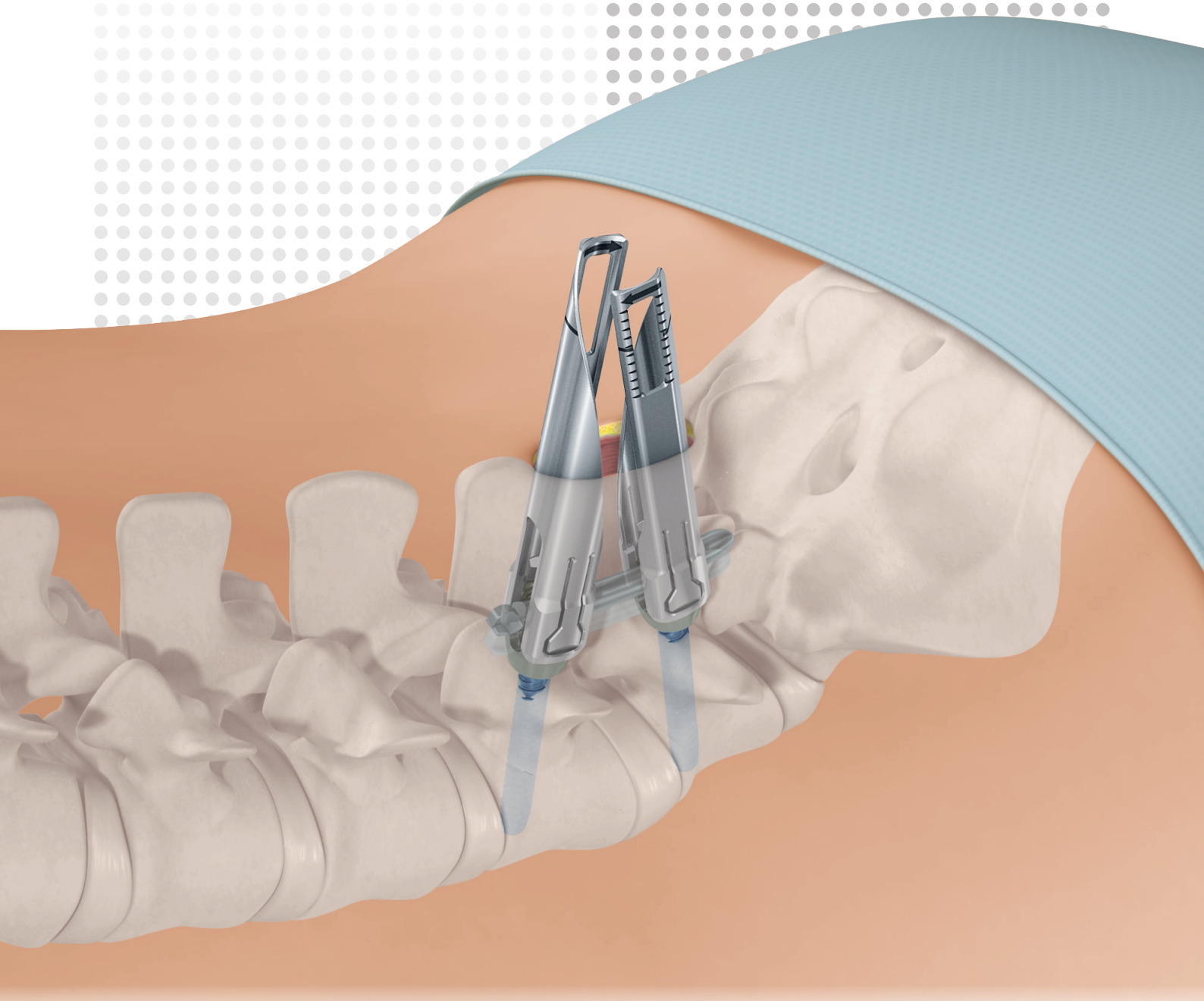
MATRIX SPINE SYSTEM

– MIS INSTRUMENTATION

Surgical Technique



DePuy Synthes

THE ORTHOPAEDICS COMPANY OF Johnson & Johnson

Image intensifier control

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

Processing, Reprocessing, Care and Maintenance

For general guidelines, function control and dismantling of multi-part instruments, as well as processing guidelines for implants, please contact your local sales representative or refer to:

http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance

For general information about reprocessing, care and maintenance of Synthes reusable devices, instrument trays and cases, as well as processing of Synthes non-sterile implants, please consult the Important Information leaflet (SE_023827) or refer to:
http://emea.depuysynthes.com/hcp/reprocessing-care-maintenance

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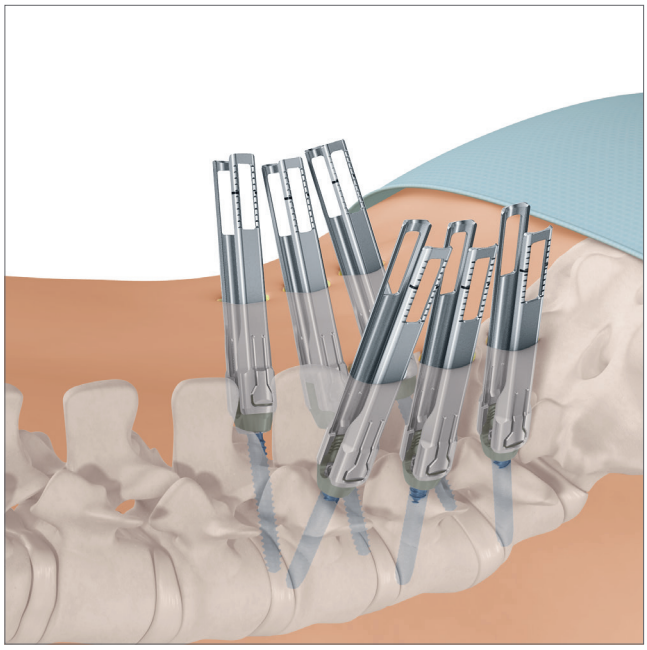
For Product Catalogue contact your local DePuy Synthes representative

Image Intensifier Control

▲ Warnings/Precautions

MATRIX Spine System – MIS Instrumentation

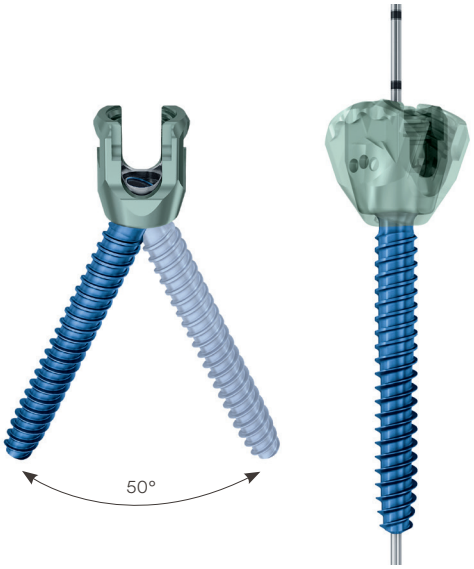
MATRIX MIS is an instrument set designed for insertion of cannulated MATRIX pedicle screws and rods through a percutaneous or mini-open approach.



Implants

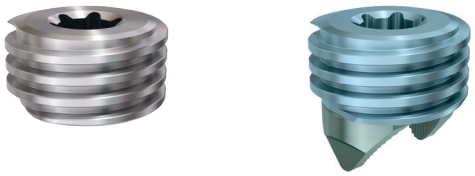
Preassembled Polyaxial and Reduction Pedicle Screw

- Allows up to 50° of angulation to facilitate in situ connection to the longitudinal rod
- Standard polyaxial head incorporates features to mate with retraction blades
- 1.8 mm cannulation for use over 1.6 mm Kirschner Wires
- Dual core and double lead thread design
- Threaded T25 Stardrive recess



Locking Cap

- Square thread design
- T25 Stardrive recess
- 1-step locking cap
- Available flat or with guidance



MIS Rods

- 5.5mm diameter in commercially pure titanium
- Bullet-nosed tip
- Available in straight or curved options
- Rod length portfolio of straight, 100 mm and 200 mm bend radius

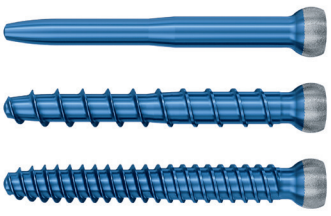
Radius 100

Radius 200

Straight

Dual Core / Double Lead Screw Design

- Dual core and double lead thread design
- Rounded blunt tip and self-tapping thread
- Threaded T25 Stardrive recess



Instruments

Rod Introduction Instrument

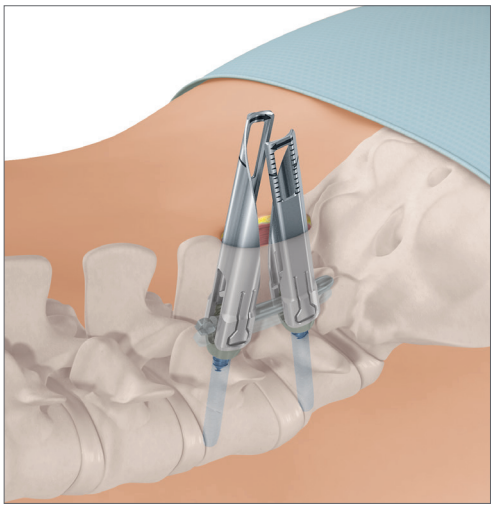
- Allows rod to pivot with user controlled braking
- Designed to facilitate rod detachment
- Controlled rod insertion

Screwdriver – Screw Interlock

- Retaining sleeve threads into screw
- Screwdriver inserted through sleeve into screw recess
- Retaining sleeve disengaged following screw insertion

Retraction Blades

- For mini-open and percutaneous approach
- Designed to provide tissue protection
- Specific instruments for treatment of the lumbar-sacral junction



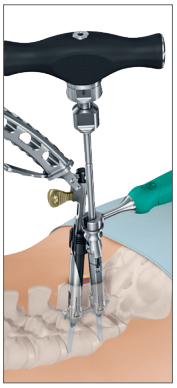
Three Functions in One Instrument

Cap guide instrument is used for:

- rod reduction
- locking cap insertion
- final tightening

Rod Reduction

Cap Insertion



Final Tightening

MIS Instruments

- A comprehensive set of MIS specific instruments designed to allow the surgeon to implant the MATRIX MIS System
- Dedicated instrument designed to control the advancement and removal of the Kirschner Wire
- Distraction and compression instruments

AO Spine Principles

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

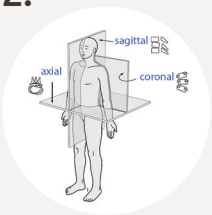
AO Principles[1,2]

1.

Stability

Stabilization to achieve a specific therapeutic outcome.

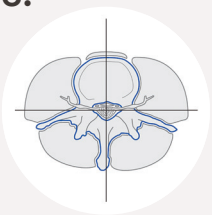
2.



Alignment

Balancing the spine in three dimensions.

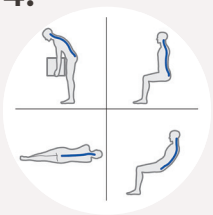
3.



Biology

Etiology, pathogenesis, neural protection, and tissue healing.

4.



Function

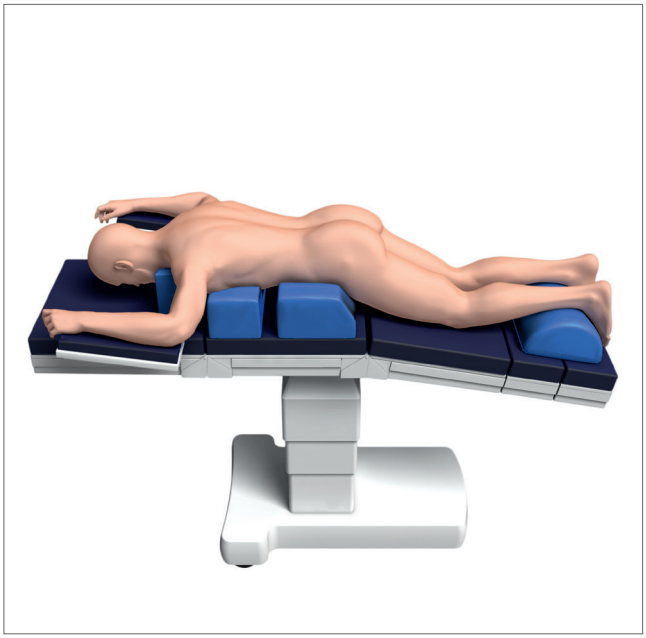
Preservations and restoration of function to prevent disability.

1. Aebi M, Thalgott JS, Webb JK (1998) AO/ASIF Principles in Spine Surgery. Springer-Verlag, Germany.
2. Aebi M, Arlet V, Webb JK (2007): AOSPINE Manual (2 vols), Stuttgart, New York: Thieme.

Preparation

1. Patient positioning

Position the patient on a radiolucent OR table in the prone position. To obtain optimal visualization of the spine, the OR table should have enough clearance available for a fluoroscopic C-arm to rotate freely for AP, oblique and lateral views. Accurate visualization of the anatomic landmarks and fluoroscopic visualization of the pedicles are imperative for using the MATRIX MIS System. In the following sections, the use of AP and lateral fluoroscopy will be described.



2. Approach

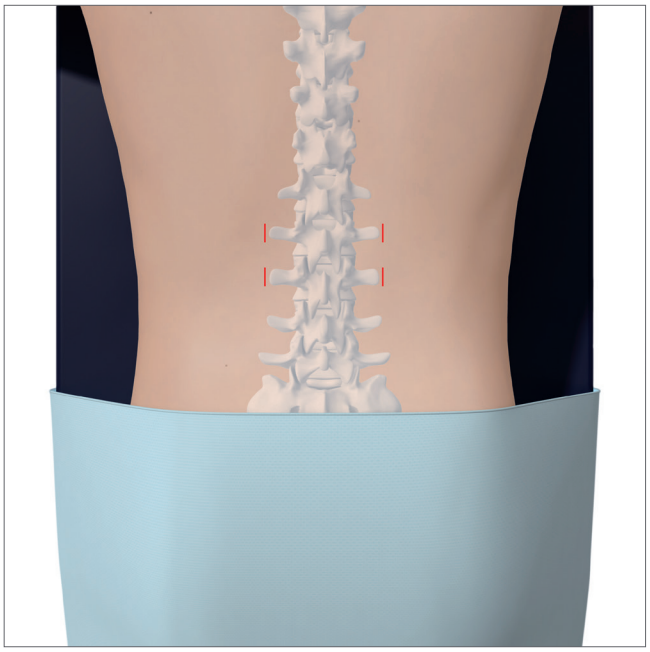
Option A: Percutaneous approach

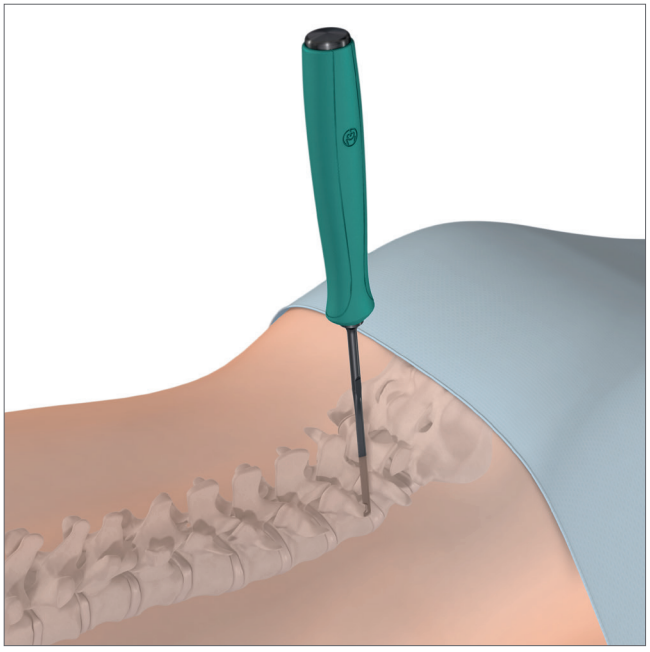
Instrument	
03.616.046	Dissector, blunt

The percutaneous approach facilitates blunt dissection of the muscles through small individual incisions, through which single implants are placed.

- Using fluoroscopy, locate and mark the lateral borders of each pedicle to receive a screw. These marks indicate where the individual incisions will be made. Each incision should have a sagittal orientation and should be approximately 15 mm in length, depending on patient anatomy and fluoroscopic location of the pedicles.

After determining the appropriate locations, make each incision in the skin and the fascia where appropriate. The blunt dissector can be used to facilitate dissection of the tissue prior to subsequent insertion of pedicle preparation instruments.





Option B: Mini-open approach

Instrument	
03.616.046	Dissector, blunt

The mini-open approach allows an atraumatic blunt dissection of the muscles so that all instruments and implants are introduced through a common incision.

Using fluoroscopy, locate and mark the lateral borders of the pedicles. This will indicate where the fascial incisions should be made. As a general guide, the incisions should be made 2 cm – 4 cm lateral to the midline. This depends on patient anatomy and actual fluoroscopic location of the pedicles.

Lateral or bilateral skin and fascial incisions

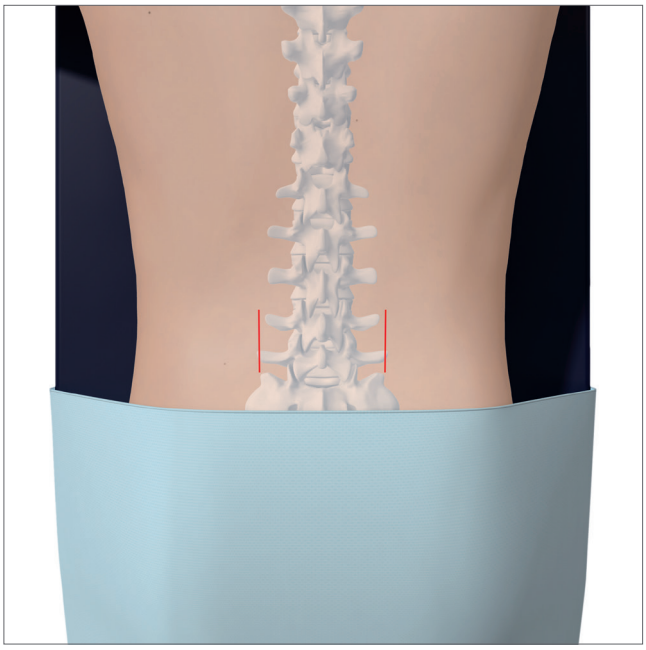
After determining the surgical trajectory, make an incision in the skin and the fascia of the appropriate size (approximately 30 mm for single-level procedures). Following incision of the fascia, locate the cleavage plane between the multifidus and longissimus muscle groups. Bluntly dissect between the multifidus and longissimus muscle planes down to the bony anatomy. Careful separation of the muscle planes can yield an avascular dissection. Ensure that adequate dissection is performed to accommodate further instrument and implant placement. The blunt dissector can be used to facilitate dissection of the tissue planes.

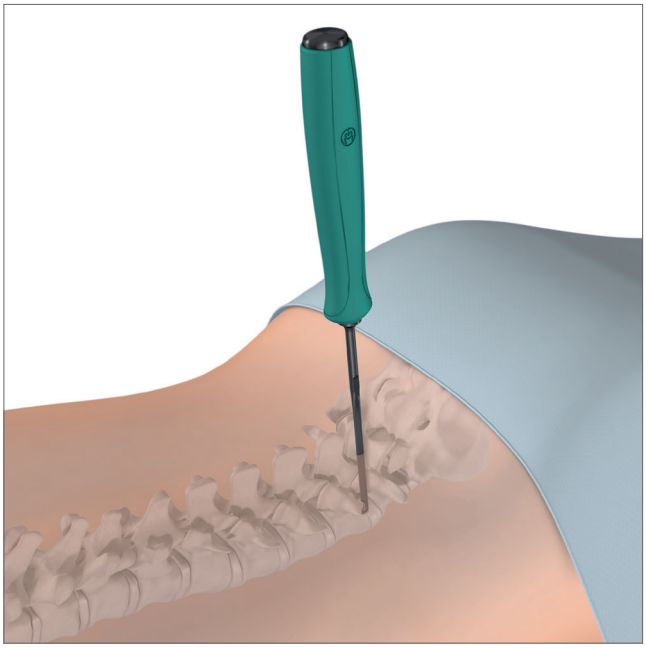
Midline skin incision

Alternatively, a midline skin incision with lateral or bilateral fascial incisions can be applied.

