

Aesculap® Hydrolift®

Next Generation Vertebral Body Replacement
Surgical Technique



Aesculap Spine

Hydrolift®



Table of contents

A)	General Information	4
B)	Preparing the Operation	
B.1	Assembling the implant applicator FW453R	5
B.2	Assembling the torque wrench to lock the implant at the correct height	6
B.3	Assembling the disconnecting device	7
C)	Instrumentation	
C.1	Insertion of K-wires (optional)	8
C.2	Partial corpectomy	10
C.3	Determining the implant size	11
C.4	Adjusting the endplates	12
C.5	Changing the endplates	14
C.6	Implant handling	15
C.7.1	Implanting the Hydrolift® implant - Positioning	16
C.7.2	Distraction of the Hydrolift® implant with hydraulic applicator	17
C.7.3	Distraction of the Hydrolift® implant with hydraulic applicator plus	24
C.7.4	Distraction of the Hydrolift® implant with distraction forceps	29
C.8.1	Removing the hydraulic connector	33
C.8.2	Removing the implant applicator	35
D)	Additional Stabilization Systems	
D.1	MACS TL® and S4® Spinal System	36
E)	System Overview	
E.1	Implants	37
E.2	Instruments	38
E.3	Trays / Container	41
F)	Reprocessing Information	
F.1	Hydraulic applicator plus	42
F.2	Disassembling MACS II K-wires insertion instrument	43

Hydrolift®

A) General Information

+ System concept

Hydrolift® is a vertebral body replacement for the thoracic and lumbar spine which can be distracted hydraulically. During the distraction process, the implant endplates can be continuously adjusted to the adjacent vertebral bodies. Available in seven different heights and three endplate sizes (S, M, L), the Hydrolift® implant can be inserted using an open or thoracoscopic technique.

+ Implant materials and surfaces

- **Implant body and endplates**
Titanium forge alloy Ti6Al4V acc. to ISO 5832-3.
- **Coating endplates**
Pure titanium acc. to ISO 5832-2.
- **Fixation screws implant body and endplates**
MP35 acc. to ISO 5832-6 cobalt-chromium alloy (containing nickel, chrome, cobalt).

+ Indications

- Fractures of the thoracic and lumbar spine.
- Tumours of the thoracic and lumbar spine.
- Degenerative or inflammatory diseases which require removal of a vertebral body.

+ Contraindications

- Multi-segmental fusion with more than two vertebral bodies.
- Osteoporosis

Hydrolift®

B) Preparing the Operation

B.1 Assembling the implant applicator FW453R

- + Insert the clamping rod (b) into the clamping nut (a) (Fig.1).

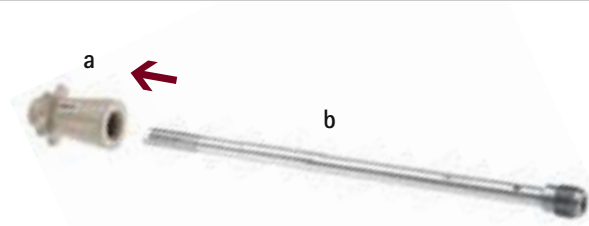


Fig. 1

- + Screw both parts together (Fig. 2).



Fig. 2

- + Pull the gold releasing ring (a) on the counter torque down and push the clamping rod (b) through the aperture (Fig. 3).

Note:

Marks (circled in red) must be lined up (Fig. 3).

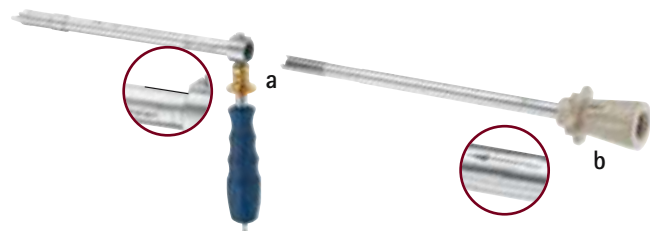


Fig. 3

Hydrolift®

B) Preparing the Operation

B.2 Assembling the torque wrench to lock the implant at the correct height

- + The 12 Nm torque wrench (FW456R) is assembled as follows:

Snap the working component (a) into the torque component (b) (Fig. 4).

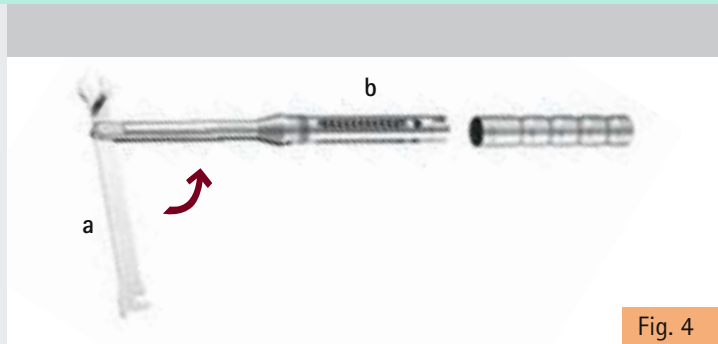


Fig. 4

- + Then screw the fastening sleeve (c) into (b) (Fig. 5).

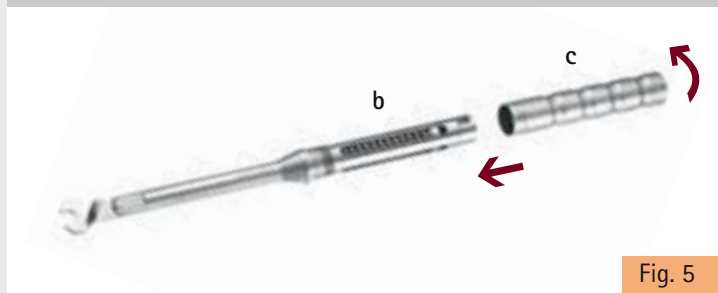


Fig. 5

- + 12 Nm torque wrench (Fig. 6).



Fig. 6

B.3 Assembling the disconnecting device

+ The disconnecting device FW452R is needed to remove the hydraulic connector. For this purpose, screw the retaining sleeve (a) to the disconnecting device (b) (Fig. 7).

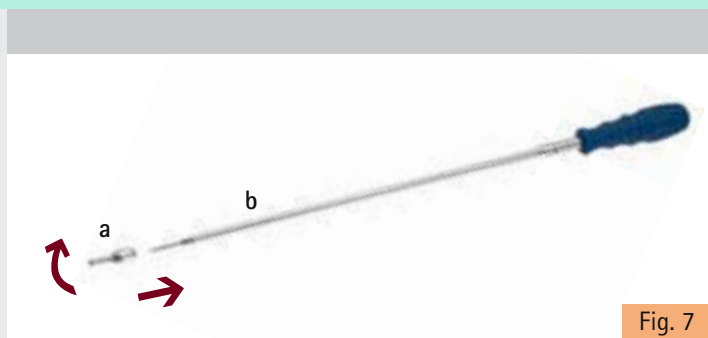


Fig. 7

Hydrolift®

C) Instrumentation

C.1 Insertion of K-wires (optional)

+ Insertion of K-wires

For better orientation K-wires can be inserted optionally in the adjacent vertebral bodies.

+ *Item number*

FW408R
MACS II K-wire inserter instrument
(Fig. 8)

Item number

FW406S
MACS II K-wire set sterile
(Fig. 9)

+ Inserting the K-wire thread side of FW406S first into the K-wire inserter FW408R and rotate to secure it into place (Fig. 10)

Positioning and impacting the K-wire with hammer FW243R until maximum possible depth of 20 mm.

Note:

With orthograde alignment the K-wire appears as a point when imaging, concentrically within the metal ring that forms part of the aiming device (Fig. 11).

Note :

The correct positioning of the K-wire must be controlled step by step by the imaging system to avoid any misalignment or damage of soft tissue.

