LINK®

LINK Embrace

Reverse Fracture and Revision Technique

Explanation of Pictograms			
	Manufacturer	REF	Article number
MAT	Material (number)	Rx only	Caution: Federal law restricts this device to sale by or on the order of a physician

LINK Embrace
Reverse Fracture and Revision Technique

1. Pre-Op Planning

The operation is planned with the assistance of standard X-rays with normal AP-view in internal and external rotation as well as an axillary view. For implantation of a glenoid component and in fracture cases a CT scan is recommended to better assess the glenoid configuration. Additionally, MRI may be indicated for assessment of the degree of bone deficiency as well as soft tissue and capsule quality. Neurological exams should be performed in post-traumatic and disabling shoulder cases.

LINK Embrace X-ray templates are available for pre-op planning of osteoarthritic cases, and they may also be used in fracture and revision cases as far as applicable. LINK Embrace X-ray templates have a 105% scale. Several digital planning platforms are supported.

2. Surgical Approaches and Patient Positioning

2.1 Surgical Approaches

The LINK Embrace Shoulder System is suitable for implantation using the existing surgical approaches. The instrument set supports the two most popular surgical approaches to the shoulder joint, delto-pectoral and lateral approach. Usually, the selected approach depends on the surgeon's experience and preferences, furthermore, the diagnosis and planned surgical treatment have to be taken into account. With the patient under anesthesia, glenohumeral ROM is evaluated in order to assess the extent of capsular release needed to restore the ROM postoperatively.

2.2 Patient Positioning

It is recommended to perform shoulder arthroplasty in a beach-chair position. This allows for full access to the shoulder joint which is necessary to intraoperatively assess the joint function, stability and range of motion. To facilitate access to the joint and, if required, the use of fluoroscopy, the patient should be positioned as lateral as possible to the affected side on the OR table. The head needs to be securely fixed.

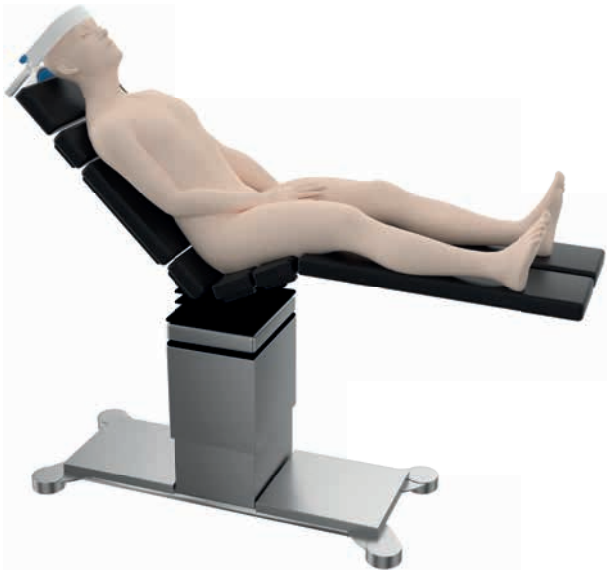


Figure 2.1

3. Color Coding

The LINK Embrace Shoulder System offers diverse fixation and biomechanical options. The options offered by each implant are indicated by a color-coding matrix on each component package. Color-coding matrix 1 (figure 3.1) is applied on all implant components except Bone Screws, for which color-coding matrix 2 is used (figure 3.2). Matrix 1 (figure 3.1) consists of seven cells in total. The first line contains product related information, such as component size, length or assignment. The left column indicates the possible biomechanical configurations the component can be used for. The right column indicates the fixation options to anchor the implant in the bone. The meaning of each cell is explained in table 3.1 below. Available options are highlighted by a specific color, and options not available are indicated by a grey cell (figure 3.2, right matrix).

L 100	Ø 13
Anatomical	Cementless
Reverse	Cemented
CTA	Hybrid

Figure 3.1 Example Color Coding Matrix 1

Color-coding matrix 2 (Figure 3.2) consists of four cells in total. The left column indicates the possible biomechanical configurations the component can be used for. The meaning of each cell is explained in table 3.1. Available options are highlighted by a specific color, options not available are indicated by a grey cell (figure 3.2, right matrix). The central cell contains the screw length L (in mm) in the first line and the screw diameter (in mm) in the second line. The right cell indicates the screw type according to the three symbols explained in table 3.1.

Anatomical	L20	
Reverse	Ø 6.0	

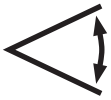
	L20	
Reverse	Ø 6.0	

Figure 3.2 Example Color Coding Matrix 2

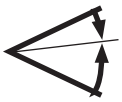
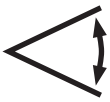
Anatomical	Indicates the component can be used for anatomical configurations (TSA). Please note this code also applies to Hemi Shoulder Arthroplasty (HEMI) when the glenoid is left native.
Reverse	Indicates the component can be used for reverse configurations (RSA).
CTA	Indicates the component is a CTA head or can be combined with a CTA head.
Cementless	Indicates cementless component fixation in the bone.
Cemented	Indicates cemented component fixation in the bone.
Hybrid	Indicates simultaneous cemented and cementless component fixation in the bone. Please refer to the surgical technique for further information.
	Indicates a central Bone Screw to be applied with the Convertible Metal-Back or Reverse Glenoid Baseplate.
	Indicates a peripheral angle-stable Bone Screw to be applied with the Reverse Glenoid Baseplate.
	Indicates a peripheral non angle-stable Bone Screw to be applied with the Reverse Glenoid Baseplate.

Table 3.1

4. Humeral Resection, Preparation

This chapter describes the surgical technique for reverse Total Shoulder Arthroplasty using

- Modular Stems with Proximal Bodies
- Modular Revision Stems with Proximal Bodies
- Humeral Fracture Stems
- Reverse Trays and Reverse Inserts
- Reverse Glenoid Baseplates and Glenospheres

The LINK Embrace Shoulder System offers components for both primary and revision surgery applying to reverse joint configurations.

A multi-option Reverse Glenoid Baseplate, available with standard and long peg for revisions, hosts the Glenospheres. Several options, e.g. inclined Reverse Trays and Inserts, allow for individual adaption of the joint kinematics to the patient requirements.

4.1 Humeral Head Resection

4.1.1 Intramedullary Alignment

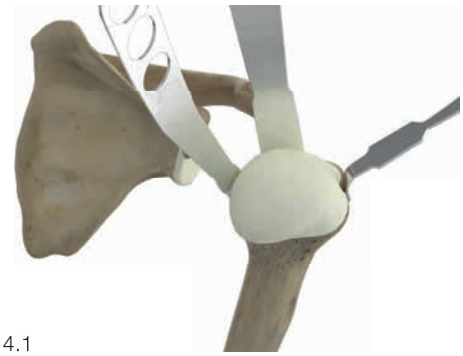


Figure 4.1

Expose and mobilize the humeral head and luxate it from the glenoid.

Figure 4.2

Open the medullary canal with a suitable instrument in line with the humeral axis.

Using the T-Handle, insert the Starter Awl into the medullary canal until the depth stop is reached. Make sure that the blue Depth Stop Disk rests in the Starter Awl shaft recess.

Figure 4.3

Prepare the Resection Guide depending on the surgical approach, i.e. selection of the Resection Block for delto-pectoral or for lateral approach.

NOTE: The LINK Embrace Instrument Set supports different surgical approaches. In the surgical technique described here, the delto-pectoral approach is used.

For lateral techniques use the Resection Block for lateral approaches and follow the workflow correspondingly.

Figure 4.4

Slide the Resection Guide down on the Starter Awl placed in the medullary canal by applying light pressure to the instrument spring clamp.

Figure 4.5

Connect the desired Resection Block and the Resection Guide Connector with the laser marks on both Connector Bar and Resection Block in line. The Resection Block is fixed to the Connector Bar by means of a magnetic connection.

Figure 4.6

Considering the side to be treated, insert the Resection Guide Connector into the fork of the Resection Guide. A slight initial resistance prevents the instrument from slipping out of the fork.

Figure 4.7

According to the desired retroversion, screw the Alignment Rod into the corresponding hole (0°, 10°, 20°, 30°) in the Alignment Rod Connector. Make sure to select the correct set of holes for treatment of the left or right side respectively, corresponding to the laser marking on the Alignment Rod Connector.

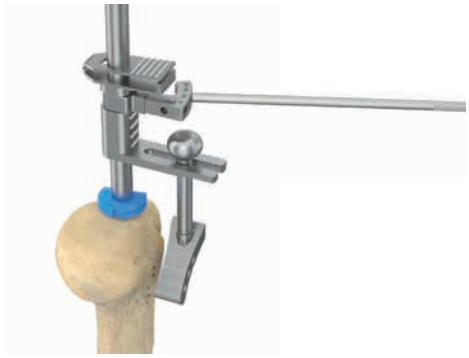


Figure 4.8

Place the Alignment Rod Connector in the required orientation (Left or Right) on the Resection Guide.

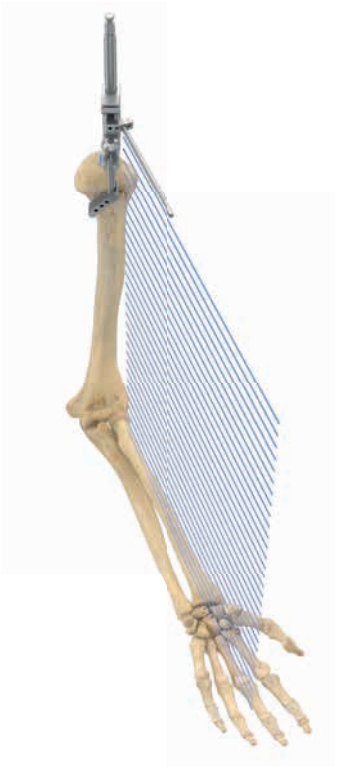


Figure 4.9

Set the desired retroversion by axially rotating the Resection Guide on the Starter Awl, adjusting the Alignment Rod parallel to the forearm which is held flexed at approx. 90°.

Adjust the Resection Guide to the desired resection level (to change the instrument level, press the instrument spring). The spring locks the instrument when released.

Finally determine the resection level with respect to the anatomical neck of the humeral head.

Side the Resection Block together with the Resection Guide Connector within the fork until it makes contact with the bone.

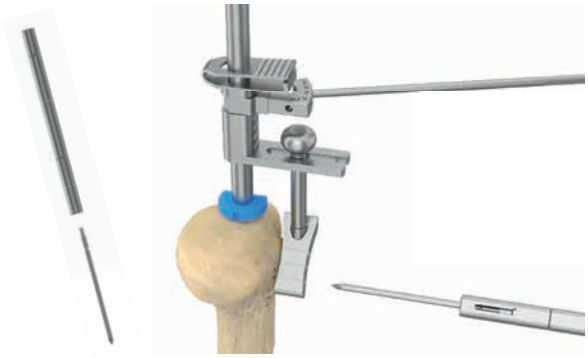


Figure 4.10

Fix the Resection Block with at least two Fixation Pins (3.0 mm) using the Universal Pin Inserter.

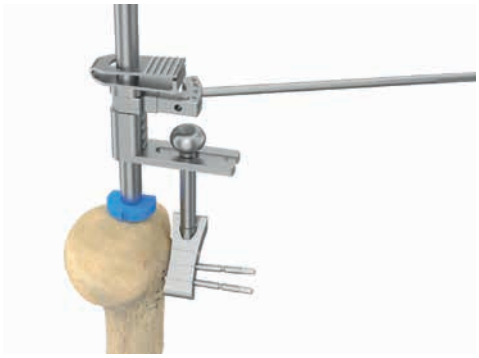


Figure 4.11

The medial and lateral pin axis are parallel to each other and will allow sliding of the resection block. The central pin axis is oblique and will fix the block in place.

The orientation of the pinholes is marked accordingly on the block. Take note that the most lateral pin might interfere with the intramedullary Starter Awl.

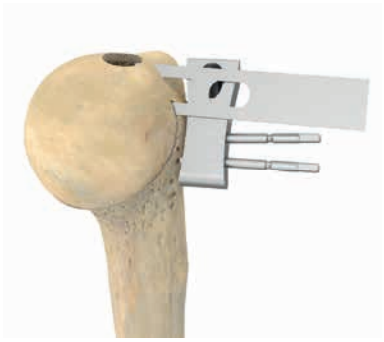


Figure 4.12

After a final check of the resection level and retroversion, the humeral head is resected with an oscillating saw blade on top of the Resection Block at 135° (defined by the instrument).

For this purpose, all instruments except the fixed Resection Block can be removed by pulling them upwards. To do so, press the spring on the Resection Guide, and slide the Resection Guide upwards over the Starter Awl. Then remove the Starter Awl using the T-Handle.

For more stability, e.g. in case of poor fixation, the Resection Guide can also be left in place. When sawing, make sure to avoid any instrument interference.

Figure 4.13

Remove all instruments. Pins can be removed with the Pin Inserter/Extractor.

4.1.2 Extramedullary Alignment

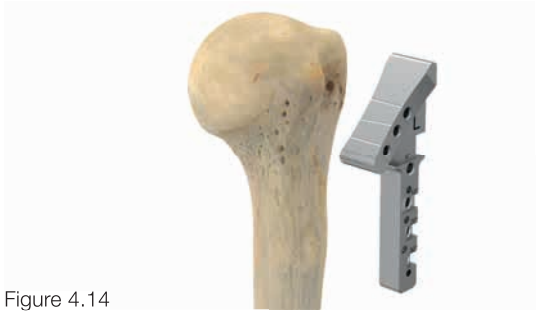


Figure 4.14

Alternatively to intramedullary alignment, use the Resection Guide for extramedullary alignment. The extramedullary Resection Guide has a built-in angle of 135°.

Figure 4.15

According to the desired retroversion, screw the threaded end of the Alignment Rod into the corresponding hole (0°, 10°, 20°, 30°) on the vertical Resection Guide bar. The guide has two opposing sets of holes for left and right application.

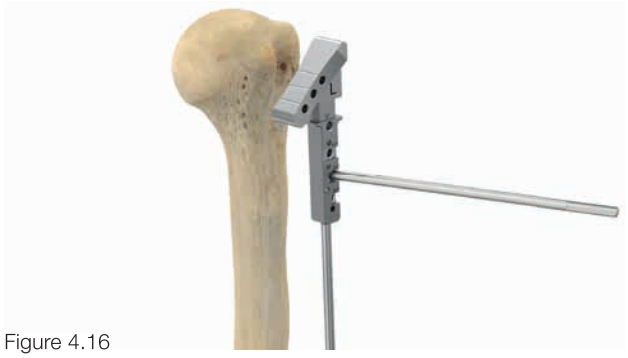


Figure 4.16

Align the rod-shaped neck of the instrument along the humeral shaft axis. A second Alignment Rod may be screwed into the hole at the distal guide end, prolonging the instrument axis for easier positioning.

