

EXACTECH | EXTREMITIES

Operative Technique Addendum



equinox[®]

**Preserve Stem Operative Technique
Addendum with Equinox Legacy
Instrumentation**



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INTRODUCTION

Since 2004, Exactech has been committed to providing clinical solutions that address the most challenging situations in shoulder arthroplasty. Our flagship product, the Equinoxe® shoulder system, has provided surgeons with a comprehensive system that uniquely focuses on all solutions in shoulder arthroplasty.

The new Equinoxe Preserve stem is our next-generation platform stem. Created through the

collaborative efforts of engineering research and global surgeon thought leaders, the Preserve stem allows intraoperative flexibility for the surgeon to choose between anatomic and reverse procedures.

This technique will outline how to perform a Preserve stem procedure using Exactech Equinoxe Legacy Instrumentation.

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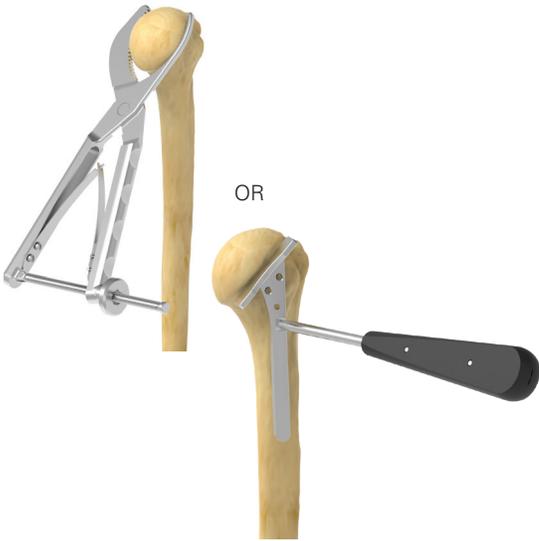


Figure A
Humeral Head Resection



Figure B
Starter Reamer



Figure C
Extended Broach



Figure D
Extended Broach Orientation



Figure E
Stem Broach



Figure F
Broach Insertion With Modular Broach Handle and Retroversion Handle



Figure G
Implant Insertion
**Option 1: Finalize aTSA with Preserve Stem*



Figure H
Trial the Reverse Tray Broach Adapter
**Option 2: Finalize rTSA with the Preserve Stem*

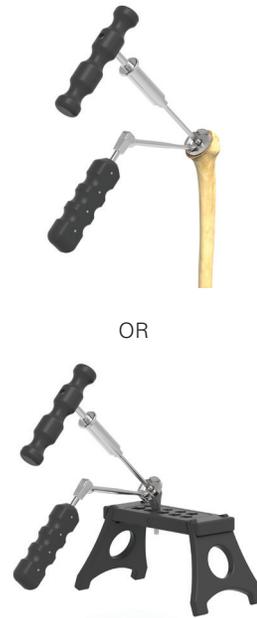


Figure I
Lock Torque Defining Screw
**Option 2: Finalize rTSA with the Preserve Stem*

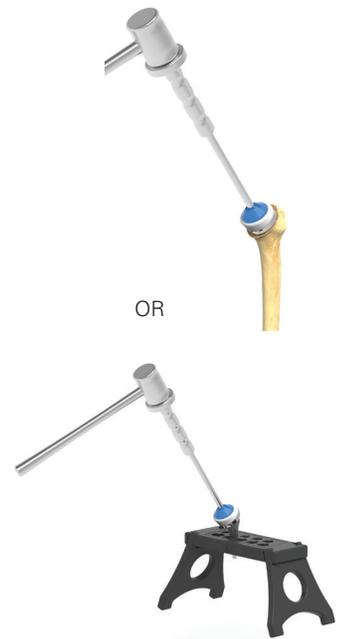


Figure J
Implant Definitive Liner
**Option 2: Finalize rTSA with the Preserve Stem*

DETAILED OPERATIVE TECHNIQUE

OPERATIVE TECHNIQUE ADDENDUM WITH EQUINOXE LEGACY INSTRUMENTATION

This document presents an addendum to Equinoxe® platform shoulder system operative technique (718-01-30) for the addition of Equinoxe Preserve stem using Equinoxe Legacy Instrumentation.

The Preserve stem is implanted using similar steps as the primary, press-fit Equinoxe humeral stem devices, however this addendum specifically addresses the steps for using the Preserve stem and its related instrumentation.

