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VACUHAND PRO
LIFTER
USER MANUAL

DOCUMENT ID: 12122022

Have Questions?

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R ON I

LIFT-O-FLEX

MOBI-Crane | movomech | Voyager

R ON I
8001 Tower Point Drive
Charlotte, NC 28227 USA

IMPORTANT: READ MANUAL CAREFULLY

Use the equipment strictly as intended to prevent injury or damage. Familiarize yourself with safety guidelines and operational instructions. For any questions or concerns, contact our office promptly.

Contents

Symbol legend

⚠ Warning! Warning! This indicates the risk of serious injury or death if instructions are not followed. This includes the risk of serious damage to the machine or injury to third parties.

⚠ Caution! Caution! This indicates the risk of minor injury and equipment damage if instructions are not followed.

⚠ Attention! Attention! This indicates the risk of equipment damage or considerable reduction in equipment service life if instructions are not followed.

The equipment complies with EU Machinery Directive 2006/42/EG, appendix 21A, as well as EN ISO 12100:2010 and SS-EN 14238 2004+A1 2009.

Introduction

Vacuhand Pro is a Swedish-manufactured lifting device (tube lifter) based on vacuum technology. See Safety Instructions below for additional important information about how to evaluate items before they are lifted to determine if Vacuhand Pro may be utlized safely. Additionally, while the Vacuhand Pro itself is capable of lifting many types of objects, the operator must also read and understand the specific manual for the equipment to which the Vacuhand Pro is attached for additional restrictions on what may be safely lifted by any given “System”. I.e. there may be additional limitations or requirements that may exist beyond those specifically listed in this manual and it is the operator’s responsibility to ensure that they are aware of and obey all such limitations as well as all safety rules. For further information, contact your supplier.

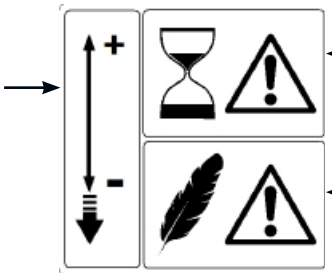
Vacuhand Pro is intended to facilitate lifting work with an emphasis on ergonomics, efficiency and safety. Movomech AB will assist with repair through authorized dealers and our support organization.

This manual addresses standard use of safety, installation, use, maintenance and troubleshooting; special Vacuhand Pro versions are not addressed. Information about special modifications to installations can be provided by your supplier. The equipment delivered may only be used to lift objects for which it is intended according to specifications from the supplier. If you need to use the lifter for other purposes, please contact your supplier. The peripheral equipment into which Vacuhand Pro is installed is not described in this manual. Refer to the separate descriptions of the equipment concerned for additional important information.

Movomech’s goal is to continually develop and improve the user-friendliness and design of our equipment. Accordingly, we reserve the right to future design changes.

Description of symbols on control levers

Operating: Up – Down – Release. Always use soft, light controlled movements when operating the lift. When releasing the load, open the control bar fully and tilt the lifter a little to release the suction foot.



Warning! Never let a load hang in the lifter for more than 60 seconds in each operation cycle.

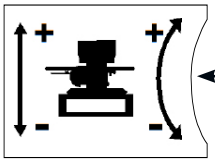
Always use soft, light controlled movements to avoid jerky operations.

Part no: 640010-03

Never stand or place any part of the body under a suspended load. Falling loads can cause serious injury or death.

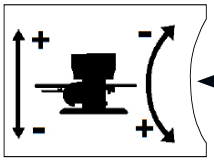
Part no: 640010-02

Users must read and understand the manuals before operating the machine.



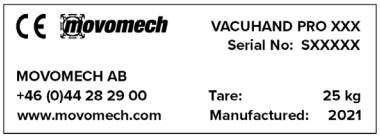
Adjustment with load.
Turn clockwise – Raises the load
Turn counterclockwise – Lowers the load

Part no:640010-04



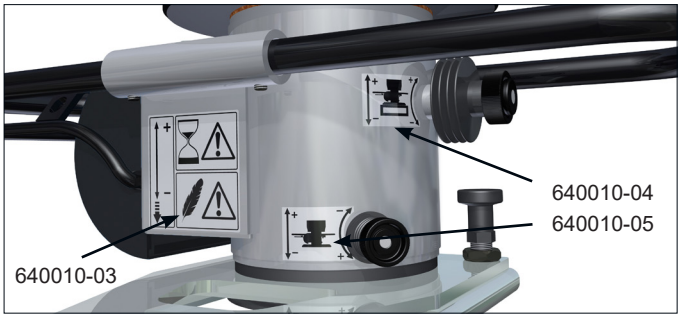
Adjustment without load.
Turn clockwise – The lifter is lowered
Turn counterclockwise – The lifter is raised

Part no: 640010-05



Part no: 640010-01

CE label with machinery model, serial number and year of manufacturing.



Safety instructions for Vacuhand Pro

Read through the safety instructions below as well as manual(s) for the equipment on which Vacuhand Pro is mounted before using Vacuhand Pro. Note that these other manuals may include instructions, warnings, or limitations for use of Vacuhand Pro beyond those listed below.

Vacuhand Pro may only be used by personnel and who have read and understood this manual, any manuals for related equipment as mentioned above, and any applicable standards and regulations. Movomech AB is not liable for any damage or injury caused by use or actions which are inconsistent with the training, manuals and any applicable standards and regulations. Such use is entirely at the user's risk.

General

⚠ Warning!

- Vacuhand Pro generates very a strong suction/negative pressure (vacuum). Do not attempt to seal the suction pad with any part of the body. Keep all body parts, clothing, and hair away from the suction pad and suction opening while the vacuum pump is operating.

⚠ Caution!

- Vacuhand Pro may only be used as intended for the materials and application described in this manual as well as any relevant equipment manuals and in accordance with the relevant safety regulations. Any other use is not as intended and is prohibited!
- The condition and serviceability of Vacuhand Pro must be inspected and tested prior to each use.
- Maintenance, servicing, lubrication and troubleshooting may only be performed by qualified persons who have read and understood all relevant manuals and who are trained and/or approved by Movomech AB or their authorized distributor.
- If a hazardous condition is identified during operation or servicing, Vacuhand Pro must not be used until the hazardous condition has been corrected.
- In the event of crack formation or other damage to Vacuhand Pro or its associated lifting tool(s), all use of the machine must immediately cease.
- Persons under the influence of drugs, alcohol or medications that affect their judgement and physical abilites must not be allowed to use, maintain nor repair Vacuhand Pro.
- Appropriate personal protective equipment should be used when operating the Vaculyft including steel toed boots, safety glasses and hearing protection as required by your employer and applicable regulations.
- The load is lifted and held using negative pressure. If there is a leak or power failure (interruption of fuel supply, blocked filter), the negative pressure is reduced and the load will be lowered to the ground. In the event of media outage, the operator should close the control handle and allow the load to be lowered in controlled fashion to the ground. Vacuhand Pro must not be used before the fault/cause of the outage has been rectified.
- The vacuum pump is the heart of the equipment – handle it carefully as it is sensitive to shocks and bumps.
- Never test run the vacuum pump without a connected air filter.

Load

⚠ Caution!

- The maximum allowable loads may be dependent on the equipment on which Vacuhand Pro is mounted. Never handle loads heavier than approved for the equipment. See relevant manual(s).
- Lifting tools are to be selected as dictated by the shape and weight of the load.
- Only use Vacuhand Pro to handle loads that are sufficiently solid to avoid the risk of their coming apart when lifted.
- Never attach the suction foot to surfaces that are loose or could come loose. Examples include but are not limited to address labels, taped objects, thin paper, etc.
- Never attach the suction foot to surfaces that are so slippery, oily, or wet that there is a risk of the load sliding in relation to the suction foot.
- Never lift objects that are sharp and that could damage the vacuum seal strip.
- Never lift hazardous or explosive materials without first ensuring that proper safety procedures, as designated by your employer, are in place.
- During operation of Vacuhand Pro the ambient temperature must be in the range of 5°C (+41°F) to +104°F (40°C). Below 3°C (+37.5°F) there is a danger of the load slipping due to ice formation.

Lifting

⚠ Warning!

- A suspended load shall not be allowed above any part of a person's body.
- Vacuhand Pro with load may not be maneuvered such that a falling load would risk personal injury or material damage.
- Never try to lift people or animals.
- The area of the suction foot must be at least 2.5 times greater than the cross-sectional area of the lifter tube to avoid unintentional release of the load.

⚠ Caution!

- Never leave a suspended load unattended.
- Never suspend a load for more than 60 seconds or the vacuum pump may overheat.
- Never try to manually assist the up or down movement of Vacuhand Pro when it has a load attached.
- Always adjust the balance height in relation to the load to allow for convenient and safe handling.
- A load which is fixed or jammed in position must not be pulled free with Vacuhand Pro.
- Always use smooth controlled movements when working with Vacuhand Pro. Jerky operation can result in the load working loose and is therefore prohibited.
- The identification plate attached to Vacuhand Pro must not be removed.

⚠ Attention!

Important information

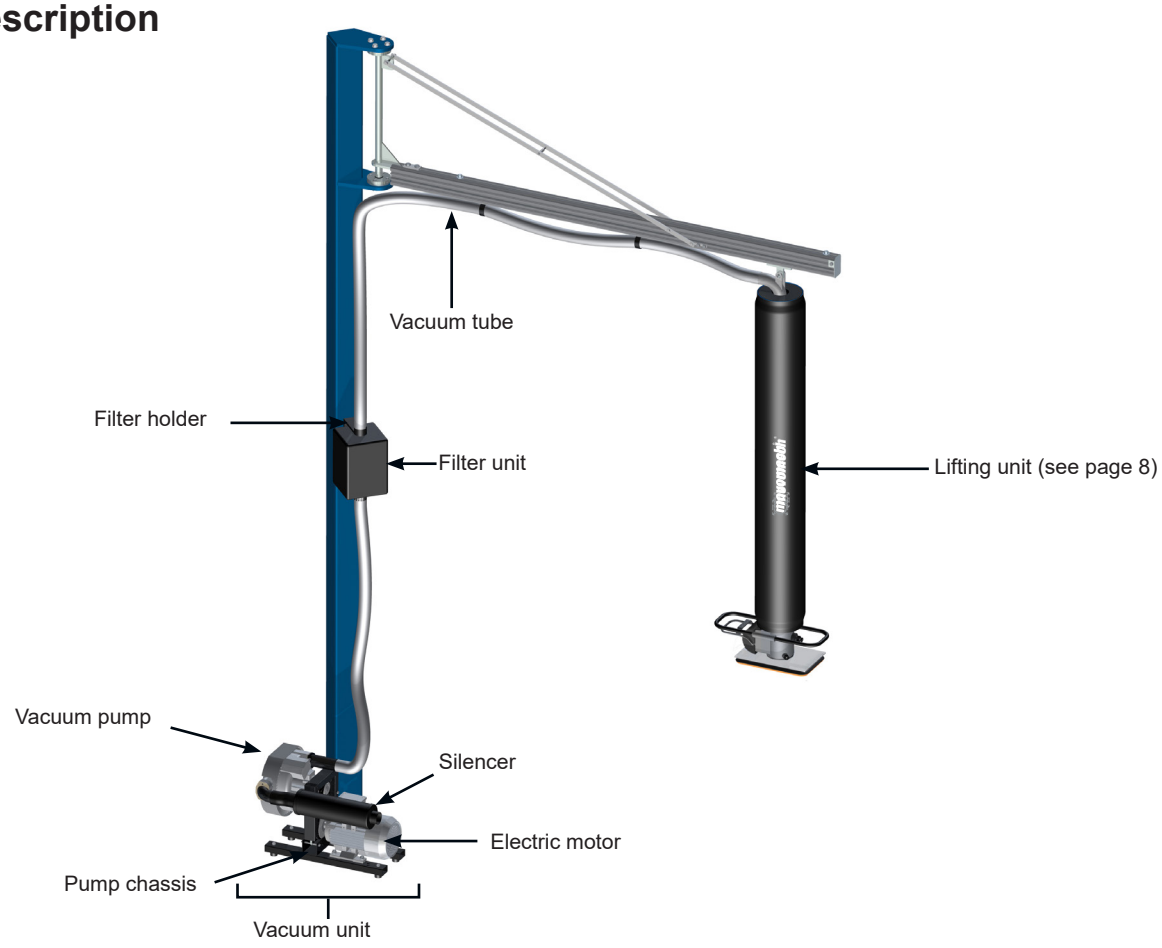
- Read through the entire manual and get to know the equipment before it is assembled and put to use.
- Operate Vacuhand Pro gently and carefully using the control levers in order to avoid jerky movements when lifting.
- The area of the suction foot must be at least 2.5 times greater than the cross-sectional area of the lifter tube to avoid unintentional release of the load (see examples of calculation on page 9 and 10).
- The equipment must be switched off during maintenance and cleaning.
- The vacuum pump is the heart of the equipment – handle it carefully as it is sensitive to shocks and bumps. Never test run the vacuum pump without a connected air filter.
- Loads may not be raised before Vacuhand Pro and its gantry or turntable crane are positioned vertically above the load.

