ST/52E

ChM®

Charfix Femoral Nail
ChFN system 2

INTRAMEDULLARY OSTEOSYNTHESIS OF FEMUR WITH TROCHANTERIC NAILS

- *IMPLANTS*
- *INSTRUMENT SET 40.6340.700*
- *INSTRUMENT SET 40.6340.710*
- *SURGICAL TECHNIQUE*

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SYMBOLS DESCRIPTION

Ti	Titanium or titanium alloy
St	Steel
L	Left
R	Right
L R	Available versions: left/right
Len	Length
	Torx drive
	Torx drive cannulated
	Hexagonal drive
	Hexagonal drive cannulated
	Cannulated
	Locking
	Diameter
	Inner diameter
	Recommended length range for a particular nail
	Angle
16 ÷ 90	Available lengths
Ster Non Ster	Available in sterile/ non- sterile condition

	Caution - pay attention to a special procedure.
	Perform the activity under X-Ray control.
	Information about the next stages of a procedure.
	Proceed to the next stage.
	Return to the specified stage and repeat the activity.
	Before using the product, carefully read the Instructions for Use. It contains, among others, indications, contraindications, side effects, recommendations and warnings related to the use of the product.
	The above description is not a detailed instruction of conduct. The surgeon decides about choosing the operating procedure.

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The manufacturer reserves the right to introduce design changes.
Updated INSTRUCTIONS FOR USE are available at the following website: ifu.chm.eu

I. INTRODUCTION

Intramedullary osteosynthesis of femur with Charfix Femoral Nail ChFN system 2 femoral nail consists of:

- implants (*intramedullary nail, distal screws, join screws, end caps*),
- instrument set for implants insertion and removal,
- surgical technique.

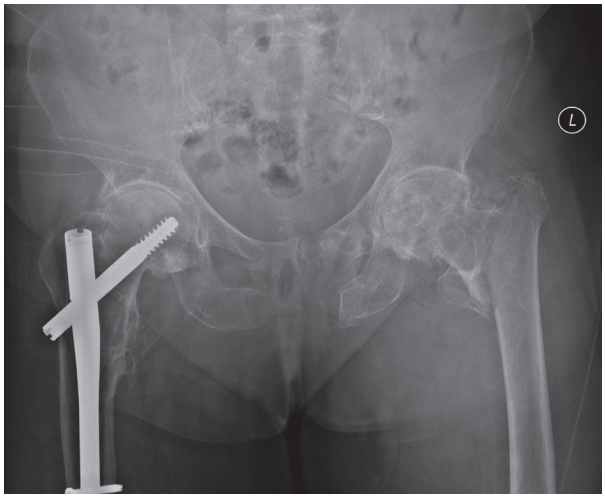
Intramedullary osteosynthesis of femur with trochanteric nails allows for stable reduction of femur peritrochanteric fractures. Application of two join screws eliminates rotation of the femur neck.

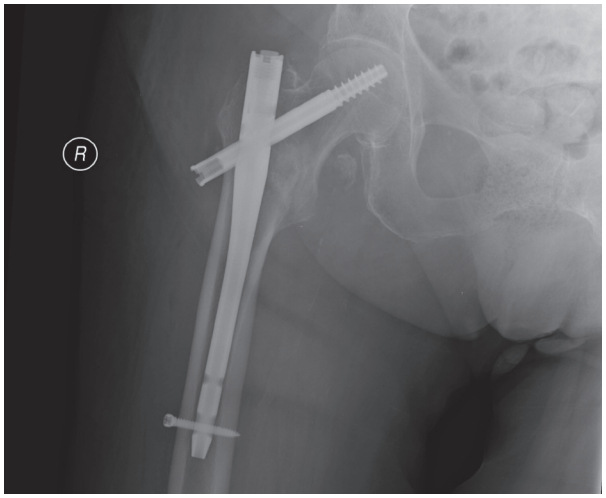
The presented range of implants is made of titanium and its alloys and implantable steel in accordance with ISO 5832 standard.

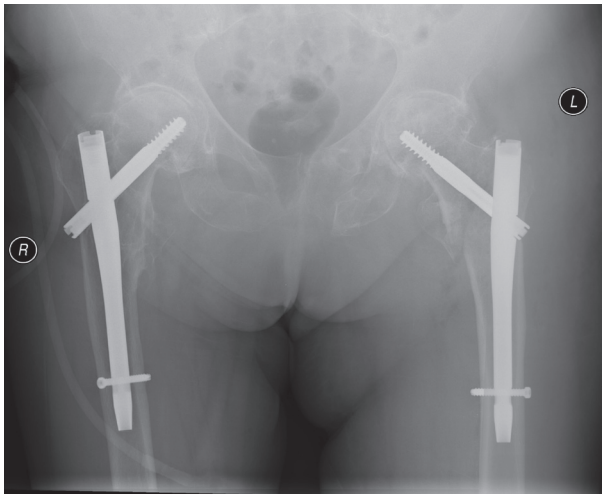
Indicated use:

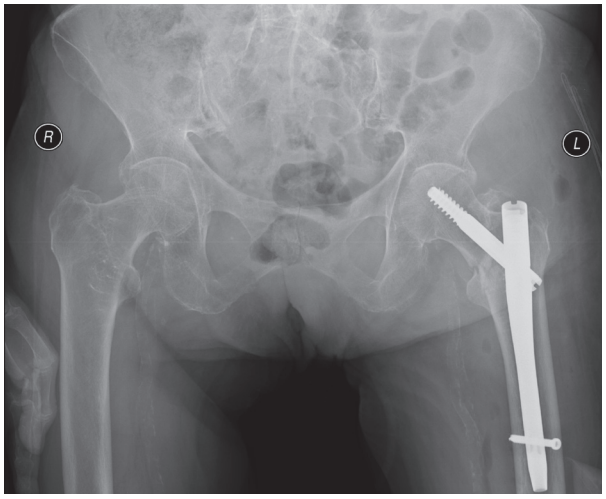
- subtrochanteric fractures,
- intertrochanteric fractures,
- pertrochanteric fractures.

Examples of femur fractures treated with trochanteric nails.









Good results are also obtained in the case of:

- Pathological (*one-place*) and ipsilateral damage of intertrochanteric region,
- Pathological (*one-place*) and ipsilateral damage of femoral shaft.

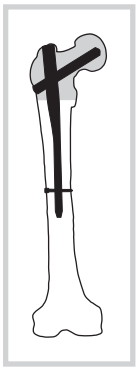
Trochanteric nails are also used in the case of:

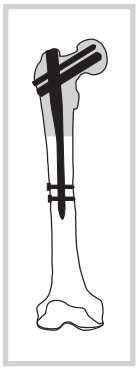
- Multifragmentary fractures of trochanteric-subtrochanteric region,
- Fractures of the femur neck located near the trochanter.

II. IMPLANTS

ChFN2 TROCHANTERIC NAIL

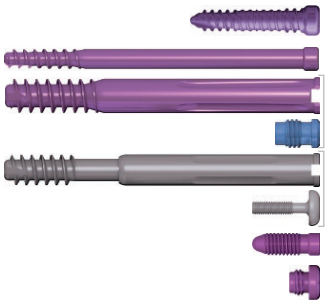
Charfix Femoral Nail
ChFN system 2





		Len	Ti
130°	10	180	3.5651.180
		200	3.5651.200
	11	180	3.5652.180
		200	3.5652.200
	12	180	3.5653.180
		200	3.5653.200
130°	Recommended		

available	Ø 10 mm ÷12 mm	pitch	1 mm
	L 170 mm ÷ 240 mm		5 mm



Ti					
3.5159.5xx	✓			5.0	30÷60
3.5805.xxx	✓			5.0	70÷110
3.5804.xxx			✓	10.5	80÷120
3.5161.003	✓		✓		
3.5961.xxx			✓	10.5	80÷120
3.5962.000	✓				
3.5808.000	✓				
3.5161.6xx	✓		✓		0÷15

* Available sterile only

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ChFN2 TROCHANTERIC NAIL

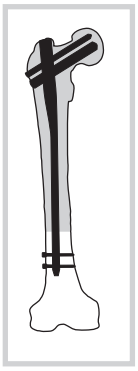
Charfix Femoral Nail
ChFN system 2

		Len	Ti
125°	10	180	3.5639.180
		200	3.5639.200
	11	180	3.5640.180
		200	3.5640.200
	12	180	3.5641.180
		200	3.5641.200
135°	10	180	3.5663.180
		200	3.5663.200
	11	180	3.5664.180
		200	3.5664.200
	12	180	3.5665.180
		200	3.5665.200

available	Ø 10 mm ÷12 mm	pitch	1 mm
	L 170 mm ÷ 280 mm		5 mm

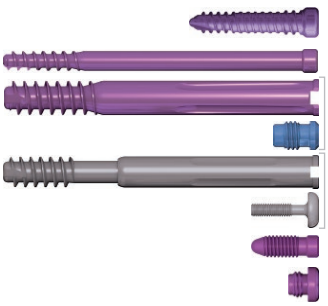
ChFN2 TROCHANTERIC NAIL

Charfix Femoral Nail
ChFN system 2



		Len	L	R
130°	10	340	3.5761.340	3.5762.340
		360	3.5761.360	3.5762.360
		380	3.5761.380	3.5762.380
		400	3.5761.400	3.5762.400
		420	3.5761.420	3.5762.420
	11	340	3.5763.340	3.5764.340
		360	3.5763.360	3.5764.360
		380	3.5763.380	3.5764.380
		400	3.5763.400	3.5764.400
		420	3.5763.420	3.5764.420
	12	340	3.5765.340	3.5766.340
		360	3.5765.360	3.5766.360
		380	3.5765.380	3.5766.380
		400	3.5765.400	3.5766.400
		420	3.5765.420	3.5766.420
130°	Recommended			

available		Ø	10 mm ÷12 mm	pitch	1 mm
		L	280 mm ÷ 480 mm		5 mm



	Ti					
3.5159.5xx	✓			5.0	30÷80	
3.5805.xxx	✓			5.0	70÷110	
3.5804.xxx			✓	10.5	80÷120	
3.5161.003	✓		✓			
3.5961.xxx			✓	10.5	80÷120	* Available sterile only
3.5962.000	✓					
3.5808.000	✓					
3.5161.6xx	✓		✓		0÷15	

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ChFN2 TROCHANTERIC NAIL

Charfix Femoral Nail
ChFN system 2

		Len	L	R
125°	10	340	3.5737.340	3.5738.340
		360	3.5737.360	3.5738.360
		380	3.5737.380	3.5738.380
		400	3.5737.400	3.5738.400
		420	3.5737.420	3.5738.420
	11	340	3.5739.340	3.5740.340
		360	3.5739.360	3.5740.360
		380	3.5739.380	3.5740.380
		400	3.5739.400	3.5740.400
		420	3.5739.420	3.5740.420
	12	340	3.5741.340	3.5742.340
		360	3.5741.360	3.5742.360
		380	3.5741.380	3.5742.380
		400	3.5741.400	3.5742.400
		420	3.5741.420	3.5742.420
135°	10	340	3.5785.340	3.5786.340
		360	3.5785.360	3.5786.360
		380	3.5785.380	3.5786.380
		400	3.5785.400	3.5786.400
		420	3.5785.420	3.5786.420
	11	340	3.5787.340	3.5788.340
		360	3.5787.360	3.5788.360
		380	3.5787.380	3.5788.380
		400	3.5787.400	3.5788.400
		420	3.5787.420	3.5788.420
	12	340	3.5789.340	3.5790.340
		360	3.5789.360	3.5790.360
		380	3.5789.380	3.5790.380
		400	3.5789.400	3.5790.400
		420	3.5789.420	3.5790.420

available		Ø	10 mm ÷12 mm	pitch	1 mm
		L	280 mm ÷ 480 mm		5 mm

Palette for trochanteric nails (implants not included) 40.4681.100

LOCKING ELEMENTS

Ti | Ster Non Ster

Charfix Femoral Nail ChFN system 2

CHARFIX2 DISTAL SCREW 5.0

30	3.5159.530
35	3.5159.535
40	3.5159.540
45	3.5159.545
50	3.5159.550
55	3.5159.555
60	3.5159.560
65	3.5159.565
70	3.5159.570
75	3.5159.575
80	3.5159.580

16 ÷ 90

ChFN2 JOIN SCREW 10.5

80	3.5804.080
85	3.5804.085
90	3.5804.090
95	3.5804.095
100	3.5804.100
105	3.5804.105
110	3.5804.110
115	3.5804.115
120	3.5804.120

ChFN2 JOIN TELESCOPIC SCREW 10.5 *

80	3.5961.080
85	3.5961.085
90	3.5961.090
95	3.5961.095
100	3.5961.100
105	3.5961.105
110	3.5961.110
115	3.5961.115
120	3.5961.120

* Available sterile only

ChFN2 JOIN SCREW 5.0

70	3.5805.070
75	3.5805.075
80	3.5805.080
85	3.5805.085
90	3.5805.090
95	3.5805.095
100	3.5805.100
105	3.5805.105
110	3.5805.110

CHARFIX2 END CAP M8

A	
+3	3.5161.003

ChFN2 COMPRESSION SCREW

	3.5962.000

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LOCKING ELEMENTS

Charfix Femoral Nail ChFN system 2

Ti Ster Non Ster

ChFN2 SETTING SCREW M6

	3.5808.000

ChFN2 END CAP M12X1.75

A	
0	3.5161.600
+5	3.5161.605
+10	3.5161.610
+15	3.5161.615

Stand for ChFN2 trochanteric nails (set with a container without implants)	40.6328.000

III. INSTRUMENT SET

III.1. BASIC INSTRUMENTS

INSTRUMENT SET FOR ChFN2 TROCHANTERIC NAILS 40.6340.700	Name	Pcs	Catalogue No.
	Targeter arm	1	40.6341.000
	Targeter 120/130	1	40.6342.100
	Connecting screw M12x1.75	1	40.6305.000
	Drill guide 14/11.5	1	40.6346.100
	Protective guide 11.5/3.2	1	40.6347.000
	Drill guide 11.0/6.0	1	40.6348.100
	Protective guide 6.0/3.2	1	40.6349.000
	Gradual drill 10.5/7	1	40.6351.000
	Drill 5.0	1	40.6352.000
	Cannulated drill 16.0	1	40.6313.000
	Protective guide 16.0	1	40.6314.000
	Guide rod 3.2/500	4	40.6356.100
	Compression wrench	1	40.6357.000
	Cannulated screw length measure	1	40.6548.000
	Wrench for self-aligning joint S7	1	40.6319.200
	Screwdriver T25 with holder	1	40.6361.100
	Protective guide 12/10	1	40.6353.000
	Drill guide 10/4	1	40.6362.000

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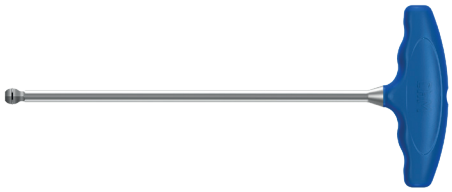
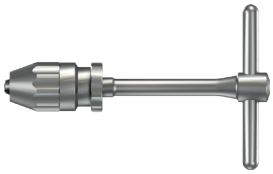
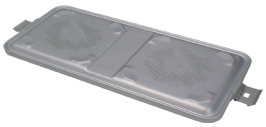
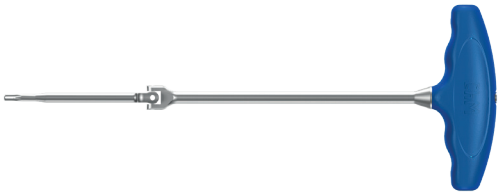
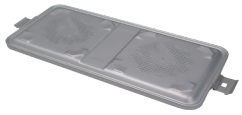
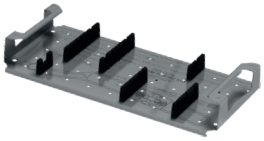
INSTRUMENT SET FOR ChFN2 TROCHANTERIC NAILS 40.6340.700	Name	Pcs	Catalogue No.
	Wrench S10	1	40.5526.200
	Drill with scale 4.0	1	40.5346.202
	Drill with scale 4.0/150	1	40.5348.202
	Impactor-extractor	1	40.6371.000
	Curved awl 8.0	1	40.5523.100
	Guide rod 3.0/580	1	40.3925.580
	Steinmann handle	1	40.0987.200
	Mallet	1	40.3667.000
	Perforated aluminum lid 1/1 595x275x15mm Gray	1	12.0750.200
	Stand for instrument set for **ChFN2** trochanteric nails	1	40.6369.700
	Container with solid bottom 1/1 595x275x185mm	1	12.0750.103

III.2. EXTENDED INSTRUMENTS

The instruments below are available as supplementary equipment.
To include them to the ordered **CHARFIX2** instrument set, please contact your local representative or the **ChM** Sales Department.

INSTRUMENT SET FOR ChFN2 TROCHANTERIC NAILS - II 40.6340.710	Name	Pcs	Catalogue No.
	Distal targeter D	1	40.6344.200
	Trocar 3.2	1	40.6350.000
	Set block 12/5.0/4.0	2	40.6359.000
	Protective guide 12/10	1	40.6353.000
	Drill guide 10/4	1	40.6362.000
	Trocar 10	1	40.6355.000
	Drill with scale 4.0	1	40.5346.202
	Screw length measure	1	40.6358.100
	Screw length measure protection	1	40.8550.000
	Nail length measure	1	40.5098.000
	Protective guide short	1	40.5871.100
	Drill guide short 7/4.0	1	40.6365.000
	Screwdriver S10	1	40.8551.000
	Guide 16/3.2	1	40.6315.000
	Wrench for self-aligning joint T25	1	40.6320.200
	Perforated aluminum lid 1/1 595x275x15mm Gray	1	12.0750.200
	Stand for instrument set for **ChFN2** trochanteric nails - II	1	40.6368.700
	Container with solid bottom 1/1 595x275x86mm	1	12.0750.100

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III.3. OPTIONAL INSTRUMENTS

INSTRUMENT SET FOR ChFN2 TROCHANTERIC NAILS - II optional	Name	Pcs	Catalogue No.
	Targeter 125/135 *(a place on the stand has been prepared)*	1	40.6343.100
	**ChFN2** trial	1	40.6360.000
	Guide 11.5/6	1	40.6363.000

IV. SURGICAL TECHNIQUE

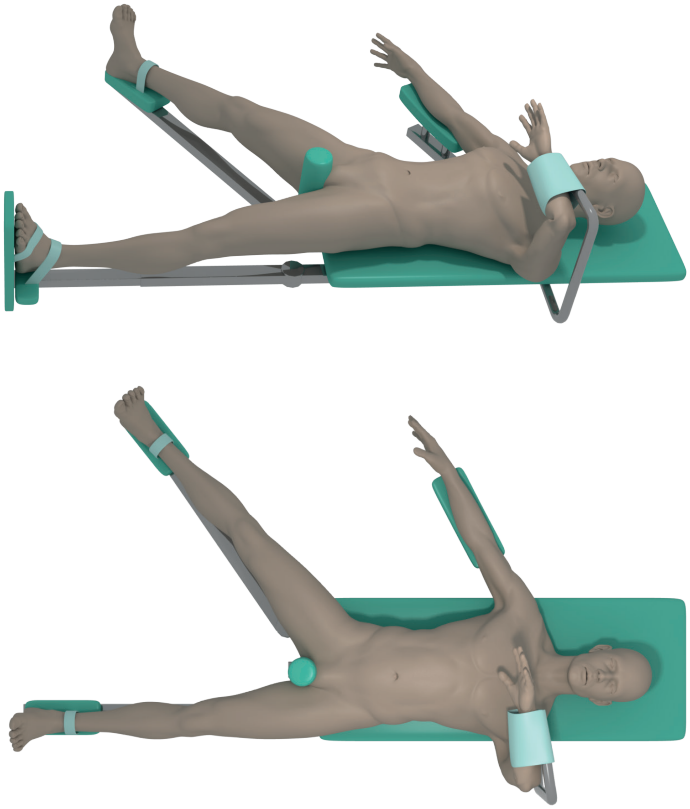
The following description covers the most important stages of the implantation of the femoral trochanteric intramedullary nails; however, it is not a detailed instruction of conduct.
The surgeon decides about choosing the operating procedure and its application in each individual case.

