

Large Distractor — Femur. Fracture reduction and provisional stabilization.

Technique Guide



Femoral
Distraction

Table of Contents

Introduction	Femoral Distraction	2
	When to Use	2

Surgical Technique	Prepare Distractor	4
	Universal Joint Assembly	5
	Sliding Carriage Assembly	6
	Femoral Distraction Technique	7
	Adjustment Technique	9
	References	10

Product Information	Instruments	11
	Set List	13

Standard Femoral Distraction

An alternative to the fracture table

In the treatment of multitrauma patients, it is frequently more advantageous to perform surgical procedures on a standard operating table. The use of a fracture table can cause a loss of mobility of the limb, and mandates the surgical approach. The distractor allows free manipulation of the affected limb without the restrictions imposed by the fracture table.

Patient positioning

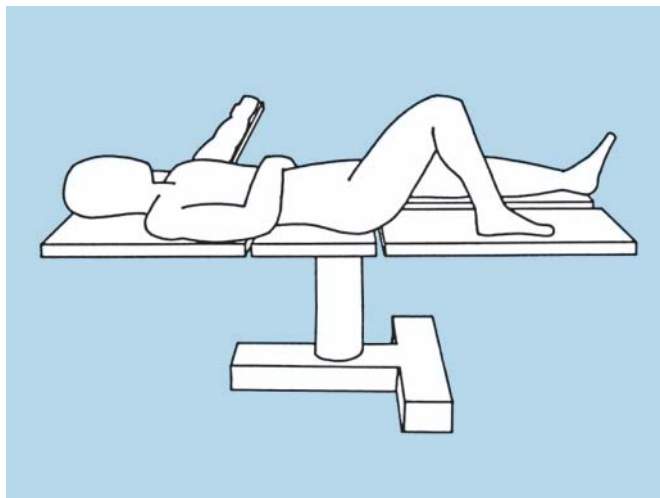
Generally, patients with multiple injuries are placed supine on the fluoroscopy table. The entire limb is assessed with the C-arm in AP and lateral views.

Direct application of force

Unlike the fracture table, where force is applied to the fractured bone through adjacent joints and soft tissue structures, the distractor applies force directly to the bone, thus allowing repositioning of the fractured extremity while adjacent parts of the body remain undisturbed. This eliminates the risk of nerve injuries and complications caused by the fracture table, including peroneal nerve palsy and pudendal crush syndrome.

When to use

The Large Distractor aids in fracture reduction and holds provisional stabilization prior to definitive fixation.



Alternate applications

The Large Distractor can be helpful for fractures involving the tibial plateau. When placing the distractor, the pins must be kept distal to the area that potentially will be plated.

The distractor aids preoperative and intraoperative repositioning and also provides temporary fixation. This is particularly advantageous in treating pelvic and joint fractures where large forces are present.



Knee-spanning

For pelvic fractures:

- An anterior approach can be utilized which requires a more lateral or longitudinal distraction.
- A posterior approach can be utilized.



Acetabular fracture (anterior approach)

