PHILOS + PHILOS Long. The anatomic fixation system for the proximal humerus with angular stability

Surgical technique

SYNTHES®

Original Instruments and Implants of the Association for the Study of Internal Fixation – AO/ASIF

Table of Contents

Image intensifier control

Warning
This description is not sufficient for immediate application of the instrumentation. Instruction by a surgeon experienced in handling this instrumentation is highly recommended.

Indications/contraindications

Indications for Philos

– Dislocated two-, three-, and four-fragment fractures of the proximal humerus, including fractures involving osteopenic bone
– Pseudarthroses in the proximal humerus
– Osteotomies in the proximal humerus

Contraindications

– Acute infections
– Children during the growth phase

Indications for Philos long

– As for Philos, but for fractures extending into the shaft or without medial support

Contraindications

– Acute infections
– Children during the growth phase
– Isolated shaft fractures

Implants/Instruments

Philos Proximal Humeral Internal Locking System

– Plate length 90 mm, short, 3 shaft holes (X41.901)

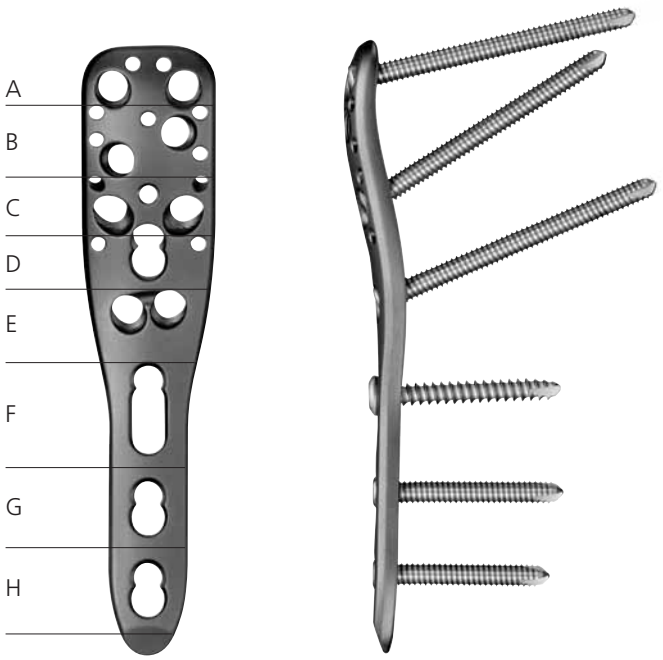
– Plate length 114 mm, long, 5 shaft holes (X41.903)

– 9 proximal screw holes in section A–E
for LCP locking screws ∅ 3.5 mm

– 10 proximal suture holes

– 3 or 5 distal LCP Combi-holes in the shaft section F–H (or F–J)
for cortex screws ∅ 3.5 mm and cancellous bone screws
∅ 4.0 mm, as well as LCP locking screws ∅ 3.5 mm

– Available in pure titanium (CPTI) and implant steel (SSt)



Philos long

– Proximal part identical to Philos

– Shaft reinforced

– Plate length 140 to 270 mm

– 5, 6, 8, 10, and 12 elongated holes in the shaft

LCP locking screws ∅ 3.5 mm (413.020–413.060)

– Self-tapping locking screw lengths:

20 mm	30 mm	40 mm	50 mm	60 mm
22 mm	32 mm	42 mm	52 mm	
24 mm	35 mm	45 mm	55 mm	
26 mm	38 mm	48 mm		
28 mm				

The LCP locking screws 3.5 mm are also available with Stardrive (412.101–412.124)

Philos Aiming Device (323.050 hexagonal, 323.051 Stardrive)

Drill Sleeve System for Philos Aiming Device

323.053	Centering Sleeve for Philos Aiming Device	
323.054	Drill Sleeve for Philos Aiming Device	
323.055	Centering Sleeve for Kirschner Wire ∅ 1.6 mm	

Philos direct measuring device (323.060)

Experience in the use of LCP or instruction by a surgeon with corresponding experience is recommended (see also the Synthes Surgical Technique for LCP 036.000.019).

1

Position of the patient and approach

Surgery is normally performed with the patient in the beach-chair position or supine position. A deltopectoral or transdeltoid approach is recommended.

2

Reduce fracture and fix provisionally

Reduce the head fragments and check the reduction under the image intensifier. Fix the reduction with Kirschner wires.

