MATHYS
European Orthopaedics

Surgical technique / Product information

Centris

Preservation in motion

For healthcare professional use only. The illustrated image does not represent a connection between the use of the medical device described, nor its performance.

Building on our heritage
Moving technology forward
Step by step with our clinical partners
Towards a goal of preserving mobility

***Preservation** in motion*

As a Swiss company, Mathys is committed to this guiding principle and pursues a product portfolio with the goal of further developing traditional philosophies with respect to materials or design in order to address existing clinical challenges. This is reflected in our imagery: traditional Swiss activities in conjunction with continuously evolving sporting equipment.

Table of contents

Remark
Please make yourself familiar with the handling of the instruments, the product-related surgical technique and the warnings, the safety notes as well as the recommendations of the instruction leaflet before using an implant manufactured by Mathys Ltd Bettlach. Make use of the Mathys user training and proceed according to the recommended surgical technique.

Introduction

Nowadays, implantation of an artificial hip joint is considered a routine operation. Hip surgery has three major purposes: relieving pain in the affected hip, restoring the patient's anatomy and joint function and, improving the range of hip movement. Due to increased life expectancy and broadening of the operative indications, the number of total or partial hip replacements is steadily increasing worldwide.

To prevent complications, a standardized, reproducible and reliable surgical technique is mandatory. The surgical technique provides a stepwise approach for planning and implantation of the Centris Total Hip Arthroplasty.

Centris stem
The Centris stem in combination with a prosthetic head and acetabular cup component (cemented/uncemented) or native acetabulum represents a system for hip arthroplasty, that is intended to restore the function of the hip joint and/or relieve pain in skeletally mature patients. The Centris stem features a highly-polished stainless steel surface, a rectangular cross section, a CCD angle of 130° and a 12/14 taper.

Charnley-Kerboull Philosophy
The cemented femoral system is based on the Charnley-Kerboull philosophy. Bone fixation is based on a clinically proven «canal filling stem» concept [1], the stem being undersized by 0.7 mm compared to the broach. Thus, the stem fills the medullary canal to a large extent and aligns and stabilizes itself during insertion.

Design features and advantages of the Charnley-Kerboull Philosophy
- The rectangular cross-section provides rotational stability [1]
- The rounded edges avoid stress concentration in the corners of the cement mantle [1]
- The double-tapered conical shape of the mirror-finished stem converts shear forces into compression forces. Thus, deleterious tensile and bending forces at the stem-cement and bone-cement interfaces can be avoided, ensuring stable long-term fixation of the implant [1]
- The highly polished surface finish with low surface roughness reduces the risk of cracking in the cement mantle [1]

1. Indications and contraindications

Indications

- Primary or secondary osteoarthritis of the hip
- Necrosis of the femoral head
- Femoral head and femoral neck fractures
- Revision surgery

Contraindications

- Presence of factors jeopardizing stable anchoring of the implant:
  – Bone loss and/or bone defects
  – Insufficient bone substance
  – Medullary canal not suitable for the implant
- Local and/or general infection
- Hypersensitivity to any of the materials used
- Severe soft tissue, nerve or vessel insufficiency that jeopardise the function and long-term stability of the implant
- Patients for whom a different type of reconstruction surgery or treatment is likely to be successful

For further information, please refer to the instructions for use or ask your Mathys representative.

2. Preoperative planning

Preoperative templating can be performed using conventional radiographs or a digital planning system. The main goal is to plan the appropriate implant size and position to restore the individual biomechanics of the hip joint. Thus, potential problems can be anticipated even before surgery. In most cases, restoration of hip biomechanics can be achieved by reconstructing the original hip rotation centre, the leg length and the femoral and acetabular offset [2].
Furthermore, the preoperative planning serves as a template in the context of intraoperative balancing by means of fluoroscopic monitoring [3].

It is recommended to document the preoperative planning in the patient's file.

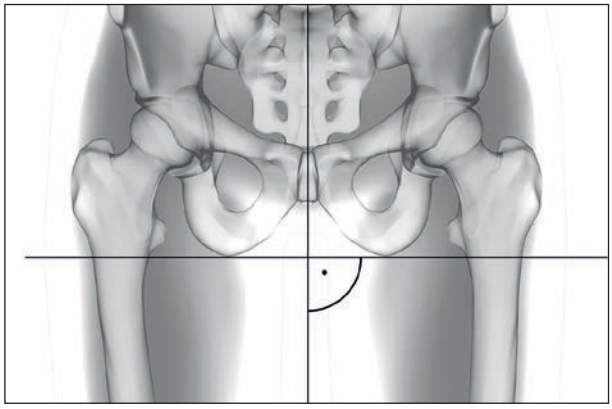


Fig. 1

Hip templating can best be performed on a pelvic radiograph taken with the patient in standing position. The radiograph needs to be symmetrical, centred on the symphysis of the pubis and with both femora in about 20° of internal rotation. The magnification scale of the radiograph can be controlled with a calibration object or by using a fixed film-to-focus distance and positioning the patient at a fixed distance between film and X-ray source (Fig. 1).

Remark
When the affected hip is severely damaged, templating on the unaffected side and mirroring the planning to the affected side should be considered.

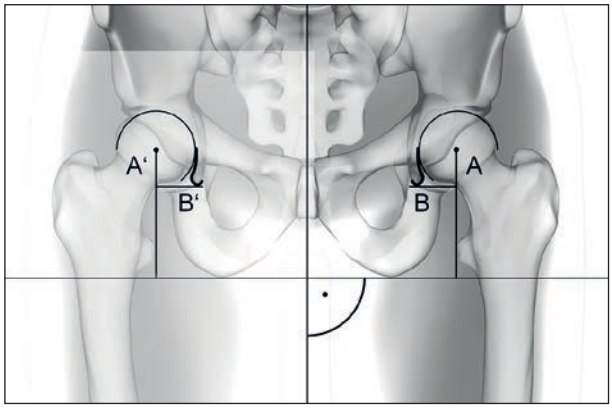


Fig. 2

The rotation centres of the healthy (A) and affected (A') hip are defined as the centre of a circle that fits the respective femoral head or the acetabular cavity.
A first, horizontal line is drawn tangent to both ischial tuberosities, and a second, perpendicular line is plotted through the centre of the symphysis of the pubis.

Remark
In case of leg length correction, the adjustment of the leg length can already be considered now, using the ischial tuberosities as a reference.

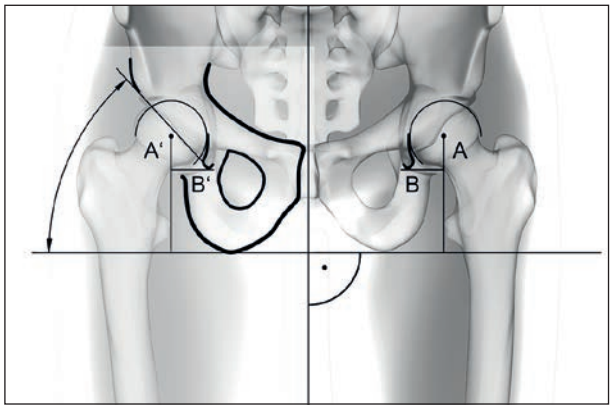


Fig. 3

The acetabular offset can be defined as the distance between Köhler's teardrop (B or B') and a vertical line through the hip rotation centre (A or A') and parallel to the symphysis line (Fig. 2).

Planning of the cup

The cup position in relation to the pelvis must take into account the acetabular contours, the hip rotation centre, Köhler's teardrop and the required cup inclination angle (Fig. 3).

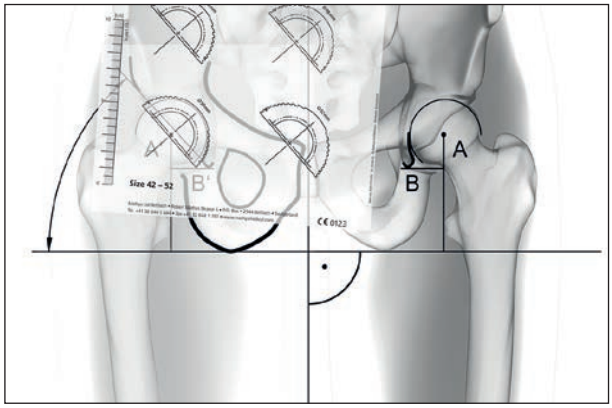


Fig. 4

To find an appropriate cup size, various cup templates are positioned at the level of the acetabular cavity aiming to restore the native hip rotation centre while establishing sufficient bone contact, both at the level of the acetabular roof and at the level of Köhler's teardrop (Fig. 4).

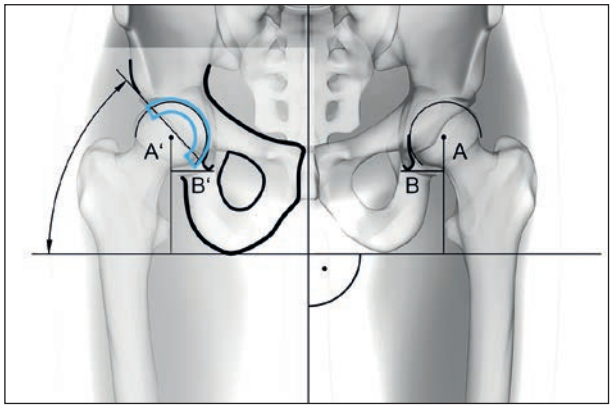


Fig. 5

The cup is positioned into the acetabulum. The implant position is established in relation to the anatomical landmarks (acetabular roof, Köhler's teardrop) and the implantation depth is marked down (Fig. 5).

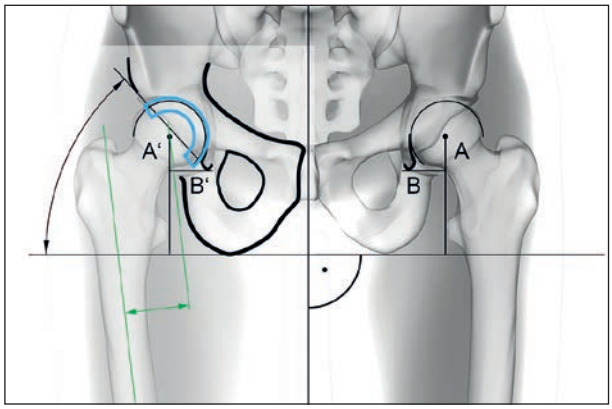


Fig. 6

Estimation of the femoral offset

The femoral offset is defined as the smallest distance between the central longitudinal axis of the femur and the hip rotation centre (Fig. 6).

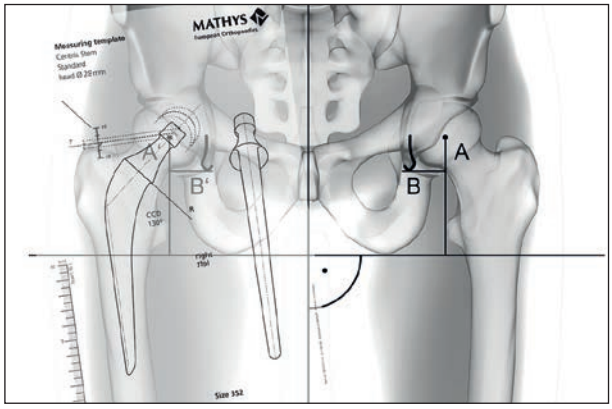


Fig. 7

Planning of the Centris stem

The complete Centris stem system is available in 3 versions Dysplasia (D = 5 sizes), Standard (S = 18 sizes), Revision (R = 4 sizes). Within the Standard version and Revision version two different types of implants are available – a standard type and long stem type. The stem offset is proportional to the stem size (diameter), and various neck length are available for each stem size. The first digit (1 – 5) in the stem identification code indicates the offset (neck length). The middle letter (S, D, R) indicates the stem version, and the last digit (1 – 3) represents the implant diameter.

First, a stem template that restores the original femoral offset is chosen. The stems aligning along the femoral axis and templates with increasing stem offsets (neck length – first digit: 1 to 5) are superimposed on the pelvic radiograph until a match with the original femoral offset is found. Then, within the chosen offset range (first digit), a stem version (second letter: S, D, R) and size (1 to 3) that fills up the femoral canal is selected (Fig. 7).

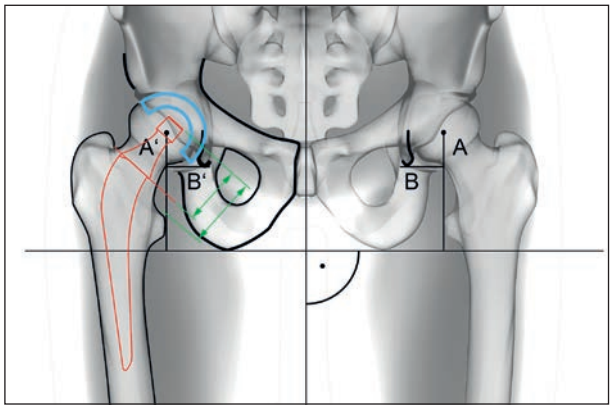


Fig. 8

The correct stem diameter is the diameter that fills the femoral cavity to within 1–2 mm distance from the inner femoral cortex (Fig. 8).

