

Operative Technique



ST.A.R.90 F4 Elbow

Articulated
external fixator

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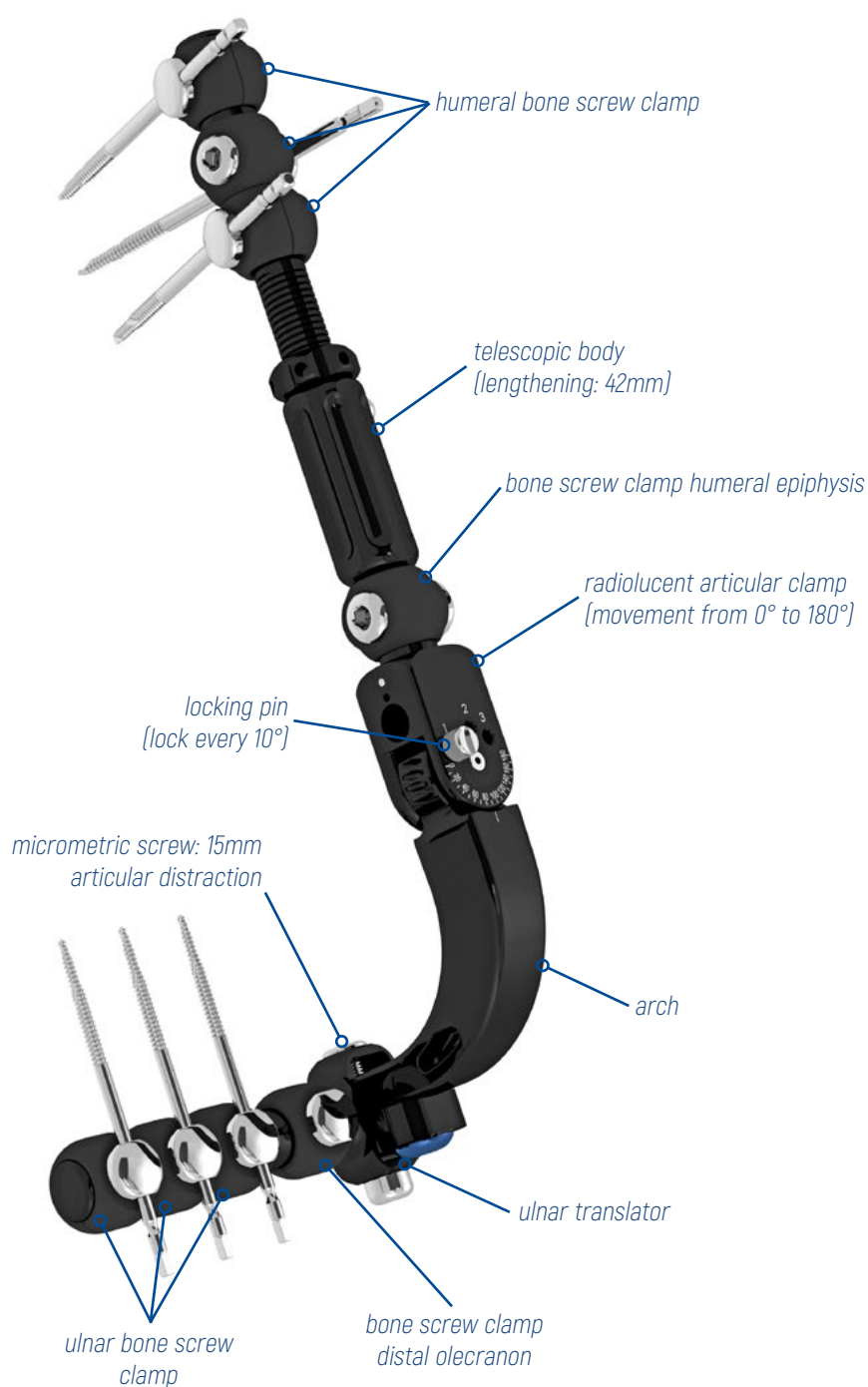
PRODUCT DESCRIPTION

Elbow articulated external fixator

The telescopic body ensures that there are at least 10 cm between the epicondyle and the first humeral diaphyseal screw to avoid damage to the radial nerve.

