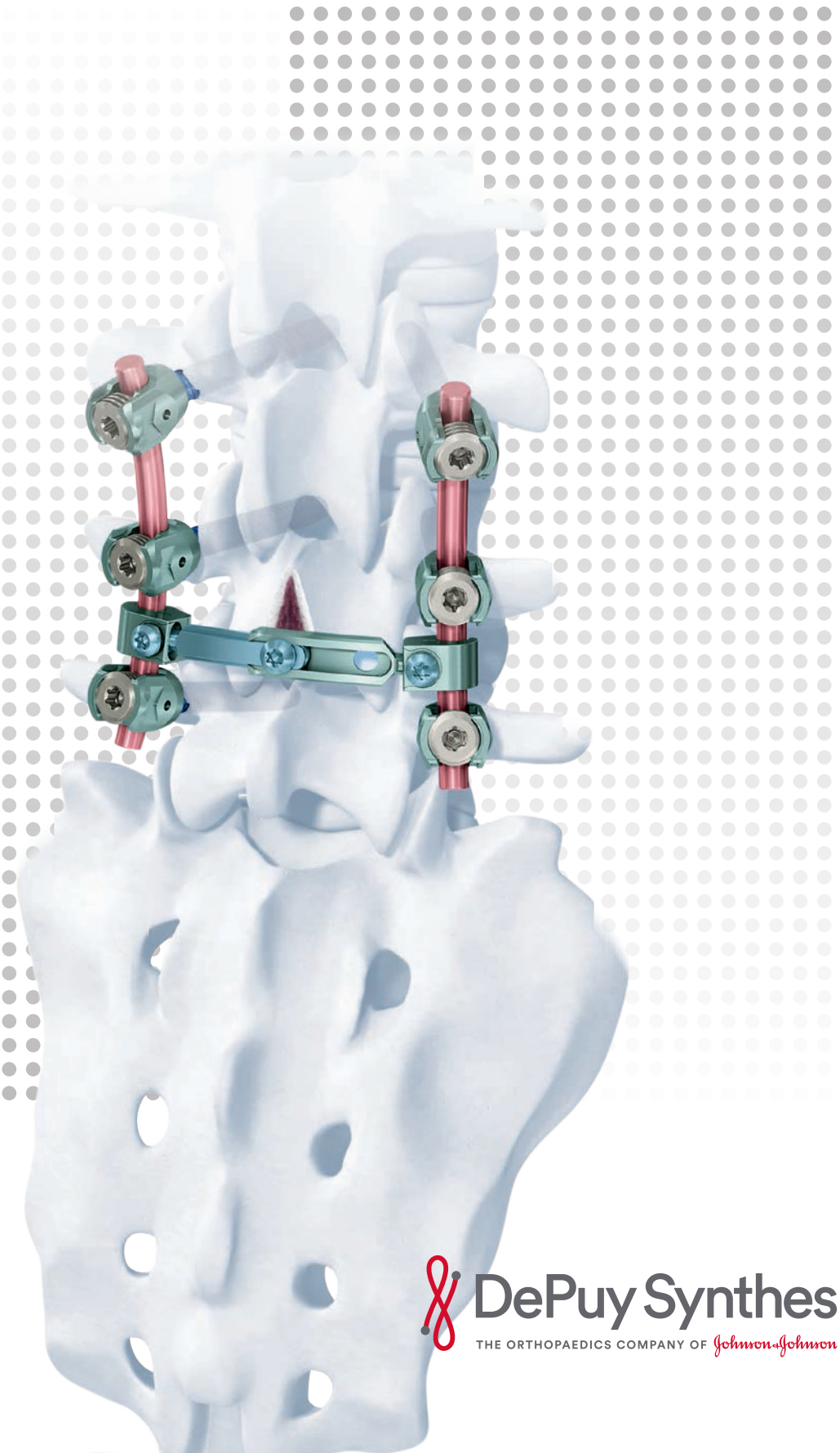
MATRIX SPINE SYSTEM

– DEGENERATIVE

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

Table of Contents

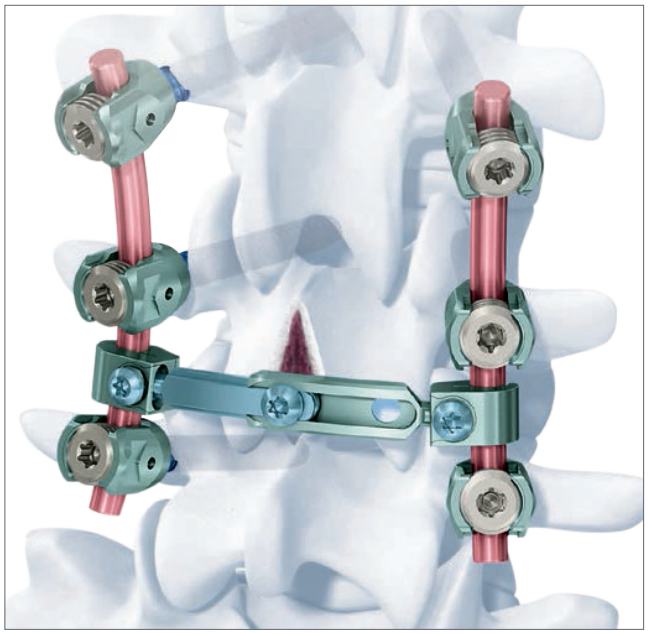
For Product Catalogue contact your local DePuy Synthes representative

Image Intensifier Control

▲ Warnings/Precautions

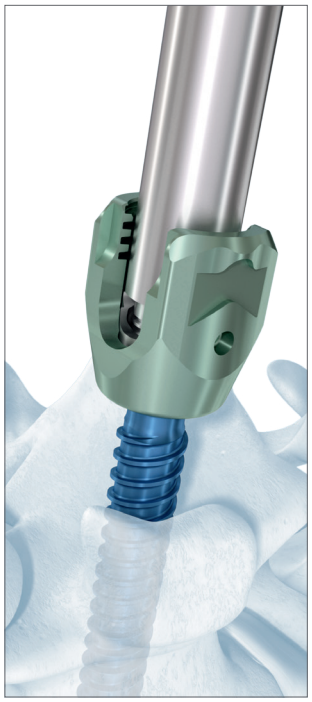
MATRIX Spine System – Degenerative

The MATRIX Spine System is a set of instruments and implants used to treat various spinal disorders (open or minimally invasive access). For a full list of indications, please refer to the Instructions For Use.



Modularity

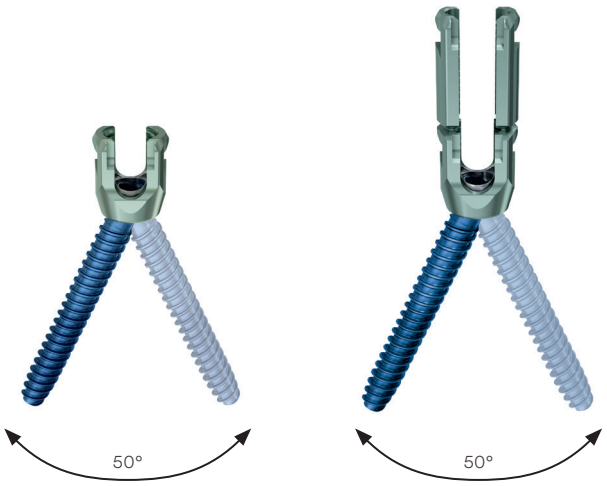
- Available as click-on and pre-assembled screws.
- Click on before or after screw insertion.
- Customized inventory possible.
- The polyaxial heads can be removed and replaced without removing the pedicle screw from the pedicle.



Implants

Preassembled Polyaxial and Reduction Pedicle Screw

- Allows up to 50° of angulation to facilitate in situ connection to the longitudinal rod.
- The rod reduction features are located at the top of the polyaxial head.
- Dual-core and double-lead thread design.
- Threaded T25 Stardrive recess.

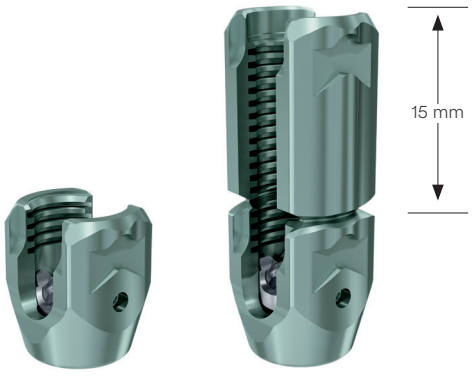


Pedicle Screw

- Designed for increased visual access to the anatomical structures.
- Dual core and double lead thread design.
- Rounded blunt tip and self-tapping thread.
- Threaded T25 Stardrive recess.

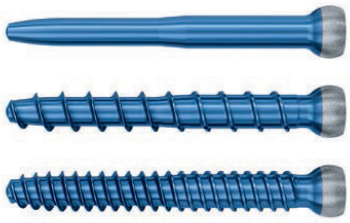
Click-on Polyaxial and Reduction Screw Head

The polyaxial head of the implant is designed for rod reduction.
The polyaxial heads can be removed and replaced without removing the pedicle screw from the pedicle.
The reduction head allows for 15 mm rod reduction.



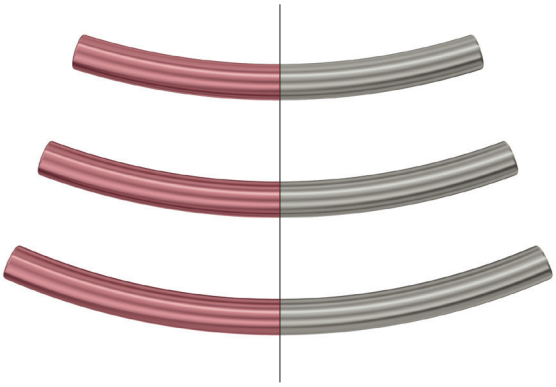
Dual Core / Double Lead Screw Design

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



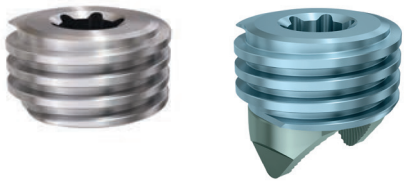
Rods

- Straight and curved options available in different materials



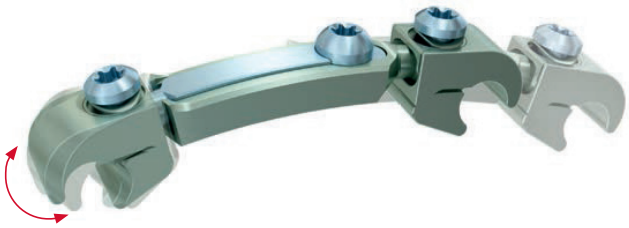
Locking Cap

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



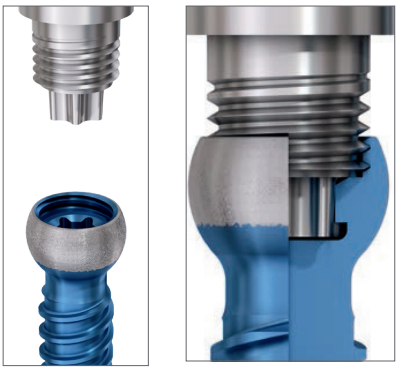
Snap-on Swiveling Transverse Connector

- The snap-on transverse connector are preassembled.
- The jaws swivel and are spring loaded.
- Telescoping body is arched and is available in a range of lengths.
- The locking screws use a T15 Stardrive



Screwdriver – Screw Interlock

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



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]

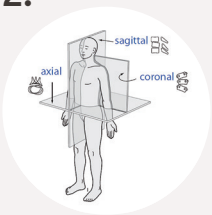
AO Principles[1,2]

1.

Stability

Stabilization to achieve a specific therapeutic outcome.

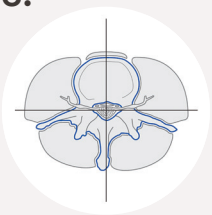
2.



Alignment

Balancing the spine in three dimensions.

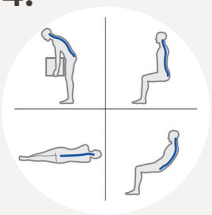
3.



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.

