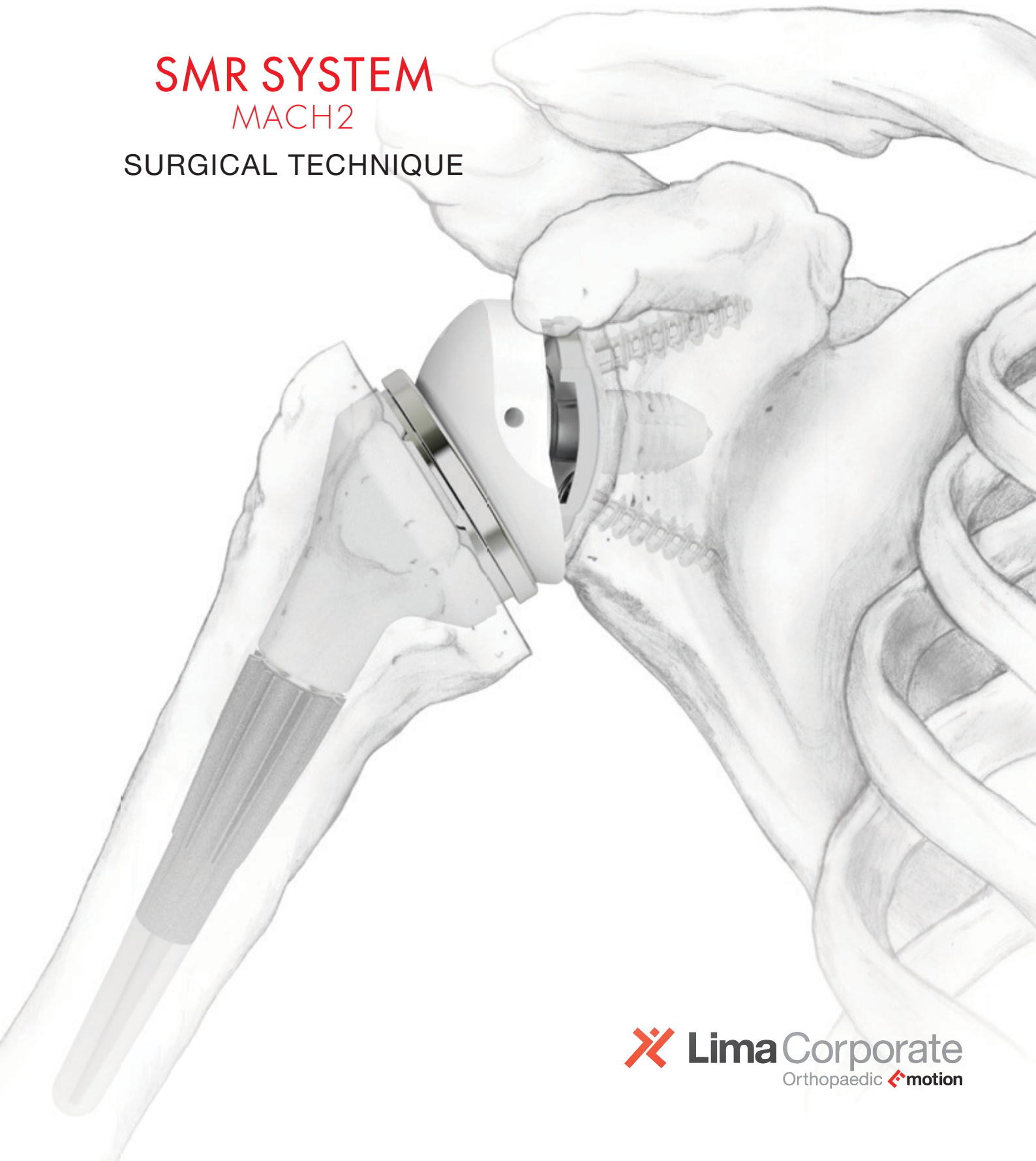
SMR

MODULAR SHOULDER REPLACEMENT

SMR SYSTEM
MACH2

SURGICAL TECHNIQUE



Lima Corporate
Orthopaedic motion

SMR PRIMARY SURGICAL TECHNIQUE
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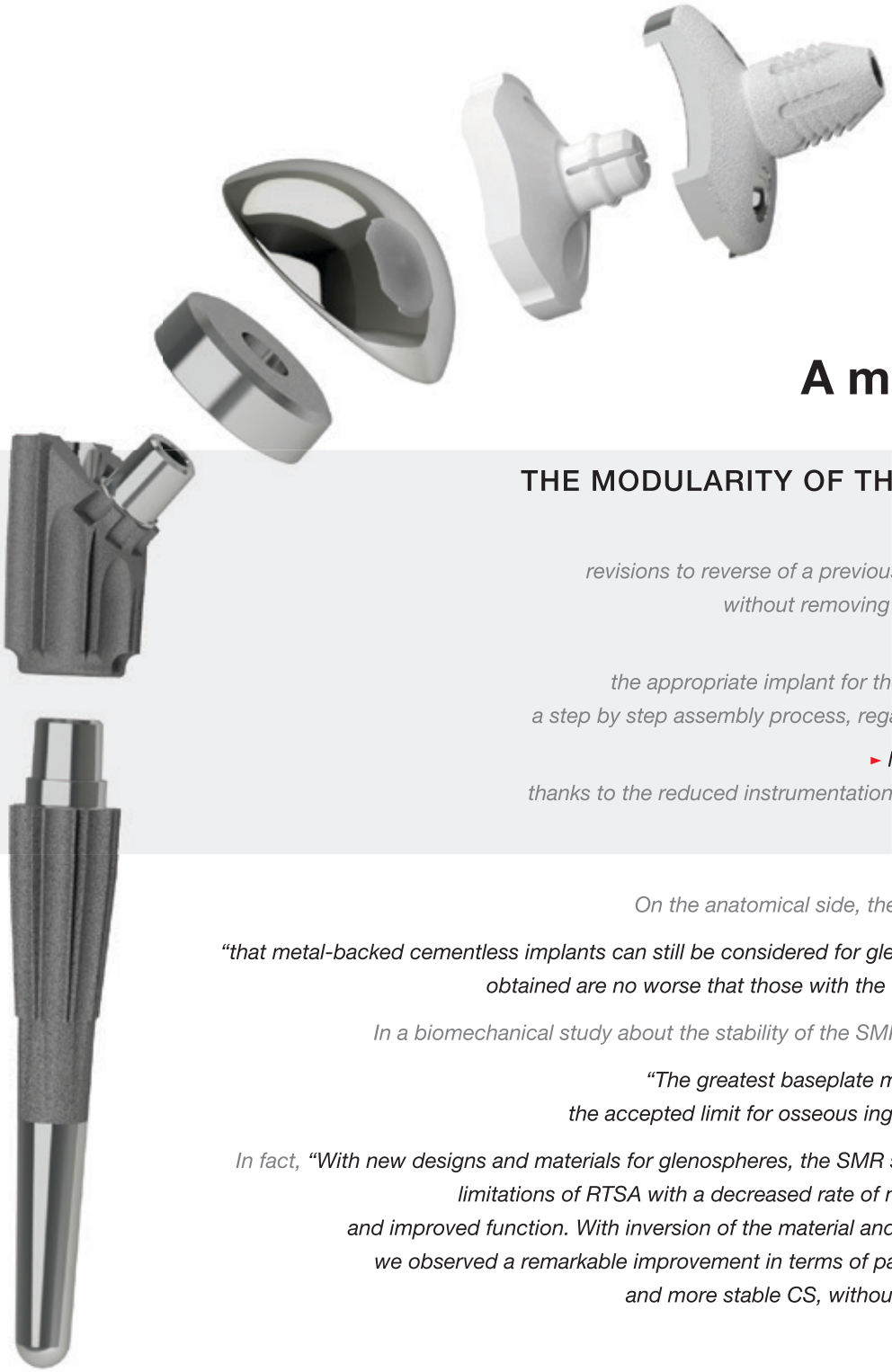
Limacorporate spa is a manufacturer of prosthetic implants and as such does not perform medical procedures. This documentation concerning surgical techniques, which provides surgeons with general guidelines for implanting the SMR SYSTEM, was developed with the advice of a team of surgical experts. All decisions as to the type of surgery and most suitable technique are obviously the responsibility of the health care professional. Surgeons must make their own decisions as to the adequacy of each planned implant technique based on their training, experience and the clinical condition of the patient. For further information about our products, please visit our web site at www.limacorporate.com

SMR

ALWAYS THE BEST OPTION



A modular system...

THE MODULARITY OF THE SYSTEM [1,2,3] ALLOWS:

► *Simple conversions:*
revisions to reverse of a previous anatomical implant can be executed without removing the stem and the Metal Back glenoid.

► *Intraoperative flexibility:*
the appropriate implant for the patient's needs can be built through a step by step assembly process, regardless of the pathology encountered.

► *More efficiency in the operating room,*
thanks to the reduced instrumentation required by a single platform system.

On the anatomical side, the SMR Metal Back glenoid has proven

"that metal-backed cementless implants can still be considered for glenoid replacement and that the results obtained are no worse that those with the cemented all-polyethylene glenoid." [3]

In a biomechanical study about the stability of the SMR Metal Back in reverse configuration,

"The greatest baseplate micromotion (26.83µm) was well within the accepted limit for osseous ingrowth into uncemented prosthesis." [4]

In fact, "With new designs and materials for glenospheres, the SMR system contributes to overcoming the limitations of RTSA with a decreased rate of notching and instability, better survival and improved function. With inversion of the material and distalization of the centre of rotation, we observed a remarkable improvement in terms of pain relief and ROM, as well as a higher and more stable CS, without any increase in complication rate." [7]

...with proven performance [1-7]

MORE THAN 15 YEARS OF CLINICAL EXPERIENCE

The clinically proven SMR modular shoulder system evolves with the pathology, allowing the surgeon to choose the most appropriate solution in resurfacing, fracture hemi, total shoulder, reverse shoulder or revision surgeries.

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INDICATIONS

The SMR Shoulder System is intended for partial or total, primary or revision shoulder joint replacement in skeletally mature patients.
The SMR Anatomic Shoulder System is indicated for partial or total, primary or revision shoulder joint replacement in patients suffering from disability due to:

- non-inflammatory degenerative joint disease including osteoarthritis and avascular necrosis;
- inflammatory degenerative joint disease such as rheumatoid arthritis;
- treatment of acute fractures of the humeral head that cannot be treated with other fracture fixation methods;
- revision of a failed primary implant;
- cuff tear arthropathy (CTA Heads);

The Large Resection Stems are indicated for oncology applications.
The SMR Reverse Shoulder System is indicated for primary, fracture or revision total shoulder replacement in a grossly rotator cuff deficient joint with severe arthropathy (disabled shoulder). The patient's joint must be anatomically and structurally suited to receive the selected implants and a functional deltoid muscle is necessary to use the device.

The Modular SMR Shoulder System allows the assembly of components in various humeral and glenoid constructs. The constructs are intended for cemented and uncemented use as specified in the following table.

Consult instruction for use provided in the product package

In the Anatomic shoulder the humeral construct consists of the humeral stem, the humeral body, the adaptor taper and the humeral head. In the Reverse shoulder the humeral construct consists of the humeral stem, the reverse humeral body and the reverse liner. On the humeral side the fixation of the humeral stem determines if the construct is cemented or uncemented.

The Anatomic glenoid construct consists of an all polyethylene glenoid or a metal back assembled with a liner while the Reverse glenoid construct consists of the metal back, the connector and the glenosphere. On the glenoid side, the fixation of the all polyethylene glenoid or the metal back determines if the construct is cemented or uncemented.

System				Use	
Anatomic	Reverse	Components	Material	Cem	Not Cem
•	•	SMR Stems (Cemented, Cemented Revision)	Ti6Al4V	X	
•	•	SMR Stems (Cementless Finned, Cementless Revision)	Ti6Al4V		X
•	•	SMR Large Resection stems	Ti6Al4V	X	
•	•	SMR Modular Spacers for large resection stems	Ti6Al4V	X	
•		SMR Humeral Bodies (Trauma, Finned)	Ti6Al4V	X	X
•	•	SMR Reverse Humeral Body	Ti6Al4V	X	X
•	•	SMR Reverse HA Coated Humeral Body	Ti6Al4V+HA		X
•	•	SMR Humeral Extension	Ti6Al4V	X	X
•		SMR Humeral Heads (Standard, CTA)	CoCrMo	X	X
			Ti6Al4V	X	X
•		SMR Adaptor Tapers (Neutral, Eccentric)	Ti6Al4V	X	X
•	•	SMR CTA Head Adaptor for Reverse Humeral Body	Ti6Al4V	X	X
	•	SMR Glenospheres	CoCrMo		X
			Ti6Al4V		X
			UHMWPE X-Lima +Ti6Al4V		X
	•	SMR Connectors	Ti6Al4V		X
	•	Reverse Liners	UHMWPE	X	X
			UHMWPE X-Lima	X	X
			CoCrMo	X	X
•		SMR Cemented Glenoids	UHMWPE	X	
•		SMR 3 Pegs Cemented Glenoids	UHMWPE X-Lima	X	
			UHMWPE	X	
•	•	SMR Metal Back Glenoids	Ti6Al4V+PoroTi	X	X
			Ti6Al4V+PoroTi+HA		X
•		Metal Back Glenoid liner	UHMWPE	X	X
			UHMWPE X-Lima		X
•	•	SMR Bone screws	Ti6Al4V		X
	•	SMR Glenoid Plates	Ti		X
Material Standards					
Ti6Al4V (ISO 5832-3 - ASTM F1472) - CoCrMo (ISO 5832-12 - ASTM F1537) - Ti (ASTM F67) - UHMWPE (ISO 5834-2) - PoroTi Titanium Coating (ASTM F1580) - HA Hyroxyapatite Coating (ISO 13779)					

The Dia. 52 and 54 mm Humeral Heads with + 2mm increased height compared to the standard humeral heads with same diameter cannot be coupled to the Long Adaptor Tapers (both concentric and eccentric).

Indications, contraindications and warnings

WARNINGS

In selecting patients for surgery, the following factors can be critical to the eventual success of the procedure:

- **Partial Shoulder replacement:** in cases with a deficient and unreconstructable rotator cuff, a CTA-head is indicated;
- **Total Shoulder replacement:** the rotator cuff must be intact or reconstructable. In cases with a deficient and unreconstructable rotator cuff, a hemiprosthesis with a CTA head or a Reverse Total Shoulder Arthroplasty is indicated.
- **Reverse Shoulder replacement:** the bone stock of the glenoid and humerus must be able to support the implant. In cases with significant bone loss and in which adequate fixation on the glenoid side cannot be obtained, a hemiarthroplasty with a CTA-head should be performed.

Note. With CTA heads the use of Trauma Humeral Bodies is recommended to avoid possible impingement between the head and the body when using the Finned Humeral Body and the eccentric tapers in the lower position.

Note. The size Large metal back is not suitable for coupling with 36 mm and 40 mm glenospheres.

Note. The Dia. 50, 52 and 54 mm Humeral Heads with + 3mm increased height cannot be coupled to the Long Adaptor Tapers (both concentric and eccentric). The Dia. 52 and 54 mm Humeral Heads with + 2mm increased height cannot be coupled to the Long Adaptor Tapers (both concentric and eccentric).

Note. SMR lateralized connectors are not indicated for use with glenoid bone grafting technique.

Note. The following table identifies the allowed (✓) / not allowed (×) combinations between the SMR Lateralized Connectors and the SMR Glenospheres:

	Lateralized Connector	
Glenosphere	Lat +2mm	Lat +4mm
Dia. 36mm	✓	✓
Dia. 36mm Ecc.	×	×
Reverse HP Dia. 40mm	✓	✓
Reverse HP Dia. 44mm	✓	×
Reverse HP Dia. 44mm Corrective (Ecc.)	×	×

CONTRAINDICATIONS

Absolute contraindications include

1. local or systemic infection;
2. septicaemia;
3. persistent acute or chronic osteomyelitis;
4. confirmed nerve lesion compromising shoulder joint function;
5. deltoid muscle insufficiency.

Relative contraindications include:

- vascular or nerve diseases affecting the concerned limb;
- poor bone stock (for example due to osteoporosis or extended previous revision surgery) compromising the stability of the implant;
- metabolic disorders which may impair fixation and stability of the implant;
- any concomitant disease and dependence that might affect the implanted prosthesis;
- metal hypersensitivity to implant materials.

In cases of bone tumors, use an appropriate system designed to treat cases requiring large bone resections (SMR Large Resections stems). The use of primary or revision implants not designed and intended for use in cases of bone resection may result in a poor outcome and / or failure of the implant or implant fixation.

RISK FACTORS

The following risk factors may result in poor results with this prosthesis:

- overweight;*
- strenuous physical activities (active sports, heavy physical work);
- incorrect implant positioning;
- muscle deficiencies;
- wrong size of components;
- multiple joint disabilities;
- refusal to modify postoperative physical activities;
- patient history of infections or falls;
- systemic diseases and metabolic disorders;
- local or disseminated neoplastic diseases
- drug therapies that adversely affect bone quality, healing, or resistance to infection
- drug use or alcoholism;
- marked osteoporosis or osteomalacia;
- patient's resistance to disease generally weakened (HIV, tumour, infections);

- severe deformity leading to impaired anchorage or improper positioning of implants;
- use our combinations with products, prosthesis or instruments of another manufacturer;
- error of operative technique.

* Correlation between patient's weight condition and BMI as defined into the literature.

PREOPERATIVE PLANNING

Standard X-rays are used to assist with planning of the operation. It is recommended to use a normal ap-view in internal and external rotation as well as an axillary view, Bernageau or Morrison view. In a fracture case it is recommended to use a CT-Scan with three-dimensional reconstruction.

If required an MRI can be used for clear examination of the extent of the bone deficit and to see the muscle/capsule quality. In cases of osteoarthritis and osteonecrosis a magnetic resonance exam is suggested to clearly evaluate the bone deficiency and the quality of the muscle and the capsule.

In post-traumatic cases, such as in special cases of disabled shoulder, a neurological exam is helpful for decision making.

Templates are used in all osteoarthritic cases; they can also be used in fracture cases but often in a limited mode, depending on the type of fracture.

The x-ray templates provided for SMR have a 105% scale; digital templates are available as well.

ANAESTHESIA

Shoulder surgery is one of the areas in which an understanding of the surgery and participation by the anaesthesiologist is important for the outcome of the surgery. This applies to accurate preoperative evaluation of the patient as well as intra op techniques. They should have a good understanding of positioning on the operating table and postoperative pain management.

Shoulder prosthetic replacement can be performed with regional (scalenus) anaesthesia combined with sedation and/or with general anaesthesia. The modern technique of interscalenic block was introduced by Winnie in 1970 and soon became the standard for anaesthesia and postoperative pain management of shoulder surgery. Requested surgical positioning (beach chair position) must be accurately followed by the anaesthetic staff to avoid hypotension and consequent brain hypoperfusion.

Artificial hypotension during surgery can only be performed under accurate anaesthesia.

Postoperative analgesia is important and can be performed by continuous or single-injection nerve blocks or intravenously. If for any reason a nerve block is not possible, patient-controlled analgesia (PCA) is recommended.

POSITIONING

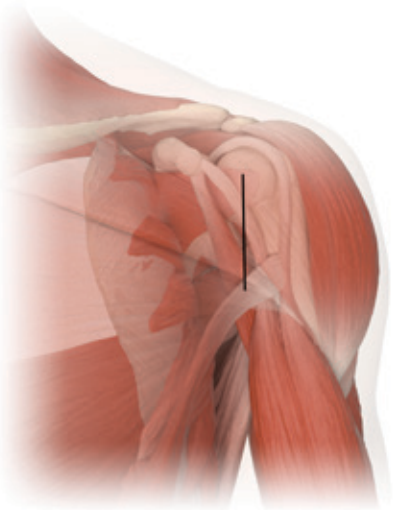
Shoulder arthroplasty is normally performed in a "beach-chair" position; the surgeon needs complete access to the shoulder joint. The arm is free or stabilized by arm-holders. The shoulder must be positioned off the edge of the table to afford unobstructed arm extension.

The patient's head must be supported and stabilized in the neutral position. Nerve injury due to brachial plexus traction during positioning and surgery must be avoided. If possible, one assistant stays behind the shoulder, the second on the opposite side of the patient, so the surgeon has a complete anterior view of the shoulder and can move the joint without any obstacles.

ACCESS

We recommend two types of surgical approach to the shoulder joint. As in every surgical procedure, the access depends not only on diagnosis and planned surgical treatment but also on the experience of the surgeon.
Ranges of glenohumeral motion are evaluated while anaesthetized to confirm the preoperative assessment and the extent of capsular release needed to restore ROM postoperatively.

