Aesculap® S4® Element

Surgical Technique

Aesculap Spine

B BRAUN
SHARING EXPERTISE

S4® Element

Table of Contents

System Overview

A

The S4® Element Spine System is a low profile and innovative thoracolumbar pedicle fixation system designed to address complex posterior pathologies. The S4® Element system features a sophisticated pressure vessel locking design capable of delivering biomechanical stability while maintaining an ultra-low profile.

The S4® Element Spine System is a top-loading low profile pedicle screw system that offers a broad selection of implants and instruments that are designed to meet the surgeons demand for a quicker yet simpler surgical procedure. The trays are configured to include polyaxial screws, ilium screws, pre-cut straight and pre-bent rods, rigid & adjustable cross connectors, and a variety of rod-to-rod connectors used to extend an existing construct in the event of a revision surgery or for new multilevel construct.

System Features & Advantages

- Small Implant Volume
  - Maximize screw head range of motion.
  - Reduce the risk of facet and soft tissue impingement.
- Patented Interlocking Thread Design
  - Minimize splaying of screw body.
- Pressure Vessel Technology
  - Transfer energy throughout the polyaxial screw construct transforming it into a solid monoaxial construct, achieving maximum construct stability.
- Undercut Thread Design
  - Help eliminate cross threading by directing the force inward, improving force transmission and efficiency throughout the rod-screw construct.

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B.1.

Fig. 1

Fig. 2

B.1. Pedicle Preparation

- Determine pedicle entry point and perforate the cortex using the bone awl (FW190R). (Fig. 1)
- Use the pedicle probe to open the pedicle canal. (Fig. 2)
  - The pedicle probes are available straight or curved blunt-tip (FW188R or FW189R) and straight or curved Lenke (FW248R or FW249R).
  - The probes have ruled markings to determine the depth measurement in the pedicle canal.
- If necessary, single or dual band pedicle markers (FW191R or FW192R) can be used to identify proper anatomic location on intra-operative imaging.

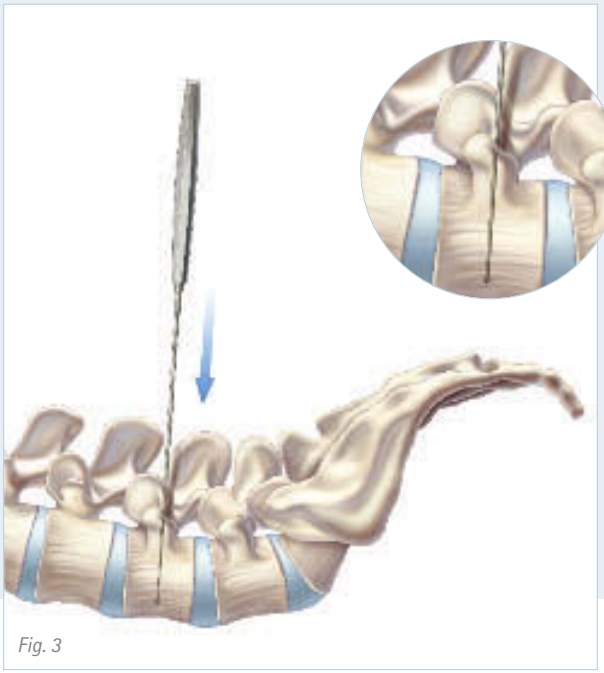

Fig. 3

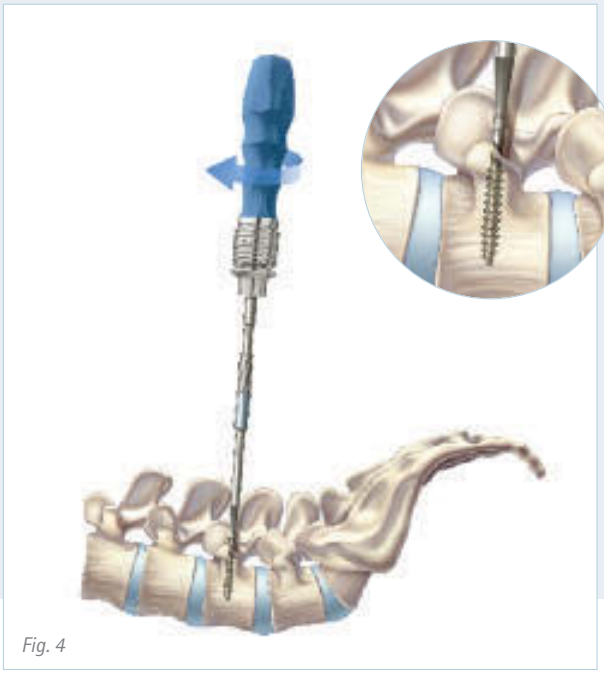

Fig. 4

- Utilize the straight or curved pedicle sounder (FW146R or FW147R) to confirm the patency of the pedicle and vertebral body cortex. (Fig. 3)

B.2. Tapping

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

- To tap, attach the straight ratchet handle or the T-handle (FW165R or FW167R) to the appropriate tap based on the screw diameter. (Fig. 4)
- If preferred, a Speed Multiplier Handle (FW730R) is also available to expedite tapping.

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B.3.

Fig. 5

Fig. 6

B.3. Screw Application

Color-coded polyaxial screws are available in various lengths and diameters.

Polyaxial Screw Application

- Attach and fully engage the hexagonal tip of the rigid fixation screwdriver (FW277R) into the head of the screw. With the rigid fixation screwdriver engaging the screw head, rotate the blue twist knob in a clockwise fashion while holding the bone screw to lock the threaded end of the screwdriver into the screw head.

Caution:
Ensure that the screwdriver is fully engaged and threaded onto the screw.

- Thread the screw into the prepared pedicle and release the screwdriver from the screw head by turning the blue twist knob counter clockwise. (Fig. 6)

Caution:
Do not thread the screw all the way into the vertebral body. Ensure that the screw maintains polyaxicity.

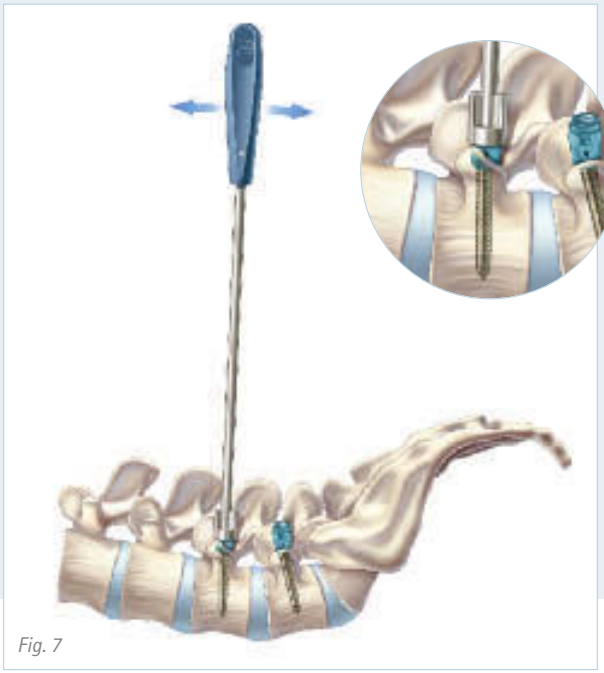

Fig. 7

Fig. 8

- All polyaxial screw heads have 42° range of motion. If desired, align the polyaxial screw bodies using the screw body manipulator (FW278R). (Fig. 7)

Note:
In case of soft tissue impingement, the Marnay lever (FW154R) can be used to retract soft tissue. If revision is necessary, use the screw manipulator to release the axial lock of the screw body and then use the shank tip screw driver (FW174R) for the safe removal of polyaxial screws.

