



**M/DN<sup>®</sup> Tibial  
Intramedullary  
Nail Utilizing  
the MIS Tibial  
Guide Surgical  
Technique**





## **Surgical Technique for the M/DN Tibial Intramedullary Nail Utilizing the MIS Tibial Guide**

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## Introduction

The *M/DN*® Intramedullary Fixation, *Minimally Invasive Solutions*™ (MIS) Anterior Tibial Guide has been designed to allow the surgeon to insert the *M/DN* Tibial Nail (see Table 1 for implant size options) with the patient's affected extremity in either flexion or extension. The guide system has been designed with a combination of stainless steel and radiolucent composite material which provides better visibility of high proximal fractures.

Table 1. Tibial Nail Expanded Set

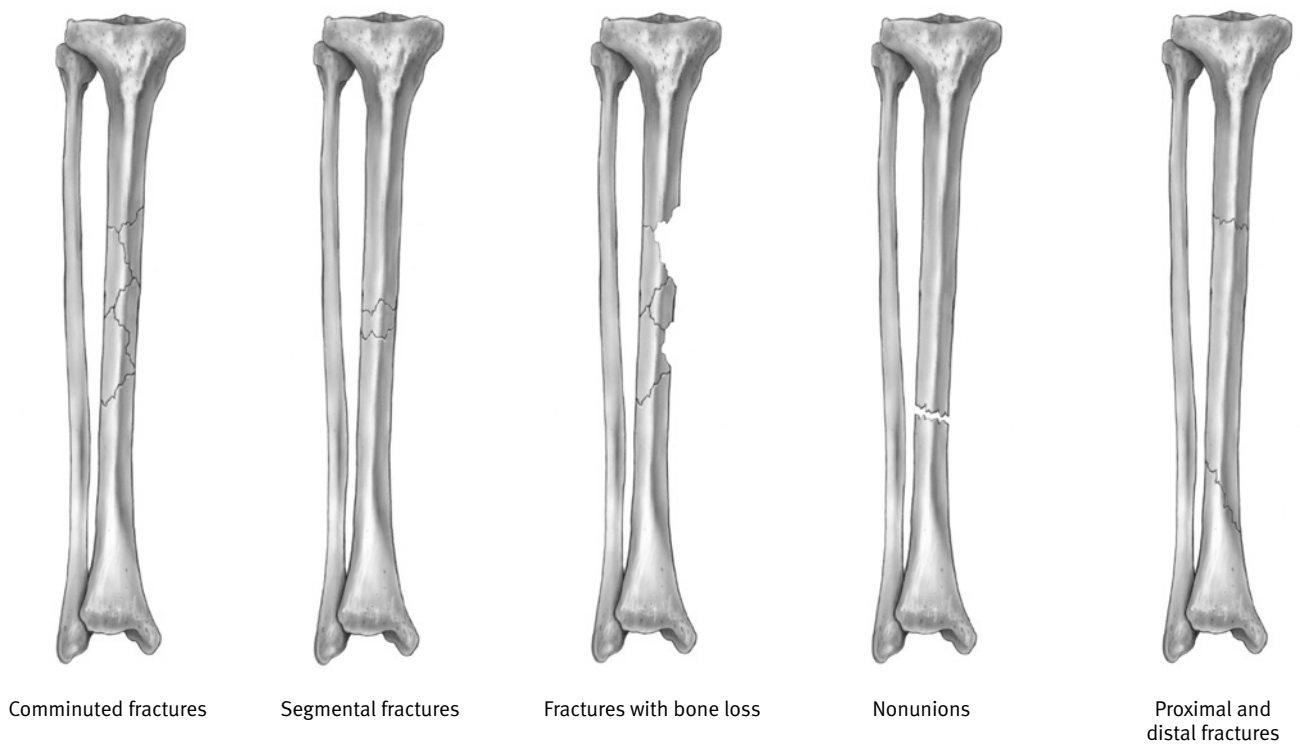
Nail Length (cm)	Nail Diameter (mm)									
	6	7	8	9	10	11	12	13	14	15
18	•	•	•	•	•	•				
20	•	•	•	•	•	•	•			
22	•	•	•	•	•	•	•	•		
24	•	•	•	•	•	•	•	•	•	•
26	•	•	•	•	•	•	•	•	•	•
28	•	•	•	•	•	•	•	•	•	•
30	•	•	•	•	•	•	•	•	•	•
32	•	•	•	•	•	•	•	•	•	•
34	•	•	•	•	•	•	•	•	•	•
36	•	•	•	•	•	•	•	•	•	•
38	•	•	•	•	•	•	•	•	•	•
40		•	•	•	•	•	•	•	•	•
42			•	•	•	•	•	•	•	•
44					•	•	•	•	•	•
46						•	•	•		

## Indications

The *M/DN* Tibial Nail is indicated for use in a variety of tibial fractures (Fig. 1), such as:

- A. Comminuted fractures
- B. Segmental fractures
- C. Fractures with bone loss
- D. Nonunions
- E. Proximal and distal fractures
- F. Transverse fractures
- G. Oblique fractures
- H. Spiral fractures
- I. Bilateral fractures
- J. Fractures with butterfly fragments
- K. Pseudarthrosis of the tibial shaft
- L. Corrective Osteotomies

Fig. 1



## Preoperative Planning

Proper preoperative planning is essential to successful interlocked nailing of the tibia. A template or ossimeter, and an x-ray film of the unaffected extremity are necessary for determining canal size and for measuring the length of the tibia to aid in determining nail length.

The Nail Length Gauge or Harris/Galante Bulb-Tip (Sounds), available in diameters from 10mm-17mm, can also be used as alternate techniques to determine nail diameter and length.

X-rays taken at a 36-inch distance from the x-ray source result in 10-15 percent magnification of bone. The M/DN ossimeter has both an actual size scale and one that takes into account this magnification. It should be used routinely to determine nail diameter and length.

The proper length of the nail should extend from 1cm below the top of the tibia to the epiphyseal scar. The diameter of the tibial nail should match the canal in the lateral x-ray projection. The surgeon should review the x-ray to assure that there are no unusual anatomic variations.

## Patient Positioning and Radiographic Control

Place the patient in the supine position on the fracture table with the injured extremity in traction and the legs extended. A small roll may be placed under the affected leg. Visualize the affected knee as well as the shaft of the tibia using image intensification to confirm proper positioning prior to prepping and draping.

An alternate method of positioning is to place a radiolucent frame under the knee, or to place the patient on a radiolucent table (Fig. 2), using a distractor for fracture reduction.

