B BRAUN
SHARING EXPERTISE

# AESCULAP® S4® Element MIS

## Modular Open Pedicle Screw System

Surgical Manual

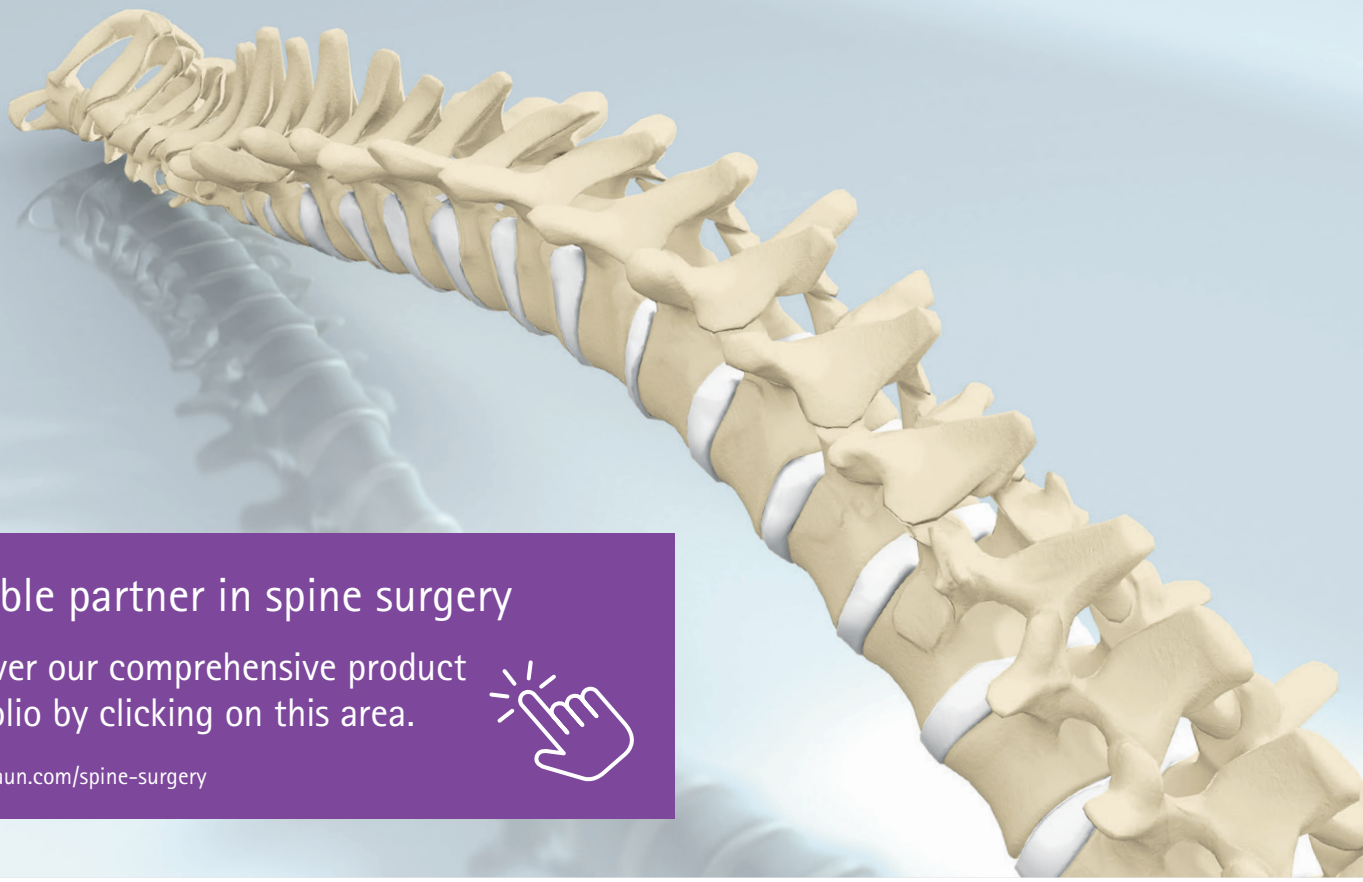
# AESCULAP® S4® Element MIS

## Content

## Protecting and preserving spinal stability

Modern life style has resulted in increasing physical inactivity among people all over the world. Of the many medical problems associated with this, spinal disorders are among the most critical. This is even more significant as the spinal column is one of the most important structures in the human body. It supports and stabilizes the upper body and is the center of our musculoskeletal system, which gives the body movement.

Our work in the field of degenerative spinal disorders is dedicated to protecting the spinal column and preserving its stability. We support spine surgeons with durable, reliable products and partner services for safe procedures and outstanding clinical outcomes.[1-6] Our philosophy of sharing expertise with healthcare professionals and patients allows us to develop innovative implant and instrument systems that help to preserve stability and stabilize the cervical and thoracolumbar spine.



# AESCULAP® S4® Element MIS

## A | System Overview

## Product advantages

## Whatever your MIS need is,

- Simple approach to MIS procedures
- Easy transition from open to MIS surgery

## S4® Element takes you there.

S4® Element MIS is a percutaneous spinal system based on AESCULAP®'s already successful S4® Element spinal system. Basing the design of the S4® Element MIS implants on the S4® Element open implants aims to provide a minimal learning curve and easier transition to MIS.

# AESCULAP® S4® Element MIS

## A | System Overview

# Design Advantages

**The design advantages of the S4® Element MIS are the results of long-term experience with the S4® Element pedicle screw system and over 30 years of innovation in spine technology.**

### Minimal Surgical Conversion Risk

Rescue technique and instrumentation design aim to reduce risk of converting from MIS to an open procedure.

### Operational Simplicity

S4® Element MIS offers streamlined instrumentation to facilitate efficiency in the OR workflow.

### Slim Profile Technology

In comparison to S4® MIS. No need for outer sleeve. Designed to allow smaller incisions and easy instrument manipulation in tight anatomical spaces, while the low profile screw reduces anatomical impingement.

MIS

# AESCULAP® S4® Element MIS

## B | Surgical Technique

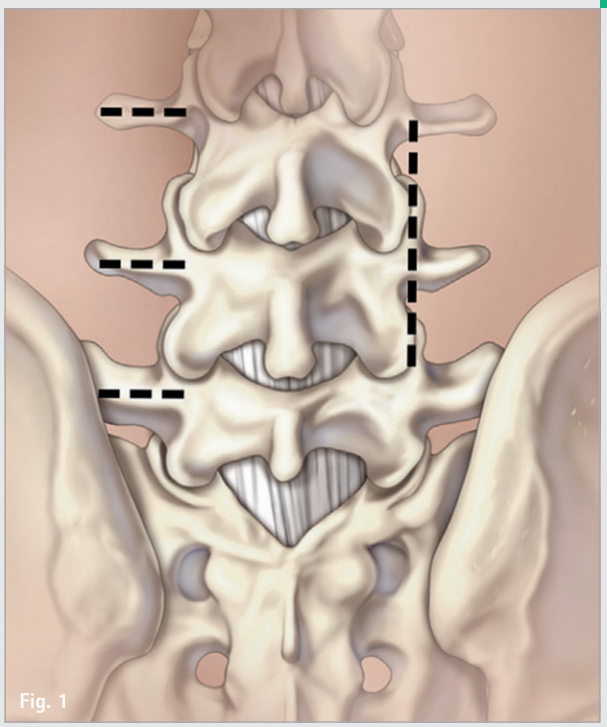


Fig. 1

### B.1. Patient Positioning, Monitoring and Incision

- Position the patient on a radiolucent OR table in prone position. The OR table should have enough clearance for a fluoroscopic C-arm to rotate freely.
- Locate the pedicles of interest through A/P and lateral X-ray and mark appropriate incision areas on skin.
- On the ipsilateral side, make an incision of at least 17 mm at the location where each pedicle screw will be placed.
- Ensure the incision is located to allow proper trajectory for percutaneous pedicle screw insertion.
- Ensure the fascia is cut to the same length.
- On the contralateral side, the mini-open TLIF technique (MOTLIF) can be used to adequately decompress and insert TLIF interbody to augment the percutaneous side.

Fig. 2

## B.2. Pedicle Preparation

- After determination of the screw entry point the guiding instrument consisting of trocar FW271M and K-Wire aiming device FW258M 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.

Fig. 3

**Note:**

- Alternatively a Jamshidi Needle can be used instead of Trocar FW271M and K-Wire Aiming Device FW258M.
- The trocar FW271M is removed while the K-Wire aiming device FW258M remains in position.

**Caution:**

- Use fluoroscopy to monitor position of the trocar during insertion.
- Avoid inserting the needle too deep into the vertebral body as there is danger of perforating the large vessels!

# AESCULAP® S4® Element MIS

## B | Surgical Technique

Fig. 4

### B.3. K-Wire Insertion

- The laser etchings on the K-Wire need to be placed away from the patient. Monitor the K-Wire tip to ensure it does not penetrate the anterior wall of the vertebral body.
- Repeat the steps for each K-Wire to be placed.
- The K-Wire FW758S is now introduced through the K-Wire aiming device.

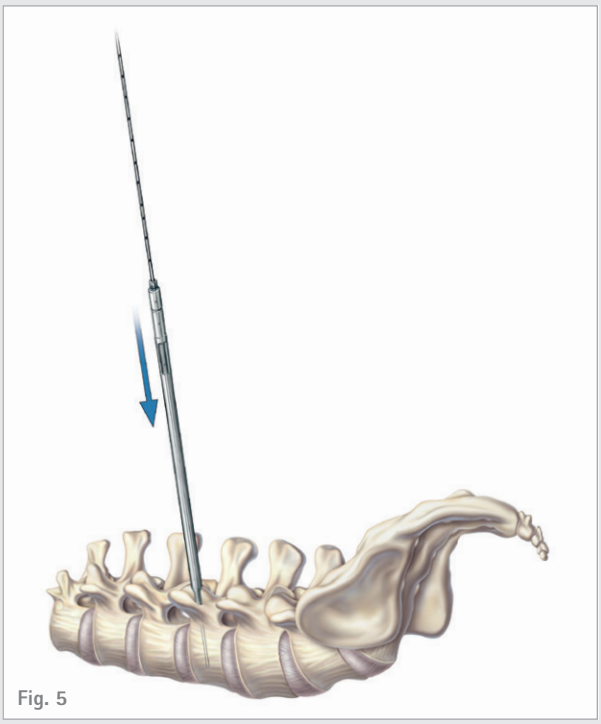


Fig. 5

**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 perforating the large vessels!

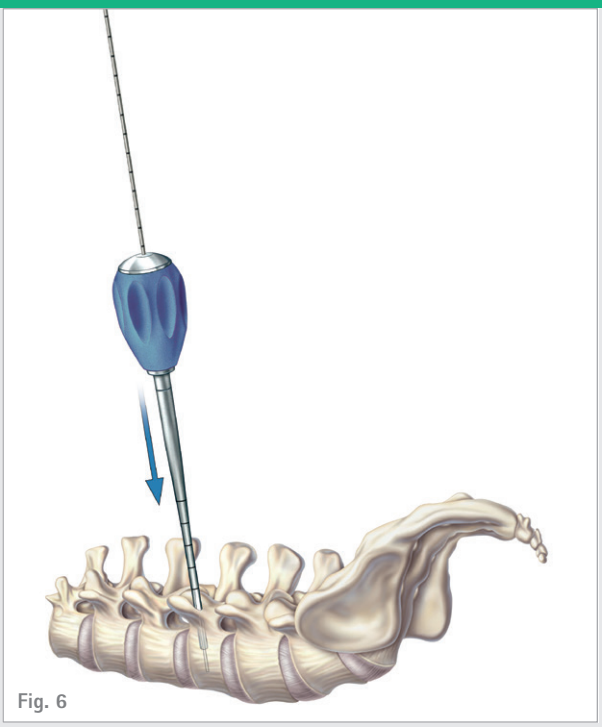


Fig. 6

## B.4. Bone Probing

- If additional bone probing is preferred, the straight cannulated bone probe (SZ376R alternative FW263R) can be used.

