Drill Bits for Screw Removal.
Part of the Synthes screw removal system.

Drill into stainless steel, instrument steel, or titanium

Remove locking screws

Single use, sterile-packed
**Intended use**

High speed and carbide drill bits are designed to drill into metal for the removal of locking screws. These drill bits may only be used to drill into Synthes metal implant and instrument material. In addition, broken instruments (i.e. tips of screw-drivers and extraction screws) may only be removed from the screw recess using a carbide drill bit. For drilling into stainless steel implant material, it is recommended to use a high speed drill bit (see recommended applications chart).

**Important:**
All drill bits are for single use only and must not be reprocessed or resterilized.

High speed and carbide drill bits are hard and brittle. To prevent breakage, start drilling with the drill bit already revolving and maintain the chosen drill axis throughout the drilling operation.

While drilling, cool with an irrigation system and remove chips with a suction device.

The carbide drill bit is made of nickel-based tungsten carbide with a carbon coating. Because of the high nickel content, no drill bit material should be left in the body.
## Recommended applications

<table>
<thead>
<tr>
<th>Item number</th>
<th>Type</th>
<th>Diameter</th>
<th>Screw size (mm)</th>
<th>Titanium*</th>
<th>Stainless steel</th>
<th>Instrument steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>309.004S</td>
<td>Carbide</td>
<td>4.0 mm</td>
<td>3.5, 4.0, 4.5, 5.0</td>
<td>++</td>
<td>−</td>
<td>+</td>
</tr>
<tr>
<td>309.006S</td>
<td>Carbide</td>
<td>6.0 mm</td>
<td>5.0, 6.5, 7.0, 7.3</td>
<td>++</td>
<td>−</td>
<td>+</td>
</tr>
<tr>
<td>309.503S</td>
<td>High Speed</td>
<td>2.5 mm</td>
<td>3.5, 4.0</td>
<td>+</td>
<td>++</td>
<td>−</td>
</tr>
<tr>
<td>309.504S</td>
<td>High Speed</td>
<td>3.5 mm</td>
<td>3.5, 4.0, 4.5, 5.0</td>
<td>+</td>
<td>++</td>
<td>−</td>
</tr>
<tr>
<td>309.506S</td>
<td>High Speed</td>
<td>4.8 mm</td>
<td>5.0, 6.5, 7.0, 7.3</td>
<td>+</td>
<td>++</td>
<td>−</td>
</tr>
</tbody>
</table>

++ good drilling ability
+ sufficient drilling ability
− not recommended

* CP titanium, Ti-6Al-7Nb and Ti-6Al-4V

## Instruments required for complete screw removal

### Screw/recess type

**Small fragment screws**
(recess: T15 StarDrive or 2.5 mm hex)

- Appropriate drill bit (see recommended applications)
- Irrigation system (syringe and water) and Drill Suction Device (03.607.110)
- Conical Extraction Screw for 2.7 mm, 3.5 mm and 4.0 mm screws (309.520)
- Extraction Bolt for 3.5 mm and 4.0 mm screws (309.039)
- Hollow Reamer for 3.5 mm and 4.0 mm screws (309.035)
- Forceps for Broken Screw Removal (398.65)
- Adhesive film (optional)

### Large fragment screws
(recess: T25 StarDrive or 3.5 mm hex)

- Appropriate drill bit (see recommended applications)
- Irrigation system (syringe and water) and Drill Suction Device (03.607.110)
- Conical Extraction Screw for 4.5 mm, 6.5 mm, and 7.0 mm screws (309.530)
- Extraction Bolt for 4.5 mm and 5.0 mm screws (309.490);
  or Extraction Bolt for 6.0 mm, 6.5 mm and 7.0 mm screws (309.069)
- Hollow Reamer for 4.5 mm screws (309.450);
  or Hollow Reamer for 6.5 mm and 7.0 mm screws (309.065)
- Forceps for Broken Screw Removal (398.65)
- Adhesive film (optional)
Removal of Screws

First, attempt to remove the screw using the conical extraction screw. To avoid breaking the extraction screw, do not use excessive force. If this fails, proceed with one of the following options.

a. Screw without broken instrument: Steps 1 and 3 are not required for removal.

b. Screw with broken instrument in the screw recess: all the steps are required.

1 Remove broken segment

Using a sharp hook and/or forceps, attempt to remove the broken-off part of the instrument. If unsuccessful, proceed to the next step.

2 Prepare instruments

Prepare instrumentation (see table on previous page) including suction and irrigation systems.

Note: It is recommended to cover the area around the screw removal site with sterile adhesive film to protect the surrounding soft tissue.

3 Begin drilling

Turn on the drill so that the drill bit is in motion before making contact with the metal. With the irrigation and suction systems operating, begin drilling perpendicular to the surface of the broken-off instrument in the screw head. Level the surface.
4

**Drill**

Drill continuously without stopping. Axial force is required for efficient drilling. Align the axis of the drill bit with the axis of the screw.

**Note:** If axial alignment cannot be achieved, a larger diameter drill bit may be required to separate the plate completely from the screw. The 6.0 mm carbide drill bit can only be used after predrilling with the 4.0 mm carbide drill bit.

5

**Remove plate**

Drill into the head of the screw until there is no longer a physical connection between the screw and the plate. Remove the plate.

6

**Remove screw shaft from bone**

**Screw protrudes from the bone**

Using the forceps for screw removal, grip the screw and turn counterclockwise. Do not pull.

**Screw does not protrude from the bone**

Using the hollow reamer and extraction bolt, align the axis of the hollow reamer with the axis of the screw and ream to a depth of 5 mm.

Place the extraction bolt over the screw.
6  
Remove screw shaft from bone  
While pushing, turn counterclockwise. This will create a tight connection between the conical shape of the extraction bolt thread and the screw shaft.

Turn counterclockwise until the screw shaft is completely removed.

7  
Confirm removal  
It is recommended to perform a final radiographic examination to ensure no undesired material has been left in the body.
**Product Information**

**Instruments**
- 309.004S  4.0 mm Carbide Drill Bit, sterile
- 309.006S  6.0 mm Carbide Drill Bit, sterile
- 309.503S  2.5 mm High Speed Drill Bit, sterile
- 309.504S  3.5 mm High Speed Drill Bit, sterile
- 309.506S  4.8 mm High Speed Drill Bit, sterile

**Required Set**
- 01.240.001  Screw Removal Set