

MOVOTEC®
Corner Leg Crank Driven
Lift System Manual
by
SUSPA®



Copyright © 2012 by
Suspa® Incorporated

All rights reserved. No part of this manual may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system without permission in writing from Suspa® Incorporated.

1.0 Table of Contents

2.0 Introduction.....	2
3.0 Safety Instructions	3
4.0 How it Works.....	5
4.1 Extension Cycle.....	5
4.2 Retraction Cycle:	6
5.0 Unpacking Instructions	6
6.0 Lift System Specifications	8
6.1 Lift Cylinder Specifications.....	8
6.2 Crank Driven Pump Specifications	9
6.3 Regulatory Information	9
7.0 Installation Instructions	10
7.1 System Component Placement	10
7.2 Workstation Frame Assembly	10
7.3 Lift Cylinder Installation	12
7.4 Crank Driven Pump Installation	13
7.5 Hydraulic Tubing Management.....	15
7.6 Workstation Leveling	15
8.1 Before Loading the Workstation	17
8.2 System Extension Cycle	19
8.3 System Retraction Cycle	19
8.4 Stowing the Crank	20
9.0 Troubleshooting	21
10.0 Inspection and Maintenance	22
11.0 Warranty	23
12.0 Replacement Parts	24
13.0 Optional Accessories	24
14.0 Disposal	24
15.0 Contact Information	24

2.0 Introduction

Thank you for purchasing the Movotec[®] Corner Leg Crank Driven Lift System.

The Movotec[®] Corner Leg Crank Driven Lift System is a single-acting fluid displacement system that is manually driven by a hand crank. The Movotec[®] Corner Leg was designed to seamlessly integrate with commercially available aluminum structural framing. Aluminum structural framing is used by many manufacturers to build custom industrial tables, machine bases, and other equipment. The Corner Leg provides manufacturers the ability to make their equipment ergonomically height adjustable. Movotec[®] Corner Leg Lift Systems are offered in hand-crank and motorized versions. The maximum load capacity for a Corner Leg four-leg system is 750 lb (340 kg) with adjustment ranges of up to 16 inches (400mm).

Movotec[®] lift systems are subjected to life cycle testing on a regular basis. The tests are performed in a temperature and humidity controlled environment under full system load conditions. Movotec[®] lift systems perform consistently well in this controlled test environment. However, due to the wide variety of possible lift system applications and operating conditions, Suspa[®] does not warrant that any particular lift system is suitable for any specific application. It is the responsibility of the person who specified the system to determine its “fitness for use” in the application, through testing and analysis, to ensure safe and reliable performance. A complete statement including terms and limitations of the Movotec[®] Corner Leg Crank Driven Lift System warranty can be found in Section 11.0 of this manual.

Movotec[®] lift systems are assembled and subjected to a full function quality test before they leave our manufacturing facility. Although Suspa[®] guarantees our products are free from material and manufacturing defects, Suspa[®] cannot support the warranty for our products if they are altered, misused, misapplied, or abused in any way. It is the responsibility of system installers, users, and service technicians to read and carry out the instructions in this manual correctly to prevent these potentially unsafe and unwarranted occurrences from happening.

Thank you again for purchasing the Movotec[®] Crank Driven “Corner-Leg” Lift System.

Suspa[®] Incorporated

3.0 Safety Instructions

READ THE INSTRUCTIONS IN THIS MANUAL BEFORE ATTEMPTING TO INSTALL, OPERATE, OR SERVICE THIS PRODUCT. FOLLOW THESE SAFETY INSTRUCTIONS AT ALL TIMES.

This manual contains safety, installation, operation, maintenance, and user service instructions for the Movotec® Corner Leg Crank Driven Lift System. Suspa® Incorporated is not responsible for any alteration, misuse, misapplication, or abuse of this product resulting in property damage, personal injury or death.



WARNING

FAILURE TO FOLLOW THE INSTRUCTIONS IN THIS MANUAL COULD RESULT IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

If you have any questions about the use of this product, the safety practices outlined in this manual or would like a digital copy of this manual, please contact:

SUSPA® Incorporated
 3970 Roger B. Chaffee Drive SE
 Grand Rapids, MI 49548-3497
 Phone: (616) 241-4200
 Fax: (616) 241-4347
www.suspa.com

VERIFY SYSTEM SELECTION. Before the installing or operating the system, please review the application to confirm that the correct Movotec® Lift System has been selected. Pay particular attention to the load capacity and adjustment range ratings listed on the orange pump warning label.

HANDLE COMPONENTS WITH CARE. Do not handle system by the hydraulic tubing. Keep hydraulic tubing far from heat, sharp edges, and moisture. If hydraulic tubing is damaged, discontinue use and have the tubing replaced immediately. Do not ever attempt to repair a damaged hydraulic tubing line.

VISUALLY INSPECT COMPONENTS. Before installing and operating the system, inspect all components for any damage that may have occurred during shipping and installation. Do not attempt to disassemble system or system components for any reason. If a defective component is found, contact Suspa® Incorporated for repair or replacement.

USE OF TRAINED AND QUALIFIED PERSONNEL System installation, operation, and repair should only be done by persons having sufficient knowledge of the lift system

and the contents of this manual. In addition, they must have an understanding of all warnings and precautionary measures noted in these safety instructions.

AVOID HAZARDOUS ENVIRONMENT. Do not operate the system outside. Do not expose the system to damp or wet conditions. Avoid any chemical or corrosive environments. Do not operate the system in the presence of flammable solvents, propellants, and/or explosive materials (i.e. gas, vapor, dust, etc.) Avoid temperatures outside of the system rated operating temperature range 41° to 113°F (5° to 45°C). Do not subject lift system components to vibration and/or impact load conditions.

