

**OVERFIX<sup>®</sup>**

TRAUMA

SURGICAL TECHNIQUE

# HUMERAL NAIL RAMIC

INTRAMEDULLARY NAIL SYSTEMS



**bioadvance<sup>®</sup>**  
MEDICAL DEVICES

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# RAMIC · HUMERAL NAIL

## INTRAMEDULLARY NAIL SYSTEMS

### Features

Straight nail with central insertion point, to avoid potential insertion through the fracture site, and to reduce the harm on supraspinatus tendon.

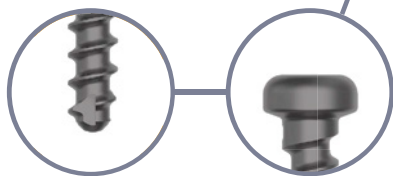


Proximal locking with 4.0mm screw: left and right design to provide stable fixation on Humeral Head . Ascending screw hole to avoid the harm on allxiary nerve and posterior humeral circumflex artery.

Distal locking with 3.5mm screw: Short nail, interlocking design to provide more stability.



Blunt screw tip to reduce harm on soft tissues. Low profile head to minimize the screw exposure .



Three size end cap are available for options.

Long nail, special screw angle to avoid the radial nerve and provide secured locking position.



### Indications

Proximal humeral fractures

Humeral shaft fractures

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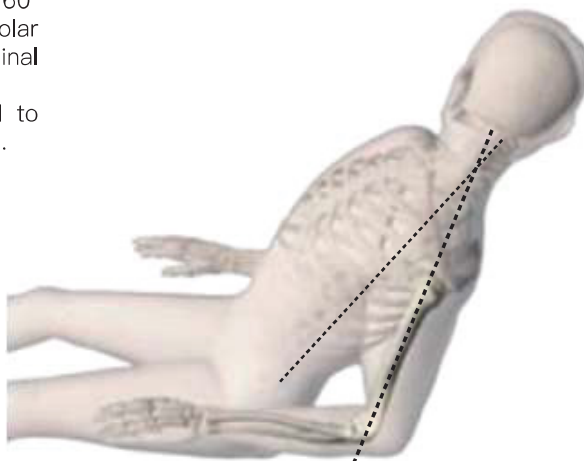
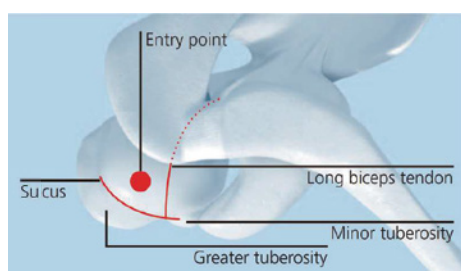
## INTRAMEDULLARY NAIL SYSTEMS

### Surgical Technique

#### 1. Patient Positioning

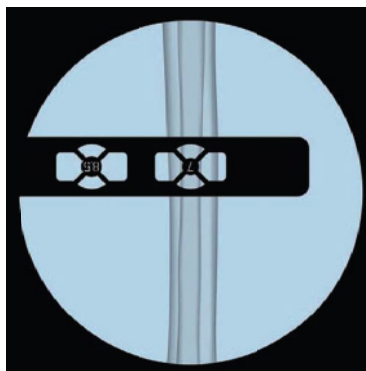
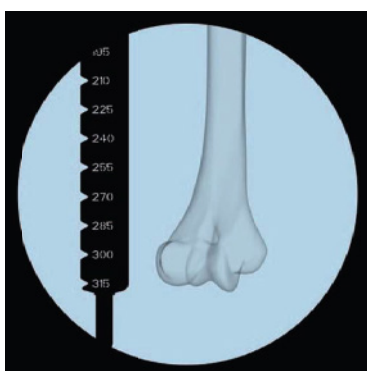
The patient is lying supine with approximately 60° from the horizontal plane. Keep the arm sagging, volar downwards, and forearm parallel to the longitudinal axis of the body.