Remark

In most cases, an adequate match can be found, i. e. a stem that fills the femoral cavity within 1–2 mm of the cortex and restores both femoral offset and leg length.

Where this is not the case, a compromise needs to be found, or a different hip system should be considered.

Once the final stem has been chosen, the femoral resection level and the stem insertion depth are marked down. To reproduce the stem insertion depth during surgery, the relation of the femoral neck cut to the lesser trochanter, the greater trochanter and the junction between the femoral neck and greater trochanter are registered.

3. Surgical technique

Depending on the positioning of the patient and the selection of the approach route, conventional approaches are differentiated from minimally invasive approaches that strive to minimise bone and soft-tissue damage. The Centris stem can be implanted through conventional as well as through minimally invasive approaches. The choice of a specific approach should be based on the patient's anatomy, the personal experience and preferences of the operating surgeon.

Two surgical techniques are suitable for implanting the Centris stem: «Modular rasp option» (page 12) and «Cancellous bone reamer option» (page 19). The preparation up to page 11, as well as the implantation of the Centris stem, starting on page 27, are identical for both surgical techniques.

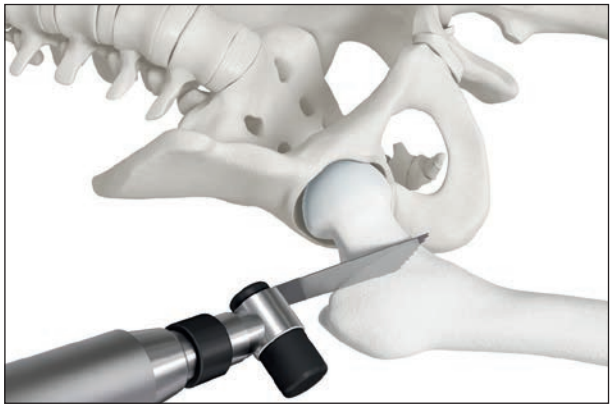


Fig. 9

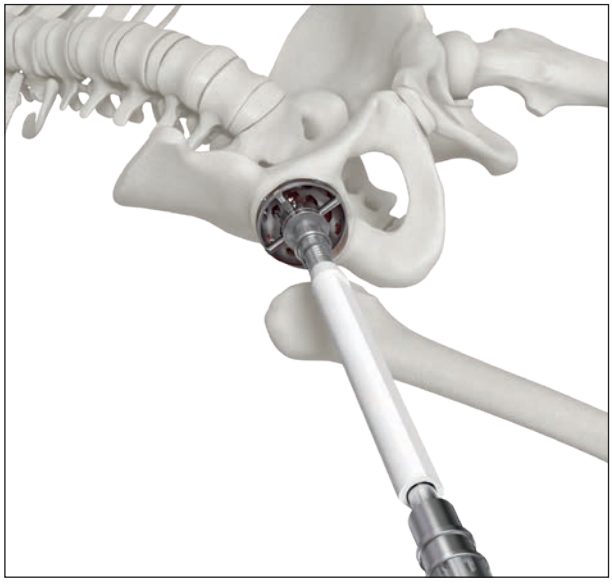


Fig. 10

Femoral osteotomy
The femoral neck resection level is related to the distance between the lesser and the greater trochanter and marked according to the preoperative planning (Fig. 9).

Remark
The level of the femoral osteotomy be performed proximally to the planned insertion depth of the stem. This allows the femoral neck cut to be finalized with the calcar reamer.

Remark
When anatomical conditions prevent head removal after a single neck cut, it is advisable to perform a double osteotomy and remove a fragment of the femoral neck first. Then the femoral head is removed with a femoral head extractor.

Depending on the preference of the surgeon, the preparation of the acetabulum and implantation of the cup are to be performed according to the surgical technique (Fig 10).

Remark
The implantation of the cup is described in a separate surgical technique which can be downloaded from the Mathys Ltd Bettlach website or requested from your local Mathys representative.

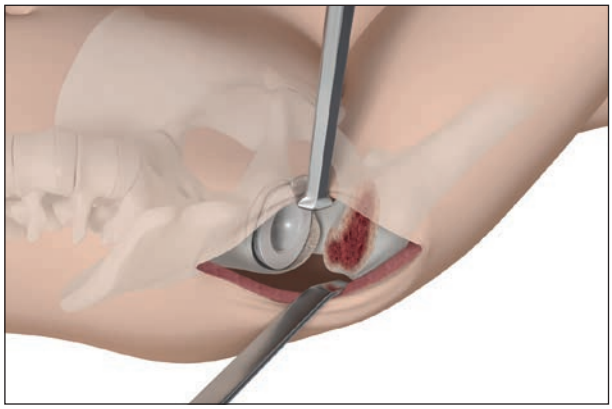


Fig. 11

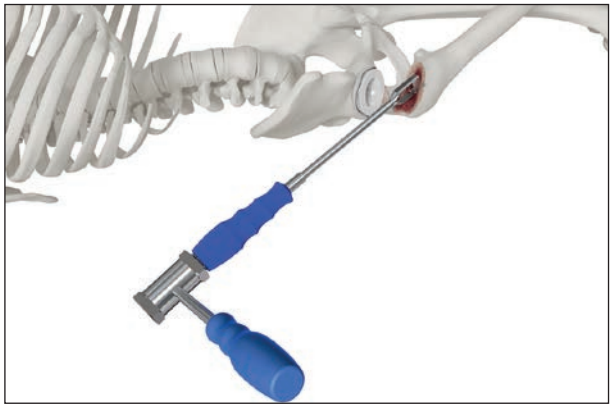


Fig. 12

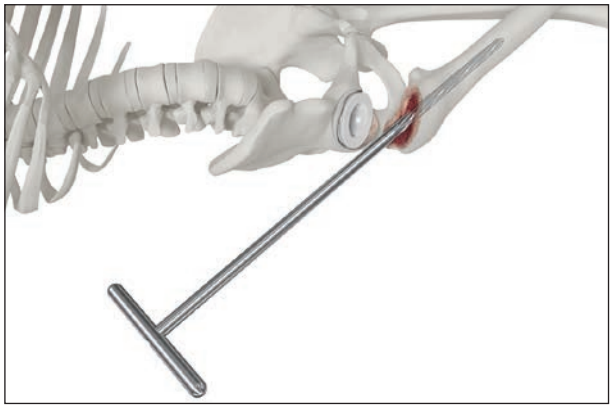


Fig. 13

Preparation of the femoral canal
Orthograde implantation is possible only after sufficient lateral opening of the femoral canal.
Therefore, the box chisel (Figs. 11 – 12) must be applied slightly medially of the piriform fossa and introduced in a parallel direction to the dorsolateral femoral cortex with careful hammer strokes.

The opening of the femoral canal with a box chisel should be done carefully so that there is no fracture of the greater trochanter.

Remark
Pay attention to the desired anteversion of the stem of approximately 10° – 15° during this step.

The box chisel should be introduced only 1 – 2 cm proximally into the medullary cavity, otherwise there is a risk of perforation (Fig. 12).

If in doubt, a sharp spoon may be used to explore the inner lateral femoral cortex before the use of the box chisel. Thus, the risk of varus or valgus malposition of the implant is reduced.

Further opening with the reamer facilitates insertion and centring of the subsequent rasps or reamers (Fig. 13).
It must be ensured that the reamer remains its central position aligned to the femoral axis along the inner cortex of the femur as a guide element for preparation of the orthograde reaming.

Remark
The cancellous bone must not be removed completely in the process.

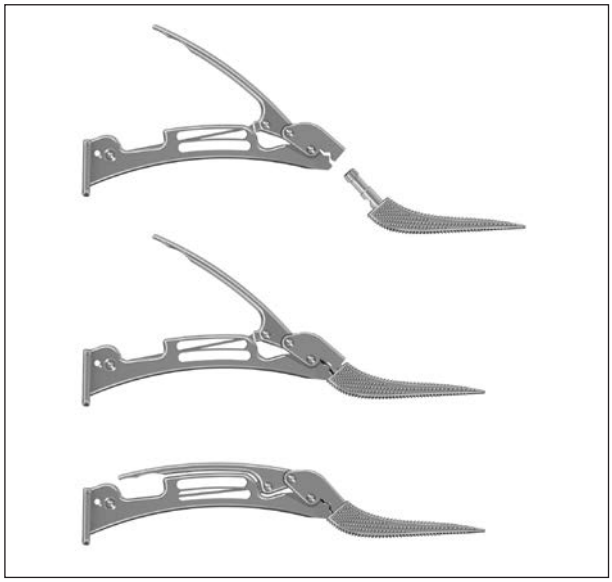


Fig. 14

Option 1: Preparation of the implant bed with modular rasps

Locking and securing of the smallest rasp in the rasp handle (Fig. 14).

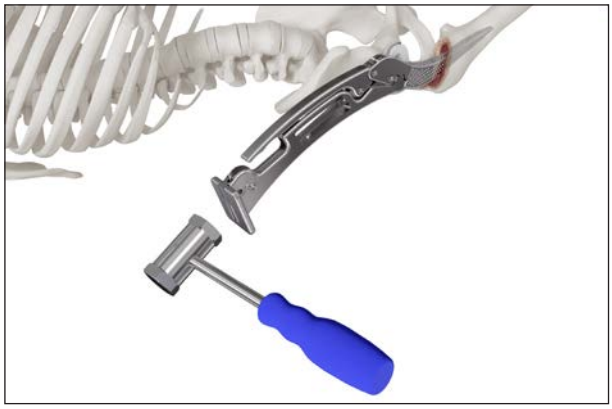


Fig. 15

Stepwise rasping of the femur.

Remark

It is recommended to start with the smallest rasp and then gradually open the femoral canal up to the pre-operatively planned size (Fig. 15).

The rasps are introduced along the lateral cortex with moderate hammer strokes into the femoral canal.

Remark

The direction of advancement of the rasp needs to be in line with the femoral axis, to reduce the risk of un-dersizing or malalignment of the final implant.

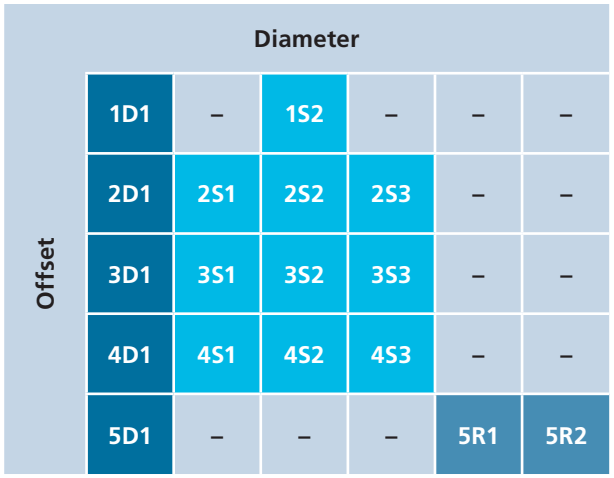


Fig. 16

The Centris hip system is available in Standard, Dysplasia and Revision version. Within the Standard version and Revision version two different types of implants are available – a standard type and long stem type (more information about the long stem type can be found on page 22). They are marked as follows:

Standard version	**10 sizes (1S2–4S3)**
Dysplasia version	**5 sizes (1D1–5D1)**
Revision version	**2 sizes (5R1–5R2)**

The first digit (1–5) in the stem identification code indicates the neck length. The middle letter (S, D, R) indicates the stem version and the last digit (1–3) represents the implant diameter (Fig. 16).

During the progressive rasping, select the desired stem version (Standard, Dysplasia, Revision) and increase first the rasp offset up to the planned neck length (first digit). Once the desired offset (neck length) is reached, increase the rasp size (last digit) up to the planned stem diameter.

Do not use rasps of size 3 unless this size has been preoperatively planned as the final implant size. In case of using a Centris long stem, do not use rasps of size 2 unless this size has been preoperatively planned.

Example
Planned stem: 4S2
Rasping sequence: 1S2 → 2S1 → 3S1 → 4S1 → 4S2

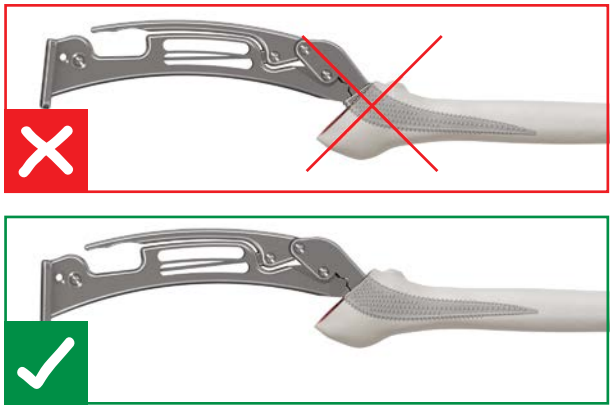


Fig. 17

When progressively widening the medullary canal using increasing rasp sizes, make sure to drive the rasps along the axis of the proximal femur and control the anteversion of the stem (Fig. 17).

Remark
Each rasp should be fully introduced up to the level of the resection plane in order to prevent protrusion of the final implant.

