SPS®
Anatomical femoral stems

Surgical technique
SPS® Hip System

symbios
custom-made for you

INTRODUCTION

The SPS® Hip System

Concept

The SPS® HA and SPS® Evolution are cementless anatomical femoral stems developed to provide the best fit and fill in the anatomy of the proximal femur following the natural shape and curvature of the femoral canal. The SPS® HA was initially introduced in the early 1990's, capitalizing on Symbios' expertise in three-dimensional planning and design technology for patient-matched femoral stems. The SPS® Evolution was launched 20 years later with the objective of optimising the extramedullary reconstruction of the prosthetic centre of rotation while preserving the intramedullary shape inherited from the SPS® HA.

Both product ranges extend the boundaries of extramedullary reconstruction solutions based on a unique and clinically proven intramedullary design concept. In addition, the SPS® HA and SPS® Evolution femoral stems are supported by 15 years of experience in 3D pre-operative planning using the HIP-PLAN® software which is provided to the surgeons.

The SPS® HA and SPS® Evolution stems are indicated for primary total hip arthroplasty.

The SPS® instrumentation is common to both product ranges (SPS® HA and SPS® Evolution) and is suitable for all hip joint surgical approaches.

Disclaimer

The surgical technique is for illustrative purposes only. This material does not replace or supersede the instructions for use. It should not be considered the exclusive source of information, and should be used in conjunction with the instruction for use. See the instructions for use for the full list of indications, contraindications, warnings, precautions, and potential undesirable effects. For further information, contact your local Symbios representative.

Naturally anatomic

PERFECTING THE RECONSTRUCTION

- Neck-shaft angle to be chosen according to patient hip morphotype
  - SPS® HA: 134°, no retroversion of the neck
  - SPS® Evolution: 129°, neck retroversion of 5°
- Standard 12/14 5°40' taper

3D ANATOMICAL CURVATURE

- Natural adaptation to the medullary canal
- 15° axial helitorsion within the metaphyseal zone
- Anterior sagittal curvature

SHORT, REFINED DISTAL PART

- To prevent thigh pain associated with distal cortical contact

CONTROL OF ROTATION

Impaction hole with a slotted recess to control rotation during impaction

Note: the SPS® HA stem has an impaction hole without slotted recess.

EXTERNAL LATERAL FLARE

For direct abutment on the external cortical bone

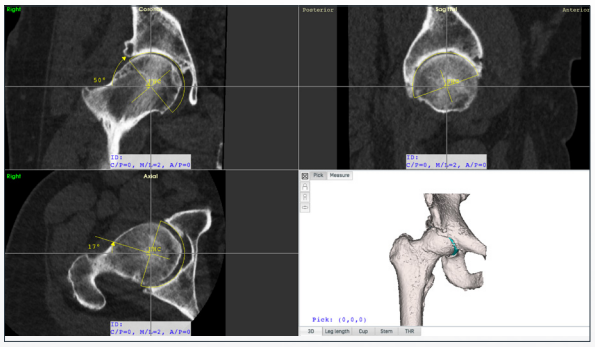
METAPHYSEAL FIXATION

- Coating of porous titanium and hydroxyapatite in the metaphyseal zone
- Roughened grooves for anchoring and stability in the cancellous bone

symbios

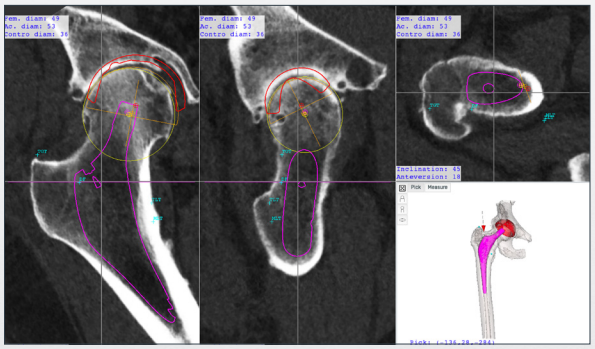
PREOPERATIVE PROCESS IN HIP-PLAN®

Analysis of the native anatomy



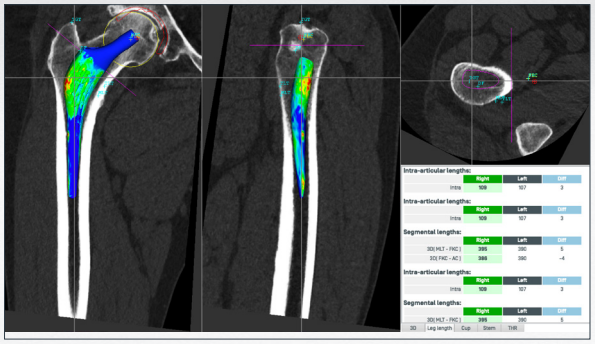
- Load the patient CT-scan in the HIP-PLAN® software.
- Determine the femoral head and acetabular diameter of the patient.
- Determine the native acetabular anteversion and inclination.

3D-planning of the stem



- Precisely determine in 3 dimensions the positioning of the stem, as well as its size and anteversion.
- Examine the functional behaviour of implants thanks to the combination of multi-plan views together with the surface view of the pelvis. Evaluate eventual cup oversizing which can lead to conflict with the iliopsoas muscle during flexion and extension of the prosthetic joint.

Evaluation of the final reconstruction



- Estimate the stability of reconstructed joint (cup and stem) by evaluating the functional outcome of reaming, position and size of chosen implants.
- Generation of the planning report file.

SURGICAL TECHNIQUE

SURGICAL STEPS

Surgical technique

Appendices

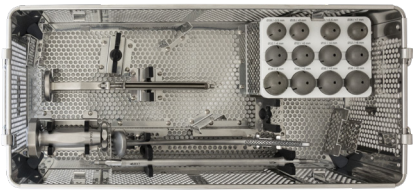
STEP 1
MATERIAL PREPARATION

Instrumentation

7002 0000 Standard Stem Instrumentation

This instrumentation is required to perform the steps from the femoral preparation to the impaction of all Symbios stems including SPS® HA and SPS® Evolution.

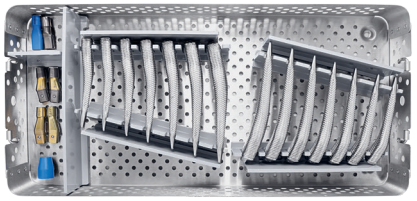
Level 1



Level 2

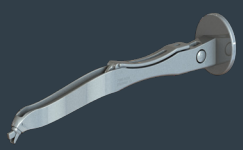
7071 0000 SPS® Rasps Instrumentation

This instrumentation contains the trial implants. Specific trial necks and rasps are used to implant either the SPS® HA stem or the SPS® Evolution stem.

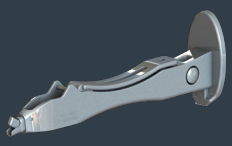


TO ORDER ACCORDING TO THE SURGICAL APPROACH

7006 1020 Double offset rasp handle - Right	7006 1022 Single offset rasp handle - Right
7006 1021 Double offset rasp handle - Left	7006 1023 Single offset rasp handle - Left



7006 1024 Hueter rasp handle



STEP 2
EXPOSURE

2.1 Surgical approach

- Determine the surgical approach based on surgery preferences and indications. [Fig.1]

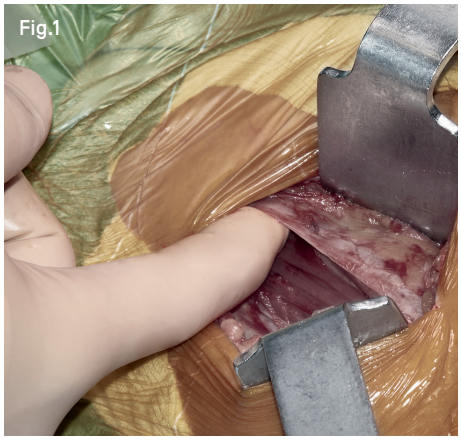


Fig.1

2.2 Opening of the joint capsule

- After opening the joint capsule, remove tissue at the femoral neck. [Fig.2]

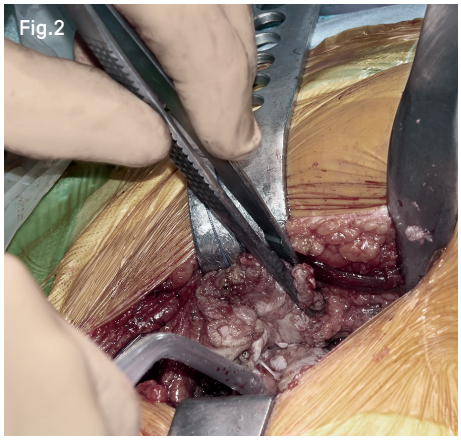


Fig.2

2.3 Resection and extraction of the femoral head

- Perform the osteotomy of the femoral head with an oscillating saw in accordance with preoperative planning. [Fig.3]
- Extract the femoral head.

› **HIP-PLAN® tip :** The height of the resection can be measured and compared to that in the planning report.

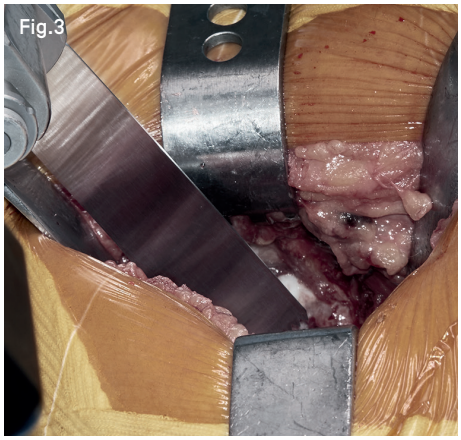


Fig.3

At the end of this step, proceed to the preparation of the acetabulum by referring both to the specific surgical technique of the planned cup and the HIP-PLAN® planning report when available.

STEP 3
PREPARATION OF THE FEMORAL MEDULLARY CANAL

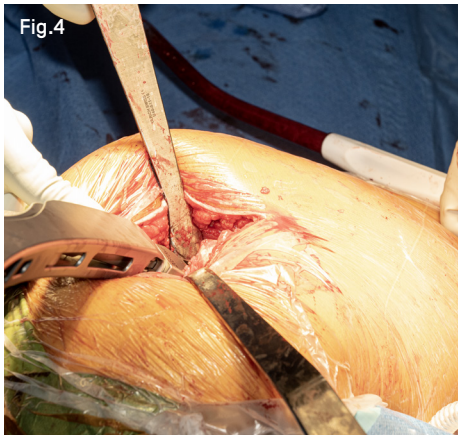


Fig.4

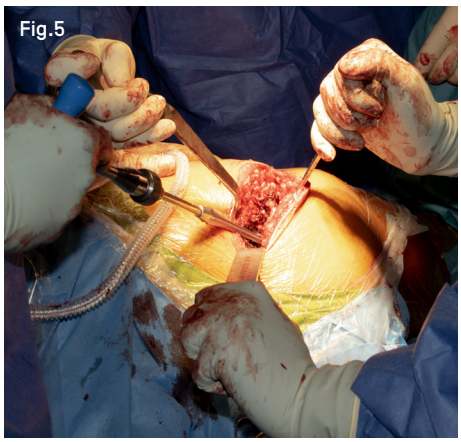


Fig.5

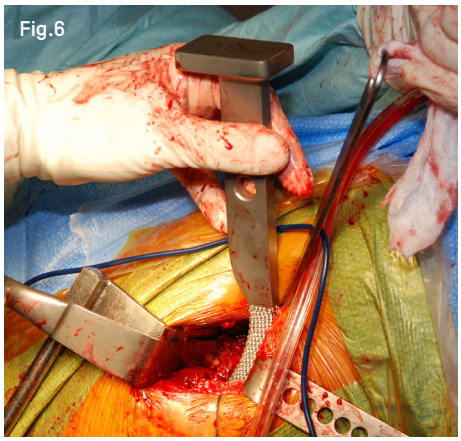


Fig.6

3.1. Preparation of the entry of the femoral medullary canal

- Once the acetabular preparation is performed and the cup implanted, expose the femur.
- Take care to expose the entry of the femoral medullary canal by means of retractors placed according to the surgical approach.
- Remove any femoral neck and fibrous tissue remnants that may interfere with the preparation of the femoral medullary canal with a curette or a long gouge.
- Prepare the entry of the femoral medullary canal with the modular box chisel connected to the straight rasp handle and applied to the internal cortex of the piriformis fossa. This removes a wedge of cancellous bone, creating a starting cavity for the femoral preparation. [Fig.4]

3.2. Preparation of the femoral medullary canal

- Assemble the small reamer with the T-handle in order to perform endomedullary reaming of the cancellous bone to check the diaphyseal axis and ensure cortical continuity. [Fig.5]
- The curved starter rasp can also be used to prepare the metaphyseal part of the femur before the insertion of the first rasp. [Fig.6]

Instruments


Long gouge
7002 1002


Modular box chisel
7004 4017


Straight rasp handle
7006 1019


Curved starter rasp
7012 2005

Small reamer
7002 3002


T-handle
7019 4001

STEP 3
PREPARATION OF THE FEMORAL MEDULLARY CANAL

3.3. Femoral rasping

- According to the chosen surgical approach, select the appropriate rasp handle (cf. APPENDIX 3 - Standard stems Intrumentation for handle options). Both left and right SPS® rasps are available. Make sure to connect the correct rasp side (corresponding to the operated hip) to the rasp handle. (Fig.7)
- Create access to the femoral canal starting with SPS® rasp B. The rasp shall run parrallel to the anterior inner cortex of the femur, following its natural anatomy. (Fig.8)
- Sequentially increase the size of the rasp, aiming the instrument toward the femoral axis. As the rasps are anatomical, they will find their way naturally. The rasps are introduced until optimal metaphyseal filling and locking is achieved. At this stage, the resection line (R) of the last rasp shall be at the level of the femoral neck osteotomy. Ensure proper alignment and antetorsion are achieved. (Fig.9)
- Check longitudinal and rotational stability is achieved with the final rasp. Leave the last rasp in place.

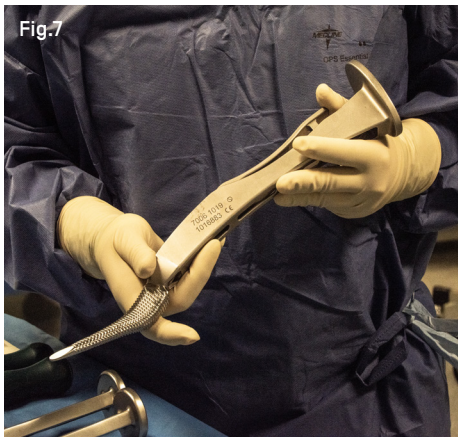


Fig.7

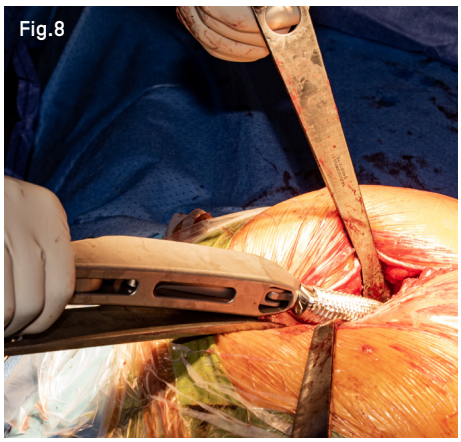


Fig.8

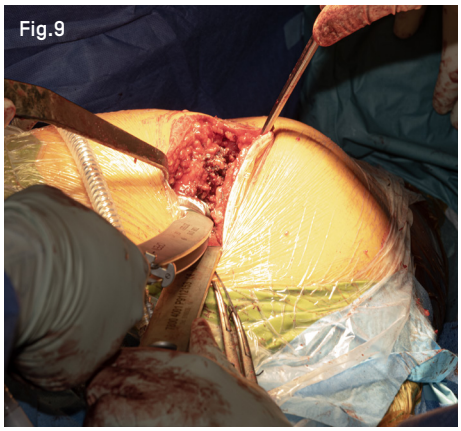
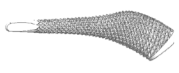


Fig.9

Instruments ^

Straight rasp handle
7006 1019



SPS® Rasp
7072 40xx

STEP 4
FUNCTIONAL TRIALS

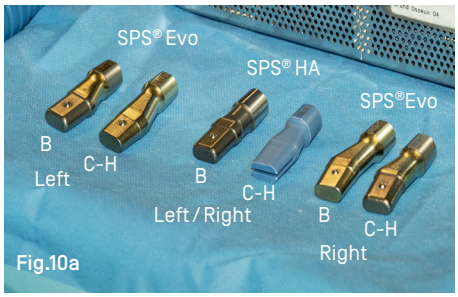
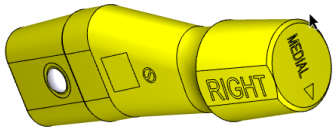


Fig.10a

Fig.10b



4.1. Selection of the trial neck

- Select the appropriate trial neck according to the planned femoral stem (SPS® HA or SPS® Evolution), laterality (Right or Left hip), stem size (B to H) and based on the specifications described below. (Fig.10a)
  - Grey trial neck: SPS® HA Size B, RIGHT and LEFT
  - Blue trial neck: SPS® HA Sizes C to H, RIGHT and LEFT
  - Yellow trial necks (4x): SPS® Evolution stems
    - 1x SPS® Evolution Size B / RIGHT
    - 1x SPS® Evolution Size B / LEFT
    - 1x SPS® Evolution Sizes C to H / RIGHT
    - 1x SPS® Evolution Sizes C to H / LEFT

  Note the trial neck orientation on the taper. (Fig.10b)

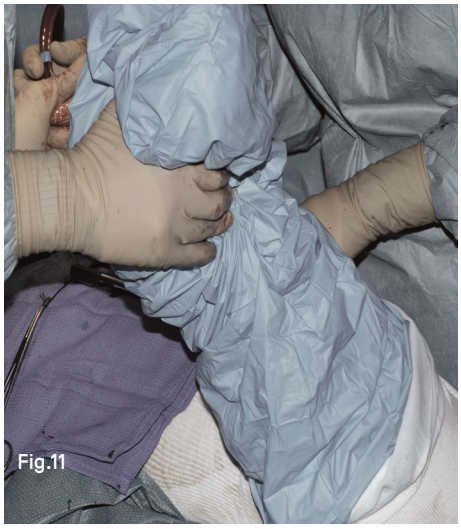


Fig.11

4.2. Performing the trial reduction

- Connect the trial neck on the rasp respecting the information marked about its orientation.

  Note: Align the arrows markings when coupling the SPS® HA Size B Trial neck with the SPS® Rasp B, RIGHT / LEFT.
- Assemble the Trial head with the selected offset on the Trial neck.
- Thanks to the head impaction end-cap assembled with the screwable impactor, proceed with the reduction of the prosthetic joint (trial head in the cup insert).
- Perform functional tests to control the mobility and stability of the joint. Change the offset of the trial head if necessary. (Fig.11)


Fig.12

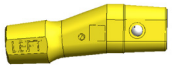
4.3. Extraction of the trial implants

- Dislocate the hip joint to disassemble the trial neck from the SPS® rasp (assembled with the trial head). (Fig.12)
- Remove all the trial implants.
- Clean the femoral medullary canal.

Instruments ^


SPS® HA Trial neck
7073 90xx

or


SPS® Evolution Trial neck
7073 90xx


Trial head
7003 4xxx


Head impaction end-cap
7004 3656


Screwable impactor
7004 1000

STEP 5
IMPLANTATION

5.1. Impaction of the stem

- Select the SPS® HA or SPS® Evolution femoral stem corresponding to the last SPS® rasp and selected trial neck used to carry out satisfactory functional tests.

› **Information :** The implant is delivered with a taper protective cover that should be left on during stem impaction.

- Insert the stem by hand ensuring it follows the anterior curvature of the femoral medullary canal.
- Position the dedicated stem impactor (see specifications below) into the impaction hole. Gently advance the stem and impact it in the central axis of the femur to the level of the hydroxyapatite coating which shall be line to line to the level of the neck osteotomy. **(Fig.13, 14)**
- Use the monobloc stem impactor to impact the SPS® HA stem (no slotted recess). Use the half-moon impactor to impact the SPS® Evolution stem (with slotted recess). **(Fig.13)**

  Information : In case the edge of the hydroxyapatite coating is not reaching the osteotomy level, remove the stem and further enlarge the medullary canal using the rasps as indicated in section 3.3. If the edge of the hydroxyapatite coating is below the resection line, remove the stem and consider replacing it with a larger stem.

Fig.13

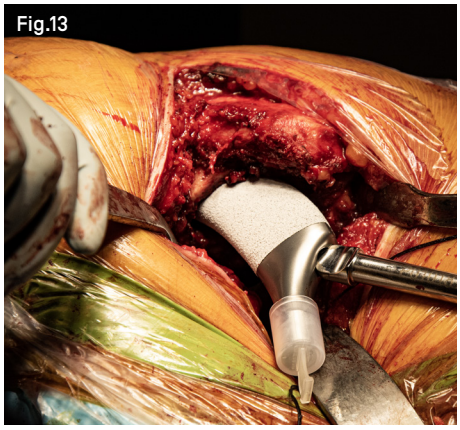
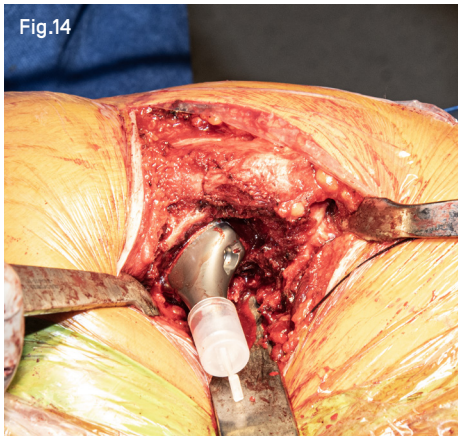


Fig.14



Caution : Cement shall not be used with coated implants.

Instruments ^

Half-moon stem impactor
7004 4008

Monobloc stem impactor
7004 4001

STEP 6
FINAL REDUCTION AND CLOSURE

6.1. Impaction of the femoral head

- Irrigate, clean and dry the neck of the stem of any blood, bone chips or other foreign materials.
- Select the femoral head of the same size than the Trial head providing satisfactory functional tests. Position it on the stem taper.
- Impact the head on the stem by using the Head impaction end-cap assembled with the Screwable impactor. [Fig.18]

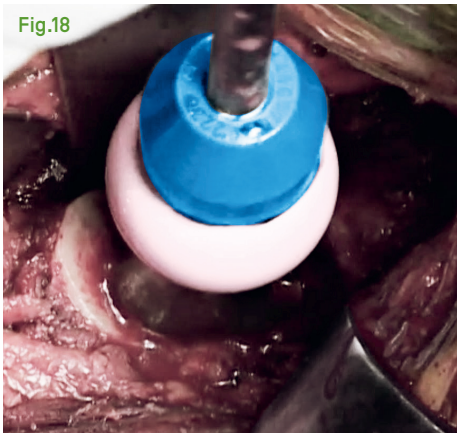


Fig.18

6.2. Final reduction

- Perform the final reduction of the prosthetic joint with the Head impaction end-cap assembled with the Screwable impactor. [Fig.19]
- Perform functional tests to control the correct mobility and stability of the joint.
- Rinse the joint thoroughly with sterile water.

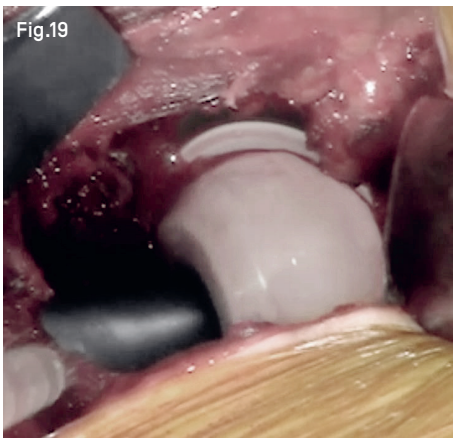


Fig.19

6.3. Closure

- Close the joint and the wound following standard surgical wound closure procedure. [Fig.20]

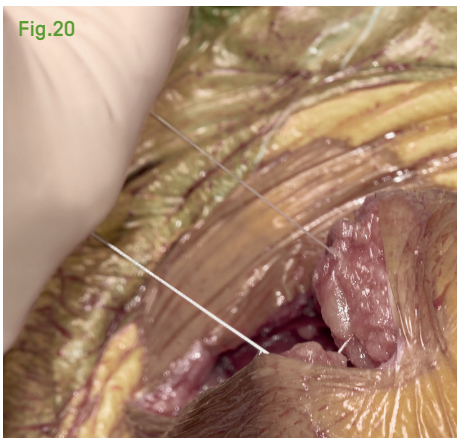


Fig.20

Instruments ^

Head impaction end-cap
7004 3656

Screwable impactor
7004 1000

APPENDICES

APPENDIX 1
PEROPERATIVE EXTRACTION

SPS® HA or SPS® Evolution stem extraction

- If the stem needs to be repositioned after impaction, use the reversible extractor to extract it. The rod of the reversible extractor has on one end a M5 thread (small) and on the other end a M8 thread (large). (Fig.21)
- Insert the rod into the handle (M8 thread first) until full engagement (no space between the rod and the handle). Screw the nut until full stop. (Fig.21)
- Screw the reversible extractor (M5 thread first) into the dedicated thread located on the upper part of the stem's shoulder. Then, extract the stem by hammering backwards on the impaction plate of the reversible extractor. (Fig.22)

› **Caution :** If the taper of the stem has been damaged during this procedure, do not re-insert the stem. Implant a new femoral stem.

Fig.21

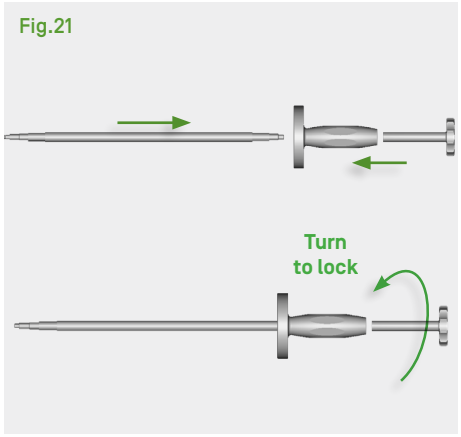


Fig.22

Instruments ^

Reversible extractor
7004 4018

APPENDIX 2
IMPLANT REFERENCES

SPS HA®

Cementless anatomical femoral stem
Titanium alloy (Ti6Al4V-ISO 5832-3)
Coating : Porous titanium and hydroxyapatite
12/14 5°40' taper. CCD shaft angle 134°

Sizes	Right (R)	Left (L)	Length
B	3022 0200	3022 0201	115 mm
C	3022 0300	3022 0301	120 mm
D	3022 0400	3022 0401	124 mm
E	3022 0500	3022 0501	131 mm
F	3022 0600	3022 0601	139 mm
G	3022 0700	3022 0701	146 mm
H	3022 0800	3022 0801	153 mm

SPS® Evolution

Cementless anatomical femoral stem
Titanium alloy (Ti6Al4V-ISO 5832-3)
Coating : Porous titanium and hydroxyapatite
12/14 5°40' taper. CCD shaft angle 129°

Sizes	Right (R)	Left (L)	Length
B	3023 0200	3023 0201	115 mm
C	3023 0300	3023 0301	120 mm
D	3023 0400	3023 0401	124 mm
E	3023 0500	3023 0501	131 mm
F	3023 0600	3023 0601	139 mm
G	3023 0700	3023 0701	146 mm
H	3023 0800	3023 0801	153 mm

APPENDIX 2
IMPLANT REFERENCES

BIOLOX® Delta Head

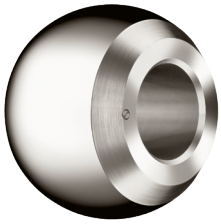
Ceramic head (Al2O3 + ZrO2-ISO 6474-2), compatible with 12/14 5°40' taper

Sizes — Offset in mm

	-4	-3.5	+0	+3.5	+4	+7	+8
Ø28	-	2014 2801	2014 2802	2014 2803**	-	-	-
Ø32	2014 3201	-	2014 3202	-	2014 3203	2014 3204	-
Ø36	2014 3601	-	2014 3602	-	2014 3603	-	2014 3604

Cobalt-Chrome Head

Cobalt-Chrome head (CoCrMo-ISO 5832-12), compatible with 12/14 5°40' taper

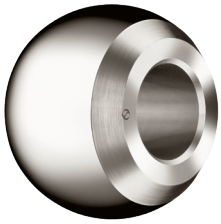


Sizes — Offset in mm

	-4	-3.5	-2	+0	+3.5	+4	+7	+8
Ø22.2	-	-	2010 2201	2010 2202	-	2010 2204*	-	-
Ø28	-	2010 2801	-	2010 2802	2010 2803**	-	2010 2804*	-
Ø32	2010 3201	-	-	2010 3202	-	2010 3203	-	2010 3204
Ø36	2010 3601	-	-	2010 3602	-	2010 3603	-	2010 3604

Stainless Steel Head

Stainless steel head (ISO 5832-9), compatible with 12/14 5°40' taper



Sizes — Offset in mm

	-4	-3.5	+0	+3.5	+4	+7	+8
Ø28	-	2011 2801	2011 2802	2011 2803**	-	2011 2804*	-
Ø32	2011 3201	-	2011 3202	-	2011 3203	-	2011 3204

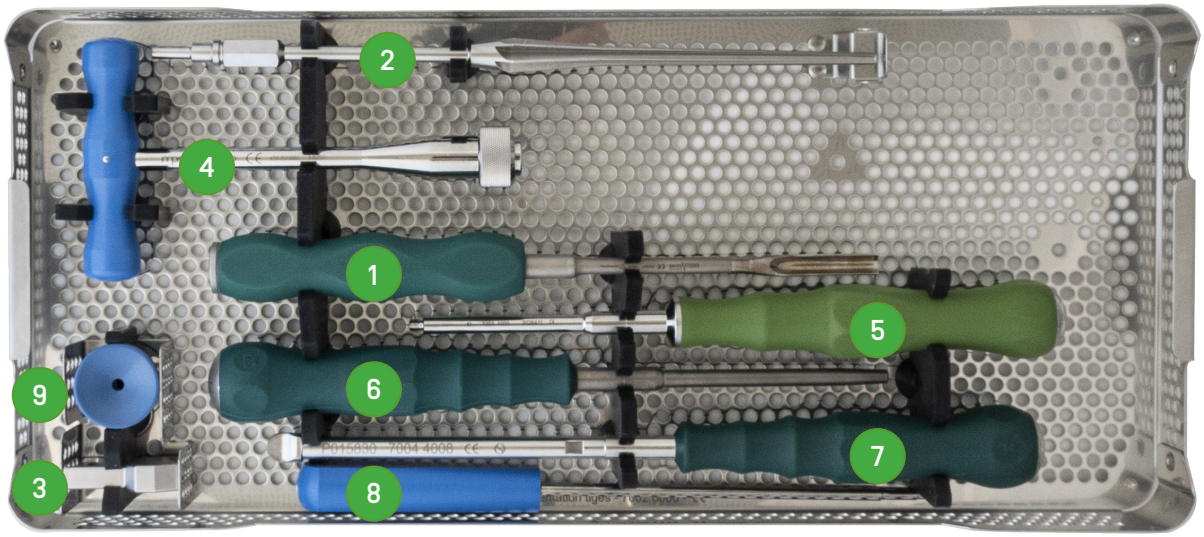
* Not compatible with SERENITY® cup
** Not compatible in combination with SPS® HA (only sizes C to H) and SERENITY® cup

APPENDIX 3
INSTRUMENT REFERENCES

symbios

Standard Stems Instrumentation

REF 7002 0000



Level 1

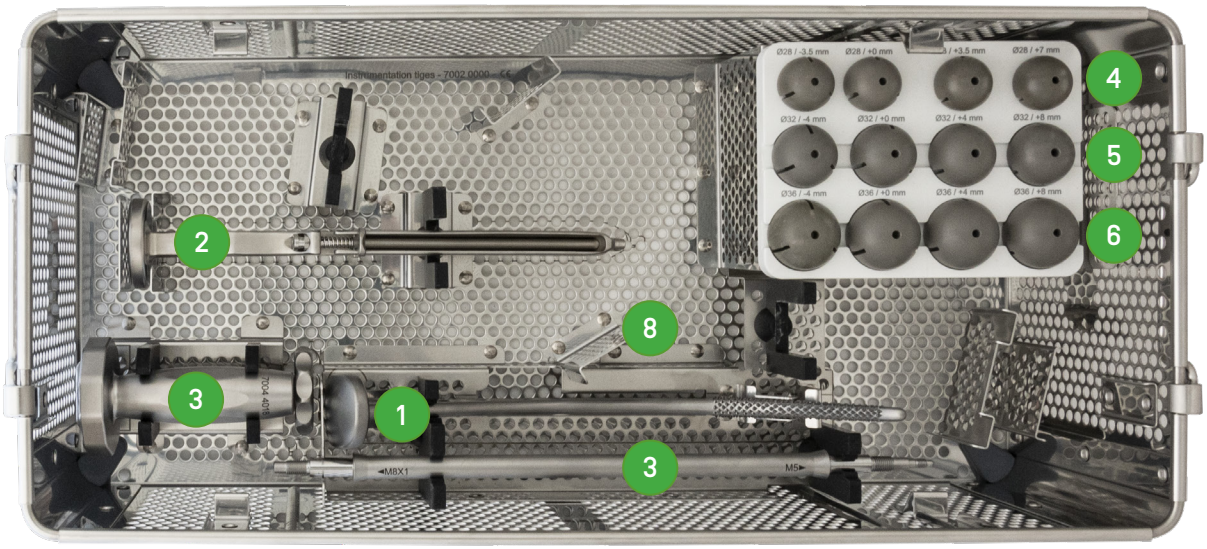
	Description	Reference	Quantity
1	Long gouge*	7002 1002*	1
2	Small reamer	7002 3002	1
3	Modular box chisel	7004 4017	1
4	T-handle*	7019 4001*	1
5	Screwable impactor	7004 1000	1
6	Monobloc stem impactor	7004 4001	1
7	Half-moon stem impactor	7004 4008	1
8	Hex screwdriver 3.5*	7018 1005*	1
9	Head impaction end-cap	7004 3656	1

*CE mark hold by another manufacturer

APPENDIX 3
INSTRUMENT REFERENCES

Standard stems Instrumentation

REF 7002 0000



Level 2

	Description	Reference	Quantity
1	Curved starter rasp	7012 2005	1
2	Straight rasp handle	7006 1019	1
3	Reversible extractor	7004 4018	1
4	Trial head Ø28 mm / -3.5 mm	7003 4128	1
	Trial head Ø28 mm / +0 mm	7003 4228	1
	Trial head Ø28 mm / +3.5 mm	7003 4328	1
	Trial head Ø28 mm / +7 mm	7003 4428	1
5	Trial head Ø32 mm / -4 mm	7003 4132	1
	Trial head Ø32 mm / +0 mm	7003 4232	1
	Trial head Ø32 mm / +4 mm	7003 4332	1
	Trial head Ø32 mm / +8 mm	7003 4432	1
6	Trial head Ø36 mm / -4 mm	7003 4136	1
	Trial head Ø36 mm / +0 mm	7003 4236	1
	Trial head Ø36 mm / +4 mm	7003 4336	1
	Trial head Ø36 mm / +8 mm	7003 4436	1

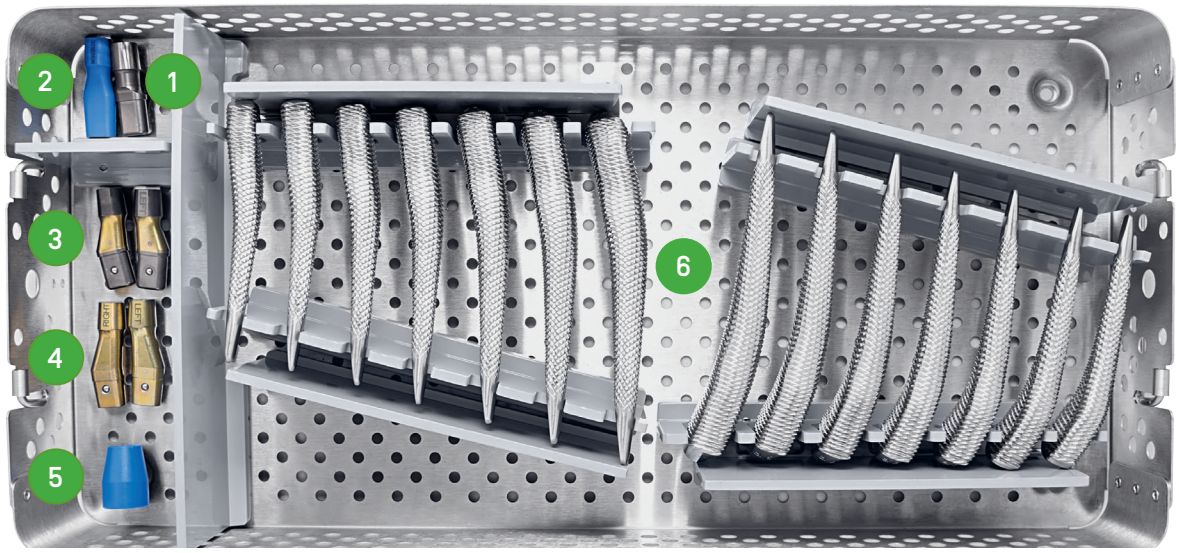
Optional

-	Double offset rasp handle - Right	7006 1020	1
-	Double offset rasp handle - Left	7006 1021	1
-	Single offset rasp handle - Right	7006 1022	1
-	Single offset rasp handle - Left	7006 1023	1
-	Hueter rasp handle	7006 1024	1

APPENDIX 3
INSTRUMENT REFERENCES

SPS® Rasps Instrumentation

REF 7071 0000



	Description	Reference	Quantity
1	SPS® HA trial neck B	7073 9002	1
2	SPS® HA trial neck C-H	7073 9003	1
3	SPS® Evolution trial neck B / RIGHT	7073 9007	1
	SPS® Evolution trial neck B / LEFT	7073 9008	1
4	SPS® Evolution trial neck C-H / RIGHT	7073 9009	1
	SPS® Evolution trial neck C-H / LEFT	7073 9010	1
5	Modular neck impactor end-cap	7074 2001	1
6	SPS® rasp B / RIGHT	7072 4020	1
	SPS® rasp B / LEFT	7072 4021	1
	SPS® rasp C / RIGHT	7072 4030	1
	SPS® rasp C / LEFT	7072 4031	1
	SPS® rasp D / RIGHT	7072 4040	1
	SPS® rasp D / LEFT	7072 4041	1
	SPS® rasp E / RIGHT	7072 4050	1
	SPS® rasp E / LEFT	7072 4051	1
	SPS® rasp F / RIGHT	7072 4060	1
	SPS® rasp F / LEFT	7072 4061	1
	SPS® rasp G / RIGHT	7072 4070	1
	SPS® rasp G / LEFT	7072 4071	1
	SPS® rasp H / RIGHT	7072 4080	1
	SPS® rasp H / LEFT	7072 4081	1

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