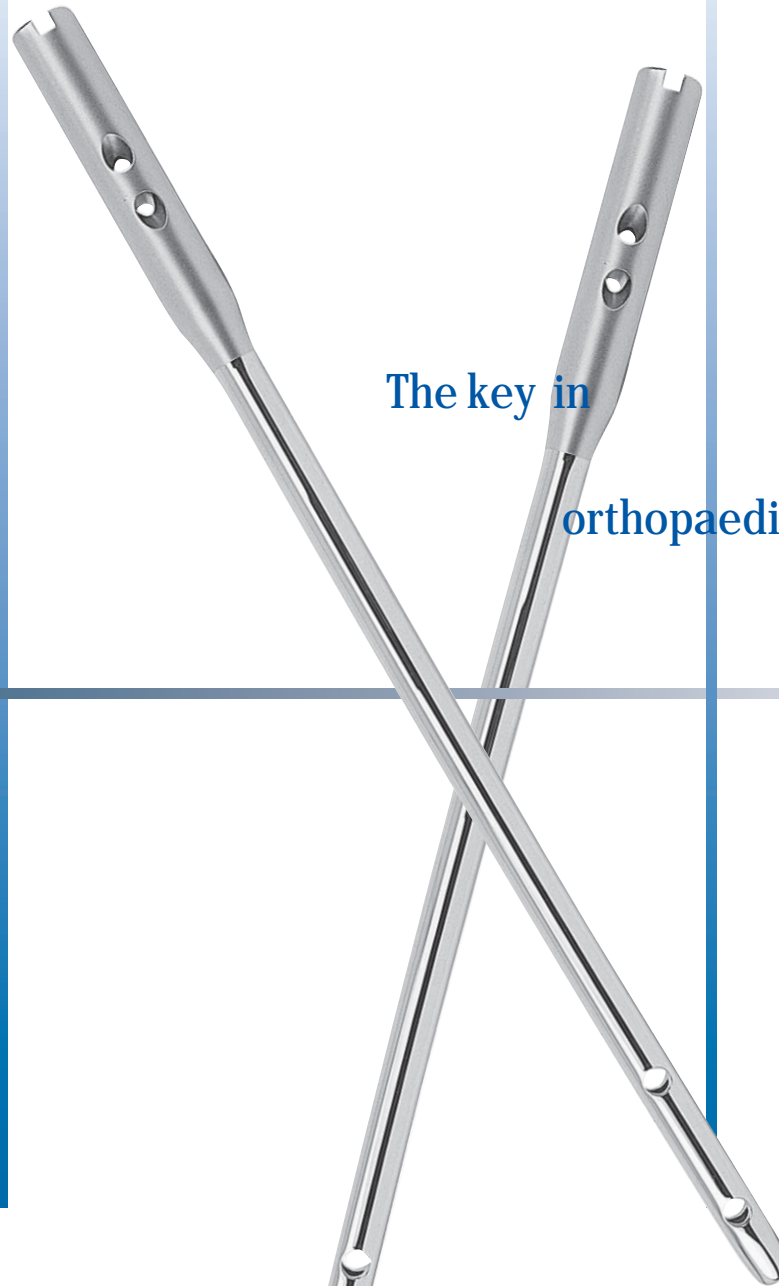




# FEMUR INTERLOCKING NAIL SYSTEM

2006  
2006  
2006  
2006



The key in  
orthopaedic  
sciences

SURGICAL TECHNIQUE  
IMPLANTS & INSTRUMENTS

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## Introduction

This interlocking nail system is the result of long term experience in medullary nailing. This nail can be used for the following fractures;

- \* Femoral shaft fractures.
- \* Subtrochanteric fractures
- \* Impending pathologic fractures
- \* Ipsilateral femoral neck / shaft fractures

For femoral shaft fractures or stable subtrochanteric fractures, 135° antegrade fixation for the left-side / right-side femur. Locking bolts screw diameter is proximally and distally the same. In pertrochanteric (femoral neck) fractures as well as subtrochanteric fractures, this femoral nail system (nails for the left and right femur with 8° anteversion integrated in proximal nail drill holes) offer a secure fixation. This nail system can also be applied in the case of dangerous pathologic fractures. Fixation is achieved with lag screws placed into femoral neck in retrograde direction, as a result rotation is avoided.

