LINK®

3C – Hip Prosthesis System

Surgical Technique

CE 0426

Explanation of Pictograms			
	Manufacturer	REF	Article number
MAT	Material number	CE	Product meets the applicable requirements, which are regulated in the EU harmonization legislation for the affixing of the CE marking.

3C – Hip Prosthesis System

3C Hip Stem, uncemented

3C Short Hip Stem, uncemented

3C Hip Stem, cemented

The 3C Hip Prosthesis System has been designed in order to treat almost all primary prosthesis indications of the femoral hip joint. The portfolio of the 3C Hip Prosthesis System is based on a monolithic straight stem prosthesis, available as a cemented stem, or uncemented and proximally coated stem, in a standard- and short-length version.

Here exposed the surgical technique is valid for the three stem versions. The only difference is that the mirror polished stem has to be cemented, and the proximally rough stems has to be implanted uncemented. Every version has its specific broaches.

Preoperative Planning

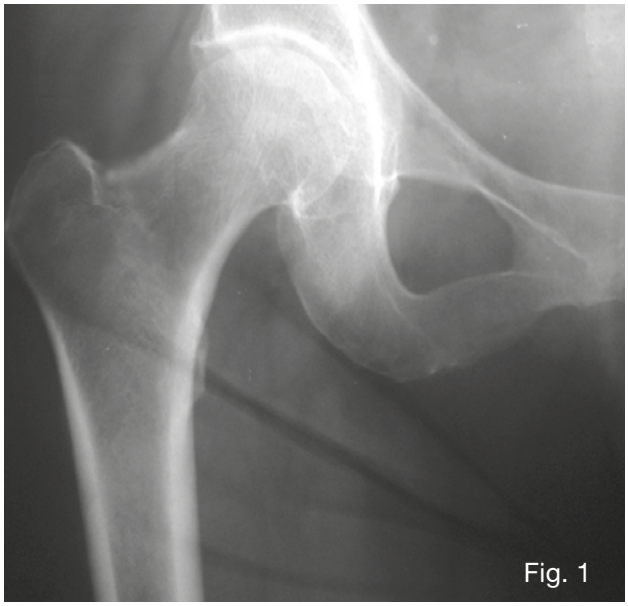


Fig. 1

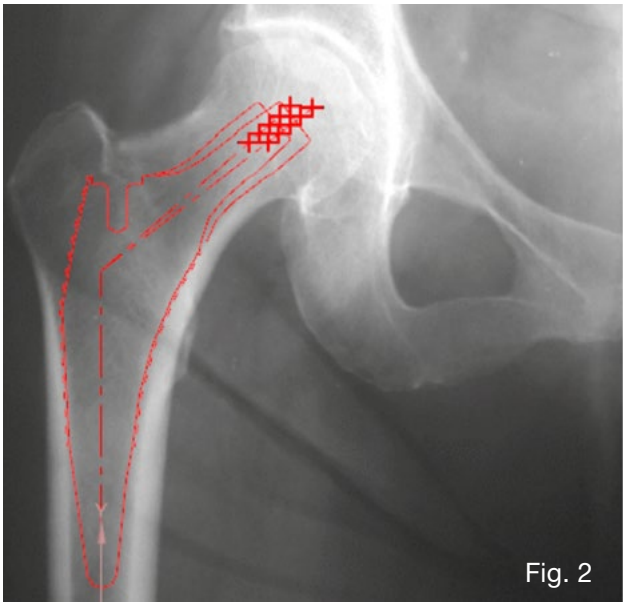


Fig. 2

For optimal results the surgery should be planned in advance using the appropriate templates.
The templates are enlarged by a factor of 110%.

The implant size should be chosen using good quality AP and ML X-rays with adequate contrast (Fig. 1). Each X-ray should be large enough to apply on the whole template (Fig. 2).

3C

Fig. 3

Choice of stem size and stem type

The stem size is selected in a way that in frontal plane the outline fills as much of the proximal femoral metaphysis as possible. In the sagittal plane it must be ensured that the stem is suited to the anterior bow of the femur.
The stem is fixed proximally and therefore does not need to fit closely in the distal area. The size of prosthesis should be chosen so that the center of rotation is correctly situated in the middle of the head respectively at a level with greater trochanter.

The stem size and the level for resection of the femoral neck should be selected such that the tip of the greater trochanter is level with the center of the head of the prosthesis (Fig. 3).

Lateralizing stems are available to achieve an anatomical reconstruction, even in case a high offset (+5 mm compared to standard stem) is required.

The templates for the 3C stem show the centers of rotation for different head-neck-lengths (Fig. 2).

INFORMATION:
Preoperative planning gives an initial estimate but cannot conclusively determine the size of stem to be used. This is decided intraoperatively.

