

# Tornier Flex

## Shoulder System

**Operative technique**



This publication sets forth detailed recommended procedures for using Stryker devices and instruments. It offers guidance that you should heed, but, as with any such technical guide, each surgeon must consider the particular needs of each patient and make appropriate adjustments when and as required.

### Important

- The patient should be advised that the device cannot and does not replicate a normal healthy bone, that the device can break or become damaged as a result of strenuous activity or trauma and that the device has a finite expected service life.
- Removal or revision of the device may be required sometime in the future.
- Cleaning and sterilization information is provided in the applicable instructions for use.
- Non-sterile devices, including implants and instruments, must be cleaned and sterilized prior to use, in accordance with validated methods.
- Devices that are able to be disassembled should be disassembled prior to point-of-use processing. Additionally, devices with movable components that do not facilitate disassembly should be manually articulated during the point-of-use processing step in order to evacuate additional soils.
- Please remember that the compatibility of different product systems has not been tested unless specified otherwise in the product labeling.
- Consult Instructions for Use (<https://ifu.stryker.com>) for a complete list of potential adverse effects and adverse events, contraindications, warnings and precautions.
- The surgeon must advise patients of surgical risks, and make them aware of adverse effects and alternative treatments.
- An implant whose packaging is open or damaged or whose expiration date has passed must not be used. Every precaution must be taken to ensure sterility when opening the packaging of the implant and during implantation.

# Tornier Flex

## Shoulder System

### Table of contents

<b>Indications and contraindications.....</b>	<b>4</b>
<b>Pre-operative planning.....</b>	<b>7</b>
<b>Operative technique.....</b>	<b>8</b>
• Delto-pectoral humeral exposure .....	8
• Supero-lateral humeral exposure .....	10
• Humeral head preparation and resection .....	11
• Distal preparation .....	15
• Proximal preparation.....	17
• Metaphyseal compaction .....	19
• Surface planning .....	23
• Protecting the resection.....	24
<b>Anatomic preparation.....</b>	<b>25</b>
• Trialing humeral head components .....	25
• Trial reduction .....	27
• Mobility testing.....	27
• Removing the trial construct .....	27
• Final implantation .....	28
• Back table assembly.....	29
• In-vivo assembly .....	30
• Testing and closure .....	32
• Rehabilitation.....	32
<b>Reversed preparation.....</b>	<b>34</b>
• Trialing reversed components.....	34
• Reversed tray/insert overview .....	34
• Understanding humeral movement with offset trays .....	36
• Selecting the reversed tray offset .....	37
• Trial reduction .....	38
• Mobility testing.....	38
• Trial adjustments .....	39
• Removing the trial construct .....	40
• Final implantation/back table assembly .....	41
• In-vivo assembly .....	43
• Testing and closure .....	45
• Complications .....	45
• Rehabilitation.....	46
<b>Revision preparation.....</b>	<b>47</b>
• Addressing recurrent instability .....	47
• Addressing conversion.....	48
<b>Components.....</b>	<b>52</b>
<b>System compatibility .....</b>	<b>67</b>
<b>Mismatch charts .....</b>	<b>68</b>

# Indications and contraindications

## Intended use

The Tornier Flex Shoulder System is intended for use as:

- A replacement of shoulder joints in primary anatomic or primary reverse.
- A replacement of other shoulder joint devices in case of revisions, if sufficient bone stock remains.

The Tornier Flex Shoulder System also allows for conversions from anatomic to reverse shoulder prosthesis in case of revision.

## Indications for use

### In anatomic:

The stem and head may be used by themselves, as a hemiarthroplasty, if the natural glenoid provides a sufficient bearing surface, or in conjunction with the glenoid, as a total replacement.

The Tornier Flex Shoulder System is to be used only in patients with an intact or reconstructable rotator cuff, where it is intended to provide increased mobility and stability and to relieve pain. The Tornier Flex Shoulder System is indicated for use as a replacement of shoulder joints disabled by:

- Rheumatoid arthritis with pain.
- Non-inflammatory degenerative joint disease (i.e. osteoarthritis and avascular necrosis).
- Correction of functional deformity.
- Fractures of the humeral head.
- Traumatic arthritis.
- Revision of other devices if sufficient bone stock remains.

### In reverse:

The Tornier Flex Shoulder System is indicated for use as a replacement of shoulder joints for patients with a functional deltoid muscle and with massive and non-repairable rotator cuff-tear with pain disabled by:

- Rheumatoid arthritis.
- Non-inflammatory degenerative joint disease (i.e. osteoarthritis and avascular necrosis).
- Correction of functional deformity.
- Fractures of the humeral head.
- Traumatic arthritis.
- Revision of the devices if sufficient bone stock remains.



The reversed adapter is indicated for use as components of the Tornier Flex Shoulder System total shoulder replacement and for transformation of the Tornier Flex Shoulder System into reverse shoulder prosthesis without the removal of the humeral stem during revision surgery for patients with a functional deltoid muscle. The components are permitted to be used in the transformation from anatomic to reverse if the humeral stem is well fixed, the patient has a functional deltoid muscle; the arthropathy is associated with a massive and non-repairable rotator cuff-tear.

**Note:**

- All components are single use.
- The coated humeral stem is intended for cemented or cementless use.
- The non-coated humeral stem is for cemented use only.
- The all-poly glenoid components are intended for cemented use only.
- The glenoid sphere implant is anchored to the bone with screws and is for non-cemented fixation.
- Titanium humeral heads are intended for patients with suspected cobalt alloy material sensitivity. The wear properties of Ti and Ti alloys are inferior to that of cobalt alloy. A titanium humeral head is not recommended for patients who lack a suspected material sensitivity to cobalt alloy.

## Contraindications for use

### In anatomic

Absolute contraindications for shoulder arthroplasty:

- Active local or systemic infection, sepsis and osteomyelitis.
- Inadequate bone stock in the proximal humerus or glenoid fossa for supporting the components.
- Poor bone quality where there could be considerable migration of the prosthesis and/or a chance of fracture of the humerus or glenoid.

Relative contraindications for shoulder arthroplasty:

- Uncooperative patient or patient with neurologic disorders who are not capable of following directions.
- Osteoporosis.
- Metabolic disorders which may impair bone formation.
- Osteomalacia.
- Distant foci of infections which may spread to the implant site.
- Rapid joint destruction, marked bone loss or bone resorption apparent on roentgenogram.

### **In reverse**

Absolute contraindications for shoulder arthroplasty:

- Poor quality and insufficient quantity of glenoid bone stock.
- Pre or per-operative glenoid fracture.
- Acromion fracture.
- Non-functional deltoid or external rotator muscles.
- Active local or systemic infection, sepsis and osteomyelitis.
- Elevation of sedimentation rate unexplained by other disease, elevation of WBC count, or marked shift in WBC differential count.
- Use of this implant is contraindicated in the presence of significant injury to the upper brachial plexus.
- Paralysis of the axillary nerve.
- Neuromuscular disease (e.g. joint neuropathy).

Relative contraindications for shoulder arthroplasty:

- Uncooperative patient or patient with neurologic disorders who are not capable of following directions.
- Osteoporosis.
- Metabolic disorders which may impair bone formation.
- Osteomalacia.
- Distant foci of infections which may spread to the implant site.
- Rapid joint destruction, marked bone loss or bone resorption apparent on roentgenogram.

Relative contraindications for reverse adapter during transformation from anatomic to reverse shoulder prosthesis:

- Stability of the reverse adapter relies on secure fixation to a stable diaphysis. If this is compromised by poor diaphyseal fixation to the humerus, insufficient access or cleanliness to fully seat the reverse adapter on the humeral taper, or damage to the humeral taper, the entire stem must be removed and replaced with a new, externally assembled, Tornier Flex Shoulder Prosthesis in reversed configuration.

## Pre-operative planning

Pre-operative planning is performed utilizing x-ray templates on the frontal and sagittal views.

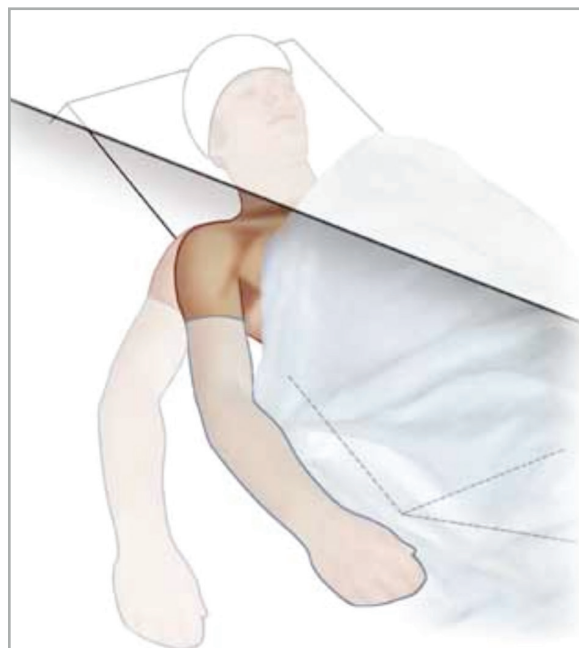
Appropriate implant size and positioning is determined.

The use of a CT scan or MRI is recommended to better determine the orientation of the glenoid, the quality of glenoid bone stock and to confirm the integrity of the rotator cuff.

X-rays are also used to determine the length of the humeral stem.

### **Patient positioning**

Position the patient in a beach chair position with the operative arm draped free. The patient should be positioned near the edge of the operating table such that the shoulder can be fully extended. A bump can be placed under the operative shoulder to stabilize the scapula.



## Operative technique

### Anatomic humeral exposure

#### Humeral exposure – delto-pectoral approach

An incision is made from the tip of the coracoid along the delto-pectoral groove, slightly lateral to the axillary fold.

The pectoralis major is identified. The deltoid and cephalic veins are retracted laterally to open the delto-pectoral groove. The coracoid process is identified. A Hohmann retractor is positioned behind the coracoid. Care should be taken to preserve the origin and insertion of the deltoid.

The clavi-pectoral fascia is incised at the external border of the coraco-brachialis. The axillary nerve is then identified before opening the subscapularis. As the arm is externally rotated, the anterior and inferior capsule is released from the humerus to the glenoid.

With adequate releases, the humeral head is then dislocated into the delto-pectoral interval by abduction of the arm and progressive external rotation and extension.

In cases of severe restriction of external rotation ( $0^\circ$  or less), it is recommended to release more of the upper pectoralis insertion.

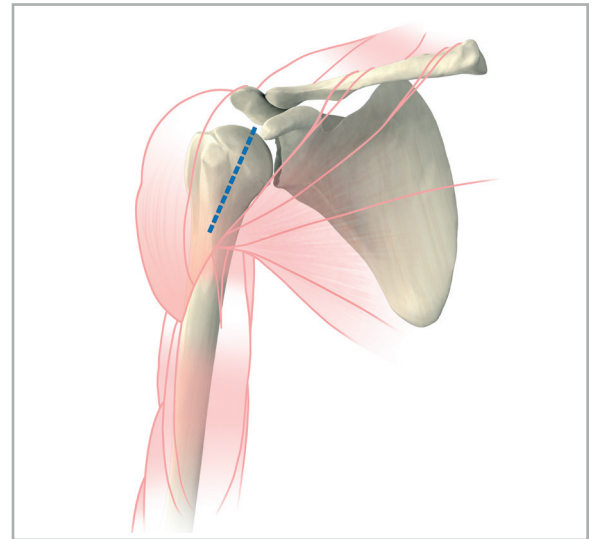


Figure 1

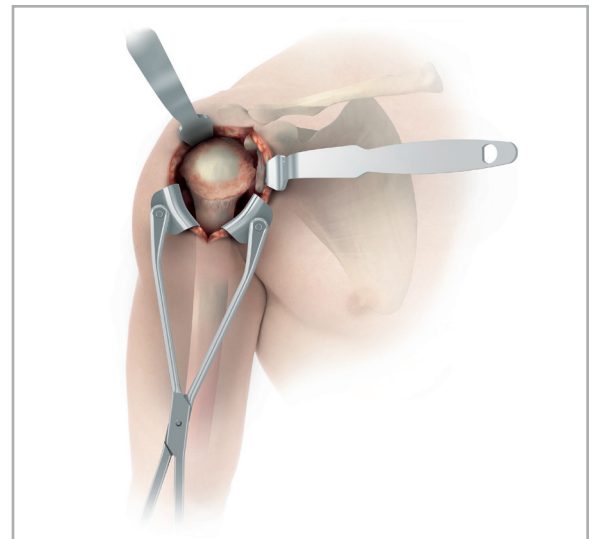


Figure 2

## Reversed humeral exposure

### Delto-pectoral approach

An incision is made from the tip of the coracoid along the delto-pectoral groove, slightly lateral to the axillary fold.

The pectoralis major is identified. The deltoid and cephalic veins are retracted laterally to open the delto-pectoral groove. The coracoid process is identified. A Hohmann retractor is positioned behind the coracoid. Care should be taken to preserve the origin and insertion of the deltoid.

The clavi-pectoral fascia is incised at the external border of the coraco-brachialis. The axillary nerve is then identified before opening the subscapularis, if still present. As the arm is externally rotated, the anterior and inferior capsule is released from the humerus to the glenoid.

With adequate releases, the humeral head is then dislocated into the delto-pectoral interval by abduction of the arm and progressive external rotation and extension.

In cases of severe restriction of external rotation ( $0^\circ$  or less), it is recommended to release more of the upper pectoralis insertion.

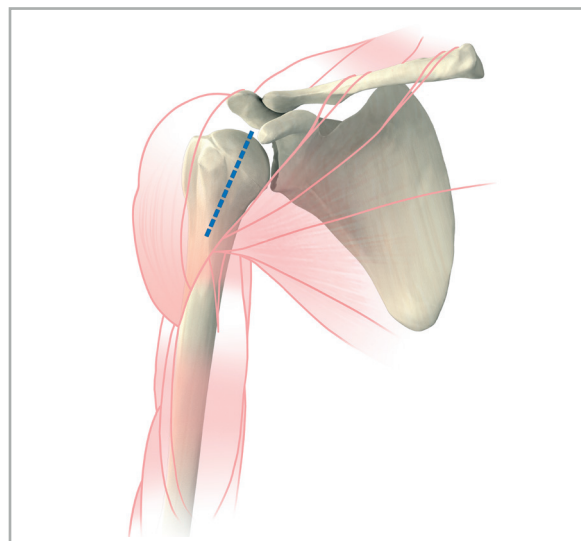


Figure 3

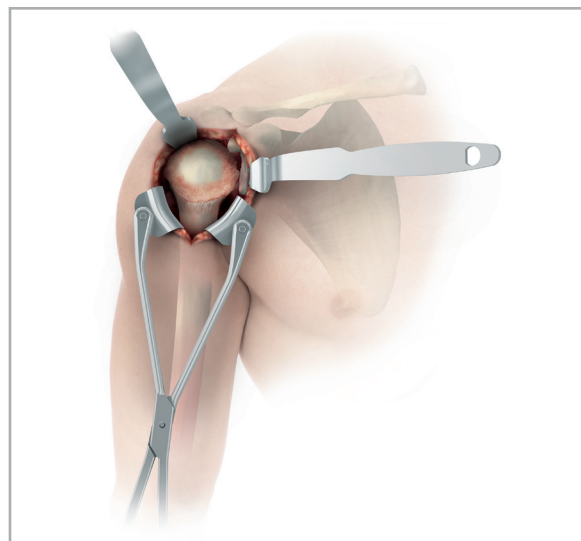


Figure 4

### Supero-lateral approach

The incision is made from the acromioclavicular joint along the anterior border of the acromion and downward approximately 4cm.

The deltoid is split in line with its fibers. Extra care should be taken to avoid any damage to the axillary nerve, which is located approximately 4cm distal to the acromion.

The anterior part of the deltoid and the coracoacromial ligament are then carefully detached from their acromial insertion up to the acromioclavicular joint.

The humeral head will then become visible at the anterior border of the acromion. Next, the subscapularis bursa is released and the humeral head dislocated by placing the arm in flexion and external rotation.

