

L1[®] Rib

The smart, simple, secure solution
featuring CB3 technology



The L1® Rib system featuring CB3 technology showcases our passion for surgical innovation in the treatment of rib fractures. This unique system was designed with careful consideration to expert feedback while incorporating innovative ideas and engineering.

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L1® Rib: the smart, simple, secure solution



L1® Rib

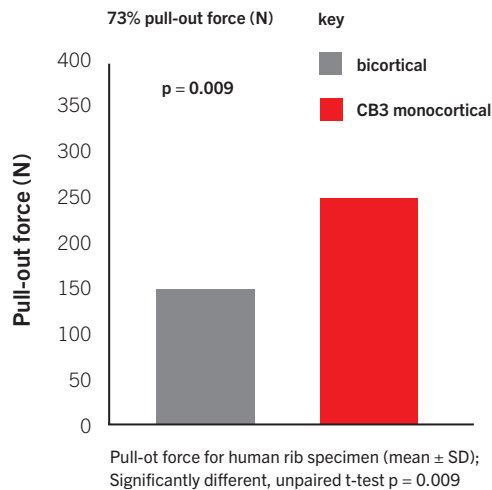
The smart, simple, secure solution featuring CB3 technology

Rib fractures are one of the most common injuries following blunt trauma, occurring in approximately 10% of all trauma patients. Traditional treatment of rib fractures includes supportive measures such as incentive spirometers, oxygen and ventilator support, and pain management via medications. In patients who receive non-operative care, the contribution of rib fractures to long-term pain and disability is greater than traditionally expected.

Surgical stabilization of rib fractures with titanium plates and screws assists in immobilizing the fracture, allowing for proper healing while maintaining normal respiratory function.

The L1® Rib system featuring CB3 technology has specifically been designed for the shape, size and complex geometry of fractured ribs. This design concept, combined with an optimized plate selection results in a system that helps mitigate risk, increase operative efficiency and provide excellent fixation for rib fractures.

Feature, function and benefit




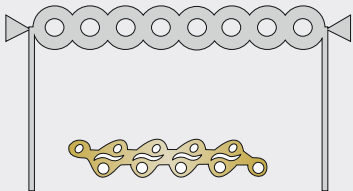
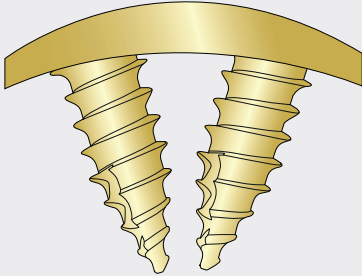
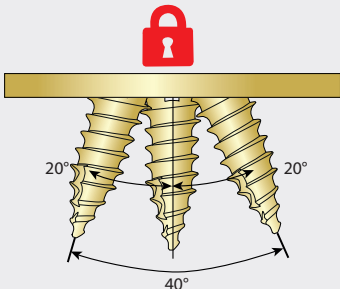
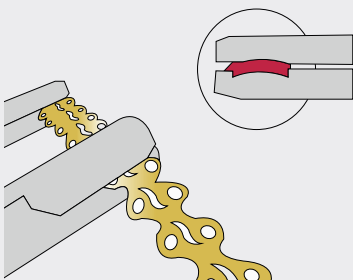
*Mechanical Comparison of Monocortical (CB3) and Bicortical Plate Fixation. Kristen L. Billiar, Ph.D. | Engineering, Worcester Polytechnic Institute.

The bones of the rib have a continuous curve in all aspects, making rib fracture titanium plate design a challenge. To overcome the 'shape' challenge, we created a smart design based on average patient curves along with an adaptive and strong geometrical plate design.

To connect the plates to the bone, the CB3 design uses a simple one length screw design delivered at convergent angles that lock into the plate. This forms a very rigid structure that is designed to avoid any penetration of the inner side of the rib.

Since the screw holes are offset, more fixation can be applied in less area.

