



Surgical Technique

Pyramid Hip Stem

Uncemented or Cemented Hip Stem System



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1 Intended Use and Product Description

1.1 Intended Use

The Pyramid hip prosthesis stem system is intended as a femoral component, in combination with other components, for the primary partial or total replacement of the human hip joint.

1.2 Uncemented Stem

The uncemented Pyramid hip stem has been in clinical use since 2010 and is based on an implant concept that has been producing good clinical results for over 40 years. The choice of materials, offset concept, size range and surface design for uncemented anchoring are state of the art. For biological anchoring, the stem body of the uncemented version made of Ti6Al4V has been coated with a high-roughness pure titanium plasma layer (Ti-VPS) and an additional thin calcium phosphate layer. The Ti-VPS layer supports secure, permanent long-term anchoring, while the thin, soluble calcium phosphate layer on top supports rapid osseointegration.

1.3 Cemented Stem

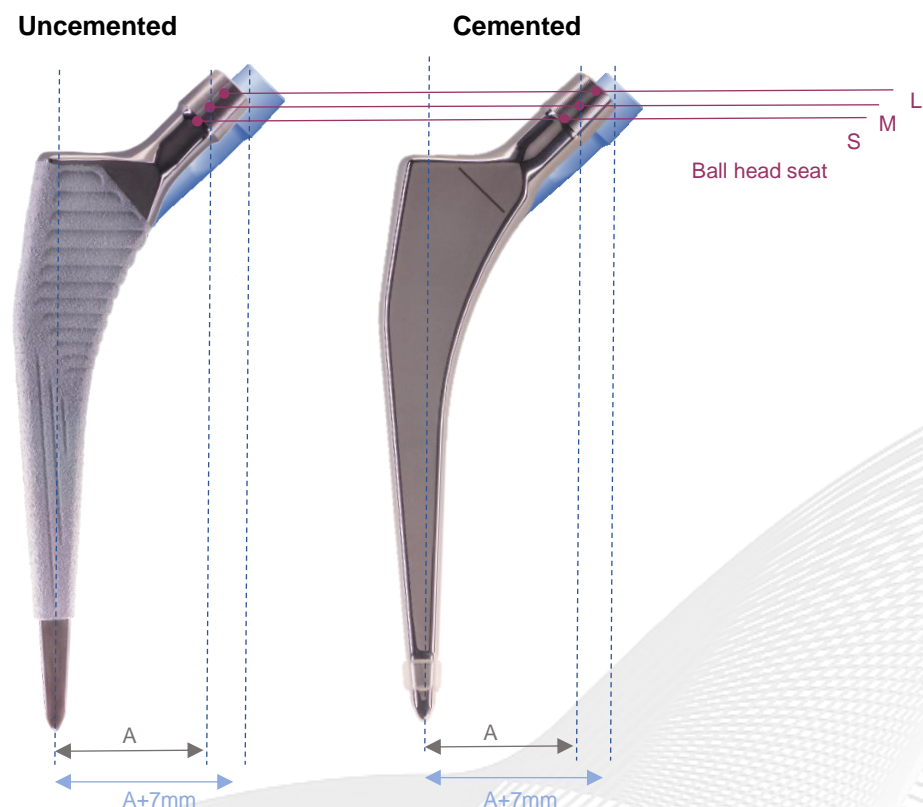
A completely polished surface was deliberately chosen for the cemented version of the Pyramid hip stem, as this, in combination with the cement connection, shows better long-term clinical results than rough surfaces. The base material is the high-nitrogen stainless steel version in accordance with ISO 5832-9.

In the standard (A) and lateral (A+7 mm) versions with a constant CCD angle (135°), the offset concept allows the joint mechanics to be reconstructed without changes in leg length and range of motion.

The stem geometry facilitates the use of mini-incision and minimally invasive surgical techniques and is suitable for all common approaches and a wide range of femur morphologies.

The size range comprises 12 standard and 11 lateral femoral stems, each with a CCD angle of 135°. The additional lateralisation is 7 mm for all sizes (see "List of implant components" on page 12).

The Pyramid hip stem is designed to fit the Pyramid cup system: the *ball heads* correspond to the various Pyramid cup diameters and allow for optimal articulation. For further information regarding the acetabulum, please refer to the surgical technique "Pyramid hip cup".



