

SURGICAL TECHNIQUE FOR METACARPAL USE OF

STERILE NX NAIL SYSTEM

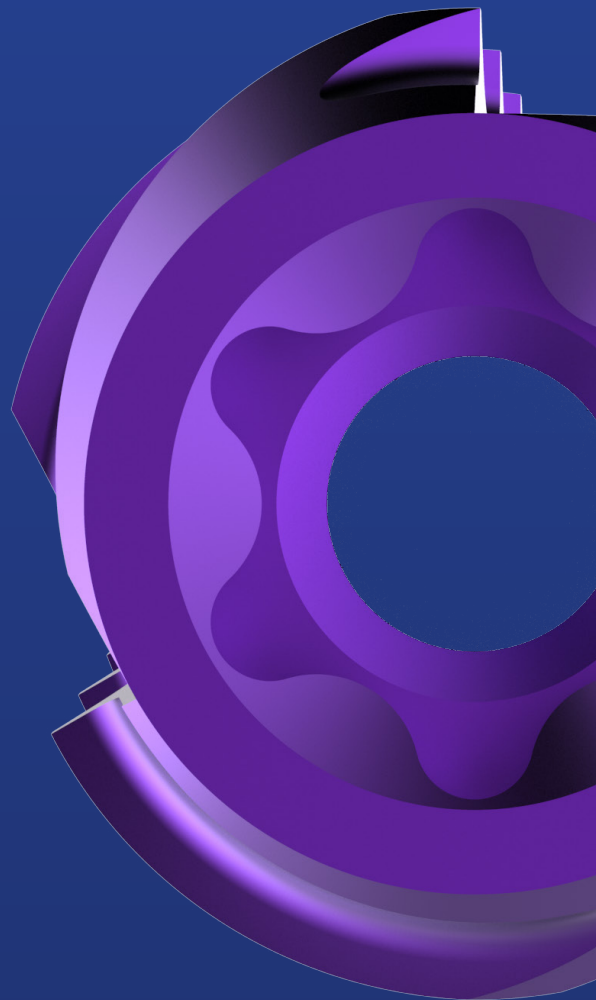
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INDICATIONS FOR USE

The FO BTES Screw and NX Nail range are intended for use in the fixation of fractures, osteotomies, and arthrodesis, appropriate for the size of the device, in adults and both children (2-12 years) and adolescents (12-21 years), in which growth plates have fused or in which growth plates will not be crossed by screw fixation.




PROCEDURAL TECHNIQUE

STEP 1: PREOPERATIVE PLANNING

Each of the five metacarpals in the hand is unique in its anatomy. Convex dorsally, concave in the volar aspect and differing in length and shape, metacarpals require consideration in three dimensions.

Review Radiographs

- If crossing the isthmus, identify the size and location to ensure the leading tip can pass through without causing fracture or getting lodged.

 **TIP:** To overcome the limitations of two-dimensional radiographs, take measurements on multiple projection angles where possible and use the smallest of these measurements taking into account the shape of the isthmus.

Templating

Prior to opening the size specific instrument kit, it is recommended to template the fractured metacarpal using the individually packed, single-use, sterile sizing template (Cat No. NXSGs/Ref No. 961) to determine the correct size instrument kit to select and open.


This radiopaque template consists of six arms, each representing one of the NX Nail sizes (2.0-5.0), which can be snapped off and placed over the injured metacarpal for imaging (as shown in the image).

The geometry of the template arms corresponds to the diameter of the implant leading tip (including threads) so that an optimal fit can be determined when taking the isthmus into account.

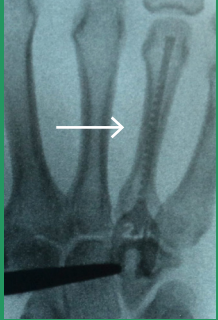
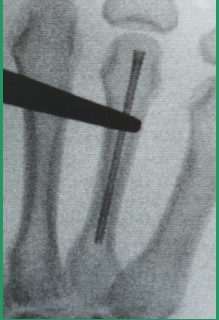

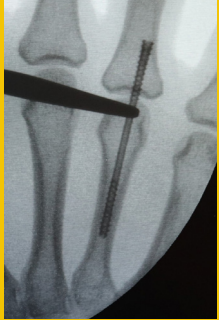




Confirming Diameter

- Ensuring the packaging seals are intact and not damaged, open the individually packed, single-use, sterile radiopaque sizing template (Cat No. NXSGs/Ref No. 961). Do not use if seals or packaging are open or damaged.
- Under fluoroscopy, using the projection angle which gave the smallest isthmus measurement, align the edge of the template arm with the borders of the isthmus.
- Refer to available size range at the back of this document.
- Select a size smaller than the line-to-line fit to ensure the implant can pass through the isthmus without making contact with cortical bone.

