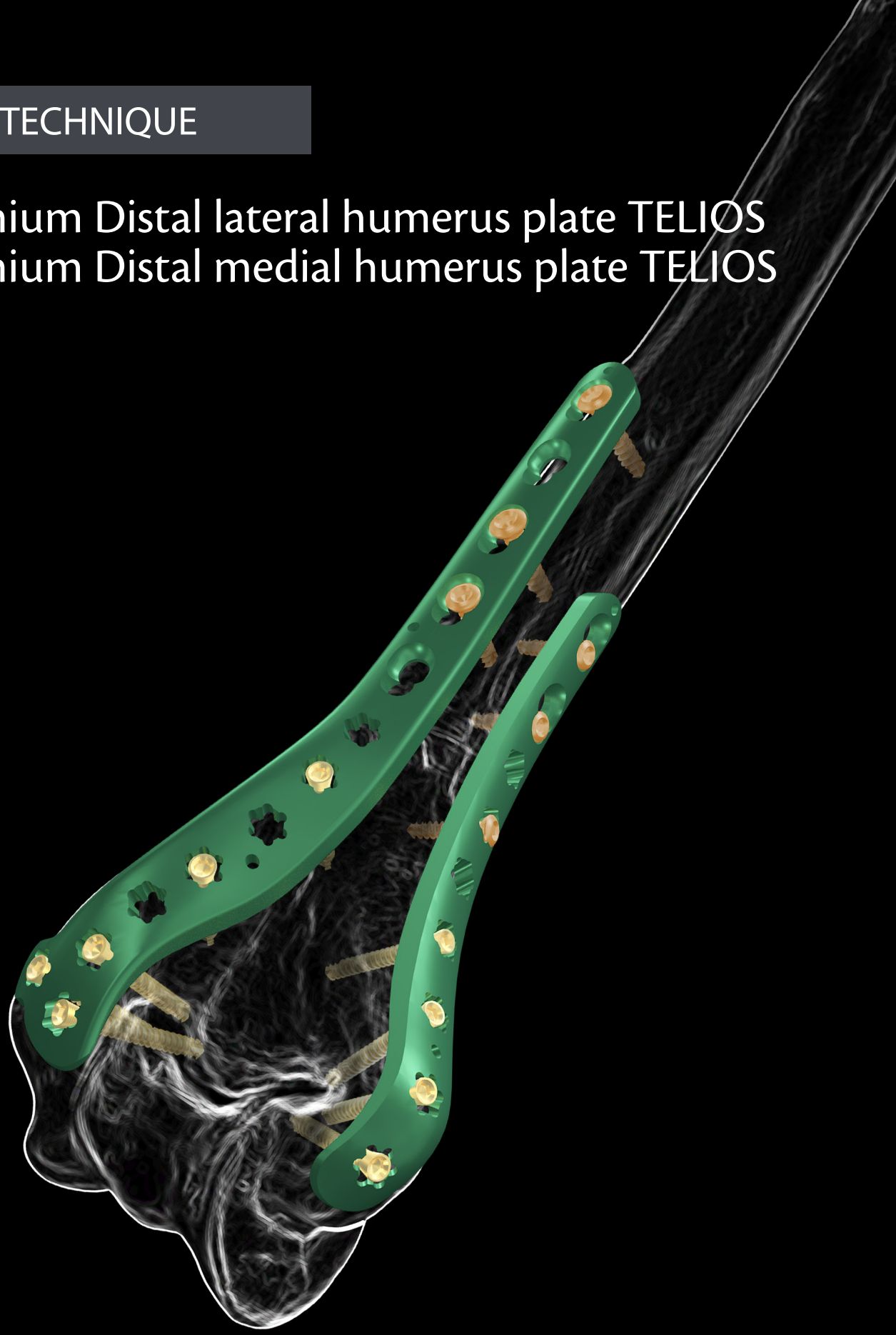
SURGICAL TECHNIQUE

ALP Titanium Distal lateral humerus plate TELIOS
ALP Titanium Distal medial humerus plate TELIOS



