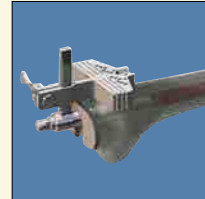


# GMRS® Proximal Tibial Surgical Protocol

Global Modular Replacement  
System



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### **Acknowledgements**

Stryker would like to thank all of the surgeons for their contributions in developing the Global Modular Replacement System (GMRS).

Stryker would especially like to thank the following surgeons for their contributions in developing the GMRS and/or for reviewing this surgical technique.

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# GMRS® Proximal Tibial Surgical Protocol

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**Introduction**

The GMRS Proximal Tibial Components are based on over a quarter of a century of clinical history. They have a reduced segment height, allowing for an 80mm replacement length.

Anterior-Posterior as well as Medial-Lateral suture holes allow for greater intra-operative freedom when attaching soft tissues.



The GMRS Standard Proximal Tibia accepts the Modular Rotating Hinge (MRH) Tibial Sleeve, Inserts and Tibial Rotating Component for seamless integration with the MRH resurfacing Hinge.

The GMRS Proximal Tibia is now available in two sizes, standard and small, to address variations in patient anatomies and different soft tissue closure challenges.

The GMRS Proximal Tibial Replacement has a comprehensive offering of stem options. The GMRS family of cemented stems offers two types: with or without extra-cortical porous-coated body sections.



## Description of the Proximal Tibial Modular Replacement System

The GMRS System was developed to meet the unique needs of patients who require reconstruction of large segmental defects for tumors, failed previous arthroplasty, or trauma. This system is designed to:

- Reconstruct large segmental defects of the proximal tibia.
- Reconstruct osteoarticular defects of varying sizes.
- Allow for variation and intra-operative changes of the surgical plan.

The system consists of proximal tibial components, tibial inserts, tibial sleeve, extension pieces and stems. It also includes a complete set of trial components and instrumentation.

The modular implants utilize a male/female taper locking mechanism. The components are assembled during surgery by impacting them together. The impaction causes the taper to securely lock the components together.



### Tibial Components

The proximal tibial components have a replacement length of 80mm, measured to the sulcus of the thinnest, 10mm, tibial insert.

**NOTE: The Global Modular Replacement System Standard Proximal Tibial Component (6495-3-102) accepts the Modular Rotating Hinge (MRH) tibial inserts. The Small Proximal Tibial Component (6495-3-101) accepts the small GMRS Tibial Inserts (6495-3-0xx) and the small GMRS Tibial Rotating Component (6495-3-601).**

The Proximal Tibial Components have fixation holes in the Anterior-Posterior (AP) and Medial-Lateral (ML) direction to re-attach soft tissues. The tibial inserts are available in five thicknesses (10, 13, 16, 20, and 24mm) of DURATION Stabilized Ultra High Molecular Weight Polyethylene (UHMWPE).

## MRS Cemented Stems



### Cemented Straight Stems

Ø8mm	6485-3-018
Ø9mm	6485-3-019
Ø10mm	6485-3-010
Ø11mm	6485-3-111
Ø13mm	6485-3-113
Ø15mm	6485-3-115
Ø17mm	6485-3-117

### Cemented Straight Stems w/body

Ø8mm	6485-3-008
Ø9mm	6485-3-009
Ø10mm	6485-3-000
Ø11mm	6485-3-011
Ø13mm	6485-3-013
Ø15mm	6485-3-015
Ø17mm	6485-3-017

The GMRS Proximal Tibia accepts the MRS cemented stems. The MRS stems are available in two styles. The first style has an extra-cortical porous coated body section with a 40mm replacement length. The stems are also available without the extracortical porous-coated body section, with a 11mm replacement length. All stems are available in 8mm, 9mm, 10mm, 11mm, 13mm, 15mm, and 17mm diameters. Their respective seat diameters at the resection level are 22mm (8mm,9mm,10mm dia.), 24mm (11mm dia.), 28mm (13mm dia.), 32mm (15mm dia.), and 36mm (17mm dia.), which allows close matching of the host bone diameter. The stems are designed to be cemented into the medullary canal. Optional stem centralizers are available for the 10-17mm diameter stems.

### Extension Pieces

The extension pieces are used to customize the replacement length and are available in 30mm, 40mm, 50mm, 60mm, 70mm, 80mm, 100mm, 120mm, 140mm, 160mm, 180mm, 200mm and 220mm lengths. The 100mm through 220mm lengths are typically required only for proximal femoral, distal femoral or total femoral replacements. This component features a male and female taper, which attaches a stem to a proximal tibial component.

## Extension Piece



## MRH Femoral Component



### Femoral Components

The MRH femoral components are available in 5 sizes: X-SML, SML, MED, LRG, X-LRG in left and right configurations. These femoral components require a 9mm resection of the distal femur and articulate with the DURACON Patellae. A comprehensive range of modular stems are available to be assembled with these femoral components.

### Trial Components

The implant system is complemented with a complete set of trial components. The trial components are replicas of their corresponding implants; however, they have non-locking trunnions. The trials are satin-finished and have no coatings, so that they can easily be distinguished from the implants. **A 30mm Trial Extension Piece also functions as the Trial Extra-Cortical Body.** Together with the Trial Cemented Stem, it forms the Trial Stem with extra-cortical porous-coated body.

**Indications**

The Modular Replacement Systems are intended for use in patients requiring extensive reconstruction of the hip joint and/or knee joint, including knee fusions, necessitated by extensive bone loss due to trauma, failed previous prosthesis and/or tumor resection.

**Contraindications**

A. As related to Bone Tumors:

Not all bone tumors may be treated successfully by segmental resection. Any condition that may have already resulted in either local or distant spread of the tumor may be a contraindication. Examples of such conditions include:

- Pathological fracture;
- Overt infection;
- Inopportune placement of biopsy incision; and,
- Rapid disease progression beyond a respectable margin.

Each patient must therefore be individualized and carefully evaluated by appropriate staging techniques prior to consideration of segmental replacement.

B. As related to Failed Previous Prosthesis and Trauma:

- Any active or suspected latent infection in or about the operative joint.
- Any mental or neuromuscular disorder which would create an unacceptable risk of prosthesis instability, prosthesis fixation failure, or complication in postoperative care.
- Bone stock compromised by disease, infection, or prior implantation, which cannot provide adequate support and fixation of the prosthesis.
- HA coated stems are contraindicated in situations where bone stock is inadequate to support press fit application.

See package insert for warnings, precautions, adverse effects, information for patients, and other essential product information.

**Before using GMRS instrumentation, verify:**

- Instruments have been properly disassembled prior to cleaning and sterilization;
- Instruments have been properly assembled post-sterilization;
- Instruments have maintained design integrity; and,
- Proper size configurations are available.

For Instructions for Cleaning, Sterilization, Inspection and Maintenance of Orthopaedic Medical Devices, refer to LSTPI-B.



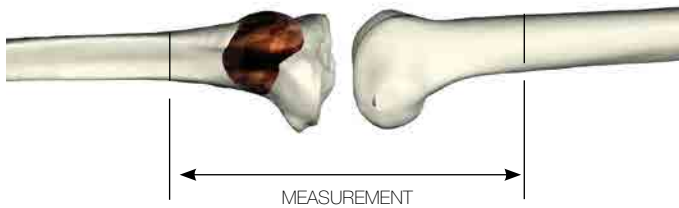
# GMRS® Proximal Tibial Surgical Protocol

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**Global Modular Replacement  
System  
Proximal Tibial Resection for  
Large Segmental Replacements**

This publication sets forth detailed recommended procedures for using Stryker Orthopaedics devices and instruments. It offers guidance that you should heed, but, as with any such technical guide, each surgeon must consider the particular needs of each patient and make appropriate adjustments when and as required based on his or her own clinical judgment.

