

Rx90® SMOOTH  
TOTAL HIP SYSTEM:  
ENHANCING CEMENT  
TECHNIQUE IN MODERN THR

*alliance*®  
HIP SYSTEMS

*Rx90*®  
SMOOTH TOTAL HIP SYSTEM

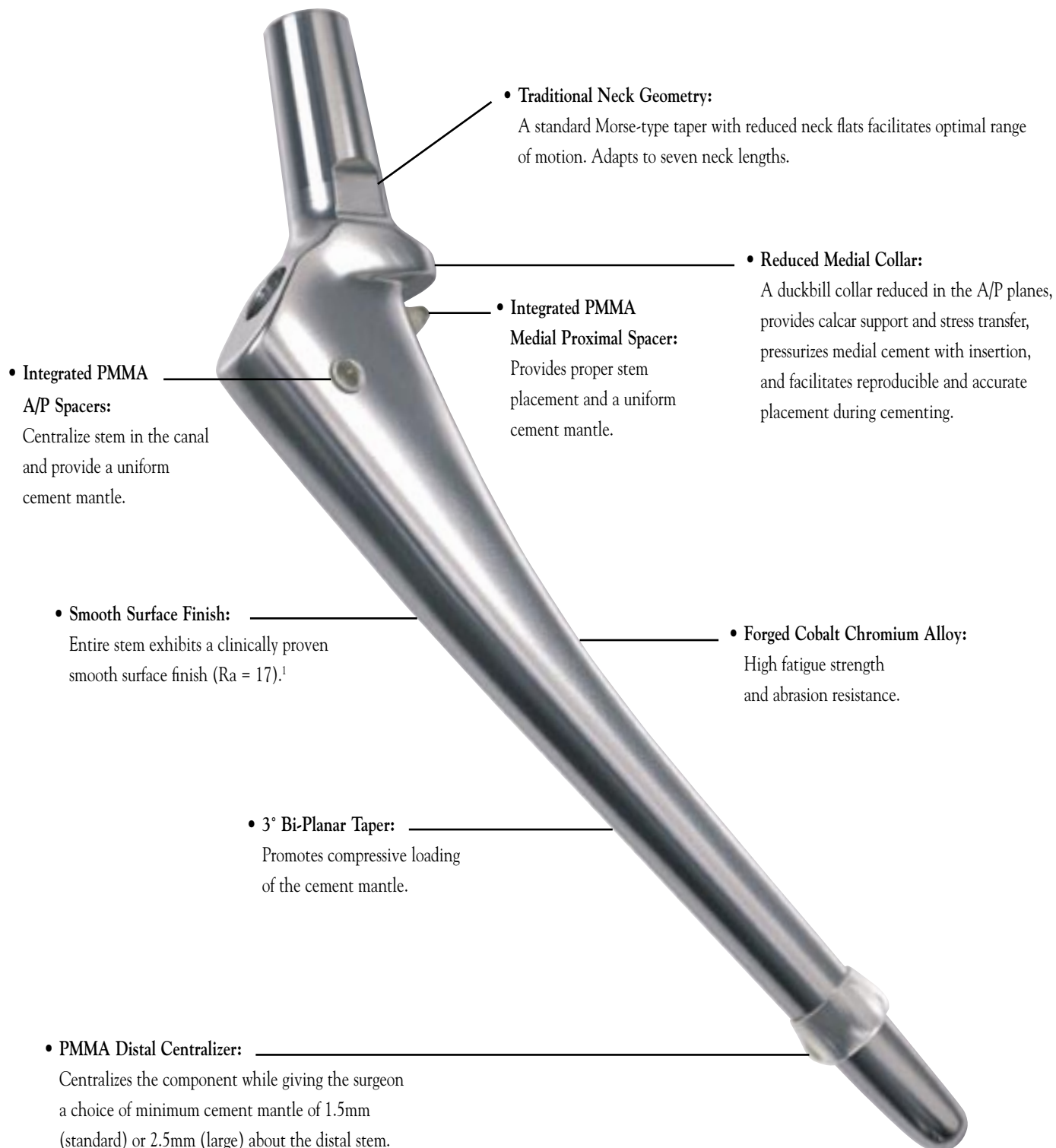


*exact*  
Hip Instrumentation

**BIOMET**  
ORTHOPEDICS, INC.

# RX90® SMOOTH HIP SYSTEM

The Rx90® Smooth hip system is an essential part of the Alliance® Family of hip stems, which comprises the largest assembly of hip implants utilizing common, accurate and reproducible Exact™ instrumentation.