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

Option

The stability of the structure will be improved with the insertion of sutures. The insertion of sutures is especially recommended in weak bone where only short screws can be used because of the risk of penetration through settling.

Draw the sutures through the appropriate holes before placing the plate against the bone. Provisionally reduce the tubercles using sutures and position the plate exactly (see step 3 on page 6) by placing one or more thick sutures in the region of the insertion of the supraspinatus, infraspinatus, and the subcapsular tendon.

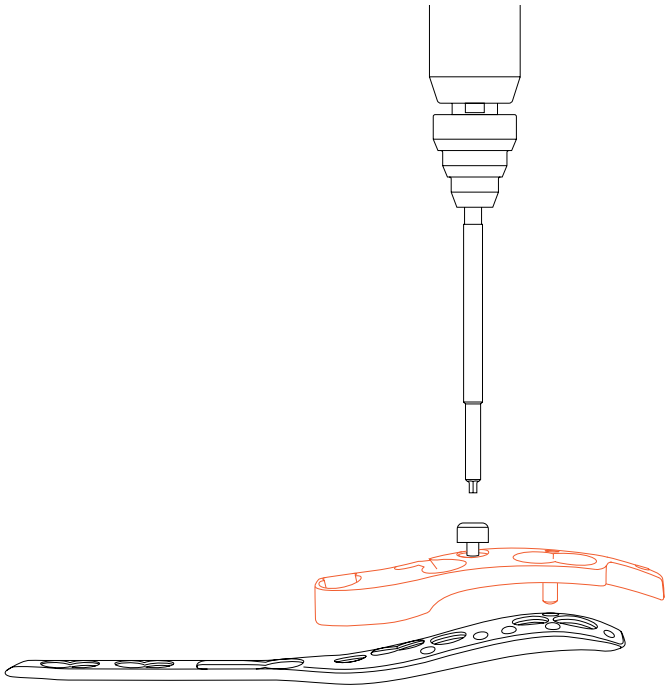
3

Attach aiming device to plate

Insert the stabilization pin of the aiming device in the specially provided hole on the Philos plate. Use the screwdriver to tighten the securing screw of the aiming device.

Required instruments

Philos aiming device (hexagonal)	323.050
or	
Philos aiming device (Stardrive)	323.051
Screwdriver shaft hexagonal	314.030
or	
Screwdriver shaft Stardrive T15	314.116

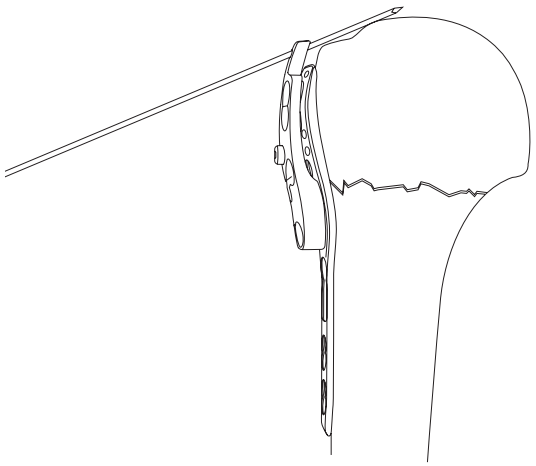


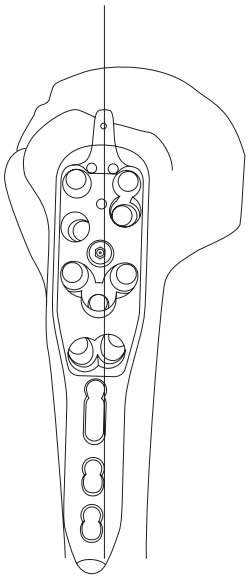
4

Position plate

Position the plate proximally at least 8 mm distal to the upper end of the greater tubercle (rotator cuff insertion). Determine the position of the plate using a Kirschner wire. Insert the Kirschner wire into the proximal guide hole of the insertion guide below the rotator cuff so that the Kirschner wire aims at the proximal joint surface.

Note: Placing the plate at too high a level increases the risk of subacromial impingement. Placing the plate too low can prevent the optimal distribution of screws in the humerus head and make it impossible to insert screws in section "E". Centre the plate laterally against the greater tubercle, ensuring that a sufficient gap is maintained between the plate and the long biceps tendon (arterial blood supply).

