



Zimmer® M/L Taper Hip Prosthesis with Kinectiv® Technology

Surgical Technique



Independent control for a natural fit



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Introduction

The *Zimmer M/L Taper Hip Prosthesis with Kinectiv Technology* is designed to facilitate an accurate and stable biomechanical reconstruction of the hip joint with modular stem and neck components. The individual neck and stem provides numerous options to independently control leg length, femoral offset, version and proximal stem fit.

Gender Solutions™ Technology for THA



The *Zimmer M/L Taper Hip Prosthesis with Kinectiv Technology* helps the surgeon address a wide range of bony morphologies.

The modular stem and neck components are designed to help the surgeon restore the hip joint center intraoperatively by addressing leg length, offset, version and proximal stem fit independently. The system's femoral version design and array of neck options efficiently targets the broad range of male and female patient anatomies.

Minimally Invasive Solutions™ Enabled

Kinectiv Technology implants and instrumentation are designed to facilitate insertion and assembly during minimally invasive THR procedures. The designs minimize soft tissue trauma and provide simple intraoperative flexibility in adjusting head center location and optimizing hip kinematics during minimally invasive hip procedures.



Preoperative Planning

Effective preoperative planning allows the surgeon to predict the impact of different interventions in order to perform the joint restoration in the most accurate and safe manner. Optimal femoral stem fit, the level of the femoral neck cut, the prosthetic neck length, and the femoral component height and offset can be evaluated through preoperative radiographic analysis. Preoperative planning also allows the surgeon to have the appropriate implants available at surgery.

The objectives of preoperative planning include:

- 1 Determination of leg length
- 2 Establishment of appropriate abductor muscle tension and femoral offset
- 3 Determination of the anticipated component sizes

The overall objective of preoperative planning is to enable the surgeon to gather anatomic parameters which will allow accurate intraoperative placement of the femoral implant.

Determination of Leg Length

Determining the preoperative leg length is essential for restoration of the appropriate leg length during surgery. If leg lengths are equal in both the recumbent and standing positions, the leg length determination is simplified; however, for most patients, leg lengths are not equal. The surgeon should determine the best treatment for various leg length discrepancies, and note how this impacts the process of implanting the *M/L Taper Hip Prosthesis with Kinectiv Technology*.

It can be helpful to assess preoperative offset using the normal hip. If the acetabular component is implanted as planned, then this femoral stem positioning should restore offset. If

acetabular component is not positioned as planned, intraoperative adjustments to the femoral neck selection must be made to achieve the desired offset.

Kinectiv Technology addresses leg length restoration by offering five leg length options in 4mm increments (-8mm, -4mm, +0mm, +4mm and +8mm). The leg length options are accomplished by offering a scope of modular necks to be used in conjunction with a +0 femoral head. This allows for a change in leg length **without** affecting offset.

Determination of Abductor Muscle Tension and Femoral Offset

Once the requirements for establishing the desired postoperative leg length have been decided, the next step is to consider the requirement for abductor muscle tension. When templating, center the femoral component in the canal. Choose the offset (Extra Reduced, Reduced, Standard, Extended and Extra Extended) that most closely approximates that of the patient when the new center of rotation is determined (after acetabular component templating). When the patient has a very large distance between the center of rotation of the femoral head and the line that is centered in the medullary canal, the insertion of a femoral component with a lesser offset will, in effect, medialize the femoral shaft. To the extent that this occurs, laxity in the abductors will result with a heightened dislocation risk. Conversely when the patient has a very small distance between the center of rotation of the femoral head and the line that is centered in the medullary canal, the insertion of a femoral component with higher offset will, in effect, lateralize the femoral shaft. Excessive tension in the abductors will result in a heightened risk of trochanteric bursitis.

Kinectiv Technology addresses offset restoration by offering five offsets in 4mm increments. The offset options are accomplished by offering a scope of modular necks to be used in conjunction with a +0 femoral head, which allows for a change in offset **without** affecting leg length.

The versatility in leg length and offset allows the surgeon to reproduce almost any leg length and offset encountered. The scope of head center options will address even patients with unusually large preoperative offsets, severe varus or severe valgus deformity. In the

unlikely event that it is not possible to restore offset and leg length in these patients, the surgeon should use the clinically appropriate surgical approach to stabilize the hip joint.

Component Size Selection/ Templating

It is recommended that at least three radiographic views be evaluated when templating. Preoperative templating of a cementless femoral component requires an anteroposterior (A/P) view of the pelvis, and an anteroposterior (A/P) view and frog leg lateral view of the

involved hip. Both views should show at least eight inches of the proximal femur. It also may be helpful to obtain an A/P view of the involved side with the femur internally rotated. This compensates for naturally occurring femoral anteversion and provides a more accurate representation of the true medial-to-lateral dimension of the metaphysis.

When templating, magnification of the femur will vary depending on the distance from the x-ray source to the film, and the distance from the patient to the film. The *Zimmer* M/L Taper with *Kinectiv* Technology Hip System Templates (Fig. 1) use standard 20% magnification, which is near the average magnification on most clinical x-rays.

Large patients and obese patients may have magnification greater than 20% because their osseous structures are farther away from the surface of the film. Conversely smaller patients may have magnification values appreciably less than average. To better determine the magnification of an x-ray film, use a standardized marker at the level of the femur. (Templates of 15% magnification can be obtained by special order. Consult your Zimmer representative for more information. Please contact your digital template software provider regarding digital templates.)

Preoperative planning is important in choosing the optimal acetabular component, and in providing an estimation of the range of acetabular components that might ultimately be required. Begin the initial templating with the A/P radiograph. Superimpose the acetabular templates sequentially on the pelvic radiograph with the acetabular component in approximately 40 to 45 degrees of abduction. Range of motion and hip stability are optimized when the socket is placed in approximately 35 to 45

