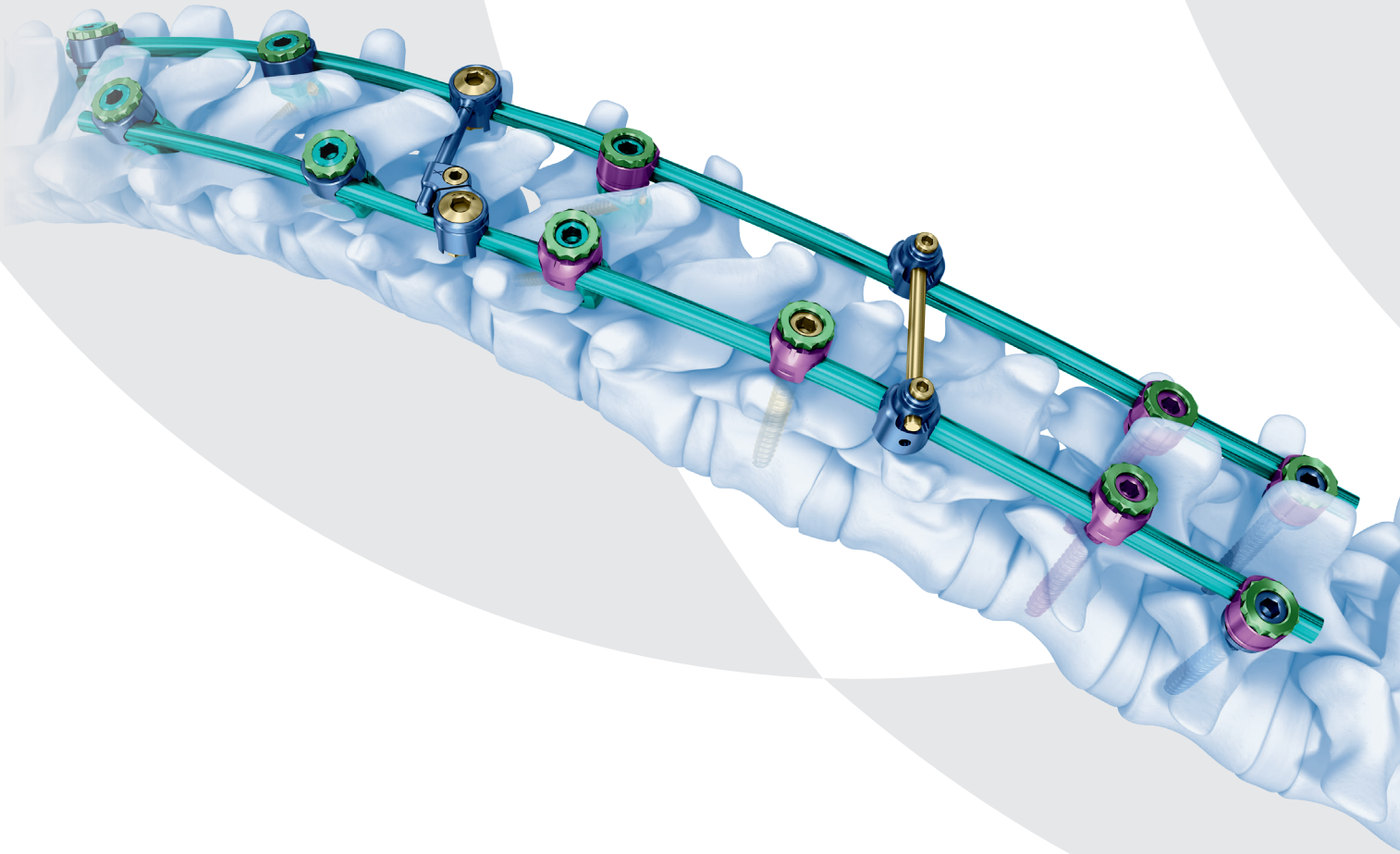
Dual opening screws and hooks for thoracolumbar spine

USS™ II Spine System

Surgical Technique



DePuy Synthes

PART OF THE Johnson & Johnson FAMILY OF COMPANIES

Image intensifier control

This description alone does not provide sufficient background for direct use of DePuy Synthes products. Instruction by a surgeon experienced in handling these products is highly recommended.

Processing, Reprocessing, Care and Maintenance
For general guidelines, function control and dismantling of multi-part instruments, as well as processing guidelines for implants, please contact your local sales representative or refer to:
http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance
For general information about reprocessing, care and maintenance of Synthes reusable devices, instrument trays and cases, as well as processing of Synthes non-sterile implants, please consult the Important Information leaflet (SE_023827) or refer to:
http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance

Table of Contents

For product catalog contact your local DePuy Synthes representative.

Overview

- Implants accept Ø 5 mm or 6 mm rods and are locked with the same nut (Fig. 1)
- Pedicle screws have a dual-core and double-lead.
- Bilateral option for fixing the implants to the rod (Fig. 2)
- Anterior vertebral body screws (Fig. 3).
- Pedicle hook with screw fixation (Fig. 4)

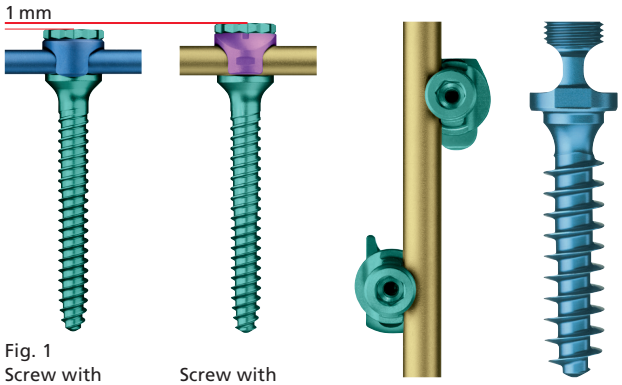


Fig. 1
Screw with Ø 5 mm rod

Screw with Ø 6 mm rod

Fig. 2

Fig. 3

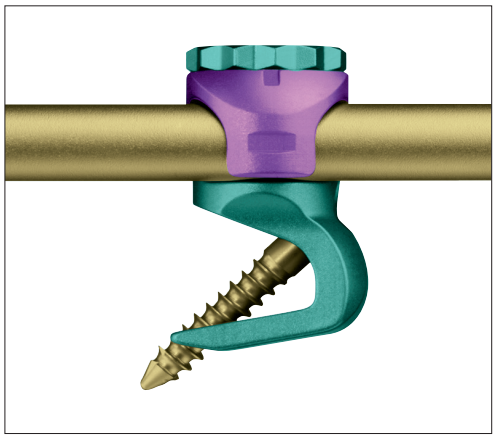
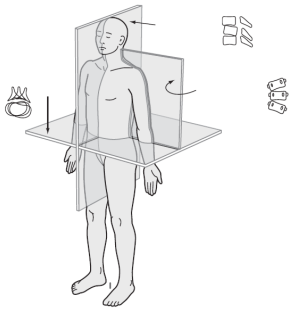


Fig. 4

AO Spine Principles

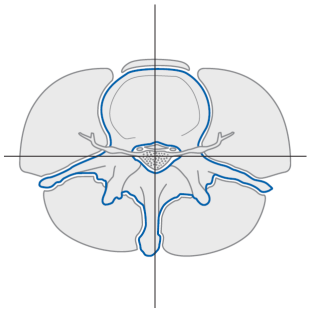
The four principles to be considered as the foundation for proper spine patient management underpin the design and delivery of the Curriculum: Stability – Alignment – Biology – Function.[1,2]

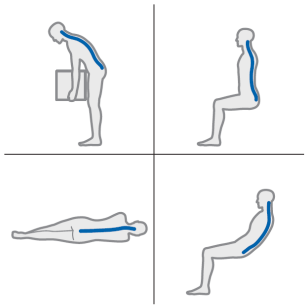
Stability
Stabilization to achieve a specific therapeutic outcome



Alignment
Balancing the spine in three dimensions

Biology
Etiology, pathogenesis, neural protection, and tissue healing





Function
Preservations and restoration of function to prevent disability

Implant Handling Using the Stick

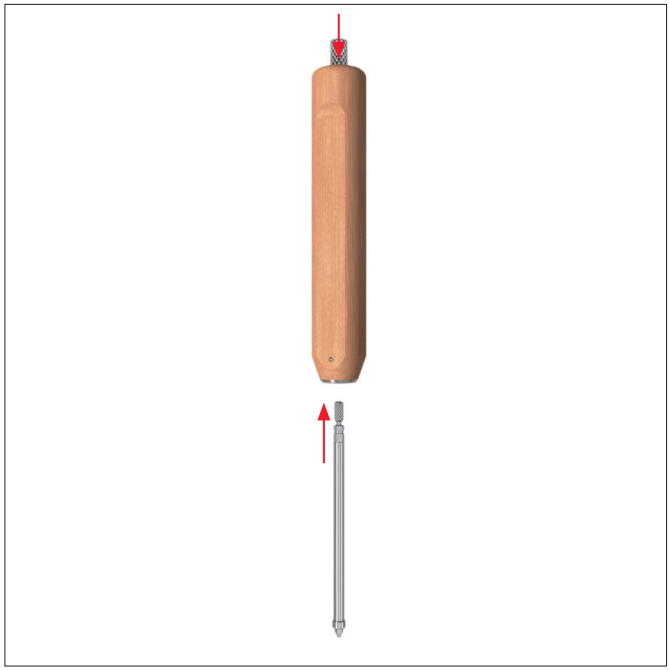
The screws with dual openings have the same head as the pedicle, lamina and transverse process hooks. The following handling tips therefore apply both to the pedicle screws and anterior vertebral body screws, and to all three types of hook (referred to below as implants).

Instruments

388.622	Handle for USS Hook and Screwholder No. 388.612
388.612	USS Hook and Screwholder, with hexagonal socket 4.0 mm

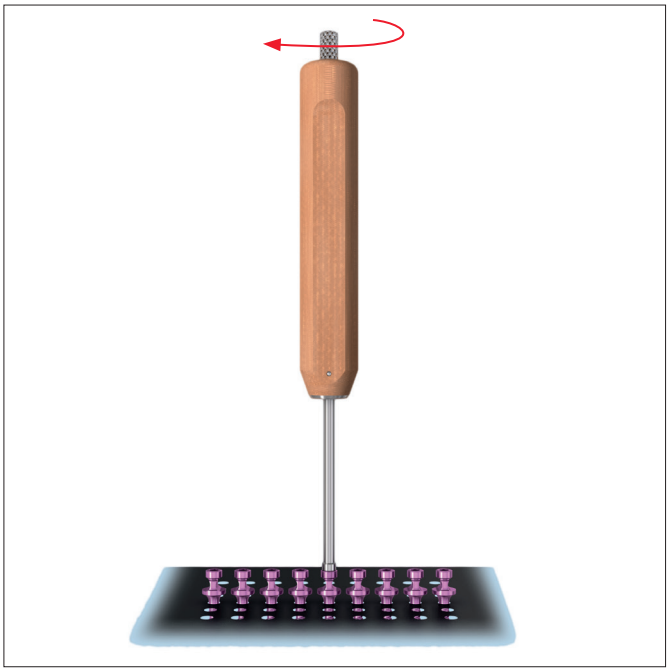
1. Attach handle to stick

Press the knurled release button on the top end of the handle and simultaneously push the USS hook and screwholder, known as the "stick", into the handle.



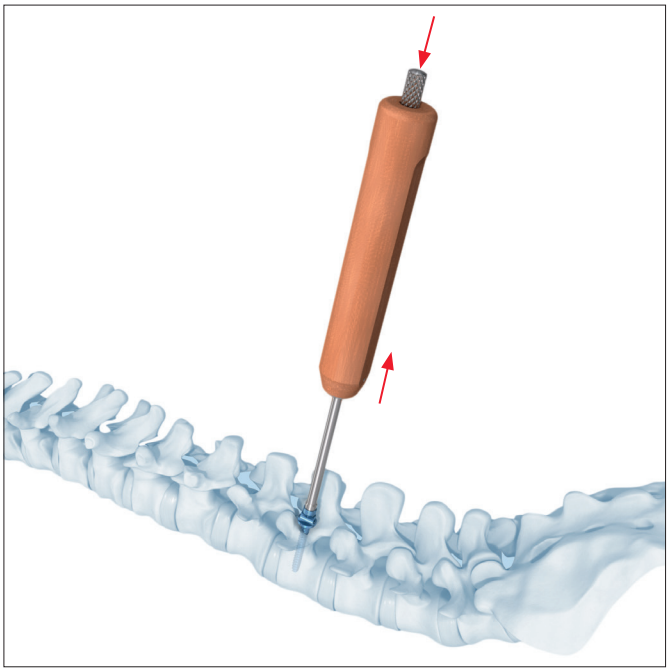
2. Pick up implant

Insert stick into implant. Turn release button in a clockwise direction and pick up the implant.



