MINIMALLY INVASIVE THORACOLUMBAR SYSTEM

THORACO-LUMBAR
FIXATION

Lumis

SURGICAL TECHNIQUE

SPINE VISION

INNOVATION THAT MATTERS

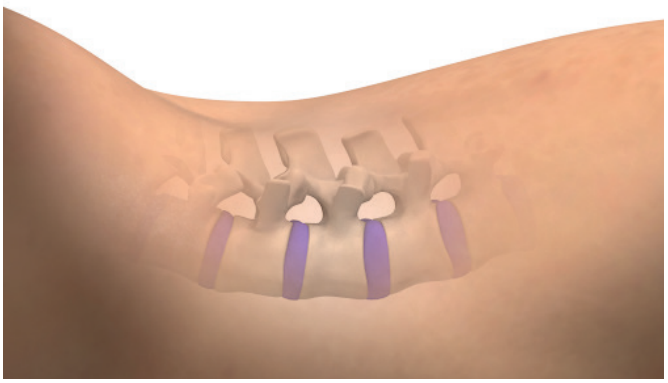
SURGICAL STEPS

REFERENCES

PATIENT PREPARATION

The patient is placed on the operating room table using the standard position indicated for posterior fixation placement.

X-ray shall be used during the entire procedure: to confirm identification of the affected disc, good positioning of the implants and the final assembly.



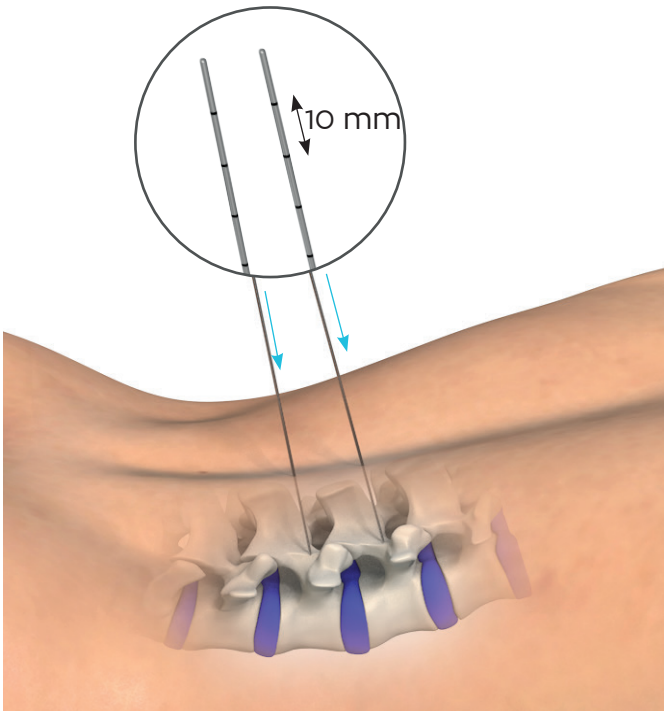
PEDICLE PREPARATION

Guide wire
MS1-WB1450

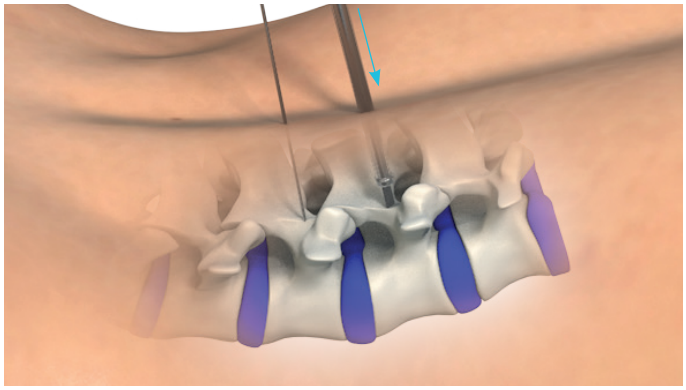
Cannulated square awl
MS1-A121

After performing a skin incision, use Jamshidi needles (11 gauges) to prepare the trans-pedicular trajectory using radioscopic control (c-arm). Once the wanted trajectory obtained, place the **guide wires** *MS1-WB1450* inside the Jamshidi needles. Remove Jamshidi needles while maintaining the wires.

CAUTION: Guide wires must not be reused.

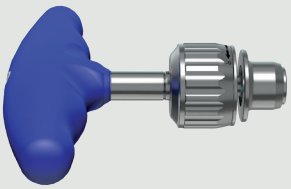


Drag the **cannulated square awl** *MS1-A121* on the guidewire and perforate the cortical.



TAPPING

Cannulated ratcheting cylindrical handle
SD-A411LSH



Cannulated ratcheting T-handle
SD-A411TSH

Cannulated taps
MS1-A11X

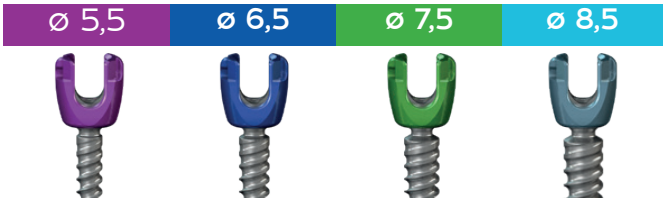
Expander 1
MS1-A110

Protection sleeve for taps
MS1-A111

If needed, and according to the bone condition, it is possible to use taps to facilitate screw insertion or optimize screw anchoring.

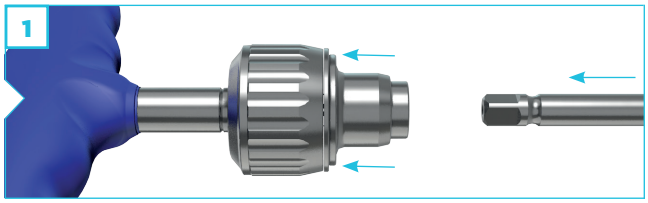
! WARNING !
The Lumis screws are color coded according to their diameter. It is mandatory to use the tap corresponding to the screw diameter. Diameter of the taps is 0.5mm lower than corresponding screw diameter.

Multiaxial Lumis screws :
MS2-MXXXT (Ex : MS2-M640T)
MS2-MDiameterLengthTitane

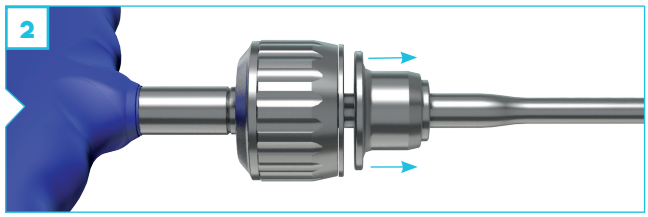


Corresponding taps:

1 To connect a **cannulated tap** *MS1-A11X* to the **cannulated ratcheting cylindrical handle** *SD-A411LSH* or **cannulated ratcheting T-handle** *SD-A411TSH*, pull the ring of the handle towards the silicon part.



2 While maintaining this position, insert the square tip of the cannulated tap into the handle and release the ring to secure the connection between the two instruments.

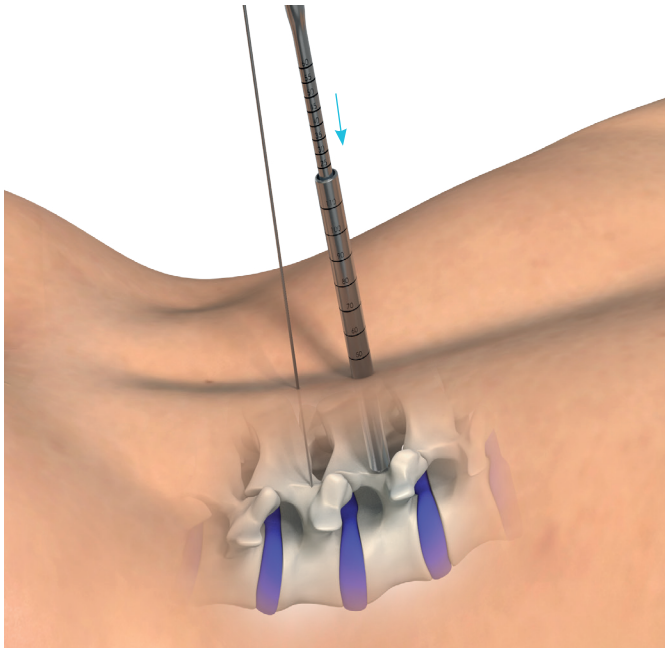


! WARNING !
Always check the connection between the handle and the screwdriver before use.

To protect soft tissue from the sharp edges of the taps, it is recommanded to use **the expander 1** *MS1-A110* and then **the protection sleeve for taps** *MS1-A111* can be inserted onto the guide wire.

Remove the expander 1.

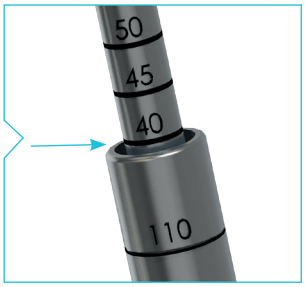
The protection sleeve must be inserted with laser marks on the caudal part to remain visible.



Insert the appropriate tap depending on the inserted screw size over the guide wire.

Forceps can be used to maintain the guide wire during tapping.

The insertion depth of the tap inside the vertebra is indicated by laser markings on the tap shaft. Thus, the appropriate screw length can be precisely determined.



IV SCREW INSERTION

Expanders
MS1-A11X

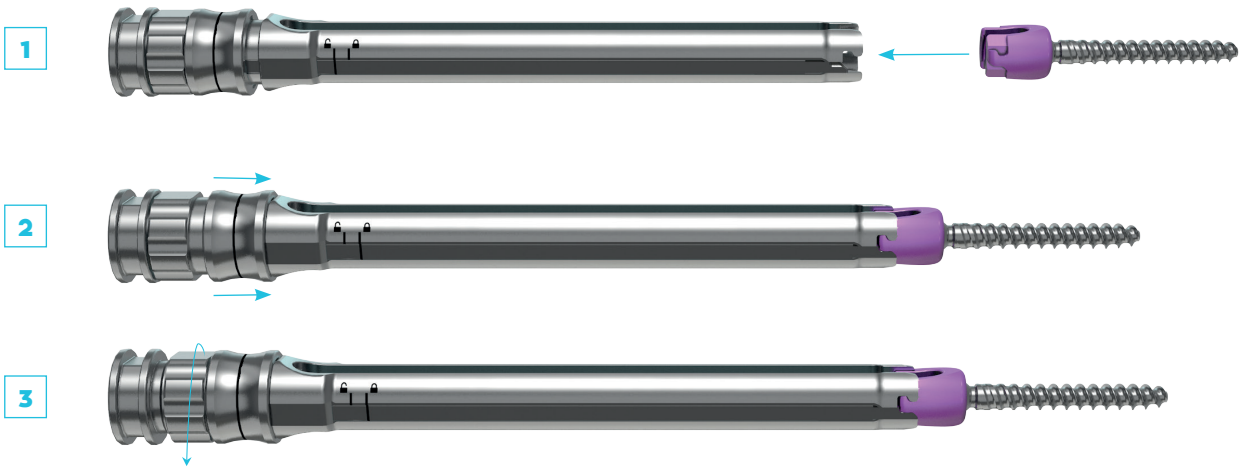
Enlarged screw extender
MS1-A214

Screw
MS2-MXXXT

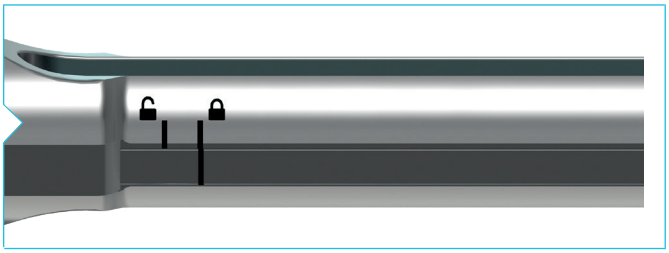
Once the screw of the desired diameter and length has been selected, it must be connected to the enlarged screw extender.

To fix the enlarged screw extender to the screw:

1. Insert the screw onto the enlarged screw extender by making sure the locking ring is up.
2. Slide down the locking ring.
3. Secure the system by screwing the nut clockwise.

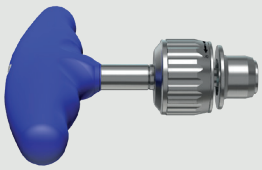


Laser marks confirm the locked position of the ring.



Lumis Universal Screwdriver
MS2-A221

Or

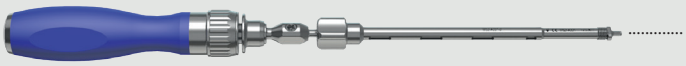


Cannulated ratcheting cylindrical handle
SD-A411LSH

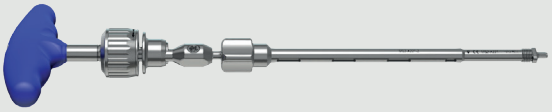
Cannulated ratcheting T-handle
SD-A411TSH

To connect a **Lumis universal screwdriver** *MS2-A221* to the **cannulated ratcheting cylindrical handle** *SD-A411LSH* or **cannulated ratcheting T-handle** *SD-A411TSH*, repeat the maneuver described in the previous step (page 4).

