

SUSPA Movotec Lift Systems "Corner Leg"

Types: Q-Drive



Read installation instructions carefully before initial use!

Follow the safety instructions!

This partly completed machinery is intended to be incorporated into other machinery, other partly completed machinery/equipment or to be joined with another framework so as to form a complete machine as specified under the Machinery Directive. A conformity assessment procedure must be carried out on the whole completed machine in accordance with the Machinery Directive before it can be put into operation.

No revision service applies to this documentation. The current installation instructions are available at

www.suspa.com/uk/downloads/

March 2018

These installation instructions are a component of the technical documentation of the system in accordance with the EC Machinery Directive.

These installation instructions correspond to the "Directive 2006/42/EC of the European Parliament and the Council for Adjustment of Legal and Administrative Regulations of Member States for Machinery" (Machinery Directive), Appendix I, Item 1.7.4.

These installation instructions are addressed to the person in charge, who must pass it on to the personnel responsible for connection, use, and maintenance of the machine. The person in charge must ensure that the installation instructions and the information contained in the accompanying documents have been read and understood.

These installation instructions must be kept in a well-known and easily accessible location and read in case of any doubt.

The manufacturer is not liable for injuries to people or animals, and damage to objects or to the machine itself arising from the improper/unauthorized use or by ignoring the safety criteria contained in these installation instructions or by modification of the machine or use of unsuitable spare parts.

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1 Information Concerning this Document

1.1 Structure of the Warnings

The combination of a signal word in conjunction with a pictogram classifies the respective warning. The symbol can vary depending on the type of danger.

⚠ THE WARNING IS GIVEN BELOW A SIGNAL WORD THAT INDICATES THE EXTENT OF THE EXISTING DANGER.

The first line after the signal word describes the type and source of the potential danger.

The following section describes the consequences if no measures are adopted to safeguard against the danger.

The last paragraph describes the measures to avoid the danger.

1.2 Signal Words and Signal Colors

The following signal words are based on DIN EN 82079-1 and ANSI Z 535.4, and are used in this documentation. The safety colors have been adopted from the standard ISO 3864-1.

Signal word	Use	Explanation
 DANGER	Warning	Indicates a dangerous situation, which if ignored, leads to death or severe injuries.
 WARNING	Warning	Indicates a dangerous situation, which, if ignored may lead to injuries and damage to property
 CAUTION	Warning	Indicates a dangerous situation, which, if ignored may lead to minor injuries and damage to property
 NOTICE	Note	Refers to ways to facilitate and simplify operation and to cross-references. It excludes the danger of damage to property and the risk of injuries.
 SAFETY INSTRUCTION	Safety instruction	Indicates certain safety-related instructions or procedures.

Table 1 Signal words and signal colors

1.3 Symbols

Some of the following special safety symbols according to DIN EN ISO 7010: 2011 are used in the corresponding sections of these installation instructions and require particular attention depending on the signal word and symbol combination:

Symbol	Use	Explanation
	Note	Important information for understanding the device or for optimized operations.

Table 2 Symbols

1.3.1 Warning Notice

Symbol	Explanation	Symbol	Explanation
	General warning sign		Warning against hazardous electrical voltage
	Warning against risk of hand injuries		

Table 3 Warning

2 Identification and Notes

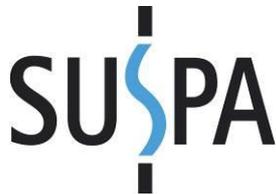
2.1 Designation

SUSPA Movotec Lift Systems "Corner Leg"

Consisting of:

- Hydraulic lifting elements
- Corner Leg housings
- Motorized hydraulic pump
- Motor controller
- Switch or remote
- Mounting elements

2.2 Manufacturer



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 3970 Roger B. Chaffee Memorial Drive
 Grand Rapids, MI 49548
 USA



SUSPA GmbH
 Eisenhammerstraße 3
 92237 Sulzbach Rosenberg
 GERMANY

2.3 Intended Use

The SUSPA Movotec Lift Systems "Corner Leg" is used to adjust the height of work surfaces that are used when sitting or standing. The lifting elements are designed for compressive loads.

NOTICE Please make sure that installation or start-up or the appropriate height adjustment has been selected. Please note in this regard the technical data (see tables 8 and 9), in particular the maximum load and adjustment range information.

Any expanded use of the Height Adjustment System is considered to be usage not in the manner intended and thus improper. In this case, the safety and protective functions of the Height Adjustment System may be impaired.

This partly completed machinery is intended to be incorporated into other machinery, other partly completed machinery/equipment or to be joined with another framework so as to form a complete machine as specified under the Machinery Directive. A conformity assessment procedure must be carried out on the whole completed machine in accordance with the Machinery Directive before it can be put into operation.

SUSPA GmbH assumes no liability for damage resulting from such improper use.

Intended use also includes:

- Following all instructions in the installation instructions
- Following all safety instructions
- Compliance with the maintenance intervals

2.4 Reasonably Foreseeable Misuse

Improper use, which could result in risks for the user, third parties and the Height Adjustment System for all operating modes are considered to be the following:

- Using the Height Adjustment System and its hydraulic and electrical equipment contrary to its intended use
- The installation of the Height Adjustment System on components that are not approved by SUSPA GmbH for this system
- Improper installation, start-up, operation and maintenance of the system
- Operating the system beyond the physical operating limits described in the Section "Operating Conditions"
- Modifying the controller software without prior consultation with SUSPA GmbH
- Any modifications to the height adjustment system as well as any add-ons or conversions without prior consultation with the company, SUSPA GmbH
- Operating the Height Adjustment System contrary to the specifications provided in the operating instructions regarding safety instructions, installation, operation, and malfunctions
- Operation of the Height Adjustment System with apparent malfunctions and/or defects

WARNING



Danger of injury due to impermissible changes

Unauthorized modifications to the component as well as the use of spare parts from other manufacturers (not original spare parts) may pose risks.

Do not allow any unauthorized or other modifications to the component without prior approval of SUSPA GmbH.

NOTE This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.

Children should be supervised to ensure that they do not play with the appliance.

2.5 General Information

2.5.1 Warranty and Liability

The "General Terms and Conditions" of SUSPA GmbH always apply. These are made available to the owner upon signing of the latest contract.

Warranty claims and liability claims for personal injury and material damage are excluded if they are attributed to one or more of the following causes:

- Improper use of the component
- Improper installation, start-up, operation and maintenance of the component
- Disregarding the information in the installation instructions
- Unauthorized structural modifications of the Height Adjustment System
- Opening the individual components
- Inadequate implementation of the prescribed maintenance operations
- Disasters caused by external influence or force majeure
- Repairs that have not been carried out by the manufacturer's specialists

Read the installation instructions carefully before using and putting the component into operation. The installation instructions should familiarize the user with the handling of the component and instruct the user in the details associated with function and maintenance. The installation instructions must be made accessible to personnel at all times and must be kept available near the Height Adjustment System. The notes provided in the installation instructions regarding maintenance and operational safety must be observed and complied with. SUSPA GmbH would be pleased to answer any questions extending beyond the scope of these installation instructions.

2.5.2 Objectives of the Installation Instructions

These installation instructions serve as a support and contain all necessary instructions that must be observed and complied with for general safety, transport, installation, operation, setup, maintenance, storage and disposal.

These installation instructions with all safety instructions as well as all additional documents of the assemblies provided by external suppliers must be:

- Observed, read and understood by all persons working on the Height Adjustment System; this applies in particular to the safety instructions
- Must be made freely available to all persons
- Consulted even in case of slightest doubt (safety)

Objectives:

- To prevent accidents
- Increase the service life and reliability of the component
- To reduce the costs of production downtime

NOTICE The right to technical modifications in the context of continuous product improvement is reserved at all times without prior notification!

2.5.3 Target Audience of the Installation Instructions

At different life cycles of the Height Adjustment System, personnel with varied competences may come into contact with the Height Adjustment System.

