Operative technique

Standard Nail

Recon Nail

EBA 2
nailing system

INTERNAL fixation

nails

31

32

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Essential moves in Trauma

This operative technique is intended for orthopaedic surgeons and describes the standard procedure suggested by the manufacturer. Surgeons should however decide on the best approach to be followed depending on their clinical judgment and the patient's needs.

Before use please read the instruction booklet enclosed in the packaging.

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Essential moves in Trauma

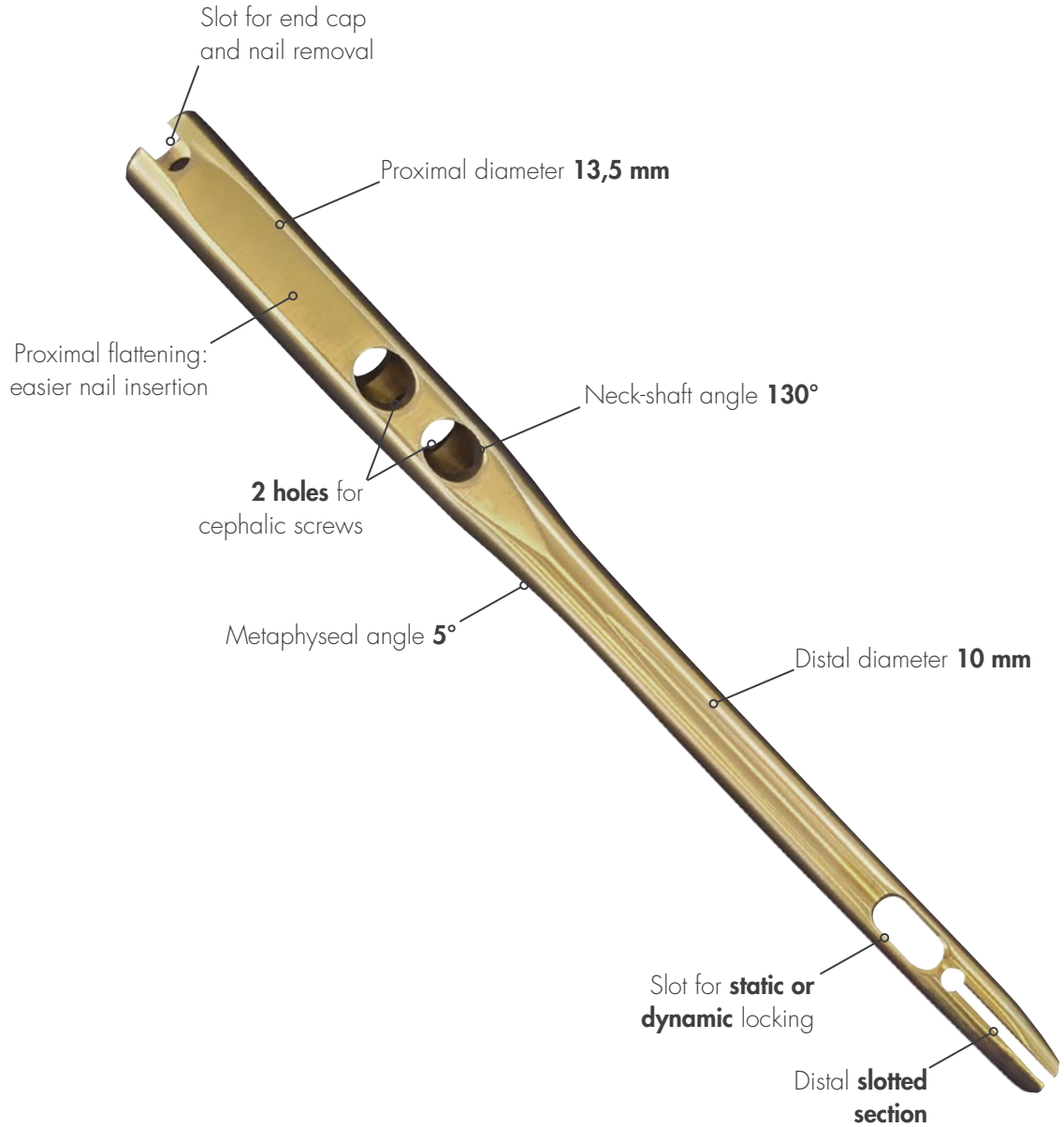
Indications and product description

TITANIUM STERILE

EBA² standard nail

Indications

Treatment of lateral proximal femoral fractures 31.A1, 31.A2, 31.A3 (AO Classification) with extension of the fracture line up to 1 cm distal to the lesser trochanter.



SCALE 1:1

Indications and product description

TITANIUM STERILE

EBA² long nail

Indications

Pertrochanteric and subtrochanteric fractures extending into the femoral diaphysis; pertrochanteric and subtrochanteric fractures combined with a diaphyseal femoral fracture (bifocal fractures), pathologic fractures, non unions and mal unions.

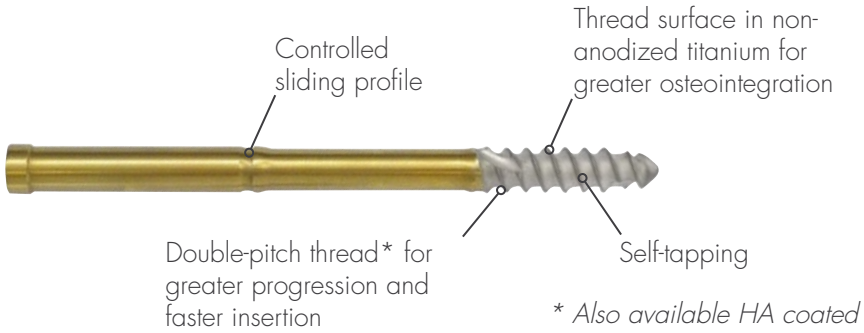
Product description

TITANIUM STERILE

The EBA² system locking screw head and end caps have a screw retention system which secures them to the screwdriver during surgery.

Cephalic screw

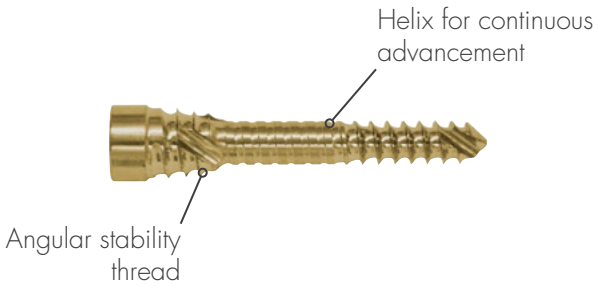
Thread diameter **7,5 mm**
Lengths **from 70 to 110 mm** (*increments of 5 mm*)



** Also available HA coated*

Cortical screw

Thread diameter **5 mm**
Lengths **from 30 to 100 mm** (*increments of 5 mm*)

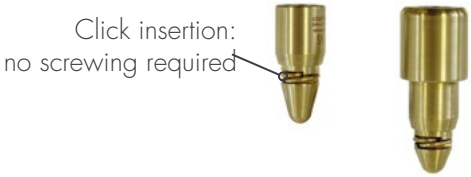


Cortical screw only for solid nail distal holes

Thread diameter **4,5 mm**
Lengths **from 30 to 60 mm** (*increments of 5 mm*)