IV.1. INTRODUCTION

When a patient cannot be operated at the day of femoral fracture, it is recommended to apply direct traction for 2 to 3 days to spread the fragments. This will considerably facilitate fracture reduction and nail insertion. Positioning of the patient on the traction table is an integral part of the operating procedure. Presented method of intramedullary osteosynthesis requires image intensifier control.

Each operating procedure must be carefully planned. X-Ray imaging of the entire femur and adjacent joints (*in AP and lateral position*) is essential in order to not overlook the injuries in its proximal or distal part. It is especially important in the cases of pathological subtrochanteric fractures. Special attention should be paid to concurrent neck fractures or proximal epiphysis comminuted fractures, and the possibility of its occurrence during the procedure. On the basis of the images of fractured femur and the healthy one (*the other one*) using a trial, the physician determines the angle, length and diameter of the nail.

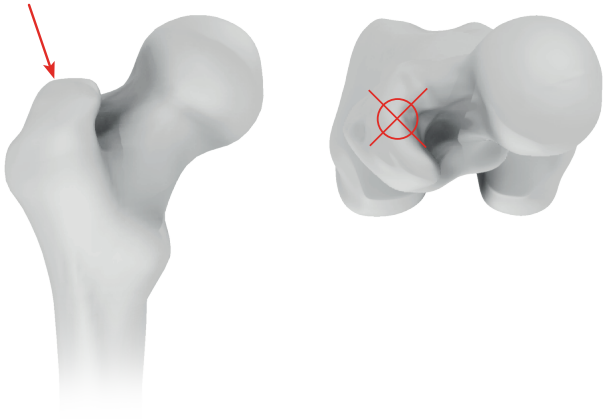
During the operation, secondary fractures of main fragments may occur.
The condition of hip joint is also important.
In advanced arthrosis or contracture, nailing may be difficult or even impossible to perform.
The procedure has to be carried out on the operating table with traction with the patient placed supine or on the side. Side position facilitates the approach to the greater trochanter which is especially important with overweight patients. Supine position provides less favorable access to the greater trochanter but makes all other stages of the operation considerably easier (*especially rotary corrections*). This surgical technique presents supine position of the patient with traction applied on the condyles of the operated femur.



Patient positioning

Lateral surgical approach shall be applied starting the incision near the tip of the greater trochanter in line with the femoral shaft axis for 8 cm. The incision should be longer in obese patients. When the fascia is reached, cut it along the skin incision line. Next the dissection of gluteus maximus muscle fibres should be performed. Back from gluteus medius muscle, approach to the greater trochanter apex is enabled.

The trochanteric nail should be introduced in such a way that its axis is approximately in line with the bone shaft axis. This beneficially influences the load distribution forces that transmit mechanical loads in a patient who started to walk.



Location of the entry point for trochanteric nail

IV.2. OPENING AND PREPARATION OF MEDULLARYCANAL FOR TROCHANTERIC NAIL INSERTION (*SHORTAND LONG NAILS*)

1 Perform a skin incision near the top of the greater trochanter.
Having located the entry point for the nail, using drive, insert the guide rod 3.2/500 **[40.6356.100]** into the medullary canal at an angle corresponding to the angle deviation of the nail shaft from the main axis (*about 4°*).

The insertion process should be done under X-Ray with visual track control.

40.6356.100

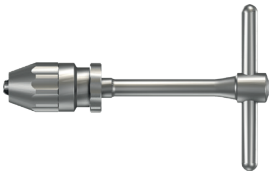
2 Using guide rod 3.2/500 **[40.6356.100]**, insert into the medullary canal curved awl 8.0 **[40.5523.100]** to the depth at which the awl blade goes along the medullary canal, allowing proper insertion of guide rod 3.0/580 **[40.3925.580]**.
Having opened medullary canal, remove guide rod 3.2/500 **[40.6356.100]**.
Mount guide rod 3.0/580 **[40.3925.580]** to Steinmann handle **[40.0987.200]** and enter the guide into the medullary canal through curved awl 8.0 to the depth required for the proper fixation of bone fragments. During guide rod insertion, control the fracture reduction and make sure the guide rod passes through all the bone fragments.

Remove Steinmann handle and curved awl 8.0.
Leave guide rod 3.0/580 in place.

40.6356.100

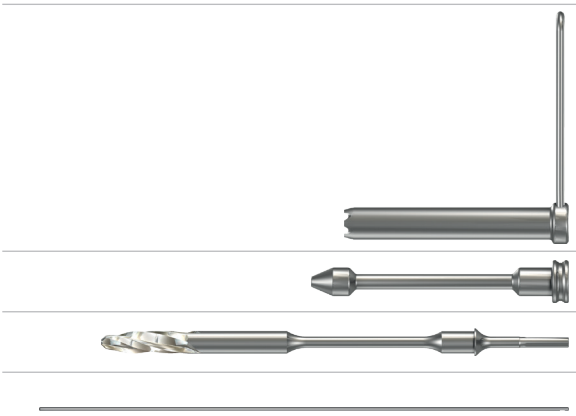

40.5523.100

40.3925.580


40.0987.200

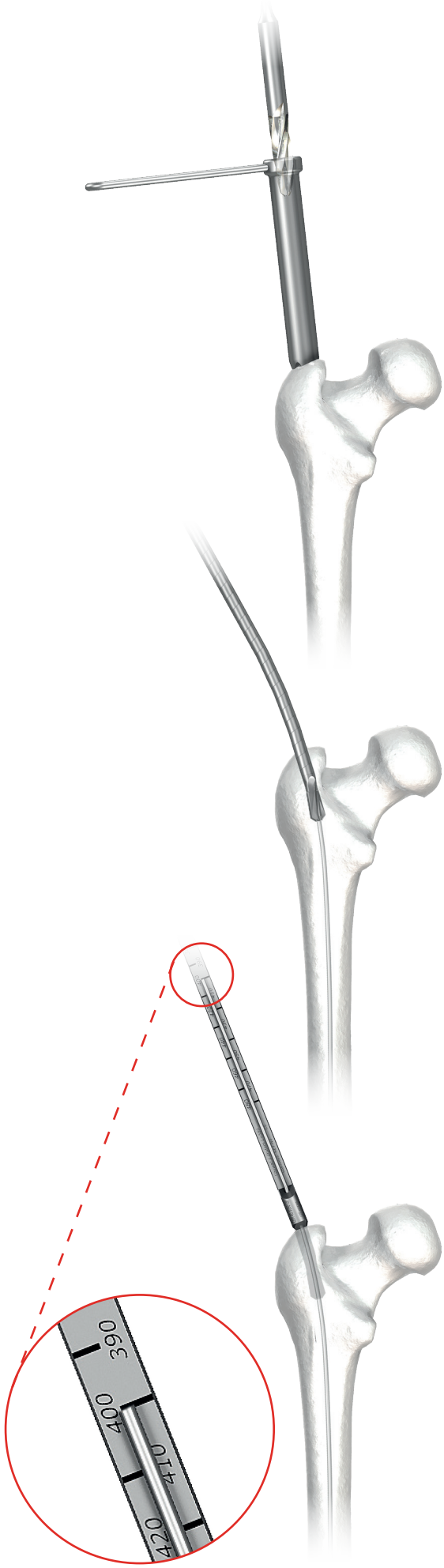
Lean protective guide 16.0 **[40.6314]** with guide 16/3.2 **[40.6315]** against the cortex. Remove the guide 16/3.2 **[40.6315]**.
Using the cannulated drill 16.0 **[40.6313]** led in the protective guide 16.0 **[40.6314]** on the guide rod 3.0/580 **[40.3925.580]** open the medullary canal.
Slowly ream the medullary canal using the cannulated drill until it rests against the protective guide.

Remove the cannulated drill and protective guide.



3 When reaming the medullary canal of femur shaft, the process should be performed gradually using reamers 0.5 mm thicker than the previous one until the diameter of the opening is 1.5 ÷ 2 mm greater than the diameter of the nail for a depth of not less than its length.
Whether the medullary canal of femur shaft is reamed or not, the proximal part of the medullary canal should be reamed to a diameter of 16 mm to a depth of about 6 cm.

Remove the reamer.



4 In the case of implantation of a long nail, measure its length.
Insert a nail length measure **[40.5098]** via the guide rod until it rests on the bone. Read the length of the nail from the scale. Remove the measure.
In the case of a solid nail, remove also the guide rod from the medullary canal.

The medullary canal is ready for nail implantation.

The above description is not a detailed instruction of conduct. The surgeon decides about choosing the operating procedure.

IV.3. NAIL-TARGETER ASSEMBLY, NAIL INSERTION

5 Mount the intramedullary nail to the targeter arm **[40.6341]** using connecting screw M12x1.75 **[40.6305]** and screwdriver S10 **[40.8551]**.

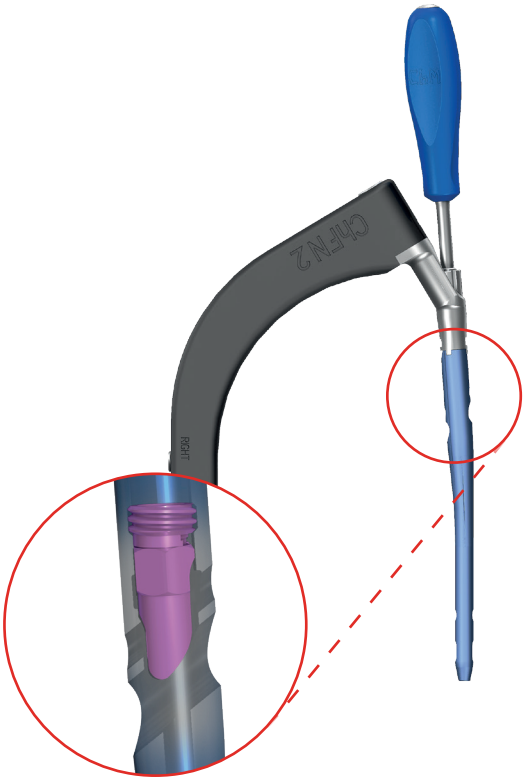
For a long nail, set the slider of the distal targeter acc. to point 6.

A fork screw has been inserted in the nail.
Do not change its position in the nail.

40.6341

40.6305

40.8551



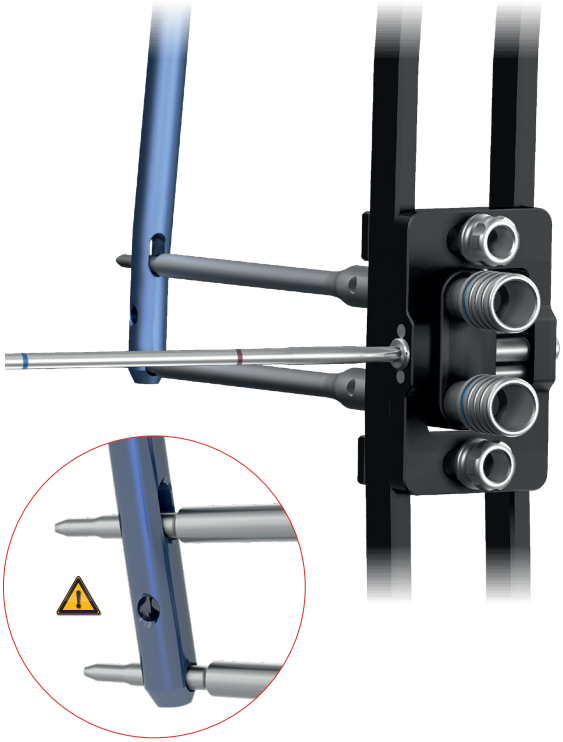
5a Insert wrench for self-aligning joint S7 **[40.6319.200]** through the hole in the connecting screw M12x1.75 **[40.6305]**. Unscrew the fork screw until it rests on the connecting screw.

This step is necessary to avoid complications when preparing the hole for the join screw insertion.

40.6305

40.6319.200

6 For long nails, attach distal targeter D **[40.6344.200]** to the targeter arm **[40.6341]** and set the correct position of the slider in relation to the locking holes in the nail in its distal part using two set blocks 12/5.0/4.0 **[40.6359]**. Lock the slider using the screwdriver T25 with holder **[40.6361.100]**.



When targeter slider is properly set and locked, set blocks should easily go through the nail holes.

Remove set blocks from the targeter slider.
Disconnect the distal targeter D from the targeter arm.


40.6341


40.6344.200


40.6359


40.6361.100

7 Connect impactor-extractor **[40.6371]** to the targeter arm **[40.6341]** and using a mallet **[40.3667]** insert the nail into the medullary canal, remove the guide rod.


40.6341

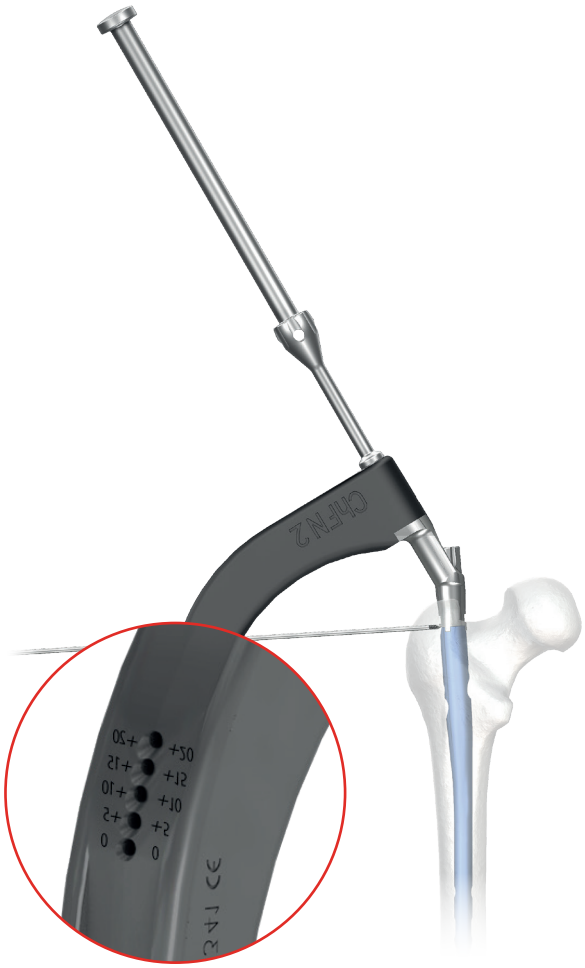

40.6371


40.3667

The above description is not a detailed instruction of conduct. The surgeon decides about choosing the operating procedure.

8 To determine the correct insertion depth, use a guide rod 3.2/500 **[40.6356.100]**, which will indicate the beginning of the nail at the hole marked as "0". *The holes marked as "+5", "+10", "+15", "+20"* are used when the nail is so deep in intramedullary canal that the nail beginning does not flush with the bone. The holes are used to establish the depth at which the nail beginning is in relation to the trochanter apex and to determine the size of end cap.

40.6356.100



IV.4. PROXIMAL LOCKING OF THE TROCHANTERIC NAIL USING JOIN SCREWS

9 Attach chosen targeter 120/130 **[40.6342.100]** or targeter 125/135 **[40.6343.100]** to the targeter arm.

- for the nails 120° and 130° - targeter 120/130 **[40.6342.100]** shall be used,
- for the nails 125° and 135° - targeter 125/135 **[40.6343.100]** shall be used.

40.6342.100

40.6343.100

10 Insert protective guide 11.5/3.2 **[40.6347]** into the drill guide 14/11.5 **[40.6346.100]** and then insert this system into the larger hole of the targeter and push to the skin.

40.6346.100

40.6347

The above description is not a detailed instruction of conduct. The surgeon decides about choosing the operating procedure.

11 Insert the trocar 3.2 **[40.6350]** in the protective guide 11.5/3.2 **[40.6347]**. Mark on the skin the entry point for the join screw and perform soft tissue incision. Use the trocar to mark on the cortex the entry point for the drill.
At the same time advance the protective guide as close to the bone as possible.

Remove the trocar and protective guide.


40.6347


40.6350

12 Insert the protective guide 6.0/3.2 **[40.6349]** in the drill guide 11.0/6.0 **[40.6348.100]** and then insert this system in the smaller hole of the proximal targeter and push to the skin.

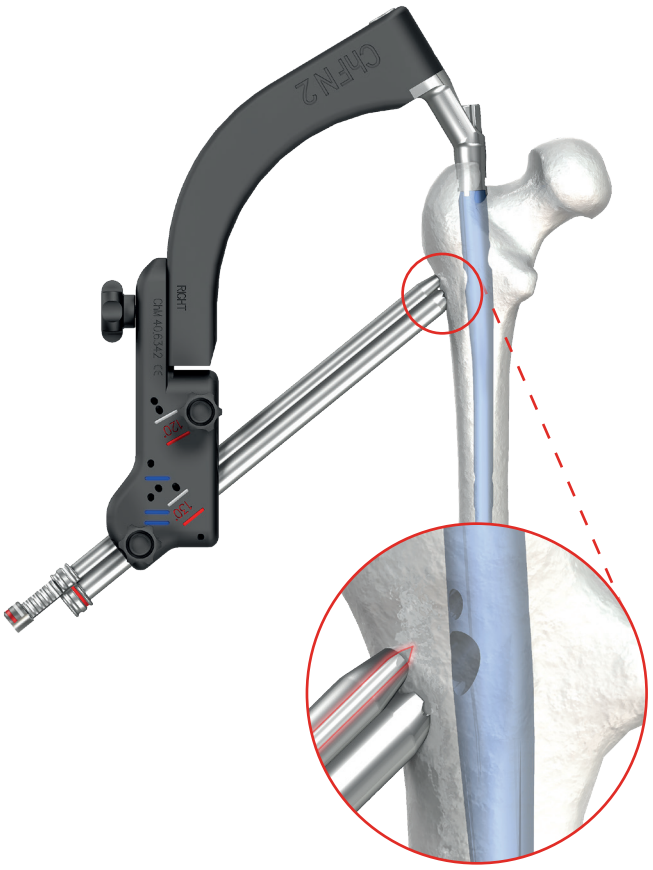
Insert the trocar 3.2 **[40.6350]** in the protective guide 6.0/3.2 **[40.6349]**. Mark on the skin the entry point for the join screw and perform soft tissue incision. Use the trocar to mark on the cortex the entry point for the drill. At the same time advance the protective guide as close to the bone as possible.