Prohibited use

⚠ Warning!

Under no circumstances may the tube lifter's design or structure be modified without permission from the manufacturer. Only ever use accessories or spare parts from Movomech AB. Modifications that are not approved by Movomech AB and/or the use of non-approved accessories or spare parts can cause serious injury during lifting operations. The maximum load may never be exceeded.

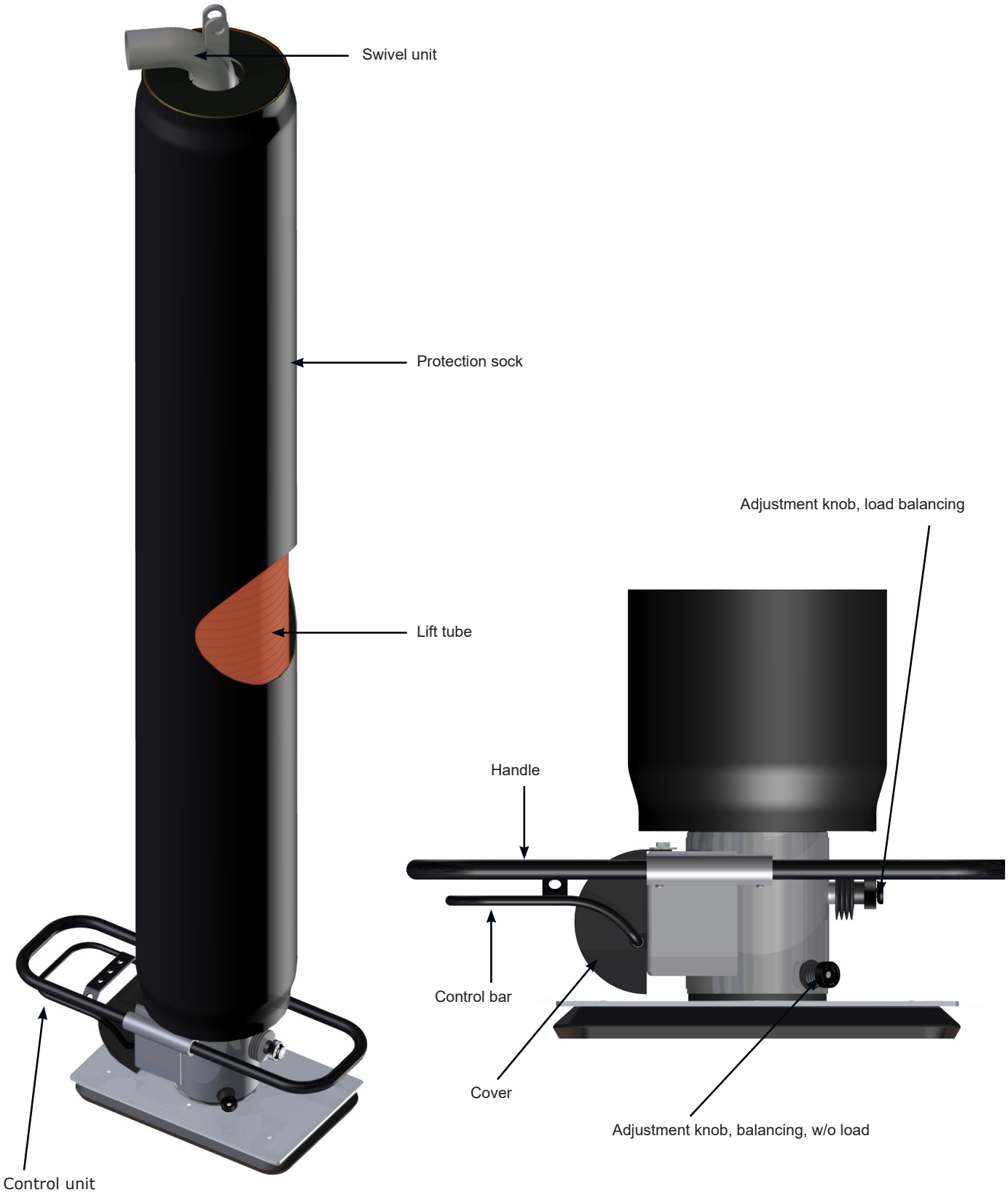
Product description



Example showing installation with jib crane

Example showing installation with crane system

Lifting unit



Installation

⚠ Caution! Make sure the correct components have been delivered and that they correspond to the delivery note/shipping documentation. If anything is missing, contact your supplier.

⚠ Caution! Read through the manual carefully before installation in order to avoid problems during assembly and commissioning.

⚠ Warning! From a safety standpoint, it is necessary to have a good understanding of the equipment. Vacuhand Pro is delivered with an electric or pneumatic vacuum pump. Carefully follow the directions and/or manual during installation.

Safety regulations for installation

- The person in charge of installation is responsible for making sure that the entire lifting system (e.g. overhead crane system) is designed to safely handle the sum total of Vacuhand Pro's tare weight plus the maximum allowable load including all necessary safety factors.
- Electrical installation must be carried out by an authorized electrician.
- In the case of jib crane installations, follow Movomech's installation instructions for jib cranes which are provided by Movomech AB.
- In the case of crane system installations, follow the supplier's assembly instructions.
- The lifting unit is hung from a suspension lug. Make sure that other suspension devices are sufficiently dimensioned and that they are secured against falls where necessary.
- Once the lifting unit is suspended, the suction foot should be around 3.9 in. (100 mm) above the floor. If the suction foot is closer to the floor, the tube must be cut (refer to Cutting the lifter tube) or the suspension system raised.
- If the suction foot is higher than 3.9 in. (100 mm), it must be lowered by lowering the lifting unit or installing a longer lifter tube.

⚠ Warning! Check that the suction foot to be used with the lifting unit concerned has a safety factor of at least 2.5. The area of the suction foot must be at least 2.5 times greater than the cross-sectional area of the lifter tube to avoid the load coming loose unintentionally.

Sample calculation:

Lifter tube cross-section: Radius x Radius x 3.14 (π) = Area

Suction foot area, rectangular: Length x Width x Number of suction feet = Area

Suction foot area, round: Radius x Radius x 3.14 x Number of cups = Total area

Example 1

Single rectangular suction foot 8.3x13 in (210x330 mm) and lifter tube Ø 5.5 in (140 mm)

Inches:

Suction foot: 8.3 x 13 in x 1pc ≈ 107.9 sq in

Lifter tube: (2.75 x 2.75 in) x 3.14 x 1pc ≈ 23.75 sq in

Safety factor: 107.9 / 23.75 sq in ≈ 4.54 In this case the safety factor is approximate 4.54, which is sufficient by a good margin.

Metrics:

Suction foot: 210 x 330x 1pc ≈ 69.300mm²

Lifter tube: (70 x 70 mm) x 3.14 x 1 ≈ 15.386 mm²

Safety factor: 69.300 / 15.386 mm² ≈ 4.50)

In this case the safety factor is approximate 4.5, which is sufficient by a good margin.

Example 2

Lifting yoke with 4 pcs round Ø5.9 in (150 mm) suction cups and lifter tube Ø 6.3 in (160 mm)

Inches:

Suction cup, round 6.3 in (150 mm): (2.95 x 2.95) x 3.14 x 4 pc ≈ 109.3 sq in

Lifter tube: (3.15 x 3.15 in) x 3.4 x 1pc ≈ 31.16 sq in

Safety factor: 109.3 / 31.16 sq in ≈ 3.50

In this case the safety factor is approximate 3.50, which is sufficient by a good margin.

Metrics:

Suction cup, round 150: 75 x 75 x 3.14 ≈ 17.662 mm² x 4pcs = 70.648 mm²

Lifter tube: 80 x 80 x 3.14 ≈ 20.096 mm²

Safety factor: 70648 / 20.096 mm² ≈ 3.51

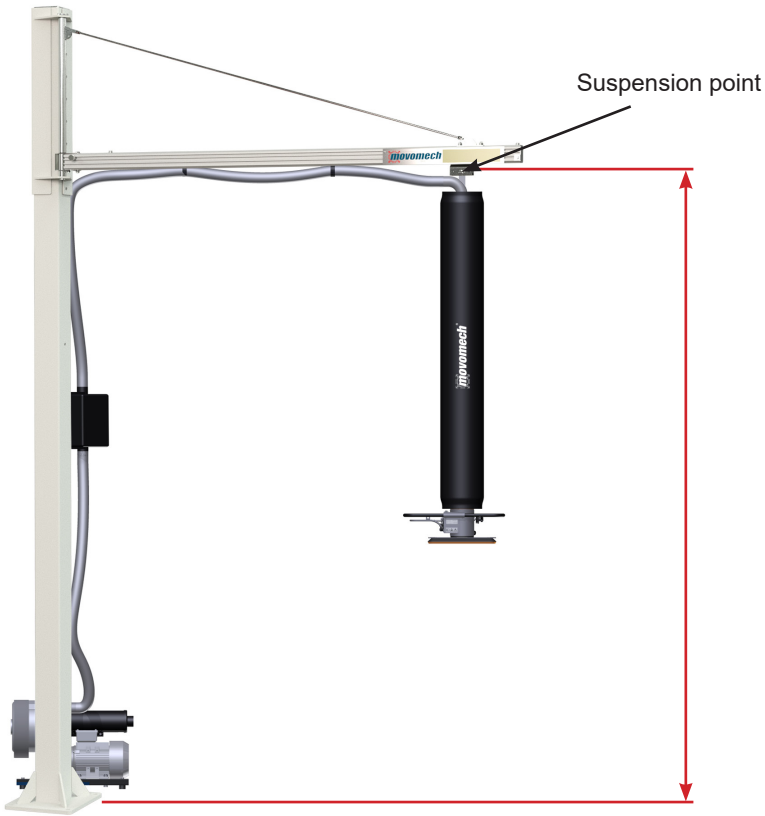
In this case the safety factor is approximate 3.50, which is sufficient by a good margin.

Cutting the lifter tube

In some cases, the lifter tube must be cut if the suspension height (the measure between the ground till the suspension point (see figure below) is lower than 9.5 ft (2.9 m).

The following is required:

- Knife
- Scissors
- Metal shears
- Cutting pliers
- Woven tape, part #700PS618

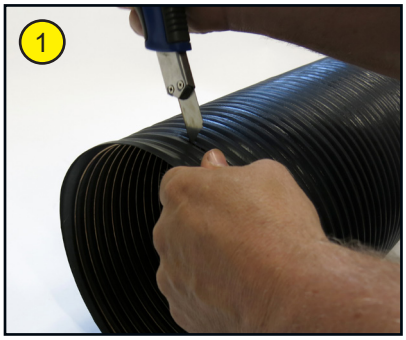


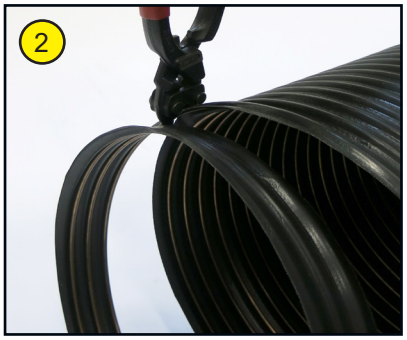
- Follow all local lockout tagout regulations to ensure that all sources of stored energy are controlled and made safe. Examples include but are not limited to the vacuum pump and gravitational energy due to the suspended components of Vacuhand Pro.
- Remove the protection sock, the woven tape and unscrew the lifter tube from the plastic adapter. Measure how much of the lifter tube must be removed to achieve the intended height above the floor.
- Cut the lifter tube (figure 1) and clip the steel wire (figure 2).
- Cut away the surplus fabric from the lifter tube (figure 3).
- Carefully bend in the end of the steel spiral so that it follows the external diameter of the tube (figure 4).

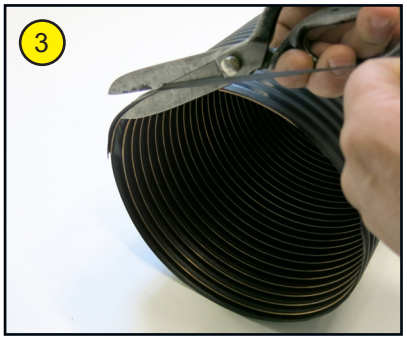
Installing/re-installing the lifter tube

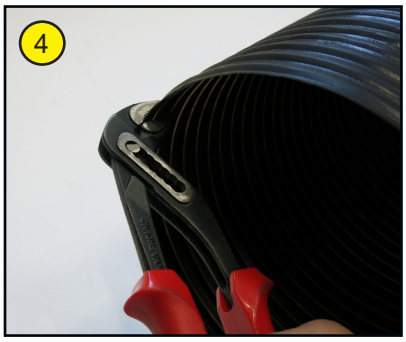
The installation instructions apply to both ends of the tube.

