djo surgical®

AltiVate® | Reverse

SURGICAL TECHNIQUE

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AltiVate | Reverse®

NOTE: *The AltiVate Reverse® Shoulder Humeral Stem Implant is designed for use with AltiVate Reverse Humeral Instrumentation and is not compatible with the RSP® Humeral Site Preparation Instruments. The AltiVate Reverse Humeral Stem Implant is compatible with the RSP Glenoid Implants and Instrumentation and the Altivate Reverse Standard Shell implant is compatible with RSP humeral liner insert trials and implants. The AltiVate Reverse Small Shell is not compatible with any RSP humeral implants.*

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Indications

Reverse Total Shoulder Indications:

The AltiVate Reverse® Shoulder Prosthesis Stem is as a reverse shoulder replacement for patients with a functional deltoid muscle and a grossly deficient rotator cuff joint suffering from pain and dysfunction due to:

- Severe arthropathy with a grossly deficient rotator cuff;
- Previously failed joint replacement with a grossly deficient rotator cuff;
- Fracture of glenohumeral joint from trauma or pathologic conditions of the shoulder including humeral head fracture, displaced 3- or 4-part fractures of proximal humerus, or reconstruction after tumor resection;
- Bone defect in proximal humerus;
- Non-inflammatory degenerative disease including osteoarthritis and avascular necrosis of the natural humeral head and/or glenoid;
- Inflammatory arthritis including rheumatoid arthritis;
- Correction of functional deformity

The glenoid baseplate is intended for cementless application with addition of screws for fixation. This device may also be indicated in the salvage of previously failed surgical attempts for anatomic and hemi procedures.

NOTE: *All humeral stems are intended for cemented or cementless use.*

NOTE: *Standard or revision-length stems are recommended for most fractures..*

Anatomic Total Shoulder Indications:

The AltiVate Reverse Shoulder Prosthesis Stem is indicated as an anatomic shoulder joint replacement for patients suffering from pain and dysfunction due to:

- Noninflammatory degenerative joint disease including osteoarthritis;
- Inflammatory arthritis of the glenohumeral joint including rheumatoid arthritis;
- Post-traumatic arthritis of the glenohumeral joint;
- Avascular necrosis of the humeral head with and without involvement of the glenoid;
- Correction of functional deformity

The all-poly glenoid is intended for cemented use.

Hemi Shoulder Indications:

The AltiVate Reverse Shoulder Prosthesis Stem is indicated as a hemi shoulder joint replacement for patients suffering from pain and dysfunction due to:

- Noninflammatory degenerative joint disease including osteoarthritis;
- Inflammatory arthritis of the glenohumeral joint including rheumatoid arthritis;
- Post-traumatic arthritis of the glenohumeral joint;
- Avascular necrosis of the humeral head with and without involvement of the glenoid;
- Correction of functional deformity;
- Rotator cuff tear arthropathy;
- Humeral fracture;
- Failed previous shoulder surgery

Contraindications

Total joint replacement is contraindicated where there is:

- Infection or Sepsis;
- Insufficient bone quality which may affect the stability of the implant;
- Muscular, neurological, or vascular deficiencies, which compromise the affected extremity;
- Alcoholism or other addictions;
- Materials (metals, etc.) sensitivity;
- Loss of ligamentous structures;
- High levels of physical activity (e.g. competitive sports, heavy physical labor);
- Non-functional deltoid muscle;
- Rotator cuff insufficiency for anatomic shoulder arthroplasty with the AltiVate Reverse® humeral stem;
- Intraoperative conversion from a reverse to an anatomic shoulder

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Surgical Snapshot – AltiVate Reverse® Humeral Preparation – Metaphyseal Approach

1 Perform osteotomy.

2 Drill guide hole.

3 Ream humeral socket.

4 Ream humeral canal.

5 Assemble trial shell and broach.

6 Insert trial assembly and reduce with socket trial.

7 Insert AltiVate Reverse stem.

8 Impact humeral socket insert.

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Surgical Snapshot – AltiVate Reverse® Humeral Preparation – Diaphyseal Approach

1 Perform osteotomy.

2 Ream humeral canal.

3 broach humeral canal.

4 Plane humeral socket.

5 Ream humeral socket.

6 Reduce with shell and socket trials.

7 Insert AltiVate Reverse stem.

8 Impact humeral socket insert.

AltiVate® Extremity Solutions®

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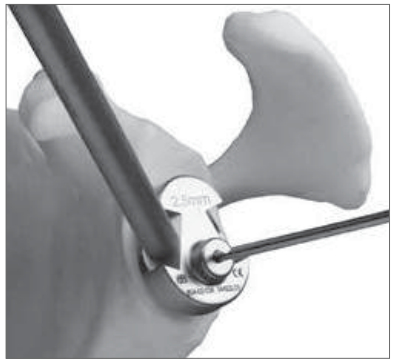
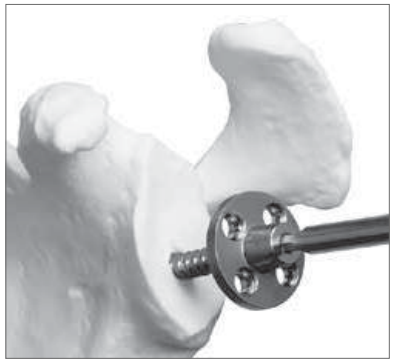
Surgical Snapshot – AltiVate Reverse® Glenoid Preparation



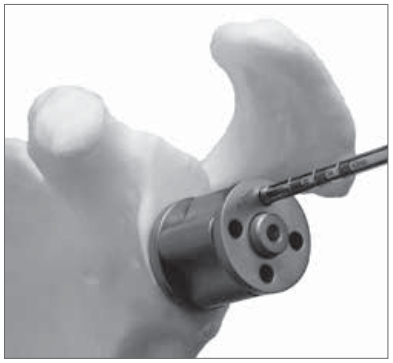
1 Drill guide hole.

2 Insert guide tap.

3 Ream glenoid.



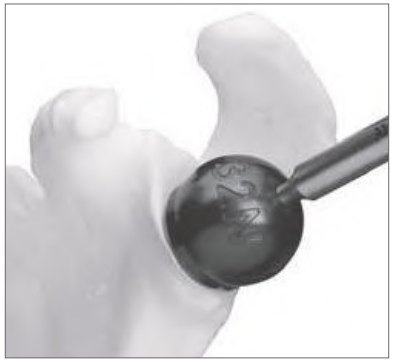
4 Insert baseplate.



5 Drill peripheral holes.

6 Insert peripheral screws.

7 Plane around baseplate rim.



8 Reduce with glenosphere trial.

9 Insert glenosphere implant.

10 Insert glenosphere retaining screw.

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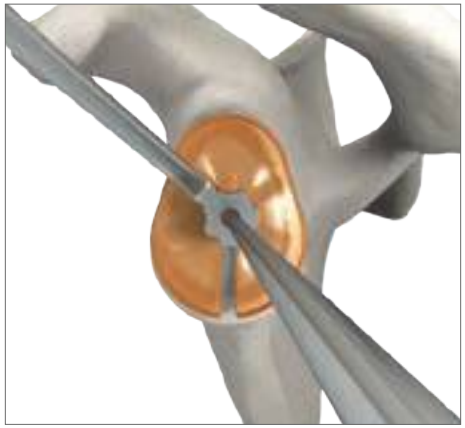
Surgical Snapshot – AltiVate® Anatomic Cannulated Gleniod Preparation



1 Drill guide hole.

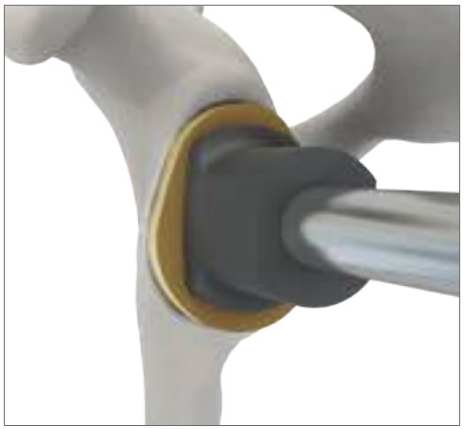
2 Ream glenoid.

3 Drill peripheral holes.

4 Expand center hole.

5 Reduce with glenoid trial.

6 Insert cement into the peg holes.



7 Cement final implant.

AltiVate® Extremity Solutions®

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Surgical Snapshot – AltiVate® Anatomic Non-Cannulated Gleniod Preparation

1 Drill guide holes.

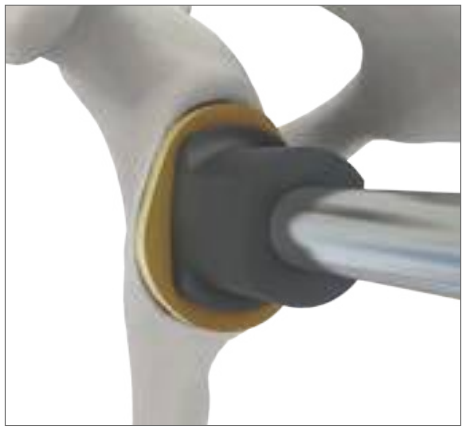
2 Expand center hole.

3 Ream glenoid.

4 Drill peripheral holes.

5 Reduce with glenoid trial.

6 Insert cement into the peg holes.



7 Cement final implant.

Patient Preparation

FIGURE 1

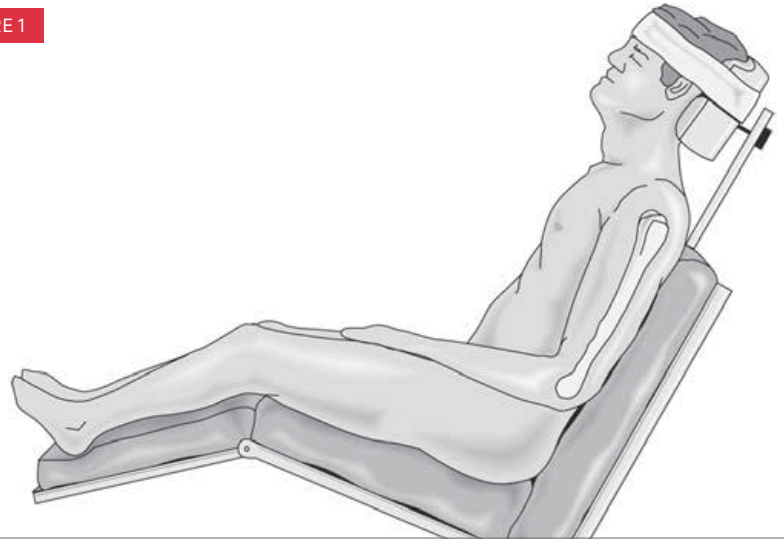
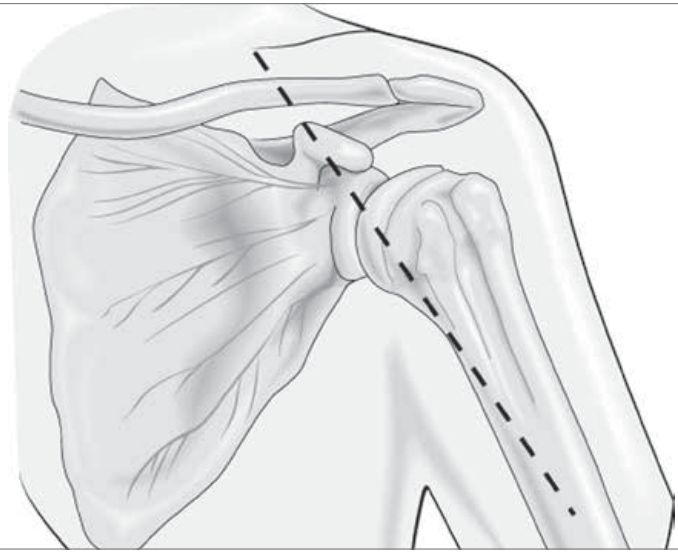


FIGURE 2



PATIENT PREPARATION AND POSITIONING

General endotracheal anesthesia combined with an interscalene nerve block is preferable prior to positioning.

Place the patient in an upright beach chair position with the head firmly secured with the arm draped free (**FIGURE 1**).

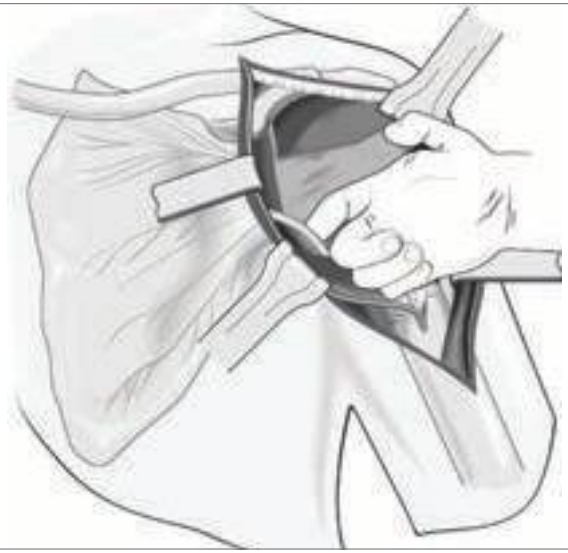
The operative arm must be sufficiently off to the side of the bed to allow for unobstructed movement of the shoulder in adduction and hyperextension.

DELTOPECTORAL SURGICAL APPROACH

An extended deltopectoral approach is used (**FIGURE 2**). In a primary case, prepare the incision 5 cm medial to the acromioclavicular joint and extend it down the anterior arm, distal and lateral to the axillary fold. Identify and preserve the cephalic vein. Free the deltoid muscle from the cephalic vein, ligating the lateral tributaries and leaving the vein medial with the pectoralis major muscle. Release a portion of the pectoralis major tendon insertion. Care should be taken to not damage the long head of the biceps tendon underneath.

Humeral Exposure

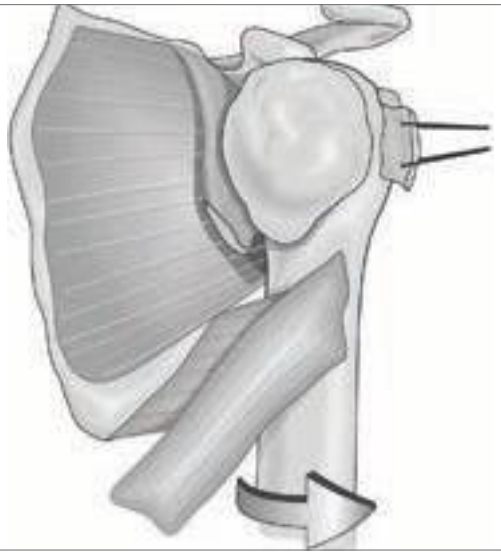
FIGURE 3



Expose the subdeltoid, subacromial, and subcoracoid spaces. Open the subdeltoid space using blunt and electrocautery dissection. Excise the subacromial bursa to allow placement of a deltoid retractor. Any remaining posterior rotator cuff insertion can be appreciated. Palpate the tip of the coracoid and identify the conjoined tendon. Incise the clavipectoral fascia superficially with electrocautery on the lateral border of the conjoined tendon. Avoid medial retractors on the conjoined tendon to prevent a musculocutaneous nerve traction injury.