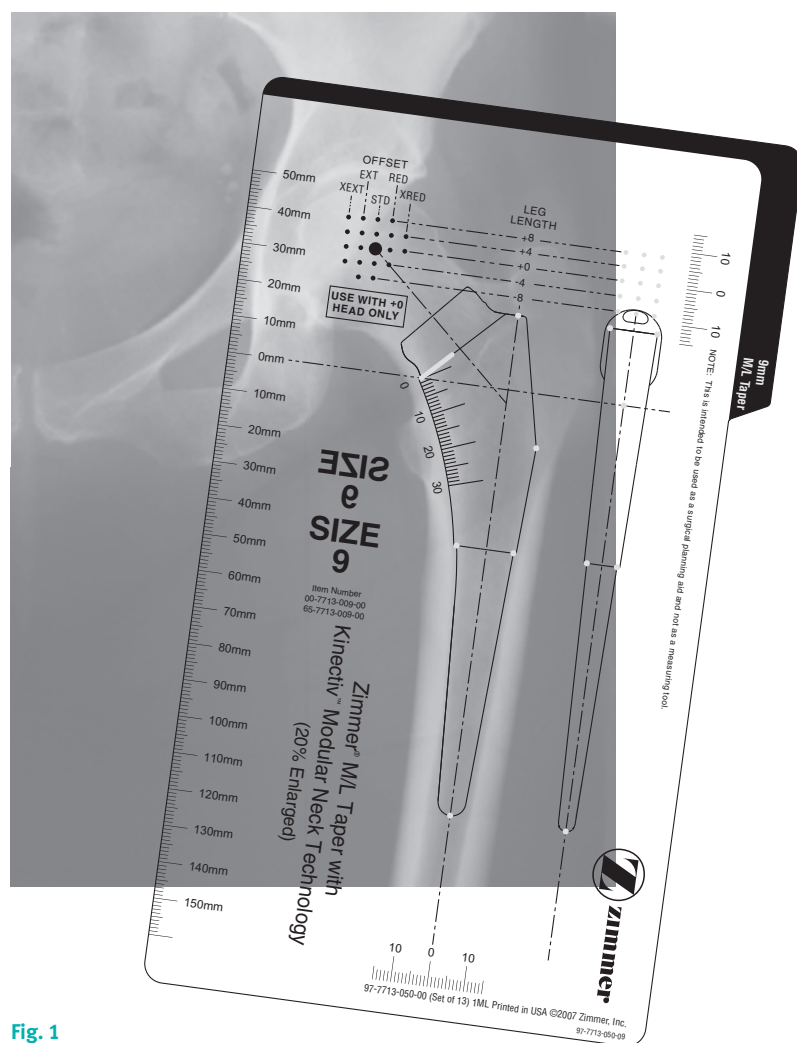


Fig. 1

degrees of abduction. Assess several sizes to estimate which acetabular component will provide the best fit for maximum coverage. Comparison of the contralateral, uninvolved hip, is useful, particularly if any acetabular deficiency or abnormality is present. In most cases, select the largest component possible, being certain that outside diameter is not too large to seat completely in the acetabulum and will retain peripheral bone. Use of a lateral radiograph of the hip may be helpful for further determining the acetabular component size. (Refer to Zimmer acetabular system surgical techniques such as the *Trabecular Metal™* Modular Acetabular System surgical technique for further details on acetabular reconstruction.)

Consider the position and thickness of acetabular component in estimating the optimum femoral neck to be used. (To simplify this, the acetabular templates are on a separate acetate sheet from the femoral template.) This allows any femoral component to be matched with the desired acetabular component by placing the femoral template over the acetabular template. Mark the acetabular size and position, and the center of rotation on the radiographs.

The M/L Taper Hip Prosthesis with *Kinectiv* Technology can be used with several head diameters and bearing surfaces. Select the **+0 femoral head size** and bearing surface based on surgeon preference. Please consult your local Zimmer sales associate for more information regarding Zimmer femoral head options.

Note: The *Kinectiv* neck implant cross sections have been optimized to facilitate maximum range of motion. Fatigue failure or component impingement could occur if other length femoral heads are used.

The objectives in templating the femoral component include:

- 1 Determining the anticipated size of the implant to be inserted
- 2 Determining the height of the implant in the femur and the location of the femoral neck osteotomy

Select the appropriate femoral template. The *Zimmer M/L Taper Hip Prosthesis with Kinectiv Technology* is available in 13 body sizes (5.0mm through 22.5mm). **The femoral templates show the leg length and offset for each of the *Kinectiv* modular femoral necks in combination with a +0 femoral head. The M/L Taper with *Kinectiv* technology has been designed for use with +0 heads only.** To estimate the femoral implant size, assess the body size on the A/P radiograph. Superimpose the template on the metaphysis and estimate the appropriate size of the femoral stem. The body of the femoral component should fill the medial height and lateral dimension on the A/P x-ray film. The medial portion of the body of the component should fit along the medial cortex in the proximal metaphysis as fully as possible, compatible with the anatomic endosteal contours of that region. It is not necessary for the stem to have cortical contact in the medullary canal. After establishing the proper size of the femoral component, determine the height of its position in the proximal femur and the amount of offset needed to provide adequate abductor muscle tension. Generally, if the leg length and offset are to remain unchanged, the center of the head of

the prosthesis should be at the same level as the center of the femoral head of the patient's hip. This should also correspond to the center of rotation of the templated acetabulum. To lengthen the limb, select a more proximal head center and/or raise the template proximally. To shorten the limb, select a more distal head center and/or shift the template distally. Five leg length options offer vertical translation of the head center in 4mm increments (-8, -4, +0, +4 and +8mm). This allows for leg length increase or decrease of 4mm without changing the horizontal position or offset. Five offset options offer medial-lateral translation of the head center in 4mm increments (Extra Reduced, Reduced, Standard, Extended and Extra Extended). This allows for an offset increase or decrease of 4mm without changing leg length.

Once the stem size and the desired head center location have been determined, identify the level of the femoral neck osteotomy. Depending on the preferred surgical approach, the following anatomical landmarks on the A/P radiograph may be used to reference the femoral osteotomy: the lesser trochanter, the inferior margin of the femoral head, the tip of the greater trochanter, and the junction of the lateral femoral neck and the medial greater trochanter (saddle of neck). Using the millimeter scale on the template, measure from the planned osteotomy to the anatomic landmark(s). These measurements will be used during femoral preparation to ensure the proper resection level.

Surgical Technique

Exposure

The M/L Taper Hip Prosthesis with *Kinectiv* Technology can be implanted with a variety of surgical approaches; the specific approach depends on the surgeon's preference. The system is highly compatible with the *Zimmer Minimally Invasive Solutions* (MIS) hip procedures taught through The Zimmer Institute including the MIS Posterior, MIS Anterolateral, MIS Anterior Supine and MIS 2-*incision*™ hip procedures. Please consult your local Zimmer representative for information on these surgical approaches.

Determination of Leg Length

Establish landmarks and obtain measurements before dislocation of the hip so that, after reconstruction, a comparison of leg length and femoral shaft offset can be obtained. From this comparison, adjustments can be made to achieve the goals established during preoperative planning. There are several methods to measure leg length. Select the most appropriate based on the surgical approach.

Osteotomy of the Femoral Neck

Dislocate the hip or make in situ femoral neck cuts based on the surgical approach. Refer to the distance from the anatomical landmark(s) to the osteotomy level that was determined during preoperative templating. After determining the desired resection level based on its relationship to the preferred anatomical landmark(s), use a marking pen or electrocautery to make a line across the femoral neck at 45° with respect to the centerline of the femur. Using the line as a guide, perform the osteotomy (Fig. 2). To prevent possible damage to the greater trochanter stop the cut as the saw approaches the greater trochanter. Remove the saw and either bring it in from the superior portion of the femoral neck to complete the osteotomy cut, or use an osteotome to finish the cut.

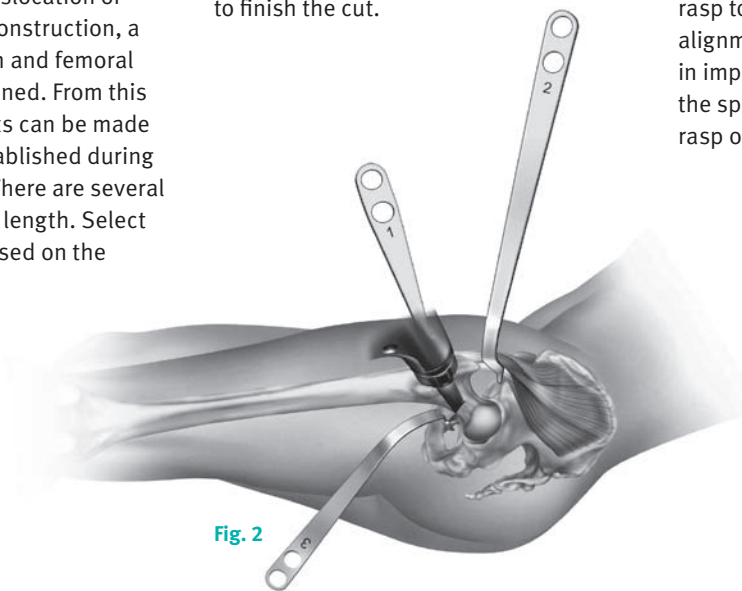


Fig. 2

Preparation of the Femur

With the proximal femur exposed, remove soft tissue from the medial portion of the greater trochanter and lateral portion of the femoral neck. It is crucial to adequately visualize the proximal femur so the correct insertion site for the femoral instruments can be located. Refer to the preoperative planning at this point. Identify the mid femoral shaft extension intraoperatively as viewed on the A/P and lateral radiographs. This is usually in the area of the piriformis tendon insertion in the junction between the medial trochanter and lateral femoral neck. Use the Box Osteotome (Fig. 3) to remove this medial portion of the greater trochanter and lateral portion of the femoral neck. There must be sufficient space in this area for the passage of each sequential rasp to ensure neutral rasp/implant alignment. Insufficient space may result in improper stem positioning. However, the space should not be larger than the rasp or implant.