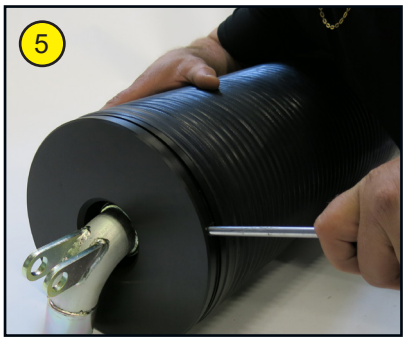
- Unscrew the lifter tube from the tube adapter. In the case of a large diameter lifter tube, a screwdriver or similar may be used as an aid (figure 5). Leave 3/8 in. (1cm) of the tube adapter visible (figure 6).
- **⚠ Attention!** **Next, wind 3 or 4 turns of woven tape, Movomech part # 700PS618, around the tube adapter and tube (figure 7). Begin tape coverage around 3/16 in. (5 mm) above the edge of the tube adapter. The tape must be tightly wound.**
- Fold down the tape and secure it against the tube adapter (figure 8).
- Fit the protection sock.

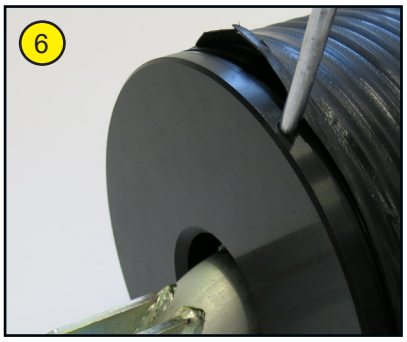


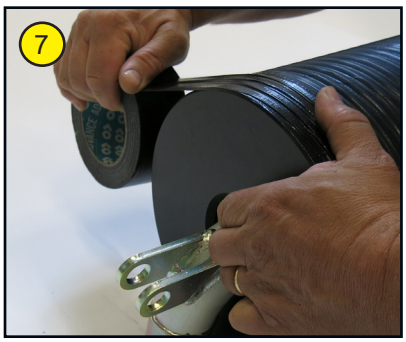


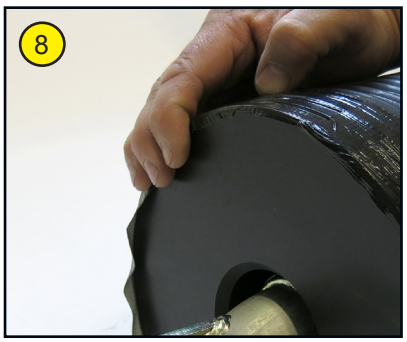












Installing the electric vacuum pump

To keep the vacuum tube short, always locate the vacuum pump as close to the lifting unit as possible.

In order to enjoy the highest possible speed during lifts, it is important that the vacuum tube between the vacuum pump and the lifting unit not be too long. A long vacuum tube reduces the ability of the lifting unit to use all of the vacuum pump's capacity. We recommend that tube length between the vacuum pump and the lifting unit not exceed 82 ft. (25 m). In the case of greater distances, contact the supplier.

⚠ Attention! With regard to its heat generation, install the pump in a well-ventilated space. Make sure the pump is positioned such that it is surrounded by a free area of at least 11.8 in. (30 cm) on all sides and that there is no risk of objects blocking the pump's ventilation holes.

⚠ Attention! Make sure the pump stands firmly. If it is not placed on the floor, it must be secured so that it does not fall or tip over.

⚠ Caution! Check that the belt guard is installed.

⚠ Caution! Electrical installation must be performed by an authorized electrician.

⚠ Caution! **Always remove the protective plug from the pump suction pipe before start.**

⚠ Caution! **Note! Never test run the pump without a connected air filter.**

The electrician must check that air blows out of the silencer to confirm the correct direction of rotation for the electric vacuum pump motor. The pump can be damaged if it runs backwards.

If multiple Vacuhand Pro are installed, vacuum pumps must be marked to clearly indicate which Vacuhand Pro unit they are connected to.

⚠ Warning! **The installation may not be put to use before an authorized electrician has installed suitable circuit breaker. Failure to install a circuit breaker is a fire risk!**

Installing the electric vacuum pump, vacuum tube and air filter

⚠ Attention!

- The air filter must be located so that it is easy to access for replacement; it must be clear which lifting unit it is connected to. Begin by hanging the vacuum tube from the suspension system to which the lifting unit is attached (e.g. in a gantry, turntable crane, etc.). Connect the vacuum tube to the lifting unit's top swivel and to the air filter.
- Connect the other vacuum tube between the air filter and the vacuum pump.
- **⚠ Caution!** **Note! The arrow on the air filter must point towards the tube that goes to the vacuum pump.**
- Make sure the vacuum tube is not exposed to crush risk anywhere along its length or can come into contact with objects that might damage it.

Test runs

⚠ Caution!

- Lift a load with a completely smooth, non-porous surface. Let the load hang suspended in the lifter while listening for hissing sounds to make sure there are no leaks anywhere in the installation.
- Lift a load that weighs 22 lb (10 kg) and has a completely smooth, non-porous surface. Let the load hang suspended in the lifter and then switch off the vacuum pump. The load, together with the lifting unit, should now sink slowly to the floor. When the lifter tube is fully stretched, a greater vacuum is raised in the tube to provide an extra soft sink rate.
- Lift a completely smooth, non-porous load at the installation's maximum permissible weight; refer to Troubleshooting (page 20) if the load is not raised.

Maximum load label

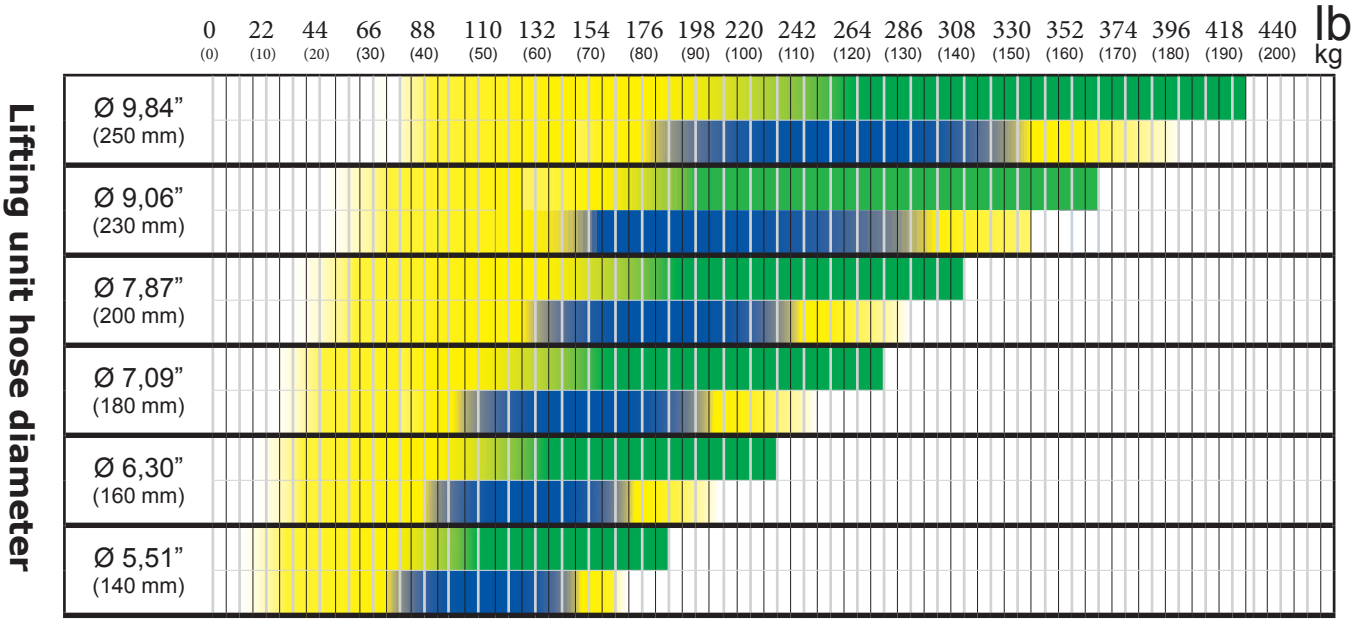
⚠ Attention!

Affix a maximum load label to the control unit following Vacuhand Pro installation in a gantry system. The maximum load must correspond to Vacuhand Pro's maximum load together with the gantry system's maximum load. **Note that Vacuhand Pro does not provide maximum load labels as standard equipment.** They can however be ordered for each respective installation. The next page provides information about Vacuhand Pro's maximum loads.

Lift capacity

= Green indicates recommended lifting capacity for loads of a smooth, non-porous material. Yellow indicates possible lift range depending on the shape of suction feet etc.

= Blue indicates recommended lifting capacity for objects of porous material. Yellow indicates possible lift range depending on the shape of suction feet etc.



The bars in the chart show the recommended load weight for smooth, non-porous/porous material that can be handled by a specific lifting unit. The recommendations are based on appropriate lifting speeds. Light loads are lifted more quickly than heavy loads. Solid material such as sheet-metal is lifted more quickly than porous material such as cardboard. Never use the lifting unit/pump combination for loads heavier than those recommended.

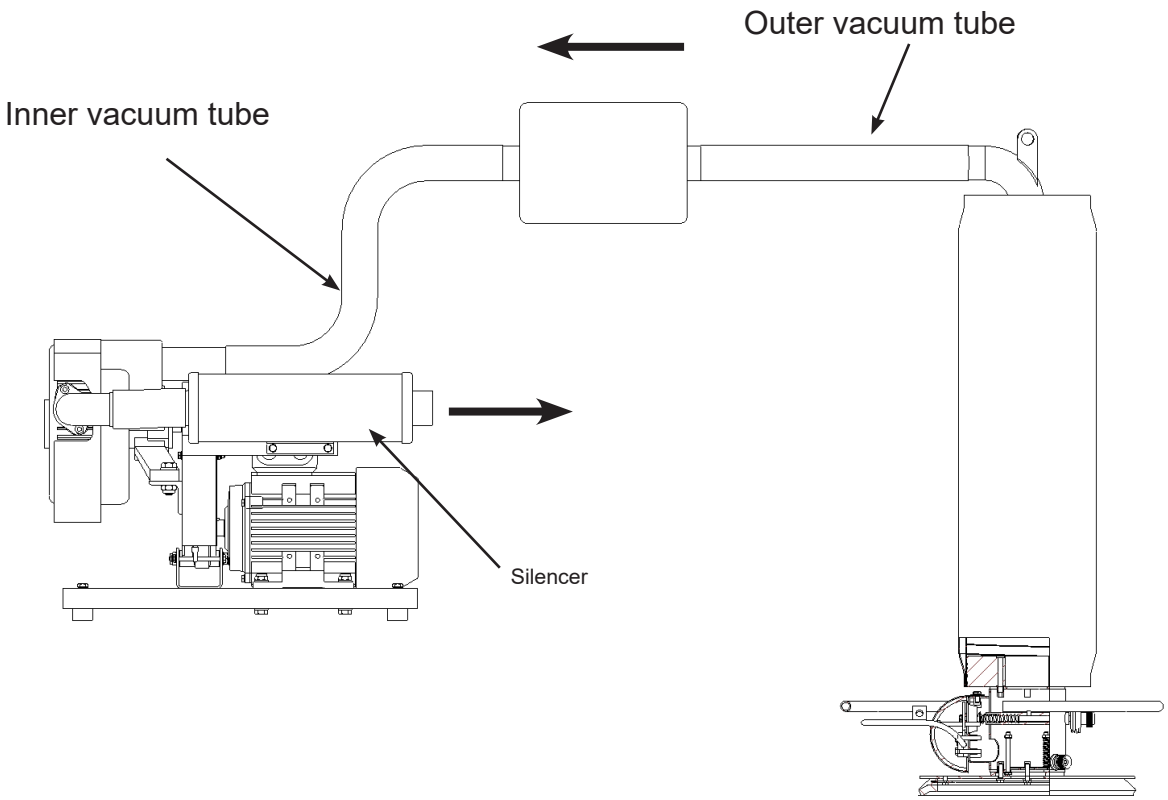
Generally speaking, always try to use the largest possible tube diameter to achieve the gentlest lifting movement.