To obtain adequate exposure, the anterior border and the remaining superior cuff can be resected. In some cases, the remaining subscapularis tendon may be resected.

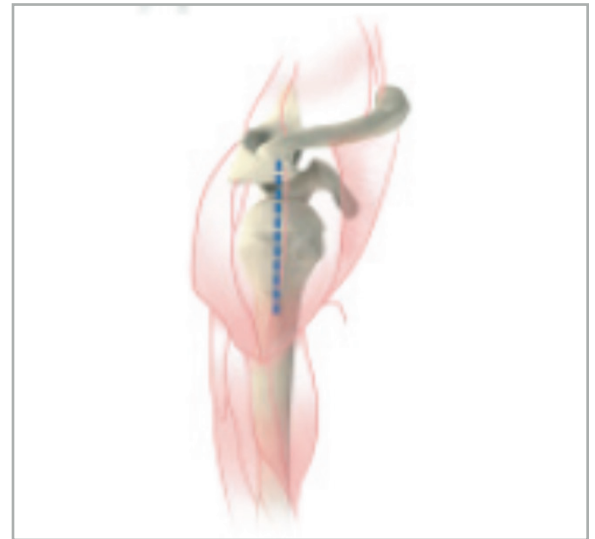


Figure 5

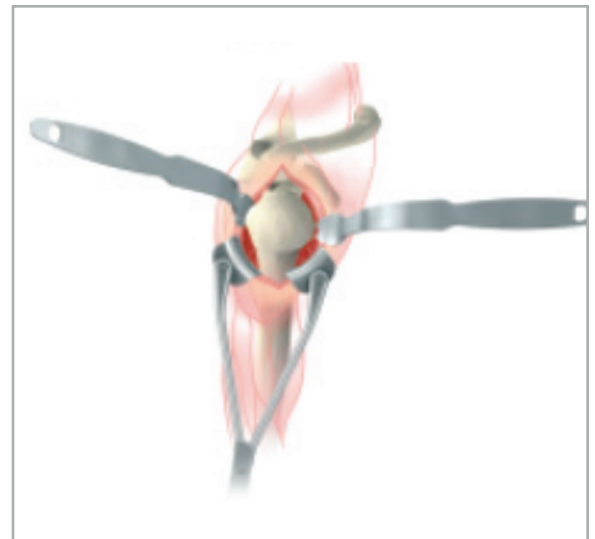


Figure 6

## Humeral head preparation

With the humeral head dislocated, remove all osteophytes. This is done with Rongeur or a curved osteotome, using a superiorly directed motion, to identify the exact capsular insertion at the anatomic neck.

## Humeral head resection

The humeral head resection for a reversed prosthesis is made at a fixed inclination of  $132.5^\circ$ , while the resection for an anatomic prosthesis is made at the level of the anatomic neck.

Two cutting guides are available to assist in the humeral head resection:

- One for the anatomic resection
- One for the reversed resection

### Anatomic resection

The anatomic head resection may be made free hand or with the assistance of a cutting guide.

### Free hand resection

To facilitate the resection, the cutting plane can be defined by:

- Marking the superior/lateral point (12 o'clock position), inferior/medial point (6 o'clock position) and the most anterior point (3 o'clock for a left shoulder and 9 o'clock for a right shoulder).
- Connecting these three points with a surgical pen or bovie will help identify the anatomic humeral neck prior to resection.
- Alternatively, the inclination guide can be utilized as a template to help determine the inclination of the anatomic neck and facilitate resection.



Figure 7

### Guided resection

To utilize the guided resection, begin by placing the appropriately sized cut ring over the humerus. It is important that the cut ring be able to pass over the humerus without impingement. The top flat portion of the cut ring can then be aligned with the anatomic neck of the humerus.

It is important that one of the four laser marks on the top of the cut ring is directed towards the 12 o'clock (most superior/lateral) position of the humerus as this will provide a fixed reference point to assess humeral inclination and version in subsequent steps.

With the cut ring appropriately positioned, place the two 3mm x 75mm guide pins through the cut ring and into the humerus to secure the construct. It is recommended to place the lateral pin first as it will act as a hinge and can facilitate more precise medial alignment of the cut ring.

If desired, the version and inclination of the cut ring can be read prior to resection. This information can be useful as it allows one to maintain these two critical anatomic parameters during the subsequent steps.



Figure 8



To read the inclination, orient the angle indicator so that the side (“L” or “R”) is visible that matches the operative side of the patient (“left” or “right”). Next place the angle indicator over the tip of the two guide pins. To adjust the inclination of the angle indicator, pull down on the trigger and pivot the shaft of the angle indicator until it aligns with the shaft of the humerus. The inclination can then be read off of the proximal body of the angle indicator. Once the inclination is confirmed remove the angle indicator.

To read the version, orient the version indicator so that the side (“L” or “R”) is visible that matches the operative side of the patient (“left” or “right”). Next place the version indicator over the tip of the two guide pins and attach the version rod to the swiveling body located at the bottom of the version indicator. Rotate the version rod until it aligns with the patient’s forearm and then advance the threads to lock it into place. The version of the cut ring can then be read off of the dial located on the version indicator. Once the version is confirmed remove the version indicator.

If adjustments are necessary, remove the pins and re-position the cut ring.

With the cut ring aligned at the anatomic neck, place the oscillating saw along the top flat portion of the cut ring and complete the head resection.



**Figure 9**



**Figure 10**

### Reversed resection

The tip of the reversed cutting guide is inserted in-line with the humeral shaft at the hinge point of the humeral head and should be centered in the anterior/posterior plane. Advance the guide until the ring sits flush on the humerus.

To define the version of the resection, a version rod can be positioned into the desired version hole along the axis of the cut guide. The guide is then rotated until the version rod is aligned with the patient's forearm. With the guide aligned, the head is then resected at a  $132.5^{\circ}$  (B) inclination with an oscillating saw below the ring of the cut guide.



Figure 11

Using the starter awl, create a pilot hole in-line with the humeral canal at the hinge point of the resection.

The starter awl should be advanced until the large fluted diameter is just below the level of the resection, thus, providing a pilot hole for the first sounder.



Figure 12

## Distal preparation

### Sizing the medullary canal

Next, the sounders (size: 1-2, 3-4, 5-6, 7-8) are utilized to determine the upper size limit of the distal humerus. The sounders have been designed to compact bone which creates a dense bony bed for the final implant.

Each sounder is color coded to correspond with instrumentation to be utilized in subsequent steps. Version holes have been incorporated into the proximal shaft of each sounder and can be used to ensure the sounders are utilized at the version established during the resection.



Figure 13

To begin sounding, insert the sounders through the pilot hole starting with the size 1-2 and progressively increasing until contact is made with the cortical wall of the canal. It is important to orient the sounders so the oblong flats of the sounder align with the plane of the resection. These flats align the flutes of the sounders to the anatomic distal implant geometry, serve as a depth stop indicator and identify the threshold for sizing.



Figure 14

When the sounder reaches the cortical wall and fits securely, stop and read the number closest to the resection. This number will indicate the largest size stem that can safely be implanted. If the sounder seats in between sizes, select the lower of the two numbers. It is important to leave the sounder in place at this time.

As an alternative to utilizing the proximal version guides, two holes have been provided on the side of each sounder at the level of the depth stops. The smooth end of the version rod can be placed through either of the two holes to act as a depth stop. The rod can also be useful in providing a visual reference to ensure that the sounders are placed in the same version as the resection.

**Note:** The sounders are not intended to cut cortical bone. As a result, a reaming motion should not be used when cortical contact is made.

**Caution:** Do not impact the sounder.



Figure 15



Figure 16

## Proximal preparation

### Metaphyseal punch

Two options are available to guide the punches which have been designed to score the proximal metaphyseal cancellous bone.

#### Option 1: Guided punching (delto-pectoral)

With the final sounder in place, select the corresponding punch template. As verification, check to ensure the color of the punch template matches that of the sounder.

Attach the punch template to the sounder via the axial slots and slide it down the sounder until the template rests flat on the resection. Place the corresponding punch into the template and impact the punch until it bottoms out on the template.

The scored bone must be removed by pulling the sounder, punch and punch template vertically out of the proximal humerus.

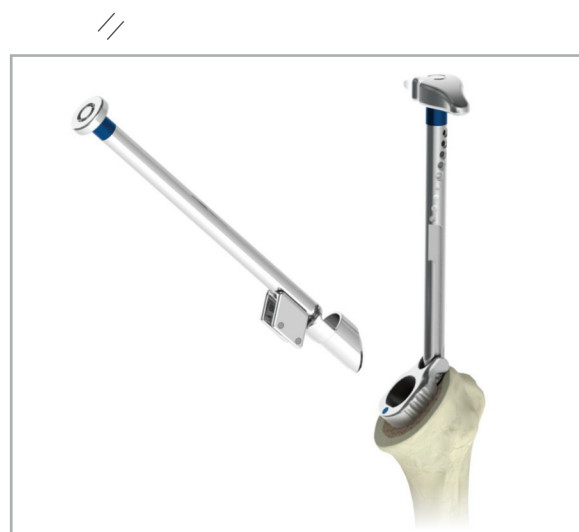


Figure 17



Figure 18



Figure 19

**Option 2: Axially punching (supero-lateral approach)**

With the final sounder in place, select the corresponding punch. As verification, check to ensure the color of the punch matches that of the sounder.

Attach the punch to the sounder via the axial slots and slide it down the sounder until the tip of the punch rests on the resection. Impact the punch to score the metaphysis taking care not to violate the medial cortex. Stop when the etch line on the top of the punch that corresponds with the size determined by the sounder aligns with the top surface of the sounder handle.



**Figure 20**



**Figure 21**

Once the cancellous bone has been scored, remove the sounder and punch. Remove the scored bone with an osteotome or rongeur.



**Figure 22**

## Metaphyseal compaction

### Compactor overview

The Tornier Flex Shoulder System offers both short and long stems and therefore offers both short and long compactors.

Short stems are offered in three anatomic angles (A-127.5°, B-132.5°, C-137.5°) and are intended to be utilized as both an anatomic and reversed implant. When utilized in the reversed configuration, select the “B” or 132.5° angle. Additional instruction on converting an anatomic implant to a reversed implant will be provided later in this operative technique.

Long stems are offered only in “B” or 132.5° angle and are intended to be utilized as a reversed or revision implant.

Short and long compactors have been designed with a proximal body that pivots about the mid-point allowing a single compactor to adjust to all three stem angles, streamlining the preparation process. The proximal body is locked into position via a set screw at the bottom of the taper that is manipulated with the 2.5mm locking inclination driver.



Figure 23



Figure 24

### Assembling the compactor

When preparing for a reversed implant, it is recommended to lock the proximal body of the compactor at the “B” or 132.5° angle prior to impaction. This angle can be read off the back of the compactor.

When preparing for an anatomic implant, it is recommended to loosen the proximal body of the compactor so that it pivots freely prior to impaction. This is a necessary step in determining the angle of the final implant.

To begin the compacting process, select the inserter handle and slide the depth stop onto the handle via the vertical slots located near the bottom of the handle. The depth stop has a positive locking feature that will automatically “click” and lock into the handle as it rides down the slots.

The inserter handle has optional version holes designed to accept the version rod to assist in orienting the compactors to the previously determined version. If utilized, be sure the version rod is placed on the side of the inserter handle that corresponds with the operative side of the patient (left or right). It is recommended to remove the version rod prior to extraction.

When possible, select the compactor three sizes below the final sounder reading and compact sequentially until satisfactory fixation is achieved. Satisfactory fixation can be assessed by a slight torque motion of the inserter handle. The compactor should not move within the humerus during this test.

To assemble the compactor to the inserter handle, ensure the handle of the inserter handle is in the fully unlocked position and place the clamp feet of the inserter handle into the medial and lateral slots on the compactor. Next, squeeze and lock the handle to secure the assembly.



Figure 25



Figure 26



Figure 27



Figure 28



### Compacting

Place the tip of the compactor into the pilot hole created by the sounders and orient the assembly so the bottom of the depth stop is parallel to the resection plane. This will ensure the version created with the resection is maintained during the compacting step. Alternatively, the optional version rod described above could be utilized in reference to the forearm to orient the compactor to the desired version.

Advance the compactor until the depth stop rests flush on the resected surface of the humerus. Continue with progressive compaction until the satisfactory fit described above is achieved.

**Note:** Metaphyseal compaction for cemented stems when implanting a cemented stem, please note that the stems are undersized to the compactors. When using sets YKAD231 or YKAD230 the resulting average cement mantle is 0.7mm. When using set YKAD230S the resulting average cement mantle is 1.4mm.



Figure 29



Figure 30

### Locking the compactor inclination

If preparing for a reversed implant, loosen the handle of the inserter handle and leave the compactor inside the humerus as the trial implant. It may be advisable to re-tighten the set screw prior to removing the handle.

If preparing for an anatomic implant, ensure the depth stop is flush on the resected humerus and the inserter handle ceases to toggle. Then pass the 2.5mm locking inclination driver through the hole in the distal end of the inserter handle and lock the inclination angle via the set screw in the bottom of the compactor taper. The angle will be read off the back of the proximal body in a subsequent step after the compactor is removed. Once the angle is locked into place, loosen the handle of the inserter handle and leave the compactor inside the humerus as the trial implant.

**Note:** It is important not to use a compactor larger than the size measured by the sounder to avoid risk of humeral fracture.



Figure 31

## Surface planning

With the final compactor in place, a surface planer can be utilized to ensure a flat resection true to the implant.

Select the surface planer size that corresponds with the final compactor. Place the plastic tip of the surface planer into the taper of the compactor.

Prior to engaging power, it is important to assess the location of the rotator cuff, if present, to ensure that it will not be damaged while planning. Depending upon the position of the taper within the humerus it may be advisable to upsize or downsize the surface planer to obtain ideal coverage.

To plane, engage the power prior to advancing the cutting teeth to the resection. Take care to ensure the surface planer is aligned with the taper of the compactor and not pushed off the axis. Slowly advance the surface planer axially into the taper until it reaches the built in stop, taking care not to rock or wobble the surface planer. Please note the surface planer can also be utilized on the final implant if desired.

At this point, the glenoid can be prepared. Optional cut protectors are available and their use is described in the section below.



Figure 32



Figure 33

**Note:** If desired, the humeral head trials can be utilized to determine the humeral head size prior to preparing the glenoid as it will impact the glenohumeral mismatch. For specific information on mismatch, refer to the charts provided towards the back of this operative technique.

## Protecting the resection

Cut protectors are provided to protect the resection from retractors while preparing the glenoid and are offered in three diameters (35mm, 40mm and 45mm). The cut protectors have been designed to include a retention feature and an eccentric taper to allow for optimal coverage.

To place the cut protector, select a diameter slightly undersized to the resection. Next, push the tip of the 3.5mm retaining driver into the screw located on the top of the cut protector. An audible “click” can be heard when the retention feature snaps into place.

The male taper of the cut protector can then be placed into the female taper of the compactor. To dial the cut protector for optimal coverage, rotate the handle of the driver without applying downward force onto the screw (pushing down on the screw will prevent the driver from rotating the cut protector). Once coverage has been achieved, push the screw down into the taper and tighten to secure it in place.

To remove the cut protector, loosen the screw with the 3.5mm retaining driver and lift the cut protector off the compactor.

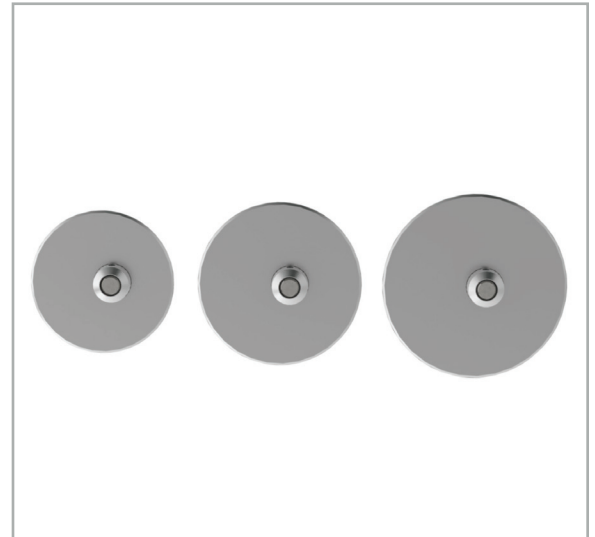


Figure 34



Figure 35

## Anatomic preparation

### Overview of subsequent steps

To this point in the technique the surgical steps have been common for the anatomic and reversed preparation. However, the next section, which begins with trialing and concludes with final implantation and rehabilitation, are unique for the anatomic and reversed implants. The first section will cover the anatomic implant and the second section will cover the reversed implant.