## RX90® SMOOTH TOTAL HIP SYSTEM PRIMARY COMPONENTS

The Rx90® Smooth Hip System offers an extensive range of femoral components designed with the most modern implant technologies to enhance the surgeon's approach to cemented arthroplasty. Designed as a member of the Alliance® Hip System, the Rx90® Smooth hip utilizes Biomet's multi-versatile Exact™ Hip Instrumentation to enhance the system's effectiveness.

The prosthesis is made from forged Cobalt Chromium alloy (CoCrMo), and incorporates a Morse-type taper, allowing for a modular head of Cobalt Chromium alloy or ceramic zircona. The integrated anterior, posterior and medial placement of the polymethylmethacrylate (PMMA) centralization system promotes proper prosthetic positioning and an ideal 3.0mm circumferential cement mantle. The prosthesis also features a smooth surface finish (Ra of 17 $\mu$ ) to aid in the stress transfer at the cement-bone interface.

## LATERAL OFFSET RESTORATION

In total hip reconstruction, the prosthesis offset is one of the most effective and easily manipulated mechanical variables to optimize the biomechanics of the hip. A lateral offset option allows the surgeon to enhance joint stability and restore normal hip function. If a potential offset deficiency is not identified or treated, it could lead to joint instability, limp, and increased joint reaction forces. The advantage, intraoperatively, is that the lateralized Rx90® Smooth femoral stem allows for adjustment of offset and soft tissue tension without changing the neck resection level or the length of the leg.<sup>2</sup>

Offset restoration with the Rx90® Smooth femoral stem is achieved by shifting the neck geometry of the implant medially 6mm while maintaining a constant neck shaft angle and slightly increasing the length of the taper (Figure 1).

ANATOMIC OFFSETS HELP RESTORE HIP BIOMECHANICS BY PROVIDING THE OPPORTUNITY TO TIGHTEN SOFT TISSUE WITHOUT CREATING LEG LENGTH DISCREPANCIES.

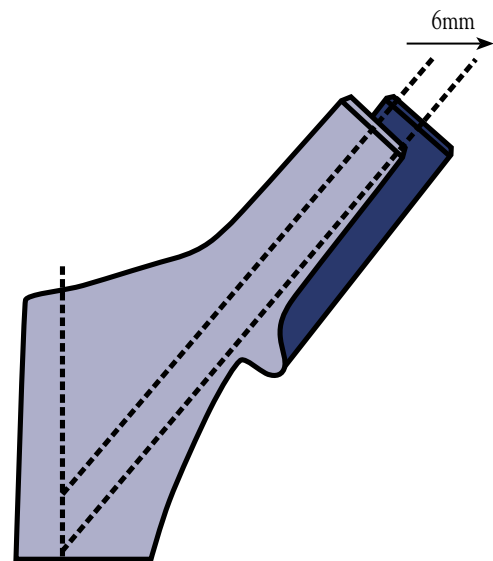


Figure 1

UNCHANGED TAPERED GEOMETRY  
WITH A CLINICALLY PROVEN  
SMOOTH SURFACE FINISH.<sup>1</sup>

# EXACT™ HIP INSTRUMENTATION

EXACT™ HIP INSTRUMENTATION OFFERS VERSATILITY, SIMPLICITY, AND INTRAOPERATIVE FLEXIBILITY BY PROVIDING A COMMON GENERAL INSTRUMENT CASE USED IN COMBINATION WITH THE ALLIANCE® SYSTEM-SPECIFIC INSTRUMENTATION.



