

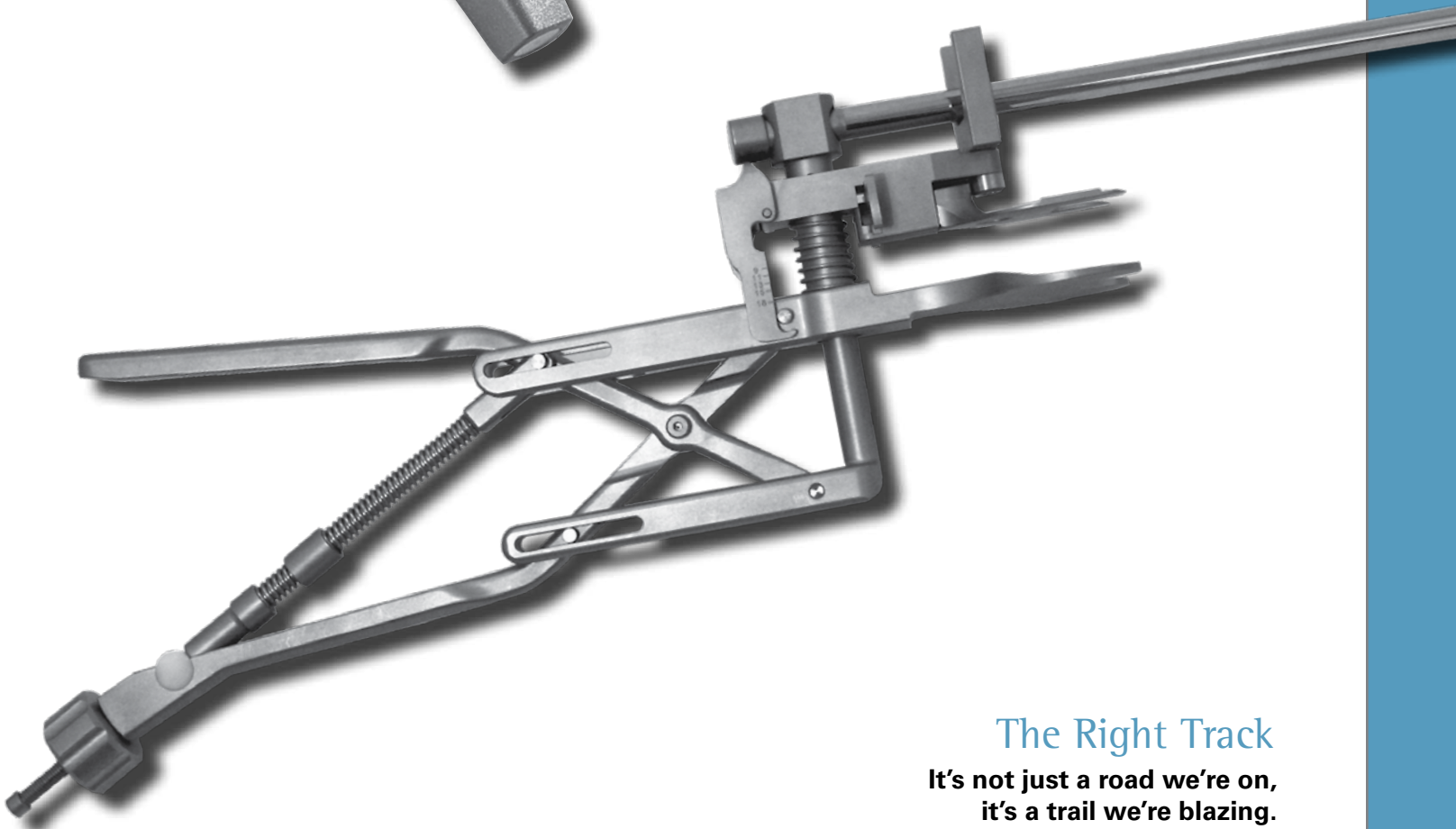
OPTETRAK®

A COMPREHENSIVE KNEE SYSTEM



LBS 11

LIGAMENT BALANCING SYSTEM
SECOND GENERATION



The Right Track

It's not just a road we're on,
it's a trail we're blazing.