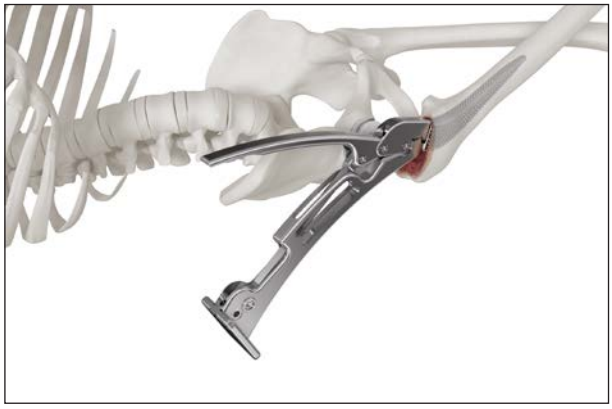


Fig. 18

Once the largest possible rasp has been introduced down to the femoral resection level or a few millimetres more distally as planned, the connection to the rasp handle is released (Figs. 18–19).

Remark
As soon as cortical contact is perceived rasping must be stopped in order to prevent possible fissures.

If the largest possible rasp is smaller than the stem size that has been templated, early locking of the rasp can be due to:
1) Incorrect insertion of the rasp, i. e. varus / valgus or rotational misalignment
2) High-density cancellous bone commonly found in young patients
3) Inaccurate templating or the use of an incorrect radiographic scale factor

Insertion of a rasp of a size larger than the one that has been templated can be due to:
1) A fracture or fissure of the proximal femur
2) Inaccurate templating or the use of an incorrect radiographic magnification factor

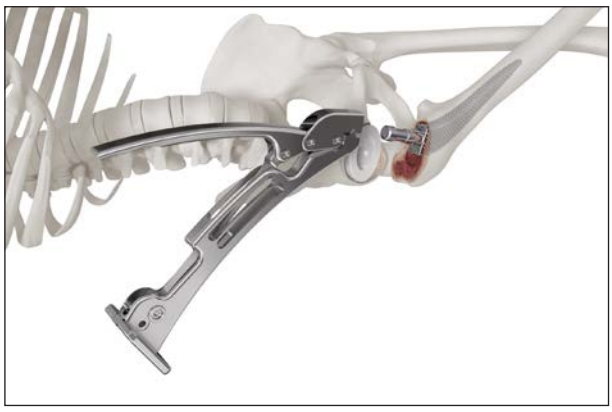


Fig. 19

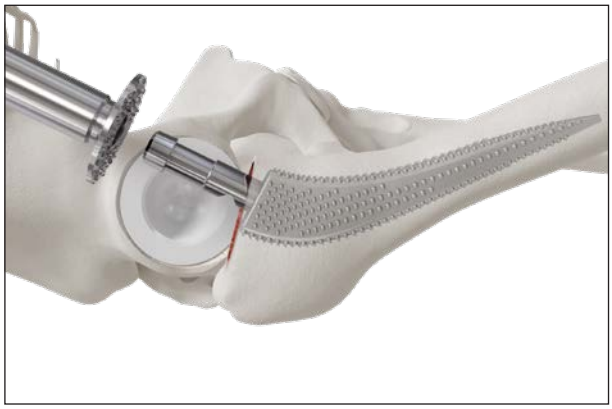


Fig. 20

Fig. 21

In each of these cases, intraoperative findings should be compared with the preoperative planning to identify the cause of the mismatch. If needed, appropriate measures to correct the cause of the mismatch should be taken.

The size markings of the rasps match the implant sizes.

Remark
Correct fit of the rasp in the femur can additionally be checked under image intensification.

Remark
The modular Centris rasps are 0.7 mm oversized compared to the Centris stems to achieve the best possible uniformity of the cement mantle once the final stem is implanted.

With the largest possible rasp in place, the calcar reamer is positioned over the rasp and the neck resection is finalized (Figs. 20–21). Thus, the small medial collar of the Centris stem will fit the medial neck cut, allowing adequate control of the insertion depth of the final implant.

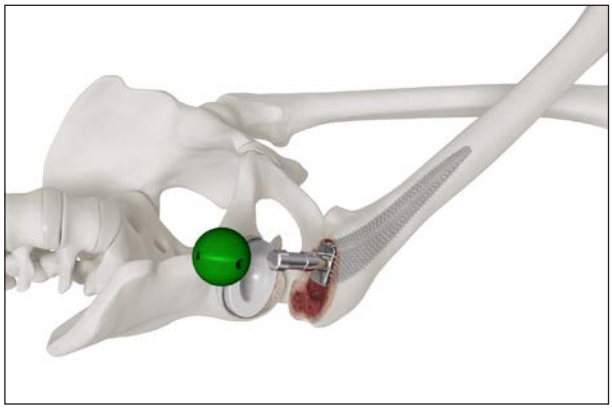


Fig. 22

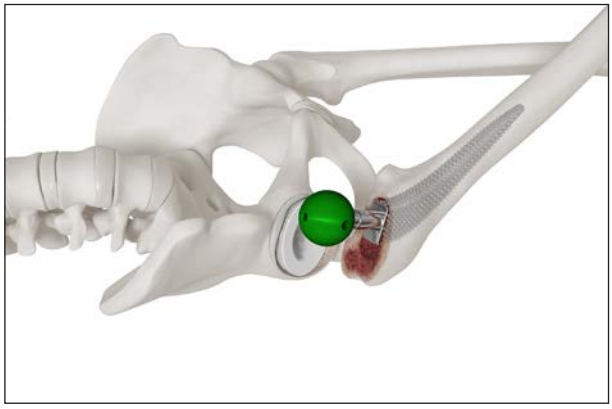


Fig. 23

The selected trial head, with a diameter corresponding to the inner diameter of the cup, is positioned on the rasp (Figs. 22–23).

Remark

In combination with the modular Centris rasp, only the corresponding trial heads may be used as the cone of the rasp is 11/12 instead of 12/14:

Item no.	Description
56.02.6004	Centris trial head f/rasp 22 S
56.02.6005	Centris trial head f/rasp 22 M
56.02.6006	Centris trial head f/rasp 22 L
56.02.6014	Centris trial head f/rasp 28 S
56.02.6015	Centris trial head f/rasp 28 M
56.02.6016	Centris trial head f/rasp 28 L

For the final implant, as well as for the trial prosthesis, the standard trial heads with the following item numbers must be used:

Item no.	Description
51.34.1061	Trial head 22 S
51.34.1062	Trial head 22 M
51.34.1063	Trial head 22 L
51.34.1064	Trial head 28 S
51.34.1065	Trial head 28 M
51.34.1066	Trial head 28 L
51.34.1067	Trial head 28 XL
51.34.1068	Trial head 28 XXL
51.34.1069	Trial head 32 S
51.34.1070	Trial head 32 M
51.34.1071	Trial head 32 L
51.34.1072	Trial head 32 XL
51.34.1073	Trial head 32 XXL
51.34.1074	Trial head 36 S
51.34.1075	Trial head 36 M
51.34.1076	Trial head 36 L
51.34.1077	Trial head 36 XL
51.34.1078	Trial head 36 XXL

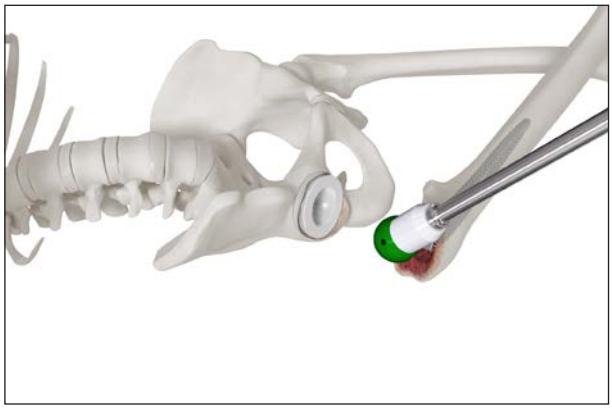


Fig. 24

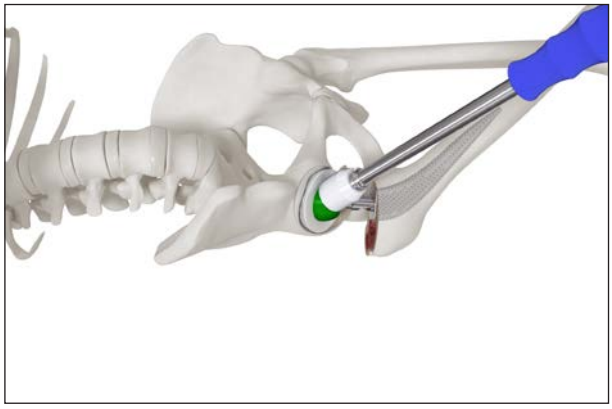


Fig. 25

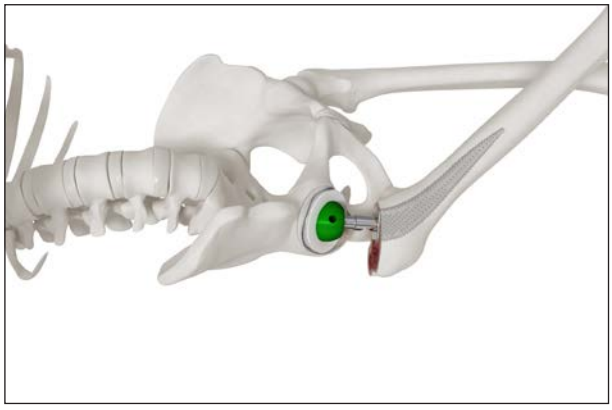


Fig. 26

Remark
Trial heads for trial reduction with the rasp are only available in diameters 22.2 mm and 28 mm, each with neck lengths S, M and L.

When using bigger head sizes or longer neck versions (XL and XXL), please use a trial prosthesis for testing purposes.

An overview of the neck lengths of the trial heads can be found in the chapter «Instruments».

Before trial reduction, it is recommended to compare the position of the rotation centre of the trial head and the insertion depth of the rasp with the preoperative templating measurements.

Remark
Match the final head size with the inner diameter of the cup.

Trial reduction of the final rasp (Figs. 24–26).

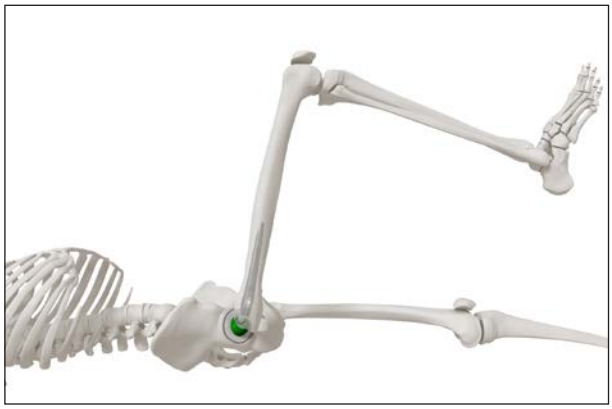


Fig. 27

Fig. 28

After trial reduction, take the hip through a full range of motion. Watch out for soft-tissue and neck-cup impingement and evaluate the tendency of the implant to dislocate during internal and external rotation in flexion and extension. Also make sure that soft tissue tension is appropriate (Figs. 27–28).

Remark

At this time, it is still possible to modify the stem size and offset, the neck length of the trial head, and to some extent the stem anteversion if needed.

Remark

Correct fit of the rasp in the femur can additionally be checked under image intensification.

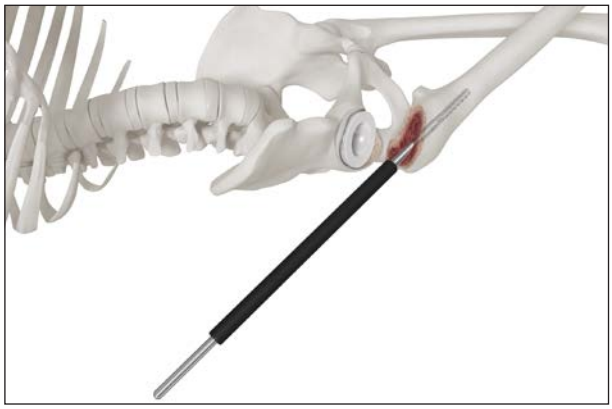


Fig. 29

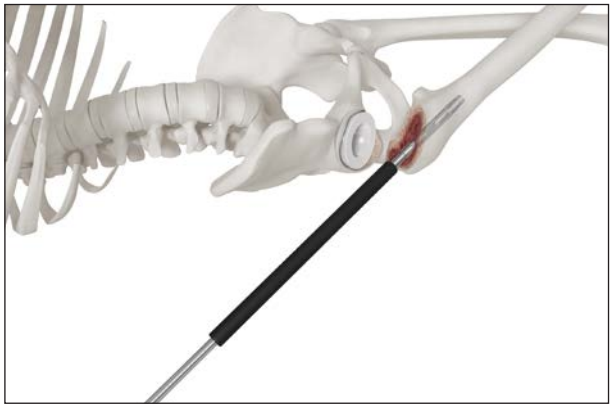


Fig. 30

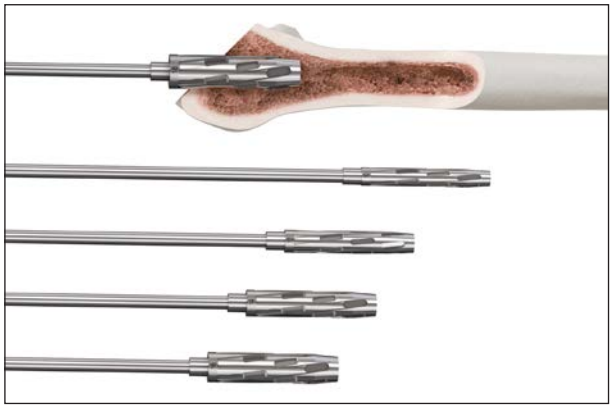


Fig. 31

Option 2: Preparation of the implant bed with the cancellous bone reamer

The cylindrical reamers are used to remove cancellous bone only. Stop reaming upon contact with the cortical bone (Figs. 29–30).

