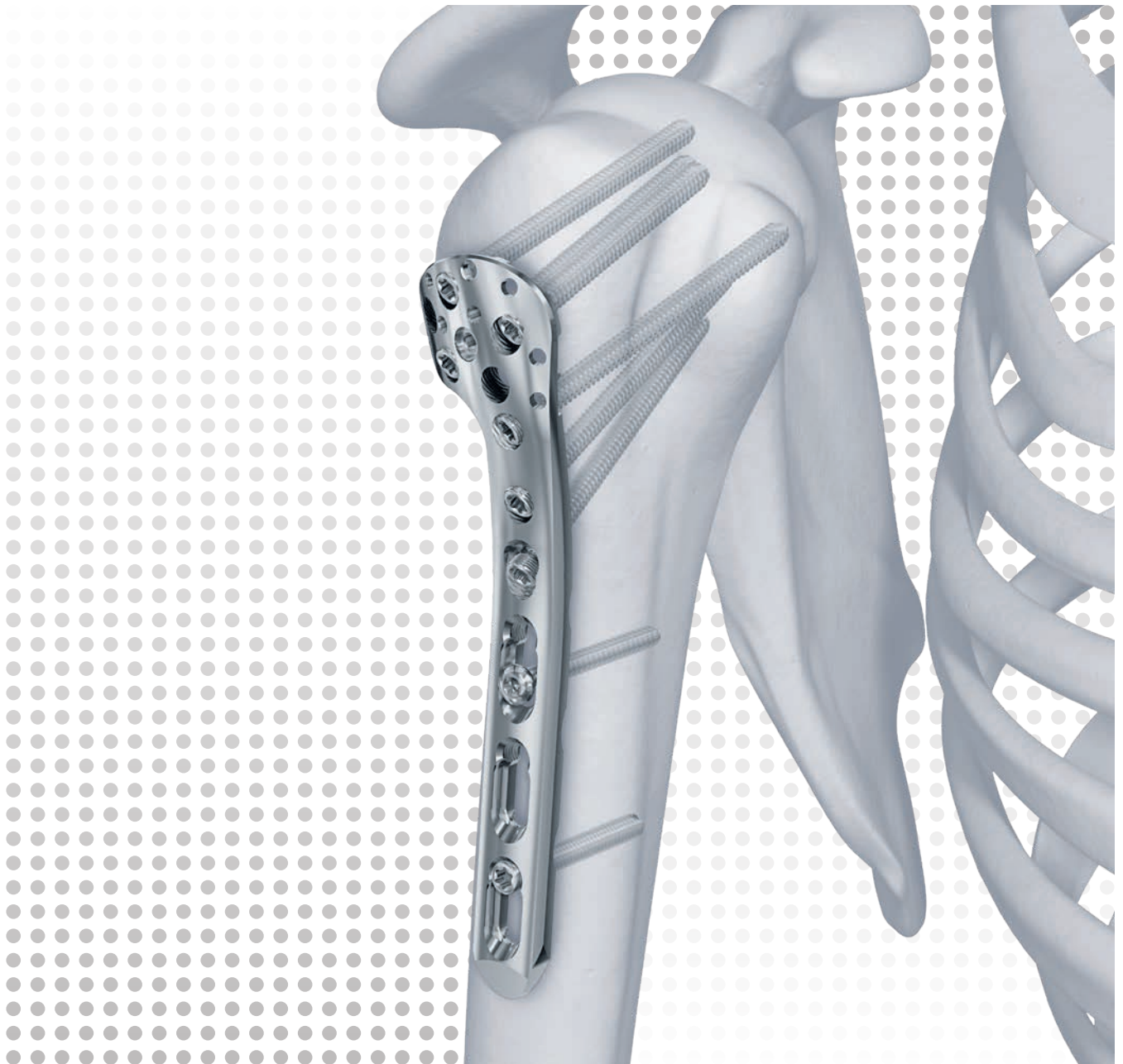


 Image intensifier control

This description alone does not provide sufficient background for direct use of DePuy Synthes products. Instruction by a surgeon experienced in handling these products is highly recommended.

Processing, Reprocessing, Care and Maintenance

For general guidelines, function control and dismantling of multi-part instruments, as well as processing guidelines for implants, please contact your local sales representative or refer to:

<http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance>

For general information about reprocessing, care and maintenance of DePuy Synthes reusable devices, instrument trays and cases, as well as processing of DePuy Synthes non-sterile implants, please consult the Important Information leaflet (SE_023827) or refer to:

<http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance>

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LCP Periarticular Proximal Humerus Plate 3.5

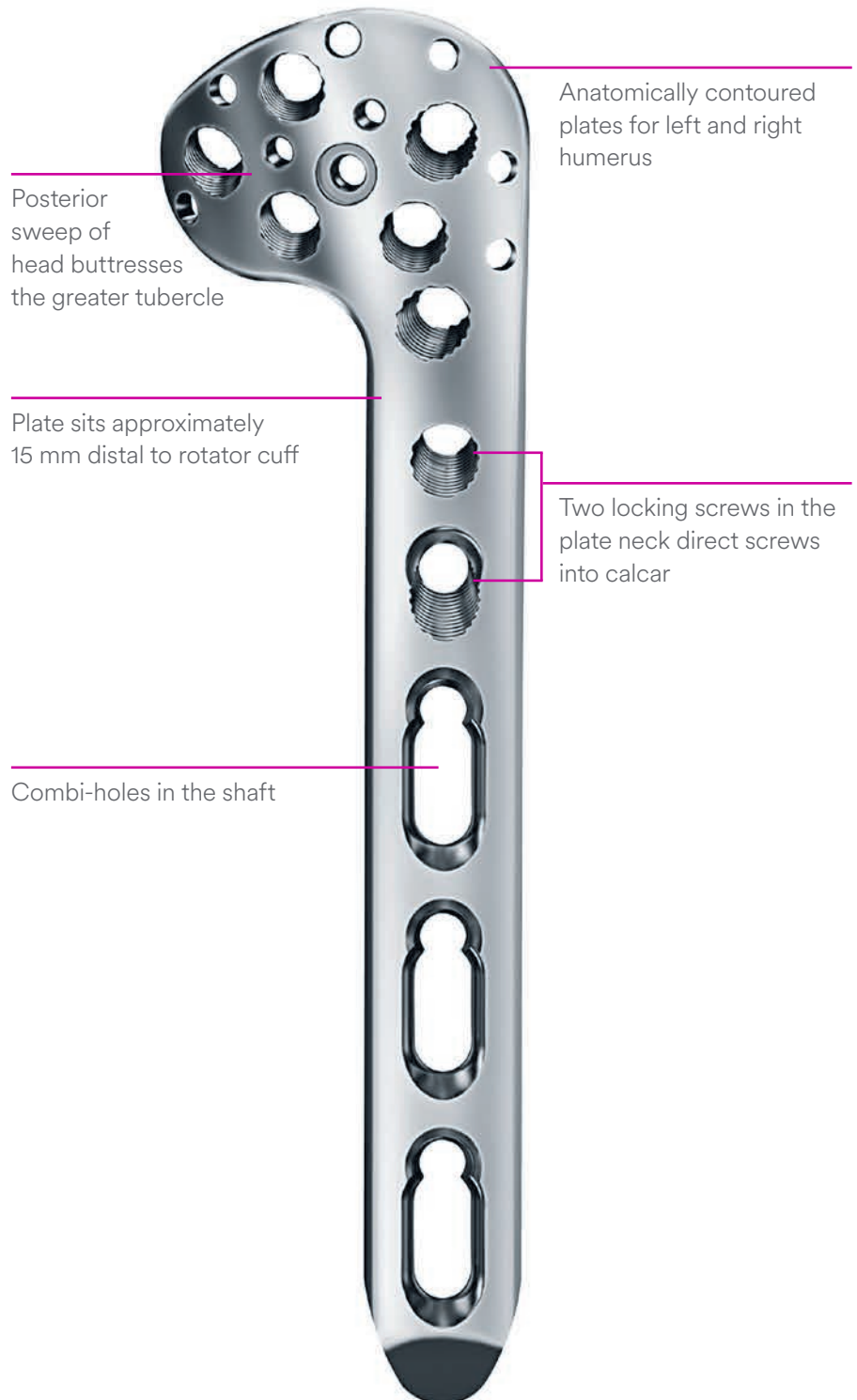
The anatomic fixation system with anterolateral shaft placement

