

Aesculap S⁴® Spinal System

Posterior Thoracolumbar Stabilization System
Surgical Technique



Aesculap Spine

S⁴® Spinal System

S⁴

Concept

From initial conception, the S⁴ Spinal System was developed to meet the spine surgeon's need for an extremely low profile and incredibly stable thoracolumbar spinal fixation system.

By combining the exceptionally small yet stable design of the screw construct with simple instrumentation, the S⁴ Spinal System emerges as a remarkably safe system for posterior column fixation.

The development elements – small, stable, simple, and safe – define the S⁴ Spinal System as the state-of-the-art pedicle fixation system of choice for surgeons requiring performance oriented top-loading pedicle screw systems!

■ Small

The S⁴ Spinal System features a revolutionary pressure vessel design capable of delivering unmatched biomechanical stability while maintaining an exceptionally small implant volume. This low profile, low volume aspect of S⁴ reduces the risk of facet and soft tissue impingement which ultimately leads to better mechanical stability and reduced soft tissue irritation.

S⁴ also features an inner Set Screw for locking the construct which greatly improves distraction and compression maneuvers and guarantees a "low run on the rod" throughout all implant components.



■ Stable

The S⁴ Spinal System features a unique closure mechanism that maximizes surface contact area which effortlessly stabilizes the whole construct and ensures a high overall biomechanical strength.

In addition, the interconnection strength between the bone screw and body is extremely stable due to a special shaped seat inside the body which creates the revolutionary pressure vessel that efficiently transfers force throughout the rod-screw construct. Lateral stability can also be achieved with S⁴ using the various rigid and adjustable cross-connectors!



■ Simple

S⁴ instruments were designed to meet the surgeons demand for a quicker yet simpler surgical procedure.

The multi-axial capability of the polyaxial screws provide 42° total range of motion, which allows for easier rod placement.

The small implant volume greatly improves distraction and compression maneuvers, especially in narrow conditions, and enhances the surgeon's ability to place interbody fusion spacers when distracting off pedicle screws.

By combining the S⁴ Spinal System with the ProSpace® interbody fusion spacers, Aesculap offers a true three-column stabilization portfolio, capable of providing the surgeon all it takes to operate in spine surgery!

■ Safe

The top-loading, inner Set Screw of S⁴ features an exclusive undercut thread design that virtually eliminates cross threading.

This unique undercut thread actually directs the forces inward to prevent splaying of the body, which ultimately results in improved force transmission and efficiency throughout the rod screw construct.

The small volume and low profile design of the S⁴ implant also minimizes interference with anatomical structures thereby allowing the surgeon the ability to remove less facet joint!





S4° Spinal System

By combining the small yet stable design of the screw construct with simple instrumentation, the S4° Spinal System emerges as a remarkably safe system for posterior column fixation.



S4° SRI

The unique design of the S4° SRI facilitates simultaneous correction of translation and slip angle thereby limiting excessive nerve root tension.



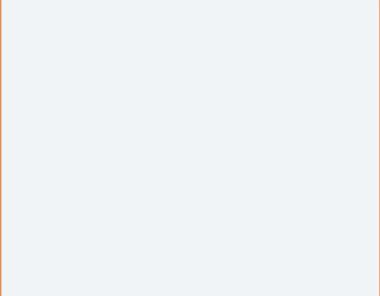
S4° CS

Optimized design for use in MIS procedures: cannulated screws and instruments for surgeries with minimal interference with anatomical structures.



S4° FRI

The system for the performance of fracture reduction: distraction, compression and the restoration of the original lordosis can be easily carried out with S4° FRI.



Open Approach

Traditionally, pedicle screws and rods are placed into the spine through an open approach. This means there is a midline incision. The large bands of muscles in the back are stripped free from their attachments to the spine and retracted off to each side. This allows for excellent visualization of the spine and easy access to the pedicles for implantation of the pedicle screws.

The downside of open surgery is that there can be considerable back pain from the muscle retraction, and the muscles develop some degree of permanent scar formation and damage as a result of the necessary retraction.

To overcome this disadvantage an intermuscular (Wiltse) approach is preferred by some surgeons. A Wiltse technique is a paramedian approach to the lumbosacral junction. Unlike a midline incision, where the exposure is created by cutting through the muscle planes, a Wiltse approach utilizes a muscle dividing technique of dissecting between the fascial planes of the multifidus and longissimus muscles to create the exposure. That approach enables the surgeon to access the spine in a less invasive way than a transmuscular approach.

The minimally invasive approach is described in the S⁴ FRI surgical technique. (O26102)

This surgical technique describes the open approach.



S4[®] Spinal System

S4[®]

Content

A. Open Approach

A.1	Pedicle Preparation	6
A.2	Tapping	8
A.3	Screw Application	9
A.3.1	Monoaxial Screw Application	10
A.3.2	Polyaxial Screw Application	11
A.4	Screw Body Manipulation	13
A.5	Rod Placement	14
A.6	Set Screw Starting for Monoaxial- and Polyaxial Screws	16
A.7	Reduction Maneuvers	18
A.7.1	Compression and Distraction Maneuvers	18
A.7.2	Rotation Maneuvers	19
A.8.	Final Tightening	20
A.9	Tab Removal	22
A.10	Cross Connector Placement	23
A.11	Final Construct	24
A.12	Hook Placement	25
A.12.1	Pedicle Hook	25
A.12.2	Lamina Hook	27
A.12.3	Thoracic Hook	27

B. Implants and Instruments – Overview

B.1	Implants	28
B.1.1	Implants – Overview	28
B.1.2	Implants – Set Configurations	32
B.2	Instruments – Set Configurations	35
B.2.1	Hooks – Implants and Instruments	35
B.2.2	Bone Preparation – Instruments	36
B.2.3	Application – Instruments	37
B.2.4	Cross Connectors Application – Instruments	38
B.2.5	Rod Bending and Reconstruction – Instruments	39
B.3	Trays	40
B.3.1	Trays – Instruments	40
B.3.2	Tray – Implants	41
B.3.3	Tray – Hooks and Hook Insertion Instruments	41

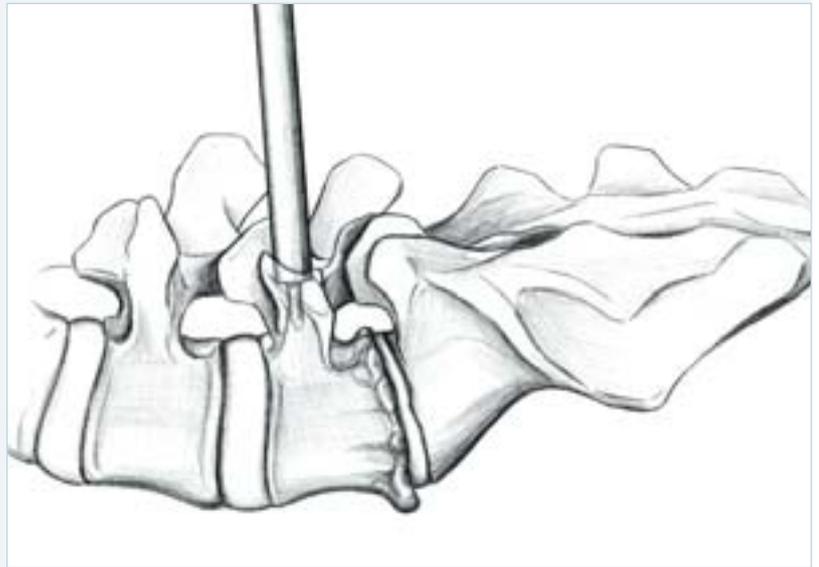


Open Approach

A 1

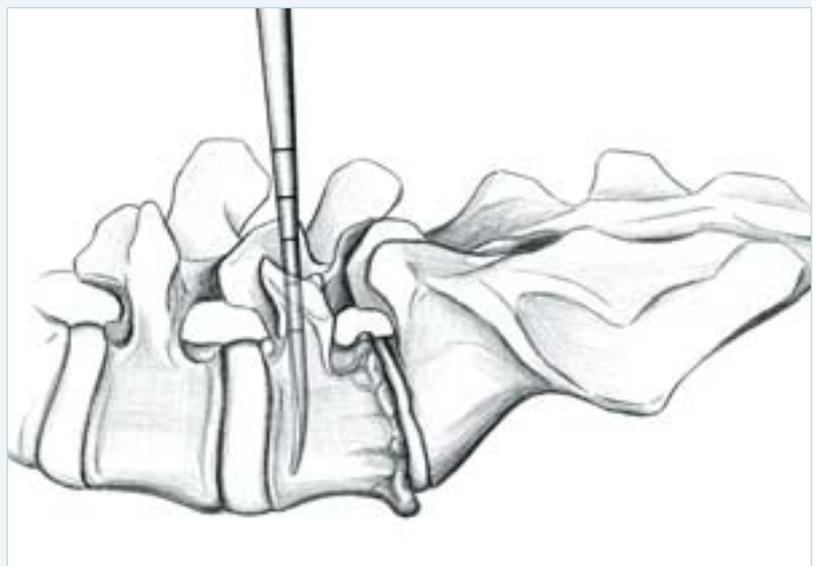
1. Pedicle Preparation

After determination of the pedicle entry point use the bone awl FW190R to open the pedicle canal.