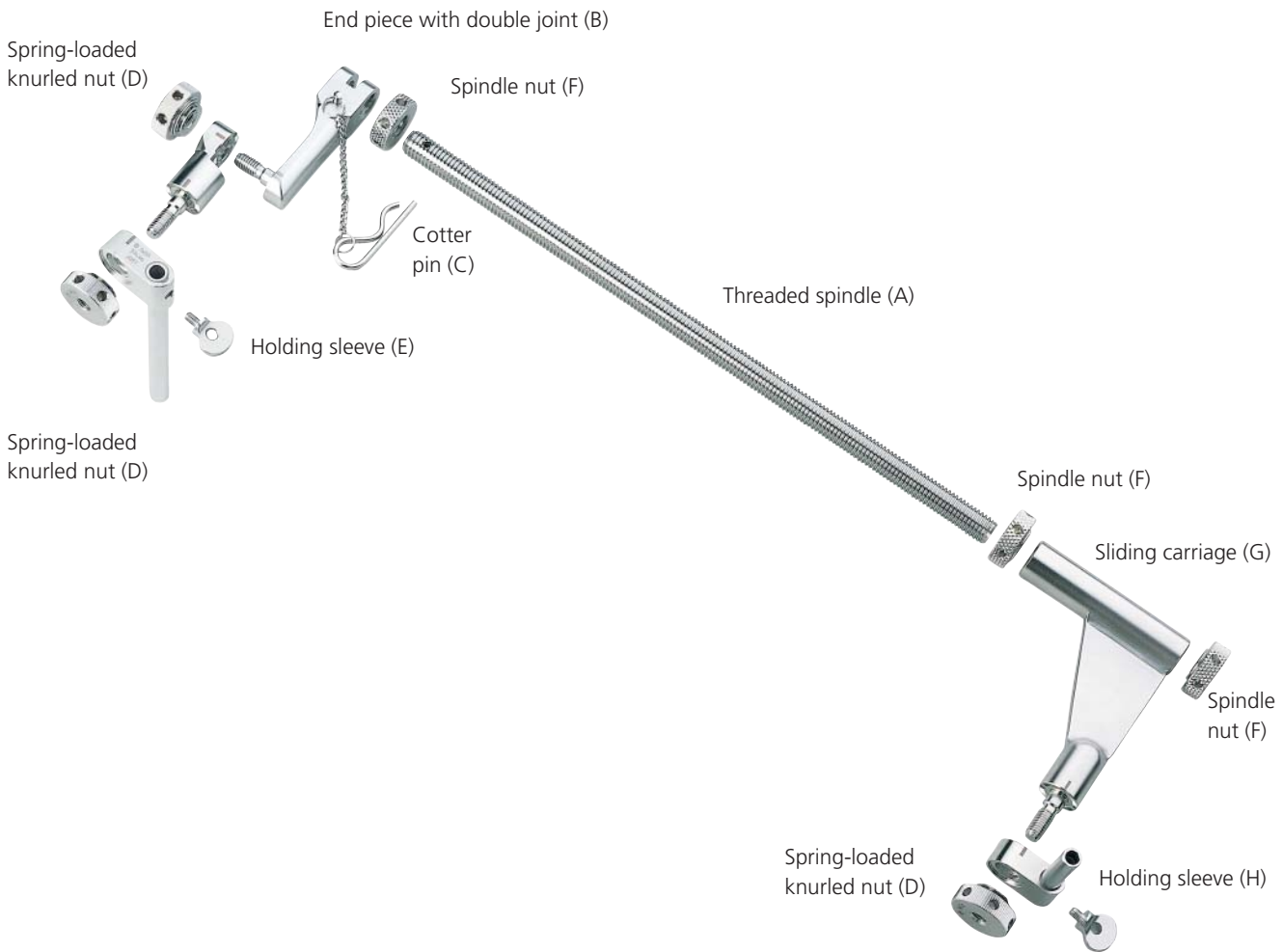


Acetabular fracture (posterior approach)

Prepare Distractor

Preparing the distractor for use

The exact configuration of the large distractor assembly depends on the particular details of each case, such as patient anatomy and which bone is involved, i.e. right or left tibia. The surgeon must consider these factors when assembling the device.



Universal Joint Assembly

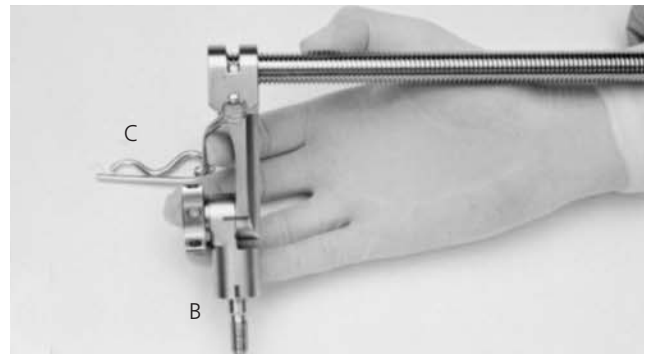
1

Select a 14.0 mm threaded spindle (A) of appropriate length (most likely 480 mm). A transverse hole will be in the proximal end when applied to the femur.