Tasks	Operating personnel	Specialized personnel	Maintenance personnel	MAKE SUSPA	Private person
Shipping (Delivery)				X	
Transport (Dispatching)		X		X	X
Start-up / installation		X	X	X	X
Operation	X	X	X	X	X
Error diagnosis	X	X	X	X	X
Troubleshooting by Error Code	X	X	X	X	X
Repair			X	X	X
Decommissioning / Dismantling		X	X	X	X

Table 4 Target group

Operating personnel

A person who has been instructed and, if required, trained by a specialist in the tasks assigned to them, the possible dangers of improper conduct and the required safety equipment and safety measures.

Qualification of operating personnel

Of course, only those persons may work with the Height Adjustment System

- who are at least 18 years of age
- who are physically and mentally suitable for this purpose

Outside of the Federal Republic of Germany, the appropriate accident prevention regulations and safety regulations of the respective country apply.

Specialists

Persons who can evaluate the work assigned to them and recognize possible dangers on the basis of their specialized training, knowledge, experience and familiarity with the relevant standards.

Maintenance personnel

Maintenance personnel are persons with adequate technical training, knowledge and experience who are familiar with and know how to avoid mechanically, hydraulically or electrically induced hazards. Maintenance personnel must meet the following requirements:

- Technical training
- Knowledge and experience
- Knowledge of applicable standards
- Ability to assess assigned works
- Ability to identify hazards

External professional personnel (SUSPA)

The external professional personnel are specially trained for the manufacturer's products and is familiar with every life stages of Height Adjustment System. The external professional personnel conduct the transport up to the transfer to the operator.

Private person

A person who has no previous know-how in the installation of mechanical, hydraulic and electrical components.

3 Safety Notices



WARNING

Danger of injury and material damage

There are dangers posed by ignoring the installation instructions and all safety instructions provided therein.

Read the installation instructions carefully before the initial start-up. Fulfill and follow the safety conditions required. Observe and follow both the general safety instructions and also the special safety instructions provided in the other chapters.

The component has been constructed using state-of-the-art technology and in line with established safety regulations. In order to prevent danger to life and limb of the user, third parties, or to the component, use the component only for intended purpose and in perfect operating condition in terms of safety.

The operator of the component or the persons assigned by the same are liable for property damage and personal injury resulting from non-compliance with the instructions provided in the installation instructions.

3.1 Obligations



WARNING

Danger of injury by disregarding the safety symbols

There is risk of injury associated with disregarding the warning notices provided in the area of the component and in the installation instructions.

Please note all warning and safety instructions in these installation instructions.

The following circumstances could increase the hazard potential of the component:

- Danger posed to persons through mechanical influences
- Malfunctions that may impair the safety during operation of the component

3.1.1 Operating Company's Obligations

This partly completed machinery is only intended to be incorporated into other machinery or other partly completed machinery or equipment or to be joined with them so as to form a complete machine as specified under the Machinery Directive. The machine should be put into operation only after a conformity evaluation procedure in accordance with the Machinery Directive has been carried out for the complete machine.

3.2 Residual Risk

NOTICE There is a residual risk posed by inadvertent movement of the drives. The following are determined as potential causes for this:

- Damaged cables
 - Damaged tubing
 - External influences (EMC)
 - Defects in the lifting elements, the controller or on the manual switch
- ➔ Take the residual risk into consideration with the construction and while preparing the operating instructions of the final product.

3.3 Safety Equipment

The component is fitted with various safety equipment. This equipment serves to protect persons working on the component from any danger to life and limb arising from electrical, hydraulic and mechanical operations and to limit material damage to the component.

3.4 Additional Instructions

In principle, the provisions of the accident prevention regulations of the professional association also apply to all work on the Height Adjustment System.

In addition, observe and follow the

- Applicable and binding accident-prevention regulations
- Applicable and binding regulations at the place of use
- Recognized technical regulations for safe and professional working methods
- Existing environmental protection regulations
- Other applicable regulations

4 Design and Function

4.1 Technical Specifications

Technical specifications - Height Adjustment System	
Controller	
Input voltage:	230 V / 50 Hz (1.25 A)
Output rating:	DC 24 V / 288 VA at 10% ED
Standby use:	<0.3 W
Protection class:	I
Switch / hall sensor operating voltage:	5 V DC / 250 mA
Motor controller dimensions:	264 x 103 x 37 mm (10.4 x 4.1 x 1.5 in)
Weight:	0.5 kg (1.1 lb)
Motorized Pump	
Output rating:	24 V DC
No-load speed gear motor:	160 rpm
No-load current:	3 A
Max. rated operating torque:	75 lbin (8.5 Nm)
Installation dimensions (Lifting element)	
Dimensions Corner Leg housing:	62.5 mm with connection lengths 45 mm (see Figure 9)
Stroke (L Hub):	150 / 200 / 300 / 400 mm
Retracted and extended length L_{in} :	see Table 8
Performance data	
Max. lifting capacity and holding load:	340 kg (see Table 8)
Duty cycle:	10% (Traversing time 2 min; Break time 18 min)
Traversing velocity:	~ 8 mm/s
Protection type	
Lifting elements:	IP 30 in accordance with DIN EN 60529
Controller:	IP 20 in accordance with DIN EN 60529
Manual switch:	IP 20 in accordance with DIN EN 60529
Traversing cycles	
At least 10,000 cycles in compliance with maintenance	

Table 5 Technical specifications

NOTICE The noise emission level of the height adjustment system is considerably less than 70 dBA.

4.2 Design and Function of the Height Adjustment System

The lifting elements are driven by a hydraulic pump and synchronized by a controller. The lifting elements are optimized for OEM or retrofit applications and consist of three important subsystems:

- Motor drive
- Pump
- Lift cylinders

The following explains how the subsystems work together and make the raising and lowering of the Height Adjustment System possible.

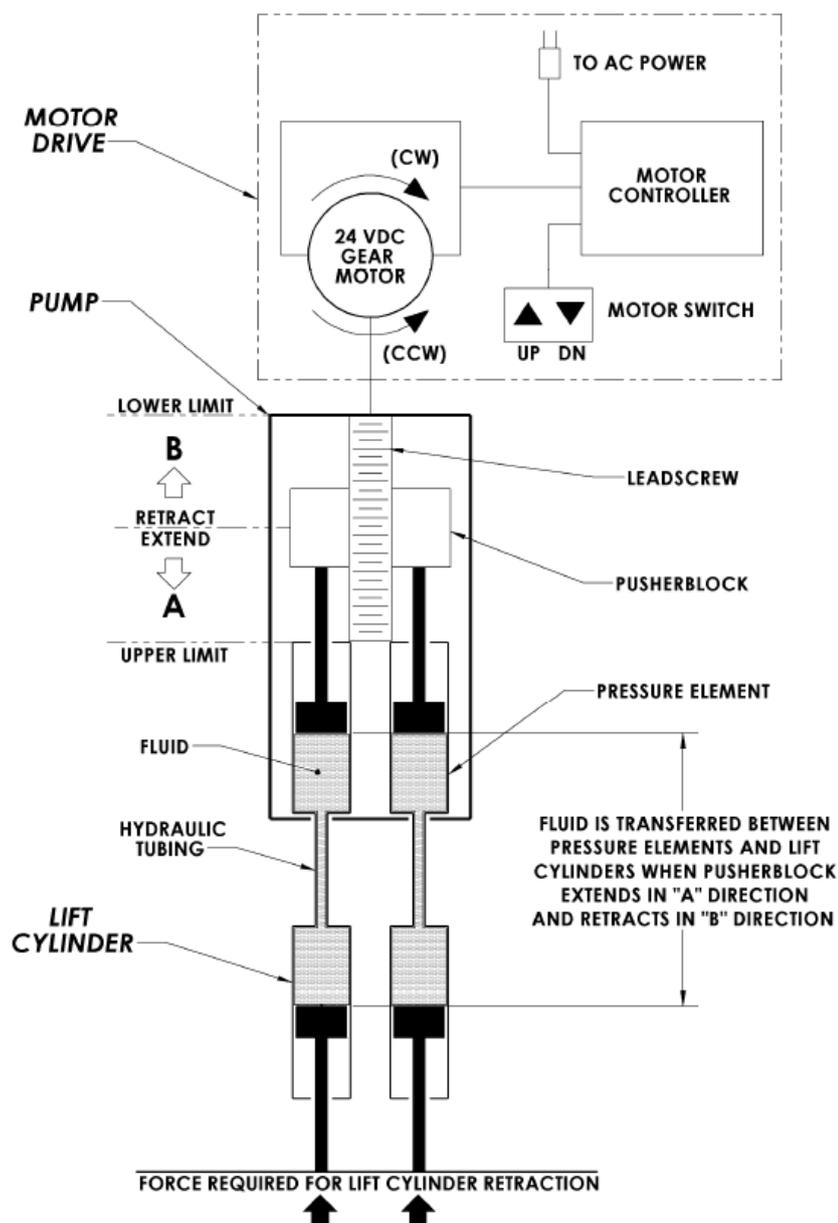


Figure 1 Schematic of function

The motor drive consists of a motor controller, a 24 V DC gear motor, and motor switch. The motor controller converts AC line voltage to DC voltage to operate the 24 V DC 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 24 V DC gear motor for lift system extension and retraction.

