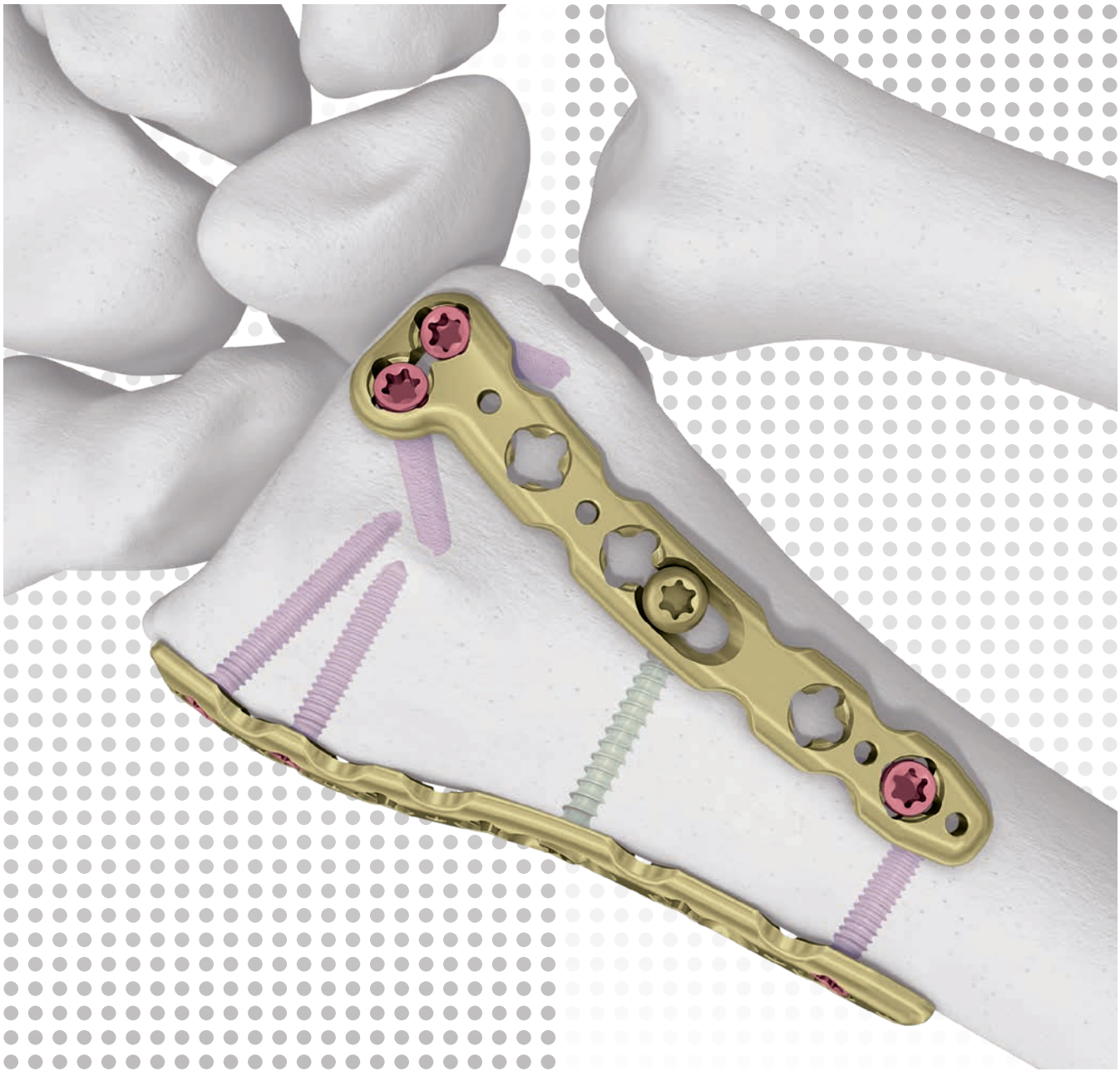
Variable Angle LCP Dorsal Distal Radius Plate 2.4

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**
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Variable Angle LCP Dorsal Distal Radius Plate 2.4

Implants are available in stainless steel and titanium.

