Operative technique

ST.A.R.90 F4

Knee

Articulated external fixator

citieffe®

Essential Moves in Trauma

Citieffe thanks

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Dr. A. Pizzoli (U.O. Orthopaedic and Traumatology, Pieve di Coriano Hospital, Mantova)
Dr. M. Manca (U.O. Orthopaedic and Traumatology, Versilia Hospital, Lido di Camaiore)
for their collaboration in the development of this operative technique

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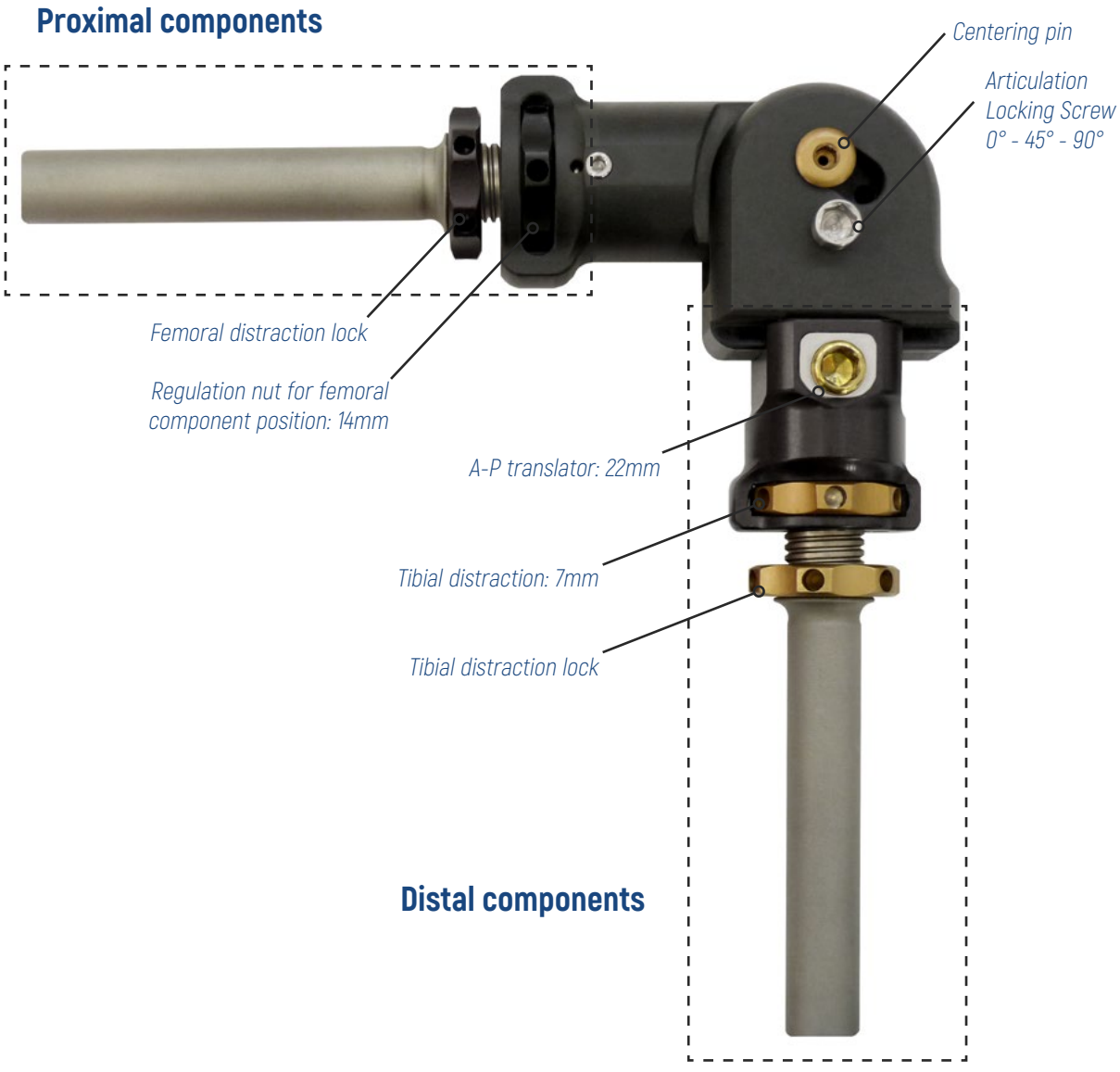
PRODUCT DESCRIPTION

