

# MOVOTEC®

## Corner Leg Q-Drive Lift System Manual

by  
**SUSPA®**



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## **2.0 Introduction**

Thank you for purchasing the Movotec<sup>®</sup> Q-Drive “Corner Leg” Lift System.

The Movotec<sup>®</sup> Q-Drive “Corner Leg” Lift System is a motor driven single-acting fluid displacement lift system. The Movotec<sup>®</sup> system was originally designed to make work-surfaces ergonomically height adjustable. For over twenty years, Movotec<sup>®</sup> systems have been used on industrial workbenches, small machine bases, physical therapy equipment, massage tables, office furniture, biological and chemical vented hoods, autopsy and necropsy tables, sewing machine bases, home healthcare beds, packaging equipment, custom yachts, and many other applications.

Movotec<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> 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 the terms and limitations of the Movotec<sup>®</sup> Q-Drive “Corner Leg” Lift System warranty can be found in Section 11.0 of this manual.

Movotec<sup>®</sup> lift systems are assembled and subjected to a full function quality test before they leave our manufacturing facility. Suspa guarantees products are free from material and manufacturing defects, but 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<sup>®</sup> Q-Drive “Corner Leg” Lift System.


Suspa<sup>®</sup> 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.**

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This manual contains safety, installation, operation, maintenance, and user service instructions for the Movotec<sup>®</sup> Corner Leg Q-Drive Lift System. Suspa<sup>®</sup> 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 FIRE, PROPERTY DAMAGE, ELECTRIC SHOCK, PERSONAL INJURY OR DEATH.**

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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<sup>®</sup> Incorporated  
3970 Roger B. Chaffee Drive SE  
Grand Rapids, MI 49548-3497

**VERIFY SYSTEM SELECTION.** Before the installing or operating the system, please review the application to confirm that the correct Movotec<sup>®</sup> Lift System has been selected. Pay particular attention to the load capacity and adjustment range ratings listed on the blue product label.

**HANDLE COMPONENTS WITH CARE.** Do not handle system by the motor cables, power cords, or hydraulic tubing. Keep motor cables, power cords, and hydraulic tubing far from heat, sharp edges, and moisture. If motor cables, power cords, or hydraulic tubing are damaged, discontinue use and have the suspect component replaced immediately. Do not ever attempt to repair a damaged motor cable, power cord or 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<sup>®</sup> 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. Furthermore, these individuals must be trained, instructed, and qualified to switch electrical circuits and equipment on and off in accordance with applicable technical safety regulations.

**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 electrically powered lift device. If this device is used by or near children, close supervision is absolutely necessary.

**OBSERVE DUTY CYCLE.** The term duty cycle refers to the amount of time that a motor or system is in motion versus the amount of time that it is resting. The Movotec® Corner Leg Q-Drive Lift System is not designed to operate continuously without rest. It is designed for intermittent use only and is rated for a 10% duty cycle. This means that if the lift system is in motion for 1 minute, it must be at rest for at least 9 minutes before the next operation. It is also important to note that the maximum system on-time is 1 minute. To avoid damaging the system, the duty cycle must not be exceeded. Motor surfaces can become warm after extended operation that exceeds the duty cycle. Provide adequate ventilation to allow heat dissipation from within and around lift system components.

**USE OF ACCESSORIES.** Use caution when routing extension cords. Do not allow cords to become pinched or stretched. Avoid positioning cords where they can become a trip hazard. 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.

**DO NOT INSERT OBJECTS.** To reduce the risk of fire or electrical shock, do not insert any objects into the system when powered.

**MAINTENANCE SAFEGUARDS.** Prior to performing any maintenance or service on the device, remove the load from all lift cylinders and unplug the motor controller from power source. 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.

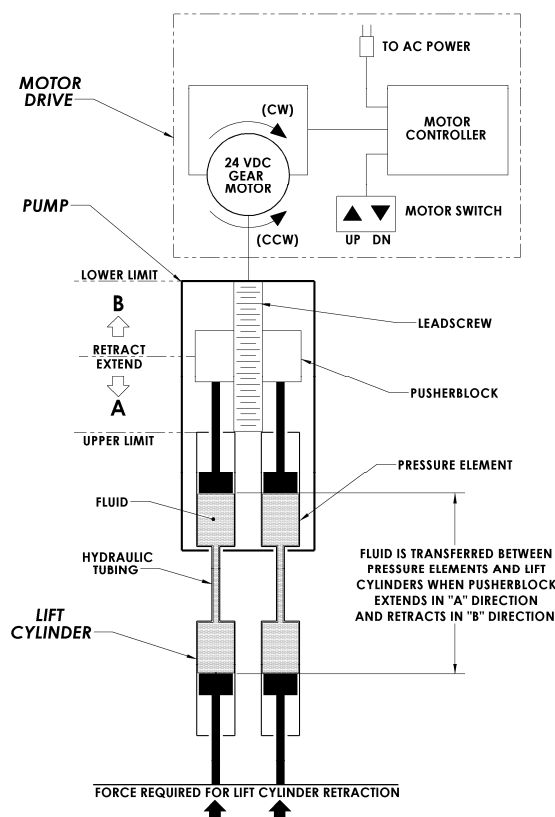
**RETRACT SYSTEM BEFORE MOVING.** To reduce the risk of property damage and personal injury, always retract the lift system fully before moving the equipment.

**UNPLUG BEFORE CLEANING.** Retract the lift system, unplug the motor controller from power source, and allow the system to cool 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 plugging into power source and operating the system.

**SAVE THIS MANUAL FOR FUTURE REFERENCE.**

## 4.0 How it Works

Movotec® Q-Drive Lift Systems are comprised of three major component subsystems; the motor drive, the pump, and the lift cylinders. In this section, we will explain how each subsystem works together to make the lift system extend and retract.



**Movotec® Q-Drive Schematic**

### 4.1 Extension Cycle:

The motor drive consists of a motor controller, a 24 VDC gear motor, and motor switch. The motor controller converts AC line voltage to DC voltage to operate the 24 VDC gear motor. It also controls motor speed and is programmed to operate within specific pump upper and lower limits. The motor switch is used to activate the 24VDC gear motor for lift system extension and retraction.

