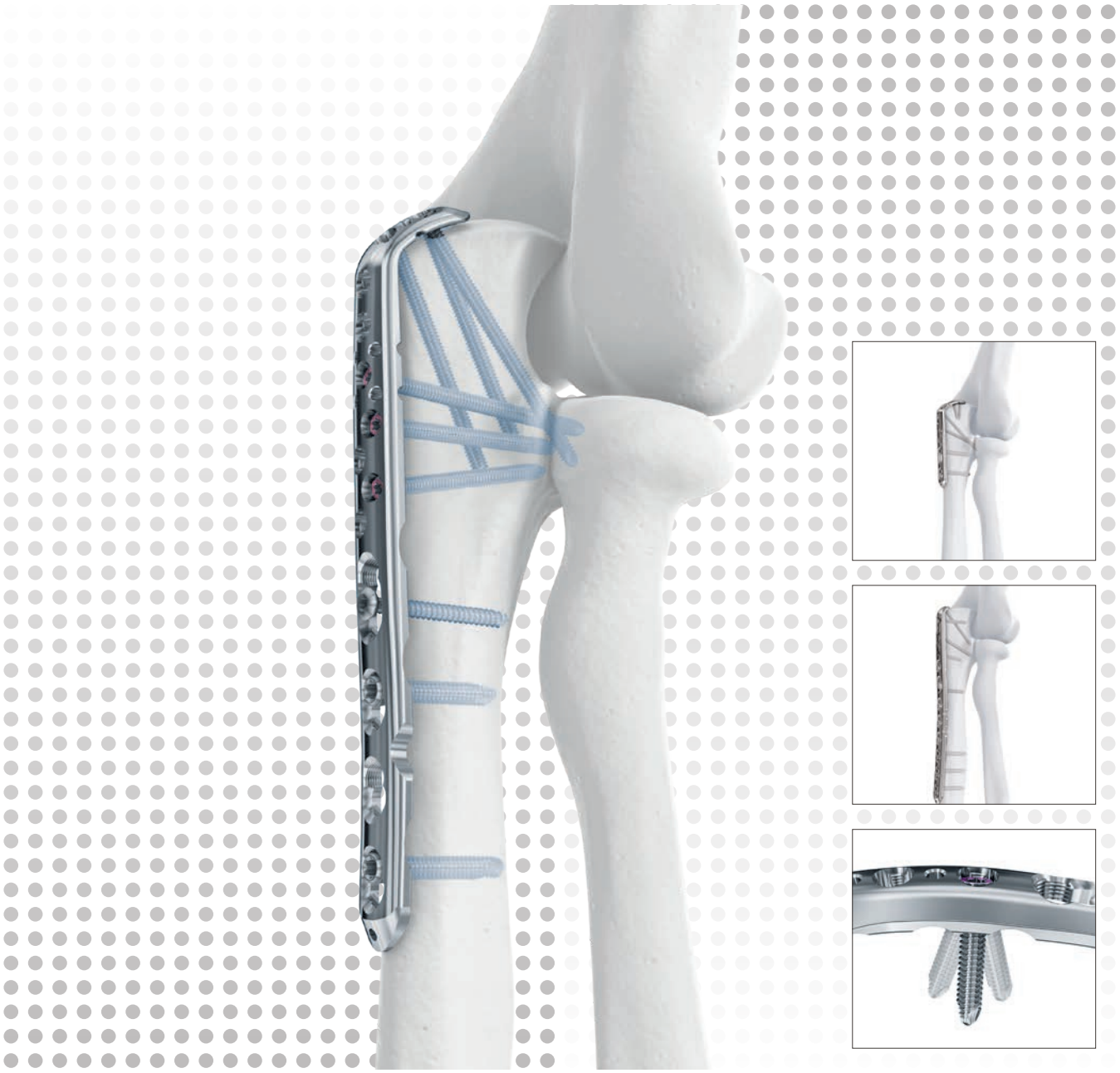
VA-LCP Olecranon Plates 2.7/3.5

Surgical Technique



approved by AO Technical Commission

DePuy Synthes
THE ORTHOPAEDICS COMPANY OF Johnson & Johnson

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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■ **Notes**
▲ **Precautions**
▲ **WARNINGS**

