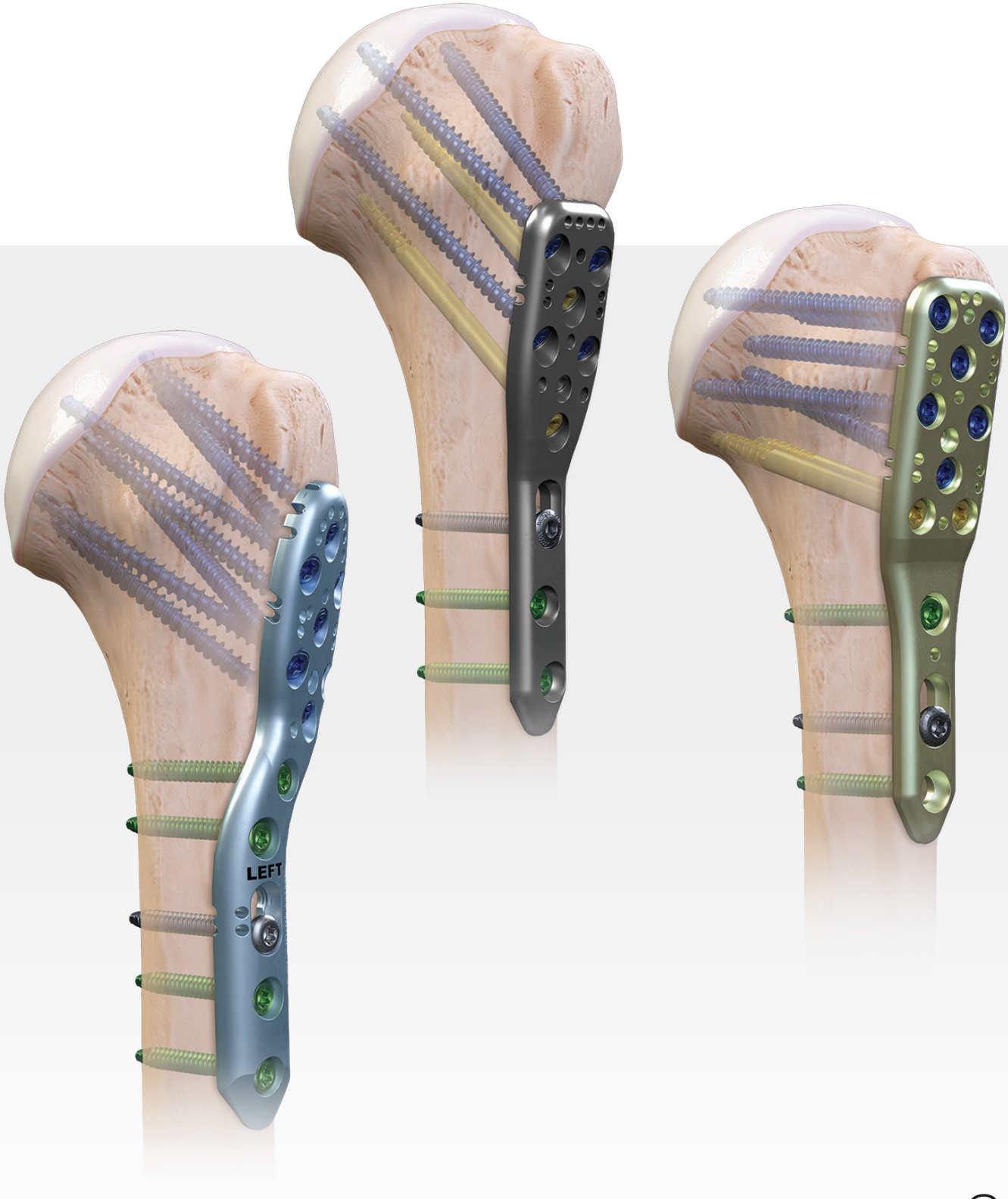
Proximal Humerus Plating System

Surgical Technique



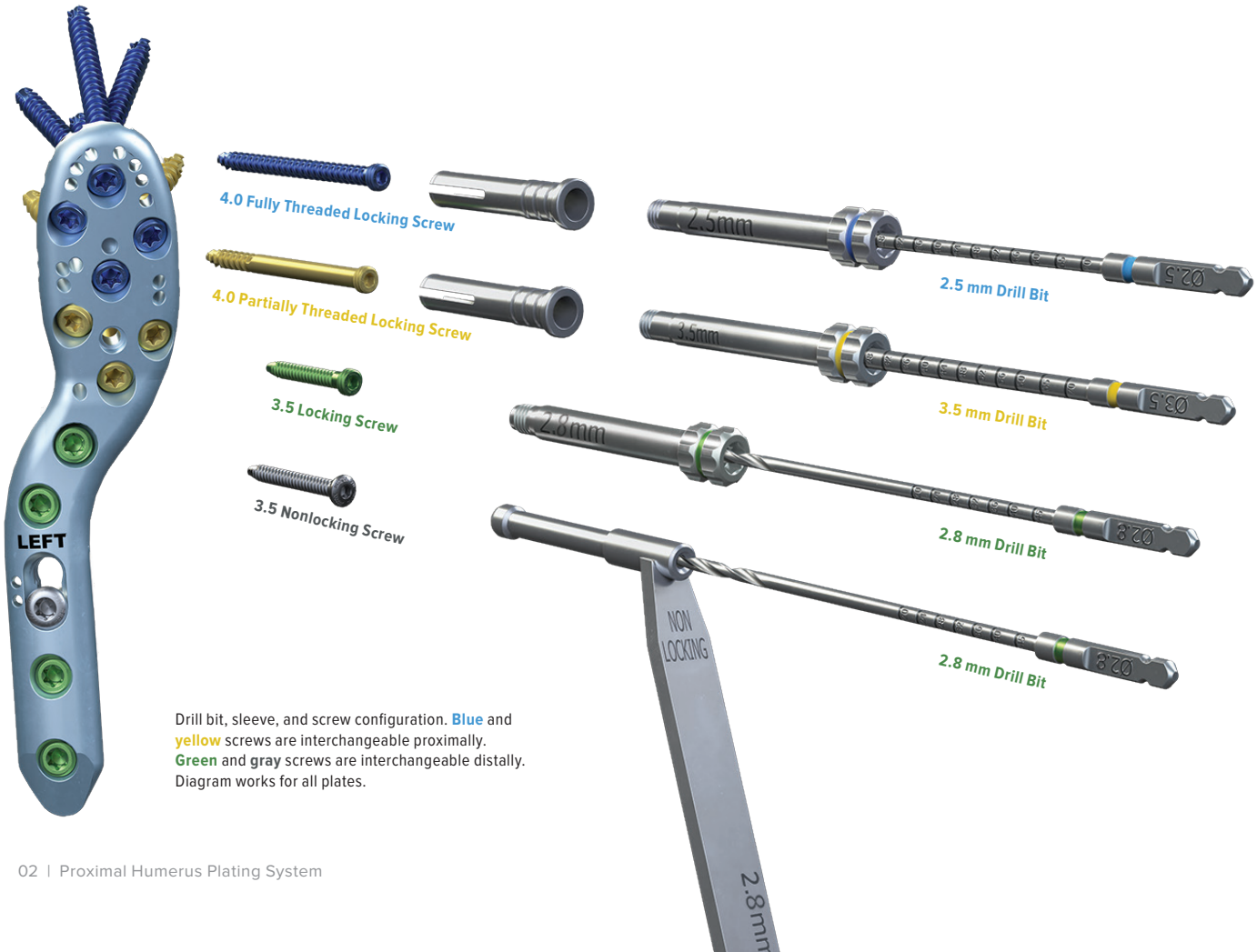
Arthrex®

Arthrex Proximal Humerus Plating System

The Arthrex Proximal Humerus Plating System is intended to treat a variety of fractures of the proximal humerus. The system includes a 95° buttress plate, a 130° proximal humeral plate, and the ALPHA anatomic plate.

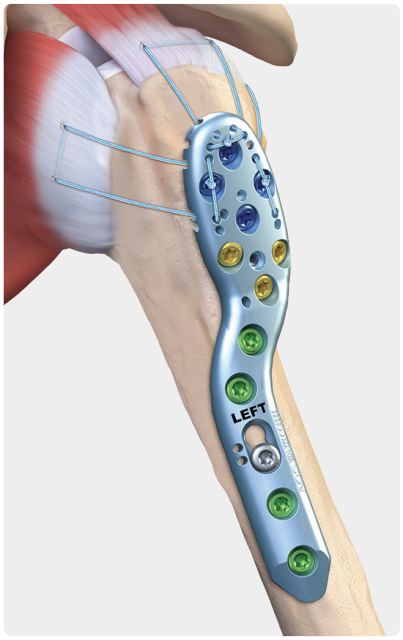
All plates accept 4.0 partial and fully threaded locking screws proximally and 3.5 locking and nonlocking screws in the shaft.

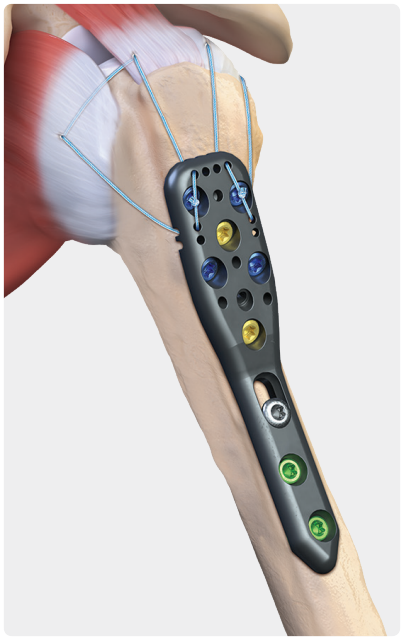
Screw Sleeve + Drill Combination Options



Drill bit, sleeve, and screw configuration. **Blue** and **yellow** screws are interchangeable proximally. **Green** and **gray** screws are interchangeable distally. Diagram works for all plates.