Ensure that the arm can be sufficiently reclined to expose the humeral head anterior to the acromion.



#### 2. Measure the diameter and length of canal

Place Radiographic Ruler for diameter (13030057) or Radiographic Ruler for length (13030056) in parallel with humerus bone. Get the measurement of diameter and length of canal from AP view under C-arm.



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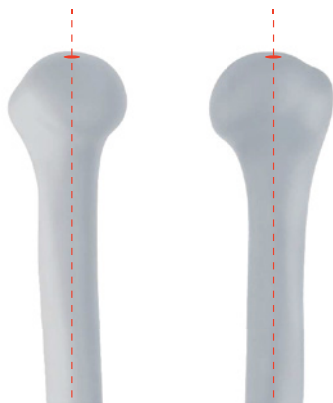
### 3. Make Incision

The incision is made from the lateral end of the acromion and extends 3cm to the lateral deltoid muscle. The deltoid muscle is split to expose the top of the humeral head.



### 4. Determine Entry point

Use Awl (13034010) to make entry point at the top of humerus head.



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### 5. Insert Guide Wire

Attach 2.9 Guide Wire with Stop (13034030) to the power drill. Drill longitudinally until its stop reaches the bone surface.

Guide wire can also be inserted manually by using the Guide Wire Gripper(13034210).



### 6. Open Medullary Canal

Connect Entry Reamer (13034050) with power drill, drill along the guide wire and through the Entry Sleeve (13034040) to its stop.



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### 7.Ream(Optional, apply to humerus nail length≥180mm)

Use Reamer  $\Phi 6.5$  to Reamer  $\Phi 9.0$ , ream in 0.5mm increments manually. Principle: finally ream to a diameter 1.0mm greater than the chosen nail diameter.

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13034220 Reamer  $\Phi 6.5$

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13034230 Reamer  $\phi 7.0$

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13034240 Reamer  $\phi 7.5$

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13034250 Reamer  $\phi 8.0$

---

13034260 Reamer  $\phi 8.5$

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13034270 Reamer  $\phi 9.0$

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### 8.Reduce fracture( Optional, apply to humerus nail length≥180mm )

Insert the Reducer(13034060) into the medullary canal for closed reduction slightly and slowly across the fracture site to the distal humerus canal. Insert the 2.5×650 Ball Tip Guide Wire(13034070) through Reducer. Then remove the Reducer.



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### 9. Ream with cannulated reamer and measure nail length


Flexible cannulated reamer is provided as optional instruments. Ream in 0.5mm increments through guide wire by power tool.

13034321	Flexible Reamer $\phi$ 6.5	
13034322	Flexible Reamer $\phi$ 7.0	
13034323	Flexible Reamer $\phi$ 7.5	
13034324	Flexible Reamer $\phi$ 8.0	option
13034325	Flexible Reamer $\phi$ 8.5	
13034326	Flexible Reamer $\phi$ 9.0	

option 



Ruler for Nail Length(13034390) is provided as optional instrument. After reaming, measure the nail length through guide wire.

13034390	Ruler for Nail Length	option	
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### 10. Insert Nail

Adjustable Handle(13034090) is composed of tube, handle and two knobs. Make groove on the tube in line with Green groove on handle, then tighten the knob. Connect nail to Adjustable Handle(13034090) by tightening the Connecting Rod (13034080) through handle.

Insert the nail through the guide wire using twisting motions. Length 160mm nail can be inserted directly without any guide wire. If insertion is difficult, use Hammer (13034190) to knock slightly the end of Connecting Rod (13034080).

Nail insertion depth reference: after insertion, the top of humerus head should be in flush with distal first circle on the handle.

If over inserted, connect the Extended Rod(13034180) to the end of Connecting Rod (13034080), and knock it little backwards through sliding hammer.