 **TIP:** The NX Nail achieves stability with the compaction taper head and leading tip. There is no need to achieve fixation within the isthmus. If presented with a line-to-line fit or "beyond", consider downsizing to avoid stuffing the isthmus.


The images below show the fourth and fifth metacarpal of a healthy 50yo male with three different template and implant sizes to compare the ability of the leading tip to safely pass through the isthmus.

RECOMMENDED		NOT ADVISED - TAKE CAUTION		DO NOT PROCEED	
					
2.0 Template	2.0 Implant	2.5 Template	2.5 Implant	3.0 Template	3.0 Implant
Shows some radiolucency at the isthmus. This scenario represents the ideal fit.		Shows no radiolucency at the isthmus. In this scenario, consider downsizing or using the drill bit from the next size up to open the isthmus.		Shows the template sitting over cortical bone at the isthmus. This size is too large.	

Measure Length

Notches on the template relate to the available lengths in each size and the black handle functions as a ruler.

- Using the confirmed diameter template, align the arm with the borders of the isthmus in the implant's final position, as the tapered head corresponds to the implant head.
- Select a length that provides enough purchase with the leading thread and crosses the fracture.
- This preliminary length measurement will be confirmed in step 3 with the sterile depth gauge from the size specified instrument kit.

 **TIP:** When measuring between sizes, the preference should be to downsize.



Open Sterile Instrument Kit

- Having confirmed implant size, select the required size specific sterile single-use instrument kit.
- Ensuring packaging seals are intact and not damaged before opening. Do not use if seals or packaging are open or damaged.




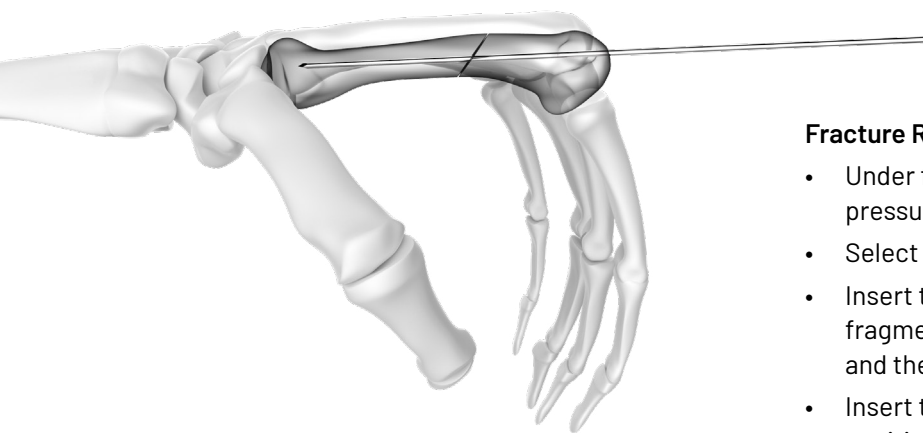
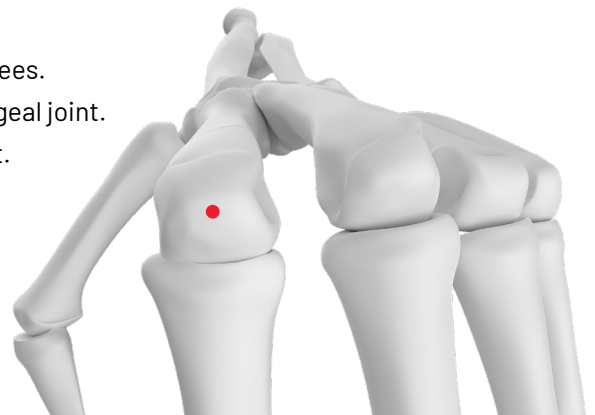
STEP 2: REDUCTION AND TEMPORARY FIXATION

The precision cannulation of the NX Nail provides accurate reduction and temporary fixation during implant preparation and insertion.

Approach


- Using the retrograde technique, flex the finger to 90 degrees.
- Make a small incision (2-3mm) over the metacarpophalangeal joint.
- Identify the dorsal third of the head for the insertion point.

 **TIP:** The dorsal third represents the ideal entry point of the K-wire in the sagittal plane, extending a line through the centre of the canal and exiting at the base.