Figure 4.17

Set the desired retroversion by internal or external rotation of the Guide, adjusting the Alignment Rod parallel to the forearm which is held flexed at approx. 90°.

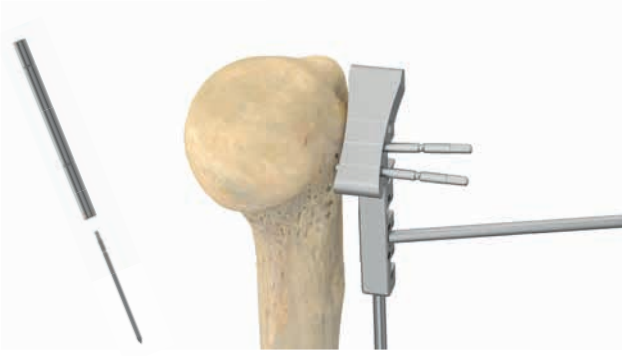
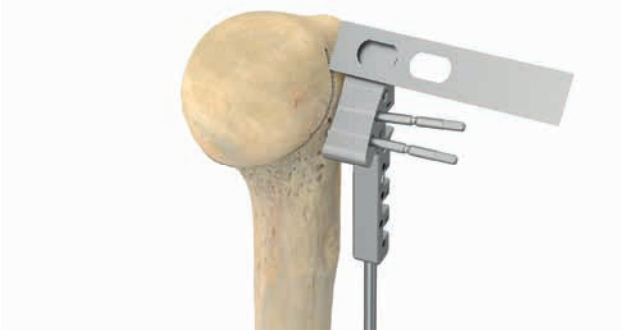


Figure 4.18

Determine the final resection level with respect to the anatomical neck of the humeral head. Fix the Resection Guide with at least two Fixation Pins (3.0 mm) using the Universal Pin Inserter. The medial and lateral pin axis are parallel to each other and will allow sliding of the resection block. The central pin axis is oblique and will fix the block in place.

The orientation of the pinholes is marked accordingly on the block.



After a final check of level and retroversion, resect the humeral head with an oscillating saw blade on top of the Resection Guide.

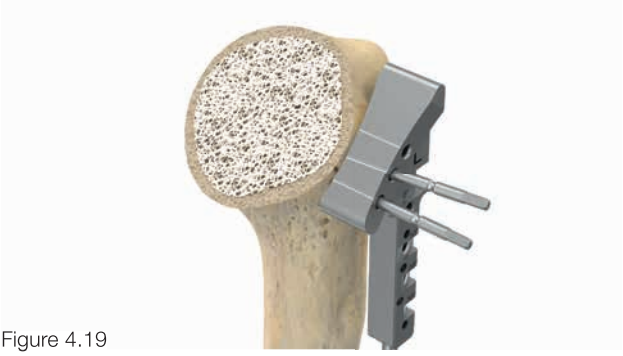


Figure 4.19

4.1.2.1 Alternative Retroversion Determination

Figure 4.20

The LINK Embrace Instrument Set supports an alternative way to determine the retroversion, using the Alignment Rod and the Alignment Rod Connector.

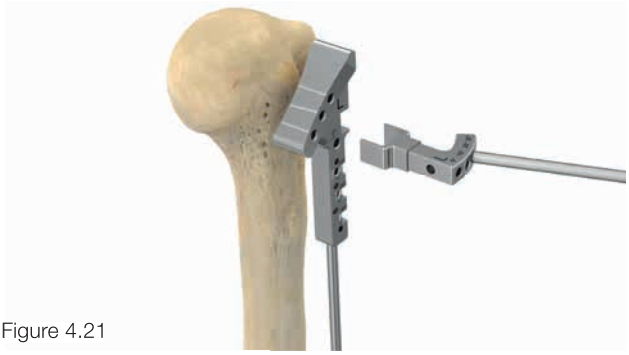


Figure 4.21

Place the Alignment Rod Connector with the Alignment Rod in the required orientation on the Resection Guide.

Go on as described in 4.1.2

4.2 Proximal Body, Modular Stem/Modular Revision Stem and Humeral Fracture Stem Preparation (FX)

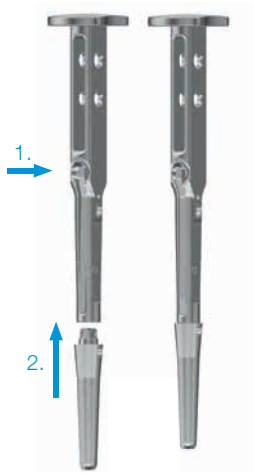


Figure 4.22

Determine the appropriate diameter and length of the Modular Stem/Modular Revision Stem using the Modular Trial Stems, which are coupled to the Handle for Modular Trial Stems. To attach the Modular Trial Stem to the Handle, press the Handle lever.

Place the Trial Stem on the Handle and release the lever. For disassembly, press the lever again and remove the Trial Stem.

Figure 4.23

The selected Modular Trial Stem is carefully driven into the bone until good stability is achieved.

NOTE: To adjust the prosthesis height, the LINK Embrace Shoulder System offers Proximal Bodies and Trials in three different heights:
-5, 0 and +5, each in three sizes: S, M and L.
A Template for Proximal Bodies is used to determine the required Proximal Body height.

NOTE: The Template is used for both left and right side. To adapt the Template to the appropriate side, slide the Template plate on the Template bar into the circumferential recess. Rotate the Template plate by 90° and detach it from the Template bar.
Depending on the side to be treated, flip the plate so that the front marking reads “left” or “right”. Reattach the plate to the bar by sliding it over the flattened bar end into the recess. Rotate the plate by 90° and slide it on the Template bar.

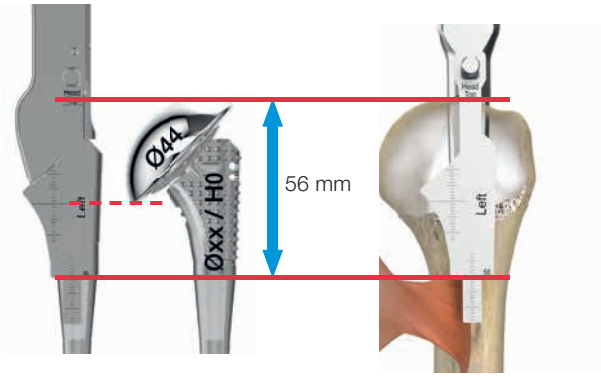


Figure 4.24

NOTE: To determine the required height of the Proximal Body, the Template for Proximal Bodies references to the proximal insertion of the Pectoralis Major m., which is approximately 56 mm below the highest point of the humeral head. The Template contour corresponds to the Proximal Body of height “0” and size “S”. The upper line mark on the Template indicates the height of a Humeral Head with a diameter of 44 mm and a height of 16 mm. The lower end of the scale is 56 mm below the upper line mark. The position of the scale end relative to the insertion can be used to determine if a different Modular Stem (length and size) and/or a higher Proximal Body has to be used.

Figure 4.25

Check the correct height level of the Stem considering the required height of the Proximal Body. To do so, attach the Template for Proximal Bodies to the Handle for Modular Trial Stems by inserting the Template bar and pin into the corresponding grooves located on the Handle. A magnetic connection fixes the Template bar to the Handle.

Figure 4.26

Connect the Handle to the Trial Stem in situ and refer to the insertion of Pectoralis Major m. as described. In case the required level cannot be achieved with the different Proximal Body heights available, adapt the level of the Modular Trial Stem. To do so, it may be necessary to select a Modular Trial Stem of a different size and/or length.

Figure 4.27

Once an appropriate Trial Stem has been inserted, remove the Handle for Modular Trial Stems. Connect the Proximal Trial Body with height “0” and size “S” to the Handle for Compressors and Proximal Bodies.

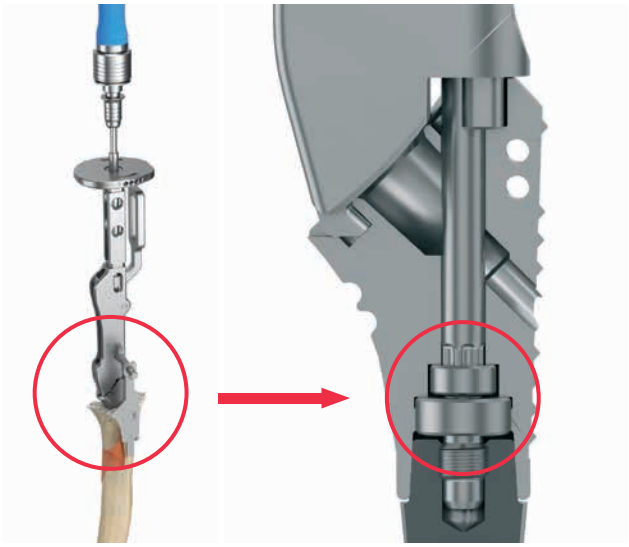


Figure 4.28

Place the Proximal Trial Body on the Modular Trial Stem located in situ.

Connect the Torx 25 Screwdriverbit to the Ratchet and push it through the cannulated Handle into the Proximal Trial Body. Make sure the Screwdriverbit fully engages into the head of the preassembled locking screw within the trial component.

Figure 4.29

Tighten the locking screw slightly with the Ratchet to create the connection between Modular Trial Stem and Proximal Trial Body.

According to the desired retroversion, screw the threaded end of the Alignment Rod into the corresponding hole (0°, 10°, 20°, 30°) in the rim of the Handle impaction plate. Make sure to select the correct set of holes for treatment of the left or right side respectively.

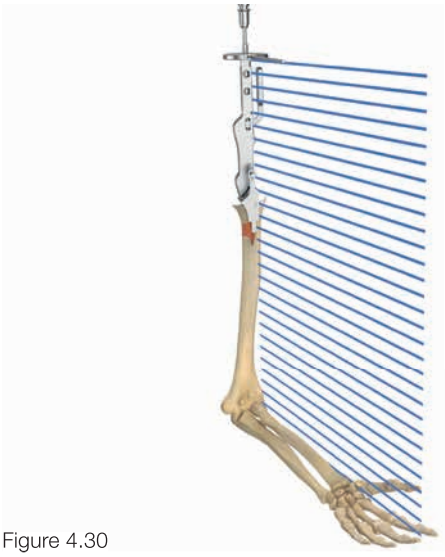


Figure 4.30

Alternatively, use the Alignment Rod together with the Alignment Rod Connector to determine the desired retroversion as described in 4.1.1.
Set the desired retroversion by axially rotating the Handle, adjusting the Alignment Rod parallel to the forearm which is held flexed at approx. 90°. To do so, slightly loosen the locking screw within the Proximal Trial Body.

Once the desired retroversion has been adjusted, tighten the screw and remove both Screwdriver and Handle.

For Humeral Fracture Stem Trialing, see section 4.2.1.

Go on with chapter 5.

4.2.1 Humeral Fracture Stem Trialing (FX)

NOTE: The LINK Embrace System offers monoblock Humeral Fracture Stems in sizes 12, 13, ..., 24 for simple and fast treatment of humeral fractures. The proximal shape of these monoblock Stems corresponds to a Proximal Trial Body of height 0, whereby the proximal diameter grows harmoniously with increasing size. Distally, monoblock Fracture Stems correspond to a Modular Trial Stem of the same size with 75 mm length.

Trial components for sizes 12 and 13 come as a monoblock. For all other sizes, the humeral trial component is assembled using the corresponding size of the 75 mm Modular Trial Stem and the Proximal Trial Body with height 0 and size M.

- Prepare the humerus and determine the required diameter of the Modular Stem as described in 4.2.
- For sizes 12 and 13, perform trial reduction with the Humeral Fracture Trial Stems (monoblock) provided.
- For sizes 14 - 24, combine Modular Trial Stems L 75 mm of the required diameter with the Proximal Trial Body with height 0 and size M. Assemble the components as described in 4.2.
- Determine the required height of the component. To do so, connect the Template for Proximal Trial Bodies to the Handle and attach the Humeral Fracture Trial Stem to the Handle. Go on as described in 4.2.
- Assemble Reverse Trial Tray and Reverse Trial Insert as described in 6.1.1.
- Perform the trial reduction as described in 6.1.1 correspondingly.

Go on with chapter 6.2.1.1 (cementless implantation) or chapter 6.2.1.2 (cemented implantation).

5 Reverse Glenoid Preparation and Implantation

5.1 Glenoid Positioning

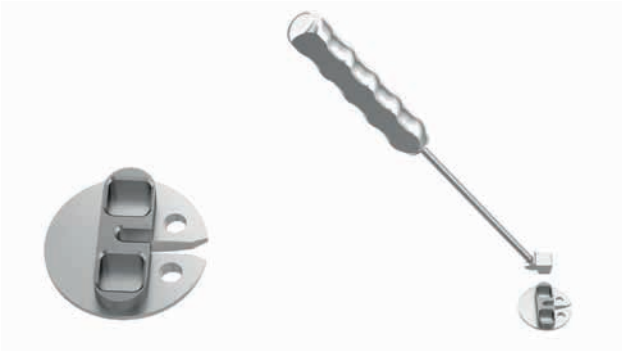


Figure 5.1

Sublux the humerus posterior-caudally with the help of a double fork retractor or a Fukuda retractor. Excise labrum and osteophytes to expose the glenoid. Connect the K-Wire Positioner for Reverse Baseplate to the Handle for Glenoid Sizers and Drill Templates (magnetic connection).

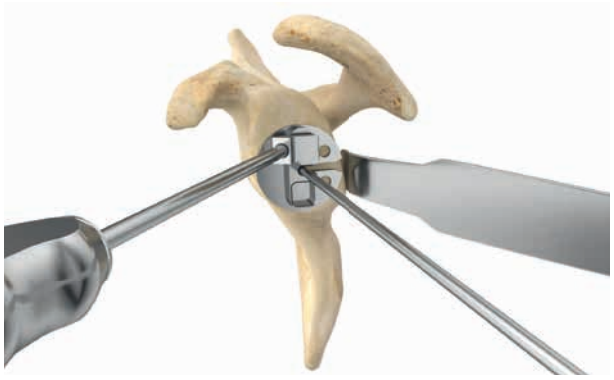


Figure 5.2

Place the K-Wire Positioner according to your preferences. Usually, the Positioner is placed as inferiorly as possible, avoiding any overhang of the Positioner with respect to the bony glenoid rim. Place the K-Wire for Glenoid Preparation (max. Ø 2.5 mm) with the drilling machine through the central hole of the Positioner in the desired direction.

