

# Specification Guide



**RESTOR<sup>◊</sup>**

Modular Resection Prosthesis

The Comprehensive  
Limb Salvage System

## Table of Contents

Indications.....	3
The System.....	4
Proximal Tibia Resection.....	5
Distal Femur Resection.....	6
Proximal Femur Resection.....	7
Total Femur Resection.....	8
Implants Lower Limb.....	9
RESTOR° Instrument Set, Lower Limb.....	10
Proximal Humerus Resection.....	12
Total Humerus Resection.....	13
Implants Upper Limb.....	14
RESTOR Instrument Set, Upper Limb.....	15
Important Medical Information.....	16

## Acknowledgement

The ADLER° product development team gratefully acknowledges the contribution and ongoing collaboration of the orthopaedic oncology team at the Tata Memorial Hospital, led by Prof. Ajay Puri, towards the development of the RESTOR modular resection system and its associated instrumentation.

The management of malignant bone tumors has made vast strides in the last few decades. From an era where amputation was the only option, to the current day function preserving resections and complex reconstructions has been a major advance.

Contemporary limb salvage surgery aims to compensate the loss of diseased bone and soft tissue with reconstructions that retain near-normal limb function .

The recent past has seen an increasing acceptance of limb salvage surgery whereby the operating surgeon successfully removes the diseased area of the bone and compensates the resulting loss of bone and muscle with the objective of not only avoiding an amputation but retaining near-normal limb function.

The use of "megaprostheses", so named due to the large segments of bone usually replaced, has gained acceptance in limb salvage surgery over the last few years. Megaprostheses offer a patient the twin benefits of restoring structural skeletal stability while retaining functional joint mobility.

The widespread use of limb salvage surgery with megaprostheses has been constrained due to various factors, some of which include:

- The necessity of customizing a prosthesis to individual patient parameters, which is a time consuming and difficult process
- Lack of easy availability of off the-shelf modular designs which can be used without the long manufacturing lead time of a customized prosthesis
- Prohibitively high cost of contemporary modular prosthesis designs

RESTOR® (Resection of Tumor and Optimal Reconstruction), a cemented, modular resection prosthesis system that enables reconstruction following limb salvage surgery, was conceived to address these issues and provide a cost-effective solution to patients who could benefit from limb salvage surgery following tumors of :

- Proximal, Distal & Total Femur
- Proximal Tibia
- Diaphyseal regions of the Femur/Humerus
- Proximal, Distal and Total Humerus

## Indications

Indications for limb salvage surgery with reconstruction using the RESTOR system include :



Osteosarcoma of the upper end of the Humerus\*

Metastasis from renal carcinoma\*

Recurrent Giant Cell Tumor of the lower end of the femur\*

- Primary malignant bone tumors
- Metastatic bone tumors
- Benign bone tumors  
(where intra-lesional methods may be unsuitable)

The RESTOR system may also be a suitable option for revision of a conventional joint replacement prosthesis with extensive bone loss.

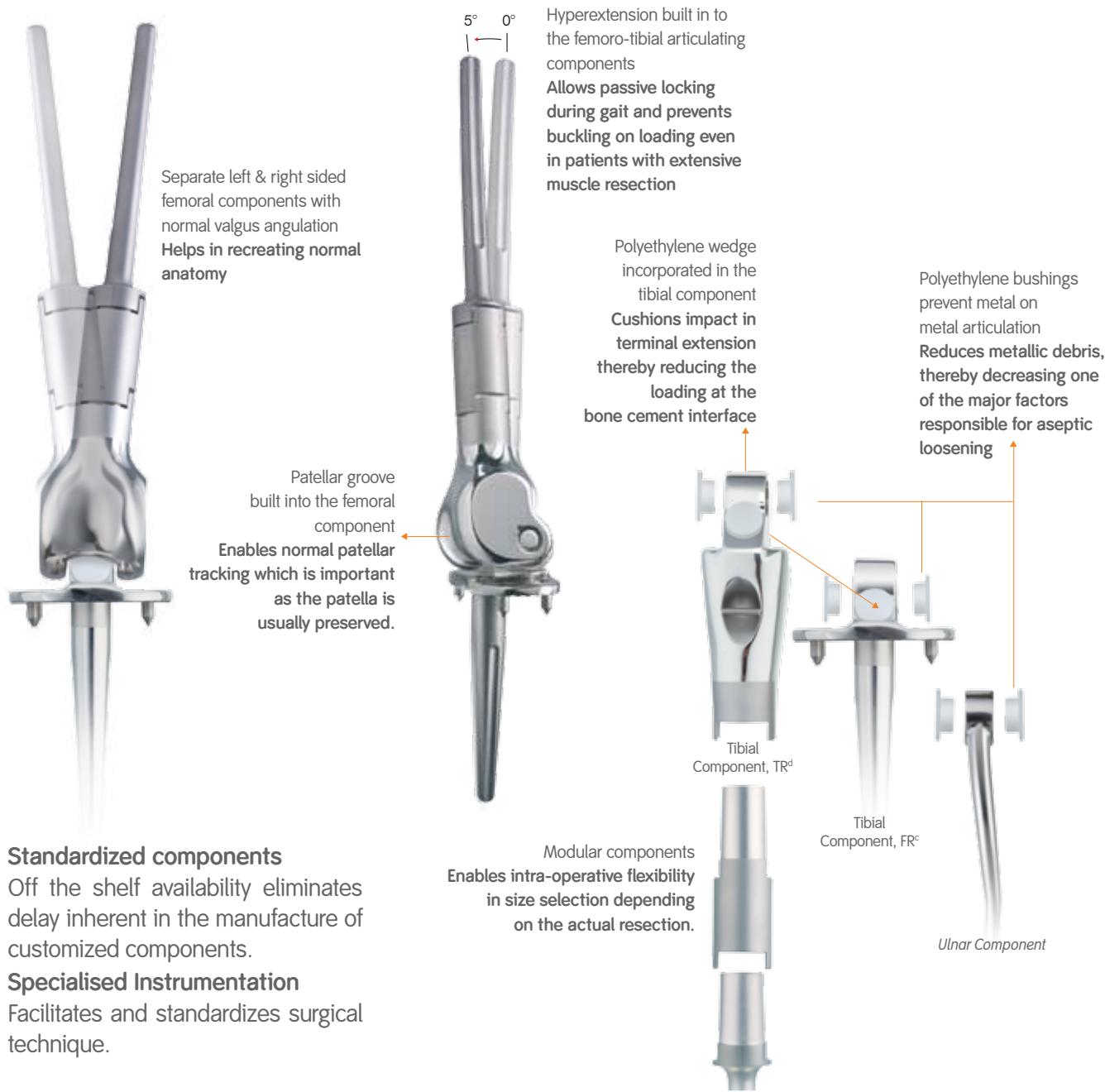
Achieving adequate oncological clearance while retaining function is the guiding principle of limb salvage surgery. At no stage must the primary goal of achieving oncological clearance be compromised in an attempt to retain function.