Plate features



Available in sterile and non-sterile with 2, 3, 4, 5, 6 or 8 shaft holes

Available in sterile with 10, 12 or 14 shaft holes



Intended Use, Indications and Contraindications can be found in the corresponding system Instructions for Use.

The AO Principles of Fracture Management

Mission

The AO's mission is promoting excellence in patient care and outcomes in trauma and musculoskeletal disorders.

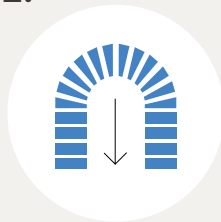
AO Principles^{1,2}

1.



Fracture reduction and fixation to restore anatomical relationships.

2.



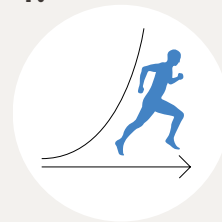
Fracture fixation providing absolute or relative stability, as required by the “personality” of the fracture, the patient, and the injury.

3.



Preservation of the blood supply to soft-tissues and bone by gentle reduction techniques and careful handling.

4.



Early and safe mobilization and rehabilitation of the injured part and the patient as a whole.

¹ Müller ME, Allgöwer M, Schneider R, Willenegger H. Manual of Internal Fixation. 3rd ed. Berlin, Heidelberg New York: Springer 1991.

² Buckley RE, Moran CG, Apivatthakakul T. AO Principles of Fracture Management: 3rd ed. Vol. 1: Principles, Vol. 2: Specific fractures. Thieme; 2017.

Preparation

■ Note:

For information on fixation principles using conventional and locked plating techniques, please refer to the LCP Locking Compression Plate Surgical Technique.

Sets

01.123.001 LCP Proximal Humeral Plates,
periarticular (Pure Titanium),
in Modular Tray, Vario Case System

or

01.123.003 LCP Proximal Humeral Plates,
periarticular (Stainless Steel),
in Modular Tray, Vario Case System

01.122.013 Small Fragment Basic Instruments,
in Modular Tray, Vario Case System

01.122.015 Screw Insertion Instruments 3.5/4.0,
in Modular Tray, Vario Case System

01.122.031 Proximal Humerus Instruments,
in Modular Tray, Vario Case System

Optional set

01.122.014 Small Fragment Reduction Instruments,
in Modular Tray, Vario Case System

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

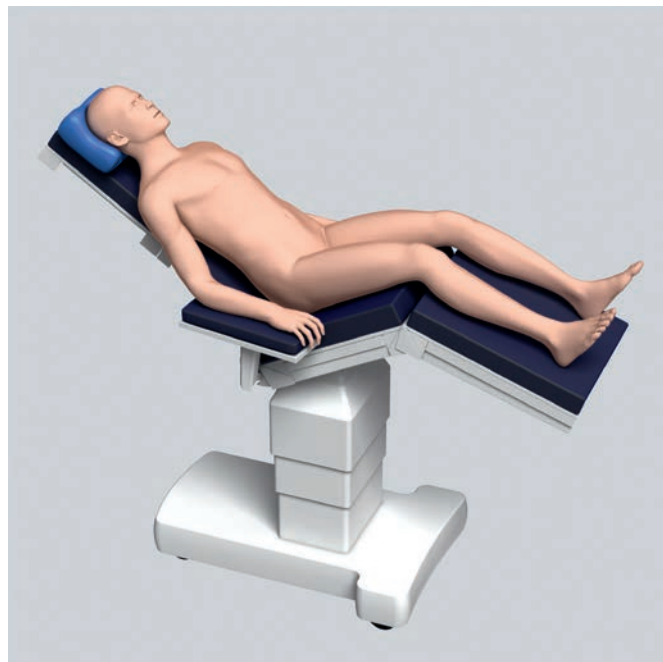
▲ Precaution:

The direction of the locking screws is determined by the plate design.

Patient Positioning and Approach

1. Position the patient

A beachchair position is recommended to provide access to the shoulder with imaging equipment.



2. Approach

The standard surgical approach for internal fixation of proximal humerus fractures is the interval between the deltoid and pectoral muscles. The skin incision starts from the coracoid process and is slightly convex toward the medial side, extending distally as far as the insertion of the deltoid muscle on the lateral humeral shaft.

For long plates, the incision may be extended as an anterior approach to the humeral shaft, proceeding distally between the biceps and the brachialis, and then down the anterolateral aspect of the arm to just above the elbow flexion crease.

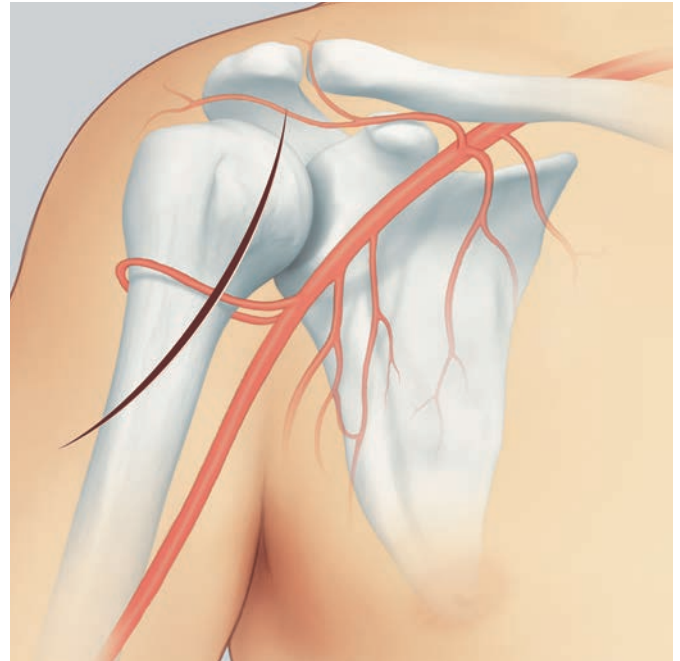
During the dissection, take care to avoid damaging the vasculature of the bone fragments. Avoid ligation of the anterior circumflex humeral artery. This can normally be ensured by keeping all dissection lateral to the intertubercular groove.

