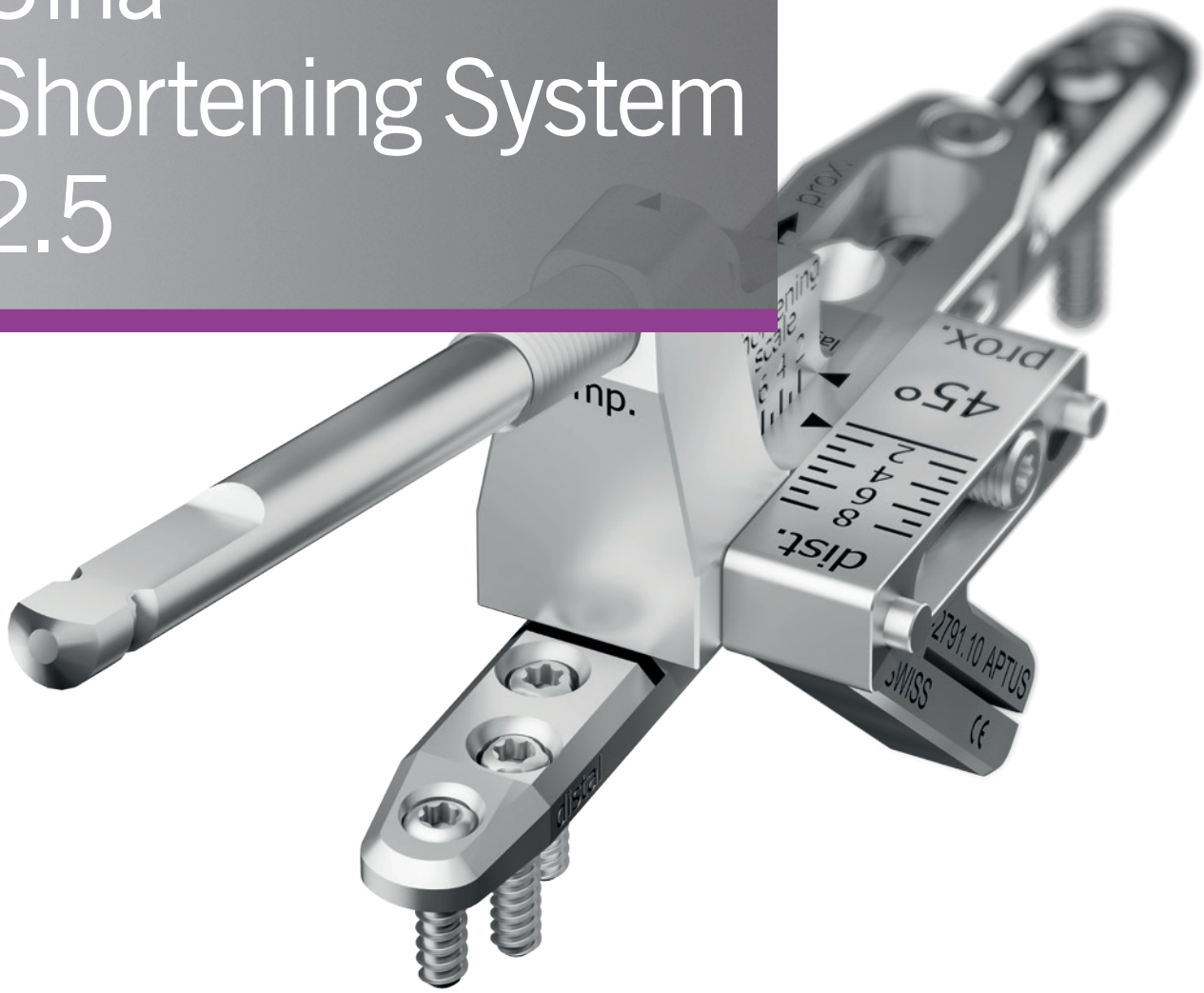
medartis®

PRECISION IN FIXATION

SURGICAL TECHNIQUE – STEP BY STEP

Ulna Shortening 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

Management of osteotomies of the ulna.

Contraindications

- Pre-existing or suspected infection at or near the implantation
- 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

Specific complications that may be associated with the Ulna Shortening System include:

- Non-union / pseudoarthrosis
- Delayed union

Delayed union and / or non-union / pseudoarthrosis might be promoted due to patient's overall state of health and / or lifestyle.

Potential risk factors contributing to complications include:

- Age
- Malnutrition
- Smoking
- Alcohol abuse

Color Coding

System	Color Code
APTUS 2.5	purple

Plates and Screws

Special implant plates and screws have their own color:

Blue implant plates:	TriLock plates (locking)
Gold implant screws:	Cortical screws (fixation)
Blue implant screws:	TriLock screws (locking)

See Instructions for Use
www.medartis.com

General Instrument Application

Drilling

All twist drills are color-coded via a ring system. System size 2.5 = purple. There are two different types of twist drills available: one for core holes and one for gliding holes (lag screw technique).

Core Hole Drills = one colored ring

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

Gliding Hole Drills = two colored rings

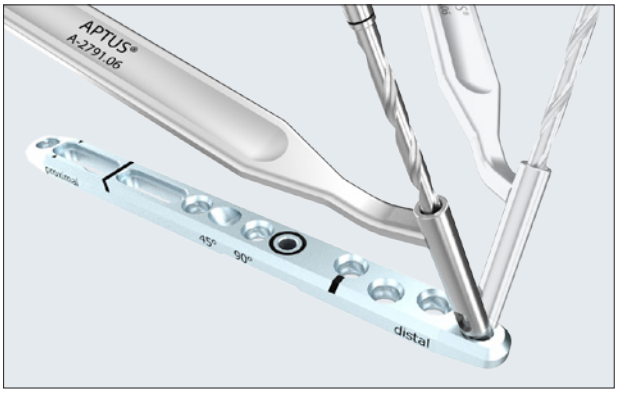
After positioning the plate, insert the drill guide and the twist drill into the plate hole. In the APTUS system, the drill is guided by the drill shaft and not the drill flute.

A-2791.06
2.5 Drill Guide for Ulna Shortening

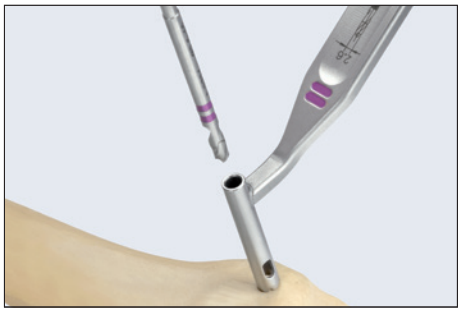
Notice:
The double-sided drill guide for lag screws (A-2721) is used only to perform the classical lag screw technique according to AO/ASIF.

A-2721
2.5 Drill Guide for Lag Screws

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° prevents the TriLock screws from correctly locking into the plate.

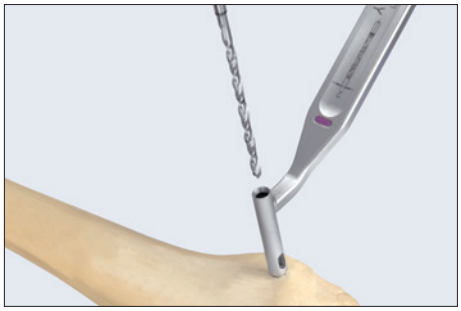


Surgical Technique Lag Screw Technique



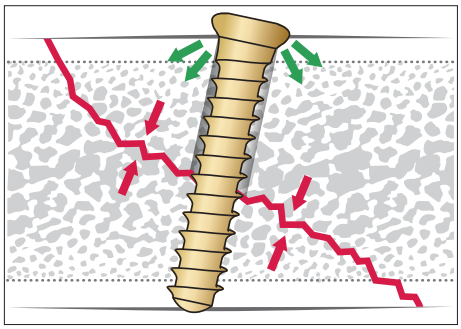
1. Drilling the gliding hole

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.



