MetaFix™

Cementless Total Hip Replacement

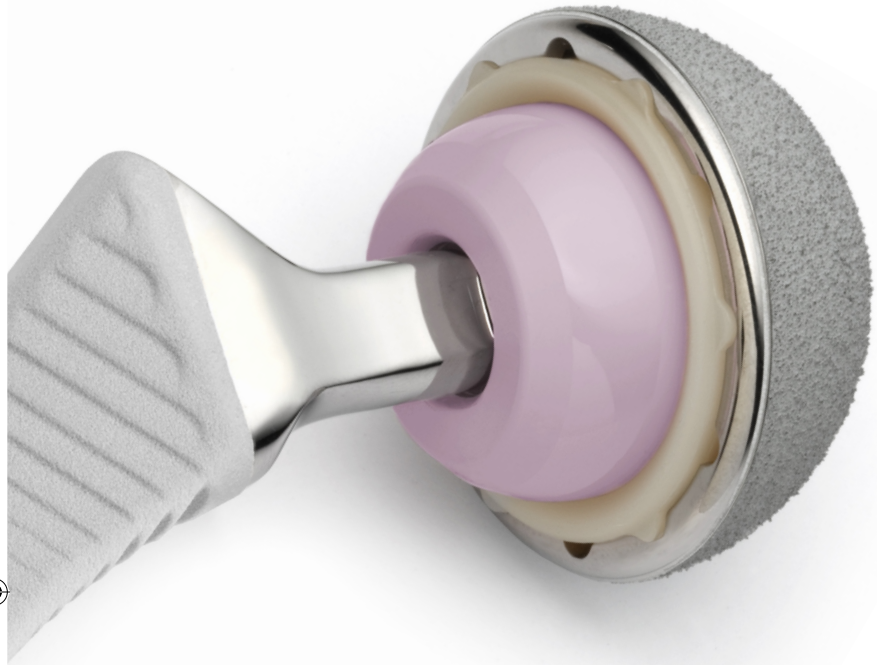
Surgical technique

Corin

Connected Orthopaedic Insight

MetaFix™

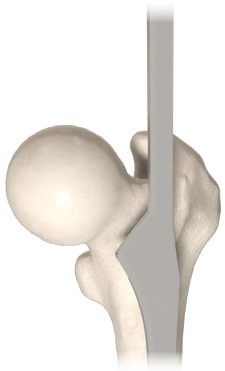
Contents



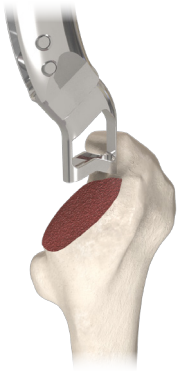
MetaFix™

Versatility | Accuracy | Simplicity

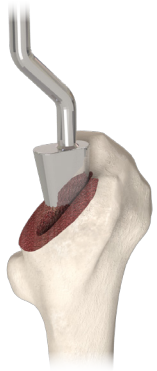
Operative summary



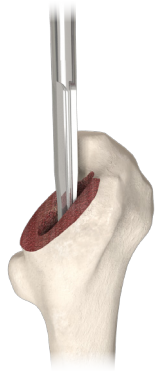
a. Femoral neck osteotomy



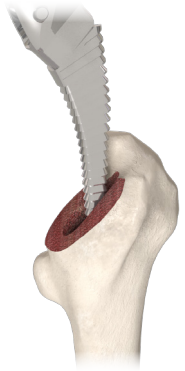
b. Femoral canal preparation



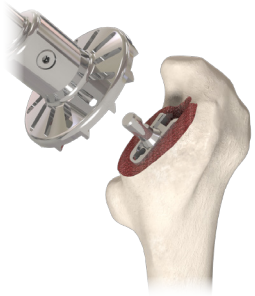
c. Femoral punch



d. Tapered IM reamer

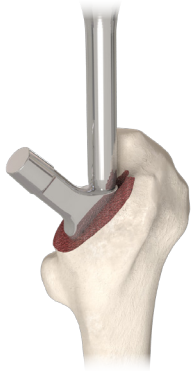


e. Compaction broaching



f. Calcar preparation

g. Trial reduction



h. Stem implantation

i. Femoral head impaction

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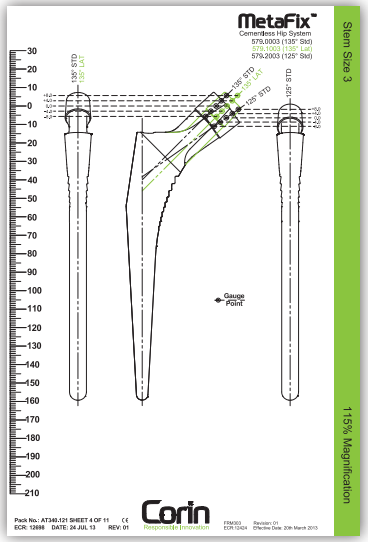
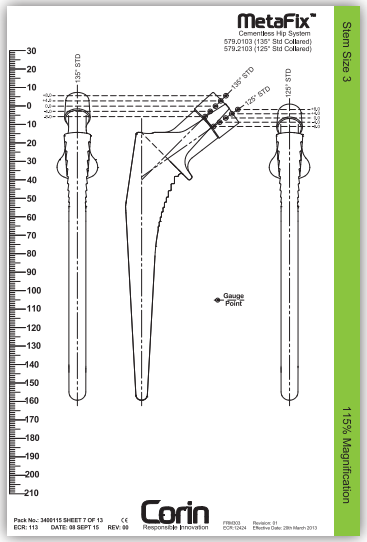
Acetabular preparation

The acetabulum is prepared as instructed for the chosen acetabular cup system. The MetaFix™ stem can be used in combination with the chosen Corin acetabular cup system – please refer to the surgical technique.





Pre-operative templating

Pre-operative templating should always be carried out to estimate the stem size and the minimum depth to which the tapered intra-medullary (IM) reamer needs to be inserted. The correct stem size should have a compacted cancellous bone envelope around it which is approximately 1-2mm thick.

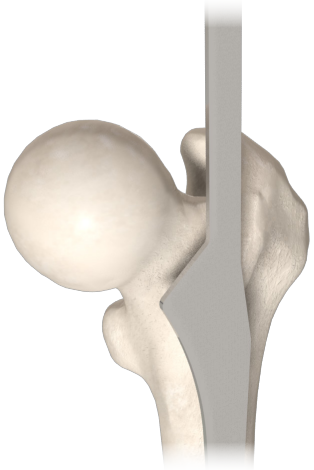
Additionally, templating provides a guide as to which neck option is most likely to restore an anatomical centre of rotation, plus it helps plan the most appropriate position for the neck resection.

MetaFix™ is available in 125°,135° standard and 135° lateralised in the collarless version and 125° and 135° standard in the collared version. The collared version also has two neck lengths in the shorter sizes to assist in recreating the patients own anatomy.