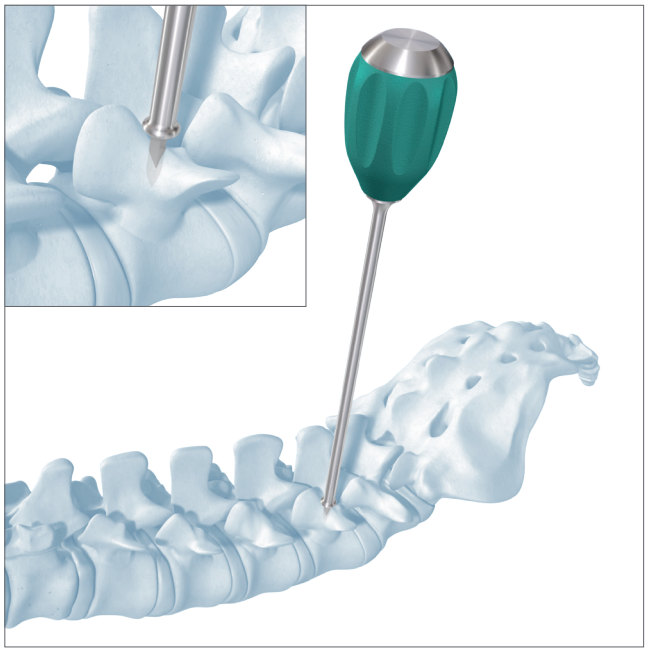
1. Prepare pedicles and determine screw lengths

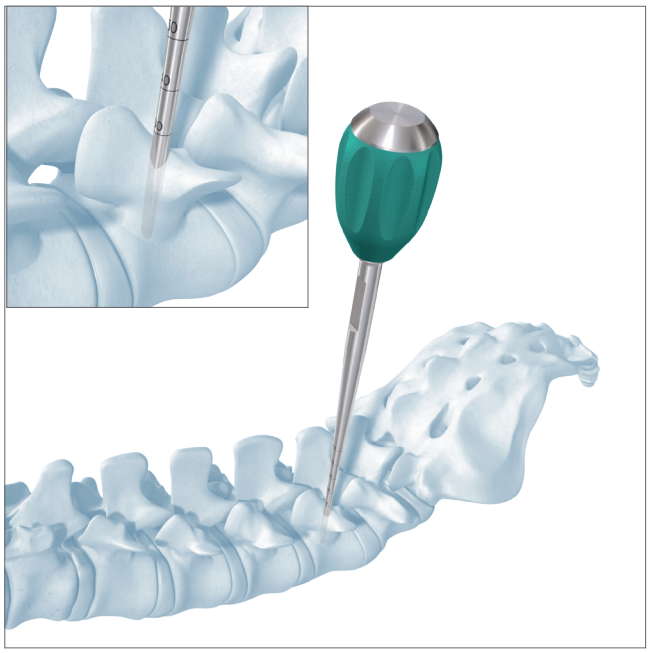
Instruments	
388.656	Pedicle Awl Ø 4.0 mm with Silicone Handle, length 255 mm, for Pedicle Screws Ø 5.0 to 7.0 mm
388.655	Pedicle Probe Ø 3.7 mm with Silicone Handle, length 240 mm, for Pedicle Screws Ø 5.0 to 7.0 mm

Locate pedicles and use the awl to perforate the cortex.

Use the probe to open the pedicle canal. Using radiographic imaging, confirm pedicle location, orientation and depth by inserting the probe. When selecting the appropriate length screw, use the markings on the probe to determine the pedicle depth.

All MATRIX pedicle screws are self-tapping; however, if tapping is preferred, use the appropriate tap and tap handle.





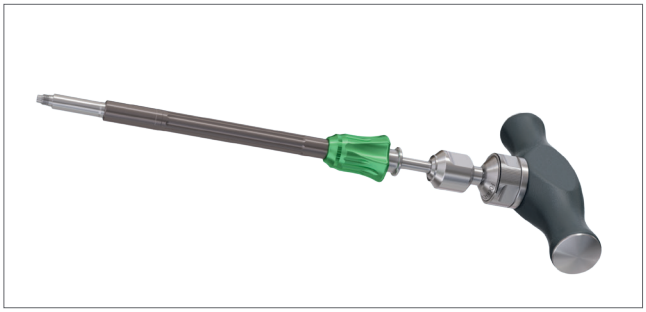
Optional instruments	
03.632.057	Pedicle Marker for Matrix
03.632.058	Inserter for Pedicle Marker, for Matrix
388.657	Pedicle Probe Ø 3.8 mm, curved, with Silicone Handle, length 290 mm, for Pedicle Screws Ø 5.0 to 7.0 mm
388.536	Pedicle Probe for Screws Ø 4.2 mm, length 240 mm
388.545	Feeler for Screw Channel, straight, Ø 2.3 mm, length 275 mm
388.546	Feeler for Screw Channel, curved, Ø 2.3 mm, length 275 mm
388.549	Feeler, straight, with rounded tip
388.551	Pedicle Awl Ø 3.0 mm, length 230 mm, for Screws Ø 4.0 and 4.2 mm
03.632.103	Tap for Pedicle Screws Ø 3.5 mm, length 180 mm
03.632.104	Tap for Pedicle Screws Ø 4.0 mm, length 180 mm
03.632.105	Tap for Pedicle Screws Ø 5.0 mm, length 180 mm
03.632.155	Tap for Pedicle Screws Ø 5.5 mm, length 180 mm
03.632.106	Tap for Pedicle Screws Ø 6.0 mm, length 180 mm
03.632.107	Tap for Pedicle Screws Ø 7.0 mm, length 180 mm
03.632.108	Tap for Pedicle Screws Ø 8.0 mm, length 180 mm
03.632.109	Tap for Pedicle Screws Ø 9.0 mm, length 180 mm
388.654	Ratchet with Handle, with Hexagonal Quick Coupling 6.0 mm

2. Assemble screwdriver

Instruments	
03.632.036	Retaining Sleeve, long, for Matrix 5.5
03.632.072	Screwdriver Shaft Stardrive, T25, long, for Matrix
03.620.061	T-Handle with Ratchet Wrench and with Torque Limiter, 10 Nm

Slide retaining sleeve on the screwdriver shaft and attach the ratchet handle.

Optional instruments	
03.616.043	Retaining Sleeve, locking, long
03.632.074	Screwdriver Stardrive, T25, long, with T-Handle, for Matrix
03.632.075	Screwdriver Stardrive, T25, long, with straight handle, for Matrix
03.616.042	Retaining Sleeve, locking
03.632.001	Retaining Sleeve, standard, for Matrix 5.5
03.632.002	Screwdriver Shaft Stardrive, T25, standard, for Matrix 5.5
03.632.004	Screwdriver Stardrive, with T-Handle, standard, for Matrix 5.5
03.632.005	Screwdriver Stardrive, T25, with straight handle, standard, for Matrix 5.5



3. Pick up screw

Instruments	
03.632.036	Retaining Sleeve, long, for Matrix 5.5
03.632.072	Screwdriver Shaft Stardrive, T25, long, for Matrix
03.620.061	T-Handle with Ratchet Wrench and with Torque Limiter, 10 Nm

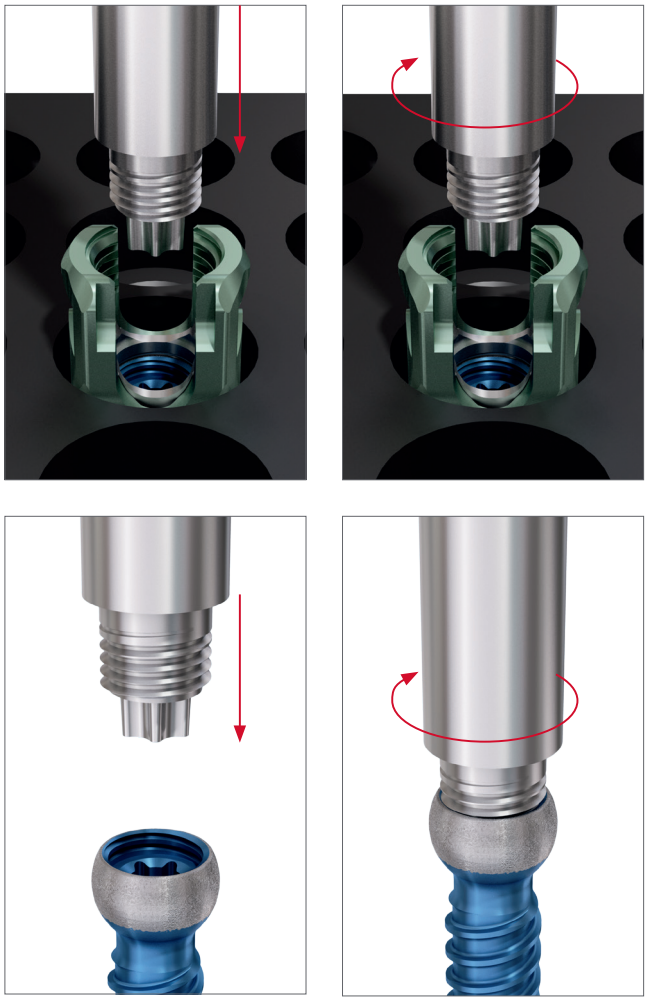
Choose the appropriate screw diameter and length based on pedicle probe feedback.

Insert the screwdriver tip into the recess of the pedicle screw and rotate the green knob of the retaining sleeve clockwise until the tip of the sleeve is firmly attached to the pedicle screw.

Verify the screw length with the template provided in the screw module.

- **Set the ratchet to the neutral position before picking up a screw.**

Optional instruments	
03.616.043	Retaining Sleeve, locking, long
03.632.074	Screwdriver Stardrive, T25, long, with T-Handle, for Matrix
03.632.075	Screwdriver Stardrive, T25, long, with straight handle, for Matrix
03.616.042	Retaining Sleeve, locking
03.632.001	Retaining Sleeve, standard, for Matrix 5.5
03.632.002	Screwdriver Shaft Stardrive, T25, standard, for Matrix 5.5
03.632.004	Screwdriver Stardrive, with T-Handle, standard, for Matrix 5.5
03.632.005	Screwdriver Stardrive, T25, with straight handle, standard, for Matrix 5.5



4. Insert screw

Instruments	
03.632.036	Retaining Sleeve, long, for Matrix 5.5
03.632.072	Screwdriver Shaft Stardrive, T25, long for Matrix
03.620.061	T-Handle with Ratchet Wrench and with Torque Limiter, 10 Nm

Insert the screw. Hold the black part of the retaining sleeve during screw insertion.

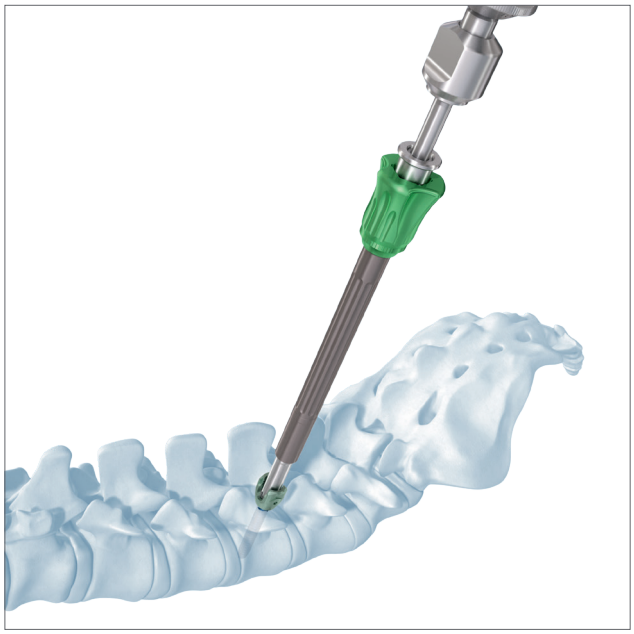
To disengage the retaining sleeve, rotate the green knob counterclockwise and remove the screwdriver.

- 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.

- If pedicle screws with separate polyaxial heads are used, follow the optional technique described on page 31.

▲ Precautions

- When countersinking, care should be taken in reaming the most superior (and inferior) level to protect the facet joints.
- Do not grasp the green knob during screw insertion as this will cause the retaining sleeve to disengage from the screw.



Optional Instruments

03.616.043	Retaining Sleeve, locking, long
03.632.074	Screwdriver Stardrive, T25, long, with T-Handle, for Matrix
03.632.075	Screwdriver Stardrive, T25, long, with straight handle, for Matrix
03.616.042	Retaining Sleeve, locking
03.632.001	Retaining Sleeve, standard, for Matrix 5.5
03.632.002	Screwdriver Shaft Stardrive, T25, standard, for Matrix 5.5
03.632.004	Screwdriver Stardrive, with T-Handle, standard, for Matrix 5.5
03.632.005	Screwdriver Stardrive, T25, with straight handle, standard, for Matrix 5.5

5. Select, cut and bend rod

Instruments	
03.632.007	Alignment Tool for polyaxial Screw Head, for Matrix 5.5
388.906	Trial Rod Ø 5.0 mm, length 150 mm
03.632.017	Rod Bender with Silicone Handle

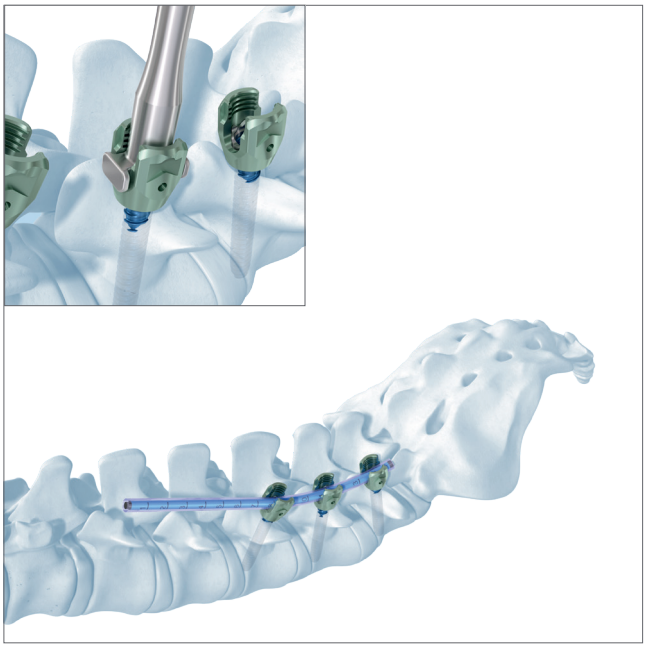
Use the head alignment tool to rotate and align the screw heads.

