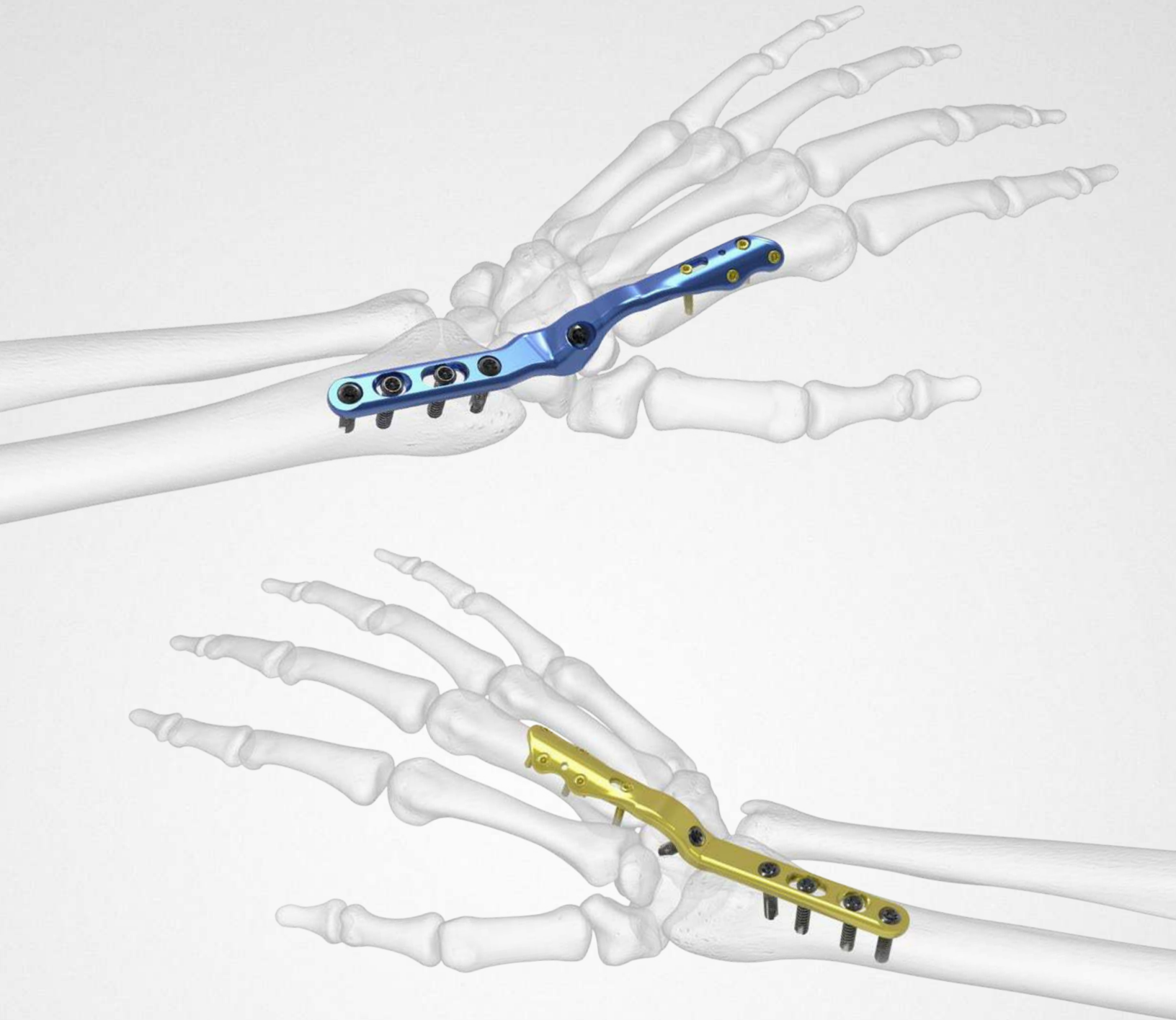


Surgical Technique



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.



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Acumed® Total Wrist Fusion Plating System

The Acumed Total Wrist Fusion Plating System is designed 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, which may help reduce extensor tendon irritation. Additionally, the fifth plate is a neutral option that is placed on the third metacarpal and is 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.¹

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 plexus palsies
- ▶ Tumor resection
- ▶ Spastic deformities

	Definition
Warning	Indicates critical information about a potential serious outcome to the patient or the user.
Caution	Indicates instructions that must be followed in order to ensure the proper use of the device.
Note	Indicates information requiring special attention.