Preparation and Implantation

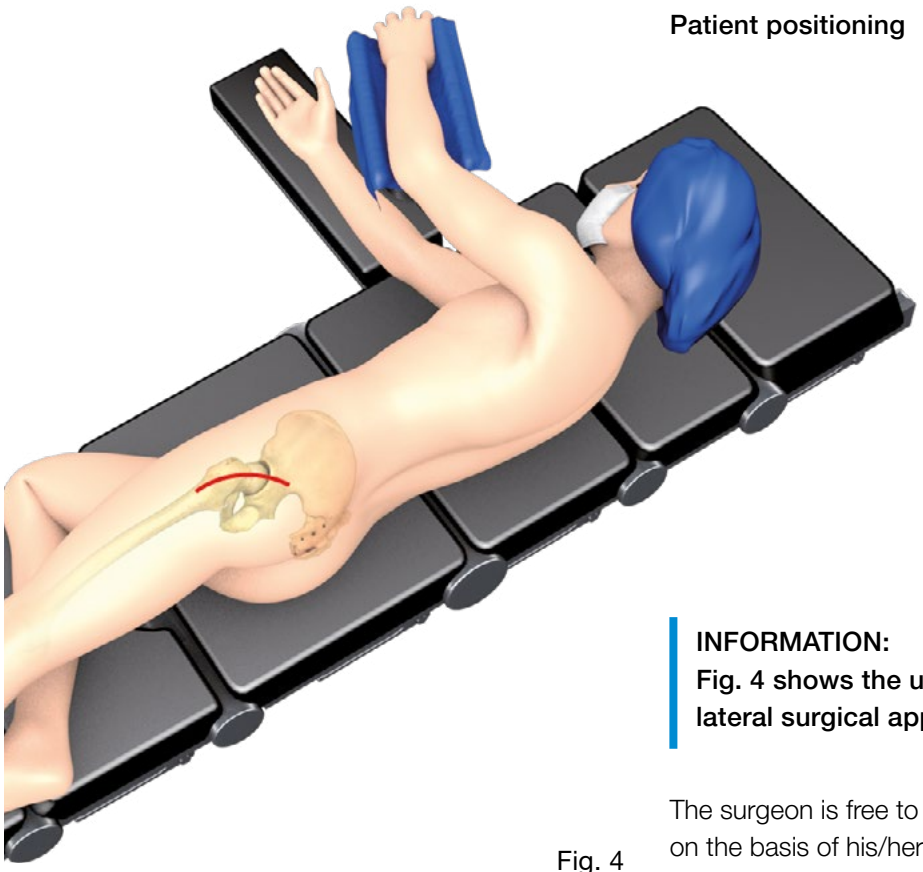


Fig. 4

Patient positioning

INFORMATION:
Fig. 4 shows the usual position for postero-lateral surgical approach.

The surgeon is free to choose the surgical approach on the basis of his/her experience and judgment, and according to the specific situation.
The hip is dislocated in the usual way.

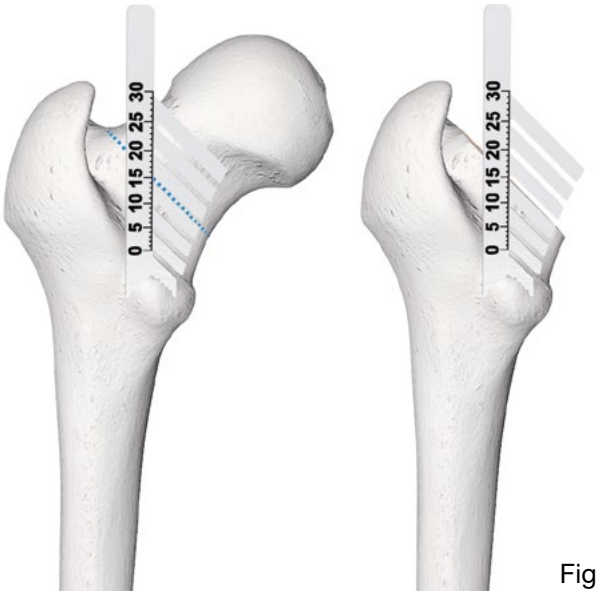


Fig. 5

Determination of the resection level

For orientation, the resection guide can be placed on the lesser trochanter and aligned parallel to the longitudinal axis of the femur (Fig. 5). The osteotomy can now be performed in the slot on the guide that corresponds to the preoperatively planned level. Both the level and the inclination of the osteotomy are given by the guide. It must be ensured that the osteotomy is performed at 90° to the axis of the femoral neck, also in A-P orientation.

In certain cases, a second vertical resection may be required. The correct orientation of the resection plane can also be checked by means of a compressor. As a general rule, the acetabulum is prepared first, prior to preparation of the femoral canal.

Fig. 6

Preparation of the proximal femur

The medullary canal is opened with a box chisel (Fig. 6). This is done as laterally as possible in order to avoid varus positioning of the stem.
Furthermore, this facilitates introduction of the compressor, and also reduces the risk of femoral shaft fracture when the prosthesis is driven in.

Fig. 7

In order to position the compressor centrally, the femoral canal is prepared axially using the Femoral Canal Opener. (Fig. 7).

Fig. 8

To insert the compressor, open the lever of the rasp handle and insert the compressor with its medial side pointing toward the lever. Then the lever is closed again to fix the compressor.

The intended anteverison has to be taken into account already when the smallest compressor is inserted (as a rule, 15°). When inserting the compressor, the surgeon must ensure correct axial alignment. With increasing sizes of the compressors, the femoral canal is prepared until maximum stability with the largest possible diameter is achieved. The process is complete as soon as the compressor is positioned centrally in the femoral canal, rotationally stable and axially aligned (Fig. 8).

Fig. 9

Drive in the bone compressor until the junction surface of the compressor is flush with the resected neck surface (Fig. 9).
The rasp handle is then removed and the compressor is left in situ.

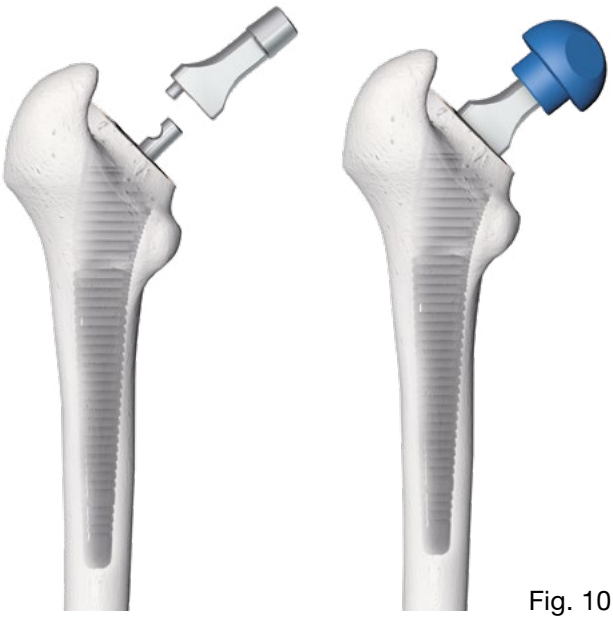


Fig. 10

Trial reduction

Usually the acetabular cup is implanted before the stem component so that trial reduction can now be done.

The trial reduction is done with the final compressor left in situ. The handle is removed for this purpose, and the trial neck segment previously determined in the preoperative planning (CCD angle) is attached. Various trial heads are used to check for optimal off-set, correct leg length and adequate stability (Fig. 10). The range of movement is also checked in order to exclude any impingement of bone or implant with the acetabular cup, and to prevent any instability (Fig. 11).

Fig. 11

Finally, the trial head and neck segment are removed. The compressor is removed from the femoral canal using the rasp handle.

Fig. 12a

Femoral implant insertion

When implanting an uncemented or cemented stem, the definitive implant size must correspond to the last compressor size used. Insert the femoral component into the femoral canal using the stem inserter.