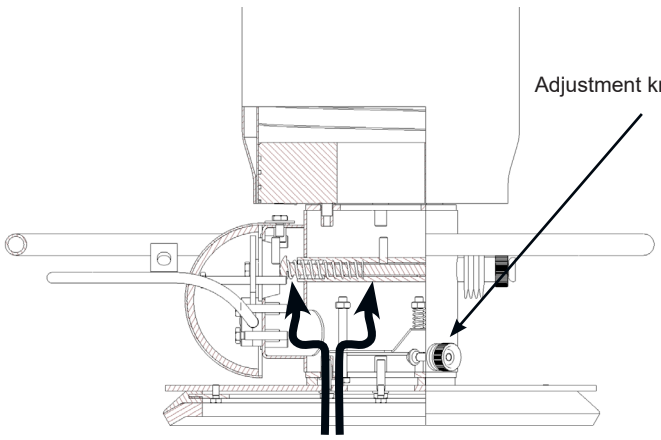
How to interpret the chart:

A Vacuhand Pro 160/25 (lifter tube diameter 6,3 in (160 mm), pump model 25 G200) is recommended for lifting solid loads with weights from around 110 lb (50 kg) up to around 230 lb (104 kg), and porous loads with weights from around 88 lb (40 kg) up to around 171 (77.5 kg).

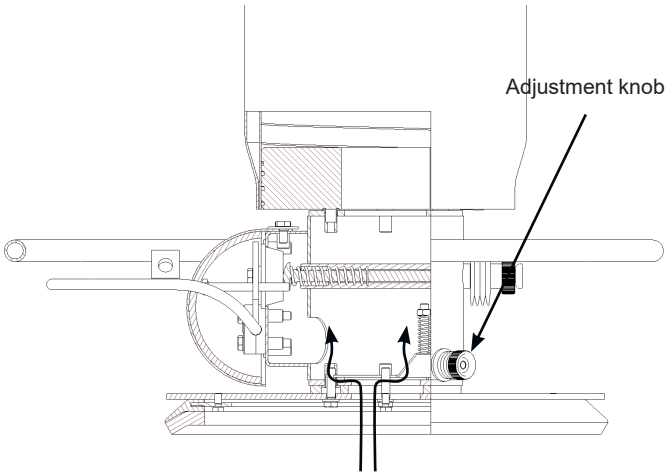
Function

Balancing without load





Turning the adjustment knob clockwise. The bottom valve opens. The lifter is lowered.

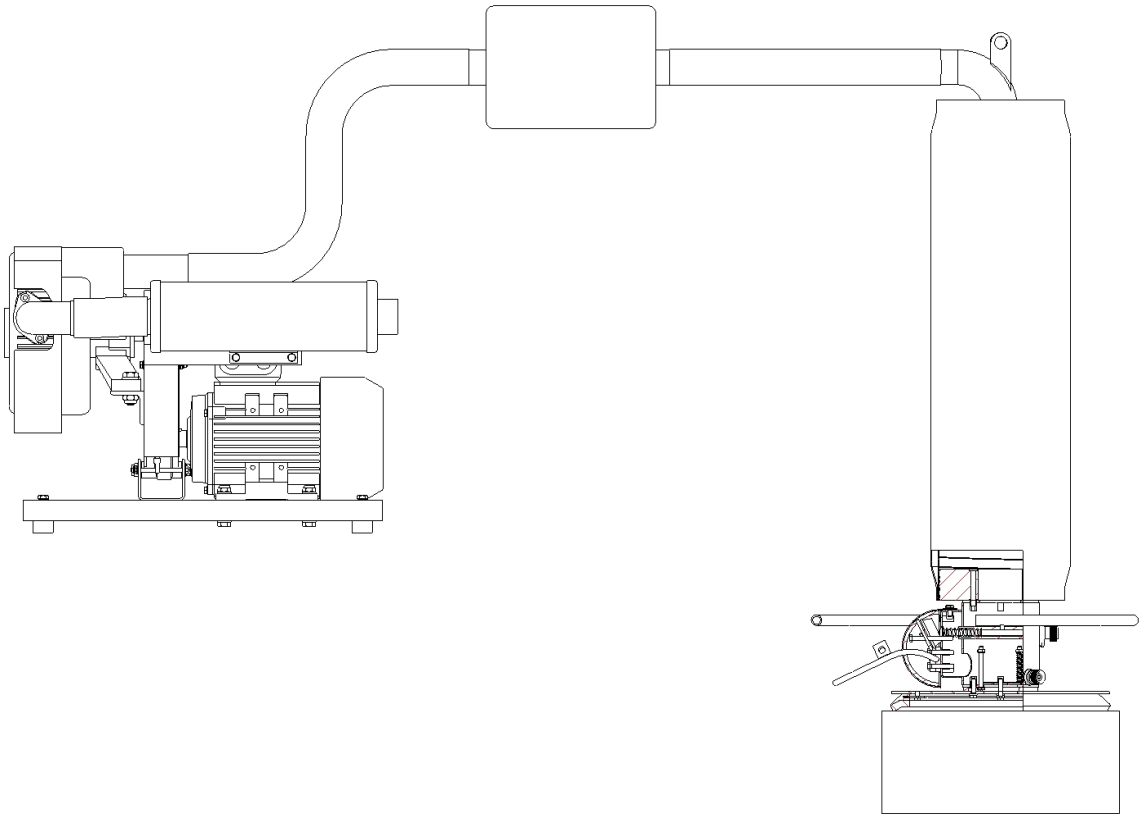


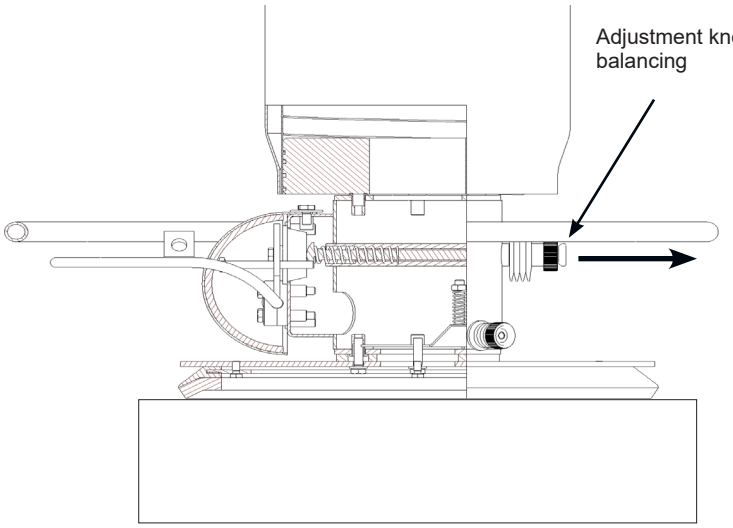
Turning the adjustment knob counterclockwise. The bottom valve is closed. The lifter is raised.

When the vacuum pump is running, a negative pressure is formed inside the lifting unit. In order to prevent the lifter tube from collapsing, air is bled in through a bottom valve. This air reduces the negative pressure in the lifter tube. The amount of bleed air is regulated by the knob for balancing without load.

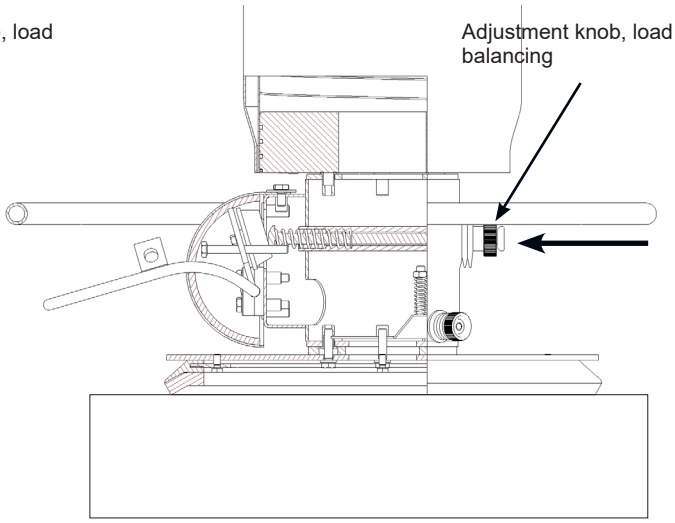
⚠ Warning! Never fully close the bottom valve adjustment knob when lifting porous materials. This can cause insufficient flow in the suction foot and there is a risk of its dropping or not being able to grip the load.

Balancing with load





Turning the adjustment knob counterclockwise. When the operating handle is closed, the lifter and the load are raised.

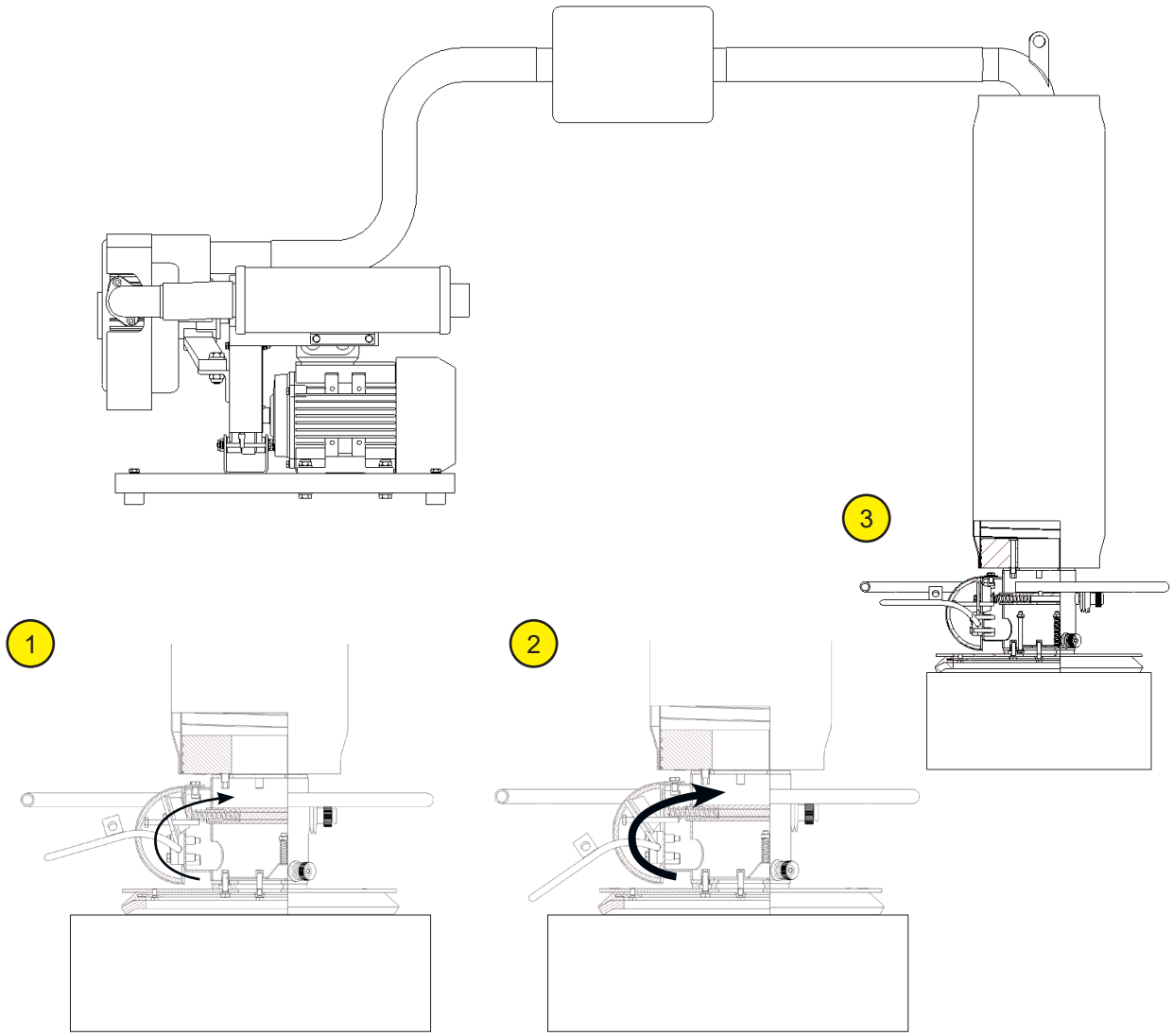


Turning the adjustment knob clockwise. When the operating handle is opened, the lifter and the load are lowered.

The load is adjusted to the preferred working height using the balance knob.

Set Vacuhand Pro balance to the average weight when lifting loads of varying weights.

Operating with load



When a load seals against the suction foot, air only enters Vacuhand Pro via the operating valve.

Operating handle in position 1:

The handle valve is partially open and the amount of air allowed into the lifting tube is controlled by the load balancing adjustment knob as described previously. **Used when moving a suspended load.** With the handle is in this position and the load balancing adjustment knob set properly the load should not move up and down on its own.

Note that the position of the operating handle is continuously variable between these three positions and small movements of the handle can be used to change the vacuum level to raise and lower the load in a controlled fashion.