Variable angle locking

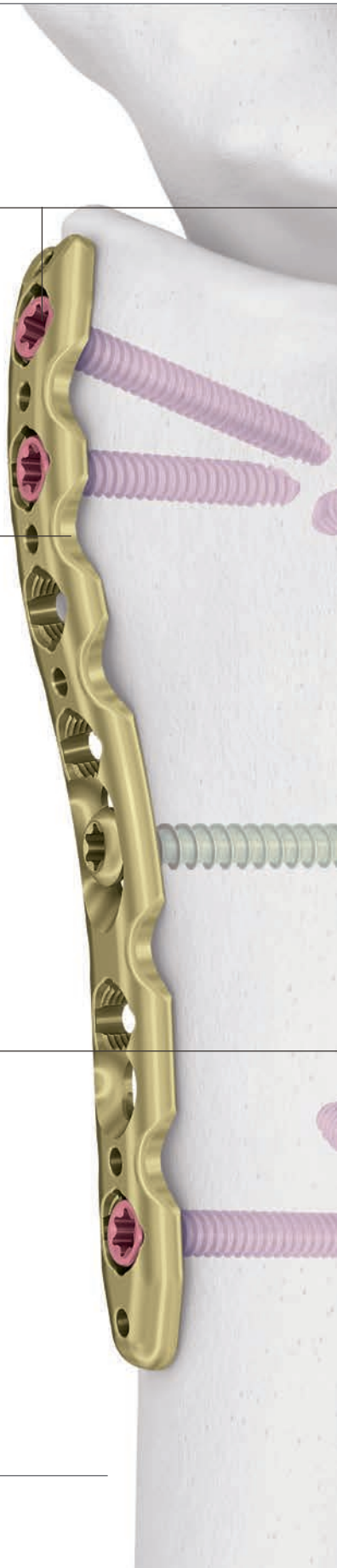
Holes allow up to 15° off-axis screw angulation.

Undercuts and bending notches

Undercuts and bending notches facilitate contouring of the plate without interfering with the VA locking holes.

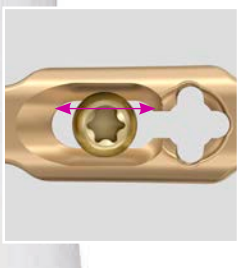
Low profile construct

Rounded edges



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

Anatomical fit



Oblong VA combi-hole

Allows plate positioning on the bone.

Kirschner wire holes

Enable preliminary plate fixation.

The AO Principles of Fracture Management

Mission

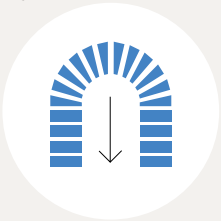
The AO's mission is promoting excellence in patient care and outcomes in trauma and musculoskeletal disorders.

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.

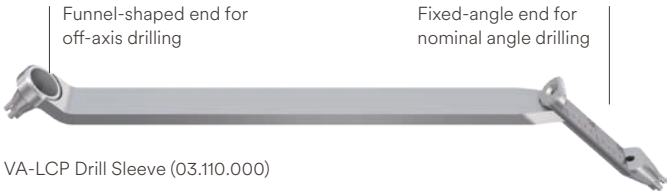
[1] Müller ME, M Allgöwer, R Schneider, H Willenegger. Manual of Internal Fixation. 3rd ed. Berlin, Heidelberg, New York: Springer. 1991
[2] Buckley RE, Moran CG, Apivatthakakul T. AO Principles of Fracture Management: 3rd ed. Vol. 1: Principles, Vol. 2: Specific fractures. Thieme; 2017.

Recommendations on Screw and Plate Insertion

Screw insertion techniques

Variable angle locking screws can be inserted using two different techniques:

- Variable angle technique
- Pre-defined nominal angle technique



VA-LCP Drill Sleeve (03.110.000)

VA-LCP Drill Sleeve, freehand (03.111.004), for off-axis drilling

a) Variable angle technique

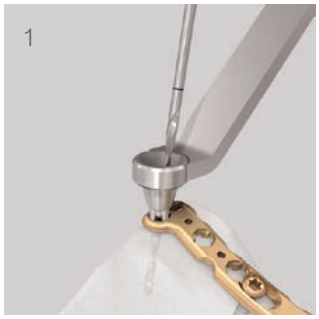
To drill variable angle holes up to 15° deviation from the nominal trajectory of the locking hole, insert the tip of the VA-LCP drill sleeve and key into the cloverleaf design of the VA locking hole. (1)