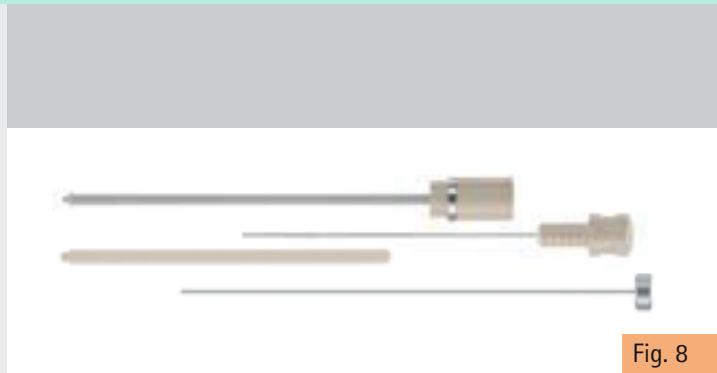


Fig. 8



Fig. 9

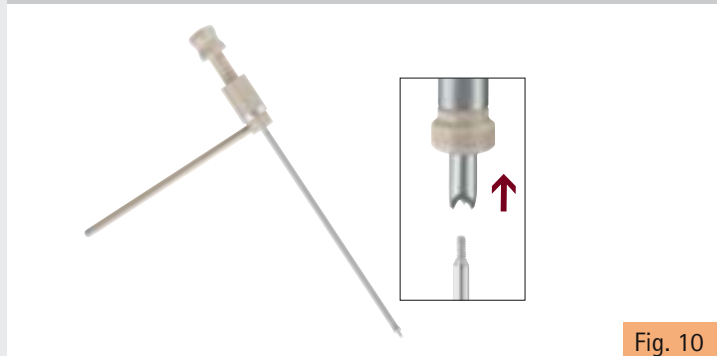


Fig. 10



Fig. 11

C.1 Insertion of K-wires (optional)

+ Remove K-wire insertion instrument

Unscrew and remove insertion impactor.



Fig. 12

+ Insert the counter holder into the K-wire inserter FW408R and remove from the K-wire (apply counterforce on the K-wire using the counter holder) (Fig. 13).

Note:

The use of the counter holder prevents an undesired removal of the K-wire. Do not push K-wire ventrally with counter holder.

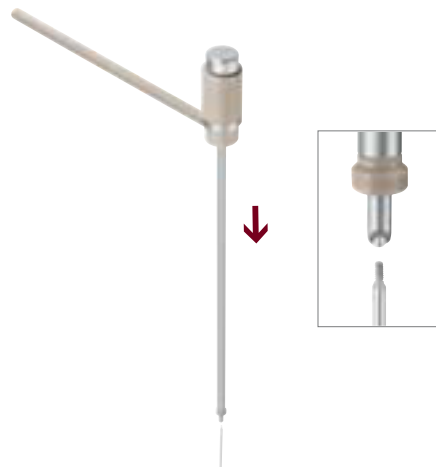


Fig. 13

+ Inserting the second K-wire accordingly (Fig. 14).



Fig. 14

Hydrolift®

C) Instrumentation

C.2 Partial corpectomy

- ✚ To perform the partial corpectomy, mark the edges of the implant bed with the chisel FW813R (Fig. 15 and 16).

Then remove the bone within the marked area using a rongeur and a rasp.

- ✚ FW813R chisel (Fig. 16)

Note:

The cover plate of the adjacent vertebral body should be cleaned with a curette to enable a reliable connection to the implant endplate.



Fig. 15



Fig. 16

C.3 Determining the implant size

- + Trial implant to determine the appropriate size of the implant endplate size cranially and caudally (Fig. 17 and 18).

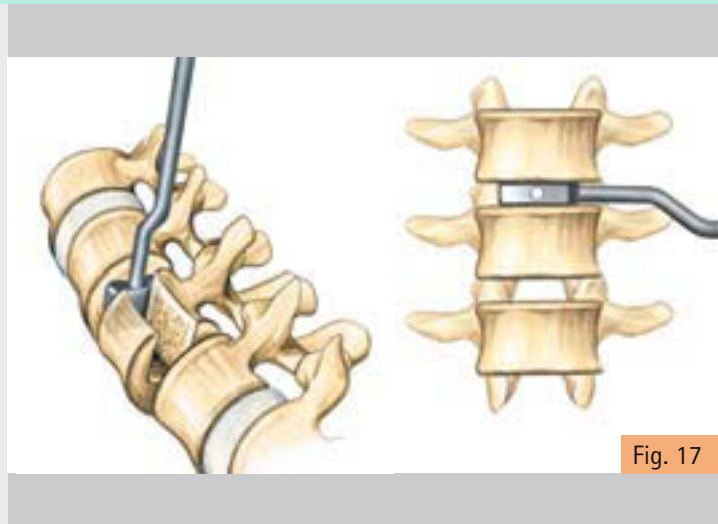


Fig. 17

- + FW440R handle
FW447R-FW449R trial implants
endplates sizes (Fig. 18)



Fig. 18

- + Trial implant to determine the appropriate height of implant (Fig. 19 and 20).

Note:

To determine the proper implant size, begin with the smallest trial implant and proceed incrementally.
Height of the trial implant = smallest implant height + 2 mm (for calculation of spikes during insertion).

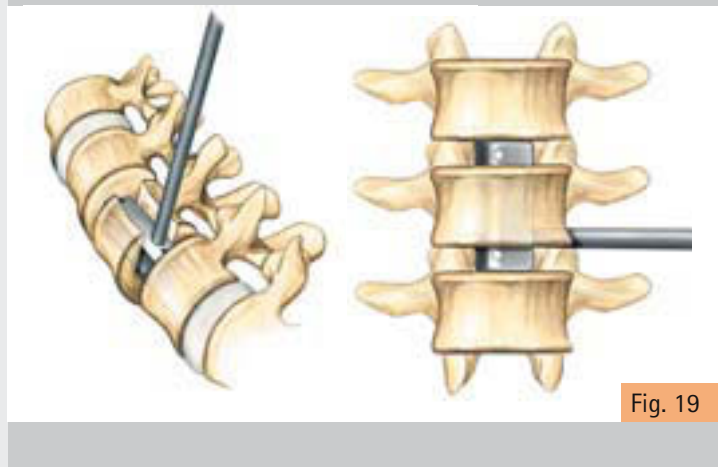


Fig. 19

- + FW440R handle
FW441R-FW446R trial implants base
bodies (Fig. 20).



Fig. 20

Hydrolift®

C) Instrumentation

C.4 Adjusting the endplates

- + The endplates can not only be adjusted during the distraction process, but also pre-set using an adjusting device (FW454R) in lordosis / kyphosis (Fig. 21).

The endplates are firmly locked with 5 Nm factory-made in 0° position ex factory. This locking position must first be unlocked by inserting the implant into the adjusting device with two 0° V-blocks and clamping it with the turning knob (Fig. 21).



Fig. 21

- + Unscrew the endplate fastening screws (Fig. 22) with the screwdriver (FW457R) (Fig. 23).

Select the adjusting angle for each endplate using the 0°, 5° and 10° V-blocks.



Fig. 22

- + FW457R screwdriver for endplates FW440R handle (Fig. 23).



Fig. 23

C.4 Adjusting the endplates

- ✚ Tighten the endplate screws using the 5 Nm torque wrench FW445R (Fig. 24).



Fig. 24

Note:

Risk of vascular lesions if the clamping screw is positioned ventrally!

- Always assemble the endplates so that both clamping screws of the endplates are in a posterior position.

Note:

Risk of dislocation and vascular lesions through open clamping of endplates on both sides!

- Implantation and distraction must be carried out with max. one open endplate.

Note:

Beware of insufficient endplate clamping!

- To lock the endplates into place, use the supplied torque wrench.