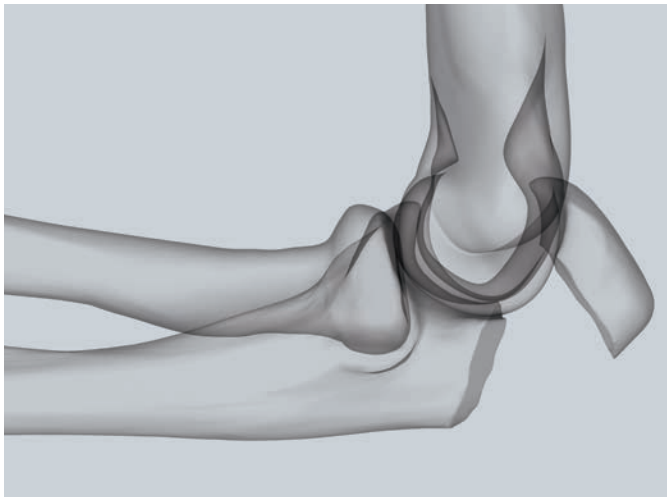
VA-LCP Olecranon Plates 2.7/3.5

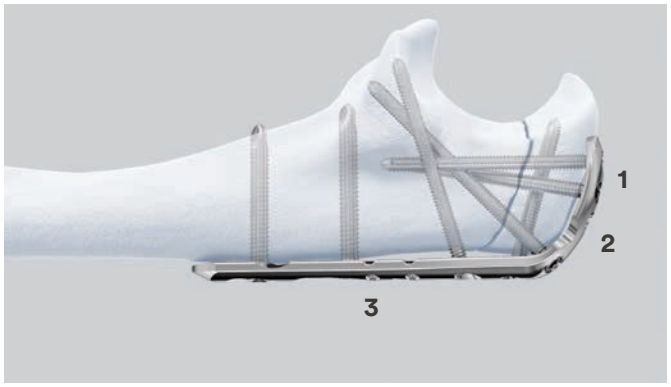
Low-Profile Fixation System with Variable Angle Locking Technology

Overview

Olecranon plates enable the surgeon to address the biomechanical requirements of each fracture pattern.

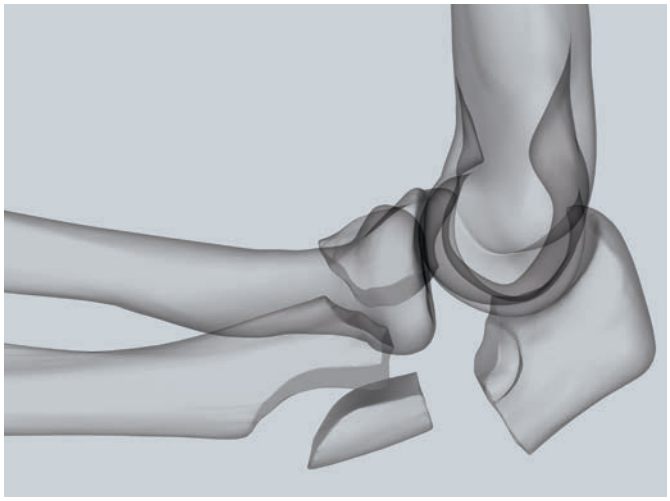
Proximal Olecranon Plate





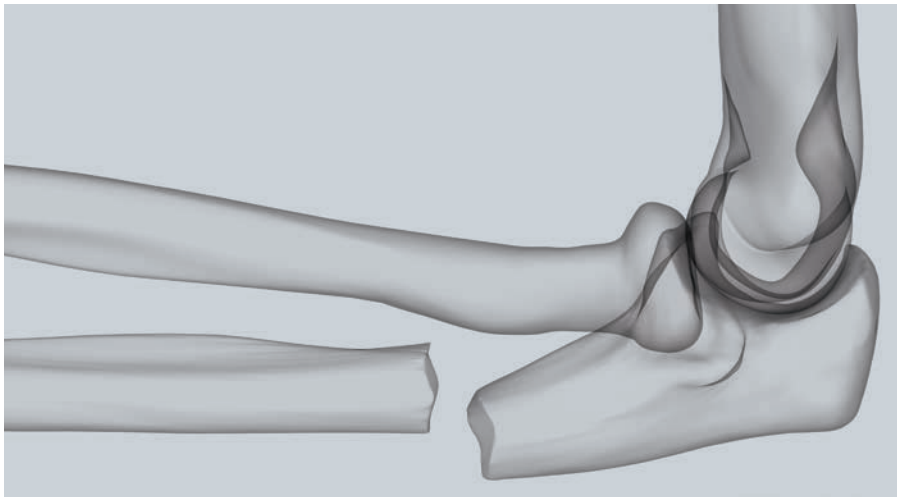
1 Long proximal extension and multiple screw options to secure small olecranon fragments
2 Notches
3 Tapered shaft thickness

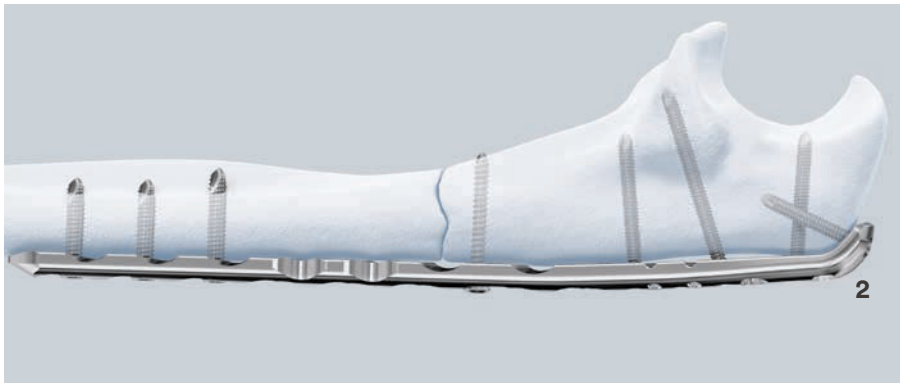
Olecranon Plate



1 Proximal extension with multiple screw options secures the olecranon
2 Various screws target to help stabilize the coronoid