MetaFix™ stems require both metaphyseal and diaphyseal fixation. Pre-operative planning will determine whether the patient's isthmus is too narrow to achieve these conditions – as is the case with extreme Dorr type A femora. In this situation the femoral diaphysis may need to be reamed to avoid prematurely engaging the distal stem prior to achieving appropriate fill of the proximal metaphysis. Using either flexible or semi-rigid, cylindrical reamers can open the diaphysis such that this does not occur.

If care is taken, the implant size actually used is usually as planned or one size either side of this. If a much larger stem is required than planned checks should be carried out for peri-operative femoral fracture, which usually occurs in the calcar region. If a much smaller stem is required, this can be corrected by lateralising the IM reamer and rebroaching.

Operative technique

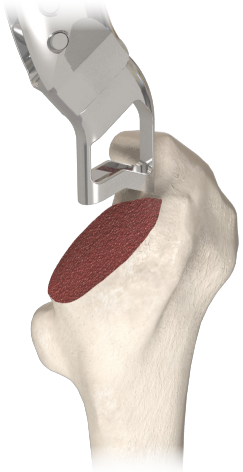


1. Femoral neck osteotomy

While pre-operative templating will help define the position of the neck resection, the neck resection guide provides intra-operative help in orientating the osteotomy for the posterior approach. It is placed so that the long axis of the instrument is in line with the long axis of the femur.

Using diathermy, a line is marked on the femoral neck at 45º to the long axis, against the angled part of the neck resection guide itself. Alternatively, one of the smaller compaction broaches can be overlaid on the femur to orientate the diathermy mark. Again, the long axes of the instrument and the femur are aligned and the angled face of the compaction broach can then be used to make the required diathermy mark.