Hydrolift®

C) Instrumentation

C.5 Changing the endplates

✚ If required, the endplates of the Hydrolift® implant can be adjusted to fit the anatomical situation and changed individually. For this purpose, unscrew the clamping screw of the endplate using the screwdriver FW457R (a). Then turn the endplate 45° and take it out (b) (Fig. 25).

To insert the new endplate, proceed in reverse order.



C.6 Implant handling

- Take the Hydrolift® implant directly out of the sterile packaging using the implant applicator FW453R (Fig. 26.1 to 26.3).

Before taking the implant out of the sterile packaging, turn the clamping nut (a) up to the stop.



Fig. 26.1



Hold the applicator (FW453R) with one hand on the clamping nut and the other on the blue handle and pull it down vertically on the implant (Fig. 26.1).



Fig. 26.2



While still holding the applicator vertically with one hand, pull with the other the blue handle down until both sides snap into the grooves on the implant (Fig. 26.2).



Fig. 26.3

Turn the clamping nut downwards to tie the implant firmly to the applicator (Fig. 26.3).

Hydrolift®

C) Instrumentation

C.7.1 Implanting the Hydrolift® implant – Positioning

✚ The implant is inserted under radiographic control. The implant should be positioned as centrally as possible (Fig. 27).

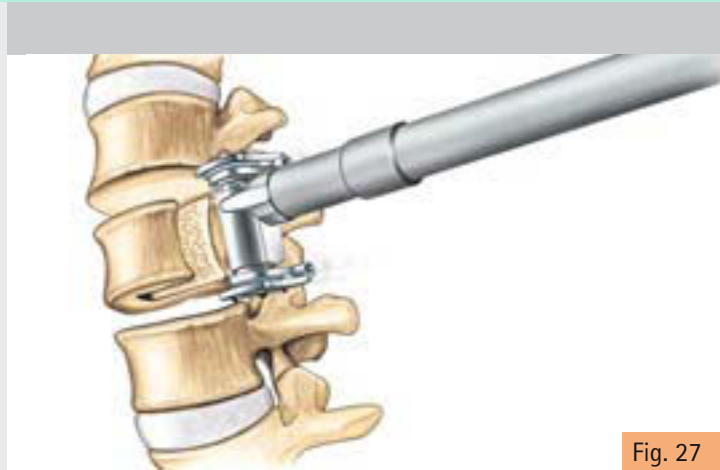


Fig. 27

✚ The endplates of the Hydrolift® implant are freely rotatable and allow the operating surgeon to insert the implant from an anterior and anterolateral as well as a posterior and posterolateral approach for implantation heights > 29 mm with endplates rotated by 90°.

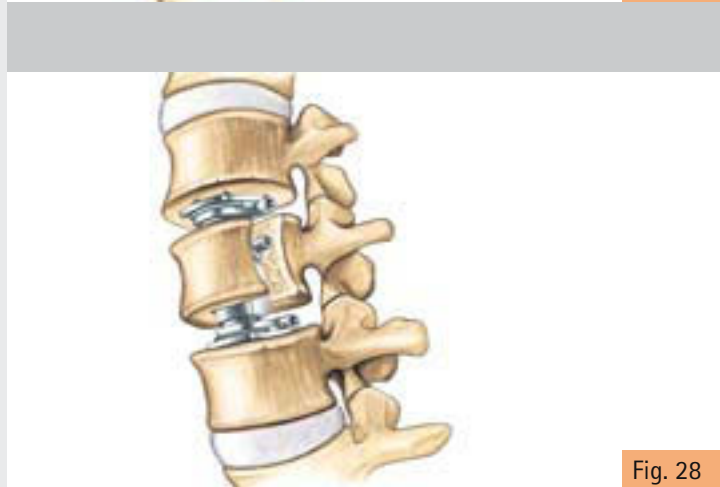


Fig. 28

Note:

The endplate screws must always point in a dorsal direction (Fig. 28).

✚ To drive the implant into position, the hit cap (a) must be placed on the applicator FW453R (Fig. 29).



Fig. 29

Note:

If a non-lateral approach is used, the endplate angle must be preset and the endplate locked into place using the appropriate torque wrench.

C.7.2 Distraction of the Hydrolift® implant with hydraulic applicator

+ General information

Item number

FW450SU Hydraulic applicator
(single-use)

Note:

The hydraulic applicator FW450SU offers a distraction up to a maximum of 30 bar.

- + To expand the implant hydraulically, use a 0.9 % sterile saline solution (NaCl solution) (Fig. 31).

- + To fill the hydraulic applicator (FW450SU) with the saline solution, first compress the handle of the applicator (a). Then, pull it back (b) to suck the saline solution into the device (Fig. 32).

Note:

Use only a 0.9 % NaCl sterile saline solution to expand the implant!



Fig. 30



Fig. 31



Fig. 32

Hydrolift®

C) Instrumentation

C.7.2 Distraction of the Hydrolift® implant with hydraulic applicator

+ Preparation

- Connect the hydraulic pipe (FW453802) to the hydraulic applicator (FW450SU) (Fig. 33 and 34).

- Evacuate the air out of the hydraulic applicator and the hydraulic pipe to build up pressure (Fig. 35).

Note:

If the air is not evacuated out of the hydraulic applicator and the hydraulic pipe, the implant cannot be distracted in a precise way.

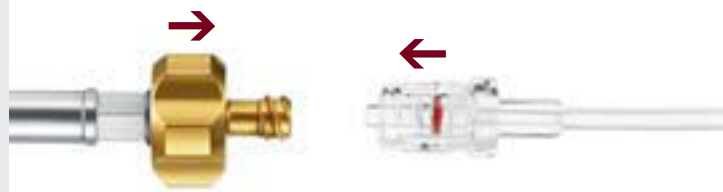


Fig. 33



Fig. 34



Fig. 35

C.7.2 Distraction of the Hydrolift® implant with hydraulic applicator

+ Inserting the hydraulic pipe into the applicator

- Before inserting the hydraulic pipe please check if the clamping nut is tightened accordingly.
- Pull down the gold releasing ring (a) on the implant applicator (FW453R) and insert the hydraulic pipe (b) until you hear the clicking into place (Fig. 36).
- To fix the hydraulic pipe please tighten the cleaning rod (c). The hydraulic pipe is now tightly connected to the hydraulic connector of the implant.

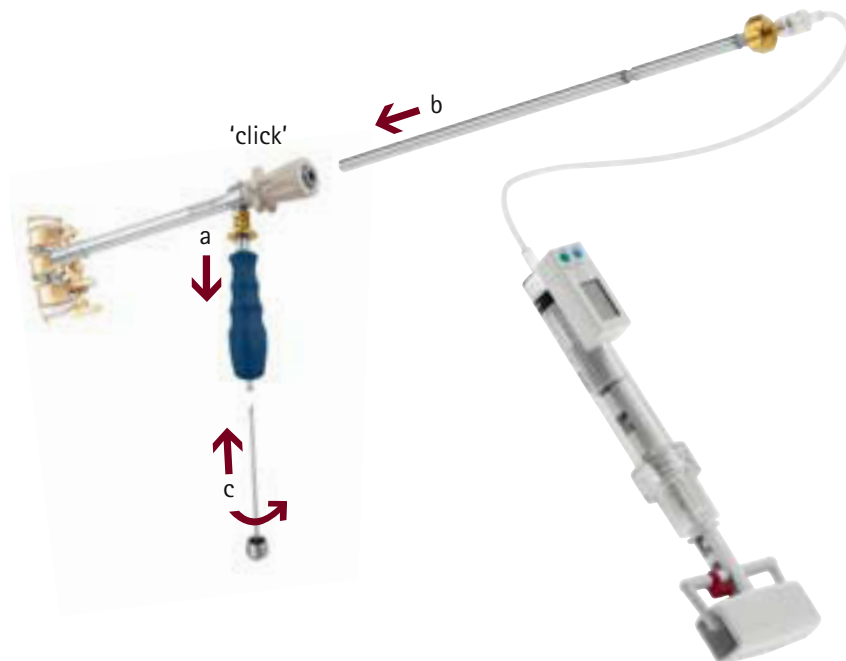


Fig. 36

Hydrolift®

C) Instrumentation

C.7.2 Distraction of the Hydrolift® implant with hydraulic applicator

+ Distraction of the Hydrolift® implant

By turning the handle (a), the implant is distracted under radiographic monitoring (Fig. 37). The pressure built up in this way is shown digitally on the pressure indicator of the hydraulic applicator (FW450SU). The pressure is limited to a maximum of 30 bar to reduce the risk of overdistractio