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TECHNOLOGICAL ADVANTAGES

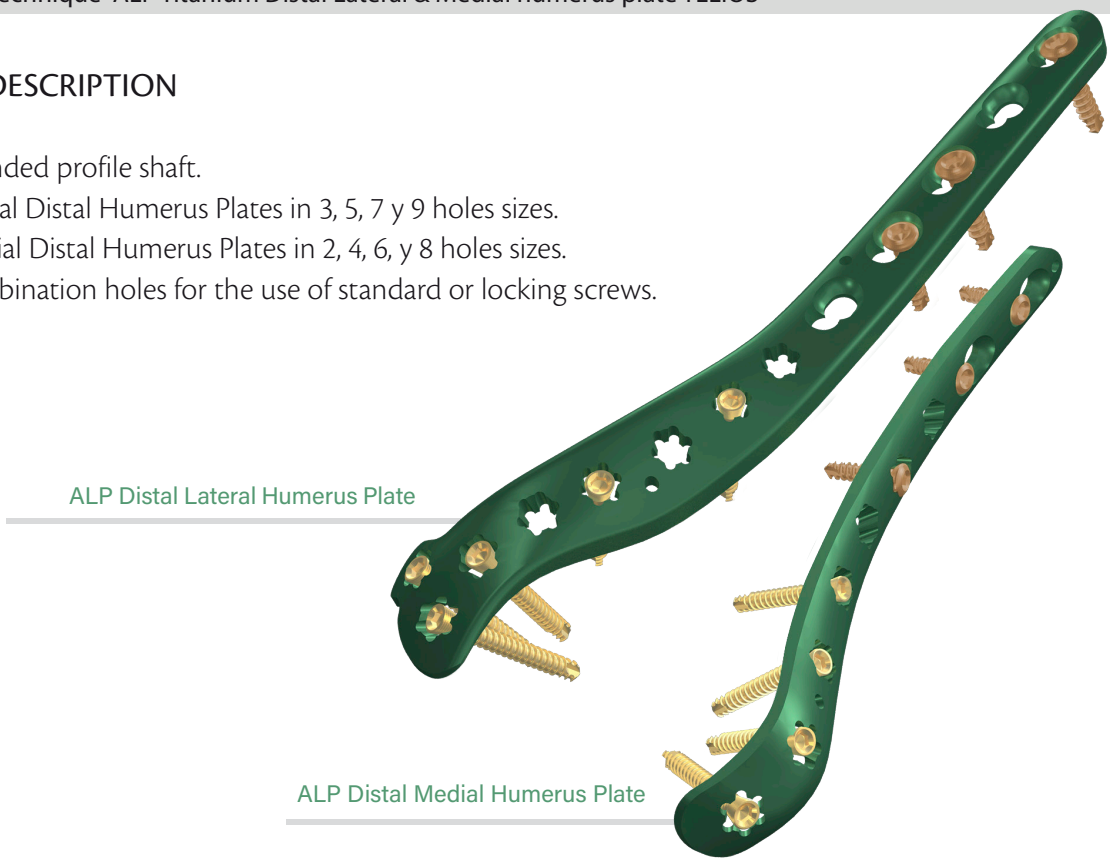
Distal humerus fractures can become one of the most difficult types of fractures that orthopedic surgeons deal with. These types of fractures are normally intra-articular or affect areas with poor bone quality; this results in the desired stability in this area being somewhat complex. Stable fixation in this area allows early mobility, which in turn can lead to better functional results. At the same time, the limited soft tissue coverage and defined anatomical shape require implants that can adapt to anatomical structures.

With these concepts in mind, Traufix has developed distal humerus plates that can form a system of anatomical locking plates and can be adapted to the requirements of these complex fractures.
The plate has reconstruction plate segments that allow it to be molded if necessary.

Left and right plates are available in titanium alloy (Ti6Al4V ELI).

PLATE DESCRIPTION

- Rounded profile shaft.
- Lateral Distal Humerus Plates in 3, 5, 7 y 9 holes sizes.
- Medial Distal Humerus Plates in 2, 4, 6, y 8 holes sizes.
- Combination holes for the use of standard or locking screws.



SURGICAL INDICATIONS

The **TELIOS ALP Distal Humerus Plate** is recommended in the following cases:

Indications

1. Intra-articular fractures of the distal humerus.
2. Supracondylar fractures of the distal humerus.
3. Pseudoarthrosis of the distal humerus.
4. Osteotomies of the distal humerus (p. g., due to defective consolidation, deformities).

General contraindications:

Systemic inflammatory response syndrome (to be evaluated by the surgeon).
Septicemia.
Osteomyelitis.
Patient unable to comply with post-operation care.
Hypersensitivity to the materials (titanium).

DESCRIPTION OF THE SURGICAL TECHNIQUE

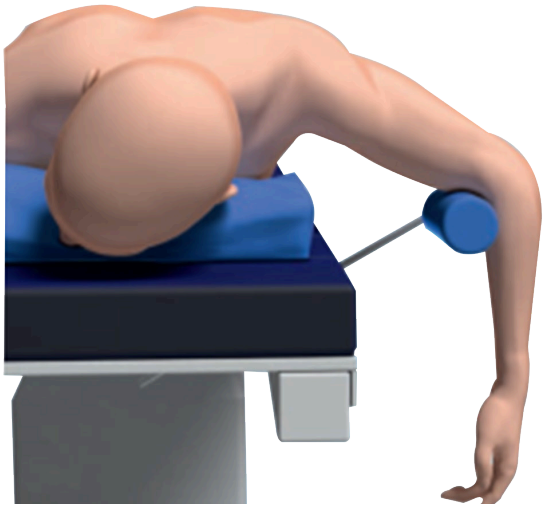
1. Pre-operation Planning

It is strongly recommended that before proceeding complete the pre-operation radiographic evaluation and develop the pre- operation plan in addition to determining plate length and screw position.