Uncemented Stem Insertion

The uncemented prosthesis stems, both short- and standard-length stems, are designed with a built-in press-fit. The corresponding implant is now removed from the sterile packaging and introduced into the medullary canal as far as possible, either manually or with the inserting forceps. This must be done with care so as to avoid damage to the implant bed.

Screw the stem positioner onto the final stem (Fig. 12a). Drive in the stem with careful and controlled hammer blows until the transition line between the porous surface and the neck area corresponds to the profile of the last bone compressor used (Fig. 12b).

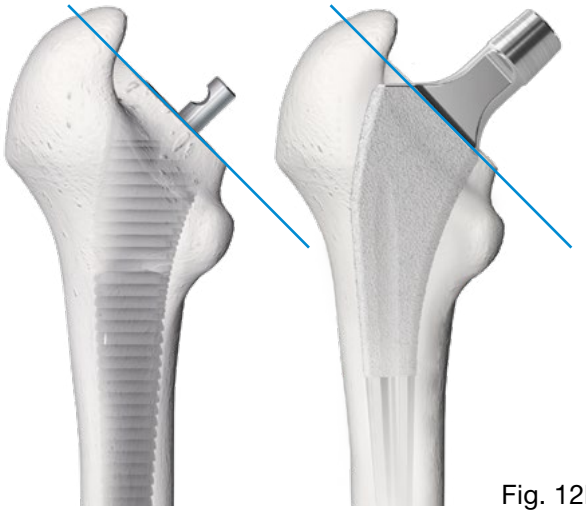


Fig. 12b

Fig. 13

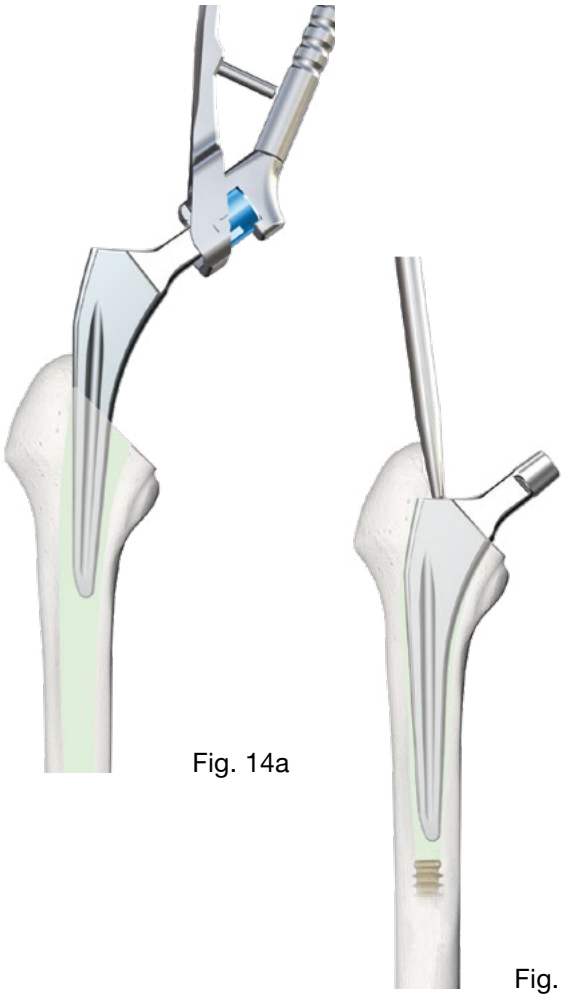


Fig. 14a

Fig. 14b

Cemented Stem Insertion

The surgical procedure for the cemented stem is identical as far as the trial reduction after the rasping process. Until this point the method of fixing the appropriate prosthesis can still be selected during the operation.

When using a cemented stem, clean and dry the femoral shaft using a high-pressure pulse lavage system in order to remove blood, fat and debris from the cancellous surface of the canal. Insert an appropriate distal femoral plug.
Deliver the cement in the clean and dry femoral shaft in a retrograde fashion (Fig. 13).

Apply the proximal seal and pressurize the cement to improve the interlock of the bone-cement interface. Insert the stem down the center with the inserting forceps (Fig. 14a) and maintain pressure on the stem through the impactor until the cement is polymerized (Fig. 14b).

Another trial reduction can be carried out with the appropriate trial head in order to check the range of the movement and the ligament tension with the implant in place.

INFORMATION:
When using a line-to-line broaching technique, the final rasp size should match the final implant size for both uncemented and cemented versions.

Fig. 15

The 3C cemented Hip Stem is driven into its final position using the impactor. The surplus of the cement has to be removed. While the cement hardens, the stem is pressed firmly into the cement bed with the tip of the impactor located in the hemispherical depression on the lateral collar, thus avoiding transmission of the surgeon's movements to the stem (Fig. 15).

Remove the Positioner

The impactor can also be used instead of the positioner to introduce the stem.

Trial Reduction

After the final stem is implanted, cemented or uncemented, another trial reduction can then be performed by placing the selected trial head on to the implant (Fig. 16). Finally, the trial head is removed again.

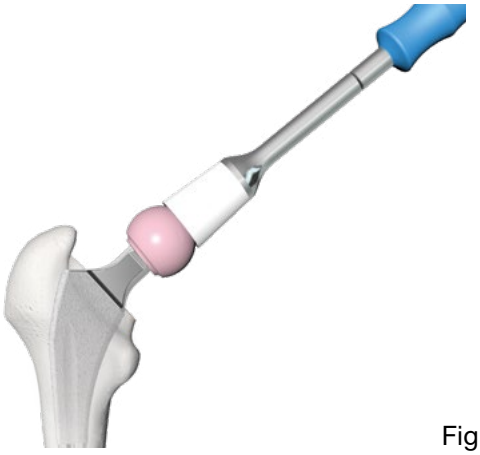


Fig. 17

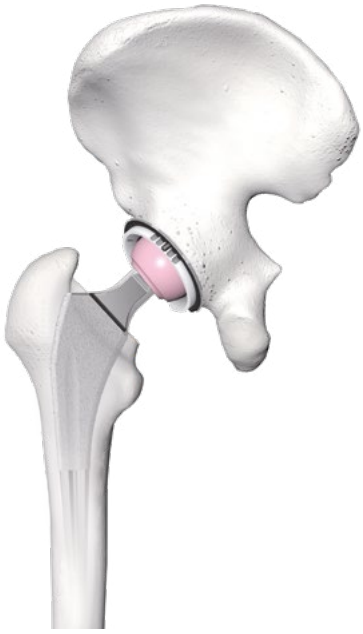


Fig. 18

Attaching the final prosthesis head

After cleaning the joint surfaces, the joint is reduced. (Figs. 17, 18)

Removing the components

Each of the prosthesis components can be removed if necessary.

