KANGHUI
medical

# 2.4 / 3.0 Headless Compression Screw System

## SURGICAL TECHNIQUE


**CHINA KANGHUI HOLDINGS**
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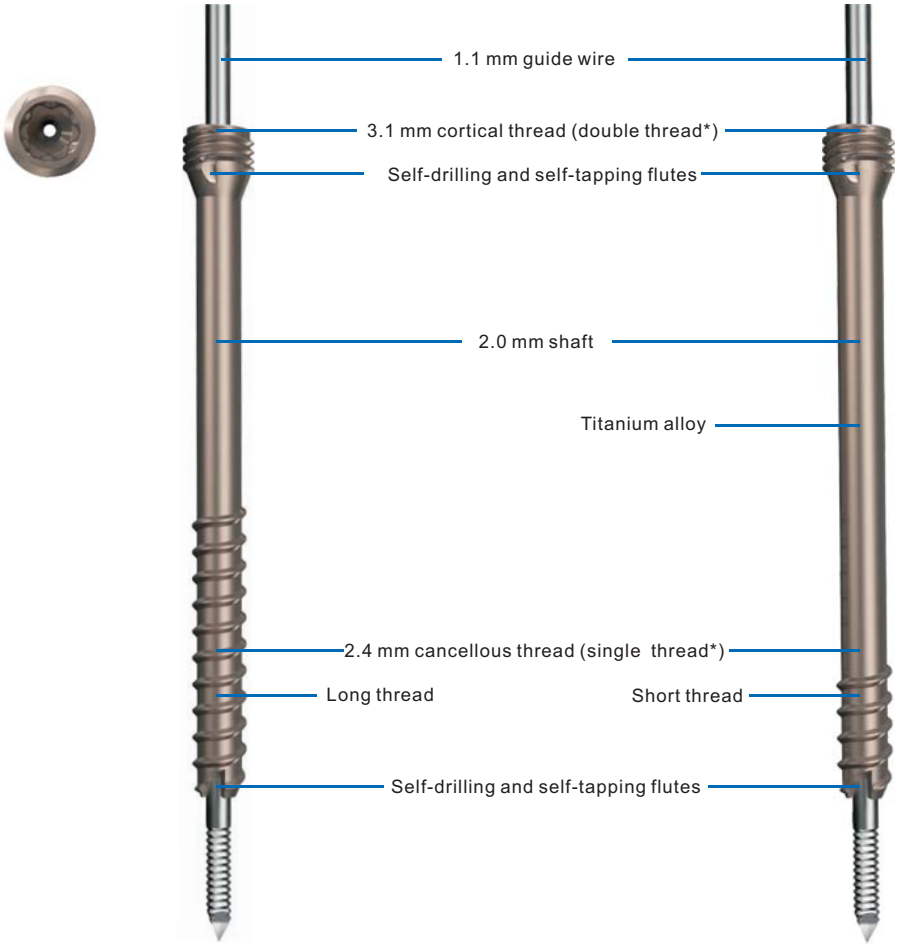
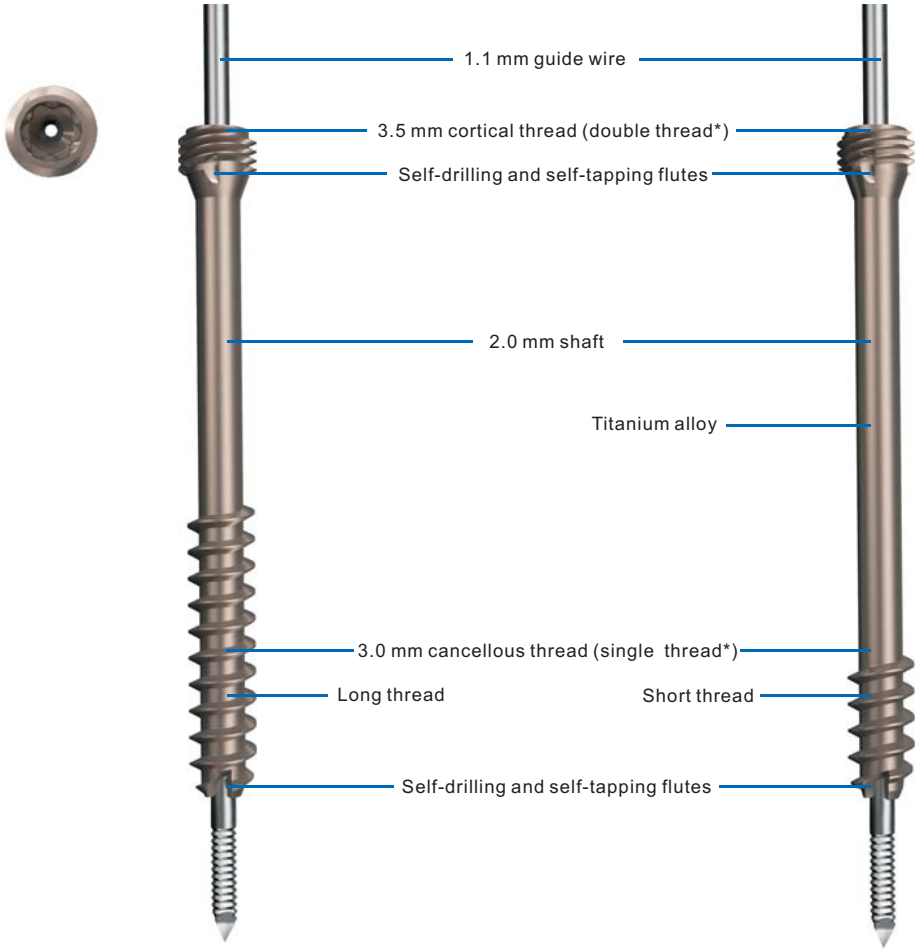
***Image intensifier control***

