TRAUMA

Operative Technique

equinoxe®

Equinoxe PHx System
with Exac-Loc™ Technology

advita ORTHO

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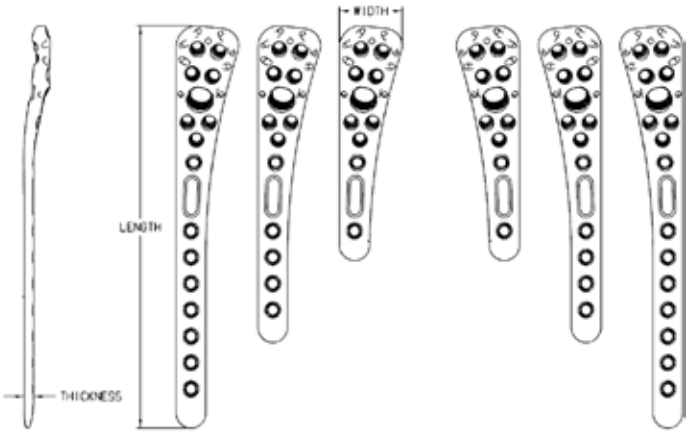
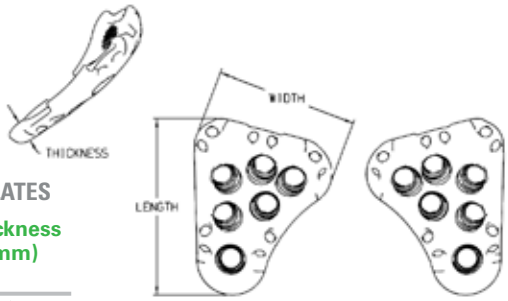


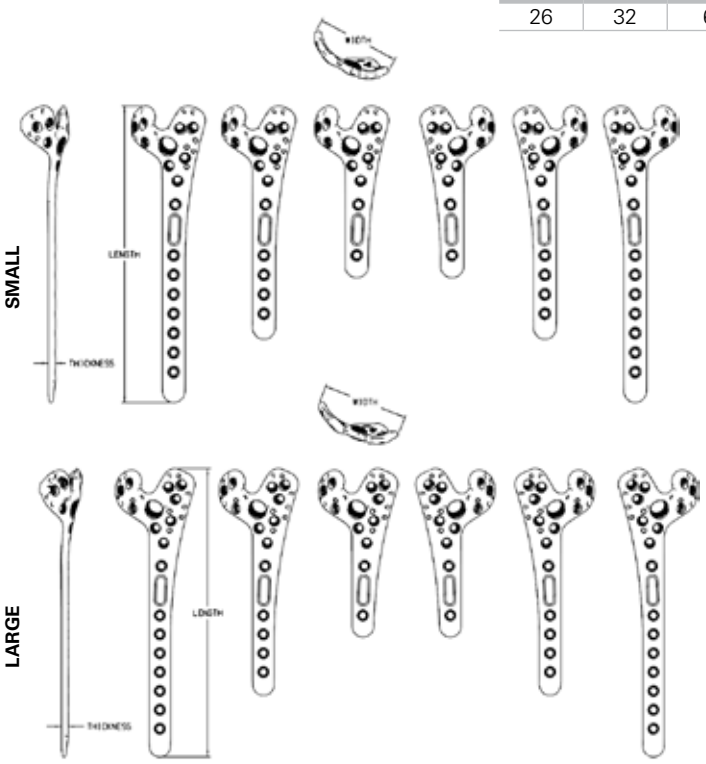
PROXIMAL HUMERUS ANATOMIC FRACTURE PLATES

Width (mm)	Length (mm)	Proximal Holes (mm)	Suture Holes (mm)	Distal Holes (mm)	Thickness (mm)
23	85	9	8	1	3
	115			4	
	150			7	



PROXIMAL HUMERUS GT FRACTURE PLATES

Width (mm)	Length (mm)	Screw Holes (mm)	Suture Holes (mm)	Thickness (mm)
26	32	6	10	3



PROXIMAL HUMERUS VICTORY FRACTURE PLATES

	Width (mm)	Length (mm)	Proximal Holes (mm)	Suture Holes (mm)	Distal Holes (mm)	Thickness (mm)
Small	42	85	10	9	1	3
		115			4	
		150			7	
Large	44	85	11	10	1	3
		115			4	
		150			7	

EXAC-LOC SCREWS*

Diameter (mm)	Length (mm)
7.5	35
	40
	45
	50
	55

EPIC NON-LOCKING SCREWS

Diameter (mm)	Length (mm)
3.5	22
	24
	26
	28
	30
	32
	34
	36

*Also available as a 7.5mm Humeral Cannulated Screw.

EPIC LOCKING SCREWS

Diameter (mm)	Length (mm)
3.5	24
	26
	28
	30
	32
	34
	36
	38
	40
	42
	44
	46
	48
	50
	52
	54
	56
	58
	60

EQUINOXE PHx SYSTEM WITH EXAC-LOC TECHNOLOGY

PRE-PLANNING

PRE-OPERATIVE PLANNING

After a careful history and physical examination, including identification of the dominant hand and an assessment of daily living activities, radiographs should be obtained. A standard shoulder trauma series should be obtained, including an AP view, a scapular lateral view, and an axillary view. A CT scan may provide additional information about involvement of the humeral head and tuberosity displacement.

Other factors to consider during the examination are: the length of time since the injury occurred, conditions predisposing the patient to seizure, neurological and vascular factors.

PATIENT POSITIONING

It is recommended that the patient be placed in a supine position. The head of the operating table should be elevated approximately 30 to 60 degrees in a modified beach chair position. It is recommended that the image intensifier is placed above the patient's head to facilitate biplane fluoroscopy. It is critical to ensure that positioning will allow live AP and axillary view images prior to draping. A small bolster should be placed laterally behind the involved shoulder. The patient should be moved to the side of the table so that the upper extremity can be placed in maximum extension without obstruction by the operating table. Alternatively, a Captain's chair or similar positioning device can be used for proper patient positioning. The patient should be secured to the operating table to minimize any changes in position intra-operatively. The entire upper extremity should be prepped and draped to allow complete access to the operative area and full mobility during the procedure. Either a deltopectoral or a superolateral approach may be used depending on the surgeon's preference and clinical parameters.