4.2.1 Extension Cycle

When the motor switch "UP" arrow button is depressed, the 24 V DC 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, or when switch is no longer depressed.

4.2.2 Retraction Cycle

When the motor switch "DOWN" arrow button is depressed, the 24 V DC 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, or when switch is no longer depressed.

5 Transport

5.1 Safety Instructions for Transport

WARNING



Danger of falling loads

There are risks caused by human misconduct and inadequately secured loads.

Allow only those individuals who have been specially trained to perform transportation work.
Secure the load against changing its position.

Pay attention to the position of the center of gravity of the component during transport.

Secure the component for transport by heavy goods vehicle on the loading surfaces with suitable means.

WARNING



Danger of injury due to unsecured transport routes

There is the risk of stumbling or slipping while transporting the components.

Arrange for proper illumination of the routes, ramps and steps over which loads are moved.
Remove obstacles and stumbling points.

CAUTION

Damage caused by improper transport

Transport with extended lifting elements may result in risk of damage to property or personal injury.

Retract the lifting element completely when transporting.

5.2 Transportation Procedure

The components have to be moved by suitable means. Use suitable cables, chains or straps for loading and unloading according to the load / weight.

NOTICE The shipment must be made by professional personnel of SUSPA GmbH. The further transport must be made by professional personnel and private persons. The following points must be observed for transporting / unloading of the components:

- ➔ Note the center of gravity.
- ➔ Avoid rubbing cables and lifting straps against sharp edges and corners.
- ➔ Check the delivered components for completeness, damage or any other abnormalities.
- ➔ Observe the applicable safety and accident prevention regulations during transport.

6 Installation

⚠ CAUTION



Danger of crushing

There is a risk of crushing due to the short distance to other objects and structures.

Make sure that the work surface has a minimum distance of 50 mm from other objects or structures. Make sure that walls, furniture, electrical wiring, hydraulic tubing, or other solid structures do not impede the movement of the work surface during operation.

NOTICE The installation of the component must be carried out by professional personnel of SUSPA GmbH, other professional personnel, maintenance personnel or private persons.

NOTICE Do not lift the Height Adjustment System on the motor cables, power cords or hydraulic tubing. Keep the cables, cords and tubes away from heat, sharp edges, and moisture. Immediately suspend the operation of the product if you notice that cables, cords or tubes are damaged and replace the damaged components without delay. Never attempt to repair damaged motor cables or power cords. When hydraulic tubing is damaged, contact SUSPA GmbH for repair info.

NOTICE Check all components for any damage that may have occurred during transport or installation before operating the system. Do not try to dismantle the system or system components. Contact SUSPA GmbH in the event that components must be repaired or replaced.

6.1 Unpacking

Proceed with the necessary diligence and caution when unpacking the system components. Do not use any sharp-edged objects, cutters or knife blades in order to prevent damage to near motor cables, power cords, hydraulic tubing or other components that may get damaged easily.

6.1.1 Disposal of Transport and Warehouse Packaging

The disposal of the transport and warehouse packaging should be performed in accordance with the local disposal regulations and environmental protection laws applicable in the operator's country.

6.1.2 Checklist of All Components Included in the Delivery

Check the completeness of the delivery while unpacking the components. Use the appropriate delivery notes on the contents of the pallets and the manufacturer's packing list for this purpose.

Q-Drive (4-leg-system):



Figure 2 Contents of a package (Q-Drive)

- | | | | |
|---|------------------------------------|----|------------------------------------------|
| 1 | Pump | 8 | Corner Leg Housings with Corner Leg Caps |
| 2 | Motor Cable (attached to motor) | 9 | Cable Ties |
| 3 | Gear Motor | 10 | Retaining Rings |
| 4 | Low-Profile Switch | 11 | Mounting Clips |
| 5 | Motor Controller | 12 | Torx Screws |
| 6 | Power Cord | 13 | Glides |
| 7 | Lift Cylinders (connected to pump) | | |

6.2 Operating Conditions

Physical operating conditions	
Operating range:	Functional operation <ul style="list-style-type: none"> ▪ Min. 0 °C ▪ Max. + 45 °C Relative moisture: <ul style="list-style-type: none"> ▪ 5 – 85% (not condensing)
Contamination:	No heavy contamination due to dust, acids, corrosive gases

Table 6 Operating conditions

- ➡ Do not operate the system outdoors. Do not expose the system to damp or wet conditions.
- ➡ Avoid environments with chemical agents or corrosive environments.
- ➡ Do not operate the system near flammable solvents, propellants and/or explosive substances (e.g. gas, vapor, dust, etc.).
- ➡ Do not expose the components of the Height Adjustment System to any excessive vibrations and/or shock loads.
- ➡ Do not use the controller near the equipment that generates strong electromagnetic fields. This may impair the function.
- ➡ In order to prevent overheating in the pump, it should not be installed in constrained, non-ventilated or thermally insulating locations. Adequate air circulation must be ensured.

NOTICE Observe the country-specific regulations regarding setup and operation of work surfaces with respect to lighting of the workstations.

For example: Lighting in accordance with ASR A3.4

The Technical Rules for Workstations (ASR) reflect the state of the art technology, occupational medicine and occupational hygiene and other sound knowledge for the setup and operation of workstations.

The values given in the table are the intensity of illumination on the reference area for visual tasks that may be horizontal, vertical or inclined.

Lighting requirements (metal machining and processing, foundries and casting)		
Working rooms work surfaces and jobs	Minimum value of the illumination intensity In lx	Minimum value of the color rendering Index Ra
Metal machining and processing, foundries and casting		
Assembly work:		
- Rough	200	80
- Medium-fine	300	80
- Fine	500	80
- Very fine	750	80

Table 7 Lighting requirements

6.3 Install Components

- Note the exact information of the installation dimensions provided in the schematic diagrams of the Height Adjustment System.

6.3.1 Installation in General

⚠ CAUTION Electrical components (motor, manual switches) should be connected or disconnected only with the power plug removed from power source!

⚠ CAUTION Hydraulic components should only be worked on when depressurized.

- Bring the lifting elements in such a manner at the work surface that the load on the system is balanced out (distributed uniformly).
- Attach the lifting elements vertically and parallel to each other, so that they do not block each other during lifting and lowering.
- Keep electrical cords and hydraulic tubing away from sharp edges and moving parts.
- Avoid contact with moisture and heat.
- Attach the motor cable, power cords and the hydraulic tubing to the workstation or structure using cable ties or mounting clips.

NOTICE When routing motor cables, power cords and the hydraulic tubing, make sure that the wires and tubes are not stretched or crushed. Position the power cord to prevent tripping hazards. Use only accessories authorized and provided by SUSPA.

The height adjustment system works properly only if it has been put into operation properly and individual components are controlled correctly.

- ➔ First check whether the individual components are damaged. If this is the case, do not put the height adjustment system into operation, but have the damaged components replaced by your supplier.
- ➔ Check the power cable for damage. Make sure to replace damaged power cables in any case.
- ➔ If possible, orient workstation as shown for ease of component placement and installation.

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 in figure Figure 3. Cross members and gussets are not included with the system. Contact SUSPA with questions regarding T-slotted aluminum profile information and / or suppliers.

