

Operative technique



Endovis B.A.

Intramedullary Nail
Lateral proximal femur fractures



INTERNAL
fixation



nails



Citieffe thanks

Dr. Vincenzo Caiaffa, Ospedale di Venere, Carbonara di Bari (Italy)
Dr. Mario Manca, Ospedale Versilia, Lido di Camaiore (LU - Italy)
for their collaboration in the development of this operative technique.

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.

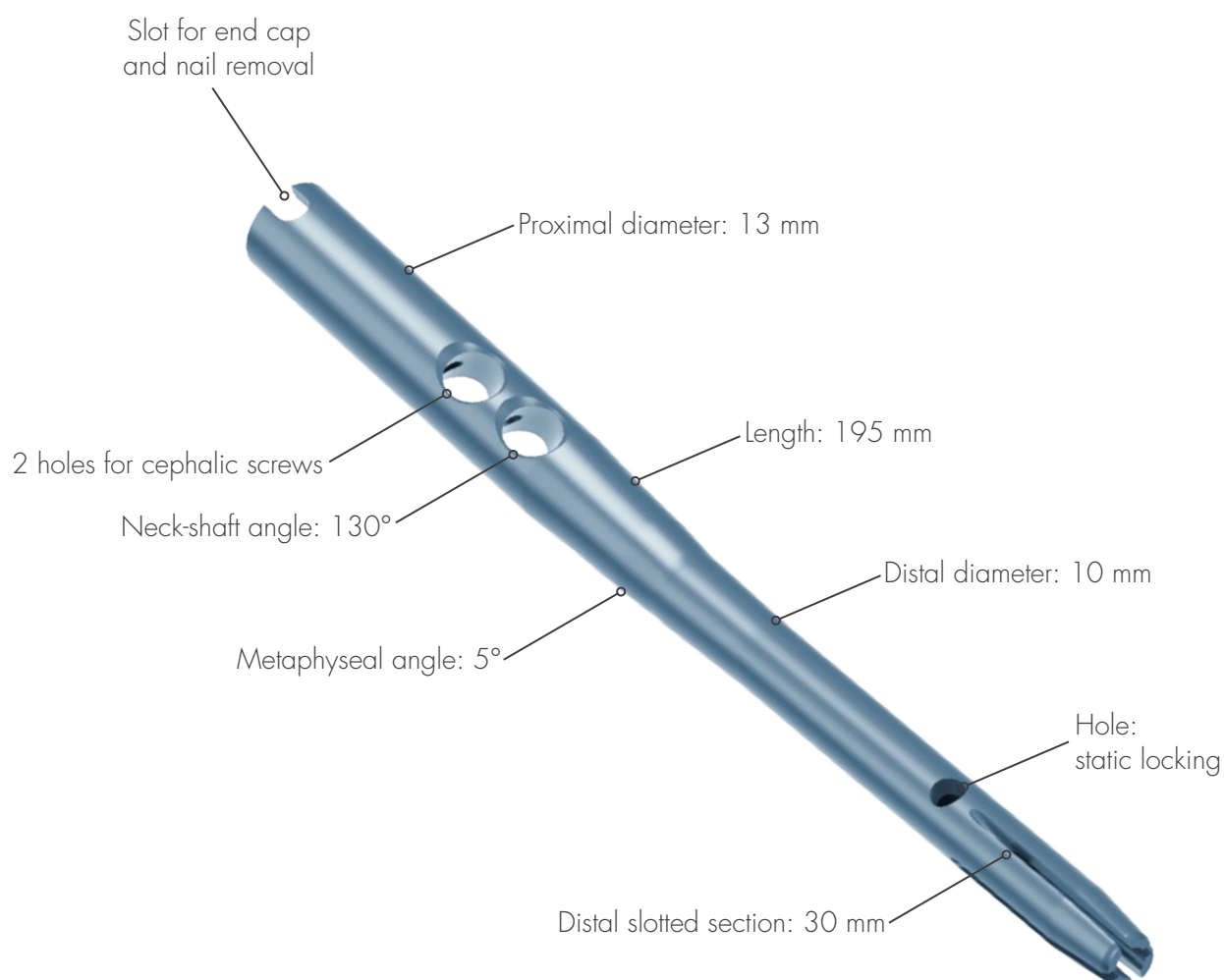
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Product description

Standard nail - One size

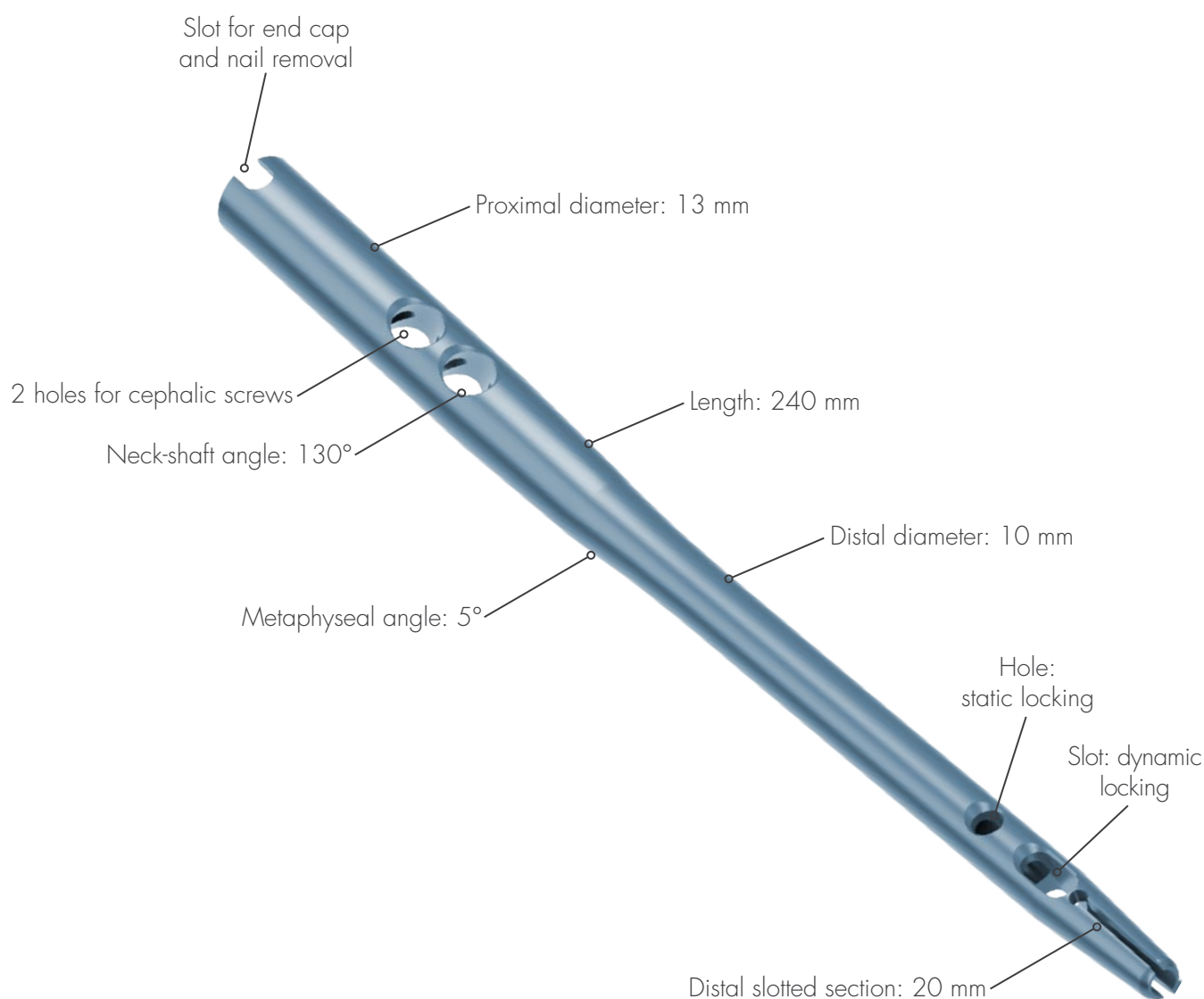
Indicated for the treatment of lateral proximal femur fractures