B.4. Rod Placement

- Optional use of flexible rod trials (FW185R) as a guide for rod bending and measuring correct rod length. (Fig. 8)

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B.4.

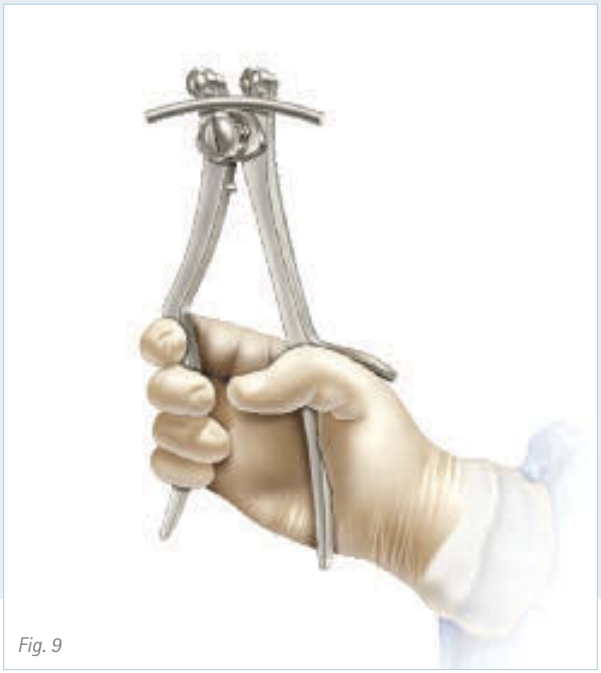

Fig. 9

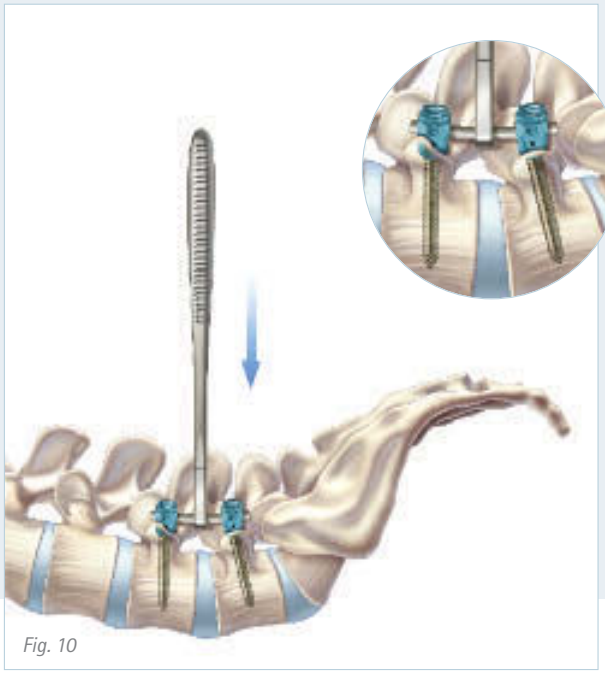

Fig. 10

Both pre-bent and straight rods are available.

- All rods may be contoured using the French rod bender (FW024R).
- To contour the rod, place rod on the bender and squeeze the handle until the desired curvature is achieved. (Fig. 9)
- Use the rod holding forceps (FW012R) to assist with rod placement or rod manipulation. (Fig. 10)

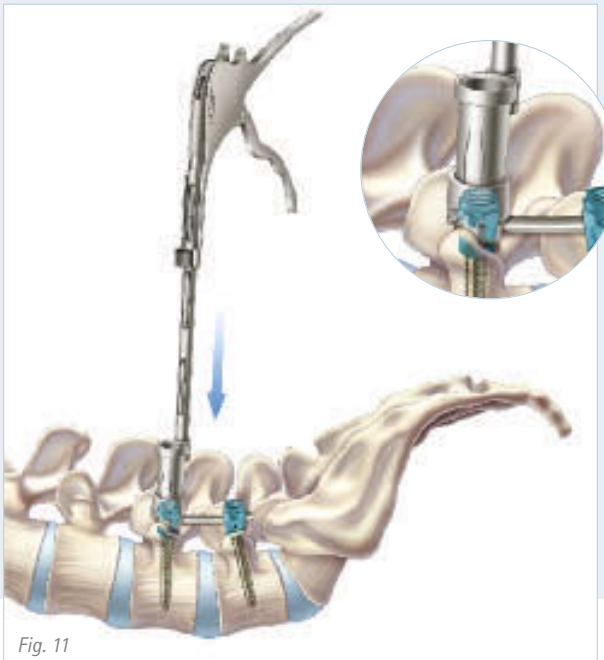

Fig. 11

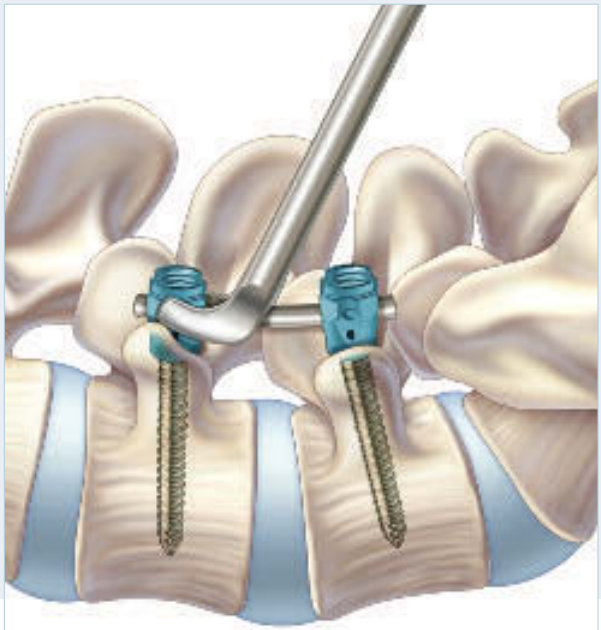

Fig. 12

B.5. Rod Reduction

a) Reduction by Rod Persuader

- Place the rod persuader (FW285R) over the implant head and ensure the tip of the persuader is fully engaged to the head of the implant. (Fig. 11)
- Squeeze the handle of the persuader to seat the rod into the head of the pedicle screw.

b) Reduction by a Fork Rocker

For minor vertical adjustments to seat the rod into the pedicle screw body, the straight or curved fork rockers (FW288R or FW289R) may be used.

- Align the pins in the fork rocker with the line on the pedicle screw body, and fit into the under cut grooves on the medial and lateral edges. (Fig. 12)

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B.6.

Fig. 13

Fig. 14

Reduction by a Fork Rocker (continued)

- Push down on the handle of the fork rocker to lever the rod into the screw head. (Fig. 13)
- If necessary, the rod pusher (FW513R) can be used to push the rod into position.

