

ACTIS™

Total Hip System

Surgical Technique



Approach Patients with Confidence

The ACTIS™ Total Hip System is the first DePuy Synthes stem specifically designed to be utilized with tissue sparing approaches, such as the anterior approach, as well as traditional approaches. The implant and instrumentation are designed to balance ease-of-insertion and may provide improved implant stability.¹

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Pre-Operative Planning

Determination Of Leg Length Discrepancy

Perform a clinical evaluation in conjunction with a radiographic analysis to determine preoperative leg length discrepancy, and use both to determine intraoperative leg length management. To estimate leg length discrepancy radiographically, draw a reference line across the bottom of the ischium (as shown). Other landmarks such as the Teardrop or Obturator Foramen can be used. Measure the distance from the lesser or greater trochanter landmark (both distances shown in Figure 1) to the reference line on each side. The difference between the pelvic reference line and the femoral landmarks is the radiographic leg length discrepancy. Clinical examination should help determine the actual leg length irregularity.

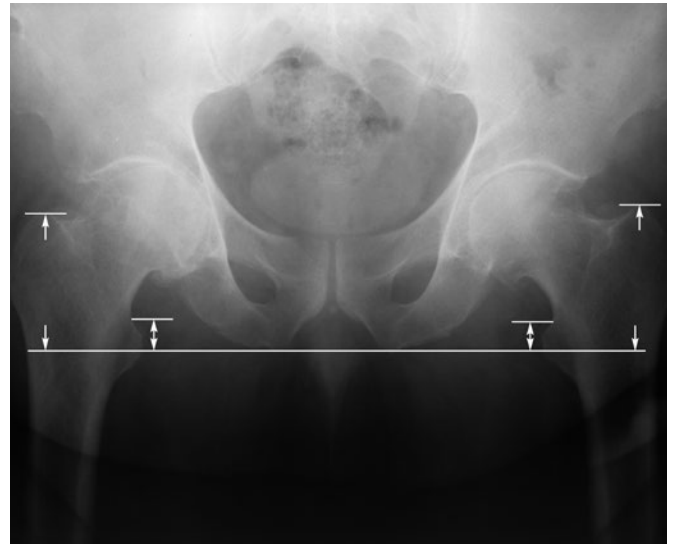


Figure 1

Acetabular Cup Sizing And Position

Acetabular sizing determinations are made using the A/P radiograph of the hip. Determine the optimal position for the acetabular component and estimate the size using the PINNACLE® Acetabular Cup System template overlays. The acetabular teardrop can be referenced as the inferomedial margin of the acetabular reconstruction. The goal in cementless acetabular fixation is to optimize position and bone contact. Once this is determined, mark the intended center of rotation of the bearing surface on the A/P radiograph. (Figure 2)

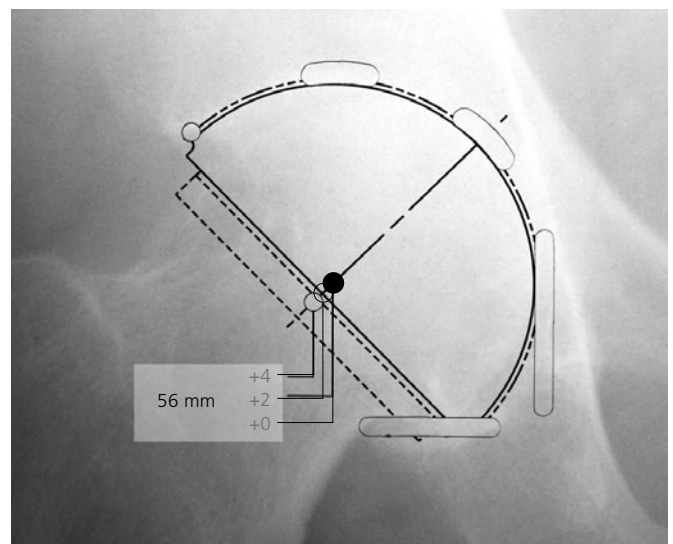


Figure 2

Cementless Femoral Stem Selection

Select the template size that fits the proximal femur and equalizes leg lengths. The femoral template should be in line with the long axis of the femur, and the neck resection line drawn at the point where the selected stem provides the desired amount of leg length. The vertical distance between the planned center of rotation of the acetabular component and the center of rotation of the femoral head constitutes the distance the leg length will be adjusted.

The ACTIS™ Stem is available with standard and high offset options, as well as collar options for all stem sizes. The high offset option provides direct lateralization, increasing offset without affecting leg length. Through templating and trialing, determine which option restores proper offset and center of rotation by matching the cup's center of rotation with the desired head center of rotation of either the standard or high offset ACTIS Stem. (Figure 3)

■ Tips:

- Templating is an important guide in the routine process of pre-operative planning. Intra-operative feedback should be used to establish final leg length and hip stability.
- Patient positioning is key to obtain adequate cup positioning and hip stability.
- A lateral x-ray should be used to assess stem size.
- Ideal x-rays are standing (weight bearing) x-rays.
- Be sure to account for any pelvic tilt at this point in the procedure to help ensure correct positioning of final implants.
- Due to the triple tapered geometry of the implant, cortical contact may be achieved circumferentially.