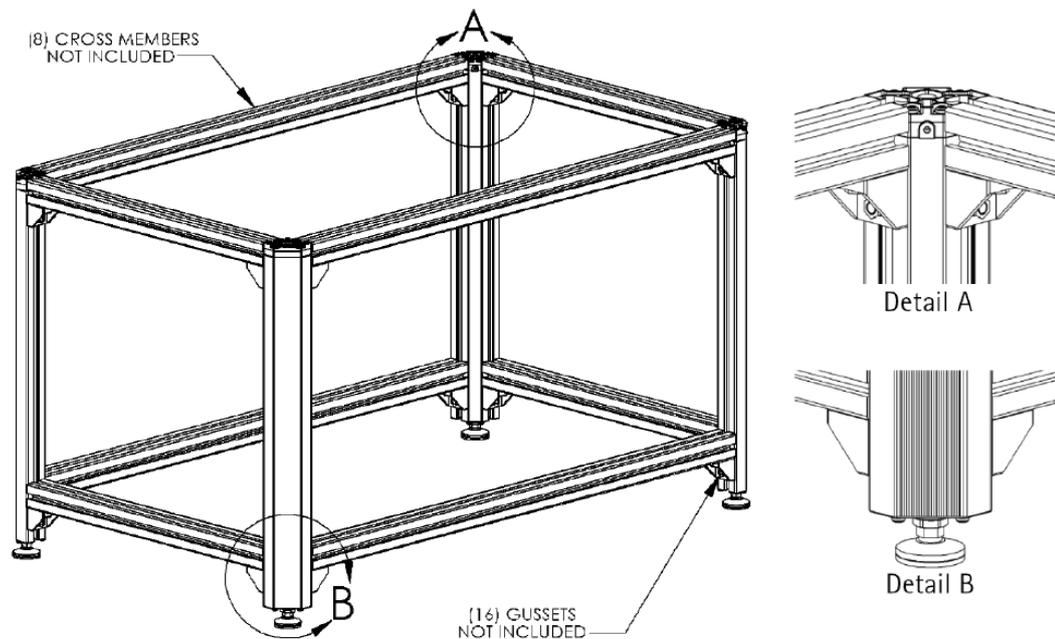


Figure 3 Typical construction of Corner Leg frame

6.3.2 Installing the Lifting Elements

- ➔ Remove the protective packaging in which the lifting elements are packaged.
- ➔ Assemble frame with Corner Leg housings as shown in Figure 4. Please note that cross members and gussets are not included with system.



Figure 4 Assembled Corner Leg frame

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

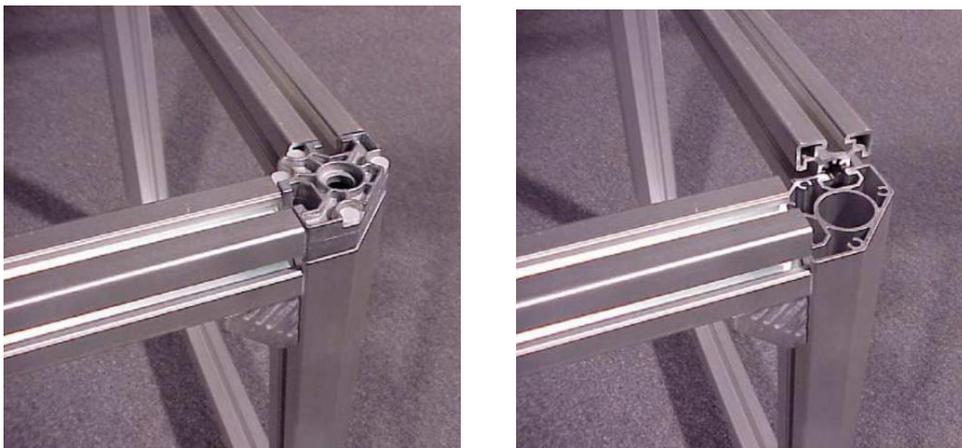


Figure 5 Removing plastic pin and upper caps

- 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 13 mm retaining ring into cylinder groove. This will secure the upper cap to the lift cylinder.

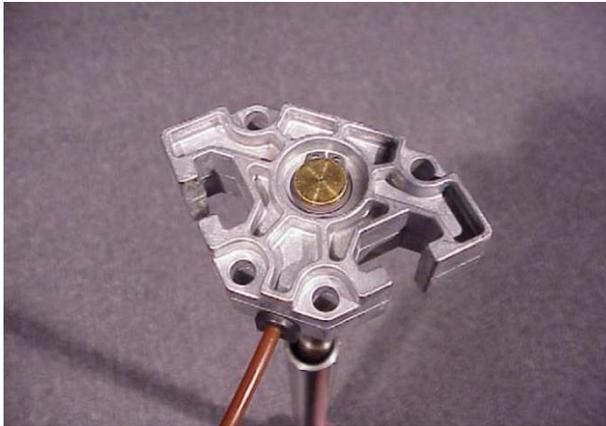


Figure 6 Installing upper cap

- 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 51 mm. Each standard system is shipped with hydraulic tubing cut-to-length and assembled to the unit, 2 lengths at 2.5 m, and 2 lengths at 3 m.

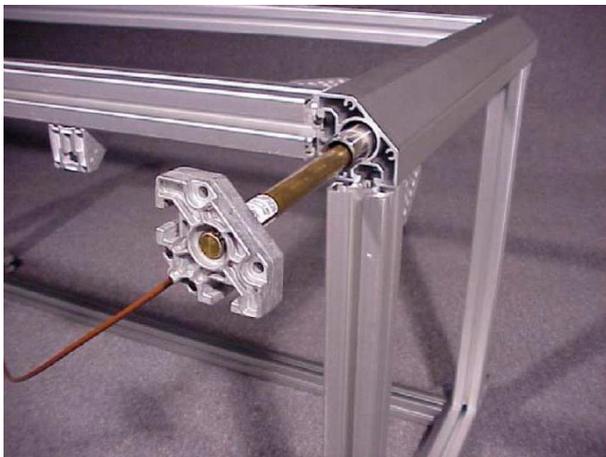


Figure 7 Inserting lift cylinder

- ➔ Fasten upper cap to Corner Leg housing using T25 Torx head thread forming screws. SUSPA recommends a lift cylinder mounting screw tightening torque of 3.5-4 N-m.

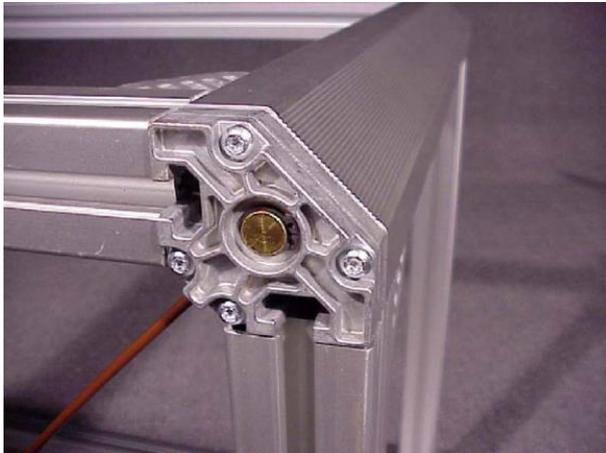


Figure 8 Fastening upper cap

- ➔ Repeat procedure for remaining lift cylinders.
- ➔ Screw the levelling feet (Glide) fully into the lifting elements.
- ➔ Position the work surface properly again such that the leveling feet (Glides) stand on the floor.

NOTICE Take care to ensure that the work surface is not put down too abruptly in order to avoid damaging the lifting elements.