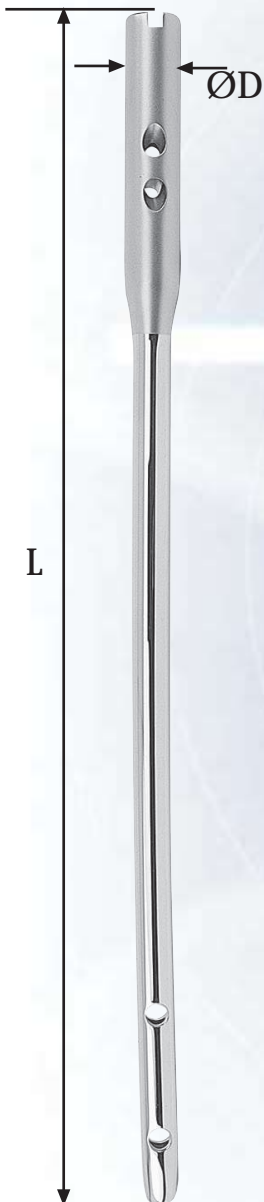
**Please Note :** This document is intended as a guide for the surgeon only. There are multiple techniques for the insertion of Femur Interlocking Nail System and, as with any surgical procedure, a surgeon should be thoroughly trained and beware that this procedure is appropriate for the patient before proceeding.

### Material

Certified Stainless Steel according to ASTM F.138 - ISO 5832/1.

Ref. Number : 1080120 . . . .

	ØD	8	9	10	11	12	13	14
	240	1001	1051	1101				
	260	1002	1052	1102				
	280	1003	1053	1103				
	300	1004	1054	1104				
L	320	1005	1055	1105	1151	1201		
	340	1006	1056	1106	1152	1202		
	360	1007	1057	1107	1153	1203	1251	1301
	380	1008	1058	1108	1154	1204	1252	1302
	400		1059	1109	1155	1205	1253	1303
	420		1060	1110	1156	1206	1254	1304
	440		1061	1111	1157	1207	1255	1305
	460			1112	1158	1208	1256	1306



L Locking Screws

Canullated Locking Screws



Ø5.0

25	10802281001
30	10802281002
35	10802281003
40	10802281004
45	10802281005
50	10802281006
55	10802281007
60	10802281008
65	10802281009
70	10802281010
75	10802281011
80	10802281012
85	10802281013
90	10802281014

10802301001
10802301002
10802301003
10802301004
10802301005
10802301006
10802301007
10802301008
10802301009
10802301010



Ø5.0

L Locking Bolt Screws

Canullated Locking Bolt Screws



Ø6.4

30	10802411001
35	10802411002
40	10802411003
45	10802411004
50	10802411005
55	10802411006
60	10802411007
65	10802411008
70	10802411009
75	10802411010
80	10802411011
85	10802411012
90	10802411013

10802431001
10802431002
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10802431008
10802431009
10802431010
10802431011



