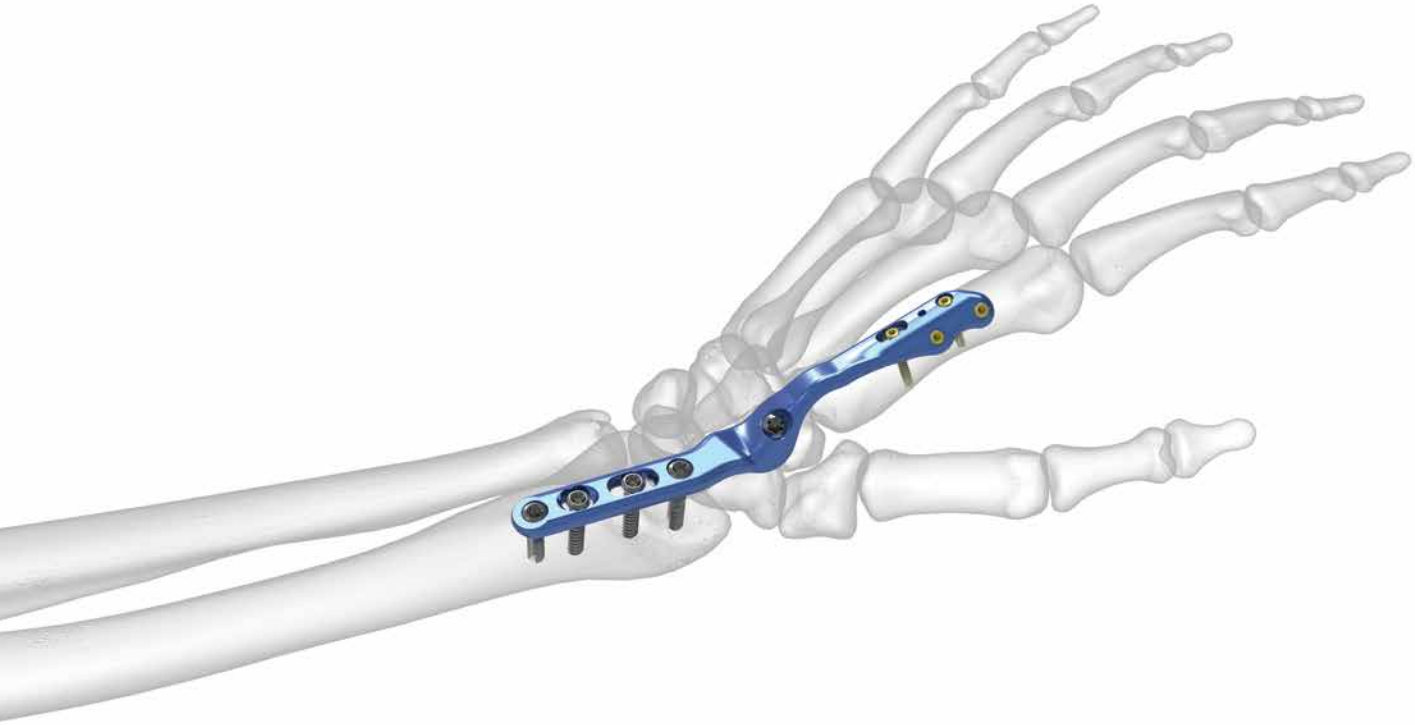
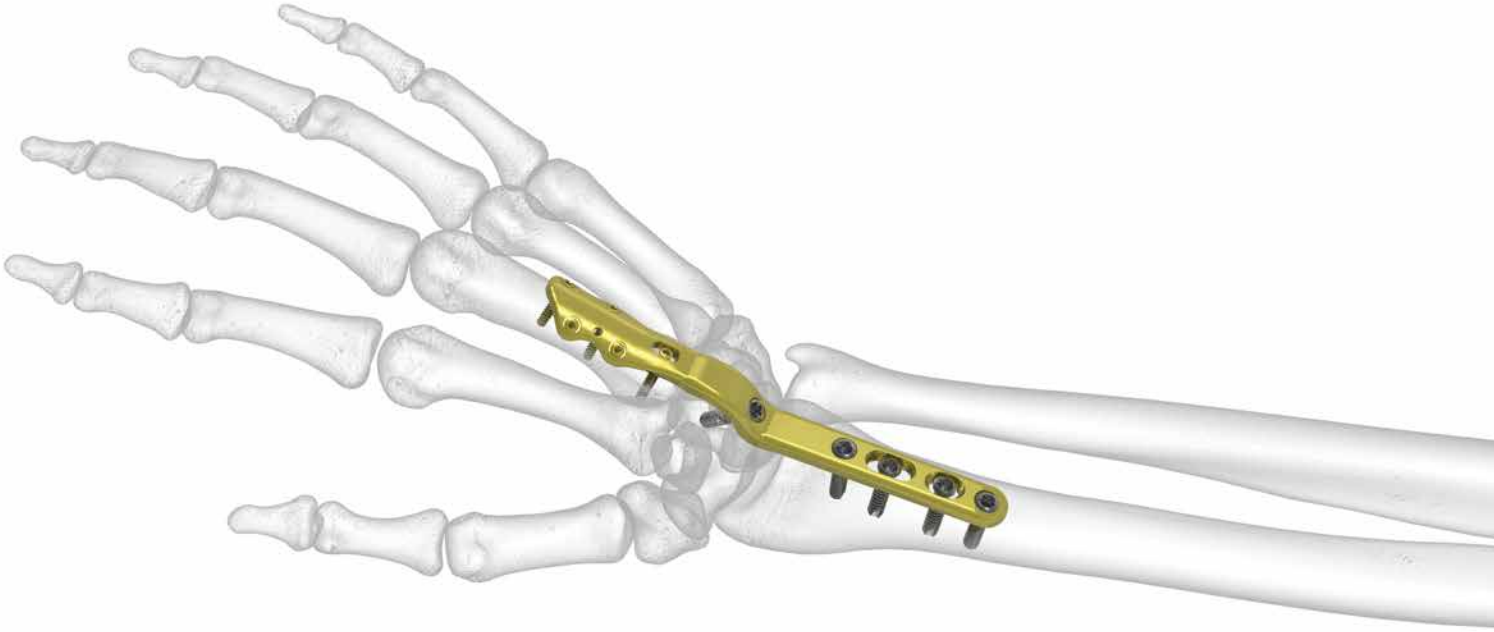
Surgical Technique





