Epoca Shoulder Arthroplasty System – Stem and Glenoid.

Components for degenerative and posttraumatic conditions.

Technique Guide

SYNTHES®

www.synthes.com

Table of Contents

Warning
This description alone does not provide sufficient background for direct use of the product. Instruction by a surgeon experienced in handling this product is highly recommended.

Epoca Shoulder Arthroplasty System.
Anatomic reconstruction of the proximal humerus.

RH Resurfacing Head

The Epoca resurfacing head is intended for minimally invasive treatment of early stage arthritis or other arthropathies with cartilage damage.

- Thin surface allows for minimum bone removal
- Anatomic reconstruction of articulating surface
- Stable and bone sparing crown fixation
- TiNb coated version for nickel sensitive patients

Stem for Fractures and Degenerative Conditions

Head

- Height proportional to radius
- Anatomic design
- Can be adjusted for medial and posterior fit
- TiNb coated version for nickel sensitive patients

Stem

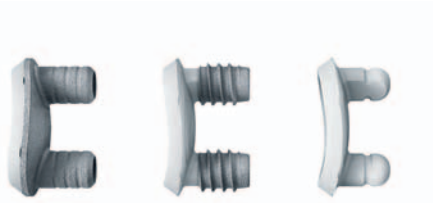
The Epoca Shoulder Arthroplasty system aims to restore glenohumeral kinematics in fractures and degenerative cases. The Epoca implant facilitates anatomic reconstruction of the proximal humerus.

- Anatomic design mimics contour of the medial calcar and medullary canal
- Non-protruding lateral design reduces risk of damage to the insertion facet of the supraspinatus tendon
- Medial and lateral holes in the stem allow for stable reattachment of the tuberosities
- Available in a variety of diameters and lengths, L and XL stems for revision
- Titanium for nickel sensitive patients

Eccenter Disc

– Allows medial and posterior offset adjustments
– Independent adjustment of the head vs. shaft
– Press-fit assembly outside the patient

Glenoid



The Epoca shoulder prosthesis is intended for use as a hemi- or total shoulder replacement

– Ensures congruent glenohumeral implant surfaces to achieve normal range of motion
– Reduced size and beveled rim for normal mobility and reduced risk of impingement
– Hybrid application with shell screws
– Cementless application with metal-back glenoid

Reco Glenoid

The Epoca Reco glenoid reconstruction device is intended to reestablish a stable fulcrum in order to prevent antero-superior subluxation of the humeral head.

Indications and Contraindications

Indications
– Advanced joint destruction resulting from degenerative, posttraumatic, rheumatoid arthritis, tumors and other conditions

Contraindications
– Infections, acute or chronic, local or systemic
– Severe muscular, neurological or vascular deficiencies, which compromise the affected extremity
– Destruction of bone or poor bone quality which may affect stability of the implant
– Any concomitant disease which may compromise the function of the implant
– Any other pathology which needs treatment priority

Conditions which can adversely affect joint replacement success
– Severe osteoporosis
– Severe deformities, congenital dislocation
– Allergic reaction to one of the used materials
– Local tumors of the bone
– Systemic and metabolic disorders
– History of infectious disease or falls
– Drug or alcohol addiction or abuse
– Obesity
– High level of physical activity, involving shocks and shaking in which the prosthesis is subject to pounding and/or excessive strains (e.g.: heavy physical labor, repetitive stress from sports, etc.)

Clinical Case

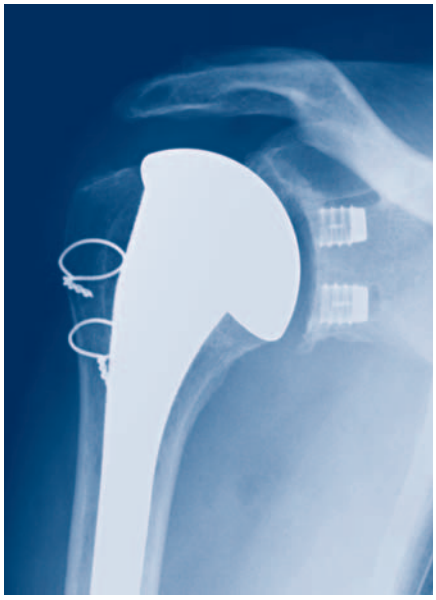
Male patient, 74 years old
Omarthrosis, right shoulder

Preoperative

AP view

Axillary view

Postoperative



AP view

Lateral anterior view

Preoperative Planning

Complete the preoperative radiographic assessment with standard AP, lateral and axillary views. A CT scan is required when an axillary view is not optimal, i.e. when more information about glenoid version and/or erosion is required.

An AP view of the contralateral humerus is helpful to estimate the size of the prosthetic head and stem.

Place the template on the AP view of the contralateral humerus to estimate the head and stem size. Then, draw the outer contour of the proximal humerus and the implant on transparent paper or on an electronic support using a computer assisted planning tool.

Flip the image horizontally and superimpose it on the pathological side. Determine the required corrections.

Preoperative planning for glenoid replacement
When planning a glenoid replacement procedure, axial CT scan views are recommended in order to assess the amount of posterior erosion and retroversion of the glenoid. This will be important to determine the amount of anterior reaming that will be necessary to correct the retroversion.

A normal glenoid has a retroversion ranging between 5° and 10°, and needs to be corrected in order to obtain stable joint kinematics. Furthermore, the inclination of the glenoid in the frontal plane requires adjustment in order to avoid subacromial impingement and/or inferior instability.

Note: Refer to the contralateral side to compare the degree of superior and inferior glenoid erosion.

Additionally, a CT-based three-dimensional reconstruction of the glenoid (with the removal of the humeral head from the 3-D model) could help to estimate the shape and size of glenoid osteophytes. These 3-D images are frequently beneficial when planning resection of the osteophytes and positioning of the implant (finding the spinning point).

Patient Positioning

Position the patient in a modified beach-chair position.

Avoid hyperextension and lateral tilting of the cervical spine in order to prevent tension on the brachial plexus.

Ensure that the patient's arm is freely extendable.

Implantation of the Humeral Component

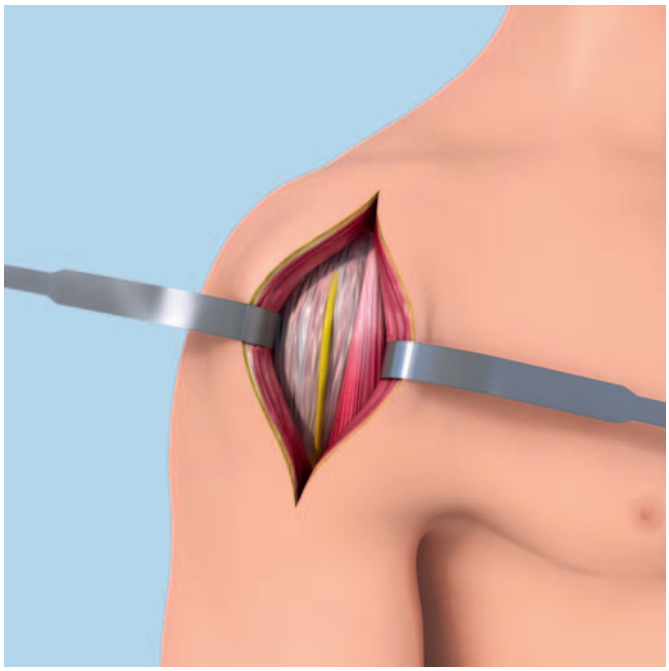
1

Approach [1]

Standard deltopectoral approach
Start the incision over the acromioclavicular joint and extend it 8 cm inferior over the anterior deltoid, lateral to the deltopectoral groove. Alternatively follow Langer's skin tension lines starting from the acromioclavicular joint.

Open the fascia over the deltopectoral groove and identify the cephalic vein. Retract the deltoid with the cephalic vein laterally, and the pectoralis major medially.

Incise the clavipectoral fascia and expose the subscapularis tendon.

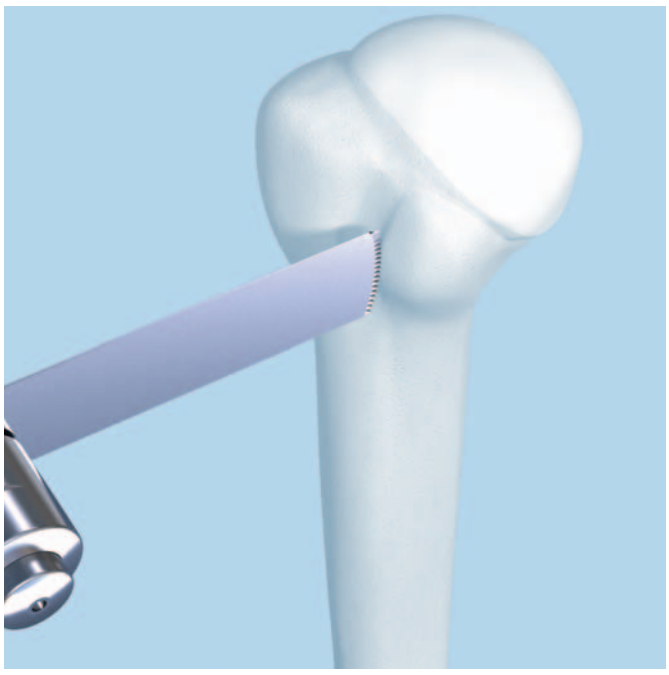


2

Expose joint

The classic approach to the joint is via detachment of the subscapularis. This can be done either by dividing the tendon, or by detaching the tendon from its insertion or via osteotomy of the lesser tuberosity. Alternatively a lesser tuberosity approach can be used, which offers a bone-to-bone healing.