DELTO-PECTORAL APPROACH



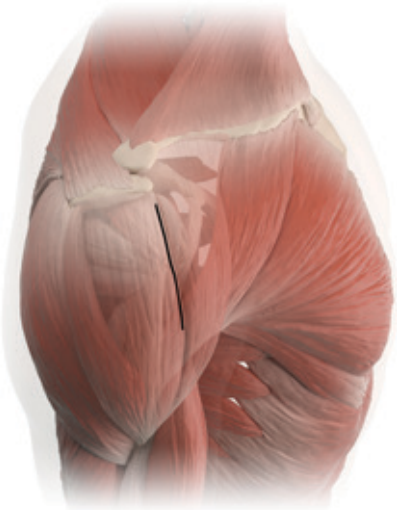
Make an anterior vertical incision, starting 1 cm lateral of the coracoid bone, slanting towards the axillary's pouch. If there is a metaphysis fracture, slant laterally towards the deltoid insertion at the humerus.
The cephalic vein is dissected and the deltopectoral interval is developed, retracting the deltoid and the cephalic vein laterally.

The clavipectoral fascia is incised along the lateral edge of the conjoined tendon up to the coracoacromial ligament. With the clavipectoral fascia incised, a retractor can easily be placed over the superolateral aspect of the humeral head to retract the deltoid.
The conjoined tendon is retracted medially.
The musculocutaneous nerve penetrates the lateral coracobrachialis muscle between 3 and 8 cm distal to the tip of the coracoid process. The position of the axillary nerve should be indentified along the anterior surface of the subscapularis muscle, deep to the conjoined tendon. The axillary nerve crosses the inferolateral border of the subscapularis 3 to 5 mm medial to its musculotendinous junction and has an intimate anatomic relation with the inferior capsule.

The anterior humeral circumflex artery and veins are visualized, ligated and divided. The subscapularis tendon is released, divided 1 cm medial to its attachment or with some bone chip of the lesser tuberosity. Separate the subscapularis from the capsule and incision of the capsule is performed to the inferior border of the glenoid rim, protecting the axillary nerve with a blunt retractor. Release of the subscapularis and 360° capsular release.

Closure: Accurate reconstruction of the minor and major tubercles by suture, bone anchors or cerclage. If the long head of the biceps tendon is intact, also reconstruct the biceps groove to avoid impingement.
Closure of delto-pectoral groove.

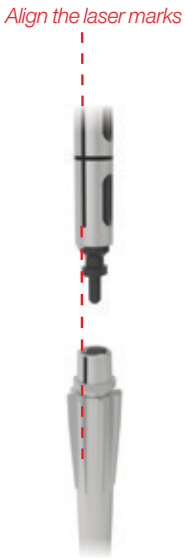
LATERAL (DELTOID SPLITTING) APPROACH

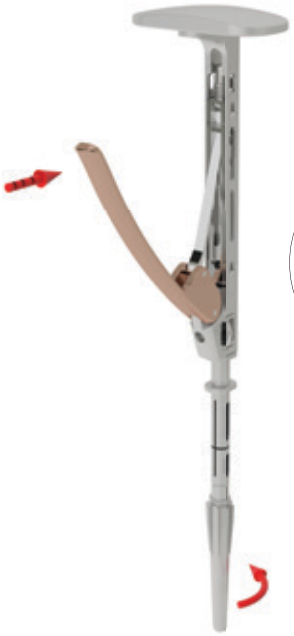


Begin the incision at the anterolateral tip of the acromion and carry it distally over the deltoid muscle about 5 cm. Define the tendinous interval 4 to 5 cm long between the anterior and middle thirds of the deltoid; splitting the muscle here provides an avascular approach to underlying structures. Incise the thin wall of the subdeltoid bursa and explore the rotator cuff as desired by rotating and abducting the arm to bring different parts of it into view in the floor of the wound.

CLOSURE

After the definitive prosthesis has been implanted, reconstruction of the rotator cuff is recommended by re-fixation of the subscapularis in the reverse case. In case of anatomic reconstruction evaluate after reattachment of the subscapularis if closure of the rotator interval is needed for further stability or not. Closure of the deltopectoral fascia, subcutaneous adaption and skin closure.





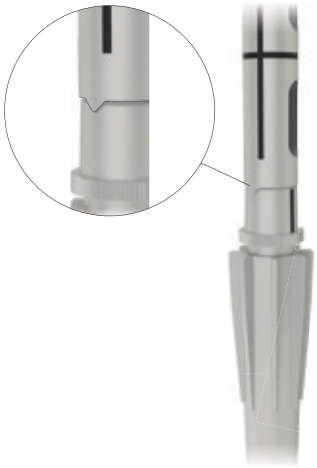


Figure 1 Figure 2 Figure 3 Figure 4 Figure 5

PRELIMINARY PHASES

Prosthetic treatment of acute traumas is generally limited to complex fractures-dislocations: fractures in 3-4 fragments, dislocation fractures of the humeral head, compression fractures with over 50% of the articular surface being damaged, etc.

FRACTURE FRAGMENT REMOVAL

It is recommended to locate distally the tendon of the long head of the biceps muscle, as it serves as guide for identifying the lesser and the greater tuberosities. These fragments are carefully preserved with the tendons of the rotator cuff inserted. Once the articular cavity has been entered, the other fragments are removed, including the humeral head. If the arm is extended and externally rotated, the diaphyseal stump can be clearly seen.

PREPARATION OF THE HUMERAL CANAL

Connect the *trial stem (C13)* with the diameter assessed during the preoperative plan to the *quick connection stem impactor (E13)* (Figure 1). To do this, insert the trial stem on the impactor aligning the laser marks (Figure 2), then turn it by approximately 90° counterclockwise and finally close the impactor's lever to engage the locking mechanism (Figure 3). Check that the spikes of the quick connection stem impactor are properly inserted in their seats on the trial stem (Figure 4) and then tap the stem into the canal (Figure 5).

Check the press-fit inside the canal by pulling the impactor and, if necessary, replace the stem with the next size up.

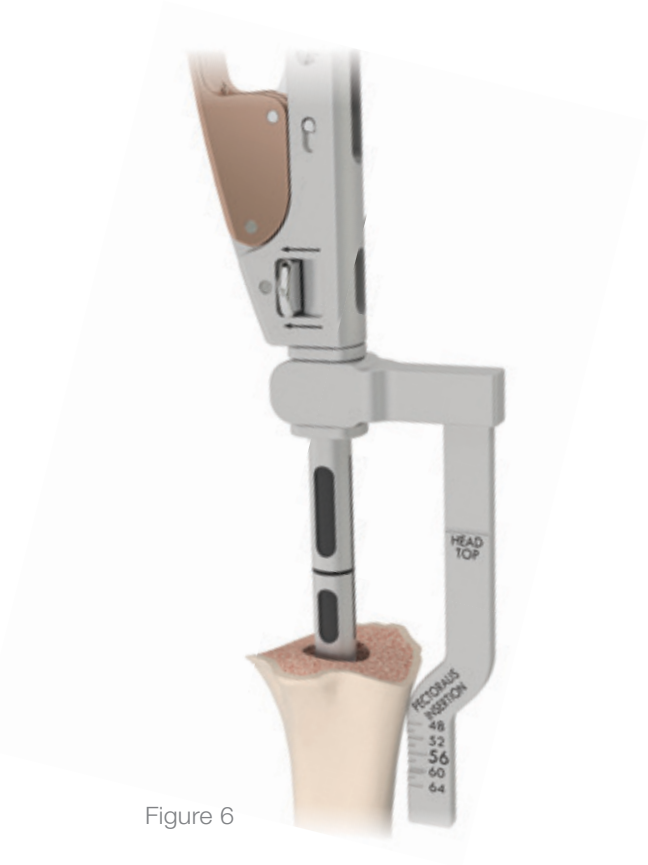


Figure 6

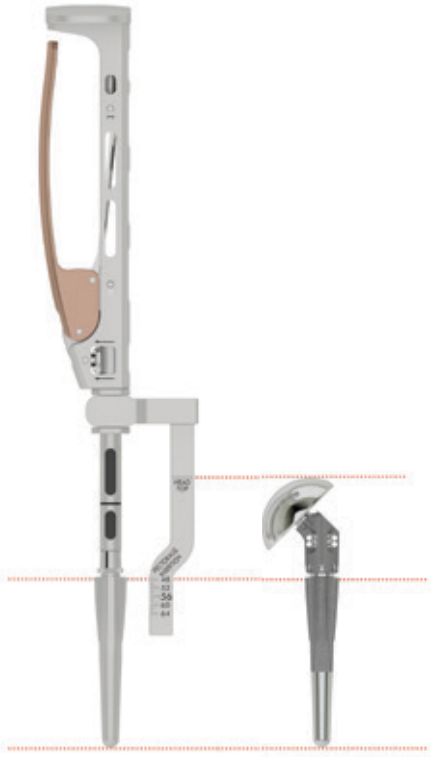


Figure 7

USE OF THE TRAUMA RULER

ASSESSMENT VIA THE "PECTORALIS MAJOR TENDON" RULE

The *trauma ruler (U23)* is provided to support the surgeon in the assessment of final implant height according to the "Pectoralis Major Tendon" rule (Torrens et al. 2008). In this case, use the Pectoralis Major Tendon proximal insertion as a specific reference point. The rule recommends placing the implant 56 mm above the upper insertion of the pectoralis major to restore, to a good approximation, the original anatomy of the fractured humerus.
Insert the trauma ruler in its seat on the *quick connection stem impactor's (E13)* (Figure 6) to assess implant's height.

If this rule is applied, the trauma ruler will therefore provide final implant height at 56 mm from the proximal insertion of the Pectoralis Major Tendon when a 46 mm humeral head, Medium humeral body and a neutral adaptor taper are used (Figure 7). If a larger or smaller diameter humeral head with a neutral adaptor taper is used instead, the implant will be 1 mm upper or lower each size respectively with regards to the horizontal mark (e.g.: 48 mm humeral head: +1 mm, 50 mm humeral head: +2 mm etc.).

The use of an eccentric adaptor taper and/or the use of a flattened humeral head will also affect final implant's height compared with the one indicated by the mark of the trauma ruler. In these cases, the surgeon should therefore assess final implant's height according to his/her experience by using the trial components.

Once the correct stem diameter has been determined and the indicated measurement has been noted, remove the trauma ruler, the quick connection stem impactor and the trial stem and proceed to the next surgical step.

Figure 8

Figure 9

Figure 10

Figure 11

The instruments feature color coding to support the surgical team using the system. The SMR humeral body is available in the three sizes: SHORT, MEDIUM and LONG. The color code is yellow for the Short size, orange for the Medium and purple for the Long size.

Apply a Medium, Long or Short *trial humeral body (H23)* to the selected stem and tighten the locking screw using the *allen wrench 5 mm (N23)* properly connected to the *ratchet T-handle with Zimmer connection (F13)* (Figure 8). Ensure that the ratchet is properly set before tightening (left turning, right turning or locked positions are allowed).

Assemble the *inserter-extractor handle (A23)* with the correct *pushrod tip (I23)* (Figure 9) and then connect the *anatomic adaptor sleeve (B23)* to the instrument (Figure 10): the *MEDIUM pushrod tip (I23)* shall be used with the MEDIUM humeral body. Otherwise, if a LONG or a SHORT humeral body is used, connect the LONG or the SHORT pushrod tip, respectively. Ensure that the pushrod tip is properly engaged into the shaft of the inserter-extractor handle before using the instrument.

Place the trial implant assembly on the previously assembled inserter and fasten it by closing the red lever (Figure 11).

Figure 12

Figure 13

Before inserting the assembly into the canal, connect the *alignment rod (S23)* into the appropriate retroversion hole (LEFT or RIGHT for the corresponding shoulder side) on the adaptor sleeve to obtain the chosen retroversion angle (20° and 30° positions are available).
Next, align the rod with the forearm flexed at 90° (Figure 12). In this position, the implant will be inserted according to the chosen retroversion (20° or 30°).

If less or more retroversion is required, the rod should be externally or internally rotated respectively, by an angle of choice.

Insert the stem in the canal and as soon as the fins start to disappear, insert the trauma ruler in the seat to copy the height of the previously measured implant.

Option - As an alternative to the inserter-extractor handle a trial implant can be completed by assembling the trial body with the trial stem selected, which has been left in its seat. Apply the trial humeral body and tighten the locking screw using the *allen wrench 5 mm (N23)* with the help of the *body stopper (J23)* (Figure 13).

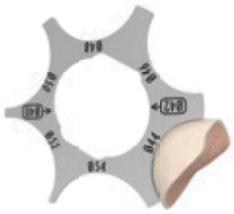


Figure 14

Figure 15

FIgure 16

Figure 17

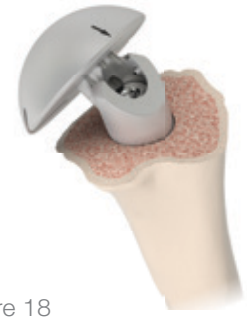


Figure 18

TRIAL ADAPTORS AND HUMERAL HEADS

The head diameter is determined using the *head gauge (F23)* (Figure 14). Insert the *neutral trial adaptor (G23)* into the *trial humeral head (E23)* by hand (Figure 15) and fit the head to the taper of the trial humeral body (Figure 16). Reduce the joint and check the match with the glenoid in neutral position of the arm. If it is not well aligned with the glenoid cavity, substitute the neutral adaptor with an eccentric one. Make up for any ligamentous laxity by using a long adaptor.

To remove trial adaptors use the *extracting pliers for trial adaptors (W23)* (Figure 17). If an eccentric adaptor is used, note the position of the head, using the arrow as a reference (Figure 18). This procedure helps to place the final head in the correct position. If there is no humeral landmark near the head, memorise the last adaptor peg seat in the trial humeral body. The final head peg should be inserted in the same seat again. Remove all trial components.

Caution! During this step, the head is not locked to the neck of the humeral body, therefore when inserting the humerus in the articular cavity again, make sure that the head does not uncouple.

Figure 19

Figure 20

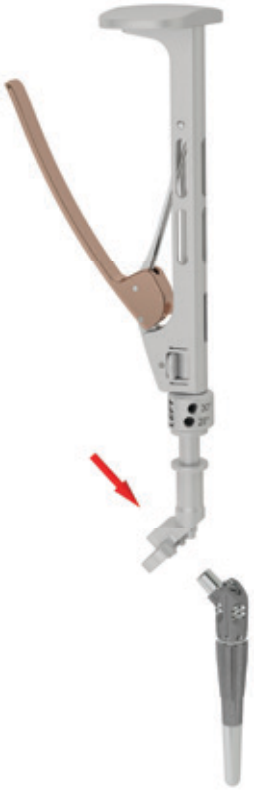


Figure 21

Figure 22

Figure 23

INSERTION OF THE FINNED STEM

Take the final finned stem with the same size as the last trial stem used. Also take the trauma humeral body in the height required.

INSERTION OF THE STEM AND FINAL BODY

Assemble the final humeral body on the finned stem. If the *stem extractor (D13)* is screwed in with force, it will engage the Morse taper (Figure 19). The *body stopper (J23)* can be used to exert a countertorque.
Remove the extractor and tighten the safety screw using the *allen wrench 5 mm (N23)* (Figure 20). The *body stopper (J23)* can be used to exert a countertorque again.
Connect the implant to the inserter-extractor handle assembled with the anatomic adaptor sleeve and the pushrod tip (Figure 21).

Important! Check that the correct pushrod tip is assembled on the inserter handle: the MEDIUM *pushrod tip (I23)* shall be used with the MEDIUM humeral body. Otherwise, if a LONG or a SHORT humeral body is used, connect the LONG or the SHORT pushrod tip, respectively. Ensure that the pushrod tip is properly engaged into the shaft of the inserter-extractor handle before using the instrument.

Before inserting the implant, connect the *alignment rod (S23)* into the appropriate retroversion hole on the anatomic adaptor sleeve and repeat the alignment procedure with the forearm to obtain the choosen retroversion angle.

Tap the implant into the canal (Figure 22) and stop when the trauma ruler has reached the required depth in relation to the reference point that had been previously chosen on the humeral stump (Figure 23); remove the introducer.

Figure 24

Figure 25

Figure 26

Figure 27

APPLICATION OF THE ADAPTOR TAPER TO THE HUMERAL HEAD

Remove the appropriate adaptor taper and final head from the sterile packaging.
Apply the adaptor taper to the head (Figure 24). If an eccentric adaptor taper is used, insert it by aligning the marking with that of the humeral head (Figure 25). The concentric adaptor taper has no such markings. Connect the *humeral head press (D23)* to the *ratchet T-handle (F13)*.

Position the system in the *humeral head press (D23)* and tighten. In this way the head and the adaptor taper will be press fitted together while applying an opposite force with the *multipurpose handle (G13)* (Figure 26).

INSERTION OF THE HUMERAL HEAD

Apply the humeral head to the humeral body inserting the adaptor taper peg in the same position as the trial component.

Make sure that the contact surfaces are perfectly clean and that the head or adaptor does not contact the bone, as this could compromise the stability of the Morse taper coupling. Lastly, secure the taper coupling by tapping with the *humeral head impactor (C23)* (Figure 27).

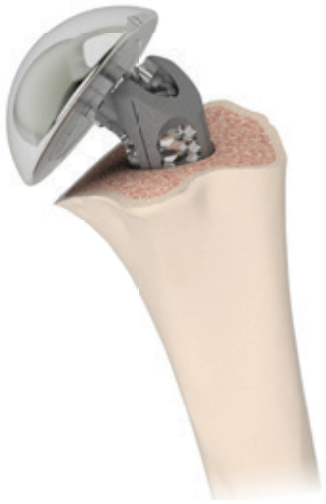


Figure 28

Figure 29

REDUCTION AND SUTURE

The joint is reduced by means of gentle traction and internal rotation (Figure 28).
The capsule is not sutured to avoid stiffness and restriction. Accurate reconstruction of the tuberosities around the humeral body and reinsertion of the subscapularis muscle, by trans-osseous stitches to the lesser tuberosity, is performed.
The use of suction drainage is recommended.

CEMENTED STEM

If cemented stems are used, the operating technique has a few variations. Proceed as described previously, replacing the “finned stem” with the “cemented stem” (Figure 29). Use a stem of two diameters smaller than the trial one, this will create a cement mantle of 1 mm. Instruments and procedure remain the same.
Fill the canal with cement, then insert the assembled components with the introducer assembly using the trauma ruler to reproduce the same height of the implant that was measured during the trial. Proceed with the surgical technique only when the cement has set.
Pay attention to proximal cleaning of the humeral head. The seat of the adaptor taper must be free from cement.

Figure 1

Figure 2

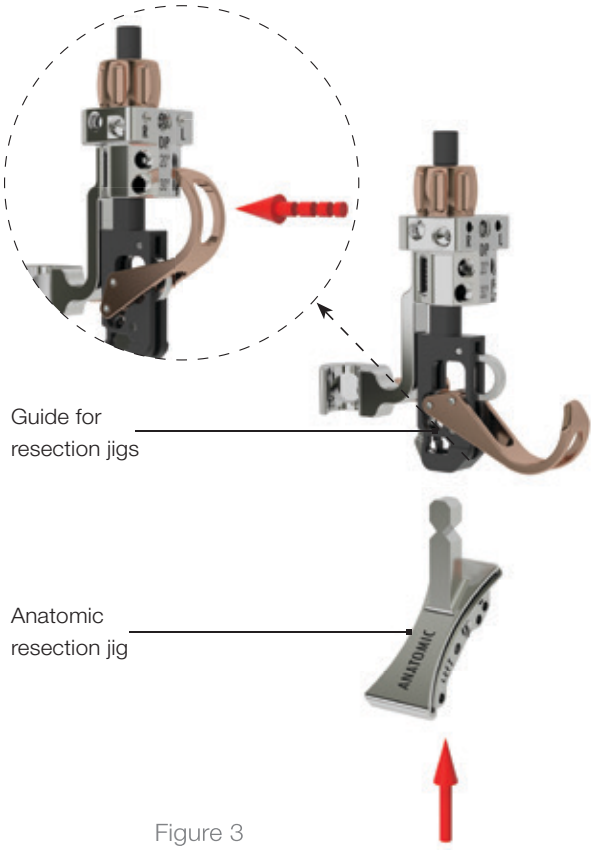


Figure 3

PREOPERATIVE PLANNING

To obtain the best results, pre-operative planning is highly recommended with the use of templates showing a 5% enlarged image of the profiles. Use good quality frontal view radiographs with adequate contrast that are large enough to contain the entire length of the pre-op template stems. Select the stem size and resection level of the humeral head, which will serve as a reference for the final implant height.