Enlarged screw extender connected to a screw
MS1-A214 + MS2-MXXXT



Or

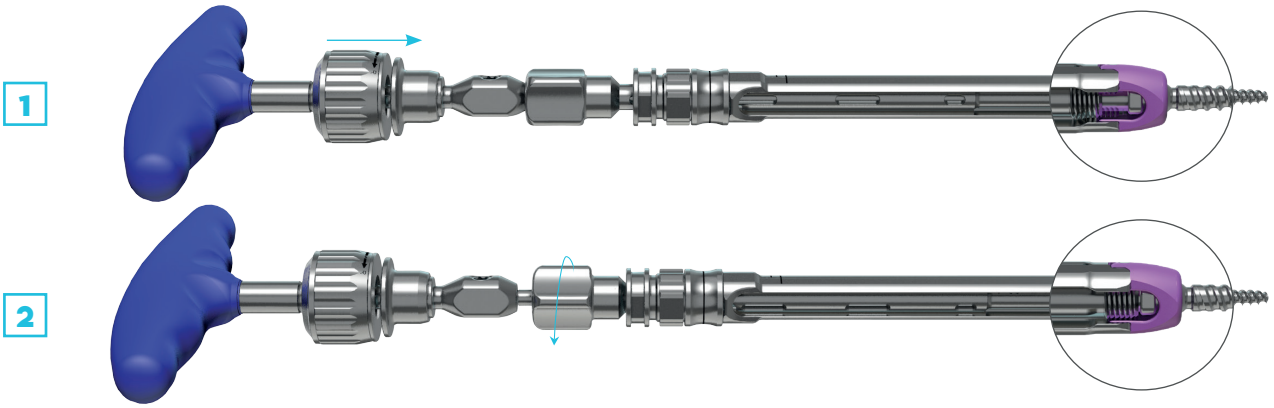


Lumis Universal Screwdriver connected to the Cannulated ratcheting cylindrical handle
MS2-A221 + SD-A411LSH

Lumis Universal Screwdriver connected to the Cannulated ratcheting T-handle
MS2-A221 + SD-A411TSH

To connect the screwdriver to the screw:

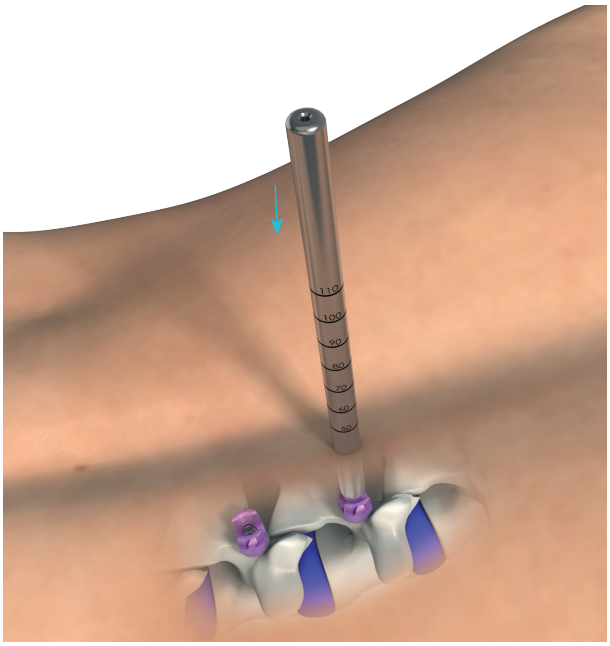
1. Insert the screwdriver in the screw head. Ensure that the screwdriver is fully seated in the screw head.
2. Turn the square piece to engage the screwdriver with the screw.



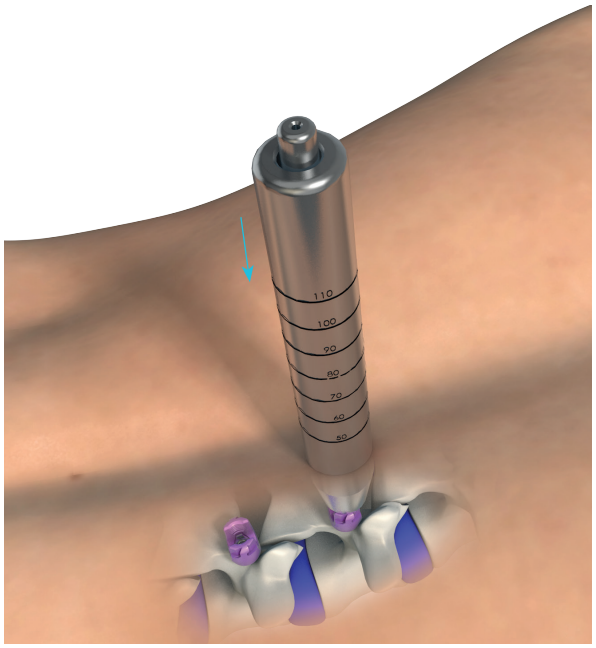
Please check the correct engagement between the screw and the screwdriver before handing parts over to the surgeon.

To protect soft tissues, it is recommended to first insert the expanders to create an opening for the passage of the screw. Then the screw will be inserted in the last expander.

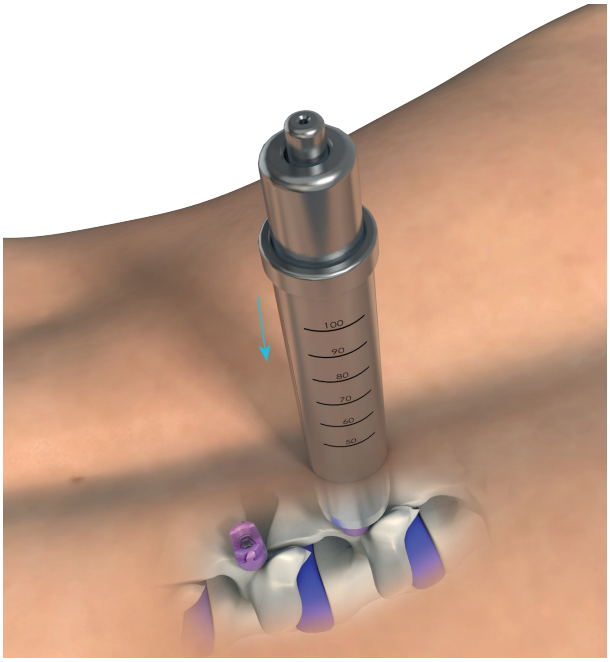
Insert **the expander 1** *MS1-A110*.



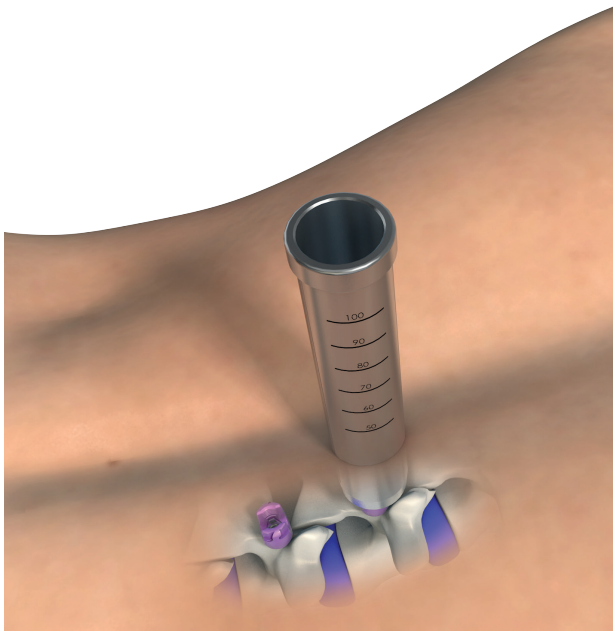
Insert **the expander 2** *MS1-A112* over the first expander.



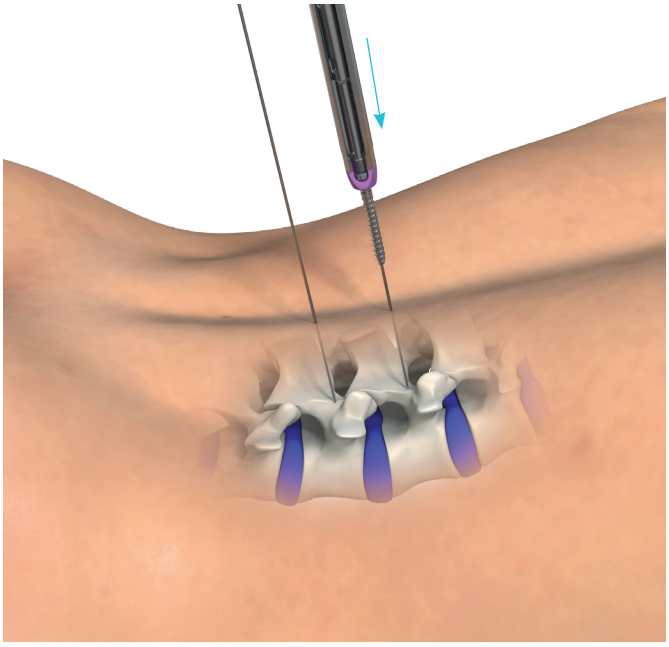
Insert **the expander 3** *MS1-A113* over the second expander.



Remove the expanders 1 & 2 to keep only the expander 3.
The next steps can then be done through the expander 3.

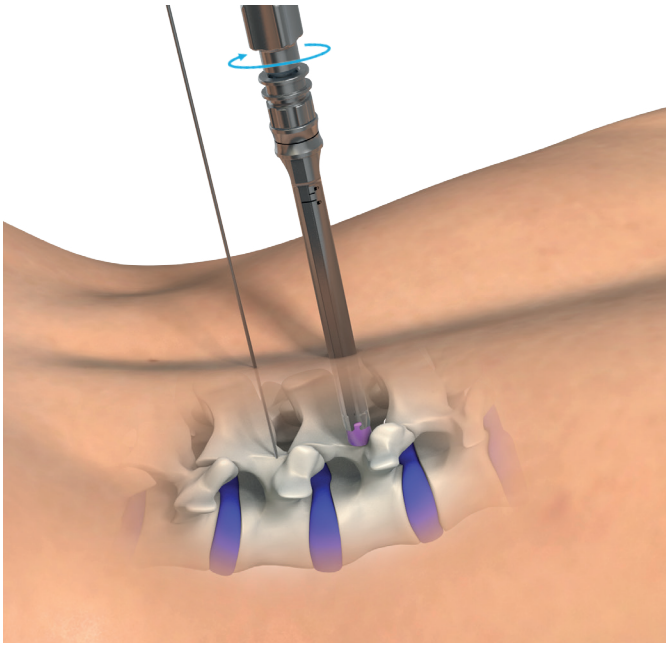


Insert the screw assembled with the screwdriver and screw extender construct over the guide wire. During all the insertion, please control the position of the wire using x-ray to prevent any migration in the anterior part.



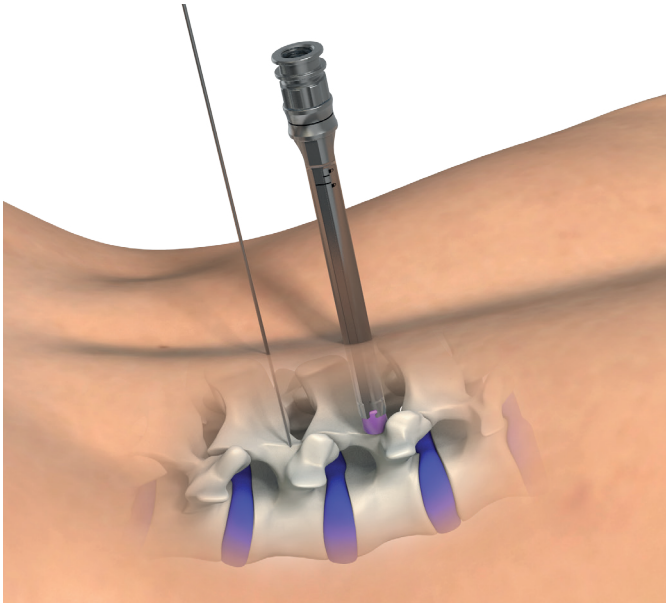
Once the screw tip is advanced far enough in the vertebral body, it is recommended to remove the guide wire to prevent any breach of the anterior wall.

The screw can then be fully inserted.



Remove the screwdriver, leaving the screw with the extender by turning the square part of the cannulated screwdriver counterclockwise.

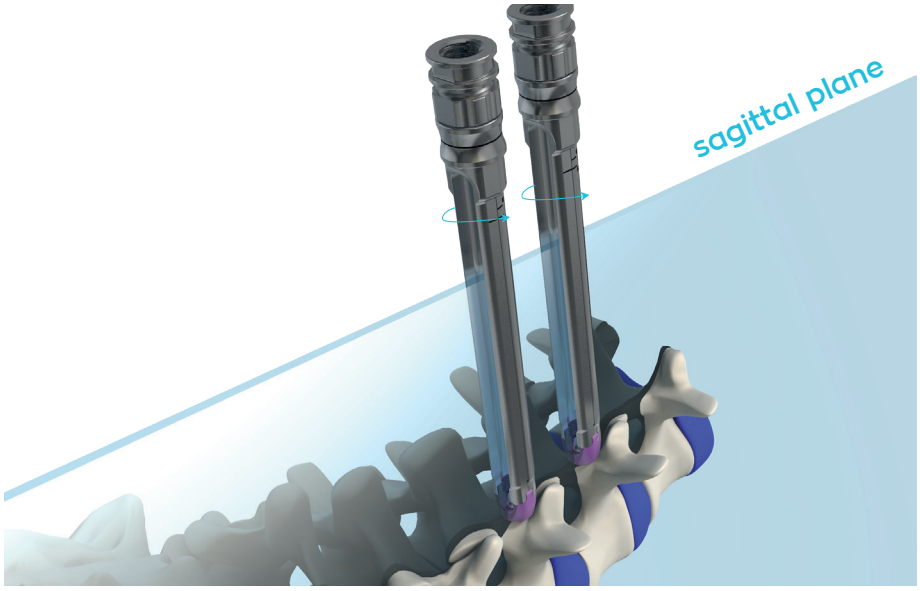
Repeat the previous surgical steps to insert as many pedicle screws as needed.



