









## **THE 48-HOOK LEUKO REDUCTION CART**



## **OPERATING MANUAL AND TECHNICAL SPECIFICATIONS**



## IMPORTANT SAFETY AND OPERATIONAL INFORMATION

 <b>WARNING</b>	
	<b>ASPHYXIATION HAZARD</b> Large prolonged leaks of bottled carbon dioxide may lead to an oxygen deficient atmosphere in small rooms resulting in death or injury.
	<b>ALWAYS:</b> <ul style="list-style-type: none"><li>• Test for leaks after making connections.</li><li>• Turn off gas at cylinder valve when not being used.</li></ul>
	<b>PROJECTILE HAZARD</b> Secure cylinder in compartment in upright position to avoid toppling and possible projectile hazard.
	Wear eye protection and gloves when connecting the regulator to the cylinder to protect against frostbite in the event of a leak.
	Read and understand operator's manual and all other safety instructions before using this equipment.



Save this manual as it contains important safety information and operating instructions.

**⚠ CAUTION** Do not use the cart for any use other than for its intended or similar and related purpose.

**⚠ CAUTION** Do not ride, stand or sit on the cart.

**⚠ CAUTION** For optimum stability, do not move the cart while the top shelf is elevated – lower it first.

**⚠ CAUTION** Take care when moving either top or bottom shelves to ensure that they do not push or pull against low ceilings, pipes or other services and any protruding obstructions from high or low locations.

**⚠ CAUTION** Do not use any form of lubricant, thread sealant, or thread tape on any of the gas fittings.

**⚠ CAUTION** Ensure that the plastic sealing washer is correctly installed on the regulator to cylinder connection so that no gas leaks when the cylinder valve is opened.

**⚠ CAUTION** Always open the gas bottle valve slowly to reduce the shock from gas surging through the lines.

**⚠ CAUTION** Before disconnecting any gas fitting first discharge any pressure in the lines by operating the up down switches till no gas can be heard exhausting – this will eliminate rapid gas release hazard.

**⚠ CAUTION** Never use the lower shelf as a lifting point for carrying the cart as that will damage the shelf, void the warranty and could result in the cart dropping unexpectedly which may cause injury. The correct way to lift or carry the cart is from beneath the square tubular sub-frame.



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## INTRODUCTION

The Kajavida Leuko Reduction Blood Cart has been designed to assist staff in the process of leukocyte reduction when using the major manufacturers' blood bags and Leukocyte filters. It is constructed of medical-grade stainless steel on an aluminum frame, using the highest quality pneumatics and has a maximum capacity to simultaneously process 48 Blood Bags weighing a maximum of 36 kg. It is considered to be part of a Blood Bank's equipment infrastructure and is virtually maintenance-free.

Its ergonomic design and simple operation can help the operator load and unload 48 Blood Bags easily, and with significantly-reduced strain in lifting, bending and physical effort compared to manual systems. This is achieved by using two adjustable shelves powered by clean and safe Food/General Purpose Grade CO<sub>2</sub> gas or Compressed Air. By pressing just two levers both shelves can be positioned at the best working height for any individual operator and will meet the manufacturers' required filtration height.

The cart works efficiently at ambient temperature and in the cold room. The shelves lift slightly slower after extended exposure in the cold room, returning to normal operating speed after a few minutes at ambient temperature.

There are many other features designed to help the operator:

- The lower shelf separates into two trays for easy cleaning.
- A small fixed shelf holds labels, a hand-held heat sealer or other supplies.
- A ruler engraved on the cart indicates the distance between the lower and upper shelves for optimum filtration according to the manufacturers' recommendations.
- An Automatic Height Stop mechanism can be preset to a particular Blood Bag manufacturers' required processing height.
- Filtration can take place with the cart in the cold room.
- Lockable, swivel wheels enable the cart to be safely positioned in any location 4 feet square during filtration.
- The speeds at which the shelves lift and lower can be individually calibrated to suit the user's own preferences.