Fracture Reduction

- Under fluoroscopy, use distraction and indirect pressure to anatomically reduce the fracture.
- Select the K-wire from the sterile instrument kit.
- Insert the K-wire in the longitudinal axis of the distal fragment centred in the head in the coronal plane and the dorsal third in the sagittal plane.
- Insert the K-wire to the depth of the implant's final position to ensure correct length measurement.

 **TIP:** A minimal approach to the fracture can be made to facilitate accurate reduction if required.

STEP 3: CONFIRM LENGTH

- Hold the depth gauge against the metacarpal head with the protruding K-wire seated in the groove.
- Measure the exposed K-wire length against the markings on the depth gauge.
- This measurement indicates the length to which the K-wire has been inserted.



TIP: It may be appropriate to subtract up to 6mm to ensure correct implant placement.





STEP 4: BONE PREPARATION

The NX Nail compaction taper head is designed to circumferentially displace and compact cancellous bone to increase relative density and load the bone. Strong fixation and rotational control are generated by the interference fit between the implant threads and the bone.

The metaphyseal drill is provided to prepare the bone for the shape of the implant head and alleviate head forces. Instrument dimensions match the implant, excluding threads.

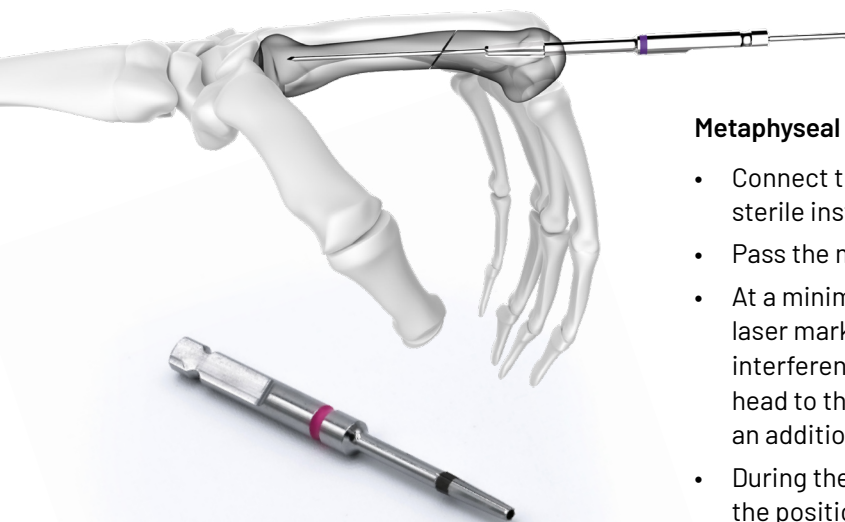
Use of the metaphyseal drill is recommended for every case.

Drill Insertion Tunnel

- Ensure the K-wire is seated securely.
- Pass the cannulated drill bit over the K-wire and drill the insertion tunnel.
- At a minimum the drill should be passed beyond the isthmus, taking care to not drill beyond the length of the K-wire which may result in loss of purchase and placement of the K-wire.
- During drill removal, take care to maintain the position of the K-wire which remains in situ.



Note: Standalone single-use drill bits are available as separately packed sterile items.




