

Mini External Fixator

Assembly and
Surgical Technique



Table of contents

Components and Configurations	2
Indications	3
Single rod assembly	4
Double rod assembly	6
Removal	8

 Image Intensifier Control

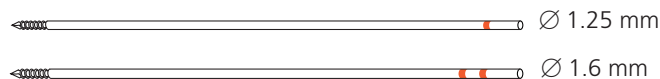
Warning

This description is not sufficient for immediate application of the instrumentation. Instruction by a surgeon experienced in handling this instrumentation is highly recommended.

Components and Configurations

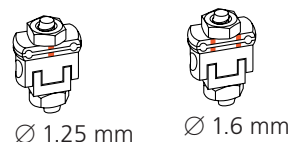
Kirschner Wires (specially designed for Mini External Fixator)

- diameter 1.25 mm (292.600) or 1.6 mm (292.708)
- length 100 mm
- threaded tip



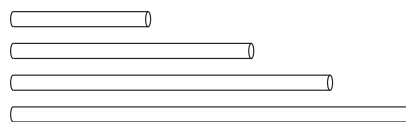
Holding Clamps

- for two Kirschner Wires \varnothing 1.25 mm (395.125) or \varnothing 1.6 mm (395.126)
- swivelling



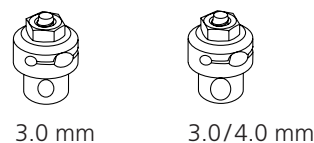
Connecting Rods

- diameter 3.0 mm
- lengths 25 mm (395.105), 45 mm (395.107), 60 mm (395.109), or 75 mm (395.111)
- radiolucent carbon fibre composite



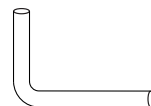
Connecting Clamps

- clamp 3.0 mm (395.133) for two \varnothing 3.0 mm rods
- clamp 3.0/4.0 mm (395.134) to connect the \varnothing 3.0 mm rods of the Mini External Fixator to the \varnothing 4.0 mm rods of the Small External Fixator



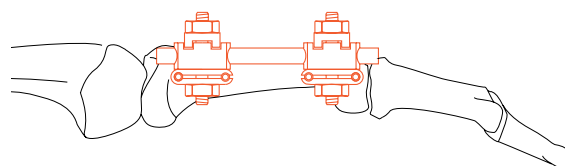
Connecting Rod, angled (395.103)

- diameter 3.0 mm
- length of limbs 18 and 26 mm, respectively
- stainless steel



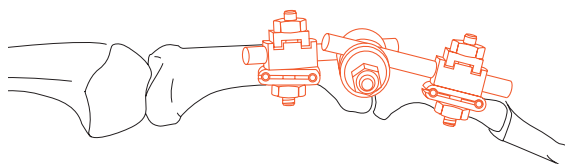
Single rod assembly

- holding clamps
- connecting rod



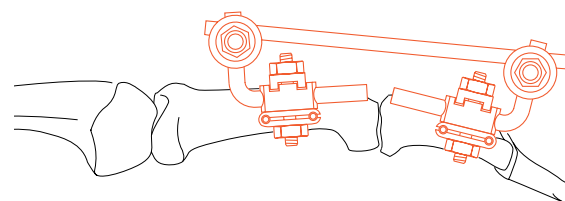
Double rod assembly

- holding clamps
- connecting rods
- connecting clamp



Assembly with angled connecting rods

- holding clamps
- angled connecting rods
- connecting clamps
- connecting rod



Indications

The Mini External Fixator is intended for the following indications on the phalanges and metacarpals of the hand:

- closed comminuted fractures
- open fractures
- dislocated joint fractures which can be reduced by ligamentotaxis
- bone, joint and soft tissue infections
- complex soft tissue injuries
- bone defects caused by trauma or tumour resection

In other bones or for bridging the wrist the Mini External Fixator is not recommended. Radius fractures are indications for the Small External Fixator or the Distal Radius Fixator.

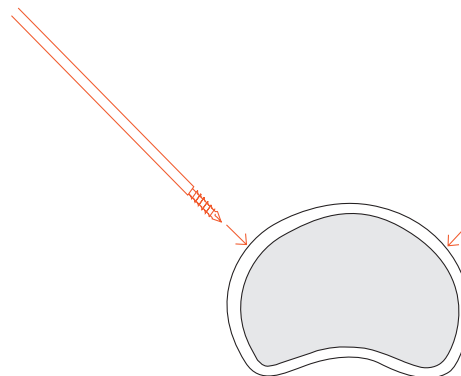
Positioning of Kirschner wires

The anatomical situation of ligaments and tendons of the hand requires particular surgical caution. As a rule, the Kirschner wires are inserted into the metacarpals and phalanges using a dorso-radial or a dorso-ulnar approach.