2. Drilling the core hole

Place the end of the drill guide (one purple marking) onto 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

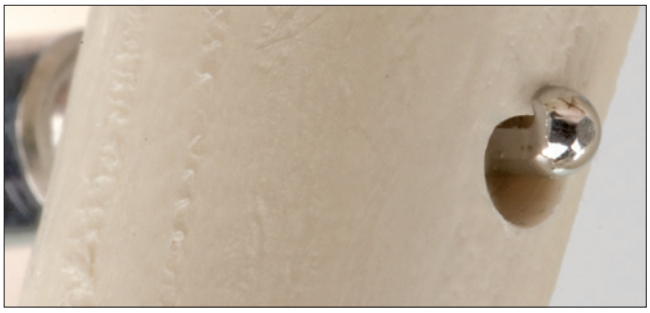
Compress the fracture with the corresponding cortical screw.

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.

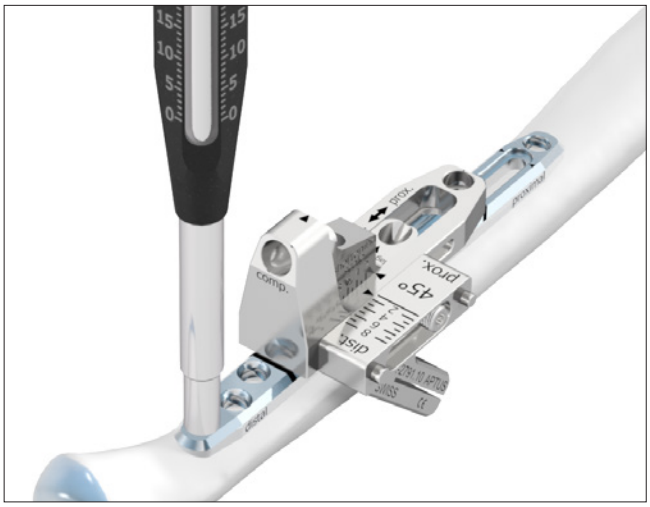
A-2730
2.5 Depth Gauge

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.

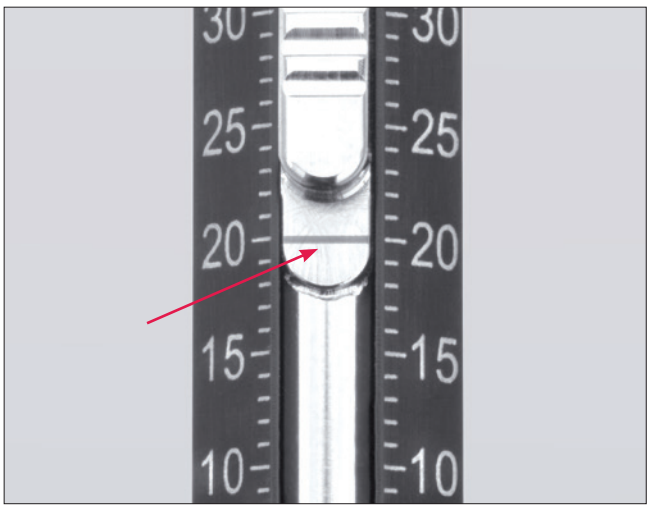


To assign the screw length, place the distal end of the slider onto the implant plate.

When using the lag screw technique or a set screw, 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 screwdriver (A-2710) and the screwdriver blade (A-2013) feature the patented HexaDrive self-holding system.

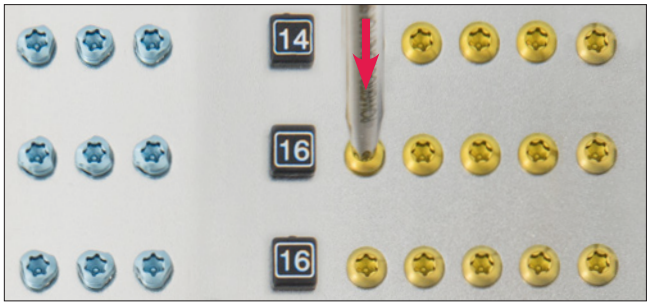
A-2710
2.5 Screwdriver, Self-Holding, HD7

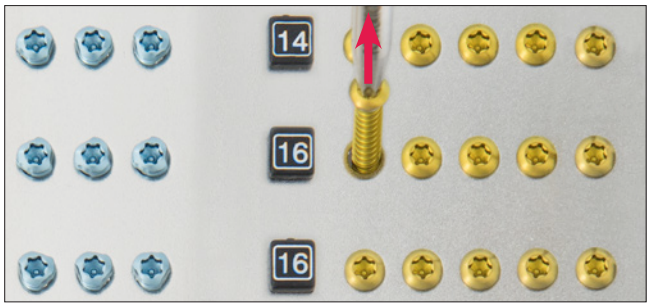
A-2013
2.5/2.8 Screwdriver Blade, HD7, AO

A-2073
Handle with Quick Connector, AO, with twist cap

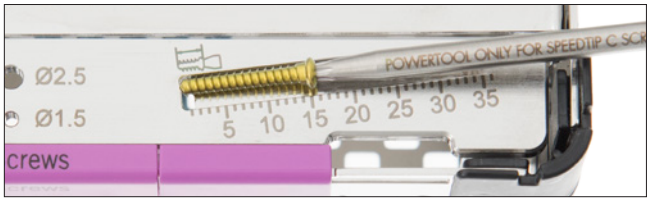
To remove the screws from the implant container, insert the screwdriver vertically into the screw head of the desired screw and pick up the screw with axial pressure.

Notice:
The screw will not hold without axial pressure!
Extract the screw vertically 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.





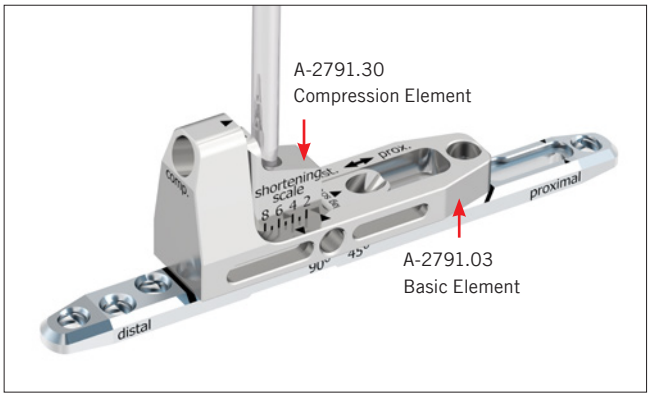
Check the screw length and diameter at the scale of the measuring module. The screw length is determined at the end of the screw head.



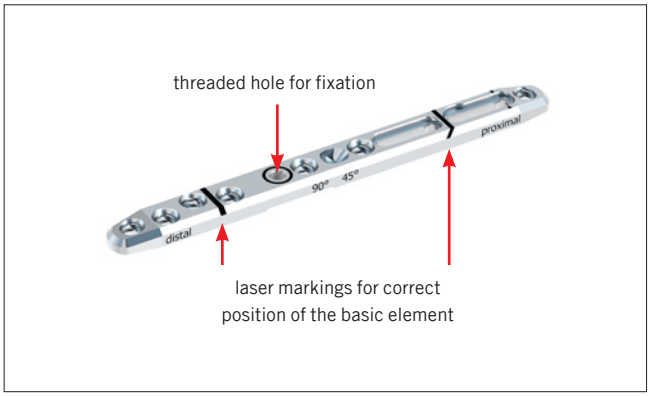
Surgical Technique

Ulna Shortening with Saw Guide 45°

Insert the compression element (A-2791.30) into the basic element (A-2791.03) and fix it to the plate with the help of the integrated screw. To tighten the screw, use the screwdriver blade (A-2013) with the handle (A-2073).

