

SURGICAL TECHNIQUE  
RADIAL DISTAL VOLAR PLATE





Instructions for use for the plates – PL0219.

## Radial distal volar plate with the polyaxial screws

### Medical device description

The implant set for osteosynthesis of fractures of a distal radius includes the plates and relevant types and sizes of the screws.

### Intended purpose for use

The plates are intended for osteosynthesis of the intraarticular and extraarticular unstable fractures of a distal radius from volar side. The aim of osteosynthesis is a reconstruction of the articular surface, a stable fixation of fragments, a restoration of the radius length and inclination.

### Indications

The plates are intended for osteosynthesis of the intraarticular and extraarticular fractures of a distal radius from volar side.

### Contraindications

1. Insufficient quantity or quality of bone which could prevent proper fixation of the bone.
2. Any fully developed or presumed latent infection.
3. Patients who are not able or willing to comply with the postoperative instructions (therapeutic regime); patients suffering from mental disorders, neuromuscular illness, etc.
4. Reduced vascularisation, which would prevent necessary blood supply of the fracture or surgical site.
5. Insufficient quality or quantity of soft tissues in the vicinity of the implants.
6. Risk of direct injury of a neurovascular bundle at introduction of the implant.
7. Usage of the steel implant, if patient is allergic to Ni.

### Intended purpose for use

The angularly stable plate for a distal radius includes locking holes for attachment of the plate to the bone using locking bone screws and a standard oval hole. Characteristics of the angularly stable plates allow its successful use also in a inferior quality and osteoporotic bone. The plates are anatomically shaped for the best contouring of the anatomical shape of the common bone.

### Locking hole

Self-tapping locking screws can be introduced to the bone and „locked“ by the tightening of the tapered thread on the screw head into the corresponding thread in the plate hole. The resulting connection is angularly stable towards the plate. The entire system works on the principle of an internal fixator. This solution prevents the following problems: (Fig. 1)

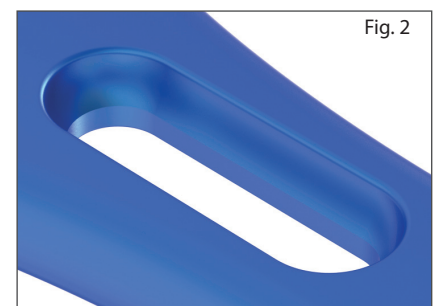
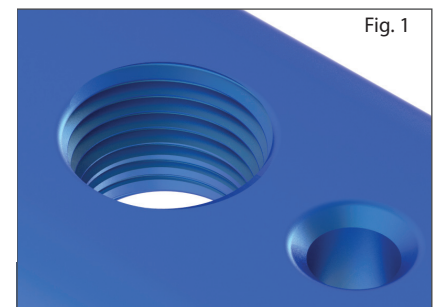
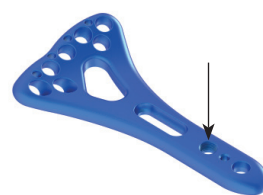
- a primary loss of the fracture fragment reposition
- a secondary loss of the reposition, most importantly in the cases of the comminuted fractures without a sufficient bone support or a low quality or osteoporotic bone
- periosteal compression followed by a worsening of a cortical bone blood supply

**WARNING:** THESE HOLES ARE INTENDED FOR LOCKING OR POLYAXIAL SCREWS ONLY DO NOT INTRODUCE CLASSICAL CORTICAL SCREWS INTO THESE HOLES!

### Standard oval hole

A standard oval hole is used for the primary fixation of the plate to the bone. This hole is intended for the cortical screw. A correction of the plate into the correct position is possible before tightening of this screw. (Fig. 2)

**WARNING:** THIS HOLE IS INTENDED FOR STANDARD CORTICAL SCREW ONLY. DO NOT INTRODUCE LOCKING OR POLYAXIAL SCREWS INTO THIS HOLE!