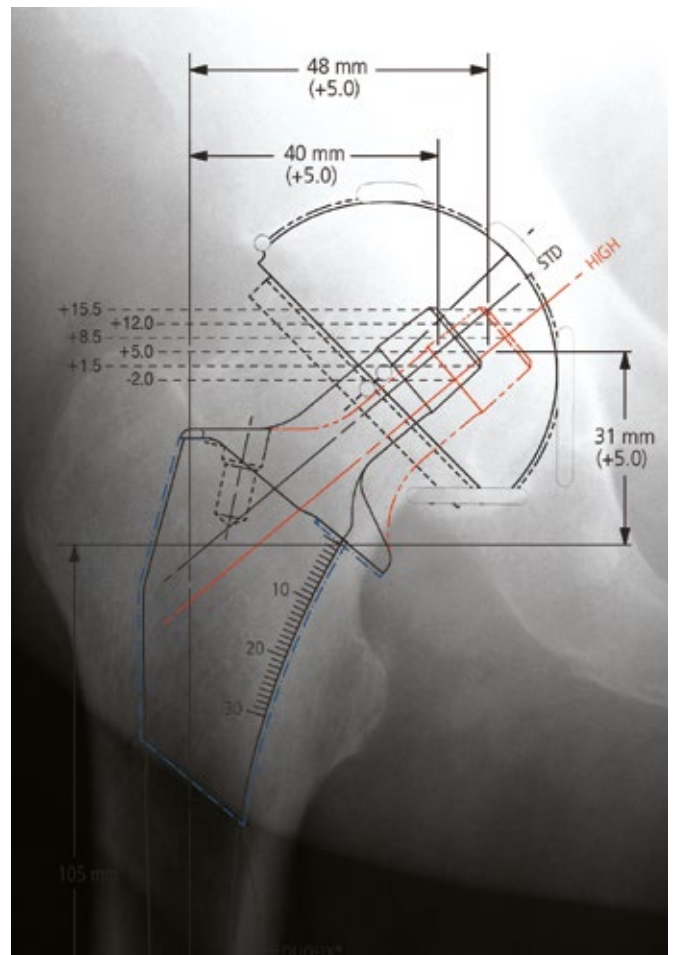


Figure 3

Femoral Neck Osteotomy

Align the neck resection guide with the long axis of the femur (Figure 4). This establishes the angle of resection at a proper 50° from the femoral axis. Determine the resection level by aligning the top of the guide with the tip of the greater trochanter or by measuring a pre-operatively determined distance above the lesser trochanter. Mark the resection line using electrocautery or methylene blue. Resect the femoral head.

■ Tips

- For the collared stem option, be conservative with initial neck cut. In order to achieve intimate collar/calcar contact, the calcar should be milled to the level of the final broach.
- A neck resection guide that can be used with fluoroscopy (as shown in Figure 5) is available to help position the neck resection from the anterior side of the femur. (Cat. Nos. 2010-03-100 and 2010-03-105 for left and right hips, respectively).



Figure 1



Figure 2

Femoral Canal Preparation

Utilize the modular box osteotome with the broach handle to enter the femoral canal and to establish version. The box osteotome should be started in the same version orientation desired for the final implant.

■ **Tips**

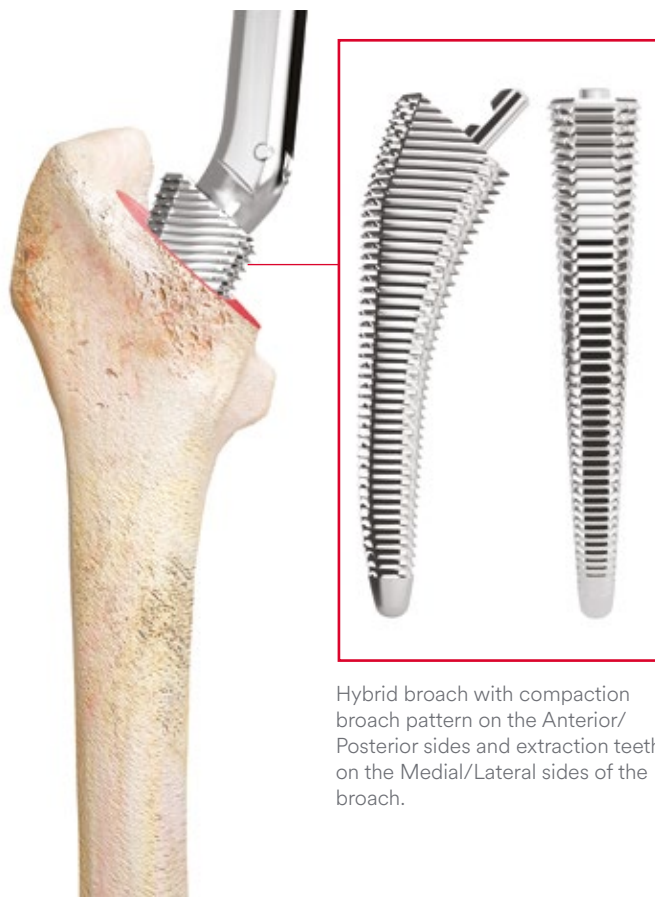
- Preserve more of the medial aspect of the greater trochanter, relative to the traditional fit-and-fill stem.
- Initiate the envelope in line with the posterior cortex to promote proper stem alignment.