L1[®] Rib

Feature	Benefit
	<ul style="list-style-type: none"> ■ Enable the same plates to be applied to any rib shape ■ Decreasing inventory ■ Improving overall system ease of use
	<ul style="list-style-type: none"> ■ Allows for more screws per area of rib than conventional reconstruction plates ■ Enables physical placement in a smaller segment of bone, smaller dissection or retraction area and easier precision in placement ■ Frees up the rib for natural movement
	<ul style="list-style-type: none"> ■ Secure osteosynthesis is possible using monocortical screws ■ No need for careful drilling, depth measurement and screw placement, which is required for traditional bicortical fixation ■ Helps to mitigate risk, increase operative efficiency and provide excellent fixation for rib fractures ■ Only one screw length required which simplifies the application and ease of use
	<ul style="list-style-type: none"> ■ Single pitch locking mechanism that allows for up to 20 degrees of angulation in any direction ■ No need for pre-drilling
	<ul style="list-style-type: none"> ■ Enables the surgeon to contour, secure and fix the plate in position with control and precision

Step by step to optimal treatment

Fields of use

The L1® Rib plating system is indicated for surgeries requiring osteosynthesis of the chest wall, including

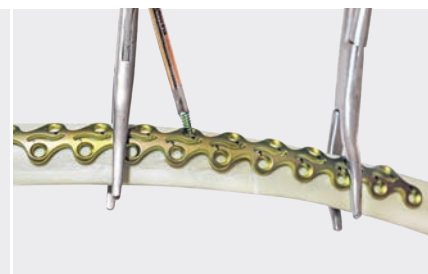
- stabilization and fixation of fractures
- osteotomies
- reconstructive procedures

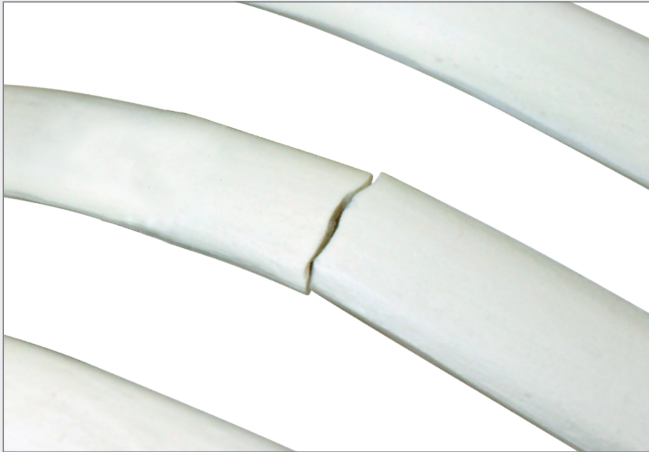


Surgical technique

**Treatment of a rib fracture
with L1® Rib plate and screws.**

Pages 10 - 17

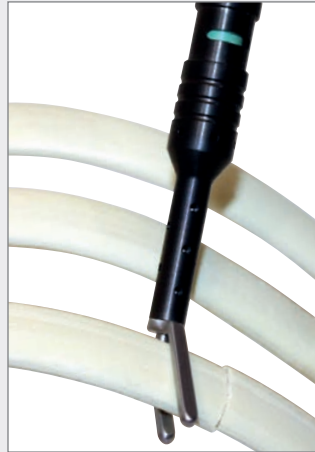




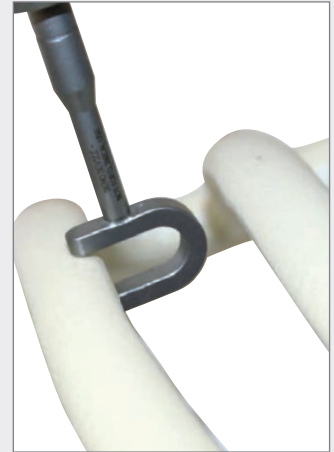
Step 1:

Expose the fractured rib

Expose to allow a minimum of three screws on each side of the fracture. Remove any nonviable bone.



Tri color depth gauge



Fixed depth gauge

Step 2:

Ensure the rib has adequate thickness

If there is no existing incision in the location where screws are desired, then make a small incision in the intercostal space at the superior border of the rib to allow insertion of a caliper. Insert the tri color depth gauge tip (2a) or fixed depth gauge tip (2b) through the incision and measure the rib thickness.

