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PRECISION IN FIXATION

SURGICAL TECHNIQUE

Distal Radius and Distal Ulna System 2.5

APTUS Wrist

Contents

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

Introduction

Product Materials

Plates and Screws
cpTi (ASTM F67), Ti6Al4V (ASTM F136)

K-Wires
Stainless steel (ASTM F138)

Instruments
Stainless steel, aluminum, aluminum alloy, cpTi (ASTM F67), Nitinol, PA, PEEK, POM, PP, PPSU, PTFE, silicone

Containers
Stainless steel, aluminum alloy, PEEK, PP, PPSU, silicone

Indications

APTUS Wrist
- Fractures, osteotomies and arthrodesis of the bones of the wrist

Distal Radius plates
- Intra- and extraarticular fractures of the distal radius
- Correction osteotomies of the distal radius

Distal Ulna plates
- Intra- and extraarticular fractures of the distal ulna

Contraindications

- Preexisting 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
2.5	Purple
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

TriLock (locking technology)

System Overview

The implant plates of the APTUS Distal Radius System 2.5 are available in different designs and various plate lengths. For the complete implant portfolio, please refer to chapter “Appendix”.

2.5 ADAPTIVE II TriLock Distal Radius Plates, Volar
A-4750.101–112

2.5 TriLock Distal Radius Plates FPL, Volar
A-4750.123–126

2.5 TriLock Distal Radius Fracture Plates, Volar
A-4750.01–02
A-4750.31–32

2.5 TriLock Distal Radius Frame Plates, Volar
A-4750.03–06
A-4750.33–36

2.5 TriLock Distal Radius Correction Plates, Volar
A-4750.11–12
A-4750.15–20

2.5 TriLock Distal Radius Small Fragment Plates
A-4750.57–58
A-4750.131–135

2.5 TriLock Distal Radius Rim Plates, Volar
A-4750.145–146

2.5 TriLock Lunate Facet Plates, Volar
A-4750.37–38

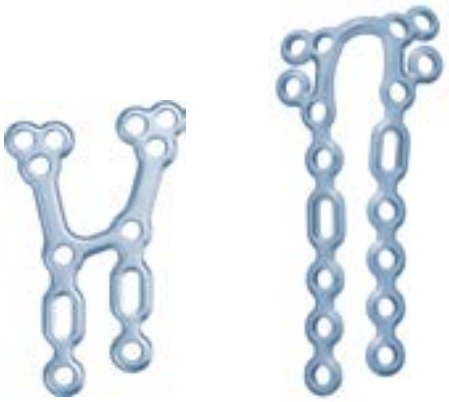
2.5 TriLock Distal Radius Fracture Plates, Extraarticular, Volar
A-4750.71–74

2.5 TriLock Distal Ulna Plates
A-4750.91–94
A-4750.97–98

1.5 Hook Plates
A-4200.40–43

2.5 TriLock Wrist Spanning Plates, Dorsal
A-4750.191S–193S

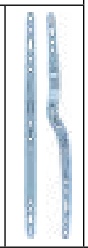
2.5 TriLock Distal Radius Plates, XL, Volar
A-4750.75–80



2.5 TriLock Distal Radius Plates, Dorsal
A-4750.13–14
A-4750.41–44

Treatment Concept

The table below lists typical clinical findings which can be treated with the implants of the APTUS Distal Radius System 2.5.

Plate Type / Fracture Type	Distal Radius														Distal Ulna	
																
A1														A		
A2																
A3																
B1.1														B		
B1.2																
B1.3																
B2																
B3																
C1														C		
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)

Instrument Application

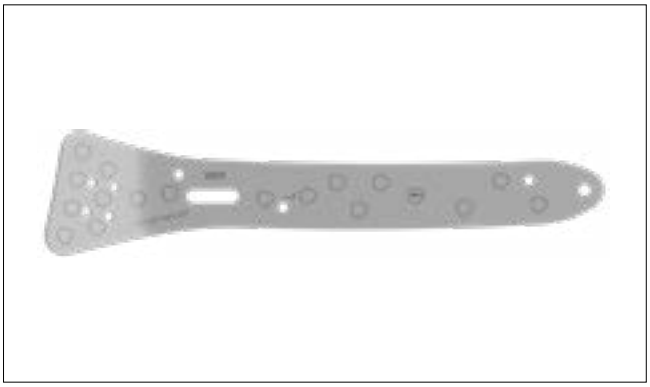
General Instrument Application

Sizing Templates

Sizing templates facilitate the intraoperative selection of the appropriate implant.
Sizing templates for the Distal Radius System 2.5 are available according to chapter “Appendix”.

The sizing templates feature symbols that indicate the type of the screw hole and its position on the respective implant:

- for a TriLock screw hole (locking) using a TriLock or a cortical screw
- for a TriLock^{PLUS} screw hole (locking/compression) using a TriLock or a cortical screw



Sizing template with TriLock and TriLock^{PLUS} screw hole symbols

The article number of the sizing template (e.g. A-4750.75TP) corresponds to the article number of the sterile implant (e.g. A-4750.75S). The suffix TP stands for template.

A-4750.75TP
Template for A-4750.75S

Use appropriate K-wires to temporarily fix the sizing template to the bone, if necessary.

Notice
Do not implant sizing templates.
Do not bend or cut sizing templates.

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

Bending

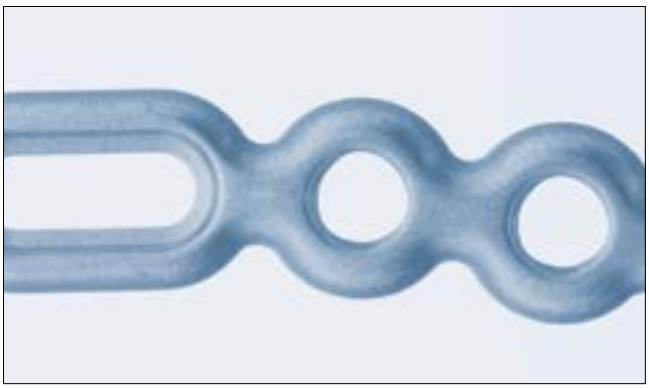
If required, the TriLock volar fracture plates, the volar frame plates, the dorsal radius plates, the small fragment plates, the lunate facet plates, the hook plates and the distal ulna plates can be bent with the plate bending pliers (A-2047). The plate bending pliers have two different pins to protect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

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

Warning
Wrong bending of the plate may lead to impaired functionality and postoperative construct failure.

The plate bending pliers are always used in pairs.

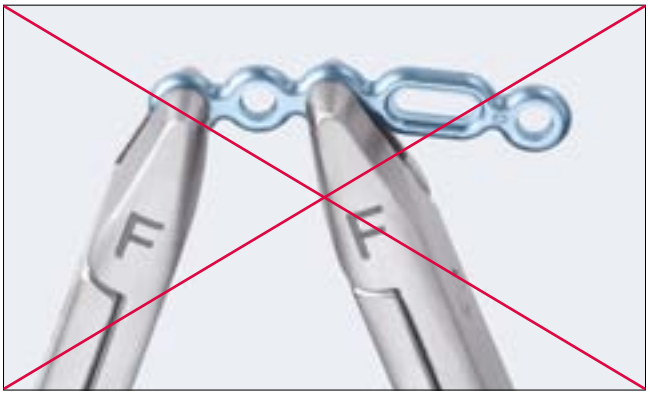
The labeled side of the plate must always face upwards when inserting the plate into the bending pliers.

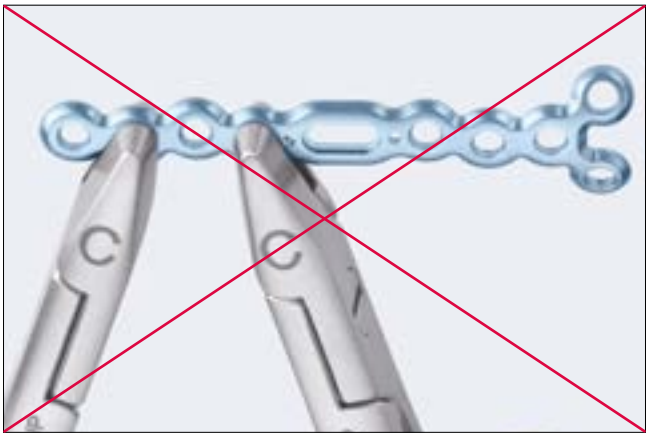


When bending a flat plate (distal radius plates), the plate bending pliers must be held so that the letters “F – FLAT PLATE THIS SIDE UP” are legible from above. This ensures that the plate holes are not damaged.