Palpate the axillary nerve proximally between the conjoined tendon and the lower subscapularis muscle and distally on the undersurface of the lateral deltoid muscle. Confirm its location by performing the tug test (**FIGURE 3**).

FIGURE 4



Expose the long head of the biceps tendon and completely open the rotator interval to the superior rim of the glenoid. Ligate the anterior humeral circumflex vessels at the lower portion of the subscapularis. Release the remnant subscapularis tendon from the lesser tuberosity and proximal humerus. Externally rotating the arm will place tension on the muscle and facilitate its release from bone. Atraumatically dislocate the shoulder anteriorly using gentle external rotation and extension (**FIGURE 4**). The humerus is often osteopenic and can be fractured if overzealous force is used to dislocate the shoulder.

Humeral Osteotomy

FIGURE 5

FIGURE 6

FIGURE 7

HUMERAL PREPARATION - OSTEOTOMY

Measure the level of the humeral head resection intraoperatively by reviewing the preoperative plan. Trim any osteophytes from the proximal humerus as needed using a straight rongeur to improve visualization of the anatomic neck of the humerus. Position the Extramedullary Osteotomy Guide onto the anterior humeral shaft to determine the varus-valgus angle of the humeral head osteotomy. For a right shoulder, the Right label should be facing outward and for a left shoulder, the Left label should be facing outward. Humeral retroversion is determined by using the forearm as a reference point to the flexed elbow. Externally rotate the forearm, and align the Retroversion Alignment Rod parallel to the forearm to recreate a preferred humeral neck resection in 30 degrees of humeral retroversion. (**FIGURE 5**) Note that the height of the osteotomy should be at the anatomic neck. (**FIGURE 6**) Drill 2 holes through the Osteotomy Guide using a 3.2mm drill bit. Tap the bone pins into the prepared drill holes to secure the Osteotomy Guide to the anterior humeral shaft. (**FIGURE 7**) A Pin Driver can be used to for pin placement instead of first drilling with a 3.2mm drill bit.

Begin the humeral head resection by cutting parallel to the top of the Osteotomy Guide until the humeral head is completely resected. Pull out the bone pins using the Bone Pin Puller/ Extractor and remove the Osteotomy Guide.

Humeral Protection

FIGURE 8

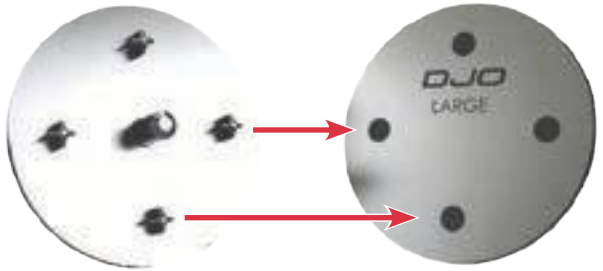


FIGURE 9

FIGURE 10

HUMERAL PROTECTION (OPTIONAL)

Humeral Protectors (available in Small and Large) can be placed on the cut humeral surface as long as socket shell reaming has not been done. The Protectors have a central post and 4 "feet" to provide fixation to the resection surface. (**FIGURE 8**)

Determine whether the patient requires a Small Shell or Standard Shell AltiVate Reverse® by sizing the metaphysis using the inner and outer circles of the Humeral Socket Sizer/Drill Guide. Use the Humeral Socket Sizer/Drill Guide to center the position of the implant shell on the osteotomy. Gently impact the Sizer/Drill Guide with a surgical mallet to firmly seat it on the osteotomy. Assemble Humeral Socket Reamer Guide Drill to power and insert into Drill Guide through-hole. (**FIGURE 9**) Drill to physical stop and remove the Guide Drill and Sizer/Drill Guide. A pilot hole is now positioned at the center of the osteotomy.

NOTE: *Prior to using the Guide Drill, inspect the cutting edges of the instruments to ensure that the surfaces are not damaged.*

Insert the central post of the Protector into the pilot hole and gently impact the Protector with a surgical mallet to firmly seat it on the osteotomy. (**FIGURE 10**) Markings correlating to the location of the 4 feet are on the top surface of the Protector and can aid in Protector positioning.

If the Protector is assembled after broaching, use the markings to position the Protector to maximize fixation on the osteotomy as the pilot hole is no longer relevant. The Protector cannot be used after socket shell reaming.

Humeral Preparation and Trialing - Metaphyseal-Based Approach

FIGURE 11

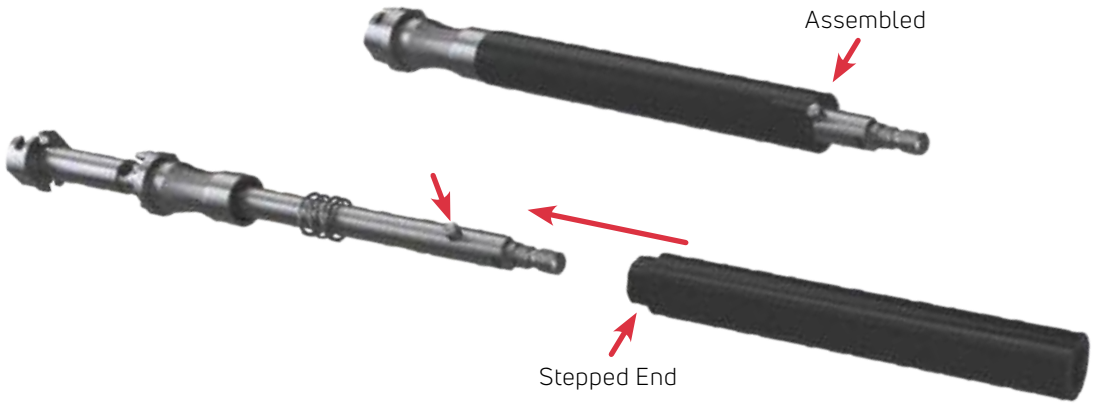
PILOT HOLE CREATION

Determine whether the patient requires a Small Shell or Standard Shell AltiVate Reverse® by sizing the metaphysis using the inner and outer circles of the Humeral Socket Sizer/Drill Guide. Use the Humeral Socket Sizer/Drill Guide to center the position of the implant shell on the osteotomy. Gently impact the Sizer/Drill Guide with a surgical mallet to firmly seat it on the osteotomy. Assemble Humeral Socket Reamer Guide Drill to power and insert into Drill Guide through-hole. (**FIGURE 11**) Drill to physical stop and remove the Guide Drill and Sizer/Drill Guide. A pilot hole is now positioned at the center of the osteotomy.

Tip for implant position: *In patients with smaller metaphyses, positioning the Humeral Socket Sizer/Drill Guide more laterally can minimize medialization of the implant.*

NOTE: *Prior to using the Guide Drill, inspect the cutting edge of the instrument to ensure that the surface is not damaged.*

FIGURE 12



HUMERAL REAMER/PLANER DRIVER ASSEMBLY

The Humeral Socket Reamer/Planer Driver and Humeral Socket Reamer/Planer Driver Sleeve must be pre-assembled prior to use with the Socket Reamers and Planers. (**FIGURE 12**) Note that the spring must be present on the shaft of the Driver, and the stepped end of the Sleeve must go on the Humeral Socket Reamer/Planer Driver first. Depress the release button and slide the Sleeve over it. Assess the fit of the Driver Assembly to ensure there is not a lot of excess space between the Sleeve and the release button.

Humeral Preparation and Trialing - Metaphyseal-Based Approach

FIGURE 13

FIGURE 14

FIGURE 15

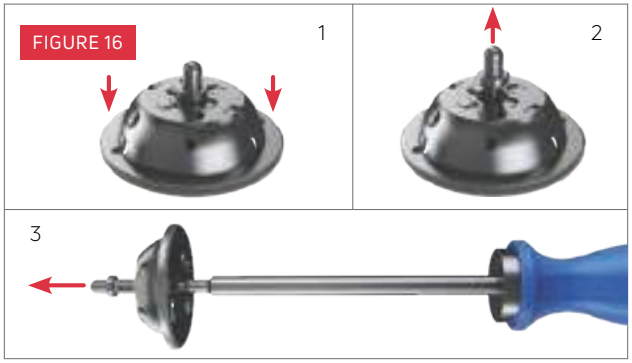
PROXIMAL HUMERAL PREPARATION

Humeral Socket Reamers are available in 4 sizes. If the patient requires a Small Shell AltiVate Reverse® stem, the Small Shell Press-Fit (SM PF) should be used in a cementless application, while the Small Shell Cemented (SM CM) size should be used in a cemented application. If the patient requires a Standard Shell AltiVate Reverse, the Small Shell Press-Fit and Small Shell Cemented sizes can be used as starter reamers if necessary. The Standard Shell Press-Fit (STD PF) size should be used in a cementless application, while the Standard Shell Cemented (STD CM) size should be used in a cemented application. Assemble the Humeral Socket Reamer Removable Guide Pin to the selected Socket Shell Reamer. (**FIGURE 13**) Next, assemble the Socket Shell Reamer and the Humeral Socket Reamer/Planer Handle Assembly. (**FIGURE 14**) Insert the Guide Pin into the pilot hole in the osteotomy and ream to the physical stop. (**FIGURE 15**)

NOTE: *The bone graft collected by the Socket Shell Reamer can be used in press-fitting the stem.*

NOTE: *Prior to using the Socket Shell Reamers, inspect the cutting edges of the instruments to ensure that the surfaces are not damaged.*

FIGURE 16



NOTE: *To disengage the guide pin from the socket reamer, set the assembly on a flat surface and push down on the reamer's physical stop. A drill bit or hex driver can aid in disassembly. (**FIGURE 16**)*

Humeral Preparation and Trialing - Metaphyseal-Based Approach

FIGURE 17

FIGURE 18

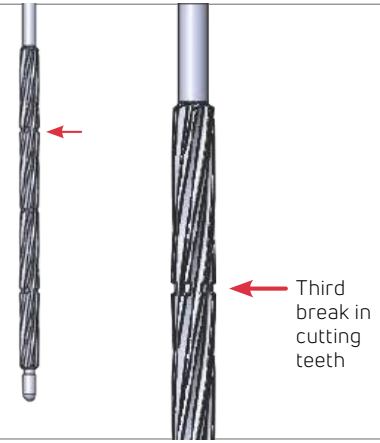
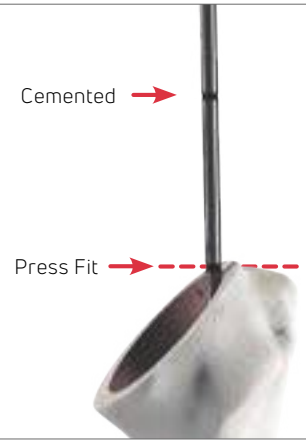


FIGURE 19



HUMERAL CANAL REAMING

The Humeral Reamers are cylindrical and self-centering, with blunt tips, proportionally sized in 6mm-20mm diameters, in 2mm increments. The Starter Reamer is the Size 5mm Canal Reamer with a starter tip. It is recommended to always manually hand-ream the intramedullary humeral canal.

Extend and adduct the humerus to allow access to the medullary canal. Remove a small amount of lateral cortical bone to allow straight access down the humeral shaft and prevent varus reaming. Enter the intramedullary canal where the supraspinatus tendon normally would attach to the greater tuberosity lateral to the humeral head cut surface. Attach the 5mm Starter Reamer to the detachable T-handle and begin reaming. (**FIGURE 17**)

Orient the Humeral Reamer laterally against the cortical bone to ensure proper alignment of the reamer along the long axis of the humeral shaft for correct component positioning. Use the proximal lateral level of the humeral osteotomy as the point of reference. For a Short stem (48mm) in press-fit application, ream to the 3rd break in the cutting teeth. (**FIGURE 18**) For a cemented short stem, ream to the top of the cutting teeth.

The other three stem lengths (Standard - 108mm, Long - 175mm and Long 2 - 220mm) are indicated by laser lines on the reamer. For these lengths, the thicker line indicates the reaming depth appropriate for a press fit application, and the thinner line indicates the reaming depth appropriate for a cemented application. (**FIGURE 19**) Sequentially ream the intramedullary canal to the size templated in the preoperative plan or until cortical bone chatter resistance is encountered.

Humeral Preparation and Trialing - Metaphyseal–Based Approach

FIGURE 20

FIGURE 21

FIGURE 22

FIGURE 23

HUMERAL STEM TRIALING

The Humeral Broaches and Socket Shell Trial can be assembled to create a "Trial Assembly" (**FIGURE 20**) for either the Small Shell or Standard Shell Implant. Select the appropriate length Humeral Broach (short or standard) and the appropriate sized Socket Shell Trial (small or standard). If preparing for a 48mm stem, the Short Humeral Broaches should be used. For all other lengths, the Standard Humeral Broaches should be used. For the Small Shell, assemble the Trialing Guide Pin to the medial (bottom) hole of the Humeral Broach. Slide the Small Socket Shell Trial over the Trialing Guide Pin so that the screw lines up with the lateral (top) hole of the Humeral Broach. Assemble the Small Socket Shell Trial to the Humeral Broach, then remove the trialing guide pin. (**FIGURE 21**) For the Standard Shell, assemble the Trialing Guide Pin to the lateral (top) hole of the Humeral Broach. Slide the Standard Socket Shell Trial over the Trialing Guide Pin so that the screw lines up with the medial hole of the Humeral Broach. Assemble the Standard Socket Shell Trial to the Humeral Broach using the 3.5mm Hex Driver, then remove the Trialing Guide Pin. (**FIGURE 22**). If the final Humeral Canal Reamer size is 10mm or smaller, start with the Size 6mm Humeral Broach and assemble with the appropriate Socket Shell Trial using the 3.5mm Hex Driver. If the final Humeral Canal Reamer size is 12mm or larger, start with a broach size that is 2 sizes smaller than the final Humeral Canal Reamer size. Assemble Retroversion Alignment Rod to the appropriate Trial/Implant Inserter and the Trial/Implant Inserter to the Trial Assembly. Insert Trial Assembly into humerus and impact the strike plate to seat the Trial Assembly. (**FIGURE 23**) Continue to sequentially insert Trial Assemblies, increasing in Broach size, until a firm and stable fit is achieved. The final broach size obtained is generally equivalent to, or is one size smaller than, the last Humeral Reamer size used.