The Kirschner wires can be introduced laterally into the metacarpals I, II and V, the distal third of the proximal phalanges, as well as into the middle and end phalanges.

To place the Kirschner wires in the proximal part of the first phalanges, the extensor hood is incised in the direction of the movement of the tendon.

With the exception of the single rod assembly, the pairs of Kirschner wires can be placed freely and independently of each other in any position or angle required. In the configuration of a double rod assembly, for instance, the components of the Mini External Fixator allow an individual three-dimensional frame assembly.



Single rod assembly

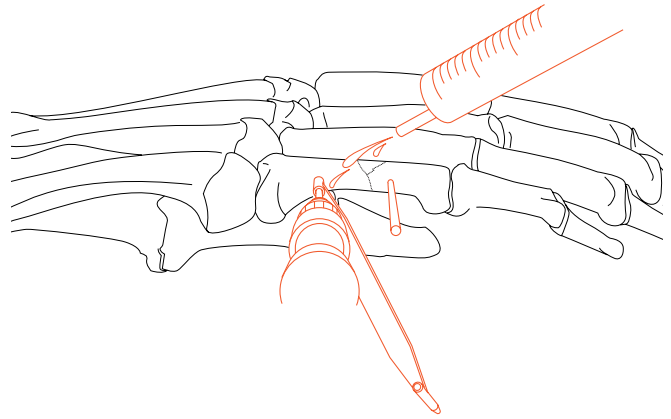
1

Insertion of primary Kirschner wires

The skin and the subjacent soft tissue are incised and one Kirschner wire (292.600 or 292.708) each is inserted proximally and distally to the fracture. Using the Double Drill Sleeve 1.25/1.6 (395.902) the Kirschner wires are inserted until their tips are anchored in the far cortical bone. They must not, however, penetrate the cortical bone. Make sure the Kirschner wires are aligned in one plane.

When using a drill, the Kirschner wires should be inserted at low speed so as to avoid heat development. During the drilling process cool the Kirschner wires with a saline or Ringer's solution. In proximity to joints Kirschner wires can also be inserted using the Handle for Kirschner Wires \varnothing 0.6 to 1.6 mm (392.040).

Note: Use Kirschner wires 292.600 or 292.708 exclusively.



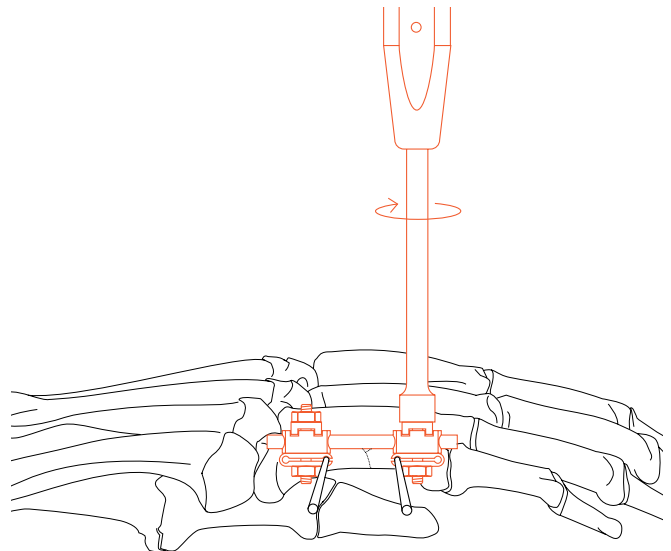
2

Rod connection assembly

Slide a Holding Clamp (395.125 or 395.126) on each Kirschner wire by its slotted opening and slightly tighten the screw nut by hand.

In order to determine the entry points of the secondary Kirschner wires introduce a Kirschner wire into the vacant openings of the clamps, mark and incise the skin and the subjacent soft tissue. Remove the Kirschner wire used for marking.

Slide a Connecting Rod (395.105/107/109/111) through both holding clamps and tighten it to one of them using the Socket Wrench \varnothing 5.5 mm (395.304).