### Anatomic preparation

#### Selecting the humeral head system

Two humeral head options are available with the Tornier Flex Shoulder System. Both options attach to the stem via a Morse taper and have unique advantages that are described in detail below.

#### Option 1: Tornier Perform Anatomic approach

The Tornier Flex Shoulder System: Aequalis Humeral Heads were designed for surgeons who prefer to replace the diseased humeral head based on normal (non-arthritis) anatomic parameters.

#### Option 2: Soft-tissue balancing approach

The Tornier Flex Shoulder System: Soft-tissue balancing humeral heads were designed to offer surgeons intra-operative flexibility when treating diseased and deformed anatomy. The intra-operative flexibility is accomplished by offering multiple humeral head thicknesses for each of the resection diameters, allowing the surgeon to tension the joint without changing the resection diameter of the humeral head.

#### Trialing humeral head components

The initial size of the humeral head trial can be determined by placing the resected head onto the humeral head sizer or by mimicking the resected head (except in the case of severe deformity). This is accomplished by placing the resected head against a trial head and determining which diameter and thickness most closely represents the resected head.



Figure 36

**Note:** In the case of severe deformity of the native humeral head, pre-operative radiographic templating may be utilized to determine the optimally sized humeral implant.

The Tornier Flex Shoulder System offers both low and high offset humeral head trials. To determine which offset to begin with, evaluate the position of the compactor relative to the center of the resection.

A compactor located centrally within the resection will most likely require a low offset humeral head trial where as a compactor further from the center will most likely require a high offset humeral head trial.

Select the humeral head trial of the determined resection diameter, height and offset. Then, insert the tips of the trial clamp into the holes located on the sides of the trial.

Place the male taper of the humeral head trial into the female taper of the compactor. Utilizing the trial clamp, rotate the trial until the best coverage is achieved or until it is determined that a different size or offset is necessary.

Once the size, offset and rotation are established, insert the 3.5mm retaining driver into the screw of the humeral head trial and advance the screw to lock the trial securely into position.

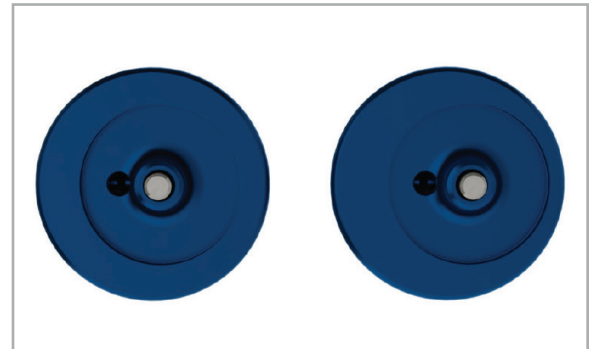


Figure 37



Figure 38



Figure 39

## Trial reduction

Reduce the humeral head trial into the glenoid.

After the shoulder joint is reduced, posterior force on the humeral head should allow for subluxation of 50% of the width of the joint.

If less than 50% subluxation is possible, remove the humeral head trial and replace it with the next smaller humeral head trial. If direct posterior force dislocates the humeral head trial, remove the trial and replace it with the next largest humeral head trial.

## Mobility testing

The arm is abducted to 90° and internally rotated. 60° of internal rotation should be obtained.

If less than 60° of internal rotation is demonstrated, further capsular release off the inferior humeral neck and glenoid may be necessary.

## Removing the trial construct

Once the humeral head size, offset and rotation have been confirmed, dislocate the shoulder and remove the trial construct. It is important to leave the trial construct assembled and remove it as one piece as this will provide information necessary for assembling the final implant.

To remove the trial construct, thread the tip of the trial slaphammer (with handle all the way at the bottom to stabilize the tip) into the threads located on the top of the humeral head trial. It is important to not over-tighten the threads.



Figure 40



Figure 41

Next, slide the handle of the trial slaphammer away from the humeral head trial. This will free the pivoting joint allowing the handle to move in any direction. Orient the handle in a superior position and with incremental backslaps, remove the trial construct.

After removing the trial construct, unthread the trial slaphammer and note the angle indicator (A, B, C angle) located on the proximal, lateral aspect of the compactor. This will determine which angle should be selected for the final stem.

To determine the rotation of the humeral head, orient the trial construct so the bottom of the humeral head trial is visible. A clock-like face with numbers ranging from 1-12 is marked on the bottom of the humeral head trial. Take note of the number that falls closest to the lateral most edge of the compactor. This number will determine the position of the final humeral head as it relates to the notch on the lateral edge of the final stem.



Figure 42



## Final implantation

The final implant can be assembled on the back table or in-vivo.

**Note:** The surgeon should inspect the implant tapers and articular surfaces for debris or blemishes before assembly. The tapers should be clean and dry for assembly. The humeral head should be assembled to the definitive stem with clean gloves.

## Back table assembly

Place the chosen definitive humeral stem (respecting the size and angle measured on the compactor) into the appropriate slot of the impaction stand.

The standard stem slots are located on one side of the impaction block and the long stem slots are located directly opposite the standard stem slots. Each side of the impaction block is then divided into two sections depending on size (1-4, 5-8).

With the definitive stem in hand, orient the selected size humeral head to the previously determined rotation and apply pressure to temporarily hold the humeral head in this position. Next, place the implant assembly into the appropriate slot of the impaction block. Using the impactor handle with the head/tray impactor tip, seat the taper.

To implant a Tornier Flex PTC Stem, insert the assembly into the prepared humerus while maintaining the established retroversion. Impact the implant until the humeral head is flush with the cut and check implant instability.

To implant a Tornier Flex Cemented Stem, irrigate and dry the humeral canal then insert a cement restrictor. Inject cement into the medullary canal using a standard cementing technique and insert the implant assembly until the humeral head is flush with the cut.

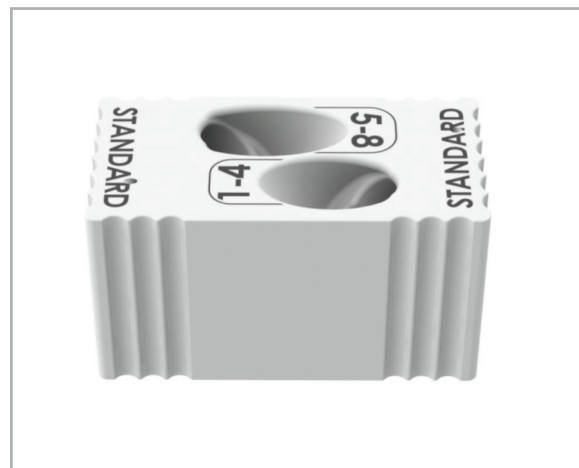


Figure 43

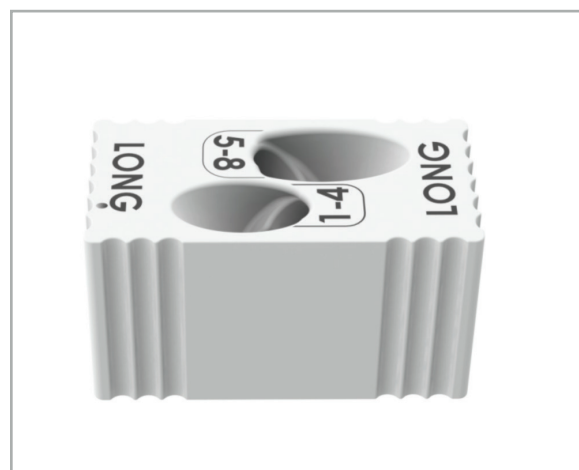


Figure 44



Figure 45

## In-vivo assembly

Attach the definitive humeral stem (respecting the size and angle measured on the trial) to the inserter handle with the depth stop in place.

The inserter handle has optional version holes designed to accept the version rod to assist in orienting the definitive stem to the previously determined version. If utilized, be sure the version rod is placed on the side of the inserter handle that corresponds with the operative side of the patient (left or right).

### Tornier Flex PTC Stem

To implant a PTC press-fit stem, insert the stem into the prepared humerus taking care to maintain the version of the resection. Impact the stem until the depth stop is a few millimeters above the resection.

Remove the inserter handle and orient the selected size humeral head to obtain coverage. Seat the taper using the impactor handle with the head/tray impactor tip and continue to impact until the humeral head is flush with the cut and check implant stability.

### Tornier Flex Cemented Stem

To implant a Tornier Flex Cemented Stem, irrigate and dry the humeral canal then insert a cement restrictor. Inject cement into the medullary canal using a standard cementing technique and insert the stem into the humeral canal. Advance the stem until the depth stop is flush against the resection taking care not to countersink the implant.



Figure 46

Remove the inserter handle and any excess cement and wait for the cement to harden. Clean and dry the stem taper. Orient the selected size humeral head to obtain the best coverage. Seat the taper using the impactor handle with the head/tray impactor tip and check implant stability.

**Note:** When implanting a PTC stem, please note that the proximal stems are larger than the compactors. When using sets YKAD231 or YKAD230 the resulting diametric press-fit is 2mm. When using set YKAD230s the resulting diametric press-fit is 1mm.

When implanting a cemented stem, please note that the stems are undersized to the compactors. When using sets YKAD231 or YKAD230 the resulting average cement mantle is 0.7mm. When using set YKAD230s the resulting average cement mantle is 1.4mm.

The decision to use cement or a press-fit technique is based upon individual surgeon preference.

## Testing and closure

After the joint has been washed and the prosthesis reduced, the stability and mobility of the shoulder are tested.

The joint is closed by reinsertion of the subscapularis to the coraco-humeral ligament, and to the subscapular remnant, allowing slight slipping of the subscapularis upwards. The wound is closed in planes over an aspiration drain.

Post-operatively the arm is immobilized in a simple sling.

## Rehabilitation

Rehabilitation begins on the evening of surgery by removing the sling and actively moving fingers, wrist and elbow. If the patient desires, his/her arm may be left along the length of his/her body, putting no tension on the suture line.

The following day, the patient begins active exercises of the fingers, wrist and elbow, assisted by a physiotherapist, 5 to 6 times daily, each for a few minutes duration. The patient is allowed to get out of bed with his/her arm in a sling. Once the drain is removed after 48 hours, the patient is encouraged to carry out brief pendular exercises throughout the day.

The fundamental principle which guides rehabilitation, either in the operative center or as an outpatient, is maximal recovery of passive joint movement prior to any active motion.

Passive elevation is begun by simple pendular movements followed rapidly by self-mobilization with the patient in the dorsal decubitus position, with elbow extended. This is helped by exhaling through the mouth, which adds a few degrees movement with each inspiration. It is preferable to perform a single smooth motion rather than repeated jerking movements. External rotation is performed using a stick, with the elbow against the body. Internal rotation is performed with the arm behind the back, helped by the other hand wherever possible.

Rehabilitation sessions should not be more than 5 minutes long and should be performed ideally hourly throughout the day. The time required for purely passive rehabilitation varies depending on pre-operative passive mobility.

In the rare case that pre-operative mobility is present; the amplitude of movement generally recovers after 45 days and active movement may be possible. In this case a few minutes of active movement should be performed mornings and evenings exercising the joint in a swimming pool using arm movements for 10 to 15 minutes daily for 3 months.

If a patient was highly restricted pre-operatively (forward elevation less than 90°), it should be understood that the total shoulder prosthesis is not a mobilizing procedure. It is unlikely the patient will recover passive elevation beyond 130°. The patient should be asked to perform multiple daily passive stretching exercises and breast-stroke movement of his/her arms in a swimming pool throughout the first postoperative year, in order to obtain and maintain maximum mobility.

**Note:** Desired rehabilitation protocols vary by surgeon. The surgeon, physical therapist and patient should play an active role in determining the appropriate recovery process.

## Reversed preparation

### Reversed preparation

#### Trialing reversed components

The Tornier Flex Shoulder System reversed components are comprised of reversed trays that are placed onto the humeral stem and reversed inserts that “snap” into and line the reversed tray.

When assembled, these two components are collectively referred to as the reversed adapter.

#### Reversed tray overview

The reversed trays are offered in centered, low and high offsets which creates meaningful flexibility in the operative setting including the following:

The flexibility to limit medial overhang. Medial overhang has been demonstrated to reduce overall range of motion and increase the probability of both scapular and acromial impingement. (Internal data on file.)

The flexibility to adjust the humeral center of rotation to be either centered within the resection surface or more lateral like the traditional grammont design.

The flexibility to facilitate reduction by decreasing tension when reducing the shoulder.

Each style of the reversed trays is offered in a +0, +6 and +12 thickness.



Figure 47

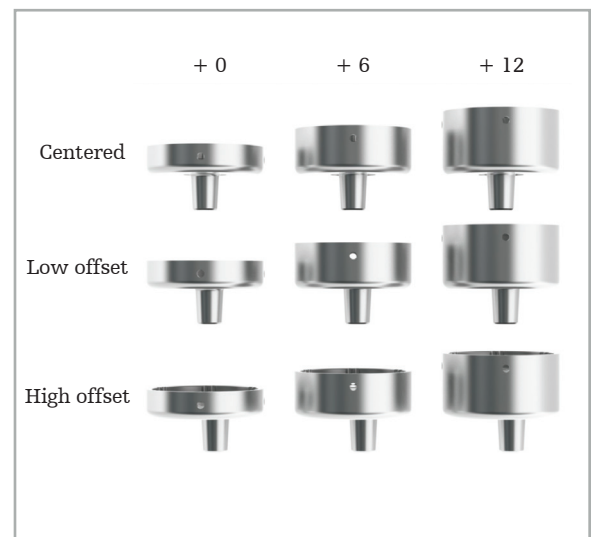


Figure 48

## Reversed insert overview

Reversed inserts are offered in A, B, and C angles to allow conversion from any stem angle to a 145° construct (A and C angles are upon request only). The reversed inserts are offered in articular surfaces of 33mm, 36mm, 39mm and 42mm diameters and in +6 and +9 thicknesses.

### Anatomic to reversed conversion chart

Anatomic stem		Reversed insert		Reversed construct	
Angle	Inclination	Angle	Inclination	Angle	Inclination
A	127.5°	A	17.5°	A	145°
B	132.5°	B	12.5°	B	145°
C	137.5°	C	7.5°	C	145°

**Note:** Additional inserts are available upon request for cases of instability or post-operative conversion from an anatomic construct into a reversed construct. These options and their use are described in detail later in this operative technique.

## Understanding humeral movement with offset trays

To determine which reversed tray will be utilized, it is necessary to first understand how the position of the offset trays influences the position of the humerus relative to the scapula.

The key point in understanding this relationship is to recognize that the reversed tray spins about the axis of the taper which is perpendicular to the resection. Therefore, in the A/P view, as the tray is rotated the humerus will move in both the superior/ inferior and medial/lateral planes at the same time. In the axillary view, the humerus will move in the anterior/ posterior plane.

As an example consider the following:

- Positioning an offset reversed tray directly lateral on the resection will move the humerus medial and inferior (down and in) relative to the scapula. **(A)**
- Positioning an offset reversed tray directly medial on the resection will move the humerus lateral and superior (up and out) relative to the scapula. **(B)**
- Positioning an offset reversed tray directly posterior on the resection will move the humerus anterior relative to the scapula. **(C)**
- Positioning an offset reversed tray directly anterior on the resection will move the humerus posterior relative to the scapula. **(D)**

As a simple rule of thumb, the humerus will move directly opposite the position of the offset reversed tray, as it relates to the scapula.

