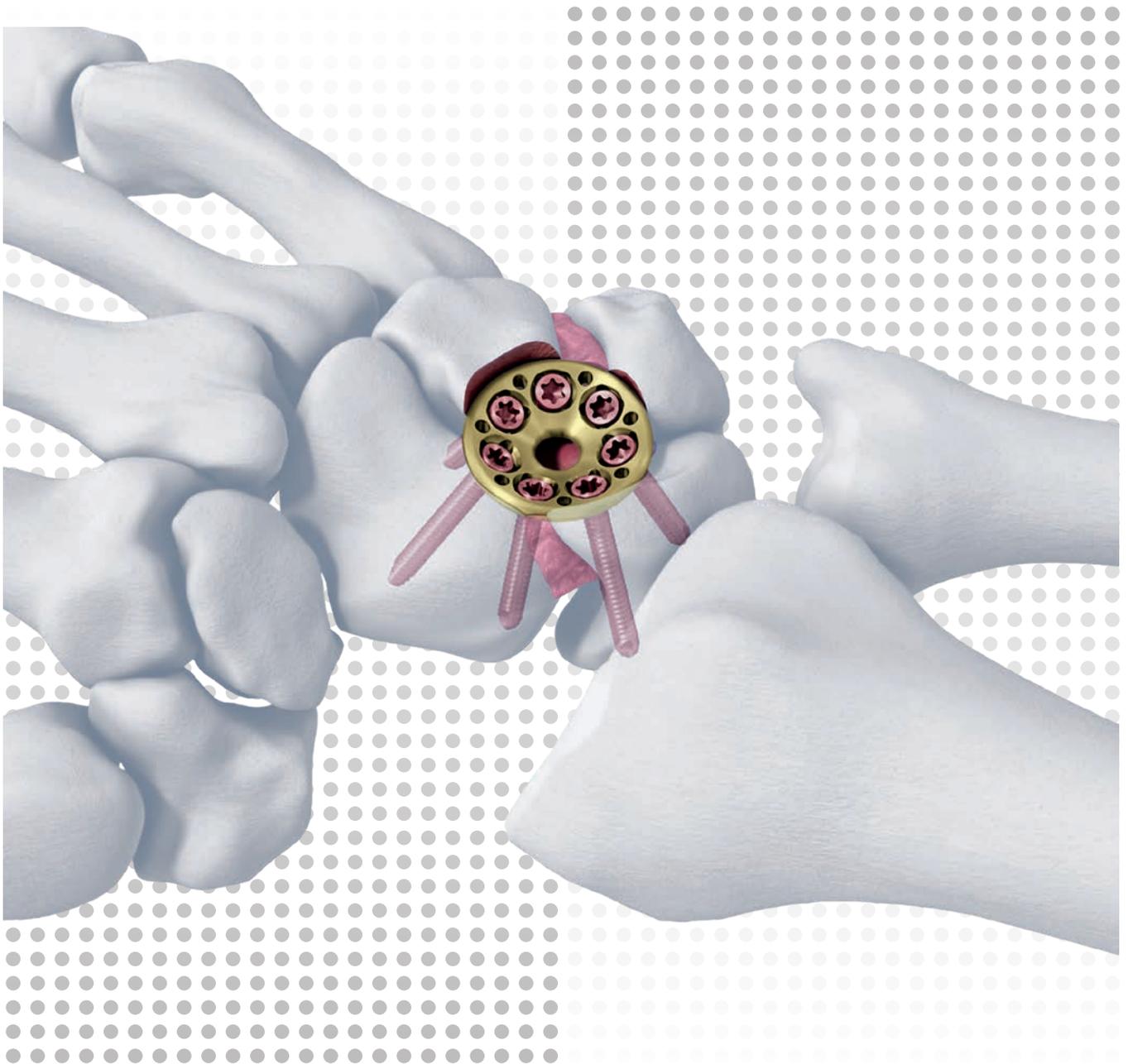


# VA-Locking Intercarpal Fusion System

Variable angle locking technology for mediocarpal partial arthrodesis

## Surgical Technique



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 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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**MRI Information**

# VA-Locking Intercarpal Fusion System

Variable angle locking technology for mediocarpal partial arthrodesis

## Low profile, variable angle locking plates



**Variable angle locking** technology for angular stable fixation within 15° in all directions



### Plate sizes

Ø 15 mm (6 holes) and  
Ø 17 mm (7 holes)  
Available in stainless steel  
and titanium alloy (TAN)

**VA-locking holes** accept both

- 2.4 mm VA-locking screws
- 2.4 mm cortex screws

**Kirschner wire** holes for temporary fixation



**Low profile** circular plate with smooth surface and rounded edges

# Available instrumentation

**Reamer** with cannulation to prepare plate countersink



## Reaming guide/ Reduction reaming guide

- Preliminary fixation of the carpus
- Guidance of the reamer
- Reduction of the carpal bones



Optional radiolucent plate positioning aid for placement of a central reaming guide wire



**Plate holder** for secure plate positioning



**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<sup>1,2</sup>

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.

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

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

# Preparation

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## 1. Preoperative planning

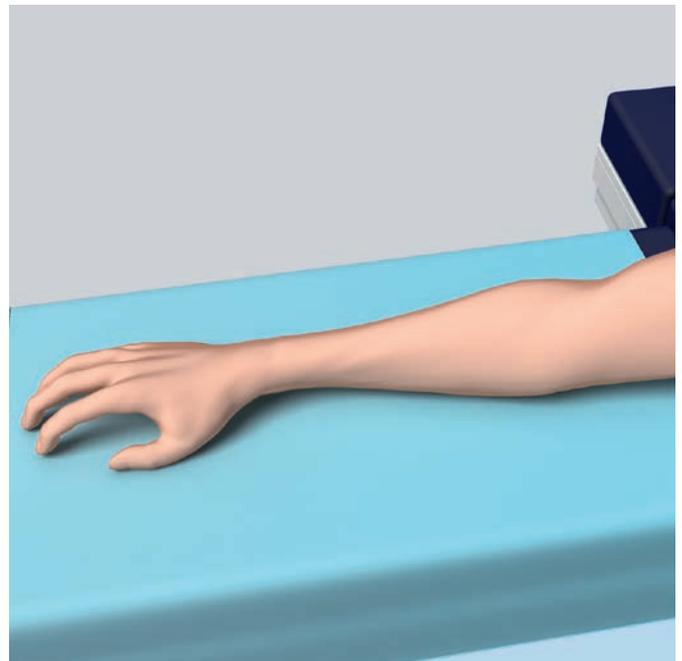
Complete preoperative radiographic assessment should confirm the presence of sufficient bone stock for the four corner fusion procedure as well as intact joint surfaces between the radius and the lunate.

