

POLARSTEM[®]

Cementless and Cemented
Stem System



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Nota Bene

The surgical technique described in this brochure is the procedure suggested by the authors for uncomplicated surgery. The surgeon must, however, decide which procedure is the most suitable and effective for each individual patient.

Introduction

The POLARSTEM® has been clinically used since 2002 and is based on a philosophy that has yielded excellent clinical results in the last 25 years.

The simple surgical technique leads to reproducible results and allows implantation using both conventional and minimally invasive techniques.

The POLARSTEM can be used for all standard femoral morphologies. The range of stems allows the implant to be matched to all bone sizes, thereby reproducing the natural hip architecture.

The cementless POLARSTEM range includes 12 standard femoral stems with a CCD angle of 135°, 10 lateral femoral stems with a CCD angle of 126° and 8 valgus femoral stems with a CCD angle of 145°. All cementless implants are coated with an open-pored titanium plasma/HA coating. The cemented POLARSTEM range includes 9 standard femoral stems and 8 lateral femoral stems.

Introduction

Indications

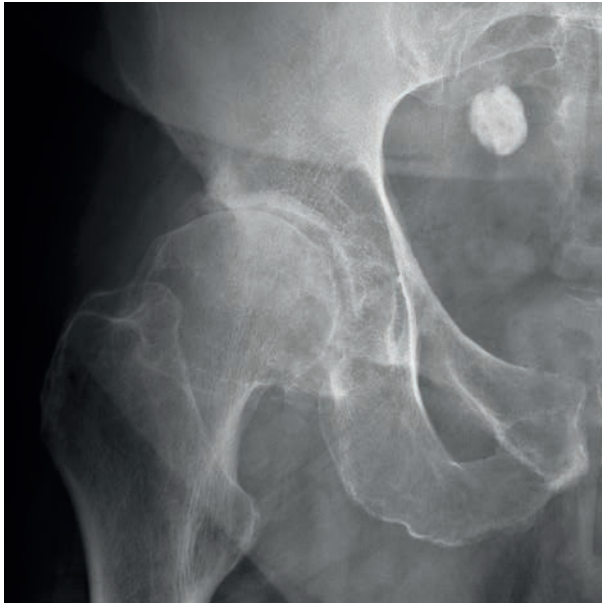
The POLARSTEM[®] Standard, Lateral and Valgus femoral stems are indicated for:

- Advanced degeneration of the hip joint as a result of degenerative, post-traumatic or rheumatoid arthritis.
- Fracture or avascular necrosis of the femoral head
- Conditions resulting from previous operations, such as osseosynthesis, joint reconstruction, arthrodesis, hemiarthroplasty or hip total prosthesis

Contraindications

- Acute or chronic infections, local or systemic
- Local infections of the area operated
- Severe muscle, nerve or vascular diseases that endanger the extremity in question
- Lacking bone substance or inadequate bone quality that endangers a stable seating of the prosthesis
- All concomitant diseases that may endanger the function of the implant, such as:
 - Any allergies to implant materials
 - Renal insufficiency
 - Cardiac insufficiency (e.g. as a result of increased metal/ions concentration in the blood)
- Pregnancy

Preoperative



Female, 72 years of age, cox arthritis

Postoperative



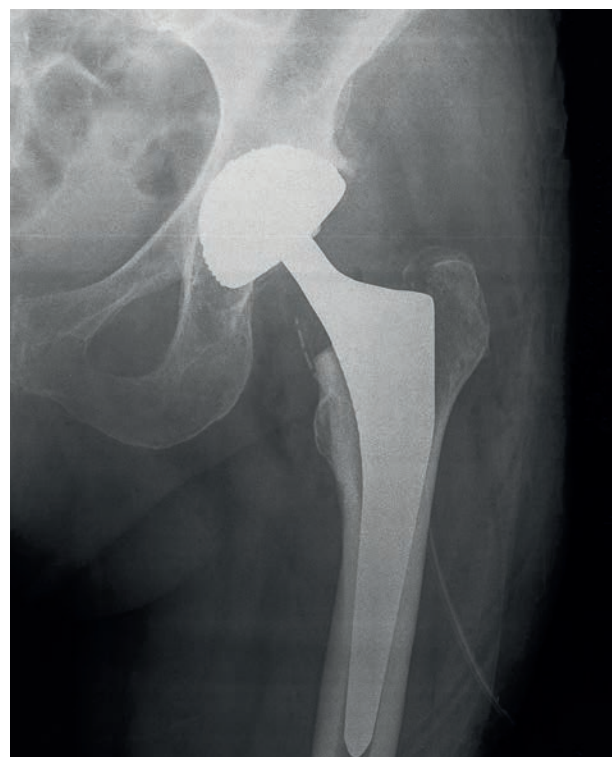
Combination of POLARCUP® and cementless POLARSTEM®

Preoperative



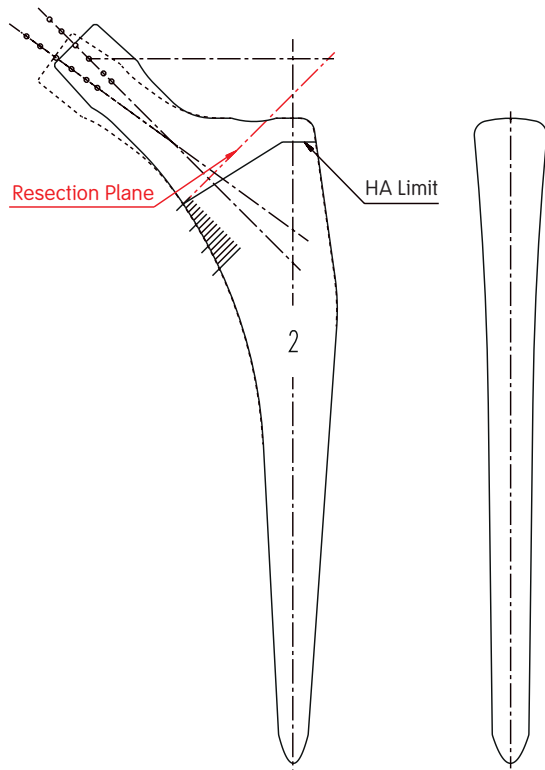
Male, 70 years of age, cox arthritis

Postoperative



Combination of POLARCUP and cementless POLARSTEM

Preoperative Planning



Preoperative planning is essential for determining the size of the femoral and acetabular components.