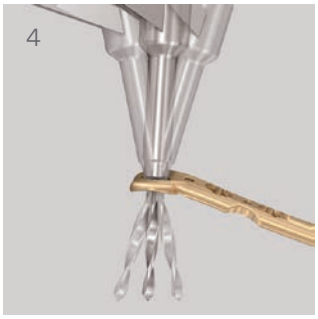
Use the funnel-shaped end of the VA-LCP drill sleeve to drill variable angle holes at the desired angle. (2)

Alternatively, use the freehand VA-LCP drill sleeve and insert it fully into the VA locking hole. (3) Drill variable angle holes at the desired angle. (4)

▲ Precaution:

It is important not to angulate more than 15° from the central axis of the screw hole. Overangulation could result in inappropriate screw-locking. Moreover, the screw head may not be fully countersunk.





b) Pre-defined nominal angle technique

The fixed-angle end of the VA-LCP drill sleeve only allows the drill bit to follow the nominal trajectory of the VA locking hole.

Screw type determination

Determine whether standard cortex screws or variable angle locking screws will be used for fixation.

The final screw placement and the use of VA locking and cortex screws are determined by the fracture pattern.

If a VA locking screw is inserted first, ensure that the plate is held securely against the bone to prevent the plate from spinning as the screw locks into the plate.

When using the pre-defined nominal angle technique standard locking screws can also be used instead of VA locking screws.

▲ Precaution:

The screw head is not completely countersunk if a cortex screw is inserted in a variable angle locking hole.

VA locking hole:
2.4 mm VA locking screw,
1.8 mm VA locking buttress pin,
2.4 mm locking screw
(only nominal angle) or 2.4 mm cortex screw applicable

Oblong VA combi-hole:
2.4 mm cortex screw applicable in the compression portion (1), 2.4 mm VA locking screw, 1.8 mm VA locking buttress pin, 2.4 mm locking screw (only nominal angle) or 2.4 mm cortex screw applicable in the threaded portion (2)

Plate insertion technique

1. Apply dorso-ulnar plate

It is recommended to apply the dorso-ulnar plate first and fix it by inserting a 2.4 mm standard cortex screw in the oblong VA combi-hole in the proximal shaft. (See insertion of cortex screws section.)

2. Apply dorso-radial plate

Apply the dorso-radial plate after provisional positioning of the dorso-ulnar plate by inserting a 2.4 mm standard cortex screw in the oblong VA combi-hole in the proximal shaft. It should form an angle of approximately 70° to the dorso-ulnar plate. (See insertion of cortex screws section.)

Use the small notch (horse-shoe tip) in the distal end of the plate to position the dorso-radial plate properly.

3. Insert screws in dorso-ulnar plate

Insert a VA locking screw in the most proximal hole in the shaft of the dorso-ulnar plate (a). Complete internal fixation by inserting VA locking screws in the distal arm of the plate (b, c). (See for insertion of variable angle locking screws section.)

4. Insert screws in dorso-radial plate

Insert a VA locking screw in the most proximal hole in the shaft of the dorso-radial plate (d). Complete internal fixation by inserting VA locking screws in the distal arm of the plate (e, f). (See for insertion of variable angle locking section.)

Preparation

Select implants

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

■ Note:

This surgical technique describes the application of the VA-LCP Dorsal Distal Radius Plates 2.4 using the plates.

Approach

Make a straight longitudinal incision over the dorsal distal radius extending 5 to 10 cm between the second and third dorsal extensor compartments. Open the extensor retinaculum by performing a longitudinal incision between the first and second extensor compartments.

Take care to elevate and mobilize the third compartment (extensor pollicis longus) proximally and distally, and translocate it radially for access to the fracture site.

Elevate the second and fourth dorsal compartments subperiosteally to preserve their integrity.