Remove the trocar and protective guide 6.0/3.2


40.6348.100


40.6349


40.6350

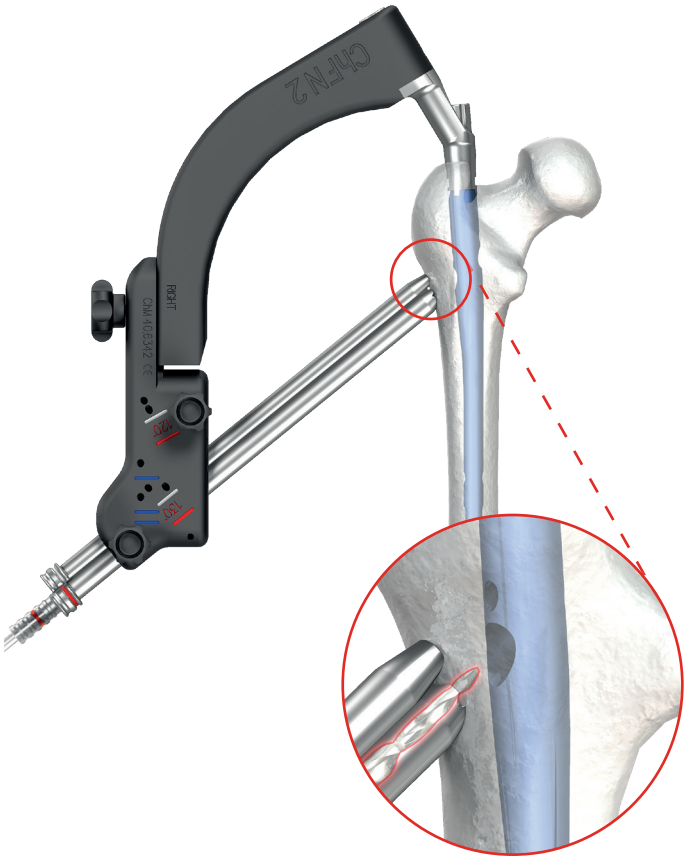


13 Insert the guide 11.5/6 **[40.6363]** into the drill guide 14/11.5 **[40.6346.100]**. Then, use the drill 5.0 **[40.6352]** mounted in the drive to drill the bone to a depth of approximately 3 mm.

Remove the drill and guide 11.5/6.


40.6363

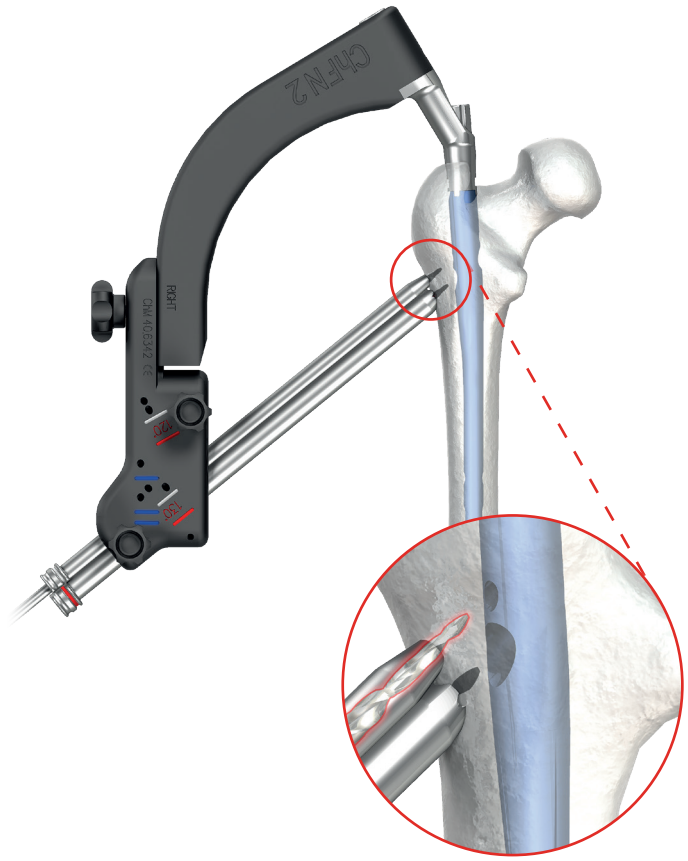
40.6352



14 Insert the drill 5.0 **[40.6352]** mounted in the drive to the drill guide 11.0/6.0 **[40.6348.100]**. Then, drill the bone to a depth of approximately 3 mm.

Remove the drill.

40.6352



The above description is not a detailed instruction of conduct. The surgeon decides about choosing the operating procedure.

15 Insert the protective guide 11.5/3.2 **[40.6347]** into the drill guide 14/11.5 **[40.6346.100]**. Then, insert the guide rod 3.2/500 **[40.6356.100]** mounted in the drive.

Guide insertion should be controlled with X-Ray imaging.

Insert the guide rod **[40.6356.100]** into the femoral head:
- at the depth of about 5 ÷ 10 mm from articular cartilage for join screw 10.5 and
- at the depth of about 15-20 mm for the join screw 5.0.


40.6347

40.6356.100

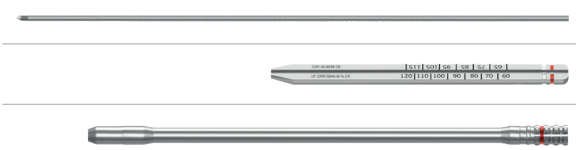
16 Insert the guide 6.0/3.2 **[40.6349]** into the drill guide 11,0/6.0 **[40.6348.100]**. Then, insert the guide rod 3.2/500 **[40.6356.100]** mounted in the drive.

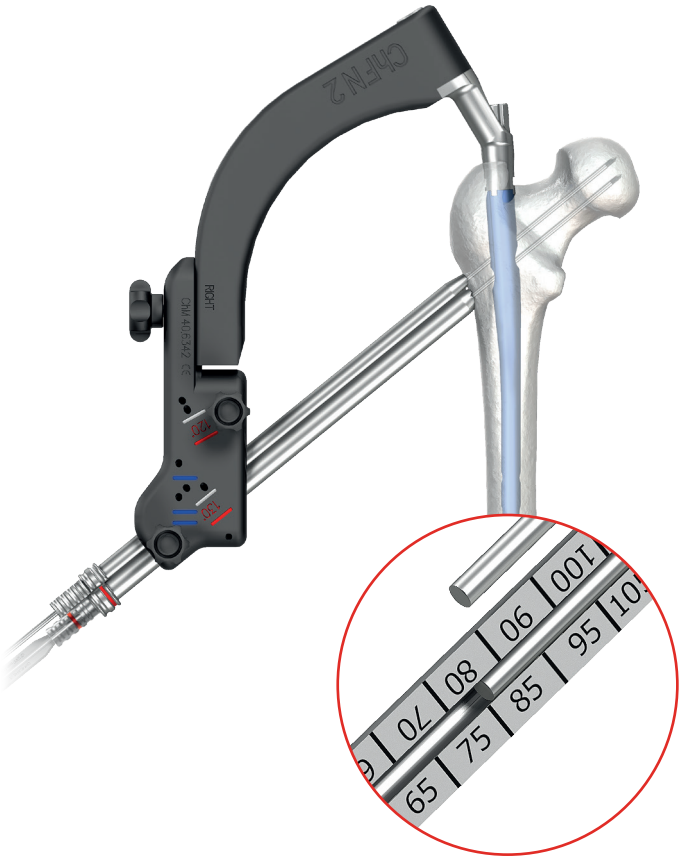

40.6349

40.6356.100

17 Insert the cannulated screw length measure **[40.6548]** via the guide rod **[40.6356.100]** (*placed into the protective guide 11.5/3.2 [40.6347]*) until its end rests on the protective guide 11.5/3.2. Read the length of the join screw 10.5 on the scale indicated by the end of the guide rod.
During the measurement, the tip of the cannulated screw length measure should rest on the protective guide 11.5/3.2, and the guide on cortex.

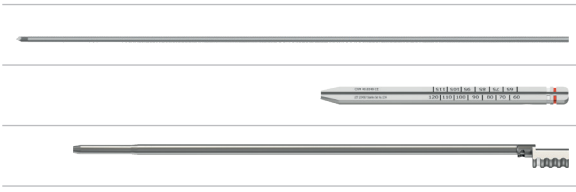
Remove the cannulated screw length measure and the protective guide 11.5/3.2. Leave the guide rod in place.





18 Insert the cannulated screw length measure **[40.6548]** via the guide rod **[40.6356.100]** (*placed into the protective guide 6.0/3.2 [40.6349]*) until its end rests on the protective guide 6.0/3.2. Read the length of the join screw 5.0 on the scale indicated by the end of the guide rod.
During the measurement, the tip of the cannulated screw length measure should rest on the protective guide 6.0/3.2, and the guide on cortex.

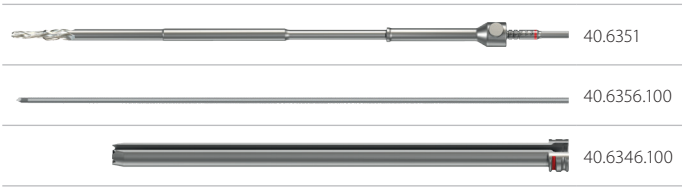
Remove the cannulated screw length measure and the protective guide 6.0/3.2. Leave the guide rod in place.



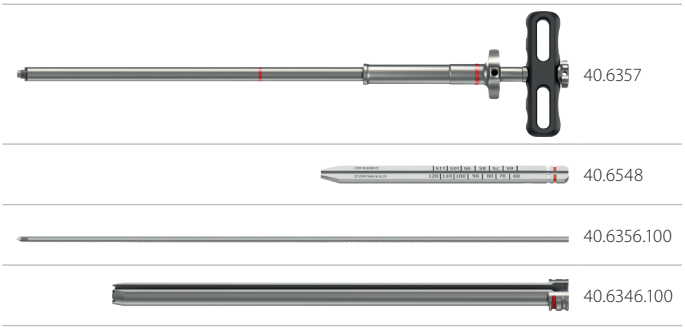
The above description is not a detailed instruction of conduct. The surgeon decides about choosing the operating procedure.

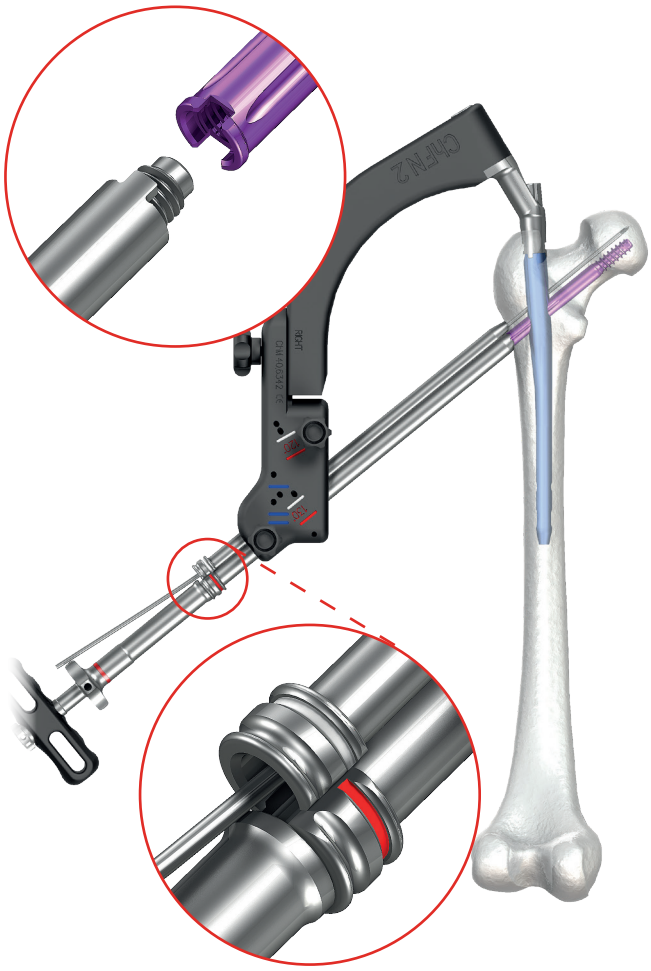
19 Set the drilling depth corresponding to the length of previously selected join screw on the gradual drill 10.5/7 **[40.6351]** using the setting latch. Mount the gradual drill in the drive and insert on the guide rod **[40.6356.100]** placed in the femoral neck. Drill a hole until the latch rests on drill guide 14/11.5 **[40.6346.100]**.

Remove the gradual drill.
Leave guide rod and drill guide in place.



20 Set the nut of the compression wrench at "*0*" acc. to the scale.
Attach the join screw 10.5 of the length earlier determined by the cannulated screws length measure **[40.6548]** to the compression wrench **[40.6357]**. Insert the join screw on the guide rod **[40.6356.100]**. Using the compression wrench that is led on the guide rod, insert the join screw in the neck of the femur until the nut of the wrench rests on the drill guide 14/11.5 **[40.6346.100]**.

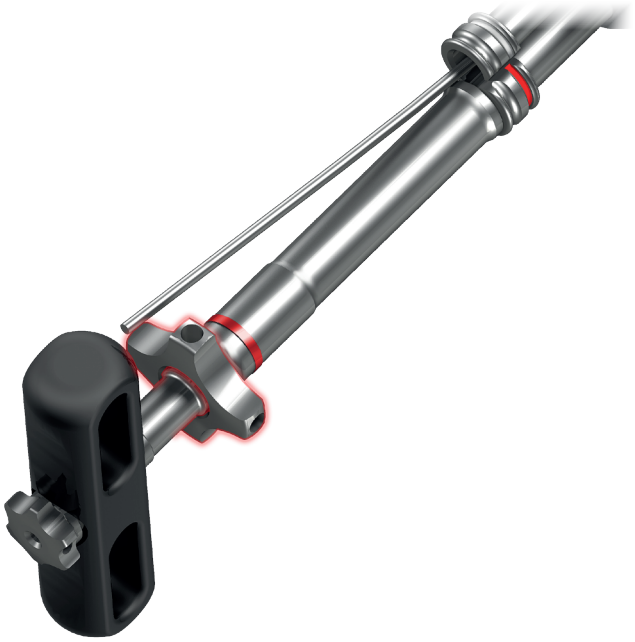


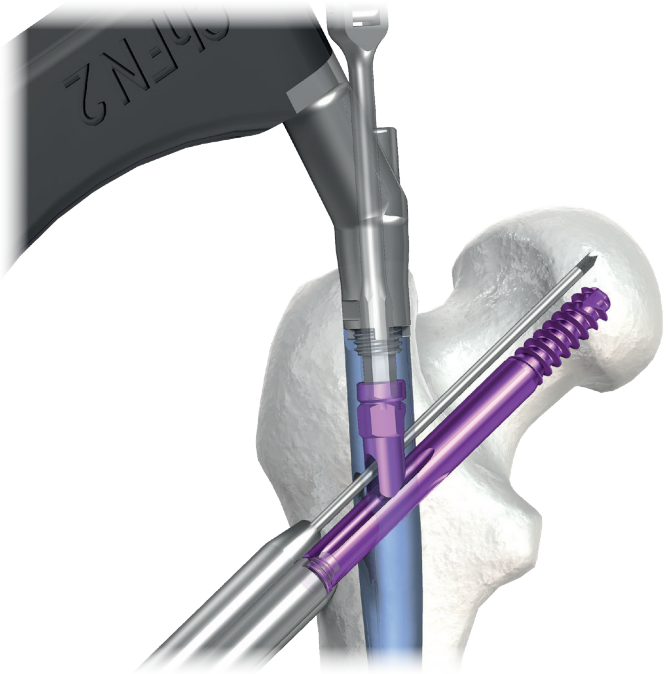


21 If fracture compression is intended, do the following:

- unscrew the compression nut (*by the length of a distance between the fragments*),
- insert the join screw at the desired depth,
- perform compression by turning the compression screw until it is on "*0*" position according to the scale.

Be careful during compression and do not pull the join screw out of the bone.





22 Set the combined join screw 10.5 with compression wrench so that the handle of the wrench is positioned parallel or perpendicular to the longitudinal axis of the nail. Insert the wrench for self-aligning joint S7 **[40.6319.200]** in the connecting screw located in the targeter arm. Tighten the fork screw located inside the nail. Join screw can be locked in two positions:

- dynamic - the fork screw is loose and allows the sliding of the screw inside the nail without the possibility of rotation (*tighten it up to the limit and then loosen by 1/4 turn*),
- static - the fork screw is tightened up.

Remove the compression wrench, guide rod and protective guide.

Guide rod [40.6356.100] is a disposable device.


40.6357


40.6319.200

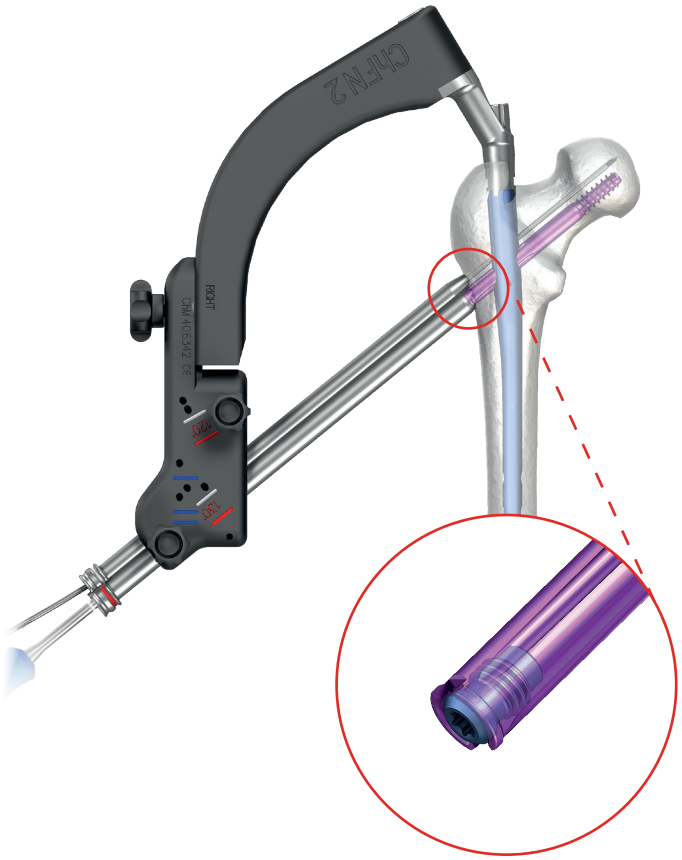
40.6356.100

The above description is not a detailed instruction of conduct. The surgeon decides about choosing the operating procedure.

23 In order to protect the internal thread of the join screw against bone ingrowth, insert an end cap M8 (*implant provided separately*) into the threaded hole of the screw using screwdriver T25 **[40.6361.100]**.


40.6361.100

The holder of screwdriver T25 **[40.6361.100]** must not be used with the drill guide 14/11.5 **[40.6346.100]**. Remove the holder.



In the case of locking the nail using a single join screw 10.5, omit the steps 24-26.