The osteotomy is performed using the diathermy line to help maintain the correct resection angle.

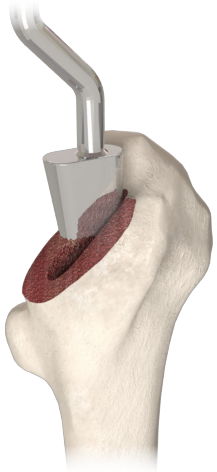


2. Femoral canal preparation

The box osteotome is used to remove the medial aspect of the greater trochanter by insertion at the anterior edge of the piriformis fossa, posterior to the midline of the neck (in a neutral or anteverted position appropriate to the patient's anatomy).

Consideration should be given to lateralising the opening into the femur during the box osteotome step so that the broaches can be inserted into the femur without cortical impingement (to avoid incorrect varus alignment and undersizing issues).

The removed cancellous bone is retained as this may be required for grafting later in the procedure.



3. Femoral punch (optional)

This optional step opens the resected neck further, without removing more bone, and compacts the cancellous bone proximally for better primary stability.

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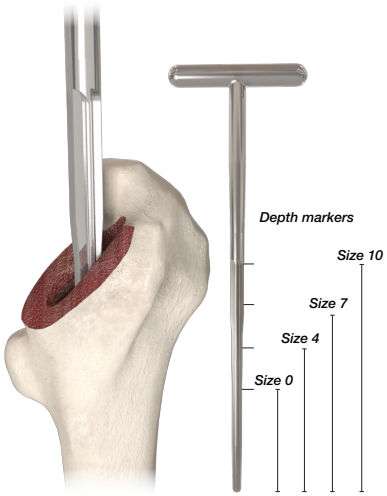
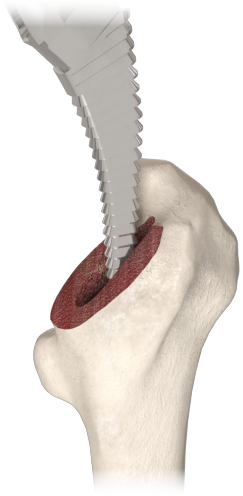


4. Tapered Intra-Medullary reamer

The T-handled tapered reamer is used to define the neutral axis of the femur and to open the femoral canal to the appropriate depth for the templated femoral stem size. It is important that the T-handled tapered reamer is inserted to the appropriate depth in order to create an open pathway for the compaction broaches. This reduces the risk of distal hang-up which can lead to improper seating of the stem.

If excessive resistance is felt at this stage this is normally due to slight varus instrument alignment which can be corrected by returning to the box chisel and femoral punch (if used) to ensure sufficient bone is removed laterally allowing neutral alignment.



5. Compaction broaching

The broach handle should be attached to the smallest broach and inserted/impacted into the femur, making sure that axial and rotational alignment is maintained at all times. Progressively larger broaches are used to compact the cancellous bone into a dense bed ready to receive the definitive implant.

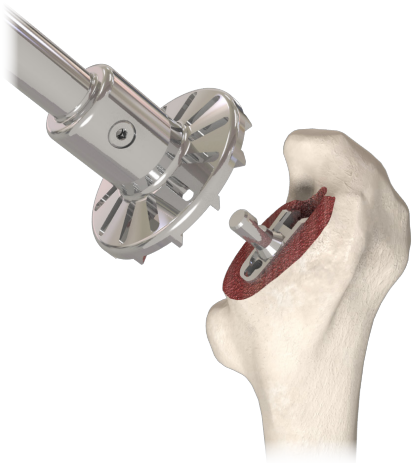
Take care to be consistent with the broaching envelope so as to not disturb the compacted bone. In order to preserve cancellous bone. A stable position must be achieved without cortical bone contact.

The expansion between adjacent broach sizes is uniform to make sequential compaction broaching more predictable and reproducible. Compaction broaching should be continued until rotational stability is achieved, noting that the proximal face of the final broach corresponds with the proximal margin of the HA coating on the definitive stem.

Axial stability is achieved in conjunction with rotational stability but if there is concern when broaching in a porotic femur then consideration should be given to using a collared implant. As the expanding broach approaches the femoral cortex then the auditory tone of impaction changes and axial stability is achieved. However in this scenario there is an increased risk that the final implant will be difficult to seat. It is hardly ever necessary to continue broaching after rotational stability has been achieved.

