

Operative technique



In-one
tibial nail

Intramedullary
nail

Surgeons must always decide on the best approach to follow according to their clinical judgement and the patient's needs. Citieffe does not dispense medical advice and recommends that surgeons be trained in the use of any particular product before using it in surgery. The information presented is intended to demonstrate the extent of Citieffe product offerings.

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Indications and product description

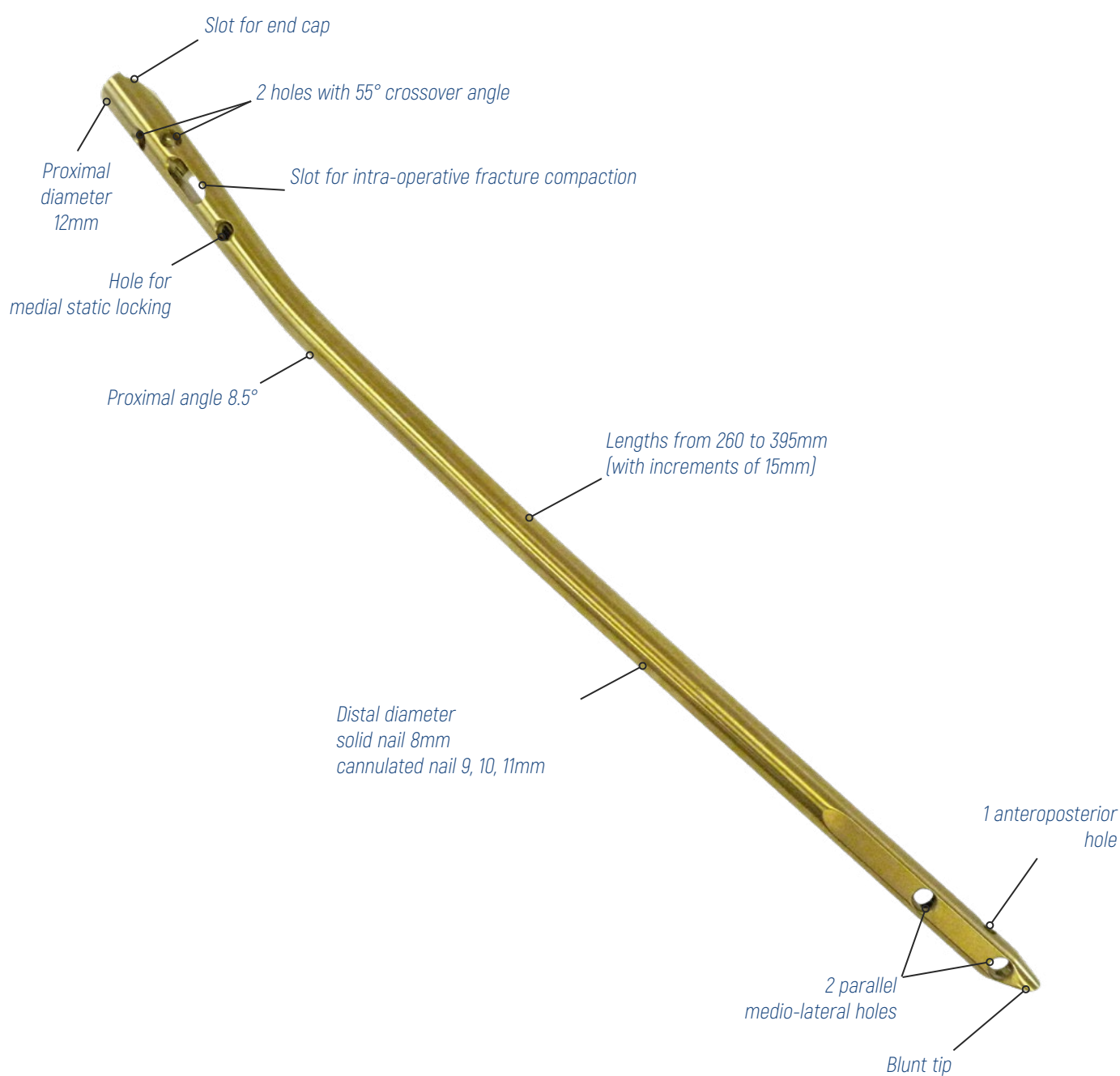
TITANIUM

STERILE

Indications

Treatment of diaphyseal fractures of the tibia including the proximal third and the distal third ; non unions, mal unions; pathologic fractures; corrective osteotomies.

In-One tibial nail



Product description

TITANIUM**STERILE**

Cortical screw

The In-One screw head and end caps have a screw retention system which secures them to the screwdriver during surgery.