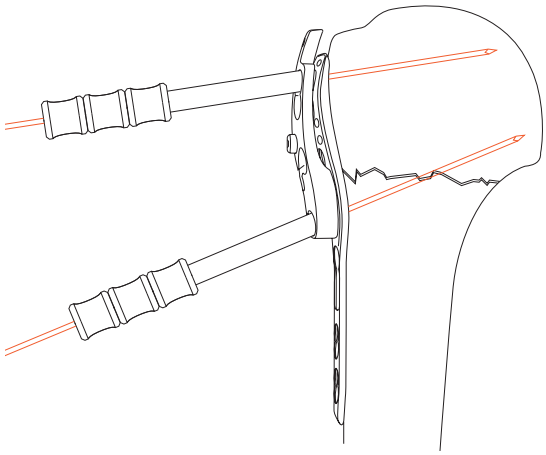




5

Define the position of the screws

Before inserting the screws, check the subsequent position of the screws using Kirschner wires. Insert one Kirschner wire in each case in sections A and E as follows: Attach a drill sleeve system, consisting of a centering sleeve for the Philos aiming device, a drill sleeve for the Philos aiming device, and a centering sleeve for the Kirschner wire (323.055), onto the aiming device and insert a Kirschner wire 1.6 mm, 150 mm long. Check the position of both Kirschner wires under the image intensifier.



Note: If possible, the distal Kirschner wire should be positioned approx. 5 mm above the "calcar". Insert the locking screws in the proximal section (A to E) depending on the respective fracture situation, as described in the following steps 6 and 7. Ideally, the plate should be secured with at least 4 or 6 proximal screws or more, particularly if the bone quality is poor.

Required instruments

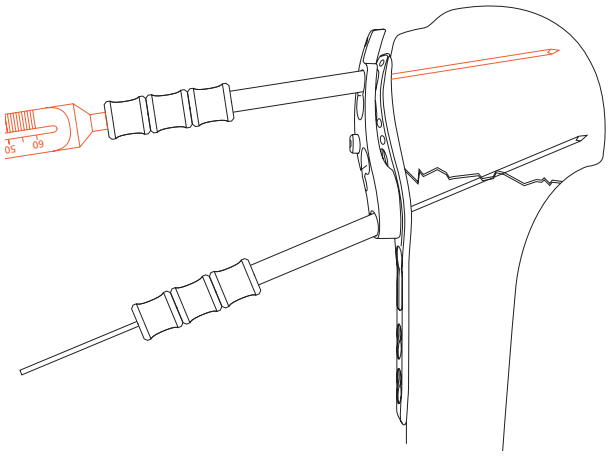
Centering sleeve for the Philos Aiming Device	323.053
Drill sleeve for the Philos Aiming Device	323.054
Centering sleeve for the Kirschner wire	323.055
Kirschner Wire 1.6 mm, 150 mm long	292.160

6

Determine the length of the proximal screws and predrill screw hole

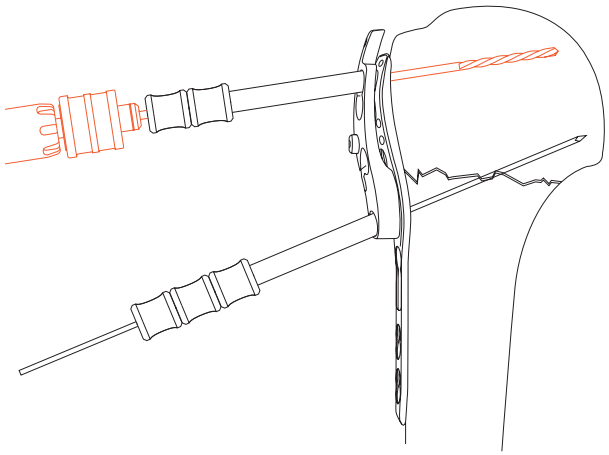
a. Using the Kirschner wire

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 Philos direct measuring device for Kirschner wire 1.6 mm over the Kirschner wire and determine the length of the required screw.