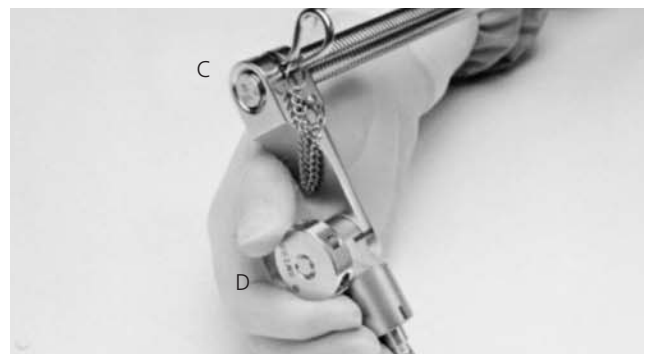
2

Turn the end piece with double joint (B) onto the threaded spindle so that the rod and end piece are flush. If the end piece is positioned correctly, the transverse hole will be centered in the slot of the end piece.



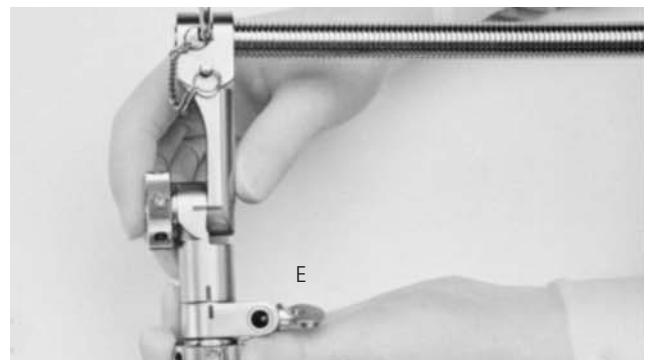
3

To lock rotation of the end piece with double joint, push the cotter pin (C) through the hole until it snaps into place. Extend the end piece so that the reference marks align, and hand-tighten the spring-loaded knurled nut (D).



4

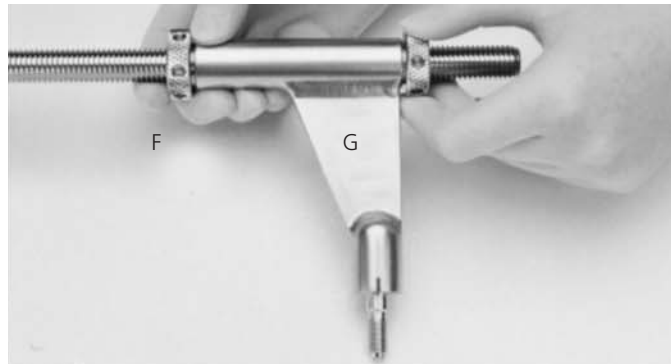
Mount the appropriate length holding sleeve (E) onto the end piece so that the serrated ends interface and the reference marks align. To secure the holding sleeve, put the spring-loaded knurled nut on the end piece and hand-tighten.



Sliding Carriage Assembly

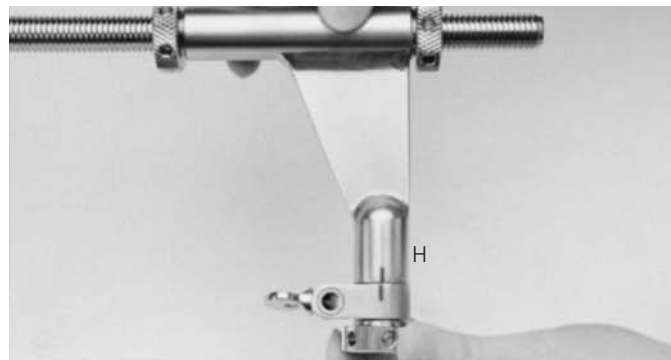
5

Thread a spindle nut (F) partway down the 14.0 mm threaded spindle. Place the sliding carriage (G) over the threaded spindle, and secure it with a second spindle nut.



6

Mount the other holding sleeve (H or E) onto the sliding carriage. The serrated ends must interface and the reference marks must align. Put the spring-loaded knurled nut on the sliding carriage to secure the holding sleeve and hand-tighten.



