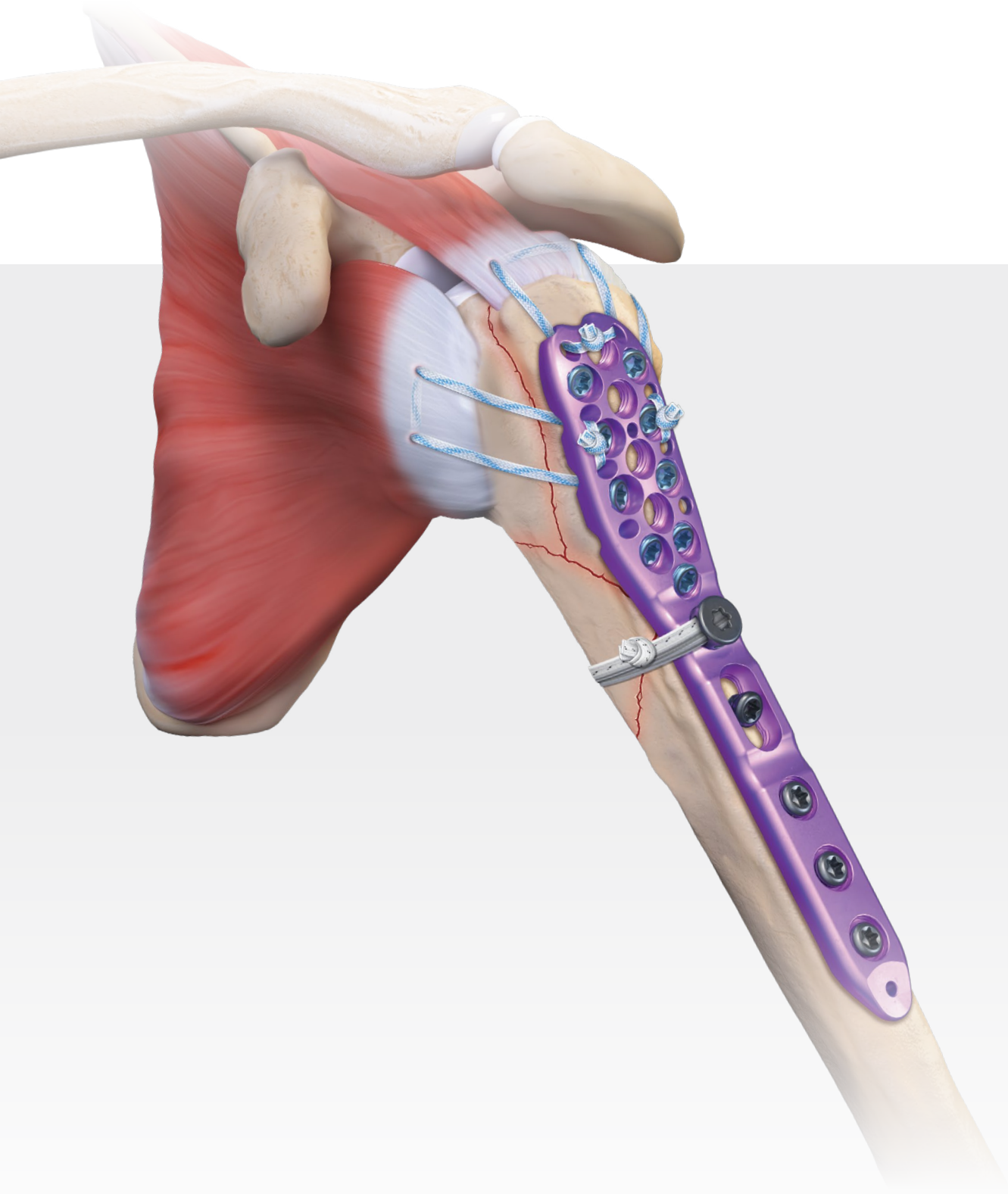
Proximal Humeral Plating System

Surgical Technique



Arthrex®

Proximal Humeral Plating System

The Arthrex Proximal Humeral Plating System is designed to treat a variety of fractures of the proximal humerus. The system offers lateral proximal humeral plates in 3-hole to 17-hole configurations, corresponding to lengths from 91 mm to 309 mm.

All plates accept 3.5 mm reinforced variable-angle locking (VAL), 3.5 mm reinforced VAL KreuLock™ or cortical screws, and 4 mm cancellous screws. 3.5 mm FiberTape® cerclage buttons may be used in the shaft of the plates.

Indications

In Non CE Accepting Countries

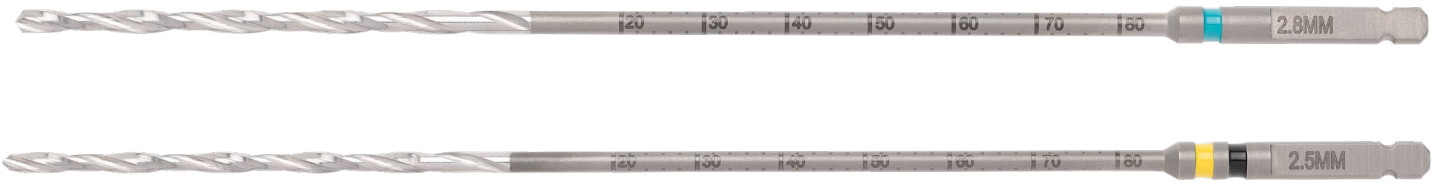
The Humeral Plating System is indicated for fractures and fracture dislocations, osteotomies, and nonunions of the proximal humerus, particularly in osteopenic bone. The cerclage button is intended for use with the Humeral Plating System and FiberTape cerclage suture to augment fracture stabilization with humeral plates in long bone fixation. The cerclage button is designed for use with the Humeral Plating System and may not be used alone.

In CE Accepting Countries

The Humeral Plating System provides internal fixation of proximal fractures of the humerus. The cerclage button is intended for use with the Humeral Plating System and FiberTape cerclage suture to augment fracture stabilization with humeral plates in long bone fixation. The cerclage button may not be used alone.

