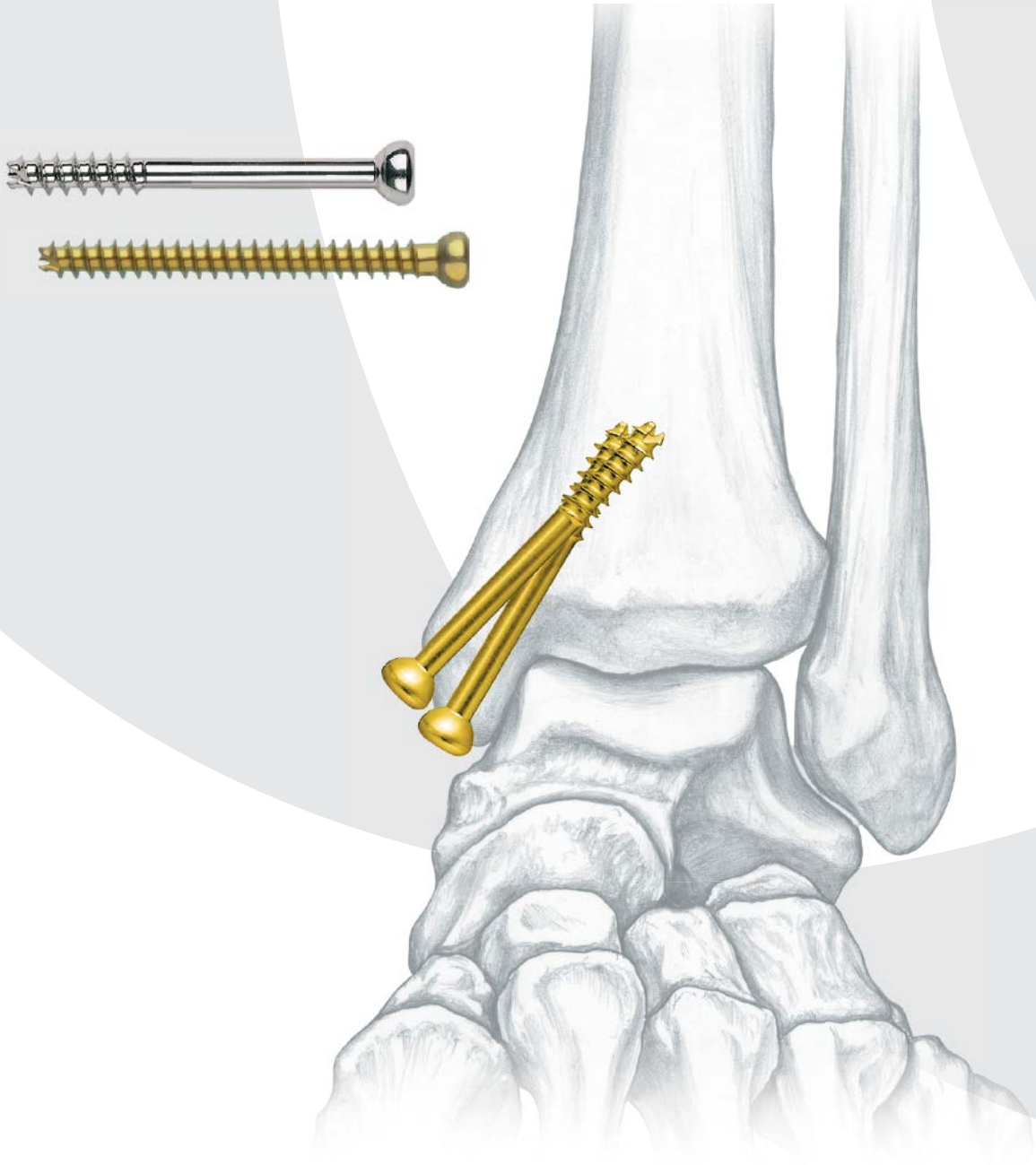


Part of the DePuy Synthes Cannulated Screw System

# 4.5 mm Cannulated Screws

Surgical Technique



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## MR Information

The 4.5 mm Cannulated Screw System has not been evaluated for safety and compatibility in the MR environment. It has not been tested for heating, migration or image artifact in the MR environment. The safety of the 4.5 mm Cannulated Screw System in the MR environment is unknown. Scanning a patient who has this device may result in patient injury.