3. Release handle from stick

Insert the implant. Press the release button on the handle to detach the handle from the stick.



Insert Pedicle Screw

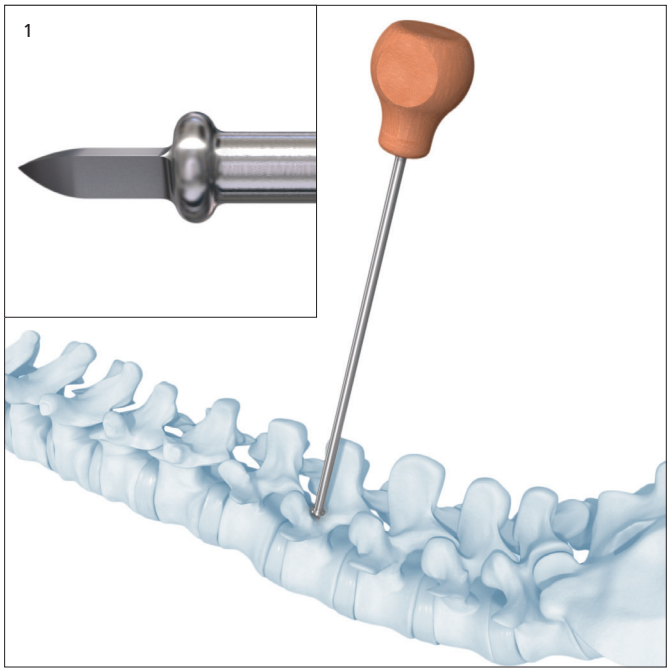
Instruments	
388.551	Pedicle Awl Ø 3.0 mm, length 230 mm, for Screws Ø 4.0 and 4.2 mm
388.550	Pedicle Awl Ø 4.0 mm with Canevasit Handle, length 230 mm, for Pedicle Screws Ø 5.0 to 7.0 mm
388.538	Pedicle Probe Ø 2.8 mm, length 230 mm, for Pedicle Screws Ø 4.2 mm
388.540	Pedicle Probe Ø 3.8 mm with Canevasit Handle, length 230 mm, for Pedicle Screws Ø 5.2 and 6.2 mm
388.539	Pedicle Probe Ø 4.8 mm with Canevasit Handle, length 230 mm, for Pedicle Screws Ø 8.0 and 9.0 mm
357.789	Length Indicator for Pedicle Screws Ø 4.2 to 9.0 mm
388.545	Feeler for Screw Channel, straight, Ø 2.3 mm, length 275 mm
388.546	Feeler for Screw Channel, curved, Ø 2.3 mm, length 275 mm
388.622	Handle for USS Hook and Screwholder No. 388.612
388.612	USS Hook and Screwholder, with hexagonal socket 4.0 mm

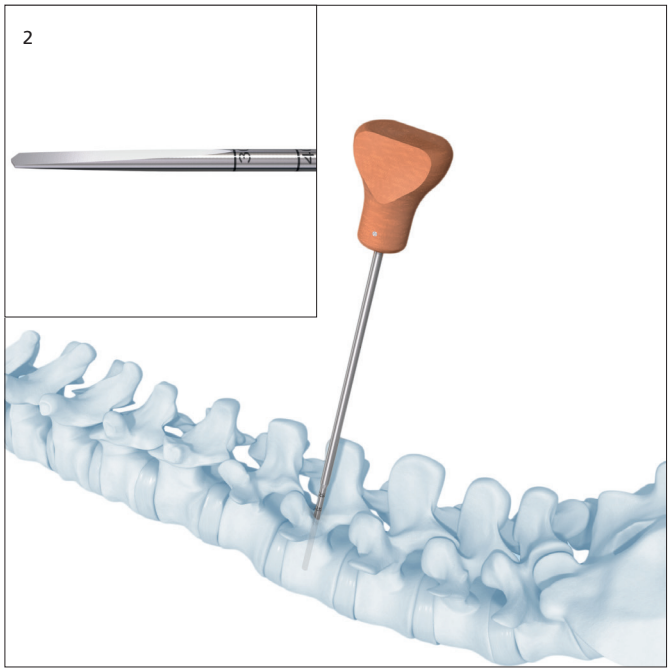
Optional instruments	
388.608	Pedicle Marker USS II, with spherical bulges
388.609	Pedicle Marker USS II, with long bulges

1. Open pedicle and determine screw length

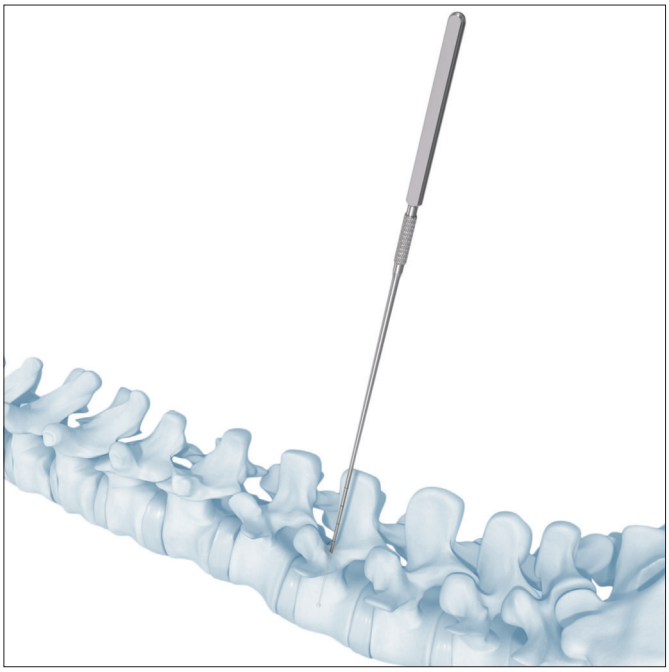
Use one of the awls to open the pedicle cortex to a depth of 10 mm (1). Open the pedicle further using one of the USS pedicle probes with markings at 30, 40 and 50 mm (2).

Ø Screw (mm)	Pedicle Awl	Pedicle Probe
4.2	388.551	388.538 (Ø 2.8 mm)
5.2, 6.2	388.550	388.540 (Ø 3.8 mm)
7.0	388.550	388.539 (Ø 4.8 mm)



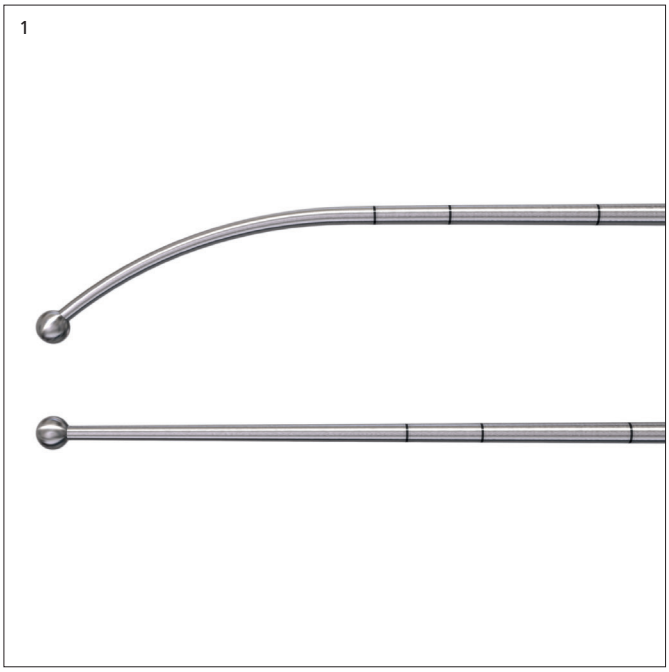


Determine the length of the pedicle screw with the Length indicator for pedicle screws (357.789).



2. Probe pedicle channel

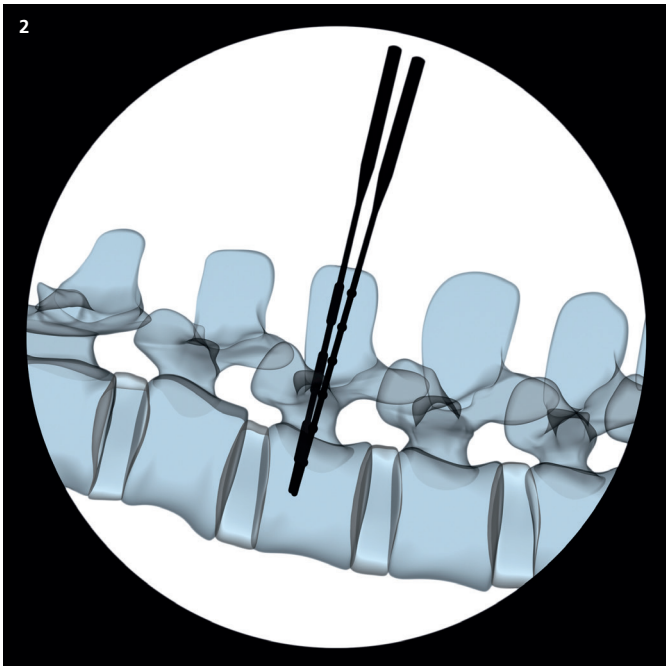
Use the straight or curved feeler to probe the pedicle screw channel to check the wall for perforations. (1)



Optional: use of pedicle markers

Use a pedicle marker with spherical bulges and/or a pedicle marker with long bulges to verify the position and alignment radiographically (2). The bulges show the depth at 10 mm intervals (3). The use of pedicle markers with bulges of two different shapes facilitates differentiation between the left and right pedicle.

2



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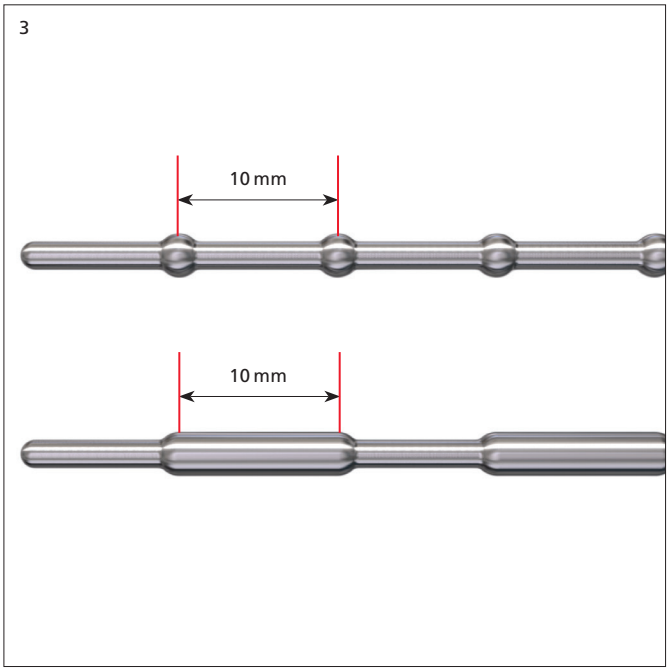
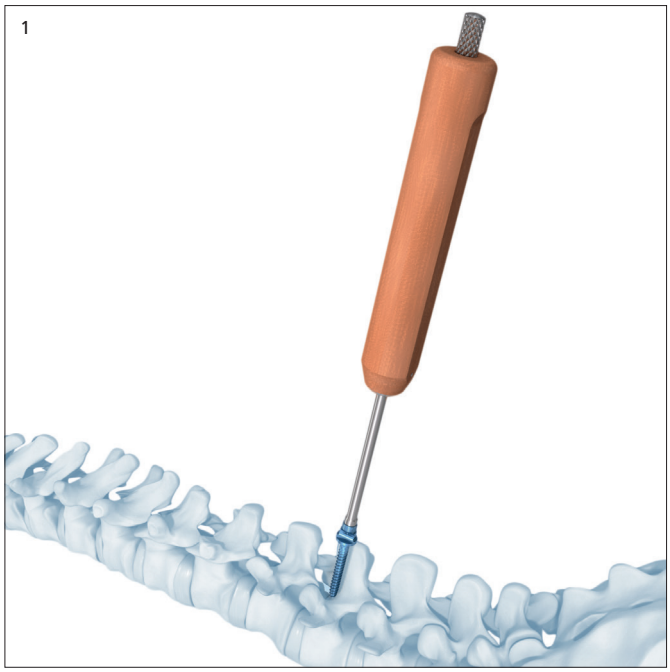
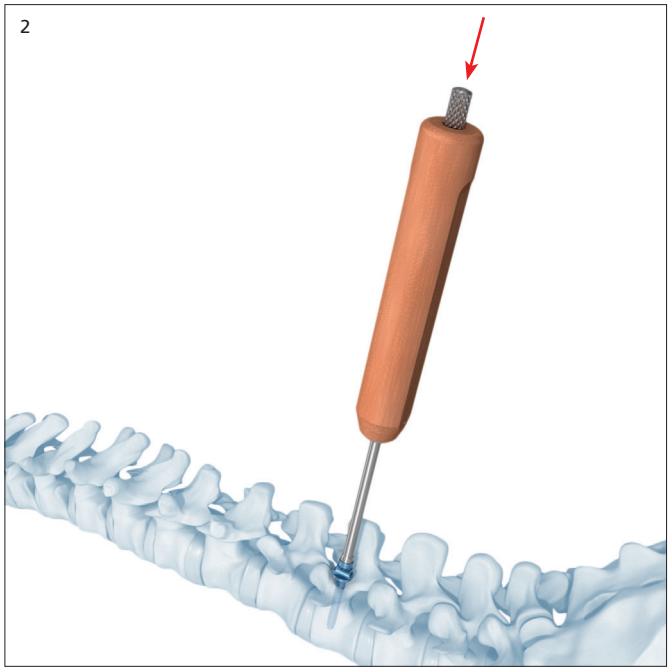