Use the trial rod to determine contour and length of the rod.

Select precontoured rod, or use rod bender to form rod according to the template.

- **The screw height must be adjusted to the rod. If necessary, adjust the screw height using a screwdriver without retaining sleeve.**
- **To restore polyaxiality of a screw head that has already been tightened, insert the alignment tool in the screw head and apply sufficient pressure to release the lock.**

When connecting rods 3.5 mm/5.5 mm and 4.0 mm/5.5 mm are used, MATRIX can be linked to the Synapse, Axon and CerviFix 3.5 mm and 4.0 mm system, respectively. When 5.5 mm/6.0 mm connecting rods are used, the Synthes 6.0 mm rod systems can be linked to the MATRIX System.



Optional instruments

03.632.017	Rod Bender with Silicone Handle
388.750	USS Rod Cutting and Bending Device
388.720	Bolt Cutter

▲ Precautions:

- The USS rod cutting and bending device must be used to cut cobalt chromium rods.
- Do not reverse bend rods. Reverse bending may produce internal stresses, which may become the focal point for eventual breakage of the implant.

6. Insert rod

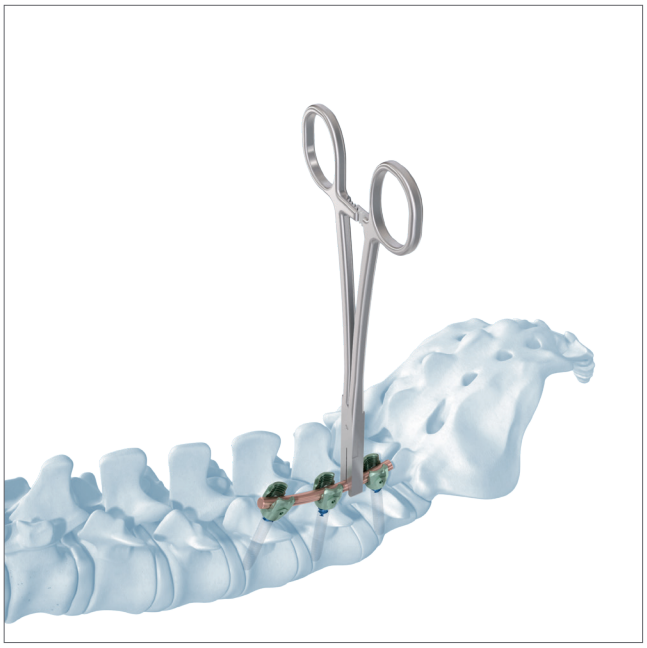
Instrument	
03.632.081	Rod Holding Forceps for Rods Ø 5.5 mm

Insert the rod using the rod holding forceps.

Optional instrument	
03.632.202	Holding Forceps for Rods Ø 5.5 and Ø 6.0 mm

▲ Precaution

- When using a connecting rod, it is important not to position the transition taper within the head of a screw or hook.



7. Reduce rod

Option A: Reduce rod with a rod pusher

Instruments	
03.632.006	Rod Pusher/Counter Torque, standard, for Matrix 5.5
03.632.080	Handle, detachable, for Matrix

Connect detachable handle to the octagonal end of the rod pusher/counter torque.

Advance rod into the screw head using the rod pusher/countertorque.

Optional instruments	
03.632.076	Rod Pusher/Counter Torque, long, for Matrix 5.5
03.632.169	Rod Pusher for Rods Ø 5.5/6.0 mm, for Matrix
03.632.000	Distraction Fork

▲ 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

Option B:
Reduce rod with a Rocker Fork

Instruments
03.632.010 Rocker Fork, small, for Matrix 5.5
03.632.012 Rocker Fork, medium, for Matrix 5.5
03.632.011 Rocker Fork, footed, for Matrix 5.5

Use a Rocker Fork to lever the rod into the head of the pedicle screw.

Reduction travels:

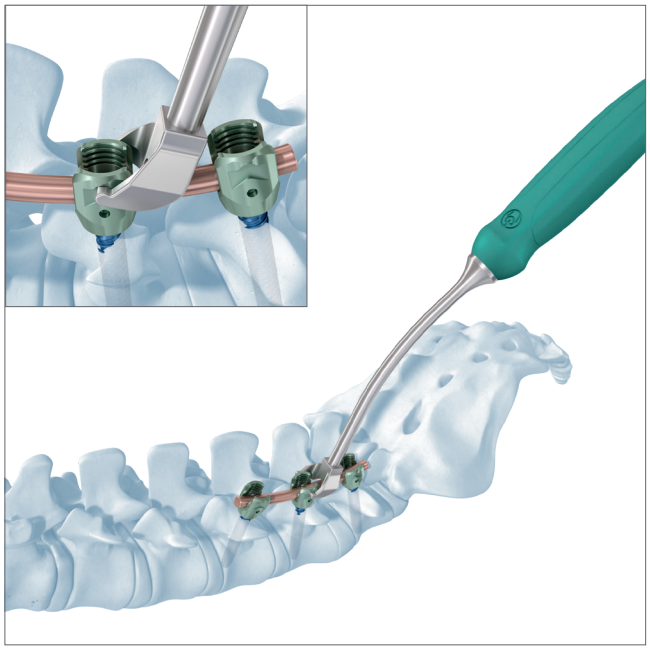
Small Rocker Fork = 8.5 mm
Medium Rocker Fork = 13.5 mm
Footed Rocker Fork = 7.5 mm

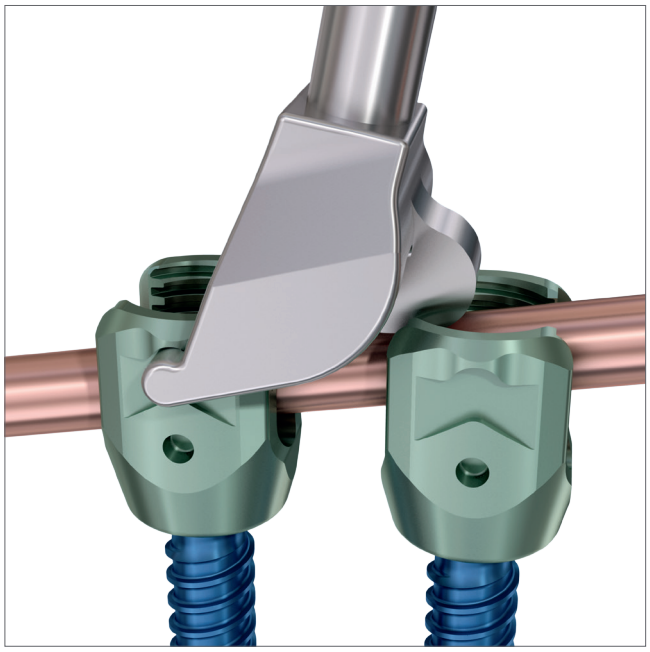
Use the footed MATRIX Rocker Fork to aid in reducing the rod into adjacent screw heads.

▲ 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.





Option C:
Reduce rod with a Rod Persuader

Instrument	
03.632.009	Rod Persuader, standard, for Matrix 5.5

Ensure that the ratchet handle is fully open. Place the rod persuader over the rod and onto the screw head. Press down firmly until the tips engage the head of the screw. Squeeze the handle to seat the rod into the head of the pedicle screw.

Reduction travel:

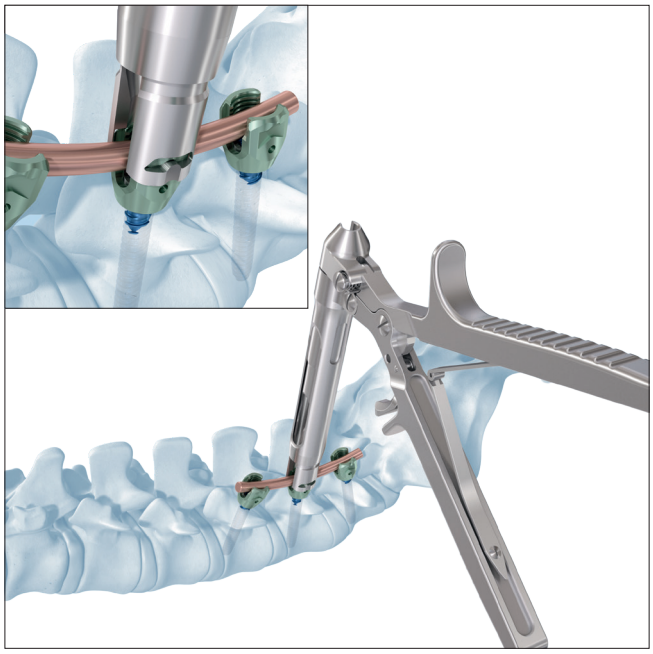
15 mm

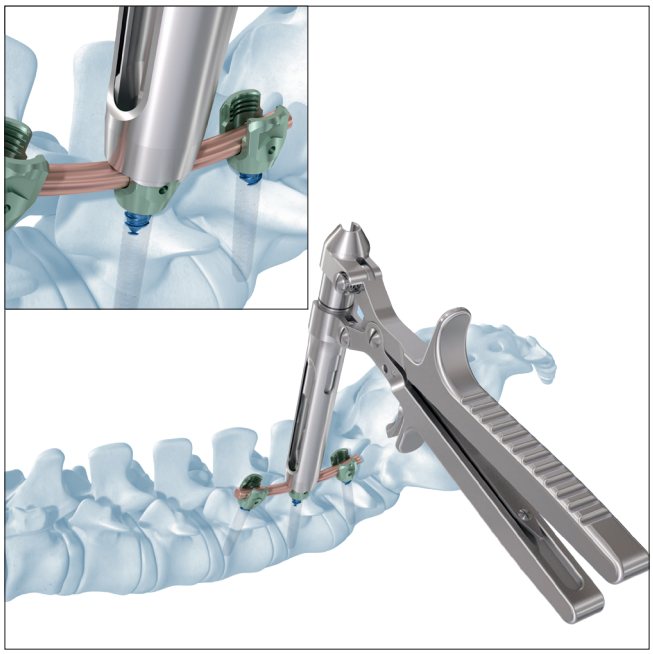
- The Rod Persuader can be used as counter torque for final tightening of the locking cap.

Optional instrument	
03.632.079	Rod Introduction Pliers, long, for Matrix 5.5

▲ 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





Option D:
Reduce rod with a Reduction Instrument for Spondylolisthesis

Instruments	
03.632.408	Reduction Instrument for Spondylolisthesis, standard, for Matrix 5.5
388.654	Ratchet with Handle, with Hexagonal Quick Coupling 6.0 mm
03.620.091	Socket, hexagonal 6.0 mm

To assemble the instrument, slide the inner tube through the outer tube. Insert the black nut and press down firmly until audible feedback. Push the inner tube up towards the black nut and turn the black nut clockwise until the black line is visible at the 30 line.

Place the reduction instrument over the screw head. Press down firmly until the tips engage. Load the hexagonal socket into the ratchet handle and insert it into the top of the reduction instrument.

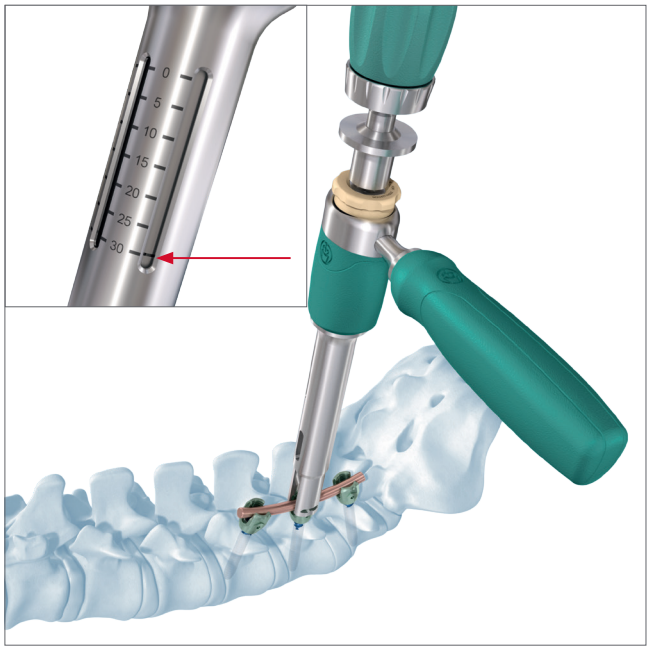
Rotate the ratchet handle clockwise to reduce the rod into the screw head. Full reduction is achieved when the black line on the side of the instrument is visible at the 0 line.