Starting with the smallest size, the reamers are introduced in successive order, and the medullary cavity is carefully prepared (Fig. 31).

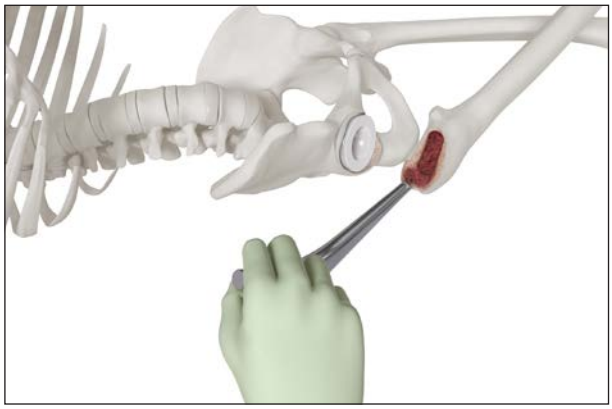


Fig. 32

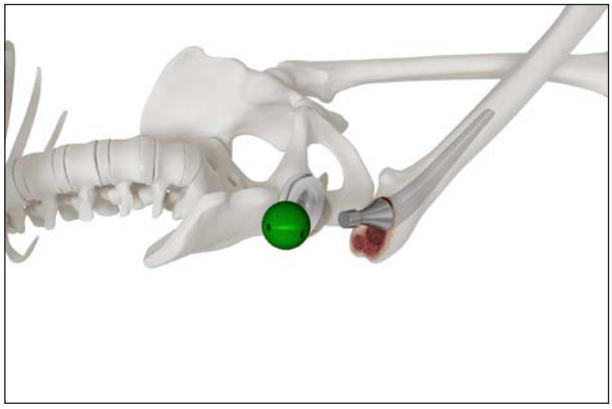


Fig. 33

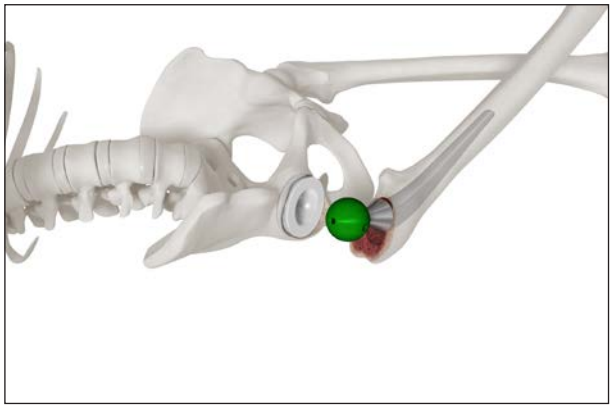


Fig. 34

Verification of the correct fit by introduction of a trial stem (Fig. 32).

The size markings of the trial prosthesis match the implant sizes.

Remark
Correct fit of the trial prosthesis in the femur can additionally be checked under image intensification.

The selected trial head, with a diameter corresponding to the inner diameter of the cup, is positioned on the taper of the trial stem (Figs. 33–34).

Remark
For the final implant, as well as for the trial prosthesis, the standard trial heads with the following item numbers must be used:

Item no.	Description
51.34.1061	Trial head 22 S
51.34.1062	Trial head 22 M
51.34.1063	Trial head 22 L
51.34.1064	Trial head 28 S
51.34.1065	Trial head 28 M
51.34.1066	Trial head 28 L
51.34.1067	Trial head 28 XL
51.34.1068	Trial head 28 XXL
51.34.1069	Trial head 32 S
51.34.1070	Trial head 32 M
51.34.1071	Trial head 32 L
51.34.1072	Trial head 32 XL
51.34.1073	Trial head 32 XXL
51.34.1074	Trial head 36 S
51.34.1075	Trial head 36 M
51.34.1076	Trial head 36 L
51.34.1077	Trial head 36 XL
51.34.1078	Trial head 36 XXL

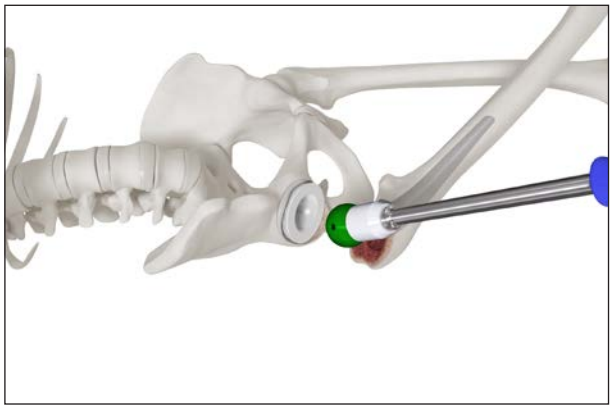


Fig. 35

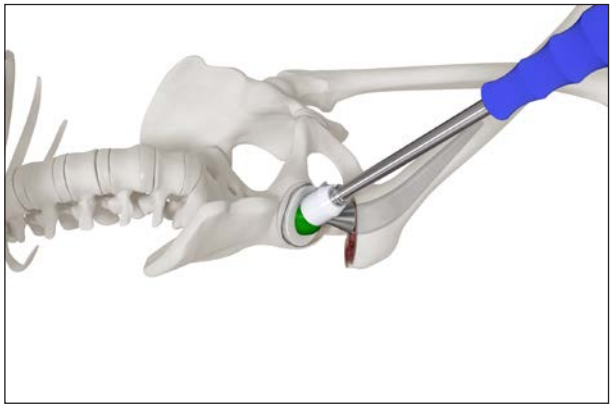


Fig. 36

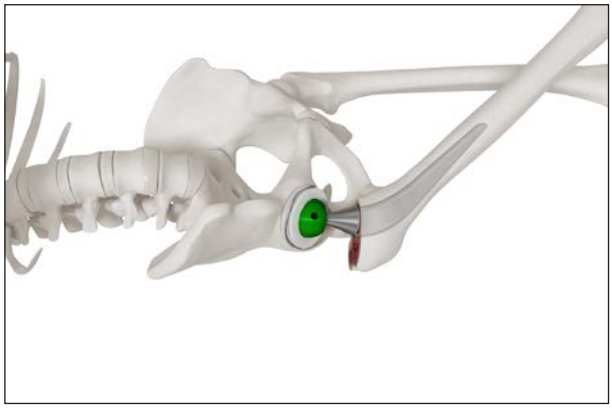


Fig. 37

Before trial reduction, it is recommended to compare the position of the rotation centre of the trial head and the insertion depth of the trial stem with the pre-operative templating measurements.

Remark
Match the final head size with the inner diameter of the cup.

Trial reduction with the trial stem (Figs. 35–36).

After trial reduction, take the hip through a full range of motion. Watch out for soft-tissue and neck-cup impingement and evaluate the tendency of the implant to dislocate during internal and external rotation in flexion and extension. Also make sure that soft tissue tension is appropriate (Fig. 37).

Remark
At this time, it is still possible to modify the stem size and offset, the neck length of the trial head, and to some extent the stem anteversion if needed.

Remark
Correct fit of the trial prosthesis in the femur can additionally be checked under image intensification.

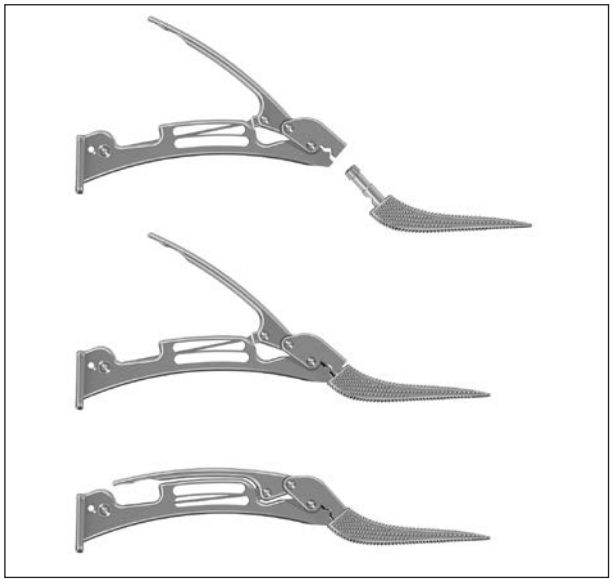


Fig. 38

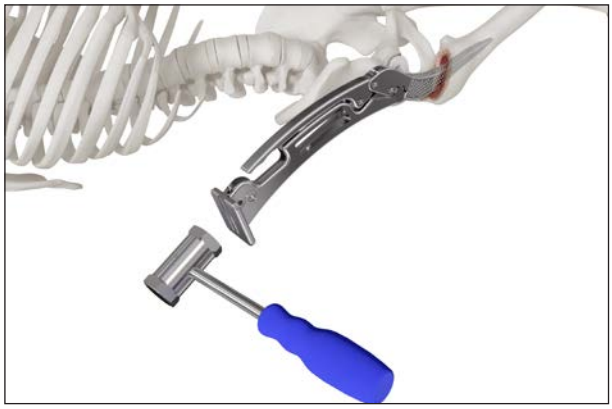


Fig. 39

Additional information for using the Centris long stem

Remark

The procedure for implanting a Centris long stem is to start with the rasping process before distal preparation of the femoral canal with the flexible reamer.

Stepwise rasping of the femur (Fig. 38).

Remark

The Centris long stems are available only in the following versions:

	180 mm	230 mm
3S1	✔	✔
3S2	✔	✔
4S1	✔	✔
4S2	✔	✔

	175 mm	225 mm
5R1	✔	✔

Remark

It is recommended to start with the smallest rasp and then gradually open the femoral canal up to the preoperatively planned size (Fig. 39).

The rasps are introduced into the femoral canal along the lateral cortex with moderate hammer strokes.

Remark

The direction of advancement of the rasp needs to be in line with the femur axis, to reduce the risk of undersizing or malalignment of the final implant.

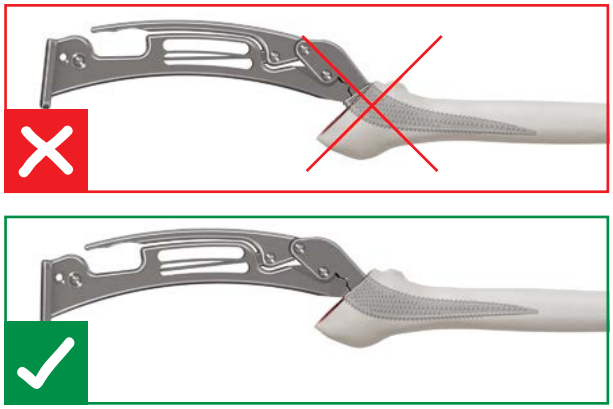


Fig. 40

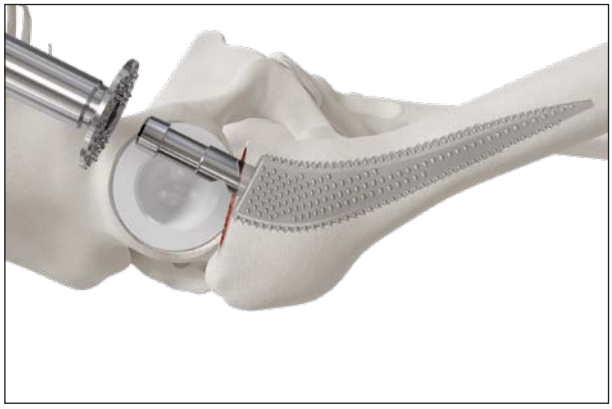


Fig. 41

Fig. 42

During the progressive rasping, select the desired stem version and increase first the rasp offset up to the planned neck length (first digit). Once the desired offset (neck length) is reached, the rasp size (last digit) is increased up to the planned stem diameter.

Do not use rasps of size 2 unless this size has been preoperatively planned as the final implant size.

Example
Planned stem: 4S2
Rasping sequence: 1S2 → 2S1 → 3S1 → 4S1 → 4S2

While progressively widening the medullary canal using increasing rasp sizes, make sure to drive the rasps along the axis of the proximal femur and control the anteversion of the stem (Fig. 40).

Remark
Each rasp should be fully introduced down to the level of the resection plane in order to prevent protrusion of the final implant.

With the largest possible rasp in place, the calcar reamer is positioned over the rasp and the neck resection is finalized (Figs. 41 – 42).

Thus, the small medial collar of the Centris long stem will fit the medial neck cut, allowing adequate control of the insertion depth of the final implant.