Preoperative planning requires:

- X-rays
- Templates for the acetabular component and the stem or
- Digital templates for the acetabular component and the stem

Templating should define the reaming required for the restoration of the cup's center of rotation, while the height and angle of the neck resection determine the optimal length and offset. This is particularly important in patients with leg length discrepancy

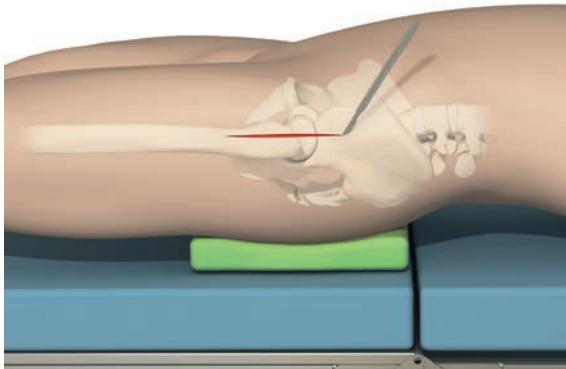
Standardized AP and lateral X-rays are essential to ensure accurate planning. The femur must be positioned in neutral rotation to produce orientation that matches the templates. An adequate length of the femoral diaphysis should be included on the X-rays. The correct stem size is determined by laying the stem template over the X-ray and selecting the optimum fit of the stem. The center of rotation of the femoral head is matched by selecting the appropriate neck length. The level of resection is shown by the template.

Warnings and precautions

- HA-coated implants must not be implanted with cement.

The same instruments can be used for implanting cementless and cemented stems.

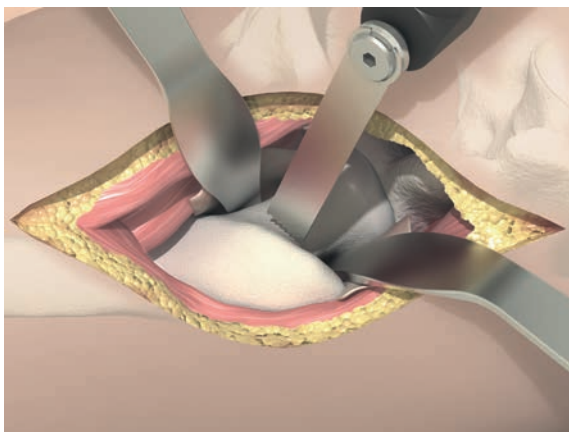
Position of the patient and approach



For the purpose of this description a lateral approach is chosen. Surgery is performed with the patient in an extended supine lateral position.

Whether an anterolateral, lateral, posterolateral or posterior approach is used is at the surgeon's discretion. The skin incision and muscle detachment depend on the selected approach. All implants and instruments also suit a minimally invasive approach.

Removing the femoral head



Laterally, the osteotomy commences at the trochanteric fossa (perpendicular to the neck axis), while medially it ends approximately a finger breadth above the lesser trochanter. The height of neck resection may be modified in the presence of abnormal anatomy as determined by preoperative templating and intraoperative measurements. The osteotomy can be performed before or after dislocation of the femoral head.

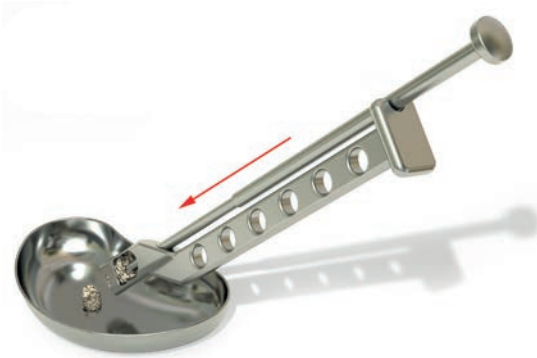
The acetabulum is replaced in a routine manner, conventionally or with a minimally invasive approach.

Preparation of the femur



The opening of the medullary cavity is performed with the offset box chisel, allowing the correct anteversion required for the implant – starting as close as possible to the greater trochanter base to allow good varus/valgus positioning.

Surgical Technique

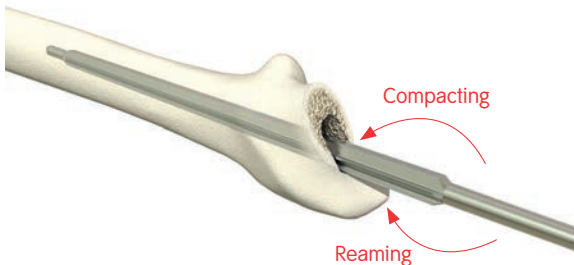


The instrument is supplied with a thin rod, allowing easy removal of extracted bone.

The femoral reamer is then introduced in the medullary canal. The canal axis is located using the endosteum.

Note

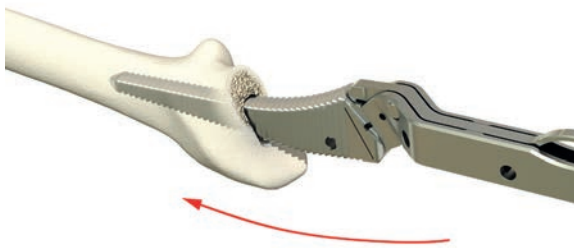
After introduction, we recommend turning the reamer counter clockwise to compact the cancellous bone. To advance the reamer deeper into the bone it then can be turned clockwise to penetrate further. Remove any (excess) bone material.