Lesser tuberosity osteotomy approach
Expose and transect the long head of the biceps tendon at the proximal end of the bicipital groove. Suture the biceps tendon to the pectoralis major tendon with simple sutures. Expose the upper border of the subscapularis tendon, the bicipital groove, and the lower border of the subscapularis muscle. Precise exposure of these structures is critical. Hold the oscillating saw against the deepest point in the bicipital groove. Internally rotate the arm. Incline the saw blade in an anterior direction until it touches the posterior rim of the bicipital groove. Make a cut approximately 8 mm deep. Break the remaining bone bridge using a 15 mm broad chisel with a slightly rotating movement. The lesser tuberosity will invariably break along the anatomic neck, thus including the entire insertion of the subscapularis tendon and muscle. Pass two stay sutures through the subscapularis tendon, close to the tendon-bone junction.



[1] see Hoppenfeld et al., 2–8.

Tendon off bone approach
Detach the subscapularis tendon sharply from its insertion at the lesser tuberosity. Secure the tendon with stay sutures for later transosseous reinsertion.

Tendon transection approach
Expose and incise the subscapularis tendon leaving a 1 cm rim of tendon attached to the lesser tuberosity. Take into account that a stable tendon-to-tendon suture is required at the end of the procedure. Resection of anterior osteophytes and osteotomy of the humeral head along a 45° plane can result in damage to a fair amount of the original tendon insertion, which may leave a thin and inconsistent lateral tendon stump for reattachment.

Z-lengthenings are rarely indicated and should be reserved for special circumstances. The main disadvantage of Z-lengthenings is thinning and subscapularis insufficiency.

Adduct, extend and externally rotate the arm to expose the inferior capsule. Detach the inferior capsule close to the humerus as external rotation increases.

Remove the osteophytes around the anatomic neck with a rongeur or a chisel. Avoid excessive osteophyte removal. Any remaining osteophytes are best removed after trial prosthesis implantation.

3

Release subscapularis tendon and muscle

The goal of releasing the subscapularis is to restore external rotation and dynamic muscle action in order to stabilize and mobilize the joint.

Retract the proximal humerus dorsally with a ring retractor (Fukuda type of retractor). Identify the axillary nerve. Resect the anterior capsule. Release the fibrous bands that may tether the upper tendinous rim of the subscapularis to the base of the coracoid. Release the inferior capsule in line with the lower muscle fibers of the subscapularis (be cautious not to injure the axillary nerve, which runs at 90° to this capsular cut). Carefully release the bursal reflexion anterior to the subscapularis; take care to avoid injury to the two motor branches innervating the subscapularis.

Release the supraspinatus, the infraspinatus and the teres-minor

The postero-superior cuff is released by resection of the tethering posterior and superior capsule. Expose the posterior capsule by holding the humerus in neutral rotation and opening the joint space with a humeral ring-spreader or a conventional AO laminar spreader. Resect a strip of the posterior and superior capsule close to the glenoid rim until muscle fibers of the supraspinatus, the infraspinatus and the teres-minor are visible. When hemiarthroplasty is planned, the labrum is best retained for stability reasons. When total joint replacement is planned, the entire labrum can be resected, which facilitates the release and enlarges the exposure of the glenoid.

In spite of capsular resection, posterior instability does not occur provided that the dynamic stabilizers are free to work, i.e. have been fully released.

Release of the inferior capsule
The inferior gleno-humeral ligament can be detached from the glenoid rim or the labrum as required. Consider that the inferior capsule was previously detached from the humeral side. However, bifocal detachment is required when abduction contracture is severe.

Note: Be sure to protect the axillary nerve while medially detaching the capsule.

Expose the proximal humerus for further preparation
Expose the humeral head by placing two blunt Hohmann retractors behind the humeral head. Bring the arm in adduction, external rotation and extension. Should the exposure still be insufficient, release the proximal centimeter of the pectoralis major tendon and the proximal one-third of the latissimus dorsi tendon.

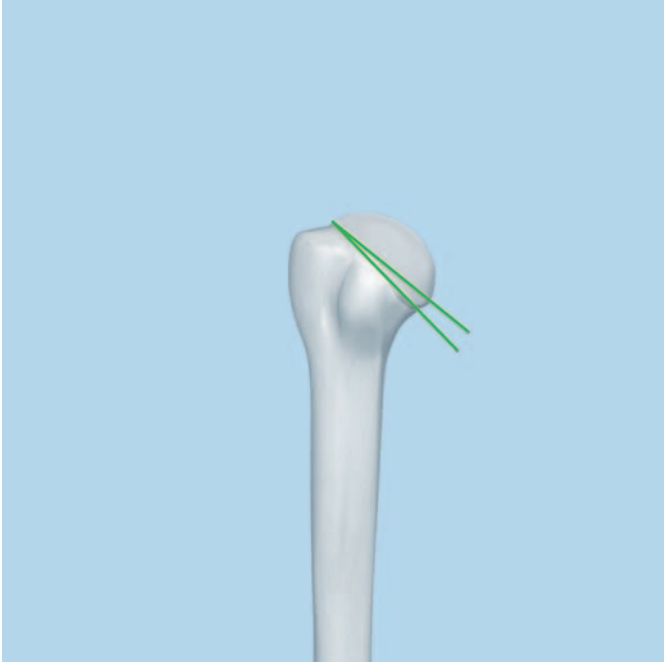
4

Perform initial resection of humeral head

Identify the anatomic neck line and the most medial insertion line of the supraspinatus. Start the osteotomy at this location. Aim for a resection which ends a few millimeters above the anatomic neck line medially.

A second cut will be performed later using an intramedullary aiming guide.

Note: It is important to start at the most medial insertion line of the supraspinatus. If the osteotomy does not start at this precise landmark the anatomic quality of the reconstruction will be compromised.



5

Select trial head size

Instruments

E5114-40 – E5114-54	Trial Heads Epoca, sizes 40 to 54

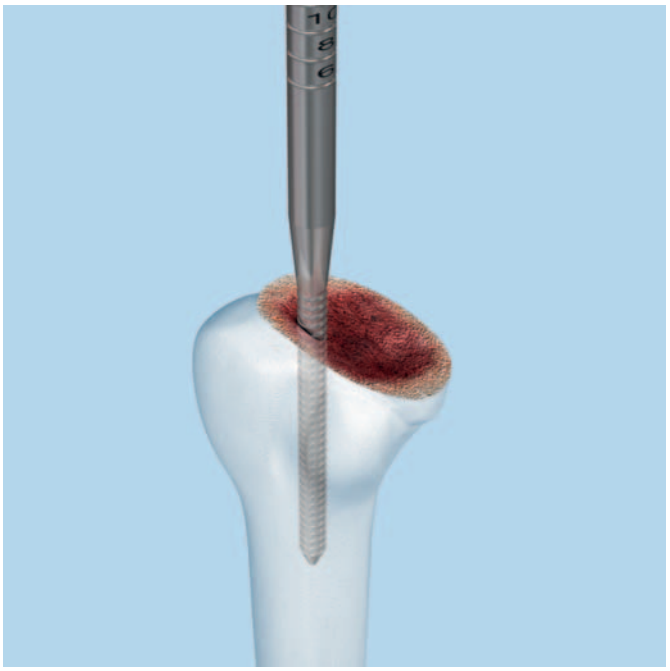
Select the trial head size that most closely matches the resected humeral head. When in doubt, always choose the smaller head size.

Note: If the AP and lateral radii differ, choose an intermediate trial head size.

6
Open medullary canal

Instruments	
359.221	Combined Hammer
E5112-1	Starter Rasp, Size 6

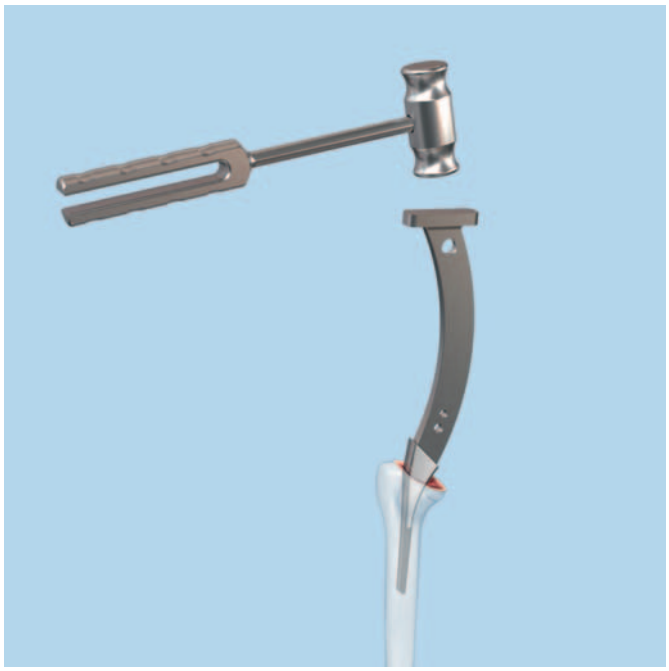
Use the starter rasp to open the humeral shaft. Start 8 mm posterior to the deepest point of the bicipital groove and close to, but not on, the medial insertion line of the supraspinatus. Lightly hammer the cylindrical rasp until it enters the medullary canal. Remove the cylindrical rasp and insert a curette to palpate the anatomy of the medullary canal. If the cancellous bone is sclerotic (hard), it is recommended to remove medial bone with a chisel, a rongeur or a sharp curette in order to allow full seating of the rasps.