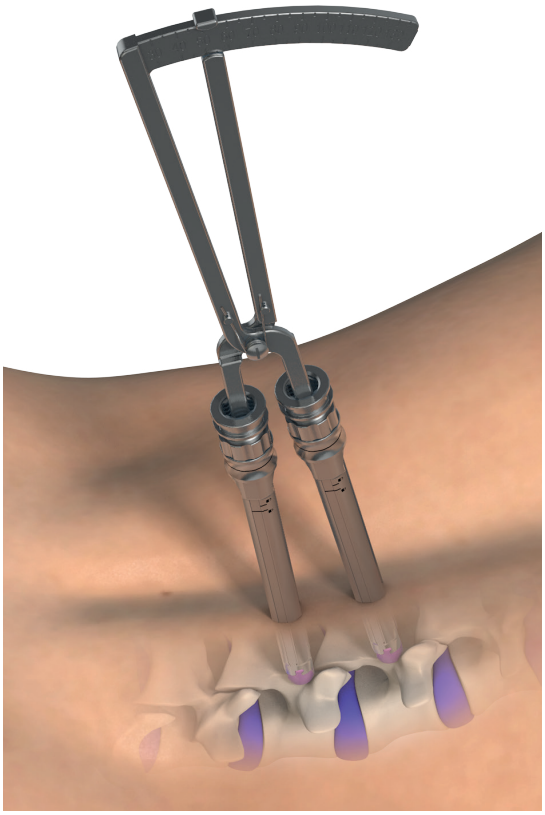
ROD LENGTH MEASUREMENT

Rod gauge
MS1-A261

Once all screws are placed, rotate the extender sleeve so that the slots line up in the sagittal plane.



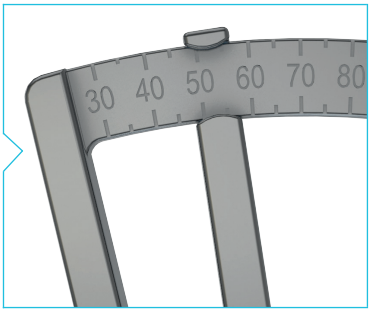
The **rod gauge** *MS1-A261* is inserted into the two most proximal and distal screw extenders until the ball tips are positioned at the bottom of the pedicle screws head.



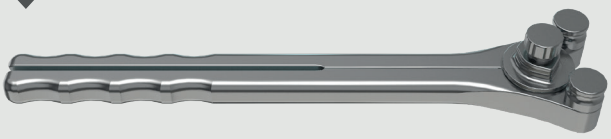
! WARNING !
For a good measurement, spheres must be positioned at the bottom of each screw head.

The rod length needed is indicated on top of the rod gauge.

In case of doubt, choose the larger size.



VI ROD PLACEMENT



French bender
U1-A321

Prebent rod
MS1-R6XXXCT

The Lumis system offers a large range of **prebent rods** *MS1-R6XXXCT* from 30mm to 120mm.

The system can also be used with s**traight rigid rod** *L2-R6XXHT* or a **Flex+2 rod**.

If needed the rigid part of the rod can be contoured prior to insertion using the **French bender** *U1-A321*.

The rod introduction can be realized:

- A : By a mini-open approach using a **rod holde**r *MS1-A271*.
- B : By a percutaneous approach using a **rod introducer** *MS1-A274*.
- C : By a percutaneous approach using a reversed **rod introducer** *MS1-A275*.

A. Mini-open approach using a rod holder

Rod holder
MS1-A271

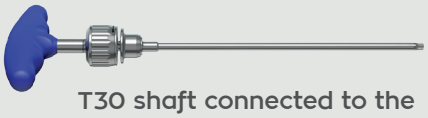
The **rod holder** *MS1-A271* can be used to insert the rod inside the extenders, and then drive it in the bottom of the screw heads.

B. Percutaneous approach using a rod introducer

Rod introducer
MS1-A274

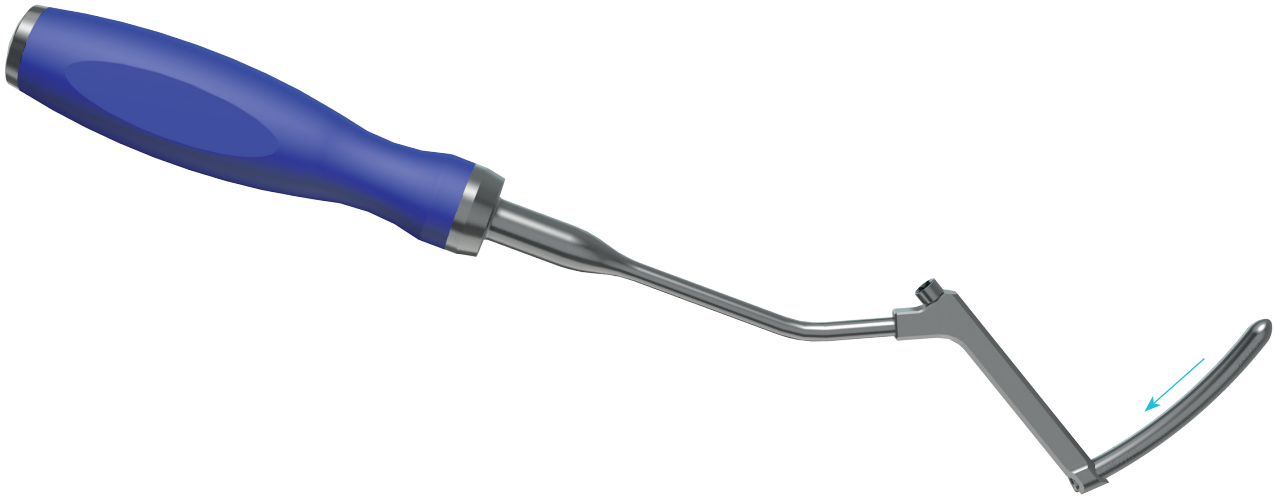
T30 shaft connected to the cannulated ratcheting cylindrical handle
MS1-A411 + SD-A411LSH

Or

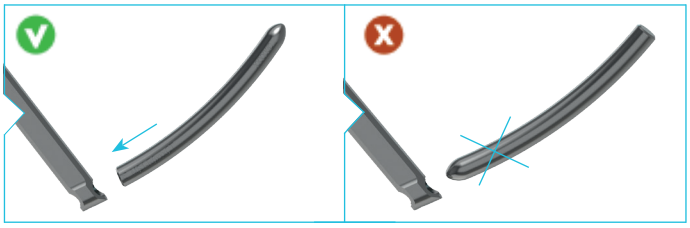


T30 shaft connected to the Cannulated ratcheting T-handle
MS1-A411 + SD-A411TSH

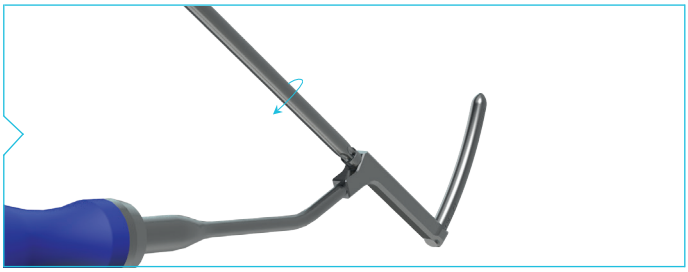
Insert the rod into the slot located at the end of the instrument, ensuring that the end of the rod points upwards.



If the **Lumis percutaneous rod** *MS1-R6xxxT / MS1-R6xxxCT* is used, take care to insert the non-bulleted extremity in the rod introducer.

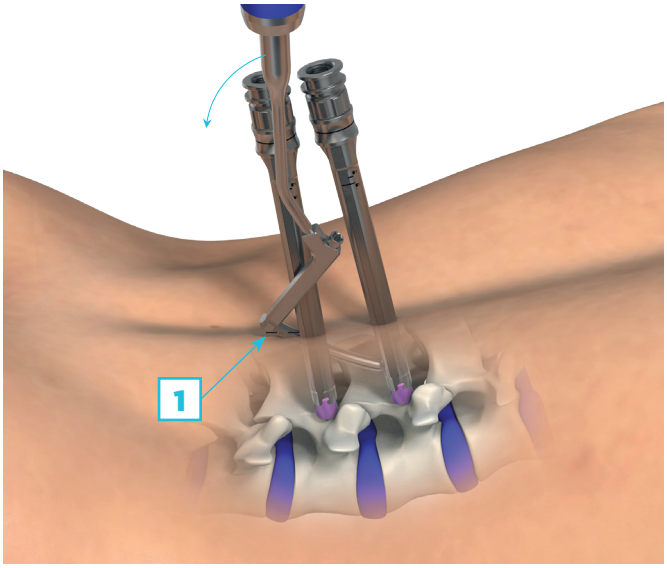


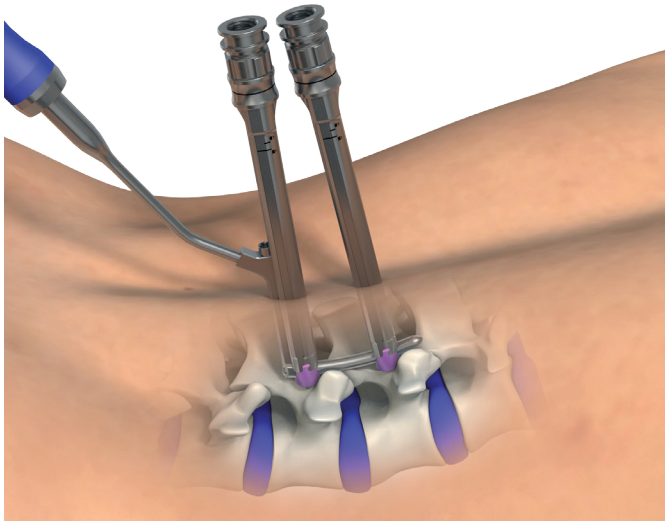
Lock the rod in the instrument by tightening the locking screw with the **T30 shaft** *MS1-A411* preassembled with the **cannulated ratcheting cylindrical handle** *SD-A411LSH* or **cannulated ratcheting T-handle** *SD-A411TSH.*



Insert the rod tip (rigid rod or Flex+2) or bullet nose (Lumis percutaneous rod) beneath the muscles and then rotate the **rod introducer** *MS1-A274*.

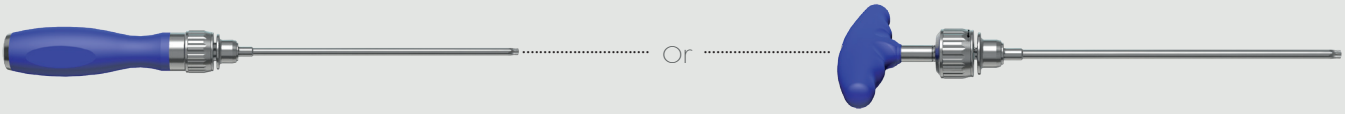
Note:
A small additional incision **1** may be necessary to be able to insert the rod.





C. Percutaneous approach using the reversed rod introducer

Reversed rod introducer
MS1-A275

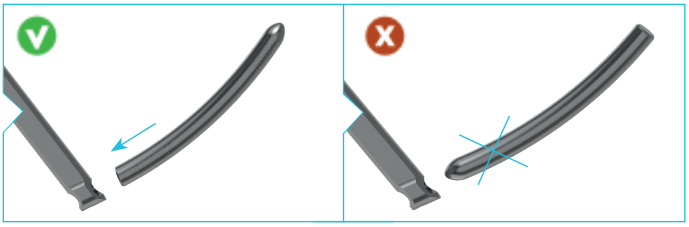


T30 shaft connected to the Cannulated ratcheting cylindrical handle
MS1-A411 + SD-A411LSH

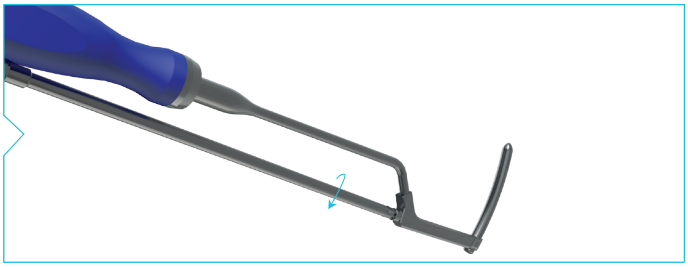
T30 shaft connected to the Cannulated ratcheting T-handle
MS1-A411 + SD-A411TSH

Insert the rod into the slot located at the end of the instrument, ensuring that the tip of the rod points upwards. A laser mark indicates which side the rod must be placed.