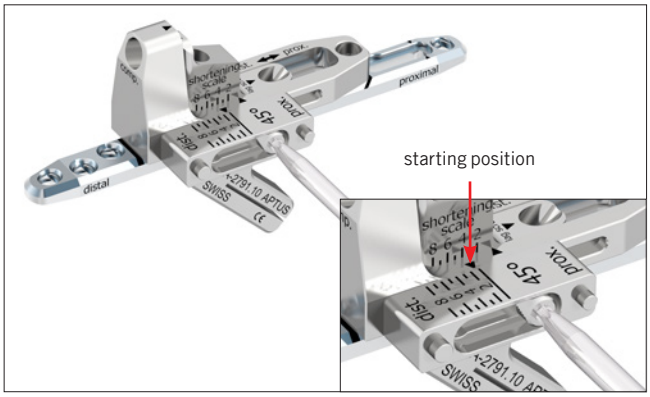


Notice:
The correct position of the basic element (A-2791.03) is indicated by two laser markings on the plate (A-4750.95).



Mounting of the saw guide 45° (A-2791.10) on the basic element (A-2791.03). Fix the saw guide 45° **at the starting position** using the integrated screw. Tighten the screw using the screwdriver blade (A-2013) with the handle (A-2073).

Notice:
The saw guide 45° can be mounted on either side of the basic element.



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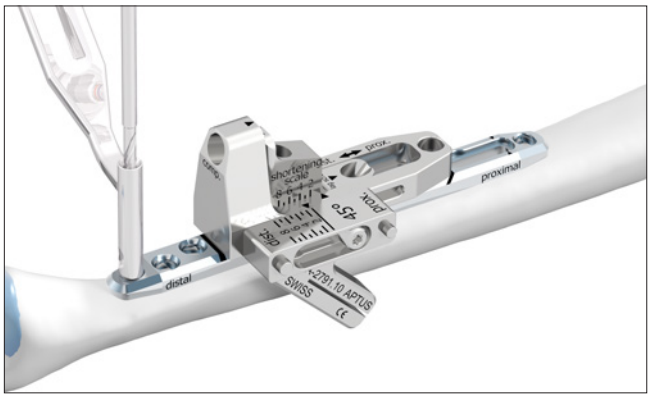
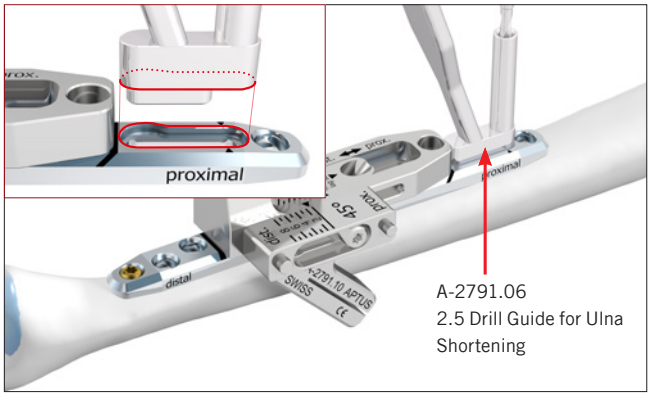
Drill a core hole through the most distal plate hole using the corresponding side of the drill guide (A-2791.06) and the APTUS twist drill (A-3713, A-3723 or A-3733) for core diameter 2.0 mm (one purple ring).



Initially, a gold cortical screw ∅ 2.5 mm (A-5700.xx) can be inserted to achieve a contact between plate and bone or, alternatively, a blue Trilock screw (A-5750.xx) can be used.

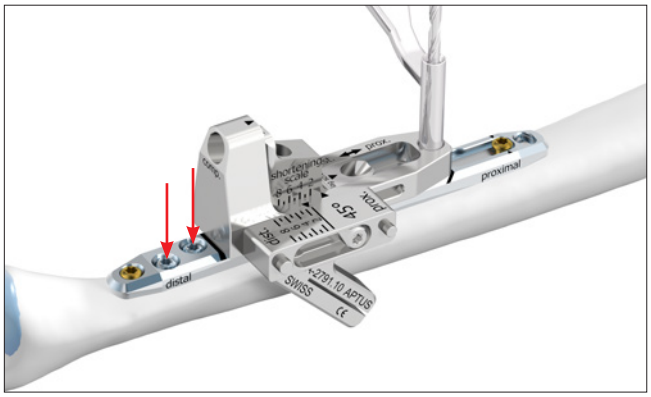
Drill a core hole through the proximal end of the oblong hole using the corresponding side of the drill guide (A-2791.06) and the APTUS twist drill (A-3713, A-3723 or A-3733) for core diameter 2.0 mm (one purple ring). Insert a gold cortical screw ∅ 2.5 mm.

Notice:
Do **not** insert blue TriLock screws ∅ 2.5 mm into the oblong hole.



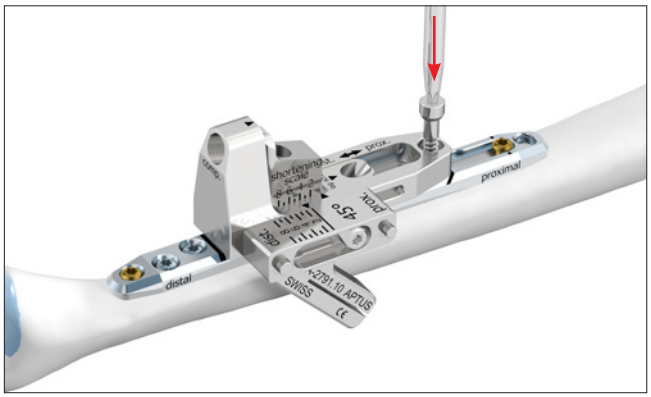
Insert two blue TriLock screws ∅ 2.5 mm into the distal plate holes.

Drill a core hole through the proximal end of the basic element (A-2791.03) using the corresponding side of the drill guide (A-2791.06) and the APTUS twist drill (A-3713, A-3723 or A-3733) for core diameter 2.0 mm (one purple ring).



Insert the temporary tension bolt (A-2791.05). The temporary tension bolt is required for force transmission during the compression.

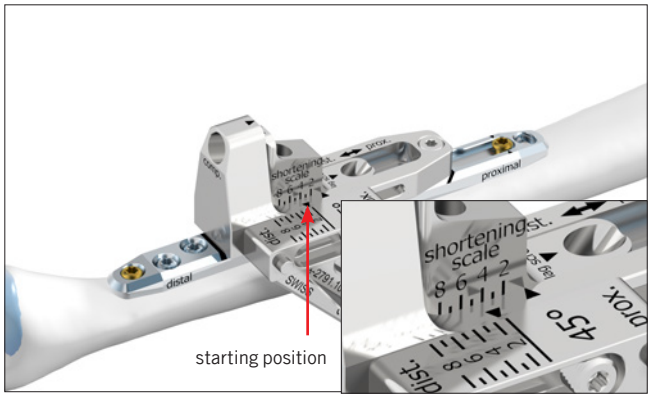
Caution:
The temporary tension bolt is for **single use** only and has to be discarded after each use.



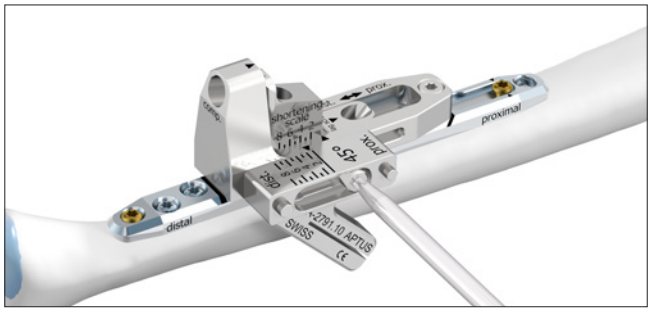
Start the osteotomy at the starting position and make the first cut.

