

3.5 mm LCP Proximal Tibia Plate. Part of the Synthes Small Fragment LCP System.

Technique Guide



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Warning

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

3.5 mm LCP Proximal Tibia Plate. Part of the Synthes Small Fragment LCP System.

The 3.5 mm LCP Proximal Tibia Plate is part of the Small Fragment LCP System, which merges locking screw technology with conventional plating techniques.

The 3.5 mm LCP Proximal Tibia Plate has a limited-contact profile. The head and neck portions of the plate accept 3.5 mm Stardrive or Hexagonal Locking Screws. The screw hole pattern allows a raft of subchondral locking screws to buttress and maintain reduction of the articular surface. This provides resistance to local depression loads in addition to the stability of the fixed-angle construct created by locking the screws into the plate.

The Locking Compression Plate (LCP) has Combi holes in the plate shaft which combine a dynamic compression unit (DCU) hole with a locking screw hole. The Combi hole provides flexibility of axial compression and locking capability throughout the length of the plate shaft.

Note: For information on fixation principles using conventional and locked plating techniques, please refer to the Synthes Small Fragment Locking Compression Plate (LCP) Technique Guide.

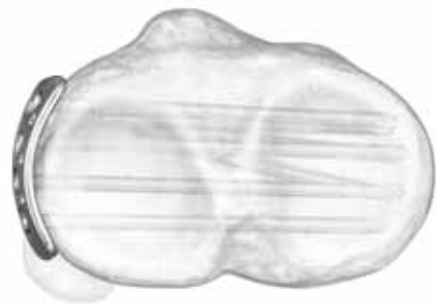


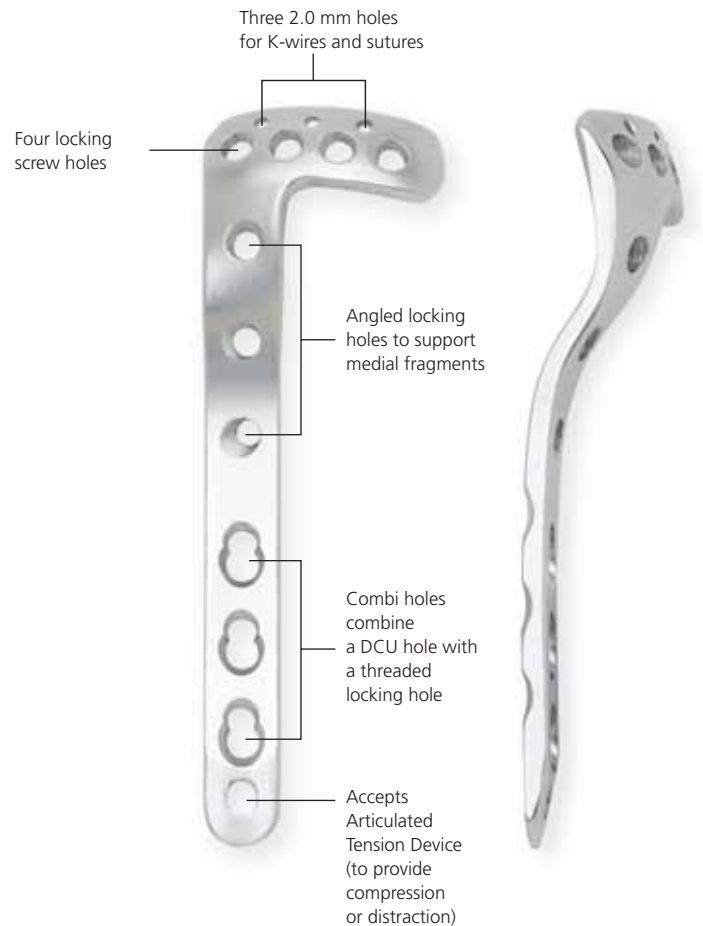
Plate head

- Anatomically contoured to match the lateral proximal tibia.
- Four convergent threaded screw holes accept 3.5 mm Stardrive or Hexagonal Locking Screws.
- Three 2.0 mm holes for preliminary fixation with K-wires, or meniscal repair with sutures.