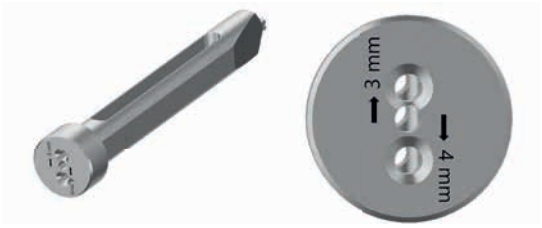


Figure 5.3

After removal of the Positioner, visually check the correct position of the K-Wire and reposition it if necessary. To do so, use the Repositioner for K-Wires. The Repositioner for K-Wires allows for parallel shifting the K-Wire in 3, 4 and 7 mm distance. Depending on the required offset, slide the Repositioner over the K-Wire through the corresponding hole down to the glenoid and align the offset.

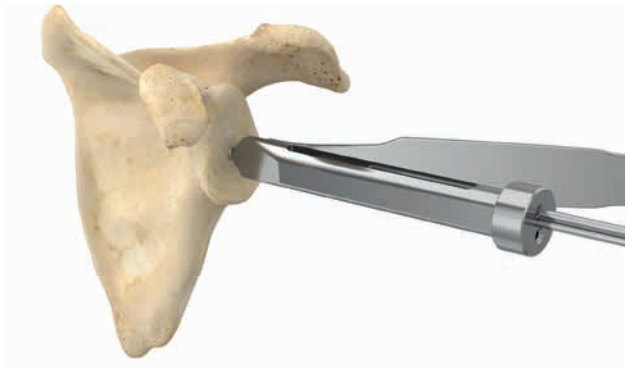


Figure 5.4

Insert a second K-Wire through the specified lumen.

After removal of the Repositioner, visually check the correct position of the K-Wire. Remove the initially positioned K-Wire with the Pin Inserter/Extractor.

Figure 5.5

NOTE: Alternatively, the K-Wire may be placed through the cannulated Guide Handle for K-Wire, ensuring perpendicular alignment of the K-Wire with respect to the K-Wire Positioner.

Figure 5.6

To do so, place the Guide Handle for K-Wire on the Positioner so that the two Guide noses click into the grooves of the Positioner (magnetic connection).

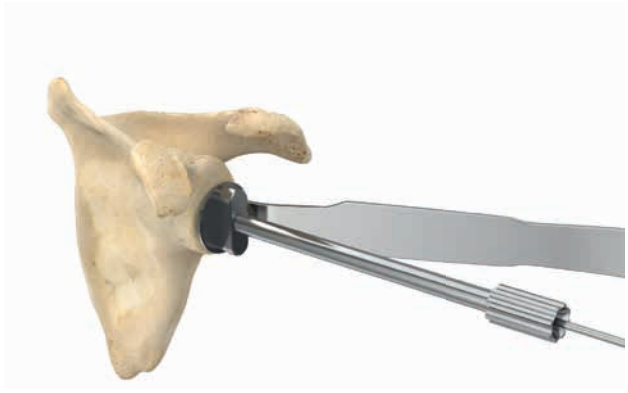


Figure 5.7

Place the instrument on the glenoid according to your preferences. Usually, the Positioner is placed as inferiorly as possible, avoiding any overhang of the Positioner with respect to the bony glenoid rim. Place a K-Wire through the Guide Handle into the glenoid bone.

5.2 Glenoid Reaming

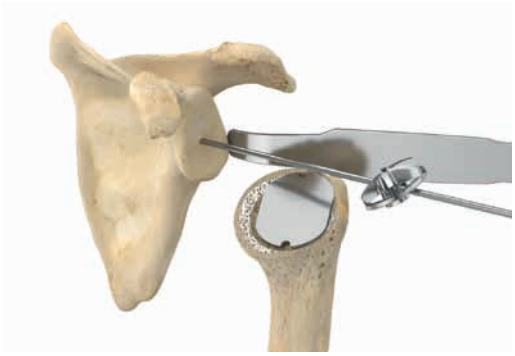


Figure 5.8

Glenoid reaming is carried out with the Glenoid Reamer size S (Ø 28 mm).

NOTE: LINK Embrace Glenoid Reamers have a slotted central hole, allowing for slightly tilting the Reamer on the K-Wire. A cut-out at the outer Reamer ring facilitates passing the surrounding soft tissue and, thus, pushing the Reamer down to the glenoid.

Select the Glenoid Reamer of size small (Ø 28 mm), tilt it and slide over the K-Wire down to the glenoid.

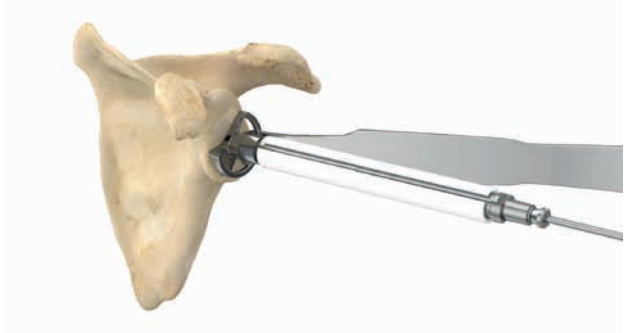


Figure 5.9

Slide the cannulated Drive Shaft for glenoid preparation (with the Tissue Protection Sleeve installed) over the K-Wire and insert it into the situs. Connect the Drive Shaft to the Glenoid Reamer in situ. To do so, insert the external hexagon of the Drive Shaft into the internal hexagon of the Reamer (magnetic connection).

Carefully ream the glenoid. For manual reaming, connect the T-Handle to the Drive Shaft employing the Hudson fitting.

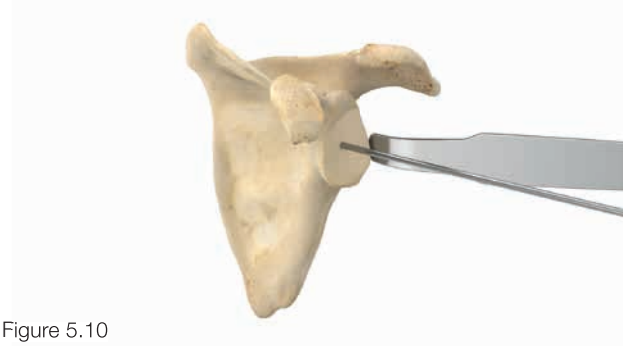


Figure 5.10

NOTE: Take into account the stability of the bone. Avoid applying excessive forces and overreaming of the glenoid. It is recommended to carefully place the reamer onto the glenoid. When using a power tool, have it already rotating before contact.

After reaming, remove the Drive Shaft and Reamer in reverse order, leaving the K-Wire in situ.

5.3 Drilling of Central Hole for Reverse Glenoid Baseplates

NOTE: LINK Embrace Reverse Glenoid Baseplates are available with standard peg (15 mm) and long peg (25 mm). Depending on the required peg length, select the appropriate Drill for the central peg hole.

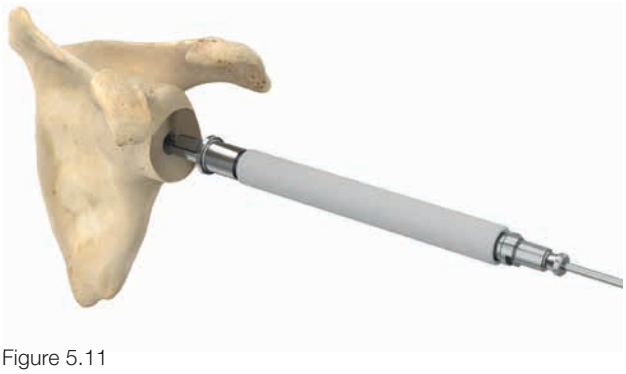


Figure 5.11

Drill the central hole for the central peg of the Reverse Glenoid Baseplate with the Drill for Central Pegs of Reverse Glenoid Baseplate over the K-Wire. To do this, attach the corresponding Drill (standard or long) for Central Pegs to the Drive Shaft (hexagon with magnetic connection) and drill until the depth stop is reached.

Remove all instruments.

5.4 Reverse Glenoid Baseplate Implantation

Figure 5.12

Slide the threaded Shaft for Impactor into the Impactor. Turn it clockwise to pass the safety thread that prevents the Shaft from slipping out of the Impactor.

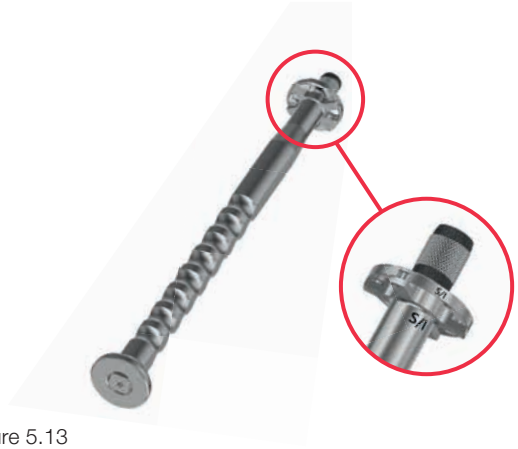


Figure 5.13

Attach the required Reverse Glenoid Baseplate to the Impactor and fix it by turning the inner Shaft clockwise using the Torx 20 Screwdriverbit connected to the Ratchet. When connecting the Reverse Baseplate to the Impactor, align the “S/I” (superior/inferior) laser mark on the Impactor with the “S/I” mark on the Reverse Baseplate rim.

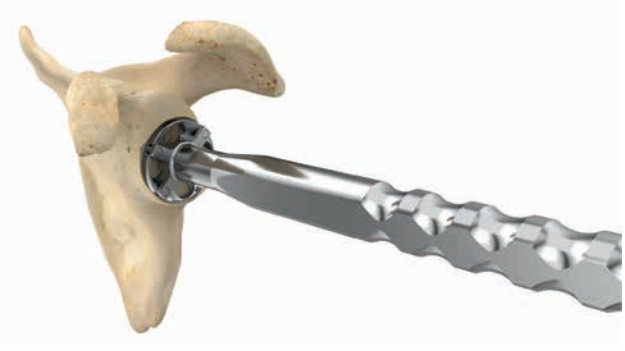


Figure 5.14

With the Reverse Glenoid Baseplate firmly fixed to the Impactor, the instrument is introduced into the situs. Prior to impaction make sure that the “S/I” mark on the Reverse Glenoid Baseplate rim is oriented superiorly. Usually, the superior hole is directed towards the coracoid base. With the component aligned in the described way, axially impact the Baseplate until it is fully seated.

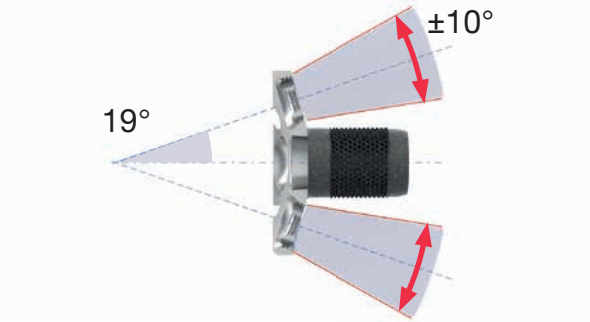


Figure 5.15

NOTE: LINK Embrace Reverse Glenoid Baseplates anchor in the bone using a central pressfit peg and up to four peripheral Bone Screws. If required, a central Bone Screw can be applied through the central peg for additional fixation. Peripheral Screws are available as Ø 6.0 mm cancellous Bone Screws, Ø 4.5 mm cortical Bone Screws and Ø 4.5 mm angle-stable cortical Bone Screws.

All peripheral screw holes of the Reverse Glenoid Baseplate can be filled with any of these screw types. It should be noted that the superior and inferior screw holes allow for polyaxial alignment of angle-stable (locking) screws, in which the screw angle can be selected within a range of ± 10° from the neutral position. The neutral position of the superior and inferior holes is designed 19° divergent in relation to the central peg. Likewise, the posterior and anterior screw holes allow for monoaxial alignment of angle-stable (locking) screws. The axes of the posterior and anterior screw holes are designed monoaxial and parallel to the central peg.

All peripheral Bone Screws are available in lengths 20, 25, 30, 35, 40, 50 and 60 mm and have a self-tapping tip. They are tightened using the Torx 25 Screwdriverbit connected to the Ratchet.

5.4.1 Reverse Glenoid Baseplate: Use of Central Bone Screws

NOTE: If required, LINK Embrace Reverse Glenoid Baseplates can additionally be fixed with a central Bone Screw. For this purpose, 6.0 cancellous central screws are available in lengths of 20 mm, 25 mm and 30 mm.

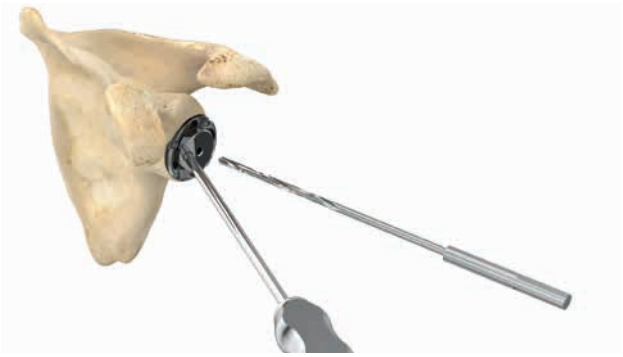


Figure 5.16

Insert the Drill Guide for central Screws into the Reverse Glenoid Baseplate central hole. The Drill Guide determines the direction of the screw. Drill the screw hole with the Ø 3.2 mm Drill to the desired depth.

Figure 5.17

The required screw length is determined with the Depth Gauge.