When the motor switch “UP” arrow button is depressed, the 24 VDC gear motor shaft begins to rotate in a (CCW) counter-clockwise direction. Since the gear motor drive shaft is mechanically coupled to the pump leadscrew shaft, the leadscrew shaft rotates in the same (CCW) direction. As the gear motor continues to rotate in a (CCW) 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. The gear motor will automatically shut off once the programmed pump upper limit is reached.

#### **4.2 Retraction Cycle:** (Refer to **Movotec® Q-Drive Schematic** on page 7)

When the motor switch “**DN**” arrow button is depressed, the 24VDC gear motor shaft begins to rotate in a (**CW**) clockwise direction. Since the gear motor shaft is mechanically coupled to the pump leadscrew shaft, the leadscrew shaft rotates in the same (**CW**) direction. As the gear motor continues to rotate in a (**CW**) 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. The gear motor will automatically shut off once the programmed pump lower limit is reached.

### **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.

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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.**

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



System Component	Quantity
<b>(A) Pump</b>	1
<b>(B) Motor Cable</b> (attached to motor)	1
<b>(C) Gear Motor</b> (attached to pump)	1
<b>(D) Low-Profile Switch</b>	1
<b>(E) Motor Controller</b>	1
<b>(F) Power Cord</b>	1
<b>(G) Lift Cylinders</b> (connected to pump)	4
<b>(H) Corner Leg Housings</b>	4
<b>(I) Cable Ties</b>	8
<b>(J) Retaining Rings</b>	4
<b>(K) Mounting Clips</b>	8
<b>(L) Torx Screws</b>	16
<b>(M) Glides</b>	4

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

## **6.0 Lift System Specifications**

The “A”, “B”, and “Z” dimensions shown in the table and drawings below vary depending on the system lift capacity and the adjustment range of the selected system.

### **US System Part Numbers**

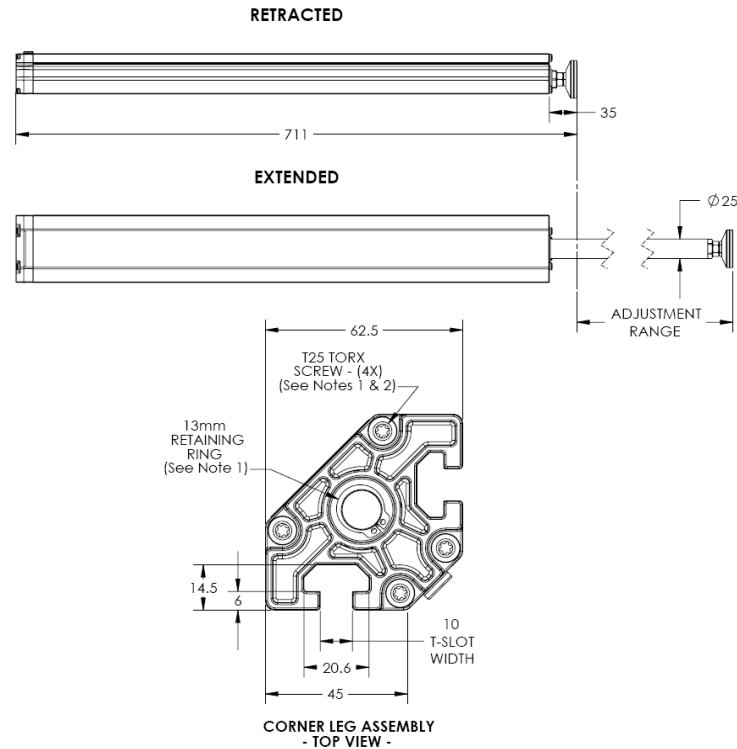
<b>Lift System Part Number</b>	<b>Adjustment Range (in/mm)</b>	<b>System Lift Capacity (lb/kg)</b>	<b>Motorized Pump "Z" (in/mm)</b>
<b>MLS-00044</b>	<b>5.9 / 150</b>	<b>750 / 340</b>	<b>12.99 / 330</b>
<b>MLS-00045</b>	<b>7.9 / 200</b>	<b>750 / 340</b>	<b>15.35 / 390</b>
<b>MLS-00046</b>	<b>11.8 / 300</b>	<b>750 / 340</b>	<b>20.08 / 510</b>
<b>MLS-00047</b>	<b>15.7 / 400</b>	<b>750 / 340</b>	<b>24.88 / 632</b>

### **European System Part Numbers**

<b>Lift System Part Number</b>	<b>Adjustment Range (in/mm)</b>	<b>System Lift Capacity (lb/kg)</b>	<b>Motorized Pump "Z" (in/mm)</b>
<b>MLS-00048</b>	<b>5.9 / 150</b>	<b>750 / 340</b>	<b>12.99 / 330</b>
<b>MLS-00049</b>	<b>7.9 / 200</b>	<b>750 / 340</b>	<b>15.35 / 390</b>
<b>MLS-00050</b>	<b>11.8 / 300</b>	<b>750 / 340</b>	<b>20.08 / 510</b>
<b>MLS-00051</b>	<b>15.7 / 400</b>	<b>750 / 340</b>	<b>24.88 / 632</b>