Determine the extent of the lunate deformity (DISI).

---

## 2. Position patient

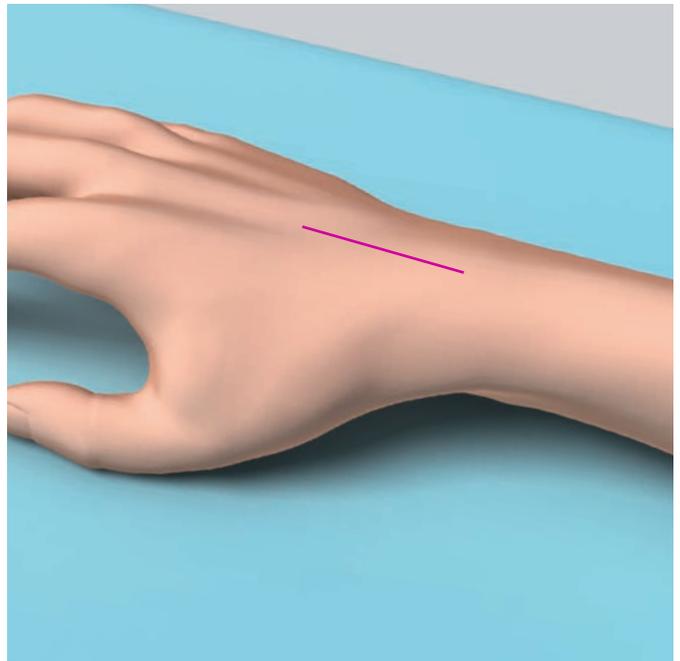
Place the patient in a supine position with the forearm positioned on a hand table in full pronation. Use a rolled towel to support the palm of the hand. The use of tourniquet and magnifying glasses is recommended.



# Approach and Reduction

## 1. Approach

Make a standard dorsal longitudinal approach to the wrist.



## 2. Excise scaphoid, debride midcarpal joint

Completely excise the scaphoid and debride the midcarpal joint. Use a small rongeur and/or chisel to remove the residual cartilage. Make sure that sclerotic and dense subchondral bone is removed down to cancellous bone.

At this point, complete debridement of the midcarpal joint is mandatory. Preparation of the joint surfaces between the capitate/hamate and lunate/triquetrum is optional or may be carried out after provisional fixation.

### ■ Note:

Proper denudation of the cartilage down to good cancellous bone is important.



### 3. Reduce rotational deformity and provisionally fix the carpal bones

#### Instrument

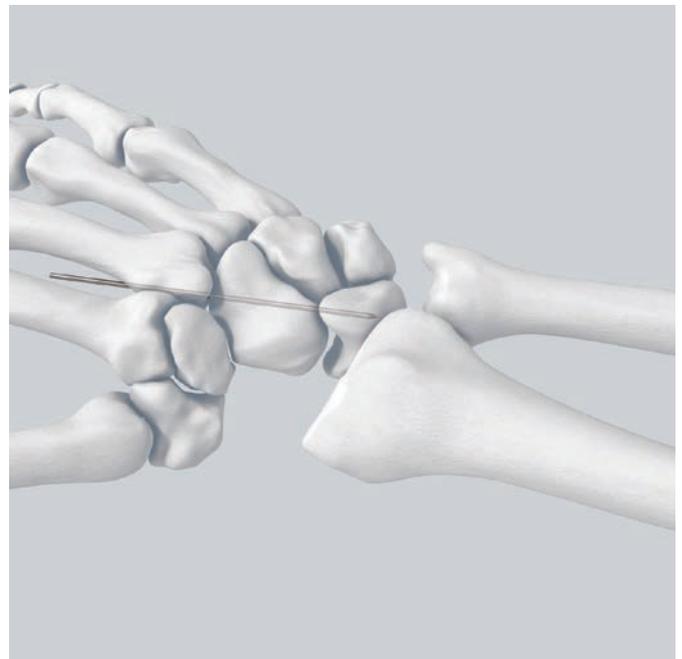
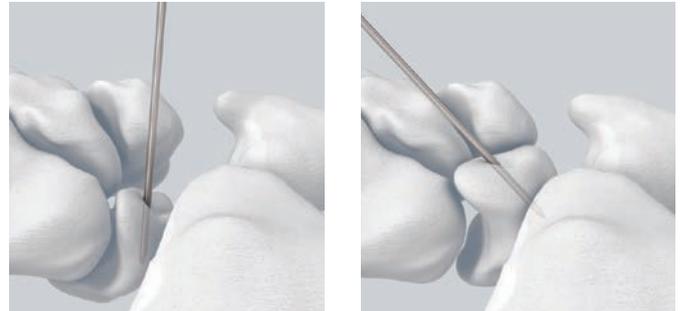
02.111.304.01 Kirschner Wire Ø 1.25 mm with trocar tip, length 80 mm, Stainless Steel

If necessary, use a 1.25 mm Kirschner wire as a joystick to correct the position of the lunate. With a Kirschner wire temporarily fix the lunate in neutral position from distal through the capitate. Remove the joystick Kirschner wire.

Check residual mobility. In general, more extension than flexion is recommended.