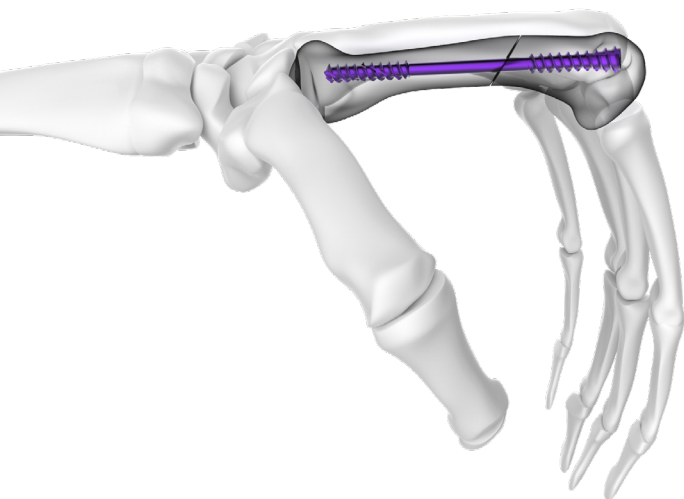
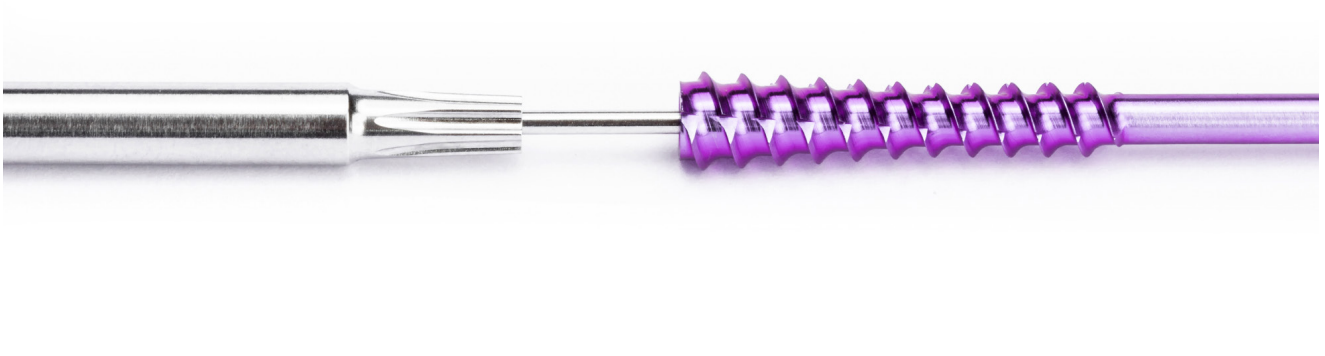
Metaphyseal Preparation

- Connect the metaphyseal drill to the handle included in the sterile instrument kit.
- Pass the metaphyseal drill over the K-wire.
- At a minimum sink the drill head to the bottom of the black laser marking band (leaving it visible). This will provide a tight interference fit. To alleviate head forces further, sink the drill head to the top of the laser marking band, which represents an additional 2mm.
- During the metaphyseal drill removal, take care to maintain the position of the K-wire that remains in situ.

STEP 5: IMPLANT INSERTION

- Connect the driver to the handle included in the sterile instrument kit.
- When connecting the driver tip to the implant head, push firmly to ensure the instrument is fully seated.
- Pass the implant over the K-wire and turn in a clockwise direction.
- During insertion, pay attention to the bone while seating the head and take care to avoid distraction or rotating the fracture.
- If resistance is felt, check under fluoroscopy.

 **TIP:** If you encounter resistance either over-drill with the drill bit from the next size up (individually packed), taking care not to drill beyond the isthmus, or downsize and consider using a longer implant.




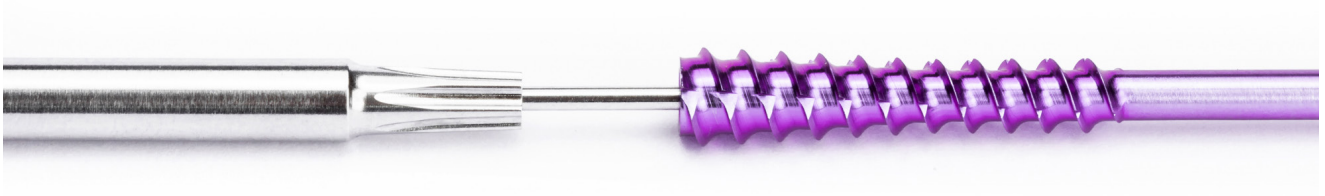
STEP 6: CLOSE

- Remove the K-wire and close using preferred method.

REMOVAL

- If implant removal is required post operatively, use a K-wire to find the cannulation in the implant.
- Pass the driver over the K-wire and fully seat the instrument in the implant head.
- Make sure the driver and implant interface is precisely aligned in the axial direction.
- Rotate the driver anti-clockwise until the implant is free.