The articulating joint has a central hole for the insertion of the guide wire, which is positioned in the centre of rotation of the elbow joint.

The articulation ranges from 0° to 180° and allows complete extension and flexion of the elbow.



PRODUCT DESCRIPTION

Right to left fixator configuration

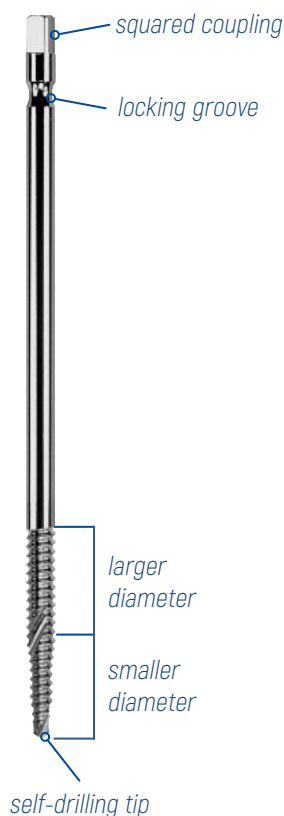


Fixator configuration for right elbow.

For application on left elbow:

- remove the ulnar portion of the fixator by loosening the blue screw of the ulnar translator with the Allen wrench;
- rotate the ulnar portion 180 ° and tighten the screw again.

Bone screw



A double diameter stainless steel bone screw are self-drilling and self-tapping. In case of hard cortical bone it may be necessary to pre-drill.

Ensures easier insertion, strength over time and the possibility of retraction, in case of excessive penetration, without loss of strength.

Also available with hydroxyapatite coating for patients with severe osteoporosis or when a long period of fixation is anticipated.

When the bone screw is inserted:

- the self-drilling tip creates a hole the size of the smaller diameter;
- the first self-tapping portion cuts the thread in the bone;
- the smaller diameter inserts easily into the bone;
- the second self-tapping portion cuts the thread for the larger diameter;
- the larger diameter is inserted creating a completely circular hole.

ø4mm recommended for ulna
ø5mm recommended for humerus

INDICATIONS AND PATIENT POSITIONING

Indications



Acute bone and/or ligament joint lesions:

- dislocations unstable after reduction
- unstable fracture dislocations
- unstable osteosynthesis (comminuted fractures, osteoporotic fractures)

Chronic joint lesions:

- instability
- stiffness



Patient positioning

Position the patient supine with the limb to be treated resting on the radiolucent support of the operating table.

OPERATIVE TECHNIQUE

K. wire insertion

Critical steps for a successful application of the external fixator

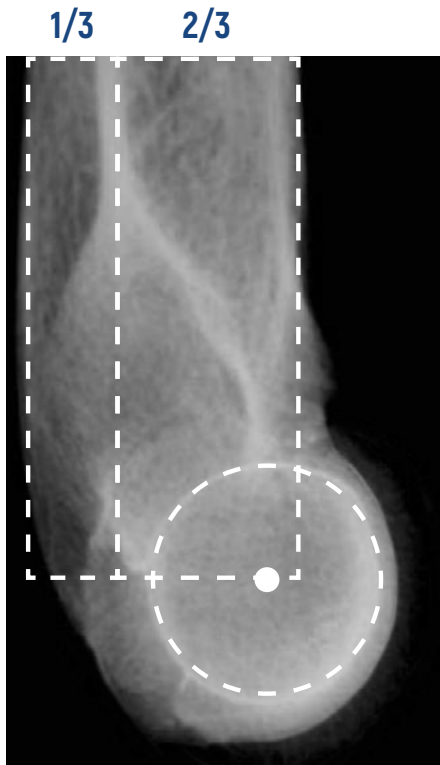


Fig. A



Fig. B

Before starting the operation, mark on the skin the regions from 6 to 9cm from the epicondyle as a reminder to avoid injury to the radial nerve.