SURGICAL APPROACH

Deltopectoral Approach

A straight deltopectoral incision is made beginning just lateral to the tip of the coracoid process, extending distally and laterally to the insertion of the deltoid. The subcutaneous tissues are divided, and the medial and lateral flaps are elevated to expose the deeper muscular layers.

The deltopectoral interval is identified by localization of the cephalic vein. The cephalic vein is usually retracted medially or laterally with the deltoid muscle, depending on the patient's anatomy and surgeon preference. In either case, care should be taken to preserve the cephalic vein throughout the procedure.

The subdeltoid space is mobilized, as is the pectoralis major. The conjoined tendon muscles are identified and the clavipectoral fascia is divided at the edge of the conjoined tendon muscles. The fracture hematoma is usually evident after dividing the clavipectoral fascia. The conjoined tendon muscles and the pectoralis major are retracted medially, and the deltoid is retracted laterally. This can be most easily done with the use of a blunt self-retaining type retractor. Depending on plate length, a portion of the anterior deltoid insertion may need to be released. After the fracture hematoma has been evacuated, the deeper structures can be visualized. The biceps tendon should be identified, as it provides an orientation to the greater and lesser tuberosities. The humeral shaft may be internally or externally rotated to provide access to the greater or lesser tuberosities.

FRACTURE REDUCTION

Once the fracture fragments have been identified, several braided, non-absorbable sutures are passed through the tuberosity-rotator cuff tendon interface and mobilized. Under fluoroscopy, the humeral head segment is elevated, and the fracture may be reduced using a broad, blunt instrument. Ensure care is taken to avoid disrupting the medial soft-tissue hinge.

During the fracture reduction, sutures and K-wires can be used to provide provisional stabilization before applying the plate and during implantation. Care should be taken with placement of K-wires so they will not interfere with the placement of the fracture plate. There are three locations on the plate that will allow a K-wire (2.0mm or 0.787 inches) to pass through for provisional fixation.

There are two strategies to consider while implanting the Proximal Humerus Fracture (PHx) plates: provisionally reducing the fracture with sutures and/or K-wires before applying the PHx plates, or applying the PHx plates and reducing the fracture to it. Consider the following pearls:

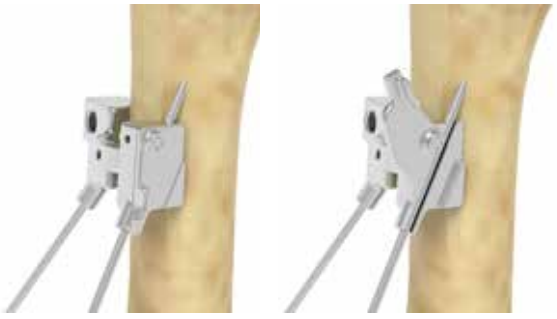
- As soon as the humerus is exposed, immediately tag the tendon-bone junction of the anterior, superior, and posterior cuff with sutures to establish control. Manipulating these sutures can be helpful to reduce the fracture.
- Place sutures between the fragments and reduce them around the humeral head to hold it in place.
- When applying the plate, a **3.5mm EPIC Non-Locking Screw** is usually inserted in the slotted hole, giving the opportunity for height adjustment after C-arm control.
- Once the plate is nearly snug to the bone, recheck the plate height and adjust the plate by sliding it along the Non-Locking Screw in the shaft slot.
- When the proper height is determined, tighten the Non-Locking Screw in the sliding hole of the plate.
- If applying the plate prior to fracture reduction, the Non-Locking Screw slot on the shaft allows for adjustment (±5mm) axially.
- While reducing the fracture, check the relationships between the humeral head, tuberosities, and humeral shaft.

OPERATIVE TECHNIQUE OVERVIEW

Step 1
Pin K-wire Block to Diaphyseal Bone. Use Threaded Drill Guide as a Handle

Step 2
Insert Convergent Wires into the Proximal Humerus to Stabilize Fracture. Remove Threaded Drill Guide Handle

Step 3
Remove Pins Stabilizing the K-wire Block to Diaphysis



Step 4
Remove K-wire Block. Pivot Slider to Release the Posterior K-wire and Slide off Anteriorly

Step 5
Ensure Converging Wires Retain Fracture

Figure 1a
K-wire Reduction Block

Figure 1b
K-wires in Place

FRACTURE REDUCTION

Once the fracture fragments have been identified, several braided, non-absorbable sutures may be passed through the tuberosity-rotator cuff tendon interface and mobilized. Under fluoroscopy, the humeral head segment may be elevated and the fracture may be reduced using a broad, blunt instrument. Care is taken to avoid disrupting the medial soft-tissue hinge.

During the fracture reduction, sutures, and K-wires can be used to provide provisional stabilization both before applying the plate and during implantation. Care should be taken with placement of K-wires so they will not interfere with the placement of the fracture plate. There are three locations on the plate that will allow a K-wire (2.0mm or 0.787 inches) to pass through for provisional fixation.

Depending on the fracture pattern, there are two strategies to consider while implanting the Proximal Humerus Fracture (PHx) Plate: provisionally reducing the fracture with sutures and/or K-wires before applying the PHx Plate or applying the PHx Plate and reducing the fracture to it. Please consider the following pearls:

- As soon as the humerus is exposed, immediately tag the tendon-bone junction of the anterior, superior and posterior cuff with sutures to establish control. Manipulating these sutures can be helpful to reduce the fracture.
- Place sutures between the fragments and reduce them around the humeral head to hold it in place.
- When applying the plate, a Compression Screw is usually inserted in the slotted hole, giving the opportunity for height adjustment after C-arm control.
- Once the plate is nearly snug to the bone, recheck the plate height and adjust the plate by sliding it along the Compression Screw in the shaft slot. When the proper height is determined, tighten the Compression Screw in the sliding hole of the plate.
- If applying the plate prior to fracture reduction, the height does not need to be perfect since the Compression Screw slot on the shaft allows for adjustment (±5.2mm).
- While positioning the plate, use the Guide Block and identify the trajectory of the lowest screws into the humeral head using the K-wire Reduction Block *(Figure 1a)*, as this is a critical component of the stability of the fracture construct.
- While reducing the fracture, check the relationships between the humeral head, tuberosities, and humeral shaft. The K-wire Reduction Block is used for assistance in providing stability to fracture reduction while the fracture plate is placed on bone *(Figure 1b)*.