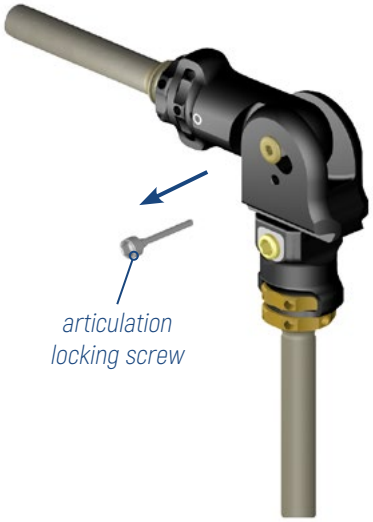
The Citieffe articulated external fixator is aligned with the transcondylar axis of the knee joint and allows stable articulation without stressing adjacent articular structures. The fixator reproduces physiologic movement between 0° and 90° and avoids overloading articular structures without permitting the physiological rotational movements of normal flexion-extension of the knee. It is very important that the articulating body of the external fixator is correctly aligned in both frontal and sagittal planes: the centre of rotation must be aligned with the transcondylar axis.

The main feature of the articulating fixator is to allow active and passive motion of the knee, protecting the joint from the mechanical stresses of movement and facilitating articular distraction when necessary.

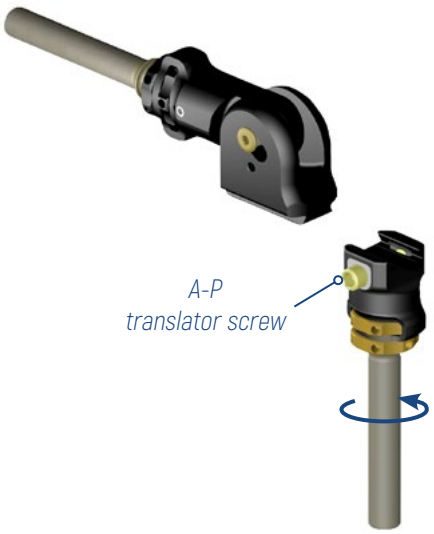
Articulated external fixation is indicated in all those pathological conditions in which it might be necessary to combine bone stabilization and/or ligamentous reconstruction with early mobilization of the articular joint, to avoid the effects of prolonged immobilization.



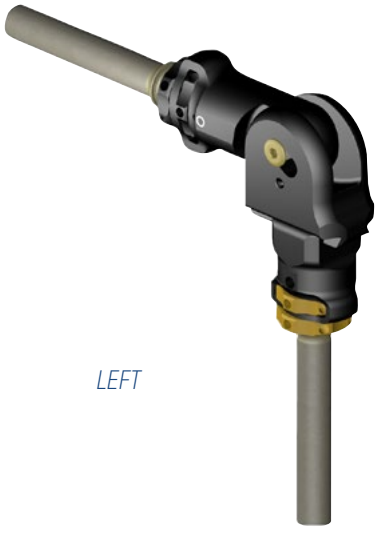
The external fixator is supplied in STERILE packaging for the RIGHT knee.
If required for the left knee, the assembly should be changed as follows.



Remove the locking screw articulation and reinsert from the opposite side.

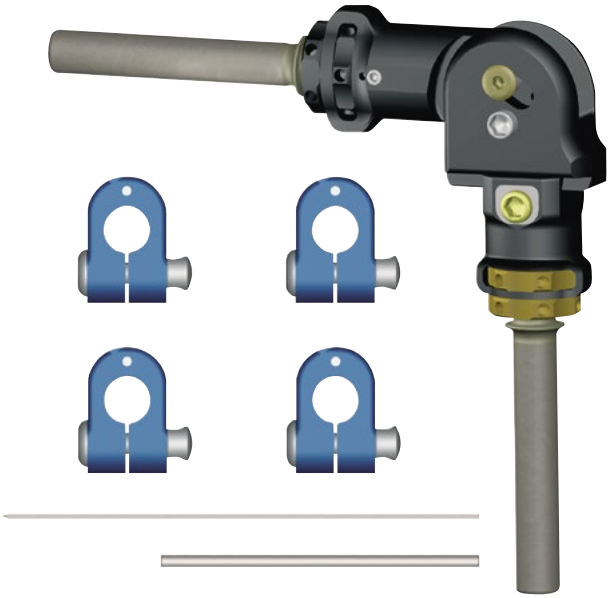


Loosen the A-P translator screw, remove the distal component and turn it 180 °.



Reinsert the distal component and lock it by tightening the translator screw.

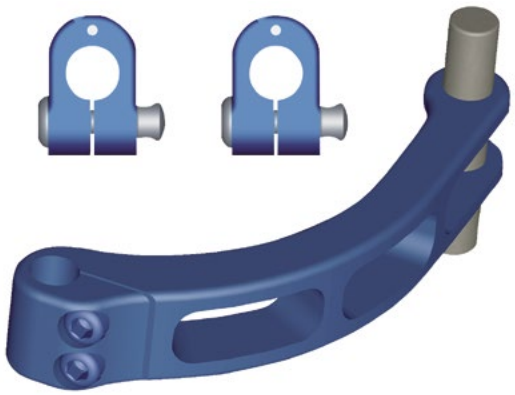
Knee fixator kit



The kit includes:
- 1 knee articulated external fixator;
- 4 clamps with bone screw hoolders;
- 1 guide wire;
- 1 pin for locking nuts.