4.2mm thread diameter

Length from 25 to 70mm *(increments of 5mm)*



3.8mm thread diameter

Length from 25 to 40mm *(increments of 5mm)*



Only for solid nail distal holes

Protection end cap

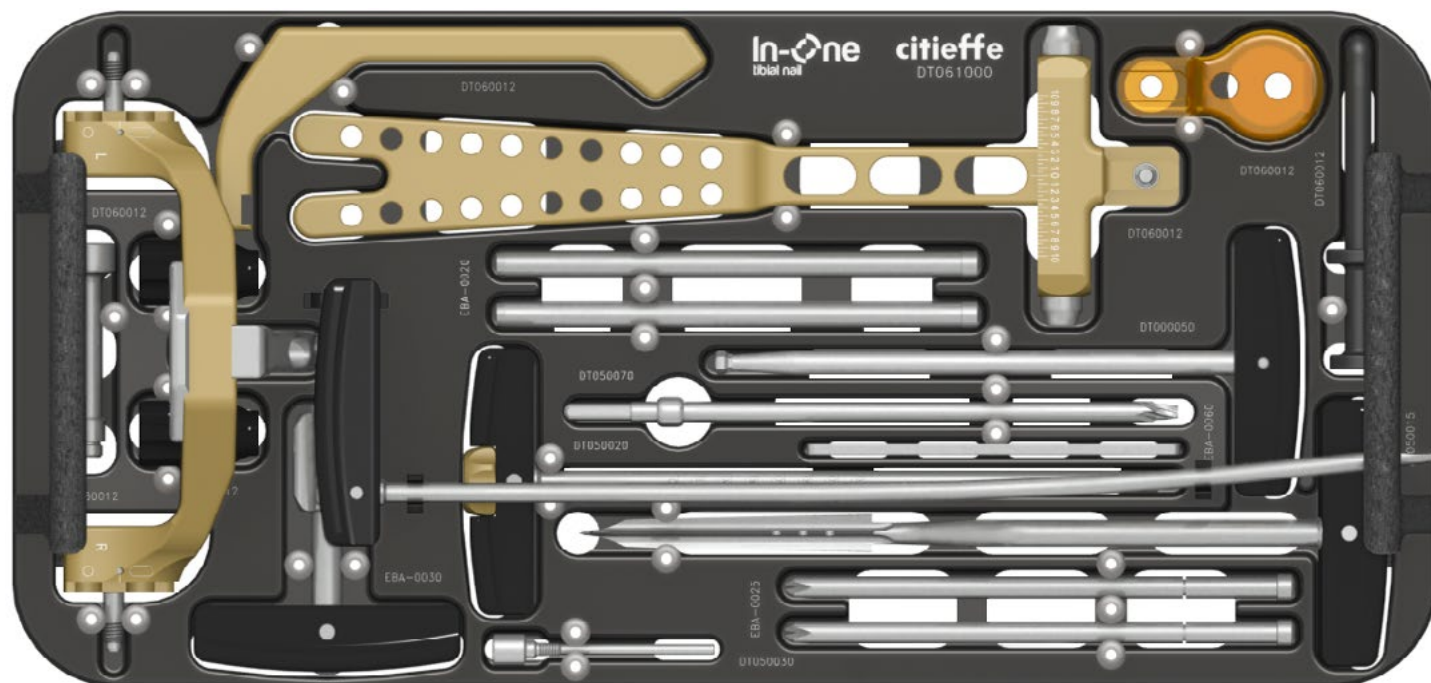
In-One end cap



5 mm In-One end cap



In-One tibia instrument set



Code no.	Description
DT000050	Hexagonal T-wrench, 8mm
DT010020	Fracture alignment guide wire exchange tool
DT050005	ø3x750mm graduated guide wire
DT050015	Hand awl
DT050020	5mm hexagonal screwdriver
DT050030	Compaction device
DT050070	ø6mm cannulated drill bit
DT060012	In-One tibia centering guide
EBA-0020	ø10mm cannula <i>[2 pieces]</i>
EBA-0025	Trocar <i>[2 pieces]</i>
EBA-0030	Chuck for ø2.5-3mm wires
EBA-0060	Screw length ruler
DT060300	In-One tibia box screws, empty
DT061000	In-One tibia instrument tray, empty
TK87170-2F-YE	580x270x100mm sterilization box, empty

Patient positioning and incision



Patient positioning

Position the patient with the limb to be treated in skeletal traction.

The contralateral hip and knee should be flexed to 90° (to allow free use of the image intensifier).

The fracture is reduced using the image intensifier.

Do not proceed with synthesis until the fracture has been correctly reduced.

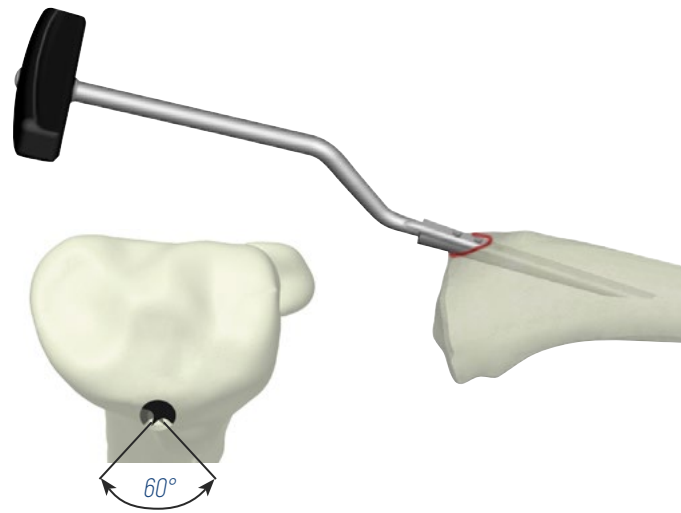
Incision

The incision is vertical and central to the tibial plateau and extends downwards for about 5cm.

Nail insertion may be via a central split in the patellar tendon or just medial to it, according to the surgeon's preferences or the anatomy of the patient.

Preparation of the entry point and nail measurement

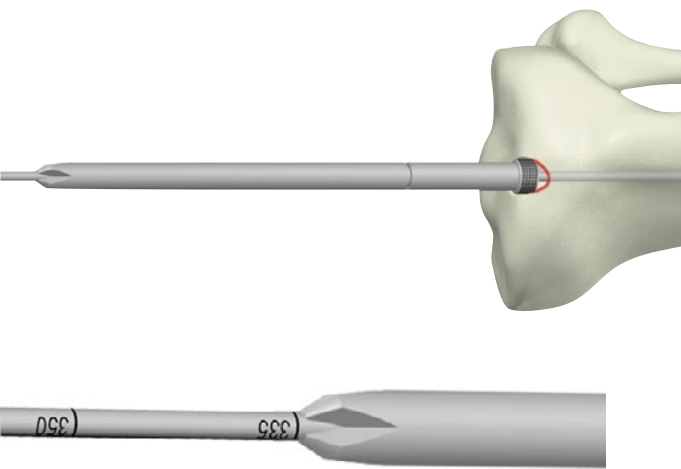
Preparation of nail entry portal



Using the hand awl, identify the entry point, which is about 1 cm below the anterior margin of the tibial plateau. Correct insertion limits the risk of damaging the posterior cortex.

Insert the awl into the cortex by hand. Advance the awl into the medullary canal with rotary movements of about $\pm 30^\circ$: greater excursions might damage the patellar tendon or the tibial tuberosity.

Nail length measurement



Remove the awl and insert the $\varnothing 3 \times 750$ mm graduated guide wire with the chuck attached into the medullary canal.