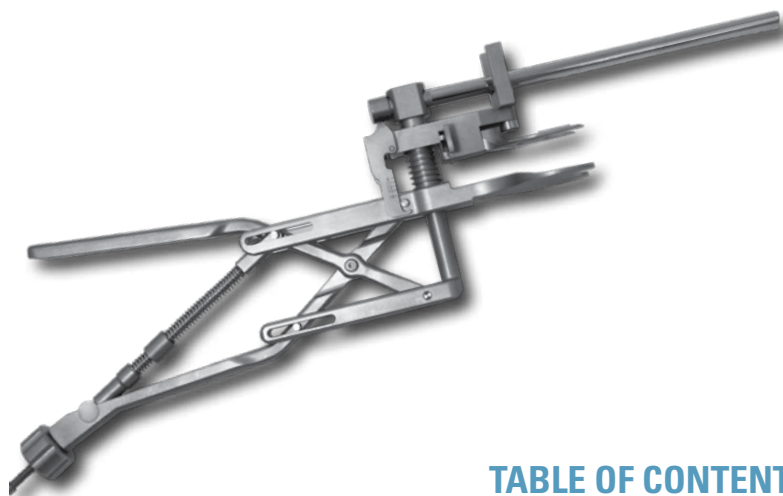


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THE OPTETRAK COMPREHENSIVE KNEE SYSTEM
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The following operative technique is an
addendum to the Optetrak® Comprehensive
Operative Technique Cruciate Retaining/
Posterior Stabilized.

INTRODUCTION

The necessity of balanced flexion and extension gaps in total knee replacement surgery has been well proven. Improper balance has been shown to result in inferior clinical results.^{1,2,12,13}

Symmetric and equal flexion and extension gaps are required to ensure proper kinematics of the joint and optimize function, range of motion and stability. Balancing of flexion and extension gaps requires proper varus/valgus alignment, rotational alignment and sizing of both femoral and tibial components. Accurate varus/valgus alignment is achieved through pre-operative planning, reliable instrumentation and carrying out of bone cuts. Balance in extension (axial) is essential prior to determining the rotational position of the femoral component. Rotational alignment is achieved through meticulous ligament balancing and proper referencing. Flexion and extension balancing techniques based solely on bony landmarks often fail to recognize variability in anatomy, bone loss and gap symmetry and, as a result, inconsistently produce a rectangular flexion space. Also, techniques using anatomic landmarks do not consider the proximal tibial resection plane or the status of the collateral ligaments, both of which directly influence femoral component rotation necessary to create a balanced flexion space. These statements are particularly true when applied to minimally invasive surgery.

This technique describes a method for balancing the medial and lateral collateral ligaments that reproducibly creates symmetric and equal flexion and extension gaps in order to optimize knee function.

DESIGN RATIONALE

Since most degenerative arthritic knees exhibit varus or valgus misalignment, the traditional approach has always been to perform medial or lateral soft tissue releases depending on the deformity, including releases of the medial collateral ligament in (MCL) severe varus knees. Reported medial collateral ligament release rates range from 12-44 percent. While ligamentous release can produce the desired realignment, it may also create leg length discrepancy, flexion-extension mismatch or unnecessary soft tissue surgery. The rationale behind the development of the Ligament Balancing System II advocates the preservation of the MCL; minimizing soft tissue releases, maintaining leg length of the patient and reducing rehabilitation time.

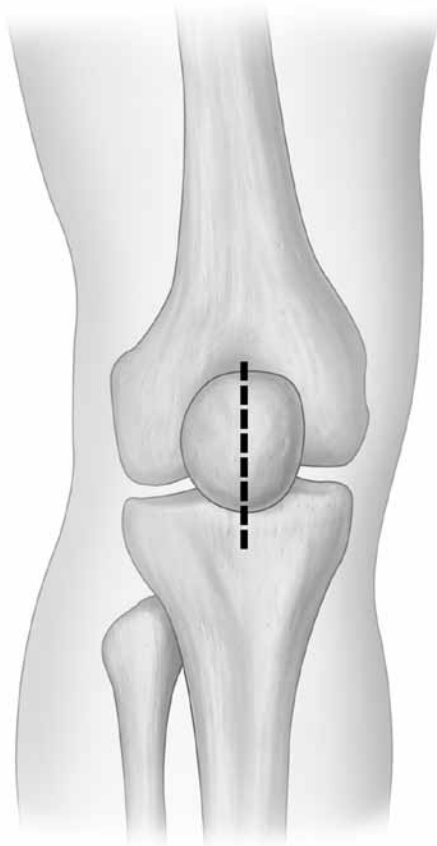


Figure 1
Skin Incision. Bony Landmarks Can Be
Recognized Underneath the Skin.

