

2.4 mm LCP Volar Column Distal Radius Plates. Part of the 2.4 mm LCP Distal Radius System.

Technique Guide



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 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.

2.4 mm LCP Volar Column Distal Radius Plates

Description

The LCP Volar Column Plate is part of the 2.4 mm LCP Distal Radius System and is indicated for the fixation of intra- and extra-articular fractures and osteotomies of the distal radius. Multiple locking screw options in the head of the plate provide additional options for fixation of the **radial** and **intermediate** columns.



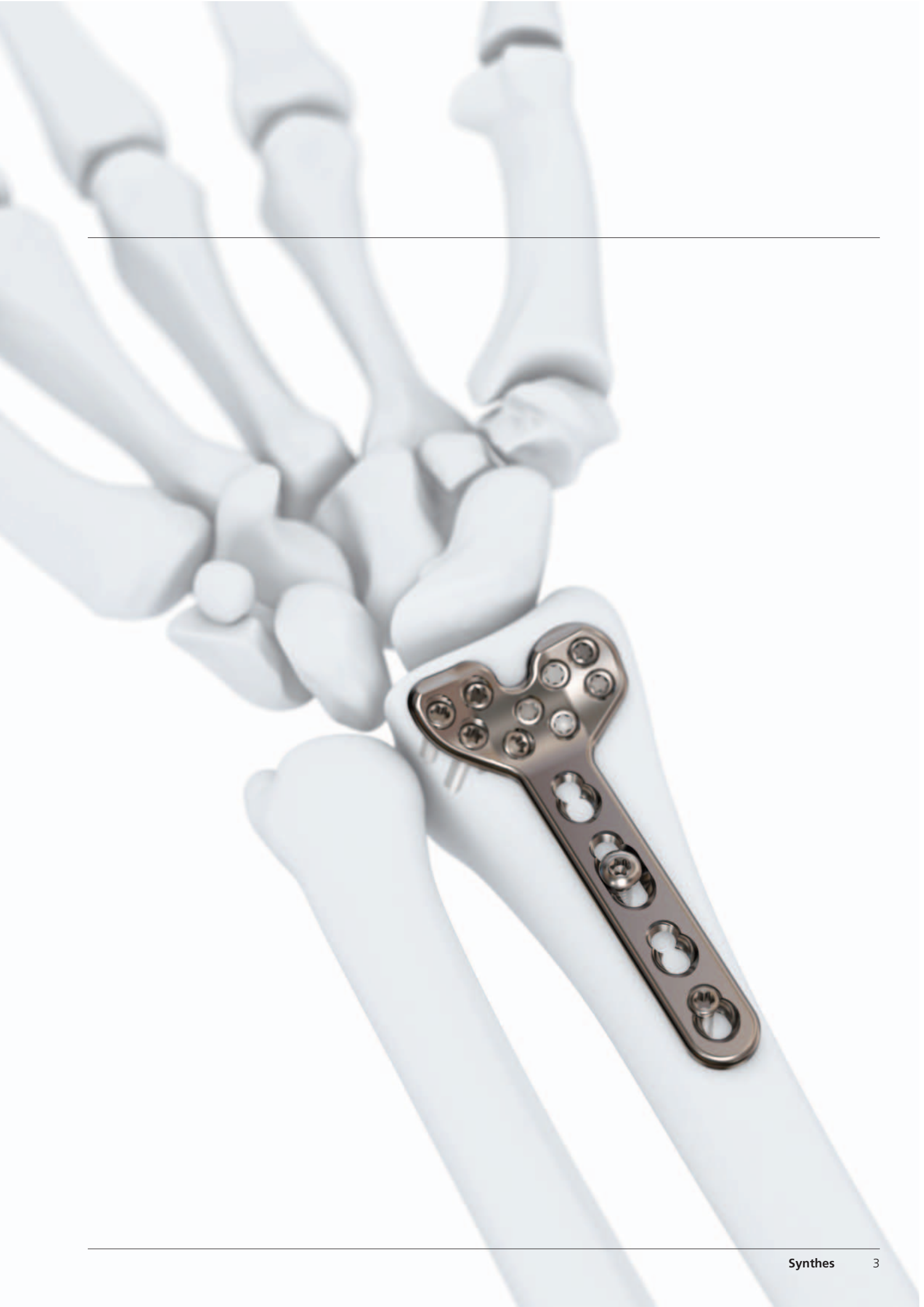
Features

- Anatomically contoured volar distal radius plates.
- Multiple locking screw options in head of plate provide fixation of the radial and intermediate column.
- Choice of 8- or 9-hole head configurations.
- Available left and right, with 3-, 4-, and 5-hole shaft length.
- Screw sizes:
 - Head: 2.4 mm locking screws
 - Shaft: 2.4 mm locking, 2.4 mm cortex, or 2.7 mm cortex screws
- Available in stainless steel and pure titanium.

