medartis®

PRECISION IN FIXATION

SURGICAL TECHNIQUE – STEP BY STEP

Distal Radius System 2.5

APTUS® Wrist

Contents

For further information regarding the APTUS product line visit:
www.medartis.com/products

Introduction

Product Materials

All APTUS implants are made of pure titanium (ASTM F67, ISO 5832-2) or titanium alloy (ASTM F136, ISO 5832-3). All of the titanium materials used are biocompatible, corrosion-resistant and non-toxic in a biological environment. K-wires are made of stainless steel (ASTM F 138); instruments are made of stainless steel, PEEK, aluminum or titanium.

Indications

APTUS Radius

- Intra- and extra-articular fractures
- Correction osteotomies

APTUS Ulna

- Management of fractures and osteotomies of the ulna

Contraindications

- Pre-existing or suspected infection at or near the implantation site
- Known allergies and/or hypersensitivity to implant materials
- Inferior or insufficient bone quality to securely anchor the implant
- Patients who are incapacitated and/or uncooperative during the treatment phase
- Growth plates are not to be blocked with plates and screws

Color Coding

System Size	Color Code
APTUS 2.5	purple
APTUS 1.5	green

Plates and Screws

Special implant plates and screws have their own color:

Implant plates gold	Fixation plates
Implant plates blue	TriLock plates (locking)
Implant screws gold	Cortical screws (fixation)
Implant screws blue	TriLock screws (locking)
Implant screws silver	TriLock Express screws (locking)
Implant screws green	SpeedTip screws (self-drilling)

Possible Combination of Plates and Screws

Plates and screws can be combined within one system size:

2.5 TriLock Plates

2.5 Cortical Screws, HexaDrive 7
2.5 TriLock Screws, HexaDrive 7
2.5 TriLock Express Screws, HexaDrive 7

1.5 Fixation Plates

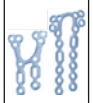
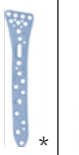
1.5 SpeedTip Screws, HexaDrive 4

Symbols

HexaDrive

Treatment Concept

The table below lists the most common surgical wrist indications which can be treated with the Distal Radius System 2.5 implants.

Fracture Type \ Plate Type													
A1													
A2													
A3													
B1.1													
B1.2													
B1.3													
B2													
B3													
C1													
C2													
C3													
Volar lunate facet fragment													
Avulsed small distal fragments													
Diaphyseal-metaphyseal fracture													
Correction osteotomy													

Primary recommendation
Recommendation
Possible

The above-mentioned information is a recommendation only. The operating surgeon is solely responsible for the choice of the suitable implant for the specific case.

* Soft tissue protecting plate position along the watershed line to be respected, according to Soong et al.
(Soong et al.; Volar locking plate implant prominence and flexor tendon rupture; J Bone Joint Surg Am. 2011; 93: 328 – 335)

→ www.medartis.com/products/aptus/wrist

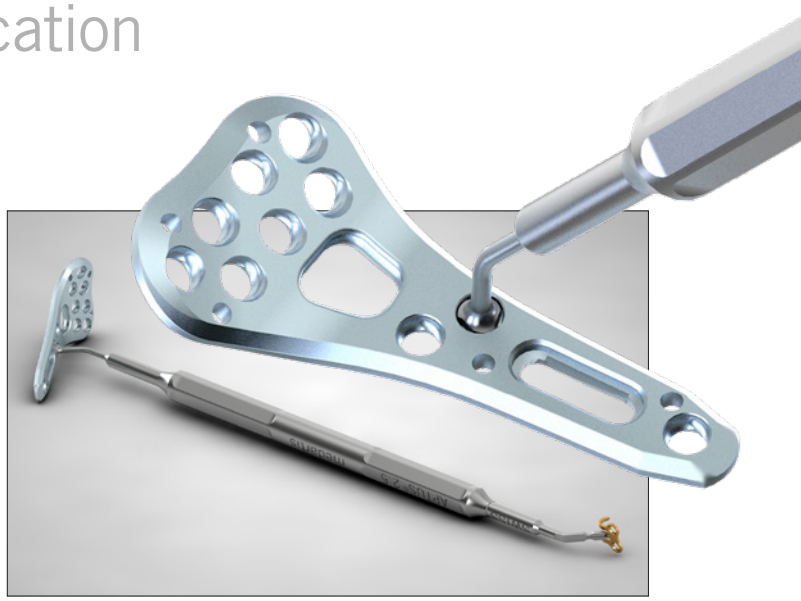
Instrument Application

General Instrument Application

Plate Holding and Positioning

The TriLock end of the plate holding and positioning instrument (A-2750) can be locked in the TriLock contour of the plate. It facilitates positioning, moving and holding the implant on the bone and can be used with all TriLock 2.5 plate holes.

The other end of the plate holding and positioning instrument is used to pick up the hook plate in order to position it on the bone.



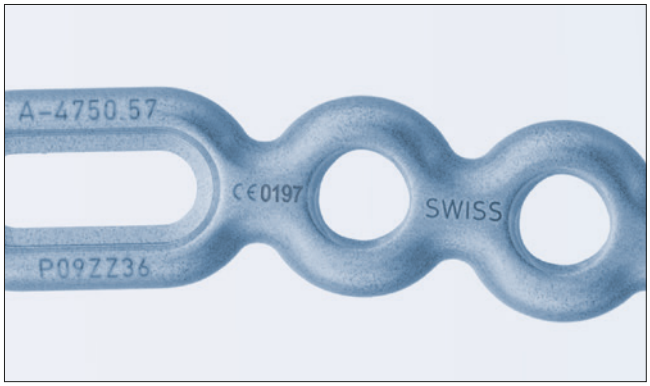
A-2750
2.5 Plate Holding and Positioning Instrument

Plate Bending

If required, the TriLock volar fracture plates, the volar frame plates, the dorsal radius plates, the small fragment plates, the lunate facet plates and the distal ulna plates can be bent with the plate bending pliers (A-2047). The plate bending pliers have two different pins to protect the locking holes of flat and curved plates during the bending process.

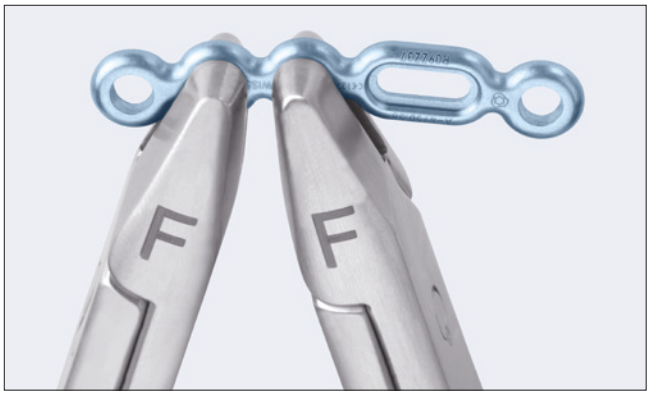
A-2047
2.0–2.8 Plate Bending Pliers, with Pins

The labeled side of the plate must always face upwards when inserting the plate into the bending pliers.