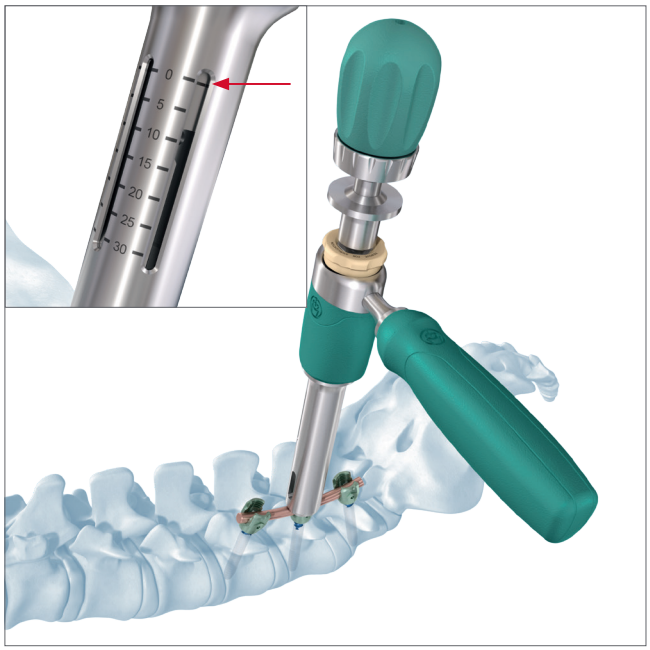
Remove the hexagonal Socket to insert a locking cap through the instrument.

To remove the instrument from the screw head, turn the palm handle counter-clockwise until the line on the side of the instrument is visible at the 30 line.

Reduction travel:

30 mm





Parallel reduction can be achieved by the simultaneous use of two reduction instruments on the same vertebral body.

- The reduction instrument for spondylolisthesis can be used as counter torque for final tightening of the locking cap.

Optional instrument

03.632.409	Reduction Instrument for Spondylolisthesis, long, for Matrix 5.5

▲ 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

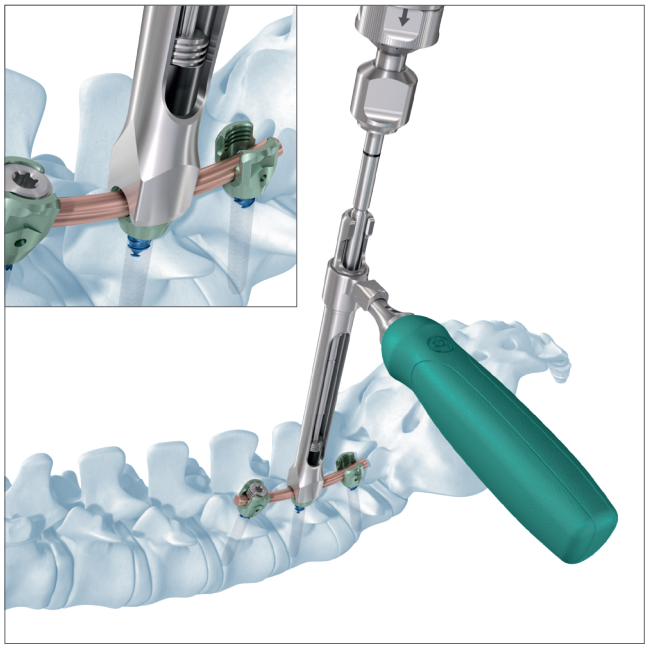
8. Insert 1-step locking cap

Instruments	
03.632.006	Rod Pusher/Counter Torque, standard, for Matrix 5.5
03.632.080	Handle, detachable, for Matrix
03.632.002	Screwdriver Shaft Stardrive, T25, standard, for Matrix 5.5
03.620.061	T-Handle with Ratchet Wrench and with Torque Limiter, 10 Nm

Insert the tip of the screwdriver shaft into the T25 recess of the locking cap. Press down firmly. The screwdriver shaft is self-retaining.

To ensure desired cap alignment, insert the locking cap through the rod pusher/counter torque. Thread the locking cap clockwise into the implant head.

Apply a light torque to provisionally tighten the locking cap and maintain the desired rod position. Place the remaining caps and provisionally tighten.

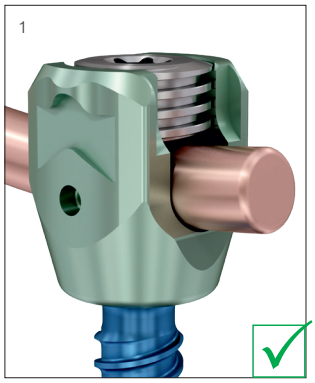


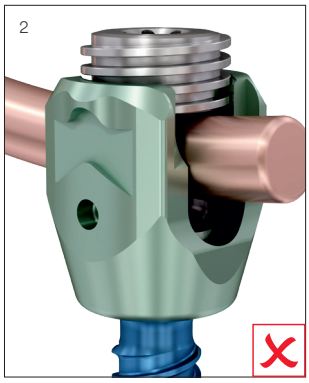
▲ Precaution

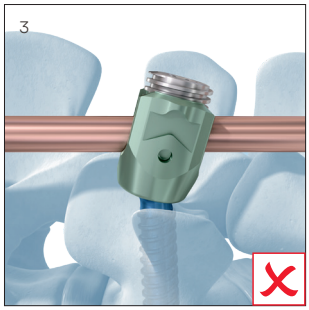
Confirm that the rod is fully aligned to the polyaxial head. Improper alignment of the rod with respect to the MATRIX implant heads could lead to construct loosening. (1)

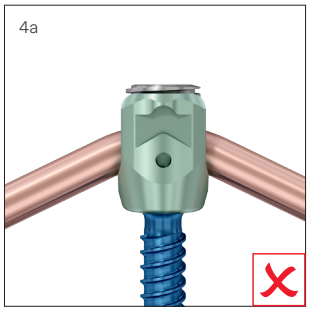
Examples of misalignment:

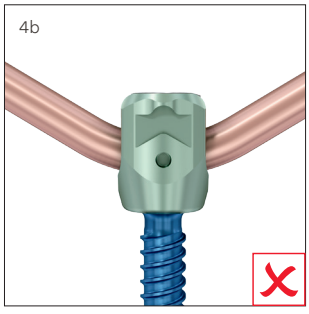
- The rod is sitting high in the polyaxial head. (2)
- The rod is not perpendicular to the polyaxial head. (3)
- A severe bend is positioned within the polyaxial head. (4a, 4b)





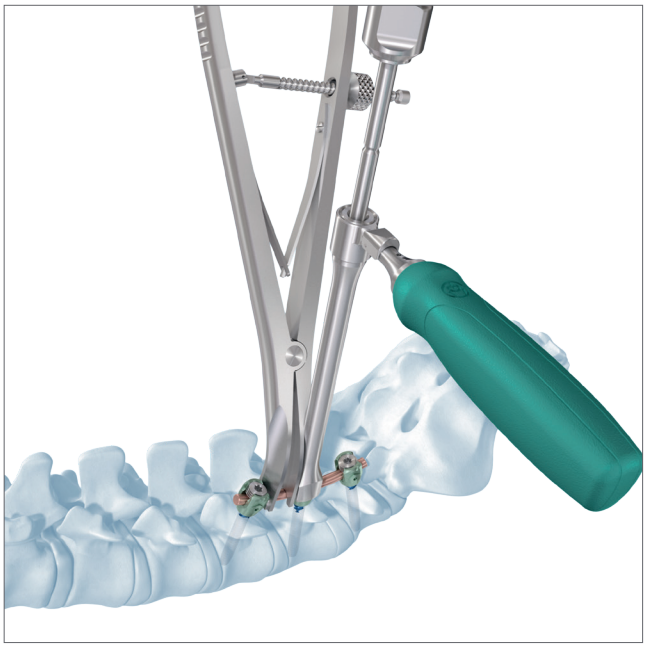






9. Distract

Instruments	
388.410	Spreader Forceps for Pedicle Screws, length 330 mm
03.632.401	Screwdriver Shaft Stardrive, T25, long, straight tip, with Hexagonal Coupling, for Matrix
03.620.061	T-Handle with Ratchet Wrench and with Torque Limiter, 10 Nm
03.632.049	Counter Torque, standard, for Matrix 5.5



▲ Precaution

- **Ensure all locking caps are fully reduced and provisionally tightened (see “Insert 1-step locking cap”). Failure to do so could potentially lead to a misalignment.**

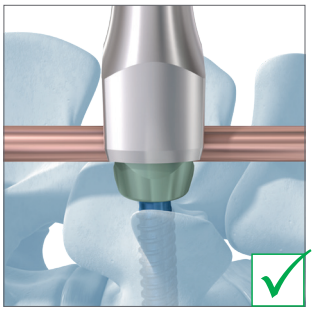
Finally tighten one locking cap completely to create a fixed point for distraction (see “Perform final tightening”). Reverse the locking cap of the screw to be relocated a quarter of a turn.

Use the distraction forceps to distract the construct. Once in the desired position, tighten the locking caps with the screwdriver.

The holding forceps can be used as a temporary point of distraction when adjacent pedicle screws are too distant from each other.

▲ Precaution

- Always fully seat the counter torque on the rod. The instrument must be perpendicular to the rod during tightening.



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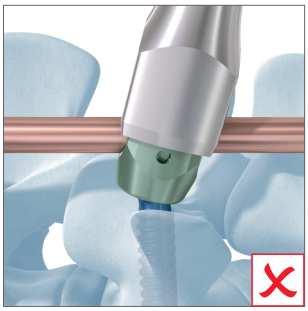


Incorrect

Optional instruments

03.632.202	Holding Forceps for Rods Ø 5.5 and Ø 6.0 mm
03.632.072	Screwdriver Shaft Stardrive, T25, long, for Matrix
03.632.074	Screwdriver Stardrive, T25, long, with T-Handle, for Matrix
03.632.075	Screwdriver Stardrive, T25, long, with straight handle, for Matrix
03.632.400	Screwdriver Shaft Stardrive, T25, standard, straight tip, with Hexagonal Coupling, for Matrix
03.632.002	Screwdriver Shaft Stardrive, T25, standard, for Matrix 5.5
03.632.004	Screwdriver Stardrive, with T-Handle, standard, for Matrix 5.5
03.632.005	Screwdriver Stardrive, T25, with straight handle, standard, for Matrix 5.5

10. Compress

Instruments

388.422	Compression Forceps, length 335 mm, for Pedicle Screws
03.632.401	Screwdriver Shaft Stardrive, T25, long, straight tip, with Hexagonal Coupling, for Matrix
03.620.061	T-Handle with Ratchet Wrench and with Torque Limiter, 10 Nm
03.632.049	Counter Torque, standard, for Matrix 5.5

▲ Precaution

- **Ensure all locking caps are fully reduced and provisionally tightened (see “Insert 1-step locking cap”). Failure to do so could potentially lead to a misalignment.**

Finally tighten one locking cap completely to create a fixed point for distraction (see “Perform final tightening”). Reverse the locking cap of the screw to be relocated a quarter of a turn.

Use the compression forceps to compress the construct. Once in the desired position, tighten the locking caps with the screwdriver.

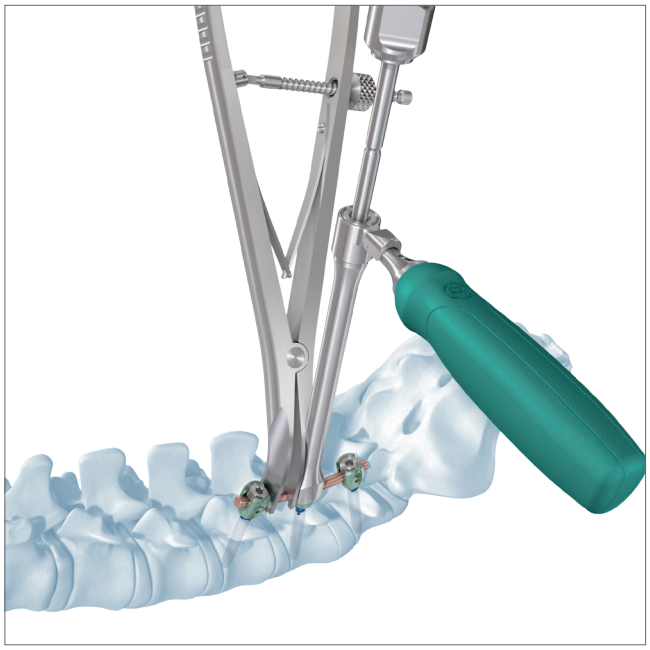
The rod holding forceps can be used as a temporary point of compression when adjacent pedicle screws are too distant.

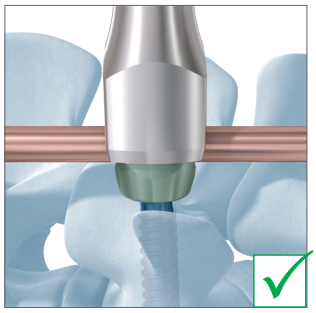
▲ Precaution

- **Always fully seat the counter torque on the rod. The instrument must be perpendicular to the rod during tightening.**

Optional instrument

03.632.202	Holding Forceps for Rods Ø 5.5 and Ø 6.0 mm





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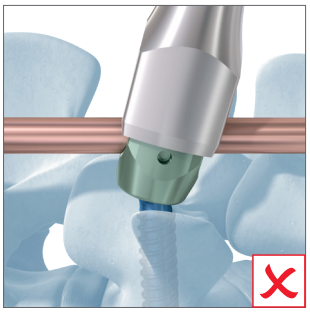


Incorrect

11. Perform final tightening

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

▲ Precaution

- Ensure all locking caps are fully reduced and provisionally tightened (see “Insert 1-step locking cap”). Failure to do so could potentially lead to a misalignment.

▲ Precaution

- The handle of the counter torque must be oriented laterally or medially. Do not orient the handle of the countertorque in line with the rod. This action could cause misalignment of the rod with the implant.