The instruments support all common surgical approaches. In addition to the standard instruments, instruments with offset for MIS approaches are also available. When designing the instruments, particular emphasis was placed on simple and safe handling and universal applicability, including the "femur first technique".

















2 Indication

- Primary and secondary hip joint arthrosis
- Fracture or avascular necrosis of the femoral head
- Rheumatoid arthritis with sufficient bone quality

3 Contraindication

- Major deformities and defects of the femur
- Radiographically evident osteoporosis or osteomalacia
- Progressive tumour diseases, localised or generalised
- Radiation-damaged bone bed
- Acute infections of the joint or its surroundings
- Suffered and continuing threat of infectious disease with possible joint manifestation
- Severe muscle, nerve or vascular diseases that may endanger the extremities
- Pregnancy

4 Warnings & List of Symbols used

	Manufacturer
	Medical device
	European authorised representative
	Follow the instructions for use
 YYYY-MM-DD	The product can be used until year/month/day
	Do not use if the packaging is damaged or the seal has been broken
	Sterilisation in final packaging by irradiation
	Sterilisation in the final packaging by ethylene oxide fumigation
	Double sterilisation barrier system
	Catalogue number / item order number
	Batch designation
	Unique device identifier
	Do not re-sterilise
	Use only once!
 cemented	Implant must be cemented
 Non-cemented	Cement-free use



Ti-VPS / calcium phosphate-coated implants must not be implanted with cement.
Read the package insert before using the product.

5 Preoperative Planning

Preoperative planning is essential for the preselection of components, both femoral and acetabular, and for planning leg length and joint offset. X-ray templates are available as transparencies (1, 115%) or in digital form for planning the stem size in standard or lateral design and the *ball head*. The height and angle of the neck resection should also be part of the planning. Calibrated, standardised AP and lateral X-rays are important for ensuring precise planning. The X-rays should show an adequate length of the femoral diaphysis.

6 Access

The implant range and the associated instruments allow implantation via all common approaches, such as the lateral transgluteal approach according to Bauer, the anterolateral approach according to Watson Jones, the dorsal approach and the anterior approach according to Smith Peterson, including the minimally invasive variants.

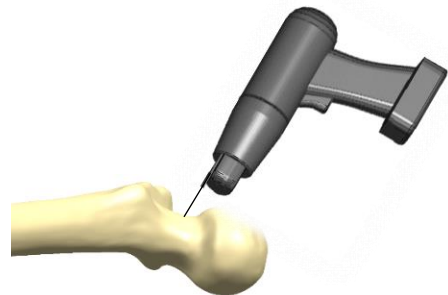
7 Use of the Instruments

The use of instruments for preparing the femur is identical for both the cemented and uncemented versions.

A lateral approach has been chosen as an example for this description. The patient is in the supine position.

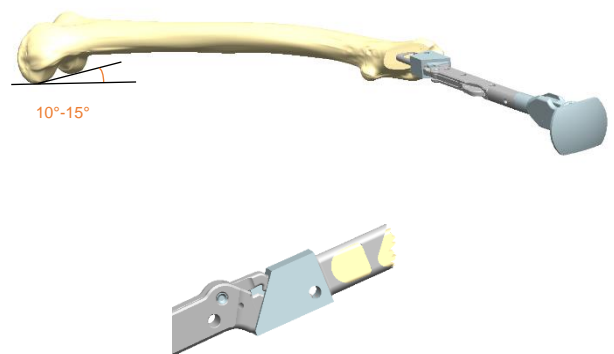
7.1 Removal of the Femoral Head

The osteotomy starts laterally at the trochanteric fossa (perpendicular to the neck axis) and ends medially approximately one finger width above the lesser trochanter. In cases of abnormal anatomy, the height of the neck resection should be adjusted in accordance with the preoperative planning and the corresponding intraoperative measurements. The osteotomy can be performed before or after dislocation of the femoral head.



7.2 Preparation of the Femur

To open the medullary cavity, the *Box Chisel* and the *Impact Handle* are mounted on the *Rasp Handle*. When opening the medullary cavity, the anteversion required for the implant must be taken into account (10-15°). The opening is made as close as possible to the base of the lesser trochanter in order to achieve a neutral varus-valgus alignment of the stem.