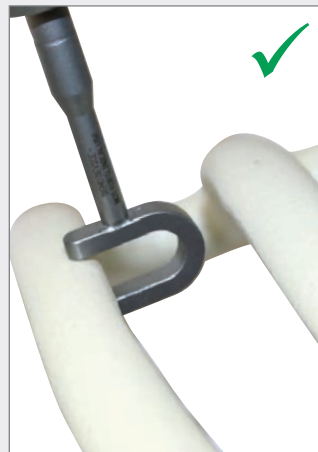


Step 2a:

Tri color depth gauge

Push the sliding button to extend the working ends around the rib. The tip is spring loaded and will close down on the rib automatically when released. After releasing the button read the display window.

- Rib has adequate thickness.
- Caution: use only with the screw guide.
- Do not use.



Step 2b:

Fixed depth gauge

The fixed depth gauge provides a simple method of measuring rib minimum thickness.

If the fixed depth gauge fits over the rib, use the adjustable Gauge to determine if screw placement is possible.

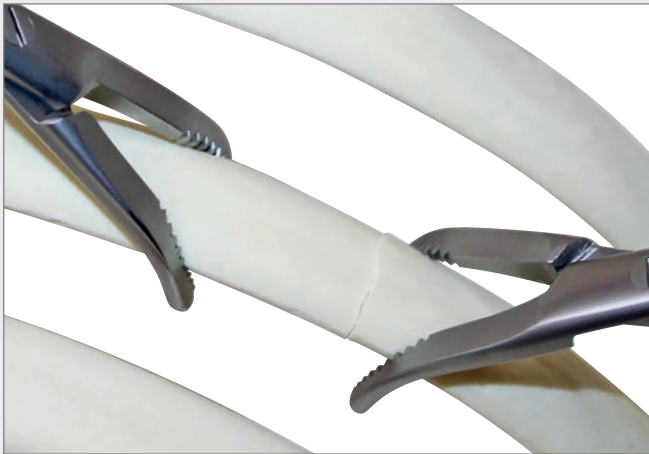
If the fixed depth gauge does not fit over the rib, then the rib thickness is greater than 7 mm. This thickness is adequate for placement of screws with or without the screw guide controlling the angle of insertion.



Tri color depth gauge



Fixed depth gauge



Step 3:

Approximate the broken rib segments with the rib bone holding forceps



Step 4:

Cut and contour the plate template (optional)

Place the template over the area where plate coverage is desired, ensuring a minimum of three screws in each segment. If desired, cut the template to the correct size.

The template may also be used to aid in contouring the plate to match the bone surface. The template is malleable and may be digitally shaped to the bone contour.



Rib bone holding forceps



Step 5:

Select and cut plate

The surgeon must select the appropriate plate for fracture fixation. If necessary, cut the plate based on your template measurements using the double action plate cutter.

A deburring attachment may be used to smooth any rough edges along the cut section.

Caution: The surgeon should ensure the fractured segment has bone to bone contact and no continuity defect. Any bridging of a continuity defect must be combined with a bone graft.



Double action plate cutter



Step 6:

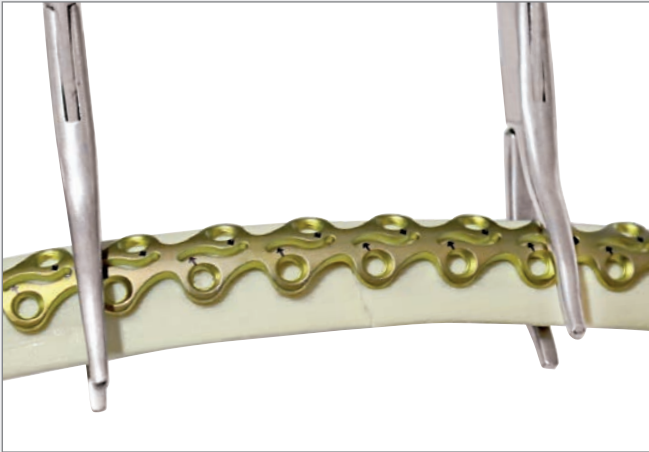
Contour the plate

Using the bending pliers with the screw hole etching facing up, contour the plate to match the template. The CB3 bending Pliers have been specially designed to retain the surface curvature and protect hole integrity while bending.