Advance the guide wire, passing the fracture site under image intensifier control, if necessary using the fracture alignment guide wire exchange tool. Continue until the wire tip reaches the distal tibial articular surface.

Slide the trocar down over the guide-wire to the anterior cortex, and read the correct nail length on the graduated scale at the proximal end of the trocar.

NOTE For intermediate readings it is advisable to use the shorter nail.

INSTRUMENTS REQUIRED



DT050015
Hand awl



DT050005
 $\varnothing 3 \times 750$ mm
graduated guide wire



DT010020
Fracture alignment guide wire
exchange tool

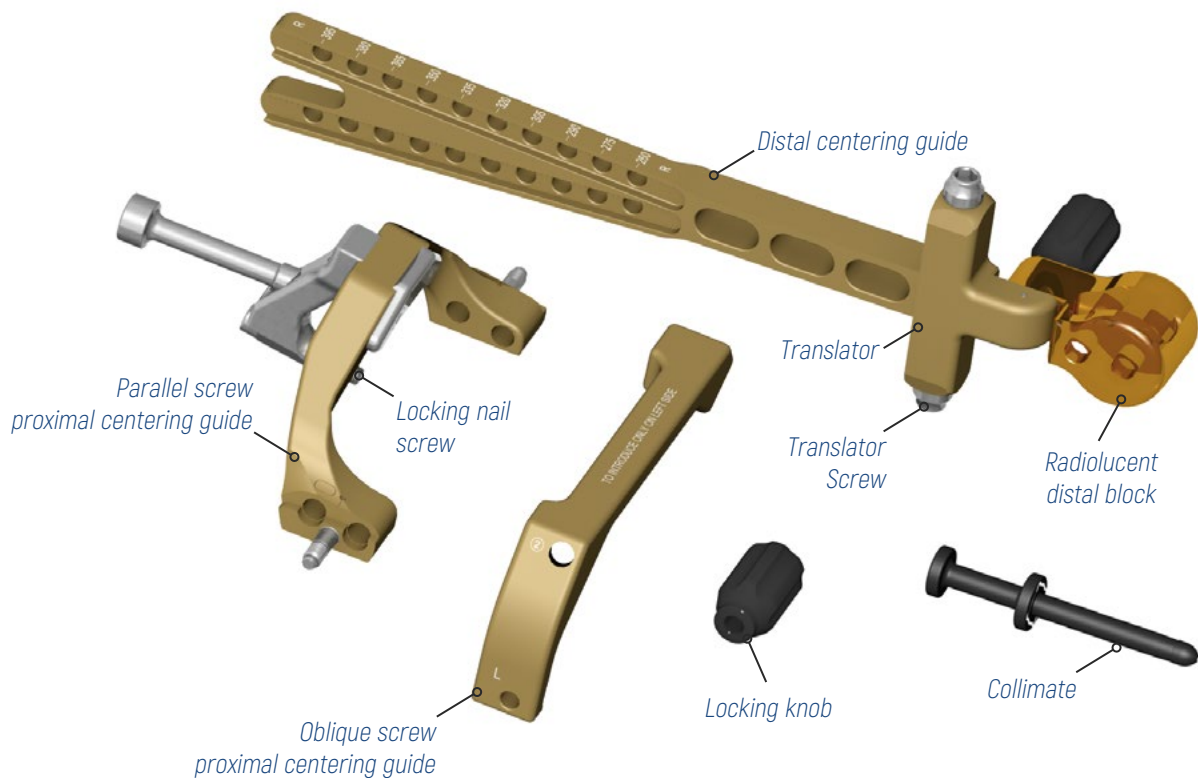


EBA-0025
Trocar



EBA-0030
Chuck for wires

In-One tibia centering guide

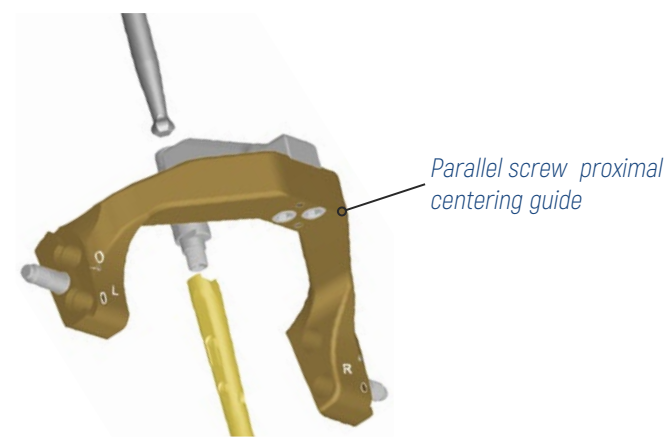


Components of the In-One tibia distal centering guide

- **Distal Centering Guide** with holes, for different nail lengths, left and right
- **Parallel Screw Proximal Centering Guide** with nail attachment
- **Oblique Screw Proximal Centering Guide** to be inserted on the side marked **LEFT** only
- **Radiolucent Distal Block** for a clear radiographic vision of the screw insertion area
- **Collimate** to obtain the alignment of the hole on the distal block with that of the nail
- **Translator** for adjusting the position of the distal block

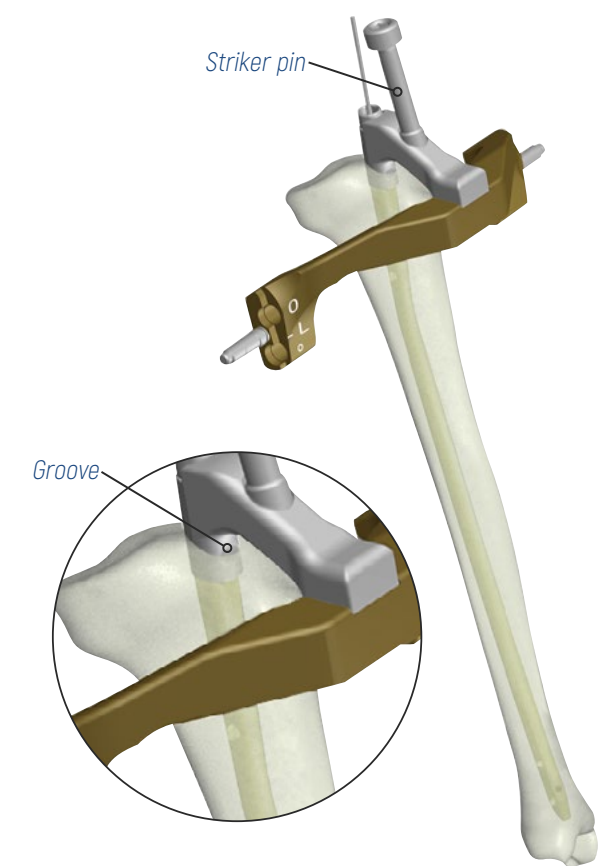
Nail insertion

Nail-guide assembly



Fit the nail onto the parallel screw proximal centering guide and lock it in place with the 8mm hexagonal T-wrench.