Plate shaft

- Available with 4, 6, 8, 10, 12, 14, or 16 screw holes.
- The three locking holes distal to the plate head accept 3.5 mm Stardrive or Hexagonal Locking Screws to secure plate position. The hole angles allow the locking screws to converge with three of the four locking screws in the plate head to support medial fragments.
- Combi holes, distal to the three angled locking holes, combine a DCU hole with a threaded locking hole. The Combi holes accept 3.5 mm Stardrive or Hexagonal Locking Screws in the threaded portion of the hole and 3.5 mm Cortex Screws or 3.5 mm Shaft Screws in the DCU portion of the hole.

Available in left and right plates, in implant quality 316L stainless steel or commercially pure (CP4) titanium.



AO ASIF Principles of Internal Fixation

In 1958, the AO ASIF (Association for the Study of Internal Fixation) formulated four basic principles,¹ which have become the guidelines for internal fixation. Those principles, as applied to the 3.5 mm LCP Proximal Tibia Plate, are:

Anatomic Reduction

Facilitates restoration of the articular surface by exact screw placement utilizing threaded drill sleeves.

Stable Fixation

Locking screws create a fixed-angle construct, providing angular stability.

Preservation of Blood Supply

Tapered end for submuscular plate insertion. Limited-contact design reduces plate-to-bone contact and vascular trauma.

Early Mobilization

Plate features combined with AO technique create an environment for bone healing, expediting a return to optimal function.

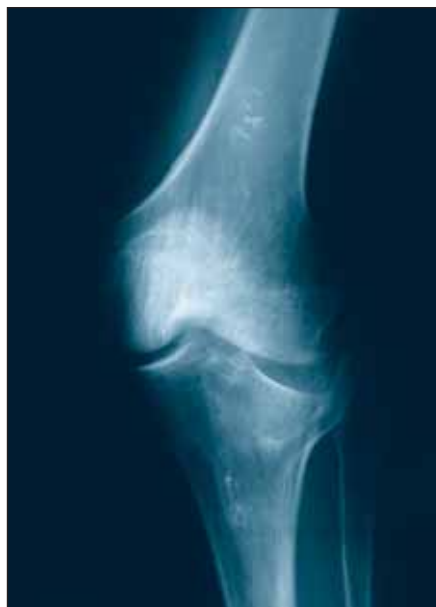
¹ Müller ME, Allgöwer M, Schneider R, Willenegger R (1991) AO Manual of Internal Fixation. 3rd ed. Berlin: Springer

Indications/Contraindications

Indications

- Split-type fractures of the lateral tibial plateau
- Lateral split fractures with associated depressions
- Pure central depression fractures
- Split or depression fractures of the medial plateau

Note: The use of a bone void filler such as chronOS Inject is only indicated in depression fractures with associated bone voids.



Contraindications

- Isolated shaft fractures
- Children in period of growth
- Osteotomies
- Sepsis
- Compromised vascularity
- Malignant primary or metastatic tumours
- Heavy/obese patients
- Non-compliant patients

Notes: Fractures with associated fractures of the shaft require a special evaluation through the surgeon. It is recommended to use a stronger plate such as the 4.5 mm LCP PTP or the 4.5 mm PLT/LISS plates for obese patients. In all cases an adapted reduced post-operative mobilization is mandatory.



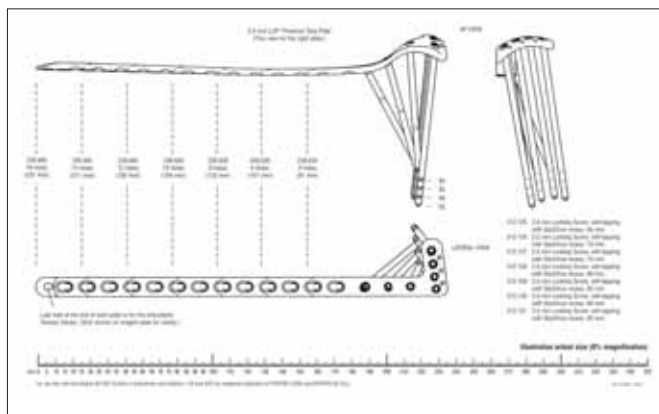
For contraindications of the bone void filler chronOS Inject see the corresponding technique guide (036.000.794)

1

Preparation

Complete the preoperative radiographic assessment and prepare the preoperative plan. Determine plate length and instruments to be used. **Determine proximal screw placement and screw lengths to ensure proper screw placement in the metaphysis.**

Position the patient supine on a radiolucent operating table. Visualization of the proximal tibia under fluoroscopy in both the lateral and AP views is necessary.



Required Set

A Small Fragment LCP Instrument Set is required when implanting the 3.5 mm LCP Proximal Tibia Plate.