1

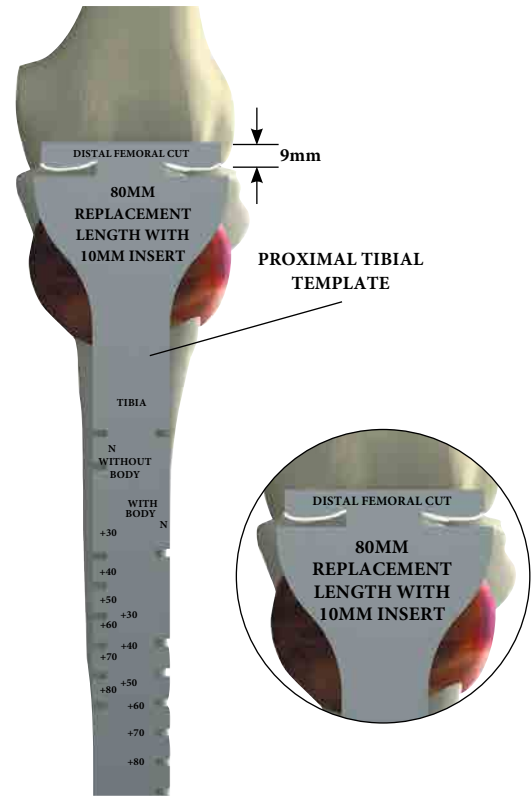


## Measuring Resection Length

**SURGICAL TIP:** As an aid to restoring leg length, a reference measurement can be established across the joint. With a Bovie, osteotome or similar device, a mark is made on the femur, proximal to the femoral resection, along with a mark on the tibia, distal to the tibial resection. The distance between these marks can be measured before the resection is made, and checked again, with the trials or implants in place to verify that leg length is restored (Figure 1).

The **Proximal Tibial Template** may be used as a guide to determine resection location. The template can be positioned using either of two methods. First, the proximal straight edge, engraved 'Distal Femoral Cut', can be positioned 9mm proximal to the distal most aspect of the condyles and determining the resection location from the appropriate slot (Figure 2). Second, the profile of the outline of the implant condyles on the template can be aligned with the distal most aspect of the condyles by viewing them through the medial and lateral cut outs in the template (Figure 2 inset) and determining the resection location from the appropriate slot.

2



The slots along the side of the template indicate the available resection lengths that can be reproduced by the available implants. One side of the template indicates stems with the extra-cortical porous coated body section and the other side indicates stems without the body (Figure 2). The resection lengths are based on the thinnest, 10mm, insert and include the tibial bearing component. The minimum resection of the tibia is 99mm, which includes 8mm for the Tibial Bearing Component, 80mm from the Proximal Tibial Component with thinnest (10mm) insert and a bodiless stem (11mm replacement length).

The anterior cortex of the tibia is marked with a Bovie, osteotome or similar device to indicate the resection level.

**6496-9-072**

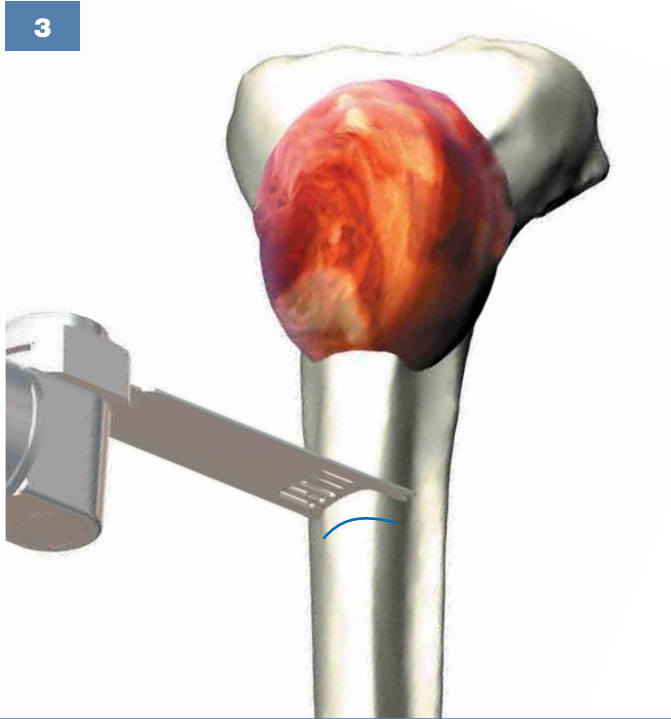
Proximal Tibial Template

GMRS Tray No: 2



**Note:** Frame color around each instrument indicates the corresponding GMRS instrument tray color.

Instruments without a colored frame are instruments from the MRH or the Duracon TS Instrument Trays.

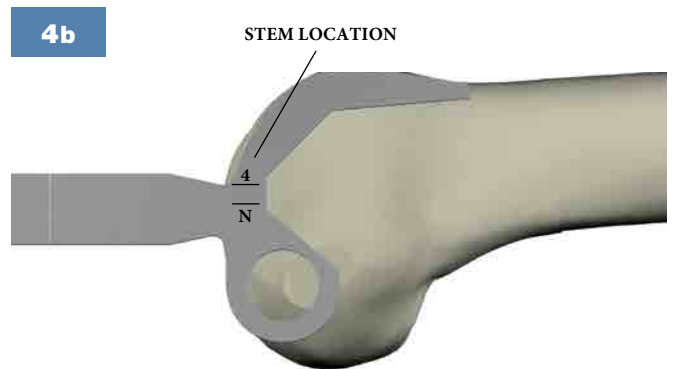
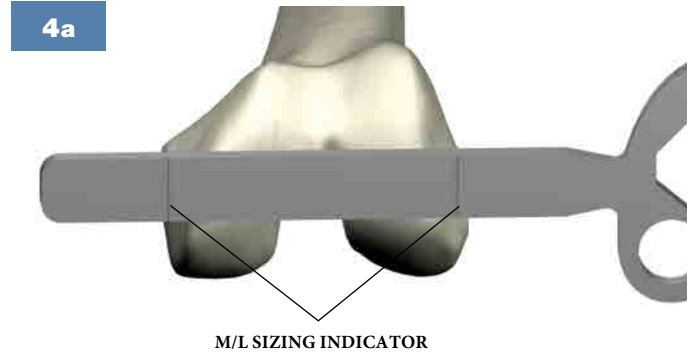


### Tibial Osteotomy

All remaining soft tissue at the level of transection is cleared. The osteotomy, perpendicular to the tibial shaft, is performed after the surrounding tissues and structures have been protected and retracted (Figure 3).

**SURGICAL TIP:** It is usually preferable to resect the tibia a millimeter or two proximal to the marked resection level. This will allow the facing reamer ( see Figure 13 page 15) to plane accurately up to the mark at a 90° angle.

**NOTE:** It is extremely important not to distract the extremity following the resection to protect the neurovascular structures. The end of the tibial osteotomy should be kept well padded to avoid injuring the vessels. The length of the resected specimen should be checked and measured again following resection.



### Femoral Sizing

In addition to pre-operative templating, femoral sizing can be accomplished using the **Femoral Sizing Template**. The first method is a simple M/L measurement accomplished by placing the template against the distal femur and choosing the appropriate width component (Figure 4a). The second method evaluates the position of the anterior flange cut with respect to the IM canal (Figure 4b).

If the two sizing methods differ, the smaller femoral size should be selected if soft tissue closure will present a challenge assuming that the smaller component will not notch the femur. Verification that the smaller size femur selected will not notch the femur occurs on page 12, Figure 9.