DISLOCATION OF THE HUMERAL HEAD

Disinsert the subscapuraris tendon at its insertion on the lesser tuberosity and medialize the tendon, dividing it from the underneath capsule. Perform an anterior-oblique capsulotomy, paying attention to avoid injury of the axillary nerve. A retractor, placed between the capsule and the tendon, can be used for protecting the nerve. With careful external rotation and extension (the humerus may be osteoporotic and osteophytes may block the rotation process), the humeral head is dislocated from the front. All humeral osteophytes are carefully removed from the humeral head so that the anatomical neck can be determined.

REAMING OF THE HUMERAL CANAL AND RESECTION OF THE HEAD

REAMING

Open the proximal end of the humerus with the *awl (A13)* connected to the *ratchet T-handle with Zimmer connection (F13)* (Figure 1). Connect the *humeral reamer (B13)* to the *ratchet T-handle with Zimmer connection (F13).* Insert the reamer into the humerus by rotating it into the canal until the stopper flange gets in contact with the surface of the humeral head (Figure 2). Prepare the *anatomic resection jig (Q23)* by properly connecting it to the *guide for resection jigs (P23)* (Figure 3).

FIgure 4

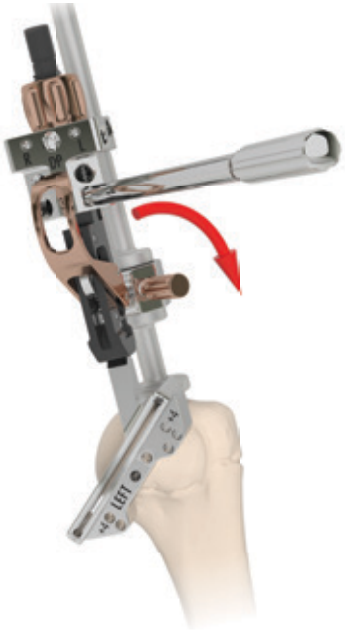


Figure 5

Connect the *alignment rod (S23)* to the assembly on the LEFT or the RIGHT side to obtain the chosen retroversion angle (20° and 30° positions are available).
Connect finally the assembly to the humeral reamer according to the shoulder side that is being operated (Figure 4). For a left shoulder, the mark LEFT shall be frontally visible on the resesction jig and viceversa the mark RIGHT for a right shoulder.

Note. When there is a large humeral canal the reamer, which has a proximal diameter of 16 mm, may enter the canal at an incorrect angle with consequent surgical error in the resection of the humeral epiphysis. To avoid this problem, apply a trial stem with a diameter larger than the reamer to the *quick connection stem impactor (E13)*, and tap it into the canal. Position then the resection jig assembly on the stem impactor.

If, on the other hand, the humeral canal is small, the reamer will not be able to go in all the way. Therefore apply a trial stem with a smaller diameter to the stem impactor and tap it into the canal.

RETROVERSION

Keeping the forearm flexed at 90°, rotate the resection guide until the *alignment rod (S23)* and the forearm are parallel. Then fix the selected retroversion by screwing the threaded rod (Figure 5).
A resection with the chosen retroversion will then be performed in this position. If less or more retroversion is required, the rod should be externally or internally rotated respectively.

Figure 6

Figure 7

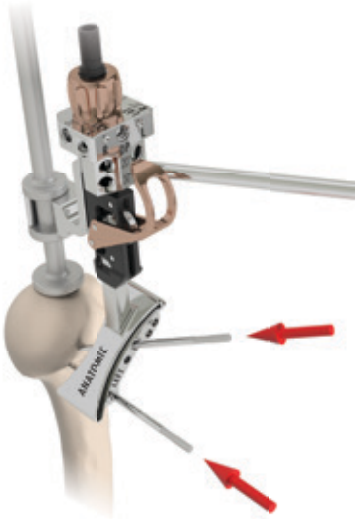


Figure 8

HEAD RESECTION

Adjust the height of the resection jig level until it is aligned with the anatomic neck. Turn clockwise or counter-clockwise the red knob to move the jig upwards or downwards respectively (Figure 6).

Use the *sickle (R23)* to assess the resection height (Figure 7) and secure the guide to the humerus with the *3 mm pins (V23)* (Figure 8) once the selected height is reached.

Figure 9

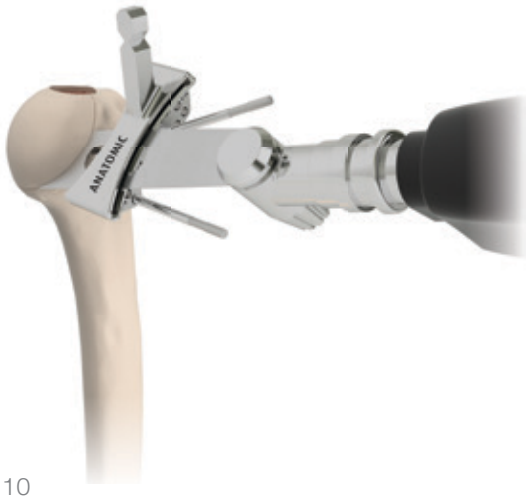


Figure 10

Once the jig is secured to the humerus with the pins, remove the guide by releasing the red lever and sliding upwards the guide for resection jigs together with the reamer, leaving only the jig onto the humerus (Figure 9).

Resect the humeral head with a blade through the guided slot of the jig (Figure 10); finally, remove the pins and the jig. If a glenoid replacement is required please refer to “SMR Glenoid” on page 32.

If needed, the SMR instrument set includes *humeral covers* (*D33*, SMALL and LARGE) to be applied to the humeral resection plane to protect the resected part.

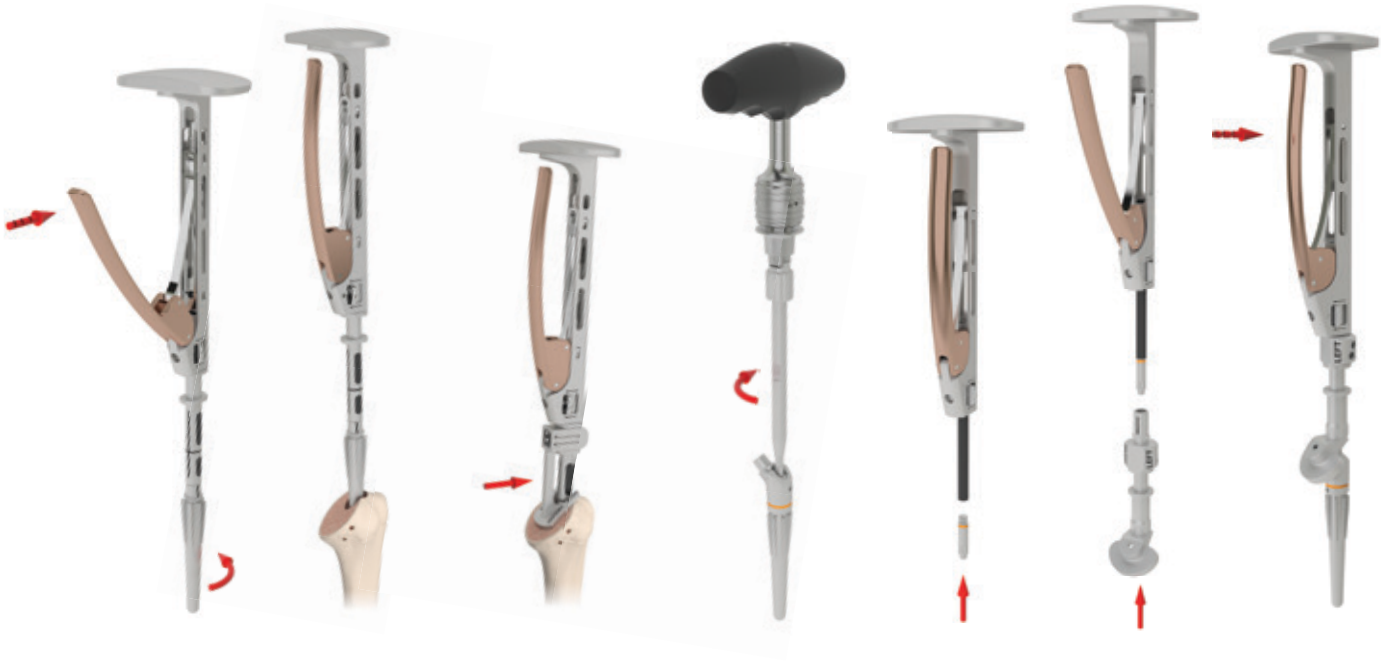


Figure 11 Figure 12 Figure 13 Figure 14 Figure 15 Figure 16 Figure 17

PREPARATION OF THE HUMERUS

CHOICE OF STEM SIZE

Once the glenoid component has been implanted, expose the humerus and remove the protection cover.

Connect the *quick connection stem impactor (E13)* to the *trial stem (C13)* (Figure 11), tap into the canal (Figure 12) and make sure that the *45° stop guide (O23)* located in the seat on the impactor comes into contact with the resected humeral surface (Figure 13).

Remove the stop guide and tap the stem in further. If it sinks in, use a stem of the next size up until getting the right one that does not go beyond the resected level. Remove the device and assemble a trial implant using the proper trial stem.

Apply the Medium *trial humeral body (H23)* to the stem and tighten the quarter-turn locking screw using the *allen wrench 5 mm (N23)* connected to the *ratchet T-handle (F13)* (Figure 14).

Assemble the *inserter-extractor handle (A23)* with the correct *pushrod tip (I23)* (Figure 15) and then connect the *anatomic adaptor sleeve (B23)* to the instrument (Figure 16). Check that the pushrod tip is properly engaged into the shaft of the inserter handle before using the instrument.

Place the trial implant assembly on the previously assembled introducer and fasten it by closing the red lever (Figure 17). Before inserting the assembly into the canal, connect the *alignment rod (S23)* to the assembly (LEFT or RIGHT for the corresponding shoulder side) to obtain the chosen retroversion angle (20° and 30° positions are available).

FIgure 18

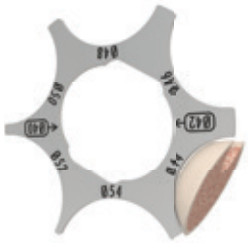


FIgure 19

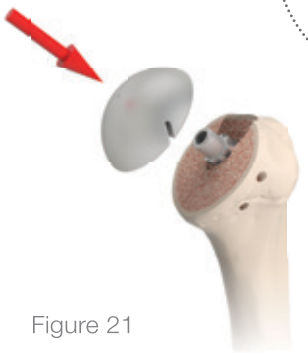


Figure 21

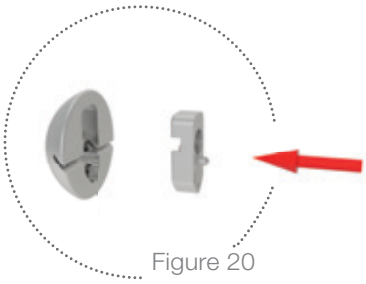


Figure 20

Figure 22

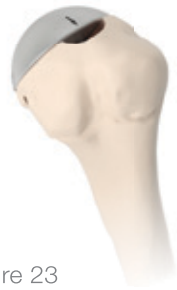


Figure 23

Next, with the arm at 90°, bring the rod parallel to the forearm. In this position, the implant will be inserted according to the chosen retroversion (20° or 30°).

If less or more retroversion is required, the rod should be externally or internally rotated respectively, by an angle of choice.
Tap the trial implant into the canal until the distal plate of the impactor comes into contact with the resected surface (Figure 18).

TRIAL ADAPTORS AND HUMERAL HEADS

The head diameter is determined using the *head gauge (F23)* (Figure 19). Insert the *neutral trial adaptor (G23)* to the *trial humeral head (E23)* by hand (Figure 20) and fit the head to the taper of the trial humeral body (Figure 21). Reduce the joint and check the match with the glenoid with the humerus in neutral position. If it is not well aligned with the glenoid cavity, substitute the neutral adaptor with an eccentric one. Make up for any ligamentous laxity by using a long adaptor.

To remove trial adaptors use the *extracting pliers for trial adaptors (W23)* (Figure 22). If an eccentric adaptor is used, mark the position of the head with an electric scalpel, using the arrow as a reference (Figure 23). This procedure helps to place the final head in the correct position. If there is no humeral landmark near the head, memorise the last adaptor peg seat in the trial humeral body. The final head peg should be inserted in the same seat again. Remove all trial components.

Caution! During this step, the head is not locked to the neck of the humeral body, therefore when inserting the humerus in the articular cavity again, make sure that the head does not uncouple.

Figure 24

Figure 25

Figure 26

Figure 27

Figure 28

INSERTION OF THE FINNED STEM

Take the final finned stem with the same size as the last trial stem used. Also take the final finned humeral body.

Assemble the final humeral body on the finned stem. If the *stem extractor (D13)* is screwed in with force, it will engage the Morse taper (Figure 24). The *body stopper (J23)* can be used to exert a countertorque.

Remove the extractor and tighten the safety screw using the *allen wrench 5 mm (N23)* (Figure 25). The *body stopper (J23)* can be used to exert a countertorque.

Connect the implant to the inserter-extractor handle assembled with the anatomic adaptor sleeve and the pushrod tip (Figure 26).

Important! Check that the correct pushrod tip is assembled on the impactor handle: the MEDIUM *pushrod tip (I23)* shall be used. Ensure that the pushrod tip is properly engaged into the shaft of the inserter-extractor handle before using the instrument.

Before inserting the implant, connect the *alignment rod (S23)* into the appropriate retroversion hole on the anatomic adaptor sleeve and repeat the alignment procedure with the forearm to obtain the choosen retroversion angle.

Tap the implant into the canal (Figure 27) and stop once the introducer plate comes in contact with the resected humeral surface (Figure 28); remove the introducer assembly.

Figure 29

Figure 30

Figure 31

APPLICATION OF THE ADAPTOR TAPER TO THE HUMERAL HEAD

Remove the appropriate adaptor taper and final head from the sterile packaging.

Apply the adaptor taper to the head (Figure 29). If an eccentric adaptor taper is used, insert it by aligning the marking with that of the humeral head (Figure 30). The concentric adaptor taper has no such markings. Connect the *humeral head press (D23)* to the *ratchet T-handle (F13)*.

Position the system in the humeral head press and tighten. In this way the head and the adaptor taper will be press fitted together while applying an opposite force with the *multipurpose handle (G13)* (Figure 31).

Figure 32

Figure 33

Figure 34

INSERTION OF THE HUMERAL HEAD

Apply the humeral head to the humeral body inserting the adaptor taper peg in the same position as the trial component (Figure 32).
Make sure that the contact surfaces are perfectly clean and that the head or adaptor does not contact the bone, as this could compromise the stability of the Morse taper coupling. Lastly, secure the taper coupling by tapping with the *humeral head impactor (C23)* (Figure 33).

REDUCTION AND SUTURE

The joint is reduced by means of gentle traction and internal rotation.
The capsule is not sutured to avoid stiffness and restriction. Accurate reconstruction of the tuberosities around the humeral body and reinsertion of the subscapularis muscle, by trans-osseous stitches to the lesser tuberosity, is performed.
The use of suction drainage is recommended.

CEMENTED STEM

If cemented stems are used, the operating technique has a few variations. Proceed as described previously, replacing the “finned stem” with the “cemented stem” (Figure 34). Use a stem of two diameters smaller than the trial one, this will create a cement mantle of 1 mm. Instruments and procedure remain the same.
Fill the canal with cement, then insert the assembled components with the introducer assembly. Proceed with the surgical technique only when the cement has set.
Pay attention to proximal cleaning of the humeral head and humeral body. The tapers must be free from cement.

Figure 1

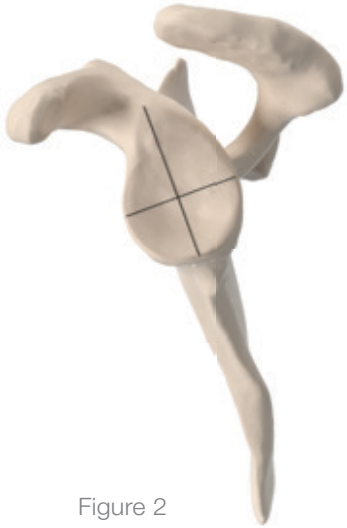


Figure 2

Figure 3

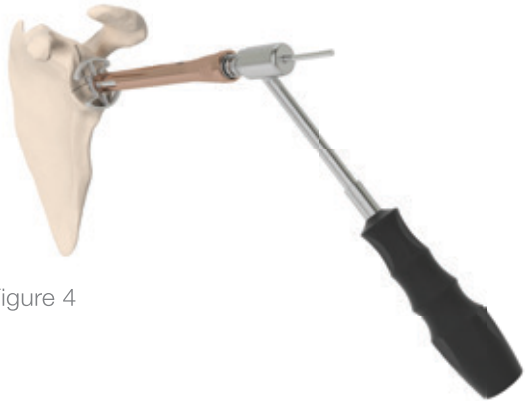


Figure 4

Insertion of the glenoid component of a total shoulder replacement is carried out after the humeral head has been resected and always before inserting the final humeral prosthesis.

EXPOSURE

Expose the glenoid performing an accurate capsular release to visualize the glenoid bone stock using adequate retractors: the *Fukuda (N33)* and the *Glenoid retractor (I33)* (Figure 1) are included into the SMR Glenoid set. Retractors should be placed so that the entire glenoid face is in clear view to aid accurate placement of the guide K-wire (Figure 2).

Any peripheral osteophytes should be removed to restore the natural anatomic shape of the glenoid.

CEMENTLESS METAL BACK GLENOID IMPLANT

DETERMINATION OF THE GLENOID CENTER

The K-wire positioning jigs are used to obtain the optimal metaglene position. The jigs are available in two sizes (Small and Standard, which reproduce the dimensions of the Metal Back) and with different inclinations (0°, 10°, 10° Anterior).

In case of glenoid erosion and / or glenoid bone deficiency, one of the angulated jigs can be used in order to insert the K-wire with the correct inclination. The instrument can be used both to find the glenoid centre and to evaluate the glenoid size. Assemble the chosen *jig (H33)* to the *positioning handle (G33)*; then turn the red sleeve clockwise to secure the jig (Figure 3).

Taking the K-wire positioning jig in place, introduce the 2.5 mm Kirschner wire into the glenoid bone (Figure 4).

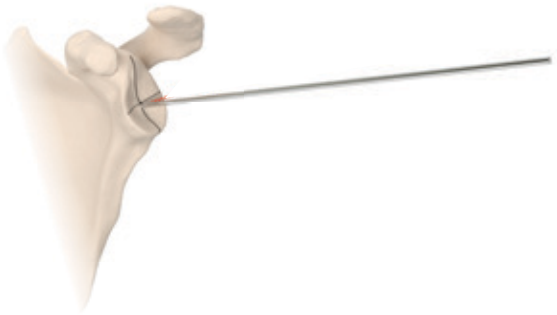


Figure 5

Figure 6

The direction taken by the guidewire will determine the final version of the glenoid component. Therefore, it is strongly recommended to perform a preoperative CT Scan or MRI before evaluating any deformation in the articular surface caused by degenerative pathologies or trauma. All correction should be made at this stage as no correction can be made when impacting the implant.

Remove the k-wire positioning guide, leaving the guide pin in place (Figure 5).

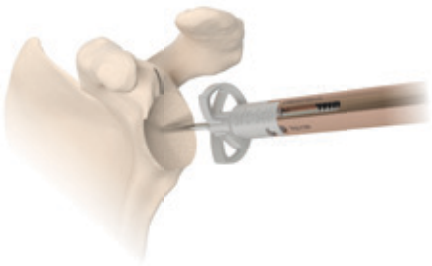


Figure 7

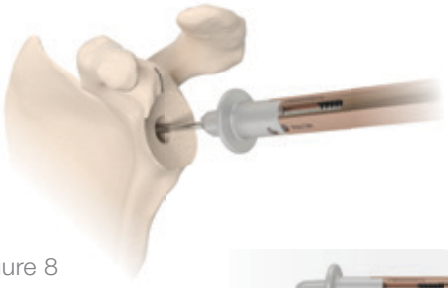


Figure 8

Figure 9

PREPARATION OF THE GLENOID SURFACE

Once the K-wire has been inserted, connect the *glenoid reamer (E33)* of the proper size (Small, STD or Large) to the *reamer shaft (J33)* (Figure 6) and ream the glenoid surface carefully (Figure 7). The purpose of this operation is to remove the cartilage and expose the subcondral bone rather than excessive bone removal.

Remove the reamer and prepare the central hole. Attach the *Small-R drill (B33)* on the *drills shaft (J33)* (Figure 8) and drill on the guide wire, until the drill baseplate touches the subchondral bone. If a component with larger peg is required (for Metal Back Small, STD or Large) use the *Small/STD /Large drill (B33)* (Figure 9).