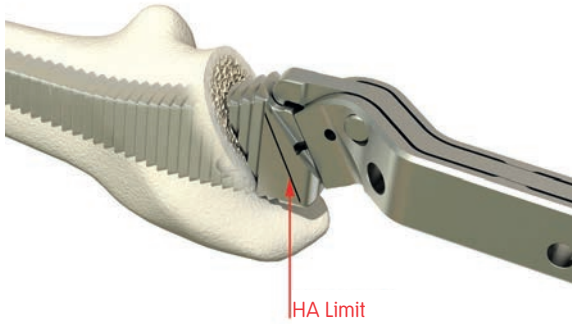


Starting with the smallest size 01 of the detachable rasp, continue using the next size rasp each time, until the appropriate rasp is fully seated

Note

We recommend that the first rasp 01 is as close as possible to the internal curve of the calcar, as a good proximal fit will optimize stability.

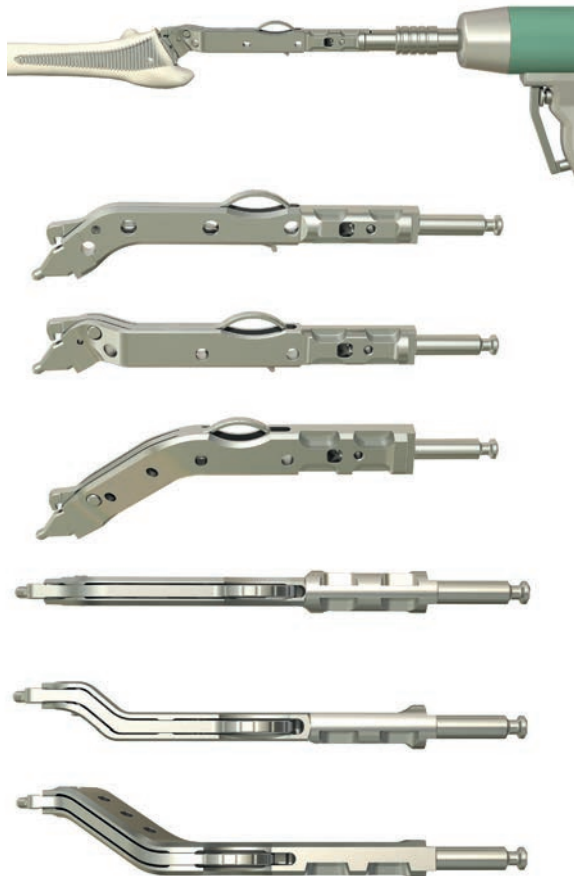




The level of the HA coating is indicated on the rasp.

Note

We recommend that the HA-coated part of the stem is completely covered by the femur.



Different offset versions of the rasp adapter are available to accommodate the selected surgical approach and/or patient size. Please refer to the instrument sets as of page 18.



All adapters can be used with the IMT power tool WOODPECKER or with the modular knock plate (75000642/21000378). At this stage anteversion can be checked using the bolt (75001747/1060909) inserted through the knock plate.

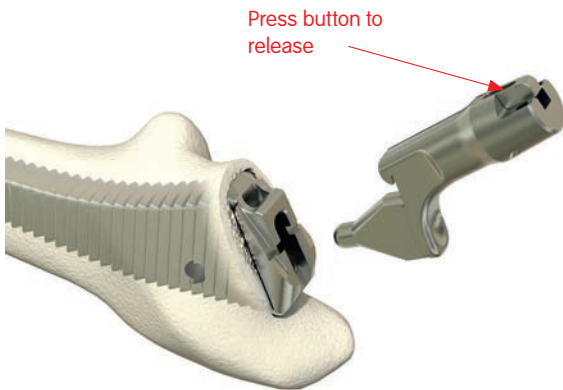
The WOODPECKER is a pneumatically powered device for hip broaching from IMT Integral Medizintechnik AG, Switzerland

Trial reposition

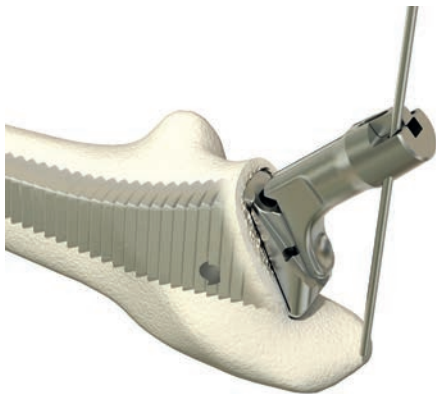
Once the appropriate trial rasp size is in place, the adapter is removed and the trial neck (Standard, Lateral or Valgus) is positioned on the rasp.

Note

Rasp sizes 01 and 0 require separate Standard trial necks. Rasp sizes 1–10 correspond with the same trial neck.

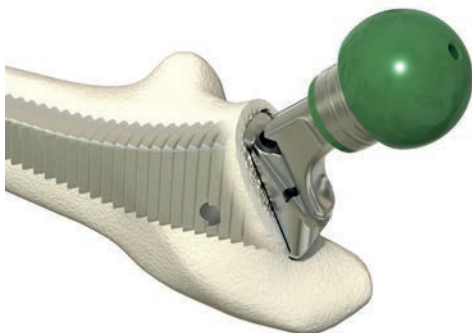


A rod (50 or 100 mm) can be introduced through the trial neck to check the level of the stem in relation to the greater trochanter.



Once the rod has been removed, a trial head is placed on the trial neck. Trial reduction is then performed to assess height, stability and absence of neck-shell impingement before inserting the final femoral component.

Remove the trial head, trial neck and trial rasp.



Stem insertion

We recommend that the plastic protective cover on the taper is not removed until the stem is in its final position and the ball head is ready to be attached to the cone.

Cementless stem

The femoral component is inserted using the stem impactor (75023369/21000644).

The edge of the HA coating indicates the required penetration level of the stem.

