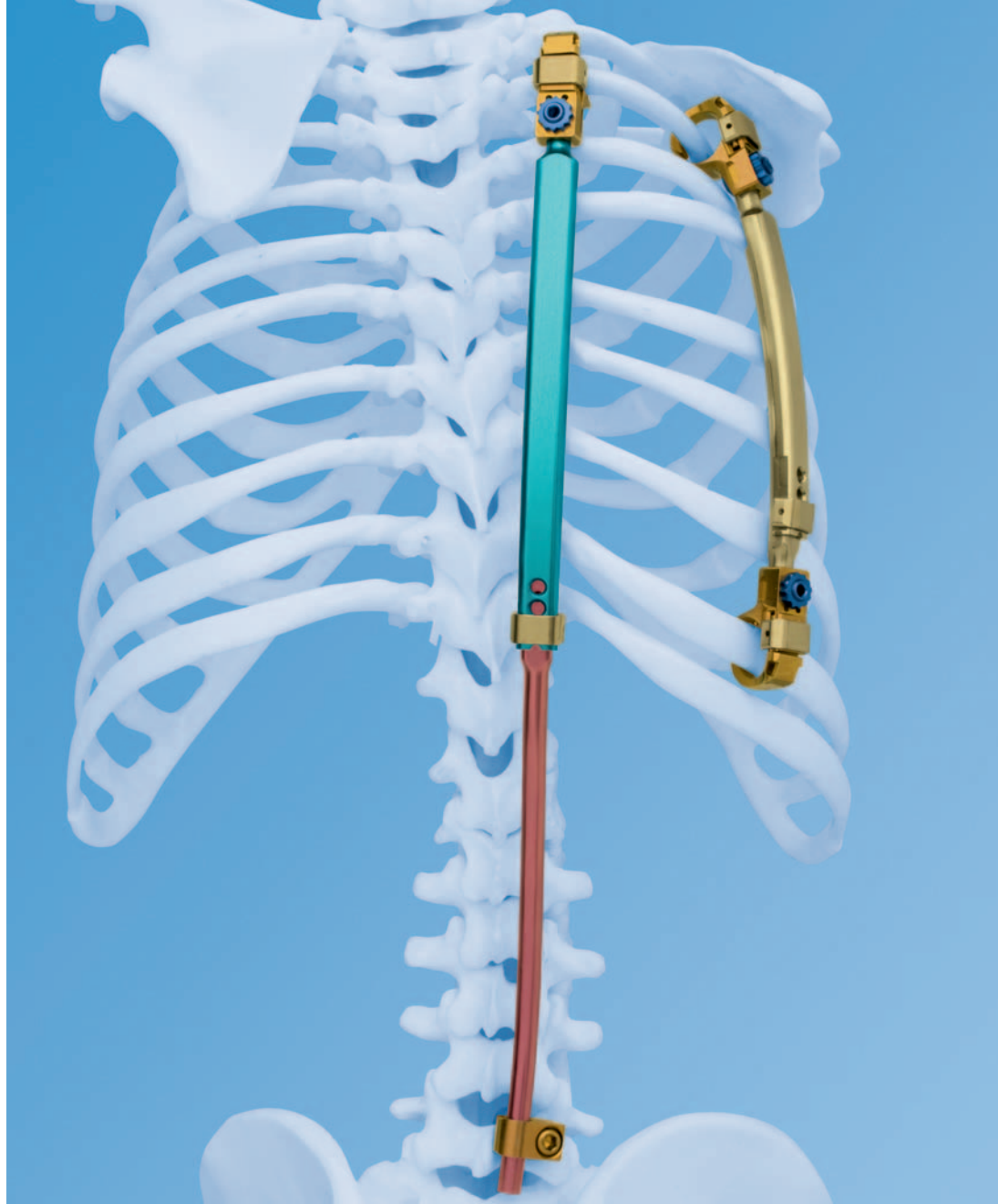


VEPTR II. Vertical Expandable Prosthetic Titanium Rib II.

Technique Guide



SYNTHES

Instruments and implants
approved by the AO Foundation

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 Image intensifier control

Warning

This description alone does not provide sufficient background for direct use of the product. Instruction by a surgeon experienced in handling this product is highly recommended.

Reprocessing, Care and Maintenance of Synthes Instruments

For general guidelines, function control and dismantling of multi-part instruments, please refer to: www.synthes.com/reprocessing

VEPTR II. Vertical Expandable Prosthetic Titanium Rib II.

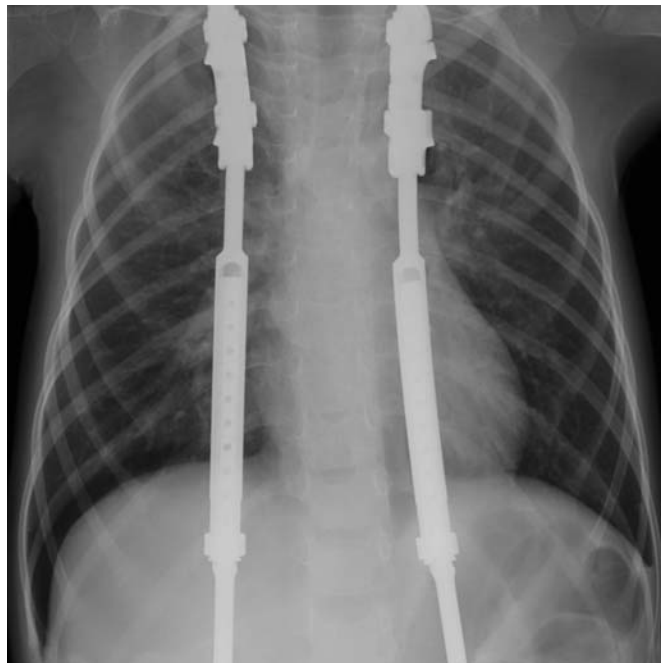
Concept and intended use

VEPTR is based on a three-dimensional thoracic approach to treat patients with complex chest wall and/or spinal deformities where the thorax is unable to support normal respiration or lung growth (Thoracic Insufficiency Syndrome). Additionally VEPTR devices control and may correct scoliosis.

VEPTR is designed to mechanically stabilize and distract the thorax to improve respiration and lung growth in infantile and juvenile patients.

Devices are attached perpendicularly to the patient's natural ribs (superior attachment point) and more caudal ribs, a lumbar vertebra or to the ilium (inferior attachment point). Once the VEPTR device is in place, its design allows expansion, anatomic distraction, and replacement of components through less-invasive surgery.

All components of the VEPTR II system are manufactured from a titanium alloy (Ti-6Al-7Nb) with the exception of the Ala-hook and S-rod, which are manufactured from commercially pure titanium.



Goals of treatment

1. Increase thoracic volume
2. Scoliosis correction
3. Improve thoracic function
4. Establish thoracic symmetry by lengthening the concave, restricted hemithorax
5. Avoid growth-inhibiting procedures
6. Maintain these improvements throughout the patient's growth

Indications and Contraindications

Indications

The device is indicated for:

Primary Thoracic Insufficiency Syndrome (TIS) due to a three-dimensional deformity of the thorax

- Progressive thoracic congenital scoliosis with concave fused ribs
- Progressive thoracic congenital scoliosis with flail chest due to absent ribs
- Progressive thoracic congenital, neurogenic or idiopathic scoliosis without rib abnormality
- Hypoplastic thorax syndrome, including
 - Jeune's syndrome,
 - Jarcho-Levin syndrome,
 - Cerebro costal mandibular syndrome,
 - others.
- Congenital chest wall defect, posterolateral
- Acquired chest wall defect, posterolateral
 - Chest wall tumor resection
 - Traumatic flail chest
 - Surgical separation of conjoined twins

Secondary Thoracic Insufficiency due to lumbar kyphosis (non gibbus)

Contraindications

The VEPTR device should not be used under the following conditions:

- Inadequate strength of bone (ribs/spine) for attachment of the VEPTR
- Absence of proximal and distal ribs for attachment of the VEPTR
- Absent diaphragmatic function
- Inadequate soft tissue for coverage of the VEPTR
- Age beyond skeletal maturity for uses of the VEPTR
- Age below 6 months
- Known allergy to any of the device materials
- Infection at the operative site

Warnings and Precautions

Patients implanted with the VEPTR device should not be braced. The VEPTR device is designed to allow for thoracic cavity growth and the restrictive nature of a brace would not help the condition, but defeat its purpose.