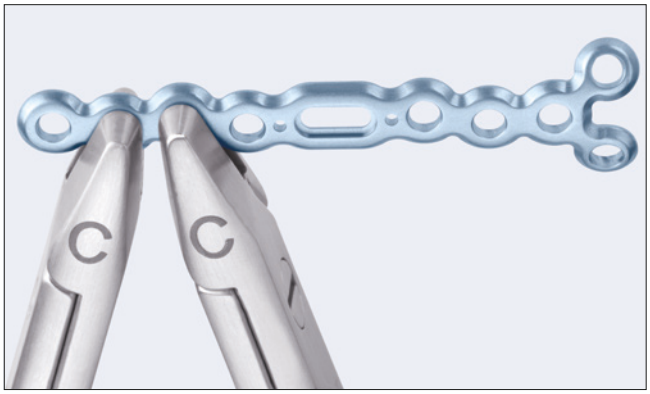


→ www.medartis.com/products/aptus/wrist

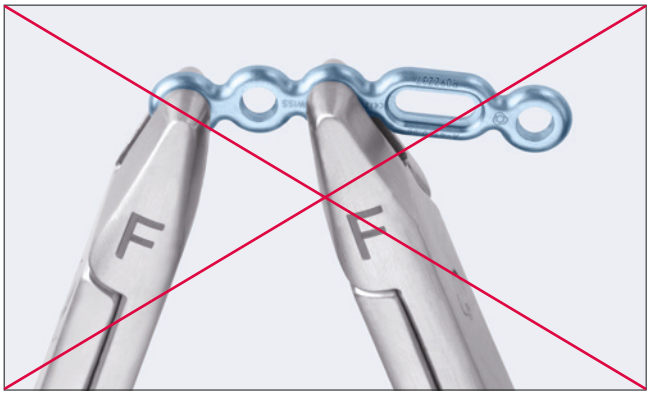
When bending a flat plate (distal radius plates), the plate bending pliers must be held so that the letters «F – FLAT PLATE THIS SIDE UP» are legible from above. This ensures that the plate holes are not damaged.

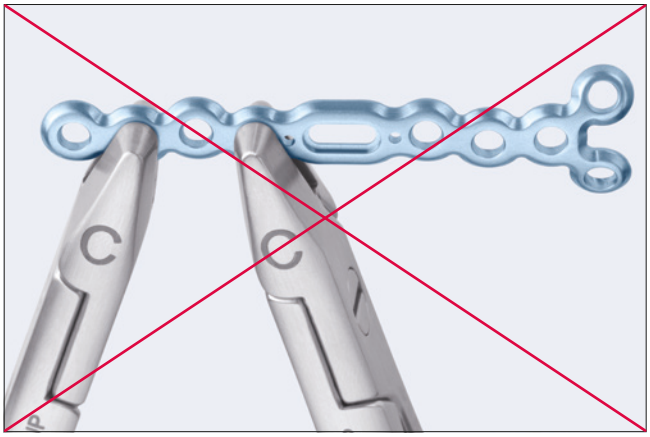


Notice
When bending a curved plate (distal ulna plates), the letters «C – CURVED PLATE THIS SIDE UP» must be legible from above. This ensures that the plate holes are not damaged.



Notice
While bending, the plate must always be held at two adjacent holes to prevent contour deformation of the intermediate plate hole.



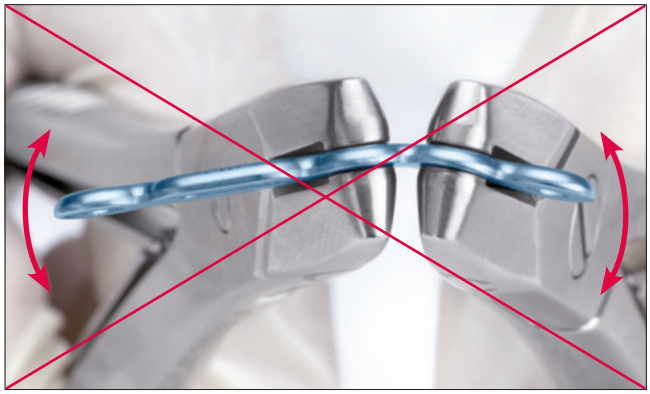


Caution

Do not bend the plate by more than 30°. Bending the plate further may deform the plate holes and may cause the plate to break postoperatively.

Caution

Repeatedly bending the plate in opposite directions may cause the plate to break postoperatively.
Always use the provided plate bending pliers to avoid damaging the plate holes. Damaged plate holes prevent correct and secure seating of the screw in the plate and increase the risk of system failure.

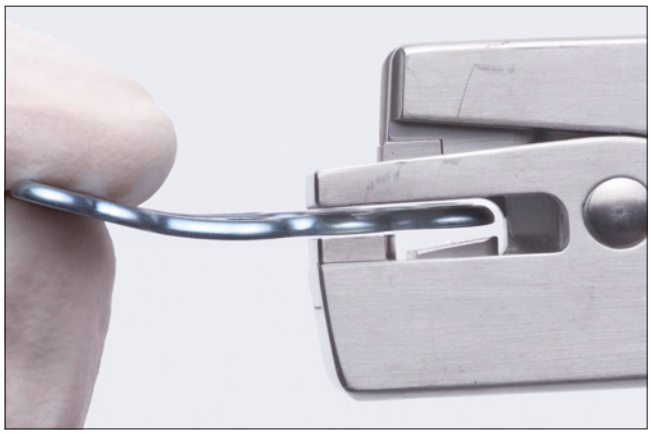


Cutting

If required, the plate cutting pliers (A-2046) can be used to cut the TriLock small fragment plates, the volar frame plates, the dorsal radius plates as well as K-wires up to a diameter of 1.8 mm.

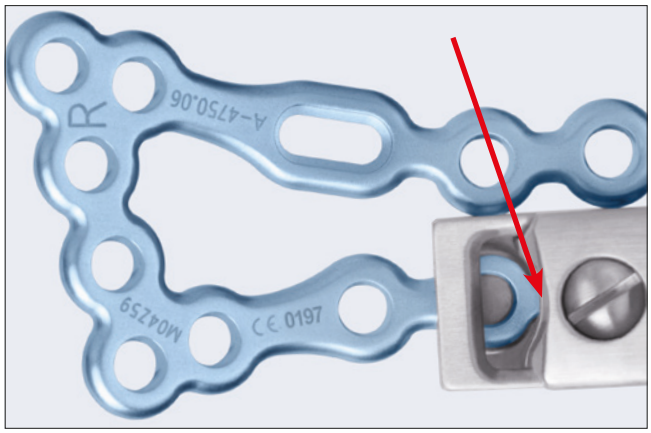
A-2046
1.2–2.8 Plate Cutting Pliers

Ensure that there are no remaining plate segments in the cutting pliers (visual check). Insert the plate from the front into the open cutting pliers. Always ensure that the labeled side of the plate is facing upwards. Hold the implantable plate segment with your hand during and after cutting.



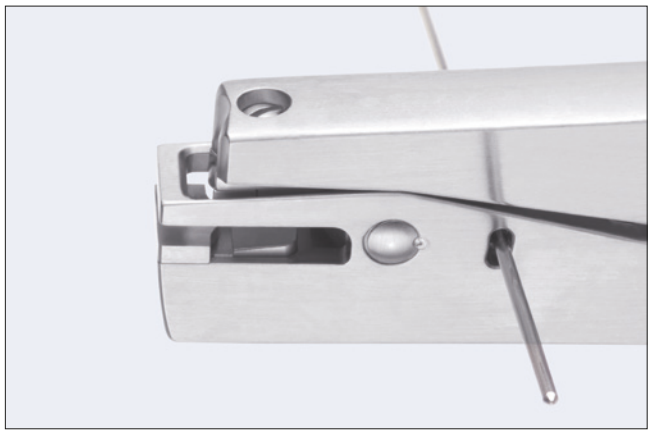
Recommendation
To facilitate the insertion of the plate, support the cutting pliers slightly with your middle finger.

You can visually check the desired cutting line through the cutting window in the head of the pliers (see figure). Always leave enough material on the rest of the plate to keep the adjacent hole intact.