acumed® | Total Wrist Fusion Plating System

Acumed® is a global leader of innovative orthopaedic and medical solutions.

We are dedicated to developing products, service methods, and approaches that improve patient care.

Total Wrist Fusion Plating System Design Surgeon
William B. Geissler, M.D.

Acumed® Total Wrist Fusion Plating System

Acumed offers the Total Wrist Fusion Plating System for wrist arthrodesis due to deformities associated with degenerative arthritis, brachial plexus palsies, and spastic disorders. This five plate system features both innovative and traditional designs. Specifically, four of the five plates are positioned on the second metacarpal. These left and right specific designs are positioned on the index finger which may reduce extensor tendon irritation. Additionally, the fifth plate is a neutral option that is placed on the third metacarpal and developed for use with a proximal row carpectomy. All plates have a 15° dorsal bend, established as a balance between anatomic resting position, hand function, and grip strength.

Indications for Use:

- Post-traumatic arthritis of the joints of the wrist
- Rheumatoid wrist deformities requiring restoration
- Complex carpal instability
- Post-septic arthritis of the wrist
- Severe unremitting wrist pain related to motion
- Brachial plus nerve palsies
- Tumor resection
- Spastic deformities

Contents

Total Wrist Fusion System Surgical Technique

1 PLATE SELECTION

Standard and small sized plates are available depending on patient anatomy. These plates are designed for use on the second metacarpal. For patients requiring a proximal row carpectomy, the Total Wrist Fusion Plate, Neutral (70-0362) is recommended. This plate is designed for use on the third metacarpal. The Neutral Plate may not fit on patients with an intact proximal carpal row.

Note: Plates may be bent as needed based on patient anatomy. However, plates should not be bent across screw holes or bent multiple times in opposite directions.

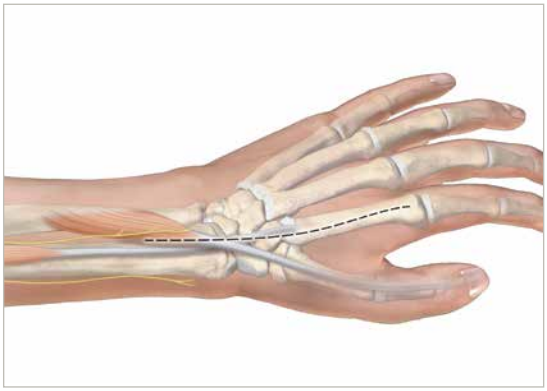
Total Wrist Fusion Plate, Standard, Left (70-0325)