## The 2.4 mm Self-drilling, Self-tapping, Cannulated Headless Compression Screw



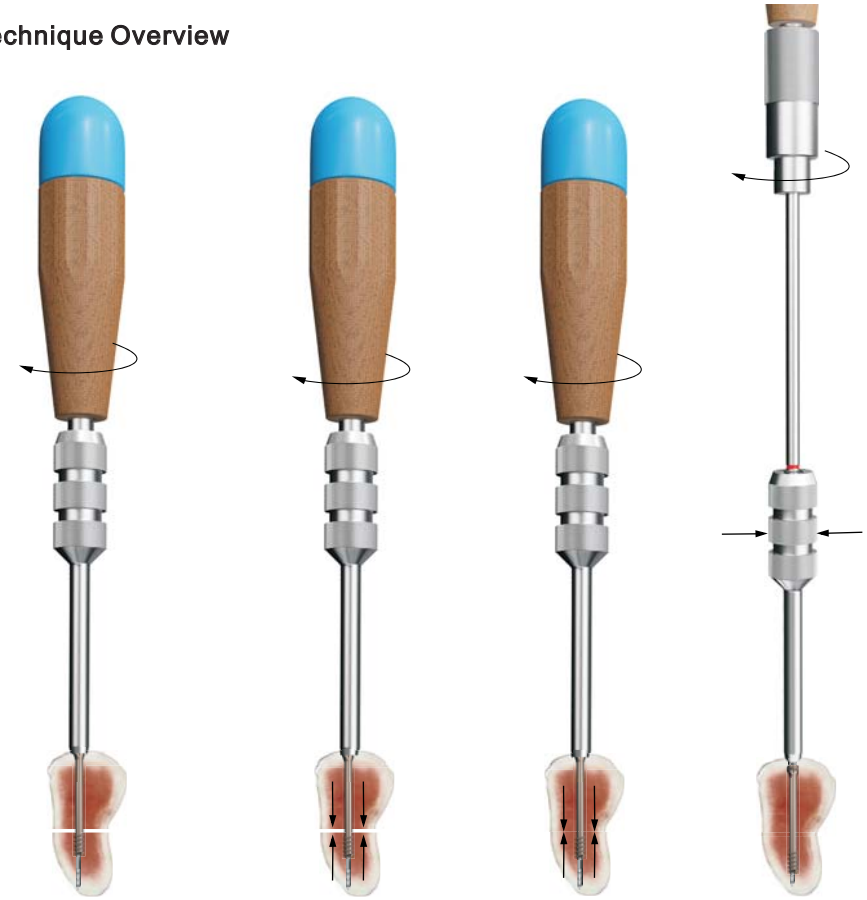

- Threads are of equal lead (i.e. they advance the same distance for each revolution)

## The 3.0 mm Self-drilling, Self-tapping, Cannulated Headless Compression Screw




- Threads are of equal lead (i.e. they advance the same distance for each revolution)

## Technique Overview



### 1 Insert screw

Thread the head of the headless compression screw into the tip of the compression sleeve. Insert the screw into the bone using the compression sleeve construct.