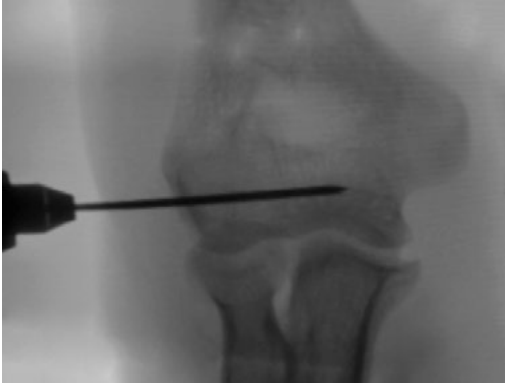
Obtain a true lateral view of the elbow joint with the Image Intensifier and identify the center of rotation: the center of the circle corresponding to the lateral projection of the humeral trochlea and the lateral humeral condyle (capitellum) (Fig. A).

A further check for proper identification of the center of rotation is to verify that the lateral ridge of the humerus is visible between the anterior two-thirds and the posterior third of the humerus.

The tip of the K. wire must be positioned in the center of the circumference (Fig. B).

K. wire insertion

Critical steps for a successful application of the external fixator

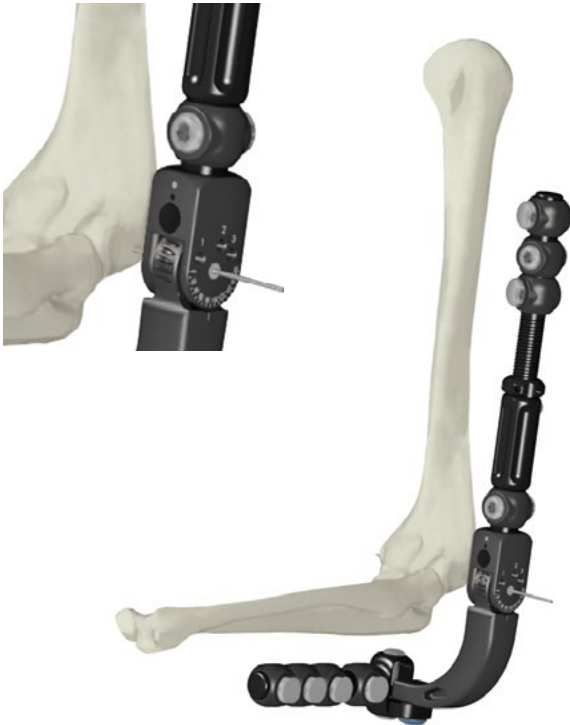


Position the wire horizontally and insert it in the center of the epicondyle in a direction parallel to the joint line.

Check under image intensifier in the antero-posterior view.



Fixator application

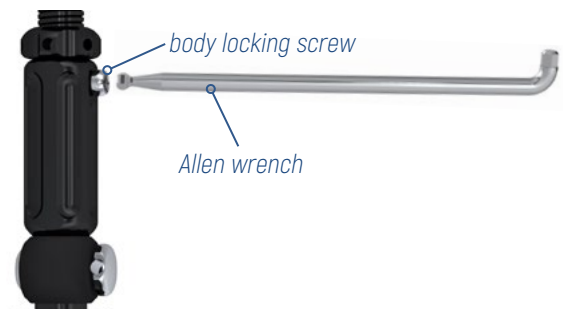


Apply the external fixator by inserting the guide wire inside the hole in the articulated clamp.