Notice
Always cut the plate holes individually. If two plate holes need to be cut off, two cutting procedures are necessary.

Shorten the K-wires by inserting the wire through the opening located on the side of the plate cutting pliers. Cut the wire by pressing the pliers.



Drilling

Color-coded twist drills are available for every APTUS system size. All twist drills are color-coded via a ring system.

System Size	Color Code
APTUS 2.5	purple

A-3713

A-3723

A-3733

Core Hole Drills = one colored ring

There are two different types of twist drills for the system size 2.5: The core hole drills are characterized by one colored ring, the gliding hole drills (for lag screw technique) are characterized by two colored rings.

A-3711

A-3721

A-3731

Gliding Hole Drills = two colored rings

The twist drill must always be guided through a drill guide. This prevents damage to the screw hole and protects the surrounding tissue from direct contact with the drill. The drill guide also serves to limit the pivoting angle.

A-2722
2.5 Drill Guide, Scaled

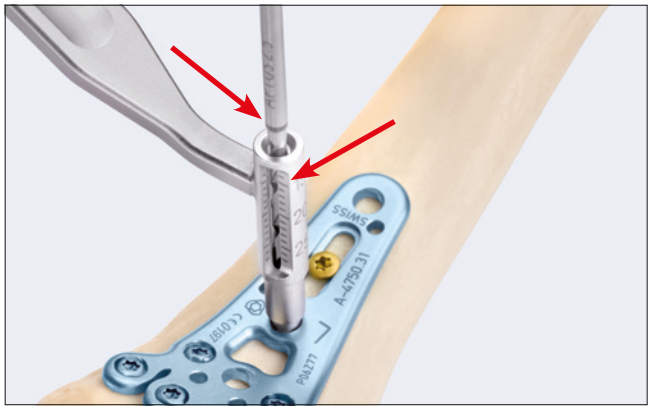
A-2721
2.5 Drill Guide for Lag Screws

A-2726
2.5 Drill Sleeve, Self-Holding

After positioning the plate, insert the drill guide and the twist drill into the screw hole. In the APTUS system, the drill is guided by the drill shaft and not the drill flute.

You can read the required screw length at the scale of the drill guide (A-2722) or the self-holding drill sleeve (A-2726) in connection with the black markings on the drill shaft of twist drills (A-3713, A-3723 or A-3733).

Notice
The double-ended drill guide for lag screws (A-2721) is used only to perform the classic lag screw technique according to AO/ASIF.



The self-holding drill sleeve (A-2726) can be locked with a clockwise turn in the TriLock holes of the plate (no more than ± 15°). It thus performs all of the functions of a drill guide without the need to be held.

Caution
For TriLock plates ensure that the plate holes are pre-drilled with a pivoting angle of no more than ± 15°. For this purpose, the drill guides show a limit stop of ± 15°. A pre-drilled pivoting angle of > 15° no longer allows the TriLock screws to correctly lock in the plate.

Assigning the Screw Length

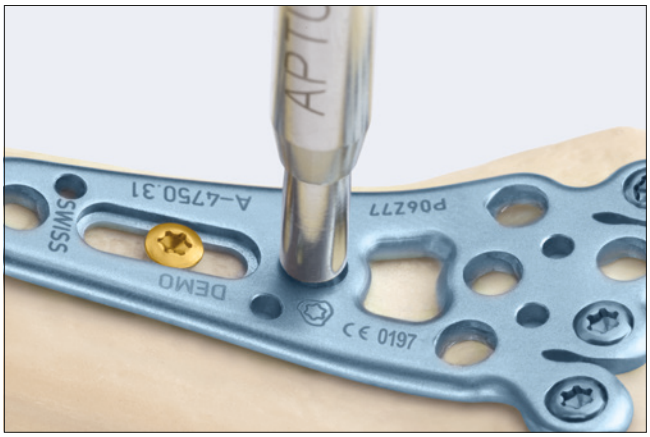
The depth gauge (A-2730) is used to assign the ideal screw length for use in monocortical or bicortical screw fixation.

A-2730
2.5 Depth Gauge

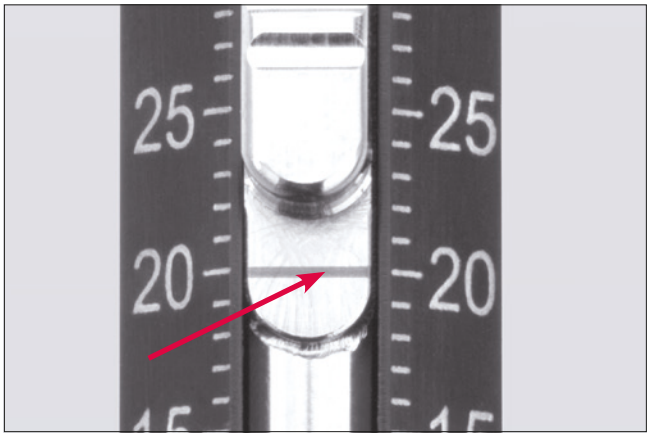
Retract the slider of the depth gauge.
The depth gauge caliper has a hooked tip that is either inserted to the bottom of the hole or is used to catch the far cortex of the bone. When using the depth gauge, the caliper stays static, only the slider is adjusted.

To assign the screw length, place the distal end of the slider onto the implant plate or directly onto the bone.

When using the lag screw technique, place the distal end of the slider directly onto the bone.

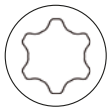


The ideal screw length for the assigned drill hole can be read on the scale of the depth gauge.



Screw Pick-Up

The screwdrivers (A-2310, A-2710) and the screwdriver blade (A-2013) feature the patented HexaDrive self-holding system.



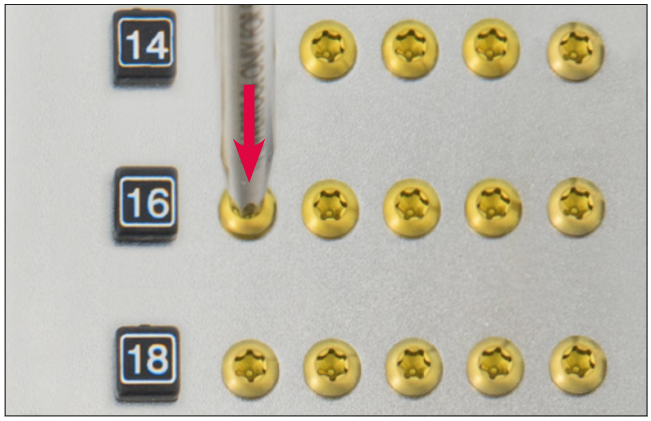
A-2710
2.5 Screwdriver, HD7, Self-Holding

A-2013
2.5/2.8 Screwdriver Blade, HD7, AO

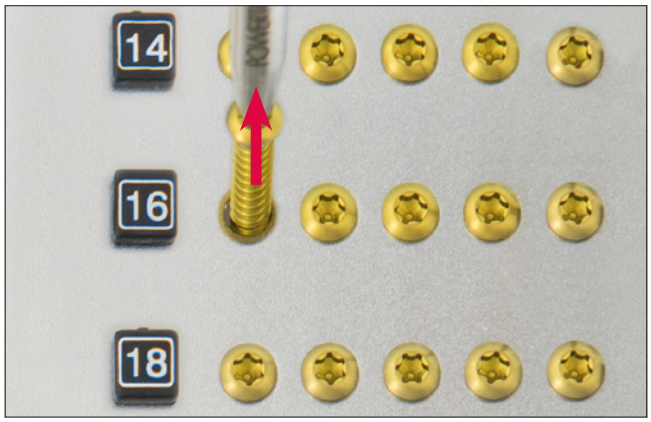
A-2073
Cannulated Handle with Quick Connector, AO

A-2310
1.2/1.5 Screwdriver, HD4, Self-Holding

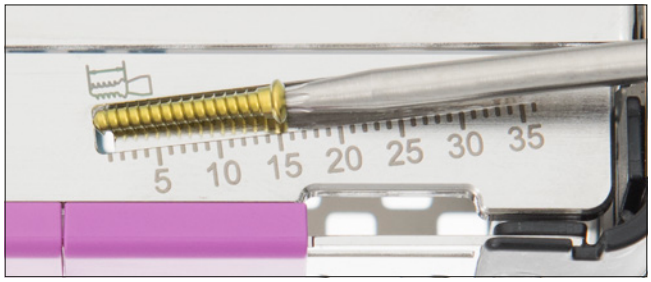
To remove the screws from the implant container, insert the appropriately color-coded screwdriver perpendicularly into the screw head of the desired screw and pick up the screw with axial pressure.