The ACTIS™ Total Hip System offers several broach handles that enable the many surgical approaches for hip replacement. Select the handle that best suits the needs of the performed approach. Begin broaching with the ACTIS™ Starter Broach. While taking care to maintain proper alignment and version, sequentially advance the broaches down the femoral canal. Continue to increase broach size until the broach attains axial and rotational stability, and is at a seating level that recreates proper leg length.

■ Tips

- A rasp or similar instrument can be used to open the canal.
- Initiate the broach parallel to the posterior cortex to promote proper stem alignment.
- Many stems emphasize the removal of bone lateral to the stem and force the broach handle laterally during broaching to avoid varus positioning of the stem. In broaching for the ACTIS™ Total Hip System, it is preferable to broach starting in slight varus, allowing the stem to gain neutral positioning as the broach size increases. Overemphasizing a valgus force during broaching can cause a scenario where the broach is axially stable but rotationally not stable. Influencing the broach into varus can help remedy this circumstance.
- Take care not to rotate the broach when inserting and extracting to preserve anterior cancellous bone.
- For the collared stem option, ideally, the calcar will be 1-2 mm above the final broach. This allows the calcar reamer to be employed to level the calcar with the implant collar.



Hybrid broach with compaction broach pattern on the Anterior/Posterior sides and extraction teeth on the Medial/Lateral sides of the broach.



Straight
2570-00-000



Extra Curved
2598-07-550
(Included in ACTIS™ Instrument Set)



Dual-Offset
2598-07-350 (Left)
2598-07-360 (Right)

Distal Femoral Reaming (Optional)

When unique femoral morphologies are encountered, such as Dorr Type A femora, ACTIS™ Distal Reamers are available to help ensure proper stem fit and stability. These situations can be identified via pre-operative planning, as well as intra-operatively when the broach will not progress further into the canal and has yet to achieve rotational stability.

Each distal reamer shaft is marked with two stem sizes, except for size 12, which has a unique reamer design. The circumferential mark next to each size indicates the depth to which the reamer should be advanced into the femur. In the case that a broach is rotationally unstable due to a narrow canal (Type A femur), reamers can be used to enlarge the distal canal.

When a rotationally unstable broach is identified, start with a reamer two sizes below the expected final stem size. Advance the reamer into the canal until the desired circumferential mark matches the level of the medial calcar. Reinsert the broach. If stable, continue with surgery. If still unstable, advance to the next reamer size. Be sure that the largest reamer used does not exceed the expected final stem size.

■ Tips

- Start reaming two sizes below expected final stem size.
- Do not advance the reamer beyond the point where the circumferential mark for the intended stem size aligns with the medial calcar of the femur. This could lead to excessive clearance distally and the potential for reduced implant stability.
- Smaller reamers may remove adequate distal bone to achieve rotational stability of a larger sized broach and/or implant.



Trial Reduction

Trial neck segments and trial heads are available to assess proper component position, joint stability, range-of-motion and leg length. Standard and high offset options are available for each stem size. Offset increases 6-8 mm (depending on stem size) from the standard to the high offset option via direct lateralization. With the final broach in-situ, attach the appropriate trial neck and trial head to the broach post. Reduce the hip and assess what adjustments, if any, are required to ensure stability through a full range of motion. When stability is achieved, note the broach size and head/neck offset.

▲ **Warning:** Do not use the ACTIS™ Hip Prosthesis and DUOFIX™ Coating Size 0 Femoral Stem with a modular femoral head length of greater than +13 mm. The safety and performance of the ACTIS Size 0 Stem with a modular femoral head length of greater than +13 mm has not been established.

■ Tips

- To facilitate trial reduction prior to calcar reaming, the trial neck does not include a collar.
- Trialing is recommended prior to reaming the calcar so that stem size adjustments can be made, especially in a case where an increase in stem size is required.
- After trialing, check broach rotational stability again. If broach trial is unstable, consider upsizing the broach trial following the appropriate steps.