The prosthesis head can be removed in an axial direction using a rod which is placed at the base of the head.

The positioner can be used to extract the femoral component.

CAUTION:
If a ceramic head has to be replaced with another ceramic head, only ceramic revision heads (with a metal inner taper) should be used.

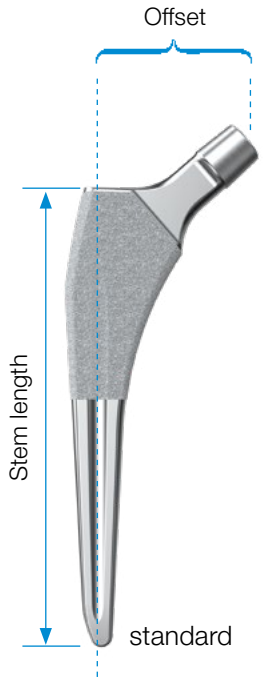
3C Hip System

Sizes

The 3C hip prosthesis types standard and lateralized are available in 13 sizes each.
The dimensions of the stems and the offset increase proportionately with increasing size.

The CCD angles are:
- 131° in standard stem type
- 127° in lateralized stem type

3C TiCaP Hip Stems, uncemented

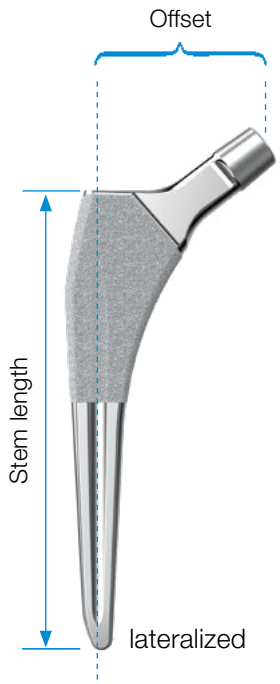


Standard type

MAT Ti6Al4V, TiCaP Double Coating (commercially pure titanium cpTi/calcium phosphate CaP), taper 12/14, CCD angle 131°

REF	Size	Stem length mm	Offset mm
167-204/01	1	120	35
167-204/02	2	123	36
167-204/03	3	126	37
167-204/04	4	129	38
167-204/05	5	132	39
167-204/06	6	135	40
167-204/07	7	138	41
167-204/08	8	141	42
167-204/09	9	144	43
167-204/10	10	147	44
167-204/11	11	150	45
167-204/12	12	153	46
167-204/13	13	156	47

3C TiCaP Hip Stems, uncemented

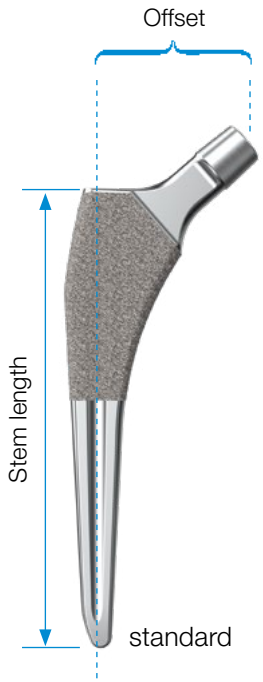


Lateralized type, + 5mm offset

MAT Ti6Al4V, TiCaP Double Coating (commercially pure titanium cpTi/calcium phosphate CaP), taper 12/14, CCD angle 127°

REF	Size	Stem length mm	Offset mm
167-205/01	1	120	40
167-205/02	2	123	41
167-205/03	3	126	42
167-205/04	4	129	43
167-205/05	5	132	44
167-205/06	6	135	45
167-205/07	7	138	46
167-205/08	8	141	47
167-205/09	9	144	48
167-205/10	10	147	49
167-205/11	11	150	50
167-205/12	12	153	51
167-205/13	13	156	52

3C PlasmaLink Hip Stems, uncemented

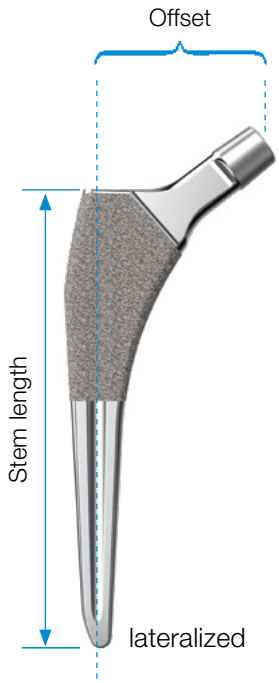


Standard type

MAT Ti6Al4V, PlasmaLink (commercially pure titanium cpTi), taper 12/14, CCD angle 131°

REF	Size	Stem length mm	Offset mm
167-202/01	1	120	35
167-202/02	2	123	36
167-202/03	3	126	37
167-202/04	4	129	38
167-202/05	5	132	39
167-202/06	6	135	40
167-202/07	7	138	41
167-202/08	8	141	42
167-202/09	9	144	43
167-202/10	10	147	44
167-202/11	11	150	45
167-202/12	12	153	46
167-202/13	13	156	47

3C PlasmaLink Hip Stems, uncemented

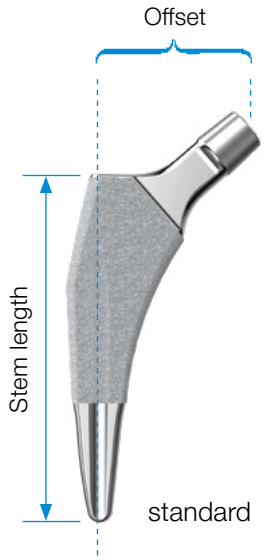


Lateralized type, + 5mm offset

MAT Ti6Al4V, PlasmaLink (commercially pure titanium cpTi), taper 12/14, CCD angle 127°

REF	Size	Stem length mm	Offset mm
167-203/01	1	120	40
167-203/02	2	123	41
167-203/03	3	126	42
167-203/04	4	129	43
167-203/05	5	132	44
167-203/06	6	135	45
167-203/07	7	138	46
167-203/08	8	141	47
167-203/09	9	144	48
167-203/10	10	147	49
167-203/11	11	150	50
167-203/12	12	153	51
167-203/13	13	156	52