Extracted bone material can be removed through the lateral window for later use.

1) The head-neck lengths of the ball head diameters S and L differ slightly (0.5 mm) for the diameters 28 mm and 32/36 mm. For the sake of simplicity, this is summarised in the foil version of the X-ray templates.

The *Penetration Broach* is inserted into the medullary canal and the position of the medullary canal axis is located. If the penetration depth is insufficient, the *Penetration Broach* must be advanced deeper by turning it until the medullary canal is accessible.

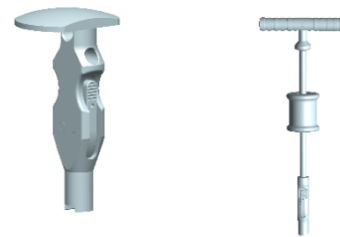


The *Rasps* are used attached to the *Rasp Handle*. To adapt to the chosen surgical approach and the anatomy of the individual patient, straight *Rasp Handles* or *Rasp Handles* with different offsets are available, in left and right versions. Further offset variants are available on request.



All *Rasp Handles* can be used with the *Impact Handle* or the *Slide Hammer*.

Starting with the smallest *Rasp* (0), rasping is continued step by step with the next larger *Rasp*.

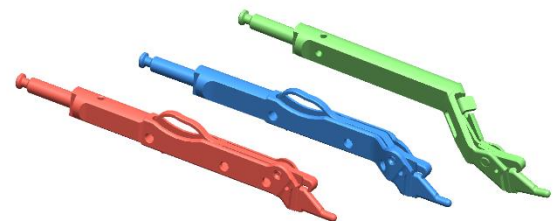


The reference points for the correct alignment of the *Rasp* are the axis of the diaphysis and the plane running parallel to the dorsal femoral condyles, represented by the knee bent at 90°. The rasping process is continued until the selected *Rasp* is positioned stably at the correct height. During rasping, care must be taken to maintain antetorsion.

The orientation of the *Rasp Handle* serves as a targeting aid for the anteversion, supplemented if necessary by the stem of the *Stem Impactor*, which is inserted into the hole in the *Impact Handle*.



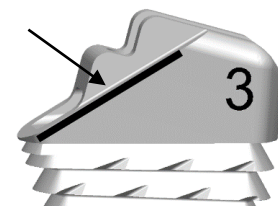
Rasp Handle Type	Lateral Offset [mm]	Dorsal Offset [mm]
Straight	0	13
Double Offset 13/17 (left/right)	13	17
Double Offset 26/37 10° (left/right)	30	17



Note: During the step-by-step rasping process, it is recommended to guide the medial curvature of the *Rasp* along the calcar femoris as far as possible in order to achieve a good proximal fit of the *Stem*.

The Ti-VPS/calcium phosphate-coated area of the *Stem* corresponds to the resection plane marked on the *Rasp* (see arrow marking).

The *Rasp* should be inserted as far as possible up to the mark on the resection surface, in accordance with the plan, so that the coated area of the stem is completely covered by the femur. If necessary, corrections to the resection plane may be required. Particularly in the event of premature contact between the *Rasp* and the Adam's arch, the possibility of re-resection should be considered due to the risk of fissures.



7.3 Trial Reduction

Once the appropriate *Rasp* is properly seated, the *Rasp Handle* can be removed and the *Pyramid Neck Trial Module* (*standard or lateral*) can be placed on the *Rasp*.

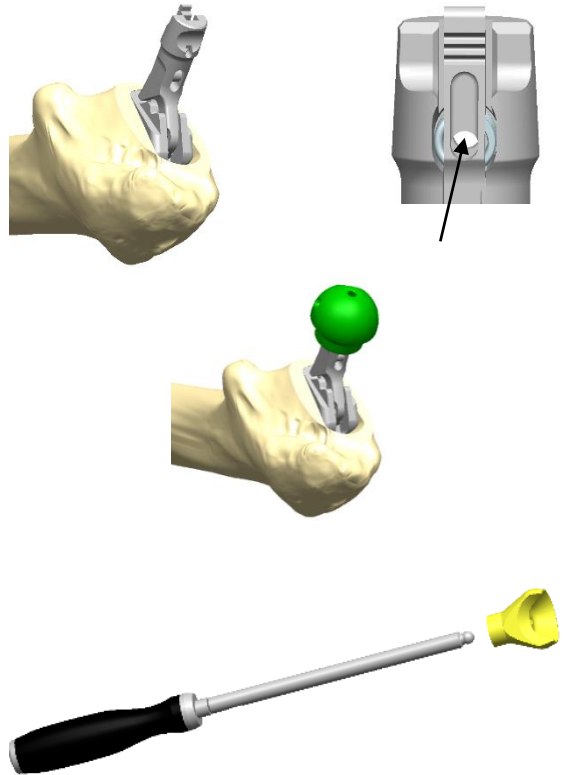
The *Pyramid Neck Trial Module* can be placed and removed either by hand or with a clamp (e.g. Backhaus clamp).