#### ■ Notes:

- Verify correct alignment of the carpal bones under image intensifier control.
- If the reaming technique without reaming guide is used, temporary fixation with multiple intercarpal Kirschner wires is recommended.
- Place temporary Kirschner wires as volar as possible to avoid later interference with the reamer.



# Reaming

## Reaming using guide or reduction reaming guide

### 1. Position reaming guide

#### Instruments

02.111.304.01	Kirschner Wire $\varnothing$ 1.25 mm with trocar tip, length 80 mm, Stainless Steel
03.111.036	Reaming Guide for VA-Locking Intercarpal Fusion Plate $\varnothing$ 15 mm
03.111.037	Reaming Guide for VA-Locking Intercarpal Fusion Plate $\varnothing$ 17 mm

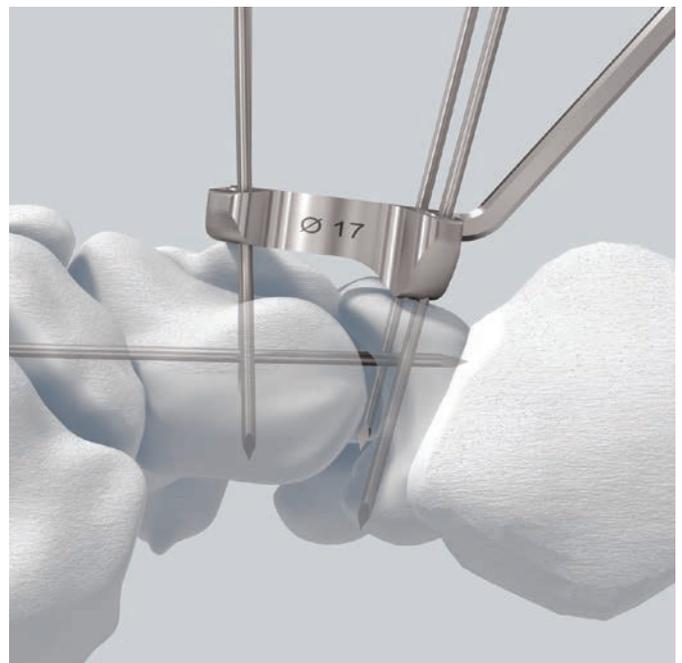
#### Optional instruments

03.111.042	Reduction Reaming Guide for VA-Locking Intercarpal Fusion Plate $\varnothing$ 15 mm
03.111.043	Reduction Reaming Guide for VA-Locking Intercarpal Fusion Plate $\varnothing$ 17 mm

Choose the reaming guide ( $\varnothing$  15 mm or  $\varnothing$  17 mm) according to the selected plate and fix it temporarily with at least one 1.25 mm Kirschner wire per carpal bone over the center of the four-bone junction.

If necessary, remove the volar luno-capitate Kirschner wire to avoid later interference with the reamer.

The shape of the reaming guide is adapted to the contour of the carpus (less height on distal part). Make sure the handle of the reaming guide is oriented to the radius as etched (see marking "RADIUS SHAFT").



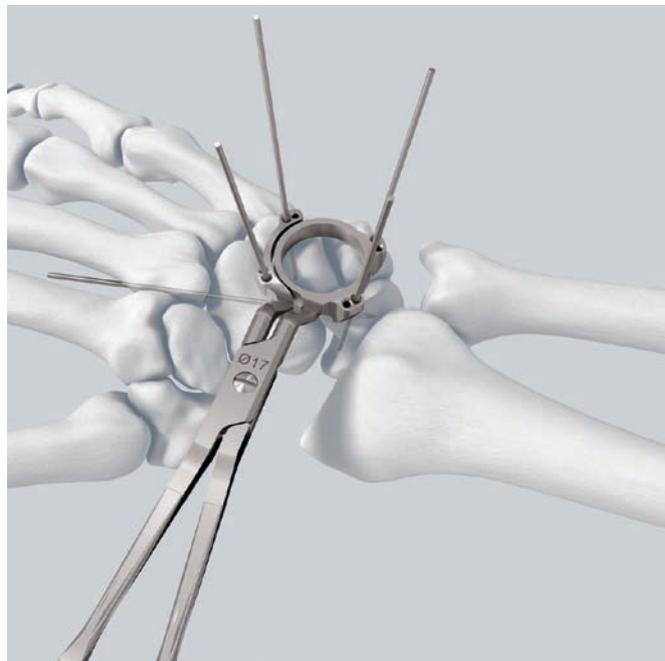
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## Optional instrument: Reduction reaming guide

Use the reduction reaming guide if reduction of the carpal bones is required.

Choose the reduction reaming guide ( $\varnothing$  15 mm or  $\varnothing$  17 mm) according to the selected plate. Open the clamp slightly and place the reduction reaming guide centered over the four bone junction. The amount of opening can be chosen according to preference.

Fix the reduction reaming guide with at least one 1.25 mm Kirschner wire per carpal bone.



## 2. Ream plate recess

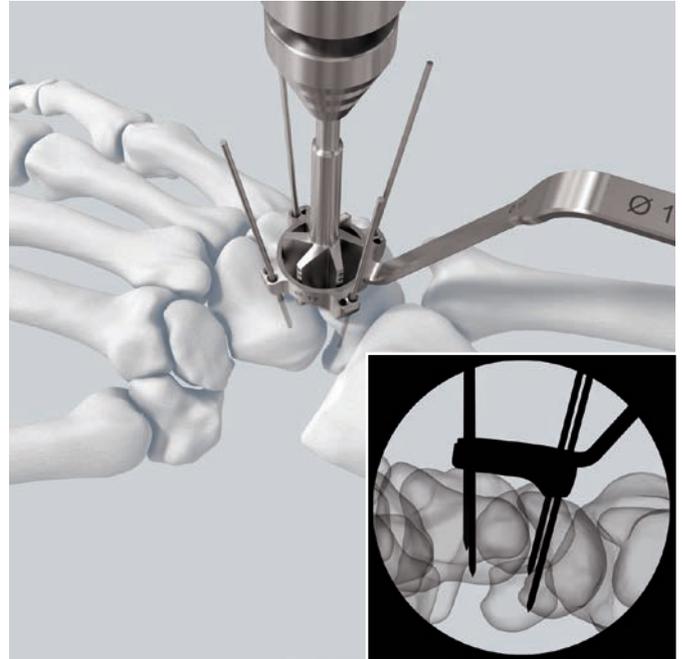
### Instruments

03.111.032	Reamer for VA-Locking Intercarpal Fusion Plate $\varnothing$ 15 mm
03.111.033	Reamer for VA-Locking Intercarpal Fusion Plate $\varnothing$ 17 mm