Design Overview





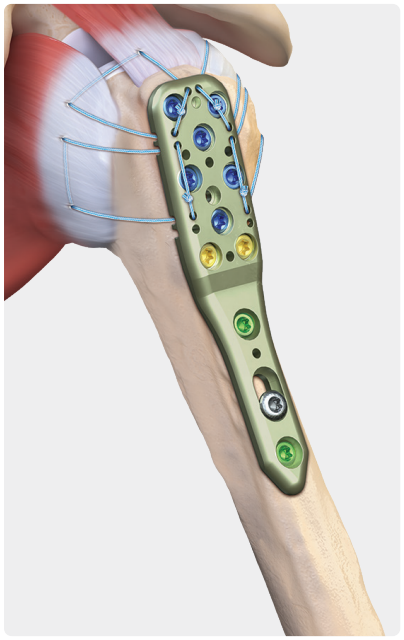
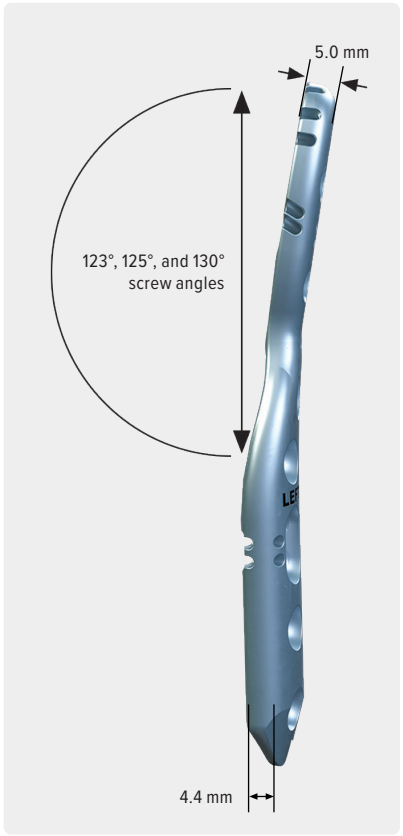
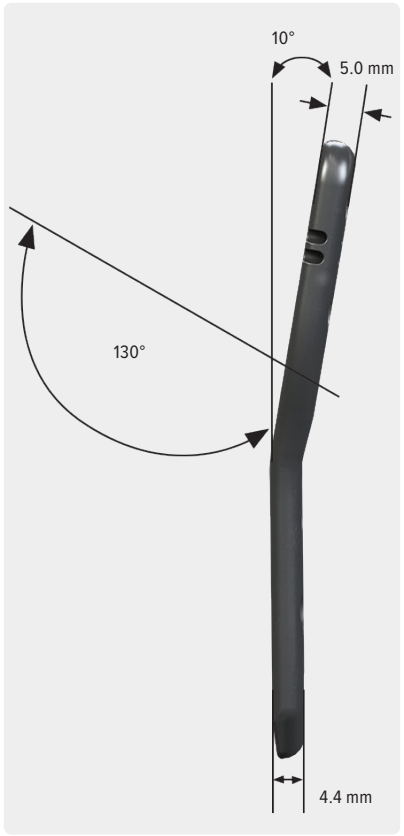


Plate-first suture holes allow plates to be fixated to bone before suture fixation.

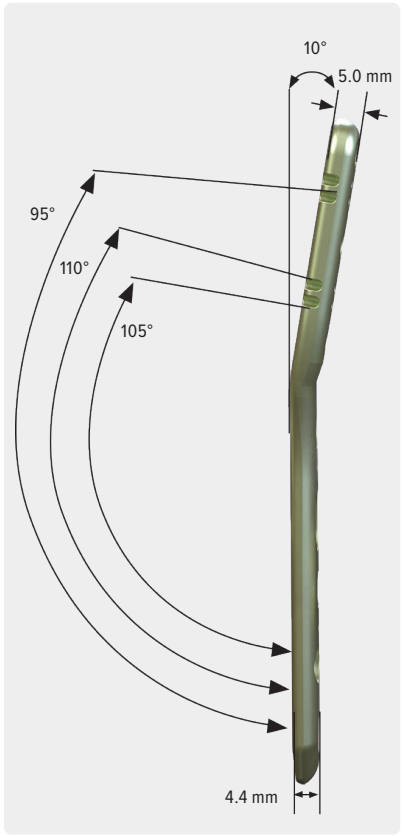
ALPHA Plate



130° Plate



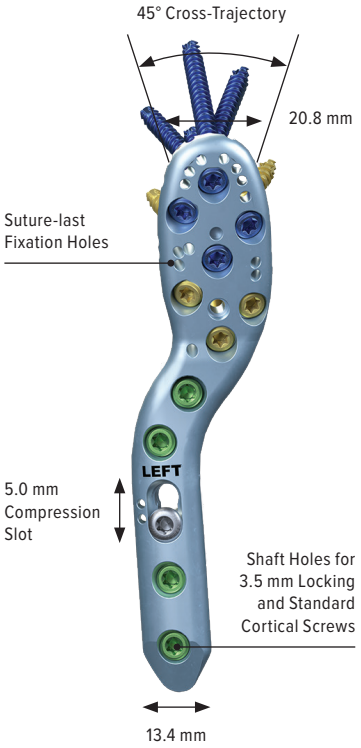
95° Plate



The 95° plate is designed to better buttress fractures involving the greater tuberosity. The 130° proximal humeral plate and ALPHA plate are designed to sit more distal on the proximal humerus to avoid impingement in the subacromial space. Each plate has a proximal thickness of 5.0 mm that tapers down to 4.4 mm in the shaft.

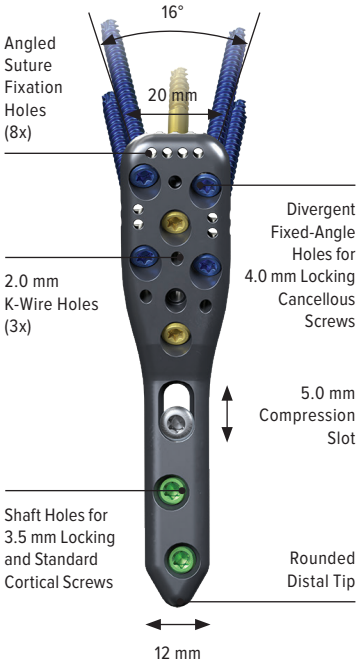
Specifications

ALPHA Plate



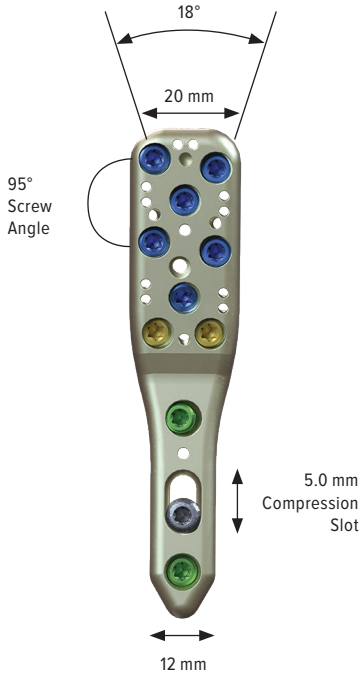
4-hole, 89 mm
5-hole, 102 mm
7-hole, 127 mm
11-hole, 178 mm
14-hole, 216 mm
16-hole, 241 mm
18-hole, 267 mm

130° Plate

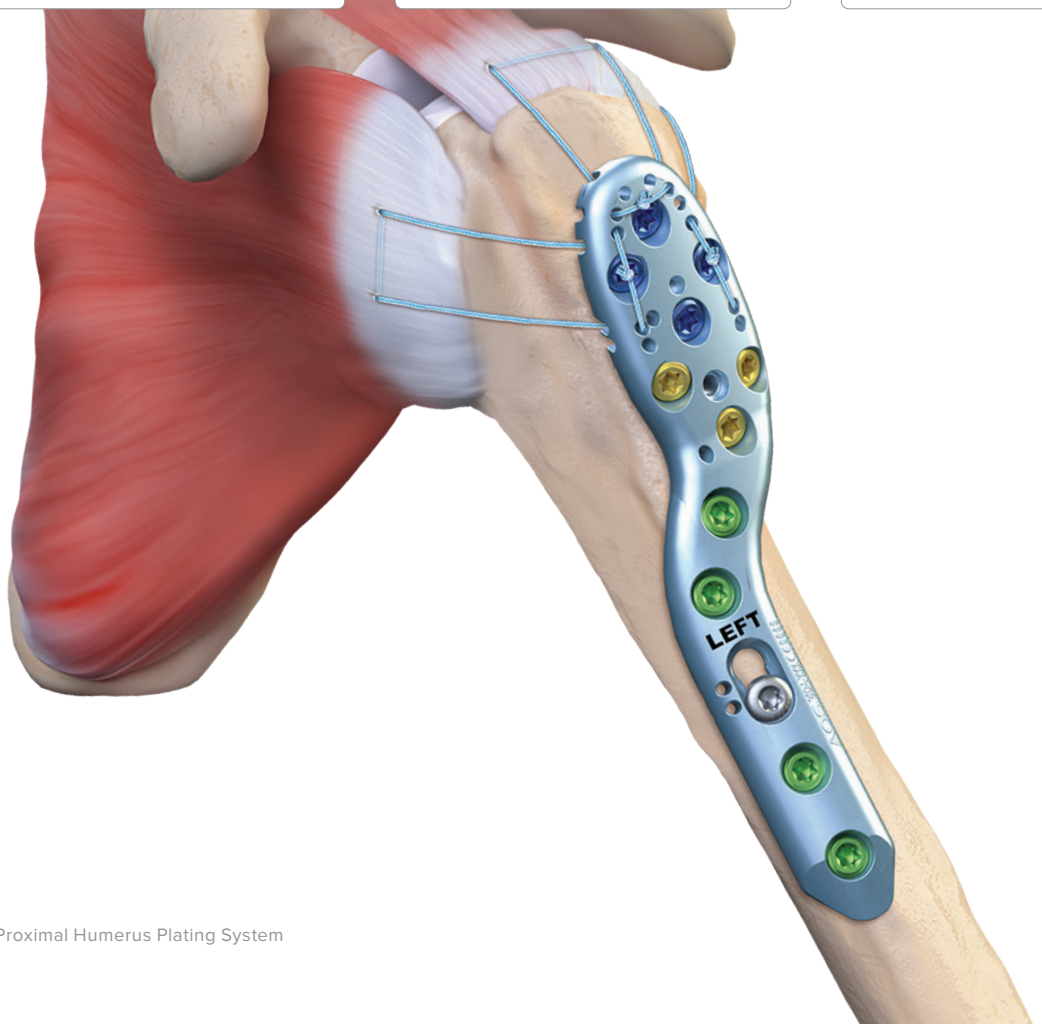


3-hole, 89 mm
5-hole, 114 mm
8-hole, 152 mm
11-hole, 190 mm
14-hole, 229 mm

95° Plate



3-hole, 89 mm
5-hole, 114 mm

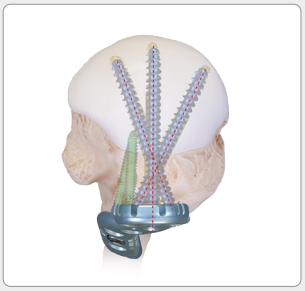


ALPHA Plate

Introduction

The ALPHA plate is a unique side-specific anatomically designed plate to treat fractures of the proximal humerus. The plate features a proximal contour to avoid violating the deltoid insertion. The secondary distal contour allows for easier access to the plate for distal fractures requiring an extended deltopectoral approach.

The dual curvature of the plate creates a near 90° opposition from proximal cluster to anterior shaft, which provides increased torsional stability. A convergent screw pattern in the humeral head allows for longer screws to be placed into the subchondral bone.