Figure 10

Figure 11

Figure 12

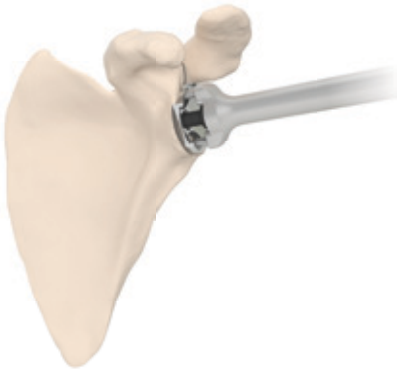


Figure 13

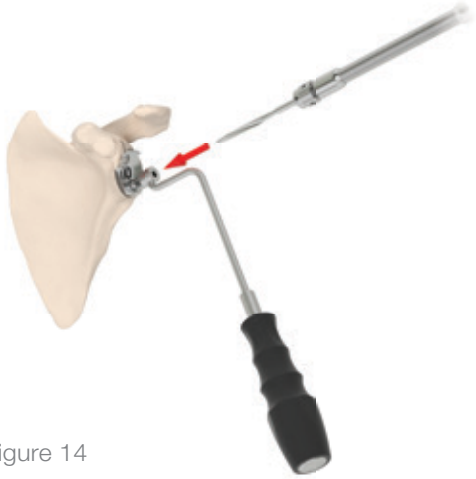


Figure 14

INSERTION OF CEMENTLESS METAL BACK GLENOID

Remove the Metal Back component of the chosen size from sterile packaging and introduce it into the glenoid cavity using the dedicated instrument. To do this, screw the appropriate *impactor guide (L33)* (Small-R or Small/STD) to the final implant and apply the *Metal Back impactor (K33)* (Figures 10-11). The two pins of the impactor fit into the Metal Back holes for the screws and allow for the Metal Back orientation (Figure 12). The long axis of the prosthesis should coincide with the larger axis of the glenoid (Figure 13). Remove the impactor by pressing the release button and unscrew the impactor guide from the implanted Metal Back.

Option - The impactor can be used as a counter torque during the removal phase: first unscrew the guide using the *screwdriver (R33)* on the top of the assembly, then remove the impactor and the guide together. Press the release button to separate the guide from the impactor.

INSERTION OF BONE SCREWS

Once the Metal Back glenoid has been positioned, prepare the holes for the fixation screws using the *flexible mandrel with Zimmer connection (T33)* attached to the *helix drill (O33)* and the *drill guide (M33)* (Figure 14).

The Long helix drill is available with notches and markings useful to evaluate the depth of the drilled hole, using the drill guide as a reference. Verify the depth of the prepared hole using the *depth gauge (S33).* Nevertheless, the superior screw should be oriented towards the base of the coracoid, while the inferior screw should point dorsally.

After having prepared the hole of the first screw, insert the screw using the *screwdriver (R33)* attached to the *ratchet handle (Q33)* and the *screw pliers (P33)* but do not fully tighten until the next screw hole has been prepared and the second screw has been inserted. The screws must be tightened at the same time to guarantee the best fit of the Metal Back on the prepared glenoid.

Figure 15

Figure 17

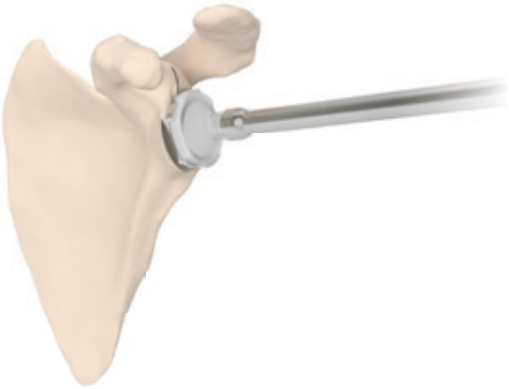


Figure 16

UHMWPE LINER INSERTION

Remove the polyethylene liner of the same size as the implanted Metal Back from the sterile packaging and after having carefully cleaned the inside and the edges of the Metal Back from fat and soft tissue, push the liner until it snaps in using the *liner inserter (F33 and U33)* (Figures 15-16).

Note. Insertion is not reversible. If the liner that has just been inserted needs to be removed intraoperatively, open an UHMWPE liner of the same size and redo the implant of the liner from scratch, after the removal of the previous liner. During the next steps, pay attention not to damage the liner with metal objects. At the end, when removing the Fukuda retractor take care to avoid possible impingement with the glenoid prosthesis.

CEMENTED UHMWPE GLENOID IMPLANT

The cemented implant is recommended where there is poor bone trophism.
The glenoid preparation procedure requires a few simple variants. Proceed as described in the cemented metal back glenoid implant operating technique up to section “Preparation of the glenoid surface”.

PROSTHESIS SELECTION AND FIXATION

Remove the UHMWPE glenoid of the same size as the used glenoid reamer from the sterile packaging. Make sure that the prosthesis fits perfectly into the seat that has been prepared beforehand. Place the acrylic cement in the cavity and insert the final glenoid component, pressing it in with the *cemented glenoid pusher (C33)* (Figure 17) until the cement has completely set. Make sure that the cement covers all the seat; this ensures the complete cementation of both the glenoid peg and backside.

SMR 3 Pegs Glenoid

Figure 1

CEMENTED 3 PEGS GLENOID IMPLANT

For a correct glenoid preparation an adequate glenoid exposure is required. The *fukuda (N33)* and the *glenoid retractor (I33)* are included into the Glenoid set. Any peripheral osteophyte should be removed to restore the natural anatomic shape of the glenoid. During this phase be careful since the axillary nerve is close to the inferior edge of the glenoid.

For glenoid preparation use the *dia. 2.5 mm K-wire (A32)* included in the instrument set.

The K-Wire can be positioned in place by using the *K-Wire position jig (H33 or B32* in case of X-Small size) *and handle (G33)* (see also the chapter dedicated to the glenoid preparation) *(Figure 1)*. These jigs can be used also to evaluate the size of the glenoid. Alternatively the glenoid reamer can be used as well.

The direction taken by the guide wire will determine the version of the glenoid component. Therefore, a preoperative CT Scan would be suggested to evaluate any deformities in the articular surface. Any corrections in the wire direction should be made at this point, correction is more difficult once the surface is reamed and/or the pegs are drilled.

Figure 2

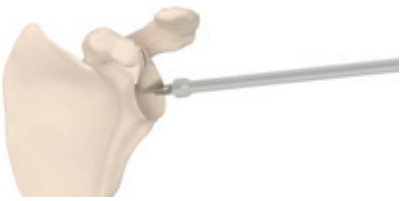


Figure 4

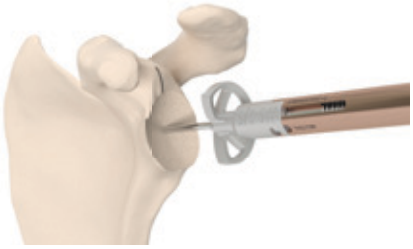


Figure 3

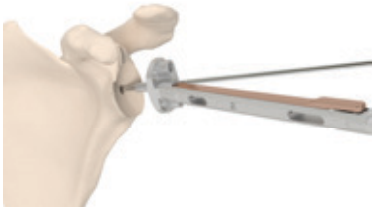


Figure 5

Figure 6

PREPARATION OF THE GLENOID SURFACE

Once the K-wire has been inserted, remove the K-wire positioning jig and the handle. Connect the *glenoid reamer (E33 or D32* in case of X-Small size) of the proper size (X-Small, Small, STD or Large) to the *reamer shaft (J33) (Figure 2)* and ream the glenoid carefully *(Figure 3)* guided by the K-Wire.

Ream carefully to avoid glenoid fractures. The aim of the reaming is just to remove the residual cartilage and expose the subchondral bone rather than excessive bone removal.

Remove the reamer leaving the K-wire in place and proceed with preparation of the central hole by using the *cannulated drill dia. 5 mm (C32)* guided by the K-Wire *(Figure 4)*.
Position the *3-Pegs glenoid drill guide (E32)* of the proper size by using the *quick connection handle (F32)* using the K-wire as a guide *(Figure 5)*.

The 3-Pegs glenoi drill guide has a central peg which is intended to fit into the hole previously drilled into the glenoid in order to increase device stability. Note: if the X-Small guide is used it could be possible that the K-Wire impinges against the power tools during the following steps of the surgical technique. In this case the K-wire could be removed and the 3-Pegs glenoid drill guide will be stabilized just by the central peg.

Drill the first peripheral hole by using the *quick connection drill dia.5 mm (H32)* connected to the power tools by means of the *quick connection shaft (G32)*. Disconnect the quick connection shaft from the drill and leave the drill in situ while drilling the second hole to stabilize the jig *(Figure 6)*. Note: during the glenoid preparation be careful on using the *3-Pegs glenoid drill guide (E32)* not the *3-Pegs removal guide (L32)* which is intended to be used in case of revision. The 3-Pegs removal guide is hosted in a dedicated caddy into the tray.

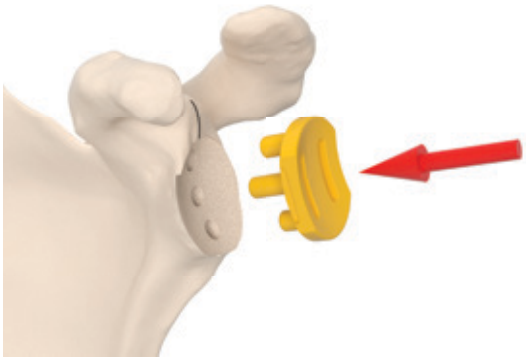


Figure 7

Figure 8

INSERTION OF THE TRIAL IMPLANT

Apply the *trial glenoid 3 Pegs (I32)* according to the size *(Figure 7)*. The trial components are color coded: X-Small component is gray, Small size is yellow, Standard size is orange and Large one is magenta. The trial component is used to check for appropriate glenoid size and positioning

Remove the trial glenoid by using the *removal pliers (J32) (Figure 8)*. Beware that the connection between the trial glenoid and the pliers is not fixed.

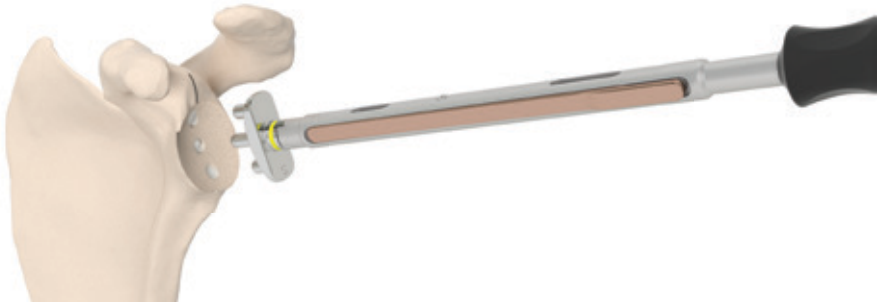


Figure 9

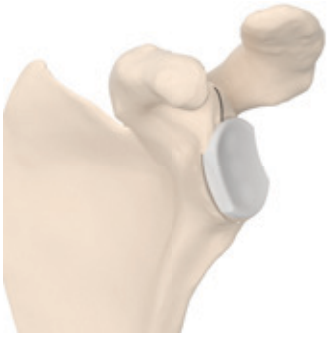


Figure 10

Figure 11

INSERTION OF THE FINAL IMPLANT

Remove the 3-Pegs glenoid of the correct size from the sterile packaging. Place the acrylic cement in the previously prepared cavities and compact it by means of the 3 Pegs *cement compactor (K32)* connected to the *quick connection handle (F32) (Figure 9)*. The aim of this step is to pressurize the cement.

Insert the final glenoid component *(Figure 10)*, then press it in by using the *cemented glenoid pusher (C33) (Figure 11)* until the cement has completely set.

Note: make sure that no cement is present at the interface between glenoid face and backside of the implant.

SMR 3 Pegs Glenoid

Figure 12

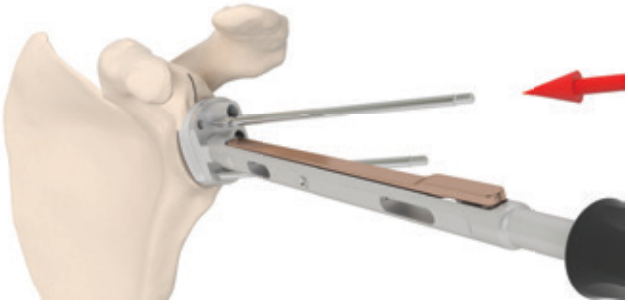


Figure 13

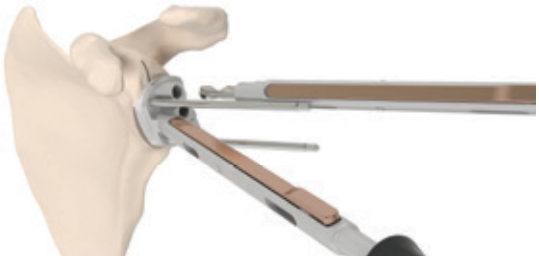


Figure 14

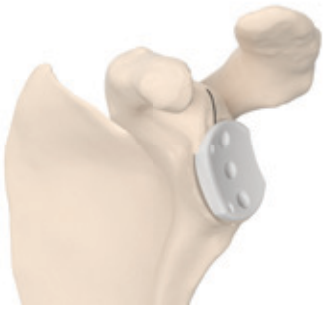


Figure 15

REMOVAL OF THE 3 PEGS GLENOID

In case removal of 3 Pegs glenoid is required use the *3 Pegs removal guide (L32)* of the proper size connected to the *quick connection handle (F32) (Figure 12)*. Fix the guide to the 3 Pegs glenoid by means of two *headless twisted pin dia. 3x90 mm (N32) (Figure 13)*.

Drill into the holes of the guide by using the *quick connection drill dia. 5mm (H32)* connected to the power tools by means of the *quick connector driver (G32) (Figure 14 - 15).*

The aim of this phase is to break the pegs in order to make removal of the 3 Pegs glenoid baseplate easier.

Then proceed with the standard steps of the surgical technique of the glenoid components you would like to implant (such as SMR Metal Back).

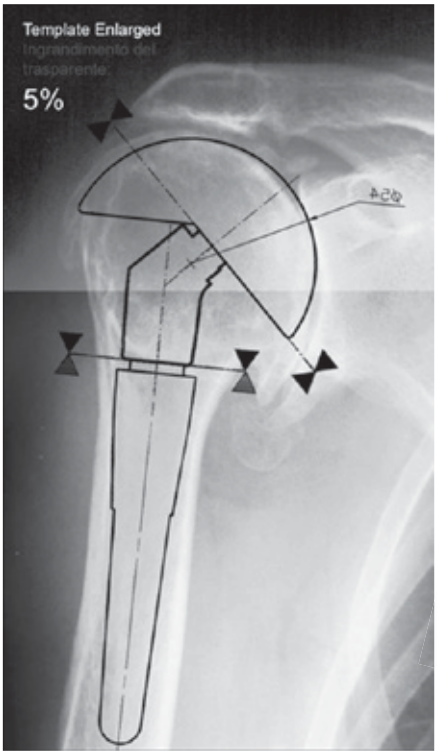


Figure 1

Figure 3

Figure 2

Figure 4

FOREWORD

The clinical indication for prosthetic treatment with CTA heads is influenced by the treatment of cuff tear arthropathy where it is not possible to implant a reverse prosthesis, either due to irregularities of the anatomy or poor bone trophism of the glenoid. The combination of CTA Head and anatomic glenoid replacement is not recommended.

PREOPERATIVE PLANNING

To obtain the best results, preoperative planning is highly recommended with the use of templates showing a 5% magnified image of the profiles. Use good quality frontal view radiographs with adequate contrast that are large enough to contain the entire length of the pre-op template stems. Select the stem size and resection level of the humeral head, which will serve as a reference for the final implant height.

REAMING OF THE HUMERAL CANAL AND RESECTION OF THE HEAD REAMING

Open the proximal end of the humerus with the *awl (A13)* connected to the *ratchet T-handle with Zimmer connection (F13)* (Figure 1).

Connect the *humeral reamer (B13)* to the *ratchet T-handle with Zimmer connection (F13)*. Insert the reamer into the humerus by rotating it into the canal until the stopper flange gets in contact with the surface of the humeral head (Figure 2).

Connect the anatomic resection assembly (Figure 3) and proceed with the humeral head resection as outlined in chapter “SMR Elective Anatomical” at page 23 (Figure 4).

Figure 5

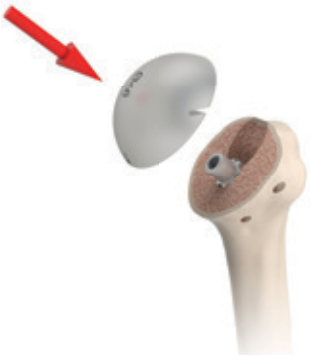


Figure 6

Figure 7

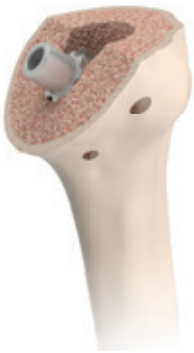


Figure 8

HUMERUS PREPARATION

INSERTION OF THE TRIAL IMPLANT AND REDUCTION

Once the osteotomy has been completed, find the stem size as outlined in "SMR Elective Anatomical – Choice of stem size", apply a Medium sized *trial humeral body (H23)* and tap into the canal (Figure 5).

The head diameter is determined using the *head gauge (F23)*. Insert the *neutral trial adaptor (G23)* to the *trial humeral head (E23)* by hand and fit the head to the taper of the trial humeral body (Figure 6).
Reduce the joint and check the match with the glenoid. If it is not well aligned with the glenoid cavity, substitute the neutral adaptor with an eccentric one. Make up for any ligamentous laxity by using a long adaptor.
To remove trial adaptors use the *extracting pliers for trial adaptors (W23)*. If an eccentric adaptor is used, mark the position of the head with an electric scalpel, using the arrow as a reference. The final head peg should be inserted in the same seat again.

DEFINITION OF THE OSTEOTOMY SIDE PLANE

Once the head and adaptor taper sizes match the required anatomy keep the components in the selected position and with an oscillating blade cut the greater tuberosity through the slot in the trial head (Figure 7). Remove the head and complete the bone resection (Figure 8).
Assemble the adaptor and *CTA trial head (B9)* and proceed with reduction.

Note. The slot in the trial head provides an indication of the osteotomy level only for neutral positioning.

Figure 9

Figure 10

Figure 11

Figure 12

INSERTION OF THE FINAL IMPLANT

ASSEMBLY AND INSERTION OF THE STEM AND HUMERAL HEAD

Remove the stem and the Trauma humeral body of the size required from the sterile package.

Assemble the components as described in the section “SMR TRAUMA-Insertion of the stem and final body” on page 20 and insert it in the canal following the standard procedure (Figure 9). Insert the component up to the level of the anatomic osteotomy plane (Figure 10).

ASSEMBLY OF THE ADAPTOR TAPER AND HEAD

Apply the adaptor taper to the head (Figure 11). If an eccentric adaptor taper is used, insert it by aligning the marking with that of the humeral head. The concentric adaptor taper has no such markings. Connect the *humeral head press (D23)* to the *ratchet T-handle (F13)*.

Position the system in the *humeral head press (D23)* and tighten. In this way the head and the adaptor taper will be press fitted together while applying an opposite force with the *multipurpose handle (G13)* (Figure 12).

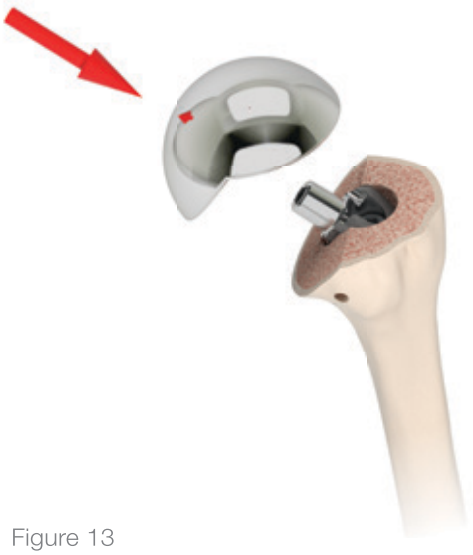


Figure 13

Figure 14

HUMERAL HEAD INSERTION

Apply the selected humeral head to the implanted humeral body (Figure 13). If an eccentric adaptor is used, apply the head making sure that the selected offset is observed. Make sure that the contact surfaces are properly cleaned and that the head or adaptor do not impinge with the bone, as this could compromise the stability of the Morse taper coupling.

Lastly, secure the taper coupling by tapping with the *humeral head impactor (C23)* (Figure 14). If there is any gap, tap in further towards the diaphyseal axis.