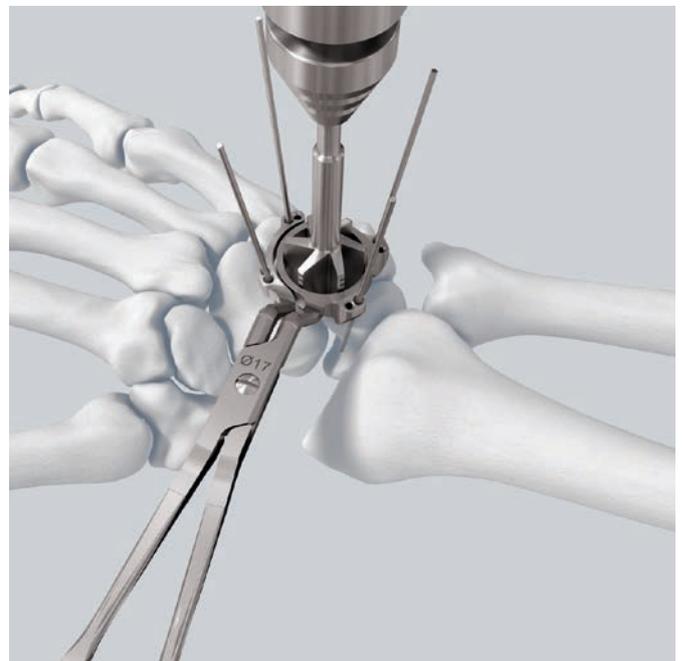
Choose the reamer corresponding to the (reduction) reaming guide ( $\varnothing$  15 mm or  $\varnothing$  17 mm). Ream through the reaming guide to the first laser marking line. Check for sufficient reaming depth by trial placement of the plate, ensuring that the plate edge does not project beyond the bone at any point. If necessary, continue reaming.

### Note:

The first laser marking line on the reamer indicates a reaming depth of 6 mm. The subsequent marking lines are at increments of 2 mm reaming depth.



Reaming guide

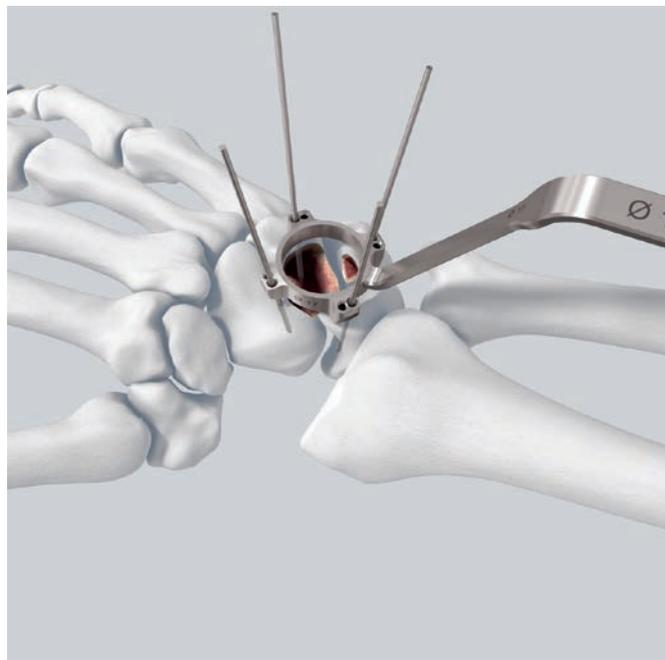


Reduction reaming guide

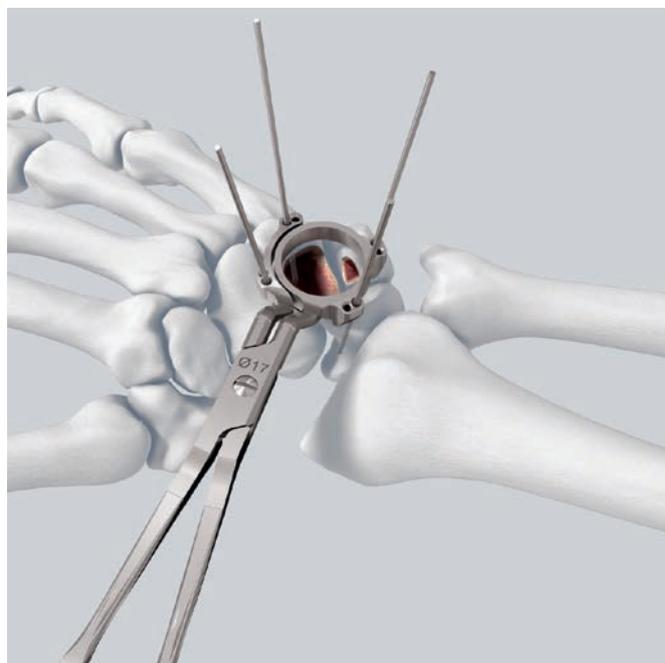
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## Optional: Further intercarpal debridement

With the (reduction) reaming guide in place, remove cartilage and sclerotic bone from the luno-triquetral and capito-hamate intervals 4–6 mm adjacent to the mid-carpal joint.