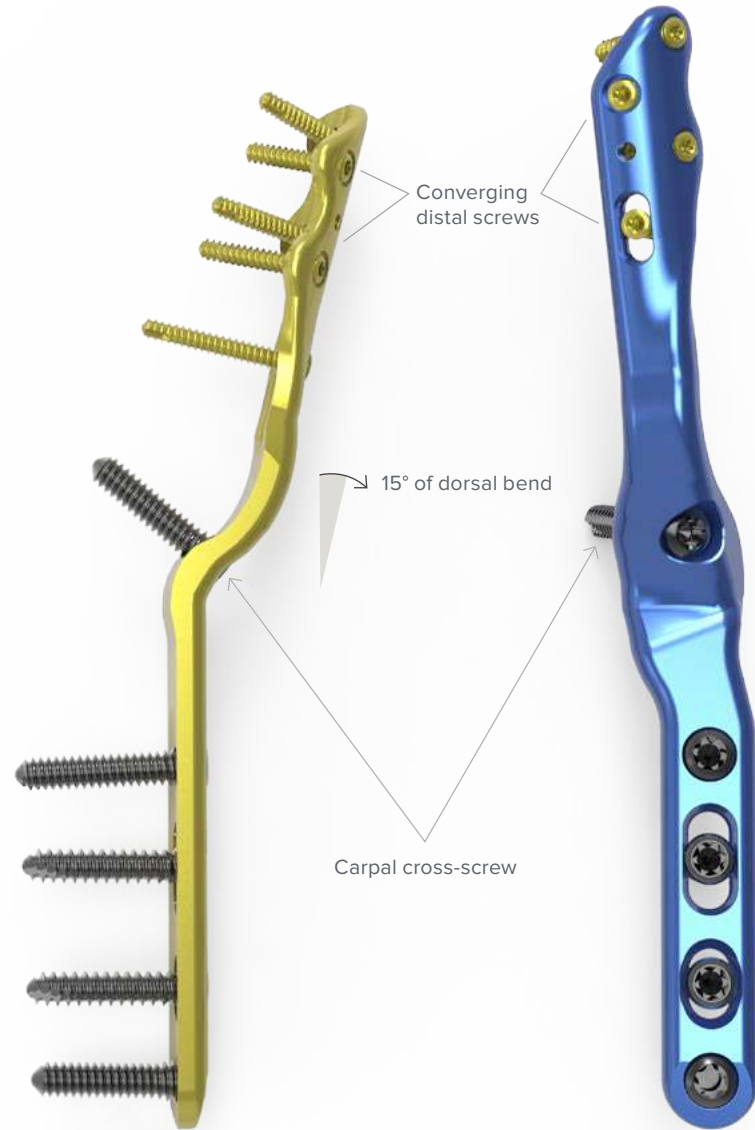
1. Field J, Herbert TJ, Prosser R. Total wrist fusion: a functional assessment. *J Hand Surg Am.* 1996;21B(4):429–433.



System Features

Total Wrist Fusion Plates

Neutral plate for placement on third metacarpal with an associated proximal row carpectomy



Converging distal screws

15° of dorsal bend

Carpal cross-screw

Left- and right-specific plates for placement on the second metacarpal have 10° of ulnar deviation

System Features [continued]

Screws

3.5 mm Locking Hexalobe Screw
(30-023X, 30-024X)

3.5 mm Nonlocking Hexalobe Screw
(30-025X, 30-026X)



Type II Anodized, cutting flutes, T15 Hexalobe Interface

2.3 mm Hexalobe MultiScrew
(3004-230XX)



T6 Hexalobe Interface
Each MultiScrew acts as a nonlocking screw in the non-threaded slots and a locking screw in the threaded holes

System Features [continued]

Total Wrist Fusion Plates



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

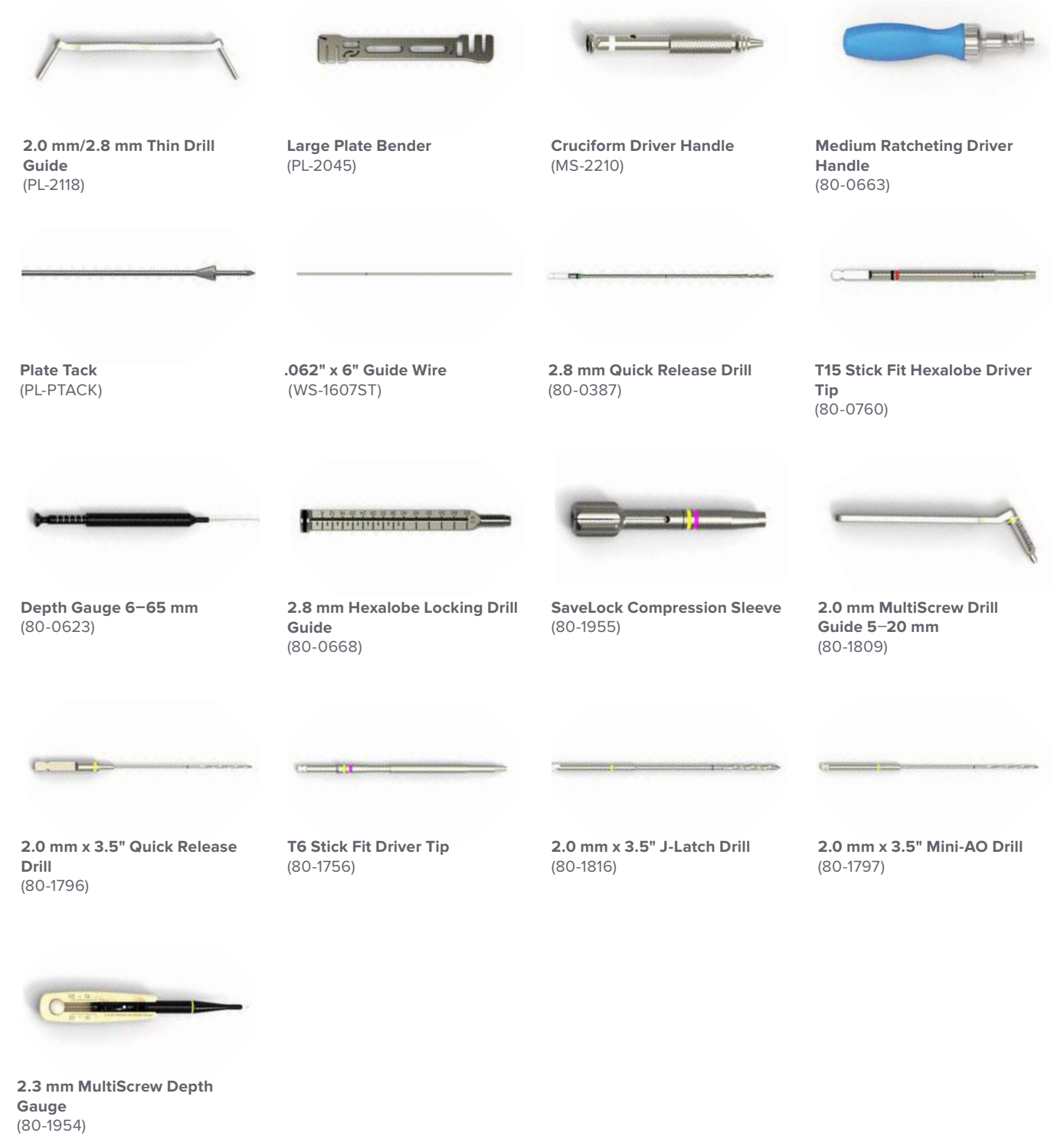
Total Wrist Fusion Plate, Small, Left
(70-0327)