PH$_X$ ANATOMIC PLATE

Step 1
Reduce Fracture

Step 2
Prepare Humerus for Non-Locking Screw in the Oblong Hole

Step 3
Place Non-Locking Screw

Step 4a
Set Plate Height Using Guide Block in Relation to Greater Tuberosity

Step 4b
Set Plate Height Using the K-wire Guide in Relation to Center of Humeral Head

Step 4c
Set Plate Height Using Calcar Screw Holes

OPERATIVE TECHNIQUE OVERVIEW

Step 5
Prepare for Proximal Locking Screws Using 2.7mm PHx Color-Coded Drill Bit

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Step 6
Place Proximal Locking Screws

Step 7
Measure Center Hole Exac-Loc Screw Length

Step 8a
Option A: Prepare for Center Exac-Loc Screw Using Depth Stop Drill

Step 8b
Option B: Prepare for Center Exac-Loc Screw Using 6.5mm PHx Color-Coded Drill Bit

Step 9
Place Exac-Loc Screw

Step 10
Deploy Exac-Loc Mechanism

Step 11
Prepare for and Place Final Distal Screw*
**Distal screw holes can accommodate Locking Screws or Non-Locking Screws.*

Step 12
Final View

DETAILED OPERATIVE TECHNIQUE

INITIAL PLACEMENT OF ANATOMIC PLATE

Diameter (mm)	Length (mm)	Color Code
3.5	22	White
	24	
	26	Black
	28	
	30	Orange
	32	
	34	Blue
	36	

Table 1
Color-Coded Non-Locking Screws

Figure 2
Prepare Humerus for Distal Non-Locking Screws

Figure 3
Place Non-Locking Screw

INITIAL PLACEMENT OF ANATOMIC PLATE

An **Anatomic Plate** of appropriate length is selected, and the **Anatomic Guide Block** is screwed into place on the Anatomic Plate using the **T-15 Driver**. The plate is applied to the lateral aspect of the humerus and shaft. The superior tip of the plate is positioned distal to the superior greater tuberosity *(Figure 2)*. The plate will sit approximately 7mm below the superior aspect of the greater tuberosity.

Note: *Anatomic Plate lengths of 85, 115 and 150mm are offered.*

During the fracture reduction, sutures and K-wires can be used to provide provisional stabilization before applying the plate and during implantation. Care should be taken with placement of K-wires so they will not interfere with the placement of the fracture plate. There are three locations on the plate that will allow a K-wire to pass through for provisional fixation. There are two strategies to consider while implanting the Proximal Humerus Fracture (PHx) System: provisionally reducing the fracture with sutures and/or K-wires before applying the PHx plates or applying the PHx plates and reducing the fracture to it. Please consider the following pearls: A 3.5mm EPIC Non-Locking Screw placed through the slotted hole of the plate should be used to bring the humeral shaft to the plate *(Table 1)*. This will allow the plate to be adjusted either proximally or distally along the humeral shaft. First, the hole is drilled using the **2.7mm PHx Color-Coded Drill Bit** through the **Compression Drill Guide** *(Figure 2)*. The **3.5mm Screw Depth Gauge** can be used to verify the screw length.

Note: *The EPIC Solid Depth Guide (2100-0001) can be used as an alternative to the 3.5mm Screw Depth Gauge.*

Once the depth is determined, the appropriately sized Non-Locking Screw is then inserted *(Figure 3)*. See page 1 for screw dimensions.

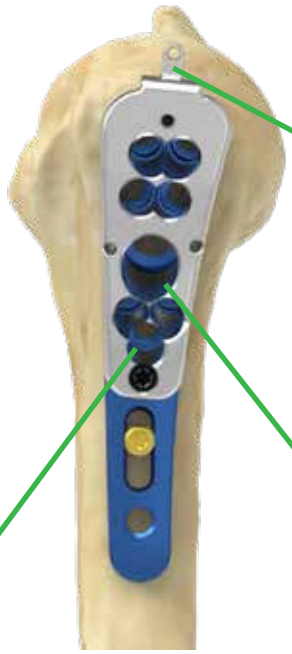

Figure 4
Set Plate Height

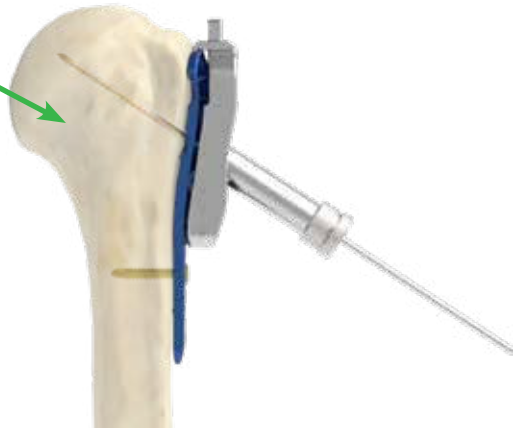

Figure 6
Option B: Set Plate Height Using Fluoroscopy and K-wire in Central Hole

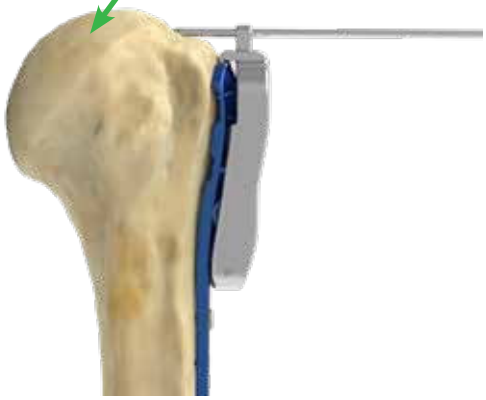

Figure 5
Option A: Set Plate Height Using Greater Tuberosity

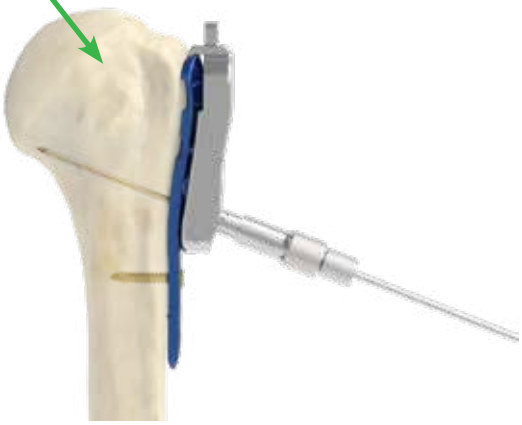

Figure 7
Option C: Set Plate Height Using Calcar Screw Holes

SET ANATOMIC PLATE HEIGHT

To set the height of the Anatomic Plate along the humerus, use one of three options *(Figure 4)*.