Product description

Medium nail - One size

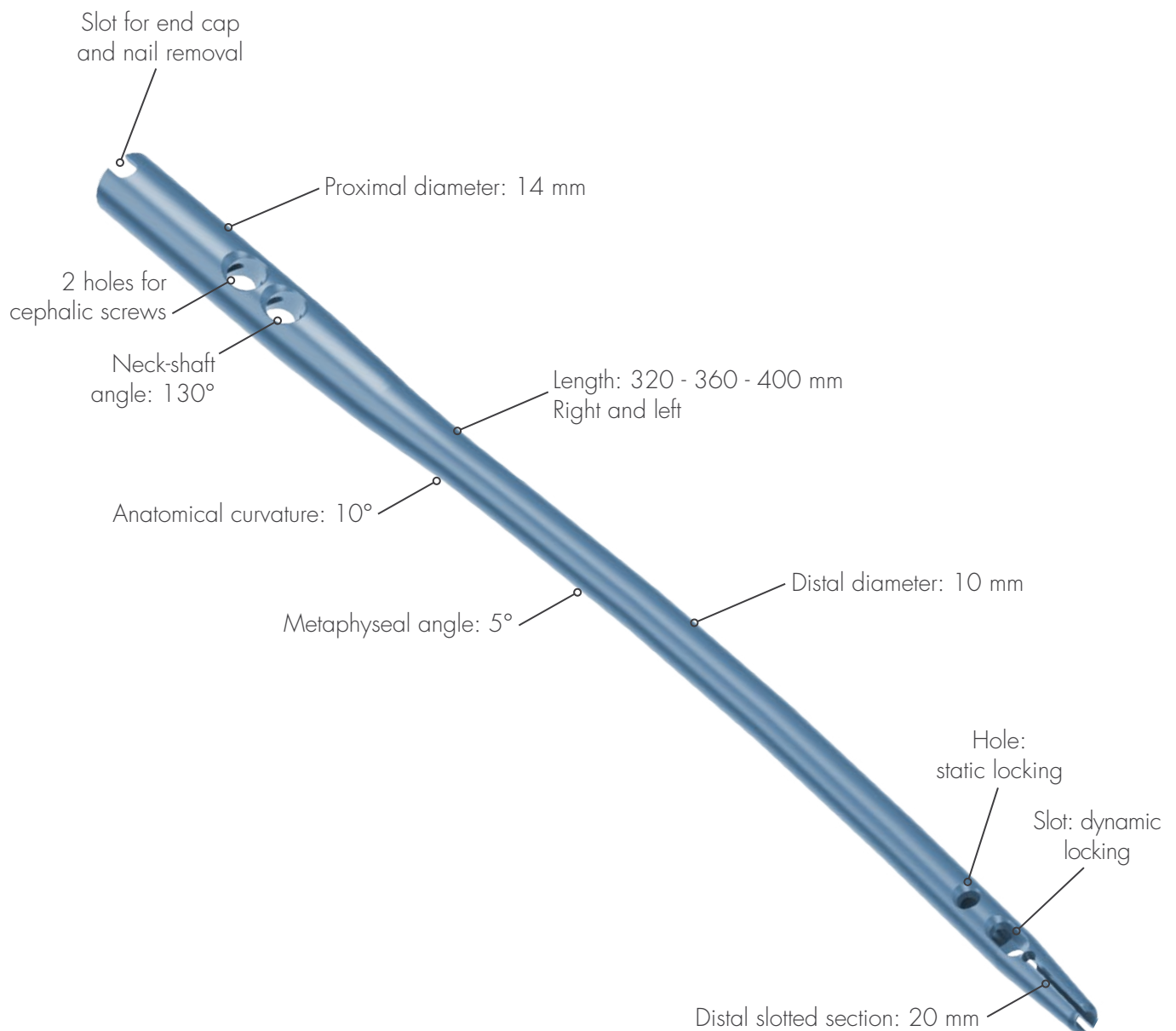
Indicated for the treatment of subtrochanteric fractures with diaphyseal extension



Product description

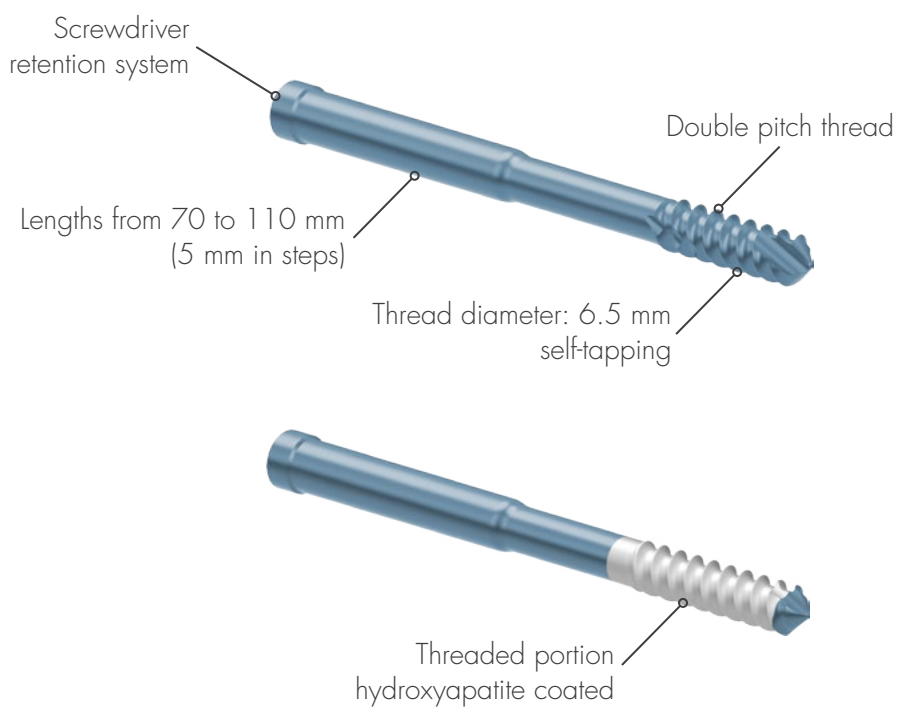
Long nail - 6 lengths (3 right and 3 left)

Indicated for the treatment of lateral proximal femur fractures associated with diaphyseal fractures

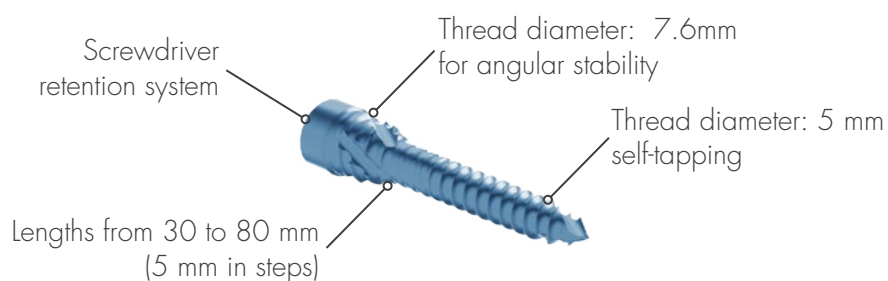


Product description

Cephalic screw - 9 lengths



Cortical screw - 11 lengths



Basic instrument



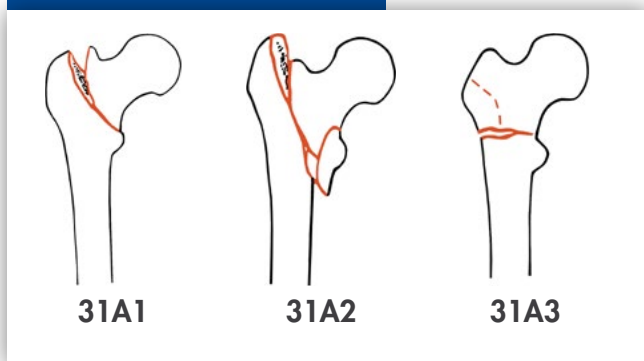
Code	Description	Qt.
4079	Cannulated awl	1
EBA-0010	Tissue protection sleeve	1
EBA-0015	ø7/15 mm trochanteric reamer	1
EBA-0020	Cannula ø10 mm	2
EBA-0025	Trocar	1
EBA-0030	Chuck for ø2.5-3 mm guide wires	1
EBA-0035	ø5/7.5 mm cephalic drill solid	1



Code	Description	Qt.
EBA-0040	6 mm hexagonal screwdriver	1
EBA-0050	6 mm Allen wrench	1
EBA-0060	Screw length ruler	1
EBA-0131	Standard Endovis B.A. nail guide	1
EBA-0160	6 mm hexagonal T-wrench	1
EBA-0250	Endovis B.A. standard instrument tray, empty	
TK87170-2F-YE	Sterilization box 580x270x110 mm, empty	