Bone quality must be considered prior to implantation to ensure that the prostheses do not subside, tilt or migrate. Bone quality is an important factor that may prevent optimal fixation.

Please refer to the Equinoxe platform shoulder system operative technique (718-01-30) for additional information related to the preparation of the glenoid and humerus as well as implantation of the additional humeral components.

PREOPERATIVE PLANNING/PATIENT POSITIONING

After a careful history and physical examination, radiographs should be obtained to assess glenohumeral joint space narrowing, osseous deformities and glenoid wear. A CT scan

is helpful to assist in the evaluation of the quality of bone stock and to further evaluate bone deformities that may be present. The following three radiographic views should

be obtained: a true A/P view of the glenohumeral joint (30 degrees external oblique), a scapular lateral view and an

axillary view. An MRI may be obtained if further evaluation of the soft tissues is determined to be helpful.

To aid in preoperative planning, radiographic templates are available for the humeral components and glenoid components to approximate the required size and alignment of the implants.

PATIENT POSITIONING

The patient should be placed on an operating table in a supine position. The head of the operating table should be elevated approximately 30 degrees in a modified beach chair position. A small bolster should be placed laterally behind the involved shoulder.

The patient should be moved to the side of the table, so that the upper extremity can be placed into maximum extension without obstruction by the operating table. Alternatively, a Captain's chair or similar positioning device can be used for proper patient positioning. The patient should be secured to the operating table to minimize any changes in position intraoperatively.

Once the patient is secure, the extremity is examined to assess the range of motion, with particular attention to external rotation with the arm at the side. If external rotation is restricted (i.e. internal rotation contracture), the need for more extensive subscapularis mobilization or lengthening procedures may be necessary. The entire upper extremity should be prepped and draped to allow complete access to the operative area and full mobility during the procedure.



SURGICAL APPROACH

An anterior deltopectoral incision is made beginning inferior to the clavicle and passing over the coracoid process and extending distally toward the deltoid insertion. Medial and lateral subcutaneous flaps are created, and the deltopectoral interval is identified (*Figures 1a and 1b*).

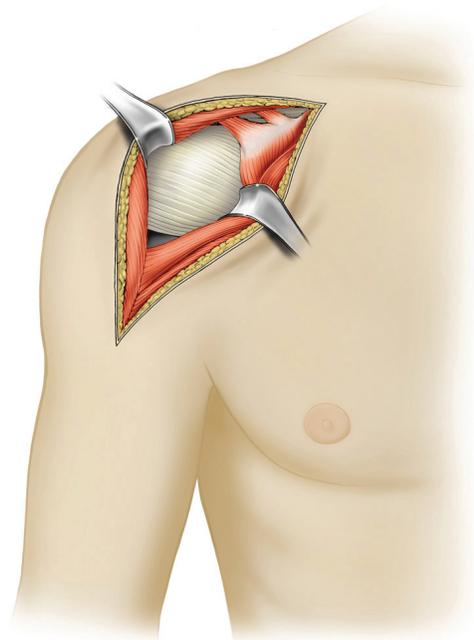
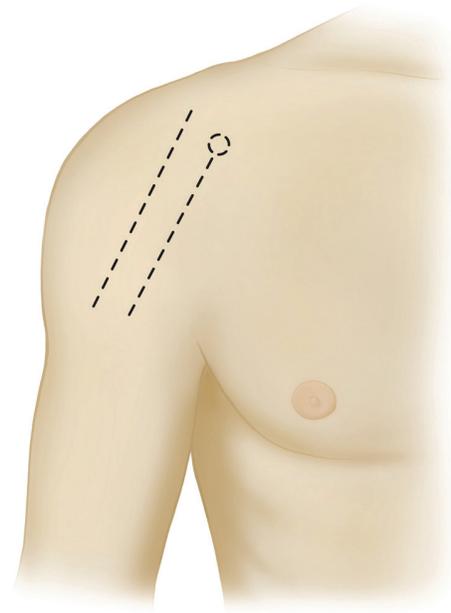
A thin fat stripe is usually located over the cephalic vein. The interval is usually developed medial to the cephalic vein, but it can also be developed laterally depending on the surgeon's preference. Branches of the cephalic vein on the approach side are cauterized, and the interval is developed inferior to superior to expose the clavipectoral fascia.

The advantage of retracting the cephalic vein with the deltoid is that the majority of the branches come from the deltoid. The disadvantage is the vein is more exposed to injury from the retractor as it crosses the superior aspect of the interval.