Proximal Ulna Plate, extra-articular





1 Reinforced shaft
2 Minimized proximal extension compared to Olecranon Plate and Proximal Olecranon Plate

Variable angle locking

Variable angle locking screws 2.7 mm give the surgeon the ability to create a fixed-angle construct with the freedom of up to 15° off-axis screw angulation.

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

The AO Principles of Fracture Management

Mission

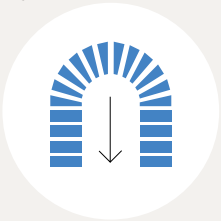
The AO's mission is promoting excellence in patient care and outcomes in trauma and musculoskeletal disorders.

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 and Approach

■ Note:

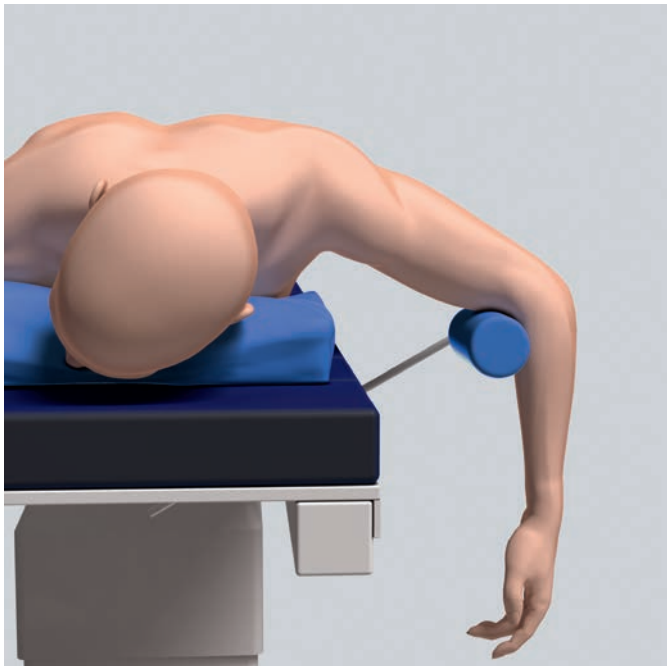
For information on fixation principles using conventional and locked plating techniques, please refer to the LCP Locking Compression Plate surgical technique.

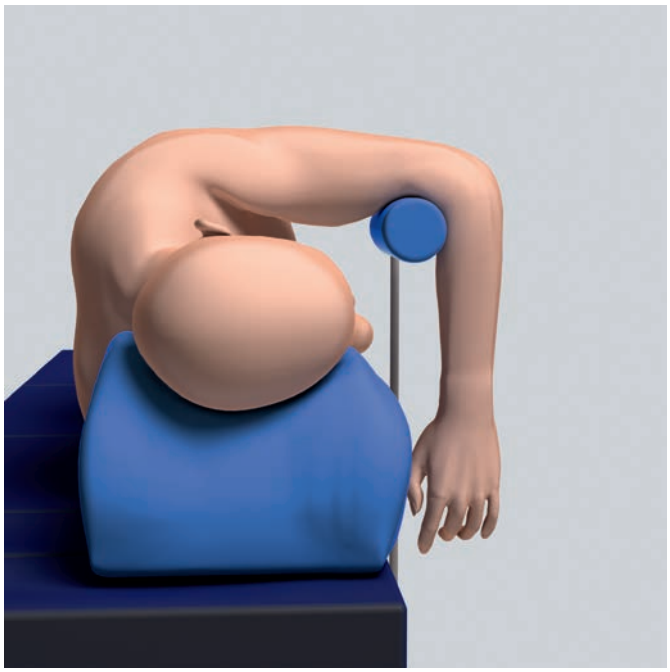
1. Preoperative planning

Complete the preoperative radiographic assessment and prepare the preoperative plan.

2. Position patient

Position the patient in supine, prone or in lateral decubitus with the arm on a radiolucent support, or a padded post. The forearm should be positioned such that it can be flexed to an angle greater than 120 degrees.





3. Approach

Make an incision running posteriorly from the supracondylar area to a point 4–5 cm distal to the fracture. The incision may curve slightly to the radial side to protect the ulnar nerve.

The type of approach is determined by the character of the fracture, and the preference and experience of the surgeon.

4. Reduce fracture and provide temporary fixation

Instruments	
03.117.998	Reduction Forceps with Points, asymmetric, with Speed Lock, length 195 mm

Reduce the fracture directly or indirectly depending on the fracture type. Ensure that the coronoid is properly reduced prior to fixation.