Limb salvage surgery must not be contemplated if adequate oncological clearance would be compromised.

\*All X-Rays are courtesy of Tata Memorial Hospital, Mumbai.

# The System

RESTOR® is supported by nearly seven years of prior experience with the first generation customized megaprosthesis, a collaborative effort between orthopaedic oncologists Dr. Ajay Puri, Dr. Manish Agarwal and the team at the Tata Memorial Hospital, Mumbai with the ADLER® product development team. The clinical performance of the TMH-NICE first generation megaprosthesis was validated in an institutional review board approved prospective trial. Early results were published<sup>b</sup>. The extensive clinical experience gained with the first generation implant and detailed analysis of failures that occurred formed the basis on which the RESTOR system evolved. As compared to the first generation implant, RESTOR witnessed major transformations in engineering design, materials and manufacturing technologies, all of which are targeted towards achieving contemporary survivorship benchmarks for limb salvage prostheses. Early clinical results<sup>c</sup> appear to indicate that implant survivorship with the system would achieve benchmarks currently considered state-of-the-art.

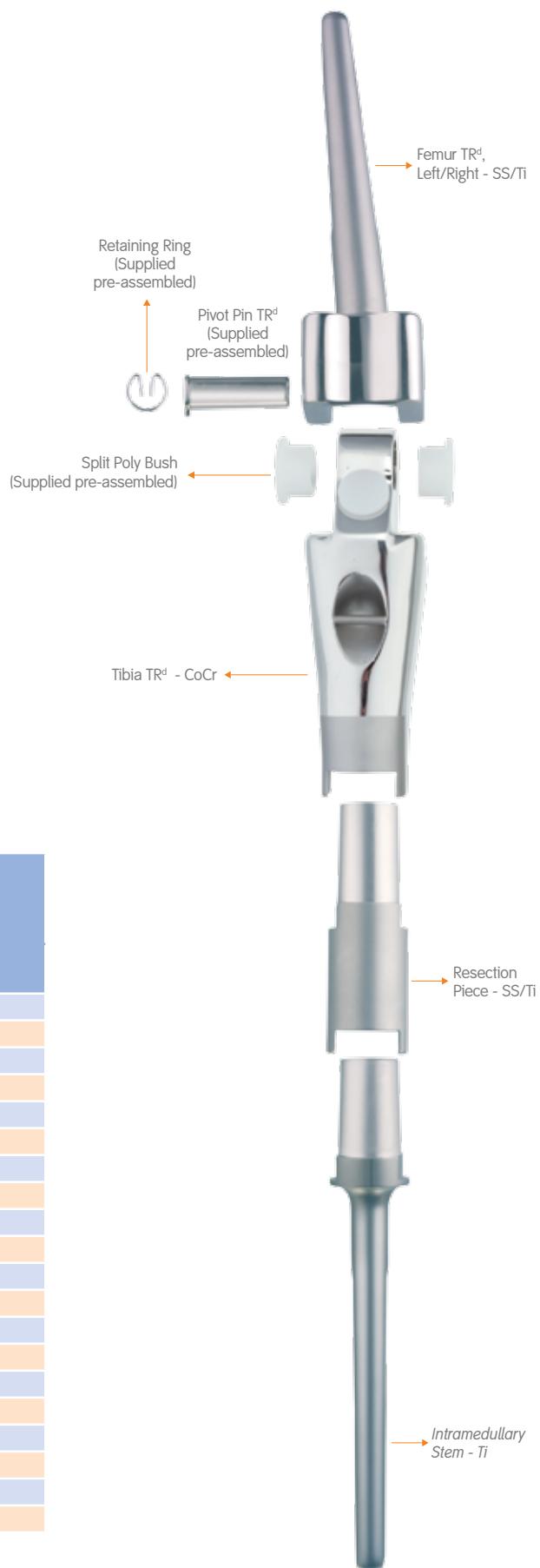


# Proximal Tibia Resection

**Proximal Tibia Resection, Pre-Op\***



**Proximal Tibia Resection, Post-Op\***



**Condylar Component Dimensions**

Length (mm)	Femur TR <sup>d</sup> -Left/Right	Tibia TR <sup>d</sup>
M-L	36	35
A-P	34	35

**Component Selection Guide - Proximal Tibia Resection**

Distal Femur Component - SS / Ti	Proximal Tibia Component - CoCr, Length (mm)	Resection Piece - SS / Ti, Length (mm)	I.M. Stem - Ti, Ø (mm) Straight/Curved	Total Resection Length (mm) with I.M. Stem
Femur TR <sup>d</sup> -Left/Right	Tibia TR <sup>d</sup> - 80	Nil	10, 11, 12, Straight/Curved	80
		40		120
		50		130
		60		140
		70		150
		80		160
		90		170
		100		180
		110		190
		120		200
		130		210
		140		220
		150		230
		160		240
		170		250
		180		260
		190		270
		200		280
		210		290
		220		300