Nail insertion



The medullary canal should be reamed using the standard technique in 0.5mm increments, at least 1.5mm more than the diameter of the nail.

Insert the nail over the guide wire and advance it carefully, checking that the nail progresses easily. If there is excessive resistance, extract the nail by hand (avoiding hammering on the guide) and ream.

The nail must be inserted until the reference on the parallel screw proximal centering guide is inside the bone (visible under image intensifier control). If there is significant intra-operative fracture compaction, the nail may back out about 5mm.

Remove the guide wire after nail insertion.

NOTE Never hammer the guide; if necessary use the striker pin guide attached to it.

INSTRUMENTS REQUIRED



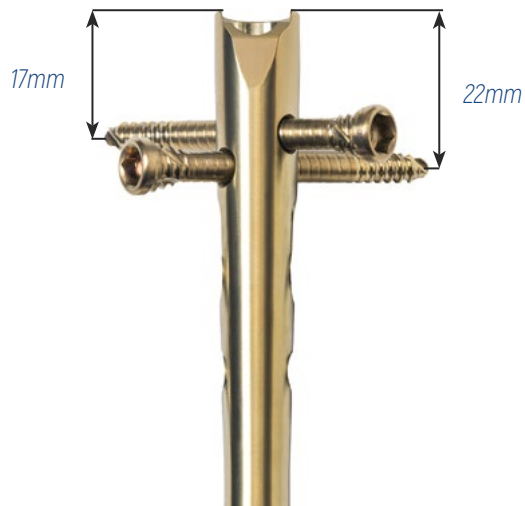
DT060012
In-One tibia centering guide



DT000050
Hexagonal T-wrench, 8mm

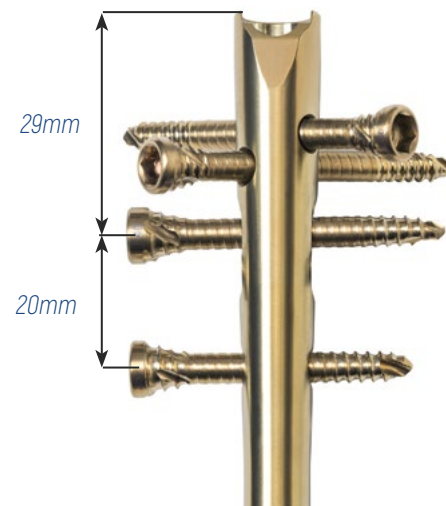
Locking options

Stable fractures locking

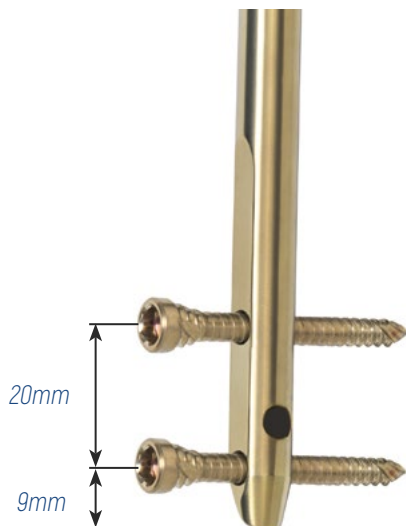


Two oblique proximal screws

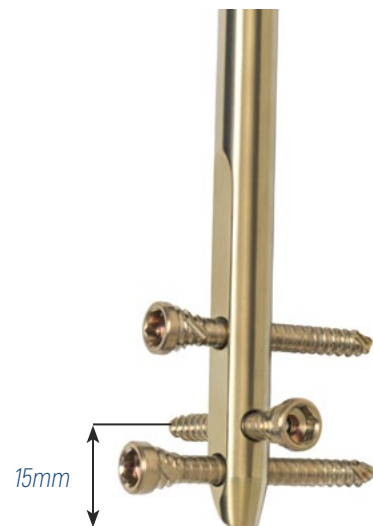
Unstable fractures locking (up to 7 locking screws)