NOTE: *The Small Trial/Implant Inserter has two knobs, one for the Small Stem Implant and one for the Small Trial Assembly. The way to remember which is which is to use the following mnemonic: Trial=Tall, Stem=Short & Silver.*

NOTE: *The Shell Trial should be firmly attached to the broach before impacting with the Trial/Implant Inserter. If using a* ***size 14 or larger*** *broach and/or if the patient has hard bone, the Broach Handle should be used with the Humeral Broach to avoid excess force on the Shell Trial.*

NOTE: *The Small Socket Shell Trial screw assembles to the lateral hole of the broach, while the Standard Socket Shell Trial assembles to the medial hole of the broach. The Small Trial/Implant Inserter assembles to the Small Trial Assembly via the medial hole of the broach, while the Standard Trial/Implant Inserter assembles to the Standard Trial Assembly via the lateral hole of the broach.*

Humeral Preparation and Trialing - Diaphyseal–Based Approach

NOTE: *The Diaphyseal-Based Approach is not recommended for the Short (48mm) humeral stems. To prepare the humerus, refer to the previous section on the Metaphyseal-Based Approach.*

OPTIONAL HUMERAL PREPARATION STEP - STARTER REAMING

NOTE: *This section describes the optional use of starter metaphyseal reaming. This starter ream can help with optimal broach positioning and sizing. Once the starter reaming is done, the humeral protectors cannot be used.*

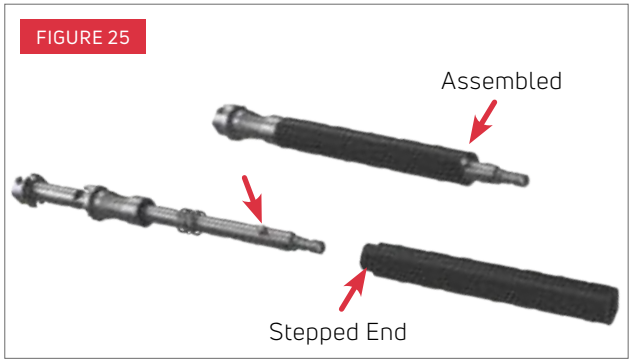
FIGURE 24

PILOT HOLE CREATION

Determine whether the patient requires a Small Shell or Standard Shell AltiVate Reverse® by sizing the metaphysis using the inner and outer circles of the Humeral Socket Sizer/Drill Guide. Use the Humeral Socket Sizer/Drill Guide to center the position of the implant shell on the osteotomy. Gently impact the Sizer/Drill Guide with a surgical mallet to firmly seat it on the osteotomy. Assemble Humeral Socket Reamer Guide Drill to power and insert into Drill Guide through-hole. (**FIGURE 24**) Drill to physical stop and remove the Guide Drill and Sizer/Drill Guide. A pilot hole is now positioned at the center of the osteotomy.

NOTE: *Prior to using the Guide Drill and the Socket Shell Reamers, inspect the cutting edges of the instruments to ensure that the surfaces are not damaged.*

FIGURE 25



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Humeral Preparation and Trialing - Diaphyseal–Based Approach

FIGURE 26

FIGURE 27

FIGURE 28

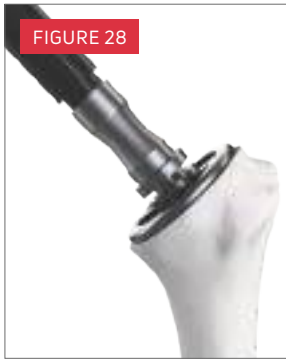
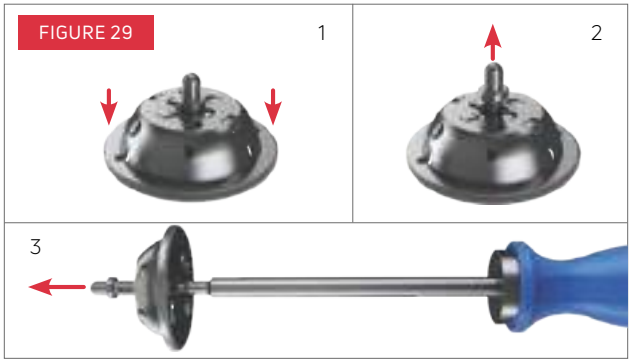


FIGURE 29



PROXIMAL HUMERAL STARTER REAMING FOR THE STANDARD SHELL IMPLANT

Assemble the Humeral Socket Reamer Removable Guide Pin to the Small Shell Press-Fit (SM PF) Socket Shell Reamer. (**FIGURE 26**)

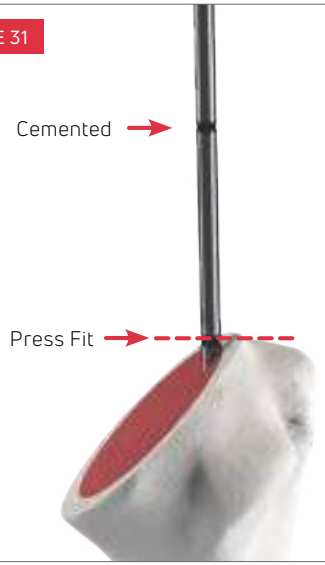
Next, assemble the Socket Shell Reamer and the Humeral Socket Reamer/Planer Handle Assembly. (**FIGURE 27**) Insert the Guide Pin into the pilot hole in the osteotomy and ream to the physical stop. (**FIGURE 28**)

NOTE: *To disengage the guide pin from the socket reamer, set the assembly on a flat surface and push down on the reamer's physical stop. A drill bit or hex driver can aid in disassembly. (**FIGURE 29**)*

Humeral Preparation and Trialing - Diaphyseal–Based Approach

FIGURE 30

FIGURE 31



HUMERAL CANAL REAMING

The Humeral Reamers are cylindrical and self-centering, with blunt tips, proportionally sized in 6mm-20mm diameters, in 2mm increments. The Starter Reamer is the Size 5mm Canal Reamer with a starter tip. It is recommended to always manually hand-ream the intramedullary humeral canal.

Extend and adduct the humerus to allow access to the medullary canal. Remove a small amount of lateral cortical bone to allow straight access down the humeral shaft and prevent varus reaming. Enter the intramedullary canal where the supraspinatus tendon normally would attach to the greater tuberosity lateral to the humeral head cut surface. Attach the 5mm Starter Reamer to the detachable T-handle and begin reaming. (**FIGURE 30**)

Orient the Humeral Reamer laterally against the cortical bone to ensure proper alignment of the reamer along the long axis of the humeral shaft for correct component positioning. Use the proximal lateral level of the humeral osteotomy as the point of reference. Reamers indicate three depths which correspond to reaming depths appropriate for three stem lengths: Standard (108mm), Long 1 (175mm) and Long 2 (220mm). Each stem length has two lines. The thicker line is the reaming depth appropriate for a press-fit application, and the thinner line is the reaming depth appropriate for a cemented application and accounts for the largest cement restrictor length. (**FIGURE 31**) Sequentially ream the intramedullary canal to the size templated in the preoperative plan or until cortical bone chatter resistance is encountered.

Humeral Preparation and Trialing - Diaphyseal–Based Approach

FIGURE 32

FIGURE 33

FIGURE 34

FIGURE 35

FIGURE 36

HUMERAL CANAL BROACHING

Humeral Broaches are designed to be consistent in shape and size with the sub-shell portion of the implant. If cementing, to allow for adequate cement mantle, a stem smaller than the final broach size should be selected. If using a cementless technique, a stem equal in size to the final broach size should be selected.

If the final Humeral Canal Reamer size is 10mm or smaller, start with the Size 6mm Humeral Broach. If the final Humeral Canal Reamer size is 12mm or larger, start with a broach size that is 2 sizes smaller than the final Humeral Canal Reamer size. Attach the Humeral Broach to the Humeral Broach Handle. (**FIGURE 32**)

As a guide for proper alignment and retroversion, attach the Retroversion Alignment Rod to the right or left hole in the Humeral Broach Handle. Externally rotate the forearm, and align the Retroversion Alignment Rod parallel to the patient's forearm to maintain the preferred amount of retroversion.

Gently impact the Humeral Broach Handle using a mallet until the depth indicator line of the Humeral Broach Handle lines up with the lateral aspect of the osteotomy (**FIGURE 33**) to ensure that the Humeral Broach has been countersunk into the metaphysis of the proximal humerus. (**FIGURE 34**)

Continue to sequentially broach, increasing in size, until a firm and stable fit is achieved. The final broach size obtained is generally equivalent to, or is one size smaller than, the last Humeral Reamer size used.

Remove the Humeral Broach Handle, and leave the final countersunk Humeral Broach in the humerus. (**FIGURE 35**) If humeral canal preparation has been done prior to the glenoid preparation, Humeral Protectors (available in Small and Large) can be placed on the cut humeral surface. (**FIGURE 36**)

Humeral Preparation and Trialing - Diaphyseal–Based Approach

FIGURE 37

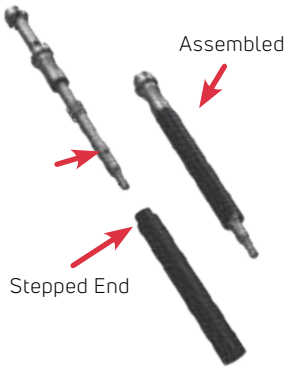


FIGURE 38

FIGURE 39

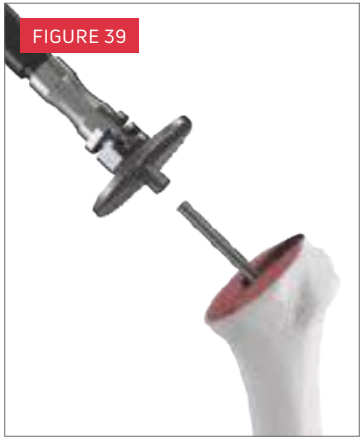


FIGURE 40

FIGURE 41

HUMERAL REAMER/PLANER DRIVER ASSEMBLY

The Humeral Socket Reamer/Planer Driver and Humeral Socket Reamer/Planer Driver Sleeve must be pre-assembled prior to use with the Socket Reamers and Planers. Note that the spring must be present on the shaft of the Driver, and the stepped end of the Sleeve must go on the Humeral Socket Reamer/Planer Driver first. Depress the release button and slide the Sleeve over it. Assess the fit of the Driver Assembly to ensure there is not a lot of excess space between the Sleeve and the release button. (**FIGURE 37**)

HUMERAL PLANING

Humeral Planers are available in Small and Large sizes. Assemble the Humeral Socket Reamer/Planer Guide Pin with the most lateral hole of the Humeral Broach in the humeral metaphysis. (**FIGURE 38**) Assemble the Humeral Planer and the Humeral Reamer/Planer Driver Assembly and ream the outer remaining surface of the osteotomy using power. (**FIGURE 39**) Plane to the physical stop. Leave the Reamer/Planer Guide Pin assembled to the broach for subsequent reaming.

NOTE: *Ensure debris is removed from the broach face (threaded holes) prior to assembly of Guide Pin*

PROXIMAL HUMERAL PREPARATION

Humeral Socket Reamers are available in 4 sizes. If the patient requires a Small Shell AltiVate Reverse stem, the Small Shell Press-Fit (SM PF) should be used in a cementless application, while the Small Shell Cemented (SM CM) size should be used in a cemented application. If the patient requires a Standard Shell AltiVate Reverse, the Small Shell Press-Fit (SM PF) and Small Shell Cemented (SM CM) sizes can be used as starter reamers if required. The Standard Shell Press-Fit (STD PF) size should be used in a cementless application, while the Standard Shell Cemented (STD CM) size should be used in a cemented application. Assemble the appropriate Socket Shell Reamer and the Humeral Socket Reamer/Planer Handle Assembly. (**FIGURE 40**) Place the Socket Reamer over the Guide Pin and ream the humeral metaphysis using power. (**FIGURE 41**) Ream to the physical stop and remove the Socket Reamer. Disassemble the Guide Pin from the Humeral Broach.

NOTE: *The bone graft collected by the Socket Shell Reamer can be used in press-fitting the stem.*

Humeral Trialing

There are two options for trialing. Trialing can be done with a Trial Assembly (Humeral Broach and Socket Shell Trial) or with the final Humeral Stem Implant.

FIGURE 42

FIGURE 43

FIGURE 44

OPTION 1: Using Trial Assembly and Socket Insert Trials

With the Metaphyseal-Based Approach, the Trial Assembly is already present in the humerus. With the Diaphyseal-Based Approach, for the Small Shell assemble the Trialing Guide Pin to the medial (bottom) hole of the Humeral Broach. Slide the Small Socket Shell Trial over the Trialing Guide Pin so that the screw lines up with the lateral (top) hole of the Humeral Broach. Assemble the Small Socket Shell Trial to the Humeral Broach, then remove the trialing guide pin. (**FIGURE 42**) For the Standard Shell, screw the Trialing Guide Pin into the lateral (top) hole of the Humeral Broach. Slide the Socket Shell Trial over the Trialing Guide Pin so that the screw lines up with the medial hole of the Humeral Broach. Assemble the Socket Shell Trial to the Humeral Broach using the 3.5mm Hex Driver, then remove the Trialing Guide Pin. (**FIGURE 43**)

NOTE: *Ensure debris is removed from the broach face (threaded holes) prior to assembly of the Socket Shell Trial.*

NOTE: *The Small Socket Shell Trial screw assembles to the lateral hole of the broach, while the Standard Socket Shell Trial assembles to the medial hole of the broach. The Small Trial/Implant Inserter assembles to the Small Trial Assembly via the medial hole of the broach, while the Standard Trial/Implant Inserter assembles to the Standard Trial Assembly via the lateral hole of the broach.*

OPTION 2: Using the Humeral Stem Implant and Socket Insert Trials

In a shoulder arthroplasty case it is recommended that trial reduction first be performed using the Trial Assembly. In certain cases, however, it may be desirable to cement or press-fit the Humeral Stem implant prior to performing the initial trial reduction.

Refer to the Humeral Stem Cementation section of this surgical technique for instructions on cementing the implant into the humerus. If using a cementless technique with the Standard Shell Implant, the bone graft window in the implant should be filled with bone graft.

Attach the Humeral Stem to the Trial/Implant Inserter and insert the stem into the humeral canal. (**FIGURE 44**) A few taps on the end of the Trial/Implant Inserter is recommended.

NOTE: *The Small Trial/Implant Inserter has two knobs, one for the Small Stem Implant and one for the Small Trial Assembly. The way to remember which is which is to use the following mnemonic: Trial=Tall, Stem=Short & Silver.*

To finish preparation for Reverse Total Shoulder Arthroplasty, continue to page 24.

To finish preparation for Anatomic Total Shoulder Arthroplasty, continue to page 34.

To finish preparation for Hemiarthroplasty, continue to page 38.