Indications

Figure 1

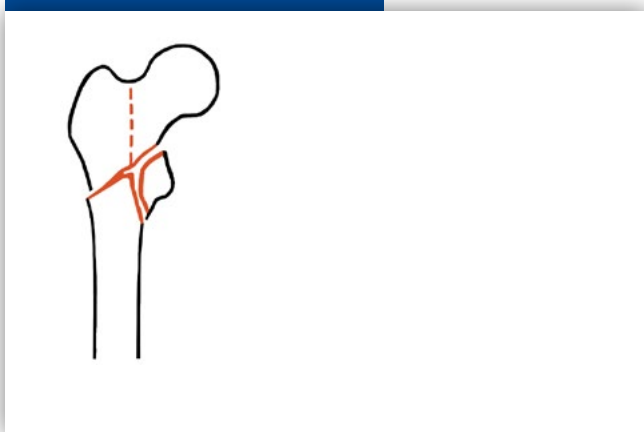


Standard nail

Fixation of lateral proximal femur fractures with extension inferior at 1 centimeter of small trochanter:

- 31A1** pertrochanteric simple fracture
- 31A2** pertrochanteric multi-fragment fracture
- 31A3** intra-subtrochanteric fracture (AO classification)

Figure 2

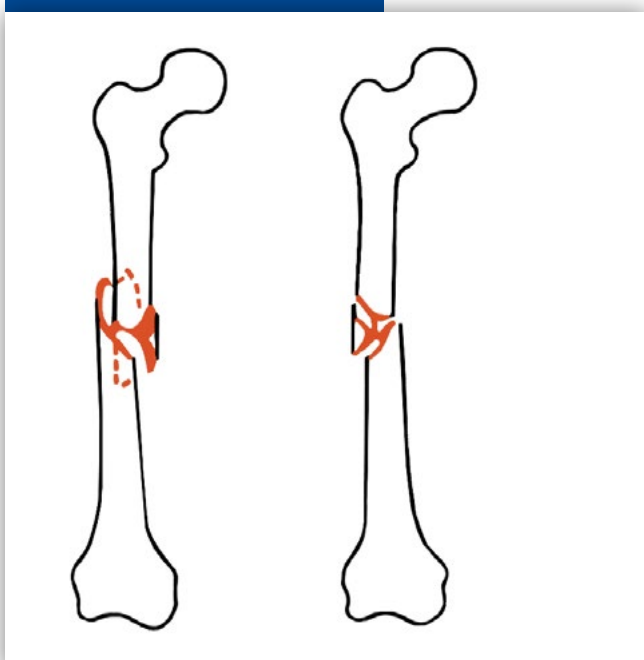


Medium nail

The device has been designed to treat 31A3.3 fractures (AO classification).

This nail is designed for less complex fractures, which need more distal locking.

Figure 3

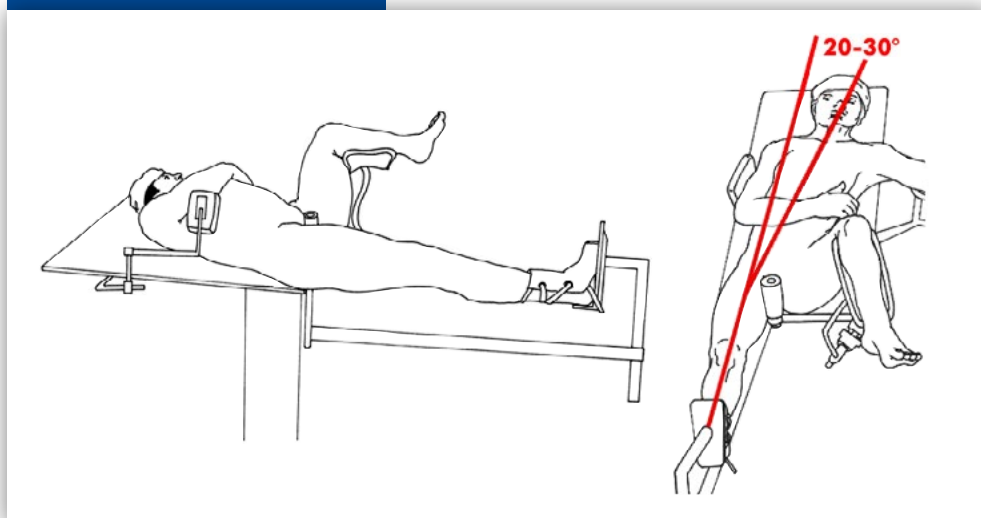


Long nail

Fixation of lateral proximal femur fractures associated with diaphyseal fractures: 31A1, 31A2, 31A3 associated with 32B1 and 32B2 (AO classification).

Patient positioning and incision

Figure 4



Patient positioning

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

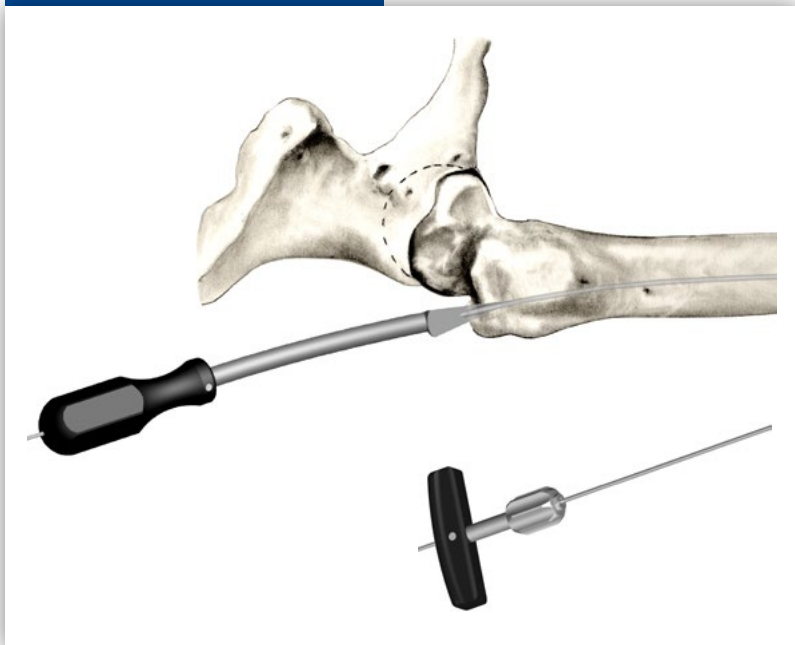
Some posterior support may be useful to reduce the fracture in the lateral view.

Incision

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

Standard nail. Proximal Locking

Figure 5



Guide wire insertion

Fix the $\varnothing 3 \times 750$ mm guide wire on the chuck by manually tightening the ring nut. Under image intensifier control penetrate the apex of the greater trochanter using the cannulated awl, and insert the guide wire down to the condyles.

Figure 6



Reaming

Remove the cannulated awl, and insert the soft tissue protection sleeve with the trochanteric reamer over the guide wire, up to the mechanical stop. Remove the trochanteric reamer and soft tissue protection sleeve leaving the guide wire in situ.

INSTRUMENTS REQUIRED



4079
Cannulated awl



EBA-0030
Chuck for wires



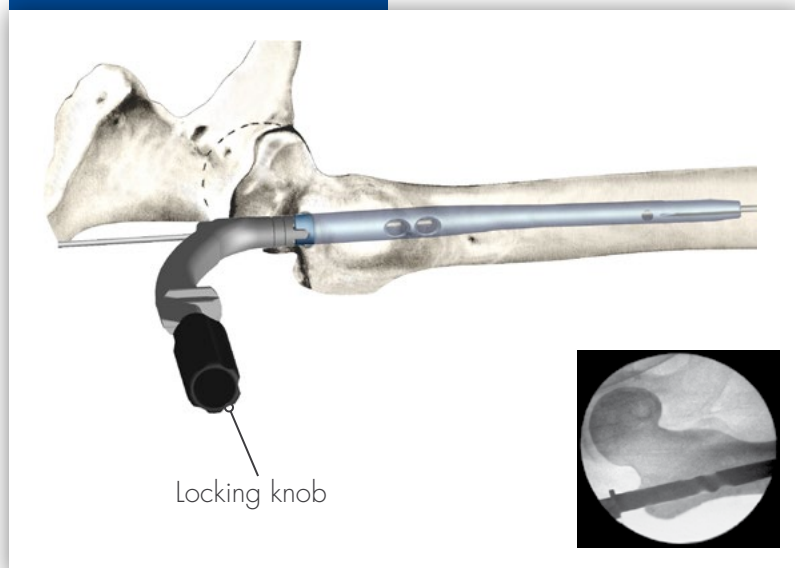
EBA-0015
Trochanteric reamer



EBA-0010
Tissue protection sleeve

Standard nail. Proximal Locking

Figure 7



Nail insertion

Attach the nail to the metal part of the nail guide, tightening the screw with the hexagonal T-wrench.

Introduce the nail over the guide wire, which is removed when the nail has passed the fracture.