Two oblique proximal screws
one or two medial parallel screws



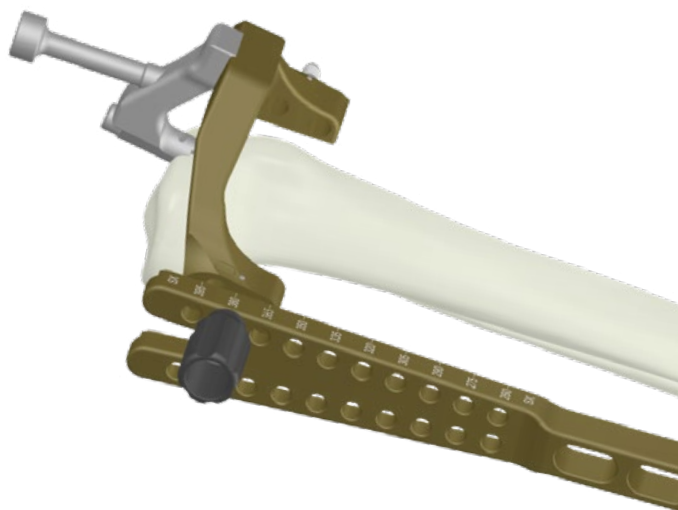
Two distal parallel screws



Two distal parallel screws
one antero-posterior screw

Distal locking

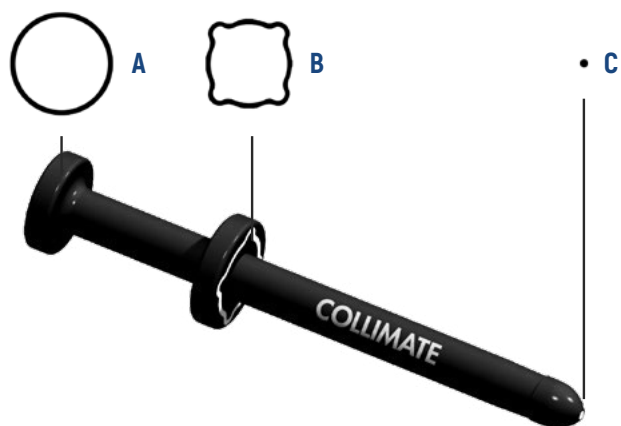
Guide components assembly



Attach the distal centering guide to the parallel screw centering guide, using the hole corresponding to the according to the length of the nail and of the limb (right or left).

Tighten the locking knob.

Collimate

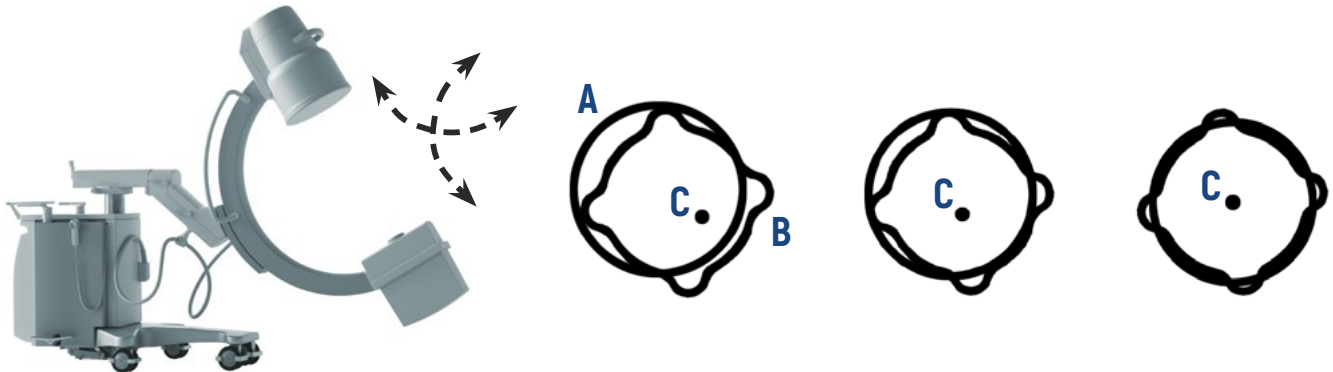


The radiolucent Collimate is characterized by radio opaque references (**A**, **B** and **C**) visible under image intensifier.

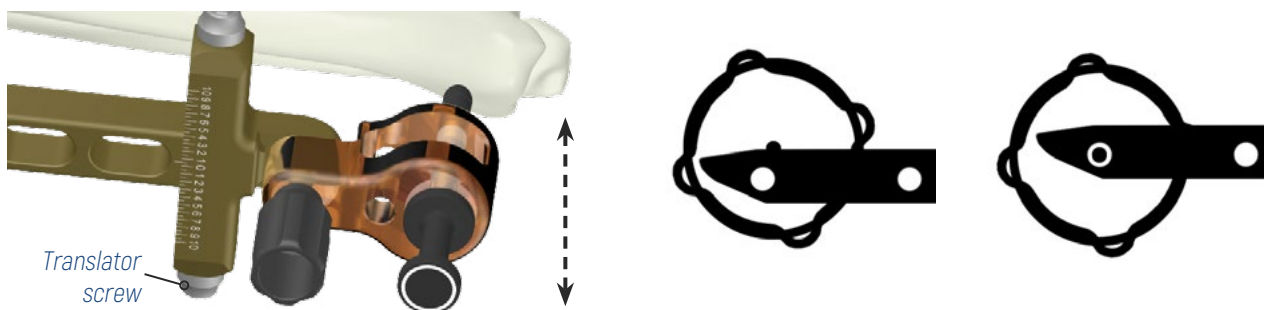
Their alignment allows precise centering of the guide for insertion of the locking screws.

Attach the radiolucent distal block to the distal centering guide.

Insert the Collimate in the most distal hole of the block.

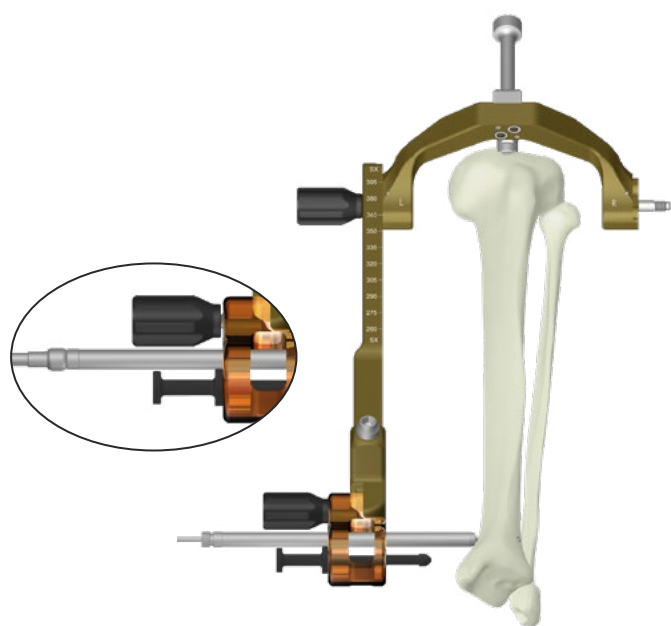


Under image intensifier: check the position of the two radio-opaque references **A** and **B** of the Collimate. With small movements of the image intensifier obtain an image in which the two references are perfectly overlapping and central. In this position reference **C** should be in the centre of references **A** and **B**.



Rotate the **translator screw** until reference **C**, in the middle of the two radio-opaque markers, is in the centre of the distal nail hole.