Operating position 2:

The handle valve is wide open. In this position so much air flows in through the valve that the negative pressure is alleviated and a lowering movement takes place. **Used to lower the suction foot** to the object to begin a lift and to **release the suction foot** from the object after placement.

Operating handle in position 3:

The handle valve is fully closed. The negative pressure in the lifter tube is intensified and the tube contracts causing a lifting motion to take place. **Used to lift the object** after proper placement of the suction foot.

Maintenance

⚠ Attention!

In order to ensure safe equipment function and to preserve lifting capacity, follow the maintenance instructions. Remedy any faults detected in Vacuhand Pro immediately. Vacuhand Pro may not be used until the defects are remedied.

⚠ Warning! The equipment must be switched off prior to maintenance.

⚠ Caution! Only use original Vacuhand Pro parts for maintenance, repairs, or replacement.

Daily checks:

- Check the filter daily in dirty or dusty conditions. Shake out and vacuum clean the filter. Damaged filters or filters that cannot be cleaned must be replaced.
- Check that the sealing strip on the suction plate is in satisfactory condition. If necessary, clean the strip with water. A defective sealing strip must be replaced.
- Visually inspect various parts of the machine for damage, cracking, and corrosion.

⚠ Warning!

Damaged or extremely dirty filters can harm the pump. This may cause loads to be dropped and injure the operator and or others. If the air filter is not cleaned, lifting capacity will eventually be lost and there is a risk that the vacuum pump will run hot.

Weekly checks:

Test the check valve (located at the top of the lifter tube) to ensure that loads do not drop quickly if power to the vacuum pump is lost.

- Start the vacuum pump.
- Lift a smooth, non-porous load of around 22 lb (10 kg) and let it hang.
- Switch off the vacuum pump. The load should now sink slowly to the floor.

⚠ Warning!

Warning: Do not use Vacuhand Pro when load sinks quickly. Contact your dealer to determine appropriate repair.

- Inspect and assure that the filter is not clogged or damaged.
- Inspect and assure that the suction foot's rubber strip is not damaged.
- Inspect and assure that the lifter tube is not damaged.
- The lifter tube will stretch over time. Inspect and assure that the suction foot does not reach the floor. Shorten the lifter tube as necessary; refer to page 10, Cutting the lifter tube.

Quarterly checks:

- Inspect and assure that the suspension lug and the equipment Vacuhand Pro is suspended from is not damaged.

⚠ Warning!

Do not use Vacuhand Pro when there is damage to the lift. Contact your dealer to determine appropriate repair.

- Inspect and assure that the nuts and bolts in the suspension system are tightened and secured where applicable.

- Inspect and assure that the vacuum tube and lifter tube are airtight and are not chafed or crushed.

Troubleshooting

Fault	Possible causes	Action
Poor or no lifting power	The vacuum pump is not on?	Start the vacuum pump.
	The vacuum pump is not starting?	Check that that vacuum pump is not stuck. This can be caused by dirt, if the filter is not correctly cleaned. Contact your dealer for the manufacturer's recommended replacement component.
	The vacuum filter is clogged up?	Clean or replace the filter.
	Is the filter unit cover correctly installed?	Secure the cover correctly.
	The sealing strip of the suction plate is dirty/defective?	Clean or replace with a new sealing strip.
	Control handle damaged?	Contact your dealer for the manufacturer´s recommended replacement component.
	Leak in the vacuum system? Vacuum hoses?	Check that all hose connections for vacuum hoses are tight. Check that the vacuum hose is intact and does not leak. Repair temporarily with woven tape Part # 700PS618. Order new hose and replace the old one as soon the part arrives.
	Leak in the vacuum system? Lifting tube. The load raised very slowly and speed up with increased height.	Check the lifting tube ends that there are no damages and the tube is not crushed. Repair with woven tape part # 700PS618 if it is a small leakage. Otherwise cut or replace lifting tube.
	Leak in the vacuum system? Quick connection, suction foot, ...	Check that the quick-release coupling for tool changes is correctly fitted and that the sealing and O-ring are not damaged. Always replace both parts if any of them are damaged.
	Debris in the suction foot?	Clean and remove the debris from the suction foot.
	Is the load too heavy?	Check that the weight corresponds to Vacuhand Pro´s lifting capacity.
	Is the load too porous?	Check the porosity of the load with the supplier.
	Still no lifting power?	Contact your dealer for the manufacturer's recommended action to solve the problem.

Fault	Possible causes	Action
The load does not sink slowly in power outage test.	Check if the check valve is damaged or leaking?	Refer to Maintenance, Weekly checks (page 18)

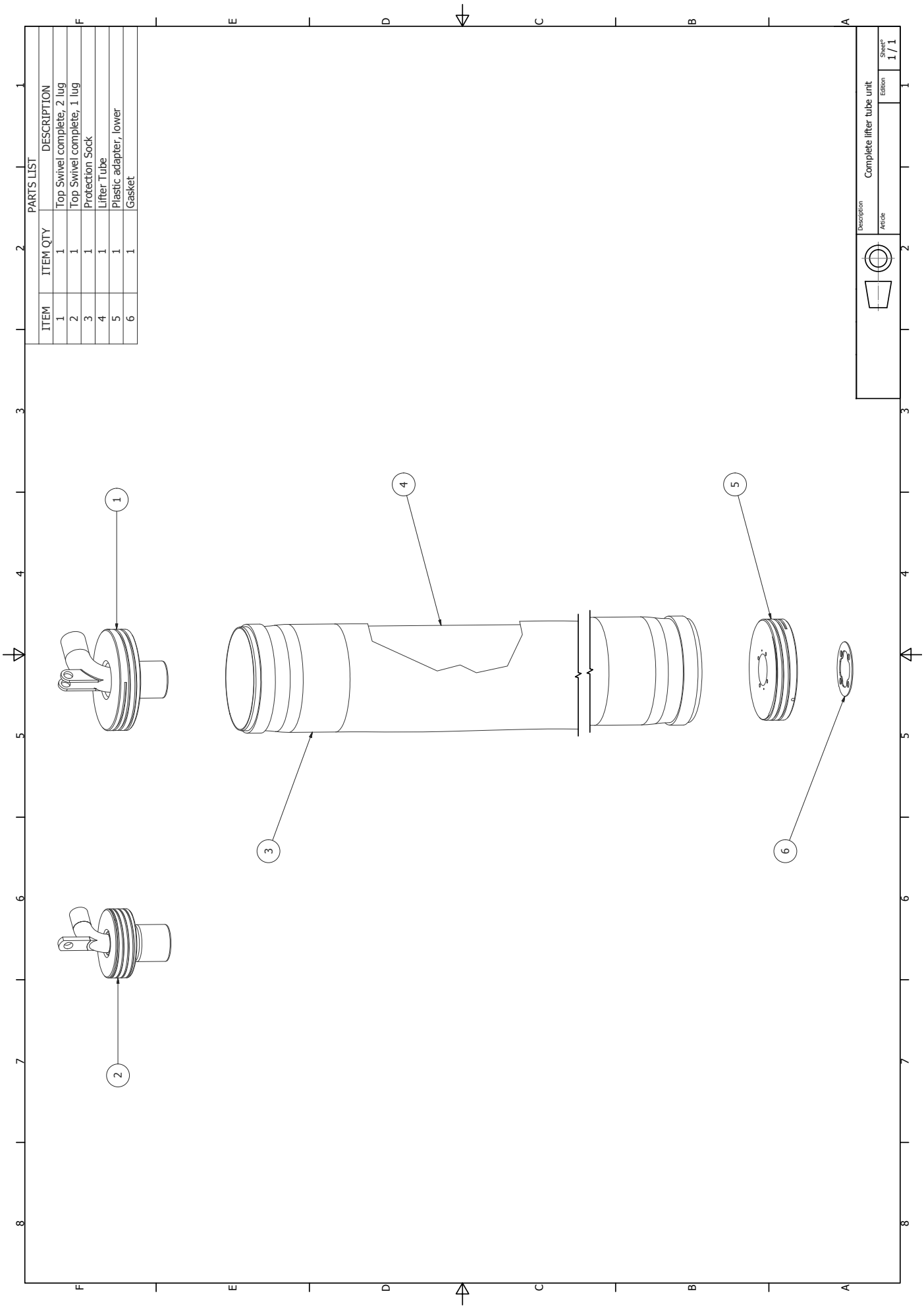
Fault	Possible causes	Action
Not possible to set desired balance level position for no load.	Check balancing knob without load?	Check for damage on knob or if its stuck. Contact your dealer for the manufacturer´s recommended replacement component.
	Check that no debris is lodged in the balance valve?	Check in bottom of the control unit by lifting in the bottom valve to visually see if there trash inside. If nothing visually seen remove the control unit from the lifter tube (see, “Cutting the lifter tube” page 10 and “Installing/re-installing the lifter tube” on page 11) Clean and remove trash.

Fault	Possible causes	Action
The vacuum pump will not start/rotate	Low oil level (hydraulic driven pump unit)?	Refill oil.
	Drive belt defective/incorrect belt tension?	Replace drive belt and/or adjust belt tension.
	Dirt/moisture in the vacuum pump?	Contact your dealer.
	Rupture in the hydraulic hose (hydraulik driven pump unit)?	Contact your dealer.

Fault	Possible causes	Action
Abnormal sound from the vacuum pump during normal operation (a whining sound is normal during operation).	Low hydraulic oil level (hydraulic driven pump units)? Incorrect belt tension?	Refill hydraulic oil. Adjust the belt tension.

If the fault remains after going through the points above, contact your dealer.

Spare parts


PARTS LIST
ITEM | ITEM QTY | DESCRIPTION
1 | 1 | Top Swivel complete, 2 lug
2 | 1 | Top Swivel complete, 1 lug
3 | 1 | Protection Sock
4 | 1 | Lifter Tube
5 | 1 | Plastic adapter, lower
6 | 1 | Gasket
Description
Complete lifter tube unit
Article
Edition
Sheet°
1 / 1

Complete lifter tube units

Part # Designation

Vacuum lifter, single lug suspension

640465-10 Lifter tube unit 140 Ø 5.51” (140 mm) std 1 lug 98.43” (2.5 m)
640475-10 Lifter tube unit 160 Ø 6.30” (160 mm) std 1 lug 98.43” (2.5 m)
640485-10 Lifter tube unit 180 Ø 7.09” (180 mm) std 1 lug 98.43” (2.5 m)
640495-10 Lifter tube unit 200 Ø 7.87” (200 mm) std 1 lug 98.43” (2.5 m)
640498-10 Lifter tube unit 230 Ø 9.06” (230 mm) std 1 lug 98.43” (2.5 m)
640505-10 Lifter tube unit 250 Ø 9.84” (250 mm) std 1 lug 98.43” (2.5 m)
640515-10 Lifter tube unit 300 Ø 11.8” (300 mm) std 1 lug 98.43” (2.5 m)

Vacuum lifter, twin lug suspension

640465-20 Lifter tube unit 140 Ø 5.51” (140 mm) std 2 lug 98.43” (2.5 m)
640475-20 Lifter tube unit 160 Ø 6.30” (160 mm) std 2 lug 98.43” (2.5 m)
640485-20 Lifter tube unit 180 Ø 7.09” (180 mm) std 2 lug 98.43” (2.5 m)
640495-20 Lifter tube unit 200 Ø 7.87” (200 mm) std 2 lug 98.43” (2.5 m)
640498-20 Lifter tube unit 230 Ø 9.06” (230 mm) std 2 lug 98.43” (2.5 m)
640505-20 Lifter tube unit 250 Ø 9.84” (250 mm) std 2 lug 98.43” (2.5 m)
640515-20 Lifter tube unit 300 Ø 11.8” (300 mm) std 2 lug 98.43” (2.5 m)

Vacuum lifter, single lug suspension, 3 m tube

640465-13 Lifter tube unit 140 Ø 5.51” (140 mm) std 1 lug 118.11” (3 m)
640475-13 Lifter tube unit 160 Ø 6.30” (160 mm) std 1 lug 118.11” (3 m)
640485-13 Lifter tube unit 180 Ø 7.09” (180 mm) std 1 lug 118.11” (3 m)
640495-13 Lifter tube unit 200 Ø 7.87” (200 mm) std 1 lug 118.11” (3 m)
640498-13 Lifter tube unit 230 Ø 9.06” (230 mm) std 1 lug 118.11” (3 m)
640505-13 Lifter tube unit 250 Ø 9.84” (250 mm) std 1 lug 118.11” (3 m)
640515-13 Lifter tube unit 300 Ø 11.8” (300 mm) std 1 lug 118.11” (3 m)