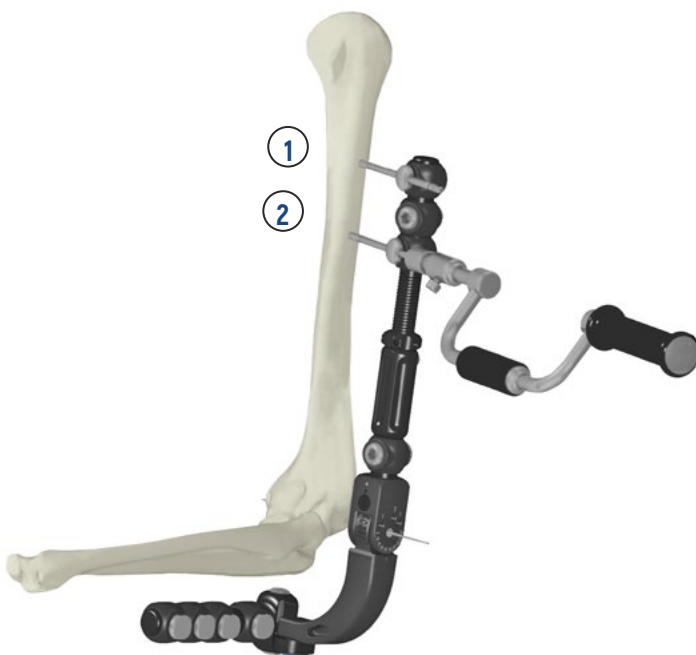
Extend the telescopic body so that the most proximal bone screw is at the level of the deltoid muscle insertion.

Gently tighten the locking screw to lock the position of the telescopic body to prevent accidental unscrewing using the Allen wrench (EBA-0050) as shown in the figure.

Check the tightness of the ulnar translator screw.



Humeral bone screw insertion



Insert two self-tapping and self-drilling humeral bone screws by using the drill brace or T handle.

It is preferable to use $\varnothing 5\text{mm}$ bone screws.

The bone screw ① must be perpendicular to the anatomical and mechanical axis of the humerus and the bone screw ② should be inserted parallel to the first.

Both screws should be inserted in the centre of the bone.

Position the fixator body about 2cm from the skin without bending the guide wire.

Tighten the bone screw clamps.

Ulnar bone screw insertion



The K. wire and the humeral bone screws should be parallel, which will allow adjustment of the external fixator in the frontal plane to find the best position for the ulnar screws.

Keep the distal part of the fixator body parallel to the ulna. Insert the ulnar bone screw ① perpendicular to the ulnar crest, the bone screw ② parallel to the first and perpendicular to the anatomical axis of the ulna.

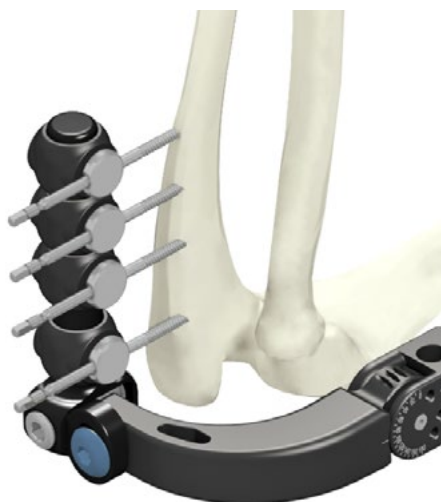
It is preferable to use Ø4mm bone screws.

Tighten the bone screw clamps and the ulnar translator. Check that the K. wire does not bend while flexing and extending the elbow.

Check in the lateral projection the congruence between the external fixator and the elbow during this movement. If the K. wire bends during the flexion-extension movement, loosen the ulnar translator screw and repeat flexion-extension movements to evaluate if this eliminates the K. wire bending.

If the K. wire remains straight, tighten the ulnar translator. If K. wire bending persists, loosen the ulnar and humeral bone screw clamps and repeat the same manoeuvres until the K. wire no longer bends. At this point lock the ulnar translator and the bone screw clamps.

Ulnar translator



The fixator has an integral ulnar translator which can compensate for possible errors in the positioning of the K. wire in the centre of rotation of the elbow.

By unlocking the ulnar translator screw, the correct position of the K. wire can be found with flexion-extension manoeuvres to avoid impingement or subluxation.

Once the correct position is obtained the screw is locked.