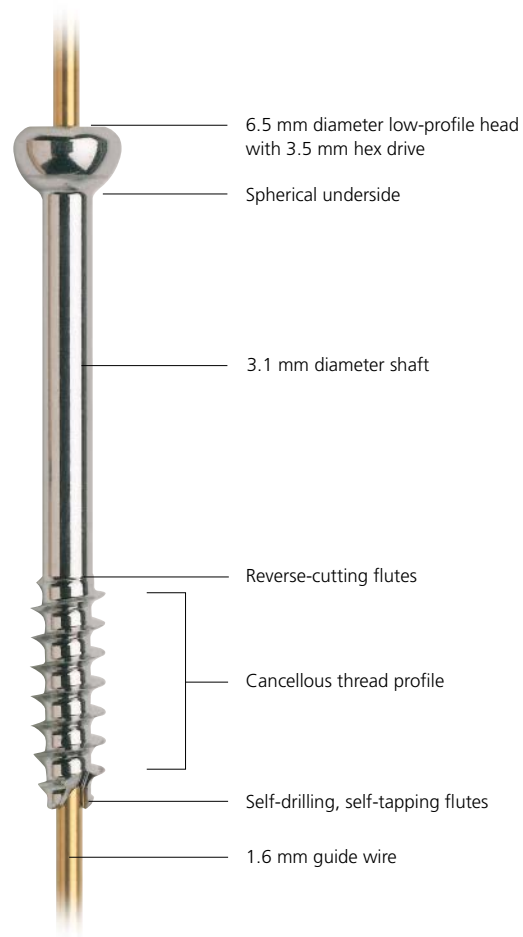
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 Image intensifier control

# 4.5 MM CANNULATED SCREWS

## Features

- Cannulated shaft accepts 1.6 mm diameter guide wires (threaded and nonthreaded wires available)
- Hemispherical head ensures optimal annular contact with washers and DePuy Synthes Companies plates when screws are angled
- Standard 3.5 mm hexagonal drive is compatible with screwdrivers in other commonly used DePuy Synthes Sets
- Reverse-cutting flutes assist in screw removal
- Cancellous thread profile uses deep cutting threads with a large pitch to increase resistance to pullout. The large pitch also accelerates screw insertion and removal
- Self-drilling, self-tapping screw tip facilitates screw insertion by eliminating the need for predrilling and tapping in most cases



## Thread lengths

- Partially threaded (thread length = 1/3 screw length)
- Fully threaded



## Materials

- Implant-quality 316L stainless steel
- Titanium alloy Ti-6Al-7Nb



# AO PRINCIPLES

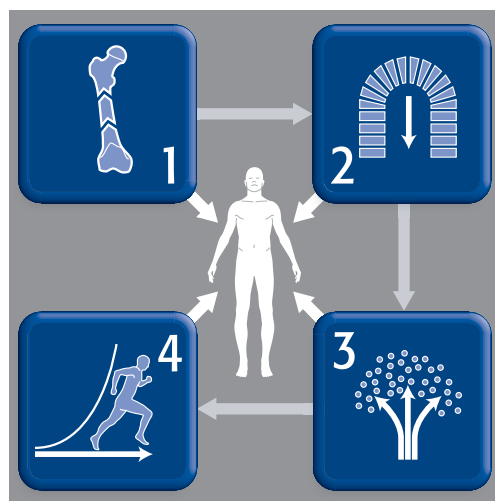
In 1958, the AO formulated four basic principles, which have become the guidelines for internal fixation.<sup>1,2</sup>

## Anatomic reduction

Fracture reduction and fixation to restore anatomical relationships.

## Early, active mobilization

Early and safe mobilization and rehabilitation of the injured part and the patient as a whole.



## Stable fixation

Fracture fixation providing absolute or relative stability, as required by the patient, the injury, and the personality of the fracture.

## Preservation of blood supply

Preservation of the blood supply to soft tissues and bone by gentle reduction techniques and careful handling.