Correct

Incorrect

Place the counter torque over the head of the screw. Attach the screwdriver shaft to the T-handle with torque limiter. Insert the instrument through the counter torque cannula into the drive recess of the locking cap. Ensuring that the polyaxial head is perpendicular to the rod, tighten until there is a tactile release. This indicates that the required 10 Nm of torque has been applied. Repeat for all locking caps.

After initial final tightening of all screws, sequentially revisit all locking caps. Start at the caudal left screw of the construct and proceed clockwise to systematically repeat final tightening of all locking caps of the construct.

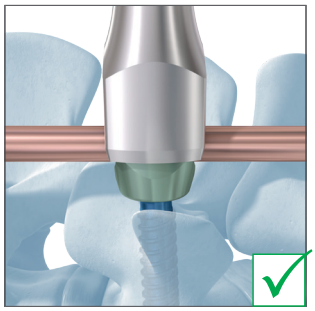
▲ Warning

- Final tightening of the locking caps should only be performed with a Synthes 10 Nm torque handle. MATRIX screw implants achieve performance standard only when tightened to the required 10 Nm tightening torque

Alternatively, the reduction instrument for spondylolisthesis and the rod persuader can be used as counter torque for final tightening of the locking cap.

▲ Precaution

- **Always fully seat the rod pusher/counter torque on the rod. The instrument must be perpendicular to the rod during final tightening.**



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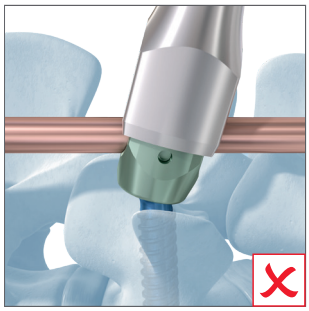


Incorrect

Optional instruments

03.632.006	Rod Pusher/Counter Torque, standard, for Matrix 5.5
03.632.008	Reduction Instrument for Spondylolisthesis, standard, for Matrix 5.5
03.632.009	Rod Persuader, standard, for Matrix 5.5
03.632.076	Rod Pusher/Counter Torque, long, for Matrix 5.5
03.632.078	Reduction Instrument for Spondylolisthesis, long, for Matrix 5.5
03.632.079	Rod Introduction Pliers, long, for Matrix 5.5
03.632.099	Rod Persuader, standard, for Matrix 5.5

Optional Technique

Screw Insertion with Retaining Sleeve, Locking

Insert screw with retaining sleeve, locking

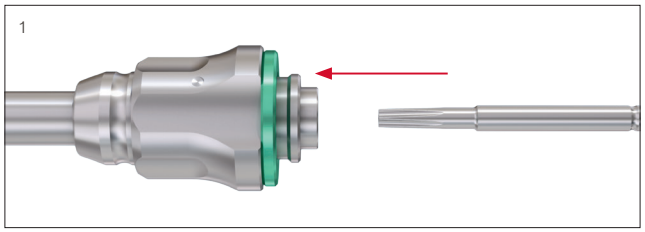
Instruments	
03.632.074	Screwdriver Stardrive, T25, long, with T-Handle, for Matrix
03.616.043	Retaining Sleeve, locking, long

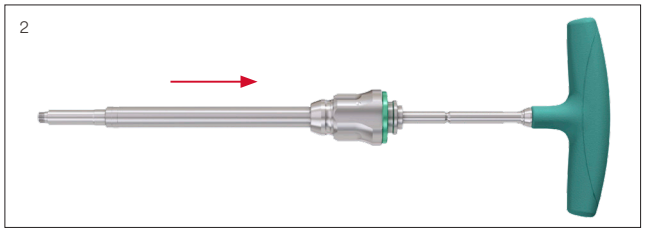
To assemble the screwdriver and the retaining sleeve, depress the loading collar on the proximal end of the retaining sleeve (1).

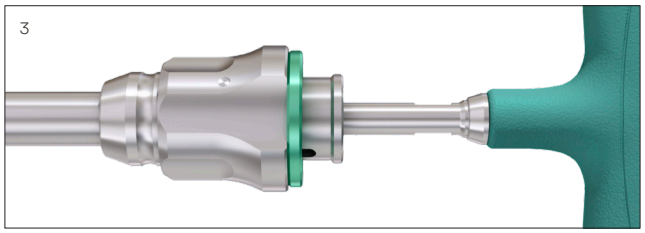
Then slide the sleeve toward the handle on the shaft until it stops (2).

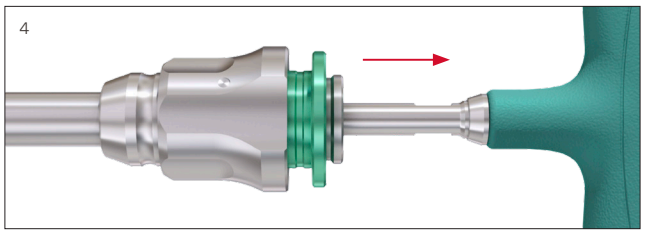
Release the loading collar and verify that the retaining sleeve is firmly attached to the screwdriver (3).

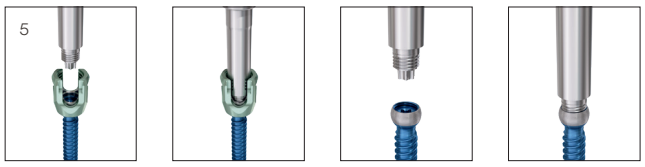
Retract the green locking ring towards the handle (4). Place the screwdriver tip securely into the T25 StarDrive recess of the pedicle screw (5).











When using a ratchet handle, make sure to set it to neutral setting.

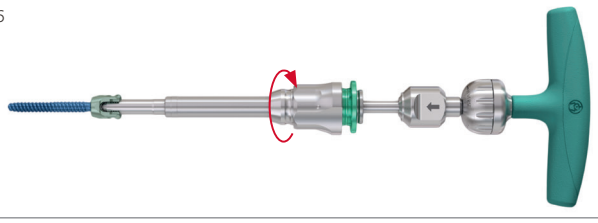
Rotate the grey knob of the retaining sleeve clockwise. Firmly tighten to secure the implant, using the handle as countertorque (6).

Push the green locking ring toward the grey knob (7). If required, set the ratchet handle to the forward setting to insert the screw.

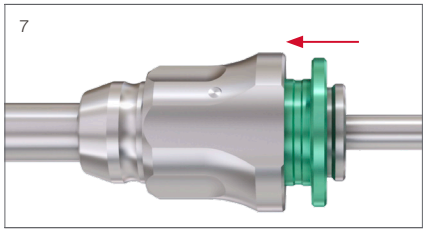
To release the screw from the retaining sleeve, retract the grey locking ring towards the handle, rotate the silver knob counterclockwise and remove the screwdriver (8).

- **Polyaxial screwheads need to remain free and mobile after insertion to allow alignment to the rod during locking cap insertion and final tightening.**
- **The mobility of the screw head cannot be assessed while the holding sleeve is attached.**

6



7



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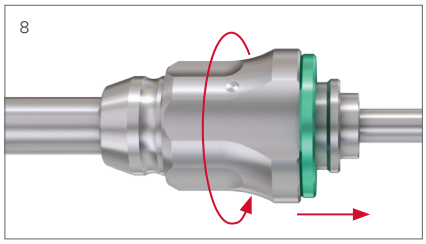


Optional instruments

03.632.072	Screwdriver Shaft Stardrive, T25, long, for Matrix
03.632.075	Screwdriver Stardrive, T25, long, with straight handle, for Matrix
03.632.042	Rod Pusher/Counter Torque for Reduction Screw, for Matrix 5.5
03.632.004	Screwdriver Stardrive, with T-Handle, standard, for Matrix 5.5
03.632.002	Screwdriver Shaft Stardrive, T25, standard, for Matrix 5.5
03.632.005	Screwdriver Stardrive, T25, with straight handle, standard, for Matrix 5.5

Optional Technique

Unassembled Pedicle Screw Insertion

1. Insert unassembled pedicle screw

Instruments	
03.632.074	Screwdriver Stardrive, T25, long, with T-Handle, for Matrix
03.632.046	Reamer for Pedicle Screws, for Matrix

Prepare the pedicle and insert the unassembled pedicle screws as recommended in steps 1 to 4 of the surgical technique (pages 8–13).

Slide the reamer over the screwdriver shaft. Engage the tip of the screwdriver in the unassembled pedicle screw. Ream until the black line is visible on the shaft. This indicates that there is enough room for the implant head.

▲ Precaution

- When reaming the most superior and inferior levels take care to protect the facet joints.

Optional instruments	
03.620.061	T-Handle with Ratchet Wrench and with Torque Limiter, 10 Nm
03.632.072	Screwdriver Shaft Stardrive, T25, long, for Matrix
03.632.075	Screwdriver Stardrive, T25, long, with straight handle, for Matrix
03.632.004	Screwdriver Stardrive, with T-Handle, standard, for Matrix 5.5
03.632.002	Screwdriver Shaft Stardrive, T25, standard, for Matrix 5.5
03.632.005	Screwdriver Stardrive, T25, with straight handle, standard, for Matrix 5.5

2. Assemble polyaxial head

Instruments	
03.632.037	Positioning Instrument for Polyaxial Screw Heads, for Matrix 5.5
68.632.125	Loading Station for Matrix 5.5

Insert the inner shaft of the positioning instrument into the handle and tighten in the clockwise direction. To pick up a screwhead, align the positioning instrument for polyaxial screw heads to the rod slot features on the polyaxial head implant and press down.

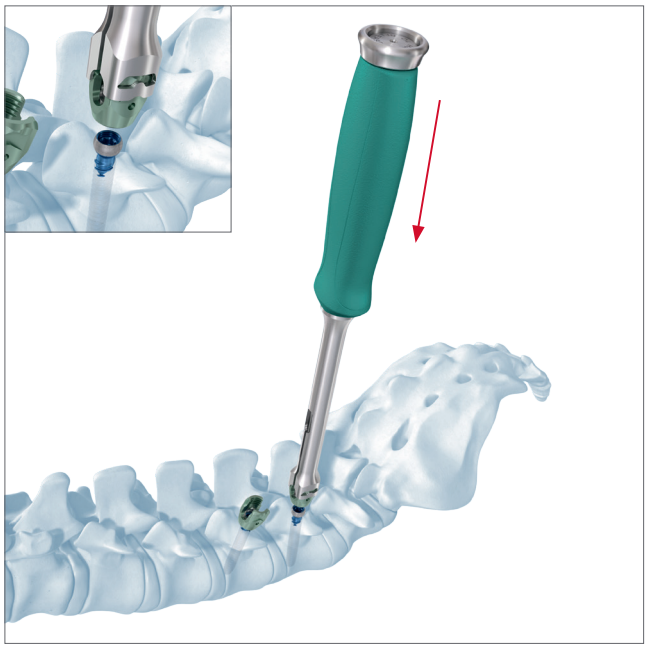
Position the placement tool with the polyaxial head over the unassembled pedicle screw and press down. To ensure the polyaxial head is securely attached to the unassembled pedicle screw, gently lift up on the placement tool and angulate the polyaxial head.

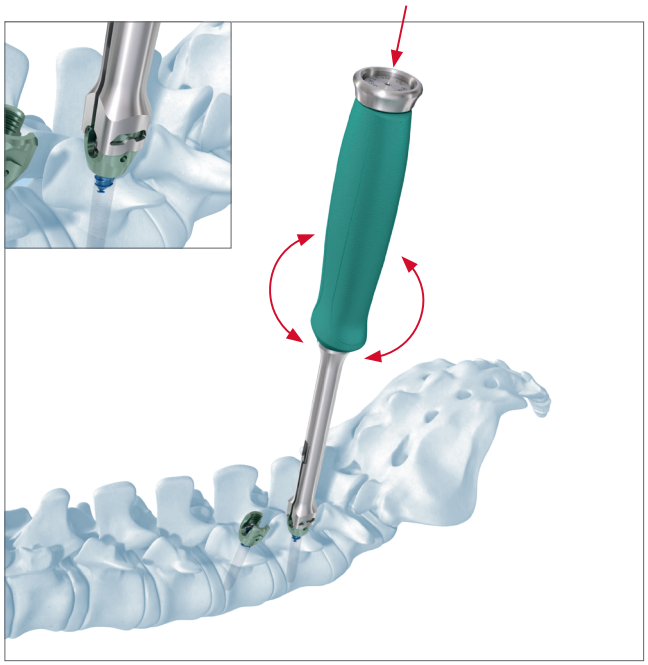
To release the head placement tool, press the button located at the distal end of the instrument.

- **If the polyaxial head does not successfully attach to the head of the unassembled pedicle screw, additional reaming or screw height adjustment may be required to ensure sufficient space exists to allow free mobility of the head.**

▲ Precaution

- **Polyaxial screw heads can be removed a maximum of three times without removing the pedicle screw; a new head must be used for each assembly.**





Optional Technique

Polyaxial Head Removal

Instruments

03.632.045	Removal Instrument for Polyaxial Screw Heads, for Matrix 5.5
388.654	Ratchet with Handle, with Hexagonal Quick Coupling 6.0 mm

If required, the polyaxial head can be removed from the pedicle screw intraoperatively.

Remove any existing locking cap and the rod.