B.6. Set Screw Application

Insert the dual ended or handled set screw starter (FW279R or FW251R) firmly into the set screw and remove the set screw from the caddy. (Fig. 14)

Note:
The set screw must be fully engaged to the set screw starter.

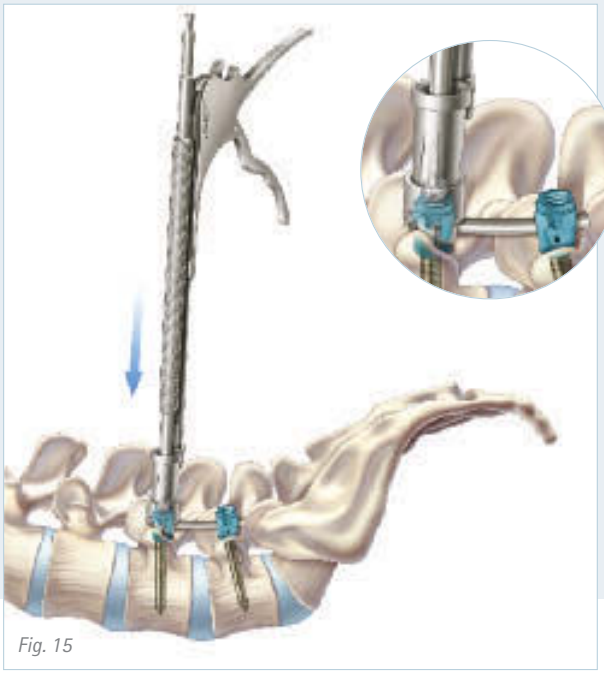

Fig. 15

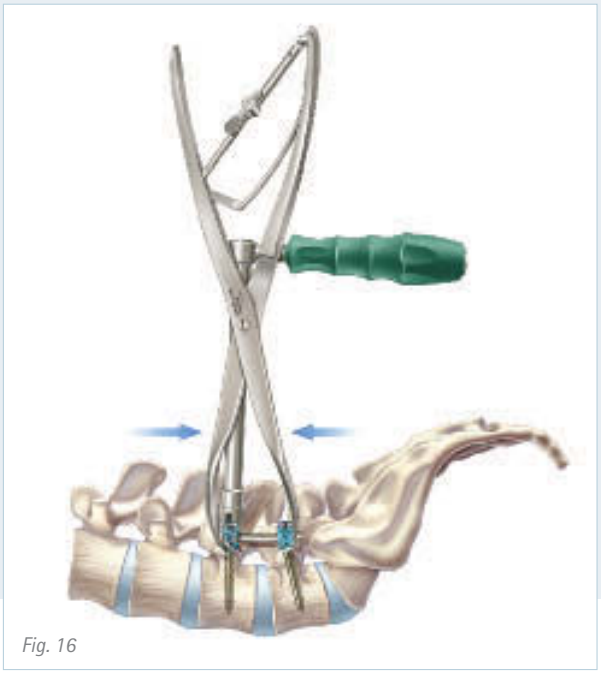

Fig. 16

Finger tighten the set screw into the screw body until it contacts the rod. (Fig. 15)

Caution:
The set screw starter 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.

B.7. Compression Maneuver

Use the compression forceps (FW282R) to compress the construct. (Fig. 16)

- Fully tighten one set screw to create a fixed point for compression.
- Fully seat the counter torque L-handle (FW283R) or the derotation sleeves (FW287R) on the unlocked screw body and perform the compression maneuver.
- Once the desired compression is achieved, fully tighten the remaining set screw.

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B.8.

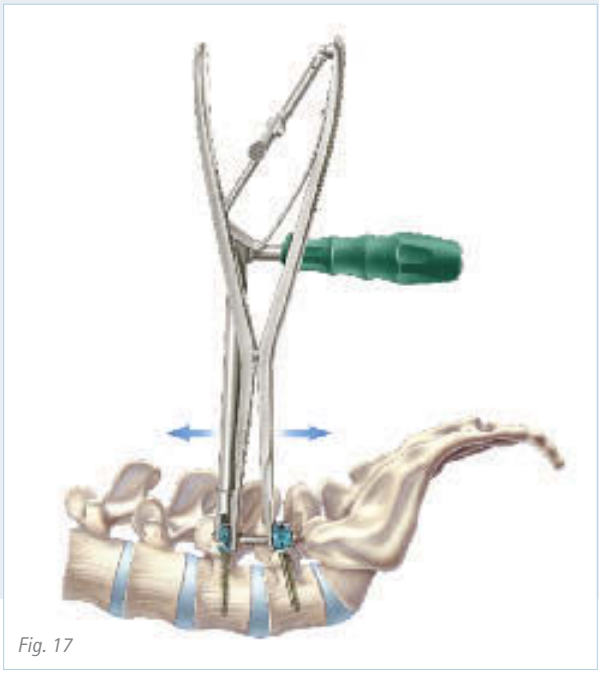

Fig. 17

B.8. Distraction Maneuver

Use the distraction forceps (FW281R) to distract the construct. (Fig. 17)

- Fully tighten one set screw to create a fixed point for distraction.
- Fully seat the counter torque L-handle (FW283R) or the derotation sleeves (FW287R) on the unlocked screw body and perform the distraction maneuver.
- Once the desired distraction is achieved, fully tighten the remaining set screw.

B.9.

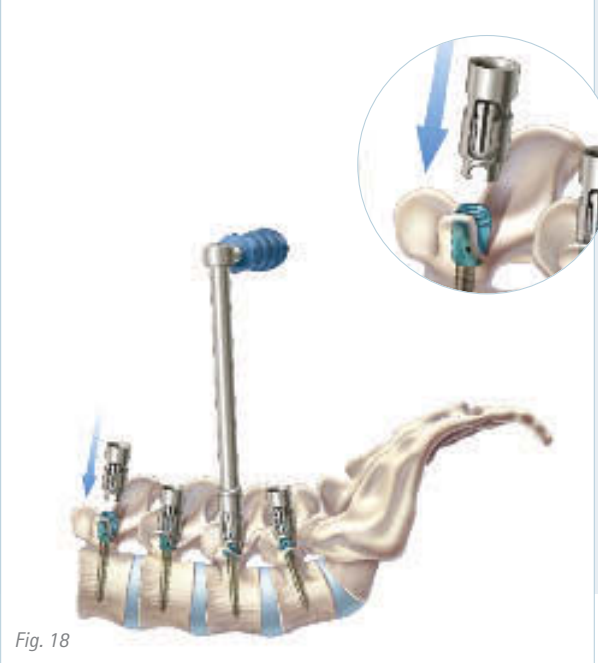

Fig. 18

B.9. Derotation Maneuver

Use the derotation sleeves (FW287R) and the counter torque L-handle (FW283R) to rotate the rod. (Fig. 18)

- Place the derotation sleeves over the pedicle screws that contain the rod to be rotated.
- Connect the counter torque L-handle to one of the derotation sleeves to perform the rotation maneuver.
- Once the desired rotation is achieved, fully tighten the set screws.

Caution:
The derotation sleeves should be used during rotation maneuvers to prevent splaying of the screw head.