▲ Precaution

- **Consider incision location with respect to final construct positioning to reduce soft tissue forces on the construct during assembly.**

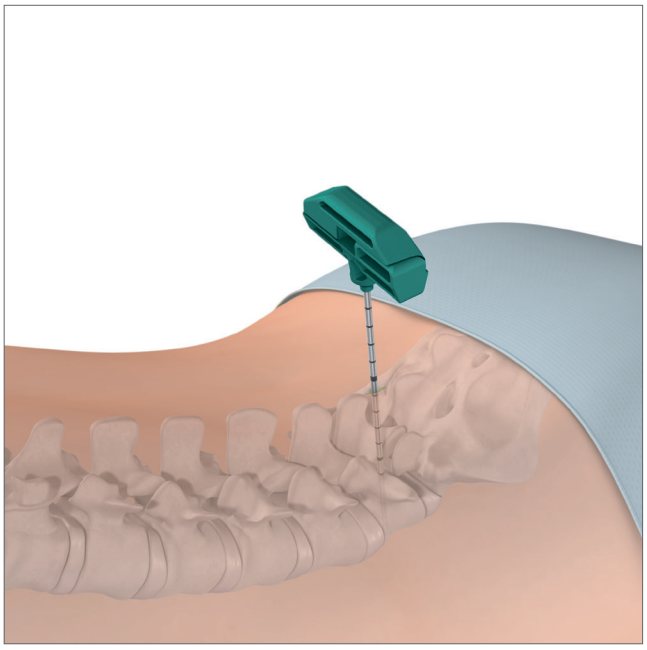




Pedicle Preparation

1. Perforate cortex of pedicle with bone access needle

Place the tip of the bone access needle at the entry point of the pedicle and align the bone access needle with the pedicle trajectory. If necessary, reinsert and realign the needle. Advance the bone access needle into the pedicle by tapping lightly with a mallet. Twist the handle one-quarter turn to detach the trocar from the bone access needle while ensuring the bone access needle remains in place.



▲ Warning

- Use fluoroscopy to monitor position of the awl during insertion.

Alternative technique:
Perforate cortex of pedicle with cannulated awl

Instruments	
03.600.032	Pedicle Awl Ø 3.8 mm, cannulated, length 255 mm, for Screws Ø 5.0 to 7.0 mm
03.606.021	Trocar Holder, for No. 03.606.020
03.616.062	Trocar for cannulated Awl

Optional Instruments	
03.600.030	Pedicle Awl Ø 5.6 mm, cannulated, length 255 mm, for Screws Ø 8.0 and 9.0 mm
03.627.029	Instrument Holder, radiolucent

Assemble cannulated awl

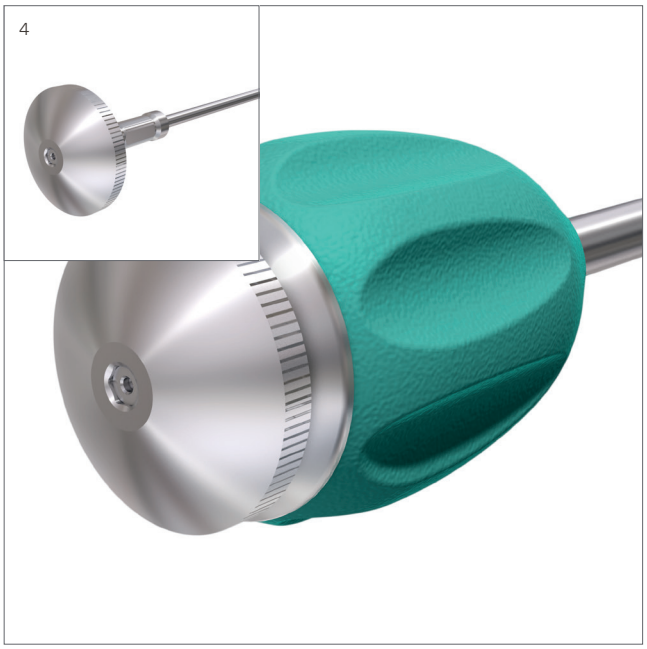
Unscrew the knob from the trocar holder and place it on a flat surface. Insert the large end of the trocar and seat it in the knob recess (1).

Slide the holding sleeve over the trocar and tighten (2).

When the trocar and trocar holding sleeve are assembled, the end of the trocar should be seated in the knob, making it flush with the knob (3).

- Select the cannulated awl that corresponds to the appropriate screw diameter

Insert the assembled trocar with holding sleeve into the palm handle of the cannulated awl and tighten (4).



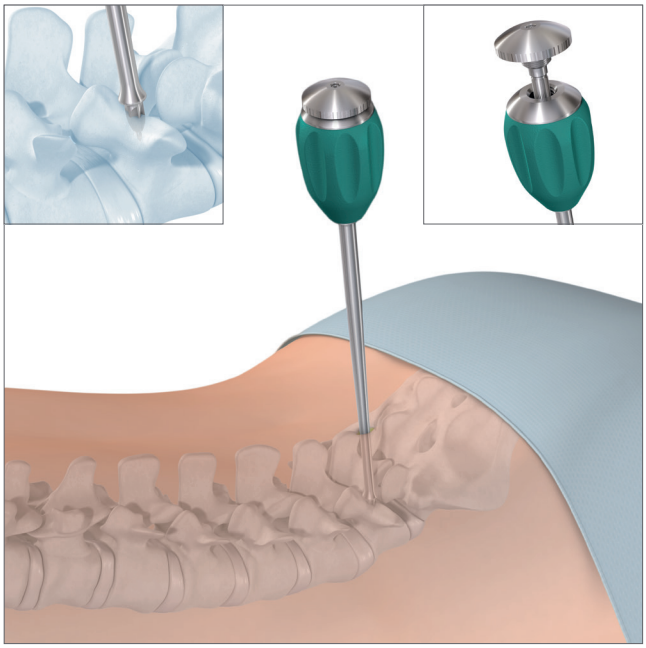
Perforate cortex of pedicle with cannulated awl

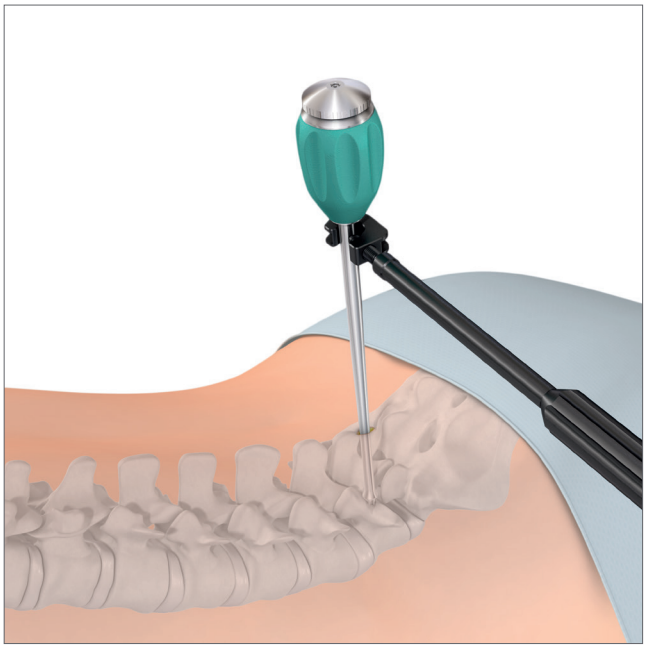
Use a cannulated awl with the trocar and trocar holder to perforate the cortex of the pedicle. While maintaining the awl's position within the pedicle, rotate the trocar assembly counterclockwise to remove it from the end of the awl.

▲ Warning

- Use fluoroscopy to monitor position of the awl during insertion.

To reduce exposure to radiation to the staff, the pedicle awl can be attached to the radiolucent instrument holder.

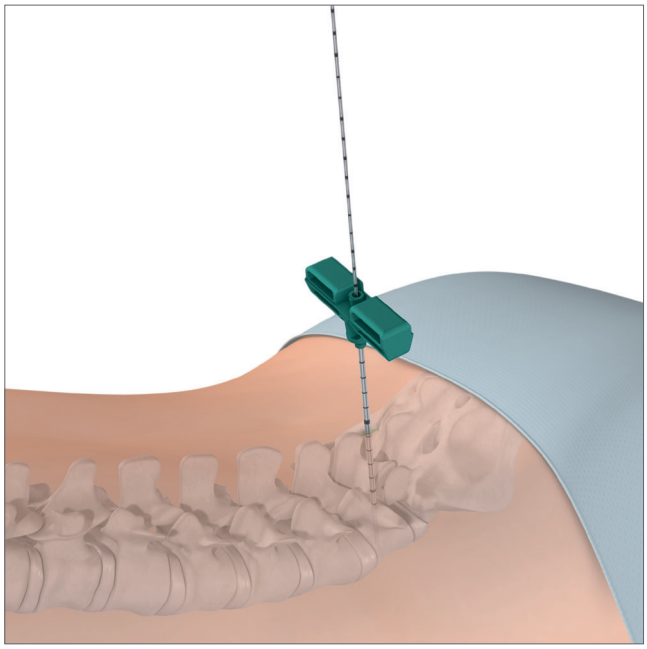




2. Insert Kirschner Wire

Instrument

02.606.003	Kirschner Wire Ø 1.6 mm without trocar tip, length 480 mm, Stainless Steel



▲ Warning

- **Ensure the Kirschner Wires remain securely in position throughout the entire duration of the procedure.**
- **Monitor the tip of the Kirschner Wire under flouroscopy to ensure it does not penetrate the anterior wall of the vertebral body.**

The Kirschner Wires are long enough to be held in place by hand during pedicle preparation and soft tissue dilation.

Insert the Kirschner Wire into the end of the cannulated awl or bone access needle.

- **Advance the Kirschner Wire, guided by fluoroscopy, to the appropriate depth. Kirschner Wire etch lines can be used as a depth reference.**

The Kirschner Wire can be advanced manually or with the handle for Kirschner Wire (see alternative technique using handle for Kirschner Wire).

Insert all Kirschner Wires as required.

Alternative technique:
Using the handle for Kirschner Wire

Instrument	
03.616.070	Handle for Kirschner Wire Ø 1.6 mm

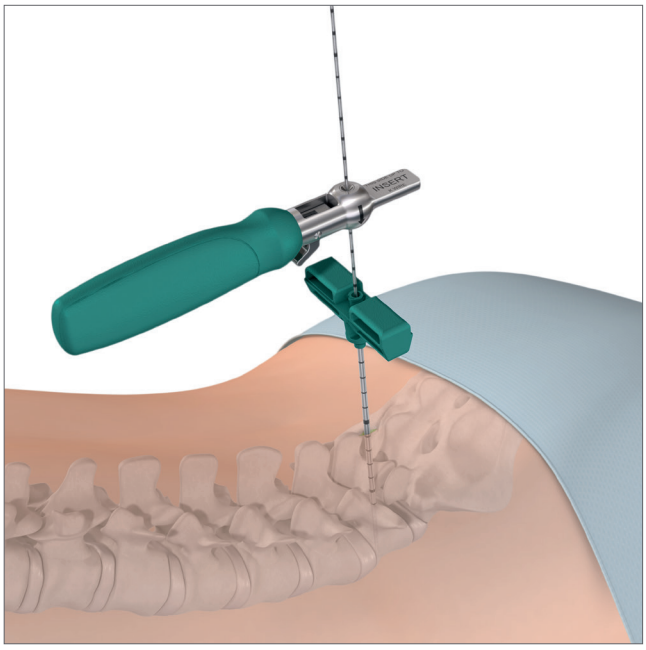
Optional instrument	
SFW691R	Combined Hammer

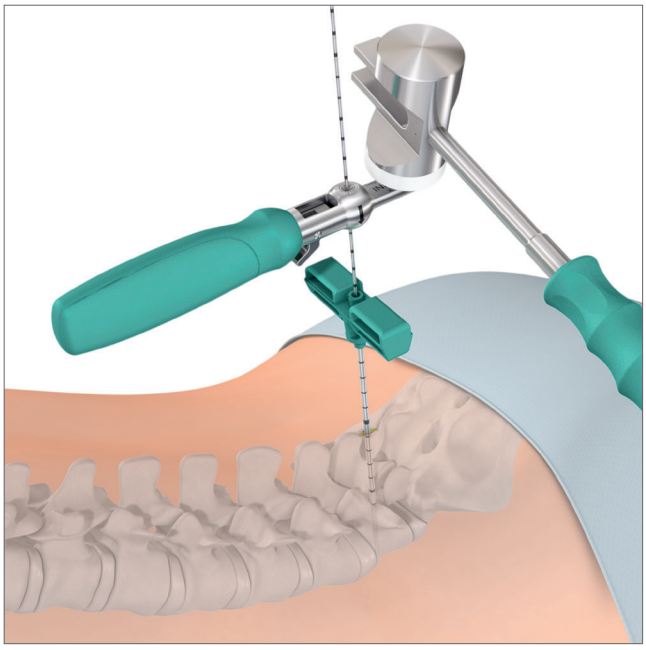
The handle for Kirschner Wire is used to either advance or remove Kirschner Wires during the procedure. The arrow on the tool indicates direction of Kirschner Wire advancement or removal. To use the handle for Kirschner Wire, depress the locking trigger and slip the tool over the Kirschner Wire. Release the trigger to locate the tool at a position above the end of the cannulated awl or bone access needle. The distance between the tool and the cannulated awl or bone access needle equals the insertion depth of the Kirschner Wire.

Lightly mallet the impaction surface to advance the Kirschner Wire.

Stop impacting when the tool reaches the top of the cannulated awl or bone access needle.

Insert all Kirschner Wires as required.





Alternative technique:
Using the flexible guide wire and tamp

Instruments	
04.616.500	Guide Wire, flexible
03.616.081	Tamp for Nitinol Kirschner Wire
SFW691R	Combined Hammer

The flexible guide wires can easily be bent away from the area of work or for fluoroscopy. The tamp is used to either advance or remove the flexible guide wires.

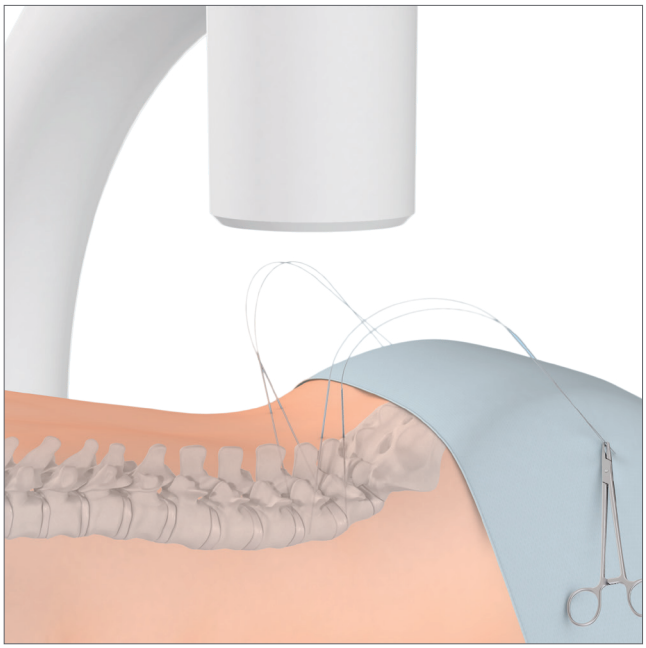
Insert the flexible guide wire through a bone access needle. Turn the knob of the tamp counterclockwise to open the locking feature and slip the tool over the guide wire.

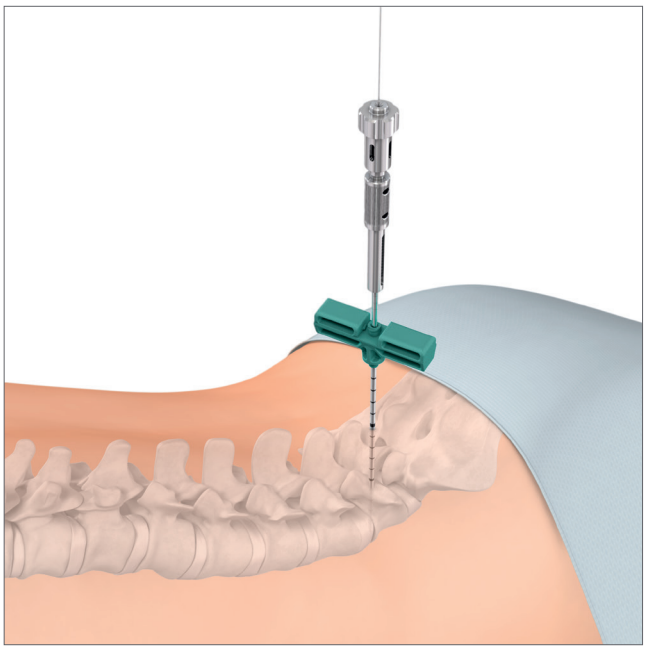
Rest the tip of the tool inside the Luer lock port of the pedicle access cannula needle. Hold the knurled section of the tamp and turn the knob clockwise to tighten the tool on the guide wire.

- Avoid placing downward pressure on the tool while tightening to the guide wire.

▲ Warning

- Monitor the tip of the flexible guide wire under fluoroscopy to ensure it does not penetrate the anterior wall of the vertebral body.





Lightly mallet the top of the tamp to advance the guide wire. Depth graduations in 5 mm increments are provided on the tip of the instrument to estimate depth of guide wire advancement.

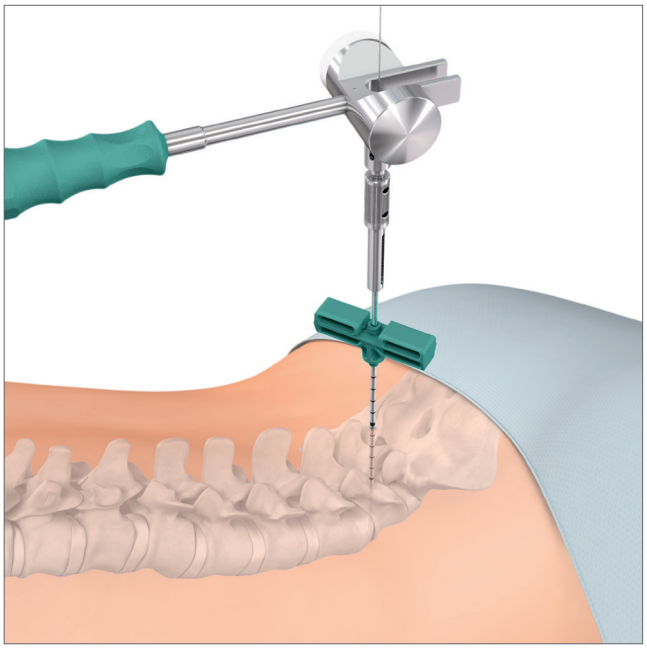
After each 15 mm of insertion, the tamp needs to be retracted to allow the guide wire to be further advanced. Turn the knob counterclockwise to open the locking feature, retract the tamp until the spring loaded tip is fully extended and turn the knob clockwise to retighten.

Stop impacting when the guide wire reaches the desired depth.

- **The tamp can advance the guide wire 15 mm from the end of the bone access needle.**

To remove the tool, turn the knob counterclockwise to loosen and slide the tool off the guide wire. Insert all guide wires as required.

For guide wire removal, insert the guide wire into the hole in the center of the knob. Turn the knurled portion of the tool clockwise to tighten the tool on the guide wire. Lightly mallet on the tool upwards to remove the guide wire.



3. Pedicle Probe

Instrument	
03.600.033	Pedicle Probe Ø 3.5 mm, cannulated, length 240 mm, for Screws Ø 5.0 to 7.0 mm

Optional instruments	
03.600.031	Pedicle Probe Ø 5.0 mm, cannulated, length 240 mm, for Screws Ø 8.0 and 9.0 mm
03.627.029	Instrument Holder, radiolucent

While maintaining the position of the Kirschner Wire within the pedicle, remove the cannulated awl or bone access needle. Place the tip of the cannulated probe over the end of the Kirschner Wire.