3. Insert pedicle screw into pedicle

Pick up the pedicle screw as described on pages 4 and 5. Insert the pedicle screw into the prepared pedicle until the screw head is well seated and one of the openings points towards the rod that is to be subsequently inserted (1). Press the release button to detach the handle from the stick (2).

Note: If using a rod connector, align the screw head such that one of the openings is perpendicular to the rod.

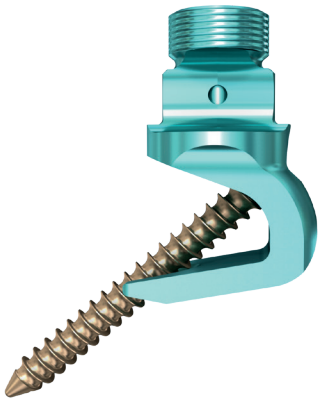




Position Pedicle Hook

Instruments	
388.510	USS Pedicle Feeler, length 300 mm
388.622	Handle for USS Hook and Screwholder No. 388.612
388.612	USS Hook and Screwholder, with hexagonal socket 4.0 mm
388.632	Hook Positioner for USS II
315.190	Dill Bit Ø 2.0 mm, length 100/75 mm, 3-flute, for Quick Coupling
388.581	USS Drill Sleeve 2.0
387.060	Handle for Drill Sleeve 2.0
319.060	Depth Gauge for Screws Ø 1.5 to 2.0 mm, measuring range up to 38 mm
388.381	Holding Sleeve for Fillister Head Screws
314.070	Screwdriver, hexagonal, small, 2.5 mm, with groove

Optional instruments	
388.512	USS II Pedicle Feeler, length 300 mm, for small hooks
388.530	USS Chisel, width 9 mm



The USS II Pedicle Hooks can be anchored in the pedicle with a single Ø 3.2 mm USS Screw for Pedicle Hook.

1. Prepare seat for pedicle hook

Prepare the pedicle with the USS pedicle feeler (1). Place the pedicle feeler between the inferior and superior articular facets.

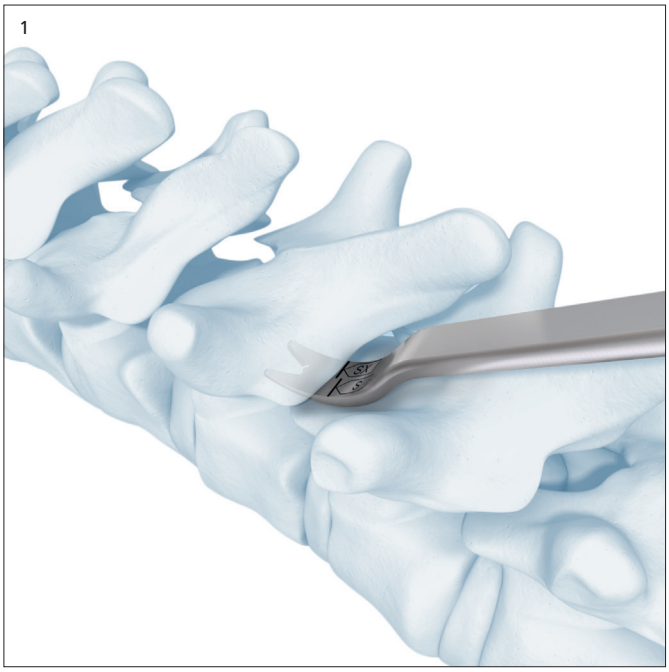
Precation: **Ensure that the feeler is placed in the articular space and not in the bone of the inferior facet.**

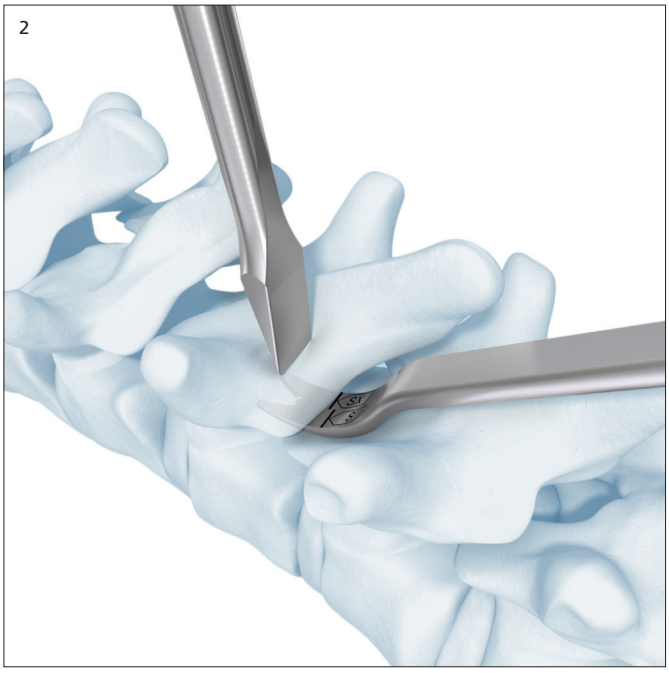
To facilitate the insertion of the pedicle hook, remove a small portion of the inferior facet with an osteotome (2). There are six marks on the pedicle feeler; once the last one has been reached, sufficient bone has been removed to position the hook about the pedicle.

Move the feeler in a lateral and cranial direction to check for the desired position.

Precaution: **Do not push medially.**

Remove the pedicle feeler.





2. Position pedicle hook

Pick up the pedicle hook as described on pages 4 and 5.

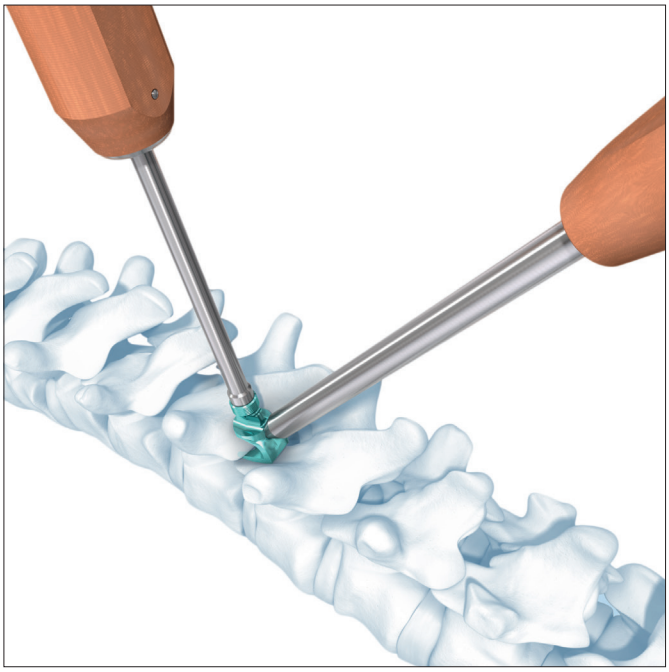
Note: **Use a front-opening hook if a rod connector is required to connect the hook to the longitudinal rod.**

Insert the hook positioner for USS II into the screw hole of the pedicle hook and move the hook into the prepared position.

Ensure that the pedicle hook is snug around the pedicle by pushing the hook positioner axially and laterally. The pedicle hook should not move.

Gently tap the hook positioner with a hammer to firmly seat the hook.

Remove the hook positioner and the handle. The stick remains attached to the hook.



3. Drill hole for screw Ø 3.2 mm and determine the screw length

To anchor the pedicle hook to the pedicle the Ø 3.2 mm screw can be inserted through the hole in the back of the hook.

Use the 3-flute drill bit Ø 2.0 mm with the USS drill sleeve 2.0 and an oscillating drill to drill the screw hole. The drill sleeve consists of two parts, the sleeve and the handle. These two components must be screwed together before use.

Warning: **Do not start the power drill if the bit does not hit bone after passing through the drill sleeve.**

Remove the drill sleeve and determine the depth of the hole using the depth gauge.

4. Insert screw Ø 3.2 mm

Pick up a suitable length USS Screw for Pedicle Hook with the holding sleeve and the hexagonal screwdriver, and insert it in the pre-drilled hole. The pedicle hook is now attached to the pedicle.

Position Lamina Hook

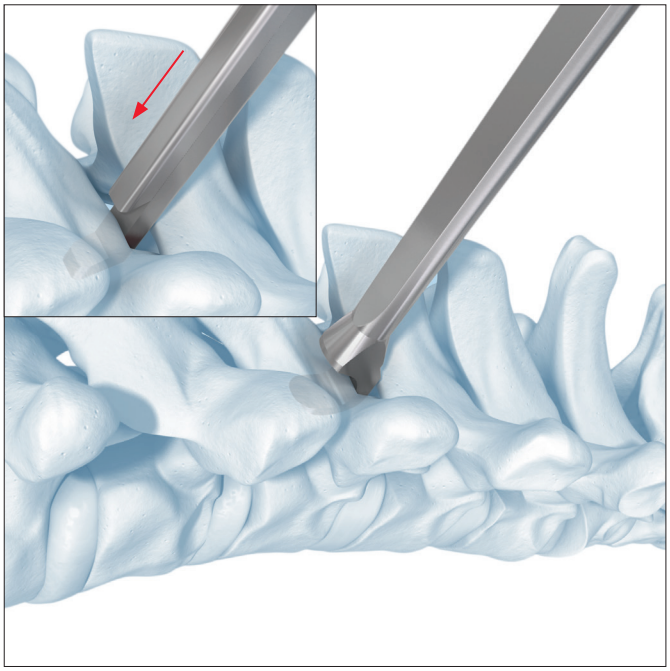
Instruments	
388.520	USS Lamina Feeler, length 300 mm
388.622	Handle for USS Hook and Screwholder No. 388.612
388.612	USS Hook and Screwholder, with hexagonal Socket 4.0 mm
388.632	Hook Positioner for USS II

Optional instrument	
388.521	USS Small Stature/Paediatric Lamina Feeler

1. Prepare seat for lamina hook

The lamina hook can be placed around either the superior or inferior portion of the lamina. Prepare the seat for the lamina hook using a lamina feeler. Carefully remove the ligamentum flavum and a small portion of the lamina with a rongeur to ensure good seating of the lamina hook.

Remove the lamina feeler.