Calcar Preparation

■ **Note:** Required for collared implants

For the collared stem option, calcar reaming is required. With the final broach fully seated, place the calcar reamer over the broach post. Apply power prior to engaging the calcar to prevent the reamer from binding. Ream the calcar to the level of the broach face.

■ **Tips**

- Multiple calcar reamer disks are available to help achieve the appropriate diameter.



Femoral Component Insertion

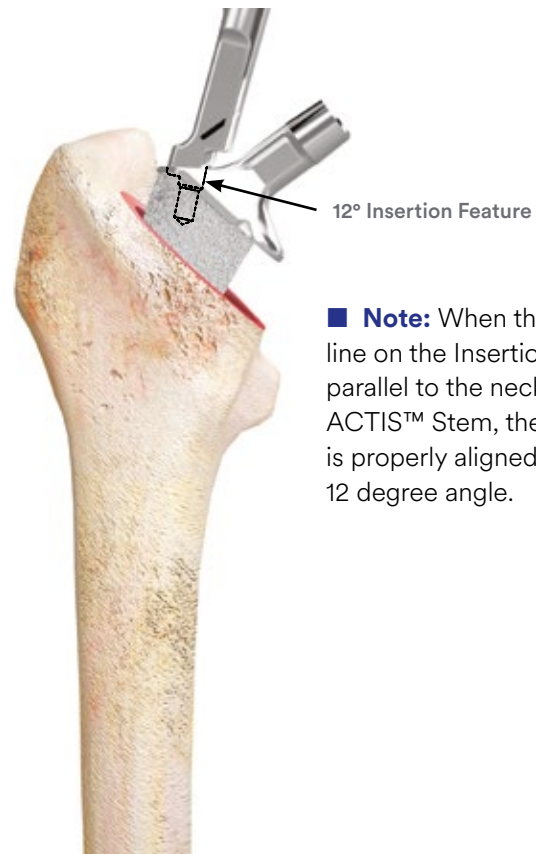
It is always recommended that you introduce the femoral stem as far as possible by hand before using a stem inserter. Stem inserters with various geometries are available to enable the many surgical approaches for hip replacement. Select the stem size and offset that corresponds to the final broach and neck trial, respectively.

The retaining (or threaded) stem inserter can be used if a positive connection between the implant and instrument is required. If the retaining inserter is chosen, verify that it is assembled with the inserter shaft threaded into the inserter handle. Ensure the tine on the inserter is aligned with the recess of the inserter feature on the top of the implant at the proper angle. Fully engage the threads of the inserter into the implant to ensure the inserter is securely attached to the implant.

With the taper protected by the cover, gently introduce the implant and impact it along the central axis of the femur to the level of the HA coating (or the collar). The implant is fully seated when the top of the DUOFIX™ Coating reaches the level where the face of the broach previously sat and the implant is stable. Excessive force should not be needed to seat the stem.

■ Tips

- Take note that the insertion feature in the stem is angled 12° medially to help the stem inserter avoid the greater trochanter and other anatomic features.
- Insert the stem by hand until it meets resistance, typically 10-20mm from final broach position.
- Select the stem inserter that best suits your technique. Straight, offset, bullet tip, and threaded options are available.
- Use moderate mallet strikes to seat the stem until it is stable, ideally when the collar rests on the calcar.
- For collared stems, in the occurrence that the stem collar will not advance to the calcar, do not increase strength of mallet blows to force the stem further distal into the femoral canal. The stem can achieve initial stability without collar contact.
- If intra-operative stem extraction is required, utilize the threaded inserter/extractor.
- In the area of DUOFIX™ Coating, the implant is oversized to the proximal broach by 0.375mm per side.



Femoral Head Impaction

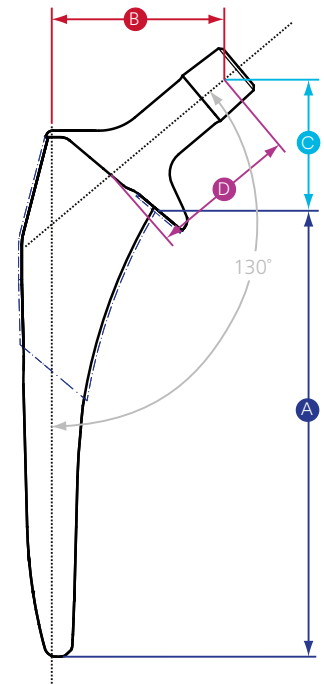
Following the final trial reduction, clean and dry the femoral stem taper to ensure it is free of debris. Place the appropriate ARTICUL/EZE™ Hip 12/14 Taper Femoral Head onto the stem taper. Using the head impactor, engage the head with moderate mallet strikes. Clean the bearing surfaces, and reduce the hip.