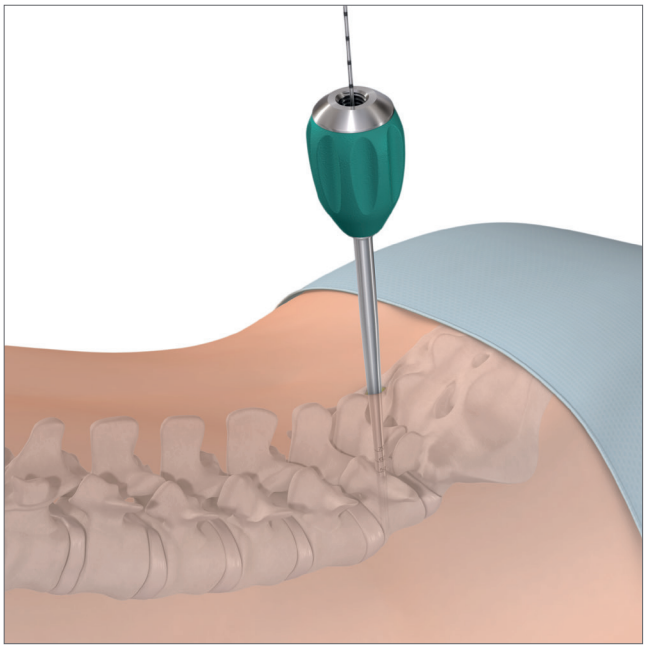
▲ Warning

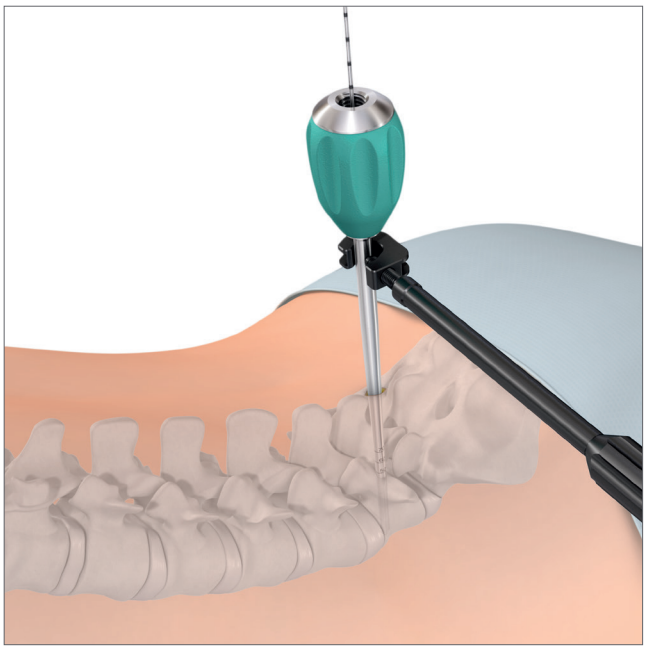
- **To prevent inadvertent advancement of the Kirschner Wire, align the trajectory of the probe with the Kirschner Wire and monitor the Kirschner Wire position using fluoroscopy.**

▲ Precaution

- **To avoid glove damage, ensure that the exit point for the Kirschner Wire is held free.**

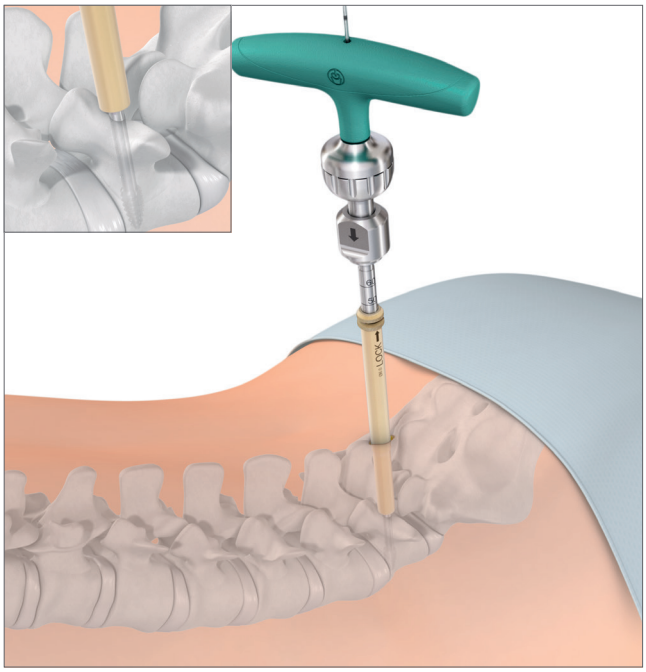
To reduce exposure to radiation to the staff, the pedicle probe can be attached to the radiolucent instrument holder.

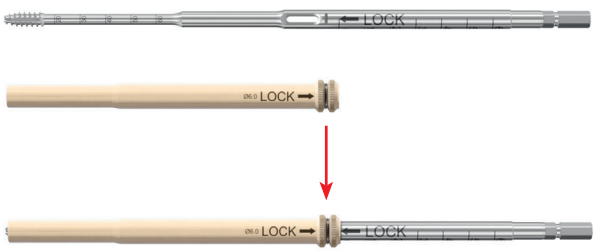




4. Tap pedicle (optional)

Instruments	
03.620.205	Tap, cannulated, for Pedicle Screws Ø 5.0 mm with dual core, length 230 /15 mm
03.620.206	Tap, cannulated, for Pedicle Screws Ø 6.0 mm with dual core, length 230 /15 mm
03.620.207	Tap, cannulated, for Pedicle Screws Ø 7.0 mm with dual core, length 230 /15 mm
03.620.208	Tap, cannulated, for Pedicle Screws Ø 8.0 mm with dual core, length 230 /15 mm
03.620.209	Tap, cannulated, for Pedicle Screws Ø 9.0 mm with dual core, length 230 /15 mm
03.616.075	Protection Sleeve for Ø 5.0 mm cannulated Tap, PEEK
03.616.076	Protection Sleeve for Ø 6.0 mm cannulated Tap, PEEK
03.616.077	Protection Sleeve for Ø 7.0 mm cannulated Tap, PEEK
03.616.078	Protection Sleeve for Ø 8.0 mm cannulated Tap, PEEK
03.616.079	Protection Sleeve for Ø 9.0 mm cannulated Tap, PEEK
03.632.090	T-Handle with Ratchet Wrench, with Hexagonal Coupling Ø 6.0 mm





Prepare a pathway for the dual core screws with the cannulated taps by penetrating the pedicle prior to screw insertion. To reduce trauma to surrounding soft tissues, protection sleeves cover the proximal tip of the tap. The protection sleeves are made of electrically insulating PEEK material. To lock the protection sleeve onto the cannulated tap shaft, align the arrows and push together. To unlock the protection sleeve, hold the knurled portion of the protection sleeve and advance the tap clockwise. Depth graduations are provided at both ends of the tap to estimate depth for proper implant sizing.

▲ Warning:

- To prevent inadvertent advancement of the Kirschner Wire, align the trajectory of the tap with the Kirschner Wire and monitor the Kirschner Wire position using fluoroscopy.
- To reduce trauma to surrounding soft tissues, protection sleeves to cover proximal tip of the tap must be used.

Screw Insertion

1. Determine screw length

Instruments	
03.616.074	Dilator Ø 1.8 mm / 10.0 mm (PEEK/SSt)
03.631.521	Screw Length Indicator

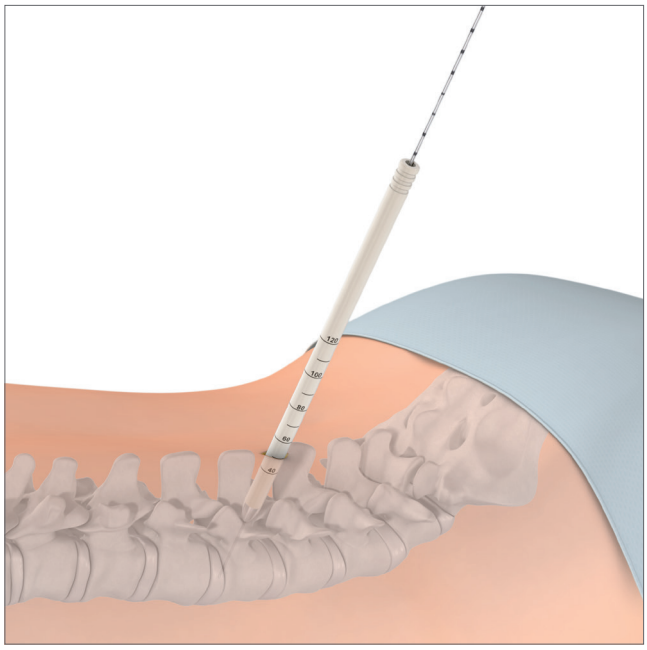
The correct length of the screw must be determined after the Kirschner Wires have been placed and pedicles have been prepared.

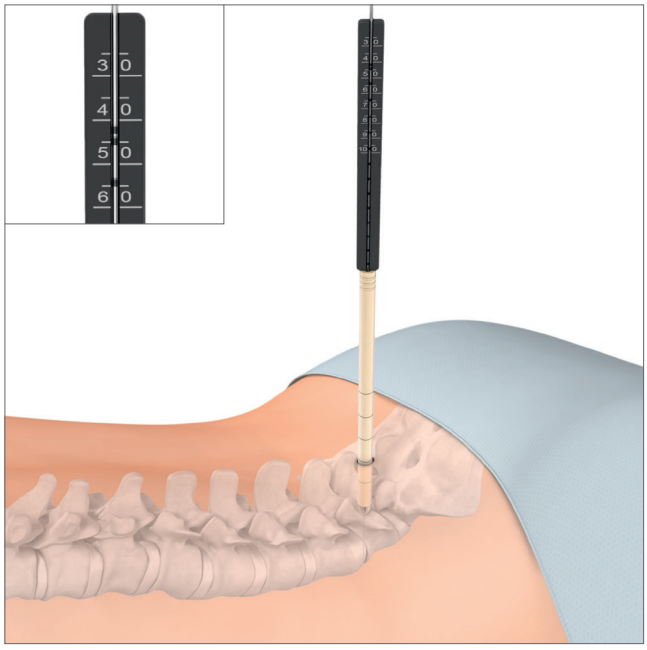
Insert the 10 mm dilator over the Kirschner Wire until the tip reaches the pedicle entry point. The dilator is made of electrically insulating PEEK material.

▲ Warning

- **To prevent inadvertent advancement of the Kirschner Wire while inserting the dilator, monitor the Kirschner Wire position using fluoroscopy.**

Determine the screw length by placing the screw length indicator on top of the dilator. Read off the screw length between the double lines of the Kirschner Wire.





2. Polyaxial screw assembly (optional)

Instrument	
03.632.037	Positioning Instrument for Polyaxial Screw Heads, for Matrix 5.5

Optional Instrument	
68.632.125	Loading Station for Matrix 5.5

- In case an unassembled cannulated pedicle screw is used, the polyaxial head needs to be assembled prior to the attachment of the retraction blades and the insertion of screw assembly.

To pick up a screw head, align the positioning instrument for polyaxial screw heads to the rod slot features on the polyaxial head implant and press down.

Position the placement tool with the polyaxial head over the unassembled pedicle screw and press down. To ensure the polyaxial head is securely attached to the unassembled pedicle screw, gently lift up on the placement tool and angulate the polyaxial head.

To release the head placement tool, press the button located at the distal end of the instrument.

▲ Precaution:

- Do not use a screw head which was removed from a pedicle screw previously.
- Ensure that polyaxial head is securely attached to the unassembled pedicle screw by gently lifting the positioning instrument and angulate the polyaxial head.

3. Select retraction blades

Instruments	
03.616.074	Dilator Ø 1.8 mm / 10.0 mm (PEEK/SSt)
03.616.035	Retraction blade, percutaneous
03.616.036	Retraction blade, mini-open

Optional instruments	
03.616.037	Retraction blade, percutaneous, long
03.616.038	Retraction blade, mini-open, long

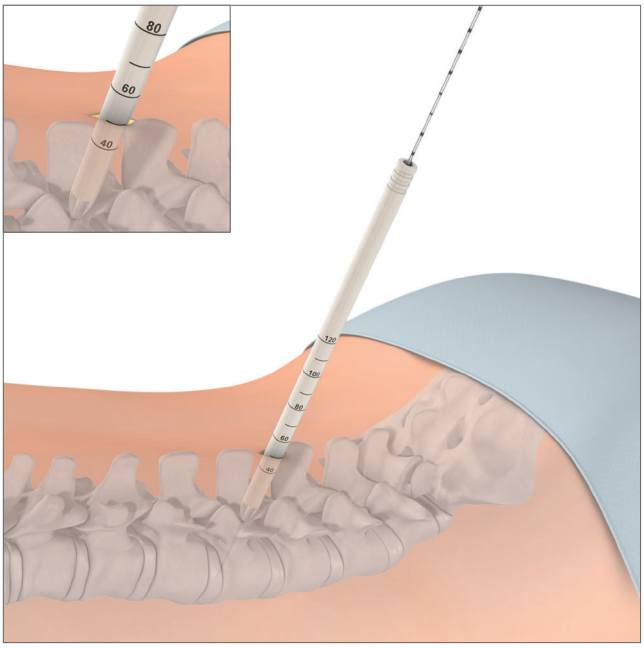
For the mini-open method, a single level construct will utilize only Retraction blade, mini-open.

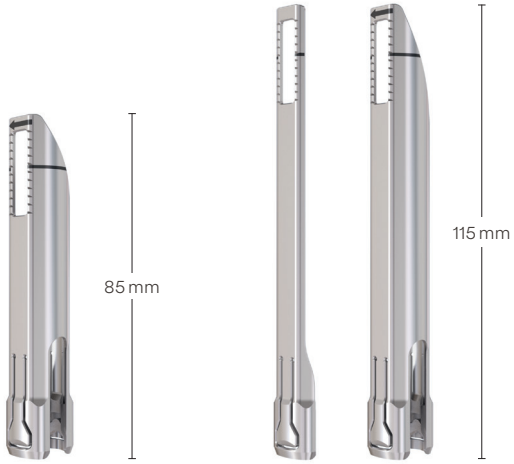
For percutaneous method and multilevel constructs, use the Retraction blade, percutaneous at all levels.

Use the standard retraction blade for approaches up to 80 mm.

Use the long retraction blade for any approach greater than 80 mm.

Etch markings on the side of the dilator indicate tissue depth.





Retraction blades, standard

Retraction blades, long

4. Attach retraction blade to pedicle screw

Choose the appropriate screw. Check length and verify diameter of the pedicle awl/probe or tap (if used) and the selected screw correspond to each other.

To connect a retraction blade, mini-open to the screw, hold the pedicle screw and the retraction blade in opposite hands, and align the slots. Pinch the retraction blade as shown in (1) while pressing the retraction blade onto the pedicle screw until they snap together.

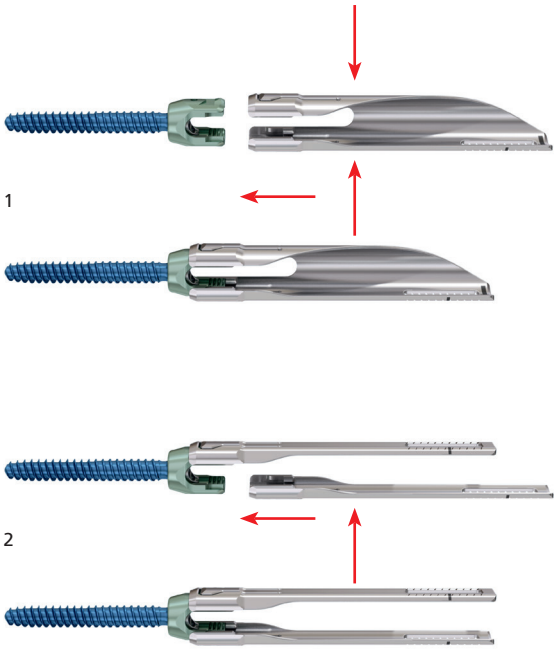
To connect a percutaneous retraction blade to the screw, hold the blade whilst applying finger tip pressure to the starting point of the leaf spring as shown in (2). Press the retraction blade onto one side of the pedicle screw until they snap together.

Snap a second retraction blade onto the opposite side of the pedicle screw.

- **Check with a brief “push and pull” of the retraction blade/screw construct to ensure secure attachment of the blades.**

▲ Precaution

- **To avoid glove damage, do not hold the retraction blade near the bottom of the deflecting tab.**



Alternative technique:
Using reattachment tool

Instrument	
03.616.072	Retraction Blade Reattachment Tool

Choose the appropriate screw. Check length and verify diameter of the pedicle probe or tap (if used) and the selected screw correspond to each other.

To connect a mini-open retraction blade, slide it up the shaft of the reattachment tool so that the window of the retraction blade matches up with the etch marks on the tool. The retraction blade will catch in the ring of the tool.

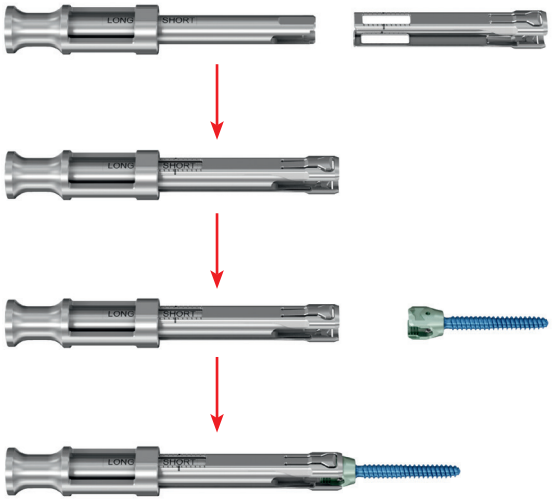
To connect percutaneous retraction blades to the screw, load the first retraction blade onto one side of the reattachment tool. Load a second retraction blade, percutaneous onto the opposite side of the reattachment tool.

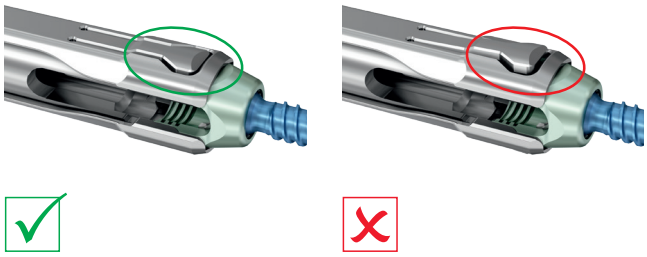
Hold the pedicle screw and the loaded reattachment tool in opposite hands, and align the slots. Press the reattachment tool onto the pedicle screw until the retraction blades snap on. The leaf springs of the retraction blades have to be fully engaged in the snap on feature.

- **Check with a brief “push and pull” of the retraction blade/screw construct to ensure secure attachment of the blades.**

▲ Precaution

- **To avoid glove damage, do not hold the retraction blade near the bottom of the deflecting tab.**





Alternative technique:
Attach retraction blade to pedicle screw seated in the screw module

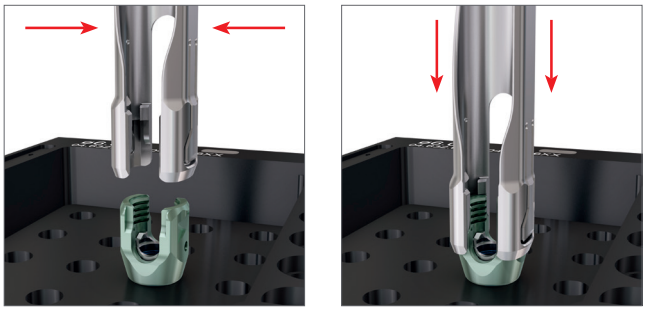
Choose the appropriate screw. Check length and verify diameter of the pedicle awl/probe or tap (if used) and the selected screws correspond to each other.

Hold the retraction blade as described on page (24) and press it onto the pedicle screw in the screw module until they snap together.

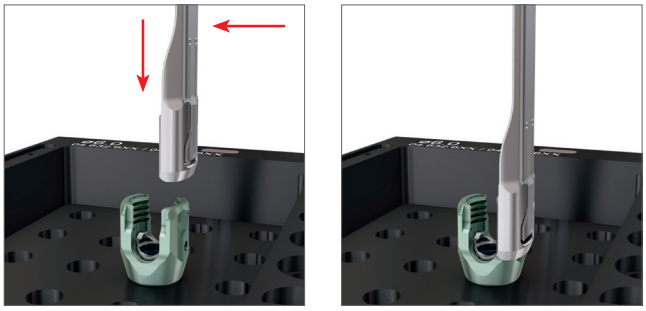
- Check with a brief “push and pull” of the retraction blade/screw construct to ensure secure attachment of the blades.

▲ Precaution

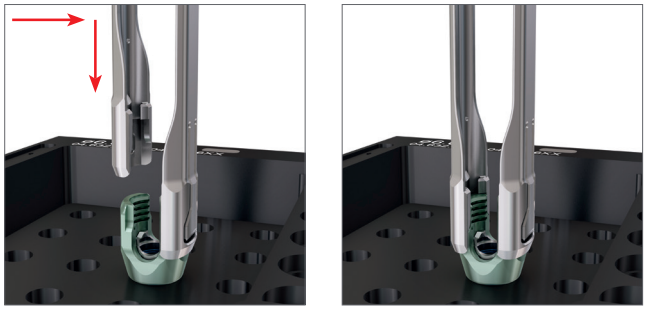
- To avoid glove damage, do not hold the retraction blade near the bottom of the deflecting tab.



Retraction blade, mini-open



Retraction blade, percutaneous



5. Load screw assembly to locking retaining sleeve

Instruments	
03.616.043	Retaining Sleeve, locking, long
03.632.073	Screwdriver Shaft, T25, cannulated, long
03.632.090	T-Handle with Ratchet Wrench, with Hexagonal Coupling Ø 6.0 mm

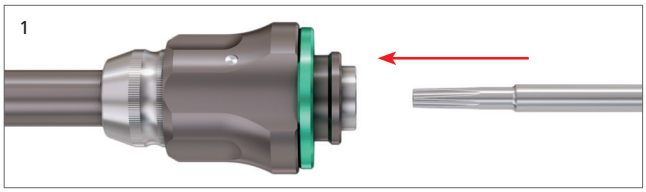
Optional Instruments	
03.632.042	Rod Pusher/Counter Torque for Reduction Screw, for Matrix 5.5
03.632.003	Screwdriver Shaft, T25, cannulated, standard

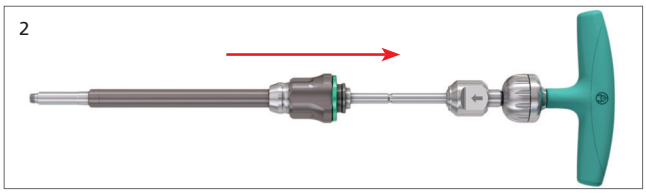
To assemble the screwdriver and the retaining sleeve, depress the loading collar on the proximal end of the retaining sleeve (1).