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B.10.

Fig. 19

B.10. Final Tightening

Final tightening of each set screw is completed using the torque wrench (FW170R) along with the counter torque L-handle (FW283R). (Fig. 19)

- Insert the torque wrench through the tube of the counter torque so the tip is exposed.
- Fully seat the tip of the torque wrench into the socket of the set screw.
- Engage the counter torque tip with the rod
- Turn the torque wrench (FW170R) in a clockwise direction while firmly holding the counter torque.
- If using the line-to-line torque wrench (FW170R), turn the wrench in the clockwise direction until the arrows on the torque wrench line up with each other.

Caution:
Over tightening the set screw more than the specified setting of 10 Nm (90 in/lbs) could lead to implant failure. Damaged set screws must be replaced.

- Use the set screw revision screwdriver with the 4 mm hex tip (FW193R) to remove a previously tightened set screw if necessary.

Warning:
Do not use the torque wrench without the counter torque L-handle. This could lead to thread jumping of the set screw within the screw body and, as a consequence to rod loosening.

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ADDENDUM: Cross Connector Application

C.1.

Fig. 20

Fig. 21

C.1. Cross Connector Application

In the event that additional rotational stability of the construct is required, a cross connector may be used.

- Determine the appropriate size using the cross connector sizing template (FW202R).
- Verify there are no obstructions, then insert the cross connector. (Fig. 20)
- 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 screw using the cross connector torque wrench (FW207R) and the cross connector counter torque (FW204R). (Fig. 21)

If necessary, the optional "bar" style adjustable cross can be used.

- The bar style adjustable cross connectors can be contoured using the cross connector bender (FW203R).
- Place the cross connector face-up in the bender and apply the necessary force required to achieve appropriate angle. The maximum angle allowed by the cross connector is 20°.

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ADDENDUM: Rod-to-rod Connector Application

D.1.

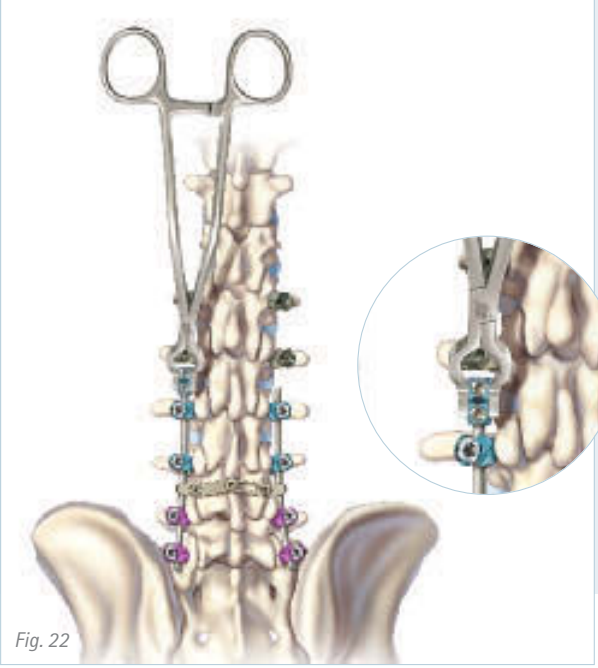

Fig. 22

Fig. 23

A rod-to-rod connector may be used to extend an existing construct in the event of a revision surgery or for a new multi-level construct or to connect to an offset screw.

D.1. Axial Rod-to-rod Connector Application

- To place the axial rod-to-rod connector, first determine required length (short or long).
- Use the rod-to-rod connector inserter (FW493R) to grab the connector and fully seat the rods inside the connector and confirm adequate rod placement using the provided window on the connector. (Fig. 22)
- Final tighten by applying 4 Nm (36 in/lbs) of torque using the torque wrench screwdriver (FW207R) and the rod-to-rod connector counter torque device (FW495R). (Fig. 23)

D.2.

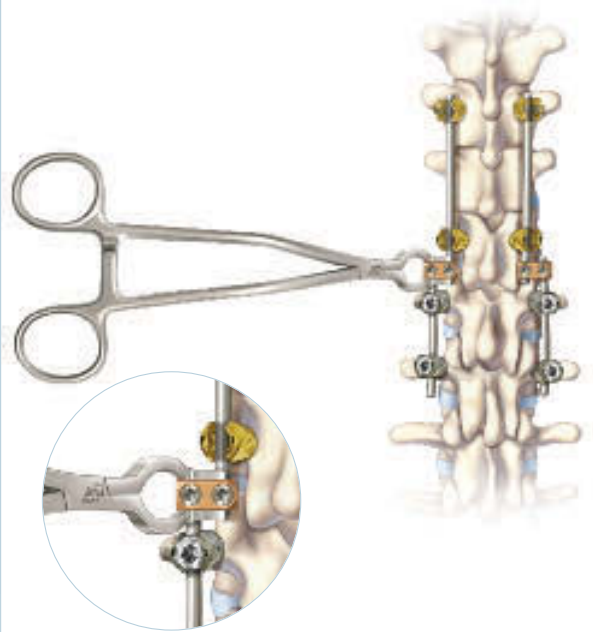

Fig. 24

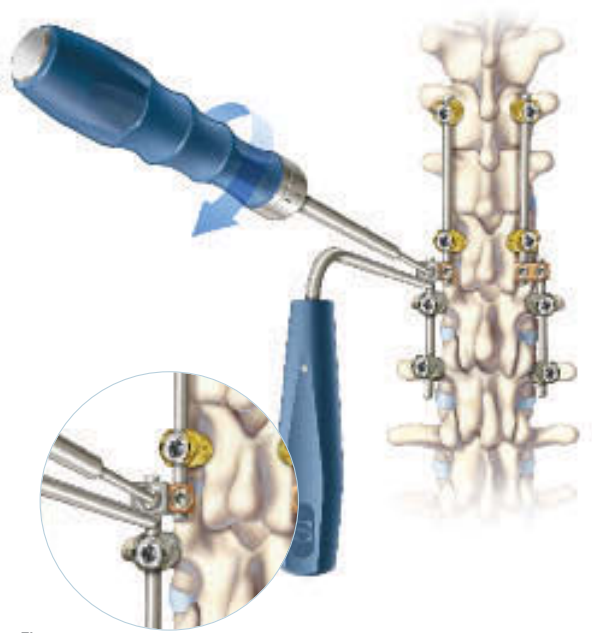

Fig. 25

D.2. Domino Rod-to-rod Connector Application

- To place the domino rod-to-rod connector, first determine required length (7 mm or 11 mm) and desired connector type (open/closed or closed)
- For open/closed style, use the rod-to-rod connector inserter (FW493R) to grab the connector and slide a rod into the closed hole and then connect to the other rod using the open hole. (Fig. 24)
- For closed style, use the inserter to grab the connector and slide both rods into the closed holes prior to placing the rods into the pedicle screw tulip heads.
- Final tighten by applying 4 Nm (36 in/lbs) of torque using the torque wrench screwdriver (FW207R) and rod-to-rod connector counter torque device (FW495R). (Fig. 25)

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ADDENDUM: Rod-to-rod Connector Application

