

SURGICAL TECHNIQUE

Ankle Trauma System 2.8 / 3.5



APTUS Ankle

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

Introduction

Product Materials

Plates

Ti6Al4V (ASTM F136), cpTi (ASTM F67)

Screws, Washers

Ti6Al4V (ASTM F136)

K-Wires

Stainless steel (ISO 5832-1)

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 Ankle

Fractures and osteotomies of the bones of the ankle

- Distal tibia plates
 - fractures, osteotomies, malunions and non-unions of the distal tibia
- Distal fibula plates
 - fractures, osteotomies, malunions and non-unions of the distal fibula

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
2.8	Orange
3.5	Green

Plates and Screws

Special implant plates and screws have their own color:

Implant plates blue	TriLock plates (locking)
Implant screws gold	Cortical screws (fixation)
Implant screws blue	TriLock screws (locking)

Possible Combination of Plates and Screws

Plates and screws can be combined within one system size:

2.8/3.5 TriLock Distal Tibia Plates

- 2.8 Cortical Screws, HexaDrive 7
- 2.8 TriLock Screws, HexaDrive 7
- 3.5 Cortical Screws, HexaDrive 15
- 3.5 TriLock Screws, HexaDrive 15

3.5 TriLock Distal Tibia T + L Plates

- 3.5 Cortical Screws, HexaDrive 15
- 3.5 TriLock Screws, HexaDrive 15

3.5 Straight Plates

- 3.5 Cortical Screw, HexaDrive 15
- 3.5 TriLock Screws, HexaDrive 15

2.8/3.5 TriLock Distal Fibula Plates


- 2.8 Cortical Screws, HexaDrive 7
- 2.8 TriLock Screws, HexaDrive 7
- 3.5 Cortical Screws, HexaDrive 15
- 3.5 TriLock Screws, HexaDrive 15

2.8 TriLock Distal Fibula Plates

- 2.8 Cortical Screws, HexaDrive 7
- 2.8 TriLock Screws, HexaDrive 7

Symbols

 HexaDrive

 TriLock (locking technology)



System Overview

The plates of the APTUS Ankle Trauma System 2.8/3.5 are available in the following designs:

Distal Tibia Plates

2.8/3.5 TriLock Distal Tibia Plates Medial are available in eight lengths in left and right versions.

Plates are available sterile and non-sterile, while the long plates from 19 to 25 holes are only available sterile.



A-4954.17
17-hole, left



A-4954.15
15-hole, left



A-4954.13
13-hole, left



A-4954.11
11-hole, left



A-4954.12
11-hole, right



A-4954.14
13-hole, right



A-4954.16
15-hole, right



A-4954.18
17-hole, right



A-4954.25S
25-hole, left
sterile only



A-4954.23S
23-hole, left
sterile only



A-4954.21S
21-hole, left
sterile only



A-4954.19S
19-hole, left
sterile only



A-4954.20S
19-hole, right
sterile only



A-4954.22S
21-hole, right
sterile only

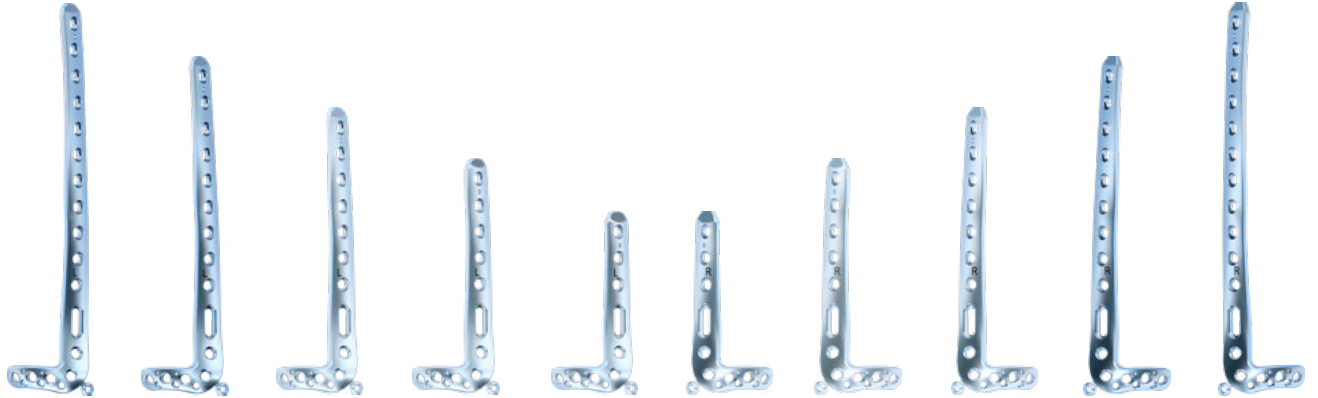


A-4954.24S
23-hole, right
sterile only



A-4954.26S
25-hole, right
sterile only

2.8/3.5 TriLock Distal Tibia Plates Anterolateral are available in five lengths in left and right versions. Plates are available sterile and non-sterile, while the long plates with 19 and 21 holes are only available sterile.



A-4954.39S	A-4954.37S	A-4954.35	A-4954.33	A-4954.31	A-4954.32	A-4954.34	A-4954.36	A-4954.38S	A-4954.40S
21-hole, left sterile only	19-hole, left sterile only	17-hole, left	15-hole, left	13-hole, left	13-hole, right	15-hole, right	17-hole, right	19-hole, right sterile only	21-hole, right sterile only

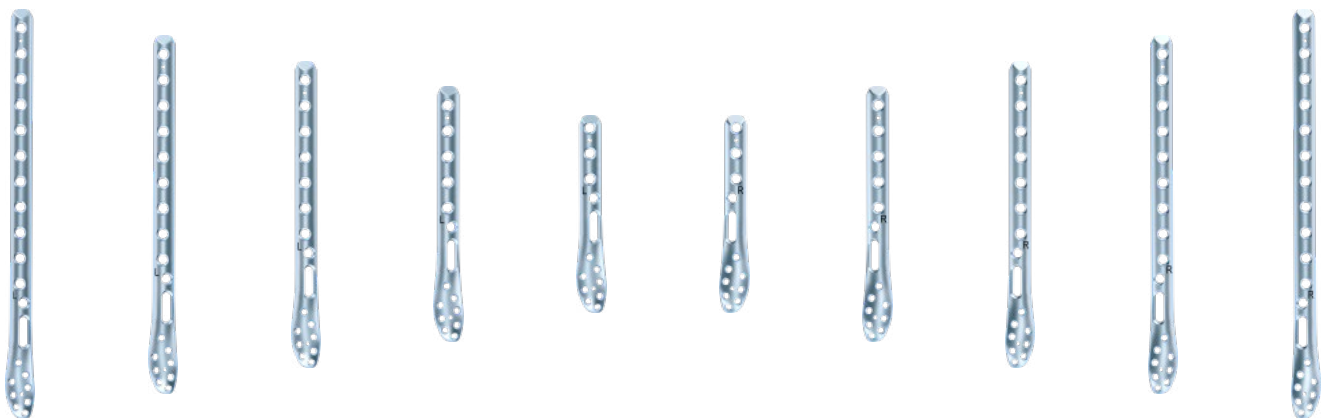
3.5 TriLock Distal Tibia T and L Plates are available in one length. The L plates are available in a left and right version. All plates are available sterile and non-sterile.



A-4954.103	A-4954.101	A-4954.102
3/3 hole, L, left	3/3 hole, T	3/3 hole, L, right

Distal Fibula Plates

2.8/3.5 TriLock Distal Fibula Plates Lateral are available in five lengths in left and right versions. All plates are available sterile and non-sterile, while the long lengths with 19 and 21 holes are only available sterile.



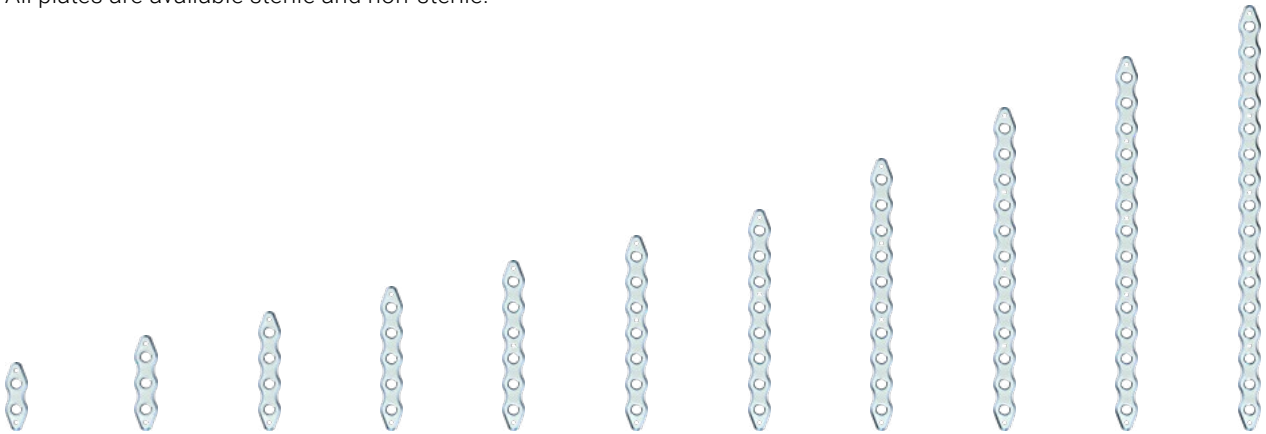
A-4954.09S	A-4954.07S	A-4954.05	A-4954.03	A-4954.01	A-4954.00	A-4954.02	A-4954.04	A-4954.06S	A-4954.08S
21-hole, left sterile only	19-hole, left sterile only	17-hole, left	15-hole, left	13-hole, left	13-hole, right	15-hole, right	17-hole, right	19-hole, right sterile only	21-hole, right sterile only

2.8/3.5 TriLock Distal Fibula Plates Lateral with Flap are available in two lengths in left and right versions. All plates are available sterile and non-sterile.



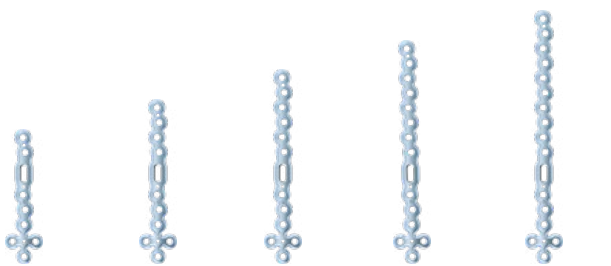
A-4954.53	A-4954.51	A-4954.52	A-4954.54
16-hole, left	14-hole, left	14-hole, right	16-hole, right

3.5 Straight Plates are available in 11 lengths. All plates are available sterile and non-sterile.



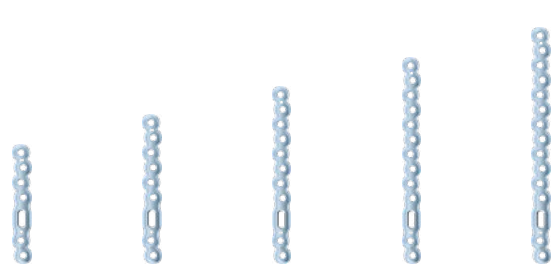
A-4950.20	A-4950.21	A-4950.22	A-4950.23	A-4950.24	A-4950.25	A-4950.26	A-4950.27	A-4950.28	A-4950.29	A-4950.30
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2.8 TriLock Distal Fibula Plates are available in five lengths. All plates are available sterile and non-sterile.



A-4854.00	A-4854.01	A-4854.02	A-4854.03	A-4854.04
3/6-hole	3/8-hole	3/10-hole	3/12-hole	3/14-hole

2.8 TriLock Distal Fibula Plates, Straight, are available in five lengths. All plates are available sterile and non-sterile.





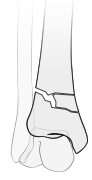


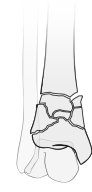




A-4854.05	A-4854.06	A-4854.07	A-4854.08	A-4854.09
7-hole	9-hole	11-hole	13-hole	15-hole

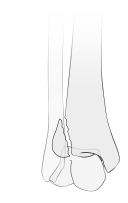



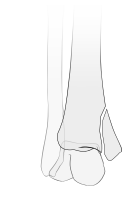



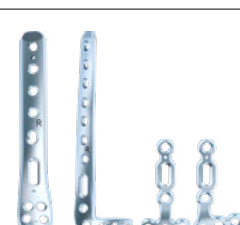
Treatment Concept

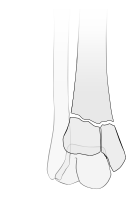



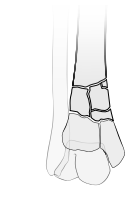



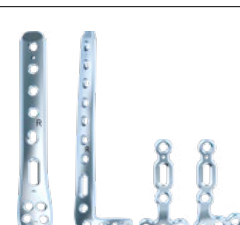
The table below lists typical clinical conditions which can be treated with the implants of the APTUS Ankle Trauma System 2.8/3.5.