Total Wrist Fusion Plate, Small, Left (70-0327)

Total Wrist Fusion Plate, Neutral (70-0362)

Total Wrist Fusion Plate, Small, Right (70-0328)

Total Wrist Fusion Plate, Standard, Right (70-0326)



2 INCISION AND DISSECTION

Standard Plates/Small Plates

1. Make a dorsal incision approximately 8 cm in length in line with the long finger centered over the radiocarpal joint and extending up the second metacarpal. Perform blunt dissection down to the level of the fascia in order to protect the dorsal cutaneous nerve branches of the radial and ulnar nerves. Identify the extensor pollicis longus (EPL) and release it through the third dorsal compartment. Retract and protect the EPL radially.
2. Elevate the second and fourth dorsal compartments exposing the dorsal capsule. Retract the second compartment radially and the fourth dorsal compartment ulnarly. Identify and excise, at the proximal portion of the incision, the terminal branch of the posterior interosseous nerve in the floor of the fourth dorsal compartment.
3. Open the dorsal capsule to expose the carpus. A radial, ulnar, or distal based flap may be created depending on the surgeon's preference. Release the extensor carpi radialis longus tendon to facilitate plate placement.
4. Remove the articular cartilage from the distal radius and the carpal bones of the proximal and middle row. Bone graft may be placed in the radiocarpal joint and midcarpal joint. In addition, the articular cartilage of the base of the index carpal metacarpal joint may be removed depending on the surgeon's preference.
5. All soft tissue must be removed from the dorsal surface of the scaphoid, lunate, capitate, and trapezoid.

Neutral Plates

1. The standard dorsal incision is made as previously described, except that the incision extends up the third metacarpal. Release the extensor carpi radialis brevis tendon to facilitate plate placement.
2. The dorsum of the third metacarpal is exposed.
3. The wrist is flexed and a proximal row carpectomy is performed.
4. The articular cartilage of the head of the capitate and distal radius is removed.
5. A radial styloidectomy is performed.

3 PLATE PLACEMENT

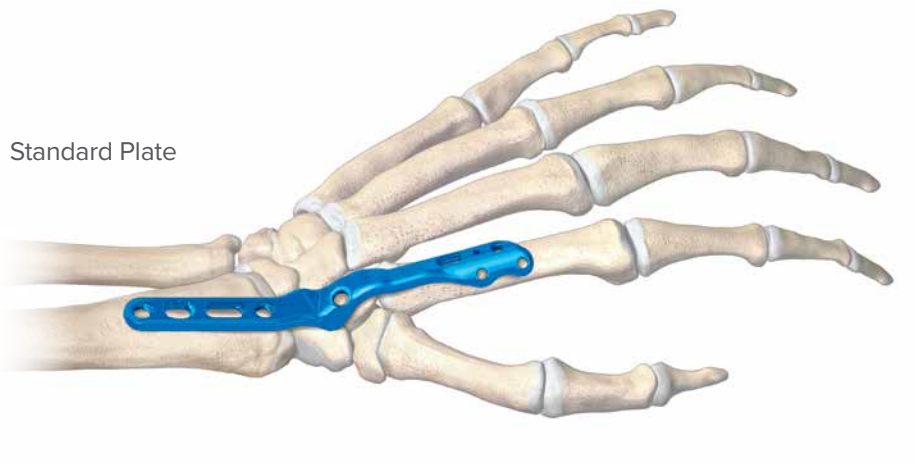
Standard Plates/Small Plates

The Total Wrist Fusion Plate, Standard (70-0325 or 70-0326) or Total Wrist Fusion Plate, Small (70-0327 or 70-0328) is placed on the dorsum of the index metacarpal and carpus and dorsoradially on the distal radius. A portion of Lister's tubercle may need to be removed to allow the plate to sit flush on the distal radius.

Placement initially should be focused on metacarpal fixation only. Standard and small plates should be placed as far distal as possible so that there is not a gap between the trapezoid and the plate.

Care should be given to ensure the distal end of the plate is placed directly dorsal and does not rotate laterally toward the thumb. The use of a K-wire on the distal portion of the plate can assist in preventing lateral rotation.

Note: If plate does not sit flat, a small piece of the trapezoid or scaphoid may need to be removed so that the plate can be positioned directly dorsal.