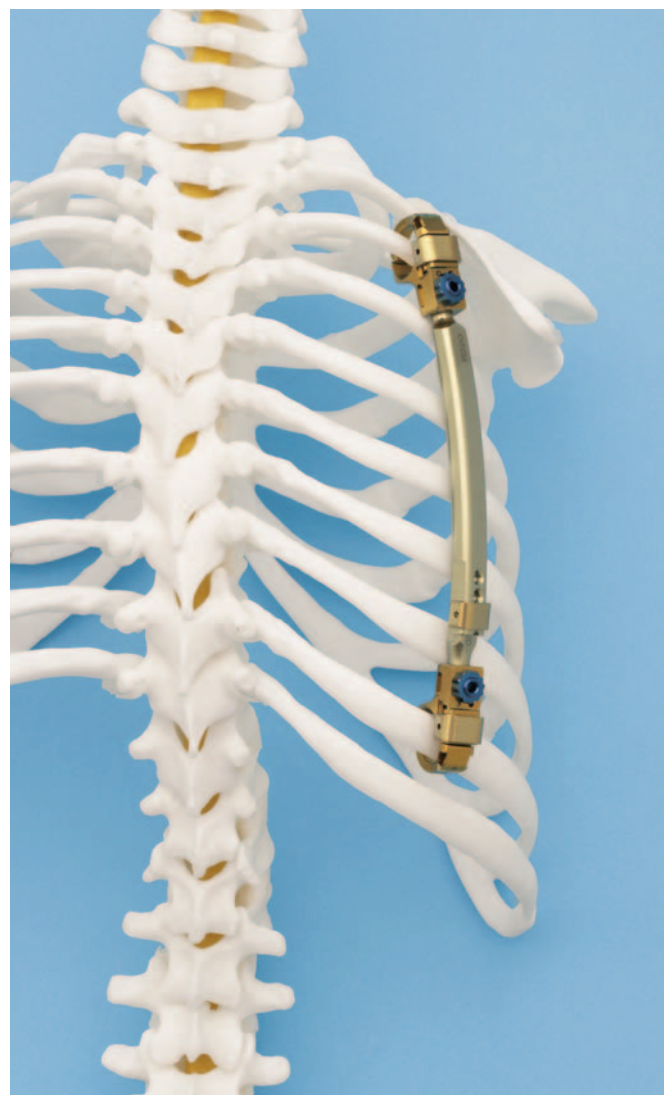
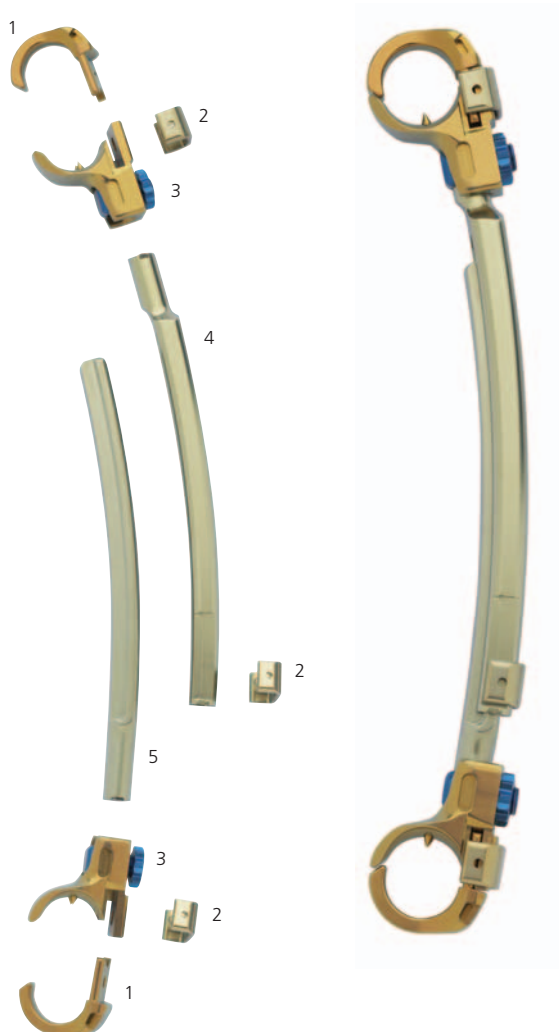
Patients may require additional wound protection to prevent inadvertent rubbing or bumping of the wound.

Patients with a diagnosis of spina bifida should have an occlusive dressing over the wound site to keep the site dry.

Construct Options

Rib-to-Rib

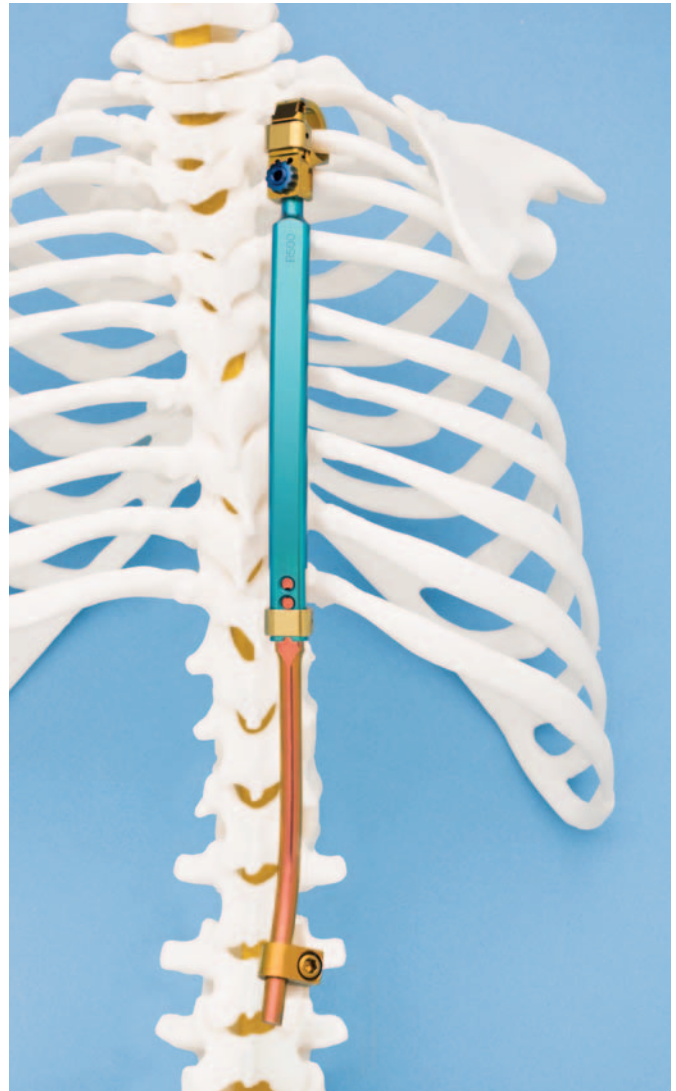
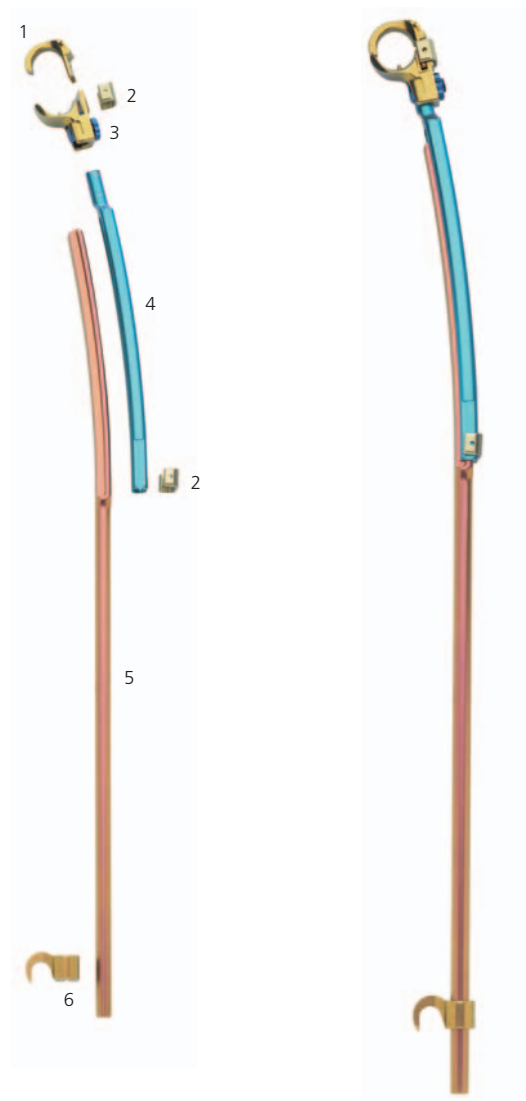
- Attaches to the superior rib and to the inferior rib
- Components available in 220 mm or 500 mm radius



- 1 Rib Hook Cap
- 2 Closure for Extension Bar
- 3 Rib Hook
- 4 Proximal Extension (220 mm Radius)
- 5 Distal Extension (220 mm Radius)

Rib-to-Lumbar Lamina

- Attaches to rib and to lumbar spine
- Components available in 220 mm or 500 mm radius