3C TiCaP Short Hip Stems, uncemented

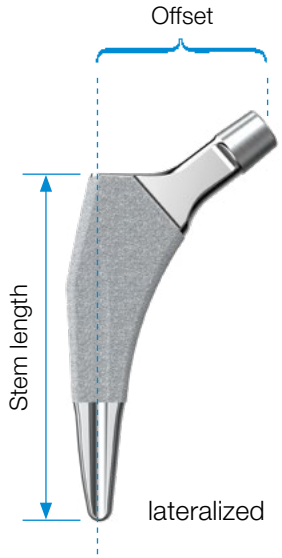


Standard type

MAT Ti6Al4V, TiCaP Double Coating (commercially pure titanium cpTi/calcium phosphate CaP), taper 12/14, CCD angle 131°

REF	Size	Stem length mm	Offset mm
167-311/01	1	92	35
167-311/02	2	92	36
167-311/03	3	92	37
167-311/04	4	97	38
167-311/05	5	100	39
167-311/06	6	103	40
167-311/07	7	106	41
167-311/08	8	109	42
167-311/09	9	111	43
167-311/10	10	113	44
167-311/11	11	115	45
167-311/12	12	117	46
167-311/13	13	120	47

3C TiCaP Short Hip Stems, uncemented

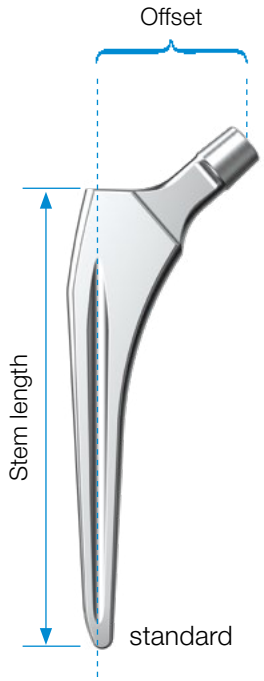


Lateralized type, + 5mm offset

MAT Ti6Al4V, TiCaP Double Coating (commercially pure titanium cpTi/calcium phosphate CaP), taper 12/14, CCD angle 127°

REF	Size	Stem length mm	Offset mm
167-312/01	1	92	40
167-312/02	2	92	41
167-312/03	3	92	42
167-312/04	4	97	43
167-312/05	5	100	44
167-312/06	6	103	45
167-312/07	7	106	46
167-312/08	8	109	47
167-312/09	9	111	48
167-312/10	10	113	49
167-312/11	11	115	50
167-312/12	12	117	51
167-312/13	13	120	52

3C Hip Stems, cemented

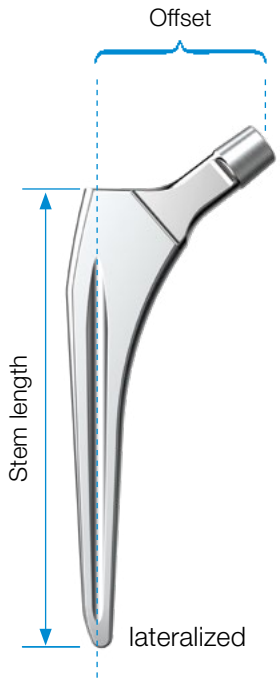


Standard type

MAT CoCrMo, taper 12/14, CCD angle 131°

REF	Size	Stem length mm	Offset mm
167-222/02	2	120	36
167-222/03	3	123	37
167-222/04	4	126	38
167-222/05	5	129	39
167-222/06	6	132	40
167-222/07	7	135	41
167-222/08	8	138	42
167-222/09	9	141	43
167-222/10	10	144	44
167-222/11	11	147	45
167-222/12	12	150	46
167-222/13	13	153	47

3C Hip Stems, cemented

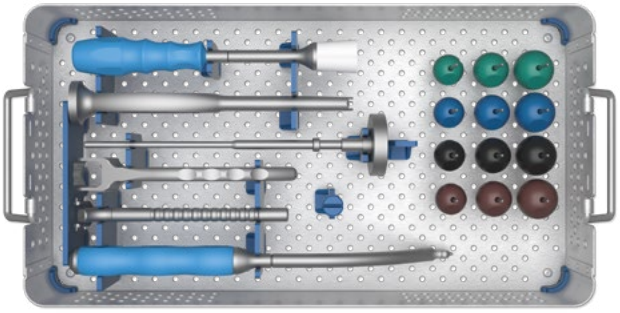


Lateralized type, + 5mm offset

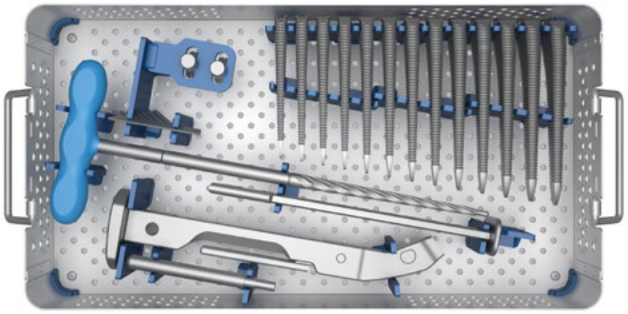
MAT CoCrMo, taper 12/14, CCD angle 127°

REF	Size	Stem length mm	Offset mm
167-223/02	2	120	41
167-223/03	3	123	42
167-223/04	4	126	43
167-223/05	5	129	44
167-223/06	6	132	45
167-223/07	7	135	46
167-223/08	8	138	47
167-223/09	9	141	48
167-223/10	10	144	49
167-223/11	11	147	50
167-223/12	12	150	51
167-223/13	13	153	52