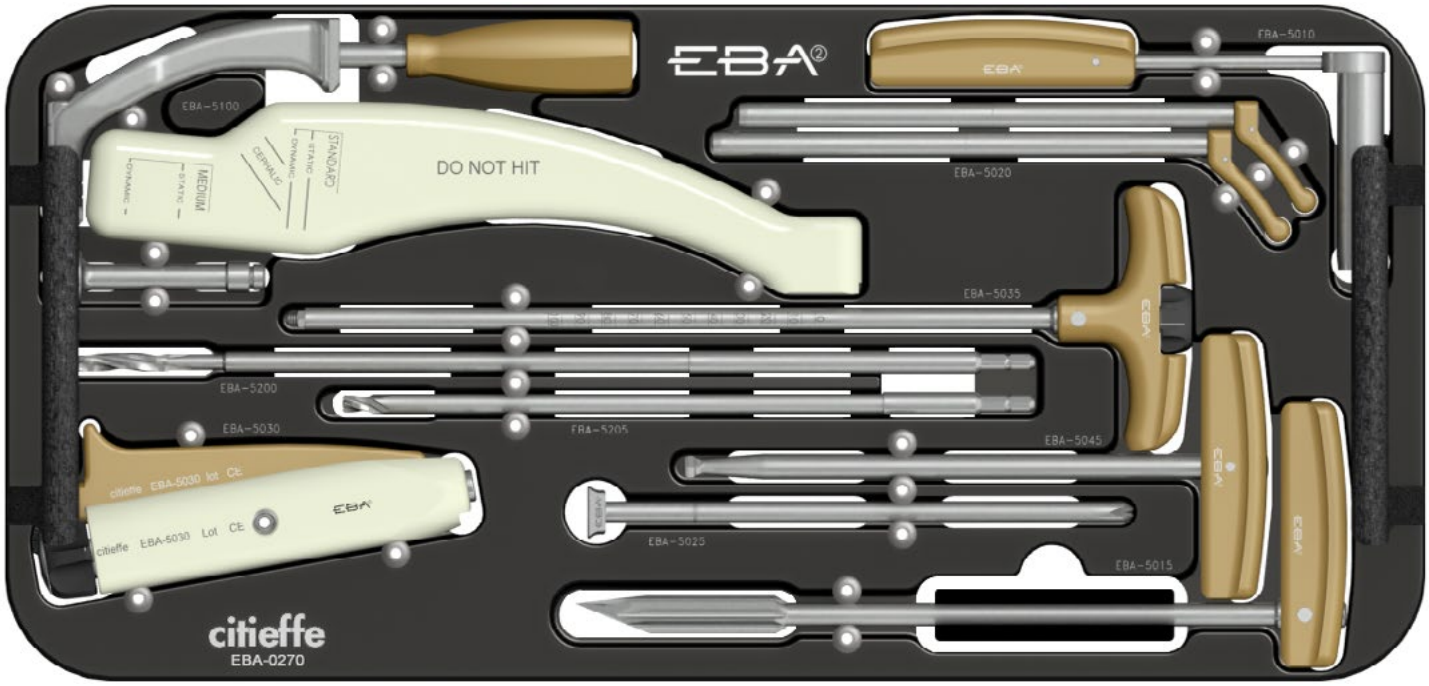
Snap-on end cap

EBA² end cap and EBA² 15 mm end cap

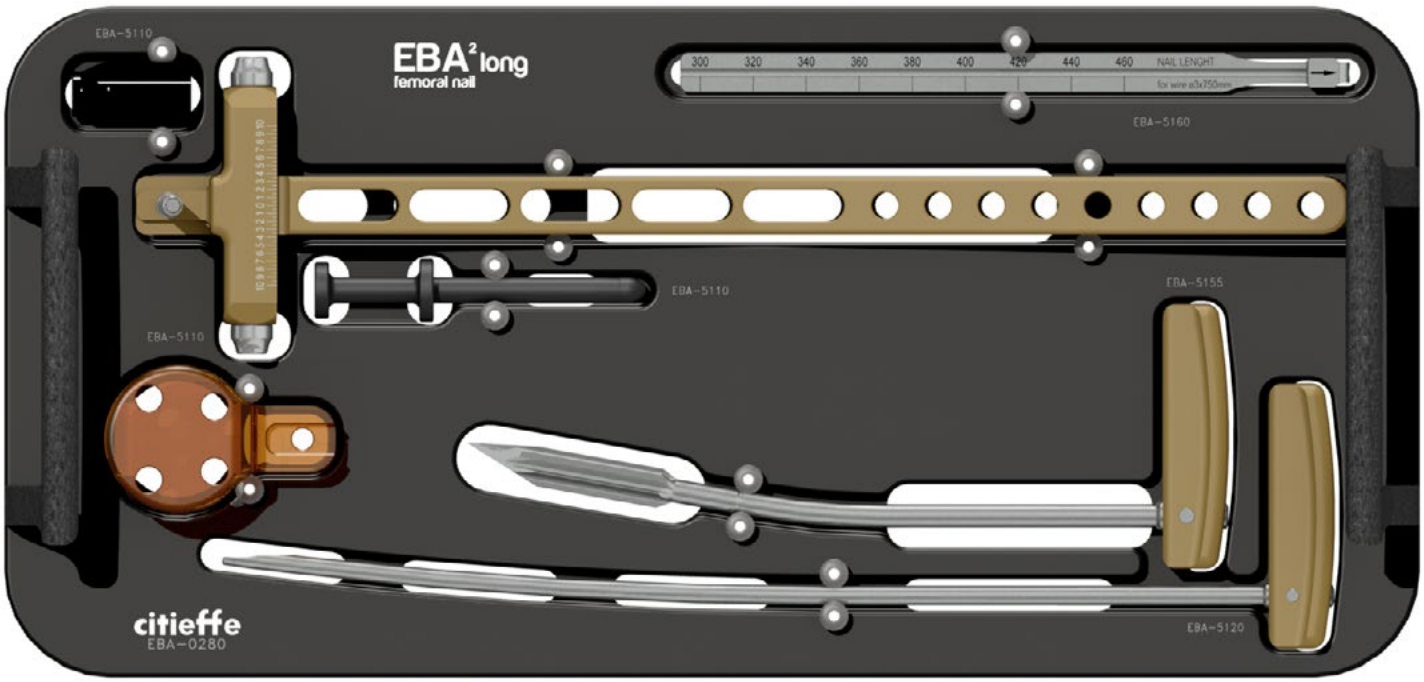


Instrument set

EBA² standard instrument set

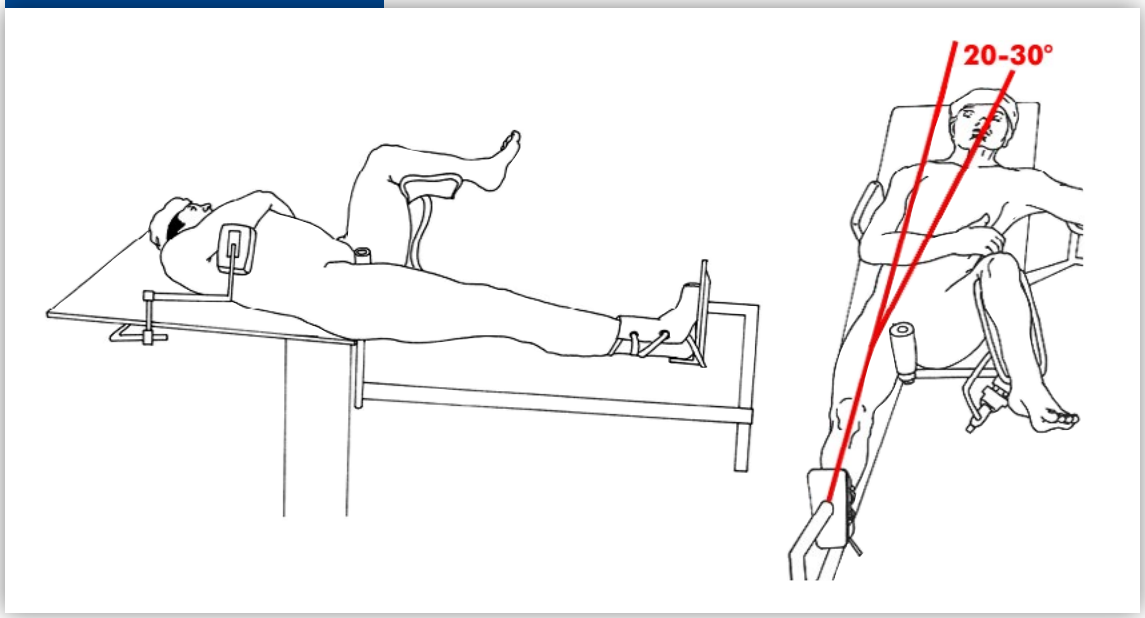


EBA² long instrument set *(to be used in addition to the standard nail instrument set)*



Patient positioning and incision

Figure 1



Patient positioning

Position the patient with the limb to be treated in traction. Controlateral hip and knee flexed at 90 degrees (to facilitate use of the image intensifier). The trunk should be turned 20-30 degrees towards the healthy limb.

In case of obese patients it may be necessary to adduct the limb (10 - 15 degrees) to facilitate introduction of the guide.

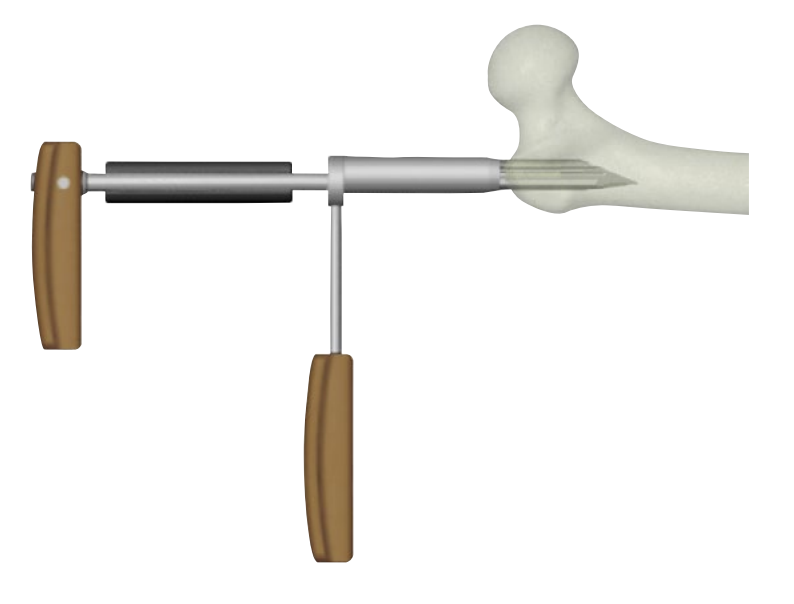
The fracture should be reduced in the best possible way, with moderate traction against a well padded perineal post.