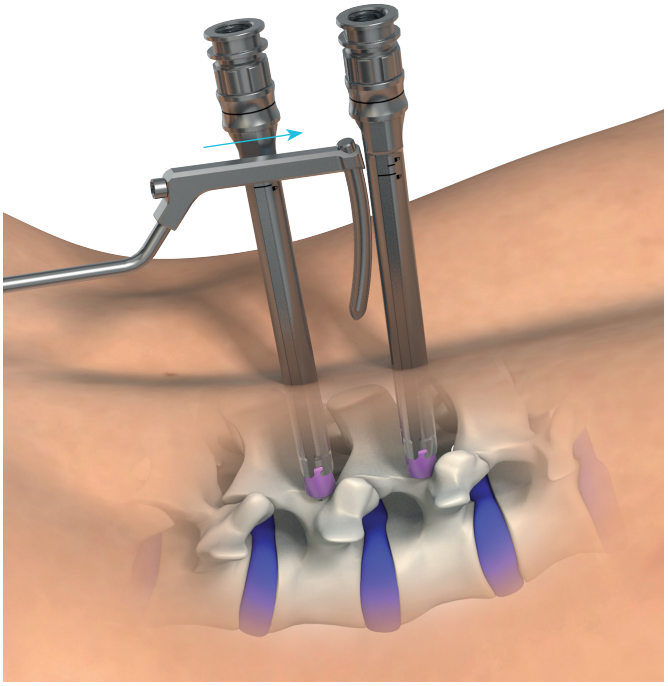
When the **Lumis percutaneous rod** is used (*MS1-R6XXXT / MS1-R6XXXCT*), take care to insert the non-bulleted extremity in the **rod introducer.**

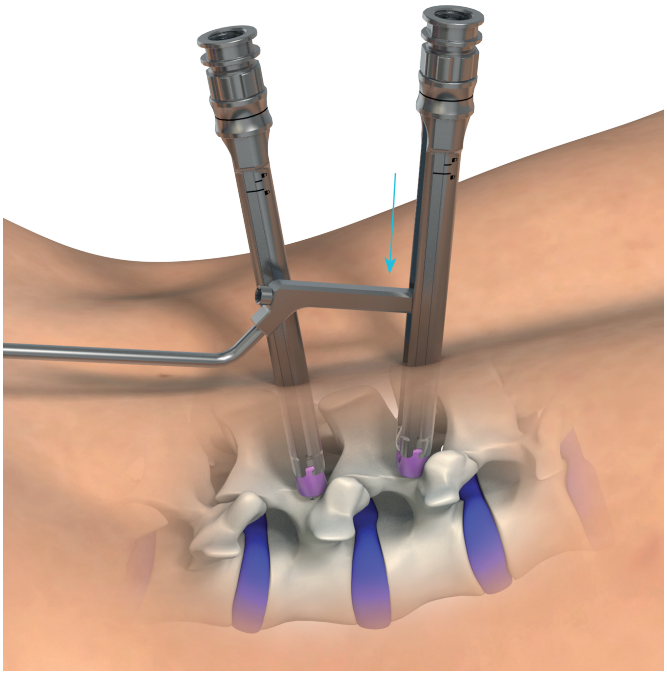


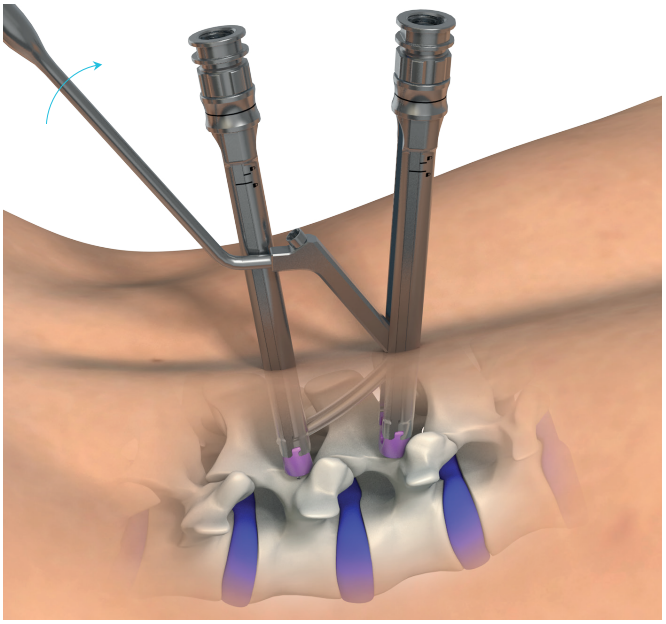
Lock the rod in the instrument by tightening the locking screw with the **T30 shaft** *MS1-A411* preassembled with the **cannulated ratcheting cylindrical handle** *SD-A411LSH* or **cannulated ratcheting T-handle** *SD-A411TSH.*

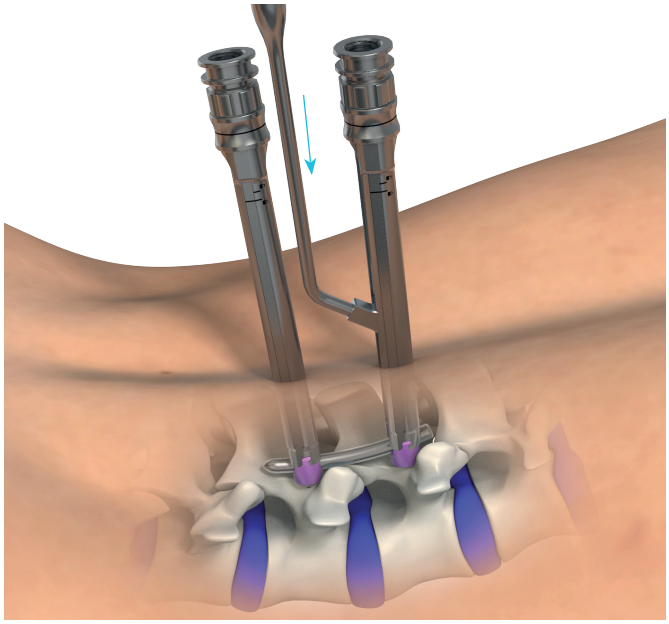


Lower the rod into the enlarged screw extender at the end of the construct and rotate the rod into the screw heads.

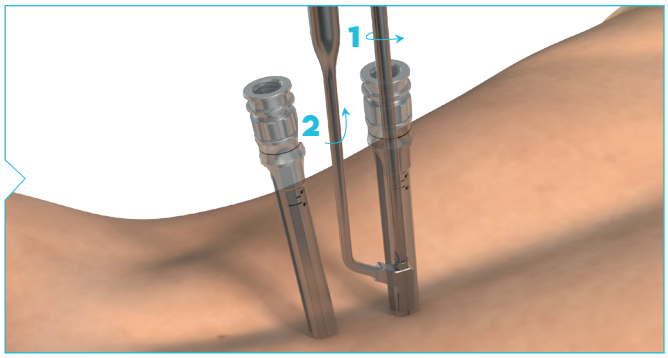






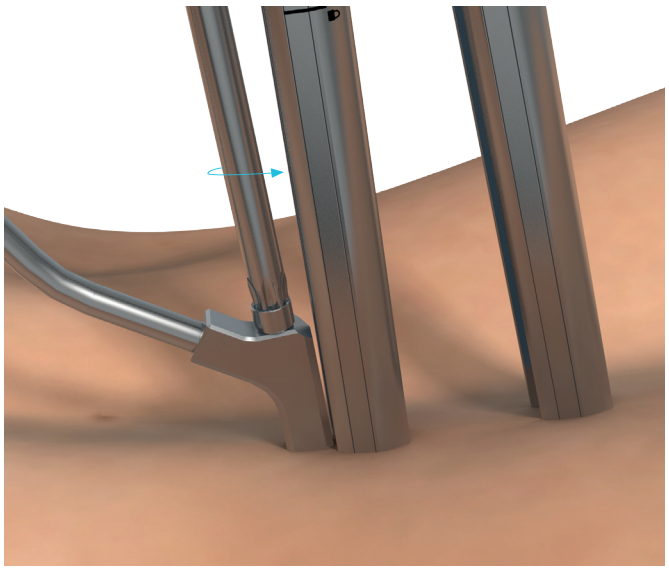


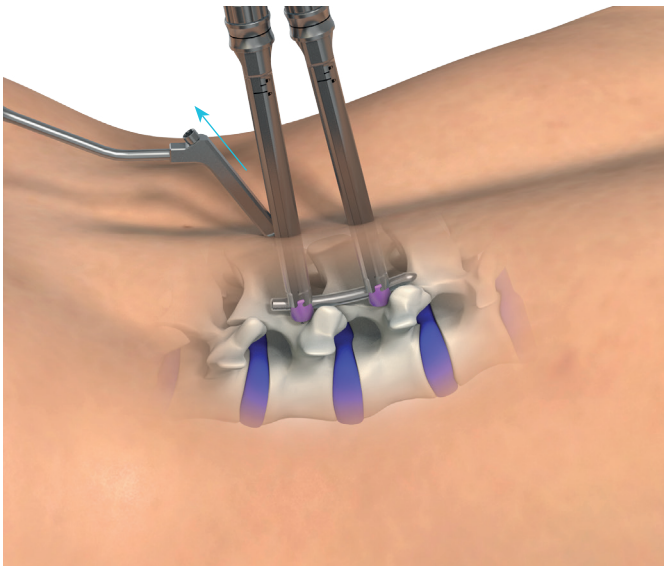
To release the rod, unscrew the locking screw with the **T30 shaft** *MS1-A411* preassembled with the **cannulated ratcheting cylindrical handle** *SD-A411LSH* or **cannulated ratcheting T-handle** *SD-A411TSH.*



Regardless of which rod introducer is used, it is obligatory to insert and tighten slightly a setscrew into one of screw heads before removing the rod introducer. Doing this will keep the rod inside the screw heads and prevent it from moving during the rod introducer removal.

To release the rod, unscrew the locking screw with the **T30 shaft** *MS1-A411* preassembled with the **cannulated ratcheting cylindrical handle** *SD-A411LSH* or **cannulated ratcheting T-handle** *SD-A411TSH.*





Control of the rod placement

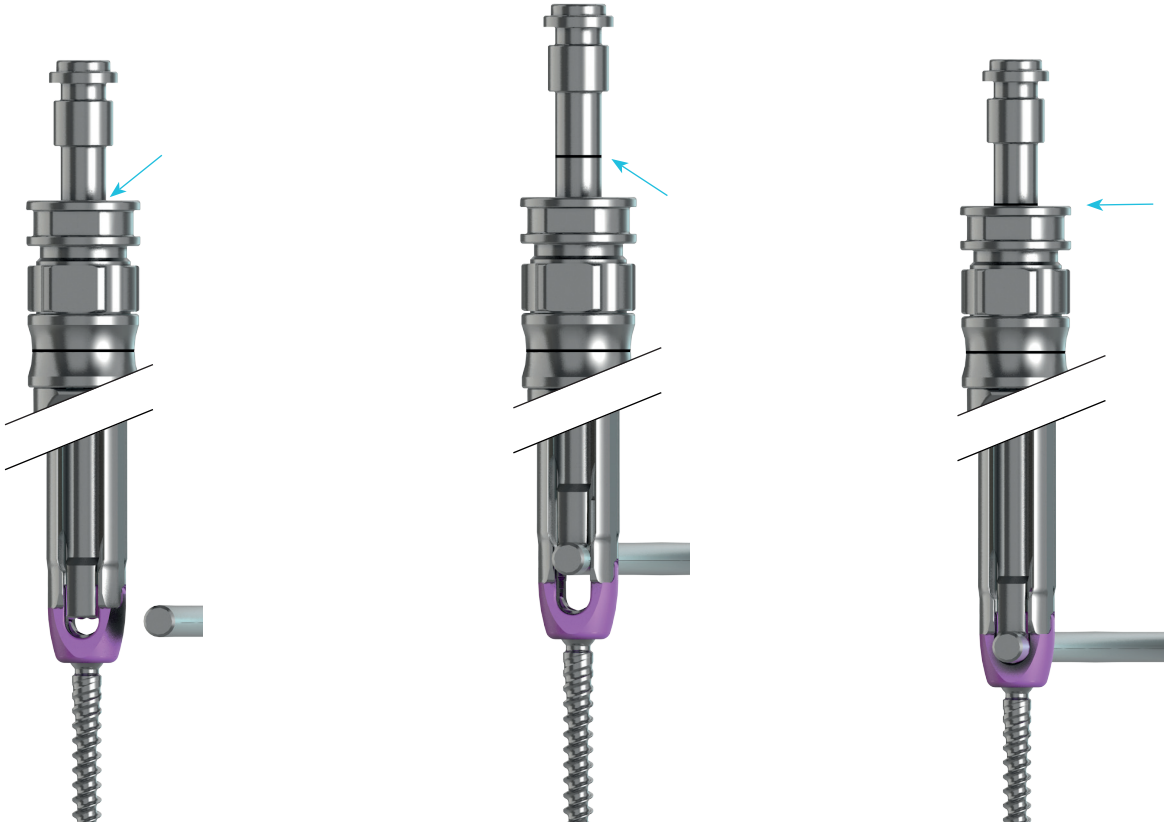
Rod persuadeur
MS1-A311

To verify that the rod is fully seated in the screw heads, insert the **rod persuader** *MS1-A311* into the screw extender and check that the laser mark is visible.

1 The laser mark is not visible. There is no rod in the screw head.

2 The laser mark is visible and not flush with the screw extender.
Rod reduction is required.

3 The laser mark is visible and flush with the screw extender. There is no need to reduce the rod.

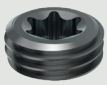


! WARNING !
The setscrew must never be placed on the bulleted part of the rod.

Allowed area
for the placement of the setscrew

ROD REDUCTION

A · The rod is perfectly seated



Setscrew
MS1-L100T

Setscrew holder
MS1-A231

Index ring
MS1-A232

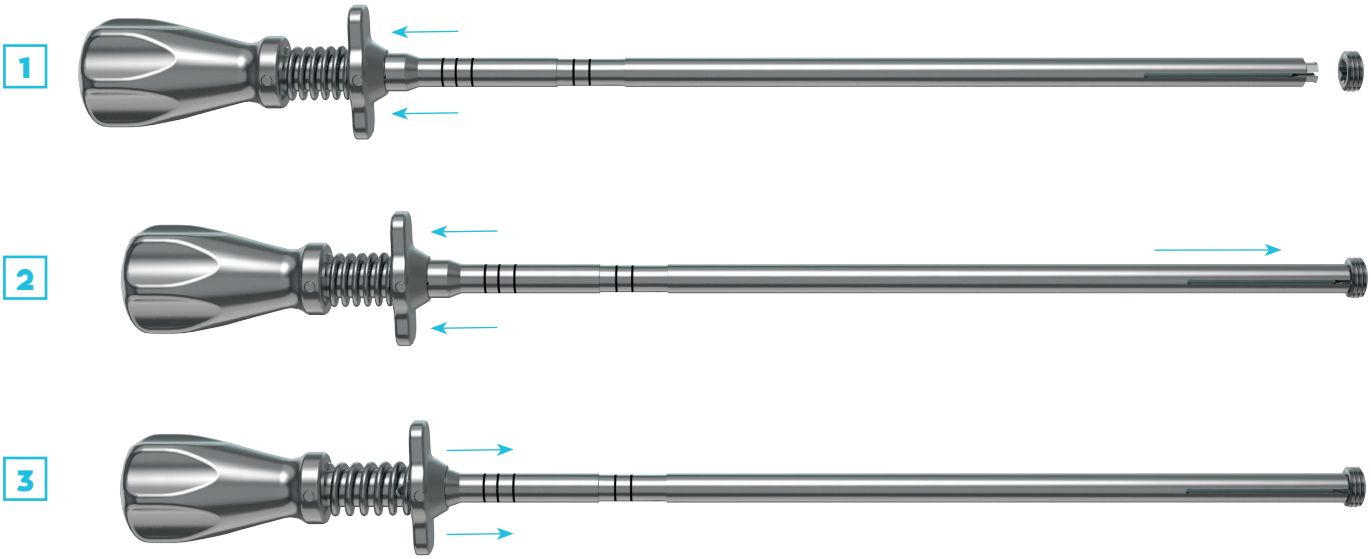
If the rod is perfectly seated in the screw head, it is possible to engage the **setscrew** *MS1-L100T* using only the **index ring** *MS1-A232* and **setscrew holder** *MS1-A231.*

To load a **setscrew** *MS1-L100T* on the **setscrew holder** *MS1-A231*:

1 Pull up the trigger of the setscrew holder.

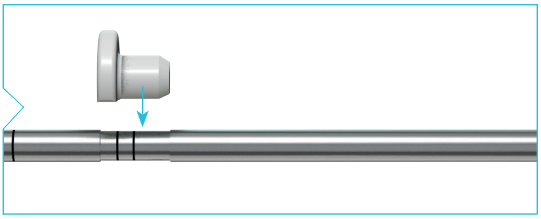
2 While maintaining this position, slide the tip of the instrument in the "star" footprint of the setscrew.