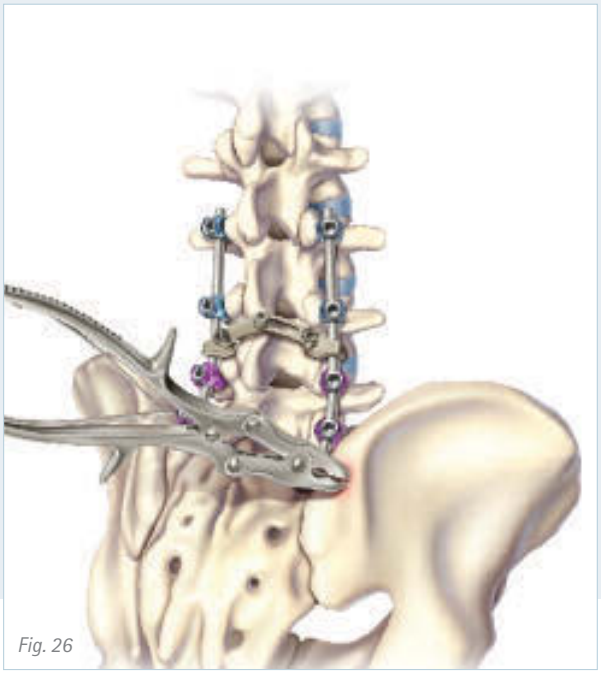

Fig. 26

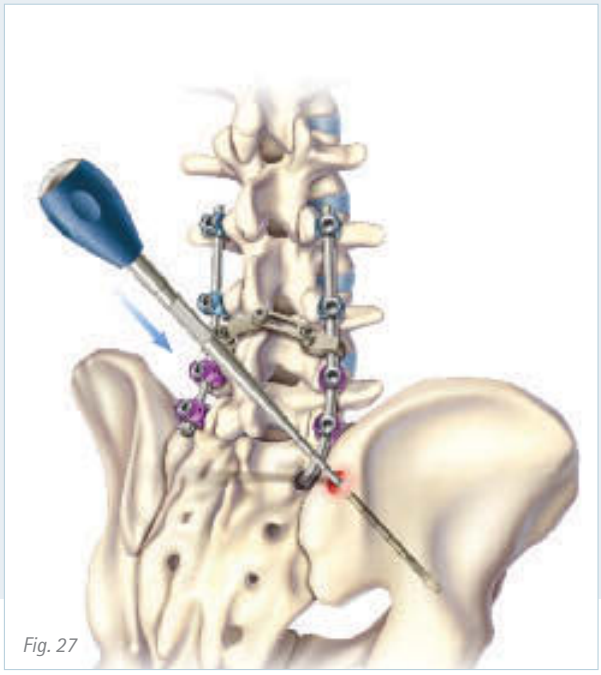

Fig. 27

D.3. Pelvic Screw & Lateral Offset Connector Application

The posterior part of the Iliac crest needs to be exposed for pelvic screw placement. Approximately 1.0 to 2.0 centimeters up from the tip of the spine is an ideal starting point.

- Use a rongeur to make a notch in the crest of sufficient length and depth for the head of the iliac screw. (Fig. 26)
- Perforate the ilium using a straight or curved extended length bone probe (FW476R or FW477R) or straight or curved extended length thoracic probe (FW474R or FW475R). (Fig. 27)

D.3.

Fig. 28

Fig. 29

- Utilize the straight or curved (FW146R or FW147R) pedicle sounder to confirm the patency of the ilium canal. Stop every few centimeters during perforation to check integrity of the canal. (Fig. 28)
- Tap canal and identify depth with the desired 7.0 mm extended screw tap (FW497R) or 8.0 mm extended screw tap (FW498R), and choose screw length. (Fig. 29)

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ADDENDUM: Rod-to-rod Connector Application

Fig. 30

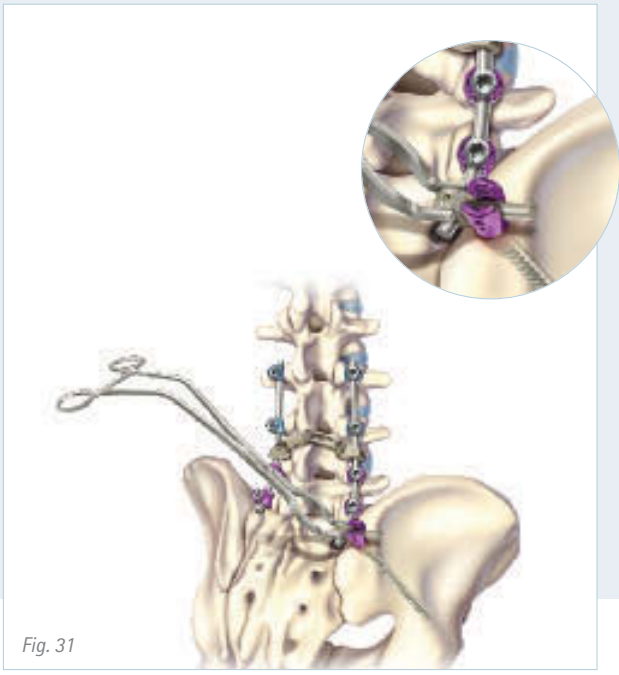

Fig. 31

- Attach desired handle to polyaxial screwdriver (FW277R) and thread the screw into the ilium. (Fig. 30)
- Determine offset distance between the pelvic screw and the rod from the main construct and choose desired lateral offset connector type (open/closed or closed).
- Use the rod-to-rod connector inserter (FW493R) to grab the lateral offset connector and attach it to the rod from the main construct. (Fig. 31)

D.3.

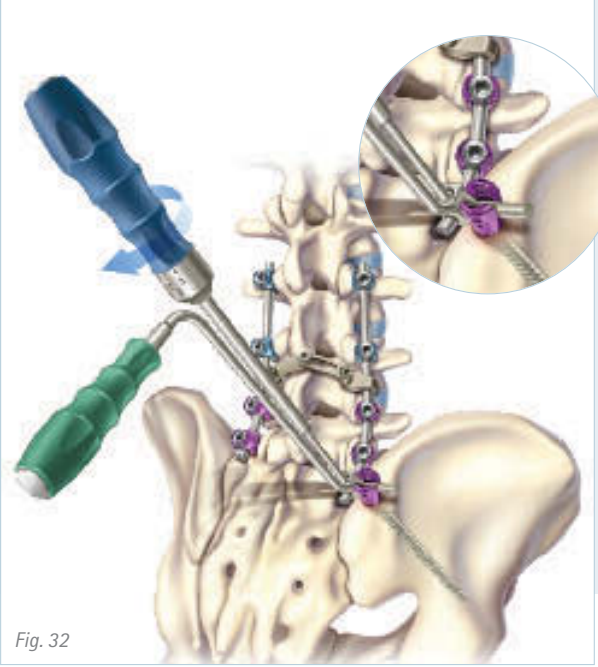

Fig. 32

Fig. 33

- Final tighten by applying 4 Nm (36 in/lbs) of torque using the torque wrench screwdriver (FW207R) and rod-to-rod connector counter torque device (FW495R). (Fig. 32)
- After connecting the lateral offset connector to the rod from the main construct, a rocker or rod persuader may be used to fully seat the connector rod into the pelvic screw's tulip head.