## Recommended screw types for the individual plate parts

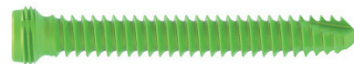


**WARNING:** THE POLYAXIAL SCREWS HAVE A LOWER LOAD BEARING CAPACITY COMPARING TO THE STANDARD LOCKING SCREWS. IT IS NECESSARY TO COMPLY WITH THIS DURING THE FOLLOWING POSTOPERATIVE CARE WHEN USING THE POLYAXIAL SCREWS. ALWAYS USE THE POLYAXIAL SCREWS IN COMBINATION WITH THE CLASSICAL LOCKING SCREWS IN THE DISTAL PART OF THE PLATE. YOU WILL ACHIEVE MORE STABLE FIXATION. IT IS FORBIDDEN TO USE ONLY POLYAXIAL SCREWS IN THE DISTAL PART OF THE PLATE!

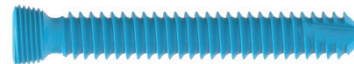


### Distal part of the plate

Self-tapping locking polyaxial screw Ø 2.4 mm



Self-tapping locking cortical screw Ø 2.7 mm



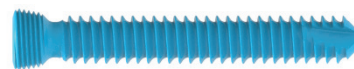
### Oval hole

Self-tapping cortical screw HA 2.7 mm



### Proximal part of the plate

Self-tapping locking cortical screw Ø 2.7 mm



## Surgical technique

Introduce the screws in the area of epiphysis only monocortically and in the area of diaphysis bicortically. Keep in mind that the locking screws do not behave like the standard compression screws. It must be remembered that after tightening of the screw and locking of the screw head in the plate hole, the screw is firmly fixed and that there is no tensile compression of bone fragments. Therefore the accurate anatomical reposition of the fracture fragments is necessary (especially for the intraarticular fractures).

### 1. The patient's position

Patient is in the supine position. The operated extremity is on the X-ray transparent pad. (Fig. 3)

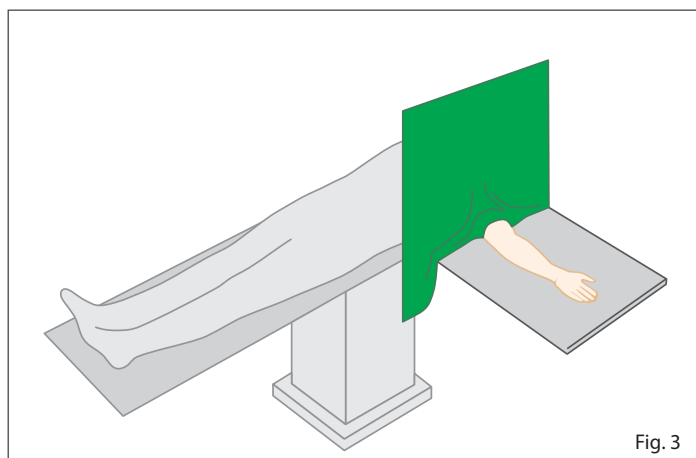


Fig. 3

### 2. Surgical approach

#### Incision

Perform the incision of the length of 7–8 cm in line with the II. metacarpus above the tendon of the *m. flexor carpi radialis* (further FCR) which is palpable on the volar and radial side of the distal forearm. (Fig. 4)

#### Releasing of the *m. flexor carpi radialis*

Proceed further over the tendon sheath of FCR or closely radially along it to the *m. pronator quadratus* (further PQ) and continue to the distal radius.

#### Releasing of the *m. pronator quadratus*

Retract *m. flexor pollicis longus* (further FPL) tendon ulnarly and release PQ this way. It is advantageous to partly separate the FPL muscle belly from its insertion on the radial part of radius diaphysis. Perform the incision of the PQ muscle perpendicularly to the muscle fibres about 1–1.5 cm from the radial muscle insertion. Cut off the PQ muscle edge in the Watershed line (determined by the most volar and prominent part of the distal radius) at the distal insertion point of the pronator quadratus muscle. The implant reaches this line by its distal edge and, due to the anatomically adapted shape of the plate edge, does not exceed this line and does not thus protrude towards the tendons of the flexor muscles of the fingers.