Drill and screw compatibility	
Drill Diameter	
2.8 mm	AR-9953DB-28
2.5 mm	AR-9953DB-25
Screw Type	
3.5 mm reinforced VAL	AR-8935RV-XX
3.5 mm cortical	AR-8935-XX
3.5 mm reinforced KreuLock	AR-8935RVCL-XX
4 mm cancellous	AR-8940-XX

Note: The 2.8 mm drill bit is to be used with the 3.5 mm reinforced screws, 2.5 mm drill bit is to be used with the 3.5 mm cortical and 4.0 mm cancellous screws.

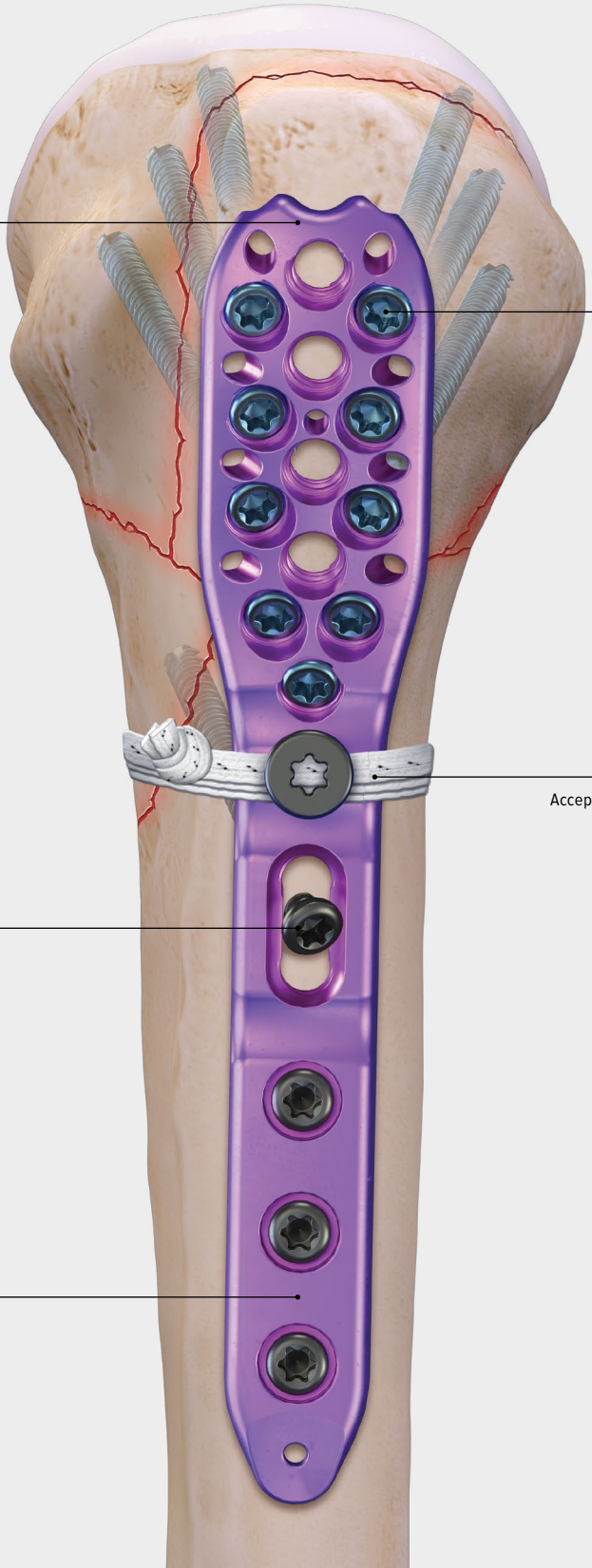


Lateral Humeral Plate

Introduction

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

Proximal screw holes can accept 4.0 mm cancellous or 3.5 mm reinforced VAL/KreuLock™ locking screws with the option to use 3.5 mm cortical or locking screws distally. FiberTape® cerclage buttons may be used in the shaft to facilitate fracture reduction.



Divergent screw pattern

Choice of 4.0 mm cancellous or 3.5 mm reinforced VAL/KreuLock locking screws in the head

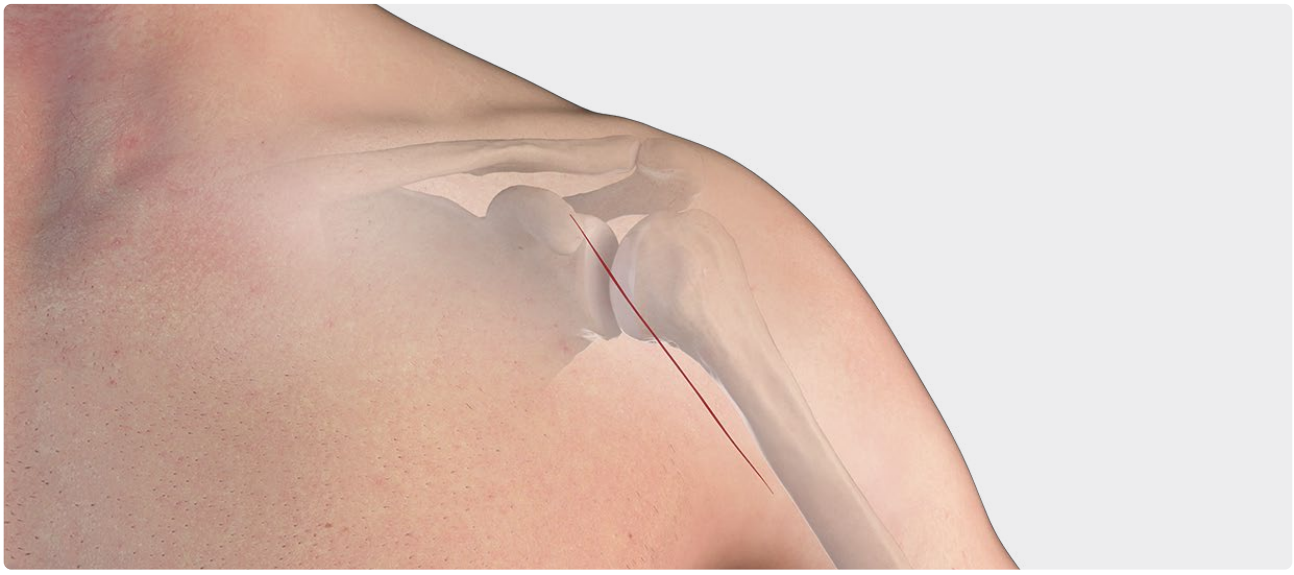
Accepts 3.5 mm locking, 3.5 mm cortical screws, or FiberTape cerclage buttons in the shaft

