

Aesculap[®] S4[®] Spinal System

Percutaneous Approach
Surgical Technique



Aesculap Spine

S⁴® Spinal System



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 reduced soft tissue irritation.

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

Stable

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

In addition, the interconnection strength between the bone screw and body is more 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.

S⁴® Spinal System

From initial conception, the S⁴® Spinal System was developed to meet the spine surgeon's need for an extremely low profile and very 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 reliable system for posterior column fixation.

Simple

S⁴® instruments were designed to meet the surgeons demand for a quicker yet simpler operational procedure. The multiaxial capability of the polyaxial screws provide 42° total range of motion, which allows for easier rod placement and reduction. 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.

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

Surgical Technique

Percutaneous Approach



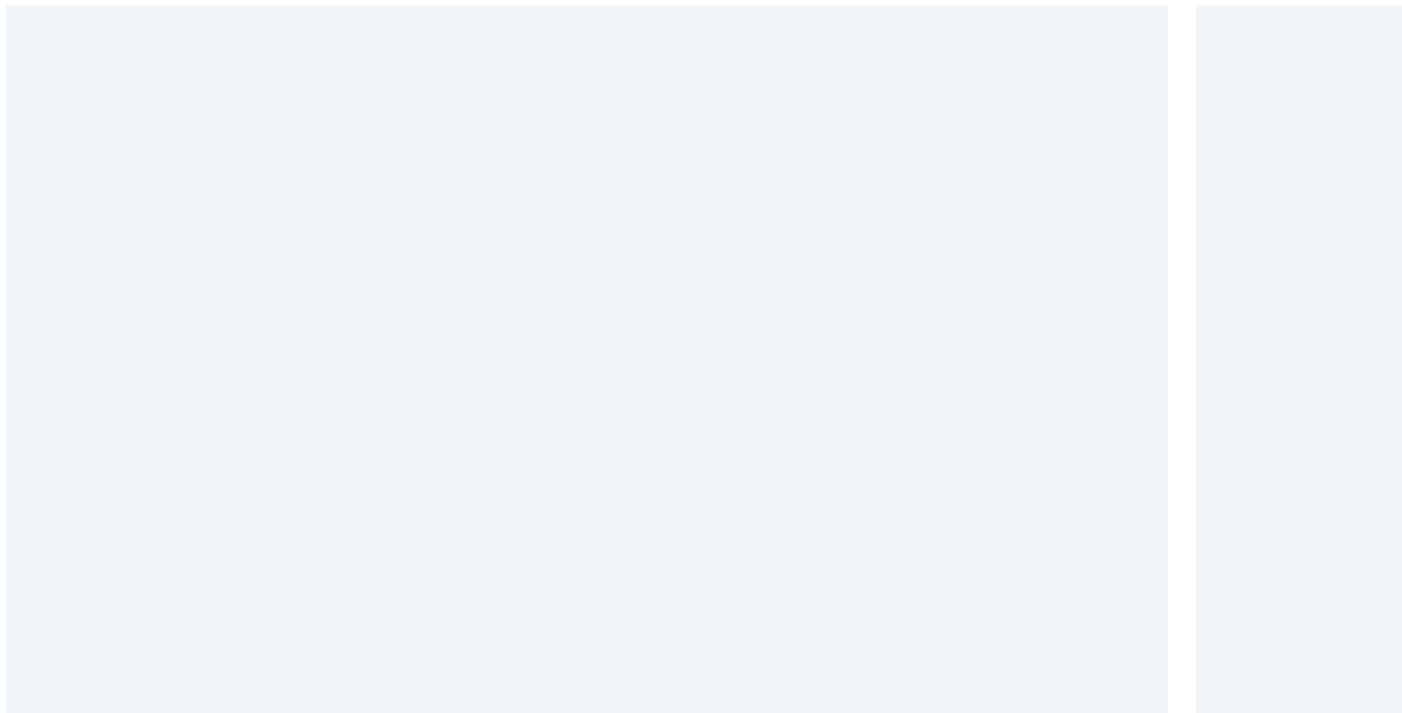
Percutaneous Approach

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. The 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.

S⁴® Spinal System

Surgical Technique



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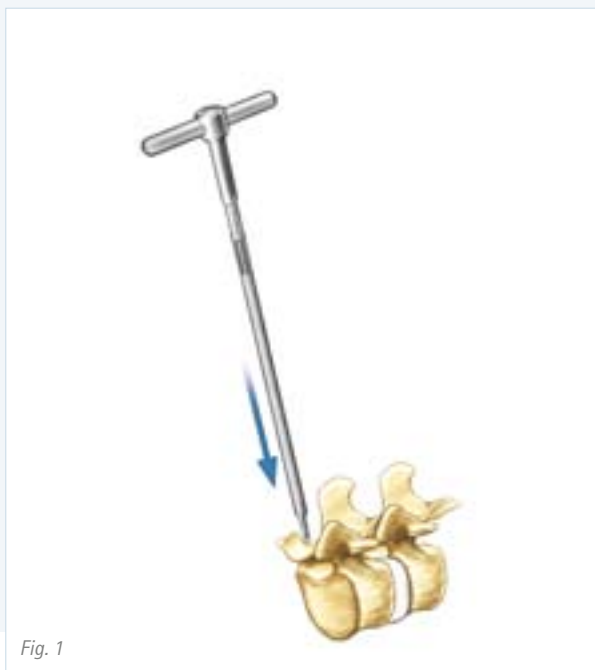


Fig. 1

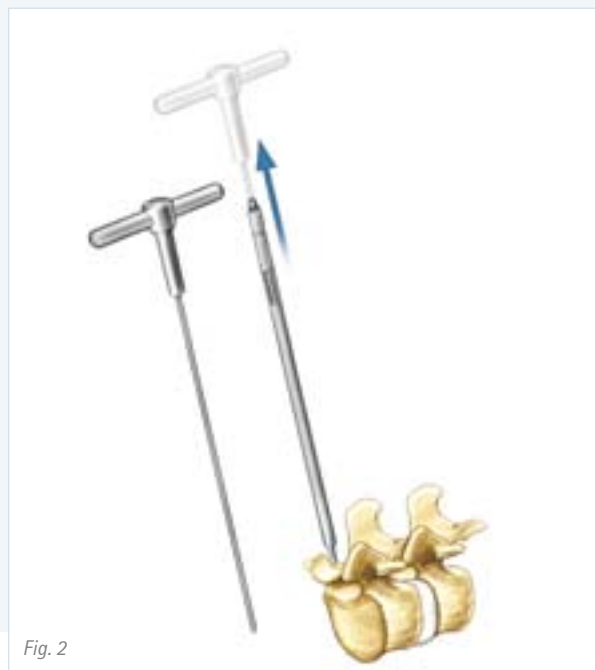


Fig. 2

A.1 Pedicle Preparation

After determination of the screw entry point the guiding instrument consisting of trocar FW271R and K-Wire aiming device FW258R is introduced at the junction of the facet to the processus transversus.

Note:

The K-Wire aiming device should be placed at the pedicle-vertebral body junction to facilitate the placement of the K-Wire.

Note:

Alternatively a Jamshidi Needle can be used instead of Trocar FW271R and K-Wire Aiming Device FW258R.

The trocar FW271R is removed while the K-Wire aiming device FW258R remains in position.

- FW258R – K-Wire Aiming Device
- FW271R – Trocar



FW258R

FW271R

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Surgical Technique

A.1



The K-Wire FW247S is now introduced through the K-Wire aiming device. In order to avoid oscillating or bending of the K-Wire the protection tube FW352R may be used.

Note:

The K-Wire should be introduced in a way that its distal tip represents the end position of the pedicle screw tip. This is essential for the determination of the screw length.

Danger:

It has to be avoided that the K-Wire is pushed too far forward because there is potential risk of perforation of the aorta!

In preparation for the screw positioning the operative field has to be dilated: insert the dilator FW354R over the aiming device.