The external fixator is supplied in the configuration for RIGHT knee application and 90° locking.
Clamp screw holders accept 6mm diameter bone screws.

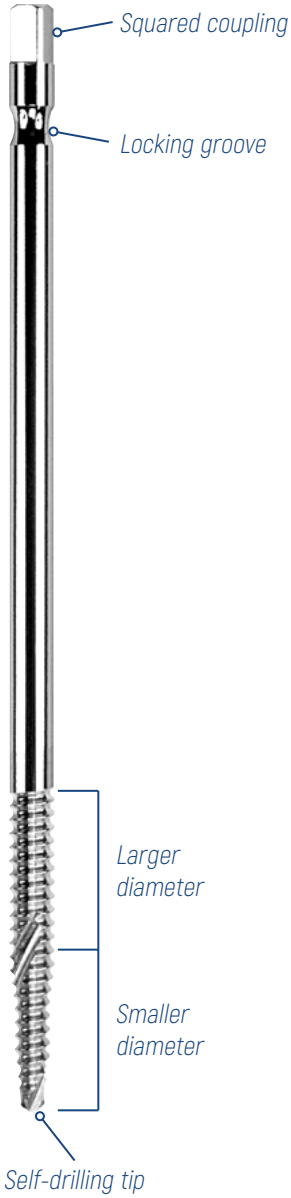
Controlateral bone screws curved arm kit



The kit includes:
- 1 curved arm for tibial bone screws;
- 2 clamps with bone screw holders.

The curved arm allows insertion of the bone screws into the antero-medial aspect of the tibia, preserving the function of the anterior compartment.
The clamp bone screw holders accept ø5mm or ø6mm bone screws.

BONE SCREWS



The double diameter stainless steel bone screw, self-drilling and self-tapping, no required pre-drilling.

Ensure easier of insertion, strength over time and possibility of retraction, in case of excessive sinking, without loss of strength. In case of hard cortical bone it may be necessary to pre-drill.

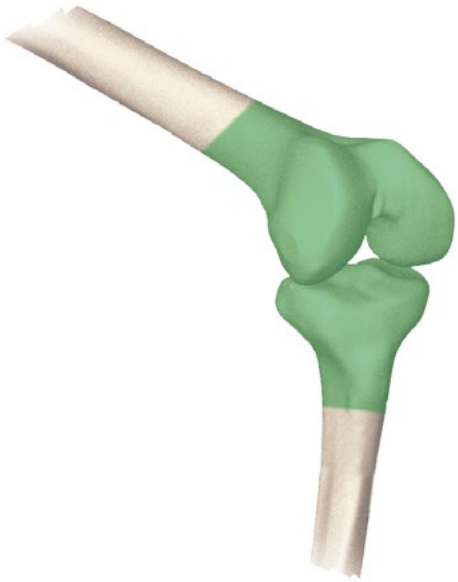
Are available with hydroxyapatite coating for patients with severe osteoporosis or in case of long duration of implant permanence.

When the bone screw is inserted:

- the self-drilling tip creates a hole the size of the smaller diameter;
- the first self-tapping portion taps and removes the bone;
- the smaller diameter inserts easily into the bone;
- the second self-tapping portion helps the larger diameter go through the bone;
- the larger diameter is inserted recovering any ovalization of the smaller diameter.

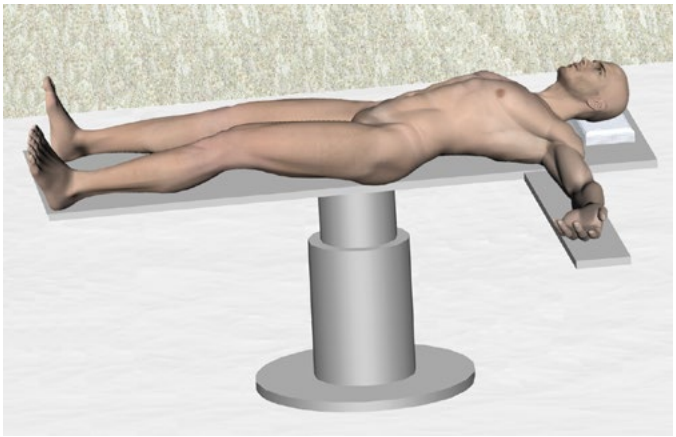
INDICATIONS AND PATIENT POSITIONING

Indications



- Knee dislocations
- Articular fractures/dislocations
- Complex fractures
- Multiligamentous reconstruction
- Removal of infected prosthesis
- Removal of infected synthesis