Figure 1

Figure 2

Figure 3

ACCESS

The SMR reverse prosthesis can be implanted with one of the usual approaches:
- delto-pectoral;
- lateral.

The operating technique described hereafter is independent from the chosen approach, with the exception of the humeral head resection, which is performed with specific jigs according to the approach used.

REAMING OF THE HUMERAL CANAL

RESECTION

Open the proximal end of the humerus with the *awl (A13)* connected to the *ratchet T-handle with Zimmer connection (F13)* (Figure 1).

Connect the *humeral reamer (B13)* to the *ratchet T-handle with Zimmer connection (F13)*. Insert the reamer into the humerus by rotating it into the canal until the stopper flange gets in contact with the surface of the humeral head (Figure 2).

RESECTION OF THE HUMERAL HEAD

ASSEMBLING OF THE RESECTION JIG

According to the chosen approach (Deltopectoral or Lateral), two different resection jigs are available in the SMR Reverse Set 9013.43.000.
Each resection jig is identified by means of a marking (Figure 3):
- “REVERSE” for the *resection jig (L43)* for Deltopectoral approach;
- “REVERSE LATERAL” for the *resection jig (M43)* for Lateral approach.

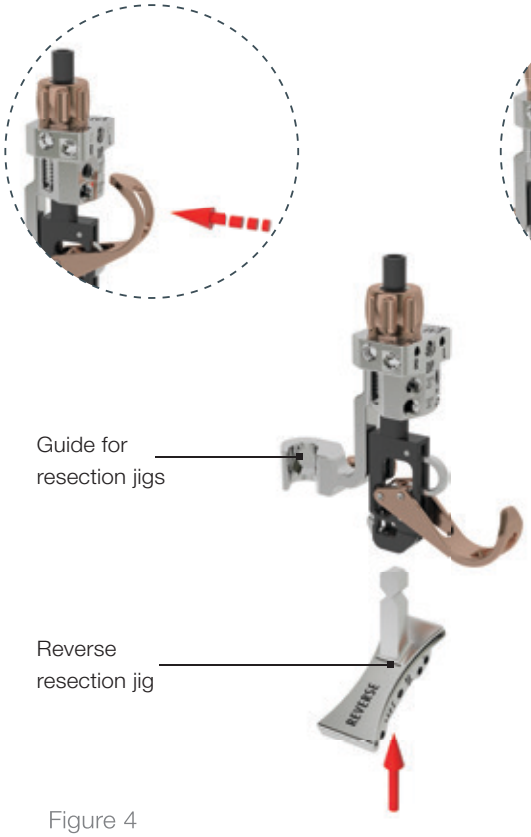


Figure 4

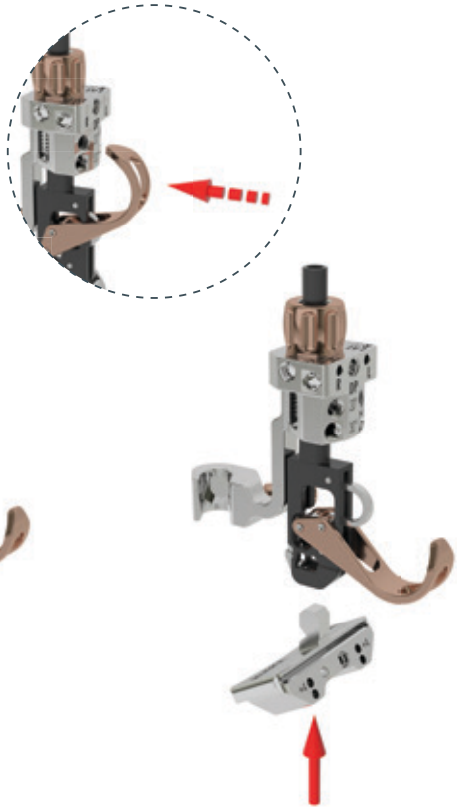


Figure 5

Figure 6

DELTOPECTORAL APPROACH

For the Deltopectoral approach, assemble the components so that the mark LEFT (or RIGHT) marked on the resection jig is frontally visible (Figure 4).

Insert the alignment rod into the appropriate retroversion hole on the resection guide. For Deltopectoral approach, revtroversion holes are available on the front side of the guide. Use the RIGHT or LEFT hole for the corresponding shoulder side and the preferred hole for orientation to the forearm (0° and 20° positions are available).

Connect finally the assembly to the humeral reamer: the marks LEFT (or RIGHT) shall be frontally visible on the jig according to the shoulder side that is being operated.

LATERAL APPROACH

For the Lateral approach, assemble the components by closing the red lever (Figure 5).
Insert the alignment rod into the appropriate retroversion hole on the resection guide. For the Lateral approach, retroversion holes are available on the lateral sides of the guide. Use the RIGHT or LEFT hole for the corresponding shoulder side and the preferred hole for orientation to the forearm (0° and 20° positions are available) (Figure 6).

Note. When there is a large humeral canal the reamer, which has a proximal diameter of 16 mm, may enter the canal at an incorrect angle with consequent surgical error in the resection of the humeral epiphysis. To avoid this problem, apply a trial stem with a diameter larger than the reamer to the *quick connection stem impactor (E13)*, and tap it into the canal. Position then the resection assembly on the stem impactor.
If, on the other hand, the humeral canal is small, the reamer will not be able to go in all the way. Therefore apply a trial stem with a smaller diameter to the *stem impactor (E13)* and tap it into the canal.

Figure 7

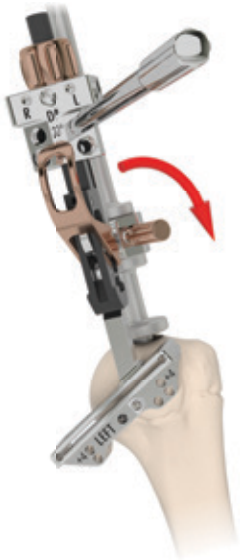


Figure 8

Keeping the forearm flexed at 90°, rotate the resection guide until the *alignment rod (I43)* and the forearm are parallel (Figure 7). Then fix the selected retroversion by screwing the threaded rod (Figure 8).

A resection with the retroversion chosen on the resection guide will then be performed in this position. If less or more retroversion is required, the rod should be externally or internally rotated respectively.

Figure 9

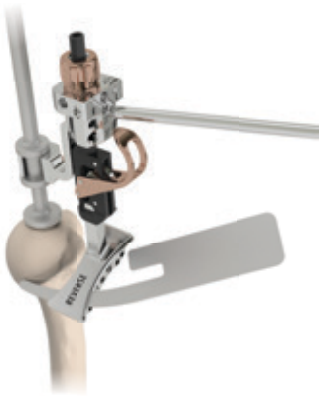


Figure 10

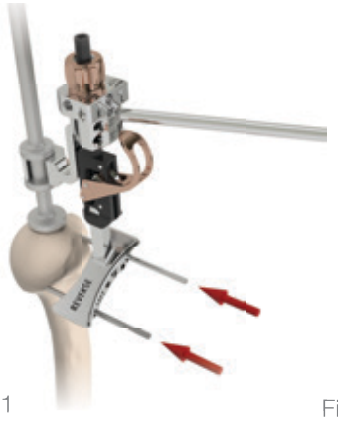


Figure 11

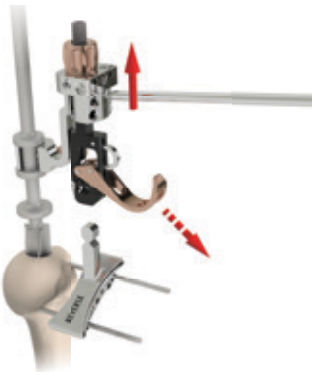


Figure 12

Figure 13

Figure 14

HUMERAL HEAD RESECTION

Adjust the height of the resection jig level until it is aligned with the anatomic neck. Turn clockwise or counter-clockwise the red knob to move the jig upwards or downwards respectively (Figure 9).

Use the *sickle (H43)* to assess the resection height (Figure 10) and secure the guide with the *3 mm pins (T43)* (Figure 11) once the selected height is reached.

Once the jig is secured to the humerus with the pins, remove the guide by releasing the red lever and sliding upwards the guide together with the reamer, leaving the jig in place (Figure 12).

Resect the humeral head with a thin blade through the guided slot of the jig (Figure 13); finally, remove the pins and the jig.

If needed, the SMR instrument set includes *humeral covers* (*D33*, Small and Large) to protect the resection plane (Figure14).

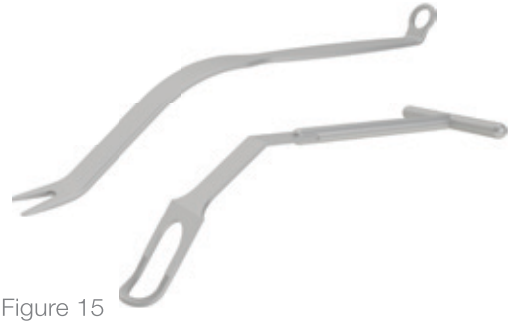


Figure 15

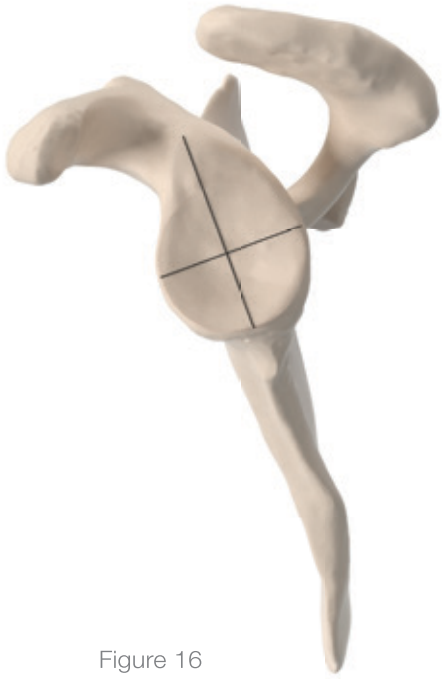


Figure 16

Glenoid preparation of a reverse shoulder replacement is carried out after the humeral head has been resected and before insertion of the final humeral prosthesis.

EXPOSURE

Expose the glenoid performing an accurate capsular release to visualize the glenoid bone stock using adequate retractors: the *Fukuda (N33)* and the *glenoid retractor (I33)* (Figure 15) are included into the SMR Glenoid Set 9013.33.000. Retractors should be placed so that the entire glenoid face is in clear view to aid accurate placement of the guide K-wire (Figure 16).
Any peripheral osteophytes should be removed to restore the natural anatomic shape of the glenoid.

CEMENTLESS METAL BACK GLENOID

The cementless SMR Metal Back implant is recommended where there is good bone trophism, which is sufficient enough to achieve fixation of the peg and the two additional screws.

DETERMINATION OF THE GLENOID CENTRE

The K-wire positioning jigs are used to obtain the optimal metaglene position.

The jigs are available in two sizes (Small and Standard, which reproduce the dimensions of the Metal Back) and with different inclinations (0°, 10°, 10° Anterior). In case of glenoid erosion and / or glenoid bone deficiency, one of the angulated jigs can be used in order to insert the K-wire with the correct inclination.

Figure 17

Figure 18

Figure 19

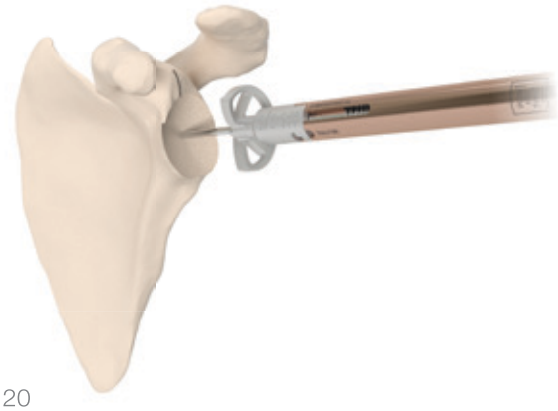


Figure 20

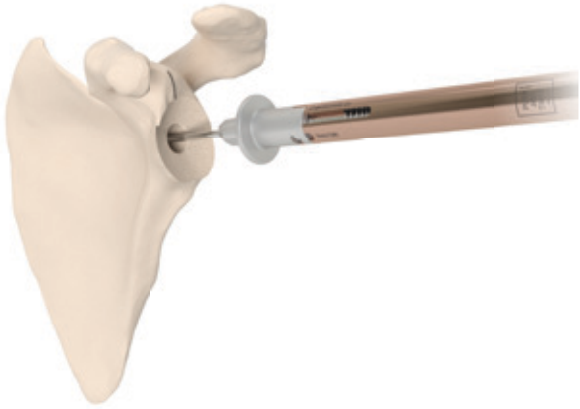


Figure 21

The instrument can be used both to find the glenoid centre and to evaluate the glenoid size.
Assemble the chosen *jig (H33)* to the *positioning handle (G33)*; then turn the red sleeve clockwise to secure the jig (Figure 17).

GUIDEWIRE INSERTION

Taking the K-wire positioning jig in place, introduce the 2.5 mm Kirschner wire into the glenoid bone (Figure 18).

The direction taken by the guidewire will determine the final version of the glenoid component. Therefore, it is strongly recommended to perform a preoperative CT Scan or MRI before to evaluate any deformation in the articular surface caused by degenerative pathologies or traumata. All correction should be made at this stage as no correction can be made when impacting the implant.
Remove the K-wire positioning guide, leaving the guide pin in place.

PREPARATION OF THE GLENOID SURFACE

Once the K-wire has been inserted, connect the *glenoid reamer (E33)* of the proper size (Small, STD or Large) to the *reamer shaft (J33)* (Figure 19) and ream the glenoid surface carefully (Figure 20). The purpose of this operation is to remove the cartilage and expose the subcondral bone rather than excessive bone removal.

Remove the reamer and prepare the central hole. Attach the *Small-R drill (B33)* on the glenoid *drill shaft (J33)* and drill on the guide wire (Figure 21), until the drill baseplate touches the subchondral bone. If a component with larger peg is required (for Metal Back Small, STD or Large) use the *Small/ STD /Large drill (B33).*

Figure 22

Figure 23

Figure 24

Figure 25

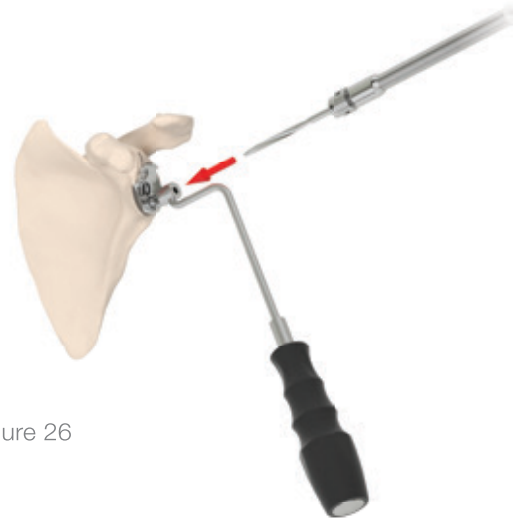


Figure 26

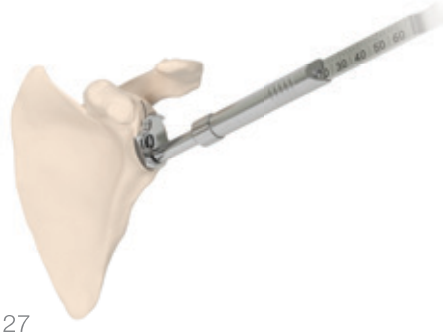


Figure 27

INSERTION OF CEMENTLESS METAL BACK GLENOID

Remove the Metal Back component of the chosen size from sterile packaging and introduce it into the glenoid cavity using the dedicated instrument.

To do this, screw the appropriate *impactor guide (L33)* (Small-R or Small/STD) to the final implant and apply the *impactor (K33)* (Figures 22-23). The two pins of the impactor fit into the Metal Back holes for the screws and allow for the Metal Back orientation. Insert the final Metal Back implant in the hole made beforehand by tapping it in with the impactor (Figure 24).

The long axis of the prosthesis should coincide with the larger axis of the glenoid. Remove the impactor by pressing the release button and unscrew the impactor guide from the implanted Metal Back.

Option - The impactor can be used as a counter torque during the removal phase: first unscrew the guide using the *screwdriver (R33)* on the top of the assembly, and then remove the impactor and the guide. Press the release button to separate the guide from the impactor.

INSERTION OF BONE SCREWS

Once the Metal Back glenoid has been positioned, prepare the holes for the fixation screws using the *flexible mandrel (T33)* attached to the *helix drill (O33)* (Figure 25) and the *drill guide (M33)* (Figure 26).
The Long helix drill is available with notches and markings useful to evaluate the depth of the drilled hole, using the drill guide as a reference.

Verify the depth of the prepared hole using the *depth gauge (S33)* (Figure 27).

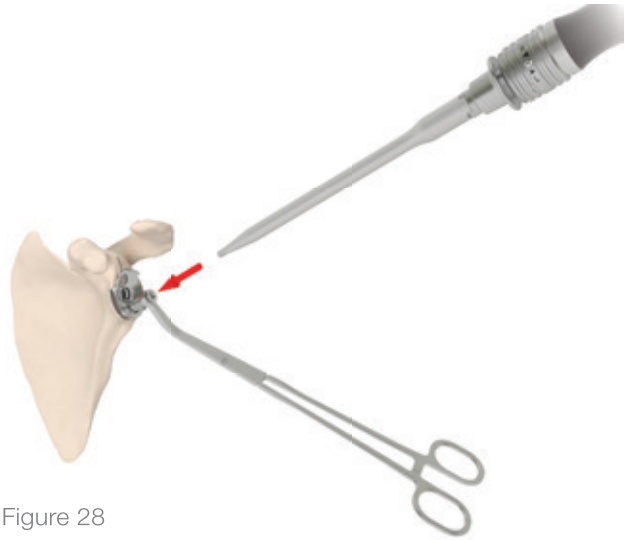


Figure 28

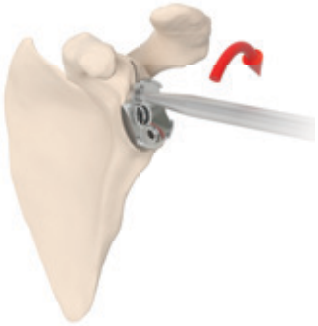


Figure 29

Figure 30

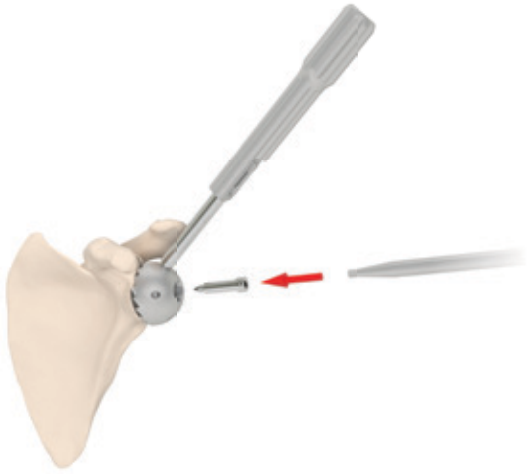


Figure 31

The seat of the screw head on the metal shell is spherical and therefore the fitting direction can be chosen within an angular range of +/-15°. Nevertheless, the superior screw should be oriented toward the base of the coracoid, while the inferior screw should point dorsally.

After having prepared the hole of the first screw, insert the screw using the *screwdriver (R33)* attached to the *ratchet handle (Q33)* and the *screw pliers (P33)* but do not fully tighten until the next screw hole has been prepared and the second screw has been inserted (Figure 28). The screws must be tightened at the same time to guarantee the best fit of the Metal Back on the prepared glenoid (Figure 29).

GLENOSPHERE IMPLANT

The surgeon can choose between concentric and eccentric version as described in the following paragraphs.
Surgeons can further choose between regular and lateralized connectors, according to the joint tensioning.

Note. The SMR instrument set 9013.47.000 is needed to implant lateralized connectors.

Note. The size large Metal Back is not suitable for coupling with 36 mm and 40 mm glenospheres.

Warning. SMR Lateralized Connectors have limited combinations allowed, as shown in the table below.

	Lateralized Connector	
Glenosphere	Lat +2mm	Lat +4mm
Dia. 36mm	✓	✓
Dia. 36mm Ecc.	✗	✗
Reverse HP Dia. 40mm	✓	✓
Reverse HP Dia. 44mm	✓	✗
Reverse HP Dia. 44mm Corrective (Ecc.)	✗	✗

USE OF THE 36 mm TRIAL GLENOSPHERE

Remove the internal stem and the pusher of the *glenosphere impactor-extractor (X43)* and apply it to the *trial glenosphere (V43 or Z43)* by screwing into the hole of the trial implant (Figure 30), then position it on the previously implanted glenoid Metal Back. Insert the *trial glenosphere screw* (*U43*, grooved screw head for Small-R Metal Back) through the central hole and, using the screwdriver, tighten until reaching the end-stop (Figure 31).