■ FW190R – Bone awl

Perforation of the pedicle is performed with the straight or curved blunt-tip pedicle probes FW188R and FW189R. The probes have ruled markings to determine the depth measurement in the pedicle canal.

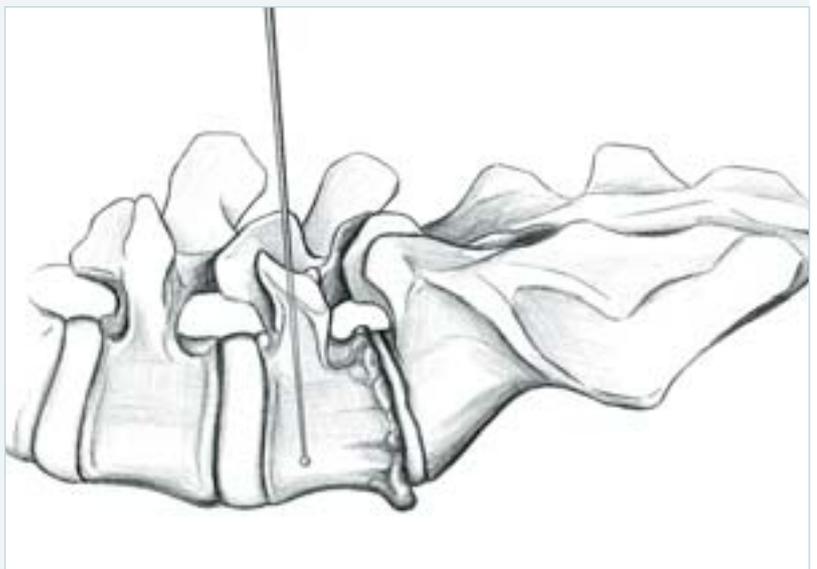


■ FW188R – Straight pedicle probe

■ FW189R – Curved pedicle probe

Utilize the straight or curved pedicle sounder FW146R or FW147R to confirm the patency of the pedicle and vertebral body cortex.

If necessary, the single or dual band pedicle markers FW191R or FW192R can be used to identify proper anatomic location on intra-operative radiographic imaging.



- FW146R – Straight pedicle sounder
- FW147R – Curved pedicle sounder
- FW191R – Single band pedicle marker
- FW192R – Dual band pedicle marker



*Single band pedicle
marker
FW191R*



*Dual band pedicle
marker
FW192R*

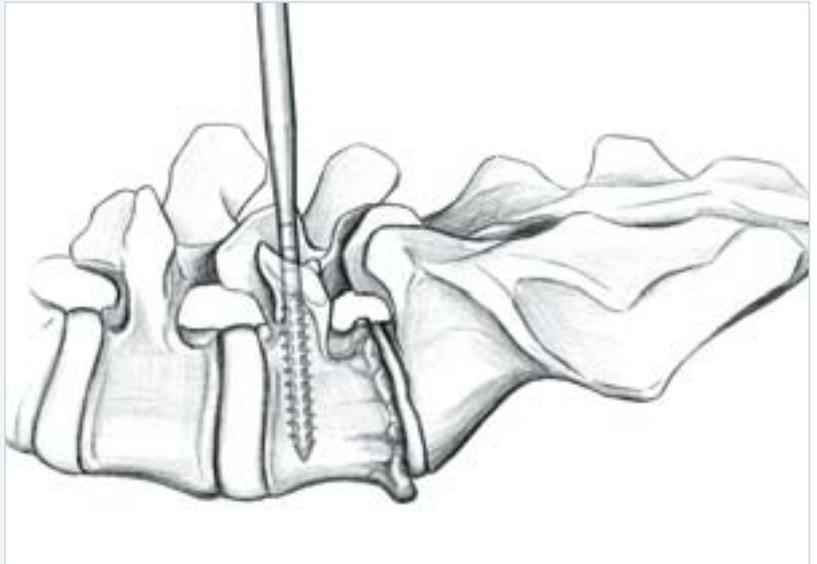
Open Approach

A 2

2. Tapping

Although the S⁴ Spinal System screws are self-tapping, screw taps are available in all diameters if desired.

To tap attach the ratchet handle FW165R to the appropriate tap, based on the screw diameter.



- FW194R – Screw tap, ø 4.5 mm (blue)
- FW195R – Screw tap, ø 5.0 mm (yellow)
- FW196R – Screw tap, ø 6.0 mm (grey)
- FW197R – Screw tap, ø 7.0 mm (light blue)
- FW198R – Screw tap, ø 8.0 mm (purple)
- FW165R – Ratchet handle, straight



3. Screw Application

Color-coded polyaxial and monoaxial screws are available in lengths from 25 mm to 60 mm and in the following diameters:

- Monoaxial screw, \varnothing 4.5 mm (blue)
- Monoaxial screw, \varnothing 5.0 mm (gold)
- Monoaxial screw, \varnothing 6.0 mm (grey)
- Monoaxial screw, \varnothing 7.0 mm (light blue)
- Monoaxial screw, \varnothing 8.0 mm (purple)

- Polyaxial screw, \varnothing 4.5 mm (blue)
- Polyaxial screw, \varnothing 5.0 mm (gold)
- Polyaxial screw, \varnothing 6.0 mm (grey)
- Polyaxial screw, \varnothing 7.0 mm (light blue)
- Polyaxial screw, \varnothing 8.0 mm (purple)

Select the appropriate screwdriver based on the screw style.

For monoaxial screws, use the rounded tip monoaxial screwdriver FW176R; for polyaxial screws use the self-retaining polyaxial screwdriver FW173R.

- FW176R – Screwdriver for mono axial screws
- FW173R – Screwdriver for poly axial screws
- FW165R – Ratchet handle



Monoaxial screw



Polyaxial screw

Open Approach

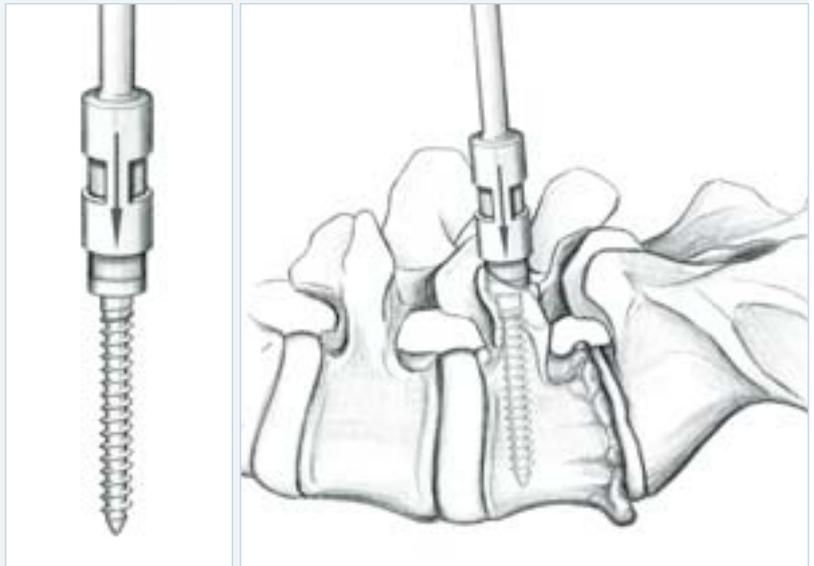
A 3.1

3.1 Monoaxial Screw Application

To place a monoaxial screw, insert and fully seat the rounded tip of the monoaxial screwdriver FW176R into the slot of the monoaxial screw then thread the screw into the prepared pedicle.

Repeat this process until all screws are placed.

For screw body manipulation the monoaxial screwdriver FW176R can be used or alternatively the screw body manipulator FW180R.



■ FW176R – Screwdriver for monoaxial screws



Completed screw insertion

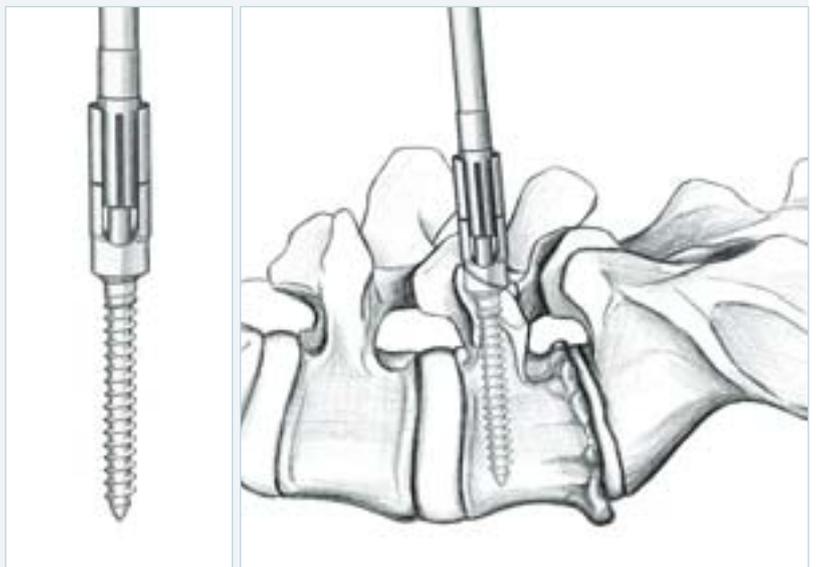
3.2 Polyaxial Screw Application

To place a polyaxial screw, first fully engage the 3.5 mm hexagonal tip of the polyaxial screwdriver FW173R into the head of the screw.