2. Position lamina hook

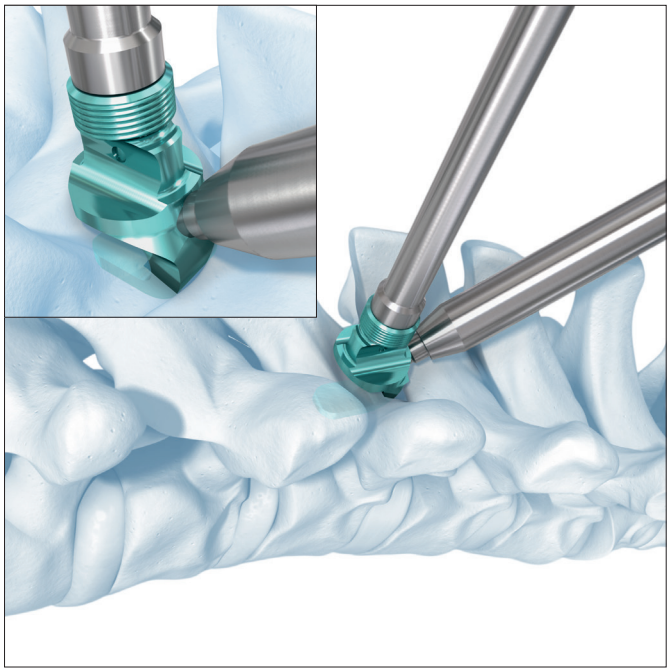
Pick up the lamina hook as described on page 4 and 5.

Note: **Use a front-opening hook if a rod connector is needed.**

Insert the hook positioner for USS II in the positioning hole of the hook and move the lamina hook into the prepared position. The inferior part of the lamina hook must fit snugly with the lamina.

Warning: **Ensure that the lamina hook does not lie too deep or press upon the spinal cord.**

Remove the hook positioner and the handle. The stick remains attached to the hook.



Angled Lamina Hook Positioning

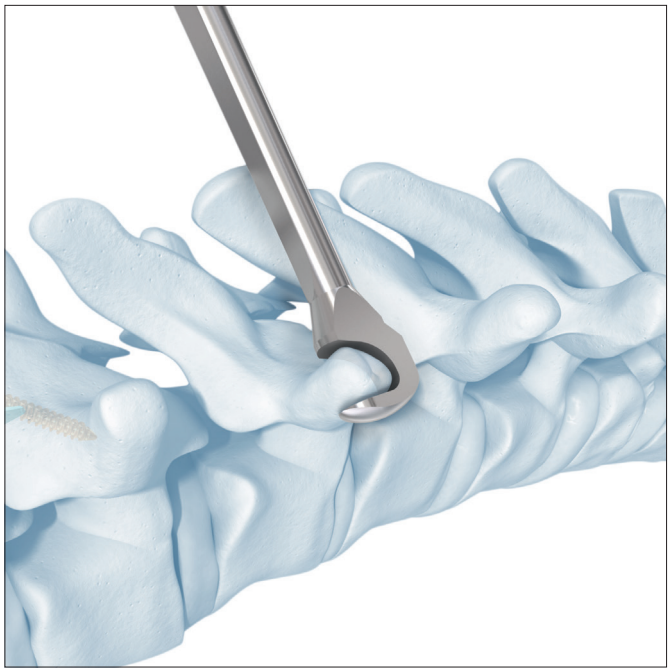
Instruments	
388.520	USS Lamina Feeler, length 300 mm
388.622	Handle for USS Hook and Screwholder No. 388.612
388.612	USS Hook and Screwholder, with hexagonal socket 4.0 mm
388.632	Hook Positioner for USS II

Optional instrument	
388.521	USS Small Stature/Paediatric Lamina Feeler

1. Prepare seat for angled lamina hook

Remove the soft tissue from the transverse process. Place a lamina feeler round the transverse process and thus detach the soft tissue attachment points from the anterior part of the transverse process.

Remove the lamina feeler.



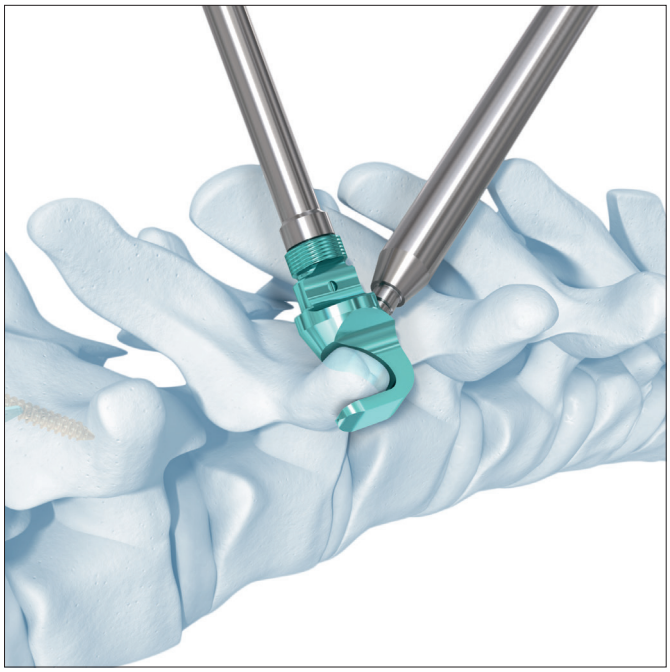
2. Angled lamina hook positioning

Pick up the angled lamina hook as described on page 4 and 5.

Note: **Use a front-opening hook if a rod connector is needed.**

Insert the hook positioner for USS II in the positioning hole of the hook and move the angled lamina hook into the prepared position.

Remove the hook positioner and the handle. The stick remains attached to the hook.



Rod Contouring

Instruments	
388.870/880	Trial Rod Ø 6.0 mm, length 150/400 mm
388.960	Bending Pliers with Rolls for USS Rods Ø 6.0 mm, length 300 mm
388.910/920	USS Bending Iron left/right
388.440	Holding Forceps with broad tip, length 290 mm, for rods Ø 6.0 mm

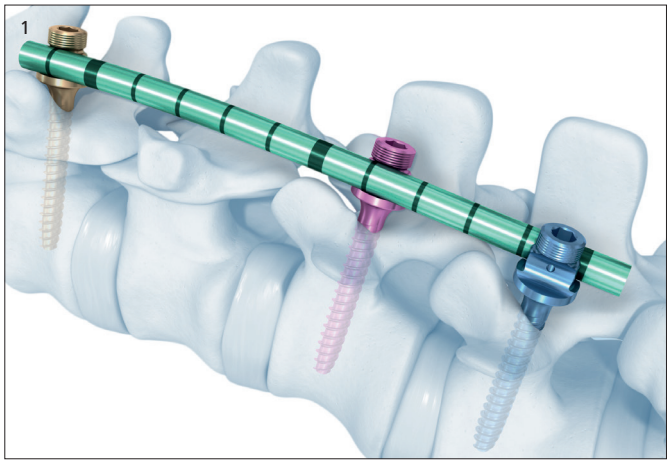
Optional instruments	
388.906/907	Trial Rod Ø 5.0 mm, length 150/500 mm
388.961	Bending Pliers with Rolls for USS Rods Ø 5.0 mm, with radius adjustment
388.911/922	USS Small Stature/Paediatric Bending Iron for Rods Ø 5.0 mm, left/right
388.441	Holding Forceps for USS Small Stature/Paediatric Rods Ø 5.0 mm

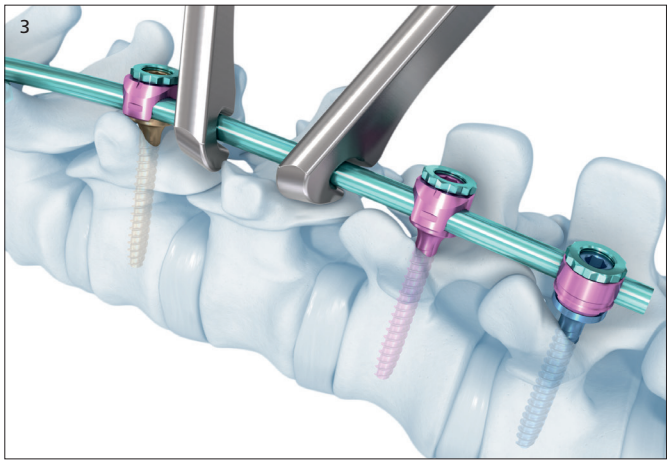
Use a trial rod for USS rods (for 5.0 mm or 6.0 mm rods) to determine the shape and length of the rod to be inserted (1).

Use the bending pliers with rolls for USS rods (2) or the USS bending iron (3) to bend the rod.

Warning: Once bent, titanium rods should not be bent back again. Do not bend titanium rods more than 45°.

Note regarding the hook/screw offset: Anatomical conditions sometimes result in the implants not being aligned in a straight line so that the rod cannot be inserted into all the implants from the same side. The USS II pedicle screws and hooks have offset heads and the dual opening design allows for insertion of the rod to either side of the pedicle screws and hooks.





Locking Implants to Rods

Variation A: Place Sleeve and Nut Consecutively

Instruments	
388.582	Sleeve Pusher for Nos. 388.503, 388.508, 388.583 and 388.161
388.161	Sleeve Positioner for USS II
388.584	Socket Wrench for twelve point nut, with L-handle
388.143	Socket Wrench 5.0 mm, with T-Handle
388.338	Screwdriver 4.0 mm with T-Handle

Optional instrument	
388.632	Hook positioner for USS II

The rod is fixed with a sleeve and a nut.

Note: **When using a 5 mm rod, sleeve 499.239 (in TAN, dark blue) must be used; when using a 6 mm rod, sleeve 499.302 (in TAN, turquoise) must be used.**

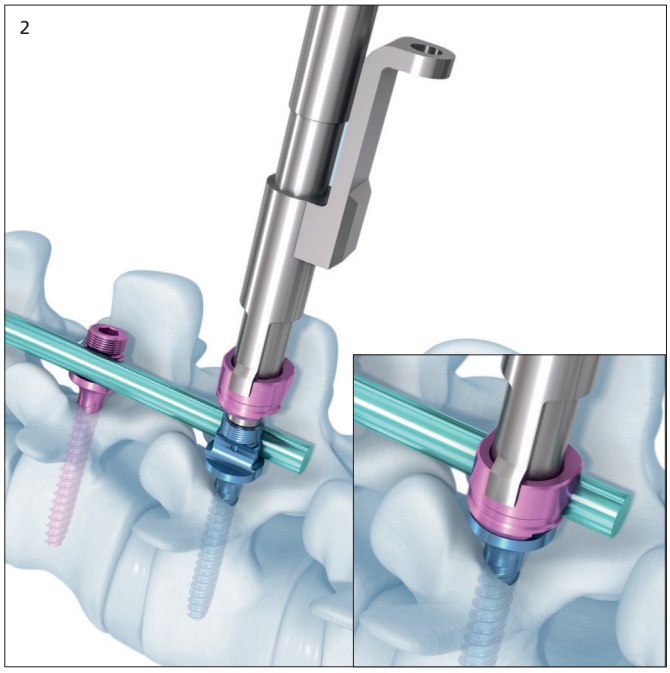
1. Pick up and locate sleeve with sleeve positioner

Place the sleeve pusher on the sleeve positioner for USS II. Pick up an appropriate sleeve: the shorter leg of the sleeve pusher must be above the narrow-lipped side of the sleeve (1).

Slide the sleeve positioner over the stick and place it on the implant.

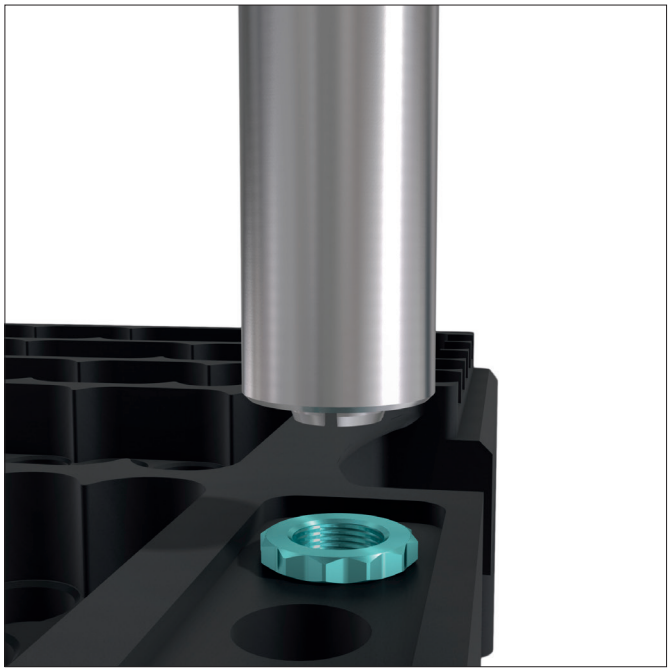
Press down on the sleeve pusher to place the sleeve on the implant/rod (2). Lift the sleeve pusher again. The sleeve remains on the implant/rod.