Notice
The screw will not hold without axial pressure!
Vertically extract the screw from the compartment. The screw is held securely by the blade. If self-retention between screwdriver and screw cannot be achieved despite being picked up correctly, usually the screw has already been picked up before. This may lead to a permanent deformation of the self-retaining area of the HexaDrive inside the screw head. In this case, a new screw has to be used.



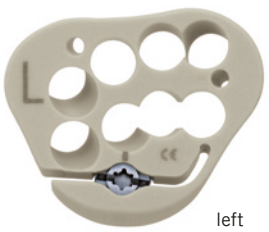
Check the screw length and diameter at the scale of the measuring module. The screw length is determined at the end of the screw head.



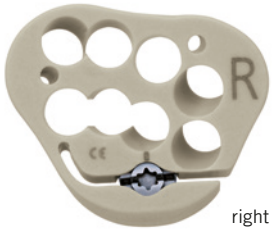
Specific Instrument Application

Drill Guide Blocks

The drill guide blocks serve to rapidly and accurately position the screws in connection with the corresponding TriLock plates. The drill guide blocks are adapted to the distal area of the plates (A-4750.61–64, A-4750.101–112, A-4750.123–126 and A-4750.145–146). There is no danger of drill channels crossing during the drilling process.



left



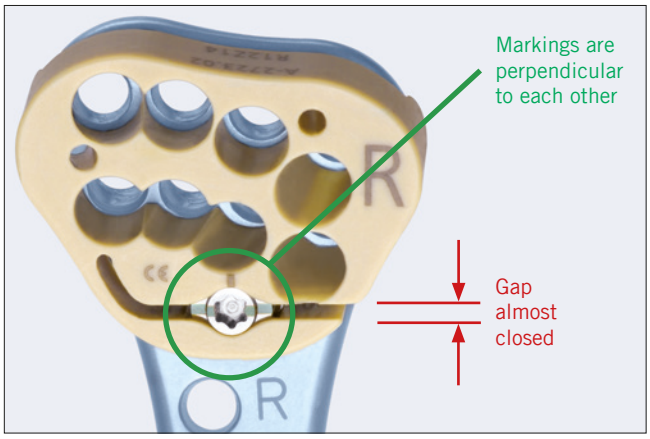
right

(Example)

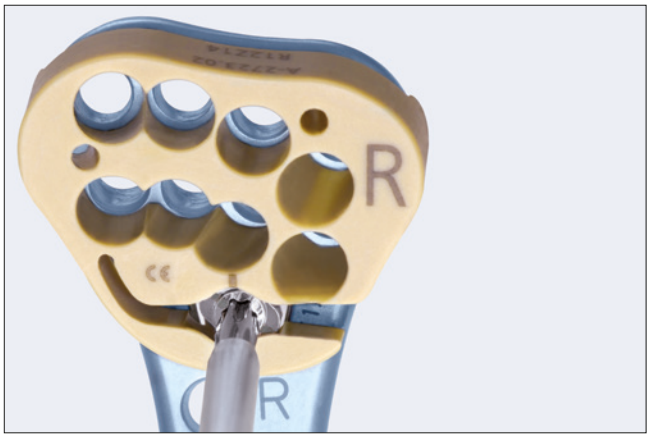
The drill guides (A-2722 or A-2726), the depth gauge (A-2730) as well as two K-wires with a diameter of up to 1.6 mm can be used together with the drill guide block. You can drill, measure and insert the screws through the holes of the attached drill guide block.

Drill Guide Block	**Plates**
A-2727.01	A-4750.101/103
A-2727.02	A-4750.102/104
A-2727.03	A-4750.105/107
A-2727.04	A-4750.106/108
A-2727.05	A-4750.109/111
A-2727.06	A-4750.110/112
A-2727.13	A-4750.123/125
A-2727.14	A-4750.124/126
A-2723.01	A-4750.61/63
A-2723.02	A-4750.62/64
A-2727.23	A-4750.145
A-2727.24	A-4750.146

Fixing and detaching the drill guide block
The drill guide block is clicked onto the plate, while the markings of the drill guide block and the rotating element are perpendicular to each other.

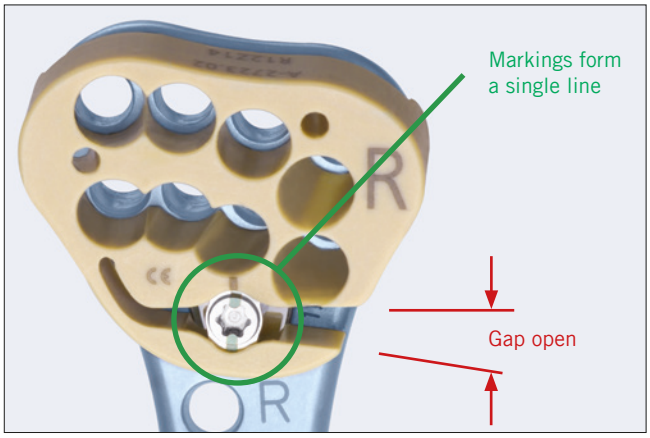


Use the screwdriver A-2710 (or A-2073, A-2013) to turn the rotating element anchored in the drill guide block by a quarter rotation in a clockwise or counter-clockwise direction, until the drill guide block expands and is firmly locked with the plate.



The marking on the drill guide block and the marking on the rotating element will form a single line.

After all screws have been fixed in the distal area of the plate, the drill guide block can be removed in reverse sequence.



Instrument for Restoration of the Volar Tilt

Preparing the instrument
The 2.5 instrument for restoration of the volar tilt (A-2794) can only be used together with the correction plates (A-4750.11-12, A-4750.15-20) and the ADAPTIVE plates (A-4750.61-64, A-4750.101-112).

Position the laser marking of the guide wire at the required correction angle.

A-2794
2.5 Instrument for Restoration of the Volar Tilt

Positioning the instrument
Insert and lock (with a clockwise turn) the instrument into the appropriate screw hole.

Correction plates: Insert the instrument into the second screw hole proximal to the oblong hole.
ADAPTIVE plates: Insert the instrument into the screw hole just proximal to the oblong hole.

Correction Plates ADAPTIVE Plates

Fixating the plate
After the appropriate incision, the distal aspect of the plate has to be positioned as close as possible to the watershed line.