Use forceps and Kirschner wires for temporary fixation. Ensure that the reduction forceps or Kirschner wires will not interfere with subsequent plate placement.

Reduction with asymmetric reduction forceps

■ Note:

Always use two asymmetric reduction forceps; one on each side of the ulna.

Drill two short holes in the ulnar shaft distal to the fracture line and insert the straight portion of the forceps into the hole. Secure the proximal fragment with the curved portion and compress carefully.

Determination of Fixation Technique

Select a plate type and length appropriate for the fracture. Choose plate lengths that offer sufficient fixation distal to the fracture line.

1. Determine plate type and length

Instruments	
03.107.002– 03.107.508	Trial Implants for VA-LCP Proximal Olecranon Plate, Olecranon Plate or Proximal Ulna Plate 2.7/3.5, right or left

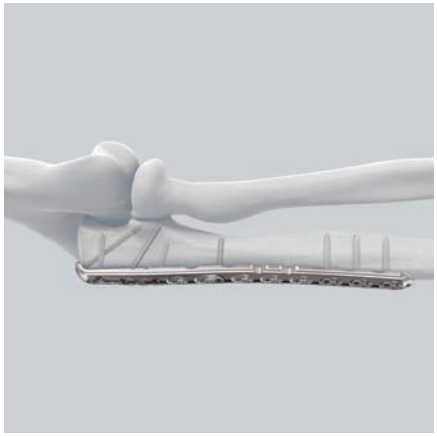
■ Note:

Do not bend trial implants.

Use of the trial implants as illustrated below is recommended to aid implant selection.

VA-LCP Proximal Olecranon Plates

VA-LCP Olecranon Plates



VA-LCP Proximal Ulna Plate, extra-articular

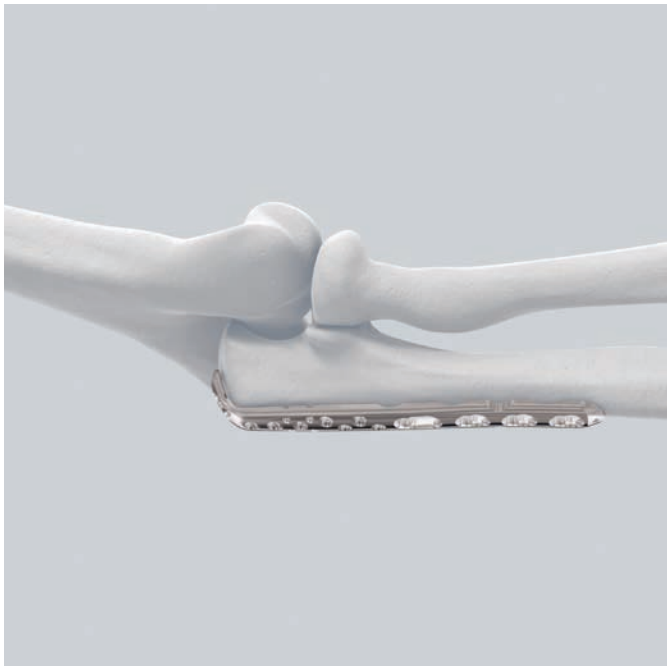
Insert Plate

1. Position plate

Position the plate on the dorsal aspect of the proximal ulna. The triceps tendon may need to be split in order to apply the plate.

■ Note:

The following steps are applicable for all three plate types.



2. Bend plate

Instruments	
329.150	Bending Pliers for Plates 2.4 to 4.0, length 230 mm
329.291	Bending Pliers for Clavicular Plates, length 227 mm
329.300	Bending Press, length 400 mm

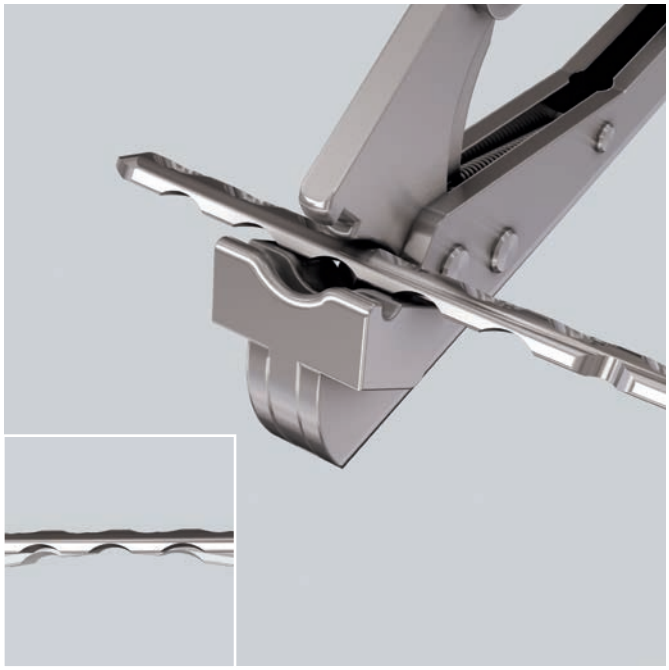
Due to varying patient anatomy, slight plate bending may be necessary.