1. Müller ME, Allgöwer M, Schneider R, Willenegger H. *Manual of Internal Fixation*. 3rd ed. Berlin, Heidelberg, New York: Springer-Verlag; 1991.  
2. Rüedi TP, RE Buckley, CG Moran. *AO Principles of Fracture Management*. 2nd ed. Stuttgart New York: Thieme; 2007.

# INDICATIONS

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For fracture fixation of long bones and long bone fragments.



**Warning:** This device is not approved for screw attachment or fixation to the posterior elements (pedicles) of the cervical, thoracic or lumbar spine.

# SURGICAL TECHNIQUE INFORMATION

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## Cleaning cannulations

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### Instruments

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|        |                        |
|--------|------------------------|
| 319.26 | 1.75 mm Cleaning Brush |
| 319.35 | 1.6 mm Cleaning Stylet |

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**Note: Cleaning the cannulation in each instrument is imperative for proper function.**

Instruments should be cleared intraoperatively with the 1.6 mm cleaning stylet to prevent accumulation of debris in the cannulation and potential binding of the instruments about the guide wire. Instruments should be cleaned postoperatively with both the stylet and the 1.75 mm cleaning brush.

### Drilling and tapping

The self-drilling, self-tapping flutes of the 4.5 mm cannulated screws make predrilling and pretapping unnecessary in most cases. The sets include 3.2 mm cannulated drill bits and a cannulated tap for use in dense bone, if needed.

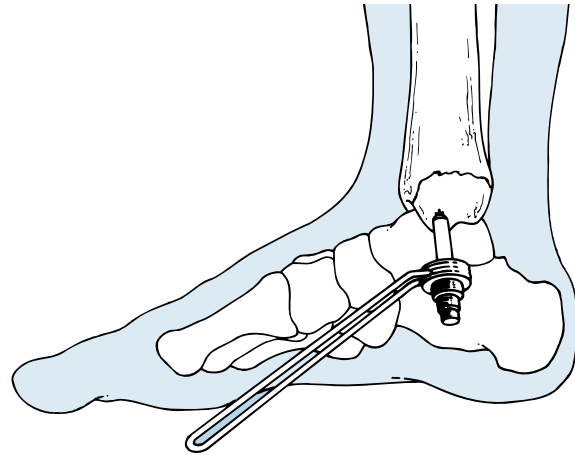
# PERCUTANEOUS INSERTION OF SCREWS

## 1

### Insert guide wire

#### Instruments

|        |                                 |
|--------|---------------------------------|
| 292.72 | 1.6 mm Threaded Guide Wire      |
| 312.74 | 1.6 mm Trocar                   |
| 312.75 | 3.2 mm/1.6 mm Drill Sleeve      |
| 312.76 | 7.0 mm/3.2 mm Drill Sleeve      |
| 312.77 | 9.5 mm/7.0 mm Protection Sleeve |



- Insert the percutaneous sleeve assembly (protection sleeve, drill sleeves, and trocar) through a stab incision and soft tissue to the bone. Remove the trocar and insert a 1.6 mm threaded guide wire through the innermost drill sleeve to the appropriate depth, under image intensification.