Additional bone screw insertion

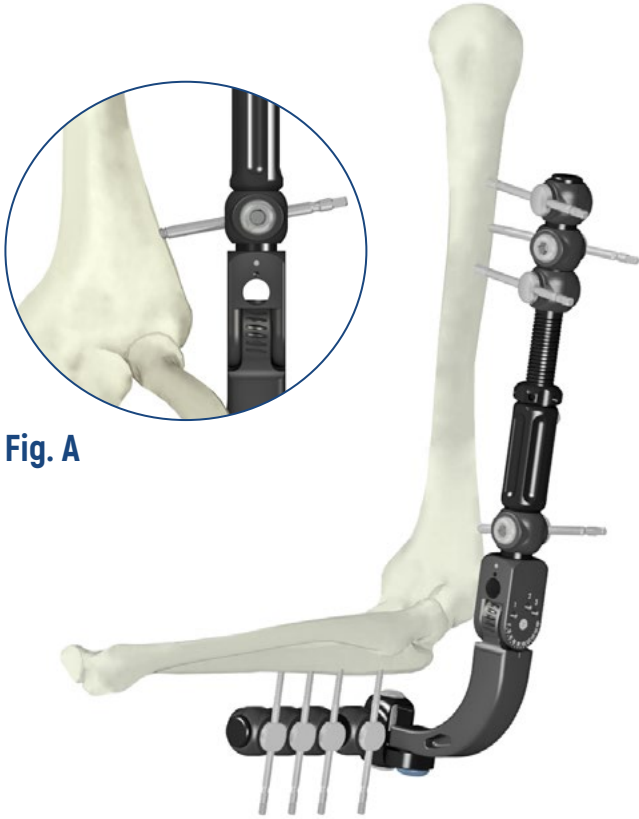


Fig. A

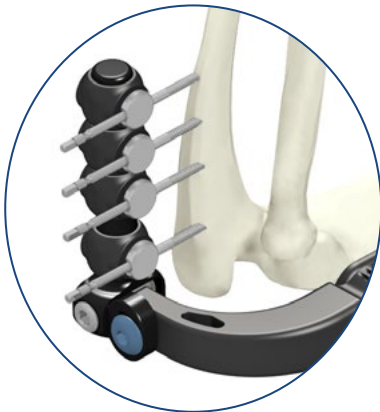


Fig. B

In patients with bulky muscles, with osteopenic bone or in case of stiff elbow, insert two additional screws: one in the distal humerus just above the olecranon fossa (Fig. A) and one immediately distal to the olecranon, making sure they are outside the joint capsule (Fig. B).

Check the fixator position

Check that there is no impingement or subluxation between the articular surfaces during the flexion and extension (Fig. C and D).

If all is well the guide wire can now be removed.