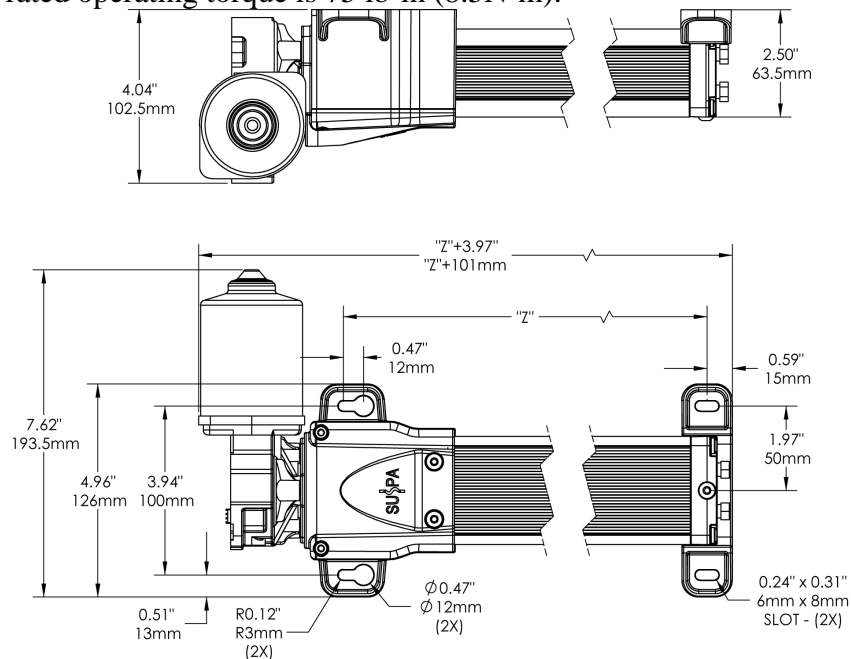
## 6.1 Lift Cylinder Specifications

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

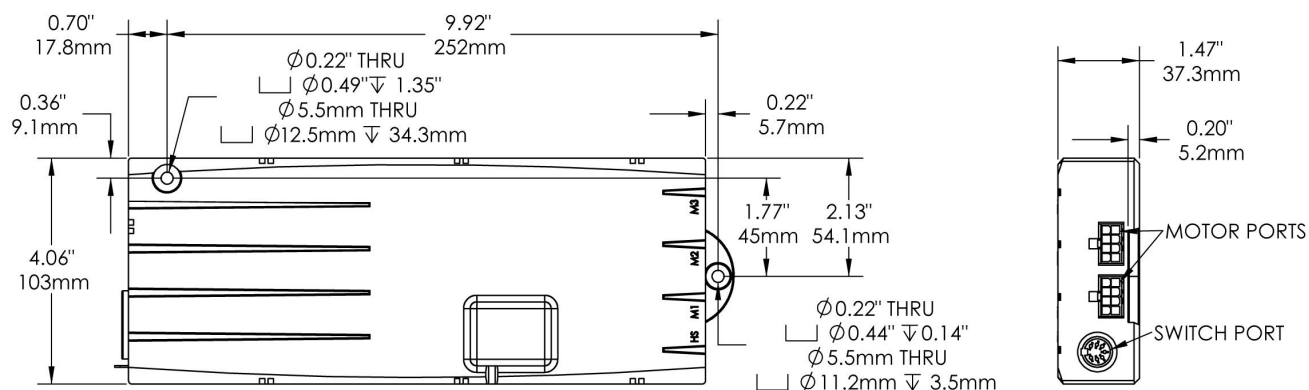


## 6.2 Motorized Pump Specifications (Refer to Chart on Page 12 for “Z” dimension)

The Movotec® Q-Drive gear motor used with the motorized pump shown below is rated for 24 volts DC. The no-load speed of the gear motor is 160 rpm. The no-load current is 3A. The maximum rated operating torque is 75 lb-in (8.5N-m).



### 6.3 Motor Controller Specifications



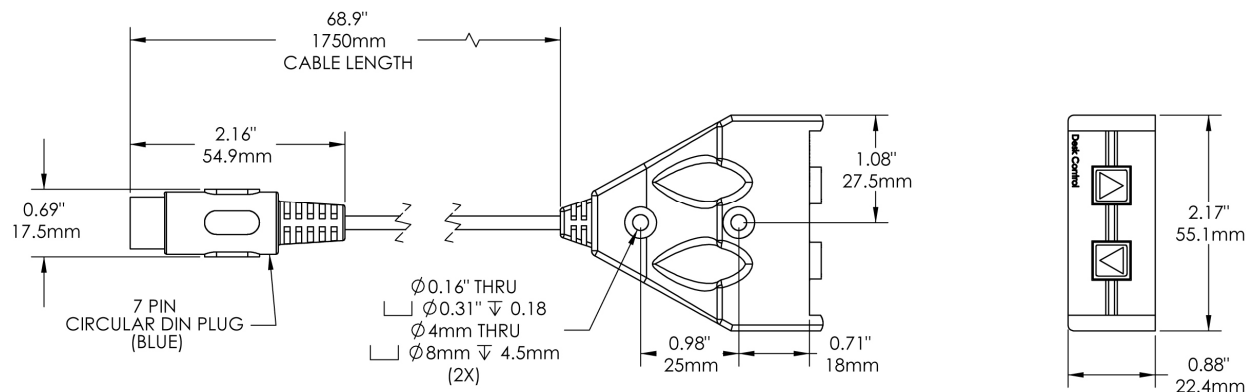
Motor Controller Parameter	Specification
Supply Voltage / Frequency	120V / 50-60Hz (US) 230V / 50-60HZ (Europe)
Standby Power Consumption	<0.7W
Switch Operating Voltage / Current	5VDC / 150mA
Hall Sensor Operating Voltage / Current	5VDC / 150mA
Operating Temperature Range	32° to 86°F (0° to 30°C)
Operating Humidity Range	5% to 85% (non-condensing)
Storage Temperature Range	-40° to 185°F (-40° to 85°C)
Storage Humidity Range	5% to 90% (non-condensing)
Protection Class	I
Motor Controller Dimensions	10.4in x 4.1in x 1.5in (264mm x 103mm x 37mm)
Weight	1.1 lb (0.5kg)

Each controller comes complete with power cable, 3000mm (120 in.) in length.

US-based systems use a 3-prong, NEMA 5-15P type plug. European-based systems use a "Schuko" style, CEE 7/7 type plug.

## 6.4 Surface Mount Switch Specifications

The operating voltage and current of the surface mount switch when attached to the motor controller is 5VDC and 150mA, respectively.