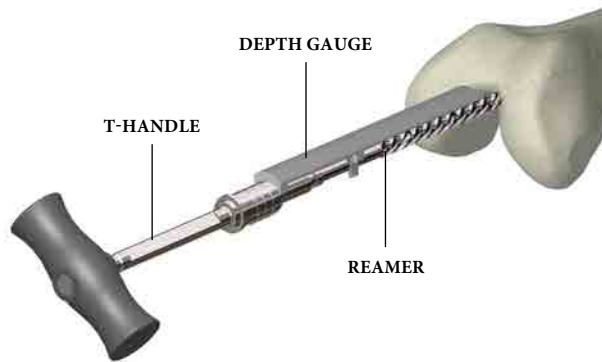
#### 6481-1-02X

Femoral Sizing  
Template

MRH Instrument Tray  
H2



5



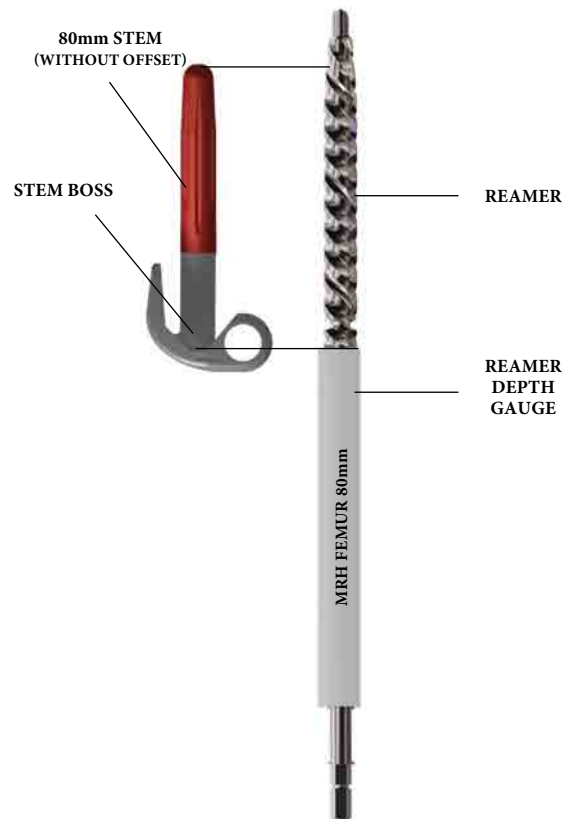
### Femoral Preparation for the Modular Rotating Hinge (MRH) Femoral Component

#### Femoral Canal Preparation

The **Intracondylar Starter Drill** should be used to create a hole immediately anterior to the insertion of the anterior cruciate ligament. A stem of at least 80mm must be used on the MRH Femoral components. The medullary canal must be reamed in order to accommodate the implant. **IM Reamers**, available in diameters 8–23mm, are sequentially advanced into the canal until the tip of the appropriate **Depth Gauge** reaches the level of the most prominent bony aspect of the distal femur (Figure 5).

**NOTE: Reamer depth stops for femoral preparation are available in two lengths for neutral stems and two lengths for offset stems. 80mm and 155mm refer to the depth required to properly seat the implant with the respective 80mm and 155mm length stem.**

6



**Figure 6** gives an example of depth stops marking, and how it relates to preparation of the medullary canal for a given combination of implants. The reamers prepare the canal for a line-to-line fit for the Cobalt Chrome Stems and prepare the canal for a 1/2 mm interference fit for the Titanium Fluted Stems.

**SURGICAL TIP:** In situations where stem diameters of 14mm or less are being used, it is necessary to ream the medullary canal of the distal femur with a 15mm reamer to at least 52mm. This reaming provides the necessary clearance to fully seat the cutting guide instrument and the “stem boss” portion of the stemmed femoral component.

**It is strongly recommended that the intramedullary reaming be performed manually to avoid bone perforation and/or fracture.**

**6838-7-673**

Intracondylar Starter Drill  
IM Reamer Tray R2



**6633-9-4XX**

IM-Reamer  
IM Reamer Tray R2



**6266-5-410**

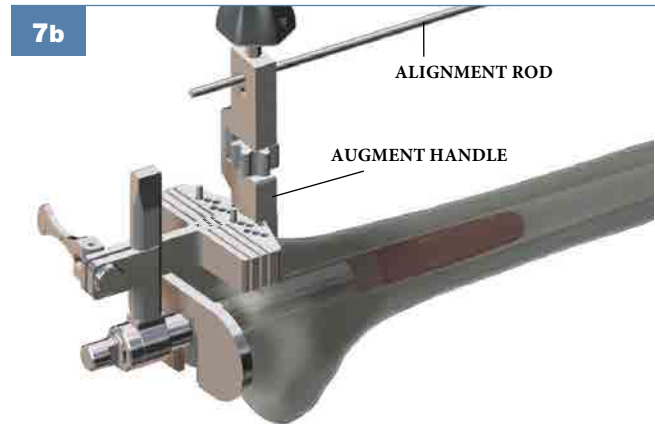
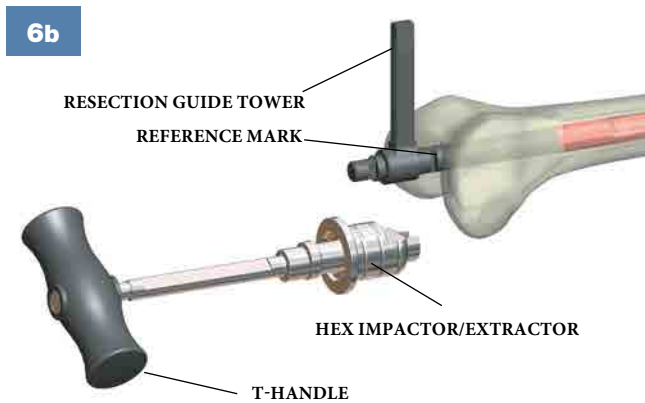
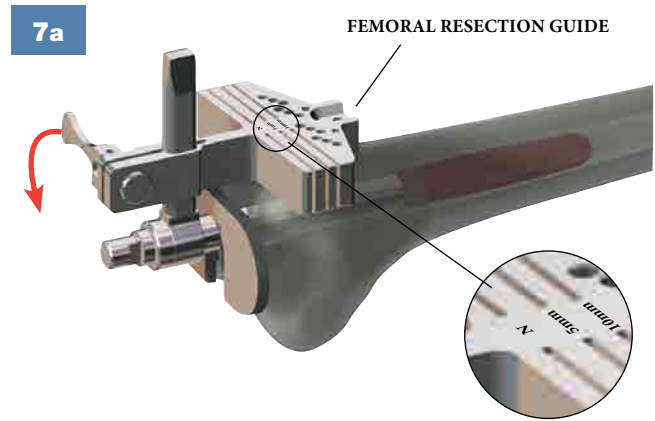
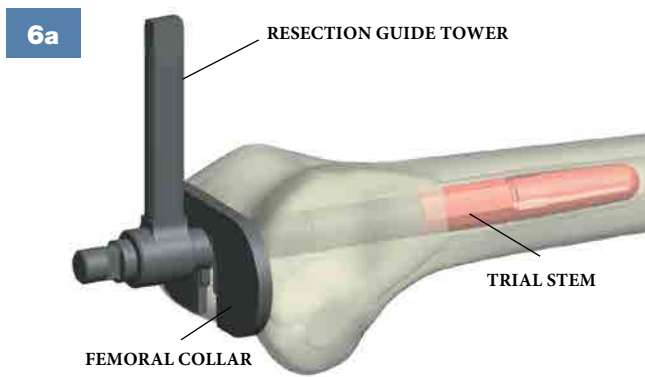
T-Handle  
IM Reamer Tray R2



**6481-1-05X**

IM-Reamer  
Depth Gauge  
MRH Instrument Tray H2





## Distal Femoral Resection

After preparing the medullary canal, the corresponding diameter **Trial Stem** is selected and attached to the **Resection Guide Tower**. The appropriate left or right **Femoral Collar** may be attached to the tower to assist in setting the final depth and rotation of the instrument (**Figure 6a**). The assembly is inserted into the canal until the collar contacts the most prominent bony aspect of the distal femur.

**SURGICAL TIP:** To insert and extract the assembly in and out of the medullary canal, the T-Handle and Impactor/Extractor can be utilized (**Figure 6b**).

The 6° valgus **Femoral Resection Guide** is assembled to the resection guide tower such that the appropriate left or right marking is visible and slid down to touch the anterior femur and secured using the cam-lock mechanism (**Figure 7a**). Further fixation to the femur can be achieved by adding 1/8" (3.2mm) drills or pins through the Femoral Resection Guide.

With the Femoral Resection Guide pinned in place, the cam-lock mechanism is released and the resection guide tower with the trial stem are removed. An additional drill pin is then inserted obliquely into the "X" drill hole to further stabilize the guide. For an intact femur, the distal cut is performed through the "10mm" slot. For a revision femur, a 2mm "clean up" cut is performed through the slot marked "N" for neutral and the "10mm" slot can be used to prepare for a 10mm distal femoral augment, if required.