Distal screw measurement



Introduce a cannula (with the trocar already inserted) into the most proximal hole of the distal guide block. Make an incision where it touches the skin, expose the bone by blunt dissection and push the cannula down to the bone.

Insert the graduated guide wire (provided with the nail) into the trocar using a motor driver, until the tip is 2mm past the second cortex. Use the image intensifier with an anteroposterior projection to make sure the guide wire is positioned correctly.

Check that the trocar is touching the bone and read the length of the screw to be implanted on the guide wire at the end of the trocar. If using the screw length ruler, read the measurement at the end of the wire.

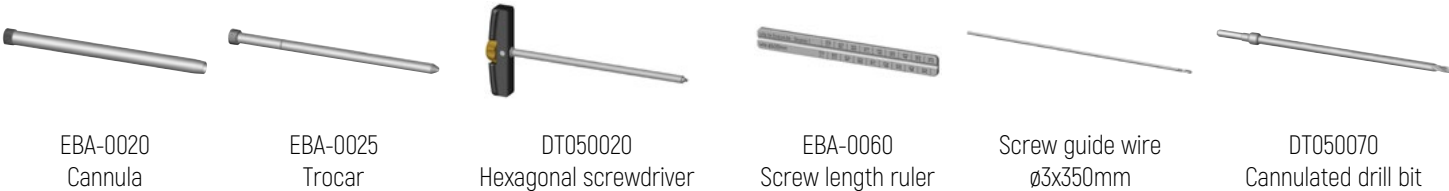
Remove the trocar, leaving the graduated wire in position and drill the first cortex up to the stop using the cannulated drill bit. Remove the drill bit with the graduated wire.

Screw insertion on the screwdriver

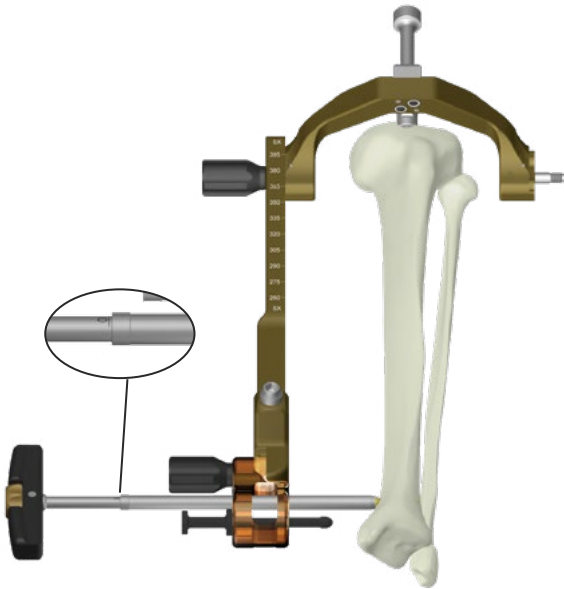


Attach the screw to the screwdriver and lock it by turning the knob clockwise.

INSTRUMENTS REQUIRED



First distal screw insertion

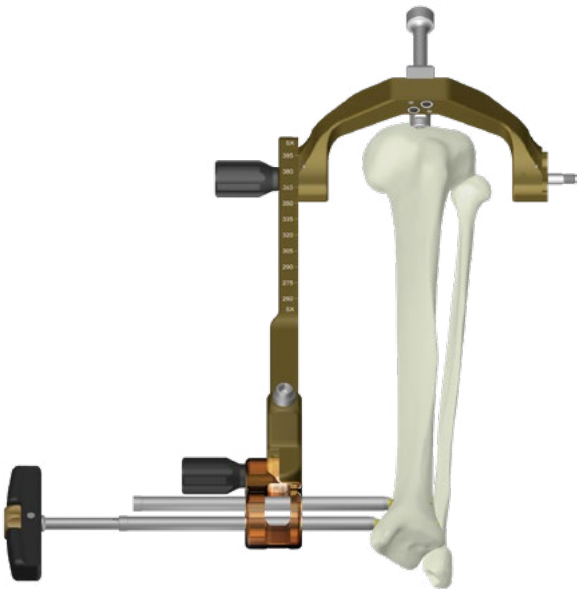


Insert the screwdriver into the cannula and screw in until the the "0" mark on the screwdriver reaches the top of the cannula, which must remain in contact with the cortex.

Check progress on the graduated scale on the screwdriver stem.

Remove the screwdriver by unscrewing the knob. If it is blocked, loosen the knob using the T-wrench.

Second distal screw insertion



Remove the Collimate.

Leave the cannula well engaged with the screw head to stabilise the position of the distal centering guide. Repeat the operations described to insert the second distal screw.

NOTE Insert the anteroposterior screw using a free-hand technique if greater implant stability is required.

INSTRUMENTS REQUIRED



EBA-0020
Cannula



EBA-0025
Trocar



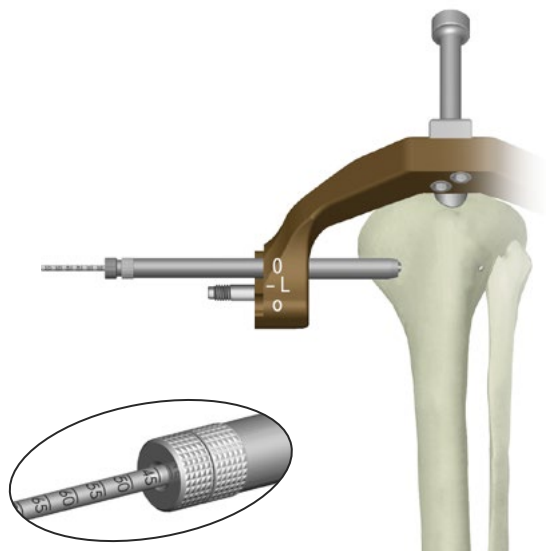
DT050020
Hexagonal screwdriver



DT050070
Cannulated drill bit

Proximal locking

Proximal screw measurement



Remove the Distal Centering Guide.

Introduce a cannula (with the trocar already inserted) in the chosen proximal hole of the guide.

