

SURGICAL TECHNIQUE | HALF-CROSS REAMERS



DELTA-REVISION TT SURGICAL TECHNIQUE

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Limacorporate spa, as manufacturer of prosthesis device, does not practice medicine. This surgical technique brochure has been developed in consultation with an experienced surgeon team and provides the surgeon with general guidance when implanting DELTA-REVISION TT. Proper surgical procedures and techniques are necessarily the responsibility of the medical professional. Each surgeon must evaluate the appropriateness of the surgical technique used based on personal medical training, experience and clinical evaluation of each individual patient. For further information about our products, please visit our web site at www.limacorporate.com

LEONARDO DA VINCI: the Vitruvian Man. Studies of human proportions (1490)

The DELTA-REVISION TT cup was designed to provide an efficient solution for acetabular revision surgery. The caudal hook and winglets ensure additional stability and the modular system allows the surgeon to treat bone defects in the most complex revisions. Entirely modular, the system can meet all intra-operative needs thanks to a custom-like implant construction.

DELTA-REVISION TT is ideal for socket revision surgery even when there are cavitory and segmental bone defects. It is possible to restore muscle tension and correct anatomical impairments, while enhancing implant stability and minimising the risk of dislocation. Excellent implant stability derives from the high friction coefficient provided by the device; stability is also enhanced by adapting the winglets and caudal hook to the patient's anatomy, thus offering numerous options for the use of cancellous bone screws.

Modular options

DELTA-REVISION TT can be used with the internal spacer system to restore coverage and anteversion. Even if there are bone defects the cranial modules ensure good stability. Polyethylene and ceramic inlays can be used, as well as dual mobility bearing.

Technology

The DELTA-REVISION TT cups are made of commercially pure Titanium. Trabecular Titanium provides high implant stability with superior osteointegration characteristics.



DELTA-REVISION TT SURGICAL TECHNIQUE

Indications and Contraindications



Consult instruction for use provided
in the product package

▼ INDICATIONS

The Delta System is indicated for use in total hip arthroplasty for reduction or relief of pain and/or improved hip function in skeletally mature patients with the following conditions:

- non-inflammatory degenerative joint disease such as osteoarthritis, avascular necrosis and hip dysplasia;
- rheumatoid arthritis;
- post-traumatic arthritis;
- correction of functional deformity;
- fractures, dislocation of the hip and unsuccessful cup arthroplasty;
- revisions in cases of good remaining bone stock.

DELTA-ONE TT, REVISION and REVISION TT cups with spacers and hemispheric modules are indicated also in:

- revision or previous unsuccessful femoral head replacement, cup arthroplasty or other procedure;
- clinical management problem where arthrodesis or alternative reconstruction techniques are less likely to achieve satisfactory results;
- where bone stock is of poor quality or is inadequate for other reconstructive techniques as indicated by deficiencies of the acetabulum.

DELTA-ONE TT and DELTA FINS are indicated also in case of hip dysplasia.

The Delta system is intended for cementless use.

▼ CONTRAINDICATIONS

Absolute contraindications include:

- local or systemic infection;
- septicaemia;
- persistent acute or chronic osteomyelitis;
- confirmed nerve or muscle lesion compromising hip joint function.

Relative contraindications include:

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

DELTA-REVISION TT SURGICAL TECHNIQUE

Indications and Contraindications

▼ RISK FACTORS

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

- overweight;
- strenuous physical activities (active sports, heavy physical work);
- incorrect implant positioning;
- medical disabilities which can lead to an unnatural gait and loading of the hip joint;
- muscle deficiencies;
- multiple joint disabilities;
- refusal to modify postoperative physical activities;
- patient's history of infections or falls;
- systemic diseases and metabolic disorders;
- local or disseminated neoplastic diseases;
- drug use or alcoholism;
- marked osteoporosis or osteomalacia;
- patient's resistance generally weakened (HIV, tumour, infections);
- severe deformity leading to impaired anchorage or improper positioning of implants.

▼ WARNINGS

Lima Corporate products should be implanted only by surgeons familiar with the joint replacement procedures described in the specific surgical techniques.

COMBINATIONS ALLOWED/NOT ALLOWED

- The use of BIOLOX® DELTA liners is allowed only with spacers;
- BIOLOX® DELTA liners can be coupled only with BIOLOX® DELTA or BIOLOX® Forte femoral heads;

DELTA-REVISION TT SURGICAL TECHNIQUE

Surgical Technique

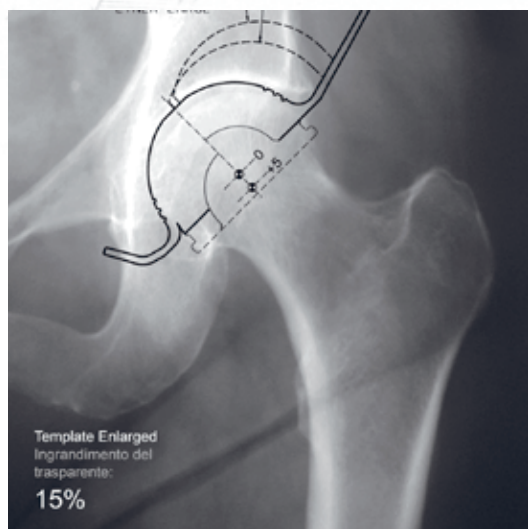


Figure 1: X-Ray with DELTA-REVISION TT template

▼ PREOPERATIVE PLANNING

IMPORTANT. *Pre-operative planning provides useful information for identifying probable implant size and for determining the correct implant placement for the patient's hip pathology.*

Note. *The correct cup size must be determined during surgery.*

To achieve a best results, pre-operative planning using special templates (with 15% magnification) is always advisable.

Note. *Other % magnification can be provided upon request.*

AP radiograph with adequate contrast should be used.

The templates show the profile of the cup, the cranial modules with different eccentricities and, the centre of rotation of the femoral head, with neutral (+0mm) and protruded (+5mm) spacers (*Fig. 1*).

Instead of conventional templates, a digital version compatible with most surgical planning software is also available.



Reamer with "Half-Cross" coupling
cod. 9057.20.9xx

Figure 2



Reamer Handle Zimmer-Hall connection
cod. 9057.20.814

Figure 3



Figure 4



Figure 5

▼ ACETABULAR EXPOSURE

Using the desired surgical approach, expose the acetabulum. Remove the existing implant such as liner, bone screws and cup, followed by the possible osteophytes. Expose the cotyloid rim thus obtaining an unobstructed view of the bone anatomy verifying presence of possible cavitory and/or segmental defects.

▼ ACETABULAR REAMING

DELTA-REVISION TT acetabular cups have a self-locking build-up that provides 1.6 mm press-fit. Reaming is performed line-to-line with the press-fit incorporated into the final implant (e.g. 54 mm cup = 55.6 mm at the rim of the cup).

It is recommended that the initial reaming begins with a reamer (*Fig. 2*) that is preferably of a smaller diameter than the size determined by pre-operative templating.

Engaging the reamer with the handle:

1. Push the handle locking guide downward (*Fig. 3*)
2. Insert the reamer and turn it by $\frac{1}{4}$ counter-clockwise (*Fig. 3*)
3. Release the locking guide (*Fig. 4*).

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Figure 6

Insert the reamer into the acetabulum by keeping it on an abduction axis of approximately 45° (Fig. 6) and an anteversion of 15°; operate the attached manipulator clockwise.

Note. This angulation refers to the ideal angle of the cup. There may however be some alterations in the acetabular anatomy making it necessary to ream the acetabular cavity at a different angle and therefore deviate from said values. In any case we recommend aiming for this ideal angle when reaming.

Progress reaming gradually with incremental sizes until final sizing is achieved.

Note. The amount of interference fit should be determined intra-operatively based upon the patient's bone quality.

To remove the reamer push the handle locking guide, turn the reamer clockwise and remove it.



Figure 7

▼ AUGMENTS

Once the acetabulum has been evaluated, it should be decided whether or not augmentation of the acetabular shell is necessary. If it is determined that augmentation of the acetabulum is required, it will be necessary to prepare site for augment placement. Use acetabular reamers, matching the corresponding cup size, to smooth the surface of the defect facilitating stable placement and impaction of the acetabular augment (Fig. 7).