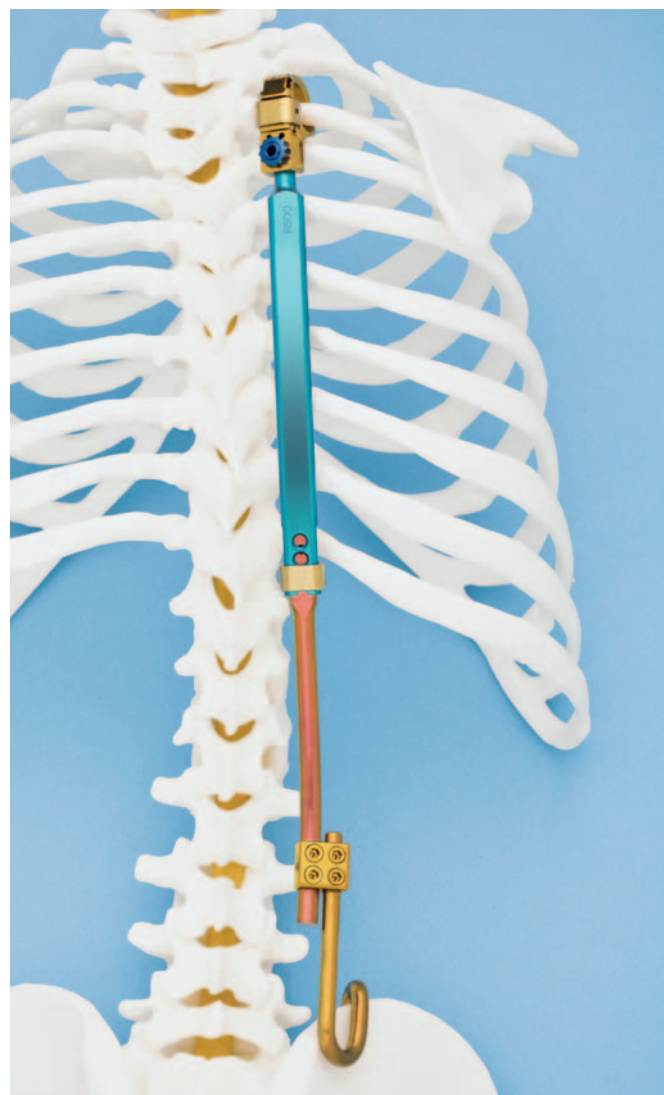
- 1 Rib Hook Cap
- 2 Closure for Extension Bar
- 3 Rib Hook
- 4 Proximal Extension (500 mm Radius)
- 5 Distal Extension (500 mm Radius)
- 6 Lamina Hook

Rib-to-Ilium

- Attaches to rib and to ilium
- Components available in 220 mm or 500 mm radius



- 1 Rib Hook Cap
- 2 Closure for Extension Bar
- 3 Rib Hook
- 4 Proximal Extension (500 mm Radius)
- 5 Distal Extension (500 mm Radius)
- 6 Parallel Connector
- 7 Ala-Hook



Primary Procedure

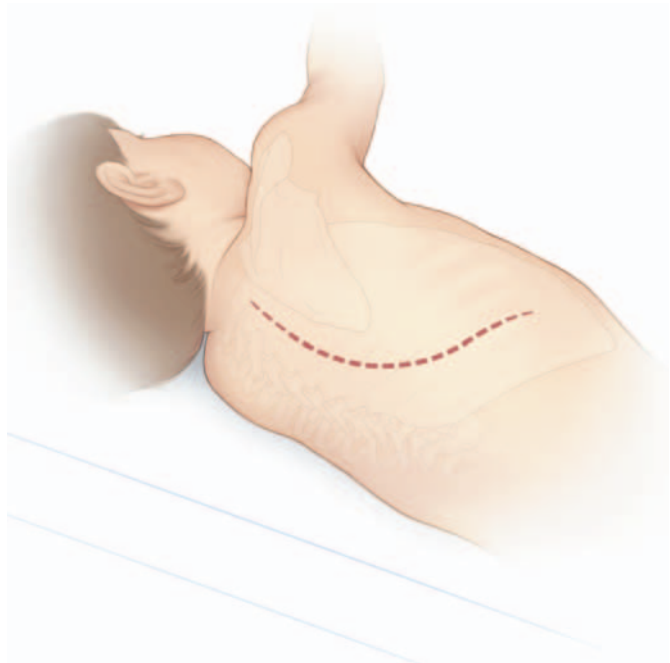
1

Patient positioning

Place the patient in a lateral decubitus position similar to that required for a standard thoracotomy.

To protect against brachial plexus injury, do not extend the shoulder more than 90°.

Note: Patient positioning and superior exposure remain the same, regardless of the construct being implanted.

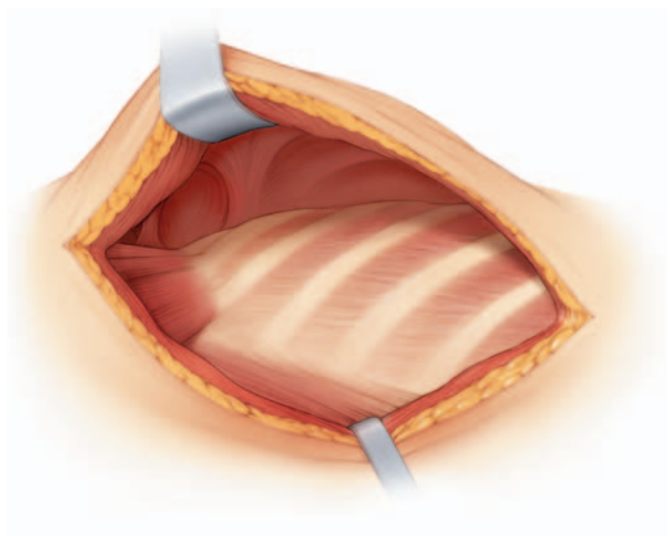


2

Perform superior exposure

Make a J-shaped thoracotomy incision without disrupting the periosteum overlying the ribs.

Retract the skin flaps. Continue the incision and elevate the paraspinal muscles medially only to the tips of the transverse processes. Gently elevate the scapula to expose the middle and posterior scalene muscle.



3

Insert superior implants

A. Identify superior rib

Identify the superior rib to be used as the superior point of attachment. Mark this point and confirm location using radiographic imaging.

Because of the risk of brachial plexus impingement, do not choose the first rib as the superior point of attachment.

B. Prepare rib for implants

Instruments

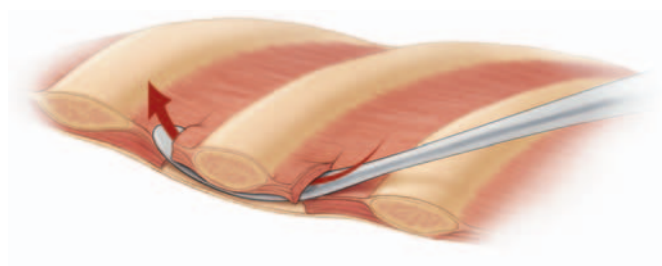
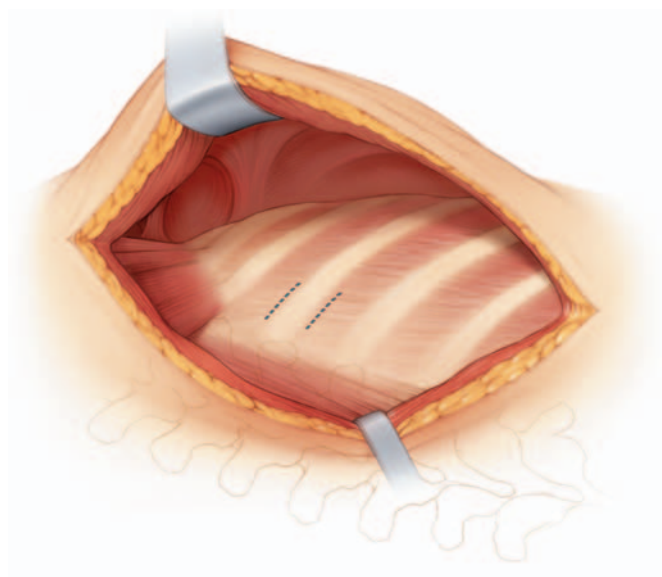
03.641.001	Trial Rib Hook, small
03.641.012	Trial Rib Hook
U44-48320	Periosteal Elevator, curved, 20 cm

Make a 1 cm incision into the intercostal muscles above and below the rib where the cranial rib support will attach. Insert a periosteal elevator to carefully elevate the periosteum adjacent to the lung. Take care to preserve the soft tissue surrounding the rib to protect rib vascularity and the neurovascular bundle.

Use the trial rib hook to prepare the rib for the rib hook and rib hook cap.

For a smaller patient where the small rib hook may be used, use the small trial rib hook to prepare the rib.

Note: The trial rib hook and small trial rib hook may also be used to determine the appropriate rib hook size.



C. Select proper rib hook size

Select the appropriate rib hook size after using the trial rib hook.



Standard



Small



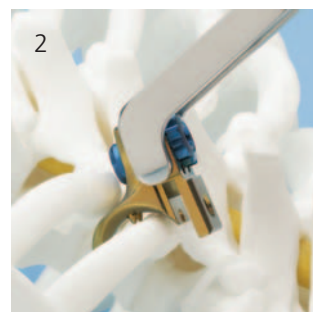
D. Seat the rib hook

Instrument

03.641.005	Rib Hook Holder
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Using the rib hook holder (1), seat the underside of the rib hook into the space between the periosteum and the rib (2). Rotate it into the correct position (3). For the medial construct, seat as medial as possible to the transverse process.

Tip: For ease of grasping the rib hook with the rib hook holder, seat one tip of the rib hook holder first rather than simultaneously.



E. Select proper rib hook cap size

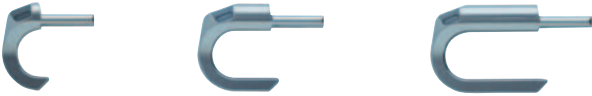
Based on the patient’s anatomy, select the appropriate rib hook cap (standard, extended, or extra long). The larger sizes can be used to encircle large areas of ribs, or multiple ribs.

Note: If using the small rib hook, it is necessary to use one of the small rib hook caps (light blue).