## 6.5 Regulatory Information

### UL Component Recognition

The Movotec<sup>®</sup> Q-Drive gear motor, 120V motor controller, and motor cable have passed relevant UL safety testing under UL962, the standard for Household and Commercial Furnishings. As a group, these three components are considered to be a UL Recognized Component and have been labeled with the UL Component Recognition mark for the United States and Canada shown below (Reference: UL File #258745).



### RoHS Directive (2002/95/EC)

Suspa<sup>®</sup> Incorporated has examined all of the materials and processes utilized in the production of Movotec<sup>®</sup> Q-Drive "Bolt-On" Lift Systems and determined that this product is in compliance with European Union RoHS Directive (2002/95/EC).

### CE Information

All known, relevant EU guidelines were observed and applied in the design and manufacture of this product. For detailed information on the relevance of CE to Movotec<sup>®</sup>, please contact Suspa<sup>®</sup> Incorporated.



## **7.0 Installation Instructions**

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### **WARNING**

**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 FIRE, PROPERTY DAMAGE, ELECTRIC SHOCK, PERSONAL INJURY OR DEATH.**

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### **7.1 System Component Placement**

There are many system components in a Movotec<sup>®</sup> Q-Drive “Bolt-On” Lift System. Since all of these components are physically linked together with hydraulic tubing and electrical cables, it is very important to make sure that the components are located on the workstation so that everything can be connected safely and correctly.

**7.1.1 Motorized Pump Placement** - The motorized pump can be mounted in any orientation, however it is recommended that the unit be mounted horizontally. The motorized pump should be mounted 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. Suspa<sup>®</sup> Incorporated offers a black thermoformed plastic motor cover to further protect the gear motor and cable connections from possible damage. The motor cover can be purchased by calling 314-869-7200.

**7.1.2 Motor Controller Placement** - There should be enough power cord length to facilitate movement of the workstation without the power cord connector becoming separated from the motor controller during operation. To accomplish this and to ensure that there is enough power cord length to reach a power receptacle, the motor controller should be placed toward the center and backside of the workstation. In addition, the motor controller should be placed so that it is in relatively close proximity to the gear motor. If this is not possible, Suspa<sup>®</sup> Incorporated offers motor extension cables to make up the difference. These cables can be purchased by calling 314-869-7200.

**7.1.3 Switch Placement** - The switch should be mounted on the side of the workstation where it is most accessible to the user and so that there is enough switch cable to reach the motor controller. Alternate motor switches can be purchased by calling 314-869-7200.

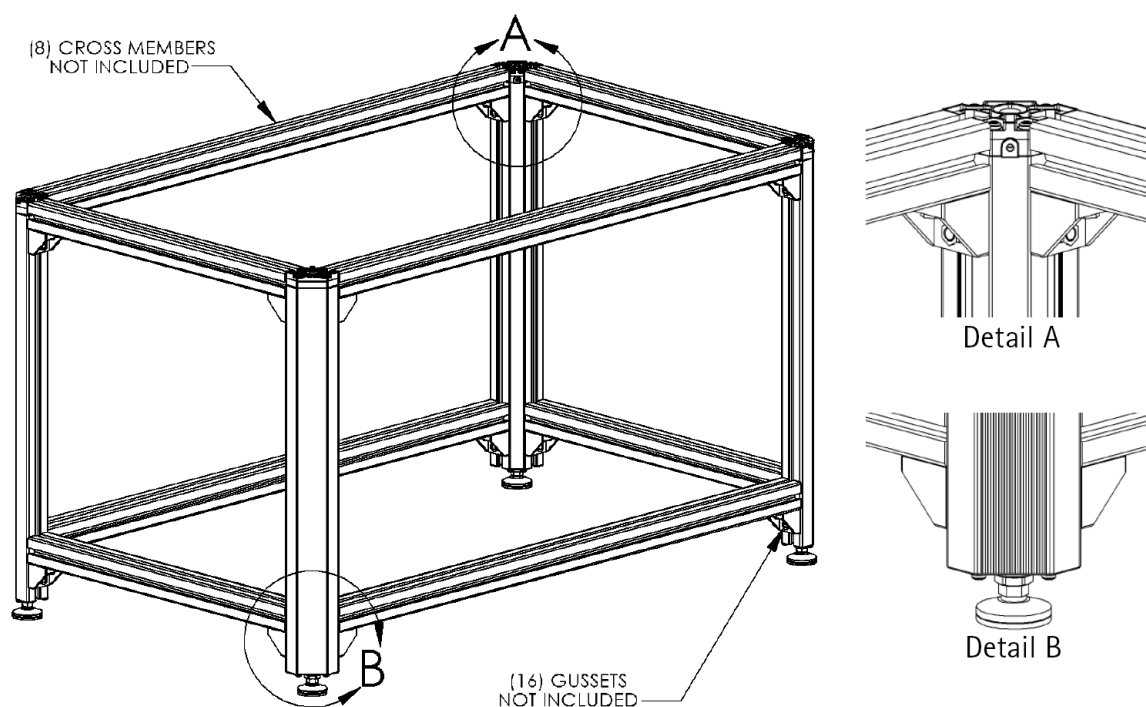
**7.1.4 Lift Cylinder Placement** – The lift cylinders should be located on the workstation so that the load on the system is balanced. Lift cylinders must also be

oriented vertically and parallel to one another to prevent cylinder binding during extension and retraction cycles.

**7.1.5 Tubing and Cable Placement** – Hydraulic tubing and power cables must be kept away from sharp edges and moving parts. Contact with moisture and heat must also be avoided. Hydraulic tubing and power cables should be fixed to the workstation or structure using the cable ties and mounting clips provided. Additional cable ties and mounting clips can be purchased by calling 314-869-7200.

## **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. The typical construction for a Corner Leg frame is shown below. Please note that cross members and gussets are not included with system. Contact Suspa® Incorporated with questions regarding T-slotted aluminum profile information and/or suppliers.