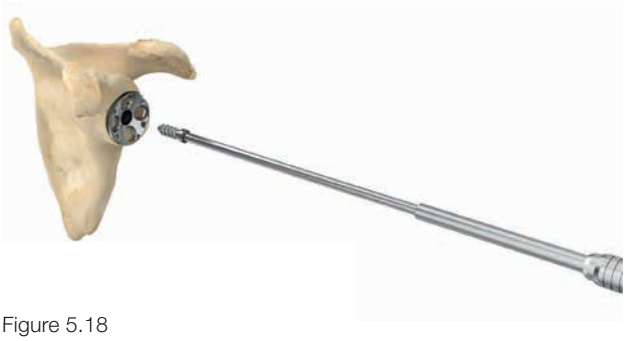


Figure 5.18

The cancellous cylinder head Screw of the desired length is inserted with the Torx 25 Screwdriverbit, which is connected to the Ratchet and tightened until it is fully seated.

NOTE: Make sure the Bone Screw is fully seated. Go on tightening the Bone Screw until the laser mark on the Screwdriverbit is level with the Reverse Baseplate surface, indicating the Bone Screw is in the required position.

NOTE: Care must be taken to not overtighten the central Bone Screw as this might impair the fixation of the Screw or damage the bone.

5.4.2 Superior and Inferior Bone Screws (angle-stable and non angle-stable)

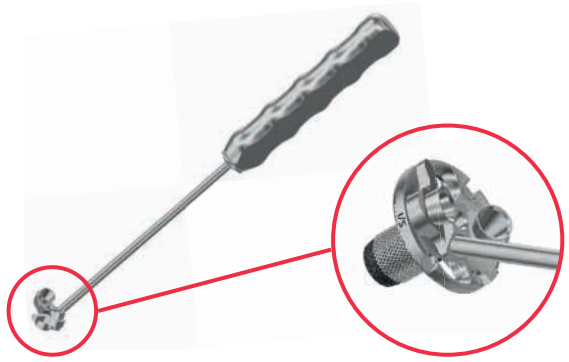


Figure 5.19

Insert the “S/I” polyaxial Drill Guide with its rear peg into the central Baseplate hole. The small outrigger will only allow the Drill Guide to mate to the Baseplate in the correct axis. The Drill Guide should sit firmly on the Baseplate.

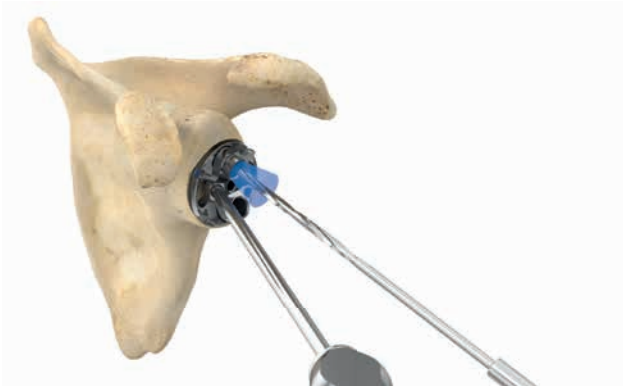


Figure 5.20

The Drill Guide limits the possible angulation range of the drill. Make sure to not exceed this under any circumstances.

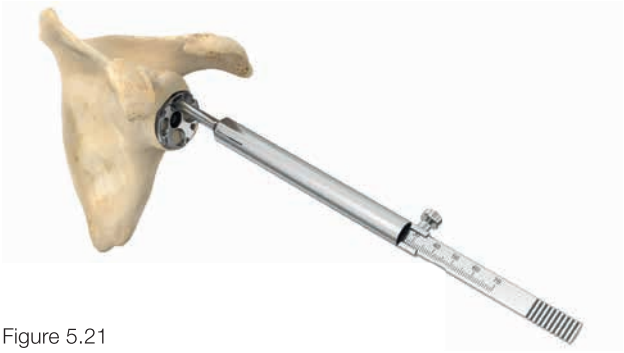


Figure 5.21

Select an appropriate angle and drill the screw hole with the Ø 3.2 mm drill to the desired depth. Usually, the superior screw is directed towards the coracoid base. Determine the required screw length with the Depth Gauge.

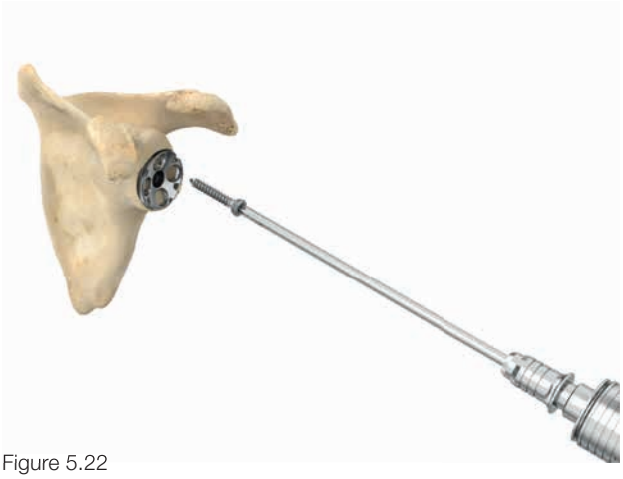


Figure 5.22

Select the required screw type from Ø 6.0 mm cancellous Bone Screws, Ø 4.5 mm cortical Bone Screws or Ø 4.5 mm angle-stable (locking) cortical Bone Screws.

NOTE: in case the use of both angle-stable (locking) and standard (non angle-stable) Bone Screws is intended, it is recommended to apply the standard screws first in order to achieve compression between Baseplate and glenoid bone.

Insert the selected Bone Screw with the Torx 25 Screwdriverbit connected to the Ratchet and tighten the Screw until it is fully seated.

NOTE: Make sure the Bone Screw is fully seated in order to avoid mechanical contact between Glenosphere backside and Bone Screw head.

Apply the same procedure for the inferior Bone Screw.

5.4.3 Posterior and Anterior Bone Screws

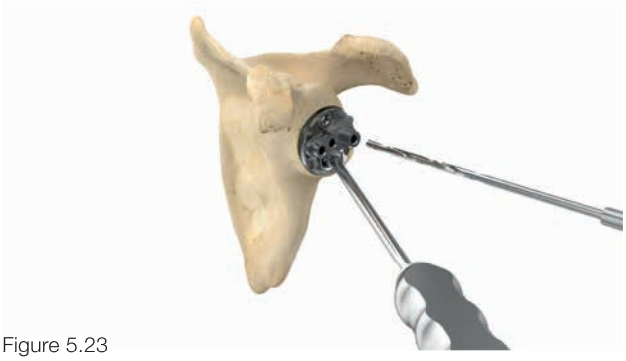


Figure 5.23

Insert the A/P monoaxial Drill Guide into the posterior screw hole. The Drill Guide determines the direction of the screw. Drill the screw hole with the Ø 3.2 mm Drill to the desired depth.

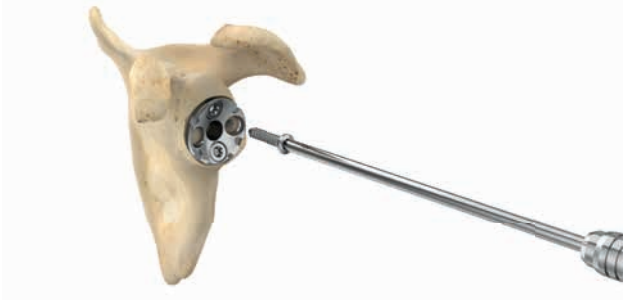


Figure 5.24

The required screw length is determined with the Depth Gauge. Select the required screw type from Ø 6.0 mm cancellous Bone Screws, Ø 4.5 mm cortical Bone Screws or Ø 4.5 mm angle-stable cortical Bone Screws. Insert the selected Bone Screw with the Torx 25 Screwdriverbit, which is connected to the Ratchet, and tighten it until it is fully seated.

NOTE: Make sure the Bone Screw is fully seated in order to avoid mechanical contact between Glenosphere backside and Bone Screw head.

Apply the same procedure for the anterior screw.

5.5 Glenospheres

NOTE: LINK Embrace Glenospheres made of EndoDur are available in 36 mm, 39 mm and 42 mm diameters in both neutral (concentric) and eccentric versions. They are to be combined with Reverse Inserts made of UHMWPE with the same diameter. All Glenospheres are fixed in the Reverse Glenoid Baseplate with a taper connection and a pre-assembled locking screw.

All LINK Embrace Glenospheres have an overhang of the dome which has to be placed inferiorly.

Figure 5.25

5.5.1 Trial Glenospheres

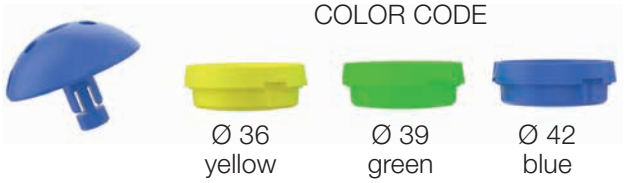


Figure 5.26

After implantation of the Reverse Glenoid Baseplate and appropriate preparation of the humeral component, a trial reduction may be performed using the neutral (concentric) or eccentric Trial Glenospheres of the required diameter. The sizes of the Trial Glenospheres and Reverse Trial Inserts are color coded:

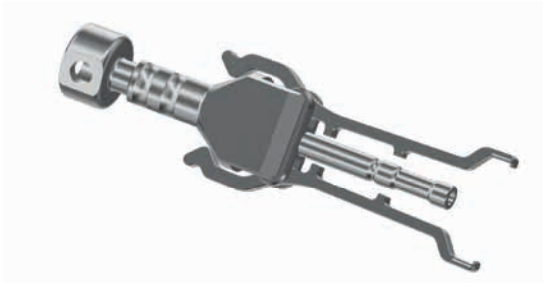


Figure 5.27

The required Trial Glenosphere is placed on the Reverse Glenoid Baseplate by means of the Handle for Glenospheres.

Figure 5.28

To do so, turn the knob of the instrument counter-clockwise to open the pincers. According to the type of Glenosphere used, select the Cap for neutral (short) or the Cap for eccentric Glenospheres (long) respectively and slide it on the central Handle rod between the pincers. When using the Cap for eccentric Glenospheres make sure the Cap is aligned with the recessing side of the tip inferiorly.

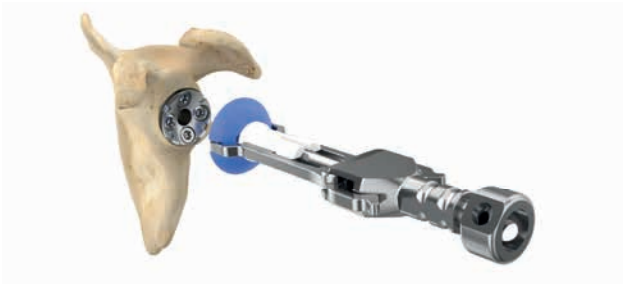


Figure 5.29

Place the required Trial Glenosphere in the Handle with the pincers positioned in the lateral grooves of the Glenosphere. Make sure the Handle and Glenosphere are axially aligned and the Cap is flush with the Glenosphere. Turn the instrument knob clockwise to close the pincers and to fix the Trial Glenosphere.

Figure 5.30

With the Handle, insert the Trial Glenosphere and press it firmly into the Reverse Baseplate to engage the taper connection.

Figure 5.31

Make sure the Trial Glenosphere does not interfere with bone or soft tissue, in particular on the superior edge. In case of contact to bone or other tissue, remove the component and excise the bone or tissue in the area of contact. Then reintroduce the Trial Glenosphere.

Remove the Handle for Glenospheres by turning the knob counterclockwise.

With the humeral trial component completely prepared, perform a trial reduction.

5.5.2 Glenospheres: Implantation

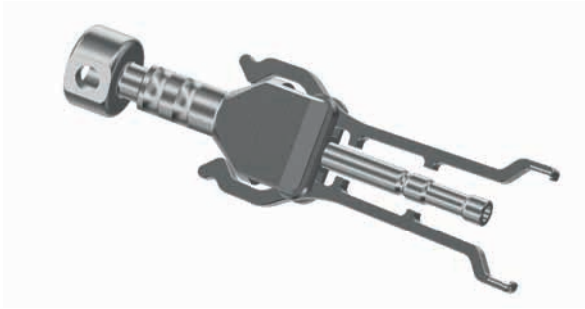


Figure 5.32

If used, remove the Trial Glenosphere. The required Glenosphere is placed on the Reverse Glenoid Baseplate by means of the Handle for Glenospheres.

Figure 5.33

To do so, turn the instrument knob counterclockwise to open the pincers. According to the type of Glenosphere used, select the Cap for neutral (short cap) or the Cap for eccentric Glenospheres (long cap) respectively and slide it on the central Handle rod between the pincers. When using the Cap for eccentric Glenospheres make sure the Cap is aligned with the recessing part of the tip inferiorly.

Figure 5.34

Place the required Glenosphere in the Handle with the pincers positioned in the lateral grooves of the Glenosphere. Make sure Handle and Glenosphere are axially aligned and the Cap is flush with the Glenosphere. Turn the instrument knob clockwise to close the branches and fix the Glenosphere.

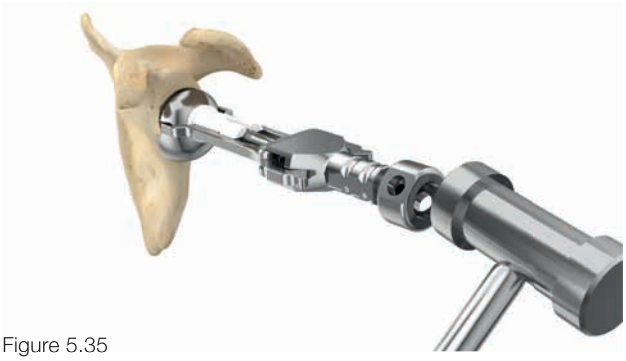


Figure 5.35

NOTE: If a central Bone Screw is implanted, recheck the full seating of the Screw prior to Glenosphere insertion in order to avoid any contact between Bone Screw head and Glenosphere fixation screw.

Insert the Glenosphere into the Reverse Baseplate. Make sure the component overhang is positioned inferiorly and the taper engages with the inner taper of the Reverse Baseplate. Make sure the Glenosphere does not interfere with bone or soft tissue, in particular at the superior edge. In case of contact to bone or other tissue, remove the component and excise the bone or tissue in the area of contact. Then reintroduce the Glenosphere. Carefully impact the Glenosphere with slight mallet blows onto the Handle impaction plate to engage the taper connection.

Figure 5.36

Check the seating of the taper connection by gently applying rotational forces with the Handle. The taper is engaged when the Glenosphere resists against axial and rotational forces.