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### 11. Insert Locking Screws( For 160mm length nail )

For 160mm length nail, all the screws ( Hole 1、 2、 4、 5、 6) can be inserted through Lateral Aiming Device(13034100). Hole 3 can be inserted through Proximal Aiming Device (13034110)

#### (A) Insert screws at Hole 1、 2、 4、 5、 6

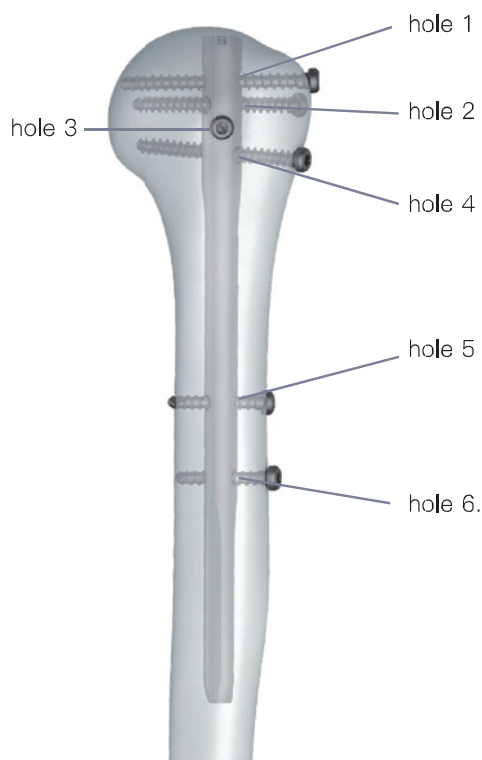
Assemble the Lateral Aiming Device(13034100) to Adjustable Handle. Pay attention to its direction. For example, if use Left nail, the LEFT side of Lateral Aiming Device should be towards laterally.

Put Screw Sleeve (13034120) and Drill Sleeve (13034130) through the aiming holes. Drill with 2.7 Drill Bit (L=252) (130340140). Pay attention not to drill to the cortical of the other side. Remove the Drill Sleeve. Measure the length with Depth Gauge (13034160).

Insert the proper screws with 3.2 Screwdriver (13034170).

Proximal use 4.0mm screws, and distal use 3.5mm screws.

The sequence of screw insertion is : hole 1, hole 2, hole 4, hole 5, hole 6.



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### (B) If needed, Insert screw at Hole 3

If lesser tubercles gets fracture or humerus head gets front-back split, hole 3 should be inserted screws to provide fixation. It should be inserted after implanting the Hole 4 screw.

Remove the Lateral Aiming Device(13034100). Loosen the black knob on the tube of Adjustable Handle(13034090). Turn handle 90° towards anterior, make sure the groove on the tube is in line with Yellow groove on the handle. Then tighten the knob. Assemble the Proximal Aiming Device (13034110). Then insert the Hole 3 screws. The steps are same as above.

After that, remove the Proximal Aiming Device (13034110), turn handle 90° back (groove on tube in line with Green groove on handle).

Assemble the Lateral Aiming Device(13034100) again to insert the distal screw at Hole 5 and 6.



### 12. Insert Locking Screws (For nail length $\geq 180$ mm)

For nail  $\geq 180$ mm length, proximal screws (Hole 1, 2, 4) can be inserted through Lateral Aiming Device(13034100). Hole 3 can be inserted through Proximal Aiming Device (13034110) if necessary. Steps are same as above.

Following is method for inserting distal screws (Hole 5, 6).

Assemble the Extended Arm (13034280) to Adjustable Handle(13034090).

Note: There is marker Face To Anterior on Extended Arm (13034280). This side should be put towards anterior direction.

Assemble Distal Transverse Arm (13034290) to Extended Arm (13034280). Tighten it with Locking Bolt(13034310). According to the chosen nail length, assemble Distal Targeting Device(13034300) to Distal Transverse Arm (13034290). Tighten it with Locking Bolt(13034310).

Insert the screws same step as above shows.

**Note:** If fracture only happens at humeral shaft, then insert the distal screw first, proximal screw secondly.



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## INTRAMEDULLARY NAIL SYSTEMS

### 13. Insert End Cap

Insert End Cap with 3.2 Screwdriver (130341700). The chosen End Cap should be 2–8mm lower than the humerus head surface. Otherwise the protrude End Cap will affect the mobility of humeral joint.