Ø6.4

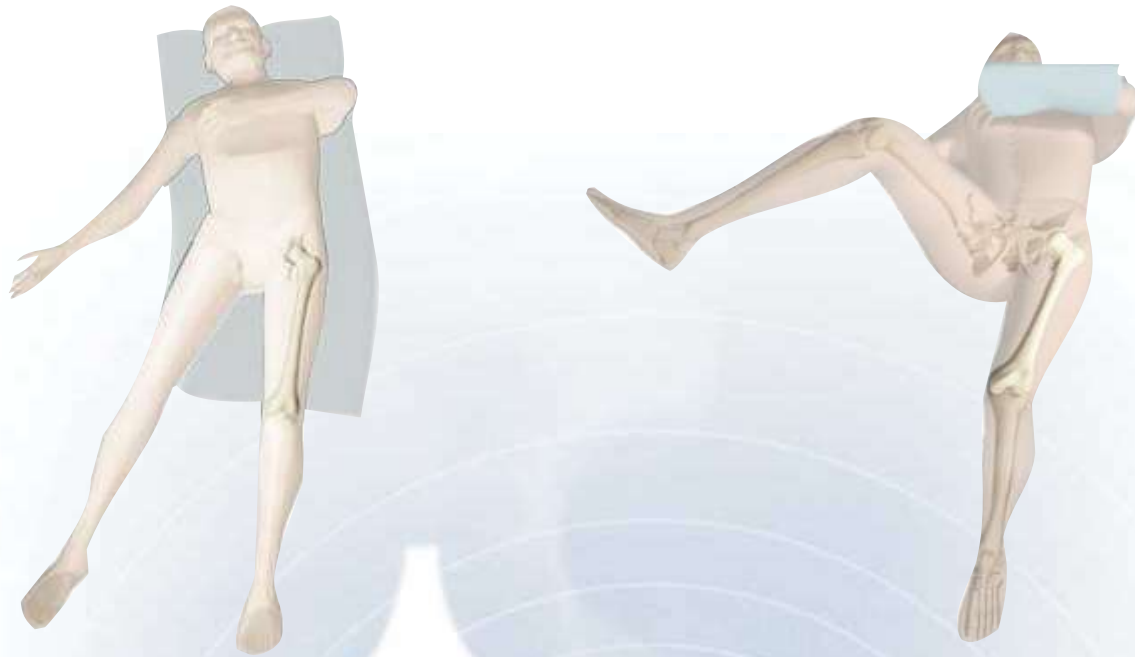
Locking End Cap



10802421002

### Patient Positioning

Place the patient in the supine position on a fracture or radiolucent imaging table. Lateral access to the proximal femur is required. The affected leg must be adducted and the trunk secured and bent toward the opposite side. The contralateral leg may be flexed at the hip or scissored below the affected leg.

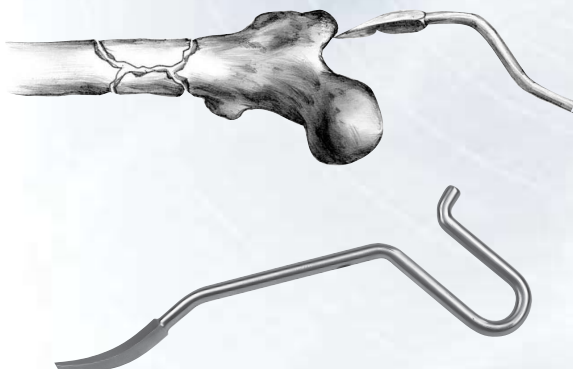


### Insertion Point



Identify the entry site, which is in the piriformis fossa. The ideal entry point is adjacent to the greater trochanter at the lateral edge of the piriformis fossa.

### Opening of the Femur

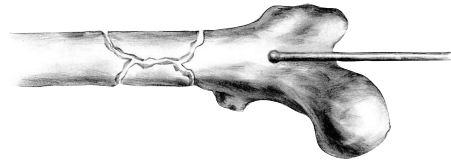


The medullary canal is opened with the Cortical AWL (Ref:10606111002) at the junction of the anterior third and posterior two-thirds of the Greater Trochanter, on the medial edge of the tip it self. Image intensification (A/P and Lateral) is used for confirmation.



## Insertion of Guide Wire

Initiate the entry site with a guide wire through a stab incision proximal to the trochanteric region, in line with the femoral axis. Confirm correct entry location and guide wire placement radiographically with AP and lateral views. The guide wire placement should be in line with the center of the femoral canal in both views.



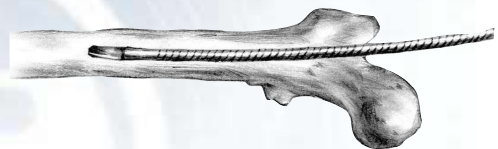
## Reaming

Canal access can be obtained using a Tapered Reamer (Ref:10606170305). The proximal nail diameter is 13 mm for all nail sizes equal to or less than 13 mm, and 14 mm nail have a proximal diameter equal to the nail diameter. Use A/P and lateral fluoroscopic views to confirm accurate placement. Use the Cortical Awl or Tapped Reamer to open the proximal femur in the piriformis fossa.