Distal Tibia

AO/OTA Classification		Description	Screw Projection Options	Treatment Options
Extraarticular (43-A)	 43-A1	Simple Extraarticular Metaphyseal		
	 43-A2	Extraarticular Metaphyseal Wedge fracture		
	 43-A3	Extraarticular Metaphyseal Multifragmentary fracture		


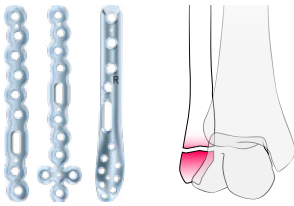
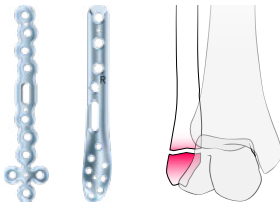


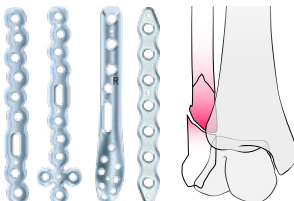

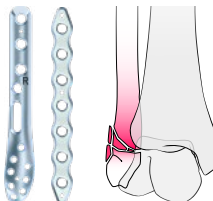

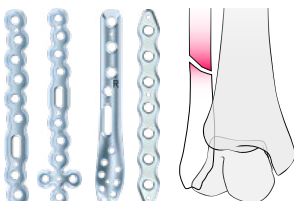

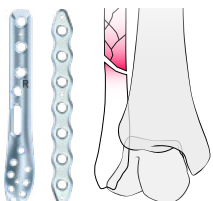
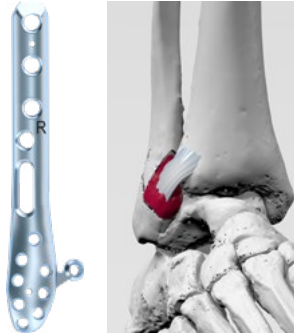
The above-mentioned information is a recommendation only. The operating surgeon is solely responsible for the choice of the suitable implant for the specific case.

AO/OTA Classification		Description	Screw Projection Options	Treatment Options
Partial articular (43-B)		Partial articular Split fractures Anterior or posterior Volkman		
		Partial articular Split with depression Anterior or posterior Volkman		
		Partial articular Multifragmentary depression Anterior or posterior Volkman		

AO/OTA Classification		Description	Screw Projection Options	Treatment Options
Complete articular (43-C)		Complete articular Simple articular Simple metaphyseal		
		Complete articular Simple articular Multifragmentary metaphyseal		
		Complete articular Multifragmentary articular Multifragmentary metaphyseal		

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.

Distal Fibula

<p>Weber A Infra-Syndesmotic</p> 	<p>2.8 Distal Fibula Straight 2.8 Distal Fibula 2.8/3.5 Distal Fibula Lateral Good Bone</p> 	<p>2.8 Distal Fibular 2.8/3.5 Distal Fibular Lateral Osteoporotic Bone</p> 	<p>2.8/3.5 Distal Fibular Lateral Comminuted Fracture</p> 
<p>Weber B Trans-Syndesmotic</p> 	<p>2.8 Distal Fibula Straight 2.8 Distal Fibula 2.8/3.5 Distal Fibula Lateral 3.5 Straight Plate Good Bone</p> 	<p>2.8/3.5 Distal Fibular Lateral 3.5 Straight Plate Osteoporotic Bone</p> 	<p>2.8/3.5 Distal Fibular Lateral 3.5 Straight Plate Comminuted Fracture</p> 
<p>Weber C Supra-Syndesmotic</p> 	<p>2.8 Distal Fibula Straight 2.8 Distal Fibula 2.8/3.5 Distal Fibula Lateral 3.5 Straight Plate Good Bone</p> 	<p>2.8/3.5 Distal Fibula Lateral 3.5 Straight Plate Osteoporotic Bone</p> 	<p>2.8/3.5 Distal Fibular Lateral 3.5 Straight Plate Comminuted Fracture</p> 
<p>Wagstaffe Fractures</p>			

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.

Instrument Application

General Instrument Application

Sizing Templates

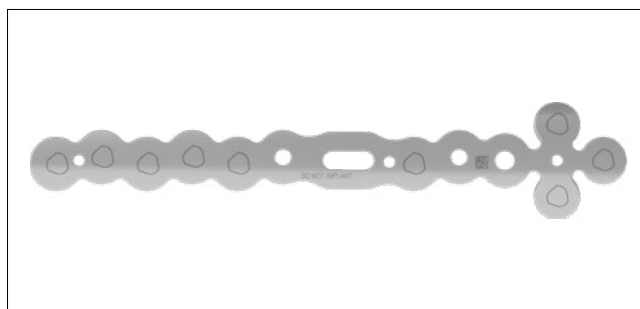
Sizing templates facilitate the intraoperative selection of the appropriate implant.

Sizing templates for the Ankle Trauma System 2.8/3.5 and 3.5 straight plates are available according to chapter "Implants, Instruments and Containers".

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 cortical screw



Sizing template with TriLock screw hole symbols

The article number of the sizing template (e.g. A-4854.02TP) corresponds to the article number of the sterile implant (e.g. A-4854.02S). The suffix TP stands for template.



A-4854.02TP
Template for A-4854.02S

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 Bending

If required, plates can be bent with the following plate bending pliers or bending irons.

Article No.	Description	For bending of
A-2047	2.0–2.8 Plate Bending Pliers with Pins	2.8 TriLock Distal Fibula Plates 2.8 TriLock Distal Fibula Plates Straight 2.8/3.5 TriLock Distal Fibula Plates Lateral with Flap 2.8/3.5 TriLock Distal Tibia Plates Anterolateral (Flap)
A-2940	3.5/4.0 Plate Bending Pliers	3.5 TriLock Distal Tibia Plates T and L 3.5 Straight Plates
A-2092	Plate Bending Iron	All plates

Depending on the associated system size of the plate there are two different plate bending pliers:

Type 1

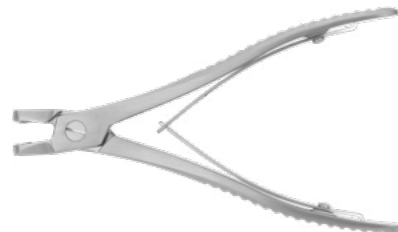
2.0–2.8 Plate Bending Pliers with Pins (A-2047)



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

Type 2

3.5/4.0 Plate Bending Pliers (A-2940)



A-2940
3.5/4.0 Plate Bending Pliers



A-2092
Plate Bending Iron

Warning

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

Plate bending pliers type 1

The plate bending pliers have two different pins to protect the locking holes of flat and curved plates during the bending process. The labeled side of the plate must always face up when inserting the plate into the bending pliers (A-2047).

When bending the curved 2.8 TriLock Distal Fibula plates (A-4854.00-09), the letters "C-CURVED PLATE THIS SIDE UP" must be legible from above. This ensures that the plate holes are not damaged.



Plate bending pliers type 2

The labeled side of the plate must always face up when inserting the plate into the bending pliers (A-2940).

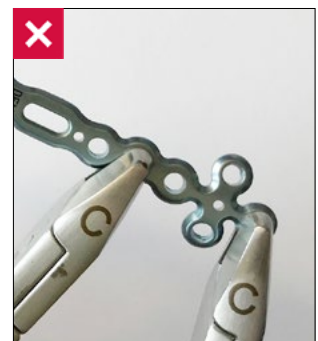
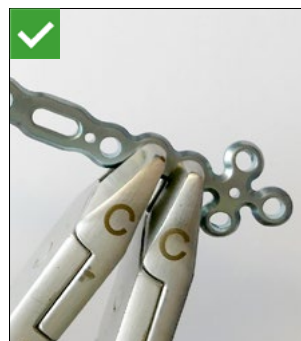
When bending the 3.5 TriLock Distal Tibia T and L plates (A-4954.101-103), the letters "UP" must be legible from above.



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 more than 30°. Bending the plate further may deform the plate holes and may cause the plate to break intra- or 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.

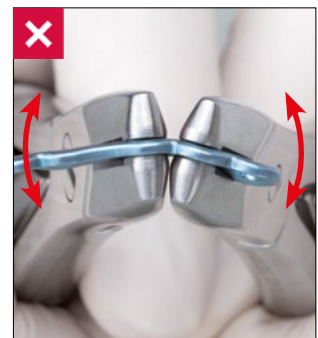
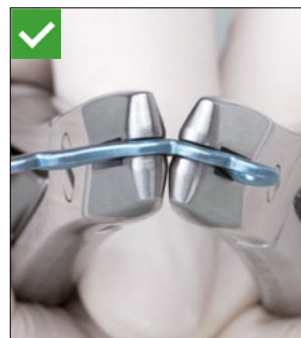
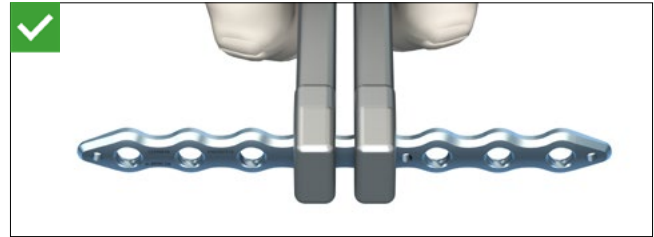
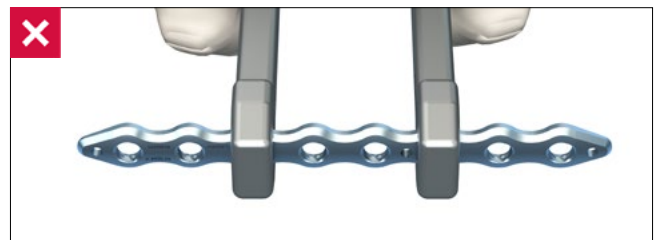


Plate Bending Iron

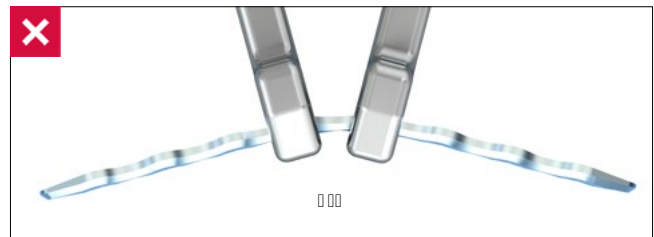
Using the closed slots in the plate bending iron (A-2092), plates can be twisted or bent out of the plate plane.

**Caution**

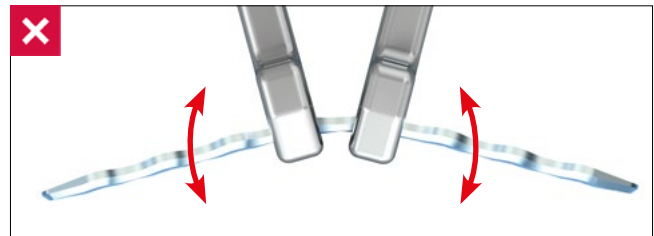
The 2-, 3- and 4-hole plates (A-4950. 20–23) have an increased thickness of 2.4 mm. For their bending, use the larger of the two closed slots in the bending irons.

**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 or bending irons 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.



Bending of Flaps

2.8/3.5 TriLock Distal Fibula Plate Lateral with Flap

The flap on the 2.8/3.5 TriLock distal fibula plate lateral with flap can be bent using the 2.0–2.8 plate bending pliers with pins (A-2047) with the letters “C” legible from above.



2.8/3.5 TriLock Distal Tibia Plates Anterolateral

The flap on the 2.8/3.5 TriLock distal tibia plates anterolateral can be bent using the 2.0–2.8 plate bending pliers with pins (A-2047) positioned in the flap with the letters “C” legible from above. Use the 3.5/4.0 plate bending pliers (A-2940) in the adjacent 3.5 hole with the letters “UP” legible from above.



Warning

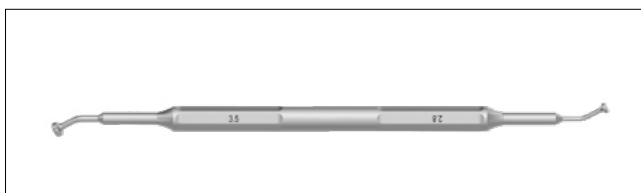
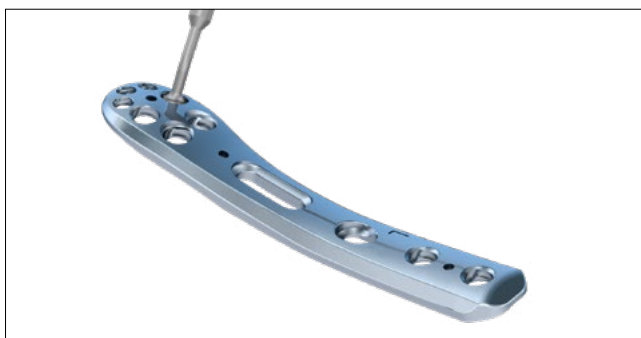
The flaps can be bent once. Bending of the flaps in opposite directions may cause the flap to break intra- or postoperatively.

Plate Bending Iron

Using the closed slots in the plate bending iron (A-2092), the distal tibia plates, including T and L plates, and the distal fibula plates can be twisted or bent out of the plate plane.

Plate Holding and Positioning

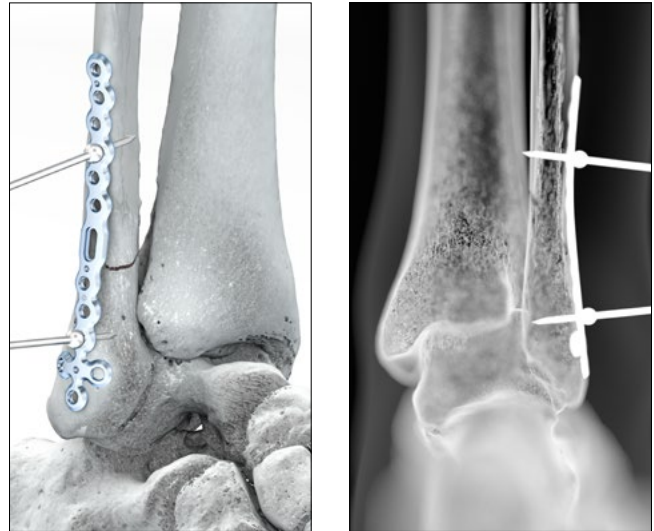
The TriLock ends of the 2.8/3.5 plate holding and positioning Instrument (A-2950) can be locked in the TriLock holes of the plate. The plate holding and positioning instrument facilitates positioning, moving and holding the implant on the bone or it can be used to insert the plate percutaneously after a tunnel for the plate has been prepared (see chapter MIPO Instrument for Tunnel Preparation). The plate holding and positioning instrument can be used with all TriLock 2.8 or 3.5 plate holes.