- FW247S – K-Wire
- FW352R – K-Wire Protection Tube
- FW354R – Dilator



FW247S



FW352R



FW354R



Fig. 5



Fig. 6

Then place the blue tissue protection tube FW355P over the dilator.

Remove the K-Wire aiming device FW258R and the dilator FW354R while carefully holding the K-Wire in place.

Note:

Use the handle FW274R to facilitate the removal of the K-Wire aiming device FW258R.

- FW355P – Tissue Protection Tube
- FW274R – Handle for the removal of the K-Wire Aiming Device



FW355P



FW274R

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Surgical Technique

A.1



Fig. 7



Fig. 8

The perforation of the pedicle is performed with the cannulated straight pedicle probe: insert the probe carefully over the K-Wire.

Although the S⁴® cannulated screws are self-tapping, screw taps are available in all diameters.

To tap, attach either the straight ratchet handle FW165R or t-shaped ratchet handle FW167R to the appropriate tap, based on screw diameter.

- FW263R – Cannulated Pedicle Probe
- FW264-FW268R – Screw Tap, 4.5 mm-8.5 mm
- FW165R – Ratchet Handle, Straight
- FW167R – Ratchet Handle, T-Shaped



FW263R



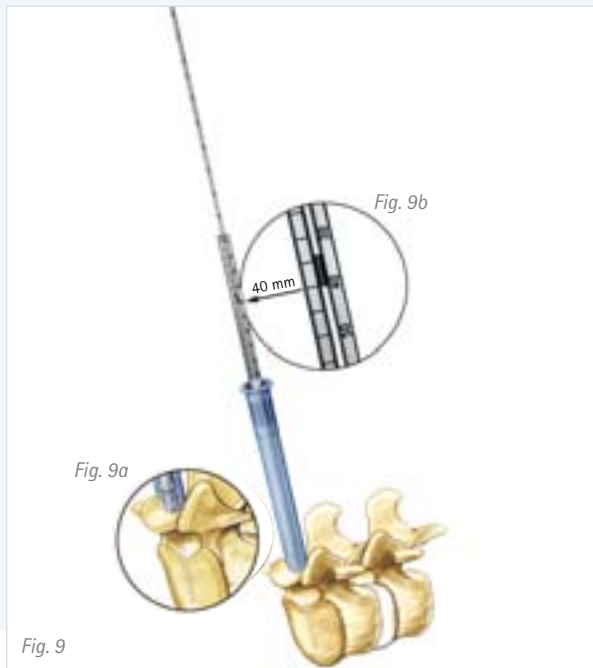
FW264R-FW268R



FW165R



FW167R



A.2 Determination of Screw Length

Introduce the screw length measuring device FW351R over the K-Wire until it touches the pedicle entry point (Fig. 9a). The lower end of the middle marking of the K-Wire indicates now the length of the screw (Fig. 9b).

■ FW351R – Screw Length Measuring Device



FW351R

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Surgical Technique

A.3



Fig. 10

A.3 Screw Placement

For percutaneous approach cannulated monoaxial and polyaxial screws are available. The use of augmentation screws is described in the surgical technique O46002.

Note:

For fracture reduction cannulated monoaxial screws are mandatory.

A.3.1 Preparation

The placement of the poly- and monoaxial screws is performed with the clamping sleeve FW693R, monoaxial screwdriver FW694R, handle FW165R or FW167R. The assembly of the parts is shown in Fig. 10.

First, the clamping sleeve is mounted. This is the blue knurled nut (1) screwed to the bottom thread on the inner shaft (2). The inner shaft is then inserted from above into the outer sleeve (3).



Fig. 11



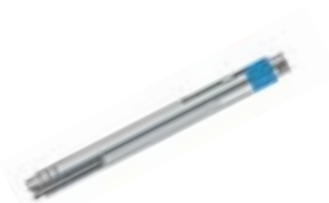
Fig. 12

A.3.1.1 Assembly of the Monoaxial Screw

The monoaxial screwdriver (B) is inserted from above into the clamping sleeve, the pins of the screwdriver are to be fully inserted into the groove of the clamping sleeve (A).

The monoaxial screw is inserted from the bottom. By turning the blue knurled nut down to the limit stop, the pedicle screw is firmly connected with the clamping sleeve.

- FW693R – Clamping Sleeve
- FW696R – Monoaxial Screwdriver
- FW165R – Ratchet Handle, Straight
- FW167R – Ratchet Handle, T-Shaped



FW693R



FW696R



FW165R



FW167R

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Surgical Technique

A.3



Fig. 13



Fig. 14

A.3.1.2 Assembly of the Polyaxial Screw

The polyaxial screwdriver (B) is inserted from above into the clamping sleeve, the pins of the screwdriver are to be fully inserted into the groove of the clamping sleeve (A).

The polyaxial screw is inserted from the bottom. By turning the blue knurled nut down to the limit stop the pedicle screw is firmly connected with the clamping sleeve.

- FW693R – Clamping Sleeve
- FW695R – Polyaxial Screwdriver
- FW165R – Ratchet Handle, Straight
- FW167R – Ratchet Handle, T-Shaped



FW693R



FW695R



FW165R



FW167R



Fig. 15



Fig. 16

A.3.2 Implantation

This construct is guided over the K-wire and the tissue protection sleeve. Repeat this process until all screws are placed.

Note:

The K-Wire can be removed once the screw has traversed the pedicle to prevent further protrusion.

Before the screwdriver is withdrawn, the alignment in the axial direction is performed using the tab on the screwdriver.

- LX182R – Grasping Forceps

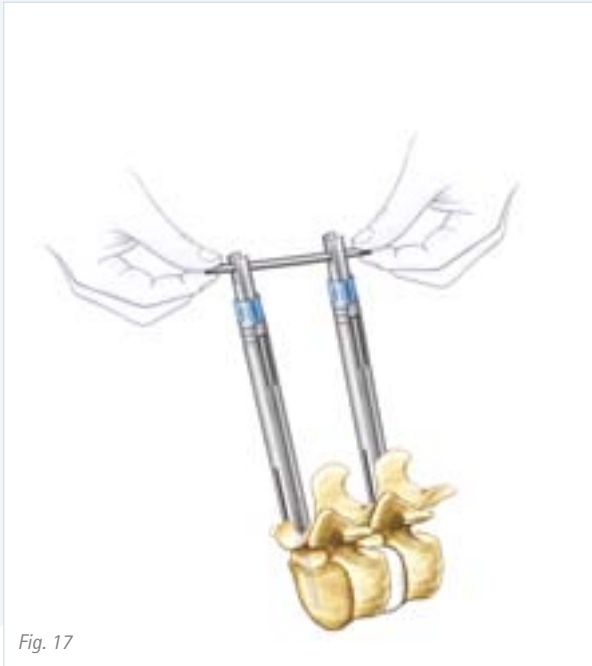


LX182R

S⁴® Spinal System

Surgical Technique

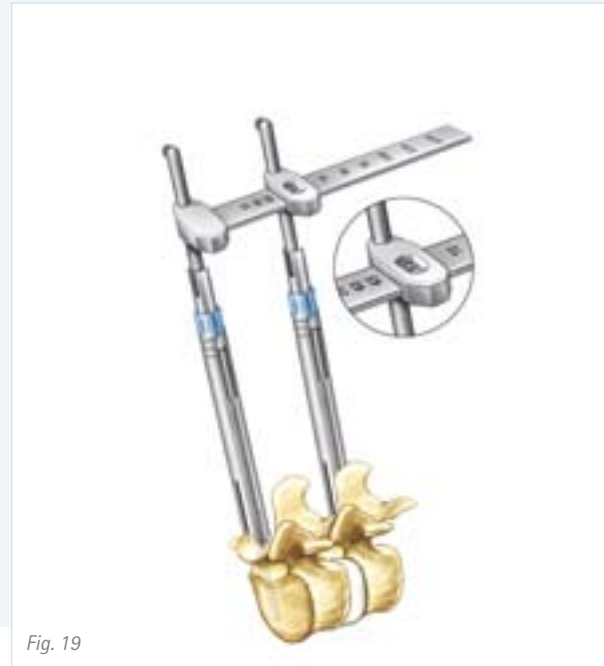
A.3



To verify the correct alignment, the rod can be placed into the slots of the clamping sleeve.