Reaming guide



Reduction reaming guide

## Option: Reaming without guide over central Kirschner wire

### Instruments

03.111.034	Positioning Aid for VA-Locking Intercarpal Fusion Plate Ø 15 mm
03.111.035	Positioning Aid for VA-Locking Intercarpal Fusion Plate Ø 17 mm
03.111.039	Combi Drill Guide 1.8 for VA-Locking and Standard
02.111.304.01	Kirschner Wire Ø 1.25 mm with trocar tip, length 80 mm, Stainless Steel



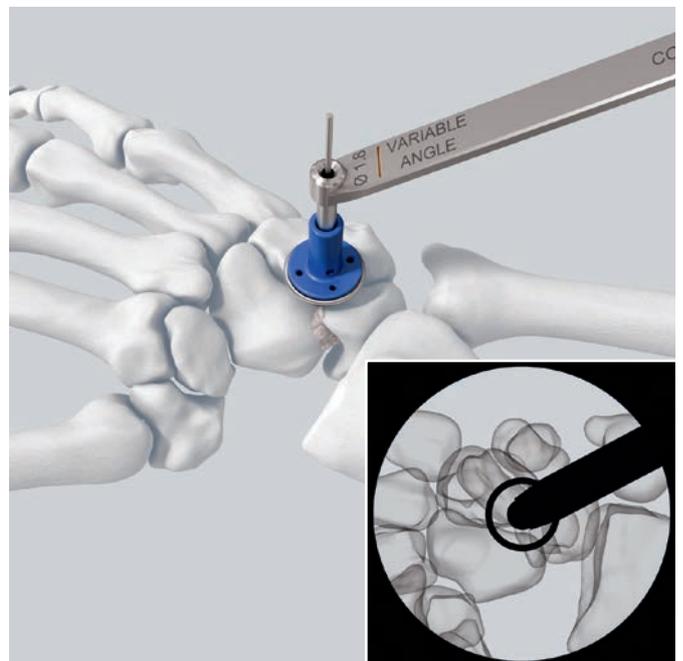
Choose the positioning aid (Ø 15 mm or Ø 17 mm) according to the selected plate.

Mount the positioning aid on the combi drill guide (click-on mechanism). Define the plate position using the radiolucent plate positioning aid under image intensifier control.

#### Note:

If needed for better visibility, fix the positioning aid temporarily on the carpus with a Kirschner wire and remove the combi drill guide from the plate positioning aid.

Insert a Kirschner wire through the combi drill guide.



---

Ream the plate recess with the appropriate sized reamer over the Kirschner wire. Check for sufficient reaming depth by trial placement of the plate, ensuring that the plate edge does not project beyond the bone at any point.

The markings on the reamer should not be used as a reference for reaming depth when reaming without the reaming guide. The reaming depth from the tip to the first laser marking line is 15 mm.



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## 6. Bone grafting

Fill the space between the four bones with autogenous bone graft taken from the iliac crest or Lister's tubercle.

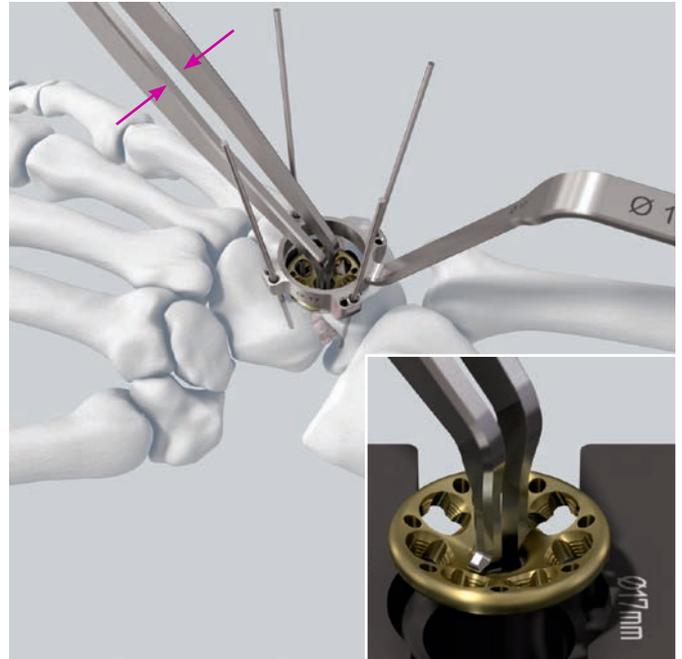
# Plate Fixation

## 1. Place plate

### Instrument

03.111.040	Plate Holder for VA-Locking Intercarpal Fusion
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Use the plate holder to pick up the appropriate sized plate (either  $\varnothing$  15 mm or  $\varnothing$  17 mm). Position the plate through the (reduction) reaming guide.



## 2. Fix plate with VA-locking screws

### Instruments

310.509	Drill Bit Ø 1.8 mm, with marking, length 110/85 mm, 2-flute for Quick Coupling
03.111.039	Combi Drill Guide 1.8 for VA-Locking and Standard
03.111.005	Depth Gauge for Screws Ø 2.0 to 2.7 mm, measuring range up to 40 mm
314.467	Screwdriver Shaft, Stardrive, T8, self-holding
03.111.038	Handle with Quick Coupling
511.776	Torque Limiter, 0.8 Nm, with AO/ASIF Quick Coupling

### Optional instrument

314.453	Screwdriver Shaft Stardrive 2.4, short, self-holding, for Quick Coupling
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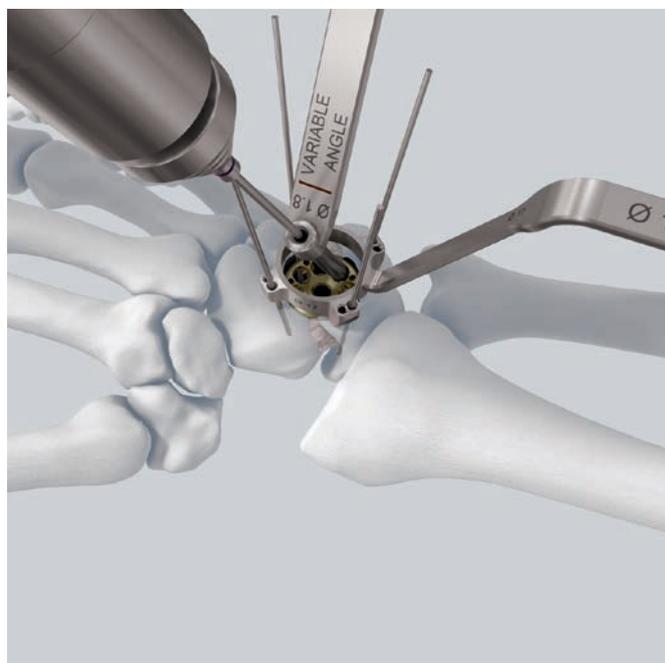
Start plate fixation with the placement of VA-locking screws in the lunate. Use the variable angle part of the combi drill guide 1.8 (see marking “VARIABLE ANGLE”) and fully insert it into the VA-locking hole. Drill the hole with the 1.8 mm drill bit at the desired angle.