▲ **Warning:** Do not use the ACTIS™ Hip and DUOFIX™ Size 0 Femoral Stem with a modular femoral head length of greater than +13 mm. The safety and performance of the ACTIS Size 0 Stem with a modular femoral head length of greater than +13 mm has not been established.



Technical Specifications

■ **Note:** When moving from a Standard to High Offset stem in sizes 3 and smaller, you gain 6 mm of direct lateralization. You gain 8 mm of direct lateralization in moving to a High Offset stem in sizes 4 and larger.



Size	A Stem Length (mm)	B Offset with Head (mm)						C Leg Adjustment Length with Head (mm)						D Neck Length with Head (mm)					
		-2	+1.5	+5	+8.5	+12	+15.5	-2	+1.5	+5	+8.5	+12	+15.5	-2	+1.5	+5	+8.5	+12	+15.5
0 Standard	95	31	34	36	39	42	*	23	25	27	30	32	*	23	27	30	34	37	*
0 High	95	37	40	42	45	48	*	23	25	27	30	32	*	27	31	34	38	41	*
1 Standard	97	31	34	36	39	42	44	23	25	27	30	32	34	23	27	30	34	37	41
1 High	97	37	40	42	45	48	50	23	25	27	30	32	34	27	31	34	38	41	45
2 Standard	99	33	36	38	41	44	46	24	26	28	31	33	35	25	28	32	35	39	42
2 High	99	39	42	44	47	50	52	24	26	28	31	33	35	29	32	36	39	43	46
3 Standard	101	33	36	38	41	44	46	25	27	29	32	34	36	25	28	32	35	39	42
3 High	101	39	42	44	47	50	52	25	27	29	32	34	36	29	32	36	39	43	46
4 Standard	103	34	37	40	42	45	48	26	28	30	33	35	37	26	30	33	37	40	44
4 High	103	42	45	48	50	53	56	26	28	30	33	35	37	32	35	39	42	46	49
5 Standard	105	34	37	40	42	45	48	26	29	31	33	35	38	26	30	33	37	40	44
5 High	105	42	45	48	50	53	56	26	29	31	33	35	38	32	35	39	42	46	49
6 Standard	107	36	39	42	44	47	50	28	30	32	34	37	39	28	32	35	39	42	46
6 High	107	44	47	50	52	55	58	28	30	32	34	37	39	33	37	40	44	47	51
7 Standard	109	36	39	42	44	47	50	28	31	33	35	37	40	28	32	35	39	42	46
7 High	109	44	47	50	52	55	58	28	31	33	35	37	40	33	37	40	44	47	51
8 Standard	111	38	41	44	46	49	52	30	32	34	36	39	41	30	34	37	41	44	48
8 High	111	46	49	52	54	57	60	30	32	34	36	39	41	36	39	43	46	50	53
9 Standard	113	38	41	44	46	49	52	30	33	35	37	39	42	30	34	37	41	44	48
9 High	113	46	49	52	54	57	60	30	33	35	37	39	42	36	39	43	46	50	53
10 Standard	115	40	43	46	48	51	54	32	34	36	38	41	43	32	35	39	42	46	49
10 High	115	48	51	54	56	59	62	32	34	36	38	41	43	37	41	44	48	51	55
11 Standard	117	40	43	46	48	51	54	32	34	36	38	41	43	32	35	39	42	46	49
11 High	117	48	51	54	56	59	62	32	34	36	38	41	43	37	41	44	48	51	55
12 Standard	119	40	43	46	48	51	54	32	34	36	38	41	43	32	35	39	42	46	49
12 High	119	48	51	54	56	59	62	32	34	36	38	41	43	37	41	44	48	51	55