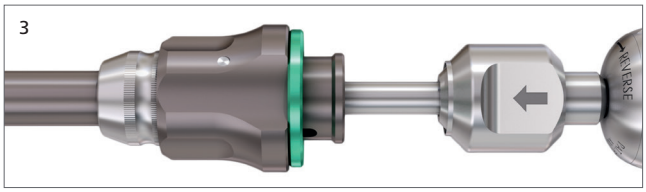
Then slide the sleeve toward the handle on the shaft until it stops (2).

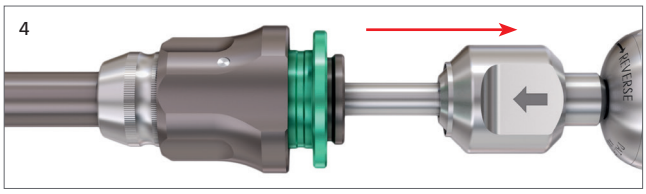
Release the loading collar and verify that the retaining sleeve is firmly attached to the screwdriver (3).

Retract the green locking ring towards the handle (4).







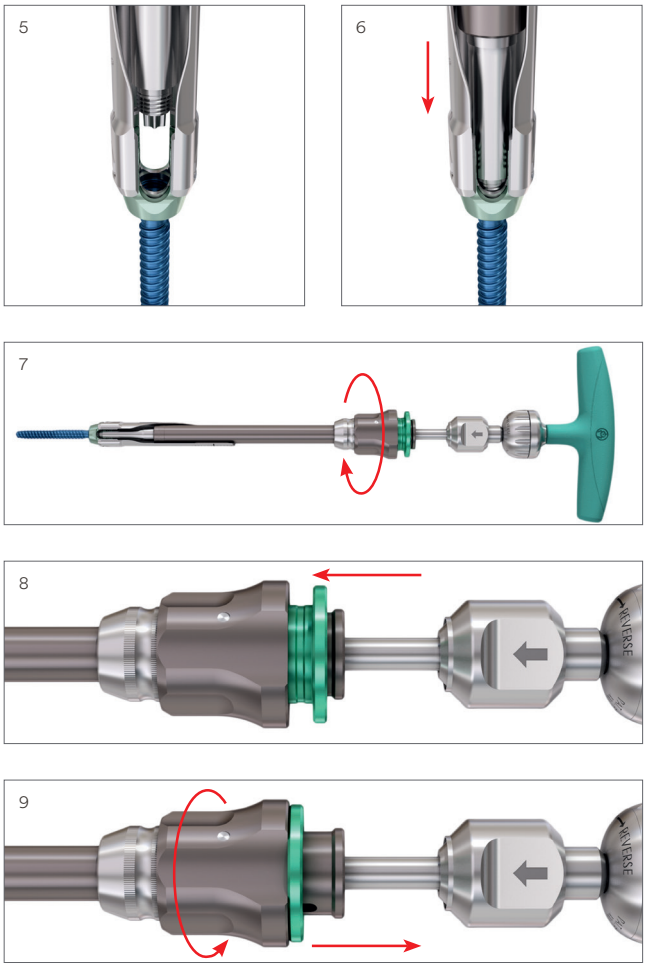


Load a retraction blade/MATRIX screw assembly onto the holding sleeve by inserting the tip of the driver through the retraction blade and into the screw head (5, 6).

When using a ratchet handle, make sure to set it to neutral setting. Rotate the grey knob of the retaining sleeve clockwise. Firmly tighten to secure the implant, using the handle as countertorque (7).

Push the green locking ring toward the grey knob (8). If required, set the ratchet handle to the forward setting to insert the screw.

To release the screw from the retaining sleeve, retract the green locking ring towards the handle, rotate the grey knob counterclockwise and remove the screwdriver (9).



Alternative technique:

Using retaining sleeve

Instruments	
03.632.036	Retaining Sleeve, long, for Matrix 5.5
03.632.073	Screwdriver Shaft, T25, cannulated, long
03.632.090	T-Handle with Ratchet Wrench, with Hexagonal Coupling Ø 6.0 mm

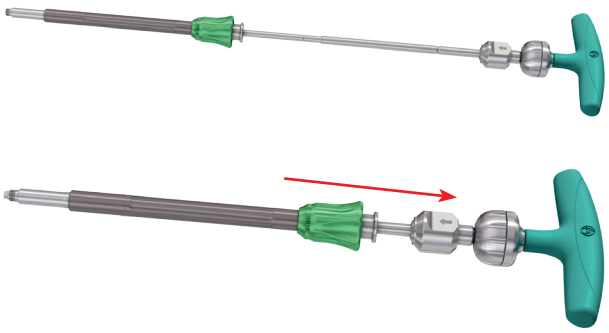
Optional instruments	
03.632.001	Retaining Sleeve, standard, for Matrix 5.5
03.632.003	Screwdriver Shaft, T25, cannulated, standard

Assemble the ratchet handle to a cannulated shaft.

To assemble the polyaxial screwdriver, retract the green knob distally, then slide the sleeve toward the handle on the cannulated shaft until it stops (1).

Load a retraction blade and pedicle screw onto the retaining sleeve by inserting the tip of the retaining sleeve through the retraction blade and into the polyaxial screw.

Place the screwdriver tip securely into the T25 Stardrive recess of the polyaxial pedicle screw and rotate the green knob of the retaining sleeve clockwise. Firmly tighten to secure the implant (2).



1

2

▲ Precaution

- Ensure when loading a screw, the ratchet handle is always in the neutral position.
- Ensure that the retraction blade is properly seated before engaging a screwdriver

Set the ratchet handle to the forward position to insert the screw. To release the sleeve, rotate the green knob counter-clockwise and remove the screwdriver (3).

3

6. Insert screw

Instrument	
03.616.070	Handle for Kirschner Wire Ø 1.6 mm

Optional instrument	
03.616.081	Tamp for Nitinol Kirschner Wire

Match the screw axis to the Kirschner Wire axis by passing the retaining sleeve assembly over the Kirschner Wire until the tip of the screw reaches the pedicle entry point. Prior to advancing the screw, fluoroscopy should be used to ensure proper placement.

▲ Warning

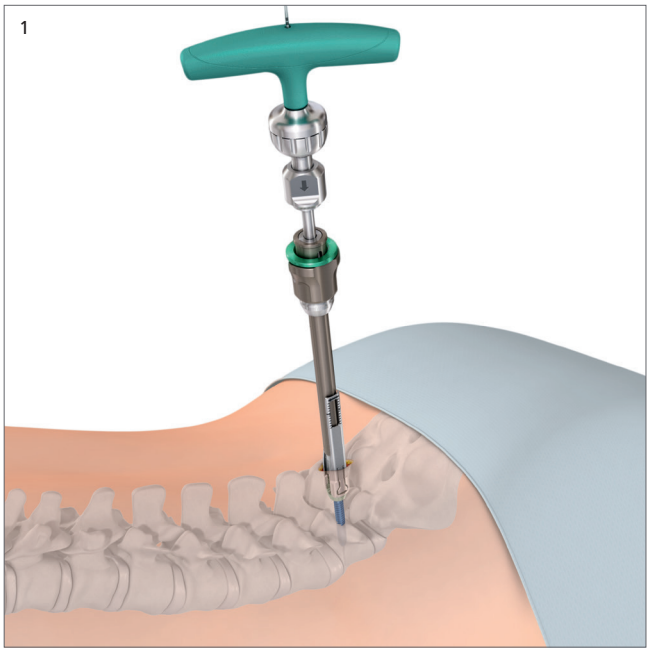
- **Do not advance the screw into the pedicle until the screw axis is aligned with the Kirschner Wire to prevent kinking or unintended advancement.**
- **Monitor the tip of the Kirschner Wire under fluoroscopy to ensure it does not penetrate the anterior wall of the vertebral body.**

Advance the screw into the pedicle by turning the ratchet handle clockwise (1).

The black part of the retaining sleeve and the retraction blade below the green knob can be held during insertion to guide trajectory.

▲ Precaution

- **Do not grasp the green knob during insertion as it will cause the retaining sleeve to disengage from the screw.**

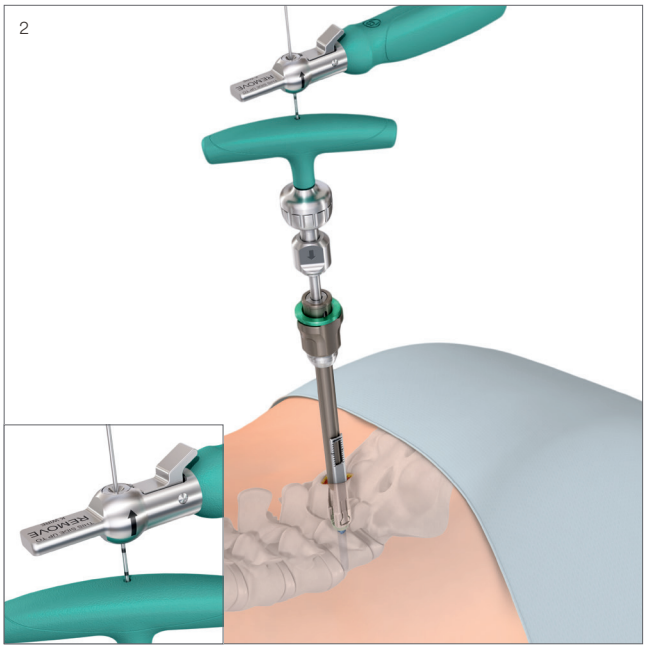


Control the Kirschner Wire exiting the proximal end of the ratchet handle.

Remove the Kirschner Wire once the tip of the screw enters the vertebral body. The handle for Kirschner Wire can be used (2).

During insertion, use fluoroscopy to confirm screw trajectory and depth.

2



▲ Precaution

- **Ensure that the polyaxial screw head remains free to adapt its position and is not restricted by, or does not rest on, bony structures. If necessary, adjust the screw height and/or ream space for the screw head.**

- **The mobility of the screw head cannot be assessed while the retaining sleeve is attached.**

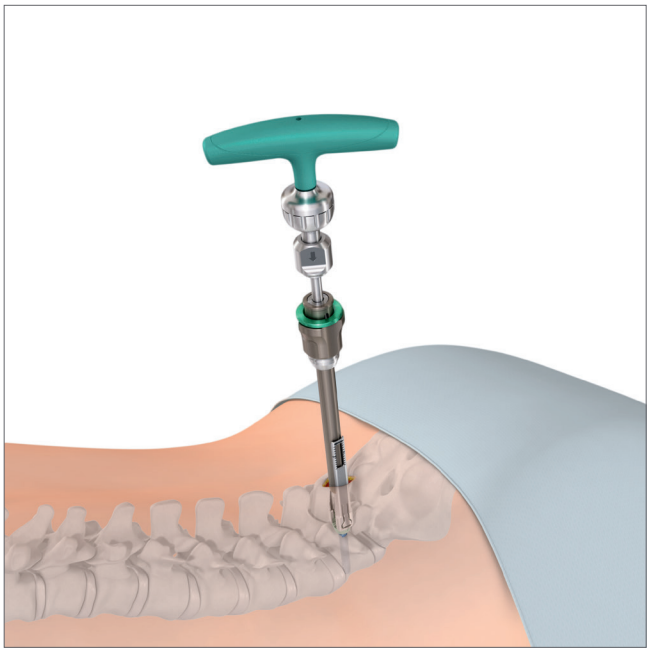
Detach the screwdriver and retaining sleeve by rotating the green knob on the retaining sleeve counterclockwise while holding the ratchet handle as countertorque.

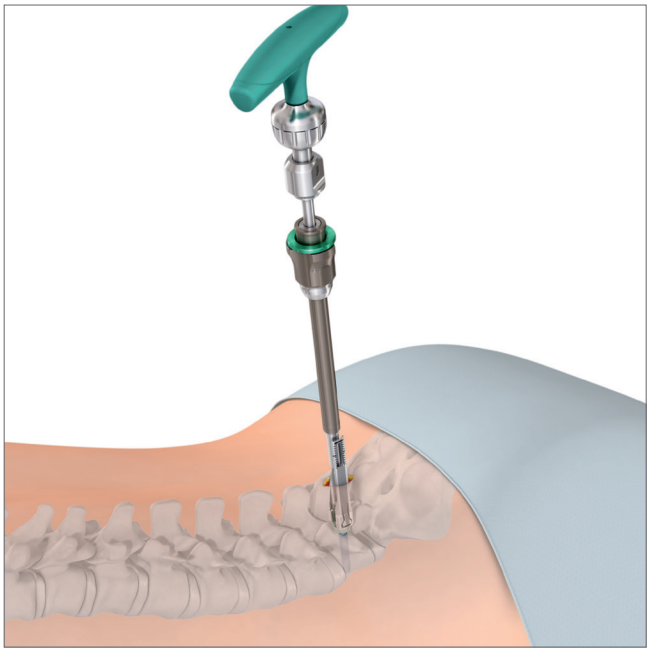
Remove the retaining sleeve and screwdriver.

The retraction blade and polyaxial head should now pivot freely.

Insert all remaining screws in the same manner.

After insertion, use fluoroscopy to confirm final screw placement is correct.





7. Adjust screw height (optional)

Instruments	
03.632.401	Screwdriver Shaft Stardrive, T25, long, straight tip, with Hexagonal Coupling, for Matrix
03.632.090	T-Handle with Ratchet Wrench, with Hexagonal Coupling Ø 6.0 mm

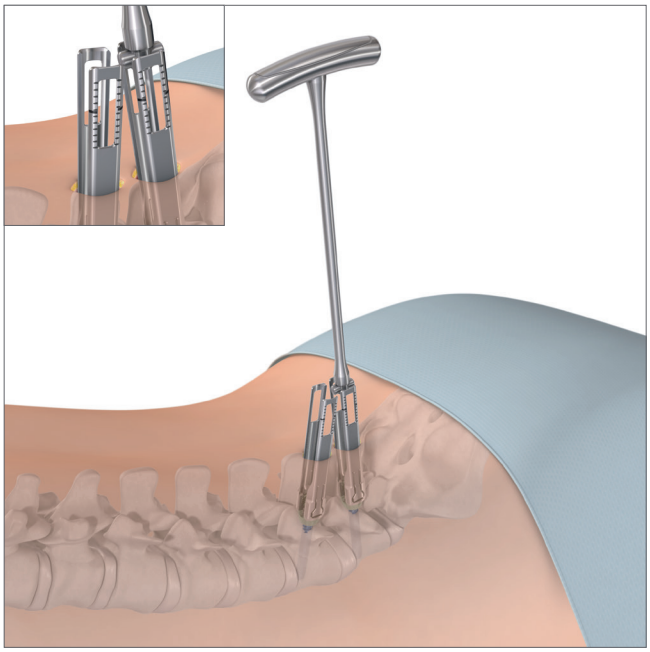
Optional Instruments	
03.632.400	Screwdriver Shaft Stardrive, T25, standard (straight tip)
03.632.073	Screwdriver Shaft, T25, cannulated, long
03.632.003	Screwdriver Shaft, T25, cannulated, standard

If the screw height needs to be adjusted, attach a ratchet handle to the T25 screwdriver shaft. Place the driver through the retraction blade(s) and into the T25 recess of the bone screw. Adjust screw height as needed.

8. Orient retraction blade

Instrument

03.616.050 Polyaxial Head Alignment Tool



Option A: For retraction blade, percutaneous
Visually assess retractor blade orientation after screw insertion is complete. Insert the alignment tool through the retraction blade and seat it in the polyaxial head.

Rotate the retraction blade as needed to achieve proper orientation. The black lines should direct towards the sagittal plane.

Use the alignment tool on the Percutaneous retraction blade to orient rod slots as needed.

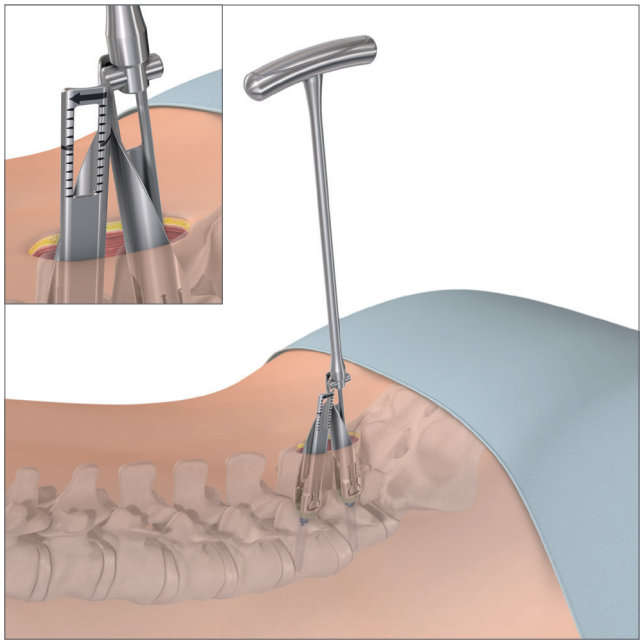
Mobilize polyaxial heads (optional)

If required insert the alignment tool through the retraction blade and seat it in the polyaxial head. If head is immobile turn screw one turn back by using the T25 screwdriver.

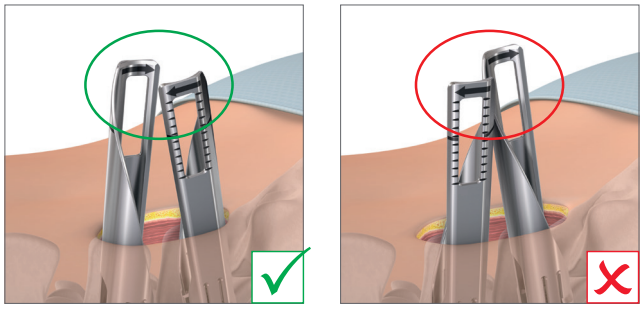
- **Use the head alignment tool to confirm that the head is still mobile and free from the surrounding anatomy prior to inserting the rod.**

Option B: For retraction blade, mini-open

Visually assess retraction blades' orientation after screw insertion is complete. If required insert the alignment tool through the retraction blade and seat in the poly-axial head.



Rotate the retraction blade as needed to achieve proper orientation. Arrows should point toward each other into the middle of the constructs.



Correct Incorrect

Mobilize polyaxial heads (optional)

Insert the alignment tool through the retraction blade and seat it in the polyaxial head. If head is immobile turn screw one turn back by using the T25 screw driver.

- **Use the head alignment tool to confirm that the head is still mobile and free from the surrounding anatomy prior to inserting the rod.**

Rod Introduction

1. Determine rod length

Option A: For percutaneous method

Instrument	
388.906	Trial Rod Ø 5.0 mm, length 150 mm

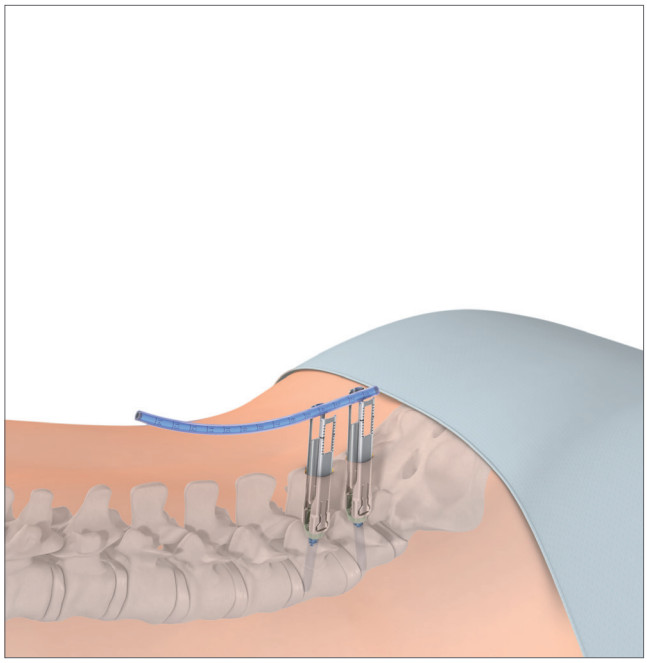
Optional instrument	
03.631.506	MIS Rod Template

For percutaneous and multi-level constructs the bending template can be used to determine the rod length at the skin level.

Align the most caudal and cranial retraction blades such they are parallel. Hold the trial rod level with the proximal ends of the retraction blades. Read the distance between the outer edges of the retraction blades. Choose rod length to allow for 5 mm of rod projection over the screw head on each side of the construct.

Additionally the trial rod can be bent in the dedicated shape of the final rod.

- When choosing rod length, anticipate the effect of distraction or compression maneuvers.
- Nominal length of MIS rods does not include the length of the bullet nose and the rod attachment feature.



Option B: For mini-open method

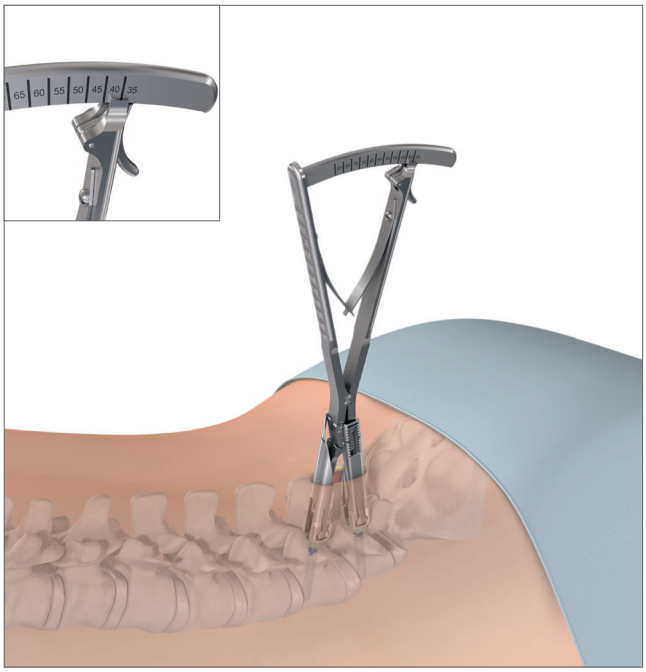
Instrument

03.616.003 Template for Rod Length

For a single level mini-open approach use the rod length template to determine the length of the rod.