#### ▲ Precaution:

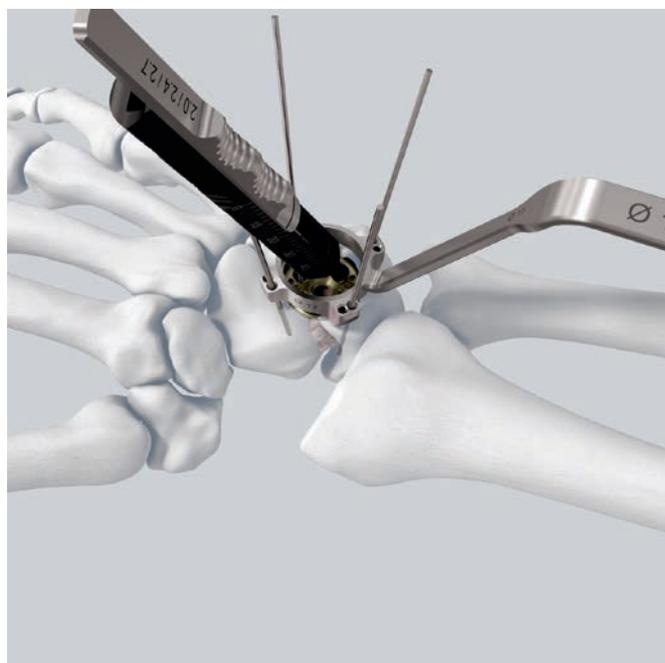
It is important not to angulate more than 15° from the central axis of the screw hole. Overangulation could result in difficulty in getting the screw to lock.

#### ■ Notes:

- All VA-locking holes accept both 2.4 mm VA-locking and 2.4 mm cortex screws.
- The plate may be provisionally fixed with a Kirschner wire to secure it in position.



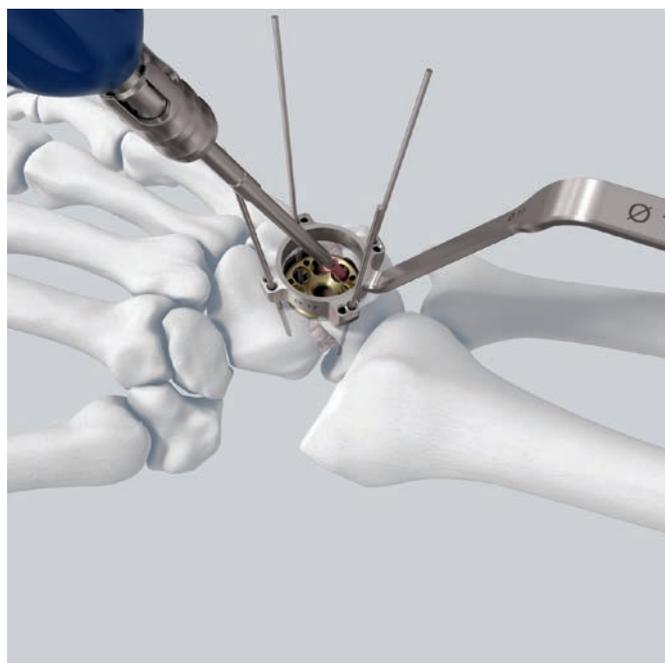
Measure screw length using the depth gauge.



Insert the VA-locking screw using the T8 screwdriver shaft with Stardrive attached to the handle with quick coupling.

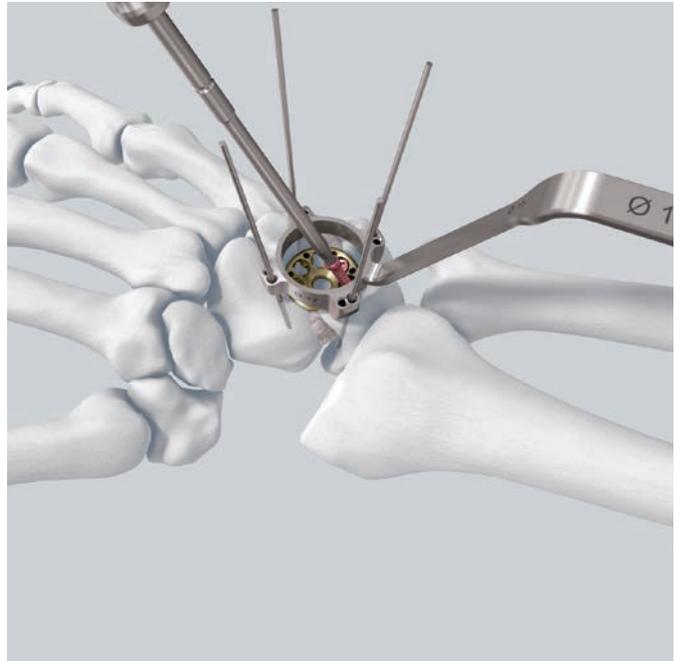
**Note:**

Do not yet fully tighten the screw to lock. For locking of VA-locking screws, refer to step 5.



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Continue plate fixation by inserting a second VA-locking screw in the lunate.