Attach the radiolucent part with the locking knob, **only when the optimal nail position has been reached.**

Figure 8



Guide wire insertion in the distal cephalic hole

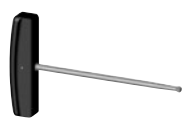
Insert the cannula with the trocar into the most distal cephalic hole of the guide until it touches the cortex. Insert the graduated wire on the chuck for at least 3 cm, secure and insert it into the bone. Check that the wire is correctly positioned in the femoral neck: in antero-posterior projection (Fig. A) it must be close to the distal cortex, and in the axial view (Fig. B) it should be in the centre of the neck and the femoral head. Advance the wire to within 5 mm of the articular surface, check that the trocar tip is resting on the lateral cortex (Fig. A), and read the length of the distal cephalic screw on the graduated wire.

NOTE The graduated wire has been designed to be introduced by hand, but can also be inserted using a power driver.

INSTRUMENTS REQUIRED



EBA-0131
Standard nail guide



EBA-0160
Hexagonal T wrench



EBA-0030
Chuck for wires



EBA-0060
Ruler



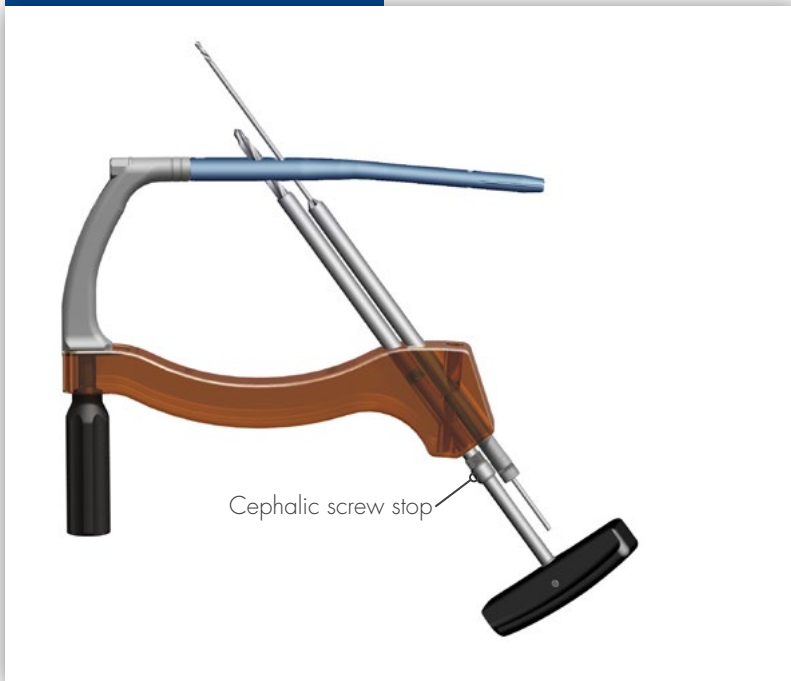
EBA-0020
Cannula



EBA-0025
Trocar

Standard nail. Proximal Locking

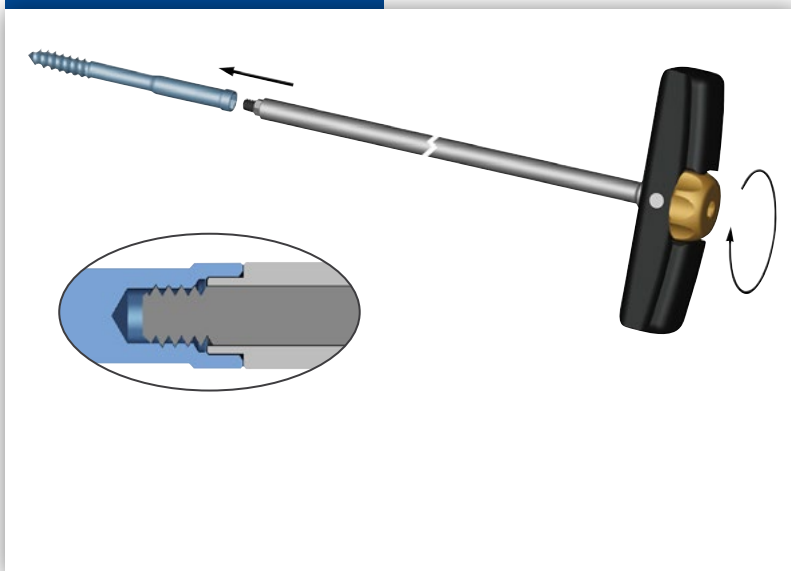
Figure 9



Cephalic screw insertion

Prepare the track for the proximal cephalic screw: if the bone is hard, use the cephalic drill inserted in the cannula until the stop.

Figure 10



Screw insertion with screwdriver

Fix a cephalic screw of a length 10 mm less than read on the graduated wire to the hexagonal screwdriver by turning the knob clockwise.

This screw will be inserted in the proximal cephalic hole of the wire guide.

There is an hexagonal socket in the knob of the screwdriver to insert the T-wrench in case of excessive tightening of the knob.

INSTRUMENTS REQUIRED



EBA-0040
Hexagonal screwdriver



EBA-0035
Cephalic drill

Standard nail. Proximal Locking

Figure 11



Insertion of the proximal cephalic screw

Insert the screw and hexagonal screwdriver through the cannula in the proximal cephalic hole of the guide, checking that the cannula is in contact with the bone. Screw progression can be seen on the graduated scale: continue until the "0" reference reaches the edge of the cannula.

Remove the screwdriver leaving the cannula over the screw head.

Figure 12



Insertion of the distal cephalic screw

Remove the trocar and guide wire.

Insert the second cephalic screw of the length read on the graduated guide wire.

INSTRUMENTS REQUIRED



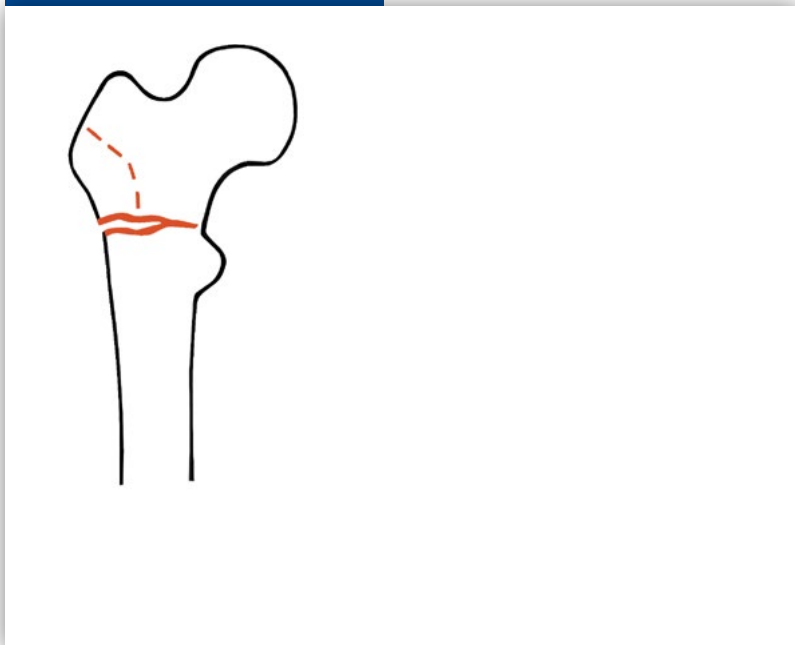
EBA-0040
Hexagonal screwdriver



EBA-0020
Cannula

Standard nail. Distal Locking

Figure 13



Distal locking

Distal locking is only indicated in those fracture cases insufficiently stabilized by the cephalic screws (for example fracture type 31A3).

Figure 14



Cortical screw insertion

Insert the trocar and cannula through the diaphyseal hole of the guide up to the cortex. Insert the graduated wire and read the length of the screw as before after checking the tip of the wire has penetrated the medial cortex by at least 2 mm.

Remove the trocar and the wire and **drill only the first cortex** with the cephalic drill.