2. Patient Placement

Depending on the medical condition of the patient, it can be placed in two positions, in general, the lateral decubitus position is chosen, but in severe C3, fractures, the prone position can be used, if the patient is otherwise fit. For this, the arm is allowed to rest on a padded bar that allows a 120º flexion of the elbow. The use of a tourniquet is not essential, preferably sterile, but it can facilitate the identification of the ulnar nerve.

Caution
This technique is suggested to describe the use TRAUFIX instruments and implants, not aiming to interfere with the experience and decisions of the traumatologist considering his/her vast clinical and surgical experience to determine the best proposal for each particular patient.



3. Surgical Approach

All fractures are approached through a slightly curved posterior incision, slightly curved immediately radial to the olecranon. The ulnar nerve is carefully identified and may need to be isolated and elevated at the ulnar epicondyle.

The type of approach is determined by the nature of the fracture, and by the preference and experience of the surgeon. In the case of supracondylar or simple joint fractures, it may be sufficient to expose the nerves on both sides of the triceps. For comminuted fractures, a distally pointed V-osteotomy of the olecranon optimally exposes the fracture.

If you are using long plates, elevate the radial nerve over the humerus and place the plate underneath. The radial nerve, on the other hand, rarely needs to be identified other than by palpation and it is rarely necessary to isolate or elevate it in these fractures.

4. Fracture reduction and temporary fixation

For type C fractures, reduce the articular fragments of the distal block by direct vision or fluoroscope and temporarily fix them with Kirschner needles or pointed reduction forceps.

Secure the joint block to the shaft with the aid of Kirschner needles or reduction forceps in both columns to ensure that the anatomy of the distal humerus is restored.

Make sure that neither the Kirschner needles nor the forceps interfere with the posterior plate placement.

If necessary, reduce the joint block with separate screws.

Note: Locking screws are not suitable for reduction as they cannot effect compression. Therefore, before inserting the locking screws, the fracture must be reduced.

5. Determining the length of the plates

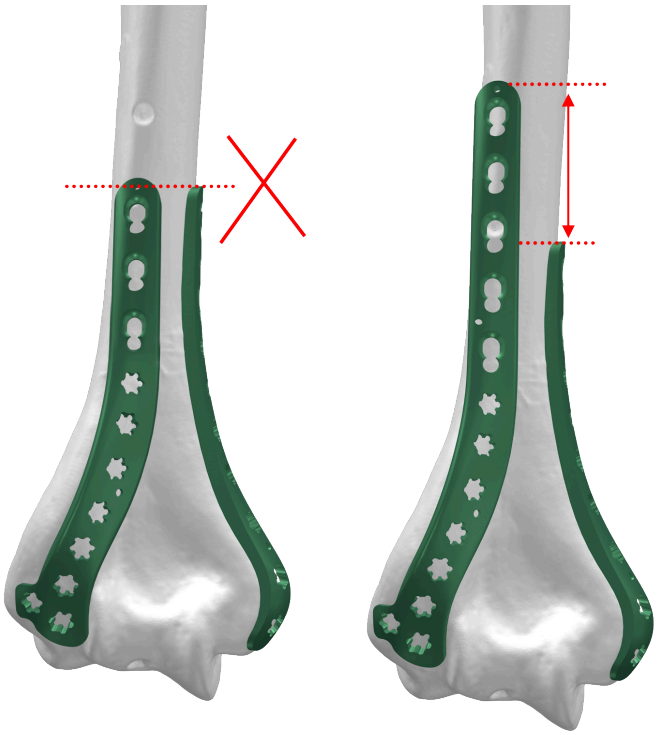
Select an appropriate size plate for the fracture. It is recommended to choose a plate size that allows sufficient fixation proximal to the fracture line. For type A or C fractures (AO classification), to achieve sufficient stability for early mobilization, two plates should be used: one for the medial column and one for the lateral one. The use of a single plate should be limited to simple fractures, in which one column remains intact.

Caution:

To avoid high diaphyseal stress, the medial and dorsolateral plates should not be the same length, for example, use a short medial plate with a medial dorsolateral or lateral plate. For fractures that extend to the diaphysis, always use the lateral and medial plates, in order to have sufficient strength, especially if 9 holes plates are used.