5 mm compression slot

Low-profile plate and screw interaction

3-hole, 91mm
5-hole, 114 mm
7-hole, 153 mm
10-hole, 200 mm
12-hole, 231 mm
14-hole, 262 mm
17-hole, 309 mm

Surgical Technique

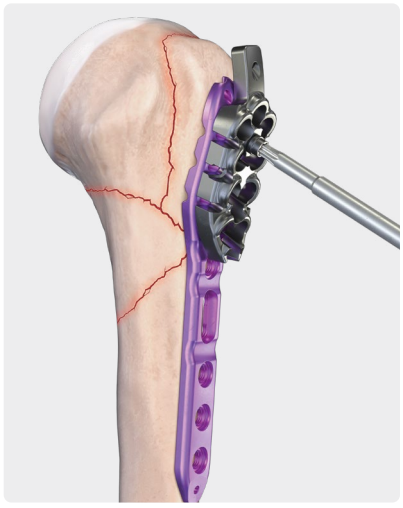


1

Obtain exposure and and perform the dissection using a deltopectoral approach.

A deltoid split approach may be preferred for certain fracture patterns when using a short plate.

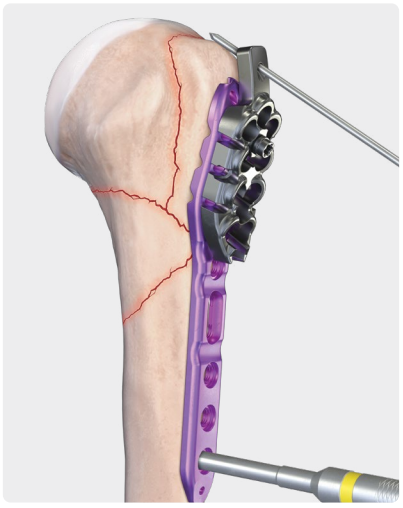
> **Note:** The lateral plate should be positioned against the lateral aspect of the greater tuberosity and situated 1 cm to 1.5 cm distal to the superior aspect of the greater tuberosity.



2a

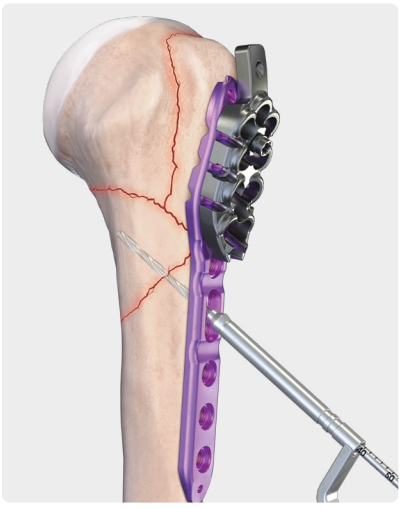
Initially, use the T15 screwdriver and handle to secure the aiming block assembly to the plate.

A locking drill guide may be used as a handle to aid in placement of the plate.



2b

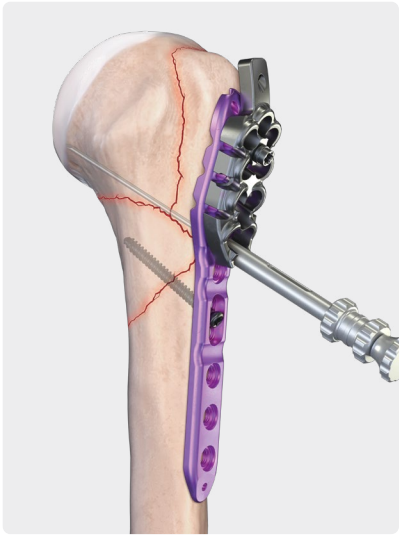
If desired, the plate position may be confirmed by placing a 2 mm K-wire through the hole on the superior aspect of the alignment guide.



2c

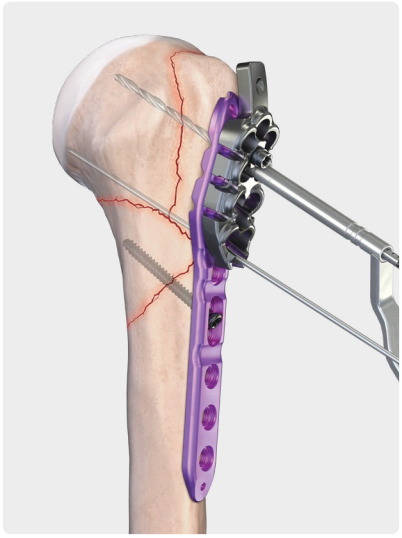
Using the VAL or a freehand drill guide and 2.5 mm calibrated drill bit, drill both cortices of the oblong hole in the shaft of the plate. Use the calibrated drill bit or sliding depth gauge to determine the appropriate screw length and insert a 3.5 mm cortical screw.

> **Note:** Locking screws placed in the oblong slot must be fixed-angle and should not be inserted off-axis from perpendicular to the plate.



3a

Next, confirm the appropriate plate positioning by placing a 1.6 mm guidewire through the K-wire insert in the drill guide. 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.