A-2950
2.8/3.5 Plate Holding and Positioning Instrument

Positioning the plate

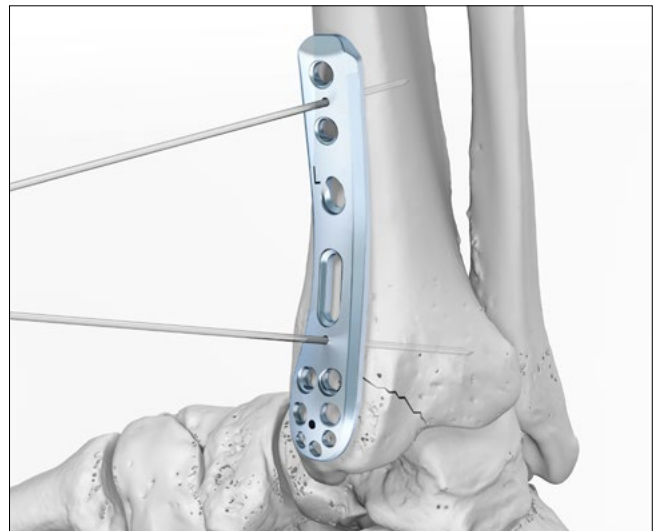
Position the required plate on the bone. For optimal placement, position the plate so that the contour best matches the bone.



Provisional fixation using 1.6 mm K-wire

After reduction of the fracture, provisional fixation of the plates can be performed using 1.6 mm K-wires (A-5040.41, A-5042.41).

The K-wires can be inserted through the provided K-wire holes in the plates to either reposition fracture fragments against the plate or temporarily fix the plate to the bone.



Provisional fixation using 2.0 mm K-wires with olive

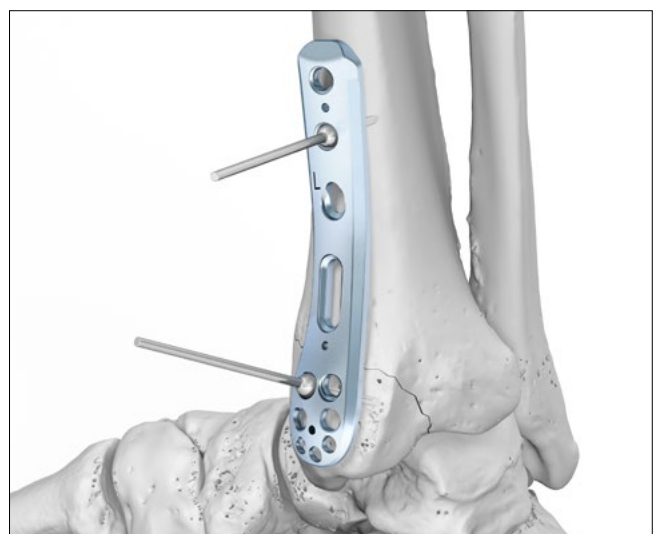
The 2.0 mm K-wires with olive (A-5045.61/1–64/1) can only be inserted through the screw holes in the plate.

Estimate the appropriate thread length needed for the plate and bone combination.

Insert the K-wire with olive into the screw hole and slow down the insertion once the olive comes in contact with the plate.

Caution

Overinsertion can lead to stripping of the bone threads and to loosening of the provisional fixation.



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
2.8	Orange
3.5	Green

Hole Drilling for 2.8 Screws

A-3832

Twist Drill Ø 2.35 mm, AO



Core hole drill with Ø 2.35 mm = one colored ring

A-3834

Twist Drill Ø 2.9 mm, AO



Gliding hole drill with Ø 2.9 mm = two colored rings

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

Hole Drilling for 3.5 Screws

3.5 Cortical

A-3934

Twist Drill Ø 2.6 mm, AO



Core hole drill with Ø 2.6 mm = one colored ring

A-3933

Twist Drill Ø 3.6 mm



Gliding hole drill with Ø 3.6 mm = two colored rings

3.5 TriLock

A-3931

Twist Drill Ø 3.0 mm, AO



Core hole drill with Ø 3.0 mm = one colored ring

For 2.8 screws the twist drill must always be guided by the drill guide (A-2820) or the self-holding drill sleeve (A-2826).



A-2820
2.8 Drill Guide



A-2826
2.5/2.8 Drill Sleeve, Self-Holding

For 3.5 screws the twist drill must always be guided by the drill guide (A-2925, A-2927) or the self-holding drill sleeve (A-2921).



A-2925
3.5 Drill Guide, Cortical,
Drill Ø 2.6/3.6 mm



A-2927
3.5 Drill Guide, TriLock, Drill Ø 3.0 mm



A-2921
3.5 Drill Sleeve, Self-Holding

The double-ended drill guides (A-2820, A-2925) are used to perform the classic lag screw technique according to AO/ASIF.

Warning

The twist drill must always be guided by the drill guide (A-2820 for 2.8 screws or A-2925, A-2927 for 3.5 screws) or the self-holding drill sleeve (A-2826 for 2.8 screws or A-2921 for 3.5 screws). 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.

Alternatively, the self-holding drill sleeve (A-2826 for 2.8 screws and A-2921 for 3.5 screws) can be locked with a clockwise turn in the TriLock holes of the plate (no more than $\pm 15^\circ$). It thus performs all the functions of a drill guide without the need to be held



A-2826
2.5/2.8 Drill Sleeve, Self-Holding



A-2921
3.5 Drill Sleeve, Self-Holding

Warning

For TriLock plates ensure that the screw holes are predrilled with a pivoting angle of no more than $\pm 15^\circ$. For this purpose, the drill guide features a limit stop of $\pm 15^\circ$. A predrilled pivoting angle of $>15^\circ$ no longer allows the TriLock screws to correctly lock in the plate.



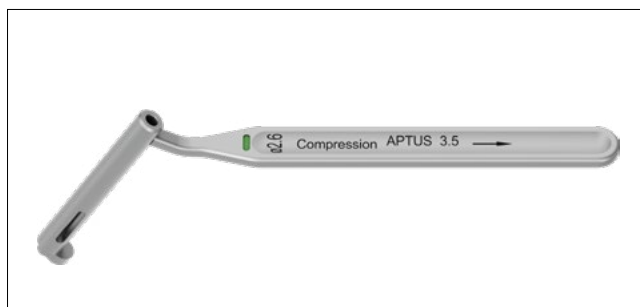
A-2927
3.5 Drill Guide, TriLock

Compression Drill Guide

The single-ended 3.5 drill guide for compression (A-2926) is used in the compression hole of the 2.8/3.5 TriLock distal tibia plate medial and provides compression up to 3 mm across the fracture or osteotomy site.

Warning

The arrow "→" indicates the direction of the compression and must always point towards the fracture/osteotomy line.



A-2926
3.5 Drill Guide, Compression

Assigning the Screw Length

The depth gauges (A-2836, A-2931) are used to assign the ideal screw length for use in monocortical or bicortical screw fixation.

Warning

It is important to use the correct depth gauge for the corresponding screw diameter, which is indicated on the slider and handle of the 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 end of the slider onto the plate or directly onto the bone.

When using the lag screw technique, place the 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.

When inserting a 3.5 cortical screw, the screw length may also be assigned directly from the scale on the twist drill \varnothing 2.6 mm (A-3934) in combination with the drill guide (A-2925). The length is assigned from the end of the drill guide.

Screw Pick-Up

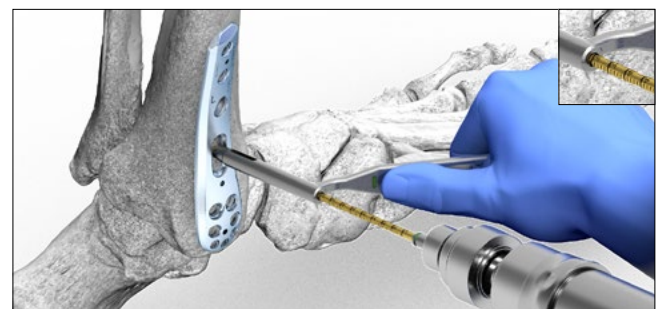
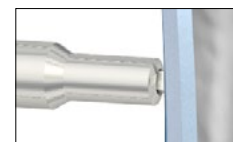
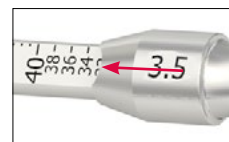
Both the 2.8 screwdriver blade (A-2013) and the 3.5 screwdriver blade (A-2911) feature the HexaDrive self-holding system.



A-2931
3.5/4.0 Depth Gauge, 10–70 mm



A-2836
2.8 Depth Gauge



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



A-2911
3.5/4.0 Screwdriver Blade, HD15, AO

2.8 screws

For 2.8 screws, attach only the orange color-coded 2.5/2.8 screwdriver blade (A-2013) to the cannulated handle with quick connector (A-2073).



A-2073
Cannulated Handle with Quick Connector, AO

3.5 screws

For 3.5 screws, attach only the green color-coded 3.5/4.0 screwdriver blade (A-2911) to either the handle with quick connector (A-2074) or the T-handle with quick connector (A-2075).



A-2074
Handle with Quick Connector, AO



A-2075
T-Handle with Quick Connector, AO

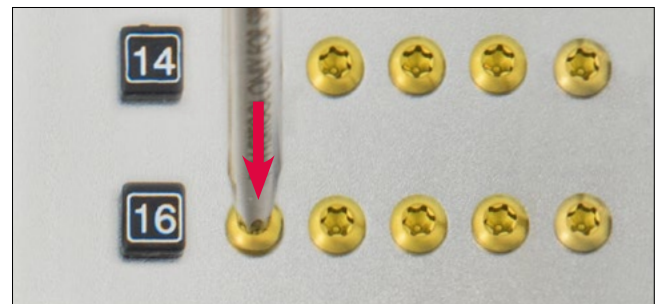
Warning

Do not use the orange color-coded 2.5/2.8 screwdriver blade (A-2013) with the large handle (A-2074) or with the T-handle (A-2075), as the high forces generated can damage the locking of the screw head in the plate hole.

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

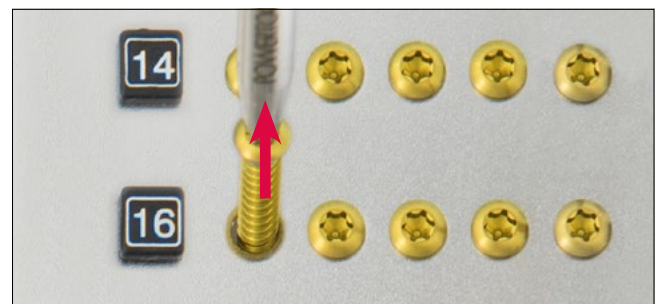
Notice

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

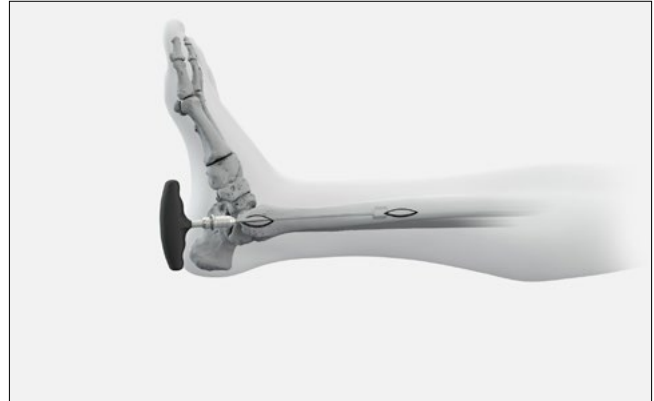
MIPO Instrument for Tunnel Preparation

In a percutaneous procedure of the tibia or fibula, the MIPO instrument for tunnel preparation (A-2051) can be used to prepare the path for the plate next to the periosteal tissue.

Attach the MIPO tunnel preparation instrument (A-2051) to either the handle with quick connector (A-2074) or to the T-handle with quick connector (A-2075).

Warning

It is important when using the MIPO tunnel preparation instrument that the surgeon is aware of the anatomical structures in the area where the instrument is to be used.



2.8/3.5 Plate Holding and Positioning Instrument

The TriLock end of the plate holding and positioning instrument (A-2950) 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 plate holes. Choose the appropriate end of the instrument based on the size of the selected distal plate hole. Insert the tip of the instrument into the appropriate plate hole and pick up the plate.

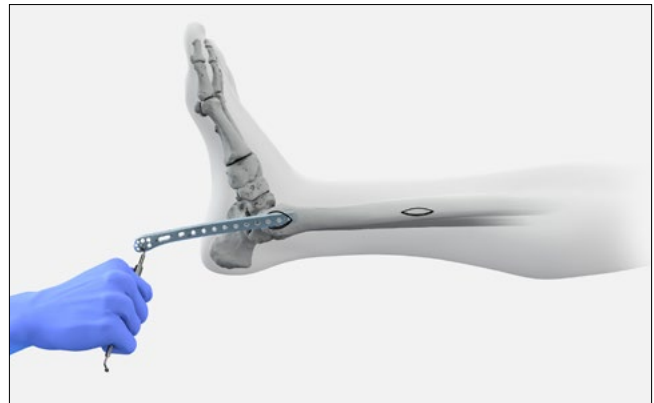
Caution

For maximum holding it is recommended to select the largest TriLock hole for insertion of the 2.8/3.5 plate holding and positioning instrument.