\*All X-rays are courtesy of Tata Memorial Hospital, Mumbai <sup>a</sup>Femoral Resection <sup>d</sup>Tibial Resection

# Distal Femur Resection

**Distal Femur Resection, Pre-Op\***



**Distal Femur Resection, Post-Op\***



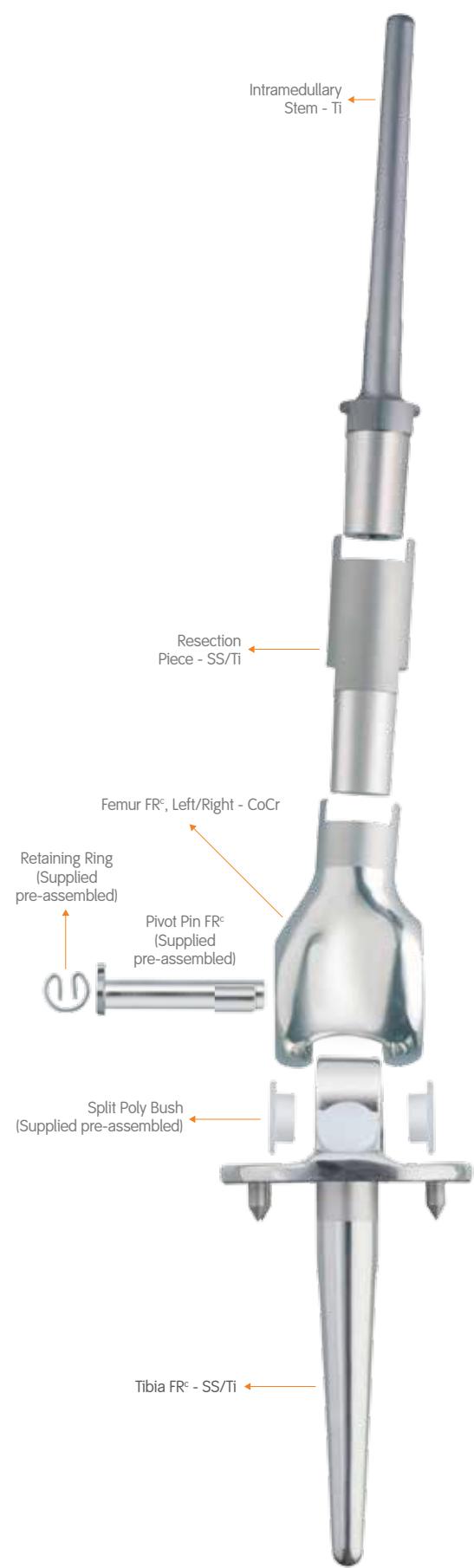
Intramedullary Stem - Ti

## Condylar Component Dimensions

Length (mm)	Tibia FR <sup>c</sup> - Regular	Tibia FR <sup>c</sup> - Small	Femur FR <sup>c</sup> - Left/Right
M-L	65	60	45
A-P	40	35	40

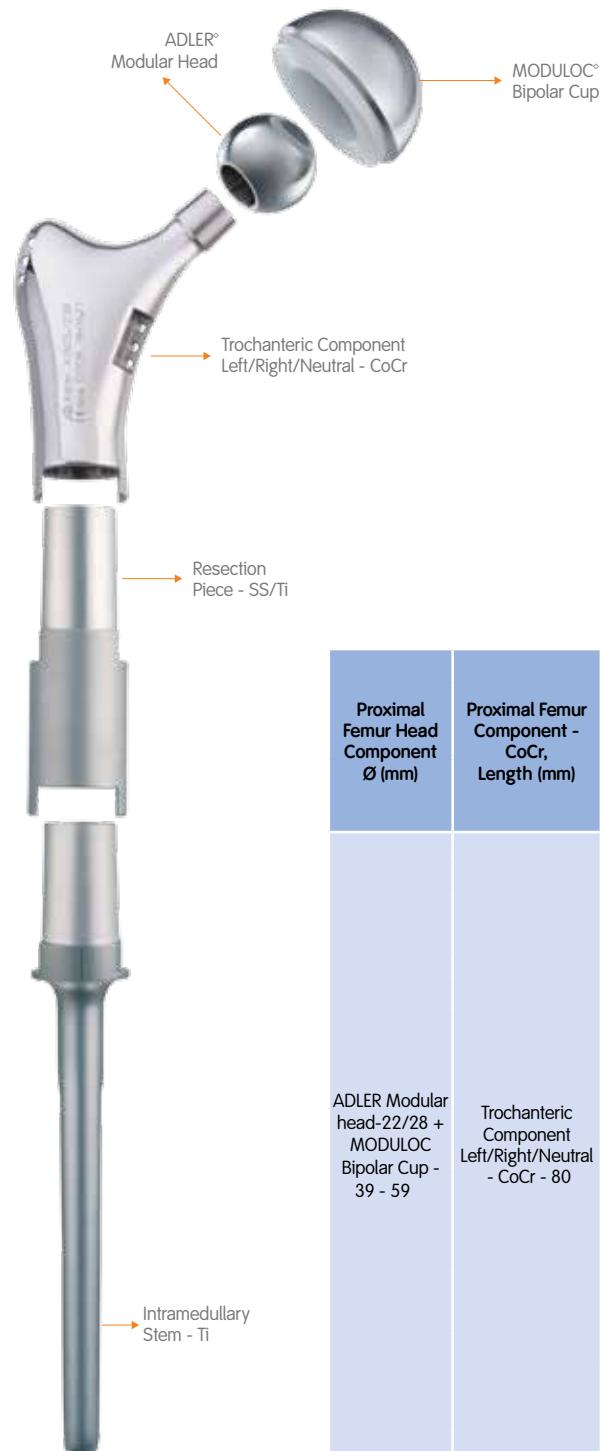
## Component Selection Guide - Distal Femur Resection

