

SURGICAL TECHNIQUE

Retrograde Femoral Nail



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TECHNOLOGICAL ADVANTAGES

The retrograde femoral nail is made of titanium (Ti6Al4V ELI), has an innovative locking system, with a 6.4mm cannulated screw for obtaining a static fixation. It also has a hole in the distal part for the split compression screw that allows better fixation of the fracture in the condyles.

It has an innovative and exclusive system of locking screws with threaded head in its proximal and distal zone, placed by means of an adjustable strip in the proximal and lateral directions, which allows a fast and safe locking without the use of an image intensifier, thus improving the reduction either open or closed, decreasing surgical time and tissue damage, compared to other treatment techniques.



SPECIFICATIONS

The retrograde femoral nail is made of high quality titanium of 9, 10, 11, and 12 mm diameter with lengths from 320 to 440 mm.

RETROGRADE FEMORAL NAIL

Diameter 9mm

176.32*	9 mm X 320 mm
176.34*	9 mm X 340 mm
176.36*	9 mm X 360 mm
176.38*	9 mm X 380 mm
176.40	9 mm X 400 mm
176.42	9 mm X 420 mm
176.44	9 mm X 440 mm

Diameter 10mm

174.32*	10 mm X 320 mm
174.34*	10 mm X 340 mm
174.36*	10 mm X 360 mm
174.38*	10 mm X 380 mm
174.40	10 mm X 400 mm
174.42	10 mm X 420 mm
174.44	10 mm X 440 mm

Diameter 11mm

175.32*	11 mm X 320 mm
175.34*	11 mm X 340 mm
175.36*	11 mm X 360 mm
175.38*	11 mm X 380 mm
175.40	11 mm X 400 mm
175.42	11 mm X 420 mm
175.44	11 mm X 440 mm

Diameter 12mm

357.32	12 mm X 320 mm
357.34	12 mm X 340 mm
357.36	12 mm X 360 mm
357.38	12 mm X 380 mm
357.40	12 mm X 400 mm
357.42	12 mm X 420 mm
357.44	12 mm X 440 mm

* Contained in the standard implant set.

SPECIFICATIONS

The short retrograde nail is made of high quality titanium of 9, 10, 11, and 12 mm diameter with lengths of 180 to 240 mm.

SHORT RETROGRADE FEMORAL NAIL

Diameter 9mm

161.24* 9 mm X 240 mm

161.26* 9 mm X 260 mm

Diameter 10mm

159.24* 10 mm X 240 mm

159.26* 10 mm X 260 mm

Diameter 11mm

160.24* 11 mm X 240 mm

160.26* 11 mm X 260 mm

Diameter 12mm

356.24 12 mm X 240 mm

356.26 12 mm X 260 mm

* Contained in the standard implant set.



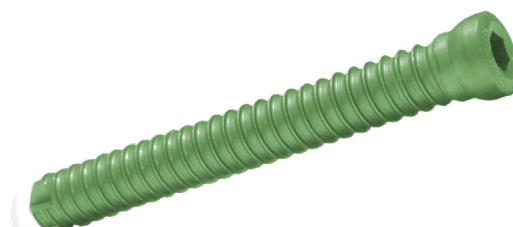
4.5 mm LOCKING SCREW FOR INTRAMEDULLARY NAIL

166.15	4.5 mm X 15 mm	166.60	4.5 mm X 60 mm
166.20	4.5 mm X 20 mm	166.65	4.5 mm X 65 mm
166.25	4.5 mm X 25 mm	166.70	4.5 mm X 70 mm
166.30	4.5 mm X 30 mm	166.75	4.5 mm X 75 mm
166.35	4.5 mm X 35 mm	166.80	4.5 mm X 80 mm
166.40	4.5 mm X 40 mm	166.85	4.5 mm X 85 mm
166.45	4.5 mm X 45 mm	166.90	4.5 mm X 90 mm
166.50	4.5 mm X 50 mm	166.95	4.5 mm X 95 mm
166.55	4.5 mm X 55 mm	166.100	4.5 mm X 100 mm



6.4 mm SCREW FOR RETROGRADE NAIL

179.25	6.4mm X 25 mm	179.75	6.4mm X 75 mm
179.30	6.4mm X 30 mm	179.80	6.4mm X 80 mm
179.35	6.4mm X 35 mm	179.85	6.4mm X 85 mm
179.40	6.4mm X 40 mm	179.90	6.4mm X 90 mm
179.45	6.4mm X 45 mm	179.95	6.4mm X 95 mm
179.50	6.4mm X 50 mm	179.100	6.4mm X 100 mm
179.55	6.4mm X 55 mm	179.105	6.4mm X 105 mm
179.60	6.4mm X 60 mm	179.110	6.4mm X 110 mm
179.65	6.4mm X 65 mm	179.115	6.4mm X 115 mm
179.70	6.4mm X 70 mm	179.120	6.4mm X 120 mm



**6.4 mm COMPRESSION SCREW FOR
RETROGRADE NAIL (WASHER INCLUDED)**

178.40	6.4 mm X 40 mm
178.45	6.4 mm X 45 mm
178.50	6.4 mm X 50 mm
178.55	6.4 mm X 55 mm
178.60	6.4 mm X 60 mm
178.65	6.4 mm X 65 mm
178.70	6.4 mm X 70 mm
178.75	6.4 mm X 75 mm
178.80	6.4 mm X 80 mm
178.85	6.4 mm X 85 mm
178.90	6.4 mm X 90 mm
178.95	6.4 mm X 95 mm
178.100	6.4 mm X 100 mm
178.105	6.4 mm X 105 mm
178.110	6.4 mm X 110 mm
178.115	6.4 mm X 115 mm
178.120	6.4 mm X 120 mm

**END CAP FOR FEMORAL NAIL****CODE 168.12**

Surgical Indications

- For fractures of the femur diaphysis.
- For distal femur fractures.

General contraindications

- Systemic inflammatory response syndrome (to be assessed by the surgeon).
- Blood Poisoning
- Osteomyelitis
- Patient unable to comply with postoperative care.
- Hypersensitivity to materials (titanium).