Required instruments

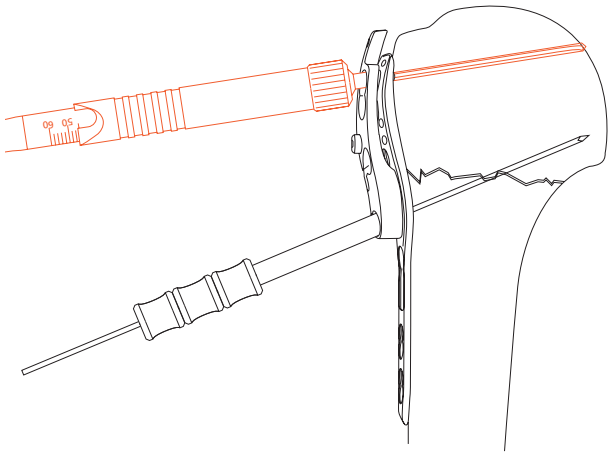
Philos Direct Measuring Device	323.060
Depth Gauge	319.010
Drill Bit 2.8 mm	310.284



Remove the direct measuring device, the Kirschner wire, and the centering sleeve for Kirschner wire. Using a drill bit ∅ 2.8 mm, predrill the screw hole. Remove the drill bit and the drill sleeve.

Alternative

b. Using the depth gauge



Remove the Kirschner wire and the centering sleeve for Kirschner wire. Using a drill bit 2.8 mm (310.284), predrill the screw hole through both cortices. Remove the drill bit and the drill sleeve. Determine the screw length through both cortices using the depth gauge. Deduct 10 mm from the measured reading.

7

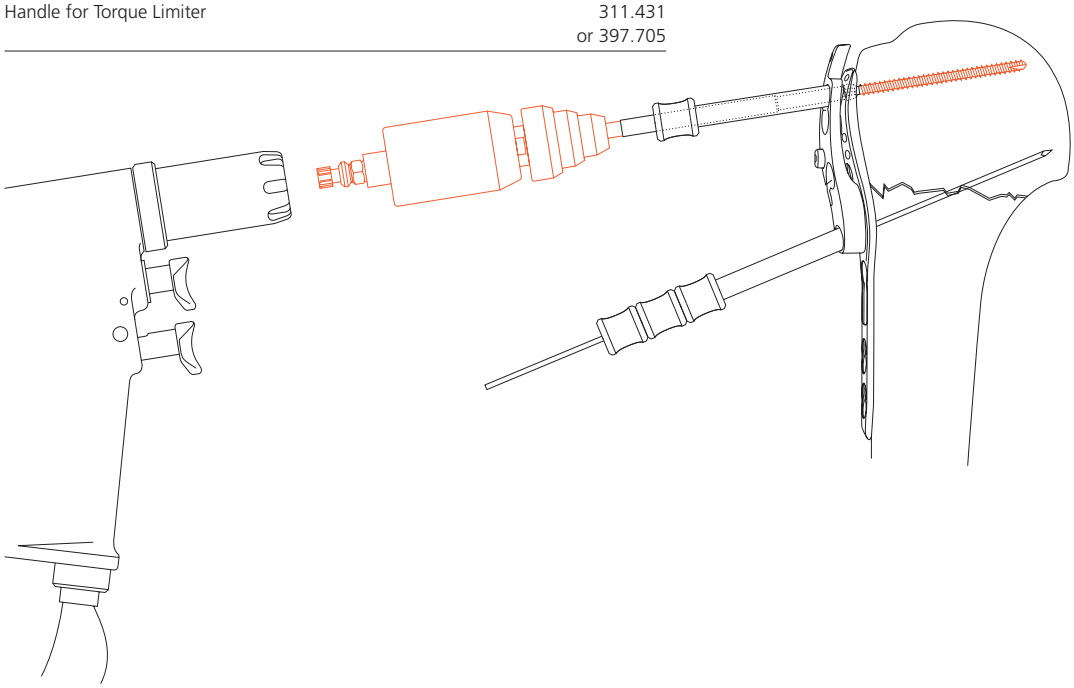
Insert proximal screws

The proximal locking screws (plate holes A–E) can be inserted either using a power tool or manually.

To insert the locking screw using a power tool, fit a torque limiter to the power tool.