Fig. 3



It is important to lateralize the starting envelope for rasping and implant insertion. Assessment of the amount of trochanteric overlap over the proximal femoral canal on the preoperative A/P radiograph can be useful in determining the degree of lateralization necessary to ensure neutral component positioning. After removing the cortical bone, use the Starter Awl (Fig. 4) or Starter Rasp to open the medullary canal. This will provide a reference for the direction of femoral rasping. Advance the Starter Awl into the medullary canal until the appropriate stem size zone is identified at the tip of the greater trochanter.



Fig. 4

Stem Size(s)**Zone on Starter Awl**

5-6	Distal Groove
7.5-11	Between Distal Groove and Proximal Groove
12.5-17.5	Between Proximal Groove and Proximal End of Teeth
20-22.5	Proximal End of Teeth

Femoral Rasping Using Kinectiv Rasps

Attach the straight or offset *Kinectiv* Technology rasp handle and begin the rasping sequence (Fig. 5) with the smallest rasp then proceed with a rasp that is at least two sizes smaller than the templated size. When inserting the rasp, be sure that it advances with each blow of the mallet.

An undercut feature on the rasp is located approximately 5mm proximal to the rasp teeth (Fig. 6). If the rasp can be seated up to 5mm deeper than the osteotomy to the level of this undercut feature, progress to the next rasp size. Do not countersink the rasp deeper than the undercut feature. Contact between the undercut and calcar could indicate a false sense of rasp stability. Repeat until the predicted final rasp size has been seated (Fig. 7).



Fig. 5

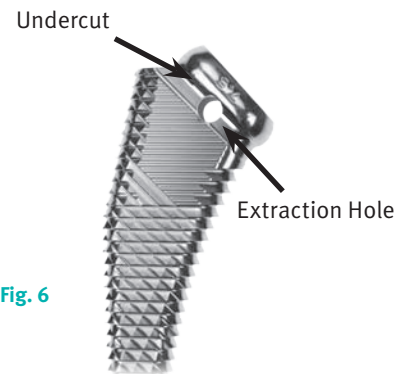


Fig. 6



Fig. 7

The extraction hole can also be used to determine appropriate rasp size. If the extraction hole is completely covered or sunk below the osteotomy, progress to the next larger rasp. The distal edge of the extraction hole is tangent to the edge of the rasp teeth (Fig. 6). For some minimally invasive procedures direct visualization of the rasp may not be possible. When using x-ray or fluoroscopy, the 5.5mm diameter extraction hole can be used to help orient the femur with respect to the imaging device and assess the level of rasp with respect to the osteotomy. The rasp handle may need to be disengaged from the rasp to adequately visualize the hole.

If the predicted final rasp size can be countersunk up to 5mm and adequate cancellous bone is available in the metaphysis region, progress to the next larger rasp size after ensuring that there is sufficient room in the distal medullary canal. Very tapered femoral canals with hard, thick cortical bone may require additional bone removal distally to appropriately seat the final broach. This can be recognized prior to surgery through preoperative templating. The rasps and corresponding implants are sized such that a press-fit is created proximally. The porous surface is 0.5mm proud (per surface) in the proximal area. Thus, the implant is 1mm larger than the rasp in both the A/P and M/L dimensions. **Note that the metaphyseal press-fit engagement provides the implant with greater rotational stability than the rasp.**

Offset and straight rasp handles designed to mitigate soft tissue abrasion during minimally invasive hip procedures are available. Please consult your local sales associate for more information regarding Zimmer Institute educational opportunities and *Zimmer* minimally invasive hip instrumentation.

Note: The *Kinectiv* rasp handles are not designed to mate with the *Kinectiv* stem implants. Do not use the *Kinectiv* rasp handles to implant the stem.

If desired, a trial reduction can be performed using the final rasp (Fig. 8). Disengage the rasp handle from the final rasp in preparation for trial reduction to determine the desired *Kinectiv* Neck implant. There will also be another opportunity to perform a trial reduction using the neck provisionals with the stem implant to confirm neck implant selection.



Fig. 8

Kinectiv Modular Neck Implants

The *Kinectiv* modular neck implants are offered in straight and anteverted/retroverted designs (Fig 9). The *Kinectiv* necks are designed for use with +0 heads only which offers some distinctive advantages. The neck cross sections are optimized for use with +0 heads to facilitate maximum range of motion and eliminate the need for skirted heads.

Head center adjustments are accomplished strictly using the array of necks to allow independent control of leg length, offset and version. The thirty-two neck implants provide sixty head center options: twenty straight, twenty anteverted and twenty retroverted.

Version is accomplished through an anterior or posterior translation of the head center of 5mm (4mm for the longest necks) (Fig. 10). Since there is a constant version distance, the version angle will differ with changes in offset. The version angle increases with decreasing offset and ranges from 4-10°.



Fig. 10



Fig. 9

Kinectiv Neck Provisional Trays

The *Kinectiv* Neck Provisional Trays have been designed to hold and orient the *Kinectiv* Neck Provisionals in locations which correspond to the head center locations found on the templates (Fig. 11). There are three *Kinectiv* Neck Provisional Trays: straight, anteverted and retroverted. Each tray presents the *Kinectiv* Neck Provisionals in an identical manner. The multiple tray presentation, the tray layouts and their etch content are meant to ease selection of the desired neck component and intraoperative adjustments of leg length, offset and version.



Fig. 11

Side-Specific Etch Content

The *Kinectiv* Neck Provisional Trays use the side-specific etch content based on the operative limb (Fig. 12). For example, for a left hip, the tray should be oriented with the “Left” etching located towards the top. This will orient the *Kinectiv* Neck Provisionals to match the head center locations for a left hip. Orientation of the case in this manner with respect to the operative side will simplify the steps of operation.



Fig. 12

Head Center Grid

The Head Center Grid located in the corners of the trays represents the head center options as shown in the templates (Fig. 13).

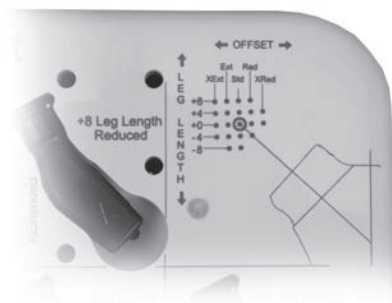


Fig. 13

Leg Length and Offset Notations

Numerical leg length etching found adjacent to each *Kinectiv* Neck Provisional represent the leg length options (Fig. 14). *Kinectiv* Neck Provisionals come in five leg length options: -8, -4, +0, +4, and +8mm. The offset etchings found immediately below the leg length etch content represent the offset option. The *Kinectiv* Neck Provisionals come in five offset options: Extra Reduced (XRed), Reduced (Red), Standard (Std), Extended (Ext) and Extra Extended (XExt). The leg length and offset values for the provisional will be different for each operative side. The orientation of the leg length and offset etch content matches the operative side etch orientation.