▲ WARNINGS:

- Do not injure the axillary nerve. The axillary nerve can be palpated at the lower margin of the incision.
- To avoid damaging the axillary nerve, do not split the deltoid more than 4 cm distal to its origin.

■ Note:

Alternatively to the deltopectoral approach, the transdeltoid approach can be performed.



Implantation

1. Reduce fracture

Instrument

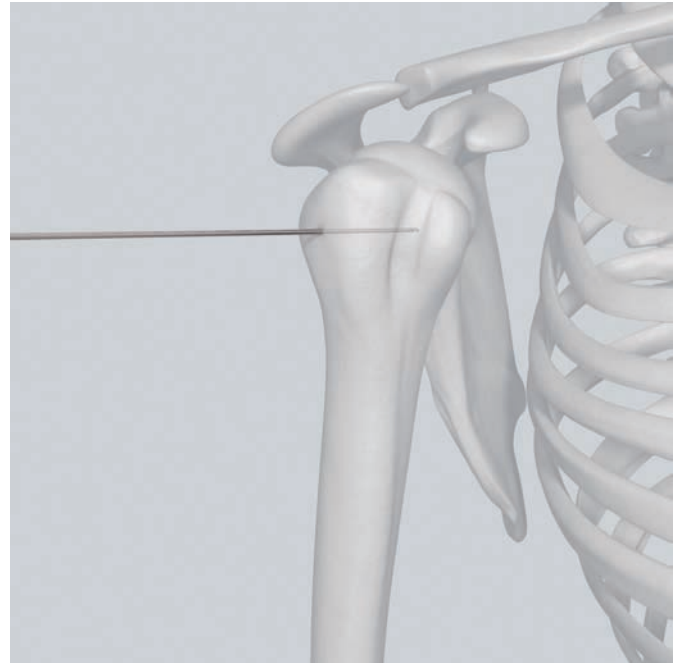
292.160	Kirschner Wire Ø 1.6 mm with trocar tip, length 150 mm, Stainless Steel
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- ① Reduce the fracture fragments and confirm the reduction under image intensification.

The humeral head and tuberosity fragments may be manipulated and provisionally fixed with sutures and/or Kirschner wires. When using Kirschner wires, they should be placed where they will not interfere with plate application.

■ Note:

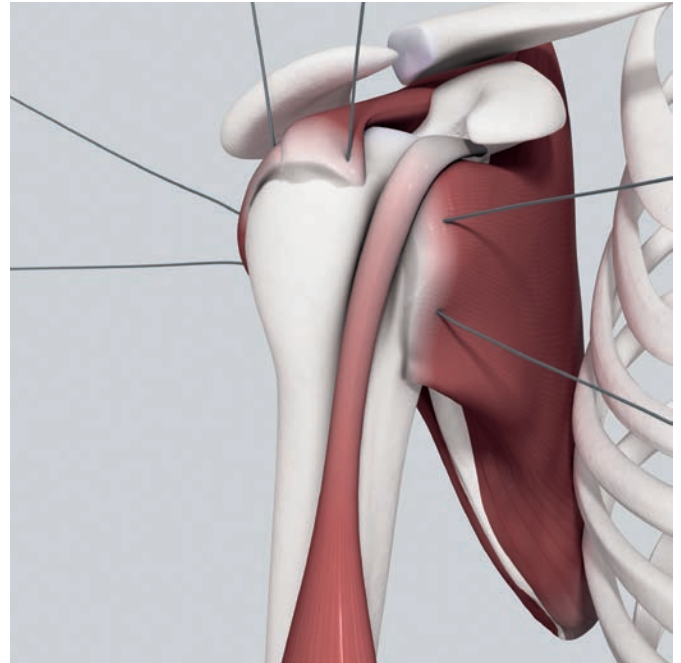
The locking screws are not suitable for reduction since they cannot exert compression. The head fragments must be reduced before insertion of locking screws.



2. Insert sutures

The stability of the construct can be increased with the insertion of sutures.

Provisionally reduce the tubercles using sutures through the insertions of the musculi subscapularis, infra- and supra-spinatus. The sutures will help to maintain the stability of the reconstruction when fixing them to the plate later. Insertion of sutures is especially recommended in weak bone where only short screws can be used due to the risk of penetration through settling.



3. Attach aiming device to plate

Instruments

03.123.010	Aiming Device for LCP Proximal Humeral Plate, periarticular, right
or	
03.123.011	Aiming Device for LCP Proximal Humeral Plate, periarticular, left
314.030	Screwdriver Shaft, hexagonal, small, Ø 2.5 mm
311.431	Handle with Quick Coupling

To facilitate insertion of the proximal locking screws, place the aiming device on the plate and tighten the attachment screw with the small hexagonal screwdriver in order to lock the device against the plate.

▲ Precaution:

Intraoperative bending of the proximal portion of the plate is not recommended for maintaining proper alignment between the aiming device and the plate.



4. Position plate on bone

Instruments

03.122.053	Outer Sleeve 6.0/5.0 for PHILOS Aiming Device
03.122.054	Drill Sleeve 5.0/2.9, for No. 03.122.053
03.122.055	Centering Sleeve for Kirschner Wire Ø 1.6 mm, for No. 03.122.054
292.160	Kirschner Wire Ø 1.6 mm with trocar tip, length 150 mm, Stainless Steel

Positioning from AP view

The superior edge of the plate should be placed approximately 15 mm distal to the insertion of the rotator cuff.

Position the plate low enough to allow locking screws in the two plate neck holes to be placed into the calcar of the proximal humerus.

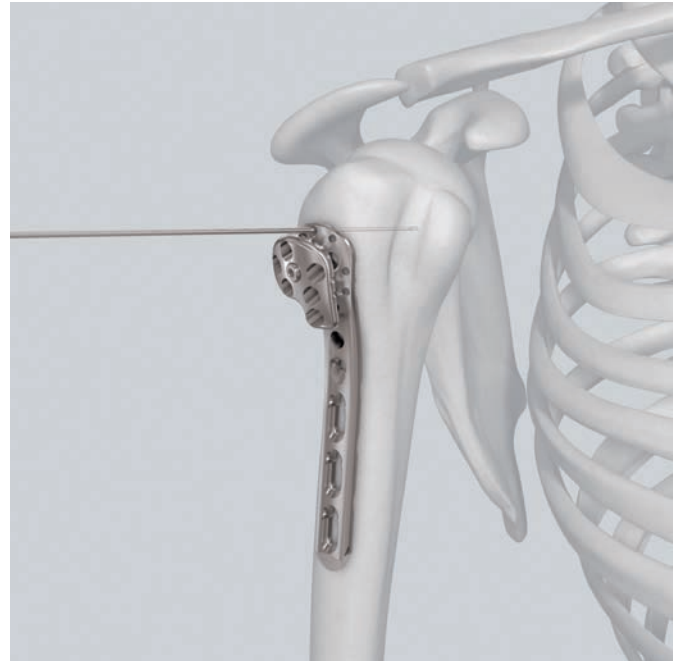
▲ Precaution:

Placing the plate too high increases the risk of subacromial impingement. Placing the plate too low can prevent the optimal distribution of screws in the humeral head.