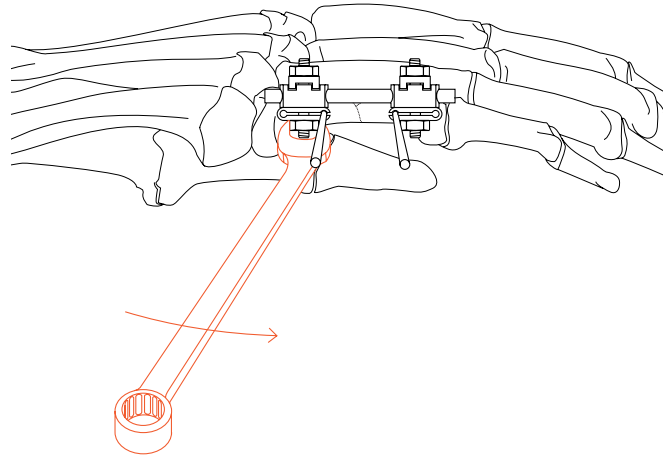


3

Fracture reduction and fixation

- Reduce the fracture and fix the reduction by slightly tightening the screw nut for the Kirschner wires with the Combination Wrench \varnothing 5.5 mm (395.302). Tighten the nut only as much as necessary to fix the reduction, making sure the vacant opening is still wide enough so that the parallel secondary Kirschner wire can be introduced later.

Securely tighten the screw nuts for the connecting rod.

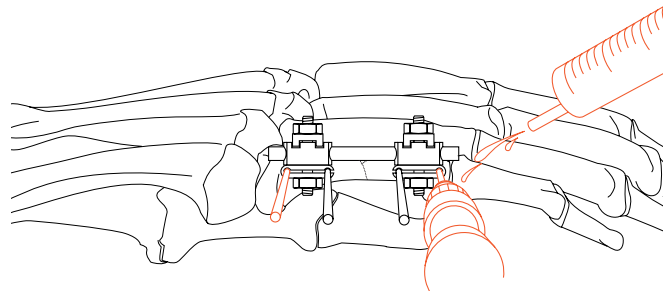


4

Insertion of the secondary Kirschner wires

- Retract the soft tissue along the incision with small bone hooks and insert the secondary Kirschner wires through the vacant openings of the holding clamps while cooling the wire and the clamps.

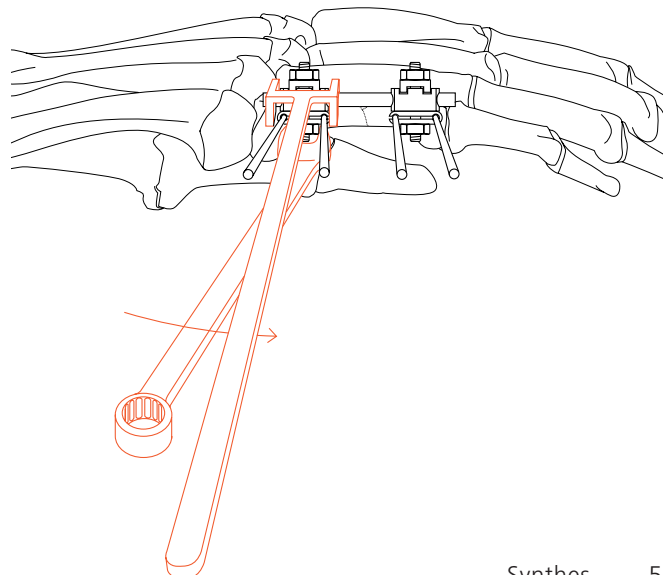
Note: Make sure to always occupy both openings of the holding clamps with a Kirschner wire to ensure proper functioning of the clamps.



5

Tightening the screw nuts

- Tighten the screw nuts for the Kirschner wires and simultaneously hold the connecting rod with the Clamp Holder (395.139) to counteract torque. Cut the Kirschner wires using a Wire Cutter (391.930).



Double rod assembly

1

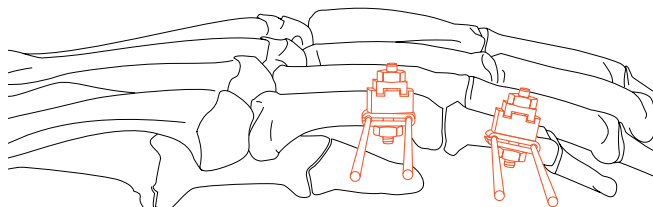
Assembly of holding clamps

Incise skin and soft tissue and introduce a Kirschner wire (292.600 or 292.708) through the double drill sleeve 1.25/1.6 (395.902) into the bone proximally to the fracture until its tip is anchored in the far cortical bone without penetrating it. Slide a Holding Clamp (395.125 or 395.126) onto the wire and introduce a Kirschner wire into the vacant opening of the clamp in order to determine the entry point of the secondary Kirschner wire. Mark the skin and make an incision. Position the holding clamp closely to the body and insert the secondary Kirschner wire.