DESCRIPTION OF THE SURGICAL TECHNIQUE

Pre-surgical planning

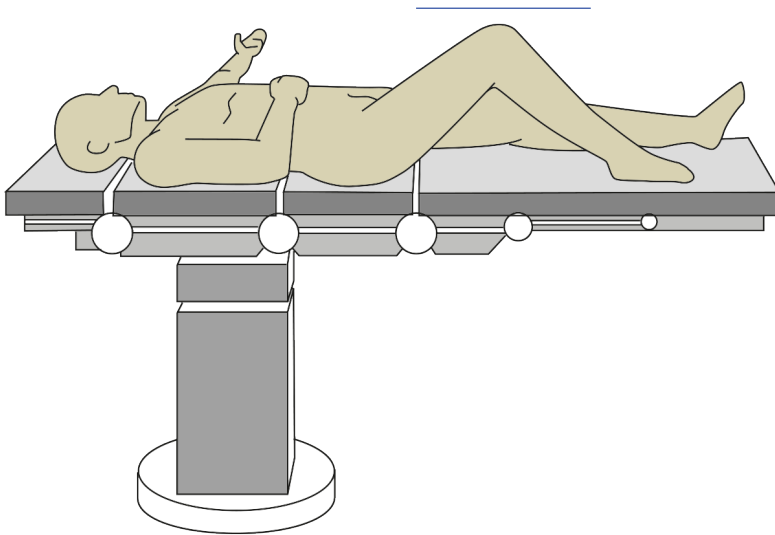
Select the diameter and nail length to use.
Use X-ray rulers is recommended

Preparation of the patient:

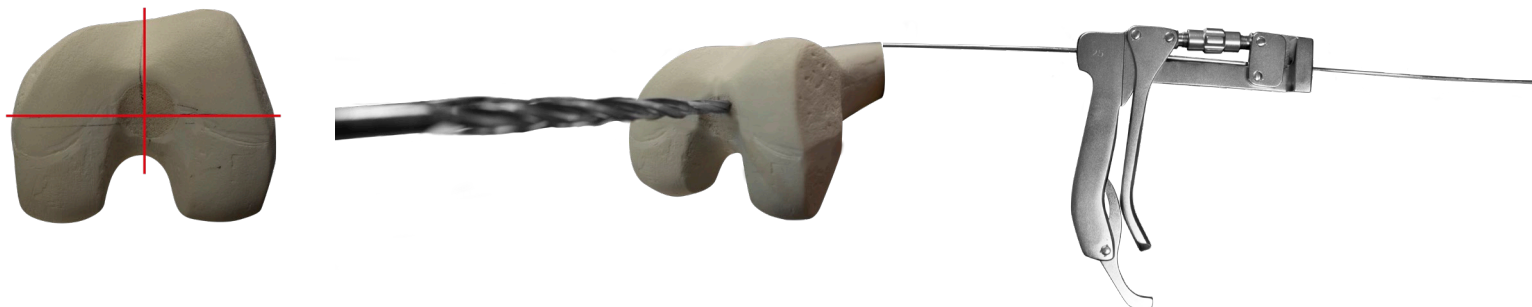
1. Position of the patient in supine decubitus with 90° flexion of the knee.
2. Anterior knee approach.

Caution

This technique is suggested to describe the use of the instrument and implant, not aiming to interfere with the experience and decisions of the traumatologist considering his/her vast clinical and surgical experience to determine the best proposal for each particular patient.



3. Proceed to enhance the opening of the channel with drill bit $\varnothing 6.4\text{mm}$, or through the threaded guide wire $\varnothing 2.5\text{mm}$ to locate channel and entry point, and then use the cannulated awl.



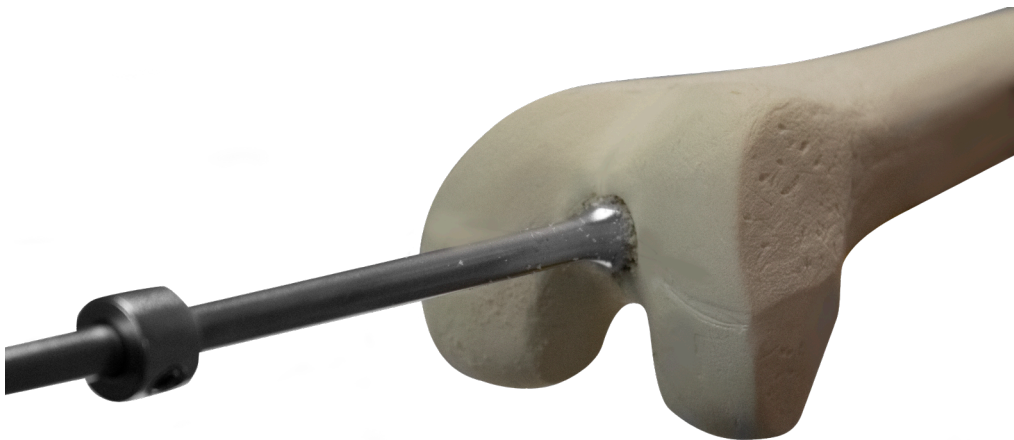
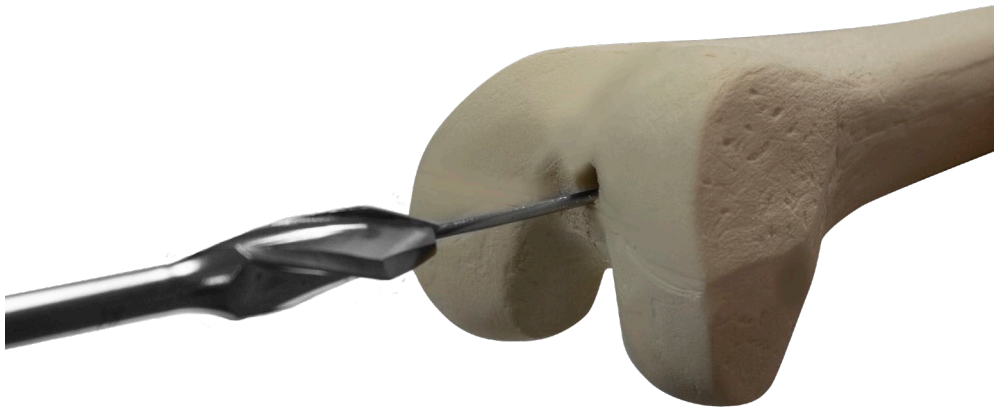
4. The guide is placed smoothly with or without olive-tip, depending on surgical plan.