Positioning from lateral view

Position the plate's anterior edge immediately lateral to the bicipital groove.

To check final placement of the plate, the outer sleeve and the drill sleeve can be assembled and inserted in the most proximal and most distal (calcar) screw hole in the head of the plate.



■ Note:

The triple sleeve assembly and a 1.6 mm Kirschner wire can also be used to check final placement and temporarily fix the plate on the bone.

▲ WARNINGS:

- Do not penetrate the joint surface with the Kirschner wires.
- Do not injure the axillary nerve. The axillary nerve can be palpated at the lower margin of the incision.
- To avoid damaging the axillary nerve, do not split the deltoid more than 4 cm distal to its origin.

Option: Temporarily reduce with pull reduction device

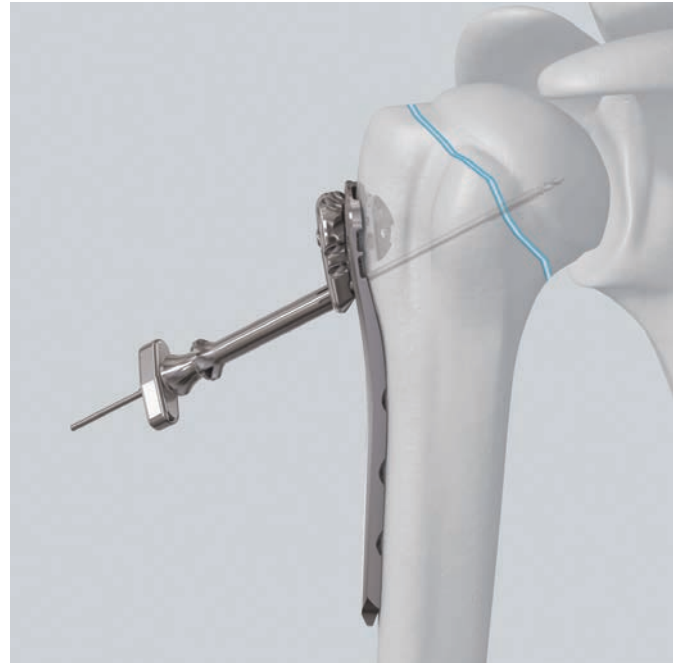
Instruments

03.122.059	Pull Reduction Device for use with No. 03.122.060 for Drill Sleeves
03.122.060	Wing Nut for Pull Reduction for use with No. 03.122.059 for Drill Sleeves

In good bone stock, the pull reduction device can optionally be used for maintaining temporary reduction. Insert the pull reduction device by power tool through the drill sleeve to the desired depth. Slide the wing nut over the wire and tighten it to pull bone fragments towards the plate.

▲ WARNING:

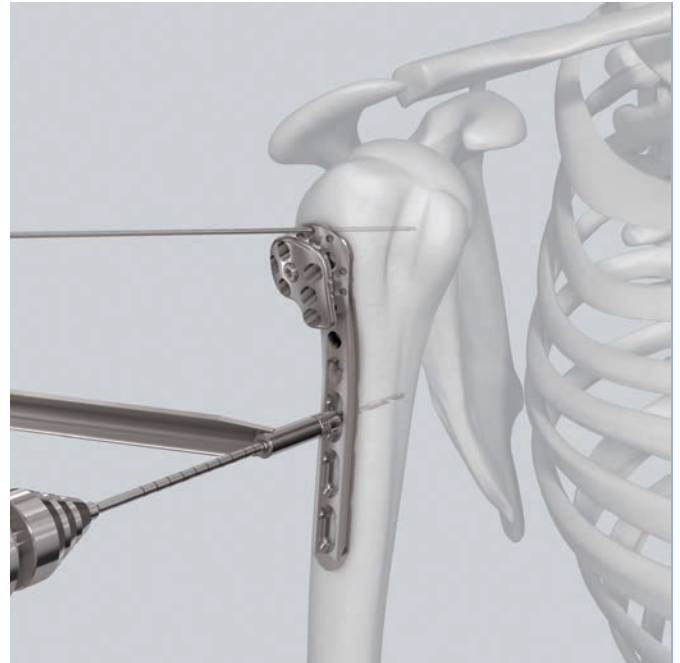
Do not penetrate the joint surface with the pull reduction device.



5. Insert cortex screw in plate shaft

Instruments

323.360	Universal Drill Guide 3.5
310.250	Drill Bit \varnothing 2.5 mm, length 110/85 mm, 2-flute, for Quick Coupling
319.010	Depth Gauge for Screws \varnothing 2.7 to 4.0 mm, measuring range up to 60 mm
314.030	Screwdriver Shaft, hexagonal, small, \varnothing 2.5 mm
or	
314.116	Screwdriver Shaft Stardrive 3.5, T15, self-holding, for AO/ASIF Quick Coupling
311.431	Handle with Quick Coupling



Once the plate is placed correctly, insert a cortex screw in the plate shaft before introducing the screws in the proximal part.

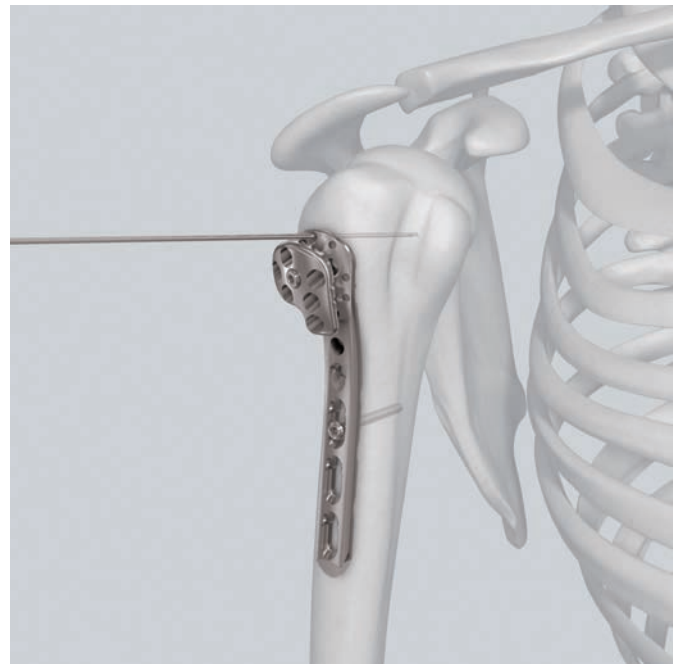
Use the 2.5 mm drill bit through the 3.5 mm universal drill guide to drill the hole. For the neutral position, press the guide down in the non-threaded hole. To obtain compression, place the drill guide at the end of a non-threaded hole away from the fracture (do not apply downward pressure on the spring-loaded tip).

Measure the screw length using the depth gauge.

Select and insert the appropriate 3.5 mm cortex screw.

▲ WARNINGS:

- Do not drill through the joint surface.
- Do not insert overly long screws in order to prevent primary or secondary screw penetration.