6. Lateral plate placement

Dorsolateral plates allow screw insertion in the posteroanterior direction. The plate holder allows additional screws to be placed through the external epicondyle in a lateromedial direction.



6.1 Plate placement

Place the plate on the dorsolateral aspect of the distal humerus, with the distal spoon-shaped portion covering the non- articulated portion of the head of the humerus, and with the lateral support extending over the most prominent tip of the lateral epicondyle, immediately proximal to the insertion of the external collateral ligament. Check that the shaft is positioned a safe distance from the olecranon fossa. (See image 1)

The position of the plate should allow insertion of the distal screw through the lateral support so that it reaches the medial face through the joint block..

Caution:

The distal position of the plate must be chosen carefully to ensure that there is no invasion of the radial head and thus no loss of extension. Normally the distance between the plate and the cartilage should not be less than 3mm.

Image 1

6.2 Temporary plate fixation

After proper plate placement, use the drill guide and the 2.5mm diameter drill bit to pre-drill both cortices. (See image 2).

Note: The plate can be temporarily fixed with Ø 1.6mm diameter Kirschner needles inserted through the Kirschner needle holes.

Determine the required length of the cortex screw using the depth meter. (See image 3).

Insert the appropriate Ø 3.5mm cortex screw with the help of the Hex Screwdriver. Be careful not to overtighten the screw. (See image 4).

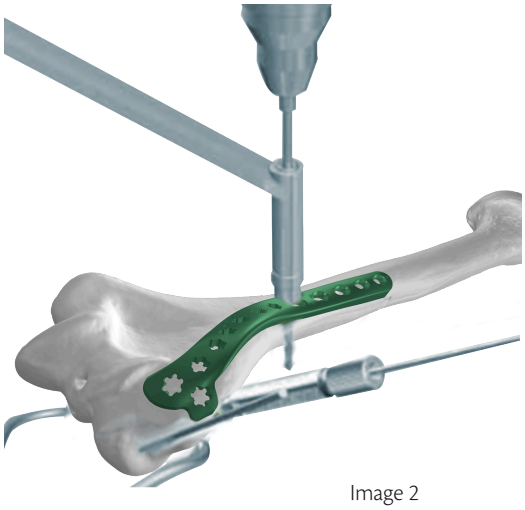


Image 2

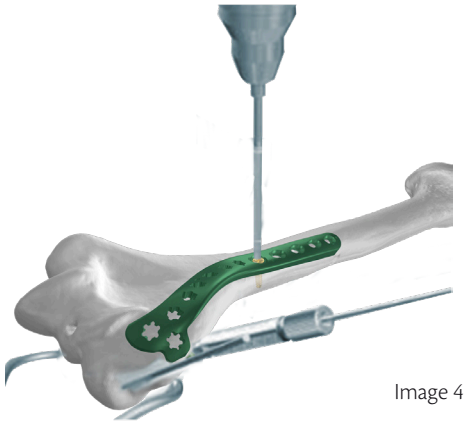


Image 4

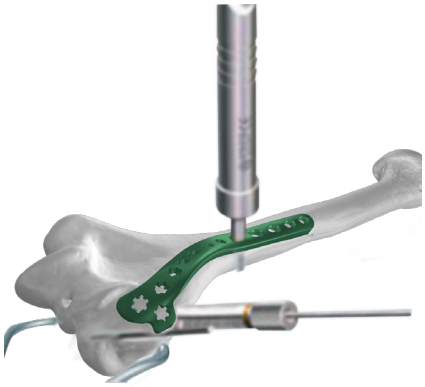


Image 3

6.3 2.5 mm Distal screws placement

Screw the threaded drill guide (128.20) into one of the threaded holes in the distal portion of the plate and drill a pre-hole with the 2.0mm diameter drill bit. Check the depth of the drill bit with the fluoroscope. (See image 5).

The fixed angle end of the drill guide ensures that the drill follows the nominal path of the locking hole.

Determine the required screw length using the scale on the drill guide. If there is only one visible mark on the drill, the 6 - 30mm scale is applied; if two marks are visible, the 34 - 58mm scale is applied.

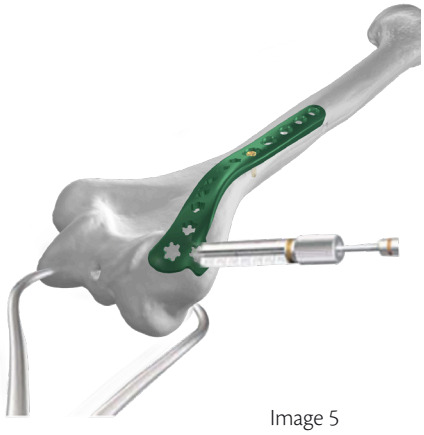


Image 5

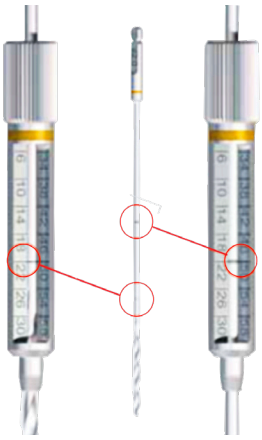


Image 6

Alternative Technique: Remove the Drill Guide and measure the screw length with the percutaneous depth meter.
The locking screw is inserted manually using a screwdriver and a torque limiter. (See image 6 and 7).