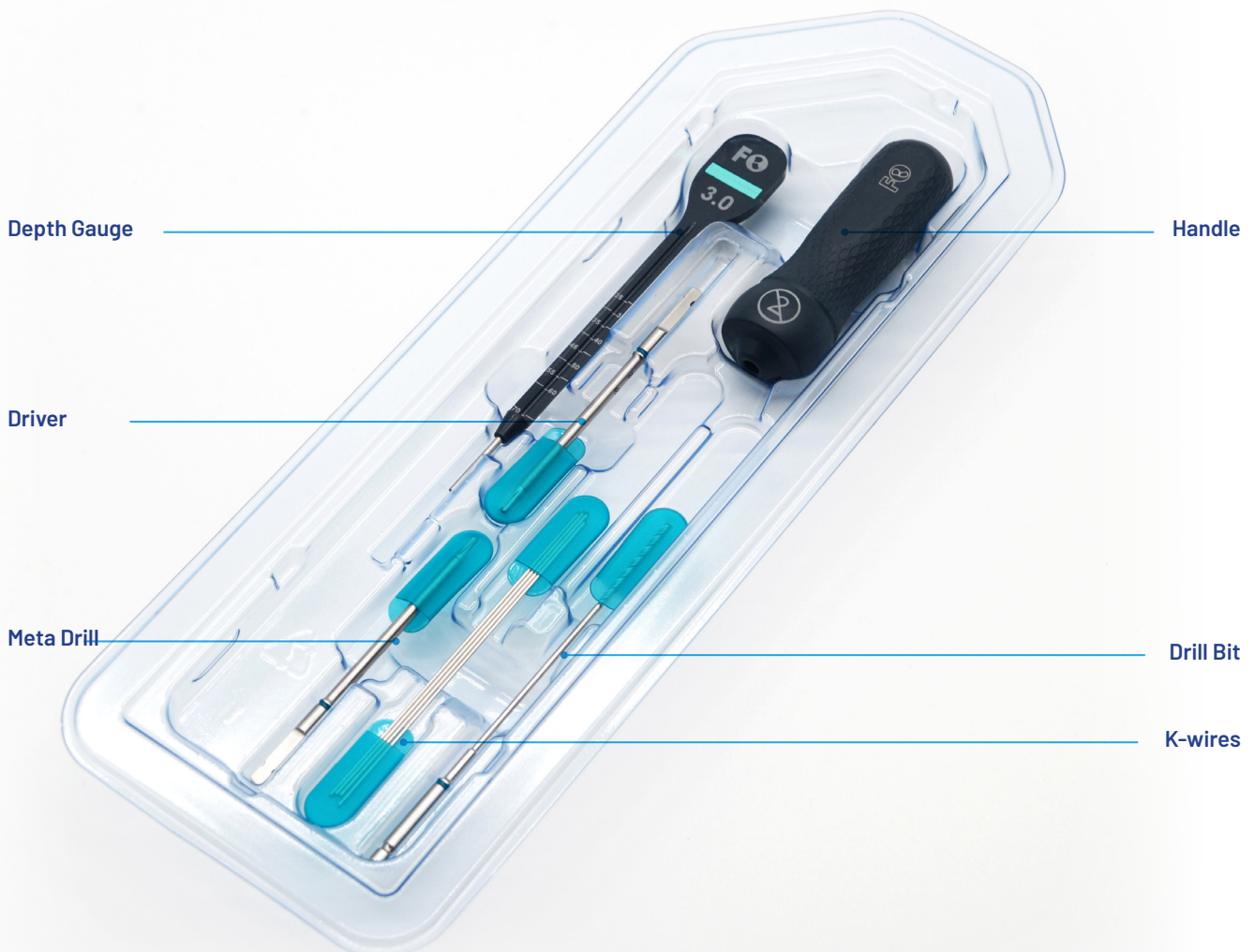
 **TIP:** In the presence of an acceptable deformity a bent implant may be left in situ and the hand treated conservatively.



STERILE INSTRUMENTATION

- Each NX Nail size range has a corresponding sterile instrument kit which is identified by colour bands.
- Instruments and packaging are single-use only.
- **Note:** A single-use sizing template and single-use individual drill bits are available sterile and packaged separately.

SIZE SPECIFIC INSTRUMENT KIT



Sizing Template

- This single-use radiopaque template covers the entire NX Nail range.
- It is used to confirm diameter and provide preliminary length information before confirming with the depth gauge in the instrument kit.