6. Determine proximal screw length and prepare screw hole

Depending on the bone quality, different surgical techniques for screw length determination have to be used. A technique for osteoporotic bone (6a) as well as a technique for good bone stock (6b) is described in the following steps.

■ Notes:

- Determine the combination of screws to be used for fixation. If a combination of locking and cortex screws will be used, cortex screws should be inserted before locking screws to pull the plate to the bone. If a cortex screw will be used in the distal neck hole, it should be inserted first to pull the plate to the bone.
- For screw placement in patients with good bone stock continue with step 6b.

6a. Drill lateral cortex and determine proximal screw length (osteoporotic bone)

Instruments

03.122.053	Outer Sleeve 6.0/5.0 for PHILOS Aiming Device
03.122.051	Drill Bit Ø 2.8mm, with Stop, for Quick Coupling
03.122.052	Length Probe for Nos. 03.122.053 and 03.122.058

Insert the outer sleeve in the desired hole of the aiming device. Drill the lateral cortex using the drill bit with stop through the outer sleeve.

▲ WARNING:

In porotic bone, only drill the lateral cortex.

Repeat this step for all required proximal screw holes.

Optional instrument

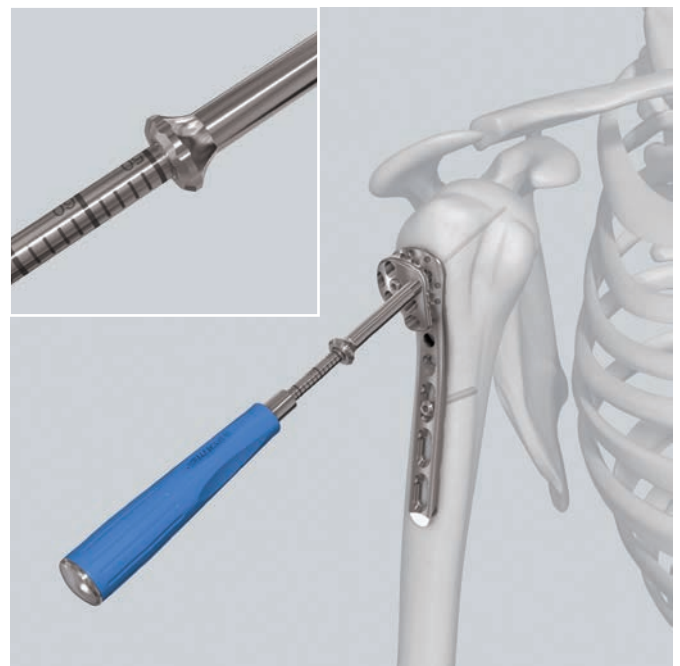
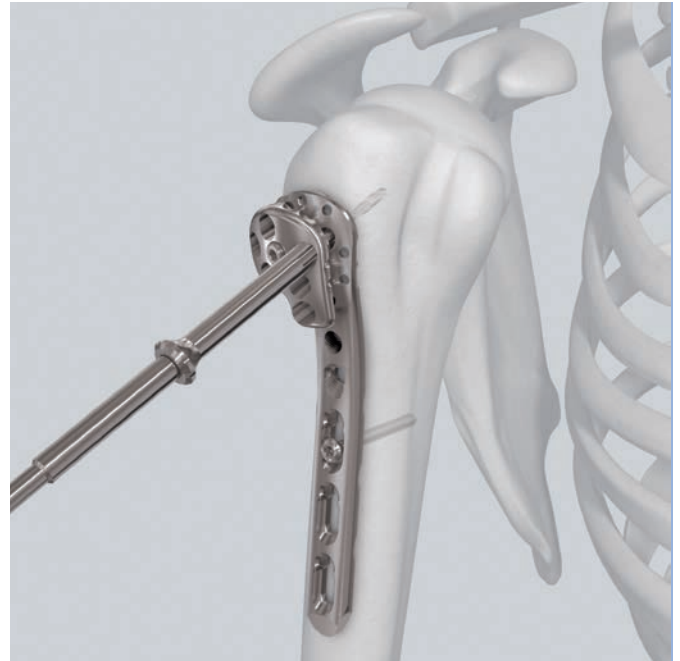
03.122.058	Drill Sleeve 6.0/2.9 with thread
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Use the drill sleeve with thread independently from the aiming device.

▲ WARNING:

Do not drill through the joint surface.

Use the length probe through the outer sleeve and push it carefully into the humeral head. Stop pushing when increased bone density is felt. Read off the required screw length from the length probe.



▲ Precaution:

Do not push the length probe through the joint surface.
Do not hammer on the length probe.

■ Notes:

- The tip of the length probe should be located approximately 5–8 mm below the joint surface.
- ① • The drill bit tip should come as close as possible to the subchondral bone, approximately 5–8 mm from the joint surface. Since it may not always be possible to feel the resistance from the subchondral bone, and the drill bit represents the final position of the locking screw, the use of image intensification is recommended.

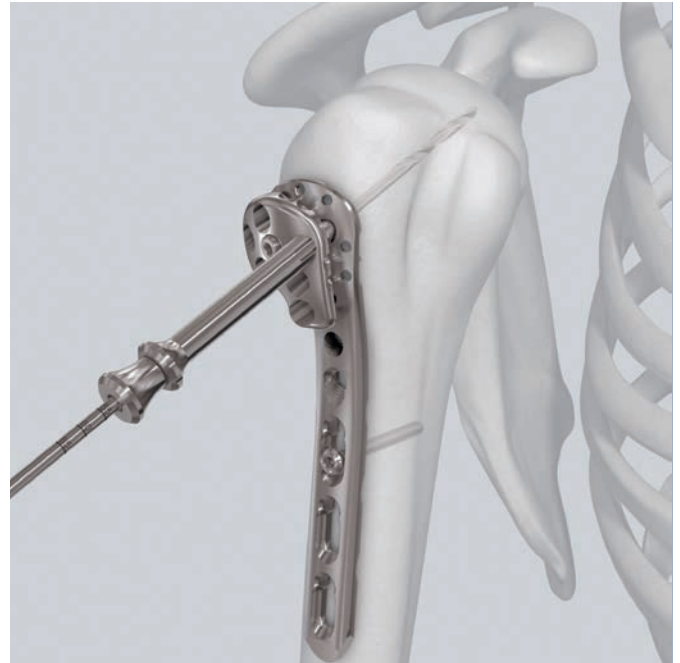
6b. Determine proximal screw lengths (good bone stock)

Instruments

03.122.053	Outer Sleeve 6.0/5.0 for PHILOS Aiming Device
03.122.054	Drill Sleeve 5.0/2.9, for No. 03.122.053
310.284	LCP Drill Bit \varnothing 2.8 mm with Stop, length 165 mm, 2-flute, for Quick Coupling

Optional instruments

03.122.055	Centering Sleeve for Kirschner Wire \varnothing 1.6 mm, for No. 03.122.054
292.160	Kirschner Wire \varnothing 1.6 mm with trocar tip, length 150 mm, Stainless Steel
323.060	PHILOS Direct Measuring Device for Kirschner Wire \varnothing 1.6 mm



If the bone stock is good, choose one of the following options:

Option A: Use a 2.8 mm drill bit through the drill sleeve and drill to 5–8 mm below the joint surface. Read off the required screw length from the drill bit.