Standard



Small



F. Insert rib hook cap

Instrument

03.641.006	Holding Forceps for Rib Hook Cap
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Using the holding forceps (1), insert the rib hook cap into the intercostal space superior to the rib (2). Rotate the rib hook cap distally to mate with the rib support. The rib hook and the rib hook cap should now be aligned (3).

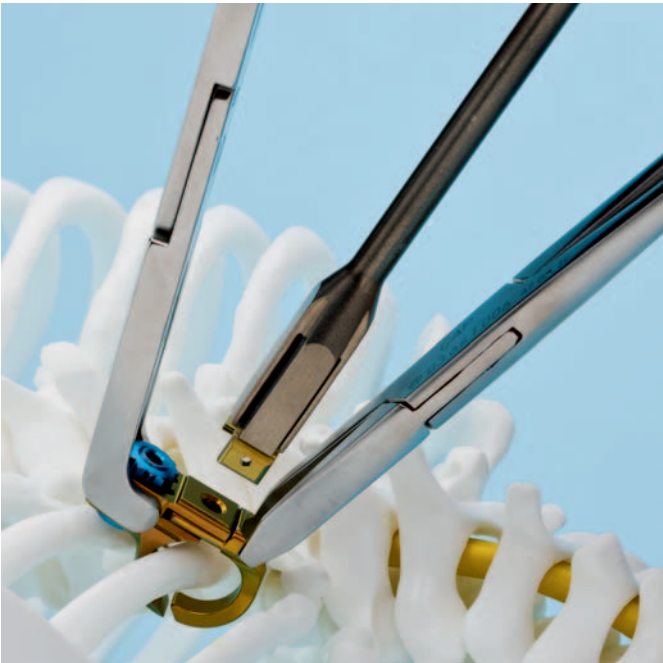


G. Insert closure for extension bar

Instruments

03.641.009	Lock Impactor with Offset
388.474	Lock Crimper, for VEPTR

Load a closure for extension bar into the lock impactor. To lock the rib hook/rib hook cap assembly, align the holes of the rib hook and rib hook cap and insert the distraction lock. Firmly tap the impactor with a hammer to seat the lock. The lock crimper should always be used to ensure the lock is fully seated.

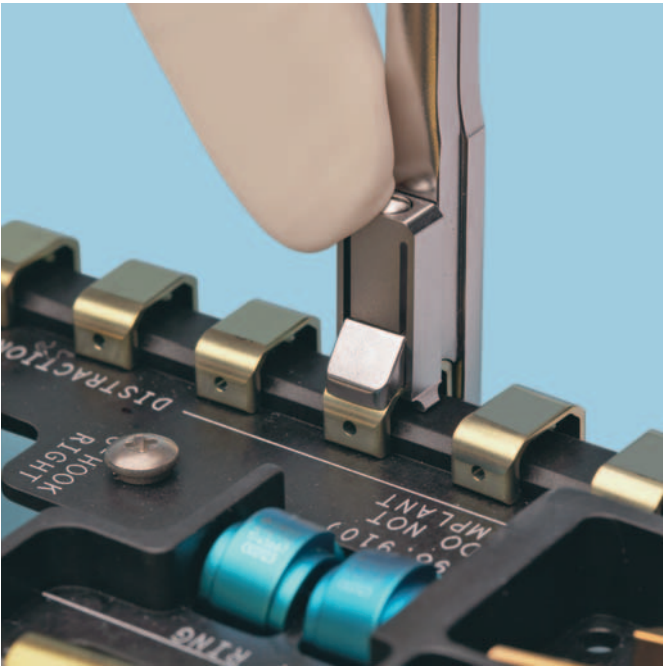


Alternative instrument

03.641.010	SureLock
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Alternatively, the SureLock can be used to place the lock and ensure it is fully seated.

Tip: To facilitate loading a closure for extension bar onto the SureLock, press the SureLock onto the closure while it remains in the graphic case. Pushing on the top of the SureLock tip will facilitate grasping the closure.



Note in case of fused ribs and scoliosis: After superior and inferior points of attachment have been chosen, perform an opening wedge thoracostomy through the fused ribs at the apex of the thoracic deformity from the tip of the transverse process to the costochondral junction. Cut a transverse osteotomy from the transverse process to the sternum, in line of the normal rib. Separate the fusion mass into multiple longitudinal sections of the approximate width of normal ribs in the patient. Ensure the continuity between the anterior and posterior attachments of the newly separated ribs.

4

Distract chest wall (if necessary)

Instruments

388.486	Foot for Rib Distractor, for No. U22-64010
U22-64010	Retractor, cervical, longitudinal
399.130	Bone Spreader, speed lock

Assemble the two feet for rib distractor to the longitudinal retractor. Distract the ribs using the rib retractor assembly as needed. A bone spreader may also be used to gently distract the chest wall at the site of the opening wedge thoracostomy.

Additional resection of medial fused ribs may be required if distraction is difficult. Only resect visible bone adjacent to the spine. Be aware of anomalous segmental arteries due to abnormal anatomy.



5

Select length of proximal extension

A. Measure expandable portion

Instrument

388.880	Trial Rod Ø 6.0 mm, length 400 mm
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Depending on the patients anatomy/pathology choose either the extension with radius 220 mm (more curved) or with radius 550 mm (less curved).

Measure the distance for the expandable portion of the construct to determine the appropriate proximal extension size.

Note: Measure the distance over the spread thorax, from the cranial rib and either to the thoraco-lumbar junction (rib-to-spine/ilium) or the chosen caudal rib (rib-to-rib).

The measurement in centimeters will correspond to the correct proximal extension size. For example, if the distance is determined to be 7 cm, use a proximal extension marked with a 7. Implant sizes are identified from 3–15 in 1 cm increments for the 500 mm radius implants, and from 3–13 in 1 cm increments for the 220 mm radius implants.



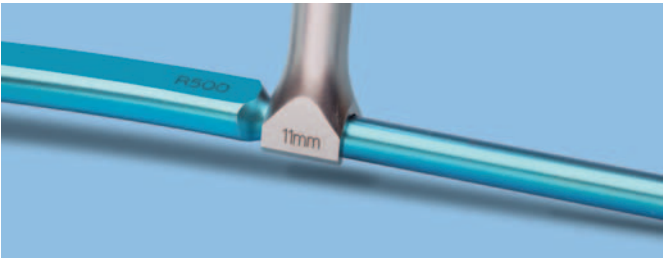
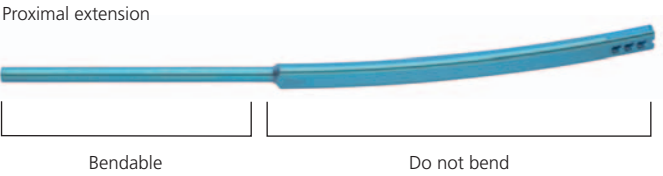
B. Cut and contour proximal extension, if necessary

Instruments	
03.641.014	Extension Measuring Device
03.620.020	Rod Bender

Excess rod on the extension needs to be cut before implantation. As a minimum 11 mm of straight rod must remain on the proximal extension to allow the rod to fully seat within the rib hook. The extension measuring device can be placed on the proximal extension to ensure enough rod is left on the extension to fully seat in the rib hook. Any remaining rod can be cut and/or contoured to match patient anatomy.

Optional instruments	
03.622.061	Bending Iron for Rods Ø 6.0 mm, left, for Coronal Plane
03.622.062	Bending Iron for Rods Ø 6.0 mm, right, for Coronal Plane
388.910	Bending Iron, left
388.920	Bending Iron, right

Using the rod bender, contour only the rod portion of the proximal extension. As an alternative, the bending irons can be used to contour the rod. The rod portion of the extension can be cut using the handheld rod cutter.



6

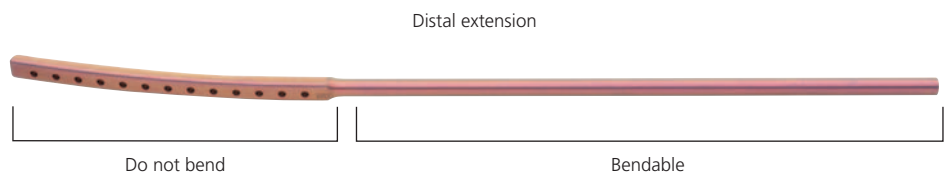
Assemble distal portion of construct

A. Select the appropriate distal extension

Distal extension sizes correspond to the proximal extension sizes. For example, if the selected proximal extension is a size 7, the correct distal extension will also be a size 7. The radius of the distal extension must match the radius of the proximal extension.

(The green proximal extension matches the pink distal extension)

(The golden proximal extension matches the golden distal extension)



B. Determine contour and cut to length, if necessary**Instruments**

03.620.020	Rod Bender
388.880	Trial Rod Ø 6.0 mm, length 400 mm

Optional instruments

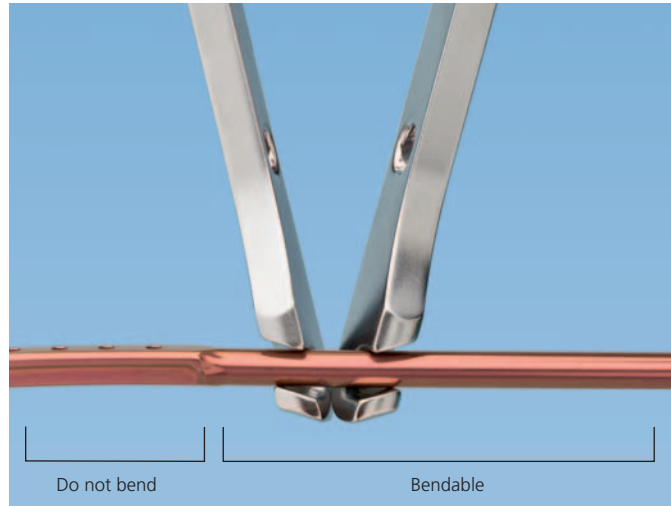
03.622.061	Coronal Rod Bender, left
03.622.062	Coronal Rod Bender, right
03.641.014	Extension Measuring Device
388.910	Bending Iron, left
388.920	Bending Iron, right

Use the trial rod to determine the contour of the rod portion of the distal extension. Do not bend the T-section of the distal extension which mates with the proximal extension.