Note:

In case of modifying the screw alignment it is mandatory to use the monoaxial screwdriver FW694R. There is otherwise a risk that the clamping sheath and pedicle screw turn against each other.



A.3.3 Rod Placement – Assembly of the Rod Length Measuring Device

Place the sliding gauge (A) over the scale. The measuring pins (C) are slid through the holders (A and B) with the tip downwards.

Determine the length of the rod using the rod measuring instrument FW242R.

It is inserted through the clamping sleeve into the screw heads. The etched scale on top indicates the required length.

Note:

When using a pre-bent rod, 10 mm has to be added to the indicated length.

■ FW242R – Rod Length Measuring Instrument



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Surgical Technique

A.3



A.3.3 Rod Placement – Assembly of the Rod Insertion Instrument

Put the clamping rod through the rod inserter and prefix it with three turns.

Insert the rod and fix it by turning the knob of the clamping rod clockwise.

Note:

Make sure that the distal tip of pre-bent rods face upwards when locked.

■ FW240R – Rod Insertion Instrument



FW240R



Fig. 22

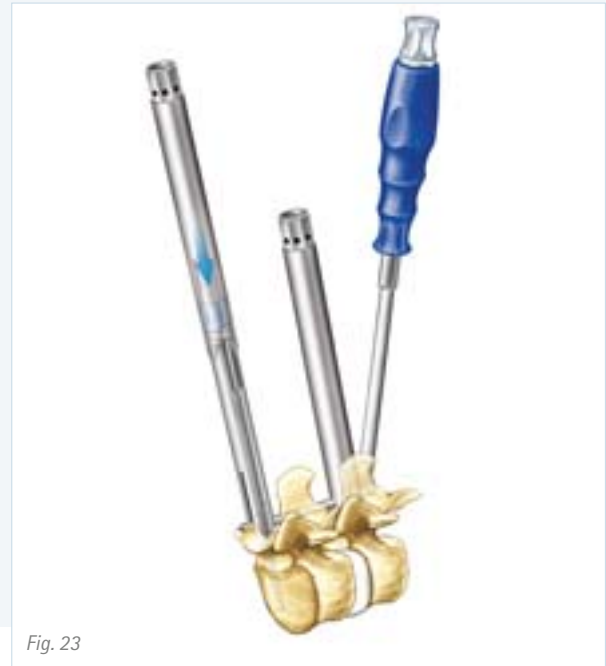


Fig. 23

The rod is inserted through the longitudinal slots of the sleeves.

The percutaneous outer sleeve is placed over the clamping tube.

Note:

Insert the rod from the side where the pedicle screw is closer to the skin. For an L1 Fracture the rod should be inserted from T12. The incision at T12 can be lengthened if necessary.

■ FW735R – Percutaneous Outer Sleeve



FW735R

S⁴® Spinal System

Surgical Technique

A.3



Fig. 24

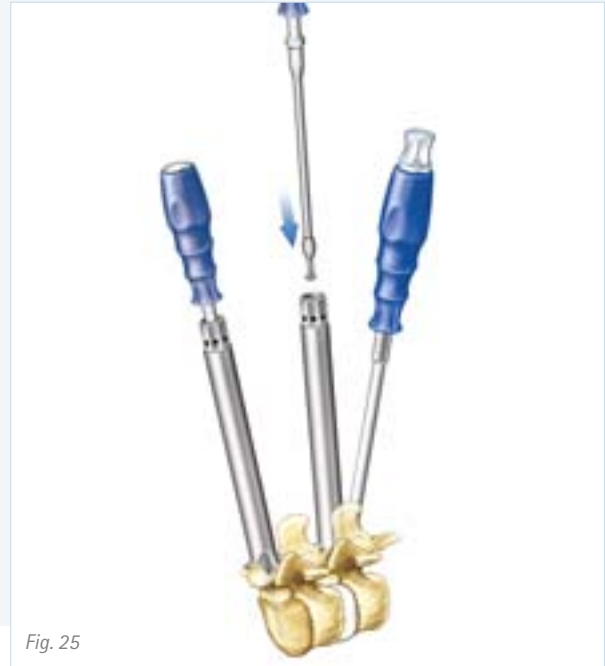


Fig. 25

A.3.4 Set Screw Placement

The Set Screw (SW790T or SW375T) is screwed down with the screwdriver FW697R.

Note:

In order to facilitate the insertion of the locking screw, the rod can be pushed down using the percutaneous outer sleeve FW735R.

Note:

In order to facilitate the insertion of the locking screw, the rod can be pushed down using the percutaneous outer sleeve FW735R.

Note:

It is important that the insertion instrument FW240R is in the correct position. The rod may otherwise turn when the set screw is finally tightened.

- FW697R – Set Screw Starter



FW697R



Fig. 26

After the placement of the set screw, pull the screwdriver back.
If no reduction is necessary, the next step is to finally tighten the construct.

In case of reduction, the steps are described in A.3.6 ff.

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A.3



Fig. 27

A.3.5 Final Tightening

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

- Insert the torque limiting wrench FW170R through the percutaneous outer tube FW735R, so the tip is exposed.
- Fully seat the tip of the torque wrench into the socket of the Set Screw.
- Engage the counter torque handle FW736R. The counter-torque is attached to the hexagonal bolt of the outer sleeve FW735R.
- Tighten the torque wrench whilst applying the counter-torque with the counter-torque handle FW736R in place until the arrows on the torque wrench line up with one another (10 Nm).

Caution:

Do not use the torque limiting wrench FW170R without the counter-torque handle FW736R. This could lead to stripping of the threads of the Set Screw within the body and subsequently to rod loosening.

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

Use the Set Screw revision instrument with the 4 mm hexagonal tip FW193R to remove a previously tightened Set Screw.

■ FW170R – Torque Wrench

■ FW736R – Counter Torque Handle



FW170R

FW736R

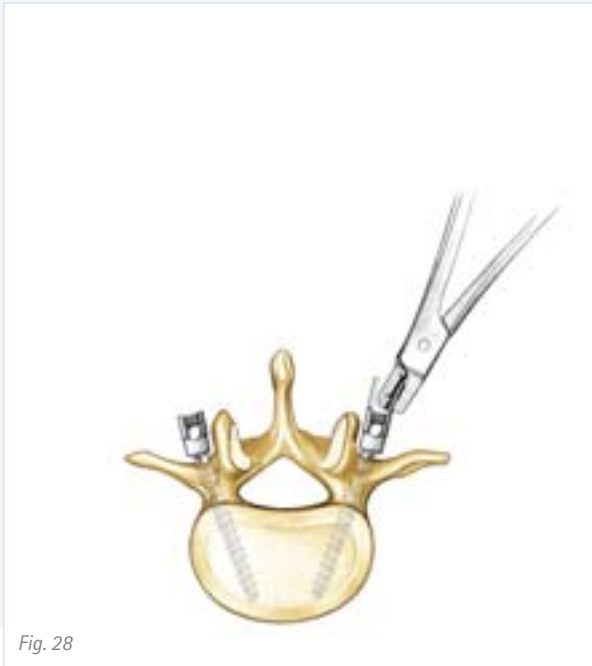


Fig. 28

The locking mechanism of the rod inserter FW240R is opened and the rod released.

Dismantle the FRI instrumentation and remove the tabs with the tab breaker FW179. The site is kept open with Langenbeck hooks.