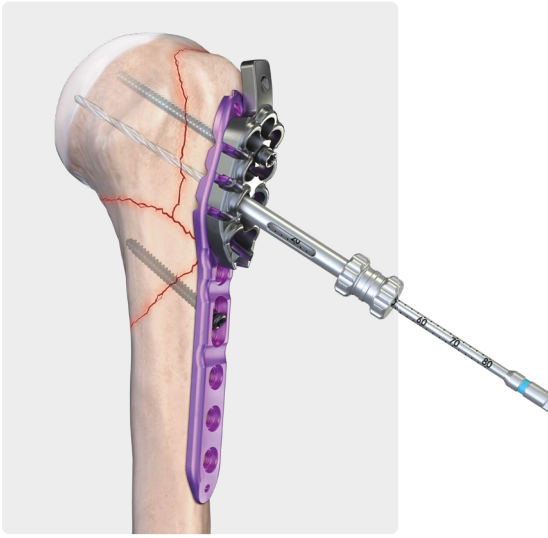


3b

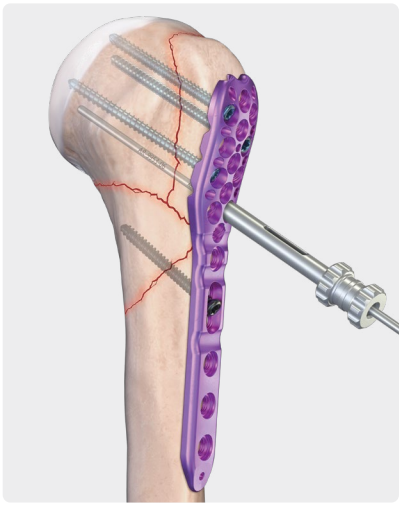
If using the 3.5 mm reinforced VAL or KreuLock™ screws, insert the 2.8 mm locking drill guide or use the VAL drill guide as shown. Screw length can be determined by referencing the drill bit calibrations on the back of either guide. If using a 4 mm cancellous screw, use the 2.5 mm instrumentation.

Important: It is imperative that the drill does not penetrate the far cortex.

Note: Screws may be inserted with the aiming block in place.

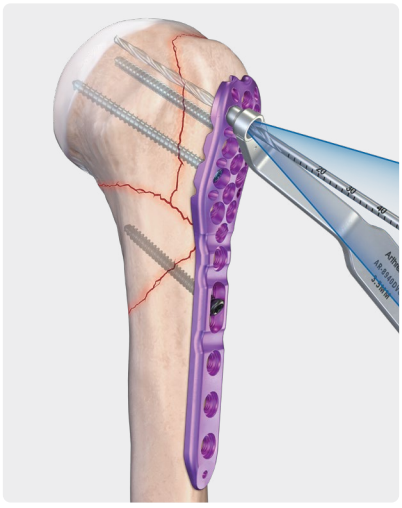


3c



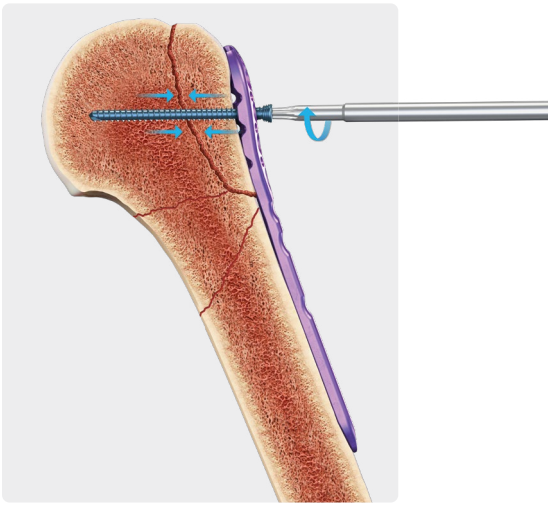
4a

If the drill bit calibrations are not visible, use the depth probe through the locking drill guide as shown.



4b

The lateral plate permits screw angulation up to 12° radially from the central axis of the locking hole. To maintain this limit, use the short side of the VAL drill guide. Screw length should be measured using a standard depth gauge.

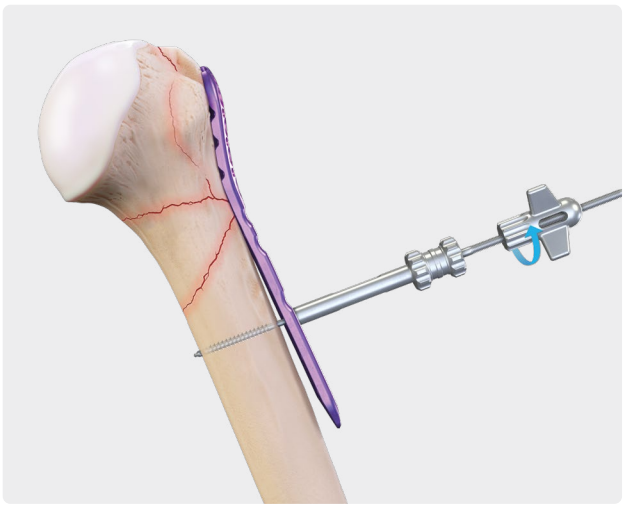


5

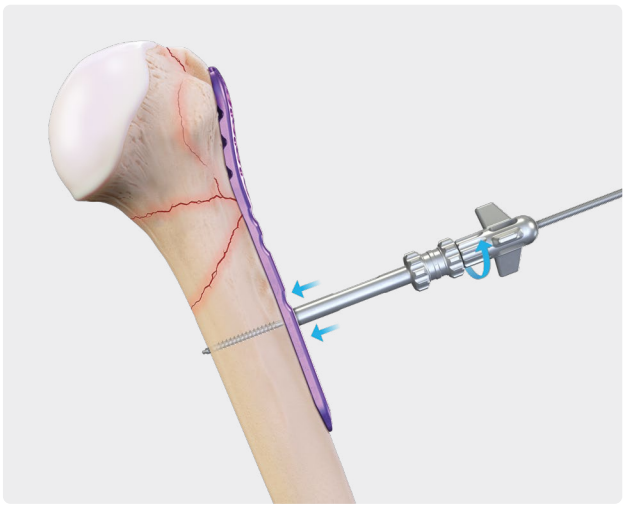
Insert the desired screw using the T15 driver. Repeat the previous steps for the remaining proximal locking screws and confirm appropriate fixation and reduction using fluoroscopy.

Important: Despite the KreuLock screw's locking head, its variable-pitch thread provides interfragmentary compression along the length of the screw.

Follow the same procedure used in step **2c** for fixation of the plate distally with 3.5 cortical or locking screws using the 2.5 mm (for cortical screws) or 2.8 mm (for locking screws) calibrated drill bit with the VAL guide and/or depth gauge.