Note:

To prevent the implant from collapsing into the endplates of the vertebral bodies:

- Distract the implant gradually under radiographic monitoring.
- Pay attention to the tactile feedback of the hydraulic applicator.
- Avoid overdistractio



Fig. 37

+ Pressure–force relationship on the Hydrolift® implant

The adjoining figure shows how much pressure is exerted on the adjacent vertebral bodies when the Hydrolift® implant is distracted (Fig. 38). The force measured increases linearly with increasing pressure.

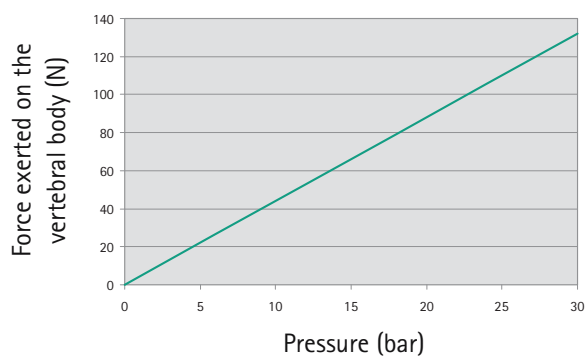


Fig. 38

C.7.2 Distraction of the Hydrolift® implant with hydraulic applicator

+ Fine adjustment of the endplates

- To keep the distraction please activate the locking mechanism of the implant manually with the crown of the hydraulic pipe.
- To obtain an optimal contact surface between the adjacent vertebral bodies and the implant, first unfasten the screw of the cranial endplate using the screwdriver(FW457R) and the handle (FW440R) (Fig. 39).
- In this way, the endplate of the implant can adjust itself to the vertebral body. Then tighten the screw using the 5 Nm torque wrench (FW455R) (Fig. 40 and 41).
- Distract again if necessary.
- The implant applicator (FW453R) serves as a counter-brace (Fig. 41). Proceed in the same way to adjust the caudal endplate.



Fig. 39



Fig. 40

Note:

Always tighten up the endplates with the 5 Nm torque wrench, even when implanting them with the preset 0° angle.



Fig. 41

Hydrolift®

C) Instrumentation

C.7.2 Distraction of the Hydrolift® implant with hydraulic applicator



Fig. 42

- Once the desired distraction height is reached, the Hydrolift® implant must be locked mechanically into place. Using the crown (a), first activate the locking mechanism manually (Fig. 42).

Note:

The final position and fit of the implant must be controlled prior to final locking of the implant with the torque wrench.



Fig. 43

- Lock the implant definitively into place using the 12 Nm torque wrench (FW456R) (Fig. 43).

The implant applicator (FW453R) serves as a counter-brace (Fig. 42).

Note:

Correction can be lost through insufficient axial clamping and insufficient clamping of the implant endplates!

For axial and endplate clamping, always use the supplied torque wrench (tightening torque for axial clamping: 12 Nm, tightening torque for endplate clamping: 5 Nm).

C.7.2 Distraction of the Hydrolift® implant with hydraulic applicator

+ Removing the hydraulic pipe

Unfasten the cleaning rod (1). Pull down the gold release ring (2) on the applicator and pull the hydraulic pipe (3) out (Fig. 44).

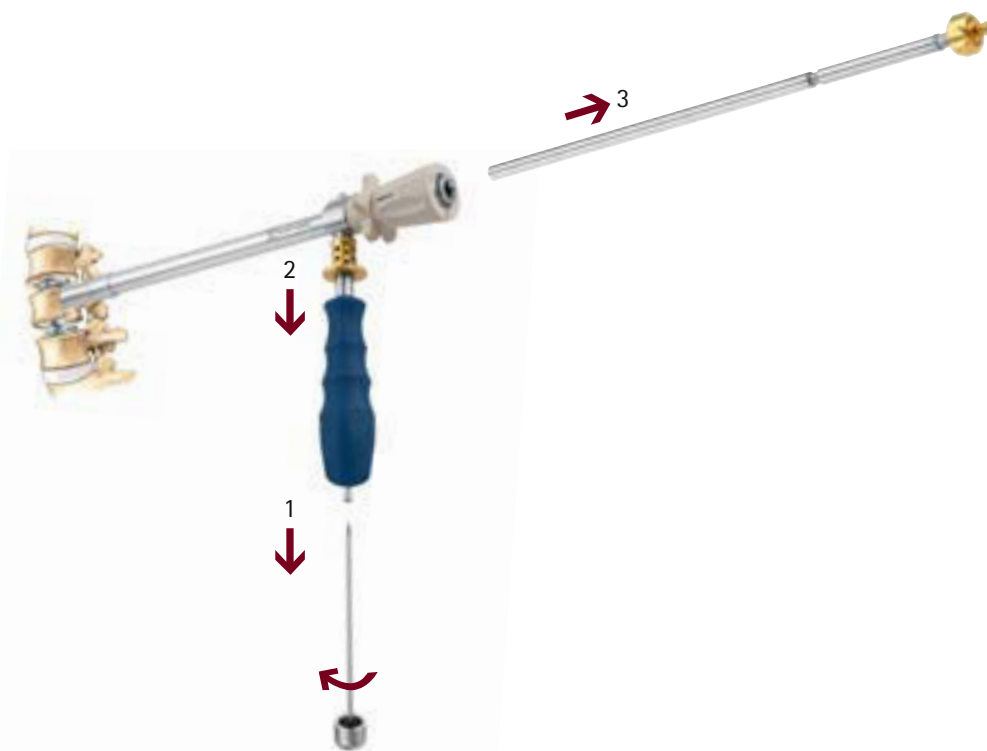


Fig. 44

Hydrolift®

C) Instrumentation

C.7.3 Distraction of the Hydrolift® implant with hydraulic applicator plus

+ General information

Item number
FW435R Hydraulic applicator plus

Note:
The hydraulic applicator plus FW435R offers a distraction up to a maximum of 900 N.

+ Elements of the hydraulic applicator plus:

- 1 Working end
- 2 Nut
- 3 Hexagon
- 4 Counter torque
- 5 Pressure cylinder
- 6 High pressure tube
- 7 Hole for overpressure protection
- E Protection sleeve

(Fig. 46 / Fig. 47)

- #### +
- The pressure cylinder (5) is fitted with an overpressure protection device, which prevents damage to the Hydrolift® implant. If the overpressure protection device is triggered, steam exits the holes (7) on the pressure cylinder (5) and no higher torque can be applied on the pressure cylinder (5).