When the screw is locked in the plate, a "click" is heard.

Important: Always use the torque limiter when inserting locking screws; otherwise, the plate or the screws may be damaged.

Image 7

Repeat the above steps for all distal holes used.

Caution: Check that the screws do not protrude into the olecranon or coronoid fossa. (See image 8).
Important: It is recommended to use at least one screw on the lateral face that passes through the distal block. The length of the screw should be 40 to 60mm, depending on the size of the humerus. The recommended screw length for the capitellum is 16 to 24mm.

Important: When driving screws into the capitellum, be careful not to damage the articular surface from screws that are too long. It is recommended to verify the position of the screws with the fluoroscope by mobilizing the elbow.

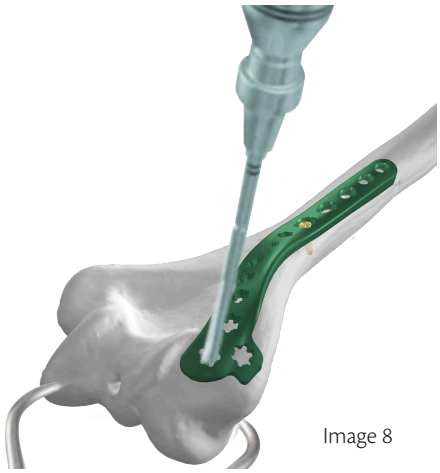


Image 8

7. Medial plate placement

Place the medial plate on the medial ridge, slightly dorsal to the intermuscular septum. The medial plate with extension will wrap around the medial epicondyle (See image 9).

To determine the optimal plate position, use the drill guide and a Kirschner needle. If necessary, check the position with the fluoroscope.

The distal screws should be inserted as far into the bone as possible; therefore, choose a plate position that allows the longest possible screw placement (See image 10). If necessary, bend the plate in order to ensure optimum plate fit and optimal positioning of the long screws through of the articular block.

Image 9

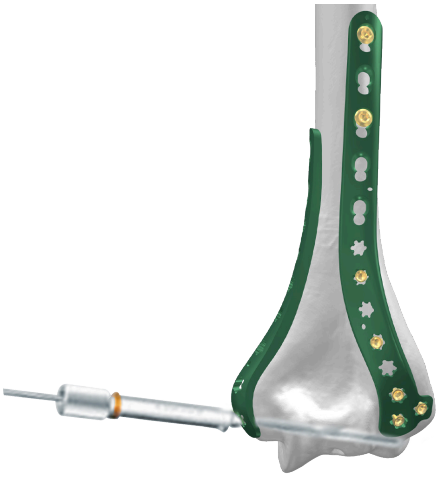


Image 10

7.1 Temporary plate fixation

To fix the distal position of the plate, use a Kirschner needle through the drill guide in the distal hole. Make sure there is no collision with the implanted screws. (See image 11)

Guide and the 2.5mm diameter drill bit to pre-drill both cortices. Determine the required length of the cortex screw using the depth meter. (See image 12)

Insert a Ø 3.5mm cortex Screw through the Dynamic Compression Portion (DCU) of the Elongated Hole using the Hex screwdriver. Be careful not to overtighten the screw. (See image 13)

To tighten the screws in a neutral position and ensure the lowest possible profile frame, press down on the drill guide.

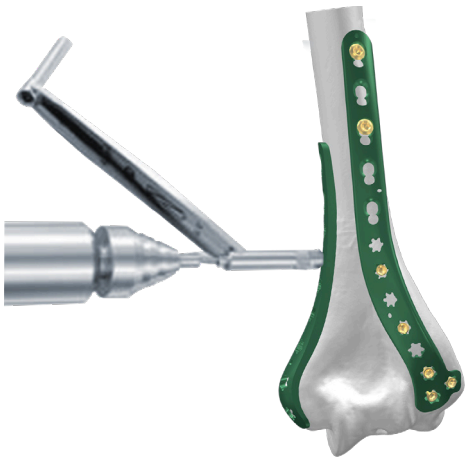


Image 11

7.2 2.5 mm Distal screws placement

To insert the locking screws, follow a procedure similar to that for the dorsolateral plate (see procedure used for the dorsolateral plate). (See image 14)

Important: Care must be taken when drilling as a collision with the dorsolateral plate screws may occur. In case of collision, stop the drill and use a suitable screw for fixing. Use other available holes for inserting more screws.