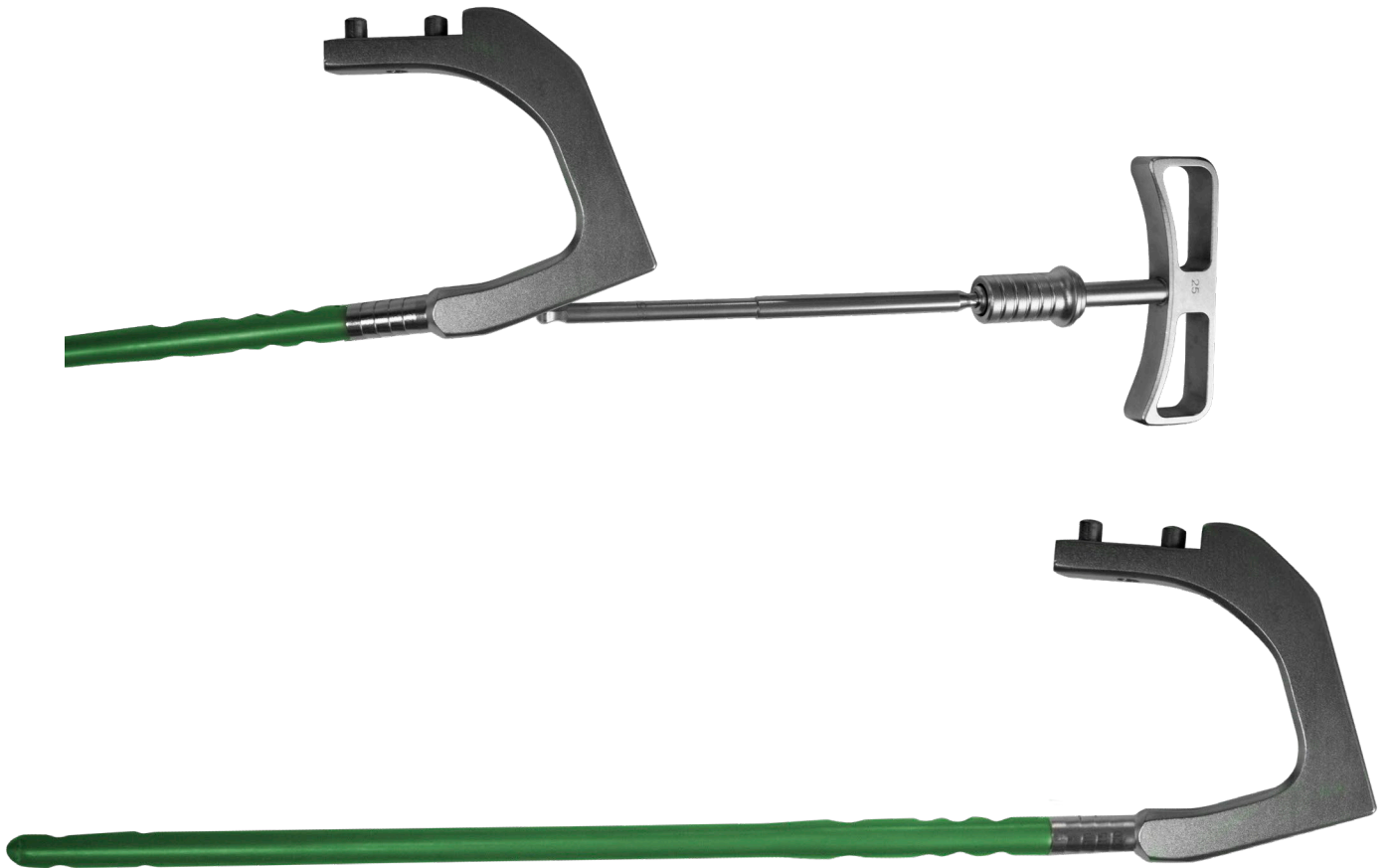
With olive

No olive

5. Apply the cannulated starter drill with stop $\varnothing 13\text{mm}$ to make nail inlet, the limit will be determined by the length of the spiral blade.



6. The insertion handle is assembled with the nail, "the direction of the lock will be determined by the direction of the insertion handle".



7. Proceeds to place the retrograde strip for retrograde nail. Indicate the length of the nail. It is useful for long nails starting from the 320mm (the strip is also used for short nails, but one is added for longer ones).



***Note:** it must be set up before inserting the nail.

For long nails:

Place the Intralock distal locking strip according to nail length.

Place the head for Intralock strip.

Place the sleeve for 6.3mm drill bit and align with butterfly nail hole.

Note: for short nails, it is not necessary to use additional strips

Note: Confirm the targeting accuracy of all locks.

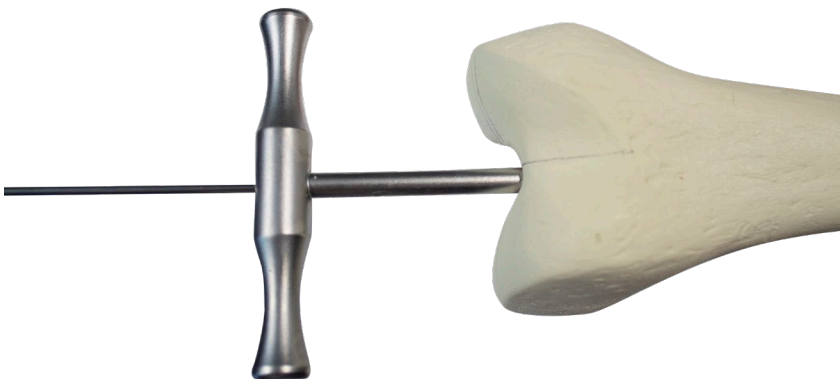


8. If you want to ream, the reaming has to be a measure above the diameter of the femur, the reamer tips increase by 0.5mm.