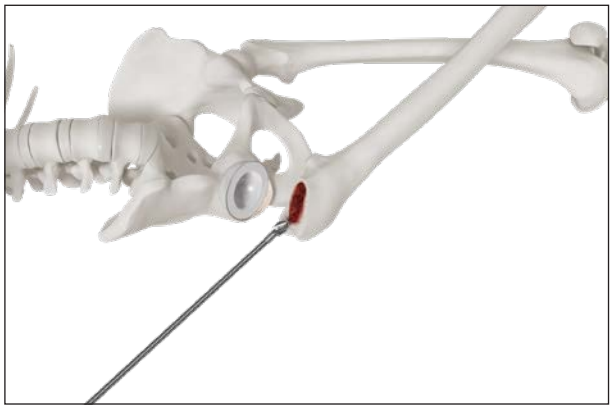


Fig. 43

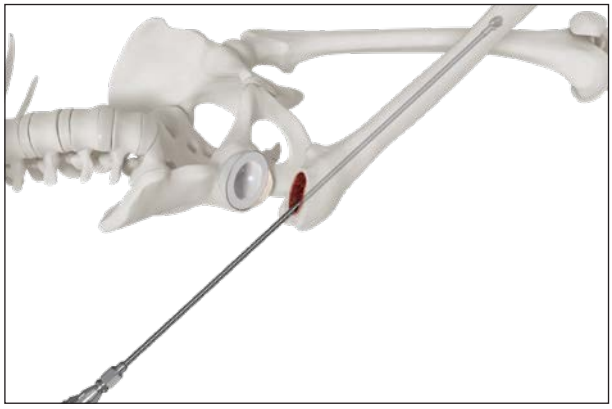


Fig. 44

Fig. 45

After rasping, use the cylindrical flexible reamers to remove distal cancellous bone only. Stop reaming upon contact with the cortical bone (Figs. 43–45).

Stem size and length	Recommended final flexible reamer size
3S1 180 mm	10
3S1 230 mm	10
3S2 180 mm	10
3S2 230 mm	10
4S1 180 mm	11
4S1 230 mm	11
4S2 180 mm	11
4S2 230 mm	11
5R1 175 mm	11/12
5R1 225 mm	11/12

Remark

Mark the length of the trial prosthesis on the flexible reamer in order to check the depth of the implant (Fig. 46).

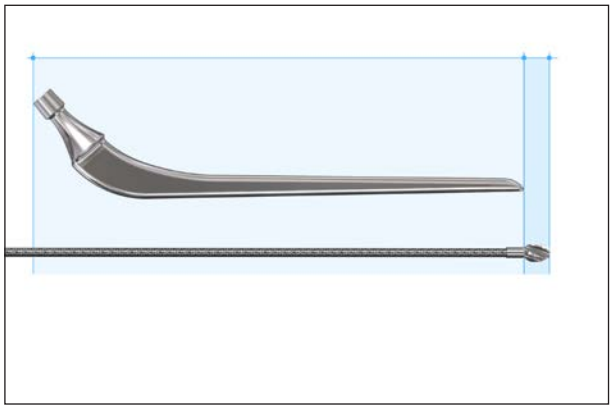


Fig. 46

Verification of the correct fit by introduction of the Centris long trial stem (Figs. 47–48).

Remark
The size markings of the trial prosthesis match the implant sizes.

Remark
Correct fit of the trial prosthesis in the femur can additionally be checked under image intensification.

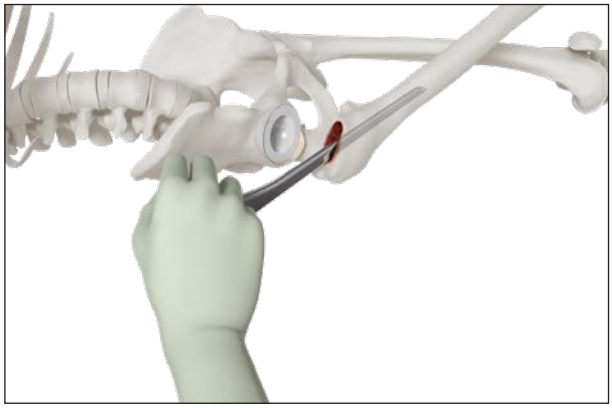


Fig. 47

The selected trial head, with a diameter corresponding to the inner diameter of the cup, is positioned on the taper of the trial stem (Figs. 49–50).

Remark
For the final implant, as well as for the trial prosthesis, the standard trial heads with the following item numbers must be used:

Item no.	Description
51.34.1061	Trial head 22 S
51.34.1062	Trial head 22 M
51.34.1063	Trial head 22 L
51.34.1064	Trial head 28 S
51.34.1065	Trial head 28 M
51.34.1066	Trial head 28 L
51.34.1067	Trial head 28 XL
51.34.1068	Trial head 28 XXL
51.34.1069	Trial head 32 S
51.34.1070	Trial head 32 M
51.34.1071	Trial head 32 L
51.34.1072	Trial head 32 XL
51.34.1073	Trial head 32 XXL
51.34.1074	Trial head 36 S
51.34.1075	Trial head 36 M
51.34.1076	Trial head 36 L
51.34.1077	Trial head 36 XL
51.34.1078	Trial head 36 XXL

An overview of the neck lengths of the trial heads can be found in chapter «Instruments».

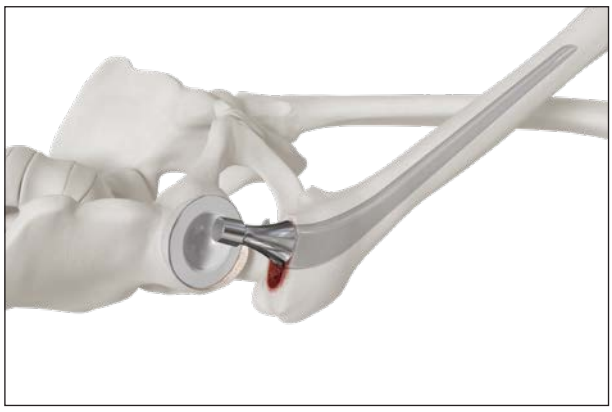


Fig. 48

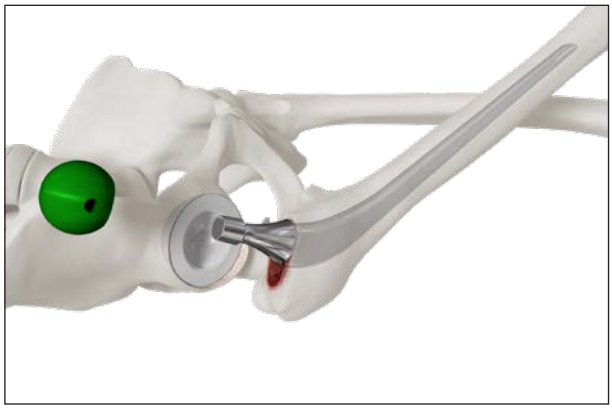


Fig. 49

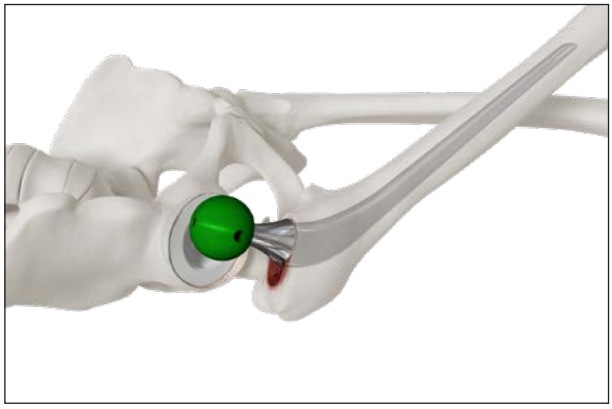


Fig. 50

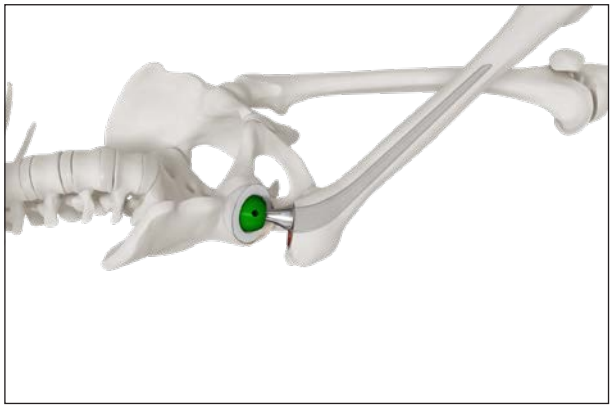


Fig. 51

Before trial reduction, it is recommended to compare the position of the rotation centre of the trial head and the insertion depth of the trial stem with the pre-operative templating measurements.

Remark
Match the final head size with the inner diameter of the cup.

Trial reduction of the trial stem
After trial reduction, take the hip through a full range of motion. Watch out for soft-tissue and neck-cup impingement and evaluate the tendency of the implant to dislocate during internal and external rotation in flexion and extension. Also make sure that soft tissue tension is appropriate (Fig. 51).

Remark
At this time, it is still possible to modify the stem size and offset, the neck length of the trial head, and to some extent the stem anteversion if needed.

Remark
Correct fit of the trial prosthesis in the femur can additionally be checked under image intensification.

Selection and insertion of the cement restrictor
The inner diameter of the medullary canal can be evaluated preoperatively on radiographs of the proximal femur or using a measuring cone positioner to determine the position and size of the medullary plug.

Remark
The measurement is performed on the medial line indicating the resection plane.
The medullary plug should be placed 1 cm distally to the tip of the prosthesis.

The medullary plug made of autologous cancellous bone, polyethylene or resorbable synthetic material is used according to the height of the test implantation.

Remark
The instruments to be used to determine the size of the medullary plug are not included in the standard instrument set and must therefore be ordered separately.

For more information about the Mathys medullary plug, please contact your local Mathys representative.

Final canal preparation
Prior to cementing, the medullary canal must be cleaned from loose bone debris and fat that could compromise proper interlocking of the cement with the cancellous bone of the proximal femur. This can be achieved with a curette or brush and extensive jet lavage. It is important to preserve the layer of cancellous bone that is well-fixed to the inner cortex to allow proper cement interlocking during cement pressurisation.

Subsequently the prosthetic bed is carefully aspirated and dried. Concomitantly, the bone cement is mixed.

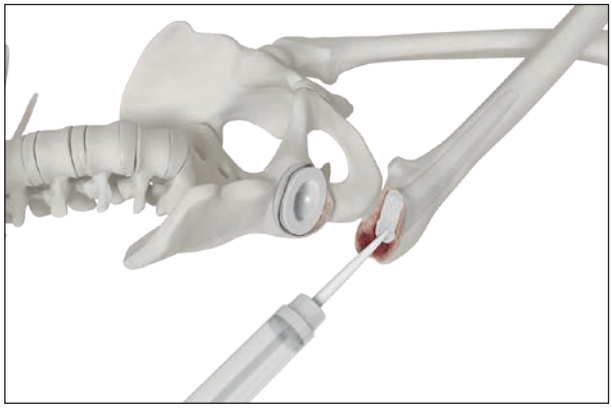


Fig. 52

Retrograde cementing technique
The long nozzle of the cement gun, filled with cement, is introduced against the cement restrictor plug. As cement is injected in a retrograde fashion into the medullary canal, the nozzle is removed progressively until the canal is filled up to the neck resection level (Fig. 52).

Antegrade cementing technique
First, a venting tube is introduced against the cement restrictor plug. Then, the short nozzle of the cement gun, filled with cement, is introduced in the proximal femur, and cement is injected into the medullary canal up to the neck resection level. The venting tube prevents air, blood and fat from being trapped by the cement restrictor plug and must be removed before cement pressurization.

Cement pressurization
To improve cement interlocking, a proximal seal is used to obliterate the proximal femoral canal, and additional cement is injected under pressure with the cement gun.

Remark
The cementing technique requires special precautions (preparation of the bone cavity, cementing technique, collaboration with the anaesthetist, etc.) which are described in the specific instructions for use of the cement.

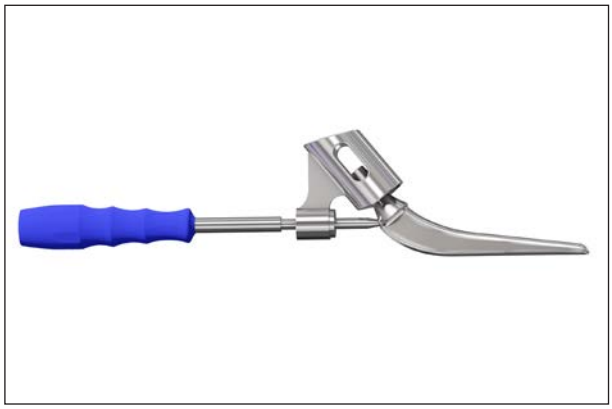


Fig. 53

Implantation of the Centris stem

The selected Centris stem, together with the cone protector, is connected to the stem introducer without a hammer (Fig. 53) and inserted into the medullary canal that has been filled with cement.