Insert the ball tips of the rod length template through the retraction blade until seated in the polyaxial heads.

The scale on the top of the instrument indicates which MIS rod to select. After selecting the rod, verify the length chosen against the caliper scale to ensure proper selection.



▲ Warning

- **Do not force open or distract the natural position of the retraction blade by expanding the tips of the template.**

2. Contour rod (optional)

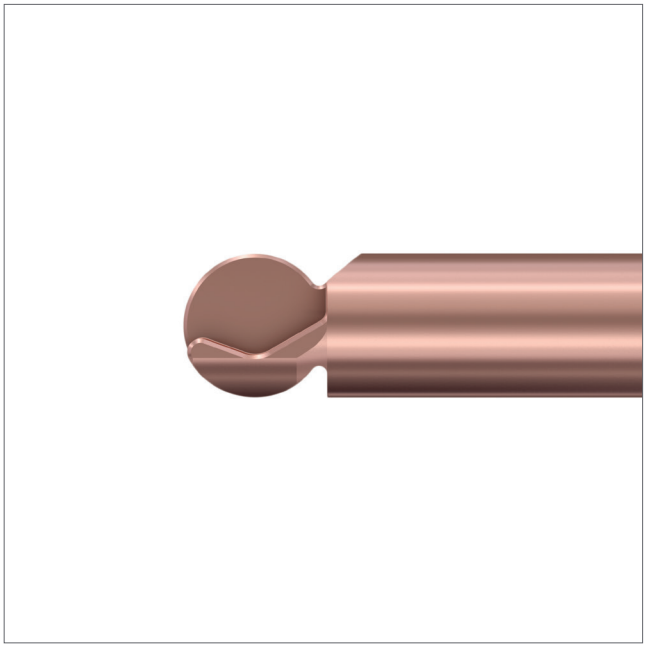
Instrument

03.632.017 Rod Bender with Silicone Handle

Contour the rod, as needed, before insertion.

▲ Precautions:

- Do not reverse bend rods. Reverse bending may produce internal stresses which may become the focal point for eventual breakage of the implants.
- The rod coupling can fit into the rod holder only in one direction (refer to “Prepare rod introducer – load rod” section). Make sure to consider the orientation of the rod coupling when contouring the rod.
- Do not bend the rod coupling to ensure correct attachment of the rod to the rod holder.
- Excessive rod contouring should be avoided to ensure proper alignment of the rod with respect to the polyaxial heads.



3a. Prepare rod introducer – attach centering sleeve

Instruments	
03.616.048	Rod Holder
03.616.047	Centering Sleeve for Rod Holder No. 03.616.048

Optional instrument	
03.616.044	Centering Sleeve for Rod Holder No. 03.616.048, long

Assemble the rod introducer prior to use in the wound. Use the centering sleeve length that corresponds to the retraction blade length.

Snap the centering sleeve onto the rod introducer along the entire length. Slide the centering sleeve up the post toward the handle until it stops.

The centering sleeve is removed by pushing off from the back side of the golden knob until it detaches.

3b. Prepare rod introducer – load rod

Instrument

03.616.048 Rod Holder

Pull the golden knob to open the capture mechanism. The red line near the handle indicates the mechanism is open.

Place the machined end of the selected MIS rod onto the receiving features at the distal tip of the rod introducer.

Squeeze the brake lever to close the capture mechanism. The red line must no longer be visible.

Squeeze the brake lever to maintain the rod at a desired insertion angle. Ensure the rod is securely attached.

- **The rod can be released if the rod introducer is in the open position and the rod is perpendicular to the shaft of the instrument.**

Alternative technique for percutaneous method:

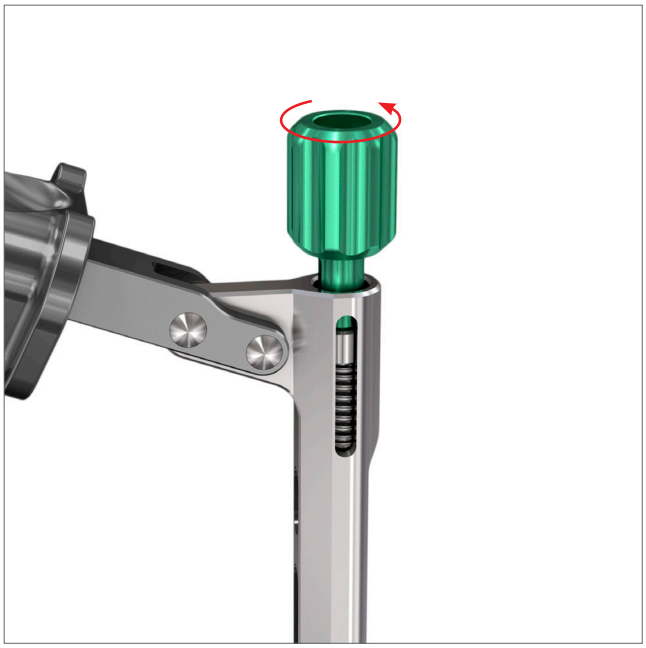
Load rod using fixed angle rod holder

Instrument

03.616.069	Rod Holder, percutaneous, with fixed angle

For use with percutaneous retraction blades, the fixed angle rod holder can be used.

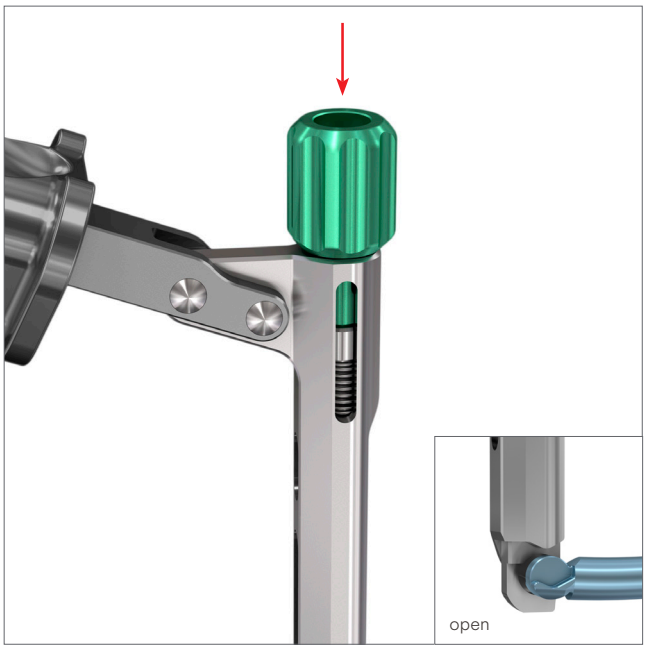
Turn the green knob counterclockwise until it is in the fully unlocked position.



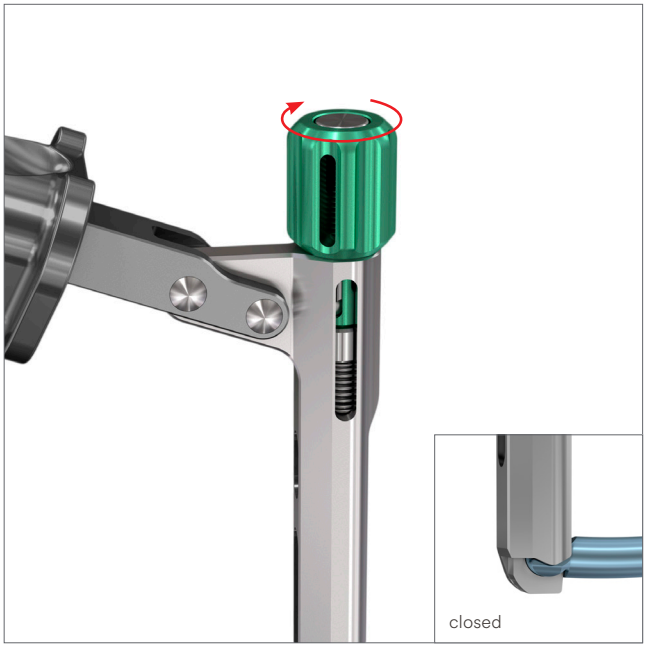
Depress and hold the green knob to open the attachment mechanism.

Place the proximal machined end of the selected MIS rod into the receiving feature of the distal tip of the rod holder.

Release the green knob to fully capture the rod.



Turn the green knob clockwise to lock the rod in place. Ensure the rod is securely attached.



4. Place rod

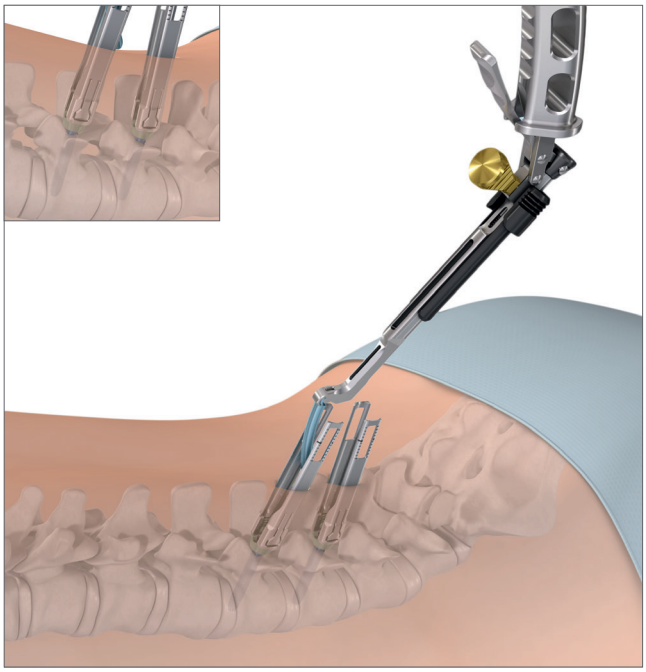
Option A: For percutaneous method / retraction blade

Instrument	
03.616.048	Rod Holder

The rod may be inserted from either cranial or caudal direction.

Align the slots of the retraction blade prior to rod insertion.

With the rod pointed down, insert the rod through the retraction blade. With the tip below the fascia and near the head of the screw, push the rod through the muscle toward the adjacent retraction blade.



Verify rod placement through adjacent retraction blade by attempting to rotate the blade. If the retraction blade will not rotate, then the rod has been inserted correctly.

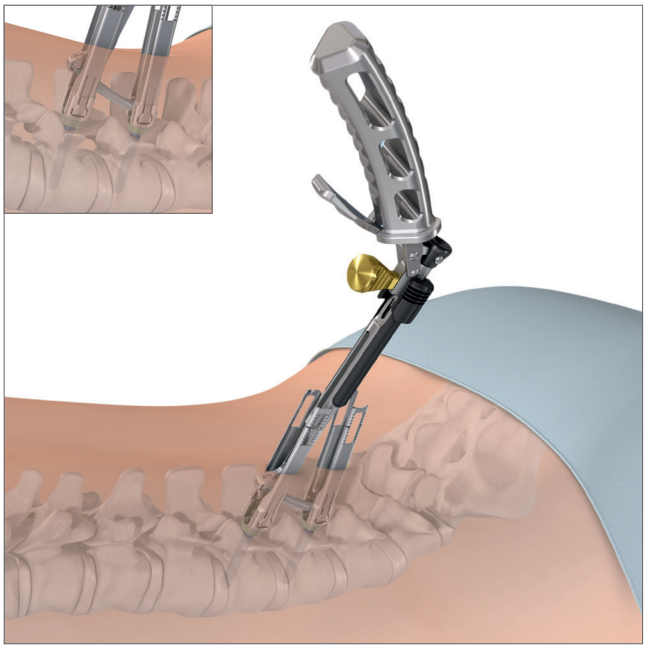
Once the bullet nose of the rod is past the last adjacent retraction blade of the construct, push the heel of the rod introducer down into the head of the first MATRIX implant.

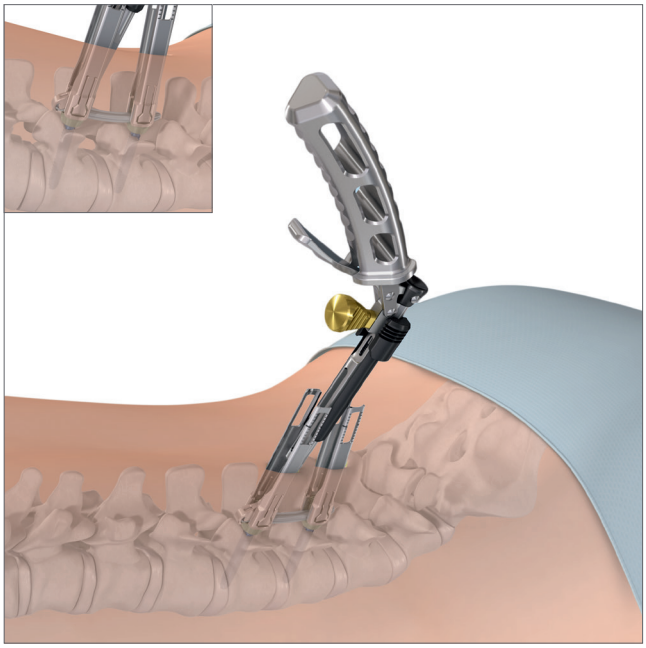
Verify final rod position using lateral fluoroscopy. Once the rod is perpendicular to the introducer shaft, keep finger pressure on the brake lever.

▲ Precaution

If significant reduction forces are encountered, consider:

- **Adjusting the screw height**
- **Checking the rod placement for tissue trapped between the rod and screw head.**





Alternative technique for percutaneous method: Introduce rod using fixed angle rod holder

Instrument	
03.616.069	Rod Holder, percutaneous, with fixed angle

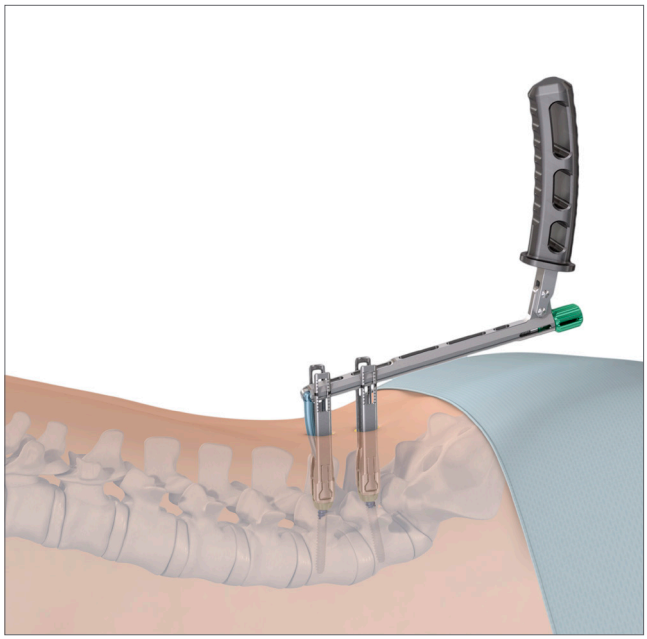
For use with percutaneous retraction blades, the fixed angle rod holder can be used.

Align the slots of the retraction blades prior to insertion.

The rod may be inserted from either the cranial or caudal direction.

With the rod pointed down, insert the rod through the retraction blades. With the tip below the fascia, push the rod through the muscle toward the adjacent retraction blades. In case of increased resistance, confirm that the rod has passed through or been placed below the fascia. The rod holder shaft should sit outside of the retraction blades.

Once the bullet nose of the rod is past the last adjacent retraction blades of the construct, push the rod holder down and position the rod holder shaft on the outside of the retraction blades.



Verify placement through adjacent retraction blades by attempting to rotate the retraction blades. If the retraction blades will not rotate, then the rod has passed through correctly.

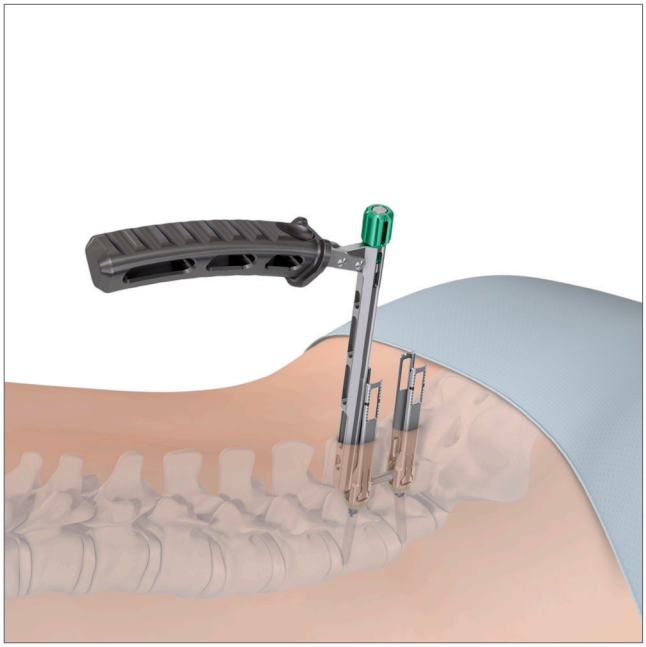
Verify final rod position using lateral fluoroscopy.

▲ Precautions

- Ensure the coupling at the end of the MIS rod is seated outside the screw head.

If significant reduction forces are encountered, consider:

- Adjusting the screw height
- Checking the rod placement for tissue trapped between the rod and screw head



Option B: For mini-open method / retraction blade

Instrument

03.616.048 Rod Holder

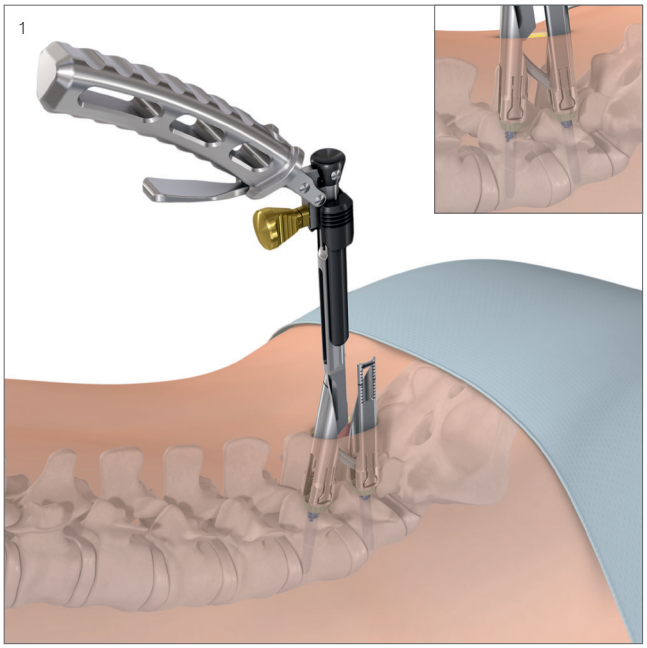
The rod may be inserted from either the cranial or caudal direction.

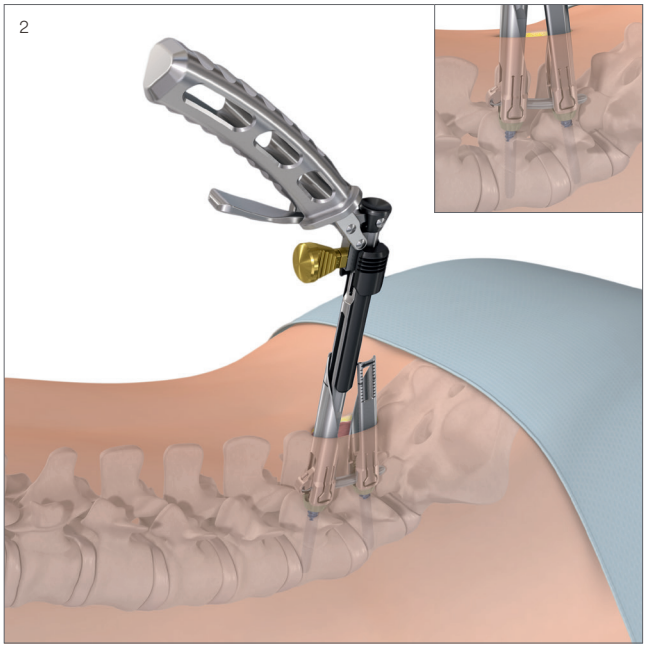
Align the slots of the retraction blade prior to rod insertion.

With the rod pointed down, position the bullet nose of the rod against the inside wall of the cranial or caudal retraction blade (1).

The line on the post of the rod introducer indicates the centering sleeve is inserted completely.

Slide the rod down until it passes through the window and slightly past the head of the MATRIX implant (2).