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



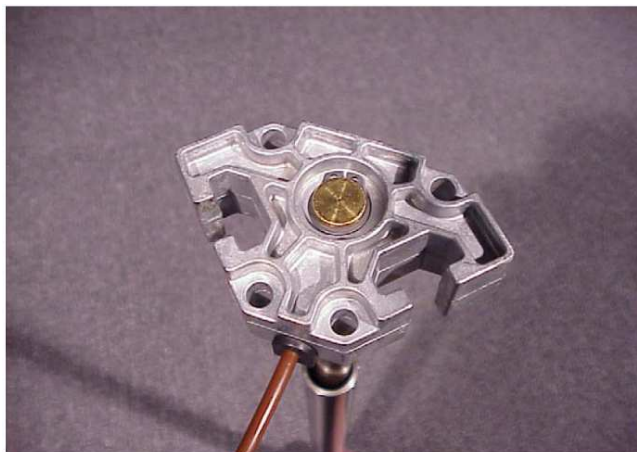
### **7.3 Lift Cylinder Installation**

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

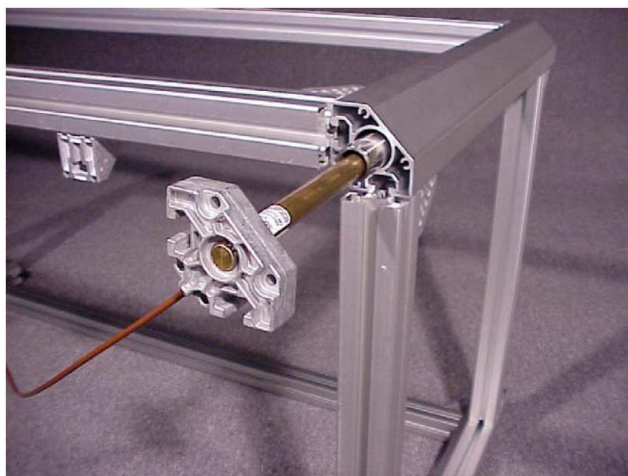




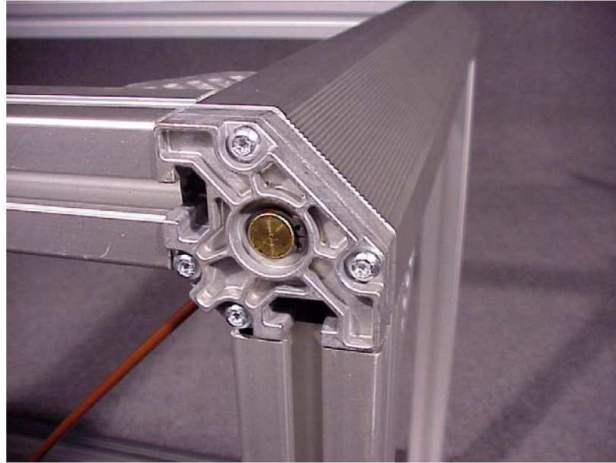
- Install upper cap onto the top of the lift cylinder. Make sure that the grommet is engaged with tubing cutout in cap opening. Using retaining ring pliers, install 13mm retaining ring into cylinder groove. This will secure the upper cap to the lift cylinder.



- 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).



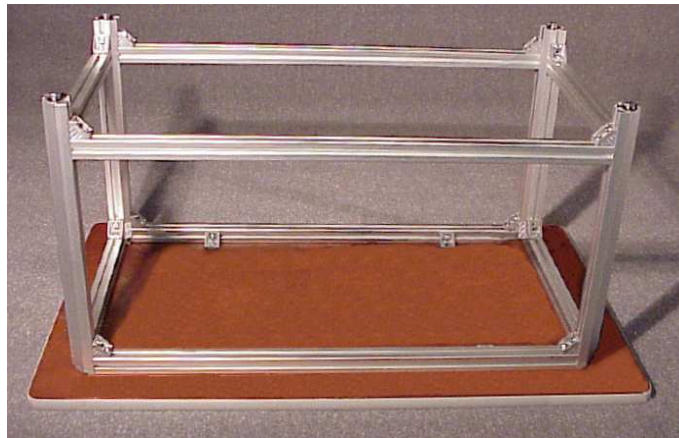
- Fasten upper cap to Corner Leg housing using T25 Torx head thread forming screws. Suspa<sup>®</sup> Incorporated recommends a lift cylinder mounting screw tightening torque of 3.5-4 N-m (31-35 lb-in.).



- Repeat procedure for remaining lift cylinders.

#### **7.4 Motorized Pump Installation**

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

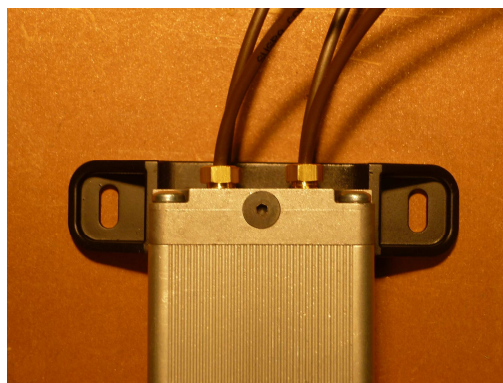


*Note: pump and hydraulic tubing not shown.*

- 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 motorized pump in the desired location. Make sure there is enough room for motor controller. Mark and prepare four holes in the locations provided by the motor bracket and rear pump support bracket.



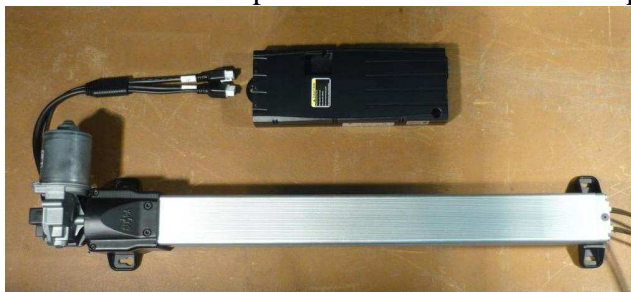
- Mount the motorized pump assembly to the surface. Please note that mounting screws are not provided with system. To avoid deforming the plastic housing, it is recommended to use washers when installing the motor bracket fasteners.