Connect the Torx 20 Screwdriverbit to the 3 Nm Torque Wrench. Slide the assembled Screwdriver through the Handle for Glenospheres. Tighten the internal fixation screw by turning the 3 Nm Torque Wrench clockwise. The required torque of 3 Nm is reached when a clicking noise can be heard.

Figure 5.37

Remove the Torque Wrench and the Handle for Glenospheres by turning the Handle knob counterclockwise.

With the humeral components/trial components completely prepared, perform a trial reduction.

6 Reverse Humeral Component Trialing and Implantation

NOTE: The LINK Embrace System offers three different Reverse Trays and Trials to accommodate Reverse Inserts. Reverse Trays are mounted onto the humeral components (Compressors, Proximal Bodies and Humeral Fracture Stems). Reverse Trays come in neutral (concentric), 10° inclined and 3 mm offset versions.

Figure 6.1

Figure 6.2

Reverse Trial Trays in inclined and offset versions as well as the respective final Reverse Trays can be rotated in 45° steps to individually adjust various parameters such as inclination, retroversion, (posterior) offset and humerus lateralization. A scale on the Tray front side is used to determine the orientation of both the Reverse Tray and the Reverse Insert. It helps with later reproduction of the selected trial configuration with the final prosthesis components. It is recommended to start trialing with a neutral Reverse Tray.

Figure 6.3

LINK Embrace Reverse Inserts are available in different diameters, heights and inclinations according to table 6.1. They have to be combined with LINK Embrace Glenospheres of the same diameter.

Reverse Humeral Inserts		
Diameter Ø	Inclination	Heights
		UHMWPE
36	0°	0, 3, 6
	10°	0, 3, 6
	20°	0, 3, 6
39	0°	0, 3, 6
	10°	0, 3, 6
	20°	0, 3, 6
42	0°	0, 3, 6
	10°	0, 3, 6
	20°	0, 3, 6
to be combined with Glenospheres made of:		EndoDur

Table 6.1: Reverse Inserts: types and allowed combinations. Numerical data in mm unless otherwise noted.

Figure 6.4

All LINK Embrace Reverse Inserts can be fixed in any position on the Reverse Trays. In combination with a Reverse Tray, different parameters such as inclination and retroversion can be adjusted independently in the respective spatial planes.

Both the inclined trial and the inclined final Reverse Inserts have a line mark that indicates the highest point, which is used to determine the orientation of the Reverse Trial Insert. It helps with later reproduction of the selected trial configuration with the final prosthesis components.

It is recommended to start trialing with a neutral Reverse Insert with height 0.

6.1 Proximal Body, Modular Stem/Modular Revision Stem and Humeral Fracture Stem Trialing (FX)

6.1.1 Proximal Body, Modular Stem/Modular Revision Stem Trialing (FX)

Figure 6.5

Place the neutral Reverse Trial Tray on the humeral component and press it down firmly until it is fully seated. A spring-loaded clamp connection fixes the Trial Tray to the humeral component.

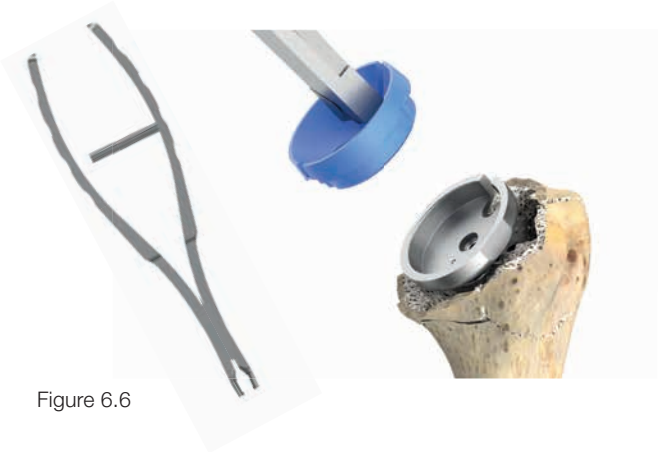


Figure 6.6

Select the suitable Reverse Trial Insert (diameter and height).

NOTE: The LINK Embrace System includes Reverse Inserts and trial components in various diameters, inclinations and heights. It is recommended to start with a neutral (0° inclination) Reverse Trial Insert with 0 mm height.

Using the Insertion Forceps, place the Reverse Trial Insert in the Reverse Trial Tray.

Figure 6.7

Perform a trial reduction to check stability, tension and function of the joint.

NOTE: If required, the joint configuration may be adapted by selecting a Reverse Trial Tray with offset or inclination and/or Reverse Trial Inserts with different height and/or inclination. Reverse Trial Trays and final Reverse Trays have a dial-like ring on their front side used to precisely determine and reproduce the selected position. For this purpose, the most laterally located digit on the trial is noted and the final Reverse Tray is later on positioned accordingly with the same digit most laterally. In case an inclined Reverse Insert is used, the position of the mark indicating the highest point is noted as well.

NOTE: Both the Reverse Trial Trays and the Reverse Trial Inserts have a cutout. Align both cut outs in lateral position in order to easily change the retroversion using the Screwdriver without removing the trial components. To do this, push the Torx 25 Screwdriverbit connected to the Ratchet through the cutouts into the pre-assembled locking screw within the Proximal Trial Body and untighten it slightly. The retroversion can now be adjusted. Finally, retighten the locking screw and remove the Screwdriver. Repeat the trialing.

If no further adjustments are required, the selected retroversion can be marked on the bone, e.g. with electric cautery, according to the line marking on the Proximal Trial Body. The implantation level can now also be transferred from the ruler to the bone for re-production during implantation of the final component.

6.2 Humeral Components: Implantation

6.2.1 Proximal Body, Modular Stem/Modular Revision Stem and Humeral Fracture Stem Implantation (FX)

6.2.1.1 Cementless Proximal Body, Modular Stem/Modular Revision Stem and Humeral Fracture Stem Implantation (FX)

NOTE: In cementless application, Modular Stem/Modular Revision Stem and Proximal Body are assembled in situ.

NOTE: Humeral Fracture Stems have a monoblock design and therefore don't need to be assembled. In order to implant Humeral Fracture Stems, connect the required Stem to the Handle for Compressors and Proximal Bodies and follow the workflow described in this chapter correspondingly.

Figure 6.8

Connect the required Modular Stem/Modular Revision Stem determined with the trial reduction to the Handle for Modular Stems (threaded connection). Attach the Template for Proximal Bodies to the Handle. Introduce the Modular Stem/Modular Revision Stem into the humerus and impact until good stability is achieved. Using the Template for Proximal Bodies, check the position of the final Modular Stem/ final Modular Revision Stem.

NOTE: Another trial reduction can be performed at this stage (suggested in case the final Stem position differs from the Trial Stem position). Proximal Trial Bodies can be connected to the final Modular Stem/ final Modular Revision Stem in situ to determine the appropriate final Proximal Body height.

Remove the Handle and Template.
Remove the transportation lock (white plastic cover) from the final Proximal Body determined with the trial reduction.

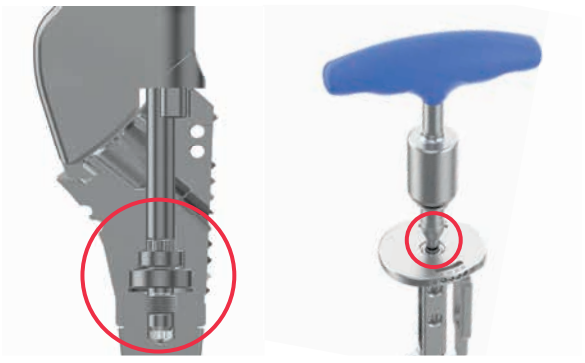


Figure 6.9

NOTE: LINK Embrace Proximal Bodies and Modular Stems/Modular Revision Stems are fixed to each other by a taper connection. A pre-assembled locking screw inside the Proximal Body is used to tighten the coupling. This is done by means of a Torx 25 Screwdriverbit and a 5 Nm Torque Wrench. When pushing the Screwdriverbit into the locking screw, make sure the line mark for the respective height of the Proximal Body on the Screwdriverbit is at the level of the Handle impaction plate. This indicates that the Screwdriverbit is fully inserted into the locking screw head.

Figure 6.10

Connect the Proximal Body to the Handle for Compressors and Proximal Bodies and place it on the Modular Stem/Modular Revision Stem in situ. Do not impact.

Connect the Torx 25 Screwdriverbit to the 5 Nm Torque Wrench and slide it through the Handle into the head of the preassembled locking screw within the Proximal Body.

Slightly turn the locking screw just until the threaded connection of screw and Stem engages, leaving the Proximal Body freely rotatable on the Modular Stem. Align the required retroversion using the Alignment Rod screwed into the appropriate hole in the Handle impaction plate.

Alternatively, align the retroversion with the Alignment Rod screwed into the appropriate hole of the Alignment Rod Connector which is connected to the Handle.

Tighten the locking screw within the Proximal Body using the 5 Nm Torque Wrench and the Torx 25 Screwdriverbit. The required torque is reached when a clicking noise can be heard.

Remove Screwdriver and Handle.
Optionally, you may now perform another trial reduction with a Reverse Trial Tray and Reverse Trial Insert. Adapt the configuration if necessary.

Figure 6.11

Place the required Reverse Tray, reproducing the configuration selected in the trial reduction. For offset and inclined Reverse Trays, the same digit as the digit determined with the trial prosthesis must be aligned laterally.

Figure 6.12

Insert the Fixation Screw into the Reverse Tray (supplied with the Reverse Tray).

Figure 6.13

Connect the Torx 25 Screwdriverbit to the 3 Nm Torque Wrench.

Figure 6.14

Position the tips of an appropriate instrument, e.g. a LINK Bankart Perforating Forceps (item code 64-4160/09) into the grooves of the Reverse Tray and hold the instrument firmly.

Figure 6.15

Introduce the prepared Srewdriver into the Fixation Screw within the Reverse Tray.

Tighten the Screw by turning the Screwdriver clock-wise while holding the Forceps firmly in place with your other hand. The required torque of 3 Nm is reached when a clicking noise can be heard.

Figure 6.16

If required, sutures can be attached using the m-l and a-p holes of the Proximal Body for tuberosities reattachment.

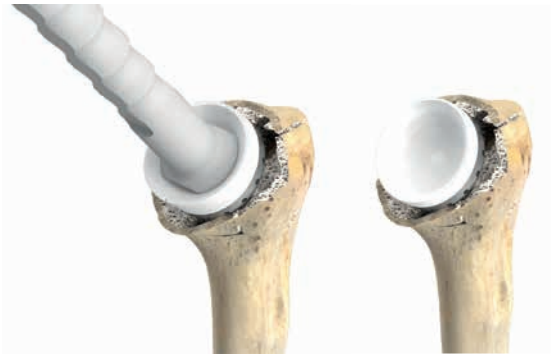


Figure 6.17

Place the required Reverse Insert (diameter, inclination and height) on the Reverse Tray, reproducing the configuration determined with the trial reduction. Use the marks at the highest point of inclined Reverse Inserts and the scale on offset and inclined Reverse Trays to do so.

Impact the Reverse Insert with the convex Impactor for Reverse Inserts until the gap between Insert and Tray is completely closed.

Figure 6.18

Perform reduction and final check.
If adjustments are necessary, both Reverse Insert and Reverse Tray can be removed.

For further information on component removal, refer to chapter 7.

6.2.1.2 Cemented Proximal Body, Modular Stem/Modular Revision Stem and Humeral Fracture Stem Implantation (FX)

NOTE: For cemented implantation, select the Modular Stem/Modular Revision Stem or the Humeral Fracture Stem (monoblock) one or two sizes smaller than the last Trial Stem or Humeral Fracture Trial Stem used. Modular Trial Stems/Fracture Trial Stems and final Modular Stems/final Humeral Fracture Stems with the same size designation have identical intramedullar stem dimensions. When selecting the final component one size smaller than the corresponding trial component, a cement mantle thickness of approx. 0.5 mm is achieved.

NOTE: In cemented application, Modular Stem/Modular Revision Stem and Proximal Body are assembled on the sterile table.

NOTE: Humeral Fracture Stems have a monoblock design and therefore don't need to be assembled. In order to implant Humeral Fracture Stems, connect the required Stem to the Handle for Compressors and Proximal Bodies and follow the workflow described in this chapter correspondingly.

The use of high viscosity cement is recommended for cementation.

Remove the transportation lock (white plastic cover) from the final Proximal Body determined with the trial reduction.

Connect the Proximal Body to the Handle for Compressors and Proximal Bodies. Connect the Proximal Body to the required Modular Stem/Modular Revision Stem and tighten the locking screw within the Proximal Body as described in chapter 6.3.2.1.

Connect the Template for Proximal Bodies to the Handle.

Clean the bone using jet or pulse lavage and apply the cement.

Figure 6.19

Insert the assembled humeral component into the soft cement taking into account the desired retroversion.

For this purpose, the Alignment Rod is screwed into the appropriate hole in the Handle impaction plate rim. Make sure to select the correct set of holes for left and right side treatment.

Figure 6.20

Alternatively, place the Alignment Rod Connector on the Handle and insert the Alignment Rod in the appropriate hole. Make sure to select the correct position of the Alignment Rod Connector for left and right side treatment.

Figure 6.21

Manually press down the humeral component into the soft cement until the Template for Proximal Bodies indicates the previously defined component level. Remove excessive bone cement.

With the Handle, the prosthesis is held in position until the cement is cured.

Figure 6.22

Remove the Handle.
Assemble the Reverse Tray and Reverse Insert as described in 6.3.2.1. Perform reduction and final check. If adjustments are necessary, both Reverse Insert and Reverse Tray can be removed.

For further information on component removal, refer to chapter 7.

7. Component Removal

All LINK Embrace components can be removed by means of specifically designed instruments.

7.1 Removal of Proximal Bodies and Modular Stems/Modular Revision Stems

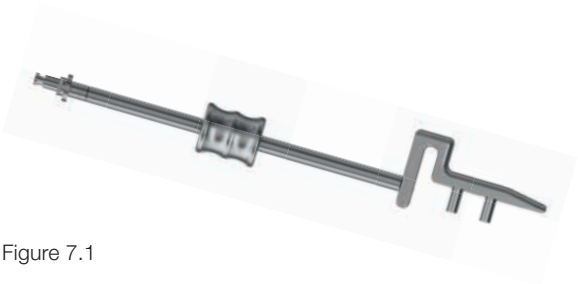


Figure 7.1

For removal of Proximal Bodies with Modular Stems/ Modular Revision Stems as well as Humeral Fracture Stems, connect the Handle for Compressors to the humeral component in situ.