Achieve proper alignment of the fracture prior to reaming and maintain it throughout the reaming process to avoid eccentric reaming. Initiate reaming by placing the Flexible Reamers (Ref:1061009 . . . .) over the ball nose guide pin. Flexible reamers are used to ream the shaft of the femur in stages starting with 8mm in diameter and increasing by 1mm increments until Cortical bone is reached.

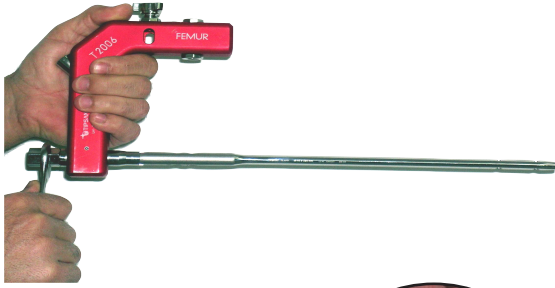
Surgeon preference should dictate the actual extent of intramedullary reaming, whether to go further in cortical bone or stop at an earlier stage. It is advised to monitor the reaming procedure using image intensification to avoid eccentric or excessive cortical reaming.



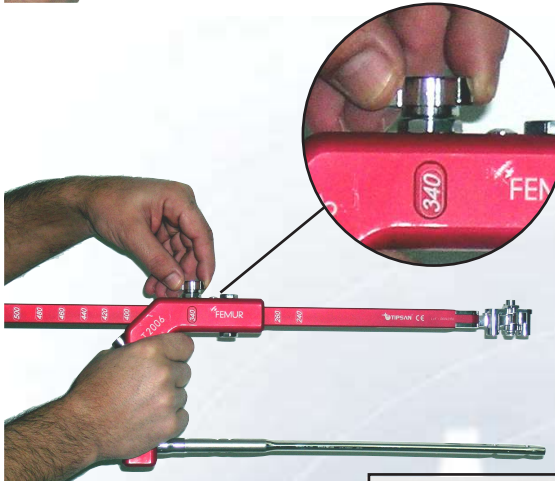
## Nail Selection

Nail length is determined by measuring the remaining length of the guide wire. The diameter of the selected nail should be 1mm smaller than that of the last reamer used. Femoral Nails are available in 1 mm increments from 8 mm to 14 mm diameters.

**Guide Fixed**



The selected nail is assembled on to the Femur Guide Attachment (Ref:10606450010) fixed with Femur guide Screw (Ref:10606450015). The curvature of the nail must match the curvature of the reamed femur.



(Fig.1)

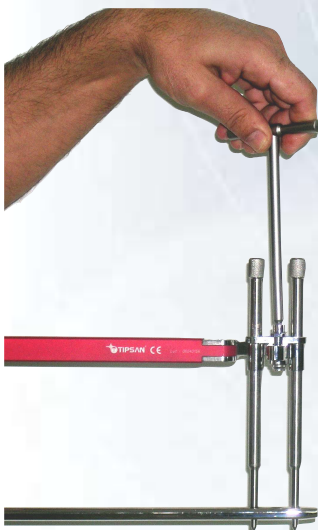
The Femur Guide-Long (Ref:10606450025) is slid into the Femur Guide Attachment and fixed with the Guide Fixed Screw at the nail length. The nail lengths are marked on the Femur Guide-Long for easier alignment (Fig.1).



(Fig.2)



Two fixation guides (Ref:10606450028) are slid into the adjustable sliding apparatus (Fig.2) located at the end of Femur Guide-Long so that the apparatus is aligned with the distal holes in the femur nail.



With T-Wrench (Ref:10604071105) or (Ref:10604011402) the alignment is fixed for further operative steps. Check if the fixation is done appropriate by letting the Fixation Guides glide from the fixed adjustable sliding apparatus directly in the distal holes of the nail. If these Fixation Guides are nothing the holes easily realignment is needed.