Incision

Skin incision should be about 4 cm extending proximally from the apex of the greater trochanter.

Entry portal

Figure 2



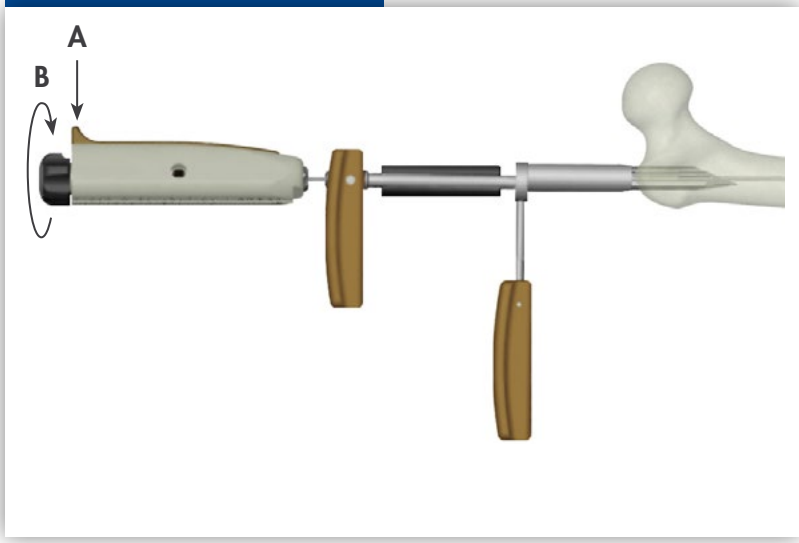
Preparation of nail entry point

Under image intensifier control insert the tissue protection sleeve together with the trochanteric drill on the apex of the greater trochanter in line with the femoral head.

Perforate the cortex and insert the trochanteric drill by hand until the stop touches the protection sleeve.

In case of EBA² long implant it may be necessary, use the EBA² long trochanteric drill and the guide wire with olive; perforate the cortex and insert the trochanteric drill by hand until the groove, that is visible on the x-rays.

Figure 3



Guide wire insertion

Lock the ø3x750 mm guide wire in the Multi-use chuck pushing the lever (**A**) and turning the knob clockwise (**B**).

Insert the wire in the medullary canal through the trochanteric drill until it is in contact with the intercondylar notch.

Remove the Multi-use chuck, the trochanteric drill and the tissue protection sleeve.

INSTRUMENTS REQUIRED

EBA-5015
Trochanteric drill

EBA-5155
EBA² long trochanteric drill

EBA-5010
Tissue protection sleeve

EBA-5030
Multi-use chuck

EBA-0005
ø3x750 mm guide wire

EBA-0007
ø3x750 mm guide wire
wih olive

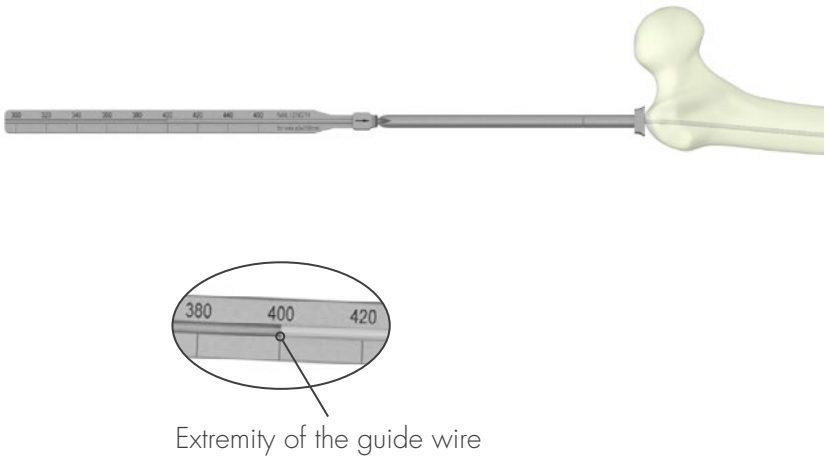
Fracture reduction and nail length measurement - EBA² long

Figure 4

Fracture reduction

The fracture alignment guide wire exchange tool inserted into the tissue protection sleeve is used to facilitate fracture reduction and the insertion of the guide wire in the correct position.

Figure 5



Nail length measurement

Slide the trocar down over the guide wire to the tip of the greater trochanter. Insert the ruler on the guide wire and bring it in contact with the trocar. The end of the guide wire on the graduated scale indicates the length of the nail to be implanted.

NOTE *If the reading is intermediate, it is advisable to use the shorter nail.*

INSTRUMENTS REQUIRED

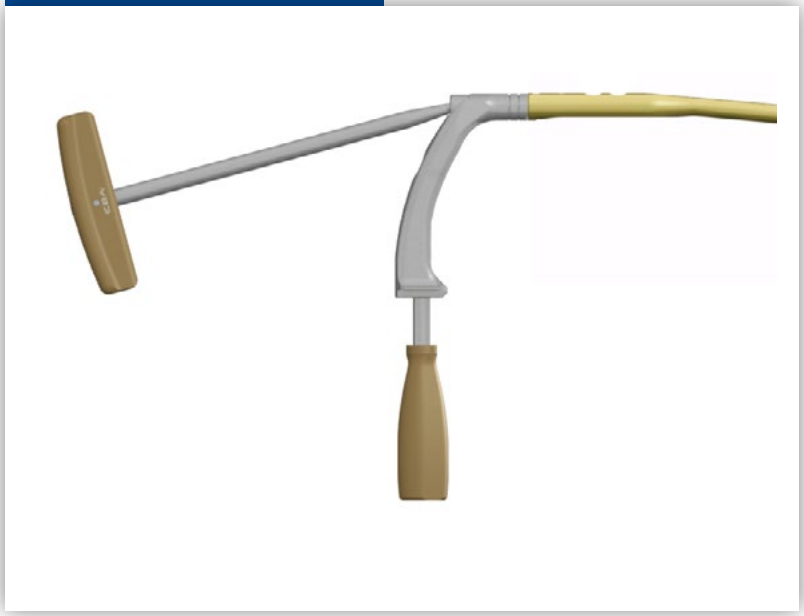
EBA-5120
Fracture alignment guide wire exchange tool

EBA-5025
Trocar

EBA-5160
Nails and screws ruler

Nail insertion

Figure 6



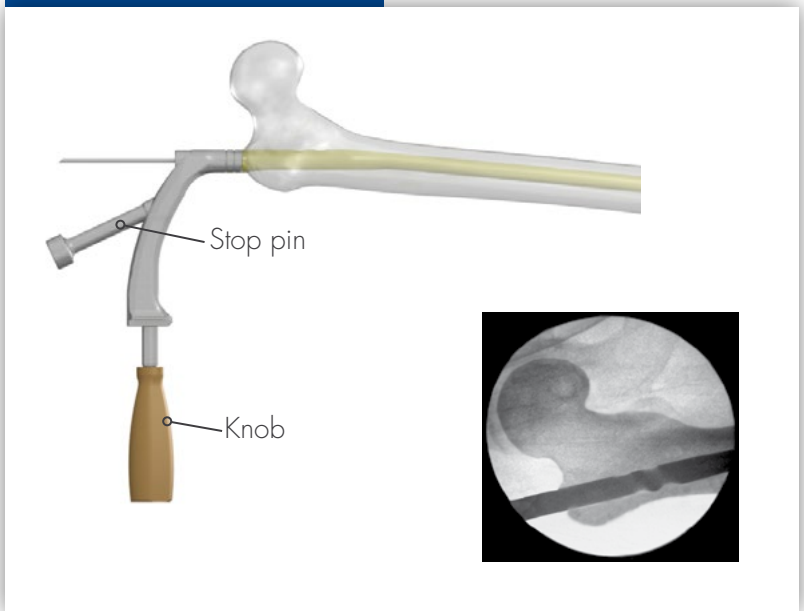
Assembly guide-nail

Mount the nail lining up the nail groove with the guide.

Tighten the screw using the T-wrench.

If a long nail is to be inserted, the intramedullary canal should be reamed with the standard technique in 0.5 mm increments, up to at least 1.5 mm more than the diameter of the nail.

Figure 7



Nail insertion

Following reaming of the intramedullary canal when the nail has gone beyond the fracture.

When inserting a long nail, keep the handle in a vertical position (with the knob upwards) until contact with the lateral wall of the femur, then turn the handle to the horizontal position.

To facilitate nail insertion, light hammering is permitted **only on the stop pin**.