Slide the plate through the prepared tunnel space and along the bone. Always keep the plate in contact with the bone.

Notice

For MIPO insertion do not use excessive force to insert the plate, as this may cause the plate holding and positioning instrument to unlock from the plate hole or damage the tip of the plate holding and positioning instrument.



Large Reduction Forceps

Reduction of the syndesmosis can be achieved using the reduction forceps 230 mm (A-7041).

Use X-ray control to verify the reduction of the syndesmosis and to confirm that the joint is not overcompressed.



Drill Guide for Compression

Insert the 3.5 drill guide for compression (A-2926) into the 3.5 compression hole of the 2.8/3.5 medial distal tibia plate.

The drill guide is used together with the twist drill \varnothing 2.6 mm (A-3934) for 3.5 cortical screws.

Up to 3 mm of compression can be achieved through the compression hole.

Warning

The arrow on the drill guide indicates the direction of the compression and must always point towards the fracture/osteotomy line.



Surgical Techniques

General Surgical Techniques

Lag Screw Technique

The drill guides for 2.8 cortical screws (A-2820) and 3.5 cortical screws (A-2925) are used to perform the classic lag screw technique according to AO/ASIF.

Warning

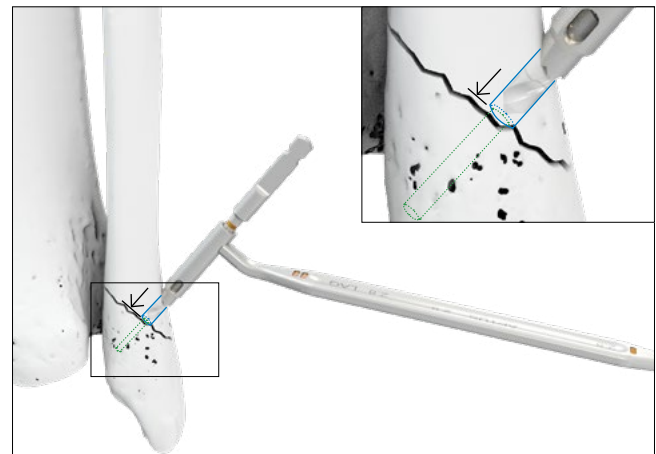
Incorrect application of the lag screw technique(s) may result in postoperative loss of reduction.

1. Drilling the gliding hole

Use the twist drills (A-3834 or A-3933) for gliding holes (two colored rings) of the required screw size in combination with the end of the drill guide labeled with "LAG". Drill perpendicular to the fracture line.

Do not drill further than to the fracture line.

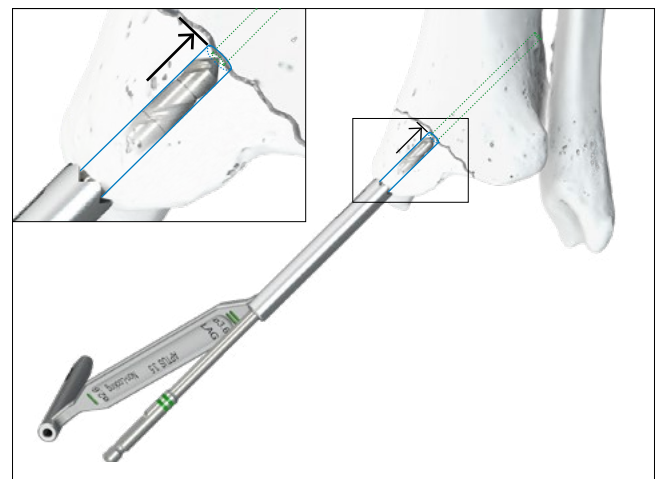
2.8 cortical screws: Twist Drill \varnothing 2.9 mm (A-3834)



2.8 cortical screws
Gliding hole

A-3834
Twist Drill \varnothing 2.9 mm = two colored rings

3.5 cortical screws: Twist Drill \varnothing 3.6 mm (A-3933)



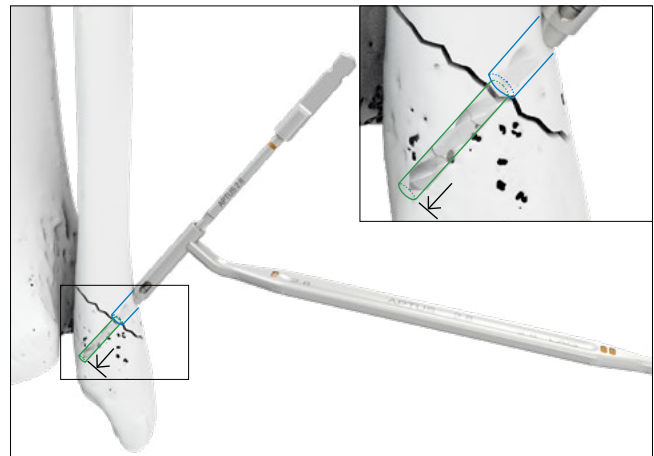
3.5 cortical screws
Gliding hole

A-3933
Twist Drill \varnothing 3.6 mm = two colored rings

2. Drilling the core hole

Place the end of the drill guide with one colored marking onto the drilled gliding hole and use the twist drills (A-3832 or A-3934) to drill the core holes (one colored ring) of the required screw size.

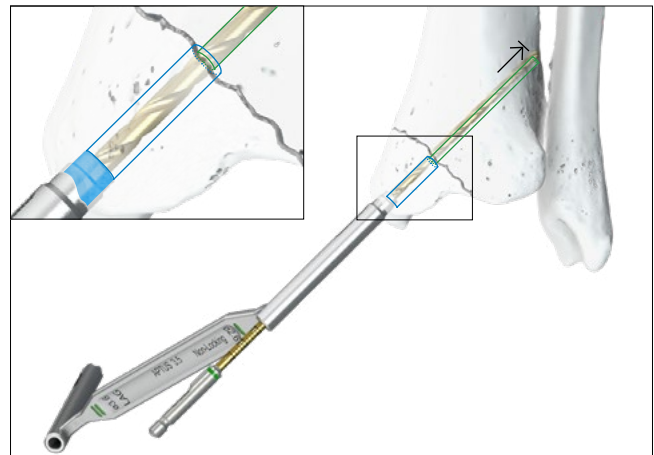
2.8 cortical screws: Twist Drill \varnothing 2.35 mm, AO (A-3832)



2.8 cortical screws
Core hole

A-3832
Twist Drill \varnothing 2.35 mm, AO

3.5 cortical screws: Twist Drill \varnothing 2.6 mm, AO (A-3934)

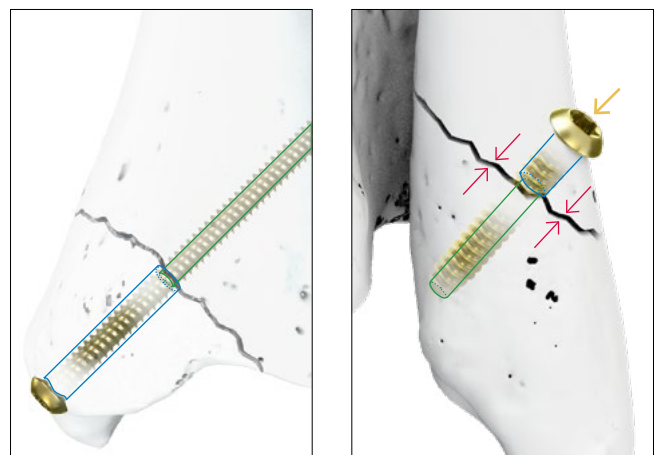


3.5 cortical screws
Core hole

A-3934
Twist Drill \varnothing 2.6 mm, AO

Compressing the fracture

Compress the fracture with the corresponding cortical screw.



Specific Surgical Techniques

2.8/3.5 TriLock Distal Tibia Plates Medial

A-4954.11-18

A-4954.19S-26S (Sterile only)

Distal Tibial Fracture

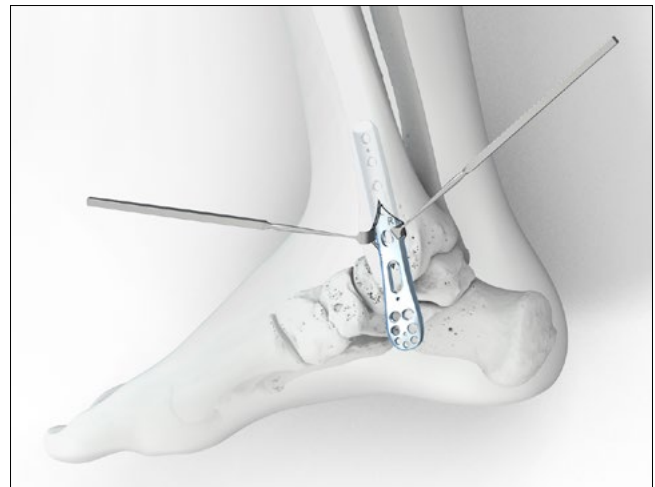
Open procedure

Open the incision as required to expose the fracture site. Carefully push the plate under the soft tissue.

Percutaneous procedure

Insert the plate through the incision and carefully push the plate under the soft tissue in the tunnel which has been prepared with the MIPO instrument for tunnel preparation (A-2051). Ensure that the plate is in contact with the bone.

The plate can be inserted using the plate holding and positioning instrument (A-2950) (see chapter 2.8/3.5 Plate Holding and Positioning Instrument).



1. Temporary fixation

After reduction of the fracture, the plate can be temporarily fixed in the desired position using 1.6 mm K-wires (A-5040.41, A-5042.41) or 2.0 mm K-wires with olive (A-5045.61/1-64/1).

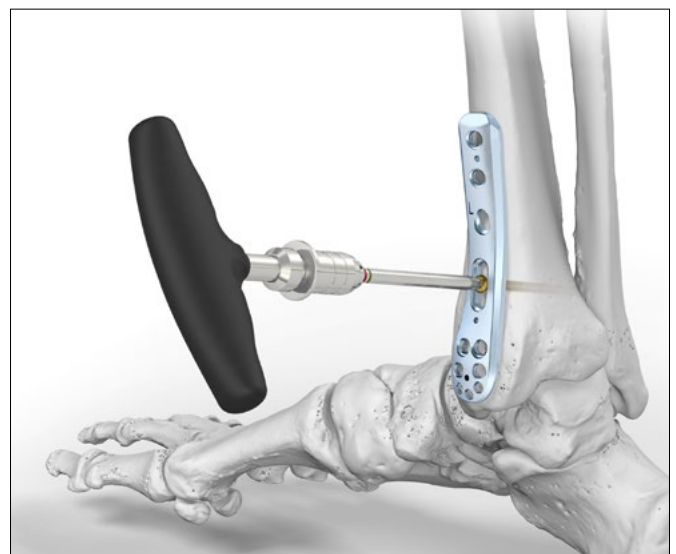
Caution

The 2.0 mm K-wires with olive can only be inserted into the screw holes of the plate.

2. Positioning the plate

If required, the plate can be brought to the bone by drilling a core hole in the center of the oblong hole using the drill guide (A-2925) and the twist drill \varnothing 2.6 mm (A-3934, one colored ring).

Assign the screw length using the 3.5/4.0 depth gauge (A-2931). Pick up a 3.5 cortical screw (A-5901.xx) of the determined length with the help of the screwdriver blade (A-2911) and the handle (A-2074 or A-2075) and insert it into the corresponding plate hole.



After positioning the plate, use X-ray control to verify the alignment on the bone. Make any adjustments before inserting the screws.

If the plate position needs to be adjusted: remove the K-wires, slightly loosen the cortical screw in the oblong hole, readjust the position of the plate and retighten the cortical screw.

3. Attaching the plate

Assess the fracture pattern and decide on the correct screw insertion sequence required. The choice of angular stable screws generally provides a higher stability of the construct, especially in case of a comminuted fracture or poor bone quality.

Insertion of distal screws

The distal section of the plate accepts three 2.8 cortical screws or 2.8 TriLock screws, which can facilitate the capture of the distal medial malleolus, and four 3.5 cortical or 3.5 TriLock screws.

Insertion of 3.5 cortical or 3.5 TriLock screws:

Drill through the 3.5 cortical or 3.5 TriLock screw holes of the plate using the 3.5 cortical drill guide (A-2925) with the twist drill \varnothing 2.6 mm (A-3934) or the 3.5 TriLock drill guide (A-2927) or 3.5 self-holding drill sleeve (A-2921) and the twist drill \varnothing 3.0 mm (A-3931).

Assign the screw length using the 3.5/4.0 depth gauge (A-2931).

Caution

The T-handle (A-2075) must always be used to lock 3.5 TriLock screws.

Insertion of 2.8 cortical or 2.8 TriLock screws:

Drill through the 2.8 cortical or 2.8 TriLock screw holes of the plate using the 2.8 drill guide (A-2820) or the 2.5/2.8 self-holding drill sleeve (A-2826) and the twist drill \varnothing 2.35 mm (A-3832).