Converging screw pattern allows for added pull-out strength and the ability to use longer screws

Suture holes for rotator cuff repair

Choice of 4.0 **partially** or **fully threaded** locking screws

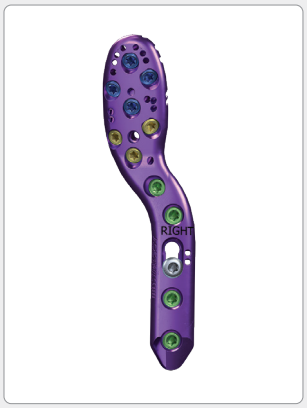
Anterior bend helps plate to avoid deltoid insertion site on lateral face of humerus

Accepts 3.5 locking and nonlocking screws in shaft

Oblong hole allows up to 5.0 mm of compression and can accept locking screws at either end

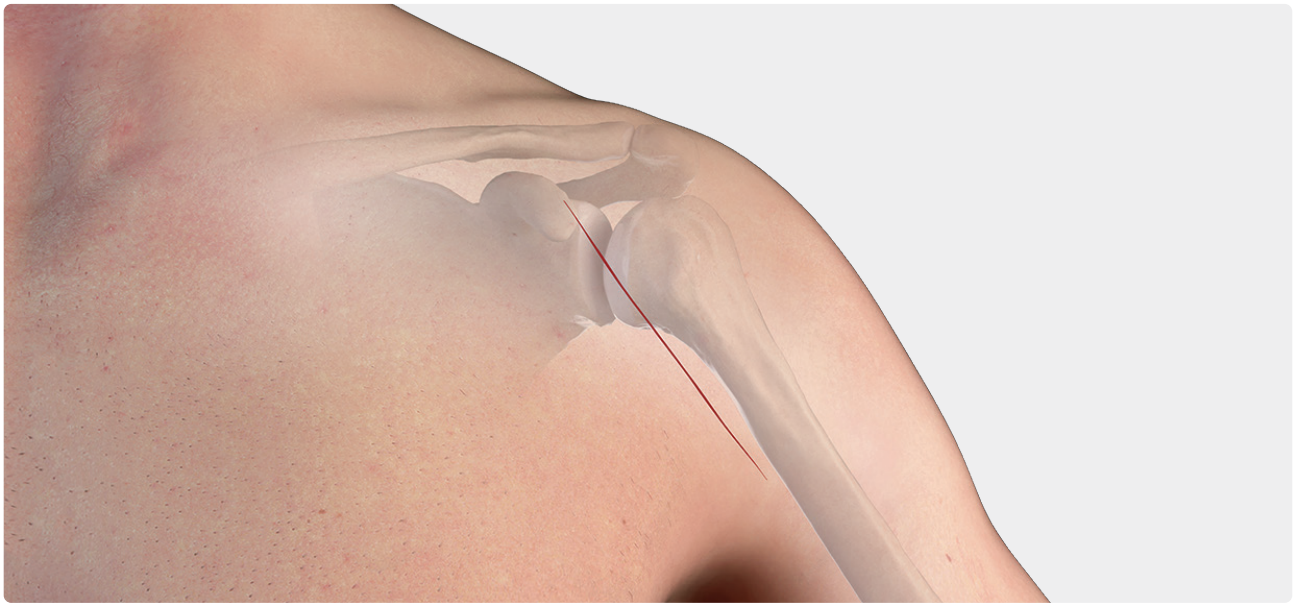
Longer plates have a second bend to aid in fixation of fractures with more distal extension

4-hole, 89 mm
5-hole, 102 mm
7-hole, 127 mm
11-hole, 178 mm
14-hole, 216 mm
16-hole, 241 mm
18-hole, 267 mm



Right side plate color

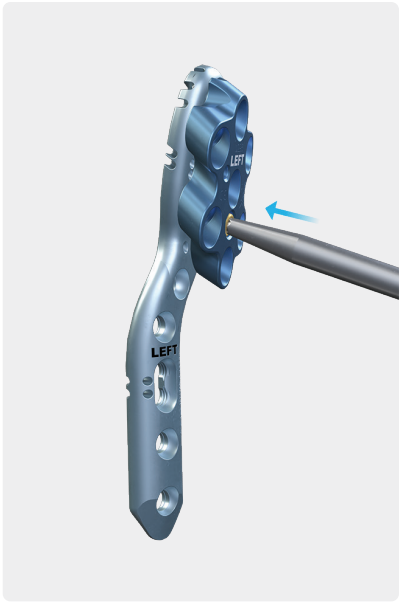
Surgical Technique



1

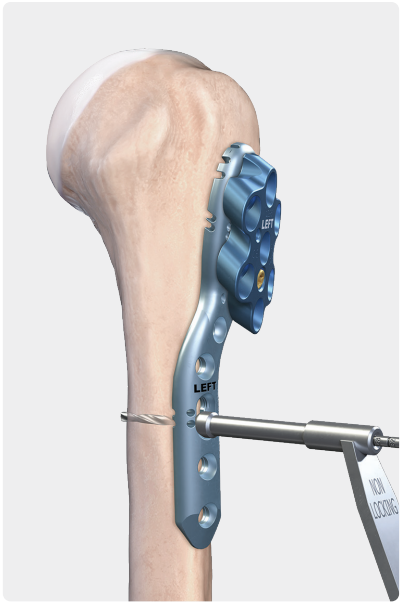
Obtain exposure and dissection using a deltopectoral approach.

> **Note:** The ALPHA plate is designed to sit centered on the lateral aspect of the greater tuberosity 1.0 cm to 1.5 cm distal to the rotator cuff attachment point.



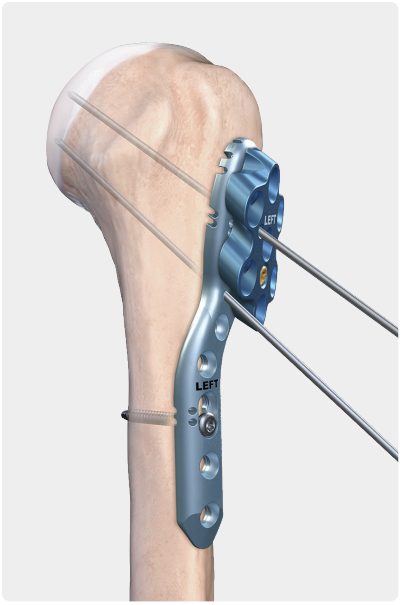
2a

Initially, use the T15 screwdriver (0432) and handle (5026) to secure the alignment guide (1296(L)/1297(R)) to the plate.



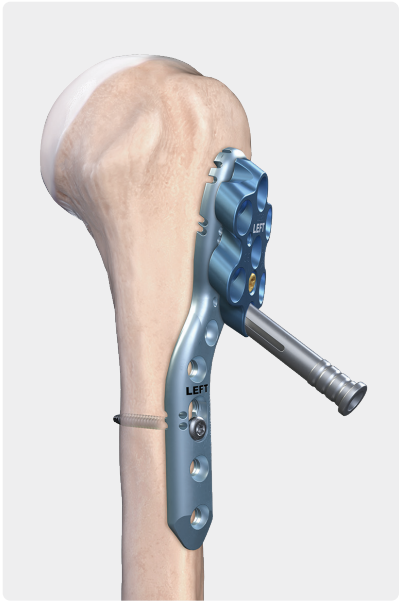
2b

Using the 2.8 mm multiple drill guide (0318) and 2.8 mm calibrated drill bit (0237), drill both cortices of the oblong hole in the shaft of the plate. Use the calibrated drill bit or sliding depth gauge to determine appropriate screw length and insert a 3.5 mm cortical screw.

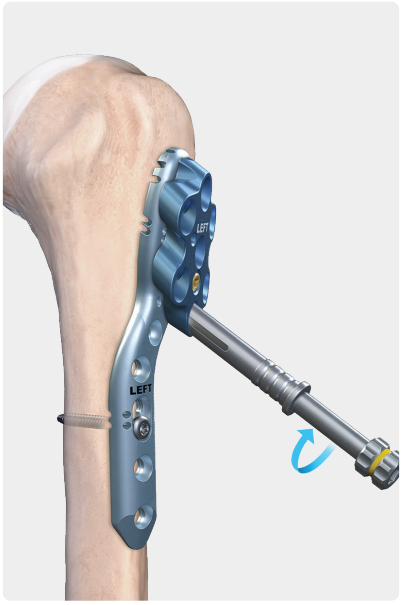


2c

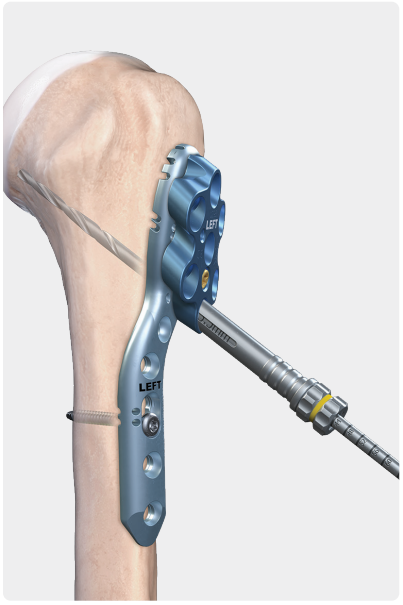
Next, confirm appropriate plate positioning by placing a guidewire through the anterior distal hole in the ALPHA plate. The distal K-wire should lie along the inferior calcar of the humeral head. A second K-wire can be placed to further stabilize the proximal portion of the plate.



3a



3b

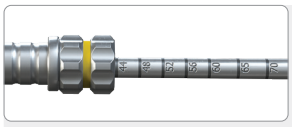


3c

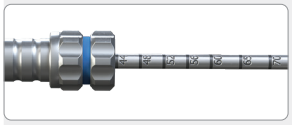
Insert the screw sheath (0316) into the desired hole of the alignment guide. If using the 4.0 mm partially threaded screws, insert the yellow 3.5 mm drill guide into the screw sheath and drill with the yellow 3.5 mm/2.5 mm calibrated drill.

If using the 4.0 mm fully threaded screws, insert the blue 2.5 mm drill guide into the screw sheath and drill with the blue 2.5 mm calibrated drill.

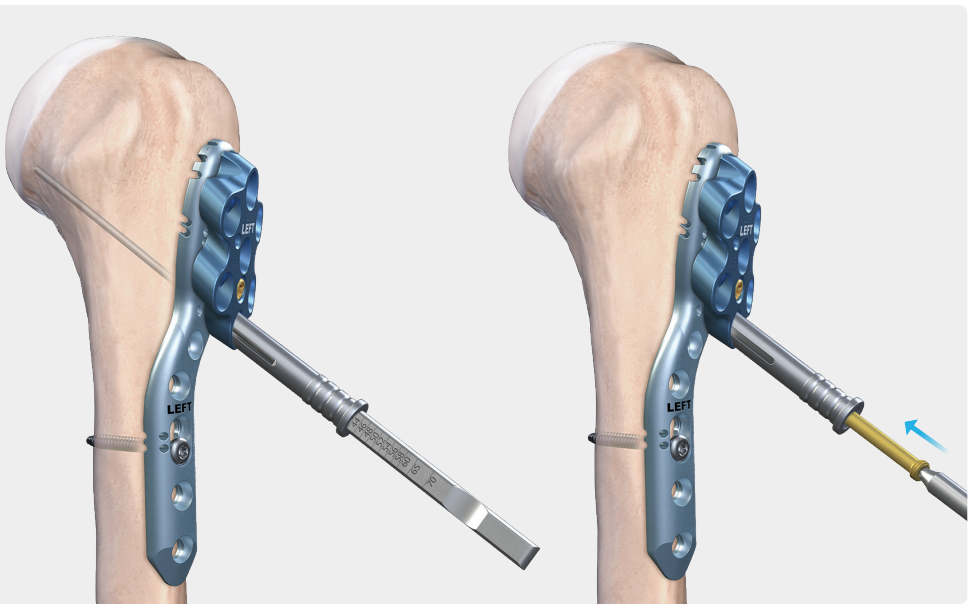
> **Note:** It is imperative that the drill does not penetrate the far cortex.