3 Finally release the trigger of the setscrew holder.

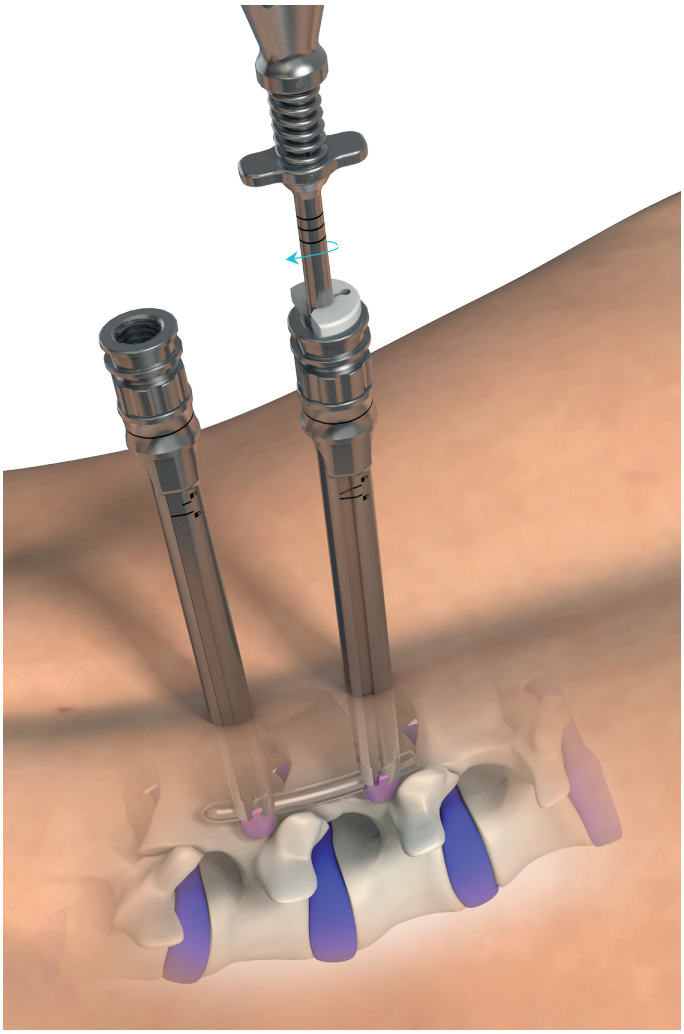


! WARNING !
Never use the setscrew holder MS1-A231 for the final tightening.

Attach the **index ring** *MS1-A232* of the setscrew holder onto the narrowest part of the **setscrew holder** *MS1-A231*.



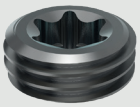
Slide the assembly into the screw extender and turn the upper part of the setscrew holder clockwise to engage the setscrew in the screw head.



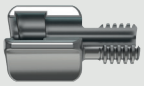
B· The rod is not perfectly seated inside the screw head

Setscrew holder
MS1-A231

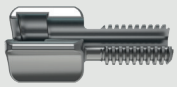
Rod Persuader
MS1-A311



Setscrew
MS1-L100T



Screw for rod persuader
MS1-A313



Long screw for rod persuader
MS1-A314

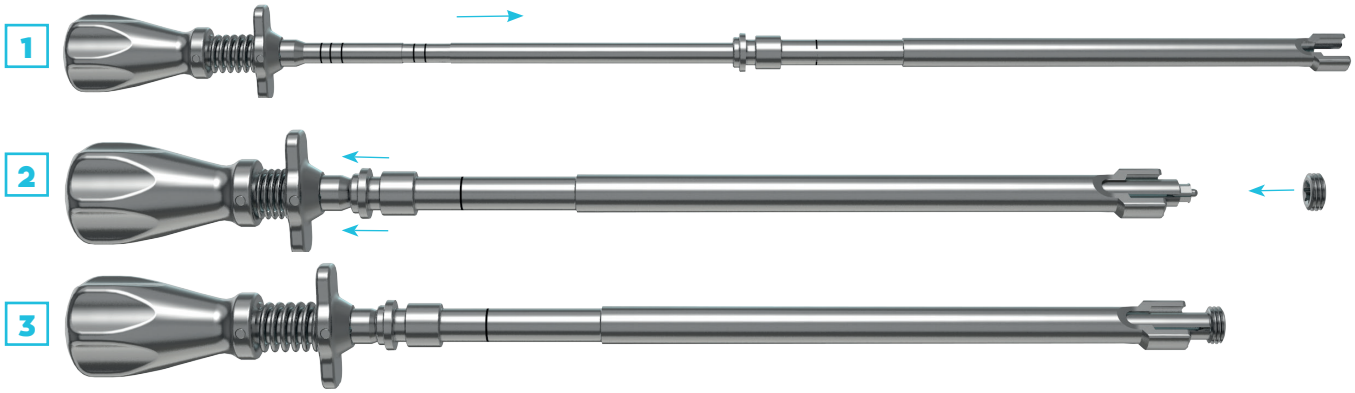
Over handle
MS1-A315

OPTION

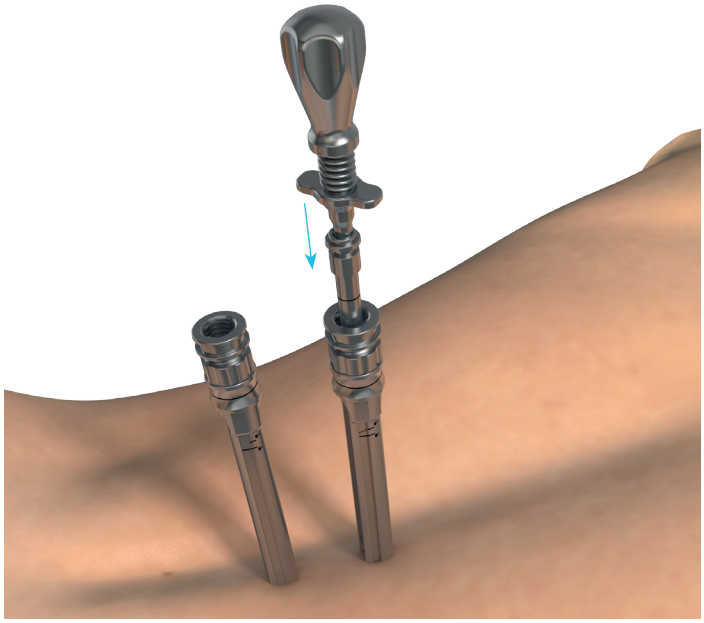
If the rod is not perfectly seated inside the screw head:

1 Slide the **setscrew holder** *MS1-A231* into the **rod persuader** *MS1-A311*

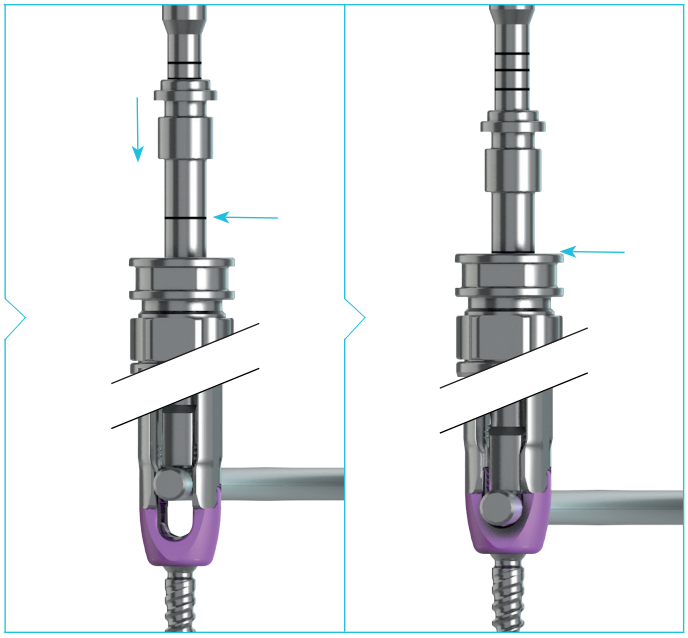
2 Then, load the **setscrew** *MS1-L100T* on the setscrew holder (as described above page 15.).



Slide the setscrew holder assembled with the rod persuader and the Lumis setscrew into the screw extender.



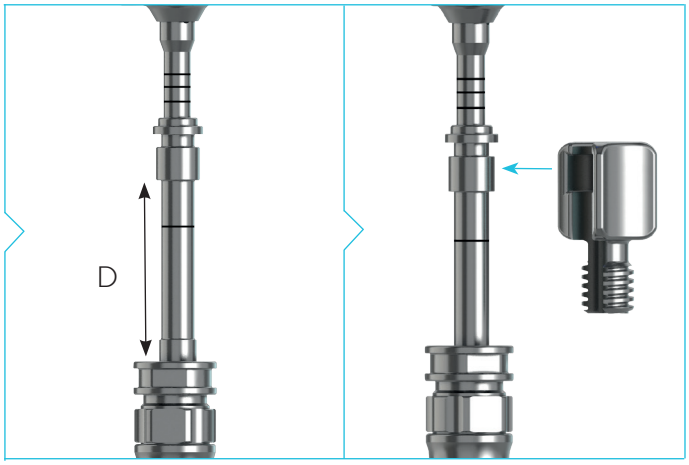
Manually reduce the rod by pushing on the rod persuader until the laser mark flushes with the level of the screw extender.



If the distance (D) between the rod and the screw head is too large use the screw for rod persuader:

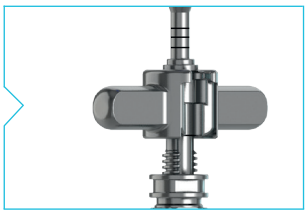
- If D < 38mm, assemble the screw for **rod persuader** *MS1-A313* on the persuader by sliding the square part on the instrument tip.

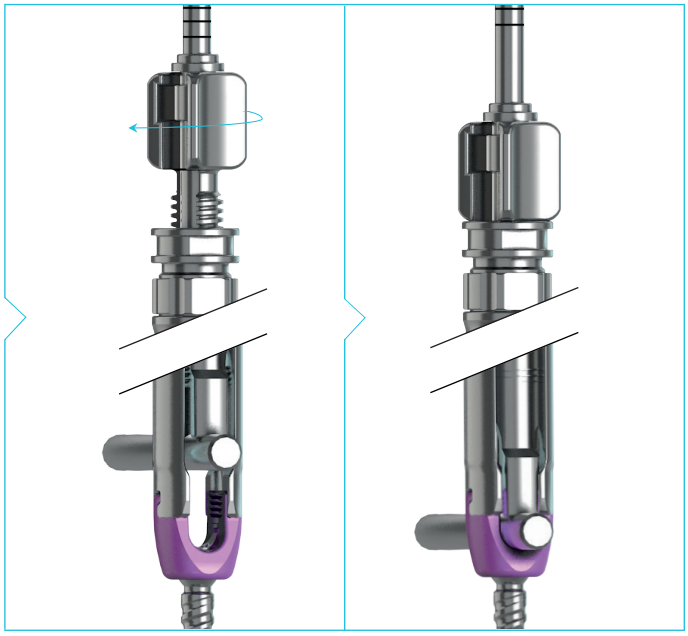
- If D > 38mm, assemble the **long screw for rod persuader** *MS1-A314.*



By turning the screw, the rod is pushed down the screw heads.