Next, a *Trial Head* corresponding to the planned *Insert* is placed on the *Pyramid Neck Trial Module*.

The leg length, joint stability and range of motion are checked after joint repositioning. The 7 mm increased offset of the lateral *Stem* and the head and neck lengths can be used to influence the interaction between leg length and joint stability.

Trial repositioning of the *Trial Head* can be assisted using the *Head Repositioning Device* mounted on the *Stem Impactor*.

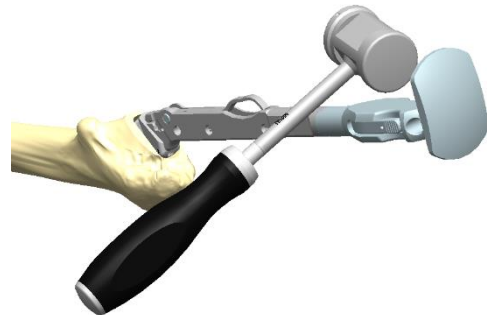
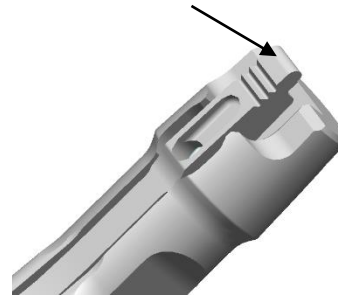
Note: The head-neck lengths *S* and *L* of diameters 32 and 36 mm are 0.5 mm shorter or longer ($S \pm 0.5$ mm) than the 28 mm diameter.



7.4 Remove the Trial Head, Pyramid Neck Trial Module and Rasp

To remove the *Pyramid Neck Trial* Module, the clamp can be used to operate the release lever (see arrow marking).

To remove the *Rasp*, first reconnect the *Rasp Handle* and the *Impact Handle* to the *Rasp*. The *Rasp* can then be loosened and removed by striking against the impact plate of the *Impact Handle* or against the stem of the *Stem Impactor* which can be inserted in the hole of the *Impact Handle*. Alternatively, the IMT "Wood-pecker" drive device can be used.



7.5 Uncemented Stem

The femoral component is inserted by hand. It is recommended that the plastic protective cover on the cone is not removed until the *Stem* is in its final position, immediately before the *Ball Head* is attached.

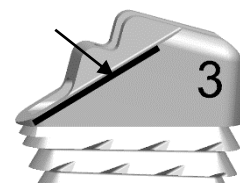
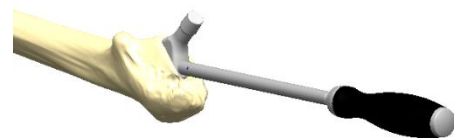
The *Stem* is set using the *Stem Impactor*. During the setting process, the intensity of the hammer blows must be adjusted to the bone quality.

The insertion process is completed as soon as a change in sound and a stable position confirm that the component is firmly in place.

Note: The standard stem size 0 is 1 mm less lateralized than the corresponding *Pyramid Neck Trial* Module.

The edge of the coating corresponds to the marking on the *Rasp* (see arrow marking) and marks the required insertion depth of the *Stem*.

If the *Stem* needs to be removed, this can be done using the *Impact Handle* and the *Retraction Instrument*.



7.6 Cemented Stem

The size designation of the cemented *Stems*, including the cement mantle, is coordinated with the X-ray planning and surgical technique. When using a *Stem* analogous to the last rasp size used, the result is a complete cement mantle with a thickness of at least 1 mm.