Patient positioning

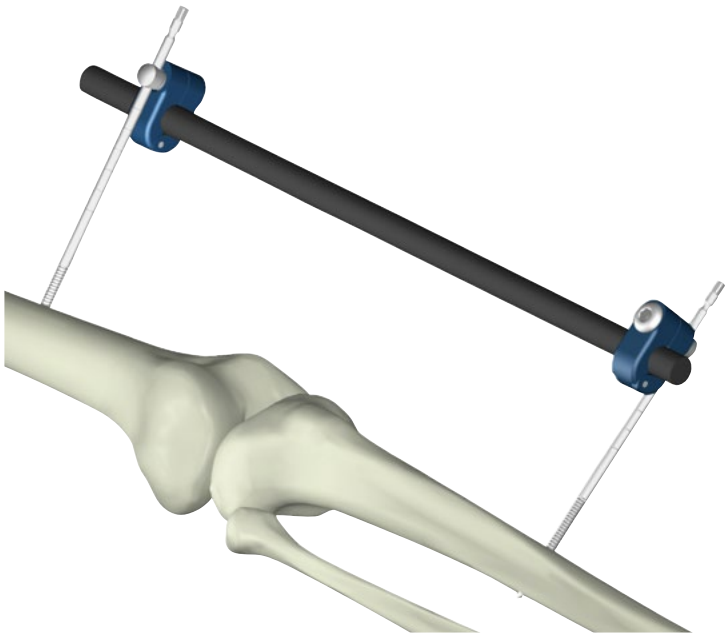


The patient is supine on a radiolucent operating table with the knee prepared for surgery.

The fixator is positioned according to anatomical landmarks. In a complex fracture it may be difficult to identify landmarks without prior reconstruction of the articular surface. This can be performed more easily after applying a temporary external fixation.

OPERATIVE TECHNIQUE

Temporary fixation

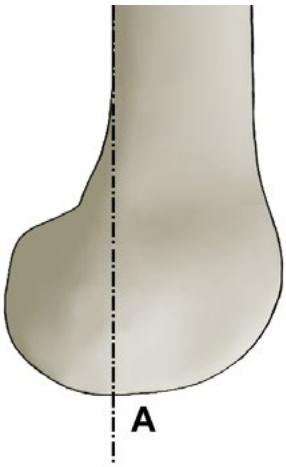


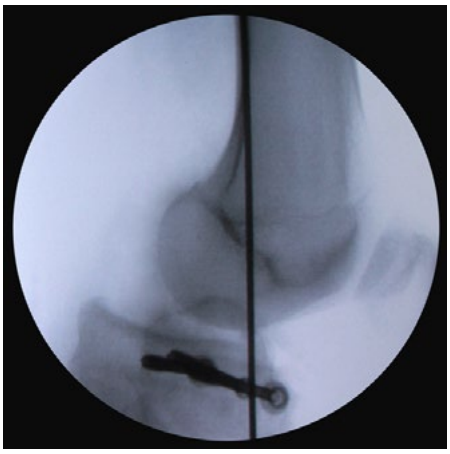
The use of a temporary transarticular external fixation is recommended, to provide stable joint reduction to permit accurate reconstruction of the articular surface. Insert anterior femoral and antero-medial tibial bone screws 13 - 14cm from the articular surface.
The screws are connected with a radiolucent rod and clamps which are locked to maintain the correct femoro-tibial alignment.

Identify the centre of rotation

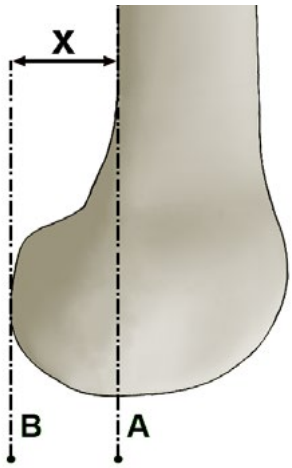
Articular fractures must be reduced and stabilized with minimal internal fixation before applying the articulated knee fixator.

The centre of rotation is identified with a Kirschner wire under image intensifier control.