Caution: If contouring is necessary, avoid sharp bends, reverse bends, or bending the implant at a screw hole. Avoid notching or scratching the implant. These factors may produce internal stresses which may become the focal point for eventual breakage of the implant.



CB3 bending pliers



Step 7:

Position the plate

Position the plate on the rib over the fracture, allowing a minimum of three screws on each side of the fracture. Verify that the contour of the plate matches the rib. The plate on the rib.

Caution: It is recommended to insert the forceps from the superior border of the rib to avoid damaging the nerve and vessel bundle located at the inferior border of the rib.



Step 8:

Select and insert the screw

The ThreadLock TaperScrew technology in the screw and plate allows up to 20 degrees of angulation; however, ideal placement angulation can easily be done with the CB3 screw guide. It is recommended to use this option if the adjustable depth guide indicated a yellow caution thickness.

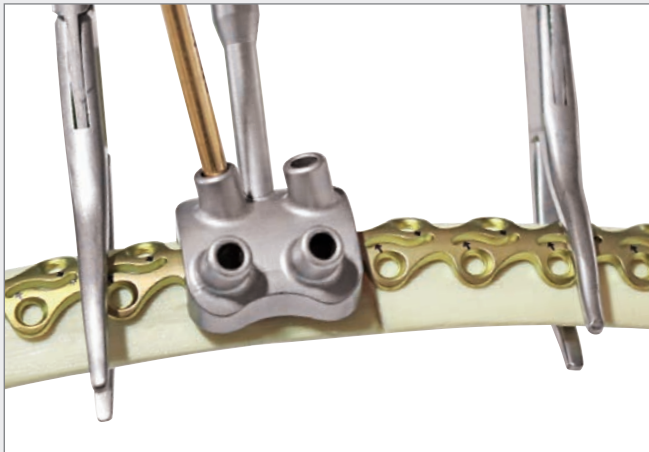
The surgeon should ensure the screws enter the plate at a correct angle if the screw guide (see step 8a) is not used. Directional markings are etched onto the plate surface to aid in correct angulation.

Alternatively the screw can be inserted with a battery-powered screwdriver (e.g. our BOS HT Driver). If a battery-powered screwdriver is used, make sure the screws are tight and further secure them with a manual screwdriver.

For placement of screws in the sub-scapular approach or in areas where a straight screwdriver may not be utilized, the Angulus 2 angled screwdriver is ideal.



Long straight plate
holding forceps

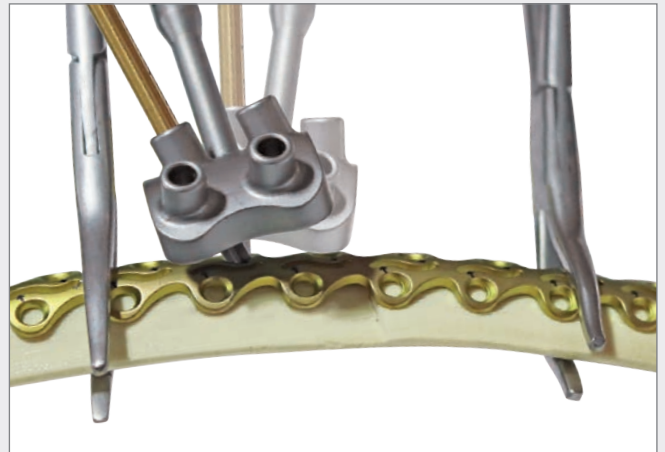


Step 8a:

Screw Insertion with thumb twist screwdriver handle and blade with CB3 Screw Guide

To load the screwdriver blade into the driver, retract the collar and fully insert the hexagonal blade. Release the collar and ensure the blade is securely seated. The collar should return to the flush position if the blade is fully inserted.