### 2 Compress

The tip of the compression sleeve acts as a conventional lag screw head.When the tip of the compression sleeve contacts the bone, the fracture gap is closed and compressed as with a lag screw.

### 3 Countersink

Following compression of the fracture, hold the compression sleeve stationary and use the screwdriver to advance the screw head into the bone.





## AO Principles

In 1958, the AO formulated four basic principles, which have become the guidelines for internal fixation. Those principles as applied to the 2.4 mm and 3.0 mm Headless Compression Screws are:

### Anatomic reduction

A guide wire marks the prescribed path for the cannulated headless compression screw and secures the alignment of the fragments while the screw is being inserted. The cannulated headless compression screw is inserted over the wire and tightened to further compress the fragments and hold the reduction.

### Stable fixation

Regardless of the size of the fracture gap, cannulated headless compression screws provide interfragmentary compression and absolute stability. Furthermore, the instrumentation allows the surgeon to directly control the amount of compression. The screws are available in different thread lengths, allowing the surgeon to optimize purchase in the far fragment for maximum compression and stability.

### Preservation of blood supply

The use of small diameter guide wires allows precise placement of the cannulated headless compression screws through small incisions. This technique minimizes disruption of soft tissue and preserves vascular blood flow for bone healing.

### Early, active mobilization

Cannulated headless compression screws provide stable fracture fixation with minimal trauma to vascular supply. This helps to create an improved environment for bone healing, accelerating the patient's return to previous mobility and function.

## Indications

The 2.4 mm Headless Compression Screws are indicated for fixation of fractures and nonunions of small bones and small bone arthrodeses, including scaphoid fractures; intra- articular fractures of the tarsals, metatarsals, carpals and metacarpals; bunionectomies and osteotomies; arthrodeses of small joints (e.g. phalanges); fractures of the patella, ulna and radial styloid.

The 3.0 mm Headless Compression Screws are intended for fixation of intra-articular and extra-articular fractures and nonunions of small bones and small bone fragments; arthrodeses of small joints; bunionectomies and osteotomies, including scaphoid and other carpal bones, metacarpals, tarsals, metatarsals, patella, ulnar styloid, capitellum, radial head and radial styloid.

## Scaphoid Fixation

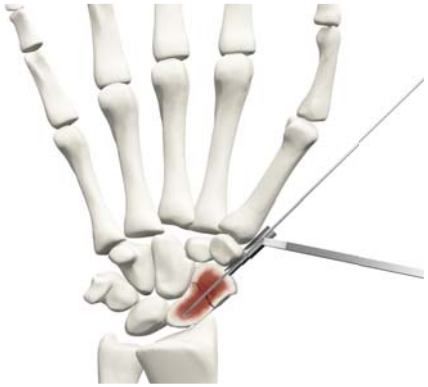
This surgical technique describes a volar approach procedure.Depending on the type and location of the fracture, a dorsal approach to the scaphoid may be preferred. The same surgical steps apply.

### Step 1
**Insert guide wire**

**Instruments**

| | |
|---|---|
| 19599800 | 1.1 mm Nonthreaded Guide Wire, 150 mm length or |
| 19599700 | 1.1 mm Threaded Guide Wire,150 mm length |
| 237170 | 2.0 mm/1.1 mm Double Drill Sleeve |

Reduce fragments with a ***1.1 mm guide wire (19599800 or 19599700)*** and the ***2.0 mm/1.1 mm Double Drill Sleeve (237170)***using image intensification. Insert the wire from distal-radial to proximal-ulnar until the tip is anchored into the far cortex. Ensure the guide wire lies along the central axis of the scaphoid in the frontal and sagittal planes.