INSTRUMENTS REQUIRED

EBA-5100
Standard nail guide

EBA-5045
8 mm T-wrench

Proximal locking

Figure 8

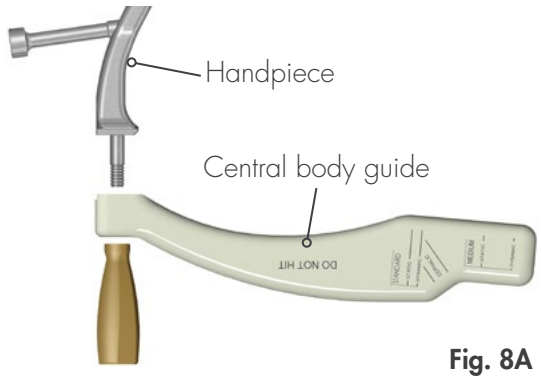


Fig. 8A

Fig. 8B

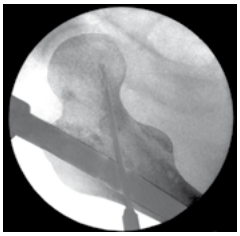


Fig. 8C

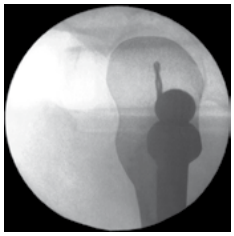


Fig. 8D

Insertion of the screw guide wire for the distal cephalic screw

Mount the central body guide on the handpiece (**Fig. 8A**), tightening the handle firmly.

Insert a cannula through the most distal cephalic hole of the guide down to the skin. Take an antero-posterior X-ray to check nail penetration.

Introduce the scalpel into the cannula.
Make the incision in the skin and fascia in succession by inserting and extracting the scalpel and turning it 180°.

Insert the trocar into the cannula and push both down to the cortex.

Insert the ø3x365 mm guide wire for screws (provided with the nail), using either the Multi-use chuck or a power drill.

Insert the guide wire up to the stop on the trocar (**Fig. 8B**) and check that it is correctly positioned: in anteroposterior projection (**Fig. 8C**) it must pass close to the calcar; in axial projection (**Fig. 8D**) it must be in the centre of the femoral head. The tip of the wire should be 5 - 10 mm from the articular surface.

NOTE *The marking* **C** *on the guide wire corresponds to a 90 mm-long screw.*

Put the Multi-use chuck in contact with the trocar and check the screw length on the graduated scale.

Leave the wire, trocar and cannula in place while the proximal screw is inserted.

INSTRUMENTS REQUIRED

EBA-5030
Multi-use chuck

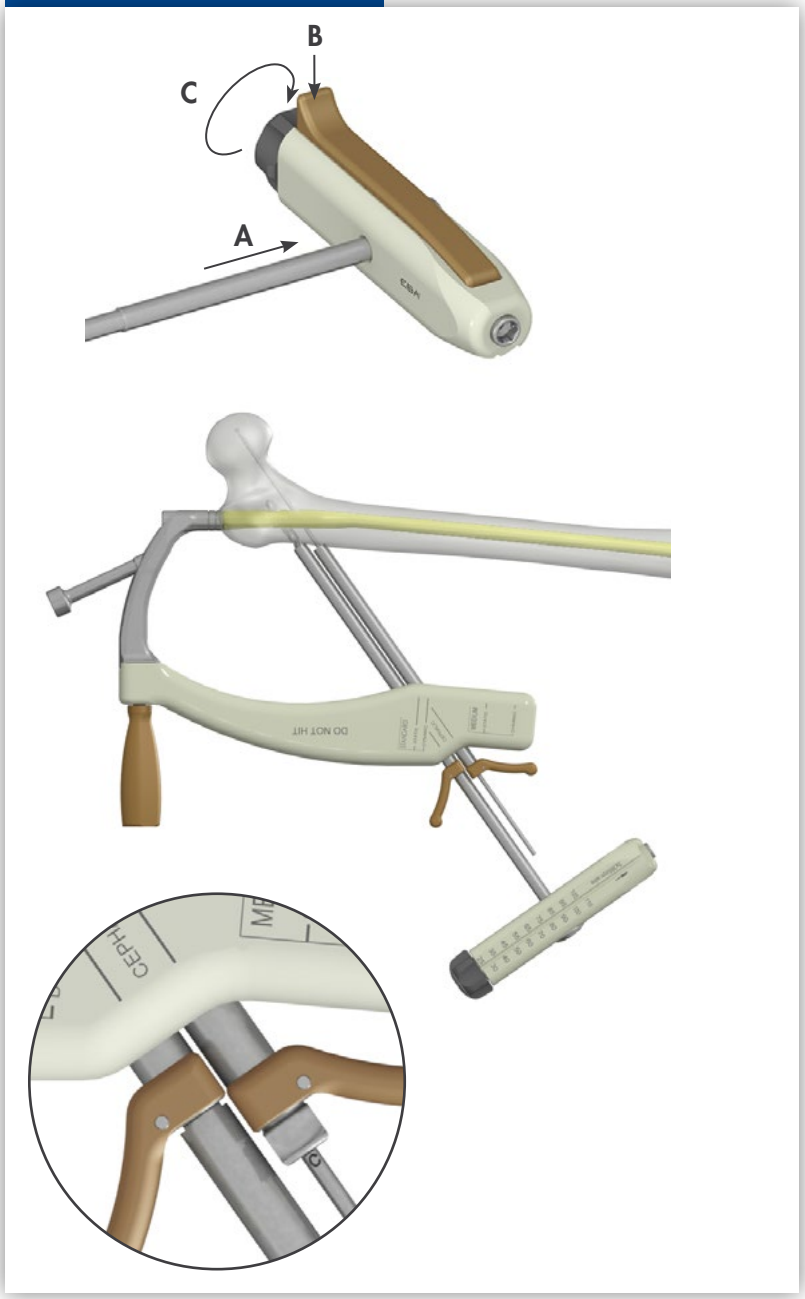
EBA-5020
Cannula

EBA-5025
Trocar

ø3x365 mm
Guide wire for screws

Proximal locking

Figure 9



Preparation for the proximal cephalic screw

Introduce the second cannula into the proximal cephalic hole of the guide down to the skin.

Introduce the scalpel into the cannula and make the incision in the skin and fascia.

Mount the cephalic screw drill bit on the Multi-use chuck and insert the drill and cannula together down to the bone.

Prepare the screw hole by turning and inserting the drill up to the mechanical stop.

INSTRUMENTS REQUIRED

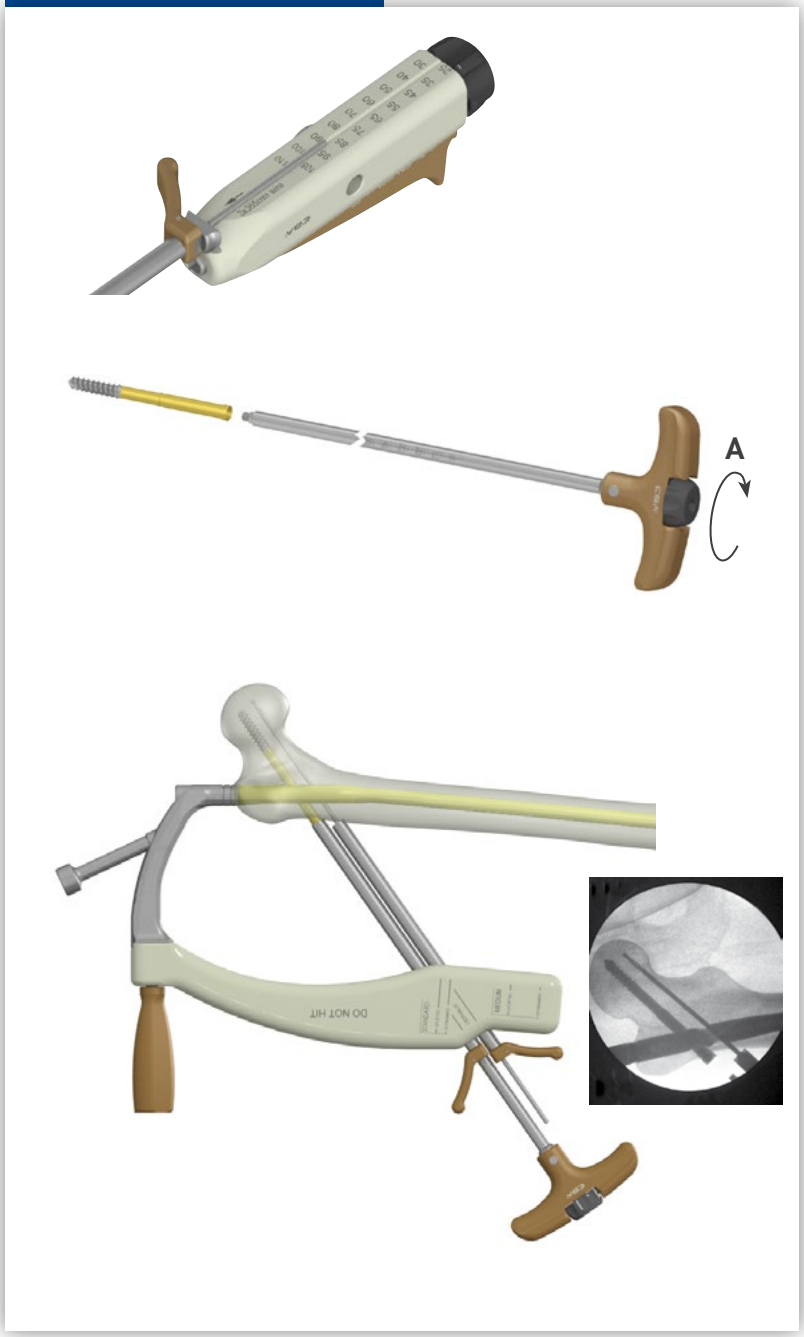
EBA-5020
Cannula

EBA-5200
Cephalic drill bit

EBA-5030
Multi-use chuck

Proximal locking

Figure 10



Proximal cephalic screw insertion

Slide the Multi-use chuck over the guide wire in the distal cannula up to the trocar and read the screw length on the graduated scale.