#### Optional technique: Insert additional guide wire(s)

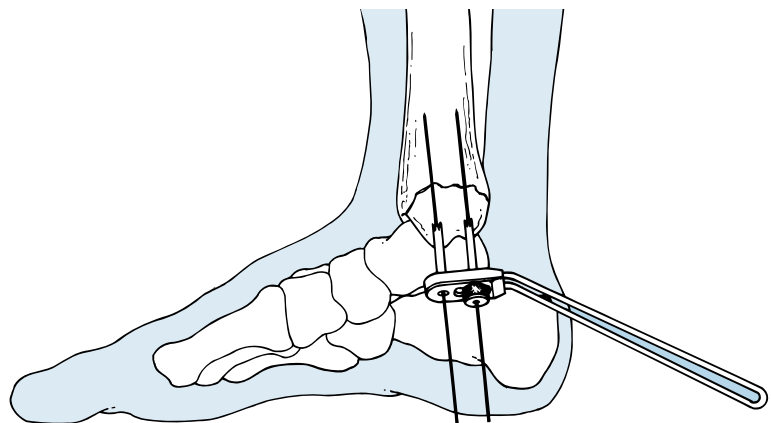
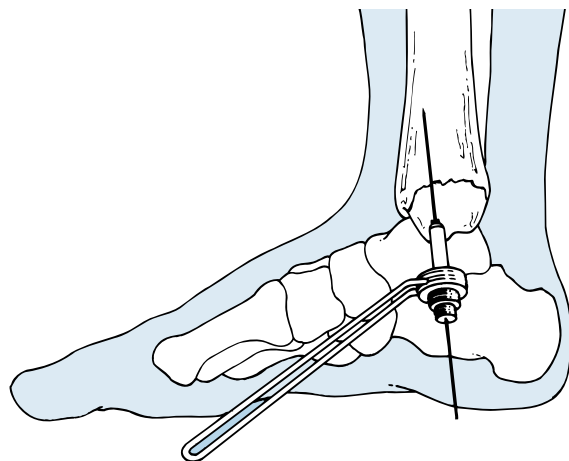
#### Instrument

|        |                                |
|--------|--------------------------------|
| 312.73 | Adjustable Parallel Wire Guide |
|--------|--------------------------------|

Use the adjustable parallel wire guide to place parallel wires at various distances from the first wire.

Place the fixed sleeve over the previously inserted wire and adjust the movable sleeve to the desired position and distance. Tighten the knurled nut on the adjustable sleeve to lock it in place and insert wire. Repeat for desired number of additional wires.

**Note: The placement of three guide wires is recommended to achieve adequate rotational stability.**



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## 2

### Countersink (optional)

---

#### Instrument

---

|        |                        |
|--------|------------------------|
| 310.85 | Cannulated Countersink |
|--------|------------------------|

---

Where soft tissue coverage is minimal, use the cannulated countersink to create a recess for the screw head. Countersinking will also facilitate screw insertion.

**Note:** If the countersink fails to bite, the near cortex can be predrilled using the cannulated drill bit.



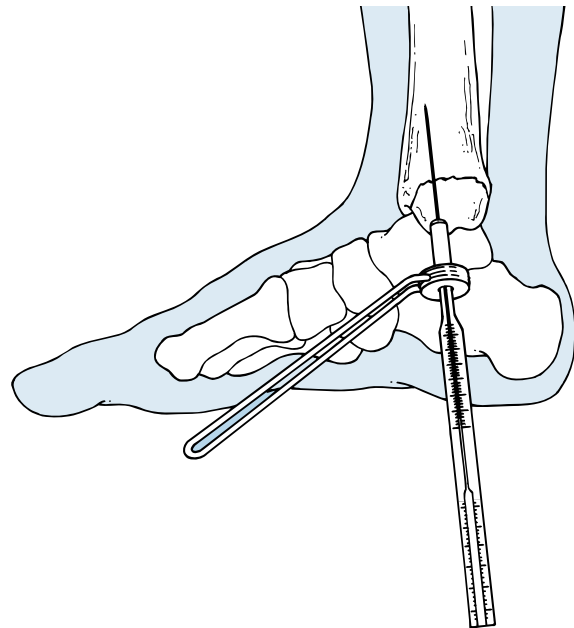
### 3

#### Measure for screw length

##### Instruments

|        |                                   |
|--------|-----------------------------------|
| 292.72 | 1.6 mm Threaded Guide Wire        |
| 319.17 | Cannulated Screw Measuring Device |

Remove the two inner drill sleeves. Slide the tapered end of the cannulated screw measuring device over the guide wire through the protection sleeve and to the bone. Read the scale at the end of the guide wire to determine appropriate screw length. This reading will place the screw 5 mm short of the guide wire tip, allowing the threaded portion of the guide wire to remain in the bone during screw insertion.



##### Notes:

- Only use the guide wire in its original length to ensure correct measurement.
- If the reading indicates 42 mm, use a 42 mm screw to place the screw 5 mm short of the wire tip.