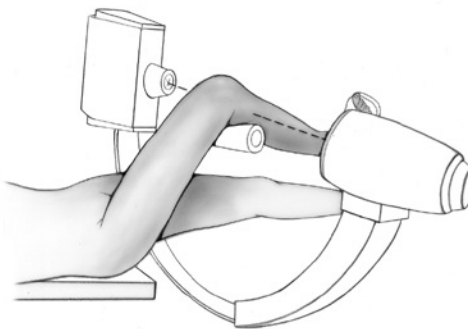


Fig. 2

## Reduction

It is important to reduce the fracture before beginning the surgical procedure.

## Incision and Exposure

Make a longitudinal incision along the medial border of the patellar ligament extending from the joint line to the inferior pole of the patella (Fig. 3). Carry the dissection medially to the patellar tendon down to the bone. Place a Blunt Retractor beneath the patellar ligament and retract the ligament laterally to expose the proximal tibia.

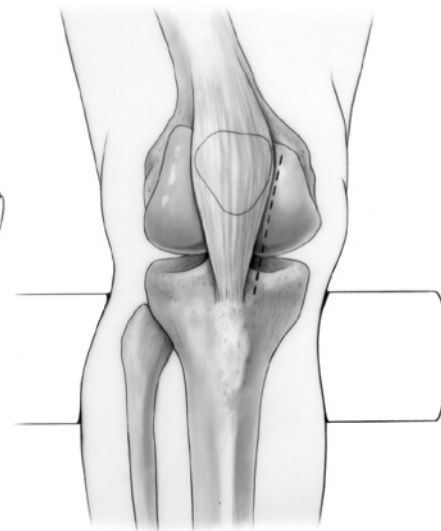


Fig. 3

### Creating the Entry Portal

Place the Tibial Awl medial to the patellar tendon and at the top of the tibia (Fig. 4). For proximal fractures, either split the patellar tendon or position the awl lateral to the tendon to prevent angulation at the fracture site. Check the position with A/P and lateral views. When the correct position is achieved, rotate the awl to create an entry portal for the Ball-Tip Guide Wire (Fig. 5). The Ball-Tip Guide Wire may also be described as a Bulb-Tip or Bullet-Tip Guide Wire.

If using the Short Cannulated Awl, insert a Steinmann Pin at the desired entry point. Rotate the Awl over the Steinmann Pin. If the pin has the correct starting point, but is in the wrong axis, remove the pin and adjust orientation using the awl. Advance the awl once the correct axis has been determined. If the pin does not have the correct starting point location, remove the pin and start over. Then, exchange the Steinmann Pin for the 3.0mm Ball-Tip Guide Wire.



Fig. 4



Fig. 5

## Guide Wire Placement and Reaming

### Conventional Guide Wire/ Exchange Tube Technique

Attach the 3.0mm Ball-Tip Guide Wire to the Wire Grip T-Handle (Fig. 6) and tighten.



Fig. 6

To aid in manipulation, bend the tip of the Guide Wire at about a 10° angle 5cm from the end. Insert the Guide Wire through the entry hole and manipulate it down the proximal tibia. At the fracture site, manipulate the Guide Wire into the distal fragment under C-arm control (Fig. 7).

Once in the distal canal, pass the wire to its final position at the epiphyseal scar (Fig. 8). Remove the Wire Grip T-Handle.



Fig. 7

**CAUTION: If the guide wire is bent shorter than 5cm from the end of the wire and/or more than 10 degrees it may be difficult to remove from the nail. If the wire becomes lodged inside the nail, utilize the WIRE GRIP T-HANDLE and mallet to remove the guide wire from the nail.**



Fig. 8



Determine the proper nail length by placing a second guide wire of equal length on the proximal tibia. The length of the wire that is not overlapping is the correct nail length required (Fig. 9). The 50cm ruler or ossimeter may be used for an accurate measurement.

Another way to measure the length is to use the C-arm to position the “0” mark on the metal ruler at the distal tibial epiphyseal scar. Then read the correct length at the proximal tibia directly from the metal ruler.

Alternatively, the Nail Length Gauge can be used to measure the appropriate IM Nail length through the measurement of one 100cm Guide Wire. To use, place a 100cm Guide Wire down the medullary canal. Slide the Nail Length Gauge over the guide wire, ensuring that the distal portion of the Nail Length Gauge is resting on the proximal tibia in order to determine the correct nail length. Nail length is determined by noting the location of the remaining Guide Wire and reading the Nail Length Gauge at that particular

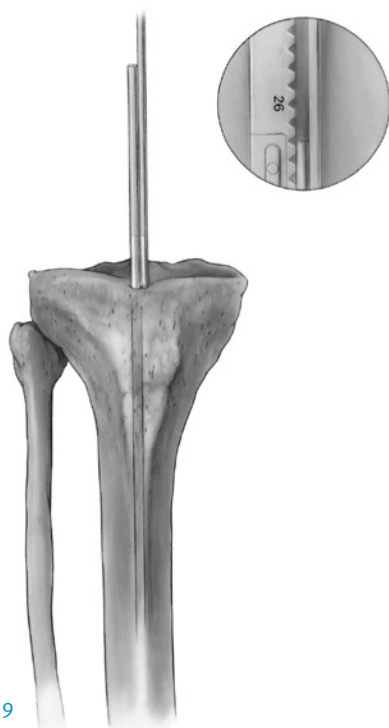


Fig. 9

location. If the length indicated is between two available nail sizes, it is recommended that the shorter nail be chosen.

**NOTE: The IM Nail Length Gauge can only be used with 100cm Guide Wire.**

Place an intramedullary reamer over the guide wire and ream the tibial canal in 1mm increments until contact is made with the cortical wall. The *Pressure Sentinel*® Intramedullary Reaming System is a system of one-piece reamers ranging in size from 5mm diameter to 27mm diameter in half millimeter increments. Each reamer is composed of a fluted reamer head, a shaft and a quick-connect drive end. The quick-connect end can be connected to a manual or powered driver. The width of the isthmus of the medullary canal is determined by preoperative x-ray examination. The instrument with the smallest possible diameter is used for initial reaming into the medullary canal. Reamers with a diameter of 5mm to 7.5mm use a 2.4mm Ball-Tip Guide Wire while reamers with a diameter of 8mm to 27mm use a 3.0mm Ball-Tip Guide Wire. As reaming



Fig. 10

continues, the reamer size should be increased by 0.5mm or 1.0mm increments until an opening of the desired size is obtained (Fig. 10). During reaming, monitor the lateral view on the image intensifier to prevent excess reaming of the posterior cortex.