Option A:
Using Greater Tuberosity
The plate height can be determined off the greater tuberosity using a **2.0mm (.079") K-wire** through the superior hole of the Anatomic Guide Block *(Figure 5)*.

Option B:
Using Fluoroscopy and K-wire in Central Hole Using fluoroscopy, the plate height can be determined using the 7.5mm central hole of the plate. A K-wire is placed through the **6.5mm K-wire Guide** and should bisect the diameter of the articular surface *(Figure 6)*. Additionally, check plate height laterally to ensure it is not above the level of the greater tuberosity.

Option C:
Using Calcar Screw Holes
The plate height can be determined using one of the three inferior calcar screw holes. Place a K-wire in the inferior head neck junction to assess the plate height under fluoroscopy. Place the **Fracture Screw Guide** in one of the three holes in the calcar region of the plate, then stack the **2.7mm Threaded Drill Guide** through the Fracture Screw Guide to attach to the plate. Using fluoroscopy, determine the plate height *(Figure 7)*.

DETAILED OPERATIVE TECHNIQUE

ANATOMIC GUIDE BLOCK FIXATION

Figure 8
Secure Guide Block Using K-wire Holes

Figure 9
Verify Screw Path Using Fluoroscopy

Figure 10
Prepare Humerus for Proximal Locking Screws

ANATOMIC GUIDE BLOCK FIXATION

The Anatomic Guide Block and plate can be secured to the bone using the provided K-wire holes in the Anatomic Guide Block* *(Figure 8)*.

**Note: This is an optional step.*

VERIFY SCREW PATH USING FLUOROSCOPY

The screw path trajectory can be verified under fluoroscopy prior to drilling for the **3.5mm EPIC Locking Screws**. Stack the Fracture Screw Guide and 2.7mm Threaded Drill Guide, inserting into the Anatomic Guide Block and locking into the Anatomic Plate. Insert a K-wire through the construct. The depth of each hole is determined using the **2.7mm PHx Color-Coded Drill Bit** or **K-wire Depth Gauge** *(Figure 9)*.

Note: *It is recommended to use fluoroscopy when preparing for the locking screws (Figure 9).*

PREPARE FOR LOCKING SCREWS

Prepare the proximal bone for the Locking Screws with the and 2.7mm Threaded Drill Guide. To prepare each hole for the Locking Screw, stack the Fracture Screw Guide and the 2.7mm Threaded Drill Guide, connecting the construct to the Guide Block and locking directly into the Anatomic Plate. Use the 2.7mm PHx Color-Coded Drill Bit to determine the appropriate Locking Screw length *(Figure 10)*.

Diameter (mm)	Length (mm)	Color Code
3.5	24	
	26	Black
	28	
	30	Orange
	32	
	34	Blue
	36	
	38	Red
	40	
	42	Green
	44	
	46	Yellow
	48	
	50	Purple
	52	
	54	Brown
	56	
	58	
	60	

Table 2
Color-Coded Locking Screws

Figure 11
Place Locking Screws

The Locking Screws are provided in lengths between 24mm and 60mm, in 2mm increments *(Table 2)*.

See page 1 for dimensions.

Note: *There should be a slight gap between the 2.7mm Threaded Drill Guide and the Fracture Screw Guide (Figure 10).*

PLACE LOCKING SCREWS

The 2.7mm Threaded Drill Guide is removed and the Fracture Screw Guide is attached to the Anatomic Guide Block. The appropriate Locking Screw is inserted through the construct using the T-15 Driver *(Figure 11)*.

A ratcheting **Mini AO Handle** is provided to facilitate the placement and tightening of the screws. The locking depth indicator line on the T-15 Driver will provide visual reference for when the screw is engaging the locking threads in the Anatomic Plate. The aforementioned steps are repeated for placing each Locking Screw.

DETAILED OPERATIVE TECHNIQUE

PREPARE FOR EXAC-LOC SCREW

Figure 12
Measure for Exac-Loc Screw Length

Figure 13
Option A: Prepare for Exac-Loc Screw Using Depth Stop Drill

Figure 14
Option B: Prepare for Exac-Loc Screw Using 6.5mm PHx Color-Coded Drill Bit

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PREPARE FOR EXAC-LOC SCREW

Thread the **K-wire Guide** into the **6.5mm Threaded Drill Guide** in the 7.5mm center hole of the Anatomic Guide Block. Using fluoroscopy, bisect the diameter of the articular surface with the K-wire. (The tip to apex distance should be approximately 10 -20mm). Using the K-wire Depth Gauge *(Figure 12)*, determine the appropriate length **Exac-Loc Screw**. Remove the K-wire and the K-wire Guide once length has been determined.

To prepare the center hole for the Exac-Loc Screw, use one of two options.

Note: *It is recommended to use fluoroscopy when preparing for the locking screws (Figure 9).*

Option A:
Using the Depth Stop and Depth Stop Drill
Assemble the **Depth Stop** to the **Depth Stop Drill**. Adjust the Depth Stop to the appropriate length on the Depth Stop Drill prior to inserting the assembly through the 6.5mm Threaded Drill Guide *(Figure 13)*.

Option B:
Using the 6.5mm PHx Color-Coded Drill Bit
Insert the **6.5mm PHx Color-Coded Drill Bit** through the 6.5mm Threaded Drill Guide. Confirm the appropriate length of Exac-Loc Screw as identified by the K-wire using the color codes on the 6.5mm Color-Coded Drill Bit *(Figure 14)*.

Figure 15
Insert Exac-Loc Screw

Diameter (mm)	Length (mm)	Color Code
7.5	35	Orange
	40	Blue
	45	Red
	50	Green
	55	Yellow

Table 3
Color-Coded Exac-Loc Drill

INSERT EXAC-LOC SCREW

The 6.5mm Threaded Drill Guide is removed and the appropriately sized Exac-Loc Screw is inserted using the **Cannulated T-40 Driver** *(Figure 15)*.