Place the Screw Guide over the plate to ensure the screws enter the plate at the correct angle and orientation. Using the Thumb Twist Screwdriver, place the 7 mm screws (with minimum rib thickness determined in Step 2) through CB3 Screw Guide and into the plate. Tighten until secure. Ensure that each screw is completely locked into the plate.



Step 8b:

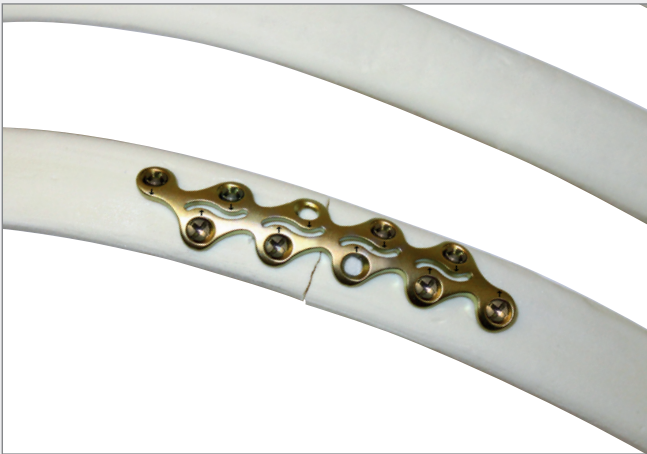
Removal of screwdriver blade

Remove the screwdriver blade from the screw by lifting the CB3 Screw Guide and rocking the screwdriver blade back and forth.



CB3 screw guide

Screw driver



Step 9:

Insert screws

Ensure that the screws are completely locked into the plate. Surgeon should ensure proper fracture reduction and plate placement.

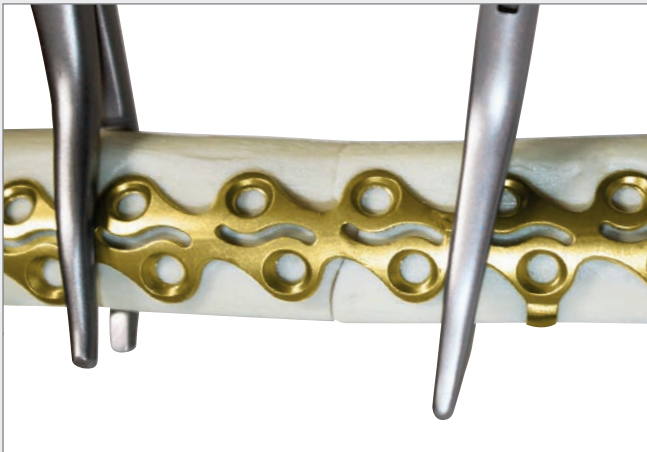
Spar plate

Position the plate on the rib over the fracture, allowing a minimum of three screws on each side of the fracture. The spar of the plate should be aligned over the fracture, leaving the screw holes on each side of the fracture. If possible, screws should be placed in the holes adjacent to the spar. Verify that the contour of the plate matches the rib. The plate holding forceps are specially designed to hold the plate on the rib.

Proceed to Step 8 for screw placement instructions.

Caution: It is recommended to insert the forceps from the superior border of the rib to avoid damaging the nerve and vessel bundle located at the inferior border of the rib.

Caution: When using the spar plate, the surgeon must ensure the spar is aligned over the fracture site and that a minimum of three screws are placed on each side of the fracture. Failure to align the plate properly may result in inadequate fixation of the fracture.