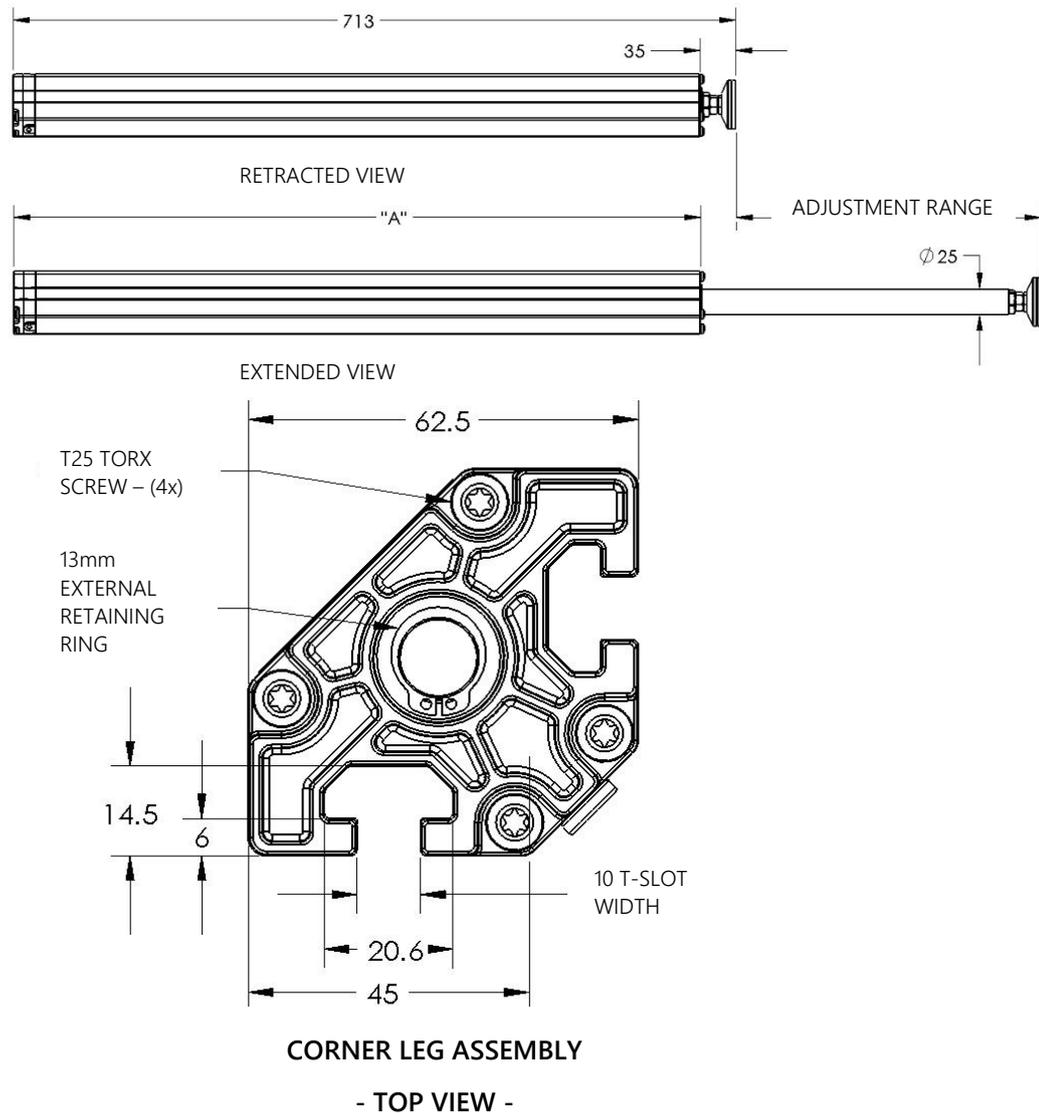


Figure 9 Lifting element dimensions / connections

Lift System Part Number (European System)	Adjustment Range (mm)*	Include CL Cylinder	System Lift Capacity (kg) E-Drive (4 leg system)	CB "Corner Leg" Cylinder "A" (mm)
MLS-00048	033 11048	150	340	678
MLS-00049	033 11049	200	340	678
MLS-00050	033 11050	300	340	678
MLS-00051	033 11051	400	340	678

*The adjustment range is reduced for motorized systems by 6 – 8 mm.

Table 8 Lifting element technical specifications (E-Drive)

6.3.3 Installing the Motorized Pump

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



Figure 10 Workstation orientation (pump and hydraulic tubing not shown)

- ➔ Mount work surface to frame. Please note that gussets and mounting screws are not included with system.

NOTICE Ensure sufficient tubing length for the lifting elements when positioning the motorized pump. The mounting fasteners needed for this is individual and not included in the scope of delivering.

- ➔ Place motorized pump in the desired location. Ensure enough room exists for motor controller.

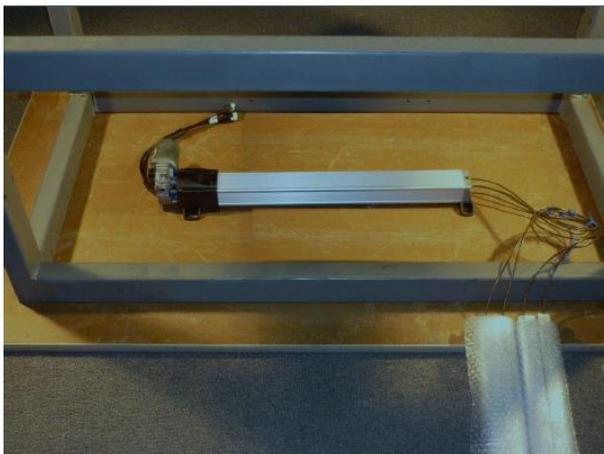


Figure 11 Placing motorized pump

- Mark and prepare four holes in the locations provided by the motor bracket and rear pump support bracket.



Figure 12 Motor bracket



Figure 13 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 metallic washers when installing the motor bracket fasteners.



Figure 14 Installing motor bracket fasteners

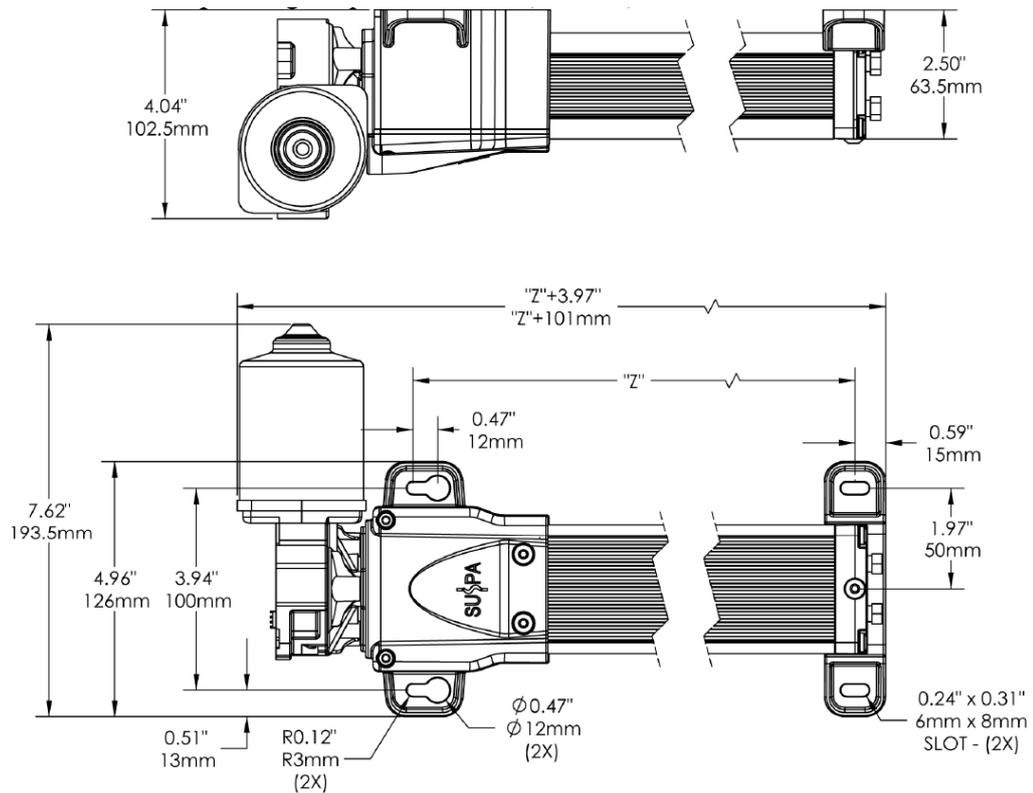


Figure 15 Motorized pump dimensions / connections

Lift System Part Number (European System)		Include Pump	Motorized Pump
			"Z" (mm)
MLS-00048	033 11048	Q4809	330
MLS-00049	033 11049	Q4812	390
MLS-00050	033 11050	Q4818	510
MLS-00051	033 11051	Q4824	632

Table 9 Motorized pump length dimension "Z" (E-Drive)

6.3.4 Installing the Motor Controller

NOTICE Ensure sufficient cable length to the motorized pump when positioning the motor controller. The mounting material needed for this is individual and not included in the scope of delivery.