Use the bending pliers to contour the plate around the axis of the undercuts.

Use the bending pliers for clavicular plates or the bending press to contour the plate around the axis of the reconstruction notches.

▲ Precautions:

- Contour the plate precisely at the level of the undercuts to avoid deformation of the plate holes.
- Contour the plate precisely at the level of the reconstruction notches to avoid deformation of the plate holes.



329.291 Bending Pliers for Clavicular Plates

3. Temporary plate fixation

Instruments	
310.250	Drill Bit ∅ 2.5 mm, length 110/85 mm, 2-flute, for Quick Coupling
314.070	Screwdriver, hexagonal, small, ∅ 2.5 mm, with Groove
319.010	Depth Gauge for Screws ∅ 2.7 to 4.0 mm, measuring range up to 60 mm
323.360	Universal Drill Guide 3.5

■ Note:

The plate can be temporarily fixed with ∅ 1.6 mm Kirschner wires inserted through the suture holes.

Insert a ∅ 3.5 mm cortex screw through the DCU portion of the elongated hole.

Use the ∅ 2.5 mm drill bit with the 3.5 universal drill guide to predrill the bone through both cortices. To set the screws in a neutral position, press the drill guide down.

Determine the required length of the cortex screw using the depth gauge.

Insert the appropriate ∅ 3.5 mm cortex screw using the hexagonal screwdriver. Do not tighten the screw.

Insert Proximal Screws

Determine the combination of screws to be used for proximal fixation. If a combination of locking and non-locking screws is used, non-locking screws must be inserted first.

1. Optional: Fixation with low profile metaphyseal compression screws ∅ 2.7 mm

Use the same instrumentation as per the insertion of variable angle locking screws ∅ 2.7 mm. Follow the instructions in step 3.

■ Note:

The low-profile metaphyseal compression screw ∅ 2.7 mm can be used to pull the plate to the bone. However, the screw can not be used to create interfragmentary compression.

▲ Precaution:

Carefully tighten the metaphyseal compression screws ∅ 2.7 mm by hand as with conventional cortical screws in order to prevent the screw thread stripping out of the bone.

2. Optional: Fixation with ∅ 2.4 mm cortex screws

Use the 2.4 universal drill guide and the 1.8 mm drill bit for insertion of ∅ 2.4 mm cortex screws. Determine the length of the screw by using the depth gauge.

3. Fixation with ∅ 2.7 mm variable angle locking screws

Instruments	
03.211.002	VA-LCP Drill Sleeve 2.7, for Drill Bits ∅ 2.0 mm
323.062	Drill Bit ∅ 2.0 mm, with double marking, length 140/115 mm, 3-flute, for Quick Coupling
03.118.007	Depth Gauge, percutaneous
314.467	Screwdriver Shaft, Stardrive, T8, self-holding
03.110.002	Torque Limiter, 1.2 Nm, with AO/ASIF Quick Coupling
03.110.005	Handle for Torque Limiters 0.4/0.8/1.2 Nm

■ Note:

When inserting screws at the nominal angle, screws should not collide with other screws in the same plate.

▲ Precautions:

- The use of variable angle in close proximity to another plate increases the risk of drill and screw collisions.
- Do not use a threaded drill guide in the variable angle locking holes, as it could damage the threads in the hole.
- If using ∅ 2.7 mm locking screws (non-VA), use the VA-LCP drill sleeve 2.7 and always drill and insert screws at the nominal angle.
- Always use the torque limiter to restrict the maximum torque.

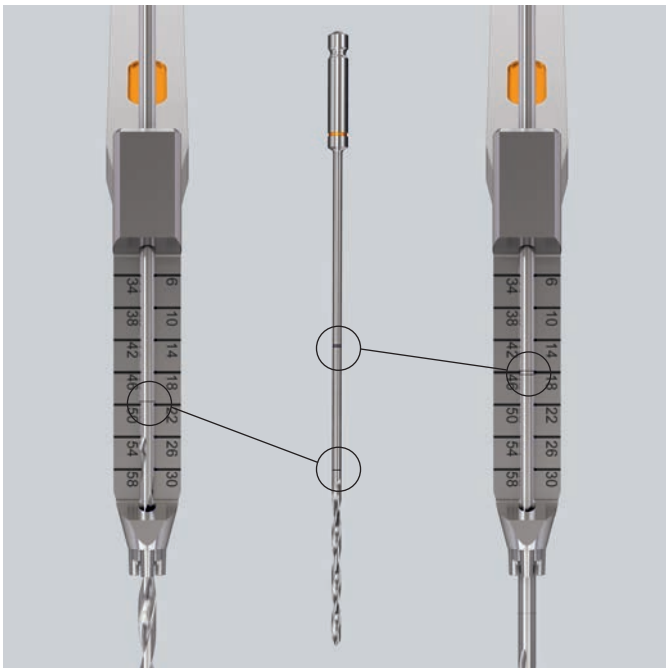
Insert screw at nominal angle

Insert the VA-LCP drill sleeve 2.7 into the variable angle locking hole, ensuring that the drill sleeve tip keys into the cloverleaf portion of the hole.