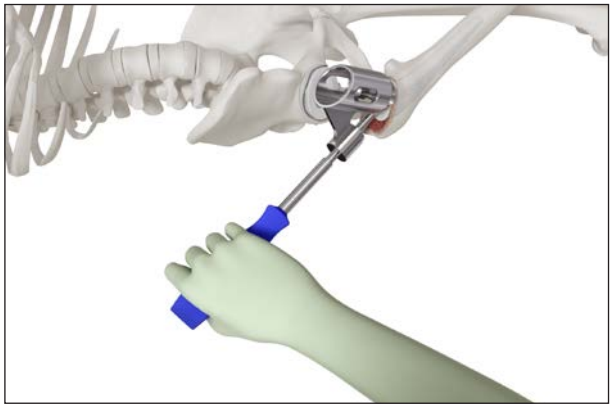


Fig. 54

To avoid misalignment and trapping of air between the stem and the cement, the stem must be introduced slowly and in line with the proximal axis of the femoral canal until the small medial collar reaches the neck resection level (Fig. 54).

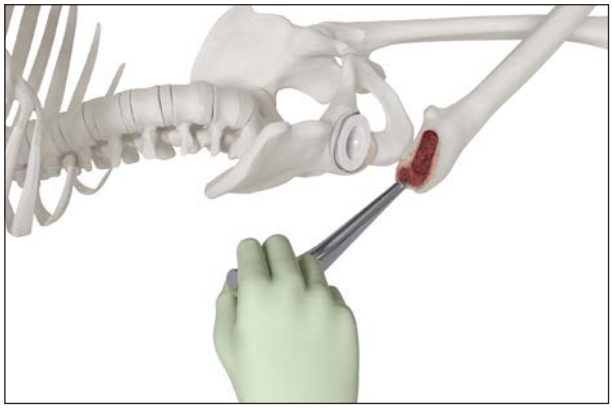


Fig. 55

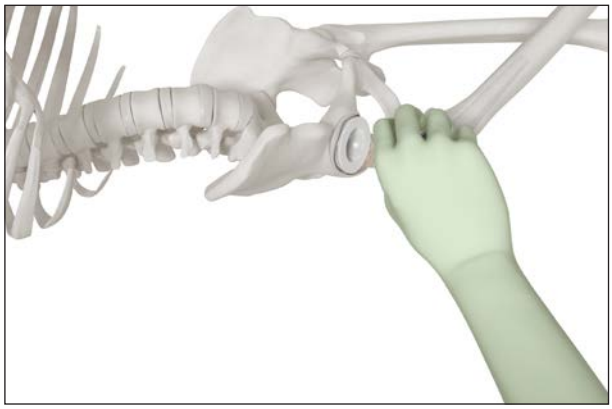


Fig. 56

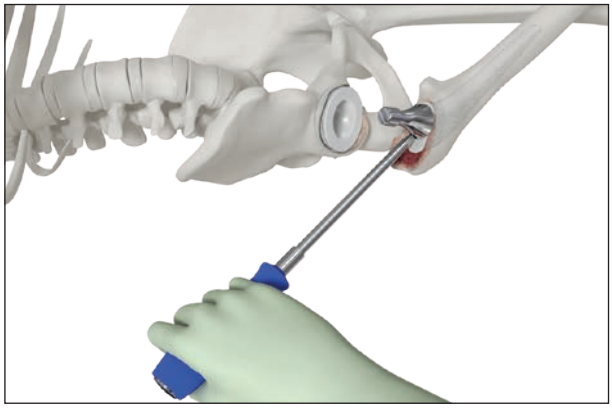


Fig. 57

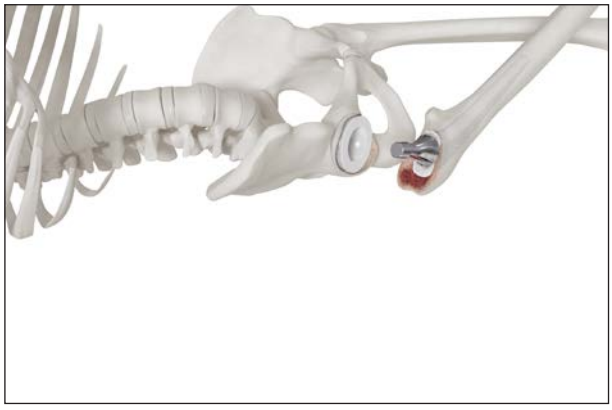


Fig. 58

Remark

Alternatively, the stem can be introduced by hand and maintained with the stem introducer (Figs. 55–58).

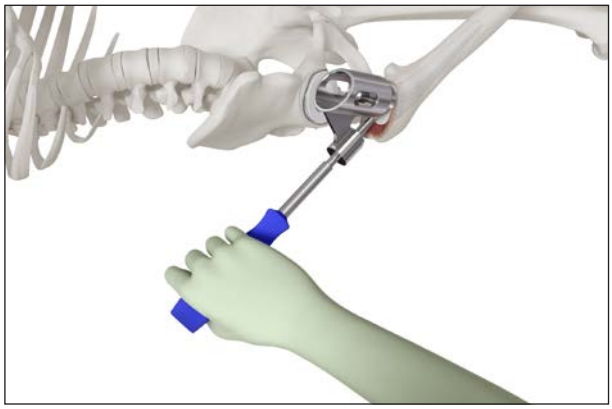


Fig. 59

Remove all excess bone cement and hold the stem steadily in position with the stem introducer until the bone cement is fully polymerized (Fig. 59).

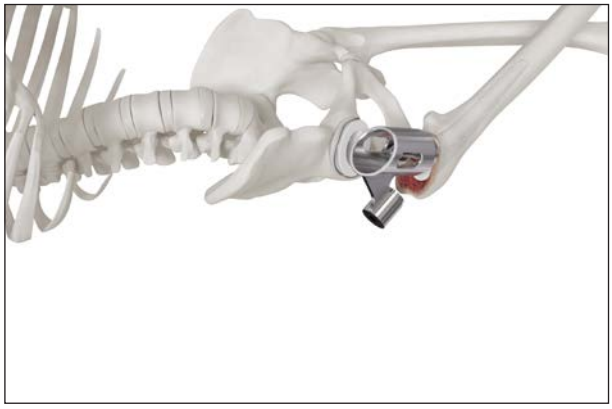


Fig. 60

Disconnect the stem introducer and remove the cone protection (Figs. 60–61).

Fig. 61

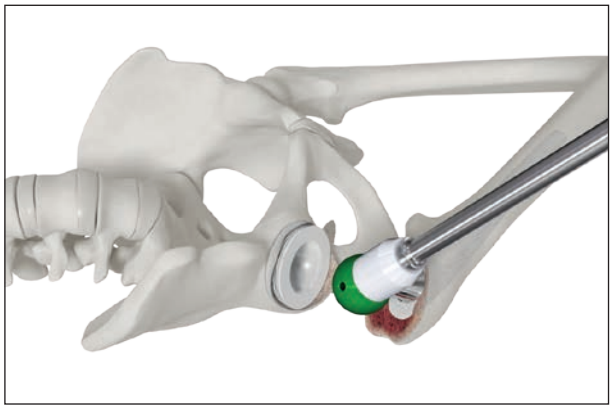


Fig. 62

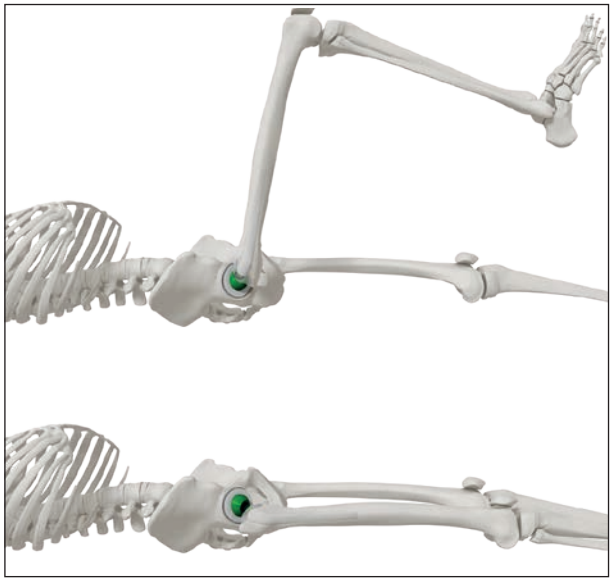


Fig. 63

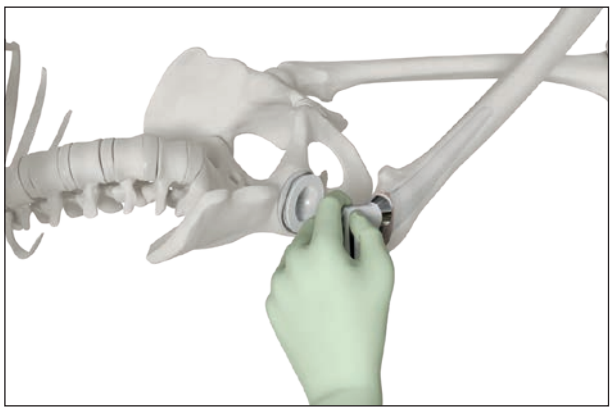


Fig. 64

After curing of the cement, the trial heads of different lengths can be used to perform another trial reduction with the implant in place for testing the range of motion and the ligament tension (Figs. 62–63).

Remark
At this time, only the neck length of the prosthetic head can still be modified if needed.

Remark
An overview of the neck lengths of the final heads and trial heads can be found in chapter «Implants» and «Instruments».

Remark
The head diameter must always match the inner diameter of the cup.

To avoid complications at the stem/head interface, the stem cone needs to be dry and free of any foreign matter (e.g. tissue parts, bone or cement particles) before assembling the final head (Figs. 64–65).

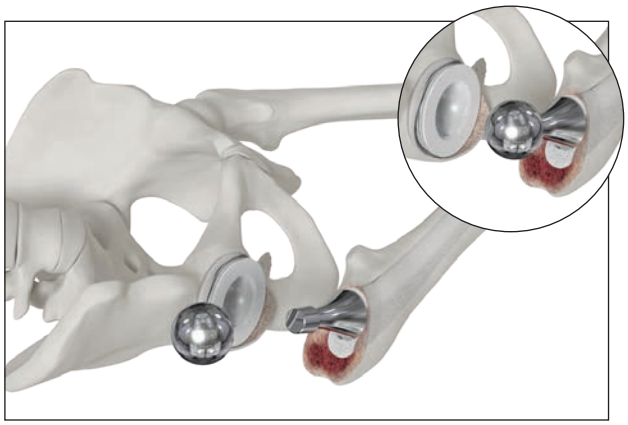


Fig. 65

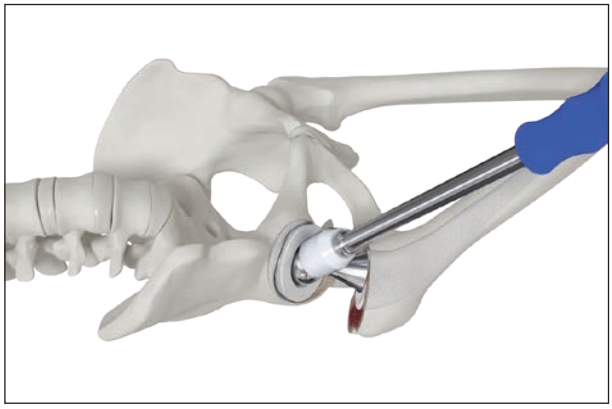


Fig. 66

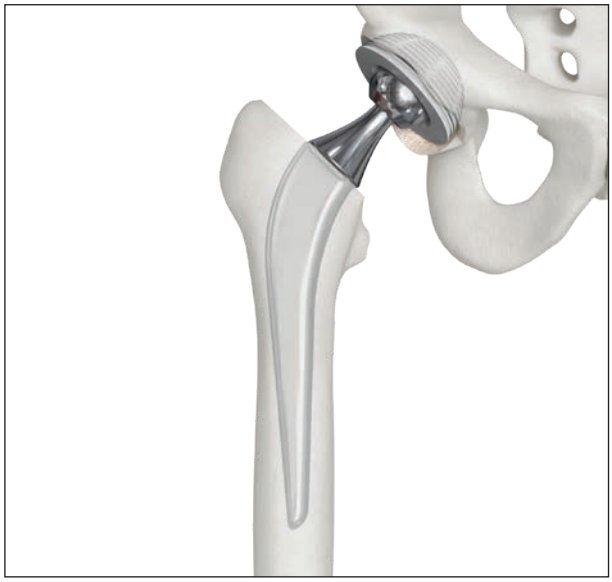


Fig. 67

Reduction of the joint (Figs. 66–67).

Remark
Correct fit of the implants can additionally be checked under image intensification.

The joint space needs to be free of any cement or bone particles present.

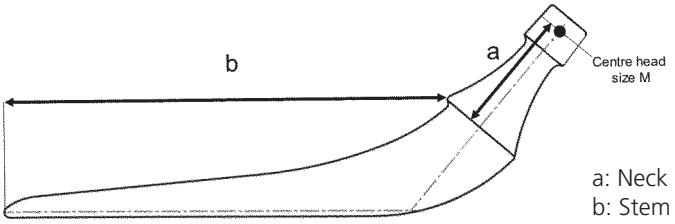
Depending on the approach, the muscle insertions are reattached, and the wound is closed layer by layer.

Removal of the Centris Stem
In case of revision, the Centris stem can be removed with universal stem extraction instruments and general instruments to remove bone cement.

For further information about stem revision and extraction instruments, please contact your local Mathys representative.

In case of intraoperative removal of the final stem, re-implantation of the same stem is not allowed – a new stem must be used.