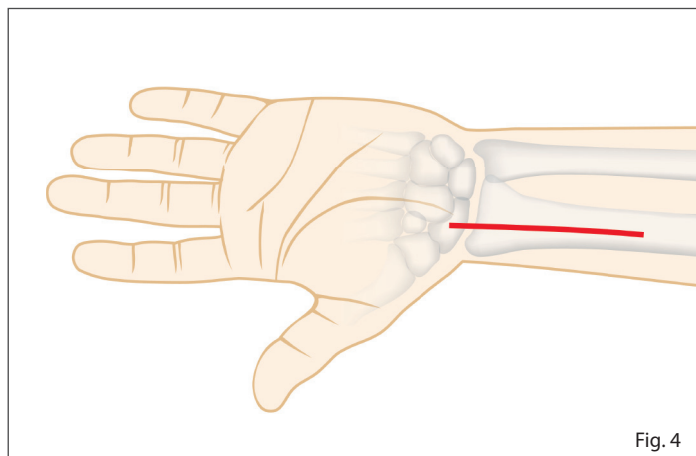


Fig. 4

#### Separating of the *m. pronator quadratus* from the bone

You can use Hohmann retractors behind the radial and ulnar edges of the radius metaphysis after a sufficient release of the PQ muscle, to gain a sufficient overview of the region of the distal radius and the volar portion of the fracture (Fig. 5)

### 3. Reposition

#### Intermediate column

Posteriorly dislocated fragments can be repositioned by ligamentotaxis, or a suitable instrument (elevator) introduced into the fracture line can also be used to anatomically reposition the intermediate column fragments. The elevator (a sharp elevator is marked on its handle by red) can be used for the reposition.

#### Radial column

One of the most powerful deforming forces on the radial column is the tension of the brachioradial muscle insertion, which inserts at the styloid process of the radius. This insertion can be used for the reposition of the radial column by carefully placing a hook between the bone and the aforementioned tendon and the tension of the instrument along the limb axis is used to reposition the styloid process of the radius and to restore the ulnar inclination of the joint surface of the distal radius. The fragment can be secured using the temporarily introduced Kirschner wire or reposition forceps after this reposition.

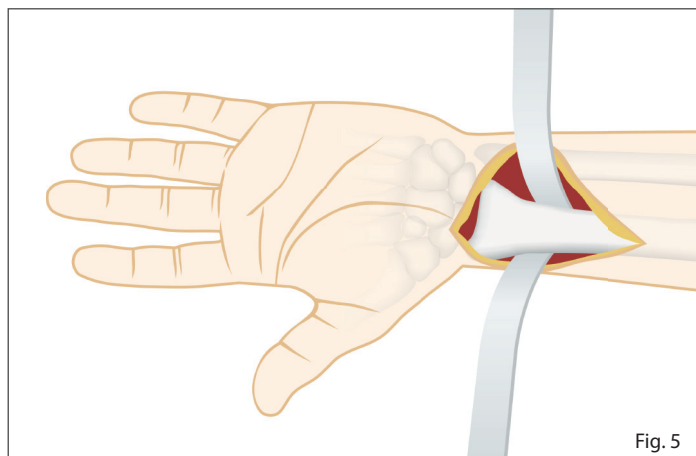


Fig. 5

#### 4. Attachment and primary fixation of the plate

Choose a correct type and size of the plate according to the fracture nature. Find the ideal position of the plate on the surface of the volar side of the distal radius when attaching the plate. (Fig. 6)

– Self-tapping cortical screw **HA 2.7 mm** (blue colour)



**WARNING:** THE PLATE IS ANATOMICALLY PRE-SHAPED AND IT IS FORBIDDEN TO ADDITIONALLY SHAPE IT IN ANY WAY. IT COULD LOWER THE STRENGTH OF THE PLATE OR DEFORM THE THREAD HOLES WHICH WOULD SUBSEQUENTLY PREVENT THE SCREW INSERTION INTO THESE HOLES!

Drill the hole for the screw in the oval hole using a universal drilling sleeve and drill. The sleeve and the drill are marked by blue colour. (Fig. 7)

Measure the depth of the hole using a depth gauge. Insert a measuring wire into the drilled hole, attach the hook from the lower side onto the second cortical bone and push the depth gauge tube against the plate. Read the measured value on the scale of the depth gauge and according to the measured value choose the appropriate screw length. (Fig. 8)

Fix the plate using one cortical screw of  $\varnothing 2.7$  mm. Take the selected length of the screw from the stand. Introduce the screw attached to the screwdriver into the drilled hole. Tighten it using hand screwdriver only. (Fig. 9a)