Fig. 14

Implant Letter References

The letter characters found at the bottom of the tray underneath each *Kinectiv* Neck Provisional correspond to the final implant (Fig. 15). The letter also facilitates relocation of the *Kinectiv* Neck Provisional within the tray. The anteverted/retroverted *Kinectiv* Neck Provisionals have alpha-numeric characters which correspond to the *Kinectiv* Straight Neck Provisionals to ease intraoperative version adjustment. Always confirm that the letter on each *Kinectiv* Neck Provisional matches the letter in the bottom of the *Kinectiv* Neck Provisional Tray prior to the surgery.



Fig. 15

Trial Reduction

Orient the *Kinectiv* Neck Provisional Tray so that it corresponds to the operative hip side, left or right. If the left hip is being replaced, orient the *Kinectiv* Neck Provisional Tray so that “Left” can be read across the top of the tray (Fig. 16). Simply rotate the tray 90° in a clockwise direction to orient the tray for a right hip procedure. Refer to the preoperative templating at this point. The *Kinectiv* Neck Provisional Tray layout reflects the head center options identified on the templates.

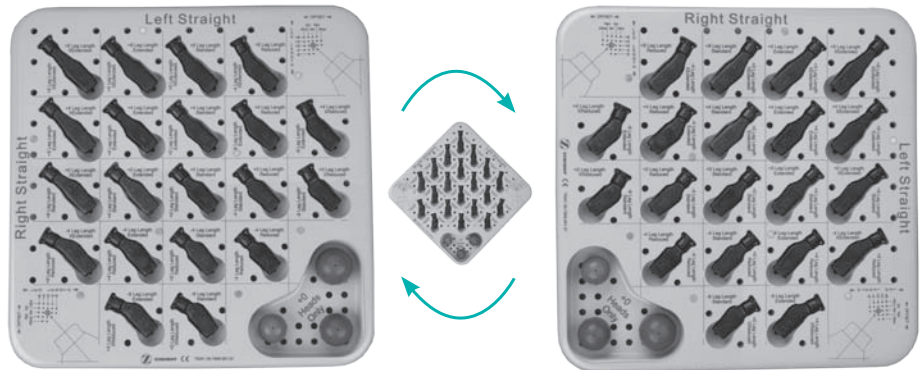


Fig. 16

A molded letter on both sides of the *Kinectiv* Neck Provisional corresponds to the *Kinectiv* Neck Implant (Fig. 17). Since *Kinectiv* Neck Provisionals can represent two head center locations (except neck provisionals A, B, C and D in which the head center location is the same regardless of orientation) an orientation feature in the form of a small bump is located on one side of the *Kinectiv* Neck Provisionals. To readily distinguish between them, the anteverted/retroverted *Kinectiv* Neck Provisionals have a silver locking ring and the straight *Kinectiv* Neck Provisionals have a gold locking ring.



Fig. 17



Fig. 19

Select the *Kinectiv* Neck Provisional which corresponds to the templated head center location. Fully insert the selected *Kinectiv* Neck Provisional by hand into the taper of the stem so that the etched line on the *Kinectiv* Neck Provisional is at the level of the proximal edge, or mouth, of the stem taper (Fig 18). Alternatively, insert the *Kinectiv* Neck Provisional using the *Kinectiv* Neck Inserter (Fig. 19). The location of the orientation bump on the *Kinectiv* Neck Provisional is replicated with an orientation bump on the *Kinectiv* Neck Implant. Place a +0 femoral head provisional onto the 12/14 taper of the *Kinectiv* Neck Provisional (Fig. 20).



Fig. 18



Fig. 20

Note: The M/L Taper Hip Prosthesis with *Kinectiv* Technology has been designed for use with +0 femoral heads only. Use of other femoral head offsets results in higher stresses in the stem and neck, increasing the risk of fatigue failure of the device.

Perform a trial reduction. Check the leg length and offset of the femur, and compare them to the measurements made before the initial dislocation of the hip. Be sure to reposition the leg exactly where it was during the first measurement. To adjust leg length and offset, change the *Kinectiv* Neck Provisional. The *Kinectiv* Neck Provisionals come in five leg length options (-8, -4, +0, +4, and +8mm) and five offsets (Extra Reduced, Reduced, Standard, Extended and Extra Extended) also in 4mm increments thus providing a total range of 16mm for both clinical parameters. Often femoral neck version will not be determined until direct visualization of the femoral neck during surgery. The selection of an anteverted or retroverted neck will typically occur intraoperatively based on the patient's anatomy or clinical impingement. To adjust version, select the corresponding *Kinectiv* Neck Provisional from the anteverted or retroverted provisional tray. The layout of the *Kinectiv* Neck Provisionals within and among the provisional trays eases intraoperative adjustments of leg length, offset and version.

When satisfactory leg length, offset, range of motion and stability have been achieved, again, note if the orientation bump is directed anteriorly or posteriorly. Dislocate the hip and remove the provisional components. Note the molded letter identification of the *Kinectiv* Neck Provisional. The letter denotes the *Kinectiv* Neck Implant to be implanted.

Reattach the rasp handle to the rasp and remove the rasp.

Femoral Rasping Using Long Post Rasps

Alternatively, the M/L Taper Long Post Rasps can also be used to prepare the femur (Fig. 21). Unlike the *Kinectiv* rasps, the Long Post Rasps do not enable a trial reduction since they are not compatible with the *Kinectiv* neck provisionals. When using the Long Post Rasps, a trial reduction can only be performed using the stem implant.

The rasping sequence is identical to that as previously described using the *Kinectiv* rasps.

Calcar Planing (Optional)

If desired, after the final rasp has been inserted to the proper level, use the Calcar Planer to plane the femoral neck. Insert the tip of the guide rod on the Calcar Planer into the hole on top of rasp (Fig. 22). Start the drill/driver and advance the planer into the bone slowly while rotating the planer around the guide rod until the appropriate neck area has been planed.

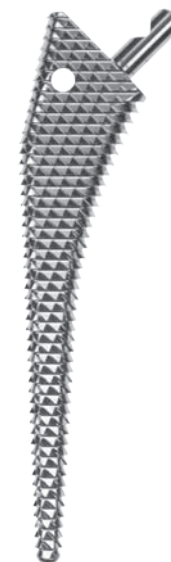


Fig. 21



Fig. 22

Insertion of the Femoral Stem Component

Insert the implant into the canal until it will no longer advance with hand pressure (Fig. 23). Locate the oblong tip of the Stem Driver or Offset Stem Driver into the implant shoulder. Tap the Stem Driver handle with a mallet until the prosthesis is fully seated or until the implant will no longer advance (Fig. 24). The prosthesis should be seated until the most proximal part of the porous surface is level with the osteotomy line (Fig. 25). If the implant does not advance with each blow of the mallet, stop insertion and remove the component. Rasp, ream or burr additional bone from the areas that are preventing the insertion, and insert the component again.

Fig. 23



Fig. 25

Locking Stem Insertion

If preferred, a Locking Stem Inserter can be used to impact the implant (Fig. 26). Attach the Locking Stem Inserter to the selected femoral implant. The stem inserter has a polymer cap to protect the female taper of the prosthesis. To facilitate alignment, the Stem Inserter has five holes that will accept the torque handle. The holes are marked for 0, 7.5, and 15 degrees of ante/retroversion.

If necessary, the locking stem inserter can also be used to extract the stem without damaging the stem taper. Continue bone preparation as necessary and re-insert the stem.

Fig. 24



Fig. 26



Femoral Stem Component Extraction

The Locking Stem Inserter can also be used to extract the stem during the initial implantation surgery. Since the polymer cap protects the female taper of the femoral component, the stem can be re-inserted following removal. If necessary, a stem extractor to remove the femoral stem components is included in the revision instrument set (Fig. 27). If the femoral stem component is removed with the stem extractor, do not re-insert it. Implant a new femoral stem component.