4. Implants



a: Neck length
b: Stem length

Centris dysplasia stem, cemented

Item no.	Size	Neck length (a)	Stem length (b)
56.11.0055	1D1	28 mm	105 mm
56.11.0056	2D1	32 mm	112 mm
56.11.0057	3D1	35 mm	120 mm
56.11.0058	4D1	39 mm	129 mm
56.11.0059	5D1	47 mm	128 mm

Material: FeCrNiMnMoNbN
Cone: 12/14 mm
CCD-angle: 130°

Centris standard stem, cemented

Item no.	Size	Neck length (a)	Stem length (b)
56.11.0060	1S2	28 mm	104 mm
56.11.0061	2S1	32 mm	112 mm
56.11.0062	2S2	32 mm	113 mm
56.11.0063	2S3	32 mm	113 mm
56.11.0064	3S1	35 mm	121 mm
56.11.0065	3S2	35 mm	122 mm
56.11.0066	3S3	35 mm	123 mm
56.11.0067	4S1	39 mm	128 mm
56.11.0068	4S2	39 mm	129 mm
56.11.0069	4S3	39 mm	129 mm

Material: FeCrNiMnMoNbN
Cone: 12/14 mm
CCD-angle: 130°

Centris revision stem, cemented

Item no.	Size	Neck length (a)	Stem length (b)
56.11.0070	5R1	47 mm	131 mm
56.11.0071	5R2	47 mm	133 mm

Material: FeCrNiMnMoNbN
Cone: 12/14 mm
CCD-angle: 130°

Centris standard long stem, cemented

Item no.	Size	Neck length (a)	Stem length (b)
56.11.0072	3S1	35 mm	180 mm
56.11.0074	3S2	35 mm	180 mm
56.11.0076	4S1	39 mm	180 mm
56.11.0078	4S2	39 mm	180 mm
56.11.0073	3S1	35 mm	230 mm
56.11.0075	3S2	35 mm	230 mm
56.11.0077	4S1	39 mm	230 mm
56.11.0079	4S2	39 mm	230 mm

Material: FeCrNiMnMoNbN
Cone: 12/14 mm
CCD-angle: 130°

Centris revision long stem, cemented

Item no.	Size	Neck length (a)	Stem length (b)
56.11.0080	5R1	47 mm	175 mm
56.11.0081	5R1	47 mm	225 mm

Material: FeCrNiMnMoNbN
Cone: 12/14 mm
CCD-angle: 130°

Femoral Heads

Femoral Head, Stainless Steel

Item no.	OD	Neck length	
54.11.1031	22.2 mm	S	- 3 mm
54.11.1032	22.2 mm	M	0 mm
54.11.1033	22.2 mm	L	+ 3 mm
2.30.410	28 mm	S	- 4 mm
2.30.411	28 mm	M	0 mm
2.30.412	28 mm	L	+ 4 mm
2.30.413	28 mm	XL	+ 8 mm
2.30.414	28 mm	XXL	+ 12 mm
2.30.400	32 mm	S	- 4 mm
2.30.401	32 mm	M	0 mm
2.30.402	32 mm	L	+ 4 mm
2.30.403	32 mm	XL	+ 8 mm
2.30.404	32 mm	XXL	+ 12 mm

Material: FeCrNiMnMoNbN
Cone: 12 / 14 mm

Femoral Head, CoCrMo

Item no.	OD	Neck length	
52.34.0125	22.2 mm	S	- 3 mm
52.34.0126	22.2 mm	M	0 mm
52.34.0127	22.2 mm	L	+ 3 mm
2.30.010	28 mm	S	- 4 mm
2.30.011	28 mm	M	0 mm
2.30.012	28 mm	L	+ 4 mm
2.30.013	28 mm	XL	+ 8 mm
2.30.014	28 mm	XXL	+ 12 mm
2.30.020	32 mm	S	- 4 mm
2.30.021	32 mm	M	0 mm
2.30.022	32 mm	L	+ 4 mm
2.30.023	32 mm	XL	+ 8 mm
2.30.024	32 mm	XXL	+ 12 mm
52.34.0686	36 mm	S	- 4 mm
52.34.0687	36 mm	M	0 mm
52.34.0688	36 mm	L	+ 4 mm
52.34.0689	36 mm	XL	+ 8 mm
52.34.0690	36 mm	XXL	+ 12 mm

Material: CoCrMo
Cone: 12 / 14 mm

Femoral Heads

Femoral Head, ceramys

Item no.	OD	Neck length	
54.47.0010	28 mm	S	- 3.5 mm
54.47.0011	28 mm	M	0 mm
54.47.0012	28 mm	L	+ 3.5 mm
54.47.0110	32 mm	S	- 4 mm
54.47.0111	32 mm	M	0 mm
54.47.0112	32 mm	L	+ 4 mm
54.47.0113	32 mm	XL	+ 8 mm
54.47.0210	36 mm	S	- 4 mm
54.47.0211	36 mm	M	0 mm
54.47.0212	36 mm	L	+ 4 mm
54.47.0213	36 mm	XL	+ 8 mm

Material: ZrO_2-Al_2O_3
Cone: 12 / 14 mm

For ceramic-ceramic pairings, use only ceramic heads with ceramic inlays by Mathys.

Femoral Head, symarec

Item no.	OD	Neck length	
54.48.0010	28 mm	S	- 3.5 mm
54.48.0011	28 mm	M	0 mm
54.48.0012	28 mm	L	+ 3.5 mm
54.48.0110	32 mm	S	- 4 mm
54.48.0111	32 mm	M	0 mm
54.48.0112	32 mm	L	+ 4 mm
54.48.0113	32 mm	XL	+ 8 mm
54.48.0210	36 mm	S	- 4 mm
54.48.0211	36 mm	M	0 mm
54.48.0212	36 mm	L	+ 4 mm
54.48.0213	36 mm	XL	+ 8 mm

Material: Al_2O_3-ZrO_2
Cone: 12 / 14 mm

For ceramic-ceramic pairings, use only ceramic heads with ceramic inlays by Mathys.

Revision Heads

Revision Head, ceramys

Item no.	OD	Neck length	
54.47.2010	28 mm	S	- 3.5 mm
54.47.2020	28 mm	M	0 mm
54.47.2030	28 mm	L	+ 3.5 mm
54.47.2040	28 mm	XL	+ 7 mm
54.47.2110	32 mm	S	- 3.5 mm
54.47.2120	32 mm	M	0 mm
54.47.2130	32 mm	L	+ 3.5 mm
54.47.2140	32 mm	XL	+ 7 mm
54.47.2210	36 mm	S	- 3.5 mm
54.47.2220	36 mm	M	0 mm
54.47.2230	36 mm	L	+ 3.5 mm
54.47.2240	36 mm	XL	+ 7 mm

Material: ZrO_2-Al_2O_3, TiAl6V4
Cone: 12/14 mm

ceramys Revision Heads can be used with all Mathys stem systems with a «12/14 cone».

The ceramys Revision Heads can be only combined with Mathys polyethylene or ceramic cups or inlays.

Bipolar Head, CoCrMo and Stainless Steel

CoCrMo	Stainless Steel	OD	Head diameter
52.34.0090	–	39 mm	22.2 mm
52.34.0091	–	40 mm	22.2 mm
52.34.0092	–	41 mm	22.2 mm
52.34.0093	–	42 mm	22.2 mm
52.34.0094	–	43 mm	22.2 mm
52.34.0100	54.11.0042	42 mm	28 mm
52.34.0101	–	43 mm	28 mm
52.34.0102	54.11.0044	44 mm	28 mm
52.34.0103	–	45 mm	28 mm
52.34.0104	54.11.0046	46 mm	28 mm
52.34.0105	–	47 mm	28 mm
52.34.0106	54.11.0048	48 mm	28 mm
52.34.0107	–	49 mm	28 mm
52.34.0108	54.11.0050	50 mm	28 mm
52.34.0109	–	51 mm	28 mm
52.34.0110	54.11.0052	52 mm	28 mm
52.34.0111	–	53 mm	28 mm
52.34.0112	54.11.0054	54 mm	28 mm
52.34.0113	–	55 mm	28 mm
52.34.0114	54.11.0056	56 mm	28 mm
52.34.0115	–	57 mm	28 mm
52.34.0116	54.11.0058	58 mm	28 mm
52.34.0117	–	59 mm	28 mm

Material CoCrMo: CoCrMo; UHMWPE
Material stainless steel: FeCrNiMnMoNbN; UHMWPE

Detailed information on the implantation of bipolar heads is provided in a separate surgical technique. Please contact your local Mathys agency for this.

Hemiprosthesis Head, Stainless Steel
Sizes 38 – 44 mm

Item no. / S -4 mm	Item no. / M 0 mm	OD
2.30.420	67092	38 mm
2.30.421	67093	40 mm
2.30.422	67094	42 mm
2.30.423	67095	44 mm

Material: FeCrNiMnMoNbN
Cone: 12 / 14 mm

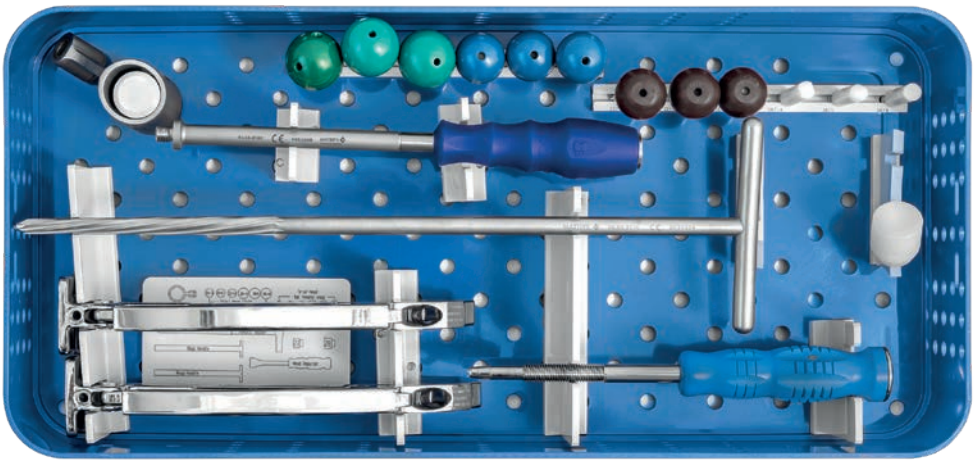
Hemiprosthesis Head, Stainless Steel
Sizes 46 – 58 mm

Item no. / S -4 mm	Item no. / M 0 mm	OD
2.30.424	67096	46 mm
2.30.425	67097	48 mm
2.30.426	67098	50 mm
2.30.427	67099	52 mm
2.30.428	67100	54 mm
2.30.429	67101	56 mm
2.30.430	67102	58 mm

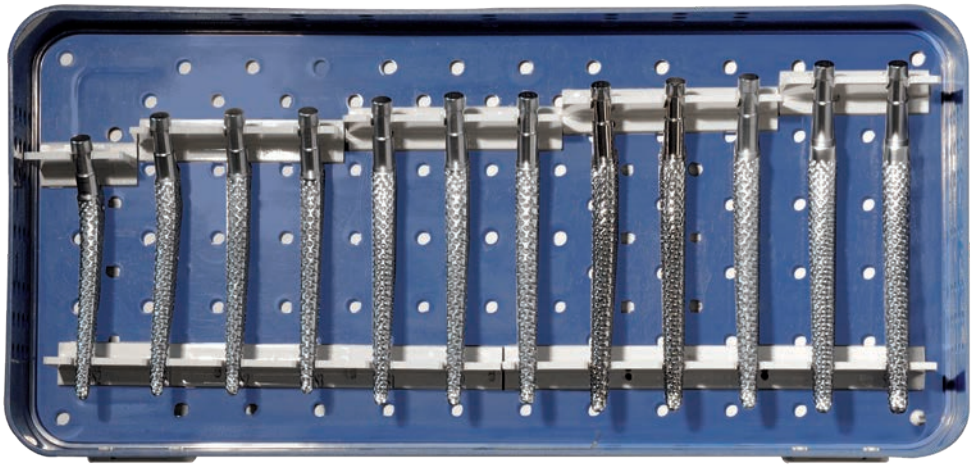
Material: FeCrNiMnMoNbN
Cone: 12 / 14 mm