INSTRUMENTS REQUIRED



EBA-0020
Cannula



EBA-0025
Trocar



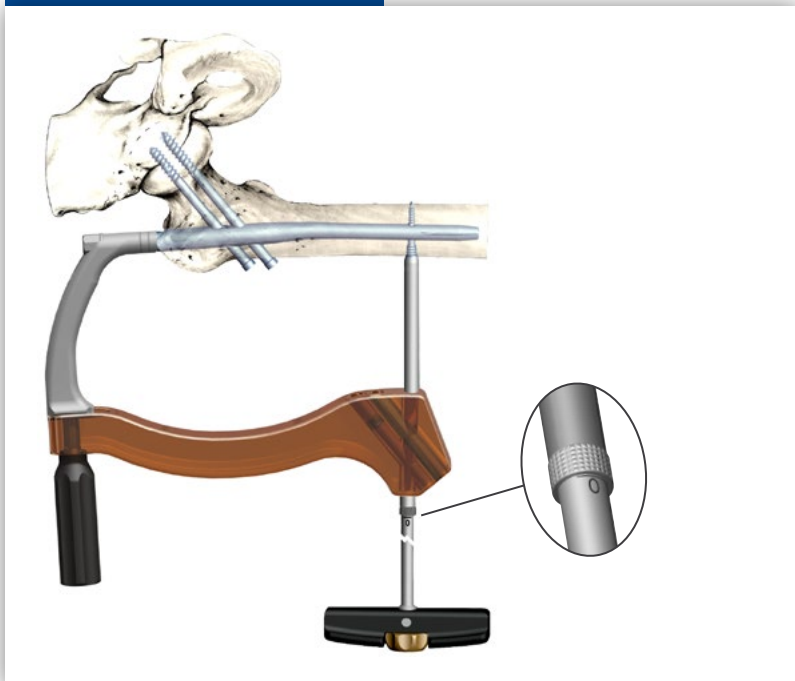
EBA-0030
Chuck for wires



EBA-0035
Cephalic drill

Standard nail. Distal Locking

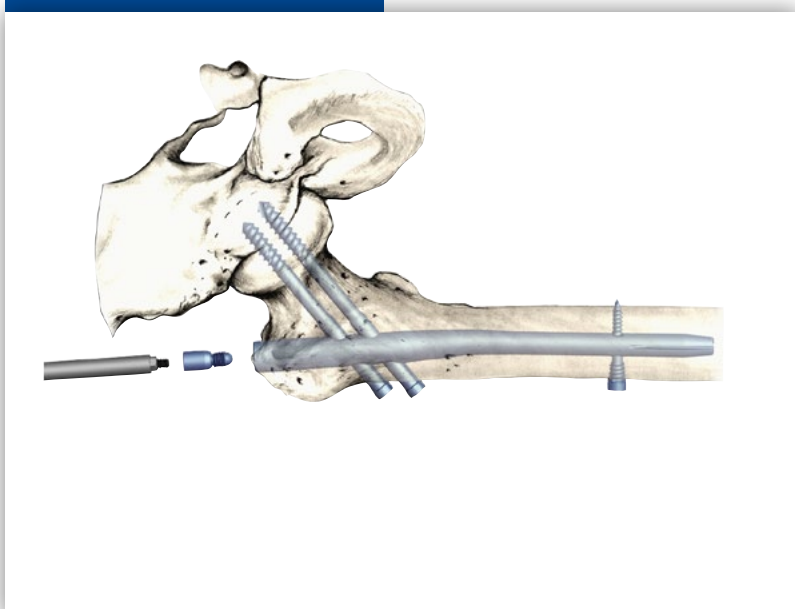
Figure 15



Cortical screw insertion

Lock the correct length screw to the screwdriver and insert it through the cannula, which should be touching the cortex. Screw progression is visible on the graduated scale on the screwdriver. Continue until the "0" reference reaches the edge of the cannula. Remove the screwdriver leaving the cannula over the screw head.

Figure 16



Insertion of the end cap

Remove the guide by unscrewing the nail locking screw with the Allen wrench. Insert the end cap in the nail. A longer end cap can be used in case of deep nail insertion.

INSTRUMENTS REQUIRED



EBA-0040
Hexagonal screwdriver



EBA-0050
Allen wrench

Medium and long nail instruments

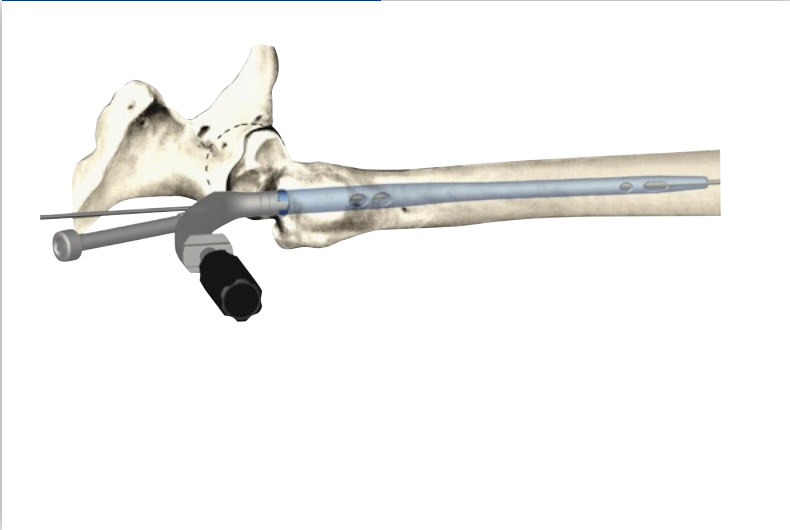


Code	Description	Qt.
50169	ø6.5 mm cannulated drill bit	1
EBA-0150	Medium and long (proximal) nail guide	1
EBA-0154	Distal centering guide for long nails	1
EBA-0155	Cannula with handle	1
EBA-0170	12 mm spanner	1
EBA-0260	Endovis B.A. medium and long instrument tray, empty	
TK87170-2F-BL	Sterilization box 580x270x110 mm, empty	



Medium nail. Proximal Locking

Figure 17



Proximal locking

For patient positioning, incision and guide wire insertion, reaming and nail insertion please refer to the operative technique described for the standard nail (see pages 11, 12 and 13).

Figure 18



Proximal locking

To carry out proximal locking of the medium Endovis B.A. nail follow the operative steps already described on page 13-14-15 using the centering guide EBA-0150.

INSTRUMENTS REQUIRED



EBA-0160
Hexagonal T wrench



EBA-0150
Medium-long nail guide



EBA-0020
Cannula



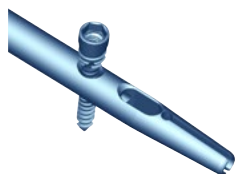
EBA-0025
Trocar



EBA-0030
Chuck for wires

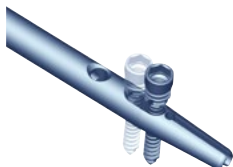
Medium nail. Distal Locking

Figure 19



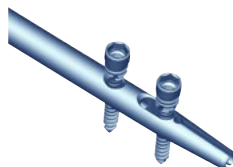
STATIC

Screw position:
proximal hole



DYNAMIC

Screw position:
distal slot



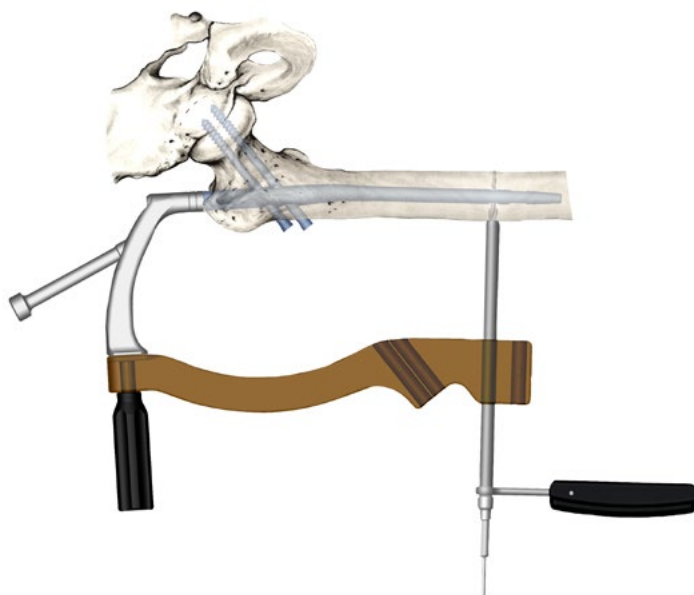
STATIC - DYNAMIC

Screws position:
proximal hole and
distal slot

Distal locking

The medium Endovis B.A. nail offers three different types of distal locking as illustrated in fig. 19.

Figure 20



Distal locking

Introduce the cannula with handle (with the trocar already inserted) into the most proximal diaphyseal hole of the guide until it rests on the cortex. Insert the graduated wire with a power driver until the tip is 2 mm beyond the medial cortex and read the screw length. Remove the trocar and introduce the $\varnothing 6.5$ mm cannulated drill bit, **perforating only the first cortex** (the drill bit has a stop). Remove the drill bit and guide wire.

INSTRUMENTS REQUIRED



EBA-0155
Cannula with handle



EBA-0025
Trocar



50169
Cannulated drill bit

Medium nail. Distal Locking

Figure 21



Insertion of the proximal cortical screw

Fix the cortical screw to the screwdriver and insert it through the cannula which must remain in contact with the cortex. Insert the proximal cortical screw as previously described.