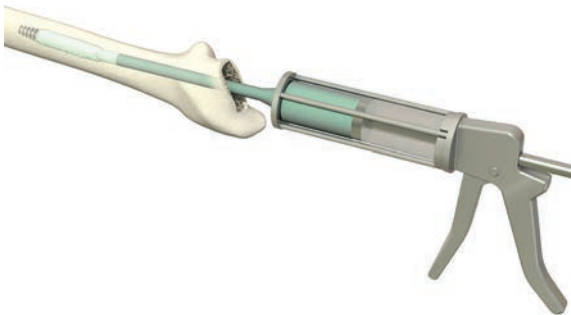


Cemented stem

The IM canal should always be plugged using either autogenic bone material or a standard IM plug.

The cement is prepared following the cement manufacturer's instruction and retrogradely filled into the IM canal by using a cement syringe.

We recommend that the cement mantle starts 10–15 mm below the tip of the stem.



Options for stem anchorage

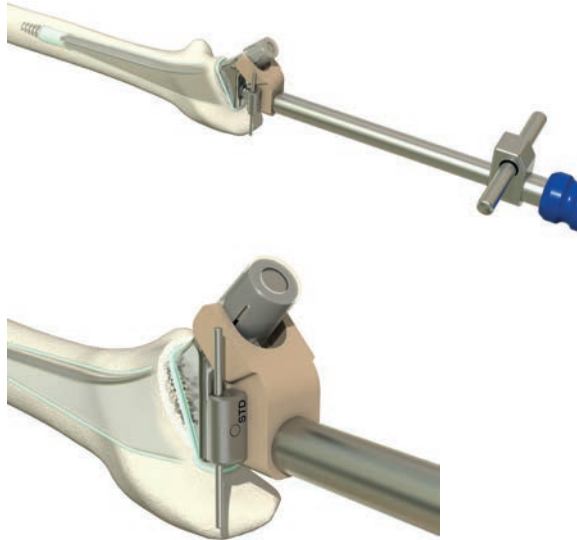
Option 1

To perform an implantation according to the **self-locking principle**, a stem of the **same size as the last rasp used** is selected.

Option 2

To obtain a **complete cement mantle**, a stem of **one to two sizes smaller than the last rasp used** is selected.

Before insertion, the anterior thread of the stem inserter (75004650/21000300) is put into the extraction hole of the stem (position the wings on either side of the stem taper). The metal wheel at the back is then turned to fix the inserter to the stem. **Please review the Assembly & Cleaning Instruction Lit. No. 1688-e.**



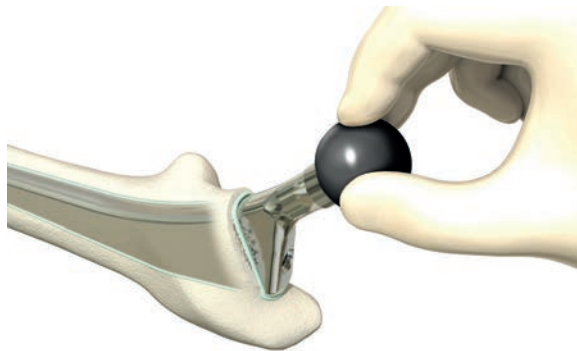
At this stage the CCD gauge (75004637/21000287) can be positioned onto the stem inserter (with the writing on the selected stem type – STD or LAT – is facing the observer), so that the position of the prosthesis in relation to the greater trochanter can be measured using the pin for CCD gauge (50/100 mm).

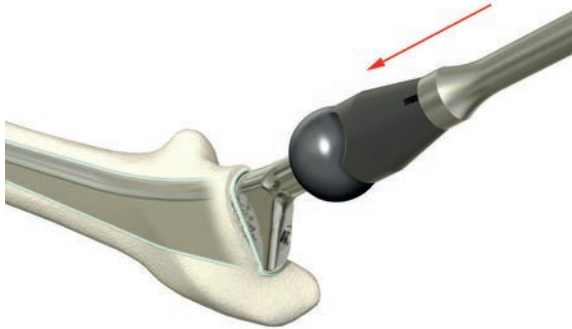
The stem is then pressed into the cement using the stem inserter. Anteversion can be checked using the bolt (75001747/1060909) and the laser marking on the stem, which corresponds to the HA limit marking on the rasp, can be used as reference line as well. The stem is held in position under slight pressure until the cement has hardened according to the manufacturer's instructions. Any excess cement should be removed.

Ball head introduction

Remove the plastic taper protection.

Before positioning the ball head, carefully wash the stem cone with water and then dry. Then position the ball head and secure in place with slight rotation.





The ball head is slightly impacted using a plastic impactor (75023710/21000662, 75023711/21000663). The joint is then reduced, manipulated and retested to ensure proper functioning.

Alternatively, trial reduction can also be performed with the stem impactor.

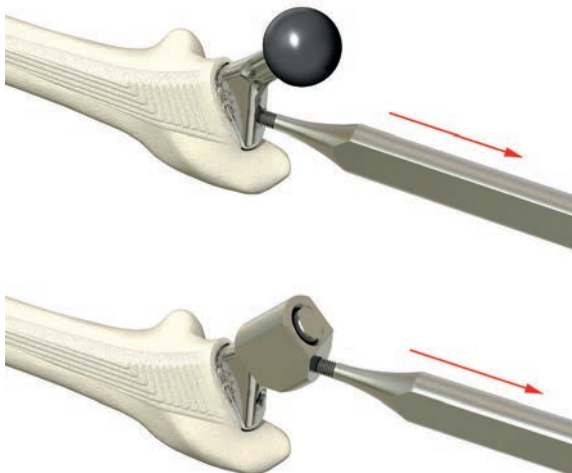
Note

Pressing the prosthetic head onto the trunnion solely by hand provides inadequate fixation. Ceramic heads must never be impacted using a metal instrument. If the POLARSTEM[®] is used with a POLARCUP[®], the ball head must first be impacted in the cup's corresponding insert before reduction.

Wound closure

Reinsert the muscle tissue. Insert a subfascial and subcutaneous redon drain and close the wound with intracutaneous sutures for aesthetic reasons.