Reverse tray position			
Humerus movement		Medial	Lateral
	Medial		•
	Lateral	•	
	Inferior		•
	Superior	•	

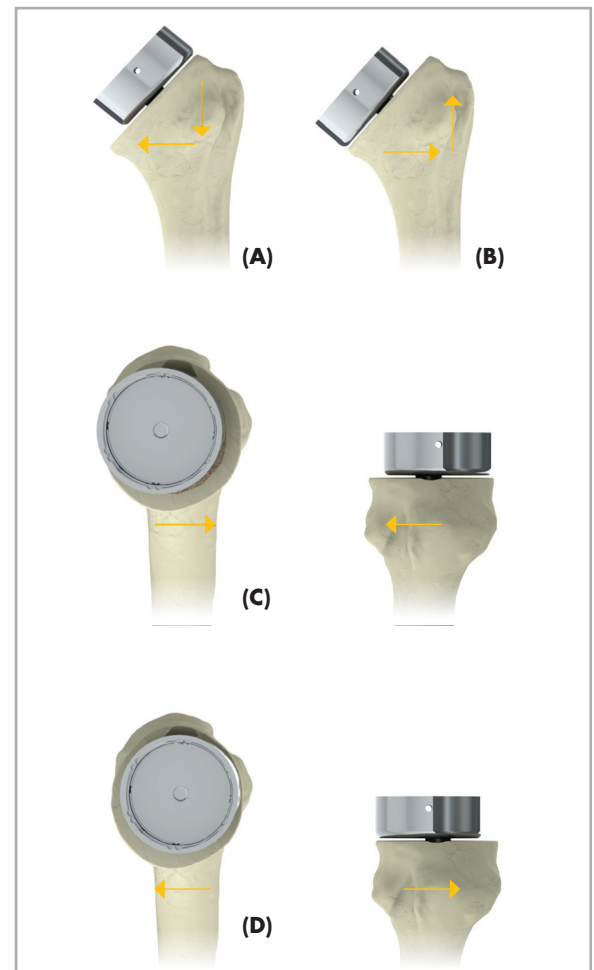


Figure 49



## Selecting the reversed tray offset

The selection of the reversed tray offset is highly dependent upon individual surgeon's preference, as each option has unique advantages. However, below are guidelines, based upon simulated use studies and laboratory experiences, which are worth consideration when selecting a reversed tray.

- Medial overhang of the tray should be avoided as it reduces overall range of motion and increases the likelihood of both scapular and acromial impingement.<sup>1,2</sup>
- Direct lateral placement of the tray generally provides less superior impingement during abduction.<sup>1,2</sup> However, it is recommended that the lateral edge of the reversed tray not be placed above the top of the resection to avoid over-lengthening.

Once a reversed tray offset has been chosen, select the +0 trial of that particular offset. Insert the tips of the trial clamp into the holes located on the sides of the trial. The trial can then be placed onto the compactor and rotated to the desired location.

With the trial placed in the desired location, insert the 3.5mm retaining driver into the screw of the reversed tray trial and advance the screw to lock the trial into position.

Next, select the +6 reversed insert trial that corresponds to the stem angle, and matches with the diameter of the glenoid sphere. Orient the insert trial so the laser mark is positioned at the most lateral position of the humerus. As a check, the thinnest portion of the insert trial should be lateral (superior) and the thickest portion of the insert trial should be medial (inferior).

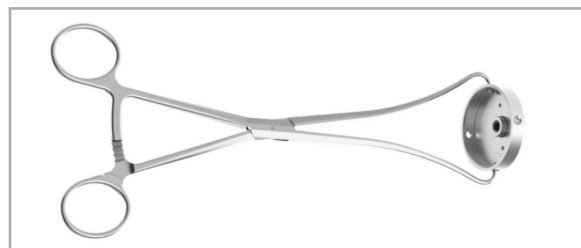


Figure 50



Figure 51

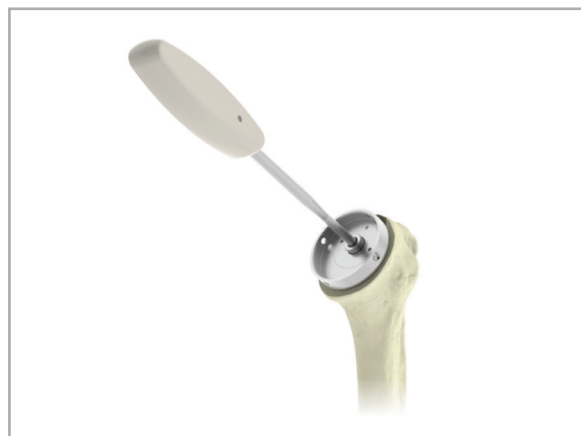


Figure 52

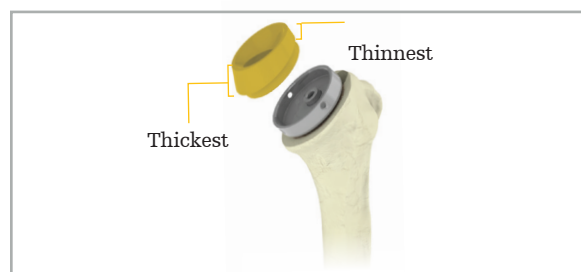


Figure 53

1 Data on file.

2 Berhouet, J. MD, Effects of the humeral tray component positioning for onlay reverse shoulder arthroplasty design: a biomechanical analysis, JSES, 2015.

## Trial reduction

The humeral trial is then reduced into the joint to check deltoid tension, stability, range of motion and impingement. If needed, the thickness of the trial implant can be adjusted to provide the desired deltoid tension. The following table provides guidance on the possible reversed adapter combinations and their impact on thickness.

### Anatomic to reversed conversion chart

Reversed tray	Reversed insert	Combined thickness
+0	+6	+6
	+9	+9
+6	+6	+12
	+9	+15
+12	+6	+18
	+9	+21

## Mobility testing

Pull the arm away from the body after reduction to ensure that there is no pistoning effect. A complete separation of the reversed insert from the glenoid sphere indicates inadequate tensioning of the deltoid.

Abduction of the arm is performed to check that there is no impingement and that anterior elevation and abduction has been restored.

External rotation with the elbow at the side checks for mobility and risk of subluxation.

Internal rotation with the elbow at the side and in abduction (the forearm has to be parallel to the thorax) is performed.

Adduct the arm to check that there is no impingement between the pillar of the scapula and the humeral implant.

After reduction, the conjoined tendon should show sufficient muscular tension (similar to the deltoid).

## Trial adjustments

In case of impingement, remove the insert trial and adjust the position of the reversed tray to prevent impingement. This can be accomplished by simply changing the position of an offset tray or by switching from a centered tray to an offset tray.

If the initial reduction is too loose, remove the +6 reversed insert trial and replace it with a +9 reversed insert trial. If additional thickness is required, remove the +9 insert and +0 tray and replace them with the +6 tray and +6 insert. Continue incrementally until the desired tension is obtained.

If muscles are over-tensioned, first try adjusting the position of the tray. If this does not adequately reduce the tension, additional resection of the metaphysis may be required.

The dimensions of the final implants (reversed tray and inserts) are determined based upon the combination that provides the best stability and range of motion.

## Removing the trial construct

Once the reversed trial components have been confirmed, dislocate the shoulder and remove the trial construct.

(It is important to leave the trial construct assembled and remove it as one piece as this will provide information necessary for assembling the final implant).

To remove the trial construct, thread the tip of the trial slaphammer (with handle all the way at the bottom to stabilize the tip) into the threads located in the screw head of the reversed tray trial. It is important to not over tighten the threads.

Next, slide the handle of the trial slaphammer away from the trial. This will free the pivoting joint allowing the handle to move in any direction. Orient the handle in a superior position and with incremental backslaps remove the trial construct.

After removing the trial construct, unthread the trial slaphammer. If an offset tray was utilized, determine the rotation by orienting the trial construct so the bottom of the reversed tray trial is visible.

A clock-like face with numbers ranging from 1-12 is marked on the bottom of the tray. Take note of the number that falls closest to the lateral most edge of the compactor. This number will determine the position of the final reversed tray as it relates to the notch on the lateral edge of the final stem.



Figure 54



Figure 55



Figure 56

## Final implantation

**Note:** The surgeon should inspect the implant tapers and mating surfaces for debris or blemishes before assembly.

The tapers should be clean and dry for assembly.

The implants should be assembled with clean gloves.

The final implant can be assembled on the back table or in-vivo.

## Back table assembly

Place the chosen definitive humeral stem (respecting the size and angle of the trial) into the appropriate slot of the impaction stand.

The standard stem slots are located on one side of the impaction block and the long stem slots are located directly opposite the standard stem slots. Each side of the impaction block is then divided into two sections depending on size (1-4, 5-8).

With the definitive stem in hand, orient the selected reversed tray to the previously determined position (please note that this does not apply to the centered reversed tray) and apply pressure to lock the tray in this position. Next, place the implant assembly into the appropriate slot of the impaction block and using the impactor handle with the head/tray impactor tip seat the taper.

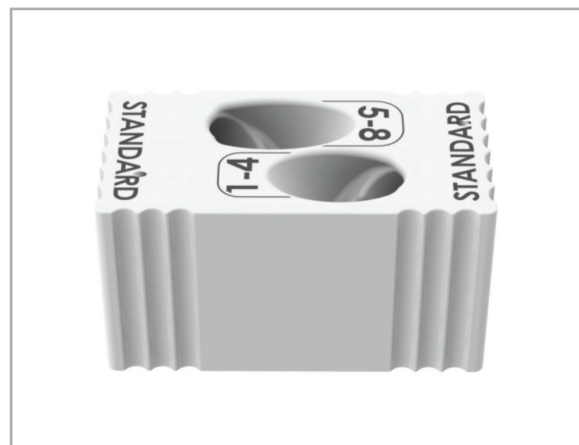


Figure 57

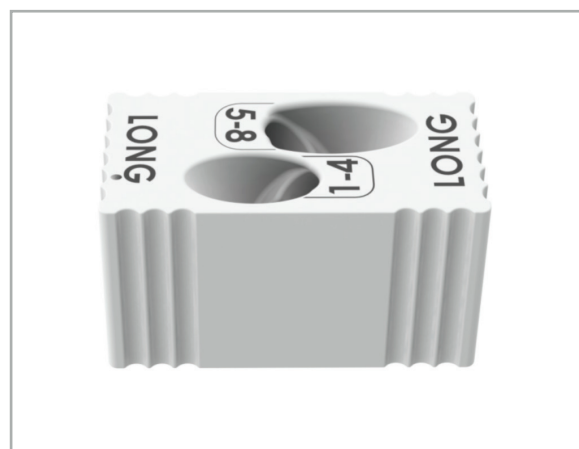


Figure 58



Figure 59 (A)

With the reversed tray and stem assembled, place the reversed tray inserter on top of the reversed tray taking care to align the notch on the inserter with the lateral notch of the stem. This will allow for version assessment in subsequent steps.

Next, ensure the latch of the inserter handle is in the fully unlocked position and place the clamp feet of the inserter handle into the slots of the reversed tray inserter.

To implant a Tornier Flex PTC Stem, insert the assembly into the prepared humerus while maintaining the established retroversion. Impact the implant until the bottom of the reversed tray is flush with the cut.

To implant a Tornier Flex Cemented Stem, irrigate and dry the humeral canal then insert a cement restrictor. Inject cement into the medullary canal using a standard cementing technique and insert the implant assembly.

To place the fixed insert, select the size and thickness determined during the trailing step and orient the insert so that the laser mark is aligned with most lateral aspect of the humerus. As a check, the thinnest portion of the insert should be lateral (superior) and the thickest portion of the insert should be medial (inferior).

The reversed tray and insert should be clean and dry prior to assembly.

With the fixed insert aligned, it is recommended to first set the insert by hand and then use the impactor handle with the insert impactor tip to ensure final seating of the insert into the tray.



Figure 59 (B)



Figure 59 (C)

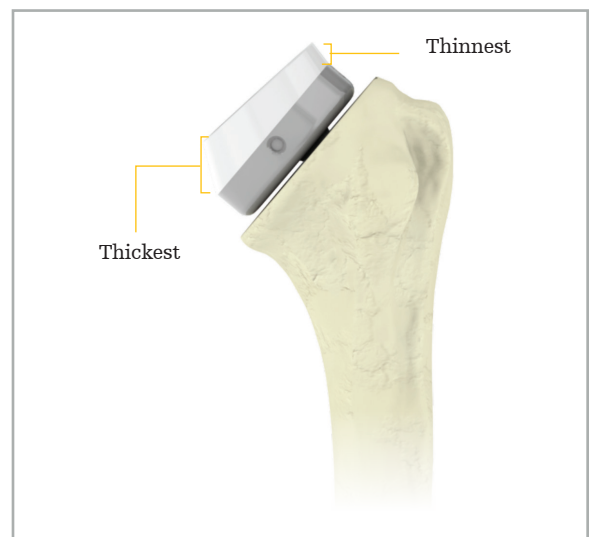


Figure 59 (D)

## In-vivo assembly

Attach the chosen definitive humeral stem (respecting the size and angle of the trial) to the inserter handle with the depth stop in place.

The inserter handle has optional version holes designed to accept the version rod to assist in orienting the definitive stem to the previously determined version. If utilized, be sure the version rod is placed on the side of the inserter handle that corresponds with the operative side of the patient (left or right).

### Tornier Flex PTC Stem

To implant a Tornier Flex Stem, insert the stem into the prepared humerus taking care to maintain the version of the resection. Impact the stem until the depth stop is a few millimeters above the resection.

Remove the inserter handle and orient the selected reversed tray to the desired location. Seat the taper using the impactor handle with the head/tray impactor tip and continue to impact until the bottom of the reversed tray is flush with the cut and check implant stability.



Figure 60

### Tornier Flex Cemented Stem

To implant a Tornier Flex Cemented Stem, irrigate and dry the humeral canal then insert a cement restrictor. Inject cement into the medullary canal using a standard cementing technique and insert the stem into the humeral canal. Advance the stem until the depth stop is flush against the resection taking care not to countersink the implant.

Remove the inserter handle and any excess cement. Clean and dry the stem taper. Orient the selected size reversed tray to the desired location. Seat the taper using the impactor handle with the head/tray impactor tip.

To place the insert, select the size and thickness determined during the trailing step and orient the insert so the laser mark is aligned with the most lateral aspect of the tray. As a check, the thinnest portion of the insert should be lateral and the thickest portion of the insert should be medial.

With the insert aligned, use the impactor handle with the insert impactor tip to seat the insert into the tray.

**Note:** When implanting a PTC stem, please note that the proximal stems are larger than the compactors. When using sets YKAD231 or YKAD230 the resulting diametric press-fit is 2mm. When using set YKAD230S the resulting diametric press-fit is 1mm.

When implanting a cemented stem, please note that the stems are undersized to the compactors. When using sets YKAD231 or YKAD230 the resulting average cement mantle is 0.7mm. When using set YKAD230S the resulting average cement mantle is 1.4mm.

The decision to use cement or a press-fit technique is based upon individual surgeon preference.



## Testing and closure

After the joint has been washed and the prosthesis reduced, the stability and mobility of the shoulder are tested.

In the supero-lateral approach, the deltoid is reattached to the acromion with a trans osseous suture. In the delto-pectoral approach, a full or partial re-insertion of the subscapularis is performed, if possible.

## Complications

### Post-operative stiffness

In case of significant pre-operative stiffness, it may be difficult to regain post-operative mobility. A surgical arthrolysis in conjunction with a capsulotomy may be required with the removal of soft tissue adhesions and removal of the tuberosities. Post-operatively, the arm is usually immobilized in a shoulder abduction splint for 3 to 6 weeks (in 60° abduction). Passive elevation above the splint in the scapular plane is started immediately.

### Prosthesis instability

Possible causes:

- Improper humeral cut
- Massive humeral bone deficiency

Such cases are the consequence of insufficient deltoid tension.

In case of early post-operative dislocation, a closed reduction under local anesthesia is performed. If the prosthesis is in good position, then immobilization for 6 weeks normally restores stability.

With recurrent instability, a revision is needed to check the humeral version and increase (if necessary) the thickness of the construct. If possible, switching to a 42mm glenoid sphere will likely provide greater stability. Upon request retentive inserts are also available and may be useful in addressing recurrent instability.