# AESCULAP® S4® Element MIS

## B | Surgical Technique

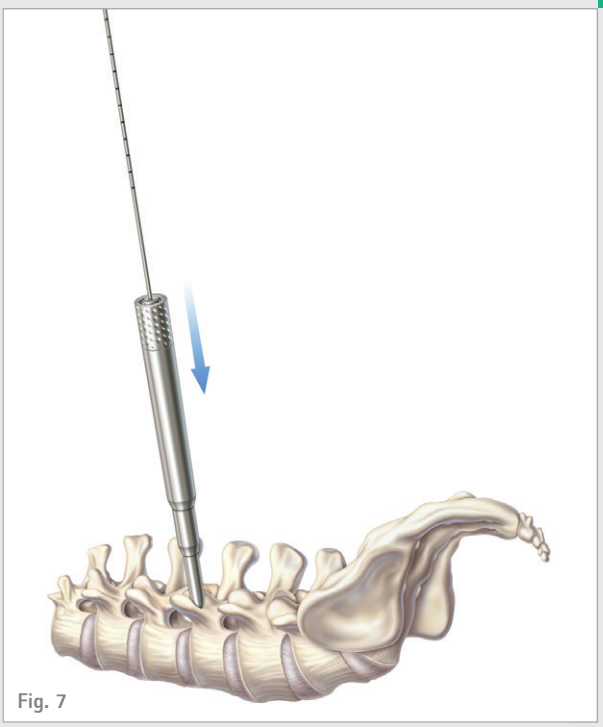


Fig. 7

### B.5. Soft Tissue Dilation

- Fascia and muscle should be dilated to allow for screw and downtube placement.
- Remove the remaining trocar while holding the K-Wire firmly in place and slide the three dilators over the K-Wire in a sequence.

**Note:**

- The diameters of the three sequential dilators are: FW814T (10 mm), FW815T (14 mm), and FW816T (18.5 mm).
- Dilators should be docked on bony anatomy to minimize tissue creepage.
- A dilator is not required while passing the downtube but if preferred remove the dilators (FW814T – FW816T) and further dilate the prepared soft tissue channel with FW768R.
- Slide the PEEK dilation sleeve (FW749P) over FW768R.
- FW768R and FW749P are available in the AUX Rescue Set.

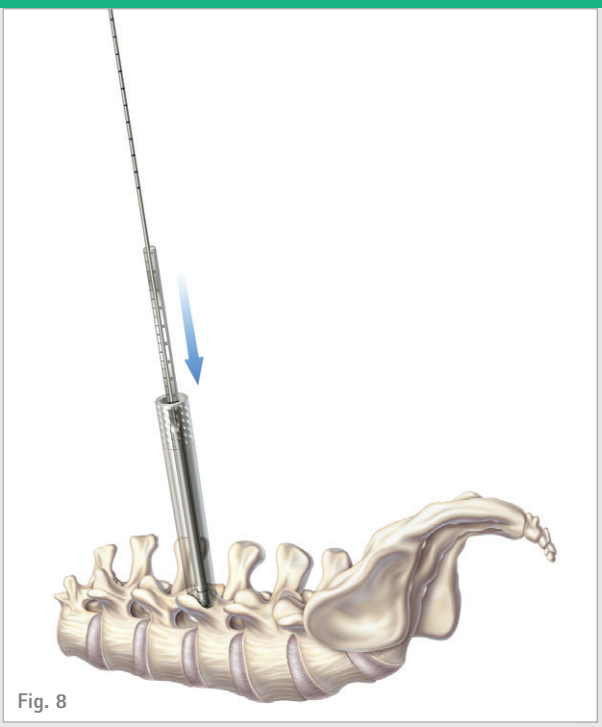


Fig. 8

## B.6. Screw Length Measuring

- Under fluoroscopic guidance, ensure the K-Wire is at an adequate depth, approximating the final screw location in the bone.
- Remove the two inner dilators.
- Leaving the third dilator (FW816T) in place, hold the K-Wire firmly and slide the screw length measuring device (FW351R) over the K-Wire.
- Read the screw length at the bottom of the widest laser marking on the K-Wire.

**Caution:**

- Avoid inserting the K-Wire too deep into the vertebral body as there is danger of perforating the large vessels!
- The reading is an approximation, depending the depth of the K-Wire in bone.

Fig. 9

## B.7. Tapping Pedicle

- The pedicle is prepared by tapping with the screw tap over the K-Wire.
- The K-Wire can also be used to evaluate the tapped pedicle.
- Remove the third dilator, leaving only the K-Wire in place.

**Note:**

- The included screw taps range from 4.5 mm to 8.5 mm in 1 mm increments and each are undersized by 0.5 mm.

**Caution:**

- If desired, the surgeon could further evaluate the tapped pedicle by using either straight or curved ball tip probes (FW146R, FW147R) while keeping the third dilator in place.
- When doing so, the K-Wire needs to be removed to insert the ball tip probes and reinserted for subsequent steps.

Fig. 10

## B.8. Downtube Assembly and Screw Insertion

- Before a screw can be inserted into the pedicle, the screw must be mounted onto the downtube.
- To attach a screw to the downtube, slide the insertion key (FW755R) into the S4® Element MIS downtube (FW752R).
- While firmly holding the downtube, rotate the T-handle clockwise to expand the downtube tip.

**Note:**

- Insertion key T-handle (FW755R) is gold for quick identification.

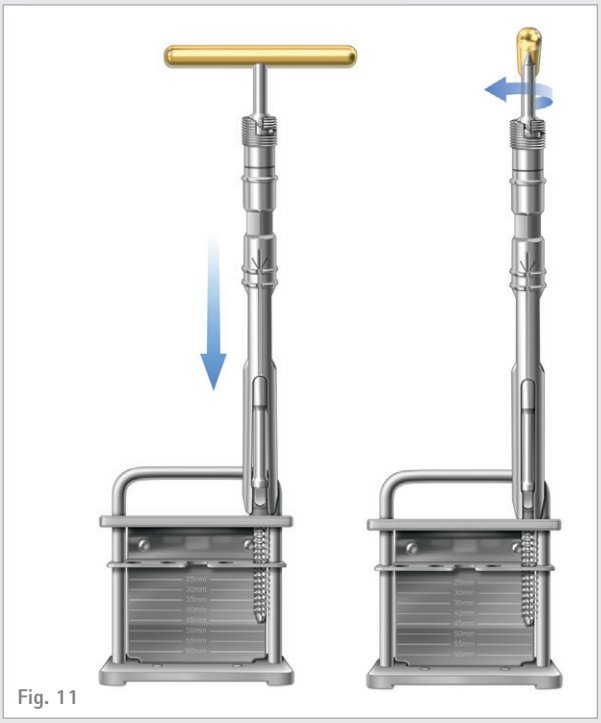


Fig. 11

- The downtube needs to be coaxial to the pedicle screw tulip head to correctly attach the screw to the downtube.
- Place the preferred screw size in the screw dispenser tray and lower the expanded downtube assembly onto the screw's tulip head coaxially.
- While applying a downward force, firmly grab the downtube with one hand and rotate the insertion key T-handle counter clockwise to clamp the downtube onto the screw.

**Note:**

- Lubricate the S4® Element MIS downtube FW752R at the threaded top-part and at the inner tip-part after each cleaning and sterilization procedure.

# AESCULAP® S4® Element MIS

## B | Surgical Technique

Fig. 12

### B.8. Downtube Assembly and Screw Insertion

- Extract the insertion key from the downtube and remove the screw-downtube assembly from the screw dispenser tray.
- Ensure proper attachment of the screw by sliding the confirmation gauge block (FW773R) up and down the downtube.
- If the gauge block does not slide freely on the downtube, repeat the Step 8 as the screw is not properly attached to the downtube.
- If the gauge block does not slide on the downtube, wiggle the screw head lightly, perpendicular to the tulip head opening as the screw could "snap" itself into place.
- Attempt to slide the gauge block again to confirm proper attachment. If not repeat Step 8.

# AESCULAP® S4® Element MIS

## B | Surgical Technique

Fig. 13

### B.9. Screwdriver Attachment and Insertion

- For polyaxial screws, insert the polyaxial screwdriver (FW750R) into the downtube while ensuring the hexagonal tip is aligned to the bone screw.
- Thread the collar of the polyaxial screwdriver (FW750R) onto the threads located at the top of the downtube. If the collar does not connect to the threads, the hex tip is not properly seated in the bone screw.
- When using monoaxial screws, use monoaxial screwdriver (FW751R) instead.
- Attach either the Ratcheting Straight Handle (FW165R) or Ratcheting T-handle (FW167R) to the screwdriver.

Fig. 14

- Slide the assembled screw and driver assembly over the K-Wire.
- Under fluoroscopic guidance, insert screw to the appropriate depth.
- Remove the K-Wire after an appropriate amount of bone purchase is established to avoid driving the K-Wire into a vertebral artery.
- Once the screw is fully inserted, remove the screwdriver from the downtube.
- Repeat the steps for all subsequent screws.