## Nail Insertion

All additional apparatus used for guidance are detached from the Femur Guide Attachment except femur nail. Femur Guide-Long and the adjustable sliding apparatus are aligned for distal holes of the femoral nail. This alignment and the nail length will be used in further steps. Do not realign or change the nail length. Gently slide the femoral nail into the hole opened previously at piriformis fossa by hand as far as possible.



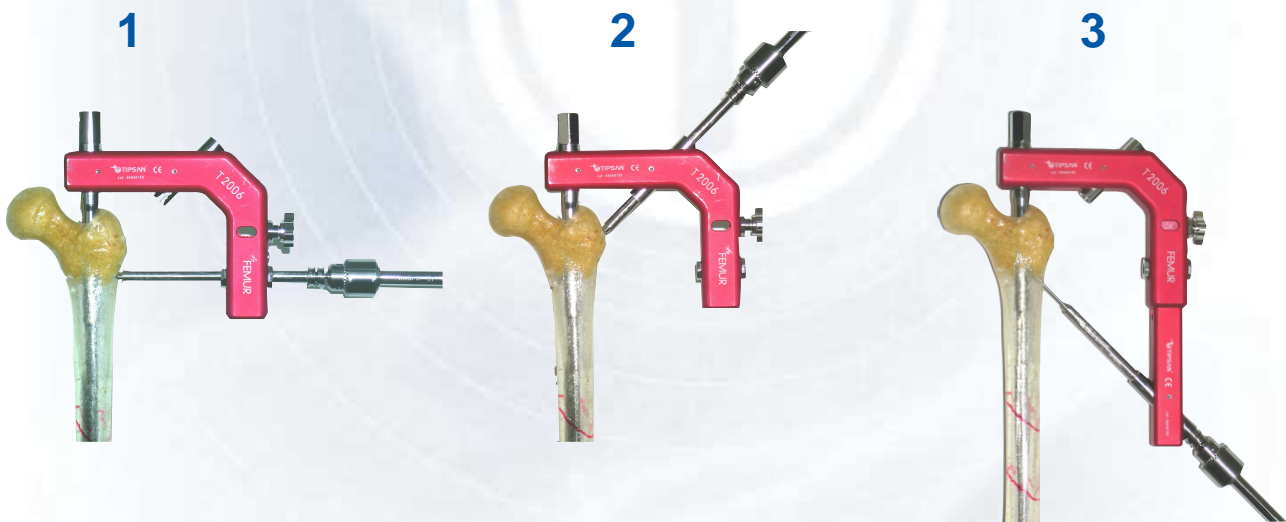
Slide Hammer (Ref:10611031001) attached to the Femur Guide Screw. Femoral Nail is impacted using the Slide hammer. Avoid excessive force while inserting the nail.



## Proximal Locking

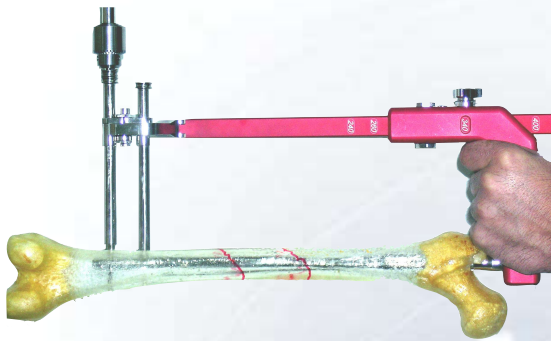
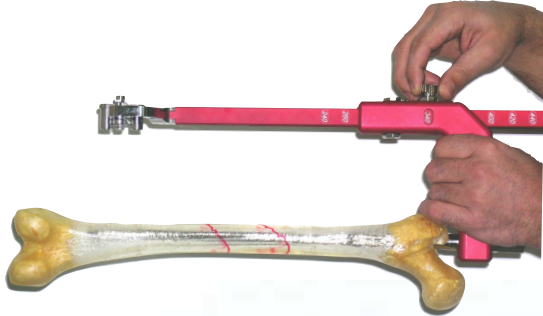
After this step the surgeon may choose three alternative positions for proximal locking. Only one of those positions can be applied.