Notice:
To ensure a precise osteotomy, the saw blade must have the following dimensions:
Thickness: 0.40 mm Width: ~10 mm Cutting length: ~30 mm

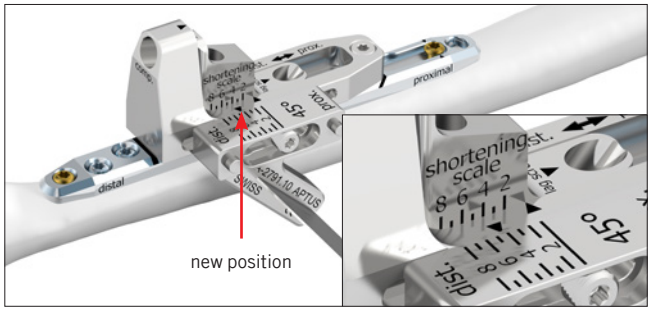
Caution:
Make sure that the plate does not get damaged during sawing.



Slight loosening of the screw integrated in the saw guide 45° allows to re-position the saw guide according to the amount of shortening preferred. Fix the saw guide at this new position by re-tightening the screw.

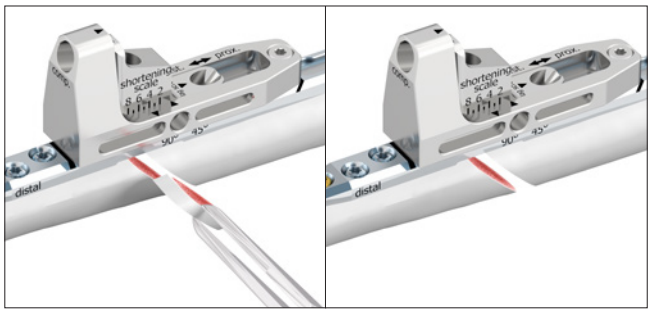


Perform the second cut.

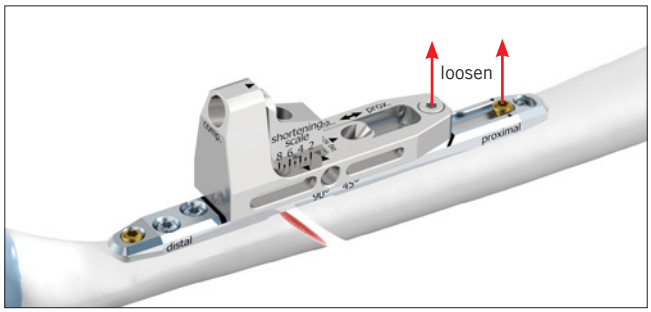


Remove the saw guide 45° and the bone wafer.

Caution:
Make sure that the bone wafer is completely removed and no bone debris remains in the osteotomy gap, which might prevent complete closure of the gap.



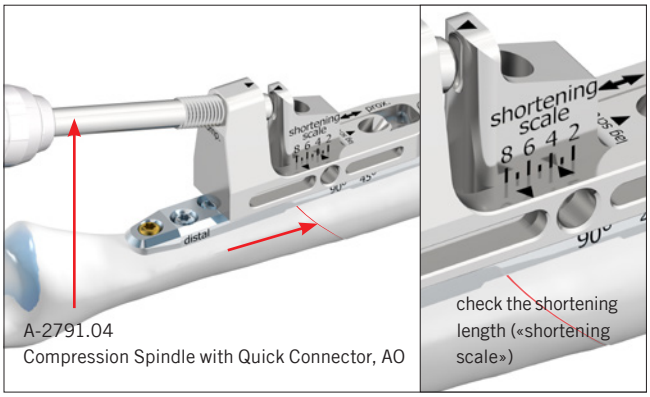
Slightly loosen the proximal cortical screw in the oblong hole of the plate and the temporary tension bolt (A-2791.05) in the basic element (½ - max ¾ turn).



Manually insert the compression spindle (A-2791.04, Quick Connector AO) into the basic element. Use the connected handle (A-2073) to close the osteotomy until the adequate compression is achieved.

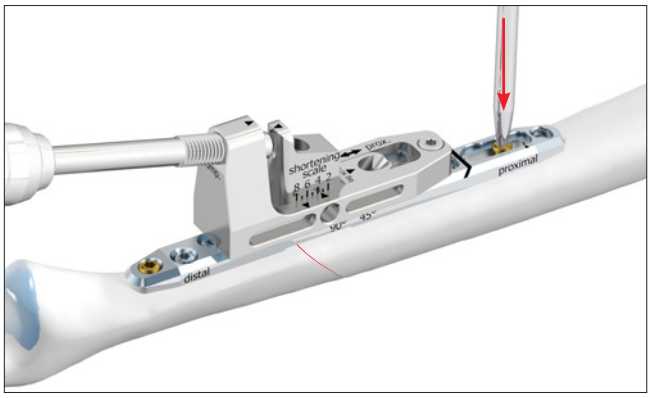
Caution:
The compression spindle must be lubricated immediately before inserting it into the basic element, refer to Instructions for Use for Medartis APTUS Plates, Screws and Instruments (chapter «Product Care»).

Caution:
Double-check the shortening length on the «shortening scale» to avoid over-compression.

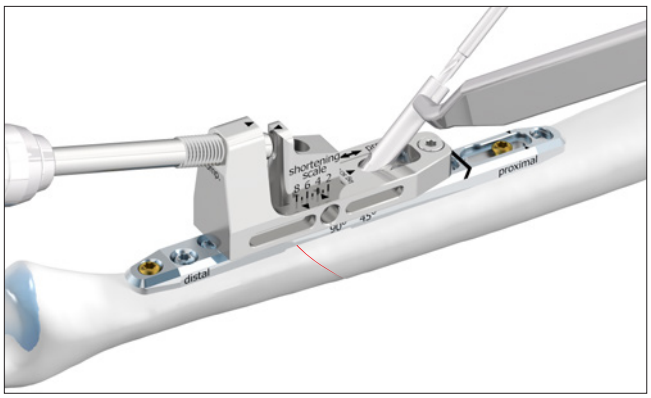


A-2791.04
Compression Spindle with Quick Connector, AO

Re-tighten the gold cortical screw ∅ 2.5 mm in the most proximal oblong hole.

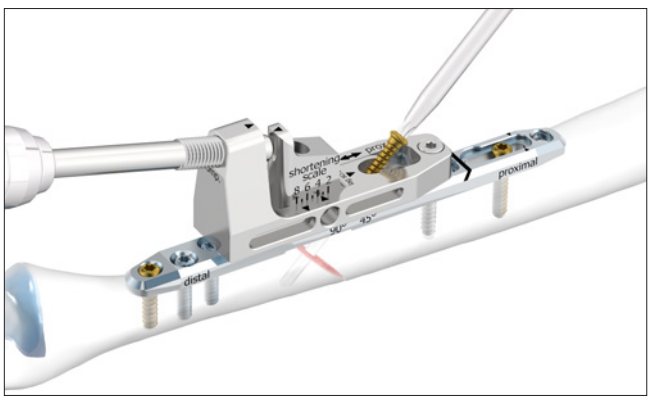


Drill a 45° core hole using the drill guide (A-2791.06) and the APTUS twist drill (A-3713, A-3723 or A-3733) for core diameter 2.0 mm (one purple ring).