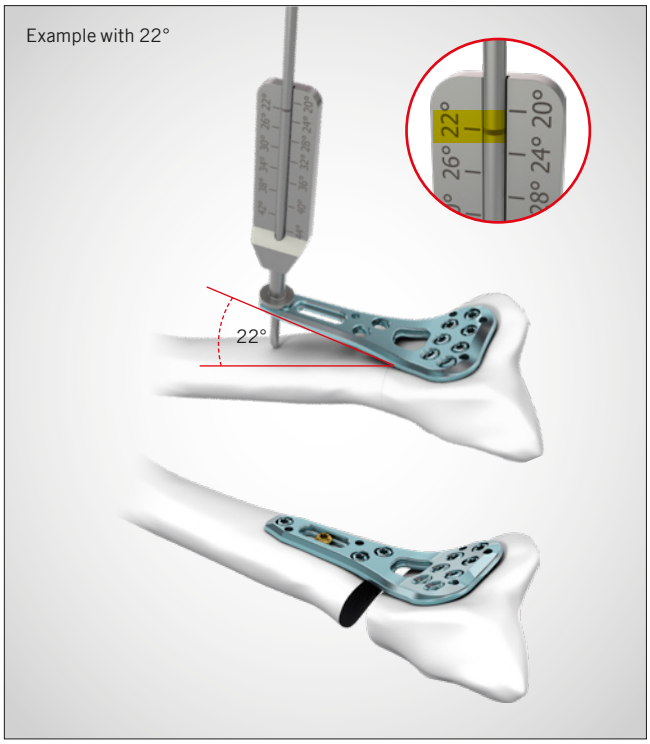
Fix the plate distally with the mounted instrument with at least two blue TriLock screws. To avoid collision with the mounted instrument during drilling, choose the screw holes accordingly.

Remove the plate with the mounted instrument.

Make the osteotomy.

Final fixation of the plate with the mounted instrument in the pre-drilled distal holes.

Remove the instrument and insert additional screws distally.



Recommendation
For ideal results, place at least three blue TriLock screws into the most distal row and two blue TriLock screws into the second distal row.

The distal fragment is reduced by aligning the proximal end of the plate shaft.

Continue the fixation by placing a gold cortical screw into the oblong hole. Complete the fixation of the plate shaft with screws of which at least one should be a blue TriLock screw (distally to the oblong hole).

Surgical Techniques

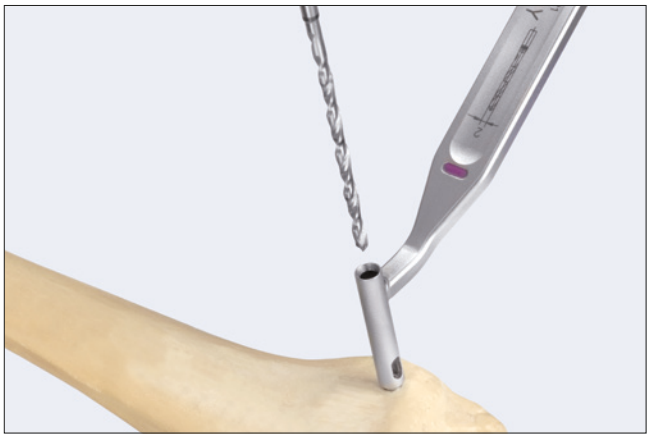
General Surgical Techniques

Lag Screws

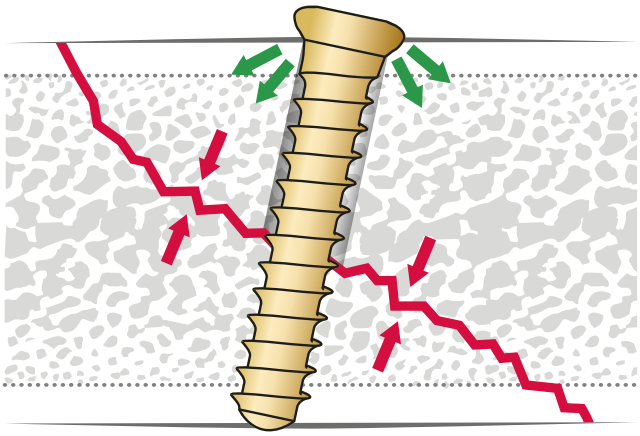
1. Drilling the gliding hole
Drill the gliding hole (∅ 2.6 mm) using the twist drill with two purple rings in combination with the correspondingly marked end of the drill guide (A-2721, two purple bars). Drill at a right angle to the fracture line.

Recommendation
Do not drill further than to the fracture line.

2. Drilling the core hole
Insert the end of the drill guide (one purple marking) into the gliding hole and use the twist drill for core holes (one purple ring) to drill the core hole (∅ 2.0 mm).



3. Compressing the fracture
Compress the fracture with the corresponding cortical screw.

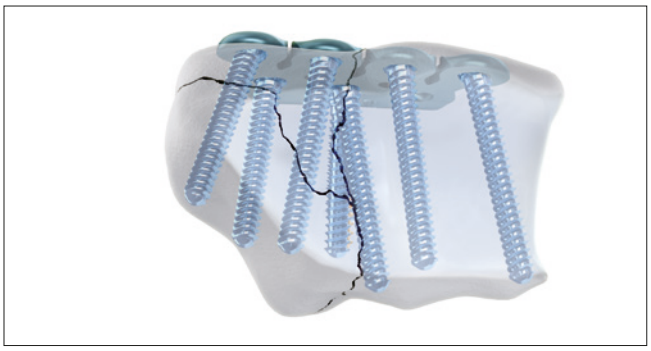


4. Optional steps before compression
If required, use the countersink (A-3830) to create a recess in the bone for the screw head.

Recommendation
Use the handle (A-2073) instead of a power tool.

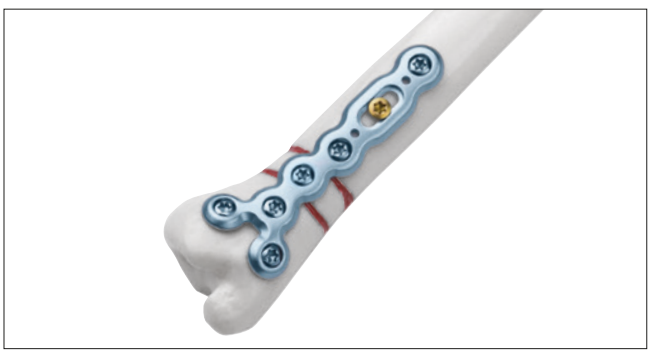
Distal Two-Row Screw Allocation

During application on the distal radius, ensure that screws are inserted in two rows at the distal end of the plate. This not only increases stability, but also provides the best possible subchondral support of the radiocarpal joint. Drill the two distal screw rows as subchondrally as possible, which automatically leads to the screws crossing over.



We recommend inserting at least three TriLock screws into the most distal row and two TriLock screws into the second distal row.

For a stable fixation of distal ulna fractures, ensure that at least three TriLock screws are set distally to the fracture line and at least two proximally. A distal orientation of the screw from the second distal row permits subchondral support of the ulnar head.