### 14. Remove the implants

Remove the End Cap, proximal screws with 3.2 Screwdriver (130341700). Connect the Extended Rod (13034180) with Connecting Rod (13034080) to the nail. Remove the distal screw. At last, remove the nail by knocking the Hammer backwards.



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## INTRAMEDULLARY NAIL SYSTEMS

### Implants

#### Humeral Nail-Left

Product Code	Diameter	Length
55407016	Φ7	160
55407018	Φ7	180
55407020	Φ7	200
55407022	Φ7	220
55407024	Φ7	240
55407026	Φ7	260
55407028	Φ7	280
55407030	Φ7	300
55408016	Φ8	160
55408018	Φ8	180
55408020	Φ8	200
55408022	Φ8	220
55408024	Φ8	240
55408026	Φ8	260
55408028	Φ8	280
55408030	Φ8	300
55409016	Φ9	160
55409018	Φ9	180
55409020	Φ9	200
55409022	Φ9	220
55409024	Φ9	240
55409026	Φ9	260
55409028	Φ9	280
55409030	Φ9	300

#### Humeral Nail-Right

Product Code	Diameter	Length
55417016	Φ7	160
55417018	Φ7	180
55417020	Φ7	200
55417022	Φ7	220
55417024	Φ7	240
55417026	Φ7	260
55417028	Φ7	280
55417030	Φ7	300
55418016	Φ8	160
55418018	Φ8	180
55418020	Φ8	200
55418022	Φ8	220
55418024	Φ8	240
55418026	Φ8	260
55418028	Φ8	280
55418030	Φ8	300
55419016	Φ9	160
55419018	Φ9	180
55419020	Φ9	200
55419022	Φ9	220
55419024	Φ9	240
55419026	Φ9	260
55419028	Φ9	280
55419030	Φ9	300



#### Humeral Locking Screw - Φ3.5

Product Code	Length
55423518	18
55423520	20
55423522	22
55423524	24
55423526	26
55423528	28
55423530	30
55423532	32
55423534	34
55423536	36
55423538	38
55423540	40
55423542	42
55423544	44
55423546	46
55423548	48
55423550	50
55423552	52
55423554	54
55423556	56
55423558	58
55423560	60



#### Humeral Locking Screw - Φ4.0

Product Code	Length
55424018	18
55424020	20
55424022	22
55424024	24
55424026	26
55424028	28
55424030	30
55424032	32
55424034	34
55424036	36
55424038	38
55424040	40
55424042	42
55424044	44
55424046	46
55424048	48
55424050	50
55424052	52
55424054	54
55424056	56
55424058	58
55424060	60