Using the rod bender, contour only the rod portion of the distal extension. As an alternative, the bending irons and coronal rod benders can be used to contour the rod. The rod portion of the extension can be cut using the handheld rod cutter.

Note: If implanting a rib-to-rib construct, approximately 11 mm of rod must remain on the proximal and distal extensions to allow the rod to fully seat within the rib hook. The extension measuring device can be placed on the extensions to ensure enough rod is left on the extensions to fully seat in the corresponding rib hooks. Any remaining rod can be cut and/or contoured to match patient anatomy.

Tip: When using a lamina hook or ala-hook with parallel connector, an additional length of 1.5 cm should be left on the rod portion of the distal extension to allow distraction.



C. Insert closure for extension bar

Instruments

03.641.009	Lock Impactor with Offset
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388.474	Lock Crimper
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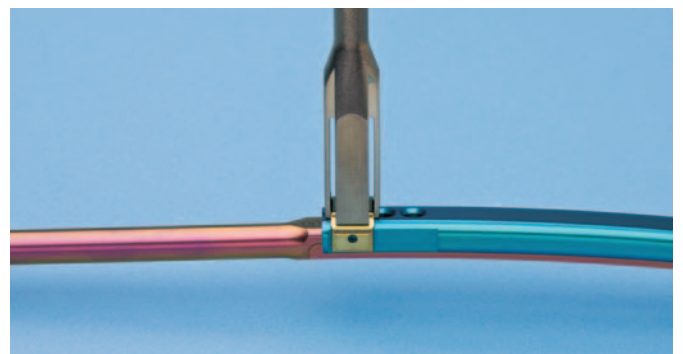
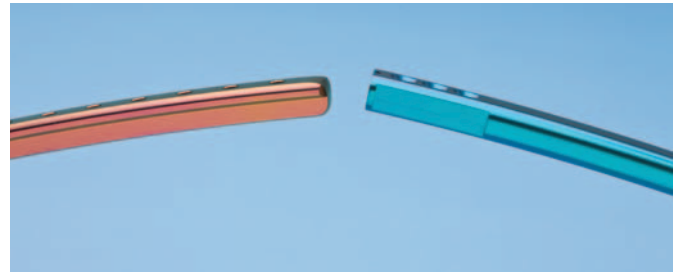
Before insertion, slide the distal extension into the proximal extension. Align the most inferior hole in the proximal extension with the most inferior hole in the distal extension. The implants should overlap completely to maximize expansion over time.

Place a closure for extension bar in this position using the offset lock impactor. Gently tap the impactor with a hammer to seat the lock. The lock crimper should always be used to ensure the lock is fully seated.

Alternative instrument

03.641.010	SureLock
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Alternatively, the SureLock can be used to place the lock and ensure it is fully seated.



D. Insert inferior implant

1. Lamina hook (for rib-to-lumbar lamina construct)

Instrument

03.641.008 Holding Forceps for Lamina Hook

Make a 4 cm, longitudinal, paraspinal skin incision on the concave side of the curve at the lumbar interspace that was selected preoperatively. Retract the paraspinal muscles laterally. Do not disturb the facet joints.

Use the lamina feeler to separate the ligamentum flavum unilaterally from the underside of the lamina to ensure good bony contact with the lamina hook and to leave the interspinous ligament intact. Resect the ligamentum flavum for the hook to pass.

Choose the appropriate lamina hook (right or left). The hook will be placed downward-facing with the setscrew most lateral.

Use the holding forceps for lamina hook to place the hook in the desired location on the lumbar vertebra. The hook can be further secured with a heavy, nonabsorbable suture around the spinous process.



2. Ala-hook or S-rod (for rib-to-iliac construct)

Instruments

03.641.013	Rod Holder
03.641.015	Screwdriver, hexagonal, small

Make a 4 cm longitudinal incision just lateral to the posterior superior iliac spine. Identify the posterior third and middle third of the iliac crest. Make a one centimeter transverse incision in the mid substance of the apophysis with equal layers of cartilage above and below the incision. Insert the periosteal elevator through the apophyseal incision to widen it into a tunnel and thread it along the medial cortical surface of the iliac crest. The tip of the periosteal elevator should be just lateral to the Sacro-iliac joint.

Choose the appropriate Ala-hook or S-rod. If using the S-rod, cut it to the appropriate length and contour as necessary.

Attach an extension connector or parallel connector to the Ala-hook or S-rod using the small hexagonal screwdriver (2).

The 5.0 mm/6.0 mm extension connector or 5.0 mm/6.0 mm parallel connector should be used with the Ala-Hooks.

The 6.0 mm/6.0 mm extension connector or 6.0 mm/6.0mm parallel connector should be used with S-rods.

Insert the Ala-hook or S-rod, using the rod holder, over the top of the iliac crest and medial to the inner table of the iliac wing.



3. Rib hook (for rib-to-rib construct)

Use the same procedure and instrumentation as described earlier for placement of the rib hook and rib hook cap.

E. Align the distal extension to the inferior implant

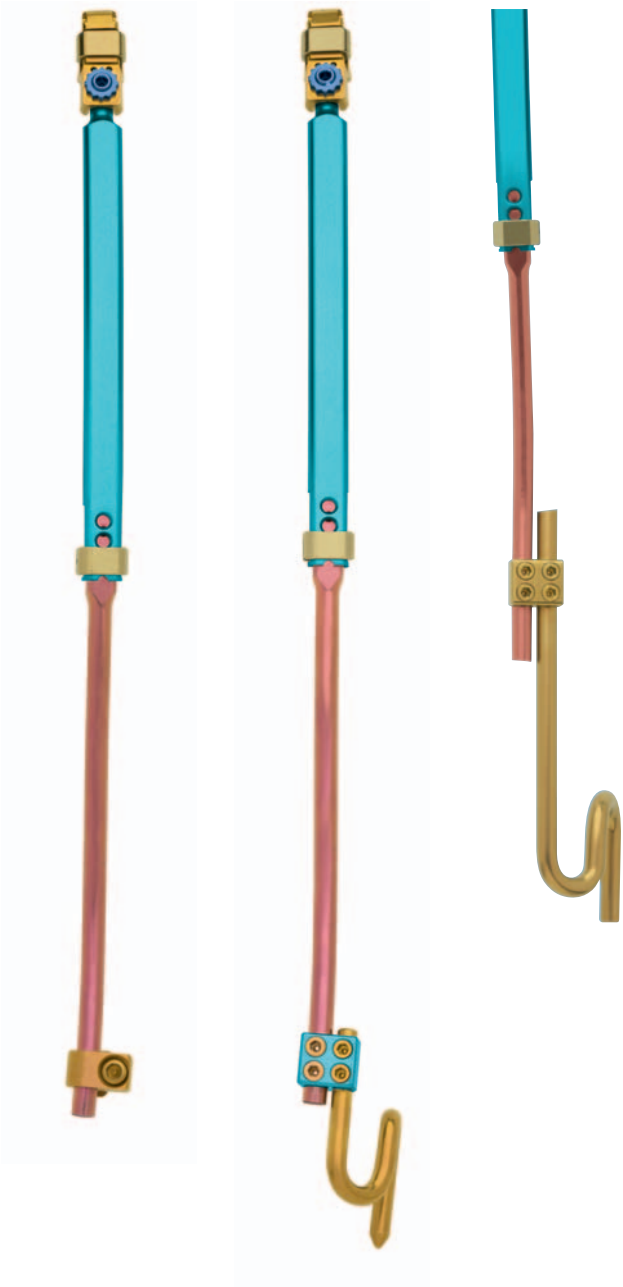
1. Placement using the lamina hook (for rib-to-spine) or Ala-hook or S-rod (for rib-to-ilium)

Instruments	
03.641.013	Rod Holder
03.641.015	Screwdriver, hexagonal, small

Create a tunnel through the paraspinal muscles from the proximal incision to just above the inferior attachment point. Place the distal extension into the tip of a no. 20 chest tube and thread safely proximal-to-distal, to the inferior attachment point.

If attaching to a lamina hook (for rib-to-spine construct), guide the distal extension into the lamina hook.

If using an Ala-hook or S-rod (for rib-to-ilium construct), guide the distal extension into the opposing side of the extension or parallel connector. Tighten the setscrews in the connector using the small hexagonal screwdriver.