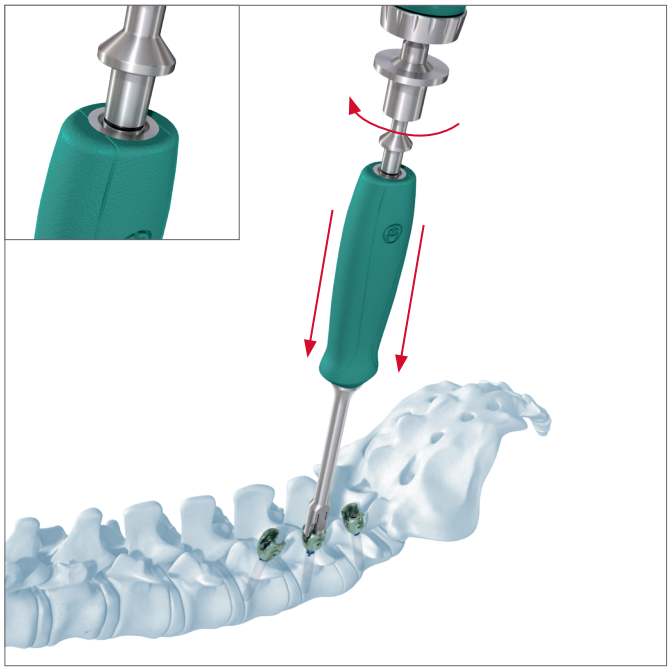
Connect the inner shaft of the removal tool for polyaxial screw heads to the ratchet and insert into the handle of the removal tool.

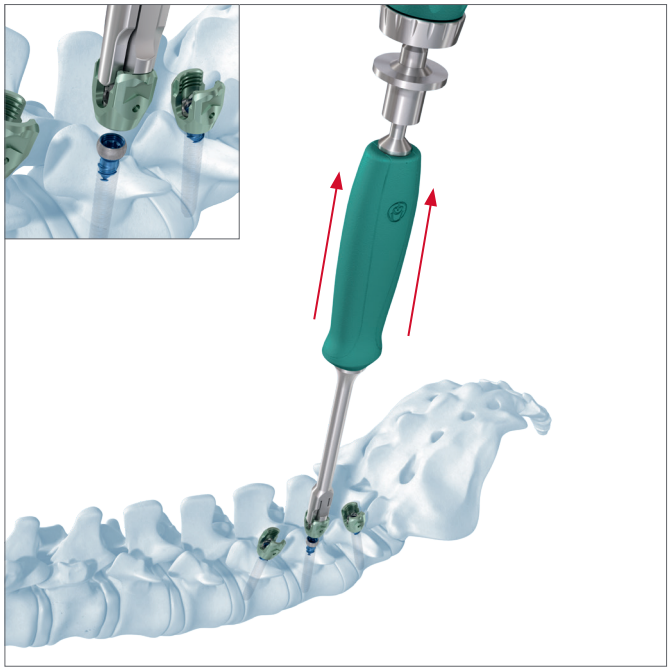
Ensure that the black line is visible on the inner shaft of the head removal tool.

Press the tip of the head removal tool into the polyaxial head. A tactile feedback may be felt as the tip of the head removal tool mates with the collet of the polyaxial head. While holding the handle, thread the inner shaft clockwise until it stops. Lift to remove the head.

To remove the implant head from the instrument, turn the ratchet counter-clockwise until the black line is visible. Pull the head off the instrument.

- **The head removal tool can be used to remove the polyaxial head of both unassembled as well as pre-assembled screws.**
- **To remove the polyaxial reduction head, the tabs must first be broken off.**





Optional Technique

Reduction Screws

Instruments

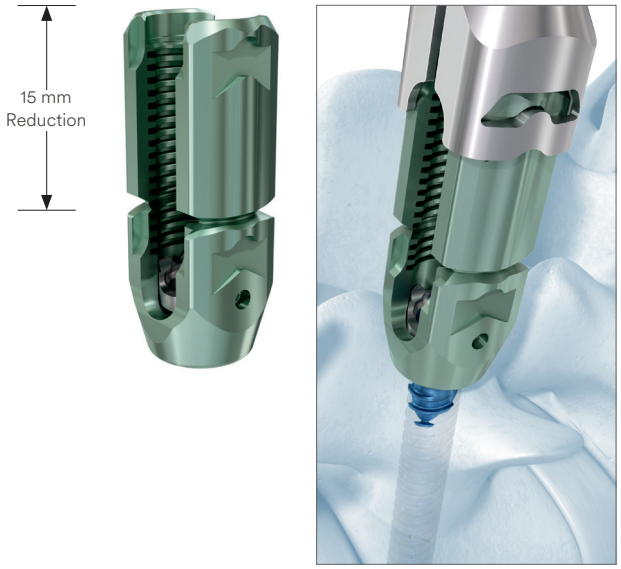
03.632.004	Screwdriver Stardrive, with T-Handle standard, for Matrix 5.5
03.632.042	Rod Pusher/Counter Torque for Reduction Screw, for Matrix 5.5
03.632.080	Handle, detachable, for Matrix
03.632.026	Rod Pusher / Counter Torque for Reduction Screws, for Matrix 5.5
03.632.030	Tab Remover for Reduction Screws, for Matrix

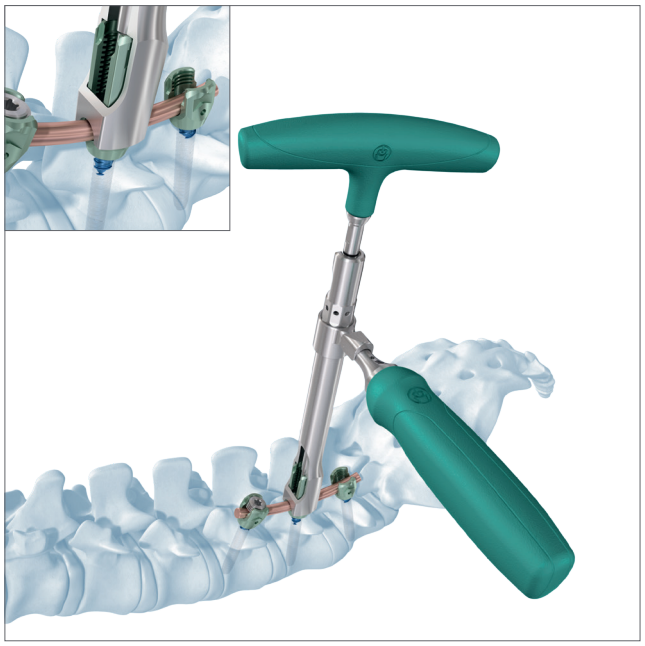
Reduction screws are available in preassembled form or as click-on versions for subsequent assembly.

Follow the technique for preassembled polyaxial screw (page 10) or unassembled pedicle screw (page 31) to insert screw.

Pick up a locking cap from the screw module with a T25 screwdriver shaft. The screwdriver shaft is self-retaining.

Place the rod pusher/counter torque for reduction screws (03.632.042) over the screw head. Insert the locking cap through the counter torque. Turning the locking cap will reduce the rod into the screw head.

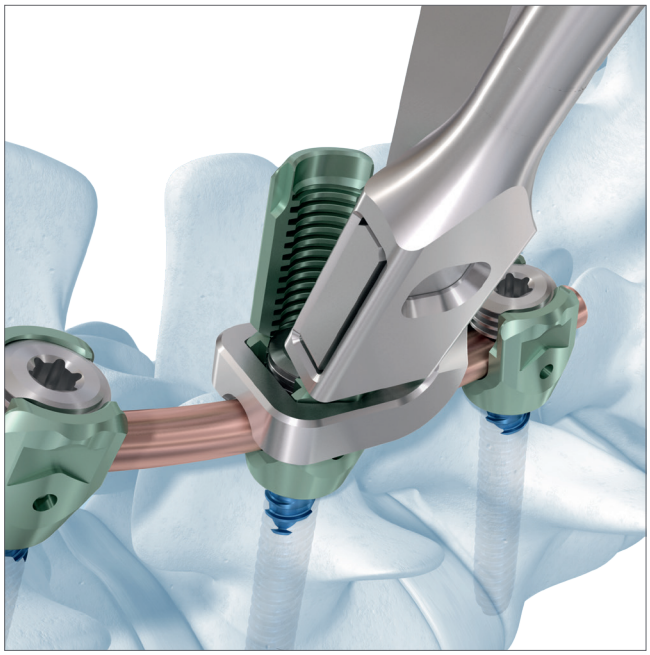




Optional instruments

03.620.061	T-Handle with Ratchet Wrench and with Torque Limiter, 10 Nm
03.632.002	Screwdriver Shaft Stardrive, T25, standard, for Matrix 5.5
03.632.005	Screwdriver Stardrive, T25, with straight handle, standard, for Matrix 5.5
03.632.025	Counter Torque for Reduction Screws, for Matrix 5.5
03.632.074	Screwdriver Stardrive, T25, long, with T-Handle, for Matrix

To break off the reduction screw tabs, place the rod pusher/counter torque for reduction screws (03.632.026) with the handle over the screw head. Gently rock the tab removal tool medial then lateral to break the tab wall free from the polyaxial head.

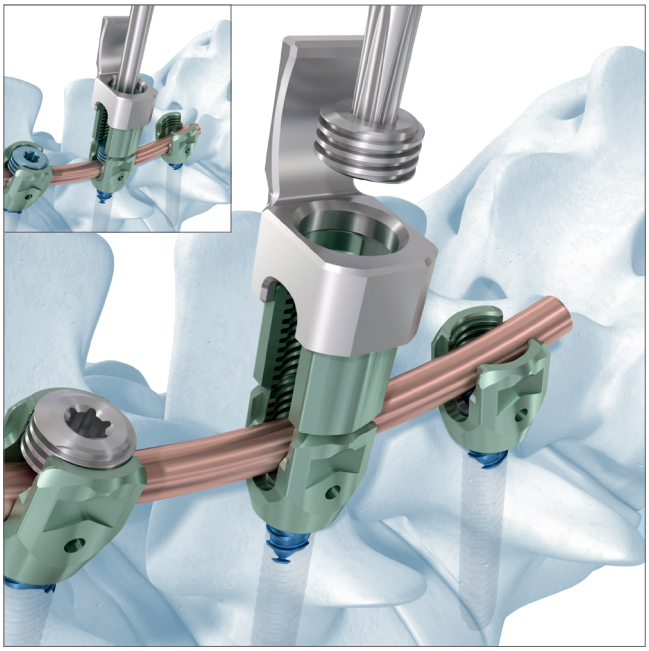


Alternative technique for locking cap insertion

Instrument

03.632.029	Holding Crown for Reduction Screws for Matrix 5.5

The holding crown for reduction screws can be used instead of the counter torque to provide guidance for the locking cap insertion.



Optional Technique

Adding Transverse Connectors

Instruments

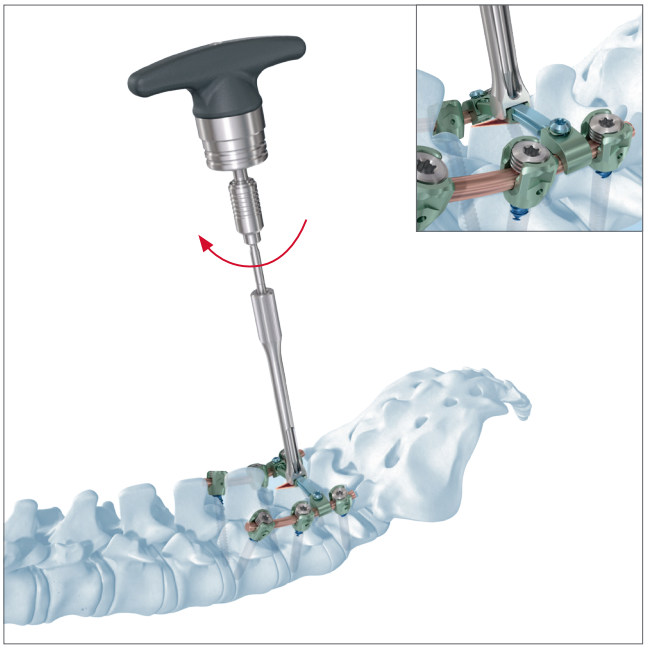
03.632.053	Length Indicator for Transverse Connectors, Snap-on, for Matrix
03.632.204	Torque-limiting Handle, 3 Nm
03.632.052	Screwdriver Stardrive, T15, short, for Matrix
03.632.050	Retaining Sleeve for Transverse Connectors, Snap-on, for Matrix

Use the length indicator for transverse connectors to estimate the distance between the two rods. On the crossbar of the length indicator note the size of the appropriate transverse connector (1–8).

The transverse connectors are marked with sizes 1–8, matching the figures on the length indicator. Select the appropriat transverse connector.

The ends of the transverse connector can be clicked onto the rod to secure it at the desired point.

Use the screwdriver and the torque limiting handle to secure the transverse connector to the rods. Use the retaining sleeve when tightening the setscrew. When tightening the setscrews a tactile release is felt.