The proximal diameter of 6mm through 10mm nails is 11mm. Therefore, the tibia must be overreamed to 12mm (approximately 64mm in length). Nails 11mm in diameter and greater have proximal diameters equivalent to the shaft diameter.

### New Guide Wire Technique Option

If using a Ball-Tip Guide Wire that does NOT have a gold-coated end OR if using a nail less than 10mm:

When the reaming is complete and the final measurements are made, insert the plastic Exchange Tube over the Ball-Tip Guide Wire. Remove the Ball-Tip Guide Wire and insert the Smooth Guide Wire (Fig. 11).

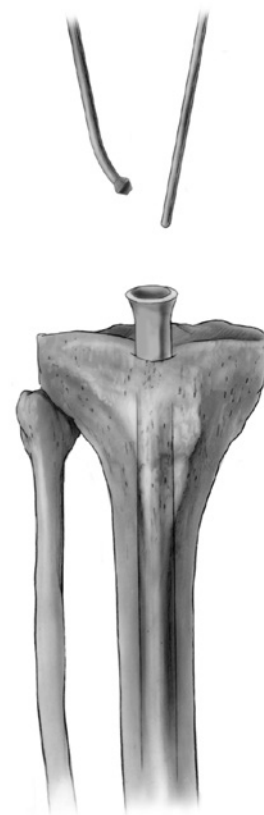


Fig. 11

**NOTE: 6mm and 7mm nails are solid and, therefore, the guide wire must be removed prior to nail insertion.**

**If using a Ball-Tip Guide Wire that DOES have a gold-coated end and if using a nail greater than 10mm:**

The Ball-Tip Guide Wire can remain in place. It is not necessary to exchange the Ball-Tip Guide Wire for a Smooth Guide Wire.

**NOTE: To avoid reamer lodging during use, reaming should be immediately stopped and the reamers retracted when there is too much resistance. If the reamer becomes lodged, stop reaming immediately. Reverse the direction of rotation of the handpiece and back the reamer out of the canal. The reamer can also be extracted by snapping the T-Handle Extractor onto the reamer end and then gently tapping the extractor with a small mallet or hammer.**

**CAUTION: Excessive blows to the T-Handle Extractor may damage the reamer or the extractor.**

**NOTE: If the GUIDE WIRE becomes lodged within the reamer, use the WIRE GRIP T-Handle to push the GUIDE WIRE back into the IM canal.**

### Nail Insertion

Select the appropriate size nail and closely approximate it to the Tibial Proximal Oblique Guide on the back table. Insert the Tibial Proximal Locking Bolt into the barrel of the guide and thread it through the barrel until it is completely seated. Slide the nail, properly oriented to accommodate for the anterior angulation of the implant, to meet the distal end of the guide barrel. Continue to thread the Locking Bolt into the proximal portion of the nail. A key on the guide which fits into a keyway in the proximal end of the nail will help to ensure proper alignment (Fig. 12).

Tighten the Locking Bolt securely using the 5.0mm Ball Hex Ratchet Driver, or the 11mm Socket Ratchet Driver (Fig. 13).



Fig. 12



Fig. 13

On the back table, assemble the 3.7mm Tibial/Humeral Drill Bushing and the 8.0mm Tibial/Humeral Screw Bushing (Fig. 14) and insert them into the appropriate hole of the Tibial Proximal Guide. Verify proper guide/nail alignment by inserting the 3.7mm Drill (Table 2) into the 3.7mm Tibial/Humeral Drill Bushing.



Fig. 14

The device is properly aligned when the drill will pass through the proximal hole in the nail (Fig. 15).



Fig. 15

Screw the Threaded Driver, the Small Threaded Driver, or the Slaphammer into position on the threaded impaction post of the Tibial Proximal Oblique Guide (Fig. 16).



Fig. 16

**Table 2. Implant/Instrumentation Specifications for Tibial Nails**

Nail Diameter (mm)	6	7	8	9	10	11	12	13	14	15
Head Diameter (mm)	11	11	11	11	11	11	12	13	14	15
Guide Wire, Smooth (mm)	—	—	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Proximal Screw Size (mm)	4.2 blue	4.2 blue	4.2 blue	4.2 blue	4.2 blue	4.2 blue	4.2 blue	4.2 blue	4.2 blue	4.2 blue
Drill Bushing Size (mm)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Proximal Drill Size (mm)	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Distal Screw Size (mm)	no holes	3.7 yellow	3.7 yellow	4.2 blue	4.2 blue	4.2 blue	4.2 blue	4.2 blue	4.2 blue	4.2 blue
Trocar Diameter (mm)	—	3.2	3.2	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Distal Drill Size (mm)	—	3.2	3.2	3.7	3.7	3.7	3.7	3.7	3.7	3.7

**Note: 4.5mm cortical interlocking screws are NOT indicated for use with the MDN system.**

Insert the nail over the Guide Wire and into the tibia. Begin seating the nail using gentle impaction with the Mallet or Slaphammer (Fig. 17).



Fig. 17

Do not directly impact the arms of the guide. The nail must advance with each blow of the mallet. If it does not advance, remove the nail and ream again. While impacting the nail, use the Tibial Proximal Oblique Guide to maintain the proper rotation (Fig. 18).



Fig. 18

The Slotted Mallet can also be used to drive the nail down into the canal. When used with the Threaded Driver, it can also be used to make slight adjustments in nail depth (Fig. 19).



Fig. 19

Use caution when crossing the fracture site. Visualize it in two planes with image intensification to ensure proper passage of the nail into the distal fragment.

The conical tip and the bevel of the nail will help guide it off the posterior cortex and maintain its position in the center of the canal. Reduce the force of impaction as the proximal end of the nail approaches the tibial tubercle.

Prior to inserting the nail past the guide wire exit hole, **REMOVE THE GUIDE WIRE** so that it does not get trapped in the bone. Finish seating the nail after

the guide wire is removed. Use the 5mm or 10mm countersink marks on the guide barrel to ensure that the nail is inserted to an acceptable depth.

**NOTE: The junction of the guide body and the barrel limits countersinking to a depth of 15mm (Fig. 20).**

Confirm the attachment of the Tibial Proximal Oblique Guide to the nail and retighten the Locking Bolt using the 3.5mm Ball Ratchet Driver or the 11mm Socket Ratchet Driver, if necessary, before proceeding.

### Oblique Proximal Locking

The *M/DN* Tibial Nail has four proximal locking holes. The two superior, oblique holes are angled for fixation in proximal fractures (Fig. 21).