Assemble the Extraction device by sliding the Slaphammer over the Stem for Slaphammer. Screw the Extraction device into the threaded hole of the Extraction Hook.

Figure 7.2

Attach the Extraction device to the Handle by sliding the two Hook bolts into the holes at the Handle.

Remove the humeral component by applying appropriate blows with the Slaphammer.

Figure 7.3

For the separate removal of Modular Stems/Modular Revision Stems, remove the Proximal Body first using the long Torx 25 Screwdriverbit connected to the Ratchet.

To do so, mount the Handle for Compressor onto the Proximal Body and slide the Screwdriver through the Handle so that it engages with the locking screw inside the Proximal Body.

Turn the Ratchet counterclockwise, disengaging the taper connection and pushing the Proximal Body off the Modular Stem.

Remove the Screwdriver, Handle and the attached Proximal Body.

Figure 7.4

Screw the Handle for Modular Stems onto the Modular Stem in situ.

Figure 7.5

Attach the extraction device to the Handle for Modular Stems by sliding the two Hook bolts into the Handle holes.

Remove the Modular Stem by applying appropriate blows with the Slaphammer.

7.2 Removal of Reverse Trays

Figure 7.6

Push a small chisel into the gap between Reverse Insert and Reverse Tray and remove the Insert by circumferential levering with the chisel. To facilitate removal you may turn a Bone Screw through the PE-Insert, pushing the Insert off the Tray.

Figure 7.7

Position the tips of an appropriate instrument, e.g. a LINK Bankart Perforating Forceps (item code 64-4160/09) into the grooves of the Reverse Tray and hold the instrument firmly.

Figure 7.8

Remove the Fixation Screw within the Reverse Tray by turning it counterclockwise using the Torx 25 Screwdriverbit connected to the Ratchet

Figure 7.9

Slide the Separator Wrench into the gap between Reverse Tray and Humeral Component.

Impact the Separator Wrench with light mallet blows. Repeat this procedure at another position in case the component cannot be removed.

Figure 7.10

In case the taper connection of the components cannot be released with the Separator Wrench, apply the extraction instruments as described subsequently.

Connect the Reverse Tray Extraction Bolt to the T-Handle.

Introduce the threaded extractor tip into the Reverse Tray's central hole.

Figure 7.11

Detach the Reverse Tray from the humeral component by turning the T-Handle clockwise, holding the Forceps with your other hand as a countertorque, until the Tray is completely separated from the humeral component.

In case of revision or conversion surgery, visually check the female taper of the humeral component for integrity. Mount the required anatomic components as described in the surgical technique of the LINK Embrace Shoulder System – Anatomic Configuration.

NOTE: In the U.S., Proximal Body and Modular Stem components of the LINK Embrace Shoulder System are only indicated for use in reverse total shoulder arthroplasty.

7.3 Removal of Glenospheres

Figure 7.12

Connect the Torx 20 Screwdriverbit to the Ratchet and introduce the screwdriver tip into the head of the Glenosphere locking screw. Untighten the screw by turning the Screwdriver counterclockwise. Make sure the screw is completely loose.

Slide the Extraction Cap for Glenospheres (metal Cap) over the central rod between the branches of the Handle for Glenospheres.

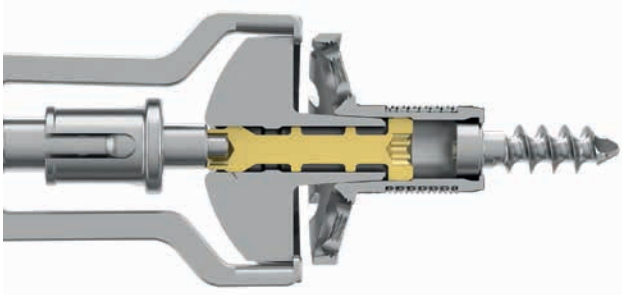


Figure 7.13

Turn the Handle knob counterclockwise in order to open the pincers. Attach the Handle to the implanted Glenosphere, inserting the metal Cap tip into the Glenosphere hole. Position the pincers in the lateral Glenosphere grooves. Turn the instrument knob clockwise to close the pincers.

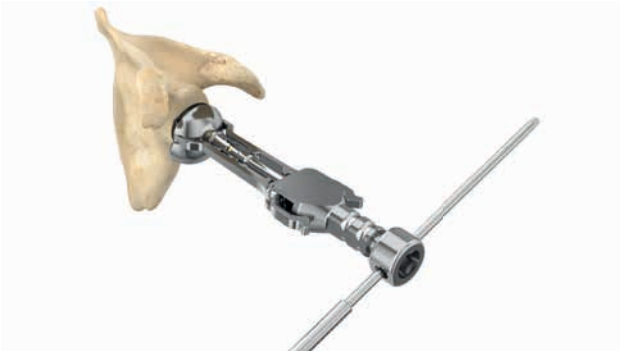


Figure 7.14

Detach the Glenosphere by continued turning the Handle knob clockwise, separating the taper connection between Glenosphere and glenoid component. To facilitate turning the knob, slide a Screwdriverbit through the knob hole and use it as a T-Handle.

Go on turning the knob clockwise until the Glenosphere is completely separated from the Reverse Baseplate.

7.4 Removal of Reverse Glenoid Baseplates

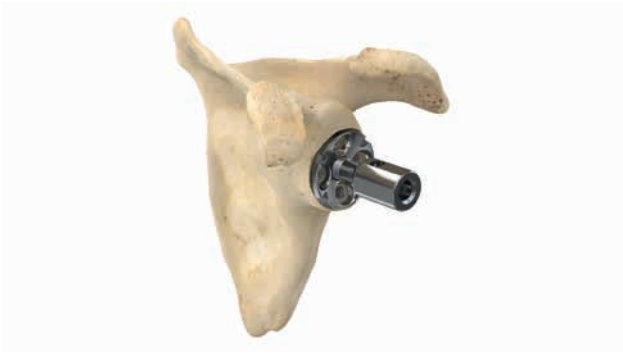


Figure 7.15

After removal of the Glenosphere, remove all peripheral Bone Screws and, if applied, the central Bone Screw using the Torx 25 Screwdriverbit connected to the Ratchet.

Screw the Extraction Adapter into the central hole of the Reverse Baseplate.

Figure 7.16

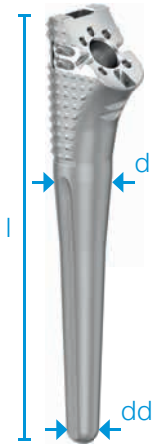
Slide the Slaphammer over the Slaphammer Stem and attach the T-Handle. Screw the assembled Slaphammer onto the Extraction Adapter.

Extract the Reverse Baseplate by carefully sliding the hammer and stabilizing the instrument with your other hand on the T-Handle.

8. Implants

Humeral Fracture Stems

MAT Tilastan-S, Fixation: cemented/cementless



REF	Length (l) mm	Diameter (d) mm	Distal Diameter (dd) mm
641-120/12	120	12	5
641-120/13	120	13	6
641-120/14	120	14	7
641-120/15	120	15	8
641-120/16	120	16	9
641-120/17	120	17	10
641-120/18	120	18	11
641-120/19	120	19	12
641-120/20	120	20	13
641-120/21	120	21	14
641-120/22	120	22	15
641-120/23	120	23	16
641-120/24	120	24	17

Proximal Bodies

MAT Tilastan-S, Fixation: cemented/cementless

REF	Height (h) mm	Size
641-040/14	- 5	S
641-040/16	- 5	M
641-040/18	- 5	L
641-045/14	± 0	S
641-045/16	± 0	M
641-045/18	± 0	L
641-050/14	+ 5	S
641-050/16	+ 5	M
641-050/18	+ 5	L

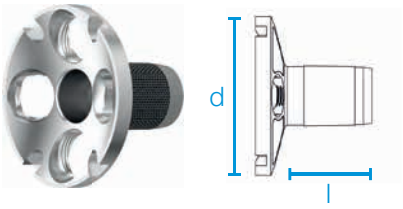
Modular Stems

MAT Tivastan-S, Fixation: cemented/cementless

REF	Length (l) mm	Diameter (d) mm	Distal Diameter (dd) mm
641-075/14	75	14	7
641-075/15	75	15	8
641-075/16	75	16	9
641-075/17	75	17	10
641-075/18	75	18	11
641-075/19	75	19	12
641-075/20	75	20	13
641-075/21	75	21	14
641-075/22	75	22	15
641-075/23	75	23	16
641-075/24	75	24	17

Reverse Glenoid Baseplates

MAT Tivastan-E



REF	Diameter (d) mm	Length (l) mm	Coating/Surface
645-080/20	28	15	TrabecuLink
645-080/30	28	25	TrabecuLink

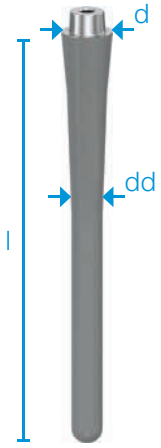
Modular Revision Stems

MAT Tiłastan-S, Fixation: cemented

REF	Length (l) mm	Diameter (d) mm	Distal Diameter (dd) mm
641-105/13	105	13	7
641-105/14	105	14	8
641-105/15	105	15	9
641-105/16	105	16	10
641-135/13	135	13	7
641-135/14	135	14	8
641-135/15	135	15	9
641-135/16	135	16	10
641-165/13	165	13	7
641-165/14	165	14	8
641-165/15	165	15	9
641-165/16	165	16	10

Modular Revision Stems

MAT Tiłastan-S, Fixation: cementless



REF	Length (l) mm	Diameter (d) mm	Distal Diameter (dd) mm
641-205/13	105	13	7
641-205/14	105	14	8
641-205/15	105	15	9
641-205/16	105	16	10
641-235/13	135	13	7
641-235/14	135	14	8
641-235/15	135	15	9
641-235/16	135	16	10
641-265/13	165	13	7
641-265/14	165	14	8
641-265/15	165	15	9
641-265/16	165	16	10

Cortical Bone Screws

MAT Ticonstan-S, Torx 25

REF	Diameter (mm)	Length (mm)
645-073/20	4.5	20
645-073/25	4.5	25
645-073/30	4.5	30
645-073/35	4.5	35
645-073/40	4.5	40
645-073/50	4.5	50
645-073/60	4.5	60

Cortical Bone Screws - angle-stable

MAT Ticonstan-S, Torx 25

REF	Diameter (mm)	Length (mm)
645-075/20	4.5	20
645-075/25	4.5	25
645-075/30	4.5	30
645-075/35	4.5	35
645-075/40	4.5	40
645-075/50	4.5	50
645-075/60	4.5	60

Central Cancellous Bone Screws

MAT Ticonstan-S, Torx 25

REF	Diameter (mm)	Length (mm)
645-077/20	6.0	20
645-077/25	6.0	25
645-077/30	6.0	30

Cancellous Bone Screws

MAT Ticonstan-S, Torx 25

REF	Diameter (mm)	Length (mm)
645-070/20	6.0	20
645-070/25	6.0	25
645-070/30	6.0	30
645-070/35	6.0	35
645-070/40	6.0	40
645-070/50	6.0	50
645-070/60	6.0	60

Humeral Reverse Tray - neutral

MAT EndoDur-S (CoCrMo), Fixation Screw included (Tiolastan-S)

REF	Material	Coating/Surface
643-010/00	EndoDur-S	-

Humeral Reverse Tray - 3 mm offset

MAT EndoDur-S (CoCrMo), Fixation Screw included (Tiolastan-S)

REF	Material	Coating/Surface
643-010/03	EndoDur-S	-

Humeral Reverse Tray - inclined 10°

MAT EndoDur-S (CoCrMo), Fixation Screw included (Tiolastan-S)

REF	Material	Coating/Surface
643-020/10	EndoDur-S	-

Reverse Inserts

MAT UHMWPE

REF	Height (mm)	Diameter (mm)	Material
643-036/00	0	36	UHMWPE
643-036/03	3	36	UHMWPE
643-036/06	6	36	UHMWPE
643-039/00	0	39	UHMWPE
643-039/03	3	39	UHMWPE
643-039/06	6	39	UHMWPE
643-042/00	0	42	UHMWPE
643-042/03	3	42	UHMWPE
643-042/06	6	42	UHMWPE
643-236/00	0	36	UHMWPE/E-DUR
643-236/03	3	36	UHMWPE/E-DUR
643-236/06	6	36	UHMWPE/E-DUR
643-239/00	0	39	UHMWPE/E-DUR
643-239/03	3	39	UHMWPE/E-DUR
643-239/06	6	39	UHMWPE/E-DUR
643-242/00	0	42	UHMWPE/E-DUR
643-242/03	3	42	UHMWPE/E-DUR
643-242/06	6	42	UHMWPE/E-DUR

Reverse Inserts - inclined 10°

MAT UHMWPE

REF	Height (mm)	Diameter (mm)	Material
643-036/10	0	36	UHMWPE
643-036/13	3	36	UHMWPE
643-036/16	6	36	UHMWPE
643-039/10	0	39	UHMWPE
643-039/13	3	39	UHMWPE
643-039/16	6	39	UHMWPE
643-042/10	0	42	UHMWPE
643-042/13	3	42	UHMWPE
643-042/16	6	42	UHMWPE
643-236/10	0	36	UHMWPE/E-DUR
643-236/13	3	36	UHMWPE/E-DUR
643-236/16	6	36	UHMWPE/E-DUR
643-239/10	0	39	UHMWPE/E-DUR
643-239/13	3	39	UHMWPE/E-DUR
643-239/16	6	39	UHMWPE/E-DUR
643-242/10	0	42	UHMWPE/E-DUR
643-242/13	3	42	UHMWPE/E-DUR
643-242/16	6	42	UHMWPE/E-DUR