**NOTE:** If a further resection is required, the cutting guide can be re-positioned referencing the pins placed on the distal femur through the 2mm or 4mm pinholes on the resection guide. If this is done, the medullary canal should be reamed a further 2mm or 4mm in order to ensure the implant is fully seated.

**SURGICAL TIP:** Before fixing the resection guide with 1/8" drills, alignment can be verified by referencing the position of the femoral head with the Alignment Rod inserted through the "NF" hole on the Alignment Handle, attached to the Distal Femoral Resection Guide (**Figure 7b**).

### 6478-6-XXX

Trial Stem



Trial Stem Tray R6

### 6633-9-428

Resection Guide Tower



Extension Gap Prep. Tray R3

### 6633-9-48X

Femoral Collar



Extension Gap Prep. Tray R3

### 6633-9-404

Impactor/Extractor



Extension Gap Prep. Tray R3

### 6633-9-430

Femoral Resection Guide



Extension Gap Prep. Tray R3

### 6838-7-2X0

Alignment Rod



Extension Gap Prep. Tray R3

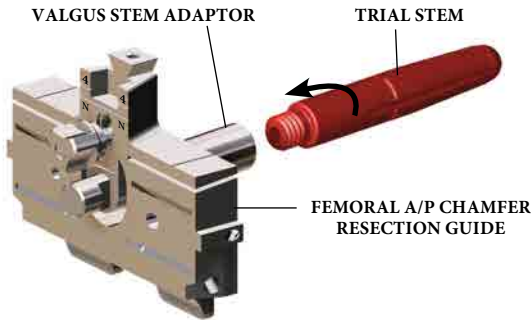
### 6633-7-250

Alignment Handle



Extension Gap Prep. Tray R3

**8a**



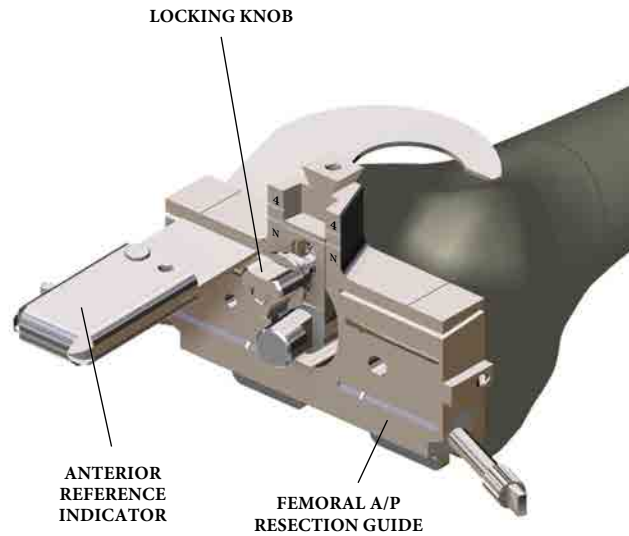
**8b**



**8c**



**9**



**Intramedullary Alignment**

The appropriate left or right 6° Valgus Stem Adaptor is assembled to the selected size Femoral A/P Chamfer Resection Guide and set to the “N” line on the resection block. The Trial Stem is then attached (Figure 8a). The assembly is inserted into the canal until the Resection Guide rests against the cut distal femur (Figure 8b).

If a 10mm distal augment cut has been made for a femur being revised, a magnetic 10mm Resection Guide Spacer should be attached to the Femoral Resection Guide (Figure 8c).

**Femoral Sizing and Resection**

Femoral Sizing can be verified using the Anterior Reference Indicator referencing the anterior cortex (Figure 9).

Correct internal/external rotation of the Femoral A/P Chamfer Resection Guide can be achieved by setting the Guide parallel to the transepicondylar axis. The Guide can then be fixed using 1/8” (3.2mm) drills or pins.

**SURGICAL TIP:** The tabs on the posterior aspect of the Femoral A/P Chamfer Resection Guide represent the external profile of the posterior condyles of the Femoral Component.

**6633-9-46X**

Valgus Stem Adaptor

MRH Instrument Tray H2



**6481-1-01X**

Femoral A/P Chamfer Resection Guide

MRH Instrument Tray H2



**6481-1-009**

Resection Guide Spacer

MRH Instrument Tray H2

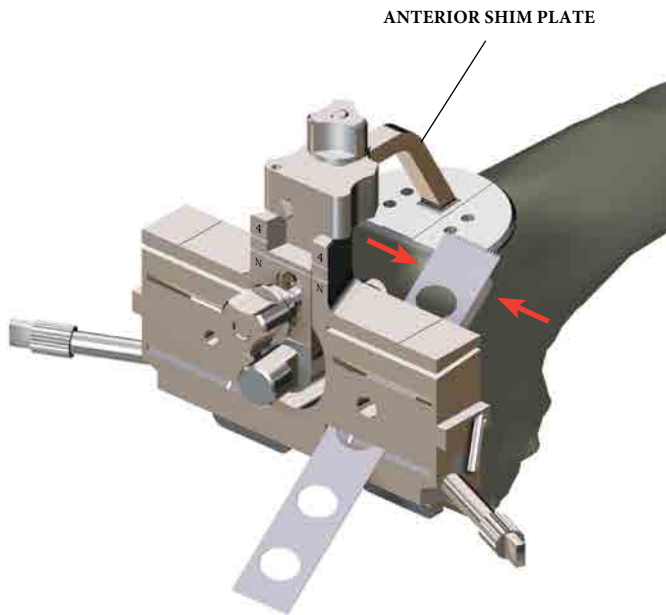


**6633-8-052**

Anterior Reference Indicator

MRH Instrument Tray H2





### Femoral Sizing and Resection (cont.)

After making the anterior flange resection, the **Anterior Shim Plate** can be attached to the Femoral A/P Chamfer Resection Guide to provide stability for the Resection Guide Assembly during the anterior and posterior chamfer resections (Figure 10).

**SURGICAL TIP:** A narrow oscillating saw blade of approximately 1/2" (12.7mm) is recommended for the chamfer cuts.

**SURGICAL TIP:** Upon removal of the Femoral A/P Chamfer Resection Guide, the edges of the entrance to the intramedullary hole may need to be rounded to allow complete seating of the femoral trial component due to the radius around the base of the stem boss.

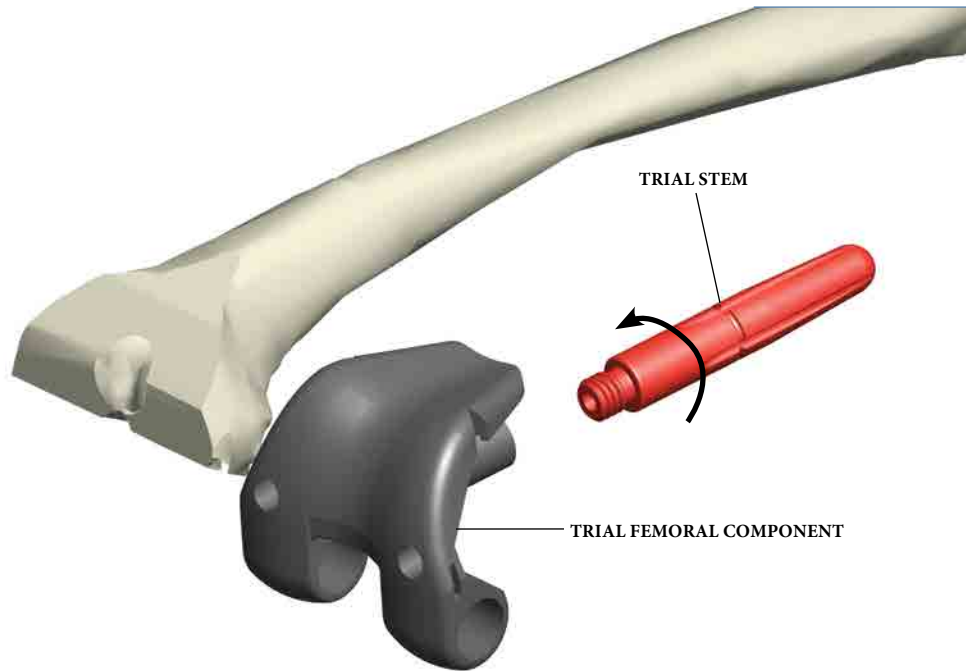
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#### 6633-9-464

Anterior Shim  
Plate

MRH Instrument Tray H2





### Femoral Trial Positioning

The **Trial Femoral Component** can be fitted with the appropriate **Trial Stem** before being placed onto the prepared bone (**Figure 11**).