Note For guide wire insertion it is suggested to use a power driver.

Figure 22



Insertion of the distal cortical screw

Insert the distal cortical screw using the same technique.

Note For guide wire insertion it is suggested to use a power driver.

INSTRUMENTS REQUIRED



EBA-0040
Hexagonal screwdriver



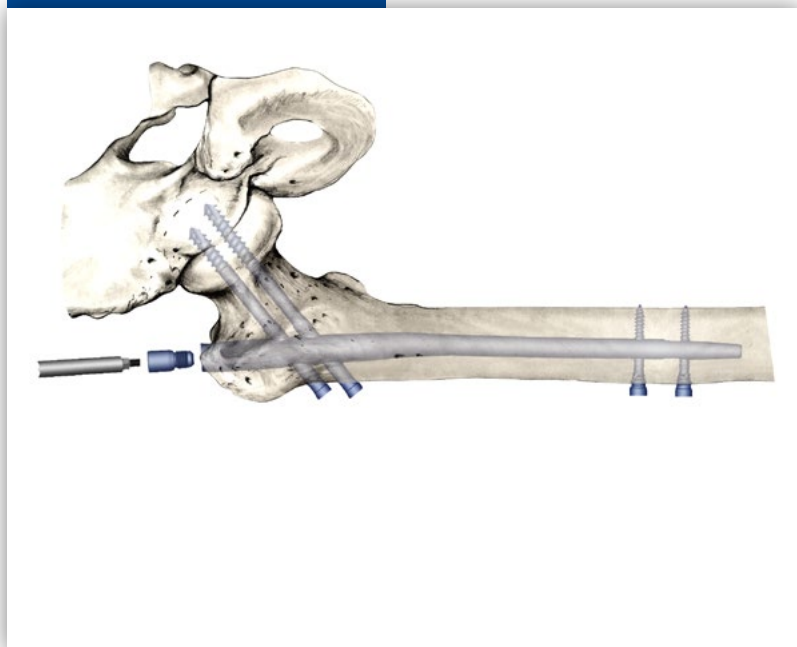
EBA-0155
Cannula with handle



EBA-0025
Trocarn

Medium nail. End cap insertion

Figure 23



Insertion of the end cap

Remove the guide by unscrewing the nail locking screw with the Allen wrench.
Insert the end cap in the nail.

INSTRUMENTS REQUIRED



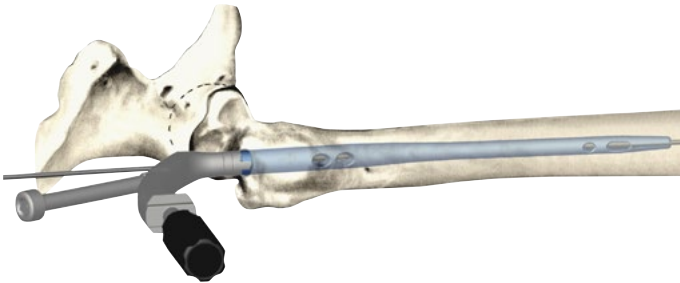
EBA-0040
Hexagonal screwdriver



EBA-0050
Allen wrench

Long nail. Proximal Locking

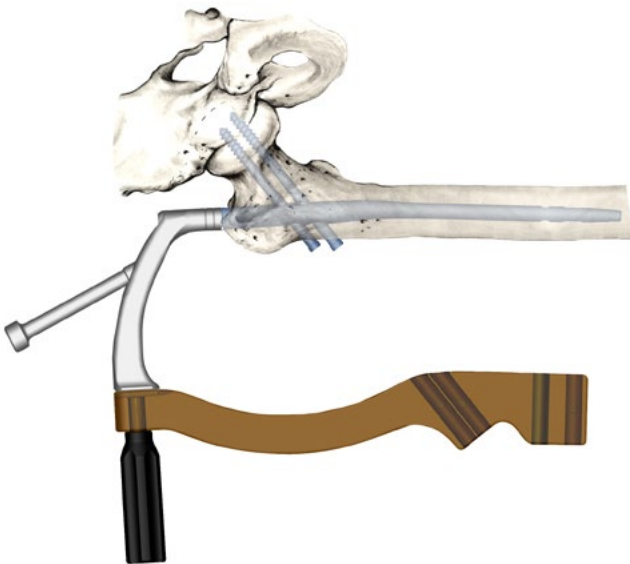
Figure 24



Proximal locking

For patient positioning, incision and guide wire insertion, reaming and nail insertion please refer to the operative technique described for the standard nail (see pages 11, 12 and 13).

Figure 25



Proximal locking

To carry out proximal locking of the medium Endovis B.A. nail follow the operative steps already described on page 13-14-15 using the centering guide EBA-0150.

INSTRUMENTS REQUIRED



EBA-0160
Hexagonal T wrench



EBA-0150
Medium-long nail guide



EBA-0020
Cannula



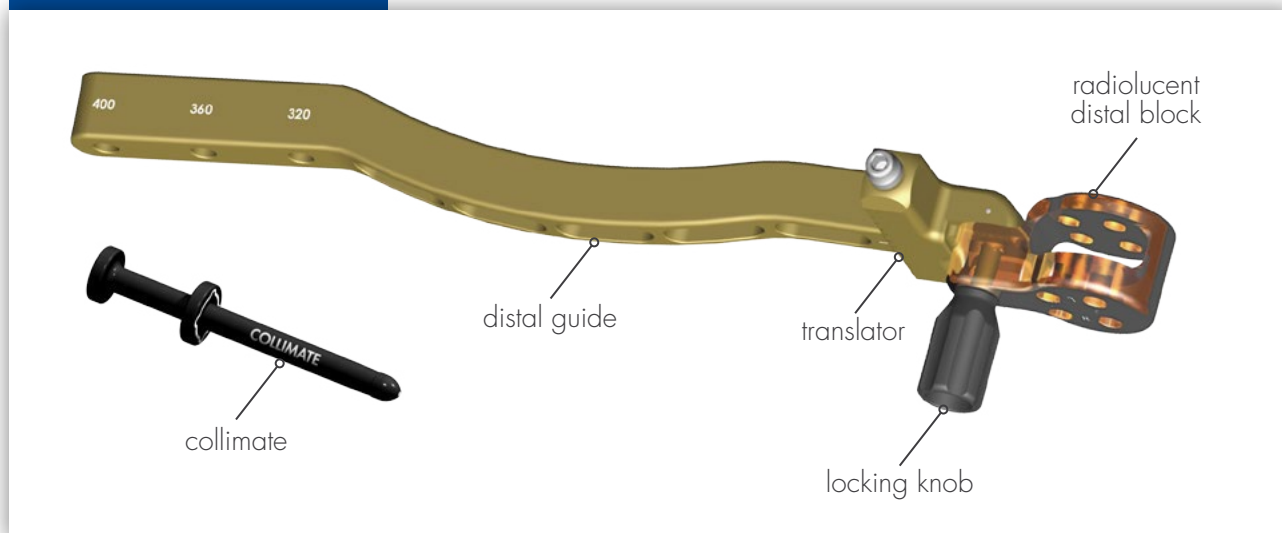
EBA-0025
Trocar



EBA-0030
Chuck for wires

Long nail. Distal Locking

Figure 26



Distal centering guide

Distal centering guide components

Radiolucent distal block: for a clear radiographic view of the screw insertion area

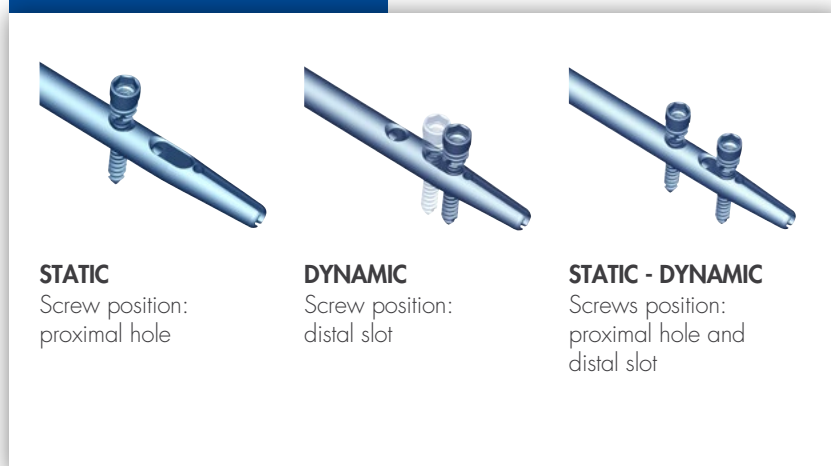
Collimate: for alignment of the guide hole with the nail hole