Select a proximal cephalic screw **with a length 1 cm shorter than previously measured on the graduated scale**; attach it to the screwdriver and lock it by turning the knob clockwise (**A**).

Insert the screw and screwdriver through the cannula into the proximal cephalic hole of the guide.
Ensure that the cannula stays in contact with the bone.

Screw down until the "0" reference is next to the edge of the cannula which must be in contact with the cortex.
The screw progression can be seen on the graduated scale on the screwdriver.

Loosen the screwdriver knob to remove the screwdriver.
If it is too tight, loosen the knob in the handle with the T-wrench.

INSTRUMENTS REQUIRED

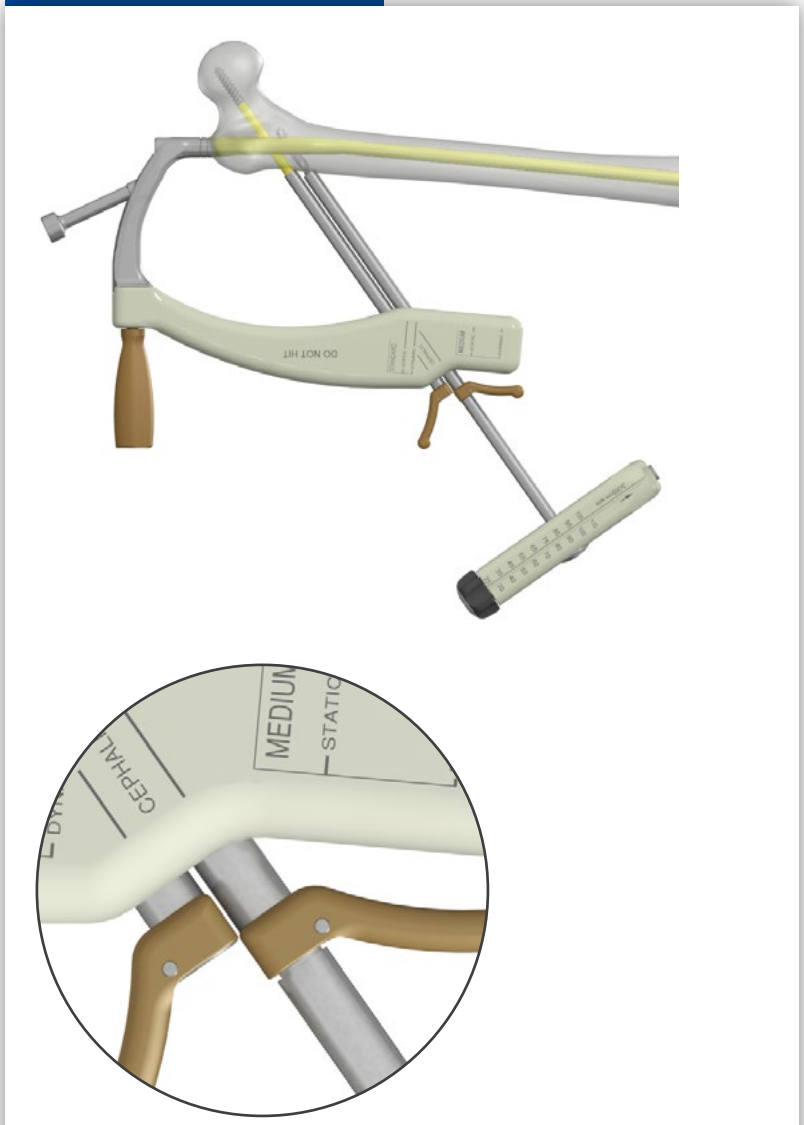
EBA-5035
6 mm hexagon screwdriver

EBA-5045
8 mm T-wrench

EBA-5030
Multi-use chuck

Proximal locking

Figure 11



Preparation for the distal cephalic screw

Remove the guide wire and the trocar.

Mount the cephalic screw drill bit on the Multi-use chuck.

Prepare the screw hole by turning and inserting the drill up to the mechanical stop.

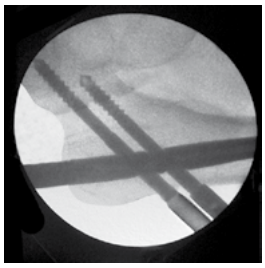
INSTRUMENTS REQUIRED

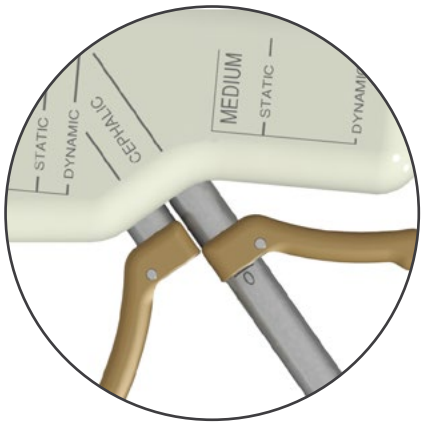
EBA-5200
Cephalic drill bit

EBA-5030
Multi-use chuck

Proximal locking

Figure 12





Distal cephalic screw insertion

Leave the proximal cannula in place (after checking that it is still over the screw head).

Follow the same procedure to introduce the distal cephalic screw (**with the length previously measured on the Multi-use chuck**).

Only for EBA² long:

remove the central body guide, insert the distal centering guide and proceed with surgical steps as described from page 20.

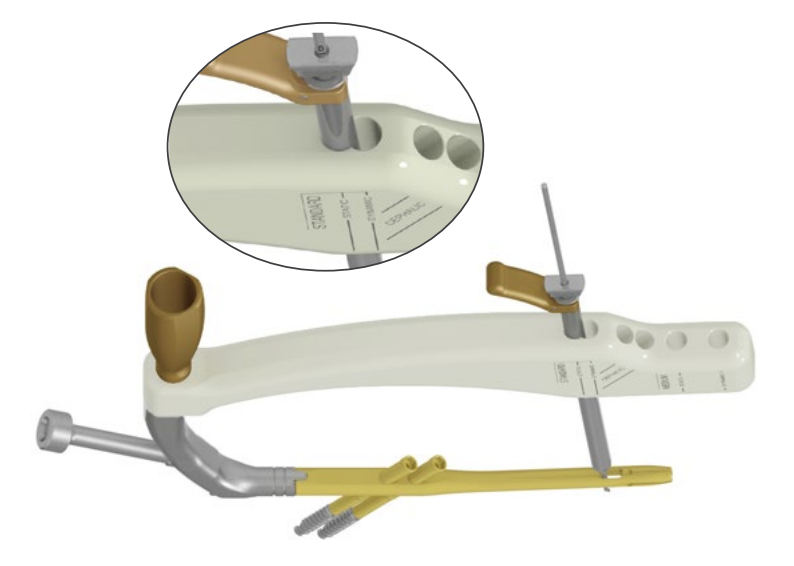
INSTRUMENTS REQUIRED

EBA-5035
6 mm hexagon screwdriver

Distal locking - EBA² standard

It is suggested to use distal locking in case of fractures not sufficiently stabilized by the cephalic screws (e.g. fractures 31.A2, 31.A3 with lesion of the lateral wall and subtrochanteric fractures 31.A3).

Figure 13



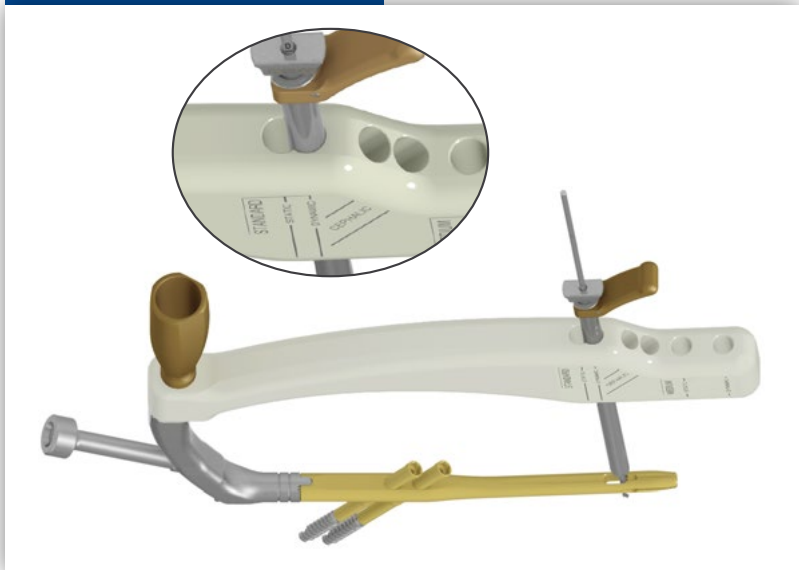
STATIC LOCKING

Insert the cannula and trocar into the corresponding hole of the guide down to the cortex (after making the incision of the skin and fascia).