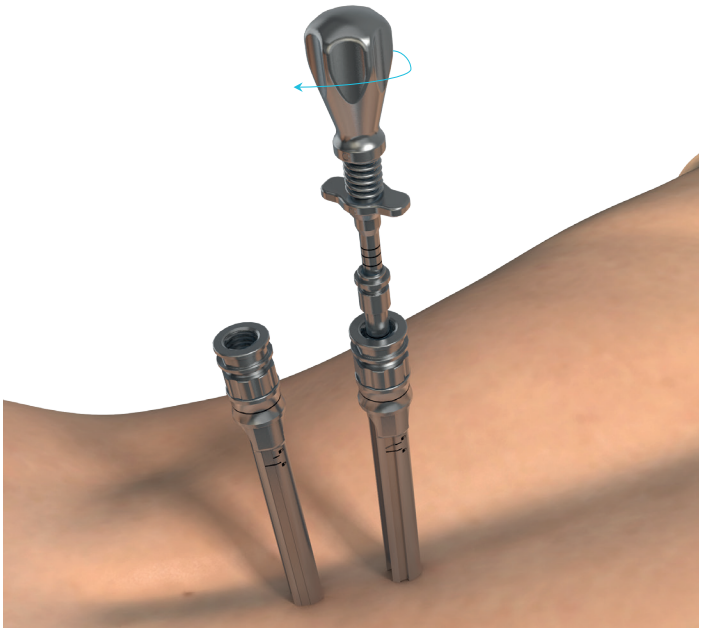
For extra leverage, it is possible to use the **over handle** *MS1-A315.*



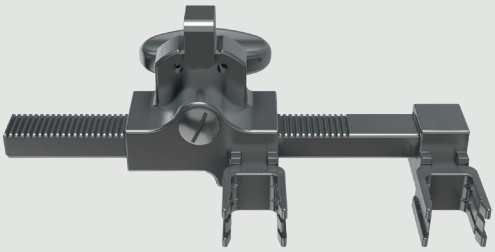


! WARNING !
The rod introduction in force induces stress on the implants and their anchorage in the bone. It may be better to adjust the rod bending.

Once the rod perfectly inserted, turn the upper part of the setscrew holder clockwise to insert the setscrew in the screw head.

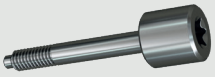


VIII COMPRESSION / DISTRACTION

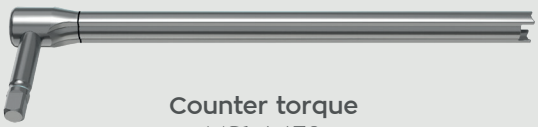


Distractor - Compressor
MS1-A331

Extender plug for distractor-compressor
MS1-A332



Screw fixation for distractor-compressor
MS1-A333



Counter torque
MS1-A432

Fulcrum connector for distractor / compressor
MS1-A334

Multiple connector for distractor / compressor
MS1-A335

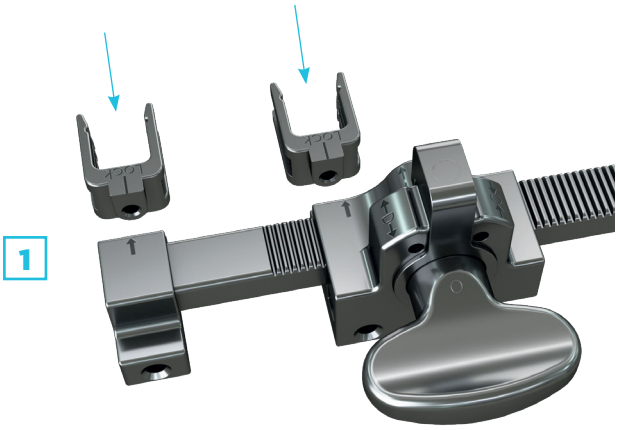
Cannulated ratcheting cylindrical handle
SD-A411LSH

OPTION

First assemble the distractor - compressor :

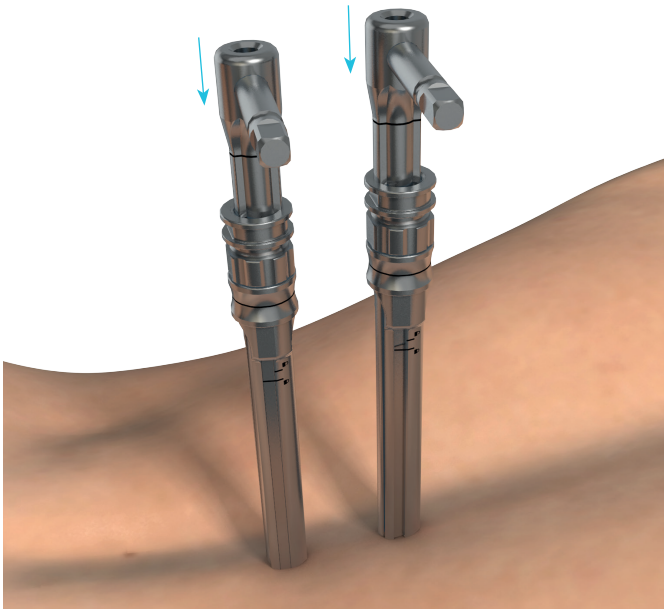
1 Insert the 2 **extender plugs** *MS1-A2332* in the **Distractor - Compressor** *MS1-A331*

2 Secure the assembly thanks to the **screw fixation** *MS1-A333*.

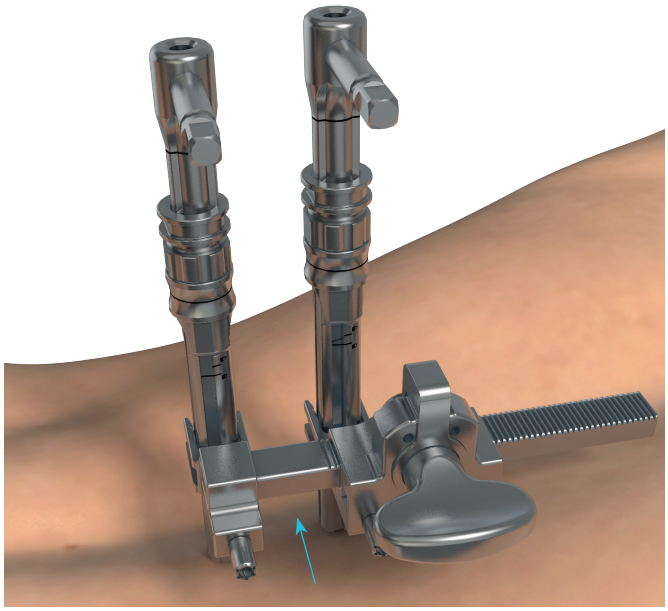


Choose a screw to be used as fulcrum and lock its setscrew to the final torque (as described in the part IX page 21 for the final tightening).

Place two **counter torques** *MS1-A432* into the screw extenders.



Place the **distractor / compressor** *MS1-A331* on the screw extenders.

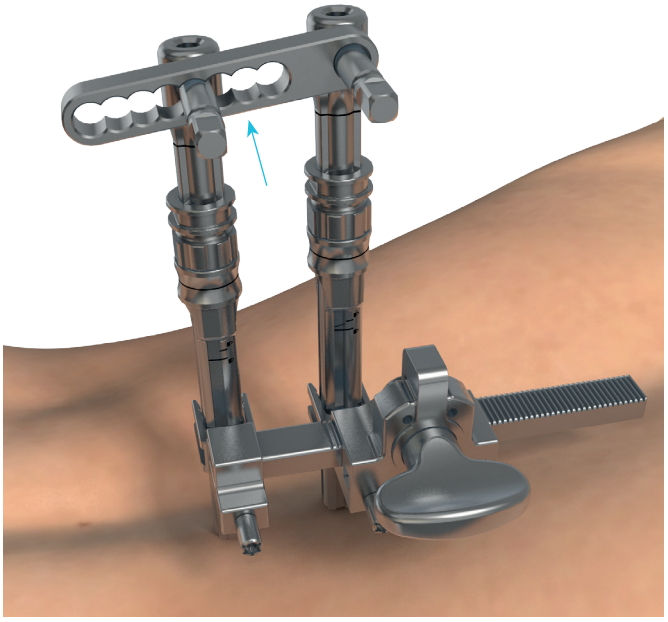


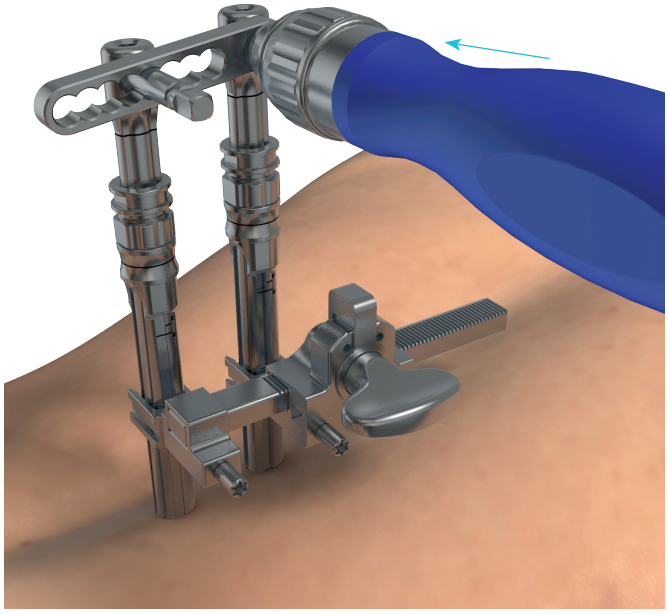
Depending on the space between the two counter-torques, choose the appropriate connector:

- **Fulcrum connector for distractor / compressor** *MS1-A334*

- **Multiple connector for distractor / compressor** *MS1-A335*

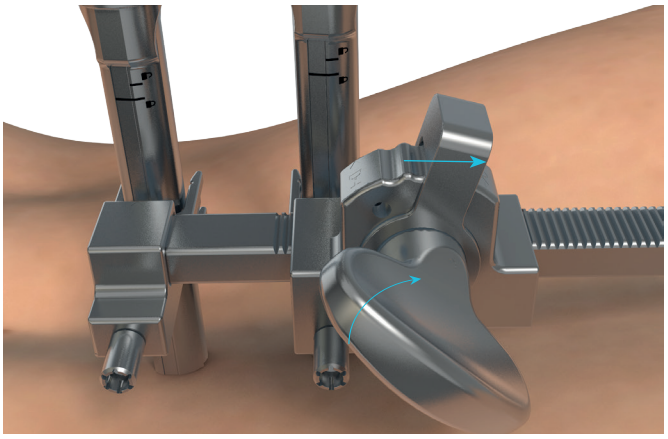
It is recommended to place a **cannulated ratcheting cylindrical handle** *SD-A411LSH* on one of the counter-torques to secure the fulcrum.



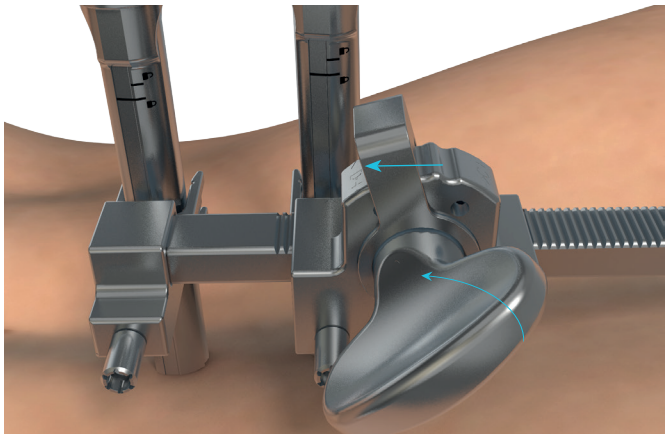


Select the desired action (compression or distraction) with the trigger and turn the turnkey.

DISTRACTION



COMPRESSION

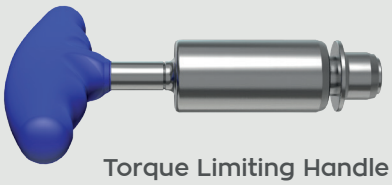


Once the correction has been performed, it is possible to perform the final tightening (part IX) on the setscrew which was not used as fulcrum while maintaining the compressor / distractor in position.

Remove the distractor / compressor by pulling it away from the screw-extenders and removing the two counter-torques.

IX FINAL TIGHTENING

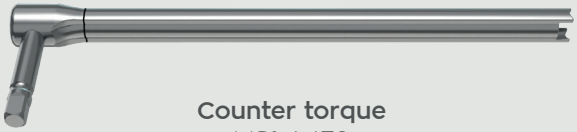
A · Percutaneous approach



Torque Limiting Handle
MS1-A421

T30 shaft
MS1-A411

Cannulated Ratcheting Cylindrical Handle
SD-A411LSH



Counter torque
MS1-A432

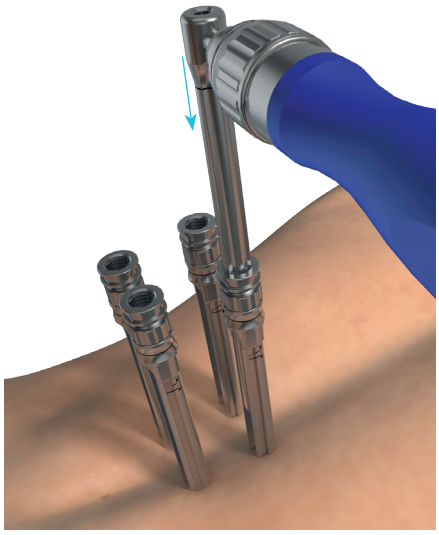
Connect the **T30 shaft** *MS1-A411* to the **torque limiting handle** *MS1-A421.*

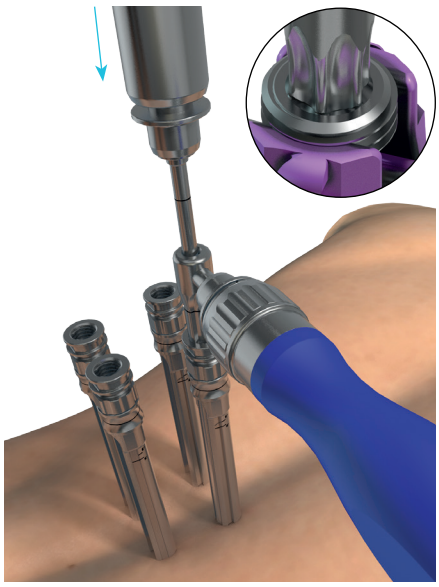
Connect the **counter torque** *MS1-A432* to the **cannulated ratcheting cylindrical handle** *SD-A411LSH.*

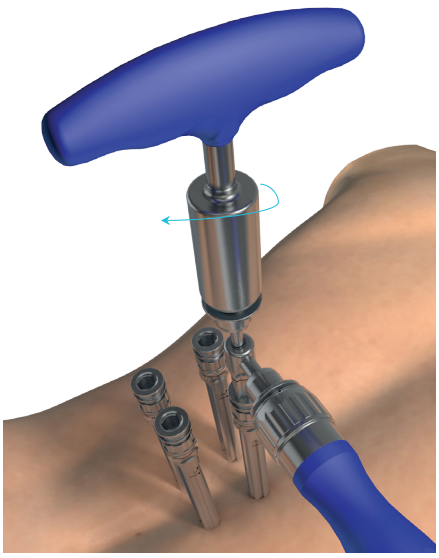
Position the **counter torque** *MS1-A432* into the screw extender and until you press the screw head.