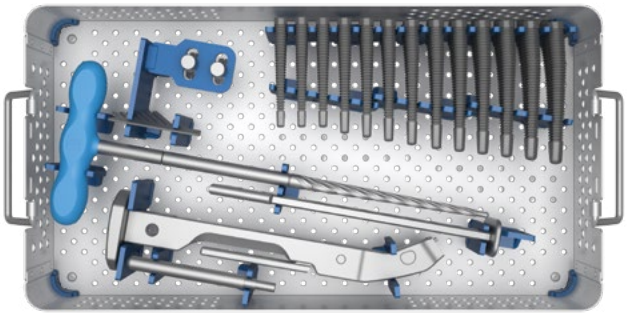
165-100/31 **Instrument Set**, complete



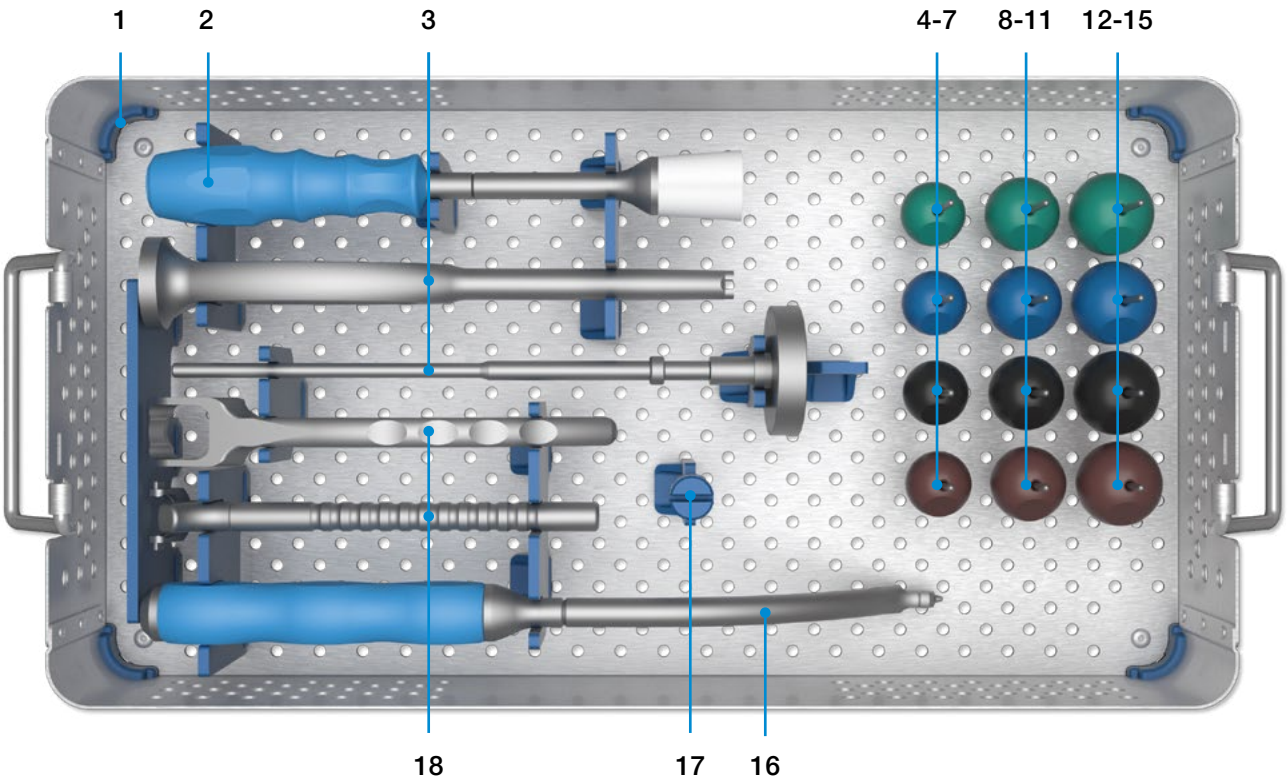
Instrument Set for 3C Standard Hip Stems