Tabbed plate

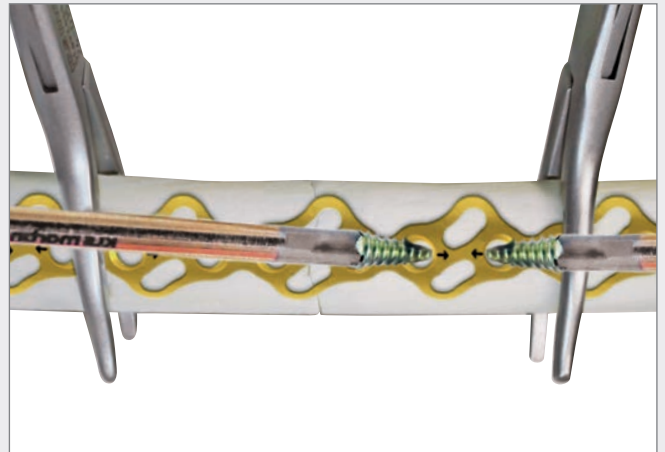
Using the bending pliers, bend the tabs on the plate to a 90° angle with the superior edge of the plate. These tabs will assist in plate alignment.

Position the plate on the rib over the fracture, allowing a minimum of three screws on each side of the fracture. The tabs will rest of the superior aspect of the rib to ensure the plate is aligned properly. Verify that the contour of the plate matches the rib. The plate holding forceps are specially designed to hold the plate on the rib. Proceed to step 8 for screw placement instructions.

Caution: When using the tabbed plate, the surgeon must not bend the tabs in a back and forth motion as this may weaken the tabs, causing them to fracture. Avoid unnecessary bending.

The tabs are for alignment purposes only and do not provide any additional fixation. The tabs should be aligned on the superior border of the rib and screws should be placed in the same manner as other rib plates.

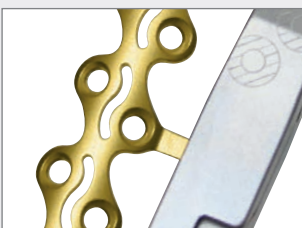
The surgeon must ensure the tabs are not interfering with any important anatomical structures and are not protruding into the pleural space.



Specialty plate screw insertion: Select and insert the screw.




The ThreadLock TaperScrew technology in the screw and plate allows up to 20 degrees of angulation. It is recommended to use this plate only when the adjustable depth guide indicates a green thickness.

The surgeon should ensure the screws enter the plate at a correct angle. Directional markings are etched onto the plate surface to aid in correct angulation.




Thoracic implants






24-015-20-71   


10 hole, X-plate
55 mm length

 = 1.5 mm





24-015-22-71   

20 hole, X-plate
106 mm length


 = 1.5 mm




Explanation of icons

- Ti CP Titanium
- 1 Quantity / units per package
-  Multidirectional locking screw hole
-  Plate profile
- Al Aluminum
- STERILE** Sterile