**Note:**
- Insert the guide wire in 10 mm to 15 mm increments to minimize the possibility of bending the wire.





### Step 2
**Drill trapezium (optional)**

**Instruments**

| | |
|---|---|
| 237150 | 4.8 mm Cannulated Trapezium Drill, quick coupling |
| 237160 | 4.8 mm Trapezium Drill Sleeve |
| 237200 | Handle, with quick coupling |

If the foot process of the trapezium is prominent, it can be removed with the ***4.8 mm Cannulated Trapezium Drill (237150)*** to ensure central placement of the screw.

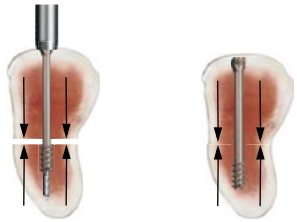
Slide the trapezium drill through the ***4.8 mm Trapezium Drill Sleeve (237160)*** and over the guide wire to the trapezium. Carefully drill the trapezium by hand to remove interfering bone. Use image intensification to ensure the trapezium drill does not damage the scaphoid.

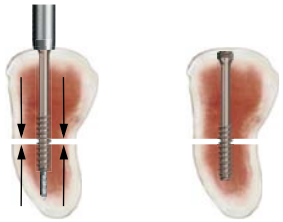
## Step 3
### Measure screw length

**Instrument**

237180 Measuring Device

Slide the tapered end of the ***Measuring Device (237180)*** over the guide wire to the bone. The reading on the measuring device at the end of the guide wire indicates the screw length which will place the screw tip at the tip of the guide wire. To choose the appropriate screw length, subtract approximately 2 mm to account for fracture gap compression and the desired countersinking depth. When selecting the shaft thread length, ensure that all threads are past the fracture line during the compression stage.





- **Correctly selected thread length**

Shaft thread is past the fracture line during compression.

- **Incorrect thread length**

Shaft thread is in the fracture gap. Compression of the fracture gap is not possible.





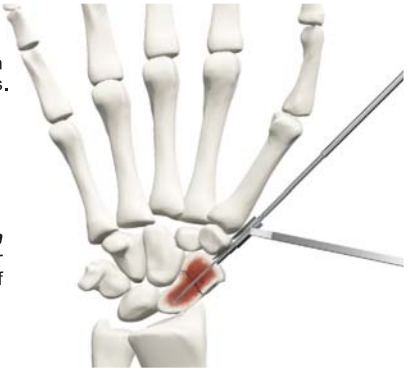
## Step 4
### Drill (optional)

**Instruments**

237140 2.0 mm Cannulated Drill Bit, quick coupling,150 mm
237170 2.0 mm/1.1 mm Double Drill Sleeve

The self-drilling flutes of the headless compression screw make pre-drilling unnecessary in most cases. Pre-drilling is recommended in dense bone and in arthrodeses, as the axial force necessary for inserting self-drilling screws could temporarily distract the fragments.

Place the ***2.0 mm/1.1 mm double drill sleeve with the 2.0 mm Ccannulated Drill Bit (237140)*** over the guide wire. Drill, using image intensification if necessary.

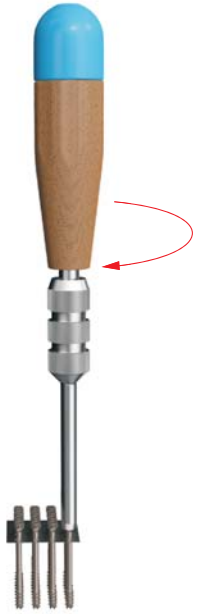


**Note:**

- To prevent the guide wire from backing out during drilling, do not over-drill at the tip of the wire, and remove the drill bit slowly. To ensure the guide wire stays in place, do not use the drill in reverse. Before drilling and after measuring, the wire may be advanced into the distal radius to assure retention after drilling.

## Step 5

### Pick up screw



**Instruments**

237100 Compression Sleeve for 3.0 mm Headless Compression Screw
237120 Compression Sleeve for 2.4 mm Headless Compression Screw

Twist the ***Compression Sleeve (237100 or 237120)*** over the head thread of the screw to remove it from the screw rack.

**Optional instrument**

01120 Screw Forceps

Alternatively, use the ***Screw Forceps (01120)*** to pick up the screw from the rack and thread it into the compression sleeve.