Instrument Set for 3C Short Hip Stems

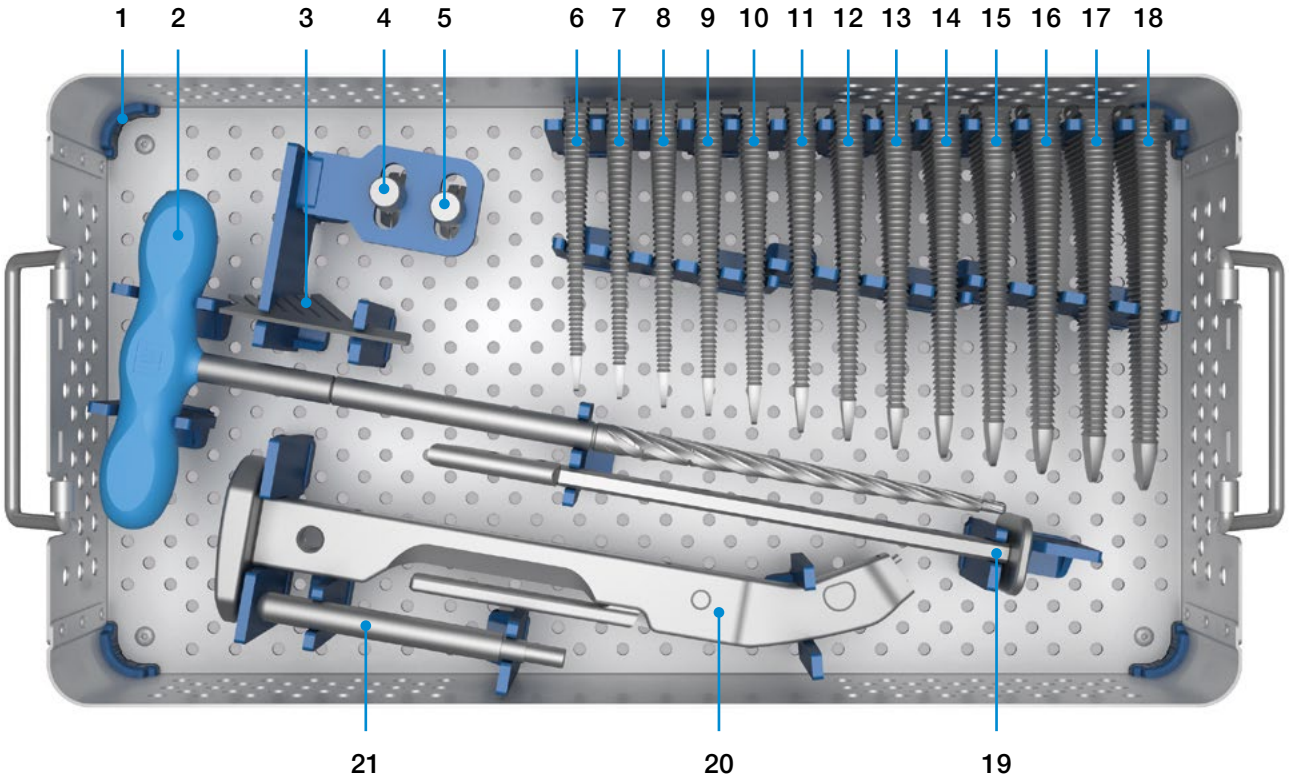


165-100/31 **Basic Instrument Set**, complete



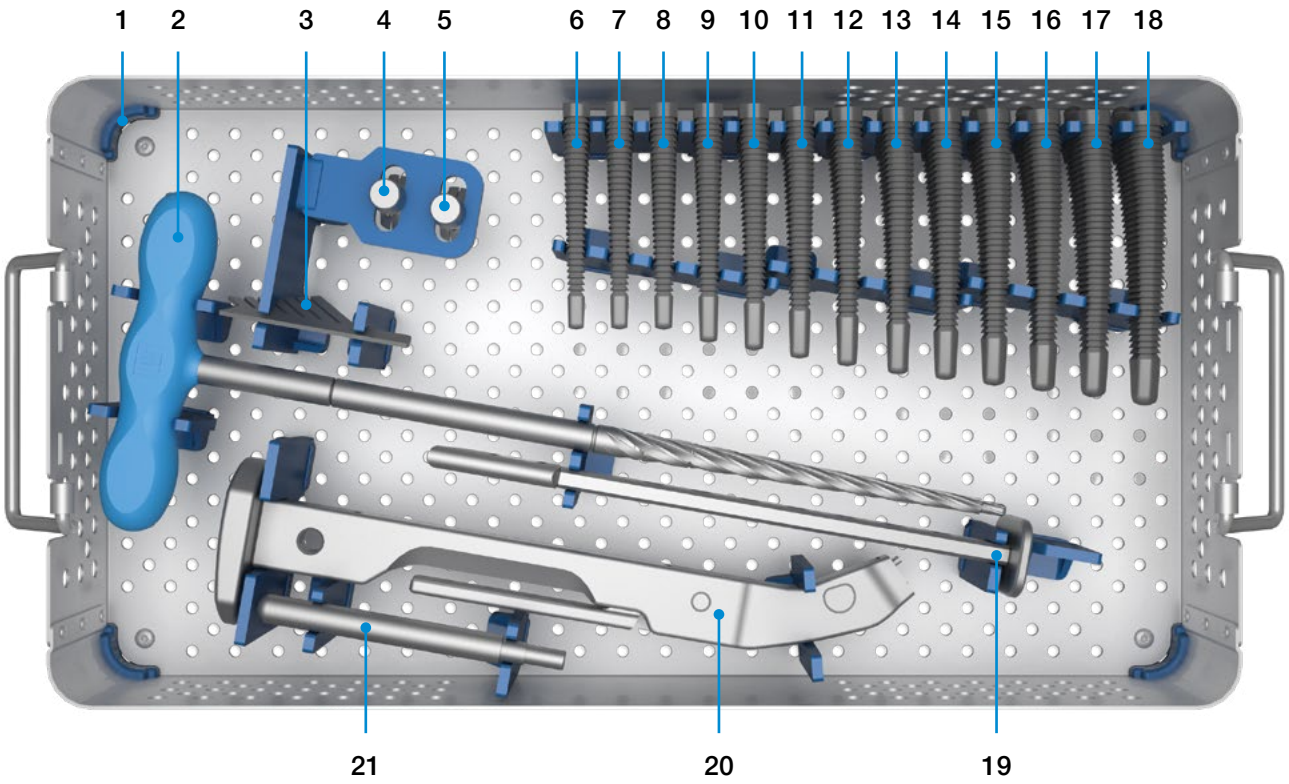
1	165-100/11	**Instrument Tray,** empty, stainless steel, with lid
2	175-360	**Head Impactor** with exchangeable plastic head, stainless steel / silicone
3	130-711	**Positioner,** stainless steel, 260mm
4	132-928/01	**Plastic Trial Head,** PPH, Taper 12/14, Ø 28mm, Neck length short, green
5	132-928/02	**Plastic Trial Head,** PPH, Taper 12/14, Ø 28mm, Neck length medium, blue
6	132-928/03	**Plastic Trial Head,** PPH, Taper 12/14, Ø 28mm, Neck length long, black
7	132-928/04	**Plastic Trial Head,** PPH, Taper 12/14, Ø 28mm, Neck length extra long, brown
8	132-932/01	**Plastic Trial Head,** PPH, Taper 12/14, Ø 32mm, Neck length short, green
9	132-932/02	**Plastic Trial Head,** PPH, Taper 12/14, Ø 32mm, Neck length medium, blue
10	132-932/03	**Plastic Trial Head,** PPH, Taper 12/14, Ø 32mm, Neck length long, black
11	132-932/04	**Plastic Trial Head,** PPH, Taper 12/14, Ø 32mm, Neck length extra long, brown
12	132-936/01	**Plastic Trial Head,** PPH, Taper 12/14, Ø 36mm, Neck length short, green
13	132-936/02	**Plastic Trial Head,** PPH, Taper 12/14, Ø 36mm, Neck length medium, blue
14	132-936/03	**Plastic Trial Head,** PPH, Taper 12/14, Ø 36mm, Neck length long, black
15	132-936/04	**Plastic Trial Head,** PPH, Taper 12/14, Ø 36mm, Neck length extra long, brown
16	130-622/01	**Impactor,** curved, stainless steel / silicone
17	179-122/01	**Taper Cap,** PPSU, blue
18	134-141/00	**Inserting Forceps** with exchangeable taper cap, stainless steel, 200mm