Vacuum lifter, twin lug suspension, 3 m tube

640465-23 Lifter tube unit 140 Ø 5.51” (140 mm) std 2 lug 118.11” (3 m)
640475-23 Lifter tube unit 160 Ø 6.30” (160 mm) std 2 lug 118.11” (3 m)
640485-23 Lifter tube unit 180 Ø 7.09” (180 mm) std 2 lug 118.11” (3 m)
640495-23 Lifter tube unit 200 Ø 7.87” (200 mm) std 2 lug 118.11” (3 m)
640498-23 Lifter tube unit 230 Ø 9.06” (230 mm) std 2 lug 118.11” (3 m)
640505-23 Lifter tube unit 250 Ø 9.84” (250 mm) std 2 lug 118.11” (3 m)
640515-23 Lifter tube unit 300 Ø 11.8” (300 mm) std 2 lug 118.11” (3 m)

Vacuum lifter, single lug suspension, 4 m tube

640465-14 Lifter tube unit 140 Ø 5.51” (140 mm) std 1 lug 157.48” (4 m)
640475-14 Lifter tube unit 160 Ø 6.30” (160 mm) std 1 lug 157.48” (4 m)
640485-14 Lifter tube unit 180 Ø 7.09” (180 mm) std 1 lug 157.48” (4 m)
640495-14 Lifter tube unit 200 Ø 7.87” (200 mm) std 1 lug 157.48” (4 m)
640498-14 Lifter tube unit 230 Ø 9.06” (230 mm) std 1 lug 157.48” (4 m)
640505-14 Lifter tube unit 250 Ø 9.84” (250 mm) std 1 lug 157.48” (4 m)
640515-14 Lifter tube unit 300 Ø 11.8” (300 mm) std 1 lug 157.48” (4 m)

Vacuum lifter, twin lug suspension, 4 m tube

640465-24 Lifter tube unit 140 Ø 5.51” (140 mm) std 2 lug 157.48” (4 m)
640475-24 Lifter tube unit 160 Ø 6.30” (160 mm) std 2 lug 157.48” (4 m)
640485-24 Lifter tube unit 180 Ø 7.09” (180 mm) std 2 lug 157.48” (4 m)
640495-24 Lifter tube unit 200 Ø 7.87” (200 mm) std 2 lug 157.48” (4 m)
640498-24 Lifter tube unit 230 Ø 9.06” (230 mm) std 2 lug 157.48” (4 m)
640505-24 Lifter tube unit 250 Ø 9.84” (250 mm) std 2 lug 157.48” (4 m)
640515-24 Lifter tube unit 300 Ø 11.8” (300 mm) std 2 lug 157.48” (4 m)

Lifter tubes

Part # Designation

Vacuum lifter 2.5 m

640461	Lifter tube 140 Ø 5.51” (140 mm) std 1 lug 98.43” (2.5 m)
640471	Lifter tube 160 Ø 6.30” (160 mm) std 1 lug 98.43” (2.5 m)
640481	Lifter tube 180 Ø 7.09” (180 mm) std 1 lug 98.43” (2.5 m)
640491	Lifter tube 200 Ø 7.87” (200 mm) std 1 lug 98.43” (2.5 m)
640499	Lifter tube 230 Ø 9.06” (230 mm) std 1 lug 98.43” (2.5 m)
640504	Lifter tube 250 Ø 9.84” (250 mm) std 1 lug 98.43” (2.5 m)
640514	Lifter tube 300 Ø 11.8” (300 mm) std 1 lug 98.43” (2.5 m)

Vacuum lifter 3 m

640461-03	Lifter tube 140 Ø 5.51” (140 mm) std 2 lug 118.11” (3 m)
640471-03	Lifter tube 160 Ø 6.30” (160 mm) std 2 lug 118.11” (3 m)
640481-03	Lifter tube 180 Ø 7.09” (180 mm) std 2 lug 118.11” (3 m)
640491-03	Lifter tube 200 Ø 7.87” (200 mm) std 2 lug 118.11” (3 m)
640499-03	Lifter tube 230 Ø 9.06” (230 mm) std 2 lug 118.11” (3 m)
640504-03	Lifter tube 250 Ø 9.84” (250 mm) std 2 lug 118.11” (3 m)
640514-03	Lifter tube 300 Ø 11.8” (300 mm) std 2 lug 118.11” (3 m)

Vacuum lifter 4 m

640461-04	Lifter tube 140 Ø 5.51” (140 mm) std 2 lug 157.48” (4 m)
640471-04	Lifter tube 160 Ø 6.30” (160 mm) std 2 lug 157.48” (4 m)
640481-04	Lifter tube 180 Ø 7.09” (180 mm) std 2 lug 157.48” (4 m)
640491-04	Lifter tube 200 Ø 7.87” (200 mm) std 2 lug 157.48” (4 m)
640499-04	Lifter tube 230 Ø 9.06” (230 mm) std 2 lug 157.48” (4 m)
640504-04	Lifter tube 250 Ø 9.84” (250 mm) std 2 lug 157.48” (4 m)
640514-04	Lifter tube 300 Ø 11.8” (300 mm) std 2 lug 157.48” (4 m)

Protection sock

Part # Designation

Vacuum lifter 2,5 m, black with logo

6040464	Protection sock, 140 Ø 5.51” (140 mm) 98.43” (2.5 m)
6050465	Protection sock, 160 Ø 6.30” (160 mm) 98.43” (2.5 m)
6050466	Protection sock, 180 Ø 7.09” (180 mm) 98.43” (2.5 m)
6050467	Protection sock, 200 Ø 7.87” (200 mm) 98.43” (2.5 m)
6050469	Protection sock, 230 Ø 9.06” (230 mm) 98.43” (2.5 m)
6050470	Protection sock, 250 Ø 9.84” (250 mm) 98.43” (2.5 m)
6050471	Protection sock, 300 Ø 11.8” (300 mm) 98.43” (2.5 m)

Vacuum lifter, black

640580-143	Protection sock, 140 Ø 5.51” (140 mm) 118.11” (3 m)
640580-163	Protection sock, 160 Ø 6.30” (160 mm) 118.11” (3 m)
640580-183	Protection sock, 180 Ø 7.09” (180 mm) 118.11” (3 m)
640580-203	Protection sock, 200 Ø 7.87” (200 mm) 118.11” (3 m)
640580-233	Protection sock, 230 Ø 9.06” (230 mm) 118.11” (3 m)
640580-253	Protection sock, 250 Ø 9.84” (250 mm) 118.11” (3 m)
640580-303	Protection sock, 300 Ø 11.8” (300 mm) 118.11” (3 m)

Vacuum lifter, black

640580-144	Protection sock, 140 Ø 5.51” (140 mm) 157.48” (4 m)
640580-164	Protection sock, 160 Ø 6.30” (160 mm) 157.48” (4 m)
640580-184	Protection sock, 180 Ø 7.09” (180 mm) 157.48” (4 m)
640580-204	Protection sock, 200 Ø 7.87” (200 mm) 157.48” (4 m)
640580-234	Protection sock, 230 Ø 9.06” (230 mm) 157.48” (4 m)
640580-254	Protection sock, 250 Ø 9.84” (250 mm) 157.48” (4 m)
640580-304	Protection sock, 300 Ø 11.8” (300 mm) 157.48” (4 m)

Plastic adapters

Part #	Designation
Plastic adapter, upper	
640346	Plastic adapter 140 Ø 5.51” (140 mm) upper
640347	Plastic adapter 160 Ø 6.30” (160 mm) upper
640348	Plastic adapter 180 Ø 7.09” (180 mm) upper
640349	Plastic adapter 200 Ø 7.87” (200 mm) upper
640350	Plastic adapter 230 Ø 9.06” (230 mm) upper
640351	Plastic adapter 250 Ø 9.84” (250 mm) upper
640352	Plastic adapter 300 Ø 11.8” (300 mm) upper
Plastic adapter, lower	
640366	Plastic adapter 140 Ø 5.51” (140 mm) lower
640367	Plastic adapter 160 Ø 6.30” (160 mm) lower
640368	Plastic adapter 180 Ø 7.09” (180 mm) lower
640369	Plastic adapter 200 Ø 7.87” (200 mm) lower
640370	Plastic adapter 230 Ø 9.06” (230 mm) lower
640371	Plastic adapter 250 Ø 9.84” (250 mm) lower
640372	Plastic adapter 300 Ø 11.8” (300 mm) lower

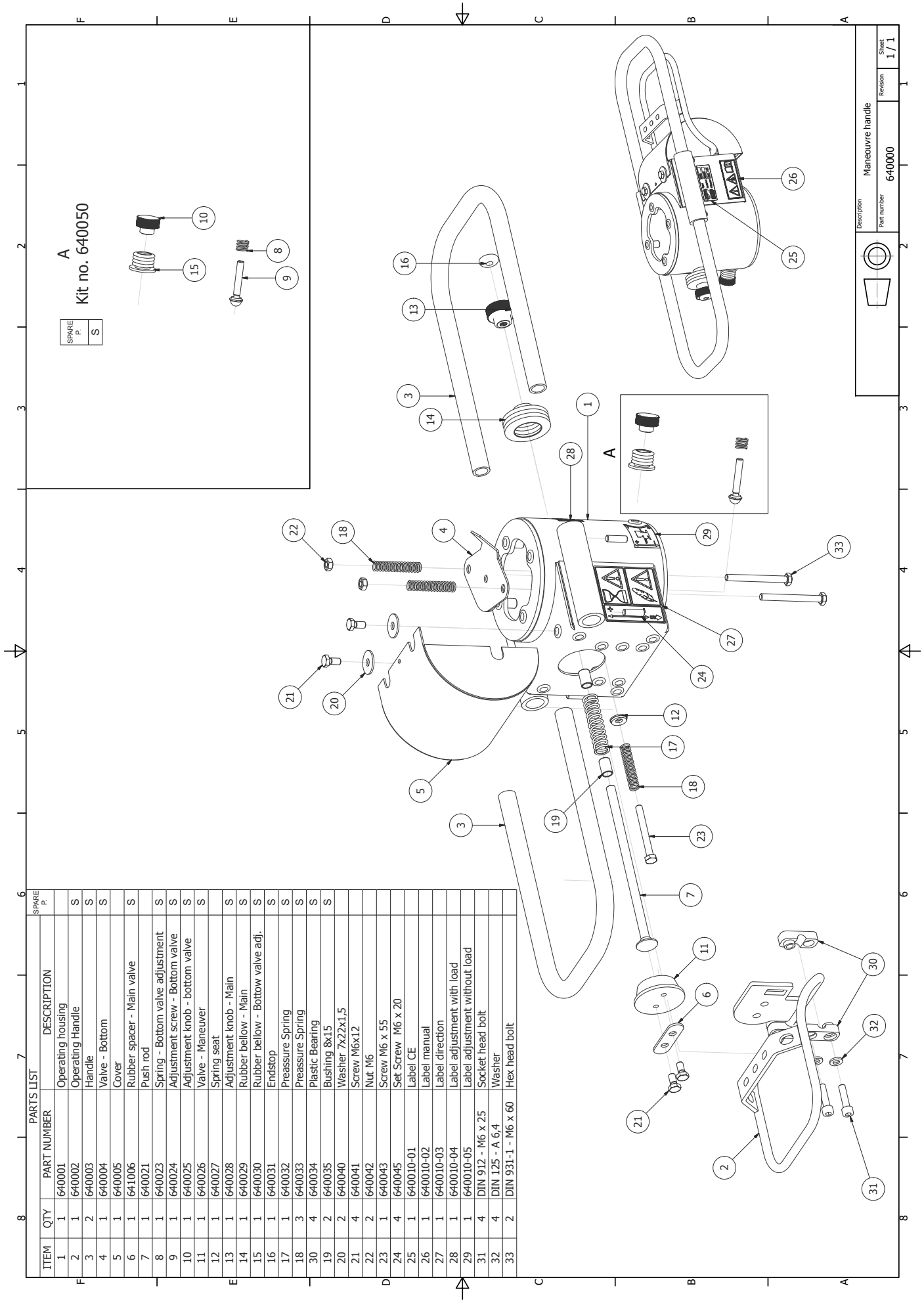
Swivels, complete

Part #	Designation
Swivel, top. 1 lug, complete	
640320-10	Swivel 140 Ø 5.51” (140 mm) 1 lug omplete
640321-10	Swivel 160 Ø 6.30” (160 mm) 1 lug complete
640322-10	Swivel 180 Ø 7.09” (180 mm) 1 lug complete
640323-10	Swivel 200 Ø 7.87” (200 mm) 1 lug complete
640324-10	Swivel 230 Ø 9.06” (230 mm) 1 lug complete
640325-10	Swivel 250 Ø 9.84” (250 mm) 1 lug complete
640326-10	Swivel 300 Ø 11.8” (300 mm) 1 lug complete
Swivel, top. 2 lug, complete	
640320-20	Swivel 140 Ø 5.51” (140 mm) 1 lug complete
640321-20	Swivel 160 Ø 6.30” (160 mm) 1 lug complete
640322-20	Swivel 180 Ø 7.09” (180 mm) 1 lug complete
640323-20	Swivel 200 Ø 7.87” (200 mm) 1 lug complete
640324-20	Swivel 230 Ø 9.06” (230 mm) 1 lug complete
640325-20	Swivel 250 Ø 9.84” (250 mm) 1 lug complete
640326-20	Swivel 300 Ø 11.8” (300 mm) 1 lug complete