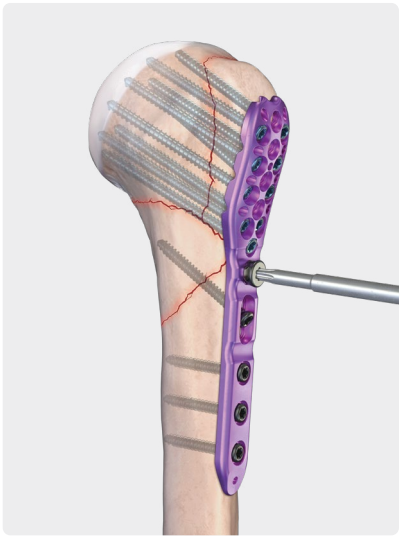
6a



6b

If interfragmentary compression is needed distally, insert the reduction bolt bicortically through a locking drill guide as shown in step **6a**. Thread the compression nut onto the reduction bolt as shown in **6a** until the bolt contacts the drill guide as shown in **6b**. Further turning of the reduction nut clockwise will initiate compression.

> **Note:** The compression nut may be used in either orientation depending on the location of the threads of the reduction bolt and the amount of compression desired.

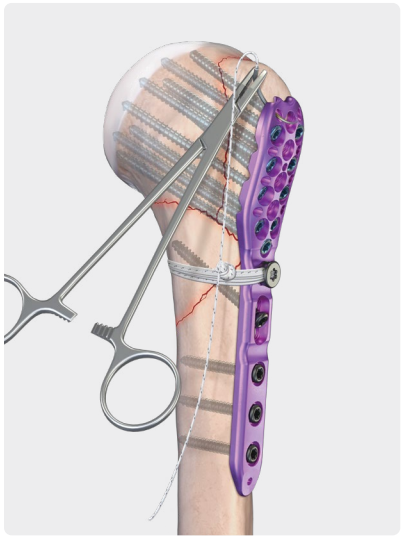


7a

7b

If desired, FiberTape® cerclage sutures may be incorporated into the plate construct using the 3.5 mm cerclage button inserted into a plate shaft screw hole as shown in **7a**. Cerclage sutures may be passed up to two times through the button and tensioned following standard technique.

> **Important:** Ensure that both passes of the FiberTape cerclage suture pass through the same two eyelets of the cerclage button.



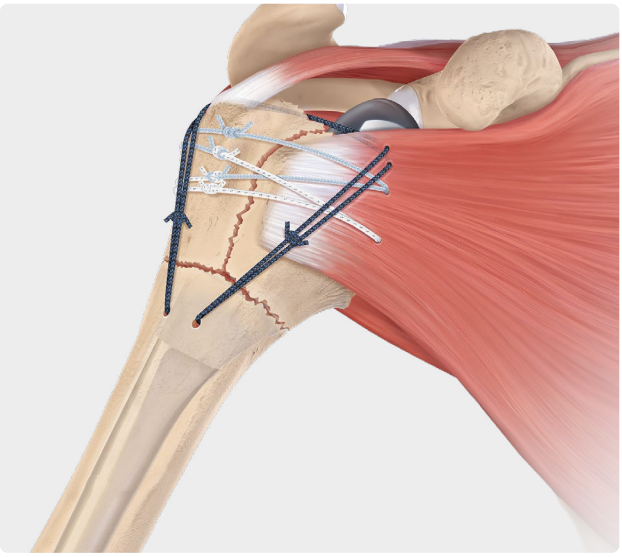
8

Soft tissue may be repaired to the plate using any of the peripheral suture eyelets as shown.

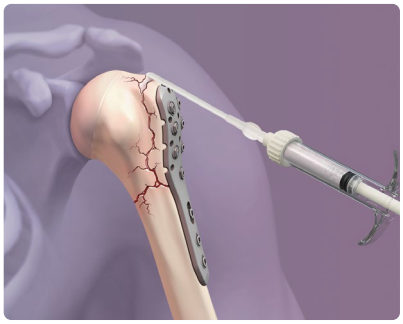
Supporting Products

Univers Revers™ Total Shoulder System
As an essential component of the Arthrex family of shoulder arthroplasty and fracture-management products, the Univers Revers total shoulder system is designed to restore function to shoulders with advanced cartilage disease in the presence of irreparable rotator cuff defects or fractures of the proximal humerus. The Univers Revers system is designed with a versatile feature set to help optimize joint mechanics and deltoid tension for each patient. The system's flexibility facilitates intraoperative decision-making, a key priority during its development. The system employs humeral implant features such as multiple inclination angles and cup sizes, metaphyseal offset, options for attaching the rotator cuff and tuberosity fragments to the prosthesis, and options for liner/spacing tensioning. Arthrex understands surgery is about decisions and options.

FxBridge™ Tuberosity Repair System
The FxBridge tuberosity repair system is used in conjunction with the Univers Revers™ shoulder system to aid in the reduction of a proximal humeral fracture via soft-tissue approximation of the greater and lesser tuberosity. The FxBridge tuberosity repair system is a sterile suture kit that consists of FiberTape® suture, TigerTape™ suture, SutureTape with needle, FiberLink™ suture, and TigerLink™ suture. The sutures are conveniently packaged with drill bit and free needle instrumentation.

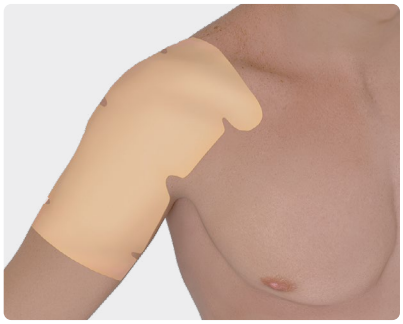


Orthobiologic Solutions



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 a cost-effective, 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 osteoinductive demineralized bone matrix is 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 comprises 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.