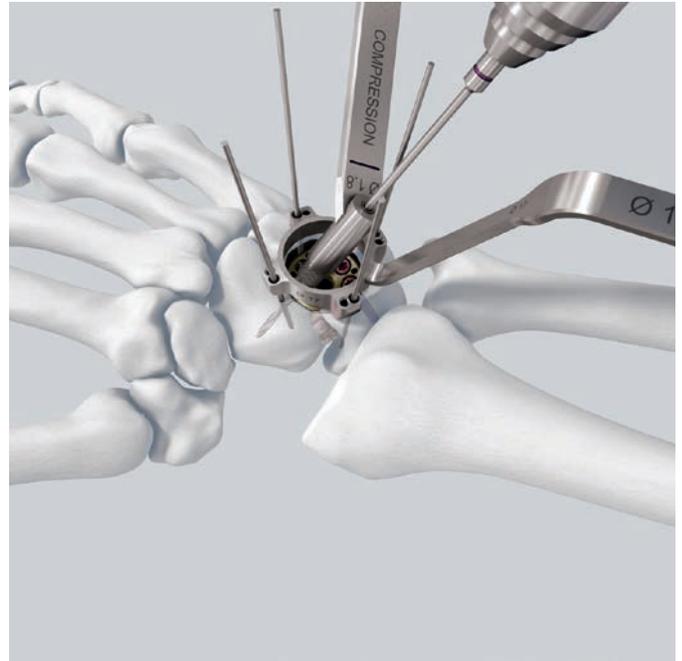


### 3. Optional: Apply compression

#### Instruments

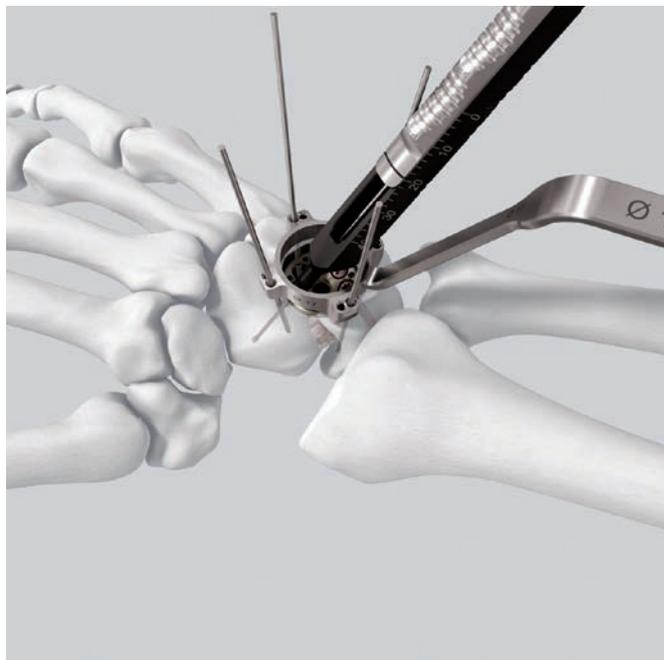
310.509	Drill Bit Ø 1.8 mm, with marking, length 110/85 mm, 2-flute, for Quick Coupling
03.111.039	Combi Drill Guide 1.8 for VA-Locking and Standard
03.111.005	Depth Gauge for Screws Ø 2.0 to 2.7 mm, measuring range up to 40 mm
314.467	Screwdriver Shaft, Stardrive, T8, self-holding
03.111.038	Handle with Quick Coupling

To apply compression insert a cortex screw in the distal carpal bones (e.g. capitate). Use the 1.8 mm drill bit and the combi drill guide to drill the hole for the cortex screw (see marking "COMPRESSION").

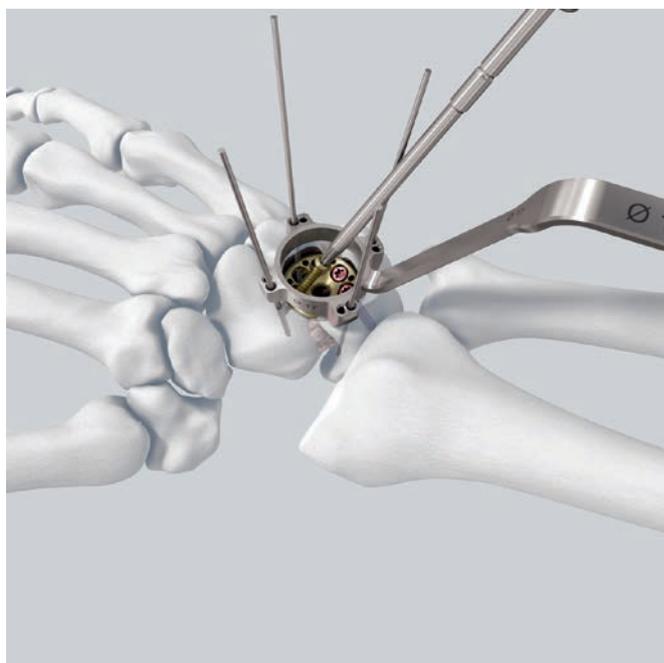


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Measure screw length using the depth gauge.



Insert the screw using the T8 screwdriver shaft with Stardrive attached to the handle with quick coupling.



## 4. Finalize plate fixation

Finalize plate fixation with a combination of 2.4 mm VA-locking and/or 2.4 mm cortex screws as preferred.

Remove the reaming guide before final tightening of the compression screw(s).