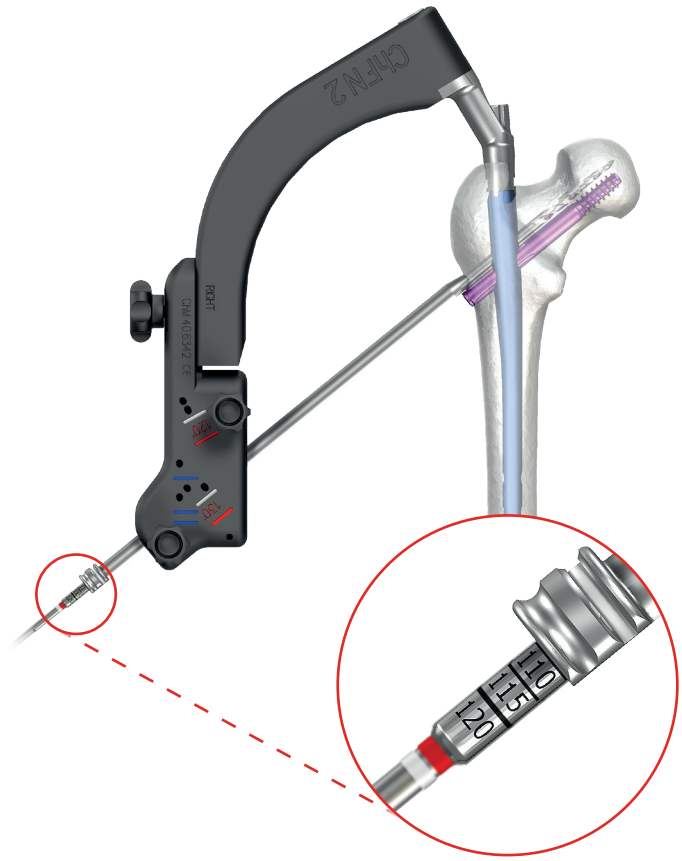
24 Remove the guide rod.

Mount the drill 5.0 **[40.6352]** in the drive, insert it in the drill guide 11.0/6.0 **[40.6348.100]** and deepen the hole in the first cortical layer (*up to the intramedullary nail*).

Remove the drill.

40.6352


40.6348.100



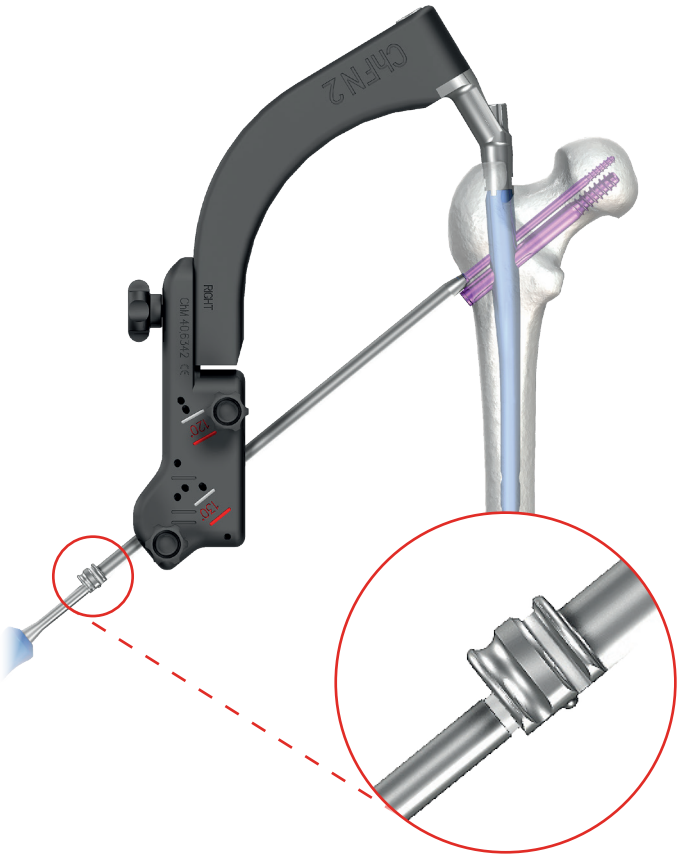
25 Insert the tip of the screwdriver T25 **[40.6361.100]** into the socket of the specified join screw 5.0 and then into drill guide 11.0/6.0 **[40.6348100]**.

Insert the join screw 5.0 in the previously drilled hole until its head reaches the cortex (*the groove on the screwdriver shaft matches the end of the protective guide*). Remove screwdriver T25 and protective guide.

The holder of screwdriver T25 **[40.6361.100]** must not be used with the drill guide 11.0/6.0 **[40.6348.100]**. Remove the holder.

40.6361.100

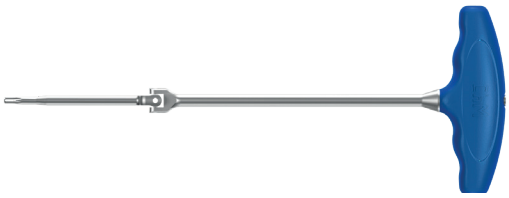
40.6348.100



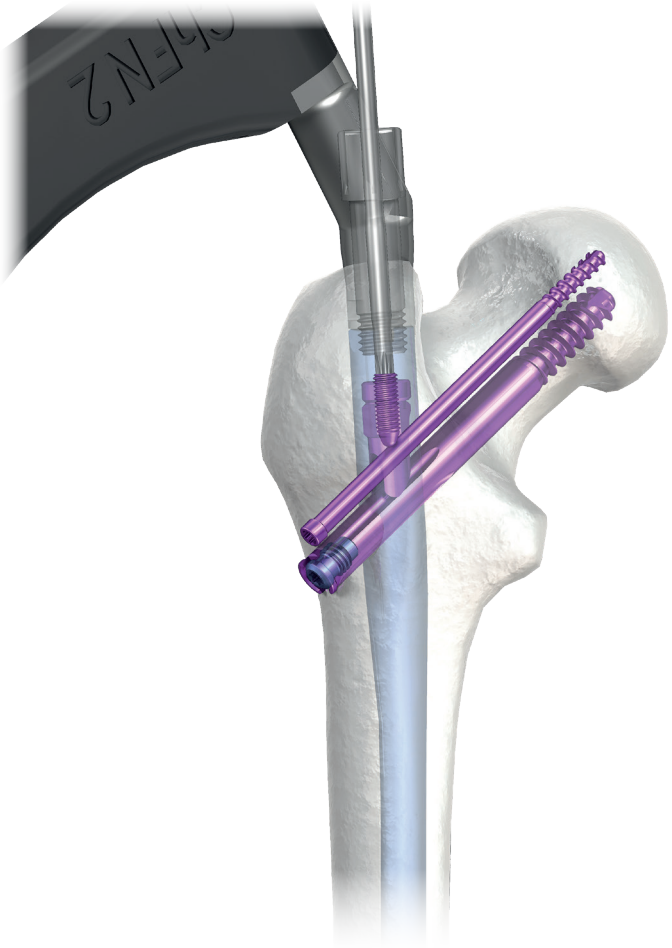
26 Join screw 5.0 locking:

Attach the setting screw (*implant*) to the wrench for self-aligning joint T25 **[40.6320.200]**. Insert the wrench with the screw in the connecting screw located in the targeter arm. Tighten the setting screw until immobilization of join screw 5.0 occurs.

Remove the wrench for self-aligning joint T25.



40.6320.200



The above description is not a detailed instruction of conduct. The surgeon decides about choosing the operating procedure.

IV.5. PROXIMAL TROCHANTERIC NAIL LOCKING USING JOIN TELESCOPIC SCREW 10.5

27 Attach chosen targeter 120/130 **[40.6342.100]** or targeter 125/135 **[40.6343.100]** to the targeter arm.

- for the nails 120° and 130° - targeter 120/130 **[40.6342.100]** shall be used,
- for the nails 125° and 135° - targeter 125/135 **[40.6343.100]** shall be used.

40.6342.100

40.6343.100

28 Insert protective guide 11.5/3.2 **[40.6347]** into the drill guide 14/11.5 **[40.6346.100]** and then insert this system into the larger hole of the targeter until it rests on the skin.

40.6346.100

40.6347

29 Insert the trocar 3.2 **[40.6350]** in the protective guide 11.5/3.2 **[40.6347]**. Mark on the skin the entry point for the join screw and perform soft tissue incision. Use the trocar to mark in the cortex the entry point for the drill.
At the same time advance the protective guide as close to the bone as possible.

Remove trocar and protective guide.


40.6347


40.6350

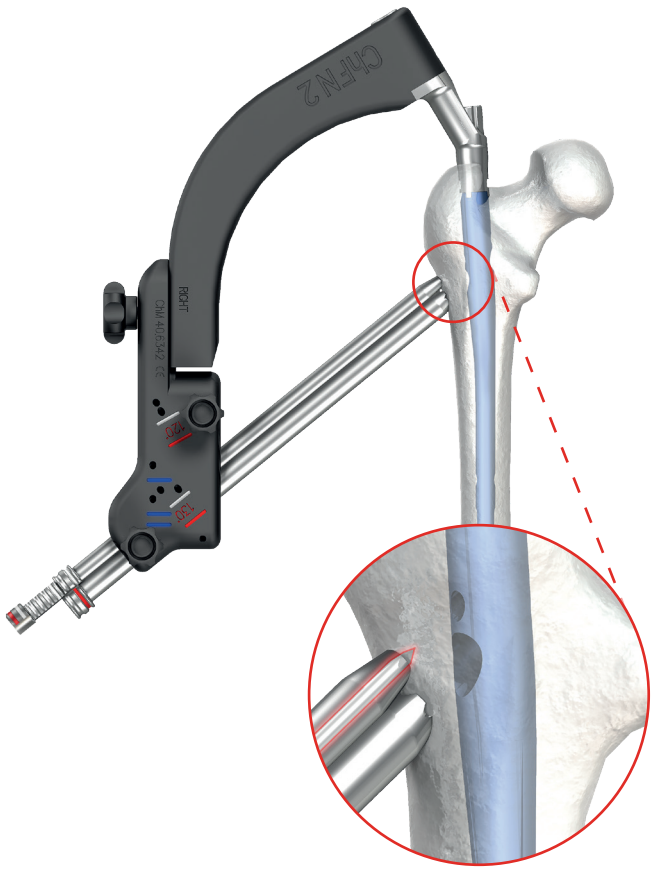
30 Insert the protective guide 6.0/3.2 **[40.6349]** in the drill guide 11.0/6.0 **[40.6348.100]** and then insert this system in the smaller hole of the chosen targeter.
Insert the trocar 3.2 **[40.6350]** in the protective guide 6.0/3.2 **[40.6349]**. Mark on the skin the entry point for the join screw and perform soft tissue incision.
Use the trocar to mark on the cortex the entry point for the drill. At the same time advance the protective guide as close to the bone as possible.

Remove trocar and protective guide 6.0/3.2.


40.6348.100


40.6349


40.6350



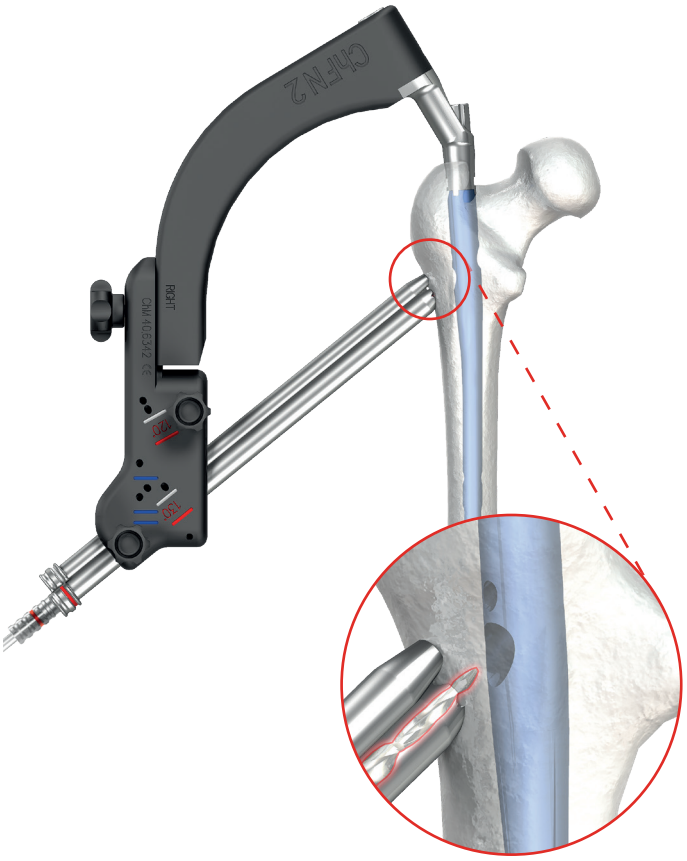
The above description is not a detailed instruction of conduct. The surgeon decides about choosing the operating procedure.

31 Insert the guide 11.5/6 **[40.6363]** into the drill guide 14/11.5 **[40.6346.100]**. Use the drive and drill 5.0 **[40.6352]** to drill a hole in the bone to a depth of about 3mm.

Remove the drill and guide 11.5/6.


40.6363

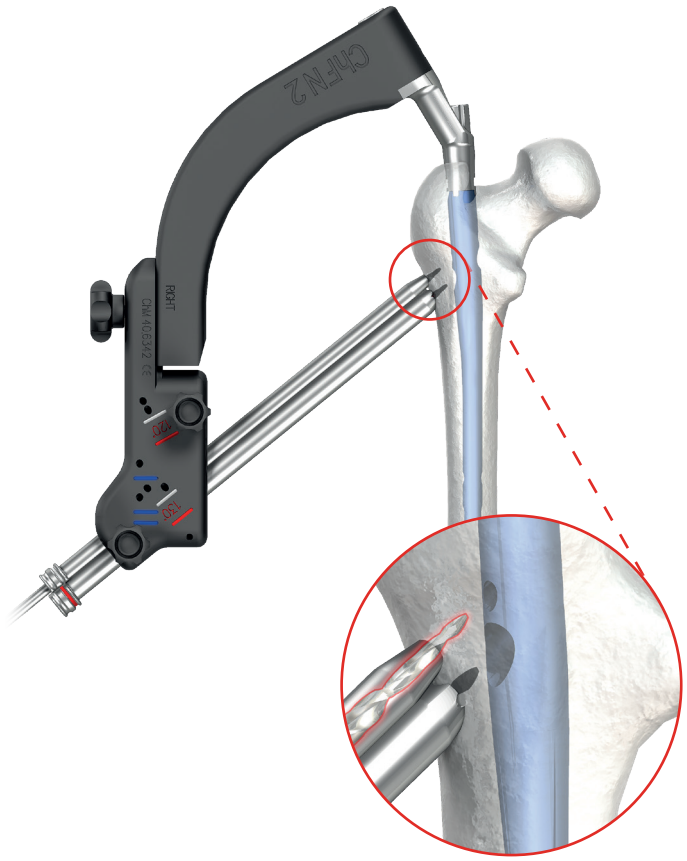
40.6352



32 Insert the drill 5.0 **[40.6352]** into the drill guide 11.0/6.0 **[40.6348]** and drill a hole in the bone to a depth of about 3mm.

Remove the drill.

40.6352



33 Insert protective guide 11.5/3.2 **[40.6347]** into drill guide 14/11.5 **[40.6346.100]**. Connect the guide rod 3.2/500 **[40.6356.100]** to the drive and advance it into the femoral head.

Guide rod insertion should be performed under X-Ray control.

Insert the guide rod 3.2/500 **[40.6356.100]** into the femoral head. at the depth of about 5÷10 mm from articular cartilage for join screw 10.5 and at the depth of about 15-20 mm for the join screw 5.0.


40.6347

40.6356.100

34 Insert the guide 6.0/3.2 **[40.6349]** into the drill guide 11.0/6.0 **[40.6348.100]**.
Attach the guide rod 3.2/500 **[40.6356.100]** to the drive and advance into the femoral head.

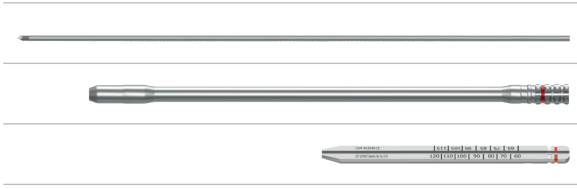

40.6349

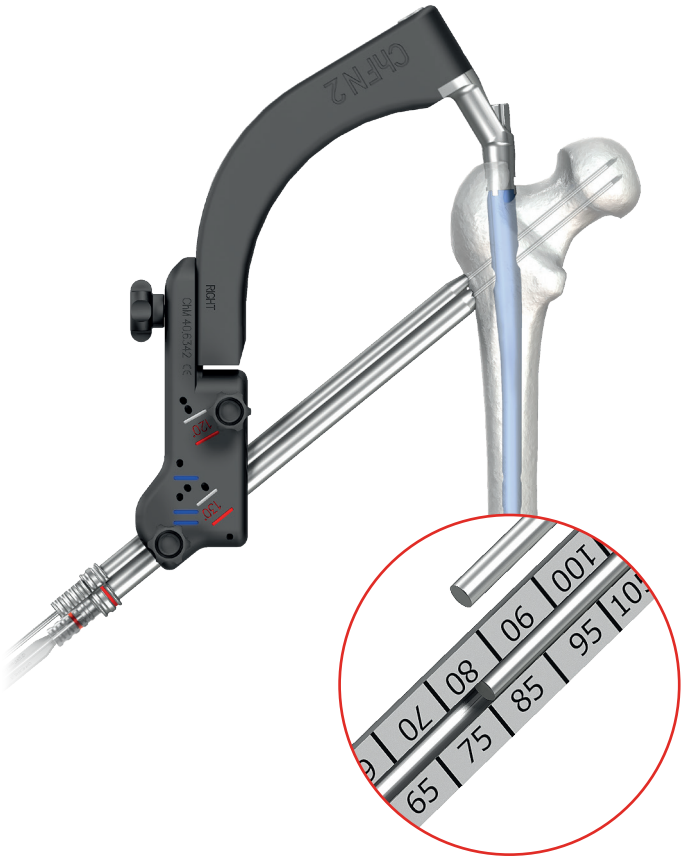
40.6356.100

The above description is not a detailed instruction of conduct. The surgeon decides about choosing the operating procedure.

35 Insert the cannulated screw length measure **[40.6548]** via the guide rod **[40.6356.100]** (*placed into the protective guide 11.5/3.2 [40.6347]*) until its end rests on the protective guide 11.5/3.2 **[40.6347]**. Read the length of the join telescopic screw on the scale indicated by the end of the guide rod.
During the measurement, the tip of the cannulated screw length measure should rest on the protective guide 11.5/3.2, and the guide on cortex.

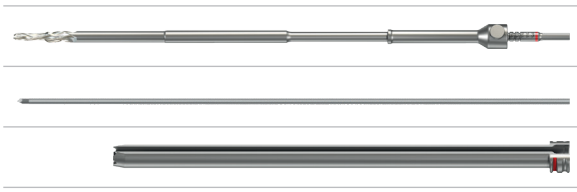
Remove the cannulated screw length measure and the protective guide 11.5/3.2.
Leave the guide rod in place.