Recommended additional sets

- Basic Instrument Set, for LC-DCP and DCP
- Small Fragment Instrument and Implant Set – LC-DCP, with self-tapping screws
- Bone Forceps Set
- Large Distractor Set
- Large External Fixator Set with Self-Drilling Schanz Screws
- Periarticular Reduction Forceps Set
- Pelvic Implant Set, with self-tapping screws (for longer length 3.5 mm cortex screws up to 110 mm)

Bone void filler

If a bone void filler is to be used, Synthes provides the following options:

- DBX: human demineralised bone (paste, putty or mix)
- NorianSRS: injectable calcium phosphate with high compressive strength
- chronOS: β -tricalcium phosphate (granules or preforms)
- chronOS Inject: injectable calcium phosphate with fast remodelling

In this technique guide, chronOS Inject is used as an example.

2

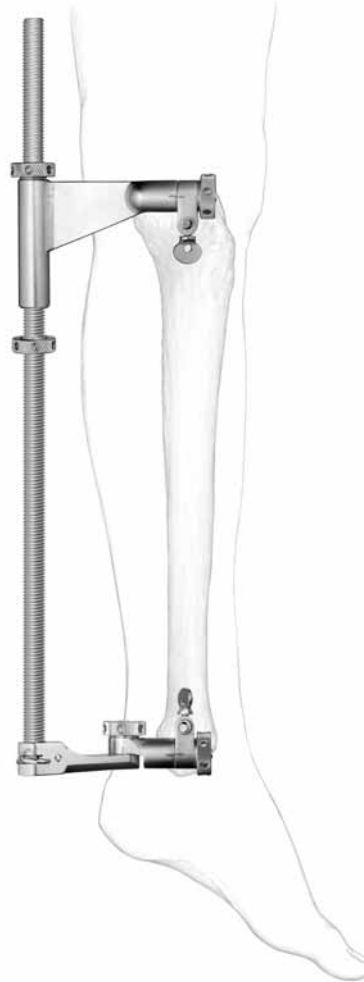
Reduce articular surface

Technique tip: Prior to reduction, application of an external fixator or Large Distractor (394.350) may facilitate visualization and reduction of the joint.

Reduce the fracture fragments and confirm reduction using image intensification. Fragments may be reduced using independent Kirschner wires; however, K-wire holes are also provided on the plate to help achieve provisional reduction, plate position, or fixation.

The locking screws do not provide interfragment or plate-to-bone compression; therefore, any desired compression must be achieved with traditional lag screws. The articular fragments must be reduced and compression must be obtained prior to applying the 3.5 mm LCP Proximal Tibia Plate with locking screws.

Technique tip: To verify that lag screws will not interfere with plate placement, hold the plate laterally to the bone.



3

Determine proximal screw placement

Prior to placing the plate on the bone, thread two 2.8 mm Threaded Drill Guides (312.648) into two nonadjacent threaded holes in the plate head. Insert 2.8 mm Percutaneous Drill Bits (324.214) through the guides and confirm that the drill bits are parallel in the transverse plane. This verifies that the guides are properly threaded into the plate, which ultimately ensures accurate screw placement.



4

Determine plate position

Using anatomic landmarks and fluoroscopy, mount the plate on the intact or reconstructed plateau without attempting to reduce the distal portion of the fracture.

Insert a 2.0 mm Kirschner Wire (292.200) through a K-wire hole. Readjust plate position, if necessary. Place a second Kirschner wire in a K-wire hole to prevent rotation of the plate and to secure provisional fixation of the plate to the tibial plateau. The K-wires should penetrate and extend several millimeters beyond the medial cortex.

Note: An additional 2.0 mm K-wire may be placed in the third K-wire hole to hold the plate in position.

Prior to proceeding, confirm plate head placement. Use clinical examination and fluoroscopy to confirm that:

- Screw trajectories in the proximal locking holes are parallel to the joint in the transverse plane, and the plate is orientated properly on the plateau.
- Screw and plate placement are consistent with the preoperative plan.
- Alignment of the plate to the shaft of the tibia is correct in both the AP and lateral views. Placement of the plate at this point will determine final flexion/extension reduction.



5

Drill for proximal screws

While the plate is placed against the bone, use the 2.8 mm Percutaneous Drill Bit (324.214) to drill for the locking screw through one of the two threaded guides attached to the plate. It is imperative to drill using fluoroscopy to ensure proper screw trajectory and screw placement. Drill through to the medial cortex or the desired screw tip location.