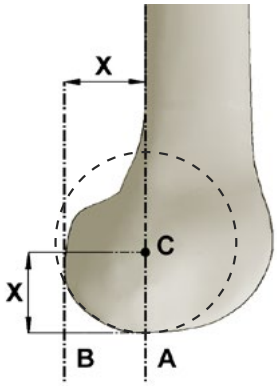


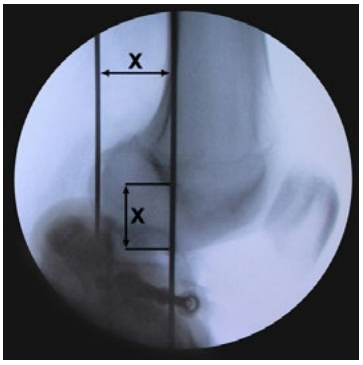


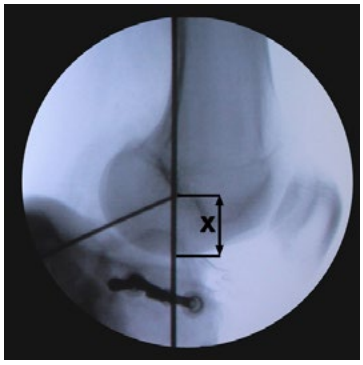
Obtain a true lateral view and continue the line of the posterior diaphyseal surface distally as line **a**



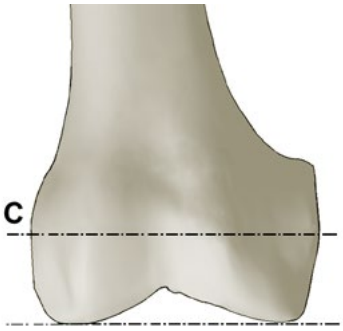
Draw a tangent to the posterior condyle, that is parallel to line **a** and measure distance **x** between lines **a** and **b**





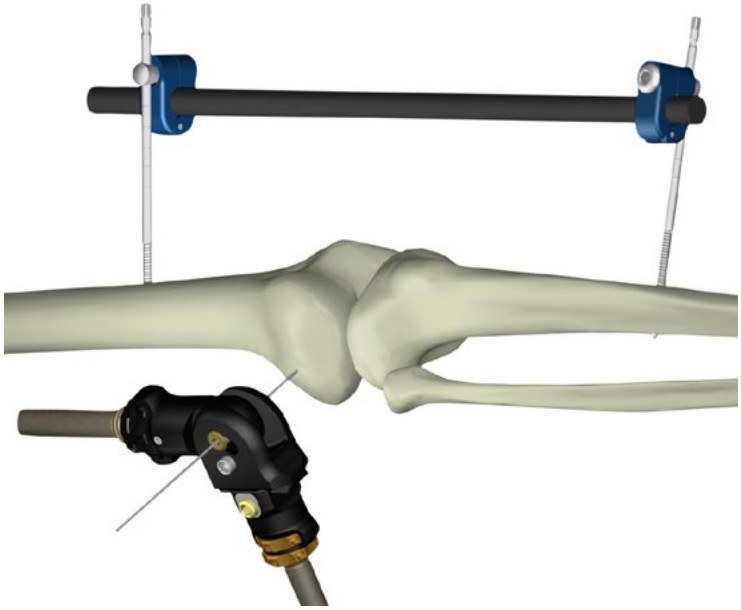


Mark distance on line **a** proximally from the margin of the femoral condyle and identify the theoretical centre of rotation **c**.

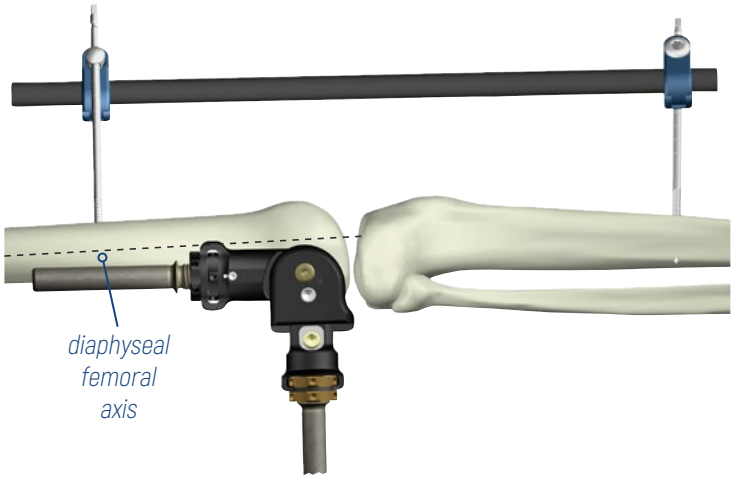


Insert a Kirschner wire at point parallel to the bicondylar line, which in the anteroposterior view should be virtually parallel with the articular surface.