## Step 6

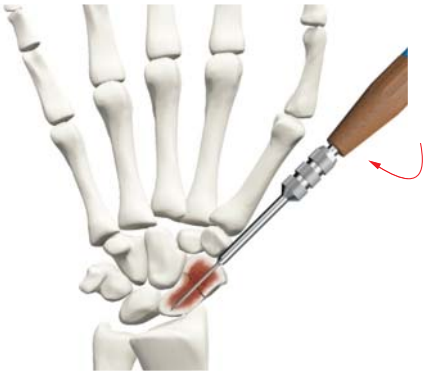
### Insert screw and compress

**Instruments**

237100 Compression Sleeve for 3.0 mm Headless Compression Screw
237130 Compression Sleeve Handle
237120 Compression Sleeve for 2.4 mm Headless Compression Screw

Slide the ***Compression Sleeve Handle (237130)*** into the back of the compression sleeve.

Insert the screw over the guide wire and thread it into the bone by turning the compression sleeve.



Tighten the compression sleeve until the fracture gap is closed and compressed.

**Warning:**

- Take care not to over-tighten the screw as the threads may strip. Use a two-finger technique to tighten the screw.

If the thread strips (noticeable through decreased resistance while tightening ), some of the compression will be lost. When the screw is countersunk, the thread will purchase the bone again, thus reducing the danger of postoperative screw loosening. If loss of compression makes screw removal necessary, follow the instructions on page 12.

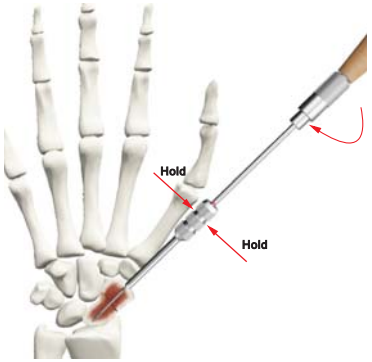
**Note:**

- Use image intensification to check that the entire shaft thread is beyond the fracture line. Otherwise no compression can be achieved.

## Step 7
### Insert screw head

**Instruments**

237100 Compression Sleeve for 3.0 mm Headless Compression Screw
237110 Cannulated StarDrive Screwdriver Shaft, T8, quick coupling
237120 Compression Sleeve for 2.4 mm Headless Compression Screw



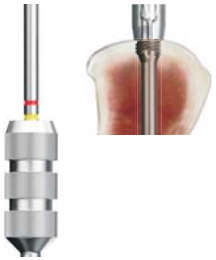

Remove the compression sleeve handle from the compression sleeve. Slide the ***Cannulated StarDrive Screwdriver Shaft (237110)*** through the compression sleeve into the recess of the screw.

Implant the head thread by turning the screwdriver clockwise. Hold the compression sleeve stable to prevent rotation, while slightly pressing the compression sleeve on the bone.

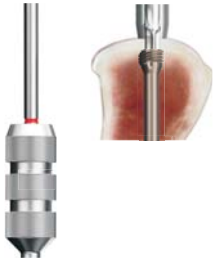
- **Color markings**

The color markings on the screwdriver shaft indicate the position of the screw in the bone:

- When the green mark is flush with the top of the compression sleeve, the screw is fully threaded into the compression sleeve and the screwdriver tip is seated in the recess of the screw



- When the yellow mark is flush with the top of the compression sleeve, the top of the screw is flush with the bone surface



- When the red mark is flush with the top of the compressionsleeve, the screw is 2 mm below the bone surface

Check final screw position with image intensification.

Remove and discard the guide wire.





## Screw Removal

**Instruments**

237100 Compression Sleeve for 3.0 mm Headless Compression Screw
286210 StarDrive Screwdriver Shaft, T8
237120 Compression Sleeve for 2.4 mm Headless Compresssion Screw
237200 Handle, with quick coupling StarDrive Screwdriver Shaft, T8

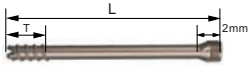
To remove the headless compression screw, use a ***T8 StarDrive screwdriver shaft(286210)***.