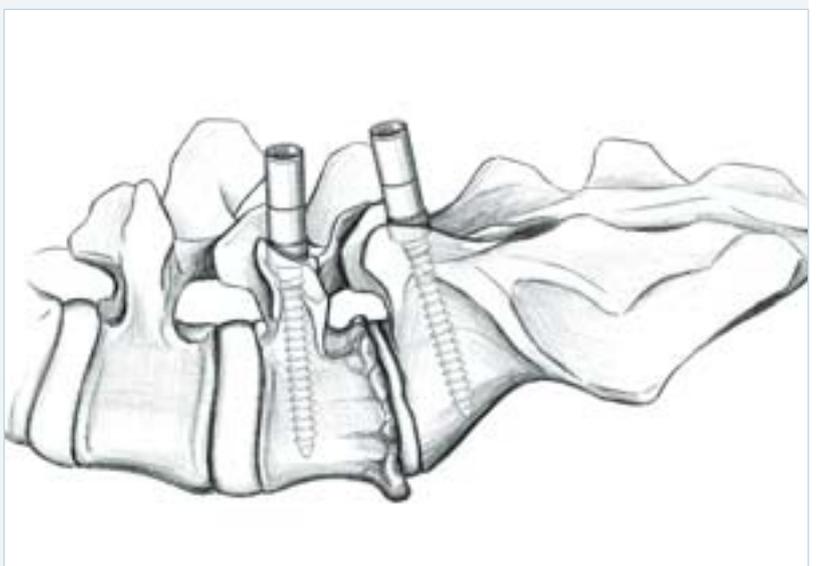
Then thread the screw into the prepared pedicle.

Note:

If the polyaxicity of the screw remains, the screwdriver FW173R is not fully engaged.



- FW173R – Screwdriver for polyaxial screws
- FW213R – Screwdriver for polyaxial screws



Completed screw insertion

Open Approach

A 3.2

In case of soft tissue impingement, the Marnay lever FW154R can be used to retract-off a previously placed pedicle screw thereby creating a free operating window.



■ FW154R –
Marnay lever

Use the shank tip screwdriver FW174R for safe removal of polyaxial screws.



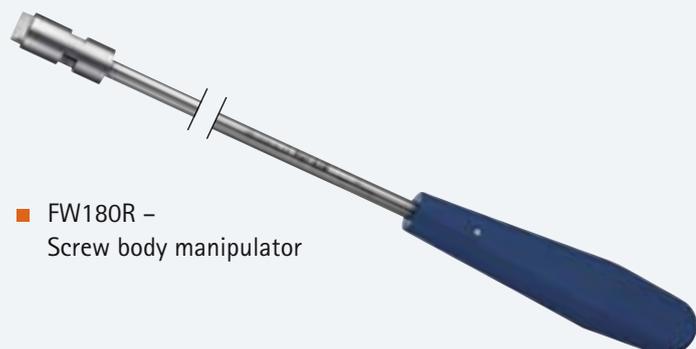
■ FW174R –
Screwdriver with
shank tip

Monoaxial screws can be removed using the standard monoaxial screwdriver FW176R.



■ FW176R –
Screwdriver for
monoaxial screws

The screw body manipulator FW180R can be used to adjust the rotation of monoaxial screw.



■ FW180R –
Screw body manipulator



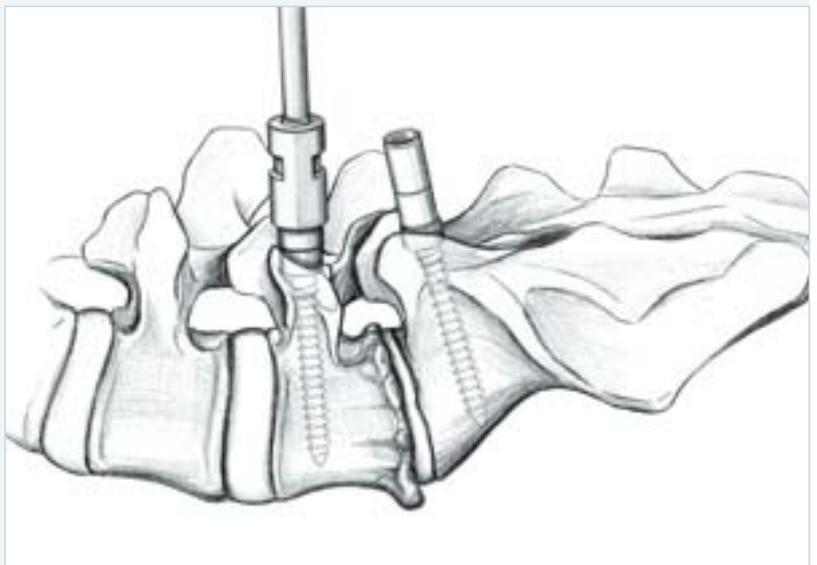
4. Screw Body Manipulation

All polyaxial screw heads have 42° range of motion (ROM) to facilitate rod placement.



Polyaxial screw range of motion

If desired, the screw body manipulator FW180R can be used to adjust the rotation of monoaxial screws as well as the alignment of the polyaxial screw bodies.



■ FW180R – Screw body manipulator

Open Approach

A 5

5. Rod Placement

The disposable, flexible rod trials FW185R can be used as a guide for rod bending and measuring correct rod length.



■ FW185R – Disposable rod trial

Both, pre-bent and straight pre-cut rods are available. All rods may be contoured using the french rod bender FW024R.



■ FW024R – French rod bender

Use the rod holding forceps FW012R to assist with rod placement or rod manipulation.



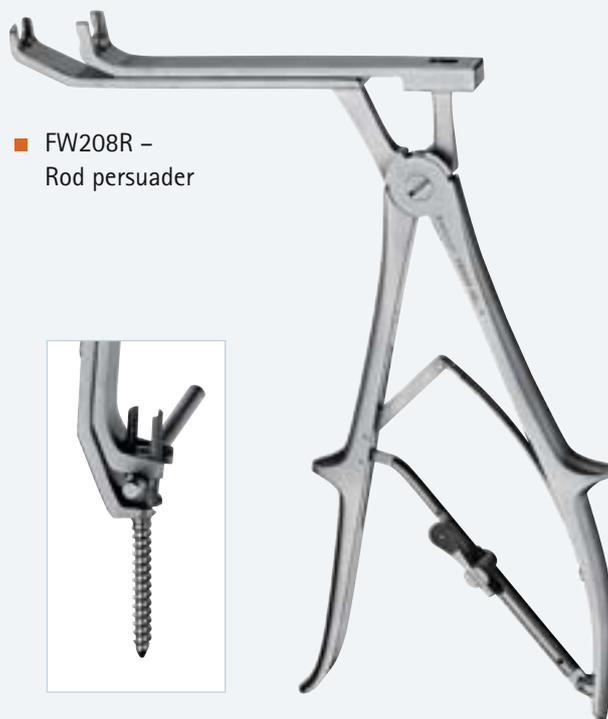
■ FW012R – Rod holding forceps

If necessary, the rod pusher FW513R can be used to push the rod into position.



■ FW513R –
Rod pusher

The rod persuader FW208R can be used to help seat the rod fully into the saddle of the screw in multisegmental cases. Using the rod persuader FW208R also simplifies Set Screw placement.



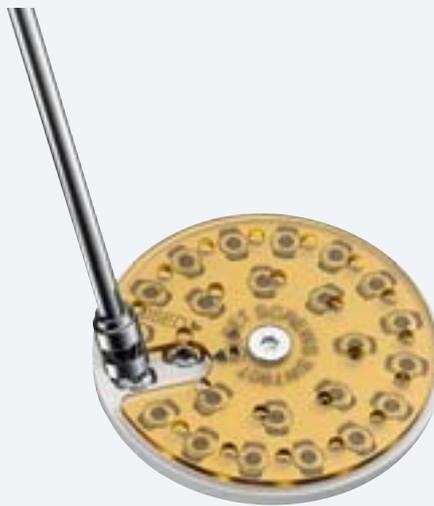
■ FW208R –
Rod persuader

Open Approach

A 6

6. Set Screw Starting for Monoaxial- and Polyaxial Screws

Pick up the Set Screw SW790T from the storage disc using the Set Screw starter FW177R.