Figure 2 – Alliance® Reamer and Broach Cases

The Exact™ Hip Instrumentation was designed for improved efficiency in the OR. The system includes precision instrument designs that promote accuracy, provide reproducible results, and complement Biomet's clinically proven femoral components. The Rx90® Smooth femoral component, a member of the Alliance® Family of hip stems, can be implanted using only three trays: the General I Insertion case and the Alliance® system-specific reamer and broach cases (Figure 2). The broach cases can accommodate up to 12 different neck trunions to support any Alliance® implant. Recognizable color-coding identifies the instrumentation specific to the selected femoral component.

## ALLIANCE® SYSTEM

The following Exact™ Hip Instrumentation cases are **necessary** to implant the Alliance® Family femoral components:



General Case I



Alliance® Reamers



Alliance® Broaches



General Case II (Extraction)  
– Open only if needed



Cylindrical Reamers  
– Optional

## KEY COMPONENTS OF THE EXACT™ INSTRUMENTATION:



A **Starter Reamer** allows for the initial opening of the femoral canal.



The **Offset Chisel** provides a direct view for accessing the piriformis fossa.



Incrementally sized **Magnetic Trial Necks** in standard and lateralized offsets offer accurate intraoperative biomechanical adjustment during trial reduction. Standard offset is gold while lateralized offset trial necks are black.



The **Femoral Inserter** facilitates implant insertion.



**System-Specific Reamers** with new markings that reference both the greater trochanter and medial resection level (Figure 5).



The **Alliance® Femoral Resection Guide** offers the versatility of medial and vertical radius reference points from the greater and lesser trochanter respectively (Figure 3). A convenient trochanter stop assists in accurate measurement.



The **Straight Broach Handle** provides solid engagement with a quick, easy trigger locking mechanism that affords a clear view and a rapid release. A large impaction plate provides for solid driving contact.



The **Exact™/Alliance® Broaches** provide efficient removal of cancellous bone to contour a precise envelope for the femoral component. These broaches utilize advanced 3-D CAD/CAM solid modeling technology to reproduce successful stem positioning every time. Nitrided surfaces provide for durability and prolonged life of the cutting edges (fully toothed broaches available).

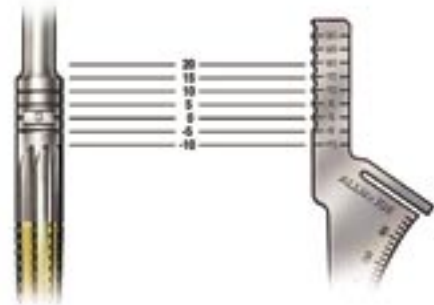


Figure 3 – Alliance® Resection Guide and Reamer. Vertical markings on the Alliance® Resection Guide correspond to markings on the Alliance® Reamers for consistent, reproducible results.

## RX90® SMOOTH X-RAY TEMPLATES: PREOPERATIVE PLANNING

The Rx90® Smooth Template system offers a precise technique for implant sizing and preoperative evaluation of anatomic offset (Figure 4). Vertical and medial scales correspond to the resection guide to aid in leg length restoration. The templates are designed to match the color-coded instrument case for ease of identification and offer a table for quick offset references (Figure 5).