INSTALLATION SAFEGUARDS. Do not use the system for any purpose other than its intended function. Before operating system, make sure that the workstation has a minimum clearance of 2 in. (51mm) from any other object or structure to prevent pinching or crushing hazards. Do not allow wall, cabinet, electrical lines, hydraulic or pneumatic lines, or any other fixed structures to obstruct the movement of the workstation during operation.

KEEP CHILDREN AWAY. It is not recommended that children operate this lift device. If this device is used by or near children, close supervision is absolutely necessary.

USE OF ACCESSORIES. Use only spare parts and accessories authorized or supplied by Suspa® Incorporated. Do not replace or replenish lift system hydraulic fluid unless the fluid is supplied by Suspa® Incorporated.

MAINTENANCE SAFEGUARDS. Prior to performing any maintenance or service on the device, remove the load from all lift cylinders. The workstation or structure that the lift system is attached to should be stabilized to prevent personal injury or property damage during maintenance or service procedures.

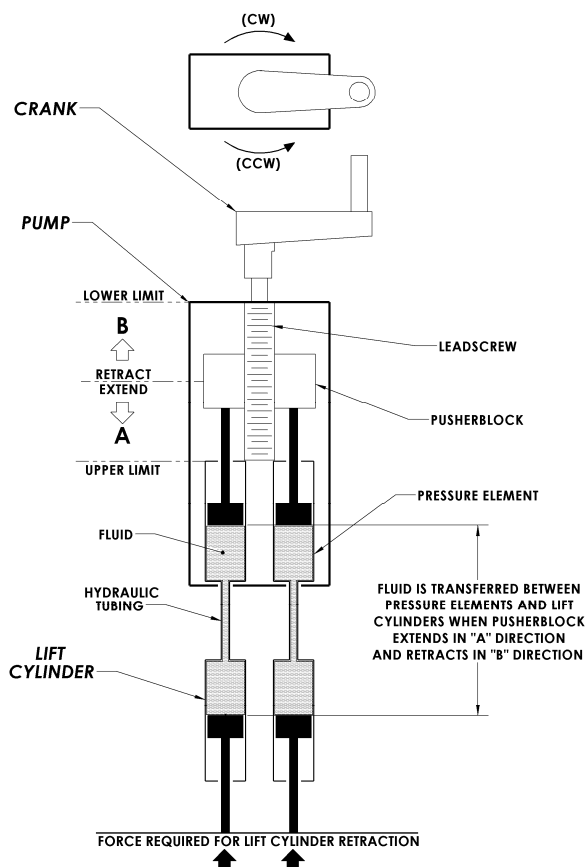
RETRACT SYSTEM BEFORE MOVING. To reduce the risk of property damage and personal injury, always retract the lift system fully before moving the equipment.

UNPLUG BEFORE CLEANING. Retract the lift system before cleaning components. Clean system components with a mild soap and water-damped cloth. Do not use corrosive cleaning agents or high pressure wash systems to clean lift system components. Make sure system is clean and dry before operating the system.

SAVE THIS MANUAL FOR FUTURE REFERENCE.

4.0 How it Works

Movotec[®] Crank Driven Lift Systems are comprised of three major component subsystems; the crank, the pump, and the lift cylinders. This section will explain how each subsystem works together to make the lift system extend and retract.



Movotec[®] Crank Driven Schematic

4.1 Extension Cycle

The crank is mechanically coupled to the pump leadscrew shaft. When the crank is rotated in a clockwise (CW) direction, the leadscrew shaft rotates in the same (CW) direction. As the crank continues to rotate in a (CW) direction, the threaded pusherblock moves up the leadscrew in the direction of arrow "A". This action drives fluid from the pressure elements, through the hydraulic tubing, and into the lift cylinders causing them to extend. As the cylinder load increases, the force required to rotate the crank increases. Generally speaking, the crank force required to extend the system will always be greater than the crank force required to retract the system. It is also important to note that when the pump has reached its upper limit, the user will feel increased resistance at the crank handle.

4.2 Retraction Cycle: (Refer to **Movotec® Crank Driven Schematic** on page 6)

The crank is mechanically coupled to the pump leadscrew shaft. When the crank is rotated in a counter-clockwise (**CCW**) direction, the leadscrew shaft rotates in the same (**CCW**) direction. As the crank continues to rotate in a (**CCW**) direction, the threaded pusherblock moves down the leadscrew in the direction of arrow “**B**”. As long as there is sufficient load on the lift cylinder piston rods, the fluid in the lift cylinders flows back through the hydraulic tubing and into the pressure elements. It is important to note that the user will feel increased resistance at the crank handle when the pump has reached its lower limit.

5.0 Unpacking Instructions

The system comes packaged in a cardboard carton. To unpack the system:

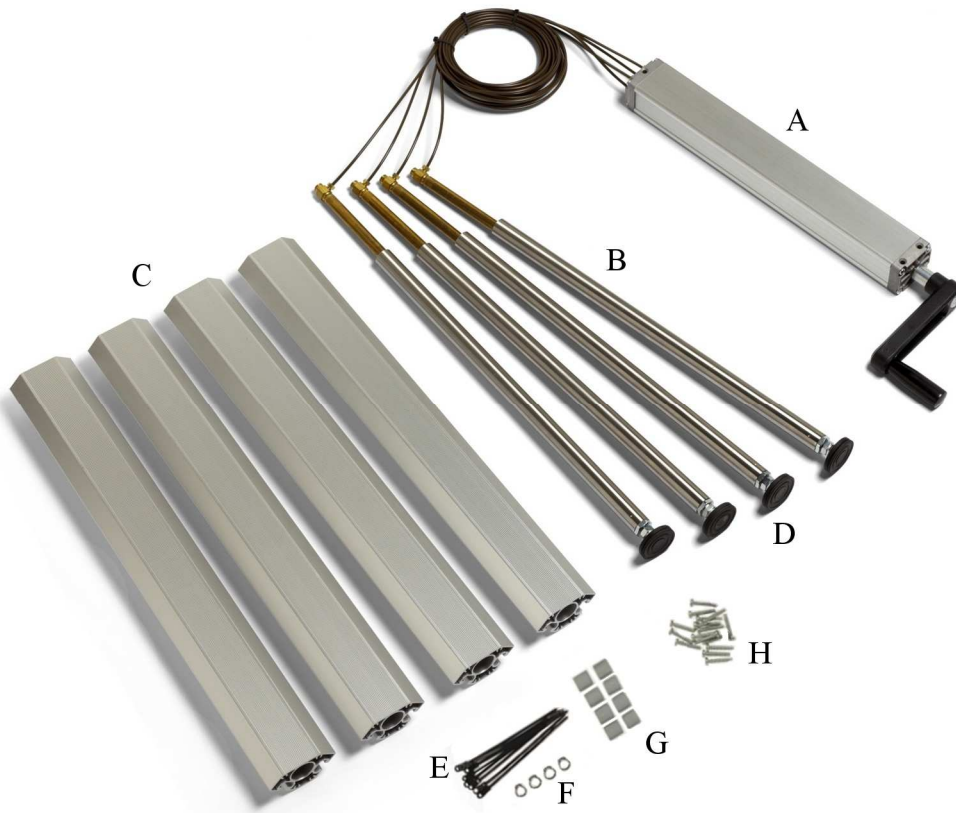
- Check the carton label to confirm that you have received the correct system; open the carton and remove packaging material.
- Carefully remove the system from the carton, and verify all components are present (reference chart below), and that the correct lift system was received.

Do not handle the lift cylinders and motorized pump by the hydraulic tubing. Incorrect handling of hydraulic tubing could weaken the tubing material and system tubing connections.



**DAMAGE TO TUBING OR TUBING CONNECTIONS
COULD CAUSE FLUID LOSS AND UNCONTROLLED
DESCENT OF THE WORK-SURFACE.**

- Verify that all of the listed components are present; carton should contain:



System Component	Quantity
(A) Crank Driven Pump	1
(B) Lift Cylinders	4
(C) Corner Leg Housings	4
(D) Glides	4
(E) Cable Ties	8
(F) Retaining Rings	4
(G) Mounting Clips	8
(H) Torx Screws	16

- If the lift system is damaged or any component is missing, please contact Suspa[®] Incorporated to resolve the issue.
- Dispose of the all packaging materials in an ecologically sound manner.

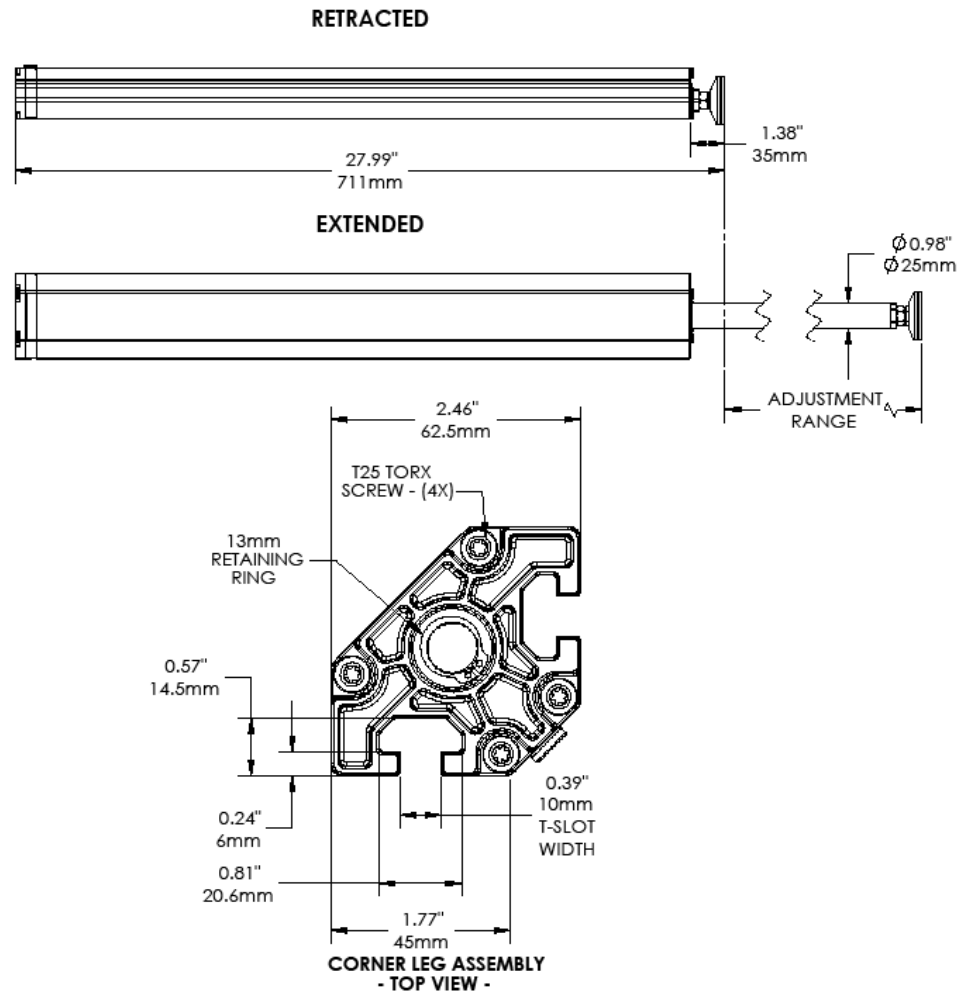
6.0 Lift System Specifications

The “X” and “Y” dimensions shown in the table and drawings below vary depending on the system lift capacity and the adjustment range of the selected system.