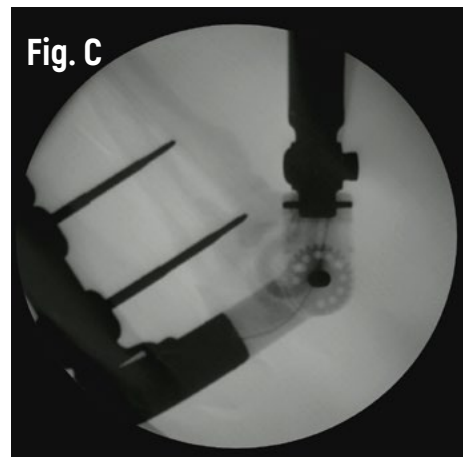


Fig. C

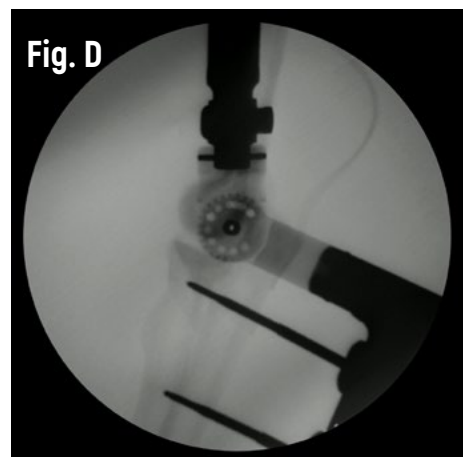
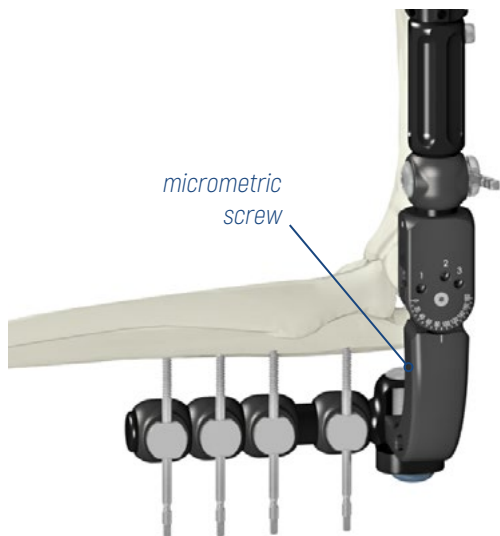


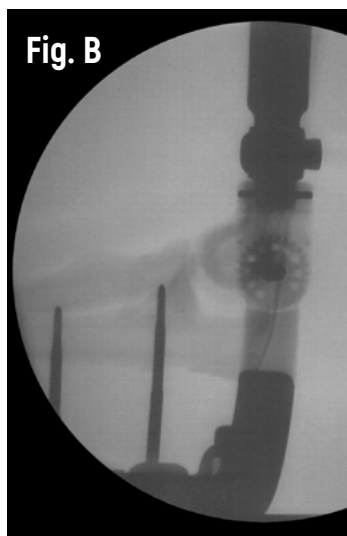
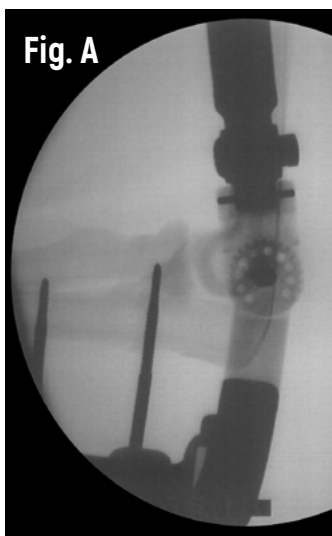
Fig. D

Articular distraction



Turning the micrometric screw with the 6mm Allen wrench produces distraction at the joint. The amount of articular diastasis can be seen with the image intensifier in the frontal plane.

The distraction force will act on the olecranon and ulna, without changing the center of rotation of the elbow joint.

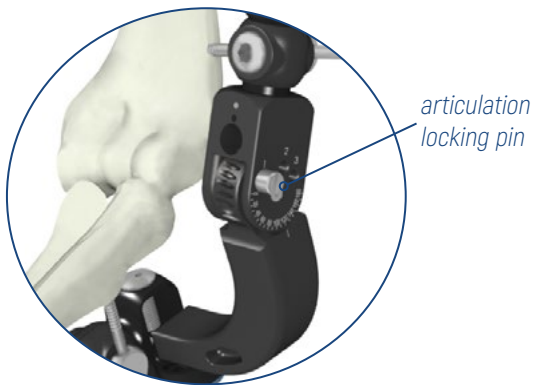


Elbow flexion-extension



Confirm that adequate soft tissue release has been performed around the humeral screws to allow free movement during flexion and extension.

At the end of the operation, insert the articulation locking pin to lock the joint in the desired position: the device has a range of movement from 0° to 180° with possible locking every 10°.



OPTIONAL OPERATIVE TECHNIQUE - FLEXION-EXTENSION CONTROL

Elbow fixator R.O.M. limiter (F4-2749)



The elbow fixator R.O.M. (Range Of Motion) limiter is a radiolucent accessory that allows to control the flexion-extension of the joint.