## Rehabilitation

### Post-operative rehabilitation

The arm is placed in a brace with the elbow close to the body in neutral or internal rotation.

An abduction cushion can be used especially in cases of deltoid detachment or if the supero-lateral approach was performed. Rehabilitation is performed with passive pendular motion exercises five times per day at 5 minutes per session. Aquatic therapy can begin as soon as healing has occurred.

### Arm motion to be avoided

Abduction/external rotation or abduction/internal rotation.

**Note:** Active motion in the arm is restricted in daily activity as only elbow, wrist and finger motion is allowed.

### 6 weeks post-op

Strengthening of the deltoid muscle and external rotators at 6 weeks post-op can be initiated with isometric exercise against resistance. Strengthening of the external rotators with the elbow at the level of the arm can be initiated by isometric exercise against resistance. Provided that deltoid attachment has not been disrupted, normal active elevation is generally rapidly recovered.

**Note:** Desired rehabilitation protocols vary by surgeon. The surgeon, physical therapist and patient should play an active role in determining the appropriate recovery process.

## Revision preparation

### Consideration for revision surgery

#### Addressing recurrent instability

With recurrent instability, a revision may be necessary to check the humeral version and increase (if necessary) the humeral lateralization utilizing a thicker insert and/or thicker tray.

Retentive inserts are available upon request and may be useful in addressing recurrent instability.

To facilitate the removal of an existing insert an insert revision clamp is available.

The insert revision clamp utilizes three of the four holes in the reversed tray to loosen the metal clip on the reversed insert.

To use, first locate the fixed arm of the clamp (the side with the larger thumb screw). Place the tip of the fixed outer arm into either the anterior or superior holes in the reversed tray ensuring the that larger thumb screw is pointed up, above the reversed tray.

Ensure that the central post is completely unthreaded and then align the central tip of the clamp with the hole in the tray. Advance the smaller thumb screw until there is slight resistance. Take care not to over tighten the clamp as it may prevent removal of the insert. Next, align the final tip and draw it into the tray with the larger thumb screw.

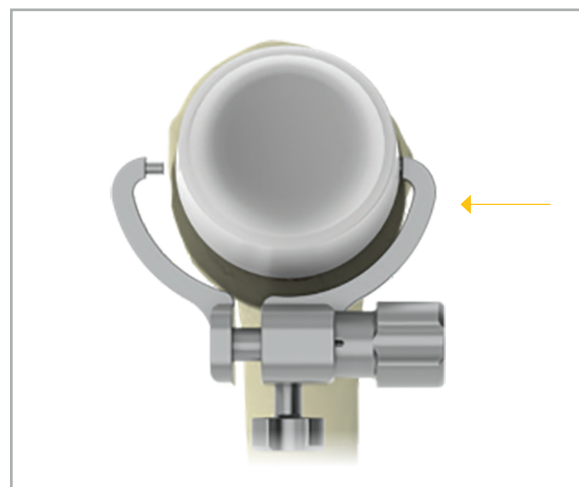


Figure 61

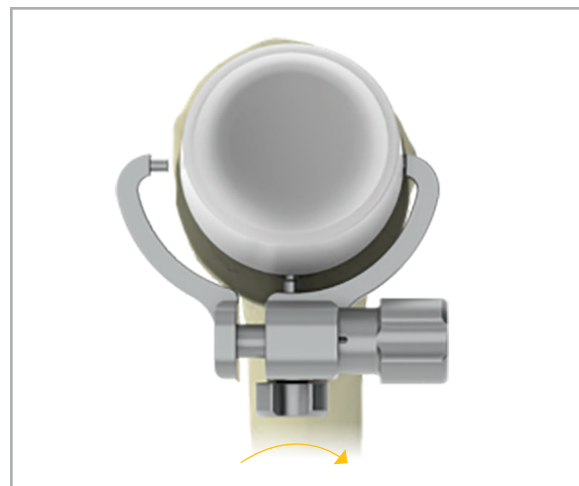


Figure 62

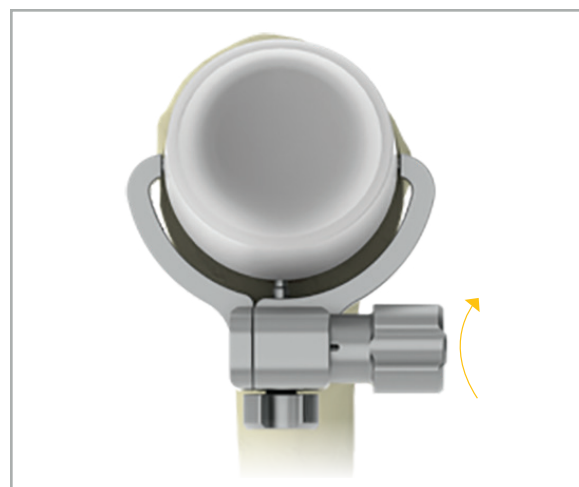


Figure 63

Finally, place the distractor over the clamp and between the insert and the tray and lift the insert out. It is critical that the distractor be placed on the same side as the clamp.

If the insert cannot be removed, adjust the tension of the thumb screws and re-attempt removal with the distractor.

Once the insert has been removed, inspect the reversed tray for damage. If damaged, remove the tray and replace it with a new tray. If the tray is not damaged, proceed with trailing until stability is obtained, then ensure the reversed tray and insert are clean and dry and implant the selected insert.

## Addressing conversion (anatomic to a reversed construct)

### Overview

Although rare, revision from an anatomic construct to a reversed construct may become necessary as a result of a secondary massive irreparable cuff tear. The Tornier Flex Shoulder System has been designed to facilitate this type of conversion without the need to remove a well-placed and well-fixed stem.

Reversed inserts have been designed and are available upon request to allow conversion from any of the anatomic inclinations to a 145° reversed construct. It is as simple as A, B, C.

### Anatomic to reversed conversion chart

Anatomic stem		Reversed insert		Reversed construct	
Angle	Inclination	Angle	Inclination	Angle	Inclination
A	127.5°	A	17.5°	A	145°
B	132.5°	B	12.5°	B	145°
C	137.5°	C	7.5°	C	145°



Figure 64

### Removing the humeral head

To begin, remove the humeral head by placing the tips of the distractor between the resection and bottom of the humeral head and impact to free the Morse taper. Once the humeral head has been removed, assess the position, fixation and taper of the stem.

### Planning the resection

If the position, fixation and taper of the stem are acceptable, select the surface planer that corresponds with the stem size and place the plastic tip of the surface planer into the taper of the stem.

Depending upon the position of the taper within the humerus it may be advisable to upsize or downsize the surface planer to obtain ideal coverage.

To plane, engage the power prior to advancing the cutting teeth to the resection. Take care to ensure the surface planer is aligned with the taper of the stem and not pushed off axis. Slowly advance the surface planer axially into the taper until it reaches the built-in stop, taking care not to rock or wobble the surface planer.

Utilizing the surface planer will ensure adequate clearance for the reversed tray that will be placed onto the stem in subsequent steps.



Figure 65



Figure 66



Figure 67

### Trialing overview

Once the metaphyseal surface is prepared, select the desired reversed tray trial and place it onto the stem in the desired location.

Please note that the screw of the tray will not lock into the stem as it does on the compactor. However, the taper connection does provide a secure fit that is acceptable for trial reduction.

Once the reversed tray trial is in place, select the +6 thickness reversed insert trial that corresponds to the stem angle (A, B or C) previously implanted and matches the glenoid sphere diameter. Orient the insert trial so the laser mark is positioned at the most lateral position of the humerus. As a check, the thinnest portion of the insert trial should be lateral (superior) and the thickest portion of the insert trial should be medial (inferior).

Reduce the joint and check deltoid tension, stability, range of motion and impingement. If necessary adjust the thickness of the insert and or tray until the desired results are achieved.

### Implant assembly

Orient the selected reversed tray implant to the desired position. Seat the taper using the impactor handle with the head/tray impactor tip.

To place the insert, select the size and thickness determined during the trialing step and orient the insert so the laser mark is aligned with the most lateral aspect of the humerus. As a check, the thinnest portion of the insert should be lateral (superior) and the thickest portion of the insert should be medial (inferior). The reversed tray and insert should be clean and dry prior to assembly.

Insert impactor tip to seat the insert into the tray.



Figure 68

**Tips for removing a humeral stem**

With the humeral head or reversed tray removed, it is recommended to run a flexible osteotome down the sides of the stem to separate bone from the stem. Attach the inserter handle to the stem and place the 3.5mm retaining driver through the hole in shaft of inserter handle until the driver handle contacts the inserter handle.

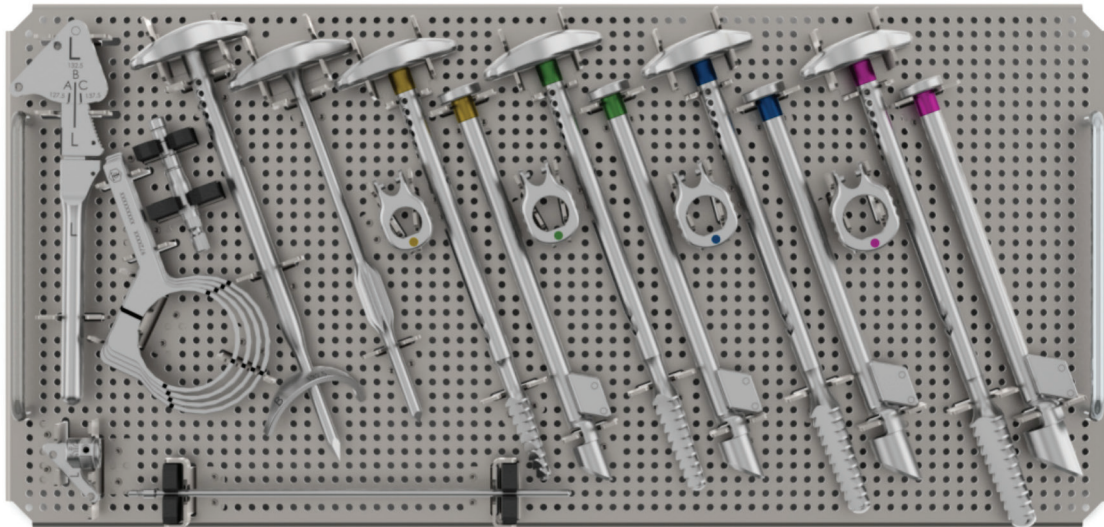
Next place thread the trial slaphammer into the top of the insert handle.

Utilizing the driver, apply gentle rotational force while simultaneously using the trial slaphammer to remove the stem.

The combination of rotational and axial force helps to expedite the removal process.

**Figure 69**

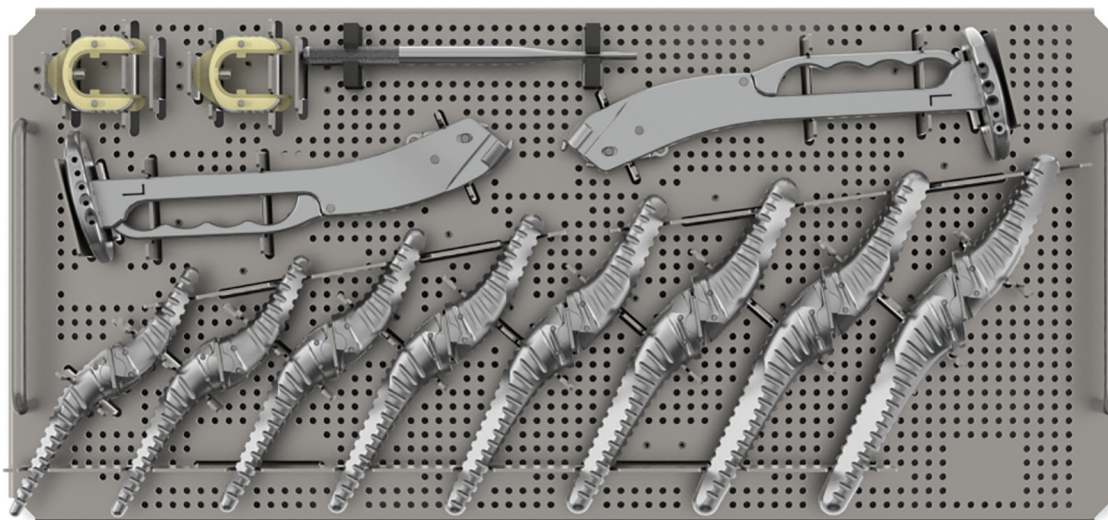
## Components



### Tornier Flex humeral instruments YKAD230, 230S, 231 (top tray)

Reference	Description
MWF004	Version indicator
MWF100	Inclination indicator
9722885	Pin driver
9722926	Small cut ring
9722927	Medium cut ring
9722928	Large cut ring
9722929	X-large cut ring
MWF113	Retroversion rod
MWF011	Reverse cut guide
MWF101	Starter awl
MWF021	Souder size 1-2
MWF023	Souder size 3-4
MWF025	Souder size 5-6
MWF027	Souder size 7-8
MWF031	Punch size 1-2
MWF033	Punch size 3-4
MWF035	Punch size 5-6
MWF037	Punch size 7-8
MWF041	Punch template size 1-2
MWF043	Punch template size 3-4
MWF045	Punch template size 5-6
MWF047	Punch template size 7-8





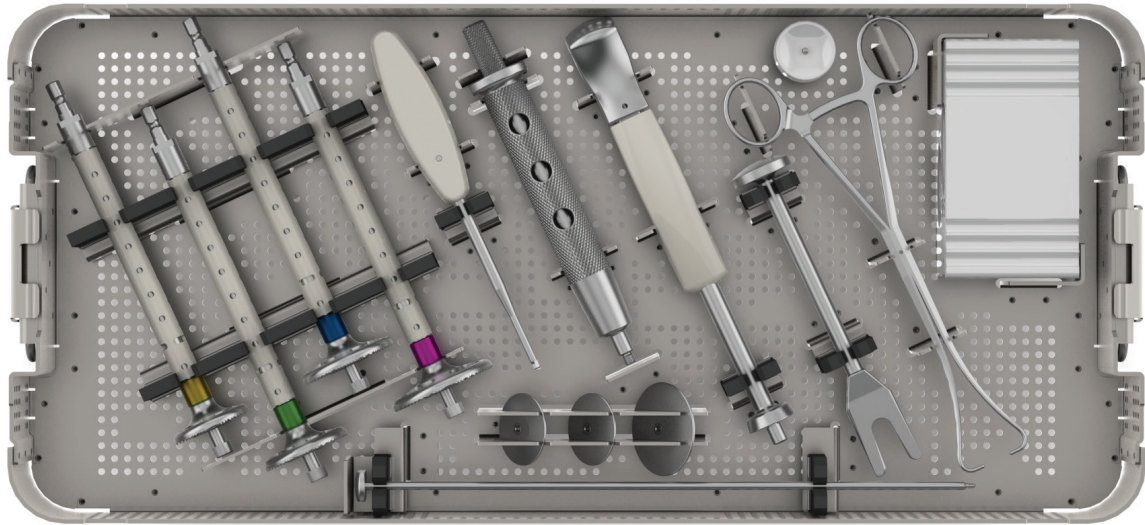
### Tornier Flex humeral instruments

#### YKAD231/230 (middle tray)

Reference	Description
MWF601	Standard stem compactor size 1
MWF602	Standard stem compactor size 2
MWF603	Standard stem compactor size 3
MWF604	Standard stem compactor size 4
MWF605	Standard stem compactor size 5
MWF606	Standard stem compactor size 6
MWF607	Standard stem compactor size 7
MWF608	Standard stem compactor size 8
MWF611	Long stem compactor size 1
MWF612	Long stem compactor size 2
MWF613	Long stem compactor size 3
MWF614	Long stem compactor size 4
MWF615	Long stem compactor size 5
MWF616	Long stem compactor size 6
MWF617	Long stem compactor size 7
MWF618	Long stem compactor size 8
MWF102	2.5mm inclination locking driver
MWF103	Insert handle
MWF106	Insert handle depth stop