If the screw threads are stripped, however, use the following procedure:

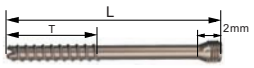
Twist the compression sleeve over the head thread, and insert the screwdriver through the compression sleeve into the StarDrive recess of the screw. If necessary, expose the StarDrive recess and part of the head thread using a hook, hollow reamer, or curette. Remove the screw by simultaneously pulling on the compression sleeve and turning the screwdriver counterclockwise.

## Implants

2.4 mm Headless Compression Screws, short thread
Shaft thread (T) approximately 20% of screw length (L)




Short Thread

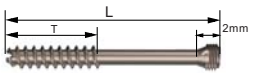



Long Thread

| Product No. TA | Product Description | Thread length(T) | Screw Length(L) |
|---|---|---|---|
| 31462009 | 2.4mm Headless Compression Screws, short thread | 9mm | 4mm |
| 31462010 | 2.4mm Headless Compression Screws, short thread | 10mm | 4mm |
| 31462011 | 2.4mm Headless Compression Screws, short thread | 11mm | 4mm |
| 31462012 | 2.4mm Headless Compression Screws, short thread | 12mm | 4mm |
| 31462013 | 2.4mm Headless Compression Screws, short thread | 13mm | 4mm |
| 31462014 | 2.4mm Headless Compression Screws, short thread | 14mm | 4mm |
| 31462015 | 2.4mm Headless Compression Screws, short thread | 15mm | 4mm |
| 31462016 | 2.4mm Headless Compression Screws, short thread | 16mm | 4mm |
| 31462017 | 2.4mm Headless Compression Screws, short thread | 17mm | 4mm |
| 31462018 | 2.4mm Headless Compression Screws, short thread | 18mm | 4mm |
| 31462019 | 2.4mm Headless Compression Screws, short thread | 19mm | 4mm |
| 31462020 | 2.4mm Headless Compression Screws, short thread | 20mm | 4mm |
| 31462021 | 2.4mm Headless Compression Screws, short thread | 21mm | 4mm |
| 31462022 | 2.4mm Headless Compression Screws, short thread | 22mm | 4mm |
| 31462023 | 2.4mm Headless Compression Screws, short thread | 23mm | 4mm |
| 31462024 | 2.4mm Headless Compression Screws, short thread | 24mm | 5mm |
| 31462025 | 2.4mm Headless Compression Screws, short thread | 25mm | 5mm |
| 31462026 | 2.4mm Headless Compression Screws, short thread | 26mm | 5mm |
| 31462027 | 2.4mm Headless Compression Screws, short thread | 27mm | 6mm |
| 31462028 | 2.4mm Headless Compression Screws, short thread | 28mm | 6mm |
| 31462029 | 2.4mm Headless Compression Screws, short thread | 29mm | 6mm |
| 31462030 | 2.4mm Headless Compression Screws, short thread | 30mm | 7mm |
| 31462032 | 2.4mm Headless Compression Screws, short thread | 32mm | 7mm |
| 31462034 | 2.4mm Headless Compression Screws, short thread | 34mm | 8mm |
| 31462036 | 2.4mm Headless Compression Screws, short thread | 36mm | 9mm |
| 31462038 | 2.4mm Headless Compression Screws, short thread | 38mm | 9mm |
| 31462040 | 2.4mm Headless Compression Screws, short thread | 40mm | 10mm |
| 31463017 | 2.4mm Headless Compression Screws, long thread | 17mm | 6mm |
| 31463018 | 2.4mm Headless Compression Screws, long thread | 18mm | 6mm |
| 31463019 | 2.4mm Headless Compression Screws, long thread | 19mm | 7mm |
| 31463020 | 2.4mm Headless Compression Screws, long thread | 20mm | 7mm |
| 31463021 | 2.4mm Headless Compression Screws, long thread | 21mm | 8mm |
| 31463022 | 2.4mm Headless Compression Screws, long thread | 22mm | 8mm |
| 31463023 | 2.4mm Headless Compression Screws, long thread | 23mm | 8mm |
| 31463024 | 2.4mm Headless Compression Screws, long thread | 24mm | 8mm |
| 31463025 | 2.4mm Headless Compression Screws, long thread | 25mm | 8mm |
| 31463026 | 2.4mm Headless Compression Screws, long thread | 26mm | 10mm |
| 31463027 | 2.4mm Headless Compression Screws, long thread | 27mm | 10mm |
| 31463028 | 2.4mm Headless Compression Screws, long thread | 28mm | 10mm |
| 31463029 | 2.4mm Headless Compression Screws, long thread | 29mm | 10mm |
| 31463030 | 2.4mm Headless Compression Screws, long thread | 30mm | 12mm |
| 31463032 | 2.4mm Headless Compression Screws, long thread | 32mm | 12mm |
| 31463034 | 2.4mm Headless Compression Screws, long thread | 34mm | 14mm |
| 31463036 | 2.4mm Headless Compression Screws, long thread | 36mm | 14mm |
| 31463038 | 2.4mm Headless Compression Screws, long thread | 38mm | 16mm |
| 31463040 | 2.4mm Headless Compression Screws, long thread | 40mm | 16mm |