Determine the appropriate screw length indicated on the calibrated drill bit. Remove the drill bit and drill guide.

Alternatively, the Depth Gauge (319.090) can be used to determine the appropriate screw length.



6

Insert proximal screws

Note: This plate can serve as a buttress for a medial wedge. This is accomplished by the convergence of the metaphyseal locking screws and the oblique locking screws from below.

The screws in the head of the plate are typically 80 mm in length.

If lag screw reduction of a fragment is required, this must be accomplished prior to inserting locking screws into the fragment. It may be necessary to predrill the lateral cortex using the 2.8 mm Percutaneous Drill Bit.

Insert the appropriate length locking screw into the bone with power, using the 1.5 Nm Torque Limiting Attachment (TLA) (511.770 or 511.773) and Stardrive or Hexagonal Screwdriver Shaft (314.116 or 314.030).

Warning: Always use the TLA when using power.

Reminder: The locking screw is not a lag screw. When inter-fragmentary compression is desired, use a standard 3.5 mm cortex screw.

At this point, verify screw placement using C-arm imaging.

Alternative

Use the Stardrive or Hexagonal Screwdriver (314.115 or 314.070) to manually insert the appropriate locking screw. Carefully tighten the locking screw, as excessive force is not necessary to produce effective screw-to-plate locking.



Repeat for remaining proximal locking holes. Securely tighten all locking screws to lock them to the plate.

7

Reduce shaft to tibial plateau

Reduce the tibial plateau to the shaft of the tibia, using indirect reduction techniques whenever possible. Using atraumatic technique, secure the plate to the tibial shaft with bone forceps.

Confirm rotational alignment of the extremity by clinical examination.

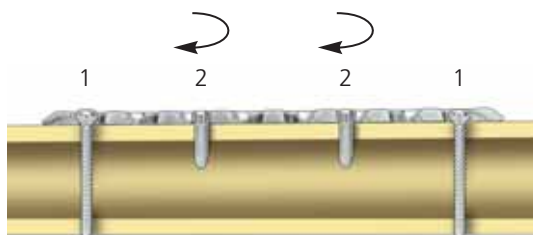
Once reduction is satisfactory, and if it is appropriate based on the fracture morphology, the plate should be loaded in tension using the Articulated Tension Device (321.120).*

Note: With multifragment fractures, it may not always be possible or desirable to achieve anatomic reduction of the fracture. However, in simple fracture patterns, the Articulated Tension Device may facilitate anatomic reduction. This device may be used to generate either compression or distraction.

In addition to having threaded locking holes, the plate functions similarly to DCP plates which offer the ability to self-compress fracture fragments. Therefore, a combination of lag screws and locking screws may be used.

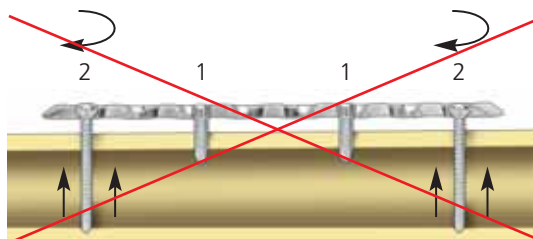


Important: If a combination of cortex (1) and locking screws (2) is used, a cortex screw should be inserted first to pull the plate to the bone.



Correct

If locking screws (1) have been used to fix the plate to a fragment, subsequent insertion of a cortex screw (2) in the same fragment without loosening and retightening the locking screw is not recommended.



Incorrect

* Found in the Basic Instrument Set, for LC-DCP and DCP

8

Insert Cortex Screws in shaft of plate

Insert as many standard 3.5 mm Cortex Screws as necessary into the distal portion of the plate.

Important: All of the 3.5 mm Cortex Screws must be inserted prior to insertion of 3.5 mm Locking Screws.

Use the 3.5 mm Universal Drill Guide (323.360) to predrill for the 3.5 mm Cortex Screws and drill through both cortices with the 2.5 mm Drill Bit (310.250).



For the neutral position, press the drill guide down in the non-threaded hole. To obtain compression, place the drill guide at the end of the nonthreaded hole away from the fracture. Do not apply downward pressure on the drill guide's spring-loaded tip.



Measure for screw length using a depth gauge. Select and insert the appropriate length 3.5 mm Cortex Screw.