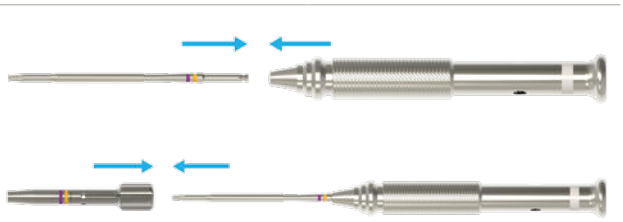
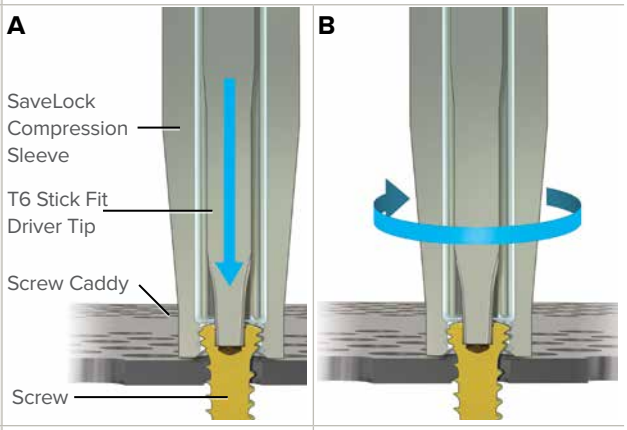
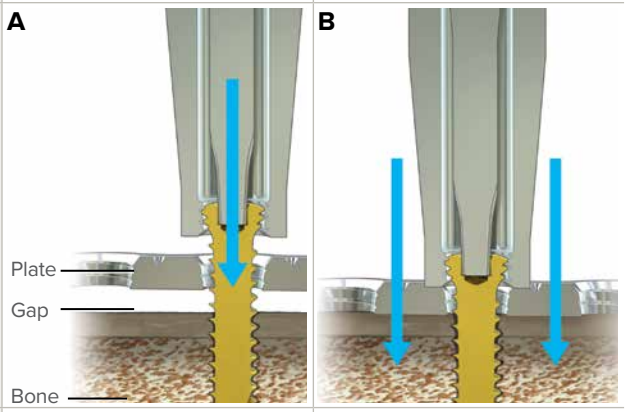
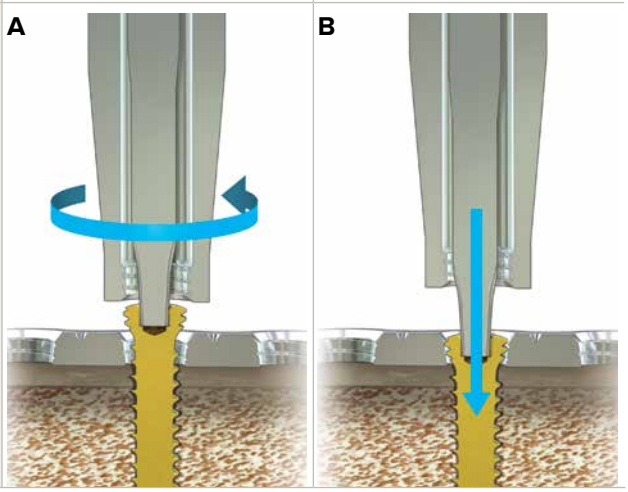
Neutral Plates

The Total Wrist Fusion Plate, Neutral is placed over the dorsal aspect of the third metacarpal. Placement initially should be focused on metacarpal fixation only. Plates should be placed as far distal as possible so that there is not a gap between the capitate and the plate.

Note: If plate does not sit flat, a small piece of the capitate may need to be removed so that the plate can be positioned directly dorsal.

SaveLock Compression Sleeve Instructions

The SaveLock Compression Sleeve is utilized with the T6 Stick Fit Driver Tip and serves two functions: to keep the 2.3 mm Hexalobe MultiScrew on the driver tip and to compress the plate to the bone when inserting the screw. The sleeve is threaded over the screw head only and prevents these threads from engaging the plate when inserting the screw shaft into the bone.