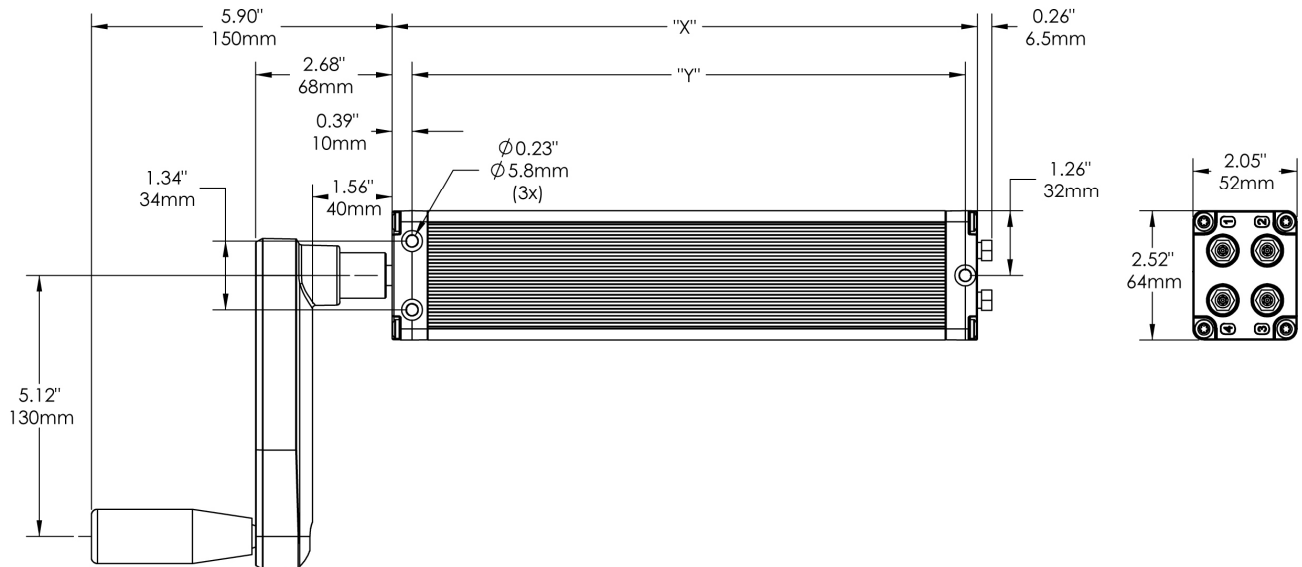
Lift System Part Number	Adjustment Range (in/mm)	System Lift Capacity (lb/kg)	Crank Driven Pump	
			"X" (in/mm)	"Y" (in/mm)
MLS-00040	5.9 / 150	750 / 340	11.50 / 292	10.87 / 276
MLS-00041	7.9 / 200	750 / 340	13.86 / 352	13.23 / 336
MLS-00042	11.8 / 300	750 / 340	18.58 / 472	17.95 / 456
MLS-00043	15.7 / 400	750 / 340	23.39 / 594	22.76 / 578

6.1 Lift Cylinder Specifications

CL4xx cylinders are rated for a maximum load of 250lb (113.4kg) each.



6.2 Crank Driven Pump Specifications (Refer to Chart on Page 10 for “X” and “Y” dimensions)



6.3 Regulatory Information

RoHS Directive (2002/95/EC)

Suspa® Incorporated has examined all of the materials and processes utilized in the production of Movotec® lift systems and has determined that this product is in compliance with the European Union RoHS Directive 2002/95/EC.

7.0 Installation Instructions



FOLLOW ALL SAFETY INSTRUCTIONS CONTAINED IN SECTION 3.0 OF THIS MANUAL BEFORE INSTALLING THIS PRODUCT. FAILURE TO FOLLOW THE INSTRUCTIONS IN THIS MANUAL COULD RESULT IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