Required instruments

Torque limiter, 1.5 Nm	511.770 or 511.773
Screwdriver Shaft hexagonal or Screwdriver Shaft Stardrive T15	314.030 314.116
Centering Sleeve for Philos Aiming Device	323.054
Handle for Torque Limiter	311.431 or 397.705



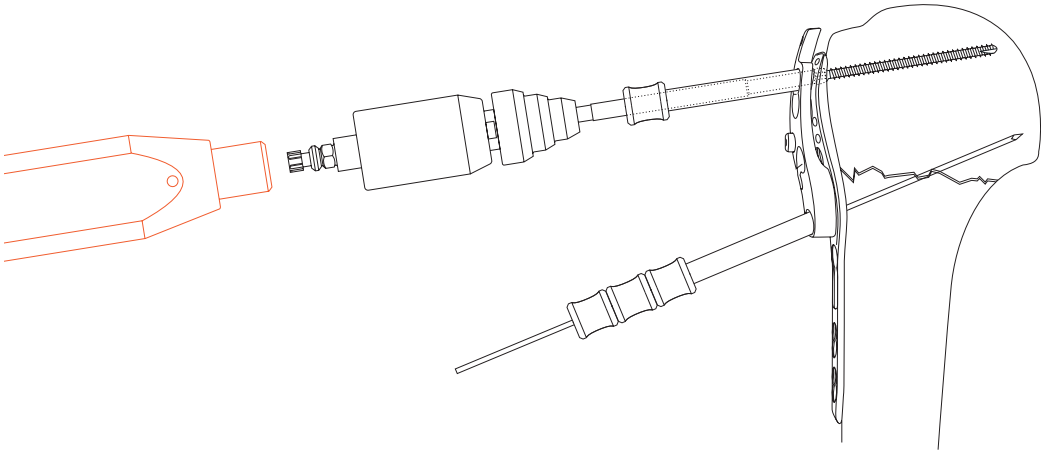
Insert the screwdriver shaft. Pick up the locking screw and insert it through the centering sleeve for the Philos aiming device into the plate hole. To insert the screw, start the power tool slowly, increase the speed and then reduce it again before the screw is fully tightened. The torque is automatically limited and a clearly audible click signifies that the torque limit has been reached. Stop the power tool and disconnect from the screw.

Note: Do not lock the screws at full speed as this risks damaging the screw recess, which would make implant removal more difficult.

Alternative

To insert the locking screw manually, attach a torque limiter to the handle and insert a screwdriver shaft. Insert the locking screw through the centering sleeve. The torque is automatically limited and a clearly audible click signifies that the torque limit has been reached.

Repeat steps 6 and 7 until all desired proximal locking screws A to E are inserted. Remove the aiming device.



8

Distal fixation

Fix the Philos plate distally. Plate holes F to H, or F to J, are LCP Combi-holes.

An LCP Combi-hole can be fixed with a standard screw (cortex or cancellous bone screw) to generate interfragmentary compression. In this case, the screws are inserted according to the technique for fixing LC-DCP standard plates, but using the universal drill guide instead of the LC-DCP drill guide.

The insertion of an angularly-stable LCP locking screw in the Combi-hole is described in the following steps 9 to 12.

Note: For more stable fixation and to reduce the risk of screw loosening in the diaphysis, the use of bicortical self-tapping screws in the distal section of the plate is recommended.

Required instruments

LC-DCP Drill Sleeve	323.360

9

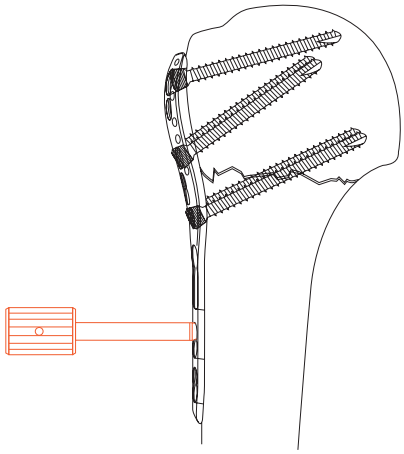
Insert LCP guide sleeve in distal plate hole

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 guide sleeve ensures that the locking screw is correctly locked in the plate. The angular stability is reduced if a locking screw is inserted obliquely.

Note: The threaded hole is perpendicular to the plane of the plate.