Reverse Total Shoulder Arthroplasty: Glenoid Preparation

FIGURE 45

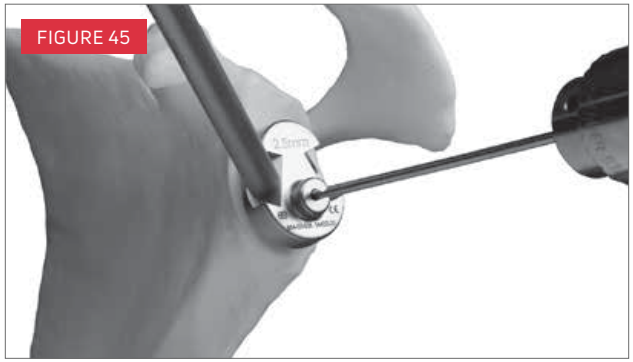


FIGURE 46

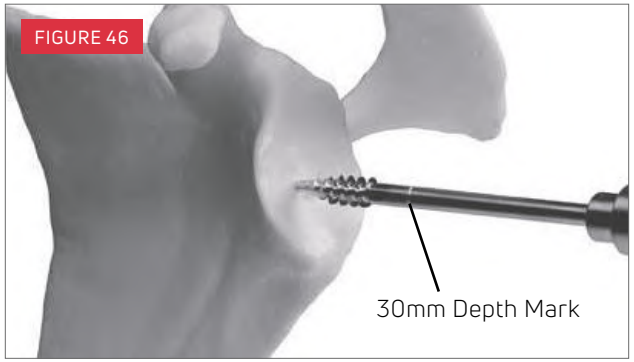


FIGURE 47

GLENOID EXPOSURE

Abduct the arm on a free-standing Mayo stand or arm holder to relax the deltoid, and allow the humerus to retract posteriorly. Extensive soft tissue releases may be necessary to gain optimal visualization and access to the glenoid.

Place a glenoid retractor on the posterior-inferior rim of the glenoid to displace the humerus posteriorly. Release the coracohumeral ligament from the lateral coracoid to free the subscapularis and visualize the lateral coracoid base.

Release the glenohumeral ligaments, capsule, and labrum, and excise them from the glenoid beginning at the 12 o'clock position and ending between the 6 and 7 o'clock positions (for the right side shoulder). Excise the inferior capsule to ensure excellent visualization of inferior glenoid. Note that the axillary nerve is at risk for injury near the posterior-inferior resection of the capsule. When using electrocautery, care must be taken to remain on the bone of the glenoid neck while performing these releases to help minimize this risk.

Place a Meyerding or blunt Hohmann retractor on the anterior glenoid neck to retract the subscapularis and facilitate releases around the glenoid to minimize traction on the anterior structures to avoid brachial plexus traction injuries.

GLENOID DRILL GUIDE PLACEMENT

Assemble the Central Drill Guide Handle to the Central Drill Guide such that the handle will be held anteriorly when the drill guide is placed on the glenoid. The Central Drill Guide has a built-in 10 degree inferior tilt to ensure accurate placement of the baseplate.

Preoperative planning helps to anticipate the tilt of the glenoid baseplate. As is common in cases of cuff tear arthropathy, superior wear of the glenoid may be present. In those cases, the 10 degree built-in inferior tilt of the drill guide may not be sufficient in ensuring the appropriate tilt of the baseplate.

Drill the hole and exit the anterior scapula using the 2.5mm drill bit. (**FIGURE 45**) Measure the depth of the drill hole using the Depth Gauge to ensure that the depth of the drill hole is approximately 30mm.

It is important to note that the length of the central screw on the baseplate is 30mm. Therefore, the length of the drilled hole should be of the appropriate length to achieve bicortical fixation after the face of the glenoid has been reamed.

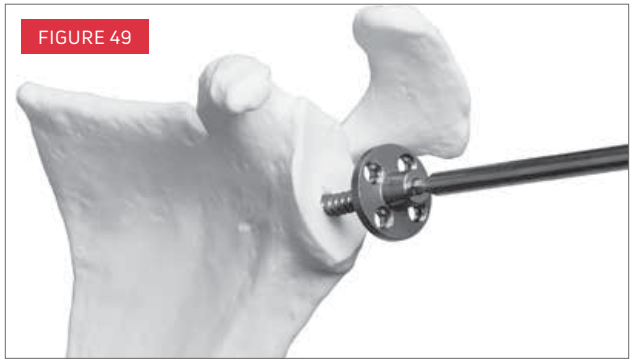
Seat the 6.5mm Guide Tap in the same direction and angle as that used for the 2.5mm drill hole until it engages the anterior cortex of the scapula. The 6.5mm Guide Tap has a 30mm depth mark to provide guidance for achieving the appropriate depth. (**FIGURE 46**) Manual placement of the 6.5mm Guide Tap is achieved by connecting the manual Tap Driver Adaptor to the Ratchet Handle. Power placement of the 6.5mm Guide Tap is achieved by using the Power Tap Driver Adaptor. Significant resistance should be felt when the anterior cortex is engaged.

Leave the 6.5 mm Guide Tap in the glenoid. (**FIGURE 47**)

Glenoid Preparation and Baseplate Implantation

FIGURE 48

FIGURE 49



GLENOID REAMING

Glenoid Reamers are cannulated and designed to create a concave glenoid surface that is congruent with the Glenoid Baseplate. They are designed for power use and are available in 4 sizes: starter, small, medium, and large.

Connect the smallest-sized Starter Glenoid Reamer to the Glenoid Reamer Driver for power use. Place the hole of the cannulated Starter Glenoid Reamer onto the 6.5mm Guide Tap and begin to ream the glenoid surface using power. (**FIGURE 48**) Ream the glenoid surface using the Small Glenoid Reamer. Medium and Large Glenoid Reamers are available based on surgeon preference. A 36mm glenosphere requires a ream up to the medium size and a 40mm glenosphere requires a ream up to the large size.

Ream to expose subchondral bone. Continue reaming to violate the subchondral bone on the inferior 50% of the prepared glenoid until bleeding bone is exposed. Remove the 6.5mm Guide Tap upon completion. Manual removal of the 6.5mm Guide Tap is achieved either by connecting the Quick-Coupling T-handle directly to the 6.5mm Guide Tap or by connecting the Manual Tap Driver Adaptor to the Ratchet Handle.

GLENOID BASEPLATE IMPLANT

The Glenoid Baseplate implant is designed with a 6.5mm centralized bone screw that is 30mm long and 4 peripheral holes for bone screws. The baseplate is manufactured using a titanium alloy substrate and porous coating on the backside of the baseplate to promote biological fixation.

GLENOID BASEPLATE INSERTION

Implant the Glenoid Baseplate into the prepared glenoid by purchasing the tip of the 6.5mm central bone screw into the pre-drilled hole on the anterior cortex of the scapula for secure fixation. (**FIGURE 49**) Manual placement of the Glenoid Baseplate is achieved by connecting the Ratchet Handle to the 3.5mm Hex Driver, which mates with a hex feature on the Morse taper of the Glenoid Baseplate.

When fully seated, the Glenoid Baseplate should sit flush with the glenoid, and the scapula should rotate slightly when attempting to tighten it down onto the glenoid surface. The purchase of the central screw when the baseplate is fully seated must be very secure so that the attempted further advancement of the screw will cause the entire scapula to rotate.

PERIPHERAL BONE SCREW IMPLANTS

Four peripherally mounted bone screws are used to provide additional fixation of the Glenoid Baseplate to the glenoid surface. For perpendicular placement, 5.0mm locking bone screw implants are indicated. For angled placement in any direction up to 12 degrees, 3.5mm non-locking bone screw implants are indicated. Selection of bone screws is at the discretion of the surgeon, however, it is preferable to use 5.0mm locking screws. A variable angle 3.5mm non-locking screw should only be used in the event that a perpendicular 5.0mm locking screw is unable to achieve adequate bone purchase.

Glenoid Preparation and Baseplate Implantation

FIGURE 50

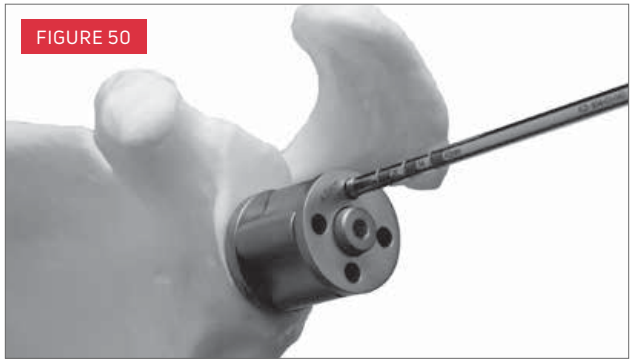


FIGURE 51

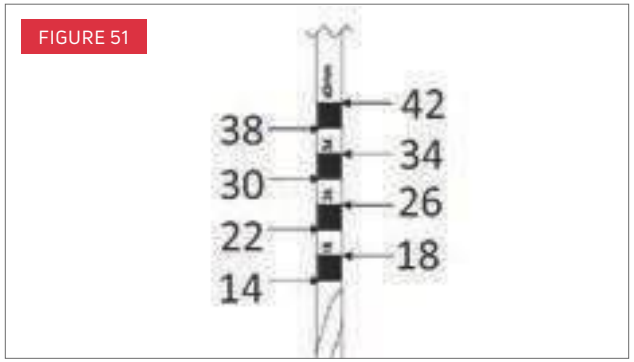


FIGURE 52

PERIPHERAL BONE SCREW INSERTION

For placement of the 5.0mm locking bone screws, attach the Two-Piece Drill Guide onto the Glenoid Baseplate. Using the 4.0mm drill bit, drill all 4 screw holes through the assembled Two-Piece Drill Guide. (**FIGURE 50**) When the rear cortex is penetrated by the drill bit, the depth line on the drill bit should be noted to determine the appropriate screw length. The 4.0mm drill bit is calibrated in 4mm increments, starting at 14mm up to 42mm. (**FIGURE 51**)

To measure the depth of each pre-drilled screw hole using the Depth Gauge, subtract 25mm (i.e., the assembled height of the drill guide) from the Depth Gauge reading to obtain screw length. Remove the inner drill guide tube section, leaving the outer screw guide. The outer screw guide provides guidance for the locking screws. Implant the appropriate 5.0mm locking bone screw into the Glenoid Baseplate. (**FIGURE 52**)

Manual placement of the 5.0mm locking bone screw is achieved using the 3.5mm Hex Driver connected to the Ratchet Handle. Power placement of the 5.0mm locking bone screw is achieved by connecting the Power Tap Driver Adaptor to the 3.5mm Power Hex Driver.

Care should be taken when using power for insertion of the 5.0mm locking screws with the screw guide. A low/slow setting must be applied when drilling. Do not engage the head of the screw to the baseplate under power.

Obtain final seating of the bone screws manually using the 3.5mm Hex Screwdriver. Screw heads should be tightened completely to prevent impingement with the Glenoid Head.

Glenoid Preparation and Baseplate Implantation

FIGURE 53

FIGURE 54

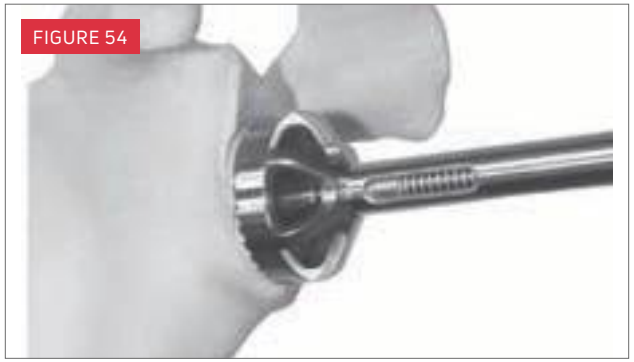
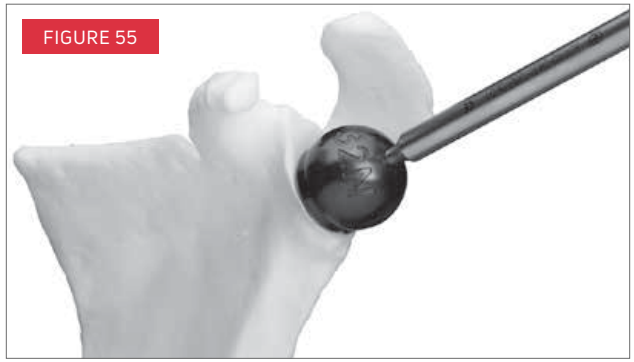


FIGURE 55



PERIPHERAL BONE SCREW INSERTION/ NON-LOCKING SCREWS

Occasionally, there may be an inadequate amount of bone stock and/or too poor quality of bone for perpendicular placement of the 5.0mm locking bone screws. Under these circumstances, the 3.5mm non-locking bone screws can be used to angle the bone screw placement using the 2.5mm drill bit and the 2.5mm/3.2mm angled drill guide for improved bone purchase. (**FIGURE 53**) Measure the depth of each pre-drilled screw hole using the Depth Gauge.

Tap the pre-drilled 2.5mm screw holes using the 3.5mm Bone Screw Tap. Manual placement of the 3.5mm non-locking bone screw is achieved using the small 2.5mm Hex Screwdriver. Power placement of the 3.5mm locking bone screw is achieved by connecting the Power Tap Driver Adaptor to the 2.5mm Power Hex Driver.

Obtain final seating of the bone screws using the 2.5mm Hex Screwdriver. Screw heads should be tightened completely to prevent impingement with the Glenoid Head.

GLENOID BASEPLATE RIM PLANING

Position the Baseplate Rim Planer over the Glenoid Baseplate. Manually ream around the rim of the Glenoid Baseplate to remove any bone or soft tissue. (**FIGURE 54**) This will help to prevent impingement when implanting the Glenoid Head onto the Glenoid Baseplate.

ALTERNATIVE GLENOID PLANING TECHNIQUE UTILIZING A BURR INSTEAD OF GLENOID RIM PLANER

Remove any observed soft tissue or bony prominence around the baseplate that might prevent the head from seating fully using rongeurs or a burr, being careful to avoid damaging the rim of the baseplate. If the trial glenoid head is seated fully and the taper is engaged, then sufficient bone was removed. If a glenosphere larger than a size 32mm neutral is used, additional bone and soft tissue will need to be removed for preparation for a larger glenosphere rim. In the case of 36 -4mm offset, 40mm neutral and 40mm -4mm offset, preparation for the associated hood will also need to be made.

GLENOID HEAD SELECTION

Glenoid Head Trials are available in seven sizes: 32mm blue (neutral and -4mm offset), 36mm yellow (neutral and -4mm offset), 40mm green (neutral and -4mm offset), and 44mm gray (+8mm offset).

Select the appropriate Glenoid Head Trial with the correct offset. Assemble the Glenoid Head Trial to the Glenoid Head Inserter by placing the Glenoid Head Inserter into the outer central hole of the Trial and rotating clockwise until tight. Position the Glenoid Head Trial onto a clean, dry Morse taper of the Glenoid Baseplate using the Glenoid Head Inserter. (**FIGURE 55**) Using the Glenoid Head Impactor, impact the Glenoid Head Trial onto the Glenoid Baseplate using three to four taps. As the 36mm -4mm offset, 40mm neutral, and 40mm -4mm offset glenoid heads are hooded on the inferior portion, excess bone from the medial, inferior margin of the glenoid should be removed using a high speed burr or curved rongeur to ensure that the hooded glenoid head sits flush on the prepared glenoid without impingement.

Pull the proximal humerus laterally while extending and externally rotating the arm to deliver the proximal humerus anteriorly.