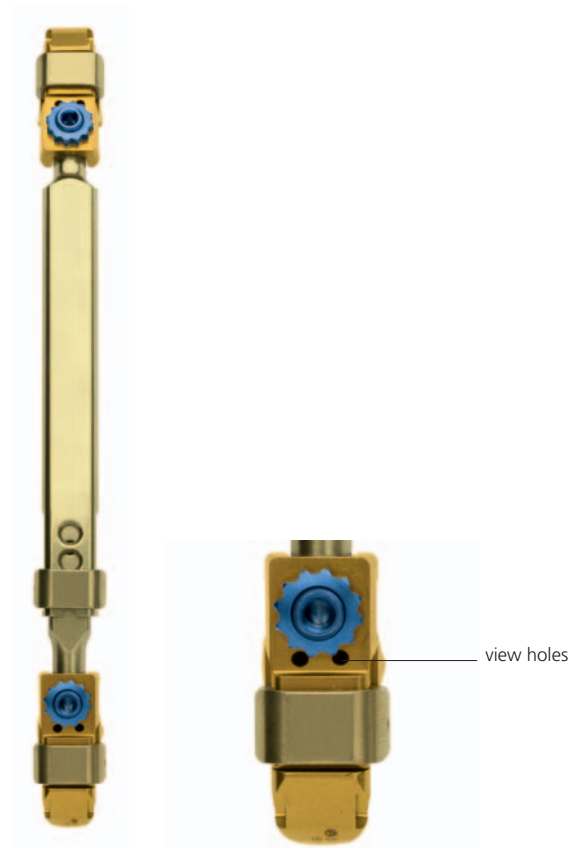


2. Placement using the rib hook (for rib-to-rib construct)

Instruments

03.641.002	Handle with Torque Limiter, 5 Nm
03.641.003	VEPTR Nut Driver Shaft
03.641.007	Sleeve Holder

Guide the distal extension into the rib hook using the sleeve holder. Ensure that the rod portion of the distal extension is visible through the view holes. Insert the nut driver shaft into the torque limiting handle. Use the torque limiting handle and shaft to tighten the nut onto the rib hook, connecting the distal extension.

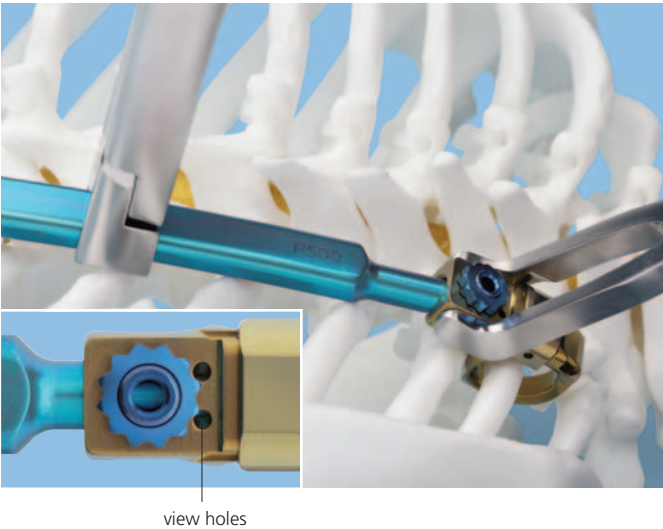


7
Final assembly

A. Assemble the proximal extension to the rib hook

Instruments	
03.641.005	Rib Hook Holder
03.641.007	Sleeve Holder

Use the sleeve holder and the rib hook holder to slide the rod end of the proximal extension into the rib hook. Ensure that the rod portion of the proximal extension is visible through the view holes.



B. Tighten the nut on the rib hook

Instruments	
03.641.002	Handle with Torque Limiter, 5 Nm
03.641.003	VEPTR Nut Driver Shaft
03.641.005	Rib Hook Holder

Insert the nut driver shaft into the torque limiting handle. Use the torque limiting handle and shaft to tighten the nut onto the rib hook, connecting the proximal extension.



Optional instrument	
03.641.004	Socket Wrench for VEPTR Nut

The socket wrench for VEPTR nut can be used when there is limited access to the rib hook nut. For example, in a rib-to-rib construct for placement of the rib hook under the scapula.



C. If using a lamina hook, distract if necessary and tighten

Instruments

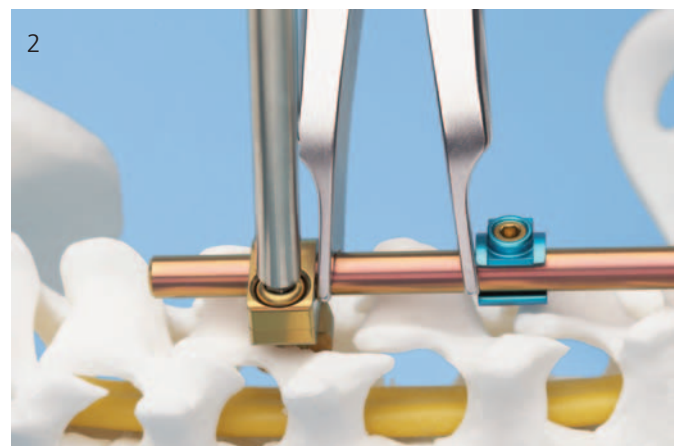
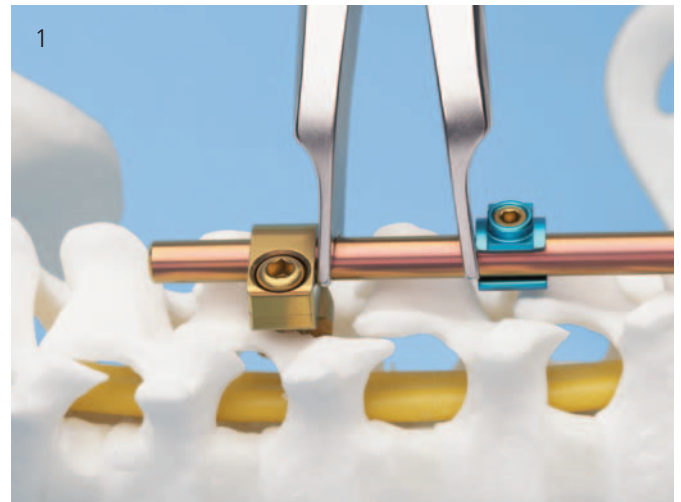
03.641.015	Screwdriver, hexagonal, small
03.641.016	Screwdriver, hexagonal, large
388.472	Distractor, curved, for Extension Bar
498.910	Fixation Ring for Rods Ø 6.0 mm, Titanium Alloy (TAN)

Using the small hexagonal screwdriver, place a fixation ring superior to the lamina hook onto the rod portion of the distal extension.

Using the distractor against the fixation ring, gently distract to further seat the hook (1). Use the large hexagonal screwdriver to tighten the setscrew in the hook (2).

Remove the fixation ring following distraction, using the small hexagonal screwdriver.

Note: If the patient is older than 6 months and of adequate body size, a second device (rib-to-rib construct) may be added posterolaterally in the midaxillary line to further expand the constricted hemithorax.



8

Alternative implant usage

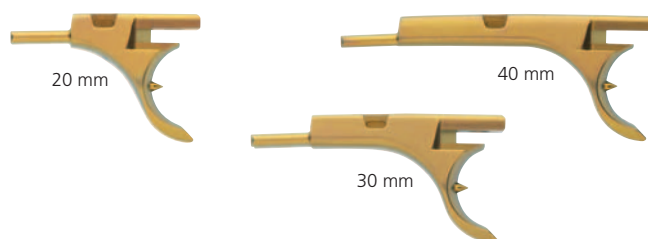
A. Using the rib hook extensions (series attachment)

Instrument

03.641.006 Holding Forceps for Rib Hook Cap

The rib hook extensions can be used when multiple rib attachment is desired. Based on the patient's anatomy, select the appropriate length rib hook extension (20 mm, 30 mm, or 40 mm). Rib hook extensions are connected to a rib hook cap (proximally) and a rib hook (distally) with a closure for extension bar (497.125).

Tip: If using the rib hook extensions, the most inferiorly placed rib hook should be the long rib hook (red).



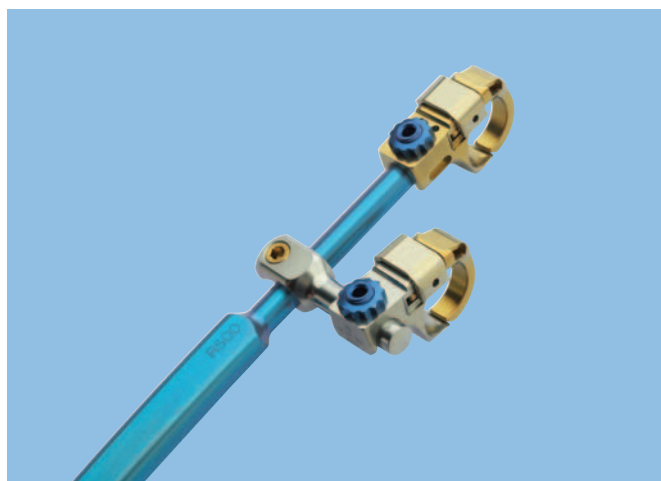
B. Using the transverse rib hooks and rod connectors (parallel attachment)

Instrument

03.641.015 Screwdriver, hexagonal, small

The transverse rib hooks and the rod connectors can be used when multiple rib attachment is desired. Insert the transverse rib hook and appropriately sized rib hook cap onto the selected rib. Based on the patient's anatomy, select the appropriate length rod connector (15 mm, 20 mm, 25 mm, or 30 mm) to connect the transverse rib hook to the rod portion of the proximal extension on the medial construct. Guide the rod of the rod connector into the transverse rib hook. Attach the rod connector to the rod portion of the proximal extension using the small hexagonal screwdriver.