24-015-30-71 Ti 1 


14 hole, universal straight
103 mm length

 = 1.5 mm



24-015-25-71 Ti 1 

32 hole, X-plate
163 mm length




 = 1.5 mm

24-015-61-71 Al 1


Template

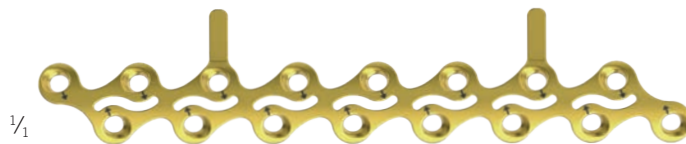
Thoracic implants






24-015-29-71   


14 hole, spar plate
90 mm length

 = 1.5 mm






24-015-31-71   


16 hole, tabbed plate
85 mm length

 = 1.5 mm






24-015-32-71   


16 hole, solid plate
85 mm length

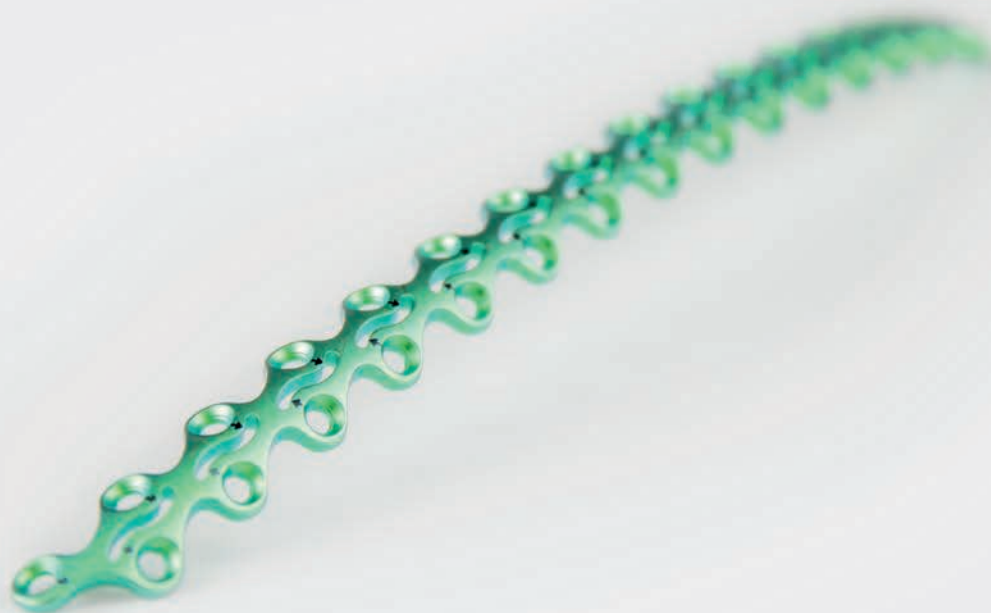
 = 1.5 mm





24-015-35-71   

20 hole, solid plate
102 mm length

 = 1.5 mm




Explanation of icons


- Ti** CP Titanium
- 1** Quantity / units per package
-  Multidirectional locking screw hole
-  Plate profile

STERILE Sterile




24-015-36-71 **Ti** **1** 


20 hole, solid plate
102 mm length

 = 2.0 mm




24-015-26-71 **Ti** **1** 

32 hole, X-plate
163 mm length




 = 2.0 mm

System components


Screws, twist drills and screwdriver

Drill-Free® maxDrive®				
Rib screws			self-retaining	
		10	10	10
	2.3 x 7 mm	24-016-07-70	24-016-07-74	24-016-07-71




24-016-07-70   
Drill-Free® maxDrive®
locking screw, rib screw
2.3 x 7 mm









50-800-04-07 
BOS driver "HT"
(without battery pack)



50-800-02-71 
Battery pack for
50-800-04-07



Explanation of icons

-  Titanium alloy
-  Quantity / units per package
-  maxDrive®
-  J-coupling
-  Dental coupling
-  Angulus coupling



STERILE R Sterile

Optional:

Screwdrivers and blades

maxDrive® 



Blades suitable for		25-407-03-04	50-990-00-07	50-800-04-07
25-486-97-07		2.0 / 2.3 mm	80 mm	
50-817-20-07		2.0 / 2.3 mm	40 mm	40 mm
50-991-20-07		2.0 / 2.3 mm		10 mm
50-991-20-71		2.0 / 2.3 mm		10 mm
24-015-58-07		2.0 / 2.3 mm	130 mm	

Twist drills

J- notch				
Ø x L (mm)	Stop (mm)			
1.5 x 50	7	STERILE R		5
1.5 x 50	7	25-449-07-07		1
1.5 x 50	7	25-449-07-91		1
1.5 x 50	7	25-449-07-71		1
Dental attachment				
Ø x L (mm)	Stop (mm)	Item number		
1.5 x 20	7	50-924-07-07		1
1.5 x 45	7	25-459-07-07		1
Angulus				
Ø (mm)	Stop (mm)	Item number		
1.5	7	50-996-07-07		1

System components Instruments



1/2

24-015-50-07 **St** **1**
Tri color depth gauge,
19 cm, 7 1/2"



1/2

24-015-51-07 **Sic** **St** **1**
Fixed depth gauge,
14 cm, 5 1/2"



1/2

12-188-17-07 **St** **1**
Cushing forceps,
serrated,
17.5 cm, 6 3/4"



1/2

23-539-15-07 **St** **1**
Bone lever,
16 cm, 6 1/4"



1/2

24-015-59-07 **Sic** **1**
CB3 screw guide,
14 cm, 5 1/2"