- Mount the motor controller with two fasteners to the work surface.
- When attaching, insert metal washers between the screws and the motor controller to prevent damage to the controller housing.
- Do not mount / operate the controller:
 - above or in front of heat sources (e.g. radiators),
 - at locations exposed to direct incidence of sunlight,
 - at or near easily inflammable materials or
 - near high-frequency equipment (e.g. transmitters, radiation equipment or similar devices).
- Make sure that connecting tubing does not have kinks or is not exposed to mechanical stress or sharp edges.

For protection against over-voltage that may occur during thunderstorms, it is recommended that you install over-voltage protection. Get advice from an electrical installation engineer.

NOTICE Observe and follow the aspects given below in the course of installation:

- Select a centralized installation location.
- Ensure that the motor cable is long enough to reach the motor ports after installation is complete (see Figure 16).



Figure 16 Placing the motor controller

- Fix the controller tightly with screws (Figure 17 Attaching the motor controller). In this way, you avoid malfunctions caused by loose plug-in connections or undesirable noise development.
- During installation, make sure that the controller is freely accessible even after installation. This enables ease of working in case you need to do service work.
- Ensure that there is adequate air circulation during installation. There is, in fact, little heat developed by the controller, but nonetheless, it exists.



Figure 17 Attaching the motor controller

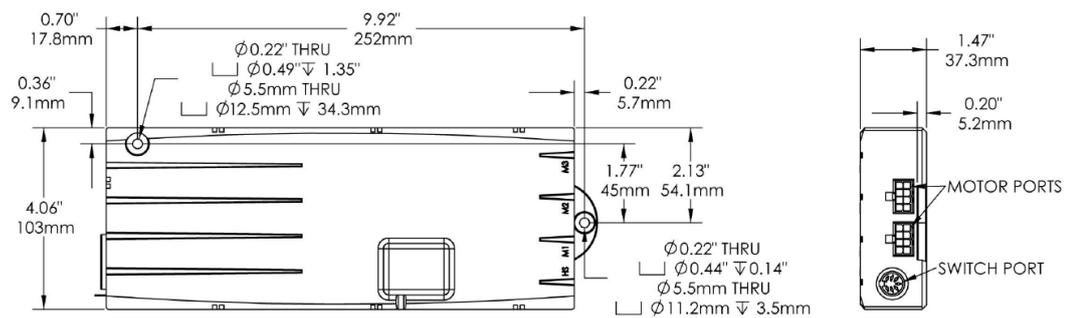


Figure 18 Motor controller dimensions-connections

Technical specifications – Motor controller	
Input voltage:	230 V / 50 Hz (1.25 A)
Output rating:	DC 24 V / 288 VA at 10% ED
Standby use:	<0.3 W
Protection class:	I
Switch / hall sensor operating voltage:	5 V DC / 250 mA
Operating temperature:	0 °C – +30 °C
Relative humidity (operation):	5% – 85% (non-condensing)
Storage and transport temperature:	-40 °C – +85 °C
Relative humidity (storage):	5% – 90% (non-condensing)
Motor controller dimensions:	264 x 103 x 37 mm (10.4 x 4.1 x 1.5 in)
Weight:	0.5 kg (1.1 lb)

Table 10 Motor controller technical specifications

Every motor controller will be delivered with a power cord that measures 3 m. European systems use a “Schuko” plug type CEE 7/7.

6.3.5 Installing the Operating Component

The Height Adjustment system can be operated either by several different switches / remotes.



Figure 19 Manual switch "Standard"



Figure 20 Manual switch with display



Figure 21 Manual switch "Office"



Figure 22 Wired remote



Figure 23 Foot switch



Figure 24 IR remote

6.3.5.1 Installing the Low Profile Switch

NOTICE Ensure sufficient cable length for the motor controller when positioning the switch.

To install the manual switches follow these steps:

- Place the switch in the desired location on the underside of the work surface.

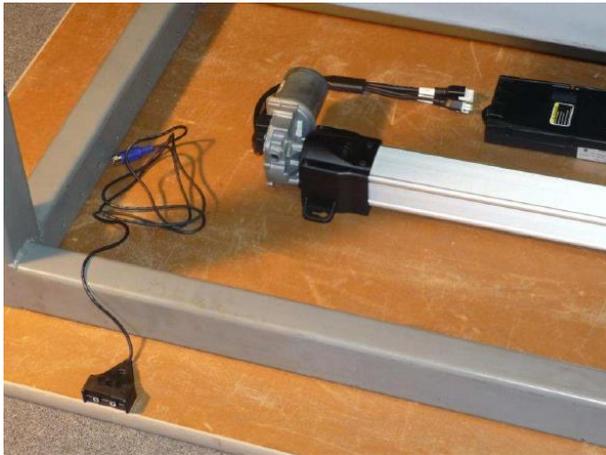


Figure 25 Placing the switch

- Align the switch body with front edge of the work-surface. Mark and prepare two holes in the locations provided in the switch enclosure.
- Mount the switch with two screws to the work surface.
- When attaching, insert metal washers between the screws and the switch to prevent damage to the controller housing.



Figure 26 Marking the locations of the holes

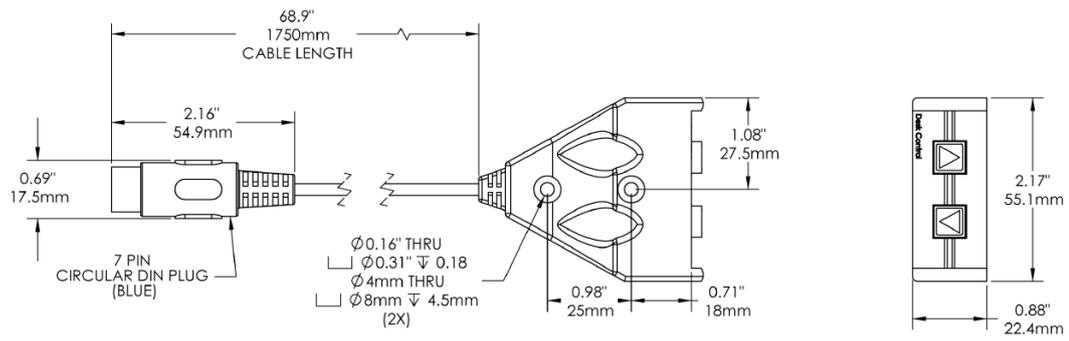


Figure 27 Low profile switch dimensions-connections

6.3.6 Connecting the Components

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



Figure 28 Motor controller ports



Figure 29 Motor controller plugs

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.



Figure 30 Connections of the motor controller

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

NOTICE The SUSPA Movotec Lift Systems “Bolt On” system can be supplied in different variants. The supply variants contain 1, 2, 3, 4, 6 or 8 lifting elements. There is a different controller variant depending on the supply variant. The correct variant of the controller can be supplied only if you specify the supply variant at the time of placing the order.

If more than four lifting elements are used in a height adjustment system, then the two motor controllers must be connected to the connector contacts with a link cable (Figure 31). Once each individual motor/controller assembly is connected independently, connect the link cable in each controller to join the two together.



Figure 31 Connection between two motor controllers

CAUTION Two controllers are necessary if you are using more than four lifting elements in one height adjustment system. The power connector of the two controllers must be joined via a connector strip or via a distribution system provided by the customer. After the power connectors have been connected, they must be coupled to the power source.

➔ Never connect the two controller power connectors separately to the power source (Socket).

IMPORTANT When the dual-drive systems leave the factory, one control box is assigned as the ‘Master’ control box, indicated on the control box label with “1” at one control box (see Figure 32). The switch will also ship installed into this ‘Master’ control box. The switch must be plugged in to this control box for the system to function! The second control ‘Slave’ box, indicated on the control box label with “2”, will not accept up/down input from the switch.