---

**6481-1-3XX**Trial Femoral  
Component

MRH Instrument Tray H1

**6778-6-XXX**

Trial Stem

Trial Stem Tray R6





12



FACING REAMER

13



TRIAL TIBIAL BEARING COMPONENT

TRIAL TIBIAL INSERT

TRIAL PROXIMAL TIBIAL COMPONENT

TRIAL EXTENSION PIECE

TRIAL CEMENTED STEM

### Preparation of the Tibia

A flexible guide wire is inserted into the tibial canal. Flexible reamers are utilized to progressively ream the canal to the appropriate diameter. To permit an adequate cement mantle, the canal should be reamed 2mm larger than the selected stem.


**NOTE: The seven stem diameters are 8mm, 9mm, 10mm, 11mm, 13mm, 15mm, and 17mm.**

The appropriate **Facing Reamer** is used to plane the osteotomy site to ensure direct contact and accurate seating of the prosthesis upon the cortices by preparing for the radius at the stem/seat junction (**Figure 12**).


### Trial Assembly

Construct the Trial Tibial Prosthesis by joining the **Trial Stem** with the **Trial Proximal Tibial Component**, and **Trial Extension Piece**, if necessary. The **Trial Insert** is seated onto the trial proximal tibial component and the **Trial Tibial Bearing Component** is inserted through the trial insert into the Trial Proximal Tibia Component (**Figure 13**).


**6496-9-2XX**  
Facing Reamer  
GMRS Tray No: 4A



**6486-3-XXX**  
Trial Stem  
GMRS Tray No: 4A



**6496-3-10X**  
Trial Proximal Tibial Component  
GMRS Tray No: 2



**6496-6-0X0**  
Trial Extension Piece  
GMRS Tray No: 2



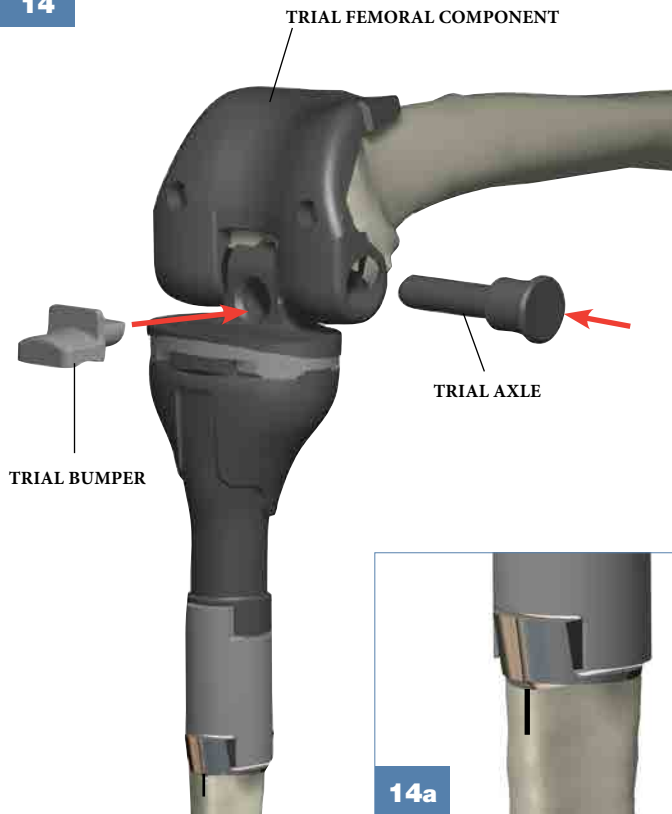
**6481-3-5XX**  
**6496-3-0XX**  
Trial Inserts  
GMRS Tray No: 2



**6496-3-60X**  
Trial Tibial Bearing Component  
GMRS Tray No: 2



**14**



**Trial Reduction**

Insert the trial tibial component construct into the tibia until it is flush with the osteotomy. Insert the **Trial Femoral Component** construct into the femur until it is flush with the cut surfaces.

Line up the Trial Tibial Bearing Component with the holes of the Trial Femoral Component and slide the **Trial Axle** into the assembly. Insert the **Trial Bumper** into the Trial Tibial Rotating Component (**Figure 14**).

**NOTE: The Trial Bumper is available in two configurations, neutral and 3° flexion.**

The purpose of the trial reduction is to determine the ease of insertion of the femoral and tibial components prior to cementing, and to determine whether the length of the prosthesis is appropriate. If the prosthesis is too long, tension will be placed on the neurovascular structures when the knee is extended. In addition, the extensor mechanism may be tight, causing a loss of flexion and difficulty in closing the soft tissues.

To determine the appropriate length, one must extend the knee and monitor the distal pulse with the trial prosthesis in place. Leg length can be further evaluated by verifying the measurement made previously between the marks made on the femur and the tibia (*see Figure 1 page 8*). The extensor mechanism should also be pulled out to length with the leg in full extension to evaluate patellar position and reattachment of the patellar tendon.

Based on the trial reduction and kinematics, different thickness insert trials can be used to optimize kinematics and patellar tracking.

Rotational Alignment of the tibial trials can be optimized at this stage. Once optimal alignment is established, a mark should be made on the tibia in line with the rotational reference mark on the trial stem. (**Figure 14a**). Typically, this reference mark will **not** be aligned with the center of the tibial crest.

**6481-1-3XX**

Trial Femoral Component

MRH Instrument Tray H1



**6778-6-XXX**

Trial Stem

Trial Stem Tray R6



**6496-2-115**

Trial Axle

GMRS Tray No: 2

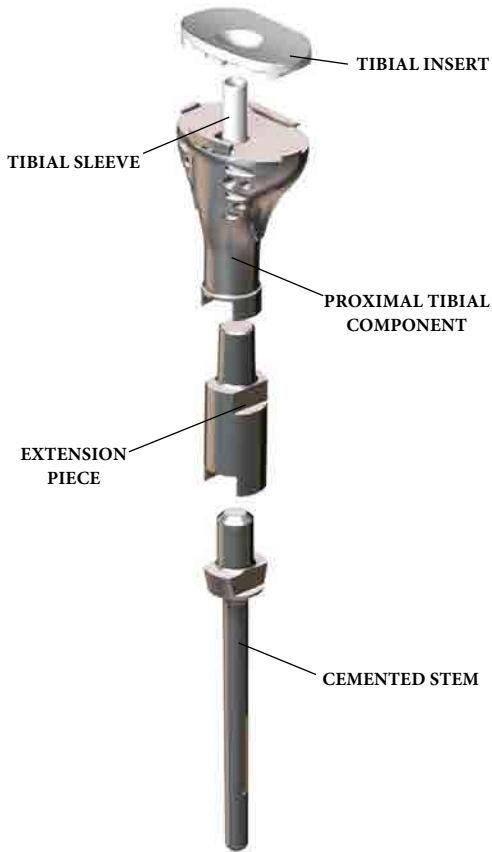
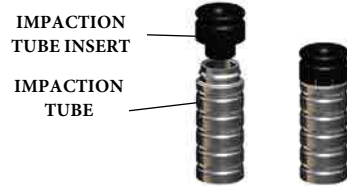
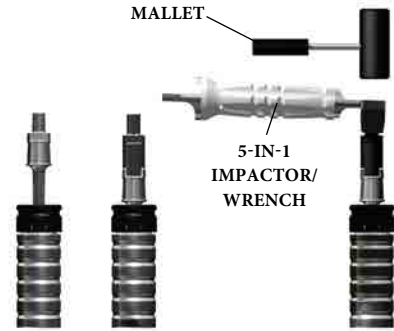


**6496-2-13X**

Trial Bumper

GMRS Tray No: 2



**15a****15b****15c****15d**

## Tibial Implant Assembly

The Proximal Tibia Prosthesis consists of the cemented stem, extension piece (when needed based on the length of the reconstruction), the proximal tibia replacement, the tibial insert and tibial sleeve (Figure 15a). Check that the correct sizes of all components have been chosen before assembly. If necessary, it is acceptable to stack two extension pieces to construct the necessary length. The instruments used for the assembly of the prosthesis are the Impaction Tube, Impaction Tube Insert, 5-in-1 Impactor, and a Mallet.