3.0 mm Headless Compression Screws, short thread
Shaft thread (T) approximately 20% of screw length (L)


Short Thread




Long Thread

| Product No. TA | Product Description | Thread length(T) | Screw Length(L) |
|---|---|---|---|
| 31464010 | 3.0mm Headless Compression Screws, short thread | 10mm | 4mm |
| 31464011 | 3.0mm Headless Compression Screws, short thread | 11mm | 4mm |
| 31464012 | 3.0mm Headless Compression Screws, short thread | 12mm | 4mm |
| 31464013 | 3.0mm Headless Compression Screws, short thread | 13mm | 4mm |
| 31464014 | 3.0mm Headless Compression Screws, short thread | 14mm | 4mm |
| 31464015 | 3.0mm Headless Compression Screws, short thread | 15mm | 4mm |
| 31464016 | 3.0mm Headless Compression Screws, short thread | 16mm | 4mm |
| 31464017 | 3.0mm Headless Compression Screws, short thread | 17mm | 4mm |
| 31464018 | 3.0mm Headless Compression Screws, short thread | 18mm | 4mm |
| 31464019 | 3.0mm Headless Compression Screws, short thread | 19mm | 4mm |
| 31464020 | 3.0mm Headless Compression Screws, short thread | 20mm | 4mm |
| 31464021 | 3.0mm Headless Compression Screws, short thread | 21mm | 4mm |
| 31464022 | 3.0mm Headless Compression Screws, short thread | 22mm | 4mm |
| 31464023 | 3.0mm Headless Compression Screws, short thread | 23mm | 4mm |
| 31464024 | 3.0mm Headless Compression Screws, short thread | 24mm | 5mm |
| 31464025 | 3.0mm Headless Compression Screws, short thread | 25mm | 5mm |
| 31464026 | 3.0mm Headless Compression Screws, short thread | 26mm | 5mm |
| 31464027 | 3.0mm Headless Compression Screws, short thread | 27mm | 6mm |
| 31464028 | 3.0mm Headless Compression Screws, short thread | 28mm | 6mm |
| 31464029 | 3.0mm Headless Compression Screws, short thread | 29mm | 6mm |
| 31464030 | 3.0mm Headless Compression Screws, short thread | 30mm | 7mm |
| 31464032 | 3.0mm Headless Compression Screws, short thread | 32mm | 7mm |
| 31464034 | 3.0mm Headless Compression Screws, short thread | 34mm | 8mm |
| 31464036 | 3.0mm Headless Compression Screws, short thread | 36mm | 9mm |
| 31464038 | 3.0mm Headless Compression Screws, short thread | 38mm | 9mm |
| 31464040 | 3.0mm Headless Compression Screws, short thread | 40mm | 10mm |
| 31465016 | 3.0mm Headless Compression Screws, long thread | 16mm | 5mm |
| 31465017 | 3.0mm Headless Compression Screws, long thread | 17mm | 6mm |
| 31465018 | 3.0mm Headless Compression Screws, long thread | 18mm | 6mm |
| 31465019 | 3.0mm Headless Compression Screws, long thread | 19mm | 7mm |
| 31465020 | 3.0mm Headless Compression Screws, long thread | 20mm | 7mm |
| 31465021 | 3.0mm Headless Compression Screws, long thread | 21mm | 8mm |
| 31465022 | 3.0mm Headless Compression Screws, long thread | 22mm | 8mm |
| 31465023 | 3.0mm Headless Compression Screws, long thread | 23mm | 8mm |
| 31465024 | 3.0mm Headless Compression Screws, long thread | 24mm | 8mm |
| 31465025 | 3.0mm Headless Compression Screws, long thread | 25mm | 8mm |
| 31465026 | 3.0mm Headless Compression Screws, long thread | 26mm | 10mm |
| 31465027 | 3.0mm Headless Compression Screws, long thread | 27mm | 10mm |
| 31465028 | 3.0mm Headless Compression Screws, long thread | 28mm | 10mm |
| 31465029 | 3.0mm Headless Compression Screws, long thread | 29mm | 10mm |
| 31465030 | 3.0mm Headless Compression Screws, long thread | 30mm | 12mm |
| 31465032 | 3.0mm Headless Compression Screws, long thread | 32mm | 12mm |
| 31465034 | 3.0mm Headless Compression Screws, long thread | 34mm | 14mm |
| 31465036 | 3.0mm Headless Compression Screws, long thread | 36mm | 14mm |
| 31465038 | 3.0mm Headless Compression Screws, long thread | 38mm | 16mm |
| 31465040 | 3.0mm Headless Compression Screws, long thread | 40mm | 16mm |