7
Determine retrotorsion

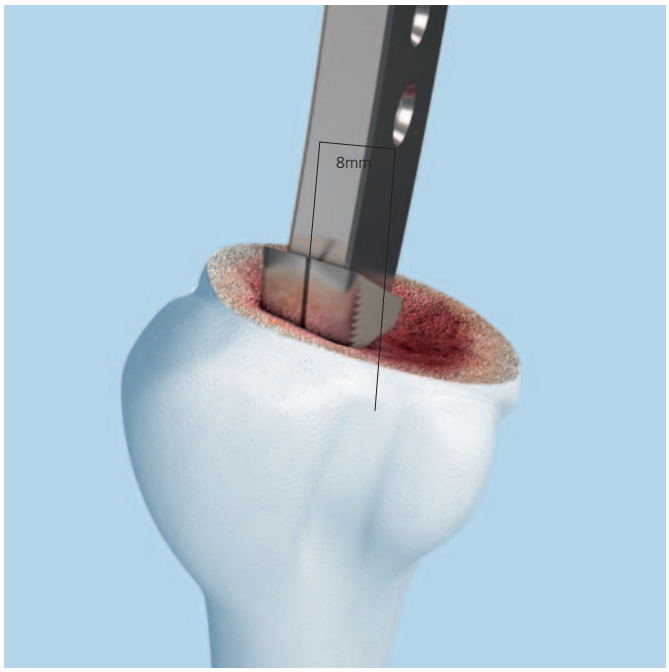
Instruments	
359.221	Combined Hammer
E5115-1	Retrotorsion Bar ∅ 6.0 mm
E5115-2	Goniometer
E5112-6 – E5112-14	Rasps, sizes 6 to 14

Insert the size 6 rasp into the canal. Lightly tap on the rasp with a hammer. The rasp is self-centering and will follow the contour of the canal. If the rasp does not advance adequately into the medullary canal, use a curette to remove bone from the medial portion of the canal.

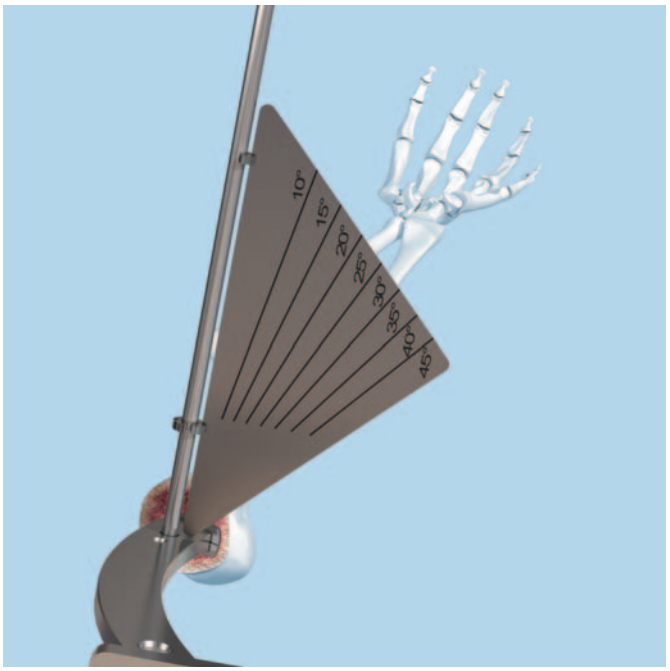


Use the deepest point of the bicipital groove as a landmark to determine the patient's retrotorsion. The mean distance between the deepest point of the bicipital groove and the center line of the rasp is approximately 8 mm. [2]

[2] see Hertel et al., 331-338.



Check the retrotorsion by threading the 6.0 mm retrotorsion bar into the threaded hole of the rasp and sliding the goniometer onto the lateral side of the retrotorsion bar. Retrotorsion is measured against the forearm axis.

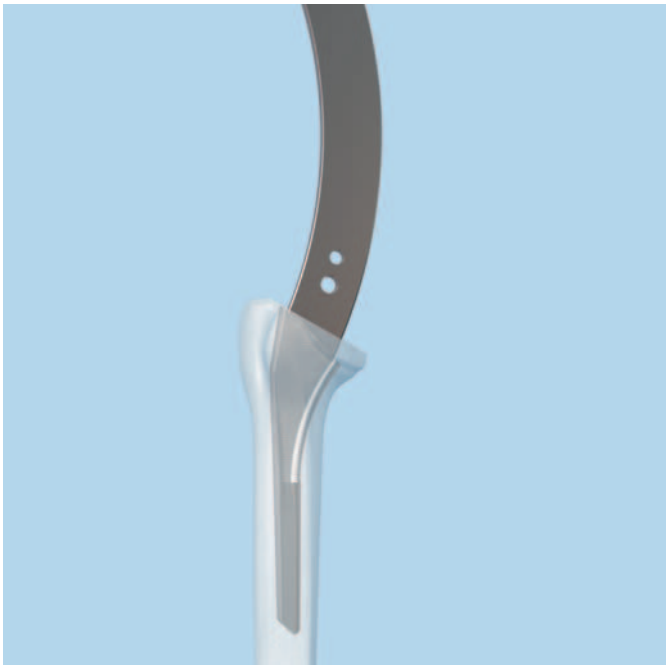


Note: If the patient's retrotorsion value is outside the range of 20° to 35°, recheck the distance between the center line of the rasp and the deepest point of the bicipital groove. When in doubt, use the bicipital groove as a landmark; it provides a more accurate adjustment of retrotorsion than relying on the mean but largely variable retrotorsion value.

Once the correct retrotorsion has been determined, the rasp can be driven into its final position with light hammer taps.

Note: It is important to adjust the retrotorsion at this stage, as it will be difficult to change once the rasp is fully inserted.

Continue rasping with incrementally larger sizes. The largest rasp that fits with its distal portion fully seated in the canal determines the final stem size for implantation.



Note: The medial side of the rasp should sit below the initial resection line. The lateral shoulder of the rasp should point directly onto the medial insertion line of the supraspinatus.

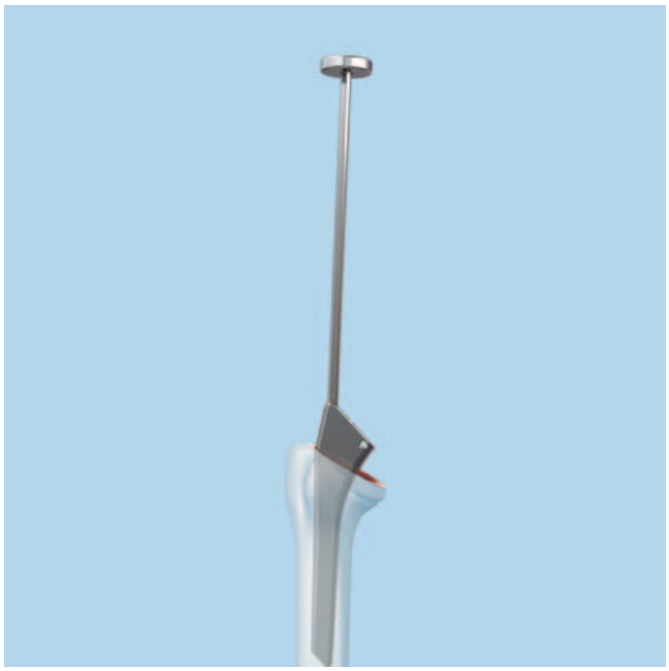
Remove rasp.

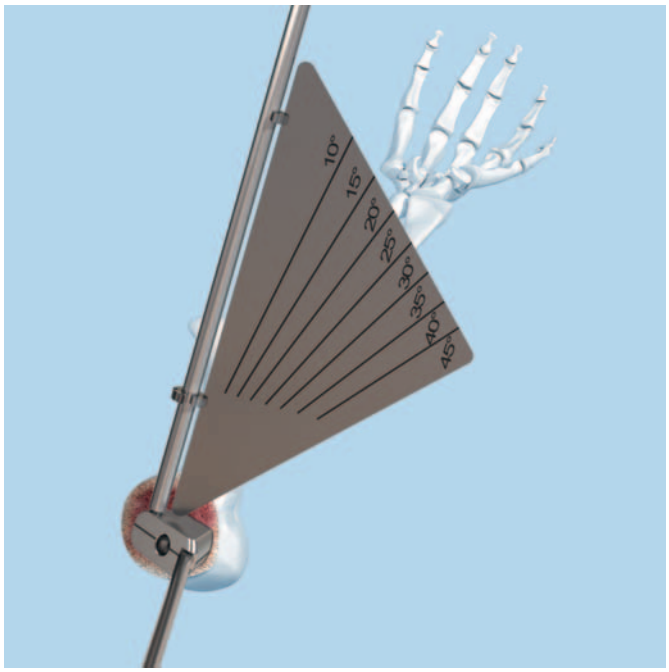
8
Insert trial stem

Instruments	
359.221	Combined Hammer
E5113-6– E5113-14	Trial Stems, sizes 6 to 14
E5115-2	Goniometer
E5115-3	Slotted Hammer/Extractor
E5115-6	Retrotorsion Bar ∅ 3.0 mm

Mount the inserter/extractor on the trial stem. Use the small retrotorsion bar to control rotation while inserting the trial implant. Apply controlled light blows with the hammer to the top of the inserter/extractor until the trial stem is fully seated.