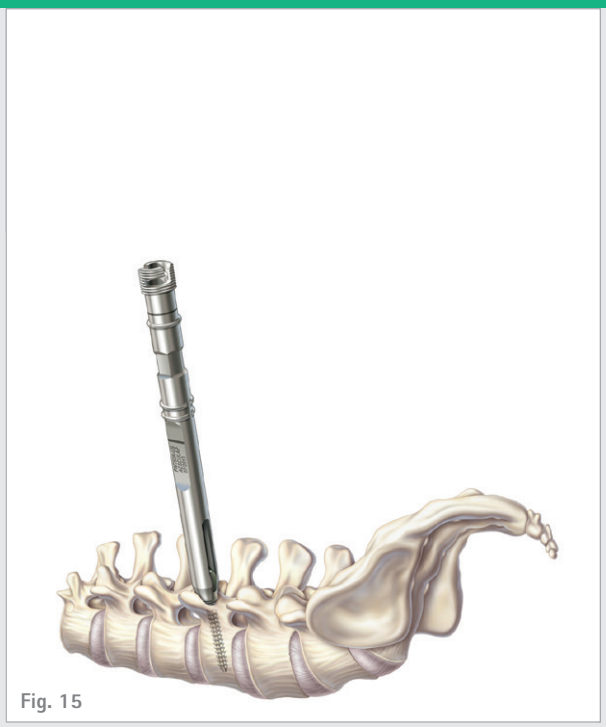


Fig. 15

Fig. 16

# AESCULAP® S4® Element MIS

## B | Surgical Technique

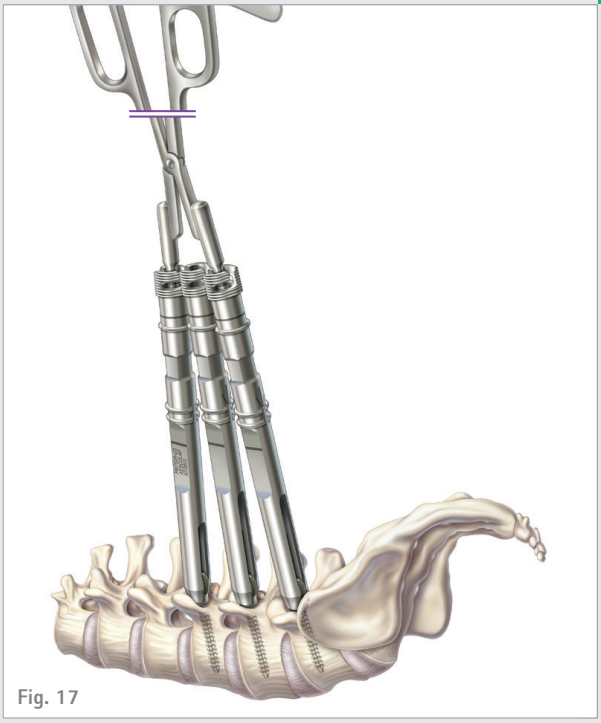


Fig. 17

### B.10. Rod Measurement

- The rod caliper (FW774R) is used to approximate necessary rod length.
- Ensure the caliper is seated fully to the screw prior to taking measurements. The length indicated by the caliper is the minimum recommended rod length.

**Option:**

- The rod length measurement tool (FW759R) can also be used to approximate rod length.
- Fully seat the cylinder blocks into the most cranial and caudal downtubes while keeping both downtubes parallel.

**Option:**

- The rod trial (SZ072SU, SZ073SU or SZ074SU) is another alternative for approximating rod length and rod bend.
- Lay the rod trial on the skin next to the downtubes and bend the trial accordingly to ensure all portions are in close contact with the skin prior to reading the scale.

**Caution:**

- When using the rod length measurement tool (FW759R), ensure the most cranial and caudal downtubes are parallel prior to reading the scale.
- The length indicated is the minimum recommended rod length.

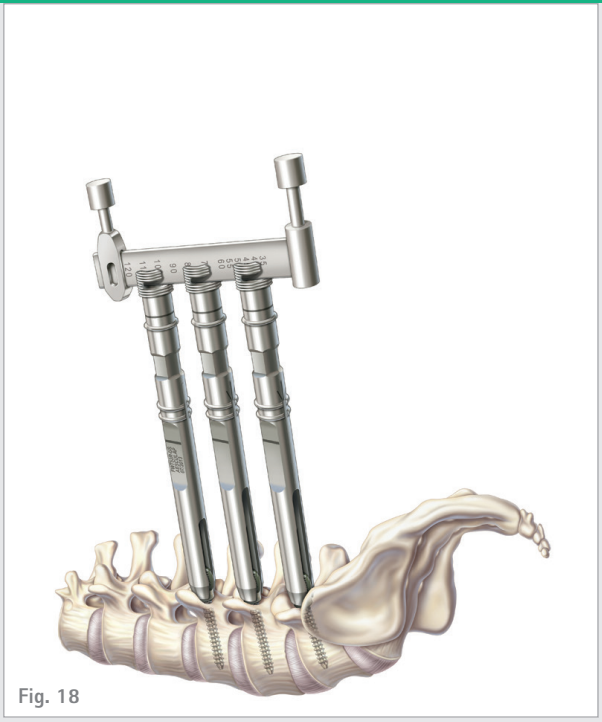


Fig. 18

Fig. 19

## B.11. Aligning Downtubes for Rod Passage

- Once the rod measurements are taken, rotate the downtubes appropriately to align the downtube slots. Ensure the longer slot of the most cranial or caudal downtube is facing the rod entry point.
- The rod length measurement tool (FW759R) has a dual function which can also be used to align downtubes.
- Flip the rod length measurement tool upside down and insert the instrument into the grove on the top of the downtubes.

# AESCULAP® S4® Element MIS

## B | Surgical Technique

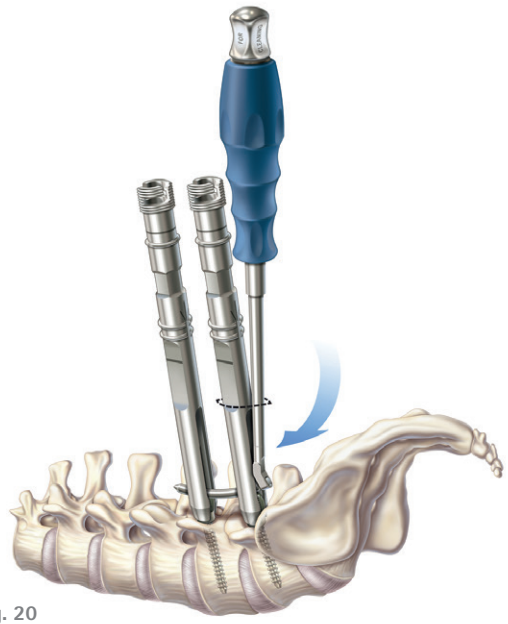


Fig. 20

### B.12. Rod Insertion

- Both 30° (FW760R) and 60° (FW240R) fixed angle rod inserters can be used for rod passing.
- The MIS rod has a bullet tip to ease passage through soft tissue and a hex end geometry to engage with the rod inserters. Unscrew the knob on top of the respective rod inserter handle and slide in the hex end into the distal opening of the instrument. Firmly tighten the knob clockwise to secure the rod in place.
- When using the 30° rod inserter, a distal incision away from the downtube may be required.
- When using a 60° rod inserter, incision length may need to be increased to facilitate rod passage.
- Guide the rod down the outer perimeter of the downtube until the rod passes through the slot opening.

**Note:**

- When using the 30° rod inserter (FW760R), a distal incision away from the downtube may be required.
- To estimate correct rod bend, place the rod inserter lateral to the patient and take a lateral fluoroscopy.

**Caution:**

- The rod inserter knob must be firmly tightened to prevent premature in-situ release of the rod.
- Do not bend the rod hex end prior to connecting it to the rod inserter.
- Use caution not to force the rod inserter tip into the downtube slots. Doing so may splay the downtube open.
- Ensure that rods are inserted below muscle fascia.
- Rod inserter may be removed only after provisional tightening of set screws.

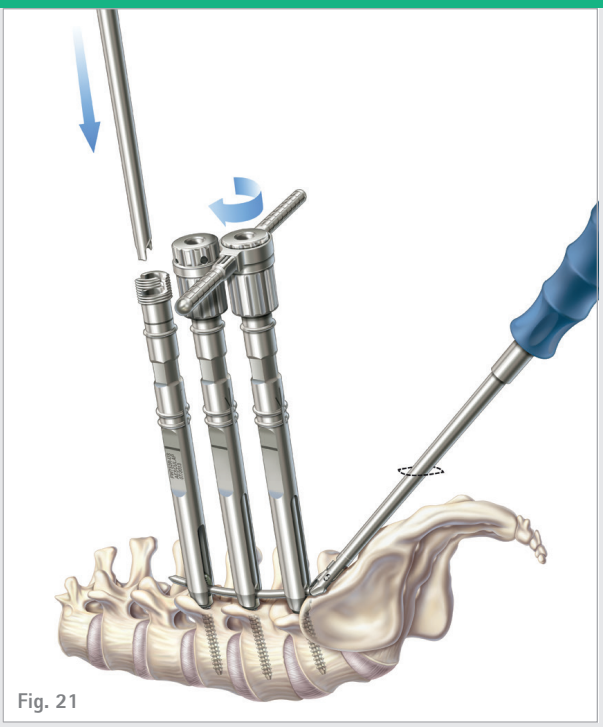


Fig. 21

## B.13. Rod Persuasion

- Once the rod has passed through all downtubes, insert the rod persuader (FW762R) into the downtubes where rod persuasion is desired.
- Tighten the persuader knob to persuade the rod down to position. The rod persuader handle (FW763R) may be used for additional torque during rotations.
- The rod is fully persuaded once the bottom of the knob reaches the upper etched line on the downtube.

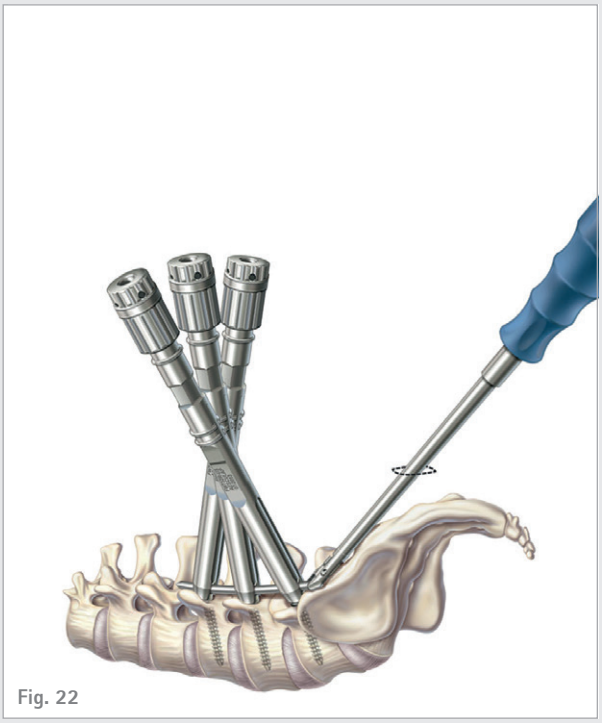


Fig. 22

**Note:**

- The persuader handle has two sides, 'IN' and 'OUT'. The corresponding side needs to be legible when persuading or removing the instrument.
- Recommend using counter torque handle (FW777R) when using rod persuader to prevent torsional loading of the patient.
- Allow free movement of downtubes when persuading rod.

**Note:**

- If a pre-bended rod is used the downtubes will adapt to the angulation of the rod.
- Downtubes are crossing each other.
- Parallel alignment of the downtubes is not possible.

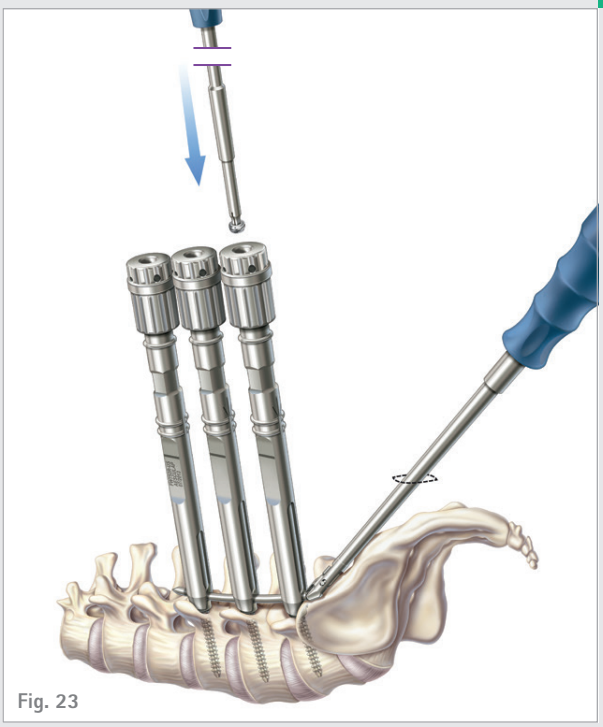


Fig. 23

## B.14. Set Screw Insertion

- Load a set screw (SW790T) on the set screw starter (FW757R) and insert it through the rod persuader (FW762R).
- Hand tighten the set screw, turning clockwise. If resistance is felt during set screw insertion, turn the starter one full revolution, counter-clockwise, and repeat the step.