STEP 1: Assembly	Assemble the T6 Stick Fit Driver Tip (80-1756) and the Cruciform Driver Handle (MS-2210). Slide the SaveLock Compression Sleeve (80-1955) over the T6 Stick Fit Driver Tip.	
STEP 2: Remove 2.3 mm Hexalobe Multiscrew from Caddy	**A:** With the SaveLock Compression Sleeve installed, insert the T6 Stick Fit Driver into the head of the 2.3 mm Hexalobe MultiScrew (3004-230xx). **B:** Thread the SaveLock Compression Sleeve around the 2.3 mm Hexalobe MultiScrew head and then remove the screw from the caddy. **Note:** The SaveLock Compression Sleeve must be positioned vertically during this step.	
STEP 3: 2.3 mm Hexalobe Multiscrew Insertion	**A:** With the SaveLock Compression Sleeve engaged, insert the 2.3 mm Hexalobe MultiScrew into the bone until the bottom surface of the SaveLock Compression Sleeve contacts the plate. **B:** Continue insertion of the 2.3 mm Hexalobe MultiScrew with the SaveLock Compression Sleeve engaged until the plate is compressed to the bone.	
STEP 4: Lock 2.3 mm Hexalobe Multiscrew into Plate	**A:** Holding the T6 Stick Fit Driver in place, unthread the SaveLock Compression Sleeve from the 2.3 mm Hexalobe MultiScrew head. **B:** Continue inserting the 2.3 mm Hexalobe MultiScrew until locked into the plate. **Note:** When the SaveLock Compression Sleeve is released, the screw will have already locked into the bone and begun to engage with the plate. This maintains compression between the plate and bone.	

4 SCREW PLACEMENT AND REDUCTION

Screws are installed filling only the distal end of the plate first, allowing proper plate positioning before placing screws proximally.

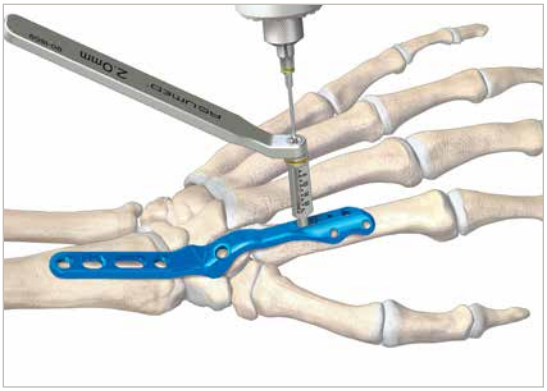
Distal Screw Placement (2.3 mm Hexalobe MultiScrew)

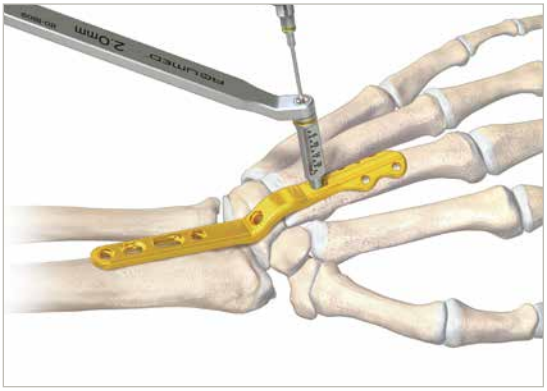
An initial 2.3 mm Hexalobe MultiScrew (3004-230xx) is placed distally to reduce the plate to the bone.

1. Utilizing the 2.0 mm x 3.5″ Quick Release Surgibit® Drill (80-1796) and the 2.0 mm MultiScrew Drill Guide 5–20 mm (80-1809), drill to the proper depth in the oblong slot in the distal end of the plate.

Note: Hexalobe MultiScrews—Each screw acts as a nonlocking screw in the unthreaded slots and a locking screw in the threaded holes.

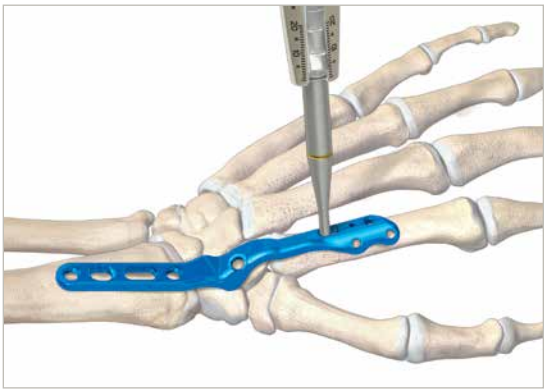
Note: When pressed into the counterbore of the plate, the drill guide will align with the proper screw trajectory.