Total Wrist Fusion Plate, Neutral
(70-0362)

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

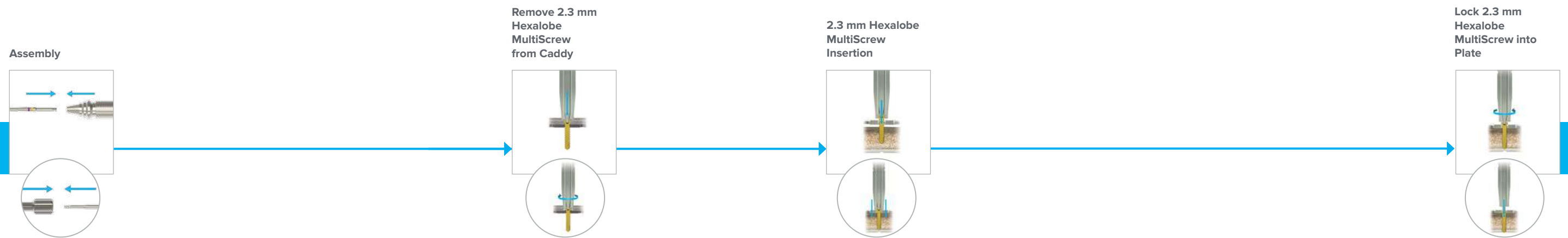
Total Wrist Fusion Plate, Standard, Right
(70-0326)

Instrument Overview

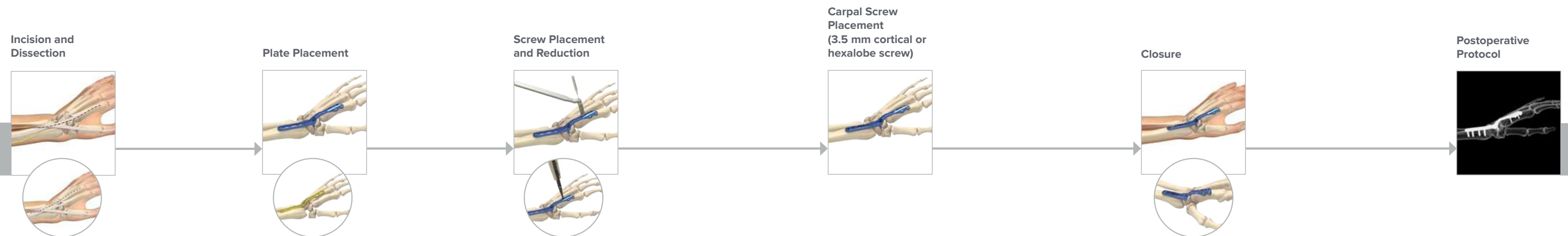


Surgical Technique and Instructions Overview

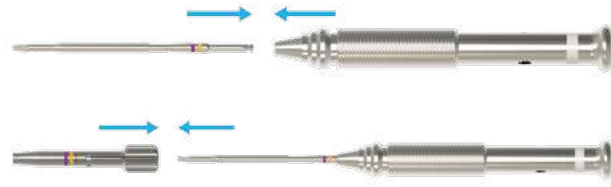
SaveLock
Compression
Sleeve



Total Wrist
Fusion System



SaveLock Compression Sleeve Instructions



The SaveLock Compression Sleeve is used 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.

Note: The 1.5 mm Hexalobe MultiScrew may also be used with the SaveLock Compression Sleeve and uses the same instrumentation as described below.