The cart has undergone a safety assessment , including tip stability, wheel securement, load and general safety tests.





## INSTALLING THE CO2 GAS BOTTLE



Before the cart shelves can be raised or lowered, a 3.15kg (6.9lb) or 6.35kg (14lb) CO2 gas bottle (or the equivalent size available in the country) must be installed. Check the section “**Technical Specifications**” to identify the size of the Gas Bottle compartment and type of CO2 Gas to be used, in order that the correct size and type of gas bottle is purchased. The bottle is contained in the stainless steel compartment with a hinged door, located in the centre of the cart. After unpacking the cart on delivery, note that the lower shelf is already at its lowest position to enable the hinged door to be opened.

To replace an existing CO2 gas bottle, always ensure the lower shelf is fully lowered before opening the door. Open the door by unclipping the catch on the side of the compartment. A set of tools will be seen inside, including an adjustable wrench to be used when installing a CO2 gas bottle.

(When installing a CO2 gas bottle for the first time, the metal elbow with the regulator & dials will be seen inside the compartment. The whole assembly needs to be attached to blue Polyurethane tubing by unscrewing the knurled nut on the

Regulator itself, threading the blue tubing through then tightening the knurled nut. Screw this whole assembly on to the CO2 gas bottle in order to power the shelves).

After attaching the blue tubing to the regulator, offer the large screw thread (on the end of the assembly), up to the new CO2 bottle. If required and provided with the new CO2 bottle, ensure the washer is located on the end of the screw thread before beginning to hand-tighten to screw onto the CO2 gas bottle. Hand-tighten the large screw thread onto the new bottle then fully tighten using the adjustable wrench provided. It is easier to open the valve on the CO2 Gas bottle and set the inlet pressure when it is out of the Gas bottle compartment and standing on the floor. The gas bottle valve may have been tightly screwed down by the manufacturer so be prepared to exert some force when turning the thread to open the gas bottle supply .

After fully opening the valve, check that there are no leaks by listening for any hissing sounds. If there is a gas leak, locate the source then turn off the valve on the bottle, unscrew the metal hosepipe and check that the washer (if required) is present and properly seated on the hose. Reconnect the metal hosepipe then fully open the valve again. If a leak is coming from anywhere other than the gas bottle connection, contact your supplier's service department.



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Set the Low Pressure Gauge at 7 Bar (100 psi) to 7.5 bar before operating the cart. To do this, read the section “**Setting the regulator pressure**”.

Place the bottle carefully on the self-centering polyurethane base in the compartment, ensuring the whole metal elbow assembly now attached to the CO<sub>2</sub> gas bottle is fully contained in the compartment. The dials must be facing the front and be seen clearly through the compartment window. Secure the CO<sub>2</sub> gas bottle inside the compartment by connecting each end of the metal hook to the connecting slots at the rear of the gas bottle compartment and sliding down it the gas bottle until the bottle is held securely.

Turn off the gas bottle valve before disconnecting or replacing a gas bottle. Expel any residual gas in the cart system by pressing the levers a few times.

## SETTING THE REGULATOR PRESSURE



The pressure regulator installed in this cart is a Harris 601 type or equivalent that has two gauges. The right side High Pressure Gauge indicates the remaining pressure in the gas bottle and does not need to be set. The pressure gauge for a full tank will read approximately 56 Bar (827psi). When this gauge shows 7 Bar (100 psi), replace the gas bottle.

The left side Low Pressure Gauge indicates exit pressure to operate the pneumatic shelves of the cart. Turn this gauge to set the pressure to between 7 Bar (100psi) and 7.5 bar.

**Warning: Failure to follow the above instructions may lead to serious injury.**

Close the hinged door and secure the catch. The transparent window allows the user to easily observe the CO<sub>2</sub> pressure. It is recommended that the pressure on both gauges is checked to be correct before commencing each leuko

reduction cycle.