POLARSTEM explantation



The POLARSTEM can be explanted using the extraction screw M6 (75002165/110249).

If this is not possible using the extraction screw, the user can also use an extractor block (75004678/21000354).

Ensure that the extraction screw is inserted axially in both cases.

The extraction screw can be used in connection with the WOODPECKER.

Postoperative Treatment

The postoperative treatment depends on the patient's age and general state of health.

The operated leg can be immediately weight bearing. For 48 hours a splint (foam) in slight abduction is recommended. The use of crutches can be helpful during the first days.

The use of antibiotics and thrombosis prophylaxis as well as suture removal are at the surgeon's discretion.

References

Cyprès A, Girardin P

Midterm results with the fully hydroxyapatite-coated POLARSTEM Femoral Stem.

Bone&JointScience 2012; Vol. 3, No. 9. available at: www.kleos.md

Fiquet A, Noyer D

Polarsystem Dual Mobility hip prosthesis and minimally invasive surgery Interactive Surgery (2006) 22: 1–5 Springer 2006

Khatib Y, Schwartz O, Mendes DG and Said M

Corail stem for total hip arthroplasty: 11 years of imaging follow-up JBJS (BR) Vol 84–B, Issue SUPP III, 301

Vidalain JP, Artro Group

HA Coating. Ten Year Experience with the Corail system in primary THA Acta Orthopaedica Belgica, Vol. 63 – Suppl. I – 1997e

Sterilization

Implants

All the implants described in this Surgical Technique are sterile when they are delivered by the manufacturer. Resterilization is not allowed.

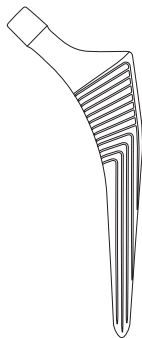
Instruments

System components and instruments are not sterile when they are delivered. Before use they must be cleaned by the usual methods in accordance with internal hospital regulations and sterilized in an autoclave in accordance with the legal regulations and guidelines applicable in the relevant country. For detailed information please refer to leaflet (Lit. no. 1363.)

The correct settings are given in the instructions for use provided by the autoclave manufacturer. Instrument manufacturers and dealers accept no responsibility for sterilization of products by the customer.

POLARSTEM° cementless Material Ti-6Al-4V ISO 5832-3 Cone 12/14

Standard stem
CCD 135°



SAP No.	Size
75100462*	01
75100463*	0
75100464	1
75100465	2
75100466	3
75100467	4
75100468	5
75100469	6
75100470	7
75100471	8
75100472	9
75100473*	10
75100509*	11

*special sizes (optional)

Demo implant

75100657	3
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Lateral stem
CCD 126°

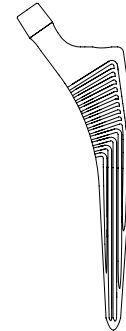


SAP No.	Size
75100474	1
75100475	2
75100476	3
75100477	4
75100478	5
75100479	6
75100480	7
75100481	8
75100482	9
75100483*	10
75100510*	11

Demo implant

75100658	3
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Valgus stem
CCD 145°



SAP No.	Size
75102072*	0
75102073*	1
75102074*	2
75102075*	3
75102076*	4
75102077*	5
75102078*	6
751020793*	7

Demo implant

75102216	3
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POLARSTEM cemented Material stainless steel ISO 5832-9 Cone 12/14

Standard stem CCD 135°

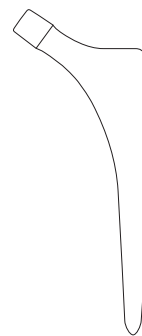


SAP No.	Item No.	Size
75002111	11000405	0
75002112	11000406	1
75002113	11000407	2
75002114	11000408	3
75002115	11000409	4
75002116	11000410	5
75002117	11000411	6
75002118	11000412	7
75002119	11000413	8

Demo implant

75000879	91000408	3
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Lateral stem CCD 126°



SAP No.	Item No.	Size
75002120	11000414	1
75002121	11000415	2
75002122	11000416	3
75002123	11000417	4
75002124	11000418	5
75002125	11000419	6
75002126	11000420	7
75002127	11000421	8

Demo implant

75000880	91000416	3
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Dimensions

Specification

Size	Stem length I mm	Stem length II mm	M/L width mm	CCD angle Valgus	CCD angle Standard	CCD angle Lateral
01	119	101	30		135	
0	125	107	29	145	135	
1	132	114	31	145	135	126
2	136	118	32	145	135	126
3	139	122	34	145	135	126
4	143	125	35	145	135	126

Size	Stem length I mm	Stem length II mm	M/L width mm	CCD angle Valgus	CCD angle Standard	CCD angle Lateral
5	147	129	36	145	135	126
6	151	133	38	145	135	126
7	155	137	38	145	135	126
8	159	141	40		135	126
9	163	145	41		135	126
10	167	149	43		135	126

Neck Height Valgus Standard Lateral (mm)