Translator: for adjusting the position of the distal block

Distal guide: has a series of holes to fit all the available screw lengths

Proximal guide: this is the connection element to the nail guide

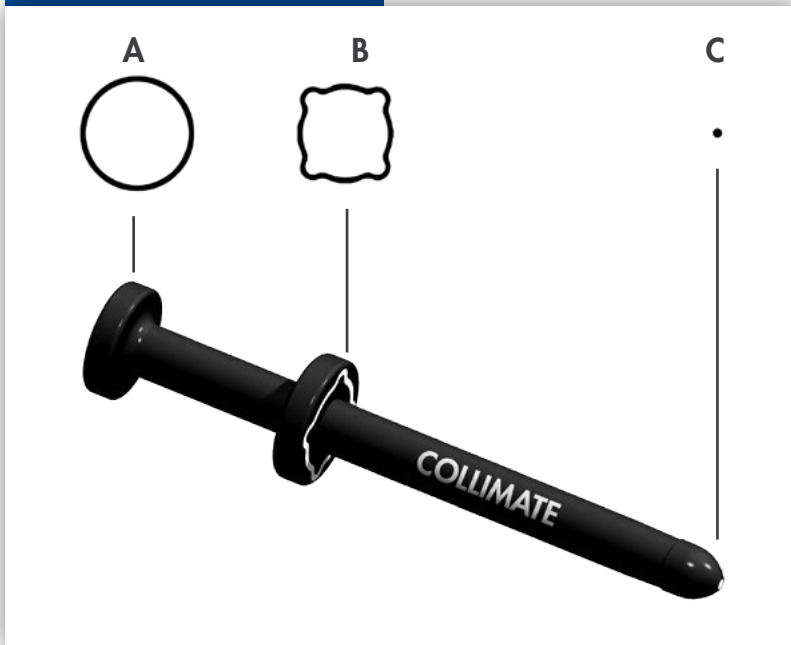
Figure 27



The long Endovis B.A. nail offers three different types of distal locking as illustrated in fig. 27.

Long nail. Distal Locking

Figure 28



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 locking screws.

Figure 29

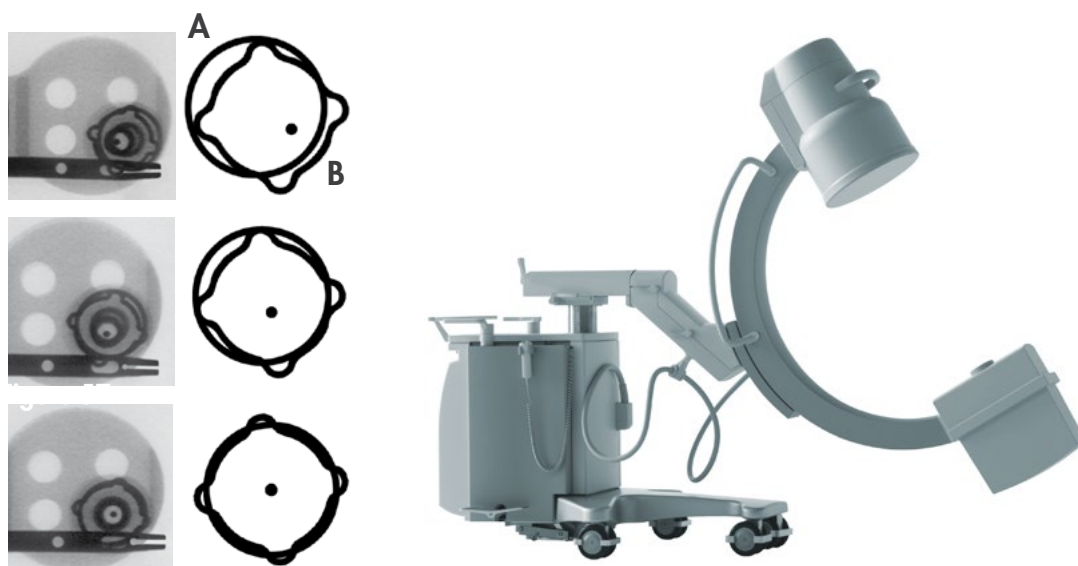


Collimate-guide assembly

Attach the distal block to the end of the guide. Insert the Collimate in the most distal hole of the block as illustrated in fig. R (Right) or L (Left) according to the limb to be treated.

Long nail. Distal Locking

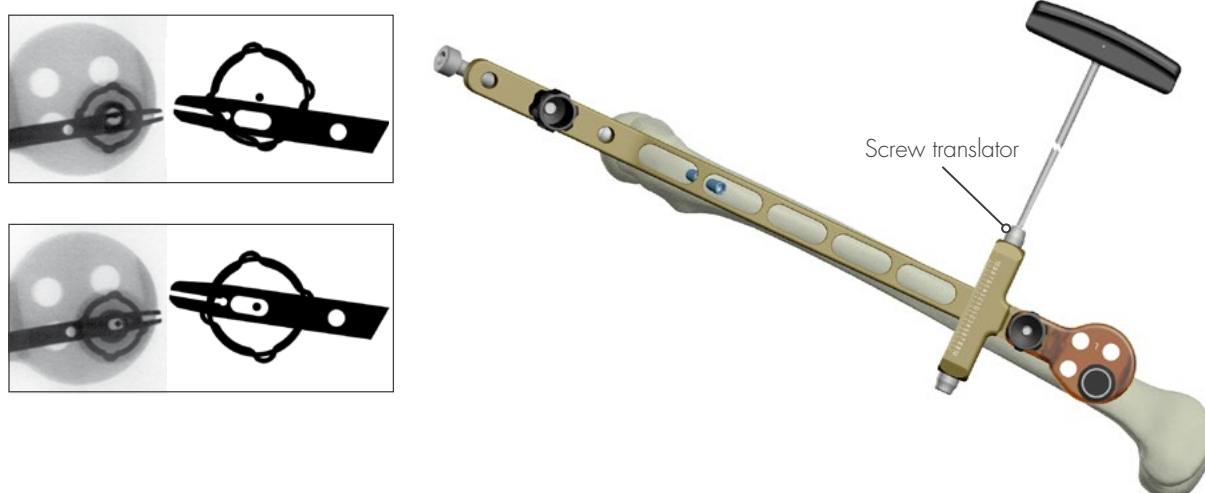
Figure 30



Centering under image intensifier

Check under image intensifier 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. In this position reference **C** should be in the center.

Figure 31



Centering with the translator

To obtain the alignment of the guide with the axis of the locking holes, rotate the screw of translator until reference **C** is in the centre of the nail slot.

Long nail. Distal Locking

Figure 32



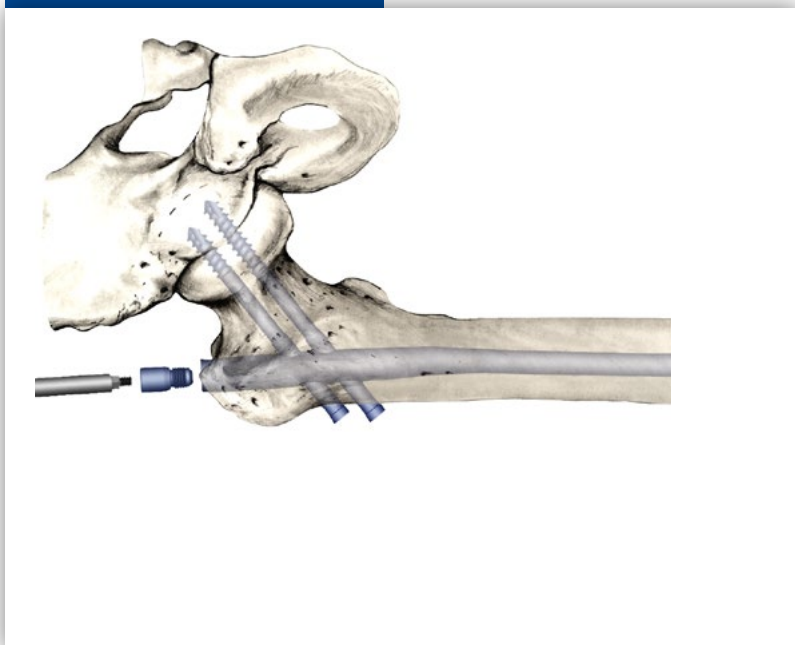
Cortical screw insertion

Make a longitudinal incision and insert a cannula and trocar down to the bone. Carefully insert a guide wire so that the tip 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.

Now proceed with the insertion of the cortical screws as previously described.

Figure 33



Insertion of the end cap

Remove the guide by unscrewing the nail locking screw with the Allen wrench. Insert the end cap in the nail.