Insert the ø3x365 mm guide wire (provided with the nail) mounted on the Multi-use chuck or a power drill up to the marking **D** (distal), which corresponds to a 35 mm-long screw.

Insert the wire up to the stop on the trocar and check that it has gone beyond the medial cortex.

Figure 14



DYNAMIC LOCKING

Introduce the cannula and the trocar into the corresponding hole of the guide.

Follow the same procedure as described for static locking.

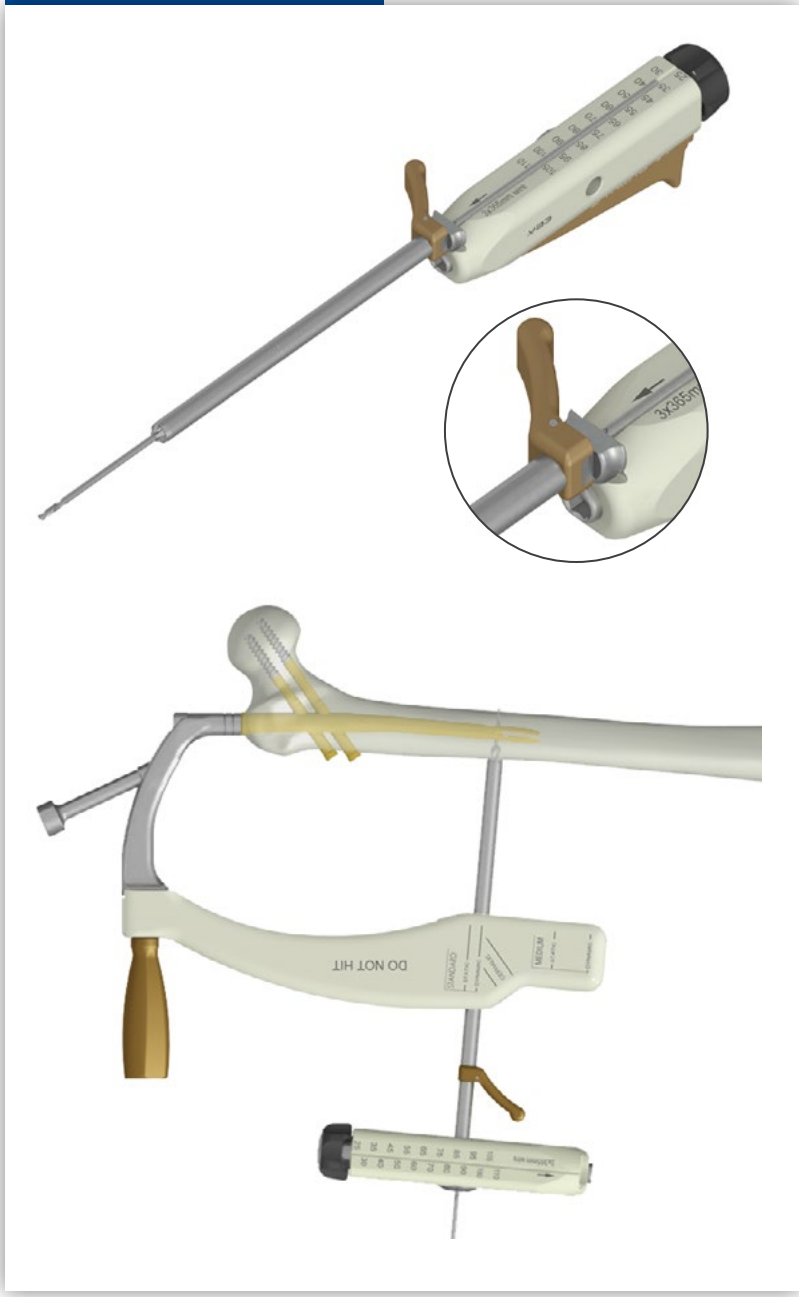
INSTRUMENTS REQUIRED

EBA-5020
Cannula

EBA-5025
Trocar

Distal locking - EBA² standard

Figure 15



Preparation for distal screw

Slide the Multi-use chuck over the guide wire up to the trocar and read the screw length on the graduated scale.

Mount the cannulated drill bit on the Multi-use chuck or a power drill.

Remove the trocar and introduce the cannulated drill bit up to the mechanical stop to drill through to the cortex.

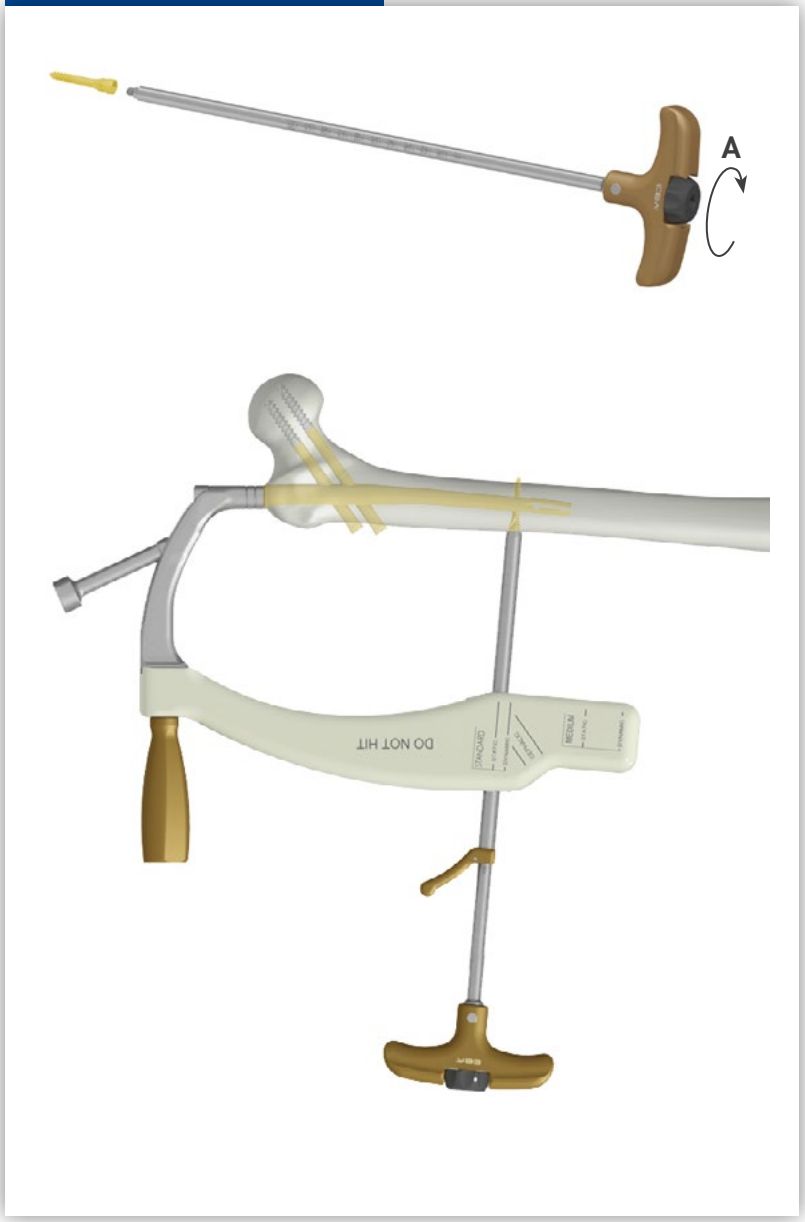
INSTRUMENTS REQUIRED

EBA-5205
Cannulated drill bit

EBA-5030
Multi-use chuck

Distal locking - EBA² standard

Figure 16



Distal locking screw insertion

Position the distal locking screw (with a length as previously measured) on the screwdriver and lock it by turning the knob clockwise (**A**).

Insert the screw fastened on the screwdriver through the cannula and check that the cannula is in contact with the bone.

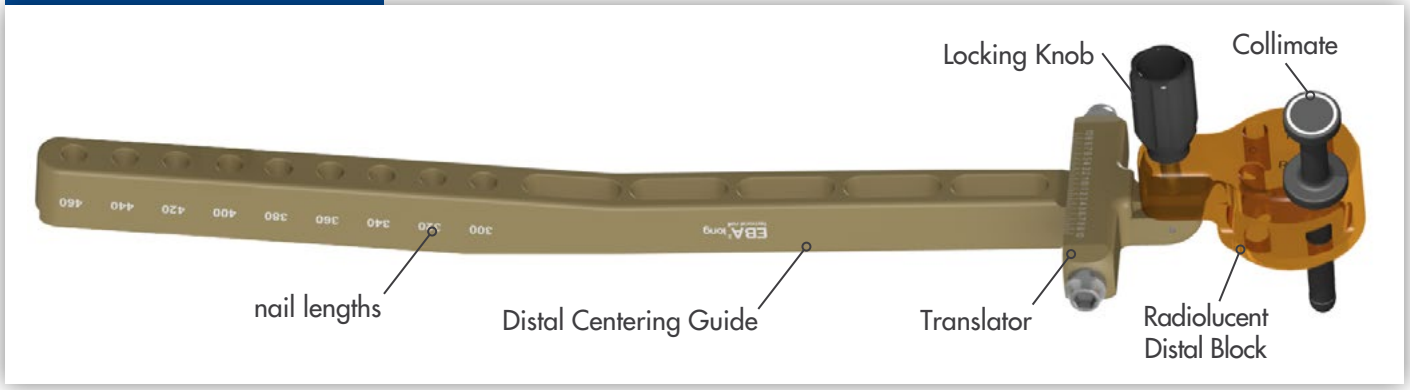
The screw progression can be seen on the graduated scale on the screwdriver: screw down until the "0" reference is next to the edge of the cannula.