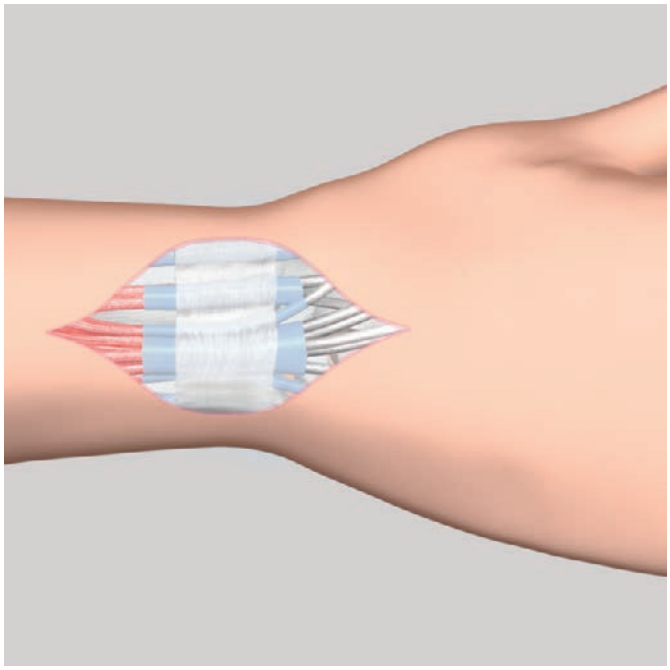


Plate Insertion

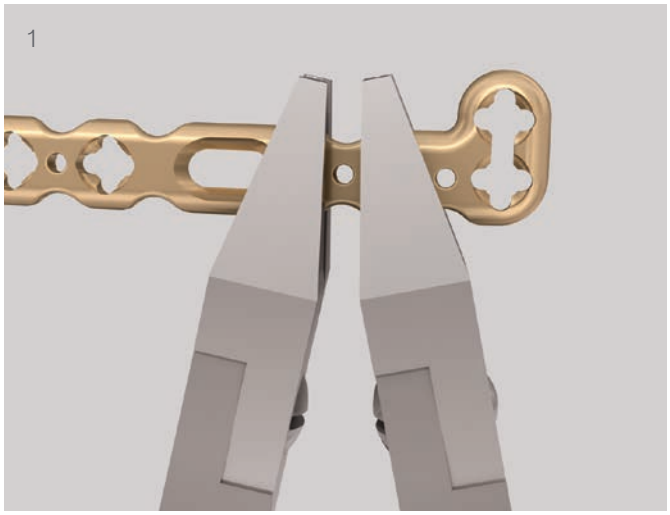
1. Reduce fracture

Reduce the fracture under image intensifier control and, if necessary, fix with Kirschner wires or reduction forceps. The reduction method will be fracture-specific.

2. Contour plate

Instrument	
347.901	Pliers, flat-nosed, pointed for Plates 1.0 to 2.4

If necessary, twist and bend the plate to suit anatomical conditions as indicated. Avoid repetitive bending. (1)



The anatomical pre-contoured plates (0X.115. 530–0X.115.641) do not usually require any contouring. (2)

Recommendation: Use non-serrated bending pliers for preservation of the plate's smooth finish.

▲ Precautions:

- The plate holes allow a certain degree of deformation. Significant distortion of the threaded holes will reduce locking effectiveness.
- Reverse bending or use of the incorrect instrumentation for bending may weaken the plate and lead to premature plate failure (e.g. breakage). Do not bend the plate beyond what is required to match the anatomy.

3. Position plate

Optional instruments	
292.120	Kirschner Wire ∅ 1.25 mm with trocar tip, length 150 mm, Stainless Steel
02.111.500.01(S)	Plate Reduction Wire ∅ 1.25 mm, with thread, with Small Stop, length 150 mm, Stainless Steel
02.111.501.01(S)	Plate Reduction Wire ∅ 1.25 mm, with thread, with Large Stop, length 150 mm, Stainless Steel
399.970	Reduction Forceps with Points, ratchet look

Position the plate over the reduced fracture and, if necessary, fix provisionally with 1.25 mm Kirschner wires or reduction forceps. (1)

Option: Plate reduction wires

1.25 mm plate reduction wires can be used for preliminary plate fixation. (2)

These must be removed when no longer needed for temporary fixation.

▲ Precaution:

The plate reduction wires and Kirschner wires are single-use items, do not re-use.

Screw Insertion

Cortex Screws

1. Drill screw hole for cortex screw

Instruments	
310.509	Drill Bit ∅ 1.8 mm with marking, length 110/85 mm, 2-flute, for Quick Coupling
323.202	Universal Drill Guide 2.4

Drill the screw hole through the shaft of the plate using the 1.8 mm drill bit and the universal drill guide.