Refer to detailed instructions within this technique guide to install specific components.



Expansion Procedure

1

Patient positioning

Place the patient in a lateral decubitus or prone position.

2

Exposure

Identify the approximate location of the closure for extension bar, locating the proximal and distal extension through palpation and/or radiographic marker. Make a transverse or longitudinal incision over the closure for extension bar.

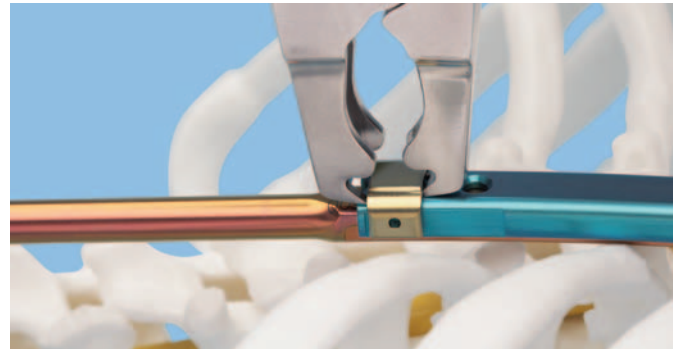
3

Remove the closure for extension bar

Instruments

388.452	Lock Removal Pliers
388.462	Lock Removal Device

Remove the closure for extension bar using the lock removal pliers or the lock removal device.



4

Distraction

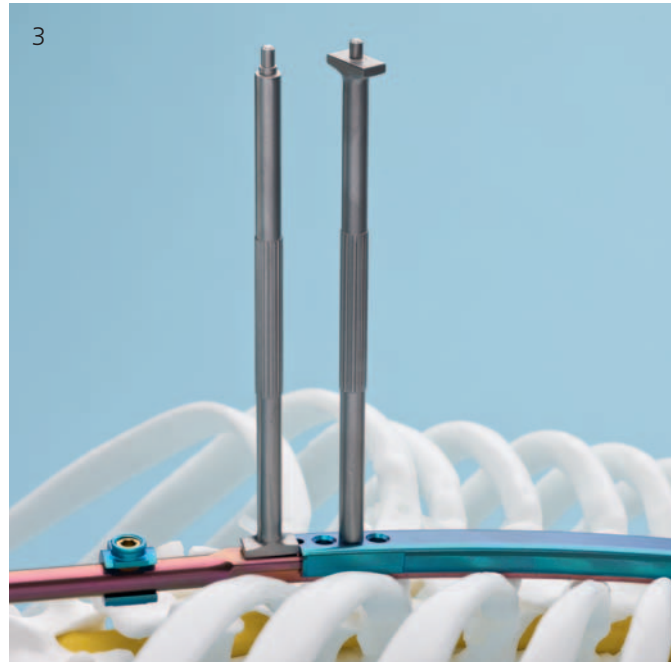
Instruments

03.641.011	Temporary Distraction Pin
388.471	Rib Distraction Pliers
388.472	Distractor, curved, for Extension Bar
498.910	Fixation Ring for Rods Ø 6.0 mm

Use the rib distraction pliers (1), or the distractor in conjunction with a fixation ring, to gently distract the implanted device until the device is adequately lengthened. Use the temporary distraction pins as placeholders to assist distraction (2).

Tip: For the initial expansion (when the rib distraction pliers cannot be used), the temporary distraction pins can be used to assist distraction (3). Use the distractor with the fixation ring to distract the proximal extension. When the desired hole location is reached, place the round tip of the first temporary distraction pin in the desired hole of the proximal extension. Remove the distractor and place the rectangular end of the second temporary distraction pin in the distal extension to prevent the proximal extension from slipping (the “foot” on the pin may need to be rotated 90° depending on the desired hole location). Remove the first temporary distraction pin to allow final locking.

Note: The hole spacing in the VEPTR II device will allow for incremental lengthening of 2.5 mm (minimum).



5

Final locking

Instruments

03.641.009	Lock Impactor with Offset
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388.474	Lock Crimper
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Insert a new closure for extension bar using the offset lock impactor to fix the proximal extension in its distracted position. Using a hammer, firmly tap the impactor to seat the closure.

Check to ensure the closure is fully seated using the lock crimper.

Alternative instrument

03.641.010	SureLock
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Alternatively, the SureLock can be used to both place the lock and ensure it is fully seated.

Replacement of Components

A. VEPTR II component replacement

For replacement of proximal extension and distal extension, make three transverse incisions, one at the midportion of the implanted construct and others along the distal and proximal portions. A portion of the previous thoracotomy incision may be used.

To disconnect the proximal extension, unlock the device by loosening the nut on the rib hook using the torque limiting handle and nut driver shaft. To disconnect the distal extension, loosen the nut on the rib hook (for rib-to-rib construct), loosen the setscrew on the lamina hook (for rib-to-spine construct) or loosen the setscrews on the extension or parallel connector (for rib-to-iliac construct).

Remove the proximal and distal extension and insert the new components through the fibrous canal surrounding the old devices. Make sure to lock the extensions before insertion.

B. VEPTR component replacement (conversion of existing VEPTR to VEPTR II)

For replacement of an original VEPTR construct (extension bar/lumbar extension rod or extension bar/caudal rib support) without removing the implanted VEPTR cranial rib support, use the VEPTR adapter. Detach and remove the original VEPTR extension bar/lumbar extension rod or extension bar/caudal rib support from the cranial rib support(s). Attach the VEPTR adapter to the original VEPTR cranial rib support using a closure for extension bar. Now a VEPTR II proximal or distal extension can be used to replace the original VEPTR extension bar construct.

Refer to detailed instructions within this technique guide to install specific components.



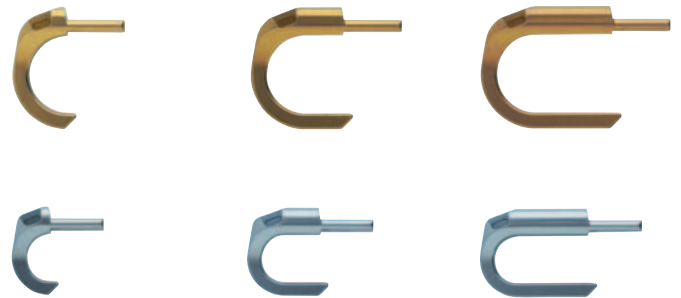
Rib Hooks

- Attach to the rib hook cap and proximal extension to support the superior rib, or the distal extension and rib hook cap to support the inferior rib
- Available in two sizes, standard and small



Rib Hook Caps

- Attach to the rib hook to encircle the superior or inferior rib(s)
- Two sizes, standard and small
- Each size is available in three lengths, standard, extended, and extra long



Closure for Extension Bar

- Connects the rib hook to the rib hook cap, rib hook to proximal or distal extension, and proximal extension to distal extension



Proximal Extension

- Attaches the superior attachment point (rib hook) to the distal extension
- 220 mm radius in eleven lengths, sizes 3–13
- 500 mm radius in thirteen lengths, sizes 3–15



Distal Extension

- Attaches the proximal extension to the inferior attachment point (rib hook, lamina hook, or connector)
- 220 mm radius in eleven lengths, sizes 3–13
- 500 mm radius in thirteen lengths, sizes 3–15



Lamina Hooks

- Right or left offset
- Low profile minimizes soft tissue interference
- Opening captures 6.0 mm rod and permits longitudinal adjustments along the rod before tightening
- 3.5 mm setscrew secures the placement



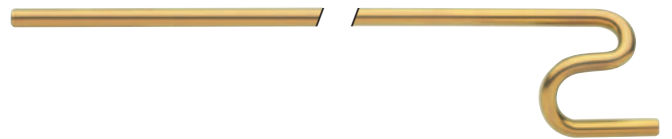
Ala-Hooks

- Used with the distal extension and connector to attach to the ilium
- Left or right contours
- Available in 90° angulation



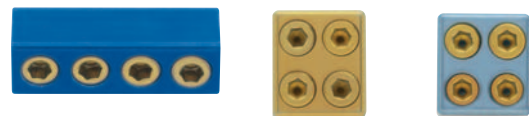
S-Rods

- Used with the distal extension and connector to attach to the ilium
- Left or right contours
- Available in 45° angulation
- 400 mm rod allows cutting to appropriate length



Extension and Parallel Connectors

- Connect the ala-hook or S-rod to the distal extension
- Available as 5.0 mm/6.0 mm for attachment to Ala-hook and 6.0 mm/6.0 mm for attachment to S-rod



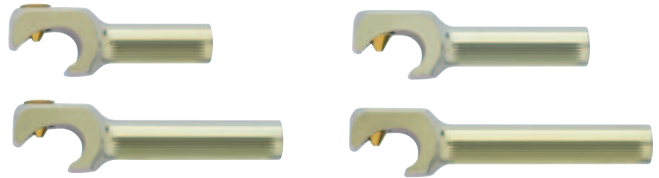
Rib Hook Extensions

- Connect to rib hook by closure for extension bar to allow for attachment to multiple ribs in a linear fashion
- Available in three sizes: 20 mm, 30 mm, 40 mm