Fig. 27
For stem extraction only.
Discard stem after use.

Trial Reduction

Perform the trial reduction with the stem implant as previously described for the *Kinectiv* rasps. If a trial reduction was performed using the *Kinectiv* Rasps, select the *Kinectiv* Neck Provisional that provided satisfactory leg length, offset, range of motion and stability during that trial reduction. If a trial reduction off the rasp was not performed, select the *Kinectiv* Neck Provisional which corresponds to the templated head center location. Fully insert the selected *Kinectiv* Neck Provisional, attach the +0 Femoral Head, and make independent adjustments to leg length, offset and version using the *Kinectiv* Neck Provisionals as detailed previously.

When satisfactory leg length, offset, range of motion and stability have been achieved, again, note if the orientation bump is directed anteriorly or posteriorly. Dislocate the hip and remove the provisional components. Note the molded letter identification of the *Kinectiv* Neck Provisional. The letter denotes the *Kinectiv* Neck Implant to be implanted.

Attachment of the Femoral Neck and Head

When the appropriate *Kinectiv* Neck Implant is confirmed, remove the femoral head and neck provisionals and check to ensure that the stem implant taper is clean and dry. The letter etched on the end of the *Kinectiv* Neck Implant should correspond to the *Kinectiv* Neck Provisional. Place the selected *Kinectiv* Neck Implant into the taper by hand or using the *Kinectiv* Neck Inserter while taking care to replicate the desired direction of the orientation bump (Fig. 28). Do not impact the *Kinectiv* Neck Implant into the taper (Fig. 29). Ensure that the *Kinectiv* Neck Implant 12/14 taper is clean and dry. Place the selected +0 femoral head on the taper and secure it firmly by twisting. Secure both tapers by striking the femoral head once with the Head Impactor or Head Inserter (Fig. 30). Test the security of the head and neck fixation by trying to remove the head by hand.



Fig. 28



Fig. 29

Note: Do not impact the femoral head onto the taper before driving in the prosthesis as the femoral head may loosen during subsequent impaction.

Reduce the hip and assess leg length, range of motion, stability, and abductor tension for the final time.

Femoral Neck Component Extraction

A Collet Neck Extractor is included in the instrument set. To attach the Collet Neck Extractor to the 12/14 neck taper, ensure that the Neck Extractor Chuck spins freely with respect to the collet. Push the collet onto the taper (Fig. 31). There should be an audible “click” to indicate that the collet is fully seated onto the neck taper. Tighten the chuck onto the collet by hand or with the Ball Hex Screwdriver until secure (Fig. 32). Dislodge the neck from the stem by impacting the Stem Driver in one of the slots on the body (Fig 33).

Closely inspect the neck for damage. If no damage to the neck is observed during close inspection, the neck can be reused; otherwise discard the neck and implant a new femoral neck component. Since ceramic heads require a pristine 12/14 taper to preserve burst strength, use of cobalt chromium heads is required on necks that are used after using the Collet Neck Extractor.



Fig. 30



Fig. 31

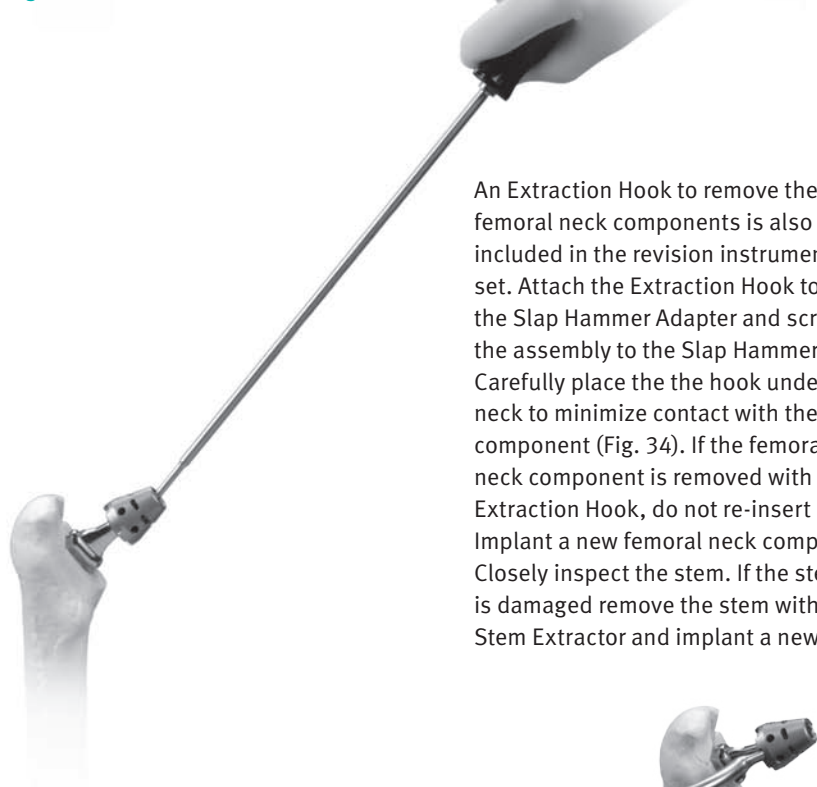


Fig. 32



Fig. 33

An Extraction Hook to remove the femoral neck components is also included in the revision instrument set. Attach the Extraction Hook to the Slap Hammer Adapter and screw the assembly to the Slap Hammer. Carefully place the hook under the neck to minimize contact with the stem component (Fig. 34). If the femoral neck component is removed with the Extraction Hook, do not re-insert it. Implant a new femoral neck component. Closely inspect the stem. If the stem is damaged remove the stem with the Stem Extractor and implant a new stem.

Wound Closure

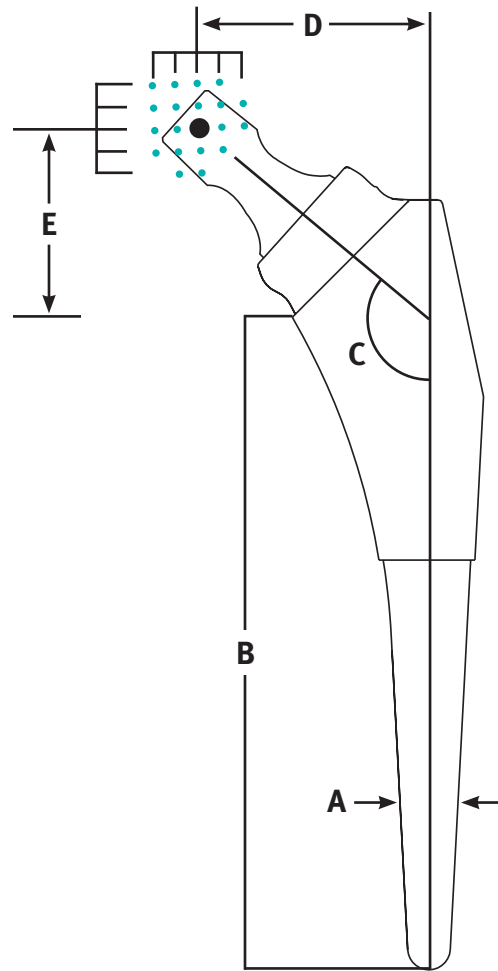
After obtaining hemostasis, close the wound layers per surgical technique, and if appropriate, insert a *Hemovac*® Wound Drainage Device.

Postoperative Management

The postoperative management of patients with a *Zimmer M/L Taper Hip Prosthesis with Kinectiv Technology* is determined by the surgical technique, patient's bone quality, fit of the implant, and the surgeon's judgment.