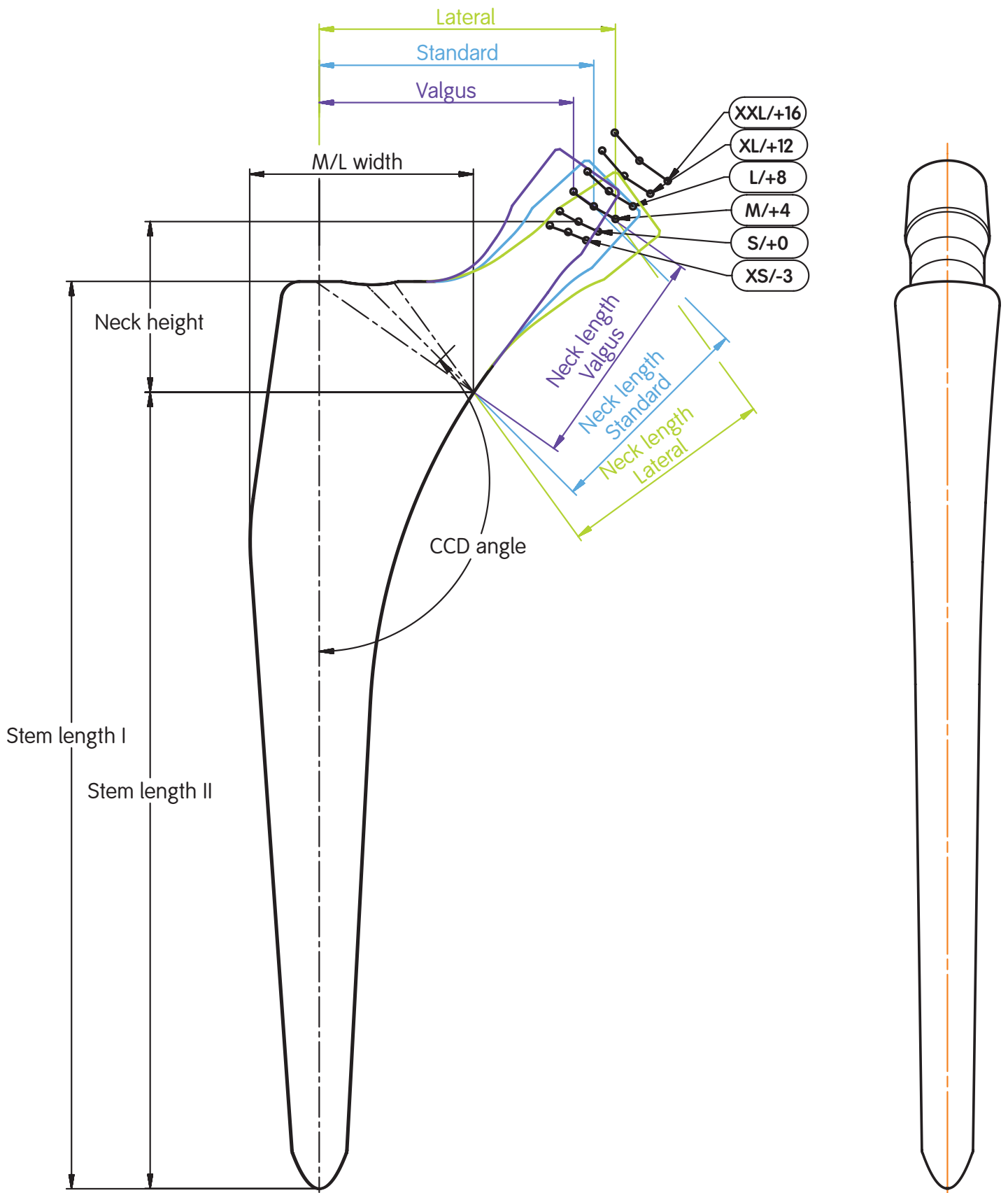
Size	XS/-3			S/+0			M/+4			L/+8			XL/+12		
01		24			28			30			33			35	
0	28	24		30	28		32	30		35	33		38	35	
1	28	26	25	30	28	26	32	30	28	35	33	30	38	35	32
2	28	26	25	30	28	26	32	30	28	35	33	30	38	35	32
3	28	26	25	30	28	26	32	30	28	35	33	30	38	35	32
4	28	26	25	30	28	26	32	30	28	35	33	30	38	35	32
5	28	26	25	30	28	26	32	30	28	35	33	30	38	35	32
6	28	26	25	30	28	26	32	30	28	35	33	30	38	35	32
7	28	26	25	30	28	26	32	30	28	35	33	30	38	35	32
8		26	25		28	26		30	28		33	30		35	32
9		26	25		28	26		30	28		33	30		35	32
10		26	25		28	26		30	28		33	30		35	32

Neck Offset Valgus Standard Lateral (mm)

Size	XS/-3			S/+0			M/+4			L/+8			XL/+12		
01		35			37			39			42			44	
0	34	35		36	37		38	39		40	42		42	44	
1	35	38	41	36	39	43	38	42	45	40	44	48	42	47	51
2	36	39	41	37	40	43	39	43	46	41	45	49	43	48	52
3	36	39	42	38	41	44	40	43	47	42	46	50	44	48	53
4	37	40	43	38	42	45	40	44	48	42	46	50	44	49	53
5	38	41	43	39	42	45	41	45	48	43	47	51	45	50	54
6	38	41	44	40	43	46	42	45	49	44	48	52	46	50	54
7	39	42	45	40	43	46	42	46	49	44	48	52	46	51	55
8		42	45		44	47		46	50		49	53		51	56
9		43	46		45	48		47	51		50	53		52	57
10		44	47		45	48		48	51		50	54		53	57

Neck Length Valgus Standard Lateral (mm)

Size	XS/-3			S/+0			M/+4			L/+8			XL/+12		
01		27			29			33			36			40	
0	30	27		32	29		36	33		39	36		43	40	
1	30	29	29	32	32	32	36	35	35	39	39	39	43	42	42
2	30	29	29	32	32	32	36	35	35	39	39	39	43	42	42
3	30	29	29	32	32	32	36	35	35	39	39	39	43	42	42
4	30	29	29	32	32	32	36	35	35	39	39	39	43	42	42
5	30	29	29	32	32	32	36	35	35	39	39	39	43	42	42
6	30	29	29	32	32	32	36	35	35	39	39	39	43	42	42
7	30	29	29	32	32	32	36	35	35	39	39	39	43	42	42
8		29	29		32	32		35	35		39	39		42	42
9		29	29		32	32		35	35		39	39		42	42
10		29	29		32	32		35	35		39	39		42	42