**NOTE: Before joining any of the tapers, make sure the male and female components are completely clean and dry.**

Insert the appropriate size **Impaction Tube Insert** (7-11, or 13-17) into the **Impaction Tube** (Figure 15b). The selected size stem implant is inserted into the impaction tube assembly. If an extension piece is required, it is assembled onto the male taper of the stem, and the male taper of the extension piece is impacted by placing the appropriate size hole of the **5-in-1 Impactor** over it and hitting with a **Mallet** (Figure 15c). The Proximal Tibial Component is then mounted onto the male taper of the stem or extension piece. The 5-in-1 impactor can be used to impact the assembly by aligning the two holes of the impactor with the two tabs of the proximal tibia segment and hitting with a mallet (Figure 15d).

**6496-9-06X**Impaction  
Tube Insert

GMRS Tray No: 4A

**6496-9-053**

Impaction Tube

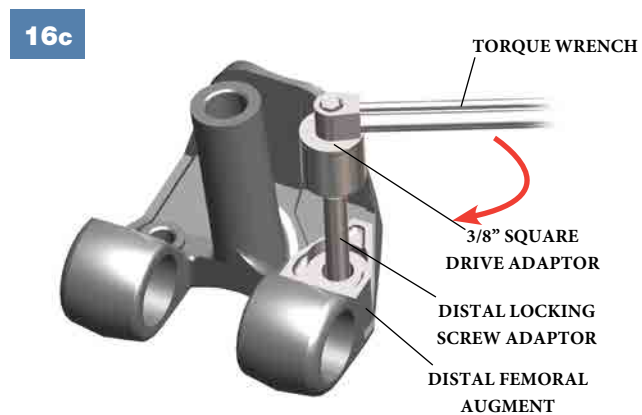
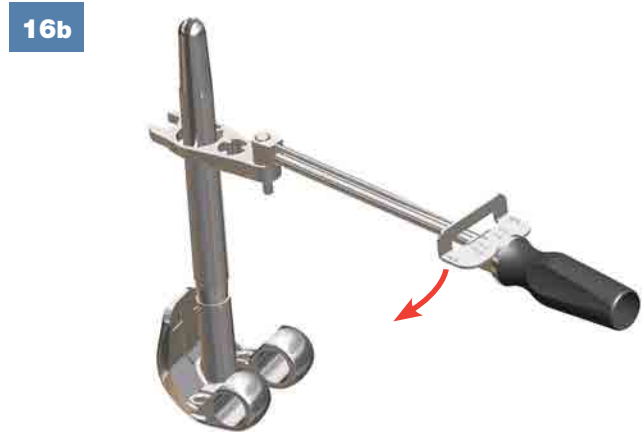
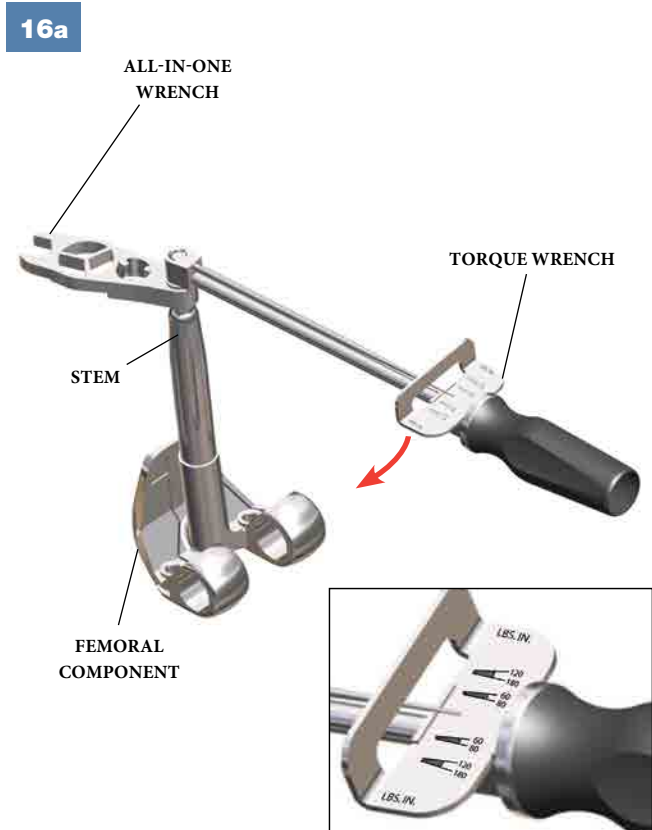
GMRS Tray No: 4A

**6496-9-063**

5-in-1 Impactor

GMRS Tray No: 3





**Femoral Implant Assembly**

To attach a CoCr Stem to the implant, hand tighten the stem into the stem boss as far as possible. Attach the **All-in-One Wrench** to the **Torque Wrench**, insert the male hex tip of the wrench into the hex recess of the Stem and tighten to 120-180 in/lbs (Figure 16a).

The implant Distal Femoral Augments are attached by screw fixation to the distal condylar area of the femoral component. The Torque Wrench is attached to the **Distal Locking Screw Adaptor** via the **3/8" Square Drive Adaptor**. A locking Torque of 60-80 in/lbs is applied to the screw head in order to lock the Augment and Femoral component together (Figure 16c).

**NOTE: If using a 155mm Titanium Fluted Stem, tighten to 120-180 in/lbs with the Tri-Fluted Section of the All-in-One Wrench (Figure 16b).**

**NOTE: Orient the All-in-One Wrench with the long axis of the Torque Wrench.**

**NOTE: A stem of at least 80mm must be used on the MRH Femoral Components.**

**8200-0105**

All-in-One Wrench

MRH Instrument Tray H2



**6633-9-986**

Torque Wrench  
MRH Instrument Tray H2



**6633-8-230**

Distal Locking Screw Adaptor

MRH Instrument Tray H2

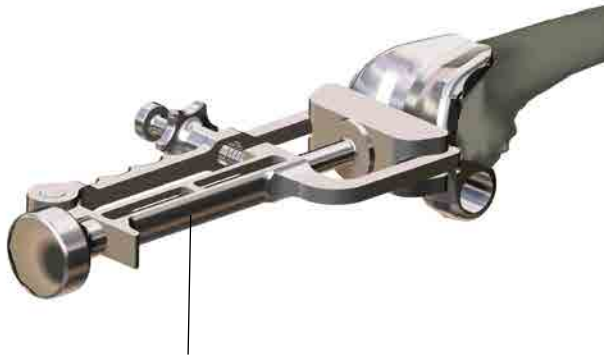


**6633-9-989**

3/8" Square Drive Adaptor

MRH Instrument Tray H2





FEMORAL IMPACTOR/EXTRACTOR

### Implantation and Orientation of the Femoral and Tibial Prostheses

To implant the tibial component, the medullary canal is irrigated and dried. Surgical bone cement is injected with a cement gun to fill the canal. Some cement is then placed around the stem of the prosthesis.

**SURGICAL TIP:** If a stem centralizer is not being used, plug the hole in the stem with bone cement. Failure to plug the hole may lead to increased porosity of the cement at the stem tip, where peak stresses occur in the cement and may initiate cracks in the cement at the stem tip.

The prosthesis is then inserted into the tibial canal until the stem seat is flush with the host bone at the osteotomy site and aligned with the mark previously made on the tibia. Excess cement is removed from around the prosthesis. Care is taken to prevent cement from getting into the extra-medullary porous-coated section. It is firmly held in place at the rotational orientation determined during the trial reduction while the cement cures.

Surgical bone cement is applied to the cut surfaces of the distal femur and to the inner surfaces and around the boss of the femoral implant construct. To implant the femoral component, the medullary canal is irrigated and dried. The prosthesis is attached to the **Femoral Impactor/Extractor** (Figure 17) and guided onto the femur and impacted until it is flush with the cut surfaces. Excess cement is removed.