Gasket

Part #	Designation
641003	Gasket

Drawings



PARTS LIST

ITEM	QTY	PART NUMBER	DESCRIPTION	SPARE P:
1	1	640001	Operating housing	
2	1	640002	Operating Handle	S
3	2	640003	Handle	S
4	1	640004	Valve - Bottom	S
5	1	640005	Cover	
6	1	641006	Rubber spacer - Main valve	S
7	1	640021	Push rod	
8	1	640023	Spring - Bottom valve adjustment	S
9	1	640024	Adjustment screw - Bottom valve	S
10	1	640025	Adjustment knob - bottom valve	S
11	1	640026	Valve - Maneuver	S
12	1	640027	Spring seat	
13	1	640028	Adjustment knob - Main	S
14	1	640029	Rubber bellow - Main	S
15	1	640030	Rubber bellow - Bottow valve adj.	S
16	1	640031	Endstop	S
17	1	640032	Preassure Spring	S
18	3	640033	Preassure Spring	S
19	4	640034	Plastic Bearing	S
20	2	640035	Bushing 8x15	S
21	4	640040	Washer 7x22x1,5	
22	2	640041	Screw M6x12	
23	1	640042	Nut M6	
24	4	640043	Screw M6 x 55	
25	1	640045	Set Screw M6 x 20	
26	1	640010-01	Label CE	
27	1	640010-02	Label manual	
28	1	640010-03	Label direction	
29	1	640010-04	Label adjustment with load	
31	4	640010-05	Label adjustment without load	
32	4	DIN 912 - M6 x 25	Socket head bolt	
33	2	DIN 125 - A 6,4	Washer	
		DIN 931-1 - M6 x 60	Hex head bolt	

EC declaration of conformity of the machinery

TRANSLATION
(according to 2006/42/EG, annex 2A)

Manufacturer
RonI, Inc
8001 Tower Point Drive
Charlotte, NC 28227
USA

Local Tel: +704-847-2464
Toll Free Tel: +866-543-8635
Fax: +866-543-9532
E-mail: +Info@RonI.com
Web: +www.RonI.com

Representative for documentation
Krister Johnsson
Movomech AB

hereby declares that the machinery

Designation
Vacuhand Pro

Machine type
Vacuum lifter

Version
140/160/180/200 (F) Pump BE 2,2 kW
140/160/180/200/230/250/300 (G) Pump BE 4,0 kW
180/200/230/250/300 (H) Pump BE 7,0 kW

and that standards and/or technical specifications as described below are applied

☒ **Machinery Directive 2006/42/EC**

☒ **EMC Directive 2014/30/EU**

☒ **Low Voltage Directive 2014/35/EU**

and that standards and/or technical specifications as described below are applied.

☒ **Machinery Directive**
SS-EN-ISO 12100:2010
SS-EN 14238:2004 + A1:2009

☒ **EMC Directive**

☒ **Low Voltage Directive**
IEC 60204-32
IEC 60204-1

Place: Kristianstad **Date:** 2021-01-01

Krister Johnsson, Managing Director
Movomech AB

LIFT-O-FLEX
MOBI-Crane | movomech | Voyager

Vacuum Pump

Table of Contents

1 Safety

Prior to handling the machine, this instruction manual should be read and understood.

Read this manual carefully before use and keep for future reference.

This instruction manual remains valid as long as the customer does not change anything on the product.

The machine is intended for industrial use. It must be handled only by technically trained personnel.

Always wear appropriate personal protective equipment in accordance with the local regulations.

The machine has been designed and manufactured according to state-of-the-art methods. Nevertheless, residual risks may remain. This instruction manual highlights potential hazards where appropriate. Safety notes and warning messages are tagged with one of the keywords DANGER, WARNING, CAUTION, as follows:

DANGER

... indicates an imminent dangerous situation that will result in death or serious injuries if not prevented.

WARNING

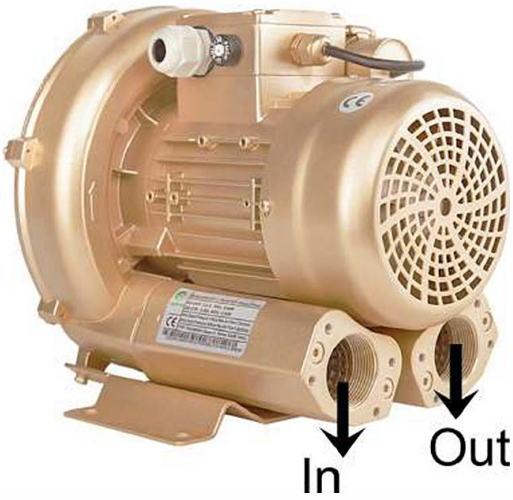
... indicates a potentially dangerous situation that could result in death or serious injuries.

CAUTION

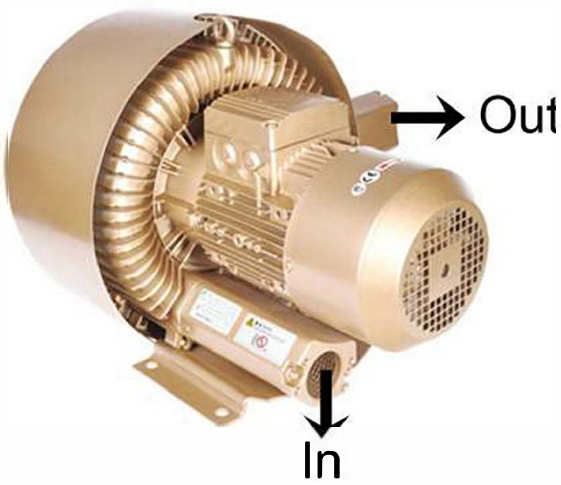
... indicates a potentially dangerous situation that could result in minor injuries.

2 Product Description

Single-stage



Double- stage



IN Suction connection

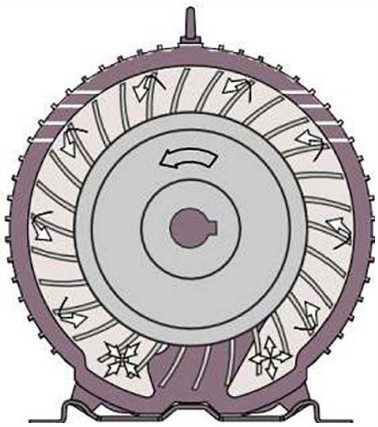
OUT Discharge connection

NOTE

Technical term.

In this instruction manual, we consider that the term 'machine' refers to the 'side channel blower.

2.1 Operating Principle



The machine works on the impulse principle, i.e. Kinetic energy is transferred from the impeller to the conveyed medium and then is converted into pressure.

The change in pressure is made without the use of any lubrication whatsoever.

NOTICE

Lubricating a dry running machine (process chamber).

Risk of damage to the machine!

- Do not lubricate the process chamber of the machine with oil or grease.

2.2 Application

The machine is intended for the suction and/or compression of air and other dry, non-aggressive, non-toxic, non-flammable and non-explosive gases.

Conveying of other media leads to an increased thermal and/or mechanical load on the machine and is permissible only after a consultation.

The machine is intended for the placement in a non-potentially explosive environment.

The machine is not capable of maintaining ultimate pressure. The minimum allowed ulti- mate pressure is to be read from the nameplate of the machine.

By means of process control and/or vacuum relief valves it must be made sure that the minimum allowed ulti- mate pressure will not be under run.

Permitted environmental conditions, see Technical Data [▶ 16].

2.3 Optional Accessories

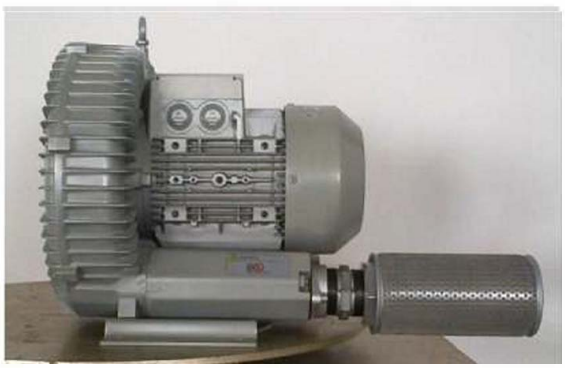
2.3.1 Pressure relief Valve

The pressure relief valve controls inlet pressure when the machine is used on vacuum duties.

The pressure regulating valve controls pressure when the machine is used on overpressure duties.

2.3.2 Inlet Filter

The inlet filter protects the machine against dust and other solids in the process gas. The inlet filter is available with a cartridge.

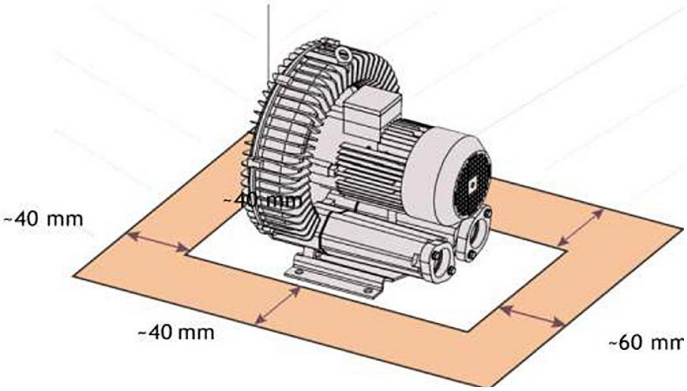


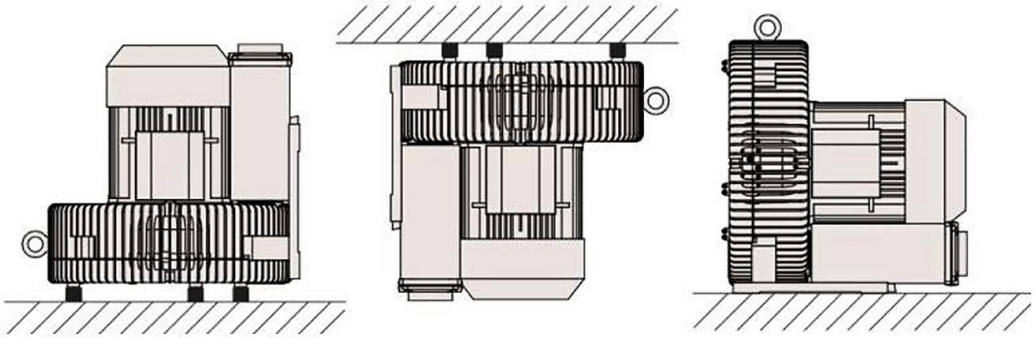
2.3.3 Silencer

A silencer at the discharge connection (OUT) can be provided to reduce the exhaust gas noise.

3 Installation

3.1 Installation Conditions





- Make sure that the environment of the machine is not potentially explosive.
- Make sure that the ambient conditions comply with the Technical Data [▶ 16].
- Make sure that the environmental conditions comply with the protection class of the motor.
- Make sure that the installation space or location is vented such that sufficient cooling of the machine is provided.
- Make sure that cooling air inlets and outlets are not covered or obstructed and that the cooling air flow is not affected adversely in any other way.
- Make sure that the machine is placed or mounted horizontally/vertically, with a maximum deviation of 1° in any direction.
- Make sure that the machine is placed or mounted horizontally on a flat surface.
- Make sure that all provided covers, guards, hoods, etc. are mounted.

If the machine is installed at an altitude greater than 1000 meters above sea level:

- Contact your sales representative, the motor should be derated or the ambient temperature limited.

If the machine is installed outdoor:

- Provide a protective cover against the weathering effects.

3.2 Connecting Lines / Pipes

- Remove all protective caps beforeinstallation.
- Make sure that theconnection lines cause no stress on the machine's connection; if necessary use flexible joints.
- Make sure that the line size of the connection lines over the entire length is at least as large as the connections of themachine.

In case of very long connection lines it is advisable to use larger line sizes in order to avoid a loss of efficiency. Seek advice from your sales representative.

3.2.1 Suction Connection

NOTICE

Intruding foreign objects or liquids.

Risk of damage to the machine!

If the inlet gas contains dust or other foreign solid particles:

- Install a suitable filter (5 micron or less) upstream from the machine.

3.2.2 Discharge Connection

Depending on the specific order, other connection dimensions may apply.

- Make sure that the discharged gas will flow without obstruction. Do not shut off or throttle the discharge line.

3.3 Electrical Connection

DANGER

Live wires.