SOFT TISSUE BALANCING

It has been shown that the lateral collateral ligament (LCL) may lengthen up to 3mm with varus deformity of up to 20 degrees, and also that the MCL does not elongate with valgus deformities of up to 15 degrees.¹ These observations have concluded that:

The lateral side is adjustable because it:

- Elongates or shortens in face of deformity
- Contracts (valgus deformity)
- Lengthens (varus deformity)

The MCL is the reference datum for:

- Flexion gap
- Extension gap
- Angular alignment

Apparent tightness of the collateral ligaments results from underlying osteophytes on the femur or tibia, which lengthen the path of the ligament. Meticulous removal of osteophytes eliminates the tension on these structures.

DETAILED OPERATIVE TECHNIQUE

The operative technique for this method of soft tissue balancing follows the pre-operative planning, approach, exposure and preparation of the femur (Steps 1-3 only) in the Optetrak® Cruciate Retaining/Posterior Stabilized (CR/PS) and LPI Operative Technique (**Figure 1**).

The distal femoral and proximal tibial resections are carried out.

KNEE PREPARATION

Prior to using the LBS II, it is very important to prepare the knee by performing any necessary soft tissue releases and removing any medial, lateral and/or posterior osteophytes that may be present. If a Posterior Stabilized knee will be implanted, complete excision of the posterior cruciate ligament is required. The distal femoral and proximal tibial cuts are performed. Distal femoral resection depth will be influenced by the degree of flexion contracture documented during pre-operative examination. Adjusting the depth of distal femoral resection to the degree of flexion contracture the patient has is

important so as to ease balancing the flexion and extension spaces. The varus/valgus plane for the distal femoral cut may be influenced by patient height and the degree of pre-operative coronal knee deformity. The coronal plane of the proximal tibial resection can be confirmed with a small provisional tray and attached alignment rod.

EXTENSION GAP BALANCING

Using the **Tibial Flexion/Extension Spacer Blocks**, choose the correct thickness that will allow the joint to achieve full extension. An acceptable degree of medial/lateral laxity should be allowed. The use of spacer blocks ensures that a rectangular extension space has been created. If the space is not rectangular, further soft tissue balancing must be performed. The size markings of the spacer blocks refer to the corresponding tibial insert thickness and take into consideration the thickness of the femoral component and tibial tray. Once the rectangular extension space is achieved, no further soft tissue balancing should be undertaken for the remainder of the procedure (**Figure 2**).

FLEXION GAP BALANCING

Verify that the femoral posterior condyle paddles are locked to the tibial paddles in the **LBS II Tensor**.

Flex the knee at 90 degrees and then place the Tensor into the joint space. Make sure that the sizer adapter is in contact with the distal femoral cut (**Figure 3**).

Insert the **LBS II 8mm Femoral Tensor Rod** into the Tensor through the turret head until it fully engages the intra-medullary canal of the femur (**Figure 4**).