**Caution:**

- Do not over tighten the set screw. A torque wrench along with a countertorque should be used for final tightening.

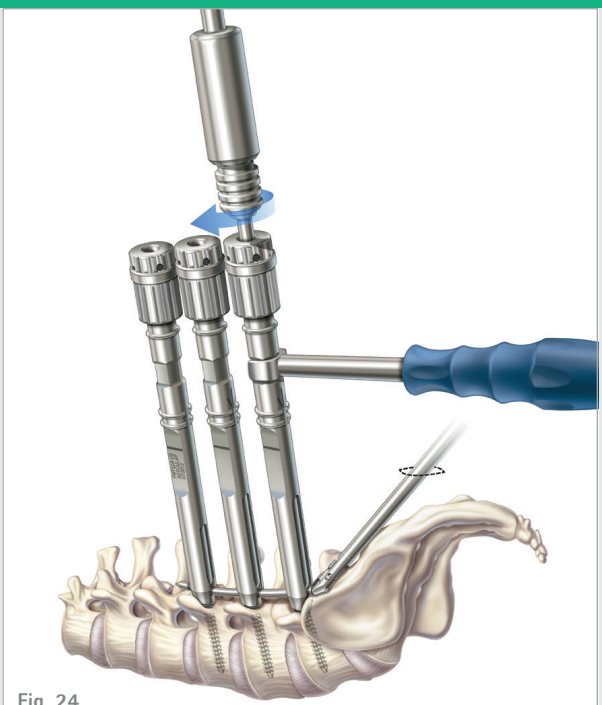


Fig. 24

## B.15. Final Tightening

- Assemble to the torque wrench handle 10NM (FW778R) by attaching the torque shaft (FW776R).
- Insert the torque limiting driver into the downtube and engage the setscrew. Attach the counter torque handle (FW777R) and final tighten the set screw to 10 Nm, the torque limiting driver will provide an audible click once 10 Nm is reached.

**Caution:**

- Ensure the tip of the torque wrench is fully seated into the set screw during final torque.
- Only tighten the set screw (SW790T) to the specified setting of 10 Nm (90/in/lbs). Over tightening will lead to damaging of the implant and could lead to implant failure.
- Never use the torque limiting wrench without the counter torque handle.

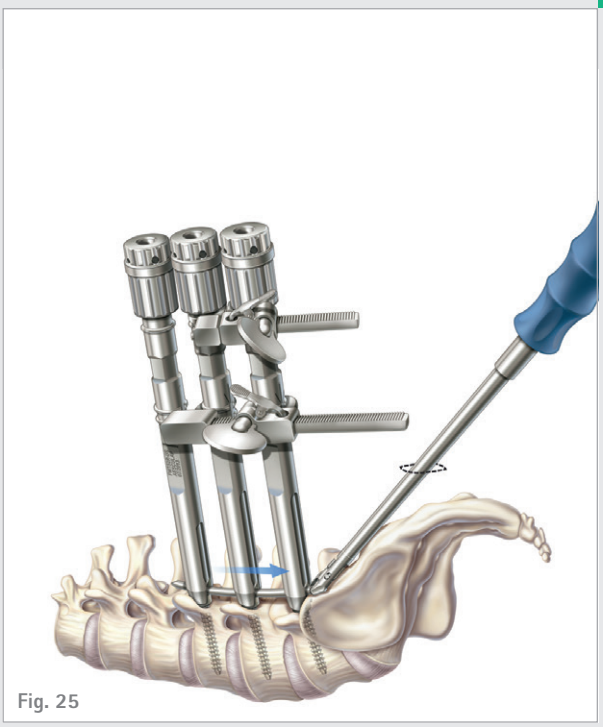


Fig. 25

## B.16. Compression and Distraction
### B.16.1. Compression

- Final tighten one setscrew prior to compressor maneuvers. The compression maneuver should be made with the locked downtube and the unlocked downtube immediately adjacent to it.
- Attach the downtube connector (FW753R) on the upper ring of the respective downtubes.
- Attach the rack compressor (FW765R) in between the lower rings of the respective downtubes.
- Compress as needed. The rack handle (FW744P) can be attached to allow additional torque during compression.
- Follow up with final tightening of the setscrews as described in the final tightening section.

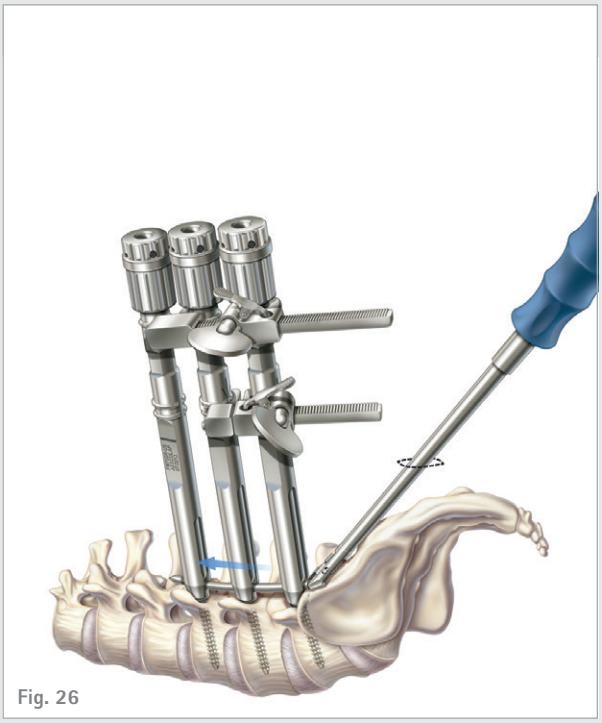


Fig. 26

### B.16.2. Distraction

- Final tighten one setscrew prior to distraction maneuvers. The distraction maneuver should be made with the locked downtube and the unlocked downtube immediately adjacent to it.
- Attach the rack compressor (FW765R) on the upper ring of the respective downtubes.
- Attach the downtube connector (FW753R) in between the lower rings of the respective downtubes.
- Distract as needed. The rack handle (FW744P) can be attached to allow additional torque during distraction.
- Follow up with final tightening of the setscrews as described in the final tightening section.

**Note:**

If preferred, an alternate style compressor (FW764R) is available.

## Optional

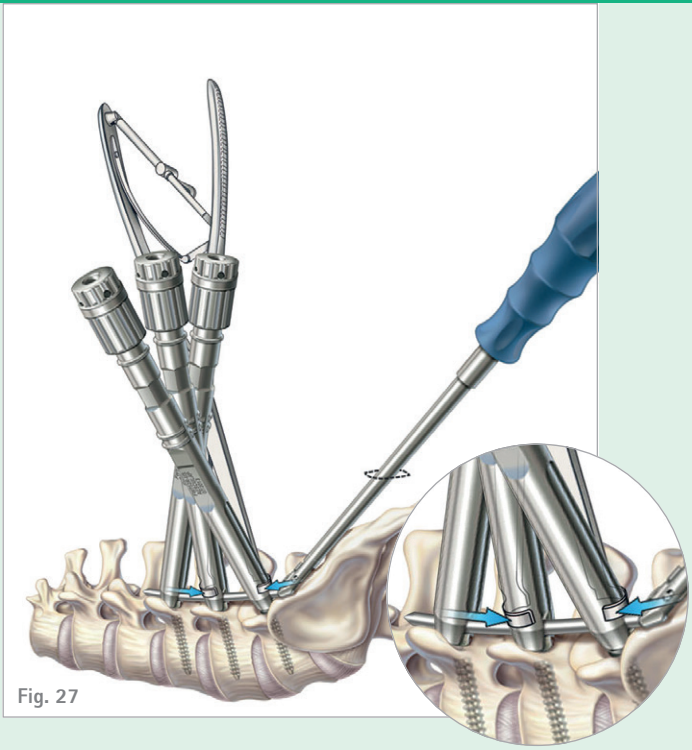


Fig. 27

### B.16.3. Compression with crossing downtubes

- Final tighten one setscrew prior to compressor maneuvers. The compression maneuver should be made with the locked downtube and the unlocked downtube immediately adjacent to it.
- Attach the compressor FW764R on the lower part of downtubes and compress as needed.
- Follow up with final tightening of the setscrews as described in the final tightening section.

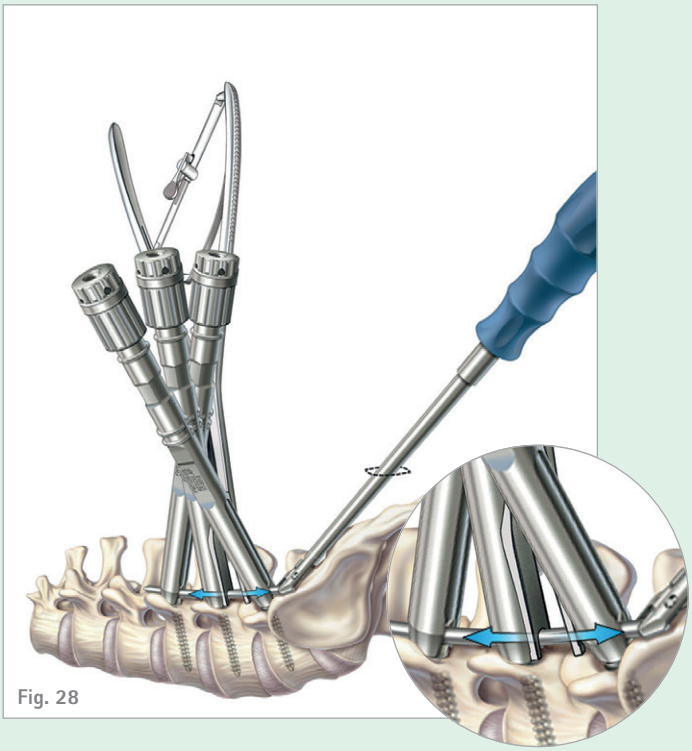


Fig. 28

### B.16.4. Distraction with crossing downtubes

- Final tighten one setscrew prior to distraction maneuvers. The distraction maneuver should be made with the locked downtube and the unlocked downtube immediately adjacent to it.
- Attach the distractor FW281R on the lower part of the downtube and distract as needed.
- Follow up with final tightening of the setscrews as described in the final tightening section.