9

Insert 3.5 mm Locking Screws in shaft of plate

Attach the 2.8 mm Threaded Drill Guide (312.648) to a locking hole in the plate shaft. Drill a hole using the 2.8 mm Percutaneous Drill Bit (324.214).

Note: Use of the drill guide is mandatory for screws to lock to the plate properly.

Determine the appropriate screw length indicated on the calibrated drill bit.

Remove the drill bit and drill guide.

Insert the appropriate length locking screw into the bone with power, using the 1.5 Nm Torque Limiting Attachment (TLA) (511.770 or 511.773) and Stardrive or Hexagonal Screwdriver Shaft (314.116 or 314.030).

Warning: Always use the TLA when using power.

Repeat as necessary to insert additional locking screws.

Examine the limb clinically and radiographically. It is important that the tibial plateau is in proper orientation to the tibial shaft.



Alternative

Use the Stardrive or Hexagonal Screwdriver (314.115 or 314.070) to manually insert the appropriate locking screw. Carefully tighten the locking screw, as excessive force is not necessary to produce effective screw-to-plate locking.



10

Insert 3.5 mm Locking Screws in the oblique holes

Note: Use the oblique locking screws to buttress medial fragments.

Thread a 2.8 mm Threaded Drill Guide (312.648) into the distal oblique locking hole.

Drill with the 2.8 mm Percutaneous Drill Bit (324.214).

Determine the appropriate screw length indicated on the calibrated drill bit.

Insert the appropriate length locking screw into the bone with power, using the 1.5 Nm Torque Limiting Attachment (TLA) (511.770 or 511.773) and Stardrive or Hexagonal Screwdriver Shaft (314.116 or 314.030).

Repeat steps for the last two oblique locking screws.

Alternative

Use the Stardrive or Hexagonal Screwdriver (314.115 or 314.070) to manually insert the appropriate locking screw. Carefully tighten the locking screw, as excessive force is not necessary to produce effective screw-to-plate locking.

Note: Securely tighten all locking screws to lock them to the plate.



Screw length considerations

When using the appropriate length screws in the oblique locking holes, the screw tips should meet the proximal locking screws.



Suggested screw lengths to achieve desired screw convergence.

Application of the Bone Void Filler chronOS Inject

With the stable fixated fracture, the defect can now be filled with an appropriate bone void filler. The application here shows chronOS Inject, the injectable calcium phosphate with fast re-modelling.

Notes: For complete instructions on how to prepare chronOS Inject, refer to the corresponding technique guide (Art.No. 036.000.794).

The use of a bone void filler such as chronOS Inject is only indicated in depression fractures with associated bone voids.

1

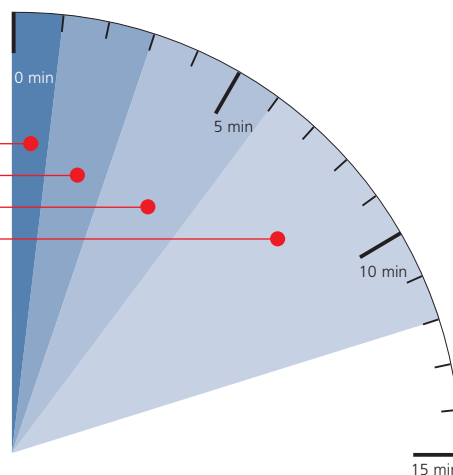
Preoperative planning

Application time: 12 minutes

The application takes 12 minutes and consists of four phases:

Mixing	1 minute	_____
Rest	2 minutes	_____
Application	3 minutes	_____
Setting	6 minutes	_____

After 12 minutes, chronOS Inject has a primary stability that permits wound closure. Hardening is complete after 24 hours.



2

Inject the bone void filler

Use an existing drill hole with access to the bone void or drill a new one.

For the application, press the lever slowly and uniformly. Do not apply excess pressure.

The time period for injection and – if necessary – shaping of chronOS Inject is 3 minutes. In the treatment of enclosed bone defects, pay attention to completely filling the defect by careful retrograde filling of the cavity.

Note: Check the joint surface to ensure that no material has leaked into the joint.



Cleaning of Instruments

Cleaning the cannulation in the threaded drill guides is imperative for proper function.

Instruments should be cleared intraoperatively using the 2.5 mm Cleaning Stylet (319.461) to prevent accumulation of debris in the cannulation. Instruments should be cleaned postoperatively using the stylet and the 2.9 mm Cleaning Brush (319.240).