Benefits

- Multiple distal locking screw options offer a fixed-angle construct to support the articular surface, reduce the need for bone graft and obtain fixation in osteoporotic bone.
- Combi holes in plate shaft allow locking screw fixation with angular stability in the threaded section, or compression with cortex screws in the DCU section of the hole.
- Low plate and screw profile minimizes potential for tendon adhesions and soft tissue irritation.
- Polished surface and rounded edges minimize potential for tendon adhesion.





In 1958, the AO ASIF (Association for the Study of Internal Fixation) formulated four basic principles, which have become the guidelines for internal fixation:¹

Fracture Reduction and Restoration of the Anatomical Relationships

The LCP Volar Column Distal Radius Plates are designed to treat a variety of distal radius fracture patterns and enables the surgeon to address fragments individually for each fracture and patient. Anatomic reduction is achieved according to fracture pattern and approach, either directly or indirectly, and can be stabilized with temporary K-wires while the plate is applied. Elongated holes in the proximal shaft of the plates are used to bring the plate to the bone with cortical screws and allow the adjustment of the plates position. Their widely universal anatomic shape makes the contouring of the plates according to the bone's anatomy unnecessary.

Stable Fixation

The versatility of the system enables the surgeon to reduce and stabilize even the most complex fractures. Complex fractures may be treated according to the three-column theory by addressing ulnar and radial fragments separately. LCP Volar Column Distal Radius Plates allow surgeons to choose from a variety of locking options. This way, they provide support of the entire articular surface, in particular near the distal radial ulna joint where bone quality is best. Additional screws securely hold distal fragments of the radial styloid.

Preservation of Blood Supply

The plates' low profile cross-sectional design together with undercuts and rounded edges reduce the potential for soft tissue irritation and ensure an optimal blood supply to the periosteum, especially when used with locking screws.

Early Mobilization

The features of the plates combined with the AO surgical technique create an environment for bone healing, expediting an early return to optimal function.

1. M.E. Müller, M. Allgöwer, R. Schneider, and H. Willenegger (1991) AO Manual of Internal Fixation, 3rd Edition. Berlin: Springer.

Indications

The LCP Volar Column Plate 2.4 is indicated for the fixation of complex intra- and extra-articular fractures and osteotomies of the distal radius and other small bones.

Preoperative Planning

Three Column Theory

Extra-articular fractures require avoidance of malunion with angulation and shortening. Malalignment results in limitations of movement, changes of load distribution, mid-carpal instability and increased risk of osteoarthritis in the radiocarpal joint.

Intra-articular fractures with articular displacement over 2 mm in the radiocarpal joint inevitably result in osteoarthritis and functional impairment.

The treatment of distal radius fractures should provide meticulous reconstruction of the joint surface, stable internal fixation and early functional post-operative treatment.

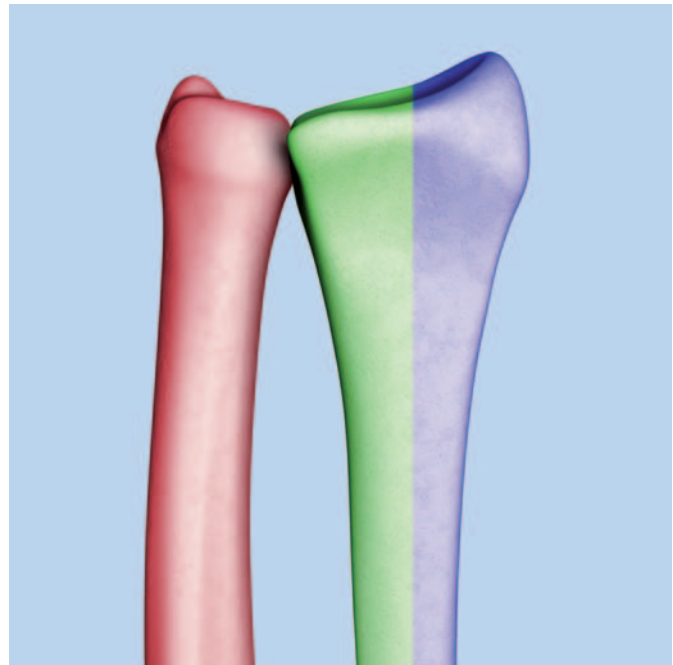
The distal radius and distal ulna form a three-column biomechanical construction:

- The ulnar column is the distal ulna, the triangular fibrocartilage and the distal radio-ulnar joint.
- The intermediate column is the medial part of the distal radius, with the lunate fossa and the sigmoid notch.
- The radial column is the lateral radius with the scaphoid fossa and the styloid process.

A dorsally displaced fracture of the distal radius shows not only dorsiflexion in the sagittal plane, but also radial deviation in the frontal plane and supination in the transverse plane.

Stabilization after reduction requires buttressing of the intermediate column as well as the radial column.

In case of a fractured distal ulna, the ulnar column should be stabilized as well.



- Radial Column
- Intermediate Column
- Ulnar Column

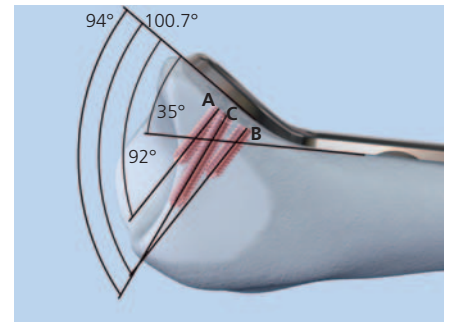
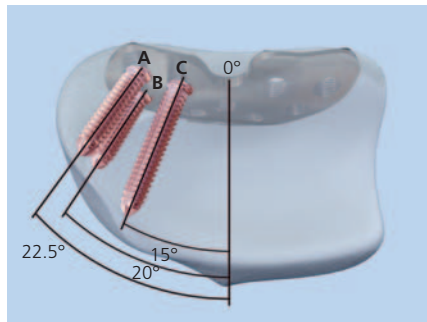
Screw trajectories in 2.4 mm LCP Volar Column Plates*

The LCP Volar Column Plate provides multiple locking screw options in the head of the plate to optimally support the articular surface:

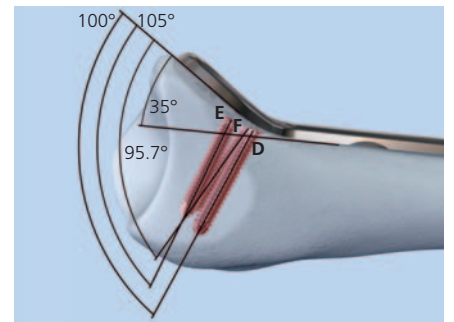
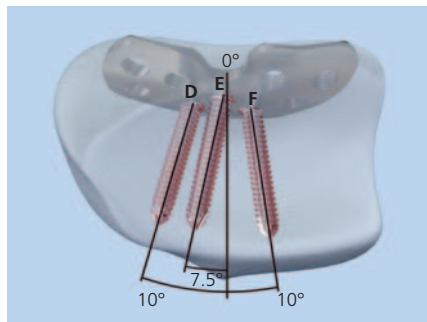
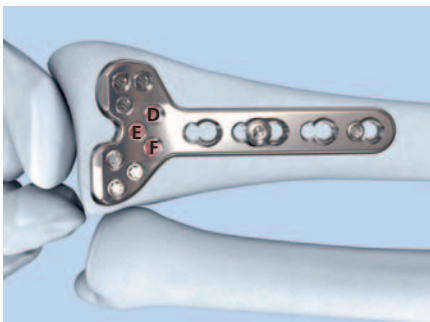
- radial screws for the radial column
- medial screws
- ulnar screws for the intermediate column

The chart below serves as a reference to plan placement of screws.