The fixed-angle end of the drill sleeve ensures that the drill bit follows the nominal trajectory of the locking hole.

Use the ∅ 2.0 mm drill bit to drill to the desired depth.

Determine the required length of the screw by using the scale on the drill sleeve. If a single marking is visible on the drill bit, the scale from 6–30 mm applies; if a double marking is visible, the scale from 34–58 mm applies.



Alternative technique

Remove the drill sleeve and use the depth gauge to measure the screw length.

■ Note:

If the depth gauge 319.010 is used for ∅ 2.7 mm screws, subtract 4 mm from the indicated length to obtain the correct screw length.

Use the T8 Stardrive screwdriver shaft attached to the 1.2 Nm torque limiter to insert the ∅ 2.7 mm variable angle locking screw. For manual insertion, use the handle for torque limiters.

▲ Precaution:

Use of the 1.2 Nm torque limiter ensures maximum strength of the plate-screw interface.

Optional: Variable angle

Use the funnel-shaped end of the drill sleeve to drill variable angle holes at the desired angle. The funnel allows the drill bit up to 15° off-axis angulation.

Use the ∅ 2.0 mm drill bit to drill at the desired angle and to the desired depth.

Verify the drill bit angle under image intensifier control to ensure the desired angle has been achieved.

Remove the drill sleeve and use the depth gauge to measure the screw length.

▲ Precautions:

- Do not angulate more than 15° from the central axis of the screw hole.
- Screws can only be removed and inserted at different angles prior to final tightening with the 1.2 Nm torque limiter.

Use the T8 Stardrive screwdriver shaft attached to the 1.2 Nm torque limiter to insert the ∅ 2.7 mm variable angle locking screw. For manual insertion, use the handle for torque limiters.

Repeat for all proximal holes to be used.

▲ Precaution:

Ensure that the screws do not protrude in the articular surface of the incisura trochlearis.

Insert Plate-Shaft Screws

After fixing the proximal portion of the plate, determine where locking or cortex screws will be used in the shaft.

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

1a. Fixation with ∅ 3.5 mm cortex screws

Instruments	
310.250	Drill Bit ∅ 2.5 mm, length 110/85 mm, 2-flute, for Quick Coupling
323.360	Universal Drill Guide 3.5
319.010	Depth Gauge for Screws ∅ 2.7 to 4.0 mm, measuring range up to 60 mm
314.070	Screwdriver, hexagonal, small, ∅ 2.5 mm, with Groove
Optional instrument	
311.320	Tap for Cortex Screws ∅ 3.5 mm, length 110/50 mm

Use the ∅ 2.5 mm drill bit with the 3.5 universal drill guide to predrill the bone through both cortices.

To set screws in a neutral position, press the drill guide down in the non-threaded hole. To obtain compression, place the drill guide at the end of the non-threaded hole away from the fracture, avoiding downward pressure on the spring-loaded tip.

Determine the required length of the cortex screw using the depth gauge.

Insert the appropriate ∅ 3.5 mm cortex screw using the hexagonal screwdriver.

1b. Fixation with ∅ 3.5 mm locking screws

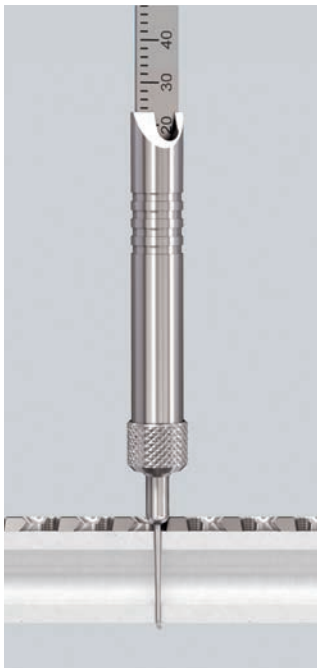
Instruments	
323.027	LCP Drill Sleeve 3.5, for Drill Bits ∅ 2.8 mm
310.284	LCP Drill Bit ∅ 2.8 mm with Stop, length 165 mm, 2-flute, for Quick Coupling
319.010	Depth Gauge for Screws ∅ 2.7 to 4.0 mm, measuring range up to 60 mm
314.030	Screwdriver Shaft, hexagonal, small, ∅ 2.5 mm
or	
314.116	Screwdriver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

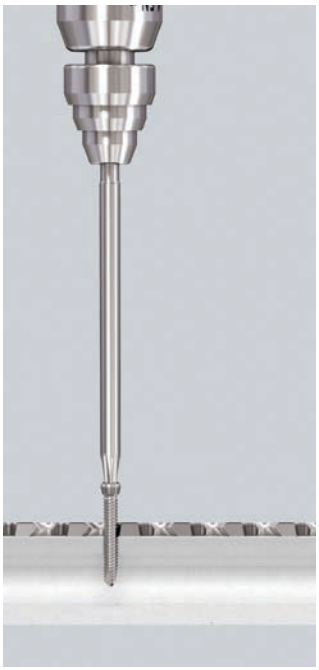
Insert the 3.5 mm drill sleeve into the locking hole until fully seated. Drill through both cortices with the ∅ 2.8 mm drill bit and use the scale to read off the screw length.