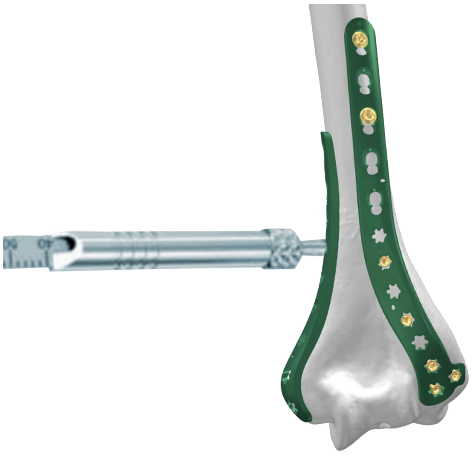


Image 12

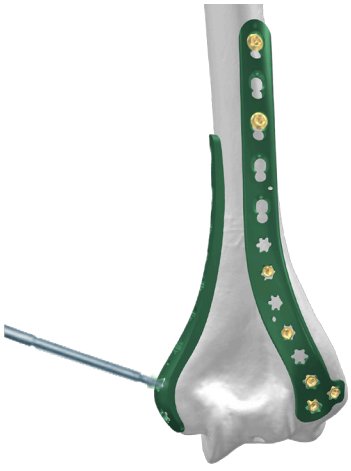


Image 14

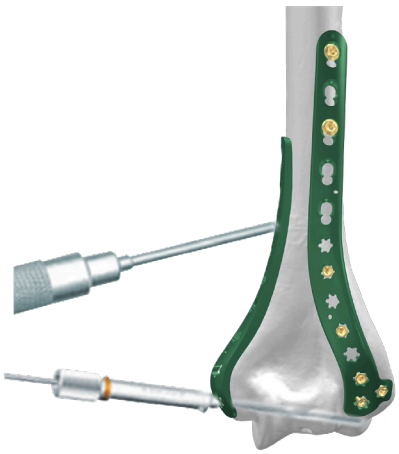
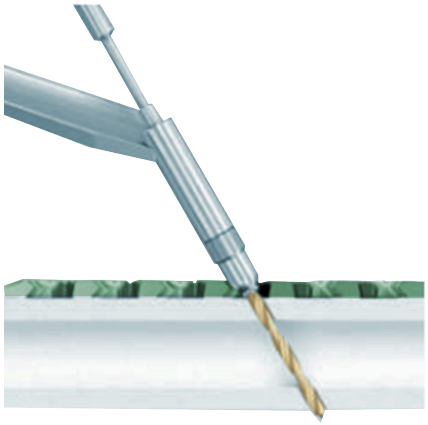


Image 13



I

II

III

8. Fixing the screws to the diaphysis

After securing the distal portion of the lateral and medial plates, determine where the locking or cortex screws will be used in the plate shaft.

Note: If you plan to use a combination of locking and cortex screws, the latter should be inserted first, in order to bring the bone closer to the plate.

8.1 Fixation with Ø 3.5 mm cortex screws

Use the Ø 2.5mm drill bit with the universal drill guide 3.5 to drill the bone bicortically. (See image I)

To tighten the screws to a neutral position and ensure the lowest possible profile structure, press down on the drill sleeve toward the unthreaded hole. To obtain compression, place the drill guide at the end of the non-threaded hole most distant from the fracture, without applying downward pressure on the spring loaded tip.

Determine the required length of the cortex screw using the depth meter. (See image II)

Insert the appropriate Ø 3.5mm cortex screw with the help of the Hex Screwdriver. (See image III)

8.2 Fixation with Ø 3.5 mm locking screws

For 3.5mm locking screws, screw the drill guide (128.27) in the locking section of the screw. Drill with a 2.7mm drill bit. Remove the guide. Measure the length with the depth meter and place the screw with the screwdriver using the torque wrench of 1.5Nm.

IMPLANT REMOVAL

The decision to remove the implant corresponds to the treating physician. Removal of the implant is recommended after completion of the consolidation process, whenever feasible and appropriate for the patient. To remove the screws, first clear the screw head, eliminating any tissue that may have penetrated the hexagonal entrance to ensure that the screwdriver enters correctly and to reduce the risk of damage preventing removal. Unscrew all screws and remove them to later remove the plate.