Figure 32

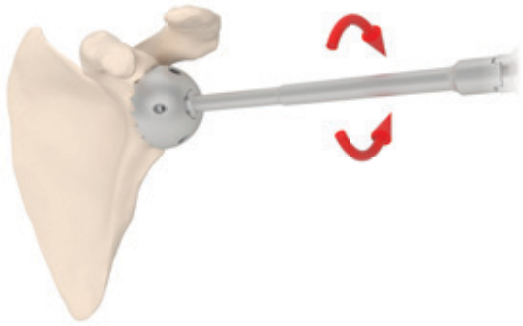


Figure 33

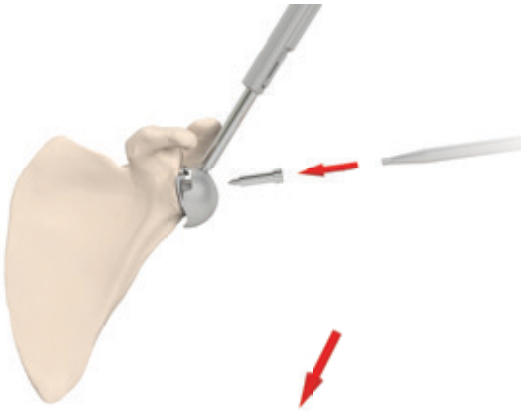


Figure 34

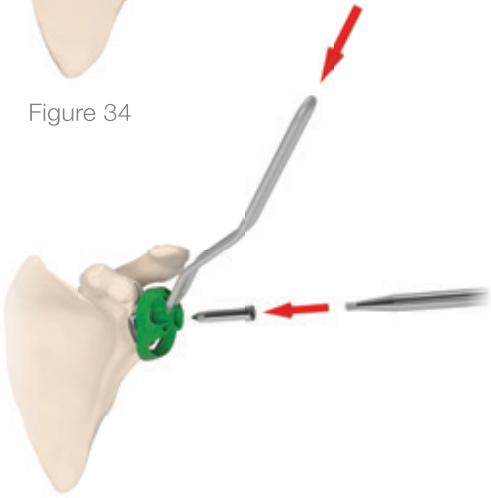


Figure 35

In case of concentric glenosphere, the implanted glenosphere is free to rotate along the screw and may also be used to remove excessive bone from the glenoid.
To do this, unscrew the glenosphere impactor-extractor and apply the *drive shaft (W43)* connected to the *T-handle with Zimmer connection (F13)* (Figure 32). Proceed with reaming by gentle rotational clockwise and anticlockwise movements to remove with extreme caution the peripheral osteophytes (Figure 33).

If using an eccentric glenosphere, keep the eccentricity of the component in one of the bottom quadrants of the glenoid (Figure 34).
If using a lateralized connector, take the 36mm trial glenosphere with the chosen offset from the dedicated instrument set and assemble it as described above. Care should be taken during trial reduction to check the joint tension. Increase the offset of the trial glenosphere if more lateralization is needed.

USE OF THE 40 OR 44 mm TRIAL GLENOSPHERE

The color code related to 40mm dedicated instrumentation is Blue, while the 44mm trial glenospheres and the related reverse liners are Green.
Apply the *trial glenosphere* and position it near the glenoid Metal Back.
Slide the trial glenosphere screw through the central hole and tighten until reaching the end stop (Figure 35).

If using a lateralized connector, take the 40mm or 44mm trial glenosphere with the chosen offset from the dedicated instrument set and assemble it as described above. Care should be taken during trial reduction to check the joint tension.

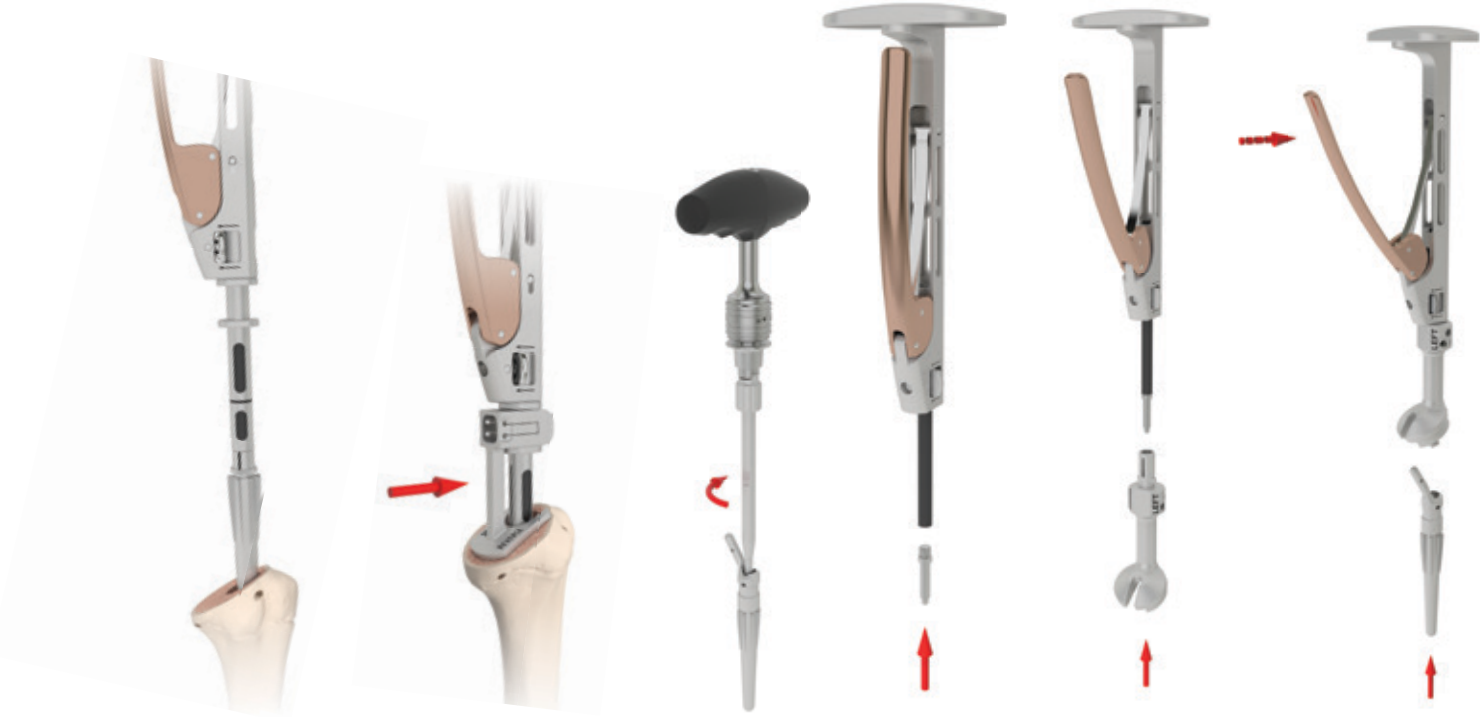


Figure 36 Figure 37 Figure 38 Figure 39 Figure 40 Figure 41

PREPARATION OF THE HUMERUS

CHOICE OF STEM SIZE

Once the glenoid component has been implanted, expose the humerus. Remove the protection cover to begin the humerus' preparation.

Connect the *quick connection stem impactor (E13)* to the *trial stem (C13)*, tap into the canal (Figure 36) and make sure that the *30° stop guide (S43)* located in the seat on the impactor rod comes into contact with the resected humeral surface (Figure 37).

Remove the stop guide and tap the stem in further. If it sinks in, use a stem of the next size up until getting the right one that does not go beyond the resected level. Remove the device once the proper trial stem size has been found.

PREPARATION OF THE HUMERUS FOR REVERSE BODY INSERTION

Apply the standard *reamer guide (N43)* to the correctly sized stem: tighten the quarter-turn locking screw using the *allen wrench 5 mm (F43)* (Figure 38).

Assemble the *inserter-extractor handle (A43)* with the *pushrod tip (B43)* (Figure 39) and then connect the *reverse adaptor sleeve (P43)* without the plastic adaptor (Figure 40). Check that the pushrod tip is properly engaged into the shaft of the inserter handle before using the instrument.

Place the assembly (reamer guide and trial stem) to the previously assembled introducer and fasten it by closing the red lever (Figure 41).

Before inserting the assembly into the canal, connect the *alignment rod (I43)* to the assembly (LEFT or RIGHT for the corresponding shoulder side) to obtain the chosen retroversion angle (0° and 20° position are available).

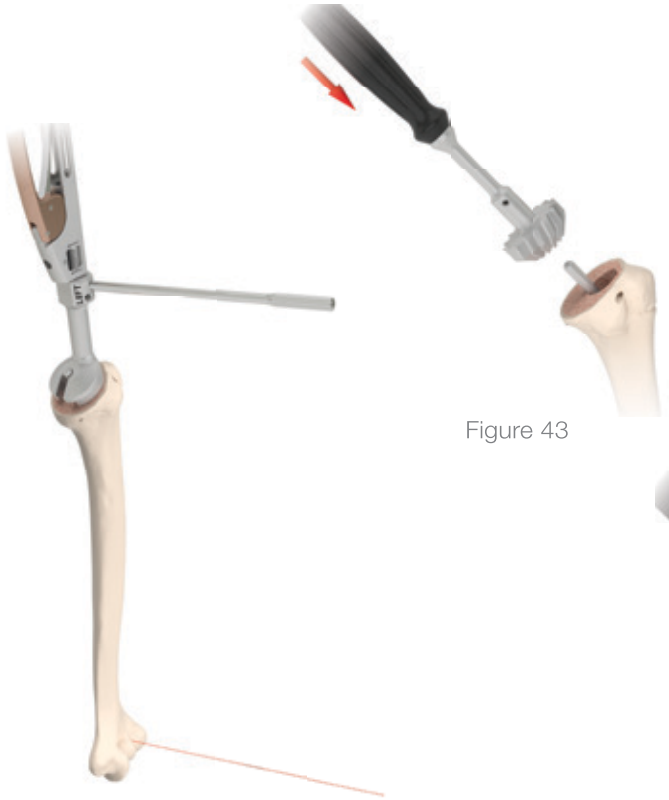


Figure 42

Figure 43

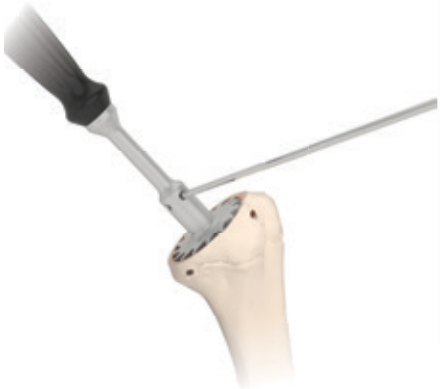


Figure 44

Figure 45

Next, with the arm at 90°, bring the rod parallel to the forearm (Figure 42). In this position, the implant will be inserted according to the chosen retroversion (0° or 20°).

If less or more retroversion is required, the rod should be externally or internally rotated respectively, by an angle of choice.

Tap the assembly into the canal until the distal plate of the impactor comes into contact with the resected surface.

Remove the impactor and afterwards ream using the *conical reamer (O43)* mounted on the *T-Handle with Zimmer Connection (F13)* (Figure 43). This step must be carried out carefully.

To make sure that the humeral part has been completely prepared, insert a Kirschner wire (dia. 2.0 mm) in the reamer hole near the cutting teeth. The humeral reaming has been completed once the Kirschner wire does not pass through (Figure 44).

INSERTION OF THE TRIAL REVERSE HUMERAL BODY

Once the humeral metaphysis has been reamed, remove the reamer guide using the impactor-extractor assembly (Figure 45).

Disassemble the reamer guide from the trial stem using the *5 mm allen wrench (F43)* connected to the *T-handle with Zimmer connection (Δ43)*.

Figure 46

Figure 47

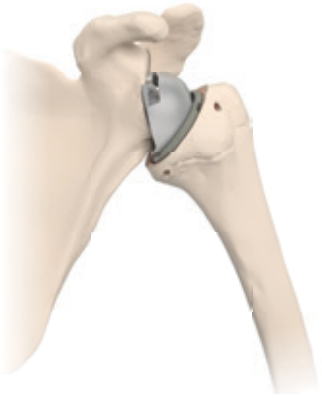


Figure 49

Figure 48

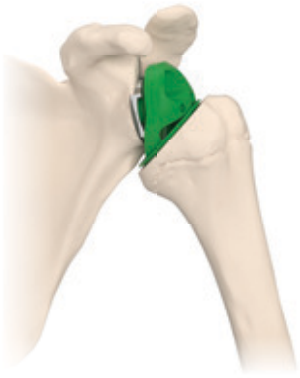


Figure 50

Take the *trial reverse humeral body (K43)* from the instrument set and assemble it on the trial stem of the selected size.
Apply the mobile plastic part to the bottom of the impactor-extractor assembly and assemble it in the same way as the reamer guide peg (Figure 46). Tap it into the metaphysis with the help of the alignment rod to obtain the retroversion angle (Figure 47).

REDUCTION AND MODIFICATION OF THE COMPONENTS

Expose the humerus and insert the *trial liner (S48 for 36mm, B42/B44/B47 for 40mm or A42/A44/A47 for 44mm glenosphere)* by hand (Figure 48). Reduce the trial glenosphere that has been implanted (Figure 49).

Assess the joint tension and address any laxity by using thicker trial liners (+3mm/ MEDIUM or +6mm/LONG), lateralizing liners (available only for 40/44mm glenospheres) or increasing the lateralization offset of the trial glenosphere (lateralized trial glenospheres are contained in the 9013.47.000 set).
Check the resulting soft tissue balance to avoid an excessive tensioning of the joint.
The shoulder is assessed for a full range of movement. If soft tissue tension is correct, the glenoid bearing will not impinge on the inferior rim of the resected humeral head.

To remove and replace the trial liner, insert a Kocher clamp through one of the holes or use a pointed chisel on the side edge as a lever. If necessary, make up for any laxity by placing a +9 mm humeral extension in between.

In case of eccentric trial glenosphere the surgeon can rotate the glenosphere on the Metal Back until the most stable position for the new joint has been obtained.
Note the last position used for the eccentric glenosphere in order to reproduce the correct position with the final implant.

Figure 51

Figure 53

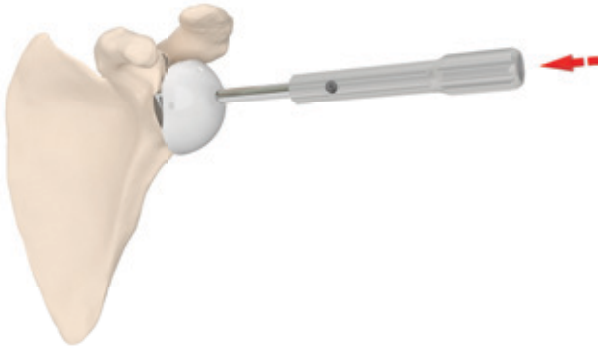


Figure 52

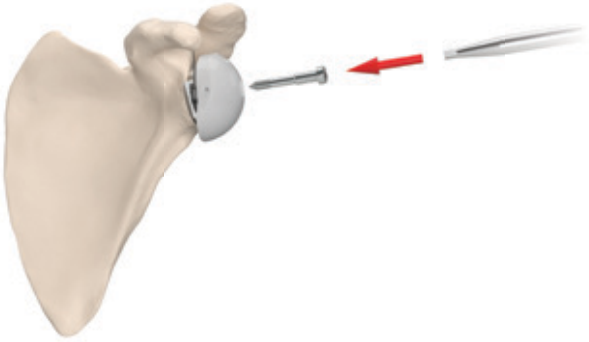


Figure 54

INSERTION OF THE FINAL IMPLANT

GLENOSPHERE INSERTION

Remove the trial glenosphere using the screwdriver. Take the final glenosphere (36 mm, 40 mm or 44 mm diameter), connector and safety screw of the correct size.

Insert the connector in the appropriate taper on the glenosphere and secure the components by tapping in (Figure 51).

Screw the *glenosphere impactor-extractor (X43)* into the glenosphere hole and impact the assembly into the implanted Metal Back (Figure 52 – see note page 58). For the eccentric glenosphere use the *orienter (Y43)* for positioning the final implant (Figure 53).

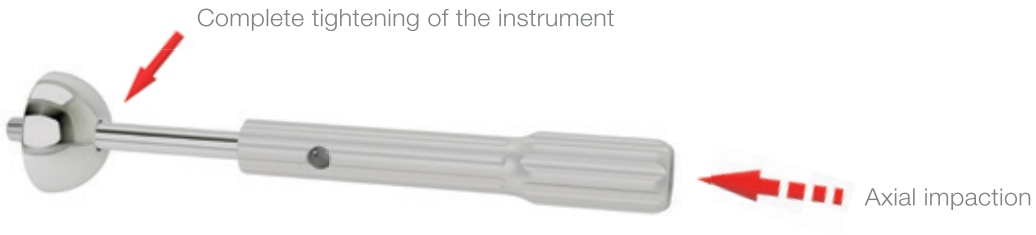
Unscrew the impactor and check by hand that the Morse taper is stable. Insert a safety screw, which is provided in the package, using the *screwdriver shaft (R33)* attached to the *ratchet T-handle with Zimmer connection (Q33)* (Figure 54) .

If using 40 mm or 44 mm glenospheres, press-fit the cap in the central hole of the implant using the *positioner for glenosphere plug*.

Warning. The connector and its specific screw are provided together in the same packaging. The connector must be used with its specific screw or with a screw having the same code. The use of the connector with different screws must be avoided as not compatible.

Care should be taken when selecting the lateralized connectors for glenospheres to avoid excessive joint tension.

SMR Reverse



Below, are described some important additional instructions to reduce the risk of intra-operative breakage of the instrument.

When the SMR Glenosphere Impactor-Extractor is used to impact the definitive glenosphere into the metal back:

- The threaded tip of the instrument must be completely tightened into the apex hole of the glenosphere, before tapping in the morse taper coupling with the mallet; the tightening of the instrument must be stopped only when the surgeon feels high resistance to continue the tightening action.

- When impacting the glenosphere, the mallet must be used along the direction (axis) of the SMR Glenosphere Impactor-Extractor, avoiding as much as possible the onset of unexpected multi-axial forces during impaction.

Please refer to picture above (red circle and red arrow). If both of the above conditions are not verified, the threaded section of the instruments is subjected to increased unexpected stresses that can lead to its breakage.

Figure 55

Figure 56

Figure 57

ASSEMBLY OF THE FINAL STEM AND REVERSE HUMERAL BODY

Remove the trial implant using the impactor-extractor handle (Figure 55).
Assemble the final humeral body and finned stem on the back table with the use of the *reverse prosthesis inserter (Q43).* Screw the instrument tightly to join the stem and humeral body.

The passing through eyelet on the inserter can be used to insert the *multipurpose handle (G13)*, which is used here as a counter-torque (Figure 56). Slightly loosen the fastening to avoid risky torsion that may damage the humerus when removing the inserter with the implant in place.

INSERTION OF THE FINAL HUMERAL COMPONENTS

Tap the implant into the canal. Correct version is obtained by using the *alignment rod (I43)* again. Once the reverse body has been inserted fully on the resection level, unscrew the reverse prosthesis inserter, insert the safety screw of the reverse body (Figure 57) and tighten with the dedicated *allen wrench* (*F43;* 5 mm for standard humeral body or 3.5 mm for SHORT reverse humeral body). Open the packaging of the liner that was selected during the trial reduction. Clean the reverse humeral body and insert the liner using the *cemented glenoid pusher (C33)*.