Application of articulated fixator

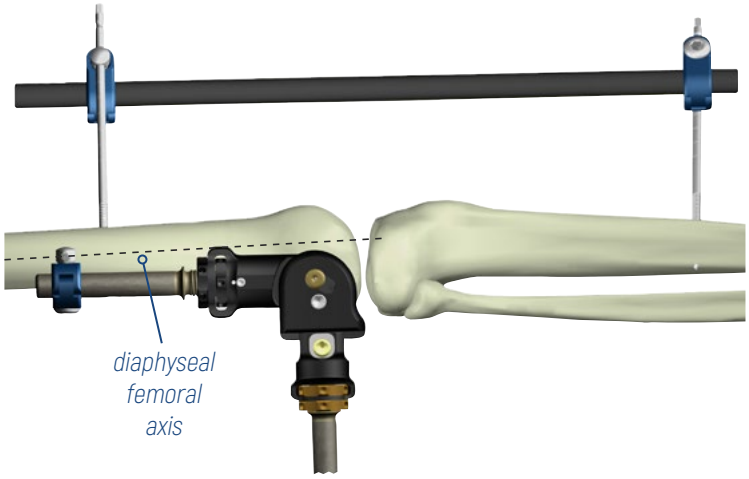


Insert the K. wire in the centering pin holder and slide the fixator over the wire, keeping the fixator locked at 90°.



Position the femoral rod of the fixator parallel to the femoral diaphyseal axis (in the lateral projection).

Insertion of first femoral bone screw



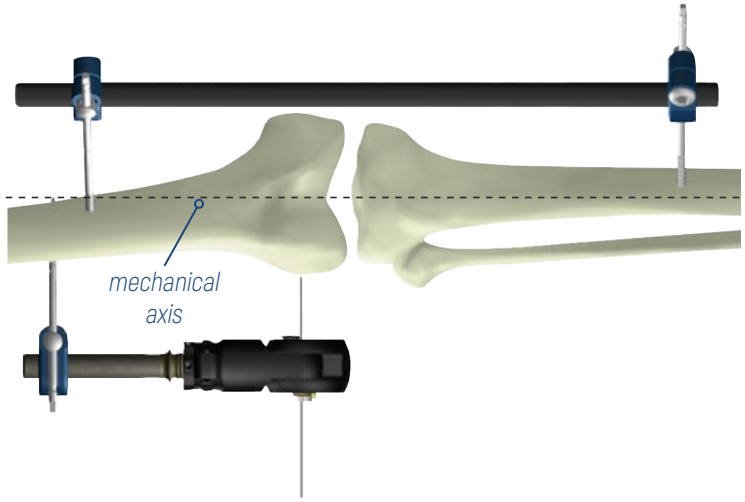
Support the fixator so that its weight does not bend the K wire, and insert the first bone screw in the centre of the diaphysis using a screw guide.

Partially lock the bone screw clamp with the hexagonal wrench.

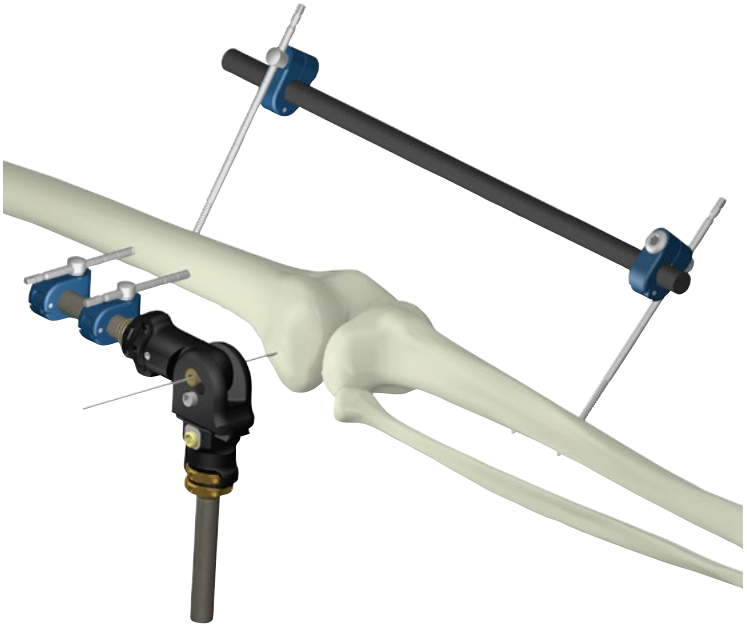
With the image intensifier check that the femoral rod of the fixator is parallel to:

- the femoral axis, in lateral projection the mechanical axis of the limb, in antero-posterior projection.

Complete tightening of the bone screw clamp.
NOTE The mechanical axis is a line drawn from the centre of the femoral head to the centre of the tibio-tarsal joint.