Remove the inserter/extractor.

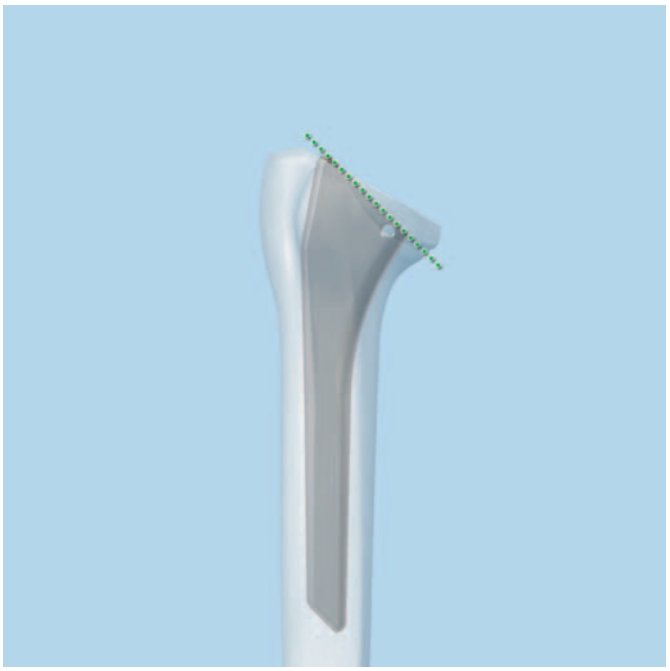


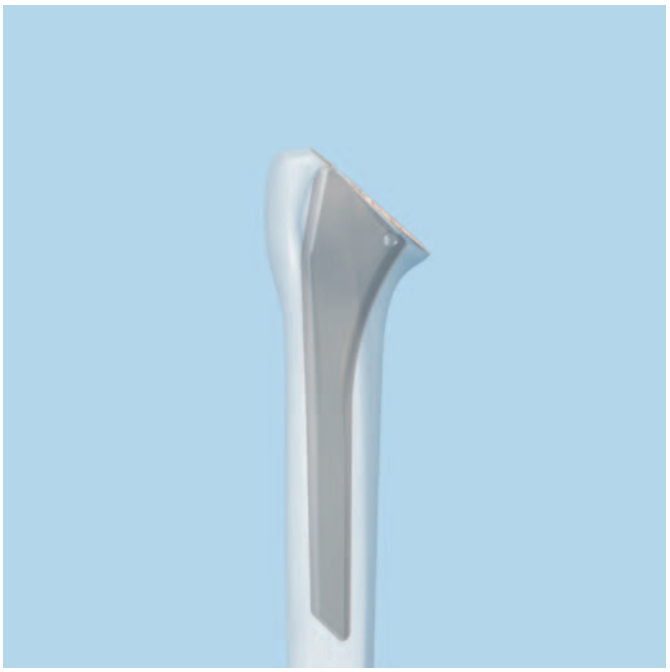


9

Perform definitive anatomic neck resection

Use the proximal surface of the trial stem as a cutting guide for anatomic neck resection. At the end, the osteotomized surface will be flush with the surface of the trial stem.





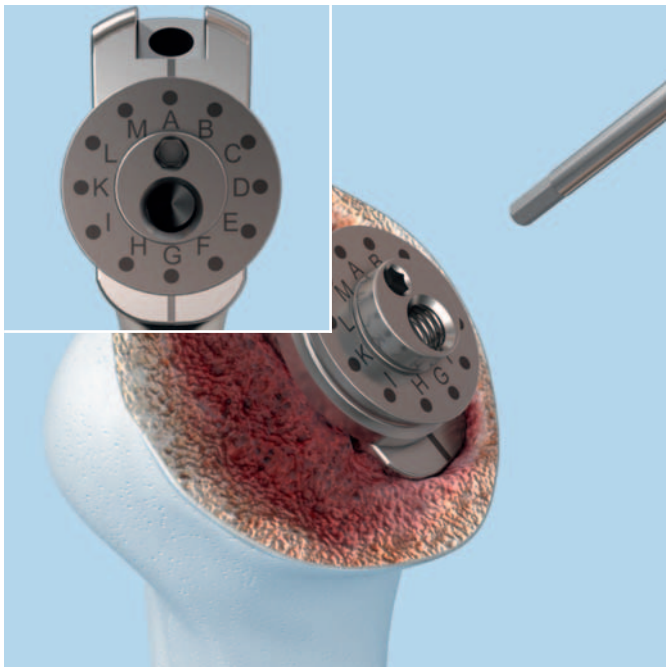
10
Insert the trial eccenter disc

Instruments	
E5115-4/2	Screwdriver Epoca, width across 2.0 mm, for Trial Implants
E5117-20	Trial Eccenter Disc

Attach the trial eccenter disc to the trial stem.

Align the letter ‘A’ on the trial eccenter disc with the lateral line on the trial stem. This position reflects the normal (median) offset.

Lock the trial eccenter disc using a 2.0 mm hex screwdriver in the proximal hole.



11
Mount the trial head and adjust offset

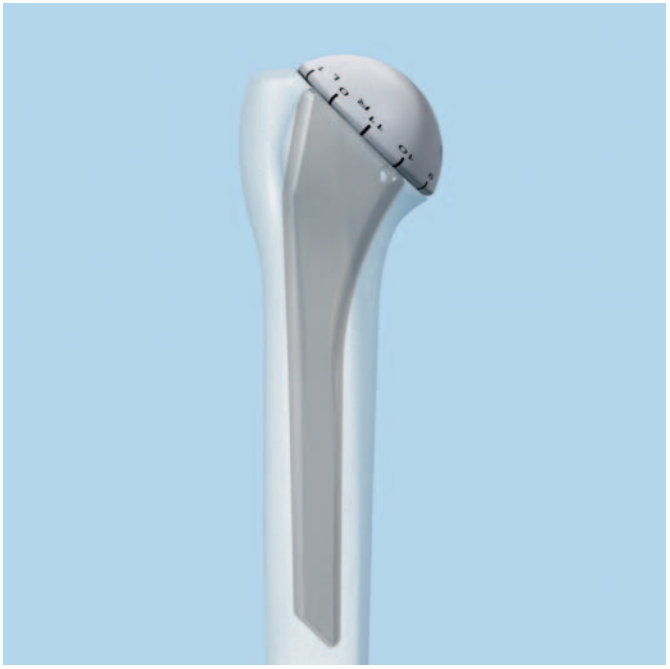
Instruments	
E5114-40– E5114-54	Trial Heads, sizes 40 to 54
E5115-4/2	Screwdriver Epoca, width across 2.0 mm, for Trial Implants
E5115-4/3	Screwdriver Epoca, width across 2.5 mm, for Trial Implants

Use the 2.0 mm hex screwdriver to back out the set screws from the trial head in order to allow for correct seating. Be careful not to back out the set screws too much, as they may fall out.

Mount the trial head on the trial eccenter disc. Rotate the head until it fully covers the osteotomized surface. If the ideal position is not obtainable, rotate the eccenter disc into position B and assess the newly possible head positions. If still no ideal position can be found, rotate the eccenter disc into position C, mount the head and assess the possible positions and so on until the ideal position can be identified. After determination of the perfect position, lock the eccenter disc and the head by tightening the interference screws.

Option
Alternatively the eccenter disc and the head can be loosened and rotated simultaneously in a clockwise respectively anticlockwise direction. By doing so the ideal head position can be quickly identified. In order to rotate the eccenter disc while the head is in situ, insert the 2.5 mm hex screwdriver into the eccenter disc.

Note: Use the 2.0 mm hex screwdriver to tighten and loosen the trial eccenter disc and the setscrews on the trial head. The 2.5 mm hex screwdriver is only used for rotating the eccenter disc.



12
Record offset and remove trial implants

Instruments	
359.221	Combined Hammer
E5115-3	Slotted Hammer/Extractor
E5115-4/2	Screwdriver Epoca, width across 2.0 mm, for Trial Implants

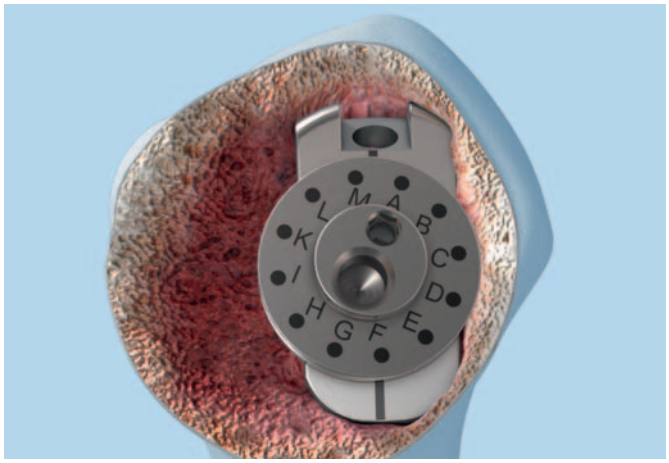
Record the offset position of the head: read the number aligned with the lateral mark on the trial stem. The lateral mark might be concealed when the implant is fully seated. In this case, use a surgical marker (pen) to mark the equatorial line on the corresponding extension of the rotator cuff, which is visible before mounting the head. Remove the trial head. Record the position of the trial eccenter disc which is marked with a letter.