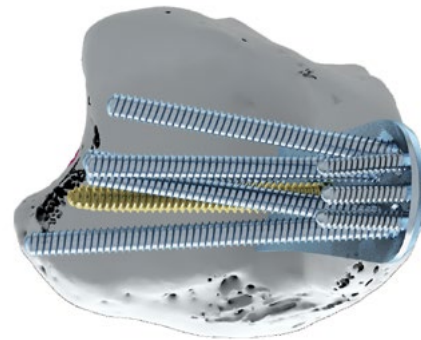
Assign the screw length using the 2.8 depth gauge (A-2836).

Warning

The cannulated handle with quick connector (A-2073) must always be used to lock 2.8 TriLock screws.

Caution

When drilling the holes for the distal screws, care must be taken that the drilling channels do not cross.



Insertion of proximal 3.5 screws

If compression is required to reduce a fracture, drill a core hole through the compression screw hole in the plate using the twist drill \varnothing 2.6 mm (A-3934) and the 3.5 drill guide for compression (A-2926).

If a 3.5 cortical screw has already been inserted into the oblong hole, slightly loosen this screw before compression is performed.

Assign the screw length using the 3.5/4.0 depth gauge (A-2931) and insert a 3.5 cortical screw to achieve compression.

4. Filling the remaining screw holes

Fill the remaining screw holes preferably with 2.8 or 3.5 TriLock screws (A-5850.xx or A-5950.xx) or with 2.8 or 3.5 cortical screws (A-5800.xx or A-5901.xx) as indicated by the type of fracture.

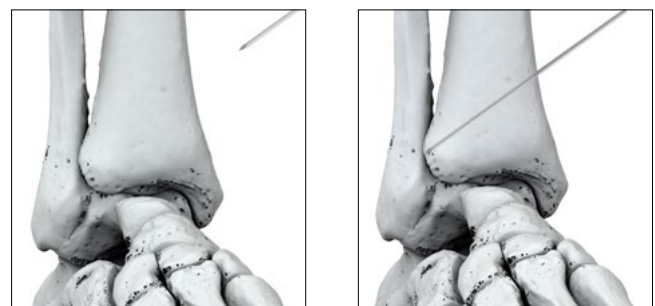
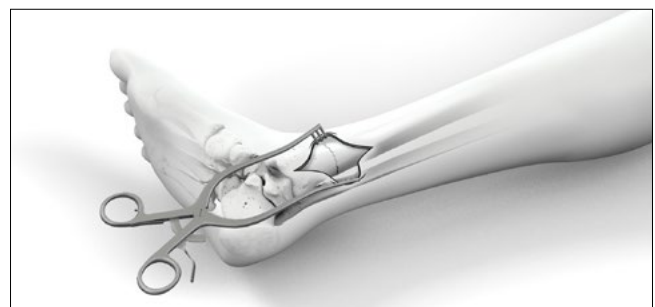
Warning

Make sure correct locking has been achieved (see chapter TriLock Locking Technology).

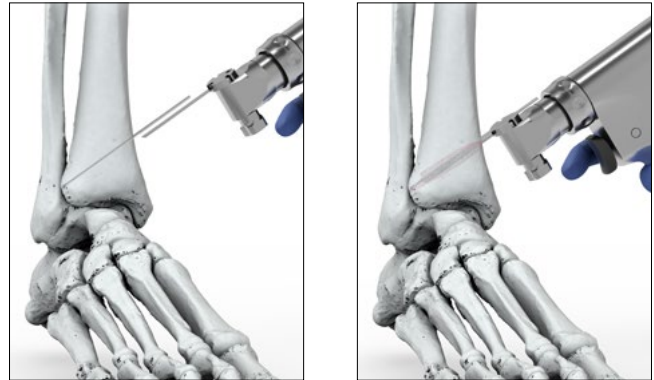
Supramalleolar Tibial Osteotomy**Open procedure**

Open the incision with a medial distal tibial approach and protect the soft tissue with two Hohmann retractors (A-7017) or tissue retractors.

Place two 1.6 mm K-wires to simulate the wedge angle required and use X-ray control to check alignment and angle of the K-wires.



Perform the osteotomy with a saw blade along the K-wires. Take care not to break the lateral cortex at the apex of the distal part of the tibia so that it can be used as a hinge.



Osteotomy along K-wires

Open or close the osteotomy manually. In the case of a closed osteotomy, a compression forceps can also be used.



Opening of osteotomy with preservation of lateral cortex

1. Temporary fixation

After the creation of the medial distal tibial osteotomy, the plate can be temporarily fixed in the desired position using 1.6 mm K-wires (A-5040.41, A-5042.41) or 2.0 mm K-wires with olive (A-5045.61/1-64/1).

Caution

The 2.0 mm K-wires with olive can only be inserted into the screw holes of the plate.

2. Positioning the plate

After positioning the plate, use X-ray control to check the alignment on the bone. Make any adjustments before inserting screws.

3. Attaching the plate

Insertion of distal 3.5 TriLock screws:

In a supramalleolar osteotomy it is recommended to insert 3.5 TriLock screws in the distal section of the plate first.

Drill the 3.5 TriLock screw holes of the plate using the 3.5 TriLock drill guide (A-2927) or the 3.5 self-holding drill sleeve (A-2921) and the twist drill Ø 3.0 mm (A-3931).

Assign the screw length using the 3.5/4.0 depth gauge (A-2931).

Caution

The T-handle (A-2075) must always be used to lock 3.5 TriLock screws.

Insertion of proximal 3.5 screws:

If compression is required to reduce the osteotomy, drill through the compression screw hole in the plate using the Ø 2.6 mm twist drill (A-3934) and the 3.5 drill guide for compression (A-2926).

Assign the screw length using the 3.5/4.0 depth gauge (A-2931) and insert a 3.5 cortical screw to achieve compression.

4. Filling the remaining screw holes

Fill the remaining screw holes preferably with 3.5 TriLock screws (A-5950.xx).

Warning

Make sure correct locking has been achieved (see chapter TriLock Locking Technology).

2.8/3.5 TriLock Distal Tibia Plates, Anterolateral

A-4954.31–36

A-4954.37S–40S (Sterile only)

Open procedure

Only an open incision is recommended with the 2.8/3.5 TriLock distal tibia plates anterolateral.

Open the incision as required to expose the fracture site. Carefully push the plate under the soft tissue.

1. Temporary fixation

After reduction of the fracture and plate positioning, the plate can be temporarily fixed in the desired position using 1.6 mm K-wires (A-5040.41, A-5042.41) or 2.0 mm K-wires with olive (A-5045.61/1–64/1).

Caution

The 2.0 mm K-wires with olive (A-5045.61/1 -64/1) can only be inserted into the screw holes of the plate.

If the flap is not in the correct position or flat on the bone, it can be bent using the 2.0–2.8 plate bending pliers with pins (A-2047). (See chapter Bending of Flaps)

2. Positioning the plate

Drill a core hole in the center of the oblong hole using the drill guide (A-2925) and the twist drill \varnothing 2.6 mm (A-3934, one colored ring).

Assign the screw length using the 3.5/4.0 depth gauge (A-2931).

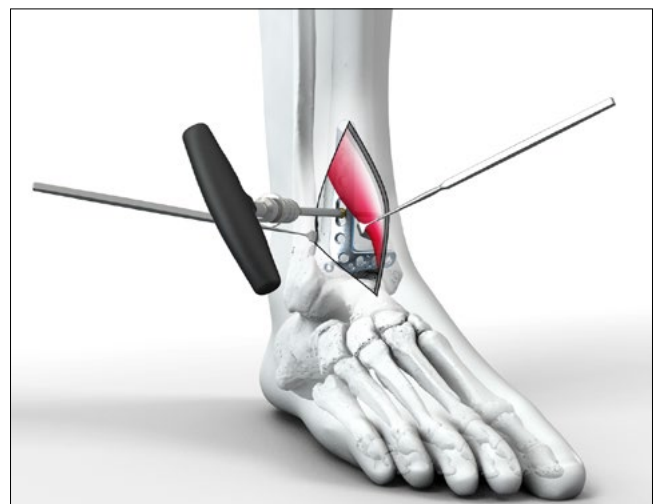
Pick up a 3.5 cortical screw (A-5901.xx) of the determined length using the screwdriver blade (A-2911) and handle (A-2074 or A-2075) and insert it into the corresponding hole.

After positioning the plate, use X-ray control to check the alignment on the bone. Make any adjustments before inserting the screws.

If the plate position needs to be adjusted: remove the K-wires, slightly loosen the cortical screw in the oblong hole, readjust the position of the plate and retighten the cortical screw.



Open procedure with careful insertion of plate under soft tissue.



3. Attaching the plate

Assess the fracture pattern and decide on the correct screw insertion sequence required.

The choice of angular stable screws generally provides a higher stability of the construct, especially in case of a comminuted fracture or poor bone quality.

Insertion of distal screws

The distal section of the plate accepts four 2.8 cortical screws or 2.8 TriLock screws and four 3.5 cortical screws or 3.5 TriLock screws, which facilitate an intersecting scaffold (rafting) to support the distal articular surface.

Insertion of 3.5 cortical or 3.5 TriLock screws:

Drill through the 3.5 cortical or 3.5 TriLock screw holes of the plate using the 3.5 cortical drill guide (A-2925) with the twist drill \varnothing 2.6 mm (A-3934) or the 3.5 TriLock drill guide (A-2927) or 3.5 self-holding drill sleeve (A-2921) and the twist drill \varnothing 3.0 mm (A-3931).

Assign the screw length using the 3.5/4.0 depth gauge (A-2931).

Caution

The T-handle (A-2075) must always be used to lock 3.5 TriLock screws.

Insertion of 2.8 TriLock screws:

Drill through the 2.8 cortical or 2.8 TriLock screw holes of the plate using the 2.8 drill guide (A-2820) or the 2.5/2.8 self-holding drill sleeve (A-2826) and the twist drill \varnothing 2.35 mm (A-3832).

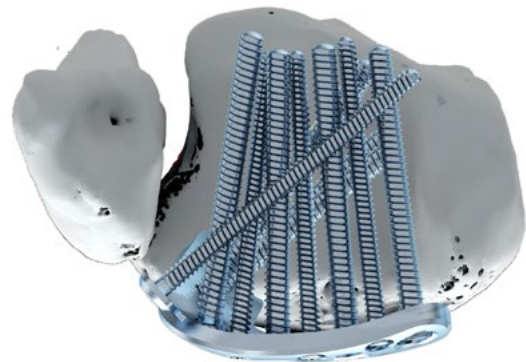
Assign the screw length using the 2.8 depth gauge (A-2836).

Warning

The cannulated handle with quick connector (A-2073) must always be used to lock 2.8 TriLock screws.

Caution

When drilling the holes for the distal screws, care must be taken that the drilling channels do not cross.



Insertion of proximal 3.5 screws

The proximal section of the plate accepts 3.5 cortical or 3.5 TriLock screws.

Insertion of 3.5 cortical or 3.5 TriLock screws:

Drill through the 3.5 cortical or 3.5 TriLock screw holes of the plate using the 3.5 cortical drill guide (A-2925) with the twist drill \varnothing 2.6 mm (A-3934) or the 3.5 TriLock drill guide (A-2927) or 3.5 self-holding drill sleeve (A-2921) and the twist drill \varnothing 3.0 mm (A-3931).

Assign the screw length using the 3.5/4.0 depth gauge (A-2931).

4. Filling the remaining screw holes

Fill the remaining screw holes preferably with 2.8 or 3.5 TriLock screws (A-5850.xx or A-5950.xx) or 2.8 or 3.5 cortical screws (A-5800.xx or A-5901.xx) as indicated by the type of fracture.

Warning

Make sure correct locking has been achieved (see chapter TriLock Locking Technology).

2.8/3.5 TriLock Distal Fibula Plates, Lateral

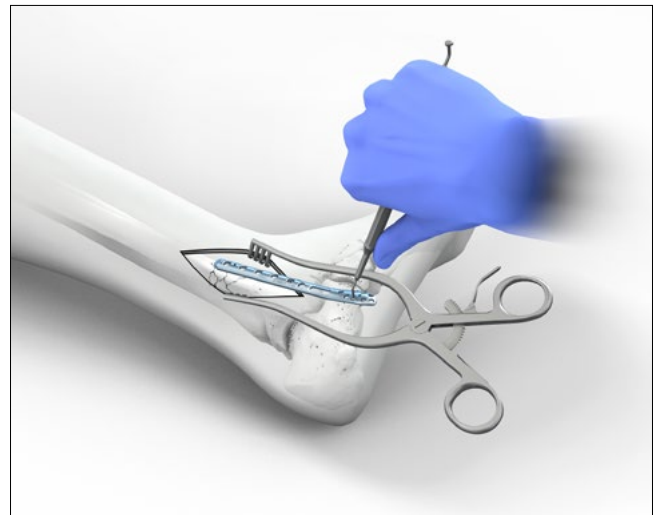
A-4954.00-05

A-4954.06S-09S (Sterile only)

Distal Fibula Fracture

Open procedure

Open the incision as required to expose the fracture site.
Carefully push the plate under the soft tissue.



Percutaneous procedure

Insert the plate through the incision and carefully push the plate under the soft tissue in the tunnel which has been prepared with the MIPO instrument for tunnel preparation (A-2051). Ensure that the plate is in contact with the bone.

The plate can be inserted using the plate holding and positioning instrument (A-2950) (see chapter 2.8/3.5 Plate Holding and Positioning Instrument).

1. Temporary fixation

After reduction of the fracture, the plate can be positioned and temporarily fixed in the desired position using 1.6 mm K-wires (A-5040.41, A-5042.41) or 2.0 mm K-wires with olive (A-5045.61/1-64/1).

Caution

The 2.0 mm K-wires with olive (A-5045.61/1 -64/1) can only be inserted into the screw holes of the plate.