If oblique fixation is desired, the screws are placed using the holes in the Tibial Proximal Oblique Guide. On the back table, insert the 3.7mm Tibial/Humeral Drill Bushing (Color Code: Blue), into the 8.0mm Tibial/Humeral Screw Bushing, and twist until the two bushings are securely tightened (Fig. 22).



Fig. 20



Fig. 21



Fig. 22

Insert this bushing construct into the Left or Right inferior hole of the Tibial Proximal Oblique Guide (Fig. 23). Press the bushings into the guide until contact is made with the skin. Make a small stab wound, then advance the nested bushings through the incision until they contact the bone. Drill through both cortices of bone (Fig. 24).



Fig. 23

The drill is calibrated to measure the hole depth and can be used to determine the appropriate screw length. If desired, the Proximal Screw Depth Gauge can also be used to determine the screw length (Fig. 25).

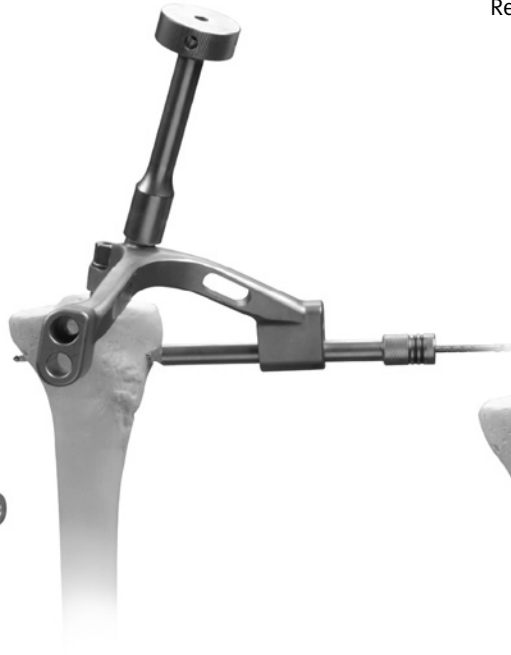


Fig. 24

The 4.2mm screw (Color Code: Blue) can be used proximally on all tibial nails. Select the appropriate screw length to ensure that the screw will engage the far cortex of the bone.

Remove the drill bushing (Fig. 26).



Fig. 26



Fig. 25

**Note: 4.5mm cortical interlocking screws are NOT indicated for use with the MDN system.**

Use the 3.5mm T-Handle Screwdriver to insert the appropriate length 4.2mm screw (Fig. 27) until the reference line marked “Tib/Hum” on the screwdriver is flush with the screw bushing (Fig. 28). Use the C-arm to check the position of the screw and tighten it appropriately. Remove the screwdriver and the Tibial/Humeral Screw Bushing.

If a second proximal oblique screw will be used, repeat the procedure for the second screw using the opposite arm of the Tibial Proximal Oblique Guide.

Take A/P and lateral C-arm views to check for correct positioning. If no further proximal fixation is required, loosen the Tibial Proximal Locking Bolt and remove the Tibial Proximal Oblique Guide.

### Transverse Proximal Locking

The *M/DN* Tibial Nail has one anterior transverse locking hole and one anterior transverse dynamization slot. The superior slot in the nail is a mediolateral elongated slot which can help achieve dynamization (Fig. 29). The inferior hole is used for transverse static locking. The slot can be used for dynamic locking, or for additional static locking, as it will permit later dynamization due to its shape.

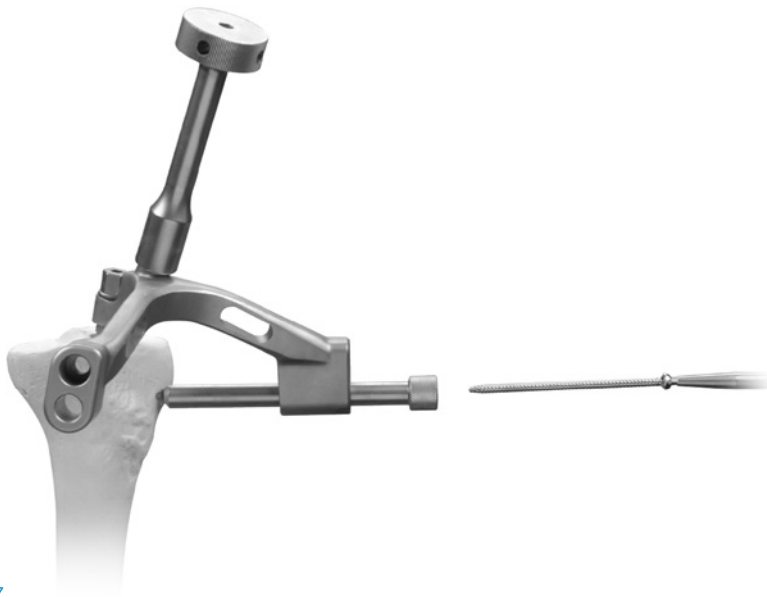


Fig. 27

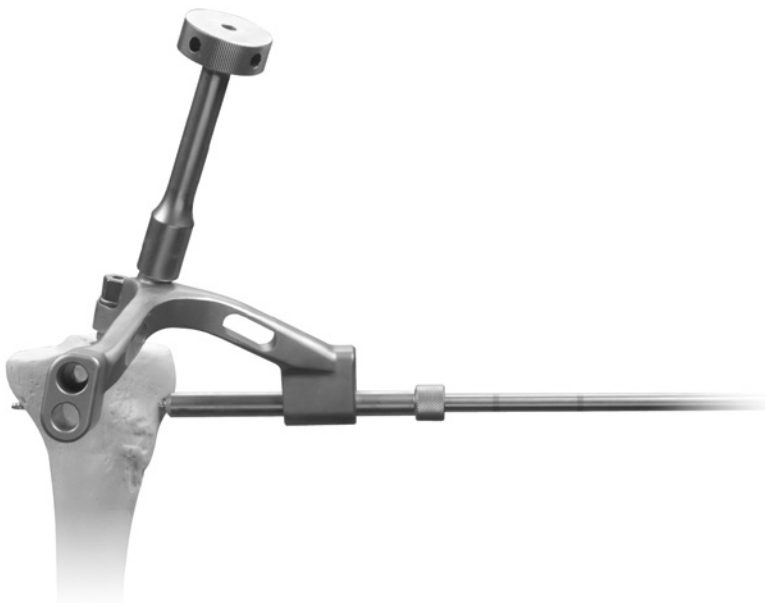


Fig. 28



Fig. 29

**Note: 4.5mm cortical interlocking screws are NOT indicated for use with the MDN system.**

If there is a potential need for later dynamization of the nail, insert locking screws in both the transverse slot and locking hole. The locking screw in the static locking hole can then be removed to achieve later dynamization. If a second static locking screw is desired, it can be placed inferiorly in the transverse screw slot.