Femoral Distraction Technique Overview

1

Insert proximal Schanz screw

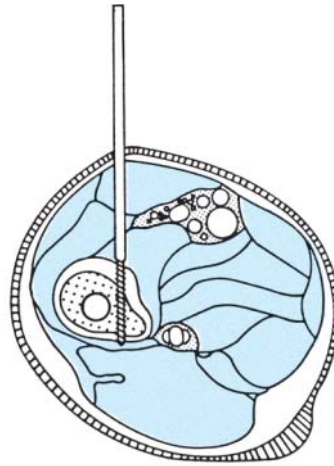
Instruments

294.5x	5.0 mm Schanz Screws
294.6x	6.0 mm Schanz Screws
393.10	Universal Chuck

The proximal Schanz screw should be placed through the calcar or lesser trochanter, perpendicular to the axis of the femur.

Care must be taken to avoid the neurovascular structures surrounding the proximal femur, and to avoid obstructing the medullary canal if IM nailing of the fracture will be attempted.

An alternative approach for plating applications is to place the proximal Schanz screw through the lateral cortex of the greater trochanter. The position of this Schanz screw will depend upon the fracture pattern.



2

Insert distal Schanz screw

The distal Schanz screw should be placed parallel to the axis of the knee joint, in the posterior half of the condyle, approximately 2 cm to 3 cm from the articular surface and inserted laterally or anterolaterally.

Note: For certain plating techniques, it may be necessary to insert the distal Schanz screw medially or anteromedially.



3

Attach distractor

Instruments

321.17 4.5 mm Pin Wrench

394.35 Large Distractor

Handling the preassembled distractor as a unit, slide the holding sleeve over the proximal Schanz screw, through the stab incision to the bone. The threaded spindle should be parallel and anterolateral to the axis of the proximal femur. Slide the holding sleeve over the distal Schanz screw, to the bone. Temporarily loosen the spring-loaded knurled nut or the spindle nuts, as needed.