2. Positioning the plate

After positioning the plate, use X-ray control to check the alignment on the bone. Make any adjustments before inserting the screws.

2.8/3.5 TriLock Distal Fibula Plates, Lateral, with Flap

A-4954.51–54

If the flap is not in the correct position to treat the Wagstaffe fracture, or is not flat on the bone, it can be bent using the 2.0-2.8 plate bending pliers with pins (A-2047). (See chapter Bending of Flaps)



Anterior tibiofibular ligament
Flap with 2.8 TriLock screw holding the Wagstaffe fragment

3. Attaching the plate

Assess the fracture pattern and decide on the correct screw insertion sequence required.

The choice of angular stable screws generally provides a higher stability of the construct, especially in case of a comminuted fracture or poor bone quality.

Insertion of distal screws

The distal section of the plates with/without flap accept nine/eight 2.8 cortical or 2.8 TriLock screws respectively.

Insertion of 2.8 cortical or 2.8 TriLock screws:

Drill through the 2.8 cortical or 2.8 TriLock screw holes of the plate using the 2.8 drill guide (A-2820) or the 2.5/2.8 self-holding drill sleeve (A-2826) and the twist drill \varnothing 2.35 mm (A-3832).

Assign the screw length using the 2.8 depth gauge (A-2836).

Warning

The cannulated handle with quick connector (A-2073) must always be used to lock 2.8 TriLock screws.

Caution

When drilling the holes for the distal screws, care must be taken that the drilling channels do not cross.

Insertion of proximal 3.5 screws

The proximal section of the plates accepts 3.5 cortical or 3.5 TriLock screws.

Insertion of 3.5 cortical or 3.5 TriLock screws:

Drill through the 3.5 cortical or 3.5 TriLock screw holes of the plate using the 3.5 cortical drill guide (A-2925) with the twist drill \varnothing 2.6 mm (A-3934) or the 3.5 TriLock drill guide (A-2927) or 3.5 self-holding drill sleeve (A-2921) and the twist drill \varnothing 3.0 mm (A-3931).

Assign the screw length using the 3.5/4.0 depth gauge (A-2931).

Caution

The T-handle (A-2075) must always be used to lock 3.5 TriLock screws.

4. Filling the remaining screw holes

Fill the remaining screw holes preferably with 2.8 or 3.5 TriLock screws (A-5850.xx or A-5950.xx) or with 2.8 or 3.5 cortical screws (A-5800.xx or A-5901.xx) as indicated by the type of fracture.

Warning

Make sure correct locking has been achieved (see chapter TriLock Locking Technology).

Distal Fibula Osteotomy

Open procedure

Open with a lateral approach respecting any former incisions or wounds. Protect the soft tissue with two Hohmann retractors (A-7017) or tissue retractors.

The osteotomy of the fibula can be performed with an oblique or Z-shaped cut. Once the osteotomy has been performed, correct the length, rotation and abduction of the lateral malleolus as needed.



Oblique or Z shaped osteotomy can be performed

1. Temporary fixation

After performing a distal fibula osteotomy, the plate can be positioned and temporarily fixed using 1.6 mm K-wires (A-5040.41, A-5042.41) or 2.0 mm K-wires with olive (A-5045.61/1 -64/1).

After provisional fixation, use X-ray control to check that the osteotomy has achieved the correct length, rotation or adduction of the fibula as required.

Caution

The 2.0 mm K-wires with olive (A-5045.61/1–64/1) can only be inserted into the screw holes of the plate.

2. Attaching the plate

In a distal fibula osteotomy, it is recommended to use angular stable screws both distally and proximally as they generally provide a higher stability of the construct, especially in case of poor bone quality.

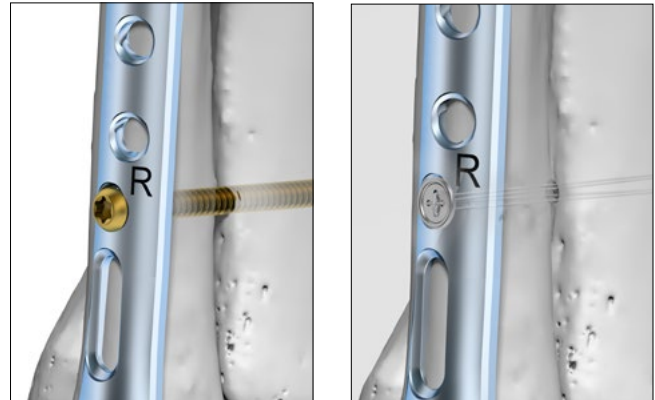
Syndesmotic Fixation

After fibular reconstruction is achieved, tibiofibular instability is determined and the decision whether or not to fix the syndesmosis is made. The decision can be made preoperatively using radiographs or intraoperatively through a series of syndesmotic stress tests.

Syndesmotic reduction is achieved using the reduction forceps (A-7041).

The 2.8/3.5 TriLock distal fibula plates lateral (A-4954.00-09S, A-4954.51-54) feature two options for syndesmotic fixation:

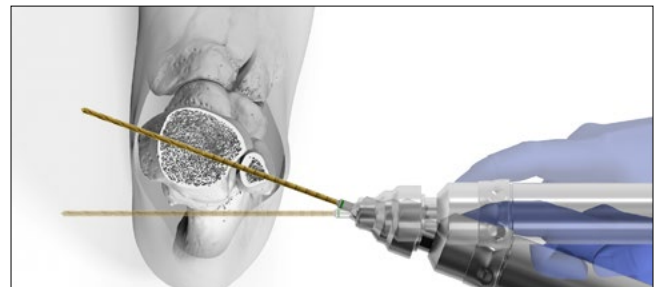
- Single syndesmotic hole with 20° angulation to allow for the proper drill angle of a syndesmotic screw or suture button implant.
- Oblong hole with 20° angulation to allow for the proper drill angle into the center of the distal tibia for one or two 3.5 cortical screws (A-5901.10/1-60/1).



Notice

Suture button implants cannot be used in the oblong hole and will fall through at certain angulations.

One or two 3.5 cortical screws (A-5901.xx) are placed through the fibula to the medial side of the tibia, achieving four points of cortical fixation. Due to the angulation of the syndesmotic holes, the screws run at an anterior trajectory and parallel to the ankle joint. These screws are placed with the intent of no compression (i. e. no lag screw technique is used).

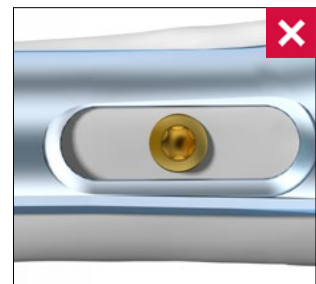
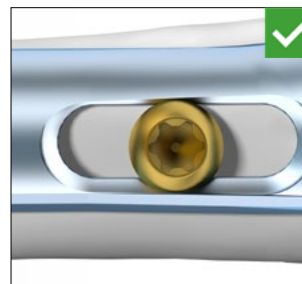


Notice

It is not recommended to use 2.8 cortical screws in the single or oblong syndesmotic hole as the screwhead diameter is too small and the screw will fall through the oblong hole.

Proper level of syndesmotic screw

The first screw is placed approximately 1 cm proximal to the syndesmosis or 4 cm proximal to the ankle joint.



3.5 TriLock Straight Plates

A-4950.20–30

Open procedure

Open the incision as required to expose the fracture site. Carefully push the plate under the soft tissue.

Percutaneous procedure

Insert the plate through the incision and carefully push the plate under the soft tissue in the tunnel which has been prepared with the MIPO instrument for tunnel preparation (A-2051). Ensure that the plate is in contact with the bone.

1. Temporary fixation

The plate can be positioned and temporarily fixed in the desired position using 1.6 mm K-wires (A-5040.41, A-5042.41) or 2.0 mm K-wires with olive (A-5045.61/1-.64/1).

Caution

The 2.0 mm K-wires with olive (A-5045.61/1-.64/1) can only be inserted into the screw holes of the plate.

2. Positioning the plate

After positioning the plate, use X-ray control to check the alignment on the bone. Make any adjustments before inserting the screws.

3. Attaching the plate

The choice of angular stable screws generally provides a higher stability of the construct, especially in case of a comminuted fracture or poor bone quality.

Insertion of 3.5 cortical or 3.5 TriLock screws

Drill through the 3.5 cortical or 3.5 TriLock screw holes of the plate using

- the 3.5 cortical drill guide (A-2925) with the twist drill \varnothing 2.6 mm (A-3934)
- or the 3.5 TriLock drill guide (A-2927)
- or the 3.5 self-holding drill sleeve (A-2921) with the twist drill \varnothing 3.0 mm (A-3931).

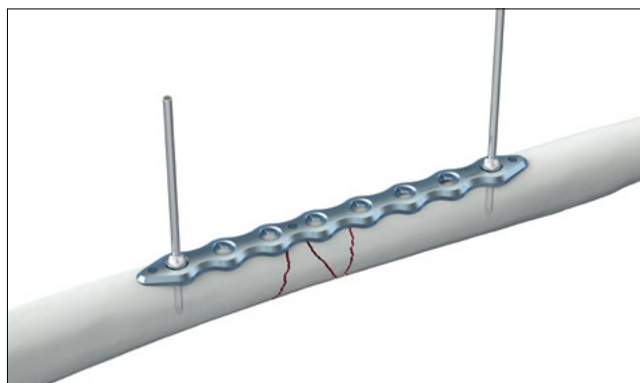
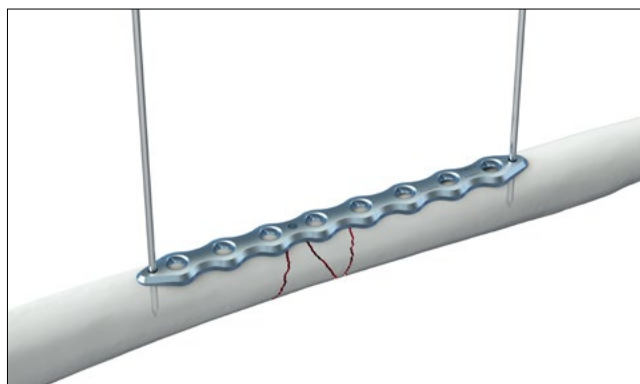
Assign the screw length using the 3.5/4.0 depth gauge (A-2931).

Caution

The T-handle (A-2075) must always be used to lock 3.5 TriLock screws.

Warning

Make sure correct locking has been achieved (see chapter TriLock Locking Technology).



3.5 TriLock Straight Plates – 2-, 3- and 4-Hole (A-4950.20, A-4950.21, A-4950.22)

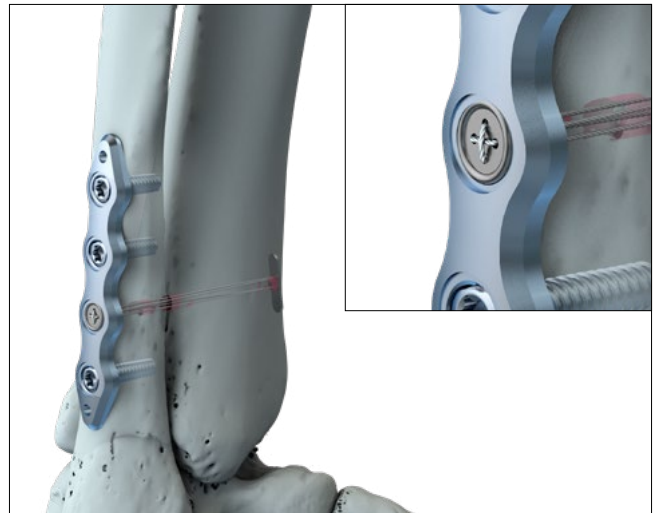


Syndesmotic fixation with a suture button device

Fibula fractures with syndesmosis injuries can be stabilized using the 2-, 3- and 4-hole 3.5 TriLock straight plates as their holes are designed to fit the lateral button of a syndesmosis suture implant, allowing the button to sit flush within the plate.

Caution

The 3.5 TriLock straight plates are only to be used with suture button devices where the buttons are between 5.0–6.5 mm.



2.8 TriLock Distal Fibula Plates

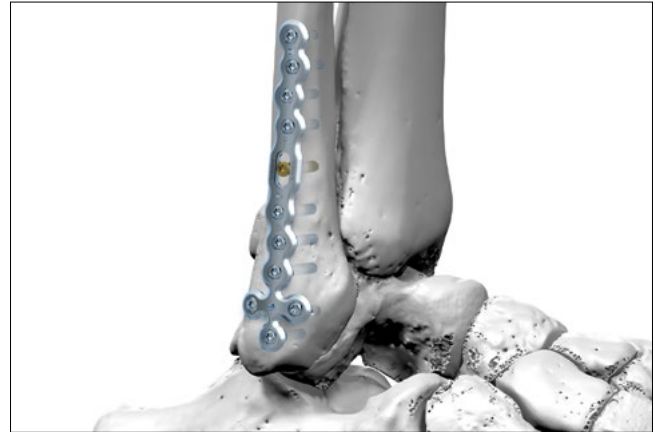
A-4854.00–04

2.8 TriLock Distal Fibula Plates, Straight

A-4854.05–09

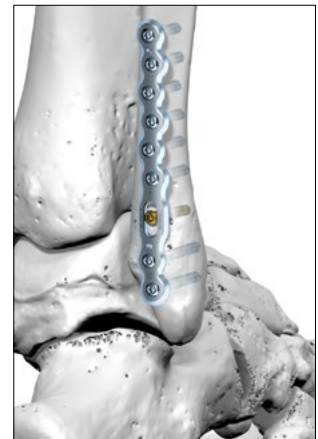
Open procedure

Open the incision as required to expose the fracture site. Carefully push the plate under the soft tissue.