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

### 7.5 Motor Controller Installation

- Place the motor controller in the desired location, ensuring that the motor cable is long enough to reach the motor ports after installation is complete.



- Mark and prepare (2) mounting holes for the control box
- Install controller using mounting screws, and check to ensure that the unit is secured.

### **7.6 Low Profile Switch Installation**

- Place the switch in the desired location on the underside of the work surface. Align the switch body with front edge of the work-surface. Mark and prepare two holes in the locations provided in the switch enclosure.



- Using the appropriate screws, mount the switch to the work-surface taking special care not to over tighten the screws. While (2) mounting screws are included with the switch, ensure they will work for the particular application before using to mount switch.
- Check mounting screws to ensure that the switch is secured.

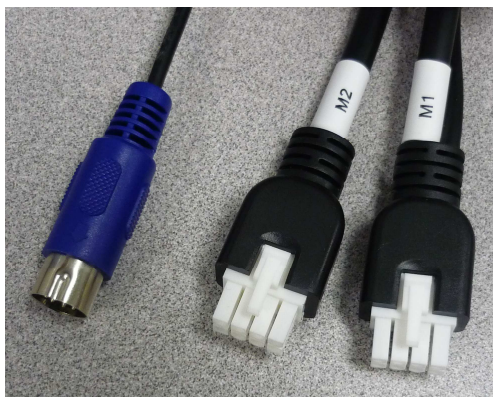
### **7.7 Motor Controller Cable Connections**

- The motor controller ports are labeled on the top side of the control box.





- The switch plug is **blue** and corresponds with the **round** switch port shown above. The motor cable plugs are marked “**M1**” and “**M2**” on the cable, and correspond with the (**M1**) and (**M2**) motor ports shown above (white, rectangular plugs).
- The switch plug has an arrow to indicate proper connection alignment. This arrow must face away from the work-surface and toward their corresponding connection port.



To make the controller connections:

- Connect the **black** motor cable plugs in to their respective (**M1**) and (**M2**) motor ports. Firmly press the plug into the port until the plastic hook “clicks” in place.

### NOTICE

It is important to install *both* motor cables in to the control box, or the system will not operate! Ensure both connections are secure and in the correct ports on the controller.

- Connect the **blue** switch cable plug to the (**HS**) switch port. Firmly press the plug into the port to ensure that a complete connection has been made.
- Connect power cord to motor controller IEC power port. Firmly press power cord plug into the IEC receptacle to ensure that a complete connection has been made.



- Check all connections to ensure that they have been made correctly and completely.

### **7.8 Hydraulic Tubing and Cable 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<sup>®</sup> Incorporated for detailed Movotec<sup>®</sup> 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<sup>®</sup> Refill Kit. Contact Suspa<sup>®</sup> 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.

### **7.9 Workstation Leveling**

- Thread glides 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.

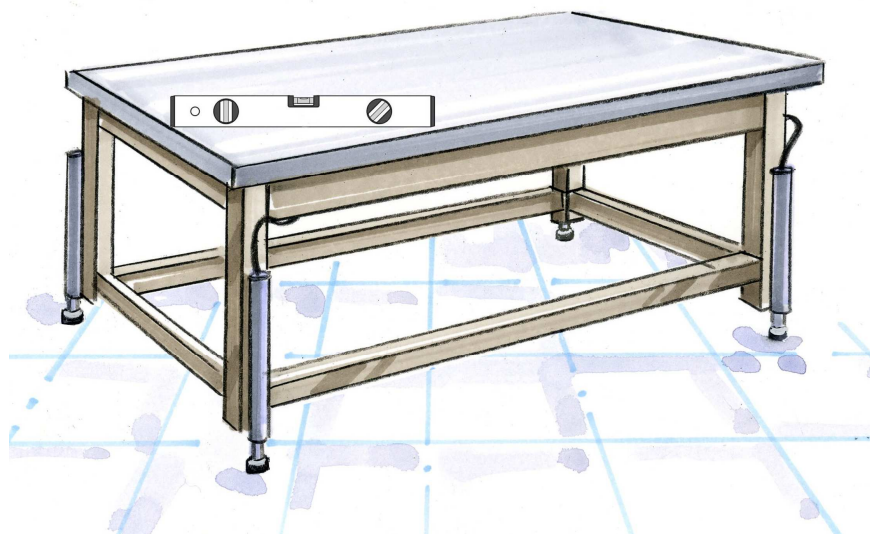


- Re-orient the workstation so that the glides are in contact with the floor as shown.

### **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**

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**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 FIRE, PROPERTY DAMAGE, ELECTRIC SHOCK, PERSONAL INJURY OR DEATH.**

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Movotec<sup>®</sup> systems can lift relatively large loads up and down for many years as long as they are installed and used correctly. The Movotec<sup>®</sup> Corner Leg Q-Drive Lift System is not intended for continuous cycling or for applications requiring precision height adjustment.

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

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### **8.1 Before Connecting to Power**

- Check all electrical and hydraulic connections.
- Check for damage to power cords or 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.



## **8.2 Connecting to Power**

### **NOTICE**

Prior to connecting system to power, make sure that the power supply voltage matches motor controller nameplate and all cables are fully connected to the correct electrical ports.

- Connect the power cord to a power outlet. The motor controller will produce an audible double-click when power is applied.



## **8.3 First Operation**

Suspa<sup>®</sup> Incorporated assembles and tests every Movotec<sup>®</sup> Q-Drive “Corner Leg” Lift System before it leaves our manufacturing facility to make sure that it functions correctly. If the unit is installed correctly, the system should be ready to operate at first operation. However, there are a few very important items to note about how the Movotec<sup>®</sup> Q-Drive motor works and what to expect during the first operation.