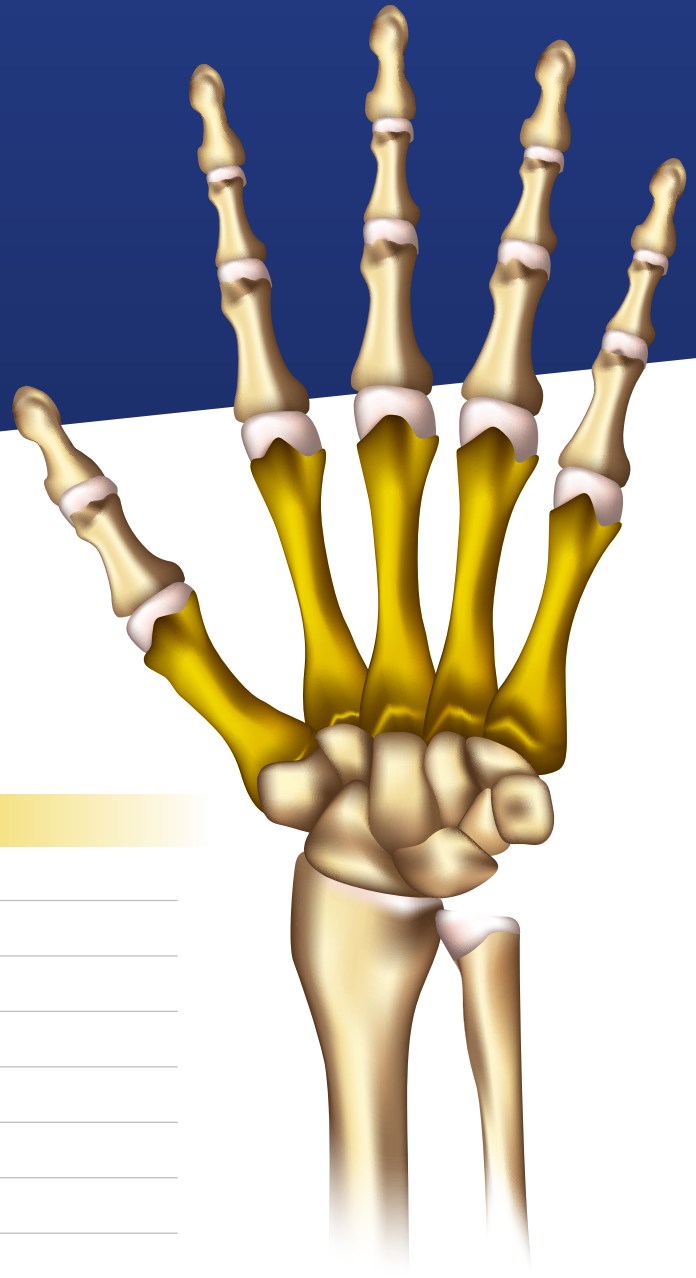


Individual Drill Bits

- In addition to the drill bits included in the size specific instrument kits, individual single-use sterile drill bits are available separately.
- Colour bands correspond to implant size range.



METACARPAL SIZE GUIDE



METACARPAL

INDICATION	Thumb, 2nd, 3rd, 4th, 5th
SIZE RECOMMENDATION	2.0 - 4.0mm
LENGTH RANGE	2.0: 12 - 40mm
	2.5: 12 - 60mm
	3.0: 25 - 70mm
	3.5: 25 - 70mm
	4.0: 35 - 80mm

COLOUR	SIZE	LENGTH	IMAGE
GOLD	2.0mm	12 - 40mm	
MAGENTA	2.5mm	12 - 60mm	
TEAL	3.0mm	25 - 70mm	
PURPLE	3.5mm	25 - 70mm	
BRONZE	4.0mm	35 - 80mm	
GREY	5.0mm	35 - 90mm	

STERILE NX NAIL SYSTEM CATALOGUE

2.0MM NAIL SYSTEM



CAT NO. / REF NO.	DESCRIPTION	QTY
SINGLE-USE DISPOSABLE INSTRUMENT KIT		
NXI20s / 960-001	2.0mm NX Nail Instrument Kit - Sterile	1
	2.0mm Depth Gauge	1
	2.0mm Metaphyseal Drill	1
	1.5mm Hex Driver	1
	Handle	1
	1.5mm Drill Bit	1
	0.8mm x 100mm K-wire	4
ACCESSORY INSTRUMENTS		
NXSGs / 961	NX Nail Sizing Template - Sterile	1
NXD150s / 963-001	1.5mm Thermally Hardened Cannulated NX Drill Bit - Sterile	1
NXD175s / 963-002	1.75mm Thermally Hardened Cannulated NX Drill Bit - Sterile	1
IMPLANTS		
NXNC2012s	2.0 x 12mm NX Nail Implant - Sterile	1
NXNC2014s	2.0 x 14mm NX Nail Implant - Sterile	1
NXNC2016s	2.0 x 16mm NX Nail Implant - Sterile	1
NXNC2018s	2.0 x 18mm NX Nail Implant - Sterile	1
NXNC2020s	2.0 x 20mm NX Nail Implant - Sterile	1
NXNC2022s	2.0 x 22mm NX Nail Implant - Sterile	1
NXNC2024s	2.0 x 24mm NX Nail Implant - Sterile	1
NXNC2026s	2.0 x 26mm NX Nail Implant - Sterile	1
NXNC2028s	2.0 x 28mm NX Nail Implant - Sterile	1
NXNC2030s	2.0 x 30mm NX Nail Implant - Sterile	1
NXNC2032s	2.0 x 32mm NX Nail Implant - Sterile	1
NXNC2034s	2.0 x 34mm NX Nail Implant - Sterile	1
NXNC2036s	2.0 x 36mm NX Nail Implant - Sterile	1
NXNC2038s	2.0 x 38mm NX Nail Implant - Sterile	1
NXNC2040s	2.0 x 40mm NX Nail Implant - Sterile	1