Figure 4 – Preoperative x-ray with new Rx90® Smooth Template

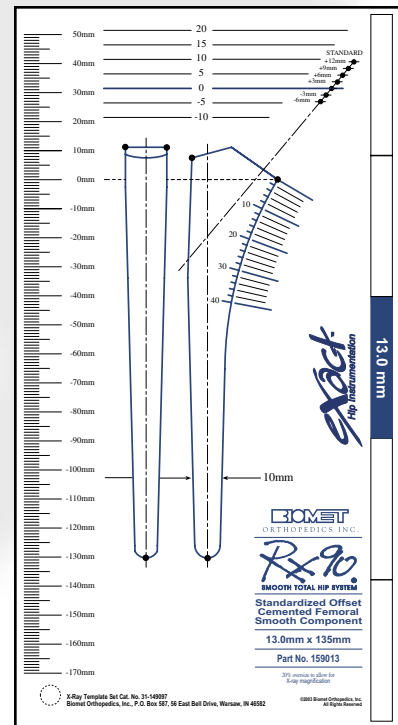


Figure 5 – Rx90® Smooth/Exact™ Template

# RX90<sup>®</sup> SMOOTH PRIMARY HIP SURGICAL TECHNIQUE

THE RX90<sup>®</sup> SMOOTH FEMORAL COMPONENT: CEMENTED FOR SUCCESS.

## FEMORAL HEAD RESECTION

Using the Exact<sup>™</sup> templates, determine the height of the femoral neck resection above the lesser trochanter and the height of the tip of the greater trochanter relative to the shoulder of the femoral component. The Alliance<sup>®</sup> femoral neck resection guide references these measurements intraoperatively. Position the femoral neck resection guide parallel to the longitudinal axis of the femoral shaft. Confirm the height of the femoral neck resection above the lesser trochanter using the scale on the medial aspect of the resection guide relative to the preoperative templated X-ray. The vertical scale referenced to the greater trochanter is an additional conformation of the resection level (Figure 1). Resect the femoral neck at this level to re-create the appropriate femoral neck length and offset.



Fig. 1

## ACCESSING FEMORAL CANAL

The Exact<sup>™</sup> Offset Chisel may be used to access the piriformis fossa and clear a channel to accept the tapered reamers. The offset chisel design assures adequate visualization for a lateral pathway to avoid varus positioning (Figure 2).

A Starter Reamer on a T-handle may be used to identify and open the femoral canal (Figure 3).

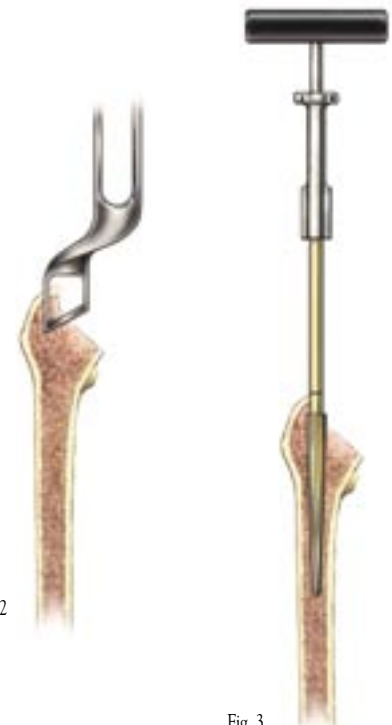


Fig. 2

Fig. 3

*The Rx90<sup>®</sup> Total Hip System was designed in conjunction with Stanley Asnis, M.D., with the cooperation of Michael Errico, M.D., and Bruce Seideman, M.D., Co-Section Chiefs of The Joint Reconstruction Service of North Shore University Hospital, Manhasset, New York, an affiliate of New York University School of Medicine.*

*This brochure is presented to demonstrate the surgical technique utilized by the developing surgeons.*

*Biomet as the manufacturer of this device, does not practice medicine and does not recommend this or any other surgical technique for use on a specific patient. The surgeon who performs any implant procedure is responsible for determining and utilizing the appropriate techniques for implanting the prosthesis in each individual patient. Biomet is not responsible for selection of the appropriate surgical technique to be utilized for an individual patient.*

## REAMING FEMORAL CANAL

The objective of reaming the canal is to provide for a planned ideal cement mantle. The Rx90® Smooth stem is designed to provide a uniform minimal 1.5mm cement mantle (3.0mm circumferentially).