The Movotec<sup>®</sup> Q-Drive gear motor is equipped with a pair of hall-effect sensors that sense the direction of gear motor shaft rotation and the number of shaft rotations. When the gear motor is in operation, these hall-effect sensors are constantly sending this information in the form of electrical pulses to the motor controller. The motor controller interprets these electrical pulses and shuts the gear motor off just before the preprogrammed pump upper and lower mechanical limits are reached. If the motor controller does not receive these electrical pulses during operation, the system could malfunction. Therefore, it is absolutely critical that the motor cable connections remain intact in order for the system to function correctly.

All Movotec<sup>®</sup> Q-Drive “Corner Leg” Lift Systems are shipped with the pump in the retracted position, approximately 0.12 in. (3mm) above the lowest mechanical limit. A similar gap will exist on the upper end of the stroke; this space has been programmed into

the motor controller to prevent the pump from bottoming out in the extended and retracted positions during operation.

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).

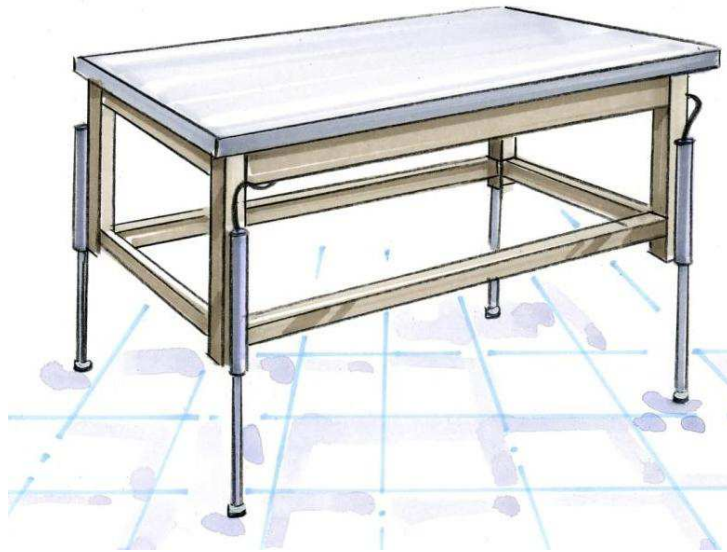


## NOTICE

Do not dismantle the system unless authorized by Suspa<sup>®</sup> Incorporated. Attempting to repair the system or system components without authorization from Suspa<sup>®</sup> Incorporated voids the warranty.

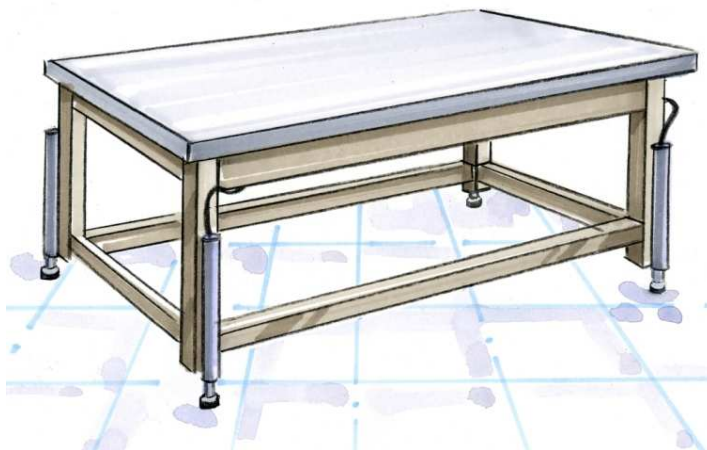
#### **8.4 System Extension Cycle**

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.



#### **8.5 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.*

## **8.6 Duty Cycle Monitoring**

The term duty cycle refers to the time that an electrical motor is activated versus the time that it is resting. The Movotec® Q-Drive “Bolt-On” Lift System is designed to operate intermittently and is rated for a 10% duty cycle. This means that if the lift system activated for 1 minute, it must be at rest for at least 9 minutes before the next operation. It is also important to note that the maximum system on-time is 1 minute.

The duty cycle has been established to prevent the gear motor and motor controller electronics from overheating. If the system is operated beyond the published duty cycle, the gear motor and motor controller electrical components will get hot.

Repeated cycling beyond the published duty cycle may cause the gear motor and motor controller to malfunction or stop functioning. It may also cause the pump components to prematurely wear, thus reducing the life of the lift system. To avoid damaging the lift system, the duty cycle should never be exceeded.

## **8.7 Deceleration Zone**

The Movotec® Q-Drive motor controller is programmed to slow down the speed of the gear motor just before the pump reaches its upper and lower pump mechanical limits. This deceleration zone provides a good indicator for the user that the lift system is about to reach its fully extended or retracted height.

## **8.8 System Reset Procedure**

The following procedure should be used to reset a Movotec® Q-Drive motor controller and pump to their respective “home” positions. The procedure should be performed only if the following conditions exist:

**1.) A new or replacement controller is introduced to an existing motor driven system.**

The Movotec® Q-Drive motor and motor controller leaves our manufacturing facility programmed as a matched set. If a different motor controller is used other than the one that was sent with the original unit, it must be matched and reset with the original motorized pump using the system reset procedure below; the controller will likely force this procedure when introduced to a new system.

**2.) The motor cable is disconnected from the gear motor.**

If this happens, reconnect the motor cable to the gear motor. Perform the system reset procedure below to ensure that the motorized pump will function within its pre-programmed limits.

**3.) The system is behaving unusually.**

Although it is not very common, a power outage or brown-out condition can cause a motor controller to lose its programmed position. If this happens, the motor may move in one revolution increments in one or both directions. To remedy this problem, perform the system reset procedure below.

### **System Reset Procedure**

- Remove the motor cables from the “M” slots on the controller (M1, M2, etc.), keeping the switch (the “HS” slot) and power cord plugged into the control box; for dual drive systems, ensure that motor cables are removed for both control boxes. After removing the M1 and M2 cables, a reset will be triggered automatically.
- Re-install the M1 and M2 plugs in to their respect ports on the control box.
- Press and hold the down button on the switch; at this point, the system will slowly begin moving downwards. Once the cylinders hit the bottom, they will automatically creep forward a slight distance (to the systems “home” position).
- After the legs have stopped, remove finger from the down button.