#### Humeral End Caps

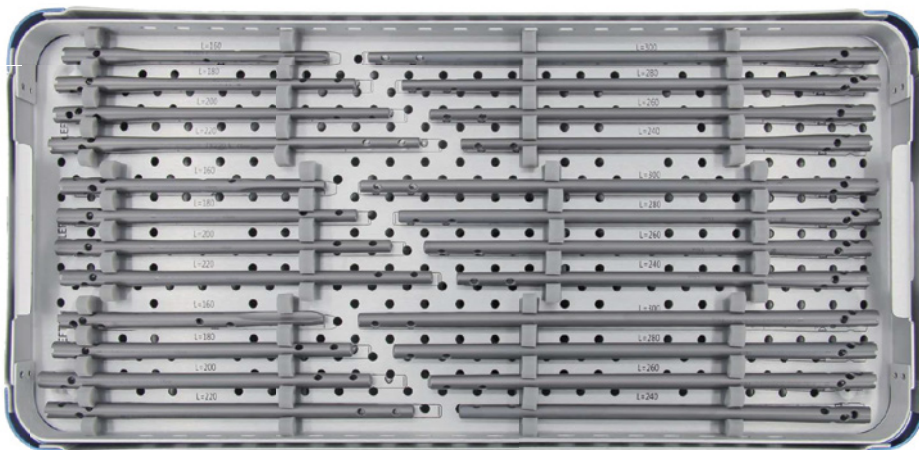
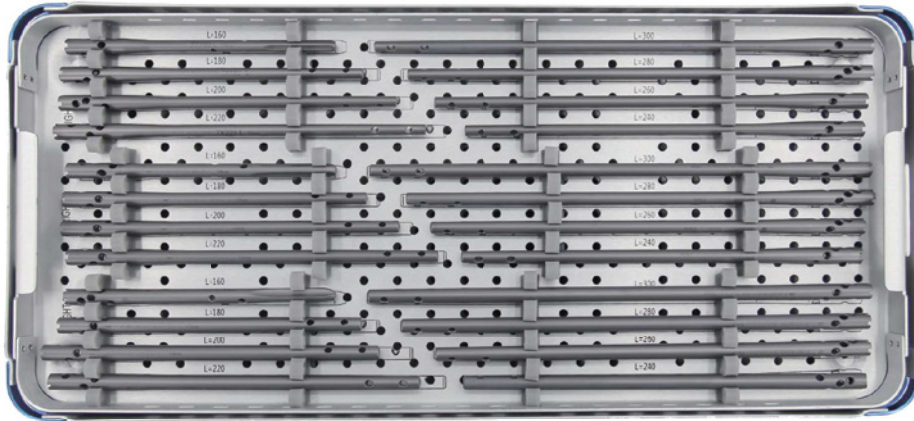
Product Code	Extension
55430000	0
55430002	2
55430004	4



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### Implant placement status















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### Instruments

Product Code	Parts Description	Quantity	Picture
13034010	Awl	1	
13034020	2.9mm Guide Wire	3	
13034030	2.9 Guide Wire with stop	2	
13034040	Entry Sleeve	1	
13034050	Entry Reamer	1	
13034060	Reducer	1	
13034070	2.5x650 Ball Tip Guide Wire	1	
13034080	Connecting Rod	1	
13034090	Adjustable Handle	1	
13034100	Lateral Aiming Device	1	

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Product Code	Parts Description	Quantity	Picture
13034110	Proximal Aiming Device	1	
13034120	Screw Sleeve	2	
13034130	Drill Sleeve	2	
13034140	2.7 Drill Bit(L=252)	1	
13034150	2.7 Drill Bit(L=110)	1	
13034160	Depth Gauge	1	
13034170	3.2 Screwdriver	1	
13034180	Extended Rod	1	
13034190	Hammer	1	
13030048	Combined Wrench	1	
13034210	Guide Wire Gripper	1	
13034280	Extended Arm	1	



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## INTRAMEDULLARY NAIL SYSTEMS

Product Code	Parts Description	Quantity	Picture
13034220	Reamer $\Phi 6.5$	1	
13034230	Reamer $\phi 7.0$	1	
13034240	Reamer $\phi 7.5$	1	
13034250	Reamer $\phi 8.0$	1	
13034260	Reamer $\phi 8.5$	1	
13034270	Reamer $\phi 9.0$	1	
13034290	Distal Transverse Arm	1	
13034310	Locking Bolt	2	
13034300	Distal Targeting Device	1	
13034991	Outer Case	1	
13034992	Screw Box	1	
13034321	Flexible Reamer $\Phi 6.5$	option	
13034322	Flexible Reamer $\phi 7.0$		
13034323	Flexible Reamer $\phi 7.5$		
13034324	Flexible Reamer $\phi 8.0$		
13034325	Flexible Reamer $\phi 8.5$		
13034326	Flexible Reamer $\phi 9.0$		
13034390	Ruler for Nail Length	option	

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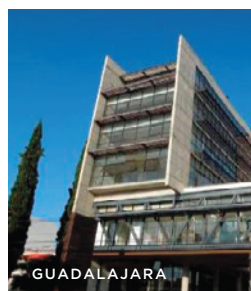
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