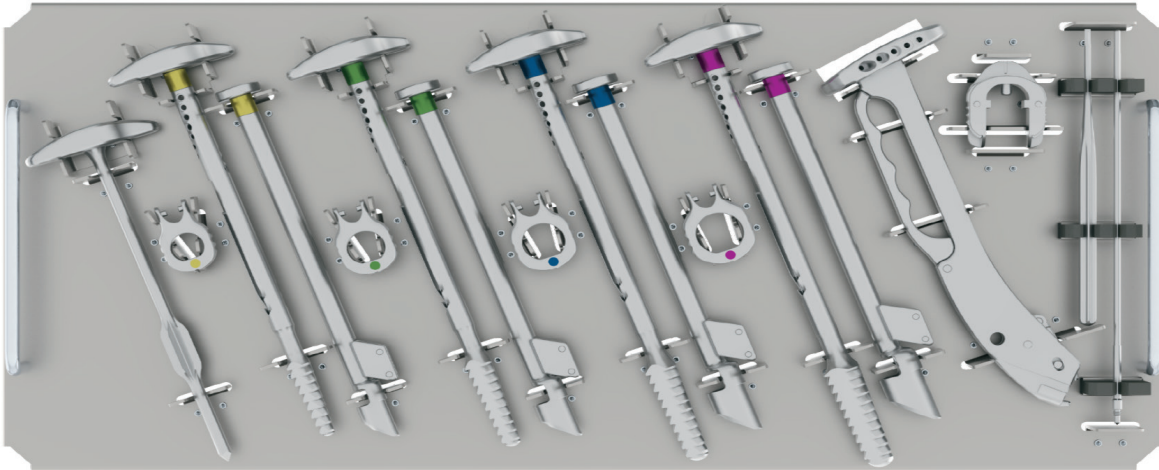
#### YKAD230S (bottom tray)

Reference	Description
MWF601S	Standard (+) compactor size 1
MWF602S	Standard (+) compactor size 2
MWF603S	Standard (+) compactor size 3
MWF604S	Standard (+) compactor size 4
MWF605S	Standard (+) compactor size 5
MWF606S	Standard (+) compactor size 6
MWF607S	Standard (+) compactor size 7
MWF608S	Standard (+) compactor size 8
MWF611S	Long (+) compactor size 1
MWF612S	Long (+) compactor size 2
MWF613S	Long (+) compactor size 3
MWF614S	Long (+) compactor size 4
MWF615S	Long (+) compactor size 5
MWF616S	Long (+) compactor size 6
MWF617S	Long (+) compactor size 7
MWF618S	Long (+) compactor size 8
MWF102	2.5mm inclination locking driver
MWF103	Insert handle
MWF106	Insert handle depth stop



**Tornier Flex humeral instruments  
YKAD 231/232 (bottom tray)**

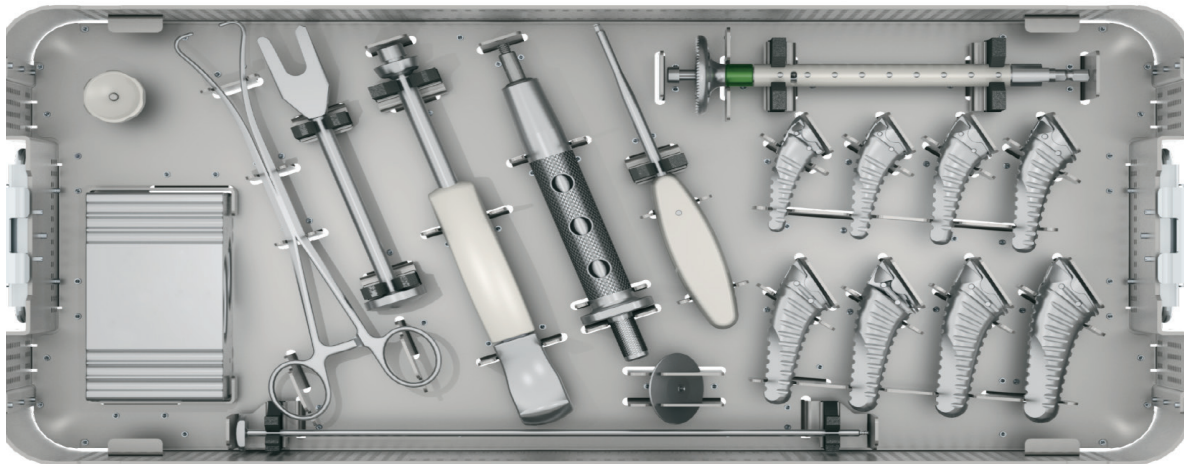
Reference	Description
MWF051	Cut protector Ø35mm
MWF053	Cut protector Ø40mm
MWF055	Cut protector Ø45mm
MWF061	Calcar planer size 1-2
MWF063	Calcar planer size 3-4
MWF065	Calcar planer size 5-6
MWF067	Calcar planer size 7-8
MWF107	Impaction block
MWF108	Head distractor
MWF109	3.5mm retaining driver
MWF110	Trial slaphammer
MWF221	Impaction handle
MWF222	Head / tray impactor tip
MWF124	Trial clamp
MBO101	Cement restrictor



**Tornier Flex Express humeral instruments  
YKAD231SE (top tray)**

Reference	Description
MWF101	Starter awl
MWF041	Punch template size 1-2
MWF021	Sounder size 1-2
MWF031	Punch size 1-2
MWF043	Punch template size 3-4
MWF023	Sounder size 3-4
MWF033	Punch size 3-4
MWF045	Punch template size 5-6
MWF025	Sounder size 5-6
MWF035	Punch size 5-6
MWF047	Punch template size 7-8
MWF027	Sounder size 7-8
MWF037	Punch size 7-8
MWF103	Inserter handle
MWF106	Inserter depth stop
MWF102	2.5mm inclination locking driver
MWF113	Retroversion rod

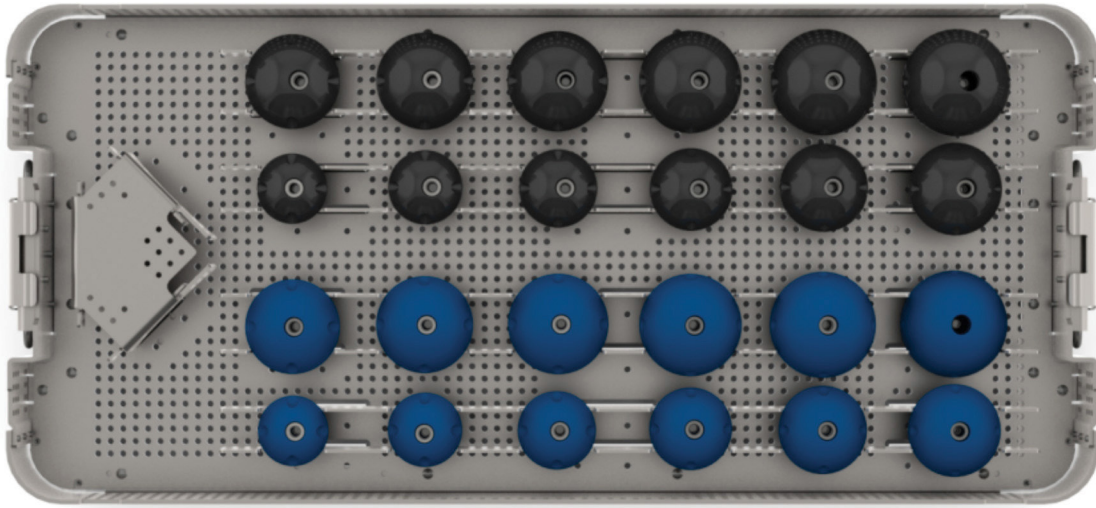
If using the Tornier Flex as a backup to Tornier Simpliciti Shoulder System, it is permissible to use the Tornier Flex Express Instrument Set (YKAD231SE) to effectively implant the definitive humeral stem.



**Tornier Flex Express humeral instruments  
YKAD231SE (bottom tray)**

Reference	Description
MWF222	Head/tray impactor tray
MWF107	Impaction block
MBO101	Cement restrictor
MWF124	Trial clamp
MWF108	Head distractor
MWF221	Impaction handle
MWF110	Trial slaphammer
MWF053	Cut protector 40mm
MWF109	3.5mm retaining driver
MWF063	Calcar planer size 3-4
MWF601S	Standard + stem compactor size 1
MWF602S	Standard + stem compactor size 2
MWF603S	Standard + stem compactor size 3
MWF604S	Standard + stem compactor size 4
MWF605S	Standard + stem compactor size 5
MWF606S	Standard + stem compactor size 6
MWF607S	Standard + stem compactor size 7
MWF608S	Standard + stem compactor size 8

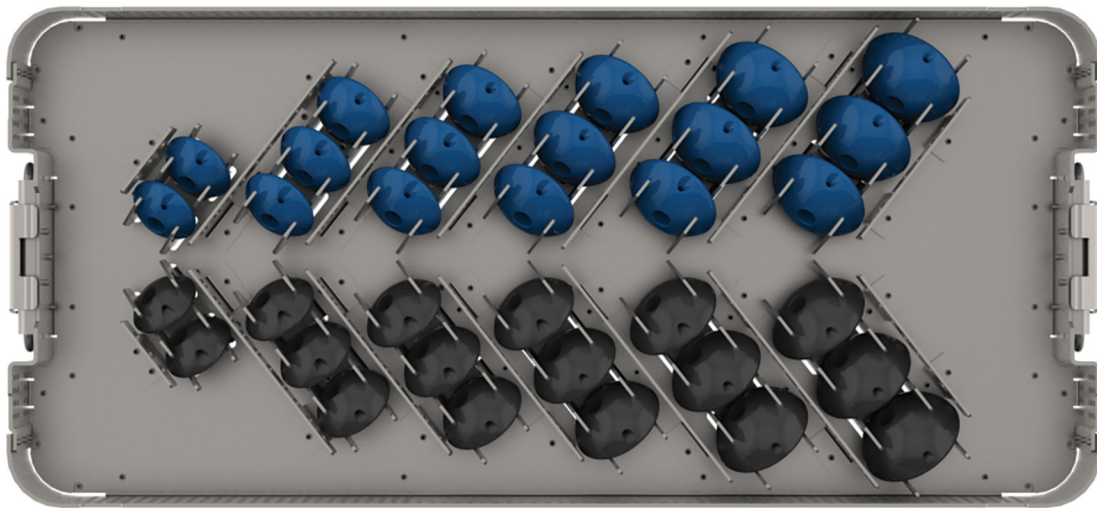




### Tornier Flex humeral head trials (YKAD233)

Reference	Description	Diameter	Height	Offset
MWF200	Humeral head sizer	N/A	N/A	N/A
*MWF237S	Humeral head trial	37mm	13.5mm	1.5mm
MWF239S	Humeral head trial	39mm	14mm	1.5mm
MWF241S	Humeral head trial	41mm	15mm	1.5mm
MWF243S	Humeral head trial	43mm	16mm	1.5mm
MWF246S	Humeral head trial	46mm	17mm	1.5mm
MWF248S	Humeral head trial	48mm	18mm	1.5mm
MWF250S	Humeral head trial	50mm	16mm	1.5mm
MWF251S	Humeral head trial	50mm	19mm	1.5mm
MWF252S	Humeral head trial	52mm	19mm	1.5mm
MWF253S	Humeral head trial	52mm	23mm	1.5mm
*MWF254S	Humeral head trial	54mm	23mm	1.5mm
*MWF255S	Humeral head trial	54mm	27mm	1.5mm
*MWF337S	Humeral head trial	37mm	13.5mm	3.5mm
MWF339S	Humeral head trial	39mm	14mm	3.5mm
MWF341S	Humeral head trial	41mm	15mm	3.5mm
MWF343S	Humeral head trial	43mm	16mm	3.5mm
MWF346S	Humeral head trial	46mm	17mm	4mm
MWF348S	Humeral head trial	48mm	18mm	4mm
MWF350S	Humeral head trial	50mm	16mm	4mm
MWF351S	Humeral head trial	50mm	19mm	4mm
MWF352S	Humeral head trial	52mm	19mm	4mm
MWF353S	Humeral head trial	52mm	23mm	4mm
*MWF354S	Humeral head trial	54mm	23mm	4mm
*MWF355S	Humeral head trial	54mm	27mm	4mm

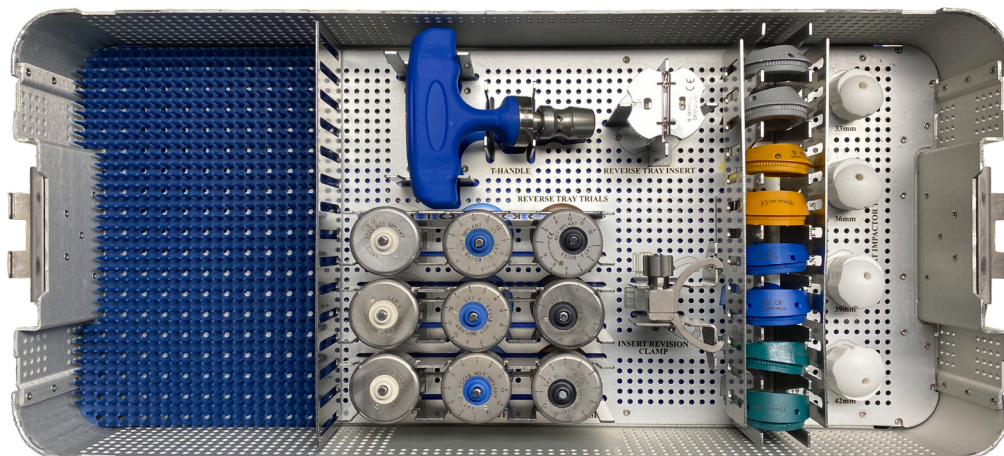
\*Indicates sizes which are available upon request and not included in the standard set



**Soft-tissue balancing humeral head instrument set (YKAD236)**

Description	Diameter	Height	Low Reference	Low Offset	High Reference	High Offset
STB humeral head trial	39mm	13mm	MWG039	1.5mm	MWG139	3.5mm
STB humeral head trial	39mm	15mm	MWG041	1.5mm	MWG141	3.5mm
STB humeral head trial	42mm	14mm	MWG042	1.5mm	MWG142	3.5mm
STB humeral head trial	42mm	16mm	MWG043	1.5mm	MWG143	3.5mm
STB humeral head trial	42mm	18mm	MWG044	1.5mm	MWG144	3.5mm
STB humeral head trial	45mm	15mm	MWG045	1.5mm	MWG145	4mm
STB humeral head trial	45mm	17mm	MWG046	1.5mm	MWG146	4mm
STB humeral head trial	45mm	19mm	MWG047	1.5mm	MWG147	4mm
STB humeral head trial	48mm	16mm	MWG048	1.5mm	MWG148	4mm
STB humeral head trial	48mm	18mm	MWG049	1.5mm	MWG149	4mm
STB humeral head trial	48mm	20mm	MWG050	1.5mm	MWG150	4mm
STB humeral head trial	51mm	17mm	MWG051	1.5mm	MWG151	4mm
STB humeral head trial	51mm	20mm	MWG052	1.5mm	MWG152	4mm
STB humeral head trial	51mm	23mm	MWG053	1.5mm	MWG153	4mm
STB humeral head trial	54mm	18mm	MWG054	1.5mm	MWG154	4mm
STB humeral head trial	54mm	21mm	MWG055	1.5mm	MWG155	4mm
STB humeral head trial	54mm	24mm	MWG056	1.5mm	MWG156	4mm

\*Sizes special request



### Tornier Flex reversed trials (YKAD234S) reversed insert trials\*

Reference	Description	Diameter	Height	Angle
MWF361B	Reversed insert trial	36mm	(+) 6	B-12.5°
MWF362B	Reversed insert trial	36mm	(+) 9	B-12.5°
MWF421B	Reversed insert trial	42mm	(+) 6	B-12.5°
MWF422B	Reversed insert trial	42mm	(+) 9	B-12.5°
MWF356B	Reversed insert trial	33mm	(+) 6	B-12.5°
MWF357B	Reversed insert trial	33mm	(+) 9	B-12.5°
MWF391B	Reversed insert trial	39mm	(+) 6	B-12.5°
MWF392B	Reversed insert trial	39mm	(+) 9	B-12.5°