## 5. Lock 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
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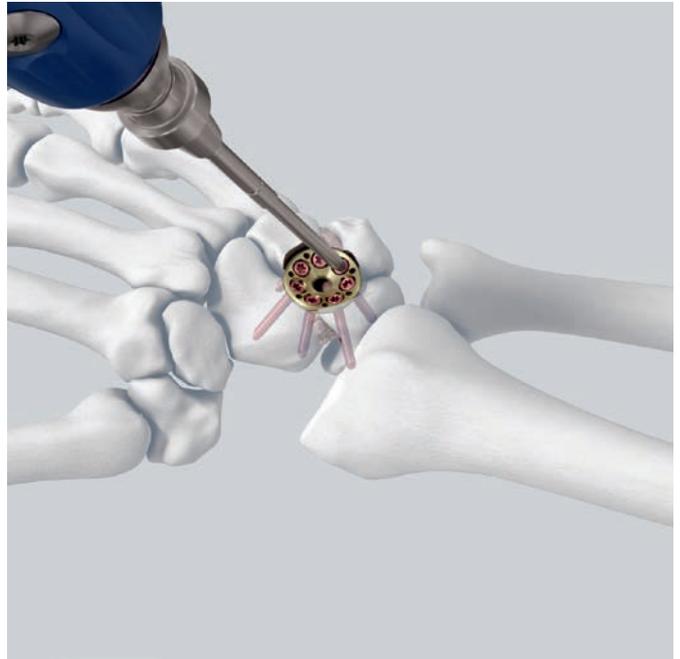
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Use the 0.8 Nm torque limiter to perform the final locking step for the VA-locking screws.

The torque limiter prevents over-tightening and ensures that the VA-Locking screws are securely locked into the plate.

**▲ Precaution:**

Do not use the 0.8 Nm TLA for screw removal.



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## 6. Postoperative treatment

Use a removable cock-up splint. According to the stability of the construct, protected range of motion exercises can be started after the postoperative swelling has subsided. Otherwise, permanent protection of the wrist in the splint is recommended until the bone has consolidated.

---

## 7. Implant removal

In case the physician decides to remove the implants, implants can be removed by using general surgical instruments. In case of difficult removal circumstances, a Screw Extraction Set is available with corresponding instructions.

**▲ Precaution:**

Do not use the 0.8 Nm TLA for screw removal.

# Implants

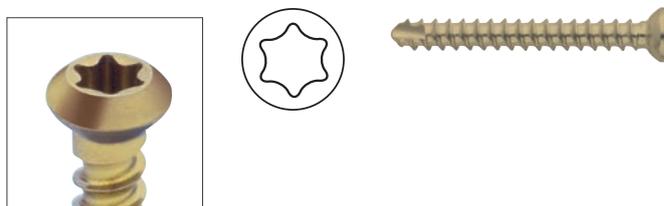
## VA-Locking Intercarpal Fusion Plate 2.4

Stainless steel	Titanium	Holes	Diameter (mm)
02.111.300	04.111.300	6	15
02.111.301	04.111.301	7	17



## Cortex Screw Stardrive $\varnothing$ 2.4 mm, self-tapping

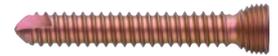
Stainless steel	Titanium	Length (mm)
201.756	401.756	6
201.757	401.757	7
201.758	401.758	8
201.759	401.759	9
201.760	401.760	10
201.761	401.761	11
201.762	401.762	12
201.763	401.763	13
201.764	401.764	14
201.766	401.766	16
201.768	401.768	18
201.770	401.770	20



---

## VA-locking Screw Stardrive $\varnothing$ 2.4 mm, self-tapping

Stainless steel	Titanium	Length (mm)
02.210.108	04.210.108	8
02.210.110	04.210.110	10
02.210.112	04.210.112	12
02.210.114	04.210.114	14
02.210.116	04.210.116	16
02.210.118	04.210.118	18
02.210.120	04.210.120	20



All implants are also available sterile packed. Add suffix „S“ to article number.

# Instruments

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## Standard instruments

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03.111.032 Reamer for VA-Locking Intercarpal Fusion Plate, Ø 15 mm



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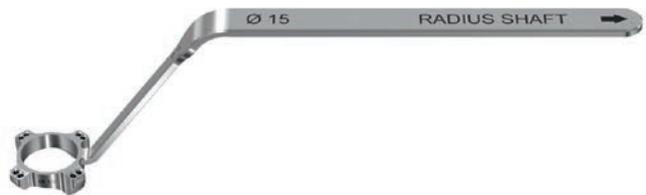
03.111.033 Reamer for VA-Locking Intercarpal Fusion Plate, Ø 17 mm



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03.111.036 Reaming Guide for VA-Locking Intercarpal Fusion Plate, Ø 15 mm

03.111.037 Reaming Guide for VA-Locking Intercarpal Fusion Plate, Ø 17 mm



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02.111.304.01(S) Kirschner Wire Ø 1.25 mm with trocar tip, length 80 mm, Stainless Steel

03.111.038	Handle with Quick Coupling	
03.111.039	Combi Drill Guide 1.8 for VA-Locking and Standard	
310.509	Drill Bit Ø 1.8 mm, with marking, length 110/85 mm, 2-flute, for Quick Coupling	
314.467	Screwdriver Shaft, Stardrive, T8, self-holding	
511.776	Torque Limiter, 0.8 Nm, with AO/ASIF Quick Coupling	
03.110.005	Handle for Torque Limiters 0.4/0.8/1.2 Nm	
03.111.005	Depth Gauge for Screws Ø 2.0 to 2.7 mm, measuring range up to 40 mm	

## Optional instruments

314.453 Screwdriver Shaft Stardrive 2.4, short, self-holding, for Quick Coupling



314.468 Holding Sleeve for Screws Stardrive Ø 2.4 mm, T8, for Screwdriver Shafts Ø 3.5 mm, for No. 314.467



03.111.040 Plate Holder for VA-Locking Intercarpal Fusion Plate



03.111.034 Positioning Aid for VA-Locking Intercarpal Fusion Plate Ø 15 mm



03.111.035 Positioning Aid for VA-Locking Intercarpal Fusion Plate Ø 17 mm



03.111.042 Reduction Reaming Guide for VA-Locking Intercarpal Fusion Plate Ø 15 mm

03.111.043 Reduction Reaming Guide for VA-Locking Intercarpal Fusion Plate, Ø 17 mm



# MRI Information

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## **Torque, Displacement and Image Artifacts according to ASTM F 2213-06, ASTM F 2052-14 and ASTM F2119-07**

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 F2182-11a**

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](http://www.depuysynthes.com/ifu)



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