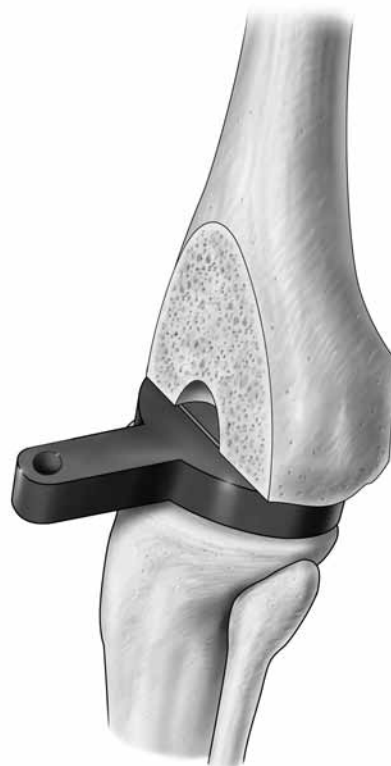


Figure 2
Checking the Extension Gap

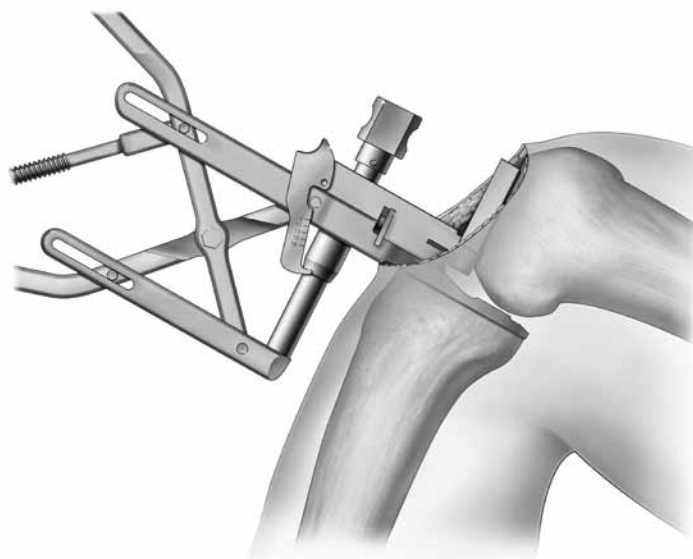


Figure 3
LBS II Tensor Positioned in the Knee

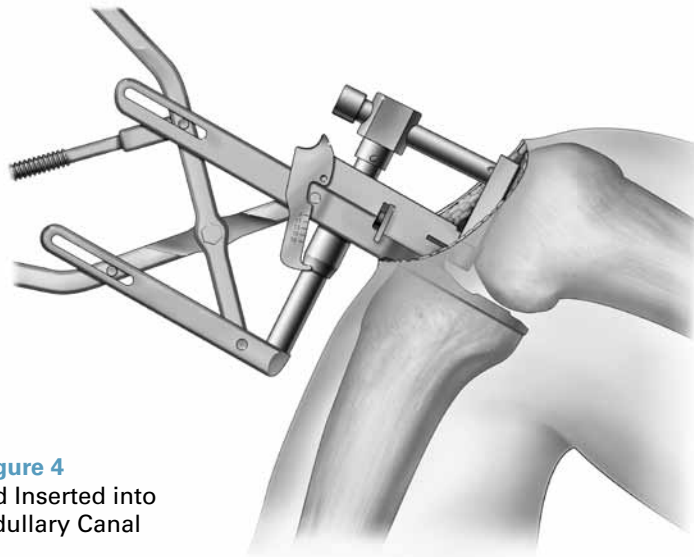


Figure 4
Tensor Rod Inserted into
Intra-medullary Canal

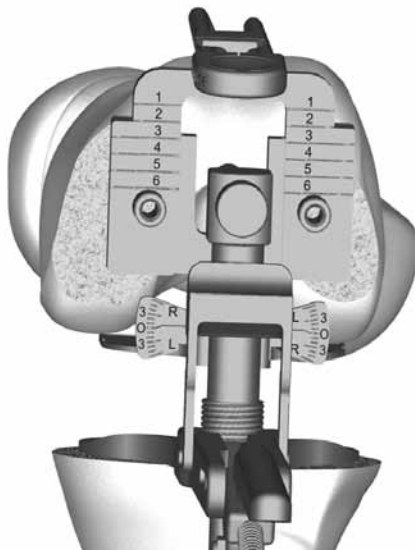


Figure 5
Determination of A/P Dimension of
Femoral Component

The next step in the procedure will be to balance the knee in flexion to create a rectangular flexion gap and to apply equal tension on both the medial and lateral collateral ligaments. Do not evert the patella to avoid over-tensioning the lateral side.

Gentle tension is applied to the Tensor. The femur auto-rotates around the LBS II Tensor Rod and stops when there is equal tension on the collateral structures. At this point, proper balance between the medial and lateral collateral ligaments is achieved. Tighten the nut on the Tensor to keep the knee distracted. Although the femur rotates internally, the Tensor Rod of the assembled LBS II instrument and the spacer adapter stay in the same position, parallel in relation with the proximal tibial surface.

Slide the **LBS II Rotation/Sizer Guide** on the sizer adapter and insert the tip of the **LPI Beta Stylus Pointer** underneath the distal anterior femoral soft tissues and into the suprapatellar pouch, engaging it with the Rotation/Sizer Guide (**Figure 5**).

The stylus of the Rotation/Sizer Guide should rest on the anterior cortex of the femur in a point midway between the highest and the lowest point of the distal epiphysis. Verify that the Rotation/Sizer Guide is flush against the resected distal femoral surface. Disengage the posterior femoral paddles of the Tensor. These will now snugly fit against the posterior femoral condyles. The assembled LBS II instrument has a built-in goniometer that measures the degrees of rotation of the femoral cuts relative to the posterior condyles. The size of the femoral implant can now be determined by reading the scale on the Rotation/Sizer Guide.