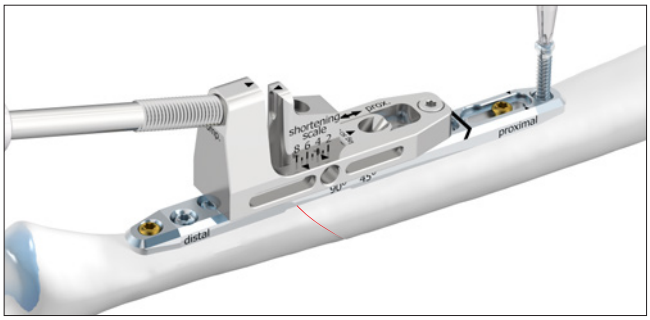
Insert a gold cortical screw ∅ 2.5 mm (set screw).

Notice:
In case of inadequate closure of the osteotomy gap, utilize the lag screw technique (see chapter «Surgical Technique Lag Screw Technique»).

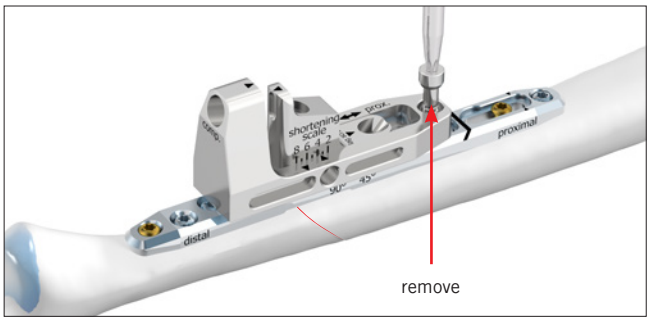


Insert a blue TriLock screw ∅ 2.5 mm in the most proximal plate hole.

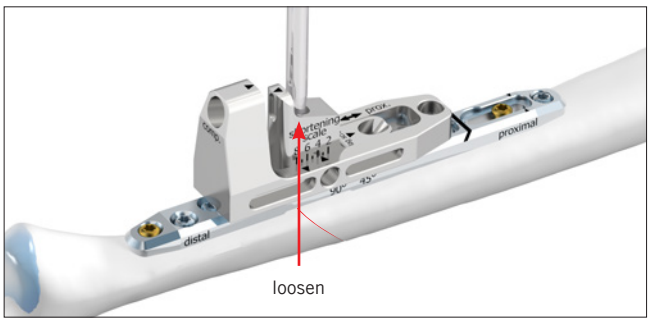
Remove the compression spindle (A-2791.04).



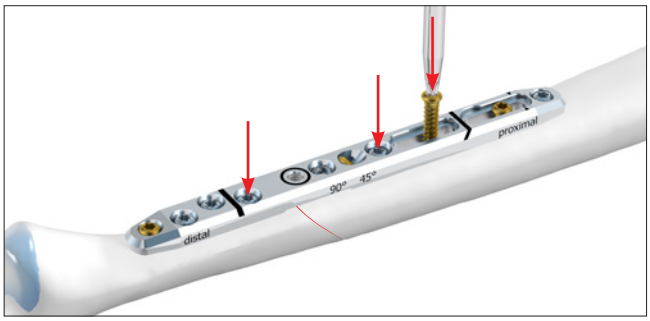
Remove the temporary tension bolt (A-2791.05) in the basic element (A-2791.03).



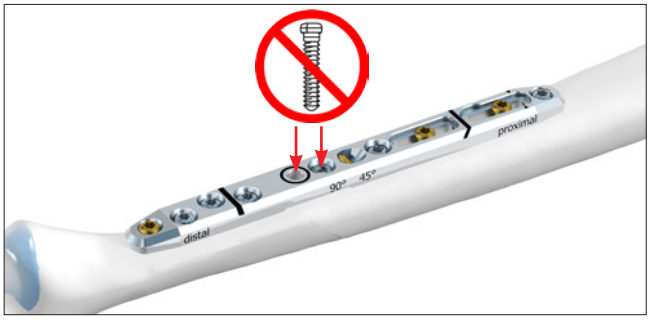
Loosen the screw integrated in the compression element (A-2791.30). Remove the basic element (A-2791.03) and the compression element (A-2791.30.



Complete the fixation of the plate. Insert two blue TriLock screws ∅ 2.5 mm into two locking holes and one gold cortical screw ∅ 2.5 mm into the distal oblong hole.



Caution:
Do **not** insert screws into the hole marked with a black ring. Also, only with the 45° technique, do not insert a screw into the hole proximal to it, as this causes a collision with the set screw.



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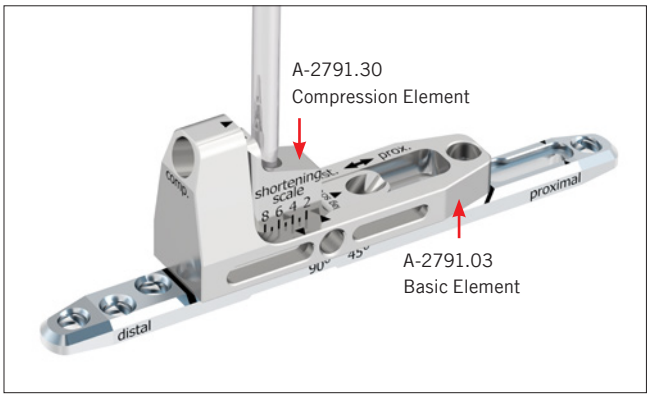
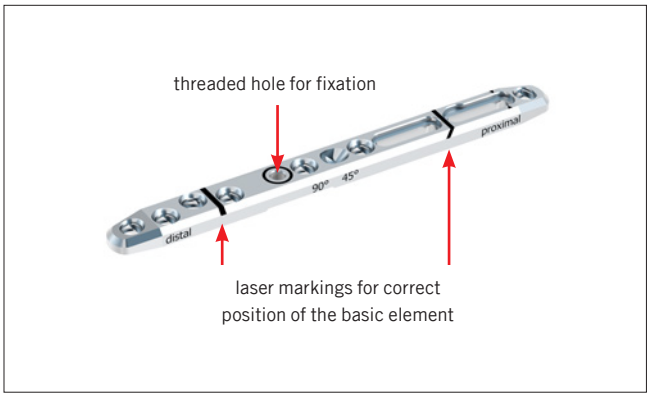
Ulna Shortening with Saw Guide 90°

Insert the compression element (A-2791.30) into the basic element (A-2791.03) and fix it to the plate with the help of the integrated screw. To tighten the screw, use the screwdriver blade (A-2013) with the handle (A-2073).

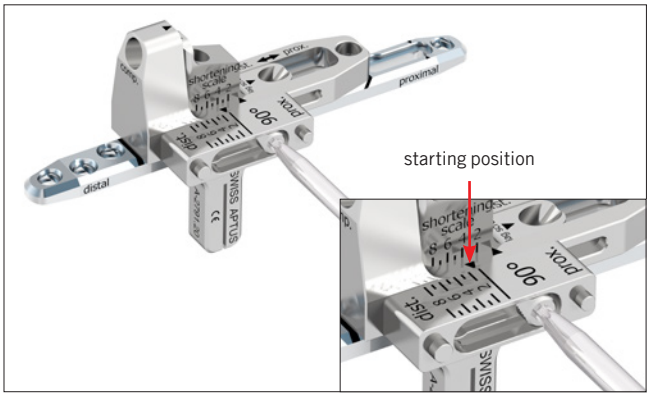


Notice:
The correct position of the basic element (A-2791.03) is indicated by two laser markings on the plate (A-4750.95).