Proximal Tibia Component - SS / Ti	Distal Femur Component - CoCr Femur FR, Length (mm)	Resection Piece - SS / Ti, Length (mm)	I.M. Stem - Ti, Ø (mm) Straight/Curved	Total Resection Length (mm) with I.M. Stem
Tibia Fr <sup>c</sup> -Regular/Small	Femur Fr <sup>c</sup> - Left/Right-80	Nil	10, 11, 12, Straight/Curved	80
		40		120
		50		130
		60		140
		70		150
		80		160
		90		170
		100		180
		110		190
		120		200
		130		210
		140		220
		150		230
		160		240
		170		250
		180		260
		190		270
		200		280
		210		290
		220		300



\*All X-rays are courtesy of Tata Memorial Hospital, Mumbai <sup>c</sup>Femoral Resection <sup>d</sup>Tibial Resection

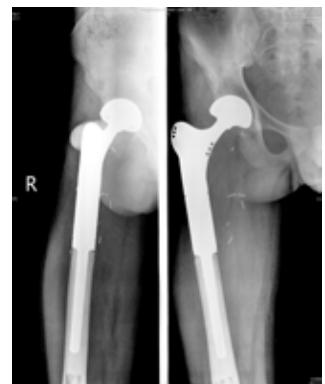
# Proximal Femur Resection



Proximal Femur Resection, Pre-Op\*



Proximal Femur Resection, Post-Op\*



Component Selection Guide - Proximal Femur Resection

Proximal Femur Head Component Ø (mm)	Proximal Femur Component - CoCr, Length (mm)	Resection Piece - SS / Ti, Length (mm)	I.M. Stem - Ti, Ø (mm) Straight/ Curved	Total Resection Length (mm) With Head				
				NL <sup>e</sup> -3.5, Lat Offset 35.5	NL <sup>e</sup> -2.0, Lat Offset 36.5	NL <sup>e</sup> 0, Lat Offset 38.0	NL <sup>e</sup> +3.5, Lat Offset 40.5	NL <sup>e</sup> +7.5, Lat Offset 44.0
		Standard	Std. Stem	Std. Stem	Std. Stem	Std. Stem	Std. Stem	Std. Stem
ADLER Modular head-22/28 + MODULOC Bipolar Cup - 39 - 59	Trochanteric Component Left/Right/Neutral - CoCr - 80	Nil	10, 11, 12, Straight/ Curved	78	79	80	82	85
		40		118	119	120	122	125
		50		128	129	130	132	135
		60		138	139	140	142	145
		70		148	149	150	152	155
		80		158	159	160	162	165
		90		168	169	170	172	175
		100		178	179	180	182	185
		110		188	189	190	192	195
		120		198	199	200	202	205
		130		208	209	210	212	215
		140		218	219	220	222	225
		150		228	229	230	232	235
		160		238	239	240	242	245
		170		248	249	250	252	255
		180		258	259	260	262	265
		190		268	269	270	272	275
		200		278	279	280	282	285
		210		288	289	290	292	295
		220		298	299	300	302	305

\*All X-rays are courtesy of Tata Memorial Hospital, Mumbai   <sup>c</sup>Femoral Resection   <sup>d</sup>Tibial Resection   <sup>e</sup>Neck Length

# Total Femur Resection



**Total Femur Resection, Pre-Op\***



**Total Femur Resection, Post-Op\***



**Condylar Component Dimensions**

Length (mm)	Tibia FR <sup>c</sup> - Regular	Tibia FR <sup>c</sup> - Small	Femur FR <sup>c</sup> - Left/Right
	M-L	65	45
A-P	40	35	40

**Component Selection Guide - Total Femur Resection**

Proximal Femur Head Component Ø (mm)	Proximal Femur Component - CoCr, Length (mm)	Resection Coupler - SS/Ti, Length (mm)	Resection Piece - SS/Ti, Length (mm)	Distal Femur Component - CoCr, Length (mm)	Proximal Tibia Component - SS/Ti	Total Resection Length (mm) With Head				
						NL <sup>e</sup> -3.5, Lat Offset 35.5	NL <sup>e</sup> -2.0, Lat Offset 36.5	NL <sup>e</sup> 0, Lat Offset 38	NL <sup>e</sup> +3.5, Lat Offset 40.5	NL <sup>e</sup> +7.5, Lat Offset 44
ADLER Modular head-22/28 + MODULOC Bipolar Cup- 39 - 59	Trochanteric Component Left/Right/Neutral - CoCr - 80	180	Nil	Femur FR <sup>c</sup> - Left/Right - 80	Tibia FR <sup>c</sup> - Regular/Small	338	339	340	342	345
			40			378	379	380	382	385
			50			388	389	390	392	395
			60			398	399	400	402	405
			70			408	409	410	412	415
			80			418	419	420	422	425
			90			428	429	430	432	435
			100			438	439	440	442	445
			110			448	449	450	452	455
			120			458	459	460	462	465
			130			468	469	470	472	475
			140			478	479	480	482	485
			150			488	489	490	492	495
			160			498	499	500	502	505
			170			508	509	510	512	515
			180			518	519	520	522	525
			190			528	529	530	532	535
			200			538	539	540	542	545
			210			548	549	550	552	555
			220			558	559	560	562	565

\*All X-rays are courtesy of Tata Memorial Hospital, Mumbai <sup>c</sup>Femoral Resection <sup>d</sup>Tibial Resection <sup>e</sup>Neck Length

# Implants Lower Limb



MODULOC® Bipolar Cup

39/22	41/22	43/22	45/28	47/28	49/28	51/28	53/28
H0307.0639	H0307.0641	H0307.0643	H0307.0645	H0307.0647	H0307.0649	H0307.0651	H0307.0653
55/28	57/28	59/28					
			H0307.0655	H0307.0657	H0307.0659		

ADLER® Modular Head, Hi-N Steel

22/-2.0    22/0.0    22/+3.5    22/+7.5    28/-3.5    28/0.0    28/+3.5    28/+7.5    28/+10    28/+12.5