Rod Connectors

- Connect to rod portion of distal or proximal extension and transverse rib hook to allow attachment to multiple ribs, or the same rib in multiple locations in an offset fashion
- Available in four lengths: 15 mm, 20 mm, 25 mm, 30 mm



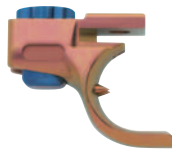
Transverse Rib Hook

- Connects with rod connector to allow attachment to multiple ribs, or the same rib in multiple locations in an offset fashion
- Attaches to standard sizes of rib hook caps with a closure for extension bar to encircle the rib



Long Rib Hook

- Attaches to the rib hook cap for long rib hook and proximal extension to support the superior rib or the distal extension and rib hook cap for long rib hook to support the inferior rib
- Longer shovel than standard rib hook allows better fit to patient anatomy



Rib Hook Cap for Long Rib Hook

- Attaches to long rib hook with a closure for extension bar to encircle the rib



VEPTR Adapter (for conversion of VEPTR to VEPTR II)

- Attaches to cranial rib support from VEPTR system and proximal or distal extension of VEPTR II system
- Attaches with closure for extension bar and nut



Instruments

03.620.020 Rod Bender for Rods Ø 6.0 mm,
with Radius Adjustment



03.622.061 Bending Iron for Rods Ø 6.0 mm, left,
for Coronal Plane



03.622.062 Bending Iron for Rods Ø 6.0 mm, right,
for Coronal Plane



03.641.001 Trial Rib Hook, small



03.641.002 Handle with Torque Limiter, 5 Nm,
for Hexagonal Coupling, 6 mm



03.641.003 VEPTR Nut Driver Shaft, for Hexagonal Coupling, 6 mm



03.641.004 Socket Wrench for VEPTR Nut



03.641.005 Rib Hook Holder



03.641.006 Holding Forceps for Rib Hook Cap



03.641.007 Sleeve Holder



03.641.008 Holding Forceps for Lamina Hook



03.641.009 Lock Impactor with Offset



03.641.010 SureLock



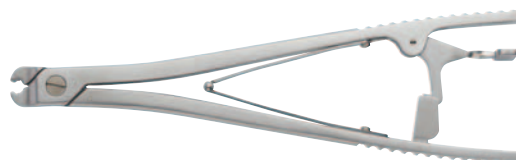
03.641.011 Temporary Distraction Pin








03.641.012 Trial Rib Hook



03.641.013 Rod Holder



03.641.014	Extension Measuring Device	
03.641.015	Screwdriver, hexagonal, small	
03.641.016	Screwdriver, hexagonal, large	
388.910	Bending Iron, left	
388.920	Bending Iron, right	
388.422	Compression Forceps, length 335 mm, for Pedicle Screws	
388.452	Lock Removal Pliers, for VEPTR	

388.462 Lock Removal Device, for VEPTR



388.464 Spreader for Rib Support



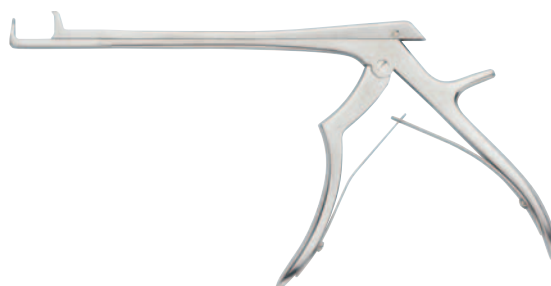
388.471 Rib Distraction Pliers



388.472 Distractor, curved, for Extension Bar



388.474 Lock Crimper, for VEPTR



388.486 Foot for Rib Distractor, for No. U22-64010



388.880 Trial Rod Ø 6.0 mm, length 400 mm



398.408 Periosteal Elevator, slightly curved blade, round tip, width 5 mm



399.130 Bone Spreader, speed lock, width 12 mm, length 270 mm



498.910 Fixation Ring for Rods Ø 6.0 mm, Titanium Alloy (TAN)



U22-64010 Retractor, cervical, longitudinal



U44-48320 Periosteal Elevator, curved, 20 cm



01.641.001 VEPTR II Implant and Instrument Set

Graphic Cases

60.641.001	Graphic Case, for VEPTR II Basic Implants
60.641.003	Graphic Case, for VEPTR II Basic Instruments
60.641.004	Graphic Case, for VEPTR II Additional Instruments



Instruments

03.620.020	Rod Bender for Rods Ø 6.0 mm, with Radius Adjustment
03.622.061	Bending Iron for Rods Ø 6.0 mm, left, for Coronal Plane
03.622.062	Bending Iron for Rods Ø 6.0 mm, right, for Coronal Plane
03.641.001	Trial Rib Hook, small
03.641.002	Handle with Torque Limiter, 5 Nm, for Hexagonal Coupling, 6 mm
03.641.003	VEPTR Nut Driver Shaft, for Hexagonal Coupling, 6 mm
03.641.004	Socket Wrench for VEPTR Nut
03.641.005	Rib Hook Holder
03.641.006	Holding Forceps for Rib Hook Cap
03.641.007	Sleeve Holder
03.641.008	Holding Forceps for Lamina Hook
03.641.009	Lock Impactor with Offset
03.641.010	SureLock
03.641.011	Temporary Distraction Pin
03.641.012	Trial Rib Hook
03.641.013	Rod Holder
03.641.014	Extension Measuring Device
03.641.015	Screwdriver, hexagonal, small
03.641.016	Screwdriver, hexagonal, large
388.910	Bending Iron, left
388.920	Bending Iron, right
388.422	Compression Forceps, length 335 mm, for Pedicle Screws

388.452	Lock Removal Pliers, for VEPTR
388.462	Lock Removal Device, for VEPTR
388.464	Spreader for Rib Support
388.471	Rib Distraction Pliers
388.472	Distractor, curved, for Extension Bar
388.474	Lock Crimper, for VEPTR
388.486	Foot for Rib Distractor, for No. U22-64010
388.880	Trial Rod Ø 6.0 mm, length 400 mm
398.408	Periosteal Elevator, slightly curved blade, round tip, width 5 mm
399.130	Bone Spreader, speed lock, width 12 mm, length 270 mm
498.910	Fixation Ring for Rods Ø 6.0 mm, Titanium Alloy (TAN)
U22-64010	Longitudinal Retractor
U44-48320	Double-Ended Elevator, 20 cm

Implants

04.601.000	Ala Hook 90°, right, Pure Titanium
04.601.001	Ala Hook 90°, left, Pure Titanium
04.641.001	Rib Hook
04.641.002	Rib Hook, small
04.641.003	Rib Hook, transverse
04.641.004	Rib Hook Cap, standard
04.641.005	Rib Hook Cap, extended
04.641.006	Rib Hook Cap, extra-long
04.641.007	Small Rib Hook Cap, standard
04.641.008	Small Rib Hook Cap, extended
04.641.009	Small Rib Hook Cap, extra-long
04.641.010	Rib Hook, long

Implants

04.641.011	Rib Hook Cap, long
04.641.017	S-Rod Ø 6.0 mm, left
04.641.018	S-Rod Ø 6.0 mm, right
04.641.019	VEPTR Adapter
497.125	Closure for Extension Bar, Titanium Alloy (TAN), gold
498.160*	Parallel Connector Ø 6.0/6.0
498.162*	Parallel Connector Ø 5.0/6.0
498.165*	Extension Connector Ø 6.0/6.0
498.167*	Extension Connector Ø 5.0/6.0
497.261	Lamina Hook with low profile, left, Titanium Alloy (TAN)
497.262	Lamina Hook with low profile, right, Titanium Alloy (TAN)

Rib Hook Extension

04.641.021	20 mm
04.641.022	30 mm
04.641.023	40 mm

Rod Connector

04.641.025	15 mm
04.641.030	20 mm
04.641.035	25 mm
04.641.040	30 mm

*All implants are also available sterile packed. Add suffix "S" to article number.

Proximal Extension, radius 500 mm

04.641.053	Size 3
04.641.054	Size 4
04.641.055	Size 5
04.641.056	Size 6
04.641.057	Size 7
04.641.058	Size 8
04.641.059	Size 9
04.641.060	Size 10
04.641.061	Size 11
04.641.062	Size 12
04.641.063	Size 13
04.641.064	Size 14
04.641.065	Size 15

Distal Extension, radius 500 mm

04.641.073	Size 3
04.641.074	Size 4
04.641.075	Size 5
04.641.076	Size 6
04.641.077	Size 7
04.641.078	Size 8
04.641.079	Size 9
04.641.080	Size 10
04.641.081	Size 11
04.641.082	Size 12
04.641.083	Size 13
04.641.084	Size 14
04.641.085	Size 15

Implants

Proximal Extension, radius 220 mm

04.641.093	Size 3
04.641.094	Size 4
04.641.095	Size 5
04.641.096	Size 6
04.641.097	Size 7
04.641.098	Size 8
04.641.099	Size 9
04.641.100	Size 10
04.641.101	Size 11
04.641.102	Size 12
04.641.103	Size 13

Distal Extension, radius 220 mm

04.641.113	Size 3
04.641.114	Size 4
04.641.115	Size 5
04.641.116	Size 6
04.641.117	Size 7
04.641.118	Size 8
04.641.119	Size 9
04.641.120	Size 10
04.641.121	Size 11
04.641.122	Size 12
04.641.123	Size 13

For additional information, please refer to the package insert.