→ www.medartis.com/products/aptus/wrist

Specific Surgical Techniques

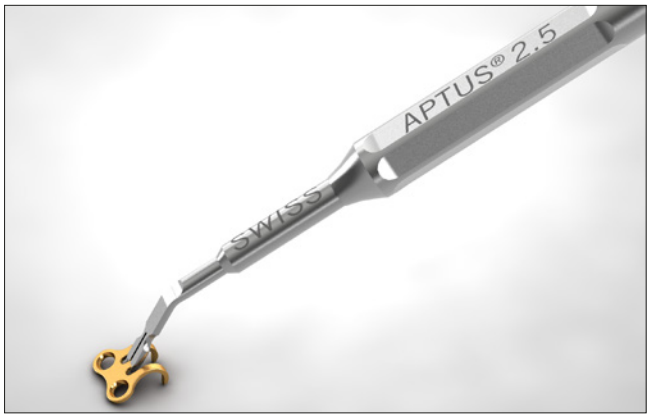
Hook Plates

1.5 Hook Plates

A-4200.40

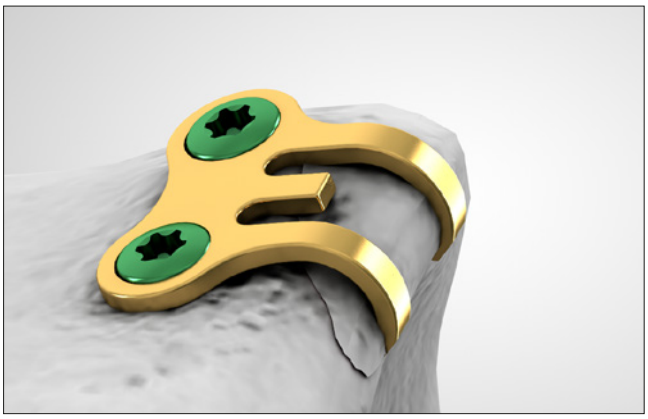
A-4200.41

1. Picking up the plate
Pick up the hook plate (A-4200.40, A-4200.41) with the holding and positioning instrument (A-2750) at the middle bar with slight axial pressure.



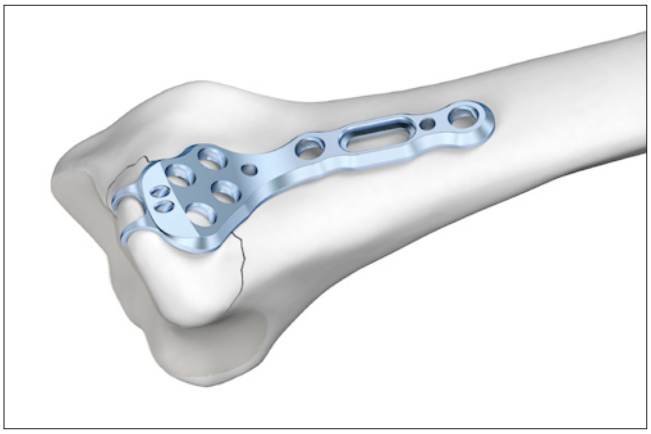
2. Positioning the plate
Press the hooks against the avulsed fragment and reconstruct the original anatomy.

3. Fixating the plate
Insert the SpeedTip screws ∅ 1.5 mm (without pre-drilling) and fix the avulsed fragment.



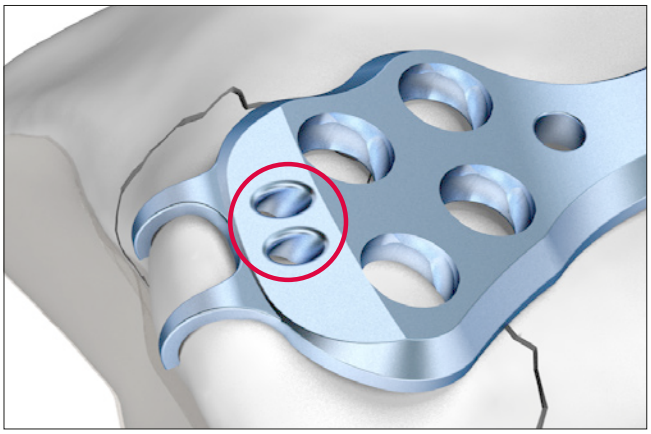
TriLock Lunate Facet Plates

1. Positioning the plate
Hold the ulnar small fragment with the pre-bent hooks of the TriLock lunate facet plate (A-4750.37, A-4750.38).

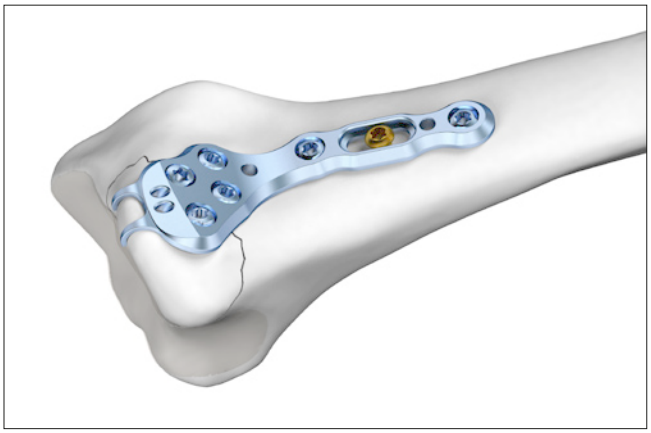


2. Attaching soft tissue
For additional soft tissue attachment, the suture holes in the plate (hole diameter = 1.3 mm) can be used.

Caution
Do not insert K-wires into the suture holes.



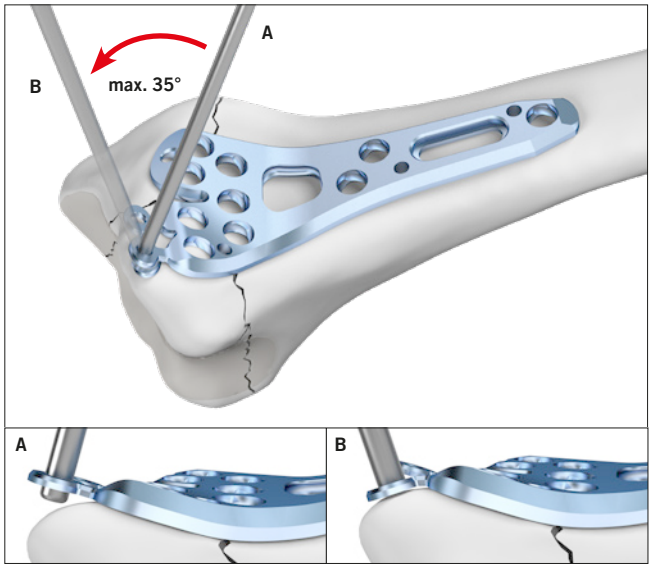
3. Fixating the plate
Drill, assign the screw length and insert the screw (see chapter «Drilling» and «Assigning the Screw Length»). Start with the cortical screw in the oblong hole. Repeat these steps with the remaining plate holes.



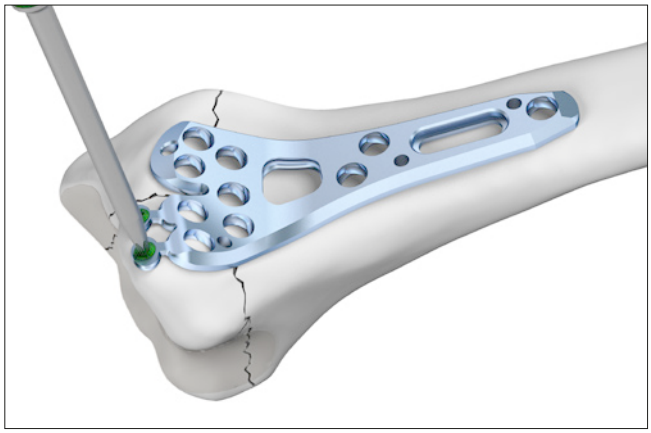
TriLock Distal Radius Rim Plates

1. Positioning the plate
Bend the flaps of the distal radius rim plate (A-4750.145, A-4750.146) using the round end of the K-wire (A-5040.41, A-5042.41). Do not bend the flaps by more than 35°.

Caution
The flaps can be bent once. Bending of the flaps in opposite directions may cause the plate to break postoperatively.