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.

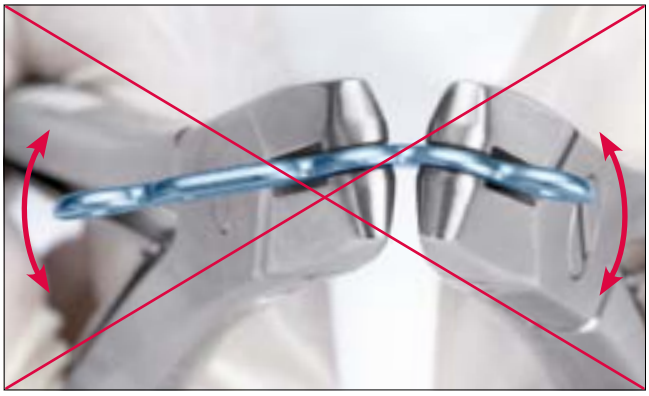
While bending, the plate must always be held at two adjacent holes to prevent contour deformation of the intermediate plate hole.





Warning
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.

Warning
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

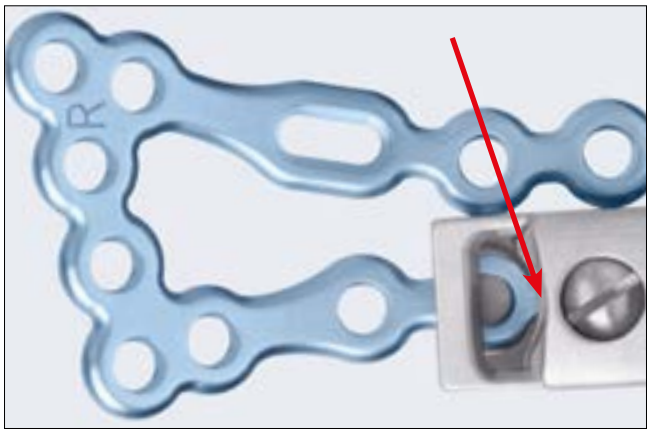
Warning
Wrong cutting of the plate may result in sharp edges and lead to injuries of the surrounding tissues.

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.

The desired cutting line can be visually checked through the cutting window in the head of the pliers. Sufficient material should always be left on the remaining plate to preserve the integrity of the adjacent hole.

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 with a ring system.

System Size	Color Code
2.5	Purple

A-3713

A-3723

A-3733

Core hole drills with Ø 2.0 mm = 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 with Ø 2.6 mm = two colored rings

Warning
The twist drill must always be guided through the drill guide (A-2722, A-2721) or the self-holding drill sleeve (A-2726). 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

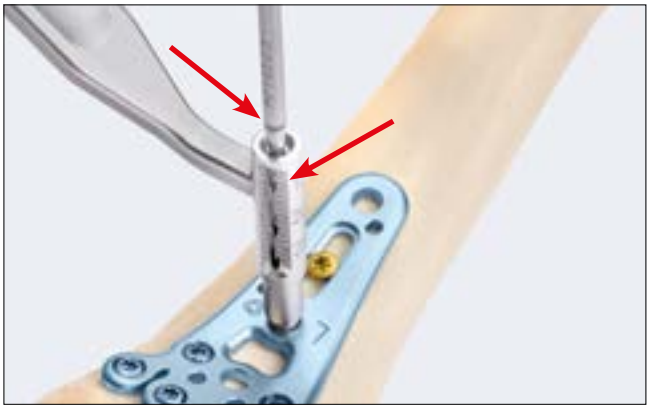
A-2721
2.5 Drill Guide for Lag Screws

A-2726
2.5 Drill Sleeve, Self-Holding

After positioning the plate, insert the drill guide or the self-holding drill-sleeve and the twist drill into the screw hole.

The required screw length can be determined by referring to the scale on either the drill guide (A-2722) or the self-holding drill sleeve (A-2726), in alignment with the black markings on the drill shaft of the 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 performs all of the functions of a drill guide without the need to be held.

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

Assigning the Screw Length

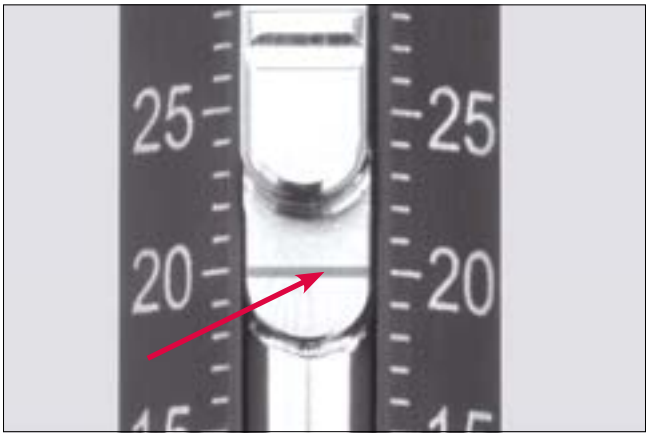
The depth gauge (A-2730) is used to assign the ideal screw length for use in monocortical or bicortical screw fixation of TriLock screws and cortical screws.

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 (e.g. for fracture fixation with lag screws).

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 HexaDrive self-holding system.

A-2710
2.5 Screwdriver, HD7, Self-Holding

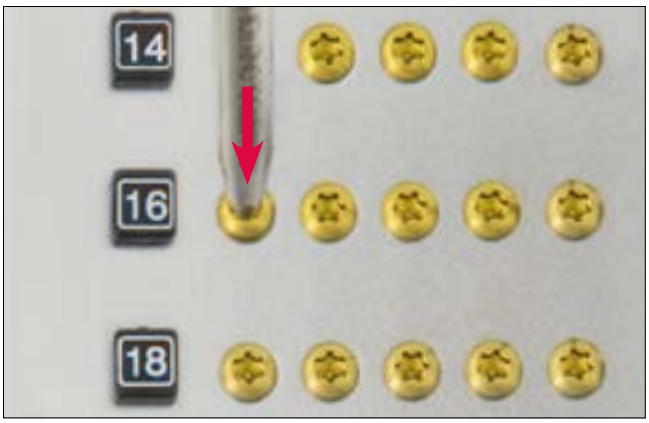
A-2013
2.5/2.8 Screwdriver Blade, HD7, AO

A-2073
Handle with Quick Connector, AO

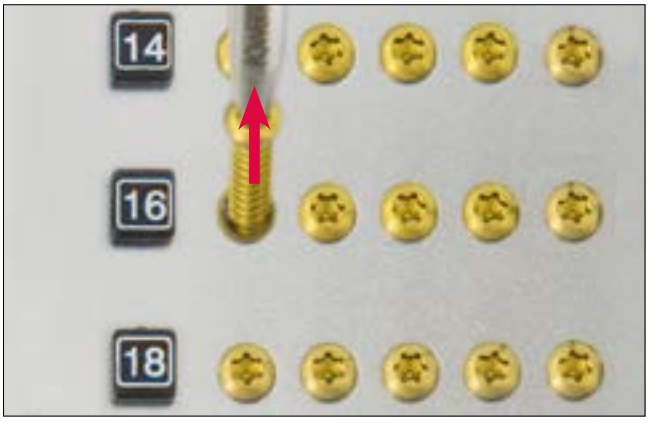
A-2310
1.2/1.5 Screwdriver, HD4, Self-Holding

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.



Caution
Vertically extract the screw from the compartment. Picking up the screw repeatedly may lead to permanent deformation of the self-retaining area of the HexaDrive inside the screw head. Therefore, the screw may no longer be able to be picked up correctly. In this case, a new screw has to be used.



Notice
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. They are marked with L and R for the left and right side. 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.