STERILE NX NAIL SYSTEM CATALOGUE

2.5MM NAIL SYSTEM



CAT NO. / REF NO.	DESCRIPTION	QTY
SINGLE-USE DISPOSABLE INSTRUMENT KIT		
NXI25s / 960-002	2.5mm NX Nail Instrument Kit - Sterile	1
	2.5mm Depth Gauge	1
	2.5mm Metaphyseal Drill	1
	1.7mm Hex Driver	1
	Handle	1
	1.75mm Drill Bit	1
	1.0mm x 100mm K-wire	4
ACCESSORY INSTRUMENTS		
NXSGs / 961	NX Nail Sizing Template - Sterile	1
NXD175s / 963-002	1.75mm Thermally Hardened Cannulated NX Drill Bit - Sterile	1
NXD200s / 963-003	2.0mm Thermally Hardened Cannulated NX Drill Bit - Sterile	1
IMPLANTS		
NXNC2512s	2.5 x 12mm NX Nail Implant - Sterile	1
NXNC2514s	2.5 x 14mm NX Nail Implant - Sterile	1
NXNC2516s	2.5 x 16mm NX Nail Implant - Sterile	1
NXNC2518s	2.5 x 18mm NX Nail Implant - Sterile	1
NXNC2520s	2.5 x 20mm NX Nail Implant - Sterile	1
NXNC2525s	2.5 x 25mm NX Nail Implant - Sterile	1
NXNC2530s	2.5 x 30mm NX Nail Implant - Sterile	1
NXNC2535s	2.5 x 35mm NX Nail Implant - Sterile	1
NXNC2540s	2.5 x 40mm NX Nail Implant - Sterile	1
NXNC2545s	2.5 x 45mm NX Nail Implant - Sterile	1
NXNC2550s	2.5 x 50mm NX Nail Implant - Sterile	1
NXNC2555s	2.5 x 55mm NX Nail Implant - Sterile	1
NXNC2560s	2.5 x 60mm NX Nail Implant - Sterile	1

STERILE NX NAIL SYSTEM CATALOGUE

3.0MM NAIL SYSTEM



CAT NO. / REF NO.	DESCRIPTION	QTY
SINGLE-USE DISPOSABLE INSTRUMENT KIT		
NXI30s / 960-003	3.0mm NX Nail Instrument Kit - Sterile	1
	3.0mm Depth Gauge	1
	3.0mm Metaphyseal Drill	1
	T8 Torx Driver	1
	Handle	1
	2.0mm Drill Bit	1
	1.0mm x 100mm K-wire	4
ACCESSORY INSTRUMENTS		
NXSGs / 961	NX Nail Sizing Template - Sterile	1
NXD200s / 963-003	2.0mm Thermally Hardened Cannulated NX Drill Bit - Sterile	1
NXD240s / 963-004	2.4mm Thermally Hardened Cannulated NX Drill Bit - Sterile	1
IMPLANTS		
NXNC3025s	3.0 x 25mm NX Nail Implant - Sterile	1
NXNC3030s	3.0 x 30mm NX Nail Implant - Sterile	1
NXNC3035s	3.0 x 35mm NX Nail Implant - Sterile	1
NXNC3040s	3.0 x 40mm NX Nail Implant - Sterile	1
NXNC3045s	3.0 x 45mm NX Nail Implant - Sterile	1
NXNC3050s	3.0 x 50mm NX Nail Implant - Sterile	1
NXNC3055s	3.0 x 55mm NX Nail Implant - Sterile	1
NXNC3060s	3.0 x 60mm NX Nail Implant - Sterile	1
NXNC3070s	3.0 x 70mm NX Nail Implant - Sterile	1