IMPLANTS AND INSTRUMENTS

PLATES

ALP TITANIUM DISTAL LATERAL HUMERUS PLATE TELIOS RIGHT

144.03 ALP titanium distal lateral humerus plate TELIOS 3 holes right
144.05 ALP titanium distal lateral humerus plate TELIOS 5 holes right
144.07 ALP titanium distal lateral humerus plate TELIOS 7 holes right
144.09 ALP titanium distal lateral humerus plate TELIOS 9 holes right

ALP TITANIUM DISTAL LATERAL HUMERUS PLATE TELIOS LEFT

145.03 ALP titanium distal lateral humerus plate TELIOS 3 holes left
145.05 ALP titanium distal lateral humerus plate TELIOS 5 holes left
145.07 ALP titanium distal lateral humerus plate TELIOS 7 holes left
145.09 ALP titanium distal lateral humerus plate TELIOS 9 holes left

ALP TITANIUM DISTAL MEDIAL HUMERUS PLATE TELIOS RIGHT

146.02 ALP titanium distal medial humerus plate TELIOS 2 holes right
146.04 ALP titanium distal medial humerus plate TELIOS 4 holes right
146.06 ALP titanium distal medial humerus plate TELIOS 6 holes right
146.08 ALP titanium distal medial humerus plate TELIOS 8 holes right

ALP TITANIUM DISTAL MEDIAL HUMERUS PLATE TELIOS LEFT

147.02 ALP titanium distal medial humerus plate TELIOS 2 holes left
147.04 ALP titanium distal medial humerus plate TELIOS 4 holes left
147.06 ALP titanium distal medial humerus plate TELIOS 6 holes left
147.08 ALP titanium distal medial humerus plate TELIOS 8 holes left

SCREWS

106.12 3.5mm titanium cortex locking screw 12mm
106.14 3.5mm titanium cortex locking screw 14 mm
106.16 3.5mm titanium cortex locking screw 16 mm
106.18 3.5mm titanium cortex locking screw 18 mm
106.20 3.5mm titanium cortex locking screw 20 mm
106.22 3.5mm titanium cortex locking screw 22 mm
106.24 3.5mm titanium cortex locking screw 24 mm
106.26 3.5mm titanium cortex locking screw 26 mm
106.28 3.5mm titanium cortex locking screw 28 mm
106.30 3.5mm titanium cortex locking screw 30 mm
106.32 3.5mm titanium cortex locking screw 32 mm
106.34 3.5mm titanium cortex locking screw 34 mm
106.36 3.5mm titanium cortex locking screw 36 mm
106.38 3.5mm titanium cortex locking screw 38 mm
106.40 3.5mm titanium cortex locking screw 40 mm
106.45 3.5mm titanium cortex locking screw 45 mm
106.50 3.5mm titanium cortex locking screw 50 mm
106.55 3.5mm titanium cortex locking screw 55 mm
106.60 3.5mm titanium cortex locking screw 60 mm

112.12 3.5mm titanium cortex screw 12 mm
112.14 3.5mm titanium cortex screw 14 mm
112.16 3.5mm titanium cortex screw 16 mm
112.18 3.5mm titanium cortex screw 18 mm
112.20 3.5mm titanium cortex screw 20 mm
112.22 3.5mm titanium cortex screw 22 mm
112.24 3.5mm titanium cortex screw 24 mm
112.26 3.5mm titanium cortex screw 26 mm
112.28 3.5mm titanium cortex screw 28 mm
112.30 3.5mm titanium cortex screw 30 mm
112.32 3.5mm titanium cortex screw 32 mm
112.34 3.5mm titanium cortex screw 34 mm
112.36 3.5mm titanium cortex screw 36 mm
112.38 3.5mm titanium cortex screw 38 mm
112.40 3.5mm titanium cortex screw 40 mm
112.45 3.5mm titanium cortex screw 45 mm
112.50 3.5mm titanium cortex screw 50 mm
112.55 3.5mm titanium cortex screw 55 mm
112.60 3.5mm titanium cortex screw 60 mm

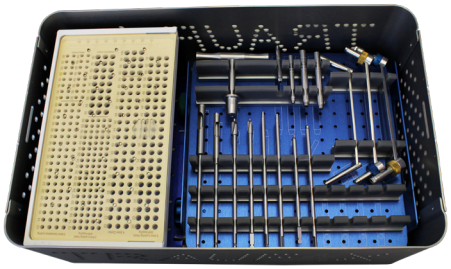
155.08	2.5 mm Titanium cortex locking screw 8 mm
155.10	2.5 mm Titanium cortex locking screw 10 mm
155.12	2.5 mm Titanium cortex locking screw 12 mm
155.14	2.5 mm Titanium cortex locking screw 14 mm
155.16	2.5 mm Titanium cortex locking screw 16 mm
155.18	2.5 mm Titanium cortex locking screw 18 mm
155.20	2.5 mm Titanium cortex locking screw 20 mm
155.22	2.5 mm Titanium cortex locking screw 22 mm
155.24	2.5 mm Titanium cortex locking screw 24 mm
155.26	2.5 mm Titanium cortex locking screw 26 mm
155.28	2.5 mm Titanium cortex locking screw 28 mm
155.30	2.5 mm Titanium cortex locking screw 30 mm
155.32	2.5 mm Titanium cortex locking screw 32 mm
155.34	2.5 mm Titanium cortex locking screw 34 mm
155.36	2.5 mm Titanium cortex locking screw 36 mm
155.38	2.5 mm Titanium cortex locking screw 38 mm
155.40	2.5 mm Titanium cortex locking screw 40 mm
155.45	2.5 mm Titanium cortex locking screw 45 mm
155.50	2.5 mm Titanium cortex locking screw 50 mm
155.55	2.5 mm Titanium cortex locking screw 55 mm
155.60	2.5 mm Titanium cortex locking screw 60 mm