Please see the below table for augment sizes availability:

▼ AUGMENTS THICKNESS & COMPATIBILITY

CUP SIZE	12 mm	18 mm
50 mm	X	X
54 mm	X	X
58 mm	X	X
62 mm	X	



Figure 8



Multi Purpose Handle
cod. 9055.28.400



Beater - Positioner - Aligner
cod. 9057.20.555

▼ CUP PROVISIONAL SIZING AND POSITIONING

Following the reaming procedure, the appropriate trial cup (*Fig. 8*) of the same diameter as the last even sized hemispherical reamer used is threaded onto the multi-purpose or positioner handle (*Fig. 9*).

The trial cup is then placed in the acetabulum for visualization and assessment of fit, contact, congruency and orientation within the acetabulum. With these trials also winglets positioning, caudal hook and holes for bone screws can be verified (*Fig. 10a*).

Furthermore, single use acetabular cups (*Fig. 10b*) are available upon request to check the correct bending of the winglets and the caudal hook.



Figure 10a



Figure 10b

DELTA-REVISION TT SURGICAL TECHNIQUE

Surgical Technique



Figure 11



Figure 12



Figure 13

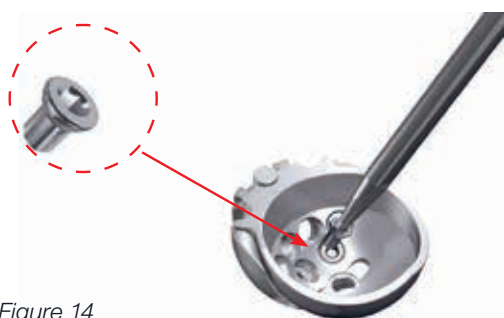


Figure 14



Figure 15

▼ AUGMENT PROVISIONAL SIZING AND POSITIONING

DELTA-Revision TT cups size 50, 54, 58 and 62 only can be coupled with augments.

Screw the provisional augment (of the needed eccentricity of 12 or 18 mm, cod. 9055.33.500-620, *Fig. 11*) onto the corresponding trial cup. Tightening is done by matching the augment's specific pin (*Fig. 12*) into one of the three housings in the trial cup (marked with circles in *Fig. 13*) and passing two of the provisional screws through the two cup holes closest to the polar opening (*Fig. 14*).

Provisional augments can be locked at three angles: 0°, -30° and +30° with respect to the symmetrical axis of the cup. Position 0° is achieved by placing the pin in the central housing of the trial cup (*Fig. 15, a*). Positions +/- 30° are achieved by placing the pin in the lateral housings (*Fig 15, b-c*).

Evaluate the dimensions and stability of the trial. If necessary repeat the process of reaming and/or selecting different augment eccentricity.



Figure 16

▼ IMPLANTING THE DEFINITIVE ACETABULAR CUP AND AUGMENT

At this point, the definitive cup having the same nominal diameter as that of the final trial cup used is impacted in the acetabulum.

The augment is fixed to the DELTA-REVISION TT cup in the same way as for the trial and a third screw is used through the winglets (depending on the chosen orientation) (Fig. 16).

Tips & Pearls. Partially screw in all the screws before tightening them, in order to avoid the risk of misalignment between cup and augment that could hinder the insertion of the last screw.

Connect the Large impactor plate to the multipurpose handle or wrench (Fig. 17). The implant is then placed onto the impactor plate (Fig. 18), aligning the internal polar grooves to the corresponding handle's pegs. The actual lodging of the pegs into the grooves is combined with a light snapping sound.



Figure 17



Figure 18

DELTA-REVISION TT SURGICAL TECHNIQUE

Surgical Technique

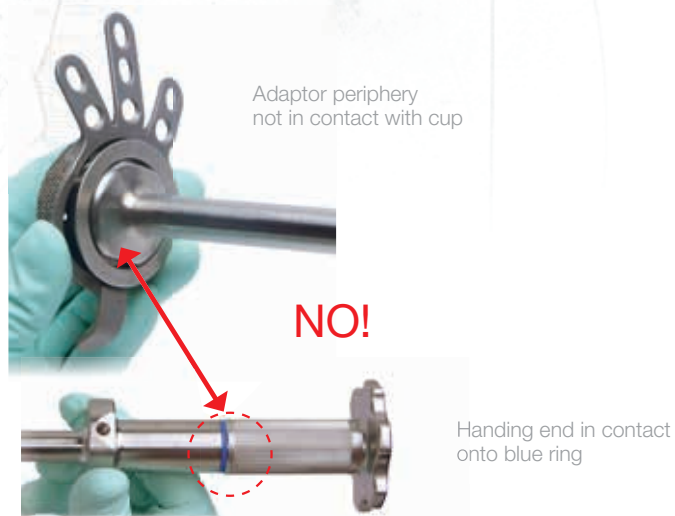


Figure 19

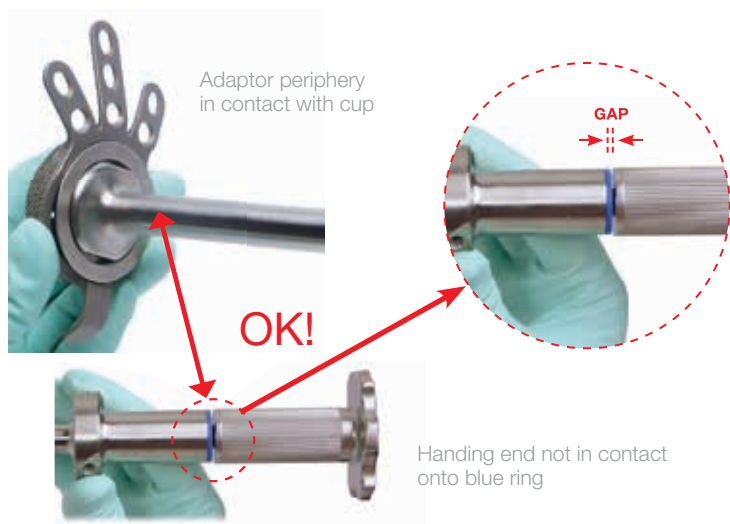


Figure 20



Figure 21



Figure 22

The rim of the cup must be in complete contact with the adaptor periphery. The opposite end of the handle also shows correct alignment (Fig. 19, 20).

Rotate the knob of the handle clockwise, threading the cup (Fig. 21) until resistance is felt. The instrument should solidly hold the implant (Fig. 22).

DELTA-REVISION TT SURGICAL TECHNIQUE

Surgical Technique



Figure 23



Figure 24



Figure 25

Bend the winglets with the appropriate tool adapting them to the anatomy of the acetabulum (Fig. 23). Care should be taken not to bend the winglets too many times as this may result in breakage. For this reason single use acetabular cups are recommended.

Adapt the caudal hook in the same way (Fig. 24).

Warning! Intra-operative handling of TT cups: when the cup is removed from its packaging, in the operation theatre, it should not come in contact with any particle releasing materials (e.g. gauzes). Due to the highly gripping Trabecular Titanium structure, it can easily remove particles from the material it has been in contact with, which can lead to undesirable reactions in the patient.

Orient the cup in a position that allows for the desired bone screws position, if needed, while maintaining the desired cup position and impact the cup.

Note. Make sure that the caudal hook is correctly housed in the obturator foramen, (Fig. 25).

If needed, bone screws can be used.

DELTA-REVISION TT SURGICAL TECHNIQUE

Surgical Technique



Figure 26



Figure 27



Drill Guide
cod. 9084.20.150

Figure 28



Figure 29

▼ INTRODUCTION OF THE BONE SCREWS

If screw fixation is desired we recommend to use the bone screws supplied with the system (Fig. 26).

Introduce the drill (Fig. 27) with a flexible drill shaft into the drill guide (Figs. 28). Two helix drills are available, one short (30 mm) and one long (50 mm) (Fig. 27). Place the drill guide in the selected hole of the cup respecting the direction/orientation of the hole and then drill the bony tissue (Fig. 29).

Grasp the bone screw with the holding forceps (Fig. 30) below the spherical head and start screwing into the bone using the universal or cardanic screwdriver (Fig. 31).

As soon as the screw starts entering the bone, remove the pliers and complete the screwing (Fig. 32).