The subdeltoid space is mobilized with a blunt elevator. The clavipectoral fascia is incised longitudinally up to the coracoacromial ligament (which is spared), and the conjoined tendon is mobilized. A self-retaining retractor is placed with care to avoid excessive traction on the conjoined tendon. The coracoacromial ligament is identified and the subacromial space is mobilized with a blunt elevator. The subscapularis tendon insertion on the lesser tuberosity is identified along with the rotator interval. The anterior humeral circumflex vessels along the inferior border of the subscapularis muscle, the "three sisters," are cauterized extensively, and the biceps tendon is palpated in its groove. The subscapularis tendon and the capsule are tenotomized 1cm medial to the lesser tuberosity and tagged with #1 sutures.

An alternative approach is to elevate the subscapularis directly off of the bone or elevate its insertion with a thin wafer of bone (1-2mm thick) using an osteotome. The choice is based primarily on surgeon preference.

The rotator interval is divided in a lateral to medial direction up to the superior glenoid rim. With the humerus extended, adducted and externally rotated, the capsule is carefully dissected off the inferior humeral neck, protecting the axillary nerve inferiorly with a small blunt retractor placed just inferior to the capsule. The capsular releases should be performed to allow 90 degrees of external rotation. The self-retaining retractor is then repositioned to retract the subscapularis. At this point, the humeral head can be dislocated.



Figures 1a & 1b
Surgical Approach

DETAILED OPERATIVE TECHNIQUE

HUMERAL HEAD RESECTION



Figures 2a and 2b*
Anatomic Cutting Guide

Humeral Head Resection

Prior to the humeral head resection, all osteophytes should be removed using a rongeur. Doing so will properly expose the anatomic humeral neck, and anatomic replication is facilitated by an accurate resection along the anatomic neck. Three resection options are available and should be selected based upon surgeon preference.

Note: Bone quality must be considered to ensure proper proximal press-fit conditions and adequate stability. It is recommended that the surgeon evaluate the metaphyseal bone to confirm that there is sufficient bone stock for a short stem. As an example, the surgeon can apply thumb pressure to the cancellous bone to make this assessment. It is highly recommended that a longer stemmed option be available as a back-up if a short stem must be abandoned.

Anatomic Cutting Guide

The **Anatomic Cutting Guide** (311-01-01) enables the surgeon to accurately resect the humeral head along the anatomic neck without the use of intramedullary or extramedullary fixturing devices (*Figures 2a and 2b*). The jaws encircle the humeral head along the anatomic neck, acting as a cutting surface. Cutting from the inferior to superior (*Figure 2a*), the thin jaw of the Anatomic Cutting Guide should slide between the bone and the superior cuff. The wide jaw should be in direct contact with the medial portion of the anatomic neck. Alternatively, an anterior-posterior cutting approach (*Figure 2b*) can be used with the thin jaw encircling the posterior side of the anatomic neck and the cutting jaw positioned on the anterior side. Once the guide is in position, it is secured using the threaded knob. To ensure the device does not move, hold the handle while performing the osteotomy. To protect the rotator cuff, the saw blade should not pass superior or posterior to the thin jaw.