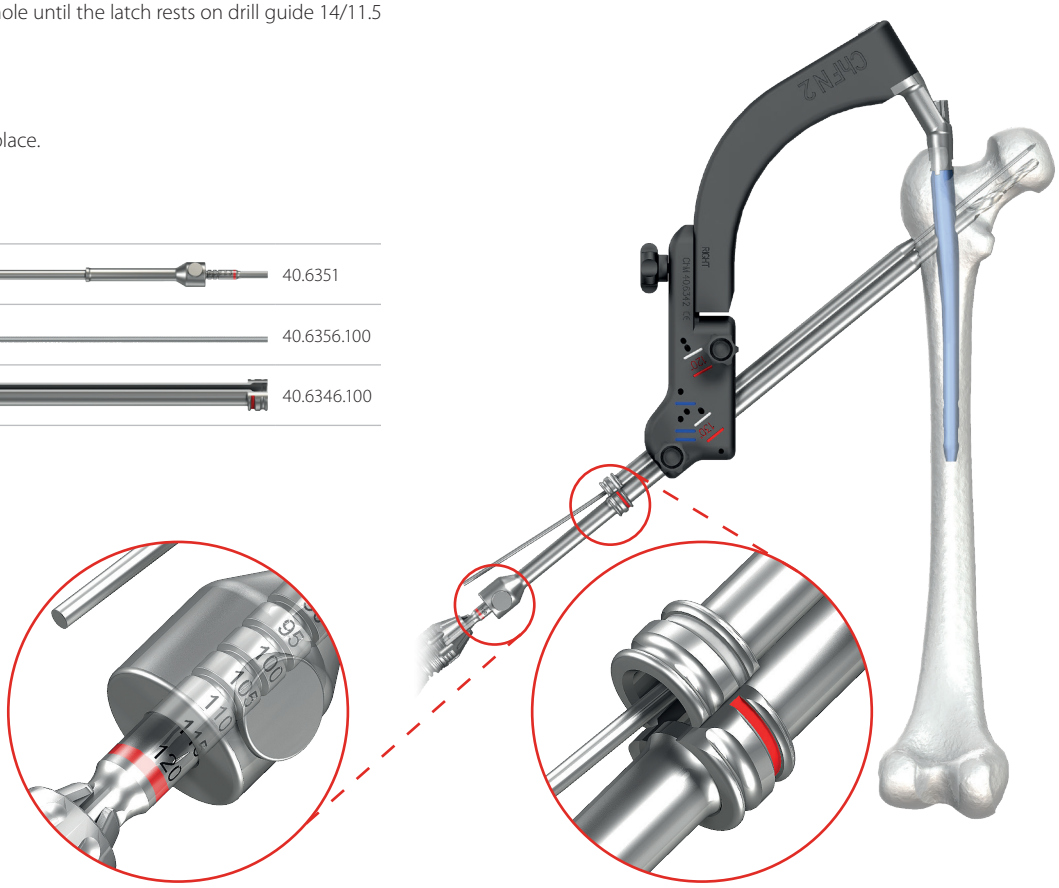




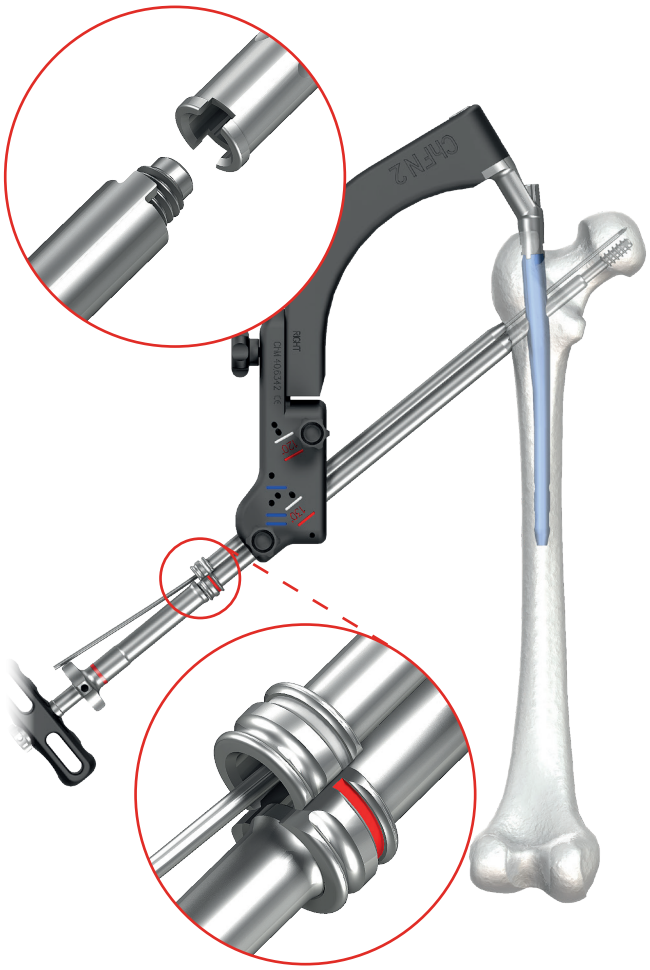
36 Set the drilling depth corresponding to the length of previously selected join screw on the gradual drill 10.5/7 **[40.6351]** using the setting latch. Mount the gradual drill in the drive and insert on the guide rod **[40.6356.100]** placed in the femoral neck. Drill a hole until the latch rests on drill guide 14/11.5 **[40.6346.100]**.

Remove the gradual drill.
Leave guide rod and drill guide in place.





37 Set the nut of the compression wrench at "*0*" acc. to the scale.
Attach the join telescopic screw 10.5 of the length earlier determined by the cannulated screws length measure **[40.6548]** to the compression wrench **[40.6357]**. Insert the join screw on the guide rod **[40.6356.100]**. Using the compression wrench that is led on the guide rod, insert the join telescopic screw in the neck of the femur until the nut of the wrench rests on the drill guide 14/11.5 **[40.6346.100]**.



Do not use the wrench for fracture compression.
Compression may be performed using a compression screw (*implant*) after locking join telescopic screw.


40.6357


40.6548

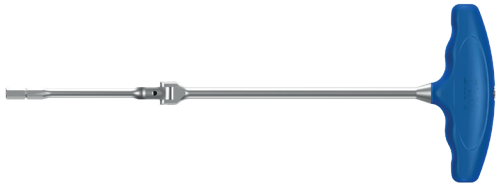
40.6356.100


40.6346.100

38 Set the combined join screw 10.5 with compression wrench so that the handle of the wrench is positioned parallel or perpendicular to the longitudinal axis of the nail. Insert the wrench for self-aligning joint S7 **[40.6319.200]** in the connecting screw located in the targeter arm. Tighten the fork screw located inside the nail.
Remove the compression wrench, guide rod and protective guide.

Guide rod **[40.6356.100]** is a disposable device.


40.6357


40.6319.200

40.6356.100

The above description is not a detailed instruction of conduct. The surgeon decides about choosing the operating procedure.

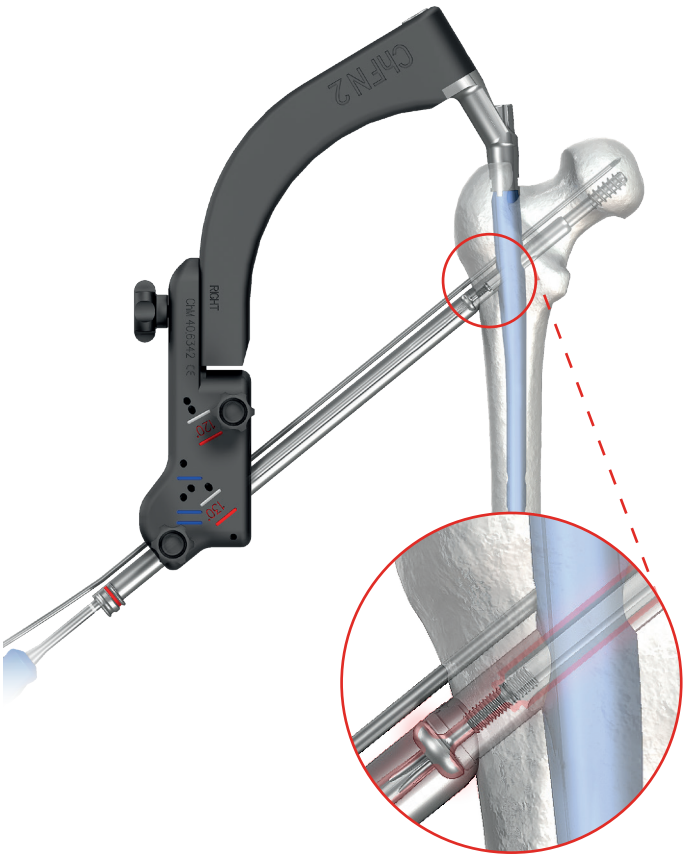
39 If fracture compression is intended, do the following:

• insert the compression screw (*implant*) into the join telescopic screw using screwdriver T25 **[40.6361.100]**,
• perform compression.

Remove screwdriver T25, guide rod and guides.


40.6361.100

The holder of screwdriver T25 **[40.6361.100]** must not be used with the drill guide 14/11.5 **[40.6346.100]**. Remove the holder.

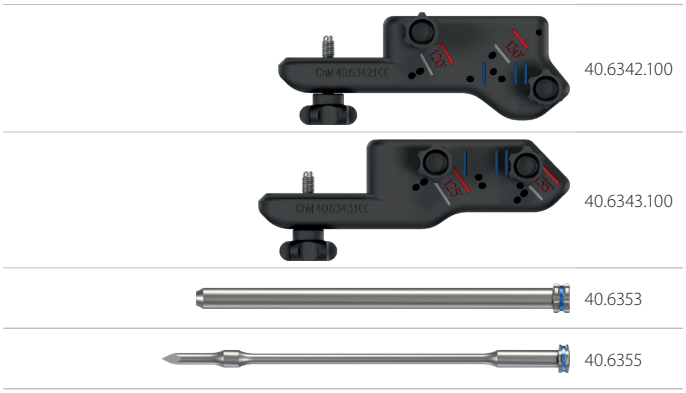


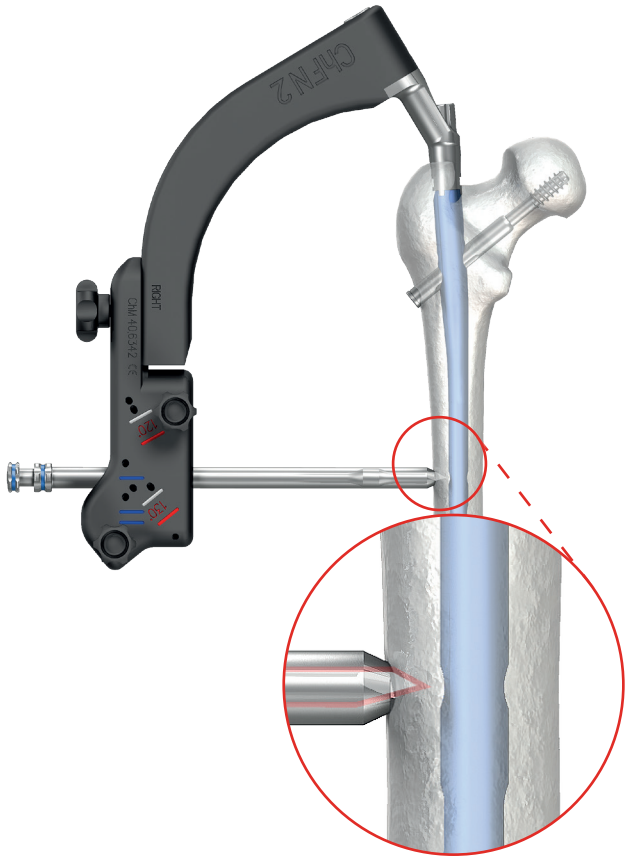
IV.6. DISTAL TROCHANTERIC NAIL (*SHORT*) LOCKING

Nails of the length of 170 or 180 can only be locked with one distal screw using the 12 mm proximal hole of the targeter **[40.6342.100]** or **[40.6343.100]**.

40 Insert the trocar 10 **[40.6355]** in the protective guide 12/10 **[40.6353]** and insert this system in the proximal 12 mm hole of the targeter **[40.6342.100]** or **[40.6343.100]**. Mark on the skin the entry point for the distal screw and perform soft tissue incision. Use the trocar to mark on the cortex the entry point for the drill. At the same time advance the protective guide as close to the bone as possible.

Remove the trocar.
Leave protective guide in place.

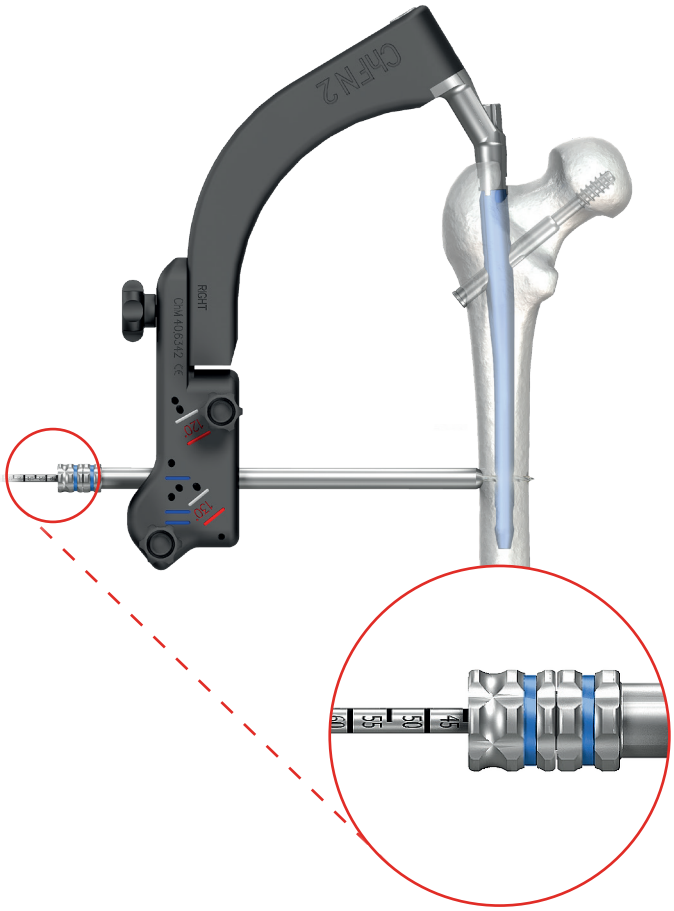




41 Insert the drill guide 10/4.0 **[40.6362]** in the protective guide 12/10 **[40.6353]**. Using a drive and a drill with scale 4.0 **[40.5346.202]** via the drill guide, drill a hole in the femur extending through both layers of the cortex and the hole in the nail. The scale on the drill indicates the length of the locking element.

The drilling process should be done under X-Ray with visual track control.

After disconnecting the drive, leave drill, drill guide and the protective guide in the hole.



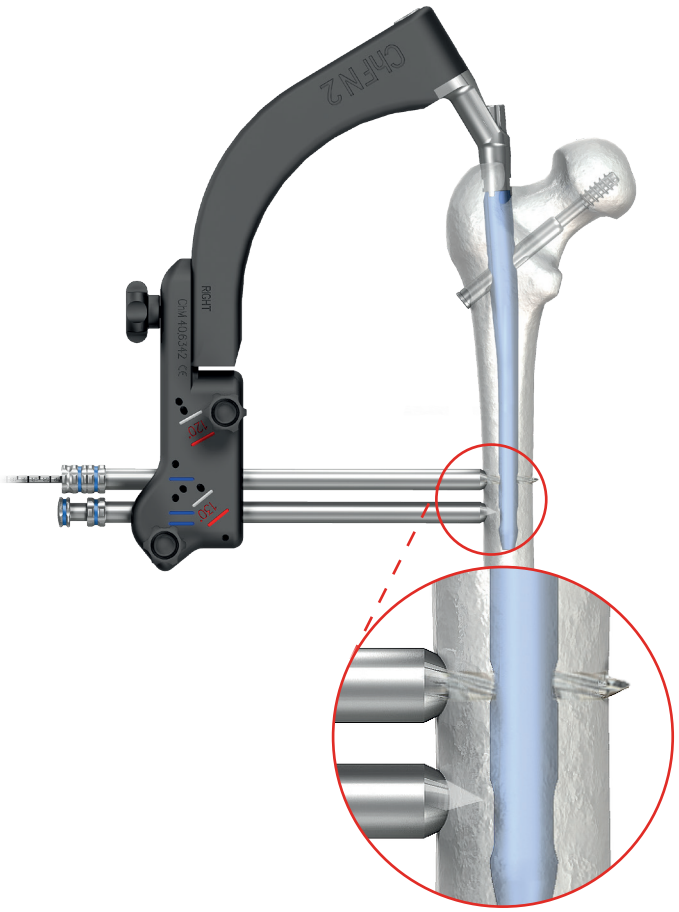
The above description is not a detailed instruction of conduct. The surgeon decides about choosing the operating procedure.

42 Insert the trocar 10 **[40.6355]** in the protective guide 12/10 **[40.6353]** and then insert this system in the other (*distal*) hole of the proximal targeter. Use the trocar to mark on the cortex the entry point for the drill. At the same time advance the protective guide as close to the bone as possible.

Remove the trocar.
Leave protective guide in place.


40.6353


40.6355



43 Insert the drill guide 10/4.0 **[40.6362]** in the protective guide 12/10 **[40.6353]**. Using a drive and a drill with scale 4.0 **[40.5346.202]** via the drill guide, drill a hole in the femur extending through both layers of the cortex and the hole in the nail. The scale on the drill indicates the length of the locking element.

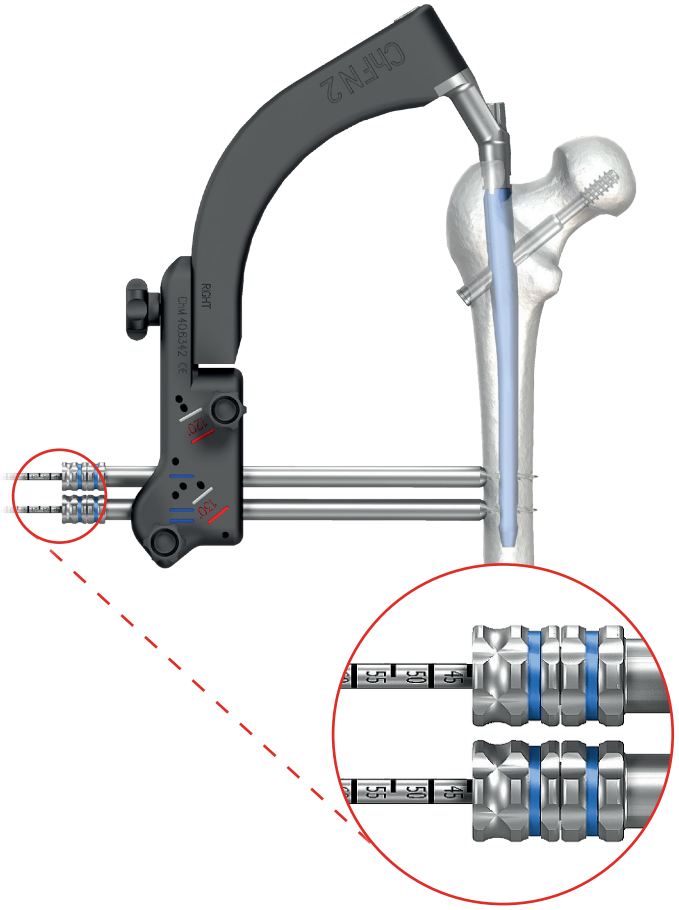

The drilling process should be done under X-Ray with visual track control.