Screw holding forceps
cod. 9095.10.115

Figure 30



Figure 31



Figure 32

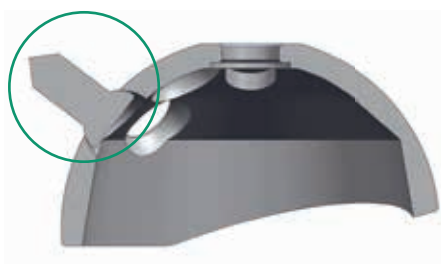
DELTA-REVISION TT SURGICAL TECHNIQUE

Surgical Technique



UNACCEPTABLE

Figure 33a



CORRECT

Figure 33b

We kindly ask surgeons to pay particular attention when implanting DELTA-REVISION TT cups with DELTA spacers (codes 5885.15.3XX-5886.15.3XX, 5885.15.5XX-5886.15.5XX).

The intra-operative internal protrusion of bone screws must be absolutely avoided, in order to guarantee a complete conical coupling between the spacer and the acetabular cup.

Method for determining the correct bone screws insertion: Use a finger to assess that the screw/s head is/are seated flush against the shell to prevent improper seating of the liner and/or spacer. If the bone screw/s is/are protruding, please tighten again until seated correctly. If this maneuver is not effective the screw/s must be removed and re-positioned along a more appropriate axis (*Fig. 33a, b*). Insert one of the trial liners into the cup and check for its stability. If the trial liner is unstable, tighten the bone screws and check again trial liner stability until the liner becomes steady inside the cup.

If this maneuver is not effective the screw/s must be removed and re-positioned along a more appropriate axis.

DELTA-REVISION TT SURGICAL TECHNIQUE

Surgical Technique



Figure 34



Figure 35



Figure 36

▼ ACETABULAR TRIAL SPACERS

Spacers are used to re-establish centre of rotation, coverage and anteversion angles (*Fig.34*).

Trial spacers are fixed to the cup in the desired position using the trial polar screws included in the instrument set (*Fig.35*).

Method for ensuring correct spacer, trial and definitive, insertion: insert the spacer with the polar safety screw all at once (*Fig.36*), by holding the screw with the fixed screwdriver (9095.10.222). Slightly tighten the screw to ensure the correct conical alignment. Then loose the polar screw and check for the spacer stability with fingers. After verifying that the spacer is steady inside the shell, firmly tighten the polar screw and perform the trial reduction.

Note. The 10° spacer trial (cod. 9058.86.500) does not have the polar screw. The 10° definitive spacer is ON REQUEST ONLY.



Neutral
Figure 37



Neutral + 5
Figure 38



10°
Figure 39



10°+5
Figure 40



20°
Figure 41



20°+5
Figure 42



Figure 43

Notes for using the spacers with DELTA-REVISION TT cups:

- The **neutral spacer** (code 5885.15.510, *Fig.37*) does not need a test component as one of the large sized liner trials, with a head of an appropriate diameter (included in the instrument set 9055.50.000), can be used. The final component of the neutral spacer without angles and protrusions has one single opening that serves to house the polar peg of the liners. The final component does not need a tightening screw.
- The **+5 mm protruded spacer** (code 5885.15.520, *Fig.38*) has one single polar opening, which is used both for the tightening screw and for the liner peg (in both test and final versions).
- The **ON REQUEST ONLY 10° lipped spacer** (code 5886.15.500, *Fig.39*) has a polar peg to replace the tightening screw (in both test and final versions). The existing opening is used to house the polar pin of the liners.
- The **5 mm protruded + 10° lipped spacer** (code 5886.15.505, *Fig.40*) has one single polar opening (in both trial and final versions), used to lodge both safety screw and polar peg.
- The **20° lipped spacers both neutral and protruded** (codes 5886.15.510 and 5886.15.520, *Figs.41-42*) have two openings. The opening placed further away from the reference mark houses both the trial and final screws, the one closest to the reference mark houses the polar peg (*Fig. 43*).

The trial spacers neutral (code 5885.15.510) or lipped at 10° without protrusion (code 5886.15.500) are not fixed with a polar screw and must therefore be put into place by means of the fingers and ensuring the firm locking of the Morse taper.

To change the liner position loose the screw and with a gentle percussion disassemble it from the cup. Reorientate the spacer and then tight the screw.

DELTA-REVISION TT SURGICAL TECHNIQUE

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Neutral Trial Liner
cod. 9055.50.xxx

Lipped Trial Liner
cod. 9058.85.xxx

Figure 44



Trial Head Low Taper
cod. 9095.10.7xx

Figure 45



Figure 46

▼ ACETABULAR TRIAL LINERS AND TRIAL REDUCTION

Normally the acetabular procedure precedes the femoral one; once the acetabular component has been inserted it is recommended to avoid any contact between the acetabular cup and femoral stem. In order to facilitate this, the insertion of a liner trial, spacer trial or protection tampon is recommended.

Proceed with the trial reduction after placing the appropriate liner (Fig. 44) and head trials (Fig. 45) into position (Fig. 46).

▼ DEFINITIVE ACETABULAR SPACER INSERTION

It is **COMPULSORY** to use one of the spacers if you intend to use a ceramic liner.

Spacers are optional (i.e. if you want to change the centre of rotation and the coverage and anteversion angles) for polyethylene or metal liners.

Thoroughly clean the inner housing of the cup before inserting the spacer and make sure that the surrounding soft tissues do not prevent the spacer from entering.

Insert the spacer with the polar screw all at once.

Position the spacer, to replicate the correct orientation as with the trial. Slightly tight the screw to ensure correct morse taper alignment. Loosen the polar screw and check for spacer's stability. Tighten the polar screw and insert the selected liner.

▼ DEFINITIVE ACETABULAR LINER INSERTION

X-LIMA AND LIMAVIT® POLYETHYLENE LINERS

Conical coupling is used to lock all the liners of the Delta system inside cups and spacers.

Thoroughly clean the inner housing of the cup, or the spacer, before inserting the final liner and make sure that the surrounding soft tissues do not prevent the liner from entering.

X-Lima and LimaVit® polyethylene liners (Fig. 47) can be inserted by hand. Hold the liner between thumb and forefinger, having the latter in the concave part of the liner. Insert the liner into the cup by pushing and slightly rotating it to achieve correct locking. Check for correct liner lodging.

Note. For protruded liners check the position of the antiluxation rim before locking the liner definitively in site.

To ensure the coupling stability, screw the liner impactor (Fig.48) onto the multi purpose handle or impactor (Fig.49-50 and 51) and tap the liner in an axial direction (Fig.52).

The bearing load will self-lock the liner.

When the liner insertion procedure is completed, thoroughly cleaning the articular surfaces prior definitively reducing the articulation.

The polyethylene liner can be removed by screwing a bone screw to the bottom.

Note. X-Lima and LimaVit® polyethylene liners have the polar peg, this occludes the DELTA-REVISION TT cup's polar hole.



UHMWPE Liners
Figure 47



Liner Impactor
cod. 9057.20.3xx
Figure 48



Multi Purpose Handle
cod. 9055.28.400
Figure 49



Beater - Positioner - Aligner
cod. 9057.20.555
Figure 50



Figure 51



Figure 52

DELTA-REVISION TT SURGICAL TECHNIQUE

Surgical Technique



Ceramic Liners
Figure 53



Figure 54



Figure 55



Figure 56

BIOLOX® DELTA CERAMIC LINERS

IT IS NOT POSSIBLE TO COUPLE DELTA-REVISION TT CUP WITH CERAMIC LINER DIRECTLY, ONLY BY MEANS OF THE SPACERS.

Thoroughly clean the inner housing of the spacer before inserting the ceramic liner and make sure that the surrounding soft tissues do not prevent the liner from entering.

Impaction of the ceramic liner (Fig. 53): fix the ceramic liner positioner (i.e. code 9058.85.090) to the i.e. MEDIUM-LARGE liner positioner (code 9058.85.220).

Screw the liner positioner to the multipurpose handle (Fig. 54). Assemble the ceramic liner to the ceramic liner positioner (Fig. 55). Impact the liner in the spacer (Fig. 56).

Remove the handle by pulling it and by disengaging the positioner from the ceramic liner. Make sure that the liner has been lodged correctly inside the cup by feeling the perimeter. The border of the liner must not protrude out from the rim of the spacer as the liner could break if it is in the wrong position.

WARNING! Never re-engage the removed ceramic liner or a new ceramic liner in a housing that has already been occupied by a ceramic liner beforehand. Complete the implant by using a polyethylene liner only.