■ FW179R – Tab Breaker



FW179R

S⁴® Spinal System

Surgical Technique

A.3

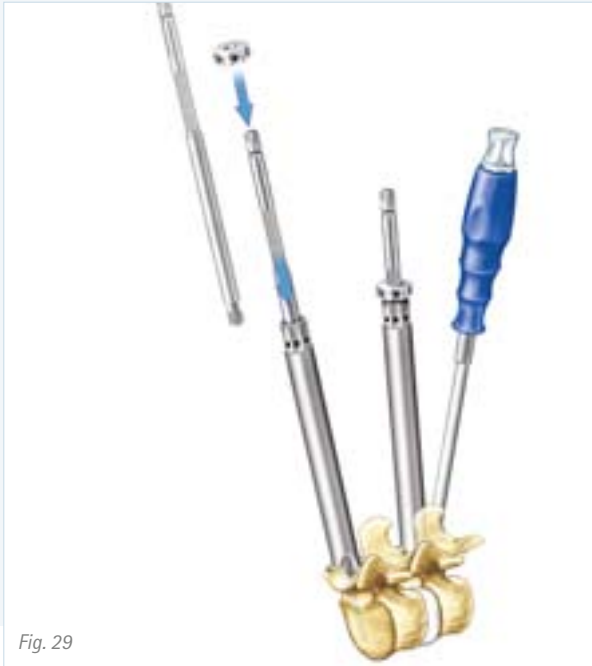


Fig. 29



Fig. 30

A.3.6 Reduction

The lever threadpipe FW734R is screwed in to the stop.

■ FW734R – Lever Threadpipe

Assembly of the Paralleldistractor

1. Place the first regulating screw on the rear parallel guide of the frame (A).
2. Position the free distractor portion (B) on the parallel guide.
3. Place the second regulating screw on the rear parallel guide.
4. Attach the distractor arms (C) on the intake of the frame.



FW734R



Fig. 31

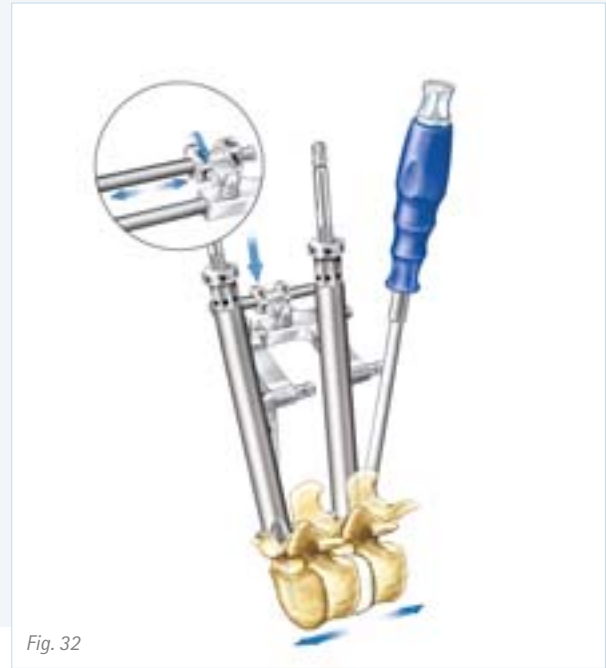


Fig. 32

The distractor (consisting of FW238R and FW239R) is now fixed to the cranial and caudal outer sleeves by sliding the pivots down the guiding groove. Repeat this process on the contra-lateral side.

Note:

The distraction arms have to be inserted parallel to the outer tube.

Distraction can be carried out by means of the regulating screw. Distraction can be changed in very small increments by rotating the distraction nut. The opposing nut can be set to prevent over-distraction.

Note:

Distraction takes place alternatively under x-ray control.

- FW238R – Distractor
- FW239R – Distractor Arm

- FW237R – Tommy Bar



FW238R



FW239R

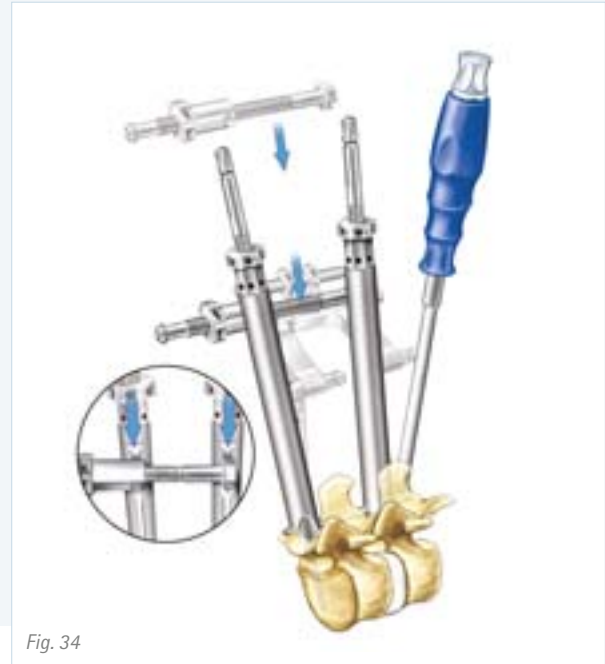
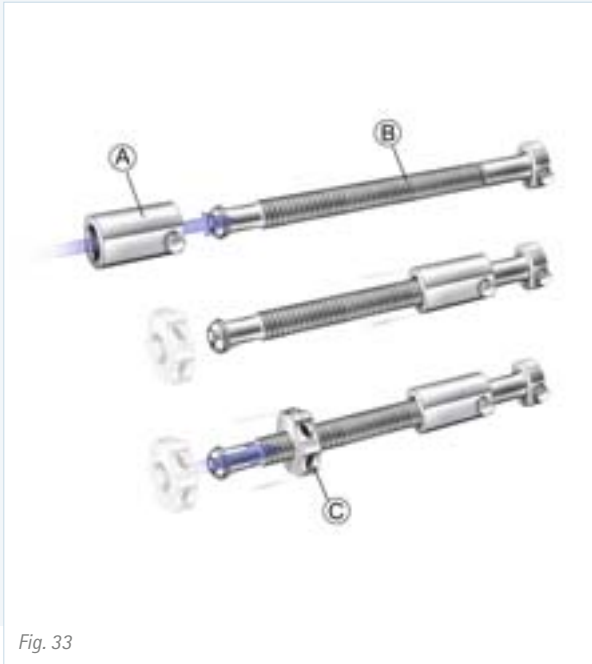


FW237R

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A.3



Assembly of the Distraction Spindle

The attachment jig (A) is placed on the spindle (B) with the pivot inward and fixed with the regulating screw (C).

If necessary, the natural lordosis can be restored with the distraction spindle. The pivots of the spindle are inserted into the groove on the upper part of the outer sleeve.

Note:

The insertion of the distraction spindle has to be placed parallel to the outer sleeve to avoid canting. Repeat this process on the contra-lateral side.

■ FW241R – Distraction Spindle



FW241R



Fig. 35

With the regulating screw lordosis can be corrected. This process is carried out alternatively.

The regulating screw can be manipulated by hand or with the tommy bar.



Fig. 36

With the regulating screw of the lever threadpipe the outer sleeve is screwed down until it blocks. The rod is now seated in the screw head.

The regulating screw of the lever threadpipe has to be screwed back by a quarter turn in order not to block the screwdriver. Handtighten the set screw by means of the screwdriver FW228R.

Note:

It must be verified whether the rod is positioned correctly in the screw head: the marking on the thread of the threadpipe must be visible above the regulating screw – 'P' stands for polyaxial screws and 'M' for monoaxial screws.

■ FW228R – Screwdriver for Set Screw

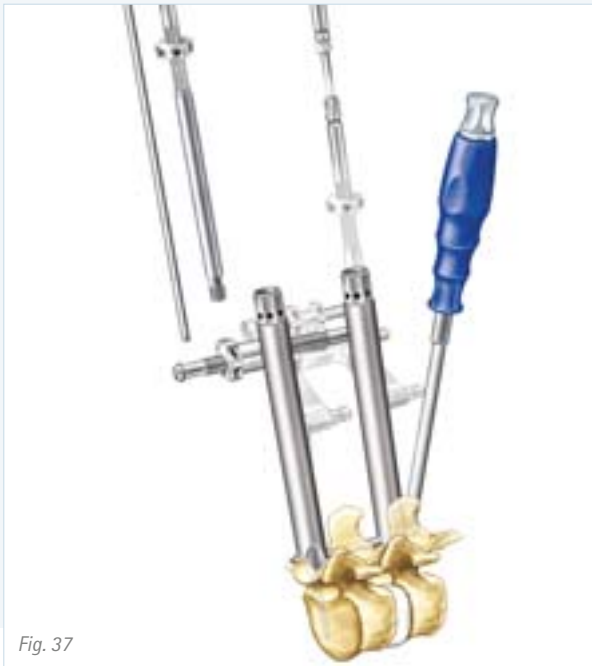


FW228R

S⁴® Spinal System

Surgical Technique

A.3



Afterwards the screwdriver is pulled out. Attach the handle to the lever threadpipe and unscrew it.