(Example) left right

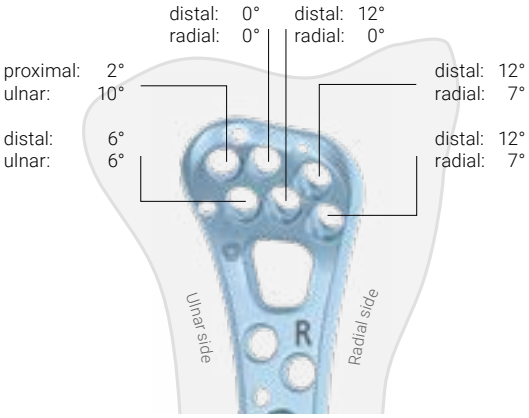
The drill guides (A-2722 or A-2726), the depth gauge (A-2730) as well as two K-wires with a diameter of up to 1.6 mm can be used together with the drill guide block. You can drill, measure and insert the screws through the holes of the attached drill guide block.

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

Overview Screw Trajectories

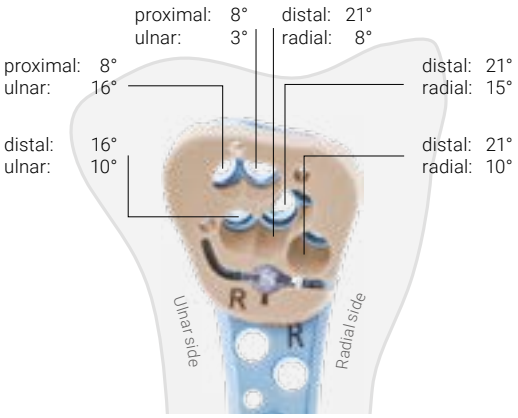
Screw trajectories for the ADAPTIVE II plates, the FPL and rim plates, without and with drill guide block.

ADAPTIVE II plates (variable angle) *

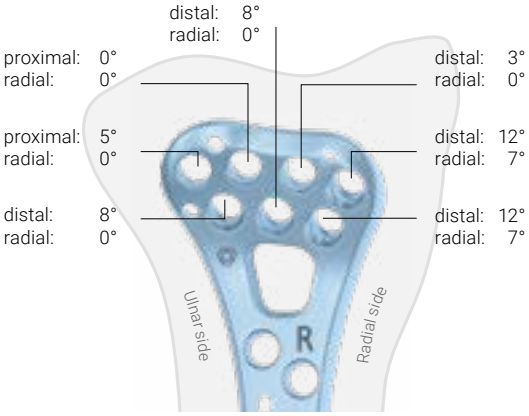


A-4750.102*

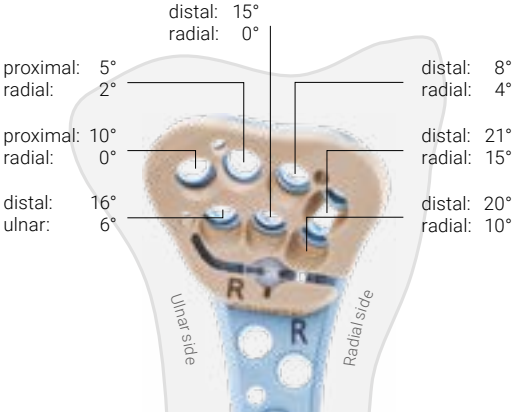
ADAPTIVE II plates with drill guide block (fixed angle)



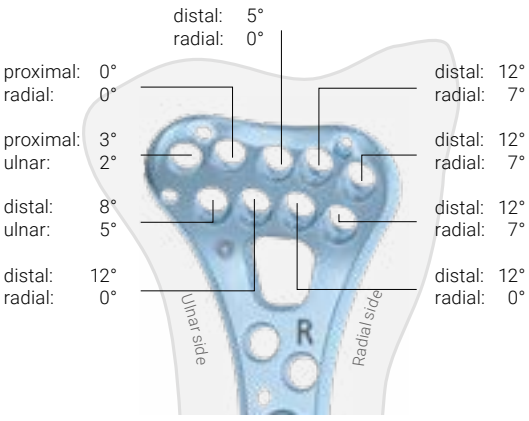
A-4750.102



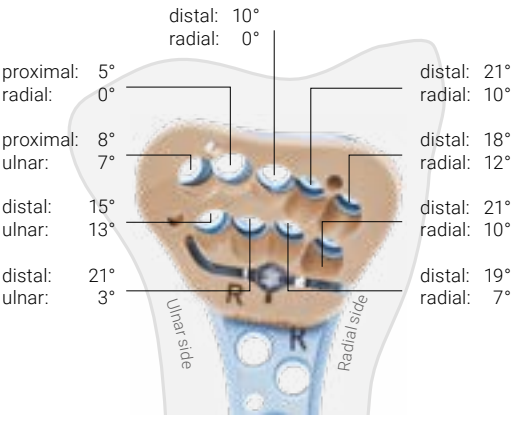
A-4750.106*



A-4750.106



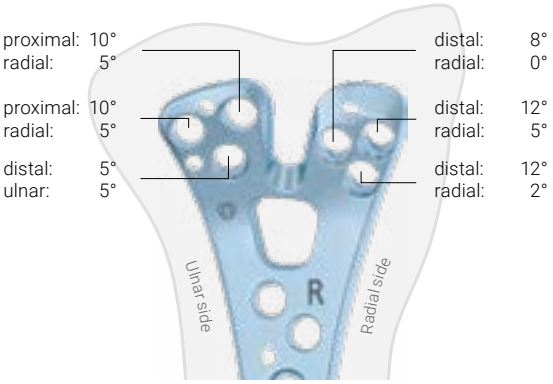
A-4750.110*



A-4750.110

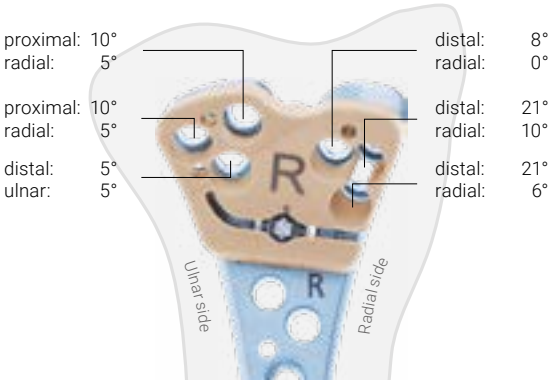
* All screw holes of the ADAPTIVE II plates allow for additional angulation of ± 15° of the preangled value.

FPL plate (variable angle)*



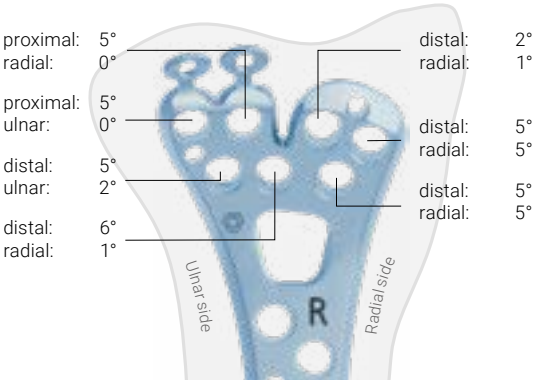
A-4750.124*

FPL plate with drill guide block (fixed angle)



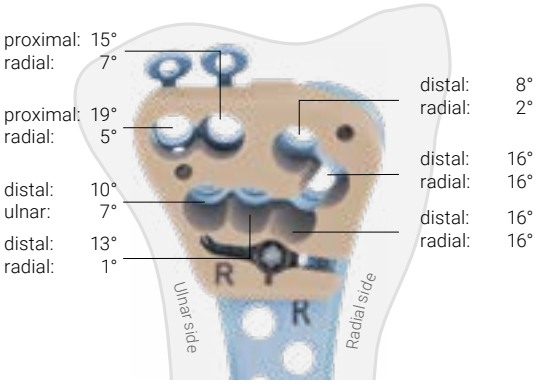
A-4750.124

Rim plate (variable angle) *



A-4750.146*

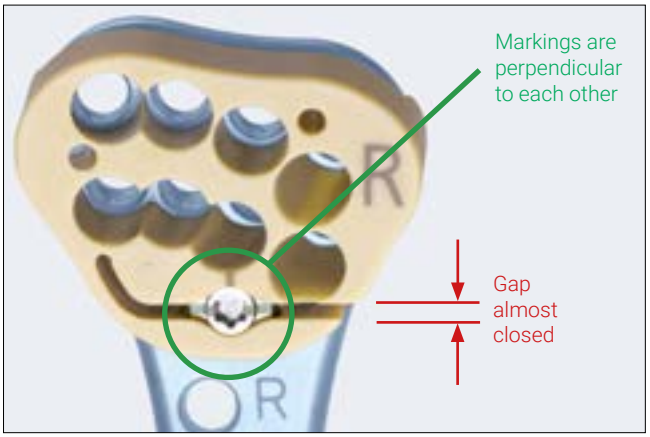
Rim plate with drill guide block (fixed angle)