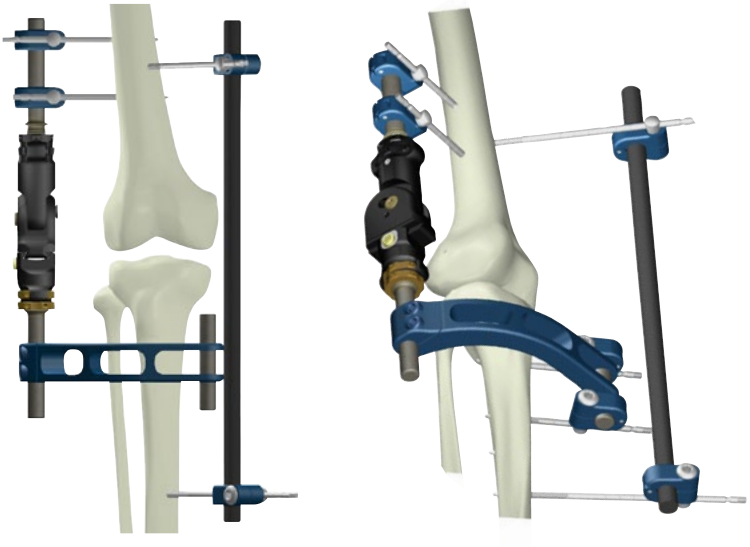
Second femoral bone screw insertion



Insert a second distal femoral bone screw parallel to the first and tighten the clamp with the hexagonal wrench.

NOTE The best stability is obtained with the clamps at each end of the rod.

Curved arm assembly

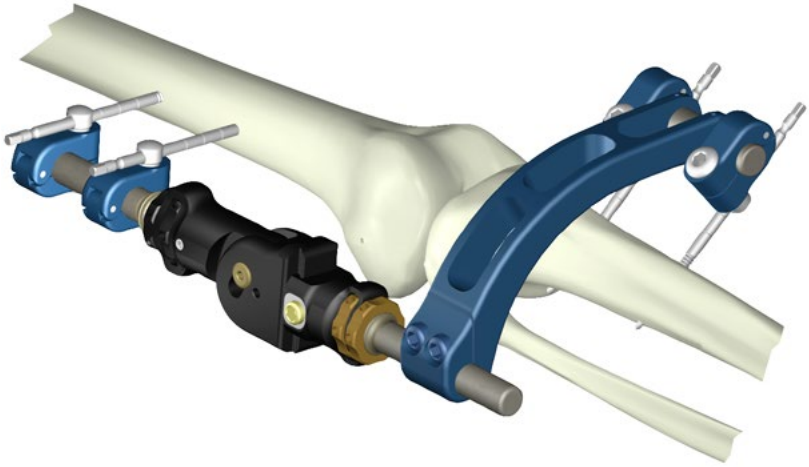


Remove the Kirschner wire and joint locking screw so that the fixator can be extended.

Insert the curved arm over the middle of the distal fixator rod and tighten the two locking screws.

Position 2 clamps on the bar at the end of the arm and insert the tibial bone screws, starting with the most distal one.

Articulated distraction

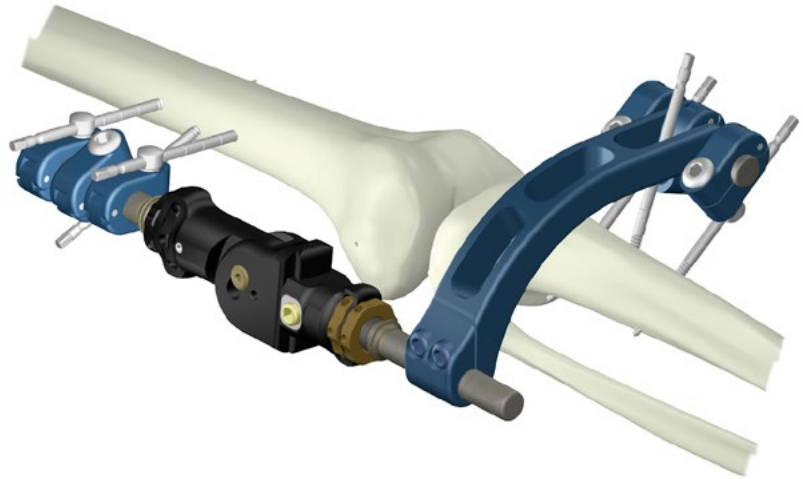


Tighten all bone screw clamps firmly and remove the temporary fixator. Distract the articulation by turning the nut of tibial distraction with the dedicated pin. Lock the position by tightening the distraction locking nut.

Check joint movement and symmetrical distraction. Check that there is no joint impingement during flexion and extension.

Further adjustment can be performed if necessary with the femoral distraction nut and locking screw translator, and with release of the fascia lata.