1 Assembly

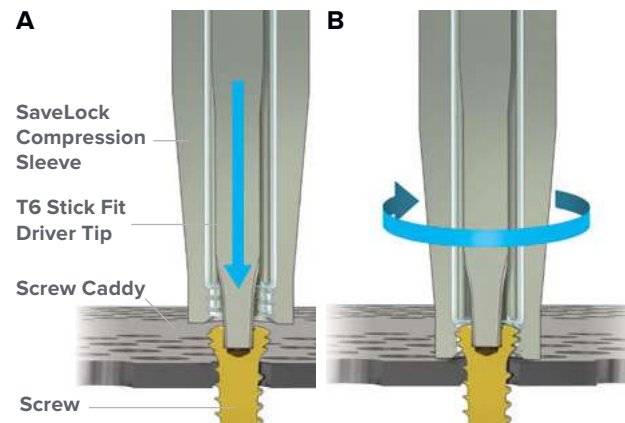
Assemble the T6 Stick Fit Driver Tip (80-1756) and the Cruciform Driver Handle (MS-2210). Slide the SaveLock Compression Sleeve (80-1955) over the T6 Stick Fit Driver Tip.

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.

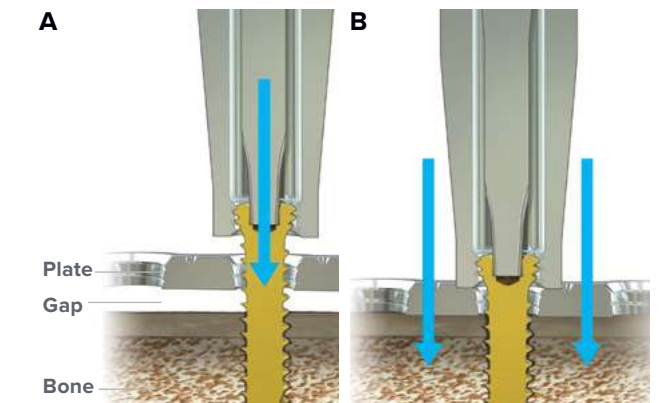


SaveLock Compression Sleeve Instructions [continued]

3 2.3 mm Hexalobe MultiScrew Insertion

A: With the SaveLock Compression Sleeve (80-1955) engaged, insert the 2.3 mm Hexalobe MultiScrew (3004-230XX) 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.

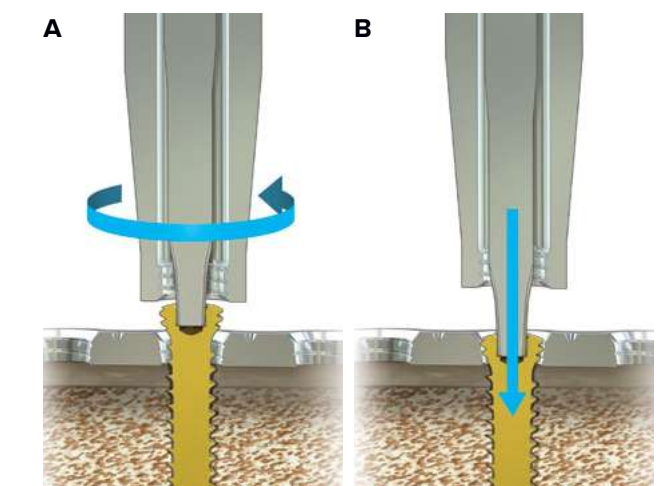


4 Lock 2.3 mm Hexalobe MultiScrew into Plate

A: Holding the T6 Stick Fit Driver Tip (80-1756) in place, unthread the SaveLock Compression Sleeve (80-1955) from the 2.3 mm Hexalobe MultiScrew (3004-230XX) 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.



Total Wrist Fusion System Surgical Technique

1 Plate Selection

The Total Wrist Fusion Plate, Standard (Left: 70-0325 or Right: 70-0326) and the Total Wrist Fusion Plate, Small (Left: 70-0327 or Right: 70-0328) 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 without 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
(70-0325 or 70-0326)



Total Wrist Fusion Plate, Small
(70-0327 or 70-0328)



Total Wrist Fusion Plate, Neutral
(70-0362)

Total Wrist Fusion System Surgical Technique

[continued]

2 Incision and Dissection

Standard Plates/Small Plates

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 (Figure 1). Perform blunt dissection down to the level of the fascia in order to protect the dorsal cutaneous nerve branches of the radial and the ulnar nerves. Identify the extensor pollicis longus (EPL) and release it through the third dorsal compartment. Retract and protect the EPL radially.

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.

Open the dorsal capsule to expose the carpus. A radial, an ulnar, or a distal based flap may be created depending on the surgeon's preference. Release the extensor carpi radialis longus tendon to facilitate plate placement.

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.

Remove all soft tissue from the dorsal surface of the scaphoid, the lunate, the capitate, and the trapezoid.

Neutral Plates

Make a standard dorsal incision as previously described, except that the incision extends up the third metacarpal (Figure 2). Release the extensor carpi radialis brevis tendon to facilitate plate placement. Expose the dorsum of the third metacarpal. Flex the wrist and perform a proximal row carpectomy. Remove the articular cartilage of the head of the capitate and distal radius. Perform a radial styloidectomy.

Figure 1



Figure 2



Total Wrist Fusion System Surgical Technique [continued]

Figure 3



3 Plate Placement

Standard Plates/Small Plates

Place the Total Wrist Fusion Plate, Standard (Left: 70-0325 or Right: 70-0326) or Total Wrist Fusion Plate, Small (Left: 70-0327 or Right: 70-0328) on the dorsum of the second metacarpal and the 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.