Slide the **T30 shaft** *MS1-A411* into the counter torque until the distal tip of the shaft engages in the setscrew's footprint.

While strongly holding the counter torque with the cylindrical handle, turn clock wisely the torque limiting handle until it clicks 3 times.







Repeat this step on all setscrews to ensure final tightening of the construct.

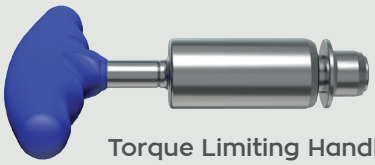
!WARNINGS!

The proper tightening of the screw is ensured by the 3 "clicks" produced by the torque limiting handle when performing tightening.

Never use the torque limiting handle to unscrew a setscrew.

Always be sure to be on the neutral position of the ratcheting handle when performing tightening.

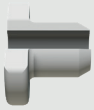
B · Mini-open approach



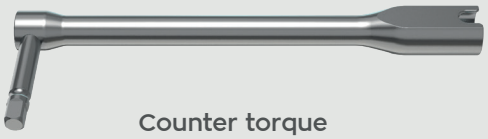
Torque Limiting Handle
MS1-A421

T30 shaft
MS1-A411

Cannulated ratcheting cylindrical handle
SD-A411LSH

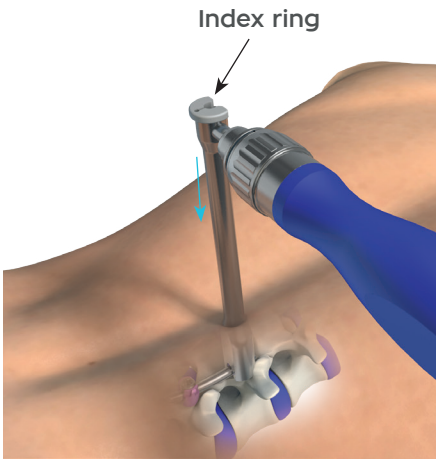


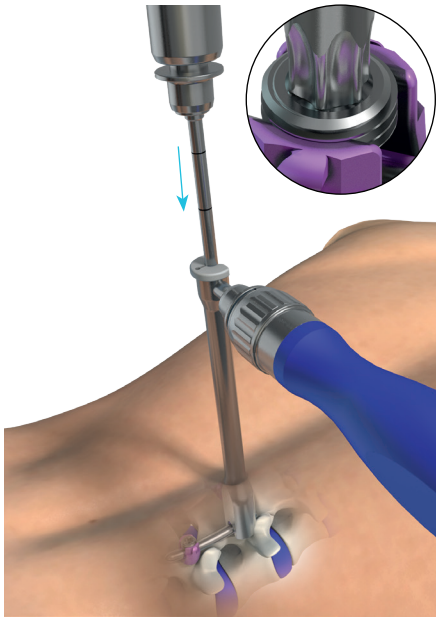
Index ring for setscrew holder
MS1-A232

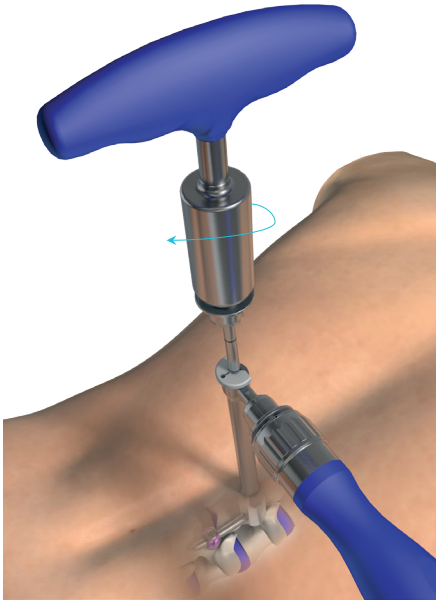


Counter torque
IS1-A431

If the surgeon wants to perform the final tightening without the screw extenders, it is possible to use the **counter torque** *IS1-A431* in combination with **the index ring for setscrew holder** *MS1-A232* to ensure a good alignment between the setscrew and the screw head.





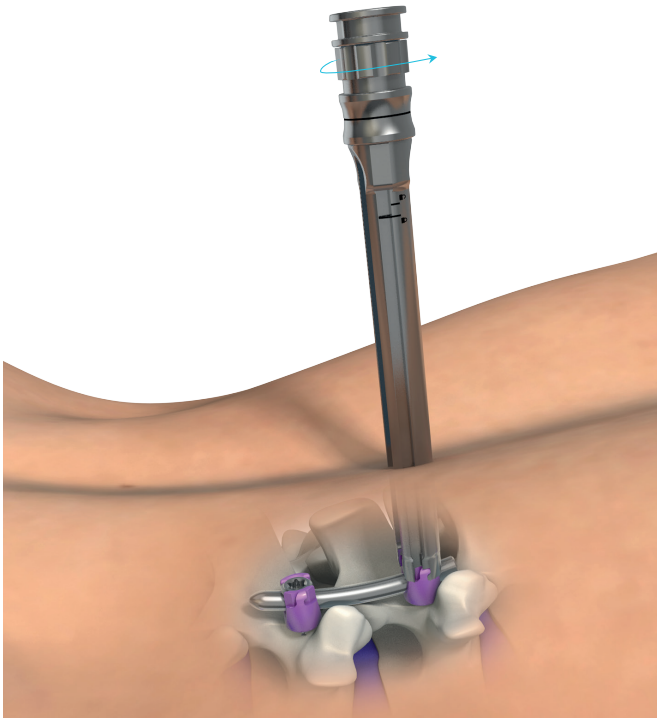


While strongly holding the counter torque with the cylindrical handle, turn clock wisely the torque limiting handle until it clicks 3 times.

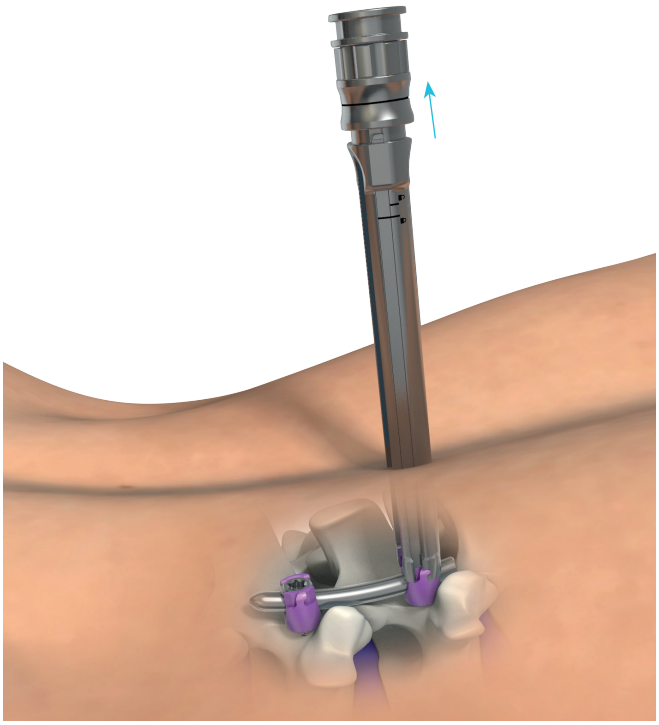
SCREW EXTENDER REMOVAL

Extender Wrench
MS1-A213

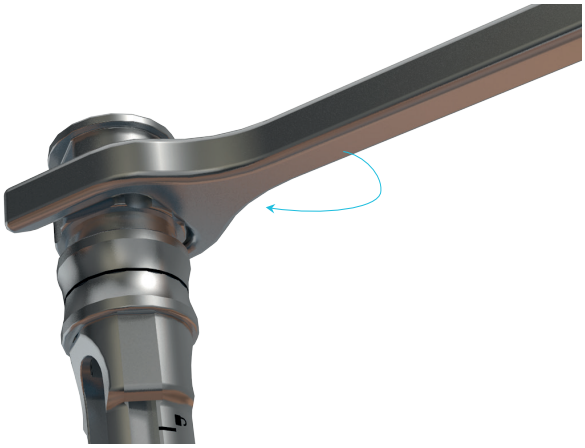
Release the **screw extender** *MS1-A214* by screwing the nut counterclockwise.

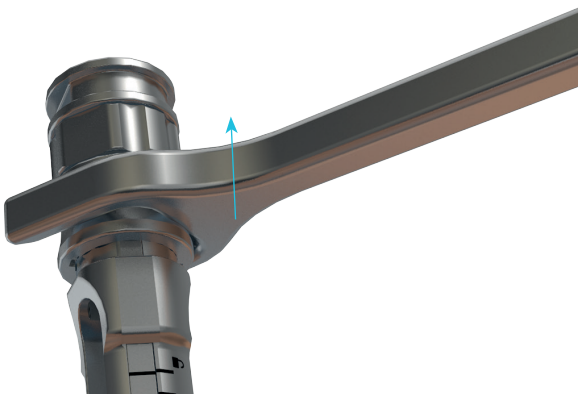


Slide the ring up to unlock the assembly.



The **extender wrench** *MS1-A213* can be used to help unlock and remove the screw extender by unscrewing the nut or by lifting the ring.





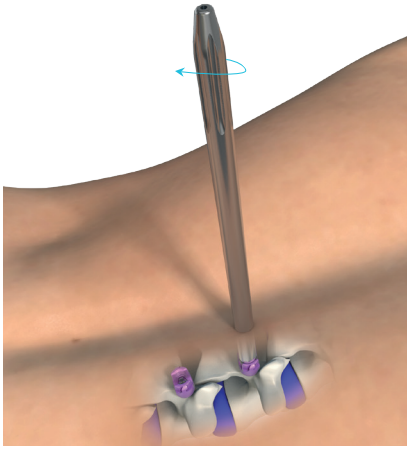
RESCUE PROCEDURE

Rescue Instrument
MS1-A223

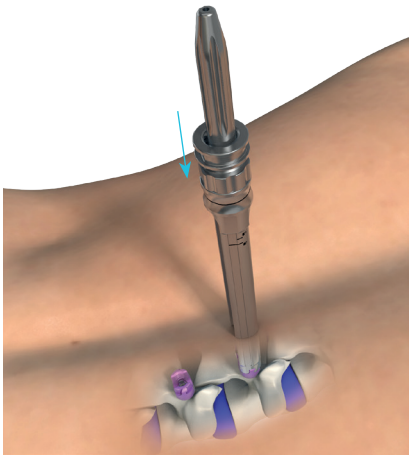
Expanders
MS1-A11X

The **rescue instrument** *MS1-A223* can be used to reconnect a screw extender to a screw if needed.

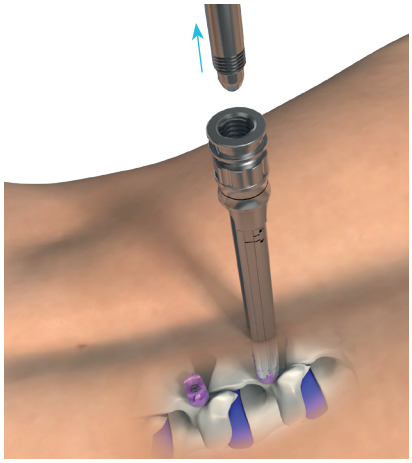
Insert the **rescue instrument** *MS1-A223* and tighten it into the screw head.



Insert the screw extender by sliding it on the rescue instrument connected to the screw.

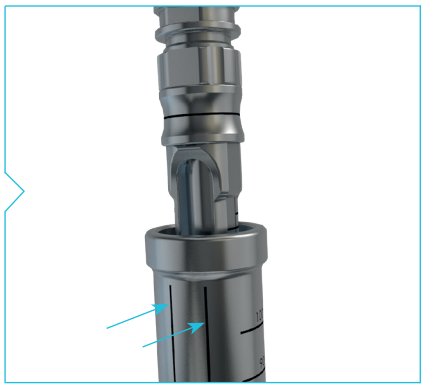


Once the screw extender is in place, unscrew the rescue instrument to remove it.

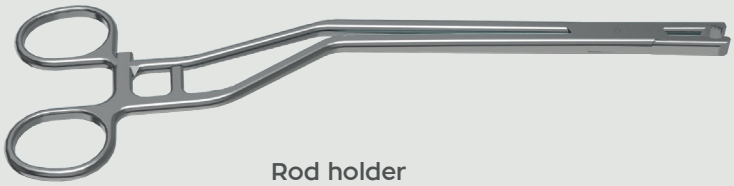


The expanders can be inserted first to facilitate the placement of the rescue instrument (see p7).

If the rod is already in place, the laser marks indicate which way the screw extender must be placed.