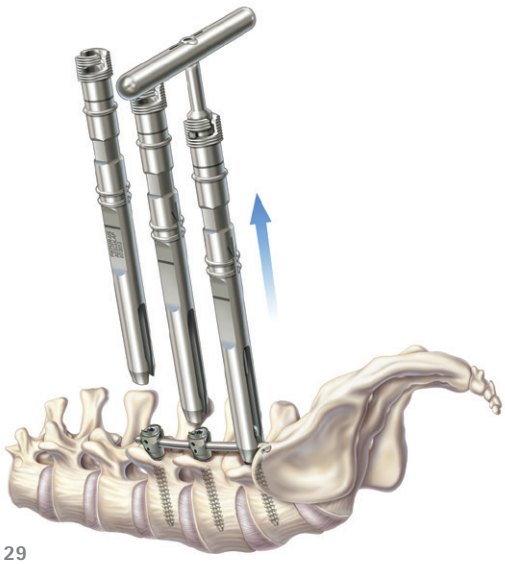


Fig. 29

## B.17. Downtube Removal

- Once all set screws have been tightened to 10 Nm, disengage the rod holder, insert the removal key (FW756R) into each downtube, turn clockwise to splay the downtube open and remove the entire assembly from the operative site.

**Note:**

- The removal key T-handle (FW756R) is silver for quick identification.

B.18. Final Construct

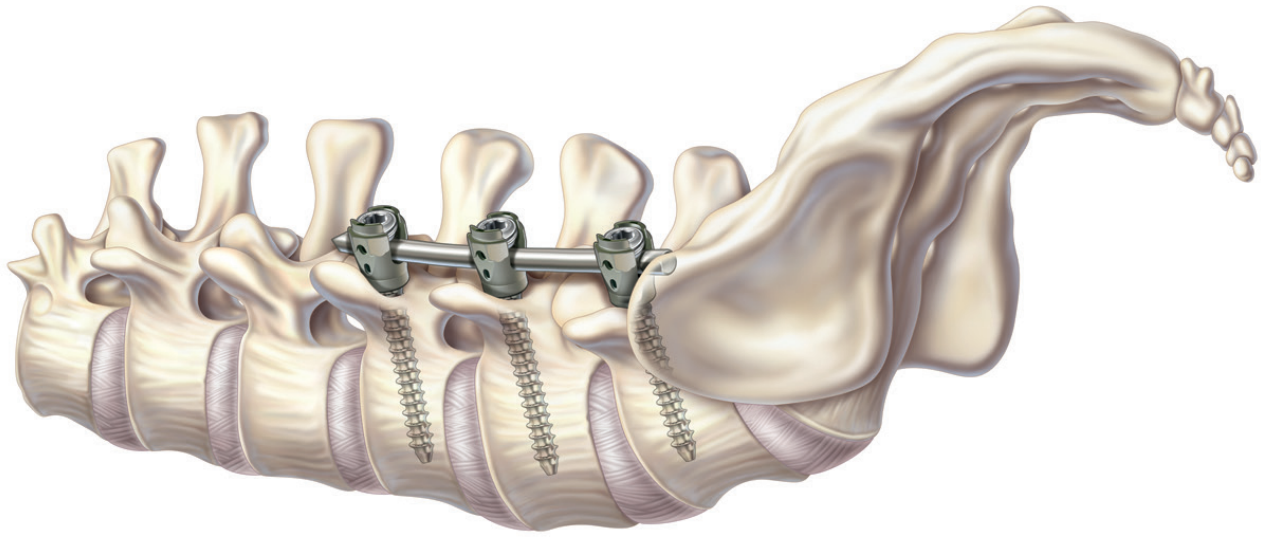


Fig. 30

# AESCULAP® S4® Element MIS

## C | Rescue Technique

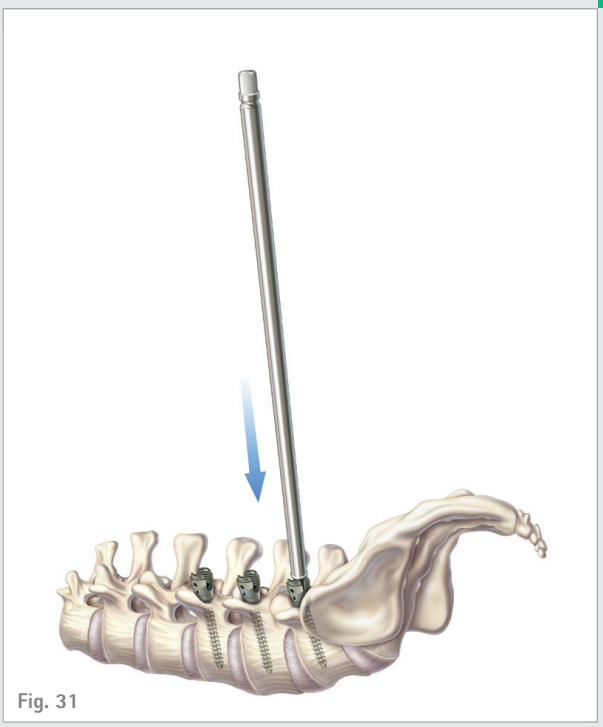


Fig. 31

### C.1. In-situ Downtube Reattachment

- If in-situ downtube reattachment is desired, use the instruments included in the AUX Rescue Set.
- Remove rod from pedicle screws.

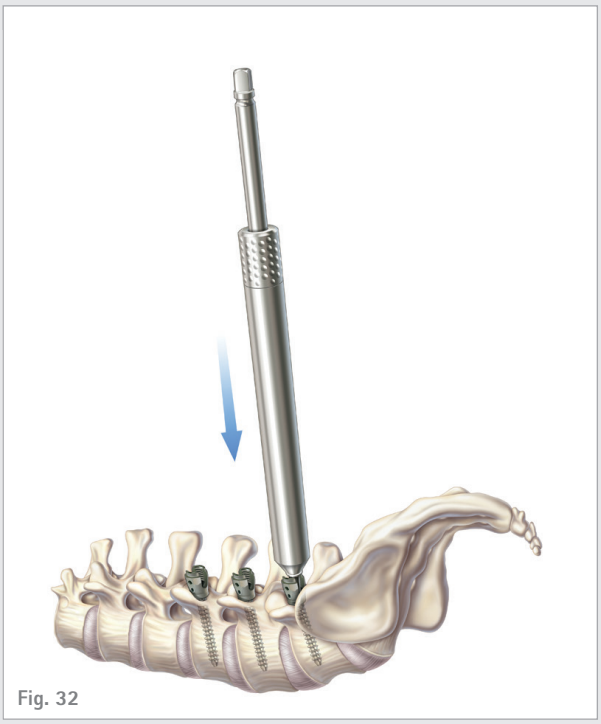


Fig. 32

- Under fluoroscopic guidance, rest the polyaxial screw removal driver (FW770R) on top of the pedicle screw that requires the downtube to be reattached.
- Slide the rescue instrument (FW768R) onto the polyaxial screw removal driver.

Fig. 33

- Slide the PEEK dilation sleeve (FW749P) over the metal dilator.

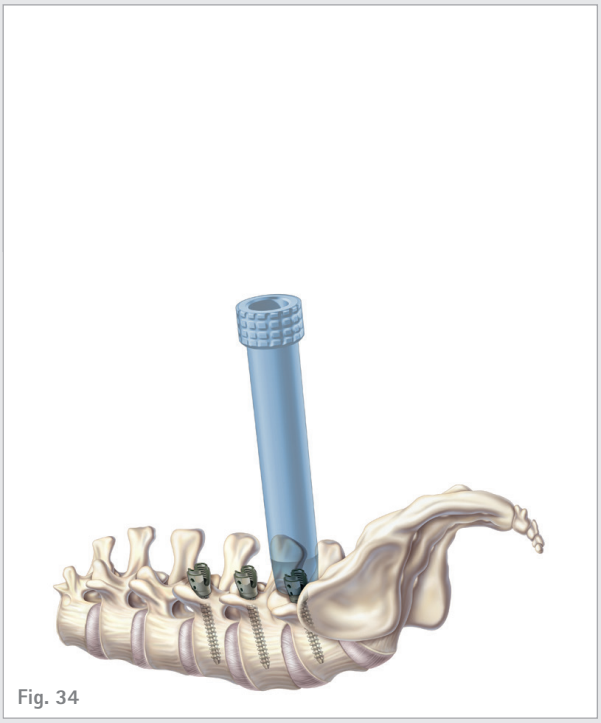


Fig. 34

# AESCULAP® S4® Element MIS

## C | Rescue Technique

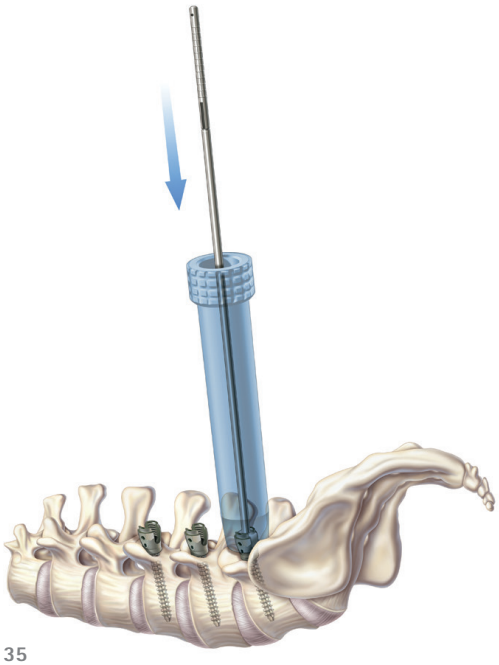


Fig. 35

### C.1. In-situ Downtube Reattachment

- Remove the polyaxial screw removal driver and the rescue instrument (FW768R) while firmly grabbing on the PEEK sleeve, leaving it in place.
- Using the MIS endoscope adapter (FW745P) and the endoscope assembly, view the access to the pedicle screw.

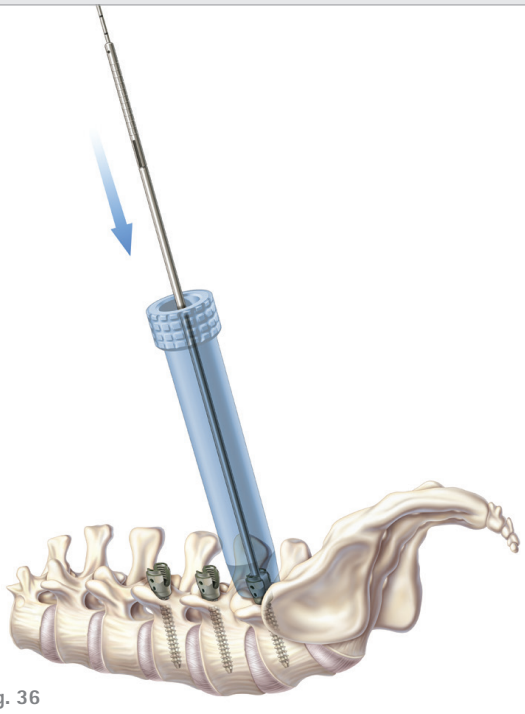


Fig. 36

- Engage the pedicle screw and place the opening of the screw body in a cranial/caudal direction with the use of the alignment tool (FW769R).
- Slide in the K-Wire through the alignment tool securing the pedicle screw to alignment tool connection.