Shoulder Trial Reduction

Socket Insert Trials are available in sixteen sizes that are defined according to diameter, constraint level, and thickness. For the Standard Shell, If a +8mm buildup is needed, the 8mm Spacer Trial can be used. The 8mm Spacer Trial is compatible with any Humeral Socket Insert Trial. For the Small Shell, 8mm and 12mm Spacer Trials are available if more humeral buildup is needed. The 8 and 12mm Spacer Trials are compatible with all Small Humeral Socket Insert Trials.

The Socket Insert Trials assemble to the Socket Shell Trial and Humeral Stem Implant by lining up the tabs of the Insert Trial with the scallops of the Shell Trial or Implant. A clockwise turn of the Insert Trial will lock it into the Shell Trial or Implant.

SHOULDER REDUCTION

Reduce the Shoulder by pulling laterally on the Humeral Socket Trial or Implant and proximal humerus to clear it from the Glenoid Head Trial, while flexing and internally rotating the arm until a gental but appreciable "clunk" occurs. If the shoulder reduces too easily, soft tissue tension is inadequate and may be addressed by incorporating greater humeral buildup and/or using a different Glenoid Head.

The Spacer Trials can also be used to further increase tensioning in the shoulder joint as required. They assemble to the Humeral Socket Trial or Humeral Stem Implant by aligning the Spacer Trial tabs to the mating scallops on the Shell Trial or Implant, followed by a clockwise turn of the Spacer Trial.

Removal of Trial Components

Once shoulder mobility and joint stability are sufficient, dislocate the shoulder to remove all trial components. Rotate the Socket Insert Trial counter-clockwise, and remove it from the Socket Shell Trial.

There are two options for removal of the Socket Shell Trial and the Broach.

OPTION 1: Disassemble the Socket Shell Trial from the Broach using the 3.5mm Hex Driver. Then, use the Broach Handle to remove the Broach from the humeral canal.

OPTION 2: Assemble the Stem Inserter to the Shell Trial. Use the Stem Inserter to remove the Trial Assembly (Socket Shell Trial and Broach).

The Glenoid Head Distractor is also used to remove the Glenoid Head Trial. Position the Glenoid Head Distractor into the central hole of the Glenoid Head Trial and rotate clockwise until the Glenoid Head Trial disengages from the Glenoid Baseplate. (**FIGURE 56**) After the trial components and the broach have been removed, clear any remaining debris from the humeral canal.

GLENOID HEAD IMPLANT

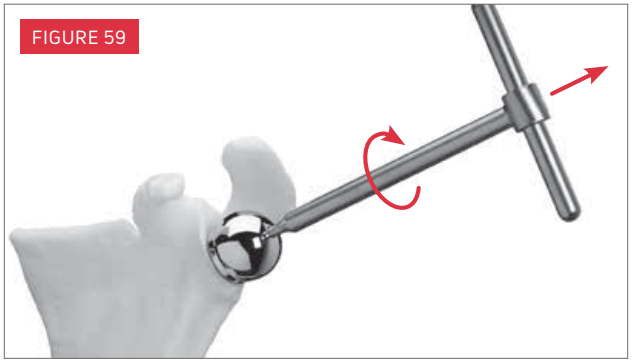
Glenoid Head Implants are manufactured with a wrought cobalt chrome articulating glenoid head surface and reverse Morse taper for fixation to the Glenoid Baseplate. Glenoid Heads are available in diameters of 32mm, 36mm, and 40mm, in either a neutral or -4mm offset. A 44mm Glenoid Head with a +8mm offset is also available. The 36mm -4mm offset, 40mm neutral, and 40mm -4mm offset Glenoid Heads are hooded on the inferior portion. All Glenoid Heads have a 5.4mm diameter hole in the center of the glenosphere to accept a Retaining Screw that is 16mm long. Although the Glenoid Head is attached to the Glenoid Baseplate via a Morse taper connection, the Retaining Screw is designed to be tightened into the central part of the Glenoid Baseplate to provide an additional measure of security.

Implantation

FIGURE 57

FIGURE 58

FIGURE 59



GLENOID HEAD INSERTION

Clear any soft tissue around the circumference of the Glenoid Baseplate. Irrigate the Glenoid Baseplate surface including the Morse taper and dry thoroughly. As the 36mm -4mm offset, 40mm neutral, and 40mm -4mm offset Glenoid Heads are hooded on the inferior portion, excess bone from the medial, inferior margin of the glenoid should be removed using a high speed burr or curved rongeur to ensure that the hooded Glenoid Head sits flush within the prepared glenoid without impingement.

Select the appropriate cobalt-chrome Glenoid Head implant with the correct offset. Assemble the Glenoid Head to the Glenoid Head Inserter by placing the Glenoid Head Inserter into the outer central hole of the Glenoid Head and rotate clockwise until tight. Position the Glenoid Head onto a clean, dry Morse taper of the Glenoid Baseplate using the Glenoid Head Inserter. (**FIGURE 57**) Remove the Glenoid Head Inserter and, using the Glenoid Head Impactor, impact the cobalt-chrome Glenoid Head implant onto the Glenoid Baseplate implant using three to four firm taps. (**FIGURE 58**)

Thread the Glenoid Head Inserter onto the Glenoid Head implant and pull on the Glenoid Head Inserter to ensure the Glenoid Head is fully seated onto the Morse taper of the Glenoid Baseplate. Also attempt to twist the Glenoid Head Inserter to ensure that the Glenoid Head is fully seated. (**FIGURE 59**) A fully seated Glenoid Head implant will not move. If the Glenoid Head implant is not fully seated. soft tissue impingement may be present. Insert the Retaining Screw into the outer central hole of the Glenoid Head. Tighten the Retaining Screw using the Torque limiting Driver.

Humeral Stem Cementless Implantation

FIGURE 60

FIGURE 61

FIGURE 62

FIGURE 63

Select the appropriately sized Humeral Stem. If using a cemented technique, note that the Humeral Stem Implant should be smaller than the final Humeral Broach size used to allow for an adequate cement mantle.

The bone graft window in the Standard Shell implant should be filled with bone graft, whether doing a cemented or cementless technique.

Assemble Retroversion Alignment Rod to the Trial/Implant Inserter and the Trial/Implant Inserter to the Implant. (**FIGURE 60**) Insert Implant into humerus and impact the strike plate to seat the Implant. (**FIGURE 61**) Disassemble the Inserter from the implant. Select the appropriately sized Humeral Socket Insert based upon the last trial reduction performed. Carefully align the Humeral Socket Insert into the opening of the humeral socket of the Humeral Stem Implant. Lightly impact the Humeral Socket Insert into the Humeral Stem using three to four firm taps on the Humeral Socket Impactor. (**FIGURE 63**) Ensure that the Socket Insert is fully seated around the entire circumference of the Socket Shell portion of the Humeral Stem.

NOTE: *The Small Shell Trial/Implant Inserter has two separate knobs: one for the Trial Assembly and the other for implantation. Be sure to use the appropriate knob when inserting the Small Shell Implant. Tall knob = Trial, Short, Silver knob = Stem (**FIGURE 62**)*

Humeral Stem Implant Cementation

Insert the appropriately sized cement restrictor into the humeral canal, approximately 1.5 cm below the distal tip of the Humeral Stem implant. Brush, irrigate, and dry the humeral canal before bone cement is pressurized into the humeral canal. Mix the bone cement according to the manufacturer's instructions. Extrude the bone cement into the humeral canal by filling the humeral canal, distal to proximal, using a retrograde technique. This technique is critical to avoid embolization of the intramedullary humeral canal with debris such as air and bone marrow. Pressurize the bone cement using a pressurizing nozzle or a digit.

NOTE: *For the Standard Shell Implant, Ensure that the bone graft window is filled with bone graft prior to insertion into cement-filled canal.*

Assemble and thread the Trial/Implant Inserter into the Humeral Stem Implant. A Retroversion Alignment Rod should then be threaded into the appropriate version hole (according to the desired amount of retroversion) of the Trial/Implant Inserter. When the bone cement has reached a dough-like consistency, the assembled Retroversion Alignment Rod should be used to orient the Humeral Stem into the humeral canal, and the Trial/Implant Inserter should be gently tapped with a surgical mallet to seat the implant. Disassemble the threaded knob of the Trial/Implant Inserter from the implant.

NOTE: *Remove any excess bone cement, focusing on the internal shell of the Standard Shell Stem Implant where the osteotome slots and poly snap feature are.*

FIGURE 64

Tip for Implant Seating: Use the Glenosphere Impactor to further seat the Standard Shell implant in the humerus prior to liner assembly. (**FIGURE 64**). Use the 32mm Humeral Socket Impactor to further seat the Small Shell Implant in the Humerus prior to liner assembly.

8 & 12mm Spacer Implantation

FIGURE 65

FIGURE 66

Follow the instructions of the Humeral Stem Implant – Socket Insert Assembly section.

If the Humeral Stem is implanted into the humeral canal prior to assembly of the Socket Insert implant, confirm the initial choice of humeral build-up by trialing the Socket Insert Trial and 8mm or 12mm (for the small shell only) Spacer Trial with the implanted Humeral Stem.

If either Spacer is determined to be needed, insert the Spacer implant into the socket of the Humeral Stem implant, ensuring that the alignment features are appropriately aligned with the mating pockets on the socket shell. (**FIGURE 65**) Insert and tighten the retaining screw using the 45 in-lb Torque Limiting Driver Handle and 5/16" Hex Socket Driver (**FIGURE 66**). Assemble the appropriately sized Socket Insert into the Humeral Stem socket or the Spacer by gently impacting the Socket Insert with the appropriately sized Humeral Socket Impactor.

Final Reduction and Closure

With the patient relaxed, reduce the humeral prosthesis onto the glenoid head prosthesis. If the prosthesis cannot be reduced, soft tissue impingement may be present.

Gently examine the shoulder while the bone cement is still curing to confirm the previously established motion and joint stability. Examine the axillary nerve again using the "tug" test.

Anatomic Total Shoulder Arthroplasty: Cannulated Glenoid Preparation

FIGURE 67

FIGURE 68

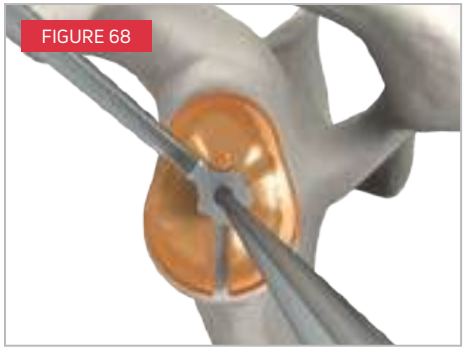


FIGURE 69

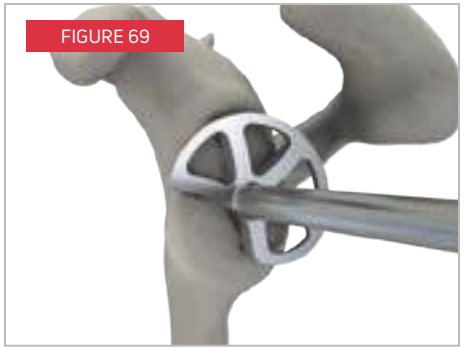
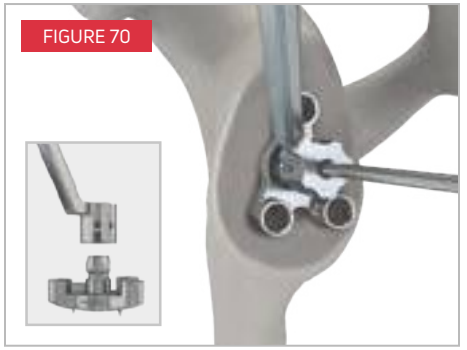


FIGURE 70



Place retractors around the glenoid to get optimal visualization of the glenoid face. Choose the appropriate Glenoid Sizer and snap to the self-retaining Drill Guide Handle. For a left shoulder the handle should be positioned to the left and conversely to the right for a right shoulder. (**FIGURE 67**)

With the Glenoid Sizer in position, the 2.4 mm Guide Wire is advanced approximately 15mm. (**FIGURE 68**)

Remove the Glenoid Sizer and advance the size 38 Cannulated Glenoid Reamer over the 2.4mm Guide Wire. Sequentially ream up to the corresponding Glenoid Sizing Trial. (**FIGURE 69**)

Select the Cannulated Drill Guide that corresponds to the Glenoid Sizer used to size the glenoid. Attach the Drill Guide Handle to the Cannulated Drill Guide and advance the assembly over the 2.4mm Guide Wire. (**FIGURE 70**)

NOTE: *Glenoid Reamer Handles are color coded to match the corresponding Trial Glenoids.*

NOTE: *The Cannulated Drill Guide - Small is to be used with the 38 and 42 Pegged Glenoid Trials and implants. The Cannulated Guide - Large is to be used with the 46, 50 and 54 Pegged Glenoid Trials and implants.*

NOTE: *Drill guides include spikes in the face to increase guide stability while drilling.*

CANNULATED DRILL GUIDE, SMALL
38 and 42mm GLENOID TRIALS and IMPLANT

CANNULATED DRILL GUIDE, LARGE
46, 50, and 54mm GLENOID TRIALS and IMPLANT

Cannulated Glenoid Preparation

Use the Cannulated Impactor to fully seat the Cannulated Drill Guide against the face of the glenoid. Using the Peripheral Drill, drill for the peripheral pegs, starting with the superior peg hole. Drill to the physical stop. (**FIGURE 71**)

Drill Guide Lugs are recommended and are inserted into the peripheral holes for rotational stability. (**FIGURE 72**)

Remove the Cannulated Drill Guide and to drill the central peg hole. The 5.8mm or 4.8mm Cannulated Center Drill is used to expand the center hole to its final size. Drill to the physical stop. (**FIGURE 73**)

NOTE: *Then 5.8mm Cannulated Center Drill creates a 1mm radial cement mantle. The 4.8mm Cannulated Center Drill will provide a slight interference fit with the bone.*

Place the corresponding Pegged Glenoid Trial into the prepared glenoid using the Glenoid Trial Inserter. (**FIGURE 74**) Ensure that the trial sits flush on the prepared glenoid surface. Proper glenoid preparation should result in a glenoid trial that does not "rock" in any direction — this indicates that the surface between the final pegged prosthesis and glenoid have an identical radius of curvature. Since the trial pegs are slightly undersized, some movement may be felt.