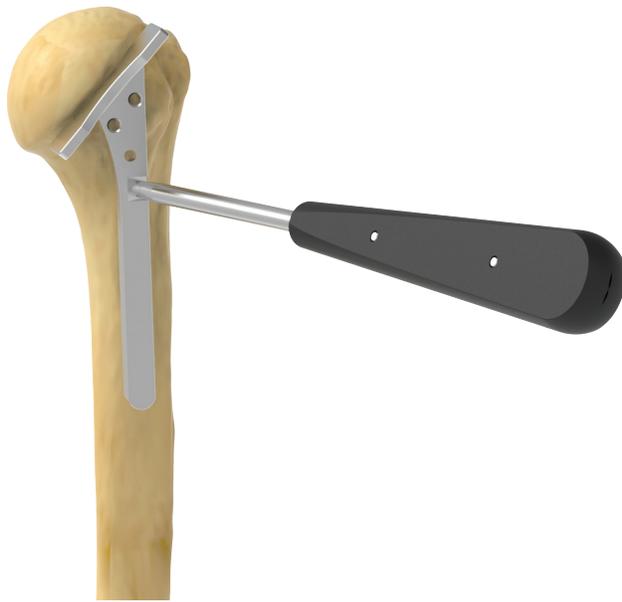


Figure 3*
Fixed Angle Cutting Guide

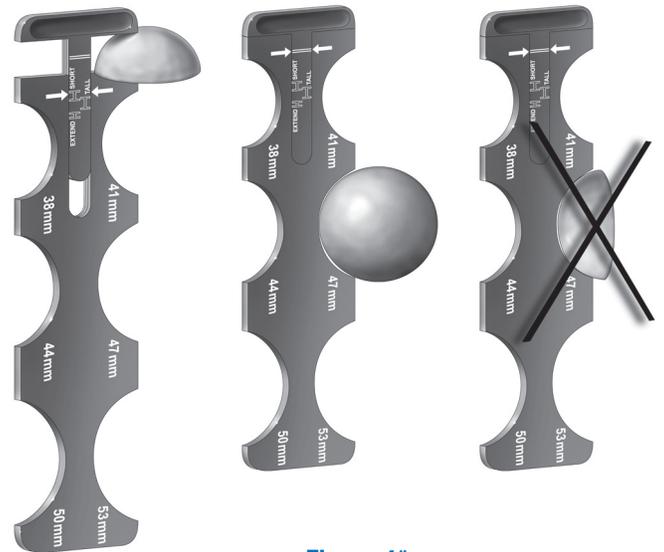


Figure 4*
Humeral Head Sizer

Head Size (mm)	38	41	44	47	50	53
Glenoid Curvature	Alpha			Beta		

Table 1
Relationship Between Humeral Head Diameter and Glenoid Curvature

Note: Removing the osteophytes is imperative in order to visualize the anatomic neck, but it also improves the bite obtained by the teeth on the cutting guide.

Freehand: Identify the anatomic neck and resect the head using a microsagittal saw.

Fixed Angle (132.5 degrees) Guide (311-01-10 in the legacy Equinox set: Though this method is not based upon the patient's anatomy, we have provided a Fixed Angle Cutting Guide for surgeons who prefer this method (*Figure 3*). Three options are available for the guide:

1. The surgeon may attach the guide to a handle, which aligns with the forearm for 20 degrees of retroversion.
2. Use .062 K-wires to secure it to the bone.
3. Use the cutting surface to mark the resection line with a bovie and then use the freehand method.

With this method, the superior portion of the resection should be just medial to the rotator cuff insertion. The amount of retroversion (usually 20-40 degrees) should be determined by positioning the humerus in external rotation before the resection is made.

Evaluate Resected Head Size

After resecting the humeral head, use the **Humeral Head Sizer** (311-01-20) to estimate both the head's diameter (circumferentially) and height in order to determine the probable size of the modular humeral head (*Figure 4*). The head diameter will determine what size glenoid will be used for aTSA as described in *Table 1*.

DETAILED OPERATIVE TECHNIQUE

HUMERAL PREPARATION

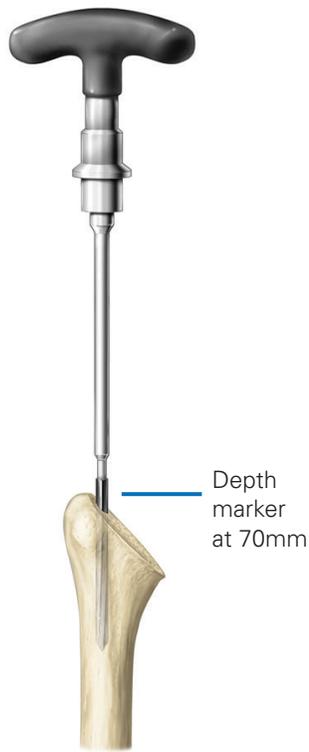


Figure 5
Starter Reamer



Figure 6
Extended Broach

Humeral Preparation

Reaming the Humeral Shaft

The Preserve stem **Starter Reamer** has a pointed tip to facilitate the initial entry into the IM canal. The entry point is made just posterior to the bicipital groove and at the junction of the middle and upper third of the resected humeral surface. It is imperative that the reamer be inserted into the canal to the appropriate depth as indicated by the depth markers (*Figure 5*).

Note: To ensure adequate depth is achieved, ream until the depth marker is no longer visible.

Broaching the Humeral Shaft

Note: Bone quality must be considered to ensure proper proximal press-fit conditions and adequate stability.

The **Extended Broach** can be used to facilitate the initial entry into the IM canal (*Figure 6*). The entry point is made

just posterior to the bicipital groove and at the junction of the middle and upper third of the resected humeral surface.