INSTRUMENTS REQUIRED

EBA-5035
6 mm hexagon screwdriver

Distal locking - EBA2 long

Figure 17



EBA² long Distal centering guide components

- Distal Centering Guide
- **Radiolucent Distal Block** for a clear radiographic view of the screw insertion area
- **Collimate** for alignment of the hole in the guide with the hole in the nail
- **Translator** for adjustment of the position of the Distal Block

Figure 18

Remove the central body guide, insert the distal centering guide into the hole corresponding to the nail length.

Figure 19

STATIC
Screw position:
proximal hole

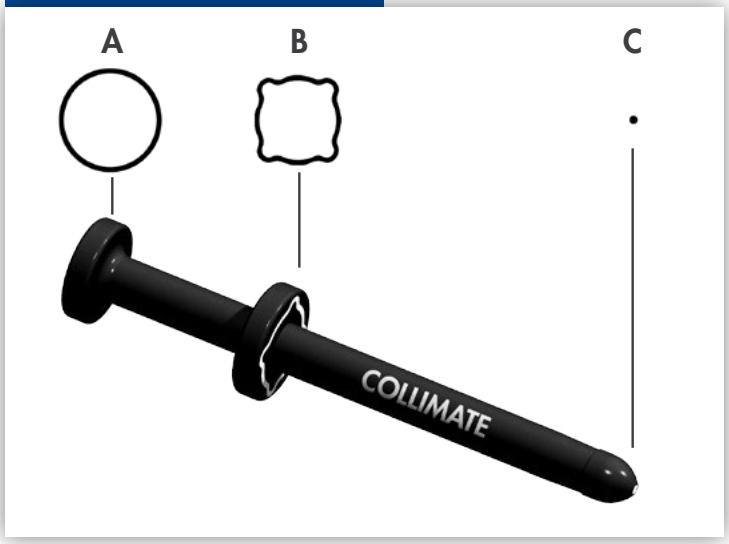
DYNAMIC
Screw position:
distal slot

STATIC-DYNAMIC
Screws position:
proximal hole and
distal slot

The EBA² nail offers three different types of distal locking as illustrated in figure.

Distal locking

Figure 20

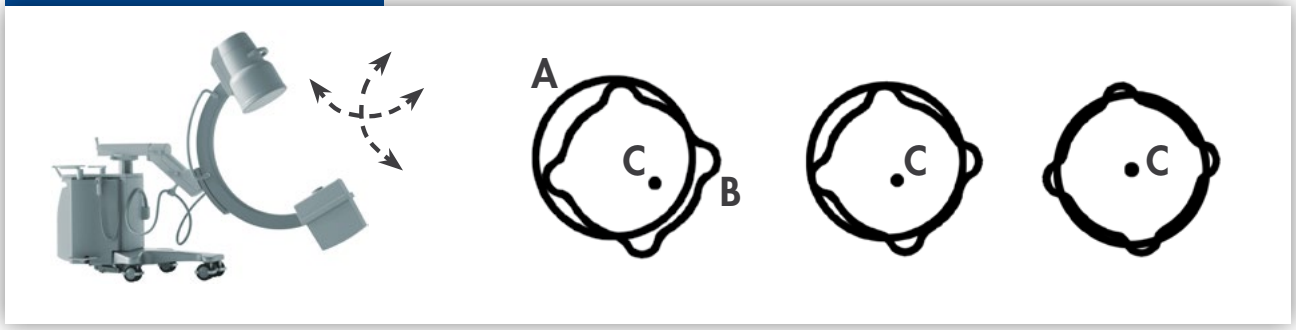


Collimate

The radiolucent Collimate is characterized by radio opaque references (**A**, **B** and **C**) visible under image intensifier.
Their alignment allows precise centering of the guide for insertion of the distal locking screws.

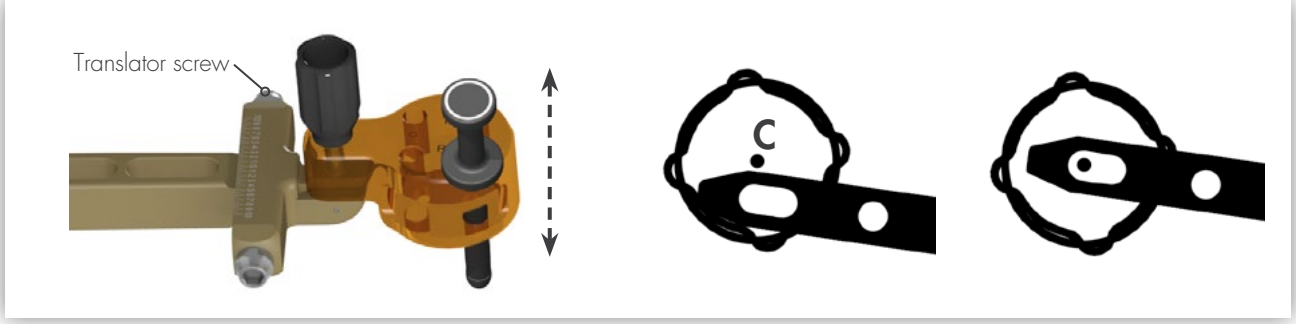
Attach the radiolucent Distal Block to the end of the Distal Guide.
Insert the Collimate in the most distal hole of the Block in the holes **R** (Right) or **L** (Left) depending on the limb being treated.

Figure 21



Under image intensifier: check the position of the two radio-opaque references **A** and **B** of the Collimate. With small movements of the image intensifier obtain an image with the two references completely overlapping and centered. In this position reference **C** should be in the center of references **A** and **B**.

Figure 22



Translator screw: turn the screw until reference **C**, which is in the center of other two radiopaque markers, is in the center of the distal slot in the nail.

Distal screws insertion, end cap insertion

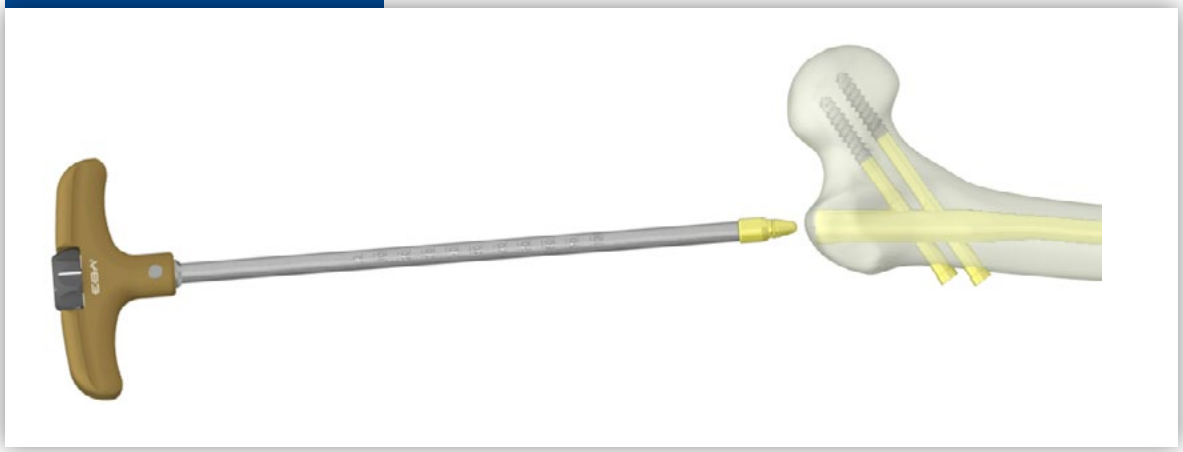
Figure 23

Distal screws insertion

Make the skin incision and insert the cannula and trocar into the proximal hole of the distal block down to the cortex.
Carefully insert a guide wire through the trocar so that extends beyond the second cortex by at least 2 mm.
Check under image intensifier that the guide wire is in the nail locking hole by temporarily removing the cannula and the trocar.

Insert the distal locking screw as follows:
- measure the proximal screw length
- remove the trocar and drill through to the cortex
- remove the guide wire and insert the screw
- leave the cannula over the proximal screw head to stabilise the centering guide
- remove the Collimate and insert cannula, trocar, guide wire
- measure the distal screw length
- remove the trocar and drill through to the cortex
- remove the guide wire and insert the distal screw.

Figure 24



Snap-on end cap insertion

Remove the guide by unscrewing the nail locking screw with the T wrench.
Lock the end cap on the screwdriver.
Insert the end cap in the nail applying light pressure on the screwdriver handle and turning a 1/4 turn.