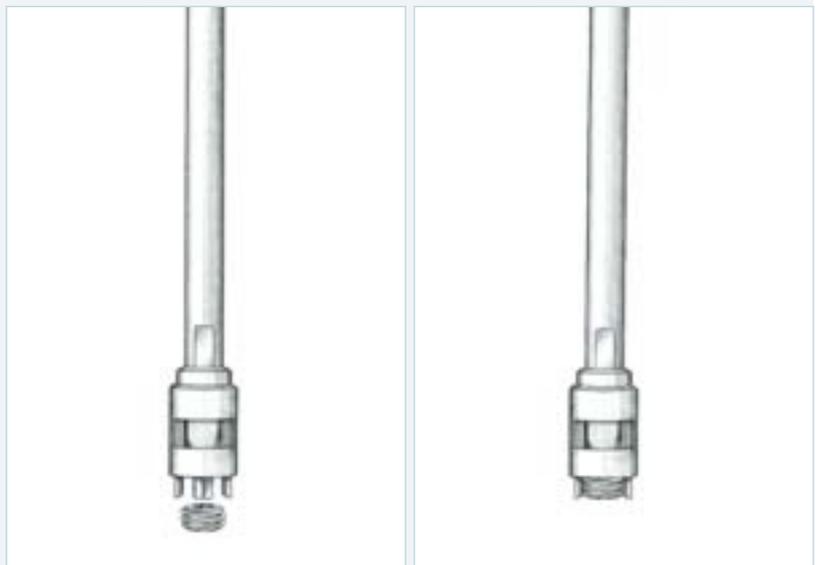


Set Screw pick up from the storage disc

Engaging the Set Screw SW790T with the Set Screw starter FW177R is only possible on the flat side of the Set Screw.

Note:

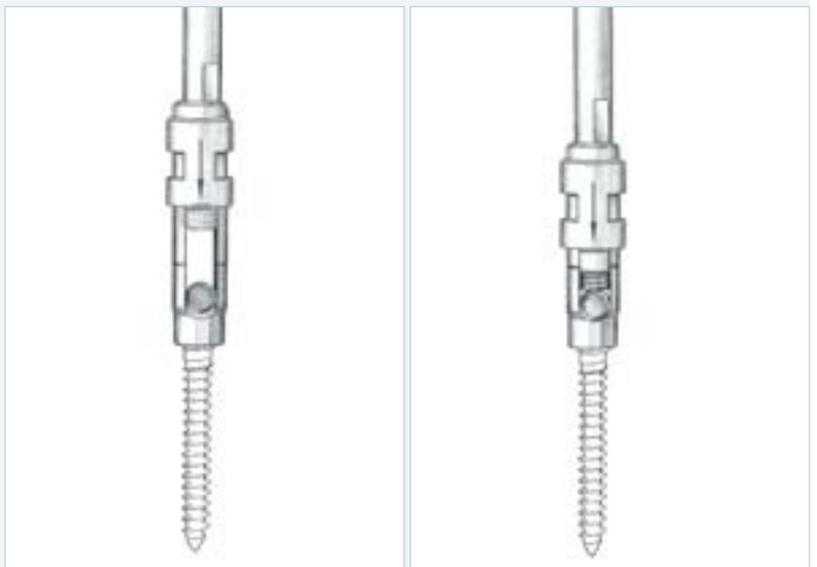
The Set Screw SW790T must be fully engaged to the Set Screw starter FW177R.



- SW790T – Set Screw for monoaxial-/ polyaxial screw
- FW177R – Set Screw starter

The outer ring of the Set Screw starter FW177R fits onto the flanks of the screw body to ensure the Set Screw SW790T trajectory is correct during initial threading.

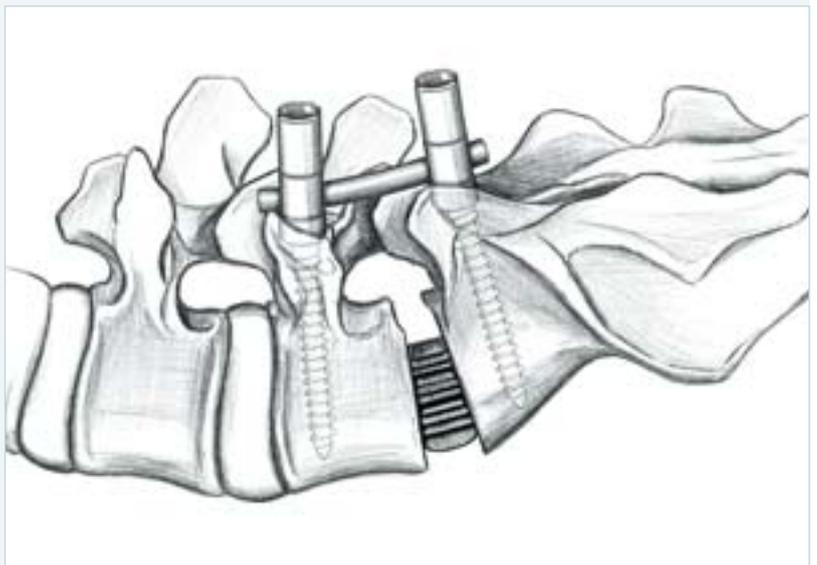
Finger tighten the Set Screw SW790T into the screw body until it contacts the rod.



Use the Set Screw revision screwdriver FW193R to remove a tightened Set Screw SW790T.

Note:

The Set Screw starter FW177R is not designed for final tightening of the construct. It is designed to only tighten to a depth that still allows compression and distraction maneuvers to be performed.



Open Approach

A 7.1

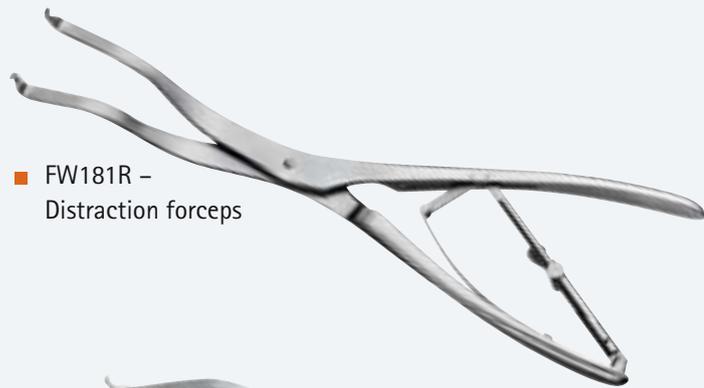
7. Reduction Maneuvers

7.1 Compression and Distraction Maneuvers

Before final tightening of the construct, compression or distraction may be performed using the compression forceps FW210R or distraction forceps FW181R.

The small distraction forceps FW023R is designed especially for small-incision surgery.

If distraction or compression is desired along the rod, but not against two screws, the rod holding forceps FW012R can be placed on the rod to provide a counter-force to compress or distract against. The rod holding forceps can also be used for rotation maneuvers.



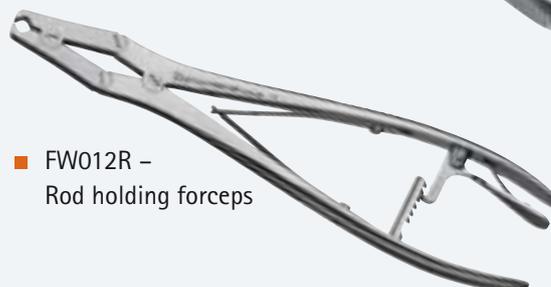
■ FW181R –
Distraction forceps



■ FW023R –
Distraction forceps, small



■ FW210R –
Compression forceps

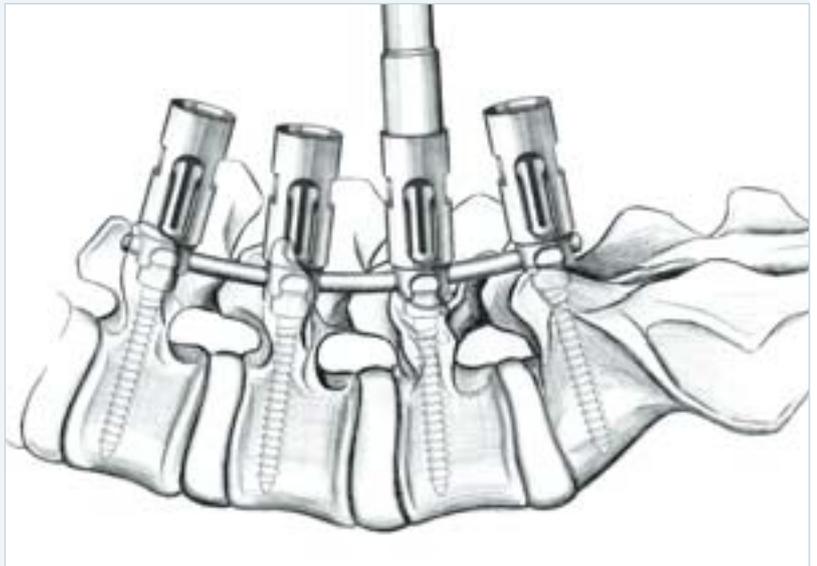


■ FW012R –
Rod holding forceps

7.2 Rotation Maneuvers

The derotation sleeves FW183R should be used during rotation maneuvers to prevent splaying of the implant head.

Place the derotation sleeves FW183R over the pedicle screws that contain the rod to be rotated. Connect the counter-torque L-handle FW178R to one of the derotation sleeves FW183R to perform the rotation maneuver. Insert the torque wrench screwdriver FW170R into the tube of the counter-torque L-handle FW178R to tighten the Set Screw SW790T (as described in A.8) and lock the rod from rotating. All Set Screws must be tightened.