If the sleeve cannot be placed on the implant/rod then tap lightly on the sleeve pusher. The hook positioner for USS II can be used for this purpose by placing it in the round indentation on the handle of the sleeve pusher.



2. Place nut on implant

Use the socket wrench for twelve point nut, with L-handle to pick up the nut from the loading station and screw it on to the implant thread (screw or hook).



3. Tighten the nut finger-tight

Tighten the nut using the socket wrench for twelve point nut with L-handle. The socket wrench for the countertorque is spring loaded and can be pressed downwards continuously with the left hand using the T-Handle.

To tighten the nut further, lift the L-handle of the socket wrench with the right hand and engage it again.

Note: **If using a 6 mm rod, a few threads will remain visible on the nut.**

Locking Implants to Rods

Variation B: Place Sleeve and Nut in a Single Operation

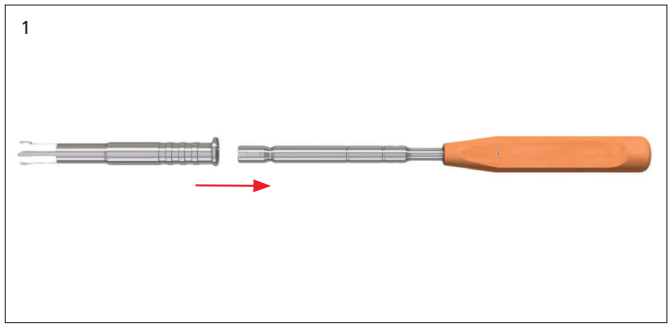
Instruments	
388.163	Holding Sleeve for No. 388.159, for Rods Ø 5.0 and 6.0 mm
388.159	Socket Wrench, with straight handle, for USS-II nuts and sleeves
388.584	Socket Wrench for twelve point nut, with L-Handle
388.143	Socket Wrench, 5.0 mm, with T-Handle
388.338	Screwdriver 4.0 mm with T-Handle
388.612	USS Hook and Screwholder, with hexagonal socket 4.0 mm

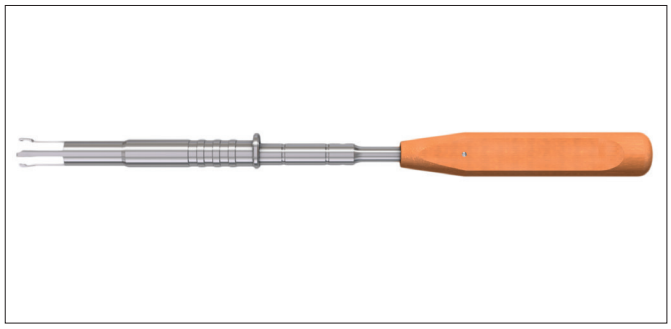
1. Position sleeve and nut

Place holding sleeve on the socket wrench with straight handle (1).

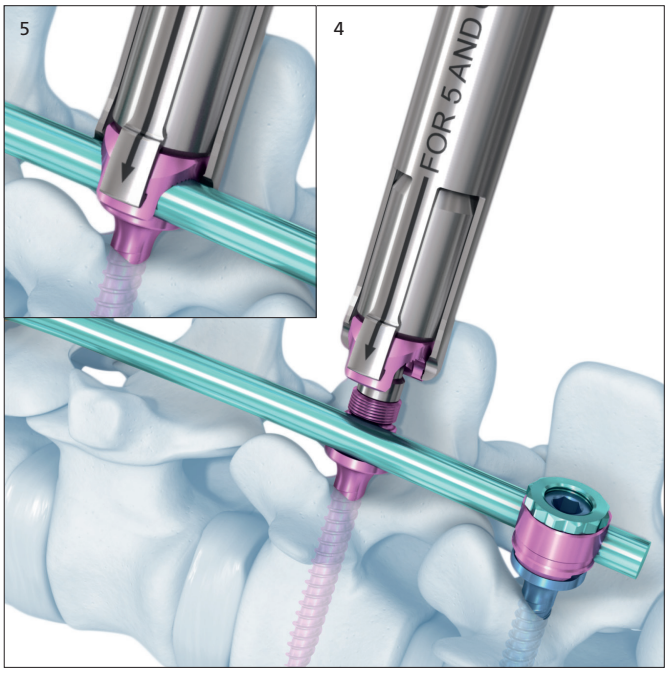
To pick up a sleeve and nut, first place a nut on the sleeve and then fit the socket wrench from above (2).

Push the holding sleeve downwards to fix the sleeve in position. The sleeve can only be picked up in a specific position. One leg of the holding sleeve is marked with an arrow. This must be located above the narrow-lipped side of the sleeve (3).





Position the socket wrench/holding sleeve connection above the implant (screw or hook) (4). Place sleeve and nut together using the socket wrench handle (5).



2. Tighten the nut finger-tight

Tighten the nut using the socket wrench for twelve point nut with L-handle. The socket wrench for the countertorque is spring-loaded and can be pressed downwards continuously with the left hand using the T-Handle.

To tighten the nut further, lift the L-handle of the socket wrench with the right hand and engage it again.

Note: **If using a 6 mm rod, a few threads will remain visible on the nut.**

Locking Implants to Rods

Variation C: Rod Introduction Pliers ("Persuader")

Instruments	
388.508	Rod Introduction Pliers for Rods Ø 6.0 mm
388.582	Sleeve Pusher for Nos. 388.503, 388.508, 388.583 and 388.161
388.615	Counter Torque for Rod Introduction Pliers
388.410	Spreader Forceps for Pedicle Screws, length 330 mm
388.584	Socket Wrench for twelve point nut, with L-Handle
388.143	Socket Wrench 5.0 mm, with T-Handle
388.338	Screwdriver 4.0 mm with T-Handle
388.612	USS Hook and Screwholder, with hexagonal socket 4.0 mm

Optional instrument	
388.632	Hook Positioner for USS II

Use rod introduction pliers ("persuader")
Occasionally, a rod cannot easily be introduced into a dual-opening implant because of the distance between the rod and the implant.

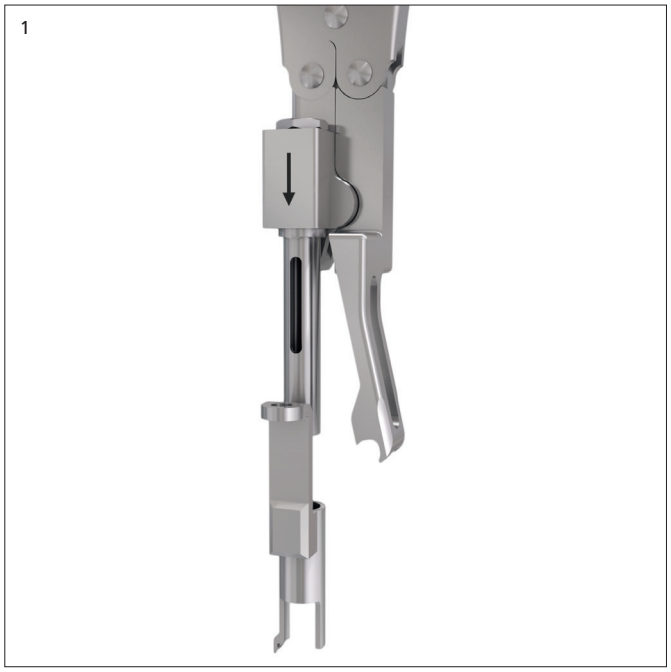
With the rod introduction pliers for USS II, the persuader, dual-opening implants can be lifted and drawn on to the rod. Rod and implant are fixed directly with the sleeve.

Note: When using a 5 mm rod, sleeve 499.239 (in TAN, dark blue) must be used, when using a 6 mm rod, sleeve 499.302 (in TAN, turquoise) must be used.

1. Mount sleeve pusher onto persuader

Fix the sleeve pusher on to the cylinder of the persuader (1). Use the attached sleeve pusher to pick up a sleeve from the loading station. The shorter leg of the sleeve pusher must be above the narrow-lipped side of the sleeve (2). The handle of the sleeve pusher must be located on the side of the persuader with the arrow.

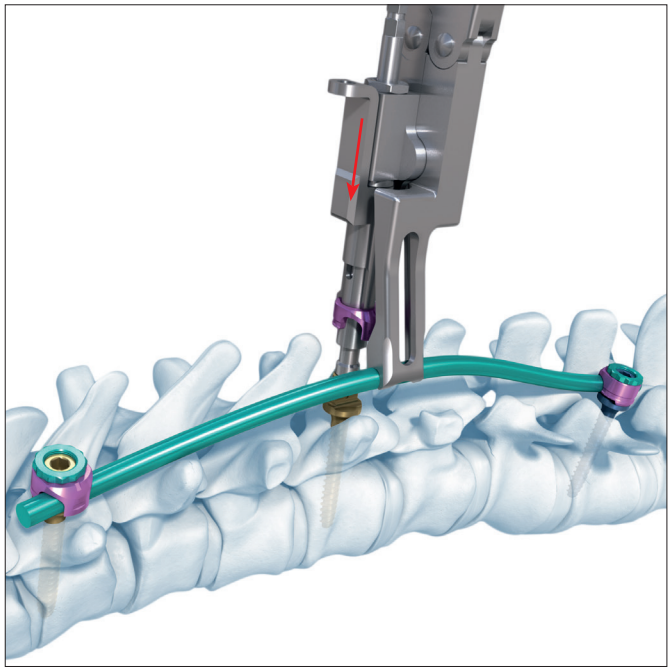
1



2

2. Place persuader on implant

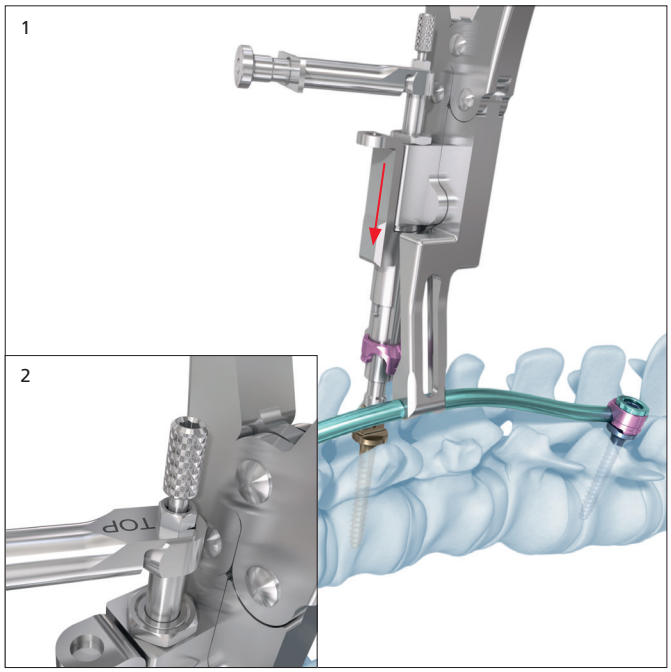
Slide the cylinder of the persuader on the stick and the leg of the pliers on the rod.



3. Attach counter torque for rod introduction pliers

The counter torque/support for rod introduction pliers serves as a locking device when lifting the implants and allows the implants to be rotated.

Slide the counter torque for rod introduction pliers on to the projecting end of the stick and pull the lever at the same time (1). The fork-shaped opening of the counter torque must point upwards. Release the lever so that the fork of the counter torque engages in the hexagonal socket of the stick (2).