Fig. 45

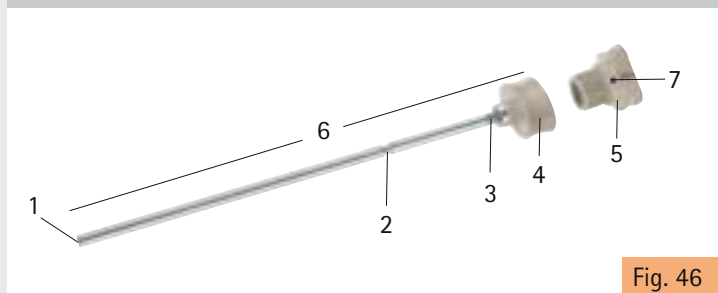


Fig. 46

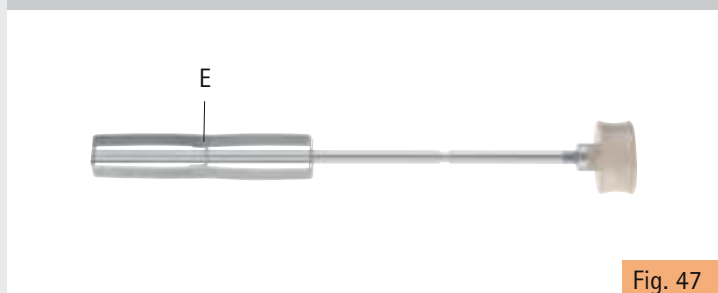


Fig. 47

C.7.3 Distraction of the Hydrolift® implant with hydraulic applicator plus

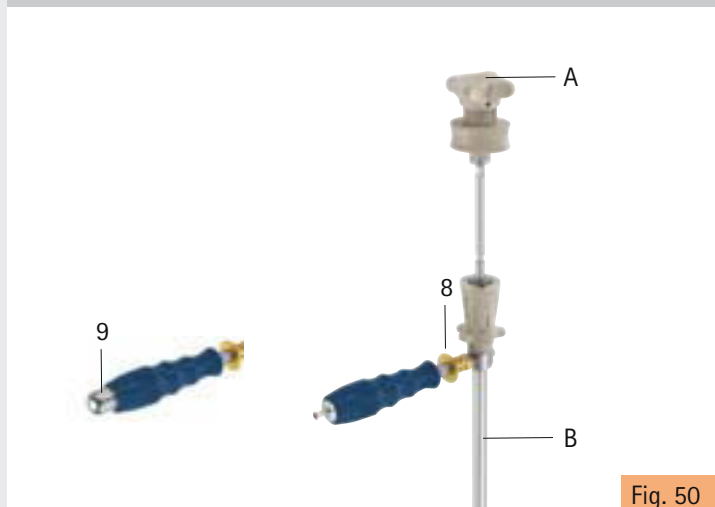
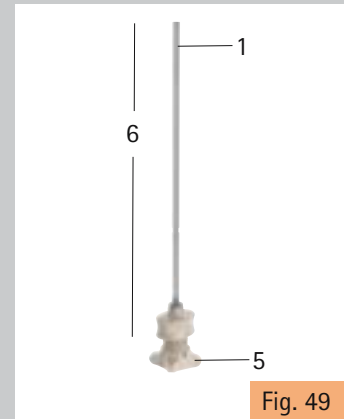
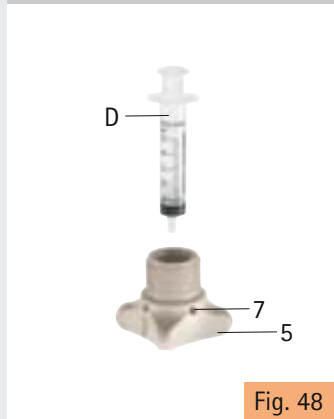
+ Preparation

- Fill pressure cylinder (5) with sterile saline solution (NaCl 0.9 %) with 5 ml disposable syringe (D) (Fig. 48).
- Hold pressure cylinder (5) vertical and screw it into high pressure tube (6) until all the air has been removed from the tube. All the air has been removed from the high pressure tube (6) when liquid comes out of the working end (1) (Fig. 49).

Note:

Use only sterile saline solution (NaCl 0.9 %) to fill the pressure cylinder.
Use only a sterile disposable syringe with a minimum volume of 5 ml to fill the pressure cylinder

- Ensure that cleaning rod (9) of the Hydrolift® insertion instrument for implants (B) has been dismantled.
- Before inserting the hydraulic applicator plus FW435R please check if the clamping nut of the insertion instrument FW453R clamping nut is tightened accordingly.
- Pull release ring (8) on Hydrolift® insertion instrument for implants (B) and insert Hydrolift® hydraulic applicator plus (A) (Fig. 50).



Hydrolift®

C) Instrumentation

C.7.3 Distraction of the Hydrolift® implant with hydraulic applicator plus

+ Distraction of the Hydrolift® implant

- Release ring (8) and carefully push forward Hydrolift® hydraulic applicator plus FW435R (A) until it audibly engages (Fig. 51).
- To lock the hydraulic applicator plus screw in cleaning rod (9) of the Hydrolift® insertion instrument (B) into the handle (Fig. 52).
- To distract the Hydrolift® implant, hold counter torque (4) of the high pressure tube (6) and screw in pressure cylinder (5) until the necessary distraction is achieved (Fig. 52).

Note:

To prevent the implant from collapsing into the endplates of the vertebral bodies it is recommended to distract the implant gradually under radiographic monitoring. Avoid overdistraction.

Note:

If the overpressure protection device is triggered, steam exits the holes (7) on the pressure cylinder (5) and no higher torque can be applied to the pressure cylinder (5).

- To pre-lock the axial clamping mechanism of the Hydrolift® implant, hold the handle of the Hydrolift® insertion instrument (B) and tighten counter torque (4) of the high pressure tube (6) hand-tight (Fig. 52).
- Check final fit of the Hydrolift® implant.

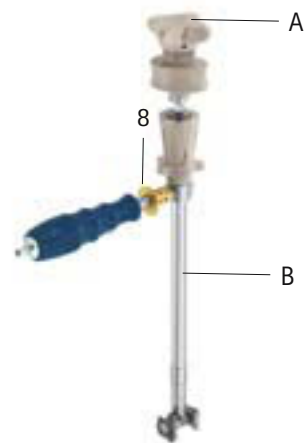


Fig. 51

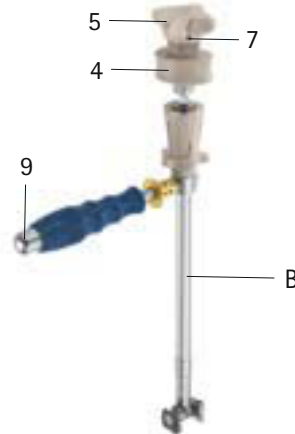


Fig. 52

C.7.3 Distraction of the Hydrolift® implant with hydraulic applicator plus

+ Fine adjustment of the endplates

- Also see instrumentation page 21 ff.
- To obtain an optimal contact surface between the adjacent vertebral bodies and the implant, first unfasten the screw of the cranial endplate using the screwdriver (FW457R) and the handle (FW440R) (Fig. 53).
- In this way, the endplate of the implant can adjust itself to the vertebral body. Then tighten the screw using the 5 Nm torque wrench (FW455R).
- Distract again if necessary.
- The implant applicator (FW453R) serves as a counter torque.
- Proceed in the same way to adjust the caudal endplate.

Note:

Always tighten up the endplates with the 5 Nm torque wrench, even when implanting them with the preset 0° angle.



Fig. 53

Hydrolift®

C) Instrumentation

C.7.3 Distraction of the Hydrolift® implant with hydraulic applicator plus

+ Locking the Hydrolift® implant

- Lock axial clamping of the Hydrolift® implant with Hydrolift® torque wrench FW456R with 12 Nm (Fig. 54). The insertion instrument FW453R serves as counter torque.

Note:

The final position and fit of the implant must be controlled prior to final locking of the implant with the torque wrench.

Correction can be lost through insufficient axial clamping and insufficient clamping of the implant endplates!

For axial and endplate clamping, always use the supplied torque wrench (tightening torque for axial clamping: 12 Nm / tightening torque for endplate clamping: 5 Nm).

+ Remove hydraulic applicator plus

- Unscrew cleaning rod (9).
- Pull release ring (8) on Hydrolift® insertion instrument (B) and remove Hydrolift® hydraulic applicator plus (A) (Fig. 55).