Figure 32 Definition ‘Master’ and ‘Slave’ at control box label

6.3.7 Hydraulic Tubing and Cable Management

- When laying the cables and tubing, make sure that:
 - they cannot be crushed
 - they are not subjected to mechanical loads or stresses (tension, pressure or bending etc.)
 - they cannot be damaged in any other way

- Fasten the tubing with adequate strain relief and adequate protection against kinks.
- Wind the excess length of cables together in rolls with a diameter of approx. 150 mm and fasten them with the fastening clamps and/or cable ties to the work surface.
- Use caution so as not to damage the tubing.
- Check the electrical lines, cables and hydraulic tubing to ensure that they are fastened securely to the work surface and have not been damaged during the operation.



Figure 33 Coiling of hydraulic tubing

- Check flexible tubing to ensure it is secured to the workstation and that no damage has been sustained during this operation.

NOTICE While it is recommended to coil up excess tubing when hydraulic tubing lengths are too long, the lines can be shortened. Contact SUSPA for detailed Movotec Tube Shortening Instructions.

NOTICE 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 for more information and instructions.

6.4 Space Requirements

For detailed information on space requirements refer to the Section 4.1 "Technical specifications" and the corresponding tables and figures in Section 6.3 "Install Components".

6.5 Component Alignment

A level will be required to ensure the entire work surface is horizontal and level.

- Create a good starting point for leveling, by completely threading the leveling feet in the lifting elements. The screw insertion depth is up to 32 mm. In the leveled state, the screw insertion depth should be at least 18mm.
- Place a level on the surface of the workstation.
- Ensure a uniform load distribution when using several lifting elements.



Figure 34 Adjusting the workstation with level

- By partially unscrewing the leveling feet of the lifting element adjust the individual leveling feet (Glides) such that the working surface is leveled and all attached lifting elements have uniform contact with the ground.

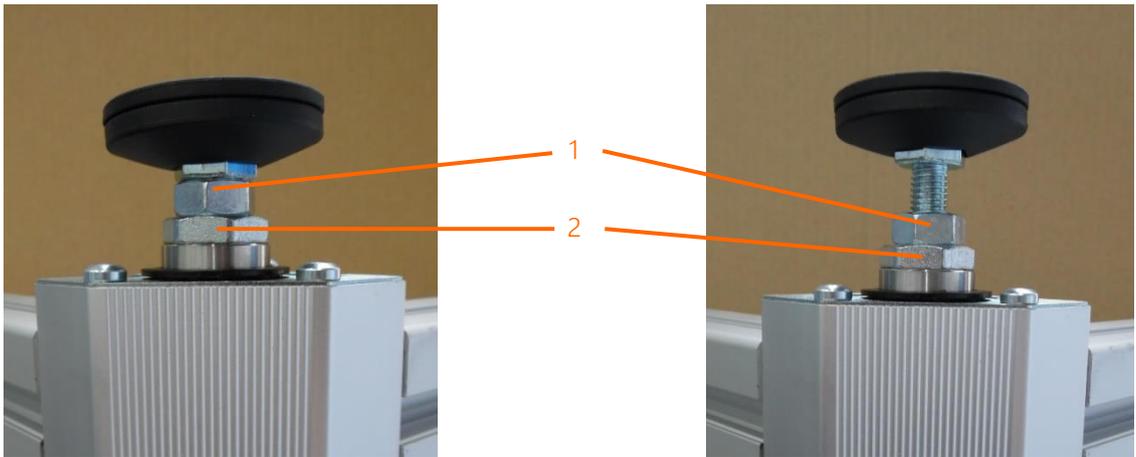


Figure 35 Adjustable leveling foot (Glide)

- 1 Leveling feet (Glides) with threaded bolts and locknut 17 mm 2 Steel insert with 22 mm (lifting element)

- ➡ Fix the locknuts tightly to all leveling feet (Glides) to ensure that the work surface remains leveled during operation.

7 Operation

7.1 Warning Notices for Operation



WARNING

Crushing or amputation risk due to moving parts

There are risks posed by removing components of the protective housing.

Do not operate the Height Adjustment System if the protective housing of the components has been removed.

NOTICE Do not allow the Height Adjustment System to be operated by children. If the device is used near children, ensure supervision by adults and activate the childproof lock.

7.2 Tests Prior to Switching the Machine On

- Check all electrical, hydraulic and mechanical connections.
- Check whether there are damages to electrical wires and hydraulic tubing which may have occurred during unpacking or installing of the system.
- Check all system components in order to ensure that they are fastened securely to the work surface.
- Make sure that the maximum load is not exceeded. The maximum load is the entire load including the raised work surface and all objects that are located on the work surface.
- Connect the work surface to the power supply only after checking the above-mentioned aspects.
- Allow the controller to adjust to the change from cold to hot environments for a few hours before putting them into operation, otherwise condensed water may damage them.

7.3 Duty Cycle

The duty cycle refers to the time period in which a motor or system is in motion, compared with the rest period.

The Height Adjustment System is not designed for continuous operation without rest periods. It is designed for intermittent use and has a maximum 10% duty cycle. This means that the Height Adjustment System must rest for at least 18 minutes before it is used again. It should be noted that the maximum period of continuous operation is 2 minutes. The limited duty cycle of 10% is stored as a security measure in the motor controller system.

CAUTION

Danger posed by thermal energies

The motor housing may become hot if the operating time exceeds the duty cycle.

The duty cycle must not be exceeded in order not to damage the system. Exceeding the duty cycle on a regular basis, can lead to system malfunction or damage to the lifting element motor(s) and/or motor controller. Moreover, this could also result in the premature wear of system components, thereby reducing the lifetime of the Height Adjustment System.

Ensure adequate ventilation to ensure sufficient heat dissipation from the components of the Height Adjustment System and do not exceed the duty cycle.

7.4 Switches and Remotes

All functions of the Height Adjustment System can be controlled using either a remote or a switch.



Figure 36 Manual switch "Standard"



Figure 37 Manual switch with display



Figure 38 Manual switch "Office"



Figure 39 Wired remote



Figure 40 Foot switch



Figure 41 IR remote

7.4.1 Function of the Switches

7.4.1.1 Simple Switches and Remotes

Symbol	Function
	<p>Up:</p> <p>Press the "Up" button until the work surface has reached the desired height or the maximum height.</p>
	<p>Down:</p> <p>Press the "Down" button until the work surface has reached the desired height or the minimum height.</p>
	<p>Reset:</p> <p>Press and hold the "Down" button. The work surface moves gradually to the lower mechanical end stop. The controller acknowledges this reset drive with a signal tone.</p>

Table 11 Function of the simple switches and remotes

7.4.1.2 Manual Switch with Display

Symbol	Function
	<p>Up:</p> <p>Press the "Up" button until the work surface has reached the desired height or the maximum height.</p>
	<p>Down:</p> <p>Press the "Down" button until the work surface has reached the desired height or the minimum height.</p>
	<p>Reset:</p> <p>Press and hold the "Down" button. The work surface moves gradually to the lower mechanical end stop. The controller acknowledges this reset drive with a signal tone.</p>
Key "S"	Memory button for storing the memory positions.
Keys "1", "2", "3" and "4"	Up to four memory positions can be stored. To reach the memory position press and hold the respective key.

Table 12 Function of the programmable manual switch with display

Storing the memory positions:

Move to the desired position and press the "S" key one time and then press the Key "1", "2", "3" or "4". The controller acknowledges the successful storage of the position with a signal tone. The memory position is retained even after a power failure.

Repeat the procedure described to store new memory positions.

7.5 Perform Reset

The following procedure should be used to reset a motor controller and pump to their respective "home" positions. The procedure should be performed only if the following conditions exist:

- A new or replacement controller is introduced to an existing motor driven system.
The 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.
- 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 preprogrammed limits.
- 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.

7.5.1 System Reset Procedure

- ➡ Remove power from the system.
- ➡ 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.
- ➡ Contact power supply 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.

7.6 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 removes 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.

NOTICE 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.

NOTICE The lower limit must exist within the lower 50% of the system's stroke.

To remove 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 removed.

- ➡ Repeat for each limit as desired.

7.7 Troubleshooting

This section contains remedial measures in case of malfunctions. If an error or fault occurs that is not listed in this table, please contact your supplier.