Note: Consideration should be given to preparing the acetabulum first when leaving the broach in situ.

The press-fit of the stem in the anterior posterior direction is 0.11 mm and 0.31 mm in the medial lateral direction. If a broach does not seat fully, the previous broach can be used to re-establish the correct envelope to accept the smaller stem, following an assessment of stability of the definitive broach.

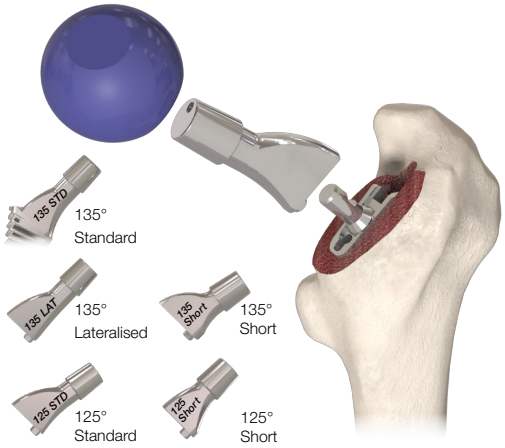


6. Calcar preparation

Locate the calcar reamer onto the spigot of male broaches or into the recess of female broaches to remove excess bone from the resected neck. The calcar reamer will remove any bone that protrudes 0.5mm or more above the face of the broach.

Initiate power to the calcar reamer prior to careful engagement with the bone to prevent damage to the femur.

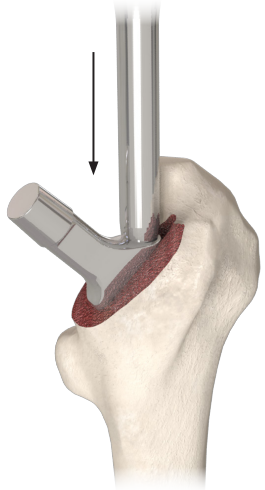
If the femoral neck has been resected inaccurately, calcar reaming at this point may be useful later in the procedure, during definitive stem impaction, as the reamed calcar region can be used to determine whether the stem is seated to the expected level, i.e. so that the proximal margin of the stem's HA coating sits flush with the neck resection.



7. Trial reduction

Attach the appropriate head and neck trials to the broach in situ and perform a trial reduction to assess stability, offset and leg length (for more details on short neck options refer to the chart on page 12).

If the leg has been lengthened so that it cannot be managed easily with the available implant options, consideration should be given to carefully countersinking the appropriate broach by 2-3mm, or modifying the neck resection and repeating the operative steps described on page 7, slightly expanding the femoral canal using an intramedullary canal may need to be considered.



8. Stem implantation

The final broach size indicates the definitive implant size. Once the final broach is removed, suction may be applied but lavage of any kind should be avoided. The stem may be held captive on the introducer or inserted by hand, but the latter is recommended. As a guide, the stem can normally be seated by hand so that no more than 10-15mm of the HA coating is showing above the resection line. In this scenario, the stem is then seated using the definitive **captive** or **non-captive** stem impactor.

If the stem sits proud by more than 10-15mm, then soft tissue and/or bony impingement around the greater trochanter may be impeding stem insertion or causing it to adopt an off-axis