To properly tighten the Set Screw SW790T resp. SW375T, the following steps must be performed:

- Insert the torque limiting wrench FW170R through the percutaneous outer tube FW735R, so the tip is exposed.
- Fully seat the tip of the torque wrench into the socket of the Set Screw.
- Engage the counter torque handle FW736R. The counter torque is attached to the hexagonal bolt of the outer sleeve FW735R.
- Tighten the torque wrench whilst applying the counter-torque with the counter-torque handle FW736R in place until the arrows on the torque wrench line up with one another (10 Nm).



Fig. 39

Caution:

Do not use the torque limiting wrench FW170R without the counter-torque handle FW736R. This could lead to stripping of the threads of the Set Screw within the body and subsequently to rod loosening.

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

Use the Set Screw revision instrument with the 4 mm hexagonal tip FW193R to remove a previously tightened Set Screw.

The locking mechanism of the rod inserter FW240R is opened and the rod released.

Dismantle the FRI instrumentation and remove the tabs with the tab breaker FW179. The site is kept open with Langenbeck hooks.

■ FW179R – Tab Breaker

- FW170R – Torque Wrench
- FW736R – Counter Torque Handle



FW170R

FW736R











FW179R

S⁴® Spinal System






Implants / Instrumentation

B.1

B.1 Implants – Overview

Monoaxial Screws			
 <p>ø 4.5 mm</p>	SW421T	S ⁴ Monoaxial Screw, cannulated, ø 4.5 mm	4.5 x 25 mm
	SW422T	S ⁴ Monoaxial Screw, cannulated	4.5 x 30 mm
	SW423T	S ⁴ Monoaxial Screw, cannulated	4.5 x 35 mm
	SW424T	S ⁴ Monoaxial Screw, cannulated	4.5 x 40 mm
	SW426T	S ⁴ Monoaxial Screw, cannulated	4.5 x 45 mm
	SW427T	S ⁴ Monoaxial Screw, cannulated	4.5 x 50 mm
 <p>ø 5.5 mm</p>	SW431T	S ⁴ Monoaxial Screw, cannulated, ø 5.5 mm	5.5 x 25 mm
	SW432T	S ⁴ Monoaxial Screw, cannulated	5.5 x 30 mm
	SW433T	S ⁴ Monoaxial Screw, cannulated	5.5 x 35 mm
	SW434T	S ⁴ Monoaxial Screw, cannulated	5.5 x 40 mm
	SW436T	S ⁴ Monoaxial Screw, cannulated	5.5 x 45 mm
	SW437T	S ⁴ Monoaxial Screw, cannulated	5.5 x 50 mm
 <p>ø 6.5 mm</p>	SW441T	S ⁴ Monoaxial Screw, cannulated, ø 6.5 mm	6.5 x 25 mm
	SW442T	S ⁴ Monoaxial Screw, cannulated	6.5 x 30 mm
	SW443T	S ⁴ Monoaxial Screw, cannulated	6.5 x 35 mm
	SW444T	S ⁴ Monoaxial Screw, cannulated	6.5 x 40 mm
	SW446T	S ⁴ Monoaxial Screw, cannulated	6.5 x 45 mm
	SW447T	S ⁴ Monoaxial Screw, cannulated	6.5 x 50 mm
 <p>ø 7.5 mm</p>	SW448T	S ⁴ Monoaxial Screw, cannulated	6.5 x 55 mm
	SW449T	S ⁴ Monoaxial Screw, cannulated	6.5 x 60 mm
	SW461T	S ⁴ Monoaxial Screw, cannulated, ø 7.5 mm	7.5 x 25 mm
	SW462T	S ⁴ Monoaxial Screw, cannulated	7.5 x 30 mm
	SW463T	S ⁴ Monoaxial Screw, cannulated	7.5 x 35 mm
	SW464T	S ⁴ Monoaxial Screw, cannulated	7.5 x 40 mm
 <p>ø 8.5 mm</p>	SW466T	S ⁴ Monoaxial Screw, cannulated	7.5 x 45 mm
	SW467T	S ⁴ Monoaxial Screw, cannulated	7.5 x 50 mm
	SW468T	S ⁴ Monoaxial Screw, cannulated	7.5 x 55 mm
	SW469T	S ⁴ Monoaxial Screw, cannulated	7.5 x 60 mm
	SW472T	S ⁴ Monoaxial Screw, cannulated, ø 8.5 mm	8.5 x 30 mm
	SW473T	S ⁴ Monoaxial Screw, cannulated	8.5 x 35 mm
SW474T	S ⁴ Monoaxial Screw, cannulated	8.5 x 40 mm	
 <p>ø 8.5 mm</p>	SW476T	S ⁴ Monoaxial Screw, cannulated	8.5 x 45 mm
	SW477T	S ⁴ Monoaxial Screw, cannulated	8.5 x 50 mm
	SW478T	S ⁴ Monoaxial Screw, cannulated	8.5 x 55 mm
	SW479T	S ⁴ Monoaxial Screw, cannulated	8.5 x 60 mm
		SW375T	Set Screw for Poly- / Monoaxial Screws, cannulated
	SW790T	Set screw for monoaxial- / polyaxial screw	

B.1 Implants – Overview

 <p>ø 4.5 mm</p>	Polyaxial Screw		
	SW321T	S ^{4°} Polyaxial Screw, cannulated, ø 4.5 mm	4.5 x 25 mm
	SW322T	S ^{4°} Polyaxial Screw, cannulated	4.5 x 30 mm
	SW323T	S ^{4°} Polyaxial Screw, cannulated	4.5 x 35 mm
	SW324T	S ^{4°} Polyaxial Screw, cannulated	4.5 x 40 mm
	SW326T	S ^{4°} Polyaxial Screw, cannulated	4.5 x 45 mm
	SW327T	S ^{4°} Polyaxial Screw, cannulated	4.5 x 50 mm
 <p>ø 5.5 mm</p>	SW331T	S ^{4°} Polyaxial Screw, cannulated, ø 5.5 mm	5.5 x 25 mm
	SW332T	S ^{4°} Polyaxial Screw, cannulated	5.5 x 30 mm
	SW333T	S ^{4°} Polyaxial Screw, cannulated	5.5 x 35 mm
	SW334T	S ^{4°} Polyaxial Screw, cannulated	5.5 x 40 mm
	SW336T	S ^{4°} Polyaxial Screw, cannulated	5.5 x 45 mm
	SW337T	S ^{4°} Polyaxial Screw, cannulated	5.5 x 50 mm
	 <p>ø 6.5 mm</p>	SW341T	S ^{4°} Polyaxial Screw, cannulated, ø 6.5 mm
SW342T		S ^{4°} Polyaxial Screw, cannulated	6.5 x 30 mm
SW343T		S ^{4°} Polyaxial Screw, cannulated	6.5 x 35 mm
SW344T		S ^{4°} Polyaxial Screw, cannulated	6.5 x 40 mm
SW346T		S ^{4°} Polyaxial Screw, cannulated	6.5 x 45 mm
SW347T		S ^{4°} Polyaxial Screw, cannulated	6.5 x 50 mm
SW348T		S ^{4°} Polyaxial Screw, cannulated	6.5 x 55 mm
 <p>ø 7.5 mm</p>	SW349T	S ^{4°} Polyaxial Screw, cannulated	6.5 x 60 mm
	SW412T	S ^{4°} Polyaxial Screw, cannulated	6.5 x 70 mm
	SW416T	S ^{4°} Polyaxial Screw, cannulated	6.5 x 80 mm
	SW361T	S ^{4°} Polyaxial Screw, cannulated, ø 7.5 mm	7.5 x 25 mm
	SW362T	S ^{4°} Polyaxial Screw, cannulated	7.5 x 30 mm
	SW363T	S ^{4°} Polyaxial Screw, cannulated	7.5 x 35 mm
	SW364T	S ^{4°} Polyaxial Screw, cannulated	7.5 x 40 mm
 <p>ø 8.5 mm</p>	SW366T	S ^{4°} Polyaxial Screw, cannulated	7.5 x 45 mm
	SW367T	S ^{4°} Polyaxial Screw, cannulated	7.5 x 50 mm
	SW368T	S ^{4°} Polyaxial Screw, cannulated	7.5 x 55 mm
	SW369T	S ^{4°} Polyaxial Screw, cannulated	7.5 x 60 mm
	SW413T	S ^{4°} Polyaxial Screw, cannulated	7.5 x 70 mm
	SW417T	S ^{4°} Polyaxial Screw, cannulated	7.5 x 80 mm
	SW372T	S ^{4°} Polyaxial Screw, cannulated, ø 8.5 mm	8.5 x 30 mm
SW373T	S ^{4°} Polyaxial Screw, cannulated	8.5 x 35 mm	
SW374T	S ^{4°} Polyaxial Screw, cannulated	8.5 x 40 mm	
SW376T	S ^{4°} Polyaxial Screw, cannulated	8.5 x 45 mm	
SW377T	S ^{4°} Polyaxial Screw, cannulated	8.5 x 50 mm	
SW378T	S ^{4°} Polyaxial Screw, cannulated	8.5 x 55 mm	
SW379T	S ^{4°} Polyaxial Screw, cannulated	8.5 x 60 mm	
SW414T	S ^{4°} Polyaxial Screw, cannulated	8.5 x 70 mm	
SW418T	S ^{4°} Polyaxial Screw, cannulated	8.5 x 80 mm	