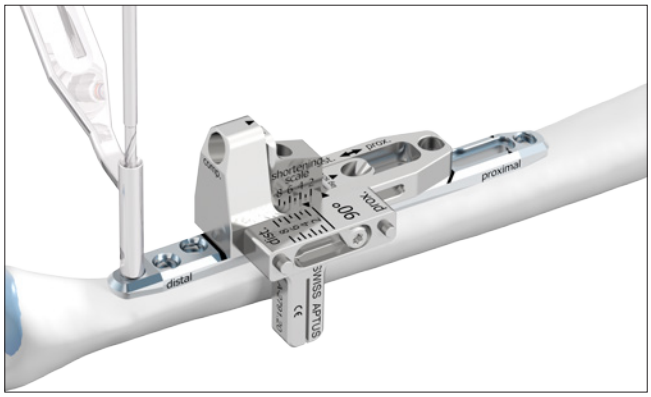
Mounting of the saw guide 90° (A-2791.20) on the basic element (A-2791.03). Fix the saw guide 90° **at the starting position** using the integrated screw. Tighten the screw using the screwdriver blade (A-2013) with the handle (A-2073).

Notice:
The saw guide 90° can be mounted on either side of the basic element.



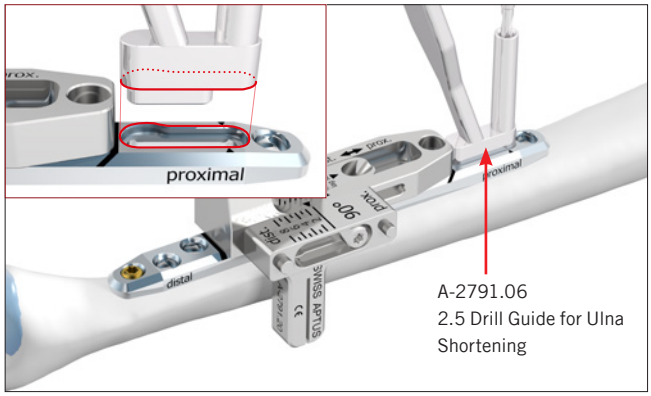
Drill a core hole through the most distal plate hole using the corresponding side of the drill guide (A-2791.06) and the APTUS twist drill (A-3713, A-3723 or A-3733) for core diameter 2.0 mm (one purple ring).

Initially, a gold cortical screw ∅ 2.5 mm (A-5700.xx) can be inserted to achieve a contact between plate and bone or, alternatively, a blue Trilock screw (A-5750.xx) can be used.



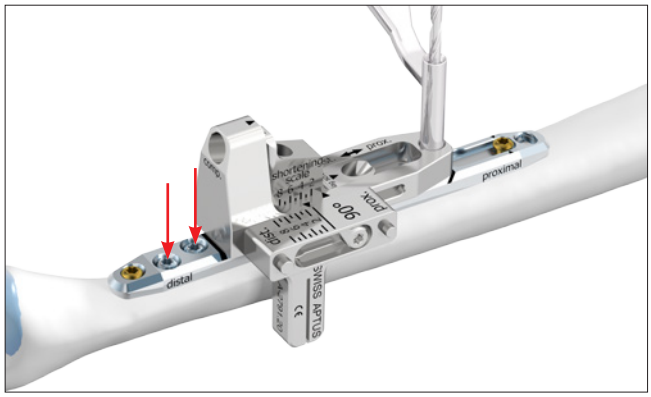
Drill a core hole through the proximal end of the oblong hole using the corresponding side of the drill guide (A-2791.06) and the APTUS twist drill (A-3713, A-3723 or A-3733) for core diameter 2.0 mm (one purple ring). Insert a gold cortical screw ∅ 2.5 mm.

Notice:
Do **not** insert blue TriLock screws ∅ 2.5 mm into the oblong hole.



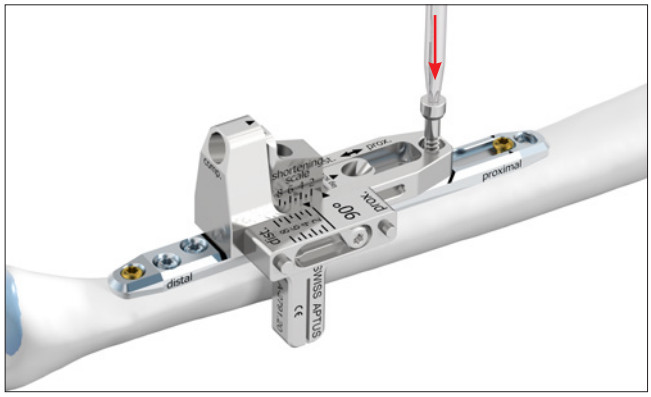
Insert two blue TriLock screws ∅ 2.5 mm into the distal plate holes.

Drill a core hole through the proximal end of the basic element (A-2791.03) using the corresponding side of the drill guide (A-2791.06) and the APTUS twist drill (A-3713, A-3723 or A-3733) for core diameter 2.0 mm (one purple ring).



Insert the temporary tension bolt (A-2791.05). The temporary tension bolt is required for force transmission during the compression.

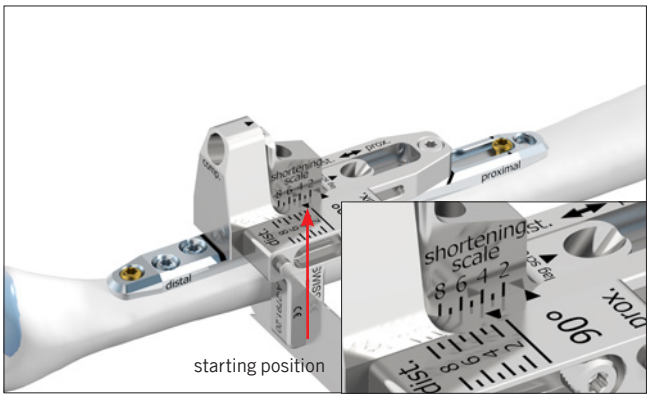
Caution:
The temporary tension bolt is for **single use** only and has to be discarded after each use.



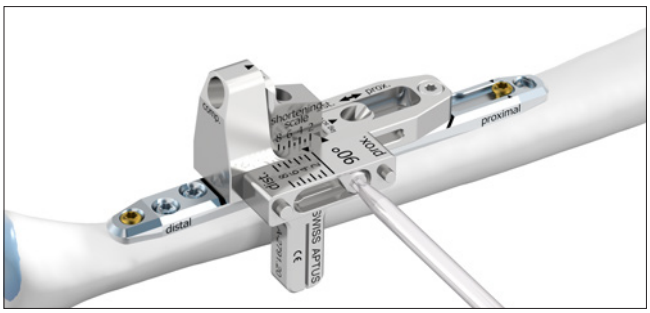
Start the osteotomy at the starting position and make the first cut.

Notice:
To ensure a precise osteotomy, the saw blade must have the following dimensions:
Thickness: 0.40 mm Width: ~10 mm Cutting length: ~30 mm

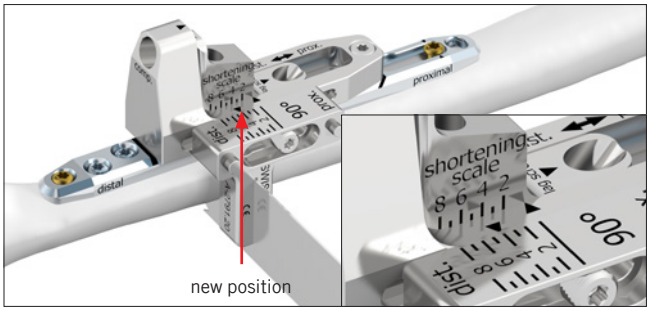
Caution:
Make sure that the plate does not get damaged during sawing.



Slight loosening of the screw integrated in the saw guide 90° allows to re-position the saw guide according to the amount of shortening preferred. Fix the saw guide at this new position by re-tightening the screw.