Alternative technique

Remove the drill guide. Use the depth gauge to determine the screw length.

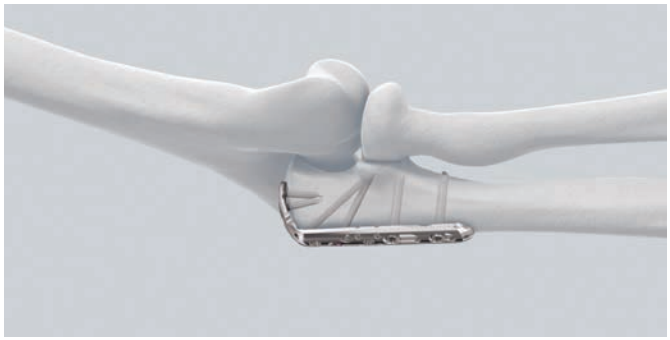
Insert the locking screw with the appropriate screwdriver shaft (hexagonal or Stardrive recess) mounted on the 1.5 Nm torque limiter. Insert the screw manually or with the use of a power tool until a click is heard. If a power tool is used, reduce the speed when tightening the head of the locking screw into the plate.

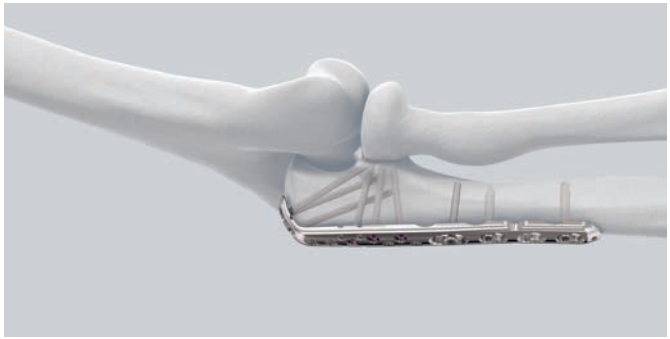


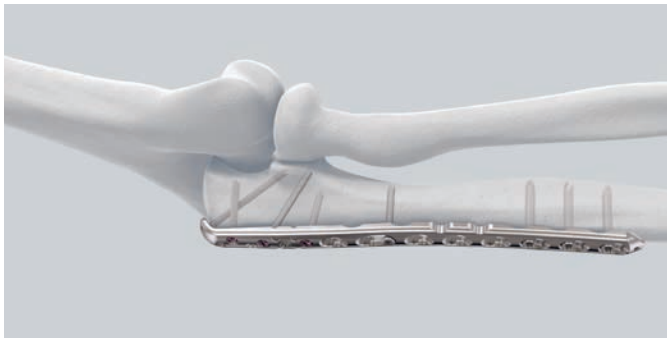


Repeat the above steps for all required shaft holes.

Irrigate prior to closure.







Implant Removal

Instruments

314.030	Screwdriver Shaft, hexagonal, small, ∅ 2.5 mm
or	
314.116	Screwdriver Shaft Stardrive 3.5, T15, self-holding, for AO/ASIF Quick Coupling
313.304	Screwdriver Shaft Stardrive, T8, cylindrical, with Groove, shaft ∅ 3.5 mm, for AO/ASIF Quick Coupling
311.431	Handle with Quick Coupling
311.440	T-Handle with Quick-Coupling
309.521	Extraction Screw for Screws ∅ 3.5 mm
309.510	Extraction Screw, conical, for Screws ∅ 1.5 and 2.0 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 Extraction Screw (309.520 or 309.521) into the screw head, and unscrew the screw in a counter-clock direction.

Implants

Plates

VA-LCP Proximal Olecranon Plate 2.7/3.5

Holes	Length	Right	Left
2	73 mm	0X.107.002	0X.107.102

VA-LCP Olecranon Plate 2.7/3.5

Holes	Length	Right	Left
2	90 mm	0X.107.202	0X.107.302
4	116 mm	0X.107.204	0X.107.304
6	142 mm	0X.107.206	0X.107.306
8	169 mm	0X.107.208S*	0X.107.308S*

VA-LCP Proximal Ulna Plate 2.7/3.5, extra-articular

Holes	Length	Right	Left
6	131 mm	0X.107.406	0X.107.506
8	157 mm	0X.107.408	0X.107.508
10	184 mm	0X.107.410	0X.107.510
12	211 mm	0X.107.412	0X.107.512

X = 2: Stainless steel
X = 4: TAN
All plates and screws are also available sterile packed.
For sterile implants, add suffix “S” to article number.