Instrument Set for 3C Standard Hip Stems, complete



1	167-100/10	**Instrument Tray,** empty, stainless steel, with lid
2	130-617	**Femoral Canal Opener,** stainless steel, 365mm
3	175-310/05	**Resection Guide,** stainless steel
4	167-110/02	**Trial Neck Segment,** stainless steel, Taper 12/14, CCD 127 °, lateralizing
5	167-110/01	**Trial Neck Segment,** stainless steel, Taper 12/14, CCD 131 °, standard
6	167-111/01	**Bone Compressor,** stainless steel, Size 1
7	167-111/02	**Bone Compressor,** stainless steel, Size 2
8	167-111/03	**Bone Compressor,** stainless steel, Size 3
9	167-111/04	**Bone Compressor,** stainless steel, Size 4
10	167-111/05	**Bone Compressor,** stainless steel, Size 5
11	167-111/06	**Bone Compressor,** stainless steel, Size 6
12	167-111/07	**Bone Compressor,** stainless steel, Size 7
13	167-111/08	**Bone Compressor,** stainless steel, Size 8
14	167-111/09	**Bone Compressor,** stainless steel, Size 9
15	167-111/10	**Bone Compressor,** stainless steel, Size 10
16	167-111/11	**Bone Compressor,** stainless steel, Size 11
17	167-111/12	**Bone Compressor,** stainless steel, Size 12
18	167-111/13	**Bone Compressor,** stainless steel, Size 13
19	130-716	**Box Chisel,** stainless steel
20	130-394/01	**Rasp Handle** with quick coupling, stainless steel, straight
21	130-393/81	**Positioning Guide** for aligment of anteversion, stainless steel, 110mm

Instrument Set for 3C Short Hip Stems, complete



1	167-100/10	**Instrument Tray,** empty, stainless steel, with lid
2	130-617	**Femoral Canal Opener,** stainless steel, 365mm
3	175-310/05	**Resection Guide,** stainless steel
4	167-110/02	**Trial Neck Segment,** stainless steel, Taper 12/14, CCD 127 °, lateralizing
5	167-110/01	**Trial Neck Segment,** stainless steel, Taper 12/14, CCD 131 °, standard
6	167-112/01	**Short Bone Compressor,** stainless steel, Size 1
7	167-112/02	**Short Bone Compressor,** stainless steel, Size 2
8	167-112/03	**Short Bone Compressor,** stainless steel, Size 3
9	167-112/04	**Short Bone Compressor,** stainless steel, Size 4
10	167-112/05	**Short Bone Compressor,** stainless steel, Size 5
11	167-112/06	**Short Bone Compressor,** stainless steel, Size 6
12	167-112/07	**Short Bone Compressor,** stainless steel, Size 7
13	167-112/08	**Short Bone Compressor,** stainless steel, Size 8
14	167-112/09	**Short Bone Compressor,** stainless steel, Size 9
15	167-112/10	**Short Bone Compressor,** stainless steel, Size 10
16	167-112/11	**Short Bone Compressor,** stainless steel, Size 11
17	167-112/12	**Short Bone Compressor,** stainless steel, Size 12
18	167-112/13	**Short Bone Compressor,** stainless steel, Size 13
19	130-716	**Box Chisel,** stainless steel
20	130-394/01	**Rasp Handle** with quick coupling, stainless steel, straight
21	130-393/81	**Positioning Guide** for aligment of anteversion, stainless steel, 110mm

X-ray Templates

X-ray Templates for 3C Hip Stems, uncemented
CCD angle 127°/131° (standard and lateralized type)
110% actual size

REF	X-ray templates for standard and lateralizing type	Set of sheets
167-115/10	**3C Hip Stems,** uncemented	13

X-ray Templates for 3C Short Hip Stems, uncemented
CCD angle 127°/131° (standard and lateralized type)
110% actual size

REF	X-ray templates for standard and lateralizing type	Set of sheets
167-115/11	**3C Short Hip Stems,** uncemented	13

X-ray Templates for 3C Hip Stems, cemented
CCD angle 127°/131° (standard and lateralized type)
110% actual size

REF	X-ray templates for standard and lateralizing type	Set of sheets
167-115/12	**3C Hip Stems,** cemented	12

Instructions for Cleaning and Maintenance

Specific instructions for instruments are available on request from info@link-ortho.com

Literature

For more information please register for our LINK Media Library (link-ortho.com)

3C Hip System, Standard
General Indications
Mobility-limiting diseases, fractures or defects of the hip joint or proximal femur which cannot be treated by conservative or osteosynthetic procedures
Indications
Primary and secondary osteoarthritis
Rheumatoid arthritis
Correction of functional deformities
Avascular necrosis
Femoral neck fractures
Revision after implant loosening dependent on bone mass and quality
Contraindications
Acute and chronic infections, local and systemic insofar as they compromise the successful implantation of a total hip prosthesis (preoperative microbiological analysis recommended)
Allergies to (implant) materials
Insufficient / inadequate bone mass- or quality which prevents a stable anchorage of the prosthesis

INFORMATION:
These indications/contraindications refer to standard cases. The ultimate decision on whether or not an implant is suitable for a patient must be made by the surgeon based on his/her individual analysis and his/her experience.

3C Hip Stems can be combined with prostheses heads up to +10,5mm additional neck length.

Important Information

Please note the following regarding the use of our implants:

1. **Choosing the right implant is very important.**
   The size and shape of the human bone determines the size and shape of the implant and also limits the load capacity. Implants are not designed to withstand unlimited physical stress. Demands should not exceed normal functional loads.

2. **Correct handling of the implant is very important.**
   Under no circumstances should the shape of a finished implant be altered, as this shortens its life span. Our implants must not be combined with implants from other manufacturers. The instruments indicated in the Surgical Technique must be used to ensure safe implantation of the components.

3. **Implants must not be reused.**
   Implants are supplied sterile and are intended for single use only. Used implants must not be used again.

4. **After-treatment is also very important.**
   The patient must be informed of the limitations of the implant. The load capacity of an implant cannot compare with that of healthy bone!

5. **Unless otherwise indicated, implants are supplied in sterile packaging.**
   Note the following conditions for storage of packaged implants:
- Avoid extreme or sudden changes in temperature.
- Sterile implants in their original, intact protective packaging may be stored in permanent buildings up until the “Use by” date indicated on the packaging.
- They must not be exposed to frost, dampness or direct sunlight, or mechanical damage.
- Implants may be stored in their original packaging for up to 5 years after the date of manufacture. The “Use by” date is indicated on the product label.
- Do not use an implant if the packaging is damaged.

6. **Traceability is important.**
   Please use the documentation stickers provided to ensure traceability.

7. **Further information** on the material composition is available on request from the manufacturer.

Follow the instructions for use!

LINK ITALIA S.P.A., Milano, Italy

LINK ITALIA S.p.A.
via Cascina Belcasule, 11 - 20141 Milano - Italy
Phone +39 02 535421 - Fax: +39 02 53542350
infolink@linkitaliaspa.it - www.link-ortho.com