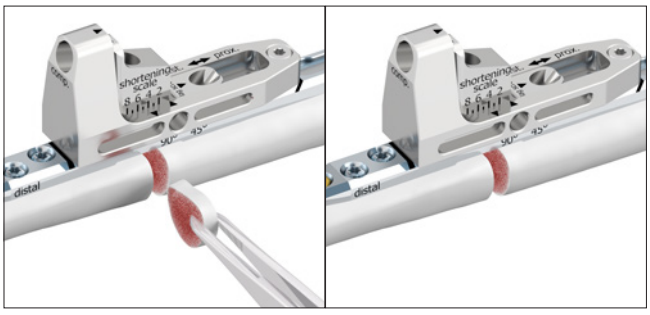


Perform the second cut.

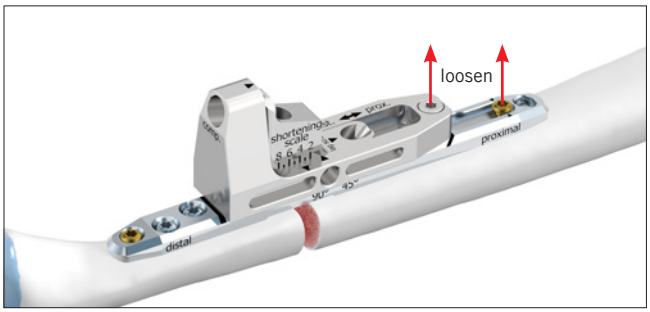


Remove the saw guide 90° and the bone wafer.

Caution:
Make sure that the bone wafer is completely removed and no bone debris remains in the osteotomy gap, which might prevent complete closure of the gap.



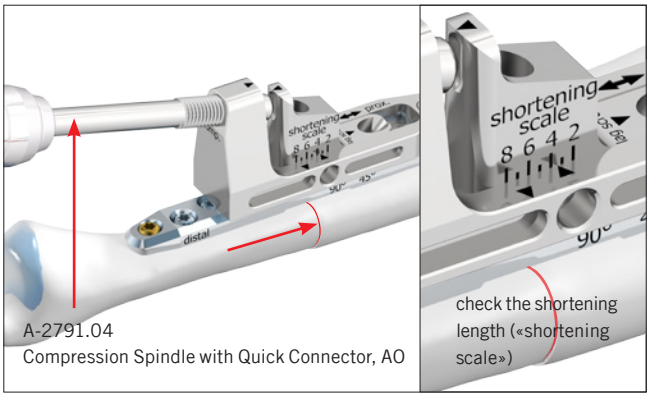
Slightly loosen the proximal cortical screw in the oblong hole of the plate and the temporary tension bolt (A-2791.05) in the basic element (½ - max ¾ turn).



Manually insert the compression spindle (A-2791.04, Quick Connector AO) into the basic element. Use the connected handle (A-2073) to close the osteotomy until the adequate compression is achieved.

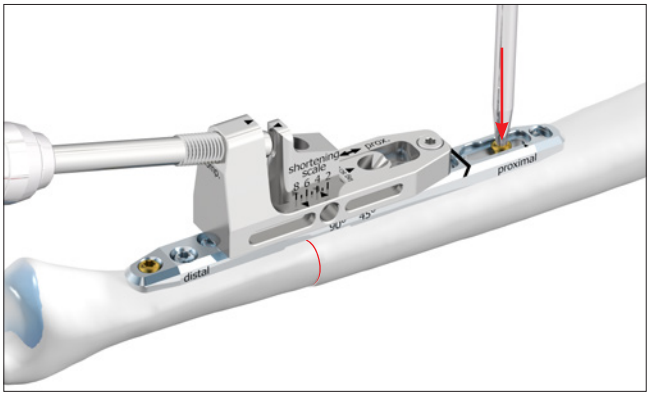
Caution:
The compression spindle must be lubricated immediately before inserting it into the basic element, refer to Instructions for Use for Medartis APTUS Plates, Screws and Instruments (chapter «Product Care»).

Caution:
Double-check the shortening length on the «shortening scale» to avoid over-compression.



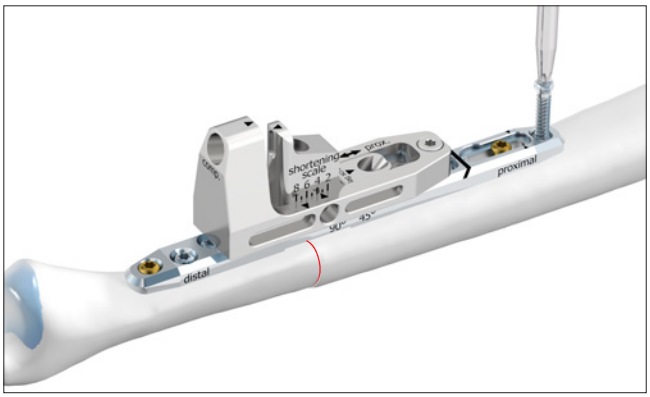
A-2791.04
Compression Spindle with Quick Connector, AO

Re-tighten the gold cortical screw ∅ 2.5 mm in the oblong hole of the plate.

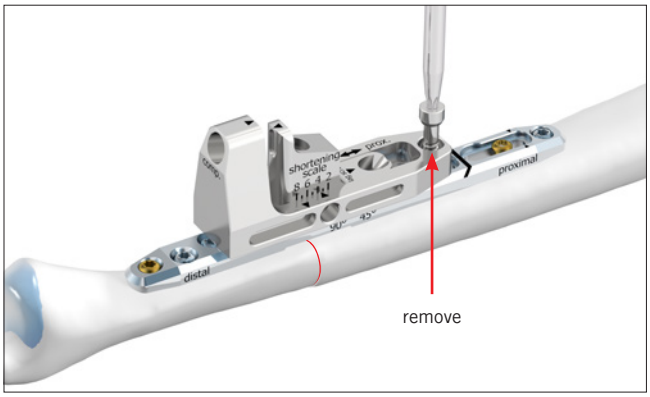


Insert a blue TriLock screw ∅ 2.5 mm in the most proximal plate hole.

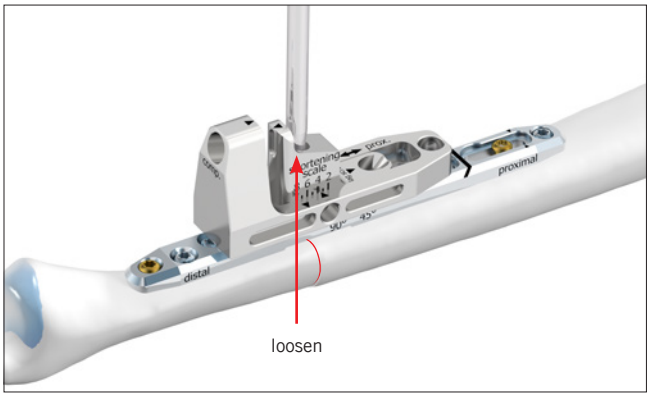
Remove the compression spindle (A-2791.04).



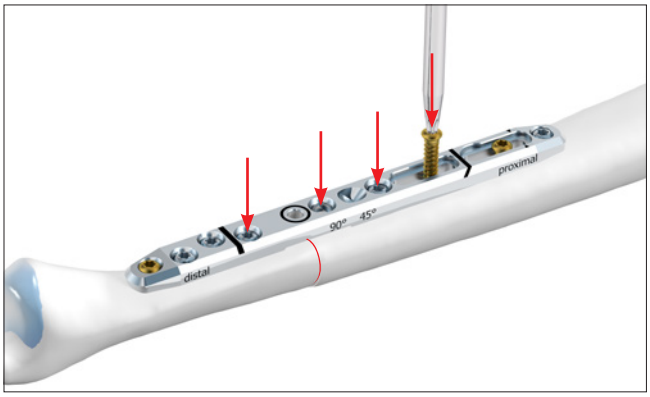
Remove the temporary tension bolt (A-2791.05) in the basic element (A-2791.03).