Important: Record the determined offset (number and letter) as these will be transferred to the final implants.

Mount the inserter/extractor on the trial stem. Lightly tap against the inserter/extractor to back out the trial stem.

Note: Ensure that the inserter/extractor is fully threaded into the trial stem to avoid possible damage to the thread during removal.

If performing glenoid replacement, refer to the section "Implantation of a glenoid component." Leave the trial stem in position in order to protect the proximal humerus from retractor-induced damage. A humeral cover plate ensures good protection of the humeral osteotomy rim during preparation of the glenoid.



13
Assemble implants

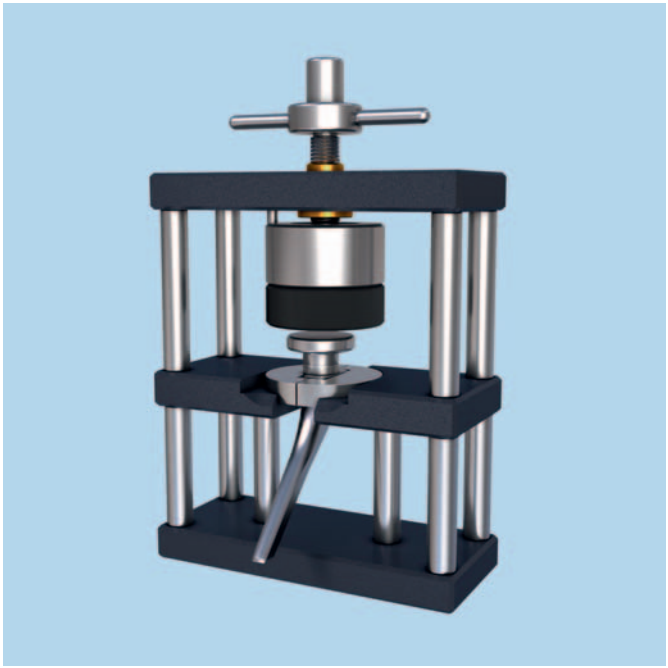
Instruments	
E5115-5/1	Press
E5115-5/3	Eccenter/Impactor
E5115-5/4	Torque Wrench for Press
E5115-5/6– E5115-5/14	Holders for Press, sizes 6 to 14

Choose the stem holder that corresponds to the size of the shaft. Hold the half of the stem holder with two pegs with the etched side facing up. Orient the distal end of the stem toward the operator and slide the stem over the pegs. Slide the other half of the stem holder over the pegs. This assembly allows the stem to be firmly held in the press.

Important: Ensure the etched side of the stem holder is facing up. Improper assembly may cause jamming.

Position the eccenter on the stem. Align the letter recorded during the trial implantation (step 12) with the center line of the stem. Place the assembly in the press and place the eccenter/impactor over the eccenter. Using the torque wrench, turn the handle of the press clockwise until a click is heard, signifying the positive engagement of the eccenter and the stem.

Turn the torque wrench counterclockwise and remove the eccenter/impactor. Remove the stem-eccenter assembly from the press.



Place the head on the stem assembly. Align the recorded offset position with the lateral marking on the implant or the contact line between the two halves of the stem holder.

Place the head and the stem eccenter assembly in the press. Compress components by turning the torque wrench clockwise until a click is heard.

Remove the implant from the press. Remove the stem holder and check for adequate seating of the head and the eccenter.

Note: No visible gap should be present between the base of the head and the humeral stem.

14
Implant the assembled prosthesis

Note: Choose the final implantation method according to the type of stem being used (pressfit or cemented).

Instruments

359.221	Combined Hammer
E5115-2	Goniometer
E5115-6	Retrotorsion Bar ∅ 3.0 mm
E5115-7	Impactor

Mount the plastic liner onto the head impactor.

14a
Final implantation for cemented stems

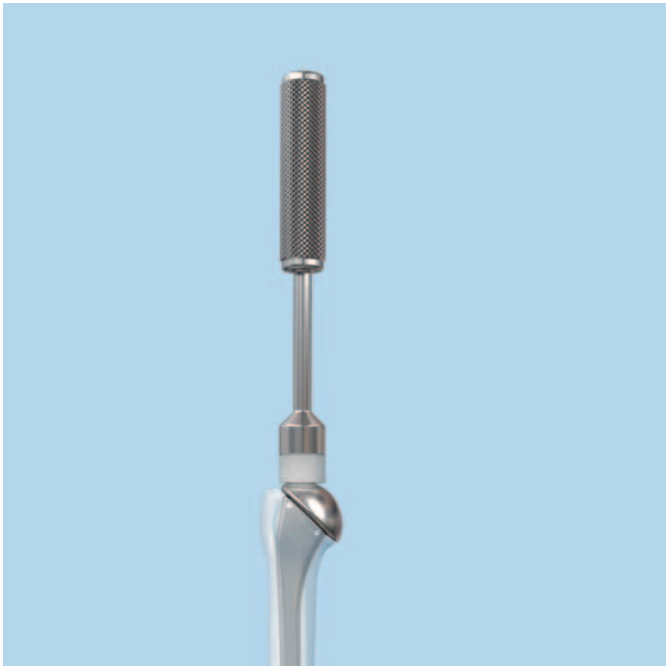
Note: Follow the manufacturer's instructions for preparation, injection, and setting of the bone cement.

Do a final irrigation of the medullary canal. Insert a cement restrictor to prevent excess cement from flowing into the distal humerus.

Place a vent tube in the medullary canal. Dry the cavity. Inject cement into the canal. Remove the vent tube while the cement is being injected.

Ensure that the implant assembly is clean before insertion. Check the final retrotorsion using the 3.0 mm retrotorsion bar and the goniometer.

Insert first manually, then using the head impactor until the implant is fully seated.



14b

Final implantation for pressfit, cementless stems

Introduce the assembled prosthesis into the medullary canal. Ensure proper placement and orientation of the implant.

Lightly tap on the head impactor with the hammer until the implant is fully seated.

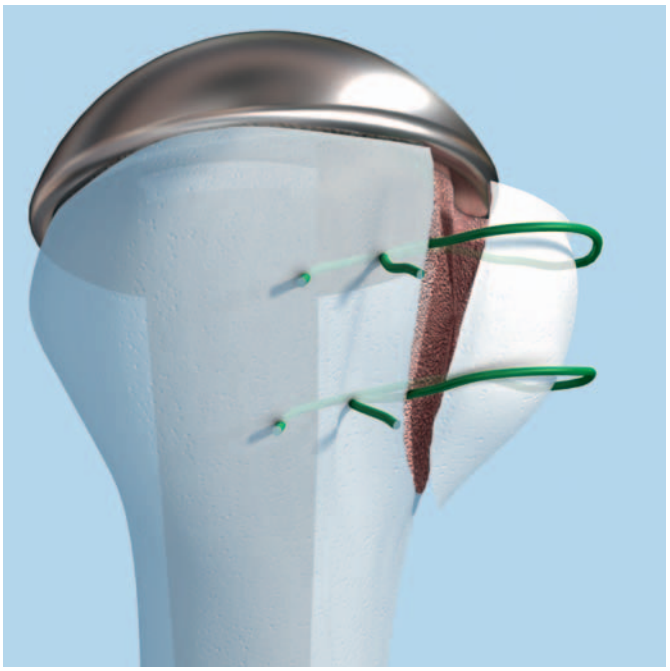
Reduce the joint and reattach the lesser tuberosity.

15
Reattach lesser tuberosity

Stable reattachment of the subscapularis is essential for early functional rehabilitation.

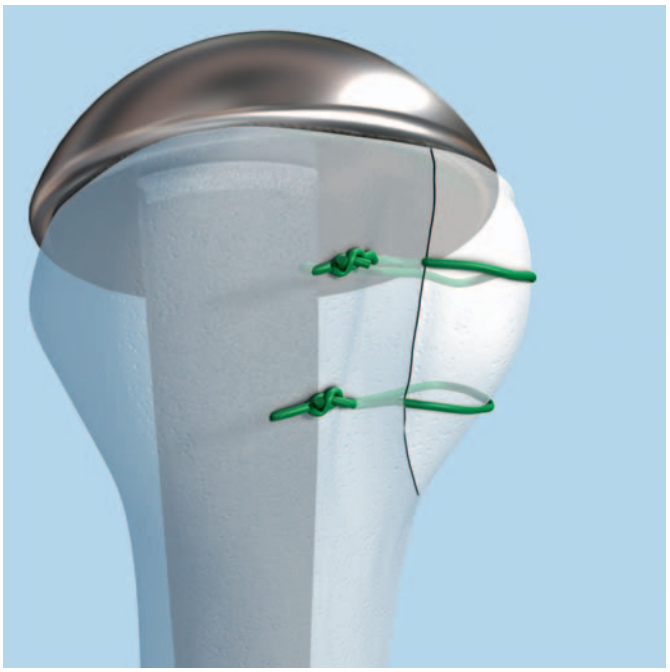
The goal is to obtain stable fixation allowing early unloaded active motion. To warrant best possible external rotation, care should be taken to avoid lateralization of the tuberosity.