Initially focus placement on metacarpal fixation only. Place standard and small plates as far distal as possible so that there is no gap between the trapezoid and the plate.

Care should be given to ensure the slot on the distal end of the plate is placed directly dorsal and does not rotate laterally toward the thumb. Use a .062" x 6" K-wire (WS-1607ST) on the distal portion of the plate to assist in preventing lateral rotation.

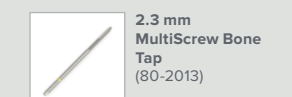
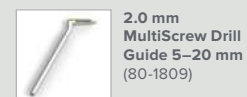
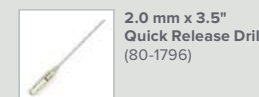
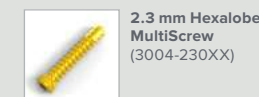
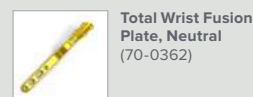
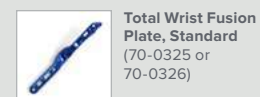
Note: If the plate does not sit flat, a small piece of the trapezoid or the scaphoid may need to be removed so that the plate can be positioned directly dorsal.

Neutral Plates

Place the Total Wrist Fusion Plate, Neutral (70-0362) over the dorsal aspect of the third metacarpal. Placement initially should be focused on metacarpal fixation only. Place plates as far distal as possible so that there is not a gap between the capitate and the plate.

Note: If the 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.

Figure 4



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.

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

Note: The SaveLock Compression Sleeve (80-1955) may be used for additional compression.

Place the remaining multiscrews through the distal aspect of the plate into the second metacarpal or third metacarpal.

Hexalobe MultiScrews should be inserted using only the Cruciform Driver Handle 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.

Measure for screw length using the 2.3 mm MultiScrew Depth Gauge (80-1954) (see Figure 6).

Insert a 2.3 mm Hexalobe MultiScrew with the Cruciform Driver Handle (MS-2210) and the T6 Stick Fit Driver Tip (80-1756) (see Figure 7).

Distal Screw Placement (2.3 mm Hexalobe MultiScrew)

Place an initial 2.3 mm Hexalobe MultiScrew (3004-230XX) distally to reduce the plate to the bone.

4 Screw Placement and Reduction

Install screws first in the distal end of the plate to allow proper plate positioning before placing screws proximally.

Figure 5



Figure 6



Figure 7



Total Wrist Fusion System Surgical Technique [continued]

Figure 8



Proximal Screw Placement (3.5 mm Cortical or Hexalobe)

Following all initial screws placed distally, place a 3.5 mm Cortical Screw (CO-3XX0) or 3.5 mm Hexalobe Screw (30-02XX) in the proximal portion of the plate in the oblong hole to secure the plate to the bone. Perform manual compression across the wrist joint as the screw is being inserted. A second 3.5 mm cortical 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.

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

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

Figure 9



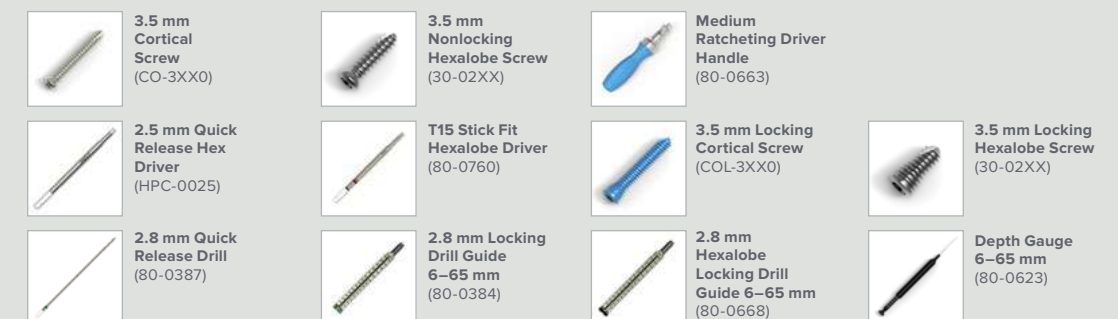
Total Wrist Fusion System Surgical Technique [continued]

Figure 10



Insert a 3.5 mm Cortical screw (CO-3XX0) or 3.5 mm Nonlocking Hexalobe Screw (30-02XX) 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.

Place the remaining 3.5 mm Locking Cortical Screws (COL-3XX0) or 3.5 mm Locking Hexalobe Screws (30-02XX) into the plate by drilling with the 2.8 mm Quick Release Drill (80-0387) through the 2.8 mm Locking Drill Guide 6–65 mm (80-0384) or the 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 (80-0623).



Total Wrist Fusion System Surgical Technique

[continued]

Figure 11



5 Carpal Screw Placement (3.5 mm Cortical or Hexalobe Screw)

Place the last screw, the 3.5 mm Locking Cortical Screw (COL-3XX0) or the 3.5 mm Locking Hexalobe Screw (30-02XX) 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.

Figure 12



6 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.

Total Wrist Fusion System Surgical Technique

[continued]

Figure 13



7 Postoperative Protocol

Postoperative care is at the discretion of the surgeon. The following protocol is provided as an example: 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.