To insert a **static** locking screw, assemble the appropriate Left or Right Tibial Proximal Transverse Guide (Fig. 30) and a Locking Bolt by threading the Locking Bolt through the attachment hole until seated (Fig. 31).



Fig. 30



Fig. 31



Attach the assembly to the appropriate side of the Tibial Proximal Oblique Guide using the Locking Bolt. Tighten the Locking Bolt until secure using the 5.0mm Ball Hex Ratchet Driver or the 11mm Socket Ratchet Driver (Fig. 32A & B).



Fig. 32A

On the back table, insert the 3.7mm Tibial/Humeral Drill Bushing (Color Code: Blue), into the 8.0mm Tibial/Humeral Screw Bushing (Fig. 33), and twist until the two bushings are securely tightened.



Fig. 33

Insert this bushing construct into the static/inferior hole of the Tibial Proximal Left or Right Transverse Guide (Fig. 34).



Fig. 34

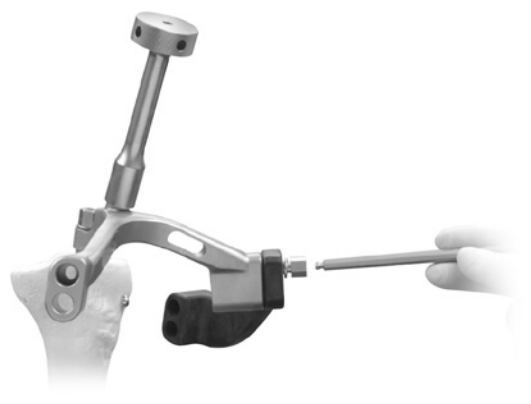


Fig. 32B

Press the bushings into the inferior hole until contact is made with the skin (Fig. 35). Make a small stab wound and advance the nested bushings through the incision until they contact the bone. Drill through both cortices of bone (Fig. 36).



Fig. 35

The drill is calibrated to measure the hole depth (Fig. 37) and can be used to determine the appropriate screw length. If desired, the Proximal Screw Depth Gauge can also be used to determine the screw length. Remove



Fig. 36

the drill and drill bushing. The 4.2mm screw (Color Code: Blue) can be used proximally on all tibial nails. **Select the appropriate screw length to ensure that the screw will engage the far cortex of the bone.**



Fig. 37

**Note: 4.5mm cortical interlocking screws are NOT indicated for use with the MDN system.**

Use the T-Handle Screwdriver to insert the appropriate length 4.2mm screw (Fig. 38) until the reference line marked “Tib/Hum” on the screwdriver is flush with the screw bushing (Fig. 39). Use the C-arm to check the position of the screw and tighten it appropriately.

Remove the screwdriver and the Tibial/Humeral Screw Bushing.

If an additional static screw is desired, repeat the procedure, placing the 8.0mm Screw Bushing into the corresponding targeting hole on the Transverse Guide. If later dynamization is required, place an additional screw into the superior portion of the dynamic locking slot, following the procedure above.

Take A/P and lateral C-arm views to check for correct positioning. If proximal fixation is adequate, loosen the Locking Bolt attaching the guide to the nail, and remove the Tibial Proximal Oblique Guide.

**NOTE: 4.2mm screws (Color Code: Blue) are used proximally for all Tibial Nails.**

**Note: 4.5mm cortical interlocking screws are NOT indicated for use with the MDN system.**



Fig. 38



Fig. 39

## End Cap Placement

If desired, insert an *M/DN* End Cap of the appropriate length (0mm, 5mm, 10mm, or 15mm) in the proximal end of the nail. These caps help protect the internal threads of the nail, facilitate future extraction, and allow the surgeon to adjust the length of the nail.

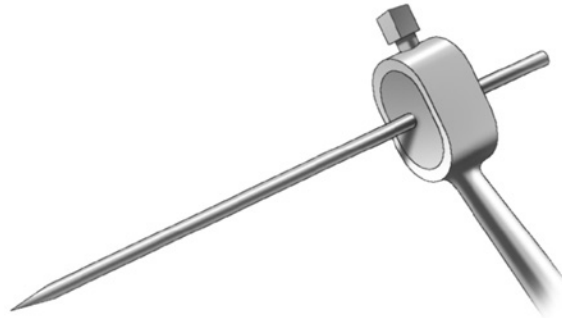


Fig. 40

## Distal Locking

### Technique for Using the Free-Hand Targeting Device

The distal locking screws are inserted with a free-hand technique using the Free-Hand Targeting Device. The *M/DN* Tibial Nail has three distal holes. Two are located for locking in the mediolateral plane, and one is located between the mediolateral holes for locking in the anteroposterior plane.

**Note: 6mm tibial nails do not have locking holes distally. 7mm and 8mm nails use 3.7mm screws distally, which require a 3.2mm Drill or Trocar (Color Code: Yellow). 9mm-15mm tibial nails use 4.2mm screws distally which require a 3.7mm Drill or Trocar (Color Code: Blue).**

Insert the appropriate size Trocar into the Targeting Device and finger tighten (Fig. 40). It is very important to properly place the C-arm. Position the C-arm so the locking hole of the nail appears perfectly round on the monitor (Fig. 41).

Make a 1cm incision on the lower extremity over the appropriate locking hole. When using the anteroposterior hole, be careful to avoid the tendon of the tibialis anterior muscle. Insert the Trocar until it contacts the tibia. Use the C-arm view to center the tip of the Trocar over the locking hole (Fig. 42).