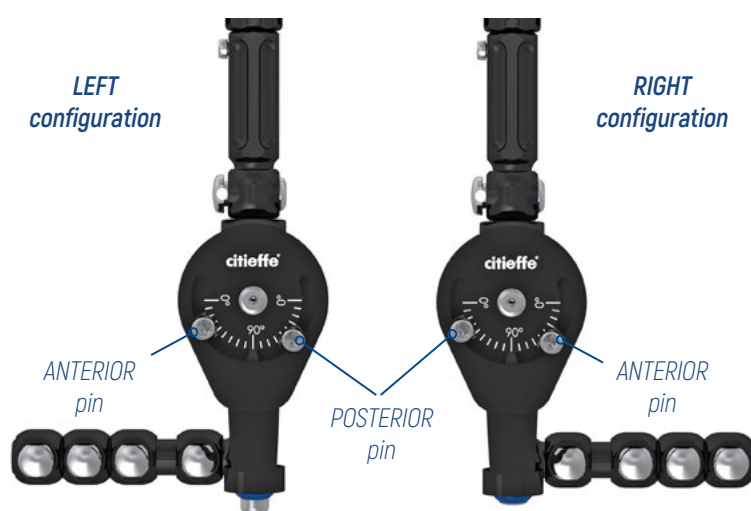
Connect the R.O.M. limiter to the fixator through the hole in the central body.

Depending on the treatment requirements, the Range Of Motion [R.O.M.] is determined by the positioning of the 2 metal pins on the graduated scale.

Tighten the 2 pins in the desired position using the 6 mm Allen wrench.

NOTE: the R.O.M. limiter could also be connected to the fixator in the post-operative phase to facilitate functional recovery and physiotherapy treatment.

Adjustment of Range Of Motion (R.O.M.)

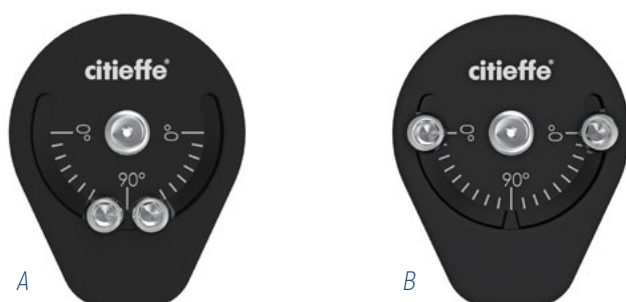


Adjust the 2 metal pins to define the desired Range Of Motion.

ANTERIOR pin to define **extension** range of movement.

POSTERIOR pin to define **flexion** range of movement.

Example of the 2 metal pins position:



A) both pins at 90°

the fixator is **locked** in both extension and flexion;

B) both pins at 0°

the fixator is **completely free** in extension and flexion movements.

OPTIONAL OPERATIVE TECHNIQUE - INDUCED FLEXION-EXTENSION

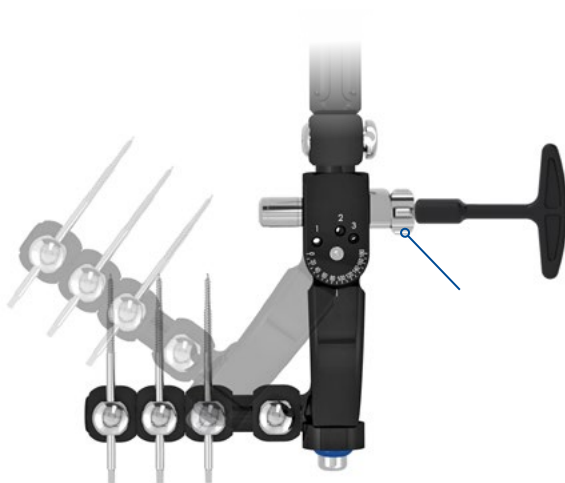
Flexo-extension device (F4-0230)



The elbow flexo-extension device is an accessory that allows to force the joint movement of the elbow in cases of stiffness or deficit in extension and is used during physiotherapy exercises.

Connect the flexo-extension device to the fixator through the hole in the central body.

Induced flexion



In cases of rigid flexion, the device must be inserted posteriorly into the joint clamp, closing it with the nut on the front.