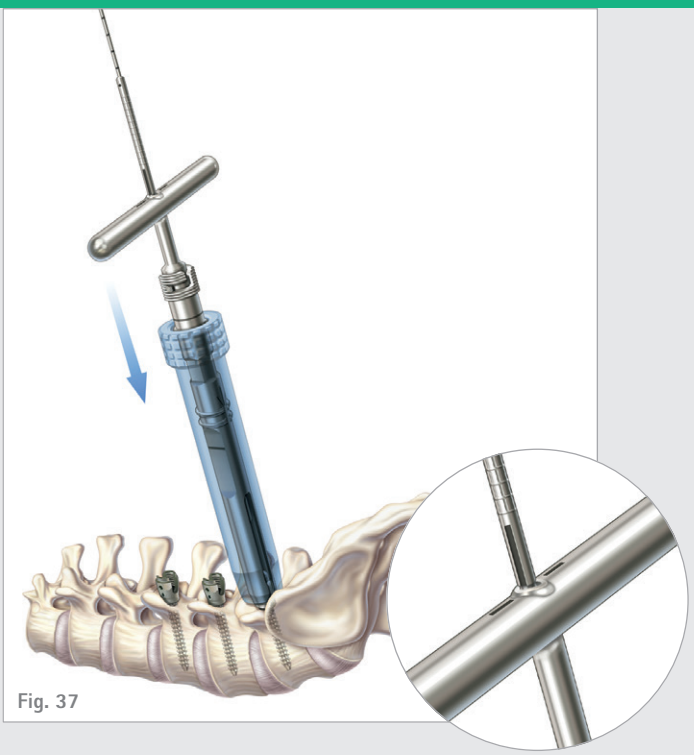


Fig. 37

- Slide the removal key (FW756R) into the downtube (FW752R) and turn the T-handle clockwise to splay the downtube open.
- Slide the expanded downtube down the alignment tool.
- Pay close attention to the line etchings on the shaft of the alignment tool and etchings on top of the removal key T-handle. These are visual markers to show proper orientation of the screw to the downtube.
- When properly engaged, the etched lines on the two instruments should be aligned and the groove on the realignment tool visible on top of the removal key (FW756R).
- While applying downward force, turn the removal key counter clockwise to have the downtube fully engaged the pedicle screw geometry. Confirm proper engagement with the endoscope assembly or turn tower 90° to check connection under fluoroscopy.

# AESCULAP® S4® Element MIS

## C | Rescue Technique

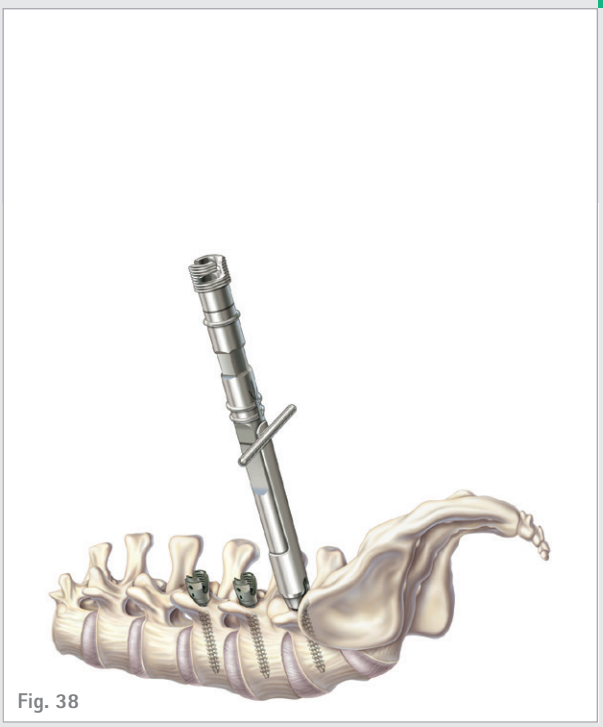


Fig. 38

### C.1. In-situ Downtube Reattachment

- Remove PEEK dilatation sleeve (FW749P) and slide on the derotation sleeve (FW766R) to reconfirm proper reattachment.
- When properly reattached, the T-handle of the derotation sleeve should be at or below the etched line of the portion of the downtube.

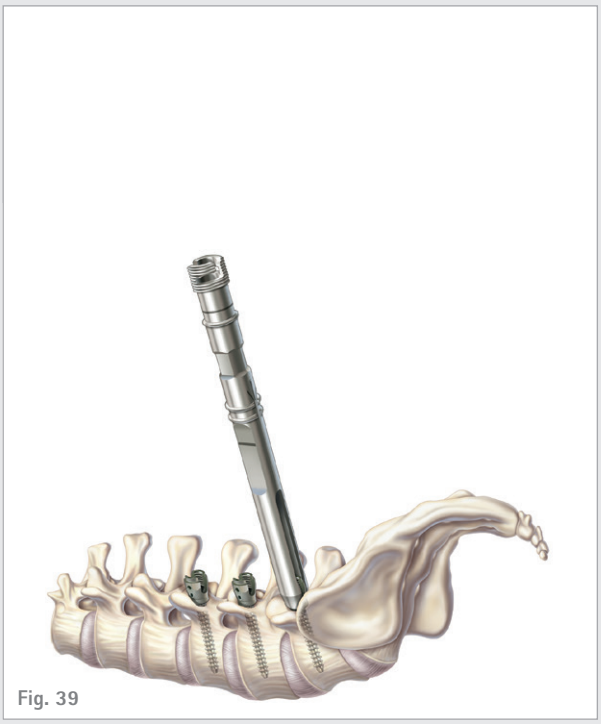


Fig. 39

- Reattached downtube.

**Note:**

- Derotation sleeves can also be attached to the downtube to reduce the possibility of detachment of the downtube during a spine de-rotation maneuver.

# AESCULAP® S4® Element MIS

## D | MIS Augmentation Technique

Fig. 40

### D.1. Downtube Assembly

- Before an augmentation screw can be inserted into the pedicle, the screw must be mounted onto the downtube.
- Please refer to chapter B.8. „Downtube Assembly and Screw Insertion" on page 15 et seqq.

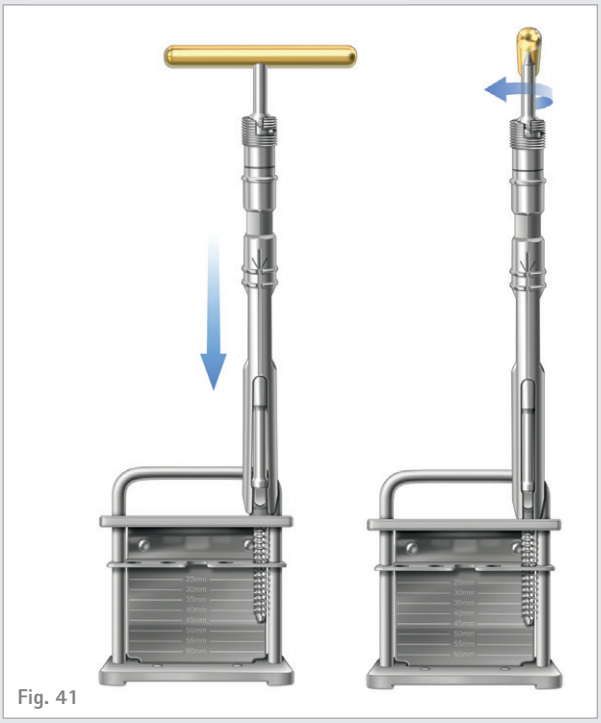


Fig. 41

- Please refer to chapter B.8. „Downtube Assembly and Screw Insertion" on page 15 et seqq.

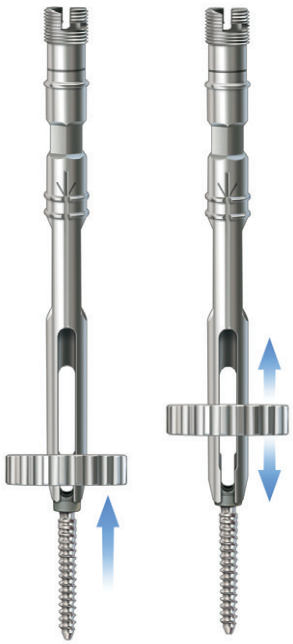


Fig. 42

- Please refer to chapter B.8. „Downtube Assembly and Screw Insertion" on page 16 et seqq.

# AESCULAP® S4® Element MIS

## D | MIS Augmentation Technique

Fig. 43

### D.2. Cannula Screwdriver Attachment

- For polyaxial and monoaxial augmentation screws, insert the S4® Element Cement Application Cannula (SR158SU) into the downtube while ensuring the hexagonal tip is aligned to the bone screw.
- Connect the locking nut (SR159R) to the shaft of the application cannula (SR158SU) onto the threads located at the top of the downtube. If the locking screw does not connect to the threats, the hex tip is not properly seated in the augmentation screw.

Fig. 44

- Make sure that the handles (SR154R or SR155R) are properly connected to the application cannula (SR158SU).

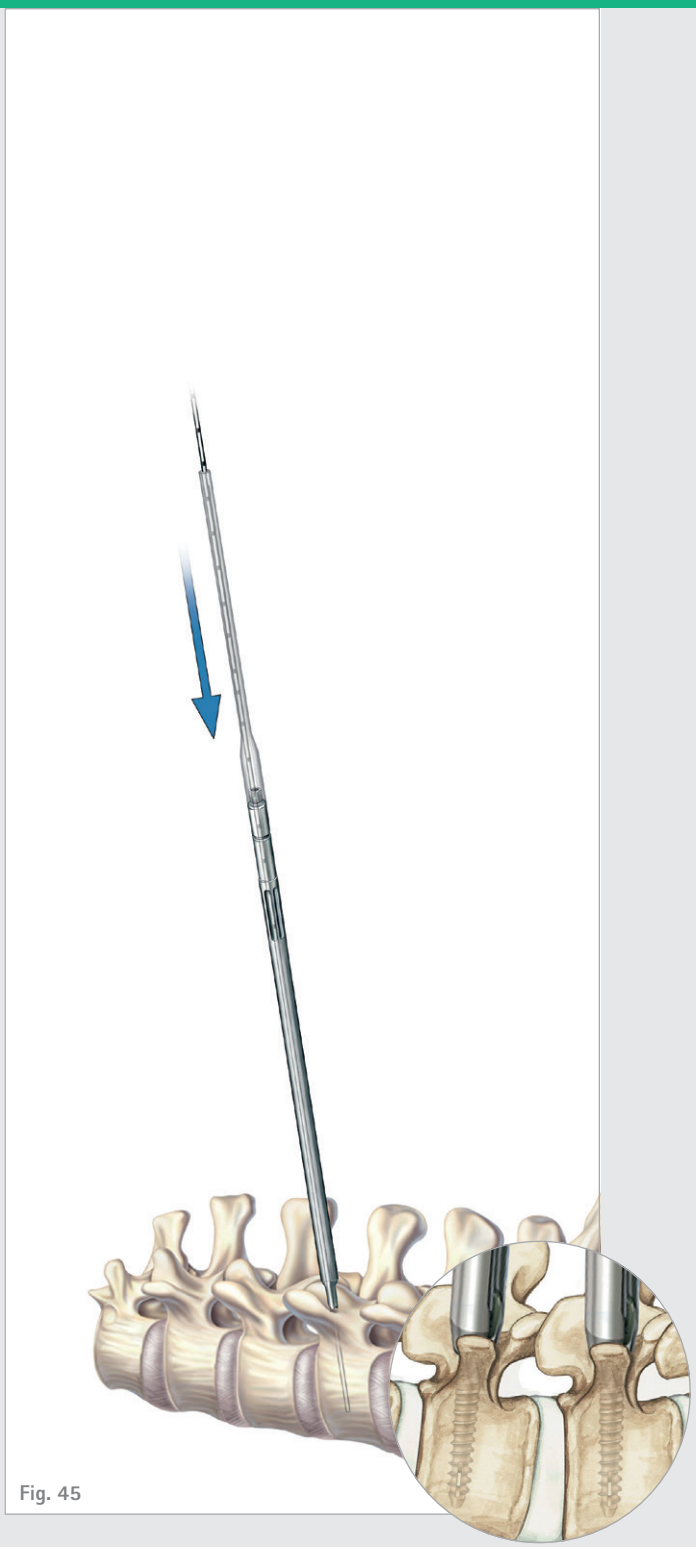


Fig. 45

## D.3. Screw Placement

- The placement of the screws is described in chapter B.9. „Screwdriver Attachment and Insertion" on page 18.
- Select the appropriate screw length. The contact with the anterior cortical wall should be avoided in order not to risk cement leakage.