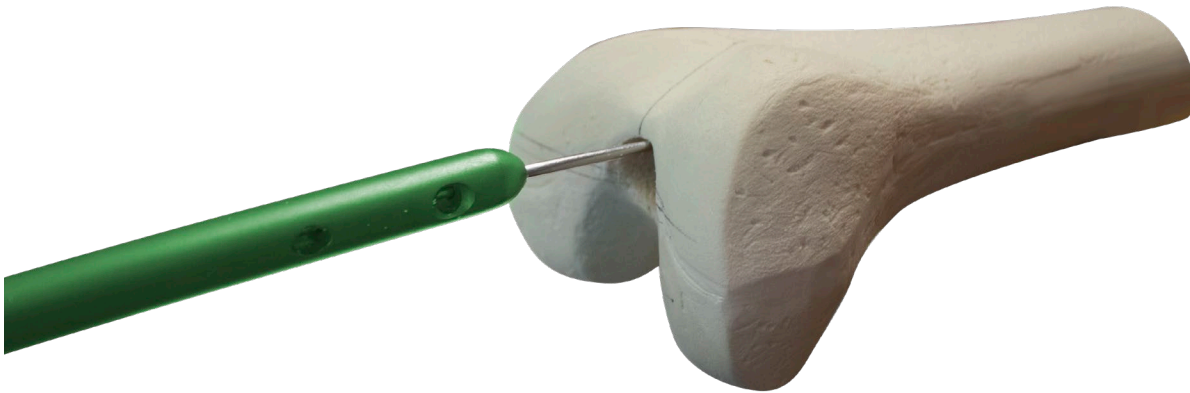
Nail	Recommended reamer
9 mm	10 mm
10 mm	11 mm
11 mm	12 mm
12 mm	13 mm



9. The system has a centromedullary guide with T-handle. Once reaming is finished, proceed to introduce the centromedullary guide with T-handle maintaining the reduction in order to be able to change from guide with olive to one without olive. Reduce fracture with the help of reducing guide.



10. The nail is inserted, aware that the direction of the nail will be determined by the location of the U-handle. The impactor can be used to insert the nail, if necessary.



The insertion handle frame has 4 notches 5 mm apart between each one, which will determine the fixation limit of the nail.

*If you want to place a condylary compression screw, it is recommended to insert the nail to the notch marked "0".

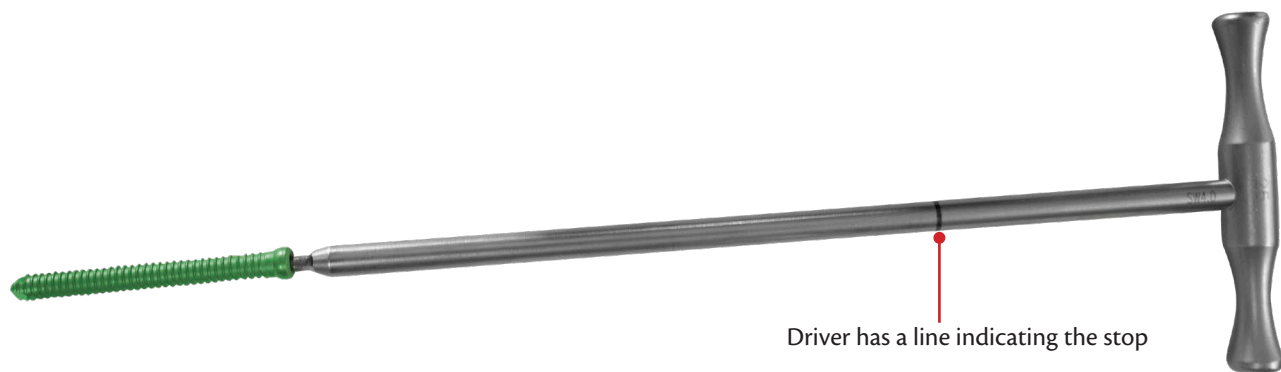


11. Proceed to lock starting in the condillary region, an outer sleeve is placed directed towards the second hole of the nail through the strip, then an inner sleeve Ø5.2mm is placed, drill with drill bit Ø5.2mm until the second cortical layer, measurement is made with depth meter. The 6.4mm screw is inserted, the screwdriver has a line indicating the stop, it is recommended to make 3 turns so that the screw is anchored to the cortical bone.