Graphic Case for 3.5 mm LCP Proximal Tibia Plate Set

690.390: stainless steel

690.391: titanium

3.5 mm LCP Proximal Tibia Plates

Stainless

Steel	Titanium		
239.934	439.934	4 holes	81 mm, right
239.935	439.935	4 holes	81 mm, left
239.936	439.936	6 holes	107 mm, right
239.937	439.937	6 holes	107 mm, left
239.938	439.938	8 holes	133 mm, right
239.939	439.939	8 holes	133 mm, left
239.940	439.940	10 holes	159 mm, right
239.941	439.941	10 holes	159 mm, left
239.942	439.942	12 holes	185 mm, right
239.943	439.943	12 holes	185 mm, left
239.944	439.944	14 holes	211 mm, right
239.945	439.945	14 holes	211 mm, left
239.946	439.946	16 holes	237 mm, right
239.947	439.947	16 holes	237 mm, left

3.5 mm Locking Screws, Self-Tapping, with Stardrive recess

Stainless

Steel	Titanium	
212.125	412.125	65 mm
212.126	412.126	70 mm
212.127	412.127	75 mm
212.128	412.128	80 mm

3.5 mm Locking Screws, Self-tapping, with hexagonal recess

Stainless

Steel	Titanium	
213.065	413.065	65 mm
213.070	413.070	70 mm
213.075	413.075	75 mm
213.080	413.080	80 mm

Instruments

319.090	Depth Gauge for Long Screws \varnothing 3.5 mm
324.214	2.8 mm Percutaneous Drill Bit

Vario Case for 3.5 mm LCP Proximal Tibia Plate Set

68.120.401: stainless steel or titanium

3.5 mm LCP Proximal Tibia Plates

Stainless

Steel	Titanium		
239.934	439.934	4 holes	81 mm, right
239.935	439.935	4 holes	81 mm, left
239.936	439.936	6 holes	107 mm, right
239.937	439.937	6 holes	107 mm, left
239.938	439.938	8 holes	133 mm, right
239.939	439.939	8 holes	133 mm, left
239.940	439.940	10 holes	159 mm, right
239.941	439.941	10 holes	159 mm, left
239.942	439.942	12 holes	185 mm, right
239.943	439.943	12 holes	185 mm, left
239.944	439.944	14 holes	211 mm, right
239.945	439.945	14 holes	211 mm, left
239.946	439.946	16 holes	237 mm, right
239.947	439.947	16 holes	237 mm, left

Additional instruments to be added to the Small Fragment LCP Instrument Set

312.648	LCP Drill Sleeve 3.5 for Drill Bits \varnothing 2.8 mm
324.214	2.8 mm Percutaneous Drill Bit
319.090	Depth Gauge for Long Screws \varnothing 3.5 mm

chronOS Inject

Implants

710.065S	chronOS Inject, 2.5 cc, in mixing and application cartridge
710.066S	chronOS Inject, 5 cc, in mixing and application cartridge
710.067S	chronOS Inject, 10 cc, in mixing and application cartridge

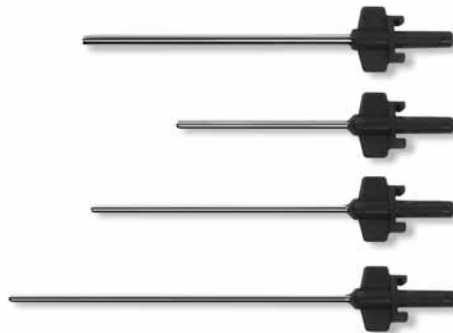


Instruments

353.000	Delivery gun for chronOS Inject
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381.000.01S	Injection cannula for chronOS Inject 10 ga × 10 cm, 1 pc.
381.000.03S	Injection cannula for chronOS Inject 10 ga × 10 cm, 3 pcs.
381.001.01S	Injection cannula for chronOS Inject 12 ga × 7.5 cm, 1 pc.
381.001.03S	Injection cannula for chronOS Inject 12 ga × 7.5 cm, 3 pcs.
381.002.01S	Injection cannula for chronOS Inject 12 ga × 10 cm, 1 pc.
381.002.03S	Injection cannula for chronOS Inject 12 ga × 10 cm, 3 pcs.
381.003.01S	Injection cannula for chronOS Inject 12 ga × 12.5 cm, 1 pc.
381.003.03S	Injection cannula for chronOS Inject 12 ga × 12.5 cm, 3 pcs.





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