Turn off the CO<sub>2</sub> gas bottle valve when the use of the cart is finished for the day.



## OPERATING THE SHELF LEVERS



Pulling up or pushing down the levers directly below the cart handle opens the CO2 gas line and thereby moves the shelves. (See “Operating the Adjustable Shelves”).

The lever on the left hand side of the cart, located below the handle controls the movement of the LOWER shelf. The lever on the right hand side of the cart, also located below the handle controls the UPPER shelf.

Pressing and holding a lever down or up moves the shelf accordingly and releasing a lever stops the shelf at the desired position.

Markers by the lever show the direction the shelf will move when the lever is pressed.

Each lever is covered by a clear finger guard.

The guard protects the hands, knuckles and fingers should they have been protruding over the edge of the handle and into the path of the lower shelf being raised up.





## OPERATING THE ADJUSTABLE SHELVES



The two shelves are raised & lowered by two levers, each located underneath the handle, one lever for each shelf. (See “Operating the shelf levers”).

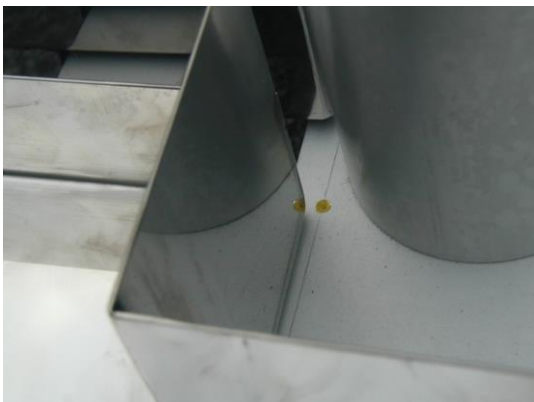
### THE UPPER SHELF

The Upper Shelf has 48 hooks that hold the blood bags during processing. The shelf should be raised to the optimum height required by the filter manufacturers or the local procedure. Any number of bags can be hung to the maximum of 48 and within the maximum total loading of 36 kg. They must be evenly distributed around all sides of the shelf. When it is fully loaded with 48 full bags or 36 kg, the shelf takes longer to reach the required processing height than when

lifting fewer bags. Expect the shelf to rise slowly at first when the lever is pressed, then move faster after a few seconds. **Be aware that the Upper Shelf will move quickly when it is lowered with 48 full bags.** To control the speed of descent, release & press the lever.

### THE LOWER SHELF

The Lower Shelf contains the bags into which the leuko-reduced blood will pass. The Leuko filter will hang freely between the Upper and Lower shelves during filtration. The Lower Shelf is designed to be the working shelf for the operator after leuko-reduction has occurred. Bringing the shelf up to a comfortable table height for each operator provides an ergonomic working area for the completion of the leuko reduction procedures, such as detaching the bags from the tubing and expressing (burping) the air.



The Lower Shelf is made in two halves for easy cleaning & removal. To dismantle the lower shelf, remove the metal retaining bars at both ends of the assembled shelf, pull the two halves apart & remove each shelf from the frame. When re-assembling, locate the guide bars underneath each shelf half by lining up each shelf half with the yellow locating spot on the frame. Push forward until the shelves are fully back into position. Replace the metal retaining bars.



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Both shelves will move at a reduced speed after being in the cold room for more than 10 minutes. The shelves will revert to moving at normal speed after a few minutes at room temperature. If the shelves have been clamped into position using the Cylinder Clamps, turn the clamps to the “off” position before operating the shelf levers.

## LOADING THE BLOOD BAGS



With the upper shelf down & the lower shelf up, both positioned at the operator's most comfortable working position, place the blood bag sets on the hooks, evenly distributed around the cart. There are 48 hooks and any number up to the maximum load of 48 filled bags or 79lb (36 kg) weight can be loaded. Do not lift more than 36kg at one time separately on either shelf. Place the receptacle bags to receive the Leuko-reduced blood, on the lower shelf. The shelf is designed to have the bags

laid across or along the shelf, without any part of the bag overlapping the shelf rim. Double-check that all blood lines and bags are contained within the shelf rim. Note there is a safety gap between the lower shelf and the lower frame to avoid trapping blood lines when the shelf is lowered.