Inner sleeve Ø5.2mm

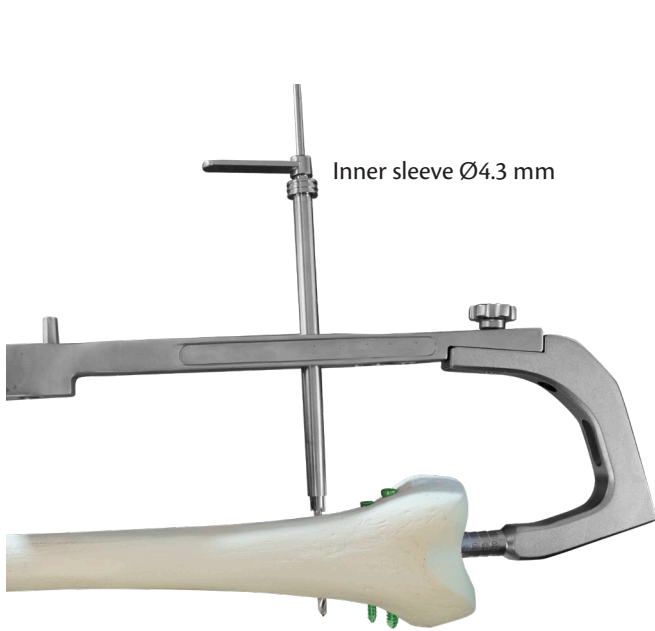




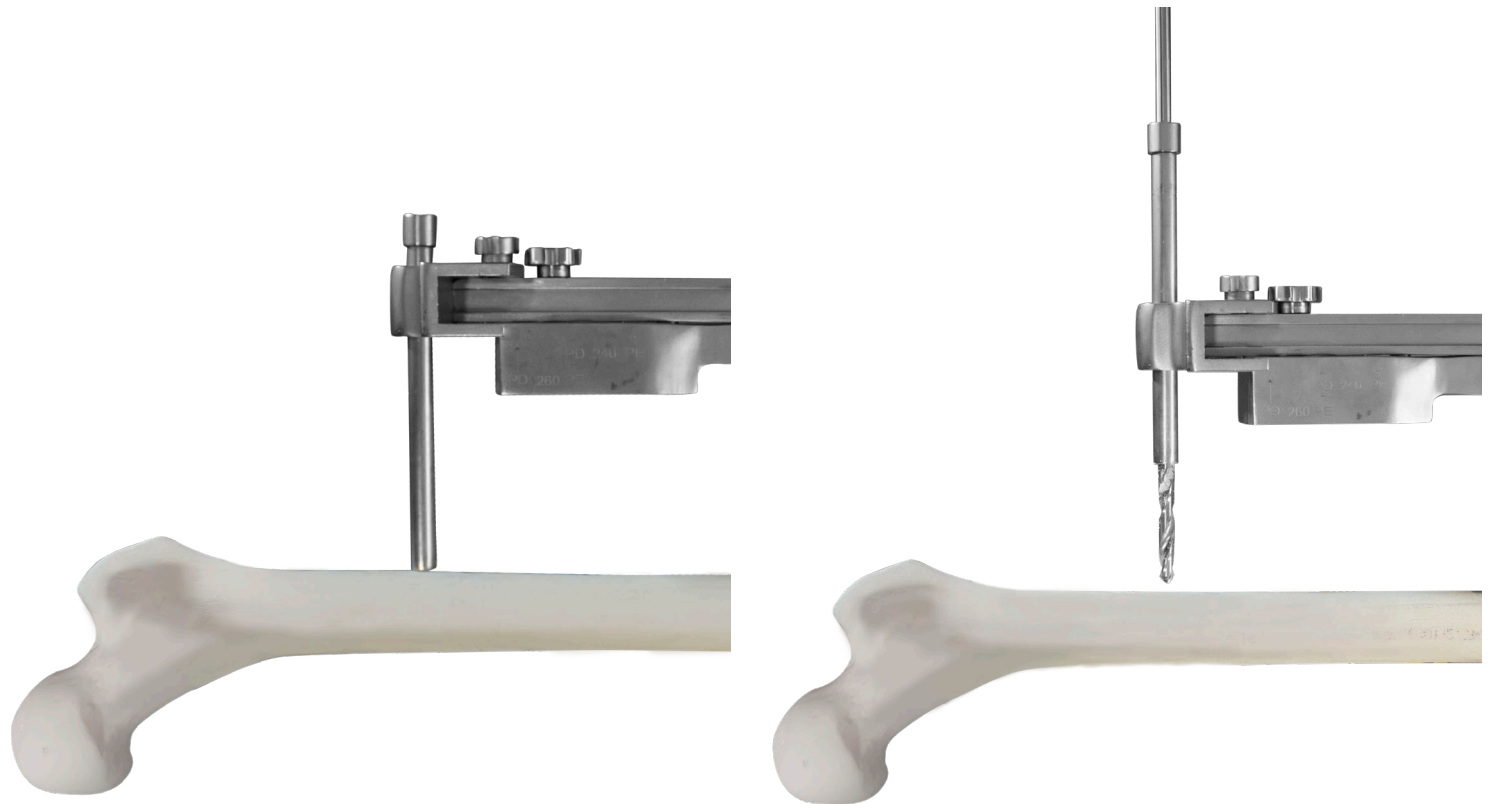
12. Place the outer sleeve in the third nail hole, then insert an inner sleeve 4.3mm. Drilling is then carried out with a drill bit $\varnothing 4.3\text{mm}$. Remove the inner sleeve to measure the depth with the depth meter. Place an inner sleeve $\varnothing 5.2\text{mm}$ to use the T-handle drill $\varnothing 5.0\text{mm}$. Finally, insert the 4.5 mm screw.



13. In case of using the dynamic hole which is the 4th, the previous steps are applied.



14. Proceed with the proximal locks. Through Intralock distal locking strip, the sleeve for 6.3mm drill bit is placed in the second proximal hole to drill with the drill bit $\varnothing 6.3\text{mm}$ the first cortical layer. The distal locking device is placed through this hole. The distal locking device will allow to make the lock more proximal.



* The second proximal hole is designed for locking device introduction; the way to know it is positioned correctly is because the nail moves in block next to the device as a test mechanism. It is also a locking hole.



15. Proceed to drill the first proximal hole. Place an outer sleeve and an inner sleeve Ø4.3mm. Use a drill bit Ø4.3mm to drill. Remove the inner sleeve and measured the length. Place a inner sleeve Ø5.2mm and tap. Remove the sleeves and insert the 4.5mm screw.