It is imperative that the Extended Broach be inserted into the canal to the appropriate depth dictated by the **Broach Handle** and **Broach Collar**. The Extended Broach should be impacted until contact is made between the tip of the Broach Handle and the resected bone surface.

The Broach Collar can be chosen to allow for the broach to be flush with that of the cut surface, utilizing the 0mm option.

The Broach Collar can also be chosen to utilize a -2mm feature, which will countersink the broach 2mm below the cut surface.

Note: Only the strike surface of the Broach Handle should be used for impaction. The use of the Extended Broach aids in orientation of the implant with the IM canal (*Figure 7*).



Figure 7
Extended Broach Orientation



Figure 8
Stem Broach



Figure 9
Broach Insertion With
Modular Broach Handle and
Retroversion Handle

If the surgeon does not feel the Extended Broach provides adequate stability, then attach the next-sized broach (*Figure 8*) to the Broach Handle, as illustrated in *Figures 8 and 9*, respectively. The **Preserve Stem Broach** should be inserted into the proximal humerus at a version consistent with that of the cut surface. The proximal humerus should be sequentially broached until sufficient stability of the broach is reached.

Note: It is important to maintain cancellous bone. If cancellous bone cannot be maintained, then switch to a longer platform stem. **We recommend using the smallest-sized broach necessary to obtain adequate fixation in order to determine rotational stability and avoid cortical contact.** In cases of conversion to a stemmed implant, the humerus is prepared following pages 11 through 13 of the Equinox Primary/Reverse Operative Technique (718-01-30).

As a visual check to assess version, the **Retroversion Bar** can be attached to the Equinox Broach Handle (“L” and “R” indicate appropriate side), as shown in *Figure 9*, and lined up with the patient’s forearm. The Retroversion Handle can be placed in 20, 30 or 40 degrees of retroversion based on surgeon preference.

Note: The broaches are undersized by 1mm (total diametrical press-fit 0.5mm per side) to ensure adequate press-fit, therefore impaction is necessary to insert the stem. Only the strike surface of the handle should be used for impaction.

Note: After the humeral preparation step, the procedural steps diverge into two pathways to perform either a primary shoulder or reverse shoulder procedure. The following pages outline the steps for each path.

DETAILED OPERATIVE TECHNIQUE

FINALIZE ATSA WITH THE PRESERVE STEM

Finalize aTSA with the Preserve Stem



Figure 10
Implant Insertion

Finalize Preserve for aTSA

Humeral Stem Insertion

Once the proximal humerus is prepared, the implant is ready to be inserted. The definitive implant will match the last broach size used. Attach the definitive implant to the **Stem Inserter**, and be sure to align the dimple on the inserter with the divot on the stem (*Figure 10*).

For this reason, it is important that the stem be completely threaded to the Stem Inserter prior to impaction to prevent damage to the threads. Use a mallet to impact the Stem Inserter until the superior face of the stem is at the level of the resected surface. Only the strike surface should be used for impaction.

As a visual check to assess version, the Retroversion Handle can be attached to the Stem Inserter in the same manner described previously. After the humeral stem insertion step, complete the primary shoulder procedure by following the Equinox Primary/Reverse Operative Technique (718-01-30), starting at the humeral protector step of the primary shoulder operative technique section.

SURGICAL NOTES

- If a tendon-to-bone repair is utilized, prepare the drill holes in the proximal humerus to facilitate the subscapularis repair prior to humeral stem insertion.
- If cement is desired, it is recommended to use an implant two sizes less than the last used broach.

Finalize rTSA with the Preserve Stem



Figure 11

Trial the Reverse Tray Broach Adapter

Finalize Preserve for rTSA

Utilizing the Humeral Stem Trial

The final broach can also be utilized as a trial humeral stem. The broach/trial is 1mm diametrically undersized in the proximal region and line-to-line distally with respect to the final implant.

The **Reverse Tray Broach Adapter** (*Figure 11*) is to be placed in the broach and trialed as denoted in the Equinox Primary/Reverse Operative Technique (718-01-30) at the trialing the humeral adapter tray and liner step of the reverse shoulder operative technique section.

Note: *The Reverse Tray Broach Adapter takes the place of the Humeral Adapter Tray Trial and Humeral Tray Adapter Captured Screw in the trialing step of the Equinox Primary/Reverse Operative Technique. The +5 trial tray can be added as needed to the Reverse Tray Broach Adapter to increase the offset.*

DETAILED OPERATIVE TECHNIQUE

HUMERAL STEM INSERTION

Finalize rTSA with the Preserve Stem



Figure 12
Implant Insertion

Humeral Stem Insertion

Once the proximal humerus is prepared, the implant is ready to be inserted. The definitive implant will match the last broach size used. Attach the definitive implant to the Stem Inserter, and be sure to align the dimple on the inserter with the divot on the stem (*Figure 12*).