4

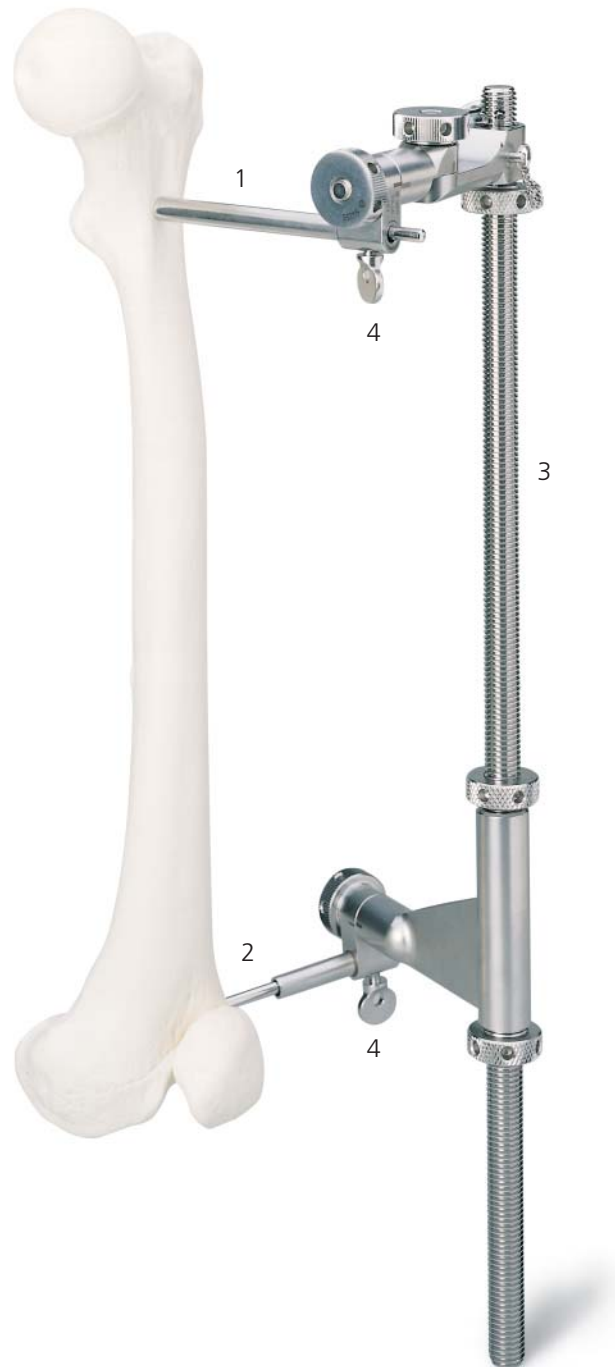
Tighten wing screws

Instruments

321.17 4.5 mm Pin Wrench

393.10 Universal Chuck with T-Handle

Securely tighten the holding sleeves on the Schanz screws by tightening the wing screws using the 4.5 mm pin wrench. If the distractor is positioned properly, the threaded spindle will parallel the axis of the proximal femur. Tighten all spring-loaded knurled nuts in the neutral position (with reference marks aligned).



Adjustment Technique

With all connections loose (except wing screws), obtain approximate alignment and rotation. When the position is acceptable, securely tighten all loose connections with the 4.5 mm pin wrench.

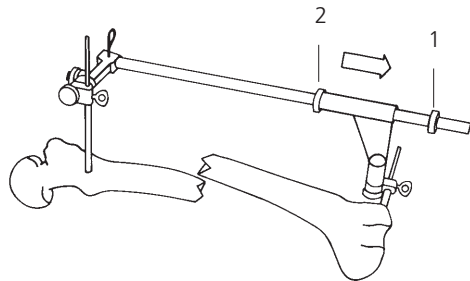
1

Distraction

Instrument

321.17 4.5 mm Pin Wrench

Loosen the distal spindle nut (1). Under image intensification, apply distraction by moving the proximal spindle nut (2) distally.



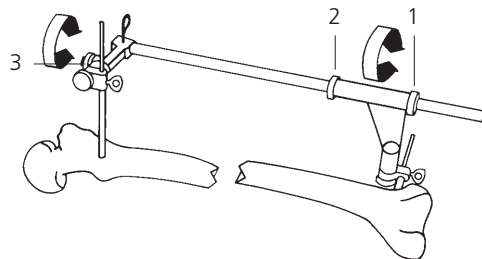
2

Rotation

Instrument

321.17 4.5 mm Pin Wrench

Loosen both spindle nuts (1 and 2) and the spring-loaded knurled nut (3) on the end piece with double joint. Correct rotation by simultaneously rotating the sliding carriage and the 14.0 mm threaded spindle.



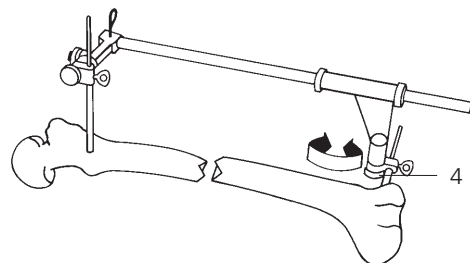
3

Valgus-Varus

Instrument

321.17 4.5 mm Pin Wrench

Loosen the spring-loaded knurled nut on the distal holding sleeve (4). Correction is achieved by manipulating the distal Schanz screw with the universal chuck with T-handle.



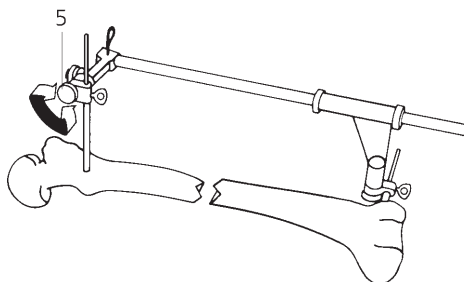
4

Anterior-posterior angulation

Instrument

321.17 4.5 mm Pin Wrench

Loosen the spring-loaded knurled nut that secures the proximal holding sleeve in the end piece with double joint (5), and correct the angulation.



5

Compression

Instrument

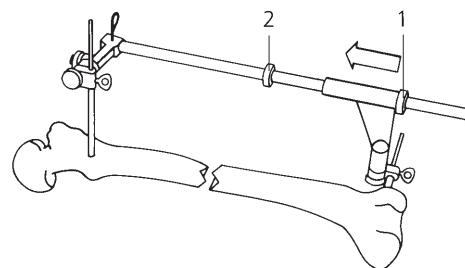
321.17 4.5 mm Pin Wrench

Loosen the proximal Spindle Nut (2). Under image intensification, apply compression by moving the distal spindle nut (1) proximally.