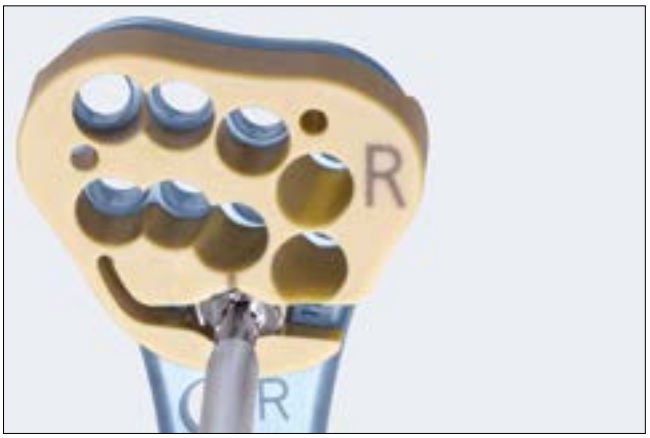
A-4750.146

* All screw holes of the FPL and rim plates allow for additional angulation of ±15° of the preangled value.

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.

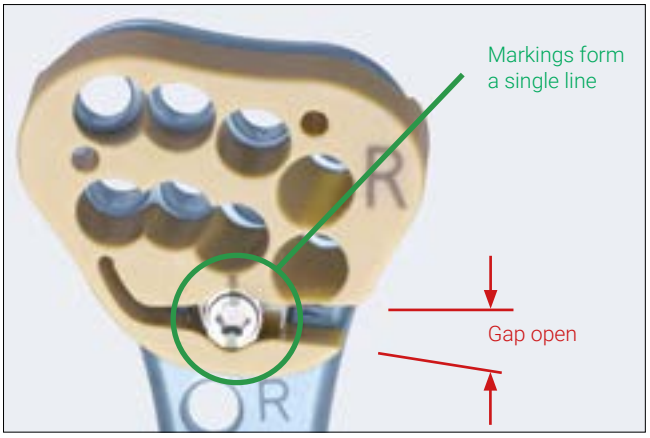


Use the screwdriver A-2710 (or A-2073, A-2013) to turn the rotating element anchored in the drill guide block by a quarter rotation in a clockwise or counter-clockwise direction, until the drill guide block expands and is firmly locked with the plate.



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).

A-2794
2.5 Instrument for Restoration of the Volar Tilt

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

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.

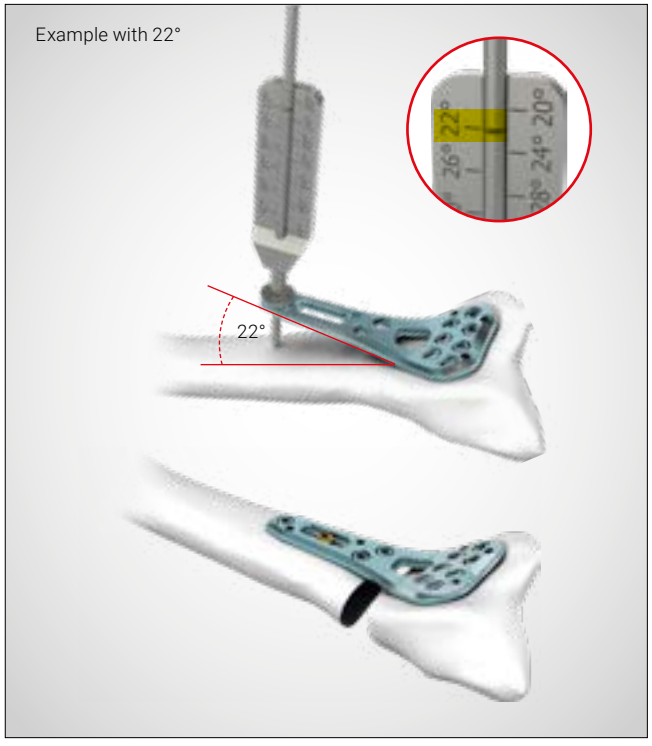
Correction Plates ADAPTIVE Plates

Fixation of 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 TriLock screws (A-5750.xx). To avoid collision with the mounted instrument during drilling, choose the screw holes accordingly.

Remove the plate with the mounted instrument.

Make the osteotomy.



Warning
Depending on the level of correction, some cases may require bone grafting between the proximal and the distal fragments, autologous bone is recommended. Insufficient bone grafting can increase the risk of breakage of the plate.

Final fixation of the plate with the mounted instrument in the predrilled distal holes.

Remove the instrument and insert additional screws distally.

Warning
For ideal results, place at least three TriLock screws into the most distal row and two 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 cortical screw (A-5700.xx) into the oblong hole. Complete the fixation of the plate shaft with screws of which at least one should be a TriLock screw (distally to the oblong hole).

Surgical Techniques

General Surgical Techniques

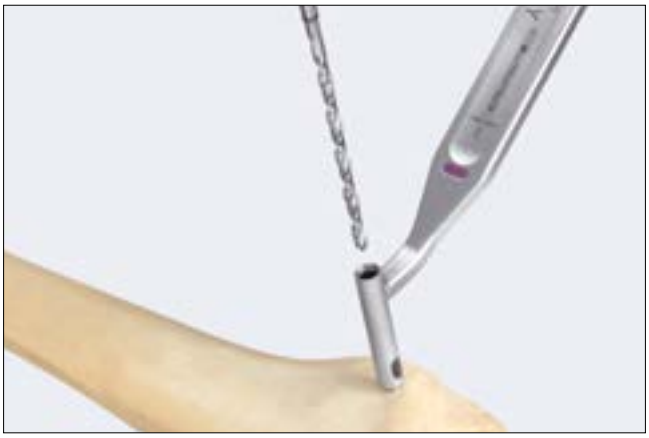
Lag Screw Technique

Warning
Incorrect application of the lag screw technique may result in postoperative loss of reduction.

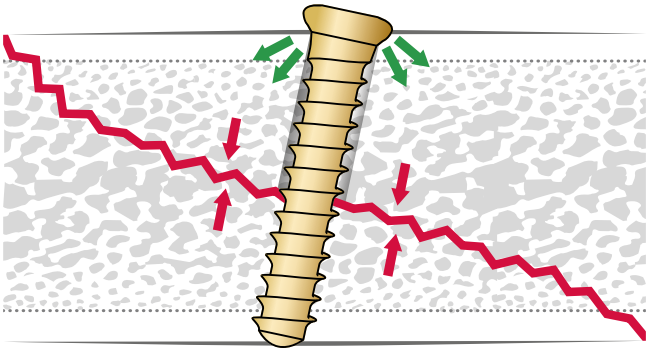
1. Drilling the gliding hole
Drill the gliding hole using the APTUS twist drill marked with two purple rings (A-3711, A-3721, A-3731, Ø 2.6 mm) in combination with the end of the drill guide (A-2721) labeled with two purple bars. Drill perpendicular to the fracture line.

Do not drill further than the fracture line.

2. Drilling the core hole
Insert the other end of the drill guide (A-2721) into the drilled gliding hole and use the twist drill for core holes with one purple ring (A-3713, A-3723, A-3733, Ø 2.0 mm) to drill the core hole.