Inner sleeve Ø4.3 mm

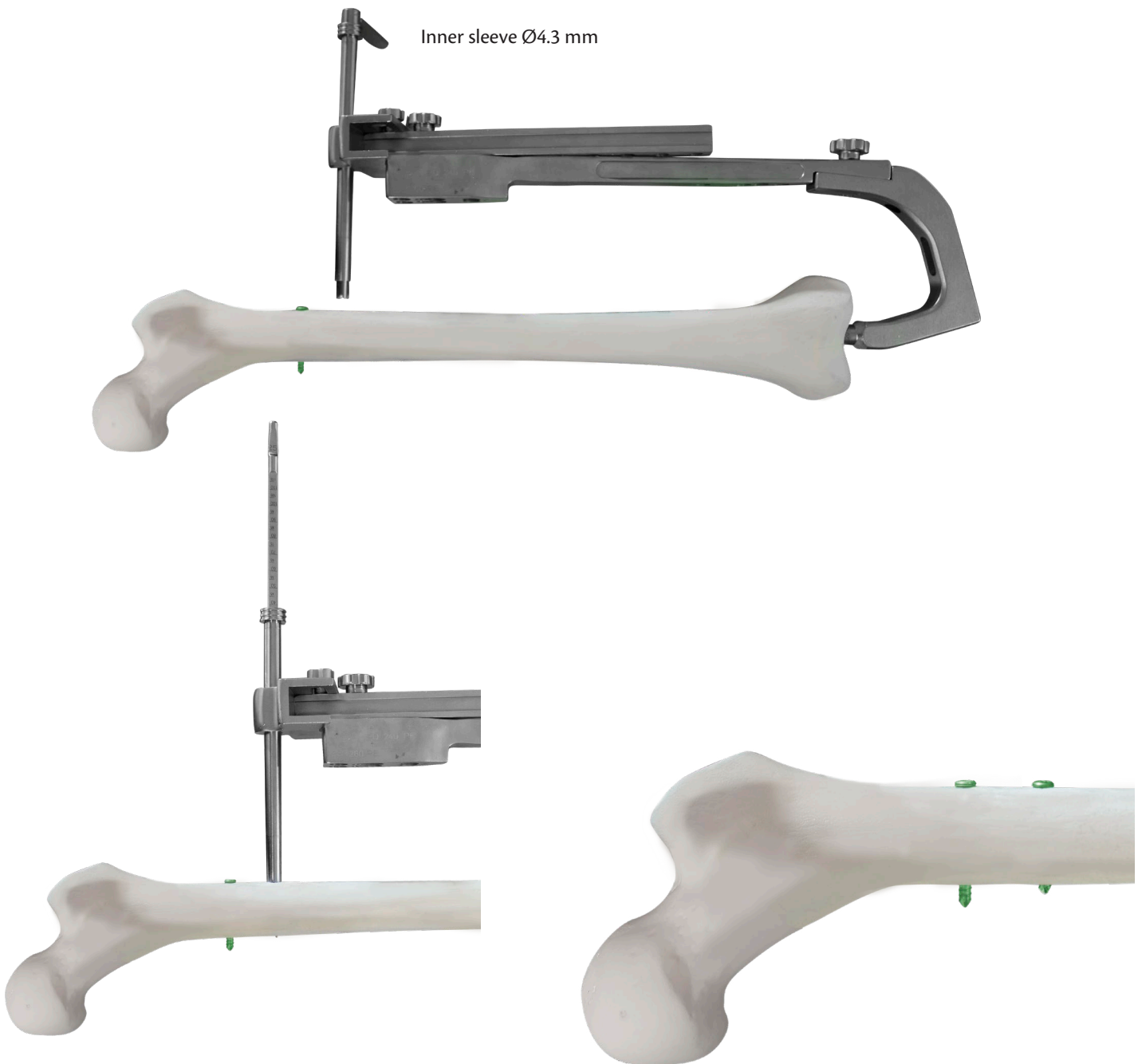


Inner sleeve Ø5.2 mm



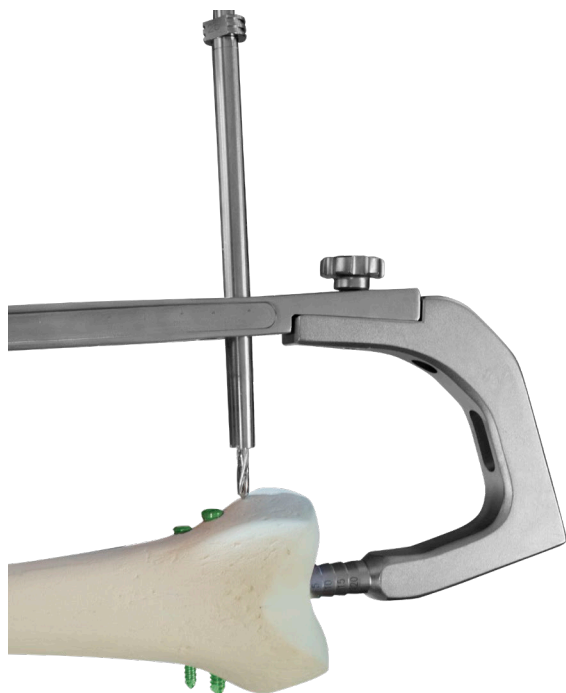
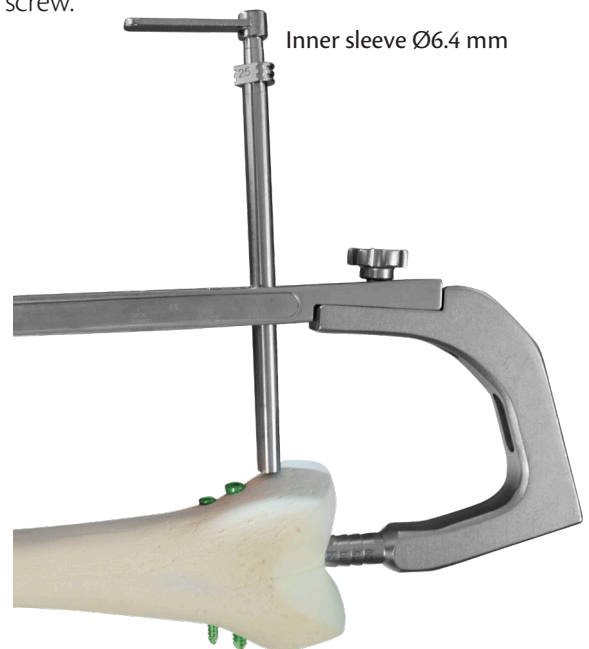
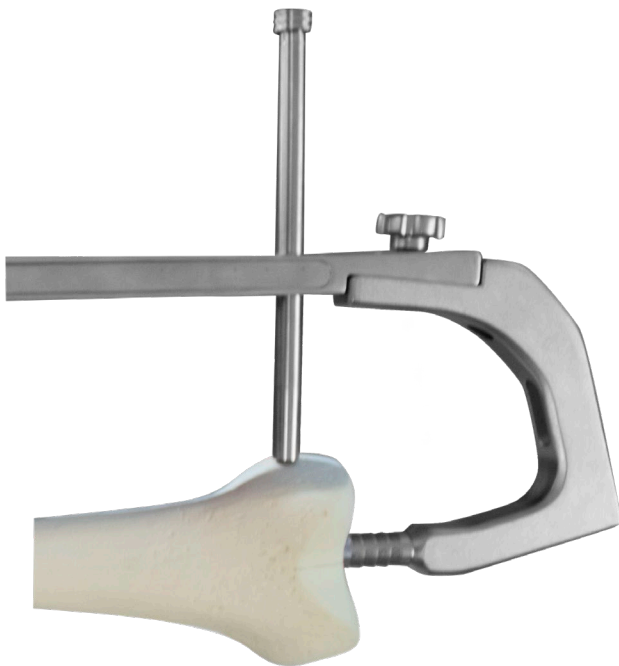