If using the Automatic Height Stop feature to pre-set the height for filtration based on the manufacturers' requirements, please read “Using the Automatic Height Stop feature” before proceeding.

When the filtration process is due to start, place the cart in a suitable location & lock the wheels (See “Locking the Wheels”). Under normal filtration times, clamping of the shelves is unnecessary, but if filtration occurs over a long period (for instance overnight), the shelves should be clamped in position using the four shelf-cylinder clamps. This clamping only prevents the shelves from moving down under the weight of the bags & the CO<sub>2</sub> gas pressure in the shelf cylinders. **The clamps will not stop the shelves moving up if the levers are pressed. (See “Clamping the Shelf Cylinders”).**

Raise the upper shelf by pulling up the lever on the left hand side of the handle, and releasing it when the shelf has reached the desired height, or the shelf stops automatically at the pre-set height. The engraved ruler on the front of the gas cylinder compartment can be used to indicate the height the upper shelf has reached relative to the lower shelf when the latter is at its lowest position. The ruler is intended as a guide height only and is not to be taken as an absolute exact measurement. Lower the lower shelf by pressing down the lever on the right hand side and releasing it when the shelf reaches its lowest position.



## USING THE AUTOMATIC HEIGHT STOP FEATURE



If required, the Upper shelf can be set to automatically stop at a pre-determined height. The Automatic Height Stop mechanism is located next to the CO2 Gas Cylinder compartment and can be seen and accessed through the side panel of the small fixed shelf. It consists of two plates clamped together by 2 mushroom-head screws. There is a yellow arrow located at the front of the cart on the gas cylinder compartment to indicate the height reached. When setting the required height, loosen the screws on the side with the Allen key tool provided, slide the plate to the required height as indicated by the yellow arrow and tighten the screws. Raise the Upper shelf to ensure it stops at the required height, before commencing Leuko reduction.

## CLAMPING THE SHELVES IN POSITION



Both shelves can be independently clamped in position to stop the loaded shelves from lowering if they are left in a raised position for an extended period. These 4 clamps (2 per shelf) work at ambient temperature and also in the cold room. Each shelf is attached to two cylinders and the pressure of the CO2 gas will raise and lower them. Around each cylinder is a clamp that, when turned in the appropriate direction clamps the shelf cylinder “on” or “off”. If it is intended to leave the shelves raised up

for an extended period, turn the clamp to the “on” position after the shelves are raised. Clamping the shelves stops them from moving when loaded with bags and in a raised position. **Remember to turn the clamp to the “off” position just before lowering or raising the relevant shelf.**

Please note that the clamps only work when the shelves are loaded and the shelf cylinders are under gas pressure. If the clamps are used when there is no load applied they will not stop the shelves from moving if the levers are used.





## LOCKING THE WHEELS



Four swing and lock high strength chromed caster wheels provide for easy rolling. They also contain a brake to lock the cart in position. Always lock the wheels when the cart is left unattended. The locks are activated by pushing the foot down on the lever that is located at the front edge of each wheel. To unlock, lift the foot up under the protruding lever or push the foot down on the top button until the lock clicks off.

## OPERATING THE CART IN THE COLD ROOM

The cart is designed to operate efficiently in the cold room. The movement of the shelves in the cold room will be at a slightly reduced speed than operating at ambient temperature.

When the cart is loaded with bags and is ready to be placed in the cold room, ensure the upper shelf is in a lowered position to ensure an unobstructed passage through doorways and to stop the bags and filters swaying unnecessarily.

Wheel the cart into the cold room, lock the wheels and raise the upper shelf to the desired height. Lower the lower shelf all the way down.

Turn the cylinder clamps to “on”.