INSTRUMENTS REQUIRED

EBA-5205
Cannulated drill

EBA-5020
Cannula

EBA-5025
Trocar

EBA-5035
6 mm hexagon screwdriver

Ordering information

TITANIUM STERILE

EBA² standard nail

Supplied with guide wire for locking screws

Code no.	Size
EBA-6100	ø10x180 mm

EBA² long nail

Supplied with guide wire for locking screws

Cannulated nail - ø10 mm

Code no.	Size
EBA-661030	ø10x300 mm RIGHT
EBA-661032	ø10x320 mm RIGHT
EBA-661034	ø10x340 mm RIGHT
EBA-661036	ø10x360 mm RIGHT
EBA-661038	ø10x380 mm RIGHT
EBA-661040	ø10x400 mm RIGHT
EBA-661042	ø10x420 mm RIGHT
EBA-661044	ø10x440 mm RIGHT
EBA-661046	ø10x460 mm RIGHT

Code no.	Size
EBA-671030	ø10x300 mm LEFT
EBA-671032	ø10x320 mm LEFT
EBA-671034	ø10x340 mm LEFT
EBA-671036	ø10x360 mm LEFT
EBA-671038	ø10x380 mm LEFT
EBA-671040	ø10x400 mm LEFT
EBA-671042	ø10x420 mm LEFT
EBA-671044	ø10x440 mm LEFT
EBA-671046	ø10x460 mm LEFT

Ordering information

TITANIUM STERILE

Cephalic screw - ø7,5 mm

Code no.	Length
EBA-7070	70 mm
EBA-7075	75 mm
EBA-7080	80 mm
EBA-7085	85 mm
EBA-7090	90 mm

Code no.	Length
EBA-7095	95 mm
EBA-7100	100 mm
EBA-7105	105 mm
EBA-7110	110 mm

Cephalic screw, HA coated - ø7.5 mm

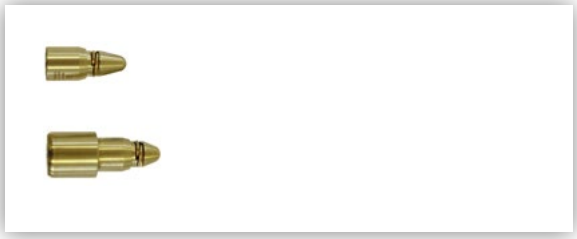
Code no.	Length
EBA-8070	70 mm
EBA-8075	75 mm
EBA-8080	80 mm
EBA-8085	85 mm
EBA-8090	90 mm

Code no.	Length
EBA-8095	95 mm
EBA-8100	100 mm
EBA-8105	105 mm
EBA-8110	110 mm

Cortical screw - ø5 mm

Code no.	Length
EBA-9030	30 mm
EBA-9035	35 mm
EBA-9040	40 mm
EBA-9045	45 mm
EBA-9050	50 mm
EBA-9055	55 mm

Code no.	Length
EBA-9060	60 mm
EBA-9065	65 mm
EBA-9070	70 mm
EBA-9075	75 mm
EBA-9080	80 mm



Snap-on end cap

Code no.	Length
EBA-6000	EBA² end cap
EBA-6015	EBA² 15 mm end cap

Material on request

TITANIUM STERILE

EBA² medium nail

Supplied with guide wire for locking screws

Code no.	Size
EBA-6500	ø10x240 mm

EBA² long nail

Supplied with guide wire for locking screws

Solid nail - ø9 mm

Code no.	Size
EBA-660930	ø9x300 mm RIGHT
EBA-660932	ø9x320 mm RIGHT
EBA-660934	ø9x340 mm RIGHT
EBA-660936	ø9x360 mm RIGHT
EBA-660938	ø9x380 mm RIGHT

Code no.	Size
EBA-670930	ø9x300 mm LEFT
EBA-670932	ø9x320 mm LEFT
EBA-670934	ø9x340 mm LEFT
EBA-670936	ø9x360 mm LEFT
EBA-670938	ø9x380 mm LEFT

EBA² long nail

Supplied with guide wire for locking screws

Cannulated nail - ø11 mm

Code no.	Size
EBA-661132	ø11x320 mm RIGHT
EBA-661134	ø11x340 mm RIGHT
EBA-661136	ø11x360 mm RIGHT
EBA-661138	ø11x380 mm RIGHT
EBA-661140	ø11x400 mm RIGHT
EBA-661142	ø11x420 mm RIGHT
EBA-661144	ø11x440 mm RIGHT
EBA-661146	ø11x460 mm RIGHT
EBA-671132	ø11x320 mm LEFT
EBA-671134	ø11x340 mm LEFT
EBA-671136	ø11x360 mm LEFT
EBA-671138	ø11x380 mm LEFT
EBA-671140	ø11x400 mm LEFT
EBA-671142	ø11x420 mm LEFT
EBA-671144	ø11x440 mm LEFT
EBA-671146	ø11x460 mm LEFT

Cannulated nail - ø12 mm

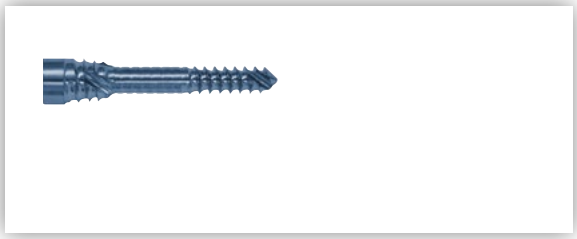
Code no.	Size
EBA-661232	ø12x320 mm RIGHT
EBA-661234	ø12x340 mm RIGHT
EBA-661236	ø12x360 mm RIGHT
EBA-661238	ø12x380 mm RIGHT
EBA-661240	ø12x400 mm RIGHT
EBA-661242	ø12x420 mm RIGHT
EBA-661244	ø12x440 mm RIGHT
EBA-661246	ø12x460 mm RIGHT
EBA-671232	ø12x320 mm LEFT
EBA-671234	ø12x340 mm LEFT
EBA-671236	ø12x360 mm LEFT
EBA-671238	ø12x380 mm LEFT
EBA-671240	ø12x400 mm LEFT
EBA-671242	ø12x420 mm LEFT
EBA-671244	ø12x440 mm LEFT
EBA-671246	ø12x460 mm LEFT

Cannulated nail - ø13 mm

Code no.	Size
EBA-661332	ø13x320 mm RIGHT
EBA-661334	ø13x340 mm RIGHT
EBA-661336	ø13x360 mm RIGHT
EBA-661338	ø13x380 mm RIGHT
EBA-661340	ø13x400 mm RIGHT
EBA-661342	ø13x420 mm RIGHT
EBA-661344	ø13x440 mm RIGHT
EBA-661346	ø13x460 mm RIGHT
EBA-671332	ø13x320 mm LEFT
EBA-671334	ø13x340 mm LEFT
EBA-671336	ø13x360 mm LEFT
EBA-671338	ø13x380 mm LEFT
EBA-671340	ø13x400 mm LEFT
EBA-671342	ø13x420 mm LEFT
EBA-671344	ø13x440 mm LEFT
EBA-671346	ø13x460 mm LEFT

Material on request

TITANIUM STERILE



Cortical screw - ø4,5 mm *

Code no.	Length
EBA-9530	30 mm
EBA-9535	35 mm
EBA-9540	40 mm
EBA-9545	45 mm
EBA-9550	50 mm
EBA-9555	55 mm
EBA-9560	60 mm

** Only for solid nail distal holes*

Cortical screw - ø5 mm

Code no.	Length
EBA-9085	85 mm
EBA-9090	90 mm
EBA-9095	95 mm
EBA-9100	100 mm

Ordering information

NOT STERILE

Instrument set - EBA² standard

Code no.	Description
EBA-0005	ø3x750 mm guide wire
EBA-5010	Tissue protection sleeve
EBA-5015	Trochanteric drill
EBA-5020	Cannula
EBA-5025	Trocar
EBA-5030	Multi-use chuck ø3 mm wire
EBA-5035	6 mm hexagon screwdriver

Code no.	Description
EBA-5045	8 mm T-wrench
EBA-5100	EBA² standard nail guide
EBA-5200	Cephalic screw drill bit
EBA-5205	Cannulated drill bit
EBA-0270	EBA² standard instrument set tray, empty
EBA-0270c	EBA² standard instrument set tray, full
EBA-0350	Box for EBA² nail screws

Instrument set - EBA² long

Code no.	Description
EBA-0007	ø3x750 mm guide wire with olive
EBA-5110	EBA² long centering distal guide
EBA-5120	Fracture alignment guide wire exchange tool
EBA-5155	EBA² long trochanteric drill

Code no.	Description
EBA-5160	EBA² long screw and nail length ruler
EBA-0280	EBA² long instrument set tray, empty
EBA-0280c	EBA² long instrument set tray, full
EBA-0351	Box for EBA² long nail screws

Optional instrument set

Code no.	Description
EBA-0006	ø3x750 mm guide wire - STERILE
KIT0001	Removal kit for citieffe nails

EBA®2

nailing system

Standard nail & Recon nail

citieffe®

Essential moves in Trauma

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