■ FW183R – Derotation sleeves

Open Approach

A 8

8. Final Tightening

Final tightening of each Set Screw is completed using the torque limiting wrench FW170R, along with the counter-torque L-handle FW178R.

Note:

It is important to only tighten the Set Screw SW790T to the specified setting of 10 Nm (90 in/lbs). Over tightening will lead to damaging of the bit and the implant.

Caution:

Do not use the torque limiting wrench FW170R without the counter-torque L-handle FW178R. This could lead to thread jumping of the Set Screw within the screw body and, as a consequence, to rod loosening.



■ FW170R –
Torque wrench



■ FW178R –
Counter-torque L-handle

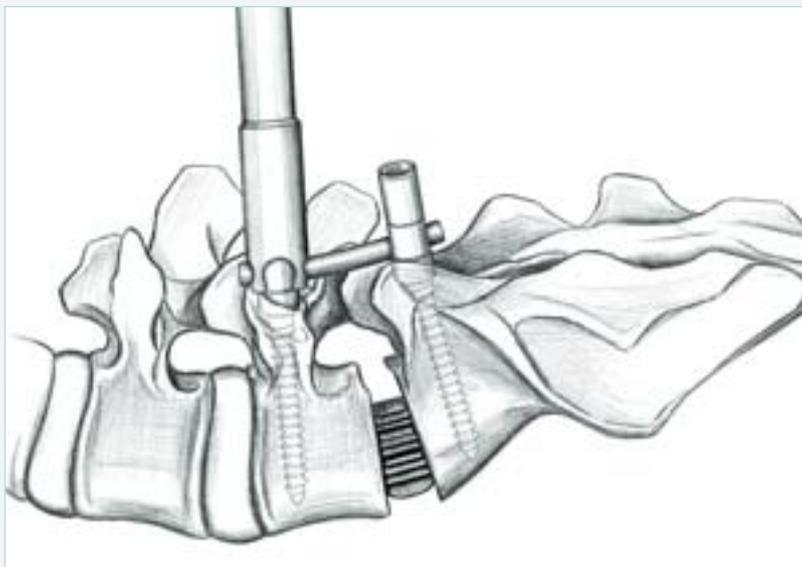
To properly tighten the Set Screw SW790T, the following steps should be performed:

- Insert the torque limiting wrench FW170R through the tube of the counter-torque FW178R, so the tip is exposed.
- Fully seat the tip of the torque wrench into the socket of the Set Screw SW790T.
- Engage the counter-torque tip FW178R with the rod.
- Tighten the torque wrench while applying the counter-torque with the counter-torque L-handle FW178R until the arrows on the torque wrench line up with one another.

Caution:

Overtightening the Set Screw SW790T could lead to implant failure. Damaged Set Screws must be replaced.

Use the Set Screw revision screwdriver with the 4mm hex tip FW193R to remove a previously tightened Set Screw SW790T.



- FW193R – Set Screw revision screwdriver with 4mm hex tip
- SW790T – Set Screw

Open Approach

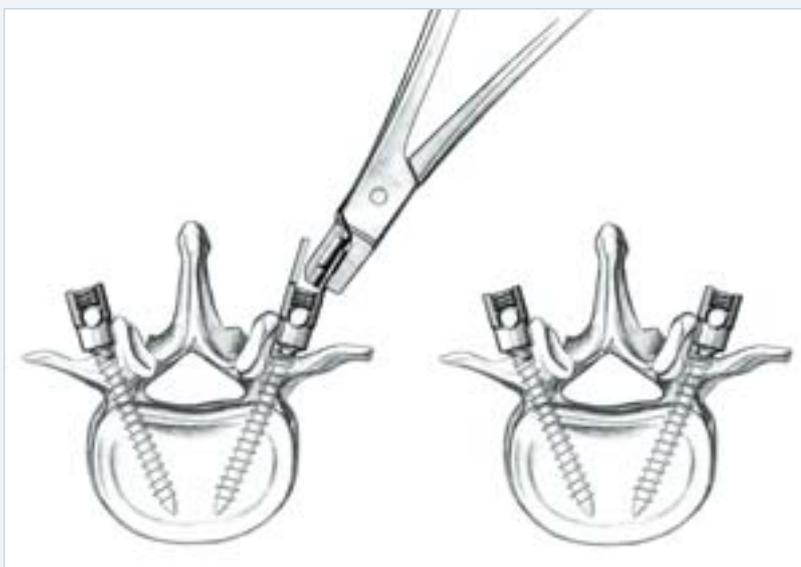
A 9

9. Tab Removal

After verifying that all screws are placed and tightened, remove the tabs with the tab breaker FW179R.

Note:

The rod persuader FW208R can be used to help seat the rod fully into the saddle of the screw if the screw body tabs break-off prematurely which should simplify Set Screw placement.



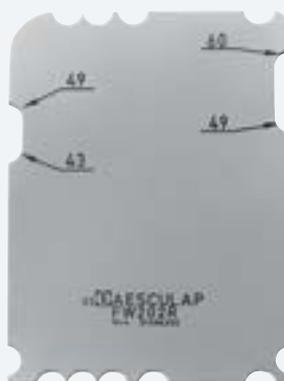
■ FW179R – Tab breaker



10. Cross Connector Placement

Although cross connector placement is optional, they may be used to create a more rigid construct.

If a cross connector will be used, determine the appropriate size using the cross connector sizing template FW202R.



- FW202R – Cross connector sizing template

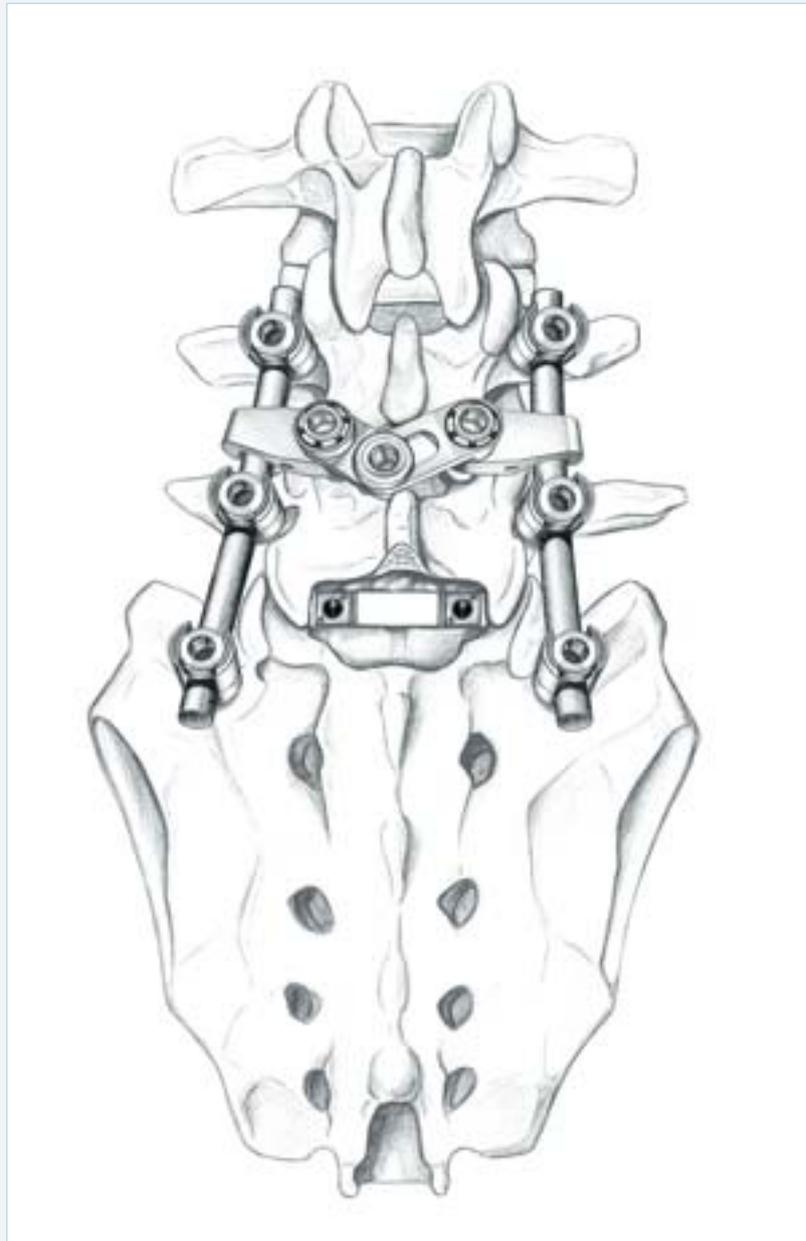
To place a cross connector, first verify there are no obstructions, then insert the cross connector. If the cross connector fits properly and is fully seated onto both rods, final tightening can be accomplished by applying 4 Nm (36 in/lbs) of torque to the locking screws using the cross connector torque wrench screwdriver FW207R and the cross connector counter-torque device FW204R.



Open Approach

A 11

11. Final Construct



12. Hook Placement

Pedicle hooks are available in right and left configuration along with two different blade opening sizes.