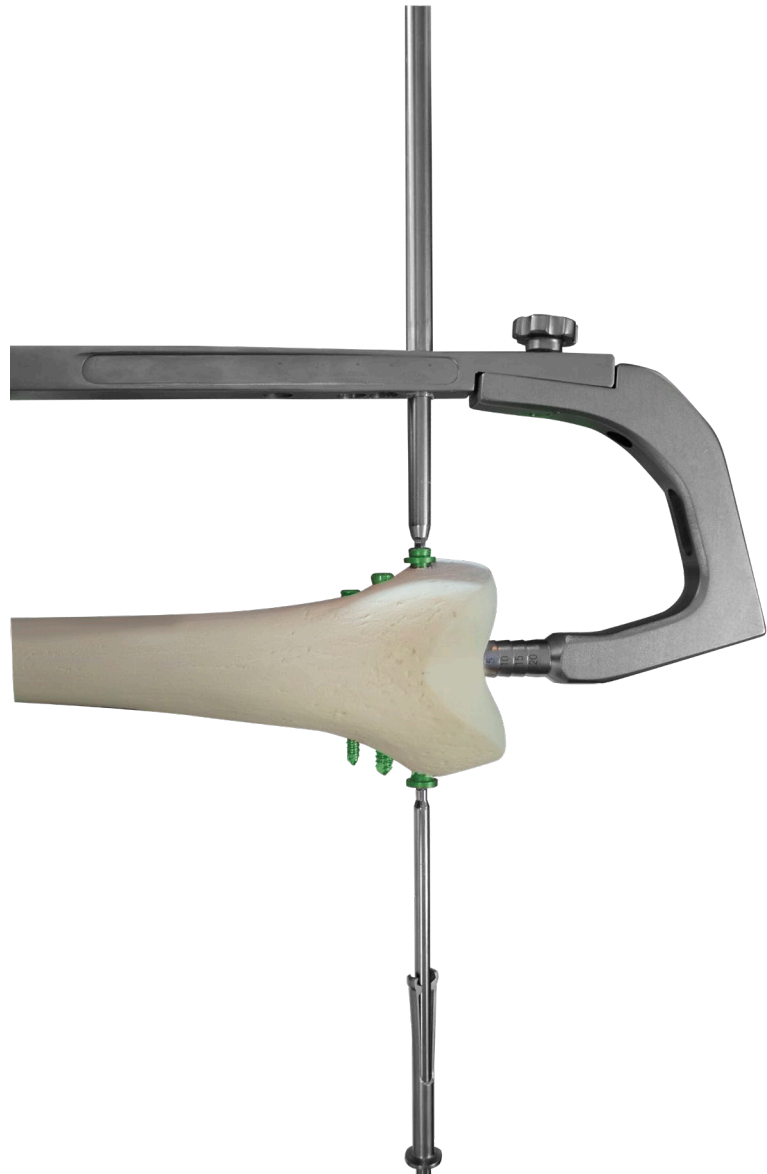
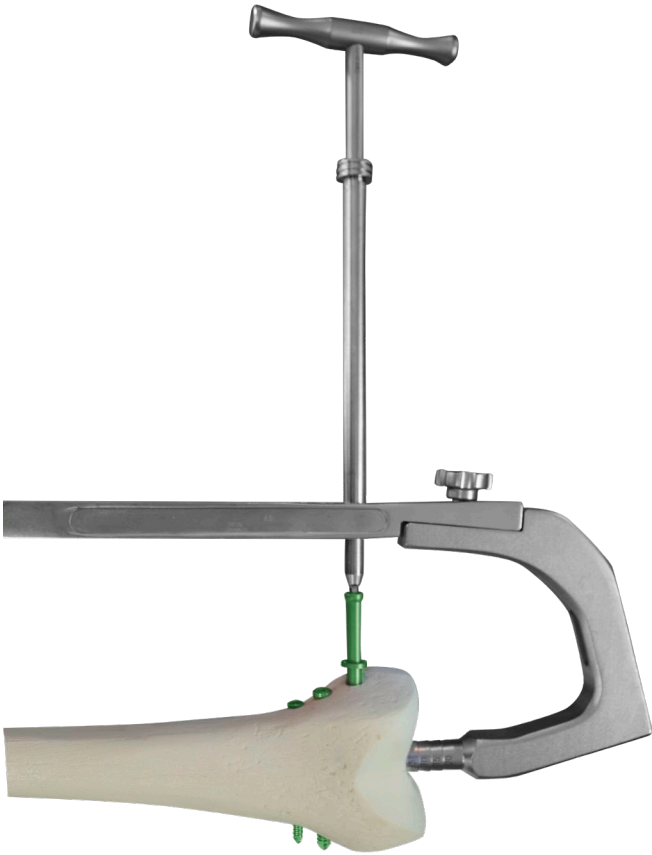
16. The locking device is removed, strip is placed again, using an outer sleeve and an inner sleeve Ø4.3mm, drill with the drill bit Ø4.3mm. The inner sleeve is removed for measurement with the depth meter. Proceed to place the 4.5mm screw.



*If required

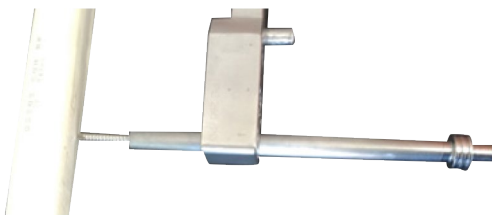
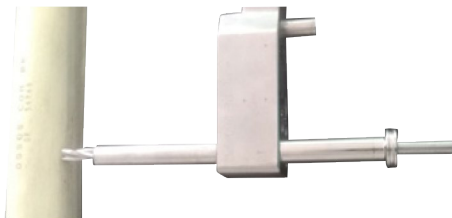
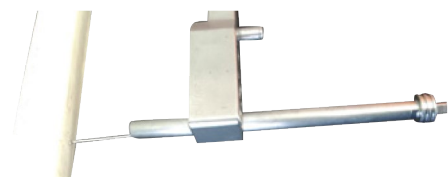
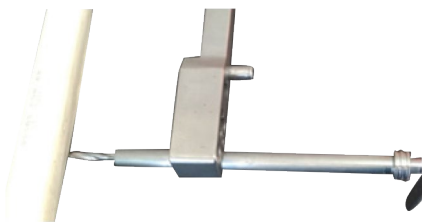
For condylary compression screw placement, outer sleeve with an inner sleeve Ø6.4mm is placed, drilled with drill bit Ø6.4mm from lateral to medial, inner sleeve is removed and the length for the screw is measured, when inserting the screw the locking bushing with its washer must be removed and placed through the medial condyle and compression with 3.5mm hexagonal screwdrivers is initiated at both sides of the screw.



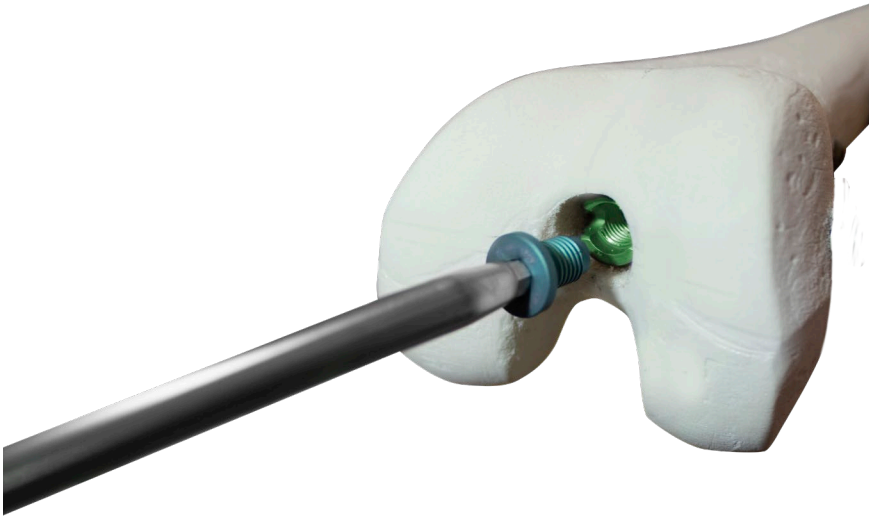


Locking of short nails

1. Place outer and inner sleeve Ø4.3 mm.
2. Drill both corticals layers with the drill bit 4.3mm.
3. Remove inner sleeve and measure depth with the help of the depth meter.
4. With the help of the T-handled drill bit, drill the first 5mm in order to make room for the head of the screw.
5. Insert screw with the help of the screwdriver. It must be completely inside the bone.