2. Determine screw length

Instrument	
03.111.005	Depth Gauge for Screws ∅ 2.0 to 2.7 mm, measuring range up to 40 mm

Determine the screw length with the depth gauge.

3. Insert cortex screw

Instruments	
314.467	Screwdriver Shaft, Stardrive, T8, self-holding
311.430	Handle with Quick Coupling, length 110 mm
Optional instrument	
314.453	Screwdriver Shaft, Stardrive, 2.4, short, self-holding, for Quick Coupling

Insert the self-tapping cortex screw using the self-holding T8 Stardrive screwdriver shaft and quick coupling handle.

Variable Angle Locking Screws

1a. Drill screw hole for VA locking screw using variable angle technique

Instruments	
310.509	Drill Bit ∅ 1.8 mm with marking, length 110/85 mm, 2-flute, for Quick Coupling
03.110.000	VA-LCP Drill Sleeve 2.4, for Drill Bits ∅ 1.8 mm
Optional instruments	
03.110.023	VA-LCP Drill Sleeve 2.4, conical, for Drill Bits ∅ 1.8mm
03.111.004	VA-LCP Drill Sleeve 2.4, for Drill Bits ∅ 1.8 mm, freehand useable

Drill using VA-LCP drill sleeve with funnel

Insert and lock the VA-LCP drill sleeve tip into the clover-leaf design of the VA locking hole.

Use the 1.8 mm drill bit to drill to the desired depth at the desired angle.

The funnel of the drill sleeve allows the drill bit to be angled up to 15° around the central axis of the locking hole.

■ Note:

- The drill guide inserts co-axially into the hole. Ensure that the tip of the drill guide remains fully seated in the hole while drilling.
- When using the cone-end of the variable angle drill guide, measurement cannot be taken with the 1.8 mm drill bit with depth mark. The depth gauge must be used.

Drill using VA-LCP drill sleeve for freehand use

Alternatively, use the freehand VA-LCP drill sleeve. Fully extend it into the VA locking hole. Drill variable angle holes at the desired angle.

To ensure that the screw is locked correctly, do not angle it in excess of ±15° from the nominal trajectory of the hole.

To achieve the desired angle, verify the drill bit angle under image intensifier control. If necessary, drill at a different angle and verify again under image intensifier control.

■ Note:

The previously inserted Kirschner wire can be used as a reference for the screw angulation by using the image intensifier.

1b. Drill screw hole for VA locking screw using nominal angle technique

Instruments	
310.509	Drill Bit ∅ 1.8 mm with marking, length 110/85 mm, 2-flute, for Quick Coupling
03.110.000	VA-LCP Drill Sleeve 2.4, for Drill Bits ∅ 1.8 mm
Optional instrument	
03.110.024	VA-LCP Drill Sleeve 2.4, coaxial, for Drill Bits ∅ 1.8 mm

The fixed-angle end of the drill sleeve only allows the drill bit to follow the nominal trajectory of the VA locking hole.

Use the 1.8 mm drill bit to drill to the desired depth.

Read the screw length directly from the laser mark on the drill bit. Alternatively, use the depth gauge to determine the screw length.

2. Determine screw length

Instrument	
03.111.005	Depth Gauge for Screws ∅ 2.0 to 2.7 mm, measuring range up to 40 mm

Determine the screw length with the depth gauge.

3. Insert VA locking screws

Instruments	
314.467	Screwdriver Shaft, Stardrive T8, self-holding
311.430	Handle with Quick Coupling, length 110 mm

Optional instrument	
314.453	Screwdriver Shaft, Stardrive, 2.4, short, elf-holding, for Quick Coupling

Insert the VA locking screws manually with the self-holding T8 Stardrive screwdriver shaft and quick coupling handle and tighten just enough for the screw head to be fully seated in the locking hole.

When using the pre-defined nominal angle technique, standard locking screws can also be used instead of VA locking screws.