## Instruments List

### 2.4 / 3.0 Headless Compression Screws Instruments Set

| Product No. | Product Description | Quantity |
|---|---|---|
| 237000 | 2.4/3.0 Headless Comression Screw instrumnets Set | |
| 237100 | Compression Sleeve for 3.0 mm Headless Compression Screw | 1 |
| 237110 | Cannulated StarDrive Screwdriver Shaft, T8, quick coupling | 1 |
| 237120 | Compression Sleeve for 2.4 mm Headless Compression Screw | 1 |
| 237130 | Compression Sleeve Handle | 1 |
| 237140 | 2.0 mm Cannulated Drill Bit, quick coupling,150 mm | 1 |
| 237150 | 4.8 mm Cannulated Trapezium Drill,quick coupling | 1 |
| 237160 | 4.8 mm Trapezium Drill Sleeve | 1 |
| 237170 | 2.0 mm/1.1 mm Double Drill Sleeve | 1 |
| 237180 | Measuring Device | 1 |
| 237190 | 1.1 mm Cleaning Stylet | 1 |
| 237200 | Handle, with quick coupling | 1 |
| 19599700 | 1.1 mm Threaded Guide Wire, 150 mm length | 2 |
| 19599800 | 1.1 mm Nonthreaded Guide Wire,150 mm length | 2 |
| 286210 | StarDrive Screwdriver Shaft, T8 | 1 |
| 01120 | Screw Forceps | 1 |
| 01232 | Scaphoid Elevator | 1 |
| 01218 | Freer Elevator | 1 |
| 237020 | Case for 3.0/2.4 Headless Compression Screw Instrument Set | 1 |
| 237030 | Tray for 3.0/2.4mm Headless Compression Screw Instrument Set | 1 |
| 237040 | Screw Rack for 2.4mm Headless Compression Screw | 1 |
| 237050 | Screw Rack for 3.0mm Headless Compression Screw | 1 |
| 237060 | Basic Tray, for 3.0/2.4mm Headless Compression Screw Instrument Set | 1 |
| 237070 | Lid for 3.0/2.4mm Headless Compression Screw Instrument Set | 1 |

## Instruments

237100 Compression Sleeve for 3.0 mm Headless Compression Screw

237110 Cannulated StarDrive Screwdriver Shaft, T8, quick coupling

237120 Compression Sleeve for 2.4 mm Headless Compression Screw

237130 Compression Sleeve Handle





237140 2.0 mm Cannulated Drill Bit, quick coupling,150 mm

237150 4.8 mm Cannulated Trapezium Drill, quick coupling

237160 4.8 mm Trapezium Drill Sleeve

237170 2.0 mm/1.1 mm Double Drill Sleeve

237180 Measuring Device

237190 1.1 mm Cleaning Stylet

237200 Handle, with quick coupling



19599700 1.1 mm Threaded Guide Wire, 150 mm length



19599800 1.1 mm Nonthreaded Guide Wire, 150 mm length



286210 StarDrive Screwdriver Shaft, T8

01120 Screw Forceps

01232 Scaphoid Elevator

01218 Freer Elevator