The listing below handles problems that are caused directly in connection with the controller.

⚠ CAUTION The troubleshooting and fault rectification should be done only by a specialist who has completed his professional education as an electro-mechanical installation engineer or an equivalent qualification. Make note of the user groups in section 2.5.3.

NOTICE Pay attention to the initialization (reset movement) in section 7.5.

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 for replacement.
Defective Switch	➡ Contact SUSPA for replacement.
System Load Rating Exceeded	➡ Verify system load does not exceed rating and remove weight as needed.
Striking of an object when raising or lowering (e.g. a trashcan etc.)	➡ Remove the object.

Table 13 Troubleshooting: System does not operate

Problem: Motor runs but does not extend or retract system

Possible Causes	Recommended Solutions
Broken Pusher Block	➡ Contact SUSPA for replacement pump.
Broken Coupler Sleeve	➡ Contact SUSPA for replacement.
Limited Movement	➡ Searching for reset home position.

Table 14 Troubleshooting: Motor runs but does not extend or retract system

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 7.5.1
Damaged switch	➡ Contact SUSPA for replacement.

Table 15 Troubleshooting: Motor runs intermittently and requires repeated switch activation

Problem: Uneven lift cylinder retraction

Possible Causes	Recommended Solutions
Insufficient Lift Cylinder Load	➡ Add load to system. Contact SUSPA for tube shortening instructions.
Cylinder Mounting Screws Too Long	➡ Reduce cylinder mounting screw length.
Flexible Tubing Lengths Too Long	➡ Contact SUSPA for tubing change or tube shortening instructions.

Table 16 Troubleshooting: Uneven lift cylinder retraction

8 Service and Maintenance

8.1 General

- Observe and follow the general accident prevention guidelines.
- Carry out prescribed adjustment, maintenance, and upkeep work according to schedule.
- Replace defective components as quickly as possible.
- Only use tools that are in perfect condition.
- Keep suitable containers ready for small parts that may have to be disassembled.
- Only use original spare parts approved by the manufacturer.
- Tighten screw connections that have been loosened after doing maintenance and service work.
- Reattach disassembled protective devices before the first re-commissioning. Make sure that the protective equipment is functioning properly.
- Perform a functional test (test run) after maintenance or repair work.
- Check the proper function of all safety and protective devices.
- Remove any used tools, screws, aids or other objects from the operational area of the Height Adjustment System.

8.2 Instructions for Maintenance

8.2.1 Cleaning



WARNING

Danger of injury by disregarding the manufacturer's instructions

The function of the components may be impaired as a result of ignoring the manufacturer's cleaning instructions.

Follow all applicable environmental regulations when cleaning.

- Remove all cleaning aids after performing cleaning work.
- Retract the Height Adjustment System before cleaning.
- Remove the load from all lifting elements before maintenance works.
- Unplug the motor control from the mains before cleaning.
- Stabilize the work surface or the structure on which the Height Adjustment System is secured before maintenance works.
- Allow the components to cool off before cleaning.
- Clean the system components with a mild detergent and a damp cloth.
- Liquid entry of any kind must be strictly avoided.
- Do not use any corrosive detergents or high pressure washing systems to clean the components of the Height Adjustment System.
- Before restarting operation make sure the system is clean and dry.

8.3 Maintenance

The Height Adjustment System should be checked regularly to determine whether there are conditions that lead to excessive wear or damage to components. Especially the following possible causes of system failure should be considered.

NOTICE The maintenance instructions given in the following must be understood as recommendations by the manufacturer. The operator of the Height Adjustment System is obligated to document maintenance-related observations and to supplement and add specifications to the maintenance list in these installation instructions on their own. In addition, the maintenance instructions of the manufacturers of outsourced parts must be observed and followed!

8.3.1 Changing Load Conditions

- ➔ Correct the overload conditions immediately and also make sure that there is even load distribution on the work surface in order to avoid premature wear of the mechanical components.
- ➔ During the further operation note that the system remains balanced and that the mounted lifting elements have uniform contact with the ground.

NOTICE One indicator of a uniform load distribution is that all the lifting elements in the area of drive units (motor / cable outlet) have the same temperature.

8.3.2 Contamination

No sterile cleanliness is necessary, but regular cleaning will prolong the life of the system. Dust and dirt may cause abrasions to movable components like mountings and bearing. Therefore try to keep the components clean throughout the whole service life.

8.3.3 Damages to Electrical Wires

Check the insulation of the electrical wires for visible signs of aging and wear. Replace defective or damaged wiring.

8.3.4 Damages to Hydraulic Tubing

Check the hydraulic tubing for visible signs of aging and wear. Replace defective or damaged tubing.

9 Decommissioning

9.1 Component Storage

The storage area should be cool and dry in order to prevent corrosion on the Height Adjustment System parts.

- Pack the Height Adjustment System parts in such a way that they are protected from damages by external influences during storage.
- If necessary, use cardboard boxes and other packaging material.
- Secure the Height Adjustment System parts against accidental tilting and instability.

Transport and storage conditions	
Temperature:	-40 °C to +85 °C
Rel. Moisture:	5% – 90% (non-condensing)
Air pressure:	106 kPa to 70 kPa

Table 17 Transport and storage conditions

9.2 Disposal of Components

- Dispose of the packaging material in accordance with national regulations.
- Dispose of cardboard packaging, protective packaging made of plastics and preserving agents separately and professionally.

The users are obliged to return the old equipment to a recycling center for old electrical and electronic equipment.

The disposal of the controller is subject to the Elektro-G (Electrical Equipment Act), the EC Directive 2002/95/EC internationally (RoHS with effect from 7/1/2006) or the respective national legislation. The disposal of the components (also operating materials) in other countries should be performed in accordance with the local disposal regulations and environmental protection laws in the country where the machine is used.

If the equipment has reached the end of its life cycle, ensure a safe and professional disposal when dismantling, in particular for those parts or substances which are hazardous for the environment. This includes lubricants, plastics and batteries etc.

- Have the machine disposed of properly by an authorized specialist company on account of the potential risk of environmental pollution.

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10.3 Incorporation

EC-Declaration of Incorporation

in accordance with Machinery Directive (2006/42/EC)

Manufacturer:

SUSPA Incorporated

3970 Roger B. Chaffee Memorial Drive

Grand Rapids, MI 49548

USA

Authorized representative in the EU:

SUSPA GmbH

Eisenhämmerstrasse 3

92237 Sulzbach-Rosenberg

GERMANY

declares herewith that the design of the partly completed machine

Machine identification: SUSPA Movotec Lift Systems "Corner Leg"

Year of construction: 2012

Designated use: The SUSPA Movotec Lift Systems "Corner Leg" are used for height adjustment

the delivered version is compliant with Directive 2006/42/EC of the European Parliament and of the Council dated 17 May 2006 on machinery, and conforms with the following harmonized standards and normative documents to which this declaration refers:

Applicable directives: EC Machinery Directive (2006/42/EC)
EC Directive for Electromagnetic Compatibility (2014/30/EU)

Applied harmonized standards:

1. **DIN EN ISO 12100:2011:** Safety of machinery – Risk assessment and risk reduction
2. **DIN EN ISO 13849-1:2008:** Safety of Machinery – Safety-related components of control systems – Part 1: General design guidelines

Technical references of other relevant products:

- UL report – UL file #258745
- UL statement over the permission to use the UL mark of conformity
- Drawing of the motor: 404.961
- Product data sheet: Compact-eco
- Operating instruction: Compact-eco
- Declaration of conformity: Compact-eco

The technical documentation for the partly completed machine is available.

We hereby guarantee that the certification procedure has been carried out in accordance with the Machinery Directive 2006/42 / EC. The start-up is prohibited until it has been determined that the machine into which the above mentioned partly completed machine is to be installed complies with the provisions of Machinery Directive 2006/42 / EC. This declaration will lose its validity if any modifications are made to the partly completed machine without consultation with us. Any unauthorized modifications in this sense excludes any liability on our part.

Manufacturer:

Grand Rapids,

on 03/05/2018



Signature

Authorized representative in the EU:

Sulzbach-Rosenberg,

on 03/05/2018



Signature