INSTRUMENTS REQUIRED



EBA-0155
Cannula with handle



EBA-0025
Trocar



50169
Cannulated drill bit



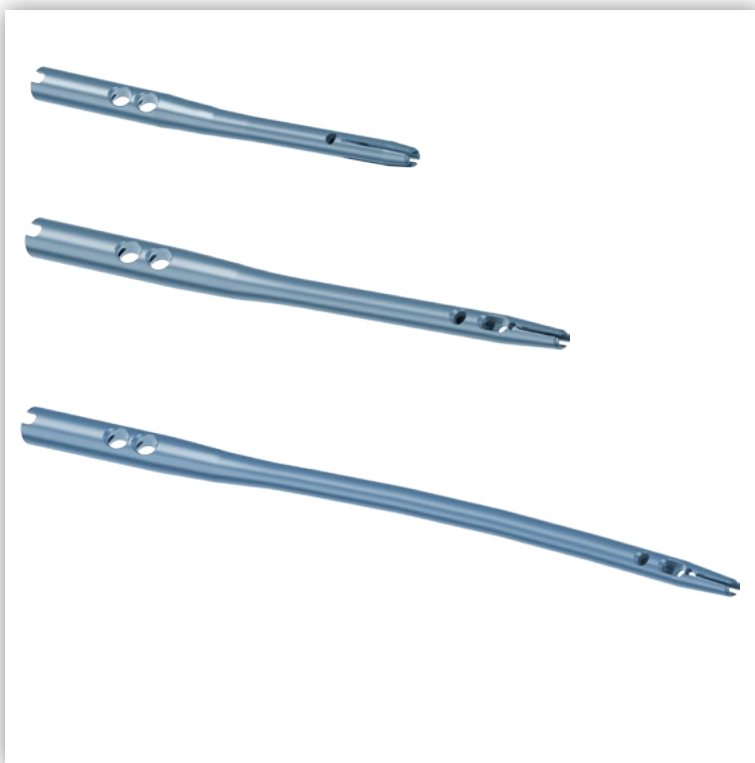
EBA-0040
Hexagonal screwdriver



EBA-0050
Allen wrench

Ordering information

STERILE



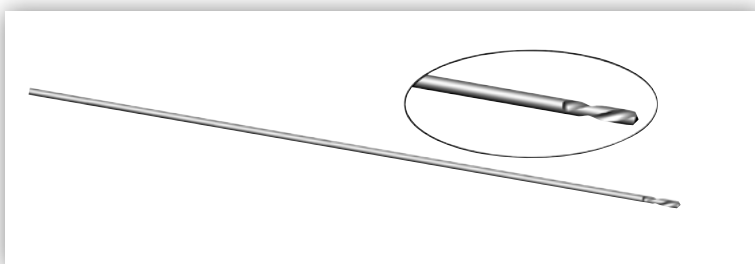
EBA-1100 Endovis B.A. standard nail,
ø10x195 mm

EBA-1500 Endovis B.A. medium nail,
ø10x240 mm

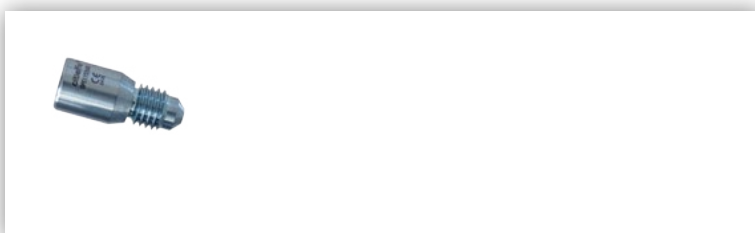
Endovis B.A. long nail

EBA-1700	ø10x320 mm RIGHT
EBA-1800	ø10x360 mm RIGHT
EBA-1900	ø10x400 mm RIGHT

EBA-1750	ø10x320 mm LEFT
EBA-1850	ø10x360 mm LEFT
EBA-1950	ø10x400 mm LEFT



All nails are supplied with the ø3x350 mm graduated wire



EBA-2000 | end cap standard nail

EBA-2001 | long end cap (standard nail)

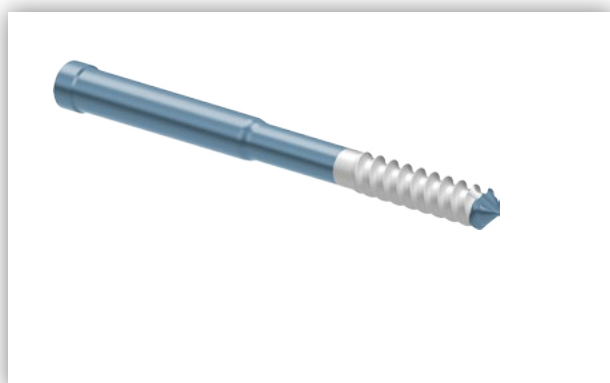
EBA-2002 | end cap long and medium nail

Ordering information

STERILE

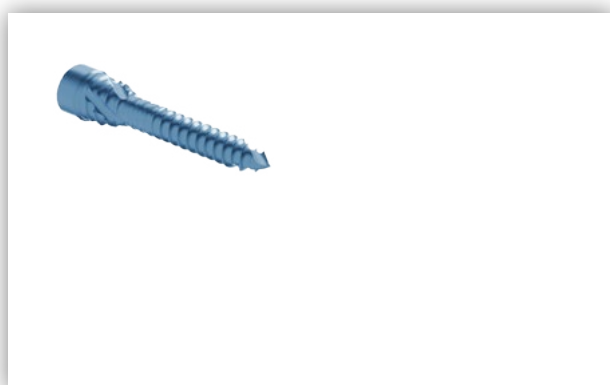

ø6.5-7.5 mm cephalic screw

EBA-2070	Screw L. 70 mm
EBA-2075	Screw L. 75 mm
EBA-2080	Screw L. 80 mm
EBA-2085	Screw L. 85 mm
EBA-2090	Screw L. 90 mm
EBA-2095	Screw L. 95 mm
EBA-2100	Screw L. 100 mm
EBA-2105	Screw L. 105 mm
EBA-2110	Screw L. 110 mm



ø6.5-7.5 mm cephalic screw, hidroxiapatite

EBA-4070	Screw L. 70 mm
EBA-4075	Screw L. 75 mm
EBA-4080	Screw L. 80 mm
EBA-4085	Screw L. 85 mm
EBA-4090	Screw L. 90 mm
EBA-4095	Screw L. 95 mm
EBA-4100	Screw L. 100 mm
EBA-4105	Screw L. 105 mm
EBA-4110	Screw L. 110 mm



ø5 mm cortical screw

EBA-3030	Screw L. 30 mm
EBA-3035	Screw L. 35 mm
EBA-3040	Screw L. 40 mm
EBA-3045	Screw L. 45 mm
EBA-3050	Screw L. 50 mm
EBA-3055	Screw L. 55 mm
EBA-3060	Screw L. 60 mm
EBA-3065	Screw L. 65 mm
EBA-3070	Screw L. 70 mm
EBA-3075	Screw L. 75 mm
EBA-3080	Screw L. 80 mm

Ordering information

Basic instrument

Code	Description
4079	Cannulated awl
EBA-0005	Guide wire ø3x750 mm
EBA-0010	Soft tissue protection sleeve
EBA-0015	ø7/15 mm trochanteric reamer
EBA-0020	ø10 mm cannula (2 pcs.)
EBA-0025	Trocar
EBA-0030	Chuck for ø2.5-3 mm wires
EBA-0035	ø5/7.5 mm cephalic drill solid
EBA-0040	6 mm hexagonal screwdriver
EBA-0050	Allen wrench
EBA-0060	Screw length ruler
EBA-0131	Standard Endovis B.A. nail guide
EBA-0160	Hexagonal T-wrench
EBA-0250	Endovis B.A. standard instrument tray, empty
EBA-0300	Box for screws, empty
TK87170-2F-BL	Sterilization box 580x270x110 mm, empty

Medium and long nail instrument *(to be added to the basic instrument set)*

50169	ø6.5 mm cannulated drill bit
EBA-0150	Endovis B.A. medium and long nail guide
EBA-0154	Distal centering guide for Endovis B.A. long nail
EBA-0155	Cannula with handle
EBA-0170	12 mm spanner
EBA-0260	Endovis B.A. medium and long instrument tray, empty
TK87170-2F-BL	Sterilization box 580x270x110 mm, empty

Optional instrument

40470810	Single use knife ø8 mm blade 10 mm, sterile
EBA-0006	ø3x750 mm guide wire, sterile
KIT0001	Removal kit for citieffe nails

Endovis B.A.

Intramedullary Nail
Lateral proximal femur fractures

citieffe®
Essential moves in Trauma

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