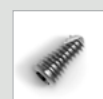
8 Optional: Implant Removal Instructions

To extract a Total Wrist Fusion Plate, use the 2.5 mm Hex Driver Tip (HPC-0025) or T15 Stick Fit Hexalobe Driver Tip (80-0760) and Medium Ratcheting Driver Handle (80-0663) to remove all the 3.5 mm screws in the plate. Use T6 Stick Fit Driver Tip (80-1756) with Cruciform Driver Handle (MS-2210) for the 2.3 mm screws.

Referencing the Screw Removal Brochure (SPF10-00) may aid in implant extraction if difficulty is experienced.



3.5 mm Locking Cortical Screw (COL-3XX0)



3.5 mm Locking Hexalobe Screw (30-02XX)



2.5 mm Hex Driver Tip (HPC-0025)



T15 Stick Fit Hexalobe Driver (80-0760)



Medium Ratcheting Driver Handle (80-0663)



T6 Stick Fit Driver Tip (80-1756)



Cruciform Driver Handle (MS-2210)

Ordering Information

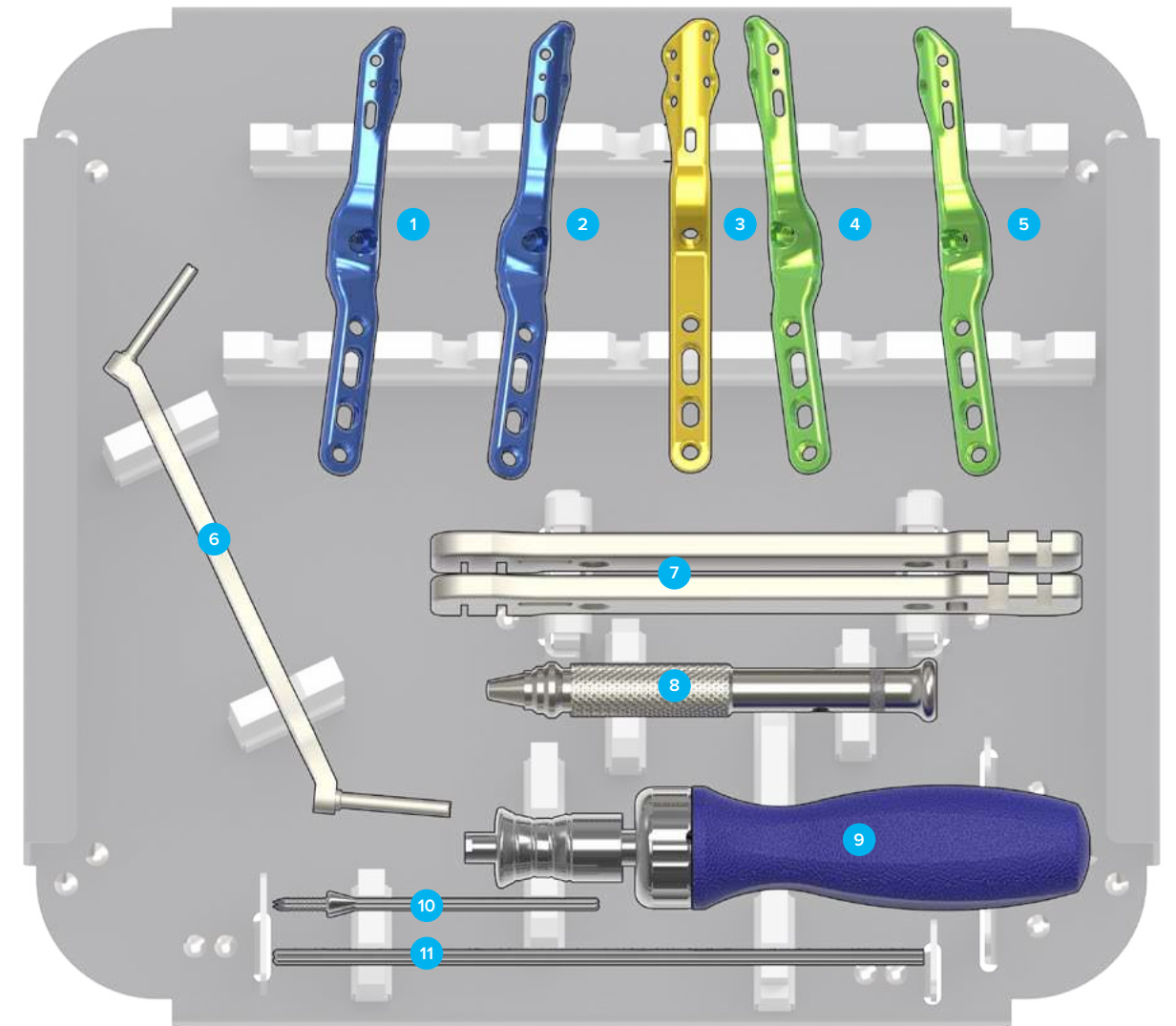
Tray Components

Implants

1	Total Wrist Fusion Plate, Small, Left	70-0327	4	Total Wrist Fusion Plate, Standard, Right	70-0326
2	Total Wrist Fusion Plate, Standard, Left	70-0325	5	Total Wrist Fusion Plate, Small, Right	70-0328
3	Total Wrist Fusion Plate, Neutral	70-0362			