Note:

- The drill bit tip should come as close as possible to the subchondral bone, approximately 5–8 mm from the joint surface. Since it may not always be possible to feel the resistance from the subchondral bone, and the drill bit represents the final position of the locking screw, the use of image intensification is recommended.

▲ WARNING:

Do not push the drill bit through the joint surface.

Option B: Check the subsequent position of the screws using Kirschner wires. Attach a drill sleeve system, consisting of an outer sleeve, a drill sleeve, and a centering sleeve for the Kirschner wire onto the aiming device and insert a Kirschner wire 1.6 mm, 150 mm long.

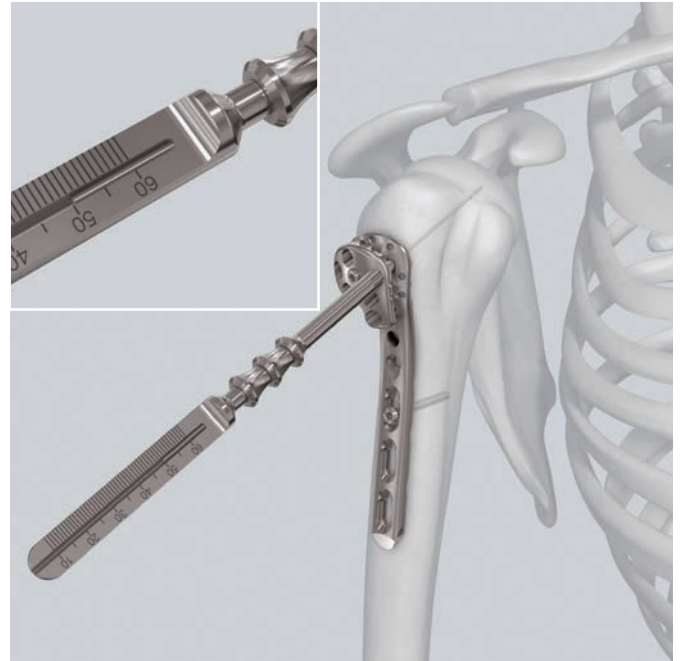
Check the position of the Kirschner wire. The tip of the Kirschner wire should be located in the subchondral bone (5–8 mm below the joint surface). Slide the direct measuring device for Kirschner wire 1.6 mm over the Kirschner wire and determine the length of the required screw.

▲ Precaution:

When selecting the appropriate screw length, the possibility of bone resorption at the fracture site must be taken into account. Ensure that the screw tip is at sufficient distance from the joint surface. Check that the plate supports the lateral aspect of the greater tuberosity.

▲ WARNING:

Do not insert overly long screws in order to prevent primary or secondary screw penetration.



7. Insert proximal screws

Instruments

03.122.053	Outer Sleeve 6.0/5.0 for PHILOS Aiming Device
511.773	Torque Limiter, 1.5 Nm, for AO/ASIF Quick Coupling
314.030	Screwdriver Shaft, hexagonal, small, Ø 2.5 mm
or	
314.116	Screwdriver Shaft Stardrive 3.5, T15, self-holding, for AO/ASIF Quick Coupling
311.431	Handle with Quick Coupling
323.027	LCP Drill Sleeve 3.5, for Drill Bits Ø 2.8 mm
310.284	LCP Drill Bit Ø 2.8 mm with Stop, length 165 mm, 2-flute, for Quick Coupling

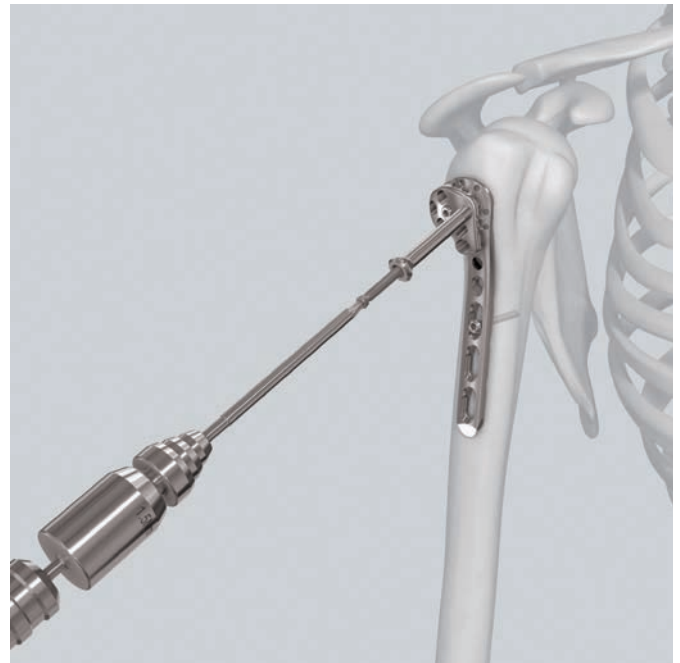
Insert the screw through the outer sleeve with the appropriate screwdriver shaft (hexagonal or Stardrive recess) and the 1.5 Nm torque limiting attachment. The outer sleeve ensures that the locking screw is correctly locked in the plate. The angular stability is reduced if a locking screw is inserted in the wrong axis.

▲ WARNING:

Do not insert overly long screws in order to prevent primary or secondary screw penetration.

■ Note:

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



Insert the screw manually or with power until a click is heard. If using power, reduce speed when tightening the head of the locking screw in the plate.

Repeat the above step for all required proximal screw holes.

▲ Precaution:

The plate should be secured with at least 4 proximal screws whereas in poor bone stock multiple fixation points using more screws is recommended.

Remove the aiming device from the plate. Carefully screw the LCP drill sleeve into the threaded section of the superior neck hole to insert LCP screws directed into the calcar.

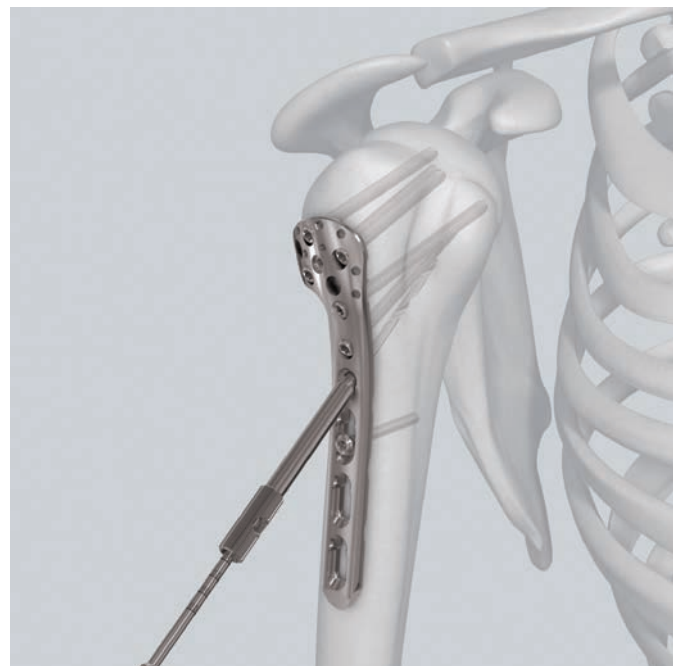
Drill the screw hole with a 2.8mm drill bit. Drill 5–8mm below the joint surface.