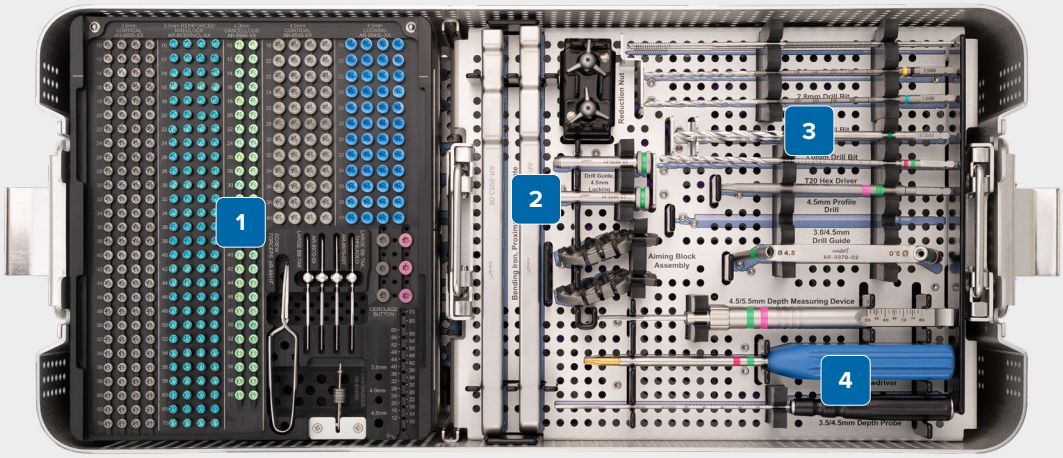
Ordering Information

General instruments 2.7 mm/3.5 mm (AR-18900S-GEN)	
General instrument case	AR-18900C-GEN
Proximal humeral plate, case lid	AR-18900C-GEN-01

Titanium VA proximal humeral plating system (AR-9953S)	
Proximal humeral plate, case	AR-9953C
Proximal humeral plate, case lid	AR-9953C-01

Instrument Trays

Titanium VA Proximal Humeral Plating System, Top Layer

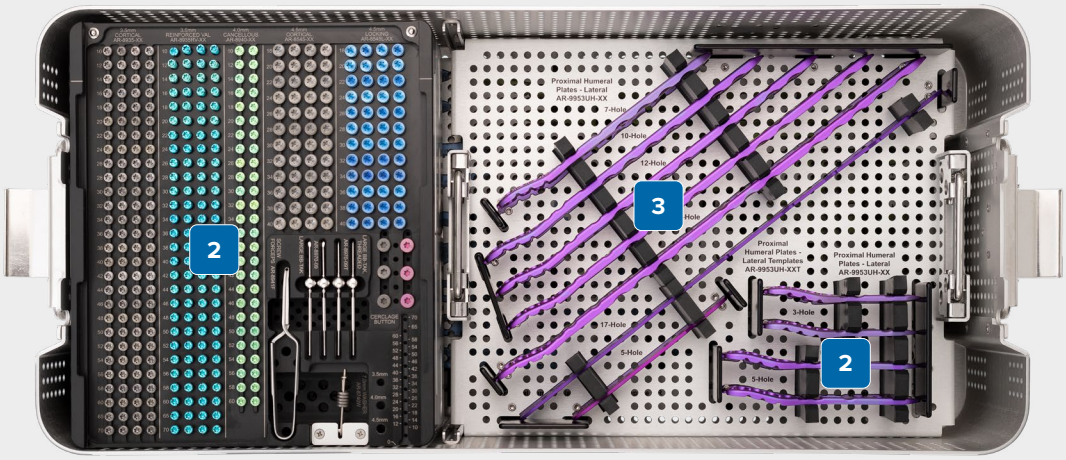


Pic.	Description	Item Number
1	**Proximal humeral plate, screw caddy, KreuLock™ reinforced**	
	Proximal humeral plate, screw caddy, KreuLock	AR-9953C-SC-VCL
	Proximal humeral plate, screw caddy, KreuLock lid	AR-9953C-SC-VCL01
	VAL KreuLock comp. screw, reinforced, Ti, 3.5 mm × 10-70 mm	AR-8935RVCL-XX
	Cortical screw, Ti, 3.5 mm × 10-70 mm	AR-8935-XX
	Cancellous screw, Ti, 4 mm × 10-60 mm	AR-8940-XX
	Low profile cortical screw, Ti, 4.5 mm × 18-40 mm	AR-8545-XX
	Low profile locking screw, Ti, 4.5 mm × 18-40 mm	AR-8545L-XX
	Washer, Ti, 7 mm	AR-8740W
	Cerclage button, 3.5 mm	AR-9953CB-T35*
	Large BB-Tak	AR-8970-09
	Large BB-Tak, threaded	AR-8970-09T
	Screw forceps	AR-8941F
2, 3, 4	**Proximal humeral plate instruments**	
	Bending iron, proximal humeral plate	AR-9953-08
	Drill guide, locking, 4.5 mm	AR-8970-01
	Aiming block assembly, proximal humerus	AR-9953-01
	Aiming block captured bolt, T15 (not pictured)	AR-9953-01B
	Reduction nut, proximal humeral plate	AR-9953-05
	Reduction bolt, proximal humeral plate, reusable	AR-9953-04RU
	Drill bit, calibrated, reusable 2.8 mm	AR-9953DB-28RU*,**
	Drill bit, calibrated, reusable 2.5 mm	AR-9953DB-25RU*,**
	Drill bit, calibrated, 3 mm	AR-8970-30
	4.5 mm drill bit	AR-8970-45
	4.5 mm profile drill	AR-18900-11
	T20 hexalobe driver (AO)	AR-8970-03
	Drill guide, 3 mm/4.5 mm	AR-8970-02
	Depth measuring device, 4.5 mm/5.5 mm	AR-8970-07
	Screwdriver T20 hexalobe, straight	AR-8970-04
	Depth probe, 3.5 mm/4.5 mm	AR-9953-06

Note: 4.5 mm instruments and implants intentionally left out of set

*Available sterile, with "S" designation, eg, AR-9953DB-28S.
** Available nonsterile, with no designation, eg, AR-9953DB-28.