12.1.1 Preparation of Pedicle Hook Placement

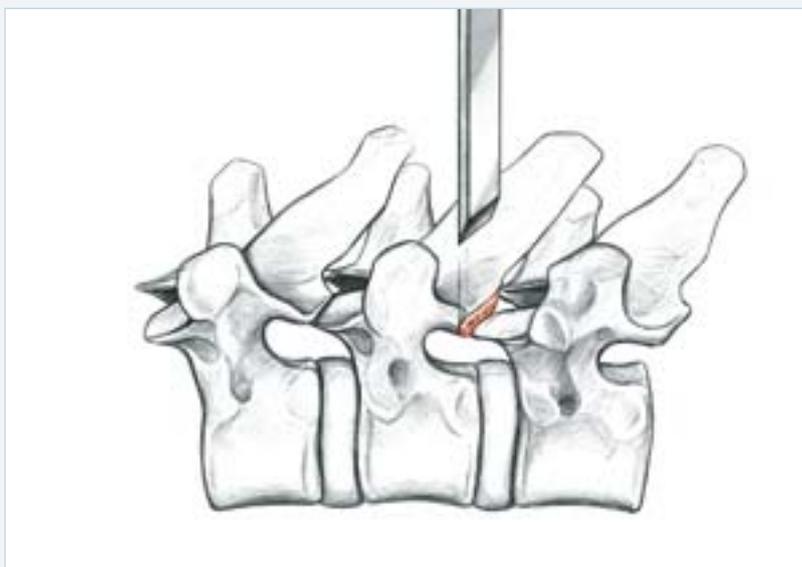
The tip of the inferior part of the articular process of the vertebra is resected using an osteotome.

The bed for the pedicle hook is prepared with the pedicle preparator FW151R.

The pedicle preparator (FW151R) crosses the capsule of the facet joint and its fork-shaped tip is set around the inferior part of the pedicle.

Note:

If the facet is long and not resected enough, the blade of the pedicle preparator does not fit to the pedicle. Further resection of the facet is then recommended.



■ FW151R – Pedicle preparator

Open Approach

A 12.1

12.1.2 Pedicle Hook Insertion

The hook is attached to the facet joint using the hook holder FW211R supported by the hook pusher FW212R. The hook can be impacted with the hook pusher.



- FW211R – Hook holder
- FW212R – Hook pusher

12.2 Lamina Hook

Lamina hooks, as well as pedicle hooks, are available in right and left configurations and also an offset type. Additionally all lamina hooks are available with two different blade opening sizes.

12.2.1 Preparation of Lamina Hook Placement

The spinal lumbar canal has to be opened by incision and resection of the ligamentum flavum.

The lamina has to be horizontalised to create a bed for the blade of the lamina hook. If lamina hooks are placed on each side, the resection has to be lateralized to avoid contact between the right and the left hook. The lamina preparator (FW152R) is carefully inserted in the canal to prepare the bed for the lamina hook blade.

Note:

Check the spinal canal with a dura palpator before using the lamina preparator (FW152R).

12.2.2 Lamina Hook Insertion

The hook is maintained in a horizontal position using the hook holder FW211R and carefully rotated around the edge of the lamina into a vertical position supported by the hook pusher FW212R.

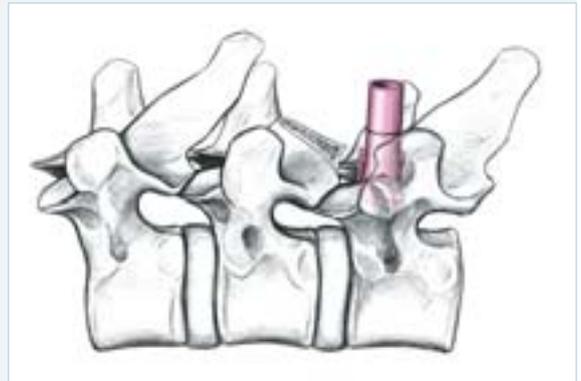
The offset hooks are being prepared and placed accordingly.

12.3 Thoracic Hook

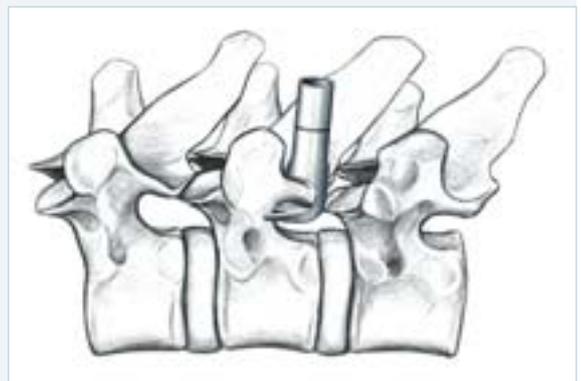
The smooth, slim design of the thoracic hook is adapted to the shape of the thoracic lamina. It is an intracanal hook in the medullar area. Preparation and Placement are performed in the same way as the lamina hooks.



■ Lamina Hook



■ Offset Hook



■ Thoracic Hook

Implants – Overview

B

1.1

Monoaxial Transpedicular Bone Screws



SW701T	S ⁴ Monoaxial screw, ø 4.5 mm	4.5 x 25 mm
SW702T	S ⁴ Monoaxial screw	4.5 x 30 mm
SW703T	S ⁴ Monoaxial screw	4.5 x 35 mm
SW704T	S ⁴ Monoaxial screw	4.5 x 40 mm
SW706T	S ⁴ Monoaxial screw	4.5 x 45 mm
SW707T	S ⁴ Monoaxial screw	4.5 x 50 mm



SW711T	S ⁴ Monoaxial screw, ø 5.0 mm	5.0 x 25 mm
SW712T	S ⁴ Monoaxial screw	5.0 x 30 mm
SW713T	S ⁴ Monoaxial screw	5.0 x 35 mm
SW714T	S ⁴ Monoaxial screw	5.0 x 40 mm
SW716T	S ⁴ Monoaxial screw	5.0 x 45 mm
SW717T	S ⁴ Monoaxial screw	5.0 x 50 mm



SW721T	S ⁴ Monoaxial screw, ø 6.0 mm	6.0 x 25 mm
SW722T	S ⁴ Monoaxial screw	6.0 x 30 mm
SW723T	S ⁴ Monoaxial screw	6.0 x 35 mm
SW724T	S ⁴ Monoaxial screw	6.0 x 40 mm
SW726T	S ⁴ Monoaxial screw	6.0 x 45 mm
SW727T	S ⁴ Monoaxial screw	6.0 x 50 mm
SW728T	S ⁴ Monoaxial screw	6.0 x 55 mm
SW729T	S ⁴ Monoaxial screw	6.0 x 60 mm



SW731T	S ⁴ Monoaxial screw, ø 7.0 mm	7.0 x 25 mm
SW732T	S ⁴ Monoaxial screw	7.0 x 30 mm
SW733T	S ⁴ Monoaxial screw	7.0 x 35 mm
SW734T	S ⁴ Monoaxial screw	7.0 x 40 mm
SW736T	S ⁴ Monoaxial screw	7.0 x 45 mm
SW737T	S ⁴ Monoaxial screw	7.0 x 50 mm
SW738T	S ⁴ Monoaxial screw	7.0 x 55 mm
SW739T	S ⁴ Monoaxial screw	7.0 x 60 mm



SW742T	S ⁴ Monoaxial screw, ø 8.0 mm	8.0 x 30 mm
SW743T	S ⁴ Monoaxial screw	8.0 x 35 mm
SW744T	S ⁴ Monoaxial screw	8.0 x 40 mm
SW746T	S ⁴ Monoaxial screw	8.0 x 45 mm
SW747T	S ⁴ Monoaxial screw	8.0 x 50 mm
SW748T	S ⁴ Monoaxial screw	8.0 x 55 mm
SW749T	S ⁴ Monoaxial screw	8.0 x 60 mm



Polyaxial Transpedicular Bone Screws

SW751T	S ⁴ Polyaxial screw, ø 4.5 mm	4.5 x 25 mm
SW752T	S ⁴ Polyaxial screw	4.5 x 30 mm
SW753T	S ⁴ Polyaxial screw	4.5 x 35 mm
SW754T	S ⁴ Polyaxial screw	4.5 x 40 mm
SW756T	S ⁴ Polyaxial screw	4.5 x 45 mm
SW757T	S ⁴ Polyaxial screw	4.5 x 50 mm



SW761T	S ⁴ Polyaxial screw, ø 5.0 mm	5.0 x 25 mm
SW762T	S ⁴ Polyaxial screw	5.0 x 30 mm
SW763T	S ⁴ Polyaxial screw	5.0 x 35 mm
SW764T	S ⁴ Polyaxial screw	5.0 x 40 mm
SW766T	S ⁴ Polyaxial screw	5.0 x 45 mm
SW767T	S ⁴ Polyaxial screw	5.0 x 50 mm



SW771T	S ⁴ Polyaxial screw, ø 6.0 mm	6.0 x 25 mm
SW772T	S ⁴ Polyaxial screw	6.0 x 30 mm
SW773T	S ⁴ Polyaxial screw	6.0 x 35 mm
SW774T	S ⁴ Polyaxial screw	6.0 x 40 mm
SW776T	S ⁴ Polyaxial screw	6.0 x 45 mm
SW777T	S ⁴ Polyaxial screw	6.0 x 50 mm
SW778T	S ⁴ Polyaxial screw	6.0 x 55 mm
SW779T	S ⁴ Polyaxial screw	6.0 x 60 mm