Figure 57

▼ DUAL MOBILITY

The Delta Dual Mobility System incorporates the following dual points of articulation:

- 22 mm and 28 mm femoral head
- Large mobile polyethylene insert that mimics a femoral head.

TRIAL COMPONENTS FOR DUAL MOBILITY

Introduce the trial liner (Medium or Large) inside the shell. Place the 28 mm trial head (Short, Medium or Long) into the appropriate mobile liner trial to mimic the final articulation function of the Delta Dual Mobility System.

Place the assembled dual mobility trials onto the neck trial or stem trunnion component (*Fig.57*).

Reduce the hip, checking for hip stability and leg length. Once both hip stability and leg length have been checked, remove all the trial components.

TRIAL LINER	TRIAL MOBILE LINER	Trial Head
9055.66.400 #M for dia. 40 mm mobile liner	9055.65.040 Trial Mobile Liner dia. 40 mm for heads dia. 28 mm	• 9095.10.611 dia.28 mm S • 9095.10.612 dia.28 mm M • 9095.12.613 dia.28 mm L
9058.85.042 #L for dia. 42 mm mobile liner	9055.65.042 Trial Mobile Liner dia. 42 mm for heads dia. 28 mm	• 9095.10.611 dia.28 mm S • 9095.10.612 dia.28 mm M • 9095.12.613 dia.28 mm L

Note. No trial available for 22 mm head

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LINER IMPLANTATION

Ensure that the inside of the shell is clean, dry and free of soft tissue or any other debris, which could prevent the liner from properly seating in the shell.

Introduce the Metal liner for dual mobility (*Fig.58*) inside the shell.

To ensure the coupling stability, screw the liner impactor onto the multi purpose handle or impactor and tap the liner in an axial direction. The bearing load will self-lock the liner.

Note. *If the metal liner becomes jammed sideways it will have to be removed by striking the metal rim of the cup with a flat bladed osteotome. The vibrations will shake the liner out of its housing.*

Take the 28 mm or 22 mm head (in ceramic or metal) and the polyethylene mobile liner that matches the implanted cup and mobile liner that match the implanted cup.

Position the components in the Head-Liner Clamp (*Fig.59*) and turn the screw until the two components have been completely assembled.

As result, the head-mobile liner freely rotate. Insert the components onto the cone of the stem and proceed with final reduction of the implant (*Fig. 60*).

Note. *Heads compatible with the double mobility system: Short, Medium and Long 28 mm and 22 mm.*



Metal Liner for
Double Mobility
Figure 58



Figure 59



Figure 60

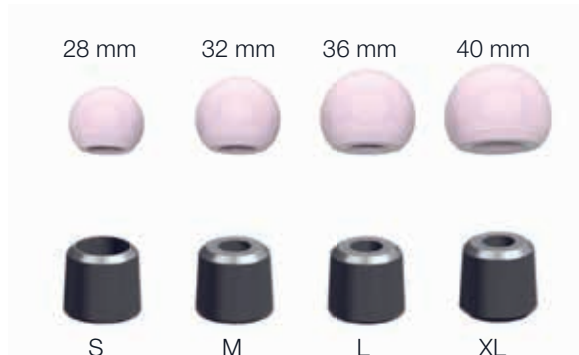


Figure 61

▼ BIOLOX® DELTA CERAMIC FEMORAL HEADS FOR REVISION SURGERY

The BIOLOX® DELTA ceramic femoral heads for revision surgery are provided, in the same package, as two separate components: BIOLOX® DELTA head (available in 28, 32, 36 and 40 mm diameters) and a metallic taper sleeve (available S, M, L and XL lengths) (Fig. 61). BIOLOX® DELTA head and metallic taper sleeve must be implanted already coupled together as described in the assembly instructions below. The complete range of sizes is reported in the following table:

CODE	DIAMETER	SLEEVE TAPER SIZE	OFFSET
5010.42.021	28 mm	S	- 3 mm
5010.42.022		M	0 mm
5010.42.023		L	+ 4 mm
5010.42.024		XL	+ 7 mm
5010.42.031	32 mm	S	- 3 mm
5010.42.032		M	0 mm
5010.42.033		L	+ 4 mm
5010.42.034		XL	+ 7 mm
5010.42.041	36 mm	S	- 3 mm
5010.42.042		M	0 mm
5010.42.043		L	+ 4 mm
5010.42.044		XL	+ 7 mm
5010.42.051	40 mm	S	- 3 mm
5010.42.052		M	0 mm
5010.42.053		L	+ 4 mm
5010.42.054		XL	+ 7 mm

Table 1

BIOLOX® DELTA heads are designed to allow surgeons to utilize a ceramic head in revision arthroplasty.

DELTA-REVISION TT SURGICAL TECHNIQUE

Surgical Technique

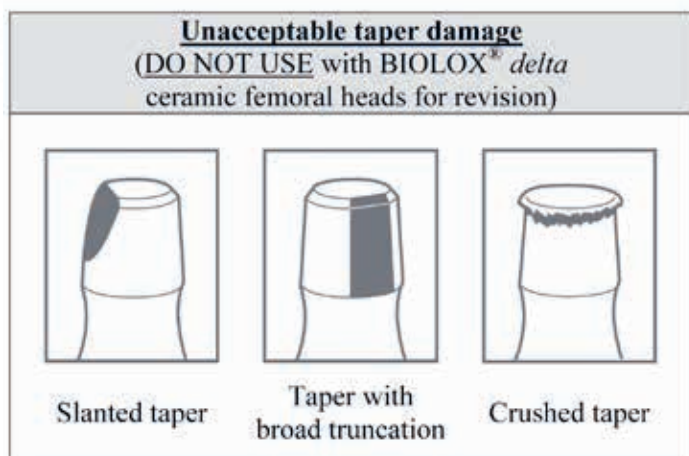


Figure 62

SURGICAL TECHNIQUE DESCRIPTION FOR BIOLOX® DELTA REVISION HEADS

The BIOLOX® DELTA ceramic femoral heads are compatible with all Limacorporate femoral components with a 12/14 tapers.

FEMORAL COMPONENT TAPER INSPECTION

After the removal of the femoral head during revision surgery, it is essential to examine the taper of the femoral component, which remains in-situ, for any type of damages. The operating surgeon has to make sure that this damage is acceptable. Inspection of the stem taper and decision criteria:

- Acceptable condition: used stem tapers displaying fine marks from head – stem disassembly
- Unacceptable stem taper deformations (*Fig. 62*). The BIOLOX® option system must not be used under these conditions.



Figure 63



Figure 64

ASSEMBLY INSTRUCTIONS

If the tapers (ceramic head taper, metallic sleeve taper, taper of the femoral component remained insitu) must be clean and dry before assembly.

The following steps should be performed:

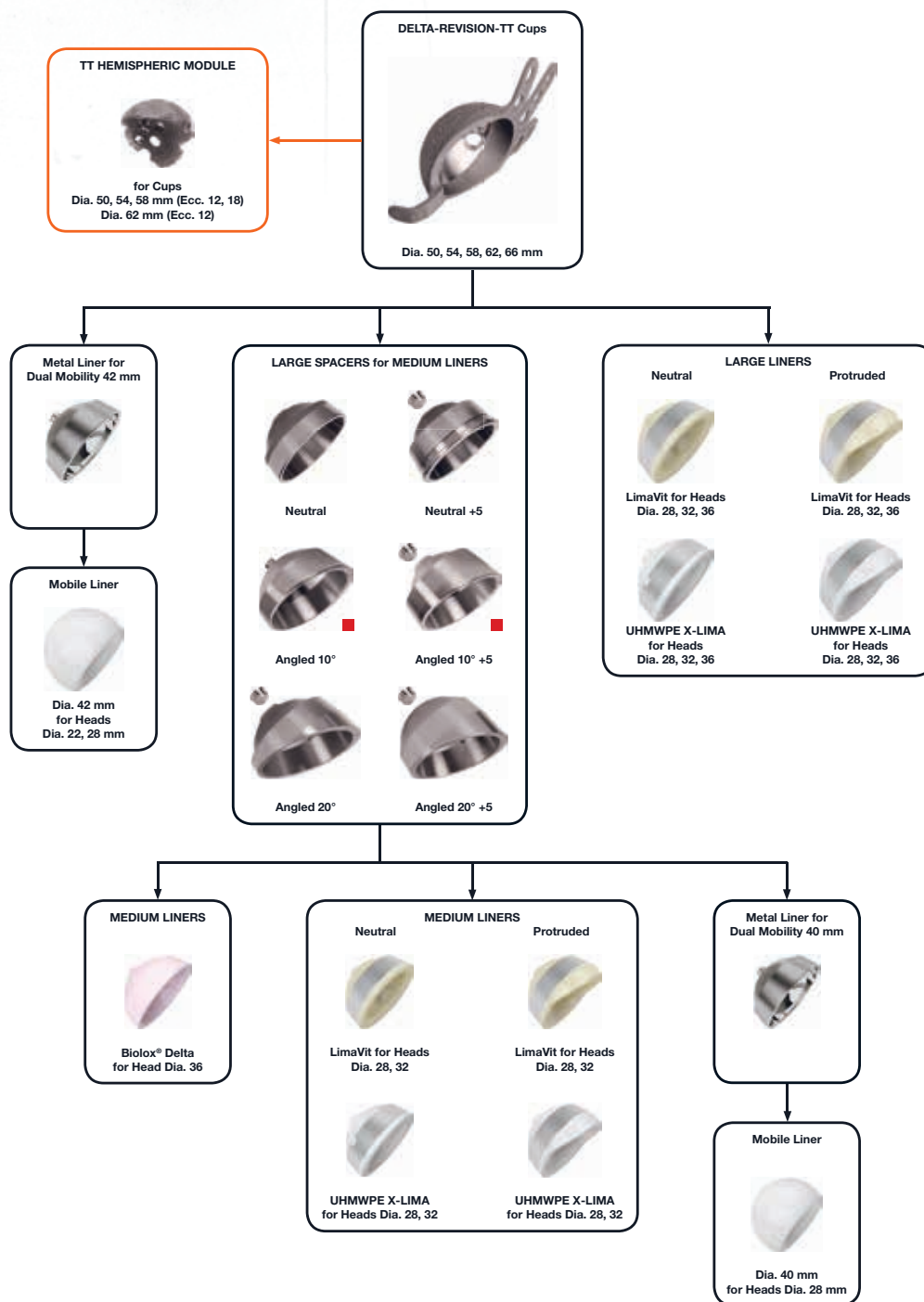
1. Determine the appropriate metallic taper sleeve length and verify the joint stability using trial femoral heads. Then, verify the correct selection of BIOLOX® DELTA ceramic femoral heads for revision and metallic taper sleeve length as determined during the trialling phase;
2. Heads and taper sleeve components are packaged in the same box but not assembled. The surgeon should assemble the two components according to *figures 63 and 64*. The ceramic femoral head is placed on the taper sleeve and pressure is applied until resistance can be felt. It should be ensured that the ceramic femoral head is placed straight down on the sleeve;
3. Place the assembled ceramic head on the taper of the femoral component remained in-situ with a twisting motion, while applying manual pressure until it locks. As a rule, it should be easy to place the BIOLOX® option femoral head and sleeve on the stem taper. Should pressure be necessary to seat the BIOLOX® option system, the system must not be used. Position the plastic impactor on the pole of the ceramic head and then fix it firmly on the stem taper with one moderate tap on the impactor in axial direction.

Note. *Never use metal impactors on ceramic femoral heads. The use of metal impactors or any other metallic objects may scratch or crack the ceramic head bearing surface, compromising the integrity of the component. If the ceramic head becomes scratched or cracked, the head and taper sleeve must be replaced.*

4. To verify fixation of the head, attempt to remove the head by hand.

DELTA-REVISION TT SURGICAL TECHNIQUE

Product Combination



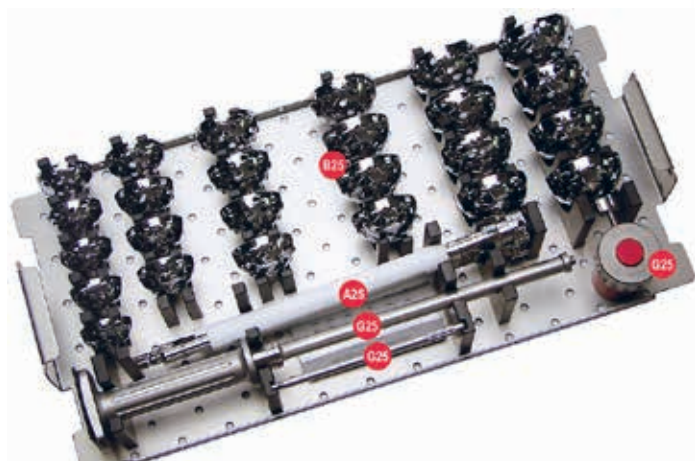
■ = upon request

— = optional coupling

DELTA-REVISION TT SURGICAL TECHNIQUE

Instrument Sets

▼ 9055.25.000 Acetabular Cup “Half-Cross” Reamer Set (Zimmer-Hall connection)*



Ref.	CODE	DESCRIPTION	Qty.
A25	9057.20.814	Reamer Handle Zimmer-Hall Coupling	2
B25	9057.20.942	Half Cross Acetabular Reamer Dia. 42mm	1
B25	9057.20.943	Half Cross Acetabular Reamer Dia. 43mm	1
B25	9057.20.944	Half Cross Acetabular Reamer Dia. 44mm	1
B25	9057.20.945	Half Cross Acetabular Reamer Dia. 45mm	1
B25	9057.20.946	Half Cross Acetabular Reamer Dia. 46mm	1
B25	9057.20.947	Half Cross Acetabular Reamer Dia. 47mm	1
B25	9057.20.948	Half Cross Acetabular Reamer Dia. 48mm	1
B25	9057.20.949	Half Cross Acetabular Reamer Dia. 49mm	1
B25	9057.20.950	Half Cross Acetabular Reamer Dia. 50mm	1
B25	9057.20.951	Half Cross Acetabular Reamer Dia. 51mm	1

*Note.

9055.24.000 Acetabular Cup “Half-Cross” Reamer Set (AO connection)

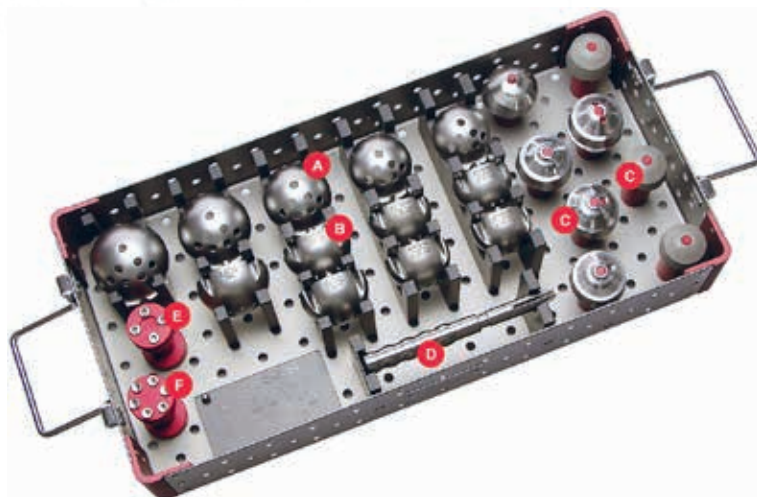
9055.26.000 Acetabular Cup “Half-Cross” Reamer Set (Hudson connection)