Following Optetrak's standard resection recommendations, when the Rotation/Sizer Guide falls between sizes, it is recommended to choose the smallest size (**Figure 6**).

The degrees of femoral rotation can now be read directly from the goniometer on the Tensor (**Figure 6**). The number represents the degrees of femoral component external rotation relative to the posterior condyles. Be aware that if a posterior condylar defect is present, the reading may be affected. However, this will not affect the degree of rotation required to achieve a rectangular flexion space since that rotation is determined by the tension of the medial and lateral collateral ligaments and the resection plane of the proximal tibia. You may reference the A/P or epicondylar axis of the femur at this time as a double-check, but the ligament balancing device does determine the one rotational position of the femoral component that will create a rectangular flexion space.

Drill two holes through the bushing guide of the Rotation/Sizer Guide using the standard A/P Sizer Collar Drill (**Figure 7**). These holes create a line that is parallel to the proximal tibia and will accommodate the pegs of the femoral finishing guide.

Remove the Tensor, Stylus Pointer and Rotation/Sizer Guide from the femur.

A Femoral Finishing Guide can now be used on the distal femur so the flexion gap can be assessed prior to cutting. If the flexion gap does not match the extension gap, up or downsizing the femoral cutting block will decrease or increase the flexion space by approximately 2mm.

Resecting additional distal femur or sloping the tibial resection are additional methods by which adjustments in the caliber of the extension and flexion spaces can be made. These steps are repeated until the flexion gap matches the dimensions of the extension gap.

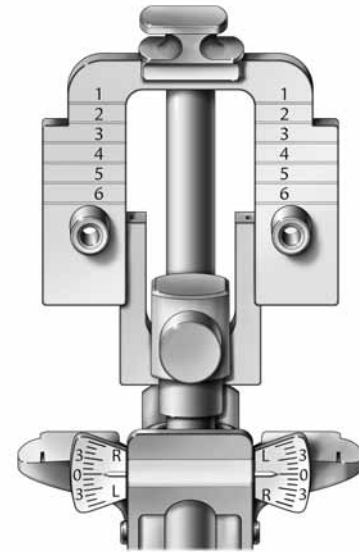


Figure 6
Rotation/Sizer Guide Sliding Down the Tensor. If Measurement is Between Sizes, Choose the Smallest One.

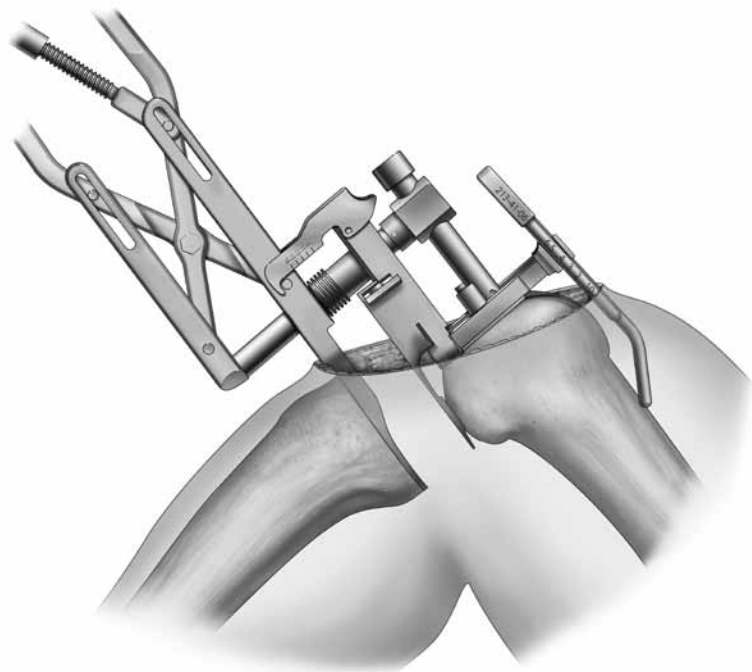
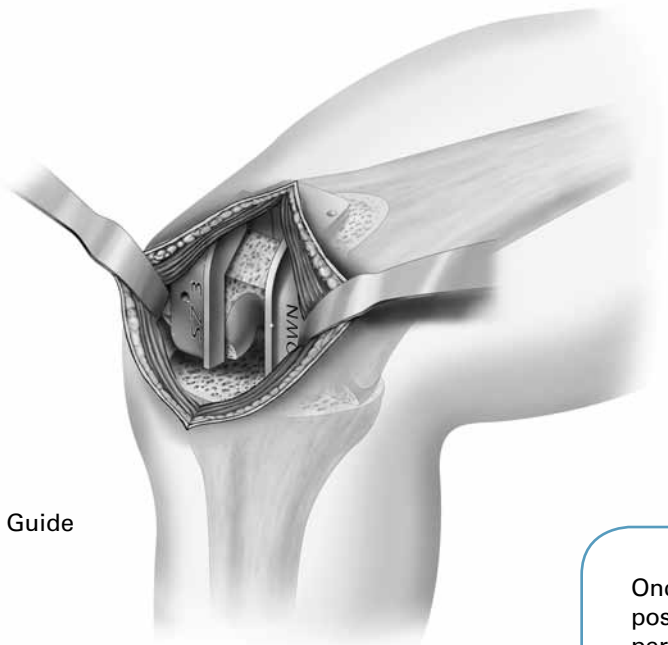