**NOTE:** YOU CAN PERFORM AN ADDITIONAL CORRECTION OF THE DISTAL END OF THE PLATE TO THE WATERSHED LINE BEFORE TIGHTENING. (FIG. 9B)

If necessary, fix the plate and the fracture fragments using K-wires  $\varnothing 1.5$  mm. Introduce them into the holes given in the distal and proximal parts. (Fig. 10)

**NOTE:** HOLES FOR THE WIRES IN THE DISTAL PART CORRESPOND WITH THE SCREW DIRECTIONS AND CREATE A LINE WHICH SHOULD NOT BE EXCEEDED BY ANY OF THE SCREWS. IT PREVENTS THE JOINT SURFACE DAMAGE.



Fig. 6



Fig. 7

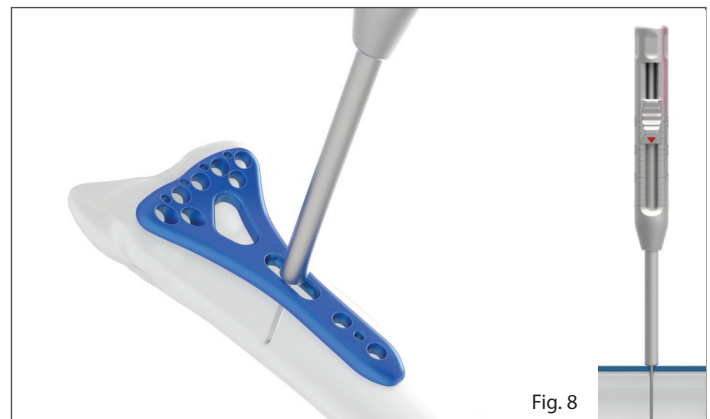


Fig. 8

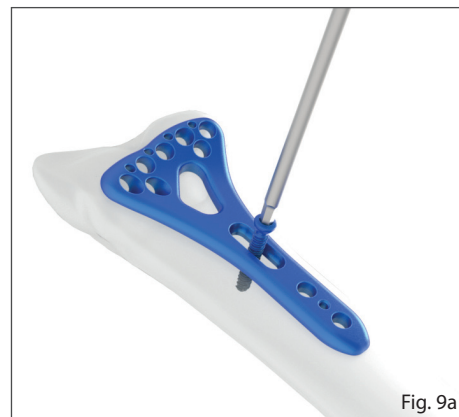


Fig. 9a



Fig. 9b



Fig. 10

## 5. Fixation of the individual fragments using the screws in the distal part of the plate

The following screws are intended for the plate fixation in the distal part:

### 5.1. For the introduction along the hole axis of the plate

– self-tapping locking cortical screws  $\varnothing 2.7$  mm (light blue colour)



**WARNING:** DO NOT USE POLYAXIAL SCREWS FOR THIS TECHNIQUE!

Perform drilling of the holes for these screws using the drill  $\varnothing 2$  mm (blue colour) guided through the sleeve  $\varnothing 2$  mm, which is also marked by the blue colour. It is necessary to keep the alignment of the screw and the hole in the plate for a proper function of the angularly stable connection. So when drilling holes for the screws use the locking guide sleeves. Screw the sleeve into the chosen hole in the plate. It is necessary to screw it along the hole axis and adequately tighten by hand. Subsequently drill the hole using a drill. It is possible to read the hole depth directly on the drill scale. Remove the drill from the sleeve when the hole is finished and unscrew the locking sleeve from the plate. (Fig. 11)



Fig. 11

### 5.2. For the introduction outside the hole axis in the plate

– self-tapping locking polyaxial screws  $\varnothing 2.4$  mm (green colour)



**WARNING:** DO NOT USE CLASSIC LOCKING SCREWS FOR THIS TECHNIQUE!

Perform drilling of the holes for these screws using the drill  $\varnothing 1.8$  mm (green colour) guided through the polyaxial funnel sleeve, which is also marked by the green colour. (Fig. 12)

**NOTE:** NOTE: THE POLYAXIAL FUNNEL SLEEVE ENABLES TO DRILL THE HOLES FOR THE SCREWS OUTSIDE THE AXIS OF THE HOLE IN THE PLATE. THE MAXIMAL DEVIATION OF THE SCREW FROM THE AXIS IS LIMITED TO  $\pm 10^\circ$ .