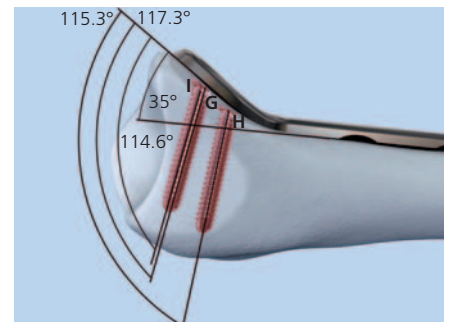
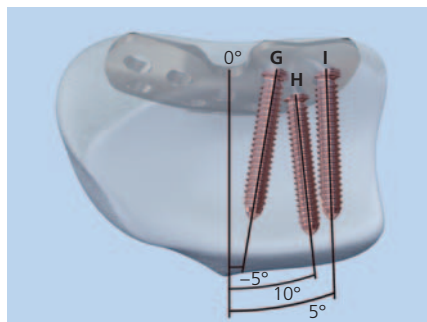
Radial screws



Medial screws



Ulnar screws



*Note: Plate with 9 head holes shown

Preparation

1

Short LCP Drill Sleeves

Instrument

323.035	LCP Drill Sleeve 2.4, short, for Drill Bits Ø 1.8 mm
314.467	Screwdriver Shaft, Stardrive, T8, self-holding
311.430	Handle with Quick Coupling, length 110 mm

Optional

323.029	LCP Drill Sleeve 2.4, with Scale up to 30 mm, for Drill Bits Ø 1.8 mm
314.468	Holding Sleeve for Screws Stardrive Ø 2.4 mm, T8, for Screwdriver Shafts Ø 3.5 mm, for No. 314.467

As an alternative to the long LCP drill sleeve 2.4, with scale up to 30 mm, short LCP drill sleeves (323.035) may be inserted into all locking holes before applying the plate.

Pick up the sleeves (selfholding) using the screwdriver shaft, Stardrive, self-holding. Insert drill sleeves carefully in line with the axis of the desired screw hole.

Tip

The short sleeves mounted to the plate before surgery will help reduce surgery time, and they will double as K-wire holes for preliminary plate fixation.

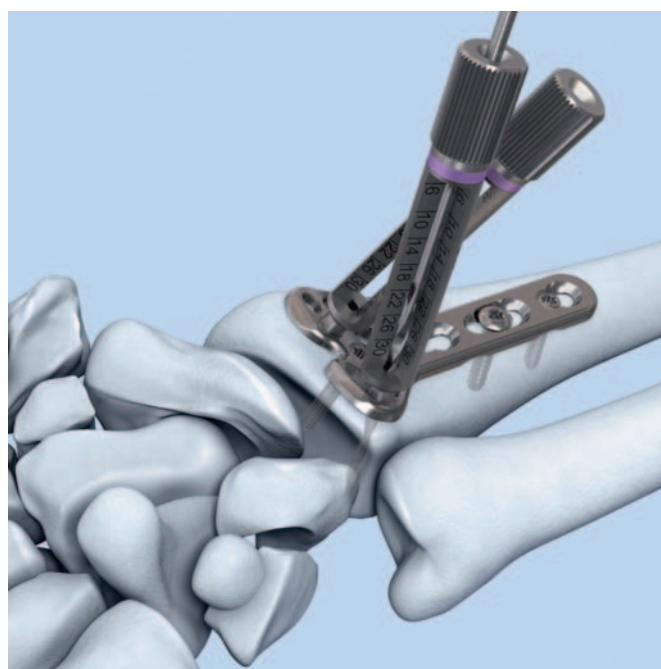
Note: Short LCP drill sleeves may also be inserted into the plate using the regular holding sleeve for screws Stardrive Ø 2.4 mm.



Short LCP drill sleeve



Volar Column Distal Radius Plate pre-loaded with short LCP drill sleeves



Optional: Volar Column Distal Radius Plate with long LCP drill sleeves

2

Screw selection

Determine what screws to use for the fixation of the plate.

Tip:

- Plate shaft
Use locking head and/or cortex screws in the shaft of the plates. If a combination of cortex screws and locking head screws is used, a cortex screw should be used first to pull the plate to the bone.
- Plate head
Locking screws in the head of the plate support the articular surface and prevent loss of reduction.

Warning: If a locking head screw is used first, ensure that the plate is held securely to the bone, to avoid spinning of the plate.

Important: 2.7 mm cortex screws can only be used in the combi hole of the volar plates.

Implantation

1

Implant selection

Select the plates according to the fracture pattern and anatomy of the radius.