2.5 mm/3.5 mm step drill



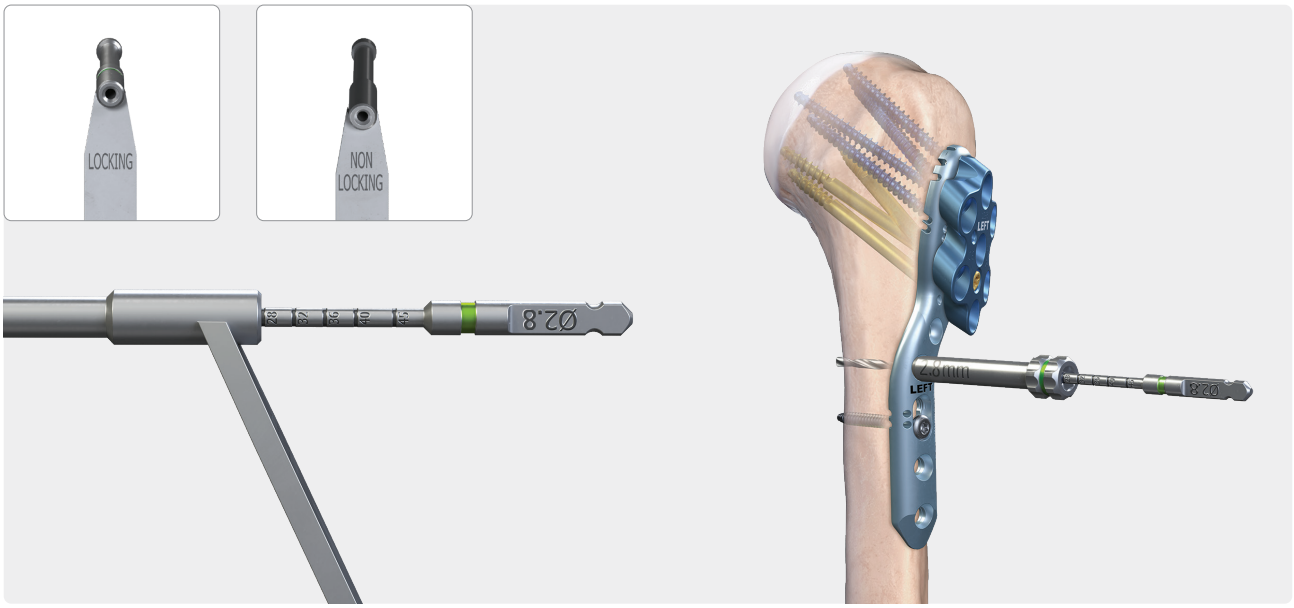
2.5 mm drill



4

Calibrations on both the yellow- and blue-striped drill bits will reflect the length of screw needed. Alternatively, surgeons can also confirm the appropriate screw length by removing the drill guide from the screw sheath and inserting the depth probe.

Insert the desired screw using the T15 driver. Repeat the previous steps for the remaining proximal locking screws and confirm appropriate fixation and reduction using fluoroscopy.



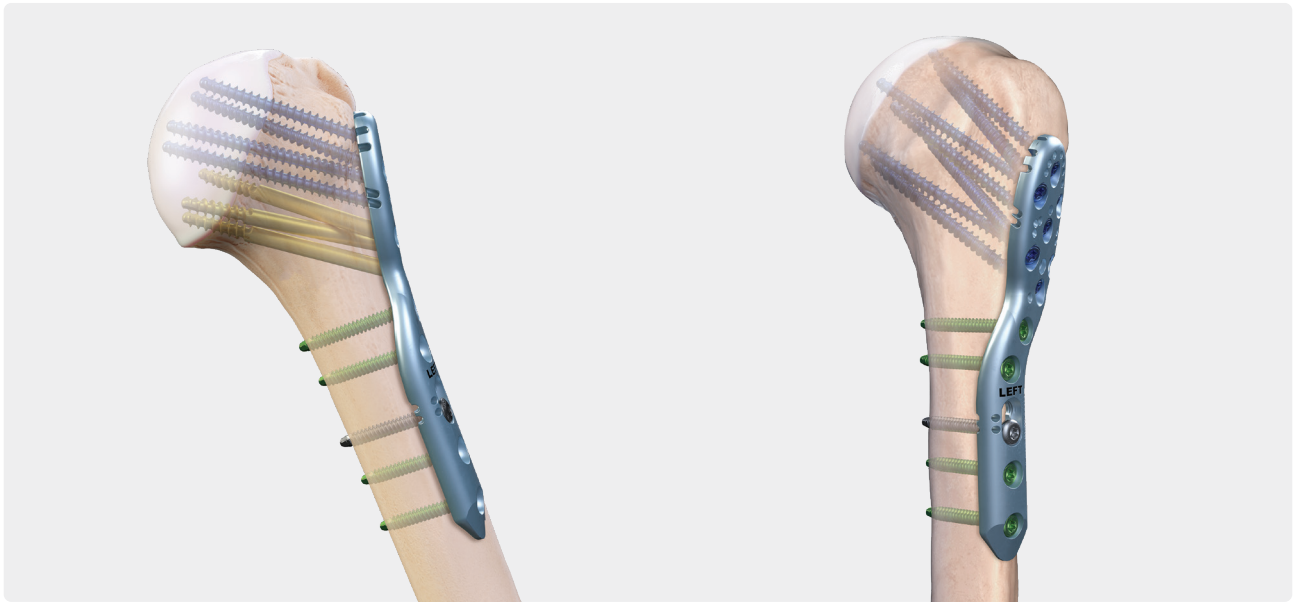
5

Technique for distal fixation in the shaft

Option 1: Drill bicortically using the 2.8 mm drill guide and 2.8 mm drill. Ensure the correct side of the drill guide is used for locking or nonlocking screw placement.

Option 2: Drill bicortically using the 2.8 mm locking drill guide and 2.8 mm drill. The appropriate length screw can be determined using the calibrations on the drill guide.

Alternatively, the sliding hook depth gauge may also be used to determine depth. Use the T15 driver for locking and nonlocking screw insertion.



6

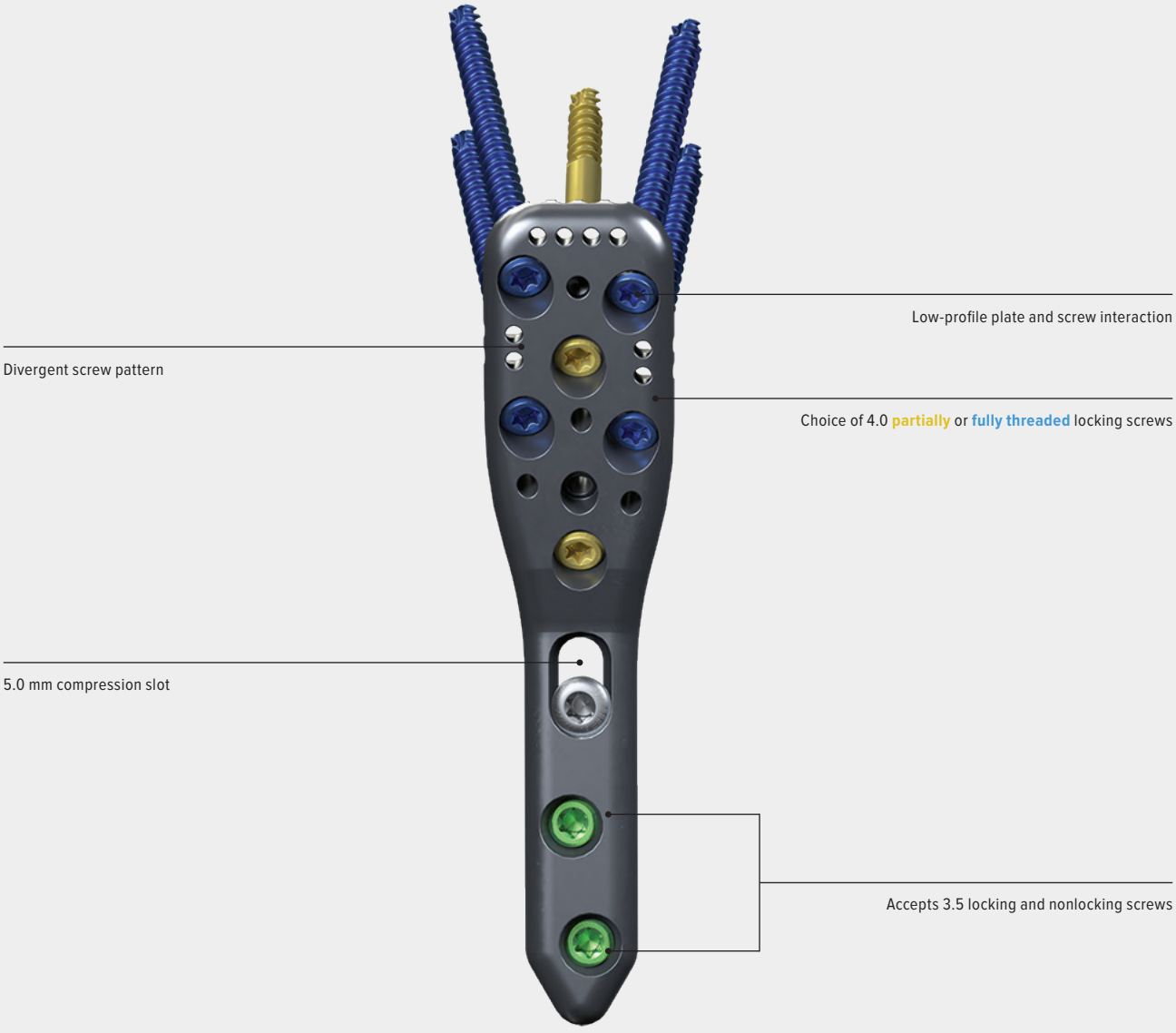
Final construct confirming appropriate fixation and screw lengths both proximally and distally.