Make an incision where it touches the skin, push the cannula (with the trocar already inserted) down to the bone. Insert the graduated guide wire through the trocar using a motor driver, until the tip is 2mm past the second cortex.

Check that the trocar is touching the bone and read the length of the screw to be implanted at the end of the trocar. If using the screw length ruler, read the measurement at the end of the wire.

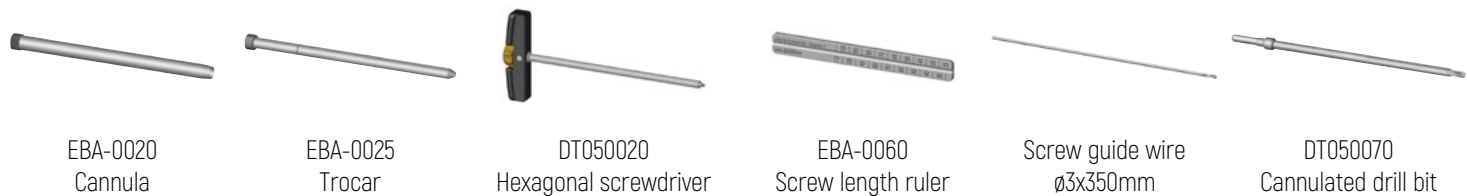
Remove the trocar, leaving the graduated wire in position, and drill the first cortex up to the stop using the cannulated drill bit. Then remove the drill bit with the graduated wire.

Screw insertion with the screwdriver



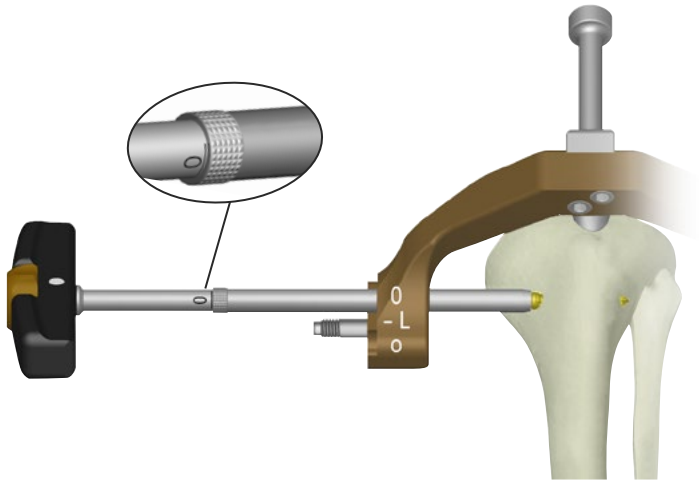
Fix a screw of the correct length to the screwdriver by turning the knob clockwise.

INSTRUMENTS REQUIRED



Proximal locking and intraoperative compaction

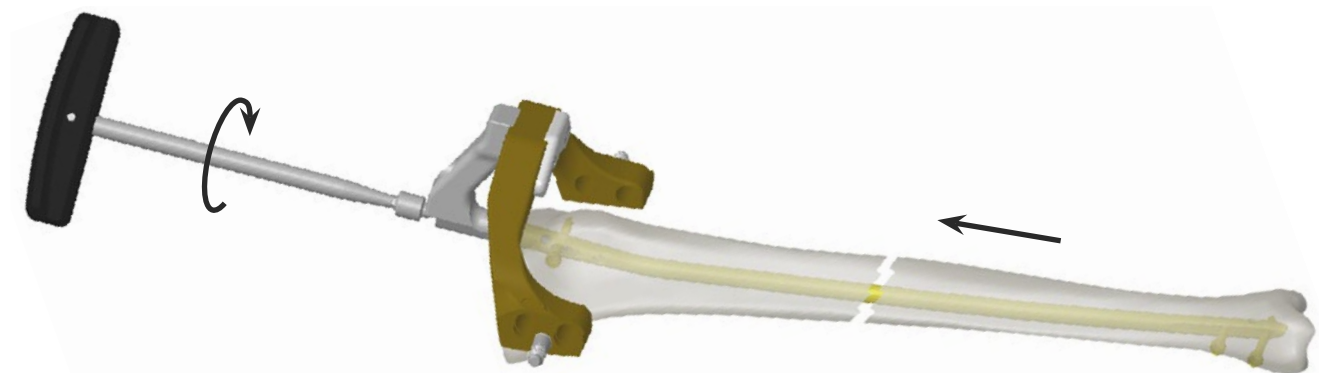
Proximal screw insertion



Insert the screwdriver into the cannula and screw in until the the "0" mark on the screwdriver reaches the top of the cannula, which must remain in contact with the cortex.

Check progress on the graduated scale on the screwdriver stem.

Remove the screwdriver by unscrewing the knob. If it is blocked, loosen the knob using the T-wrench.



The intra operative fracture compaction directly on the parallel screw proximal centering guide is possible only when the nail is locked proximally with the screw inserted in the slot.

Insert the compaction device into the locking screw nail.

Fit the 8mm T-wrench on to the compaction device. Turn clockwise to perform compaction. Check progress under image intensifier.

With the compaction device inserted, introduce the second proximal screw whilst maintaining the compaction obtained. Remove the compaction device from the proximal hole component.

NOTE During compaction, the nail moves proximally by up to 5mm.