S⁴® Spinal System

Implants / Instrumentation

B.1

B.1 Implants – Overview



S⁴® Rod with hexagonal connection, pre-bent, ø 5.5 mm

SW554T	with tip and hexagonal connection	5.5 x 35 mm
SW555T	with tip and hexagonal connection	5.5 x 40 mm
SW556T	with tip and hexagonal connection	5.5 x 45 mm
SW557T	with tip and hexagonal connection	5.5 x 50 mm
SW558T	with tip and hexagonal connection	5.5 x 55 mm
SW559T	with tip and hexagonal connection	5.5 x 60 mm
SW561T	with tip and hexagonal connection	5.5 x 70 mm
SW562T	with tip and hexagonal connection	5.5 x 80 mm
SW563T	with tip and hexagonal connection	5.5 x 90 mm
SW564T	with tip and hexagonal connection	5.5 x 100 mm
SW566T	with tip and hexagonal connection	5.5 x 110 mm
SW567T	with tip and hexagonal connection	5.5 x 120 mm



S⁴® Rod with hexagonal connection, straight, ø 5.5 mm

SW573T	with tip and hexagonal connection	5.5 x 35 mm
SW574T	with tip and hexagonal connection	5.5 x 40 mm
SW576T	with tip and hexagonal connection	5.5 x 45 mm
SW577T	with tip and hexagonal connection	5.5 x 50 mm
SW578T	with tip and hexagonal connection	5.5 x 55 mm
SW579T	with tip and hexagonal connection	5.5 x 60 mm
SW581T	with tip and hexagonal connection	5.5 x 70 mm
SW582T	with tip and hexagonal connection	5.5 x 80 mm
SW583T	with tip and hexagonal connection	5.5 x 90 mm
SW584T	with tip and hexagonal connection	5.5 x 100 mm
SW585T	with tip and hexagonal connection	5.5 x 110 mm
SW586T	with tip and hexagonal connection	5.5 x 120 mm
SW587T	with tip and hexagonal connection	5.5 x 150 mm
SW588T	with tip and hexagonal connection	5.5 x 180 mm
SW589T	with hexagonal connection	5.5 x 200 mm
SW590T	with hexagonal connection	5.5 x 300 mm
SW591T	with hexagonal connection	5.5 x 400 mm
SW592T	with hexagonal connection	5.5 x 500 mm



SW690T	Cross Connector, straight	21 mm
SW691T	Cross connector, straight	25 mm
SW490T	Cross connector, straight	28 mm
SW491T	Cross connector, straight	30 mm
SW492T	Cross connector, straight	32 mm
SW493T	Cross connector, straight	34 mm



SW488T	Cross Connector, adjustable	35-36 mm
SW489T	Cross connector, adjustable	36-38 mm
SW494T	Cross connector, adjustable	38-42 mm
SW495T	Cross connector, adjustable	42-50 mm
SW496T	Cross connector, adjustable	50-60 mm
SW497T	Cross connector, adjustable	60-77 mm
SW498T	Cross connector, adjustable	77-107 mm



B.1 Implants – Overview



Augmentation Screws (sterile packed)

SW510TS	Monoaxial Screw for Cement Augmentation, \varnothing 5.5 mm	5.5 x	35 mm
SW515TS	Monoaxial Screw for Cement Augmentation	5.5 x	40 mm
SW518TS	Monoaxial Screw for Cement Augmentation	5.5 x	45 mm
SW519TS	Monoaxial Screw for Cement Augmentation	5.5 x	50 mm
SW531TS	Monoaxial Screw for Cement Augmentation, \varnothing 6.5 mm	6.5 x	35 mm
SW532TS	Monoaxial Screw for Cement Augmentation	6.5 x	40 mm
SW533TS	Monoaxial Screw for Cement Augmentation	6.5 x	45 mm
SW534TS	Monoaxial Screw for Cement Augmentation	6.5 x	50 mm
SW536TS	Monoaxial Screw for Cement Augmentation	6.5 x	55 mm
SW537TS	Monoaxial Screw for Cement Augmentation	6.5 x	60 mm
SW538TS	Monoaxial Screw for Cement Augmentation	6.5 x	70 mm
SW539TS	Monoaxial Screw for Cement Augmentation	6.5 x	80 mm
SW541TS	Monoaxial Screw for Cement Augmentation, \varnothing 7.5 mm	7.5 x	35 mm
SW542TS	Monoaxial Screw for Cement Augmentation	7.5 x	40 mm
SW543TS	Monoaxial Screw for Cement Augmentation	7.5 x	45 mm
SW544TS	Monoaxial Screw for Cement Augmentation	7.5 x	50 mm
SW546TS	Monoaxial Screw for Cement Augmentation	7.5 x	55 mm
SW547TS	Monoaxial Screw for Cement Augmentation	7.5 x	60 mm
SW548TS	Monoaxial Screw for Cement Augmentation	7.5 x	70 mm
SW549TS	Monoaxial Screw for Cement Augmentation	7.5 x	80 mm