Figure 58

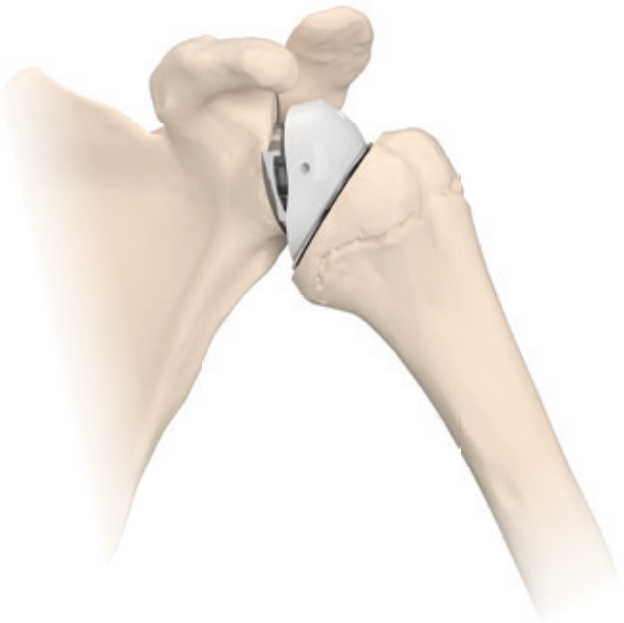
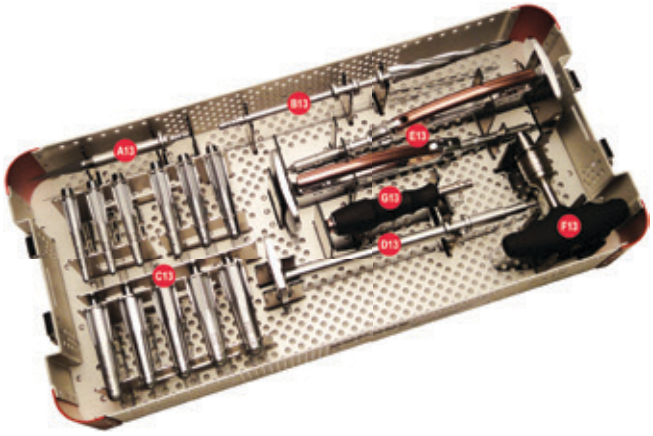


Figure 59

REDUCTION

The *namba shoulder slide (∑43)* (Figure 58) can be used to reduce the joint (Figure 59). Perform the usual articular movements. Check that any humeral and glenoid osteophytes are carefully removed. Palpating the axillary nerve should find a normal structure tension as before surgery.

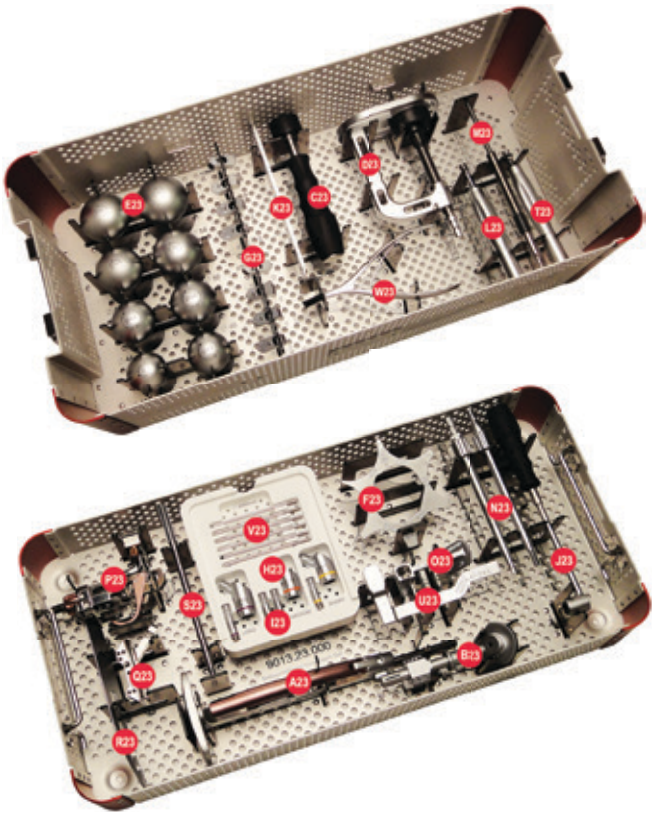
9013.13.000 'General' Instrument Set for SMR Shoulder Prosthesis



Ref.	CODE	DESCRIPTION	Qty.
A13	9013.02.001	Awl	1
B13	9013.02.016	Humeral Reamer Dia. 16mm	1
C13	9013.02.141	Dia. 14 - Trial Stem with Quick Connection	1
C13	9013.02.151	Dia. 15 - Trial Stem with Quick Connection	1
C13	9013.02.161	Dia. 16 - Trial Stem with Quick Connection	1
C13	9013.02.171	Dia. 17 - Trial Stem with Quick Connection	1
C13	9013.02.181	Dia. 18 - Trial Stem with Quick Connection	1
C13	9013.02.191	Dia. 19 - Trial Stem with Quick Connection	1
C13	9013.02.201	Dia. 20 - Trial Stem with Quick Connection	1
C13	9013.02.211	Dia. 21 - Trial Stem with Quick Connection	1
C13	9013.02.221	Dia. 22 - Trial Stem with Quick Connection	1
C13	9013.02.231	Dia. 23 - Trial Stem with Quick Connection	1
C13	9013.02.241	Dia. 24 - Trial Stem with Quick Connection	1
D13	9013.02.301	Stem Extractor	1
E13	9013.02.302	Quick Connection Stem Impactor	2
F13	9095.11.201	Ratchet T-Handle with Zimmer Connection	1
G13	9095.11.251	Multipurpose Handle	1
	9013.13.990	Instrument Tray	1

SMR PRIMARY SURGICAL TECHNIQUE
Instrument Set

▼ 9013.23.000 'Endoprosthesis' Instrument Set for SMR Shoulder Prosthesis



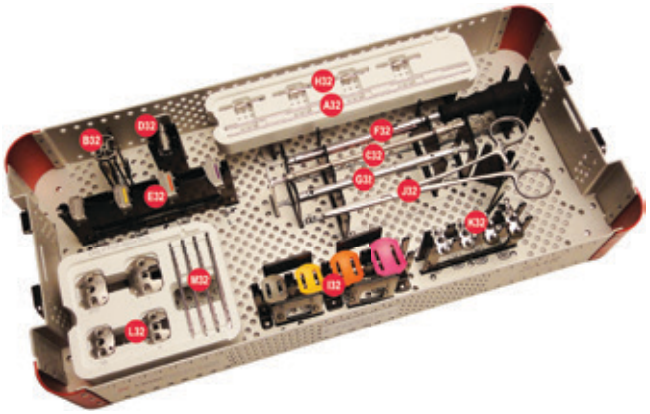
Ref.	CODE	DESCRIPTION	Qty.
A23	9013.02.303	Inserter-Extractor Handle	1
B23	9013.02.321	Anatomic Adaptor Sleeve	1
C23	9013.22.100	Humeral Head Impactor	1
D23	9013.22.200	Humeral Head Press	1
E23	9013.22.405	Trial Humeral Head Dia. 40mm	1
E23	9013.22.425	Trial Humeral Head Dia. 42mm	1
E23	9013.22.445	Trial Humeral Head Dia. 44mm	1
E23	9013.22.465	Trial Humeral Head Dia. 46mm	1
E23	9013.22.485	Trial Humeral Head Dia. 48mm	1
E23	9013.22.505	Trial Humeral Head Dia. 50mm	1
E23	9013.22.525	Trial Humeral Head Dia. 52mm	1
E23	9013.22.545	Trial Humeral Head Dia. 54mm	1
F23	9013.22.800	Head Gauge	1
G23	9013.30.011	Trial Adaptor Taper Neutral	1
G23	9013.30.016	Trial Adaptor Taper Ecc. 2mm	1
G23	9013.30.021	Trial Adaptor Taper Ecc. 4mm	1
G23	9013.30.031	Trial Adaptor Taper Ecc. 8mm	1
G23	9013.31.011	Trial Adaptor Taper Neutral Long	1
G23	9013.31.016	Trial Adaptor Taper Ecc. 2mm Long	1
G23	9013.31.021	Trial Adaptor Taper Ecc. 4mm Long	1
G23	9013.31.031	Trial Adaptor Taper Ecc. 8mm Long	1
H23	9013.50.011	Trial Humeral Body Short	1
I23	9013.50.012	Pushrod Tip for Short Humeral Body	1
H23	9013.50.021	Trial Humeral Body Medium	1
I23	9013.50.022	Pushrod Tip for Medium Humeral Body	2
H23	9013.50.031	Trial Humeral Body Long	1
I23	9013.50.032	Pushrod Tip for Long Humeral Body	1
J23	9013.50.101	Body Stopper	1
K23	9013.50.121	Multipurpose Extractor	1
L23	9013.50.165	Threaded Extractor	1
M23	9013.50.175	Universal Stem for Extractor	1
N23	9013.50.210	Allen Wrench 5mm	1
N23	9013.50.211	Allen Wrench 3.5mm	1
O23	9013.50.251	45° Stop Guide	1
P23	9013.50.303	Guide for Resection Jigs	1
Q23	9013.50.304	Anatomic Resection Jig	1
R23	9013.50.305	Sickle	1
S23	9013.50.316	Alignment Rod	1
T23	9013.52.165	Expansion Extractor	1
U23	9013.75.145	Trauma Ruler	1
V23	9066.15.095	Pin Dia. 3 x 80 mm	6
W23	9066.35.610	Extracting Plier for Trial Adaptors	1
	9013.23.990	Instrument Tray	1

9013.25.000 SMR Variable Height Humeral Heads Instrument Set

Ref.	CODE	DESCRIPTION	Qt.
A25	9013.21.401	Trial Humeral Head Dia.40 H13mm Neutral	1
A25	9013.21.402	Trial Humeral Head Dia.40 H13mm Ecc.2mm	1
A25	9013.21.404	Trial Humeral Head Dia.40 H13mm Ecc.4mm	1
A25	9013.21.407	Trial Humeral Head Dia.40 H13mm Ecc.7mm	1
A25	9013.21.421	Trial Humeral Head Dia.42 H13mm Neutral	1
A25	9013.21.422	Trial Humeral Head Dia.42 H13mm Ecc.2mm	1
A25	9013.21.424	Trial Humeral Head Dia.42 H13mm Ecc.4mm	1
A25	9013.21.427	Trial Humeral Head Dia.42 H13mm Ecc.7mm	1
A25	9013.21.441	Trial Humeral Head Dia.44 H14mm	1
A25	9013.21.461	Trial Humeral Head Dia.46 H15mm	1
A25	9013.21.481	Trial Humeral Head Dia.48 H16mm	1
A25	9013.22.501	Trial Humeral Head Dia.50 H16mm	1
A25	9013.22.521	Trial Humeral Head Dia.52 H17mm	1
A25	9013.22.541	Trial Humeral Head Dia.54 H18mm	1
A25	9013.24.401	Trial Humeral Head Dia.40 H17mm	1
A25	9013.24.421	Trial Humeral Head Dia.42 H17mm	1
A25	9013.24.441	Trial Humeral Head Dia.44 H18mm	1
A25	9013.24.461	Trial Humeral Head Dia.46 H19mm	1
A25	9013.24.481	Trial Humeral Head Dia.48 H20mm	1
A25	9013.24.501	Trial Humeral Head Dia.50 H21mm	1
A25	9013.24.521	Trial Humeral Head Dia.52 H22mm	1
A25	9013.24.541	Trial Humeral Head Dia.54 H23mm	1
	9013.25.990	Sterilizable Box	1

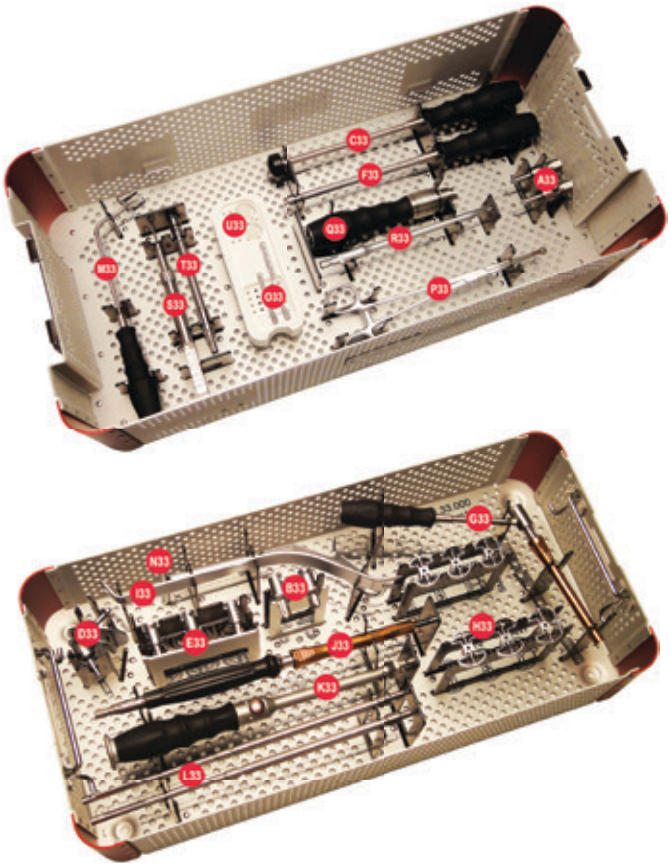
SMR PRIMARY SURGICAL TECHNIQUE
Instrument Set

9013.32.000 3 Pegs Glenoid Instrument Set for SMR Shoulder Prosthesis



Ref.	CODE	DESCRIPTION	Qty.
A32	9095.11.953	Dia. 2.5x240mm K-Wire	2
B32	9013.75.305	K-Wire Positioning Jig X-SMALL	1
C32	9013.79.211	Cannulated Drill Dia. 5mm	1
D32	9013.75.105	X-SMALL Glenoid Reamer	1
E32	9013.79.105	3 Pegs X-SMALL Glenoid Drill Guide	1
E32	9013.79.121	3 Pegs SMALL Glenoid Drill Guide	1
E32	9013.79.111	3 Pegs STD Glenoid Drill Guide	1
E32	9013.79.131	3 Pegs LARGE Glenoid Drill Guide	1
F32	9013.75.481	Quick Connection Handle	1
G32	9013.79.215	Quick Connection Driver	1
H32	9013.79.216	Quick Connection Drill Dia. 5mm	4
I32	9013.79.005	Trial Glenoid 3 Pegs X-SMALL	1
I32	9013.79.021	Trial Glenoid 3 Pegs SMALL	1
I32	9013.79.011	Trial Glenoid 3 Pegs STD	1
I32	9013.79.031	Trial Glenoid 3 Pegs LARGE	1
J32	9013.79.226	Removal Pliers	1
K32	9013.79.305	3 Pegs X-SMALL Cement Compactor	1
K32	9013.79.320	3 Pegs SMALL Cement Compactor	1
K32	9013.79.310	3 Pegs STD Cement Compactor	1
K32	9013.79.330	3 Pegs LARGE Cement Compactor	1
L32	9013.79.340	3 Pegs X-SMALL Removal Guide	1
L32	9013.79.342	3 Pegs SMALL Removal Guide	1
L32	9013.79.341	3 Pegs STD Removal Guide	1
L32	9013.79.343	3 Pegs LARGE Removal Guide	1
M32	9095.11.A9A	Headless Twisted Pin Dia. 3x90mm	4
	9013.32.990	Instrument Tray	1

9013.33.000 'Glenoid' Instrument Set for SMR Shoulder Prosthesis



Ref.	CODE	DESCRIPTION	Qty.
A33	9013.02.305	Extractor for Small-R MB Glenoid	1
A33	9013.02.310	Extractor for MB Glenoid	1
B33	9013.75.125	Glenoid Drill - Small-R	1
B33	9013.75.130	Glenoid Drill - Small/STD/Large	1
C33	9013.75.140	Cemented Glenoid Pusher	1
D33	9013.75.150	Humeral Cover Small	1
D33	9013.75.151	Humeral Cover Large	1
E33	9013.75.160	Glenoid Reamer Small	1
E33	9013.75.165	Glenoid Reamer STD	1
E33	9013.75.170	Glenoid Reamer Large	1
F33	9013.75.180	Liner Inserter	1
G33	9013.75.301	K-Wire Positioning Handle	1
H33	9013.75.315	K-Wire Positioning Jig S 0°	1
H33	9013.75.316	K-Wire Positioning Jig S 10°	1
H33	9013.75.317	K-Wire Positioning Jig S 10° ANT	1
H33	9013.75.325	K-Wire Positioning Jig STD 0°	1
H33	9013.75.326	K-Wire Positioning Jig STD 10°	1
H33	9013.75.327	K-Wire Positioning Jig STD 10° ANT	1
I33	9013.75.330	Glenoid Retractor	1
J33	9013.75.350	Reamers and Drills Shaft	1
K33	9013.75.385	Metal Back Impactor	1
L33	9013.75.386	Guide for Metal Back Impactor - Small-R	1
L33	9013.75.387	Guide for Metal Back Impactor - Small/ STD/Large	1
M33	9013.75.400	Drill Guide	1
N33	9075.10.281	Fukuda	1
O33	9084.20.081	Helix Drill Dia. 3.5mm	1
O33	9084.20.086	Long Helix Drill Dia 3.5mm x 79mm	1
P33	9095.10.115	Screw Pliers	1
Q33	9095.10.227	Ratchet Handle with Zimmer Connection	1
R33	9095.10.228	Screwdriver Shaft	1
S33	9095.11.301	Depth Gauge	1
T33	9095.11.700	Flexible Mandrel	1
U33	9013.75.181	Suction Cup for Liner Inserter	2
	9013.33.990	Instrument Tray	1

SMR PRIMARY SURGICAL TECHNIQUE
Instrument Set

▼ 9013.42.000 SMR Reverse HP

Ref.	CODE	DESCRIPTION	Qt.
A42	9013.62.010	Trial Liner SHORT Dia. 44mm	1
A42	9013.62.015	Trial Liner MEDIUM Dia. 44mm	1
A42	9013.62.020	Trial Liner LONG Dia. 44mm	1
A42	9013.62.115	Trial Liner Lateralizing MEDIUM Dia. 44mm	1
A42	9013.62.120	Trial Liner Lateralizing LONG Dia. 44mm	1
B42	9013.65.010	Trial Liner SHORT Dia. 40mm	1
B42	9013.65.015	Trial Liner MEDIUM Dia. 40mm	1
B42	9013.65.020	Trial Liner LONG Dia. 40mm	1
B42	9013.65.115	Trial Liner Lateralizing MEDIUM Dia. 40mm	1
B42	9013.65.120	Trial Liner Lateralizing LONG Dia. 40mm	1
C42	9013.74.105	Guide-Screw SMALL-R Trial Glenosphere	2
D42	9013.74.120	Guide-Screw Trial Glenosphere	2
E42	9013.74.401	Trial Glenosphere Dia. 40mm	1
F42	9013.74.440	Trial Glenosphere Dia. 44mm	1
F42	9013.74.444	Trial Glenosphere Dia. 44mm Corrective	1
G42	9013.74.605	Positioner for Glenosphere Plug	1
H42	9013.74.650	Trial Glenosphere Positioner	1
	9013.42.950	Instrument Tray	1

9013.44.000 SMR Reverse HP

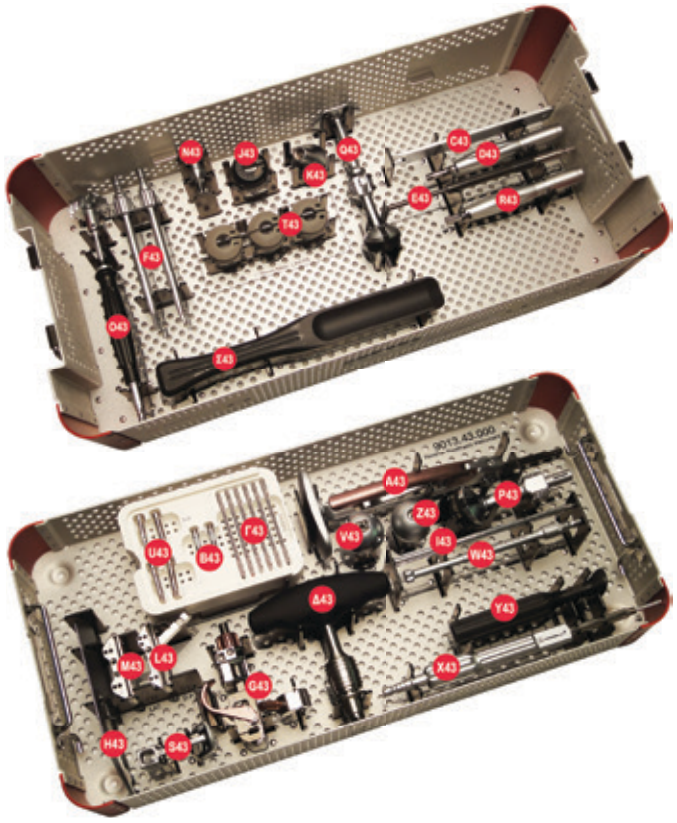
Ref.	CODE	DESCRIPTION	Qt.
A44	9013.62.011	Trial Liner SHORT Dia.44mm	1
A44	9013.62.016	Trial Liner MEDIUM Dia.44mm	1
A44	9013.62.021	Trial Liner LONG Dia.44mm	1
A44	9013.62.116	Trial Liner Lateralizing MEDIUM Dia.44mm	1
A44	9013.62.121	Trial Liner Lateralizing LONG Dia.44mm	1
B44	9013.65.011	Trial Liner SHORT Dia.40mm	1
B44	9013.65.016	Trial Liner MEDIUM Dia.40mm	1
B44	9013.65.021	Trial Liner LONG Dia.40mm	1
B44	9013.65.116	Trial Liner Lateralizing MEDIUM Dia.40mm	1
B44	9013.65.121	Trial Liner Lateralizing LONG Dia.40mm	1
C44	9013.74.402	Trial Glenosphere Dia.40mm	1
C44	9013.74.441	Trial Glenosphere Dia.44mm	1
C44	9013.74.445	Trial Glenosphere Dia.44mm Corrective	1
D44	9013.74.606	Inserter for Glenosphere Plug	1
E44	9013.74.651	Dia. 40-44mm Glenosphere Orienter - LEFT	1
E44	9013.74.652	Dia. 40-44mm Glenosphere Orienter - RIGHT	1
	9013.44.990	Instrument Tray	1