3. Compressing the fracture
Compress the fracture with the corresponding cortical screw (A-5700.xx).

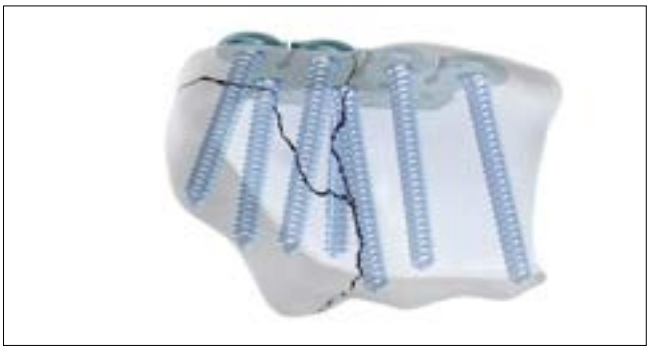


4. Optional steps before compression
If required, use the countersink (A-3830) to create a recess in the bone for the screw head.

Caution
Use the handle (A-2073) instead of a power tool to reduce the risk of countersinking too far through the near cortex.

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.



Warning
Insert at least three TriLock screws into the most distal row and two TriLock screws into the second distal row.

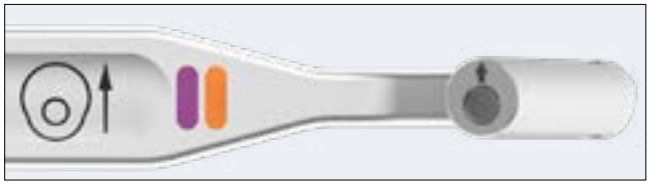
Warning
For a stable fixation of distal ulna fractures, ensure that at least three TriLock screws are set distally to the fracture line and at least two proximally. A distal orientation of the screw from the second distal row permits subchondral support of the ulnar head.

TriLock^{PLUS}

TriLock^{PLUS} holes are available on all XL plates (A-4750.75-80).

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) and a plate with a TriLock^{PLUS} hole are required. The TriLock^{PLUS} holes and the respective end of the drill guide are both marked with an arrow indicating the direction of the compression. Before using a TriLock^{PLUS} hole, ensure that there is no fixation on the TriLock^{PLUS} side, and fix the plate with at least one TriLock screw on the opposite side of the fracture or osteotomy line.

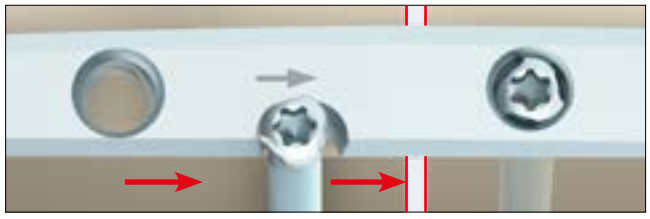


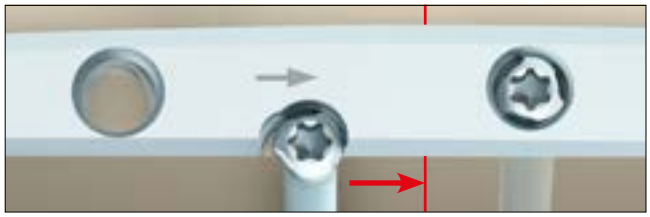
1. Positioning the drill guide in the plate
Following the direction of the compression, insert the 2.5/2.8 drill guide TriLock^{PLUS} perpendicular to the plate. The arrow on the drill guide and the plate both indicate the direction of the compression.

Warning
Correct compression is only achieved if the drill guide is inserted in a 90° angle into the plate.

2. Drilling through the drill guide TriLock^{PLUS}
Use the twist drill for core holes with one purple ring (A-3713, A-3723, A-3733) to completely drill through the bone (bicortically).

3. Inserting the screw and locking in final position
Insert a TriLock screw into the predrilled hole. Axial compression starts as soon as the screw head touches the plate. The final position is reached when the screw is locked into the TriLock screw hole.





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 end of the drill guide (A-2026, A-2722, A-2726), see also section “Drilling”.

Specific Surgical Techniques

Hook Plates

1. Picking up the plate
Pick up the hook plate (A-4200.40–43) 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. Fixing the plate
Insert the SpeedTip screws ∅ 1.5 mm (without predrilling) and fix the avulsed fragment.

4. Postoperative Care

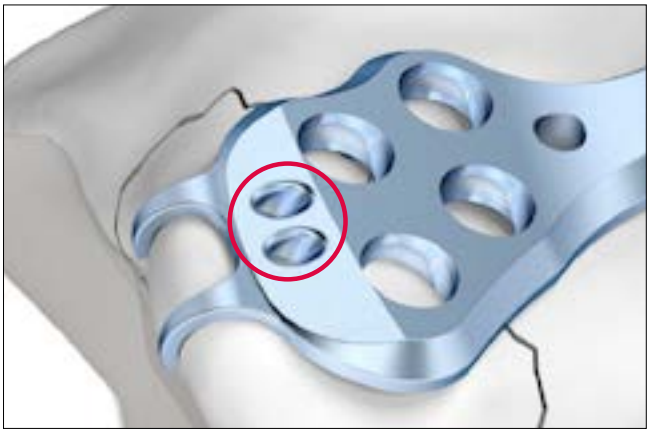
Warning
The plate is designed to treat very distal volar rim fractures which require fixation distal to the watershed line. Plate removal, after sufficient (osseous) healing has taken place, must be considered.

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

4. Postoperative Care

Warning
The plate is designed to treat very distal volar rim fractures which require fixation distal to the watershed line. Plate removal, after sufficient (osseous) healing has taken place, must be considered.

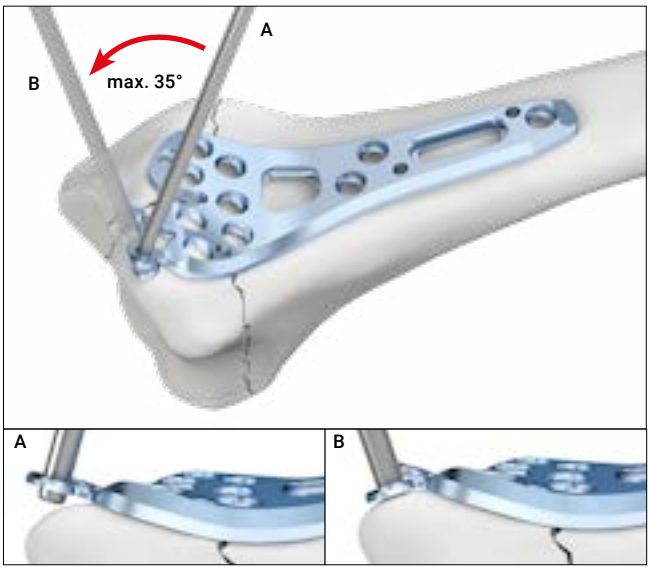
TriLock Distal Radius Rim Plates

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°.

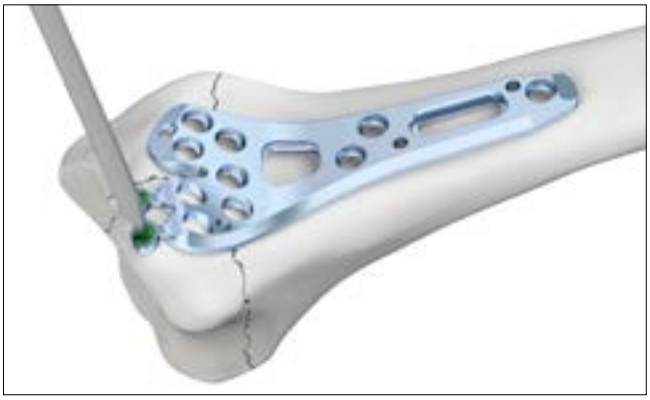
Warning

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



2. Fixing the plate

Insert two SpeedTip screws ∅ 1.5 mm (without predrilling) to fix the fragment. The screw holes can also be used for soft tissue fixation with a suture (hole diameter = 1.7 mm).



Drill, assign the screw length and insert the screw (see section “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 section ”Drill Guide Blocks”).

3. Postoperative Care

Warning

The plate is designed to treat very distal volar rim fractures which require fixation distal to the watershed line. Plate removal, after sufficient (osseous) healing has taken place, must be considered.

TriLock Wrist Spanning Plates

The curved plates (A-4750.191S, A-4750.192S) are designed for distal radius fracture fixation over the 3rd metacarpal.

Be sure to select the plate with the correct lateral curvature as the plates are designed to treat distal radius fractures of left (A-4750.191S) and right (A-4750.192S) forearms.