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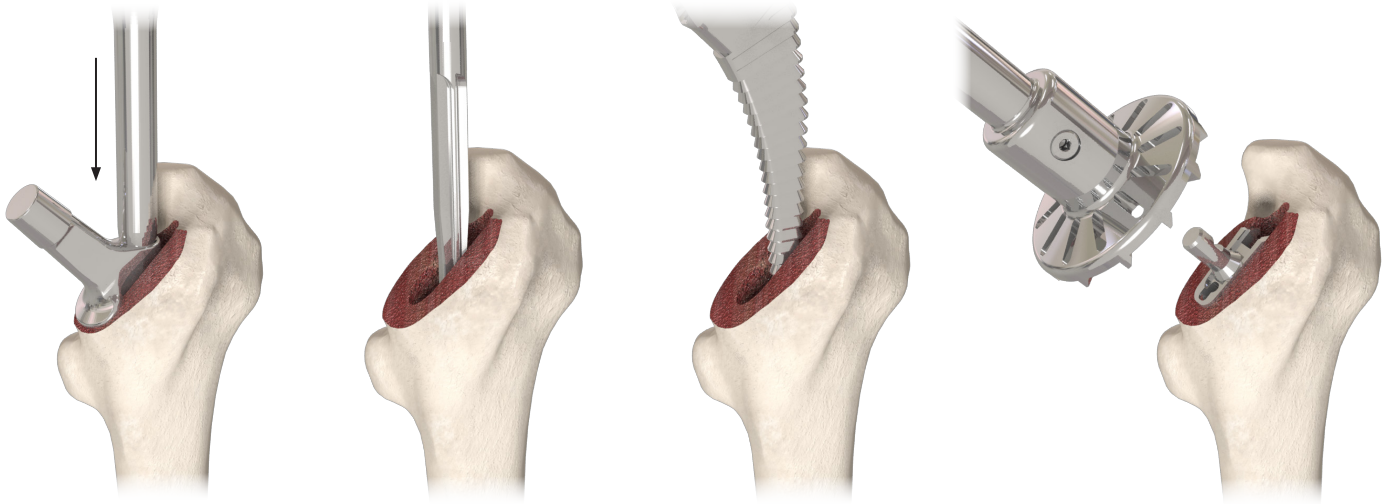


orientation. It is therefore important to ensure that soft tissue is retracted and/or bony obstacles are removed adequately to allow the stem to seat fully and in the correct orientation. While off-axis stem insertion is uncommon, a well-orientated clear pathway for the definitive stem to follow during insertion and impaction is advantageous (see steps four to six relating to opening/re-opening the canal pathway).

Return to the penultimate broach size to develop the canal. Use repeated impaction and extraction until it is seated flush with the resection line. This step should then be repeated with the final broach size prior to inserting the definitive femoral implant by hand. This reduces the possibility of early hang-up due to pre-impaction malalignment.

Occasionally in collarless stems the final broach may sit against extremely dense compacted cancellous bone (or even harder cortical bone). In this scenario the broach may be oversized for that patient, so the definitive stem may sit proud in the first instance. In this circumstance, where the broach is oversized, the stem may feel slightly more difficult to insert than the broach. It is not unusual for uncemented stems of this type to sit proud by up to 2mm and a minus head may be useful in this scenario. If the stem sits proud by more than 2mm it is advisable to remove the stem and revisit the operative steps detailed in steps four to six.

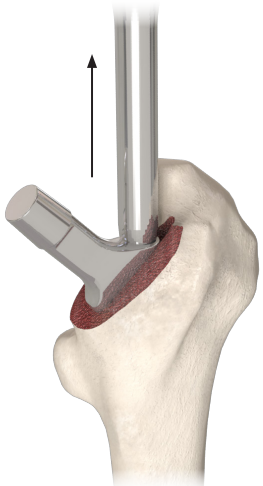
For a collared MetaFix™ if the stem is fully seated and the collar does not seat on the calcar this is by no means a reason to remove the stem, as long as the discrepancy is only a few millimeters. In cases where the collar sits less than 5mm above the calcar when placed in by hand, re-seat the broach and remove a little more calcar.

9. Femoral head impaction

Once the acetabular cup is implanted, but before placing the definitive head on the stem, the stem taper is thoroughly rinsed and carefully dried to ensure that it is free from debris. The head is then placed on the stem taper by twisting lightly and by applying axial manual pressure until it is seated firmly. The plastic head impactor is placed on the pole of the head and impacted lightly with the hammer in an axial direction. This tapping of the impactor on the head plastically distorts the surface structure of the metal taper causing an optimal distribution of pressure and a torsion-resistant fixation.

⚠ **Never use a metal hammer directly on the BIOLOX *delta*® head, only the plastic head impactor provided.**

The hip can then be carefully reduced and closure performed using the surgeon's preferred technique.



10. Stem removal

If the stem needs to be removed, screw the introducer onto the stem and hammer the baseplate to extract.

Alternatively screw the optional slap hammer onto the stem and extract.