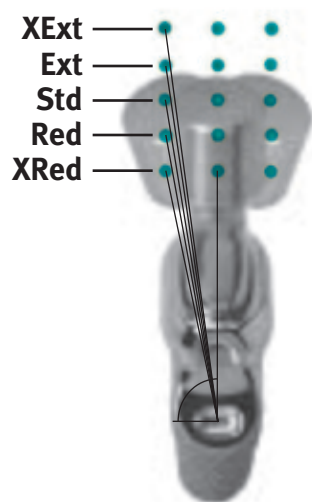


Fig. 34
Discard neck implant after extraction.



Prod. No.*	A Stem Size (mm)	B Stem Length (mm)	C Junction Angle (degrees)	D Offset (mm) when Neck Component is:					E Leg Length (mm) when Neck Component is:				
				X-Reduced	Reduced	Standard	Extended	X-Extended	-8	-4	+0	+4	+8
00-7713-005-00	5	109	134	29.8	33.8	37.8	41.7	45.7	24.2	28.2	32.2	36.2	40.2
00-7713-006-00	6	111	133	30.6	34.6	38.6	42.5	46.5	24.5	28.5	32.5	36.4	40.4
00-7713-007-00	7.5	114	132	31.8	35.8	39.8	43.7	47.7	24.8	28.8	32.8	36.8	40.8
00-7713-009-00	9	117	132	33.0	37.0	41.0	44.9	48.9	25.2	29.2	33.2	37.2	41.2
00-7713-010-00	10	119	132	33.8	37.8	41.8	45.7	49.7	25.5	29.5	33.5	37.4	41.4
00-7713-011-00	11	121	132	34.6	38.6	42.6	46.5	50.5	25.7	29.7	33.7	37.7	41.7
00-7713-012-00	12.5	124	132	35.8	39.8	43.8	47.7	51.7	26.1	30.1	34.1	38.1	42.1
00-7713-013-00	13.5	126	132	36.6	40.6	44.6	48.5	52.5	26.3	30.3	34.3	38.3	42.3
00-7713-015-00	15	129	132	37.8	41.8	45.8	49.7	53.7	26.7	30.7	34.7	38.7	42.7
00-7713-016-00	16.25	132	132	38.8	42.8	46.8	50.7	54.7	27.0	31.0	35.0	39.0	43.0
00-7713-017-00	17.5	134	132	39.8	43.8	47.8	51.7	55.7	27.3	31.3	35.3	39.3	43.3
00-7713-020-00	20	139	132	41.8	45.8	49.8	53.7	57.7	28.0	32.0	36.0	39.9	43.9
00-7713-022-00	22.5	144	132	43.8	47.8	51.8	55.7	59.7	28.6	32.6	36.6	40.6	44.6

* The M/L Taper with *Kinectiv* Technology is available with an HA/TCP coating. The product numbers for this option begin with a 65-prefix instead of a 00-prefix.



Prod. No.	Version Angle (degrees) when Neck Component is:				
	X-Reduced	Reduced	Standard	Extended	X-Extended
00-7713-005-00	10	8	8	7	5
00-7713-006-00	9	8	7	7	5
00-7713-007-00	9	8	7	7	5
00-7713-009-00	9	8	7	6	5
00-7713-010-00	8	8	7	6	5
00-7713-011-00	8	7	7	6	5
00-7713-012-00	8	7	7	6	4
00-7713-013-00	8	7	6	6	4
00-7713-015-00	8	7	6	6	4
00-7713-016-00	7	7	6	6	4
00-7713-017-00	7	7	6	6	4
00-7713-020-00	7	6	6	5	4
00-7713-022-00	7	6	6	5	4

Zimmer M/L Taper Hip Prosthesis Instrumentation

NOTE: The instrument sets do NOT contain a rasp handle, as there are several that can be used based on the surgical technique. However, there are places in the tray for two handles. Please be sure to order the rasp handles that are appropriate for the surgeon's surgical approach (see Table 1 for a list of compatible rasp handles).

Table 1. Rasp handles compatible with the *Kinectiv* Rasps.

Part Number	Part Name	Surgical Approach
00-7714-050-00	<i>Kinectiv</i> Straight Rasp Handle	MIS Hip Procedures, Mini-Incision Hip Procedures, <i>Zimmer 2-Incision</i> Hip Procedure, Traditional THA
00-7714-035-01	Left Offset Rasp Handle	MIS Anterolateral, MIS Anterior Supine, Traditional Anterolateral THA
00-7714-035-02	Right Offset Rasp Handle	MIS Anterolateral, MIS Anterior Supine, Traditional Anterolateral THA

Table 2. Rasp handles compatible with the *Zimmer M/L Taper Long Post* Instruments.

Part Number	Part Name	Surgical Approach
00-7712-050-60	<i>Zimmer M/L Taper Long Post</i> Straight Rasp Handle	MIS Hip Procedures, MIS Mini-Incision Hip Procedures, Traditional THA
00-7865-035-21	Left Offset Rasp Handle – 23.5°	MIS Anterior Supine
00-7865-035-22	Right Offset Rasp Handle – 23.5°	MIS Anterior Supine
00-7806-035-01	Left Offset Rasp Handle – 30°	MIS Anterolateral and Mini Anterolateral THA
00-7806-035-02	Right Offset Rasp Handle – 30°	MIS Anterolateral and Mini Anterolateral THA
00-7712-035-01	Left Offset Rasp Handle – 45°	MIS Anterolateral and Mini Anterolateral THA
00-7712-035-02	Right Offset Rasp Handle – 45°	MIS Anterolateral and Mini Anterolateral THA

The *Zimmer M/L Taper with Kinectiv Technology* instrument set requirements and options.

Required Sets

00-7805-000-11 - Size 5 – 17.5 *Kinectiv* M/L Taper Rasp Set

- Required to implant any size *Zimmer M/L Taper with Kinectiv Technology* Hip Prosthesis
- Starter rasp also provided
- Existing M/L Taper users willing to trial using stem only can use the existing M/L Taper long post rasps

00-7805-000-02 – *Kinectiv* Technology General Instrument Set

- Required to implant and intraoperatively extract any *Zimmer M/L Taper with Kinectiv Technology* Hip Prosthesis

00-7805-000-03 – *Kinectiv* Technology Straight Neck Provisional and +0 Head Provisional Set

- Includes straight neck provisionals and 28, 32 and 36mm +0 head provisionals
- Includes quantity two (2) of each of the varus/valgus neck provisionals

Version Sets

00-7805-000-04 – *Kinectiv* Technology Anteverted Neck Provisional Set

00-7805-000-05 – *Kinectiv* Technology Retroverted Neck Provisional Set

Optional Sets

00-7805-000-01 – Size 4 -17.5 Long Post Rasp Set

- Enable femoral preparation of M/L Taper and M/L Taper with *Kinectiv* Technology
- Requires trial reduction with stem only for *Kinectiv* implants
- Enables calcar planing
- Size 4 rasp provided to be used as a starter rasp