Then insert the 6mm Allen wrench by turning it clockwise to gradually recover the joint flexion.

Once the desired degree of flexion has been reached, the fixator can be locked in the position reached by the locking pin (see pag. 13).

Induced extension



In cases of rigid extension, the device must be inserted anteriorly into the joint clamp, closing it with the nut on the back.

Then insert the 6mm Allen wrench by turning it clockwise to gradually recover the joint extension.

Once the desired degree of extension has been reached, the fixator can be locked in the position reached by the locking pin (see pag. 13).

OPTIONAL OPERATIVE TECHNIQUE - DISTAL EXTENSION OF THE ULNAR SCREWS

Extension (F4-2748)



The external fixator has an extension that allows distal positioning of the ulnar bone screw clamps up to 7cm.

It is indicated where internal fixation, or soft tissue injuries, prevent ulnar screw insertion in the standard positions.

The extension is single use, in sterile packaging.

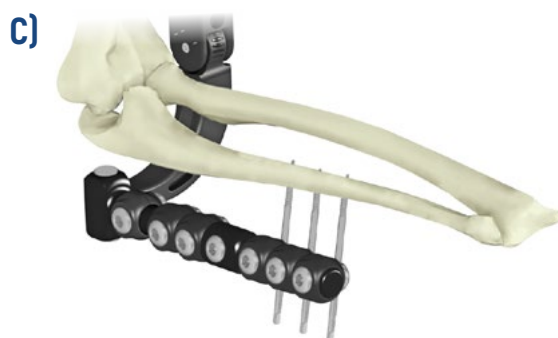
Extension



A) Remove the most distal ulnar bone screw clamp, it will not be used.

B) Unscrew the pin of the first clamp of the device Extension.

C) Insert the Extension device on the end distal of the fixator and lock by screwing the pin.



ORDERING INFORMATION

STERILE

F4-2250

Elbow Articulated External Fixator

Contents:
1 articulated external fixator
1 K. wire $\varnothing 2 \times 200$ mm
1 locking pin
NOTE: unique fixator for right and left side

F4-2748

Elbow External Fixator Extension


F4-2749

Elbow Fixator R.O.M. limiter

Cortical bone screw


 $\varnothing 4$ mm recommended for ulna

 $\varnothing 5$ mm recommended for humerus

Are also available bone screws with hydroxyapatite coating or in Nickel-free stainless steel alloy

ULNA

HUMERUS

Code	Thread $\varnothing$ mm	Stem $\varnothing$ mm	Thread L. mm	Total L. mm
F4-134080	3 - 4	4	20	80
F4-134095	3 - 4	4	34	95
F4-134120	3 - 4	4	34	120
F4-145080	4 - 5	5	22	80
F4-145100	4 - 5	5	34	100
F4-145120	4 - 5	5	34	120
F4-145150	4 - 5	5	40	150


SF1381

 Targeting guide for K. wire $\varnothing 2$ mm

	F4-0230	Flexo-extension elbow device	
	660201	K. wire trocar tip ø2x200mm	STERILE
	66020	K. wire trocar tip ø2x150mm	STERILE
	66021	K. wire trocar tip ø2x150mm	
	SF1304	Quick-connect adapter for bone screw (stem ø4mm)	STERILE
	SF1305	Quick-connect adapter for bone screw (stem ø5mm)	STERILE
	SF1366	Allen wrench, 6mm	STERILE
	EBA-0050	Allen wrench, 6mm	
	SF1356	T-handle hexagon 6mm	
	DF900005	T-handle ø5mm	STERILE
	SF1050	Drill brace	
	SF1374	Chuck for ø4mm bone screws	STERILE
	SF1375	Chuck for ø5mm bone screws	STERILE
	SF1070	Chuck for ø4mm bone screws	
	SF1080	Chuck for ø5mm bone screws	
	F4-0220	T-handle for chuck	
	SF1385	Bone screws guide	STERILE
	F4-0215	Bone screws guide	

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Articulated external fixator



INSPIRED BY PEOPLE
MOVED BY INNOVATION



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