⚠ **If removal of an implanted collared stem is required, use an appropriate osteotome between calcar and collar to facilitate the removal of the stem.**

Ordering information

Collared stem 135° standard offset

579.0100	Size 0*Δ
579.0101	Size 1
579.0102	Size 2
579.0103	Size 3
579.0104	Size 4
579.0105	Size 5
579.0106	Size 6
579.0107	Size 7
579.0108	Size 8
579.0109	Size 9

Collared stem 125° standard offset

579.2101	Size 1*Δ
579.2102	Size 2
579.2103	Size 3
579.2104	Size 4
579.2105	Size 5
579.2106	Size 6
579.2107	Size 7
579.2108	Size 8
579.2109	Size 9

Collared stem 125° short neck

579.2201	Size 1*Δ
579.2202	Size 2

Collared stem 135° short neck

579.0200	Size 0*Δ
579.0201	Size 1
579.0202	Size 2

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Collarless stem 135° standard offset

579.0000	Size 0*Δ
579.0001	Size 1
579.0002	Size 2
579.0003	Size 3
579.0004	Size 4
579.0005	Size 5
579.0006	Size 6
579.0007	Size 7
579.0008	Size 8
579.0009	Size 9
579.0010	Size 10**

Collarless stem 135° lateralised offset

579.1000	Size 0*Δ
579.1001	Size 1
579.1002	Size 2
579.1003	Size 3
579.1004	Size 4
579.1005	Size 5
579.1006	Size 6
579.1007	Size 7
579.1008	Size 8
579.1009	Size 9
579.1010	Size 10**

Collarless Stem 125° Standard Offset

579.2000	Size 0*Δ
579.2001	Size 1*Δ
579.2002	Size 2
579.2003	Size 3
579.2004	Size 4
579.2005	Size 5
579.2006	Size 6
579.2007	Size 7
579.2008	Size 8
579.2009	Size 9
579.2010	Size 10**

BIOLOX® *delta* ceramic modular heads (12/14)
from the **Trinity**™ acetabular system

104.2800	Short	-3.5mm	28mm
104.3200	Short	-4.0mm	32mm
104.3600	Short	-4.0mm	36mm
104.4000	Short	-4.0mm	40mm
104.2805	Medium	0.0mm	28mm
104.3205	Medium	0.0mm	32mm
104.3605	Medium	0.0mm	36mm
104.4005	Medium	0.0mm	40mm
104.2810	Long	+3.5mm	28mm
104.3210	Long	+4.0mm	32mm
104.3610	Long	+4.0mm	36mm
104.4010	Long	+4.0mm	40mm
104.3215	Extra long	+7.0mm	32mm
104.3615	Extra long	+8.0mm	36mm
104.4015	Extra long	+8.0mm	40mm

CoCr modular heads (12/14)
from the **Trinity**™ acetabular system

E321.428	Extra short	-5.0mm	28mm
E321.432	Extra short	-6.0mm	32mm
E321.436	Extra short	-8.0mm	36mm
E321.440	Extra short	-8.0mm	40mm
E321.028	Short	-3.5mm	28mm
E321.032	Short	-4.0mm	32mm
E321.036	Short	-4.0mm	36mm
E321.040	Short	-4.0mm	40mm
E321.128	Medium	0.0mm	28mm
E321.132	Medium	0.0mm	32mm
E321.136	Medium	0.0mm	36mm
E321.140	Medium	0.0mm	40mm
E321.228	Long	+3.5mm	28mm
E321.232	Long	+4.0mm	32mm
E321.236	Long	+4.0mm	36mm
E321.240	Long	+4.0mm	40mm
E321.328	Extra long	+7.0mm	28mm
E321.332	Extra long	+7.0mm	32mm
E321.336	Extra long	+8.0mm	36mm
E321.340	Extra long	+8.0mm	40mm

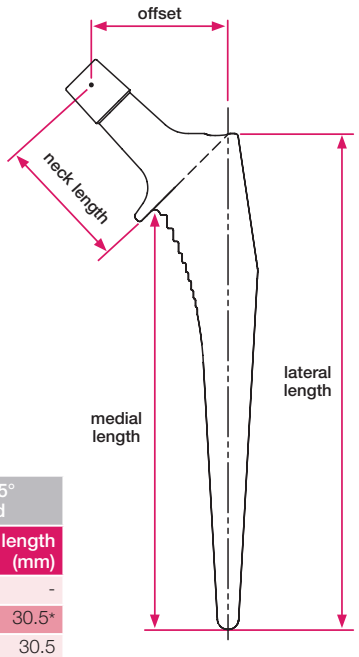
Collarless stem X-ray templates		**Collared stem X-ray templates**	
AT340.101	100%	3400100	100%
AT340.111	110%	3400110	110%
AT340.121	115%	3400115	115%
AT340.131	120%	3400120	120%