INSTRUMENTS REQUIRED



DT050030
Compaction device



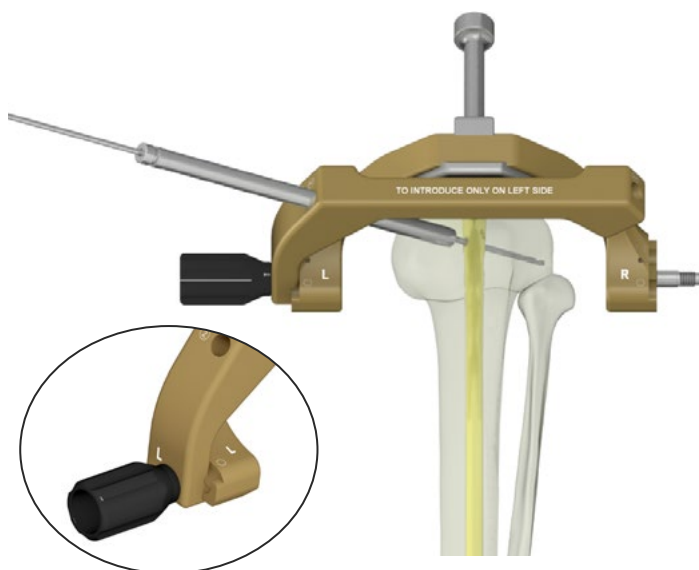
DT050020
Hexagonal screwdriver



DT000050
T-wrench

Proximal locking with oblique screws

Guide wire insertion

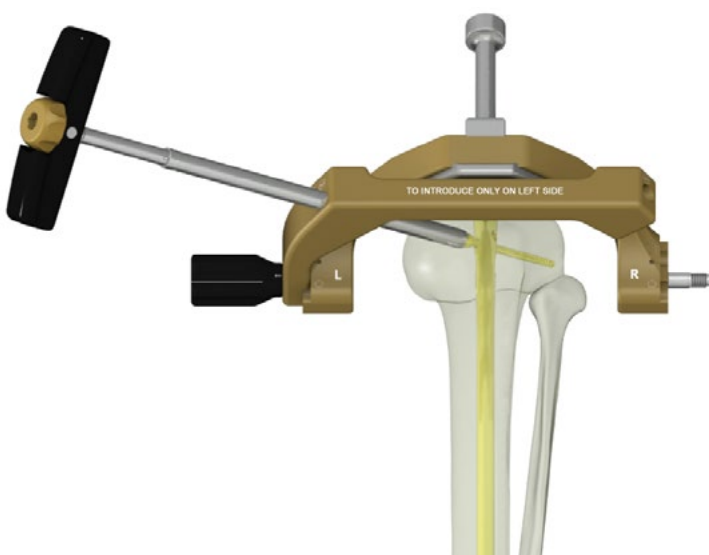


Fit the oblique screw proximal centering guide on to the parallel screw proximal centering guide **on the side labelled LEFT** and tighten the locking knob.

Insert the cannula and trocar into the guide hole. Introduce the screw guide wire into the trocar using a motor driver, without going beyond the second cortex.

Check that the trocar is touching the bone and read the length of the screw to be implanted on the guide wire at the end of the trocar.

Oblique screw insertion



Position a screw of the correct length on the screwdriver and lock by turning the knob clockwise manually.

Remove the screwdriver by unscrewing the knob. If it is blocked, loosen the knob using the T-wrench.

If the second oblique screw is to be inserted, repeat the operations just described leaving the first cannula inserted.

INSTRUMENTS REQUIRED



EBA-0020
Cannula



EBA-0025
Trocar



DT050020
Hexagonal screwdriver



DT050070
Cannulated drill bit

In-One end cap insertion

End cap insertion



Remove the guide by unscrewing the nail locking screw with the T-wrench.

Lock the end cap on the screwdriver and insert it in the apex of the nail turning clockwise.

INSTRUMENTS REQUIRED



DT050020
Hexagonal screwdriver



DT000050
T-wrench

Ordering information

TITANIUM

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Solid nail

Supplied with guide wire for locking screws



Code no.	Size (mm)
DT608260	ø8x260
DT608275	ø8x275
DT608290	ø8x290
DT608305	ø8x305
DT608320	ø8x320
DT608335	ø8x335
DT608350	ø8x350

Cannulated nail

Supplied with guide wire for locking screws



Code no.	Size (mm)
DT609260	ø9x260
DT609275	ø9x275
DT609290	ø9x290
DT609305	ø9x305
DT609320	ø9x320
DT609335	ø9x335
DT609350	ø9x350
DT609365	ø9x365
DT609380	ø9x380
DT609395	ø9x395

Code no.	Size (mm)
DT610260	ø10x260
DT610275	ø10x275
DT610290	ø10x290
DT610305	ø10x305
DT610320	ø10x320
DT610335	ø10x335
DT610350	ø10x350
DT610365	ø10x365
DT610380	ø10x380
DT610395	ø10x395

Code no.	Size (mm)
DT611260	ø11x260
DT611275	ø11x275
DT611290	ø11x290
DT611305	ø11x305
DT611320	ø11x320
DT611335	ø11x335
DT611350	ø11x350
DT611365	ø11x365
DT611380	ø11x380
DT611395	ø11x395

Ordering information

TITANIUM

STERILE



Cortical screw - $\varnothing 4.2\text{mm}$



Code	L. (mm)
DT645025	25
DT645030	30
DT645035	35
DT645040	40
DT645045	45
DT645050	50
DT645055	55
DT645060	60
DT645065	65
DT645070	70

Cortical screw - $\varnothing 3.8\text{mm}$

Only for $\varnothing 8\text{mm}$ solid nail distal holes



Code	L. (mm)
DT638020	20
DT638025	25
DT638030	30
DT638035	35
DT638040	40

In-One end cap



Code	Description
DT600000	In-One end cap
DT600005	5mm In-One end cap

Ordering information - Instrument set

NOT STERILE

Basic instruments

Code no.	Description
DT000050	Hexagonal T-wrench, 8mm
DT010020	Fracture alignment guide wire exchange tool
DT050005	ø3x750mm graduated guide wire
DT050015	Hand awl
DT050020	5mm hexagonal screwdriver
DT050030	Compaction device
DT050070	ø6mm cannulated drill bit
DT060012	In-One tibia centering guide
EBA-0020	ø10mm cannula <i>[2 pieces]</i>
EBA-0025	Trocar <i>[2 pieces]</i>
EBA-0030	Chuck for ø2.5-3mm wires
EBA-0060	Screw length ruler
DT060300	Box for In-One tibia screws, empty
DT061000	In-One tibia instrument set tray, empty
TK87170-2F-YE	580x270x100mm sterilization box, empty

Optional instruments

Code no.	Description
66990N	ø3x350mm graduated guide wire, hel. tip - STERILE
DT050006	ø3x750mm graduated guide wire with olive
KIT0001	Nails removal kit



Intramedullary nail



INSPIRED BY PEOPLE
MOVED BY INNOVATION



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