00-7805-000-06 – Head/Neck Inserter Set

00-7805-000-16 – 22mm and 26mm Head/Neck Inserter Set

00-7805-000-07 – *Kinectiv* Technology Revision Set

- Includes instrumentation to remove neck and/or stem for revision procedure

Surgical Templates

97-7713-050-00 – Stem size 5 – 22.5 with 20% magnification

97-7713-051-00 – Stem size 5 – 22.5 with 15% magnification

Zimmer M/L Taper Hip Prosthesis with Kinectiv Technology

Stems

Item Number*	Product Description
00-7713-005-00	Zimmer M/L Taper Hip Prosthesis with Kinectiv Technology, Stem Size 5
00-7713-006-00	Zimmer M/L Taper Hip Prosthesis with Kinectiv Technology, Stem Size 6
00-7713-007-00	Zimmer M/L Taper Hip Prosthesis with Kinectiv Technology, Stem Size 7.5
00-7713-009-00	Zimmer M/L Taper Hip Prosthesis with Kinectiv Technology, Stem Size 9
00-7713-010-00	Zimmer M/L Taper Hip Prosthesis with Kinectiv Technology, Stem Size 10
00-7713-011-00	Zimmer M/L Taper Hip Prosthesis with Kinectiv Technology, Stem Size 11
00-7713-012-00	Zimmer M/L Taper Hip Prosthesis with Kinectiv Technology, Stem Size 12.5
00-7713-013-00	Zimmer M/L Taper Hip Prosthesis with Kinectiv Technology, Stem Size 13.5
00-7713-015-00	Zimmer M/L Taper Hip Prosthesis with Kinectiv Technology, Stem Size 15
00-7713-016-00	Zimmer M/L Taper Hip Prosthesis with Kinectiv Technology, Stem Size 16.25
00-7713-017-00	Zimmer M/L Taper Hip Prosthesis with Kinectiv Technology, Stem Size 17.5
00-7713-020-00	Zimmer M/L Taper Hip Prosthesis with Kinectiv Technology, Stem Size 20
00-7713-022-00	Zimmer M/L Taper Hip Prosthesis with Kinectiv Technology, Stem Size 22.5

Straight Neck Implants

00-7848-002-00	Kinectiv Technology Neck Implant K
00-7848-003-00	Kinectiv Technology Neck Implant S
00-7848-011-00	Kinectiv Technology Neck Implant A
00-7848-012-00	Kinectiv Technology Neck Implant E
00-7848-013-00	Kinectiv Technology Neck Implant P
00-7848-014-00	Kinectiv Technology Neck Implant X
00-7848-022-00	Kinectiv Technology Neck Implant B
00-7848-023-00	Kinectiv Technology Neck Implant G
00-7848-024-00	Kinectiv Technology Neck Implant R
00-7848-033-00	Kinectiv Technology Neck Implant C
00-7848-034-00	Kinectiv Technology Neck Implant J
00-7848-044-00	Kinectiv Technology Neck Implant D

Ante/Retroverted Neck Implants

Item Number	Product Description
00-7848-002-01	Kinectiv Technology Neck Implant K1
00-7848-003-01	Kinectiv Technology Neck Implant S1

00-7848-011-01	Kinectiv Technology Neck Implant AA
00-7848-012-01	Kinectiv Technology Neck Implant E1
00-7848-013-01	Kinectiv Technology Neck Implant P1
00-7848-014-01	Kinectiv Technology Neck Implant X1
00-7848-020-01	Kinectiv Technology Neck Implant K2
00-7848-021-01	Kinectiv Technology Neck Implant E2
00-7848-022-01	Kinectiv Technology Neck Implant BB
00-7848-023-01	Kinectiv Technology Neck Implant G1
00-7848-024-01	Kinectiv Technology Neck Implant R1
00-7848-030-01	Kinectiv Technology Neck Implant S2
00-7848-031-01	Kinectiv Technology Neck Implant P2
00-7848-032-01	Kinectiv Technology Neck Implant G2
00-7848-033-01	Kinectiv Technology Neck Implant CC
00-7848-034-01	Kinectiv Technology Neck Implant J1
00-7848-041-01	Kinectiv Technology Neck Implant X2
00-7848-042-01	Kinectiv Technology Neck Implant R2
00-7848-043-01	Kinectiv Technology Neck Implant J2
00-7848-044-01	Kinectiv Technology Neck Implant DD

Instruments

Item Number	Product Description
00-7805-000-01	M/L Taper Long Post Rasp Instrument Set (Includes one each of the following:)
00-7805-001-80	Zimmer M/L Taper Rasp Case
00-5900-099-00	Generic Stackable Lid Assembly
00-7712-004-60	Zimmer M/L Taper Size 4 Long Post Rasp
00-7712-005-60	Zimmer M/L Taper Size 5 Long Post Rasp
00-7712-006-60	Zimmer M/L Taper Size 6 Long Post Rasp
00-7712-007-60	Zimmer M/L Taper Size 7.5 Long Post Rasp
00-7712-009-60	Zimmer M/L Taper Size 9 Long Post Rasp
00-7712-010-60	Zimmer M/L Taper Size 10 Long Post Rasp
00-7712-011-60	Zimmer M/L Taper Size 11 Long Post Rasp
00-7712-012-60	Zimmer M/L Taper Size 12.5 Long Post Rasp
00-7712-013-60	Zimmer M/L Taper Size 13.5 Long Post Rasp
00-7712-015-60	Zimmer M/L Taper Size 15 Long Post Rasp
00-7712-016-60	Zimmer M/L Taper Size 16.25 Long Post Rasp
00-7712-017-60	Zimmer M/L Taper Size 17.5 Long Post Rasp
00-9801-032-00	Small Calcar Planar

* The M/L Taper with Kinectiv Technology is available with an HA/TCP coating. The product numbers for this option begin with a 65-prefix instead of a 00-prefix.

Item Number	Product Description
00-7805-000-21	Size 20-22.5 M/L Taper Long Post Rasp Instrument Set (Includes one each of the following:)
00-7712-020-60	Zimmer M/L Taper Size 20 Long Post Rasp
00-7712-022-60	Zimmer M/L Taper Size 22.5 Long Post Rasp
00-7805-000-11	M/L Taper with Kinectiv Technology Kinectiv Rasp Instrument Set
00-7805-001-80	M/L Taper General Rasp Case
00-5900-099-00	Generic Stackable Lid Assembly
00-7714-004-00	M/L Taper Starter Kinectiv Rasp
00-7714-005-00	M/L Taper Size 5 Kinectiv Rasp
00-7714-006-00	M/L Taper Size 6 Kinectiv Rasp
00-7714-007-00	M/L Taper Size 7.5 Kinectiv Rasp
00-7714-009-00	M/L Taper Size 9 Kinectiv Rasp
00-7714-010-00	M/L Taper Size 10 Kinectiv Rasp
00-7714-011-00	M/L Taper Size 11 Kinectiv Rasp
00-7714-012-00	M/L Taper Size 12.5 Kinectiv Rasp
00-7714-013-00	M/L Taper Size 13.5 Kinectiv Rasp
00-7714-015-00	M/L Taper Size 15 Kinectiv Rasp
00-7714-016-00	M/L Taper Size 16.25 Kinectiv Rasp
00-7714-017-00	M/L Taper Size 17.5 Kinectiv Rasp
00-7805-000-31	Size 20-22.5 M/L Taper with Kinectiv Technology Kinectiv Rasp Macro Size Instrument Set
00-7714-020-00	M/L Taper Size 20 Kinectiv Rasp
00-7714-022-00	M/L Taper Size 22.5 Kinectiv Rasp
00-7805-000-02	Kinectiv Technology General Instrument Set (Includes one each of the following:)
00-6601-054-00	Small Box Osteotome
00-7712-052-00	Tapered Awl
00-7896-004-00	Charnley Awl
00-7803-058-00	Stem Driver
00-7806-011-10	Oval Tip Offset Stem Driver
00-7805-061-01	Kinectiv Locking Stem Inserter
00-0155-002-00	Mallet
00-7942-020-00	Curved Hand Rasp
00-9027-058-00	Head Impactor
00-6551-060-00	VerSys® T-Handle
9375-00-032	Ball Hex Screwdriver
9375-00-041	T-Handle Ruler, 40mm
00-7805-064-00	Kinectiv Collet Neck Extractor Assembly
00-7805-001-10	Kinectiv General Instrument Case (includes lid)