Percutaneous procedure

Insert the plate through the incision and carefully push the plate under the soft tissue in the tunnel which has been prepared with the MIPO instrument for tunnel preparation (A-2051). Ensure that the plate is in contact with the bone.



Posterolateral fixation of fibula

1. Temporary fixation

After reduction of the fracture and restoration of the fibula length, the plate can be positioned and temporarily fixed in the desired position using 1.6 mm K-wires (A-5040.41, A-5042.41) or 2.0 mm K-wires with olive (A-5045.61/1-64/1).

Caution

The 2.0 mm K-wires with olive (A-5045.61/1-64/1) can only be inserted into the screw holes of the plate.

2. Positioning the plate

If required, the plate can be brought to the bone by drilling a core hole in the center of the oblong hole using the drill guide (A-2820) and the twist drill \varnothing 2.35 mm (A-3832, one colored ring). After positioning the plate, use X-ray control to check the alignment on the bone. Make any adjustments before inserting the screws.

If the plate position needs to be adjusted: remove the K-wires, slightly loosen the cortical screw in the oblong hole, readjust the position of the plate and retighten the cortical screw.

3. Attaching the plate

Assess the fracture pattern and decide on the correct screw insertion sequence required.

The choice of angular stable screws generally provides a higher stability of the construct, especially in case of a comminuted fracture or poor bone quality.

Insertion of 2.8 cortical or 2.8 TriLock screws

Drill through the 2.8 cortical or 2.8 TriLock screw holes of the plate using the 2.8 drill guide (A-2820) or the 2.5/2.8 self-holding drill sleeve (A-2826) and the twist drill \varnothing 2.35 mm (A-3832).

Assign the screw length using the 2.8 depth gauge (A-2836).

Warning

The cannulated handle with quick connector (A-2073) must always be used to lock 2.8 TriLock screws.

4. Filling the remaining screw holes

Fill the remaining screw holes with 2.8 TriLock screws (A-5850.xx) or 2.8 cortical screws (A-5800.xx) as indicated by the type of fracture.

Warning

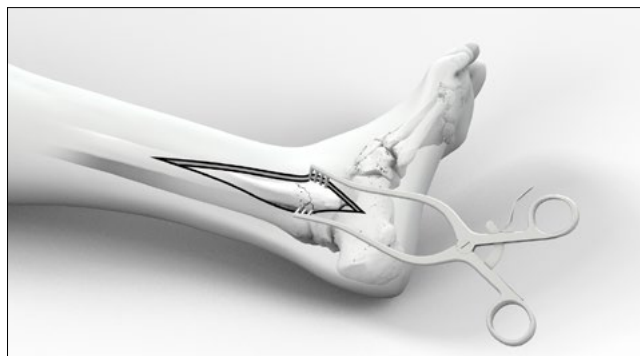
Make sure correct locking has been achieved (see chapter TriLock Locking Technology).

3.5 Distal Tibia T and L Plates

A-4954.101-103

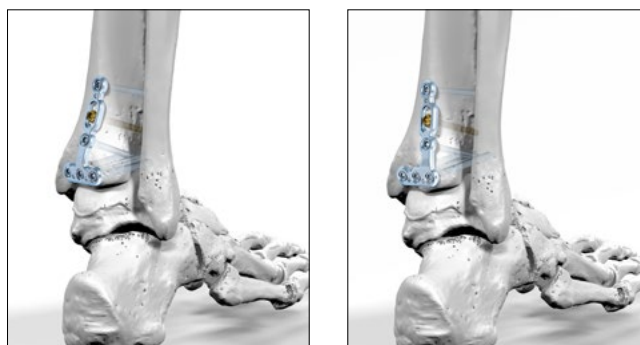
Open procedure

Open the incision as required to expose the fracture site. Carefully push the plate under the soft tissue.



1. Temporary fixation

After reduction of the fracture and plate positioning, the plates can be temporarily fixed in the desired position using 1.6 mm K-wires (A-5040.41, A-5042.41) or 2.0 mm K-wires with olive (A-5045.61/1-64/1).



Posterior fixation with T and L plates

Caution

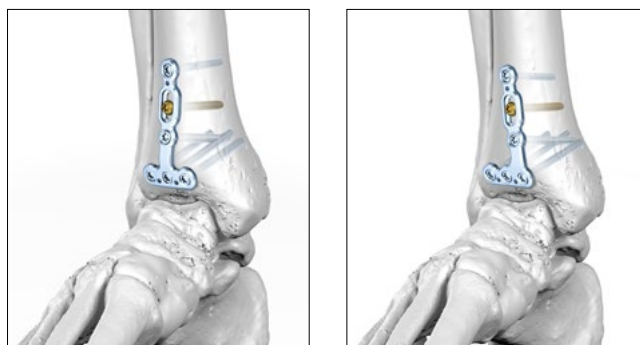
The 2.0 mm K-wires with olive (A-5045.61/1-64/1) can only be inserted into the screw holes of the plate.

2. Positioning the plate

If required, the plate can be brought to the bone by drilling a core hole in the center of the oblong hole using the drill guide (A-2925) and the twist drill \varnothing 2.6 mm (A-3934, one colored ring). After positioning the plate, use X-ray control to check the alignment on the bone. Make any adjustments before inserting the screws.



If the plate position needs to be adjusted: remove the K-wires, slightly loosen the cortical screw in the oblong hole, readjust the position of the plate and retighten the cortical screw.



Anterior fixation with T and L plates

3. Attaching the plate

Assess the fracture pattern and decide on the correct screw insertion sequence required.

The choice of angular stable screws generally provides a higher stability of the construct, especially in case of a comminuted fracture or poor bone quality.

Insertion of 3.5 cortical or 3.5 TriLock screws

The distal screw hole trajectories are angled superiorly, with the intention to avoid the joint space.

Drill through the 3.5 cortical or 3.5 TriLock screw holes of the plate using the 3.5 cortical drill guide (A-2925) with the twist drill \varnothing 2.6 mm (A-3934) or the 3.5 TriLock drill guide (A-2927) or 3.5 self-holding drill sleeve (A-2921) and the twist drill \varnothing 3.0 mm (A-3931).

Assign the screw length using the 3.5/4.0 depth gauge (A-2931).

Caution

The T-handle (A-2075) must always be used to lock 3.5 TriLock screws.

4. Filling the remaining screw holes

Fill the remaining screw holes preferably with 2.8 or 3.5 TriLock screws (A-5850.xx or A-5950.xx) or with 2.8 or 3.5 cortical screws (A-5800.xx or A-5901.xx) as indicated by the type of fracture.

Warning

Make sure correct locking has been achieved (see chapter TriLock Locking Technology).

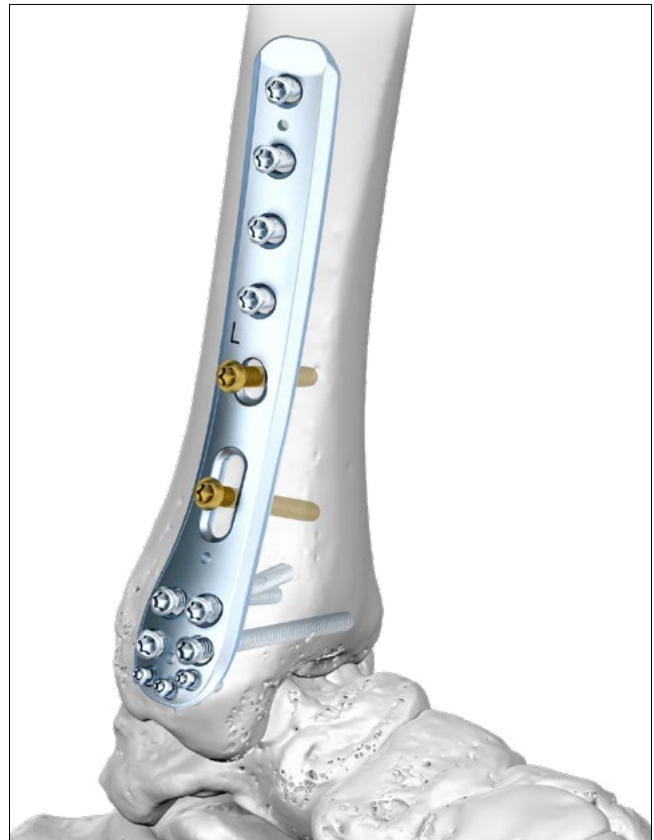
Explantation

Removal of Screws

Unlock all screws from the plate.

When all screws have been unlocked, remove them in a random order.

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



Caution

When removing the screws, ensure that any bone ingrowth in the screw head has been removed, that the screwdriver/screw head connection is aligned in an axial direction, and that a sufficient axial force is used between the blade and the screw.

Only original APTUS instruments are recommended for the explantation of APTUS implants.

TriLock Locking Technology

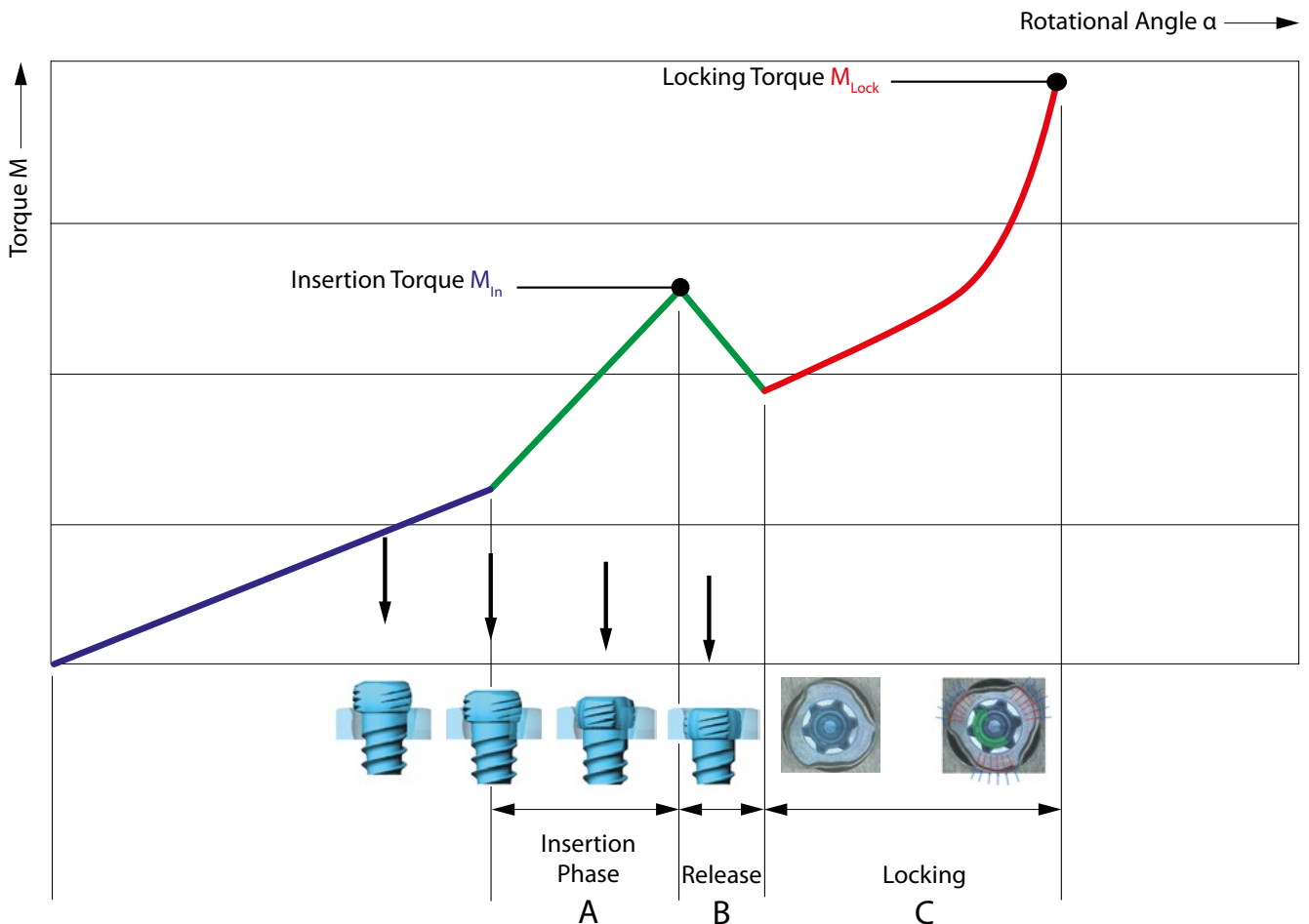
Correct Application of the TriLock Locking Technology – 2.8 TriLock Screws

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.