Risk of electrical shock.

- Electrical installation work must only be executed by qualified personnel.

- Make sure that the power supply for the motor is compatible with the data on the nameplate of the motor.
- Provide overload protection according to EN 60204-1 for the motor.
- Make sure that themotor of the machine will not be affected by electric or electro-magnetic disturbance from the mains; if necessary seek advice from your sales representative.
- Connect the protective earth conductor.
- Electrically connect the motor.

NOTICE

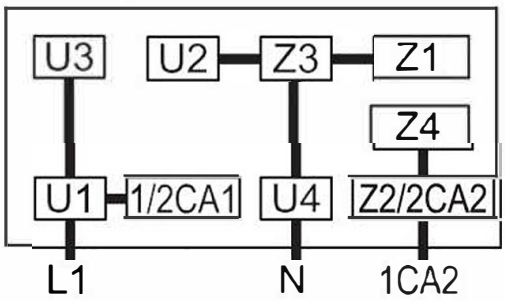
Incorrect connection.

Risk of damage to the motor!

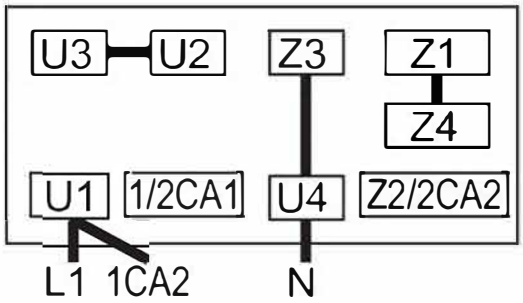
- The wiring diagrams given below are typical. Check the inside of the terminal box for motor connection instructions/diagrams.

3.3.1 Wiring Diagram Single-Phase Motor

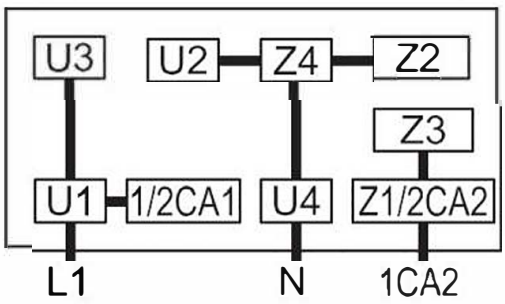
Low voltage:



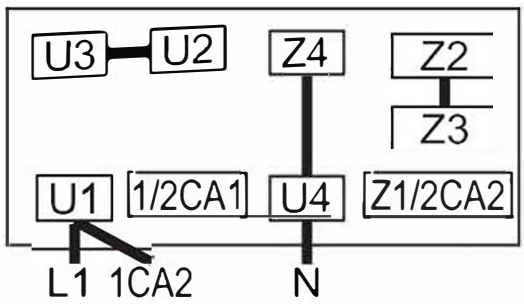
High voltage:



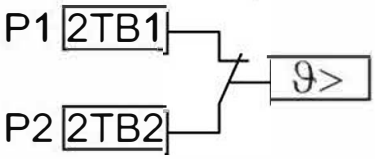
Low voltage (with motor protection):



High voltage (with motor protection):



Connection motor protection:



3.3.2 Wiring Diagram Three-Phase Motor

NOTICE

Incorrect direction of rotation.

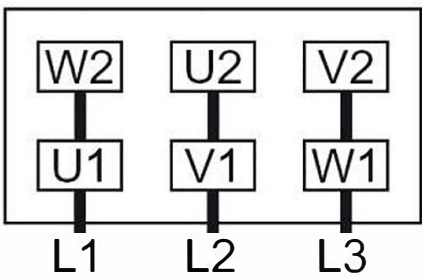
Risk of damage to the machine!

- Operation in the wrong direction of rotation can destroy the machine in a short time! Prior to start-up, ensure that the machine is operated in the right direction.

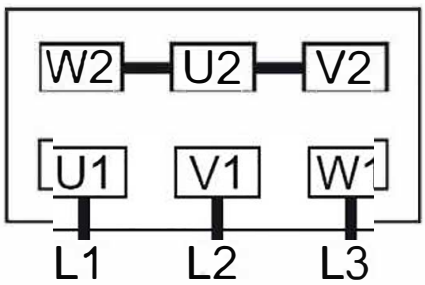
If the rotation of the motor must be changed:

- Switch any two of the motor phase wires.

Delta connection (low voltage):



Star connection (high voltage):



4 Commissioning

NOTICE

Lubricating a dry running machine (process chamber).

Risk of damage to the machine!

- Do not lubricate the process chamber of the machine with oil or grease.

CAUTION

During operation the surface of the machine may reach temperatures of more than 70°C.

Risk of burns!

- Avoid contact with the machine during and directly after operation.

CAUTION

Noise of running machine.

Risk of damage to hearing!

If persons are present in the vicinity of a non noise insulated machine over extended periods:

- Make sure that ear protection is being used.

- Make sure that the installation conditions (see Installation Conditions [▶ 7]) are complied with.
- Switch on the machine.
- Make sure that the maximum permissible number of starts does not exceed 6 starts per hour.
- Make sure the working/pause periods are equal with multiple starts per hour.

As soon as the machine is operated under normal operating conditions:

- Measure the motor current and record it as reference for future maintenance and trouble shooting work.

5 Maintenance

WARNING

Machines contaminated with hazardous material.

Risk of poisoning!

Risk of infection!

If the machine is contaminated with hazardous material:

- Wear appropriate personal protective equipment.

CAUTION

Hot surface.

Risk of burns!

- Prior to any action requiring touching the machine, let the machine cool down first.

- Shut down the machine and lock against inadvertent start up.
- Vent the connected lines to atmospheric pressure.

If necessary:

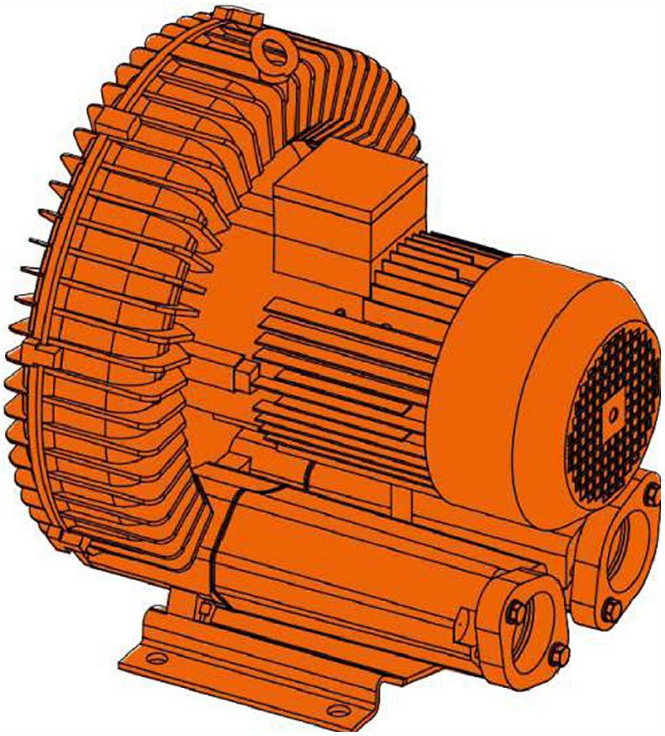
- Disconnect all connections.

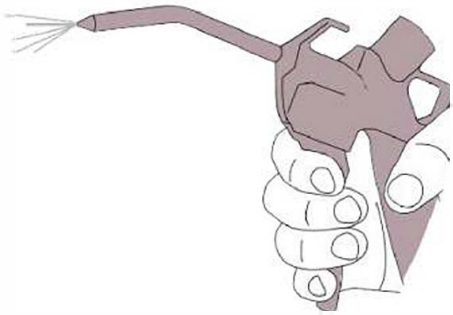
5.1 Maintenance Schedule

The maintenance intervals depend very much on the individual operating conditions. The intervals given below are desired to be considered as starting values which should be shortened or extended as appropriate. Particularly heavy duty operation, such as high dust loads in the environment or in the process gas, other contamination or ingress of processmaterial, can make it necessary to shorten themaintenance intervals significantly.

Interval	Maintenance work
Monthly	• Clean the machine from dust and dirt. in case of an inlet filter being installed: • Check the inlet filter cartridge, replace if necessary.
Every 6 months	• Clean the machine from dust and dirt. • Make sure that the electronic components and the cooling fan are free from dust.
Yearly	• Carry out a visual inspection and clean the machine from dust and dirt. • Check the electrical connections and the monitoring devices. • Clean the inlet and outlet silencer.
Every 5 years	• Have a major overhaul on the machine (contact your sales representative).

5.2 Cleaning from Dust and Dirt





Clean the ventilation grilles and cooling fins

6.Overhaul

NOTICE

Improper assembly.

Risk of premature failure!

Loss of efficiency!

- It is highly recommended that any dismantling of the machine that goes beyond any-thing that is described in this manual should be done by the manufacturer.

WARNING

Machines contaminated with hazardous material.

Risk of poisoning!

Risk of infection!

If the machine is contaminated with hazardous material:

- Wear appropriate personal protective equipment.

In case of the machine having conveyed gas that was contaminated with foreign materials which are dangerous to health:

- Decontaminate the machine as well as possible and state the contamination status in a 'Declaration of Contamination'.

7 Decommissioning

- Shut down the machine and lock against inadvertent start up.
- Vent the connected lines to atmospheric pressure.
- Disconnect all connections.

If the machine is going to be stored:

- See Storage [▶ 6].

7.1 Dismantling and Disposal

- Separate special waste from the machine.
- Dispose of special waste in compliance with applicable regulations.
- Dispose of the machine as scrap metal.

8 Spare Parts

NOTICE

Use of non-manufacturer genuine spare parts. **Risk of premature failure!**

Loss of efficiency!

- The exclusive use of genuine spare parts and consumables is recommended for the proper function of the machine and for granting of warranty.

Commercially available standard parts are to be purchased on the open market.

If other parts are required:

- Contact your sales representative for the detailed spare parts and accessory list.

9.Troubleshooting

DANGER

Live wires.

Risk of electrical shock.

- Electrical installation work must only be executed by qualified personnel.

CAUTION

Hot surface.

Risk of burns!

- Prior to any action requiring touching the machine, let the machine cool down first.

Problem	Possible cause	Remedy
The machine does not start.	At least two power supply leads are interrupted	• Check the fuses, terminals and power supply cables
	The motor is not supplied with the correct voltage.	• Check the power supply.
	The motor is defective.	• Repair the machine (contact us).
The machine does not start; humming noise.	One power supply lead is interrupted	• Check the fuses, terminals and power supply cables
	Impeller defective	• Replace impeller
	Impeller is jammed	• Open the cover, remove foreign body and clean.
		• Check the impeller gap.
	Bearing on motor side machine side is defective	• Replace defective bearing.
Motor protective switch trips when starting the machine. Power consumption is too high.	Winding short-circuit	• Check the winding.
	Motor overloaded.	• Reduce throttling.
	Throttling does not match specification on rating plate	• Clean filters, mufflers and connecting pipes.
	Compressor is jammed.	• See The machine does not start; humming noises [▶ 14].
The machine runs very noisily.	The machine runs in the wrong direction	• Check the direction of rotation.
	Bearings lacking grease	• Relubricate or replace if necessary.
	Defective bearings.	• Repair the machine (contact us).
The machine runs with abnormal flow noises.	The flow speed is too high	• Use larger sized pipes.
	The silencers are soiled.	• Check silencer inserts, cleanor replaceif necessary.

The machine does not reach the usual pressure on the suction connection.	Suction or discharge lines too long or section diameter too small.	• Use larger diameter or shorter lines. • Seek advice from your local sales representative.
	The machine runs in the wrong direction.	• Check the direction of rotation, see Wiring Diagram Three-Phase Motor
	Different density of conveyed medium	• Take conversion of pressure value into account. Contact us if neces sary.
	Change in blade profile due soiling.	• Check the impeller, clean or replace if necessary.
	In case an inlet screen is installed: The inlet screen is partially clogged.	• Clean the inlet screen.
	In case a vacuum relief valve is installed: The vacuum relief valve is misadjusted or defective.	• Replace the vacuum relief valve.
	In case an inlet filter valve is installed: The inlet filter cartridge is partially clogged.	• Replace the inlet filter cartridge.
	Leak in the system.	• Repair leak.
	Internal parts are worn or damaged.	• Repair the machine (contact us).
The machine runs too hot.	Insufficient cooling.	• Remove dust and dirt from the machine.
	Ambient temperature too high.	• Observe the permitted ambient temperature.
Compressor leaky.	Seals on silencer defective.	• Check silencer seals and replace if necessary
	Seals in motor area defective.	• Check motor seals and replace if necessary

For the solution of problems not mentioned in the troubleshooting chart contact your sales representative.