If the *Stem* is to be implanted "line-to-line", the stem size must be one size larger than the last *Rasp* used. The centralizer must be removed before implantation by tapping it lightly.

For *Rasp size 0*, only "line-to-line" implantation is possible. It is generally recommended to use the same stem size as the last rasp size used. This will result in a cement mantle at least 1 mm thick.

The femoral component is inserted by hand.

The plastic protective cover on the cone should only be removed when the *Stem* is in its final position, immediately before placing the *Ball Head*.

The use of low-viscosity cement is recommended, applying a current cementing technique. For details, see the manufacturer's instructions of the cement supplier. The choice of cement is the responsibility of the surgeon.

Note: The *standard 0* stem size is 1 mm less lateralised than the corresponding *Pyramid Neck Trial Module*.

The neck diameters of the cemented *stems* are slightly larger than the *Pyramid Neck Trial Modules*. This results in a slightly reduced range of motion during repositioning. However, the deviation is no more than 4°.

If the *Stem* needs to be removed, this can be done using the *Retraction Instrument* in combination with the *Impact Handle*.

Caution: The thread of the *Retraction Instrument* must always be screwed in as far as it will go to prevent deformation of the instrument.

Rasp Size	Stem Size
X	X
When using the same size designations, a cement coating with a minimum thickness of 1 mm should be used. The centraliser supports the cementing process.	
X	X+1
If the stem size is selected one size larger than the rasp size ("line-to-line" implantation), the centraliser must be removed and only a very thin cement mantle may be used.	



7.7 Insertion of the Ball Head

Remove the plastic protective cover from the cone.

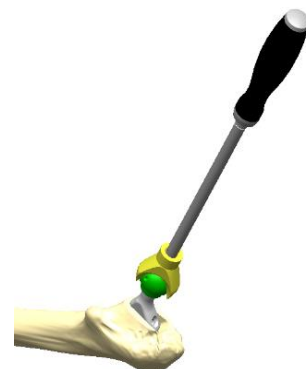
Before positioning the *Ball Head*, it is advisable to carefully clean the cone by hand with water and dry it thoroughly. The *Ball Head* is attached by hand and secured with a slight twisting motion.

The *Ball Head* can now be carefully fixed in place with a light tap using the *stem impactor* and the screwed-on *Head Repositioning Device*.

Note: It is not sufficient to simply place the *Ball Head* on; it must be tapped in place with measured force.

Caution: Ceramic *Ball Heads* must never be hammered in with a metal instrument.

After mounting the *Ball Head*, the joint gets repositioned. The functionality of the treated joint in terms of range of motion and stability in positions prone to dislocation, in internal and external rotation, is checked by manipulating the limb.



This is followed by a check of the achieved leg length.

Note: The *Stems* have been mechanically tested in combination with the *Ball Heads* up to the maximum neck length XXL in accordance with ISO 7206-4, -6 and -8.

The use of longer neck lengths is the responsibility of the surgeon.

Caution: If a fixed *Stem* is retained during revision, only ceramic *Revision Ball Heads* with titanium sleeves or metal *Ball Heads* may be used. If a ceramic *Ball Head* has previously broken, only **ceramic** *Revision Ball Heads* with titanium sleeves should be used.

7.8 Wound Closure

The following steps correspond to the standard procedure for hip joint surgery and are at the discretion of the treating surgeon. Before repositioning the joint and closing the wound, the surgical area must be thoroughly cleaned of bone cement, bone chips or other tissue debris and foreign material.

It may be advisable to insert a drain

8 Follow- up Treatment

8.1 Uncemented Stem

Depending on the patient's age and state of health, movement therapy can be started either on the day of the operation or the following day, and the operated leg can be fully weight-bearing. However, partial weight-bearing with forearm crutches may be necessary for up to 6 weeks.

For the first 48 hours, it is recommended that the leg be positioned in slight abduction.

Antibiotics and thrombosis prophylaxis are administered in accordance with local guidelines or at the discretion of the treating surgeon.

The recommended follow-up intervals are 3 and 6 months postoperatively, then annually.

8.2 Cemented stem

Depending on wound healing, patients can get up early after the operation with assistance and, as a rule, put full weight on the operated leg or partial weight during the first few weeks. Walking training is carried out with forearm crutches.