After filtration and when the cart is ready to be moved out of the cold room, remember to turn the cylinder clamps to “off”, lower the upper shelf and unlock the wheels.

## CLEANING AND MAINTENANCE

Clean the Cart when necessary using appropriate cleaning or decontaminate solutions. For example, use medical-grade bleach.

There are few mechanical parts to this cart. Maintenance is required only when the cart is malfunctioning.



## **THE SHELF SPEED ADJUSTERS (Trained personnel only)**

**Instructions for the adjustment of the shelf speeds are included in this operating manual but MUST ONLY EVER BE CARRIED OUT BY TRAINED PERSONNEL.**

### **Introduction.**

The cart is capable of lifting 36kg with the regulator pressure set between 7.0 bar and 7.5 bar. These settings are within the cart's safety limits. The time to lift 48 bags @ 750 grams each at 7 bar pressure is longer than 7.5 bar pressure because there is less lifting force. The time taken to lift 25kg is quicker than lifting 36kg because there is less weight to lift, but with the same force. In addition, the actual pressure fluctuates slightly up and down as the levers open to take in air to power the lifting.

### **Recommended lift procedure.**

Bags with whole blood, and the filter, lines and empty bags can weigh 750grams each, so 48 complete sets will weigh 36kg. The recommended method to lift these full bags that weigh greater than 25kg in total is :

- a) Raise the lower shelf to the operator's waist height,
- b) Rest the empty bags and lines on the lower shelf,
- c) Place the full bags on the upper shelf hooks,
- d) Raise the upper shelf to the required filtration height.
- e) Lower the lower shelf to the bottom position

In this way, the lower shelf takes up some of the total weight of 36kg when the upper shelf is raised, and so the upper shelf is not lifting 36kg.

### **Lift times for new carts.**

The cart is unused when first delivered so all internal fittings are at their maximum thickness without any initial give, and will ease after a few days of use. So with these factors, including the method that users employ to load the shelves, lift times can and do vary. Some users might consider the lift times to be slow, but can be calibrated to your whatever they feel comfortable with. The shelf lift and drop times can be further refined, but only by trained personnel, using the speed adjusters described below.





## Factory settings.

Notwithstanding the recommended loading and lifting procedure, the lift times of the shelves are calibrated during our QA tests with the most conservative set of parameters to the factory settings as follows.

CO2 Gas Pressure	7.0 bar to 7.2 bar
Lift weight	36kg
Upper Shelf lift time	18 – 28 seconds
Upper shelf drop time	7 – 10 seconds
Lower Shelf (C-Tray) lift time	8 – 16 seconds
Lower Shelf (C Tray) drop time	6 – 10 seconds

With the Gas Pressure set at 7.5 bar, the Upper Shelf lift time is approximately 12 to 15 seconds and the drop time is 5 to 8 seconds.

Therefore there is flexibility to speed up or slow down the lift times in a very easy way without need to access the individual speed controllers for each shelf. Either increase the gas pressure to 7.5 bar, or/and distribute the whole bag set weight by resting the empty bags on the lower shelf first as described above.

## USING THE SHELF SPEED ADJUSTERS

Each shelf has 2 speed adjusters, an “up speed” adjustment (lift) and “a down speed” adjustment (drop). If the speeds are still to slow or too quick after making adjustments to the gas pressure, make further adjustments by increasing or decreasing the rate of escape of the exhaust gases from the cylinders.

**These adjustments are only ever to be made by trained personnel AND NOT AN UNTRAINED END USER. The shelves can drop VERY QUICKLY & DANGEROUSLY if the wrong adjustment is made and a heavy load is on the shelves.**

These adjustments must be made while knowing and understanding the regulator settings (7 to 7.5 bar) and the procedure employed by the users to lift and lower the bags. For these reasons the procedure below is not reproduced in the Operating Manual.

## THE UPPER SHELF



The Upper Shelf speed adjusters are located on the front panel that also shows the height the bags are lifted to, with the heights engraved on it.