H0407.2120 H0407.2200 H0407.2235 H0407.2275 H0407.2735 H0407.2800 H0407.2835 H0407.2875 H0407.2900 H0407.2925

RESTOR® Trochanteric Component - CoCr  
Offset, 38mm

Neutral	15° Anteversion	
	Left	Right
A1605.1038	A1605.1138 <sup>a</sup>	A1605.1238 <sup>a</sup>

RESTOR Resection Piece - SS/Ti

S.Steel	Titanium	Length (mm)
A1601.0304	A1601.1304	40
A1601.0305	A1601.1305	50
A1601.0306	A1601.1306	60
A1601.0307	A1601.1307	70
A1601.0308	A1601.1308	80
A1601.0309	A1601.1309	90
A1601.0310	A1601.1310	100
A1601.0311	A1601.1311	110
A1601.0312	A1601.1312	120
A1601.0313	A1601.1313	130
A1601.0314	A1601.1314	140
A1601.0315	A1601.1315	150
A1601.0316	A1601.1316	160
A1601.0317	A1601.1317	170
A1601.0318	A1601.1318	180
A1601.0319	A1601.1319	190
A1601.0320	A1601.1320	200
A1601.0321	A1601.1321	210
A1601.0322	A1601.1322	220

RESTOR Resection Coupler - SS/Ti

S.Steel	Titanium	Length (mm)
A1604.0180	A1604.1180	180

RESTOR Femur FR<sup>c</sup> - CoCr, Left with Pivot Pin & Retaining Ring

A1601.1011

RESTOR Femur FR<sup>c</sup> - CoCr, Right with Pivot Pin & Retaining Ring

A1601.1012

RESTOR Femur TR<sup>d</sup> - Left with Pivot Pin & Retaining Ring, (MP)

SS A1601.1161  
Ti A1601.1171

RESTOR Femur TR<sup>d</sup> - Right with Pivot Pin & Retaining Ring, (MP)

SS A1601.1162  
Ti A1601.1172

RESTOR Tibia FR<sup>c</sup> - SS/Ti

	Regular	Small
SS	A1601.1026	A1601.1027
Ti	A1601.1036	A1601.1037

RESTOR Tibia TR<sup>d</sup> - CoCr

A1601.1121

RESTOR, Straight Intramedullary Stem

	Len. 120mm	Ø (mm)
A1601.0109	9 <sup>a</sup>	
A1601.0110	10	
A1601.0111	11	
A1601.0112	12	
A1601.0113	13	
A1601.0115	15	
A1601.0117	17	

	Len. 120mm	Ø (mm)
A1601.0209	9 <sup>a</sup>	
A1601.0210	10	
A1601.0211	11	
A1601.0212	12	
A1601.0213	13	
A1601.0215	15	
A1601.0217	17	

<sup>a</sup>Not in standard manufacturing program. Available on request. <sup>c</sup>Femoral Resection <sup>d</sup>Tibial Resection

Illustrations not to scale. Specifications subject to change without notice

# RESTOR<sup>®</sup> Instrument Set, Lower Limb

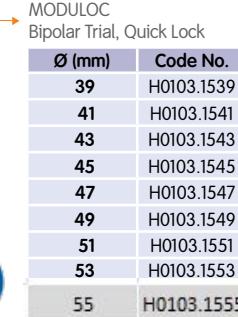
**MODULOC<sup>®</sup> Trial Heads**

Code	NL(mm)
H0105.2120	-2.0
H0105.2200	0.0
H0105.2235	+3.5
H0105.2275	+7.5
H0105.2735	-3.5
H0105.2800	0.0
H0105.2835	+3.5
H0105.2875	+7.5
H0105.2900	+10
H0105.2925	+12.5



**MODULOC Bipolar Trial, Quick Lock**

Ø (mm)	Code No.
39	H0103.1539
41	H0103.1541
43	H0103.1543
45	H0103.1545
47	H0103.1547
49	H0103.1549
51	H0103.1551
53	H0103.1553
55	H0103.1555
57	H0103.1557
59	H0103.1559