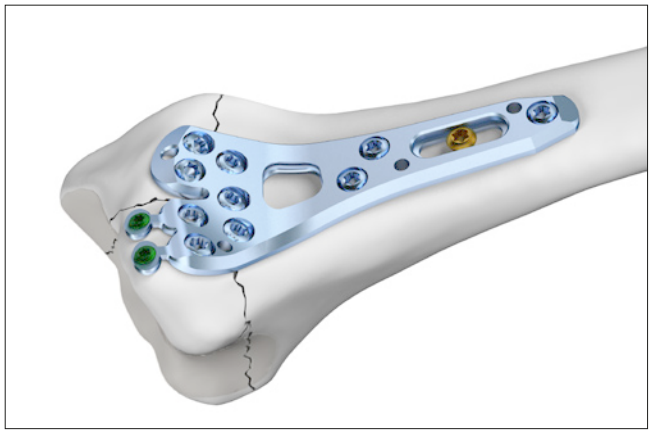


2. Fixating the plate
Insert two SpeedTip screws ∅ 1.5 mm (without pre-drilling) to fixate the fragment. The screw holes can also be used for soft tissue fixation by means of a suture (hole diameter = 1.7 mm).



Drill, assign the screw length and insert the screw (see chapter «Drilling» and «Assigning the Screw Length»). Start with the cortical screw in the oblong hole. Repeat these steps with the remaining plate holes.

Recommendation
The drill guide blocks (A-2727.23, A-2727.24) can be used along with the distal radius rim plates (A-4750.145, A-4750.146) for fast and precise positioning of the screws (see chapter «Drill Guide Blocks»).



XL Plates with TriLock^{PLUS}

TriLock^{PLUS} allows for 1 mm compression and angular stable locking in one step.

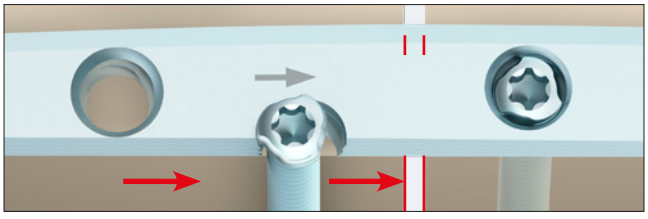
For this technique, a TriLock screw, the 2.5/2.8 drill guide TriLock^{PLUS} (A-2026) as well as the XL plates (A-4750.75-80) containing TriLock^{PLUS} holes are required. The TriLock^{PLUS} holes and the corresponding end of the drill guide (A-2026) are both marked with an arrow sign «←» indicating the direction of the compression.

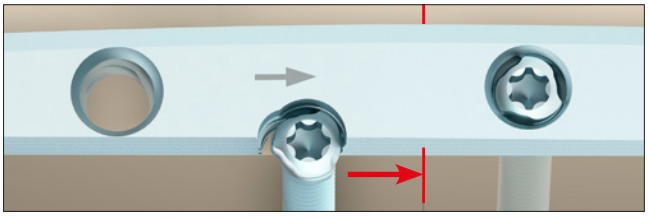
1. Positioning the drill guide in the plate
Following the direction of the compression, insert the 2.5/2.8 drill guide TriLock^{PLUS} (A-2026) perpendicular to a XL plate (A-4750.75-80). The arrow sign on the drill guide and the plate both indicate the direction of the compression.

Caution
Correct compression in the following steps is only achieved if the drill guide is inserted in a 90° angle into the XL plate.

2. Drilling through the TriLock^{PLUS} drill guide
Use the twist drill for core holes (one purple ring) to drill through the drill guide TriLock^{PLUS} up to the far cortex.

3. Inserting the screw and locking in final position
Insert a TriLock screw into the pre-drilled hole. Final position is reached when the screw has locked into the TriLock screw hole.





Caution
TriLock^{PLUS} holes can also be used as conventional TriLock holes allowing for multidirectional (±15°) and angular stable locking with TriLock screws or for the insertion of cortical screws. For conventional drilling, use the respective side of the 2.5 drill guide (A-2026, A-2722, A-2726), see also chapter «Drilling».

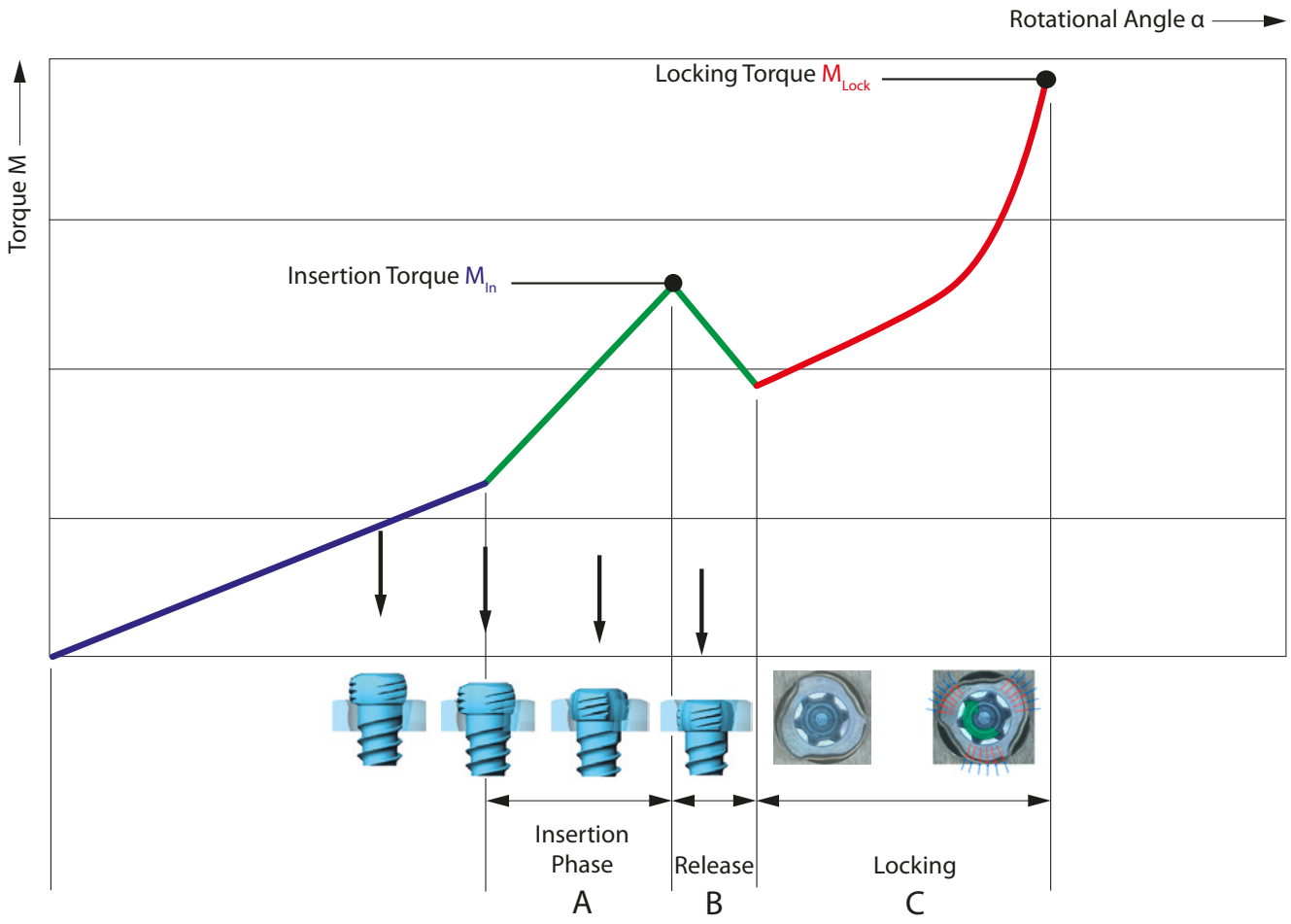
TriLock® Locking Technology

Correct Application of the TriLock Locking Technology

The screw is inserted through the plate hole into a pre-drilled canal in the bone. An increase of the tightening torque will be felt as soon as the screw head gets in contact with the plate surface.