Important: Distinguishing left plate from right plate: Rounded side is positioned on the **R**adial styloid.



left plate



right plate

2

Fracture reduction

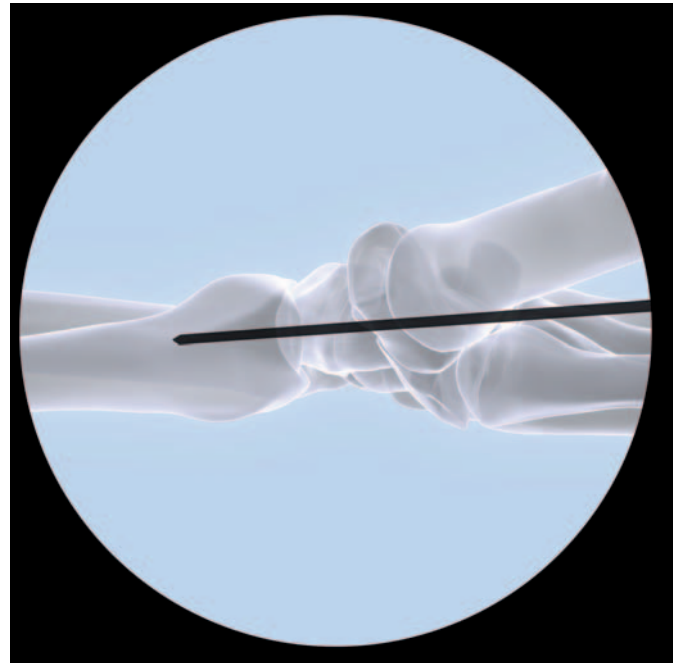
Translate the shaft portion of the fracture from the ulnar to radial side at the same time to manipulate the radial column into alignment.

Once the fracture is reduced, insert K-wires or drill bits for preliminary fracture stabilization.

- 1 Perform several radiographic views of the distal radius to ensure alignment and reduction.



Example of K-wire fixation: AP view



20° in clined lateral

3

Apply plate

Instruments

310.509	Drill Bit Ø 1.8 mm, with marking
311.430	Handle, with Quick Coupling
314.467	Screwdriver Shaft, Stardrive, T8, self-holding
319.005	Depth Gauge for Screws Ø 2.0 and 2.4 mm
323.202	Universal Drill Guide 2.4

Optional

310.534	Drill Bit Ø 2.0 mm, with marking
314.468	Holding Sleeve for Screws Stardrive Ø 2.4 mm, T8, for Screwdriver Shafts Ø 3.5 mm, for No. 314.467
319.010	Depth Gauge for Screws Ø 2.7 to 4.0 mm
323.260	Universal Drill Guide 2.7

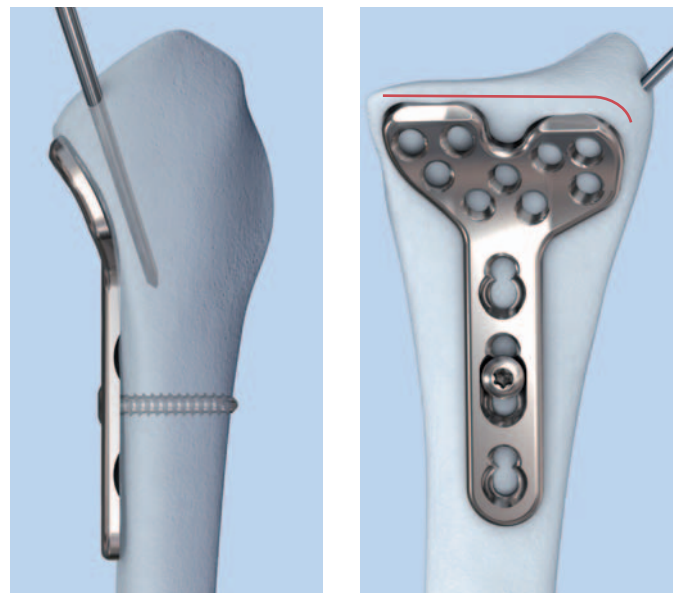
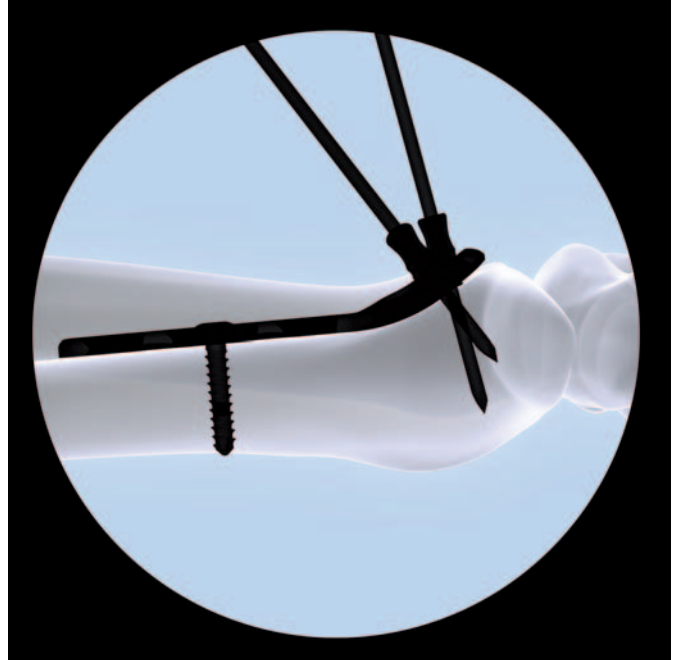