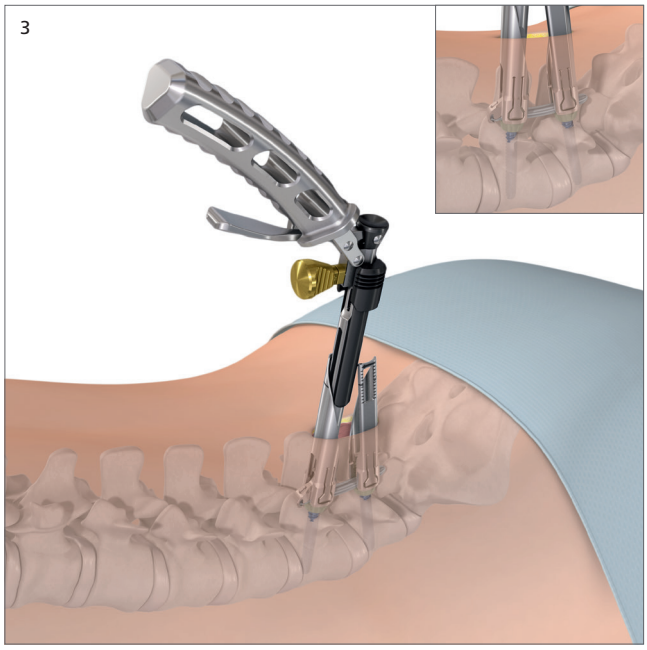


Drag the heel of the rod introducer into the inside wall of the opposite retraction blade (3).

Push the heel down into the head of the opposite MATRIX implant.

Verify rod placement through adjacent retraction blade by attempting to rotate the blade. If the retraction blade will not rotate, then the rod has been inserted correctly.

Verify final rod position using lateral fluoroscopy. Once the rod is perpendicular to the introducer shaft, keep finger pressure on the brake lever.



Alternative technique for mini-open method: Introduce rod using rod forceps

Instrument

03.616.053 Rod Forceps

Clasp the selected rod with the forceps.

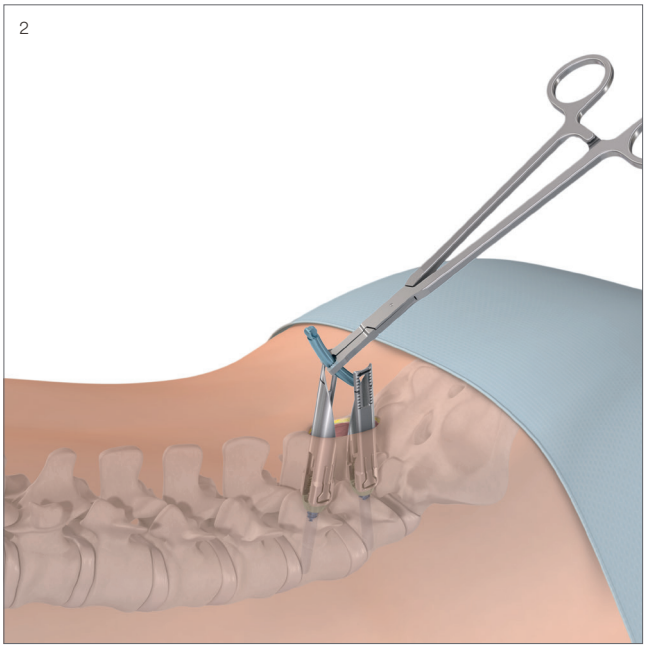
The rod may be inserted from either the cranial or caudal direction.

The rod can pivot while attached to the rod forceps (1).

With the rod pointed down, introduce the rod until it passes through the window of the first retraction blade (2).

1

2

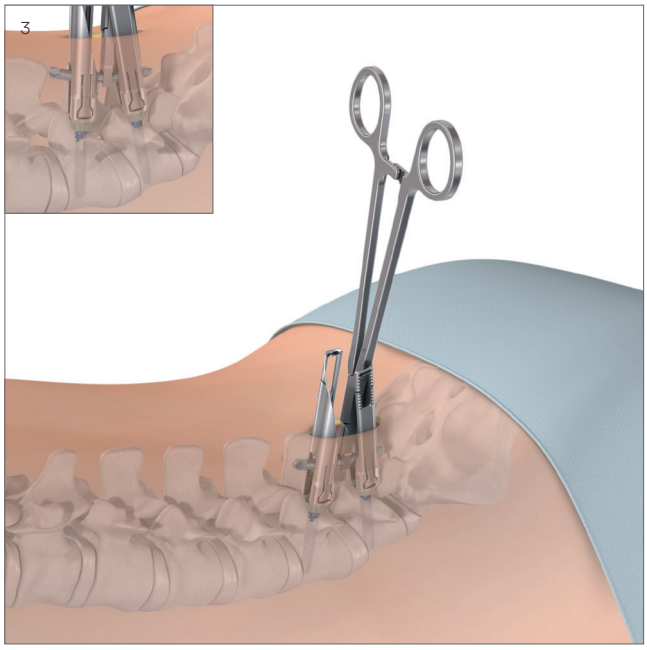


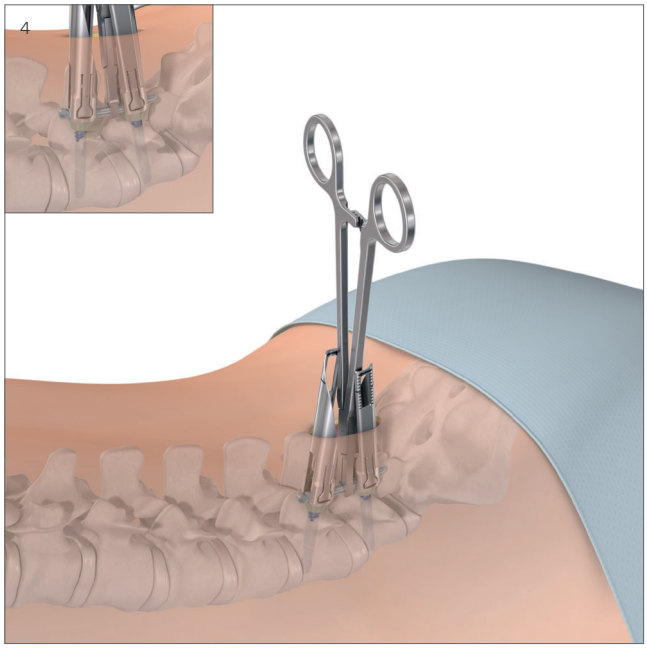
Pass the opposite end of the rod through the window of the opposite retraction blade (3).

Push down on the forceps to seat the rod in the MATRIX implants (4).

Do not remove the forceps until the rod is secured by a locking cap.

- Verify final rod position using lateral fluoroscopy.





5. Secure rod introducer

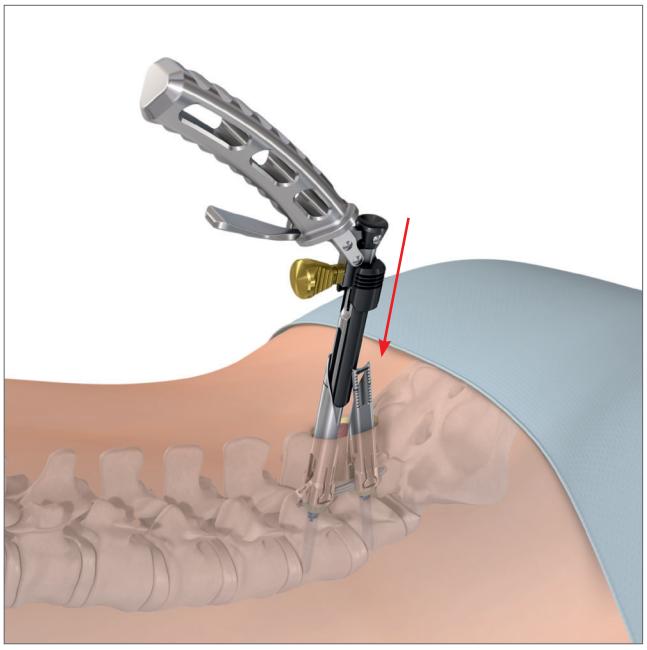
Instruments	
03.616.048	Rod Holder
03.616.047	Centering Sleeve for Rod Holder No. 03.616.048

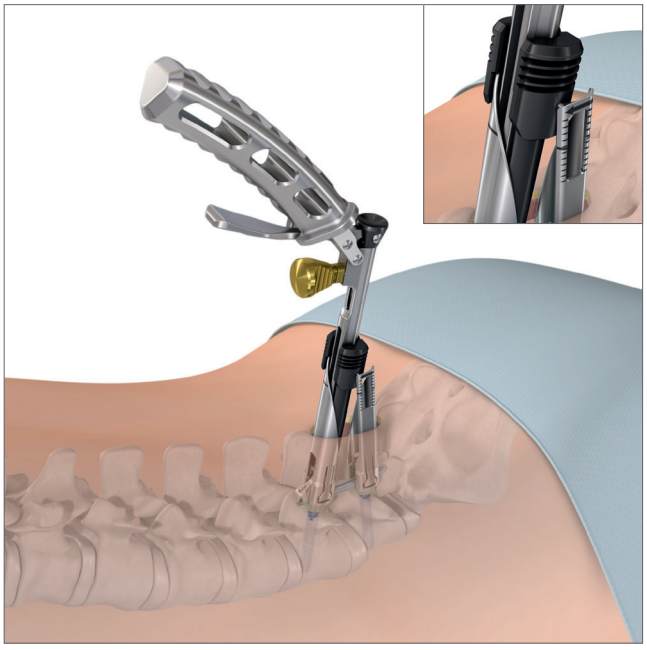
Optional instrument	
03.616.044	Centering Sleeve for Rod Holder No. 03.616.048, long

The post of the rod introducer should be coaxial with the retraction blade.

Slide the centering sleeve down the post and into the retraction blade until the black line is visible.

Do not remove the rod introducer until the rod is secured by a locking cap.





Rod Reduction and Locking Cap Introduction

1. Load locking cap

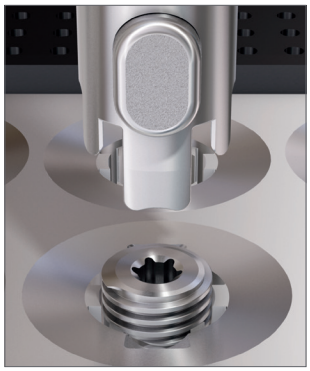
Instrument

03.616.051	Cap Guide, one-step

Optional instrument

03.616.052	Cap Guide, one-step, long

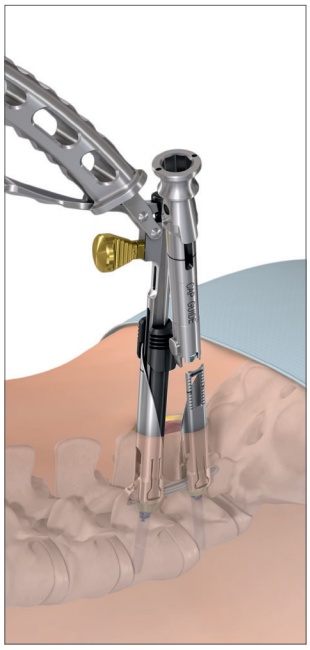
Properly orient and position the cap guide over the locking cap on the holding tray. Press down firmly to capture the locking cap. The locking cap will snap into the distal tip of the cap guide.

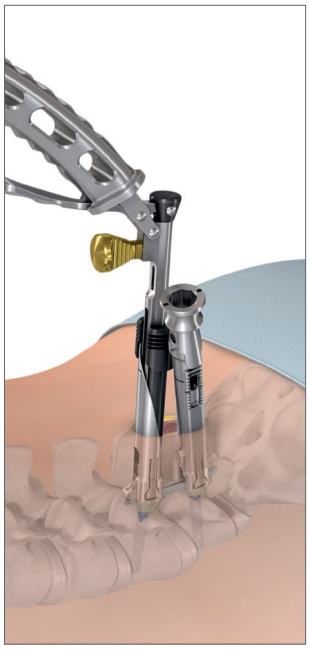


2. Insert locking cap

Instruments	
03.620.061	T-Handle with Ratchet Wrench and with Torque Limiter, 10 Nm
03.632.401	Screwdriver Shaft Stardrive, T25, long, straight tip, with Hexagonal Coupling, for Matrix
03.616.051	Cap Guide, one-step

Optional instruments	
03.616.052	Cap Guide, one-step, long
03.632.073	Screwdriver Shaft, T25, cannulated, long





Insert the loaded cap guide into the retraction blade with the black indicator facing the middle of the construct.

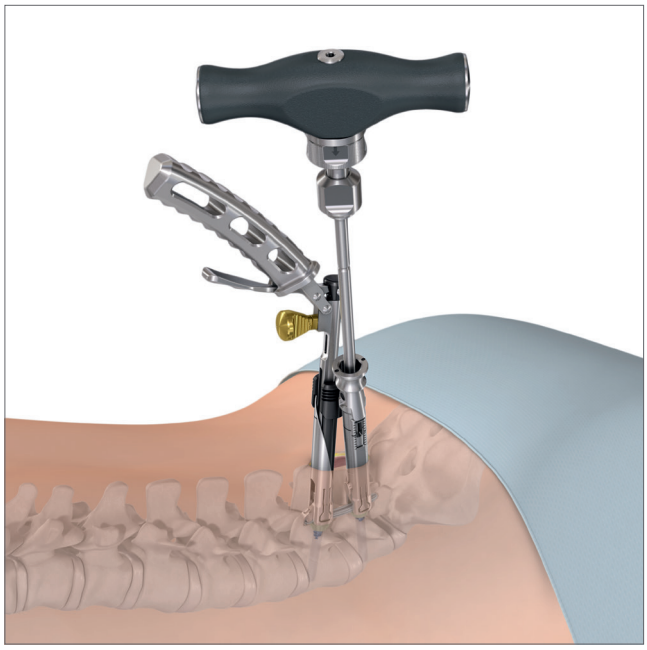
Insert the screwdriver until it is seated in the locking cap. If persuasion is required please refer to step 3, page 58.

Seat the locking cap with a light downward pressure.

Apply a light torque to provisionally tighten the locking cap and maintain the desired rod position. After rod position has been secured, detach the rod introducer (step 5, page 66). Place the remaining locking caps and provisionally tighten.

Remove the driver or proceed to final tightening (step 4, page 63).

- **Only attempt to tighten the locking cap if the black line of the cap guide is in line with the black line on the retraction blade. If these lines are not in line, please proceed with step 3, page 58.**

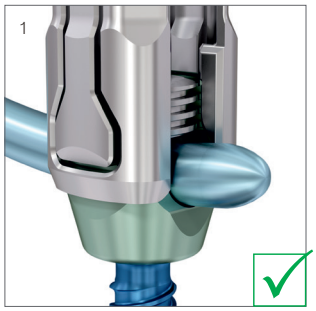


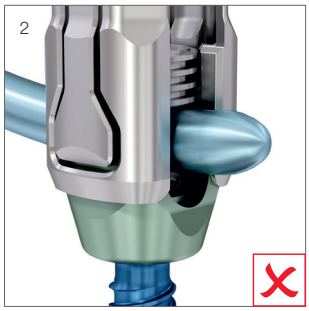
▲ Precaution

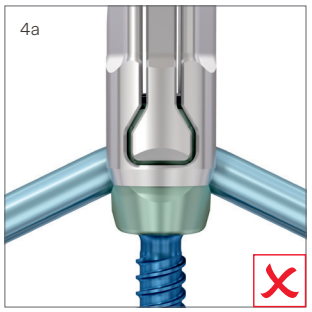
- Confirm with lateral fluoroscopy that the rod is fully aligned to the polyaxial head. (1)

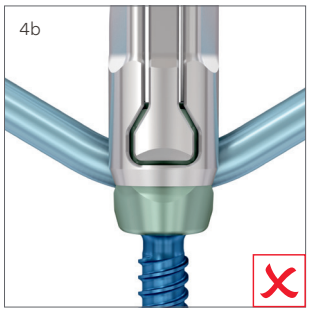
Examples of misalignment:

- The rod is sitting high in the polyaxial head. (2)
- The rod is not perpendicular to the polyaxial head. (3)
- A severe bend is positioned within the polyaxial head. (4a, 4b)









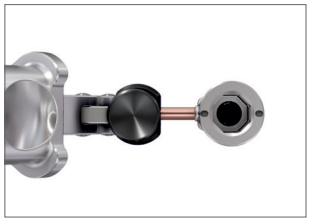
▲ Precaution

- The polyaxial head must align perpendicular to the rod. The use of curved rods might cause the instruments to cross each other. If necessary adjust position of instruments laterally and medially. Improper alignment of the rod with respect to the MATRIX polyaxial heads could lead to construct loosening.

▲ Precaution

If significant reduction forces are encountered, consider:

- Adjusting the screw height
- Checking the rod placement for tissue trapped between the rod and screw head



3. Rod reduction (optional)

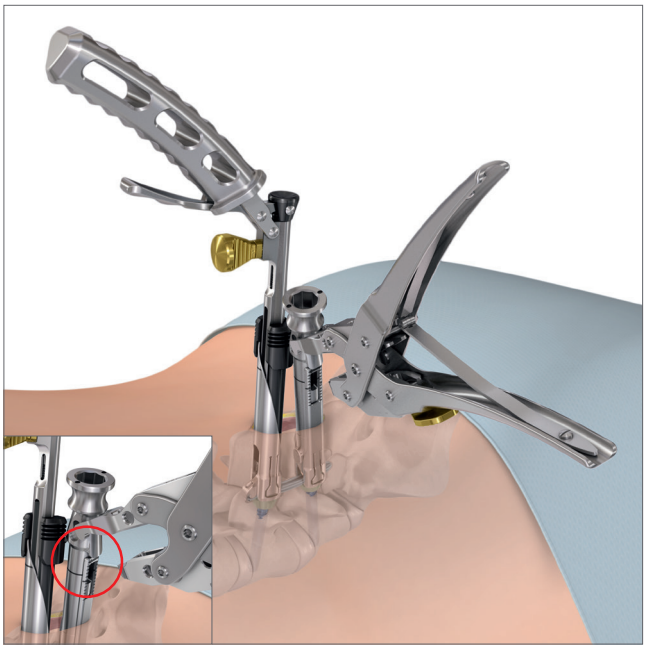
For persuasion up to 9 mm, use the rod persuader.

For persuasion greater than 9 mm and up to 30 mm, use the axial reduction instrument.

Using rod persuader

Instruments	
03.616.056	Rod Persuader
03.620.061	T-Handle with Ratchet Wrench and with Torque Limiter, 10 Nm
03.632.401	Screwdriver Shaft Stardrive, T25, long, straight tip, with Hexagonal Coupling, for Matrix
03.616.051	Cap Guide, one-step

Optional instruments	
03.616.052	Cap Guide, one-step, long
03.632.090	T-Handle with Ratchet Wrench, with Hexagonal Coupling Ø 6.0 mm
03.632.073	Screwdriver Shaft, T25, cannulated, long



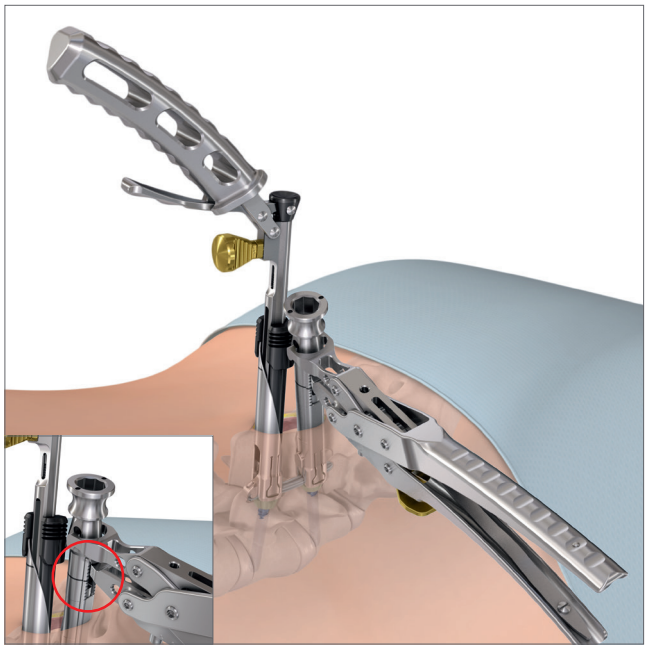
Persuasion required

When the etch lines on the cap guide and the retraction blade are not aligned, rod persuasion is required.

Attach the top fork of the persuader to the cap guide, then pivot down to engage the retraction blade.

Squeeze the handle to persuade the rod. Once reduction has been achieved, the handle will remain in the reduced position. The rod introducer may be attached during reduction procedure.

Proceed with cap insertion as indicated in step 2, page 55.