9013.47.000 SMR Reverse HP and Lateralized Glen. Set

Ref.	CODE	DESCRIPTION	Qt.
A47	9013.62.011	Trial Liner SHORT Dia.44mm	1
A47	9013.62.016	Trial Liner MEDIUM Dia.44mm	1
A47	9013.62.021	Trial Liner LONG Dia.44mm	1
A47	9013.62.116	Trial Liner Lateralizing MEDIUM Dia.44mm	1
A47	9013.62.121	Trial Liner Lateralizing LONG Dia.44mm	1
B47	9013.65.011	Trial Liner SHORT Dia.40mm	1
B47	9013.65.016	Trial Liner MEDIUM Dia.40mm	1
B47	9013.65.021	Trial Liner LONG Dia.40mm	1
B47	9013.65.116	Trial Liner Lateralizing MEDIUM Dia.40mm	1
B47	9013.65.121	Trial Liner Lateralizing LONG Dia.40mm	1
C47	9013.74.402	Trial Glenosphere Dia.40mm	1
D47	9013.74.441	Trial Glenosphere Dia.44mm	1
D47	9013.74.445	Trial Glenosphere Dia.44mm Corrective	1
E47	9013.74.606	Inserter for Glenosphere Plug	1
F47	9013.74.651	Dia. 40-44mm Glenosphere Orienter - LEFT	1
F47	9013.74.652	Dia. 40-44mm Glenosphere Orienter - RIGHT	1
G47	9013.74.105	Guide Screw for S-R Trial Glenosphere	2
G47	9013.74.120	Guide Screw for Trial Glenosphere	2
H47	9013.74.312	Trial Glenosphere Lat.+2mm Dia. 36mm	1
H47	9013.74.314	Trial Glenosphere Lat.+4mm Dia. 36mm	1
I47	9013.74.502	Trial Glenosphere Lat.+2mm Dia. 40mm	1
I47	9013.74.504	Trial Glenosphere Lat.+4mm Dia. 40mm	1
J47	9013.74.542	Trial Glenosphere Lat.+2mm Dia. 44mm	1
K47	9013.74.145	Glenosphere Extractor	1
	9013.47.990	Instrument Tray	1

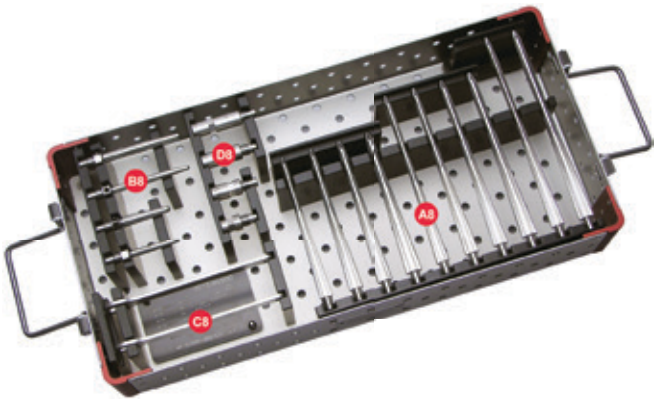
SMR PRIMARY SURGICAL TECHNIQUE
Instrument Set

9013.43.000 Instrument Set for 'Reverse' SMR Shoulder Prosthesis



Ref.	CODE	DESCRIPTION	Qty.
A43	9013.02.303	Inserter-Extractor Handle	1
B43	9013.52.022	Pushrod Tip	2
C43	9013.50.121	Multipurpose Extractor	1
D43	9013.50.165	Threaded Extractor	1
E43	9013.50.175	Universal Stem for Extractor	1
F43	9013.50.210	Allen Wrench 5mm	1
F43	9013.50.211	Allen Wrench 3.5mm	1
G43	9013.50.303	Guide for Resection Jigs	1
H43	9013.50.305	Sickle	1
I43	9013.50.316	Alignment Rod	1
J43	9013.52.002	Trial Extension for Reverse Humeral Body	1
K43	9013.52.021	Trial Reverse Humeral Body	1
L43	9013.52.304	Reverse Resection Jig - Deltopectoral Approach	1
M43	9013.52.305	Reverse Resection Jig - Lateral Approach	1
N43	9013.52.116	Guide for Conical Reamer	1
O43	9013.52.131	Conical Reamer	1
P43	9013.52.141	Reverse Adaptor Sleeve	1
Q43	9013.52.142	Reverse Prosthesis Inserter	1
R43	9013.52.165	Expansion Extractor	1
S43	9013.52.201	30° Stop Guide	1
T43	9013.60.011	STD Trial Liner	1
T43	9013.60.016	+3 Trial Liner	1
T43	9013.60.031	+6 Trial Liner	1
U43	9013.74.105	Guide Screw for S-R Trial Glenosphere	2
V43	9013.74.111	Trial Glenosphere Dia. 36mm	1
U43	9013.74.120	Guide Screw for Trial Glenosphere	2
W43	9013.74.131	Drive Shaft for Trial Glenosphere	1
X43	9013.74.141	Glenosphere Impactor-Extractor	1
Y43	9013.74.142	Ecc. Glenosphere Orienter	1
Z43	9013.76.031	Trial Ecc. Glenosphere Dia. 36mm	1
Γ43	9066.15.095	Pin Dia. 3 x 80mm	6
Δ43	9095.11.201	Ratchet T-Handle with Zimmer Connection	1
∑43	9095.11.907	Namba Shoulder Slide	1
	9013.43.990	Instrument Tray	1

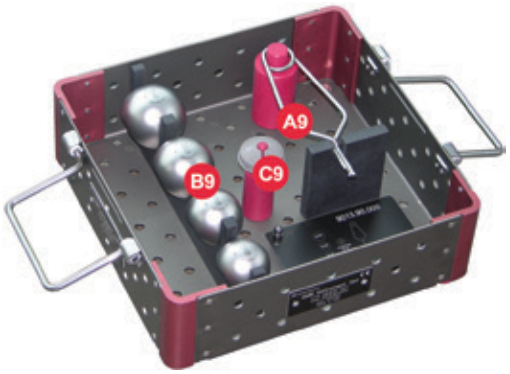
9013.80.000 'Revison+Resection' Instrument Set for SMR Shoulder Prosthesis



Ref.	CODE	DESCRIPTION	Qty.
A8	9013.08.134	Trial Revision Stem Dia. 13 h 150 mm	1
A8	9013.08.136	Trial Revision Stem Dia. 13 h 180 mm	1
A8	9013.08.144	Trial Revision Stem Dia. 14 h 150 mm	1
A8	9013.08.146	Trial Revision Stem Dia. 14 h 180 mm	1
A8	9013.08.148	Trial Revision Stem Dia. 14 h 210 mm	1
A8	9013.08.154	Trial Revision Stem Dia. 15 h 150 mm	1
A8	9013.08.156	Trial Revision Stem Dia. 15 h 180 mm	1
A8	9013.08.164	Trial Revision Stem Dia. 16 h 150 mm	1
A8	9013.08.166	Trial Revision Stem Dia. 16 h 180 mm	1
A8	9013.08.168	Trial Revision Stem Dia. 16 h 210 mm	1
B8	9013.13.010	Trial Resection Stem Dia. 7 mm H50 mm	1
B8	9013.13.040	Trial Resection Stem Dia. 7 mm H80 mm	1
B8	9013.13.110	Trial Resection Stem Dia. 10 mm H50 mm	1
B8	9013.13.140	Trial Resection Stem Dia. 10 mm H80 mm	1
C8	9013.13.200	Dia. 13 mm Wrench	2
D8	9013.14.020	Trial Modular Spacer H20 mm	1
D8	9013.14.030	Trial Modular Spacer H30 mm	1
D8	9013.14.040	Trial Modular Spacer H40 mm	1
D8	9013.14.050	Trial Modular Spacer H50 mm	1
	9013.80.950	Instrument Tray	1

SMR PRIMARY SURGICAL TECHNIQUE
Instrument Set

9013.90.000 'CTA' Instrument Set for SMR Shoulder Prosthesis



Ref.	CODE	DESCRIPTION	Qty.
A9	9013.30.100	Pliers for Trial Adaptor	1
B9	9013.23.420	Trial CTA Head Dia. 42 mm	1
B9	9013.23.460	Trial CTA Head Dia. 46 mm	1
B9	9013.23.500	Trial CTA Head Dia. 50 mm	1
B9	9013.23.540	Trial CTA Head Dia. 54 mm	1
C9	9013.23.600	Trial Adaptor Dia. 36 mm	1
	9013.90.950	Instrument Tray	1

CODE	DESCRIPTION	Qty.
9013.62.011	Trial Liner SHORT Dia. 44mm	1
9013.62.016	Trial Liner MEDIUM Dia. 44mm	1
9013.62.021	Trial Liner LONG Dia. 44mm	1
9013.62.116	Trial Liner Lateralizing MEDIUM Dia. 44mm	1
9013.62.121	Trial Liner Lateralizing LONG Dia. 44mm	1
9013.65.011	Trial Liner SHORT Dia. 40mm	1
9013.65.016	Trial Liner MEDIUM Dia. 40mm	1
9013.65.021	Trial Liner LONG Dia. 40mm	1
9013.65.116	Trial Liner Lateralizing MEDIUM Dia. 40mm	1
9013.65.121	Trial Liner Lateralizing LONG Dia. 40mm	1

■ Upon Request

FINNED HUMERAL BODY WITH LOCKING SCREW

Ti6Al4V	1350.15.110	Finned Humeral Body Medium

TRAUMA HUMERAL BODIES WITH LOCKING SCREW

Ti6Al4V	1350.15.010	Medium
	1350.15.020	Long
	1350.15.030	Short

CEMENTED STEMS L. 80 MM

Ti6Al4V	1306.15.120	Dia. 12 mm
	1306.15.140	Dia. 14 mm
	1306.15.160	Dia. 16 mm
	1306.15.180	Dia. 18 mm
	1306.15.200	Dia. 20 mm

CEMENTLESS FINNED STEMS L. 60 MM

Ti6Al4V	1304.15.110	Dia. 11 mm	■
	1304.15.120	Dia. 12 mm	■
	1304.15.130	Dia. 13 mm	■

CEMENTLESS FINNED STEMS L. 80 MM

Ti6Al4V	1304.15.140	Dia. 14 mm
	1304.15.150	Dia. 15 mm
	1304.15.160	Dia. 16 mm
	1304.15.170	Dia. 17 mm
	1304.15.180	Dia. 18 mm
	1304.15.190	Dia. 19 mm
	1304.15.200	Dia. 20 mm
	1304.15.210	Dia. 21 mm
	1304.15.220	Dia. 22 mm
	1304.15.230	Dia. 23 mm
	1304.15.240	Dia. 24 mm

■ Upon Request

SMR PRIMARY SURGICAL TECHNIQUE
Product Codes

LARGE RESECTION STEMS

Ti6Al4V	1313.15.010	Dia. 7 mm, h 50 mm
	1313.15.040	Dia. 7 mm, h 80 mm
	1313.15.110	Dia. 10 mm, h 50 mm
	1313.15.140	Dia. 10 mm, h 80 mm

MODULAR SPACERS FOR LARGE RESECTION STEMS

Ti6Al4V	1314.15.020	h 20 mm
	1314.15.030	h 30 mm
	1314.15.040	h 40 mm
	1314.15.050	h 50 mm

RING

Ti6Al4V	1314.15.200	Ring

CEMENTED REVISION STEMS

Ti6Al4V	1309.15.134	Dia. 13 mm - h 150 mm	
	1309.15.136	Dia. 13 mm - h 180 mm	
	1309.15.138	Dia. 13 mm - h 210 mm	■
	1309.15.154	Dia. 15 mm - h 150 mm	
	1309.15.156	Dia. 15 mm - h 180 mm	
	1309.15.158	Dia. 15 mm - h 210 mm	■

■ Upon Request

CEMENTLESS REVISION STEMS

Ti6Al4V	1308.15.134	Dia. 13 mm - h 150 mm
	1308.15.136	Dia. 13 mm - h 180 mm
	1308.15.144	Dia. 14 mm - h 150 mm
	1308.15.146	Dia. 14 mm - h 180 mm
	1308.15.154	Dia. 15 mm - h 150 mm
	1308.15.156	Dia. 15 mm - h 180 mm
	1308.15.164	Dia. 16 mm - h 150 mm
	1308.15.166	Dia. 16 mm - h 180 mm

NEUTRAL ADAPTOR TAPERS

Ti6Al4V	1330.15.270	0 mm
	1331.15.270	0 mm, Long

ECCENTRICAL ADAPTOR TAPERS

Ti6Al4V	1330.15.272	+ 2 mm
	1330.15.274	+ 4 mm
	1330.15.278	+ 8 mm
		LONG
	1331.15.272	+ 2 mm
	1331.15.274	+ 4 mm
	1331.15.278	+ 8 mm

HUMERAL HEADS

CoCrMo	1322.09.400	Dia. 40 mm	■
	1322.09.420	Dia. 42 mm	
	1322.09.440	Dia. 44 mm	
	1322.09.460	Dia. 46 mm	
	1322.09.480	Dia. 48 mm	
	1322.09.500	Dia. 50 mm	
	1322.09.520	Dia. 52 mm	
	1322.09.540	Dia. 54 mm	

■ Upon Request

SMR PRIMARY SURGICAL TECHNIQUE

Product Codes

CoCrMo	1321.09.401	Dia. 40 mm H13
	1321.09.402	Dia. 40 mm H13 ECC2
	1321.09.404	Dia. 40 mm H13 ECC4
	1321.09.407	Dia. 40 mm H13 ECC7
	1321.09.421	Dia. 42 mm H13
	1321.09.422	Dia. 42 mm H13 ECC 2
	1321.09.424	Dia. 42 mm H13 ECC 4
	1321.09.427	Dia. 42 mm H13 ECC 7
	1321.09.441	Dia. 44 mm H14
	1321.09.461	Dia. 46 mm H15
	1321.09.481	Dia. 48 mm H16
	1322.09.501	Dia. 50 mm H16
	1322.09.521	Dia. 52 mm H17
	1322.09.541	Dia. 54 mm H18
	1324.09.401	Dia. 40 mm H17
	1324.09.421	Dia. 42 mm H17
	1324.09.441	Dia. 44 mm H18
	1324.09.461	Dia. 46 mm H19
	1324.09.481	Dia. 48 mm H20
	1324.09.501	Dia. 50 mm H21
	1324.09.521	Dia. 52 mm H22
	1324.09.541	Dia. 54 mm H23

■ Upon Request

CTA HUMERAL HEADS

CoCrMo	1323.09.420	Dia. 42 mm
	1323.09.460	Dia. 46 mm
	1323.09.500	Dia. 50 mm
	1323.09.540	Dia. 54 mm

CTA HEADS ADAPTOR FOR REVERSE HUMERAL BODY

Ti6Al4V	1352.15.200	Adaptor 36 mm for Reverse Humeral Body	■

REVERSE HUMERAL BODIES WITH LOCKING SCREW

Ti6Al4V	1352.20.010	HA Coated Reverse Humeral Body	
	1352.15.005	Reverse Humeral Body - Short	■
	1352.15.050	Finned Reverse Humeral Body for Trauma	■
	1352.15.001	Humeral Extension +9 mm	

REVERSE LINERS 36 MM

UHMWPE X-LIMA	1360.50.010	Standard	
	1360.50.015	+3 mm	
	1360.50.020	+6 mm	
	1361.50.010	Retentive Std.	■
	1361.50.015	Retentive +3 mm	■
	1361.50.020	Retentive +6 mm	■

■ Upon Request

SMR PRIMARY SURGICAL TECHNIQUE
Product Codes

GLENOSPHERE 36 MM WITH CONNECTOR

CoCrMo	1374.09.105	Glenosphere dia. 36 mm - Small-R
	1374.09.110	Glenosphere dia. 36 mm
	1376.09.025	Eccentrical Glenosphere dia. 36 mm - Small-R
	1376.09.030	Eccentrical Glenosphere dia. 36 mm
	1374.15.010	Glenosphere + Adaptor + “LTO Randelli” Screw

GLENOSPHERE 36 MM

CoCrMo	1374.09.111	Glenosphere dia. 36 mm
	1376.09.031	Eccentrical Glenosphere dia. 36 mm

REVERSE HP LINERS

CoCrMo		DIA. 40 MM	
	1365.09.010	Liner dia. 40 mm - Short	
	1365.09.015	Liner dia. 40 mm - Medium	
	1365.09.020	Liner dia. 40 mm - Long	
	1365.09.115	Lateralizing Liner 40 mm - Medium	■
	1365.09.120	Lateralizing Liner 40 mm - Long	■
		DIA. 44 MM	
	1362.09.010	Liner dia. 44 mm Short	
	1362.09.015	Liner dia. 44 mm Medium	
	1362.09.020	Liner dia. 44 mm Long	
	1362.09.115	Lateralizing Liner 44 mm - Medium	■
	1362.09.120	Lateralizing Liner 44 mm - Long	■

■ Upon Request

REVERSE HP GLENOSPHERE

UHMWPE X-LIMA + Ti6Al4V		DIA. 40 MM
	1374.50.400	Glenosphere dia. 40 mm
		DIA. 44 MM
	1374.50.440	Glenosphere dia. 44 mm
	1374.50.444	Corrective Glenosphere dia. 44 mm

CONNECTORS WITH SCREW *

Ti6Al4V	1374.15.305	Connector with Screw - Small-R
	1374.15.310	Connector with Screw - Small STD

* Necessary with REVERSE HP, optional with 36 mm glenospheres

LATERALIZED CONNECTORS WITH SCREW

Ti6Al4V	1374.15.312	SMALL-R Connector +2mm	■
	1374.15.314	SMALL-R Connector +4mm	■
	1374.15.322	SMALL / STD Connector +2mm	■
	1374.15.324	SMALL / STD Connector +4mm	■

	MB Size	Regular (mm)	+2 Connector (mm)	+4 Connector (mm)
36mm	Small-R	5.1	7.1	9.1
	Small/STD	5.4	7.4	9.4
HP 40mm	Small-R	5.5	7.6	9.6
	Small/STD	5.9	7.9	9.9
HP 44mm	Small-R	5	7	
	Small/STD	5.4	7.4	

Centre of rotation lateralization from glenoid surface obtained using different connectors.

■ Upon Request

SMR PRIMARY SURGICAL TECHNIQUE

Product Codes

CEMENTED GLENOID

UHMWPE	1378.50.005	Small-R
	1378.50.010	Standard
	1378.50.020	Small

CEMENTED GLENOID 3 PEGS

UHMWPE X-LIMA	1379.51.005	X-Small
	1379.51.010	Standard
	1379.51.020	Small
	1379.51.030	Large

METAL BACK GLENOIDS

Ti6Al4V + PoroTi + HA	1375.20.005	Small - R
	1375.20.020	Small
	1375.20.010	Standard
	1375.20.030	Large ■

METAL BACK GLENOID LINER

UHMWPE	1377.50.005	Small - R
	1377.50.020	Small
	1377.50.010	Standard
	1377.50.030	Large ■

■ Upon Request

BONE SCREWS

Ti6Al4V		DIA. 6.5 MM
	8420.15.010	L. 20 mm
	8420.15.020	L. 25 mm
	8420.15.030	L. 30 mm
	8420.15.040	L. 35 mm
	8420.15.050	L. 40 mm

GLENOID PLATES *

Ti CP	1374.15.505	Small-R - Double
	1374.15.510	Small STD - Double

* Glenoid Plates are suitable only for REVERSE HP

CORTICAL BONE SCREWS *

Ti6Al4V		DIA. 4.5 MM
	8430.15.010	L. 32 mm
	8430.15.020	L. 36 mm
	8430.15.030	L. 40 mm
	8430.15.040	L. 44 mm
	8430.15.050	L. 48 mm
	8430.15.060	L. 52 mm

* Cortical Bone Screws are suitable only for GLENOID PLATES

■ Upon Request

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