Plate placement. The red line indicates the volar ridge.

After fracture is reduced with K-wires, apply the volar column plate to fit the volar surface and insert a 2.4 mm cortex screw into the elongated hole in the shaft. Adjust the plate position as necessary, and tighten the screw.

Note: Alternatively, a 2.7 mm cortex screw may be inserted into the elongated hole.

- Provisionally fix the plate distally with K-wires or drill bits inserted through the short drill sleeves.



Preliminary K-wire fixation with short drill guides.

4

Insertion of proximal screws

Instruments

310.509	Drill Bit Ø 1.8 mm, with marking
311.430	Handle, with Quick Coupling
314.467	Screwdriver Shaft, Stardrive, T8, self-holding
319.005	Depth Gauge for Screws Ø 2.0 and 2.4 mm
323.029	LCP Drill Sleeve 2.4, with scale
323.202	Universal Drill Guide 2.4

Optional

310.260	Drill Bit Ø 2.7 mm, length 100/75 mm, 2-flute, for Quick Coupling
310.530	Drill Bit Ø 2.4 mm, length 100/75 mm, 2-flute, for Quick Coupling
310.534	Drill Bit Ø 2.0 mm, with marking
314.468	Holding Sleeve for Screws Stardrive Ø 2.4 mm, T8, for Screwdriver Shafts Ø 3.5 mm, for No. 314.467
319.010	Depth Gauge for Screws Ø 2.7 to 4.0 mm
323.035	LCP Drill Sleeve 2.4, short, for Drill Bits Ø 1.8 mm
323.260	Universal Drill Guide 2.7
511.776	Torque Limiter 0.8Nm

Insert additional proximal screws. Determine whether 2.4 mm locking or cortex screws will be used in the shaft of the plate.

For locking screws, carefully insert the LCP drill sleeve 2.4 with scale, in line with the hole's axis until it is seated in the desired locking hole. Drill with the drill bit \varnothing 1.8 mm.

Read the screw length directly from the laser mark on the drill bit, or use the corresponding Depth Gauge to determine the screw length.

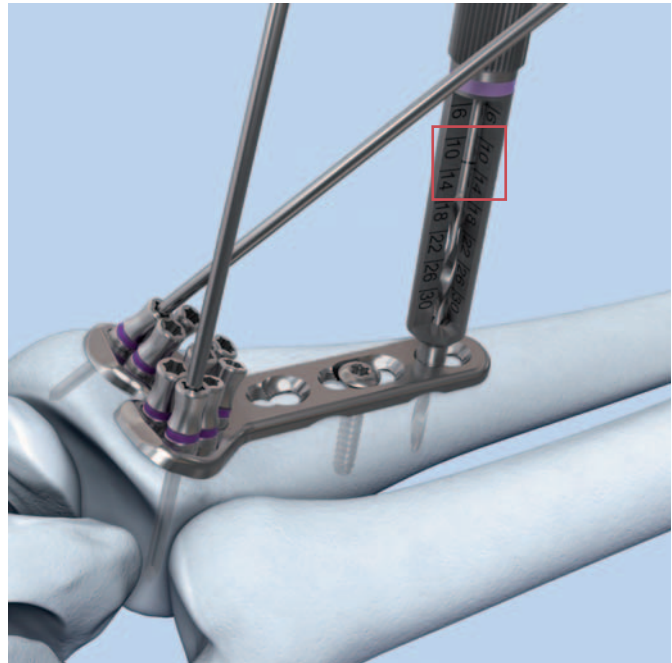
Note: The short LCP drill sleeves 2.4 may be used alternatively to the long LCP drill sleeve 2.4.