SW621TS	Polyaxial Screw for Cement Augmentation, \varnothing 5.5 mm	5.5 x	35 mm
SW622TS	Polyaxial Screw for Cement Augmentation	5.5 x	40 mm
SW623TS	Polyaxial Screw for Cement Augmentation	5.5 x	45 mm
SW624TS	Polyaxial Screw for Cement Augmentation	5.5 x	50 mm
SW631TS	Polyaxial Screw for Cement Augmentation, \varnothing 6.5 mm	6.5 x	35 mm
SW632TS	Polyaxial Screw for Cement Augmentation	6.5 x	40 mm
SW633TS	Polyaxial Screw for Cement Augmentation	6.5 x	45 mm
SW634TS	Polyaxial Screw for Cement Augmentation	6.5 x	50 mm
SW636TS	Polyaxial Screw for Cement Augmentation	6.5 x	55 mm
SW637TS	Polyaxial Screw for Cement Augmentation	6.5 x	60 mm
SW638TS	Polyaxial Screw for Cement Augmentation	6.5 x	70 mm
SW639TS	Polyaxial Screw for Cement Augmentation	6.5 x	80 mm

available
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SW641TS	Polyaxial Screw for Cement Augmentation, \varnothing 7.5 mm	7.5 x	35 mm
SW642TS	Polyaxial Screw for Cement Augmentation	7.5 x	40 mm
SW643TS	Polyaxial Screw for Cement Augmentation	7.5 x	45 mm
SW644TS	Polyaxial Screw for Cement Augmentation	7.5 x	50 mm
SW646TS	Polyaxial Screw for Cement Augmentation	7.5 x	55 mm
SW647TS	Polyaxial Screw for Cement Augmentation	7.5 x	60 mm
SW648TS	Polyaxial Screw for Cement Augmentation	7.5 x	70 mm
SW649TS	Polyaxial Screw for Cement Augmentation	7.5 x	80 mm



SR146SU Injection Cannula for Augmentation Screws*

SR148SU Percutaneous Injection Cannula

* sterile packed

S⁴® Spinal System

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B.2

B.2 Implants – Set

Article Number	Description	Recommended	Optional
¹ FW259P	Implant Tray	1	
	S⁴® Monoaxial Screw, cannulated, ø 5.5 mm		
SW433T	S ⁴ ® Monoaxial Screw, cannulated, 35 mm		4
SW434T	S ⁴ ® Monoaxial Screw, cannulated, 40 mm	6	
SW436T	S ⁴ ® Monoaxial Screw, cannulated, 45 mm	6	
SW437T	S ⁴ ® Monoaxial Screw, cannulated, 50 mm		4
	S⁴® Monoaxial Screw, cannulated, ø 6.5 mm		
SW443T	S ⁴ ® Monoaxial Screw, cannulated, 35 mm		2
SW444T	S ⁴ ® Monoaxial Screw, cannulated, 40 mm	6	
SW446T	S ⁴ ® Monoaxial Screw, cannulated, 45 mm	6	
SW447T	S ⁴ ® Monoaxial Screw, cannulated, 50 mm	6	
SW448T	S ⁴ ® Monoaxial Screw, cannulated, 55 mm		2
SW449T	S ⁴ ® Monoaxial Screw, cannulated, 60 mm		2
	S⁴® Monoaxial Screw, cannulated, ø 7.5 mm		
SW461T	S ⁴ ® Monoaxial Screw, cannulated, 25 mm		
SW462T	S ⁴ ® Monoaxial Screw, cannulated, 30 mm		2
SW463T	S ⁴ ® Monoaxial Screw, cannulated, 35 mm	4	
SW464T	S ⁴ ® Monoaxial Screw, cannulated, 40 mm	6	
SW466T	S ⁴ ® Monoaxial Screw, cannulated, 45 mm	6	
SW467T	S ⁴ ® Monoaxial Screw, cannulated, 50 mm	6	
SW468T	S ⁴ ® Monoaxial Screw, cannulated, 55 mm	6	
SW469T	S ⁴ ® Monoaxial Screw, cannulated, 60 mm		2
	S⁴® Polyaxial Screw, cannulated, ø 5.5 mm		
SW331T	S ⁴ ® Polyaxial Screw, cannulated, 25 mm		2
SW332T	S ⁴ ® Polyaxial Screw, cannulated, 30 mm	4	
SW333T	S ⁴ ® Polyaxial Screw, cannulated, 35 mm	4	
SW334T	S ⁴ ® Polyaxial Screw, cannulated, 40 mm	4	
SW336T	S ⁴ ® Polyaxial Screw, cannulated, 45 mm	4	
SW337T	S ⁴ ® Polyaxial Screw, cannulated, 50 mm	2	
	S⁴® Polyaxial Screw, cannulated, ø 6.5 mm		
SW341T	S ⁴ ® Polyaxial Screw, cannulated, 25 mm		2
SW342T	S ⁴ ® Polyaxial Screw, cannulated, 30 mm	2	
SW343T	S ⁴ ® Polyaxial Screw, cannulated, 35 mm	4	
SW344T	S ⁴ ® Polyaxial Screw, cannulated, 40 mm	8	
SW346T	S ⁴ ® Polyaxial Screw, cannulated, 45 mm	8	
SW347T	S ⁴ ® Polyaxial Screw, cannulated, 50 mm	8	
SW348T	S ⁴ ® Polyaxial Screw, cannulated, 55 mm	2	
SW349T	S ⁴ ® Polyaxial Screw, cannulated, 60 mm	2	

Article Number	Description	Recommended	Optional
	S4° Polyaxial Screw, cannulated, ø 7.5 mm		
SW361T	S4° Polyaxial Screw, cannulated, 25 mm		2
SW362T	S4° Polyaxial Screw, cannulated, 30 mm	2	
SW363T	S4° Polyaxial Screw, cannulated, 35 mm	6	
SW364T	S4° Polyaxial Screw, cannulated, 40 mm	8	
SW366T	S4° Polyaxial Screw, cannulated, 45 mm	8	
SW367T	S4° Polyaxial Screw, cannulated, 50 mm	8	
SW368T	S4° Polyaxial Screw, cannulated, 55 mm	2	
SW369T	S4° Polyaxial Screw, cannulated, 60 mm	2	
SW375T	Set Screw for Poly- / Monoaxial Screws, cannulated	20	
	S4° Rod with hexagonal connection, pre-bent, ø 5.5 mm		
SW554T	with tip and hexagonal connection, 35 mm	2	
SW555T	with tip and hexagonal connection, 40 mm	2	
SW556T	with tip and hexagonal connection, 45 mm	2	
SW557T	with tip and hexagonal connection, 50 mm	2	
SW558T	with tip and hexagonal connection, 55 mm	2	
SW559T	with tip and hexagonal connection, 60 mm	2	
SW561T	with tip and hexagonal connection, 70 mm	2	
SW562T	with tip and hexagonal connection, 80 mm	2	
SW563T	with tip and hexagonal connection, 90 mm	2	
SW564T	with tip and hexagonal connection, 100 mm	2	
SW566T	with tip and hexagonal connection, 110 mm	2	
SW567T	with tip and hexagonal connection, 120 mm	2	
	S4° Rod with hexagonal connection, straight, ø 5.5 mm		
SW573T	with tip and hexagonal connection, 35 mm	2	
SW574T	with tip and hexagonal connection, 40 mm	2	
SW576T	with tip and hexagonal connection, 45 mm	2	
SW577T	with tip and hexagonal connection, 50 mm	2	
SW578T	with tip and hexagonal connection, 55 mm	2	
SW579T	with tip and hexagonal connection, 60 mm	2	
SW581T	with tip and hexagonal connection, 70 mm	2	
SW582T	with tip and hexagonal connection, 80 mm	2	
SW583T	with tip and hexagonal connection, 90 mm	2	
SW584T	with tip and hexagonal connection, 100 mm	2	
SW585T	with tip and hexagonal connection, 110 mm	2	
SW586T	with tip and hexagonal connection, 120 mm	2	
SW587T	with tip and hexagonal connection, 150 mm	2	
SW588T	with tip and hexagonal connection, 180 mm	2	

S⁴® Spinal System

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B.2

B.2 Implants – Set

Article Number	Description	Recommended	Optional
S⁴ Rod with hexagonal connection, straight, ø 5.5 mm			
SW589T	with hexagonal connection, 200 mm		2
SW590T	with hexagonal connection, 300 mm		2
SW591T	with hexagonal connection, 400 mm		2
SW592T	with hexagonal connection, 500 mm		2
Straight Cross Connectors			
SW690T	Cross Connector, 21 mm		1
SW691T	Cross Connector, 25 mm		1
SW490T	Cross Connector, 28 mm		1
SW491T	Cross Connector, 30 mm		1
SW492T	Cross Connector, 32 mm		1
SW493T	Cross Connector, 34 mm		1
Adjustable Cross Connectors			
SW488T	Cross Connector, 35-36 mm	1	1
SW489T	Cross Connector, 36-38 mm	1	1
SW494T	Cross Connector, 38-42 mm	1	1
SW495T	Cross Connector, 42-50 mm	1	1
SW496T	Cross Connector, 50-60 mm	1	1
SW497T	Cross Connector, 60-77 mm	1	1
SW498T	Cross Connector, 77-107 mm	1	1