Optional Technique

Adding Rod-to-Rod Connectors

Instruments

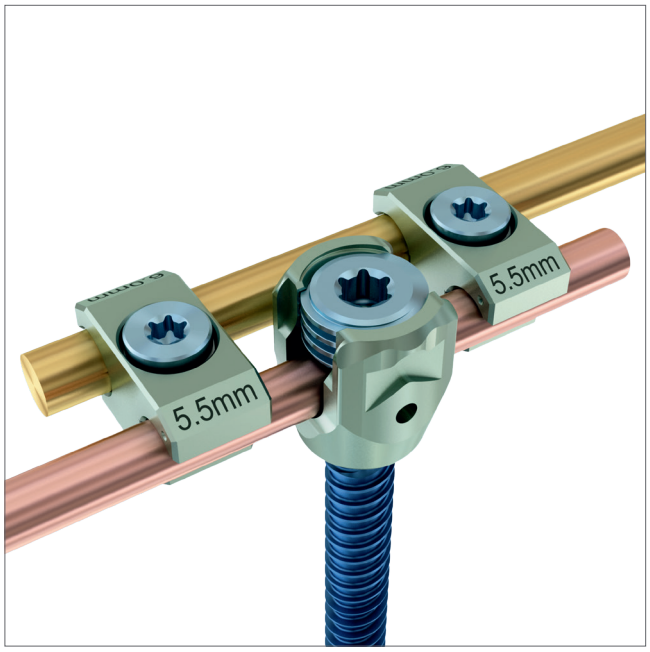
03.632.204	Torque-limiting Handle, 3 Nm
03.632.055	Screwdriver Shaft Stardrive, T15, standard
03.632.050	Retaining Sleeve for Transverse Connectors, Snap-on, for Matrix

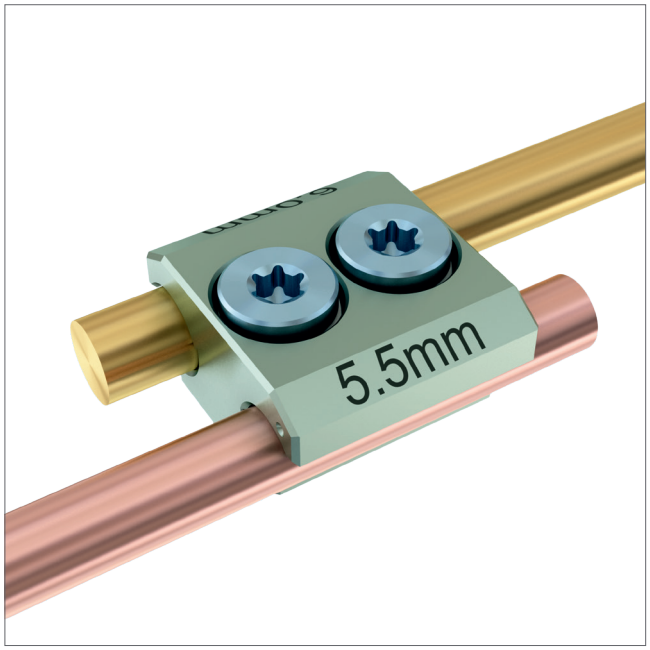
Choose the snap-on open parallel connector according the rod diameters to be received. The diameters accepted are etched on both sides of the connector to ensure the correct rod size is attached to each opening.

▲ Precaution

- **Parallel connectors with one set screw should be used in pairs on each side of the construct. Connectors with two set screws can be used one per side of the construct.**

Attach the preferred connector to each rod. Mount the T15 screwdriver shaft to the 3 Nm torque-limiting handle and slide the retaining sleeve over the screwdriver shaft. To secure the connector to the rods, engage the T15 drive into each setscrew recess, slide the retractable retaining sleeve to the distal position. Tighten all the set screws until a tactile release is felt.





- If any part of the construct requires further adjustment, all set screws must be loosened to the point of resistance. Do not remove set screws from the assembly. After final adjustment, retighten the set screws.

- The retaining sleeve for transverse connector cannot be used when tightening parallel with two set screws.

▲ Precaution

- Care should be taken not to tighten the connector on a portion of the rod that has been contoured or deformed by a rod cutter.

For information related to connectivity with other DePuy Synthes posterior spine systems, please refer to the Instructions For Use.

Refer to the torque-limiting handle package and labeling for the recommended calibration maintenance.

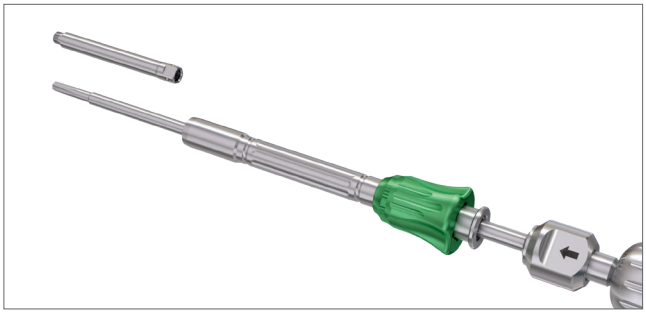
Optional instrument	
03.632.052	Screwdriver Stardrive, T15, short, for Matrix

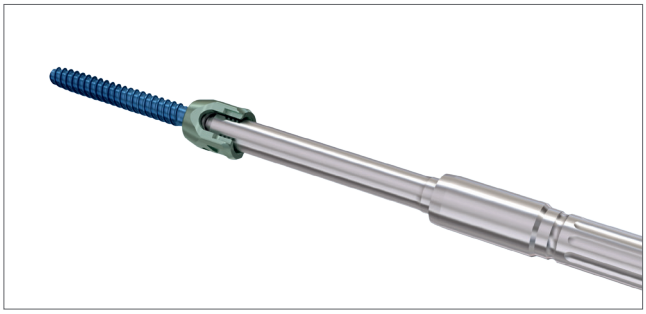
Optional Technique

Distraction for Posterior Interbody Fusion

Instruments

03.632.074	Screwdriver Stardrive, T25, long, with T-Handle, for Matrix
03.632.085	Retaining Sleeve, detachable, for Matrix 5.5
03.632.083	Distractor Tip, for Bone Screws, for Matrix 5.5
03.632.087	Toothed Rack Retractor, for Matrix





Slide detachable retaining sleeve over long T25 screw driver. Slide the distractor tip over the screwdriver tip and press firmly into the detachable retaining sleeve.

Insert the tip of the screwdriver shaft into the screw head. Make sure that the tip of the screwdriver is fully seated in the recess of the screw head. Turn the green knob clockwise.

Insert two pedicle screws.

To release the detachable retaining sleeve from the distractor tip, pull the green knob towards the handle. Remove the screwdriver and retaining sleeve and repeat the procedure for the second pedicle screw.

▲ Precaution

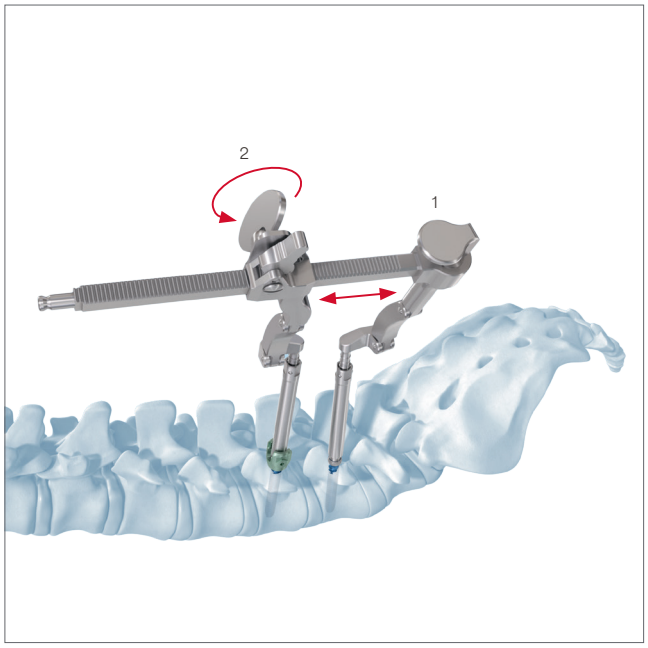
- **Do not grasp the green knob during screw insertion as this will cause the retaining sleeve to disengage from the screw**

Insert both posts of the distractor into the distractor tips. Lock the angular position of the rotatable distractor arm (1) by turning the lever. Switch the rocker lever (2) to the distraction position (D) and rotate the wing nut screw clockwise until the desired distraction is achieved.

Perform discectomy and interbody fusion.

Turn the rocker lever (2) to neutral (N) to unlock the angular position and remove the distractor.

Reattach the screwdriver/detachable retaining sleeve and turn the green knob counterclockwise.



Alternative instruments

03.632.083	Distractor Tip, for Bone Screws, for Matrix 5.5
03.632.084	Distractor Tip, for Screw Heads, for Matrix 5.5
03.632.089	Distractor Tip, with Hook End, for Matrix

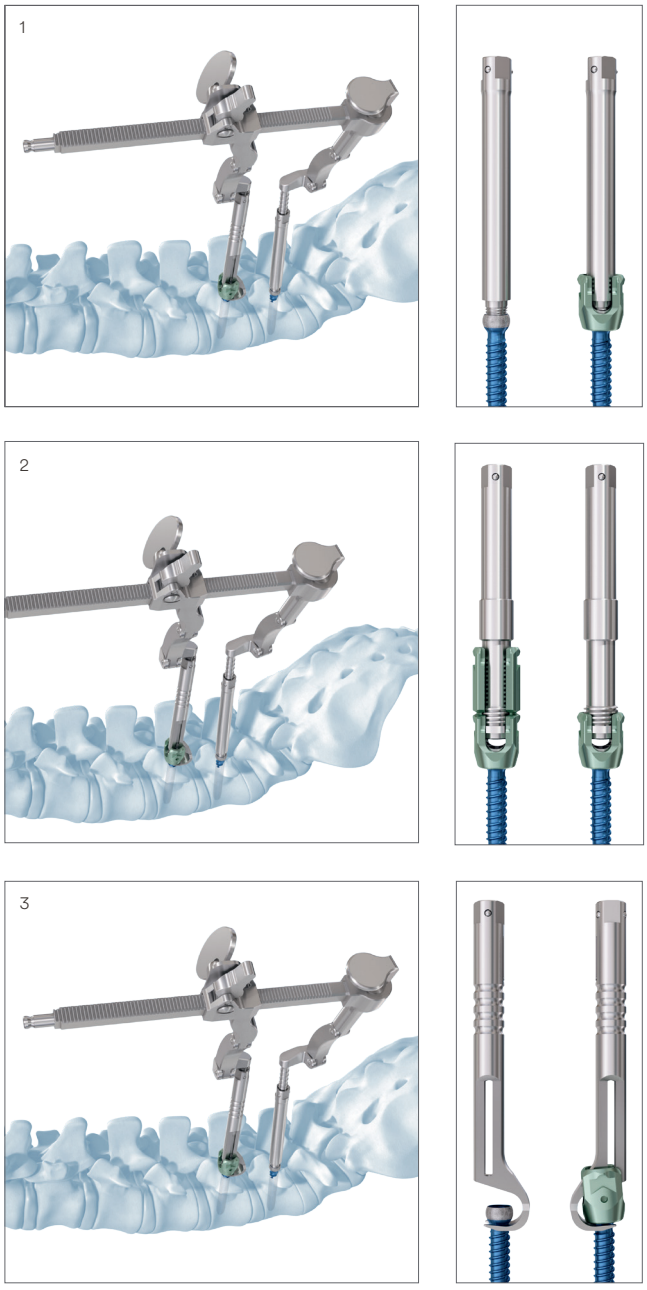
Alternative distractor tips and techniques

Three different distractor tips are available, which can be used in a variety of combinations.

The distractor tip for screws (1) can be used with pedicle, polyaxial, and polyaxial reduction screws. Parallel distraction can be performed.

The distractor tip with screw heads (2) can be used with polyaxial, polyaxial reduction, and monoaxial screws. They are attached to the polyaxial screw head after insertion of the pedicle screw. If firmly tightened the screw becomes monoaxial and parallel distraction can be performed. These tips are particularly suitable for cases where the tips for bone screws would cross over as a result of pronounced lordotic curvature of the spine.

The distractor tip with hook end (3) can be used with pedicle, polyaxial, and polyaxial reduction screws. Distraction can be performed.



Optional Technique

Locking Cap Removal

Loosen locking cap

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

To remove a locking cap, slide the counter torque with detachable handle over the screwhead. Place the ratchet of the torque limiting handle in the neutral position, engage a T25 screwdriver with the Stardrive recess of the locking cap and turn counter-clockwise.