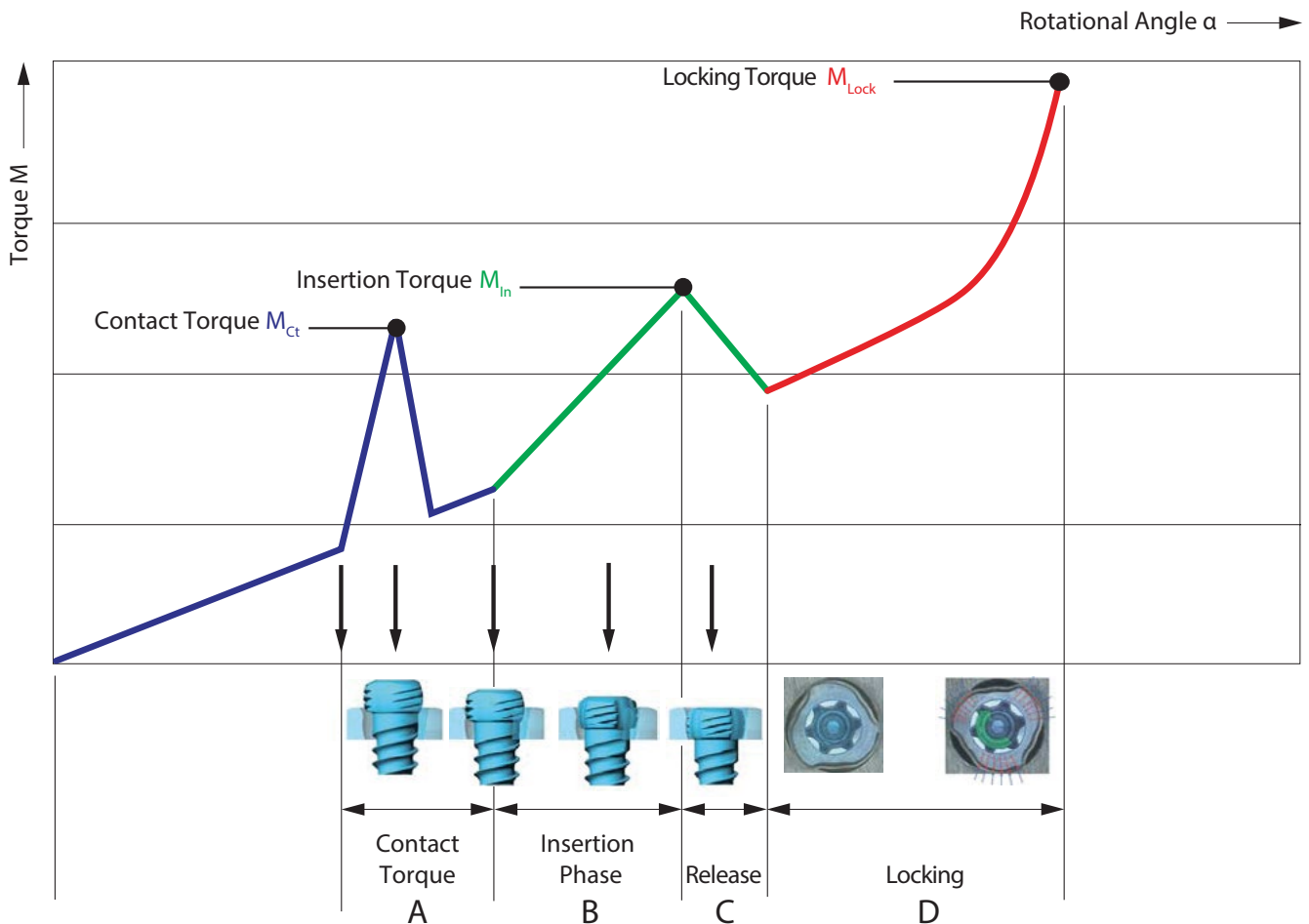
Correct Application of the TriLock Locking Technology – 3.5 TriLock Screws

The screw is inserted through the plate hole into the predrilled bone. A "contact torque" will be felt once the screw head makes contact with the plate surface; for the 3.5 TriLock screws this torque increase is easily perceived (section "A" in the diagram).

The torque then decreases before it starts increasing again during the "Insertion Phase", as the screw head enters the locking hole (section "B" in the diagram). Once the screw head

has entered the locking hole, a second decrease of torque occurs (section "C" in the diagram). Finally, the actual locking is initiated (section "D" in the diagram) as a friction connection is established between screw and plate when tightening firmly. The torque applied in section "D" is decisive for the quality of the locking.

In summary, two intermediate torque maxima have to be overcome before there is the final locking of the screw.



Correct Locking ($\pm 15^\circ$) of the TriLock Screws in the Plate

Correct locking occurs only when the screw head has 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 might 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

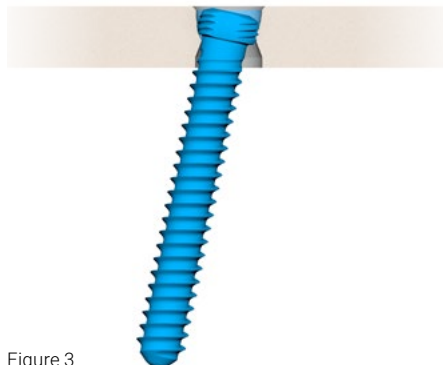


Figure 3

Incorrect: UNLOCKED

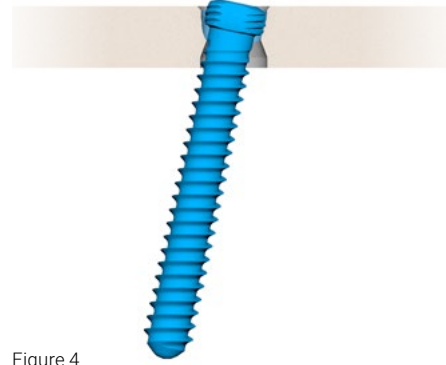


Figure 4

Appendix

Implants, Instruments and Containers

Plates,	A-4950.23S	A-4954.12S	A-4954.53S	A-5800.26/1	A-5850.12/1	A-5850.40/1
Templates	A-4950.23TP	A-4954.13	A-4954.54	A-5800.26/1S	A-5850.12/1S	A-5850.40/1S
A-4854.00	A-4950.24	A-4954.13S	A-4954.54S	A-5800.28	A-5850.14	A-5850.45
A-4854.00S	A-4950.24S	A-4954.14	A-4954.101	A-5800.28/1	A-5850.14/1	A-5850.45/1
A-4854.00TP	A-4950.24TP	A-4954.14S	A-4954.101S	A-5800.28/1S	A-5850.14/1S	A-5850.45/1S
A-4854.01	A-4950.25	A-4954.15	A-4954.101TP	A-5800.30	A-5850.16	A-5850.50
A-4854.01S	A-4950.25S	A-4954.15S	A-4954.102	A-5800.30/1	A-5850.16/1	A-5850.50/1
A-4854.01TP	A-4950.25TP	A-4954.16	A-4954.102S	A-5800.30/1S	A-5850.16/1S	A-5850.50/1S
A-4854.02	A-4950.26	A-4954.16S	A-4954.102TP	A-5800.32	A-5850.18	A-5850.55
A-4854.02S	A-4950.26S	A-4954.17	A-4954.103	A-5800.32/1	A-5850.18/1	A-5850.55/1
A-4854.02TP	A-4950.26TP	A-4954.17S	A-4954.103S	A-5800.32/1S	A-5850.18/1S	A-5850.55/1S
A-4854.03	A-4950.27	A-4954.18	A-4954.103TP	A-5800.34	A-5850.20	A-5850.60
A-4854.03S	A-4950.27S	A-4954.18S		A-5800.34/1	A-5850.20/1	A-5850.60/1
A-4854.03TP	A-4950.27TP	A-4954.19S	Screws	A-5800.34/1S	A-5850.20/1S	A-5850.60/1S
A-4854.04	A-4950.28	A-4954.20S	A-5800.08	A-5800.36	A-5850.22	A-5901.10/1
A-4854.04S	A-4950.28S	A-4954.21S	A-5800.08/1	A-5800.36/1	A-5850.22/1	A-5901.10/1S
A-4854.04TP	A-4950.28TP	A-4954.22S	A-5800.08/1S	A-5800.36/1S	A-5850.22/1S	A-5901.12/1
A-4854.05	A-4950.29	A-4954.23S	A-5800.10	A-5800.38	A-5850.24	A-5901.12/1S
A-4854.05S	A-4950.29S	A-4954.24S	A-5800.10/1	A-5800.38/1	A-5850.24/1	A-5901.14/1
A-4854.05TP	A-4950.29TP	A-4954.25S	A-5800.10/1S	A-5800.38/1S	A-5850.24/1S	A-5901.14/1S
A-4854.06	A-4950.30	A-4954.26S	A-5800.12	A-5800.40	A-5850.26	A-5901.16/1
A-4854.06S	A-4950.30S	A-4954.31	A-5800.12/1	A-5800.40/1	A-5850.26/1	A-5901.16/1S
A-4854.06TP	A-4950.30TP	A-4954.31S	A-5800.12/1S	A-5800.40/1S	A-5850.26/1S	A-5901.18/1
A-4854.07	A-4954.00	A-4954.32	A-5800.14	A-5800.45	A-5850.28	A-5901.18/1S
A-4854.07S	A-4954.00S	A-4954.32S	A-5800.14/1	A-5800.45/1	A-5850.28/1	A-5901.20/1
A-4854.07TP	A-4954.01	A-4954.33	A-5800.14/1S	A-5800.45/1S	A-5850.28/1S	A-5901.20/1S
A-4854.08	A-4954.01S	A-4954.33S	A-5800.16	A-5800.50	A-5850.30	A-5901.22/1
A-4854.08S	A-4954.02	A-4954.34	A-5800.16/1	A-5800.50/1	A-5850.30/1	A-5901.22/1S
A-4854.08TP	A-4954.02S	A-4954.34S	A-5800.16/1S	A-5800.50/1S	A-5850.30/1S	A-5901.24/1
A-4854.09	A-4954.03	A-4954.35	A-5800.18	A-5800.55	A-5850.32	A-5901.24/1S
A-4854.09S	A-4954.03S	A-4954.35S	A-5800.18/1	A-5800.55/1	A-5850.32/1	A-5901.26/1
A-4854.09TP	A-4954.04	A-4954.36	A-5800.18/1S	A-5800.55/1S	A-5850.32/1S	A-5901.26/1S
A-4950.20	A-4954.04S	A-4954.36S	A-5800.20	A-5800.60	A-5850.34	A-5901.28/1
A-4950.20S	A-4954.05	A-4954.37S	A-5800.20/1	A-5800.60/1	A-5850.34/1	A-5901.28/1S
A-4950.20TP	A-4954.05S	A-4954.38S	A-5800.20/1S	A-5800.60/1S	A-5850.34/1S	A-5901.30/1
A-4950.21	A-4954.06S	A-4954.39S	A-5800.22	A-5850.08	A-5850.36	A-5901.30/1S
A-4950.21S	A-4954.07S	A-4954.40S	A-5800.22/1	A-5850.08/1	A-5850.36/1	A-5901.32/1
A-4950.21TP	A-4954.08S	A-4954.51	A-5800.22/1S	A-5850.08/1S	A-5850.36/1S	A-5901.32/1S
A-4950.22	A-4954.09S	A-4954.51S	A-5800.24	A-5850.10	A-5850.38	A-5901.34/1
A-4950.22S	A-4954.11	A-4954.52	A-5800.24/1	A-5850.10/1	A-5850.38/1	A-5901.34/1S
A-4950.22TP	A-4954.11S	A-4954.52S	A-5800.24/1S	A-5850.10/1S	A-5850.38/1S	A-5901.36/1
A-4950.23	A-4954.12	A-4954.53	A-5800.26	A-5850.12	A-5850.40	A-5901.36/1S

A-5901.38/1	A-5950.40/1	A-5045.62/1	A-6608.010
A-5901.38/1S	A-5950.40/1S	A-5045.62/2S	A-6608.011
A-5901.40/1	A-5950.45/1	A-5045.63/1	A-6608.015
A-5901.40/1S	A-5950.45/1S	A-5045.63/2S	A-6608.016
A-5901.45/1	A-5950.50/1	A-5045.64/1	A-6608.017
A-5901.45/1S	A-5950.50/1S	A-5045.64/2S	A-6608.018
A-5901.50/1	A-5950.55/1		A-6608.019
A-5901.50/1S	A-5950.55/1S	Instruments	A-6608.020
A-5901.55/1	A-5950.60/1	A-2013	A-6608.021
A-5901.55/1S	A-5950.60/1S	A-2047	A-6608.022
A-5901.60/1		A-2051	A-6610.71
A-5901.60/1S	Washers	A-2073	A-6610.72
A-5950.10/1	A-4700.70	A-2074	A-6611
A-5950.10/1S	A-4700.70/1	A-2075	M-6710
A-5950.12/1	A-4700.70/1S	A-2092	M-6720
A-5950.12/1S	A-4900.70	A-2820	M-6726
A-5950.14/1	A-4900.70/1	A-2826	M-6727
A-5950.14/1S	A-4900.70/1S	A-2836	
A-5950.16/1		A-2911	
A-5950.16/1S	Twist Drills	A-2913.1	
A-5950.18/1	A-3832	A-2913.2	
A-5950.18/1S	A-3832S	A-2921	
A-5950.20/1	A-3834	A-2925	
A-5950.20/1S	A-3834S	A-2926	
A-5950.22/1	A-3931	A-2927	
A-5950.22/1S	A-3931S	A-2931	
A-5950.24/1	A-3933	A-2940	
A-5950.24/1S	A-3933S	A-2950	
A-5950.26/1	A-3934	A-7009	
A-5950.26/1S	A-3934S	A-7014	
A-5950.28/1		A-7016	
A-5950.28/1S	K-Wires	A-7017	
A-5950.30/1	A-5040.41	A-7018	
A-5950.30/1S	A-5040.41/1	A-7041	
A-5950.32/1	A-5040.41/2S		
A-5950.32/1S	A-5042.41	Containers	
A-5950.34/1	A-5042.41/1	A-6600.020	
A-5950.34/1S	A-5042.41/2S	A-6608.000	
A-5950.36/1		A-6608.001	
A-5950.36/1S	Olive K-Wires	A-6608.002	
A-5950.38/1	A-5045.61/1	A-6608.005	
A-5950.38/1S	A-5045.61/2S	A-6608.006	

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