\*33mm/39mm reversed trials available as shown in YKAD234S, previous version YKAD234 does not include 33mm/39mm

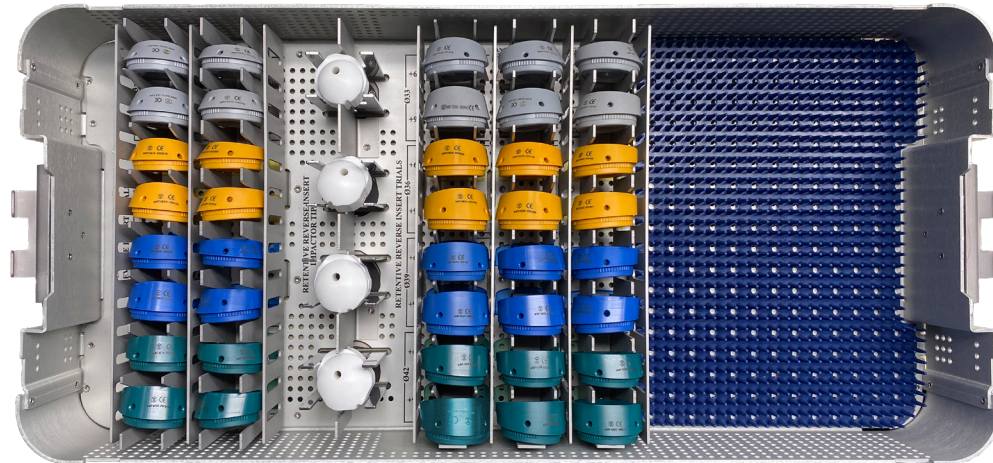
### Reversed tray trials

Reference	Description	Thickness	Offset
MWF500S	Reversed tray trial	(+) 0	0mm
MWF501S	Reversed tray trial	(+) 6	0mm
MWF502S	Reversed tray trial	(+) 12	0mm
MWF510S	Reversed tray trial	(+) 0	1.5mm
MWF511S	Reversed tray trial	(+) 6	1.5mm
MWF512S	Reversed tray trial	(+) 12	1.5mm
MWF520S	Reversed tray trial	(+) 0	3.5mm
MWF521S	Reversed tray trial	(+) 6	3.5mm
MWF522S	Reversed tray trial	(+) 12	3.5mm

### Miscellaneous instruments

Reference	Description
MWF621	Insert revision clamp
MWF722	Insert impaction tip, 36mm
MWF723	Insert impaction tip, 42mm
MWF757	Insert impaction tip, 33mm
MWF758	Insert impaction tip, 39mm
MWB497	T-handle
MWF630	Tray inserter





**Tornier Flex reversed revision trials (YKAD235S)\***

Reference	Description	Dia.	Thick.	Angle
MWF356A	Reversed insert trial	33mm	(+) 6	A - 17.5
MWF356C	Reversed insert trial	33mm	(+) 6	C - 7.5
MWF357A	Reversed insert trial	33mm	(+) 9	A - 17.5
MWF357C	Reversed insert trial	33mm	(+) 9	C - 7.5
MWF358A	Reversed retentive insert trial	33mm	(+) 6	A - 17.5
MWF358B	Reversed retentive insert trial	33mm	(+) 6	B - 12.5
MWF358C	Reversed retentive insert trial	33mm	(+) 6	C - 7.5
MWF359A	Reversed retentive insert trial	33mm	(+) 9	A - 17.5
MWF359B	Reversed retentive insert trial	33mm	(+) 9	B - 12.5
MWF359C	Reversed retentive insert trial	33mm	(+) 9	C - 7.5
MWF361A	Reversed insert trial	36mm	(+) 6	A - 17.5
MWF361C	Reversed insert trial	36mm	(+) 6	C - 7.5
MWF362A	Reversed insert trial	36mm	(+) 9	A - 17.5
MWF362C	Reversed insert trial	36mm	(+) 9	C - 7.5
MWF364A	Reversed retentive insert trial	36mm	(+) 6	A - 17.5
MWF364B	Reversed retentive insert trial	36mm	(+) 6	B - 12.5
MWF364C	Reversed retentive insert trial	36mm	(+) 6	C - 7.5
MWF365A	Reversed retentive insert trial	36mm	(+) 9	A - 17.5
MWF365B	Reversed retentive insert trial	36mm	(+) 9	B - 12.5
MWF365C	Reversed retentive insert trial	36mm	(+) 9	C - 7.5
MWF391A	Reversed insert trial	39mm	(+) 6	A - 17.5
MWF391C	Reversed insert trial	39mm	(+) 6	C - 7.5
MWF392A	Reversed insert trial	39mm	(+) 9	A - 17.5
MWF392C	Reversed insert trial	39mm	(+) 9	C - 7.5

Reference	Description	Dia.	Thick.	Angle
MWF394A	Reversed retentive insert trial	39mm	(+) 6	A - 17.5
MWF394B	Reversed retentive insert trial	39mm	(+) 6	B - 12.5
MWF394C	Reversed retentive insert trial	39mm	(+) 6	C - 7.5
MWF395A	Reversed retentive insert trial	39mm	(+) 9	A - 17.5
MWF395B	Reversed retentive insert trial	39mm	(+) 9	B - 12.5
MWF395C	Reversed retentive insert trial	39mm	(+) 9	C - 7.5
MWF421A	Reversed insert trial	42mm	(+) 6	A - 17.5
MWF421C	Reversed insert trial	42mm	(+) 6	C - 7.5
MWF422A	Reversed insert trial	42mm	(+) 9	A - 17.5
MWF422C	Reversed insert trial	42mm	(+) 9	C - 7.5
MWF424A	Reversed retentive insert trial	42mm	(+) 6	A - 17.5
MWF424B	Reversed retentive insert trial	42mm	(+) 6	B - 12.5
MWF424C	Reversed retentive insert trial	42mm	(+) 6	C - 7.5
MWF425A	Reversed retentive insert trial	42mm	(+) 9	A - 17.5
MWF425B	Reversed retentive insert trial	42mm	(+) 9	B - 12.5
MWF425C	Reversed retentive insert trial	42mm	(+) 9	C - 7.5
MWF211	Retentive insert impactor tip, 36mm			
MWF212	Retentive insert impactor tip, 42mm			
MWF213	Retentive insert impactor tip, 33mm			
MWF214	Retentive insert impactor tip, 39mm			

\*33mm/39mm reversed trials available as shown in YKAD235S, previous version YKAD235 does not include 33mm/39mm



**Tornier Flex: standard PTC humeral stems**

Reference	Description	Diameter	Angle	Length
DWF601A	Standard PTC humeral stem	1A	127.5°	66mm
DWF601B	Standard PTC humeral stem	1B	132.5°	66mm
DWF601C	Standard PTC humeral stem	1C	137.5°	66mm
DWF602A	Standard PTC humeral stem	2A	127.5°	70mm
DWF602B	Standard PTC humeral stem	2B	132.5°	70mm
DWF602C	Standard PTC humeral stem	2C	137.5°	70mm
DWF603A	Standard PTC humeral stem	3A	127.5°	74mm
DWF603B	Standard PTC humeral stem	3B	132.5°	74mm
DWF603C	Standard PTC humeral stem	3C	137.5°	74mm
DWF604A	Standard PTC humeral stem	4A	127.5°	78mm
DWF604B	Standard PTC humeral stem	4B	132.5°	78mm
DWF604C	Standard PTC humeral stem	4C	137.5°	78mm
DWF605A	Standard PTC humeral stem	5A	127.5°	82mm
DWF605B	Standard PTC humeral stem	5B	132.5°	82mm
DWF605C	Standard PTC humeral stem	5C	137.5°	82mm
DWF606A	Standard PTC humeral stem	6A	127.5°	86mm
DWF606B	Standard PTC humeral stem	6B	132.5°	86mm
DWF606C	Standard PTC humeral stem	6C	137.5°	86mm
DWF607A	Standard PTC humeral stem	7A	127.5°	90mm
DWF607B	Standard PTC humeral stem	7B	132.5°	90mm
DWF607C	Standard PTC humeral stem	7C	137.5°	90mm
DWF608A	Standard PTC humeral stem	8A	127.5°	94mm
DWF608B	Standard PTC humeral stem	8B	132.5°	94mm
DWF608C	Standard PTC humeral stem	8C	137.5°	94mm

**Tornier Flex: long PTC humeral stems**

Reference	Description	Diameter	Angle	Length
DWF611B	Long PTC humeral stem	1B	132.5°	88mm
DWF612B	Long PTC humeral stem	2B	132.5°	93mm
DWF613B	Long PTC humeral stem	3B	132.5°	98mm
DWF614B	Long PTC humeral stem	4B	132.5°	104mm
DWF615B	Long PTC humeral stem	5B	132.5°	109mm
DWF616B	Long PTC humeral stem	6B	132.5°	115mm
DWF617B	Long PTC humeral stem	7B	132.5°	120mm
DWF618B	Long PTC humeral stem	8B	132.5°	125mm



**Tornier Flex: standard cemented humeral stems**

Reference	Description	Size	Angle	Length
DWF702A	Standard cemented humeral stem	2A	127.5°	66mm
DWF702B	Standard cemented humeral stem	2B	132.5°	66mm
DWF702C	Standard cemented humeral stem	2C	137.5°	66mm
DWF704A	Standard cemented humeral stem	4A	127.5°	74mm
DWF704B	Standard cemented humeral stem	4B	132.5°	74mm
DWF704C	Standard cemented humeral stem	4C	137.5°	74mm
DWF706A	Standard cemented humeral stem	6A	127.5°	82mm
DWF706B	Standard cemented humeral stem	6B	132.5°	82mm
DWF706C	Standard cemented humeral stem	6C	137.5°	82mm
DWF708A	Standard cemented humeral stem	8A	127.5°	90mm
DWF708B	Standard cemented humeral stem	8B	132.5°	90mm
DWF708C	Standard cemented humeral stem	8C	137.5°	90mm



**Tornier Flex: long cemented humeral stems**

Reference	Description	Size	Angle	Length
DWF712B	Long cemented humeral stem	2B	132.5°	88mm
DWF714B	Long cemented humeral stem	4B	132.5°	98mm
DWF716B	Long cemented humeral stem	6B	132.5°	109mm
DWF718B	Long cemented humeral stem	8B	132.5°	120mm



**Tornier Flex anatomic humeral heads (cobalt chrome)**

Reference	Description	Diameter	Height	Offset		
*DWF037	Humeral head	37mm	13.5mm	1.5mm	Low	
DWF039	Humeral head	39mm	14mm	1.5mm		
DWF041	Humeral head	41mm	15mm	1.5mm		
DWF043	Humeral head	43mm	16mm	1.5mm		
DWF046	Humeral head	46mm	17mm	1.5mm		
DWF048	Humeral head	48mm	18mm	1.5mm		
DWF050	Humeral head	50mm	16mm	1.5mm		
DWF051	Humeral head	50mm	19mm	1.5mm		
DWF052	Humeral head	52mm	19mm	1.5mm		
DWF053	Humeral head	52mm	23mm	1.5mm		
*DWF054	Humeral head	54mm	23mm	1.5mm		
*DWF055	Humeral head	54mm	27mm	1.5mm		
*DWF137	Humeral head	37mm	13.5mm	3.5mm		High
DWF139	Humeral head	39mm	14mm	3.5mm		
DWF141	Humeral head	41mm	15mm	3.5mm		
DWF143	Humeral head	43mm	16mm	3.5mm		
DWF146	Humeral head	46mm	17mm	4mm		
DWF148	Humeral head	48mm	18mm	4mm		
DWF150	Humeral head	50mm	16mm	4mm		
DWF151	Humeral head	50mm	19mm	4mm		
DWF152	Humeral head	52mm	19mm	4mm		
DWF153	Humeral head	52mm	23mm	4mm		
*DWF154	Humeral head	54mm	23mm	4mm		
*DWF155	Humeral head	54mm	27mm	4mm		

\*Indicates sizes which are available upon request and not included in the standard set

**Tornier Flex anatomic humeral heads (titanium)**

Reference	Description	Diameter	Height	Offset	
DWF239	Eccentric humeral head	39mm	14mm	1.5mm	Low
DWF241	Eccentric humeral head	41mm	15mm	1.5mm	
DWF243	Eccentric humeral head	43mm	16mm	1.5mm	
DWF246	Eccentric humeral head	46mm	17mm	1.5mm	
DWF248	Eccentric humeral head	48mm	18mm	1.5mm	
DWF250	Eccentric humeral head	50mm	16mm	1.5mm	
DWF251	Eccentric humeral head	50mm	19mm	1.5mm	
DWF252	Eccentric humeral head	52mm	19mm	1.5mm	
DWF253	Eccentric humeral head	52mm	23mm	1.5mm	
DWF339	Eccentric humeral head	39mm	14mm	3.5mm	
DWF341	Eccentric humeral head	41mm	15mm	3.5mm	
DWF343	Eccentric humeral head	43mm	16mm	3.5mm	
DWF346	Eccentric humeral head	46mm	17mm	4mm	
DWF348	Eccentric humeral head	48mm	18mm	4mm	
DWF350	Eccentric humeral head	50mm	16mm	4mm	
DWF351	Eccentric humeral head	50mm	19mm	4mm	
DWF352	Eccentric humeral head	52mm	19mm	4mm	
DWF353	Eccentric humeral head	52mm	23mm	4mm	

**Tornier Flex soft-tissue balancing humeral heads (cobalt chrome)**

Catalog #	Description	Diameter	Height	Offset	
DWG039	STB humeral head	39mm	13mm	1.5mm	Low
DWG041	STB humeral head	39mm	15mm	1.5mm	
DWG042	STB humeral head	42mm	14mm	1.5mm	
DWG043	STB humeral head	42mm	16mm	1.5mm	
DWG044	STB humeral head	42mm	18mm	1.5mm	
DWG045	STB humeral head	45mm	15mm	1.5mm	
DWG046	STB humeral head	45mm	17mm	1.5mm	
DWG047	STB humeral head	45mm	19mm	1.5mm	
DWG048	STB humeral head	48mm	16mm	1.5mm	
DWG049	STB humeral head	48mm	18mm	1.5mm	
DWG050	STB humeral head	48mm	20mm	1.5mm	
DWG051	STB humeral head	51mm	17mm	1.5mm	
DWG052	STB humeral head	51mm	20mm	1.5mm	
DWG053	STB humeral head	51mm	23mm	1.5mm	
DWG054	STB humeral head	54mm	18mm	1.5mm	
DWG055	STB humeral head	54mm	21mm	1.5mm	
DWG056	STB humeral head	54mm	24mm	1.5mm	
DWG139	STB humeral head	39mm	13mm	3.5mm	High
DWG141	STB humeral head	39mm	15mm	3.5mm	
DWG142	STB humeral head	42mm	14mm	3.5mm	
DWG143	STB humeral head	42mm	16mm	3.5mm	
DWG144	STB humeral head	42mm	18mm	3.5mm	
DWG145	STB humeral head	45mm	15mm	4mm	
DWG146	STB humeral head	45mm	17mm	4mm	
DWG147	STB humeral head	45mm	19mm	4mm	
DWG148	STB humeral head	48mm	16mm	4mm	
DWG149	STB humeral head	48mm	18mm	4mm	
DWG150	STB humeral head	48mm	20mm	4mm	
DWG151	STB humeral head	51mm	17mm	4mm	
DWG152	STB humeral head	51mm	20mm	4mm	
DWG153	STB humeral head	51mm	23mm	4mm	
DWG154	STB humeral head	54mm	18mm	4mm	
DWG155	STB humeral head	54mm	21mm	4mm	
DWG156	STB humeral head	54mm	24mm	4mm	