Instruments

6	2.0 mm/2.8 mm Thin Drill Guide	PL-2118	9	Medium Ratcheting Driver Handle	80-0663
7	Large Plate Bender	PL-2045	10	Plate Tack	PL-PTACK
8	Cruciform Driver Handle	MS-2210	11	.062" x 6" Guide Wire	WS-1607ST

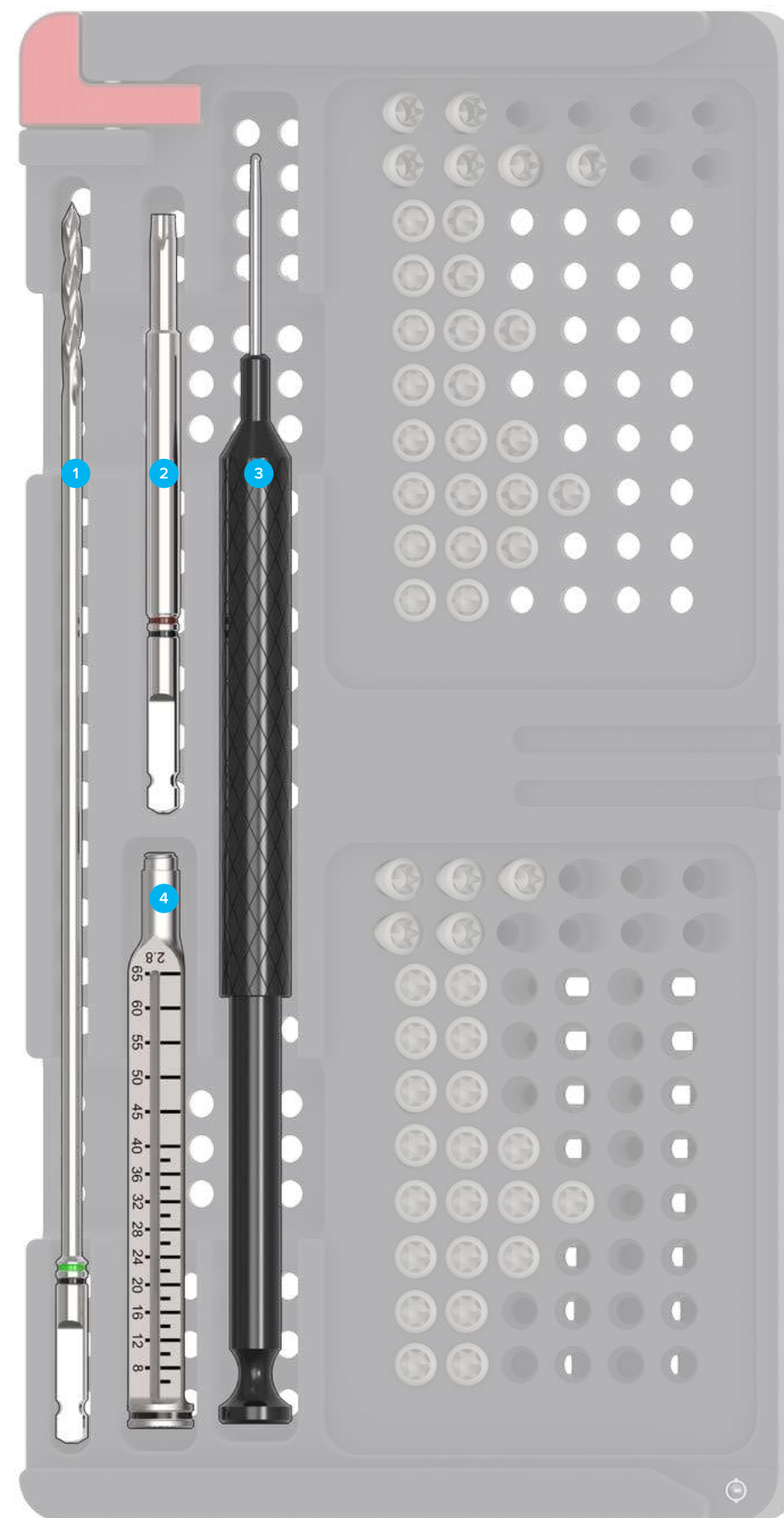


Ordering Information [continued]

Instruments				
1	2.8 mm Quick Release Drill	80-0387	3 Depth Gauge 6–65 mm	80-0623
2	T15 Stick Fit Hexalobe Driver Tip	80-0760	4 2.8 mm Hexalobe Locking Drill Guide 6–65 mm	80-0668