The Exac-Loc Screws are provided in lengths between 35mm and 55mm, in 5mm increments *(Table 3)*. **7.5mm Humeral Cannulated Screws**, without the deployable locking mechanism, are also available. The 6.5mm Threaded Drill Guide is removed and the appropriately sized Exac-Loc Screw is inserted.

Figure 16
Deploy Exac-Loc Screw

Figure 17
Top View

DEPLOY EXAC-LOC SCREW

Once the Exac-Loc Screw is locked into the plate, use the Cannulated T-40 Driver as a counter torque and insert the **Exac-Loc Driver** through the Cannulated T-40 Driver to deploy the talons within the Exac-Loc Screw *(Figure 16)*.

The Exac-Loc Driver must be used with the ratcheting Mini AO Handle when deploying the locking talon *(Figure 17)*.

Note: *It is recommended to use fluoroscopy when deploying the talon mechanism of the Exac-Loc Screw (Figure 17).*

After deploying the Exac-Loc screw, remove the Anatomic Plate Guide Block.

Figure 18
Place Final Distal Screw

Figure 19
Final View

PLACE FINAL DISTAL SCREWS

The final distal screws can be a Non-Locking Screw or Locking Screw. Use the Non-Locking Screw Drill Guide with the Non-Locking Screw. The 2.7mm Threaded Drill Guide is required for use with the Locking Screws.

The Screw Depth Gauge can be used to verify the screw length. The 2.7mm PHx Color-Coded Drill Bit is used with the corresponding Threaded Drill Guide to prepare the bone for the final screws. Bicortical fixation is recommended *(Figures 18 and 19)*. Insert the final screws using the T-15 Driver.

Figure 20
Pass Sutures

SUTURE ANATOMIC PLATE

The Anatomic Plate has several proximal locations that will allow sutures to pass through the plate *(Figure 20)*. Heavy braided, non-absorbable sutures are recommended for attaching soft tissue or bony fragments. Sutures may be passed once the plate is fixed to the humerus.

WOUND CLOSURE

The wound is closed in layers over a suction drain with braided non-absorbable sutures to prevent formation of hematoma.

PH$_X$ GT PLATE

OPERATIVE TECHNIQUE OVERVIEW

Step 1
Place GT Plate

Step 2
Set Plate Height

Step 3
Prepare for Locking Screws

Step 4
Place Locking Screws

Step 5
Place Final Locking Screw

Step 6
Final View

Figure 21
Initial Placement of GT Plate

Figure 22
Secure GT Plate with K-wires

INITIAL PLACEMENT OF GT PLATE

The **Greater Tuberosity (GT) Plate** is applied to the lateral aspect of the humerus and shaft posterior to the bicipital groove. The plate can be positioned using a 2.7mm Threaded Drill Guide as a handle *(Figure 21)*.

Using a K-wire, secure the GT Plate to the bone *(Figure 22)*. The GT Plate is designed with dual suture and K-wire holes to assist in stabilizing the plate in position.

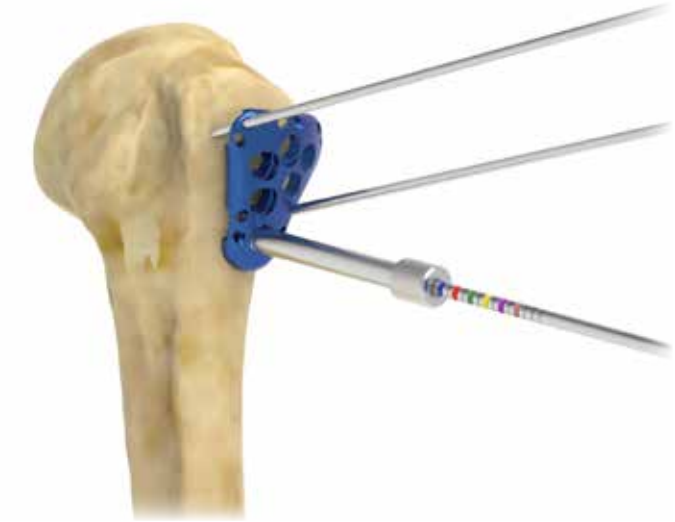


Figure 23
Prepare Bone for Proximal Locking Screws

Diameter (mm)	Length (mm)	Color Code
3.5	24	
	26	Black
	28	
	30	Orange
	32	
	34	Blue
	36	
	38	Red
	40	
	42	Green
	44	
	46	Yellow
	48	
	50	Purple
	52	
	54	Brown
	56	
	58	
	60	

Table 4
Color-Coded Locking Screws

PREPARE FOR LOCKING SCREWS

Prepare the proximal bone for the Locking Screws with the 2.7mm PHx Color-Coded Drill Bit and 2.7mm Threaded Drill Guide *(Figure 23)*.

The screw path trajectory can be verified under fluoroscopy prior to drilling for the Locking Screw. Lock the 2.7mm Threaded Drill Guide into the chosen hole and insert a K-wire.

Note: *It is recommended to use fluoroscopy when preparing for the Locking Screws.*

The depth of each hole is determined using the 2.7mm PHx Color-Coded Drill Bit or Screw Depth Gauge. The Locking Screws are provided in lengths between 24mm and 60mm, in 2mm increments *(Table 4)*.

See page 1 for screw dimensions.