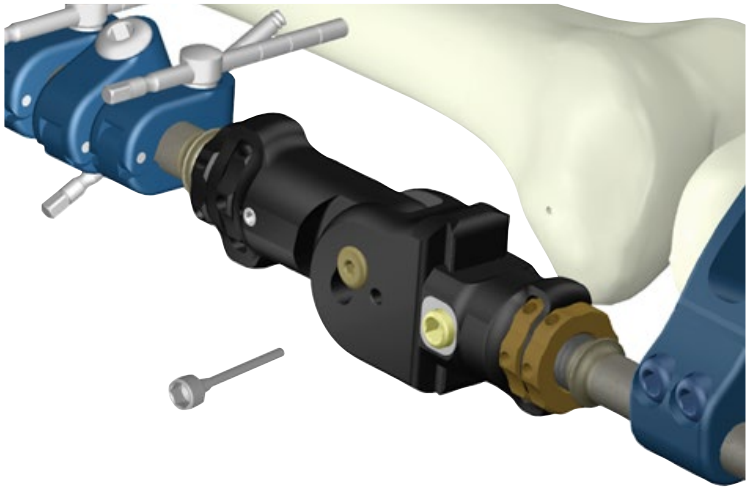
Final assembly



Finally a third femoral and tibial bone screw is inserted. These should be oblique to the previous screws and preferably between them.

Final tightening of all bone screw clamps is performed with the torque wrench.

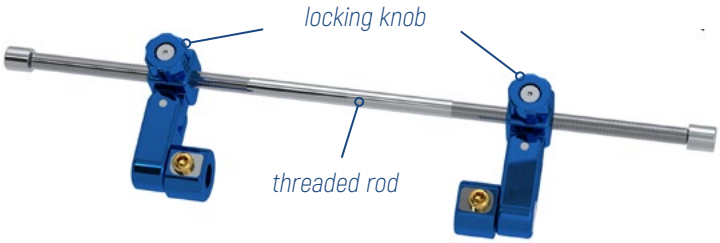
Post-operative management



The fixator can be locked in extension by inserting the articulation locking screw. The amount and timing of permitted joint movement are determined by the type of lesion and stability of any fractures.

Weightbearing must also be moderated during the first weeks after surgery, according to the type of injury, and increased progressively.

Knee fixator distractor (F4-2746)



The knee fixator distractor is an accessory that allows you to force joint movement of the knee in cases of stiffness or deficit in extension or flexion.

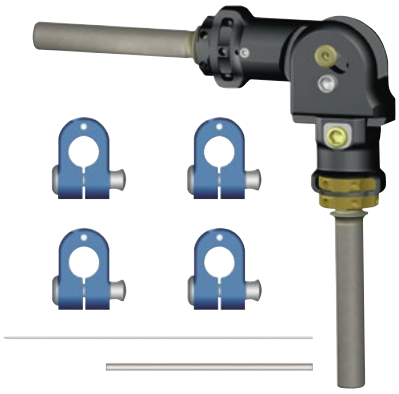
For proper assembly, loosen the distractor end knobs by turning them counterclockwise so that they slide freely along the threaded rod.

Connect the ends of the distractor with those of the fixator body and lock the knobs by turning them clockwise.

The forcing of the extension or flexion movement occurs by acting with the hexagonal wrench directly on one of the ends of the threaded rod.

ORDERING INFORMATION

STERILE



Code	Description
F4-2460	Knee external fixator kit *Contents:* *1 articulated knee external fixator* *4 bone screw clamps with holder* *1 guide wire* *1 pin for locking nuts*

F4-2745	Controlateral bone screws curved arm kit *Contents:* *1 controlateral bone screws curved arm* *2 bone screw clamps with holder*

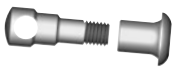
F4-145120	ø5mm cortical bone screw - L. 120-34mm
F4-145150	ø5mm cortical bone screw - L. 150-40mm
F4-156150	ø6mm cortical bone screw - L. 150-40mm
F4-156180	ø6mm cortical bone screw - L. 180-50mm
F4-156200	ø6mm cortical bone screw - L. 200-60mm

Bone screws are also available with hydroxyapatite coating or in Nickel-free stainless steel alloy

F4-2746	Knee fixator distractor

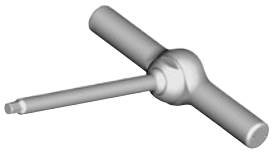
F4-2798	ø14x360mm radiolucent rod
F4-2799	ø14x400mm radiolucent rod

F4-5100	Clamp



F4-5200	Bone screw holder

NOT STERILE

	Code	Description
	**EBA-0050**	6mm hexagonal wrench
	**F4-0205**	Torque wrench
	**F4-0215**	Bone screw guide
	**F4-0220**	T-handle for chucks
	**SF1050**	Drill brace
	**SF1080** **SF1090**	Chuck for ø5mm bone screws Chuck for ø6mm bone screws

ST.A.R.90 F4

Knee

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citieffe®
Essential Moves in Trauma

INSPIRED BY PEOPLE
MOVED BY INNOVATION

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