Pass two high-strength sutures through the subscapularis tendon close to the tendon-bone junction. Drill four holes in the dense bone posterior to the bicipital groove and pass the sutures through these perforations using a Mario Donati type of vertical mattress suture (passing both strands of the sutures under the bicipital groove and exiting the hard bone immediately posterior to the bicipital groove). This will position the lesser tuberosity snugly against the osteotomized surface. If desired, an additional 0.8 mm wire suture loop can be passed to enhance stability and to enhance visualization of the lesser tuberosity for later x-ray controls.



Close the lateral half of the rotator interval with nonabsorbable sutures. Relocate the distal stump of the biceps tendon in the bicipital groove and suture it to the transverse ligament remnants.

Examine the range of motion and the stability of the joint. Posterior translation of at least 50% of glenoid width should be possible. A too tight subscapularis may lead to posterior subluxation as the arm reaches its external rotation limit. In this case more subscapularis release or indirect lengthening via medialization is required.



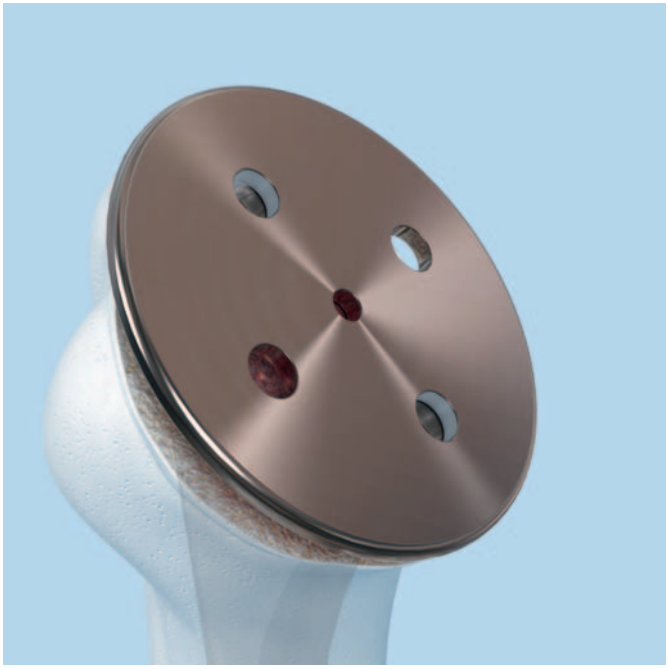
Implantation of a Glenoid Component

Implantation of a glenoid component is performed as part of total joint replacement or total arthroplasty. This procedure begins after preparation of the humeral side and implantation of a trial stem. Follow the steps for a humeral component, and when directed to do so, proceed with the following procedure.

Note: The size of the glenoid implant is determined by the size of the humeral head component.

1
Approach and exposure

Instruments	
E5115-4/2	2.0 mm Hex Screwdriver
E5115-8/38	Humeral Cover ∅ 38 mm for Trial Stem
E5115-8/44	Humeral Cover ∅ 44 mm for Trial Stem
E5115-8/48	Humeral Cover ∅ 48 mm for Trial Stem



Adequate exposure of the glenoid is essential for implantation. Exposure must permit the use of straight instruments such as reamers and drill bits.

Place the protection cover on the trial stem to protect the humeral shaft from glenoid retractors and reamers during glenoid implantation. Tighten the center hole screw of the cover with the 2.0 mm hex screwdriver.

Note: Use the smallest cover that fully protects the anterior rim of the humeral osteotomy area (the numbers indicate the diameter of the cover and have no relation to head sizes).

Release the joint capsule around the perimeter of the glenoid to allow for posterior and inferior dislocation of the proximal humerus. The remnants of the labrum can be resected. The release is adequate if the muscular fibers of the rotator cuff can be seen at the level of the glenoid rim.

Release the coracohumeral ligament and adhesions along the anterior border of the supraspinatus to provide additional exposure.

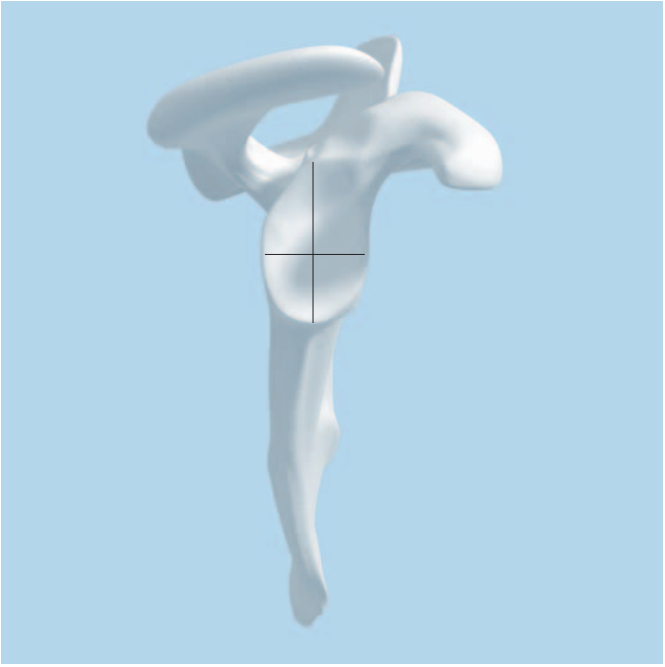
Place the arm in slight internal rotation and introduce a tear-drop ring retractor (or other instrument such as a Fukuda Ring Retractor) to displace the proximal humerus in a posterior and inferior direction. The exposure is adequate when the glenoid can be accessed with straight instruments.

Remove any larger osteophytes with a rongeur or chisel. Posterior osteophytes may be left in situ until completion of the procedure since they can assist in obtaining a better exposure i.e. providing an offset fulcrum for the tear drop ring retractor. Superior osteophytes may impede normal gliding of the rotator cuff. Anterior and inferior osteophytes may restrict internal rotation and adduction. Posterior osteophytes may restrict external rotation and may be a cause of persistent posterior subluxation.

2

Locate center point

Locate the true center of the glenoid, which is slightly inferior to the midpoint of Saller's line (vertical line dividing the glenoid into anterior and posterior halves). This is the slippage point of the humeral head during concentric motion.



3
Ream glenoid

Instruments	
292.260	Kirschner Wire ∅ 2.5 mm, length 280 mm
E5211-2	Guide Extension, rigid
E5211-3	Wrench, width across 10 (2×)
E5211-4L	Drill Guide, left
E5211-4R	Drill Guide, right
E5211-28	Reamer ∅ 28 mm for Glenoid
E5211-32	Reamer ∅ 32 mm for Glenoid

The shape of the drill guide matches the shape of the glenoid implant. Determine the desired anatomic position of the glenoid implant by placing the drill guide (left or right) on the glenoid. The central hole of the drill guide should cover the center point located in step 2. Hold the drill guide in the corrected position. Introduce the 2.5 mm K-wire and recheck the position.

Assemble the smallest reamer (28 mm) onto the cannulated extension using 10 mm wrenches. Couple the assembly to power equipment using a Jacobs chuck. If there is sufficient exposure, place the reamer assembly over the K-wire, position the reamer firmly against the glenoid, and ream.

If there is not enough exposure to be able to slide the reamer over the K-wire, remove the K-wire. Place the reamer assembly on the glenoid, then reintroduce the K-wire through the assembly into the previously drilled central hole, and ream.

Option
Alternatively, free-hand reaming is possible without the use of guide wires. The reamer produces a uniformly concave surface, which is independent of the size of the glenoid.

Ream clockwise at high speed with steady light pressure. Windows in the reamer allow for visualization of the Glenoid and the extent of reaming. During the reaming process, correct the retro- or anteversion while preserving as much dense subchondral bone as possible.

Warning: Too much axial pressure on the reamer on weak, osteopenic bone may lead to overreaming.

For larger glenoid sizes (52 mm – 58 mm), continue reaming with the 32 mm reamer to gain superior and inferior extension of the prepared surface.

4

Prepare for trial glenoid

Instruments	
E5211-4L	Drill Guide, left
E5211-4R	Drill Guide, right
E5211-6K	Drill Bit ∅ 7.4 mm, length 150 mm, for Glenoid and Shell Screw
E5211-6L	Drill Bit ∅ 7.4 mm, length 200 mm, for Glenoid and Shell Screw
292.260	Kirschner Wire ∅ 2.5 mm, length 280 mm

If the K-wire has been removed, reinsert it. Reintroduce the drill guide (left or right) over the K-wire. Rotate the drill guide until anatomic alignment is obtained.

Note: Use the insertion point of the biceps tendon as a landmark to determine the alignment of the longitudinal axis of the glenoid. It is recommended to position the inferior hole slightly posterior and the superior hole slightly anterior to Saller's line. Bone stock is typically better in this location.

Using the shorter (150 mm) drill bit, drill the distal hole first. The depth of the drill hole depends on the planned implant type.

4a

Cemented all-poly glenoid

For cemented all-poly glenoid, drill to a depth of 19 mm.

4b

Hybrid glenoid with shell screws

For shell screw 10 mm, drill to a depth of 21 mm.
For shell screw 15 mm, drill to a depth of 28 mm.
For shell screw 20 mm, drill to a depth of 31 mm.

The smallest (10 mm) shell screw is the standard implant. Longer versions are typically used when there are bone defects.