For the first 48 hours, the use of a suitable positioning device with slight abduction is recommended.

Antibiotics and thrombosis prophylaxis are administered in accordance with locally applicable guidelines or at the discretion of the attending surgeon.

The recommended follow-up intervals are 3-6 months postoperatively, then annually.

9 Disassembly, Cleaning, Assembly and Sterilisation of Instruments

All instruments in the system must be sterilised with hot steam. Reprocessing and steam sterilisation must be carried out in accordance with the conditions of the applicable standards (EN ISO 17664-1). Further information on the disinfection, cleaning and sterilisation of instruments can be found in the brochure "Reprocessing of reusable instruments", which is provided as part of the product documentation by Atesos medical AG.

If there are indications of TSE contamination, a pre-vacuum steam sterilisation cycle with an exposure time of 18 minutes at 134°C (273°F) should be performed.

All instruments of the Pyramid hip stem system are disinfected, cleaned and sterilised without further disassembly.



Important Information:

Disposal Information

Before disposing of instruments and implant components that have been in contact with patients, they must be disinfected and sterilised. Disposal is carried out according to material-specific criteria, in accordance with the institution's guidelines.

Reporting Obligation

All users are obliged to report serious incidents relating to the product to the competent authorities.

10 List of Implant Components

10.1 Pyramid Cementless Hip Stem

Features

- Standard and lateral variants available
- CCD angle 135°
- Cone 12/14

Material

- Core: Ti-6Al-4V: ISO 5832.3
- Coating: Ti-VPS, calcium phosphate

Standard



Lateral



Item no. Standard	Item no. Lateral	Size
310001	-	0
310002	310014	1
310003	310015	2
310004	310016	3
310005	310017	4
310006	310018	5
310007	310019	6
310008	310020	7
310009	310021	8
310010	310022	9
310011	310023	10
310012	310024	11

10.2 Pyramid Cemented Hip Stem

Features

- Standard and lateral variants available
- CCD angle 135°
- Cone 12/14

Material

- Stem: Stainless steel, polished: ISO 5832-9
- Centraliser: PMMA

Standard



Lateral



Item no. Standard	Item no. Lateral	Size
350000	-	1
350001	350013	2
350002	350014	3
350003	350015	4
350004	350016	5
350005	350017	6
350006	350018	7
350007	350019	8
350008	350020	9
350009	350021	10
350010	350022	11
350011	350023	12

10.3 Ball Heads

Ceramic Ball Heads

Material:

- Zirconium oxide reinforced aluminium oxide ceramic (ISO 6474-2)

Ceramic ELEC® plus



Outer Diameter	Size	Item no.
28	S	110230
28	M	110240
28	L	110250



32	S	110260
32	M	110270
32	L	110280
32	XL	110291



36	S	110300
36	M	110310
36	L	110320
36	XL	110330

(Manufacturer: HiPer Medical AG, Oberkrämer, Germany)

Note: XXL Ball Head size available in all materials on request.

Material:

- CoCrMo (ISO 5832-12)



Outer diameter	Size	Item no.
22	M	177.02.22
22	L	177.03.22

28	S	188.01.28
28	M	188.02.28
28	L	188.03.28
28	XL	188.04.28

32	S	189.01.32
32	M	189.02.32
32	L	189.03.32
32	XL	189.04.32

(Manufacturer: Stemcup Medical Products AG, Zurich, Switzerland)

10.4 Revision Ball Heads (with Titanium Sleeve)

Material

- > Zirconium oxide reinforced aluminium oxide ceramic (ISO 6474-2)
- > Titanium sleeve (ISO 5832-3)



Outer Diameter	Size	Item no.
28	S	160000
28	M	160010
28	L	160020
28	XL	160030
32	S	160040
32	M	160050
32	L	160060
32	XL	160070
36	S	160080
36	M	160090
36	L	160100
36	XL	160110

(Manufacturer: HiPer Medical AG, Oberkrämer, Germany)

10.5 Bipolar Heads

Material:

- > CoCrMo (ISO 5832-12)
- > UHMW-PE (ISO 5834-2)