The straight plate (A-4750.193S) is designed for distal radius fracture fixation over the 2nd metacarpal.

TriLock Wrist Spanning Plates, Curved (A-4750.191S, A-4750.192S)

1. Surgical approach
Position the preferred plate on the skin over the 3rd metacarpal and radial shaft. Use intraoperative X-ray control to verify the correct plate position.

Mark the distal and proximal plate ends.

Make a first incision over the dorsal aspect of the 3rd metacarpal shaft. Mobilize the extensor tendon to the side and expose the bone.

2. Positioning the plate and initial fixation
With the wrist flexed and beginning immediately ulnar to Lister's tubercle, insert the plate from distal to proximal deep to the fourth dorsal compartment until the plate's bend naturally settles into the carpal recess.

Once fully inserted, use intraoperative X-ray control to verify the correct plate position. Palpate the proximal edge of the plate. Make a second incision over this area.

Split the muscle until the plate is identified. Confirm that the plate is centered on the radius without any soft tissue interposition.

Although the plate has been designed to avoid tendon entrapment, particularly the extensor pollicis longus (EPL), trauma may obscure the normal anatomy. In cases where the EPL may be significantly displaced due to the trauma, or if the patient is very small, surgeons may elect to make a small incision over Lister's tubercle to verify that the EPL remains free from the plate.

Similarly, this third incision may be made to access the fracture site in order to obtain reduction or add bone graft when needed.

Extend the wrist to meet the plate distally. For temporary plate fixation, K-wires (A-5040.41, A-5042.41, A-5045.41) may be inserted into the metacarpal.

Use intraoperative X-ray control to verify the correct plate position.

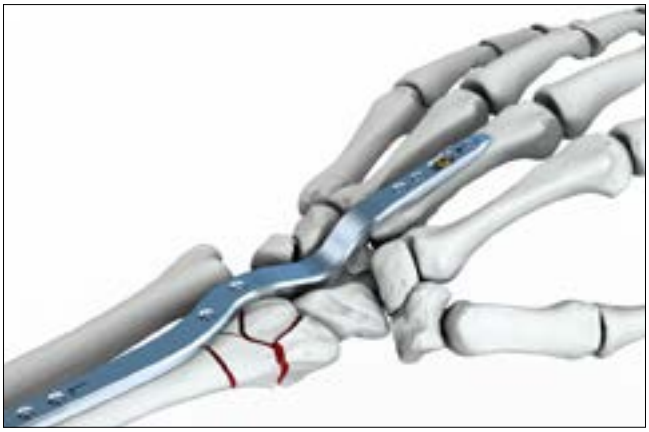
With the drill guide (A-2722) and the APTUS twist drill (A-3713, A-3723, A-3733) for core diameter 2.0 mm (one purple ring), drill a core hole in the metacarpal through the center of the distal oblong hole.

Assign the screw length using the depth gauge (A-2730) and insert a cortical screw ∅ 2.5 mm (A-5700.xx).

If the plate position needs adjustment: remove the distal K-wire, slightly loosen the cortical screw in the oblong hole, readjust the position of the plate and retighten the cortical screw.

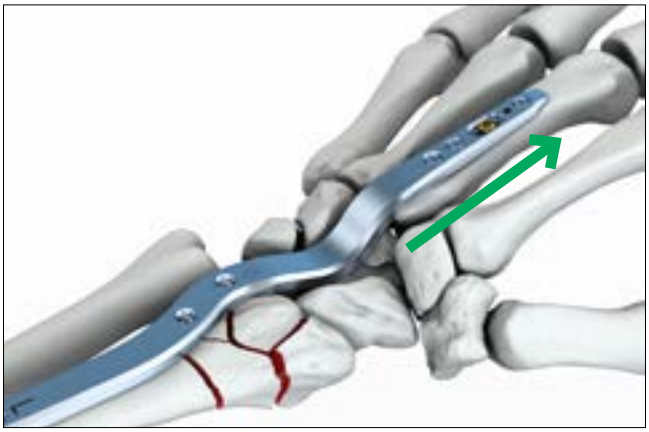
Drill, assign the screw length and fill the remaining distal screw holes in the metacarpal with TriLock screws ∅ 2.5 mm (A-5750.xx).

Remove all K-wires (A-5040.41, A-5042.41, A-5045.41) if previously placed.



3. Reducing the fracture and fixing the plate
While in neutral rotation, apply longitudinal traction to utilize the effect of ligamentotaxis for restoration of articular surface congruency, radial height and inclination.

Avoid inappropriate rotation while performing distraction. Applying traction in a pronated position may result in a rotational malreduction.



For temporary plate fixation, K-wires (A-5040.41, A-5042.41, A-5045.41) may be inserted into the radial shaft.

Drill, assign the screw length and fill the proximal oblong hole centrally with a cortical screw Ø 2.5 mm (A-5700.xx).

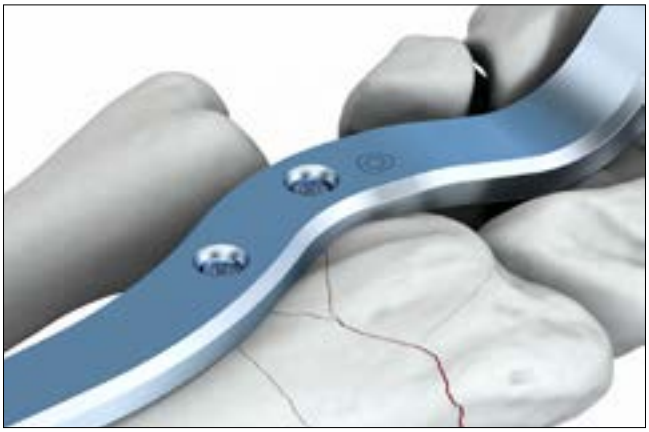
Use intraoperative X-ray control to assess the reduction prior to securing the plate proximally.

If further adjustment is needed: remove the proximal K-wire, slightly loosen the cortical screw in the oblong hole, readjust the position of the plate and retighten the cortical screw.

Drill, assign the screw length and fill the remaining proximal screw holes with TriLock screws Ø 2.5 mm (A-5750.xx).

Remove all K-wires (A-5040.41, A-5042.41, A-5045.41) if previously placed.

The plate provides optional holes that can be used for several purposes, including direct buttressing of lunate facet with TriLock screws ∅ 2.5 mm (A-5750.xx).



4. Closure and aftercare

Close the incisions as per surgeon's preference.
Patients are instructed to elevate the extremity and mobilize the fingers actively. Once the distal radius has healed, the plate should be removed to allow wrist motion (usually four months).

TriLock Wrist Spanning Plate, Straight
(A-4750.193S)

1. Surgical approach
Position the plate on the skin over the 2nd metacarpal and radial shaft. Use intraoperative X-ray control to verify the correct plate position.

Mark the distal and proximal plate ends.

Make a first incision over the dorsal aspect of the 2nd metacarpal shaft. Avoid injury to branches of the superficial radial nerve overlying the 2nd metacarpal. Mobilize the extensor tendon to the side and expose the bone.

2. Positioning the plate and initial fixation
Insert the plate from distal to proximal with the wrist flexed. Advance the plate retrograde deep into the 2nd dorsal compartment in alignment with the axis of the radial shaft.

Once fully inserted, use intraoperative X-ray control to verify the correct plate position. Palpate the proximal edge of the plate. Make a second incision over this portion of the plate.

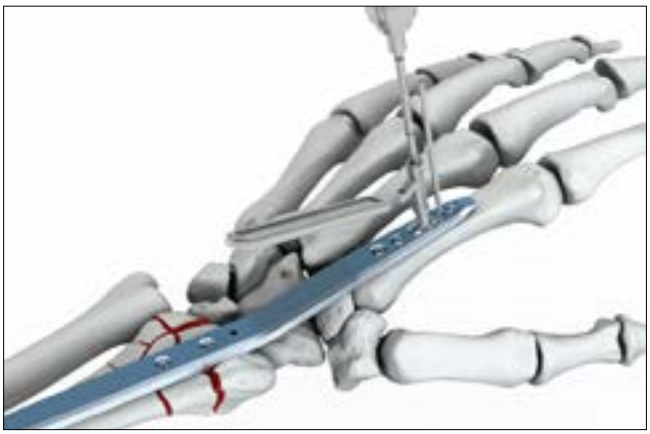
Avoid the lateral antebrachial cutaneous nerve superficial to the fascia as well as the superficial branch of the radial nerve deep to the fascia and brachioradialis muscle.