* not available in the US ** available on special order Δ weight limit 80kg

MetaFix™

Sizing guide

			standard 135° collarless		lateralised 135° collarless		standard 125° collarless	
size	medial stem length (mm)	lateral stem length (mm)	offset (mm)	neck length (mm)	offset (mm)	neck length (mm)	offset (mm)	neck length (mm)
0	94	115	38.0*	38.5*	44.0*	42.7*	43.0*	37.9*
1	109	130	38.5	38.5	44.5	42.7	43.5*	37.9*
2	118	140	39.0	38.5	45.0	42.7	44.0	37.9
3	124	145	40.0	38.5	46.0	42.7	45.5	37.9
4	129	150	41.0	38.5	46.5	42.7	46.0	37.9
5	133	154	41.5	38.5	47.5	42.7	46.5	37.9
6	139	160	42.0	38.5	48.0	42.7	47.0	37.9
7	144	165	42.5	38.5	48.5	42.7	48.0	37.9
8	149	170	43.5	38.5	49.5	42.7	49.0	37.9
9	159	180	44.5	38.5	50.5	42.7	50.0	37.9
10	168	190	45.5	38.5	51.5	42.7	51.0	37.9



			standard 135° collared		short 135° collared		standard 125° collared		short 125° collared	
size	medial stem length (mm)	lateral stem length (mm)	offset (mm)	neck length (mm)	offset (mm)	neck length (mm)	offset (mm)	neck length (mm)	offset (mm)	neck length (mm)
0	94	115	38.0*	38.5*	33.0*	31*	-	-	-	-
1	109	130	38.5	38.5	33.5	31	43.5*	37.9*	38.0*	30.5*
2	118	140	39.0	38.5	33.5	31	44.0	37.9	38.0	30.5
3	124	145	40.0	38.5	-	-	45.5	37.9	-	-
4	129	150	41.0	38.5	-	-	46.0	37.9	-	-
5	133	154	41.5	38.5	-	-	46.5	37.9	-	-
6	139	160	42.0	38.5	-	-	47.0	37.9	-	-
7	144	165	42.5	38.5	-	-	48.0	37.9	-	-
8	149	170	43.5	38.5	-	-	49.0	37.9	-	-
9	159	180	44.5	38.5	-	-	50.0	37.9	-	-

* not available in the US ** available on special order

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Description

The MetaFix™ hip is a tapered stem manufactured from titanium (Ti6Al4V) with a layer of hydroxyapatite (HA) coating applied. The MetaFix™ hip is available in a 135° standard offset (collared and collarless), 135° lateralised high offset (collarless), a 125° standard offset (collared and collarless), a 125° short neck (collared) and 135° short neck (collared).The device is intended to be used with 12/14 modular taper heads.

The MetaFix™ hip is intended to provide increased patient mobility and reduce pain by replacing the damaged hip joint articulation in patients where there is evidence of sufficient sound bone to seat and support the components.

* Please note that the 125° standard offset and 125° short neck for size 1, and all offsets for size 0 are not available in the USA.

Warnings and precautions

Please note the MetaFix™ hip stem should not be used for patients who weigh more than 80kg for all size 0 stems and size 1 125° standard and short neck stems.

Indications

The indications for the Corin MetaFix™ hip stem as a total hip arthroplasty, and when used in combination with a Corin hemiarthroplasty head, as a hip hemiarthroplasty, include:

- Non-inflammatory degenerative joint disease including osteoarthritis and avascular necrosis
- Rheumatoid arthritis
- Correction of functional deformity
- Treatment of non-union and femoral neck fractures
- Developmental Dysplasia of the Hip (DDH) and Congenital Dysplasia of the Hip (CDH)

The Corin MetaFix™ hip stem is indicated for cementless use only.

Contraindications

- Active infection
- Marked bone loss or bone resorption
- Metabolic disorders which may impair bone formation
- Vascular insufficiency
- Muscular atrophy or neuromuscular disease
- Allergy to implant material
- Severe deformity
- Charcot's or Paget's disease
- For hemi-hip arthroplasty, any pathological condition of the acetabulum, such as distorted acetabuli with irregularities, protrusion acetabuli (arthrokatadysis), or migration acetabuli, that would preclude the use of the natural acetabulum as an appropriate articular surface for the hemi-hip prosthesis.

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