Note:
For sacropelvic fixation, it is recommended to place a screw in the sacrum, which is attached to the spinal rod, above or below the attachment of the lateral offset rod connector to the rod.

- Start the set screw on the pelvic screw and finger tighten the set screw. (Fig. 33)

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ADDENDUM: Rod-to-rod Connector Application

D.3.

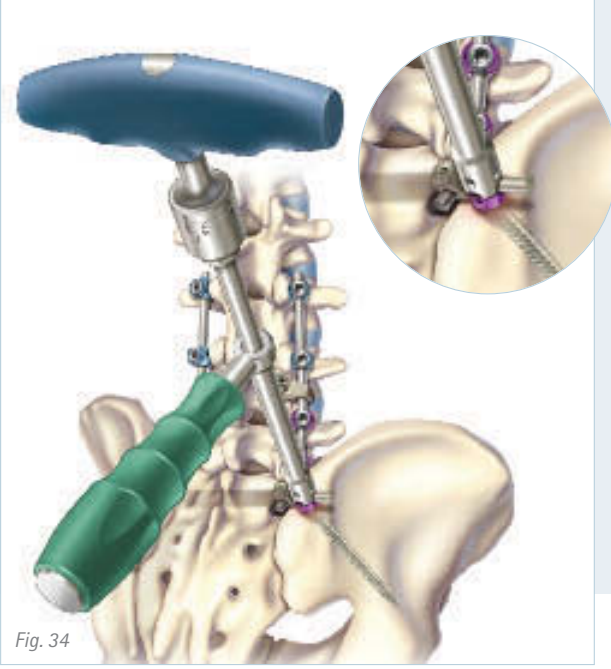


Fig. 34

- Final tightening of the set screw by using the clicking torque handle or the line-to-line torque wrench along with the counter torque L-handle (as described in section 10). (Fig. 34)

Note:
For removal of rod connector, use connector revision screwdriver (FW491R). To remove pedicle screw, first use set screw revision screwdriver (FW193R) to disengage set screw and use screwdriver with shank tip (FW174R) to remove the polyaxial screw.

S4® Element

Implant Options

Implants – Overview


ø 4.5 mm

	S4® Element Polyaxial Screws	
ST240T	**S4® Element Polyaxial screw, ø 4.5 mm**	4.5 x 25 mm
ST241T	S4® Element Polyaxial screw	4.5 x 30 mm
ST242T	S4® Element Polyaxial screw	4.5 x 35 mm
ST243T	S4® Element Polyaxial screw	4.5 x 40 mm
ST244T	S4® Element Polyaxial screw	4.5 x 45 mm
ST245T	S4® Element Polyaxial screw	4.5 x 50 mm


ø 5.0 mm

ST250T	**S4® Element Polyaxial screw, ø 5.0 mm**	5.0 x 25 mm
ST251T	S4® Element Polyaxial screw	5.0 x 30 mm
ST252T	S4® Element Polyaxial screw	5.0 x 35 mm
ST253T	S4® Element Polyaxial screw	5.0 x 40 mm
ST254T	S4® Element Polyaxial screw	5.0 x 45 mm
ST255T	S4® Element Polyaxial screw	5.0 x 50 mm


ø 6.0 mm

ST260T	**S4® Element Polyaxial screw, ø 6.0 mm**	6.0 x 25 mm
ST261T	S4® Element Polyaxial screw	6.0 x 30 mm
ST262T	S4® Element Polyaxial screw	6.0 x 35 mm
ST263T	S4® Element Polyaxial screw	6.0 x 40 mm
ST264T	S4® Element Polyaxial screw	6.0 x 45 mm
ST265T	S4® Element Polyaxial screw	6.0 x 50 mm
ST266T	S4® Element Polyaxial screw	6.0 x 55 mm
ST267T	S4® Element Polyaxial screw	6.0 x 60 mm


ø 7.0 mm

ST270T	**S4® Element Polyaxial screw, ø 7.0 mm**	7.0 x 25 mm
ST271T	S4® Element Polyaxial screw	7.0 x 30 mm
ST272T	S4® Element Polyaxial screw	7.0 x 35 mm
ST273T	S4® Element Polyaxial screw	7.0 x 40 mm
ST274T	S4® Element Polyaxial screw	7.0 x 45 mm
ST275T	S4® Element Polyaxial screw	7.0 x 50 mm
ST276T	S4® Element Polyaxial screw	7.0 x 55 mm
ST277T	S4® Element Polyaxial screw	7.0 x 60 mm
ST230T	S4® Element Polyaxial screw	7.0 x 70 mm
ST231T	S4® Element Polyaxial screw	7.0 x 80 mm
ST232T	S4® Element Polyaxial screw	7.0 x 90 mm
ST233T	S4® Element Polyaxial screw	7.0 x 100 mm
ST234T	S4® Element Polyaxial screw	7.0 x 110 mm

Implants – Overview

ø 8.0 mm

S4® Element Polyaxial Screws		
ST281T	**S4® Element Polyaxial screw, ø 8.0 mm**	8.0 x 30 mm
ST282T	S4® Element Polyaxial screw	8.0 x 35 mm
ST283T	S4® Element Polyaxial screw	8.0 x 40 mm
ST284T	S4® Element Polyaxial screw	8.0 x 45 mm
ST285T	S4® Element Polyaxial screw	8.0 x 50 mm
ST286T	S4® Element Polyaxial screw	8.0 x 55 mm
ST287T	S4® Element Polyaxial screw	8.0 x 60 mm
ST235T	S4® Element Polyaxial screw	8.0 x 70 mm
ST236T	S4® Element Polyaxial screw	8.0 x 80 mm
ST237T	S4® Element Polyaxial screw	8.0 x 90 mm
ST238T	S4® Element Polyaxial screw	8.0 x 100 mm
ST239T	S4® Element Polyaxial screw	8.0 x 110 mm

ø 9.0 mm

ST291T	**S4® Element Polyaxial screw, ø 9.0 mm**	9.0 x 30 mm
ST292T	S4® Element Polyaxial screw	9.0 x 35 mm
ST293T	S4® Element Polyaxial screw	9.0 x 40 mm
ST294T	S4® Element Polyaxial screw	9.0 x 45 mm
ST295T	S4® Element Polyaxial screw	9.0 x 50 mm
ST296T	S4® Element Polyaxial screw	9.0 x 55 mm
ST297T	S4® Element Polyaxial screw	9.0 x 60 mm

ø 10.0 mm

ST301T	**S4® Element Polyaxial screw, ø 10.0 mm**	10.0 x 25 mm
ST302T	S4® Element Polyaxial screw	10.0 x 30 mm
ST303T	S4® Element Polyaxial screw	10.0 x 35 mm
ST304T	S4® Element Polyaxial screw	10.0 x 40 mm
ST305T	S4® Element Polyaxial screw	10.0 x 45 mm
ST306T	S4® Element Polyaxial screw	10.0 x 50 mm
ST307T	S4® Element Polyaxial screw	10.0 x 55 mm