Remove the LCP drill sleeve.

Using the depth gauge, determine the required screw length.

Insert the locking screw manually or using a power tool as described above.

Repeat above steps to insert second calcar screw.



8. Insert cortex screws in plate shaft

Insert cortex screws in the plate shaft as described in step 5.

9. Insert locking screws in plate shaft

Instruments

323.027	LCP Drill Sleeve 3.5, for Drill Bits Ø 2.8 mm
310.284	LCP Drill Bit Ø 2.8mm with Stop, length 165mm, 2-flute, for Quick Coupling
319.010	Depth Gauge for Screws Ø 2.7 to 4.0 mm, measuring range up to 60 mm
314.030	Screwdriver Shaft, hexagonal, small, Ø 2.5 mm
or 314.116	Screwdriver Shaft Stardrive 3.5, T15, self-holding, for AO/ASIF Quick Coupling
311.431	Handle with Quick Coupling
511.773	Torque Limiter, 1.5 Nm, for AO/ASIF Quick Coupling

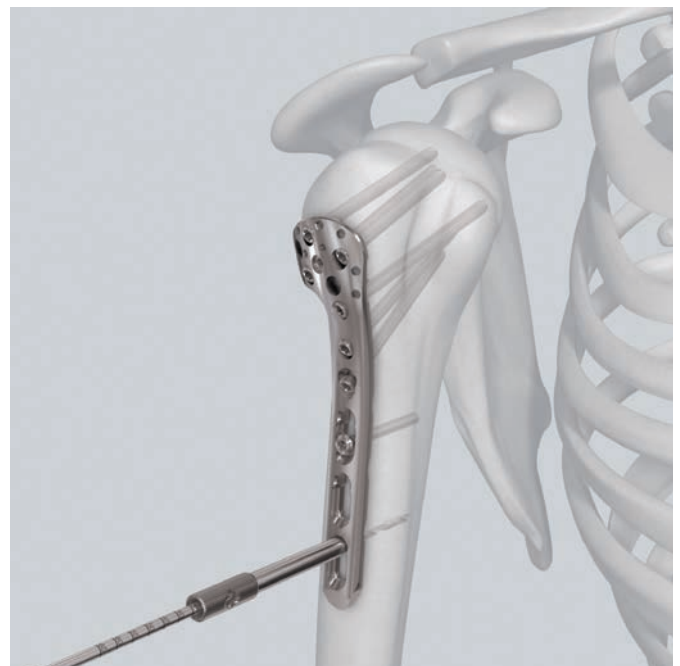
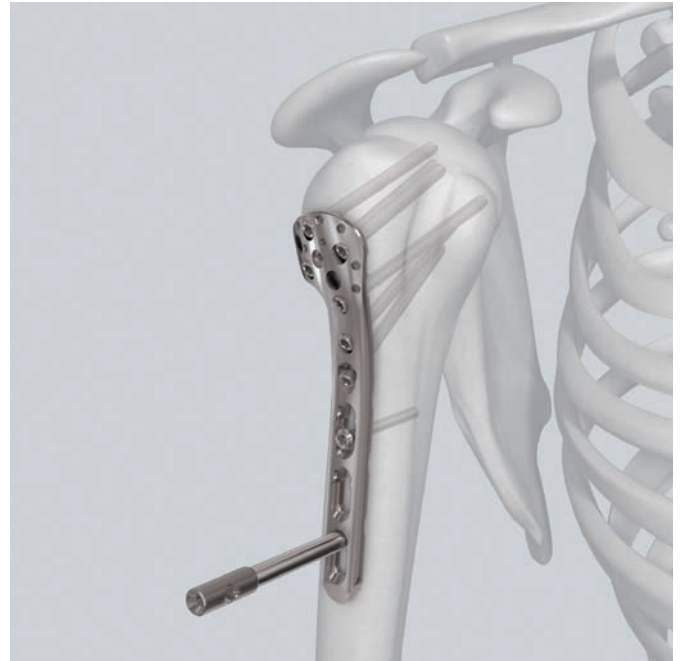
Carefully screw the LCP drill sleeve into the threaded section of the desired combi-hole until it is gripped completely by the thread. The LCP drill sleeve ensures that the hole for the locking screw is drilled in the correct axis (perpendicular to the plane of the plate shaft).

Drill the screw hole with a 2.8mm drill bit passing through both cortices.

Remove the LCP drill sleeve.

Using the depth gauge, determine the required screw length.

Insert the locking screws manually or using a power tool as described in step 7. The distal locking screws must be locked in the combi-hole at an angle of 90° to ensure stability.



10. Attach sutures

Knot the sutures through the designated plate holes if you have not already done so. This construct functions as a tension band and transmits the forces of the rotator cuff over the plate and into the shaft, while preventing fragment displacement during the early rehabilitation period.

11. Final check

- Ⓒ Before closing the wound, check the screw lengths under image intensification as well as the stability of the suture fixation. Ensure that there is full range of glenohumeral motion and that the screws do not penetrate the articular surface.

▲ Precaution:

It is important to check the screw lengths in all planes as their angulation and direction may be difficult to visualize.

Check the sutures to ensure that they do not rupture during motion.

▲ Precaution:

Remove the aiming device from the plate before closing the wound.

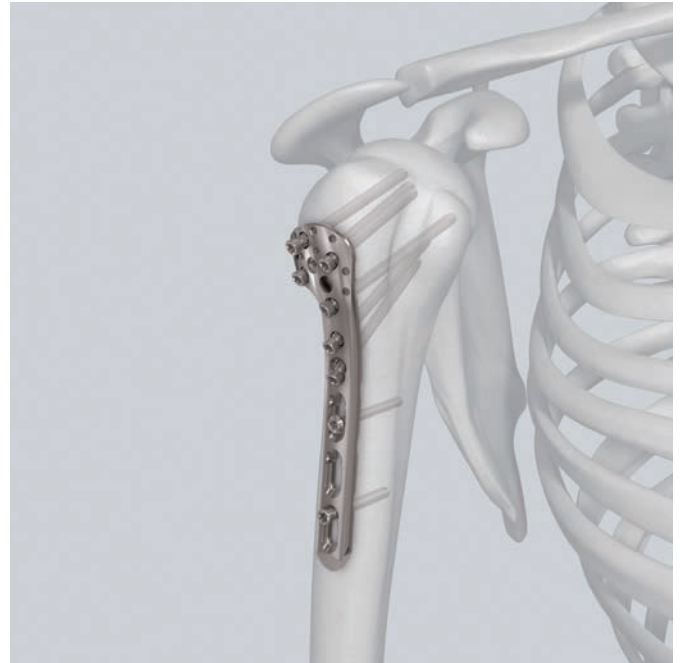


Implant Removal

Instruments

314.030	Screwdriver Shaft, hexagonal, small, Ø 2.5 mm
or	
314.116	Screwdriver Shaft Stardrive 3.5, T15, self-holding, for AO/ASIF Quick Coupling
311.431	Handle with Quick Coupling
311.440	T-Handle with Quick Coupling
309.520	Extraction Screw, conical, for Screws Ø 2.7, 3.5 and 4.0 mm
309.521	Extraction Screw for Screws Ø 3.5 mm

Unlock all screws from the plate, then remove the screws completely from the bone. This prevents simultaneous rotation of the plate when unlocking the last lockscrew. If a screw cannot be removed with the screwdriver (e.g. if the hexagonal or Stardrive recess of the locking screw is damaged or if the screw is stuck in the plate), use the T-Handle with Quick Coupling (311.440) to insert the conical Extraction Screw (309.520 or 309.521) into the screw head, and unscrew the screw in a counter-clock direction.