Instrument Set

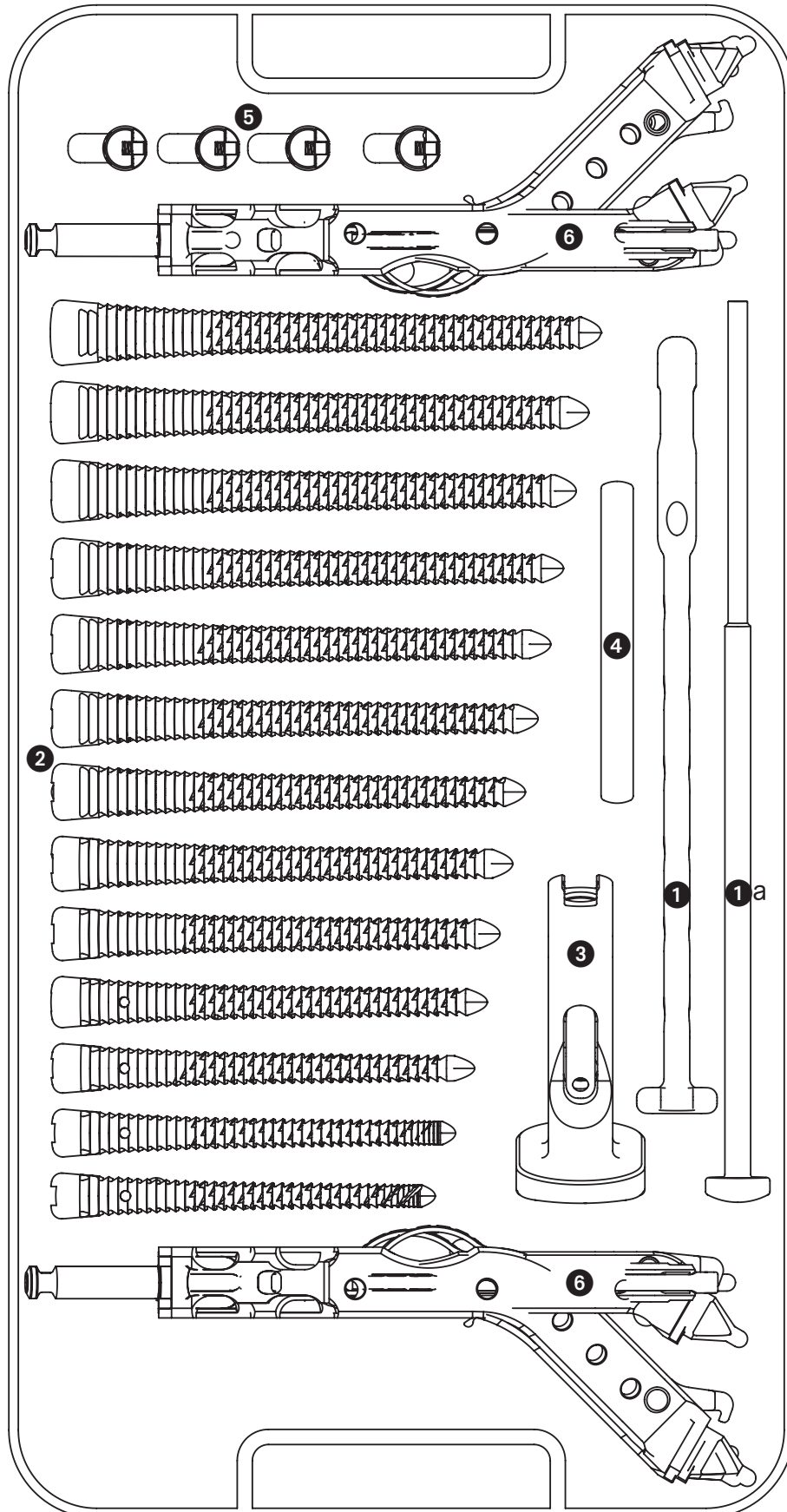
Set No.
75210200

	SAP No.	Item No.	Name	Size
	75007661	990019	Lid	
	75100214	21000676	Insert for Basic Case 21000675	
①	75004665	21000341	Box Chisel	
①a	75004666	21000342	Rod for Box Chisel	
②	75023019	21000616	Trial Rasp	01
	75004641	21000291	Trial Rasp	0
	75004642	21000292	Trial Rasp	1
	75004643	21000293	Trial Rasp	2
	75004644	21000294	Trial Rasp	3
	75004645	21000295	Trial Rasp	4
	75004646	21000296	Trial Rasp	5
	75004647	21000297	Trial Rasp	6
	75004648	21000298	Trial Rasp	7
	75004649	21000299	Trial Rasp	8
	75018110	21000592	Trial Rasp	9
	75018111	21000593	Trial Rasp	10
	75023020*	21000617	Trial rasp	11
③	75000642	21000378	Modular Knock Plate	
④	75001747	1060909	Bolt	
⑤	75023794	21000668	Trial Neck Standard	01
	75023370	21000645	Trial Neck Standard	0
	75004639	21000289	Trial Neck Standard	1–10
	75004640	21000290	Trial Neck Lateral	1–10
	75102213*	75102213	Trial Neck Valgus	0-7

*special size (optional)

Optional Rasp Adapters:

	Set No.	SAP No.	Item No.	Name	Size
⑥	75200166	75007307	600920	Offset-Adapter 25 mm	25 mm
	75200168	75007308	600921	Offset-Adapter 40 mm	40 mm
	75200169	75007309	600922	Offset-Adapter 10 mm	10 mm
	75200171	75007310	600923	Offset-Adapter 17 mm left	17/13 mm
		75007311	600924	Offset-Adapter 17 mm right	17/13 mm
	75210202	75004612	21000262	Offset-Adapter 60 mm left	60/25 mm
		75004613	21000263	Offset-Adapter 60 mm right	60/25 mm



Instrument Set

Set No.