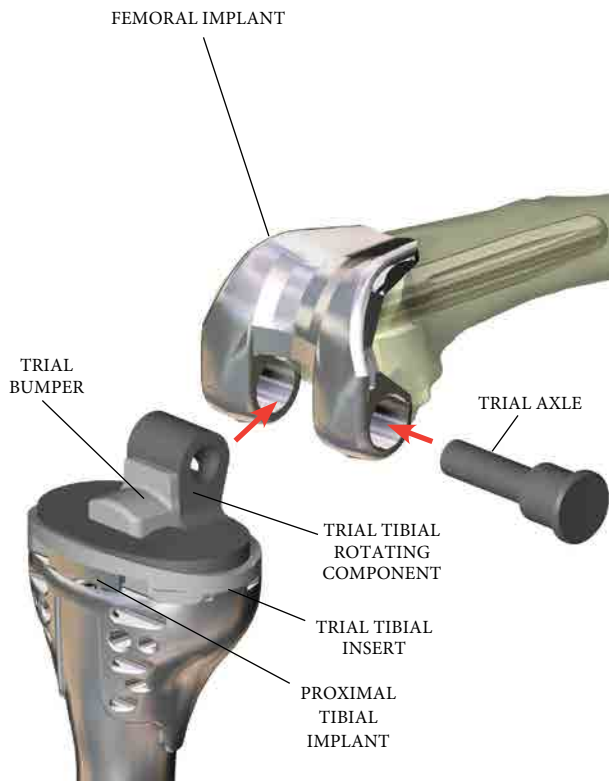
#### 6633-9-406

Femoral Impactor/  
Extractor



Extension Gap Prep. Tray R3

**18**

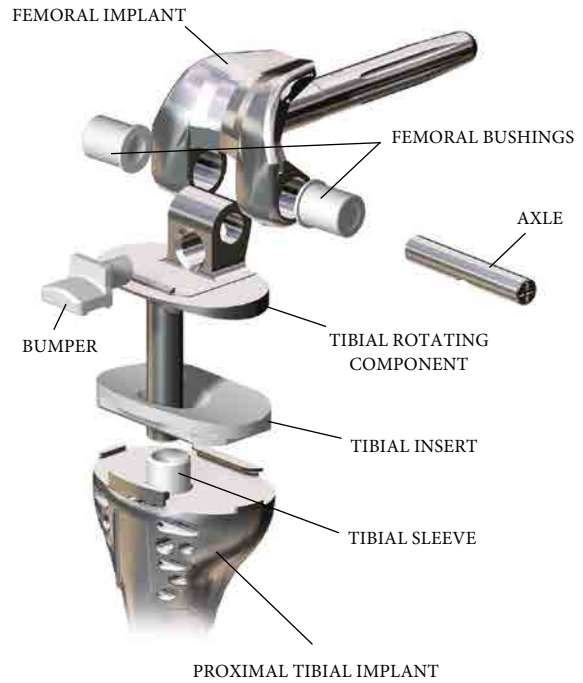


**Final Trial Articulation with Prostheses**

With the Femoral and Tibial prostheses in place, it is possible to use the Trial Axle, the Trial Bumper, the Trial Tibial

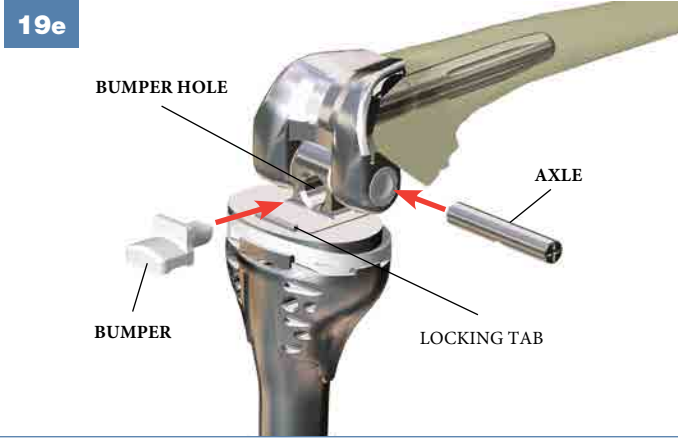
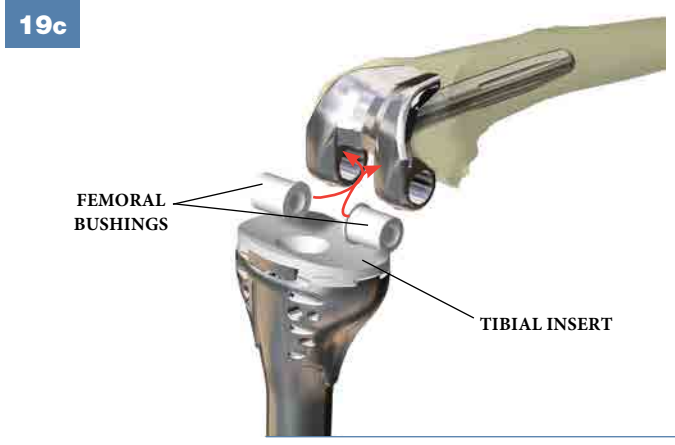
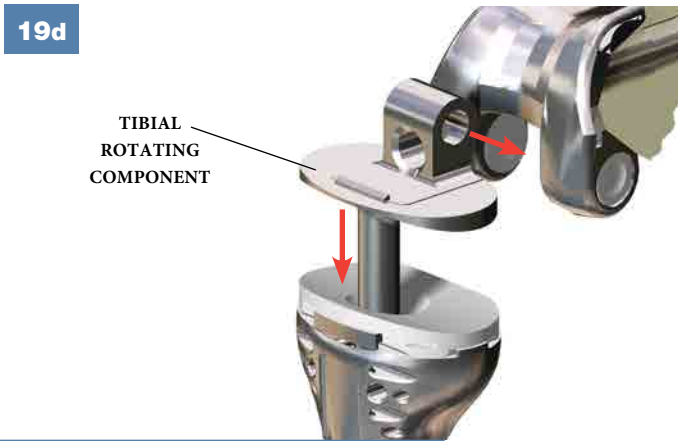
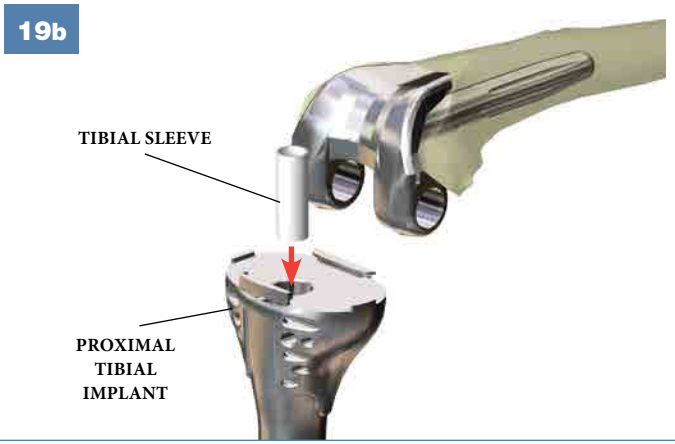
Rotating Component and the Trial Tibial Insert to verify that the appropriate motion, stability and patellar tracking will be achieved (**Figure 18**). With the knee in full extension this also assists in loading the femoral and tibial components while the cement is curing to provide an optimal bond between implant and bone.

**19a**



**Assembly of Rotating Hinge Mechanism**

The parts needed to assemble the Rotating Hinge mechanism are shown in **Figure 19a**.



The tibial sleeve is inserted into the proximal tibia (Figure 19b). The appropriate size tibial insert is impacted onto the proximal tibia. The two bushings are inserted into the femoral component from the centerline of the implant outward as shown (Figure 19c). The Tibial Rotating Component is inserted into the proximal tibia and brought between the bushings (Figure 19d). The axle is then introduced as shown (Figure 19e). A recess or cut-out exists on the axle to accept the bumper. By viewing through the bumper hole, verify the recess of the axle is aligned with the hole. The bumper is then inserted as shown (Figure 19e) to lock the assembly together. It should be impacted until flush with the tibial rotating component, and has cleared the locking tab.