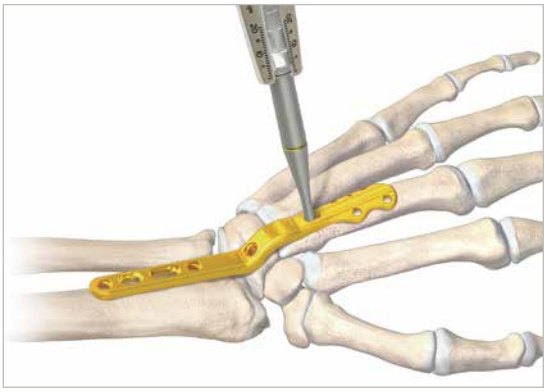


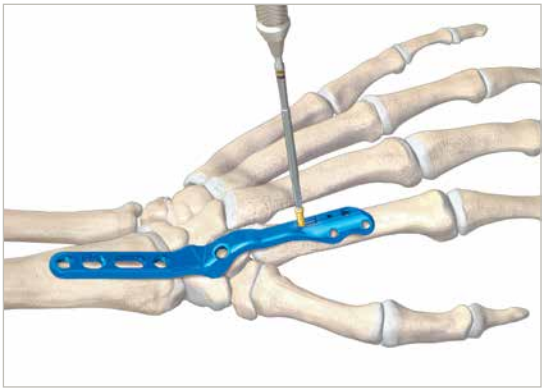


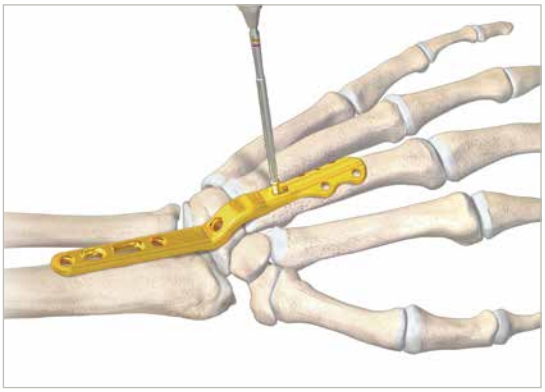
2. Measure for screw length using the 2.3 mm MultiScrew Depth Gauge (80-1954).

Note: For particularly hard bone, the hole may be tapped using the 2.3 mm MultiScrew Bone Tap (80-2013). This optional part is available upon request.





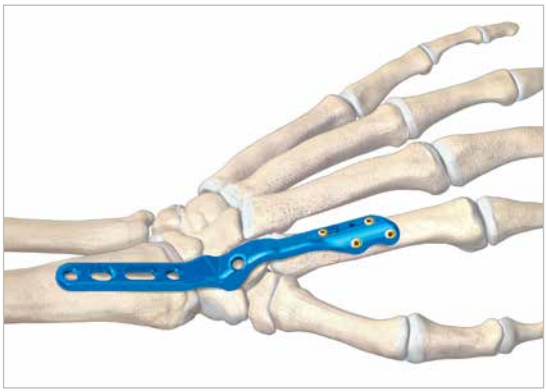


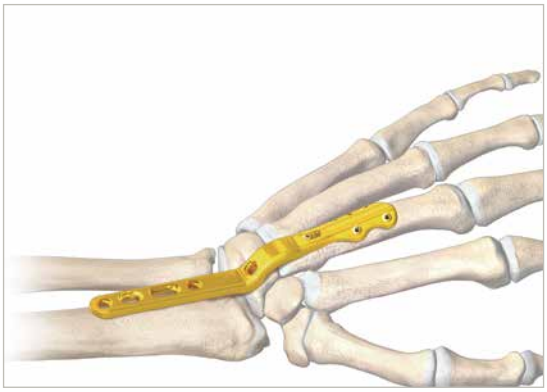


3. Insert a 2.3 mm Hexalobe MultiScrew with the SaveLock Compression Sleeve (80-1955) and the T6 Stick Fit Driver Tip (80-1756).

Note: Hexalobe MultiScrews should be inserted using only the Cruciform Driver Handle (MS-2210) provided in the system and locked to "three finger tight." This is generated by using only the thumb, index, and middle fingers.

Unlike traditional nonlocking screws, there is no "hard stop" feature when Hexalobe MultiScrews are used as a nonlocking screw in an oblong slot, so they should be inserted only until they are "three finger tight."



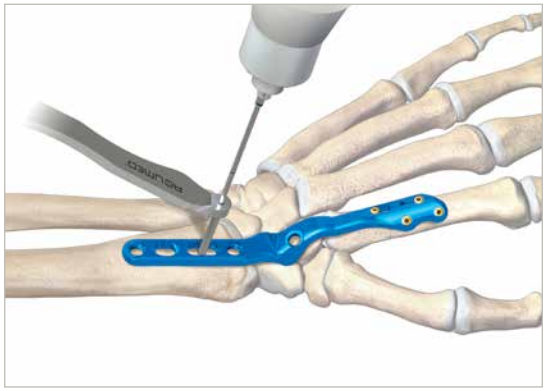


4. The remaining MultiScrews are then placed through the distal aspect of the plate into the index finger or third metacarpal.