S4® Element

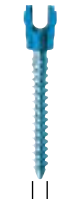
Implant Options

Implants – Overview


ø 4.5 mm


ø 5.0 mm


ø 6.0 mm


ø 7.0 mm

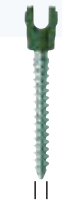
	S4® Element Monoaxial Screws	
ST340T	**S4® Element Monoaxial screw, ø 4.5 mm**	4.5 x 25 mm
ST341T	S4® Element Monoaxial screw	4.5 x 30 mm
ST342T	S4® Element Monoaxial screw	4.5 x 35 mm
ST343T	S4® Element Monoaxial screw	4.5 x 40 mm
ST344T	S4® Element Monoaxial screw	4.5 x 45 mm
ST345T	S4® Element Monoaxial screw	4.5 x 50 mm
ST350T	**S4® Element Monoaxial screw, ø 5.0 mm**	5.0 x 25 mm
ST351T	S4® Element Monoaxial screw	5.0 x 30 mm
ST352T	S4® Element Monoaxial screw	5.0 x 35 mm
ST353T	S4® Element Monoaxial screw	5.0 x 40 mm
ST354T	S4® Element Monoaxial screw	5.0 x 45 mm
ST355T	S4® Element Monoaxial screw	5.0 x 50 mm
ST360T	**S4® Element Monoaxial screw, ø 6.0 mm**	6.0 x 25 mm
ST361T	S4® Element Monoaxial screw	6.0 x 30 mm
ST362T	S4® Element Monoaxial screw	6.0 x 35 mm
ST363T	S4® Element Monoaxial screw	6.0 x 40 mm
ST364T	S4® Element Monoaxial screw	6.0 x 45 mm
ST365T	S4® Element Monoaxial screw	6.0 x 50 mm
ST366T	S4® Element Monoaxial screw	6.0 x 55 mm
ST367T	S4® Element Monoaxial screw	6.0 x 60 mm
ST370T	**S4® Element Monoaxial screw, ø 7.0 mm**	7.0 x 25 mm
ST371T	S4® Element Monoaxial screw	7.0 x 30 mm
ST372T	S4® Element Monoaxial screw	7.0 x 35 mm
ST373T	S4® Element Monoaxial screw	7.0 x 40 mm
ST374T	S4® Element Monoaxial screw	7.0 x 45 mm
ST375T	S4® Element Monoaxial screw	7.0 x 50 mm
ST376T	S4® Element Monoaxial screw	7.0 x 55 mm
ST377T	S4® Element Monoaxial screw	7.0 x 60 mm
ST330T	S4® Element Monoaxial screw	7.0 x 70 mm
ST331T	S4® Element Monoaxial screw	7.0 x 80 mm
ST332T	S4® Element Monoaxial screw	7.0 x 90 mm
ST333T	S4® Element Monoaxial screw	7.0 x 100 mm
ST334T	S4® Element Monoaxial screw	7.0 x 110 mm

Implants – Overview

S4® Element Monoaxial Screws

ø 8.0 mm

ST381T	**S4® Element Monoaxial screw, ø 8.0 mm**	8.0 x 30 mm
ST382T	S4® Element Monoaxial screw	8.0 x 35 mm
ST383T	S4® Element Monoaxial screw	8.0 x 40 mm
ST384T	S4® Element Monoaxial screw	8.0 x 45 mm
ST385T	S4® Element Monoaxial screw	8.0 x 50 mm
ST386T	S4® Element Monoaxial screw	8.0 x 55 mm
ST387T	S4® Element Monoaxial screw	8.0 x 60 mm
ST335T	S4® Element Monoaxial screw	8.0 x 70 mm
ST336T	S4® Element Monoaxial screw	8.0 x 80 mm
ST337T	S4® Element Monoaxial screw	8.0 x 90 mm
ST338T	S4® Element Monoaxial screw	8.0 x 100 mm
ST339T	S4® Element Monoaxial screw	8.0 x 110 mm



ø 9.0 mm

ST391T	**S4® Element Monoaxial screw, ø 9.0 mm**	9.0 x 30 mm
ST392T	S4® Element Monoaxial screw	9.0 x 35 mm
ST393T	S4® Element Monoaxial screw	9.0 x 40 mm
ST394T	S4® Element Monoaxial screw	9.0 x 45 mm
ST395T	S4® Element Monoaxial screw	9.0 x 50 mm
ST396T	S4® Element Monoaxial screw	9.0 x 55 mm
ST397T	S4® Element Monoaxial screw	9.0 x 60 mm

ø 10.0 mm

ST401T	**S4® Element Monoaxial screw, ø 10.0 mm**	10.0 x 30 mm
ST402T	S4® Element Monoaxial screw	10.0 x 35 mm
ST403T	S4® Element Monoaxial screw	10.0 x 40 mm
ST404T	S4® Element Monoaxial screw	10.0 x 45 mm
ST405T	S4® Element Monoaxial screw	10.0 x 50 mm
ST406T	S4® Element Monoaxial screw	10.0 x 55 mm
ST407T	S4® Element Monoaxial screw	10.0 x 60 mm

S4® Element

Implant Options

Implants – Overview

Pre-bent Rods, ø 5.5 mm		
SW653T	S4® Pre-bent rod	5.5 x 30 mm
SW654T	S4® Pre-bent rod	5.5 x 35 mm
SW655T	S4® Pre-bent rod	5.5 x 40 mm
SW656T	S4® Pre-bent rod	5.5 x 45 mm
SW657T	S4® Pre-bent rod	5.5 x 50 mm
SW658T	S4® Pre-bent rod	5.5 x 55 mm
SW659T	S4® Pre-bent rod	5.5 x 60 mm
SW661T	S4® Pre-bent rod	5.5 x 70 mm
SW662T	S4® Pre-bent rod	5.5 x 80 mm
SW663T	S4® Pre-bent rod	5.5 x 90 mm
SW684T	S4® Pre-bent rod	5.5 x 100 mm

Straight Rods, ø 5.5 mm		
SW674T	S4® Straight rod	5.5 x 35 mm
SW675T	S4® Straight rod	5.5 x 40 mm
SW676T	S4® Straight rod	5.5 x 45 mm
SW677T	S4® Straight rod	5.5 x 50 mm
SW678T	S4® Straight rod	5.5 x 55 mm
SW679T	S4® Straight rod	5.5 x 60 mm
SW681T	S4® Straight rod	5.5 x 70 mm
SW682T	S4® Straight rod	5.5 x 80 mm
SW664T	S4® Straight rod	5.5 x 100 mm
SW666T	S4® Straight rod	5.5 x 120 mm
SW667T	S4® Straight rod	5.5 x 150 mm
SW668T	S4® Straight rod	5.5 x 180 mm
SW669T	S4® Straight rod	5.5 x 200 mm
SW670T	S4® Straight rod	5.5 x 300 mm
SW671T	S4® Straight rod	5.5 x 400 mm
SW672T	S4® Straight rod	5.5 x 500 mm