REMOVAL OR REVISION PROCEDURE

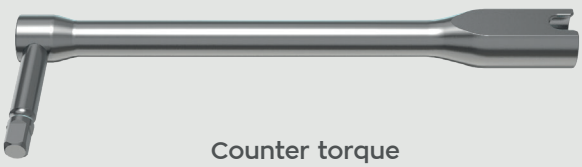


Rod holder
MS1-A271

Or

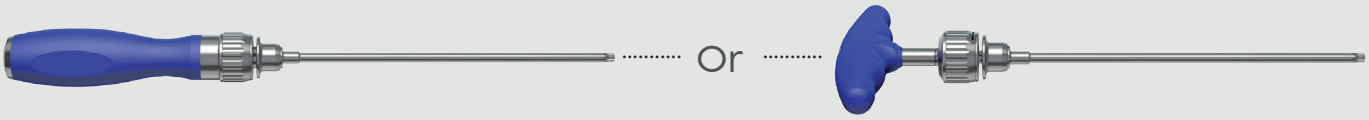
Lumis Universal screwdriver connected to the cannulated ratcheting cylindrical handle
MS2-A221 + SD-A411LSH

Lumis Universal screwdriver connected to the cannulated ratcheting T-handle
MS2-A221 + SD-A411TSH



Counter torque
IS1-A431

Setscrew holder
MS1-A231



Or

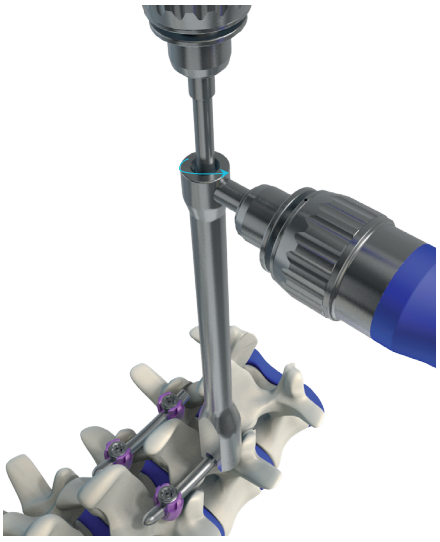
T30 shaft connected to the cannulated ratcheting cylindrical handle
MS1-A411 + SD-A411LSH

T30 shaft connected to the cannulated ratcheting T-handle
MS1-A411 + SD-A411TSH

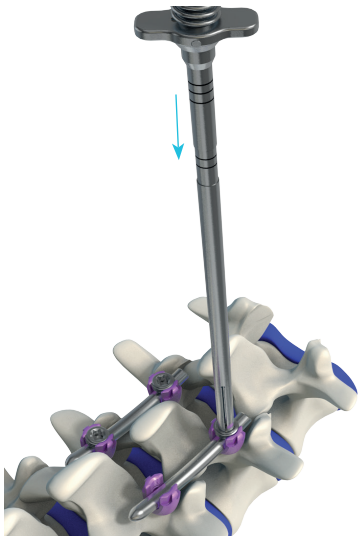
The removal of Lumis screws will be done using an open approach.

Unlock the setscrew using the **counter torque** *IS1-A431* and the **T30 shaft** *MS1-A411*.

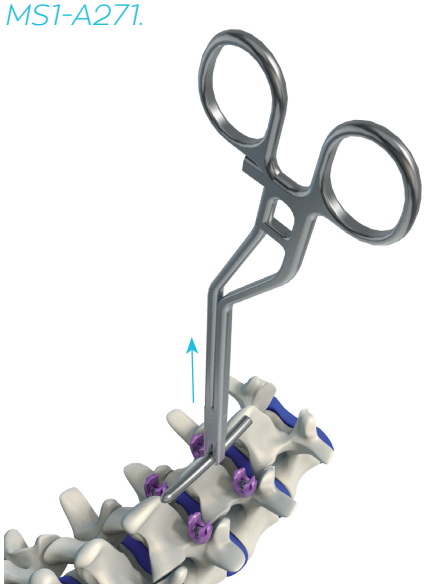
The counter torque must be placed in the axis of the screw head and as deep as possible to ensure the good position of the rod in the notch of the counter torque to ensure a proper grip while unlocking the setscrew.



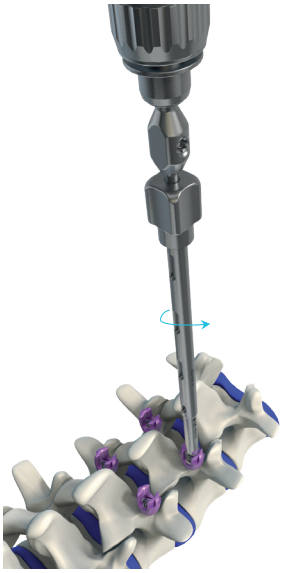
Once the setscrew is unlocked, the **setscrew holder** *MS1-A231* can be used to finish the unscrewing and remove the setscrew: pull the trigger of the setscrew holder to catch and release the setscrew.



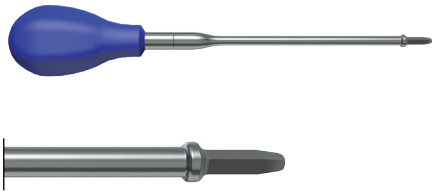
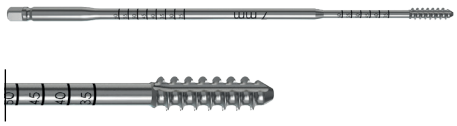
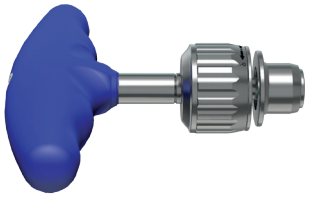
Capture the rod using the rod holder and then continue to remove all setscrews with the setscrew holder. Once all setscrews have been removed, remove the rod using the **rod holder** *MS1-A271.*

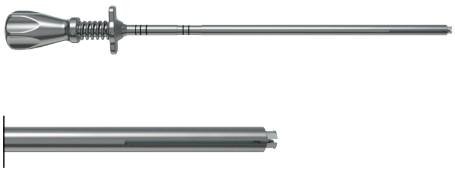
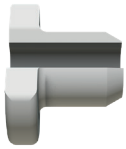
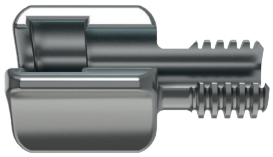
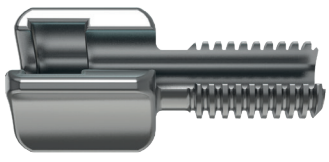
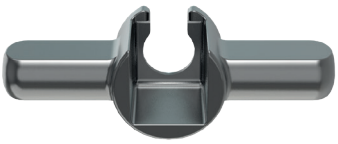


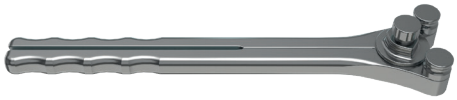
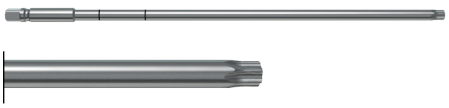
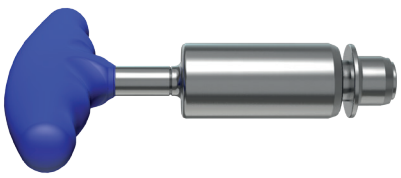
Place the **Lumis Universal Screwdriver** *MS2-A221* into the screw head and turn the handle counter-clockwise to remove each screw.

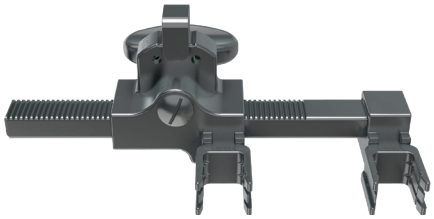
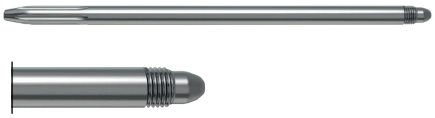


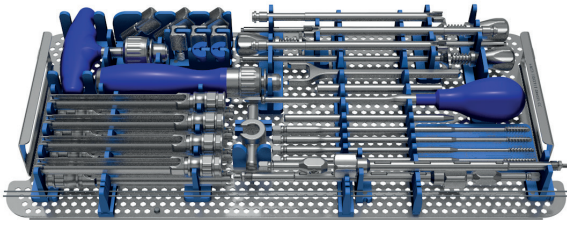
1 INSTRUMENTS

	**Guidewire**	MS1-WB1450
	**Cannulated square awl**	MS1-A121
	**Protection sleeve for taps**	MS1-A111
	**Cannulated taps**	MS1-A11X
	**Lumis Universal Screwdriver**	MS2-A221
	**Enlarged screw extender**	MS1-A214
	**Cannulated Ratcheting T-Handle**	SD-A411TSH

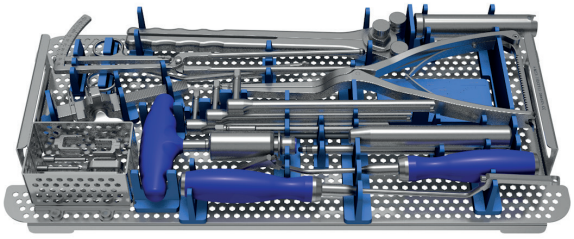
	**Cannulated Ratcheting Cylindrical Handle**	SD-A411LSH
	**Expander 1**	MS1-A110
	**Setscrew Holder**	MS1-A231
	**Index ring for setscrew holder**	MS1-A232
	**Rod persuader**	MS1-A311
	**Screw for rod persuader**	MS1-A313
	**Long screw for rod persuader**	MS1-A314
	**Over Handle**	MS1-A315

	**Extender Wrench**	MS1-A213
	**Rod gauge**	MS1-A261
	**Rod holder**	MS1-A271
	**French bender**	U1-A321
	**Rod introducer**	MS1-A274
	**Reversed rod introducer**	MS1-A275
	**T30 Shaft**	MS1-A411
	**Torque Limiting Handle**	MS1-A421

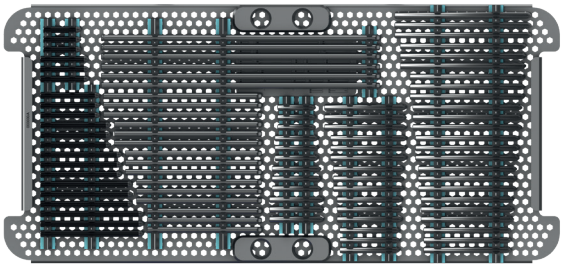
	**Counter torque**	MS1-A432
	**Compressor-Distractor**	MS1-A331
	**Fulcrum connector for distractor-compressor**	MS1-A334
	**Multiple connector for distractor-compressor**	MS1-A335
	**Expander 2**	MS1-A112
	**Expander 3**	MS1-A113
	**Rescue instrument**	MS1-A223
	**Counter torque**	IS1-A431



Tray 1 LUMIS
MS1-TRAY111

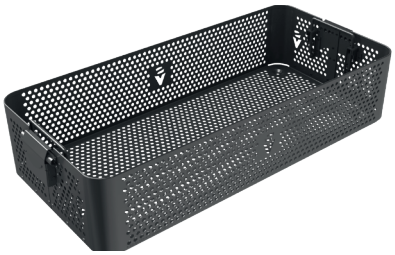


Tray 2 LUMIS
MS1-TRAY112



Tray 5 ULIS
IS1-TRAY115

Screws Rack
SD-RACK1

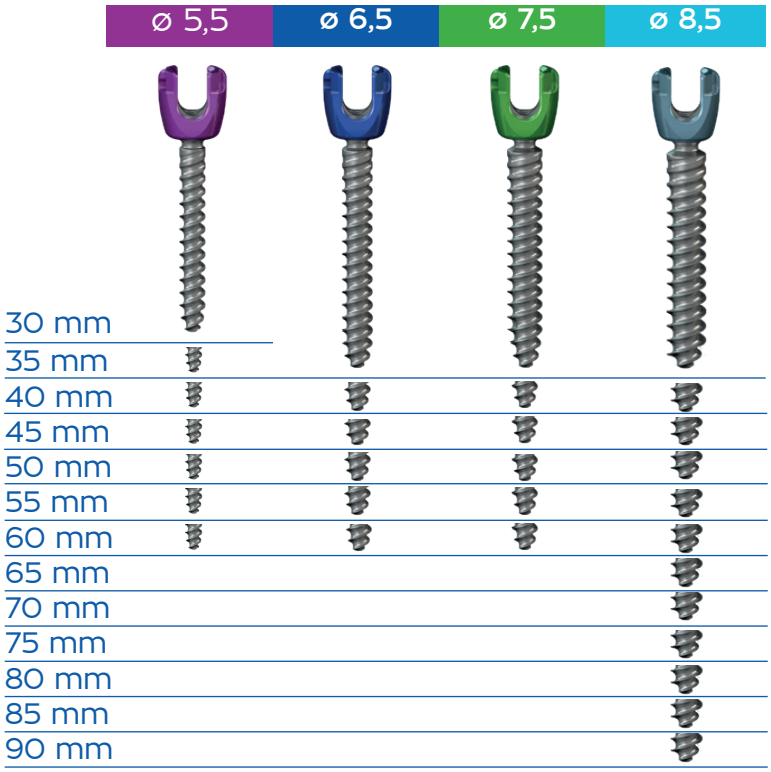


SV Common Base (2 levels)
SD-BASE11117

SCREWS

REFERENCE:

MS2-M6XXT (Ex: MS2-M640T)
MS2-MDiameterLengthTitanium



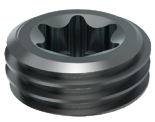
ROD

REFERENCE:

MS1-R6XXXT or MS1-R6XXXCT or L2-R6XXCHT or L2-R6XXHT
MS1-RDiameterLengthCurveHexagonalTitanium

	Designation	Length	Reference
	Prebent Percutaneous Rod	30 > 100mm (5 mm inc.) 110 et 120mm	MS1-R6XXXCT
	Straight Percutaneous Rod	250mm	MS1-R6XXXT
	Prebent Rod with Hexagonal End	40 > 120mm (10mm inc.)	L2-R6XXCHT
	Straight Rod with Hexagonal End	110 > 140mm (10mm inc.)	L2-R6XXHT

SETSCREW



MS1-L100T

NOTES

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