Reverse Inserts - inclined 20°

MAT UHMWPE

REF	Height (mm)	Diameter (mm)	Material
643-036/20	0	36	UHMWPE
643-036/23	3	36	UHMWPE
643-036/26	6	36	UHMWPE
643-039/20	0	39	UHMWPE
643-039/23	3	39	UHMWPE
643-039/26	6	39	UHMWPE
643-042/20	0	42	UHMWPE
643-042/23	3	42	UHMWPE
643-042/26	6	42	UHMWPE
643-236/20	0	36	UHMWPE/E-DUR
643-236/23	3	36	UHMWPE/E-DUR
643-236/26	6	36	UHMWPE/E-DUR
643-239/20	0	39	UHMWPE/E-DUR
643-239/23	3	39	UHMWPE/E-DUR
643-239/26	6	39	UHMWPE/E-DUR
643-242/20	0	42	UHMWPE/E-DUR
643-242/23	3	42	UHMWPE/E-DUR
643-242/26	6	42	UHMWPE/E-DUR

Glenospheres - neutral

MAT EndoDur-S (CoCrMo), with locking screw (EndoDur + TiNbN)

REF	Diameter (mm)	Material	Coating/Surface
646-036/00	36	EndoDur-S	-
646-039/00	39	EndoDur-S	-
646-042/00	42	EndoDur-S	-

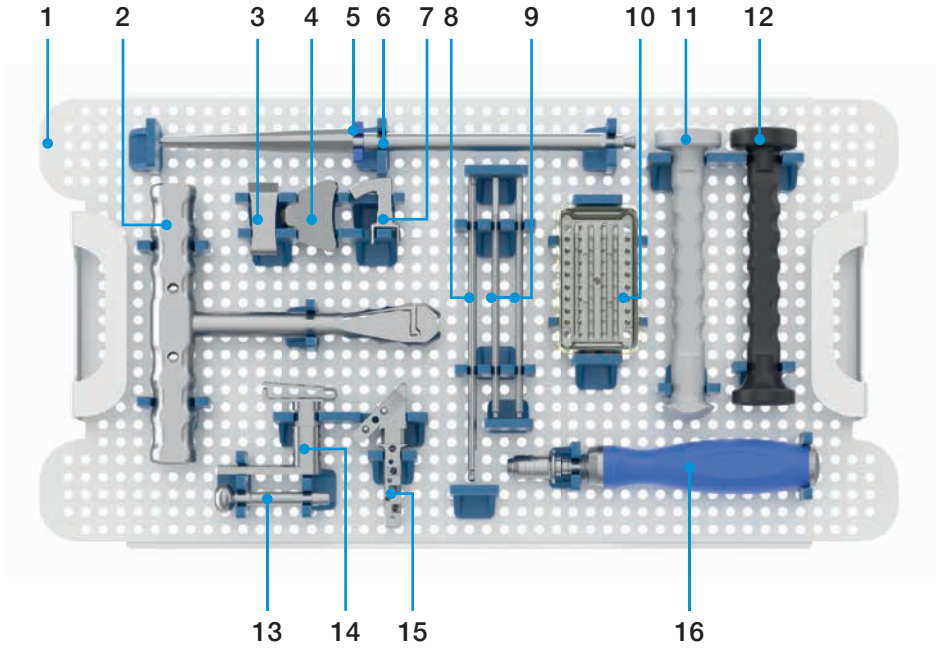
Glenospheres - eccentric

MAT EndoDur-S (CoCrMo), with locking screw (EndoDur + TiNbN)

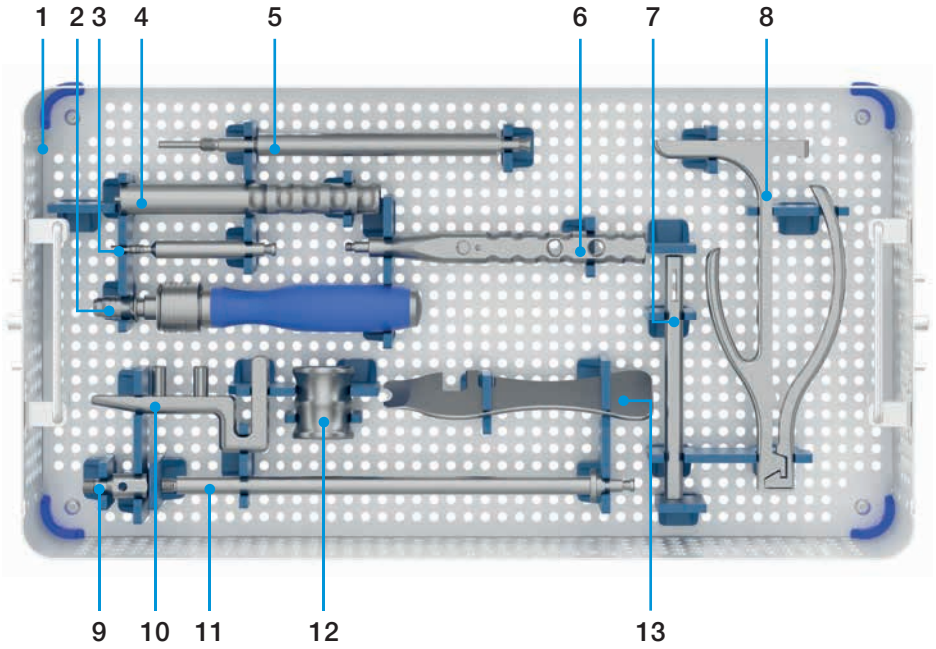
REF	Diameter (mm)	Eccentricity (mm)	Material	Coating/ Surface
646-036/03	36	3.0	EndoDur-S	-
646-039/03	39	3.5	EndoDur-S	-
646-042/03	42	4.0	EndoDur-S	-

9. Instruments

650-001/00 General Set

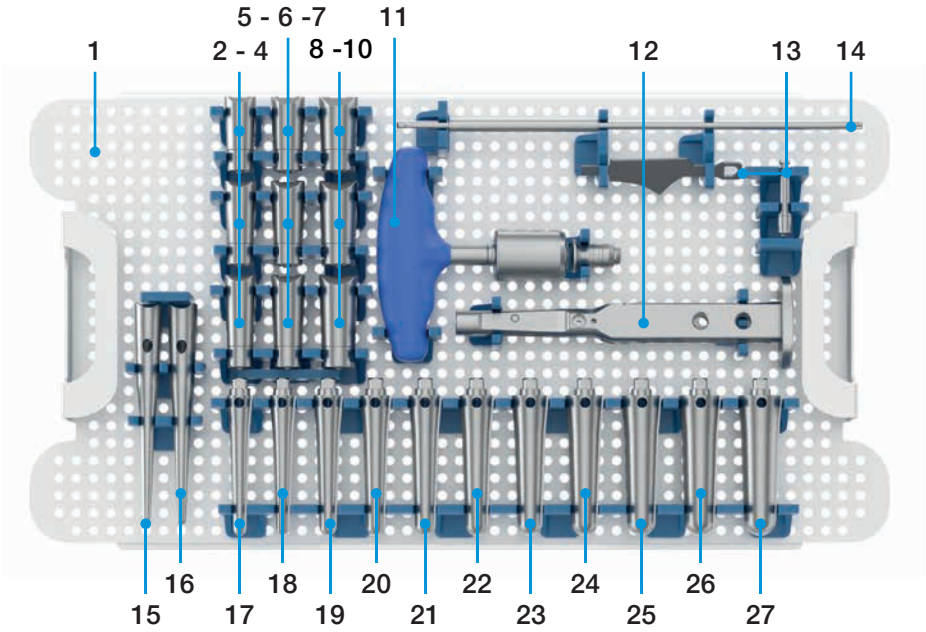


1	650-011/00	**General Set Tray**
2	15-6053/00	**T-Handle** (Hudson fitting)
3	632-005/02	**Resection Block** (for Delto-Pectoral Approach)
4	632-005/07	**Resection Block** (for Lateral Approach)
5	630-001/11	**Depth Stop Disk**
6	630-001/10	**Starter Awl**
7	632-005/09	**Alignment Rod Connector**
8	630-001/06	**Screwdriverbit** (T25, for Bone Screws)
9	632-005/08 × 2	**Alignment Rod**
10	319-601/30	**Sterilizing Box**, contains:
	632-005/65 × 4	**Fixation Pin**
11	643-001/01	**Impactor** (for Reverse Inserts and PE Glenoids)
12	632-001/01	**Impactor** (for Humeral Heads)
13	632-005/01	**Resection Guide Connector**
14	632-005/00	**Resection Guide** (for Humeral Head)
15	632-005/10	**Extramedullary Resection Guide**
16	134-220/03	**Torque Wrench, 3 Nm** (AO fitting)

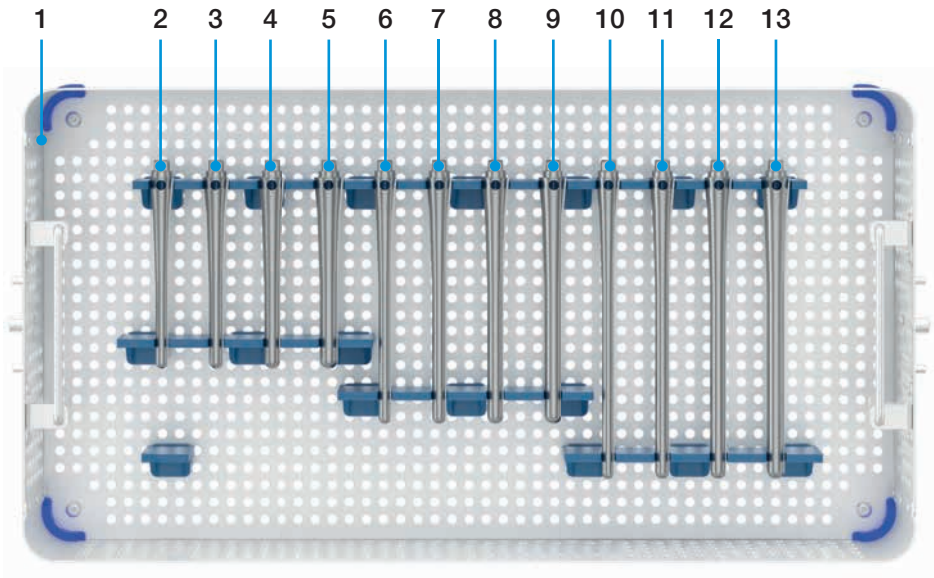


1	650-011/00	**General Set Tray**
2	80-2014	**Ratchet Handle** (AO fitting)
3	645-090/13	**Reverse Tray Extraction Bolt**
4	645-090/11	**Counter Sleeve** (for Head Adapter Extraction Bolt)
5	645-090/09	**Head Adapter Extraction Bolt**
6	631-001/01	**Impactor** (for Modular Stems)
7	445-121/00	**Pin Inserter, universal**
8	445-120/00	**Pin Inserter/Extractor, universal**
9	645-090/07	**Extraction Adapter** (for Convertible Metal-Back and Reverse Baseplate)
10	645-090/01	**Extraction Hook**
11	645-090/03	**Stem for Slaphammer**
12	645-090/05	**Slaphammer**
13	645-090/21	**Separator Wrench**

650-004/00 Modular Stem & Modular Revision Stem Set

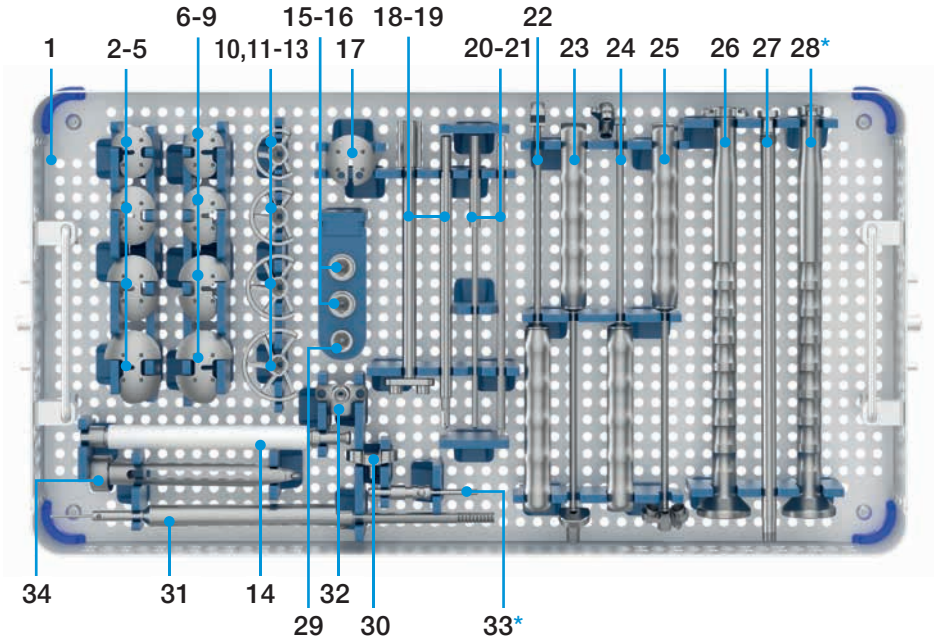


1	650-014/00	**Modular Stem & Modular Revision Stem Set Tray**
2	631-040/14	**Proximal Trial Body, S, - 5**
3	631-045/14	**Proximal Trial Body, S, ± 0**
4	631-050/14	**Proximal Trial Body, S, + 5**
5	631-040/16	**Proximal Trial Body, M, -5**
6	631-045/16	**Proximal Trial Body, M, ± 0**
7	631-050/16	**Proximal Trial Body, M, + 5**
8	631-040/18	**Proximal Trial Body, L, - 5**
9	631-045/18	**Proximal Trial Body, L, ± 0**
10	631-050/18	**Proximal Trial Body, L, + 5**
11	630-001/04	**Torque Wrench, 5 Nm** (AO fitting)
12	631-001/03	**Handle** (for Modular Trial Stems)
13	631-001/05	**Template** (for Proximal Bodies)
14	630-001/05	**Screwdriverbit** (T25, for Handle f. Compr. a. Prox. Bodies)
15	631-010/12	**Humeral Fracture Trial Stem, Ø 12**
16	631-010/13	**Humeral Fracture Trial Stem, Ø 13**
17	631-075/14	**Modular Trial Stem, Ø 14, L75 mm**
18	631-075/15	**Modular Trial Stem, Ø 15, L75 mm**
19	631-075/16	**Modular Trial Stem, Ø 16, L75 mm**
20	631-075/17	**Modular Trial Stem, Ø 17, L75 mm**
21	631-075/18	**Modular Trial Stem, Ø 18, L75 mm**
22	631-075/19	**Modular Trial Stem, Ø 19, L75 mm**
23	631-075/20	**Modular Trial Stem, Ø 20, L75 mm**
24	631-075/21	**Modular Trial Stem, Ø 21, L75 mm**
25	631-075/22	**Modular Trial Stem, Ø 22, L75 mm**
26	631-075/23	**Modular Trial Stem, Ø 23, L75 mm**
27	631-075/24	**Modular Trial Stem, Ø 24, L75 mm**