¹ Recommended Container: Bottom JK441 and Lid JK489

B.3. Instruments – Overview






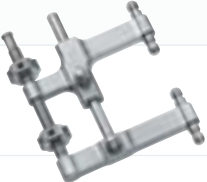





	Art. No.	Description
	FW240R	Rod Insertion Instrument
	FW242R	Rod Length Measuring Instrument
	FW243R	Slotted Hammer, 12.5 mm
	FW247S	K-Wire
	FW258R	K-Wire Aiming Device
	FW271R	Trocar
	FW274R	Handle for removal of FW258R
	FW351R	Screw Length Measuring Device
	FW352R	K-Wire Protection Sleeve
	FW354R	Dilation Tube
	FW695R	Polyaxial Driver
	FW696R	Monoaxial Driver
	FW697R	Set Screw Starter

S⁴® Spinal System

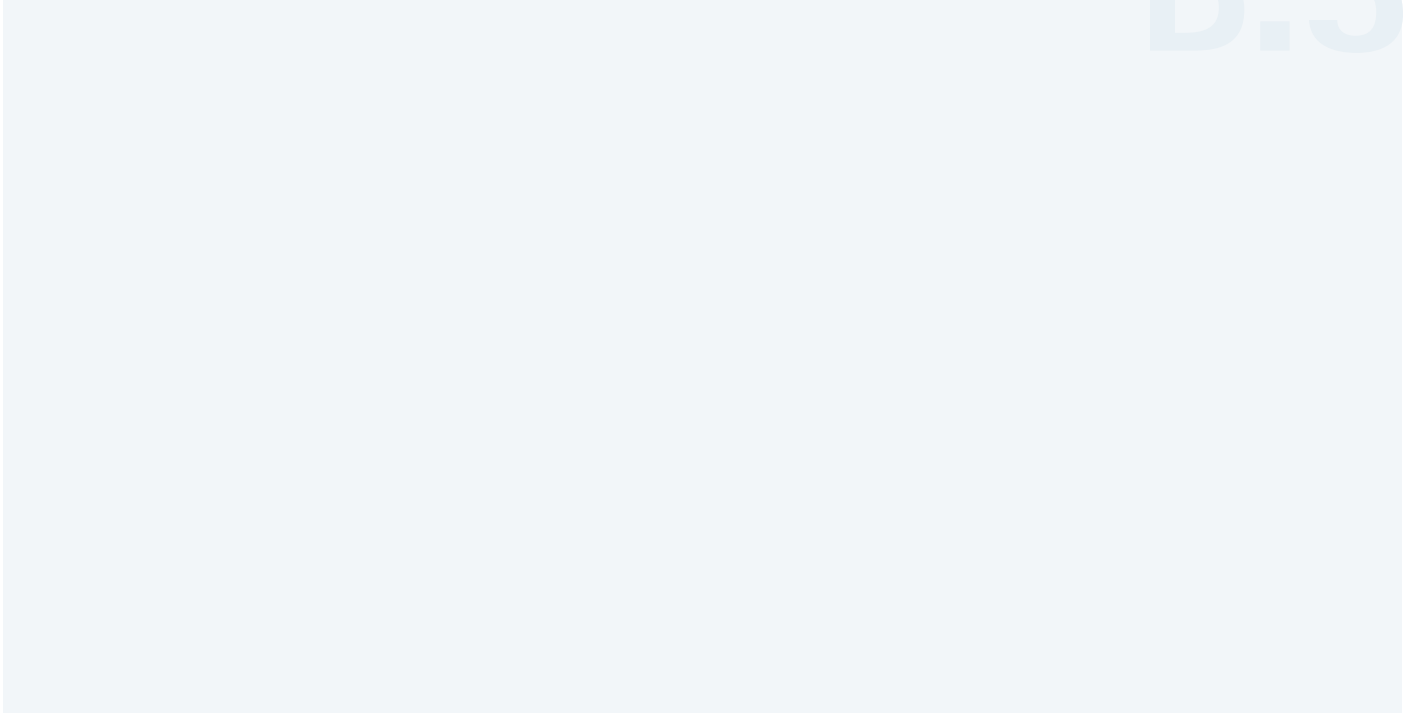
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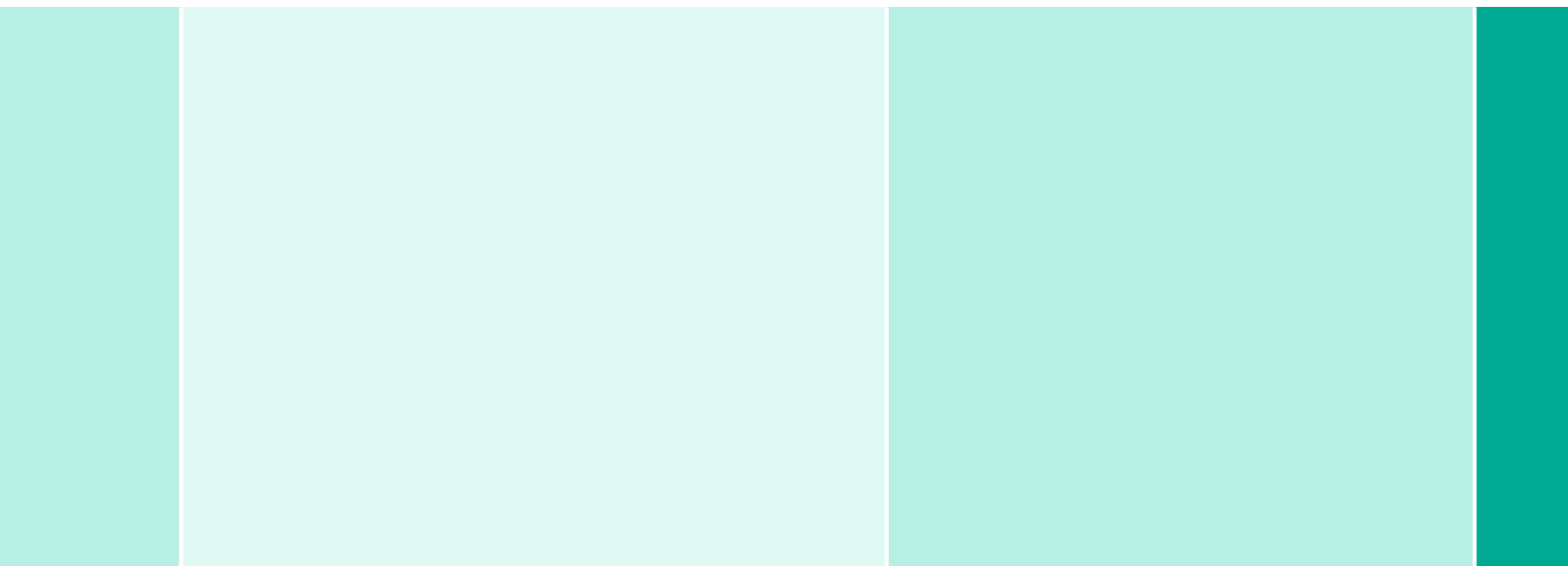
B.3

B.3. Instruments – Overview

	Art. No.	Description
	LX182R	Grasping Forceps
	FW228R	Screwdriver for Set Screw
	FW735R	Percutaneous Outer Sleeve
	FW736R	Counter Torque
	FW237R	Tommy Bar
	FW238R	Distractor
	FW239R	Distraction Arm
	FW241R	Distraction Spindle
	FW734R	Lever Threadpipe
	FW693R	Outer Clamping Tube
	FW355P	Tissue Protection Sleeve

B.3





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