For this reason, it is important that the stem be completely threaded to the Stem Inserter prior to impaction to prevent damage to the threads. Use a mallet to impact the Stem Inserter until the superior face of the stem is at the level of the resected surface. Only the strike surface should be used for impaction. As a visual check to assess version, the Retroversion Handle can be attached to the Stem Inserter in the same manner described previously.

After the humeral stem insertion step, complete the reverse shoulder procedure by following the Equinox Primary/Reverse Operative Technique (718-01-30), starting at the humeral protector step of the reverse shoulder operative technique section.

SURGICAL NOTES

- If a tendon-to-bone repair is utilized, prepare the drill holes in the proximal humerus to facilitate the subscapularis repair prior to humeral stem insertion
- If cement is desired, it is recommended to use an implant two sizes less than the last used broach.

Finalize rTSA with the Preserve Stem



Figure 13
Lock Torque Defining Screw

Inserting the Final Implant

The final Humeral Adapter Tray is attached to the Humeral Stem (*Figure 13*) using the **Reverse Torque Defining Screw**.

It is critical that the Humeral Adapter Tray be oriented properly, which requires aligning the indicator mark on the tray with the lateral fin on the stem. The plate is locked to the stem by applying 11 N·m torque to the Screw with the supplied driver while countering the torque to the arm with the Reverse Shoulder Modular Replicator Handle. The superior portion of the Screw will disengage when 11 N·m is reached (and will remain in the Screw Drive, both of which are disposable). After the head of the Torque Defining Screw disengages at 11 N·m, verify that the screw head is retained by the Torque Defining Screw Driver. The final humeral liner

is attached to the Humeral Adapter Tray by orienting the asymmetric connecting features and sliding the lip of the liner under the superior rim of the Humeral Tray.

SURGICAL TIP

The big lip of the poly should be inferior with the Equinox Reverse. As noted on the previous page, it can also be helpful to place the Torque Defining Screw through the humeral tray before connecting it to the stem so that the threads engage more easily.

As with the trial insertion, it is important to note that the assembled humeral component will have a humeral neck angle of 145 degrees because the Humeral Liner adds 12.5

DETAILED OPERATIVE TECHNIQUE

INSERTING THE FINAL IMPLANT

Finalize rTSA with the Preserve Stem

Size	Color of Impactor Tip
38	Blue
42	Yellow
46	Orange

Table 2
Impactor Tips

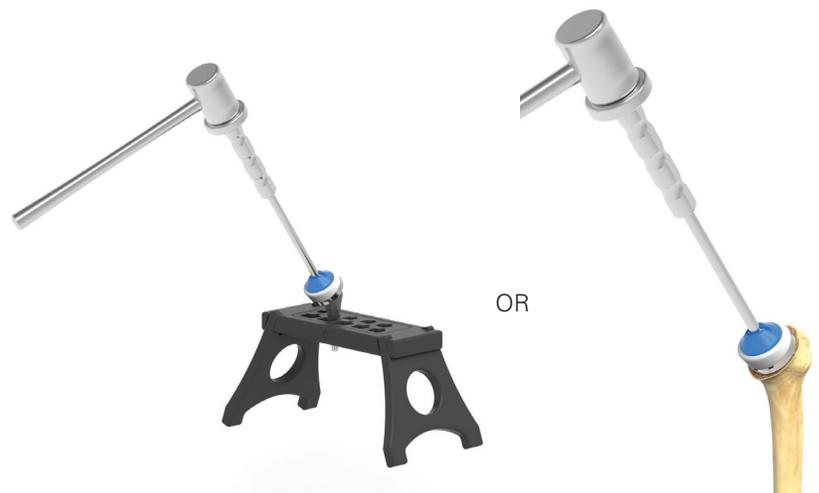


Figure 14
Implant Definitive Liner

degrees to the stem's 132.5-degree neck angle. Finally, the apical mushroom of the Humeral Liner is engaged to the apical lock of the Humeral Adapter Tray by impacting the Humeral Liner with the appropriately sized Humeral Liner Impactor Tip (Table 2).