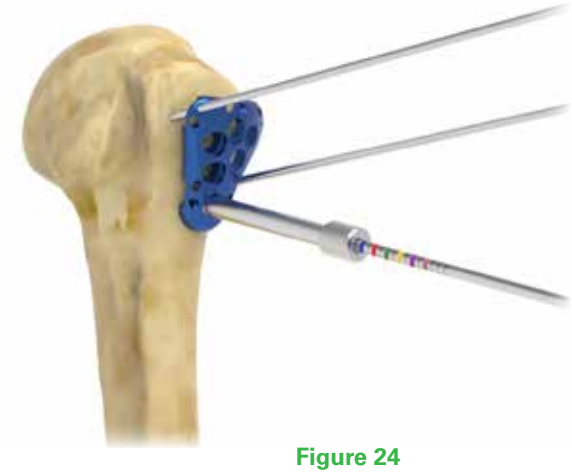


Figure 24
Place Locking Screw

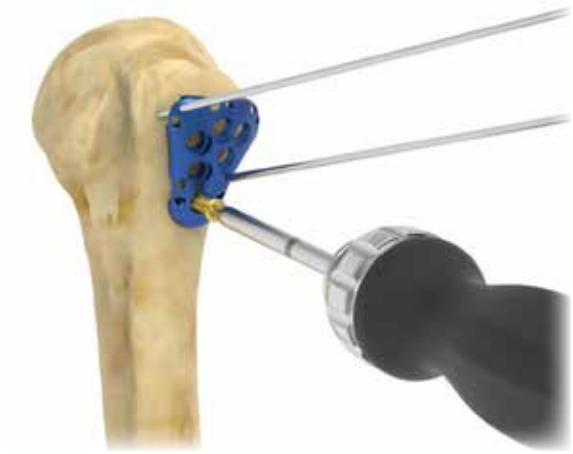


Figure 25
Place Final Locking Screw

Figure 26
Final View

PLACE LOCKING SCREWS

The 2.7mm Threaded Drill Guide is removed and the appropriate length Locking Screw is inserted. A ratcheting Mini AO Handle is used to facilitate the placement and tightening of the screws. The locking depth indicator line on the T-15 Driver will provide visual reference for when the screw is engaging the locking threads in the plate *(Figure 24)*.

The aforementioned steps are then repeated for placing each Locking Screw in the proximal GT Plate *(Figures 25 and 26)*.

SUTURE GT PLATE

The GT Plate has several proximal locations that will allow sutures to pass through the plate. Heavy braided, non-absorbable sutures are recommended for attaching soft tissue or bony fragments. Sutures may be passed once the plate is fixed to the humerus.

WOUND CLOSURE

The wound is closed in layers over a suction drain with braided non absorbable sutures to prevent formation of hematoma.

PH$_X$ VICTORY PLATE

Step 1
Reduce Fracture

Step 2
Place Victory Plate

Step 3
Prepare Humerus for Non-Locking Screw in Oblong Hole Using 2.7mm PHx Color-Coded Drill Bit

Step 4
Place Non-Locking Screw

Step 5
Set Plate Height

Step 6
Measure Center Hole Exac-Loc Screw Length

Step 7a
Option A: Prepare for Center Exac-Loc Screw Using Depth Stop Drill

Step 7b
Option B: Prepare for Center Exac-Loc Screw Using 6.5mm PHx Color-Coded Drill Bit

Step 8
Place Exac-Loc Center Screw

OPERATIVE TECHNIQUE OVERVIEW

Step 9
Deploy Exac-Loc Mechanism

Step 10
Prepare for Proximal Locking Screws

Step 11
Place Proximal Locking Screws

Step 12
Prepare for and Place Final Distal Shaft Screw*

**Distal screw holes can accommodate Locking Screws or Non-Locking Screws*

Step 13
Final View

Figure 27
Initial Placement of Victory Plate

Figure 28
Prepare Humerus for Distal Non-Locking Screw

Figure 29
Set Plate Height

Diameter (mm)	Length (mm)	Color Code
3.5	22	White
	24	
	26	Black
	28	
	30	Orange
	32	
	34	Blue
	36	

Table 5
Color-Coded Non-Locking Screws

INITIAL PLACEMENT OF VICTORY PLATE

A **Victory Plate** of appropriate length and width is selected, and the **Victory Guide Block** is screwed into place on the Victory Plate using the T-15 Driver. The plate is applied to the lateral aspect of the humerus and shaft along the lateral aspect of the bicipital groove. The superior tip of the plate is positioned distal to the superior greater tuberosity *(Figure 27)*. The plate will sit approximately 7mm below the superior aspect of the greater tuberosity.

Note: *Victory Plates are offered in two sizes, small and large, in lengths of 85, 115, and 150mm.*

A Non-Locking Screw placed through the slotted hole of the plate should be used to bring the humeral shaft to the plate *(Table 5)*.

This will allow the plate to be adjusted either proximally or distally along the humeral shaft. First, the hole is drilled using the 2.7mm PHx Color-Coded Drill Bit through the Compression Drill Guide. Once the depth is determined, the appropriately sized Non-Locking Screw is then inserted *(Figures 28 and 29)*.

See page 1 for screw dimensions.

Figure 30
Set Plate Height

Figure 31
Secure Guide Block and Plate to Bone Using K-wire

SET VICTORY PLATE HEIGHT

Using fluoroscopy, the plate height can be determined using the 7.5mm central hole of the plate. A K-wire is placed through the K-wire Guide and should bisect the diameter of the articular surface *(Figure 30)*. Check plate height laterally to ensure it is not above the level of the greater tuberosity.

VICTORY GUIDE BLOCK FIXATION

The Victory Guide Block and Victory Plate can be secured to the bone using the provided K-wire holes in the Guide Block* *(Figure 31)*.

***Note:** This is an optional step.*

Figure 32
Prepare for Exac-Loc Screw

Figure 33
Option A: Prepare Central Hole for Exac-Loc Screw Using Depth Stop Drill

Figure 34
Option B: Prepare Central Hole for Exac-Loc Screw Using 6.5mm PHx Color-Coded Drill Bit

PREPARE FOR EXAC-LOC SCREW

With the K-wire still in place, use the K-wire Depth Gauge to determine the required length of Exac-Loc Screw *(Figure 32)*.

To prepare the humeral bone for the Exac-Loc Screw, use one of two options.

INSERT EXAC-LOC SCREW

Option A:
Using the Depth Stop and the Depth Stop Drill
Assemble the Drill Stop and the Depth Stop Drill. Adjust the Depth Stop Drill to the appropriate length as determined by the K-wire Depth Gauge and K-wire prior to inserting the assembly through the 6.5mm Threaded Drill Guide *(Figure 33)*.

Option B:
Using the 6.5mm PHx Color-Coded Drill Bit
Insert the 6.5mm PHx Color-Coded Drill Bit through the 6.5mm Threaded Drill Guide. Confirm the appropriate length of Exac-Loc Screw as identified by the K-wire using the color codes on the 6.5mm Color-Coded Drill Bit *(Figure 34)*.