**Tornier Flex reversed inserts**

		33mm Diameter		39mm Diameter	
		Reference	Description	Reference	Description
Standard	DWF356A		Flex reversed insert 33 Dia +6/17.5 A	DWF391A	Flex reversed insert 39 Dia +6/17.5 A
	DWF357A		Flex reversed insert 33 Dia +9/17.5 A	DWF392A	Flex reversed insert 39 Dia +9/17.5 A
	DWF356B		Flex reversed insert 33 Dia +6/12.5 B	DWF391B	Flex reversed insert 39 Dia +6/12.5 B
	DWF357B		Flex reversed insert 33 Dia +9/12.5 B	DWF392B	Flex reversed insert 39 Dia +9/12.5 B
	DWF356C		Flex reversed insert 33 Dia +6/7.5 C	DWF391C	Flex reversed insert 39 Dia +6/7.5 C
	DWF357C		Flex reversed insert 33 Dia +9/7.5 C	DWF392C	Flex reversed insert 39 Dia +9/7.5 C
Retentive	DWF358A		Flex retentive reversed insert 33 Dia +6/17.5 A	DWF394A	Flex retentive reversed insert 39 Dia +6/17.5 A
	DWF359A		Flex retentive reversed insert 33 Dia +9/17.5 A	DWF395A	Flex retentive reversed insert 39 Dia +9/17.5 A
	DWF358B		Flex retentive reversed insert 33 Dia +6/12.5 B	DWF394B	Flex retentive reversed insert 39 Dia +6/12.5 B
	DWF359B		Flex retentive reversed insert 33 Dia +9/12.5 B	DWF395B	Flex retentive reversed insert 39 Dia +9/12.5 B
	DWF358C		Flex retentive reversed insert 33 Dia +6/7.5 C	DWF394C	Flex retentive reversed insert 39 Dia +6/7.5 C
	DWF359C		Flex retentive reversed insert 33 Dia +9/7.5 C	DWF395C	Flex retentive reversed insert 39 Dia +9/7.5 C
		36mm Diameter		42mm Diameter	
		Reference	Description	Reference	Description
Standard	DWF361A		Revision reversed insert 36 Dia +6/17.5 A	DWF421A	Revision reversed insert 42 Dia +6/17.5 A
	DWF362A		Revision reversed insert 36 Dia +9/17.5 A	DWF422A	Revision reversed insert 42 Dia +9/17.5 A
	DWF361B		Standard reversed insert 36 Dia +6 B	DWF421B	Standard reversed insert 42 Dia +6 B
	DWF362B		Standard reversed insert 36 Dia +9 B	DWF422B	Standard reversed insert 42 Dia +9 B
	DWF361C		Revision reversed insert 36 Dia +6/7.5 C	DWF421C	Revision reversed insert 42 Dia +6/7.5 C
	DWF362C		Revision reversed insert 36 Dia +9/7.5 C	DWF422C	Revision reversed insert 42 Dia +9/7.5 C
Retentive	DWF364A		Retentive reversed insert 36 Dia +6/17.5 A	DWF424A	Retentive reversed insert 42 Dia +6/17.5 A
	DWF365A		Retentive reversed insert 36 Dia +9/17.5 A	DWF425A	Retentive reversed insert 42 Dia +9/17.5 A
	DWF364B		Retentive reversed insert 36 Dia +6/12.5 B	DWF424B	Retentive reversed insert 42 Dia +6/12.5 B
	DWF365B		Retentive reversed insert 36 Dia +9/12.5 B	DWF425B	Retentive reversed insert 42 Dia +9/12.5 B
	DWF364C		Retentive reversed insert 36 Dia +6/7.5 C	DWF424C	Retentive reversed insert 42 Dia +6/7.5 C
	DWF365C		Retentive reversed insert 36 Dia +9/7.5 C	DWF425C	Retentive reversed insert 42 Dia +9/7.5 C

**Tornier Flex Reversed Trays**

Reference	Description	Thickness	Offset	
DWF500	Reversed tray	(+) 0	0mm	Centered
DWF501	Reversed tray	(+) 6	0mm	
DWF502	Reversed tray	(+) 12	0mm	
DWF510	Reversed tray	(+) 0	1.5mm	Low
DWF511	Reversed tray	(+) 6	1.5mm	
DWF512	Reversed tray	(+) 12	1.5mm	
DWF520	Reversed tray	(+) 0	3.5mm	High
DWF521	Reversed tray	(+) 6	3.5mm	
DWF522	Reversed tray	(+) 12	3.5mm	

\*All B-style standard inserts are within the standard implant bank.  
All other standard and retentive insets are available upon request.

## System Compatibility

The Tornier Flex Shoulder System in the anatomic configuration must be used with Tornier Perform Anatomic glenoid, Tornier Perform Anatomic Augmented glenoid, Affiniti glenoid, or Aequalis glenoid in case of total shoulder arthroplasty.

The Tornier Flex Shoulder System in the reversed configuration must be used with the Aequalis Reversed II, Tornier Perform Reversed, or Tornier Perform Reversed Augmented glenoid implant.

## Mismatch charts

### Tornier Flex Humeral Heads with Tornier Perform Anatomic Glenoid – mismatch chart Tornier Flex Shoulder System

Recommended combinations heads/glenoids diametrical mismatch in mm, \*the cleared range for this combination is 1mm to 24.8mm

Size	Heads	37x13.5	39x14	41x15	43x16	46x17	48x18	50x16	50x19	52x19	52x23	54x23	54x27
Glenoid	Diameter of curvature	39	41.2	43	45	48	50	55	52	54.6	52.4	54.7	54
Small	55.4	16.4	14.2	12.4	10.4	7.4	5.4	0.4	3.4	0.8	3	0.7	1.4
Medium	59.6	20.6	18.4	16.6	14.6	11.6	9.6	4.6	7.6	5	7.2	4.9	5.6
Large	63.6	24.6	22.4	20.6	18.6	15.6	13.6	8.6	11.6	9	11.2	8.9	9.6
XL	67.8	28.8	26.6	24.8	22.8	19.8	17.8	12.8	15.8	13.2	15.4	13.1	13.8

### Tornier Flex Humeral Heads with Affiniti Glenoid – mismatch chart Tornier Flex Shoulder System

Recommended combinations heads/glenoids diametrical mismatch in mm, \*the cleared range for this combination is 1mm to 24.8mm

Size	Heads	37x13.5	39x14	41x15	43x16	46x17	48x18	50x16	50x19	52x19	52x23	54x23	54x27
Glenoid	Diameter of curvature	39	41.2	43	45	48	50	55	52	54.6	52.4	54.7	54
40	46	7	4.8	3	1	-2	-4	-9	-6	-8.6	-6.4	-8.7	-8
44	50	11	8.8	7	5	2	0	-5	-2	-4.6	-2.4	-4.7	-4
48	54	15	12.8	11	9	6	4	-1	2	-0.6	1.6	-0.7	0
52	58	19	16.8	15	13	10	8	3	6	3.4	5.6	3.3	4
56	62	23	20.8	19	17	14	12	7	10	7.4	9.6	7.3	8

Cleared mismatch range  Non-cleared mismatch range



### Tornier Flex Humeral Heads with Aequalis Glenoid – mismatch chart Tornier Flex Shoulder System

Recommended combinations heads/glenoids diametrical mismatch in mm, \*the cleared range for this combination is 1mm to 24.8mm

Size	Heads	37x13.5	39x14	41x15	43x16	46x17	48x18	50x16	50x19	52x19	52x23	54x23	54x27
Glenoid	Diameter of curvature	39	41.2	43	45	48	50	55	52	54.6	52.4	54.7	54
Small	47	8	5.8	4	2	-1	-3	-8	-5	-7.6	-5.4	-7.7	-7
Medium	51	12	9.8	8	6	3	1	-4	-1	-3.6	-1.4	-3.7	-3
Large	56	17	14.8	13	11	8	6	1	4	1.4	3.6	1.3	2
XL	61	22	19.8	18	16	13	11	6	9	6.4	8.6	6.3	7
2XL	61	22	19.8	18	16	13	11	6	9	6.4	8.6	6.3	7
3XL	61	22	19.8	18	16	13	11	6	9	6.4	8.6	6.3	7

### Tornier Flex Humeral Heads with keeled Aequalis EU Glenoid – mismatch chart Tornier Flex Shoulder System

Recommended combinations heads/glenoids diametrical mismatch in mm, \*the cleared range for this combination is 1mm to 24.8mm

Size	Heads	37x13.5	39x14	41x15	43x16	46x17	48x18	50x16	50x19	52x19	52x23	54x23	54x27
Glenoid	Diameter of curvature	39	41.2	43	45	48	50	55	52	54.6	52.4	54.7	54
Small	55	16	13.8	12	10	7	5	0	3	0.4	2.6	0.3	1
Medium	60	21	18.8	17	15	12	10	5	8	5.4	7.6	5.3	6
Large	65	26	23.8	22	20	17	15	10	13	10.4	12.6	10.3	11

Cleared mismatch range     Non-cleared mismatch range

**Tornier Flex STB Humeral Heads with Tornier Perform Anatomic Glenoid – mismatch chart**  
**Tornier Flex Shoulder System**

Recommended combinations heads/glenoids diametrical mismatch in mm, \*the cleared range for this combination is 1mm to 24.8mm

Size	Heads	39x13	39x15	42x14	42x16	42x18	45x15	45x17	45x19	48x16	48x18	48x20	51x17	51x20	51x23	54x18	54x21	54x24	56x24
Glenoid	Diameter of curvature	42.3	40.4	45.5	43.6	42.5	48.8	46.8	45.6	52	50	48.8	55.3	52.5	51.3	58.5	55.7	54.4	56
Small	55.4	13.1	15	9.9	11.8	12.9	6.6	8.6	9.8	3.4	5.4	6.6	.01	2.9	4.1	-3.1	-0.3	1	-0.6
Medium	59.6	17.3	19.2	14.1	16	17.1	10.8	12.8	14	7.6	9.6	10.8	4.3	7.1	8.3	1.1	3.9	5.2	3.6
Large	63.6	21.3	23.2	18.1	20	21.1	14.8	16.8	18	11.6	13.6	14.8	8.3	11.1	12.3	5.1	7.9	9.2	7.6
XL	67.8	25.5	27.4	22.3	24.2	25.3	19	21	22.2	15.8	17.8	19	12.5	15.3	16.5	9.3	12.1	13.4	11.8

**Tornier Flex STB Humeral Heads with Affiniti Glenoid – mismatch chart**  
**Tornier Flex Shoulder System**

Recommended combinations heads/glenoids diametrical mismatch in mm, \*the cleared range for this combination is 1mm to 24.8mm

Size	Heads	39x13	39x15	42x14	42x16	42x18	45x15	45x17	45x19	48x16	48x18	48x20	51x17	51x20	51x23	54x18	54x21	54x24	56x24
Glenoid	Diameter of curvature	42.3	40.4	45.5	43.6	42.5	48.8	46.8	45.6	52	50	48.8	55.3	52.5	51.3	58.5	55.7	54.4	56
40	46	3.7	5.6	0.5	2.4	3.5	-2.8	-0.8	0.4	-6	-4	-2.8	-9.3	-6.5	-5.3	-12.5	-9.7	-8.4	-10
44	50	7.7	9.6	4.5	6.4	7.5	1.2	3.2	4.4	-2	0	1.2	-5.3	-2.5	-1.3	-8.5	-5.7	-4.4	-6
48	54	11.7	13.6	8.5	10.4	11.5	5.2	7.2	8.4	2	4	5.2	-1.3	1.5	2.7	-4.5	-1.7	-0.4	-2
52	58	15.7	17.6	12.5	14.4	15.5	9.2	11.2	12.4	6	8	9.2	2.7	5.5	6.7	-0.5	2.3	3.6	2
56	62	19.7	21.6	16.5	18.4	19.5	13.2	15.2	16.4	10	12	13.2	6.7	9.5	10.7	3.5	6.3	7.6	6

 Cleared mismatch range  Non-cleared mismatch range

**Tornier Flex STB Humeral Heads with Aequalis Glenoid – mismatch chart**  
**Tornier Flex Shoulder System**

Recommended combinations heads/glenoids diametrical mismatch in mm, \*the cleared range for this combination is 1mm to 24.8mm

Size	Heads	39x13	39x15	42x14	42x16	42x18	45x15	45x17	45x19	48x16	48x18	48x20	51x17	51x20	51x23	54x18	54x21	54x24	56x24
Glenoid	Diameter of curvature	42.3	40.4	45.5	43.6	42.5	48.8	46.8	45.6	52	50	48.8	55.3	52.5	51.3	58.5	55.7	54.4	56
Small	47	4.7	6.6	1.5	3.4	4.5	-1.8	0.2	1.4	-5	-3	-1.8	-8.3	-5.5	-4.3	-11.5	-8.7	-7.4	-9
Medium	51	8.7	10.6	5.5	7.4	8.5	2.2	4.2	5.4	-1	1	2.2	-4.3	-1.5	-0.3	-7.5	-4.7	-3.4	-5
Large	56	13.7	15.6	10.5	12.4	13.5	7.2	9.2	10.4	4	6	7.2	0.7	3.5	4.7	-2.5	0.3	1.6	0
XL	61	18.7	20.6	15.5	17.4	18.5	12.2	14.2	15.4	9	11	12.2	5.7	8.5	9.7	2.5	5.3	6.6	5
2XL	61	18.7	20.6	15.5	17.4	18.5	12.2	14.2	15.4	9	11	12.2	5.7	8.5	9.7	2.5	5.3	6.6	5
3XL	61	18.7	20.6	15.5	17.4	18.5	12.2	14.2	15.4	9	11	12.2	5.7	8.5	9.7	2.5	5.3	6.6	5

**Tornier Flex STB Humeral Heads with keeled Aequalis EU Glenoid – mismatch chart**  
**Tornier Flex Shoulder System**

Recommended combinations heads/glenoids diametrical mismatch in mm, \*the cleared range for this combination is 1mm to 24.8mm

Size	Heads	39x13	39x15	42x14	42x16	42x18	45x15	45x17	45x19	48x16	48x18	48x20	51x17	51x20	51x23	54x18	54x21	54x24	56x24
Glenoid	Diameter of curvature	42.3	40.4	45.5	43.6	42.5	48.8	46.8	45.6	52	50	48.8	55.3	52.5	51.3	58.5	55.7	54.4	56
Small	55	12.7	14.6	9.5	11.4	12.5	6.2	8.2	9.4	3	5	6.2	-0.3	2.5	3.7	-3.5	-0.7	0.6	-1
Medium	60	17.7	19.6	14.5	16.4	17.5	11.2	13.2	14.4	8	10	11.2	4.7	7.5	8.7	1.5	4.3	5.6	4
Large	65	22.7	24.6	19.5	21.4	22.5	16.2	18.2	19.4	13	15	16.2	9.7	12.5	13.7	6.5	9.3	10.6	9

 Cleared mismatch range  Non-cleared mismatch range

This document is intended solely for the use of healthcare professionals. A surgeon must always rely on his or her own professional clinical judgment when deciding whether to use a particular product when treating a particular patient. Stryker does not dispense medical advice and recommends that surgeons be trained in the use of any particular product before using it in surgery.

The information presented is intended to demonstrate a Stryker product. A surgeon must always refer to the package insert, product label and/or instructions for use, including the instructions for cleaning and sterilization (if applicable), before using any Stryker product. Products may not be available in all markets because product availability is subject to the regulatory and/or medical practices in individual markets. Please contact your Stryker representative if you have questions about the availability of Stryker products in your area.

The instructions for use, operative techniques, cleaning instructions, patient information leaflets and other associated labeling may be requested online at [ifu.stryker.com](http://ifu.stryker.com) or [wright.com](http://wright.com). If saving the instructions for use, operative techniques, cleaning instructions from the above mentioned websites, please make sure you always have the most up to date version prior to use.

Stryker Corporation or its divisions or other corporate affiliated entities own, use or have applied for the following trademarks or service marks: Aequalis, Affiniti, Perform, Simpliciti, Stryker, Tornier. All other trademarks are trademarks of their respective owners or holders.

Content ID: AP-015233A 07-June-2021

Copyright © 2022 Stryker



**Manufacturer:**

Tornier SAS  
161 Rue Lavoisier  
38330 Montbonnot Saint Martin  
France

[stryker.com](http://stryker.com)