After reduction, secure distractor joints by tightening all connections.

Notes:

To aid with manipulation of the distractor, attach the universal chuck with T-handle to the distal Schanz screw. These steps need not be performed in the order given, except for Step 5 (compression), which should be performed last. To avoid loss of correction, retighten all loosened nuts after each step.



References

- 1 Baumgaertel, Fred et al. "Technique of Using the AO Femoral Distractor for Femoral Intramedullary Nailing." *Journal of Orthopaedic Trauma*. 8;4. 315–21.
- 2 Berton R. et al. "Unreamed Retrograde Intramedullary Nailing of Fractures of the Femoral Shaft." *Journal of Orthopaedic Trauma*. 12;5. 334–42.
- 3 Duwelius, Paul J., M.D., Knute Buehler, M.D., and Jim Green, "The Universal Distractor: The Evaluation of a Technique to Reduce Tibia Fractures." *Techniques in Orthopaedics*. 12;4. 280–88.
- 4 Mast J., R. Jakob and R. Ganz. *Planning and Reduction Technique in Fracture Surgery*. Springer & Verlag. 1989. 195–97.

Instruments

310.37 3.5 mm Drill Bit, 195 mm, quick coupling



321.17 4.5 mm Pin Wrench



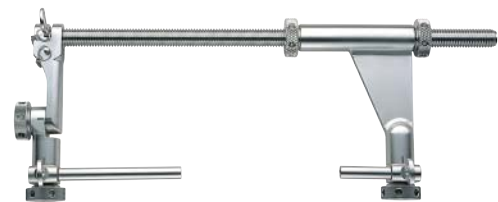
393.10 Universal Chuck with T-Handle



394.182 3.5 mm Trocar, 118 mm (long)



394.35 Large Distractor, complete



394.40 14.0 mm Threaded Spindle, 480 mm



394.41 14.0 mm Threaded Spindle, 330 mm



394.42 Spindle Nut



394.43 Sliding Carriage



394.44 End Piece with double joint



394.45 Holding Sleeve, 55 mm length



394.46 Holding Sleeve, 105 mm length



395.913 5.0 mm/3.5 mm Drill Sleeve, 107 mm (long)



395.923 6.0 mm/5.0 mm Threaded Drill Sleeve, 98 mm (long)



Large Distractor Set (115.700)

Graphic Case

305.78 Large Distractor Set Graphic Case

Contents

294.55	5.0 mm Schanz Screw, blunted trocar point, 170 mm, 4 ea.
294.56	5.0 mm Schanz Screw, blunted trocar point, 200 mm, 4 ea.
294.67	6.0 mm Schanz Screw, spade point, 160 mm, 4 ea.
294.68	6.0 mm Schanz Screw, spade point, 190 mm, 4 ea.
310.37	3.5 mm Drill Bit, 195 mm, quick coupling, 2 ea.
321.17	4.5 mm Pin Wrench
393.10	Universal Chuck with T-Handle
394.182	3.5 mm Trocar, 118 mm (long)
394.40	14.0 mm Threaded Spindle, 480 mm
394.41	14.0 mm Threaded Spindle, 330 mm
394.42	Spindle Nut, 3 ea.
394.43	Sliding Carriage
394.44	End Piece with double joint
394.45	Holding Sleeve, 55 mm length, 2 ea.
394.46	Holding Sleeve, 105 mm length, 2 ea.
395.913	5.0 mm/3.5 mm Drill Sleeve, 107 mm (long)
395.923	6.0 mm/5.0 mm Threaded Drill Sleeve, 98 mm (long)



Also Available

105.731	Medium Distractor Set
03.100.048	6.0 mm LCP Attachment Pin
305.79	Medium Distractor Set Graphic Case
394.35	Large Distractor, complete
395.49	Medium Distractor, complete

Note: Additional sets are needed for nailing applications.

Contact your Synthes sales representative for a list of replacement parts that are available for the Large and Medium Distractors.

Note: For additional information, please refer to package insert.



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