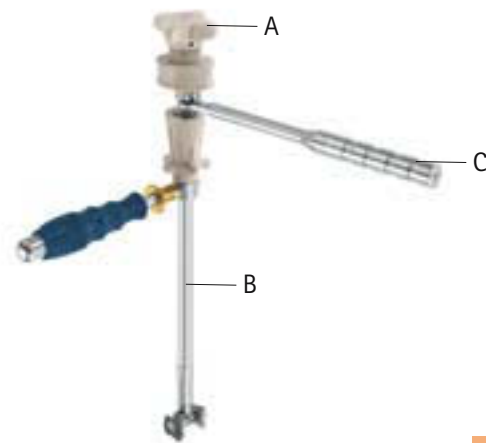


Fig. 54

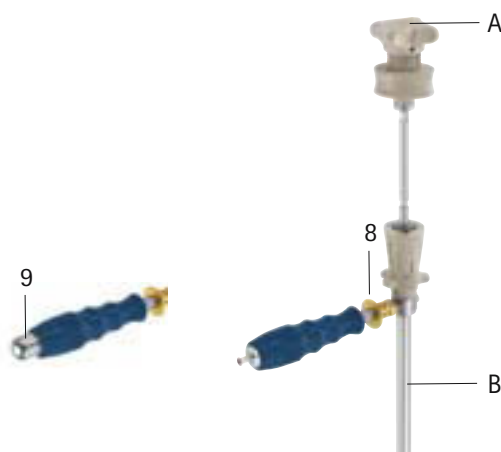


Fig. 55

C.7.4 Distraction of the Hydrolift® implant with distraction forceps

+ General information

Item number
FW436R Hydrolift® distraction forceps

Note:

The distraction forceps is used for mechanical distraction of the Hydrolift® implant in thoracoscopic approach in case the implant cannot be distracted hydraulically.

+ Elements of the distraction forceps

- 1 Connection to Hydrolift® implant endplate
- 2 Working end
- 3 Bearing area to insertion instrument FW453R
- 4 Handles
- 5 Ratchet

(Fig. 57)

Note:

Endplates on the distractable side of the implant must be preadjusted and torqued with torque wrench with 5 Nm before using the distraction forceps (Fig. 58).



Fig. 56

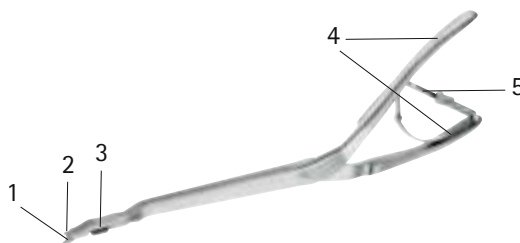


Fig. 57



Fig. 58

Hydrolift®

C) Instrumentation

C.7.4 Distraction of the Hydrolift® implant with distraction forceps

+ Distraction

- Set bearing area on implant insertion instrument FW453R.
- Introduce working end of distraction forceps.
- Align distraction forceps to Hydrolift® implant (Fig. 59).

- Connect working end of the distraction forceps to Hydrolift® implant endplate.
- Make sure that the upper working end is completely connected to the implant endplate.
- Make sure that bearing area of the distraction forceps is completely set on insertion instrument FW453R (Fig. 60).



C.7.4 Distraction of the Hydrolift implant with distraction forceps

- Open axial locking screw of the Hydrolift implant through hydraulic pipe (7) of insertion instrument FW453R (Fig. 61).

- Distract Hydrolift implant carefully (Fig. 62).

Note:

To prevent the implant from collapsing into the endplates of the vertebral bodies:
Control by imaging where needed.
Pay attention to tactile feedback of distraction forceps. Avoid overdistractioin.
Do not use distraction forceps together with hydraulic applicator.

- Tighten axial locking screw of the Hydrolift® implant manually with hydraulic pipe (7) of the insertion instrument FW453R (Fig. 61).
- Control implant fit.

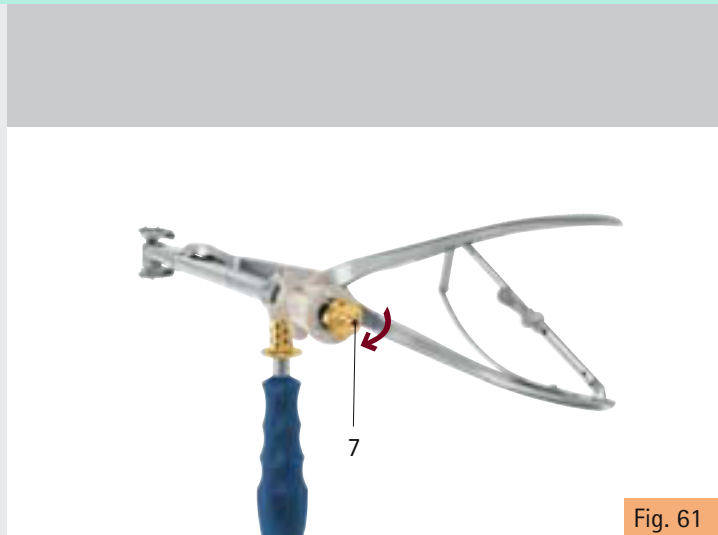


Fig. 61



Fig. 62

Hydrolift®

C) Instrumentation

C.7.4 Distraction of the Hydrolift® implant with distraction forceps

+ Removing

- Open ratchet of distraction forceps (a) (Fig. 63).

- Close distraction forceps and remove carefully (Fig. 64).

+ Locking of the Hydrolift® implant

- Also see instrumentation page 22 ff.
- As described tighten axial locking screw of the Hydrolift® implant manually with hydraulic pipe of the insertion instrument FW453R before removing the distraction forceps (Fig. 65).
- The final position and fit of the implant must be controlled prior to final locking of the implant with the torque wrench.
- Lock axial clamping of the Hydrolift® implant with Hydrolift® torque wrench FW456R with 12 Nm. The insertion instrument FW453R serves as counter torque (Fig. 65).
- Unfasten the cleaning rod (1). Pull down the gold release ring (2) on the applicator and pull the hydraulic pipe out (3) (also see Fig. 44).

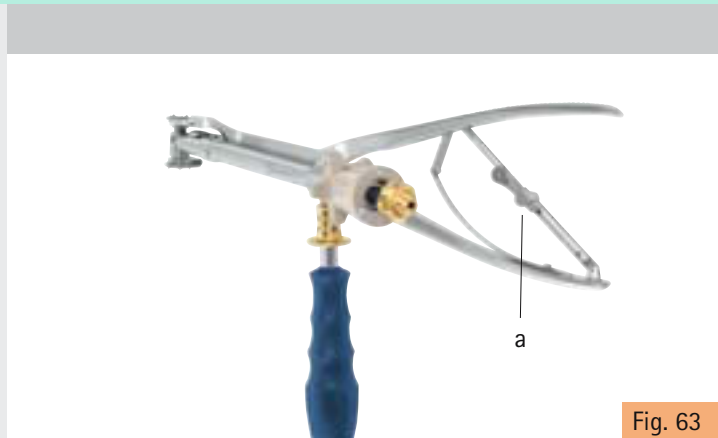


Fig. 63



Fig. 64

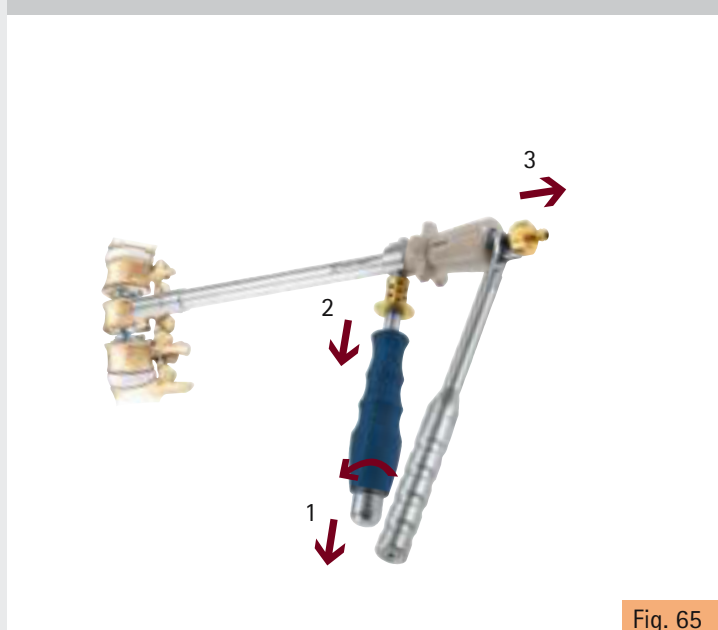


Fig. 65

C.8.1 Removing the hydraulic connector



Fig. 66

Note:

Before removing the hydraulic connector the final positioning and fit of the implant must be controlled.