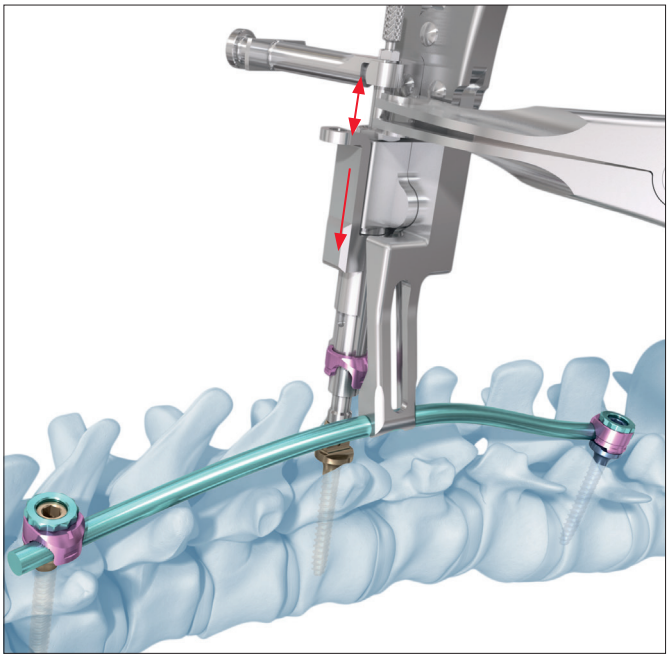
4. Bring rod towards dual-opening implant

Bring the spreader forceps to the stick between the counter torque and persuader. Slowly open the spreader to bring the implant up towards the rod. Once the implant opening has reached the level of the rod, slowly close the persuader to insert the rod.

Precaution: **Do not close the persuader completely since it can transmit very high forces. If necessary the locking clamp can be tilted up so that the persuader does not remain in the closed position.**

Remove the counter torque/support for rod introduction pliers.

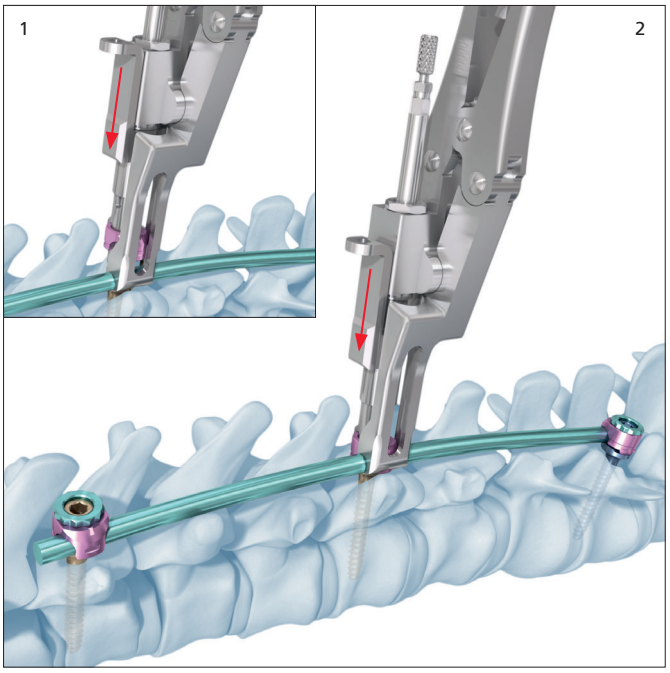
Warning: **Do not apply too much force on the anchorage of the implant or it will tear out of the bone.**



5. Place sleeve over implant and rod

Push the sleeve pusher down the cylinder to place the sleeve over the rod and implant (1). Retract the sleeve pusher (2). The sleeve remains on the implant/rod.

If the sleeve cannot be readily placed in position, ensure that the lateral opening of the screw or hook is properly aligned on the rod. If necessary, a light tap on the sleeve pusher may help. The hook positioner for USS II may be used for this purpose: place it in the round indentation on the handle of the sleeve pusher.



6. Attach implant to rod

Remove the persuader. Pick up a nut with the socket wrench for twelve point nut, allow it to slide over the stick and screw it loosely on to the implant.

Instruments

388.584	Socket Wrench for twelve point nut, with L-Handle
388.143	Socket Wrench 5.0 mm, with T-Handle
388.612	USS Hook and Screwholder, with hexagonal socket 4.0 mm

Optional instrument

388.338	Screwdriver 4.0 mm with T-Handle

Final Tightening of Nut

Tighten the nut firmly with the socket wrench for twelve point nut with L-handle. Insert the socket wrench 5.0 mm with T-Handle into the socket wrench for twelve point nut and pass the two together over the stick. The socket wrench 5.0 mm must engage in the hexagonal socket of the stick. The stick serves to apply counter-torque. The socket wrench is spring-loaded and can be pushed down continuously with the left hand on the T-Handle. To tighten the nut further, lift the L-handle of the socket wrench with the right hand and engage it again.

If the stick has already been removed, push the screw-driver 4.0 mm with T-Handle into the socket wrench for twelve point nut and use this to apply countertorque.

Note: **When using a 6 mm rod, several threads of the nut will remain visible.**

Option: Using the torque-limiting device

Instruments

388.145	Socket Wrench, hexagonal, 5.0 mm with T-Handle
03.602.042	Torque-limiting Handle, 12 Nm, for USS II
388.612	USS Hook and Screwholder, with hexagonal socket, 4.0 mm

Use the torque limiting handle to tighten the nut firmly. Insert the hexagonal socket wrench 5.0 mm with T-Handle into the torque-limiting device. Tighten the nut until the torque-limiting device disengages.

Note: **To get the hexagonal socket wrench to engage in the hexagonal socket of the stick, apply a little pressure to the socket wrench and move it back and forth.**

Distraction or Compression of Adjacent Implants

Instruments	
388.410	Spreader Forceps for Pedicle Screws, length 330 mm
388.422	Compression Forceps, length 335 mm, for Pedicle Screws
498.910	Fixation Ring for Rods Ø 6.0 mm, Titanium Alloy (TAN)
314.070	Screwdriver, hexagonal, small, 2.5 mm, with groove
388.360	USS Holding Sleeve, for No. 314.070
388.440	Holding Forceps with broad tip for Rods Ø 6.0 mm, length 290 mm

Optional instruments	
498.909	Fixation Ring for Rods Ø 5.0 mm, Titanium Alloy (TAN), light blue
388.441	Holding Forceps for USS Small Stature/Paediatric Rods Ø 5.0 mm
388.413	Spreader Forceps for USS Small Stature/Paediatric
388.424	Compression Forceps for USS Small Stature/Paediatric

Distraction or compression with corresponding forceps

Once the rod has been introduced and loosely attached to the implant, distraction or compression can be performed.

Before tightening the nut on the implant, use the spreader for distraction or the compression forceps for compression.

Option: Additional use of fixation ring

Fixation rings

Ø Rod	Fixation ring
5.0 mm	498.909
6.0 mm	498.910 or 498.911

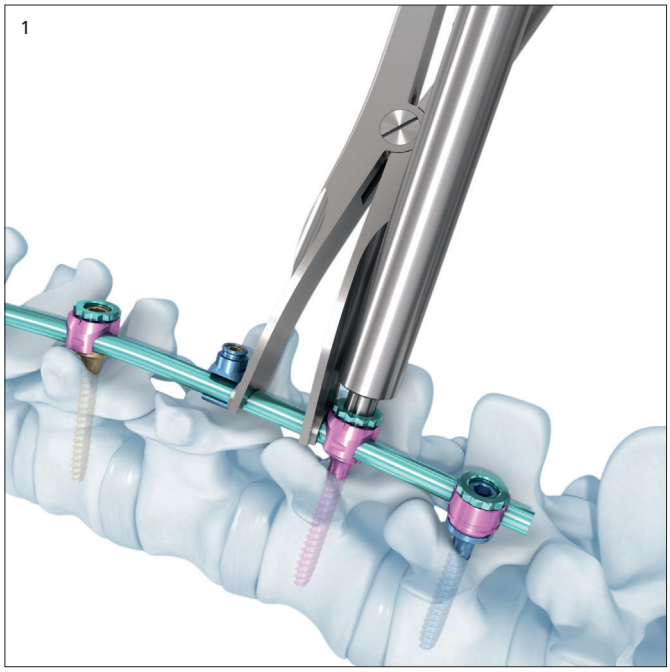
Use a fixation ring if the two implants are too far apart. Place the fixation ring on the rod using the small hexagonal screwdriver and the holding sleeve.

Perform the distraction (1) or compression (2). The implant-rod connection must be loose during this procedure.

Remove the fixation ring and tighten the implant nut firmly.

Option: Additional use of holding forceps for rods
The appropriate holding forceps for 5 mm or 6 mm rods may be used instead of a fixation ring. Attach forceps to rod and perform the distraction or compression operation.

1



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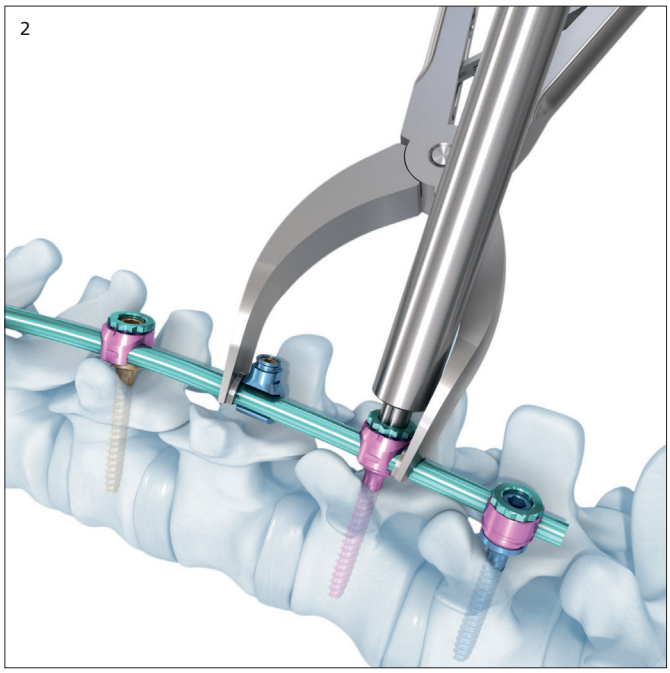


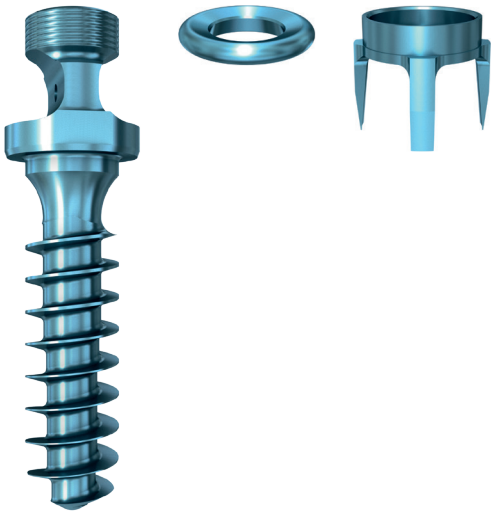
Insertion of Vertebral Body Screws with Washer

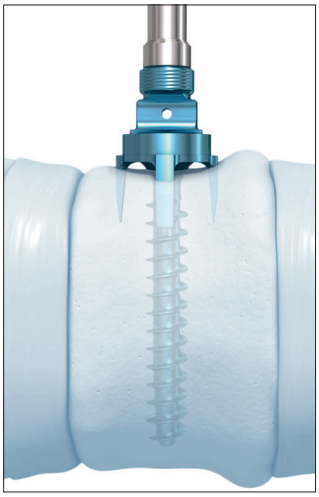
(Anterior Approach)

Instruments*	
388.550	Pedicle Awl Ø 4.0 mm with Canevasit Handle, length 230 mm, for Pedicle Screws Ø 5.0 to 7.0 mm
388.538	Pedicle Probe Ø 2.8 mm, length 230 mm
388.540	Pedicle Probe Ø 3.8 mm with Canevasit Handle, length 230 mm, for Pedicle Screws Ø 5.0 to 7.0 mm
357.789	Length Indicator for Pedicle Screws Ø 4.2 to 9.0 mm
388.622	Handle for USS Hook and Screwholder No. 388.612
388.612	USS Hook and Screwholder, with hexagonal socket 4.0 mm
385.807	Inserter for Angled Washers Ø 6.0 to 8.0 mm

The vertebral body screws for anterior approach (Ø 6.2 and 8.0 mm) have large thread flanks compared to the pedicle screws.

Flat and angled washers can be used with anterior fixation constructs to distribute the force of the screw over the bone. The angled washers form a fixed angle with the screw.