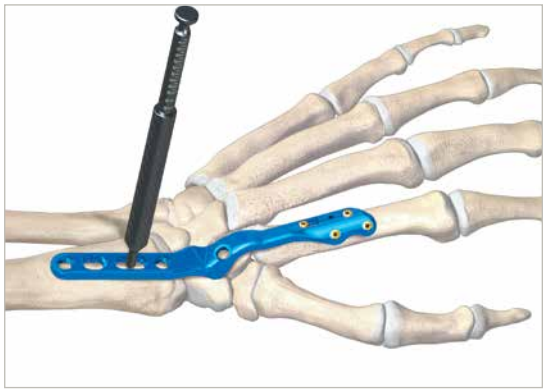
Proximal Screw Placement (3.5 mm Hex or Hexalobe)

Following all initial screws placed distally, a 3.5 mm Nonlocking Hex or Hexalobe Screw (CO-31xx or 30-02xx) is placed in the proximal portion of the plate in the oblong hole to secure the plate to the bone. Manual compression across the wrist joint is performed as the screw is being inserted. A second 3.5 mm nonlocking hex or hexalobe screw can be placed in the compression slot to further compress the arthrodesis site.

Note: The proximal portion of the plate should be placed on the distal radius so that the hand is positioned in slight extension and ulnar deviation.

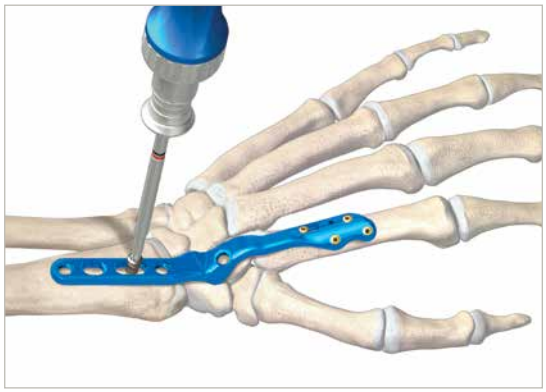


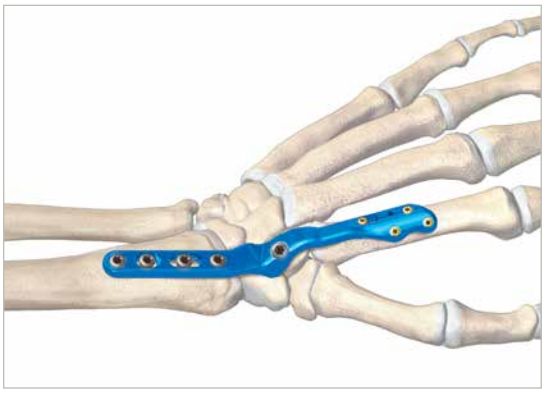
1. In the oblong slot on the proximal end of the plate, utilize the 2.8 mm Quick Release Surgibit® Drill (80-0387) to drill through the 2.0 mm/2.8 mm Thin Drill Guide (PL-2118) to the proper depth.



2. Measure for screw length using the Depth Gauge 6–65 mm (80-0623).

3. Insert a 3.5 mm nonlocking hex or hexalobe screw with the Medium Ratcheting Driver Handle (80-0663) and the 2.5 mm Quick Release Hex Driver (HPC-0025) or T15 Stick Fit Hexalobe Driver (80-0760) into the larger oval reduction slot to secure the plate to the bone. A second nonlocking screw may be placed in the remaining oblong compression slot to compress the arthrodesis site. The position of the wrist, compression of the arthrodesis site, and screw length should be confirmed under fluoroscopic evaluation after this second proximal screw is placed.





4. The remaining 3.5 mm Locking Hex or Hexalobe Screws (COL-31xx or 30-02xx) are then placed into the plate by drilling with the 2.8 mm Quick Release Surgibit® Drill through the 2.8 mm Locking Drill Guide 6–65 mm (80-0384) or 2.8 mm Hexalobe Locking Drill Guide 6–65 mm (80-0668). Screw length can be determined by the laser mark reference line on the drill in conjunction with the locking drill guide or with the Depth Gauge 6–65 mm. The last screw placed is the locking carpal screw in the center of the plate. For the standard plates placed on the second metacarpal, this screw is inserted through the capitate and unicortically into the hamate for additional construct stability. For the neutral plate placed on the third metacarpal, this screw is inserted unicortically into the capitate.