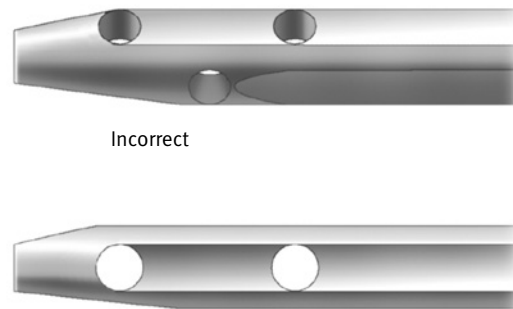
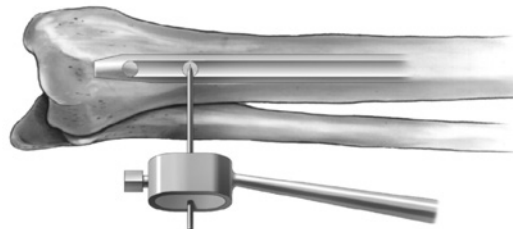


Fig. 41 Correct



Distal Locking Holes

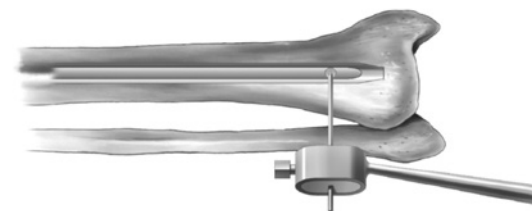
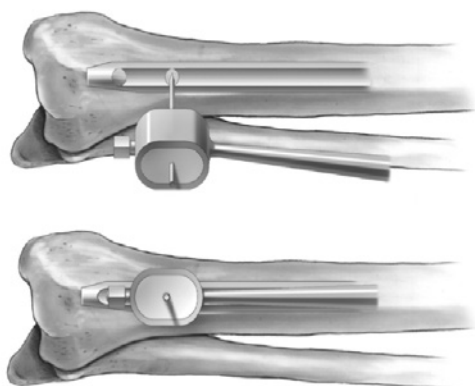


Fig. 42 A/P Distal Locking Hole

**Note: 4.5mm cortical interlocking screws are NOT indicated for use with the MDN system.**

Then use the C-arm to align the Trocar in the proper axis (Fig. 43). Use a small mallet to drive the Trocar into the tibia and through the hole in the nail in line with the x-ray beam. (Do not penetrate the far cortex.)



Distal Locking Holes

Verify Trocar placement in both the A/P and lateral planes using image intensification (Fig. 44).

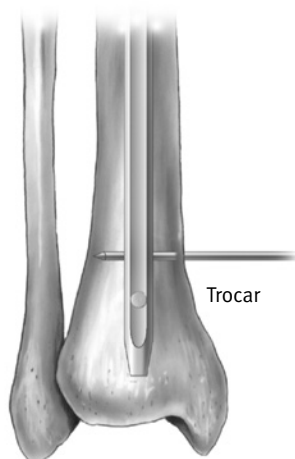


Fig. 44

Remove the Trocar. The path of the Trocar in the bone acts as a pilot hole for the drill. Use the appropriate drill to drill a hole through the guide hole left by the Trocar (Fig. 45). Drill through the far cortex. Remove the drill.

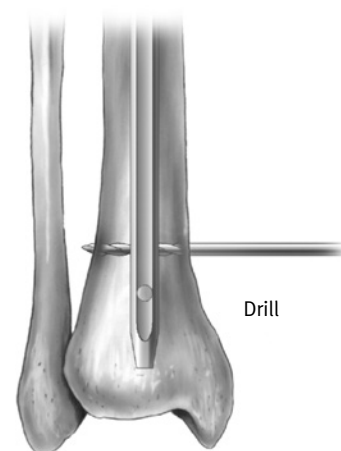
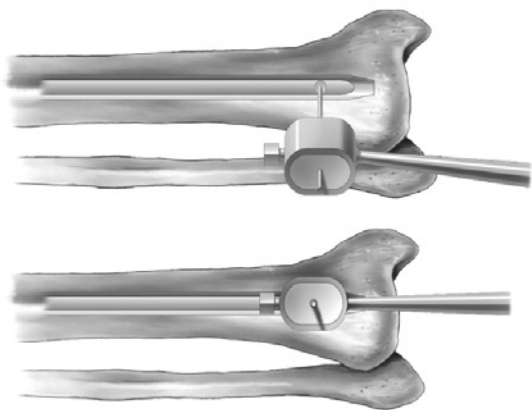


Fig. 45



A/P Distal Locking Hole

Use the Distal Screw Depth Gauge to select the proper length screw (Fig 46). Read the length directly off the gauge. Select an appropriate length screw to ensure that the screw will engage the far cortex.

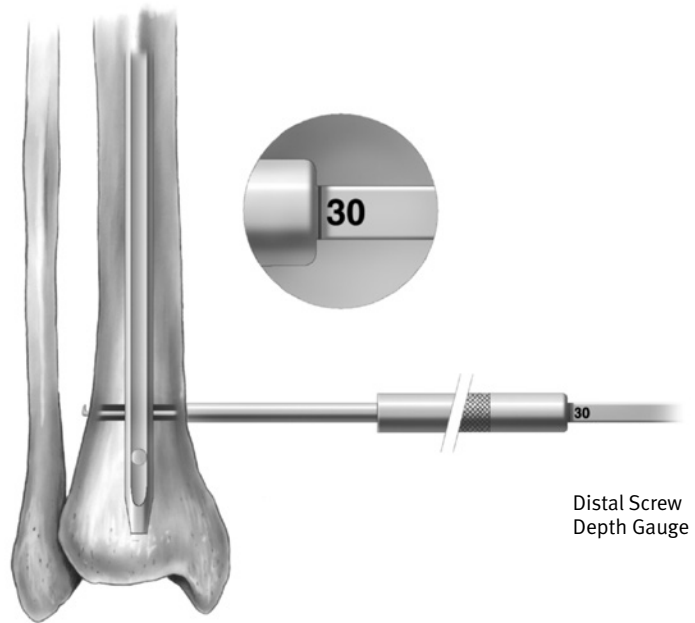


Fig. 46

Use the Distal Screwdriver to insert the screw through the hole (Fig. 47).

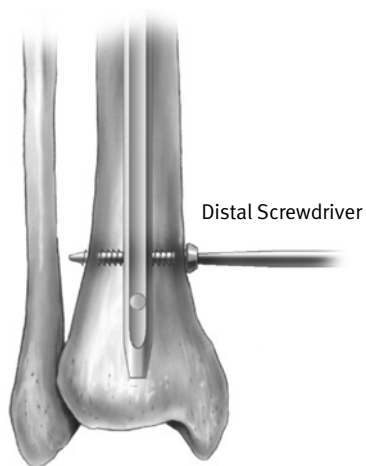


Fig. 47

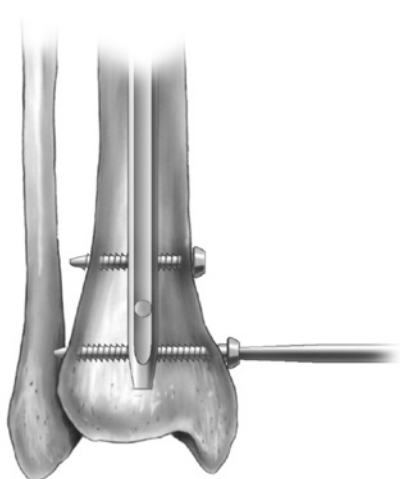


Fig. 48

Insert the second and third distal locking screws in the same manner (Fig. 48). Check the position of all screws with the C-arm in the A/P and lateral planes (Fig. 49).