#### **Up (lift) speed**

There is a small screw hole at the top of this panel accessible only with a small slot head screwdriver. To decrease the speed the upper shelf lifts at, turn the screw clockwise. One complete turn is approximately equal to 3 seconds. This action lets out less exhaust gas (that is at a lower pressure than the 7 bar inlet gas), slows down the rate of replacement by 7-bar gas entering the cylinder and so slows down the lift time. To increase the speed, turn the screw anti-clockwise. Letting out more exhaust gas that is at a lower pressure than the 7 bar inlet gas, enables more 7 bar gas to enter the cylinder and so speed up the lift time.

#### **Down (drop) speed**

There is a small screw hole at the bottom of this panel & this is the Upper Shelf DOWN SPEED adjuster. The method of adjustment is the same as above.

### **THE LOWER SHELF**

The Lower Shelf speed adjusters are located on the small shelf that holds a hand-held sealer, labels & sundry small items, adjacent to the auto height adjuster.



#### **Up (lift) speed**

Stand holding the handle and look at the small shelf. On the opposite side of the shelf there are two valves protruding through the shelf side. The screw in the right hand side valve controls the Lower Shelf UP SPEED. Follow the instructions above.

#### **Down (drop) speed**

To the left of the Up speed adjuster is the Down speed adjuster. Follow the instructions above.

### **TECHNICAL SPECIFICATIONS**

Height: 88"maximum (2235mm), 58"minimum (1473mm).



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Width: 27" (686mm).

Length: 43" (1092mm) or 48" (1219mm) with the handle.

Weight: 170 lb (77kg) excluding the CO2 tank and blood bags.

Working Pressure (CO2 or Compressed Air): 7 Bar (100psi) to 7.5 bar.

Working lift capacity: maximum 36kg (79lb) at 7 bar to 7.5 bar.

Gas Bottle Compartment dimensions: Width 140mm, Depth 150mm.

CO2 Gas Type : Food/General Purpose Grade. (Medical Grade CO2 gas bottle connectors are incompatible with the cart's own connectors).

Cart Materials: Stainless Steel, Aluminum, Polyurethane & Polycarbonate.

Estimated Working Cycles: 3.1 kg ( 6.9 lb) CO2 gas bottle - 55 cycles.  
 : 4.6 kg (10.0 lb) CO2 gas bottle - 80 cycles.  
 : 6.3 kg (14.0 lb) CO2 gas bottle - 161 cycles.

One cycle is defined as: From both shelves stationary in the middle, the top shelf being fully loaded, raise the top shelf up and lower the bottom shelf down. Reverse the operation

Speed of the Upper Shelf when fully loaded between 7-7.5 bar pressure		
<u>Total weight loaded on hooks</u>	<u>Time of movement to maximum position</u>	
	<u>Up</u>	<u>Down</u>
25 kg	8 secs	14 secs
30 kg	11 secs	11 secs
36 kg	18 secs	8 secs

(Approximate times)

## PARTS LIST

Item No.	Maker	Description	Part No. & Size	Qty
1	Festo	Rodless cylinder	DGP-40-845-PPV-AB	1
2	Festo	Compact cylinder	DNC-32-760-PPV-A	1
3	Camoozi	Solenoid valve	368-905	2



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4	Festo	Speed controller	GRLA-1/4-QS-6-RS-B	2
5	Festo	Speed controller	GRLA-1/8-QS-6-RS-B	2
6	SMC	Elbow	KQL06-02S	4
7	SMC	Straight fitting	KQS06-02S	2
8	SMC	'Y' joint	KQU06-00	1
9	Rhombus	Rotary caster wheel	5"	2
10	Rhombus	Rotary caster wheel complete with brake	5"	2
11	Harris	Regulator & nut	601E-10-C02	1
12	Own manufacture	Stem	601E-stem	1
13	Festo	Polyurethane tubing	1100U06-04	12m