155.08X	2.5 mm Titanium cortex locking screw, Torx drive 8 mm
155.10X	2.5 mm Titanium cortex locking screw, Torx drive 10 mm
155.12X	2.5 mm Titanium cortex locking screw, Torx drive 12 mm
155.14X	2.5 mm Titanium cortex locking screw, Torx drive 14 mm
155.16X	2.5 mm Titanium cortex locking screw, Torx drive 16 mm
155.18X	2.5 mm Titanium cortex locking screw, Torx drive 18 mm
155.20X	2.5 mm Titanium cortex locking screw, Torx drive 20 mm
155.22X	2.5 mm Titanium cortex locking screw, Torx drive 22 mm
155.24X	2.5 mm Titanium cortex locking screw, Torx drive 24 mm
155.26X	2.5 mm Titanium cortex locking screw, Torx drive 26 mm
155.28X	2.5 mm Titanium cortex locking screw, Torx drive 28 mm
155.30X	2.5 mm Titanium cortex locking screw, Torx drive 30 mm
155.32X	2.5 mm Titanium cortex locking screw, Torx drive 32 mm
155.34X	2.5 mm Titanium cortex locking screw, Torx drive 34 mm
155.36X	2.5 mm Titanium cortex locking screw, Torx drive 36 mm
155.38X	2.5 mm Titanium cortex locking screw, Torx drive 38 mm
155.40X	2.5 mm Titanium cortex locking screw, Torx drive 40 mm
155.45X	2.5 mm Titanium cortex locking screw, Torx drive 45 mm
155.50X	2.5 mm Titanium cortex locking screw, Torx drive 50 mm
155.55X	2.5 mm Titanium cortex locking screw, Torx drive 55 mm
155.60X	2.5 mm Titanium cortex locking screw, Torx drive 60 mm

INSTRUMENTS

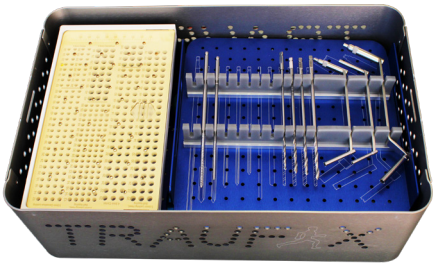
The following instruments are designed to anchor only on Traufix implants, the use of instruments from other brands may damage the product and not anchor properly.

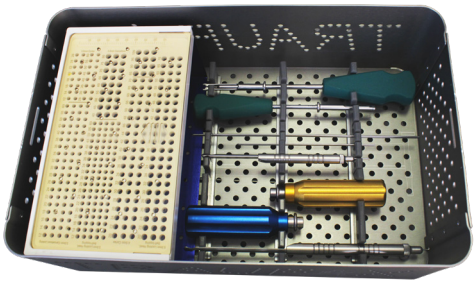
CODE	INSTRUMENT
128.27	Drill guide for 2.7mm drill bit
128.20	Drill guide for 2.0mm drill bit



Other generic instruments needed:

QTY.	DESCRIPTION
2	2.0mm threaded guide-wire
2	1.5mm threaded guide-wire
1	2.5mm hexagonal screwdriver for 3.5mm/4.5mm screw
1	2.5mm eccentric neutral drill guide
1	2.5mm/3.5mm double drill guide
1	2.5mm/3.5mm double drill guide
1	Torque wrench AO of 1.5Nm
1	T-handle with quick coupling (AO)
1	60mm depth gauge
1	6mm countersink tip for 3.5mm/4.0mm screw
1	2.5mm screwdriver hexagonal tip
1	2.5mm hexagonal screw extractor tip
1	3.5mm tap tip
1	6.5mm reamer tip for small fragments
1	2.5mm drill bit quick coupling
1	2.7mm drill bit quick coupling
1	2.0mm drill bit quick coupling





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