Reference #103516648

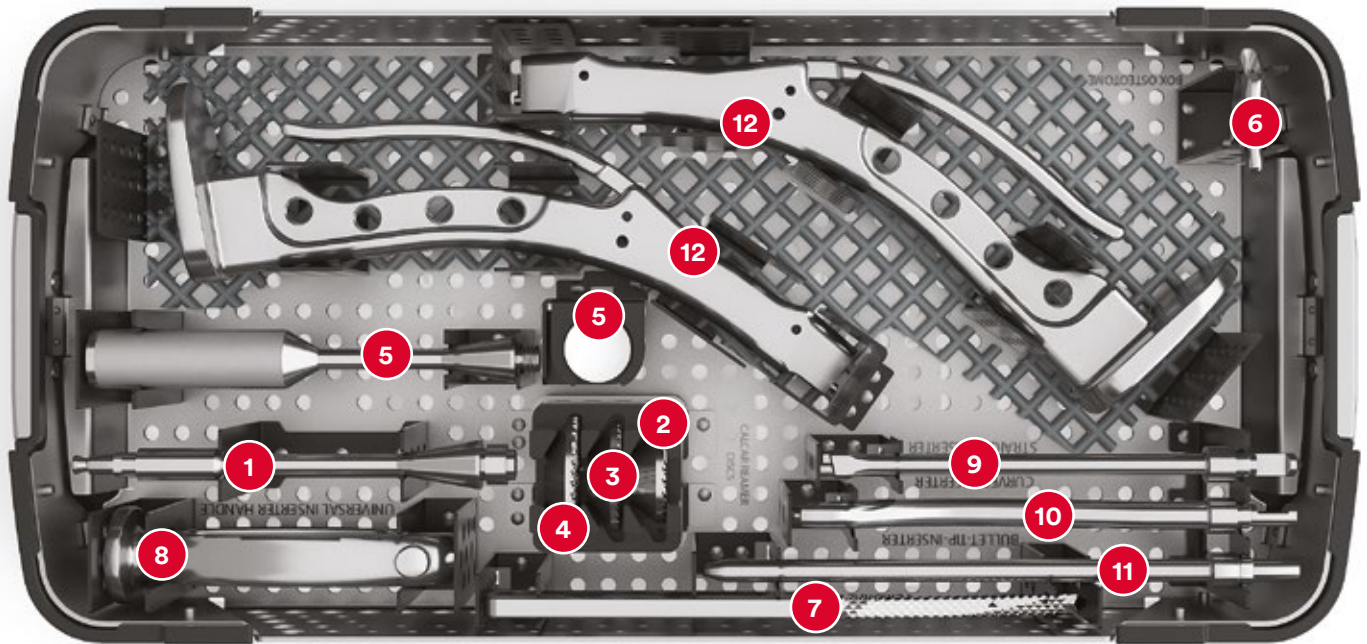
▲ ***Warning:** Do not use the ACTIS™ DUOFIX™ Size 0 Femoral Stem with a modular femoral head length of greater than +13 mm. The safety and performance of the ACTIS Size 0 Stem with a modular femoral head length of greater than +13 mm has not been established.

Femoral Stems

Collared Stems

Standard Offset	Description	Size	High Offset	Description	Size
101011005	ACTIS COLLARED STD	SIZE 0	101012005	ACTIS COLLARED HIGH	SIZE 0
101011010	ACTIS COLLARED STD	SIZE 1	101012010	ACTIS COLLARED HIGH	SIZE 1
101011020	ACTIS COLLARED STD	SIZE 2	101012020	ACTIS COLLARED HIGH	SIZE 2
101011030	ACTIS COLLARED STD	SIZE 3	101012030	ACTIS COLLARED HIGH	SIZE 3
101011040	ACTIS COLLARED STD	SIZE 4	101012040	ACTIS COLLARED HIGH	SIZE 4
101011050	ACTIS COLLARED STD	SIZE 5	101012050	ACTIS COLLARED HIGH	SIZE 5
101011060	ACTIS COLLARED STD	SIZE 6	101012060	ACTIS COLLARED HIGH	SIZE 6
101011070	ACTIS COLLARED STD	SIZE 7	101012070	ACTIS COLLARED HIGH	SIZE 7
101011080	ACTIS COLLARED STD	SIZE 8	101012080	ACTIS COLLARED HIGH	SIZE 8
101011090	ACTIS COLLARED STD	SIZE 9	101012090	ACTIS COLLARED HIGH	SIZE 9
101011100	ACTIS COLLARED STD	SIZE 10	101012100	ACTIS COLLARED HIGH	SIZE 10
101011110	ACTIS COLLARED STD	SIZE 11	101012110	ACTIS COLLARED HIGH	SIZE 11
101011120	ACTIS COLLARED STD	SIZE 12	101012120	ACTIS COLLARED HIGH	SIZE 12
			201005100	ACTIS Template	