The same operations as for distal locking can be applied to proximal locking of femur nail. For the 3rd position an additional Femur Guide-Short has to be used to extend the length of Femur Guide.



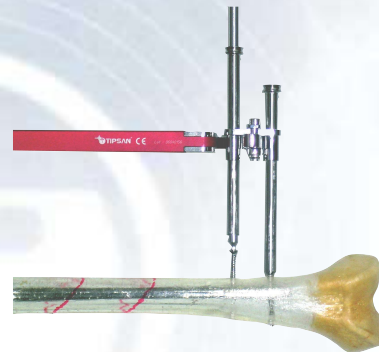


### Distal Locking



The aligned Femur Guide-Long is mounted to Femur Guide Attachment and fixed at the nail length (Fig.1).

A Skin incision should be performed so that Screw Sleeves (Ref:10606181007) can be slid through both holes in adjustable sliding apparatus up to femur. After Screw Sleeves are inserted appropriate Drill Guides (Ref:10606181004-05) ( $\text{Ø}4.0$ ,  $\text{Ø}4.8$ ) are inserted inside the Screw Sleeves. Long Drill ( $\text{Ø}4.0$ ,  $\text{Ø}4.8$ ) is put into the Drill Guide, and drilled through the lateral and medial cortex. Firstly the last distal hole should be drilled. Special attention has to be paid that the drill passes directly through the distal holes of femur nail, adjustable slotted apparatus should result in precise drilling.



Long Drill and Drill Guide is removed from the apparatus, Screw Length Gauge (Ref:10608081001) is inserted in the Screw Guide and the length of screw is determined by this measurement.

According to the nail diameter the appropriate screw diameter should be chosen. (Ref:1080228 . . . . or 1080230 . . . .) screws may be used for all nail sizes equal to or less than 11 mm, (Ref:1080241 . . . . or 1080243 . . . .) screws are used in nails with 12 mm to 14 mm.

The right screw is locked by inserting and screwing through the Screw Guide using T Wrench (Ref:10604011401 or 10604011402). The operations are repeated for the other distal hole.
























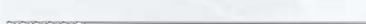
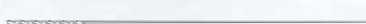
Locking of distal holes for femoral nail is completed. Screw Guide and Femur Guide-Long can be dismantled.

## End Cap Insertion



By mounting the Locking End Cap (Ref:10802421002) at the top of Femur Nail. The procedure is finalized and ingrowth of bone is made impossible.

# Instruments

10604001012		Universal Socket Wrench
10604001013		T Handle for Flexible Reamer
10604011401		T Wrench for Canullated Screw / 4
10604011402		T Wrench for Canullated Screw / 5
10604051003		Double Open Wrench
10604071105		T Wrench for Femur-Tibia Adjusted Guide
10606061003		Reamer Guide Rod Holder
10606111002		Cortical Awl
10606170305		Tapered Reamer Canullated
10606170315		Internal Fracture Alignment Device
10606181001-04-05		Drill Sleeve Ø2.1 - Ø4.0 - Ø4.8
10606181007		Drill Sleeve Ø8.0 Long
10606450010		Femur Guide Attachment
10606450015		Femur Guide Screw
10606450020		Femur Guide Short
10606450025		Femur Guide Long
10606450028		Fixation Guide for Femur Guide
10608081001		Screw Length Gauge
10608081003		Skin Protector
10610091005 07-09-11-13-15-17		Flexible Reamer 8-9-10-11-12-13-14
10611031001		Slide Hammer
10611031003		Supine Driver
10611031012		Femoral Extractor Bolt
10809021005-48		Long Drill Ø4.0-Ø4.8
10809031201-11		Canullated Drill Ø4.0-Ø4.8



The products being manufactured by TIPSAN A.S. has been certified from TÜV PRODUCT SERVICE GMBH for EC certificate (CE 0123) according to Annex II. 3 of Council Directive 93/42/EEC concerning medical devices

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