Optional

Insert the self-tapping locking screws with the torque limiter.

For cortex screws, use the universal drill guide 2.4. Drill threaded holes with the drill bit \varnothing 1.8 mm and gliding holes for compression with the drill bit \varnothing 2.4 mm. Then, measure the screw length using the corresponding Depth Gauge.

Note: When 2.7 mm cortex screws are inserted, use the universal drill guide 2.7. Drill threaded holes with the drill bit \varnothing 2.0 mm and gliding holes for compression with the drill bit \varnothing 2.7 mm.



Long LCP drill sleeve, inserted into the locking part of the LCP combi hole.

5

Insertion of distal screws

Instruments

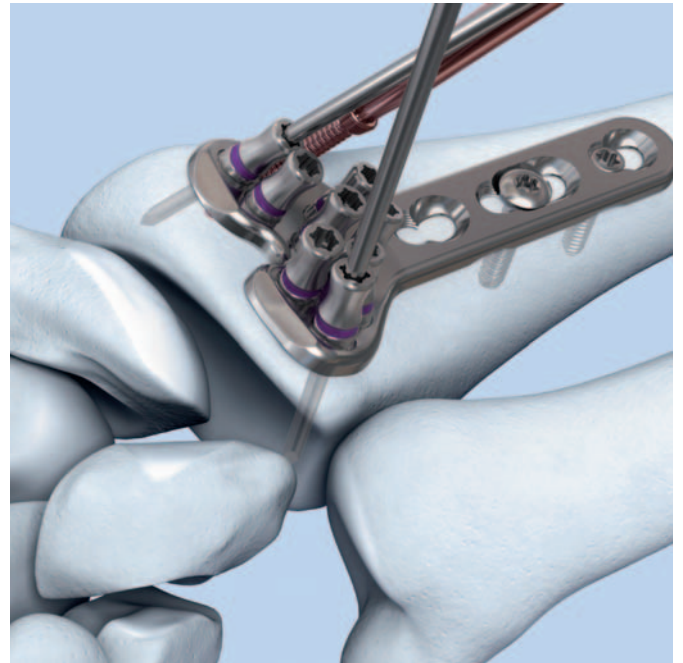
310.509	Drill Bit \varnothing 1.8 mm, with marking
311.430	Handle, with Quick Coupling
314.467	Screwdriver Shaft, Stardrive, T8, self-holding
319.005	Depth Gauge for Screws \varnothing 2.0 and 2.4 mm
323.035	LCP Drill Sleeve 2.4, short, for Drill Bits \varnothing 1.8 mm

Optional

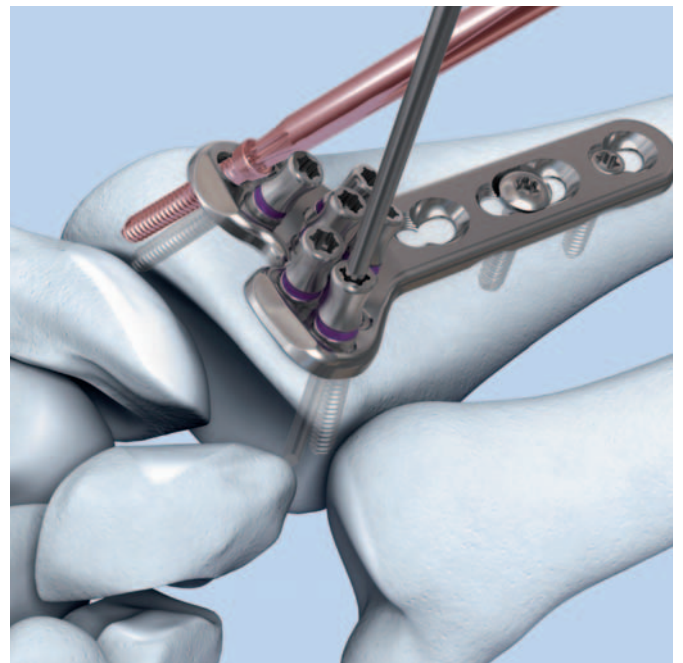
314.468	Holding Sleeve for Screws Stardrive \varnothing 2.4 mm, T8, for Screwdriver Shafts \varnothing 3.5 mm, for No. 314.467
323.029	LCP Drill Sleeve 2.4, with scale
511.776	Torque Limiter 0.8Nm

Insert distal screws. Insert 2.4 mm locking screws into the distal part of the plate, selecting hole locations appropriate to the particular fracture pattern. For screw insertion, remove K-wires and drill sleeves as needed (see illustration). It is important to ensure the screws do not penetrate the far cortex.