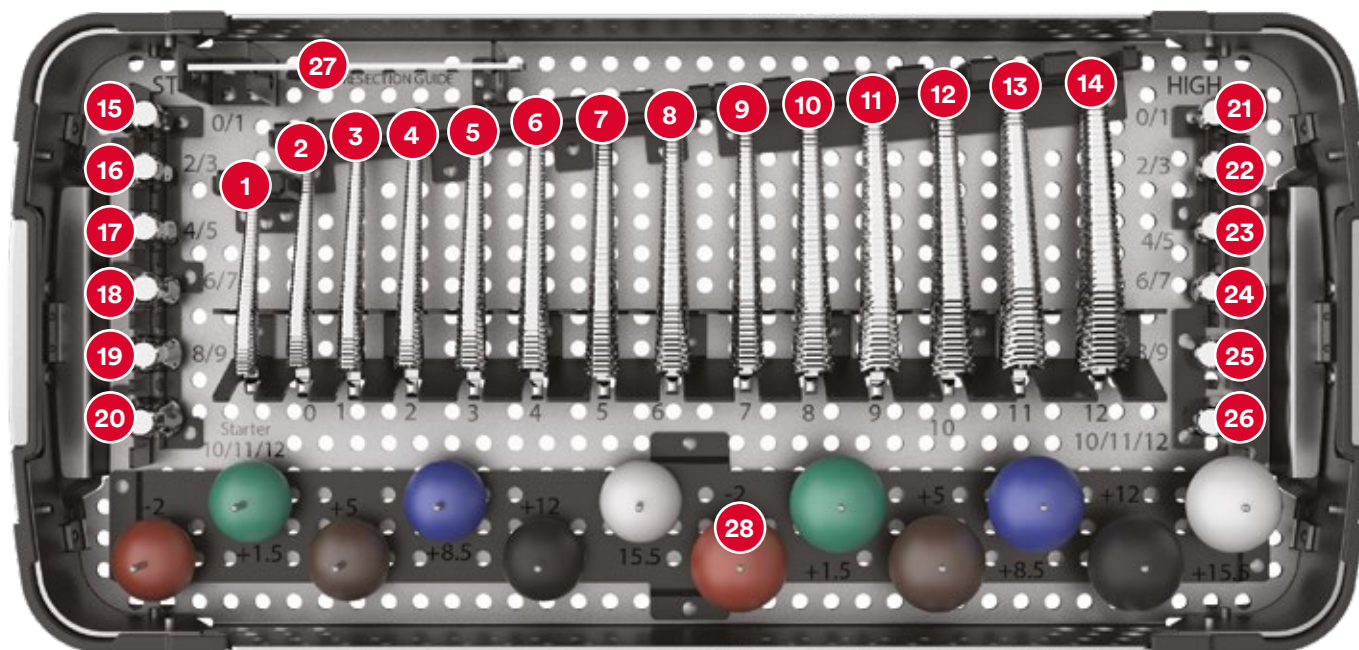
Cases



ACTIS™ CORE CASE BASE: 2010-04-500

DEPUY SYNTHES LID: 2545-01-700

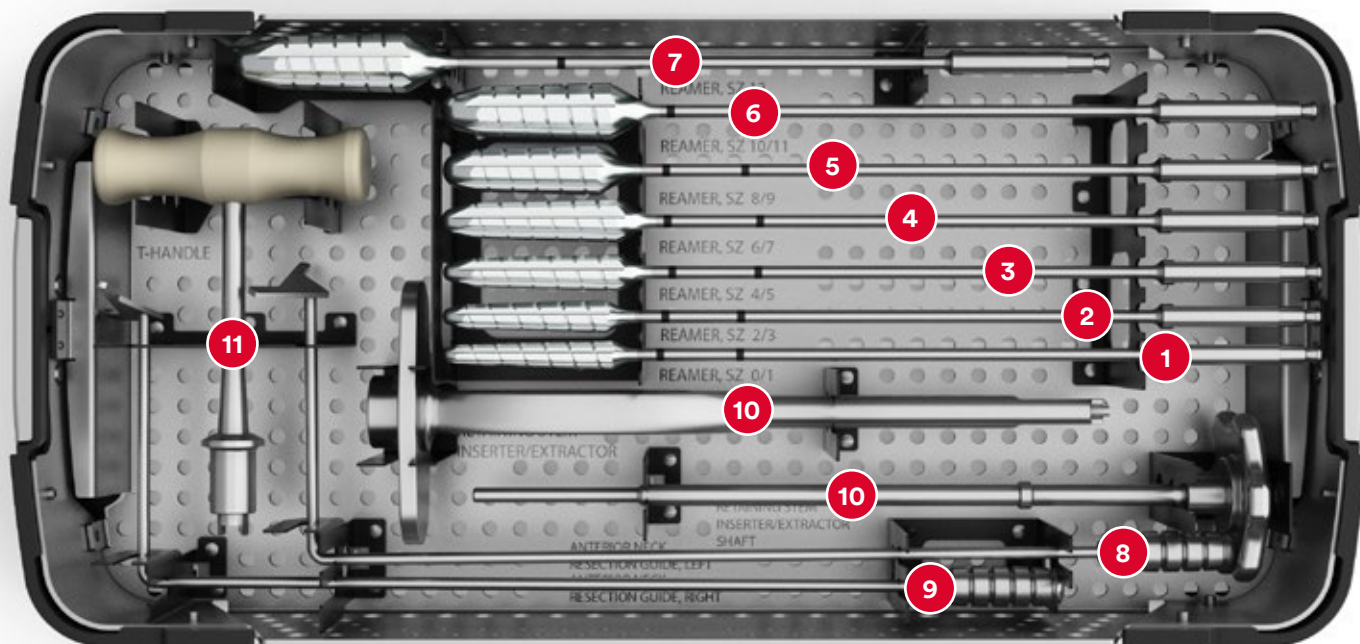
1	2570-04-500	MODULAR CALCAR REAMER SHAFT
2	2001-47-000	MODULAR CALCAR REAMER DISC, SMALL
3	2001-48-000	MODULAR CALCAR REAMER DISC, MEDIUM
4	2001-49-000	MODULAR CALCAR REAMER DISC, LARGE
5	2001-65-000	FEMORAL HEAD IMPACTOR
6	2598-07-530	MODULAR BOX OSTEOTOME
7	85-3927	FEMORAL RASP
8	2598-07-460	UNIVERSAL INSERTER HANDLE
9	2010-07-110	ACTIS STRAIGHT INSERTER SHAFT
10	2010-07-120	ACTIS CURVED INSERTER SHAFT
11	2598-07-435	BULLET TIP INSERTER SHAFT
12	2598-07-550	EXTRA CURVED BROACH HANDLE (2 broach handles)