Required instruments

LCP Drill Sleeve	323.027

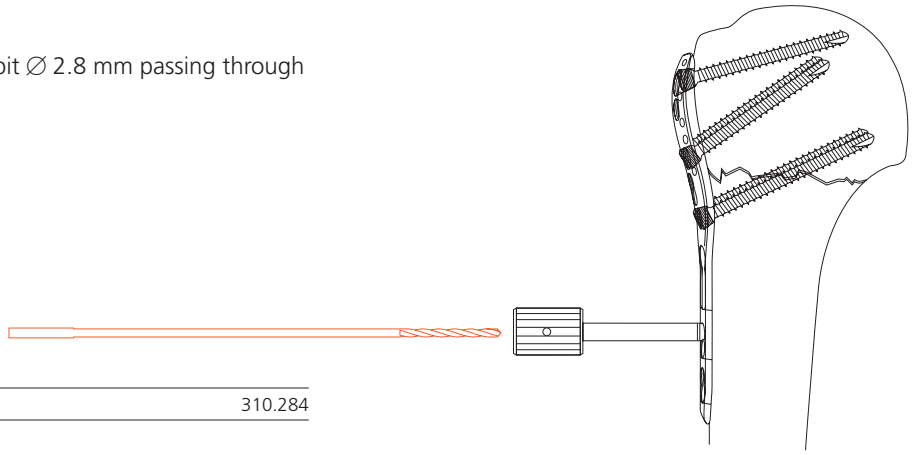


10

Predrill screw hole

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

Remove the LCP guide sleeve.



Required instruments

Drill bit 2.8 mm	310.284

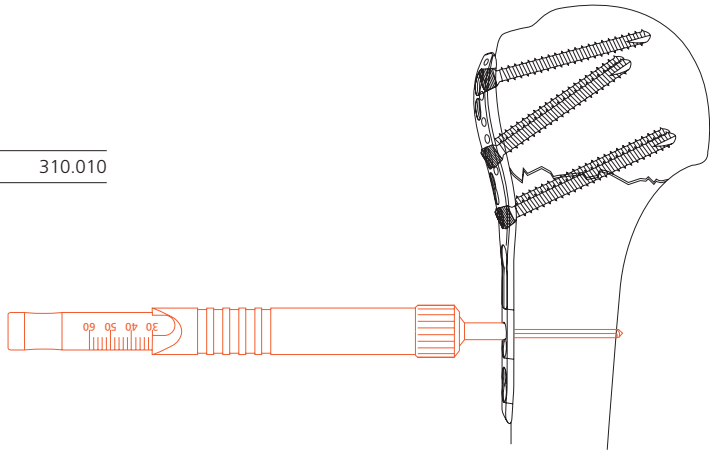
11

Determine screw length

Using the depth gauge, determine the screw length.

Required instruments

Depth gauge	310.010

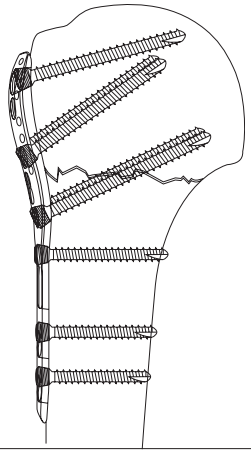


12

Insert distal screws

Insert the locking screws manually or using a power tool as described step 7 on page 10. The distal locking screws must be locked in the Combi-hole at an angle of 90° to ensure optimal stability.

Insert all distal screws (depending on the particular plate, 3–5 locking screws or standard screws).



Surgical technique for Philos Long

The surgical technique is essentially identical to that for the Philos plate. However, the following points should be considered in particular.

Approach

The approach must normally be lengthened because of the plate. An extended deltopectoral approach is possible.

Position plate

The positioning of the Philos Long requires a partially lateral section of the deltoid muscle. Alternatively, the plate can also be advanced into the middle of the muscle insertion.

Note: The plate can be shaped with the bending tools. It can then also be guided in the form of a spiral toward the anterior.

Distal fixation

The fracture and possible fragments are to be fixed with use of the elongated holes. This allows considerable angulation when cortical screws are used.

Note: To achieve maximum stability, the shaft should be secured with at least 3 LCP screws.

Postoperative treatment

Start exercises as soon as possible after surgery to prevent later restrictions of movement. However, make absolutely sure that full load is exerted only after complete consolidation of the fracture.

Implant removal

To remove the plate, first unlock all screws with the screwdriver before removing them definitively in a second step, otherwise the plate may rotate while the last screw is being removed and cause soft tissue damage.

If the screws cannot be removed with the screwdriver (e.g., if the hexagonal recess of the locking screw is damaged or if the screws are stuck in the plate), loosen the conical extraction screw with a left-handed thread using the T-handle with quick coupling by turning counterclockwise.

Required instruments

Screwdriver Shaft hexagonal	314.030
or	
Screwdriver Shaft Stardrive T15	314.116
Extraction Screw with Left-handed Thread	309.521

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