Note: Unicortical drilling of the carpal screw protects the ulnar nerve. The use of fluoroscopy during drilling is recommended.

5 CLOSURE

Close the wound in layers with the dorsal capsule closed over the plate. Close the second and fourth dorsal compartments leaving the extensor pollicis longus tendon free in the subcutaneous tissues.

6 POSTOPERATIVE PROTOCOL

Postoperatively, place the patient in a volar brace and encourage early digital range of motion. Continue temporary removable wrist immobilization for three to four weeks, and initiate physical therapy for strengthening at four to six weeks postoperatively.

Ordering Information

Total Wrist Fusion Plates

Total Wrist Fusion Plate, Standard, Left	70-0325
Total Wrist Fusion Plate, Standard, Right	70-0326
Total Wrist Fusion Plate, Small, Left	70-0327
Total Wrist Fusion Plate, Small, Right	70-0328
Total Wrist Fusion Plate, Neutral	70-0362

Instruments

2.0 mm x 3.5” Quick Release Surgibit® Drill	80-1796
T6 Stick Fit Driver Tip	80-1756
2.8 mm Quick Release Surgibit® Drill	80-0387
T15 Stick Fit Hexalobe Driver Tip	80-0760
.062″ x 6″ Guide Wire	WS-1607ST
Plate Tack	PL-PTACK

2.3 mm Hexalobe MultiScrews

2.3 mm x 5 mm Hexalobe MultiScrew	3004-23005
2.3 mm x 6 mm Hexalobe MultiScrew	3004-23006
2.3 mm x 7 mm Hexalobe MultiScrew	3004-23007
2.3 mm x 8 mm Hexalobe MultiScrew	3004-23008
2.3 mm x 9 mm Hexalobe MultiScrew	3004-23009
2.3 mm x 10 mm Hexalobe MultiScrew	3004-23010
2.3 mm x 11 mm Hexalobe MultiScrew	3004-23011
2.3 mm x 12 mm Hexalobe MultiScrew	3004-23012
2.3 mm x 13 mm Hexalobe MultiScrew	3004-23013
2.3 mm x 14 mm Hexalobe MultiScrew	3004-23014
2.3 mm x 16 mm Hexalobe MultiScrew	3004-23016
2.3 mm x 18 mm Hexalobe MultiScrew	3004-23018
2.3 mm x 20 mm Hexalobe MultiScrew	3004-23020

3.5 mm Locking Hexalobe Screws

3.5 mm x 8 mm Locking Hexalobe Screw	30-0232
3.5 mm x 10 mm Locking Hexalobe Screw	30-0233
3.5 mm x 12 mm Locking Hexalobe Screw	30-0234
3.5 mm x 14 mm Locking Hexalobe Screw	30-0235
3.5 mm x 16 mm Locking Hexalobe Screw	30-0236
3.5 mm x 18 mm Locking Hexalobe Screw	30-0237
3.5 mm x 20 mm Locking Hexalobe Screw	30-0238
3.5 mm x 22 mm Locking Hexalobe Screw	30-0239
3.5 mm x 24 mm Locking Hexalobe Screw	30-0240
3.5 mm x 26 mm Locking Hexalobe Screw	30-0241

3.5 mm Nonlocking Hexalobe Screws

3.5 mm x 8 mm Nonlocking Hexalobe Screw	30-0255
3.5 mm x 10 mm Nonlocking Hexalobe Screw	30-0256
3.5 mm x 12 mm Nonlocking Hexalobe Screw	30-0257
3.5 mm x 14 mm Nonlocking Hexalobe Screw	30-0258
3.5 mm x 16 mm Nonlocking Hexalobe Screw	30-0259
3.5 mm x 18 mm Nonlocking Hexalobe Screw	30-0260
3.5 mm x 20 mm Nonlocking Hexalobe Screw	30-0261
3.5 mm x 22 mm Nonlocking Hexalobe Screw	30-0262
3.5 mm x 24 mm Nonlocking Hexalobe Screw	30-0263
3.5 mm x 26 mm Nonlocking Hexalobe Screw	30-0264

To learn more about the full line of Acumed® innovative surgical solutions, please contact your local Acumed® Sales Representative, call 888.627.9957, or visit acumed.net.

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