**Note:**

- When the augmentation screws are being placed without K-wire, there is a risk of penetration of bone particles, which could interfere with the proper injection of the cement. Therefore it is necessary to check the path by introducing carefully a K-wire under image intensifier control.
- Align the monoaxial screws before introducing the cement. Afterwards, realignment is not possible.

**Danger:**

- It has to be avoided that the K-wire is pushed too far forward because there is danger of perforation of the aorta.

# AESCULAP® S4® Element MIS

## D | MIS Augmentation Technique

Fig. 46

### D.4. Cement Application

- Attach the cement applier to the cannula (SR158SU). For cement application make sure that the consistency of the cement is pasty (see manufacturers specifications).

**Note:**

- It is important that there is no cement at the connection between applier and cannula.
- When applying cement ensure that the cannula doesn't loose connection.
- Recommended cement quantity: 2 ml
  Cannula volume: 0.8 ml
- For each augmentation screw one augmentation cannula (single use) is required.

Fig. 47

Cement injection should be effected under real time image intensifier control:

- Inject cement until it extrudes from the slots.
- Check that no cement leakage occurs.
- Continue the injection until the adequate quantity of cement is introduced and shows in a cloud pattern.

**Note:**

- Check that there is no cement leakage at any time.
- The cannula remains in the pedicle screw until the cement has hardened.
- Otherwise there is a risk of contamination of the screw head.

**Note:**

- The manufacturers specifications for the cement hardening times have to be observed.

# AESCULAP® S4® Element MIS

## D | MIS Augmentation Technique

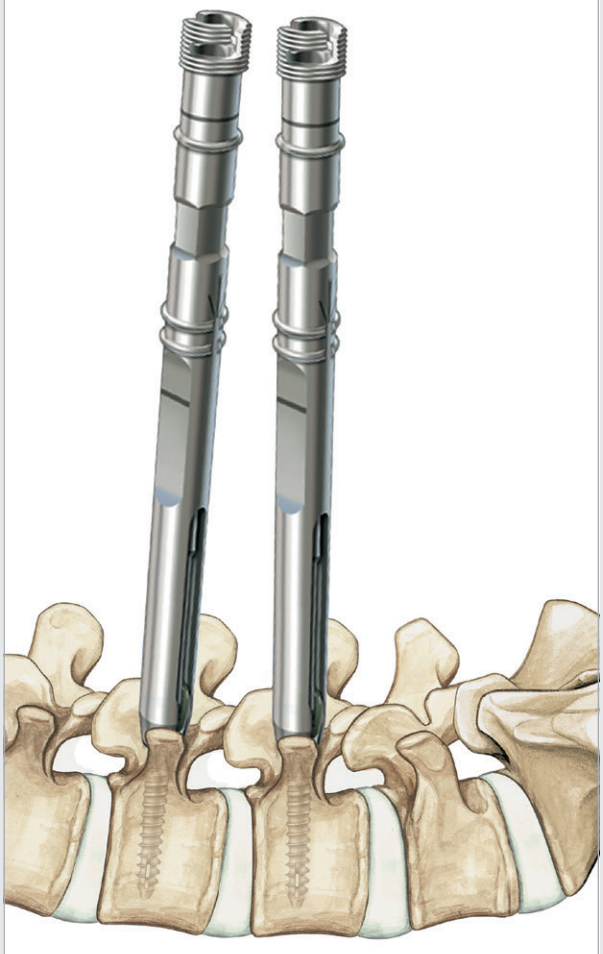


Fig. 48

### D.4. Cement Application

The next steps (rod positioning, insertion of the locking screw, ...) are described starting from page 20 chapter B.10. „Rod Measurement" et seqq.

# AESCULAP® S4® Element MIS

## E | Implants and Instruments Overview

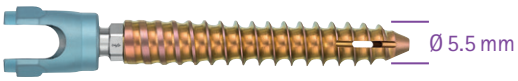
| Polyaxial Screws | Article No. | Description | |
|---|---|---|---|
|  | ST040T | S4® Element MIS Polyaxial screw, Ø 4.5 mm | 4.5 x 25 mm |
| | ST041T | | 4.5 x 30 mm |
| | ST042T | | 4.5 x 35 mm |
| | ST043T | | 4.5 x 40 mm |
| | ST044T | | 4.5 x 45 mm |
| | ST045T | | 4.5 x 50 mm |
|  | ST050T | S4® Element MIS Polyaxial screw, Ø 5.5 mm | 5.5 x 25 mm |
| | ST051T | | 5.5 x 30 mm |
| | ST052T | | 5.5 x 35 mm |
| | ST053T | | 5.5 x 40 mm |
| | ST054T | | 5.5 x 45 mm |
| | ST055T | | 5.5 x 50 mm |
|  | ST060T | S4® Element MIS Polyaxial screw, Ø 6.5 mm | 6.5 x 25 mm |
| | ST061T | | 6.5 x 30 mm |
| | ST062T | | 6.5 x 35 mm |
| | ST063T | | 6.5 x 40 mm |
| | ST064T | | 6.5 x 45 mm |
| | ST065T | | 6.5 x 50 mm |
| | ST066T | | 6.5 x 55 mm |
| | ST067T | | 6.5 x 60 mm |
|  | ST070T | S4® Element MIS Polyaxial screw, Ø 7.5 mm | 7.5 x 25 mm |
| | ST071T | | 7.5 x 30 mm |
| | ST072T | | 7.5 x 35 mm |
| | ST073T | | 7.5 x 40 mm |
| | ST074T | | 7.5 x 45 mm |
| | ST075T | | 7.5 x 50 mm |
| | ST076T | | 7.5 x 55 mm |
| | ST077T | | 7.5 x 60 mm |

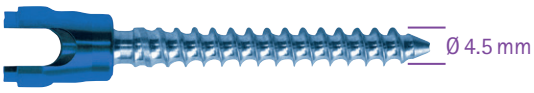
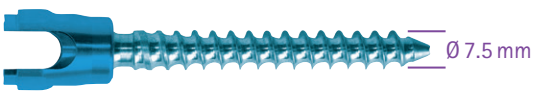
## Polyaxial Screws

| Article No. | Description | |
|---|---|---|
| ST081T | S4® Element MIS<br>Polyaxial screw, Ø 8.5 mm | 8.5 x 30 mm |
| ST082T | | 8.5 x 35 mm |
| ST083T | | 8.5 x 40 mm |
| ST084T | | 8.5 x 45 mm |
| ST085T | | 8.5 x 50 mm |
| ST086T | | 8.5 x 55 mm |
| ST087T | | 8.5 x 60 mm |

# AESCULAP® S4® Element MIS

## E | Implants and Instruments Overview

| Polyaxial Screws | Article No. | Description | |
|---|---|---|---|
|  | ST422T | Polyaxial Screws for Cement Augmentation (sterile packed) | 5.5 x 35 mm |
| | ST423T | | 5.5 x 40 mm |
| | ST424T | | 5.5 x 45 mm |
| | ST425T | | 5.5 x 50 mm |
| | ST432T | Polyaxial Screws for Cement Augmentation (sterile packed) | 6.5 x 35 mm |
| | ST433T | | 6.5 x 40 mm |
| | ST434T | | 6.5 x 45 mm |
| | ST435T | | 6.5 x 50 mm |
| | ST436T | | 6.5 x 55 mm |
| | ST437T | | 6.5 x 60 mm |
| | ST438T | | 6.5 x 70 mm |
| | ST439T | | 6.5 x 80 mm |
| | ST442T | Polyaxial Screws for Cement Augmentation (sterile packed) | 7.5 x 35 mm |
| | ST443T | | 7.5 x 40 mm |
| | ST444T | | 7.5 x 45 mm |
| | ST445T | | 7.5 x 50 mm |
| | ST446T | | 7.5 x 55 mm |
| | ST447T | | 7.5 x 60 mm |
| | ST448T | | 7.5 x 70 mm |
| | ST449T | | 7.5 x 80 mm |
| | ST452T | Polyaxial Screws for Cement Augmentation (sterile packed) | 8.5 x 35 mm |
| | ST453T | | 8.5 x 40 mm |
| | ST454T | | 8.5 x 45 mm |
| | ST455T | | 8.5 x 50 mm |
| | ST456T | | 8.5 x 55 mm |
| | ST457T | | 8.5 x 60 mm |
| | ST458T | | 8.5 x 70 mm |
| | ST459T | | 8.5 x 80 mm |

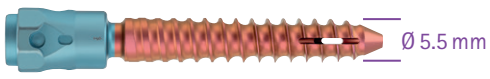
| Monoaxial Screws | Article No. | Description | |
|---|---|---|---|
|  | ST140T | S4® Element MIS Monoaxial screw, ø 4.5 mm | 4.5 x 25 mm |
| | ST141T | | 4.5 x 30 mm |
| | ST142T | | 4.5 x 35 mm |
| | ST143T | | 4.5 x 40 mm |
| | ST144T | | 4.5 x 45 mm |
| | ST145T | | 4.5 x 50 mm |
|  | ST150T | S4® Element MIS Monoaxial screw, ø 5.5 mm | 5.5 x 25 mm |
| | ST151T | | 5.5 x 30 mm |
| | ST152T | | 5.5 x 35 mm |
| | ST153T | | 5.5 x 40 mm |
| | ST154T | | 5.5 x 45 mm |
| | ST155T | | 5.5 x 50 mm |
|  | ST160T | S4® Element MIS Monoaxial screw, ø 6.5 mm | 6.5 x 25 mm |
| | ST161T | | 6.5 x 30 mm |
| | ST162T | | 6.5 x 35 mm |
| | ST163T | | 6.5 x 40 mm |
| | ST164T | | 6.5 x 45 mm |
| | ST165T | | 6.5 x 50 mm |
| | ST166T | | 6.5 x 55 mm |
| | ST167T | | 6.5 x 60 mm |
|  | ST170T | S4® Element MIS Monoaxial screw, ø 7.5 mm | 7.5 x 25 mm |
| | ST171T | | 7.5 x 30 mm |
| | ST172T | | 7.5 x 35 mm |
| | ST173T | | 7.5 x 40 mm |
| | ST174T | | 7.5 x 45 mm |
| | ST175T | | 7.5 x 50 mm |
| | ST176T | | 7.5 x 55 mm |
| | ST177T | | 7.5 x 60 mm |