4c

Pressfit metalback glenoid

For pressfit metalback glenoid, drill to a depth of 21 mm.

Remove the Jacobs chuck but leave the drill bit in situ to stabilize the drill guide while drilling the second hole.
Prepare the proximal hole using the long drill bit (200 mm).
Remove the drill bits, K-wire and drill guide.

5
Introduce trial glenoid

Instruments	
E5211-8E	Holding Forceps for Trial Glenoid
E5213-42– E5213-54	Trial Glenoids, size 42 to 54

Select the trial glenoid that matches the size of the humeral head.

Trial Glenoids

Head size	40	42	44	46	48	50	52	54
Trial size	40/42	40/42	44/46	44 /46	48/50	48/50	52/54	52/54
Art. No.	E5213–42	E5213–42	E5213–46	E5213–46	E5213–50	E5213–50	E5213–54	E5213–54

Use the trial glenoid holding forceps to insert the trial glenoid. Check the fit of the trial implant and ensure that the rear surface of the trial fits firmly to the reamed surface of the glenoid. If not, additional reaming of the glenoid is required. Alternatively, gaps may be filled with autogenous bone graft.

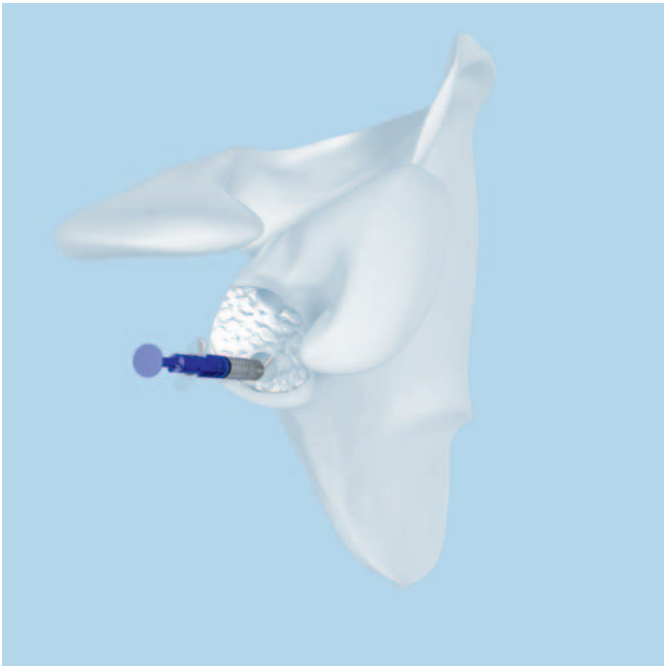
6
Implant glenoid component

Instruments	
359.221	Combined Hammer
E5211-8	Holding Forceps for Glenoid
F017-4.5	Screwdriver, hexagonal, width across 4.5 mm
F017-2.5	Screwdriver, hexagonal, width across 2.5 mm
E5211-10	Glenoid Impactor
E5221-1	Metalback Impactor
E5221-2	Drill Sleeve 2.5 (2×)
E5221-3	Drill Bit ∅ 2.5 mm

Ensure that the plastic impactor liner is mounted on the glenoid impactor.

Cemented all-poly glenoid
Clean and dry the drilled cavities. Consider using a suction device introduced through the base of the coracoid process to evacuate undesired fluids. Introduce a small amount of bone cement (methylmethacrylate) into the two drilled cavities (0.15 ml in each cavity) using a 1 ml syringe.

Note: Avoid overflow of the cement onto the faceplate of the glenoid, as this will lead to a thin and brittle cement layer. Consult the manufacturer's instructions for proper bone cement usage.



Mount the glenoid implant on the special holding forceps and introduce the implant in the correct orientation (the narrow part facing up). Introduce the glenoid implant and seat it into its final position by light hammer taps on the glenoid impactor.

Hybrid glenoid (with shell screws)
Insert the previously selected shell screws (see step 5) with the long 4.5 mm hex screwdriver. The shell screw should be slightly below the surface of the bone. Introduce a small amount of bone cement (0.13 ml methylmethacrylate) into each shell screw using a 1ml syringe.

Note: Avoid overflow of the cement onto the faceplate of the glenoid, as this will lead to a thin and brittle cement layer. Consult the manufacturer's instructions for bone cement usage.

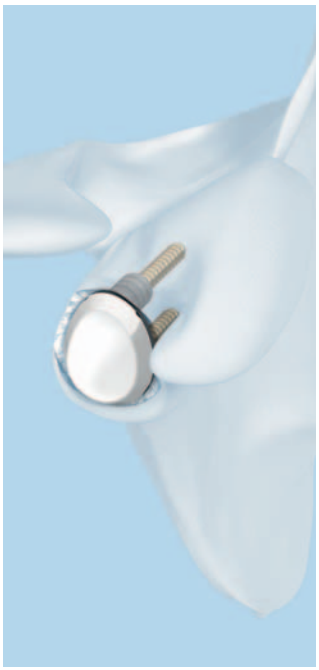
Place the glenoid implant in position using the glenoid holding forceps. Drive the glenoid implant into place using the hammer and glenoid impactor.

Pressfit metalback glenoid
Place the metalback glenoid implant in position using the metalback impactor. Lightly tap the glenoid implant into place using the hammer and glenoid impactor.

Note: The metalback glenoid can be fixed with 3.5 mm cortex screws at the bottom of the pegs for additional stability.

Option
Additional screw fixation depends upon surgeons intraoperative judgment and preference. For this purpose, a special aiming drill guide is available. Introduce the cylindrical drill guide in the cylindrical metal-back peg and drill with a 2.5 mm drill bit. Measure the screw length and introduce a standard 3.5 mm cortical screw.

Place the polyethylene glenoid implant in position using the glenoid clamp. Lightly tap the glenoid implant into place using the hammer and glenoid impactor.



7

Complete implantation of standard humeral component

Remove the humeral retractors and expose the proximal humerus. Complete implantation of a standard humeral component.

Implants

(all Implants are sterile packed)

Humeral Stem, uncemented

– Titanium alloy (TAV) with Ti+HA coating
– Also for nickel sensitive patients

Art. No.	Size (mm)	Length (mm)
5528-6/11	6	115
5528-8/12	8	120
5528-10/12	10	125
5528-12/13	12	130
5528-14/13	14	135

Humeral Stem, cemented

– Stainless Steel

Art. No.	Size (mm)	Length (mm)
5614-6/11	6	115
5614-8/12	8	120
5614-10/12	10	125
5614-12/13	12	130
5614-14/13	14	135

Titanium Eccenter

– Titanium alloy (TAV)

Art. No.	Usage
5413-20/5	Standard

Head

– Stainless Steel

Art. No.	∅ (mm)	Height (mm)	
5311-40/15	40	15.00	
5311-42/15	42	15.75	
5311-44/16	44	16.50	
5311-46/17	46	17.25	
5311-48/18	48	18.00	
5311-50/18	50	18.75	
5311-52/19	52	19.50	
5311-54/20	54	20.25	
5311-56/21	56	21.00	optional
5311-58/22	58	21.75	optional

Glenoid

– UHMW polyethylene

– Can be used as stand alone component or in combination with shell screws or metalback component

Art. No.	For head ∅ (mm)	
5213-42	40 and 42	
5213-44	44	
5213-46	46	
5213-48	48	
5213-50	50	
5213-52	52	
5213-54	54	
5213-56	56	optional
5213-58	58	optional

Shell Screws for hybrid glenoid
– Titanium alloy (TAV)
– For use with polyethylene glenoid component

Art. No.	Length (mm)	Glenoid
5114-9/10	10	5213-42 to 5213-58
5114-9/15	15	5213-42 to 5213-58
5114-9/20	20	5213-42 to 5213-58

Metalback component for cementless glenoid
– Titanium alloy (TAV)
– For use with polyethylene glenoid

Art. No.	Size	Glenoid
5118-42	40 + 42	5213-42
5118-46	44 + 46	5213-44 / 5213-46
5118-50	48 + 50	5213-48 / 5213-50
5118-54	52 + 54	5213-52 / 5213-54

Cortex Screw ∅ 3.5 mm
– Optional for use with metalback glenoid

Art. No.	Length (mm)
404.010S	10
404.012S	12
404.014S	14
404.016S	16
404.018S	18
404.020S	20
404.022S	22
404.024S	24
404.026S	26
404.028S	28
404.030S	30

Special Implants

(all Implants are sterile packed)

Head for allergy patients

– Stainless Steel, with TiNb coating

Art. No.	∅ (mm)	Height (mm)	
5321-40/15	40	15.00	
5321-42/15	42	15.75	
5321-44/16	44	16.50	
5321-46/17	46	17.25	
5321-48/18	48	18.00	
5321-50/18	50	18.75	
5321-52/19	52	19.50	
5321-54/20	54	20.25	
5321-56/21	56	21.00	optional
5321-58/22	58	21.75	optional