**Trial Rasp Adaptor, LEGEND<sup>®</sup>/ENDOFIT<sup>®</sup>**

Code
H0105.3500



**RESTOR Trochanteric Component, Offset, 38mm, Trial**

Neutral	15° Anteversion	
	Left	Right
C1605.1038	C1605.1138	C1605.1238



**RESTOR Resection Coupler, Trial**

Length 180mm	
	C1604.0180



**RESTOR Femur FR<sup>c</sup> Left, Trial**

**RESTOR Femur FR<sup>c</sup> Right, Trial**

C1601.1011
C1601.1012




**RESTOR Tibia FR<sup>c</sup> Trial**

Regular	Small
C1601.1040	
C1601.1041	



**RESTOR HA<sup>d</sup> Collar Stem Spacer, Trial**

**A1601.0140**



**RESTOR Curved, Intramedullary Stem, Trial**

Len. 120 mm	Ø (mm)
C1601.0209	09
C1601.0210	10
C1601.0211	11
C1601.0212	12



**RESTOR Straight, Intramedullary Stem, Trial**

Len. 120 mm	Ø (mm)
C1601.0109	09
C1601.0110	10
C1601.0111	11
C1601.0112	12



**Aluminium Case, 2-Part, 600 X 275 X 95, ADLER<sup>®</sup>**

**D0101.2103**



**Upper Tray, RESTOR Trial Instrument Set**

**D0102.1305**



**Lower Tray, RESTOR Trial Instrument Set**

**D0102.1304**



**RESTOR Pivot Pin, FR<sup>c</sup>, Trial**

**RESTOR Retaining Ring, Trial**

C1601.0810
C1601.0912




**RESTOR Femur TR<sup>d</sup> - Left, Trial, (MP)**

**RESTOR Femur TR<sup>d</sup> - Right, Trial, (MP)**

C1601.0811
C1601.1161
C1601.1162




**RESTOR Tibia TR<sup>d</sup>, Trial**

**C1601.1121**



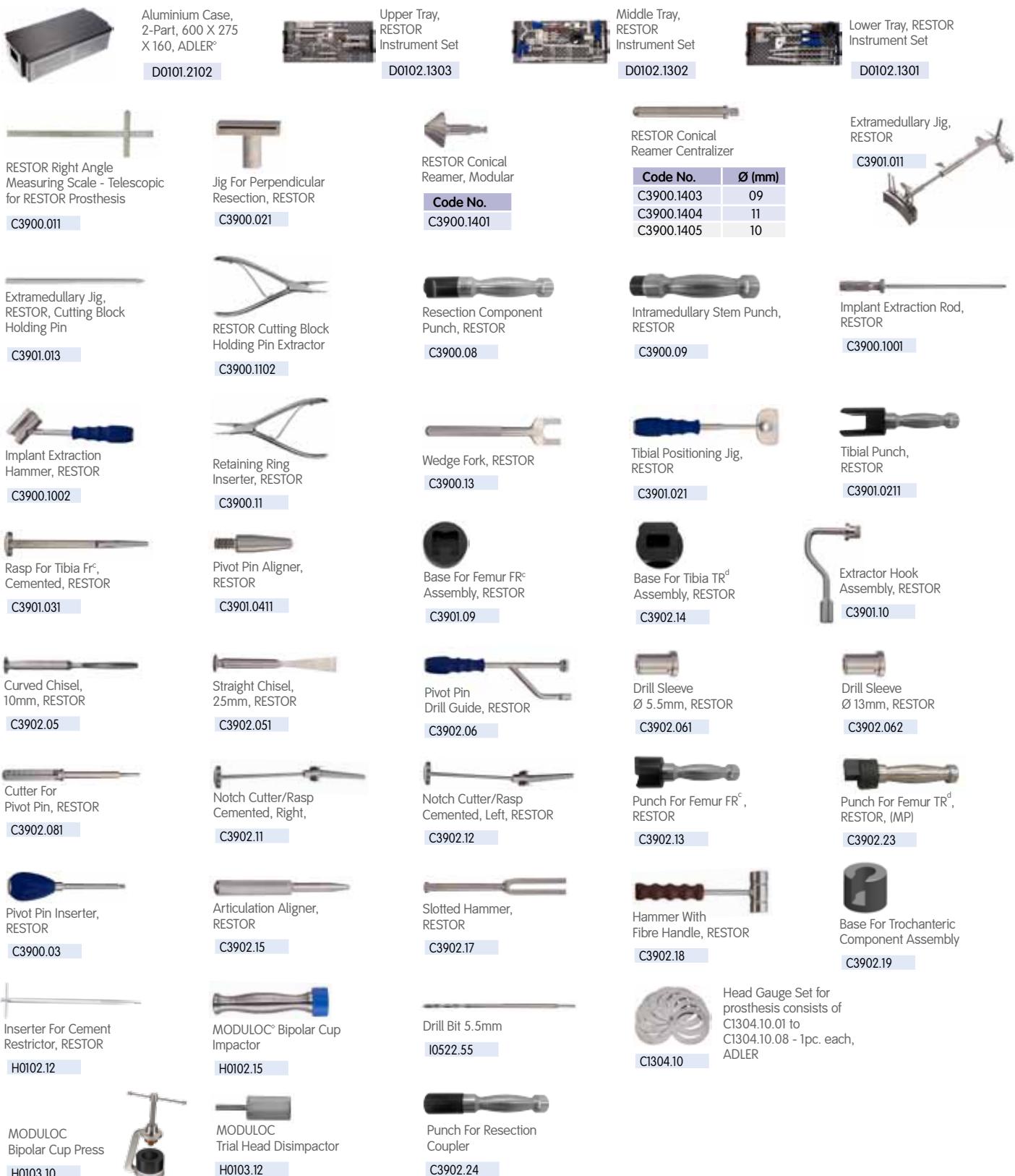
**RESTOR Resection Piece, Trial**

Code No.	Length (mm)
C1601.0304	40
C1601.0305	50
C1601.0306	60
C1601.0307	70
C1601.0308	80
C1601.0309	90
C1601.0310	100
C1601.0311	110
C1601.0312	120
C1601.0313	130
C1601.0314	140
C1601.0315	150
C1601.0316	160
C1601.0317	170
C1601.0318	180
C1601.0319	190
C1601.0320	200
C1601.0321	210
C1601.0322	220

<sup>c</sup>Femoral Resection <sup>d</sup>Tibial Resection

Illustrations not to scale. Specifications subject to change without notice

# RESTOR® Instrument Set, Lower Limb



<sup>c</sup> Femoral Resection   <sup>d</sup> Tibial Resection

<sup>a</sup> Not to be used if the Polyethylene Wedge is supplied pre-assembled with the component

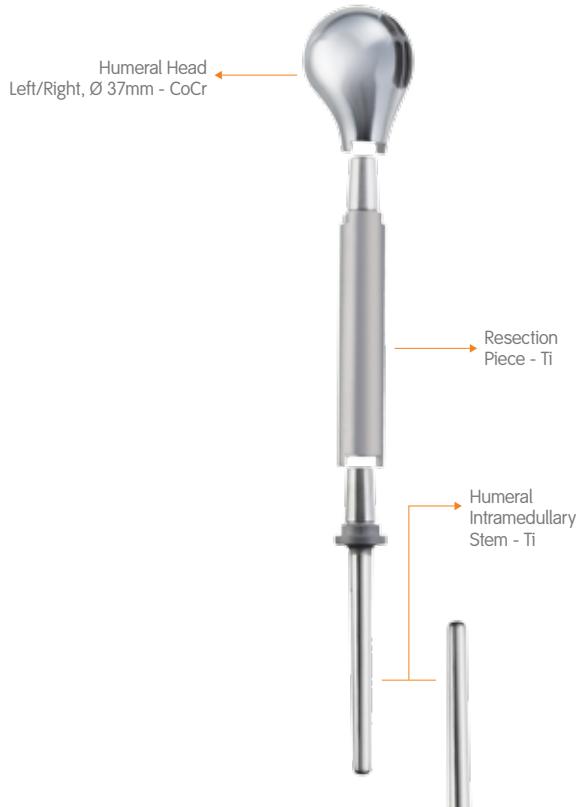
Illustrations not to scale. Specifications subject to change without notice