Remove drill and drill guide.
Leave protective guide in the proximal targeter hole.


40.6353


40.6362

40.5346.202

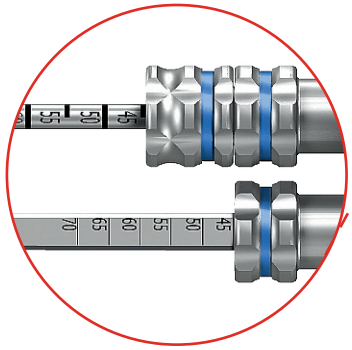


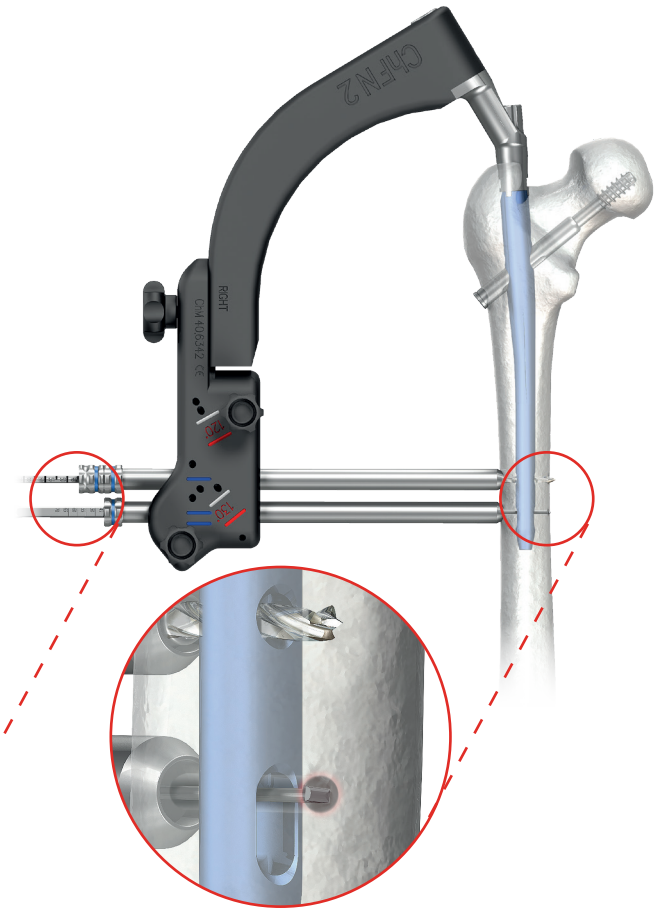
44 Insert the screw length measure **[40.6358.100]** through the protective guide 12/10 **[40.6353]** into drilled hole until its hook reaches the exit hole.
Read the length of distal screw on the B-D scale.
During measurements the tip of protective guide 12/10 should rest on the cortex bone.

Remove the screw length measure.
Leave the protective guide in the targeter hole.


40.6353


40.6358.100





45 Insert the tip of the screwdriver T25 with holder **[40.6361.100]** into the socket of selected distal screw. Slide the holder on the screw head. Then advance both into the protective guide 12/10 **[40.6353]**.
Insert the distal screw in the prepared hole until the head of the screw reaches the cortex of the bone (*the collar of the holder rests against the protective guide 12/10 and the holder detaches from the screw head*).

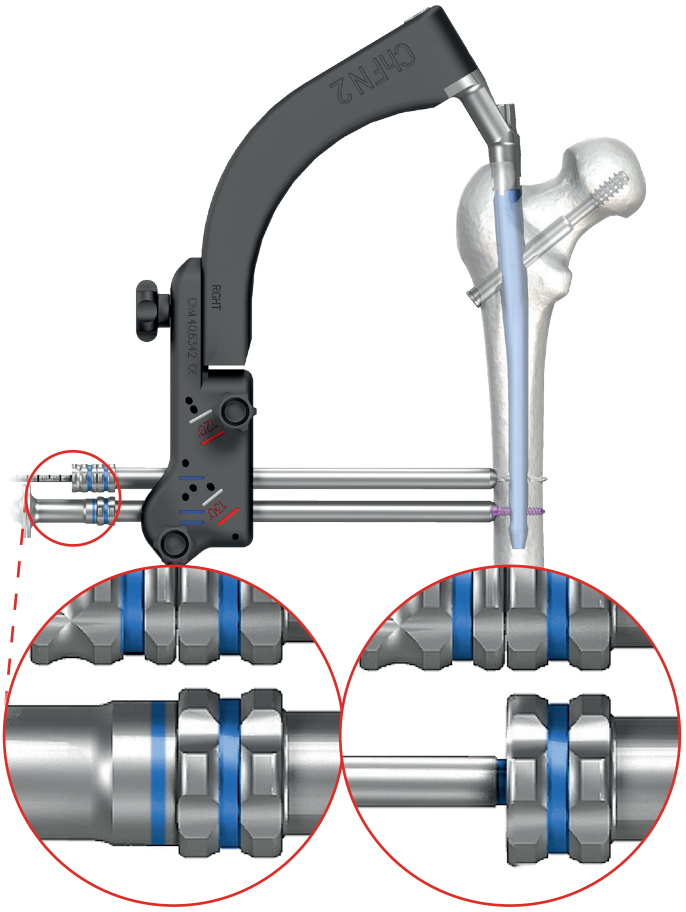
Remove the screwdriver and protective guide.

Screw insertion should be controlled with X-Ray imaging.


40.6361.100

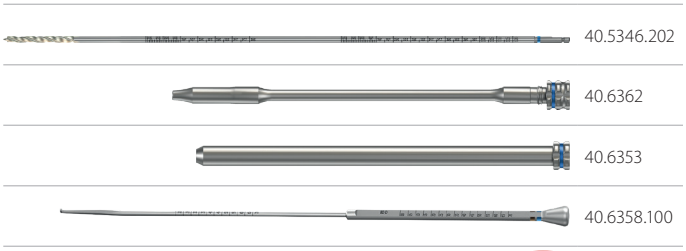

40.6353

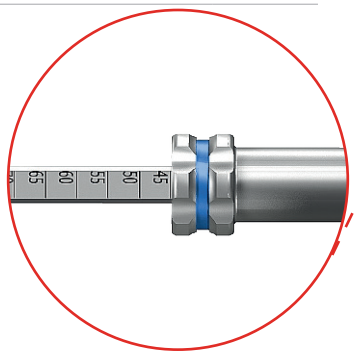
The distal screw can be inserted also using screwdriver T25 **[40.6361.100]** with the holder removed. When the groove on the screwdriver shaft matches the edge of protective guide 12/10 **[40.6353]**, the screw head reaches the cortex of the bone.

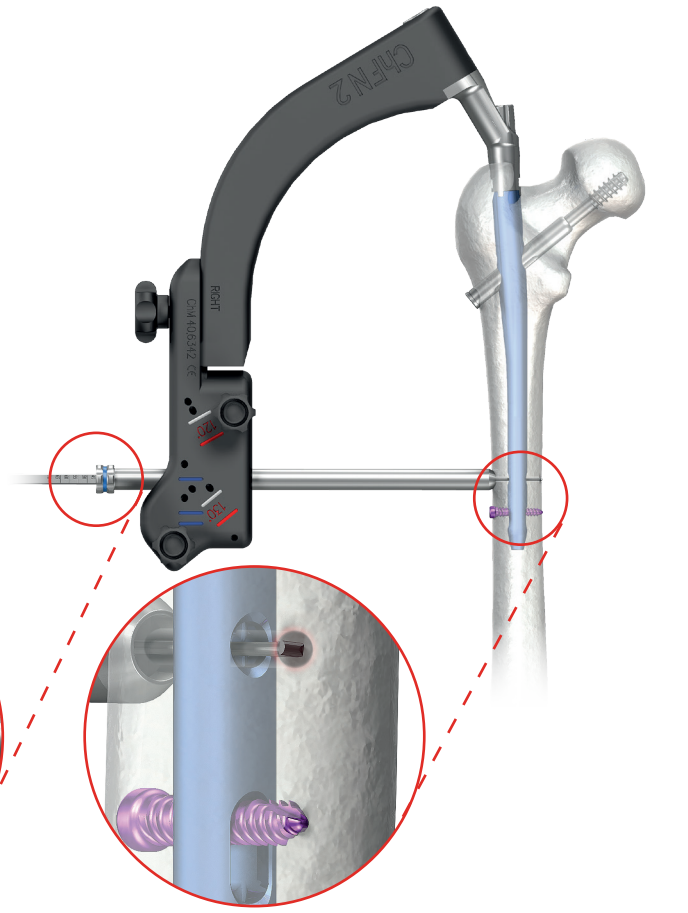


The above description is not a detailed instruction of conduct. The surgeon decides about choosing the operating procedure.

46 Remove drill with scale 4.0 **[40.5346.202]** and the drill guide 10/4.0 **[40.6362]** from the proximal hole of the targeter. Leave the protective guide 12/10 **[40.6353]** in the targeter hole. Insert the screw length measure **[40.6358.100]** through the protective guide 12/10 **[40.6353]** into drilled hole until its hook reaches the exit hole. Read the length of distal screw on the B-D scale. During measurements the tip of protective guide 12/10 should rest on the cortex of the femur.
Remove the screw length measure.
Leave the protective guide in the targeter hole.



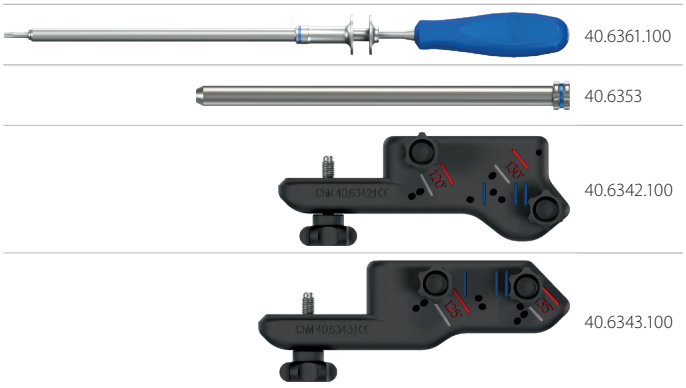




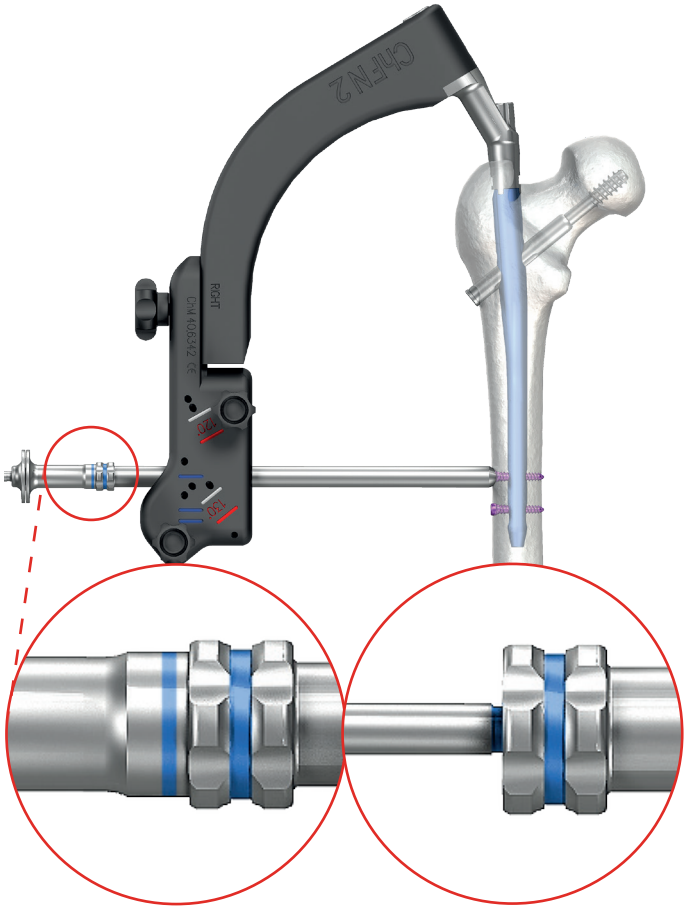
47 Insert the tip of the screwdriver T25 with holder **[40.6361.100]** into the socket of selected distal screw. Slide the holder on the screw head. Then advance both into the protective guide 12/10 **[40.6353]**.
Insert the distal screw in the prepared hole until the head of the screw reaches the cortex of the bone (*the collar of the holder rests against the protective guide 12/10 and the holder detaches from the screw head*).

Remove the screwdriver, protective guide and the targeter **[40.6342.100]** or **[40.6343.100]**.

Screw insertion should be controlled with X-Ray imaging.



The distal screw can be inserted also using screwdriver T25 **[40.6361.100]** with the holder removed. When the groove on the screwdriver shaft matches the edge of protective guide 12/10 **[40.6353]**, the screw head reaches the cortex of the bone.



IV.7. DISTAL TROCHANTERIC NAIL (*LONG*) LOCKING

48 After locking the trochanteric nail long in its proximal part and disconnecting the chosen targeter, attach the distal targeter D **[40.6344.200]** to the targeter arm **[40.6341]**.

Verify, using X-Ray vision track, the mutual position of the holes in the targeter slider and holes in the distal trochanteric nail.

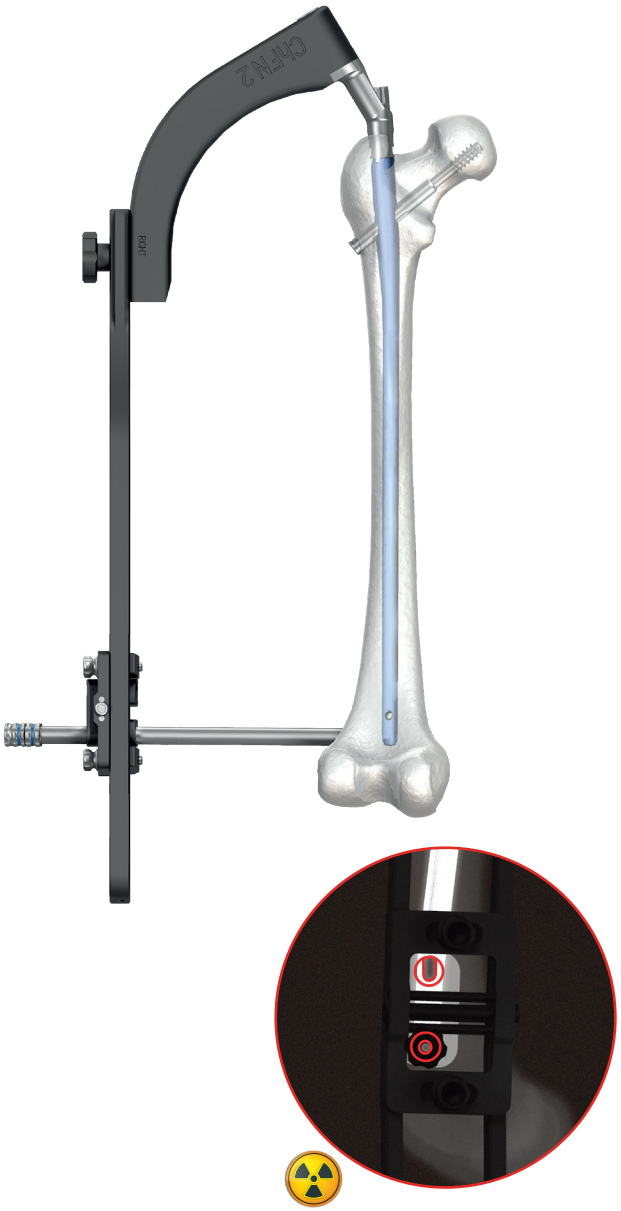
Set X-Ray vision track so that the image of the hole in the targeter (*proximal or distal*) seen on the screen is a circle. Insert the drill guide 10/4.0 **[40.6362]** in the protective guide 12/10 **[40.6353]** and then the system in the appropriate hole of the distal targeter D slider. The end of drill guide should rest on the soft tissues of the lower extremity. Verify using the X-Ray vision track the position of the drill guide hole and the nail hole. The holes must overlap. The circle image on the screen shall appear (*image close to the circle is acceptable*). If the image on the screen is not a circle, settings of the distal targeter D must be corrected.
To do so, use the knob of the setting screw of the distal targeter D slider **[40.6344.200]** to move the slider (*turn the knob left or right*) until the circle appears on the screen (*image close to circle is acceptable*).


40.6344.200

40.6341


40.6353


40.6362



The above description is not a detailed instruction of conduct. The surgeon decides about choosing the operating procedure.

49 Remove the drill guide 10/4.0 **[40.6362]** from the protective guide 12/10 **[40.6353]** and insert trocar 10 **[40.6355]** there. Mark on the skin the entry point for the distal screw and perform soft tissue incision. Use the trocar to mark on the cortex the entry point for the drill. At the same time advance the protective guide as close to the bone as possible.

Remove the trocar.
Leave protective guide in place.


40.6353


40.6362


40.6355

50 Insert the drill guide 10/4.0 **[40.6362]** in the protective guide 12/10 **[40.6353]**. Using a drive and a drill with scale 4.0 **[40.5346.202]** via the drill guide, drill a hole in the femur extending through both layers of the cortex and the hole in the nail. The scale on the drill indicates the length of the locking element.

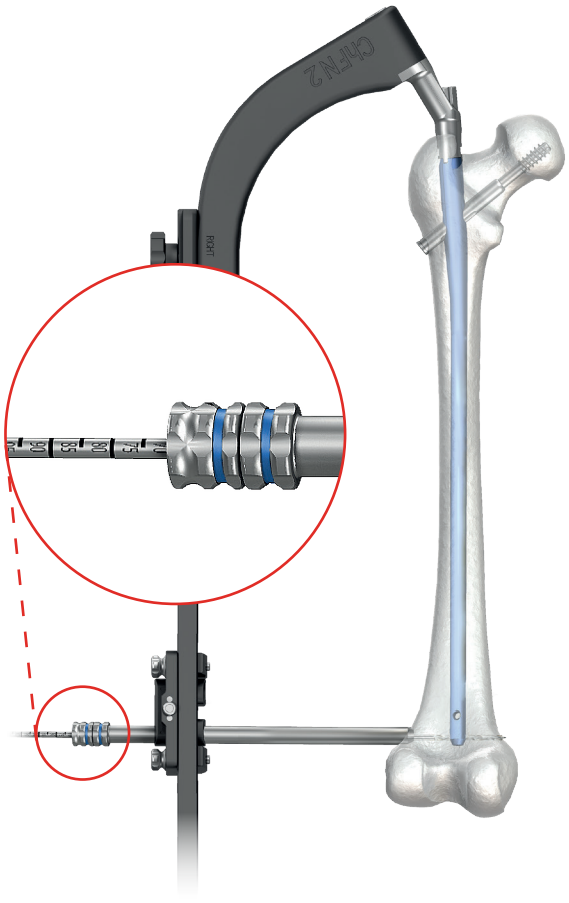

The drilling process should be done under X-Ray with visual track control.

After disconnecting the drive, leave drill, drill guide and the protective guide in the hole.