Screw the sleeve into the chosen hole in the plate. It is necessary to screw it along the hole axis and adequately tighten by hand. Subsequently drill the hole using a drill. Remove the drill from the sleeve when the hole is finished and unscrew the locking sleeve from the plate.



Fig. 12

Measure the depth of the hole using a depth gauge. Insert a measuring wire into the drilled hole, attach the hook from the lower side onto the second cortical bone and push the depth gauge tube against the plate. Read the measured value on the scale of the depth gauge and according to the measured value choose the appropriate screw length. (Fig. 13)



Fig. 13

Take the selected length of the screw from the stand. Introduce the screw attached to the screwdriver into the drilled hole. Tighten it using hand screwdriver only. Use the same procedure to introduce the remaining screws in the distal part. Distribution of the distal holes enables to introduce a sufficient number of the screws, which ensures a fixation and specifically a support of the individual columns of the distal radius. (Fig. 14)

**NOTE:** ENSURE THAT THE PLATE IS FIRMLY FIXED IN THE CORRECT POSITION BEFORE INTRODUCING THE FIRST LOCKING SCREW. OTHERWISE A ROTATION OF THE PLATE AROUND THE SCREW COULD HAPPEN WHEN TIGHTENING.

**NOTE:** THE SCREWDRIVER CONSISTS OF THE SEPARATE BIT WHICH IS ATTACHED TO THE SILICONE HANDLE A FUNCTIONAL END OF THE SCREWDRIVER IS SPECIALLY ADAPTED TO FIRMLY HOLD THE SCREW FOR A CONVENIENT REMOVING OF THE SCREW FROM THE STAND AND FOR ITS INTRODUCTION INTO THE GIVEN HOLE (OR EXTRACTION).

**WARNING:** IT IS ALLOWED ONLY ONE LOCKING OF THE SCREW HEAD IN THE PLATE WHEN USING THE POLYAXIAL SCREWS. USE A NEW POLYAXIAL SCREW IF IT IS NECESSARY TO UNSCREW IT AND INTRODUCE UNDER THE NEW ANGLE. IT IS POSSIBLE TO INTRODUCE THE SCREW REPEATEDLY IF THE SCREW HEAD WAS NOT LOCKED IN THE PLATE!

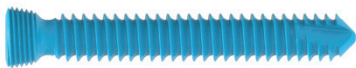
**NOTE:** IT IS POSSIBLE TO USE THE GAUGE IN THE SCREW STAND IN THE CASE WHERE IT IS NECESSARY TO VERIFY THE LENGTH OF THE USED SCREW. PUT THE SCREW HEAD TO THE 0 MARKING AND READ THE SCREW LENGTH ON THE GAUGE.

Check the position of the screws continuously using X-rays. The screws must not intervene with the articular surface and significantly exceed through the second cortical bone.

## 6. Fixation of the plate using the screws in the proximal part

The following screws are intended for the plate fixation in the proximal part:

– self-tapping locking cortical screws  $\varnothing$  2.7 mm (light blue colour)



**NOTE:** IT IS POSSIBLE TO ADJUST THE PLATE POSITION BEFORE THE INTRODUCTION OF THE SCREWS IN THE PROXIMAL PART TO ENSURE ITS CORRECT POSITION (RESTORATION OF THE RADIUS LENGTH AND INCLINATION). (FIG. 15)

**WARNING:** DO NOT USE POLYAXIAL SCREWS IN THIS PART!

Introduce at least 1–2 stable screws into the diaphyseal part particularly at the patients with osteoporosis to prevent loosening of the plate from the radius diaphysis. The procedure of the screw introduction is equal to the screw introduction in the distal part (Fig. 16)