▲ Precaution

- **The polyaxial head must align perpendicular to the rod. The use of curved rods might cause the instruments to cross each other. If necessary adjust position of instruments laterally and medially as shown on the previous page.**

Using axial reduction instrument

Instruments	
03.616.054	Axial Reduction Instrument
03.616.083	Knob for Reduction Instruments, axial, for Nos. 03.616.054 and 03.616.063

Optional instrument	
03.616.063	Axial Reduction Instrument, long

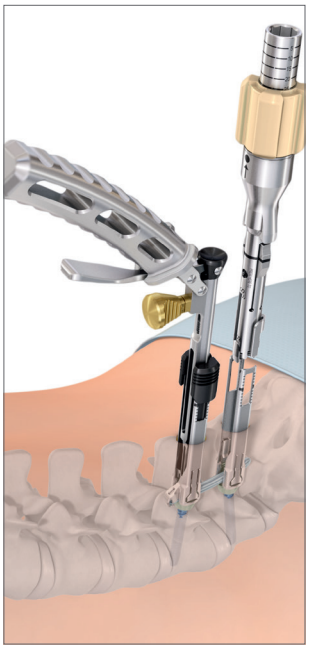
Ensure the PEEK knob is fully turned clockwise until it stops.

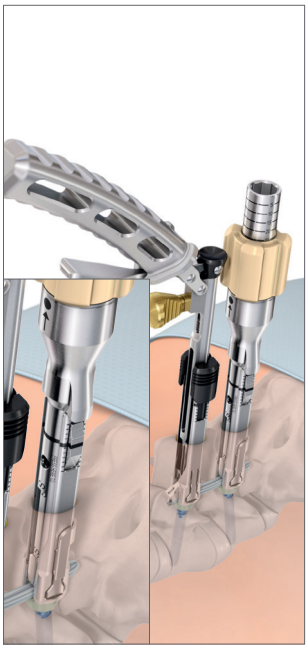
Properly orient and position the axial reduction instrument tip over the locking cap on the holding tray. Press down firmly to capture the locking cap. The locking cap will snap into the distal tip of the axial reduction instrument.

Turn the PEEK knob counterclockwise until it stops and the 25 mm etch mark is fully visible. The reduction tip with locking cap will be fully retracted into the axial reduction instrument. Insert the axial reduction instrument into the retraction blade with the black etch on the reduction assembly facing the middle of the construct. Apply downward pressure. The axial reduction instrument tabs will snap into the window(s) of the retraction blades and the etch lines will match up.

Turn the PEEK knob clockwise to reduce the rod. The etch markings on the threaded shaft will indicate how much reduction is still required. If needed, the axial reduction instrument Knob can be used for better grip. The countertorque handle can also be used to assist with turning the reduction knob. The rod introducer may be attached during reduction procedure.

Refer to the precautions and guidance on page 57 of this STG for confirmation of the rod placement within the polyaxial head



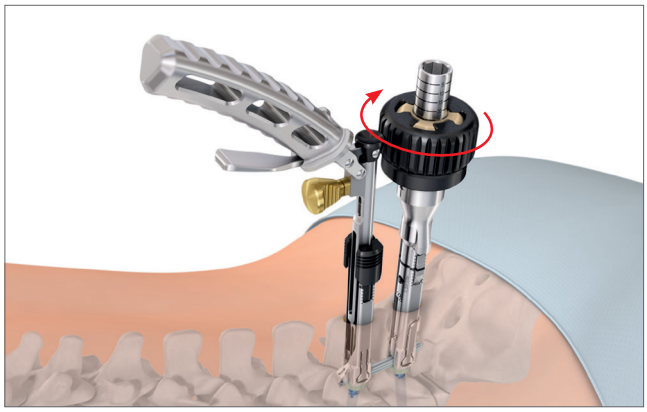


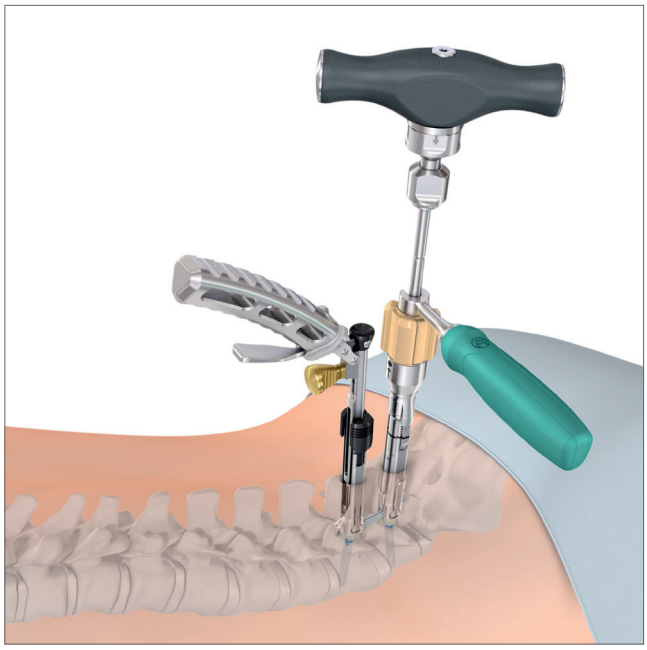
Once fully reduced, insert the screwdriver with attached 10 Nm torque limiting handle until it is seated in the locking cap. Slide the countertorque down the driver shaft and seat it in the proximal socket on the axial reducer.

Adjust the orientation of the countertorque handle to be 90° to the rod orientation. Provisionally tighten the locking cap.

Turn the PEEK knob counterclockwise until it fully stops. Depress the axial reducer tabs and pull upwards to remove. Proceed to final tightening (Step 4).

The reducer tip must be fully retracted before the tabs can be depressed for instrument removal.

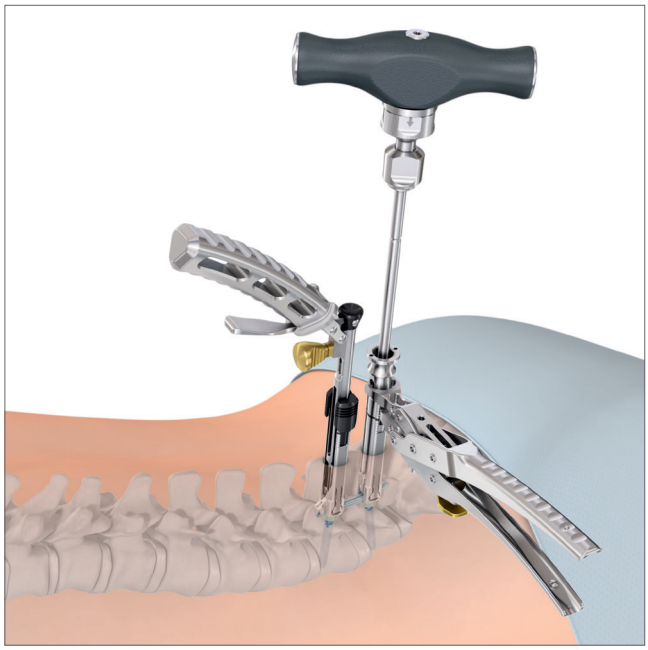




4. Final tighten locking cap

Instruments	
03.616.057	Counter Torque
03.620.061	T-Handle with Ratchet Wrench and with Torque Limiter, 10 Nm
03.632.401	Screwdriver Shaft Stardrive, T25, long, straight tip, with Hexagonal Coupling, for Matrix

Optional instrument	
03.632.073	Screwdriver Shaft, T25, cannulated, long



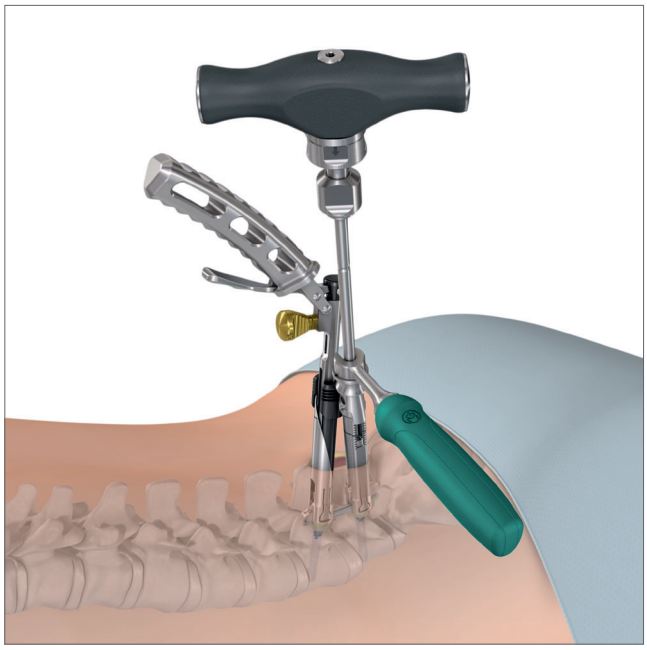
▲ Precaution

- **Ensure all locking caps are fully reduced and provisionally tightened (see Locking Cap Insertion). Failure to do so could potentially lead to a misalignment.**

If using a rod persuader, it may be used as a countertorque.

Insert the screwdriver until it is seated in the locking cap.

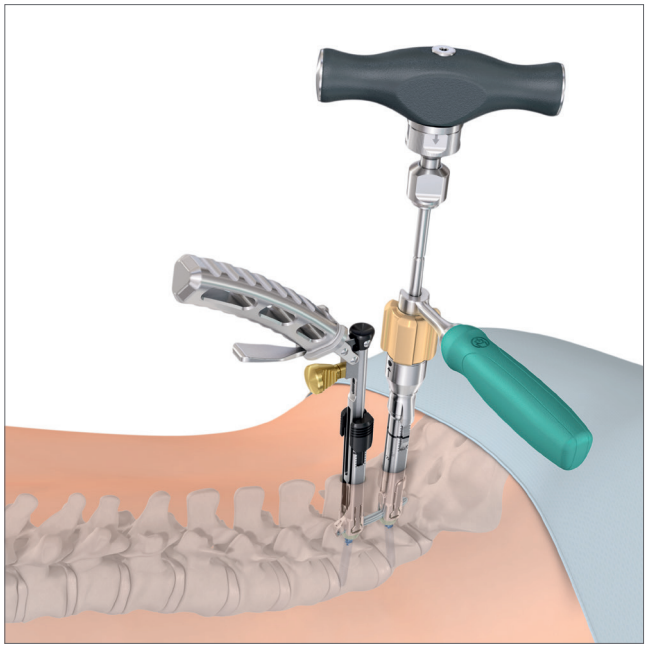
If using the cap guide or the axial reduction instrument, slide the counter torque down the driver shaft and seat it in the proximal socket on the instruments. Adjust the orientation of the counter torque handle laterally or medially.



▲ Precaution

- **Ensure that the polyaxial head is perpendicular to the rod. When using lordotically contoured rods it may be necessary to allow the retraction blades and inserted instruments to cross in the sagittal plane.**

Final tighten the locking cap with the 10 Nm torque limiting handle until there is a tactile release.



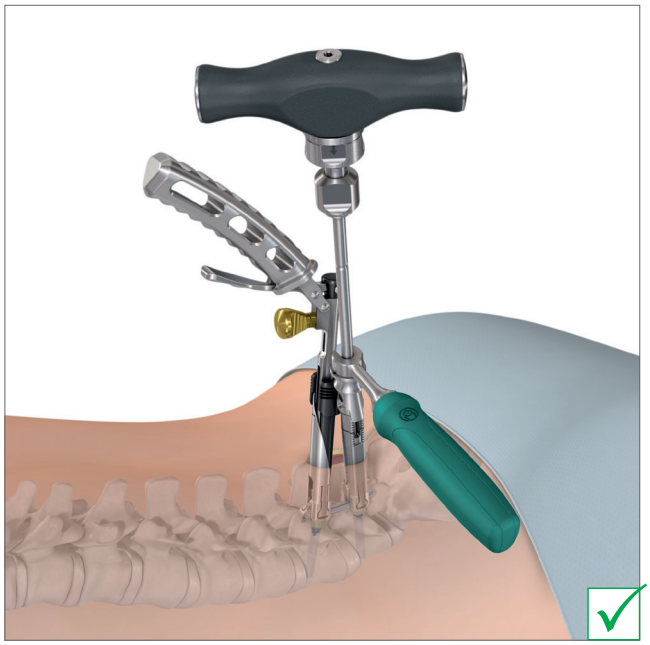
▲ Precautions

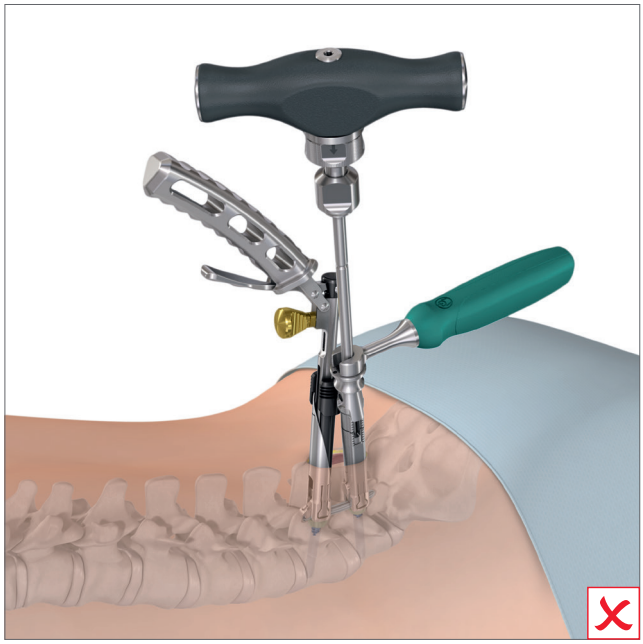
- The handle of the counter torque must be oriented laterally or medially. Do not orient the handle of the counter torque in line with the rod. This action could cause misalignment of the rod with the implant.
- Refer to the torque limiting handle package and labeling for the recommended calibration maintenance.

▲ Warning

- Ensure the required torque of 10 Nm is applied to each locking cap by using the torque limiting handle.
- Never use a fixed or ratcheting T-handle screw-driver for this technique. If the torque limiting attachment is not used, breakage of the driver may occur and could potentially harm the patient.

If a locking cap needs to be loosened or removed after having been tightened to 10 Nm, use a counter torque and straight-tip screwdriver shaft with torque limiting handle.





5. Detach rod introducer

Ensure the first locking cap is provisionally tightened prior to rod introducer detachment.

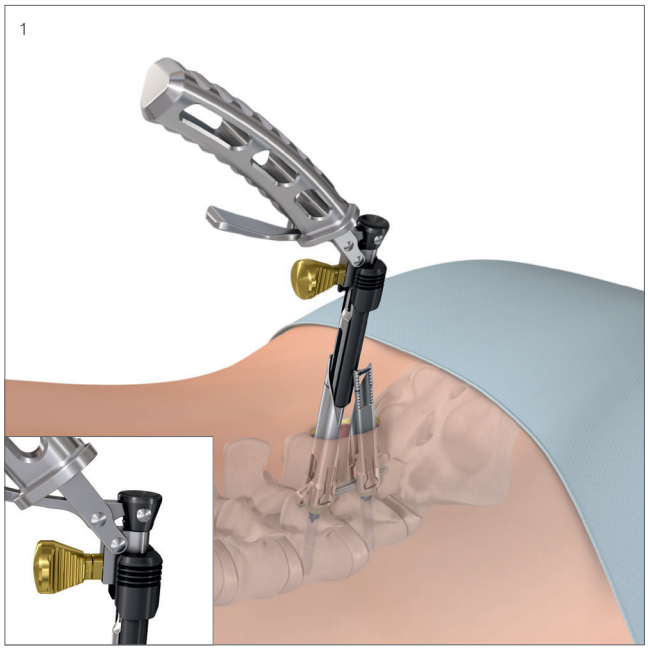
Slide the centering sleeve up and out of the retraction blade (1).

Pull the golden knob to open the capture mechanism on the rod introducer.

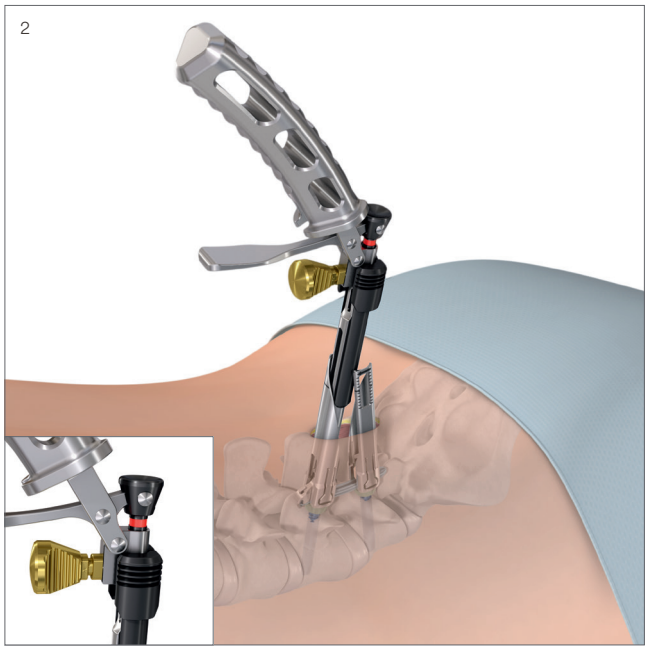
The red line indicates the tool is ready to be detached from the rod (2).

Remove the rod introducer from the retraction blade.

1



2



Alternative technique for percutaneous method: Detach fixed angle rod holder

Instrument	
03.616.069	Rod Holder, percutaneous, with fixed angle

Prior to rod holder detachment ensure at least one locking cap has been finally tightened and all other locking caps have been provisionally tightened.

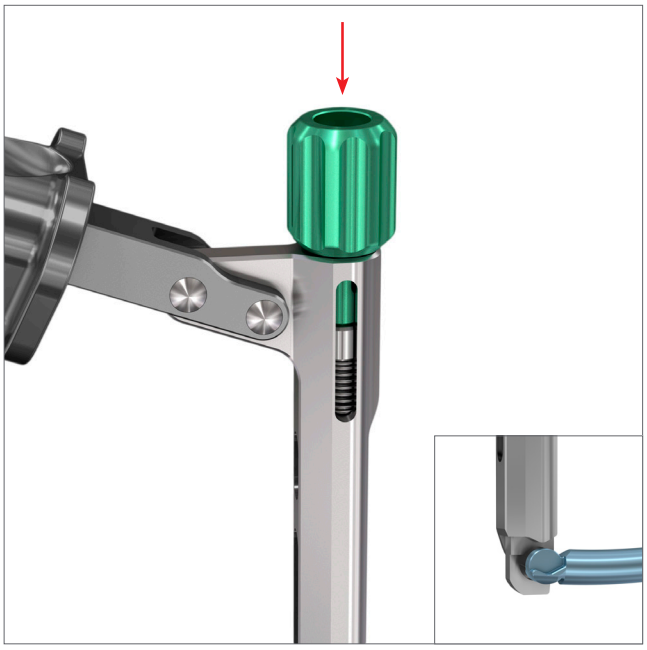
Turn the green knob counterclockwise until it is in the fully unlocked position.

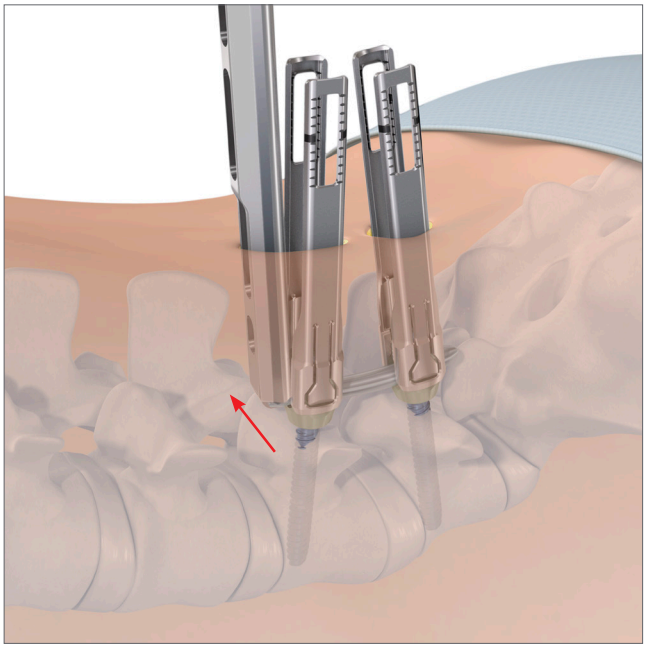
While depressing the green knob to open the attachment mechanism, push the tip of the rod holder to the left.

Remove the rod holder from the wound.