# Proximal Humerus Resection

Proximal Humerus Resection, Pre-Op\*



Proximal Humerus Resection, Post-Op\*



Component Selection Guide - Proximal Humerus Resection

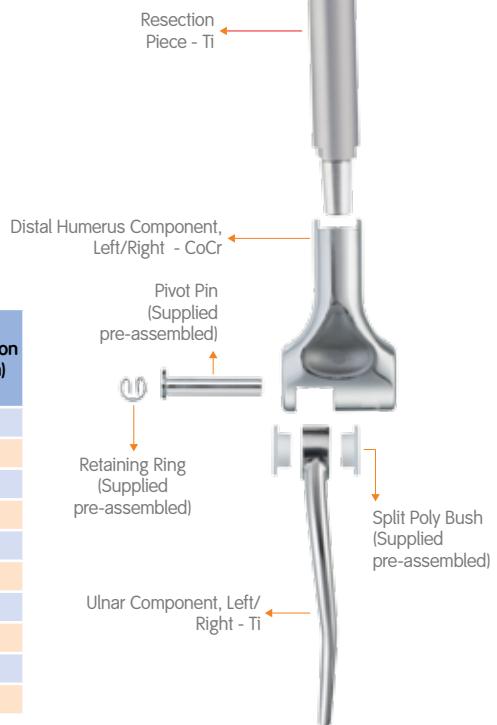
Proximal Humerus Component-CoCr, Length (mm)	Resection Piece - Ti, Length (mm)	Humeral I.M. Stem -Ti, Ø (mm)	Humeral I.M. Stem -Ti, Length (mm)	Total Resection Length (mm)
Humeral Head-Left/Right - 55	Nil	6, 7, 8	80,100	55
	35			90
	45			100
	55			110
	65			120
	75			130
	85			140
	105			160
	125			180
	145			200

# Distal Humerus Resection

Distal Humerus Resection, Pre-Op\*



Distal Humerus Resection, Post-Op\*



Component Selection Guide - Distal Humerus Resection

Distal Humerus Component - CoCr, Length (mm)	Resection Piece - Ti, Length (mm)	Humeral I.M. Stem -Ti, Ø (mm)	Humeral I.M. Stem Length (mm)	Ulnar Component Left/Right - Ti, Ø (mm)	Ulnar Component Left/Right - Ti, Length (mm)	Total Resection Length (mm)
Distal Humerus Component-Left/Right - 65	Nil	6, 7, 8	80,100	4, 5	80	65
	35					100
	45					110
	55					120
	65					130
	75					140
	85					150
	105					170
	125					190
	145					210

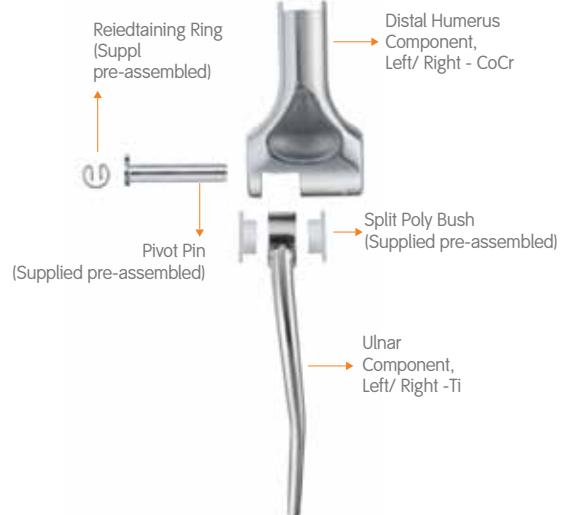
\*All X-rays are courtesy of Tata Memorial Hospital, Mumbai