Non-Cannulated Glenoid Preparation

FIGURE 75

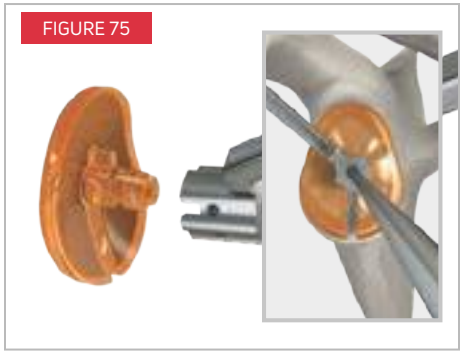


FIGURE 76

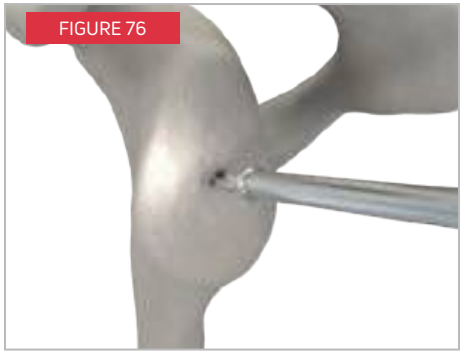


FIGURE 77

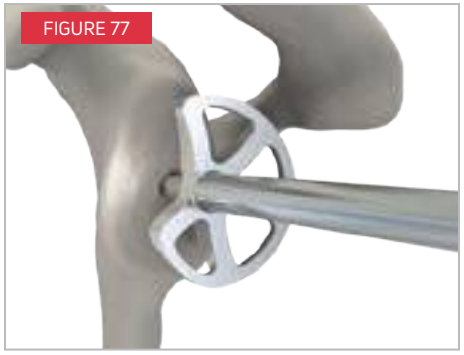


FIGURE 78

Choose the appropriate Glenoid Sizer and snap to the self-retaining Drill Guide Handle. For a left shoulder the handle should be positioned to the left and conversely to the right for a right shoulder.

With the Glenoid Sizer in position, the 2.4mm Guide Wire is advanced to create a short pilot hole for the Non- Cannulated Center Drill. (**FIGURE 75**)

Remove the Glenoid Sizer and handle. Advance the Non-Cannulated Center Drill into the pilot hole and drill to the physical stop. (**FIGURE 76**)

Insert the tip of the Non-Cannulated Reamer into the drill hole and sequentially ream up to the corresponding Glenoid Sizer. (**FIGURE 77**)

NON-CANNULATED DRILL GUIDE, SMALL
38 and 42mm GLENOID TRIALS and IMPLANT

NON-CANNULATED DRILL GUIDE, LARGE
46, 50, and 54mm GLENOID TRIALS and IMPLANT

Select the Non-Cannulated Drill Guide that corresponds to the Glenoid Sizer used to size the glenoid. Attach the Drill Guide Handle to the Non-Cannulated Drill Guide and insert into the drill hole created by the Non-Cannulated Center Drill. (**FIGURE 78**)

NOTE: *Glenoid Reamer Handles are color coded to match the corresponding Trial Glenoids.*

NOTE: *The Non-Cannulated Drill Guide - Small is to be used with the 38 and 42 Pegged Glenoid Trials and implants. The Non- Cannulated Guide - Large is to be used with the 46, 50 and 54 Pegged Glenoid Trials and implants.*

NOTE: *Drill guides include spikes in the face to increase guide stability while drilling.*

Non-Cannulated Glenoid Preparation

Use the Cannulated Impactor to fully seat the Non- Cannulated Drill Guide against the face of the glenoid. Using the Peripheral Drill, drill for the peripheral pegs, starting with the superior peg hole. Drill to the physical stop. (**FIGURE 79**)

Drill Guide Lugs are recommended and are inserted into the peripheral holes for rotational stability. (**FIGURE 80**)

Place the corresponding Pegged Glenoid Trial into the prepared glenoid using the Glenoid Trial Inserter. (**FIGURE 81**) Ensure that the trial sits flush on the prepared glenoid surface. Proper glenoid preparation should result in a glenoid trial that does not "rock" in any direction — this indicates that the surface between the final pegged prosthesis and glenoid have an identical radius of curvature. Since the trial pegs are slightly undersized, some movement may be felt.

NOTE: *Refer to the Turon® Modular Shoulder System Surgical Technique if the use of a Turon Pegged or Keeled Glenoid is required.*

Shoulder Trial Reduction

Humeral Head Trials from the Turon® Anatomic Shoulder System are available in five neutral and offset diameters (38mm, 42mm, 46mm, 50mm, and 54mm) in various head heights. These are used in conjunction with the Turon Hemi-Adaptor trial. Humeral Head Trials from the AltiVate® Anatomic Shoulder System are available in seven neutral and offset diameters (38mm, 40mm, 42mm, 46mm, 50mm, 54mm, 56mm) in various head heights. These are used in conjunction with the AltiVate Anatomic Hemi-Adaptor Trials. There are various Hemi-Adapter Trials due to the differences between the Turon Humeral Head Trials and the AltiVate Anatomic Humeral Head Trials. The compatibility of each Hemi-Adapter Trial with the Standard and Small Shell Trial Assemblies and Stem Implants is outlined in (**FIGURE 82, ON NEXT PAGE**).

The Turon Hemi-Adaptor Trial assembles to the Socket Shell Trial and Humeral Stem Implant by lining up the tabs of the Hemi-Adaptor Trial with the scallops of the Shell Trial or Implant. A clockwise turn of the Hemi-Adaptor Trial will lock it into the Shell Trial or Implant. The AltiVate Anatomic Hemi-Adapter Trials assemble the same way as the AltiVate Anatomic Humeral Neck Trials, by first attaching to the AltiVate Anatomic Humeral Head Trial then to the AltiVate Reverse Broach or Stem Implant. The 38x14mm and 40x14mm AltiVate Anatomic Hemi-Adapters have the same scallops as the Turon Hemi-Adapter Trial and similarly locks into the Shell Trial or Stem Implant. The Turon Humeral Head Trials assemble to the Turon Hemi-Adaptor Trial with a 3.5mm Hex Screwdriver. The AltiVate Anatomic Head Trials assemble to the AltiVate Anatomic Hemi-Adaptor Trial with a T-20 Torx Screwdriver.

NOTE: *The 38x14mm and 40x14mm AltiVate Anatomic Hemi-Adapter Trials are only compatible with the AltiVate Reverse® Small Shell Trial and Small Shell Implant.*

SHOULDER REDUCTION

After the appropriate Humeral Head Trial has been assembled to the Hemi-Adaptor Trial, reduce the shoulder by pushing laterally on the Humeral head Trial while internally rotating the arm until the Humeral Head Trial slides onto the Glenoid Trial. An appropriately-sized Humeral Head trial will translate approximately 50% of its diameter.

Figure 82: Hemi-Adapter Compatibility

		Standard Shell Turon®	Small Shell Turon®	AltiVate® Anatomic - Broach	AltiVate® Anatomic - Stem	AltiVate® Anatomic 38x14 & 40x14
STANDARD SHELL	 Broach			✓		
	 Standard Trial Assembly	✓				
	 Standard Stem	✓			✓	
SMALL SHELL	 Broach			✓		
	 Small Trial Assembly		✓			✓
	 Small Stem		✓		✓	✓

Humeral Stem Implant – Cementless Implantation

FIGURE 83

Remove trial components. Select the appropriately sized Humeral Stem. If using a cemented technique, note that the Humeral Stem Implant should be smaller than the final Humeral Broach size used to allow for an adequate cement mantle.

The bone graft window in the Standard Shell implant should be filled with bone graft, whether doing a cemented or cementless technique.

FIGURE 84

Assemble Retroversion Alignment Rod to the Trial/Implant Inserter and the Trial/Implant Inserter to the Implant. (**FIGURE 83**) Insert Implant into humerus and impact the strike plate to seat the Implant. (**FIGURE 84**) Disassemble the Inserter from the implant.

NOTE: *The Small Shell Trial/Implant Inserter has two separate knobs: one for the Trial Assembly and the other for implantation. Be sure to use the appropriate knob when inserting the Small Shell Implant. Tall knob = Trial, Short, Silver knob = Stem* (**FIGURE 85**)

FIGURE 85

Humeral Stem Implant Cementation

Insert the appropriately sized cement restrictor into the humeral canal, approximately 1.5 cm below the distal tip of the Humeral Stem implant. Brush, irrigate, and dry the humeral canal before bone cement is pressurized into the humeral canal. Mix the bone cement according to the manufacturer's instructions. Extrude the bone cement into the humeral canal by filling the humeral canal, distal to proximal, using a retrograde technique. This technique is critical to avoid embolization of the intramedullary humeral canal with debris such as air and bone marrow. Pressurize the bone cement using a pressurizing nozzle or a digit.

NOTE: *For the Standard Shell Implant, ensure that the bone graft window is filled with bone graft prior to insertion into cement-filled canal.*

Assemble and thread the Trial/Implant Inserter into the Humeral Stem Implant. A Retroversion Alignment Rod should then be threaded into the appropriate version hole (according to the desired amount of retroversion) of the Trial/Implant Inserter. When the bone cement has reached a dough-like consistency, the assembled Retroversion Alignment Rod should be used to orient the Humeral Stem into the humeral canal, and the Trial/Implant Inserter should be gently tapped with a surgical mallet to seat the implant. Disassemble the threaded knob of the Trial/Implant Inserter from the implant.

NOTE: *Remove any excess bone cement, focusing on the internal shell of the Standard Shell Stem Implant where the osteotome slots and poly snap feature are.*

Tip for Implant Seating: Use the Glenosphere Impactor to further seat the Standard Shell implant in the humerus prior to liner assembly. (**FIGURE 86**) Use the 32mm Humeral Socket Impactor to further seat the Small Shell Implant in the Humerus prior to liner assembly.

FIGURE 86

Hemi-Adaptor/Humeral Head Assembly

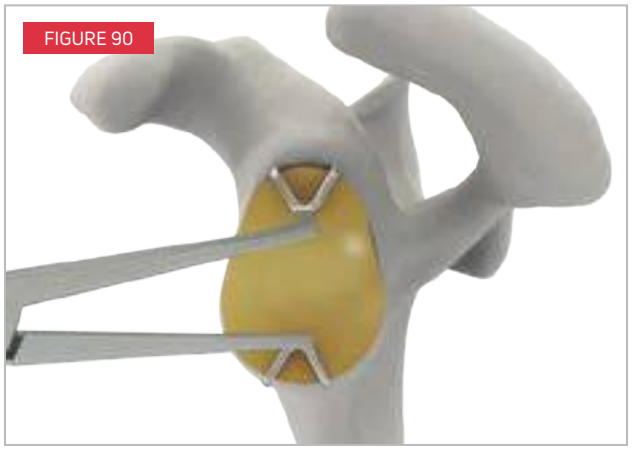
FIGURE 87

Select the appropriately-sized (small or standard) Adaptor implant and position it into the socket of Humeral Stem by aligning the tabs on the adaptor with the mating pockets on the stem socket. (**FIGURE 87**) Insert the retaining screw through the adaptor and tighten using the 45 in-lb Torque Limiting Driver Handle and 3.5mm Hex Driver. (**FIGURE 88**)

FIGURE 88

Select the appropriate Turon® or AltiVate® Anatomic Humeral Head implant. Position the humeral head onto a clean, dry Morse taper of Hemi-Adaptor, and seat it firmly using a gentle rotational movement. Assemble the Impactor Handle to the Humeral Head Impactor. Lightly impact the humeral head implant onto the Hemi-Adaptor implant using three to four firm taps. Pull on the implanted humeral head to confirm that it is locked onto the Hemi-Adaptor. If it is not seated properly, soft tissue impingement may be present.

Implantation



CEMENTING THE GLENOID IMPLANT

Remove the glenoid trial using the Glenoid Trial Inserter. A Toomey syringe with a catheter tip is filled with a single dose of Cobalt Bone Cement. The glenoid peg holes are then filled with cement. The cement should be in a doughy state when applied. (**FIGURE 89**)

Place the implant in the prepared bone by hand or by using the optional Glenoid Implant Inserter. (**FIGURE 90**)

38mm and 42mm
Peg Pattern

46mm, 50mm, 54mm
Peg Pattern

Thread the Glenoid Pusher Handle to the Glenoid Pusher. Align the Glenoid Pusher assembly so that it is in-line with the trajectory of the glenoid implant. Then lightly mallet the Glenoid Pusher handle until the implant is sits flush against the bone. (**FIGURE 91**)

The trilobes on the peripheral pegs allow for a DROP AND GO™ technique that does not require continuous pressure on the implant while the cement cures.

The Glenoid Pusher can also be used to maintain pressure on the component while the cement cures.

NOTE: *Please refer to Turon® Modular Shoulder System Surgical Technique if the use of a Turon Keeled Glenoid in required.*

FINAL REDUCTION AND CLOSURE

Reduce the glenohumeral joint and again ensure that the head translates approximately fifty percent of its diameter. Thoroughly irrigate the joint and remove loose fragments of bone or cement.

Fracture Treatment

The Humeral Stem implant can be used as a hemi arthroplasty or reverse arthroplasty prosthesis for fracture treatment. The Humeral Stem Implant has suture holes placed within the rim of the stem, through the fins and also has a cerclage hole. Any of these can be used for sutures to assist in properly fixating tuberosities.

NOTE: *If cementing, make sure the suture holes on the implant shell are cleared of cement.*

* Standard Shell only

[1] Data on file at DJO. Laboratory testing does not necessarily indicate clinical performance.

[2] Beck et al. Bone response to load bearing percutaneous osseointegrated implants for amputees: a sheep amputation model. Poster 2085 at the 57th Annual Meeting of the Orthopaedic Research Society. 2011.