SW781T	S ⁴ Polyaxial screw, ø 7.0 mm	7.0 x 25 mm
SW782T	S ⁴ Polyaxial screw	7.0 x 30 mm
SW783T	S ⁴ Polyaxial screw	7.0 x 35 mm
SW784T	S ⁴ Polyaxial screw	7.0 x 40 mm
SW786T	S ⁴ Polyaxial screw	7.0 x 45 mm
SW787T	S ⁴ Polyaxial screw	7.0 x 50 mm
SW788T	S ⁴ Polyaxial screw	7.0 x 55 mm
SW789T	S ⁴ Polyaxial screw	7.0 x 60 mm



SW792T	S ⁴ Polyaxial screw, ø 8.0 mm	8.0 x 30 mm
SW793T	S ⁴ Polyaxial screw	8.0 x 35 mm
SW794T	S ⁴ Polyaxial screw	8.0 x 40 mm
SW796T	S ⁴ Polyaxial screw	8.0 x 45 mm
SW797T	S ⁴ Polyaxial screw	8.0 x 50 mm
SW798T	S ⁴ Polyaxial screw	8.0 x 55 mm
SW799T	S ⁴ Polyaxial screw	8.0 x 60 mm

Implants – Overview

B

1.1



Pre-bent Rods, \varnothing 5.5 mm

SW653T	S ⁴ Pre-bent rod	5.5 x 30 mm
SW654T	S ⁴ Pre-bent rod	5.5 x 35 mm
SW655T	S ⁴ Pre-bent rod	5.5 x 40 mm
SW656T	S ⁴ Pre-bent rod	5.5 x 45 mm
SW657T	S ⁴ Pre-bent rod	5.5 x 50 mm
SW658T	S ⁴ Pre-bent rod	5.5 x 55 mm
SW659T	S ⁴ Pre-bent rod	5.5 x 60 mm
SW661T	S ⁴ Pre-bent rod	5.5 x 70 mm
SW662T	S ⁴ Pre-bent rod	5.5 x 80 mm
SW663T	S ⁴ Pre-bent rod	5.5 x 90 mm
SW684T	S ⁴ Pre-bent rod	5.5 x 100 mm



Straight rod, \varnothing 5.5 mm

SW674T	S ⁴ Straight rod	5.5 x 35 mm
SW675T	S ⁴ Straight rod	5.5 x 40 mm
SW676T	S ⁴ Straight rod	5.5 x 45 mm
SW677T	S ⁴ Straight rod	5.5 x 50 mm
SW678T	S ⁴ Straight rod	5.5 x 55 mm
SW679T	S ⁴ Straight rod	5.5 x 60 mm
SW681T	S ⁴ Straight rod	5.5 x 70 mm
SW682T	S ⁴ Straight rod	5.5 x 80 mm
SW664T	S ⁴ Straight rod	5.5 x 100 mm
SW666T	S ⁴ Straight rod	5.5 x 120 mm
SW667T	S ⁴ Straight rod	5.5 x 150 mm
SW668T	S ⁴ Straight rod	5.5 x 180 mm
SW669T	S ⁴ Straight rod	5.5 x 200 mm
SW670T	S ⁴ Straight rod	5.5 x 300 mm
SW671T	S ⁴ Straight rod	5.5 x 400 mm
SW672T	S ⁴ Straight rod	5.5 x 500 mm



Straight Cross Connectors

SW690T	S ⁴ Cross connectors	21 mm straight
SW691T	S ⁴ Cross connectors	25 mm straight
SW490T	S ⁴ Cross connectors	28 mm straight
SW491T	S ⁴ Cross connectors	30 mm straight
SW492T	S ⁴ Cross connectors	32 mm straight
SW493T	S ⁴ Cross connectors	34 mm straight



Adjustable Cross Connectors

SW488T	S ⁴ Cross connectors	35-36 mm adjustable
SW489T	S ⁴ Cross connectors	36-38 mm adjustable
SW494T	S ⁴ Cross connectors	38-42 mm adjustable
SW495T	S ⁴ Cross connectors	42-50 mm adjustable
SW496T	S ⁴ Cross connectors	50-60 mm adjustable
SW497T	S ⁴ Cross connectors	60-77 mm adjustable
SW498T	S ⁴ Cross connectors	77-107 mm adjustable



Set Screw

SW790T	S ⁴ Set Screw for monoaxial-/polyaxial screws
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Pedicle Hook

SW831T	S ⁴ Pedicle hook	6 mm
SW832T	S ⁴ Pedicle hook	10 mm



Lamina Hook

SW827T	S ⁴ Lamina hook, right	6 mm
SW829T	S ⁴ Lamina hook, right	10 mm
SW826T	S ⁴ Lamina hook, left	6 mm
SW828T	S ⁴ Lamina hook, left	10 mm



Thoracic Hook

SW833T	S ⁴ Thoracic hook	6 mm
SW834T	S ⁴ Thoracic hook	8 mm



Offset Hook

SW837T	S ⁴ Offset hook, right	10 mm
SW836T	S ⁴ Offset hook, left	10 mm



Storage Pins for Monoaxial Screws*

TE864P	Pin for monoaxial screws, blue	ø 4.5 mm
TE865P	Pin for monoaxial screws, gold	ø 5.0 mm
TE866P	Pin for monoaxial screws, grey	ø 6.0 mm
TE867P	Pin for monoaxial screws, light blue	ø 7.0 mm
TE868P	Pin for monoaxial screws, purple	ø 8.0 mm



Storage Pins for Polyaxial Screws*

TE854P	Pin for polyaxial screws, blue	ø 4.5 mm
TE855P	Pin for polyaxial screws, gold	ø 5.0 mm
TE856P	Pin for polyaxial screws, grey	ø 6.0 mm
TE857P	Pin for polyaxial screws, light blue	ø 7.0 mm
TE858P	Pin for polyaxial screws, purple	ø 8.0 mm



* Note: 1 pack contains 10 pcs.

Implants – Set Configurations

B 1.2



Implant Tray Set-Up Recommendation

Art.-Nr.	Component	Recommended	Optional
¹ FW259P	Implant tray	1	
SW721T	Monoaxial screw, \varnothing 6.0 x 25 mm		2
SW722T	Monoaxial screw, \varnothing 6.0 x 30 mm	4	
SW723T	Monoaxial screw, \varnothing 6.0 x 35 mm	4	
SW724T	Monoaxial screw, \varnothing 6.0 x 40 mm	6	
SW726T	Monoaxial screw, \varnothing 6.0 x 45 mm	6	
SW727T	Monoaxial screw, \varnothing 6.0 x 50 mm	6	
SW728T	Monoaxial screw, \varnothing 6.0 x 55 mm		2
SW729T	Monoaxial screw, \varnothing 6.0 x 60 mm		2
SW731T	Monoaxial screw, \varnothing 7.0 x 25 mm		2
SW732T	Monoaxial screw, \varnothing 7.0 x 30 mm	4	
SW733T	Monoaxial screw, \varnothing 7.0 x 35 mm	6	
SW734T	Monoaxial screw, \varnothing 7.0 x 40 mm	6	
SW736T	Monoaxial screw, \varnothing 7.0 x 45 mm	6	
SW737T	Monoaxial screw, \varnothing 7.0 x 50 mm	4	
SW738T	Monoaxial screw, \varnothing 7.0 x 55 mm	4	
SW739T	Monoaxial screw, \varnothing 7.0 x 60 mm		2
SW771T	Polyaxial screw, \varnothing 6.0 x 25 mm		2
SW772T	Polyaxial screw, \varnothing 6.0 x 30 mm	2	
SW773T	Polyaxial screw, \varnothing 6.0 x 35 mm	8	
SW774T	Polyaxial screw, \varnothing 6.0 x 40 mm	8	
SW776T	Polyaxial screw, \varnothing 6.0 x 45 mm	8	
SW777T	Polyaxial screw, \varnothing 6.0 x 50 mm	8	
SW778T	Polyaxial screw, \varnothing 6.0 x 55 mm	2	
SW779T	Polyaxial screw, \varnothing 6.0 x 60 mm	2	
SW781T	Polyaxial screw, \varnothing 7.0 x 25 mm		2
SW782T	Polyaxial screw, \varnothing 7.0 x 30 mm	2	
SW783T	Polyaxial screw, \varnothing 7.0 x 35 mm	8	
SW784T	Polyaxial screw, \varnothing 7.0 x 40 mm	8	
SW786T	Polyaxial screw, \varnothing 7.0 x 45 mm	8	
SW787T	Polyaxial screw, \varnothing 7.0 x 50 mm	8	
SW788T	Polyaxial screw, \varnothing 7.0 x 55 mm	2	
SW789T	Polyaxial screw, \varnothing 7.0 x 60 mm	2	
SW790T	Set Screw for monoaxial- / polyaxial screws	20	