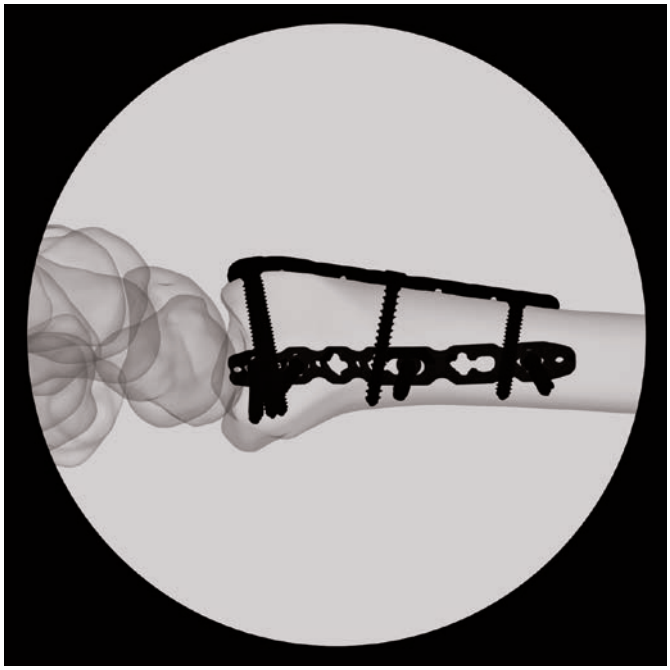
■ Note:

Do not over-tighten the screws. This allows the screws to be removed if they are not in the desired position.

4. Ensure proper joint reconstruction

After insertion of screws, ensure proper joint reconstruction, screw placement and screw length using the image intensifier. Verify that the distal screws are not in the joint by using additional views.

In an AP view, the dorso-ulnar plate should be projected almost antero-posteriorly, the dorso-radial plate almost laterally, and vice versa for the lateral view. If the plates appear to be parallel, the dorso-radial plate is positioned too far on the ulnar side.



5. Final fixation of VA locking screws

Instruments	
03.110.005	Handle for Torque Limiters 0.4/0.8/1.2 Nm
511.776	Torque Limiter, 0.8 Nm, with AO/ASIF Quick Coupling
314.467	Screwdriver Shaft, Stardrive, T8, self-holding
Optional instrument	
314.453	Screwdriver Shaft, Stardrive, 2.4, short, self-holding, for Quick Coupling

▲ Precaution:

Use of the 0.8 Nm torque limiter (TLA) is mandatory when inserting locking screws into variable angle locking holes to ensure the adequate torque is applied (1). Final locking must be done manually using the TLA.

The torque limiter prevents over-tightening and the VA locking screws are securely locked into the plate. (2)

■ Note:

For dense bone, visually inspect if the screw is counter-sunk after tightening with the torque limiter. If required, carefully tighten without the torque limiter until the screw head is flush with the plate surface.

Postoperative Treatment/Implant Removal

Postoperative treatment

Postoperative treatment with VA locking compression plates does not differ from conventional internal fixation procedures.

Implant removal

Instruments	
311.430	Handle with Quick Coupling, length 110 mm
314.467	Screwdriver Shaft, Stardrive, T8, self-holding
Optional instrument	
314.453	Screwdriver Shaft, Stardrive, 2.4 short, self-holding, for Quick Coupling

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 on the shaft. This prevents the plate from spinning when locking screws are removed.

Plates

VA-LCP Dorsal Distal Radius Plate 2.4, Radial Column

Part number	Head holes	Length (mm)
0X.115.530	5	46
0X.115.540	6	57

VA-LCP Dorsal Distal Radius Plate 2.4, Intermediate Column

■ Note:

The plates for the right radius (0X.115.630 and 0X.115.640) are left angled and the plates for the left radius (0X.115.631 and 0X.115.641) are right angled.

Part number	Head holes	Shaft holes	Length (mm)	For radius
0X.115.630	2	3	41	Right
0X.115.631	2	3	41	Left
0X.115.640	2	4	49	Right
0X.115.641	2	4	49	Left

VA-LCP Dorsal Distal Radius L-Plate 2.4

Part number	Head holes	Shaft holes	Length (mm)	Angle
0X.115.130	2	3	37	Right
0X.115.131	2	3	37	Left
0X.115.150	2	5	51	Right
0X.115.151	2	5	51	Left

All plates are also available sterile packed. Add suffix “S” to article number.
X = 2: Stainless Steel (SSt)
X = 4: Titanium (TiCp)

VA-LCP Dorsal Distal Radius L-Plate 2.4

Part number	Head holes	Shaft holes	Length (mm)	Angle
0X.115.230	3	3	37	Right
0X.115.231	3	3	37	Left
0X.115.250	3	5	51	Right
0X.115.251	3	5	51	Left