Adjustable Cross Connectors		
SW488T	S4® Cross connectors	35-36 mm adjustable
SW489T	S4® Cross connectors	36-38 mm adjustable
SW494T	S4® Cross connectors	38-42 mm adjustable
SW495T	S4® Cross connectors	42-50 mm adjustable
SW496T	S4® Cross connectors	50-60 mm adjustable
SW497T	S4® Cross connectors	60-77 mm adjustable
SW498T	S4® Cross connectors	77-107 mm adjustable
SW697T	S4® Cross connectors	43-49 mm adjustable
SW698T	S4® Cross connectors	49-60 mm adjustable
SW699T	S4® Cross connectors	60-75 mm adjustable

Rigid Cross Connectors

SW490T	S4® Cross connectors	28 mm straight
SW491T	S4® Cross connectors	30 mm straight
SW492T	S4® Cross connectors	32 mm straight
SW493T	S4® Cross connectors	34 mm straight
SW690T	S4® Cross connectors	21 mm straight
SW691T	S4® Cross connectors	25 mm straight
SW695T	S4® Cross connectors	38 mm straight
SW696T	S4® Cross connectors	41 mm straight

Set Screw

SW790T	S4® Set Screw for monoaxial- / polyaxial screws 35-36 mm adjustable	

Rod-to-rod Connectors

(All rod-to-rod connectors available as both non-sterile and sterile packed implants. Sterile packed article nr. SW838TS-SW871TS)

SW842T	Closed Domino Connector	7 mm
SW844T	Closed Domino Connector	11 mm

SW841T	Closed/Open Domino Connector	7 mm
SW843T	Closed/Open Domino Connector	11 mm

SW838T	Axial Connector	Short

SW839T	Axial Connector	Long

SW847T	Closed Lateral Offset Connector	20 mm
SW849T	Closed Lateral Offset Connector	35 mm
SW872T	Closed Lateral Offset Connector	50 mm

SW846T	Open Lateral Offset Connector	20 mm
SW848T	Open Lateral Offset Connector	35 mm
SW871T	Open Lateral Offset Connector	50 mm

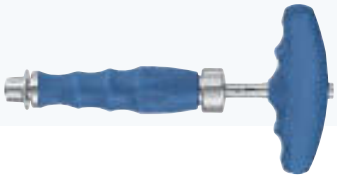
S4® Element

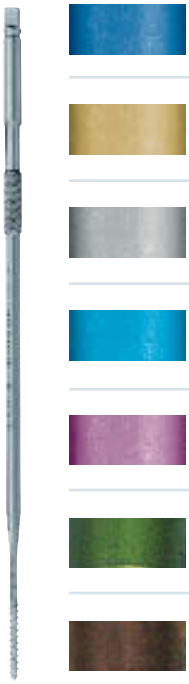
Instruments

Instrument Overview

Bone Awl	Item No.	Description
	FW190R	Bone Awl
Probes	**Item No.**	**Description**
	FW188R	Straight Pedicle Probe
	FW189R	Curved Pedicle Probe
	FW248R	Straight Lenke Probe
	FW249R	Curved Lenke Probe
Sounders	**Item No.**	**Description**
	FW146R	Straight Pedicle Sounder
	FW147R	Curved Pedicle Sounder
Markers	**Item No.**	**Description**
	FW191R	Single Band Pedicle Marker
	FW192R	Dual Band Pedicle Marker

Instrument Overview

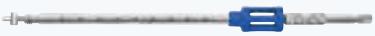
Handles	Item No.	Description
	FW165R	Ratchet Straight Handle
	FW167R	Ratchet T-Handle
	FW730R	S4® Element Speed Multiplier Handle 1:2

Screw Taps	Item No.	Description
	FW194R	Screw Tap, 4.5 mm
	FW195R	Screw Tap, 5.0 mm
	FW196R	Screw Tap, 6.0 mm
	FW197R	Screw Tap, 7.0 mm
	FW198R	Screw Tap, 8.0 mm
	FW356R	Screw Tap, 9.0 mm
	FW357R	Screw Tap, 10.0 mm

S4® Element

Instruments

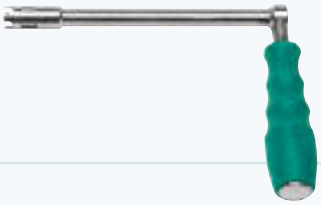
Instrument Overview

Screwdrivers	Item No.	Description
	FW277R	S4® Element Polyaxial Screw Driver
	FW276R	S4® Element Monoaxial Screw Driver
	FW278R	Screw Body Manipulator
	FW174R	Removal Screwdriver with Shank Tip
	FW193R	Set Screw Revision Screwdriver

Screw Starters	Item No.	Description
	FW279R	Dual Ended Set Screw Starter
	FW251R	Handled Set Screw Starter

Rod Persuader	Item No.	Description
	FW285R	S4® Element Rod Persuader
	FW485R	S4® Element Detachable Rod Persuader
	FW288R	S4® Element Fork Rocker Straight
	FW289R	S4® Element Fork Rocker Curved

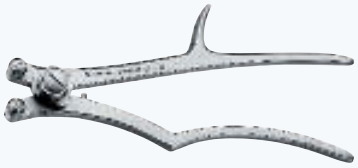
Instrument Overview

Torque Wrenches	Item No.	Description
	FW283R	Counter Torque L-Handle
	FW170R	Line-to-Line Torque Wrench
Lever	**Item No.**	**Description**
	FW154R	Marnay Lever
Rod Trial	**Item No.**	**Description**
	FW185R	Flexible Rod Trial

S4® Element

Instruments

Instrument Overview

Rod Bender	Item No.	Description
	FW024R	French Rod Bender
Holding Forceps	**Item No.**	**Description**
	FW012R	Rod Holding Forceps
Rod Pusher	**Item No.**	**Description**
	FW513R	Rod Pusher
Compression Forceps	**Item No.**	**Description**
	FW282R	Compression Forceps Derotation Sleeve
Derotation Sleeve	**Item No.**	**Description**
	FW287R	Derotation Sleeve

Instrument Overview

Connector Instruments	Item No.	Description
	FW493R	Rod-to-rod Connector Inserter
	FW495R	Rod-to-rod Connector Counter-torque

Screw Taps & Bone Probes	Item No.	Description
	FW497R	Extended Length Screw Tap, 7.0 mm
	FW498R	Extended Length Screw Tap, 8.0 mm
	FW474R	Extended Length Lenke Probe, Straight
	FW475R	Extended Length Lenke Probe, Curved
	FW476R	Extended Length Bone Probe, Straight
	FW477R	Extended Length Bone Probe, Curved

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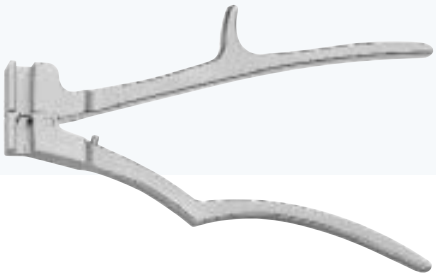
Instruments

Instrument Overview

Cross Connector Instruments	Item No.	Description
	FW202R	Cross Connector Sizing Template
	FW203R	Cross Connector Bender
	FW204R	Cross Connector Counter Torque
	FW207R	Cross Connector Torque Wrench, 4 Nm

Notes

Aesculap AG | Am Aesculap-Platz | 78532 Tuttlingen | Germany
Phone +49 7461 95-0 | Fax +49 7461 95-26 00 | www.aesculap.com

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