7.1 System Component Placement

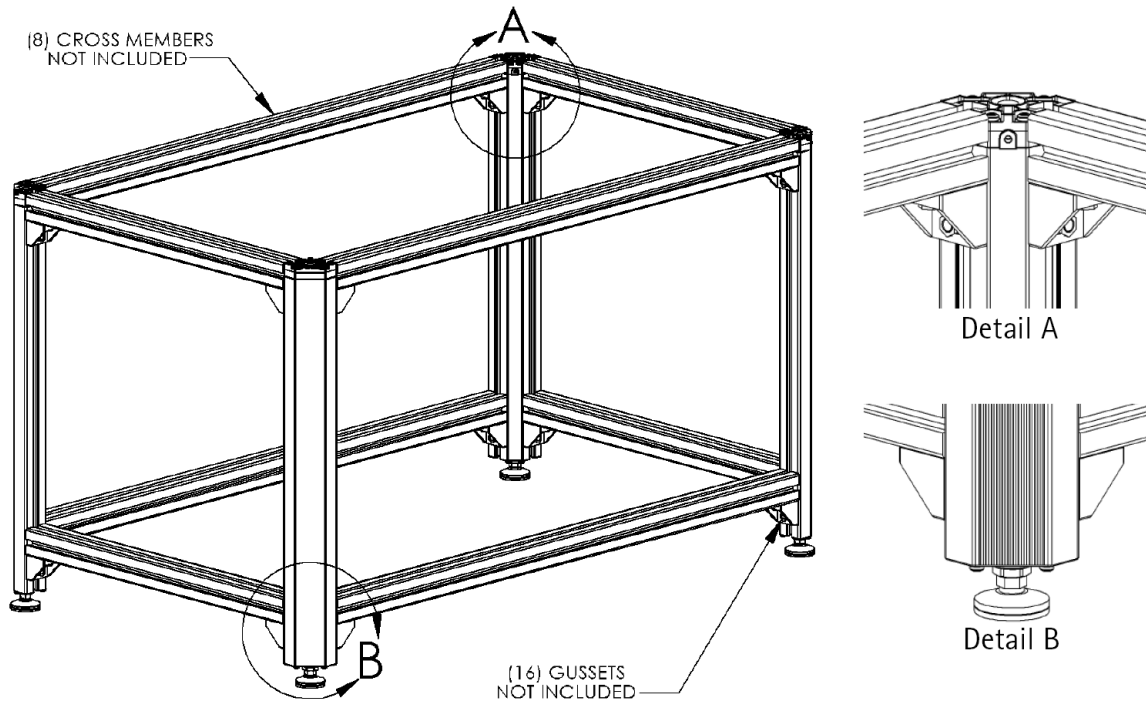
Movotec[®] Corner Leg Crank Driven Lift System components are physically linked together with hydraulic tubing. Therefore, it is very important to make sure that the system components are located on the workstation so that each component can be installed safely without damaging the hydraulic tubing. It is also important to make sure that the crank has enough clearance to fold away under the work-surface.

7.1.1 Crank Driven Pump Placement - The crank driven pump can be installed in any orientation, however it is recommended that the unit is mounted horizontally. The pump should be installed so that there is enough hydraulic tubing to reach each lift cylinder and enough clearance for the minimum hydraulic tubing bend radius of 2 in.(51mm) to be maintained. The crank should be located near the edge of the work-surface. Suspa[®] Incorporated offers other cranks and crank hardware options which can be purchased on our website at <http://movotec.com>.

7.1.2 Hydraulic Tubing Placement – Hydraulic tubing must be kept away from sharp edges and moving parts. Contact with moisture and heat must also be avoided. Hydraulic tubing should fixed to the workstation or structure using the cable ties and mounting clips provided. Additional cable ties and mounting clips can be purchased on our website at <http://movotec.com>.

7.2 Workstation Frame Assembly

The Corner Leg housing was designed to be used in conjunction with aluminum structural framing profiles to create a height adjustable frame assembly. A typical construction for a Corner Leg frame is shown below. Please note that profile cross members and gussets are not included with system. Contact Suspa[®] Incorporated with questions regarding aluminum structural framing and framing hardware information.

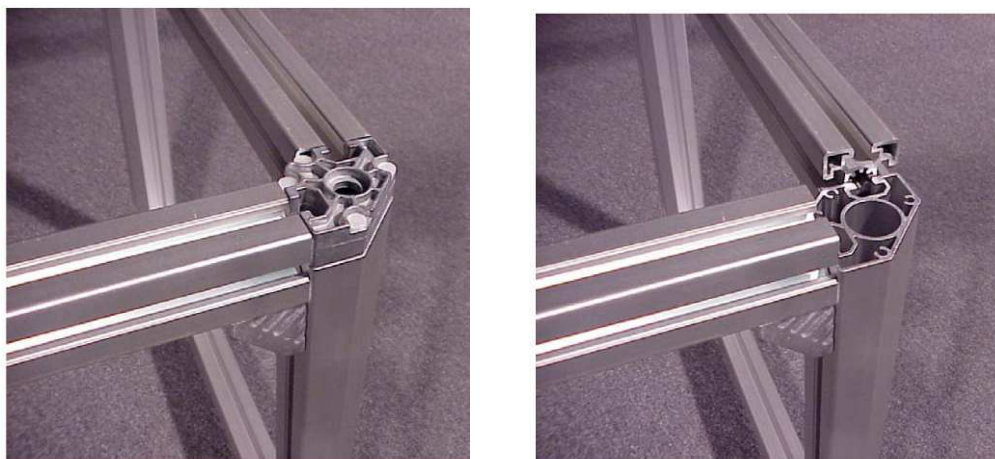


- Assemble workstation frame with Corner Leg housings as shown. Please note that cross members and gussets are not included with system.

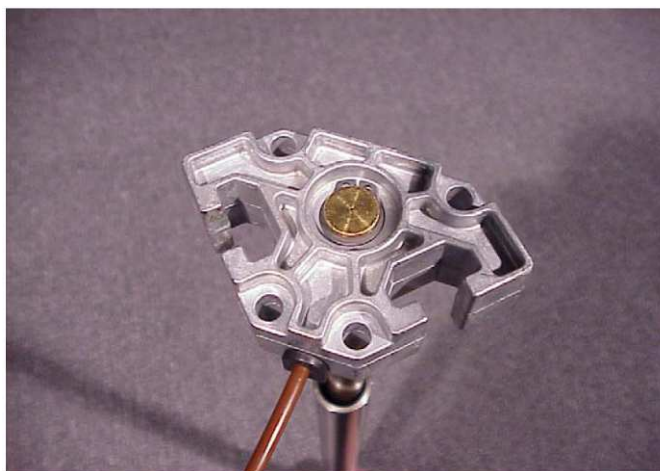


7.3 Lift Cylinder Installation

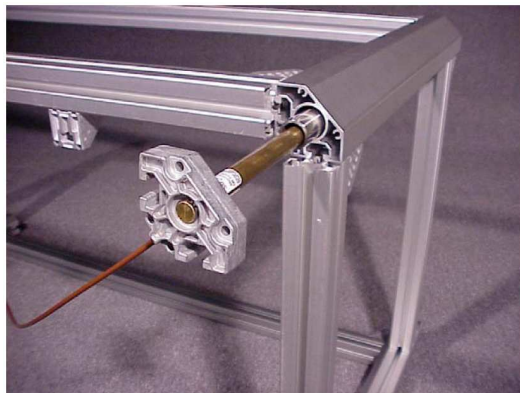
- Remove plastic pins from upper caps. Remove upper caps from workstation frame assembly.