Titanium VA Proximal Humeral Plating System, Middle Layer

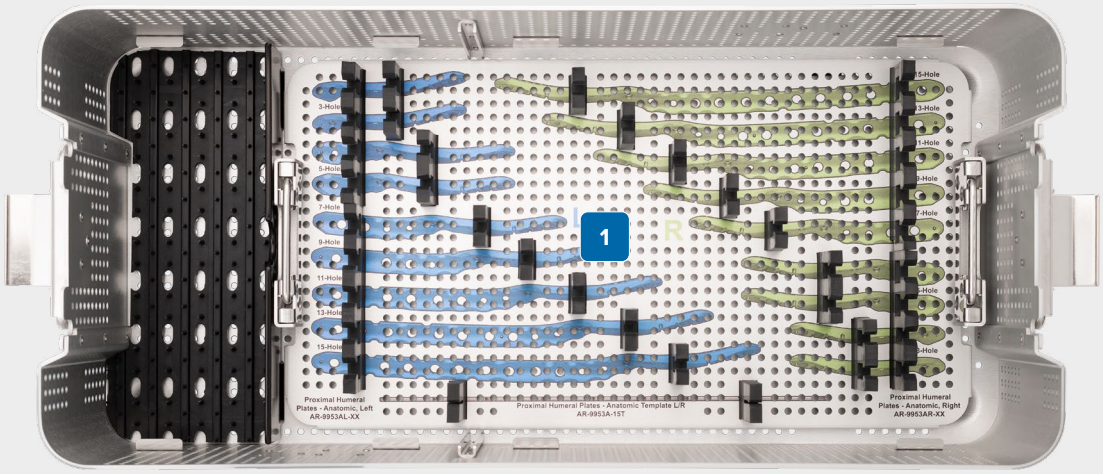


Pic.	Description	Item Number
1	**Proximal humeral plate, screw caddy, VAL reinforced**	
	Proximal humeral plate, screw caddy, VAL	AR-9953C-SC-VAL
	Proximal humeral plate, screw caddy, VAL lid	AR-9953C-SC-VAL01
	VAL screw, reinforced, Ti, 3.5 × 10-70 mm	AR-8935RV-XX
	Cortical screw, Ti, 3.5 x × 10-70 mm	AR-8935-XX
	Cancellous screw, Ti, 4.0 × 10-60 mm	AR-8940-XX
	Low profile cortical screw, Ti, 4.5 x 18-40 mm	AR-8545-XX
	Low profile locking screw, Ti, 4.5 x 18-40 mm	AR-8545L-XX
	Washer, Ti, 7 mm	AR-8740W
	Cerclage button, 3.5 mm	AR-9953CB-T35*
	Large BB-Tak	AR-8970-09
	Large BB-Tak, threaded	AR-8970-09T
	Screw forceps	AR-8941F
2, 3	**Proximal humeral plate, lateral tray**	
	Lateral proximal humeral plate, 3H, 91 mm	AR-9953UH-03*
	Lateral proximal humeral plate, 5H, 114 mm	AR-9953UH-05*
	Lateral proximal humeral plate, 7H, 153 mm	AR-9953UH-07*
	Lateral proximal humeral plate, 10H, 200 mm	AR-9953UH-10*
	Lateral proximal humeral plate, 12H, 231 mm	AR-9953UH-12*
	Lateral proximal humeral plate, 14H, 263 mm	AR-9953UH-14*
	Lateral proximal humeral plate, 17H, 309 mm	AR-9953UH-17*
	Lateral proximal humeral template, 5H	AR-9953UH-05T
	Lateral proximal humeral template, 17H	AR-9953UH-17T

Note: 4.5mm implants intentionally left out of set

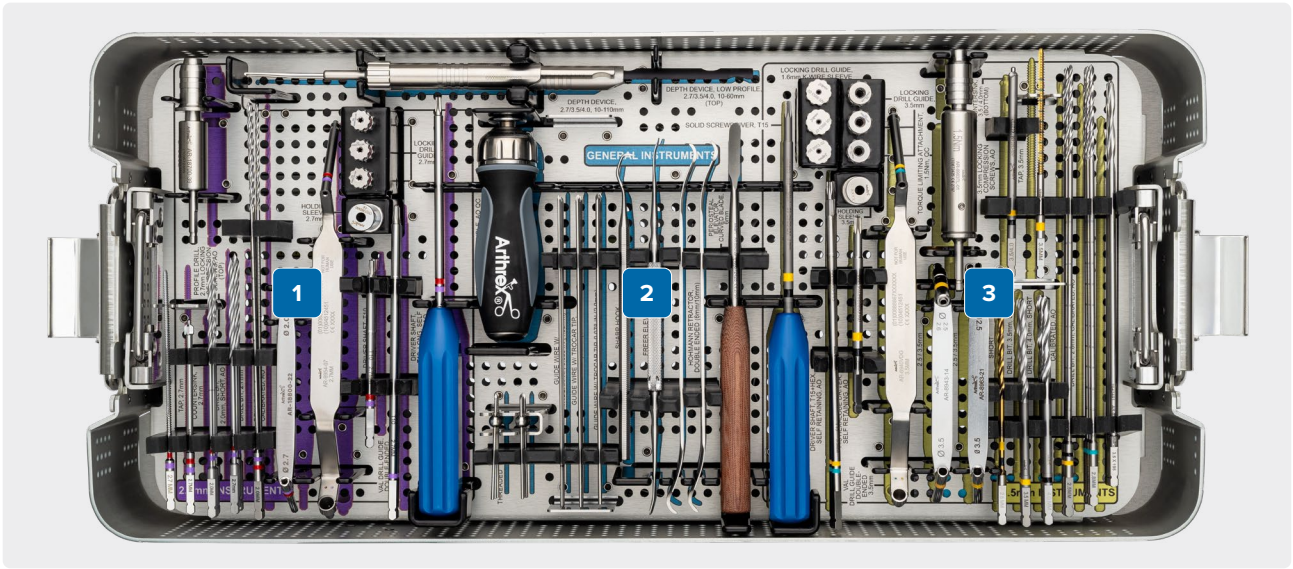
*Available sterile, with "S" designation, eg, AR-9953UH-03S.