ACTIS™ BROACH CASE BASE: 2010-04-200
DEPUY SYNTHES LID: 2545-01-700

1	2010-01-002	ACTIS BROACH STARTER
2	2010-01-005	ACTIS BROACH SZ 0
3	2010-01-010	ACTIS BROACH SZ 1
4	2010-01-020	ACTIS BROACH SZ 2
5	2010-01-030	ACTIS BROACH SZ 3
6	2010-01-040	ACTIS BROACH SZ 4
7	2010-01-050	ACTIS BROACH SZ 5
8	2010-01-060	ACTIS BROACH SZ 6
9	2010-01-070	ACTIS BROACH SZ 7
10	2010-01-080	ACTIS BROACH SZ 8
11	2010-01-090	ACTIS BROACH SZ 9
12	2010-01-100	ACTIS BROACH SZ 10
13	2010-01-110	ACTIS BROACH SZ 11
14	2010-01-120	ACTIS BROACH SZ 12

15	2010-02-100	ACTIS STD NK SZ0/1
16	2010-02-200	ACTIS STD NK SZ2/3
17	2010-02-300	ACTIS STD NK SZ4/5
18	2010-02-400	ACTIS STD NK SZ6/7
19	2010-02-500	ACTIS STD NK SZ8/9
20	2010-02-600	ACTIS STD NK SZ10/11/12
21	2010-02-150	ACTIS HIGH NK SZ0/1
22	2010-02-250	ACTIS HIGH NK SZ2/3
23	2010-02-350	ACTIS HIGH NK SZ4/5
24	2010-02-450	ACTIS HIGH NK SZ6/7
25	2010-02-550	ACTIS HIGH NK SZ8/9
26	2010-02-650	ACTIS HIGH NK SZ10/11/12
27	2012-06-100	NECK RESECTION GUIDE
28		FEMORAL HEAD TRIALS



ACTIS™ REAMER CASE BASE: 2010-04-600
DEPUY SYNTHES LID: 2545-01-700

1	2011-01-210	ACTIS REAMER SZ 0 AND 1
2	2011-01-220	ACTIS REAMER SZ 2 AND 3
3	2011-01-230	ACTIS REAMER SZ 4 AND 5
4	2011-01-240	ACTIS REAMER SZ 6 AND 7
5	2011-01-250	ACTIS REAMER SZ 8 AND 9
6	2011-01-260	ACTIS REAMER SZ 10 AND 11
7	2011-01-270	ACTIS REAMER SZ 12
8	2010-03-100	AA NECK RESECTION GUIDE, LEFT
9	2010-03-105	AA NECK RESECTION GUIDE, RIGHT
10	2010-07-100	ACTIS RETAINING STEM INSERTER
11	2001-42-000	T-HANDLE



Femoral Head Trials

Note: Two of the following four femoral head trial diameter sets (with 5 or 6 offset options each) can be added to the ACTIS™ Broach Case.

28 mm

+1.5	green	2530-81-000
+5	brown	2530-82-000
+8.5	blue	2530-83-000
+12	black	2530-84-000
+15.5	natural	2530-85-000

32 mm

+1	green	2530-91-000
+5	brown	2530-92-000
+9	blue	2530-93-000
+13	black	2530-94-000

36 mm

-2	rust	2531-50-000
+1.5	green	2531-51-000
+5	brown	2531-52-000
+8.5	blue	2531-53-000
+12	black	2531-54-000
+15.5	natural	2531-55-000

40 mm

-2	rust	2531-04-000
+1.5	green	2531-05-000
+5	brown	2531-06-000
+8.5	blue	2531-07-000
+12	black	2531-08-000
+15.5	natural	2531-09-000

References:

1. Hamburg University Actis Cadaveric Stability Testing. Data on File. Adaptiv # 103156243

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Please also refer to the package insert(s) or other labeling associated with the devices identified in this surgical technique for additional information.

Not all products may currently be available in all markets.



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