* Only available sterile

Screws

Proximal screws

0*X.211.010– 0*X.211.060	VA Locking Screw Stardrive ∅ 2.7 mm (head 2.4), self-tapping, length 10–60 mm		
0*X.118.510– 0*X.118.570	Low Profile Metaphyseal Compression Screw Stardrive ∅ 2.7 mm, self-tapping, length 10–70 mm		
*X01.760– *X01.790	Cortex Screw Stardrive ∅ 2.4 mm, self-tapping, length 10–40 mm		

Shaft screws

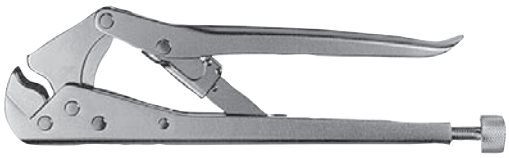
*X12.102– *X12.124	Locking Screw Stardrive ∅ 3.5 mm, self-tapping, length 12–60 mm		
or			
*X13.012– *X13.060	Locking Screw ∅ 3.5 mm, self-tapping, length 12–60 mm		
**X04.810– **X04.860	Cortex Screw ∅ 3.5 mm, self-tapping, length 10–60 mm		
or			
0*X.200.012– 0*X.200.060	Cortex Screw Stardrive ∅ 3.5 mm, self-tapping, length 12–60 mm		

X = 2: Stainless steel
*X = 4: TAN
**X = 4: TiCP
All plates and screws are also available sterile packed.
For sterile implants, add suffix “S” to article number.

Instruments

309.521	Extraction Screw for Screws ∅ 3.5 mm	
309.510	Extraction Screw, conical, for Screws ∅ 1.5 and 2.0 mm	
310.250	Drill Bit ∅ 2.5 mm, length 110/85 mm, 2-flute, for Quick Coupling	
311.431	Handle with Quick Coupling	
310.284	LCP Drill Bit ∅ 2.8 mm with Stop, length 165 mm, 2-flute, for Quick Coupling	
314.467	Screwdriver Shaft, Stardrive, T8, self-holding	
319.010	Depth Gauge for Screws ∅ 2.7 to 4.0 mm, measuring range up to 60 mm	
314.030	Screwdriver Shaft, hexagonal, small, ∅ 2.5 mm	
323.062	Drill Bit ∅ 2.0 mm, with double marking, length 140/15 mm, 3-flute, for Quick Coupling	
311.320	Tap for Cortex Screws ∅ 3.5 mm, length 110/50 mm	

314.116	Screwdriver Shaft Stardrive 3.5, T15, self-holding, for AO/ASIF Quick Coupling	
323.027	LCP Drill Sleeve 3.5, for Drill Bits ∅ 2.8 mm	
323.360	Universal Drill Guide 3.5	
03.110.005	Handle for Torque Limiters 0.4/0.8/1.2 Nm	
03.110.002	Torque Limiter, 1.2 Nm, with AO/ASIF Quick Coupling	
03.117.998	Reduction Forceps with Points, asymmetric, with Speed Lock, length 195 mm	

329.150	Bending Pliers for Plates 2.4 to 4.0, length 230 mm	
314.070	Screwdriver, hexagonal, small, ∅ 2.5 mm, with Groove	
03.118.007	Depth Gauge, percutaneous	
03.211.002	VA-LCP Drill Sleeve 2.7, for Drill Bits ∅ 2.0 mm	
511.773	Torque Limiter, 1.5 Nm, for AO/ASIF Quick Coupling	
329.291	Bending Pliers for Clavicular Plates, length 227 mm	
329.300	Bending Press, length 400 mm	

Trial Implants

03.107.002	Trial Implant for VA-LCP Proximal Olecranon Plate 2.7/3.5, right, 2 holes, length 73 mm, Stainless Steel
03.107.102	Trial Implant for VA-LCP Proximal Olecranon Plate 2.7/3.5, left, 2 holes, length 73 mm, Stainless Steel
03.107.204	Trial Implant for VA-LCP Olecranon Plate 2.7/3.5, right, 4 holes, length 116 mm, Stainless Steel
03.107.304	Trial Implant for VA-LCP Olecranon Plate 2.7/3.5, left, 4 holes, length 116 mm, Stainless Steel
03.107.408	Trial Implant for VA-LCP Proximal Ulna Plate 2.7/3.5, right, extraarticular, 8 holes, length 157 mm, Stainless Steel
03.107.508	Trial Implant for VA-LCP Proximal Ulna Plate 2.7/3.5, left, extraarticular, 8 holes, length 157 mm, Stainless Steel

MRI Information

Torque, Displacement and Image Artifacts according to ASTM F 2213, ASTM F 2052 and ASTM F 2119

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 F 2182

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.

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