Art.-Nr.	Component	Recommended	Optional
SW653T	Pre-bent rod, \varnothing 5.5 x 30 mm		2
SW654T	Pre-bent rod, \varnothing 5.5 x 35 mm	2	
SW655T	Pre-bent rod, \varnothing 5.5 x 40 mm	2	
SW656T	Pre-bent rod, \varnothing 5.5 x 45 mm	2	
SW657T	Pre-bent rod, \varnothing 5.5 x 50 mm	2	
SW658T	Pre-bent rod, \varnothing 5.5 x 55 mm	2	
SW659T	Pre-bent rod, \varnothing 5.5 x 60 mm	2	
SW661T	Pre-bent rod, \varnothing 5.5 x 70 mm	2	
SW662T	Pre-bent rod, \varnothing 5.5 x 80 mm	2	
SW663T	Pre-bent rod, \varnothing 5.5 x 90 mm		2
SW684T	Pre-bent rod, \varnothing 5.5 x 100 mm		2
SW674T	Straight rod, \varnothing 5.5 x 35 mm	2	
SW675T	Straight rod, \varnothing 5.5 x 40 mm	2	
SW676T	Straight rod, \varnothing 5.5 x 45 mm	2	
SW677T	Straight rod, \varnothing 5.5 x 50 mm	2	
SW678T	Straight rod, \varnothing 5.5 x 55 mm	2	
SW679T	Straight rod, \varnothing 5.5 x 60 mm	2	
SW681T	Straight rod, \varnothing 5.5 x 70 mm	2	
SW682T	Straight rod, \varnothing 5.5 x 80 mm	2	
SW664T	Straight rod, \varnothing 5.5 x 100 mm	2	
SW666T	Straight rod, \varnothing 5.5 x 120 mm	2	
SW667T	Straight rod, \varnothing 5.5 x 150 mm	2	
SW668T	Straight rod, \varnothing 5.5 x 180 mm		2
SW669T	Straight rod, \varnothing 5.5 x 200 mm		2
SW670T	Straight rod, \varnothing 5.5 x 300 mm		2
SW671T	Straight rod, \varnothing 5.5 x 400 mm		2
SW672T	Straight rod, \varnothing 5.5 x 500 mm		2
SW488T	Cross connector, 35-36 mm, adjustable	1	1
SW489T	Cross connector, 36-38 mm, adjustable	1	1
SW494T	Cross connector, 38-42 mm, adjustable	1	1
SW495T	Cross connector, 42-50 mm, adjustable	1	1
SW496T	Cross connector, 50-60 mm, adjustable	1	1
SW497T	Cross connector, 60-77 mm, adjustable	1	1
SW498T	Cross connector, 77-107 mm, adjustable	1	1

Implants and Instruments – Set Configurations

B

1.2

Art.-Nr.	Component	Recommended	Optional
SW690T	Cross connectors, 21 mm, straight		1
SW691T	Cross connectors, 25 mm, straight		1
SW490T	Cross connectors, 28 mm, straight		1
SW491T	Cross connectors, 30 mm, straight		1
SW492T	Cross connectors, 32 mm, straight		1
SW493T	Cross connectors, 34 mm, straight		1

Note:

Pins for Mono-/Polyaxial screws are included in implant tray FW259P (detailed information see section B 1.1)

¹ Recommended container: bottom JK441 and lid JK489



B 2.1



Hook Tray Set-up Recommendation

	Art.-Nr.	Component	Recommended	Optional
	² FW160P	Tray for hooks and hook insertion instruments	1	
	SW826T	Lamina hook, 6 mm, left	2	
	SW827T	Lamina hook, 6 mm, right	2	
	SW828T	Lamina hook, 10 mm, left	2	
	SW829T	Lamina hook, 10 mm, right	2	
	SW831T	Pedicle hook, 6 mm	4	
	SW832T	Pedicle hook, 10 mm	4	
	SW833T	Thoracic hook, 6 mm	2	
	SW834T	Thoracic hook, 8 mm	2	
	SW836T	Offset hook, 10 mm, left	2	
	SW837T	Offset hook, 10 mm, right	2	
	FW211R	Hook holder	1	
	FW212R	Hook pusher	1	
	FW227R	In-situ-bender, right		1
	FW226R	In-situ-bender, left		1
	FW151R	Pedicle preparator	1	
	FW152R	Lamina preparator	1	
	FW012R	Rod holding forceps	*2	

² Recommended container: bottom JK442 and lid JK489

* not needed when S⁴ Basic tray available.

Instruments – Set Configurations



B 2.2

Bone Preparation

	Art.-Nr.	Component	Recommended	Optional
	³ FW163P	Tray Preparation / Application	1	
	FW146R	Pedicle sounder, straight	1	
	FW147R	Pedicle sounder, curved	1	
	FW165R	Ratchet handle, straight	2	
	FW188R	Bone probe, straight	1	
	FW189R	Bone probe, curved	1	
	FW190R	Bone awl	1	
	FW191R	Pedicle marker, single band	4	2
	FW192R	Pedicle marker, dual band	4	2
	FW194R	Screw tap, ø 4.5 mm		1
	FW195R	Screw tap, ø 5.0 mm		1
	FW196R	Screw tap, ø 6.0 mm	1	
	FW197R	Screw tap, ø 7.0 mm	1	
	FW198R	Screw tap, ø 8.0 mm		1

³ Recommended container: bottom JK442 and lid JK489

B

2.3



Application

	Art.-Nr.	Component	Recommended	Optional
	³ FW163P	Tray Preparation / Application	1	
	FW170R	Torque limiting wrench (10 Nm/90 in/lbs)	1	
	FW173R	Screwdriver for polyaxial screws	2	
	FW213R	Screwdriver for polyaxial screws		2
	FW174R	Screwdriver with 3.5 mm hex tip	1	
	FW176R	Screwdriver for monoaxial screws	2	
	FW177R	Set Screw starter	2	
	FW178R	Counter-torque L-handle	1	
	FW179R	Tab breaker	1	
	FW180R	Screw body manipulator	1	
	FW193R	Set Screw revision screwdriver 4 mm hex tip	1	
	FW154R	Marnay lever	2	

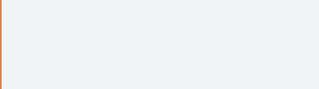
³ Recommended container: bottom JK442 and lid JK489

Instrumente – Set Configurations

B 2.4



Cross Connector Application

	Art.-Nr.	Component	Recommended	Optional
	⁴ FW164P	Tray Cross Connector Application	1	
	FW204R	Counter-torque for cross connectors	1	
	FW207R	Cross connector torque wrench (4 Nm/36 in/lbs)	1	
	FW202R	Cross connector sizing template	1	
	FW203R	Cross connector bender		1

⁴ Recommended container: bottom JK442 and lid JK489

B

2.5



Rod Bending and Reconstruction

	Art.-Nr.	Component	Recommended	Optional
	⁴ FW164P	Tray Cross Connector Application	1	
	FW012R	Rod holding forceps	2	
	FW024R	French rod bender	1	
	FW181R	Distraction forceps	1	
	FW023R	Distraction forceps, small		1
	FW184R	Compression forceps		1
	FW210R	Compression forceps	1	
	FW185R	Rod trial single use	2	
	FW513R	Rod pusher	1	
	FW208R	Rod persuader	1	
	FW183R	De-rotation sleeves	4	2
	FW206R	Rod cutter		1

⁴ Recommended container: bottom JK442 and lid JK489

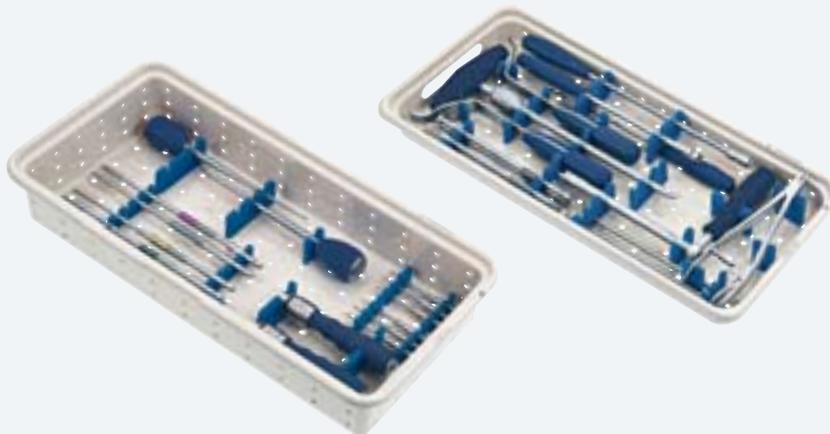


Trays – Instruments

Art.-Nr. Component

* FW163P S⁴ Tray I: Preparation / Application

- Bone Preparation
- Application



* FW164P S⁴ Tray II: Cross Connector Application

- Cross Connector Application
- Rod Bending and Reconstruction



* Recommended container: bottom JK442 and lid JK489

B

3.2

3.3

Trays – Implants / Hooks

Art.-Nr.	Component
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** FW259P	S ⁴ Tray: Implants
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*** FW160P	S ⁴ Tray: Hooks and Hook Insertion Instruments
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** Recommended container: bottom JK441 and lid JK489

*** Recommended container: bottom JK442 and lid JK489