1	650-014/00	Modular Stem & Modular Revision Stem Set Tray
2	631-105/13	Modular Revision Trial Stem, Ø 13, L105 mm
3	631-105/14	Modular Revision Trial Stem, Ø 14, L105 mm
4	631-105/15	Modular Revision Trial Stem, Ø 15, L105 mm
5	631-105/16	Modular Revision Trial Stem, Ø 16, L105 mm
6	631-135/13	Modular Revision Trial Stem, Ø 13, L135 mm
7	631-135/14	Modular Revision Trial Stem, Ø 14, L135 mm
8	631-135/15	Modular Revision Trial Stem, Ø 15, L135 mm
9	631-135/16	Modular Revision Trial Stem, Ø 16, L135 mm
10	631-165/13	Modular Revision Trial Stem, Ø 13, L165 mm
11	631-165/14	Modular Revision Trial Stem, Ø 14, L165 mm
12	631-165/15	Modular Revision Trial Stem, Ø 15, L165 mm
13	631-165/16	Modular Revision Trial Stem, Ø 16, L165 mm

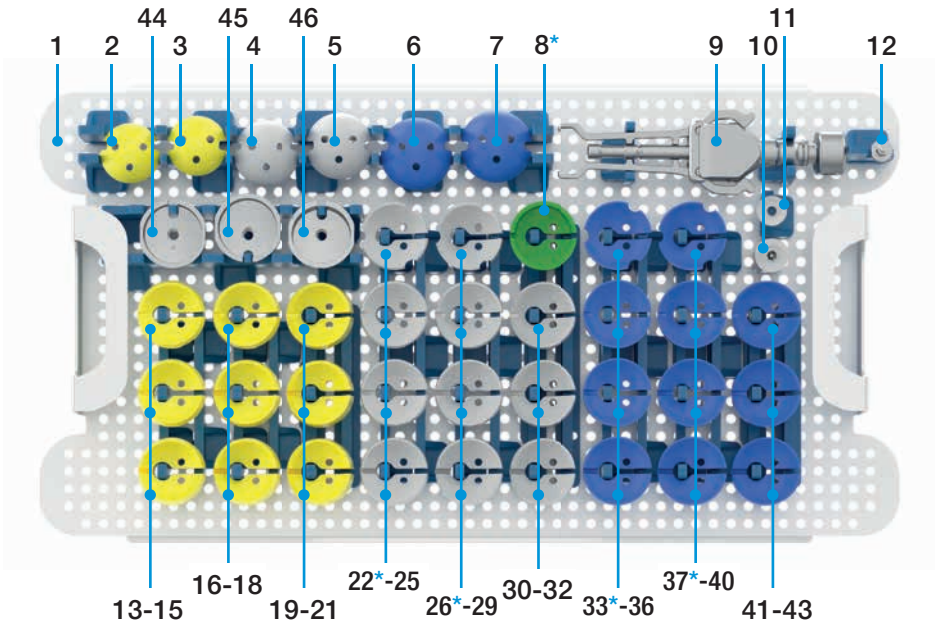
650-005/00 Glenoid Set



1	650-015/00	**Glenoid Set Tray**
2	645-001/09	**Glenoid Sizer, left, small**
3	645-001/11	**Glenoid Sizer, left, medium**
4	645-001/13	**Glenoid Sizer, left, large**
5	645-001/15	**Glenoid Sizer, left, x-large**
6	645-001/10	**Glenoid Sizer, right, small**
7	645-001/12	**Glenoid Sizer, right, medium**
8	645-001/14	**Glenoid Sizer, right, large**
9	645-001/16	**Glenoid Sizer, right, x-large**
10	645-001/28	**Glenoid Reamer, small** (Ø 28)
11	645-001/32	**Glenoid Reamer, medium** (Ø 32)
12	645-001/36	**Glenoid Reamer, large** (Ø 36)
13	645-001/40	**Glenoid Reamer, x-large** (Ø 40)
14	645-001/01	**Drive Shaft** (for Glenoid Preparation, cannulated, Hudson fitting)
15	645-002/03	**Drill, standard** (for Reverse Glen. Baseplate for Central Peg)
16	645-002/05	**Drill, long** (for Reverse Glenoid Baseplate, for Central Peg)
17	645-002/28	**K-Wire Positioner for Reverse Baseplate**
18	645-002/12	**Guide Handle** (for K-Wire)
19	645-002/07	**Drill** (for Glenoids, for Peripheral Pegs)
20	64-8022	**Twist Drill, Ø 3.2**
21	80-2030	**Screwdriverbit** (T20, for Glenospheres)
22	645-080/50	**Handle** (for Glenoid Sizers and Drill Templates)
23	645-080/60	**Drill Guide** (for Central Screws)
24	645-080/52	**Drill Guide A/P monoaxial**
25	645-080/54	**Drill Guide "S/I" polyaxial**
26	645-080/56	**Impactor** (for Reverse Baseplate)
27	645-080/59	**Shaft for Impactor** (for Reverse Baseplate)
28	645-080/58*	**Impactor** (for Convertible Metal-Back)
29	645-002/01	**Drill** (for Cemented All Poly Glenoids, for Central Peg)
30	645-002/09	**Drill Template** (for Cemented All Poly Glenoids, for Peripheral Pegs)
31	645-080/64	**Depth Gauge** (for Bone Screws)
32	645-003/09	**Drill Template** (for Convertible Metal-Back*, for Peripheral Pegs)
33	645-002/08*	**Fixation Pin** (for Drill Templates)
34	645-002/15	**Repositioner** (for K-Wire)

* not available in the US

650-007/00 Reverse Set



1	650-017/00	**Reverse Set Tray**
2	646-536/03	**Trial Glenosphere, Ø 36, eccentric**
3	646-536/00	**Trial Glenosphere, Ø 36, neutral**
4	646-539/03	**Trial Glenosphere, Ø 39, eccentric**
5	646-539/00	**Trial Glenosphere, Ø 39, neutral**
6	646-542/03	**Trial Glenosphere, Ø 42, eccentric**
7	646-542/00	**Trial Glenosphere, Ø 42, neutral**
8	643-930/09*	**Humeral Trial Extender**
9	646-530/00	**Handle for Glenospheres**
10	646-530/04	**Cap** (for eccentric Glenospheres)
11	646-530/02	**Cap** (for neutral Glenospheres)
12	645-090/23	**Extraction Cap** (for Glenosphere Removal)
13	643-836/00	**Reverse Trial Insert, Ø 36, H0 mm**
14	643-836/03	**Reverse Trial Insert, Ø 36, H3 mm**
15	643-836/06	**Reverse Trial Insert, Ø 36, H6 mm**
16	643-836/10	**Reverse Trial Insert, Ø 36, H0 mm, 10°**
17	643-836/13	**Reverse Trial Insert, Ø 36, H3 mm, 10°**
18	643-836/16	**Reverse Trial Insert, Ø 36, H6 mm, 10°**
19	643-836/20	**Reverse Trial Insert, Ø 36, H0 mm, 20°**
20	643-836/23	**Reverse Trial Insert, Ø 36, H3 mm, 20°**
21	643-836/26	**Reverse Trial Insert, Ø 36, H6 mm, 20°**
22	643-839/33*	**Reverse Trial Insert, Ø 39, H-3 mm**
23	643-839/00	**Reverse Trial Insert, Ø 39, H0 mm**
24	643-839/03	**Reverse Trial Insert, Ø 39, H3 mm**
25	643-839/06	**Reverse Trial Insert, Ø 39, H6 mm**
26	643-839/43*	**Reverse Trial Insert, Ø 39, H-3 mm, 10°**
27	643-839/10	**Reverse Trial Insert, Ø 39, H0 mm, 10°**
28	643-839/13	**Reverse Trial Insert, Ø 39, H3 mm, 10°**
29	643-839/16	**Reverse Trial Insert, Ø 39, H6 mm, 10°**

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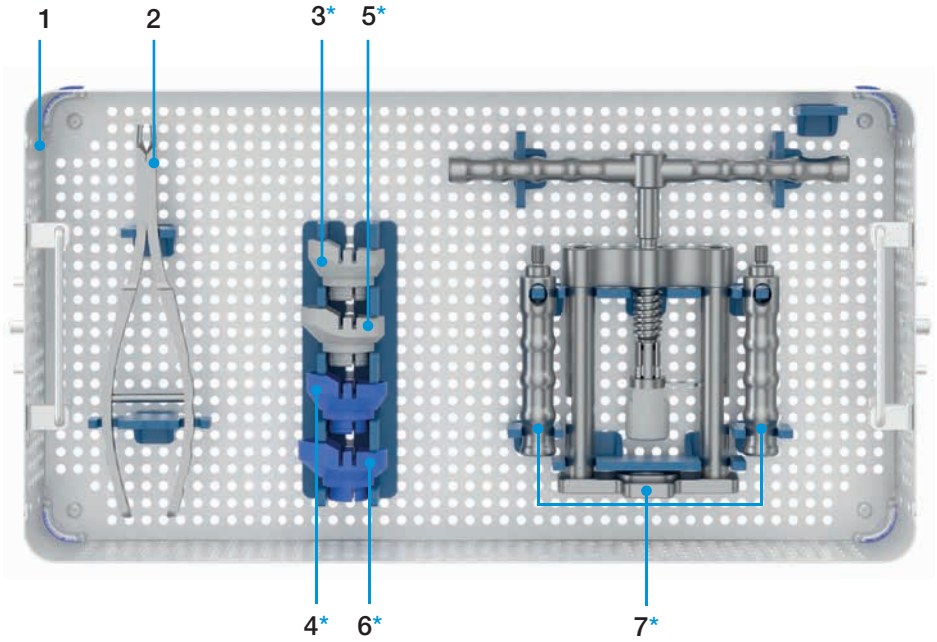
* not available in the US

30	643-839/20	**Reverse Trial Insert, Ø 39, H0 mm, 20°**
31	643-839/23	**Reverse Trial Insert, Ø 39, H3 mm, 20°**
32	643-839/26	**Reverse Trial Insert, Ø 39, H6 mm, 20°**
33	643-842/33*	**Reverse Trial Insert, Ø 42, H-3 mm**
34	643-842/00	**Reverse Trial Insert, Ø 42, H0 mm**
35	643-842/03	**Reverse Trial Insert, Ø 42, H3 mm**
36	643-842/06	**Reverse Trial Insert, Ø 42, H6 mm**
37	643-842/43*	**Reverse Trial Insert, Ø 42, H-3 mm, 10°**
38	643-842/10	**Reverse Trial Insert, Ø 42, H0 mm, 10°**
39	643-842/13	**Reverse Trial Insert, Ø 42, H3 mm, 10°**
40	643-842/16	**Reverse Trial Insert, Ø 42, H6 mm, 10°**
41	643-842/20	**Reverse Trial Insert, Ø 42, H0 mm, 20°**
42	643-842/23	**Reverse Trial Insert, Ø 42, H3 mm, 20°**
43	643-842/26	**Reverse Trial Insert, Ø 42, H6 mm, 20°**
44	643-910/00	**Reverse Trial Tray** (neutral)
45	643-910/03	**Reverse Trial Tray** (3 mm offset)
46	643-920/10	**Reverse Trial Tray** (10° inclined)

* not available in the US



1	650-017/00	**Reverse Set Tray**
2	15-2042	**Insertion Forceps**
3	646-530/16*	**Support for Press, Ø 39, eccentric**
4	646-530/18*	**Support for Press, Ø 42, eccentric**
5	646-530/15*	**Support for Press, Ø 39, neutral**
6	646-530/17*	**Support for Press, Ø 42, neutral**
7	646-530/11*	**Press**

* not available in the US

10. X-ray Templates

1	650-030/02	Proximal Bodies & Modular Stems / Modular Revision Stems & Humeral Fracture Stems
2	650-030/05	Reverse Trays & Reverse Inserts & Humeral Extender
3	650-030/06	Reverse Glenoid Baseplates & Glenospheres

11. System Compatibility

This chapter comprises all tables showing component compatibility and restrictions within the LINK Embrace Shoulder system. For further information refer to the specified chapter.

Reverse Inserts: Types and Allowed Combinations

Chapter 6 Reverse Humeral Component Trialing

Reverse Humeral Inserts		
Diameter	Inclination	Heights
		UHMWPE
36	0°	0, 3, 6
	10°	0, 3, 6
	20°	0, 3, 6
39	0°	0, 3, 6
	10°	0, 3, 6
	20°	0, 3, 6
42	0°	0, 3, 6
	10°	0, 3, 6
	20°	0, 3, 6
to be combined with Glenospheres made of:		EndoDur

Table 6.1: Reverse Inserts: types and allowed combinations. Numerical data in mm unless otherwise noted.

Please note the following regarding the use of our implants:

1. **Choosing the right implant is very important.**
   The size and shape of the human bone determines the size and shape of the implant and also limits the load capacity.
   Implants are not designed to withstand unlimited physical stress. Demands should not exceed normal functional loads.

2. **Correct handling of the implant is very important.**
   Under no circumstances should the shape of a finished implant be altered, as this shortens its life span. Our implants must not be combined with implants from other manufacturers. The instruments indicated in the Surgical Technique must be used to ensure safe implantation of the components.

3. **Implants must not be reused.**
   Implants are supplied sterile and are intended for single use only. Used implants must not be used again.

4. **After-treatment is also very important.**
   The patient must be informed of the limitations of the implant. The load capacity of an implant cannot compare with that of healthy bone!

5. **Unless otherwise indicated, implants are supplied in sterile packaging.**
   Note the following conditions for storage of packaged implants:

- Avoid extreme or sudden changes in temperature.
- Sterile implants in their original, intact protective packaging may be stored in permanent buildings up until the "Use by" date indicated on the packaging.
- They must not be exposed to frost, dampness or direct sunlight, or mechanical damage.
- Implants may be stored in their original packaging for up to 5 years after the date of manufacture. The "Use by" date is indicated on the product label.
- Do not use an implant if the packaging is damaged.

6. **Traceability is important.**
   Please use the documentation stickers provided to ensure traceability.

7. **Further information** on the material composition is available on request from the manufacturer.

Follow the instructions for use!

Waldemar Link GmbH & Co. KG, Hamburg

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