#### Optional technique: Drill and tap

##### Instruments

|        |                                 |
|--------|---------------------------------|
| 310.65 | 3.2 mm Cannulated Drill Bit     |
| 311.59 | Cannulated Tap                  |
| 312.76 | 7.0 mm/3.2 mm Drill Sleeve      |
| 312.77 | 9.5 mm/7.0 mm Protection Sleeve |

To predrill and tap in dense bone, place the 7.0 mm/3.2 mm drill sleeve into the protection sleeve and drill through the near cortex with the 3.2 mm cannulated drill bit. Remove the 7.0 mm/3.2 mm drill sleeve. Use the cannulated tap through the protection sleeve.

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**4**

**Insert screw**

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**Instruments**

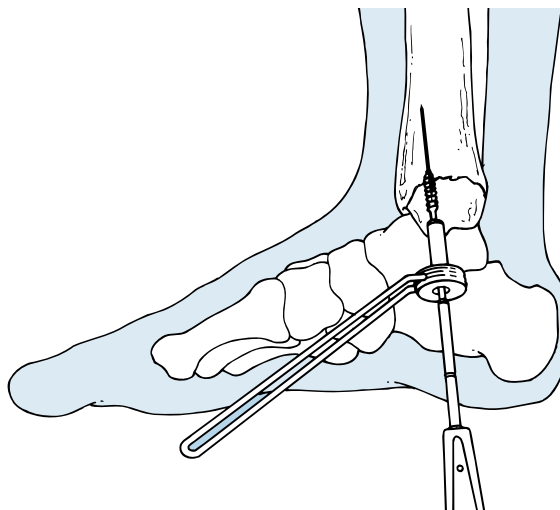
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|         |  |
|---------|--|
| 292.72  | 1.6 mm Threaded Guide Wire             |
| 314.20  | Cannulated Hexagonal Screwdriver       |
| 314.31  | Holding Sleeve                         |
| 314.80* | Cannulated Hexagonal Screwdriver Shaft |

---

Place the appropriate length screw over the guide wire. Use the cannulated hexagonal screwdriver, or cannulated hexagonal screwdriver shaft, and holding sleeve to insert the screw. Remove and discard the guide wire.

**Note:** In osteoporotic bone, a washer may be necessary to prevent the screw head from sinking into the bone.



\*Also available.

# IMPLANT REMOVAL

---

## Instruments

---

|        |   |
|--------|---|
| 314.15 | Large Hexagonal Screwdriver Shaft,<br>3.5 mm width across flats |
| 311.44 | T-Handle, with Quick Coupling                                   |

---

Expose the screw head and remove the screws using the special screwdriver for the removal of cannulated screws.

**Precaution: Do not use the cannulated screwdriver for implant removal.**

# IMPLANTS

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## 4.5 mm Cannulated Screws, partially threaded

- 20 mm–56 mm lengths in 2 mm increments
- 60 mm–80 mm lengths in 4 mm increments
- Thread length = 1/3 screw length
- 316L stainless steel and titanium alloy (Ti-6Al-7Nb)



## 4.5 mm Cannulated Screws, fully threaded\*

- 20 mm–56 mm lengths in 2 mm increments
- 60 mm–80 mm lengths in 4 mm increments
- 316L stainless steel and titanium alloy (Ti-6Al-7Nb)



## Washer, 10.0 mm

- To prevent screw head from sinking into osteoporotic bone
- 316L stainless steel and commercially pure (CP) titanium



\*Also available.

# INSTRUMENTS

---

292.72      1.6 mm Threaded Guide Wire, 150 mm



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292.727\*      1.6 mm Nonthreaded Guide Wire, 150 mm



---

310.16      1.5 mm Drill Bit, quick coupling, 110 mm



---

310.65      3.2 mm Cannulated Drill Bit, quick coupling, 170 mm, 1.7 mm cannulation



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310.66\*      4.5 mm Cannulated Drill Bit, quick coupling, 170 mm, 1.7 mm cannulation



---

310.85      Cannulated Countersink, quick coupling



---

311.44      T-Handle, with quick coupling



---

311.59      Cannulated Tap for 4.5 mm Cannulated Screws, 180 mm



\*Also available.