1. Prepare screw hole and determine screw length

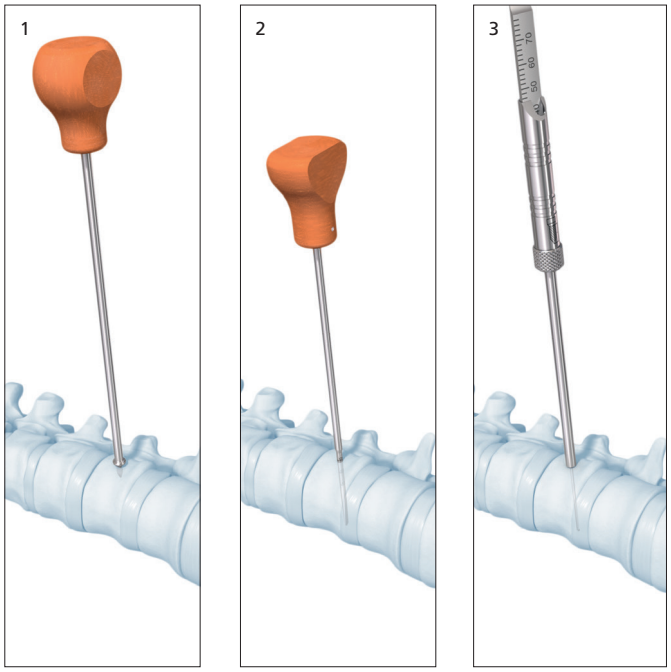
Probes

Ø Screw	Ø Probe
6.2 mm	2.8 mm (388.538)
8.0 mm	3.8 mm (388.540)

Determine the entry point for the screw, ideally selecting it at the junction of the pedicle with the vertebral body.

Align the pedicle awl (1) perpendicular to the contralateral side and prepare the screw hole. Use the appropriate pedicle probe (2) to deepen the screw hole until you have penetrated the opposite cortex.

Use the length indicator to determine the length of the vertebral body screw (3). Be aware of additional screw length needed because of the washer.

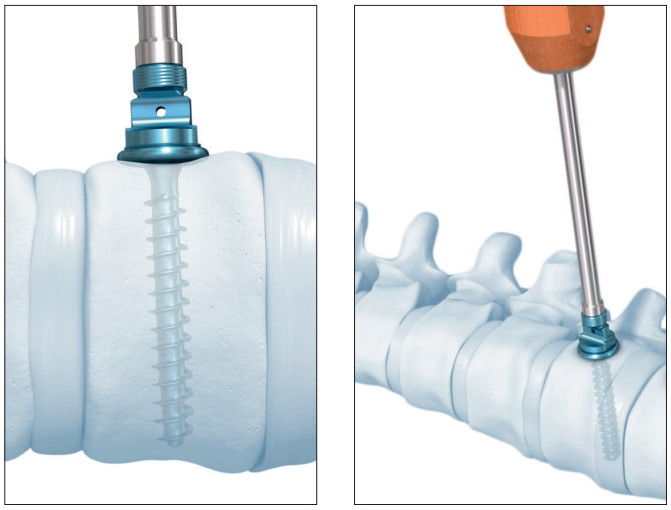


2. Insert washer

2a. Insert flat washer and screw

Place the flat washer on the concavity of the vertebral body with the convex side down.

Pick up a vertebral body screw with dual opening according to the description on page 4 and 5. Insert the screw in the prepared vertebral body until the screw head is well seated. Press the release button on the handle to detach the handle from the stick.

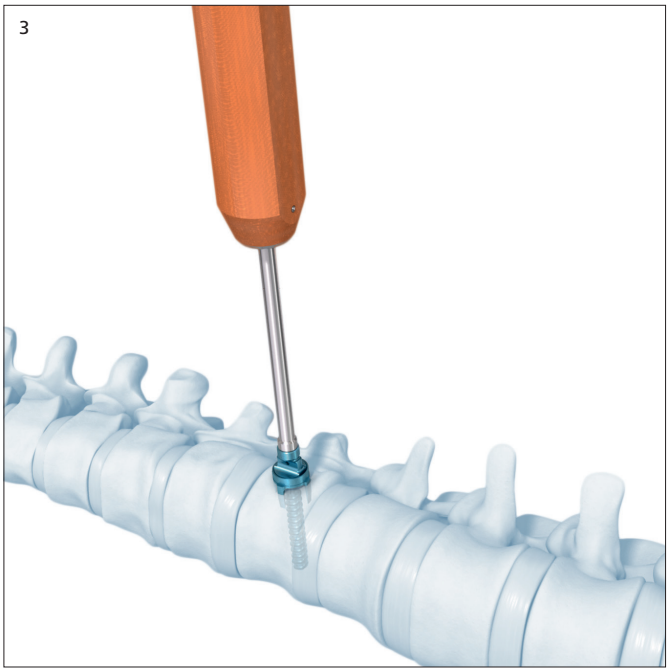


2b. Insert angled washer and screw

Press the loading button on the inserter and hold it down while picking up a washer. Anchor the washer in the bone by tapping lightly on the inserter (1).

Press the loading button on the inserter down and remove the inserter (2).

Pick up a vertebral body screw with dual opening according to the description on pages 4 and 5. Insert the screw in the prepared vertebral body until the screw head is well seated (3). Press the release button to detach the handle from the stick.



Connecting Rod and Implant Using Rod Connector

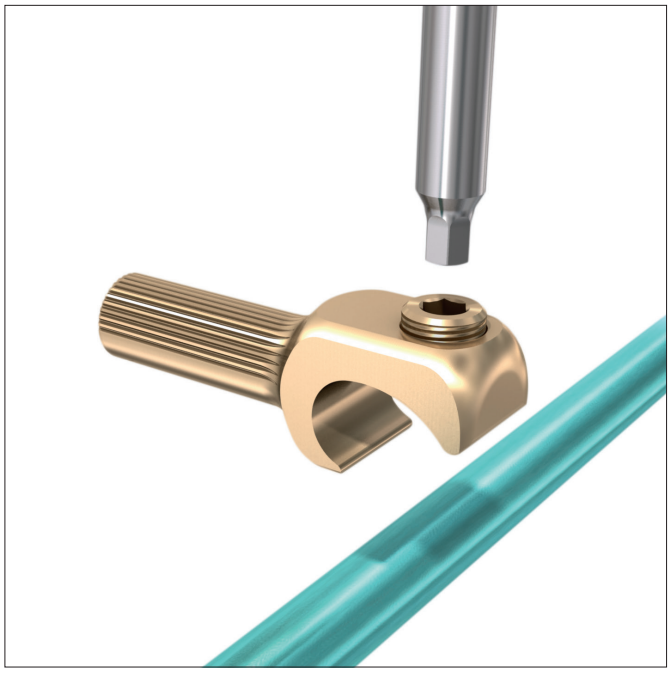
Instruments	
314.070	Screwdriver, hexagonal, small, 2.5 mm, with groove
388.584	Socket Wrench for twelve point nut, with L-Handle
388.143	Socket Wrench 5.0 mm, with T-Handle

Rod connectors are used in cases in which the distances between rod and implant cannot be bridged with the persuader. All rod connectors are open and can be applied at any point in the intervention. When using rod connectors, front-opening hooks must be used, or the pedicle screws must be rotated 90°.

Precaution: **The rod connectors supplied in the set can only be used with the 6 mm rod.**

1. Fasten rod connector to rod

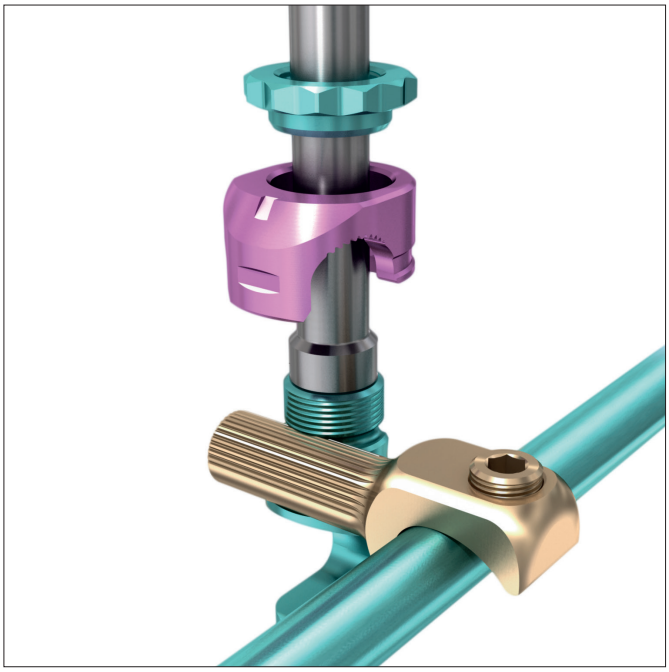
Position the rod connector on the rod, and insert the ribbed part of the rod connector in the hook or the front-opening screw. Screw the set screw of the rod connector tight using the small hexagonal screwdriver.



2. Connect rod connector to implant

Place the toothed, violet sleeve and the twelve point nut on the implant. Tighten the nut firmly with the socket wrench for twelve point nut, with L-handle, and apply countertorque using the socket wrench 5.0 mm, with T-Handle, mounted on the stick.

Note: **Use only the toothed, violet sleeve with rod connectors.**



Connecting Two Rods

Variation A: Connecting Two Rods with 6 mm Cross-link Clamps

Instruments	
314.070	Screwdriver, hexagonal, small, 2.5 mm, with groove
388.363	Holding Sleeve with Catches, for No. 314.070
388.450	Holding Forceps for USS Rods Ø 3.5/4.5 mm, length 295 mm

Optional instruments	
388.750	USS Rod Cutting and Bending Device
388.410	Spreader Forceps for Pedicle Screws, length 330 mm

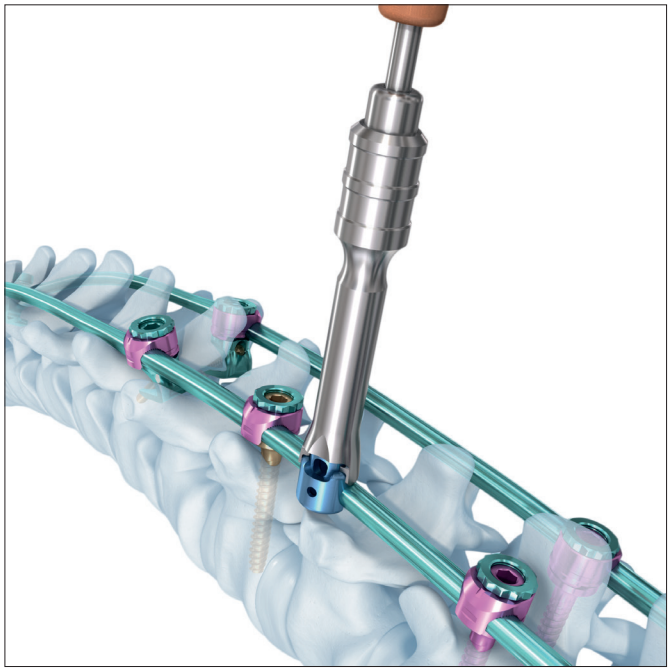
Transverse connectors are designed to connect the two longitudinal rods.

1. Mount first cross-link clamp

Assemble the small hexagonal screwdriver and the holding sleeve with locking catches. Retract the holding sleeve.

To pick up the pre-assembled cross-link clamp, insert the hexagonal screwdriver in the fixing screw of the clamp, push the holding sleeve downwards and the locking catches over the sleeve of the cross-link clamp.

Retract the holding sleeve slightly, place the clamp on the rod and let go of the holding sleeve.

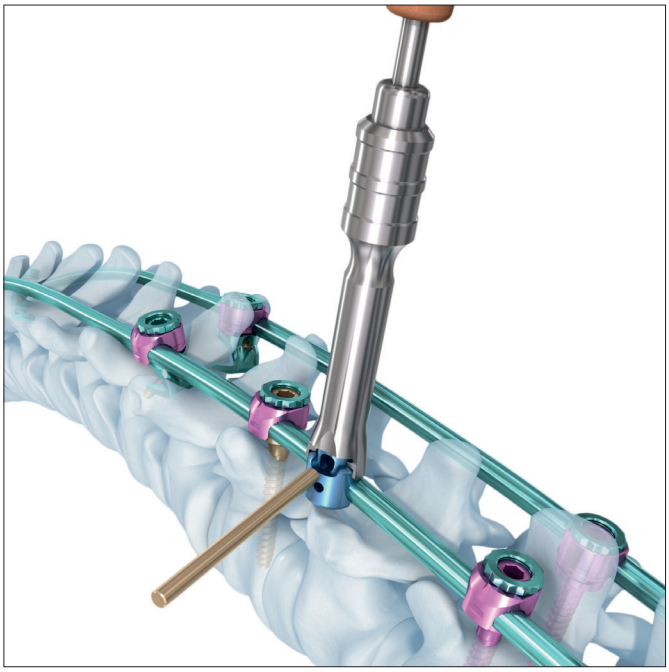


2. Insert rod for transverse connector

The design of the transverse connection sleeve with the two indentations on the upper side means that the transverse connector rod can be angled by up to ± 20° as necessary.