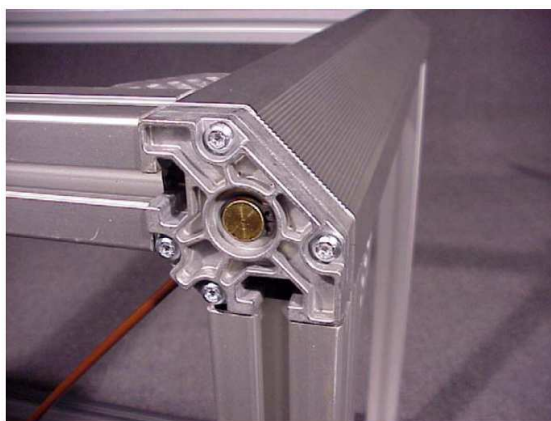
- Install upper cap onto the top of the lift cylinder. Make sure that the grommet is engaged with tubing cutout in cap opening. Using retaining ring pliers, install 13mm retaining ring into cylinder groove. This will secure upper cap to the lift cylinder.



- Insert lift cylinder into open end of corner leg housing. Make sure there is enough flexible hydraulic tubing to reach each leg without putting any tension on the tubing and while maintaining the minimum flexible tubing bend radius of 2in. (51mm). Each system is shipped with hydraulic tubing cut-to-length and assembled to the unit, (2) lengths at 8.2 ft. (2.5m), and (2) lengths at 10.2 ft. (3.1m).



- Fasten upper cap to Corner Leg housing using T25 Torx head thread forming screws. Suspa® Incorporated recommends a lift cylinder mounting screw tightening torque of 3.5-4 N-m (31-35 lb-in.).



- Repeat procedure for remaining lift cylinders.

7.4 Crank Driven Pump Installation

- If possible, orient workstation upside down for easy assembly.



Note: pump and hydraulic tubing not shown.

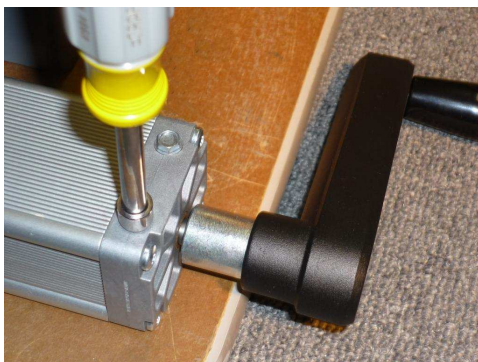
- Mount work surface to frame. Please note that gussets and mounting screws are not included with system (contact Suspa, Incorporated for information regarding a complete workstation kit).



- Place crank driven pump in the desired location. Make sure there is enough room for crank to fold away under the work-surface. Mark and prepare three holes in the locations provided in the pump front and rear mounting plates.



- Mount the crank driven pump to the work-surface. Please note that mounting screws are not provided with system.



- Check mounting screws to ensure that the unit is tightly secured.

7.5 Hydraulic Tubing Management

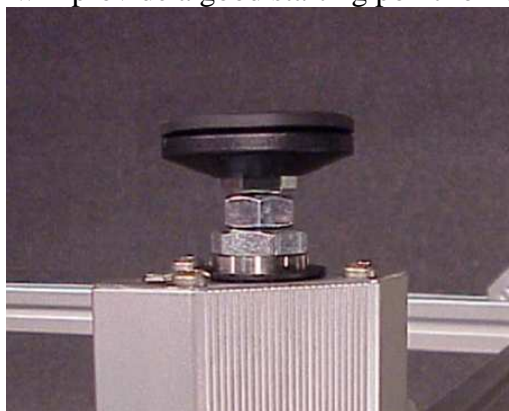
- Coil up excess hydraulic flexible tubing into approximately 6 in. (150mm) diameter coil(s) and attach to the workstation using the mounting clips and/or cable ties. Take special care not to damage flexible tubing during this operation.



- While it is recommended to coil up excess tubing when hydraulic tubing lengths are too long, the lines can be shortened. Contact Suspa[®] Incorporated for detailed Movotec[®] Tube Shortening Instructions.
- If hydraulic tubing lengths are too short, it is only possible to make the tubing lengths longer by replacing the line, using a Movotec[®] Refill Kit. Contact Suspa[®] Incorporated for a more information and instructions.
- Check flexible tubing to ensure it is secured to the workstation and that no damage has been sustained during this operation.

7.6 Workstation Leveling

- Thread glide into all lift cylinders until the glide threads are fully engaged as shown. This step will provide a good starting point for leveling the workstation.