Fig. 14



Fig. 15

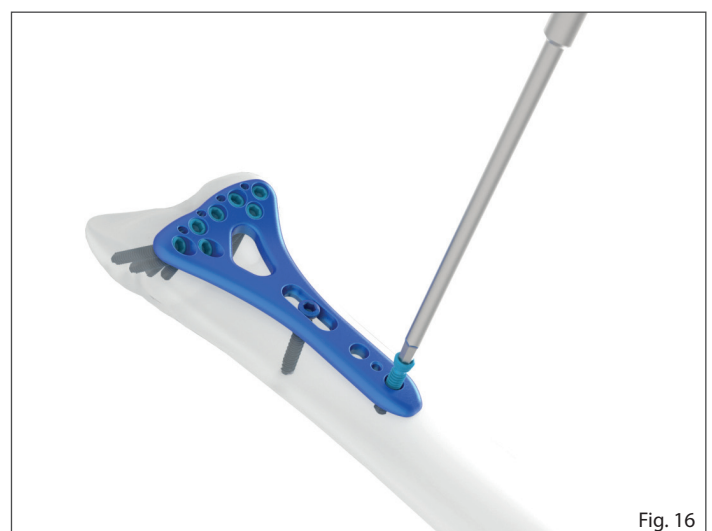


Fig. 16

## 7. Check

Check if the articular surface was repositioned properly and if all screws were tighten. (Fig. 17a, 17b, 17c)

Check the correct position and length of the screws using X-rays. Remove potential instruments used for temporary plate fixation.



Fig. 17a



Fig. 17b



Fig. 17c

## 8. Closing of the surgical wound

Start closing of the surgical wound by the suture of the *pronator quadratus* muscle. It will separate the plate from the tendons of the wrist and finger flexors. Close the surgical wound in the next step. Use the fixation with a brace or splint after closing of the surgical wound.

### Plate removal

When removing the plate, loosen all screws and then remove them gradually, thus preventing possible rotation of the plate around the axis of the last removed screw.

When stripping of hexagon in the screw head or having other problems with removing of the screws, use instrumentarium MEDIN for removing the screws.

### Final notes

- The implants are available in titanium version.
- Never combine different materials in one patient.
- The MEDIN company requires to use their own implants only to guarantee safe use of the implant.
- Implants from different companies must never be combined.
- The implants are intended for single use, single patient and single bone stabilization only.
- Repeated use is forbidden, this is stated in the product leaflet and is valid for all implants.







Radial distal volar plate, angularly stable, right

Ti	A	number of holes (a × b)
<b>397 129 70 4403</b>	47mm	6×2
<b>397 129 70 4413</b>	55mm	6×3
<b>397 129 70 4423</b>	63mm	6×4
<b>397 129 70 4433</b>	47mm	7×2
<b>397 129 70 4443</b>	55mm	7×3
<b>397 129 70 4453</b>	63mm	7×4
<b>397 129 70 4463</b>	47mm	8×2
<b>397 129 70 4473</b>	55mm	8×3
<b>397 129 70 4483</b>	63mm	8×4



Radial distal volar plate, angularly stable, left

Ti	A	number of holes (a × b)
<b>397 129 70 4303</b>	47mm	6×2
<b>397 129 70 4313</b>	55mm	6×3
<b>397 129 70 4323</b>	63mm	6×4
<b>397 129 70 4333</b>	47mm	7×2
<b>397 129 70 4343</b>	55mm	7×3
<b>397 129 70 4353</b>	63mm	7×4
<b>397 129 70 4363</b>	47mm	8×2
<b>397 129 70 4373</b>	55mm	8×3
<b>397 129 70 4383</b>	63mm	8×4

plate thickness \_\_\_\_\_ 2.5 mm

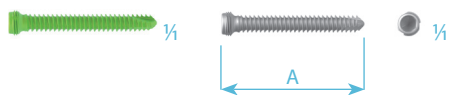
SCREWS:  
 Self-tapping locking screw 2.4  
 Self-tapping locking cortical screw 2.7  
 Self-tapping cortical screw 2.7



**397 129 68 0240** Sieve for the radial distal volar plates  
 240 × 240 × 50 mm  
 without the implants

# RADIAL DISTAL VOLAR PLATE

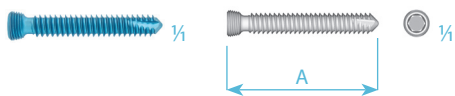
## LOCKING SCREWS 2.7 AND 2.4



thread diameter	2.4 mm
core diameter	1.7 mm
head diameter	3.5 mm
drill for the thread	Ø 1.8 mm
screwdriver	Ø 2.0 mm