**SURGICAL TIP:** The Axle Guider Rod can be threaded into the end of the Axle implant to help guide and align the holes of the bushings with the hole of the TRC during assembly. The Axle Introducer can be used to rotate the Axle to align the recess in the axle with the bumper hole to assemble the bumper.

**NOTE:** After the bumper is in place, the axle should not be rotated. It will be in its final position.

**6481-1-008**  
Axle Guider Rod



MRH Instrument Tray H1

**6483-9-008**  
Axle Introducer



MRH Instrument Tray H1





# GMRS® Proximal Tibial Surgical Protocol

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Appendix  
Taper Disassembly

### Taper Disassembly

Should it be necessary to disengage an assembled taper joint, a taper separator is provided. The taper separator utilizes the mechanical advantage of a wedge(s) and lever arm to overcome the locking forces of the tapers and separate the components. It is important that the separator be positioned so that the wedge(s) does not act against the antirotation tabs of the implants. The correct orientation is in an anterior-to-posterior direction. The implants are designed to withstand the forces generated by the separator in this direction. Placement of the separator wedges against the anti-rotation tabs may damage them, making disengagement difficult. The separator may be used via three different methods.

#### Method 1

The wedges are initially advanced by hand to bring them in contact with the implant at the joint to be disengaged. The wedges are advanced by turning the nut in a clockwise direction, until resistance is felt (**Figure 20a**). The wedges are then further advanced, using the wrench end of the 5-in-1 impactor provided, until the tapers disengage.

#### Method 2

The wedges of the separator are advanced until they are sufficiently tight against the taper junction to be separated using the wrench end of the 5-in-1 impactor. A mallet can then be used to impact the chisel component of the separator. The separator is designed to allow the nut and chisel to travel a small distance when impacted to ease separation.

#### Method 3

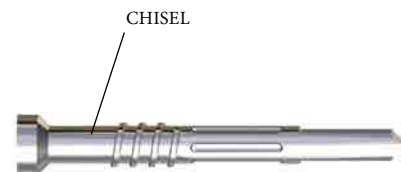
The separator can be disassembled and the chisel component of the assembly can be used by itself to separate a taper junction (**Figure 20b**). The chisel is inserted anteriorly at the location to be separated and impacted with a mallet until separation is achieved.

**Caution should be taken when disengaging any taper-locked joint. The high forces that hold a taper-locked joint together may result in a sudden and forceful action upon disengagement along the axis of the tapers.**

20a



20b



**6496-9-054/055/056**

Taper Separator

GMRS Tray No: 3







# GMRS® Proximal Tibial Surgical Protocol

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**Implant Listing and Resection Length  
Overview Chart**

**Implant Listing**

Description	Diameter	Titanium Fluted		Cobalt Chrome	
		80mm	155mm	80mm	155mm
Stem	10mm	6478-6-600	6478-6-680	6478-6-395	6478-6-435
Stem	11mm	6478-6-605	6478-6-685	6478-6-396	6478-6-436
Stem	12mm	6478-6-610	6478-6-690	6478-6-397	6478-6-437
Stem	13mm	6478-6-615	6478-6-695	6478-6-398	6478-6-438
Stem	14mm	6478-6-620	6478-6-700	6478-6-399	6478-6-439
Stem	15mm	6478-6-625	6478-6-710	6478-6-400	6478-6-440
Stem	16mm	6478-6-630	6478-6-715	6478-6-405	6478-6-445
Stem	17mm	6478-6-635	6478-6-720	6478-6-410	6478-6-450
Stem	18mm	6478-6-640	6478-6-725	6478-6-415	6478-6-455
Stem	19mm	6478-6-645	6478-6-730	6478-6-420	6478-6-460
Stem	21mm	6478-6-655	6478-6-740	6478-6-425	6478-6-465
Stem	23mm	6478-6-665	6478-6-750	6478-6-430	6478-6-470

Description	Size	Cat No
Femoral Distal Block 10mm	XS	6481-1-200
Femoral Distal Block 10mm	Small	6481-1-210
Femoral Distal Block 10mm	Medium	6481-1-220
Femoral Distal Block 10mm	Large	6481-1-230
Femoral Distal Block 10mm	XL	6481-1-240

Description	Size	Left	Right	M/L	A/P
MRH Femoral Component	XS	6481-1-100	6481-1-101	60mm	54mm
MRH Femoral Component	Small	6481-1-110	6481-1-111	65mm	55mm
MRH Femoral Component	Medium	6481-1-120	6481-1-121	70mm	61mm
MRH Femoral Component	Large	6481-1-130	6481-1-131	75mm	64mm
MRH Femoral Component	XL	6481-1-140	6481-1-141	80mm	66mm

Description	Size	Cat No
MRH Axle	All Sizes	6481-2-120
MRH Femoral Bushing	All Sizes	6481-2-110
Tibial Sleeve	All Sizes	6481-2-140
Bumper Insert	Neutral	6481-2-130
Bumper Insert	3 Degrees	6481-2-133

Description	Size	Cat No
GMRS Tibial Rotating Component for Small Proximal Tibia only	Small	6495-3-601
MRH Tibial Rotating Component for Standard Proximal Tibia only	Standard	6481-2-100

Description	Thickness	Cat No
GMRS Tibial Insert for Small Proximal Tibia	10mm	6495-3-010
GMRS Tibial Insert for Small Proximal Tibia	13mm	6495-3-013
GMRS Tibial Insert for Small Proximal Tibia	16mm	6495-3-016
GMRS Tibial Insert for Small Proximal Tibia	20mm	6495-3-020
GMRS Tibial Insert for Small Proximal Tibia	24mm	6495-3-024

Description	Thickness	Cat No S1/S2
MRH Tibial Insert for Standard Proximal Tibia	10mm	6481-3-210
MRH Tibial Insert for Standard Proximal Tibia	13mm	6481-3-213
MRH Tibial Insert for Standard Proximal Tibia	16mm	6481-3-216
MRH Tibial Insert for Standard Proximal Tibia	20mm	6481-3-220
MRH Tibial Insert for Standard Proximal Tibia	24mm	6481-3-224

<b>Description</b>	<b>Size</b>	<b>Cat No</b>	<b>M/L</b>	<b>A/P</b>
Proximal Tibial Component	Small	6495-3-101	52mm	41mm
Proximal Tibial Component	Standard	6495-3-102	65mm	41mm

<b>Description</b>	<b>Length</b>	<b>Cat No</b>
Extension Piece	30mm	6495-6-030
Extension Piece	40mm	6495-6-040
Extension Piece	50mm	6495-6-050
Extension Piece	60mm	6495-6-060
Extension Piece	70mm	6495-6-070
Extension Piece	80mm	6495-6-080

#### Straight Stem

<b>Description</b>	<b>Diameter</b>	<b>With porous coated</b>	<b>W/O porous coated</b>
		<b>body section</b>	<b>body section</b>
Cemented Stem (102mm Length)	8mm	6485-3-008	6485-3-018
Cemented Stem (102mm Length)	9mm	6485-3-009	6485-3-019
Cemented Stem (102mm Length)	10mm	6485-3-000	6485-3-010
Cemented Stem (127mm Length)	11mm	6485-3-011	6485-3-111
Cemented Stem (127mm Length)	13mm	6485-3-013	6485-3-113
Cemented Stem (127mm Length)	15mm	6485-3-015	6485-3-115
Cemented Stem (127mm Length)	17mm	6485-3-017	6485-3-117

## Proximal Tibia Resection Lengths

<b>Proximal Tibial Component Length (including 10mm Tibial Insert)</b>	=	<b>80mm</b>
<b>Tibial Rotating Component</b>	=	<b>8mm</b>
<b>Stem without Body</b>	=	<b>11mm</b>
<b>Stem with Body</b>	=	<b>40mm</b>

<b>Extension Piece Length</b>	<b>Stem without Body</b>	<b>Stem with Body</b>
None	99mm	128mm
30mm	129mm	158mm
40mm	139mm	168mm
50mm	149mm	178mm
60mm	159mm	188mm
70mm	169mm	198mm
80mm	179mm	208mm

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