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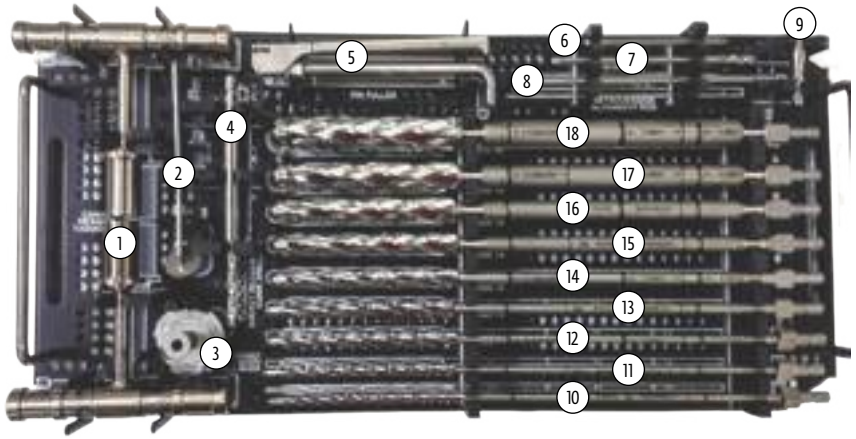

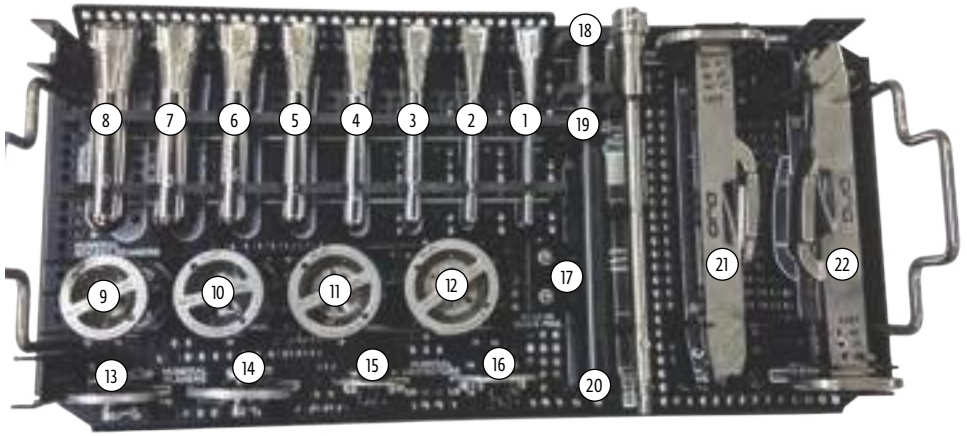

AltiVate Reverse® Humeral Preparation – Top Tray

	Part No.	Description
1	803-05-257	Detachable T-Handle (x2)
2	804-06-033	Extramedullary Osteotomy Guide
3	804-06-061	Socket Sizer/Drill Guide
4	804-06-062	Socket Reamer Guide Drill
5	800-01-035	Pin Extractor
6	800-01-338	Quick Release Bone Pin (x2)
7	801-01-020	3.2mm Drill Bit (x2)
8	803-01-057	Retroversion Alignment Rod
9	800-01-339	Pin Driver

	Part No.	Description
10	804-06-015	Humeral Canal Reamer 5mm
11	804-06-016	Humeral Canal Reamer 6mm
12	804-06-018	Humeral Canal Reamer 8mm
13	804-06-020	Humeral Canal Reamer 10mm
14	804-06-022	Humeral Canal Reamer 12mm
15	804-06-024	Humeral Canal Reamer 14mm
16	804-06-026	Humeral Canal Reamer 16mm
17	804-06-028	Humeral Canal Reamer 18mm
18	804-06-030	Humeral Canal Reamer 20mm

AltiVate Reverse® Humeral Preparation – Bottom Tray

	Part No.	Description
1	804-06-036	Humeral Broach 6mm
2	804-06-038	Humeral Broach 8mm
3	804-06-040	Humeral Broach 10mm
4	804-06-042	Humeral Broach 12mm
5	804-06-044	Humeral Broach 14mm
6	804-06-046	Humeral Broach 16mm
7	804-06-048	Humeral Broach 18mm
8	804-06-050	Humeral Broach 20mm
9	804-06-005	Socket Reamer Small PF (Press-Fit)
10	804-06-006	Socket Reamer Small CM (Cemented)
11	804-06-007	Socket Reamer Standard PF (Press-Fit)

	Part No.	Description
12	804-06-008	Socket Reamer Standard CM (Cemented)
13	804-06-053	Humeral Planer Small
14	804-06-054	Humeral Planer Large
15	804-06-063	Humeral Protector Small
16	804-06-064	Humeral Protector Large
17	804-06-060	Humeral Socket Reamer Removable Guide Pin (x2)
18	804-06-059	Socket Reamer/Planer Guide Pin
19	804-06-095	Trialing Guide Pin
20	804-06-002	Socket Reamer/Planer Driver Sleeve
21	804-06-001	Socket Reamer/Planer Driver
22	804-06-034	Broach Handle (x2)

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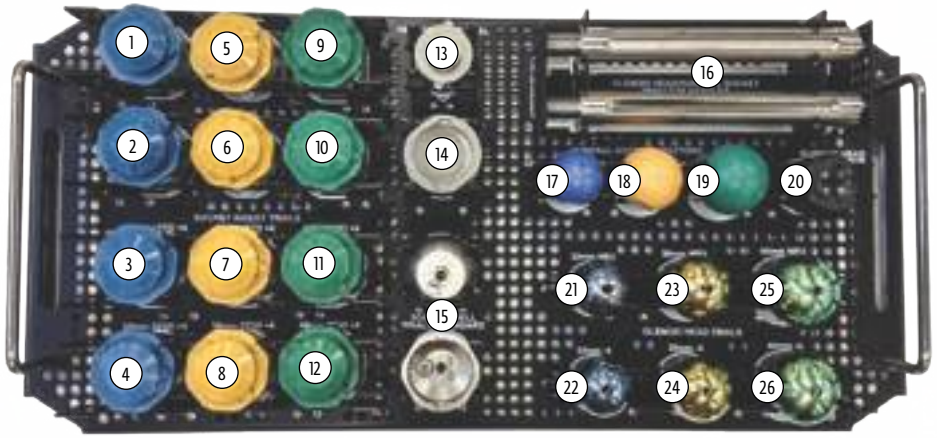
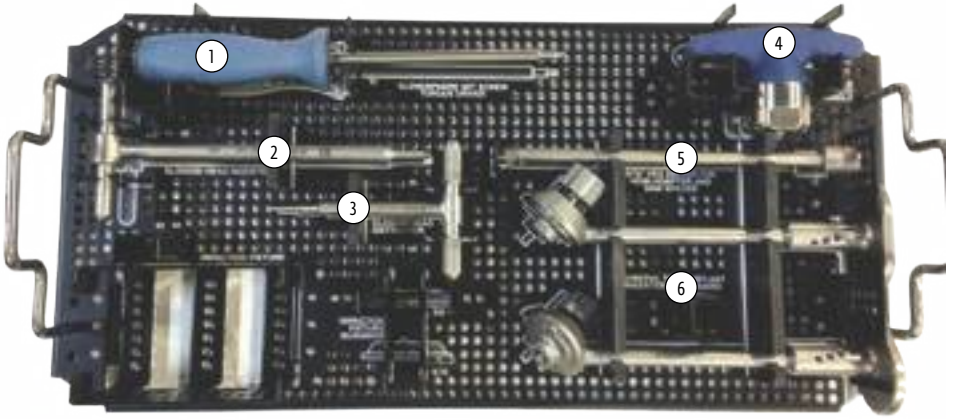


AltiVate Reverse® Humeral Trialing – Top Tray

	Part No.	Description
1	804-02-468	Socket Insert Trial 32mm Standard
2	804-02-471	Socket Insert Trial 32mm Semiconstrained
3	804-02-460	Socket Insert Trial 32mm Standard +4
4	804-02-461	Socket Insert Trial 32mm Semiconstrained +4
5	804-02-469	Socket Insert Trial 36mm Standard
6	804-02-472	Socket Insert Trial 36mm Semiconstrained
7	804-02-462	Socket Insert Trial 36mm Standard +4
8	804-02-463	Socket Insert Trial 36mm Semiconstrained +4
9	804-02-470	Socket Insert Trial 40mm Standard
10	804-02-473	Socket Insert Trial 40mm Semiconstrained
11	804-02-464	Socket Insert Trial 40mm Standard +4
12	804-02-465	Socket Insert Trial 40mm Semiconstrained +4
13	804-02-072	Hemi Adapter Trial

	Part No.	Description
14	804-02-071	8mm Spacer Trial
15	804-06-152 804-06-252	Socket Shell Trial Standard (x2)
16	800-01-018	Glenoid Head/Humeral Socket Impactor Handle (x2)
17	804-02-002	Humeral Socket Impactor 32mm
18	804-02-036	Humeral Socket Impactor 36mm
19	804-02-037	Humeral Socket Impactor 40mm
20	804-03-001	Glenoid Head Impactor
21	804-03-042	Glenoid Head Trial 32mm Neutral
22	804-03-043	Glenoid Head Trial 32mm -4
23	804-03-044	Glenoid Head Trial 36mm Neutral
24	804-03-045	Glenoid Head Trial 36mm -4
25	804-03-046	Glenoid Head Trial 40mm Neutral
26	804-03-047	Glenoid Head Trial 40mm -4



AltiVate Reverse® Humeral Trialing – Bottom Tray

	Part No.	Description
1	804-06-009	Torque Driver for Glenosphere Set Screw
2	804-03-051	Glenoid Head Inserter/Impactor
3	804-02-035	Glenoid Head Distractor

	Part No.	Description
4	801-01-662	Torque Limiting T Handle
5	804-02-075	5/16" Hex Socket Driver for Hemi Adapter and 8mm spacer
6	804-06-056	Humeral Trial/Implant Inserter Standard

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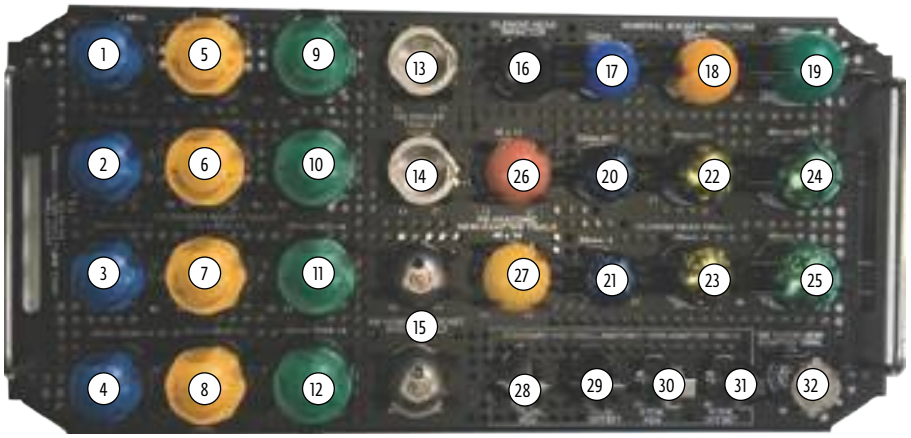

AltiVate Reverse® Small Shell Top Tray

	Part No.	Description
1	804-06-200	Small Socket Insert Trial 32mm Neutral
2	804-06-201	Small Socket Insert Trial 32mm Semi-constrained
3	804-06-202	Small Socket Insert Trial 32mm Neutral +4
4	804-06-203	Small Socket Insert Trial 32mm Semi-constrained +4
5	804-06-204	Small Socket Insert Trial 36mm Neutral
6	804-06-205	Small Socket Insert Trial 36mm Semi-constrained
7	804-06-206	Small Socket Insert Trial 36mm Neutral +4
8	804-06-207	Small Socket Insert Trial 36mm Semi-constrained +4
9	804-06-208	Small Socket Insert Trial 40mm Neutral
10	804-06-209	Small Socket Insert Trial 40mm Semi-constrained
11	804-06-210	Small Socket Insert Trial 40mm Neutral +4

	Part No.	Description
12	804-06-211	Small Socket Insert Trial 40mm Semi-constrained +4
13	804-06-218	Small Spacer Trial, 8mm
14	804-06-219	Small Spacer Trial, 12mm
15	804-06-051	Small Humeral Socket Shell Trial (x2)
16	804-03-001	Glenoid Head Impactor
17	804-02-002	Humeral Socket Impactor, 32mm
18	804-02-036	Humeral Socket Impactor, 36mm
19	804-02-037	Humeral Socket Impactor, 40mm
20	804-03-042	Glenoid Head Trial 32mm Neutral
21	804-03-043	Glenoid Head Trial 32mm -4
22	804-03-044	Glenoid Head Trial 36mm Neutral

	Part No.	Description
23	804-03-045	Glenoid Head Trial 36mm -4
24	804-03-046	Glenoid Head Trial 40mm Neutral
25	804-03-047	Glenoid Head Trial 40mm -4
26	804-06-223	Small Hemi-Adapter Trial, Anatomic, 38x14mm
27	804-06-224	Small Hemi-Adapter Trial, Anatomic, 40x14mm
28	804-06-221	Hemi-Adapter Trial, Anatomic, Broach, Neutral
29	804-06-222	Hemi-Adapter Trial, Anatomic, Broach, Offset
30	804-06-216	Hemi-Adapter Trial, Anatomic, Stem, Neutral
31	804-06-217	Hemi-Adapter Trial, Anatomic, Stem, Neutral
32	804-06-220	Small Hemi-Adapter Trial, Turon

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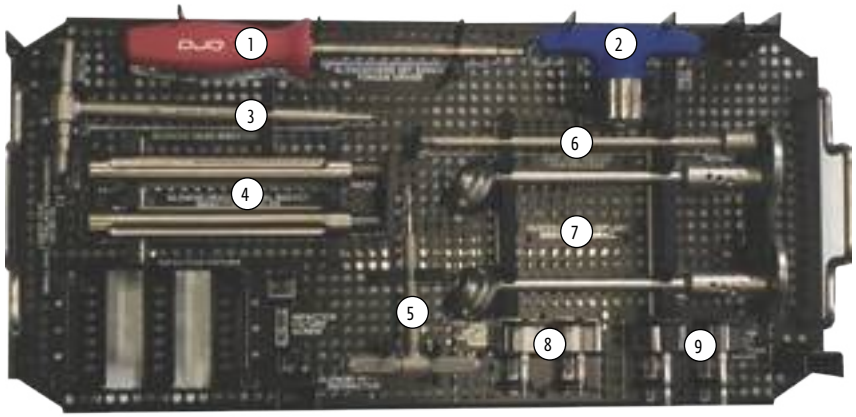

AltiVate Reverse® Small Shell Bottom Tray

	Part No.	Description
1	804-06-009	22.5 IN-LB TORQUE-LIMITING DRIVER FOR GLENOSPHERE SET SCREW
2	801-01-662	45 in-lb Torque-Limiting T-Handle
3	804-03-051	GLENOID HEAD INSERTER
4	800-01-018	GLENOID HEAD/HUMERAL SOCKET IMPACTOR HANDLE (X2)
5	804-03-055	Glenoid Head Distractor
6	804-02-075	5/16" Hex Socket Driver for Spacer Screws
7	804-06-055	SMALL HUMERAL STEM TRIAL/IMPLANT INSERTER (X2)
8	804-06-157	SMALL HUMERAL STEM IMPLANT INSERTER KNOB (X2)
9	804-06-057	SMALL HUMERAL STEM TRIAL INSERTER KNOB (X2)