### Self-tapping locking polyaxial screw Ø 2.4 × L mm

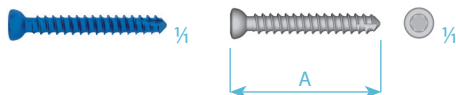
Ti	L
<b>397 129 70 1634</b>	12 mm
<b>397 129 70 1644</b>	14 mm
<b>397 129 70 1654</b>	16 mm
<b>397 129 70 1664</b>	18 mm
<b>397 129 70 1674</b>	20 mm
<b>397 129 70 1684</b>	22 mm
<b>397 129 70 1694</b>	24 mm
<b>397 129 70 1704</b>	26 mm
<b>397 129 70 1714</b>	28 mm
<b>397 129 70 1724</b>	30 mm



thread diameter	2.7 mm
core diameter	2.0 mm
head diameter	3.5 mm
drill for the thread	Ø 2.0 mm
screwdriver	Ø 2.0 mm

### Self-tapping locking cortical screw Ø 2.7 × L mm

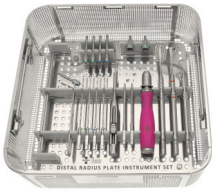
Ti	L
<b>397 129 70 1934</b>	12 mm
<b>397 129 70 1944</b>	14 mm
<b>397 129 70 1954</b>	16 mm
<b>397 129 70 1964</b>	18 mm
<b>397 129 70 1974</b>	20 mm
<b>397 129 70 1984</b>	22 mm
<b>397 129 70 1994</b>	24 mm
<b>397 129 70 2004</b>	26 mm
<b>397 129 70 2014</b>	28 mm
<b>397 129 70 2024</b>	30 mm



thread diameter	2.7 mm
core diameter	2.0 mm
head diameter	4.0 mm
drill for the thread	Ø 2.0 mm
screwdriver	Ø 2.0 mm

### Self-tapping cortical screw HA 2.7 × L mm

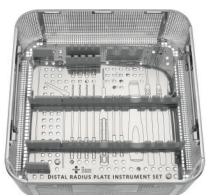
Ti	L
<b>397 129 70 2534</b>	12 mm
<b>397 129 70 2544</b>	14 mm
<b>397 129 70 2554</b>	16 mm
<b>397 129 70 2564</b>	18 mm
<b>397 129 70 2574</b>	20 mm
<b>397 129 70 2584</b>	22 mm
<b>397 129 70 2594</b>	24 mm
<b>397 129 70 2604</b>	26 mm
<b>397 129 70 2614</b>	28 mm
<b>397 129 70 2624</b>	30 mm



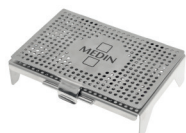
**397 139 09 0915** Instrumentation set for the radial distal volar plates  
240 × 240 × 90 mm  
*instruments included*



<b>397 139 09 0910</b>		set	pcs
1	<b>397 129 09 2480</b>	K-wire MEDIN Ø 1.5; 160 mm	5
2	<b>397 129 69 6700</b>	Guide locking sleeve Ø 1.8 mm	2
3	<b>397 129 69 6710</b>	Guide locking sleeve Ø 2 mm	2
4	<b>397 129 69 6720</b>	Guide locking polyaxial sleeve; D 13 × L 25 mm	2
5	<b>397 129 69 6730</b>	Guide sleeve Ø 2 mm	1
6	<b>397 129 69 7400</b>	Drill Ø 1.8; 110 mm	2
7	<b>397 129 69 7410</b>	Drill Ø 2; 110 mm	2
8	<b>397 129 69 7674</b>	Depth gauge	1
9	<b>397 129 69 7680</b>	Elevator, blunt	1
10	<b>397 129 69 7690</b>	Hook, blunt	1
11	<b>397 129 69 7910</b>	Screwdriver 2 × 90 mm; hexagon	1
12	<b>397 129 69 8460</b>	Elevator, sharp	1
13	<b>BD17-080-AO</b>	Holder AO; 21 × 120 mm	1



**397 129 68 0230** Sieve for the instrumentation set for the radial distal volar plates  
240 × 240 × 90 mm  
*excluding instruments*



**397 129 68 0260** Stand for the screws for distal radius  
135 × 90 × 36 mm  
*without the implants*

# REFID