VA-LCP Dorsal Distal Radius L-Plate 2.4, oblique

Part number	Head holes	Shaft holes	Length (mm)	Angle
0X.115.430	3	3	41	Right
0X.115.431	3	3	41	Left
0X.115.450	3	5	55	Right
0X.115.451	3	5	55	Left

VA-LCP Dorsal Distal Radius T-Plate 2.4

Part number	Head holes	Shaft holes	Length (mm)	Angle
0X.115.330	3	3	37	
0X.115.350	3	5	51	

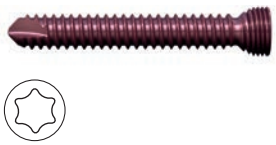
All plates are also available sterile packed. Add suffix "S" to article number.

X = 2: Stainless steel (SSt)
X = 4: Titanium (TiCp)

Screws

Variable Angle Locking Screws 2.4 mm

0X.210.108 – 0X.210.130	VA Locking Screw Stardrive ∅ 2.4 mm, self-tapping, lengths 8 mm to 30 mm For use in VA locking holes.



▲ Precaution:

For final locking, the 0.8 Nm torque limiter is required.

Cortex Screws 2.4 mm

X01.756 – X01.780	Cortex Screw Stardrive ∅ 2.4 mm, self-tapping, lengths 6 mm to 30 mm For use in VA locking holes or combi-holes.

All screws are also available sterile packed. Add suffix "S" to article number.

X = 2: Stainless steel (SSt)
X = 4: Titanium Alloy (TAN)

Optional:

Variable Angle Locking Buttress Pins 1.8 mm

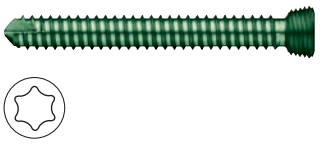
0X.210.078 – 0X.210.100	VA-LCP Buttress Pin Stardrive ∅ 1.8 mm, lengths 8 mm to 30 mm For use in VA locking holes.

▲ Precaution:

For final locking, the 0.8 Nm torque limiter is required.

Locking Screws 2.4 mm

X12.806 – X12.830	Locking Screw Stardrive ∅ 2.4 mm, self-tapping, lengths 6 mm to 30 mm For use in VA locking holes but only in pre-defined angle using nominal angle technique.



▲ Precaution:

For final locking, the 0.8 Nm torque limiter is required.

All screws are also available sterile packed. Add suffix "S" to article number.

X = 2: Stainless steel
X = 4: TAN

Instruments

03.110.000	VA-LCP Drill Sleeve 2.4, for Drill Bits ∅ 1.8 mm	
323.202	Universal Drill Guide 2.4	
310.509	Drill Bit ∅ 1.8 mm with marking, length 110/85 mm, 2-flute, for Quick Coupling	
314.453	Screwdriver Shaft, Stardrive 2.4, short, self-holding, for Quick Coupling	
314.467	Screwdriver Shaft, Stardrive, T8, self-holding	
03.111.005	Depth Gauge for Screws ∅ 2.0 to 2.7 mm, measuring range up to 40 mm	
311.430	Handle with Quick Coupling, length 110 mm	
03.110.005	Handle for Torque Limiters 0.4/0.8/1.2 Nm	
511.776	Torque Limiter 0.8 Nm, with AO/ASIF Quick Coupling	
292.120(S)	Kirschner Wire ∅ 1.25 mm with trocar tip, length 150 mm, Stainless Steel	

Optional Instruments

03.111.038	Handle with Quick Coupling	
03.110.023	VA-LCP Drill Sleeve 2.4, conical, for Drill Bits ∅ 1.8 mm	
03.110.024	VA-LCP Drill Sleeve 2.4, coaxial, for Drill Bits ∅ 1.8 mm	
03.111.004	VA-LCP Drill Sleeve 2.4, for Drill Bits ∅ 1.8 mm, freehand useable	
02.111.500.01(S)	Plate Reduction Wire ∅ 1.25 mm, with thread, with Small Stop, length 150 mm, Stainless Steel	
02.111.501.01(S)	Plate Reduction Wire ∅ 1.25 mm, with thread, with Large Stop, length 150 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.

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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