Space exists for a tray and additional +0 Head Provisionals which must be ordered individually

00-7895-022-02	+0 Provisional Head 22mm
9666-22-000	+0 Provisional Head 22mm (CEP)
00-7895-026-02	+0 Provisional Head 26mm
9666-38-000	+0 Provisional Head 38mm
00-7895-040-02	+0 Provisional Head 40mm
9666-44-000	+0 Provisional Head 44mm
00-7805-001-50	+0 Provisional Head Tray
00-7805-043-01	Kinectiv Technology Neck Provisional J2
00-7805-044-01	Kinectiv Technology Neck Provisional DD
00-7805-001-30	Kinectiv Technology Anteverted Neck Provisional Tray (includes lid)

Item Number	Product Description
00-7805-000-03	Kinectiv Technology Straight Neck Provisional and +0 Head Provisional Set (Includes one each of the following:)
00-7805-002-00	Kinectiv Technology Neck Provisional K (qty. 2)
00-7805-003-00	Kinectiv Technology Neck Provisional S (qty. 2)
00-7805-011-00	Kinectiv Technology Neck Provisional A
00-7805-012-00	Kinectiv Technology Neck Provisional E (qty. 2)
00-7805-013-00	Kinectiv Technology Neck Provisional P (qty. 2)
00-7805-014-00	Kinectiv Technology Neck Provisional X (qty. 2)
00-7805-022-00	Kinectiv Technology Neck Provisional B
00-7805-023-00	Kinectiv Technology Neck Provisional G (qty. 2)
00-7805-024-00	Kinectiv Technology Neck Provisional R (qty. 2)
00-7805-033-00	Kinectiv Technology Neck Provisional C
00-7805-034-00	Kinectiv Technology Neck Provisional J (qty. 2)
00-7805-044-00	Kinectiv Technology Neck Provisional D
00-7895-028-02	+0 Provisional Head 28mm
00-7895-032-02	+0 Provisional Head 32mm
00-7895-036-02	+0 Provisional Head 36mm
00-7805-001-20	Kinectiv Technology Straight Neck Provisional Tray (includes lid)

00-7805-000-04	Kinectiv Technology Anteverted Neck Provisional Set (Includes one each of the following:)
00-7805-002-01	Kinectiv Technology Neck Provisional K1
00-7805-003-01	Kinectiv Technology Neck Provisional S1
00-7805-011-01	Kinectiv Technology Neck Provisional AA
00-7805-012-01	Kinectiv Technology Neck Provisional E1
00-7805-013-01	Kinectiv Technology Neck Provisional P1
00-7805-014-01	Kinectiv Technology Neck Provisional X1
00-7805-020-01	Kinectiv Technology Neck Provisional K2
00-7805-021-01	Kinectiv Technology Neck Provisional E2

00-7805-022-01	<i>Kinectiv</i> Technology Neck Provisional BB
00-7805-023-01	<i>Kinectiv</i> Technology Neck Provisional G1
00-7805-024-01	<i>Kinectiv</i> Technology Neck Provisional R1
00-7805-030-01	<i>Kinectiv</i> Technology Neck Provisional S2
00-7805-031-01	<i>Kinectiv</i> Technology Neck Provisional P2
00-7805-032-01	<i>Kinectiv</i> Technology Neck Provisional G2
00-7805-033-01	<i>Kinectiv</i> Technology Neck Provisional CC
00-7805-034-01	<i>Kinectiv</i> Technology Neck Provisional J1
00-7805-041-01	<i>Kinectiv</i> Technology Neck Provisional X2
00-7805-042-01	<i>Kinectiv</i> Technology Neck Provisional R2
00-7805-043-01	<i>Kinectiv</i> Technology Neck Provisional J2
00-7805-044-01	<i>Kinectiv</i> Technology Neck Provisional DD
00-7805-001-30	<i>Kinectiv</i> Technology Anteverted Neck Provisional Tray (includes lid)

Item Number	Product Description
00-7805-000-05	<i>Kinectiv</i> Technology Retroverted Neck Provisional Set (Includes one each of the following:)
00-7805-002-01	<i>Kinectiv</i> Technology Neck Provisional K1
00-7805-003-01	<i>Kinectiv</i> Technology Neck Provisional S1
00-7805-011-01	<i>Kinectiv</i> Technology Neck Provisional AA
00-7805-012-01	<i>Kinectiv</i> Technology Neck Provisional E1
00-7805-013-01	<i>Kinectiv</i> Technology Neck Provisional P1
00-7805-014-01	<i>Kinectiv</i> Technology Neck Provisional X1
00-7805-020-01	<i>Kinectiv</i> Technology Neck Provisional K2
00-7805-021-01	<i>Kinectiv</i> Technology Neck Provisional E2
00-7805-022-01	<i>Kinectiv</i> Technology Neck Provisional BB
00-7805-023-01	<i>Kinectiv</i> Technology Neck Provisional G1
00-7805-024-01	<i>Kinectiv</i> Technology Neck Provisional R1
00-7805-030-01	<i>Kinectiv</i> Technology Neck Provisional S2
00-7805-031-01	<i>Kinectiv</i> Technology Neck Provisional P2
00-7805-032-01	<i>Kinectiv</i> Technology Neck Provisional G2
00-7805-033-01	<i>Kinectiv</i> Technology Neck Provisional CC
00-7805-034-01	<i>Kinectiv</i> Technology Neck Provisional J1
00-7805-041-01	<i>Kinectiv</i> Technology Neck Provisional X2
00-7805-042-01	<i>Kinectiv</i> Technology Neck Provisional R2
00-7805-043-01	<i>Kinectiv</i> Technology Neck Provisional J2
00-7805-044-01	<i>Kinectiv</i> Technology Neck Provisional DD
00-7805-001-40	<i>Kinectiv</i> Technology Retroverted Neck Provisional Tray (includes lid)

Item Number	Product Description
00-7805-000-06	<i>Kinectiv</i> Head and Neck Inserter Set (Includes one each of the following:)
00-7804-053-00	Head-Neck Inserter Handle
00-7804-053-01	<i>Kinectiv</i> Neck Inserter
00-7804-053-28	Head Inserter 28mm
00-7804-053-32	Head Inserter 32mm
00-7804-053-36	Head Inserter 36mm
00-7804-053-38	Head Inserter 38mm
00-7804-053-40	Head Inserter 40mm
00-7804-053-44	Head Inserter 44mm
00-7805-001-60	Head and Neck Inserter Case (includes lid)
Spaces for 22mm and 26mm Head Inserters exist in Head and Neck Inserter Case	
00-7805-000-16	22mm and 26mm Head Inserters Set (Includes one each of the following:)
00-7804-053-22	Head Inserter 22mm
00-7804-053-26	Head Inserter 26mm
00-7805-000-07	<i>Kinectiv</i> Technology Revision Set (Includes one each of the following:)
00-7805-062-00	<i>Kinectiv</i> Neck Extractor
00-7805-063-00	<i>Kinectiv</i> Stem Extractor
00-9986-030-15	Slap Hammer Adapter
00-6551-006-00	Slap Hammer
9375-00-032	Ball Hex Screwdriver
00-7805-064-00	<i>Kinectiv</i> Collet Neck Extractor Assembly
00-7806-011-10	Oval Tip Offset Stem Driver
00-7805-001-70	<i>Kinectiv</i> Revision Case (includes lid)

Please refer to package insert for complete product information, including contraindications, warnings, precautions, and adverse effects.

Contact your Zimmer representative or visit us at www.zimmer.com



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