▲ Precaution

- **Avoid rod displacement by excess lateral or medial tilting of the instrument.**



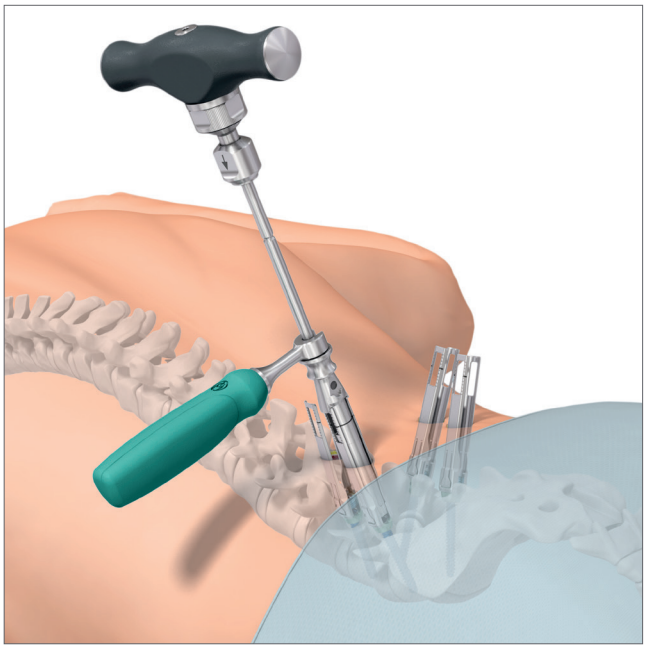


Sequential Revisiting of Locking Caps

Revisit Locking Caps

Instruments	
03.616.051	Cap Guide, one-step
03.616.057	Counter Torque
03.620.061	T-Handle with Ratchet Wrench and with Torque Limiter, 10 Nm
03.632.401	Screwdriver Shaft Stardrive, T25, long, straight tip, with Hexagonal Coupling, for Matrix

Optional instruments	
03.616.052	Cap Guide, one-step, long
03.632.073	Screwdriver Shaft, T25, cannulated, long
03.632.400	Screwdriver Shaft Stardrive, T25, standard, straight tip, with Hexagonal Coupling, for Matrix
03.632.003	Screwdriver Shaft, T25, cannulated, standard



▲ Precaution

- **The countertorque must be placed on each implant requiring final tightening. If the countertorque is not used during final tightening, construct loosening may occur.**
- **Do not orientate the handle of the countertorque in line with the rod. This action could cause misalignment of the rod with the polyaxial heads.**

Before retraction blade removal, repeat the final tightening of all locking caps. Start at the caudal left screw of the construct and proceed clockwise to systematically repeat final tightening of all locking caps.

Refer to “Final Tighten Locking Cap” section for instructions on final tightening locking caps.

Compression and Distraction (Optional)

1. Compress mini-open construct

Instruments	
03.616.057	Counter Torque
03.616.051	Cap Guide, one-step
03.616.059	Compression Instrument, mini-open
03.620.061	T-Handle with Ratchet Wrench and with Torque Limiter, 10 Nm
03.632.401	Screwdriver Shaft Stardrive, T25, long, straight tip, with Hexagonal Coupling, for Matrix

Optional instruments	
03.632.073	Screwdriver Shaft, T25, cannulated, long
03.616.052	Cap Guide, one-step, long

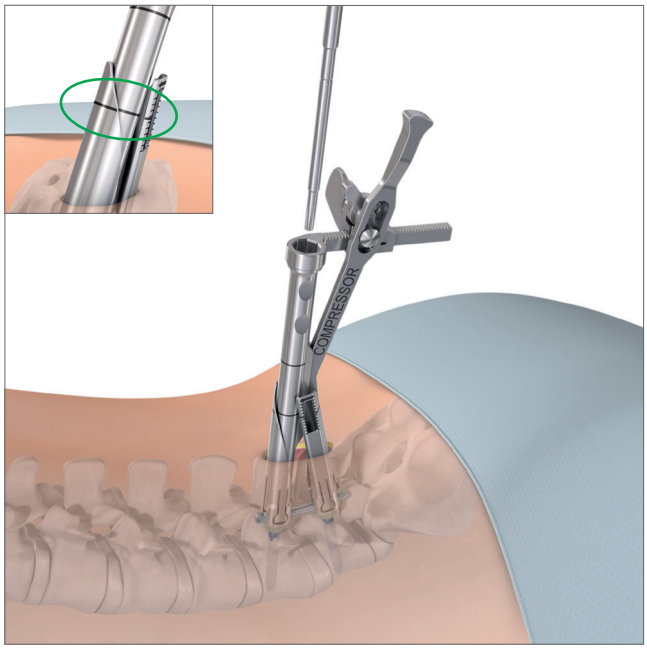
▲ Precaution

- Ensure all locking caps are fully seated and provisionally tightened (see chapter “Rod Reduction and Locking Cap Introduction”).

At the level where compression is desired, final tighten the first locking cap. With the compressor foot retracted into the cannula shaft, insert the cannula of the compression instrument into the other retraction blade.

- **Ensure correct alignment of the etching of the compression instrument and the retraction blade. If the lines cannot be aligned, check the reduction of the rod.**

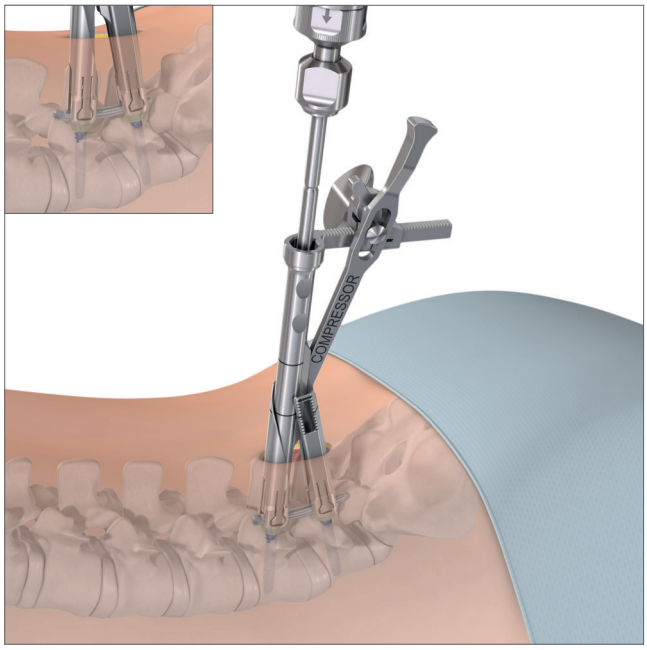
Place the driver through the compression instrument cannula, and seat it onto the screw head. Reverse the provisionally tightened locking cap ¼ of a turn.



With the K-bar in the unlocked position, lift the K-bar arm while moving toward the cannula of the Compression instrument. Lower the arm and slide outward until the K-bar arm catches on the final tightened locked locking cap.

Lock the K-bar and turn the knob to the desired compression. Perform compression under lateral fluoroscopy and ensure that the rod is properly aligned within the polyaxial head.

Provisionally tighten the locking cap. Remove the compression instrument and final tighten the locking cap (see section 4 “Final Tighten Locking Cap”).



Alternative technique:

Insertion of locking cap using the compression instrument

Properly orient and position the compressor over the locking cap on the module for locking caps. Press down firmly to capture the locking cap. The locking cap will snap into the distal tip of the compressor.

With the compressor foot retracted into the cannula shaft, insert the cannula of the compressor into the retraction blade. Place the driver through the compression instrument cannula, seat it into the socket of the untightened locking cap and provisionally tighten.

▲ Preacaution

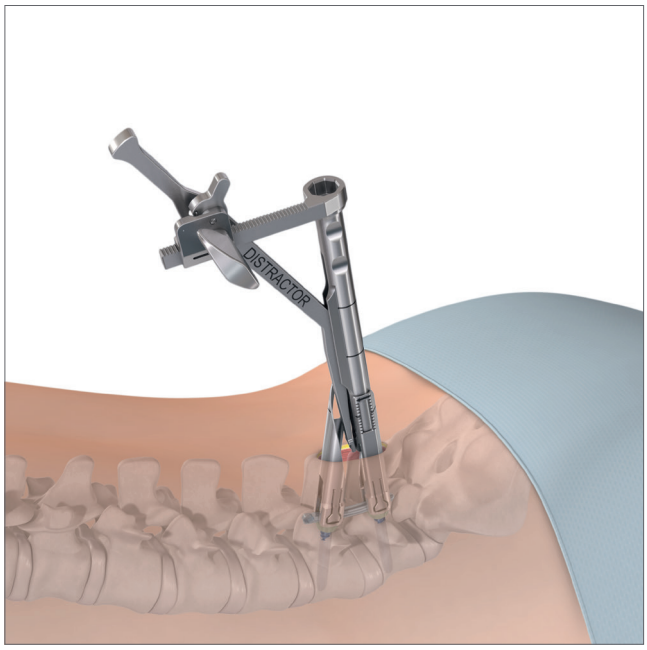
- **Always fully seat the compressor instrument on the screw head. The cannula of the instrument must be perpendicular to the rod during tightening.**

For compression, follow the steps as outlined in step 1, page 70.

2. Distract mini-open construct

Instruments	
03.616.057	Counter Torque
03.616.051	Cap Guide, one-step
03.616.058	Distraction instrument, mini-open
03.620.061	T-Handle with Ratchet Wrench and with Torque Limiter, 10 Nm
03.632.401	Screwdriver Shaft Stardrive, T25, long, straight tip, with Hexagonal Coupling, for Matrix

Optional instruments	
03.632.073	Screwdriver Shaft, T25, cannulated, long
03.616.052	Cap Guide, one-step, long



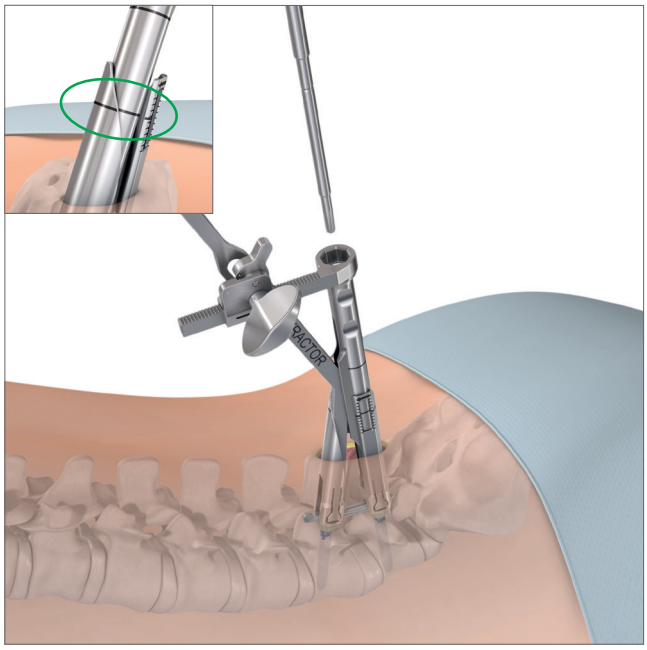
▲ Precaution

- Ensure all locking caps are fully seated and provisionally tightened (see chapter “Rod Reduction and Locking Cap Introduction”).

At the level where distraction is desired, final tighten the first locking cap. With the distractor foot retracted into the cannula shaft, insert the cannula of the distraction instrument into the other retraction blade.

- **Ensure correct alignment of the etching of the distraction instrument and the retraction blade. If the lines cannot be aligned, check the reduction of the rod.**

Place the driver through the distraction instrument cannula, and seat it onto the screw head. Reverse the provisionally tightened locking cap ¼ of a turn.



Position the K-bar next to the adjacent implant.

Set the rack to lock and turn the knob to distract.

Perform distraction under fluoroscopy.

Provisionally tighten the locking cap. Remove the distraction instrument and final tighten the locking cap (see section 4 “Final Tighten Locking Cap”).

Alternative technique:
Insertion of locking cap using the distraction instrument

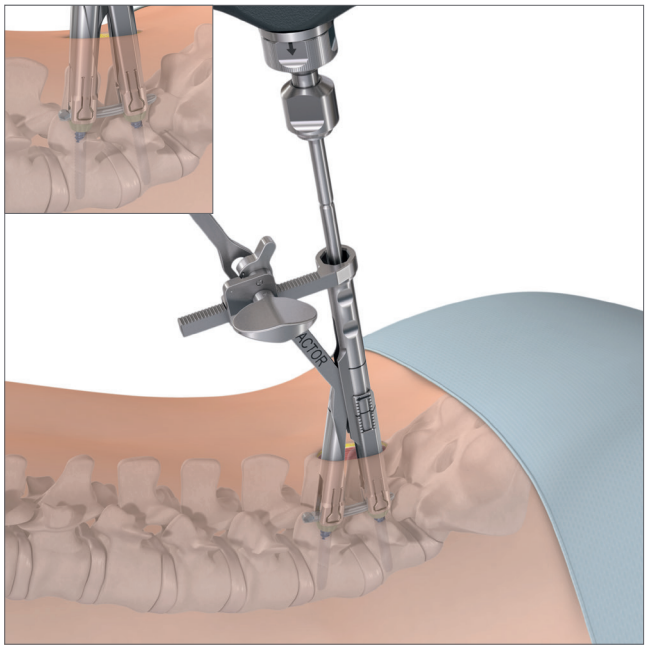
Properly orient and position the distractor instrument over the locking cap on the module for locking caps. Press down firmly to capture the locking cap. The locking cap will snap into the distal tip of the distractor.

With the distractor foot retracted into the cannula shaft, insert the cannula of the distractor into the retraction blade. Place the driver through the distractor instrument cannula, seat it into the socket of the untightened locking cap and provisionally tighten.

▲ Precaution

- **Always fully seat the distraction instrument on the screw head. The cannula of the instrument must be perpendicular to the rod during tightening.**

For distraction, follow the steps as outlined in step 2, page 73.

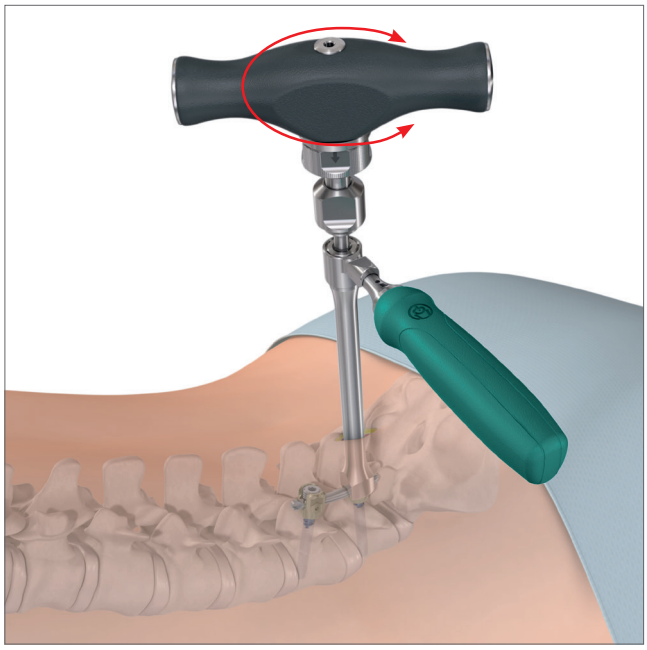


Locking Cap Loosening

Loosen locking cap (optional)

Instruments	
03.620.061	T-Handle with Ratchet Wrench and with Torque Limiter, 10 Nm
03.632.401	Screwdriver Shaft Stardrive, T25, long, straight tip, with Hexagonal Coupling, for Matrix
03.632.099	Counter Torque, long, for Matrix 5.5
03.632.080	Handle, detachable, for Matrix

Optional instrument	
03.632.073	Screwdriver Shaft, T25, cannulated, long



If a locking cap needs to be loosened after tightened to 10 Nm, use a countertorque with detachable handle, MATRIX screwdriver shaft, and a 10 Nm torque limiting handle to loosen the locking cap.

- **Locking caps are designed to lock the construct and resist postoperative loosening and rod push through. Therefore, in certain cases, the loosening torque may be higher than 10 Nm. In such cases, apply the following technique to loosen a locking cap.**

Place the torque handle in the neutral position and begin to sequentially tighten and then immediately loosen the locking cap. Turn until tactile or audible feedback from the implants is experienced. It is important to approach the torque limit of the handle, but not exceed through the limit. Repeat the tightening / loosening steps until the locking cap is loose. To ensure the screwdriver shaft is protected from damage, always use the 10 Nm torque limiting handle.

▲ Warning

- **Never use a fixed or ratcheting T-handle screwdriver for this technique. If the torque limiting attachment is not used, breakage of the driver may occur and could potentially harm the patient.**

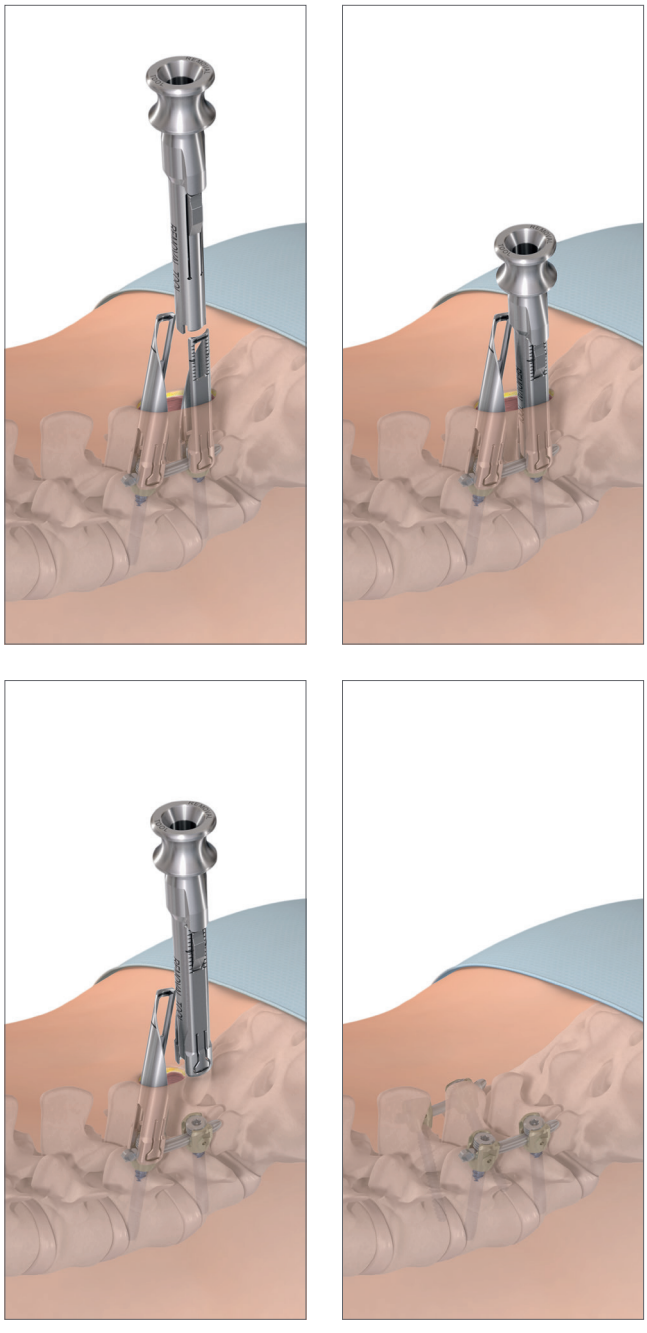
Retraction Blade Removal

Remove retraction blades

Instrument	
03.616.039	Retraction Blade Removal Instrument

Optional instrument	
03.616.040	Retraction Blade Removal Instrument, long

Insert the retraction blade removal instrument with tabs facing the windows on the retraction blade. Apply light pressure until the tabs snap into the windows. Pull the remover with the attached retraction blade from the incision.



Retraction Blade Reattachment

In situ reattachment of retraction blades

Instruments	
03.616.072	Retraction Blade Reattachment Tool
03.616.071	In-situ Reattachment Tube

Optional instruments	
03.632.401	Screwdriver Shaft Stardrive, T25, long, straight tip, with Hexagonal Coupling, for Matrix
03.632.073	Screwdriver Shaft, T25, cannulated, long

To reattach a retraction blades onto a final tightened screw head, slide the selected retraction blade(s) up the shaft of the reattachment tool so that the window(s) of the retraction blades(s) match(es) up with the etch marks on the tool. The retraction blade end will catch in the ring of the tool.

If tissue creep around the head of the screw is encountered, place the in situ reattachment tube into the wound over the screw with the tightened locking cap. Orient the tube rod slot with the rod.

- The tube should be centered over the screw head.

Place the reattachment tool into the tube, with retraction blade arrows pointing towards the center of the construct, and seat the retraction blade(s) over the head. Apply downward pressure until the retraction blade(s) snap(s) on.

The T25 screwdriver shaft can be placed through a loaded retraction blade reattachment tool to help guide the attachment tool to the screw.

Remove the reattachment tool and in-situ reattachment tube.

▲ Precaution

- **Do not impact the retraction blade reattachment tool.**

Revision/Removal

Construct revision/removal

Instruments	
03.616.053	Rod Forceps
03.620.061	T-Handle with Ratchet Wrench and with Torque Limiter, 10 Nm
03.632.401	Screwdriver Shaft Stardrive, T25, long, straight tip, with Hexagonal Coupling, for Matrix
03.632.076	Rod Pusher / Counter Torque, long, for Matrix 5.5
03.632.080	Handle, detachable, for Matrix

Optional instrument	
03.632.073	Screwdriver Shaft, T25, cannulated, long

If the construct requires revision or removal, use a minimally invasive approach to gain access to the construct.

Insert the rod pusher / counter torque, with detachable handle attached.

Refer to loosen locking cap section for instructions on loosening of locking caps for removal.

Remove the 10 Nm torque limiting ratchet handle with locking cap from the incision site. Use the rod forceps to recover the rod once the locking caps are removed.

Once the rod has been recovered, use the ratchet T-handle driver construct to back out each pedicle screw.

Bibliography

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

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

Indications and Contraindications

Please refer to the corresponding Instructions for Use for specific information on Intended use, Indications, Contraindications, Warnings and Precautions, Potential Adverse Events, Undesirable Side Effects and Residual Risks.

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