Outer Diameter	Inner Diameter	Item no.
42	22	138.22.42
44	28	138.28.44
46	28	138.28.46
48	28	138.28.48
50	28	138.28.50
52	28	138.28.52
54	28	138.28.54
56	28	138.28.56
58	28	138.28.58
60	28	138.28.60
62	28	138.28.62

(Manufacturer: Stemcup Medical Products AG, Zurich, Switzerland)

Note: For Bipolar Heads, see separate surgical technique from Stemcup Medical Products AG under QR code or URL: <https://stemcup.ch>



11 List of Instruments

Item no.	Description / Size
800151	Box Chisel
800152	Opening Broach
800153	Pilot Rasp
800154	Rasp Handle Straight
800155	Rasp Handle Double Offset 13/17 left
800156	Rasp Handle Double Offset 13/17 right
800157	Impact Handle
800158	Pyramid Rasp Size 0
800159	Pyramid Rasp Size 1
800160	Pyramid Rasp Size 2
800161	Pyramid Rasp Size 3
800162	Pyramid Rasp Size 4
800163	Pyramid Rasp Size 5
800164	Pyramid Rasp Size 6
800165	Pyramid Rasp Size 7
800166	Pyramid Rasp Size 8
800167	Pyramid Rasp Size 9
800168	Pyramid Rasp Size 10
800169	Pyramid Rasp Size 11
800171 I/II	Stem Impactor (I/II)
800171 II/II	Head Repositioning Device (II/II)
800172	Extraction Screw
800174	Ruler
800175	Pyramid Neck Trial standard 0-11
800176	Pyramid Neck Trial lateral 1-11
800178	Rasp Handle Double Offset 30/17 left ²
800179	Rasp Handle Double Offset 30/17 right ²⁾
800182	Rasp Handle Straight DAA ²⁾
800183	Rasp Handle, Double Offset 37/26 left ²⁾
800184	Rasp Handle, Double Offset 37/26 right ²⁾
800185	Rasp Handle, Double Offset, 52/26, left ²
800186	Rasp Handle, Double Offset, 52/26, right ²
800187	Rasp Handle, Double Offset 37/26-10° left
800188	Rasp Handle, Double Offset 37/26-10° right
800189	Punch
800201	Trial Head ø28 S
800202	Trial Head ø28 M
800203	Trial Head ø28 L
800204	Trial Head ø28 XL ³⁾
800206	Trial Head ø32 S
800207	Trial Head ø32 M
800208	Trial Head ø32 L
800209	Trial Head ø32 XL ³⁾
800211	Trial Head ø36 S
800212	Trial Head ø36 M
800213	Trial Head ø36 L
800214	Trial Head ø36 XL ³⁾
800103	Hammer 450g ¹⁾
800226	Slide Hammer ²⁾

1) Optional if only Stem set is available, without Pan Set 2) Optional
3) Manipulation Ball Head for XXL Ball Heads available on request

12 Basic UDI-DIs

Basic UDI-DI

764106428INST-01KM

764106428INSTSTEM-IR-084V

764106428INST-05KV

764106428STEMUNCEM-02HB
764106428STEMCEM-03B2

764106428INST-06KX

764106428INST-02KP

Intended use

Comparative instruments for determining implant size and checking positioning and joint stability.

Reusable surgical instruments for preparing the bone bed by cutting, drilling, sawing, scraping, shaving, clamping, stapling or similar.

Instrument for inserting/setting and/or removing orthopaedic hip implants and manipulation instruments

Femoral component for primary partial or total replacement of the human hip joint

Instrument for force transmission during insertion/placement and/or removal of implants and manipulation instruments

Products for the methodical organisation, storage, transport, use and preparation of other medical devices

Basic UDI-DI third-party products

425043607

0764012143meballheadsD7

0764012143bipolarLS

Product group

Ceramic Ball Heads

Metal Ball Heads

Bipolar heads

Note: *Ceramic Ball Heads, Metal Ball Geads, Revision heads and Bipolar Heads* are purchased from third parties and are subject to approval by the respective manufacturer.

13 Contact



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09356 St. Egidien
Germany

Email: info@hestomed.de
URL: <https://hestomed.de>
Tel: +49 6298 3753 100
Fax: +49 37204 638-21

Ed. 09/2025

Subject to change without notice. For the currently valid surgical technique, please consult the Atesos medical AG website at URL or QR code: <https://atesos.ch>