This indicates the start of the «Insertion Phase» as the screw head starts entering the locking zone of the plate (section «A» in the diagram). Afterwards, a drop of the tightening torque occurs (section «B» in the diagram). Finally the actual locking is initiated (section «C» in the diagram) as a friction connection is established between screw and plate when tightening firmly.

The torque applied during fastening of the screw is decisive for the quality of the locking as described in section «C» of the diagram.



→ www.medartis.com/products/aptus/wrist

Correct Locking (± 15°) of the TriLock Screws in the Plate

Visual inspection of the screw head projection provides an indicator of correct locking. Correct locking has occurred only when the screw head has locked flush with the plate surface (Fig. 1 and 3).

However, if there is still a noticeable protrusion (Fig. 2 and 4), the screw head has not completely entered the plate and reached the locking position. In this case, the screw has to be retightened to obtain full penetration and proper locking. In case of poor bone quality a slight axial pressure might be necessary to achieve proper locking.

Do not overtighten the screw, otherwise the locking function cannot be guaranteed anymore.

Correct: LOCKED

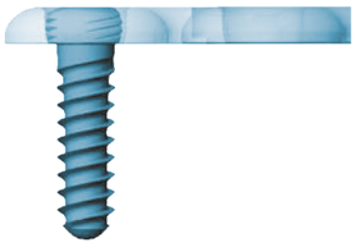


Figure 1

Incorrect: UNLOCKED

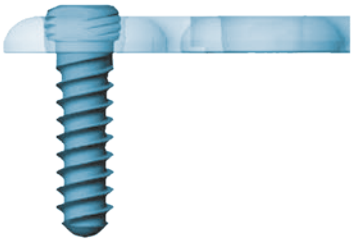


Figure 2

Correct: LOCKED

Figure 3

Incorrect: UNLOCKED

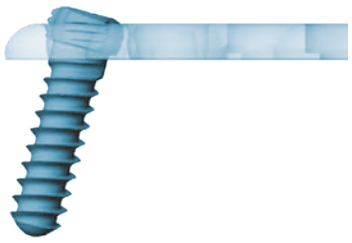


Figure 4

Appendix

Implants and Instruments

For detailed ordering information, please refer to the APTUS Ordering Catalog, also available at www.medartis.com

Plates

Art. No.
A-4200.40
A-4200.41
A-4700.70
A-4700.70/1
A-4750.01
A-4750.02
A-4750.03
A-4750.04
A-4750.05
A-4750.06
A-4750.07
A-4750.08
A-4750.09
A-4750.10
A-4750.11
A-4750.12
A-4750.13
A-4750.14
A-4750.15
A-4750.16
A-4750.17
A-4750.18
A-4750.19
A-4750.20
A-4750.21
A-4750.22
A-4750.23
A-4750.24
A-4750.31
A-4750.32
A-4750.33
A-4750.34
A-4750.35
A-4750.36
A-4750.37
A-4750.38
A-4750.41
A-4750.42
A-4750.43
A-4750.44
A-4750.50
A-4750.51
A-4750.52

Art. No.
A-4750.53
A-4750.54
A-4750.55
A-4750.56
A-4750.57
A-4750.58
A-4750.61
A-4750.62
A-4750.63
A-4750.64
A-4750.71
A-4750.72
A-4750.73
A-4750.74
A-4750.75
A-4750.76
A-4750.77
A-4750.78
A-4750.79
A-4750.80
A-4750.91
A-4750.92
A-4750.101
A-4750.102
A-4750.103
A-4750.104
A-4750.105
A-4750.106
A-4750.107
A-4750.108
A-4750.109
A-4750.110
A-4750.111
A-4750.112
A-4750.123
A-4750.124
A-4750.125
A-4750.126
A-4750.131
A-4750.132
A-4750.133
A-4750.134
A-4750.135

Art. No.
A-4750.145
A-4750.146
S-4750.65
S-4750.66
S-02071.3.141
S-02071.3.142
S-02071.3.143
S-02071.3.144
S-02071.3.57
S-02071.3.58
S-02071.3.84
S-02071.3.85

Screws, K-Wires

Art. No.
A-5040.21
A-5040.41
A-5042.21
A-5042.41
A-5210.08/1
A-5210.08
A-5210.10/1
A-5210.10
A-5210.12/1
A-5210.12
A-5210.14/1
A-5210.14
A-5700.08
A-5700.08/1
A-5700.10
A-5700.10/1
A-5700.11/1
A-5700.12
A-5700.12/1
A-5700.13/1
A-5700.14
A-5700.14/1
A-5700.15/1
A-5700.16
A-5700.16/1
A-5700.18
A-5700.18/1
A-5700.20
A-5700.20/1
A-5700.22
A-5700.22/1
A-5700.24
A-5700.24/1
A-5700.26
A-5700.26/1
A-5700.28
A-5700.28/1
A-5700.30
A-5700.30/1
A-5700.32
A-5700.32/1
A-5700.34
A-5700.34/1

Art. No.
A-5750.08
A-5750.08/1
A-5750.10
A-5750.10/1
A-5750.12
A-5750.12/1
A-5750.14
A-5750.14/1
A-5750.16
A-5750.16/1
A-5750.18
A-5750.18/1
A-5750.20
A-5750.20/1
A-5750.22
A-5750.22/1
A-5750.24
A-5750.24/1
A-5750.26
A-5750.26/1
A-5750.28
A-5750.28/1
A-5750.30
A-5750.30/1
A-5750.32
A-5750.32/1
A-5750.34
A-5750.34/1
A-5755.14
A-5755.14/1
A-5755.16
A-5755.16/1
A-5755.18
A-5755.18/1
A-5755.20
A-5755.20/1
A-5755.22
A-5755.22/1
A-5755.24
A-5755.24/1

RCI

Art. No.
A-3711
A-3713
A-3721
A-3723
A-3731
A-3733
A-3830
A-5045.41/1
A-5045.41/4
S-3724
S-3733

Instruments

Art. No.
A-2013
A-2026
A-2046
A-2047
A-2060
A-2070
A-2073
A-2310
A-2710
A-2721
A-2722
A-2723.01
A-2723.02
A-2726
A-2727.01
A-2727.02
A-2727.03
A-2727.04
A-2727.05
A-2727.06
A-2727.13
A-2727.14
A-2727.23
A-2727.24
A-2730
A-2730.1
A-2750
A-2794
A-2795
A-7001
A-7002
A-7003
A-7004
A-7005
A-7006
A-7007
A-7008
A-7009
A-7010
A-7011
A-7012
A-7013
S-02071.19
S-02071.4.1.9

→ www.medartis.com/products/aptus/wrist

MANUFACTURER & HEADQUARTERS

Medartis AG | Hochbergerstrasse 60E | 4057 Basel/Switzerland

P +41 61 633 34 34 | F +41 61 633 34 00 | www.medartis.com

SUBSIDIARIES

Australia | Austria | Brazil | France | Germany | Mexico | New Zealand | Poland | UK | USA

For detailed information regarding our subsidiaries and distributors, please visit www.medartis.com

CE
0197