- To avoid soft tissue irritation, the hydraulic connector must be removed from the implant.
- For this purpose, insert the disconnecting device (FW452R) (a) into the implant applicator FW453R (b) (Fig. 66).

Hydrolift®

C) Instrumentation

C.8.1 Removing the hydraulic connector

- Unscrew the hydraulic connector from the implant (Fig. 67).
- Then pull the disconnecting device together with the unscrewed connector out of the applicator (Fig. 68).



C.8.2 Removing the implant applicator

- Unscrew the clamping nut (a) (Fig. 69).



Fig. 69

- Pull the handle back to the clamping nut, then pull the applicator (b) vertically out of the implant (Fig. 70).

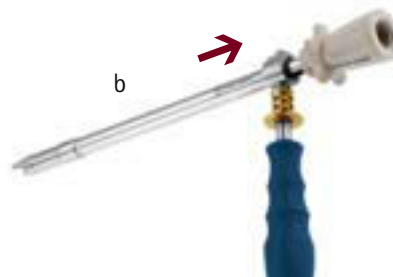


Fig. 70

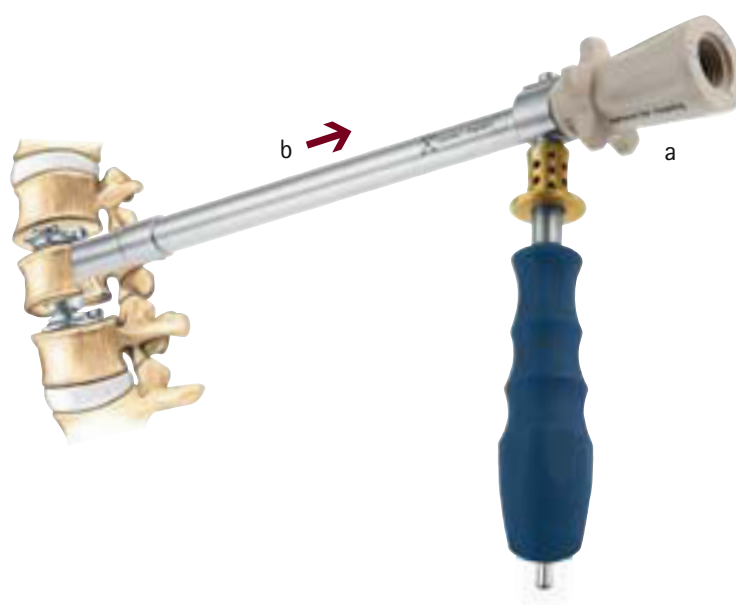


Fig. 71

Hydrolift®

D) Additional Stabilization Systems

D.1 MACS TL® and S4® Spinal System

† Vertebral body replacement systems are never used without additional anterior and / or posterior stabilization systems. For a reliable treatment with Hydrolift®, it is recommended that the treatment be complemented by using the S4® posterior stabilisation and / or the MACS TL® ventral stabilization system.



Fig. 72



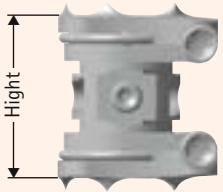
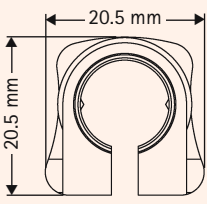
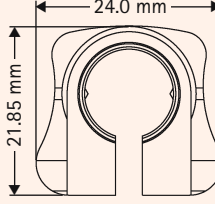
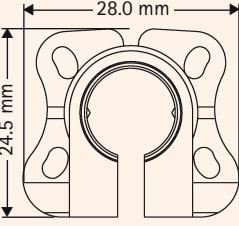
Fig. 73

Case:
Dirk Brücher, M.D.
Städtisches Klinikum
Karlsruhe

Hydrolift®

E) System Overview



E.1 Implants

Implants			
			
Height implant including endplates, without spikes	S 20.5 x 20.5 mm	M 21.85 x 24.0 mm	L 24.5 x 28.0 mm
Size 1 21.0 – 24.0 mm	SV001T		
Size 2 23.0 – 28.0 mm	SV004T	SV005T	
Size 3 26.0 – 33.5 mm	SV007T	SV008T	SV009T
Size 4 31.0 – 43.0 mm	SV010T	SV011T	SV012T
Size 4+ 35.5 – 52.0 mm	SV030T	SV031T	SV032T
Size 5 40.0 – 60.5 mm		SV014T	SV015T
Size 6 57.0 – 93.5 mm			SV018T
Endplates			
Endplate Size S	SV019T		
Endplate Size M		SV020T	
Endplate Size L			SV021T









Hydrolift®

E) System Overview

E.2 Instruments















Trial Implants			Unit	
FW441R	trial implant base body 1	(21.0 - 24.0 mm)*	1	
FW442R	trial implant base body 2	(23.0 - 28.0 mm)*	1	
FW443R	trial implant base body 3	(26.0 - 33.5 mm)*	1	
FW444R	trial implant base body 4	(31.0 - 43.0 mm)*	1	
FW439R	trial implant base body 4+	(35.5 - 52.0 mm)*	1	
FW445R	trial implant base body 5	(40.0 - 60.5 mm)*	1	
FW446R	trial implant base body 6	(57.0 - 93.5 mm)*	1	
FW447R	trial implant endplate S		1	
FW448R	trial implant endplate M		1	
FW449R	trial implant endplate L		1	

* Height = smallest height + 2 mm (to calculate spikes during insertion)

Applicators		Unit	
FW453R	insertion instrument consisting of: FW453800 counter torque**	1	
	FW453216 hit cap	1	
	FW453802 hydraulic pipe	2	
	FW453801 rod with clamping nut**	1	
	FW453803 cleaning rod	1	
FW450SU	hydraulic applicator (30 bar) (single-use)	1	
FW435R	hydraulic applicator plus	1	
FW436R	distraction forceps	1	

** Note: In case of damage to the FW453800 counter torque or the FW453801 clamping rod, the whole instrument must be sent in for inspection.



E.2 Instruments

Applicators		Unit	
FW454R	adjusting device	1	
	consisting of:		
	FW454R angle block 0°	2	
	FW454R angle block 5°	2	
	FW454R angle block 10°	2	
	FW453201 threaded rod	1	
Fastening Devices		Unit	
FW452R	disconnecting device	1	
	to FW462201 sleeve	1	
FW455R	5 Nm torque wrench	1	
FW456R	12 Nm torque wrench	1	
	to FW456R handle	1	
FW457R	screw driver for endplates	1	
Additional Instruments		Unit	
FW243R	slot hammer	1	
FW440R	handle	2	
FW813R	chisel	1	
FW819R	cancellous bone punch	1	
	stick complementing to FW819R	1	

Hydrolift®

E) System Overview

E.2 Instruments

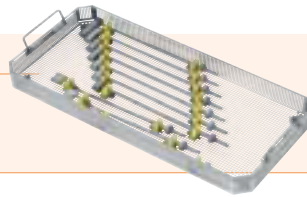
Additional Instruments		Unit	
FW408R	MACS II K-wire insertion instrument	1	
FW406R	MACS II K-wire set sterile (single-use)	2	

* Optionally, K-wire protection sleeves (2 x FW394R) with corresponding holding forceps (FW326R) are available.