Proximal Humeral Plate

Introduction

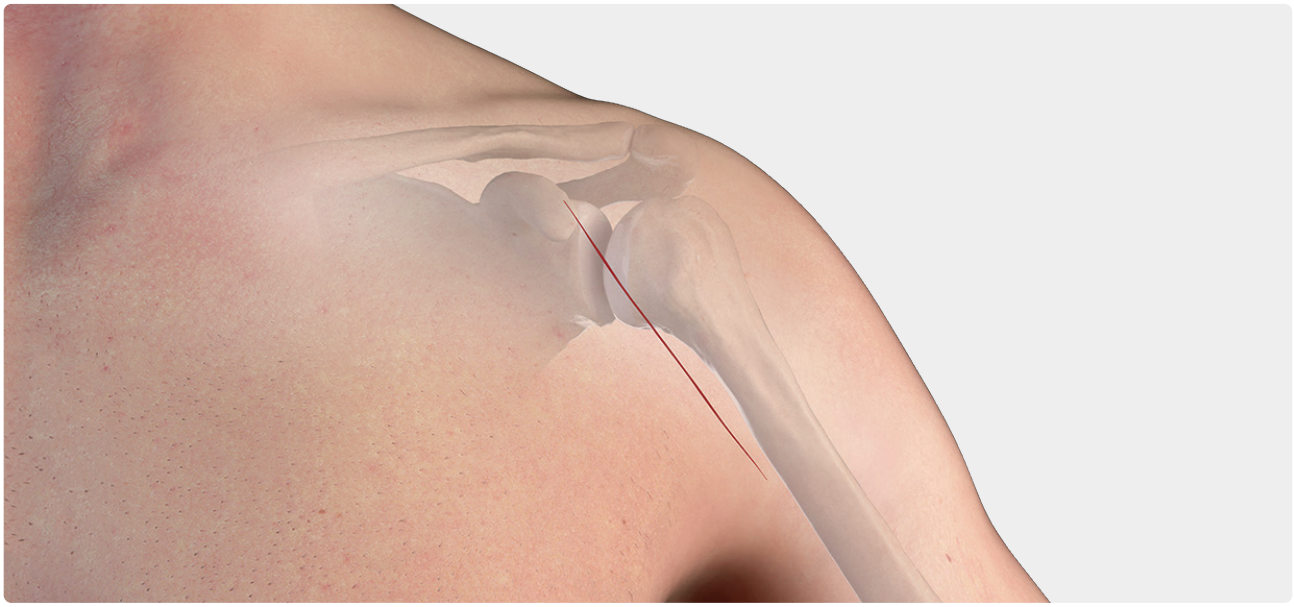
The 130° proximal humerus plate is designed to be used as a limited-contact option for fixation of proximal humeral fractures. The plate has a divergent proximal screw cluster for optimal articular reconstruction.

All screw holes proximally can accept 4.0 partially and fully threaded locking screws with the option to use 3.5 locking and nonlocking screws in the shaft.



3-hole, 89 mm
5-hole, 114 mm
8-hole, 152 mm
11-hole, 190 mm
14-hole, 229 mm

Surgical Technique



1

Obtain exposure and dissection using a deltopectoral approach.

> **Note:** The PHP plate should be positioned against the lateral aspect of the greater tuberosity and situated 1.5 cm to 2.0 cm distal to the rotator cuff attachment site.

2a

Initially, use the T15 screwdriver (0432) and handle (5026) to secure the alignment guide 1250-200 to the plate.

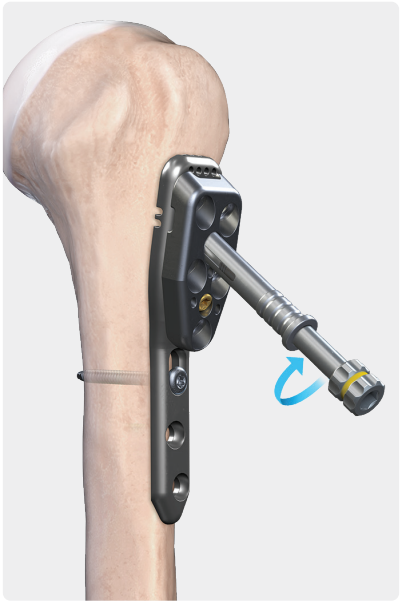
2b

Using the 2.8 mm multiple drill guide (0318) and 2.8 mm calibrated drill bit (0237), drill both cortices of the oblong hole in the shaft of the plate. Use the calibrated drill bit or sliding depth gauge to determine appropriate screw length and insert a 3.5 mm cortical screw.

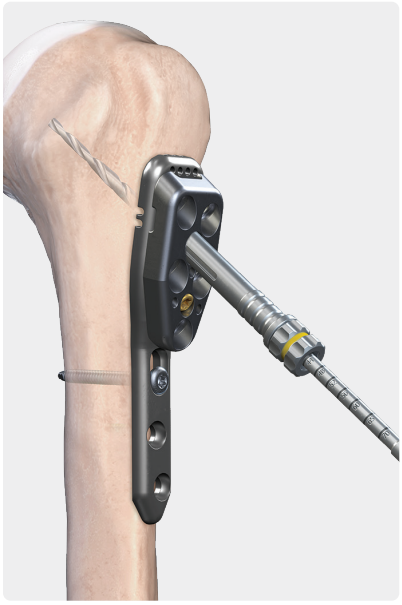
2c

Next, confirm appropriate plate positioning by placing a guidewire through the K-wire holes in the plate. The distal K-wire should lie along the humeral calcar. The screw will be slightly more inferior. A second K-wire can be placed to further stabilize the proximal portion of the plate.

3a



3b

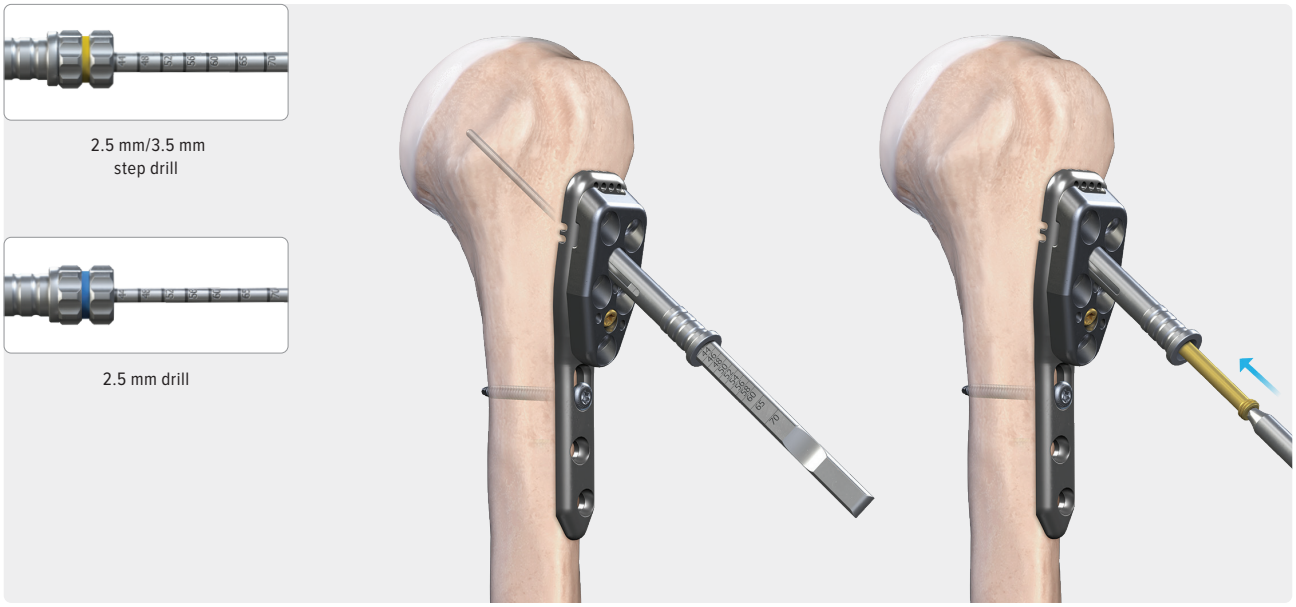


3c

Insert the screw sheath (0316) into the desired hole of the alignment guide. If using the 4.0 mm partially threaded screws, insert the yellow 3.5 mm drill guide into the screw sheath and drill with the yellow 3.5 mm/2.5 mm calibrated drill.

If using the 4.0 mm fully threaded screws, insert the blue 2.5 mm drill guide into the screw sheath and drill with the blue 2.5 mm calibrated drill.

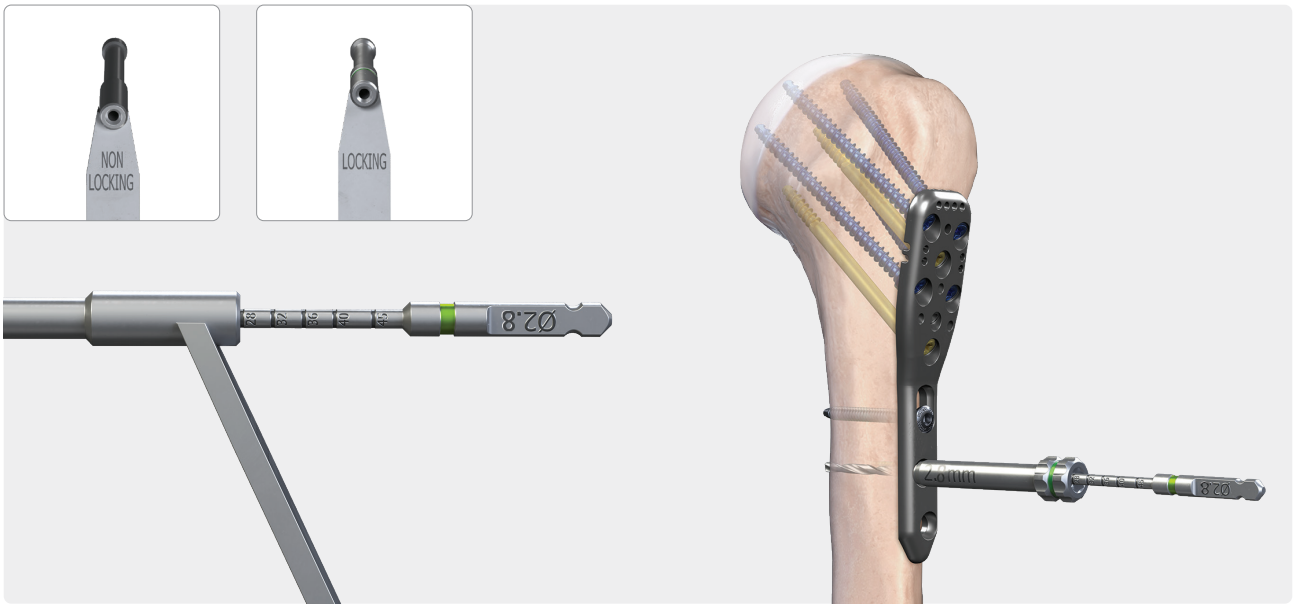
> **Note:** It is imperative that the drill does not penetrate the far cortex.



4

Calibrations on both the yellow- and blue-striped drill bits will reflect the length of screw needed. Alternatively, surgeons can also confirm the appropriate screw length by removing the drill guide from the screw sheath and inserting the depth probe.

Insert the desired screw using the T15 driver. Repeat the previous steps for the remaining proximal locking screws and confirm appropriate fixation and reduction using fluoroscopy.