The stem tray and liner can be assembled using the **Back Table Assembly** (Figures 13 and 14) first and then placed as a unit into the humerus.

The disadvantage of this technique is that further implant trialing is not possible, so it should only be used when the surgeon is confident about the thickness of the tray and liners based on the previous trialing.

Note: Ensure the correct orientation of the Preserve Stem in the Back Table Insert's corresponding hole prior to implant assembly. When the Preserve Stem is placed in the Back Table, the Preserve Stem's bowl cutout and the sizing identification markings on the Insert should be facing the user.

Note: Do not impart excessive impaction forces on the Preserve Stem in the Back Table Assembly, as this could result in the stem getting stuck in the Back Table Insert. If the stem does get stuck, wiggle the distal portion of the stem or lightly tap on the bottom of the stem with a soft face mallet to release it.



Figure 15
Preserve Stem

Cementing the Press-Fit Prosthesis

The press-fit **Preserve Stem** (Figure 15) was designed with several features that optimize a cementless application. However, the stem has features that enable it to be cemented if desired. In this situation, a stem two sizes smaller in diameter than the broach size would provide a minimum 1mm cement mantle proximally and a minimum 2mm distally.

In cases where an adequate press-fit was not achieved, the surgeon has two options. A minimized cement technique could be employed, whereby a small amount of cement is placed in the proximal canal. For example, whatever size stem is cemented in a humerus, it has to be broached to the same size.

Alternatively, in this same scenario, the surgeon could broach up a larger size to create room for a more robust proximal cement mantle and then cement a stem one size smaller than what was broached.

The use of a cement restrictor is based on personal preference, however an appropriately-sized cement restrictor will improve distribution. Formal cement pressurization is avoided to decrease the possibility of humeral shaft fracture. The intramedullary canal should then be packed with a sponge to obtain adequate drying before cementing. Once the canal is prepared, the cement is mixed and injected into the canal.

IMPLANT & INSTRUMENT LISTINGS

PRESERVE SHOULDER - IMPLANTS - KIT-300PSS

CATALOG NUMBER	PART DESCRIPTION
300-30-06	Equinox, Preserve Stem, Size 6mm
300-30-07	Equinox, Preserve Stem, Size 7mm
300-30-08	Equinox, Preserve Stem, Size 8mm
300-30-09	Equinox, Preserve Stem, Size 9mm
300-30-10	Equinox, Preserve Stem, Size 10mm
300-30-11	Equinox, Preserve Stem, Size 11mm
300-30-12	Equinox, Preserve Stem, Size 12mm
300-30-13	Equinox, Preserve Stem, Size 13mm
300-30-14	Equinox, Preserve Stem, Size 14mm



PRESERVE SHOULDER INSTRUMENTS UNIVERSAL - KIT-311PSS_U

301-05-20 Retroversion Bar



301-05-00 Equinox Broach Collar



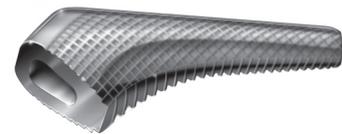
301-05-01 Equinox Broach Handle



301-15-06 Starter Reamer



301-30-06	Preserve Stem Broach, Size 6mm*
301-30-07	Preserve Stem Broach, Size 7mm*
301-30-08	Preserve Stem Broach, Size 8mm*
301-30-09	Preserve Stem Broach, Size 9mm*
301-30-10	Preserve Stem Broach, Size 10mm*
301-30-11	Preserve Stem Broach, Size 11mm*
301-30-12	Preserve Stem Broach, Size 12mm*
301-30-13	Preserve Stem Broach, Size 13mm*
301-30-14	Preserve Stem Broach, Size 14mm*
301-32-06	Ergo-Compatible Broach, Size 6mm
301-32-07	Ergo-Compatible Broach, Size 7mm
301-32-09	Ergo-Compatible Broach, Size 8mm
301-32-08	Ergo-Compatible Broach, Size 9mm
301-32-10	Ergo-Compatible Broach, Size 10mm
301-32-11	Ergo-Compatible Broach, Size 11mm
301-32-12	Ergo-Compatible Broach, Size 12mm
301-32-13	Ergo-Compatible Broach, Size 13mm
301-32-14	Ergo-Compatible Broach, Size 14mm



IMPLANT & INSTRUMENT LISTINGS

CATALOG NUMBER	PART DESCRIPTION
303-30-06	Preserve Stem Extended Broach, Size 6mm*
303-32-06	Ergo-Compatible Extended Broach, Size 6mm
321-05-21	Reverse Tray Trial Broach Adapter
321-15-49	Equinox Preserve Back Table Insert*
301-51-01	Equinox, Preserve Stem, Instrument Case