---

312.46 4.5 mm/3.2 mm Double Drill Sleeve



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312.73 Adjustable Parallel Wire Guide



---

312.74 1.6 mm Trocar, 59 mm length



---

312.75 3.2 mm/1.6 mm Drill Sleeve



---

312.76 7.0 mm/3.2 mm Drill Sleeve



---

312.77 9.5 mm/7.0 mm Protection Sleeve



---

314.15 Large Hexagonal Screwdriver Shaft,  
3.5 mm width across flats



---

314.20 Cannulated Hexagonal Screwdriver,  
1.7 mm cannulation, 3.5 mm width  
across flats



---

314.31 Holding Sleeve



---

314.80\* Cannulated Hexagonal Screwdriver  
Shaft, 1.8 mm cannulation, 3.5 mm  
width across flats



---

319.17 Cannulated Screw Measuring Device



---

319.26 1.75 mm Cleaning Brush



---

319.35 1.6 mm Cleaning Stylet



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319.97 Screw Forceps



\*Also available.

# 4.5 MM CANNULATED SCREW INSTRUMENT AND IMPLANT SETS

Stainless Steel (105.04) and Titanium (145.04)

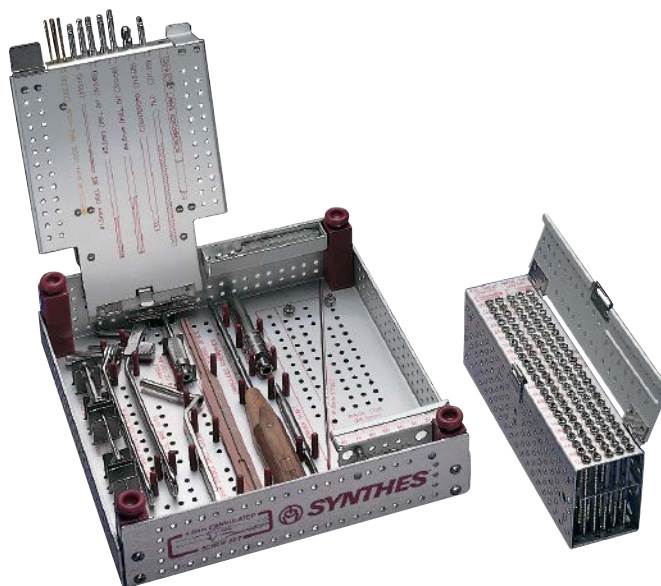
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## Graphic Case

- 304.220 4.5 mm Cannulated Screw Instrument and Implant Set Graphic Case
- 304.420 4.5 mm Titanium Cannulated Screw Instrument and Implant Set Graphic Case

## Instruments

- 292.72 1.6 mm Threaded Guide Wire, 150 mm, 10 ea.
- 310.16 1.5 mm Drill Bit, quick coupling, 110 mm
- 310.65 3.2 mm Cannulated Drill Bit, quick coupling, 170 mm, 2 ea.
- 310.85 Cannulated Countersink
- 311.44 T-Handle, with quick coupling
- 311.59 Cannulated Tap for 4.5 mm Cannulated Screws
- 312.46 4.5 mm/3.2 mm Double Drill Sleeve
- 312.73 Adjustable Parallel Wire Guide
- 312.74 1.6 mm Trocar, 59 mm length
- 312.75 3.2 mm/1.6 mm Drill Sleeve
- 312.76 7.0 mm/3.2 mm Drill Sleeve
- 312.77 9.5 mm/7.0 mm Protection Sleeve
- 314.15 Large Hexagonal Screwdriver Shaft
- 314.20 Cannulated Hexagonal Screwdriver
- 314.31 Holding Sleeve
- 319.17 Cannulated Screw Measuring Device, for 4.5 mm Cannulated Screws
- 319.26 1.75 mm Cleaning Brush
- 319.35 1.6 mm Cleaning Stylet
- 319.97 Screw Forceps



For detailed cleaning and sterilization instructions, please refer to [www.synthes.com/cleaning-sterilization](http://www.synthes.com/cleaning-sterilization) or sterilization instructions, if provided.