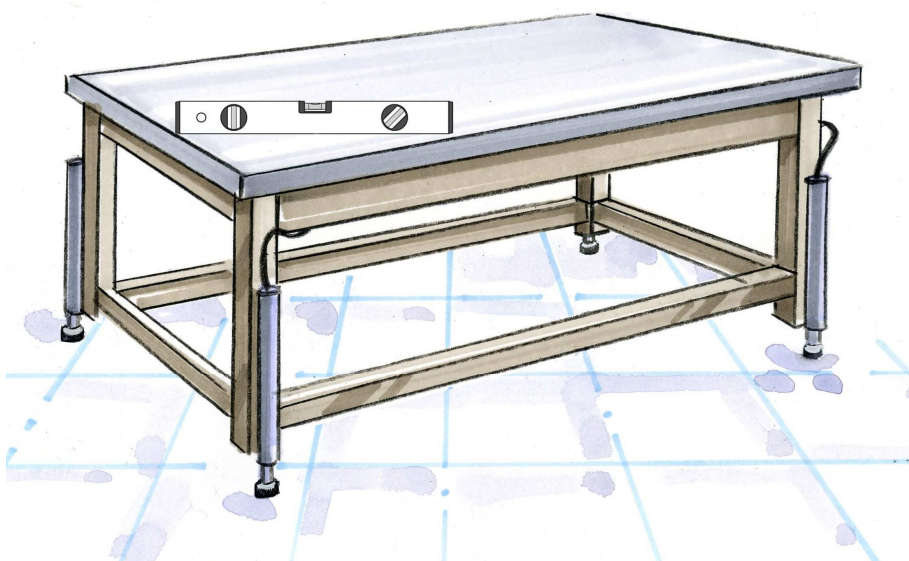


- Re-orient the workstation so that the glides are in contact with the floor as shown.

NOTICE

To prevent damage from occurring to the system, take special care not to drop the workstation onto the lift cylinders

- Place a level on the top of the work-surface. Unthread glide(s) from the lift cylinder(s) as needed to achieve a level work-surface. Once the workstation is level, tighten the lock nut on all four glides to ensure the workstation will remain level during use.



Note: CB-style cylinders shown in illustration.

8.0 Operation Instructions



FOLLOW ALL SAFETY INSTRUCTIONS CONTAINED IN SECTION 3.0 OF THIS MANUAL BEFORE OPERATING THIS PRODUCT. FAILURE TO FOLLOW THE INSTRUCTIONS IN THIS MANUAL COULD RESULT IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

Movotec[®] systems can lift relatively large loads, lasting for many years, as long as they are installed and used correctly. The Movotec[®] Crank Driven “Corner-Leg” Lift System is not intended for continuous cycling or for applications requiring precision height adjustment.

The Movotec[®] lift system is single-acting and will require a minimum load of 35 lb (15.9 kg) per cylinder for even lift system retraction.

8.1 Before Loading the Workstation

- Check all hydraulic connections.
- Check for damage to flexible hydraulic tubing that may have occurred while unpacking or installing the system.
- Check all system components to ensure that they are tightly secured to the work station.
- Confirm that a minimum load of 35 lb (15.9 kg) per cylinder is present for even lift system retraction.
- Confirm the maximum system load is not being exceeded. The maximum system load is the total load including the workstation being lifted and anything on top of the work-surface.

WARNING

If the lift system does not operate as explained in Section 4.0 of this manual, remove the load from the system immediately and contact Suspa[®] Incorporated technical support.

If technical support is needed, or any questions exist before operation, system information can be found using the product labels located on the side of the pump (reference photographs below).

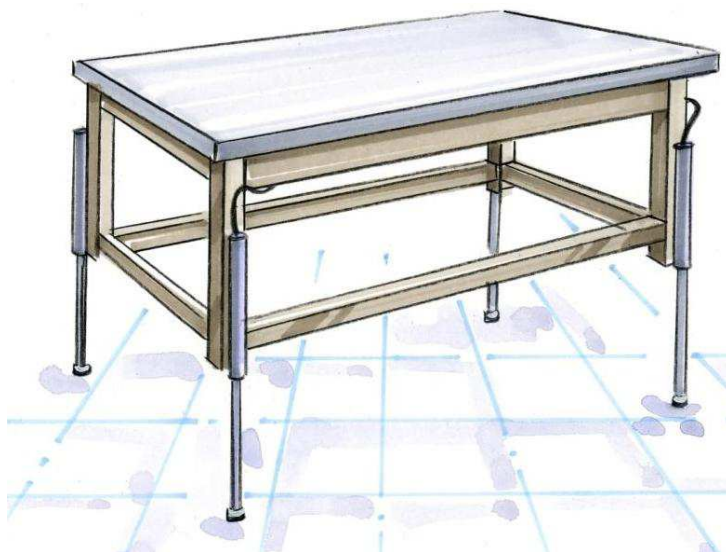


NOTICE

Do not dismantle the system unless authorized by Suspa[®] Incorporated. Attempting to repair the system or system components without authorization from Suspa[®] Incorporated voids the warranty.

8.2 System Extension Cycle

Rotate crank in the clockwise (**CW**) direction. Continue rotating the crank in the (**CW**) direction until the workstation has reached the desired height or the upper limit is reached.



8.3 System Retraction Cycle

Rotate crank in the counter-clockwise (**CCW**) direction. Continue rotating the crank in the (**CCW**) direction until the workstation has reached the desired height or the lower limit is reached



Note: CB-style cylinders shown in illustrations.

8.4 Stowing the Crank

When not in use, the folding handle can easily be stowed inside the crank body.

Pull crank grip outward until crank mechanism begins to fold.



9.0 Troubleshooting

Many system problems can be attributed to system load conditions or incorrect mounting hardware usage. In most cases, problems can be solved by reviewing the following possible system problems, possible causes, and implementing the recommended solutions.

Problem: Crank turns but does not extend or retract system.

Possible Causes	Recommended Solutions
Crank not fully engaged	Ensure crank handle is fully installed on to pump shaft.
Broken Pusher Block	Contact Suspa [®] Incorporated for replacement pump.