B25	9057.20.952	Half Cross Acetabular Reamer Dia. 52mm	1
B25	9057.20.953	Half Cross Acetabular Reamer Dia. 53mm	1
B25	9057.20.954	Half Cross Acetabular Reamer Dia. 54mm	1
B25	9057.20.955	Half Cross Acetabular Reamer Dia. 55mm	1
B25	9057.20.956	Half Cross Acetabular Reamer Dia. 56mm	1
B25	9057.20.957	Half Cross Acetabular Reamer Dia. 57mm	1
B25	9057.20.958	Half Cross Acetabular Reamer Dia. 58mm	1
B25	9057.20.959	Half Cross Acetabular Reamer Dia. 59mm	1
B25	9057.20.960	Half Cross Acetabular Reamer Dia. 60mm	1
B25	9057.20.961	Half Cross Acetabular Reamer Dia. 61mm	1
B25	9057.20.962	Half Cross Acetabular Reamer Dia. 62mm	1
B25	9057.20.963	Half Cross Acetabular Reamer Dia. 63mm	1
B25	9057.20.964	Half Cross Acetabular Reamer Dia. 64mm	1
B25	9057.20.965	Half Cross Acetabular Reamer Dia. 65mm	1
B25	9057.20.966	Half Cross Acetabular Reamer Dia. 66mm	1
C25	9055.28.400	Multipurpose Handle	1
D25	9056.10.010	Impactor for Cemented Cups Dia. 28mm	1
D25	9056.10.020	Impactor for Cemented Cups Dia. 32mm	1
E25	9057.20.300	Liner Impactor for Dia. 28mm Heads	1
E25	9057.20.310	Liner Impactor for Dia. 32mm Heads	1
E25	9057.20.320	Liner Impactor for Dia. 36mm Heads	1
E25	9057.20.330	Liner Impactor for Dia. 40mm Heads	1
F25	9055.28.442	Trial Cup Dia. 42 mm	1
F25	9055.28.444	Trial Cup Dia. 44 mm	1
F25	9055.28.446	Trial Cup Dia. 46 mm	1
F25	9055.28.448	Trial Cup Dia. 48 mm	1
F25	9055.28.450	Trial Cup Dia. 50 mm	1
F25	9055.28.452	Trial Cup Dia. 52 mm	1
F25	9055.28.454	Trial Cup Dia. 54 mm	1
F25	9055.28.456	Trial Cup Dia. 56 mm	1
F25	9055.28.458	Trial Cup Dia. 58 mm	1
F25	9055.28.460	Trial Cup Dia. 60 mm	1
F25	9055.28.462	Trial Cup Dia. 62 mm	1
F25	9055.28.464	Trial Cup Dia. 64 mm	1
F25	9055.28.466	Trial Cup Dia. 66 mm	1
G25	9057.20.555	Beater-Positioner-Aligner	1
H25	9058.85.090	Ceramic Liner Positioner	2
I25	9058.85.110	Joint for Ceramic Liner Positioner	1
L25	9058.85.210	Liner Positioner SMALL Dia. 32mm	1
L25	9058.85.220	Liner Positioner MEDIUM-LARGE Dia. 36mm	1
L25	9058.85.230	Liner Positioner LARGE Dia. 40mm	1
M25	9095.10.225	Hexagonal Screwdriver	1
	9055.25.950	Sterilizable box	1

DELTA-REVISION TT SURGICAL TECHNIQUE

Instrument Sets

▼ 9055.33.000 Instrument Set for DELTA-ONE TT, DELTA-REVISION

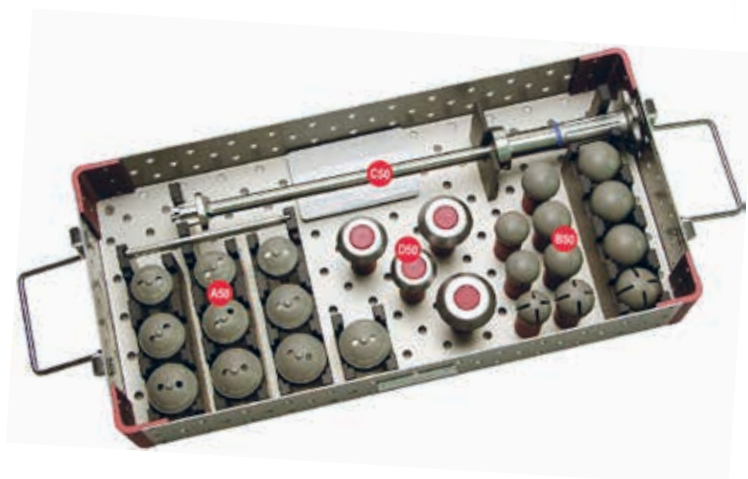


Ref.	CODE	DESCRIPTION	Qty.
A	9055.33.050	Trial Cup Dia. 50mm	1
A	9055.33.054	Trial Cup Dia. 54mm	1
A	9055.33.058	Trial Cup Dia. 58mm	1
A	9055.33.062	Trial Cup Dia. 62mm	1
A	9055.33.066	Trial Cup Dia. 66mm	1
B	9055.33.500	Trial Hemispheric Module Dia. 50mm Ecc. 12mm	1
B	9055.33.502	Trial Hemispheric Module Dia. 50mm Ecc. 18mm	1
B	9055.33.540	Trial Hemispheric Module Dia. 54mm Ecc. 12mm	1
B	9055.33.542	Trial Hemispheric Module Dia. 54mm Ecc. 18mm	1
B	9055.33.580	Trial Hemispheric Module Dia. 58mm Ecc. 12mm	1
B	9055.33.582	Trial Hemispheric Module Dia. 58mm Ecc. 18mm	1
B	9055.33.620	Trial Hemispheric Module Dia. 62mm Ecc. 12mm	1
C	9058.85.320	Trial Neutral Spacer # S + 5	1
C	9058.85.520	Trial Neutral Spacer # L + 5	1
C	9058.86.300	Trial Angled Spacer 10° # S	1
C	9058.86.310	Trial Angled Spacer 20° # S	1
C	9058.86.500	Trial Angled Spacer 10° # L	1
C	9058.86.505	Trial Angled Spacer 10° # L + 5	1
C	9058.86.510	Trial Angled Spacer 20° # L	1
C	9058.86.520	Trial Angled Spacer 20° # L + 5	1
D	9055.32.010	Handle for Winglets Modeling	1
E	9058.86.501	Screw for Trial Angled Spacer	4
F	5533.15.001	Screw for Trial Hemispheric Module	6
	9055.33.920	Sterilizable Box	1

DELTA-REVISION TT SURGICAL TECHNIQUE

Instrument Sets

▼ 9055.50.000 Instrument Set for DELTA TT/PF/FINS Cups



Ref.	CODE	DESCRIPTION	Qty.
A50	9055.50.020	Trial Liner, Large for Head Dia. 28mm	1
A50	9055.50.025	Trial Liner, Large for Head Dia. 32mm	1
A50	9055.50.030	Trial Liner, Large for Head Dia. 36mm	1
A50	9055.50.035	Trial Liner, Large for Head Dia. 40mm	1
A50	9055.50.120	Trial Liner, Medium for Head Dia. 28mm	1
A50	9055.50.125	Trial Liner, Medium for Head Dia. 32mm	1
A50	9055.50.130	Trial Liner, Medium for Head Dia. 36mm	1
A50	9055.50.220	Trial Liner, Small for Head Dia. 28mm	1
A50	9055.50.225	Trial Liner, Small for Head Dia. 32mm	1
A50	9055.50.230	Trial Liner, Small for Head Dia. 36mm	1
B50	9095.10.521	Trial Head Taper 12/14 Dia. 32mm S	1
B50	9095.10.522	Trial Head Taper 12/14 Dia. 32mm M	1
B50	9095.10.523	Trial Head Taper 12/14 Dia. 32mm L	1
B50	9095.10.531	Trial Head Taper 12/14 Dia. 36mm S	1
B50	9095.10.532	Trial Head Taper 12/14 Dia. 36mm M	1
B50	9095.10.533	Trial Head Taper 12/14 Dia. 36mm L	1
B50	9095.10.534	Trial Head Taper 12/14 Dia. 36mm XL	1
B50	9095.10.541	Trial Head Taper 12/14 Dia. 40mm S	1
B50	9095.10.542	Trial Head Taper 12/14 Dia. 40mm M	1
B50	9095.10.543	Trial Head Taper 12/14 Dia. 40mm L	1
B50	9095.10.544	Trial Head Taper 12/14 Dia. 40mm XL	1
C50	9055.51.015	Wrench for Cups DELTA-PF	1
D50	9055.51.310	Adapter Small for Cups DELTA-PF Wrench	1
D50	9055.51.320	Adapter Medium for Cups DELTA-PF Wrench	1
D50	9055.51.330	Adapter Large for Cups DELTA-PF Wrench	1
D50	9055.51.340	Adapter Extra-Large for Cups DELTA-PF Wrench	1
	9055.50.920	Sterilizable Box	