Explanation of icons

St Stainless steel

Sic Silicon

1 Quantity / units per package

TC GOLD Instrument with tungsten carbide inserts



1/2

22-523-22-07 **St 1 TC GOLD**
Double action plate cutter,
22 cm, 8 3/4"



1/2

24-015-66-07 **St 1**
Rib plate holding forceps,
narrow tip,
13.5 cm, 5"



1/2

24-015-68-07 **St 1**
Rib forceps, large box,
27 cm, 10"



1/2

24-015-69-07 **St 1**
Rib plate holding forceps,
press style,
21.5 cm, 8 1/2"

System components Instruments



24-015-53-07 **St 1**
Long straight plate holding forceps,
17.7 cm, 7"



24-015-65-07 **St 1**
Rib forceps, small box,
16 cm, 6"



24-015-71-07 **St 1**
Rib plate holding forceps,
vertical,
20 cm, 7"



Explanation of icons

- St** Stainless steel
- 1** Quantity / units per package



24-015-70-07 **St 1**
Rib grasping forceps,
15 cm, 6"



24-015-72-07 **St 1**
Rib plate holding forceps,
press style, rotating,
19 cm, 7"



24-015-74-07 **St 1**
Rib plate holding forceps,
narrow tip,
20 cm, 8"



24-015-75-07 **St 1**
Rib plate holding forceps,
right angle,
20 cm, 8"

System components Instruments



24-015-76-07 **St 1**
Rib bone holding forceps,
20.5 cm, 7"



24-015-55-07 **St 1**
CB3 bending pliers,
15 cm, 6"



24-015-54-07 **St 1**
Rib bone holding forceps,
press style,
14 cm, 5 1/2"

Explanation of icons

- St** Stainless steel
- 1** Quantity / units per package



1/2

50-501-01-07 **St 1**
Trocar handle,
18 cm, 7"



1/2

24-015-56-07 **St 1**
Trocar,
11.3 cm, 4"



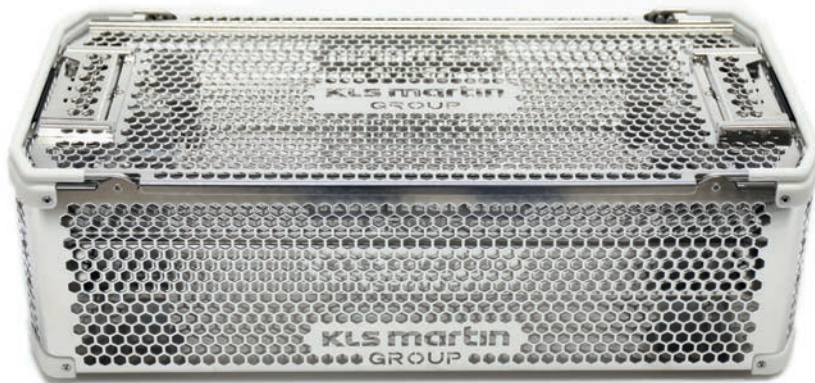
1/2

24-015-57-07 **St 1**
Cannula,
10 cm, 4 7/8"

Note: It is the surgeon's responsibility to ensure the appropriate level of fixation is used to ensure a stable construct for the fixation of fractures in the chest wall.

System components

Storage



55-981-00-04

L1® Rib instrument tray cpl. with lid

55-981-01-04

L1® Rib Instrument tray

55-981-05-04

Lid for L1® Rib tray



55-981-04-04
Lid for L1® Rib instrument tray



55-981-02-04
Insert for L1® Rib instrument tray 1



55-981-03-04
Insert for L1® Rib instrument tray 2

Storage	
55-981-00-04	L1® Rib instrument tray cpl. with lid
55-981-01-04	L1® Rib instrument tray
55-981-02-04	Insert for L1® Rib instrument tray 1
55-981-03-04	Insert for L1® Rib instrument tray 2
55-981-04-04	Lid for L1® Rib instrument tray
55-981-05-04	Lid for L1® Rib tray

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