Problem: Crank is difficult to turn.

Possible Causes	Recommended Solutions
Upper or Lower Limit Reached	Stop rotating crank.
Workstation movement is obstructed by fixed object(s)	Provide clearance between workstation and obstruction.
System Load is High or Load Rating is exceeded	Verify system load does not exceed rating and remove weight as needed.

Problem: Uneven lift cylinder retraction.

Possible Causes	Recommended Solutions
Insufficient Lift Cylinder Load	Add load to system. Contact Suspa [®] Incorporated for tube shortening instructions.
Flexible Tubing Lengths Too Long	Contact Suspa [®] Incorporated for tube shortening instructions.

10.0 Inspection and Maintenance



FOLLOW ALL SAFETY INSTRUCTIONS CONTAINED IN SECTION 3.0 OF THIS MANUAL BEFORE PERFORMING INSPECTION AND MAINTENANCE PROCEDURES ON THIS PRODUCT. FAILURE TO FOLLOW THE INSTRUCTIONS IN THIS MANUAL COULD RESULT IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

The Movotec[®] Corner Leg Crank Driven Lift System should be inspected regularly to detect any condition which has or may lead to excessive component wear or premature failure. Special attention should be given to the following possible causes of system failure.

10.1 Changing Load Conditions

Overload conditions should be promptly corrected to prevent premature wear of mechanical components. This will also prevent overheating and premature failure of electrical components.

10.2 Contamination

Although surgical cleanliness is not required, ordinary cleaning practices will pay off in increased service life of the lift system. Dust and dirt can restrict ventilation for electrical components and cause wear in moving components such as shafts and bearings. An attempt should be made to keep the system components reasonably clean throughout their useable service life.

10.3 Hydraulic Tubing Damage

Check the hydraulic tubing for visible signs of aging and wear. Replacement of damaged hydraulic tubing will prevent future breakdowns and possible injury to personnel.

11.0 Warranty

Suspa[®] Incorporated warrants that if the Movotec[®] Corner Leg Crank Driven Lift System has been properly installed and not subject to abuse or misuse and proves to be defective (as defined below) within the Applicable Warranty Period after the date of manufacture of the item by Suspa[®] Incorporated or, if applicable, by Suspa[®] Incorporated's supplier and if the Buyer returns the item to Seller within that period, F.O.B. Suspa[®] Incorporated's plant in Grand Rapids, Michigan, then Suspa[®] Incorporated shall, at Suspa[®] Incorporated's option, either repair or replace the defective item, at Suspa[®] Incorporated's expense. If Suspa[®] Incorporated fails to repair or replace a defective item within a reasonable time, then Suspa[®] Incorporated shall be liable to the Buyer for the lesser of (1) the reasonable costs of repair or replacement by a third party or (2) that part of the purchase price of the defective goods that the Buyer shall have paid, but the Buyer shall not obtain repair or replacement by a third party without giving Suspa[®] Incorporated at least fifteen (15) days prior written notice, during which time Suspa[®] Incorporated may repair or replace the defective item. An item shall be considered "defective" if Suspa[®] Incorporated finds that it is defective in materials or workmanship and if the defect materially impairs the value of the goods to the Buyer, except that if the Buyer shall have approved drawings of, or specifications for, or production samples of the goods, then the goods shall not be defective to the extent that they conform to the drawings, specifications, or samples. This paragraph sets forth the Buyer's sole and exclusive remedies for any defect in the goods. The Applicable Warranty Period for the Movotec[®] Corner Leg Crank Driven Lift System is two years.

EXCEPT AS STATED IN THE PREVIOUS PARAGRAPH, SUSPA[®] INCORPORATED DOES NOT MAKE ANY WARRANTY AS TO THE GOODS AND, IN PARTICULAR, DOES NOT MAKE ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, AND THE BUYER IS SOLELY RESPONSIBLE FOR DETERMINING THE PROPER APPLICATION AND USE OF THE GOODS. Suspa[®] Incorporated shall not have any tort liability to the Buyer with respect to any of the goods and shall not be liable for consequential or incidental damages that arise from any product defect, delay, nondelivery, or other breach. The Buyer shall not have any right of rejection or of revocation of acceptance of Movotec[®] Corner Leg Crank Driven Lift System products.

If you have any questions regarding the warranty or believe that you have received a defective component, please contact Suspa[®] Incorporated.

12.0 Replacement Parts

Contact Suspa[®] Incorporated if the system has sustained any damage during shipping or installation. Suspa[®] Incorporated can help determine whether the system can be serviced with replacement parts or if the entire system should be replaced. Before contacting Suspa[®] Incorporated, please have the system part number, system model number, and date code ready, which can be found on the blue product label affixed to the side of the pump (as shown below):



13.0 Optional Accessories

Suspa[®] Incorporated offers many optional accessories for customizing Movotec[®] Crank Driven “Corneg-Leg” Lift Systems which include:

- Workstation Kits
- Special folding cranks
- Hydraulic tube shortening instructions
- System refill kits

Please contact Suspa[®] Incorporated or view our website for more detailed information.

14.0 Disposal

Dispose of the lift system components in an ecologically sound manner, separating plastic, mechanical components, and hydraulic fluid. Fluid disposal instructions for Movotec[®] NT15 hydraulic fluid can be found on our Material Safety Data Sheet (MSDS) document which is available upon request.

15.0 Contact Information

SUSPA Incorporated
 3970 Roger B. Chaffee Drive SE
 Grand Rapids, MI 49548-3497
 Phone: (616) 241-4200
 Fax: (616) 241-4347
www.suspa.com