EQUINOXE HUMERAL REAMER & REPLICATOR TRAY - KIT-311B

301-07-10	Primary Stem Inserter Extractor
301-07-30	T-Handle
301-07-70	Small T-Handle



EQUINOXE HUMERAL BROACH & TRIAL TRAY - KIT-311A

301-03-10	Retroversion Handle
301-07-01	Mallet
311-01-01	Anatomic Cutting Guide
311-01-10	132.5 Degree Osteotomy Guide
315-07-20	Drill Guide Handle



INSTRUMENT LISTING

EQUINOXE HUMERAL HEAD TRAY - KIT - 311C

311-01-20 Humeral Head Sizer



REVERSE HUMERAL TRAY - KIT-321A

301-10-00 Replicator Handle



321-07-05 Impactor Handle



321-07-38 Humeral Liner Impactor Tip 38mm
321-07-42 Humeral Liner Impactor Tip 42mm



321-10-05 Equinox Humeral Tray Trial Assembly +5



321-10-35 Reverse Shoulder Modular Replicator Handle



321-15-22 Universal Backtable Assembly



**These items are special ordered. Please reach out to your Customer Service Representative for more information.*

INDICATIONS FOR USE

The Equinox Preserve stems are indicated for use in skeletally mature individuals with degenerative diseases of the glenohumeral joint where anatomic total arthroplasty, anatomic hemi-arthroplasty, or reverse total arthroplasty is determined by the surgeon to be the preferred method of treatment.

Clinical indications for anatomic total arthroplasty and anatomic hemi-arthroplasty are as follows:

- Rheumatoid arthritis, osteoarthritis, osteonecrosis or posttraumatic degenerative problems
- Congenital abnormalities in the skeletally mature
- Primary and secondary necrosis of the humeral head
- Pathologies where arthrodesis or resectional arthroplasty of the humeral head are not acceptable
- Revisions of humeral prostheses when other treatments or devices have failed (where adequate fixation can be achieved)
- To restore mobility from previous procedures (e.g. previous fusion)

The Equinox Preserve stems are additionally indicated for use in reverse total arthroplasty in skeletally mature individuals with degenerative diseases of the glenohumeral joint and a grossly deficient, irreparable rotator cuff or a failed glenohumeral joint replacement with loss of rotator cuff function resulting in superior migration of the humeral head. The patient must be anatomically and structurally suited to receive the implants and a functional deltoid muscle is necessary.

The Equinox Preserve stems are intended for press-fit applications but may be used with bone cement at the discretion of the surgeon.

CONTRAINDICATIONS FOR USE

Use of the Equinox Preserve stems are contraindicated in the following situations:

- Osteomyelitis of the proximal humerus or scapula; if a systemic infection or a secondary remote infection is suspected or confirmed, implantation should be delayed until infection is resolved.
- Inadequate or malformed bone that precludes adequate support or fixation of the prosthesis.
- Neuromuscular disorders that do not allow control of the joint.
- Significant injury to the brachial plexus
- Non-functional deltoid muscles
- Patient's age, weight or activity level that would cause the surgeon to expect early failure of the system.
- The patient is unwilling or unable to comply with the postoperative care instructions.
- Alcohol, drug or other substance abuse
- Any disease state that could adversely affect the function or longevity of the implant.
- Acute fracture of the proximal humerus and displacement of the tuberosities, displaced three- and four-part fractures of the proximal humerus (hemi-arthroplasty) or acute fracture of the proximal humerus with failure of the glenohumeral joint (total anatomic shoulder arthroplasty).
- Acute fracture of the proximal humerus in combination with degenerative diseases of the glenohumeral joint and a grossly deficient, irreparable rotator cuff resulting in superior migration of the humeral head (reverse total shoulder arthroplasty).

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For additional device information, refer to the Exactech Preserve Stem Instructions for Use for a device description, indications, contraindications, precautions and warnings. 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.

Exactech, as the manufacturer of this device, does not practice medicine, and is not responsible for recommending the appropriate surgical technique for use on a particular patient. These guidelines are intended to be solely informational and each surgeon must evaluate the appropriateness of these guidelines based on his or her personal medical training and experience. Prior to use of this system, the surgeon should refer to the product package insert for comprehensive warnings, precautions, indications for use, contraindications and adverse effects.

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