Split the muscle until the plate is identified. Confirm that the plate is centered on the radius without any soft tissue interposition.

Extend the wrist to meet the plate distally.
For temporary plate fixation, K-wires (A-5040.41, A-5042.41, A-5045.41) may be inserted into the metacarpal.

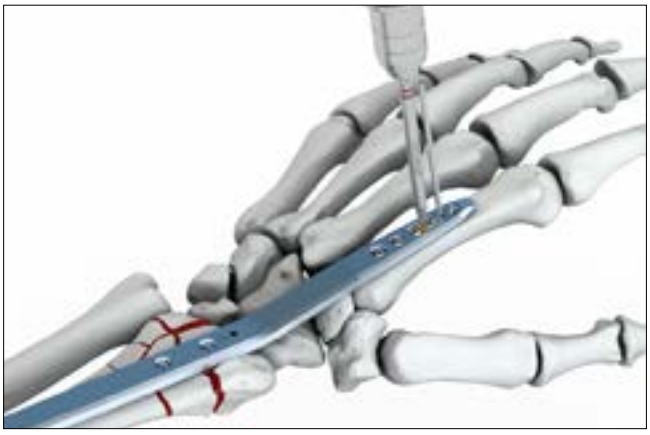
Use intraoperative X-ray control to verify the correct plate position.

With the drill guide (A-2722) and the APTUS twist drill (A-3713, A-3723, A-3733) for core diameter 2.0 mm (one purple ring), drill a core hole in the metacarpal through the center of the distal oblong hole.



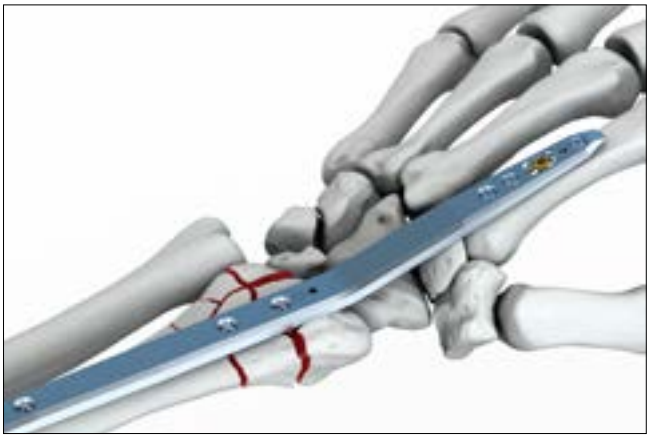
Assign the screw length using the depth gauge (A-2730) and insert a cortical screw ∅ 2.5 mm (A-5700.xx).

If the plate position needs adjustment: remove the distal K-wire, slightly loosen the cortical screw in the oblong hole, readjust the position of the plate and retighten the cortical screw.



Drill, assign the screw length and fill the remaining distal screw holes in the metacarpal with TriLock screws ∅ 2.5 mm (A-5750.xx).

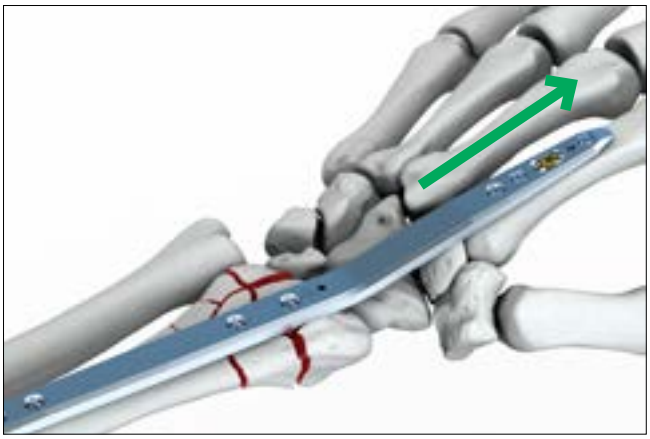
Remove all K-wires (A-5040.41, A-5042.41, A-5045.41) if previously placed.

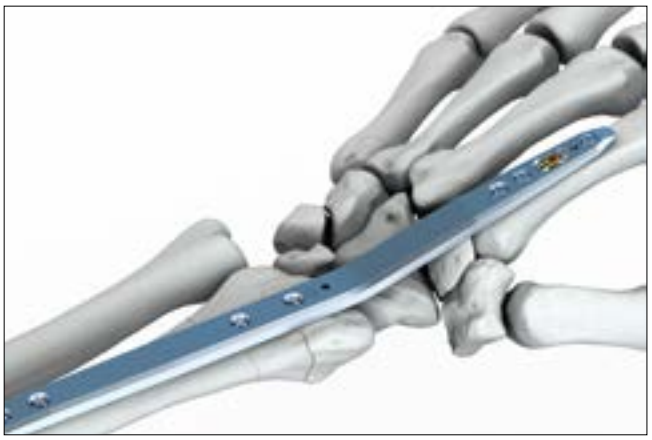


3. Reducing the fracture and fixing the plate

While in neutral rotation, apply longitudinal traction to utilize the effect of ligamentotaxis for restoration of articular surface congruency, radial height and inclination.

Avoid inappropriate rotation while performing distraction. Applying traction in a pronated position may result in a rotational malreduction.





For temporary plate fixation, K-wires (A-5040.41, A-5042.41, A-5045.41) may be inserted into the radial shaft.

Drill, assign the screw length and fill the proximal oblong hole centrally with a cortical screw ∅ 2.5 mm (A-5700.xx).

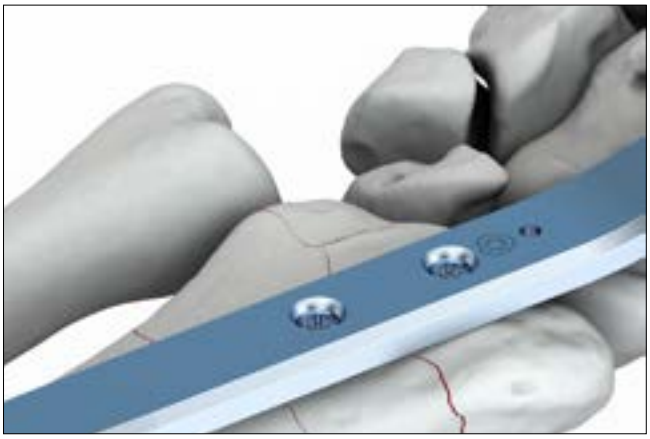
Use intraoperative X-ray control to assess the reduction prior to securing the plate proximally.

If further adjustment is needed: remove the proximal K-wire, slightly loosen the cortical screw in the oblong hole, readjust the position of the plate and retighten the cortical screw.

Drill, assign the screw length and fill the remaining proximal screw holes with TriLock screws ∅ 2.5 mm (A-5750.xx).

Remove all K-wires (A-5040.41, A-5042.41, A-5045.41) if previously placed.

The plate provides optional holes that can be used for several purposes, including direct buttressing of scaphoid facet with TriLock screws ∅ 2.5 mm (A-5750.xx).



4. Closure and aftercare

Close the incisions as per surgeon's preference.
Patients are instructed to elevate the extremity and mobilize the fingers actively. Once the distal radius has healed, the plate should be removed to allow wrist motion (usually four months).

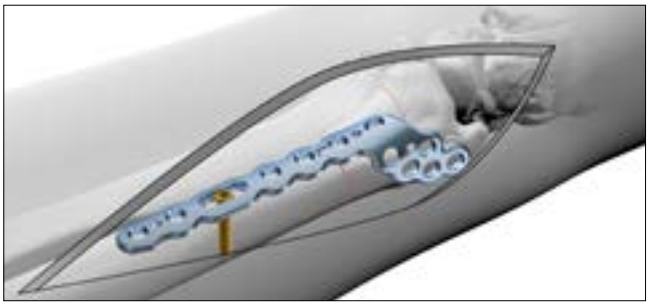
TriLock Distal Ulna Plates
(A-4750.93, A-4750.94, A-4750.97, A-4750.98)

1. Surgical approach
Position the arm vertically in neutral rotation.

Make an incision approx. 5 mm from the tip of the ulna head to 6 – 7 cm proximally on the ulnar side. Dissect the pronator quadratus of the volar distal surface of the ulna.