Repeat this process for the second holding clamp.

When using a drill, Kirschner wires should be inserted at low speed so as to avoid heat development. During the drilling process cool the Kirschner wire with a saline or Ringer's solution. In proximity to joints Kirschner wires can also be inserted using the Handle for Kirschner Wires \varnothing 0.6 to 1.6 mm (392.040).

Note: Use Kirschner wires 292.600 or 292.708 exclusively.

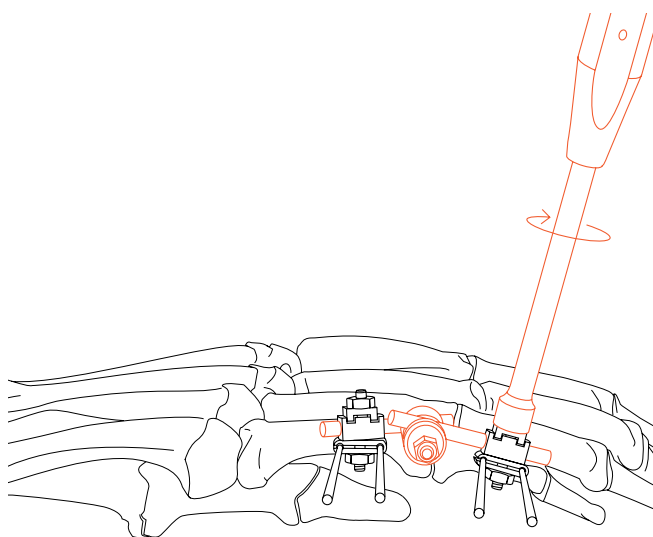


2

Frame assembly

Slide a Connecting Rod (395.105/107/109/111) through each holding clamp and mount the Connecting Clamp (395.133) (do not tighten the screw nut). Tighten the screw nut for the connecting rod of the distal holding clamp using the Socket Wrench \varnothing 5.5 mm (395.304).

Alternative: The use of the assembly with angled connecting rods increases the assembly freedom.



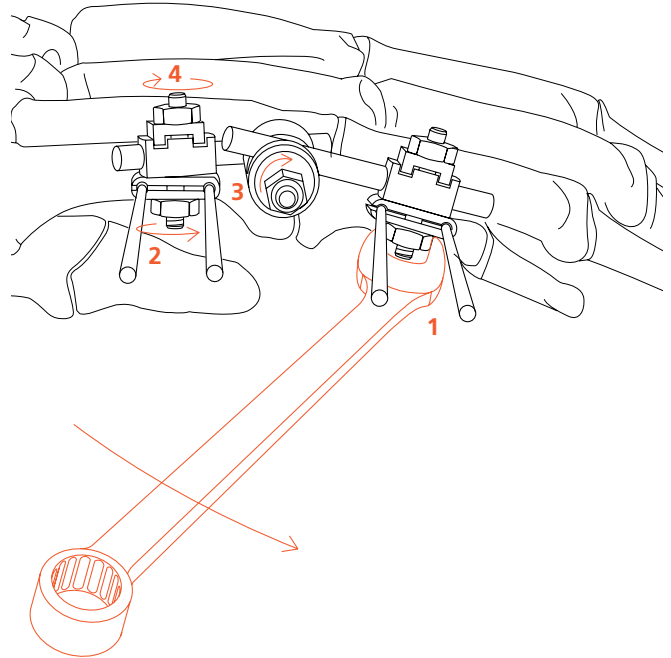
3

Fracture reduction and fixation



Reduce the fracture and fix the reduction by tightening the screw nuts of the holding clamps and of the connecting clamp with the Combination Wrench \varnothing 5.5 mm (395.302). Sequence for tightening the screw nuts: 1, 2, 3, 4.

Cut the Kirschner wires using a Wire Cutter (391.930).



Removal

Dismount connecting rods and holding clamps. If the holding clamps cannot be removed from the Kirschner wires, the clamping plate can easily be opened on the slotted side with a chisel for instance. Unscrew the Kirschner wires anticlockwise with the Handle for Kirschner Wires \varnothing 0.6 to 1.6 mm (392.040), Wire Bending Pliers (391.820) or flat-nosed Pliers (391.850).



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Presented by:

