



*Enjoy Mobility*

# SAPHIR

**OPERATING TECHNIQUE**



# SAPHIR

## OPERATING TECHNIQUE

SAPHIR stem has been designed with different intraoperative needs in mind and it is available in a wide range of sizes and versions, with progression of the extramedullary part (the neck) in homothetic increments.

SAPHIR prosthesis is a shortened stem, category 5, according to the classification of the French Society of Hip and Knee Surgery (SFHG), with a trapezoidal section in its proximal region, quadrangular section in the distal part and with a blunt distal tip.

SAPHIR stem, with and without collar, is available in two uncemented versions: the first with double HAP coating and Ti-Growth C<sup>®</sup>; the second with Ti-Growth C<sup>®</sup> plasma spray in the proximal section and glassbead treatment in the distal section.

The stem is also available in a cemented version, in a high nitrogen content steel alloy.



## INDICATIONS

The indications are tied to hip pathologies that require an arthroplasty to reduce or eliminate pain and / or improve joint function. The general guidelines are: Non-inflammatory degenerative joint disease such as primary or secondary osteoarthritis; Aseptic necrosis of the femoral head; Rheumatoid Arthritis; Post-traumatic Arthritis; Correction of functional deformity; Outcomes of fractures of the femoral neck; Outcomes of traumatic dislocations of the hip; Failures of osteotomy; Outcomes of arthrodesis.

## CONTRAINDICATIONS

SAPHIR stem, in addition to the absolute and relative contraindications mentioned below, is also absolutely contraindicated, in sizes 0 and in sizes 1 for all versions in which they are available, in patients with a body mass greater than 48 kg.

The hip joint surgery is absolutely contraindicated in cases of: systemic or local infection, sepsis, and osteomyelitis. It is relatively contraindicated in case of: Osteoporosis; Patient uncooperative or suffering from neurological disorders, unable to follow directions; Systemic disorders and / or metabolic problems that lead to a progressive deterioration of bone support; Neurological or neuromuscular disorders that could create an unacceptable risk to the prostheses instability or lead to a failure of prostheses fixation; Osteomalacia; Active infection or suspected latent infection in the hip joint; Distant focus of infection that could spread to the implant site; Vascular insufficiency, muscular atrophy, neuromuscular diseases; Incomplete or insufficient presence of soft tissue around the knee joint; Obesity; Inadequate bone stock for the prostheses support or fixation; Skeletal immaturity; Local or disseminated neoplastic diseases; Incurable severe deformities.

## MATERIALS

UNCEMENTED SAPHIR: Titanium Ti6Al4V (ISO 5832-3)

CEMENTED SAPHIR: High Nitrogen Stainless Steel (ISO 5832-9)

### UNCEMENTED SAPHIR COATINGS:

- Stem completely coated with hydroxyapatite (HAP) with double coating of HAP and Ti-Growth-C® in the proximal area
- Proximal coating of Ti-Growth-C® and distal finish: micro-beading

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### 1 Preoperative planning

In order to make the most of the different available variants of the SAPHIR stem (10 stem sizes for 5 different neck models), making a pre-operative plan by superimposing the templates on AP and ML radiographs is recommended.

To predetermine the choice of the size and version that will best fit the patient's femur, a choice has to be made concerning filling the canal (femoral stem size), the CCD angle (132° or 126°) and the off-set (STD and Lateralized). There is also the option of an 8° anteverted and 8° retroverted version.

The preoperative choice of a certain stem size is indicative; the final size will be determined intra-operatively on the basis of the actual positioning (sinking and off-set) achieved.

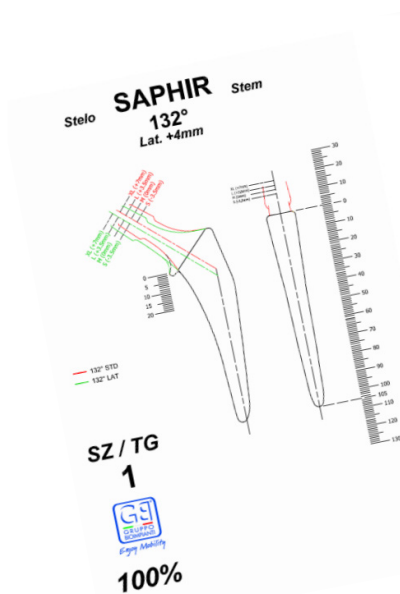


FIG.1

### 2 Femoral neck osteotomy

After joint exposure, depending on the access route the surgeon chooses to take and prior to dislocation, joint length and off-set measurements can be taken using the Off-set/length gauge (Ref. 120411180A ÷ 120411180F).\*

Once the joint is dislocated, it is possible to proceed with the osteotomy.

A 135° resection guide (Ref. 120411185) is available in the SAPHIR instruments set: it should be positioned in the direction of the femoral axis, referring to the reference points and dimensions from the pre-operative plan. (FIG.2)

\* When using Off-set/length gauge, please refer to MESOFFLONG-OT-XXX.

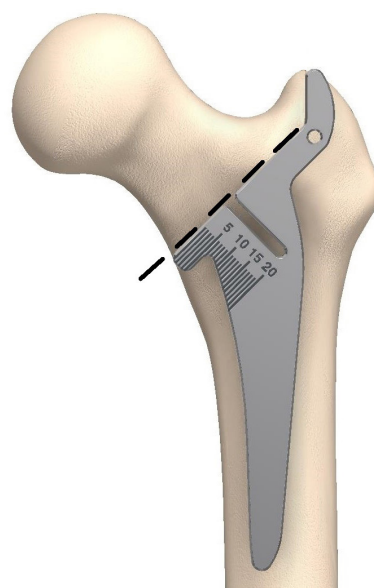


FIG.2

### 3 Femoral canal preparation

The bone of the greater trochanter area is freed using the special Modular Osteotome (Ref. 120411177) fitted to the Saphir Universal handle (Ref. 120411172). (FIG.3)

The removal of the underlying bone at the apex of the greater trochanter allows for better insertion of the rasps without forcing the bone, thus limiting the risk of fracture.

The femoral canal is released by manually introducing the Taper Reamer (Ref. 120411186) fitted to the appropriate "T" Handle (Ref. 120411187). (FIG.4)



FIG.3

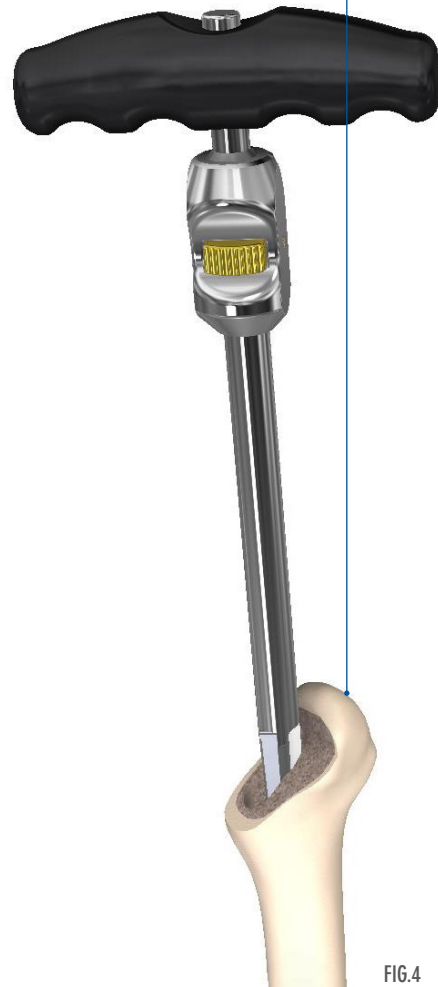


FIG.4

# SAPHIR

## OPERATING TECHNIQUE

Once the canal has been properly reamed, the reamer can remain in place to allow guided positioning of the Trochanter Reamer (Ref. Size 0-4: 120411183; Ref. Size 5-9: 120411184) chosen according to the planned SAPHIR stem size.

(FIG.5)

To avoid stress in the calcar area, a Modular "canal finder" rasp is supplied (Ref. 120411178), which allows the passage of the rasps to be prepared and the housing of the final stem (FIG. 7).



## 4 Broaching of the femoral canal

Once the femur preparatory phase has been completed, the SAPHIR Rasps (Ref. 120411160 - 120411169) mounted on the Rasp handle (Ref. 120411182) are inserted. (FIG.8)

The femoral canal should be prepared by progressively introducing the rasps from size 0 until the planned size is reached and/or the desired fit is achieved.

To check the fit of the rasp, check that the rasp does not move by forcing the Rasp Holder handle left in place to rotate (internal and external). (FIG.9)

N.B. In the event of an Emergency, an emergency rasp Extractor is available within the SAPHIR instrument set (Ref. 120411174)

N.B. Saphir rasps have been specially designed to allow the possibility of freely approaching cup preparation while leaving the rasp in place, in the case of a "Femur first" approach.

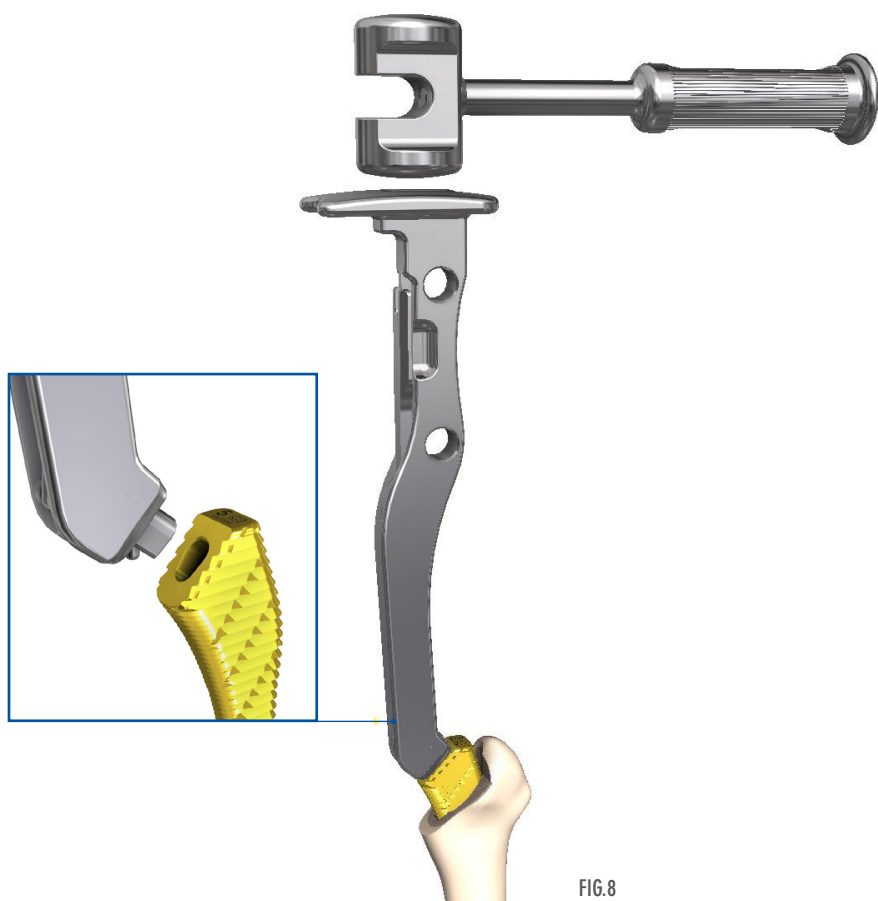


FIG.8

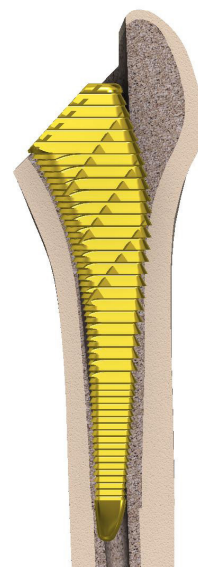


FIG.9

# SAPHIR

## OPERATING TECHNIQUE

### 5 Trial necks

Once the best rasp size has been confirmed, which will determine the choice of the final SAPHIR stem size, it is possible to proceed with the trial reduction by choosing the trial neck of the planned size and version (Ref. 120411150 - 120411159).

The trial necks, which are available in the SAPHIR instrument set, can be recognized by two colour codes.

One colour, that of the body (FIG.10), indicates the rasp size:

- from size 0 to 4: dark grey
- from size 5 to 9: gold

The coloured insert (FIG.11), placed at the level of the morse taper in the direction of the rasp, determines the version of the final stem:

- STD 132°: Red
- Lat 132°: Green
- Var 126°: Yellow
- Ante Left – Retro Right: Blue
- Retro Left – Ante Right: Brown

COLORED TRIAL NECK INSERT

Size	STD	LAT	VAR	Ante L	Retro L
	132°	132°	126°	Retro R	Ante R
0	●	●	●	●	●
1	●	●	●	●	●
2	●	●	●	●	●
3	●	●	●	●	●
4	●	●	●	●	●
5	●	●	●	●	●
6	●	●	●	●	●
7	●	●	●	●	●
8	●	●	●	●	●
9	●	●	●	●	●



FIG.10

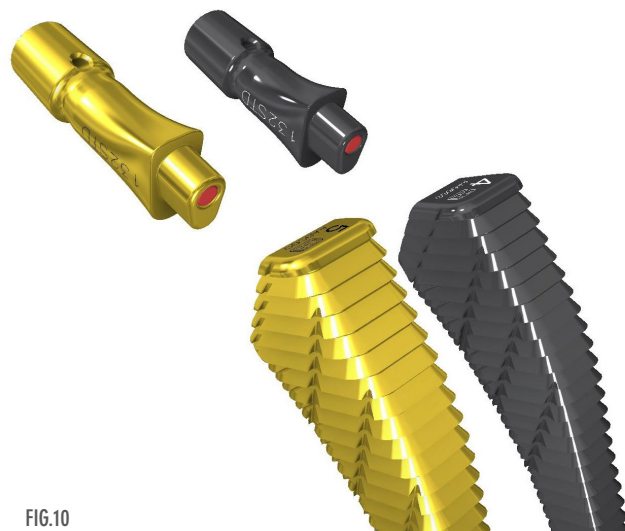


FIG.11



## 6 Trochanterometer

On the upper apex of the necks, at the level of the morse taper for housing the head, there is a transverse hole in the ML direction, inside which it is possible to house the Trochanterometer (Ref. 120411176). (FIG. 12)

The trochanterometer allows the surgeon to evaluate the height of the final implant with head M, referring to the apex of the greater trochanter.

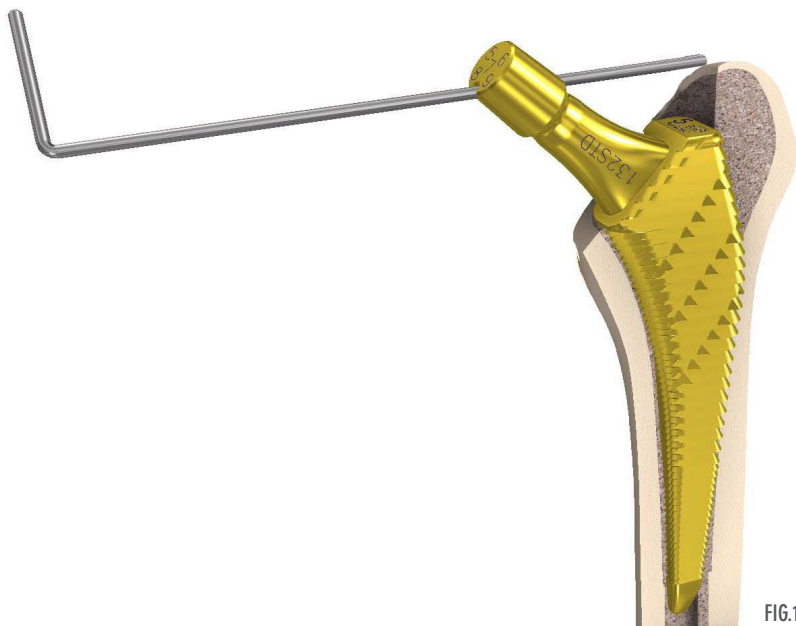


FIG.12

## 7 Trial reduction

Leave the last rasp in place and proceed with the trial reduction.

Insert the Modular trial neck (Ref. 120411150 - 120411159), according to the plan, on the rasp, taking care to respect the coupling colour code.

The Trial head, available in four diameters and four lengths (Ref. 28mm 110380860 - 110380890; Ref. 32mm 110380960 - 110380990; Ref. 36mm 110381060 - 110381090) can now be fitted onto the trial neck. (FIG.13)

To facilitate the trial reduction, the Modular head pusher (Ref. 120411179), contained in the SAPHIR instrument set, can be used.

After the surgeon has carefully assessed the 3 important parameters: stability throughout the entire range of motion, leg length and soft tissue tension, the surgeon will validate the final implant.

If necessary, he can optimize the implant by replacing the neck or the trial head or both.

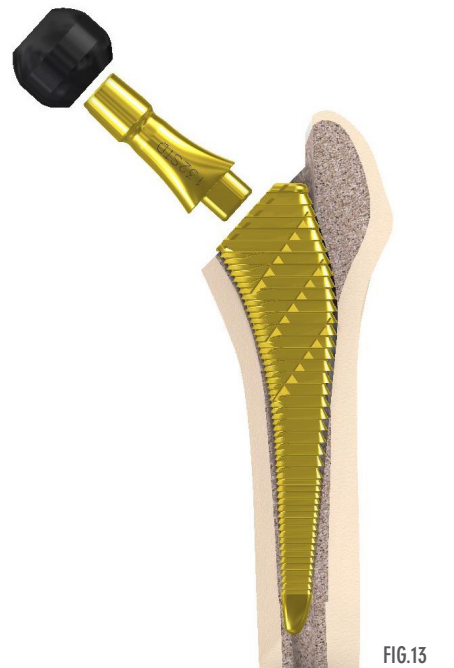


FIG.13

# SAPHIR

## OPERATING TECHNIQUE

### 8 Stem insertion

Once the trial reduction has been carried out, remove the Trial Head, Trial Neck and finally the Rasp, in that order.

The stem can then be inserted using the special impactor (Ref. 120411175) mounted on the Universal handle (Ref. 120411172), which allows the rotation of the stem to be controlled during insertion. (FIG.14)



FIG.14

The impactor has been specially designed to be orientable on the Varo-Valgus plane and tapered near the greater trochanter to avoid contact and stress on the latter. (FIG.15)

\*SAPHIR stem is also absolutely contraindicated, in sizes 0 and in sizes 1, for all versions in which they are available, in patients with a body mass greater than 48 kg.



FIG.15

## 9 Positioning of the femoral head

Once the stem has been inserted, it is advisable to perform a further trial reduction and a further check with the length gauge to select the final head. (FIG.16)

To ensure the proper tightness of the final head, use the appropriate Impactor (Ref. 120411179), fitted to the Universal handle.

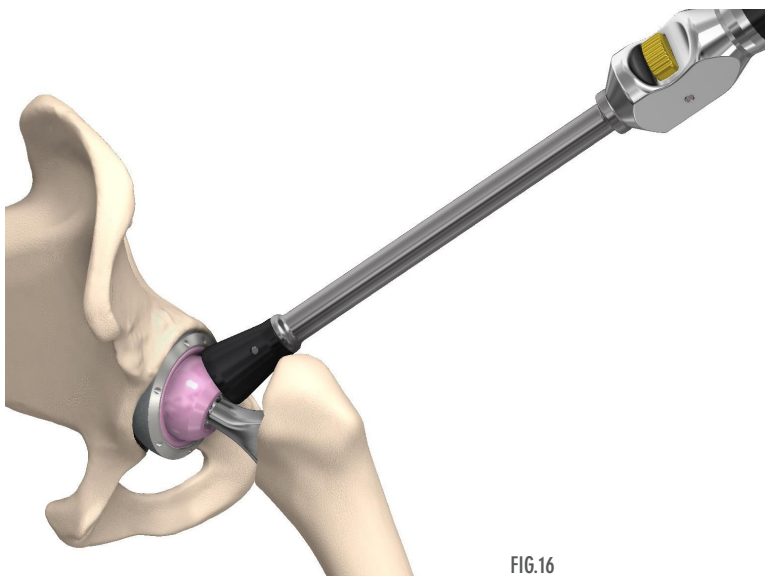


FIG.16

## 10 Stem extraction

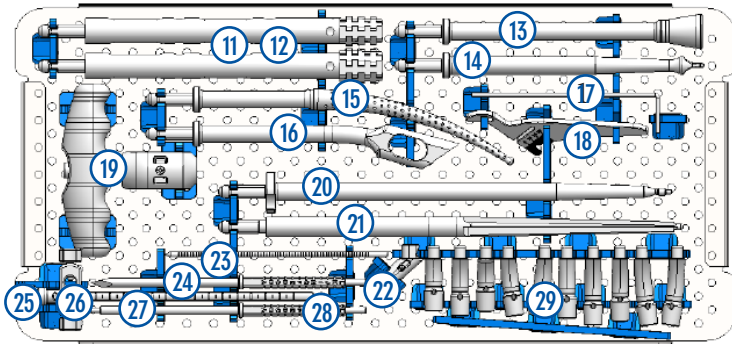
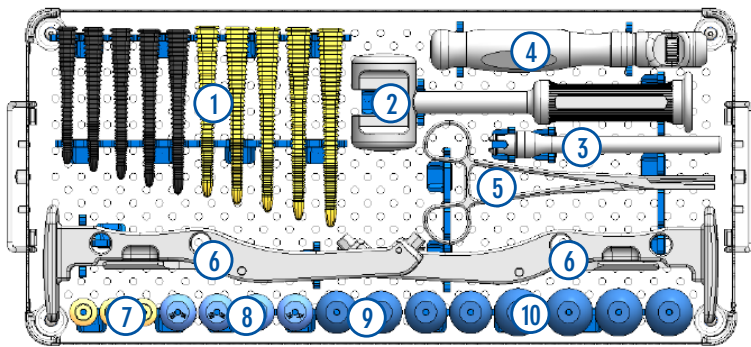
If it is necessary to extract the stem, use the dedicated Stem Extractor (Ref. 120411190), attaching it onto the universal handle. (FIG.17)

The extractor has a threaded end which is screwed into the threaded hole of the stem. To complete the extraction, tap the base of the universal handle with the Diapason hammer (Ref. 12041118) contained in the SAPHIR instrument set.



FIG.17

## SAPHIR INSTRUMENT CODES



Tray and lid for instruments  
SAPHIR  
REF: 120411195, 120411196

	DESCRIPTION	REF.	SIZE	QNT
①	Rasps SAPHIR Stem	120411160	0	1
		120411161	1	1
		120411162	2	1
		120411163	3	1
		120411164	4	1
		120411165	5	1
		120411166	6	1
		120411167	7	1
		120411168	8	1
		120411169	9	1
②	Diapason Hammer	120411181	-	1
③	T Bar	120411173	-	1
④	Saphir Universal handle	120411172	-	1
⑤	Clamp	120411118	-	1
⑥	Rasp handle	120411182	-	2

	DESCRIPTION	REF.	NECK	QNT
⑦	Trial head (Diam. 22.2mm)	110381020*	S	1
		110381050*	M	1
		110381040*	L	1
⑧	Trial head (Diam. 28mm)	110380860	S	1
		110380870	M	1
		110380880	L	1
		110380890	XL	1
		110380960	S	1
⑨	Trial head (Diam. 32mm)	110380970	M	1
		110380980	L	1
		110380990	XL	1

	DESCRIPTION	REF.	NECK	QNT
⑩	Trial head (Diam. 36mm)	110381060	S	1
		110381070	M	1
		110381080	L	1
		110381090	XL	1

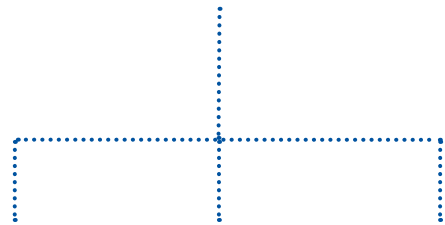
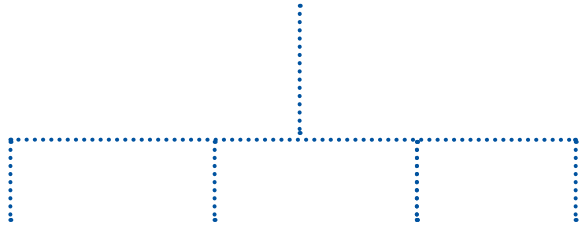
	DESCRIPTION	REF.	SIZE	QNT
⑪	Trochanter Reamer	120411183	0-4	1
⑫	Trochanter Reamer	120411184	5-9	1
⑬	Modular head pusher	120411179	-	1
⑭	Impactor	120411175	-	1
⑮	Canal finder rasp	120411178	-	1
⑯	Modular Osteotome	120411177	-	1
⑰	Trochanterometer	120411176	-	1
⑱	135° resection guide	120411185	-	1
⑲	« T » Handle	120411187	-	1
⑳	Stem Extractor	120411190	-	1
㉑	Taper reamer	120411186	-	1
㉒	Rasp extractor	120411174	-	1
㉓	Palpator*	120411180D	-	1
㉔	Trocar depth gauge*	120411180B	-	1
㉕	Locking screw*	120411180F	-	3
㉖	Graduated rod*	120411180A	-	1
㉗	Locking system*	120411180E	-	1
㉘	Support depth gauge*	120411180C	-	1

	DESCRIPTION	REF.	NECK	SIZE	QNT	
⑳	Trial Neck	120411150	132STD	0-4	1	
		120411151	132LAT	1-4	1	
		120411152	126	0-4	1	
		120411153	132AG/RD	1-4	1	
		120411154	132RG/AD	1-4	1	
		120411155	132STD	5-9	1	
		120411156	132LAT	5-9	1	
		120411157	126	5-9	1	
		120411158	132AG/RD	5-9	1	
		120411159	132RG/AD	5-9	1	

UNIVERSAL SAPHIR HANDLE  
Ref. 120411172



« T » HANDLE  
Ref. 120411187



OSTEOTOME  
Ref. 120411177

IMPACTOR  
Ref. 120411175

HEAD PUSHER  
Ref. 120411179

EXTRACTOR  
Ref. 120411190

CANAL FINDER RASP  
Ref. 120411178

TAPER REAMER  
Ref. 120411186

TROCHANTER REAMER  
Ref. 120411183; 120411184



\*Upon request

## SAPHIR IMPLANT CODES

### UNCEMENTED HA+TI-GROWTH-C® SAPHIR STANDARD 132°

REF.	SIZE
120440000	0
120440001	1
120440002	2
120440003	3
120440004	4
120440005	5
120440006	6
120440007	7
120440008	8
120440009	9

### UNCEMENTED HA+TI-GROWTH-C® SAPHIR STANDARD 132° WITH COLLAR\*

REF.	SIZE
120440100	0
120440101	1
120440102	2
120440103	3
120440104	4
120440105	5
120440106	6
120440107	7
120440108	8
120440109	9

### CEMENTED SAPHIR STANDARD 132°

REF.	SIZE
120440200	0
120440201	1
120440202	2
120440203	3
120440204	4
120440205	5
120440206	6
120440207	7
120440208	8
120440209	9

### UNCEMENTED HA+TI-GROWTH-C® SAPHIR LATERALIZED 132°

REF.	SIZE
120440011	1
120440012	2
120440013	3
120440014	4
120440015	5
120440016	6
120440017	7
120440018	8
120440019	9

### UNCEMENTED HA+TI-GROWTH-C® SAPHIR LATERALIZED 132° WITH COLLAR\*

REF.	SIZE
120440111	1
120440112	2
120440113	3
120440114	4
120440115	5
120440116	6
120440117	7
120440118	8
120440119	9

### CEMENTED SAPHIR LATERALIZED 132°

REF.	SIZE
120440211	1
120440212	2
120440213	3
120440214	4
120440215	5
120440216	6
120440217	7
120440218	8
120440219	9

### UNCEMENTED HA+TI-GROWTH-C® SAPHIR VARIZED 126°

REF.	SIZE
120440020	0
120440021	1
120440022	2
120440023	3
120440024	4
120440025	5
120440026	6
120440027	7
120440028	8
120440029	9

### UNCEMENTED HA+TI-GROWTH-C® SAPHIR VARIZED 126° WITH COLLAR\*

REF.	SIZE
120440120	0
120440121	1
120440122	2
120440123	3
120440124	4
120440125	5
120440126	6
120440127	7
120440128	8
120440129	9

### CEMENTED SAPHIR VARIZED 126°

REF.	SIZE
120440220	0
120440221	1
120440222	2
120440223	3
120440224	4
120440225	5
120440226	6
120440227	7
120440228	8
120440229	9

### UNCEMENTED HA+TI-GROWTH-C® SAPHIR ANTE R / RETRO L (AR/RL)\*

REF.	SIZE
120440031	1
120440032	2
120440033	3
120440034	4
120440035	5
120440036	6
120440037	7
120440038	8
120440039	9

### UNCEMENTED HA+TI-GROWTH-C® SAPHIR ANTE L / RETRO R (AL/RR)\*

REF.	SIZE
120440041	1
120440042	2
120440043	3
120440044	4
120440045	5
120440046	6
120440047	7
120440048	8
120440049	9

### CEMENTED SAPHIR RETRO R / ANTE L (RR/AL)\*

REF.	SIZE
120440231	1
120440232	2
120440233	3
120440234	4
120440235	5
120440236	6
120440237	7
120440238	8
120440239	9

### CEMENTED SAPHIR RETRO R / ANTE L (RR/AL)\*

REF.	SIZE
120440241	1
120440242	2
120440243	3
120440244	4
120440245	5
120440246	6
120440247	7
120440248	8
120440249	9

**UNCEMENTED SAPHIR TI-GROWTH-C®  
STANDARD 132° \***

REF.	SIZE
120440050	0
120440051	1
120440052	2
120440053	3
120440054	4
120440055	5
120440056	6
120440057	7
120440058	8
120440059	9

**UNCEMENTED SAPHIR TI-GROWTH-C®  
STANDARD 132° WITH COLLAR \***

REF.	SIZE
120440150	0
120440151	1
120440152	2
120440153	3
120440154	4
120440155	5
120440156	6
120440157	7
120440158	8
120440159	9

**UNCEMENTED SAPHIR TI-GROWTH-C®  
LATERALIZED 132° \***

REF.	SIZE
120440061	1
120440062	2
120440063	3
120440064	4
120440065	5
120440066	6
120440067	7
120440068	8
120440069	9

**UNCEMENTED SAPHIR TI-GROWTH-C®  
LATERALIZED WITH COLLAR \***

REF.	SIZE
120440161	1
120440162	2
120440163	3
120440164	4
120440165	5
120440166	6
120440167	7
120440168	8
120440169	9

**UNCEMENTED SAPHIR TI-GROWTH-C®  
VARIZED 126° \***

REF.	SIZE
120440070	0
120440071	1
120440072	2
120440073	3
120440074	4
120440075	5
120440076	6
120440077	7
120440078	8
120440079	9

**UNCEMENTED SAPHIR TI-GROWTH-C®  
VARIZED 126° WITH COLLAR \***

REF.	SIZE
120440170	0
120440171	1
120440172	2
120440173	3
120440174	4
120440175	5
120440176	6
120440177	7
120440178	8
120440179	9

**UNCEMENTED SAPHIR TI-GROWTH-C®  
ANTE R / RETRO L (AR/RL) \***

REF.	SIZE
120440081	1
120440082	2
120440083	3
120440084	4
120440085	5
120440086	6
120440087	7
120440088	8
120440089	9

**UNCEMENTED SAPHIR TI-GROWTH-C®  
RETRO R / ANTE L (RR/AL) \***

REF.	SIZE
120440091	1
120440092	2
120440093	3
120440094	4
120440095	5
120440096	6
120440097	7
120440098	8
120440099	9

**CrCo HEAD  
Cone 12/14**

REF.	DIAM.	NECK	R.I.C.
110207105E	22.2mm	S	-2mm
110207110E	22.2mm	M	0
110207115E	22.2mm	L	+2mm
110210105E	28mm	S	-3.5mm
110210110E	28mm	M	0mm
110210115E	28mm	L	+3.5mm
110210120E	28mm	XL	+7mm
110220105E	32mm	S	-4mm
110220110E	32mm	M	0mm
110220115E	32mm	L	+4mm
110220120E	32mm	XL	+7mm
110367705	36mm	S	-4mm
110367710	36mm	M	0mm
110367715	36mm	L	+4mm
110367720	36mm	XL	+8mm

**CERAMIC HEAD  
Cone 12/14**

REF.	DIAM.	NECK	R.I.C.
110240205	28mm	S	-3.5mm
110240210	28mm	M	0mm
110240215	28mm	L	+3.5mm
110240305	32mm	S	-4mm
110240310	32mm	M	0mm
110240315	32mm	L	+4mm
110240320	32mm	XL	+7mm
110240405	36mm	S	-4mm
110240410	36mm	M	0mm
110240415	36mm	L	+4mm
110240420	36mm	XL	+8mm

**STAINLESS STEEL FEMORAL HEAD  
Cone 12/14**

REF.	DIAM.	NECK	R.I.C.
110205105E	28mm	S	-3.5mm
110205110E	28mm	M	0mm
110205115E	28mm	L	+3.5mm
110205120E	28mm	XL	+7mm
110205205E*	32mm	S	-4mm
110205210E*	32mm	M	0mm
110205215E*	32mm	L	+4mm
110205220E*	32mm	XL	+7mm

## Web Site

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Use the QR-Code to visit Gruppo Bioimpianti website



## IFU

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Use the QR-Code to view complete product informations, including instructions for use, indications and contraindications, precautions and warnings



Erivan R, Villatte G, Dartus J, Mertl P, Piriou P, Tracol P, Vernizeau M, Mulliez A, Puch J, Girard J, Descamps S, Boisgard S et la Société française de chirurgie de la hanche et du genou (SFHG) *French Hip & Knee Society classification of short-stem hip prostheses: Inter- and intraobserver reproducibility* Orthop Traumatol Surg Res. 2022 Feb;108(1):103126. doi: 10.1016/j.otsr.2021.103126. Epub 2021 Oct 23.

This surgical technique is exclusively intended for medical professionals, especially physicians and surgeons.

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