▼ OPTIONAL INSTRUMENTS

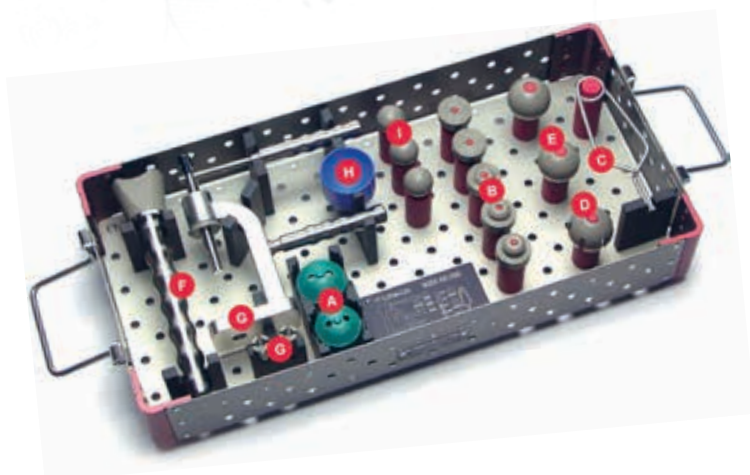


9058.85.055	Lipped trial liner # SMALL, 28 mm head	■
9058.85.058	Lipped trial liner # MEDIUM, 28 mm head	■
9058.85.060	Lipped trial liner # LARGE, 28 mm head	■
9058.85.158	Lipped trial liner # MEDIUM, 32 mm head	■
9058.85.160	Lipped trial liner # LARGE, 32 mm head	■
9058.85.260	Lipped trial liner # LARGE, 36 mm head	■
9095.11.906	Head slide	■

DELTA-REVISION TT SURGICAL TECHNIQUE

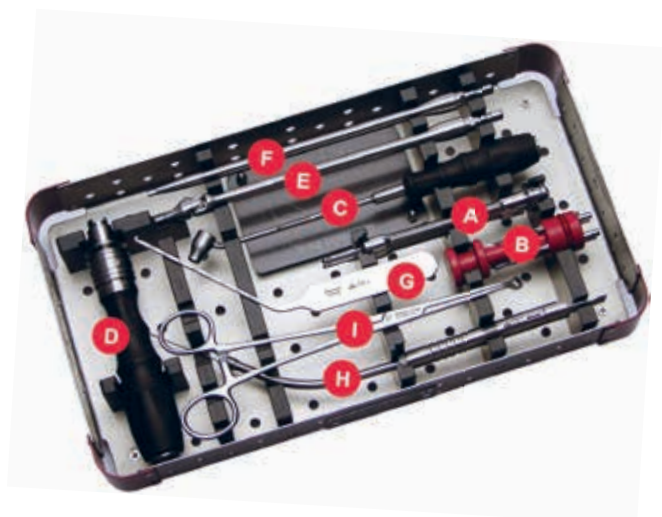
Instrument Sets

▼ 9055.65.000 Instrument Set for Double Mobility



Ref.	CODE	DESCRIPTION	Qty.
A	9055.66.400	Trial Liner #M for Double Mobility Dia. 40mm	1
A	9058.85.042	Trial Liner #L for Met and Double Mobility Dia. 42mm	1
B	9050.45.010	Trial Short Adaptor	1
B	9050.45.020	Trial Medium Adaptor	1
B	9050.45.030	Trial Long Adaptor	1
B	9050.45.040	Trial XLong Adaptor	1
B	9050.45.050	Trial XXL Long Adaptor	1
C	9013.30.100	Pliers for Trial Adaptor	1
D	9050.45.420	Trial Head Dia. 42mm	1
E	9055.65.040	Trial Mobile Liner Dia. 40mm for Heads Dia. 28mm	1
E	9055.65.042	Trial Mobile Liner Dia. 42mm for Heads Dia. 28mm	1
F	9055.60.750	Implant Reducer	1
G	9055.60.100	Head-Liner Clamp	1
H	9055.60.101	Holder for Mobile Liners Dia. 42-46	1
I	9095.10.611	Trial Head Low Taper 12/14 Heads Dia. 28mm Small	1
I	9095.10.612	Trial Head Low Taper 12/14 Heads Dia. 28mm Medium	1
I	9095.10.613	Trial Head Low Taper 12/14 Heads Dia. 28mm Large	1
	9055.65.950	Sterilizable Box	1

▼ 9084.21.000 Set for Bone Screw

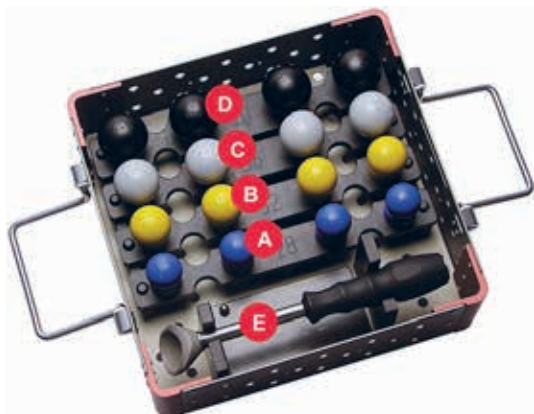


Ref.	CODE	DESCRIPTION	Qty.
A	9084.20.010	Flexible Drill Shaft	2
B	9084.20.100	SHORT Drill - Dia. 4.5mm Length 30mm	2
B	9084.20.110	LONG Drill - Dia. 4.5mm Length 50mm	2
C	9084.20.150	Drill Guide - Dia. 4.5mm	1
D	9084.20.305	Ratcheting Handle	1
E	9084.20.310	Cardan Hex Screwdriver Insert	1
F	9084.20.320	Universal Hex Screwdriver Insert	1
G	9084.20.400	Depth Gauge	1
H	9084.20.410	Curved Depth Gauge	1
I	9095.10.115	Screws Holding Forceps	1
	9084.21.950	Sterilizable Box	1

DELTA-REVISION TT SURGICAL TECHNIQUE

Instrument Sets

▼ 9095.50.000 Instrument set for trial heads



Ref.	CODE	DESCRIPTION	Qty.
A	9095.10.711	Trial Head Dia. 28mm S	1
A	9095.10.712	Trial Head Dia. 28mm M	1
A	9095.10.713	Trial Head Dia. 28mm L	1
A	9095.10.714	Trial Head Dia. 28mm XL	1
B	9095.10.721	Trial Head Dia. 32mm S	1
B	9095.10.722	Trial Head Dia. 32mm M	1
B	9095.10.723	Trial Head Dia. 32mm L	1
B	9095.10.724	Trial Head Dia. 32mm XL	1
C	9095.10.731	Trial Head Dia. 36mm S	1
C	9095.10.732	Trial Head Dia. 36mm M	1
C	9095.10.733	Trial Head Dia. 36mm L	1
C	9095.10.734	Trial Head Dia. 36mm XL	1
D	9095.10.741	Trial Head Dia. 40mm S	1
D	9095.10.742	Trial Head Dia. 40mm M	1
D	9095.10.743	Trial Head Dia. 40mm L	1
D	9095.10.744	Trial Head Dia. 40mm XL	1
E	9095.11.110	Femoral Head Impactor	1
	9095.50.950	Sterilizable Box	1

▼ SINGLE USE ACETABULAR CUPS



AISI 304	9632.74.010	Dia. 50 mm	■
	9632.74.020	Dia. 54 mm	■
	9632.74.030	Dia. 58 mm	■
	9632.74.040	Dia. 62 mm	■
	9632.74.050	Dia. 66 mm	■

DELTA-REVISION TT SURGICAL TECHNIQUE

Product Codes



▼ DELTA-REVISION TT ACETABULAR CUPS

Ti	for Liners Size Large	
	5533.38.050	Dia. 50 mm
	5533.38.054	Dia. 54 mm
	5533.38.058	Dia. 58 mm
	5533.38.062	Dia. 62 mm
	5533.38.066	Dia. 66 mm



▼ TT - HEMISPHERIC MODULE

Ti6AL4V	5533.14.500	Dia. 50 mm, Eccentricity 12 mm
	5533.14.502	Dia. 50 mm, Eccentricity 18 mm
	5533.14.540	Dia. 54 mm, Eccentricity 12 mm
	5533.14.542	Dia. 54 mm, Eccentricity 18 mm
	5533.14.580	Dia. 58 mm, Eccentricity 12 mm
	5533.14.582	Dia. 58 mm, Eccentricity 18 mm
	5533.14.620	Dia. 62 mm, Eccentricity 12 mm