Fig. 49

Bushings are available that can be used with the Free-Hand Targeting Device. A separate radiolucent Bushing Insert is available to accommodate these bushings.

### Closure and Postoperative Care

After irrigating the wounds, close the proximal wound in layers. Then apply a soft compression dressing.

A short leg splint is used until pain and swelling are decreased. Then early range-of-motion exercises of the knee and ankle are encouraged. Allow toe-touch weight bearing to progress to full weight bearing as fracture callus increases on x-ray films, usually six to eight weeks.

### Extraction

Should extraction of the nail become necessary, attach the Threaded Extractor to the end of the nail and use the Slaphammer to extract the nail (Fig. 50).

The cannulated Locking Bolt should not be used for nail removal. Extraction of the nail should be accomplished by using the Threaded Extractor.

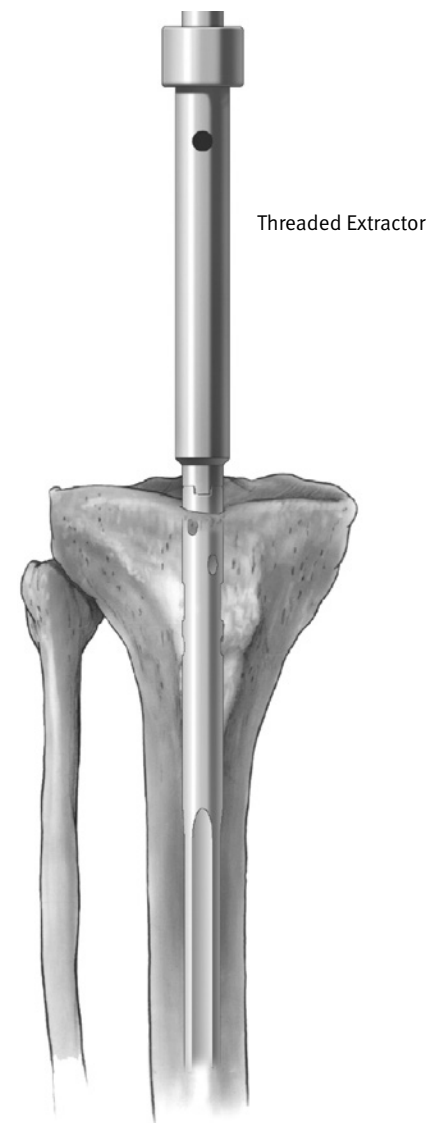


Fig. 50



## Instrument Case Options

### Tibial Instruments

Set Number 00-2255-031-00 (includes case/tray/lid + instruments)  
Case Number 00-2255-062-00 (includes trays and lid)

#### MIS Tibial Instruments (top tray holds the following)

Prod. No.	Description	
00-2237-042-01	Small Threaded Driver	1
00-2255-032-37	Tib./Hum. 3.7mm Drill	2
00-2255-033-00	Tibial Proximal Oblique Guide	1
00-2255-033-01	Tib. Prox. Lt. Trans. Guide	1
00-2255-033-02	Tib. Prox. Rt. Trans. Guide	1
00-2255-033-04	Tib. Prox. Locking Bolt	4
00-2255-033-05	5.0mm Ball Hex Ratchet Driver	1
00-2255-033-06	11mm Socket Ratchet Driver	1
00-2255-036-37	Tibial 3.7mm Drill Bushing	1
00-2255-036-80	Tibial 8.0mm Screw Bushing	1

#### MIS Tibial/Humeral Instruments (base of case holds the following)

Prod. No.	Description	
00-2255-001-00	Locking Bolt	1
00-2255-003-00	Tibial Proximal Targeting Guide	1
00-2255-003-01	Tibial Oblique Hole Adapter	1
00-2255-003-03	Set Screw	2
00-2255-004-00	Humeral Proximal Targeting Guide	1
00-2255-004-01	Humeral Oblique Hole Adapter	1
00-2255-028-00	Pin Wrench	1
00-2255-020-00	T-Handle Ratchet Screwdriver	1*

\*Fits into the MIS Tibial Instruments case bag (storage area)

### General Instrument Set

Set Number 00-2255-000-16 (includes case/trays/lid + instruments)  
Case Set Number 00-2237-095-00 (includes trays and lid)

#### General Instruments (top tray holds the following)

Prod. No.	Description	
00-2237-053-00	Wire Grip T-Handle	1
00-2237-061-00	Long T-Handle Cannulated Awl	1
00-2237-066-00	Short T-Handle Cannulated Awl	1
00-2255-016-00	7mm Angled Femoral Awl*	1
00-2255-034-00	Reduction Finger	1
00-2255-052-00	9mm/14mm Perc. Tapered Reamer	1
00-2255-060-00	8mm Trochanteric Reamer	1
00-2258-067-00	ITST® Threaded Guide Pin 355mm	3
00-2255-038-00	T-Handle	1
00-4816-060-00	Ball-Spiked Pusher	1
00-4817-011-00	Shoulder Hook	1

#### General Instruments (middle tray holds the following)

Prod. No.	Description	
00-2228-097-00	Diameter Gauge	1
00-2237-055-00	Ruler	1
00-2255-057-00	Flexible Reamer Extension	2
00-2305-024-00	Screwdriver, Small Hexhead	1
00-2237-060-00	Slotted Mallet	1
00-2237-062-00	Threaded Driver	1
00-2237-063-00	Screw Depth Gauge, Long	1
00-2255-013-00	Screwdriver 3.5mm Hex, Long	1
00-2255-017-00	Flared Exchange Tube	1
00-2237-064-00	Nail Length Gauge	1
00-2258-057-00	Cannulated Depth Gauge	1

\* The 7mm Straight Awl (00-2237-001-07) OR the 7mm Angled Femoral Awl (00-2255-016-00) will fit in the case. However, when you order the set number (00-2255-000-16), you will get the Angled Awl.