STERILE NX NAIL SYSTEM CATALOGUE

3.5MM NAIL SYSTEM



CAT NO. / REF NO.	DESCRIPTION	QTY
SINGLE-USE DISPOSABLE INSTRUMENT KIT		
NXI35s / 960-004	3.5mm NX Nail Instrument Kit - Sterile	1
	3.5mm Depth Gauge	1
	3.5mm Metaphyseal Drill	1
	T10 Torx Driver	1
	Handle	1
	2.4mm Drill Bit	1
	1.2mm x 150mm K-wire	4
ACCESSORY INSTRUMENTS		
NXSGs / 961	NX Nail Sizing Template - Sterile	1
NXD240s / 963-004	2.4mm Thermally Hardened Cannulated NX Drill Bit - Sterile	1
NXD275s / 963-005	2.75mm Thermally Hardened Cannulated NX Drill Bit - Sterile	1
IMPLANTS		
NXNC3525s	3.5 x 25mm NX Nail Implant - Sterile	1
NXNC3530s	3.5 x 30mm NX Nail Implant - Sterile	1
NXNC3535s	3.5 x 35mm NX Nail Implant - Sterile	1
NXNC3540s	3.5 x 40mm NX Nail Implant - Sterile	1
NXNC3545s	3.5 x 45mm NX Nail Implant - Sterile	1
NXNC3550s	3.5 x 50mm NX Nail Implant - Sterile	1
NXNC3555s	3.5 x 55mm NX Nail Implant - Sterile	1
NXNC3560s	3.5 x 60mm NX Nail Implant - Sterile	1
NXNC3570s	3.5 x 70mm NX Nail Implant - Sterile	1

STERILE NX NAIL SYSTEM CATALOGUE

4.0MM NAIL SYSTEM



CAT NO. / REF NO.	DESCRIPTION	QTY
SINGLE-USE DISPOSABLE INSTRUMENT KIT		
NXI40s / 960-005	4.0mm NX Nail Instrument Kit - Sterile	1
	4.0mm Depth Gauge	1
	4.0mm Metaphyseal Drill	1
	T15 Torx Driver	1
	Handle	1
	2.75mm Drill Bit	1
	1.2mm x 150mm K-wire	4
ACCESSORY INSTRUMENTS		
NXSGs / 961	NX Nail Sizing Template - Sterile	1
NXD275s / 963-005	2.75mm Thermally Hardened Cannulated NX Drill Bit - Sterile	1
NXD350s / 963-006	3.5mm Thermally Hardened Cannulated NX Drill Bit - Sterile	1
IMPLANTS		
NXNC4035s	4.0 x 35mm NX Nail Implant - Sterile	1
NXNC4040s	4.0 x 40mm NX Nail Implant - Sterile	1
NXNC4045s	4.0 x 45mm NX Nail Implant - Sterile	1
NXNC4050s	4.0 x 50mm NX Nail Implant - Sterile	1
NXNC4055s	4.0 x 55mm NX Nail Implant - Sterile	1
NXNC4060s	4.0 x 60mm NX Nail Implant - Sterile	1
NXNC4070s	4.0 x 70mm NX Nail Implant - Sterile	1
NXNC4080s	4.0 x 80mm NX Nail Implant - Sterile	1

STERILE NX NAIL SYSTEM CATALOGUE

5.0MM NAIL SYSTEM



CAT NO. / REF NO.	DESCRIPTION	QTY
SINGLE-USE DISPOSABLE INSTRUMENT KIT		
NXI50s / 960-006	5.0mm NX Nail Instrument Kit - Sterile	1
	5.0mm Depth Gauge	1
	5.0mm Metaphyseal Drill	1
	T20 Torx Driver	1
	Handle	1
	3.5mm Drill Bit	1
	1.6mm x 150mm K-wire	4
ACCESSORY INSTRUMENTS		
NXSGs / 961	NX Nail Sizing Template - Sterile	1
NXD350s / 963-006	3.5mm Thermally Hardened Cannulated NX Drill Bit - Sterile	1
IMPLANTS		
NXNC5035s	5.0 x 35mm NX Nail Implant - Sterile	1
NXNC5040s	5.0 x 40mm NX Nail Implant - Sterile	1
NXNC5045s	5.0 x 45mm NX Nail Implant - Sterile	1
NXNC5050s	5.0 x 50mm NX Nail Implant - Sterile	1
NXNC5055s	5.0 x 55mm NX Nail Implant - Sterile	1
NXNC5060s	5.0 x 60mm NX Nail Implant - Sterile	1
NXNC5070s	5.0 x 70mm NX Nail Implant - Sterile	1
NXNC5080s	5.0 x 80mm NX Nail Implant - Sterile	1
NXNC5090s	5.0 x 90mm NX Nail Implant - Sterile	1

FIELD ORTHOPAEDICS

Get in touch with your local sales representative today to discuss how NX Nail can meet your hand trauma needs.

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