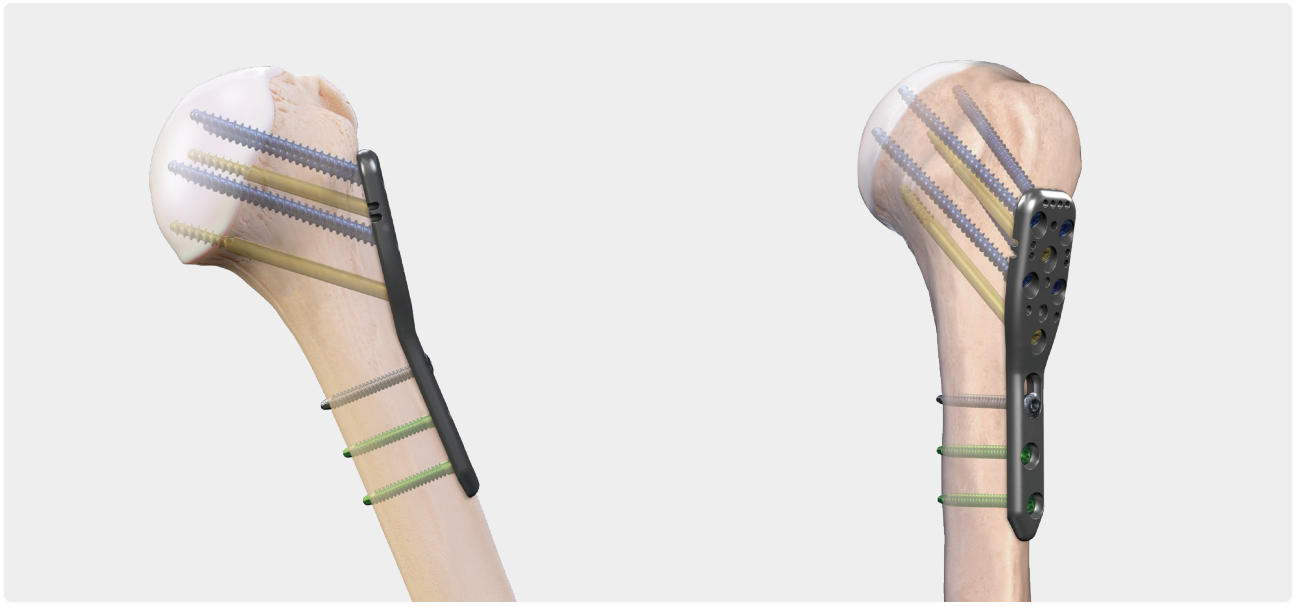
5

Technique for distal fixation in the shaft

Option 1: Drill bicortically using the 2.8 mm drill guide and 2.8 mm drill. Ensure the correct side of the drill guide is used for locking or nonlocking screw placement.

Option 2: Drill bicortically using the 2.8 mm locking drill guide and 2.8 mm drill. The appropriate length screw can be determined using the calibrations on the drill guide.

Alternatively, the sliding hook depth gauge may also be used to determine depth. Use the T15 driver for locking and nonlocking screw insertion.



6

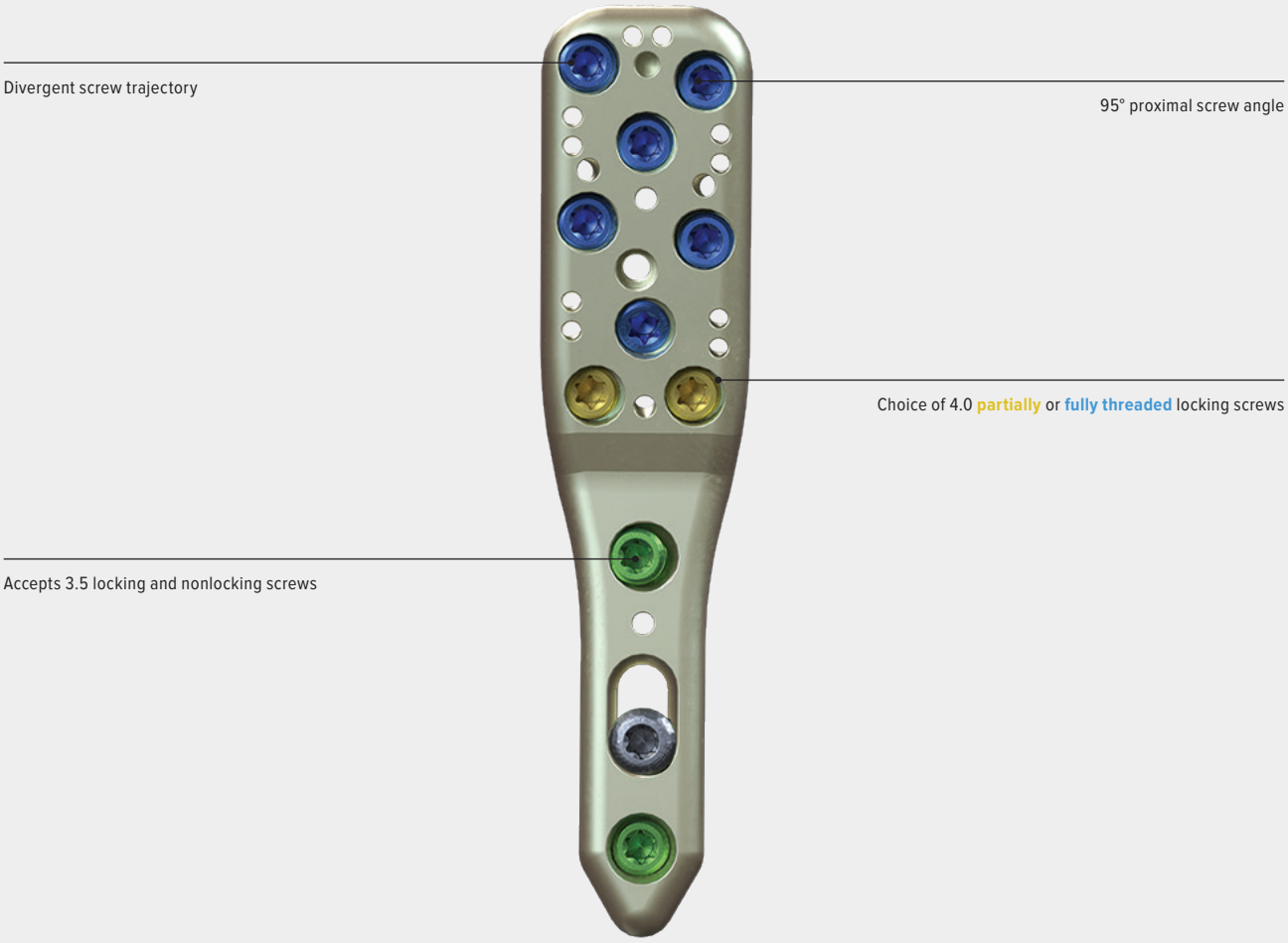
Final construct confirming appropriate fixation and screw lengths both proximally and distally.

95° Plate

Introduction

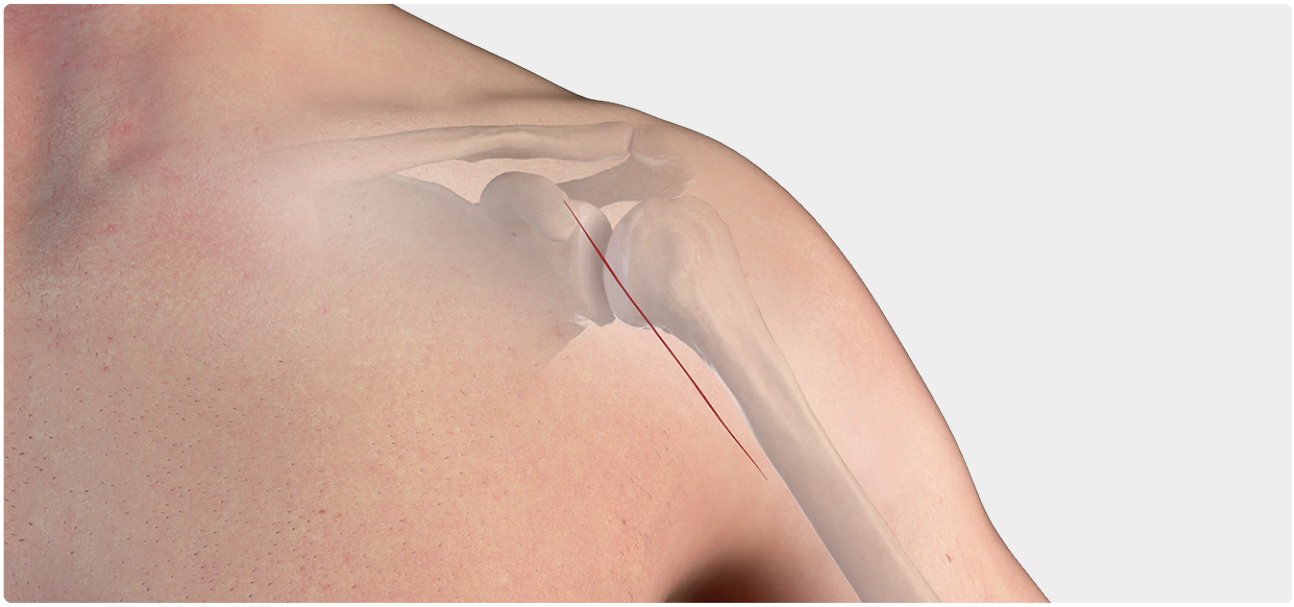
The 95° proximal humerus plate is designed to buttress tuberosity fractures. The divergent screw pattern proximally allows for the placement for 4.0 partially or fully threaded locking screws.

The shaft holes of the plate accept both 3.5 locking and nonlocking cortical screws to allow compression and stabilization of the plate to bone. The 95° plate comes in 3- and 5-hole options and is not side-specific.



3-hole, 89 mm
5-hole, 114 mm

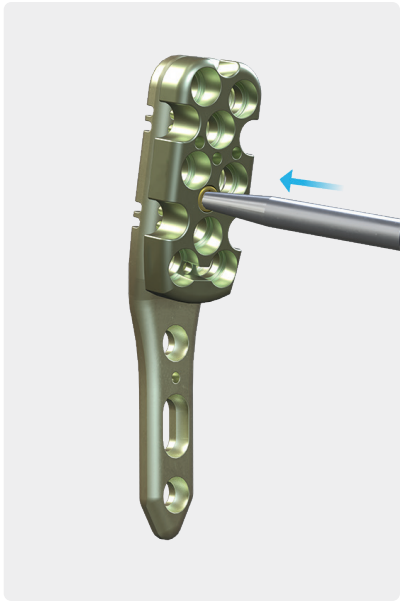
Surgical Technique



1

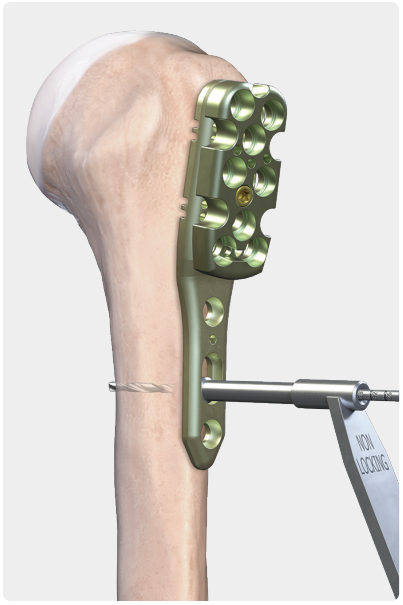
Obtain exposure and dissection using either a deltopectoral or deltoid split approach.

> **Note:** The 95° plate is designed to be placed 0.5 cm to 1.0 cm distal to the rotator cuff attachment point centered against the greater tuberosity.