*Note: A 9mm prosthesis circumferentially has a 2mm cement mantle and sizes 11mm–17mm each have a 3mm circumferential cement mantle.*

The tapered Exact™ Alliance® reamers will produce a minimum 1.5mm cement mantle envelope per side (3mm circumferentially) when used with the same size Rx90® Smooth femoral component. Example: Ream and broach to 11mm. Implant a size 11mm Rx90® Smooth stem (Figure 4).

Bands along the reamer shank reference the vertical scale on the templates and the resection guide, which correspond to the center of the femoral head (Figure 5). For example: If the templated vertical scale is a 10, bury the reamer until the 10mm mark on the reamer corresponds to the top of the trochanter for accurate femoral depth. Begin with a canal reamer that is 3–4mm smaller than the templated femoral component. Sequentially ream the femoral canal until cortical “chatter” is encountered. It is important to stay lateral with the femoral reamers to ensure that the canal is being prepared in neutral alignment with the femoral axis (Figure 6).

*Note: If a large cement mantle is desired, a set of flexible reamers may be used to create a distal minimal mantle of 2.5mm. Following the sequential tapered conical reamers, flexible reamers are used to enlarge the distal canal. A 2.5mm PMMA centralizer can be utilized for the large mantle about the distal portion of the stem.*

## BROACHING PROXIMAL FEMUR

Like the tapered reamers, the broach will create an envelope that will provide for a minimum of 1.5mm per side or a 3mm circumferential cement mantle.

Begin the broaching process with a broach at least 2–3mm smaller than the largest reamer used. Attach the broach handle to the broach by pulling back on the trigger handle and releasing to lock it into place. It is important that the broach is oriented so to produce the desired femoral anteversion. This will help to ensure maximum proximal canal fill (Figure 7). The broach is impacted until it is slightly below the level of the initial calcar cut. Sequentially increase the size of the broach until the templated size is reached or the broach engages the medial cortex and can not be placed deeper.

With the proper size broach in place, the calcar can be planed flush by using the Exact™ retractable calcar planer. The calcar planer is specially designed to reach the short broach post and prevent metal-to-metal wear of the post (Figure 8).



Fig. 4



Fig. 5



Fig. 6



Fig. 7

Fig. 8

# RX90® SMOOTH PRIMARY HIP SURGICAL TECHNIQUE

## TRIAL REDUCTION

To perform the trial reduction with the final broach still in place, attach the Exact™ Integral® magnetic neck trunion over the extended broach post. The gold trunion indicates standard offset, while the black trunion represents lateralized offset (Figure 9). The Exact™ Integral® magnetic trunions are sized to correspond to the appropriate broach, and the stem size is clearly marked on top of the trunion. Select the trial femoral head of desired diameter and neck length (The collared trial should rest on the calcar and the rasp surface) (Figure 10). Reduce the hip to ensure that proper leg length and joint stability have been achieved. If needed, additional adjustments to neck length and/or offset can be completed at this time. *Note: The Rx90® Smooth Hip and the Integral® Hip utilize the same Exact™ magnetic neck trunions.*



## CEMENT INSERTION

A Biomet® Bio-Plug or intramedullary bone plug component is placed in the canal to allow a 2cm cement column below the tip of the stem. The canal is then thoroughly irrigated with pulsatile irrigation and packed dry. Using the Optivac® Mixing System, inject Palacos® Bone Cement in a retrograde fashion and then pressurize. The VacPac® cement mixing system with Generation 4® Bone Cement may be utilized in a similar fashion.



## FEMORAL COMPONENT INSERTION

Select the appropriate sized Rx90® Smooth stem that correlates with the last reamer size used. Next, slide the same sized distal centralizer onto the stem. For example, an 11mm stem accepts the same size 11mm, 1.5mm centralizer sleeve. The stem is inserted placing slight medial pressure to ensure contact of medial spacer to calcar and fully seated (Figure 11). Extraneous cement is then removed. Once cement hardening is achieved, a final trial reduction may be done and the correct modular head chosen for reconstitution of leg length, lateral offset and stability can be impacted (Figure 12).

With the Rx90® smooth hip system, a lateralized implant option is available. If additional offset is required after assessing joint stability with the proper broach in place, the lateralized provisional stem should then be inserted and another trial reduction completed. The offset will be increased by 6mm in all lateralized femoral components. This increased offset will allow soft tissue tension without changing neck resection level or the length of the leg. The lateralized stem should be inserted in the same fashion as previously described.



# BIOMET® BONE CEMENT AND MIXING SYSTEMS

THE PALACOS® BONE CEMENT/OPTIVAC® MIXING SYSTEM COMBINATION BUILDS ON AN ALREADY ESTABLISHED TRACK RECORD TO AID IN THE SUCCESS OF CEMENTED ARTHROPLASTY.

## PALACOS® BONE CEMENT/OPTIVAC® MIXING SYSTEM COMBINATION

Palacos® Bone Cement has demonstrated the lowest rate for revision compared to other leading bone cements in the world's largest on-going clinical study.<sup>3</sup> The Optivac® Mixing System was developed specifically for Palacos® Bone Cement, providing an efficient vacuum mixing and delivery system that reduces cement porosity better than any other system.<sup>4</sup> With the Palacos® Bone Cement/Optivac® Mixing System combination you will:

- Reduce porosity in your cement.
- Improve handling characteristics.
- Have a cement that is easily recognizable when compared to bone.
- Save valuable O.R. time.
- Improve the postoperative white-out.
- Standardize the mixing technique.\*
- Provide the best possible cement mantle for your cemented arthroplasty.

## GENERATION 4® BONE CEMENT/VACPAC® MIXING AND DELIVERY SYSTEM COMBINATION

The Generation 4® Bone Cement builds on years of cemented arthroplasty by offering a chemical composition that is similar to other clinically proven bone cements. The features and benefits of Generation 4® Bone Cement:

- Vacuum-packed in the VacPac® Mixing and Delivery System, a revolutionary process designed to create a void-free cement.
- No glass ampoules.
- No foot pumps.
- A safe, efficient and easy-to-use cement mixing system.\*
- No fumes during mixing.
- 83% less waste.



Palacos® Bone Cement mixed in the Optivac® Mixing System reaches the dough phase immediately, saving valuable O.R. time.

THE VACPAC® MIXING AND DELIVERY SYSTEM...A REVOLUTIONARY PROCESS BUILDING ON THE SUCCESS OF CEMENT FIXATION.



Generation 4® Bone Cement in the VacPac® Mixing System provides a medium viscosity cement that is based on other clinically proven cement chemistries.

\* Refer to Palacos® surgical technique Y-BMT-653 and Generation 4® technical brochure Y-BMT-759.

# ORDERING INFORMATION

## RX90® SMOOTH FEMORAL COMPONENT

Stem Size	Stem Length	Implant Standard	Implant Lateralized	Exact™ Alliance® Broach	Exact™ Alliance® Tapered Reamer
9mm	115	159009	11-159009	31-400007	31-400027
11mm	125	159011	11-159011	31-400009	31-400029
13mm	135	159013	11-159013	31-400011	31-400031
15mm	145	159015	11-159015	31-400013	31-400033
17mm	155	159017	11-159017	31-400015	31-400035

## INTEGRAL® MAGNETIC NECK TRUNIONS

Standard (Gold)		Lateralized (Black)	
Sizes	Part No.	Sizes	Part No.
7-10mm	31-400022	8-10mm	31-400042
11-14mm	31-400023	11-14mm	31-400043
15-21mm	31-400024	15-21mm	31-400044

## PMMA CENTERING SLEEVES

1.5mm		2.5mm	
Sizes	Part No.	Sizes	Part No.
9mm	149019	9mm	149029
11mm	149021	11mm	149031
13mm	149023	13mm	149033
15mm	149025	15mm	149035
17mm	149027	17mm	149037

Exact™ Instrument Cases:

Exact™ General Case I

595100

Exact™ General Case II

595101

Alliance® Specific Cases:

Exact™ Alliance® Broach Case

595105

Exact™ Alliance® Tapered Reamer Case

595106

Rx90® Smooth Template:

Exact™ Rx90® Smooth Template  
Standard and Lateralized

31-149097

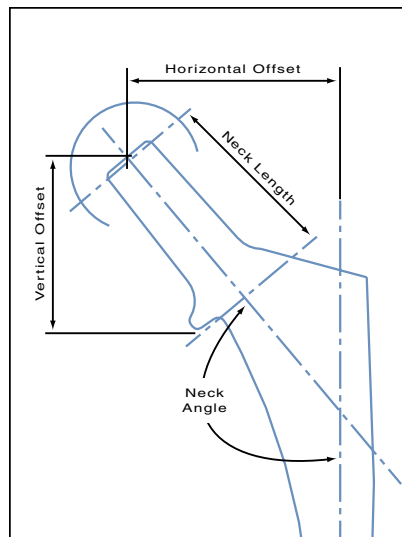
# OFFSET INFORMATION

## STANDARD RX90® SMOOTH PRIMARY

Size	Neck Angle	Horizontal Offset							Vertical Offset							Neck Length						
		-6	-3	STD	+3	+6	+9	+12	-6	-3	STD	+3	+6	+9	+12	-6	-3	STD	+3	+6	+9	+12
9mm	140°	35.6	37.5	39.5	41.4	43.3	45.2	47.2	25.5	27.8	30.1	32.4	34.7	37.0	39.3	28.3	31.3	34.3	37.3	40.3	43.3	46.3
11mm	140°	36.0	37.9	39.8	41.7	43.7	45.6	47.5	25.5	27.8	30.1	32.4	34.7	37.0	39.3	28.3	31.3	34.3	37.3	40.3	43.3	46.3
13mm	140°	37.5	39.4	41.4	43.3	45.2	47.1	49.1	25.1	27.4	29.7	32.0	34.3	36.6	38.9	28.3	31.3	34.3	37.3	40.3	43.3	46.3
15mm	140°	37.5	39.4	41.3	43.2	45.2	47.1	49.0	25.9	28.2	30.4	32.7	35.0	37.3	39.6	28.3	31.3	34.3	37.3	40.3	43.3	46.3
17mm	140°	37.1	39.0	40.9	42.9	44.8	46.7	48.6	26.8	29.1	31.4	33.7	36.0	38.3	40.6	28.3	31.3	34.3	37.3	40.3	43.3	46.3

## LATERALIZED RX90® SMOOTH PRIMARY

Size	Neck Angle	Horizontal Offset							Vertical Offset							Neck Length						
		-6	-3	STD	+3	+6	+9	+12	-6	-3	STD	+3	+6	+9	+12	-6	-3	STD	+3	+6	+9	+12
9mm	140°	41.6	43.5	45.5	47.4	49.3	51.2	53.2	25.5	27.8	30.1	32.4	34.7	37.0	39.3	31.8	34.8	37.8	40.8	43.8	46.8	49.8
11mm	140°	42.0	43.9	45.8	47.7	49.7	51.6	53.5	25.6	27.9	30.2	32.4	34.7	37.0	39.3	31.8	34.8	37.8	40.8	43.8	46.8	49.8
13mm	140°	43.5	45.4	47.4	49.3	51.2	53.1	55.1	25.1	27.4	29.7	32.0	34.3	36.6	38.9	31.8	34.8	37.8	40.8	43.8	46.8	49.8
15mm	140°	43.5	45.4	47.3	49.2	51.2	53.1	55.0	25.9	28.2	30.4	32.7	35.0	37.3	39.6	31.8	34.8	37.8	40.8	43.8	46.8	49.8
17mm	140°	43.1	45.0	46.9	48.9	50.8	52.7	54.6	26.8	29.1	31.4	33.7	36.0	38.3	40.6	31.8	34.8	37.8	40.8	43.8	46.8	49.8



## REFERENCES & ADDITIONAL SUPPORT MATERIAL

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6. Data at Biomet.

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