Titanium VA Proximal Humeral Plating System, Bottom Layer



Pic.	Description	Item Number
1	**Proximal humeral plate, anatomic tray (AR-9953C-02)**	

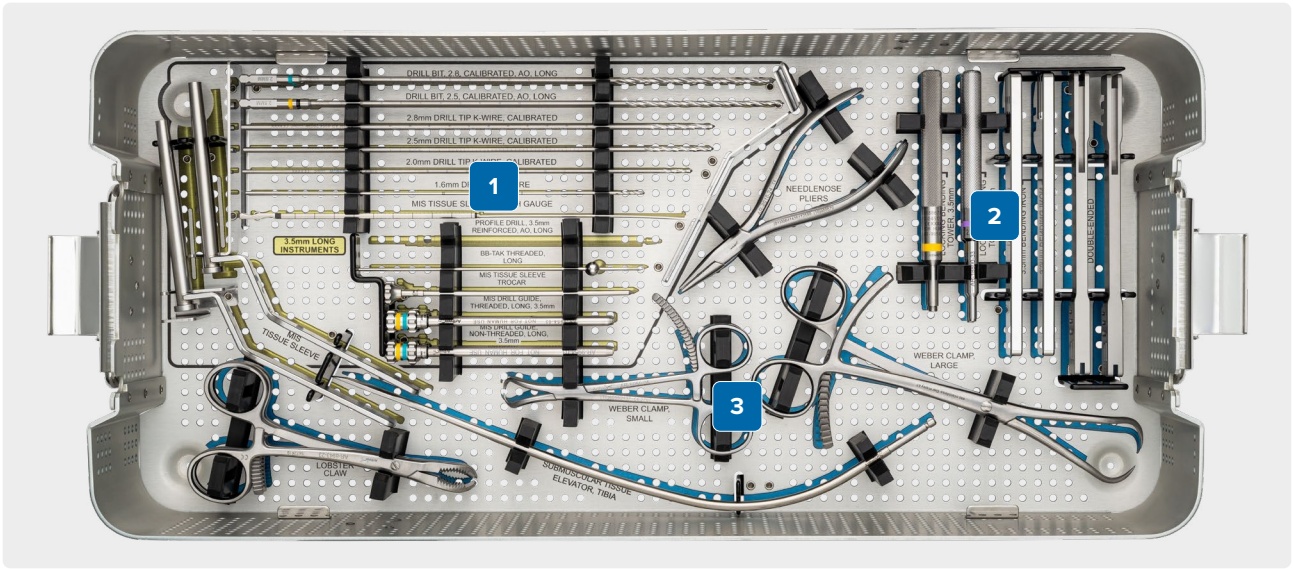
General Instruments 2.7 mm/3.5 mm, Top Layer



Pic.	Description	Item Number
1	**2.7 mm Instruments and disposables**	
	Torque limiting adapter, AO, 0.8 Nm	AR-18700-39
	Locking drill guide, 2.7 mm	AR-9954-06
	Holding sleeve, 2.7 mm	AR-18800-32
	Drill guide, 2 mm/2.7 mm	AR-18800-22
	VAL drill guide, double-ended, 2.7 mm	AR-9954-07
	Driver shaft, T10	AR-18800-24
	Driver shaft, T10, long	AR-18800-26
	Solid screwdriver, T10	AR-18800-27
	Tap, 2.7 mm	AR-18800-34
	Countersink, 2.7 mm	AR-18800-23
	Drill bit, 2 mm, short, AO	AR-18800-18
	Drill bit, 2.7 mm	AR-18800-20
	Drill bit, 2 mm, calibrated, AO	AR-9954-20
2	**General instruments and disposables**	
	Depth device, low profile, 2.7 mm/3.5 mm/4 mm	AR-8943-15
	Ratcheting handle, AO QC	AR-8700RH
	Sharp hook	AR-8943-21
	Freer elevator	AR-8943-19
	Hohmann retractor, double ended (6 mm/10 mm)	AR-18700-53
	Periosteal elevator, curved blade, 6 mm	AR-8943-20
	BB-Tak	AR-13226
	BB-Tak, threaded	AR-13226T
	Guidewire w/ trocar tip, 0.053 in (1.35 mm)	AR-8943-01
	Guidewire w/ trocar tip, 0.062 in (1.6 mm)	AR-8941K
	Guidewire w/ trocar tip, 0.078 in (2 mm)	AR-8945K

Pic.	Description	Item Number
3	**3.5 mm Instruments and disposables**	
	Solid screwdriver, T15	AR-8943-10
	Driver shaft, T15, long	AR-9953-T15
	T15 hexalobe driver	AR-8941DH
	VAL drill guide, double ended, 3.5 mm	AR-8940VDG
	Lag drill guide, 3.5 mm/2.5 mm	AR-8963-21
	Drill guide, 2.5 mm/3.5 mm	AR-8943-14
	Torque limiting attachment, 1.5 Nm, QC	AR-8963TL-01
	Countersink, 3.5 mm/4 mm	AR-8950-03
	Tap, 3.5 mm	AR-8935T
	Drill bit, 2.5, short	AR-8943-30
	Drill bit, 3.5, short	AR-4160-35
	Drill bit, 4 mm	AR-4160-40
	Drill bit, 2.5, calibrated, AO	AR-9954-25
	Drill bit, 2.8, calibrated, AO	AR-9954-28
	Drill bit, 3.5, long	AR-8964-10

General Instruments 2.7 mm/3.5 mm, Bottom Layer



Pic.	Description	Item Number
1	**3.5 mm Long instruments and disposables**	
	Drill bit, calibrated, AO, long, 2.8 mm	AR-9954-28L
	Drill bit, calibrated, AO, long, 2.5 mm	AR-9954-25L
	Drill tip K-wire, calibrated, 2.8 mm	AR-9954-28GW
	Drill tip K-wire, calibrated, 2.5 mm	AR-9954-25GW
	Drill tip K-wire, calibrated, 2 mm	AR-9954-20GW
	Drill tip K-wires, 1.6 mm	AR-18800-36
	MIS tissue sleeve depth gauge	AR-9954-05
	Profile drill, reinforced, AO, long, 3.5 mm	AR-18900-10
	BB-Tak, threaded, long	AR-14016B
	MIS tissue sleeve trocar, long	AR-9954-04
	MIS drill guide, threaded, long, 3.5 mm	AR-9954-02
	MIS drill guide, non-threaded, long, 3.5 mm	AR-9954-03
	MIS tissue sleeve	AR-9954-01
2	**General instruments**	
	Locking bending tower, 3.5 mm	AR-9954-09
	Bending iron	AR-8943-18
	Bending iron, double-ended	AR-18800-44
3	**Hand instruments**	
	Needlenose pliers	AR-8916-24
	Weber clamp, small	AR-5050-05
	Weber clamp	AR-8943-24
	Submuscular tissue elevator, distal tibia	AR-8963-10
	Lobster claw	AR-8943-23

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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)

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