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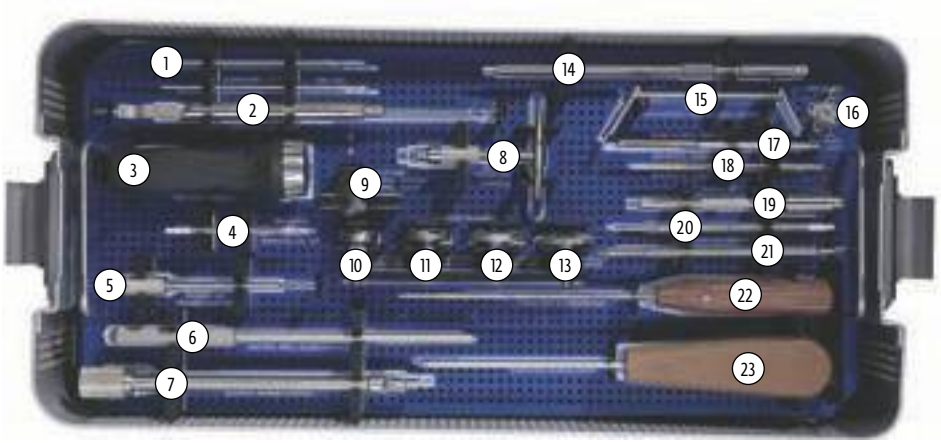
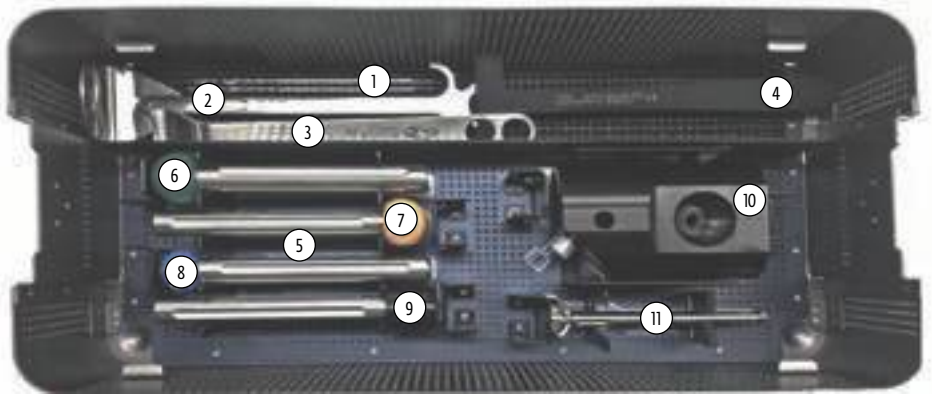


RSP® Glenoid – Top Tray

	Part No.	Description
1	1395-1025	2.5mm Drill Bit (x2)
2	804-03-003	Depth Gauge
3	803-05-163	Black Ratchet Handle
4	804-03-008	RSP 6.5mm Guide Tap
5	804-03-020	Power Driver Adaptor
6	804-03-037	Central Drill Guide Handle
7	804-03-011	Glenoid Reamer Driver
8	804-03-019	Quick-Coupling T-Handle
9	804-03-036	2.5mm Central Drill Guide
10	804-03-012	Glenoid Reamer, Starter
11	804-03-013	Glenoid Reamer, Small
12	804-03-014	Glenoid Reamer, Medium

	Part No.	Description
13	804-03-015	Glenoid Reamer, Large
14	803-05-167	3.5mm Hex Driver
15	804-03-007	2.5mm / 3.2mm Angled Drill Guide
16	804-03-048	Two Piece Drill Guide
17	804-03-017	5.0mm Bone Screw Tap
18	804-03-018	3.5mm Bone Screw Tap
19	804-03-016	Manual Tap Driver Adaptor
20	804-03-021	2.5mm Power Hex Driver
21	804-03-022	3.5mm Power Hex Driver
22	1395-1030	Small 2.5mm Hex Screwdriver
23	801-01-042	Large 3.5mm Hex Screwdriver



RSP® Glenoid – Bottom Tray

	Part No.	Description
1	804-03-049	4.0mm Drill Bit (x2)
2	804-00-098	Deltoid Retractor
3	804-00-099	Humeral Retractor
4	804-00-097	Glenoid Retractor
5	800-01-018	Impactor Handle (x4)
6	804-02-037	40mm Humeral Socket Impactor

	Part No.	Description
7	804-02-036	36mm Humeral Socket Impactor
8	804-02-002	32mm Humeral Socket Impactor
9	804-03-001	Glenoid Head Impactor
10	804-03-053	Humeral Stem / Socket Impaction Fixture
11	804-03-056	32mm Baseplate Rim Planer

AltiVate® Extremity Solutions

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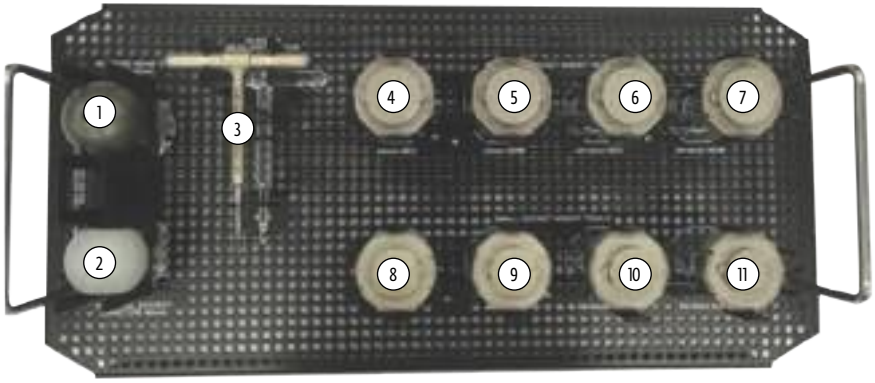
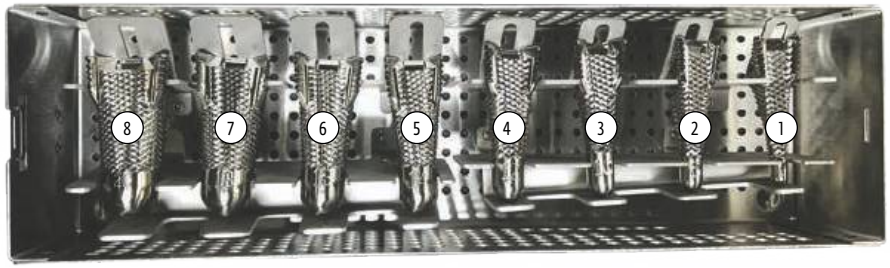


AltiVate Reverse® 44mm Tray

	Part No.	Description
1	804-04-048	Glenoid Head Trial, 44mm
2	804-02-068	Humeral Socket Impactor, 44mm
3	804-03-055	Glenoid Head Distractor
4	804-02-066	Humeral Socket Insert Trial 44mm Neutral
5	804-02-067	Humeral Socket Insert Trial 44mm Semi-constrained
6	804-02-466	Humeral Socket Insert Trial 44mm Neutral +4
7	804-02-467	Humeral Socket Insert Trial 44mm Semi-constrained +4
8	804-06-212	AltiVate Reverse Small Socket Insert Trial 44mm Neutral
9	804-06-213	AltiVate Reverse Small Socket Insert Trial 44mm Semi-constrained
10	804-06-214	AltiVate Reverse Small Socket Insert Trial 44mm Neutral +4
11	804-06-215	AltiVate Reverse Small Socket Insert Trial 44mm Semi-constrained +4



AltiVate Reverse® Short Broach Tray

	Part No.	Description
1	804-06-106	Short Humeral Broach, 6mm
2	804-06-108	Short Humeral Broach, 8mm
3	804-06-110	Short Humeral Broach, 10mm
4	804-06-112	Short Humeral Broach, 12mm
5	804-06-114	Short Humeral Broach, 14mm
6	804-06-116	Short Humeral Broach, 16mm
7	804-06-118	Short Humeral Broach, 18mm
8	804-06-120	Short Humeral Broach, 20mm

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IMPLANT PART NUMBERS

AltiVate Reverse® Humeral Stem, Short

Part No.	Size	Length
530-06-048	6	48mm
530-08-048	8	48mm
530-10-048	10	48mm
530-12-048	12	48mm
530-14-048	14	48mm
530-16-048	16	48mm
530-18-048	18	48mm

AltiVate Reverse® Humeral Stem, Standard

Part No.	Size	Length
530-06-108	6	108mm
530-08-108	8	108mm
530-10-108	10	108mm
530-12-108	12	108mm
530-14-108	14	108mm
530-16-108	16	108mm
530-18-108	18	108mm

AltiVate Reverse® Humeral Stem, Revision

Part No.	Size	Length
530-06-175	6	175mm
530-08-175	8	175mm
530-10-175	10	175mm
530-12-175	12	175mm
530-14-175	14	175mm
530-16-175	16	175mm
530-06-220	6	220mm
530-08-220	8	220mm
530-10-220	10	220mm

AltiVate Reverse® Humeral Stem, Small Shell Short

Part No.	Size	Length
533-06-048	6	48mm
533-08-048	8	48mm
533-10-048	10	48mm
533-12-048	12	48mm

AltiVate Reverse® Humeral Stem, Small Shell

Part No.	Size	Length
533-06-108	6	108mm
533-08-108	8	108mm
533-10-108	10	108mm
533-12-108	12	108mm

AltiVate Reverse® Humeral Stem, Small Shell Revision

Part No.	Size	Length
533-06-175	6	175mm
533-08-175	8	175mm
533-10-175	10	175mm
533-12-175	12	175mm
533-06-220	6	220mm
533-08-220	8	220mm
533-10-220	10	220mm

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IMPLANT PART NUMBERS

Socket Inserts, Standard Poly

Part No.	Size	Thickness	Constraint
508-00-032	32	Standard	
508-00-036	36	Standard	
508-00-040	40	Standard	
508-00-044	44	Standard	
508-00-432	32	+4	
508-00-436	36	+4	
508-00-440	40	+4	
508-00-444	44	+4	
508-01-032	32	Standard	Semi
508-01-036	36	Standard	Semi
508-01-040	40	Standard	Semi
508-01-044	44	Standard	Semi
508-01-432	32	+4	Semi
508-01-436	36	+4	Semi
508-01-440	40	+4	Semi
508-01-444	44	+4	Semi

Socket Inserts, E+ Poly

Part No.	Size	Thickness	Constraint
509-00-032	32	Standard	
509-00-036	36	Standard	
509-00-040	40	Standard	
509-00-044	44	Standard	
509-00-432	32	+4	
509-00-436	36	+4	
509-00-440	40	+4	
509-00-444	44	+4	
509-01-032	32	Standard	Semi
509-01-036	36	Standard	Semi
509-01-040	40	Standard	Semi
509-01-044	44	Standard	Semi
509-01-432	32	+4	Semi
509-01-436	36	+4	Semi
509-01-440	40	+4	Semi
509-01-444	44	+4	Semi

Small Socket Inserts, Standard Poly

Part No.	Size	Thickness	Constraint
508-02-032	32	Standard	
508-02-036	36	Standard	
508-02-040	40	Standard	
508-02-044	44	Standard	
508-02-432	32	+4	
508-02-436	36	+4	
508-02-440	40	+4	
508-02-444	44	+4	
508-03-032	32	Standard	Semi
508-03-036	36	Standard	Semi
508-03-040	40	Standard	Semi
508-03-044	44	Standard	Semi
508-03-432	32	+4	Semi
508-03-436	36	+4	Semi
508-03-440	40	+4	Semi
508-03-444	44	+4	Semi

Small Socket Inserts, E+ Poly

Part No.	Size	Thickness	Constraint
509-02-032	32	Standard	
509-02-036	36	Standard	
509-02-040	40	Standard	
509-02-044	44	Standard	
509-02-432	32	+4	
509-02-436	36	+4	
509-02-440	40	+4	
509-02-444	44	+4	
509-03-032	32	Standard	Semi
509-03-036	36	Standard	Semi
509-03-040	40	Standard	Semi
509-03-044	44	Standard	Semi
509-03-432	32	+4	Semi
509-03-436	36	+4	Semi
509-03-440	40	+4	Semi
509-03-444	44	+4	Semi

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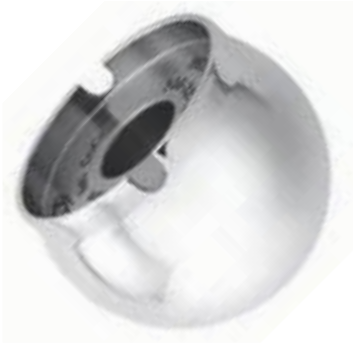

Glenospheres with Retaining Screw

Part No.	Size	Offset
508-32-101	32	N
508-32-103	32	-4
508-36-101	36	N
508-36-103	36	-4
508-40-101	40	N
508-40-103	40	-4
508-44-101	44	N
508-00-001		Screw

Glenoid Baseplate

Part No.	Coating
508-32-104	HA/3D MATRIX
508-32-204	P[2]

Glenoid Baseplate Locking Bone Screws

Part No.	Size	Length
506-03-114	5mm	14mm
506-03-118	5mm	18mm
506-03-122	5mm	22mm
506-03-126	5mm	26mm
506-03-130	5mm	30mm
506-03-134	5mm	34mm
506-03-138	5mm	38mm

Glenoid Baseplate Nonlocking Bone Screws

Part No.	Size	Length
506-02-114	3.5mm	14mm
506-02-116	3.5mm	16mm
506-02-118	3.5mm	18mm
506-02-120	3.5mm	20mm
506-02-122	3.5mm	22mm
506-02-124	3.5mm	24mm
506-02-126	3.5mm	26mm
506-02-128	3.5mm	28mm
506-02-130	3.5mm	30mm
506-02-132	3.5mm	32mm
506-02-134	3.5mm	34mm
506-02-136	3.5mm	36mm
506-02-138	3.5mm	38mm

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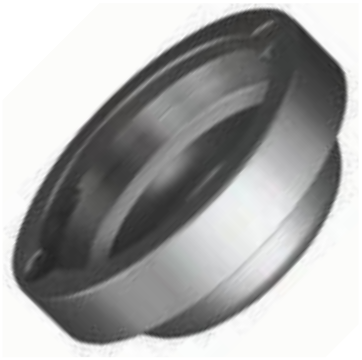
IMPLANT PART NUMBERS



Metal Spacers

Part No.	Description
510-08-000	Standard +8mm Spacer & Screw
510-08-001	Spacer Replacement Screw
533-08-000	Small +8mm Spacer and Screw
533-12-000	Small +12mm Spacer and Screw

Hemi-Adaptors

Part No.	Description
510-99-000	Standard Hemi-Adaptor
510-99-001	Hemi-Adaptor Replacement Screw
533-01-002	Small Shell Hemi-Adaptor

AltiVate® Anatomic Humeral Heads

Part No.	Size	Offset
520-38-214	38x14	Standard
520-40-214	40x14	Standard
520-40-216	40x16	Standard
520-42-216	42x16	Standard
520-42-218	42x18	Standard
520-46-216	46x16	Standard
520-46-218	46x18	Standard
520-50-218	50x18	Standard
520-50-220	50x20	Standard
520-54-218	54x18	Standard
520-54-220	54x20	Standard

Part No.	Size	Offset
520-56-222	56x22	Standard
520-40-316	40x16	Offset
520-42-316	42x16	Offset
520-42-318	42x18	Offset
520-46-316	46x16	Offset
520-46-318	46x18	Offset
520-50-318	50x18	Offset
520-50-320	50x20	Offset
520-54-318	54x18	Offset
520-54-320	54x20	Offset
520-56-322	56x22	Offset

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IMPLANT PART NUMBERS

AltiVate® Anatomic
Drop-and-Go™ E+ Glenoids

Part No.	Size	Poly Type
521-07-238	38	E+
521-07-242	42	E+
521-07-246	46	E+
521-07-250	50	E+
521-07-254	54	E+

AltiVate® Anatomic
Drop-and-Go™ Glenoids

Part No.	Size	Poly Type
520-07-238	38	Standard
520-07-242	42	Standard
520-07-246	46	Standard
520-07-250	50	Standard
520-07-254	54	Standard

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