40.6353


40.6362

40.5346.202

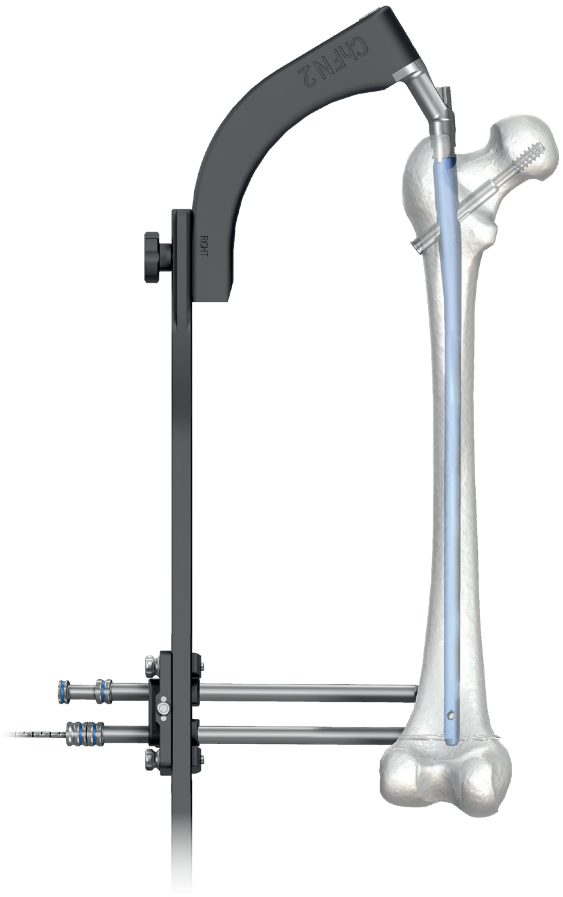


51 Insert the trocar 10 **[40.6355]** in the protective guide 12/10 **[40.6353]** and then the system in the other distal hole of the distal targeter D. Use the trocar to mark on the cortex the entry point for the drill. At the same time advance the protective guide as close to the bone as possible.

Remove the trocar.
Leave protective guide in place.


40.6353


40.6355



52 Insert the drill guide 10/4.0 **[40.6362]** in the protective guide 12/10 **[40.6353]**. Using a drive and a drill with scale 4.0 **[40.5346.202]** via the drill guide, drill a hole in the femur extending through both layers of the cortex and the hole in the nail. The scale on the drill indicates the length of the locking element.

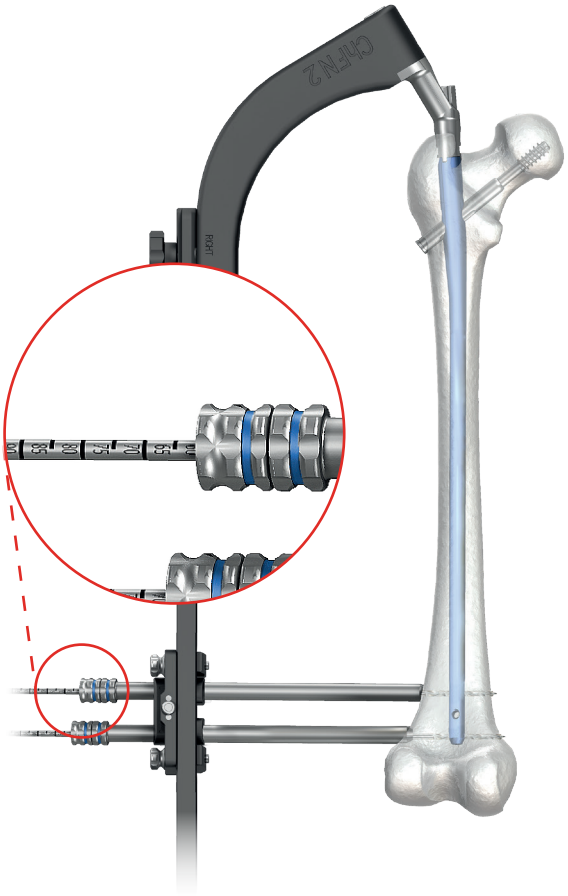

The drilling process should be done under X-Ray with visual track control.

Remove drill and drill guide.
Leave protective guide in the targeter hole.


40.6353


40.6362

40.5346.202



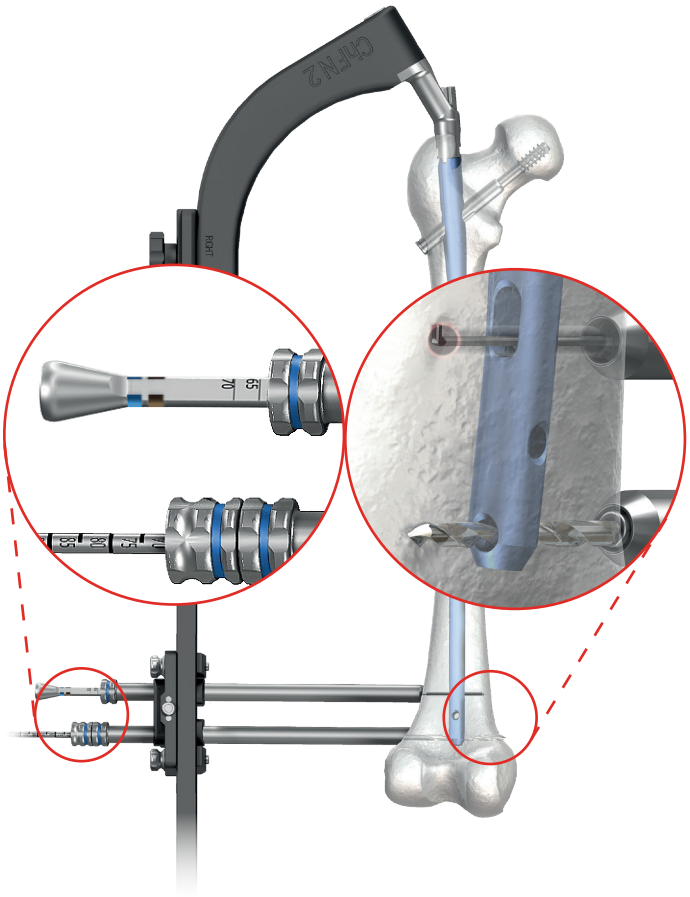
The above description is not a detailed instruction of conduct. The surgeon decides about choosing the operating procedure.

53 Insert the screw length measure **[40.6358.100]** through the protective guide 12/10 **[40.6353]** into drilled hole until its hook reaches the exit hole.
Read the length of distal screw on the B-D scale.
During measurements the tip of protective guide 12/10 should rest on the cortex bone.

Remove the screw length measure.
Leave the protective guide 12/10 in the targeter hole.


40.6353


40.6358.100



54 Insert the tip of the screwdriver T25 with holder **[40.6361.100]** into the socket of selected distal screw. Slide the holder on the screw head. Then advance both into the protective guide 12/10 **[40.6353]**.
Insert the distal screw in the prepared hole until the head of the screw reaches the cortex of the bone (*the collar of the holder rests against the protective guide 12/10 and the holder detaches from the screw head*).

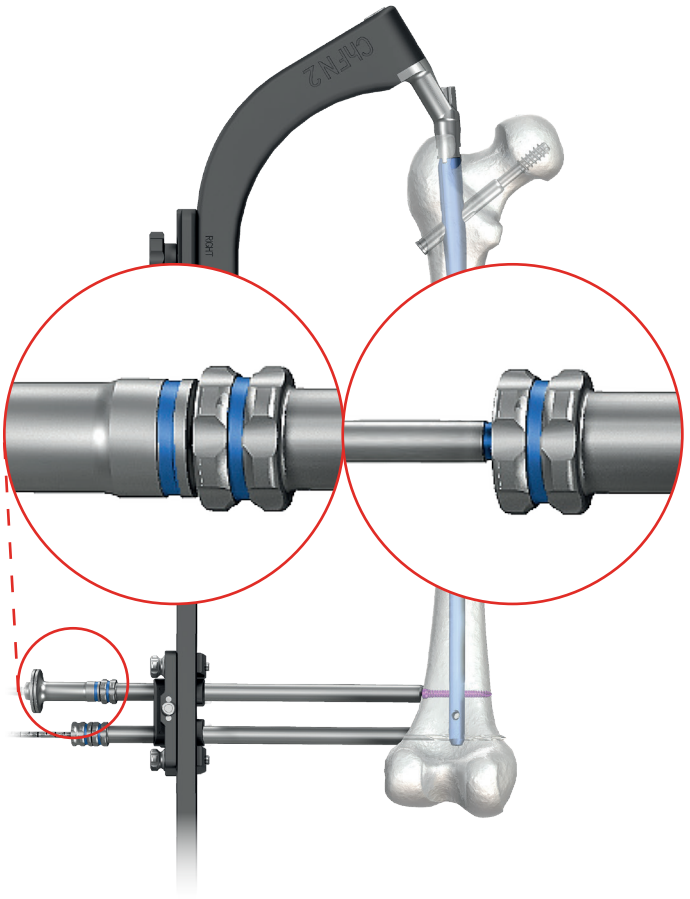
Remove the screwdriver and the protective guide.

Screw insertion should be controlled with X-Ray imaging.


40.6361.100


40.6353

The distal screw can be inserted also using screwdriver T25 **[40.6361.100]** with the holder removed. When the groove on the screwdriver shaft matches the edge of protective guide 12/10 **[40.6353]**, the screw head reaches the cortex of the bone.



55 Remove drill with scale 4.0 **[40.5346.202]** and the drill guide 10/4.0 **[40.6362]** from the distal hole of the targeter. Leave the protective guide 12/10 **[40.6353]** in the targeter hole. Insert the screw length measure **[40.6358.100]** through the protective guide 12/10 **[40.6353]** into drilled hole until its hook reaches the exit hole. Read the length of distal screw on the B-D scale.
During measurements the tip of protective guide should rest on the cortex bone.

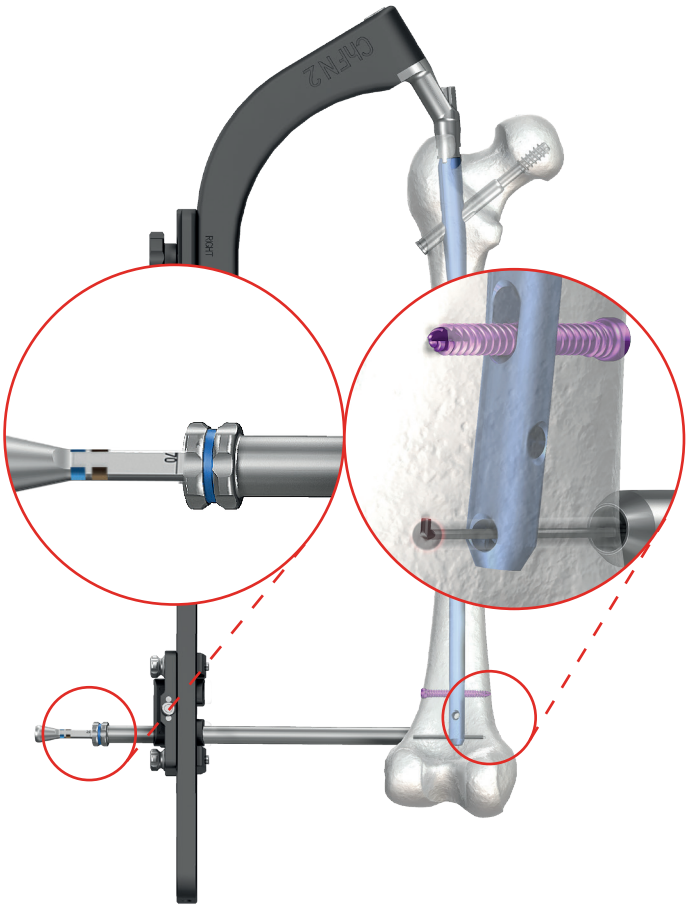
Remove the screw length measure.
Leave the protective guide in the targeter hole.

40.5346.202


40.6362


40.6353


40.6358.100



56 Insert the tip of the screwdriver T25 with holder **[40.6361.100]** into the socket of selected distal screw. Slide the holder on the screw head. Then advance both into the protective guide 12/10 **[40.6353]**.
Insert the distal screw in the prepared hole until the head of the screw reaches the cortex of the bone (*the collar of the holder rests against the protective guide 12/10 and the holder detaches from the screw head*).

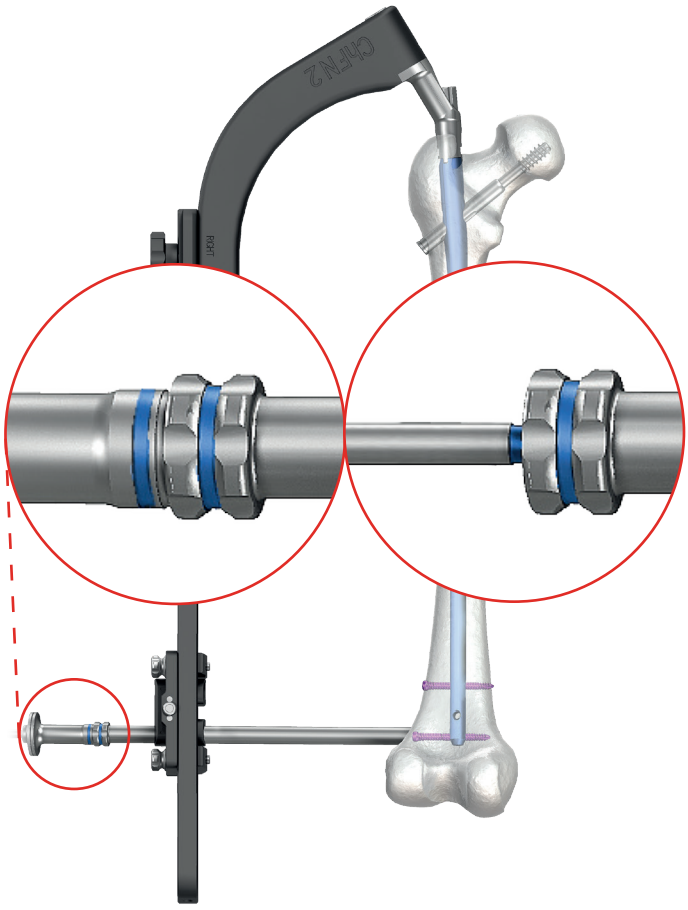
Remove the screwdriver, protective guide and the distal targeter D.

Screw insertion should be controlled with X-Ray imaging.


40.6361.100


40.6353

The distal screw can be inserted also using screwdriver T25 **[40.6361.100]** with the holder removed. When the groove on the screwdriver shaft matches the edge of protective guide 12/10 **[40.6353]**, the screw head reaches the cortex of the bone.



The above description is not a detailed instruction of conduct. The surgeon decides about choosing the operating procedure.

IV.8. LOCKING THE LONG TROCHANTERIC NAIL USING THE "*FREE HAND*" TECHNIQUE - METHOD I

To determine the drilling holes and when drilling, radiological control should be used.

57 For drilling holes, it is recommended to use a drive angular attachment, so that the operator's hands are outside the field of direct X-Ray radiation. After marking on the skin the entry points for a drill, make 1.5 cm long incisions of the soft tissues through these points.

58

Use X-Ray machine to determine the position of the protective guide short **[40.5871.100]** in relation to the hole of the nail.

The holes in the nail and protective guide short **[40.5871.100]** must overlap. The guide blades should be immersed in the cortex of the bone.

40.5871.100

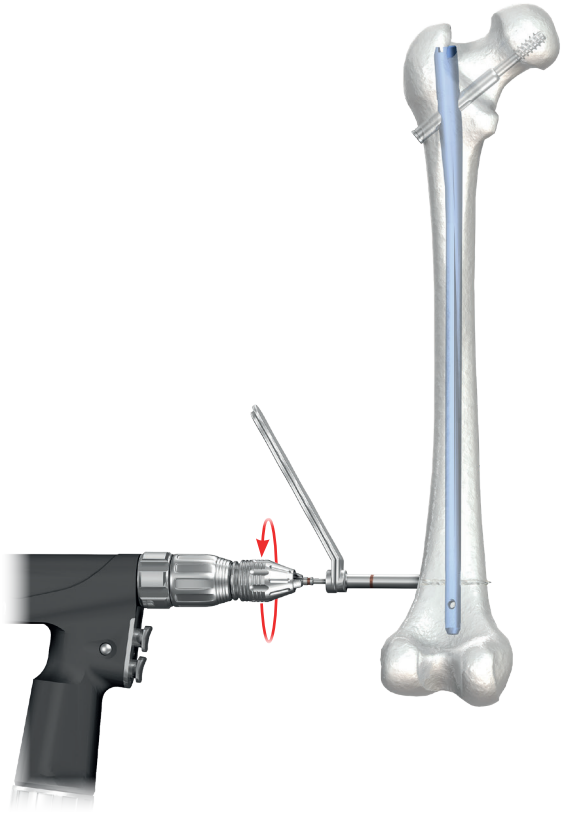
59 Insert the drill guide short 7/4.0 **[40.6365.000]** into the hole of the protective guide short **[40.5871.100]**.
Use the drill with scale 4.0/150 **[40.5348.202]** in the drill guide to drill a hole through the nail and both cortical layers of the bone.
The scale on the drill indicates the length of the locking element.

Remove the drill.
Remove the drill guide.


40.5871.100


40.6365.000

40.5348.202

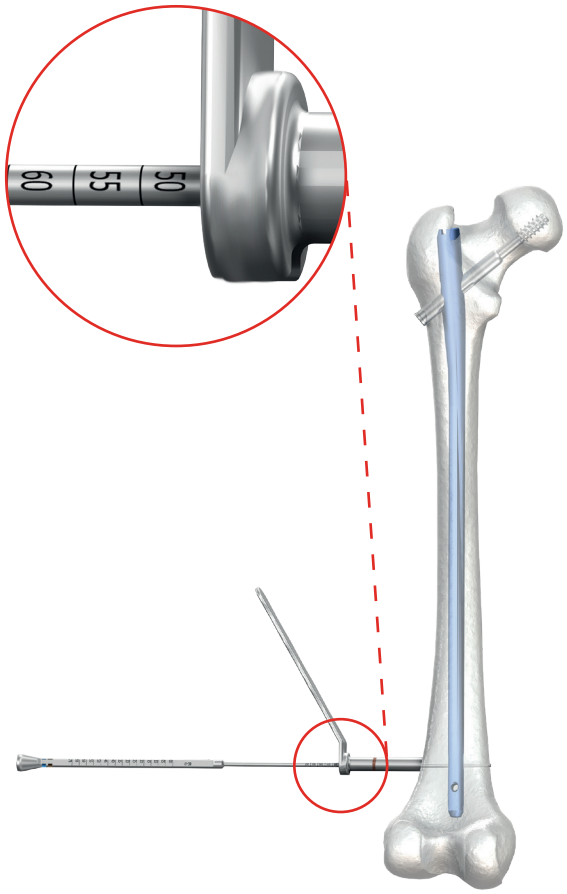


60 Use the protective guide short **[40.5871.100]** to insert into the drilled hole the screw length measure **[40.6358.100]**, until the hook of the measuring tip rests on the outer surface of the second cortex.
Read the length of the locking screw on the scale.

Remove the screw length measure.
Leave the protective guide in the place.