4.5 mm Cannulated Screw Instrument and Implant Sets  
Stainless Steel (105.04) and Titanium (145.04)

---

**Implants**

4.5 mm Cannulated Screws, partially threaded, 3 ea.  
(thread length=1/3 screw length)

Stainless

| Steel   | Titanium | Length (mm) |
|---------|----------|-------------|
| 214.520 | 414.520  | 20          |
| 214.522 | 414.522  | 22          |
| 214.524 | 414.524  | 24          |
| 214.526 | 414.526  | 26          |
| 214.528 | 414.528  | 28          |
| 214.530 | 414.530  | 30          |
| 214.532 | 414.532  | 32          |
| 214.534 | 414.534  | 34          |
| 214.536 | 414.536  | 36          |
| 214.538 | 414.538  | 38          |
| 214.540 | 414.540  | 40          |
| 214.542 | 414.542  | 42          |
| 214.544 | 414.544  | 44          |
| 214.546 | 414.546  | 46          |
| 214.548 | 414.548  | 48          |
| 214.550 | 414.550  | 50          |
| 214.552 | 414.552  | 52          |
| 214.554 | 414.554  | 54          |
| 214.556 | 414.556  | 56          |
| 214.560 | 414.560  | 60          |
| 214.564 | 414.564  | 64          |
| 214.568 | 414.568  | 68          |
| 214.572 | 414.572  | 72          |

|        |        |                           |
|--------|--------|---------------------------|
| 219.91 | 419.91 | Washer, 10.0 mm,<br>5 ea. |
|--------|--------|---------------------------|

4.5 mm Cannulated Screw Instrument and Implant Sets  
Stainless Steel (105.04) and Titanium (145.04)

**Also Available**

|  |          |             |         |   |
|--|----------|-------------|---------|---|
| 4.5 mm Cannulated Screws, partially threaded |          |             | 292.727 | 1.6 mm Nonthreaded Guide Wire, 150 mm   |
| Stainless Steel                              |          |             | 304.223 |   |
|  | Titanium | Length (mm) |         | 4.5 mm Cannulated Screw Instrument and Implant Set Graphic Case Screw Rack          |
| 214.576                                      | 414.576  | 76          | 304.423 | 4.5 mm Titanium Cannulated Screw Instrument and Implant Set Graphic Case Screw Rack |
| 214.580                                      | 414.580  | 80          |         |   |
| 4.5 mm Cannulated Screws, fully threaded     |          |             | 310.66  | 4.5 mm Cannulated Drill Bit, quick coupling, 170 mm, 1.7 mm cannulation             |
| Stainless Steel                              |          |             | 314.80  | Cannulated Hexagonal Screwdriver shaft, 3.5 mm width across flats                   |
|  | Titanium | Length (mm) |         |   |
| 214.720                                      | 414.720  | 20          |         |   |
| 214.722                                      | 414.722  | 22          | 105.954 | Small Battery Drive Set with 14.4 V battery pack                                    |
| 214.724                                      | 414.724  | 24          |         |   |
| 214.726                                      | 414.726  | 26          | 105.957 | Power Drive Set   |
| 214.728                                      | 414.728  | 28          |         |   |
| 214.730                                      | 414.730  | 30          |         |   |
| 214.732                                      | 414.732  | 32          |         |   |
| 214.734                                      | 414.734  | 34          |         |   |
| 214.736                                      | 414.736  | 36          |         |   |
| 214.738                                      | 414.738  | 38          |         |   |
| 214.740                                      | 414.740  | 40          |         |   |
| 214.742                                      | 414.742  | 42          |         |   |
| 214.744                                      | 414.744  | 44          |         |   |
| 214.746                                      | 414.746  | 46          |         |   |
| 214.748                                      | 414.748  | 48          |         |   |
| 214.750                                      | 414.750  | 50          |         |   |
| 214.752                                      | 414.752  | 52          |         |   |
| 214.754                                      | 414.754  | 54          |         |   |
| 214.756                                      | 414.756  | 56          |         |   |
| 214.760                                      | 414.760  | 60          |         |   |
| 214.764                                      | 414.764  | 64          |         |   |
| 214.768                                      | 414.768  | 68          |         |   |
| 214.772                                      | 414.772  | 72          |         |   |
| 214.776                                      | 414.776  | 76          |         |   |
| 214.777                                      | 414.777  | 80          |         |   |

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