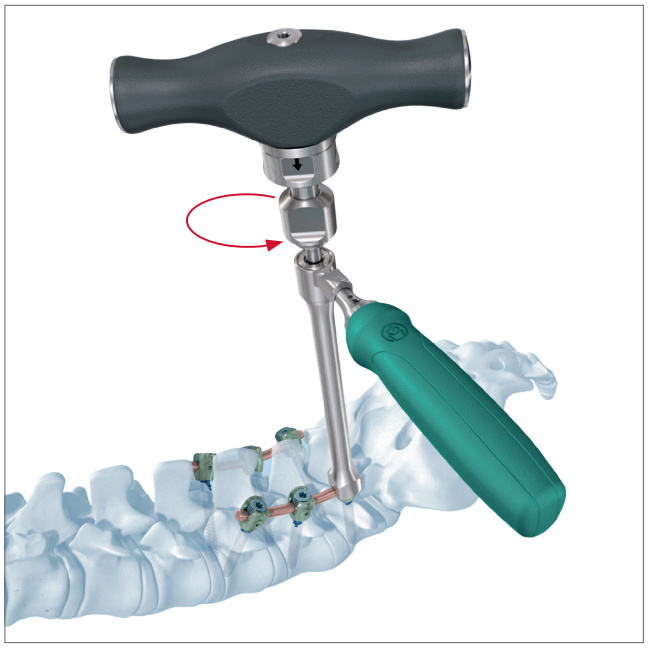
- **Locking caps are designed to lock the construct and reduce the chance of post-operative loosening and rod-push-through. Therefore, in certain cases, the loosening torque may be higher than 10 Nm. In such cases, use the following techniques to remove a locking cap.**

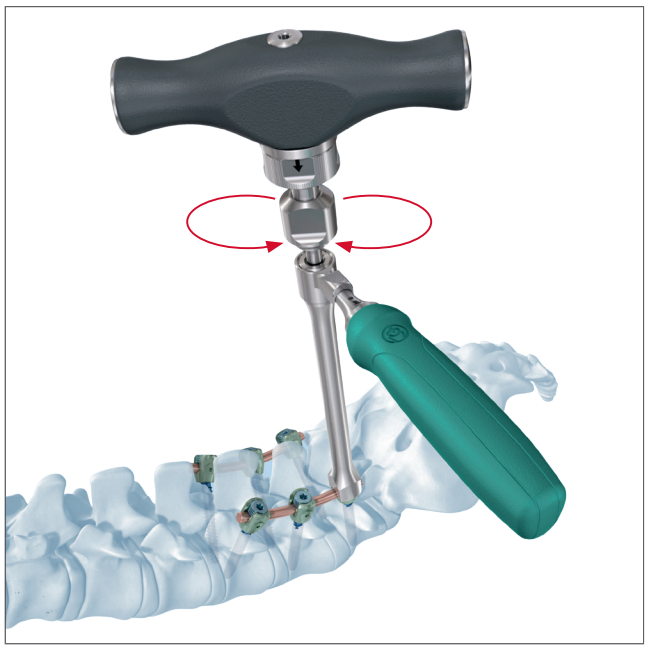
Sequentially turn clockwise and then immediately counter-clockwise. Turn until tactile or audible feedback from the implant is experienced. Repeat the steps until the locking cap is loose.

▲ Precaution:

- **For this technique, always use the torque limiting handle (03.620.061) to reduce risk of damage to the T25 screwdriver shaft.**
- **If this method does not produce the desired result, follow the technique according to Option A (page 44).**

Optional instruments	
03.632.002	Screwdriver Shaft Stardrive, T25, standard, for Matrix 5.5
03.632.401	Screwdriver Shaft Stardrive, T25, long, straight tip, with Hexagonal Coupling, for Matrix
03.632.072	Screwdriver Shaft Stardrive, T25, long, for Matrix

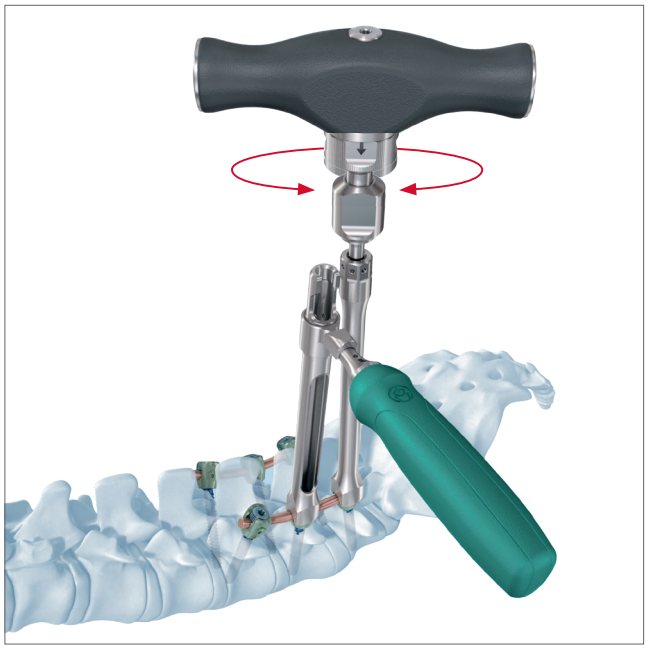




If after multiple attempts to loosen the locking cap the torque is still excessive, the following techniques should be used:

Option A: Counter torque on an adjacent screw

Instruments	
03.620.061	T-Handle with Ratchet Wrench and with Torque Limiter, 10 Nm
03.632.400	Screwdriver Shaft Stardrive, T25, standard, straight tip, with Hexagonal Coupling, for Matrix
03.632.049	Counter Torque, standard, for Matrix 5.5
03.632.006	Rod Pusher/Counter Torque, standard, for Matrix 5.5
03.632.080	Handle, detachable, for Matrix



Place the rod pusher/counter torque with detachable handle over an adjacent screw on the same rod (i.e. one level higher or lower). Simultaneously place the countertorque over the locking cap to be loosened and engage the screwdriver shaft and torque limiting handle with the stardrive recess of the locking cap. Place the ratchet of the torque limiting handle in the neutral position and begin to sequentially turn clockwise and then immediately counter-clockwise. Turn until tactile or audible feedback from the implant is experienced. Repeat the steps until the locking cap is loose.

▲ Precaution

- For this technique, always use the torque limiting handle (03.620.061) to reduce risk of damage to the T25 screwdriver shaft.
- Retighten the locking cap on which the counter torque was applied to 10 Nm.
- To loosen the last locking cap, replace the counter torque, consisting of rod pusher/counter torque and handle, with a rod persuader.
- If this method does not produce the desired result, follow the technique according to Option B (page 44).

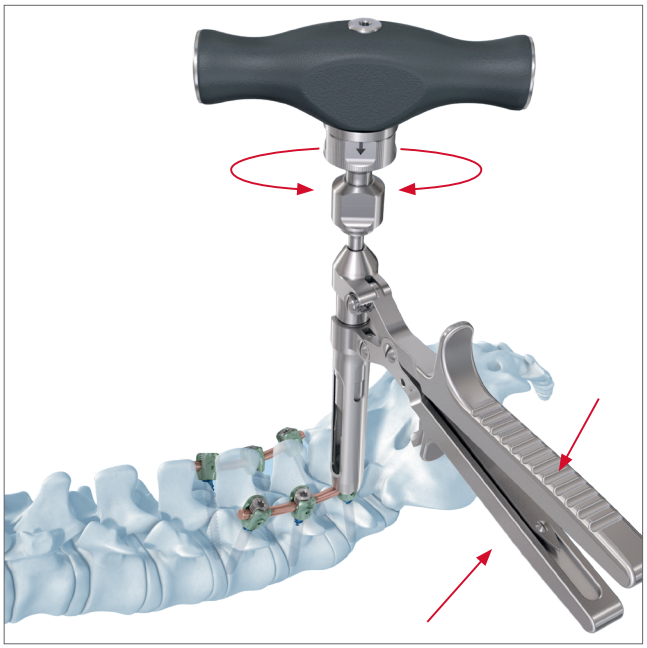
Optional instruments

03.632.002	Screwdriver Shaft Stardrive, T25, standard, for Matrix 5.5
03.632.009	Rod Persuader, standard, for Matrix 5.5
03.632.401	Screwdriver Shaft Stardrive, T25, long, straight tip, with Hexagonal Coupling, for Matrix
03.632.072	Screwdriver Shaft Stardrive, T25, long, for Matrix
03.632.079	Rod Introduction Pliers, long, for Matrix 5.5

Option B:
Apply a downward force to the rod

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
03.632.079	Rod Introduction Pliers, long, for Matrix 5.5

Apply a downward force to the rod. Place the Rod Persuader on the screw and firmly squeeze the handles. Place the ratchet of the torque limiting handle in the neutral position. With the reduction load applied begin to sequentially turn clockwise and then immediately counter-clockwise. Turn until tactile or audible feedback from the implant is experienced. Repeat the steps until the locking cap is loose.



▲ Precaution

- **For this technique, always use the torque limiting handle (03.620.061) to reduce risk of damage to the T25 screwdriver shaft.**
- **If this method does not produce the desired result, follow the technique according to Option A (page 42).**

Optional Instruments	
03.632.072	Screwdriver Shaft Stardrive, T25, long, for Matrix
03.632.400	Screwdriver Shaft Stardrive, T25, standard, straight tip, with Hexagonal Coupling, for Matrix
03.632.002	Screwdriver Shaft Stardrive, T25, standard, for Matrix 5.5
03.632.009	Rod Persuader, standard, for Matrix 5.5

MATRIX Implant Removal

If a Matrix Spine System has to be removed the following technique is recommended:

Removing Transverse Connectors

Instruments	
03.632.052	Screwdriver Stardrive, T15, short, for Matrix
03.632.204	Torque-limiting Handle, 3 Nm
03.632.050	Retaining Sleeve for Transverse Connectors, Snap-on, for Matrix

Remove the Snap-On Transverse Connectors if necessary. The set-screws on the transverse connectors that attach to the longitudinal rods can be removed with the T15 Stardrive screwdriver with the 3 Nm Torque limiting Handle. Use the retaining sleeve when loosening the setscrew.

Removing Rod-to-Rod Connectors

Instruments	
03.632.055	Screwdriver Shaft Stardrive, T15, standard
03.632.204	Torque-limiting Handle, 3 Nm
03.632.050	Retaining Sleeve for Transverse Connectors, Snap-on, for Matrix

Remove the Snap-On Open Parallel Connectors if necessary. The set-screws on the parallel connectors that attach to the longitudinal rods can be removed with the T15 Stardrive screwdriver with the 3 Nm Torque limiting Handle. The retaining sleeve for transverse connectors cannot be used when loosening parallel with two set screws.

Optional instrument	
03.632.052	Screwdriver Stardrive, T15, short, for Matrix

Locking Cap Removal (see page 42 of the STG (Optional Technique, Locking Cap Removal)

Rod Removal

Instrument

03.632.081	Rod Holding Forceps for Rods Ø 5.5 mm

Remove the rod using the rod holding forceps.

Optional instrument

03.632.202	Holding Forceps for Rods Ø 5.5 and Ø 6.0 mm

Polyaxial Head Removal (see page 42 of the STG (Optional Technique, Locking Cap Removal)

Screw removal

Instruments	
03.632.036	Retaining Sleeve, long, for Matrix 5.5
03.632.072	Screwdriver Shaft Stardrive, T25, long, for Matrix
03.620.061	T-Handle with Ratchet Wrench and with Torque Limiter, 10 Nm

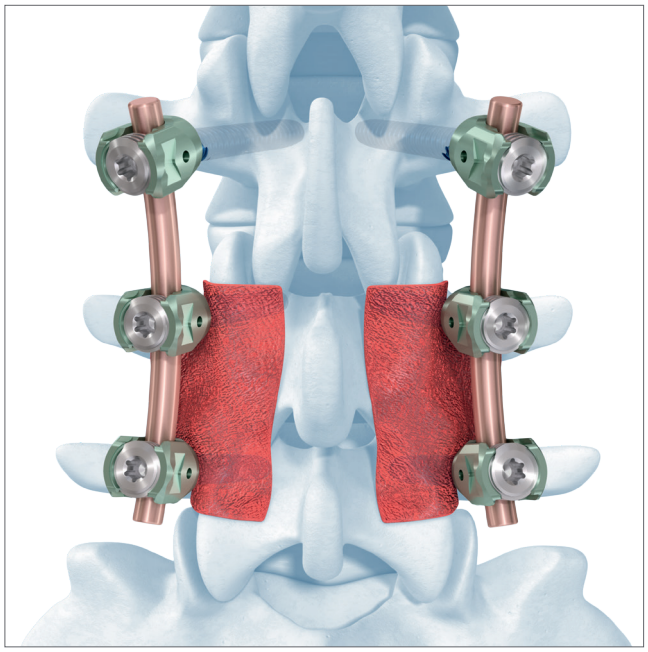
Insert the screwdriver tip into the recess of the pedicle screw and rotate the green knob of the retaining sleeve clockwise until the tip of the sleeve is firmly attached to the pedicle screw. Hold the black part of the retaining sleeve during screw removal. Remove the screw.

To disengage the retaining sleeve, rotate the green knob counterclockwise and remove the screwdriver.

Optional Instruments	
03.616.043	Retaining Sleeve, locking, long
03.632.074	Screwdriver Stardrive, T25, long, with T-Handle, for Matrix
03.632.075	Screwdriver Stardrive, T25, long, with straight handle, for Matrix
03.616.042	Retaining Sleeve, locking
03.632.001	Retaining Sleeve, standard, for Matrix 5.5
03.632.002	Screwdriver Shaft Stardrive, T25, standard, for Matrix 5.5
03.632.004	Screwdriver Stardrive, with T-Handle, standard, for Matrix 5.5
03.632.005	Screwdriver Stardrive, T25, with straight handle, standard, for Matrix 5.5

Biomaterial Implants

To facilitate fusion, bone graft is often applied in the lateral gutters. A suitable bone graft substitute may be used by itself or in combination with autograft.



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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.

Instructions for Use are available at www.e-ifu.com and/or www.depuysynthes.com/ifu

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SE_841427 AA (036.001.185; DSEM/SPN/0115/0286(2) EOS 173603-210413 EMEA 08/21