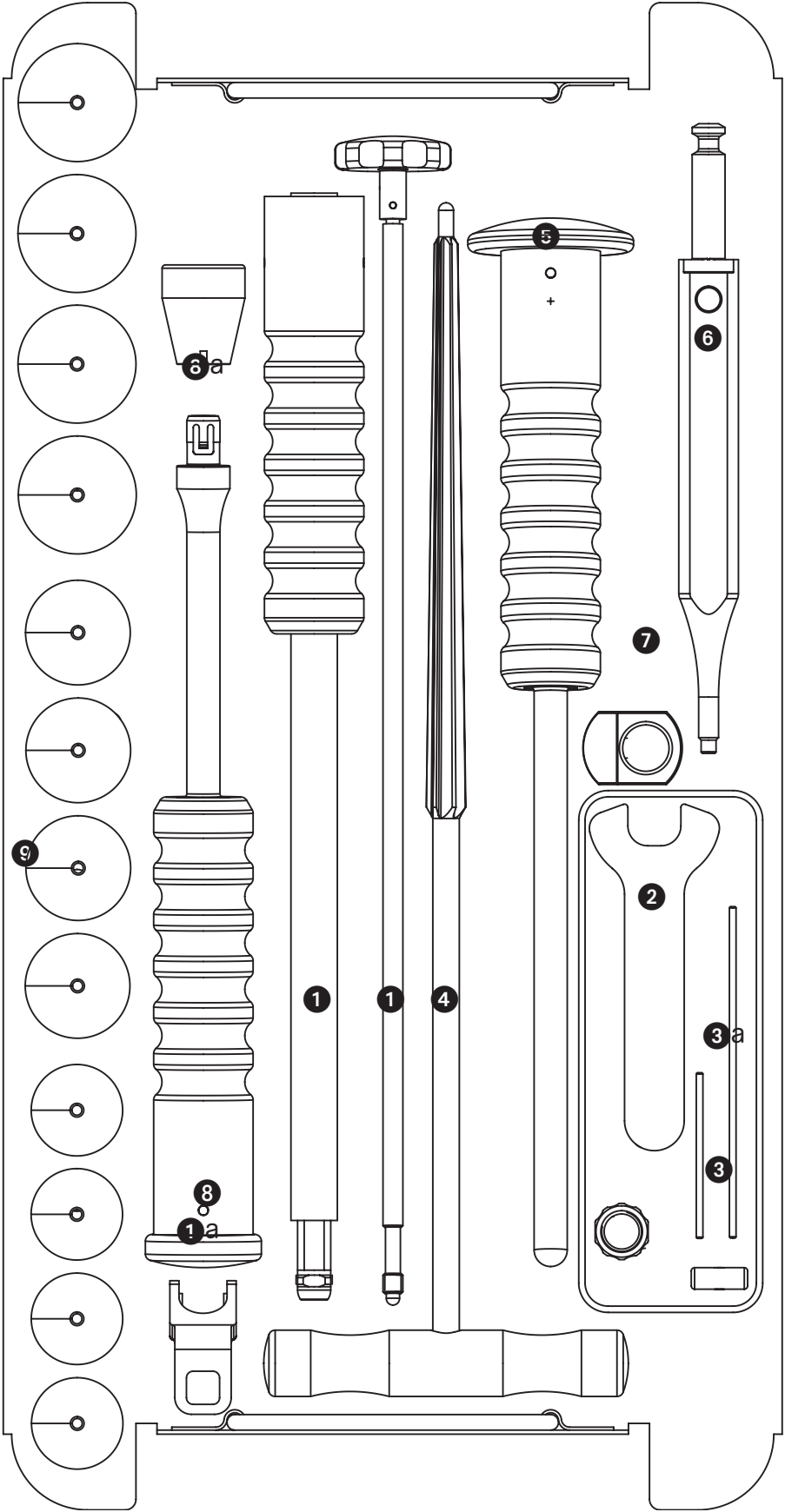
75210200

	SAP No.	Item No.	Name	Size
①	75004650	21000300	Stem Inserter	
①a	75023745	21000667	Wing Stabilizer for 21000300	
②	75100194	21000673	Fork Key for 21000300	
③	75004637	21000287	CCD Gauge	
③a	75004638	21000288	Pin for CCD Gauge	50 mm
③a	75004664	21000340	Pin for CCD Gauge	100 mm
④	75004667	21000343	Femoral Reamer	
⑤	75023369	21000644	Stem Impactor	
⑥	75002165	110249	Extraction Screw	M6
⑦	75004678	21000354	Extractor Block	
⑧	75023710	21000662	Head Impactor	
⑧a	75023711	21000663	Modular Head for 21000662	
⑨	75100839*	75100839	Trial Femoral Head	22 S/+0
	75100840	75100840	Trial Femoral Head	22 M/+4
	75100841	75100841	Trial Femoral Head	22 L/+8
	75100842*	75100842	Trial Femoral Head	22 XL/+12
	75100843*	75100843	Trial Femoral Head	28 XS/-3
	75100844	75100844	Trial Femoral Head	28 S/+0
	75100845	75100845	Trial Femoral Head	28 M/+4
	75100846	75100846	Trial Femoral Head	28 L/+8
	75100847	75100847	Trial Femoral Head	28 XL/+12
	75100848*	75100848	Trial Femoral Head	28 XXL/+16
	75100849*	75100849	Trial Femoral Head	32 XS/-3
	75100850	75100850	Trial Femoral Head	32 S/+0
	75100851	75100851	Trial Femoral Head	32 M/+4
	75100852	75100852	Trial Femoral Head	32 L/+8
	75100853	75100853	Trial Femoral Head	32 XL/+12
	75100854*	75100854	Trial Femoral Head	32 XXL/+16
	75100855*	75100855	Trial Femoral Head	36 XS/-3
	75100856	75100856	Trial Femoral Head	36 S/+0
	75100857	75100857	Trial Femoral Head	36 M/+4
	75100858	75100858	Trial Femoral Head	36 L/+8
	75100859	75100859	Trial Femoral Head	36 XL/+12

* special size (optional)

Optional:

SAP No.	Art. No.	Description	Size
75210292	75210292	SET 40mm Trial Femoral Heads	XS/-4 to L/+8
75210293	75210293	SET 44mm Trial Femoral Heads	XS/-4 to L/+8



Manufacturer

Smith & Nephew Orthopaedics AG
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Contact