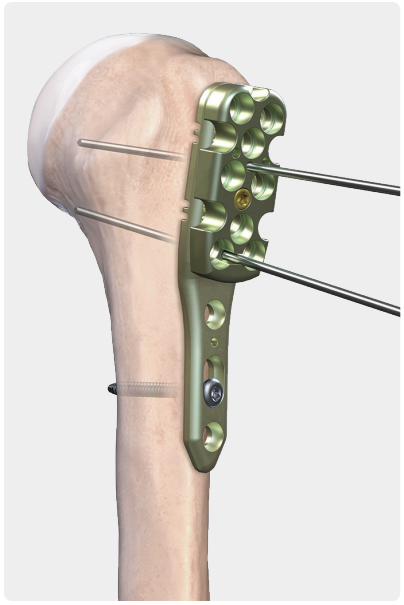
2a

Initially, use the T15 screwdriver (0432) and handle (5026) to secure the alignment guide 1288-000 to the plate.



2b

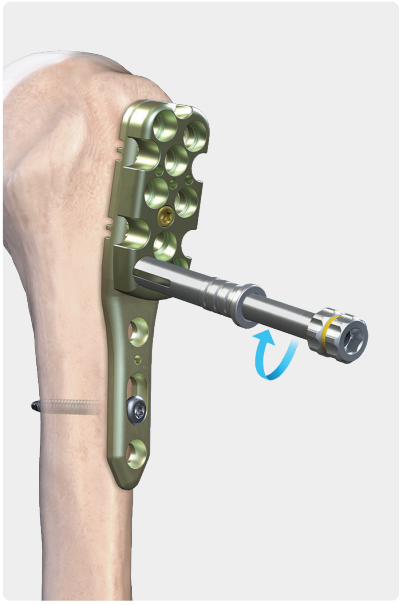
Using the 2.8 mm multiple drill guide (0318) and 2.8 mm calibrated drill bit (0237), drill both cortices of the oblong hole in the shaft of the plate. Use the calibrated drill bit or sliding depth gauge to determine appropriate screw length and insert a 3.5 mm cortical screw.



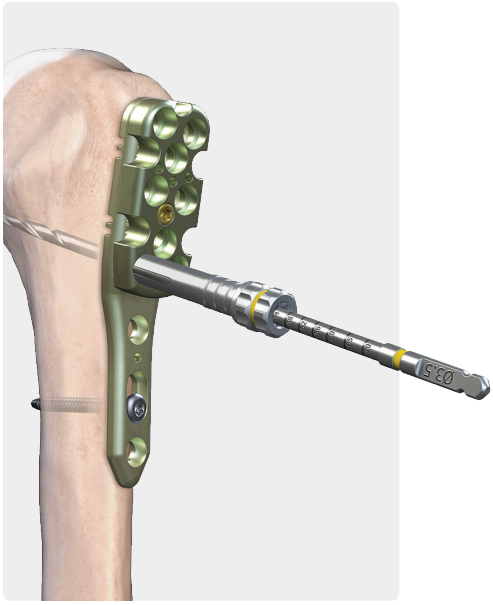
2c

Next, confirm appropriate plate positioning by placing a guidewire through the central distal hole in the plate. The distal K-wire should lie along the humeral calcar. A second K-wire can be placed to further stabilize the proximal portion of the plate.

3a



3b

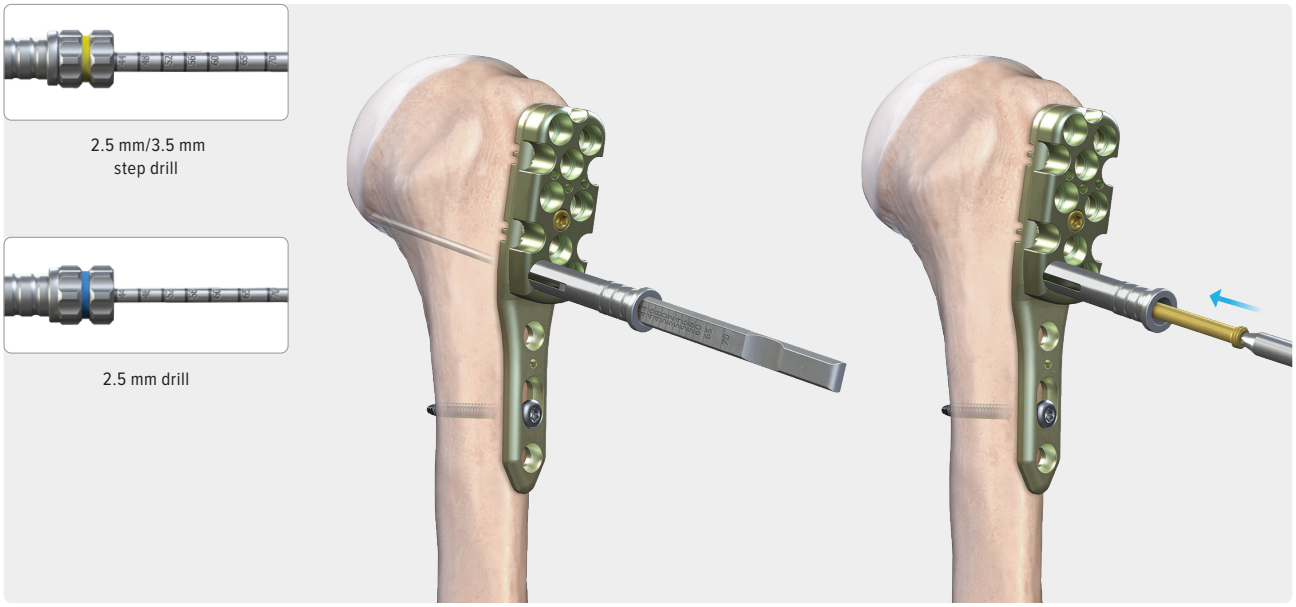


3c

Insert the screw sheath (0316) into the desired hole of the alignment guide. If using the 4.0 mm partially threaded screws, insert the yellow 3.5 mm drill guide into the screw sheath and drill with the yellow 3.5 mm/2.5 mm calibrated drill.

If using the 4.0 mm fully threaded screws, insert the blue 2.5 mm drill guide into the screw sheath and drill with the blue 2.5 mm calibrated drill.

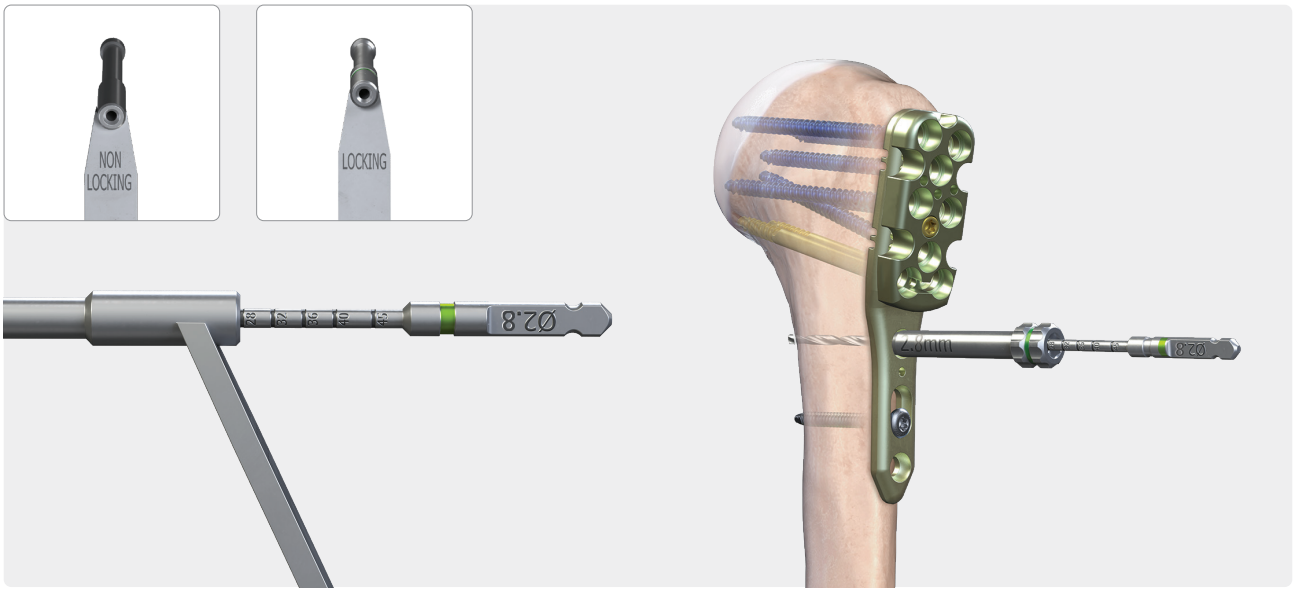
> **Note:** It is imperative that the drill does not penetrate the far cortex.



4

Calibrations on both the yellow- and blue-striped drill bits will reflect the length of screw needed. Alternatively, surgeons can also confirm the appropriate screw length by removing the drill guide from the screw sheath and inserting the depth probe.

Insert the desired screw into the prepared bone tunnel using the T15 driver. Repeat the previous steps for the remaining proximal locking screws and confirm appropriate fixation and reduction using fluoroscopy.



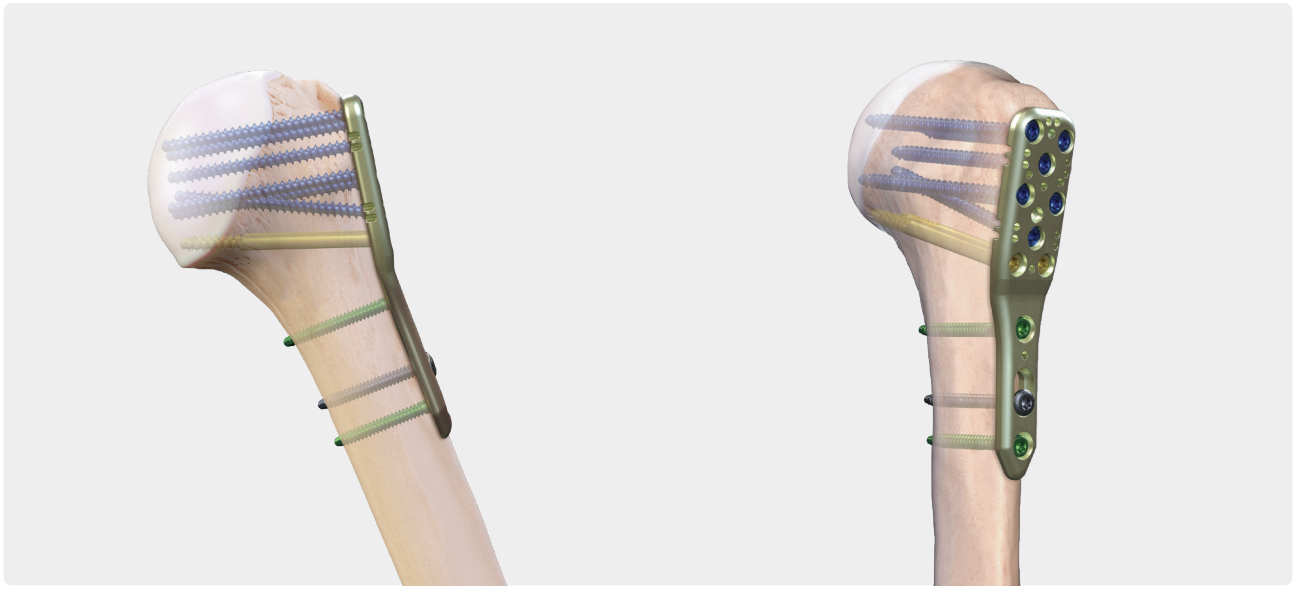
5

Technique for distal fixation in the shaft

Option 1: Drill bicortically using the 2.8 mm drill guide and 2.8 mm drill. Ensure the correct side of the drill guide is used for locking or nonlocking screw placement.