# Total Humerus Resection

**Total Humerus  
Resection, Pre-Op\***



**Total Humerus  
Resection, Post-Op\***

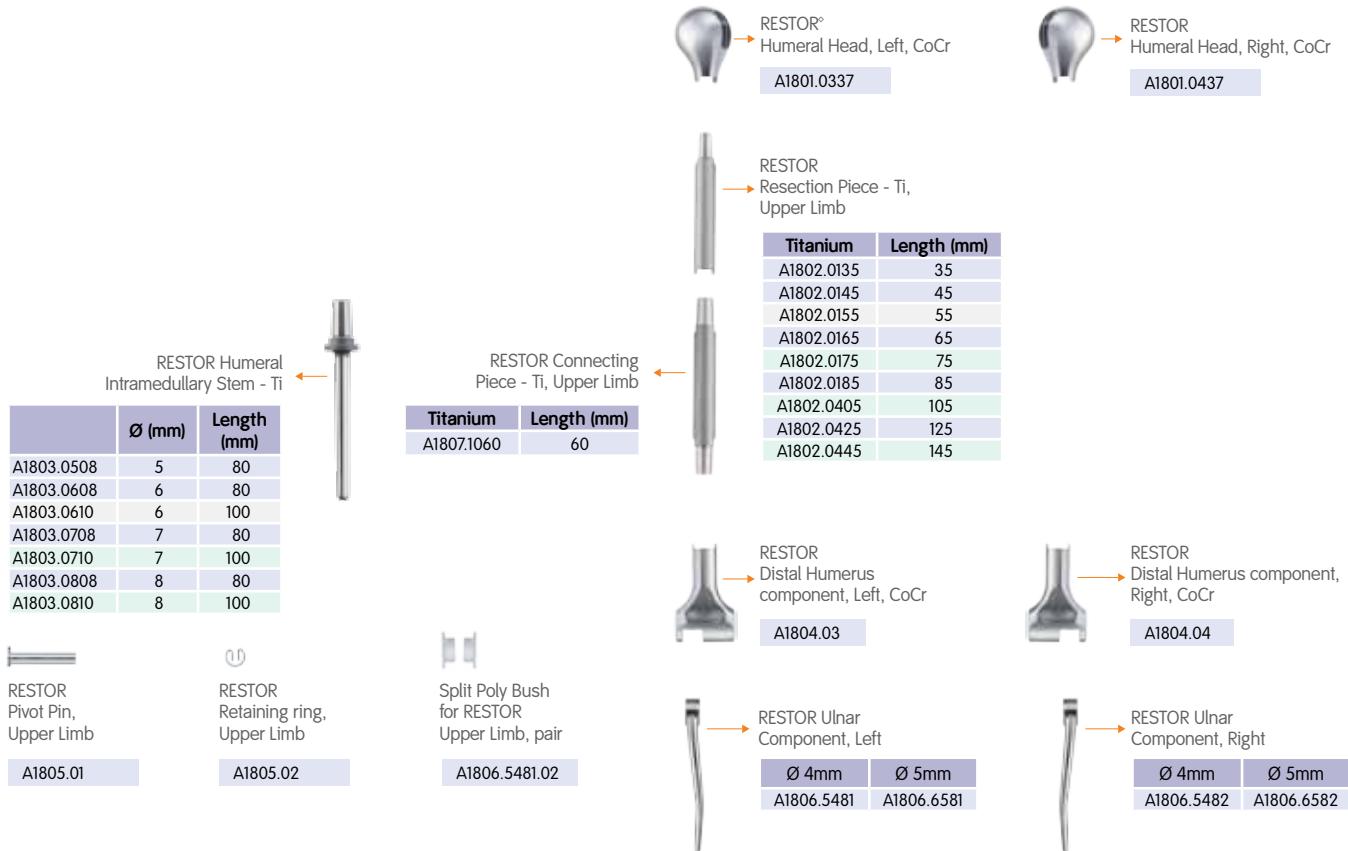


**Component Selection Guide Total Humerus Resection**

Proximal Humerus Component - CoCr, Length (mm)	Resection Piece - Ti, Length (mm)	Connecting Piece - Ti, Length (mm)	Distal Humerus Component - CoCr, Length (mm)	Ulnar Component Left/Right - Ti, Ø (mm)	Ulnar Component Left/Right - Ti, Length (mm)	Total Resection Length (mm)
Humeral Head-Left/Right - 55	Nil	60	Distal Humerus-Left/Right Component - 65	4, 5	80	180
	35					215
	45					225
	55					235
	65					245
	75					255
	85					265
	105					285
	125					305
	145					325

\*All X-rays are courtesy of Tata Memorial Hospital, Mumbai

# Implants Upper Limb



Illustrations not to scale. Specifications subject to change without notice

<sup>a</sup>Not in standard manufacturing program. Available on request. <sup>c</sup>Femoral Resection <sup>d</sup>Tibial Resection

# RESTOR® Instrument Set, Upper Limb



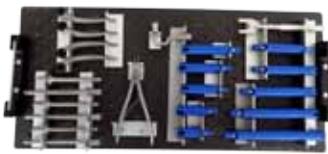
Aluminium Case, 2-Part, 600 X 275 X 95, ADLER®

D0101.2103



Upper Tray, RESTOR Upper Limb Instrument Set

D0102.1801



Lower Tray, RESTOR Upper Limb Instrument Set

D0102.1802



RESTOR Humeral Head Trial

Left	Right
C1801.0137	C1801.0237

RESTOR Resection Piece, Upper Limb, Trial

Code No.	Length (mm)
C1802.0135	35
C1802.0145	45
C1802.0155	55
C1802.0165	65
C1802.0175	75
C1802.0185	85
C1802.0405	105
C1802.0425	125
C1802.0445	145

RESTOR Connecting Piece, Upper Limb, Trial

C1807.1060

RESTOR Distal Humerus Component, Trial

Left	Right
C1804.01	C1804.02

RESTOR Pivot Pin, Upper Limb, Trial

C1805.01



RESTOR Ulnar Component, Trial

Left	Right	Length (mm)
C1806.5481	C1806.5482	4
C1806.6581	C1806.6582	5



RESTOR Humeral I.M Stem, Trial

Code No.	Length (mm)	Ø (mm)
C1803.0608	80	6
C1803.0610	100	6
C1803.0708	80	7
C1803.0710	100	7
C1803.0808	80	8
C1803.0810	100	8



Resection Component Punch, Upper Limb, RESTOR

C3900.0801

Ulnar Component Punch, RESTOR

C3900.1500

Distal Humerus Component Punch, RESTOR

C3900.0903

Humeral I.M Stem Punch, RESTOR

C3900.0901

Connecting Component Punch, Upper Limb, RESTOR

C3900.0802

Humeral Head Punch, RESTOR

C3900.0902

Base for Humeral Head Assembly, RESTOR

C3900.0700

Base for Distal Humerus Component Assembly, RESTOR

C3900.0701

Pivot Pin Inserter, Upper Limb, RESTOR

C3900.0301

Ulnar Rasp, RESTOR

Left	Right
C3902.2045	C3902.2145

IM Stem Extractor, Upper Limb, RESTOR

C3902.2200

Ulnar Component Hook, RESTOR

C3900.1600

Wedge Fork, Upper Limb, RESTOR

C3900.18

Conical Reamer, Modular, Upper Limb, RESTOR

C3900.1901

Conical Reamer Centralizer, 6mm, Upper Limb, RESTOR

C3900.1902

Slotted Hammer, Small, ADLER

C3900.1700



Retaining Ring Inserter, Upper Limb, RESTOR

C3900.1101

Articulation Aligner, Upper Limb, RESTOR

C3901.0412

Manufactured by

**ADLER HEALTHCARE PVT. LTD.**

A-1, MIDC Sadavali, Tal. Sangameshwar,  
Dist. Ratnagiri, PIN 415804, Maharashtra, India  
License number : MFG/MD/2021/000369

To see instructions for use please visit :  
<http://www.adler-healthcare.com>

<sup>®</sup> Trademark owned by Adler Healthcare Pvt. Ltd.