Figure 7
LBS II in the Knee Joint. Femoral Paddles Have Been Released. Tensor Has Been Locked and External Rotation is Marked.

Figure 8
PS Notch Cutting Guide



Once the correct size is chosen, the anterior, posterior and chamfer resections can be performed. Continue with the standard Optetrak CR/PS or LPI Operative Technique, Preparation of the Femur, Step 6 (**Figures 8 & 9**).

If the **posterior cruciate ligament is retained**, follow the CR/PS or LPI Operative Technique beginning at "Placement and Sizing of Trial Components."

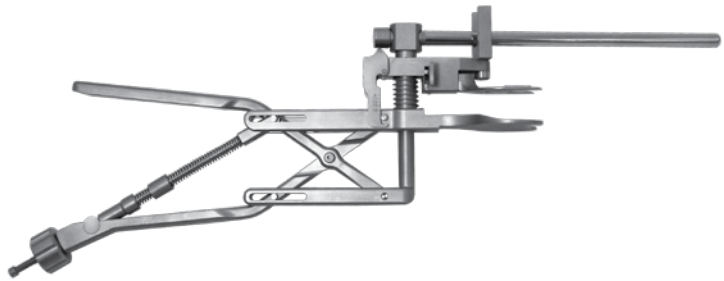
If the **posterior cruciate ligament is being substituted**, follow the CR/PS or LPI Operative Technique beginning at "Posterior Stabilized Femoral Preparation" and continue to completion at "Placement and Sizing of Trial Components." The final tibial and patellar preparation may now follow.



Figure 9
Femur Prepared for PS Femoral Component

OPTETRAK® LBS II INSTRUMENT SCOPE

207-60-00 LBS II Tensor

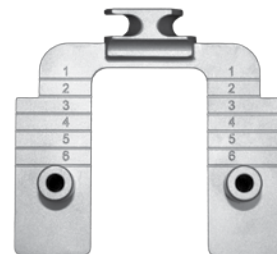


207-60-01 LBS II 9mm Femoral Tensor Rod

207-60-11 LBS II 8mm Femoral Tensor Rod



207-60-02 LBS II Rotation/Sizer Guide



OPTETRAK® LPI® INSTRUMENTS

213-41-06 LPI Beta Stylus Pointer



OPTETRAK® INSTRUMENTS

205-54-09 Optetrak Tibial Flexion/Extension Spacer Blocks *(not pictured)*, 9mm
205-54-11 Optetrak Tibial Flexion/Extension Spacer Blocks *(not pictured)*, 11mm
205-54-13 Optetrak Tibial Flexion/Extension Spacer Blocks *(not pictured)*, 13mm
205-54-15 Optetrak Tibial Flexion/Extension Spacer Blocks *(not pictured)*, 15mm
205-54-18 Optetrak Tibial Flexion/Extension Spacer Blocks *(not pictured)*, 18mm

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For additional device information, refer to the Exactech Optetrak® Comprehensive Knee System – Instructions for Use.

For further product information, please contact Customer Service, Exactech, Inc. 2320 NW 66th Court, Gainesville, Florida 32653-1630, USA. (352) 377-1140, (800) 392-2832 or FAX (352) 378-2617.

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