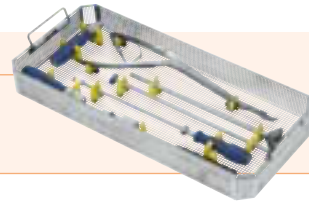
E.3 Trays / Container

Instrument trays – bare*

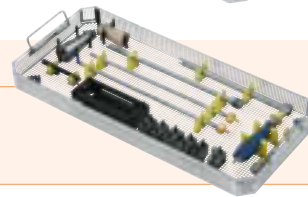
FW461R Hydrolift® instrument tray I
TE973 Packing template for FW461R



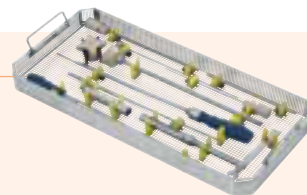
FW462R Hydrolift® instrument tray II
TE974 Packing template for FW462R



FW463R Hydrolift® instrument tray III
TE975 Packing template for FW463R



FW464R Hydrolift® instrument tray IV
TE976 Packing template for FW464R



* Instruments must be ordered separately.

Recommended containers		Unit	
JK441	Container body, 592 x 24 x 120 mm	1	
JK442	Container body, 592 x 24 x 135 mm	1	
JK489	Silver lid 2	2	

Hydrolift®

F) Reprocessing Information

F.1 Hydraulic applicator plus

- ✚ Unscrew pressure cylinder (5) from counter torque (4) counterclockwise (Fig. 74).

Note:

If the pressure cylinder (5) cannot be unscrewed from the counter torque (4), use Hydrolift® torque wrench FW456R to apply counter force on the hexagon (3).

- ✚ Rinse non-visible surfaces of the pressure cylinder (4) with disposable syringe (D) (Fig. 75).

- ✚ Rinse non-visible surfaces of the high pressure tube (6) with disposable syringe (D) (Fig. 76).

- ✚ Protect working end of the hydraulic applicator plus with delivered protection sleeve (E) FW4358003 (Fig. 77).



Fig. 74

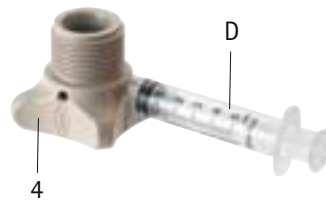


Fig. 75

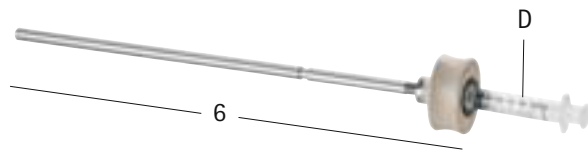


Fig. 76



Fig. 77

F.2 Disassembly MACS II K-wire insertion instrument



Disassembly FW408R
MACS II K-wire insertion instrument

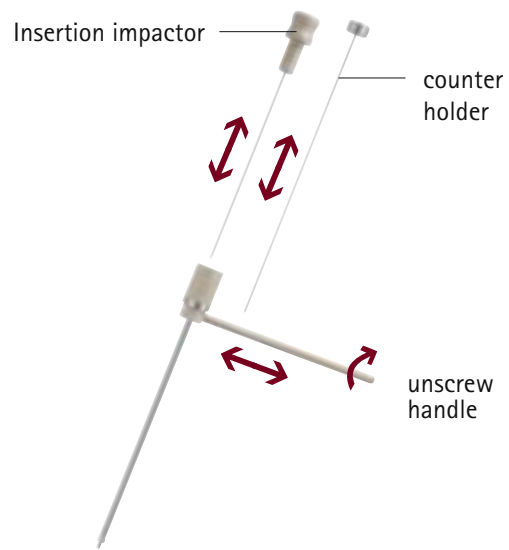
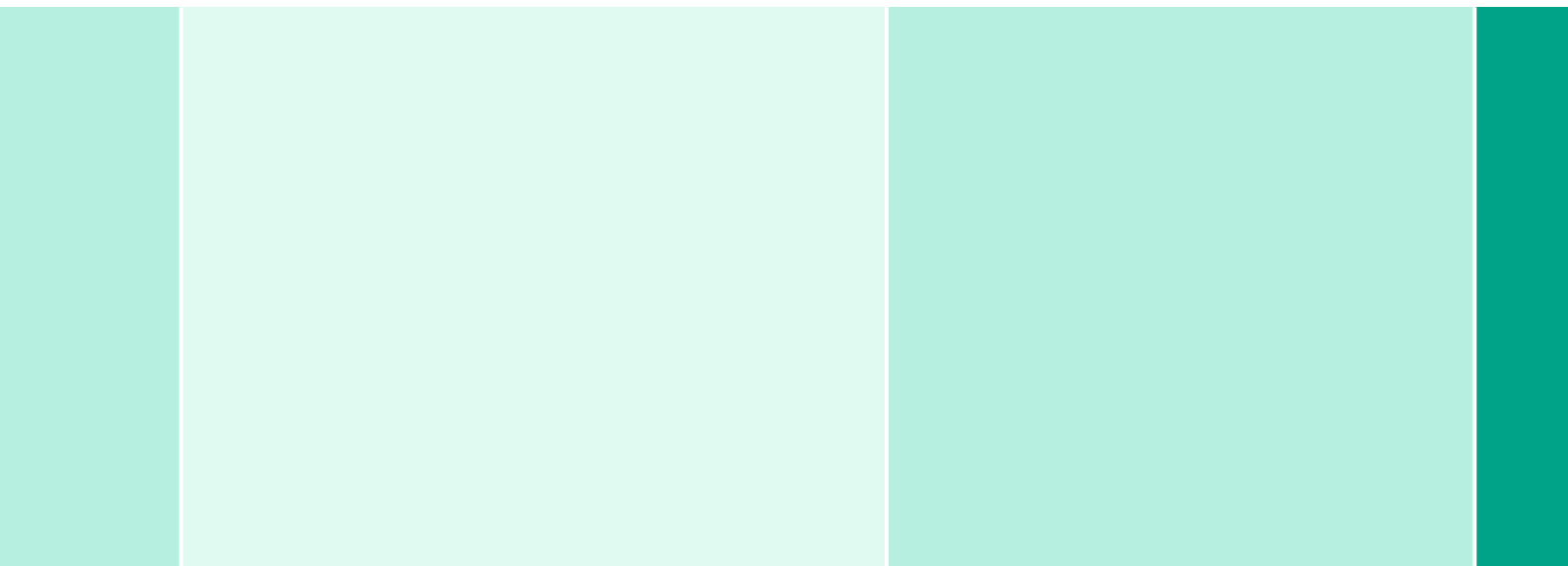


Fig. 78



Aesculap AG | Am Aesculap-Platz | 78532 Tuttlingen | Germany
Phone +49 (0) 74 61 95-0 | Fax +49 (0) 74 61 95-26 00 | www.aesculap.com

Aesculap – a B. Braun company

The main product trademark 'Aesculap' and the product trademarks 'MACS TL' and 'S⁴' are registered trademarks of Aesculap AG.

Subject to technical changes. All rights reserved. This brochure may only be used for the exclusive purpose of obtaining information about our products. Reproduction in any form partial or otherwise is not permitted.

Brochure No. 037602

1013/1/4