*Instrument Case Options continued on following page.*

**General Instruments (base of case holds the following)**

Prod. No.	Description	
00-2255-009-00	Slaphammer	1
00-2255-028-00	Pin Wrench	1
00-2237-065-00	Threaded Extractor (17cm)	1
00-2237-065-01	Threaded Extractor (32cm)	1
00-2255-012-33	3.2mm Trocar	3
00-2255-012-37	3.7mm Trocar	3
00-2255-012-50	5.0mm Trocar	3
00-2255-033-32	3.2mm Drill	3
00-2255-033-37	3.7mm Drill	3
00-2255-033-50	5.0mm Drill	3
00-2255-018-00	Distal Screw Depth Gauge	1
00-2255-013-01	Distal Screwdriver 3.5mm Hex	1
00-2255-015-03	Wand Handle	1
00-2255-015-01	Wand Insert	1
00-2255-015-02	Wand Set Screw	1

**Pressure Sentinel Intramedullary Reaming System  
Order Information**

Prod. No.	Description
<b>00-2228-000-00</b>	<b>Pressure Sentinel Reamer Full Set</b> Includes the following instruments & case:
00-2228-005-00	5.0mm Flexible Reamer
00-2228-005-05	5.5mm Flexible Reamer
00-2228-006-00	6.0mm Flexible Reamer
00-2228-006-05	6.5mm Flexible Reamer
00-2228-007-00	7.0mm Flexible Reamer
00-2228-007-05	7.5mm Flexible Reamer
00-2228-008-00	8.0mm Flexible Reamer
00-2228-008-05	8.5mm Flexible Reamer
00-2228-009-00	9.0mm Flexible Reamer
00-2228-009-05	9.5mm Flexible Reamer
00-2228-010-00	10.0mm Flexible Reamer
00-2228-010-05	10.5mm Flexible Reamer
00-2228-011-00	11.0mm Flexible Reamer
00-2228-011-05	11.5mm Flexible Reamer
00-2228-012-00	12.0mm Flexible Reamer
00-2228-012-05	12.5mm Flexible Reamer

00-2228-013-00	13.0mm Flexible Reamer
00-2228-013-05	13.5mm Flexible Reamer
00-2228-014-00	14.0mm Flexible Reamer
00-2228-014-05	14.5mm Flexible Reamer
00-2228-015-00	15.0mm Flexible Reamer
00-2228-015-05	15.5mm Flexible Reamer
00-2228-016-00	16.0mm Flexible Reamer
00-2228-016-05	16.5mm Flexible Reamer
00-2228-017-00	17.0mm Flexible Reamer
00-2228-017-05	17.5mm Flexible Reamer
00-2228-018-00	18.0mm Flexible Reamer
00-2228-018-05	18.5mm Flexible Reamer
00-2228-019-00	19.0mm Flexible Reamer
00-2228-019-05	19.5mm Flexible Reamer
00-2228-020-00	20.0mm Flexible Reamer
00-2228-020-05	20.5mm Flexible Reamer
00-2228-021-00	21.0mm Flexible Reamer
00-2228-021-05	21.5mm Flexible Reamer
00-2228-022-00	22.0mm Flexible Reamer
00-2228-030-00	T-Handle Extractor
00-2228-097-00	Diameter Gauge
00-2228-098-00	Soak Tray
00-5044-012-00	1/4in. Jacob's Chuck to Zimmer Adapter, Qty=2
00-2228-090-00	Sterilization Case

**Optional Reamer Sizes**

Prod. No.	Description
00-2228-022-05	22.5mm Flexible Reamer
00-2228-023-00	23.0mm Flexible Reamer
00-2228-023-05	23.5mm Flexible Reamer
00-2228-024-01	24.0mm Flexible Reamer
00-2228-024-05	24.5mm Flexible Reamer
00-2228-025-01	25.0mm Flexible Reamer
00-2228-025-05	25.5mm Flexible Reamer
00-2228-026-01	26.0mm Flexible Reamer
00-2228-026-05	26.5mm Flexible Reamer
00-2228-027-01	27.0mm Flexible Reamer

**Pressure Sentinel Sets**

<b>Prod. No.</b>	<b>Description</b>
<b>00-2228-000-01</b>	<b>Pressure Sentinel Reamer Trauma Set</b> Includes the following instruments & case: 5.0mm, 6.0mm, 7.0mm & 8.00mm-17.5mm Flexible Reamers in .5mm increments (1ea.)
00-2228-030-00	T-Handle Extractor
00-5044-012-00	1/4in. Jacob's Chuck to Zimmer Adapter, Qty=2
00-2228-090-00	Sterilization Case
<b>00-2228-000-02</b>	<b>Pressure Sentinel Reamer Hip Set</b> Includes the following instruments & case: 8.0mm-18.0mm Flexible reamers in 1mm increments (1ea.)
00-2228-030-00	T-Handle Extractor
00-5044-012-00	1/4in. Jacob's Chuck to Zimmer Adapter, Qty=1
00-2228-090-00	Sterilization Case
<b>00-2228-000-03</b>	<b>Pressure Sentinel Reamer Expanded Hip Set</b> Includes the following instruments & case: 8.0mm-18.0mm Flexible reamers in .5mm increments (1ea.)
00-2228-030-00	T-Handle Extractor
00-5044-012-00	1/4in. Jacob's Chuck to Zimmer Adapter, Qty=1
00-2228-090-00	Sterilization case

**00-2228-90-00 Sterilization Case**

Includes the following components:

00-2228-091-00	Base
00-2228-092-00	18.0mm to 22.0mm Reamer Tray
00-2228-093-00	12.0mm to 17.5mm Reamer Tray
00-2228-094-00	5.0mm to 11.5mm Reamer Tray
00-2228-096-00	Case Lid

**00-9975-011-00 Pressure Sentinel Reamer ZMR® Hip Set**

Includes the following components:

8.0mm-27.0mm Flexible reamers in .5mm increments (1ea.)	
00-9965-081-10	ZMR Flexible Reamer Diameter Gauge
00-9975-099-00	Case Lid
00-2228-040-00	ZMR Flexible Reamer Metal Case

\* Set includes case and contents without the 00-9975-099-00 Case Lid. The Case Lid must be ordered separately.

**Optional Instruments**

<b>Prod. No.</b>	<b>Description</b>
00-2255-008-00	Guide Wire 2.4mm, Ball-Tip, 70cm box (required for 5.0mm-7.5mm Pressure Sentinel Reamers)
47-2255-008-01	Guide Wire 3.0mm, Ball-Tip, 100cm Sterile/box (required for 8.0mm and larger Pressure Sentinel Reamers)
00-2255-008-01	Guide Wire 3.0mm, Ball-Tip, 100cm Non-sterile/box (required for 8.0mm and larger Pressure Sentinel Reamers)









**DISCLAIMER:**

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