Figure 35
Place Exac-Loc Screw

Diameter (mm)	Length (mm)	Color Code
7.5	35	Orange
	40	Blue
	45	Red
	50	Green
	55	Yellow

Table 6
Color-Coded Exac-Loc Drill Bit

INSERT EXAC-LOC SCREW

The 6.5mm Threaded Drill Guide is removed and the appropriately sized Exac-Loc Screw is inserted using the Cannulated T-40 Driver *(Figure 35)*.

The Exac-Loc Screws are provided in lengths between 35mm and 55mm, in 5mm increments *(Table 6)*.

The Humeral Cannulated Screws without the deployable locking talons are also available. The **6.5mm Threaded Drill Guide** is removed and the appropriately sized Humeral Cannulated Screw is inserted.

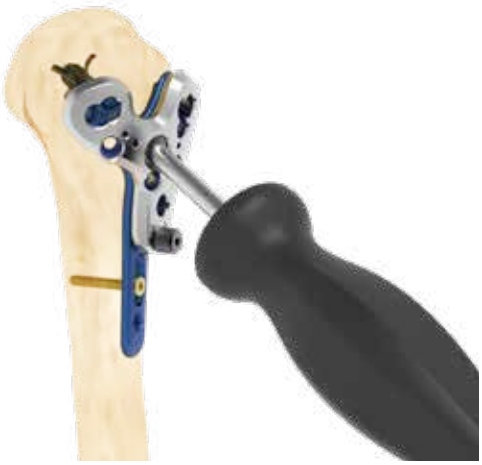


Figure 36
Deploy Exac-Loc Screw

Figure 37
Verify Locking Screw Path Using Fluoroscopy

DEPLOY EXAC-LOC SCREW

Once the Exac-Loc Screw is locked into the plate, use the Cannulated T-40 Driver as a counter torque and insert the Exac-Loc Driver through the Cannulated T-40 Driver to deploy the locking talons within the Exac-Loc Screw. The Exac-Loc Driver must be used with the ratcheting Mini AO Handle when deploying the locking talons *(Figure 36)*.

Note: *It is recommended to use fluoroscopy when deploying the locking mechanism of the Exac-Loc Screw (Figure 37).*

VERIFY SCREW PATH USING FLUOROSCOPY

Prior to drilling for the Locking Screws, the screw path trajectory can be verified under fluoroscopy using a K-wire *(Figure 37)*.

Stack the Fracture Screw Guide and the 2.7mm Threaded Drill Guide and insert into the Guide Block, locking into the plate. Insert a K-wire through the construct. The depth of each hole can be determined using the K-wire Depth Gauge *(Figure 37)*.

Note: *It is recommended to use fluoroscopy when preparing for the Locking Screws (Figure 37).*

DETAILED OPERATIVE TECHNIQUE

PREPARE FOR LOCKING SCREWS

Figure 38
Prepare Humerus for Locking Screws

Figure 39
Built-in Gap Between Drill Guide and Screw Guide

Diameter (mm)	Length (mm)	Color Code
3.5	24	
	26	Black
	28	
	30	Orange
	32	
	34	Blue
	36	
	38	Red
	40	
	42	Green
	44	
	46	Yellow
	48	
	50	Purple
	52	
	54	Brown
	56	
	58	
	60	

Table 7
Color-Coded Locking Screws

PREPARE FOR LOCKING SCREWS

To prepare each hole for the Locking Screws, stack the Screw Guide and the 2.7mm Threaded Drill Guide and connect to the Victory Plate Guide Block. The2.7mm Threaded Drill Guide will thread directly into the plate. Use the 2.7mm PHx Color-Coded Drill Bit to determine the appropriate Locking Screw length *(Figure 38)*.

Note: *There should be a slight gap between the 2.7mm Threaded Drill Guide and the Fracture Screw Guide (Figure 39).*

The Locking Screws are provided in lengths between 24mm and 60mm, in 2mm increments *(Table 7)*.

See page 1 for screw dimensions.

Figure 40
Place Screws Using Guide

Figure 41
Top View

PLACE LOCKING SCREWS

The 2.7mm Threaded Drill Guide is removed and the Fracture Screw Guide is attached to the Victory Guide Block. The appropriate Locking Screw is inserted through the construct using a T-15 Driver *(Figure 40)*.

A ratcheting Mini AO Handle is provided to facilitate the placement and tightening of the screws. The locking depth Indicator line on the T-15 Driver will provide visual reference for when the screw is engaging the locking threads in the Victory Plate.

The aforementioned steps are then repeated for placing each Locking Screw in the proximal portion of the plate *(Figure 41)*.

After placing all Locking Screws, remove the Victory Plate Guide Block.

DETAILED OPERATIVE TECHNIQUE

PLACE FINAL DISTAL SCREWS

Figure 42
Place Final Distal Screw

Figure 43
Final View

Figure 44
Pass Sutures

PLACE FINAL DISTAL SCREWS

The final distal screw can be a Non-Locking Screw or Locking Screw. The Non-Locking Screw Drill Guide is used with the Non-Locking Screw. The 2.7mm Threaded Drill Guide is required for use with the Locking Screw. The Screw Depth Gauge can be used to verify the screw length. The 2.7mm PHx Color-Coded Drill Bit is used with the 2.7mm Threaded Drill Guide to prepare the bone for the final screw. Bi-cortical fixation is recommended *(Figures 42 and 43).* Insert the final screws using the T-15 Driver.

SUTURE VICTORY PLATE

The Victory Plate has several proximal locations for sutures to pass through the plate *(Figure 44).* Heavy braided, non-absorbable sutures are recommended for attaching soft tissue or bony fragments. Sutures may be passed once the plate is fixed to the humerus.

WOUND CLOSURE

The wound is closed in layers over a suction drain with braided non-absorbable sutures to prevent formation of hematoma.

IMPLANT REMOVAL

In the event that the patient must be revised and the implants must be removed, the ratcheting Mini AO Handle and drivers are used. To remove the Exac-Loc Screw, use the Cannulated T-40 Driver as a counter torque with the Exac-Loc Driver. Retract the talons by inserting the Exac-Loc Driver through the T-40 cannulation. Confirm the talons are fully retracted using fluoroscopy prior to removing the Exac-Loc Screw. Unlock the remaining screws from the plate before removing them completely from the bone.