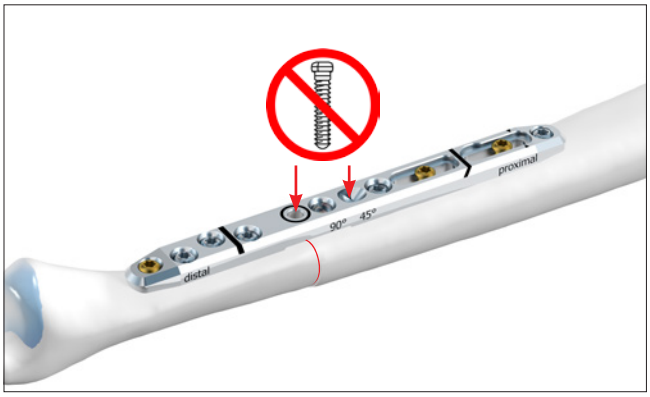
Loosen the screw integrated in the compression element (A-2791.30).
Remove the basic element (A-2791.03) and the compression element (A-2791.30.



Complete the fixation of the plate. Insert three blue TriLock screws ∅ 2.5 mm into the remaining locking holes and one gold cortical screw ∅ 2.5 mm into the distal oblong hole.



Caution:
Do **not** insert screws into the hole marked with a black ring. Also, only with the 90° technique, do not insert a screw into the second hole proximal to it, as this causes a collision.



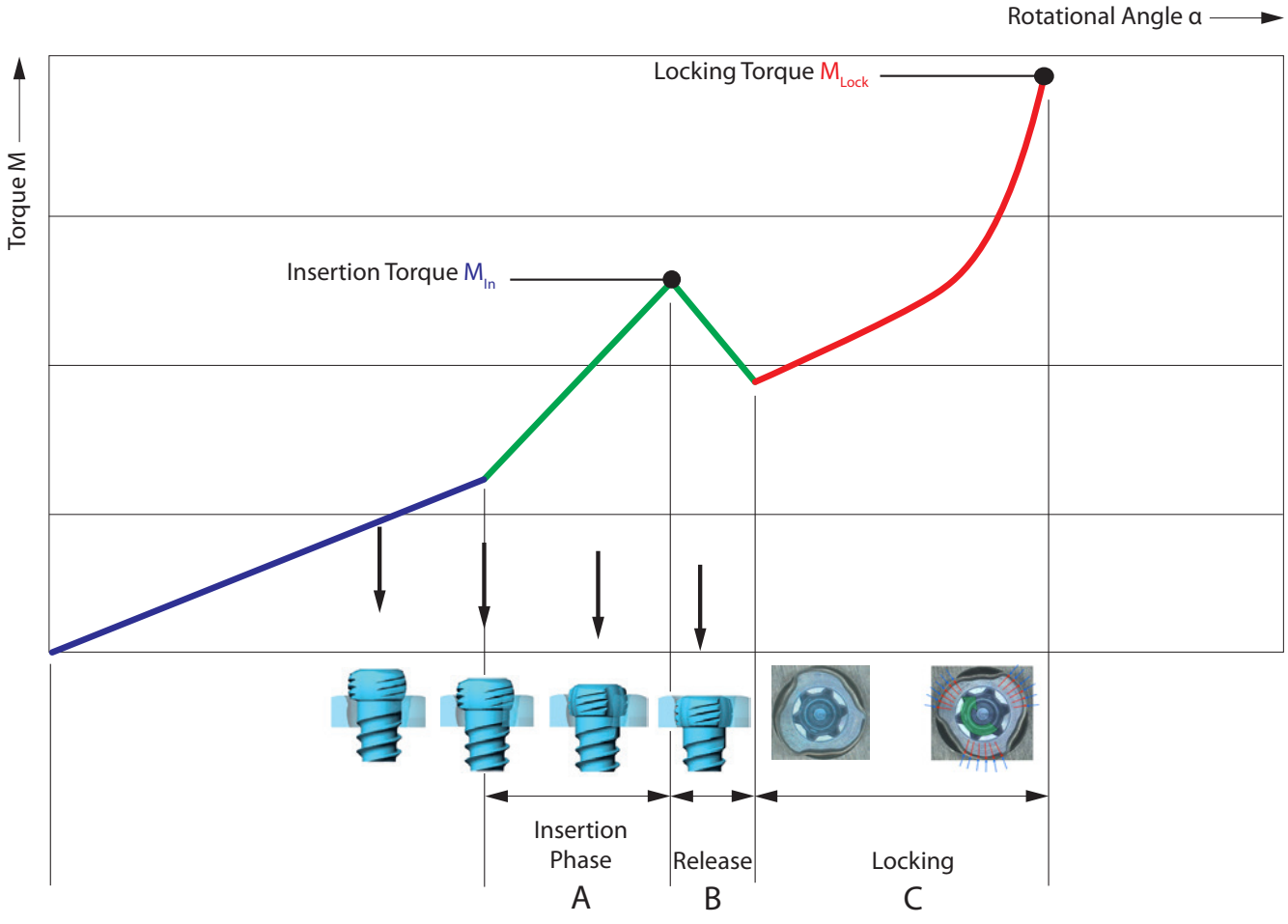
TriLock® Locking Technology

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 additional 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. Due to the system characteristics, a screw head protrusion of around 0.2 mm exists when using plates with 1.0 mm thickness.

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

Correct: LOCKED

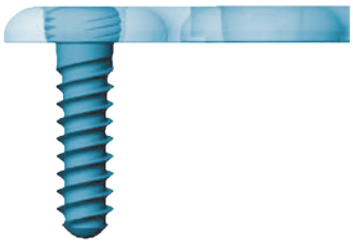


Figure 1

Incorrect: UNLOCKED

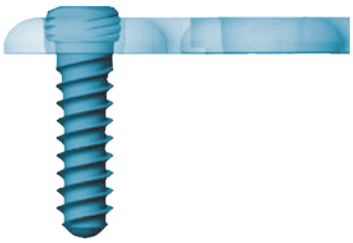


Figure 2

Correct: LOCKED

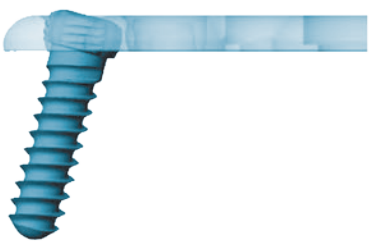


Figure 3

Incorrect: UNLOCKED

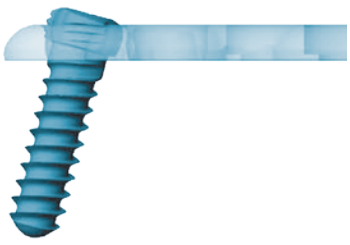


Figure 4

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-4750.95

Screws, K-Wires

Art. No.	Art. No.
A-5700.08/1	A-5750.08/1
A-5700.10/1	A-5750.10/1
A-5700.12/1	A-5750.12/1
A-5700.14/1	A-5750.14/1
A-5700.16/1	A-5750.16/1
A-5700.18/1	A-5750.18/1
A-5700.20/1	A-5750.20/1
A-5700.22/1	A-5750.22/1
A-5700.24/1	A-5750.24/1
A-5700.26/1	

RCI

Art. No.
A-3711
A-3713
A-3721
A-3723
A-3731
A-3733

Instruments

Art. No.
A-2013
A-2073
A-2721
A-2730
A-2730.1
A-2791.01
A-2791.02
A-2791.03
A-2791.04
A-2791.05
A-2791.06
A-2791.10
A-2791.20
A-2791.30

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