### **8.9 Limit Alteration Instructions**

The system is capable of having its limits of travel changed temporarily. The upper and lower limit can be changed independently, or in conjunction with one another, and activated or de-activated as often as desired. It will remain set, until the user manually unsets it. Using the low-profile switch (or any other switch with a separate up and down button):

#### ***Setting Upper Limit:***

- Raise the system to the desired upper limit of travel. Press and hold the up and down button simultaneously for 10 seconds, until a ‘double click’ confirmation is heard from the control box.

*Note: the upper limit must exist within the upper 50% of the system’s stroke*

#### ***Setting Lower Limit:***

- Lower the system to the desired lower limit of travel. Press and hold the up and down button simultaneously for 10 seconds, until a ‘double click’ confirmation is heard from the control box.

*Note: the lower limit must exist within the lower 50% of the system’s stroke*

To unset either limit, move the system to limit, and repeat the procedure above – press and hold the up/down buttons simultaneously for 10 seconds, until a double click is heard from the control box. Once heard, the limit has been un-set. Repeat for each limit as desired.

## **9.0 Troubleshooting**

Many system problems can be attributed to electrical cables that are not connected correctly, system load conditions, or incorrect mounting hardware usage. In most cases, problems can be solved by reviewing the following system problems, possible causes, and implementing the recommended solutions.

**Problem:** System does not operate.

Possible Causes	Recommended Solutions
Power Cord is not connected	Connect power cord to motor controller and/or power source completely.
Motor Cable is not connected	Connect motor cable to gear motor and/or motor controller completely.
Switch Cable is not connected	Connect switch cable to motor controller completely.
Defective Motor Controller	Contact Suspa <sup>®</sup> Incorporated for replacement.
Defective Switch	Contact Suspa <sup>®</sup> Incorporated for replacement.
System Load Rating Exceeded	Verify system load does not exceed rating and remove weight as needed.

**Problem:** Motor runs but does not extend or retract system.

Possible Causes	Recommended Solutions
Broken Pusher Block	Contact Suspa <sup>®</sup> Incorporated for replacement pump.

**Problem:** Motor runs intermittently and requires repeated switch activation.

Possible Causes	Recommended Solutions
System Load Rating Exceeded	Verify system load does not exceed rating and remove weight as needed.
Motor Controller in Reset Mode	Perform “System Reset Procedure” in Section 8.8.

**Problem:** Uneven lift cylinder retraction.

Possible Causes	Recommended Solutions
Insufficient Lift Cylinder Load	Add load to system. Contact Suspa <sup>®</sup> Incorporated for tube shortening instructions.
Flexible Tubing Lengths Too Long	Contact Suspa <sup>®</sup> Incorporated for tubing change or 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 FIRE, PROPERTY DAMAGE, ELECTRIC SHOCK, PERSONAL INJURY OR DEATH.**

The Movotec<sup>®</sup> Corner Leg Q-Drive 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 motor or 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 Motor and Load Alignment**

Pump and motor shafts can become misaligned if a lift system is installed incorrectly or if the motorized pump sustains an impact during transit or use. Misaligned motor and pump shafts can cause noise and uneven wear to the driving components which can lead to premature failure of the system. If the system drive shafts become misaligned, correct the alignment as needed.

### **10.3 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.

### **10.4 Power Cord and Hydraulic Tubing Damage**

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

## **11.0 Warranty**

Suspa<sup>®</sup> Incorporated warrants that if the Movotec<sup>®</sup> Corner Leg Q-Drive 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<sup>®</sup> Incorporated or, if applicable, by Suspa<sup>®</sup> Incorporated's supplier and if the Buyer returns the item to Seller within that period, F.O.B. Suspa<sup>®</sup> Incorporated's plant in Grand Rapids, Michigan, then Suspa<sup>®</sup> Incorporated shall, at Suspa<sup>®</sup> Incorporated's option, either repair or replace the defective item, at Suspa<sup>®</sup> Incorporated's expense. If Suspa<sup>®</sup> Incorporated fails to repair or replace a defective item within a reasonable time, then Suspa<sup>®</sup> 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<sup>®</sup> Incorporated at least fifteen (15) days prior written notice, during which time Suspa<sup>®</sup> Incorporated may repair or replace the defective item. An item shall be considered "defective" if Suspa<sup>®</sup> 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<sup>®</sup> Corner Leg Q-Drive Lift System is two years.

**EXCEPT AS STATED IN THE PREVIOUS PARAGRAPH, SUSPA<sup>®</sup> 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<sup>®</sup> 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<sup>®</sup> Corner Leg Q-Drive Lift System products.

If you have any questions regarding the warranty or believe that you have received a defective component, please contact Suspa<sup>®</sup> Incorporated.



## **12.0 Replacement Parts**

Contact Suspa<sup>®</sup> Incorporated if the system has sustained any damage during shipping or installation. Suspa<sup>®</sup> Incorporated can help determine whether the system can be serviced with replacement parts or if the entire system should be replaced. Before talking with Suspa<sup>®</sup> Incorporated, please have the system part number, system model number, and date code ready. This information can be found on the blue product label affixed to side of the pump, as shown below.



## **13.0 Optional Accessories and Enhanced Capabilities**

Suspa<sup>®</sup> offers many optional accessories and enhanced capabilities for the Movotec<sup>®</sup> Q-Drive “Bolt-On” Lift Systems which include:

- Wire connection to PLC controller for lift system activation
- Complete workstation frames
- Using multiple activation switches on a single workstation
- Storing up to (4) favorite workstation heights in memory
- Displaying work-surface height in standard inch or metric units
- Shortening or lengthening hydraulic tubing lengths

Please contact Suspa<sup>®</sup> 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, electronic components, mechanical components, and hydraulic fluid. Fluid disposal instructions for Movotec<sup>®</sup> NT15 hydraulic fluid can be found on our Material Safety Data Sheet (MSDS) documentation which is available upon request.

## **15.0 Contact Information**

Distributed by Tri-State Equipment Company Inc.

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