▼ SPACERS

Ti6AL4V	5885.15.510	Neutral Spacer Size L (Use Liner Medium)	
	5885.15.520	Neutral Spacer Size L+5 (Use Liner Medium)	
	5886.15.500	Angled Spacer 10° Size L (Use Liner Medium)	■
	5886.15.510	Angled Spacer 20° Size L (Use Liner Medium)	
	5886.15.505	Angled Spacer 10° Size L+5 (Use Liner Medium)	■
	5886.15.520	Angled Spacer 20° Size L+5 (Use Liner Medium)	

■ Upon Request

DELTA-REVISION TT SURGICAL TECHNIQUE

Product Codes



▼ DELTA LINERS

BIOLOX® DELTA	5885.42.258	I.D. 36 mm - Size MEDIUM
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Note: the use of ceramic is allowed only with spacers



▼ NEUTRAL LINERS

LimaVit® + Ti6Al4V	5885.54.058	I.D. 28 mm - Size MEDIUM
	5885.54.158	I.D. 32 mm - Size MEDIUM
	5885.54.060	I.D. 28 mm - Size LARGE
	5885.54.160	I.D. 32 mm - Size LARGE
	5885.54.260	I.D. 36 mm - Size LARGE

Note: LimaVit® = "UHMWPE X-Lima + Vitamin E"



▼ PROTRUDED LINERS

LimaVit® + Ti6Al4V	5886.54.058	I.D. 28 mm - Size MEDIUM
	5886.54.158	I.D. 32 mm - Size MEDIUM
	5886.54.060	I.D. 28 mm - Size LARGE
	5886.54.160	I.D. 32 mm - Size LARGE
	5886.54.260	I.D. 36 mm - Size LARGE

Note: LimaVit® = "UHMWPE X-Lima + Vitamin E"



▼ NEUTRAL LINERS

UHMWPE + Ti6Al4V	5885.50.058	I.D. 28 mm - Size MEDIUM
	5885.50.060	I.D. 28 mm - Size LARGE



▼ PROTRUDED LINERS

UHMWPE + Ti6Al4V	5886.50.058	I.D. 28 mm - Size MEDIUM
	5886.50.060	I.D. 28 mm - Size LARGE

DELTA-REVISION TT SURGICAL TECHNIQUE

Product Codes



▼ NEUTRAL LINERS

UHMWPE X-LIMA + Ti6Al4V	5885.51.058	I.D. 28 mm - Size MEDIUM
	5885.51.158	I.D. 32 mm - Size MEDIUM
	5885.51.060	I.D. 28 mm - Size LARGE
	5885.51.160	I.D. 32 mm - Size LARGE
	5885.51.260	I.D. 36 mm - Size LARGE



▼ PROTRUDED LINERS

UHMWPE X-LIMA + Ti6Al4V	5886.51.058	I.D. 28 mm - Size MEDIUM
	5886.51.158	I.D. 32 mm - Size MEDIUM
	5886.51.060	I.D. 28 mm - Size LARGE
	5886.51.160	I.D. 32 mm - Size LARGE
	5886.51.260	I.D. 36 mm - Size LARGE

Note: X-Lima = "Cross-Linked"



▼ 40 mm COUPLING FOR DUAL MOBILITY

CoCrMo	5885.09.040	Liner M for Dual Mobility dia. 40 mm
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▼ MOBILE LINER

UHMWPE	5566.50.401	I.D. 28 mm - dia. 40
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■ Upon Request

DELTA-REVISION TT SURGICAL TECHNIQUE

Product Codes



▼ 42 mm COUPLING FOR DUAL MOBILITY

CoCrMo	5885.09.042	Liner L for Dual Mobility dia. 42 mm	■
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▼ MOBILE LINERS

UHMWPE	5566.50.420	I.D. 28 mm - dia. 42	■
	5565.50.420	I.D. 22 mm - dia. 42	■



▼ HEADS - TAPER 12/14

BIOLOX® DELTA		DIA. 28 mm	
	5010.42.281	S	
	5010.42.282	M	
	5010.42.283	L	
		DIA. 32 mm	
	5010.42.321	S	
	5010.42.322	M	
	5010.42.323	L	
		DIA. 36 mm	
	5010.42.361	S	
	5010.42.362	M	
	5010.42.363	L	
	5010.42.364	XL	■
		DIA. 40 mm	
	5010.42.401	S	
	5010.42.402	M	
	5010.42.403	L	
	5010.42.404	XL	■

■ Upon Request

DELTA-REVISION TT SURGICAL TECHNIQUE

Product Codes



▼ HEADS- TAPER 12/14

CoCrMo	DIA. 28 mm	
	5010.09.281	S
	5010.09.282	M
	5010.09.283	L
	5010.09.284	XL
	5010.09.285	XXL
	5010.09.286	XXXL
	DIA. 32 mm	
	5010.09.321	S
	5010.09.322	M
	5010.09.323	L
	5010.09.324	XL
	5010.09.325	XXL
	5010.09.326	XXXL
	DIA. 36 mm	
	5010.09.361	S
	5010.09.362	M
	5010.09.363	L
	5010.09.364	XL
	5010.09.365	XXL
	5010.09.366	XXXL



▼ HEADS - TAPER 12/14

FeCrNiMn-MoNbN	DIA. 22 mm	
	2416.07.221	- 2
	2416.07.222	0
	2416.07.223	+ 4

■ Upon Request

DELTA-REVISION TT SURGICAL TECHNIQUE

Product Codes



▼ REVISION HEADS - TAPER 12/14

BIOLOX® DELTA + Ti6Al4V		DIA. 28 mm	
	5010.42.021	S	■
	5010.42.022	M	■
	5010.42.023	L	■
	5010.42.024	XL	■
		DIA. 32 mm	
	5010.42.031	S	■
	5010.42.032	M	■
	5010.42.033	L	■
	5010.42.034	XL	■
		DIA. 36 mm	
	5010.42.041	S	■
	5010.42.042	M	■
	5010.42.043	L	■
	5010.42.044	XL	■
		DIA. 40 mm	
	5010.42.051	S	■
	5010.42.052	M	■
	5010.42.053	L	■
	5010.42.054	XL	■

▼ BONE SCREWS



Ti6Al4V		DIA. 6.5 mm	
	8420.15.010	h. 20 mm	
	8420.15.020	h. 25 mm	
	8420.15.030	h. 30 mm	
	8420.15.040	h. 35 mm	
	8420.15.050	h. 40 mm	
	8420.15.060	h. 45 mm	
	8420.15.070	h. 50 mm	
	8420.15.080	h. 55 mm	
	8420.15.090	h. 60 mm	

■ Upon Request

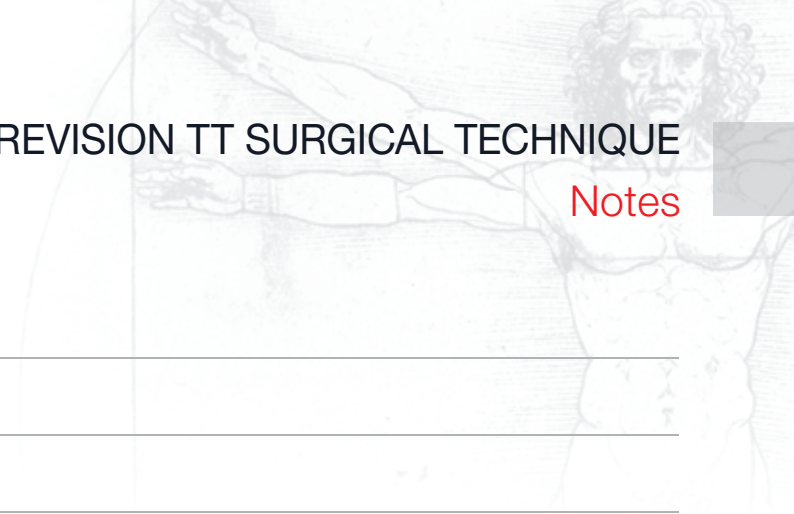


Notes

40 SURGICAL TECHNIQUE DELTA-REVISION TT

REVISION TT SURGICAL TECHNIQUE

Notes

The background of the slide features a faint, light gray version of Leonardo da Vinci's famous 'Vitruvian Man' drawing. The figure is shown from the waist up, with arms and legs extended, inscribed within a circle and a square. The overall aesthetic is clean and academic, suitable for a medical or surgical presentation.This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

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