IMPLANT LISTING

CATALOG NO.	PART DESCRIPTION
370-04-85	Anatomic Plate, 85mm, Left
370-14-85	Anatomic Plate, 85mm, Right
370-04-115	Anatomic Plate, 115mm, Left
370-14-115	Anatomic Plate, 115mm, Right
370-04-150	Anatomic Plate, 150mm, Left
370-14-150	Anatomic Plate, 150mm, Right

370-01-12	GT Plate, Left
370-01-13	GT Plate, Right

370-02-85	Victory Plate Small, 85mm, Left
370-12-85	Victory Plate Small, 85mm, Right
370-03-85	Victory Plate Large, 85mm, Left
370-13-85	Victory Plate Large, 85mm, Right
370-02-115	Victory Plate Small, 115mm, Left
370-12-115	Victory Plate Small, 115mm, Right
370-03-115	Victory Plate Large,115mm, Left
370-13-115	Victory Plate Large,115mm, Right
370-02-150	Victory Plate Small, 150mm, Left
370-12-150	Victory Plate Small, 150mm, Right
370-03-150	Victory Plate Large, 150mm, Left
370-13-150	Victory Plate Large, 150mm, Right

370-75-35	Exac-Loc Screw, 35mm
370-75-40	Exac-Loc Screw, 40mm
370-75-45	Exac-Loc Screw, 45mm
370-75-50	Exac-Loc Screw, 50mm
370-75-55	Exac-Loc Screw, 55mm

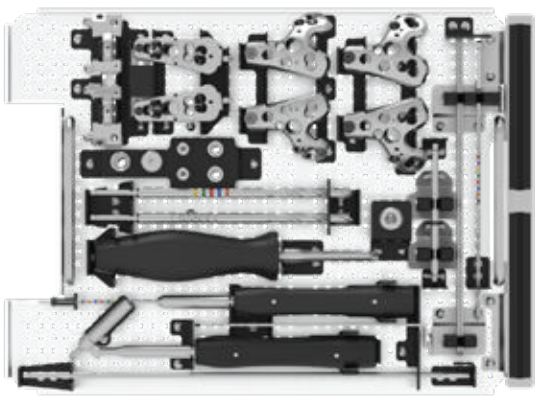
370-65-35	Humeral Cannulated Screw, 7.5mm x 35mm
370-65-40	Humeral Cannulated Screw, 7.5mm x 40mm
370-65-45	Humeral Cannulated Screw, 7.5mm x 45mm
370-65-50	Humeral Cannulated Screw, 7.5mm x 50mm
370-65-55	Humeral Cannulated Screw, 7.5mm x 55mm

2001-3522-N	EPIC Non-Locking Screw, 3.5mm x 22mm
2001-3524-N	EPIC Non-Locking Screw, 3.5mm x 24mm
2001-3526-N	EPIC Non-Locking Screw, 3.5mm x 26mm
2001-3528-N	EPIC Non-Locking Screw, 3.5mm x 28mm
2001-3530-N	EPIC Non-Locking Screw, 3.5mm x 30mm
2001-3532-N	EPIC Non-Locking Screw, 3.5mm x 32mm
2001-3534-N	EPIC Non-Locking Screw, 3.5mm x 34mm
2001-3536-N	EPIC Non-Locking Screw, 3.5mm x 36mm

CATALOG NO.	PART DESCRIPTION
2000-3524	EPIC Locking Screw, 3.5mm x 24mm
2000-3526	EPIC Locking Screw, 3.5mm x 26mm
2000-3528	EPIC Locking Screw, 3.5mm x 28mm
2000-3530	EPIC Locking Screw, 3.5mm x 30mm
2000-3532	EPIC Locking Screw, 3.5mm x 32mm
2000-3534	EPIC Locking Screw, 3.5mm x 34mm
2000-3536	EPIC Locking Screw, 3.5mm x 36mm
2000-3538	EPIC Locking Screw, 3.5mm x 38mm
2000-3540	EPIC Locking Screw, 3.5mm x 40mm
2000-3542	EPIC Locking Screw, 3.5mm x 42mm
2000-3544	EPIC Locking Screw, 3.5mm x 44mm
2000-3546	EPIC Locking Screw, 3.5mm x 46mm
2000-3548	EPIC Locking Screw, 3.5mm x 48mm
2000-3550	EPIC Locking Screw, 3.5mm x 50mm
2000-3552	EPIC Locking Screw, 3.5mm x 52mm
2000-3554	EPIC Locking Screw, 3.5mm x 54mm
2000-3556	EPIC Locking Screw, 3.5mm x 56mm
2000-3558	EPIC Locking Screw, 3.5mm x 58mm
2000-3560	EPIC Locking Screw, 3.5mm x 60mm
371-01-24	Threaded Drill Guide, 2.7mm
371-01-02	Threaded Drill Guide, 6.5mm
371-01-20	Compression Drill Guide
371-01-29	K-wire Guide, 6.5mm
371-01-18	Fracture Screw Guide
371-02-00	Guide Block, Anatomic Plate, Left
371-02-01	Guide Block, Anatomic Plate, Right

INSTRUMENT LISTING

CATALOG NO.	PART DESCRIPTION
371-04-00	Guide Block, Victory Plate, Small, Left
371-04-01	Guide Block, Victory Plate, Small, Right
371-03-00	Guide Block, Victory Plate, Large, Left
371-03-01	Guide Block, Victory Plate, Large, Right
371-20-00	2.0mm (.079") K-wire
341-07-85	Mini AO Handle
371-00-27	PHx Color-Coded Drill Bit, 2.7mm
371-01-17	PHx Color-Coded Drill Bit, 6.5mm
371-01-65	Depth Stop Drill
371-01-33	Exac-Loc Driver
371-01-40	Cannulated T-40 Driver
371-01-09	3.5mm Screw Depth Gauge
371-01-32	Depth Stop
371-01-31	K-wire Depth Gauge
2100-0001	EPIC Solid Depth Guide
371-01-30	T-15 Driver
371-01-34	K-wire Block, Left
371-01-35	K-wire Block, Right



NOTES

REFERENCE

1. AO Principles of Fracture Management, Thieme Verlag. Most recent version is from 2018.

These products are manufactured by Exactech, Inc. and distributed by Advita Ortho, LLC.

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