Option 2: Drill bicortically using the 2.8 mm locking drill guide and 2.8 mm drill. The appropriate length screw can be determined using the calibrations on the drill guide.

Alternatively, the sliding hook depth gauge may also be used to determine depth. Use the T15 driver for locking and nonlocking screw insertion.



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Final construct confirming appropriate fixation and screw lengths both proximally and distally.

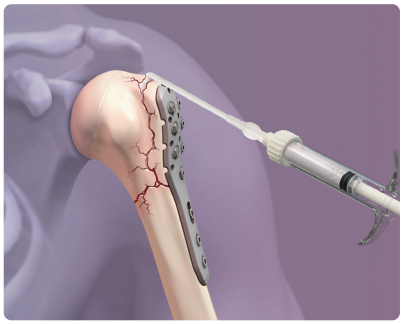
Supporting Products

Univers Revers™ Total Shoulder System
The Univers Revers total shoulder system provides orthopedic surgeons the option to implant a traditional Grammont-style configuration that follows the principles of a constrained environment that medializes the center of rotation and lengthens the deltoid, resulting in increased torque with forward flexion. In addition, this unique implant design offers the option to create a more anatomic center of rotation by altering the neck-shaft angle from 155° to 135° and using a lateralized glenosphere. This more lateralized center of rotation decreases the risk of scapular notching, while increasing the external rotator torque by lengthening the intact posterior cuff musculature. This adjustable neck-shaft angle, in combination with the wide range of offset options available in the humeral and glenoid components, allows surgeons to tailor the implant specific to each patient's anatomy and disease process.

Univers™ Fracture Stem
The Univers fracture stem identifies issues relating to stabilization of the humeral prosthesis and accurate position of the humeral head, combined with a straightforward reproducible protocol to accurately reduce and fix the tuberosities.

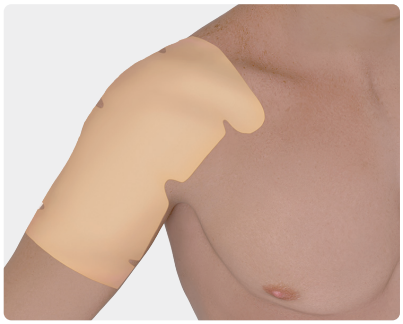
- Interoperative adjustable head prosthesis for secondary correction of implant in situ
- Preoperative and intraoperative measure guide to accurately set humeral head height
- Lateral pin positions with suture eyelets for anatomic reconstruction of tuberosities
- Smooth chamfered dimples medially to allow suture fixation of tuberosity fragments with suture fraying or breaking

Orthobiologic Solutions

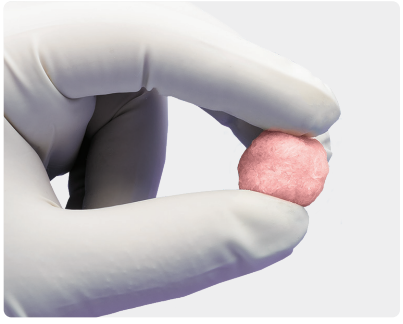


BoneSync™ Fast-Setting, Drillable Calcium Phosphate Cement
BoneSync cement offers improved handling in preparation and delivery, and can be mixed with saline, blood, and bone marrow aspirate (BMA). This makes BoneSync cement an affordable, easy-to-use, fast-remodeling, settable, and drillable biomimetic solution to fracture repair. The self-contained, fast-setting mixing system allows immediate supplemental fixation that, once cured, is drillable and accepts screws for final repair.

AlloSync™ Pure Demineralized Bone Matrix
AlloSync Pure is an osteoinductive demineralized bone matrix derived from 100% human allograft bone. AlloSync Pure can be used in a fluid environment once prepared with the ability for the surgeon to control the level of viscosity that is desired.



JumpStart® Antimicrobial Wound Dressing
JumpStart antimicrobial wound dressing powered by V.Dox™ technology provides sustained, antimicrobial protection against a broad spectrum of microbes, including harmful multidrug-resistant and biofilm-forming pathogens. JumpStart dressing is embedded with islands of elemental silver and zinc, which create microcell batteries that generate electrical currents and kill pathogens.[1-7] JumpStart dressings are available in multiple sizes and configurations to meet the needs of all orthopedic physicians.



ArthroCell™ Bone Allograft
ArthroCell viable bone allograft contains cellular, scaffold, and gel components derived from human bone. The microparticulate scaffold is comprised of a proprietary blend of cortical and cancellous allograft bone. The bone-derived gel component provides optimal handling and resists irrigation. The cellular component consists of mesenchymal stem cells, osteoprogenitor cells, and pluripotent cells.

Angel® cPRP System
The Angel cPRP system uses proprietary sensor technology and one-button automation to deliver customized platelet-rich plasma (PRP) concentrate. The Angel cPRP system is the only device that can provide PRP concentrate from BMA with adjustable cellular levels. Bone marrow is a rich source of platelets, nucleated cells, and progenitor cells that may be used to hydrate bone grafts.

Ordering Information

Proximal Humeral Plate Main Tray

Instruments	
Screw Sheath	0316-100
Drill Guide, nonlocking/locking, 2.8 mm	0318-200
Drill Guide. 2.5 mm	0327-000
Drill Guide, 2.8 mm	0324-500
Drill Guide, 3.5 mm	0331-000
T15 Driver, AO style	0432-400
Screw Gripper, 3.5 mm/4.0 mm screws	0433-000
Hex Driver, 2.5 mm	0448-000
Solid T15 Screwdriver	0448-300
Hex Driver, 5.0 mm	5001-000
T15 Screwdriver, Large Hudson	0452-200
Ratcheting Small Axial Handle, A0 quick connect, cannulated	5026-100
Proximal Screw Depth Gauge	0522-100
Hook Tip Depth Gauge, locking/nonlocking	0523-100
Alignment Guide, 130° proximal humeral plate	1250-200
Bolt, T15, alignment guide, proximal humeral plate	1251-200
Proximal Humeral Plate Case Assembly, main tray: screws, instruments, 130° plate	9912-100
Alignment Guide, 95° PHP	1288-000
Alignment Guide, ALPHA plate, left	1296-000
Alignment Guide, ALPHA plate, right	1297-000
AOS Proximal Humeral Plate Expansion Kit Tray, ALPHA plates and 95° plates	9941-000
Disposables	
Trocar Tip Guidewire, 2.0 mm × 150 mm	0102-150
Cortical Tap, 3.5 mm, A0 Style	0226-100
Calibrated Drill, AO style, 2.8 mm × 95 mm	0237-200
Calibrated Drill, long. 2.5 mm × 130 mm	0250-000
Calibrated Step Drill, A0 style, 3.5/2.5 mm × 130 mm	0254-000
Cancellous Tap, 3.5 mm, AO style	0255-200
Guide Pin, 1.5 mm	0109-150

Plates	
130° Proximal Humeral Plate, 3-hole	3012-003
130° Proximal Humaral Plate, 5-hole	3012-005
130° Proximal Humeral Plate, 8-hole	3012-008
130° Proximal Humeral Plate, 11-hole	3012-011
130° Proximal Humeral Plate, 14-hole	3012-014
95° Proximal Humeral Plate, 3-hole	3022-003
95° Proximal Humeral Plate, 5-hole	3022-005
ALPHA Plate, left, 4-hole	3024-004
ALPHA Plate, left, 5-hole	3024-005
ALPHA Plate, left, 7-hole	3024-007
ALPHA Plate, left, 11-hole	3024-011
ALPHA Plate, left, 14-hole	3024-014
ALPHA Plate, left, 16-hole	3024-016
ALPHA Plate, left, 18-hole	3024-018
ALPHA Plate, right, 4-hole	3025-004
ALPHA Plate, right, 5-hole	3025-005
ALPHA Plate, right, 7-hole	3025-007
ALPHA Plate, right, 11-hole	3025-011
ALPHA Plate, right, 14 hole	3025-014
ALPHA Plate, right, 16-hole	3025-016
ALPHA Plate, right, 18-hole	3025-018
Screws	
Cortical Screw. 3.5 mm × 20 mm-32 mm (2.0 mm increments), 35 mm, 40 mm, 45 mm	8010-200-450
Cortical Locking Screw, 3.5 mm × 20 mm-36 mm (2.0 mm increments)	8014-200-360
Cortical Bone Screw, 3.5 mm × 20 mm-32 mm (2.0 mm increments), 35 mm, 40 mm, 45 mm	8110-020-045
Cortical Screw, double lead lock, 3.5 mm × 20 mm-36 mm (2.0 mm increments)	8114-020-036
Cancellous Locking Screw, fully threaded, 4.0 mm × 22 mm-60 mm (2.0 mm increments), 65 mm, 70 mm	8124-022-070
Cancellous Locking Screw, partially threaded, 4.0 mm × 22 mm-60 mm (2.0 mm increments), 65 mm, 70 mm	8128-022-070

References

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2. Banerjee J, Ghatak P, Roy S, et al. Silver-zinc redox-coupled electroceutical wound dressing disrupts bacterial biofilm. *PLoS One.* 2015:1-15. doi:10.1371/journal.pone.0119531
3. Kim H, Izadjoo M. Antibiofilm efficacy evaluation of a bioelectric dressing in mono- and multi-species biofilms. *J Wound Care.* 2015;24 Suppl 2:S10-S14. doi:10.12968/jowc.2015.24.Sup2.S10
4. Barki K, Das A, Dixith S, et al. Electric field based dressing disrupts mixed species bacterial biofilm infection and restores functional wound healing. *Ann Surg.* 2019;269(4):756-766. doi:10.1097/SLA.0000000000002504
5. Vomaris Innovations, Inc. Data on file (#SLM090512CMC01F). Tempe, AZ.
6. Blount A, Foster S, Rapp D, et al. The use of bioelectric dressings in skin graft harvest sites: a prospective case series. *J Burn Care Res.* 2012;33(3):354-357. doi:10.1097/BCR.0b013e31823356e4
7. Cole W. Human acellular dermal matrix paired with silver-zinc coupled electroceutical dressing results in rapid healing of complicated diabetic wound of mixed etiology: a novel case series. *Wounds.* 2016;28(7):241-247.

This description of technique is provided as an educational tool and clinical aid to assist properly licensed medical professionals in the usage of specific Arthrex products. As part of this professional usage, the medical professional must use their professional judgment in making any final determinations in product usage and technique. In doing so, the medical professional should rely on their own training and experience and should conduct a thorough review of pertinent medical literature and the product's directions for use. Postoperative management is patient-specific and dependent on the treating professional's assessment. Individual results will vary and not all patients will experience the same postoperative activity level or outcomes.

Arthrex manufacturer, authorized representative, and importer information (Arthrex eIFUs)

US patent information

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