Implant Specifications

LCP Periarticular Proximal Humerus Plate 3.5

Material	TiCp 4 or stainless steel
Profile (head)	2.6 mm
Profile (shaft)	4.2 mm
Width (shaft)	12.5 mm
Design	6 suture holes and 6 locking holes in plate head 2 neck screws directed into calcar 2–14 elongated combi-holes in plate shaft

Implants

LCP Periarticular Proximal Humerus Plate 3.5

Stainless steel	Titanium	Shaft holes	Length (mm)	
02.123.020	04.123.020	2	91	right
02.123.021	04.123.021	2	91	left
02.123.022	04.123.022	4	127	right
02.123.023	04.123.023	4	127	left
02.123.024	04.123.024	6	163	right
02.123.025	04.123.025	6	163	left
02.123.026	04.123.026	8	199	right
02.123.027	04.123.027	8	199	left
02.123.028S*	04.123.028S*	10	235	right
02.123.029S*	04.123.029S*	10	235	left
02.123.030S*	04.123.030S*	12	271	right
02.123.031S*	04.123.031S*	12	271	left
02.123.032S*	04.123.032S*	14	307	right
02.123.033S*	04.123.033S*	14	307	left
02.123.040	04.123.040	3	109	right
02.123.041	04.123.041	3	109	left
02.123.042	04.123.042	5	145	right
02.123.043	04.123.043	5	145	left



Implants marked with a * are only available sterile packed. The other implants are available nonsterile or sterile packed. Add suffix "S" to article number to order sterile product.

Screws

Screws used with LCP Periarticular Proximal Humerus Plates 3.5

-
- ✦ X12.102 – 124 Locking Screw Stardrive Ø 3.5 mm, length 12–60 mm, self-tapping

 - X13.012 – 060 Locking Screw Ø 3.5 mm, length 12–60 mm, self-tapping

 - *X04.812 – 860 Cortex Screw Ø 3.5 mm, length 12–60 mm, self-tapping
-



- ✦ Stardrive
- Hexagonal

X=2: Stainless steel
X=4: TAN
*X=4: TiCP

All screws are available nonsterile or sterile packed.
Add suffix "S" to article number to order sterile product.

Instruments

03.122.051 Drill Bit Ø 2.8mm, with Stop,
for Quick Coupling



03.122.052 Length Probe for Nos. 03.122.053
and 03.122.058



03.122.053 Outer Sleeve 6.0/5.0 for PHILOS
Aiming Device



03.122.054 Drill Sleeve 5.0/2.9, for No. 03.122.053



03.122.055 Centering Sleeve for Kirschner Wire
Ø 1.6 mm, for No. 03.122.054



03.122.058 Drill Sleeve 6.0/2.9 with thread












03.122.059 Pull Reduction Device for use with
No. 03.122.060 for Drill Sleeves



03.122.060 Wing Nut for Pull Reduction for use
with No. 03.122.059 for Drill Sleeves



03.123.010	Aiming Device for LCP Proximal Humeral Plate, periarticular, right	
03.123.011	Aiming Device for LCP Proximal Humeral Plate, periarticular, left	
292.160	Kirschner Wire Ø 1.6 mm with trocar tip, length 150 mm, Stainless Steel	
310.250	Drill Bit Ø 2.5 mm, length 110/85 mm, 2-flute, for Quick Coupling	
310.284	LCP Drill Bit Ø 2.8 mm with Stop, length 165 mm, 2-flute, for Quick Coupling	
311.431	Handle with Quick Coupling	
314.030	Screwdriver Shaft, hexagonal, small, Ø 2.5 mm	
314.116	Screwdriver Shaft Stardrive 3.5, T15, self-holding, for AO/ASIF Quick Coupling	
319.010	Depth Gauge for Screws Ø 2.7 to 4.0 mm, measuring range up to 60 mm	

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



323.060 PHILOS Direct Measuring Device
for Kirschner Wire Ø 1.6 mm



511.773 Torque Limiter, 1.5 Nm,
for AO/ASIF Quick Coupling



Optional instrument

309.521 Extraction Screw for Screws Ø 3.5 mm



Sets

01.123.001 LCP Proximal Humeral Plates,
periarticular (Pure Titanium),
in Modular Tray, Vario Case System

01.123.003 LCP Proximal Humeral Plates,
periarticular (Stainless Steel),
in Modular Tray, Vario Case System

01.122.013 Small Fragment Basic Instruments,
in Modular Tray, Vario Case System

01.122.015 Screw Insertion Instruments 3.5/4.0,
in Modular Tray, Vario Case System

01.122.031 Proximal Humerus Instruments,
in Modular Tray, Vario Case System

Optional set

01.122.014 Small Fragment Reduction Instruments,
in Modular Tray, Vario Case System

MRI Information

Torque, Displacement and Image Artifacts according to ASTM F 2213, ASTM F 2052 and ASTM F2119

Non-clinical testing of worst case scenario in a 3 T MRI system did not reveal any relevant torque or displacement of the construct for an experimentally measured local spatial gradient of the magnetic field of 3.69 T/m. The largest image artifact extended approximately 169 mm from the construct when scanned using the Gradient Echo (GE). Testing was conducted on a 3 T MRI system.

Radio-Frequency-(RF-)induced heating according to ASTM F2182

Non-clinical electromagnetic and thermal testing of worst case scenario lead to peak temperature rise of 9.5 °C with an average temperature rise of 6.6 °C (1.5 T) and a peak temperature rise of 5.9 °C (3 T) under MRI Conditions using RF Coils [whole body averaged specific absorption rate (SAR) of 2 W/kg for 6 minutes (1.5 T) and for 15 minutes (3 T)].

▲ Precautions:

The above mentioned test relies on non-clinical testing. The actual temperature rise in the patient will depend on a variety of factors beyond the SAR and time of RF application. Thus, it is recommended to pay particular attention to the following points:

- It is recommended to thoroughly monitor patients undergoing MR scanning for perceived temperature and/or pain sensations.
- Patients with impaired thermoregulation or temperature sensation should be excluded from MR scanning procedures.
- Generally, it is recommended to use a MR system with low field strength in the presence of conductive implants. The employed specific absorption rate (SAR) should be reduced as far as possible.
- Using the ventilation system may further contribute to reduce temperature increase in the body.

Not all products are currently available in all markets.
This publication is not intended for distribution in the USA.
Intended use, Indications and Contraindications can be found in the corresponding system Instructions for Use.
All Surgical Techniques are available as PDF files at www.depuysynthes.com/ifu



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