5. Instruments

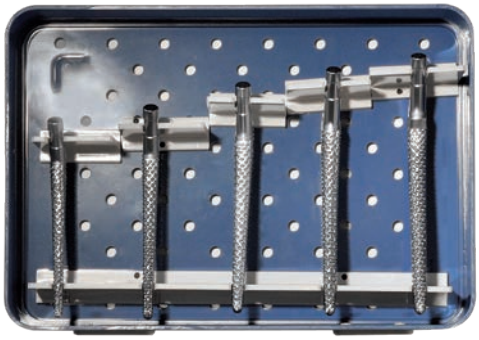
Centris Instrumentation



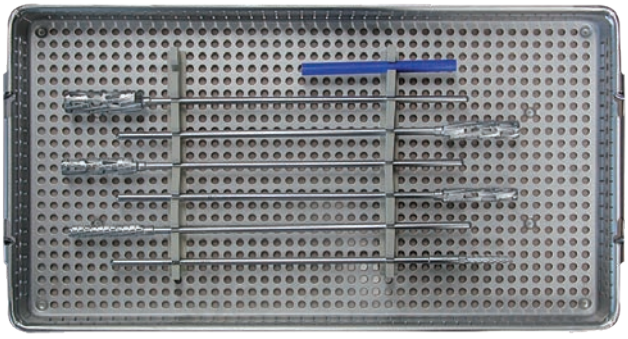
Item no. 56.03.6101 **Centris tray 1**



Item no. 56.03.6102 **Centris tray 2**

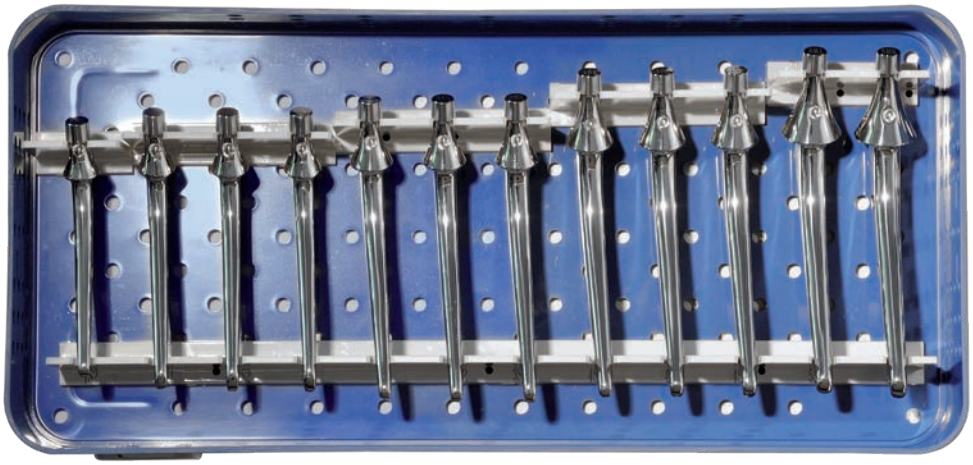


Item no. 56.03.6103 **Centris tray 3**

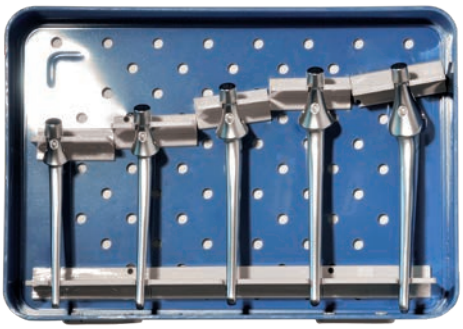


Item no. 56.03.6104 **Centris tray 4**

Centris Instrumentation



Item no. 56.03.6105 **Centris tray 5**

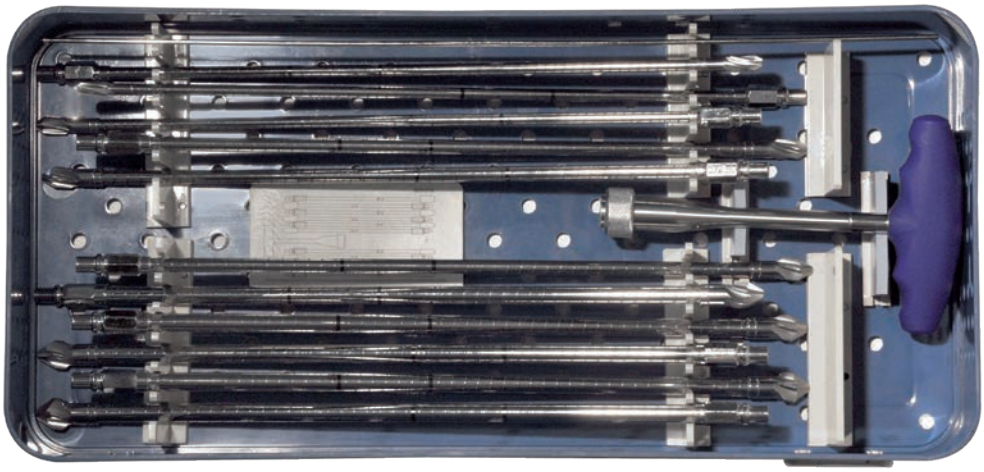


Item no. 56.03.6106 **Centris tray 6**

Item no. 56.03.6107 **Centris tray 7**

Item no. 56.03.6108 **Centris tray 8**

Centris Instrumentation



Item no. 51.34.0074 **Centris tray 9**

Centris Instrumentation
OPT Modular Rasps 56.01.0011A

Tray no.	Item no.
1	56.03.6101
2	56.03.6102
3	56.03.6103

Centris Instrumentation
OPT Cancellous Reamer 56.01.0012A

Tray no.	Item no.
1	56.03.6101
4	56.03.6104
5	56.03.6105
6	56.03.6106

Centris Instrumentation
LS Addition 56.01.0013A*

Tray no.	Item no.
7	56.03.6107
8	56.03.6108
9	51.34.0074

Centris Instrumentation
Trial Prosth. Addition 56.01.0014A*

Tray no.	Item no.
5	56.03.6105
6	56.03.6106

Note: The mentioned Item numbers refer to the empty trays. The pictures are intended as support and illustrate the different set options.

* Optional – needed for long stems

Item no.	Description	Tray no.
56.02.6160	Centris trial prosthesis 1S2	5
56.02.6161	Centris trial prosthesis 2S1	5
56.02.6162	Centris trial prosthesis 2S2	5
56.02.6163	Centris trial prosthesis 2S3	5
56.02.6164	Centris trial prosthesis 3S1	5
56.02.6165	Centris trial prosthesis 3S2	5
56.02.6166	Centris trial prosthesis 3S3	5
56.02.6167	Centris trial prosthesis 4S1	5
56.02.6168	Centris trial prosthesis 4S2	5
56.02.6169	Centris trial prosthesis 4S3	5
56.02.6170	Centris trial prosthesis 5R1	5
56.02.6171	Centris trial prosthesis 5R2	5

Set no. 56.01.0012A, 56.01.0014A

Item no.	Description	Tray no.
56.02.6155	Centris trial prosthesis 1D1	6
56.02.6156	Centris trial prosthesis 2D1	6
56.02.6157	Centris trial prosthesis 3D1	6
56.02.6158	Centris trial prosthesis 4D1	6
56.02.6159	Centris trial prosthesis 5D1	6

Set no. 56.01.0012A, 56.01.0014A

Item no.	Description	Tray no.
56.02.6004	Centris trial head f/rasp 22 S	1
56.02.6005	Centris trial head f/rasp 22 M	1
56.02.6006	Centris trial head f/rasp 22 L	1

Cone 11/12 mm; Set no. 56.01.0011A

Item no.	Description	Tray no.
51.34.1061	Trial head 22 S	1
51.34.1062	Trial head 22 M	1
51.34.1063	Trial head 22 L	1

Cone 12/14 mm; Set no. 56.01.0011A, 56.01.0012A

Item no.	Description	Tray no.
56.02.6014	Centris trial head f/rasp 28 S	1
56.02.6015	Centris trial head f/rasp 28 M	1
56.02.6016	Centris trial head f/rasp 28 L	1

Cone 11/12mm; Set no. 56.01.0011A

Item no.	Description	Tray no.
51.34.1064	Trial head 28 S	1
51.34.1065	Trial head 28 M	1
51.34.1066	Trial head 28 L	1

Cone 12/14mm; Set no. 56.01.0011A, 56.01.0012A

Item no.	Description	Tray no.
51.34.0135	Head impactor silicone	1

Set no. 56.01.0011A, 56.01.0012A

Item no.	Description	Tray no.
3.30.536	Top f/head impactor	1

Set no. 56.01.0011A, 56.01.0012A

Item no.	Description	Tray no.
56.02.6035	Impactor	1

Set no. 56.01.0011A, 56.01.0012A

Item no.	Description	Tray no.
56.02.6001	Centris impact handle	1

Set no. 56.01.0011A, 56.01.0012A

Item no.	Description	Tray no.
56.02.2016	Reamer, narrow	1

Set no. 56.01.0011A, 56.01.0012A

Item no.	Description	Tray no.
56.02.6110	Centris cancellous reamer 8	4
56.02.6111	Centris cancellous reamer 10	4
56.02.6112	Centris cancellous reamer 12	4
56.02.6113	Centris cancellous reamer 14	4
56.02.6114	Centris cancellous reamer 16	4
56.02.6115	Centris cancellous reamer 18	4

Set no. 56.01.0012A

Item no.	Description	Tray no.
56.02.6116	Centris Teflon holder cancellous reamer	4

Set no. 56.01.0012A

Item no.	Description	Tray no.
56.02.6180	Centris trial prosthesis 5R1/175	7
56.02.6172	Centris trial prosthesis 3S1/180	7
56.02.6174	Centris trial prosthesis 3S2/180	7
56.02.6176	Centris trial prosthesis 4S1/180	7
56.02.6178	Centris trial prosthesis 4S2/180	7
56.02.6181	Centris trial prosthesis 5R1/225	8
56.02.6173	Centris trial prosthesis 3S1/230	8
56.02.6175	Centris trial prosthesis 3S2/230	8
56.02.6177	Centris trial prosthesis 4S1/230	8
56.02.6179	Centris trial prosthesis 4S2/230	8

Set no. 56.01.0013A

Item no.	Description	Tray no.
51.34.0063	Reamer flexible 8.0, 2nd gen.	9
51.34.0064	Reamer flexible 8.5, 2nd gen.	9
51.34.0065	Reamer flexible 9.0, 2nd gen.	9
51.34.0066	Reamer flexible 9.5, 2nd gen.	9
51.34.0067	Reamer flexible 10.0, 2nd gen.	9
51.34.0068	Reamer flexible 10.5, 2nd gen.	9
51.34.0069	Reamer flexible 11.0, 2nd gen.	9
51.34.0070	Reamer flexible 11.5, 2nd gen.	9
51.34.0071	Reamer flexible 12.0, 2nd gen.	9
51.34.0072	Reamer flexible 12.5, 2nd gen.	9
51.34.0073	Reamer flexible 13.0, 2nd gen.	9

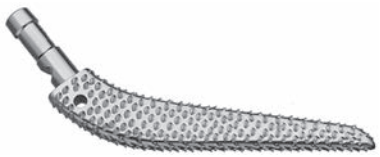
Set no. 56.01.0013A

Item no.	Description	Tray no.
56.02.6183	Guide for medullary reamer flex.	9

Set no. 56.01.0013A

Item no.	Description	Tray no.
58.02.4008	Handle with quick coupling	9

Set no. 56.01.0013A



Item no.	Description	Tray no.
56.02.6130	Centris rasp modular 1S2	2
56.02.6131	Centris rasp modular 2S1	2
56.02.6132	Centris rasp modular 2S2	2
56.02.6133	Centris rasp modular 2S3	2
56.02.6134	Centris rasp modular 3S1	2
56.02.6135	Centris rasp modular 3S2	2
56.02.6136	Centris rasp modular 3S3	2
56.02.6137	Centris rasp modular 4S1	2
56.02.6138	Centris rasp modular 4S2	2
56.02.6139	Centris rasp modular 4S3	2
56.02.6140	Centris rasp modular 5R1	2
56.02.6141	Centris rasp modular 5R2	2

Set no. 56.01.0011A

Item no.	Description	Tray no.
56.02.6125	Centris rasp modular 1D1	3
56.02.6126	Centris rasp modular 2D1	3
56.02.6127	Centris rasp modular 3D1	3
56.02.6128	Centris rasp modular 4D1	3
56.02.6129	Centris rasp modular 5D1	3

Set no. 56.01.0011A

Item no.	Description
56.02.6200	Centris Calcar Reamer

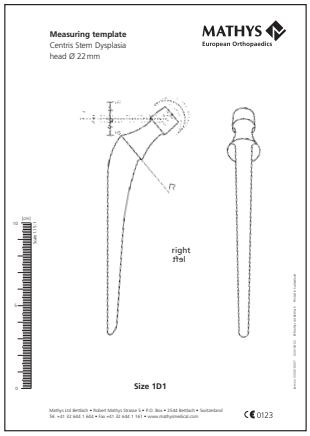
Set no. 56.01.0011A, 56.01.0012A

Centris Instruments – optional

Item no.	Description
51.34.0295	MIS Stem impactor with ball

Item no.	Description
56.02.2017	Impactor for tapping

6. Measuring templates



Item no.	Description
330.010.007	Centris stem dysplasia template
330.010.008	Centris dysplasia 28 mm template
330.010.010	Centris standard 28 mm template
330.010.011	Centris long stem 28 mm template

7. References

1 Scheerlinck et al (2006) The design features of cemented femoral hip implant; J Bone Joint Surg [Br] 2006;88-B:1409-18

2 Scheerlinck Th. (2010) Primary hip arthroplasty templating on standard radiographs. A stepwise approach; Acta Orthop. Belg., 2010, 76, 432-442

3 Loweg L., Kutzner K.P., Trost M., Hechtner M., et al. The learning curve in short-stem THA: influence of the surgeon's experience on intraoperative adjustments due to intraoperative radiography. European Journal of Orthopaedic Surgery & Traumatology, 2017

8. Symbols


Manufacturer


Correct


Incorrect


Caution

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