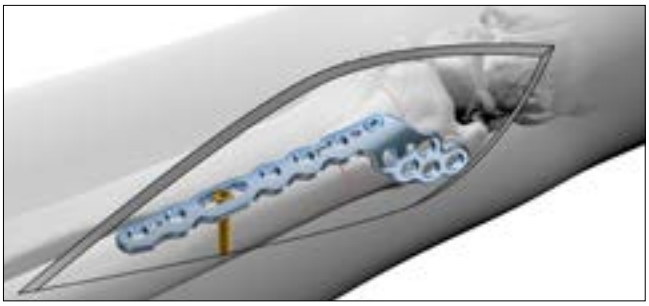
2. Positioning the plate and initial fixation
Position the arm in full supination on a supporting roll in slight elbow flexion.

After fracture reduction, select the appropriate length of the distal ulna plate. Place the plate on the volar surface of the distal ulna. Drill, assign the screw length and fill the oblong hole centrally with a cortical screw (see section "Drilling" and "Assigning the Screw Length"). Use intraoperative X-ray control to verify the correct plate position. If the plate position needs adjustment: slightly loosen the cortical screw, readjust the position of the plate and retighten the cortical screw.



Caution
The plates should be placed in the so-called safe zone to avoid impingement with the distal radius during forearm rotation.

The safe zone is described in literature between the 12 and 2 o'clock position on the right wrist, and between the 10 and 12 o'clock position on the left wrist. *



3. Fixing the plate
Drill, assign the screw length and insert the screws (see section "Drilling" and "Assigning the Screw Length") into the remaining screw holes.

* Hazel A, Nemeth N, Bindra R. Anatomic considerations for plating of the distal ulna. J Wrist Surg. 2015;4(3):188-193.

Explantation

Explantation of Wrist Plates

1. Removing the screws
Unlock all screws and remove them.

The order in which the screws are removed is not relevant.

In case the plate sticks to the bone, use a periosteal elevator to carefully lift and detach it from the bone.

Notice
When removing the screws, make sure that the screwdriver/ screw head connection is aligned in axial direction.

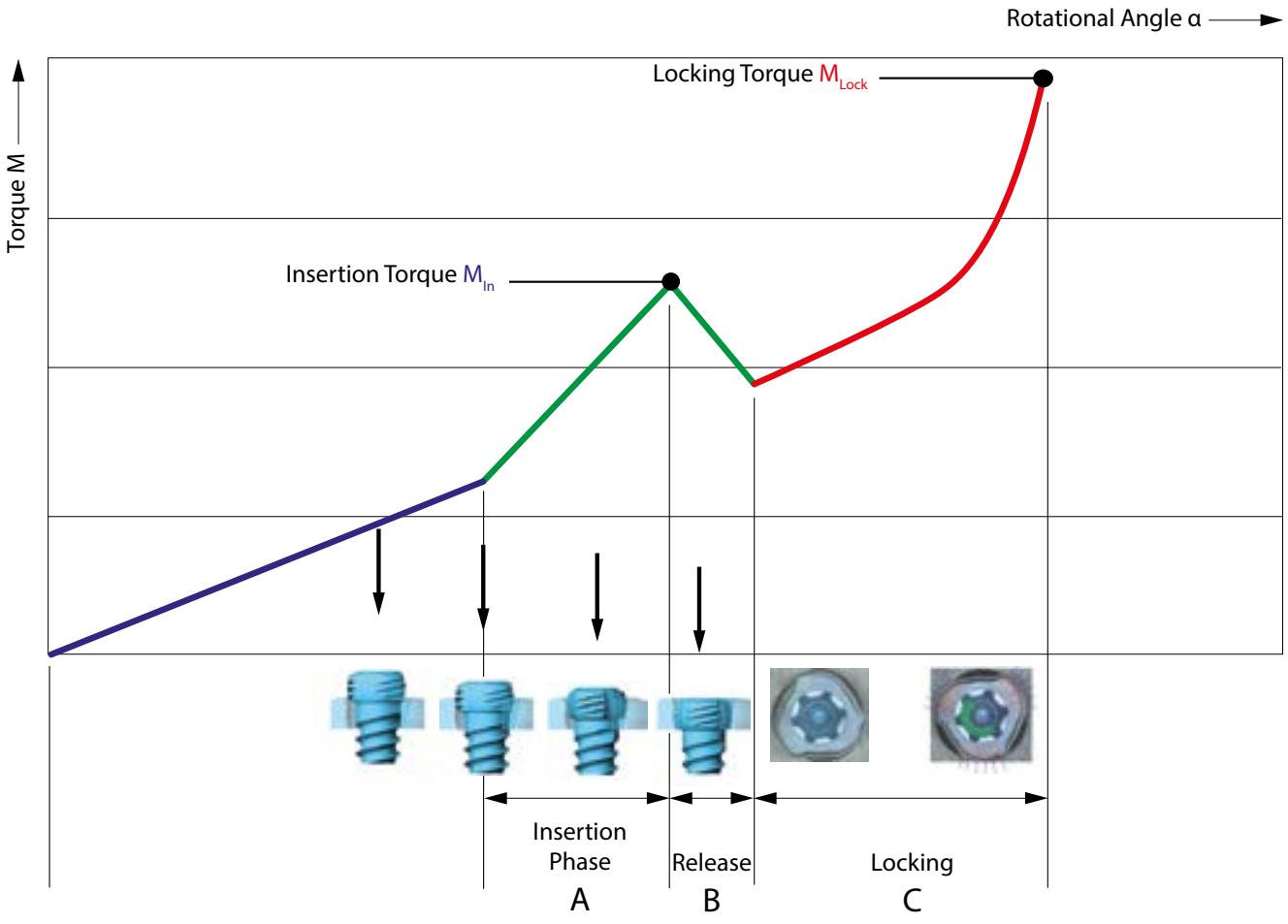
TriLock Locking Technology

Correct Application of the TriLock Locking Technology

The screw is inserted through the plate hole into a predrilled 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.



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

Correct locking occurs only when the screw head is locked flush with the locking contour (Fig. 1 and 3).

However, if there is still a noticeable protrusion (Fig. 2 and 4), the screw head has not completely 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 may be necessary to achieve proper locking.

After having reached the locking torque (MLock), do not further tighten 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, Instruments and Containers

Plates, Templates, Washers
A-4200.40
A-4200.40S
A-4200.41
A-4200.41S
A-4200.42
A-4200.42S
A-4200.43
A-4200.43S
A-4700.70
A-4700.70/1
A-4700.70/1S
A-4750.01
A-4750.01S
A-4750.01TP
A-4750.02
A-4750.02S
A-4750.02TP
A-4750.03
A-4750.03S
A-4750.03TP
A-4750.04
A-4750.04S
A-4750.04TP
A-4750.05
A-4750.05S
A-4750.05TP
A-4750.06
A-4750.06S
A-4750.06TP
A-4750.07
A-4750.08
A-4750.09
A-4750.10
A-4750.11
A-4750.11S
A-4750.11TP
A-4750.12
A-4750.12S
A-4750.12TP
A-4750.13
A-4750.13S
A-4750.13TP
A-4750.14
A-4750.14S
A-4750.14TP
A-4750.15
A-4750.15S
A-4750.15TP
A-4750.16
A-4750.16S
A-4750.16TP
A-4750.17
A-4750.17S
A-4750.17TP
A-4750.18
A-4750.18S
A-4750.18TP
A-4750.19
A-4750.19S
A-4750.19TP
A-4750.20
A-4750.20S
A-4750.20TP
A-4750.21
A-4750.22
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A-4750.24
A-4750.31
A-4750.31S
A-4750.31TP
A-4750.32
A-4750.32S
A-4750.32TP
A-4750.33
A-4750.33S
A-4750.33TP
A-4750.34
A-4750.34S
A-4750.34TP
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A-4750.35S
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A-4750.44TP
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Drill Guide Blocks
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Olive K-Wires
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