3.5 mm Locking Hexalobe Screws			
3.5 mm x 8 mm Locking Hexalobe Screw	30-0232	3.5 mm x 18 mm Locking Hexalobe Screw	30-0237
3.5 mm x 10 mm Locking Hexalobe Screw	30-0233	3.5 mm x 20 mm Locking Hexalobe Screw	30-0238
3.5 mm x 12 mm Locking Hexalobe Screw	30-0234	3.5 mm x 22 mm Locking Hexalobe Screw	30-0239
3.5 mm x 14 mm Locking Hexalobe Screw	30-0235	3.5 mm x 24 mm Locking Hexalobe Screw	30-0240
3.5 mm x 16 mm Locking Hexalobe Screw	30-0236	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 18 mm Nonlocking Hexalobe Screw	30-0260
3.5 mm x 10 mm Nonlocking Hexalobe Screw	30-0256	3.5 mm x 20 mm Nonlocking Hexalobe Screw	30-0261
3.5 mm x 12 mm Nonlocking Hexalobe Screw	30-0257	3.5 mm x 22 mm Nonlocking Hexalobe Screw	30-0262
3.5 mm x 14 mm Nonlocking Hexalobe Screw	30-0258	3.5 mm x 24 mm Nonlocking Hexalobe Screw	30-0263
3.5 mm x 16 mm Nonlocking Hexalobe Screw	30-0259	3.5 mm x 26 mm Nonlocking Hexalobe Screw	30-0264



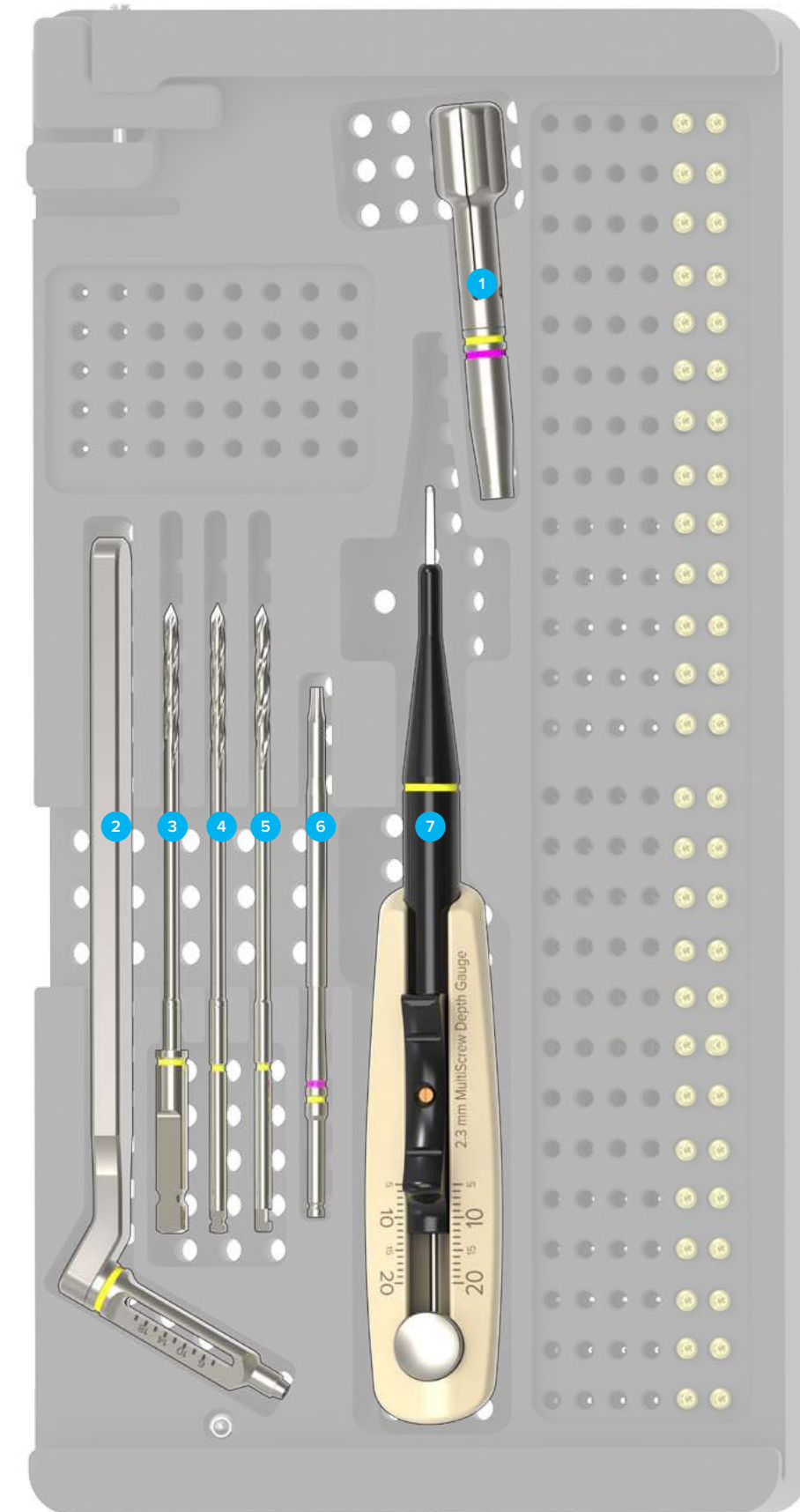
Ordering Information [continued]

Instruments

1	SaveLock Compression Sleeve	80-1955	5	2.0 mm x 3.5" J-Latch Drill	80-1816
2	2.0 mm MultiScrew Drill Guide 5–20 mm	80-1809	6	T6 Stick Fit Driver Tip	80-1756
3	2.0 mm x 3.5" Quick Release Drill	80-1796	7	2.3 mm MultiScrew Depth Gauge	80-1954
4	2.0 mm x 3.5" Mini-AO Drill	80-1797			

2.3 mm Hexalobe MultiScrews

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





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