Determine the appropriate length of the rod for transverse connector Ø 3.5 mm. If necessary, cut the rod to size with the rod cutting and bending device.

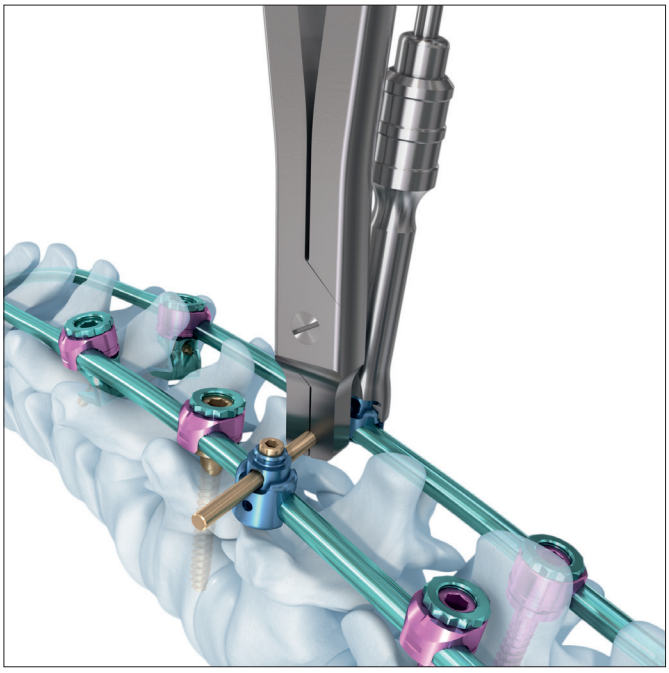
Hold the clamp with the small hexagonal screwdriver and pass the cross-link rod Ø 3.5 mm through the hole in the cross-link clamp. If necessary, use the holding forceps to insert the rod for transverse connector. Tighten the set screw of the cross-link clamp firmly with the small hexagonal screwdriver.



3. Mount second cross-link clamp

Repeat the procedure described in Step 1 for the second clamp on the opposite rod.

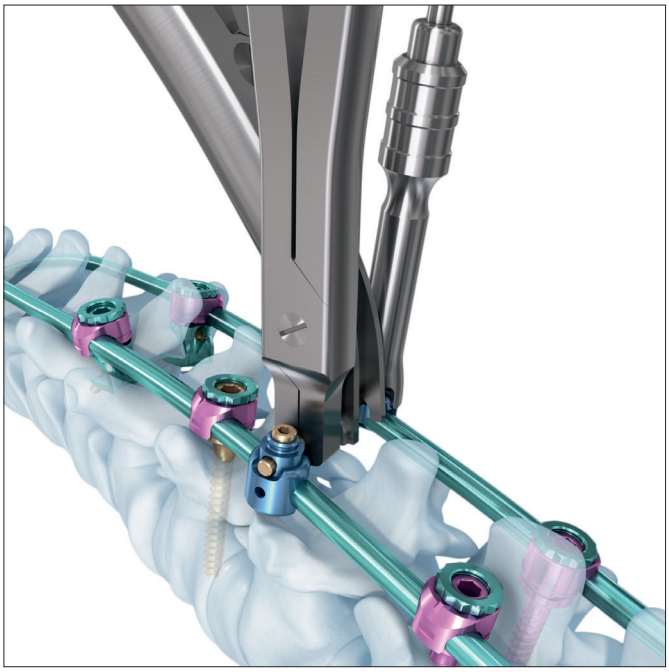
Pass the cross-link rod Ø 3.5 mm through the hole in the second clamp so that it projects 5 mm above the clamp. Tighten the set screw firmly with the small hexagonal screwdriver.



4. Distract cross-link assembly (optional)

Loosen one of the set screws, place the holding forceps next to the clamp and carry out the distraction with the spreader forceps.

Re-tighten the set screw tightly with the small hexagonal screwdriver.



Connecting Two Rods

Variation B: Connecting Two 5 mm Rods with Transverse Connectors

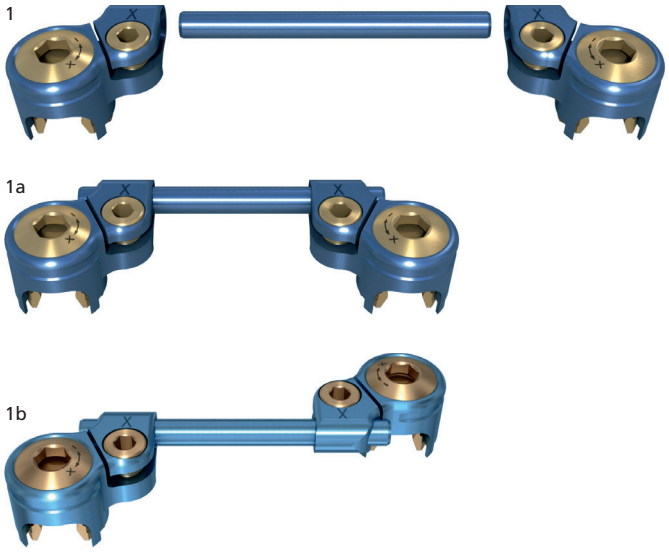
Instruments	
388.338	Screwdriver 4.0 mm with T-Handle
314.070	Screwdriver, hexagonal, small, 2.5 mm, with Groove
388.450	Holding Forceps for USS Rods Ø 3.5/4.5 mm, length 295 mm

Optional instrument	
388.410	Spreader Forceps for Pedicle Screws, length 330 mm

Transverse connectors are designed to connect the two longitudinal rods.

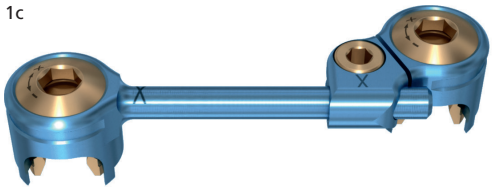
1. Assemble transverse connectors

Outside the operating field pass a cross-link rod of a suitable length through the two cross-link clamps (1). Either one right and one left clamp (1a) or two identical clamps (1b) can be used depending on the spatial conditions.



Alternative: **In the case of distances of less than 30 mm between the two rods to be connected, one of the two cross-link clamps must be replaced by a cross-link clamp with rod (1c). Push the rod of the cross-link clamp with rod through the second cross-link clamp.**

1c



Do not tighten the set screws firmly at this stage.

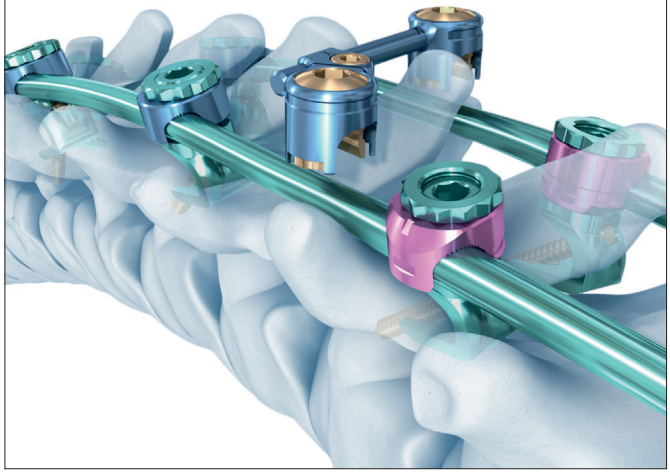
2. Mount transverse connectors on rods

Click the assembled transverse connectors on the rods (2). The fixing screws for the rod (large screws) must be totally loosened to do this.

The 3.5 mm cross-link rod can be angled up to ±15° (3).

If the transverse connector cannot be clicked on to the rod, loosen the fixing screws for the rod completely at both cross-link clamps.

2



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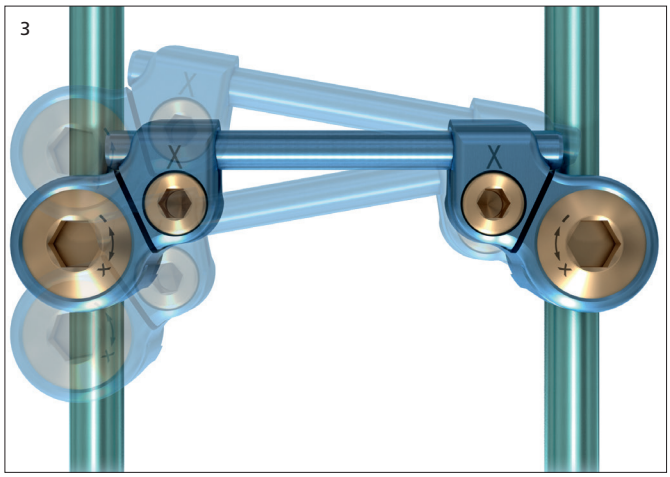
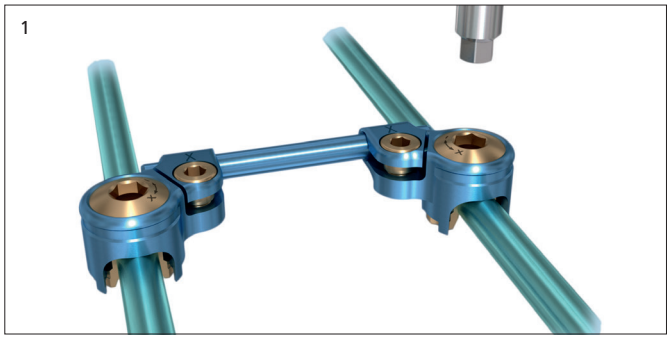


3. Fix transverse connector

First tighten the fixing screws for the rod of both cross-link clamps firmly with the hexagonal screwdriver 4.0 mm with T-Handle (1). Then tighten both set screws of the Ø 3.5 mm cross-link rod firmly with the hexagonal screwdriver 2.5 mm (2).

1



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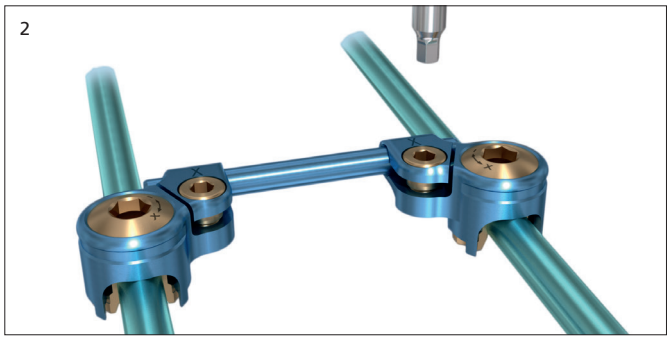

4. Distract cross-link assembly (optional)

Loosen one of the set screws with the small hexagonal screwdriver, place the holding forceps next to the relevant clamp and carry out the distraction with the spreader forceps. Retighten the set screws.

Indications and Contraindications

Please refer to the corresponding Instructions for Use for specific information on Intended use, Indications, Contraindications, Warnings and Precautions, Potential Adverse Events, Undesirable Side Effects and Residual Risks. Instructions for Use are available at www.e-ifu.com and/or www.depuysynthes.com/ifu.

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1. Aebi M, Thalgott JS, Webb JK (1998). AO ASIF Principles in Spine Surgery. Berlin: Springer-Verlag.

2. Aebi M, Arlet V, Webb JK (2007). AOSPINE Manual (2 vols), Stuttgart, New York: Thieme.

3. Modular Stabilization System: The Universal Spine System, in Aebi M, Thalgott JS, Webb JK (1998) AO ASIF Principles in Spine Surgery. Springer Berlin, Heidelberg. This chapter provides additional background and details on the USS system (only side-opening systems are covered in this chapter).

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