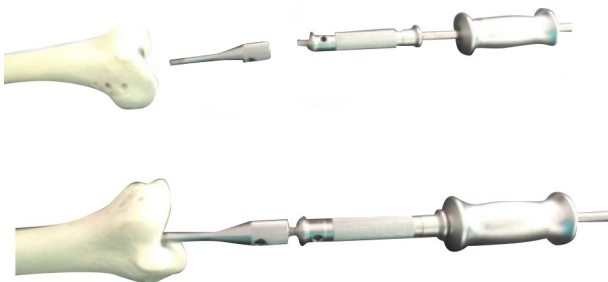


Proceed to remove the strip and place the ending cap.



Extraction

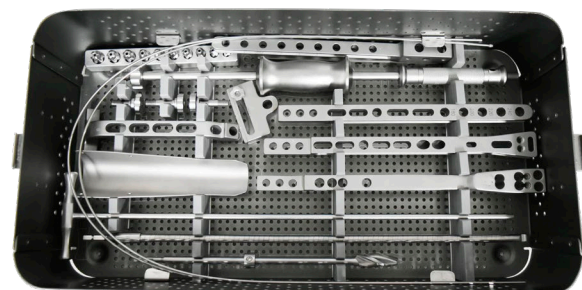
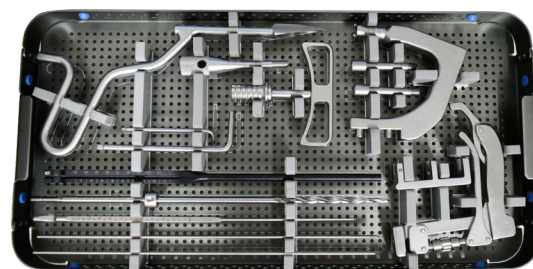
1. Remove all but one locking screw used to stabilize the nail while inserting the extractor.
2. Remove ending cap, if any.
3. Place universal extractor.
4. Remove the locking screw that was left.
5. Remove the nail, if necessary, use the sliding impactor.



INSTRUMENTS

QTY Description (Code)

1	Awl (31.02.01)
1	Universal extractor (19.03.01)
1	Small allen wrench 3.0 (26.02.30)
1	Large allen wrench 5.0 (26.02.50)
1	T-handle for quick anchoring (12.02.01)
1	Guide wire meter 120mm (16.02.120)
1	Graduated drill bit with stop 6.4mm (13.06.64)
1	Depth meter 115 mm or 120mm (16.01.115 / 16.01.120)
3	Threaded tip guide wire Ø2.5mm x 35cm (23.01.25)
3	Smooth tip guide wire Ø2.5mm x 35cm (23.05.25)
1	Nail fastener screw (39.01.01)
1	Insertion handle (40.01.01)
1	Guide wire positioner (12.04.01)
2	Stabilizing device (41.01.01)
1	Outer sleeve Ø8.0mm (18.11.80)
1	Lag screw screwdriver 6.5mm (11.06.65)
1	Short outer sleeve Ø8.0mm (18.12.80)
1	Hexagonal screwdriver bit with quick coupling for holding Ø 6.5 mm screws (11.04.65)
1	Hexagonal screwdriver with T-handle for Ø6.5mm screw (11.07.65)
1	Position rod (42.01.01)
1	Short trocar(Awl) Ø8.0mm (31.03.80)
1	T-handled drill Ø5.0mm (13.11.50)
1	Long trocar (Awl) Ø8.0mm (31.04.80)
1	Inner sleeve Ø2.5mm (18.10.25)
1	Inner sleeve Ø6.4mm (18.10.64)
1	Inner sleeve Ø4.3mm (18.10.43)
1	Inner sleeve Ø4.3mm (18.10.43)
1	Inner sleeve Ø5.2mm (18.10.52)
1	Drill bit with stop Ø4.3mm x 30cm (13.12.43)
1	Drill bit Ø4.3mm x 30cm (13.01.43)
1	Hexagonal screwdriver with T-handle for Ø4.5mm screws (11.07.40)
1	Drill bit Ø5.2mm x 25 cm (13.01.52)
10	Reaming tips set (24.05.01): Ø 8.5mm (24.04.85), Ø 9.0mm (24.04.90), Ø 9.5mm (24.04.95), Ø10.0mm (24.04.10), Ø10.5mm (24.04.105), Ø11.0mm (24.04.11), Ø11.5mm (24.04.115), Ø12.0mm (24.04.12), Ø12.5mm (24.04.125), and Ø13.0mm (24.04.13).



- 1 Impactor (30.04.01)
- 3 Screws for strip (39.02.01 & 39.02.02)
- 1 Distal targeting device (40.05.01)
- 1 Tissue protector (43.01.01)
- 1 Centromedullary guide with T-handle (18.13.01)
- 1 Flexible Reamer Ø8.0mm (24.06.80)
- 1 Starter drill with stop Ø13mm (13.14.01)
- 1 Distal strip 180mm-240mm (40.06.240)
- 1 Proximal locking strip (40.07.01)
- 1 Distal strip 320mm-440mm (40.06.440)
- 1 Olive-tip guide wire Ø2.5mm (23.07.25)
- 1 Drill Bit Ø6.3mm x 250mm with AO anchor (13.01.25)
- 1 Sleeve for 6.3mm drill bit (**191.01**)
- 1 Olive-free wire guide Ø2.4mm x 1000mm (211.24)
- 1 Head for Intralock strip (189.01)
- 1 Intralock strip head screw (188.01)
- 1 Intralock distal locking strip (190.01)
- 1 Retrograde strip (190.02)
- 1 Distal locking device (210.03)
- 2 Threaded guide Ø2.0mm x 320mm (005.2032)
- 1 Femoral nail instrument tray (28.04.01)
- 1 Femoral nail implants tray (BT-046)



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