Note: The order of screw insertion and the number of screws used will depend on the fracture pattern.



Example of screw insertion when starting on the radial side. While leaving the K-wire secure the fragment by choosing a locking hole beneath.



Remove K-wire and drill sleeve on radial side to insert a second locking screw for rotational stability. Proceed the same way on the ulnar side.

Important: When finished with the fixation, remove all unused drill sleeves from the plate. The holding sleeve for T8 Stardrive screwdriver shaft can be used for drill guide removal.

Optional

Insert the self-tapping locking screws with the torque limiter.



Final fixation

6

Confirm proper joint reconstruction

- Confirm proper joint reconstruction, screw placement and screw length using multiple C-arm views. To assure that the most distal screws are not in the joint, use additional views, such as 10° tilted AP, 20° inclined lateral, and 45° pronated oblique.



View 10° tilted AP



20° inclined lateral view

7

Postoperative treatment

Postoperative treatment with Locking Compression Plates (LCP) does not differ from conventional internal fixation procedures.

Implant Removal

Instruments

311.430	Handle, with Quick Coupling
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314.467	Screwdriver Shaft, Stardrive, T8, self-holding
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Optional:

314.468	Holding Sleeve for Screws Stardrive Ø 2.4 mm, T8, for Screwdriver Shafts Ø 3.5 mm, for No. 314.467
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To remove locking screws, first unlock all screws from the plate; then remove the screws completely from the bone. The last screw removed should be a non-locking screw of the shaft. This guarantees the plate not to spin when locking screws are removed.

Implants

Locking Screws

X12.806–830 Locking Screw 2.4 mm, self-tapping

X=2: stainless steel
X=4: TAN



Cortex Screws 2.4

X01.756–780 Cortex Screw 2.4 mm, self-tapping



Optional:

Cortex Screws 2.7

X02.870–890 Cortex Screw 2.7 mm, self-tapping

X=2: stainless steel
X=4: TAN



All screws with Stardrive, T8 recess.

LCP Volar Column Distal Radius Plates 2.4

Part Number	Head Holes	Shaft Holes	Left/Right	Length (mm)
OX.110.330	9	3	R	49
OX.110.331	9	3	L	49
OX.110.340	9	4	R	58
OX.110.341	9	4	L	58
OX.110.350	9	5	R	67
OX.110.351	9	5	L	67
OX.110.430	8	3	R	49
OX.110.431	8	3	L	49
OX.110.440	8	4	R	58
OX.110.441	8	4	L	58
OX.110.450	8	5	R	67
OX.110.451	8	5	L	67

X=2: stainless steel
X=4: TAN



Instruments

310.509	Drill Bit 1.8 mm with marking, length 110/85 mm, 2-fluted, for Quick Coupling	
311.430	Handle with Quick Coupling, length 110 mm	
314.467	Screwdriver Shaft, Stardrive, T8, self-holding	
314.468	Holding Sleeve for Screws Stardrive 2.4 mm, T8, for Screwdriver Shafts 3.5 mm, for No. 314.467	
319.005	Depth Gauge for Screws Ø 2.0 and 2.4 mm, measuring range up to 40 mm	
323.029	LCP Drill Sleeve 2.4, with scale up to 30 mm, for Drill Bit 1.8 mm	
323.035	LCP Drill Sleeve 2.4, short, for Drill Bits Ø 1.8 mm, for LCP Distal Radius Plates	
Optional:		
310.260	Drill Bit Ø 2.7 mm, length 100/75 mm, 2-flute, for Quick Coupling	
310.530	Drill Bit Ø 2.4 mm, length 100/75 mm, 2-flute, for Quick Coupling	
310.534	Drill Bit Ø 2.0 mm, with marking, length 110/85 mm, 2-flute, for Quick Coupling	
319.010	Depth Gauge for Screws Ø 2.7 to 4.0 mm, measuring range up to 60 mm	
511.776	Torque Limiter, 0.8 Nm, with AO/ASIF Quick Coupling	

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