# AESCULAP® S4® Element MIS

## E | Implants and Instruments Overview

| Monoaxial Screws | Article No. | Description | |
|---|---|---|---|
|  | ST181T | S4® Element MIS<br>Monoaxial screw, ø 8.5 mm | 8.5 x 30 mm |
| | ST182T | | 8.5 x 35 mm |
| | ST183T | | 8.5 x 40 mm |
| | ST184T | | 8.5 x 45 mm |
| | ST185T | | 8.5 x 50 mm |
| | ST186T | | 8.5 x 55 mm |
| | ST187T | | 8.5 x 60 mm |

## Monoaxial Screws

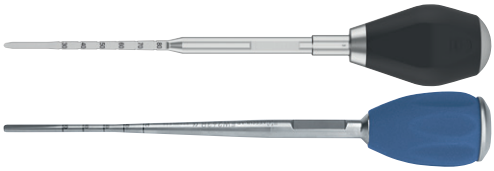



| Article No. | Description | |
|---|---|---|
| ST462T | Monoaxial Screws for Cement Augmentation (sterile packed) | 5.5 x 35 mm |
| ST463T | | 5.5 x 40 mm |
| ST464T | | 5.5 x 45 mm |
| ST465T | | 5.5 x 50 mm |
| ST472T | Monoaxial Screws for Cement Augmentation (sterile packed) | 6.5 x 35 mm |
| ST473T | | 6.5 x 40 mm |
| ST474T | | 6.5 x 45 mm |
| ST475T | | 6.5 x 50 mm |
| ST476T | | 6.5 x 55 mm |
| ST477T | | 6.5 x 60 mm |
| ST478T | | 6.5 x 70 mm |
| ST479T | | 6.5 x 80 mm |
| ST482T | Monoaxial Screws for Cement Augmentation (sterile packed) | 7.5 x 35 mm |
| ST483T | | 7.5 x 40 mm |
| ST484T | | 7.5 x 45 mm |
| ST485T | | 7.5 x 50 mm |
| ST486T | | 7.5 x 55 mm |
| ST487T | | 7.5 x 60 mm |
| ST488T | | 7.5 x 70 mm |
| ST489T | | 7.5 x 80 mm |
| ST492T | Monoaxial Screws for Cement Augmentation (sterile packed) | 8.5 x 35 mm |
| ST493T | | 8.5 x 40 mm |
| ST494T | | 8.5 x 45 mm |
| ST495T | | 8.5 x 50 mm |
| ST496T | | 8.5 x 55 mm |
| ST497T | | 8.5 x 60 mm |
| ST498T | | 8.5 x 70 mm |
| ST499T | | 8.5 x 80 mm |

# AESCULAP® S4® Element MIS

## E | Implants and Instruments Overview

| RodS and Set Screw | Article No. | Description | |
|---|---|---|---|
|  | SW554T | Rod with tip and hexagonal connection, pre-bent, ø 5.5 mm | 5.5 x 35 mm |
| | SW555T | | 5.5 x 40 mm |
| | SW556T | | 5.5 x 45 mm |
| | SW557T | | 5.5 x 50 mm |
| | SW558T | | 5.5 x 55 mm |
| | SW559T | | 5.5 x 60 mm |
| | SW561T | | 5.5 x 70 mm |
| | SW562T | | 5.5 x 80 mm |
| | SW563T | | 5.5 x 90 mm |
| | SW564T | | 5.5 x 100 mm |
| | SW566T | | 5.5 x 110 mm |
| | SW567T | | 5.5 x 120 mm |
|  | SW573T | Rod with tip and hexagonal connection, straight, ø 5.5 mm | 5.5 x 35 mm |
| | SW574T | | 5.5 x 40 mm |
| | SW576T | | 5.5 x 45 mm |
| | SW577T | | 5.5 x 50 mm |
| | SW578T | | 5.5 x 55 mm |
| | SW579T | | 5.5 x 60 mm |
| | SW581T | | 5.5 x 70 mm |
| | SW582T | | 5.5 x 80 mm |
| | SW583T | | 5.5 x 90 mm |
| | SW584T | | 5.5 x 100 mm |
| | SW585T | | 5.5 x 110 mm |
| | SW586T | | 5.5 x 120 mm |
| | SW587T | | 5.5 x 150 mm |
| | SW588T | | 5.5 x 180 mm |
| | SW589T | Rod with hexagonal connection, straight, ø 5.5 mm | 5.5 x 200 mm |
| | SW590T | | 5.5 x 300 mm |
| | SW591T | | 5.5 x 400 mm |
| | SW592T | | 5.5 x 500 mm |
|  | SW790T | Set Screw | |

| Instruments | Article No. | Description |
|---|---|---|
|  | **FW258M** | K-Wire Aiming Device |
|  | **FW271M** | S4® Trocar F/Cannulated Screws |
|  | **FW274M** | S4® Handle to Remove Aiming Device FW258M |
|  | **FW758S** | S4® Element MIS K-Wire 1.5 x 530 mm Blunt |
|  | **SZ376R****<br>**alternative**<br>**FW263R** | S4® Bone Probe Straight for Cannulated Screws |
|  | **FW814T** | S4® Element MIS Tissue Dilator 10.0 mm |
|  | **FW815T** | S4® Element MIS Tissue Dilator 14.0 mm |
|  | **FW816T** | S4® Element MIS Tissue Dilator 18.5 mm |
|  | **BM178R** | TC Needle Holder Double Action Heavy 200 mm* |

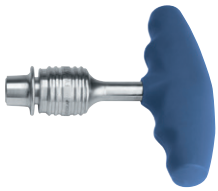
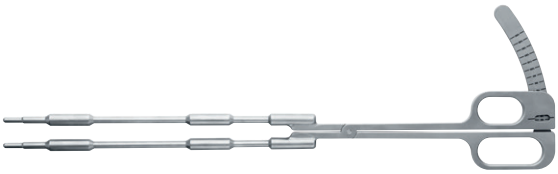
* *This article is optional.*
** *Please note that the articles have an older version which is shipped as long as available.*

# AESCULAP® S4® Element MIS

## E | Implants and Instruments Overview

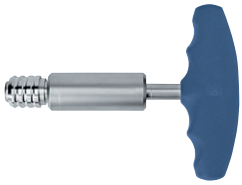
| Instruments | Article No. | Description |
|---|---|---|
|  | **FL036R** | Mallet, Removable Discs, 135 g* |
|  | **FW351R** | S4® Screw Length Measuring Device |
|  | **FW146R** | Pedicle Probe with Button Straight |
|  | **FW147R** | Pedicle Probe with Button Curved |
|  | **FW264R** | S4® Screw Tap for Cannulated Screws 4.5 mm |
|  | **FW265R** | S4® Screw Tap for Cannulated Screws 5.5 mm |
|  | **FW266R** | S4® Screw Tap for Cannulated Screws 6.5 mm |
|  | **FW267R** | S4® Screw Tap for Cannulated Screws 7.5 mm |
|  | **FW268R** | S4® Screw Tap for Cannulated Screws 8.5 mm |

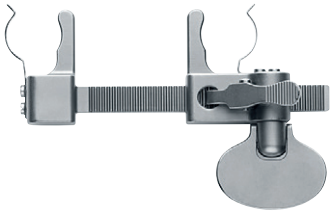
*this article is optional

| Instruments | Article No. | Description |
|---|---|---|
|  | **FW165R** | S4® Ratchet Handle Blue Straight |
|  | **FW167R** | S4® Cannulated |
|  | **FW774R** | S4® Element MIS Rod Caliper |
|  | **FW759R** | S4® Element MIS Rod Length Measurement Device |
|  | **FW240R** | S4® Rod Insertion Instrument with Hexagon Jaws |
|  | **FW760R** | S4® MIS Element Freehand Rod Inserter |
|  | **FW757R** | S4® Element MIS Set Screw Inserter |

# AESCULAP® S4® Element MIS

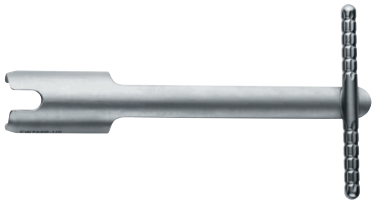
## E | Implants and Instruments Overview

| Instruments | Article No. | Description |
|---|---|---|
|  | **FW777R** | S4® Element MIS Counter Torque Handle |
|  | **FW776R** | S4® Element MIS Torque Wrench Shaft |
|  | **FW778R** | Torque Wrench Handle 10Nm |
|  | **FW170R** | S4® Torque Indicating Screw Driver |
|  | **FW764R** | S4® Element MIS Compressor |
|  | **FW281R** | S4® Element Distractor |
|  | **FW752R** | S4® Element MIS Downtube |
|  | **FW755R** | S4® Element MIS Insertion Key |

| Instruments | Article No. | Description |
|---|---|---|
|  | **FW750R** | S4® Element MIS Polyaxial Screwdriver |
|  | **FW751R** | S4® Element MIS Monoaxial Screwdriver |
|  | **FW773R** | Gauge Block |
|  | **FW762R** | S4® Element MIS Rod Persuader |
|  | **FW763R** | S4® Element MIS Rod Persuader Handle |
|  | **FW765R** | S4® Element MIS Rack Compressor |
|  | **FW753R** | S4® Element MIS Downtube Connector |

# AESCULAP® S4® Element MIS

## E | Implants and Instruments Overview

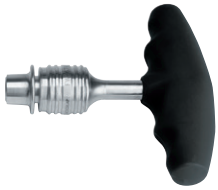
| Instruments | Article No. | Description |
|---|---|---|
|  | **FW744P** | S4® Element MIS Rack Handle |
|  | **FW756R** | S4® Element MIS Removal Key |
|  | **SZ072SU** | ROD BENDING TEMPLATE 60 MM |
|  | **SZ073SU** | ROD BENDING TEMPLATE 150 MM |
|  | **SZ074SU** | ROD BENDING TEMPLATE 290 MM |
|  | **FW766R** | S4® Element MIS De-Rotation Sleeves |
|  | **FW769R** | S4® Element MIS Rescue Alignment Tool |
|  | **FW749P** | S4® Element MIS Peek Dilation Sleeve |
|  | **FW768R** | S4® Element MIS Rescue Instrument |

| Instruments | Article No. | Description |
|---|---|---|
|  | **FW772R** | S4® Element MIS Setscrew Removal Driver |
|  | **FW771R** | S4® Element MIS Mono Removal Driver |
|  | **FW770R** | S4® Element MIS Poly Removal Screw Driver |
|  | **FW775R** | S4® Element Locked Head Removal Driver |
|  | **FW024R** | Rod Bending Forceps Adjustable |
|  | **GF385R** | Long Frasier Tip* |

*this article is optional

# AESCULAP® S4® Element MIS

## E | Implants and Instruments Overview

| Instruments | Article No. | Description |
|---|---|---|
|  | **SR158SU** | S4® Element Cement Application Cannula |
|  | **SR159R** | S4® Element Locking Nut F/Augmentation |
|  | **SR154R** | S4® Element T-Handle F/Augmentation |
|  | **SR155R** | S4® Element Handle F/Augmentation STR |

# F | Literature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