40.5871.100


40.6358.100



The above description is not a detailed instruction of conduct. The surgeon decides about choosing the operating procedure.

61 Insert the tip of the screwdriver T25 **[40.6361.100]** into the socket of selected distal screw.

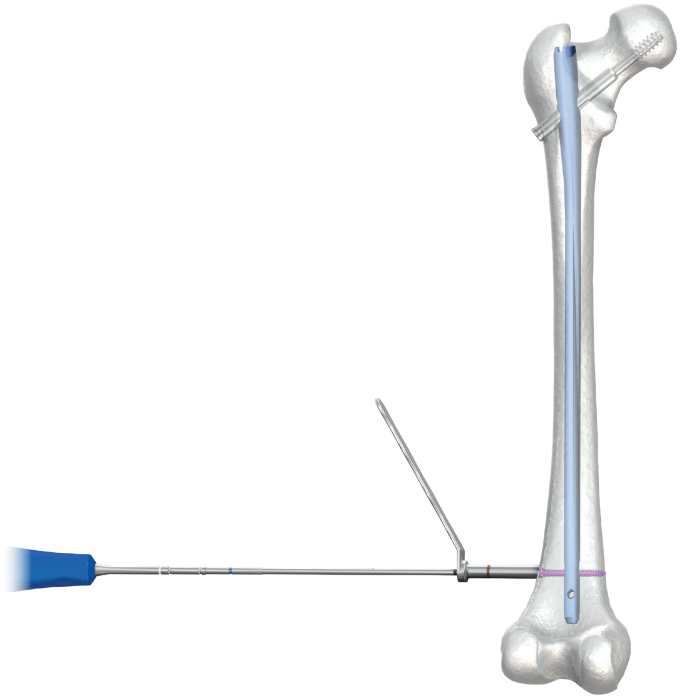
The holder of screwdriver T25 **[40.6361.100]** must not be used with protective guide **[40.5871.100]**. Remove the holder.

Advance the screw into the protective guide short and insert the implant until the head of the screw reaches the cortex of the bone.

Remove the screwdriver and protective guide.


40.6361.100


40.5871.100



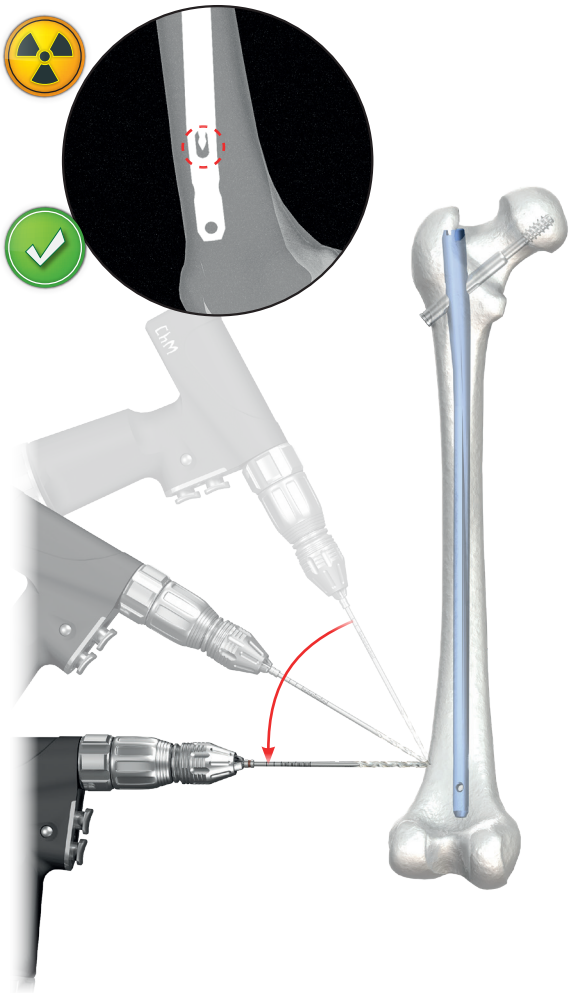
	standard locking	locking with angular stabilization
Round hole		
Oval shaped hole	**5.0 screw** (*purple colour*)	**5.5 screw** (*blue colour*)


IV.9. LOCKING THE LONG TROCHANTERIC NAIL USING THE "*FREE HAND*" TECHNIQUE - METHOD II

To determine the drilling holes and when drilling, radiological control should be used.

62 Position the X-Ray machine in such a way that the nail hole on the monitor screen is a circle.
Place the tip of the drill with scale 4.0/150 **[40.5348.202]** in the center of the nail hole visible on the screen.
Mark the drilling points on the skin and make 1.5 cm long incisions of soft tissues through these points.

40.5348.202

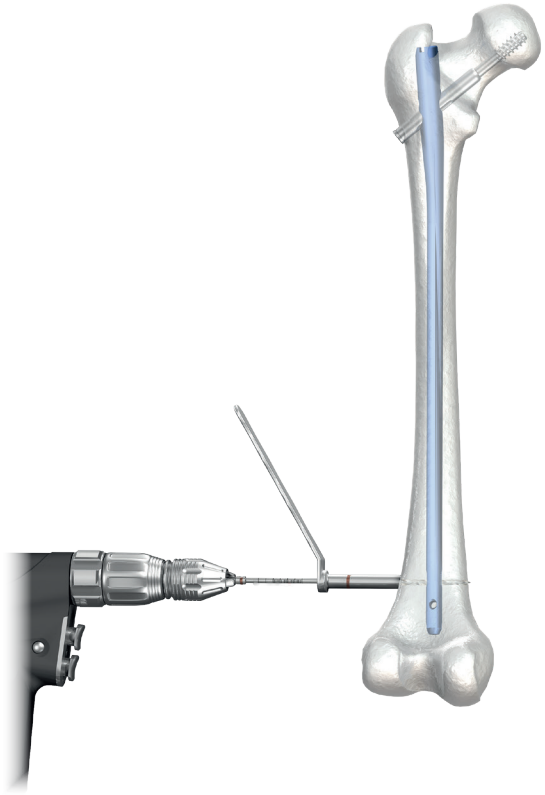


63 Set the tip of the drill with scale 4.0/150 **[40.5348.202]** in the center of the nail hole visible on the screen, again.
Place the drill bit against the bone and turn it.
Place the protective guide short **[40.5871.100]** on the drill to protect the soft tissues.
Using the drill with scale 4.0/150 in the drill guide, drill a hole through the nail and both cortical layers of the bone.

Remove the drill.
Remove the protective guide.

40.5348.202


40.5871.100

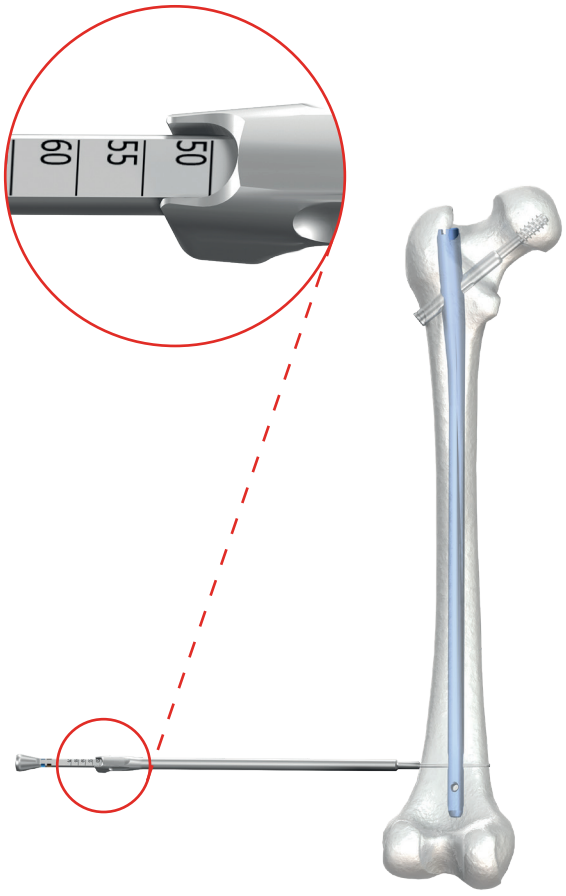


64 Insert the screw length measure **[40.6358.100]** with screw length measure protection **[40.8550]** applied, until the hook of the measuring tip rests on the outer surface of the second cortex.

The screw length measure protection indicates the length of the locking screw on the scale.


40.6358.100


40.8550.000



The above description is not a detailed instruction of conduct. The surgeon decides about choosing the operating procedure.

65 Insert the tip of the screwdriver T25 **[40.6361.100]** into the socket of selected distal screw.

The holder of screwdriver T25 **[40.6361.100]** must not be used with protective guide **[40.5871.100]**. Remove the holder.

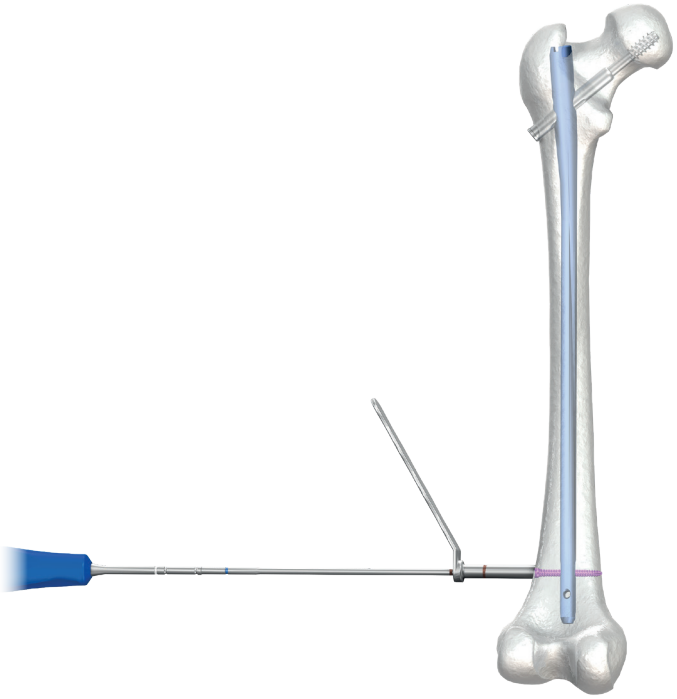
Advance the screw into the protective guide short and insert the implant until the head of the screw reaches the cortex of the bone.

Remove the screwdriver.

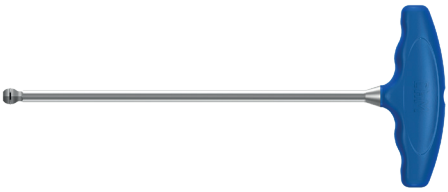

40.6361.100


40.5871.100

	standard locking	locking with angular stabilization
Round hole		
Oval shaped hole	**5.0 screw** (*purple colour*)	**5.5 screw** (*blue colour*)



66 Using wrench S10 **[40.5526.200]**, remove the connecting screw **[40.6305]** from the trochanteric nail.

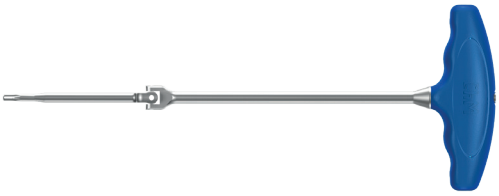


40.5526.200

40.6305

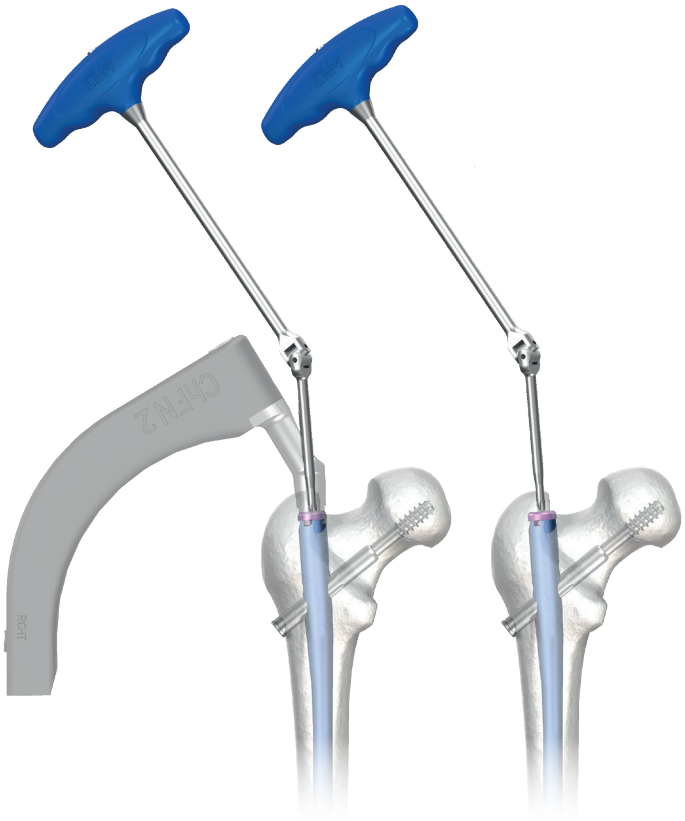
67 In order to protect the internal thread of the nail against bone ingrowth, insert an end cap (*implant provided separately*) into the threaded hole of the nail using the wrench for self-aligning joint T25 **[40.6320.200]**.

End cap "*0*" **[3.5161.600]** may be inserted via the targeter arm **[40.6341]** after removing the connecting screw.



40.6320.200

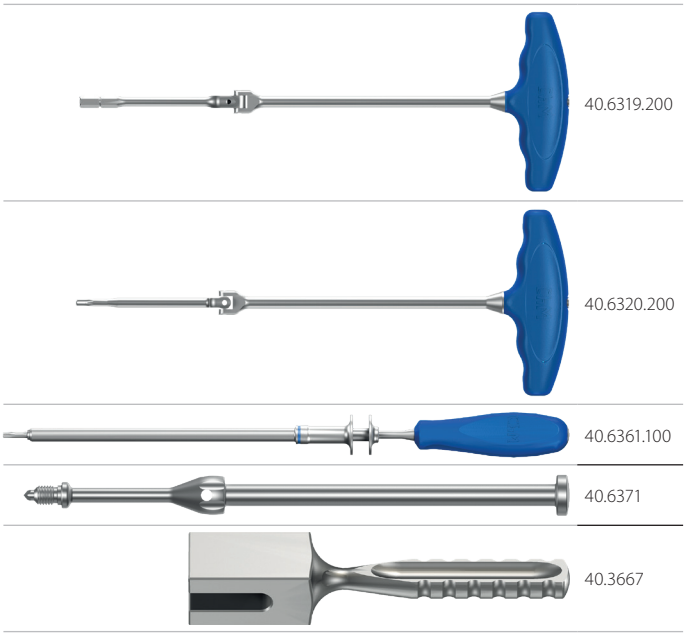
40.6341

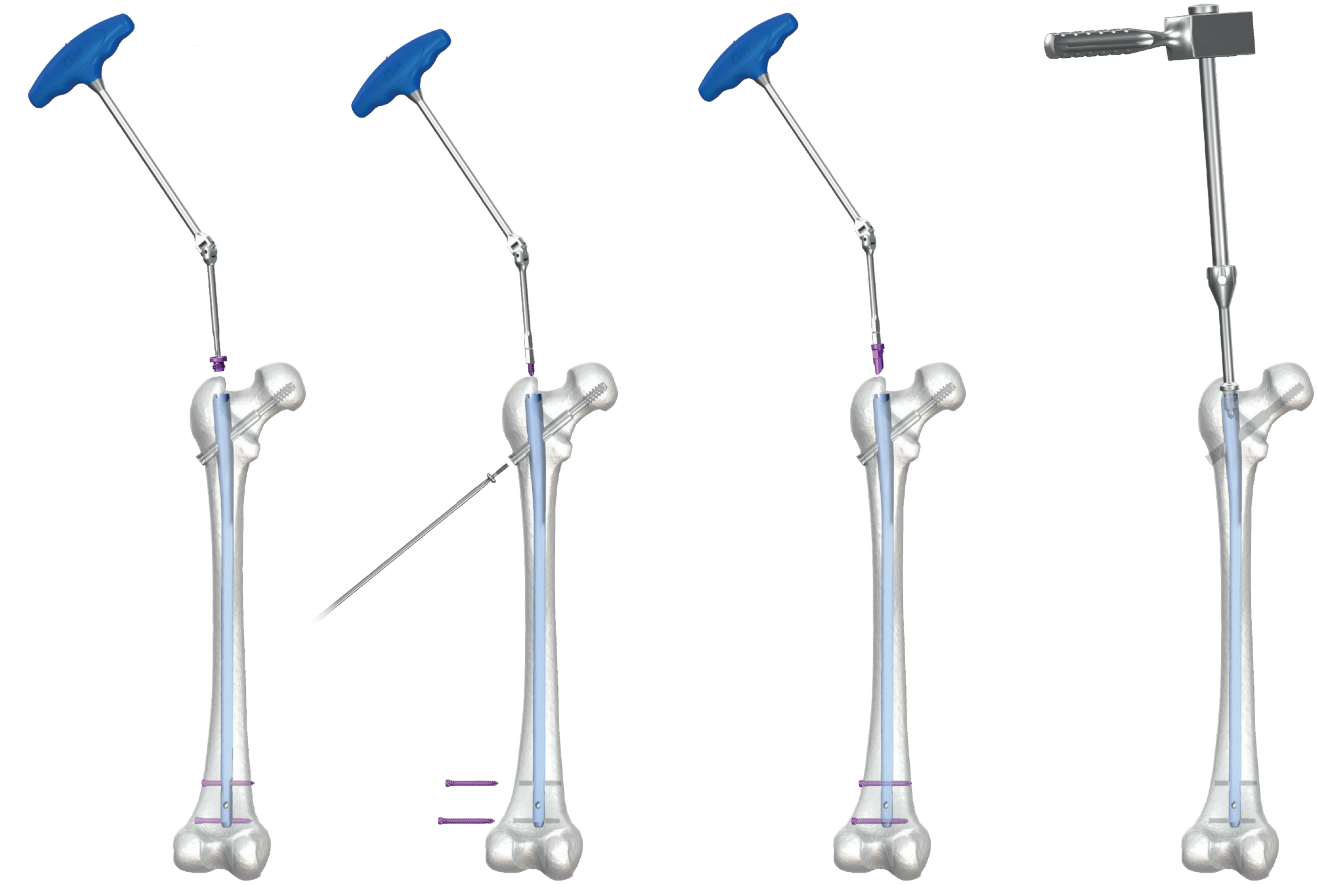


The above description is not a detailed instruction of conduct. The surgeon decides about choosing the operating procedure.

IV.10. TROCHANTERIC NAIL REMOVAL (*SHORT AND LONG NAILS*)

68 Using wrench for self-aligning joint S7 **[40.6319.200]**, wrench for self-aligning joint T25 **[40.6320.200]** and screwdriver T25 with holder **[40.6361.100]**, remove end cap, fork screw and all the locking (*distal and join*) screws. Insert the connector of extractor M12x1.75 **[40.6345]** in the threaded hole of the nail shaft. Apply impactor-extractor **[40.6371]** to the connector and using the mallet **[40.3667]**, remove the nail from the medullary canal.





The above description is not a detailed instruction of conduct. The surgeon decides about choosing the operating procedure.

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