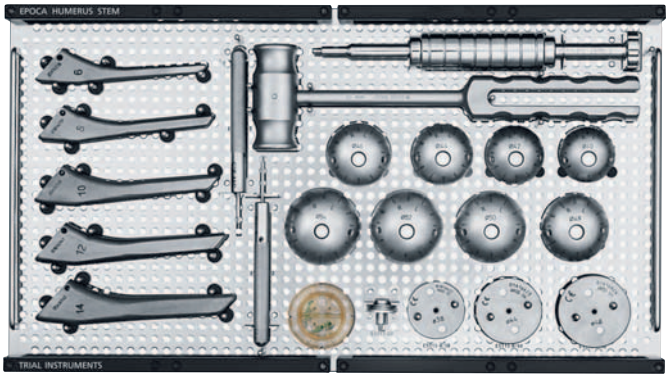
Stem for allergy patients, sterile

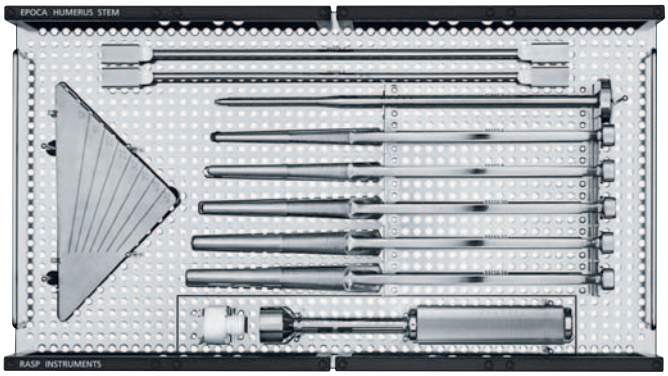
– See Humeral Stem, cementless (Titanium alloy TAV)

– REF 5528-6/11 to 5528-14/13

Instruments

01.401.030	Instruments Epoca Humerus
68.401.037	Vario Case for Humerus Instruments
689.507	Lid for Vario Case



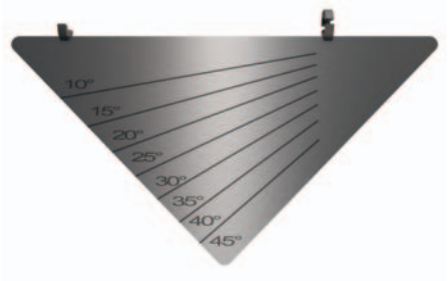


359.221	Combined Hammer

E5112-1	Starter Rasp Epoca, size 6

E5115-1	Retrotorsion Bar Epoca ∅ 6.0 mm

E5115-2	Goniometer Epoca



E5112-6	Rasp Epoca, size 6
E5112-8	Rasp Epoca, size 8
E5112-10	Rasp Epoca, size 10
E5112-12	Rasp Epoca, size 12
E5112-14	Rasp Epoca, size 14

E5115-3	Slotted Hammer/Extractor Epoca

E5113-6	Trial Stem Epoca, size 6
E5113-8	Trial Stem Epoca, size 8
E5113-10	Trial Stem Epoca, size 10
E5113-12	Trial Stem Epoca, size 12
E5113-14	Trial Stem Epoca, size 14

E5115-6	Retrotorsion Bar Epoca ∅ 3.0 mm

E5115-4/2	Screwdriver Epoca, width across 2.0 mm, for Trial Implants

E5115-4/3	Screwdriver Epoca, width across 2.5 mm, for Trial Implants

E5117-20	Trial Eccenter Disc Epoca

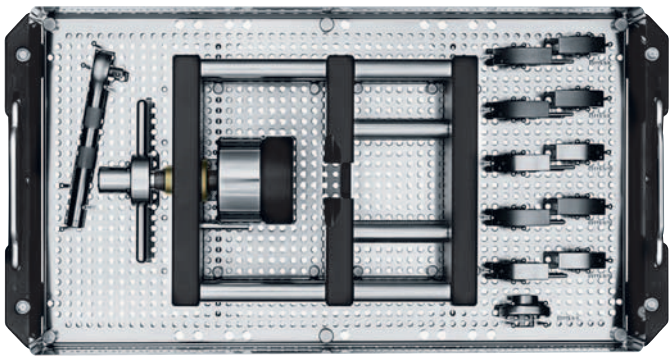
E5114-40	Trial Head Epoca, size 40
E5114-42	Trial Head Epoca, size 42
E5114-44	Trial Head Epoca, size 44
E5114-46	Trial Head Epoca, size 46
E5114-48	Trial Head Epoca, size 48
E5114-50	Trial Head Epoca, size 50
E5114-52	Trial Head Epoca, size 52
E5114-54	Trial Head Epoca, size 54
E5114-56	Trial Head Epoca, size 56 (optional)
E5114-58	Trial Head Epoca, size 58 (optional)

E5115-8/38	Humeral Cover Epoca ∅ 38 mm, for Trial Stem
E5115-8/44	Humeral Cover Epoca ∅ 44 mm, for Trial Stem
E5115-8/48	Humeral Cover Epoca ∅ 48 mm, for Trial Stem

E5115-7	Impactor Epoca

Press Epoca

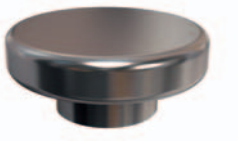
68.401.032	Vario Case for Press Epoca
689.507	Lid for Vario Case



E5115-5/1	Press Epoca

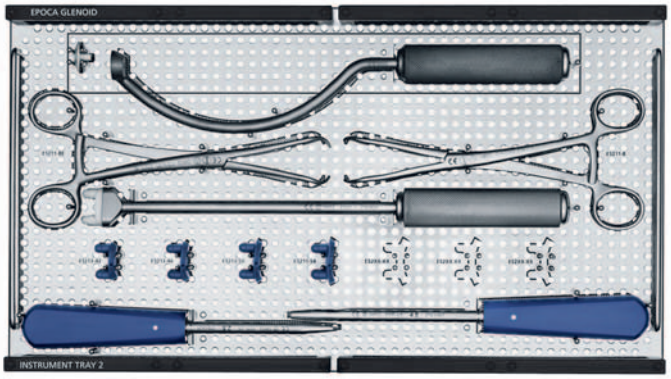
E5115-5/6	Holder Epoca for size 6, for Press
E5115-5/8	Holder Epoca for size 8, for Press
E5115-5/10	Holder Epoca for size 10, for Press
E5115-5/12	Holder Epoca for size 12, for Press
E5115-5/14	Holder Epoca for size 14, for Press

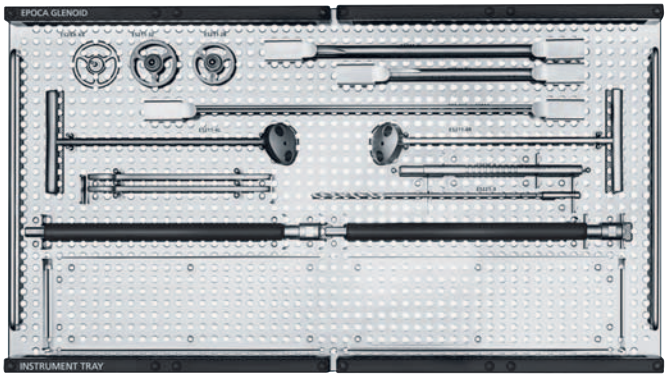
E5115-5/3	Eccenter/Impactor Epoca



E5115-5/4	Torque Wrench Epoca, for Press

01.401.033	Instruments for Glenoids Epoca
68.401.033	Vario Case for Instruments for Glenoids Epoca
689.507	Lid for Vario Case





E5211-4L	Drill Guide Epoca, left
E5211-4R	Drill Guide Epoca, right

292.260	Kirschner Wire Epoca ∅ 2.5 mm, length 280 mm (2×)	
E5211-2	Guide Extension Epoca, rigid	
E5211-3	Wrench Epoca, width across 10 (2×)	
E5211-28	Reamer Epoca ∅ 28 mm, for Glenoid	
E5211-32	Reamer Epoca ∅ 32 mm, for Glenoid	
E5211-6L	Drill Bit Epoca ∅ 7.4 mm, length 200 mm, for Glenoid and Hollow Screw	
E5211-6K	Drill Bit Epoca ∅ 7.4 mm, length 150 mm, for Glenoid and Hollow Screw	
E5211-8E	Holding Forceps Epoca for Trial Glenoid	
E5213-42	Trial Glenoid Epoca, size 42	
E5213-46	Trial Glenoid Epoca, size 46	
E5213-50	Trial Glenoid Epoca, size 50	
E5213-54	Trial Glenoid Epoca, size 54	

F017-4.5	Screwdriver Epoca, hexagonal, width across 4.5 mm	
E5221-1	Metalback Impactor Epoca	
E5211-8	Holding Forceps Epoca for Glenoid	
E5211-10	Glenoid Impactor Epoca	
E5221-2	Drill Sleeve Epoca 2.5 (2×)	
E5221-3	Drill Bit Epoca ∅ 2.5 mm	
F017-2.5	Screwdriver, hexagonal, Epoca, width across 2.5 mm	

Bibliography

Hertel R, Knothe U, Ballmer FT. Geometry of the proximal humerus and implications for prosthetic design. J Shoulder Elbow Surg. 2002;11(4):331-8.

Hempfing A, Leunig M, Ballmer FT, Hertel R. Surgical landmarks to determine humeral head retrotorsion for hemiarthroplasty in fractures. J Shoulder Elbow Surg. 2001;10(5):460-3.

Hoppenfeld S, de Boer P (2003). Surgical Exposures in Orthopaedics – The Anatomic Approach. 3rd Edition. Philadelphia, PA: Lippinoot Williams & Wilkins 2003: 2-8.

SYNTHES®

Synthes GmbH
Eimattstrasse 3
CH-4436 Oberdorf
www.synthes.com

Presented by:

CE
0123